



## **RECOMPACTED SOIL BARRIER PREQUALIFICATION REPORT**

### **FINAL CLOSURE CONSTRUCTION CENTRAL WASTE DISPOSAL FACILITY MAHONING COUNTY, OHIO**

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**CEC Project 153-121.0002**

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## TABLE OF CONTENTS

	<u>Page</u>
1.0 INTRODUCTION.....	1
2.0 SOIL TESTING REQUIREMENTS .....	1
3.0 SAMPLE COLLECTION.....	2
4.0 LABORATORY TEST RESULTS .....	2
5.0 BEST FIT LINE OF OPTIMUMS.....	6
6.0 CONCLUSIONS.....	7

## FIGURES

- Figure 1 – Test Pit Location Map
- Figure 2 – Optimum Moisture Content vs. Liquid Limit
- Figure 3 – Maximum Dry Density vs. Liquid Limit
- Figure 4 – Proctor Data vs. Saturation
- Figure 5 – Best Fit Line of Optimums Equation
- Figure 6 – Best Fit Line of Optimums

## TABLES

- Table 1 – Laboratory Data Results Summary
- Table 2 – Required In-situ Moisture Content and Dry Density

## APPENDICES

- Appendix A – Soils Laboratory Test Results

## **RECOMPACTED SOIL BARRIER PREQUALIFICATION REPORT FINAL CLOSURE CONSTRUCTION CENTRAL WASTE DISPOSAL FACILITY**

### **1.0 INTRODUCTION**

The Central Waste Disposal Facility is located in Alliance, Mahoning County, Ohio. Civil & Environmental Consultants, Inc. (CEC) performed prequalification sampling and testing of in-situ soil which is proposed for use as recompacted soil barrier (RSB) in the construction of the Final Closure Construction. The soils sampled are from Borrow Area C located southwest of the landfill. Prequalification testing was performed in accordance with the Construction Quality Assurance/Quality Control (CQA/QC) Plan and Ohio EPA Guidance Document No. 665 for use of the Best Fit Line of Optimums (BFLO).

Approximately 47 acres of RSB will be required for the Final Closure of the Central Waste Disposal Facility. The volume of the 18-inch thick RSB required is approximately 113,740 cubic yards (cy). Incorporating a 10 percent factor for the excavation of in-situ materials, the required RSB volume is approximately 125,114 cy. This soils prequalification report will prequalify 66,000 cy of RSB material.

This soil prequalification report proposes to approve soils with a minimum clay content (particles smaller than 0.002 mm) of 11 percent. The RSB will be compacted using BFLO compaction criteria and the construction specifications in accordance with the Test Pad No. 2 (1993) and No. 3 (1994). The soils used in the test pad are consistent with the proposed BFLO.

### **2.0 SOIL TESTING REQUIREMENTS**

OAC 3745-27-08(D) and the CQA/QC Plan require that prior to utilizing soils to construct the RSB, the following testing must be performed to demonstrate that the soil material is suitable for use to construct the RSB. Testing of specific gravity is required because the BFLO is used.

TEST	FREQUENCY
Moisture content/density relationship	1 test per 1,500 cubic yards
Grain size distribution	1 test per 1,500 cubic yards
Atterberg limits	1 test per 1,500 cubic yards
Specific Gravity	1 test per 1,500 cubic yards
Remolded permeability at construction specifications	1 test per 10,000 cubic yards

Because the BFLO is being used for compaction testing of the RSB, half of the samples were tested for a modified Proctor and half of the samples were tested for a standard Proctor moisture/density relationship. Six samples were tested for both modified and standard proctor moisture density relationship based on a frequency of one test per 12,000 cubic yards.

### **3.0 SAMPLE COLLECTION**

Within the Borrow Area C, test pits were excavated in an approximate 100 foot grid and soil samples were collected at 4-foot depth intervals providing a frequency of approximately 1 sample per 1,481 cubic yards, which meets the required minimum frequency of 1 sample per 1,500 cubic yards. The sample locations are depicted on Figure 1. All samples were collected from the brown clay at depths below the topsoil of 0 to 4 ft and 4 ft to 8 feet. Forty-four samples were tested for prequalification testing, representing approximately 66,000 cubic yards.

Remolded permeability testing was performed on a total of seven samples resulting in a test frequency greater than the required minimum of 1 test per 10,000 cubic yards.

### **4.0 LABORATORY TEST RESULTS**

Laboratory soil sample testing was performed by Geotechnics in East Pittsburgh, Pennsylvania and Geotechnical Testing Services, Inc. in Coraopolis, Pennsylvania. Geotechnical laboratory testing includes grain size analysis, Atterberg limits, soil classification, specific gravity, standard and modified Proctor moisture/density relationship, and remolded permeability. Geotechnical laboratory

data is included in Appendix B and summarized in Table 1. The laboratory test results are discussed below.

### Grain Size Analysis

In accordance with the RSB gradation requirements in the CQA/QC Plan, the minimum clay content requirement is 11.0 percent. Grain-size analysis including sieve analysis and hydrometer were performed using ASTM D422. The results of the grain-size distribution indicate the following.

- The percent passing the 2-inch sieve was 100.0 percent for all samples except four samples with a minimum percent passing of 98.9 percent.
- The percent passing the 0.75-inch sieve was a minimum of 96.1 percent, maximum of 100.0 percent and an average of 99.2 percent. All samples met the requirement of at least 90 percent passing the 0.75-inch sieve.
- The percent passing the No. 200 sieve was a minimum of 50.7 percent, maximum of 93.3 percent and an average of 81.6 percent. All samples met the requirement of at least 50 percent passing the No. 200 sieve.
- The percent smaller than 0.002 mm was a minimum of 11.1 percent, maximum of 42.5 percent and an average of 27.6 percent. All samples met the requirement of at least 11 percent smaller than 0.002 mm.

Based on the results of grain size distribution, all samples are considered acceptable for use as RSB. The Contractor and CQA technicians will observe the soils during the RSB placement for particles greater than 2-inch diameter. Particles greater than 2-inch diameter will be removed by the Contractor.

## Soil Classification

Soils were classified using ASTM D2487 and the soil consistency was determined using Atterberg limits (ASTM D4318). The samples are classified as having a Unified Soil Classification System (USCS) symbol of CL or CL-ML.

The samples being prequalified have liquid limits between 22 and 45 percent with an average of 32 percent. The plasticity index ranges between 6 and 23 percent with an average of 15 percent. The USCS soil classification and Atterberg limit results indicate that the material is of low permeability.

## Specific Gravity Testing

Specific gravity testing was performed using ASTM D854. The specific gravity results ranged from 2.63 to 2.75 with an average value of 2.69.

## Moisture-Density Relationship

Both standard (ASTM D698) and modified (ASTM D1557) Proctor tests were conducted for the soils prequalification because the BFLO will be used as the compaction criteria. The type of Proctor test was alternated with each sample so that the entire borrow area and depth was represented by both Proctor types. Testing included 24 modified Proctor and 26 standard Proctor tests.

The soils have a modified Proctor maximum dry density (MDD) ranging from 116.4 to 124.2 pounds per cubic foot (pcf) with an average of 120.5 pcf. The optimum moisture content (OMC) for the modified Proctor ranges from 11.1 to 14.4 percent, with an average of 12.5 percent. The soils have a standard Proctor MDD ranging from 104.4 to 118.6 pcf with an average of 111.6 pcf. The OMC for the standard Proctor ranges from 12.6 to 18.8 percent, with an average of 15.7 percent.

The BFLO for soils prequalification will use the Proctor validation protocol defined in DSIRW Guidance Document No. 0665 entitled *Use of Best Fit Line of Optimums (BFLO) for Test Pad and*

*Recompacted Soil Liner Construction.* Guidance Document No. 0665 provides several methods for validating the Proctor test results as follows:

- Review of the shape of the Proctor curve. If the curve is broken backed, flat, too peaked, or has only one point dry or wet of optimum; the curve should be considered suspect.
- Plot the OMC versus the Liquid Limit.
- Plot the MDD versus the Liquid Limit.
- Plot the 82 percent and 88 percent degree of saturation on the graph of OMC and MDD.

CEC reviewed the shape of each Proctor curve to determine if the curve appeared to be valid based on the shape of the curve. The shape of the Proctor curves appears to be valid.

The plot of OMC verses the Liquid Limit is provided on Figure 2 and the plot of MDD versus the Liquid Limit is provided on Figure 3. A best fit linear regression was drawn through the standard and modified Proctor data sets. The Proctor data plot near the best fit lines through the data and appear valid based on this validation method.

The 82 percent and 88 percent degree of saturation were plotted on the graph of OMC versus MDD and are provided on Figure 4. No Proctor data plotted above the 88 percent saturation line using the maximum specific gravity of 2.75 from all of the samples. Two of the Proctor data points plotted slightly below the 82 percent saturation line using the minimum specific gravity of 2.63 from all of the borrow area samples. The sample results are considered valid based on the 82 and 88 percent saturation line.

Based on the evaluation of the Proctor data, the results appear to be valid for use in defining the BFLO to be used as the compaction specification.

## Laboratory Permeability Testing

Remolded permeability testing was performed on 3 samples using ASTM D5084. The samples were generally remolded to a dry density and moisture content at or below the BFLO. Permeability results were less than the maximum value of  $1 \times 10^{-6}$  cm/sec specified by OAC 3745-27-08 (D)(21)(f)(iii) for the samples. The permeability values ranged from  $1.8 \times 10^{-8}$  cm/sec to  $9.5 \times 10^{-7}$  cm/sec with an average of  $3.4 \times 10^{-7}$  cm/sec. Test results and sample preparation conditions are summarized in Table 1.

## **5.0 BEST FIT LINE OF OPTIMUMS**

The equation to define the BFLO was developed in accordance with Ohio EPA Guidance Document No. 665. The BFLO was developed from the Phase 4 and Phase 5 Cell RSL samples. Figure 5 presents the OMC and MDD for each sample plotted and a trendline drawn through the data using a second order polynomial. The BFLO for soils being prequalified is defined by the following equation:

$$DD = (0.124 * MC^2) - (6.1392 * MC) + 177.42$$

where: DD = dry density (pcf)

MC = moisture content (%)

The BFLO defined by this equation determines the pass/fail criteria for in-situ moisture/density testing of the RSB. A passing compaction test must plot on or above the line defined by this equation. The BFLO minimum compaction test results are tabulated in Table 2 based on the equation defining the BFLO.

In accordance with Ohio EPA Guidance Document No. 0665, the soils will be considered as acceptable for RSB using the following criteria:

- The OMC for a soil sample is within plus or minus 1.0 percent of the moisture content (measured parallel to the x-axis) of the BFLO.
- If the OMC of a soil sample is more than 1 percent dry of the BFLO (measured parallel to the x-axis), then the soils represented by that sample must be rejected for use as RSB or compacted to an in-situ moisture content and density above the BFLO. If the soil cannot be compacted to a moisture/density above the BFLO, then the soil must be removed from the RSB.
- If the OMC of a soil sample is more than 1 percent wet of the BFLO (measured parallel to the x-axis), then a new line of optimums must be calculated and submitted to the Ohio EPA for approval prior to use of the soils.

Figure 6 presents the plot of the OMC and MDD, the BFLO, the lines defining plus and minus 1 percent moisture content of the BFLO and the Zero Air Voids for the maximum and minimum specific gravity. All of the samples from the soils being prequalified for Closure Area 1 RSB plot below the plus 1 percent moisture content line of the BFLO and above the minus 1 percent moisture content line of the BFLO.

## 6.0 CONCLUSIONS

Based upon the results of the prequalification sampling, the soils included in this report are representative of soils used to construct Test Pads No. 2 and 3, and meet the requirements in Ohio EPA Guidance Document No. 665.

The RSB will be constructed in accordance with the requirements of Best Fit Line of Optimums compaction criteria and the CQA/QC Plan. Passing in-situ density/moisture test results will be required to plot on or above the BFLO presented on Figure 6. The required in-situ moisture content and corresponding dry density developed from the BFLO is provided in Table 2 and will be used during compaction testing of the RSB.

Construction specifications for RSB construction including the equipment, number of contacts, and lift thickness will be based on Test Pads No. 2 and 3 or approved equivalent equipment or methods. In addition, the construction specifications in the CQA/QC Plan will be used. The construction requirements are as follows.

- The soil will be placed in maximum 8-inch loose lifts. The soils will be graded using a dozer or grader.
- Each lift will be compacted with at least five overlapping passes of a Caterpillar 825C sheepfoot compactor, six overlapping passes with a TT22 compactor towed by a dozer, or an overlapping passes with an equivalent sheepfoot compactor. A pass is defined as one trip by the compaction equipment over the lift with a minimum overlap of one foot between successive passes.
- Rocks greater than 2 inches in any dimension will be removed as the soil is being placed as RSB.
- Each previous lift shall be scarified using the sheepfoot compactor or dozer tracks prior to the placement of any subsequent lifts.
- Each lift will be compacted to meet the BFLO. All of the in-situ moisture/density results shall plot on or above the BFLO.

Also, the following additional compaction methods have been approved for RSB construction:

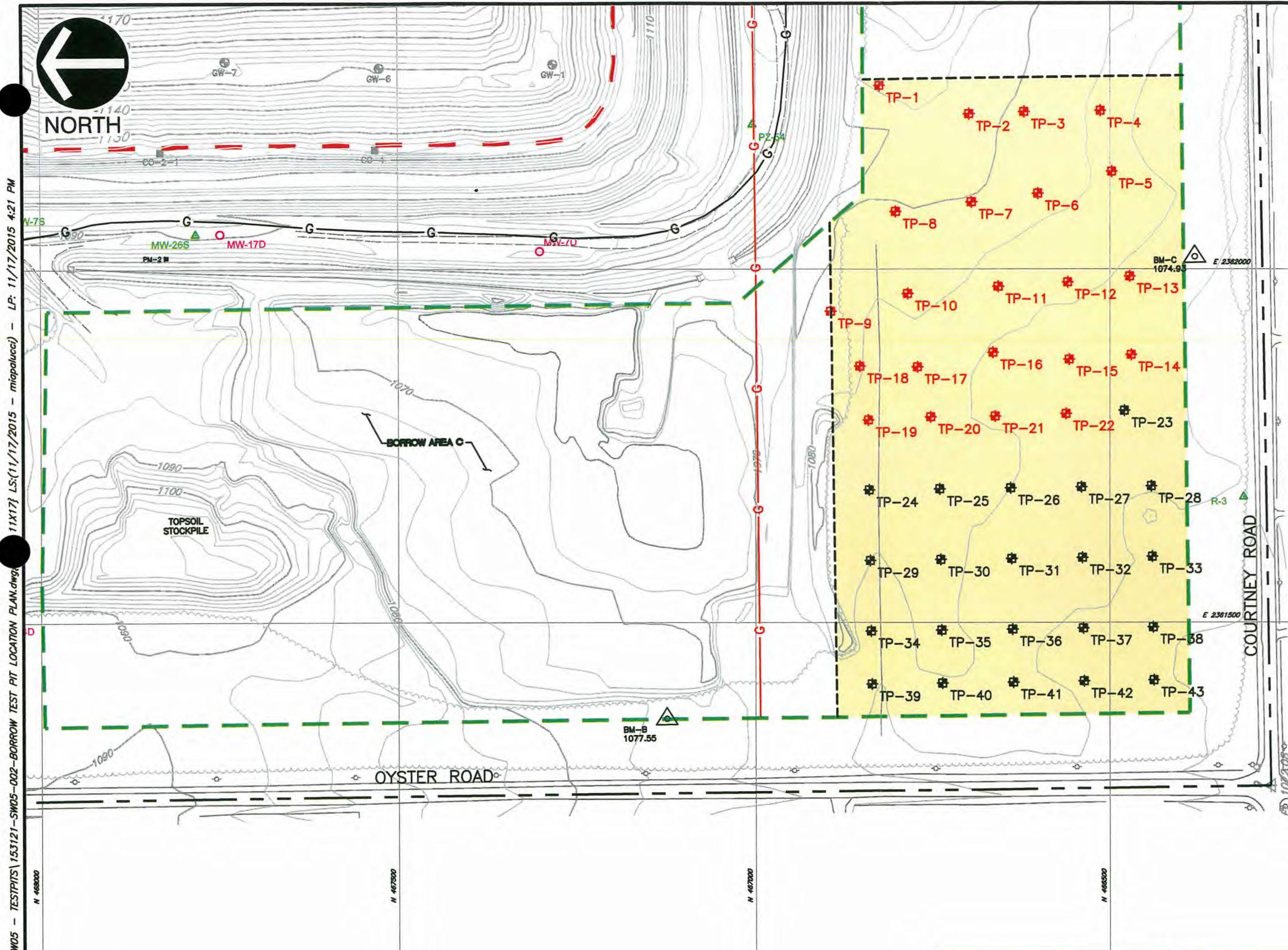
- Six passes with a Ferguson SP120D compactor towed by a dozer was approved for the RSL construction in the Phase 1 cell.
- Six passes with a CAT 815 padfoot compactor per Alteration Request approved December 14, 2006 for a compactor equivalency demonstration.
- Eight passes with a Le Tourneau Pull-Behind sheepfoot compactor per Alteration Request approved December 14, 2006 for a compactor equivalency demonstration.
- Six passes with a CAT 563 padfoot vibratory compactor per Alteration Request approved December 14, 2006 for a compactor equivalency demonstration.

The existing vegetation and topsoil will be removed and stockpiled prior to excavation. Construction quality assurance personnel will monitor the excavation and placement of the RSB so that the unacceptable materials are not used for RSB construction. Unacceptable soils include organic materials, soils with rocks greater than 2 inches in diameter, and coarse-grained soils.

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**FIGURES**

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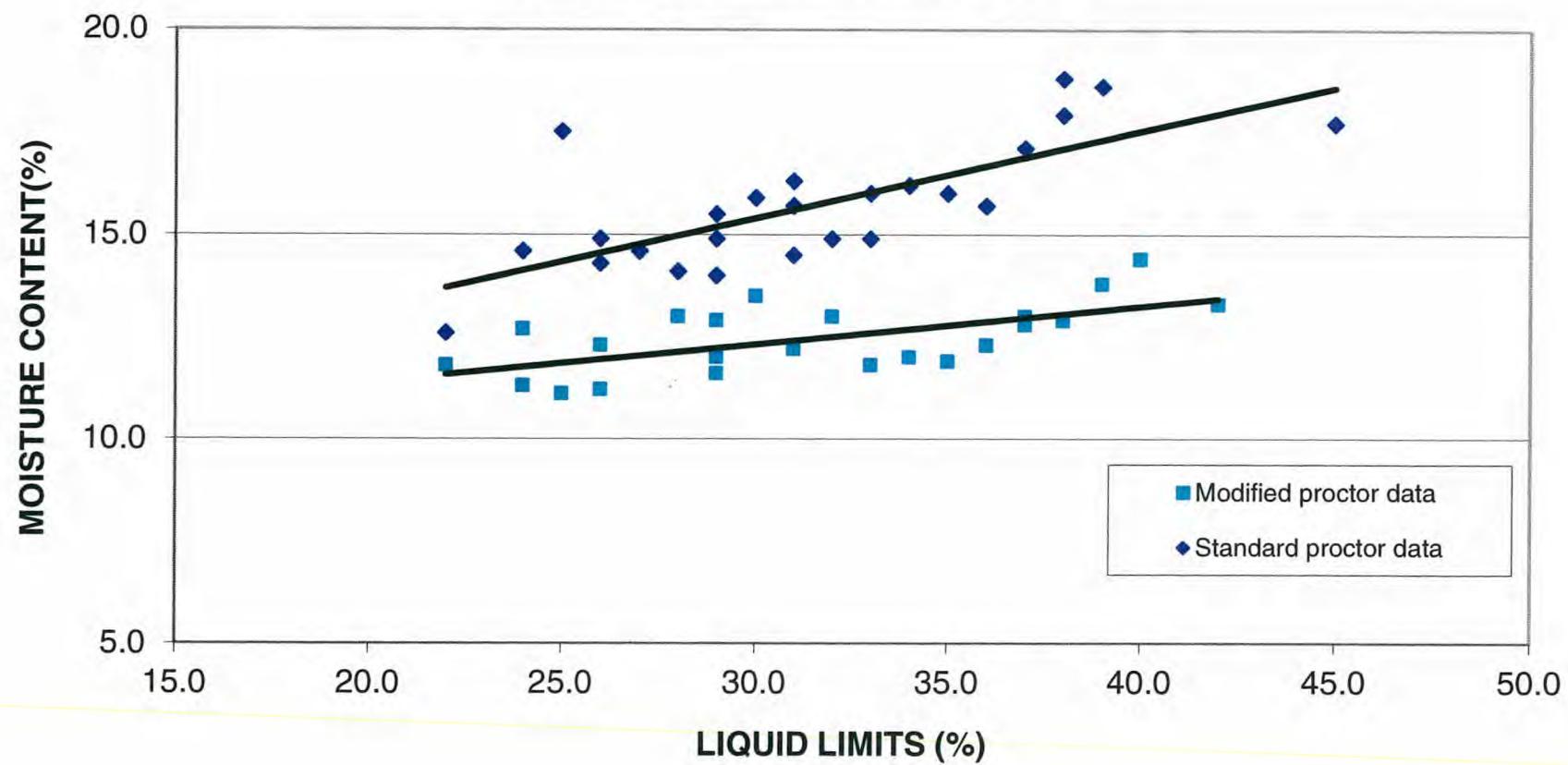
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DRAWN BY:	MJI	CHECKED BY:	MRF	APPROVED BY:	DRL *	FIGURE NO.:
DATE:	11/16/15	DWG SCALE:	AS SHOWN	PROJECT NO.:	153-121.0002	1

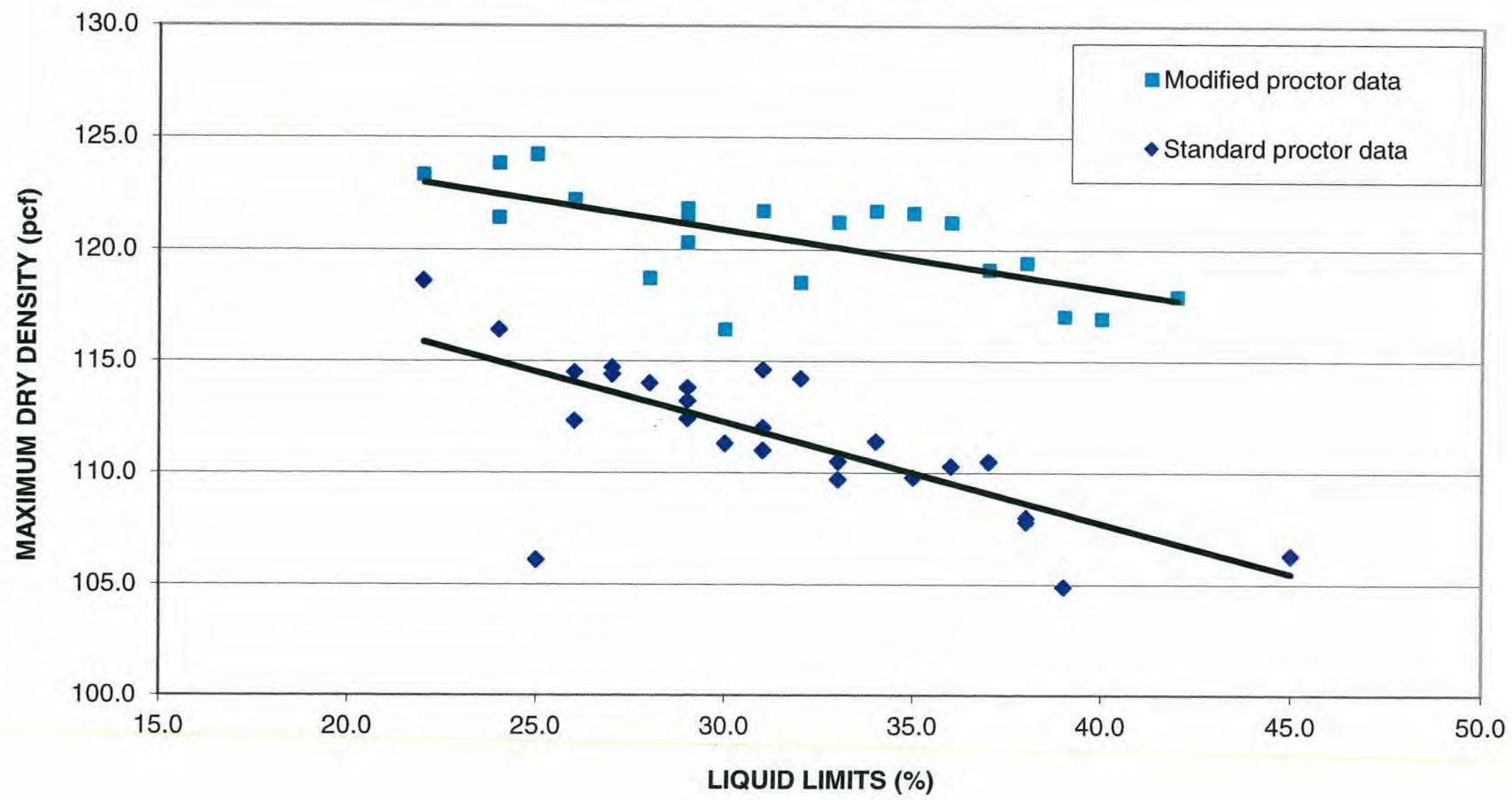
**BOND SAFEGUARD INSURANCE COMPANY**  
**RSB SOILS PREQUALIFICATION**  
**CENTRAL WASTE DISPOSAL FACILITY**  
**ALLIANCE, OHIO**

**RSB TESTPIT LOCATION PLAN**

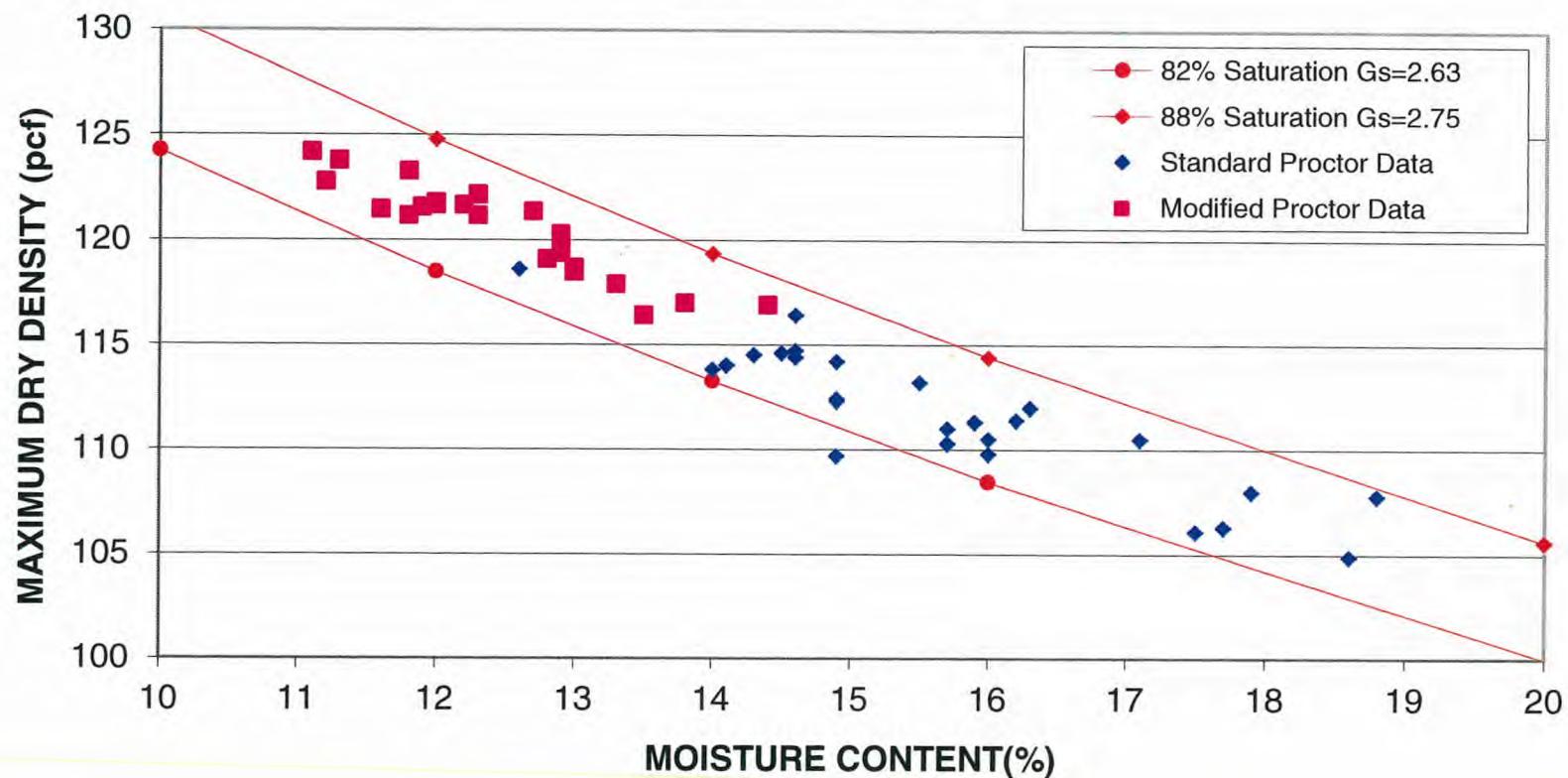
**FIGURE 2**  
**OPTIMUM MOISTURE CONTENT vs. LIQUID LIMIT**  
**CLOSURE CONSTRUCTION**  
**CENTRAL WASTE DISPOSAL FACILITY**



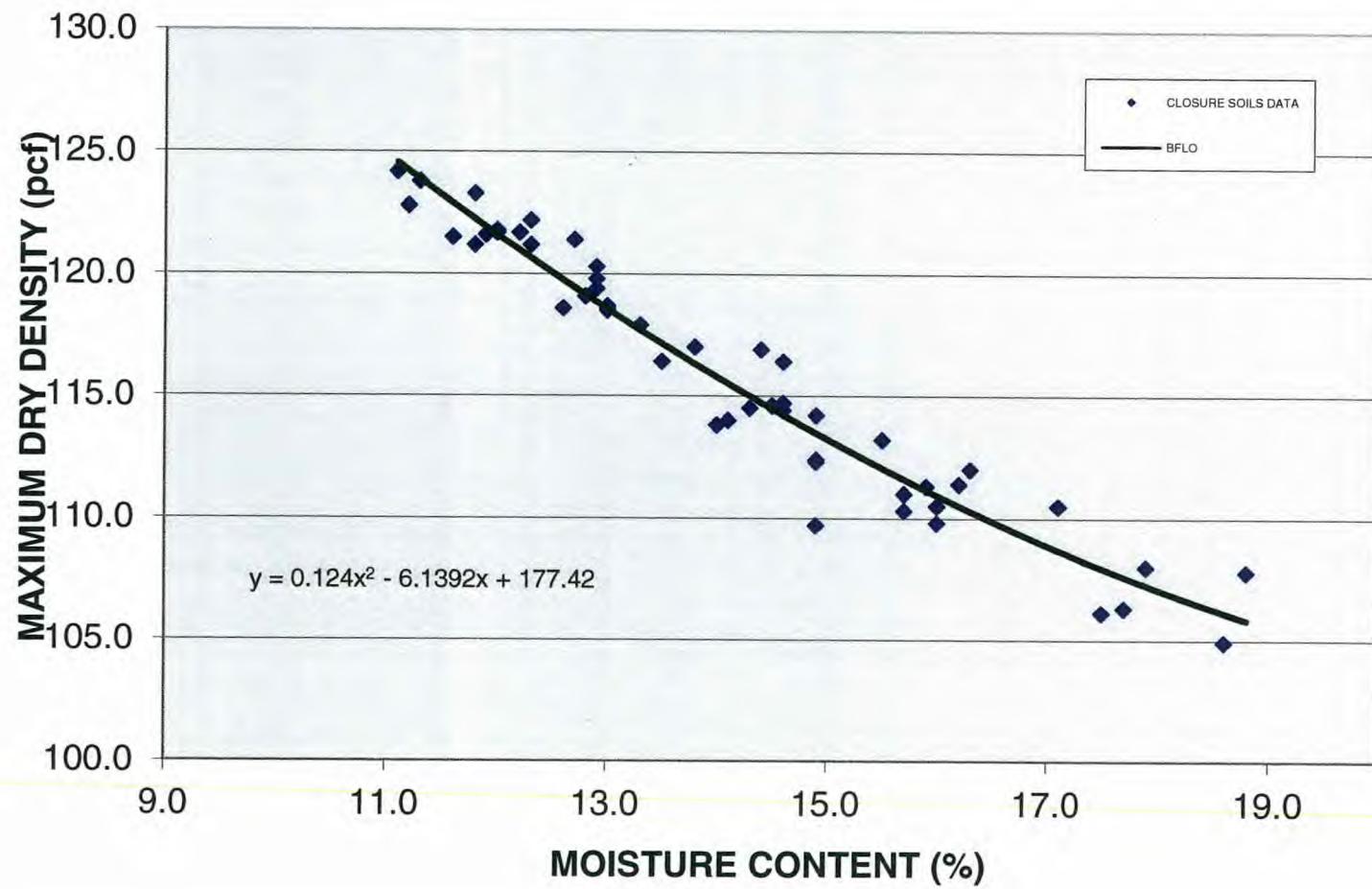
**FIGURE 3**  
**MAXIMUM DRY DENSITY vs. LIQUID LIMIT**  
**CLOSURE CONSTRUCTION**  
**CENTRAL WASTE DISPOSAL FACILITY**



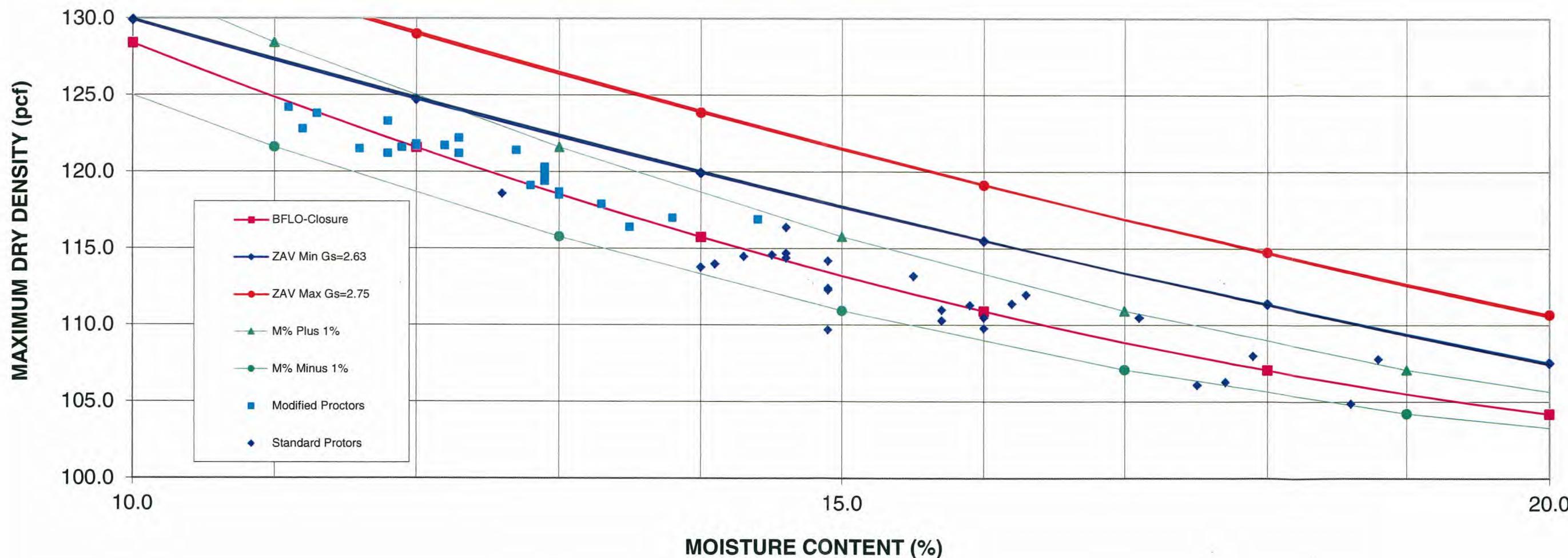
**FIGURE 4**  
**PROCTOR DATA VS. SATURATION**  
**CLOSURE CONSTRUCTION**  
**CENTRAL WASTE FACILITY DISPOSAL**



**FIGURE 5**  
**BEST FIT LINE OF OPTIMUM EQUATION (COMBINED)**  
**CLSOUURE CONSTRUCTION**  
**CENTRAL WASTE DISPOSAL FACILITY**



**FIGURE 6**  
**BEST FIT LINE OF OPTIMUMS**  
**CLOSURE CONSTRUCTION**  
**CENTRAL WASTE DISPOSAL FACILITY**



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**TABLES**

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**TABLE 1**  
**RECOMPACTED SOIL BARRIER SOILS TEST RESULTS SUMMARY**  
**FINAL CLOSURE CONSTRUCTION**  
**CENTRAL WASTE DISPOSAL FACILITY**

SAMPLE NUMBER	REPRESENTATIVE SOIL SAMPLE DIMENSIONS (ftxftxft)	SAMPLE DEPTH (ft)	MOISTURE DENSITY RELATIONSHIP				SPECIFIC GRAVITY	ATTERBERG LIMITS		USCS GRAIN SIZE DISTRIBUTION				USCS SYMBOL	USCS DESCRIPTION	REMOLDED PERMEABILITY			
			MODIFIED PROCTOR OMC (%)	MDD (pcf)	STANDARD PROCTOR OMC (%)	MDD (pcf)		Liquid Limit (%)	Plasticity Index (%)	% Passing 2" SIEVE (%)	% Passing 3/4" SIEVE (%)	% Passing No. 200 SIEVE (%)	% Less Than 0.002 mm (%)			MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT COMPACTION (%)	PERMEABILITY (cm/sec)
<b>MINIMUM ACCEPTANCE VALUES</b>																		<b>≤ 1.0E-06</b>	
TP-1A	100 x100 x4	0' - 4'	13.8	117.0			2.67	39	19	100.0	99.3	82.8	32.9	CL	LEAN CLAY WITH SAND	15.8	111.2	95.0%	9.5E-07
TP-1B	100 x100 x4	4' - 8'			14.6	114.7	2.67	27	10	99.6	98.1	78.7	22.5	CL	LEAN CLAY WITH SAND				
TP-2A	100 x100 x4	0' - 4'	11.6	121.5	14.9	112.4	2.66	29	11	100.0	99.5	84.5	22.5	CL	LEAN CLAY WITH SAND				
TP-2B	100 x100 x4	4' - 8'	13.0	118.5			2.72	32	12	100.0	99.9	92.4	24.7	CL	LEAN CLAY				
TP-3A	100 x100 x4	0' - 4'	14.4	116.9			2.71	40	21	100.0	99.7	87.7	36.8	CL	LEAN CLAY				
TP-3B	100 x100 x4	4' - 8'			14.0	113.8	2.66	29	12	100.0	98.7	80.1	25.2	CL	LEAN CLAY WITH SAND				
TP-4A	100 x100 x4	0' - 4'			16.0	109.8	2.68	35	19	100.0	99.8	84.0	31.0	CL	LEAN CLAY WITH SAND				
TP-4B	100 x100 x4	4' - 8'	12.3	122.2			2.67	26	9	100.0	99.3	85.4	21.6	CL	LEAN CLAY				
TP-5A	100 x100 x4	0' - 4'	11.9	121.6			2.70	35	18	100.0	99.5	84.3	37.3	CL	LEAN CLAY WITH SAND				
TP-5B	100 x100 x4	4' - 8'			15.9	111.3	2.69	30	12	100.0	99.0	86.8	28.0	CL	LEAN CLAY				
TP-6A	100 x100 x4	0' - 4'			16.2	111.4	2.68	34	16	100.0	99.8	82.5	33.0	CL	LEAN CLAY WITH SAND	18	106.4	95.5%	6.0E-07
TP-6B	100 x100 x4	4' - 8'	12.2	121.7	16.3	112.0	2.67	31	14	98.9	97.7	78.9	28.3	CL	LEAN CLAY WITH SAND				
TP-7A	100 x100 x4	0' - 4'	11.8	123.3			2.67	22	8	100.0	99.4	76.8	18.7	CL	LEAN CLAY WITH SAND				
TP-7B	100 x100 x4	4' - 8'			15.5	113.2	2.68	29	12	99.0	98.5	79.4	23.2	CL	LEAN CLAY WITH SAND				
TP-8A	100 x100 x4	0' - 4'			14.6	114.4	2.66	27	12	100.0	97.9	67.6	17.1	CL	SANDY LEAN CLAY				
TP-8B	100 x100 x4	4' - 8'	12.7	121.4			2.72	24	6	100.0	99.5	82.2	11.9	CL-ML	SILT WITH SAND				
TP-9A	100 x100 x4	0' - 4'	12.9	119.4			2.71	38	19	100.0	99.4	89.4	39.8	CL	LEAN CLAY				
TP-9B	100 x100 x4	4' - 8'			18.8	107.8	2.74	38	19	100.0	98.7	90.1	40.5	CL	LEAN CLAY				
TP-10A	100 x100 x4	0' - 4'			14.9	114.2	2.69	32	16	99.2	98.6	80.5	28.7	CL	LEAN CLAY WITH SAND				
TP-10B	100 x100 x4	4' - 8'	11.3	123.8	14.6	116.4	2.71	24	8	100.0	99.4	81.0	21.4	CL	LEAN CLAY WITH SAND	16.9	109.7	94.2%	4.3E-07
TP-11A	100 x100 x4	0' - 4'			15.7	111.0	2.71	31	18	100.0	100.0	68.2	20.9	CL	SANDY LEAN CLAY	17.8	106.3	95.8%	6.2E-08
TP-11B	100 x100 x4	4' - 8'	12.0	121.8			2.75	29	13	100.0	98.9	78.5	21.9	CL	LEAN CLAY WITH SAND				
TP-12A	100 x100 x4	0' - 4'	13.5	116.4			2.72	30	12	100.0	99.6	85.5	19.9	CL	LEAN CLAY				
TP-12B	100 x100 x4	4' - 8'			14.9	112.3	2.73	26	14	100.0	100.0	86.4	20.7	CL	LEAN CLAY				
TP-13A	100 x100 x4	0' - 4'	12.8	119.1	17.1	110.5	2.74	37	22	100.0	100.0	88.2	34.8	CL	LEAN CLAY				
TP-13B	100 x100 x4	4' - 8'	11.1	124.2			2.73	25	9	100.0	98.6	71.5	19.1	CL	LEAN CLAY WITH SAND				
TP-14A	100 x100 x4	0' - 4'	13.0	118.7			2.68	28	12	100.0	100.0	86.6	26.5	CL	LEAN CLAY				
TP-14B	100 x100 x4	4' - 8'			14.5	114.6	2.69	31	17	100.0	98.7	77.7	29.8	CL	LEAN CLAY WITH SAND	13.8	109.8	95.8%	2.8E-07
TP-15A	100 x100 x4	0' - 4'			18.6	104.9	2.67	39	20	100.0	98.6	77.3	37.1	CL	LEAN CLAY WITH SAND				
TP-15B	100 x100 x4	4' - 8'	12.9	120.3			2.67	29	12	100.0	99.6	89.7	21.1	CL	LEAN CLAY				
TP-16A	100 x100 x4	0' - 4'	13.3	117.9			2.69	42	21	100.0	100.0	93.3	42.0	CL	LEAN CLAY				
TP-16B	100 x100 x4	4' - 8'			14.9	109.7	2.68	33	15	100.0	100.0	87.5	29.2	CL	LEAN CLAY				
TP-17A	100 x100 x4	0' - 4'			17.7	106.3	2.69	45	23	100.0	99.5	89.7	42.5	CL	LEAN CLAY				
TP-17B	100 x100 x4	4' - 8'	11.8	121.2	16.0	110.5	2.71	33	15	100.0	99.5	84.5	33.9	CL	LEAN CLAY WITH SAND				
TP-18A	100 x100 x4	0' - 4'	12.3	121.2			2.66	36	19	100.0	96.4	67.4	30.3	CL	SANDY LEAN CLAY				
TP-18B	100 x100 x4	4' - 8'			17.9	108.0	2.69	38	20	100.0	99.5	84.0	33.3	CL	LEAN CLAY WITH SAND				
TP-19A	100 x100 x4	0' - 4'			15.7	110.3	2.67	36	20	100.0	99.5	81.4	33.2	CL	LEAN CLAY WITH SAND				
TP-19B	100 x100 x4	4' - 8'	12.0	121.7			2.67	34	17	100.0	99.2	78.7	32.1	CL	LEAN CLAY WITH SAND	13.8	116.6	95.8%	1.8E-08
TP-20A	100 x100 x4	0' - 4'	12.9	119.8			2.65	37	20	100.0	96.1	74.4	31.3	CL	LEAN CLAY WITH SAND				
TP-20B	100 x100 x4	4' - 8'			14.1	114.0	2.67	28	12	100.0	98.9	74.4	23.9	CL	LEAN CLAY WITH SAND				</td

**TABLE 2**  
**MINIMUM COMPACTION TEST RESULTS PER BEST FIT LINE OF OPTIMUMS**  
**CLOSURE AREA 1 CAP SYSTEM CONSTRUCTION**  
**CENTRAL WASTE DISPOSAL FACILITY**

MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
9.0	132.21	13.4	117.42	17.8	107.43
9.1	131.82	13.5	117.14	17.9	107.26
9.2	131.43	13.6	116.86	18.0	107.09
9.3	131.05	13.7	116.59	18.1	106.92
9.4	130.67	13.8	116.31	18.2	106.76
9.5	130.29	13.9	116.04	18.3	106.60
9.6	129.91	14.0	115.78	18.4	106.44
9.7	129.54	14.1	115.51	18.5	106.28
9.8	129.16	14.2	115.25	18.6	106.13
9.9	128.80	14.3	114.99	18.7	105.98
10.0	128.43	14.4	114.73	18.8	105.83
10.1	128.06	14.5	114.47	18.9	105.68
10.2	127.70	14.6	114.22	19.0	105.54
10.3	127.34	14.7	113.97	19.1	105.40
10.4	126.98	14.8	113.72	19.2	105.26
10.5	126.63	14.9	113.48	19.3	105.12
10.6	126.28	15.0	113.23	19.4	104.99
10.7	125.93	15.1	112.99	19.5	104.86
10.8	125.58	15.2	112.75	19.6	104.73
10.9	125.24	15.3	112.52	19.7	104.60
11.0	124.89	15.4	112.28	19.8	104.48
11.1	124.55	15.5	112.05	19.9	104.36
11.2	124.22	15.6	111.83	20.0	104.24
11.3	123.88	15.7	111.60	20.1	104.12
11.4	123.55	15.8	111.38	20.2	104.01
11.5	123.22	15.9	111.16	20.3	103.89
11.6	122.89	16.0	110.94	20.4	103.78
11.7	122.57	16.1	110.72	20.5	103.68
11.8	122.24	16.2	110.51	20.6	103.57
11.9	121.92	16.3	110.30	20.7	103.47
12.0	121.61	16.4	110.09	20.8	103.37
12.1	121.29	16.5	109.88	20.9	103.28
12.2	120.98	16.6	109.68	21.0	103.18
12.3	120.67	16.7	109.48	21.1	103.09
12.4	120.36	16.8	109.28	21.2	103.00
12.5	120.06	16.9	109.08	21.3	102.91
12.6	119.75	17.0	108.89	21.4	102.83
12.7	119.45	17.1	108.70	21.5	102.75
12.8	119.15	17.2	108.51	21.6	102.67
12.9	118.86	17.3	108.32	21.7	102.59
13.0	118.57	17.4	108.14	21.8	102.52
13.1	118.28	17.5	107.96	21.9	102.44
13.2	117.99	17.6	107.78	22.0	102.37
13.3	117.70	17.7	107.60	22.1	102.31

Note: BFLO Equation, equal to  $DD=0.124(MC)^2 - 6.1392(MC) + 177.42$ , based on approved soils for closure.

---

**APPENDIX A**

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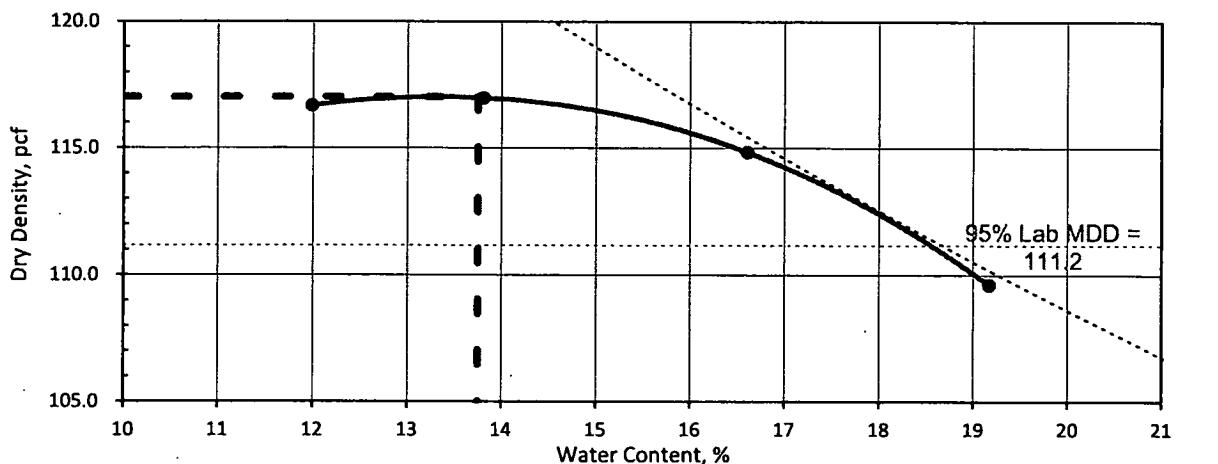
**SOILS LABORATORY TEST RESULTS**

---

## LABORATORY COMPACTION CHARACTERISTICS OF SOIL

Client Civil & Environmental Consultants, Inc. Boring TP-1A  
 Client Project 153-121.0002 Closure Construction Ce Depth 0.0'-4.0'  
 Project No. 36291 Sample Bucket  
 Lab Sample No. 36291007

Visual Description: YELLOWISH BROWN LEAN CLAY WITH SAND

WET DENSITY					TEST PARAMETERS			
Mold ID	C	D	C	D	Test Method	ASTM D1557		
Compaction Point #	1	2	3	4	Compaction Energy	Modified		
Wt. Mold & WS, gm.	6192	6233	6241	6195	Test Procedure	A		
Wt. Mold, gm.	4216	4214	4216	4214	Mold Diameter, in	4		
Wt. WS, gm.	1976	2019	2025	1981	Compacted Layers	5		
Mold Volume, cc	944	946	944	946	Blows Per Layer	25		
Wet Density, gm./cc	2.09	2.13	2.15	2.09	Rammer Weight / Fall	10 lbs / 18 in.		
Wet Density, pcf	130.7	133.1	133.9	130.6	Size of Material Used	-#4 Sieve		
					Use: <5% Retained on #4			
WATER CONTENT					OVERSIZE PARTICLE CORRECTION			
Tare Number	460	903	979	831	No Corrections Needed			
Wt. Tare & WS, gm.	836.7	831.8	809.8	940.5				
Wt. Tare & DS, gm.	756.3	743	709.1	805.6	Percent of Oversize Rock (+#4 Sieve) = <5%			
Wt. Tare, gm.	85.7	100	102.7	101.9	(Based on As-received Screening & Soaking)			
Water Content, %	12.0	13.8	16.6	19.2	W.C. of Finer Material, % (-#4 Sieve) = NA			
DRY DENSITY vs. WATER CONTENT					SAMPLE SUMMARY			
LABORATORY TEST VALUES								
Water Content, %	12.0	13.8	16.6	19.2	Lab Optimum Water Content, %			
Dry Density, pcf	116.7	117.0	114.8	109.6	13.8			
					Lab Maximum Dry Density, pcf			
					117.0			
<i>Note: Maximum Density and Optimum Water Content reported from estimated best fit smooth curve!</i>								
								
<i>Note: Compacted with automatic compaction machine</i>								

Input Validation: BLS

Reviewed By: AJD

Date Tested: 10/08/15

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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client Civil & Environmental Consultants, Inc. Boring TP-1A  
 Client Project 153-121.0002 Closure Construction Central Waste Depth 0.0'-4.0'  
 Project No. 36291 Sample Bucket  
 Lab Sample 36291007

Sample Color: YELLOWISH BROWN  
 USCS Group Name: LEAN CLAY WITH SAND

USCS Group Symbol: CL

USDA: SILTY CLAY LOAM

AASHTO: A-6 (15)

MECHANICAL SIEVE								
Total Sample	Sieve Size	Nominal Opening, mm	Dry Wt, gm	% Retained	Split % Retained	Normalized % Finer	Project Specifications	
Total Sample Wet Wt, gm (-3")	25054	3"	75	0	0.0%	100.0%		
Sample Split on Sieve	3/4"	2-1/2"	63	0	0.0%	100.0%		
Coarse Washed Dry Sample, gm	147	2"	50	0	0.0%	100.0%		
Wet Wt Passing Split, gm	24907	1-1/2"	37.5	91.62	0.4%	99.6%		
Dry Wt. Passing Split, gm	21777	1"	25	19.08	0.1%	99.5%		
Total Sample Dry Wt, gm	21924	3/4"	19	36.52	0.2%	99.3%		
	1/2"	12.5	2.97	0.3%	99.0%			
<b>Split Sample - Passing 3/4"</b>								
Tare No.	1013	3/8"	9.5	0	0.0%	99.0%		
Tare + WS., gm	1258	No. 4	4.75	4.19	0.4%	98.6%		
Tare + DS., gm	1124	No. 10	2	9.79	1.0%	97.5%		
Tare, gm	191.7	No. 20	0.85	13.39	1.4%	96.1%		
<b>Water Content of Split Sample</b>	<b>14.4%</b>	No. 40	0.425	17.94	1.9%	94.2%		
Wt. of DS., gm	932.30	No. 60	0.25	29.97	3.2%	91.0%		
Wt. of +#200 Sample, gm	155.48	No. 140	0.106	57.36	6.1%	84.9%		
		No. 200	0.075	19.87	2.1%	82.8%		

HYDROMETER (#200)									
Tare No.	549	Wt. Dispers., gm	5	Specific Gravity	2.67	Tested			
Wt. Tare + DS., gm	254	Wt. Dry Soil, gm (-#200)	53.19						
-#10 Dispersed 1min in Hamilton Beach Mixer									
Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)	
2	52.5	22.5	4.5	48.0	0.0132	89.8	0.0257	74.4%	
5	49	22.5	4.5	44.5	0.0132	83.3	0.0169	68.9%	
15	43.5	22.5	4.5	39.0	0.0132	73.0	0.0103	60.4%	
30	39	22.5	4.5	34.5	0.0132	64.6	0.0075	53.4%	
60	35	22.5	4.5	30.5	0.0132	57.1	0.0055	47.2%	
250	28.5	21.4	4.9	23.6	0.0134	44.2	0.0029	36.6%	
1530	23.5	19.7	5.4	18.1	0.0137	33.9	0.0012	28.0%	

USCS SOIL CLASSIFICATION			USDA CLASSIFICATION			
Corrected For 100% Passing a 3" Sieve						
% Gravel (-3" & +#4)	1.4	Silt=37% Clay=45.6%	Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)	Corrected Percent of -2.0 mm Material for USDA
Coarse=0.7; Fine=0.8		D60, mm NA				
% Sand (#4 & +#200)	15.8	D30, mm NA				
Coarse=1; Medium=3.3; Fine=11.4		D10, mm NA				
% Fines (#200)	82.8	Cc NA				
% Plus #200 (-3")	17.2	Cu NA				
USCS Description LEAN CLAY WITH SAND						
USCS Group Symbol	Atterberg Limits Group Symbol					
CL	CL - LEAN CLAY					
Auxiliary Information	Wt Ret, gm	% Retained	% Finer			
12" Sieve - 300 mm	0	0.0	100.0			
6" Sieve - 150 mm	0	0.0	100.0			
3" Sieve - 75 mm	0	0.0	100.0			
USDA Classification SILTY CLAY LOAM						

Input Validation Yes Reviewed By: SVG Date Tested 9/21/2015

**LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS**  
**ASTM D 4318**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-1A
Client Project	153-121.0002 Closure Construction Central Waste	Depth	0.0'-4.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291007

Soil Description:  
 (-#40 Fraction)  
 YELLOWISH BROWN LEAN CLAY

AS-RECEIVED W.C.			SAMPLE SUMMARY		
Tare Number	1013		Activity Index = .58; Liquidity Index = -.29		
Wt. Tare & WS, gm	1258.00		Liquid Limit (LL), %	39	
Wt. Tare & DS, gm	1124.00		Plastic Limit (PL), %	20	
Wt. Tare, gm	191.70		Plasticity Index (PI)	19	
Water Content, %	14.4		USCS Group Symbol (-#40 Fraction)	CL	
			USCS Group Name (-#40 Fraction)	LEAN CLAY	
			Sample Color:	YELLOWISH BROWN	
PLASTIC LIMIT			LIQUID LIMIT		
Points Run	3 Points		3 Points		
Tare Number	205	206	223	215	234
Wt. Tare & WS, gm	23.00	23.07	22.21	23.23	23.68
Wt. Tare & DS, gm	21.88	21.93	21.18	21.16	21.54
Wt. Tare, gm	16.28	16.15	16.05	16.12	16.14
Water Content, %	20.0	19.7	20.1	41.1	39.6
			# of Blows	16	21
					28
PLASTICITY CHART			FLOW CURVE		
Plasticity Index			Water Content		
60			45		
50			40		
40			35		
30			30		
20			25		
10			20		
0			15		
			10		
			5		
			0		
0	10	20	10	20	30
10	20	30	20	30	40
20	30	40	25	35	50
30	40	50	30	40	60
40	50	60			
50	60	70			
60	70	80			
70	80	90			
80	90	100			
90	100				
100					
Liquid Limit			No. of Blows		

Input Validation: Yes

Reviewed By: SVG

Date Tested: 9/21/2015

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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-1A
Client Project	153-121.0002 Closure Construction Central Waste	Depth	0.0' - 4.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291007

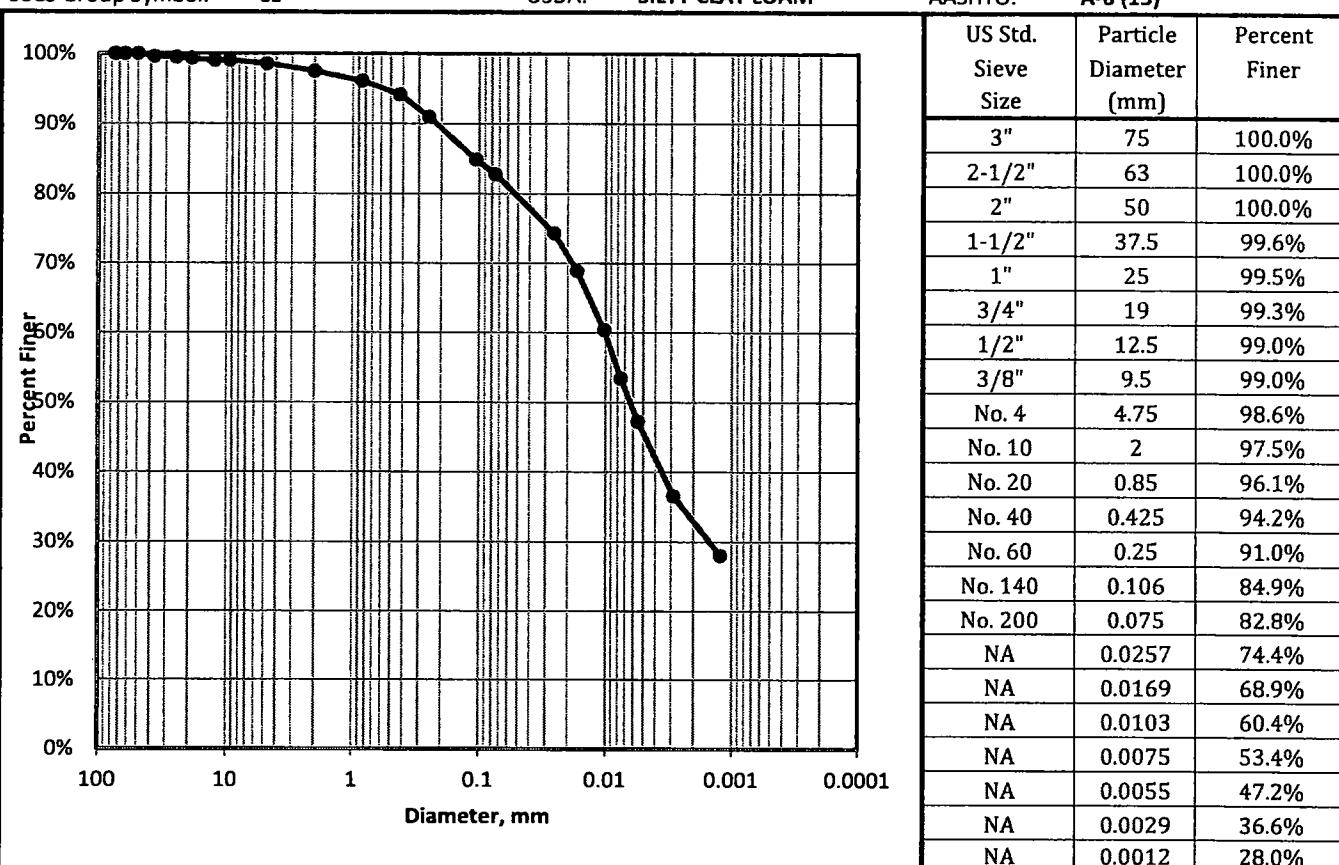
Sample Color: **YELLOWISH BROWN**

USCS Group Name: **LEAN CLAY WITH SAND**

USCS Group Symbol: **CL**

USDA: **SILTY CLAY LOAM**

AASHTO: **A-6 (15)**



USCS SOIL CLASSIFICATION			USDA CLASSIFICATION			
Corrected For 100% Passing a 3" Sieve						
% Gravel (-3" & +#4)	1.4	Silt=37% Clay=45.6%	Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)	Corrected Percent of -2.0 mm Material for USDA
Coarse=0.7; Fine=0.8		D60, mm NA	100	100	Gravel 2.5	0
% Sand (-#4 & +#200)	15.8	D30, mm NA	2	97.5	Sand 17.9	18.4
Coarse=1; Medium=3.3; Fine=11.4		D10, mm NA	0.05	79.6	Silt 46.6	47.8
% Fines (-#200)	82.8	Cc NA	0.002	32.9	Clay 32.9	33.8
% Plus #200 (-3")	17.2	Cu NA				
USCS Description			USDA Classification			
LEAN CLAY WITH SAND			SILTY CLAY LOAM			
USCS Group Symbol	Atterberg Limits Group Symbol					
CL	CL - LEAN CLAY					
Auxiliary Information	Wt Ret, gm	% Retained				
12" Sieve - 300 mm	0	0.0				
6" Sieve - 150 mm	0	0.0				
3" Sieve - 75 mm	0	0.0				

### USDA CLASSIFICATION CHART

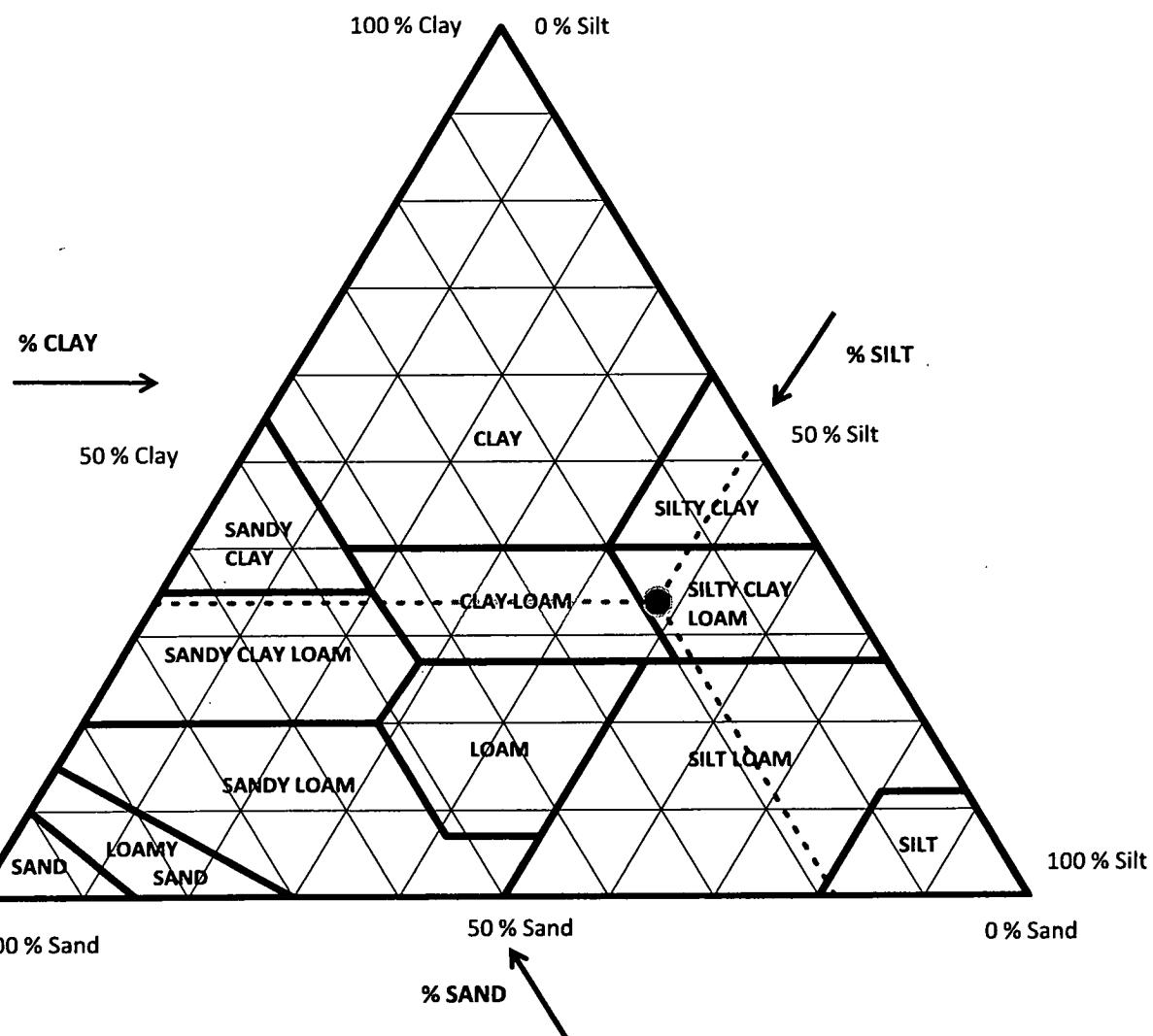
Client Civil & Environmental Consultants, Inc. Boring TP-1A  
 Client Project 153-121.0002 Closure Construction Central Waste Depth 0.0'-4.0'  
 Project No. 36291 Sample Bucket  
 Lab Sample 36291007

Sample Color: **YELLOWISH BROWN**  
 USCS Group Name: **LEAN CLAY WITH SAND**  
 USCS Group Symbol: **CL**

USDA: **SILTY CLAY LOAM**

AASHTO: **A-6 (15)**

Corrected for 0% gravel		Sand Subsizes	
		Corrected Percentages	
Percent Gravel, %	0.0	Very Coarse Sand; 2-1	1.2
Percent Sand, %	18.4	Coarse Sand; 1-0.5	1.8
Percent Silt, %	47.8	Medium Sand; 0.5-0.25	3.7
Percent Clay, %	33.8	Fine Sand; 0.25-0.1	6.6
		Very Fine Sand; 0.1-0.05	5.1
		Total	18.4



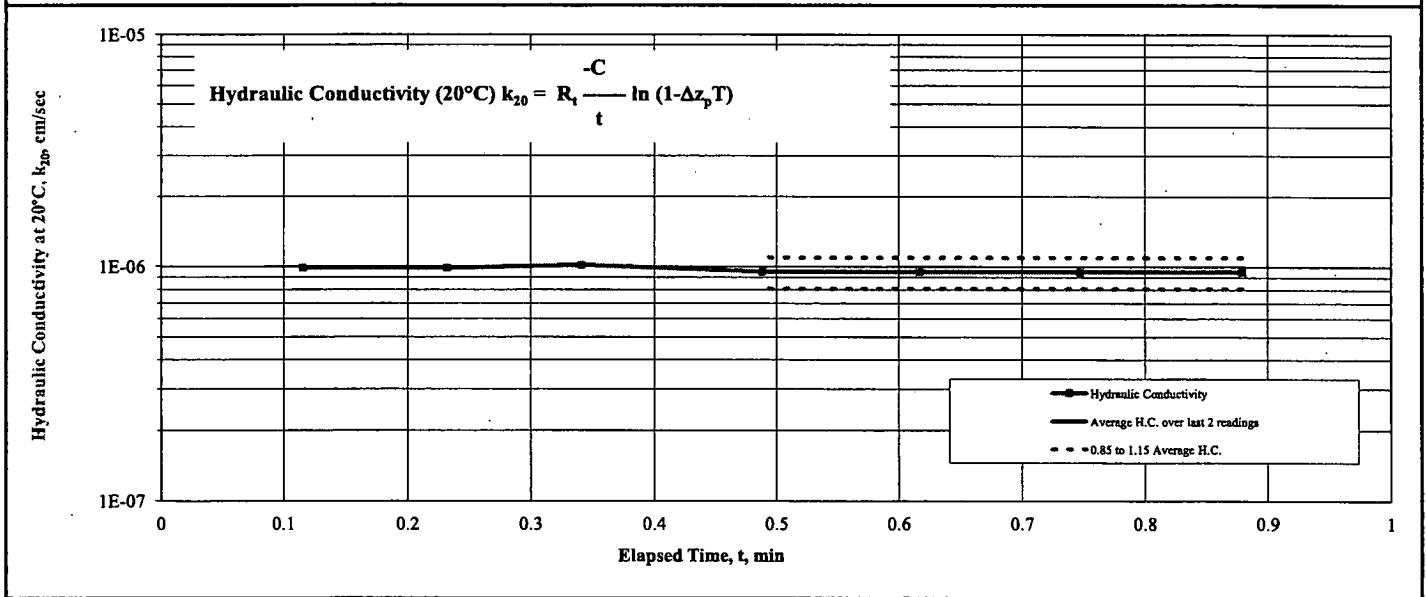
## MEASUREMENT OF HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIALS USING A FLEXIBLE WALL PERMEAMETER

ASTM D5084-00 Method F; Mercury U-Tube Perrometer - Inflow Volume = Outflow Volume

Client Civil & Environmental Consultants, Inc. Boring TP-1A  
 Client Project 153-121.0002 Closure Construction Central Waste Depth 0.0'-4.0'  
 Project No. 36291 Sample Bucket  
 Visual Description YELLOWISH BROWN LEAN CLAY WITH SAND Lab Sample No. 36291007  
 Sample Condition Remolded

SAMPLE CONDITIONS			TEST CONSTANTS & EQUATIONS			SAMPLE SUMMARY					
Sample Status	Initial	Final	Pipette Area, $a_p$ - cm <sup>2</sup>	0.031416	Avg. Hydraulic Conductivity, $k_{20}$ , cm/sec	9.5E-07					
Tare Number	2008	2071	Annulus Area, $a_a$ , cm <sup>2</sup>	0.76712	Initial Water Content, %	15.8%					
Wt. Tare & WS, gm	267.4	843.03	Manometer Constant, $M_1 = a_a a_v / (a_a + a_v)$ , cm <sup>2</sup>	0.03018	Initial Dry Density, pcf	111.2					
Wt. Tare & DS, gm	251.77	715.22	Manometer Constant, $M_2 = 1 + a_v / a_a$	1.0410	% Compaction	95.0%					
Wt. Tare, gm	152.7	150.85	Sample Constant, $S = L/A$ , cm <sup>-1</sup>	0.184	Sample Status	Remolded					
Moisture Content, %	15.8%	22.6%	Specific Gravity, $\delta = \delta_{hg} - \delta_w$ , gm/cc	12.562	B Parameter	98					
Wt. Tube & WS., gm	653.6	NA	Test Constant, $C = M_1 S / 6$	4.43E-04	Permeant	Desired Water					
Wt. Of Tube, gm	0	NA	Mercury Level at Equilibrium, $R_{eq}$ , cm	3.1	Cell Pressure, psi	105					
Wt. Of WS., gm	653.6	692.4	Mercury Level of Pipette at t=0, $R_{p0}$ , cm	9.5	Back Pressure, psi	100					
Length 1, in	3	3.145	Initial Head Difference, $z_i = (R_{p0} - R_{eq})M_2$ , cm	6.66	Avg.(Mid-Height) Confining Stress, psi	5					
Length 2, in	3	3.155	Trial Constant, $T = M_2 / z_i$ , cm	0.1563	Maximum Gradient	10.5					
Length 3, in	3	3.151	Temperature Correction for 20°C, $R_t$	0.976	Average Test Temperature, °C	21.0					
Top Diameter, in	2.864	2.923	TEST DATA								
Middle Diameter, in	2.865	2.968	t <sub>i</sub> Elapsed Time min	R <sub>pt</sub> Mercury Height cm	Δz <sub>p</sub> R <sub>p0</sub> -R <sub>pt</sub> cm	i Gradient cm/cm	H <sub>t</sub> Head cm	ΔH <sub>t</sub> Percent of Initial Head from t=0 %	σ' max Effective Stress Max psi	σ' min Min psi	k <sub>20</sub> Hydraulic Conductivity cm/sec
Bottom Diameter, in	2.8655	2.893									
Average Length, L, cm	7.62	8.00									
Average Area, A, cm <sup>2</sup>	41.59	43.44									
Sample Volume, cc	316.9	347.6									
Unit Wet Wt., gm/cc	2.06	1.99									
Unit Wet Wt., pcf	128.7	124.3									
Unit Dry Wt., pcf	111.2	101.3									
Unit Dry Wt., gm/cc	1.78	1.62									
Specific Gravity, Assumed	2.7	2.7									
Void Ratio, e	0.516	0.663									
Porosity, n	0.340	0.399									
Pore Volume, cc	107.81	138.53									
Saturation, %	82.6%										

## ELAPSED TIME vs. HYDRAULIC CONDUCTIVITY



Input Validation: ALO

Reviewed By: SVG

Date Tested:

11/17/2015

Note: The average Hydraulic Conductivity is calculated using the average of the last 4 determinations where all requisite flow and Hydraulic Conductivity conditions are achieved!

Prerequisites: Inflow / Outflow Ratio = 1 by definition of test procedure. Final Hydraulic Conductivity = + - 25% of average Hydraulic Conductivity when k &gt; 1E-8 cm/sec and + - 50% when k &lt; 1E-8 cm/sec.

## **LABORATORY COMPACTION CHARACTERISTICS OF SOIL**

Client	Civil & Environmental Consultants, Inc. Boring	TP-1B
Client Project	153-121.0002 Closure Construction Ce Depth	4.0'-8.0'
Project No.	36291	Sample
		Lab Sample No.

**Visual Description:** YELLOWISH BROWN LEAN CLAY WITH SAND

## **Input Validation: BLS**

Reviewed By: AJD

Date Tested: 10/06/15

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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client Civil & Environmental Consultants, Inc. Boring TP-1B  
 Client Project 153-121.0002 Closure Construction Central Waste Depth 4.0'-8.0'  
 Project No. 36291 Sample Bucket  
 Lab Sample 36291008

Sample Color: YELLOWISH BROWN  
 USCS Group Name: LEAN CLAY WITH SAND

USCS Group Symbol: CL

USDA: SILT LOAM

AASHTO: A-4 (6)

MECHANICAL SIEVE										
Total Sample	Sieve Size	Nominal Opening, mm	Dry Wt, gm	% Retained	Normalized % Finer	Project Specifications				
Total Sample Wet Wt, gm (-3")	28798	3"	75	0	100.0%					
Sample Split on Sieve	3/4"	2-1/2"	63	0	100.0%					
Coarse Washed Dry Sample, gm	457	2"	50	110.49	0.4%					
Wet Wt Passing Split, gm	28341	1-1/2"	37.5	203.66	0.8%					
Dry Wt. Passing Split, gm	24213	1"	25	27.26	0.1%					
Total Sample Dry Wt, gm	24670	3/4"	19	115.23	0.5%					
Split Sample - Passing 3/4"										
Tare No.	3003	1/2"	12.5	8.49	1.0%	97.2%				
Tare + WS., gm	1206.9	3/8"	9.5	5.08	0.6%	96.6%				
Tare + DS., gm	1058.35	No. 4	4.75	9.81	1.1%	95.5%				
Tare, gm	187.1	No. 10	2	11.91	1.3%	94.2%				
Water Content of Split Sample	17.1%	No. 20	0.85	13.51	1.5%	92.7%				
Wt. of DS., gm	871.25	No. 40	0.425	15.05	1.7%	91.0%				
Wt. of +#200 Sample, gm	172.51	No. 60	0.25	26.75	3.0%	87.9%				
		No. 140	0.106	59.84	6.7%	81.2%				
		No. 200	0.075	22.07	2.5%	78.7%				
HYDROMETER (-#200)										
Tare No.	Q51	Wt. Dispers., gm	5	Specific Gravity			2.67			
Wt. Tare + DS., gm	233.17	Wt. Dry Soil, gm (-#200)	36.9	Tested						
Wt. Tare, gm	191.27	#10 Dispersed 1min in Hamilton Beach Mixer			a Factor			0.9955		
Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)		
2	36	22.5	4.5	31.5	0.0132	85.0	0.0300	66.9%		
5	33	22.5	4.5	28.5	0.0132	76.9	0.0194	60.5%		
15	27	22.6	4.5	22.5	0.0132	60.7	0.0117	47.8%		
30	24.5	22.6	4.5	20.0	0.0132	54.0	0.0084	42.5%		
60	21.5	22.5	4.5	17.0	0.0132	45.9	0.0061	36.1%		
250	17.5	21.2	4.9	12.6	0.0134	34.0	0.0031	26.8%		
1530	14	19.7	5.4	8.6	0.0137	23.2	0.0013	18.3%		
USCS SOIL CLASSIFICATION				USDA CLASSIFICATION						
Corrected For 100% Passing a 3" Sieve				Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)	Corrected Percent of -2.0 mm Material for USDA			
% Gravel (-3" & +#4)	4.5	Silt=45.1% Clay=33.4%		100	100	Gravel 5.8	0			
Coarse=1.9; Fine=2.6		D60, mm	NA							
% Sand (-#4 & +#200)	16.8	D30, mm	NA							
Coarse=1.3; Medium=3.2; Fine=12.2		D10, mm	NA							
% Fines (-#200)	78.7	Cc	NA							
% Plus #200 (-3")	21.3	Cu	NA							
USCS Description				USDA Classification						
LEAN CLAY WITH SAND				SILT LOAM						
USCS Group Symbol	Atterberg Limits Group Symbol									
CL	CL - LEAN CLAY									
Auxiliary Information	Wt Ret, gm	% Retained	% Finer							
12" Sieve - 300 mm	0	0.0	100.0							
6" Sieve - 150 mm	0	0.0	100.0							
3" Sieve - 75 mm	0	0.0	100.0							

Input Validation

Yes

Reviewed By: SVG

Date Tested

9/21/2015

**LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS**  
**ASTM D 4318**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-1B
Client Project	153-121.0002 Closure Construction Central Waste	Depth	4.0'-8.0'
Project No.	36291	Sample	Bucket

**Soil Description:** YELLOWISH BROWN LEAN CLAY  
(-#40 Fraction)

**Input Validation:** Yes

Reviewed By: **SVG**

Date Tested: 9/21/2015

**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

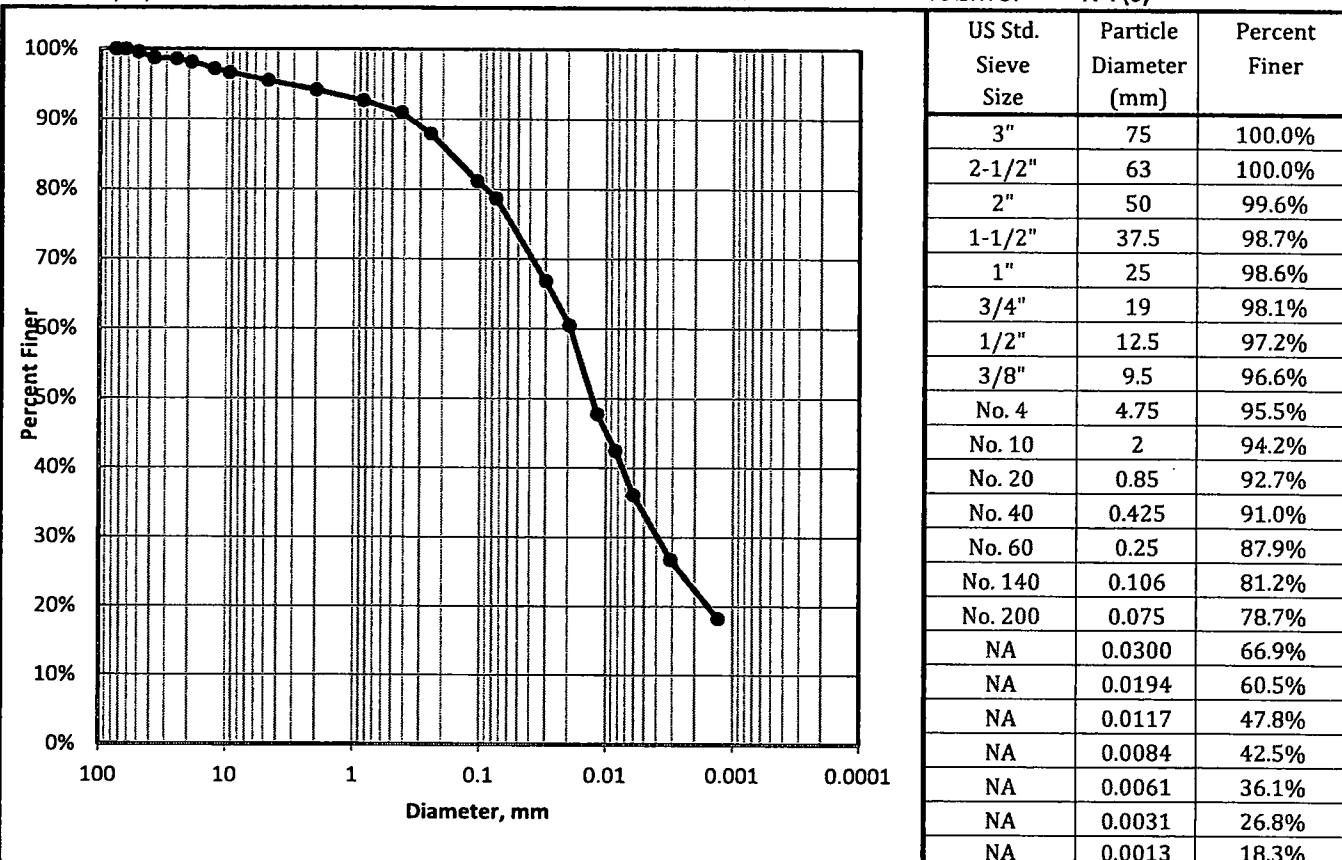
Client Civil & Environmental Consultants, Inc. Boring TP-1B  
 Client Project 153-121.0002 Closure Construction Central Waste Depth 4.0'-8.0'  
 Project No. 36291 Sample Bucket  
 Lab Sample 36291008

Sample Color: **YELLOWISH BROWN**

USCS Group Name: **LEAN CLAY WITH SAND**

USCS Group Symbol: **CL** USDA: **SILT LOAM**

AASHTO: **A-4 (6)**



USCS SOIL CLASSIFICATION			USDA CLASSIFICATION				
Corrected For 100% Passing a 3" Sieve			Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)		Corrected Percent of -2.0 mm Material for USDA
% Gravel (-3" & +#4)	4.5	Silt=45.1% Clay=33.4%			Gravel	5.8	
Coarse=1.9; Fine=2.6		D60, mm NA					0
% Sand (-#4 & +#200)	16.8	D30, mm NA					
Coarse=1.3; Medium=3.2; Fine=12.2		D10, mm NA					
% Fines (-#200)	78.7	Cc NA					
% Plus #200 (-3")	21.3	Cu NA					
USCS Description							
LEAN CLAY WITH SAND							
USCS Group Symbol	Atterberg Limits Group Symbol						
CL	CL - LEAN CLAY						
Auxiliary Information	Wt Ret, gm	% Retained	% Finer	USDA Classification			
12" Sieve - 300 mm	0	0.0	100.0	SILT LOAM			
6" Sieve - 150 mm	0	0.0	100.0				
3" Sieve - 75 mm	0	0.0	100.0				

### USDA CLASSIFICATION CHART

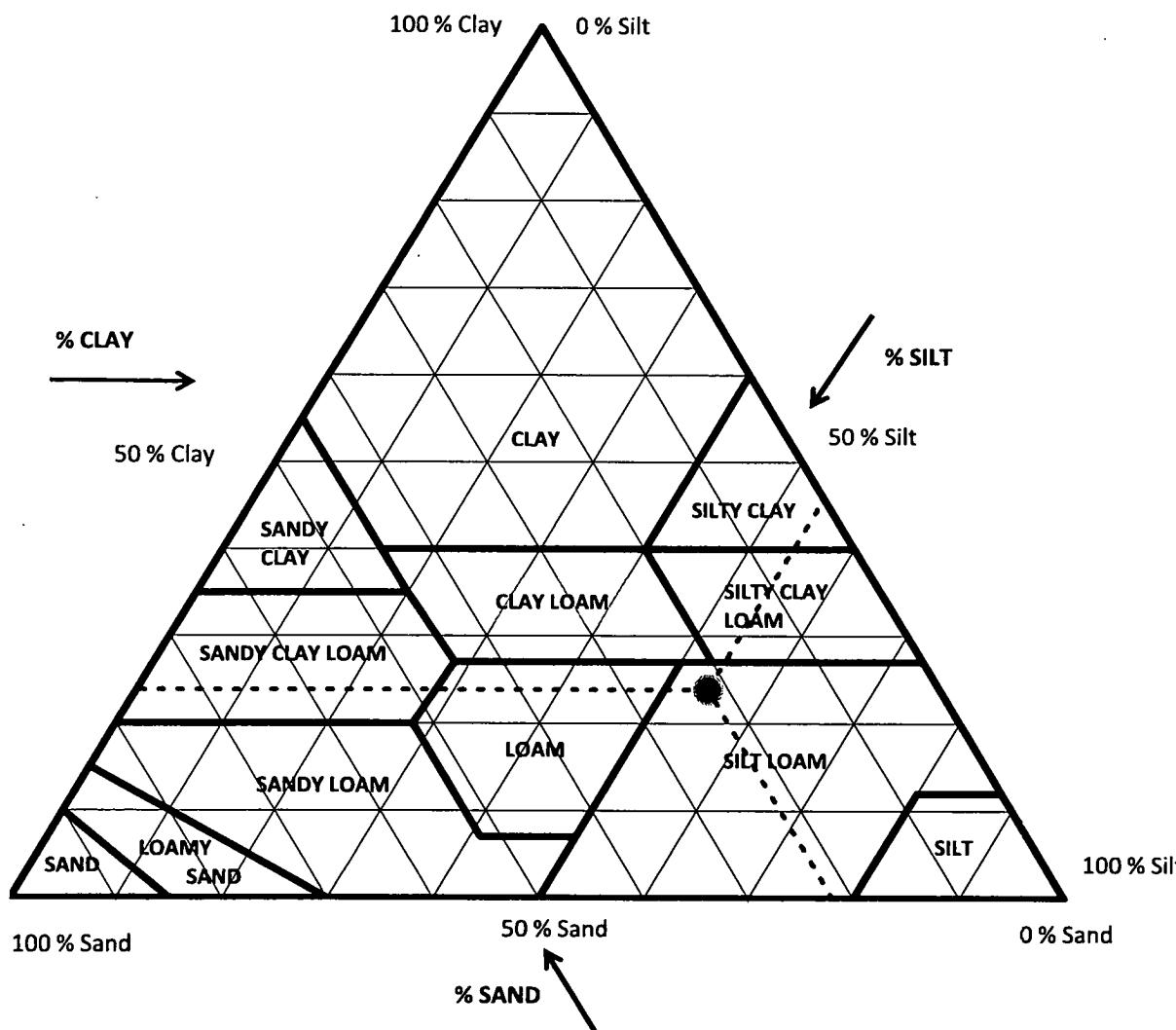
Client Civil & Environmental Consultants, Inc.  
 Client Project 153-121.0002 Closure Construction Central Waste  
 Project No. 36291  
 Boring TP-1B  
 Depth 4.0'-8.0'  
 Sample Bucket  
 Lab Sample 36291008

Sample Color: YELLOWISH BROWN  
 USCS Group Name: LEAN CLAY WITH SAND  
 USCS Group Symbol: CL

USDA: SILT LOAM

AASHTO: A-4 (6)

Corrected for 0% gravel		Sand Subsizes	
		Corrected Percentages	
Percent Gravel, %	0.0	Very Coarse Sand; 2-1	1.3
Percent Sand, %	22.0	Coarse Sand; 1-0.5	1.7
Percent Silt, %	54.2	Medium Sand; 0.5-0.25	3.6
Percent Clay, %	23.9	Fine Sand; 0.25-0.1	7.6
		Very Fine Sand; 0.1-0.05	7.7
		Total	22.0



**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client Civil & Environmental Consultants, Inc. Boring TP-2A  
 Client Project 153-121.0002 Closure Construction Central Waste Depth 0.0'-4.0'  
 Project No. 36291 Sample Bucket  
 Lab Sample 36291009

Sample Color: YELLOWISH BROWN  
 USCS Group Name: LEAN CLAY WITH SAND  
 USCS Group Symbol: CL

USDA: SILT LOAM

AASHTO: A-6 (8)

MECHANICAL SIEVE								
Total Sample	Sieve Size	Nominal Opening, mm	Dry Wt, gm	% Retained	Split Normalized % Finer	Project Specifications		
Total Sample Wet Wt, gm (-3")	23683	3"	75	0	0.0%	100.0%		
Sample Split on Sieve	3/4"	2-1/2"	63	0	0.0%	100.0%		
Coarse Washed Dry Sample, gm	101	2"	50	0	0.0%	100.0%		
Wet Wt Passing Split, gm	23582	1-1/2"	37.5	0	0.0%	100.0%		
Dry Wt. Passing Split, gm	20638	1"	25	72.07	0.3%	99.7%		
Total Sample Dry Wt, gm	20739	3/4"	19	28.8	0.1%	99.5%		
Split Sample - Passing 3/4"								
Tare No.	305	1/2"	12.5	0	0.0%	99.5%		
Tare + WS., gm	1136.1	3/8"	9.5	0	0.0%	99.5%		
Tare + DS., gm	1006.8	No. 4	4.75	4.32	0.5%	99.0%		
Tare, gm	100.5	No. 10	2	13.02	1.4%	97.6%		
Water Content of Split Sample	14.3%	No. 20	0.85	13.42	1.5%	96.1%		
Wt. of DS., gm	906.30	No. 40	0.425	18.64	2.0%	94.1%		
Wt. of +#200 Sample, gm	136.35	No. 60	0.25	24.95	2.7%	91.3%		
		No. 140	0.106	43.35	4.8%	86.6%		
		No. 200	0.075	18.65	2.0%	84.5%		
HYDROMETER (-#200)								
Tare No.	Q60	Wt. Dispers., gm	5	Specific Gravity			2.66	
Wt. Tare + DS., gm	249.58	Wt. Dry Soil, gm (-#200)	53	Tested				
Wt. Tare, gm	191.58	#10 Dispersed 1min in Hamilton Beach Mixer			a Factor	0.9977		
Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	49	22.6	4.5	44.5	0.0132	83.8	0.0267	70.8%
5	43	22.5	4.5	38.5	0.0132	72.5	0.0179	61.3%
15	34.5	22.4	4.5	30.0	0.0132	56.5	0.0111	47.7%
30	30.5	22.4	4.5	26.0	0.0132	48.9	0.0081	41.4%
60	27	22.3	4.6	22.4	0.0133	42.2	0.0059	35.6%
250	21	21.1	5.0	16.0	0.0135	30.1	0.0030	25.5%
1530	17.5	19.7	5.4	12.1	0.0137	22.8	0.0013	19.3%
USCS SOIL CLASSIFICATION				USDA CLASSIFICATION				
Corrected For 100% Passing a 3" Sieve				Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)	Corrected Percent of -2.0 mm Material for USDA	
% Gravel (-3" & +#4)	1.0	Silt=51.2% Clay=33.1%		100	100	Gravel 2.4	0	
Coarse=0.5; Fine=0.5		D60, mm	NA	2	97.6	Sand 18.5	18.9	
% Sand (#4 & +#200)	14.5	D30, mm	NA	0.05	79.2	Silt 56.7	58.1	
Coarse=1.4; Medium=3.5; Fine=9.5		D10, mm	NA	0.002	22.5	Clay 22.5	23.0	
% Fines (-#200)	84.5	Cc	NA					
% Plus #200 (-3")	15.5	Cu	NA					
USCS Description				USDA Classification				
LEAN CLAY WITH SAND				SILT LOAM				
USCS Group Symbol	Atterberg Limits Group Symbol							
CL	CL - LEAN CLAY							
Auxiliary Information	Wt Ret, gm	% Retained	% Finer					
12" Sieve - 300 mm	0	0.0	100.0					
6" Sieve - 150 mm	0	0.0	100.0					
3" Sieve - 75 mm	0	0.0	100.0					

Input Validation

Yes

Reviewed By: SVG

Date Tested

9/21/2015

## LABORATORY COMPACTION CHARACTERISTICS OF SOIL

Client	Civil & Environmental Consultants, Inc. Boring	TP-2A
Client Project	153-121.0002 Closure Construction Ce Depth	0.0'-4.0'
Project No.	36291	Sample
		Lab Sample No.
Visual Description:	YELLOWISH BROWN LEAN CLAY WITH SAND	

WET DENSITY					TEST PARAMETERS	
Mold ID	G	G	G	G	Test Method	ASTM D698
Compaction Point #	1	2	3	4	Compaction Energy	Standard
Wt. Mold & WS, gm.	6222	6298	6337	6289	Test Procedure	A
Wt. Mold, gm.	4368	4368	4368	4368	Mold Diameter, in	4
Wt. WS, gm.	1854	1930	1969	1921	Compacted Layers	3
Mold Volume, cc	943	943	943	943	Blows Per Layer	25
Wet Density, gm./cc	1.97	2.05	2.09	2.04	Rammer Weight / Fall	5.5 lbs / 12 in.
Wet Density, pcf	122.6	127.6	130.2	127.0	Size of Material Used	-#4 Sieve
					Use: <5% Retained on #4	
WATER CONTENT					OVERSIZE PARTICLE CORRECTION	
Tare Number	979	503	553	923	No Corrections Needed	
Wt. Tare & WS, gm.	1023	761.1	997.4	1028	Percent of Oversize Rock (+#4 Sieve) = <5%	
Wt. Tare & DS, gm.	929.7	681.1	883.5	876.5	(Based on As-received Screening & Soaking)	
Wt. Tare, gm.	102.4	102.4	199.1	98.6	W.C. of Finer Material, % (-#4 Sieve) = NA	
Water Content, %	11.3	13.8	16.6	19.5		
DRY DENSITY vs. WATER CONTENT					SAMPLE SUMMARY	
LABORATORY TEST VALUES						
Water Content, %	11.3	13.8	16.6	19.5	<i>Lab Optimum Water Content, %</i>	
Dry Density, pcf	110.2	112.1	111.6	106.3	<i>Lab Maximum Dry Density, pcf</i>	
Note: Maximum Density and Optimum Water Content reported from estimated best fit smooth curve!						
115.0						
110.0						
105.0						
10	11	12	13	14	15	16
Water Content, %	11.3	13.8	16.6	19.5	15.0	17.0
Dry Density, pcf	110.2	112.1	111.6	106.3	112.4	106.8

## **Input Validation: BLS**

Reviewed By: AJD

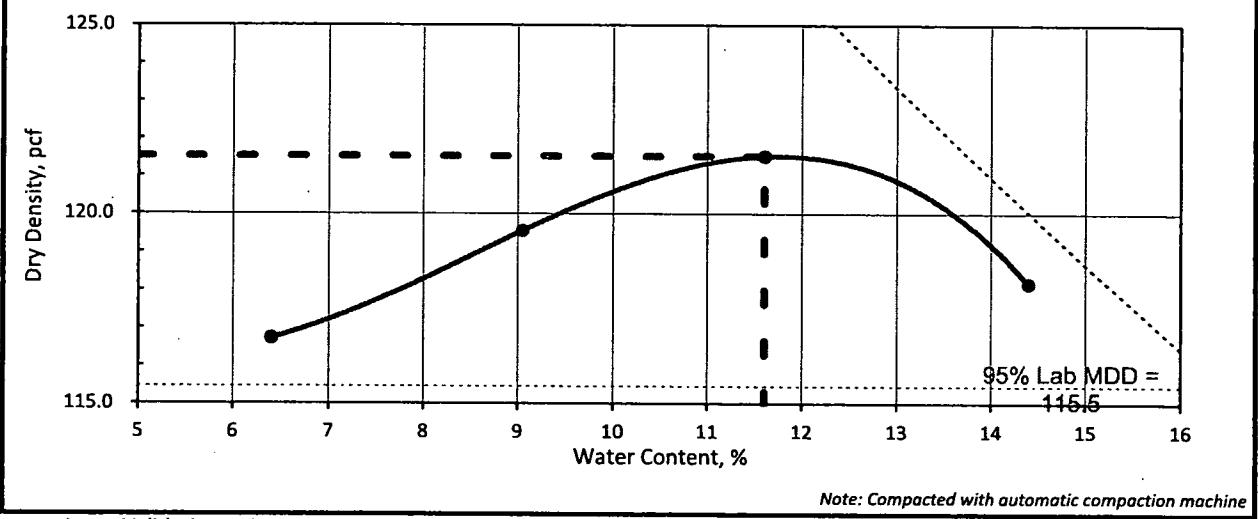
Date Tested: 10/06/15

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## LABORATORY COMPACTION CHARACTERISTICS OF SOIL

Client	Civil & Environmental Consultants, Inc. Boring	TP-2A
Client Project	153-121.0002 Closure Construction Ce Depth	0.0'-4.0'
Project No.	36291	Sample
		Lab Sample No.
		36291009

**Visual Description:** YELLOWISH BROWN LEAN CLAY WITH SAND



## **Input Validation: BLS**

Reviewed By: AJD

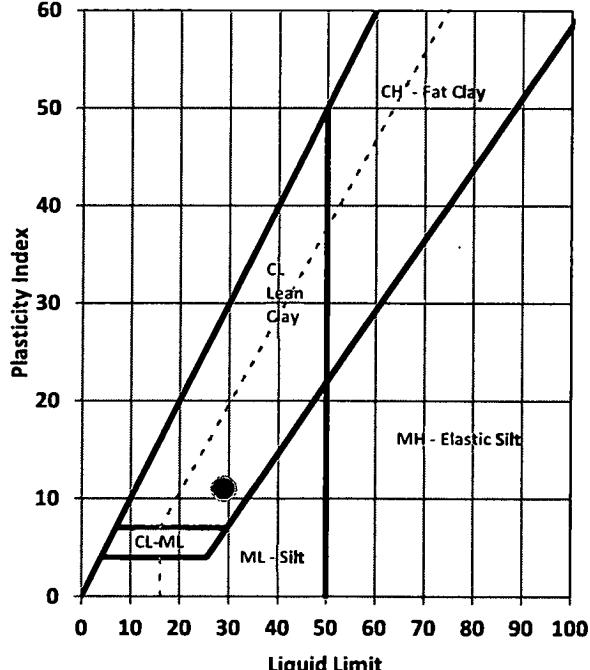
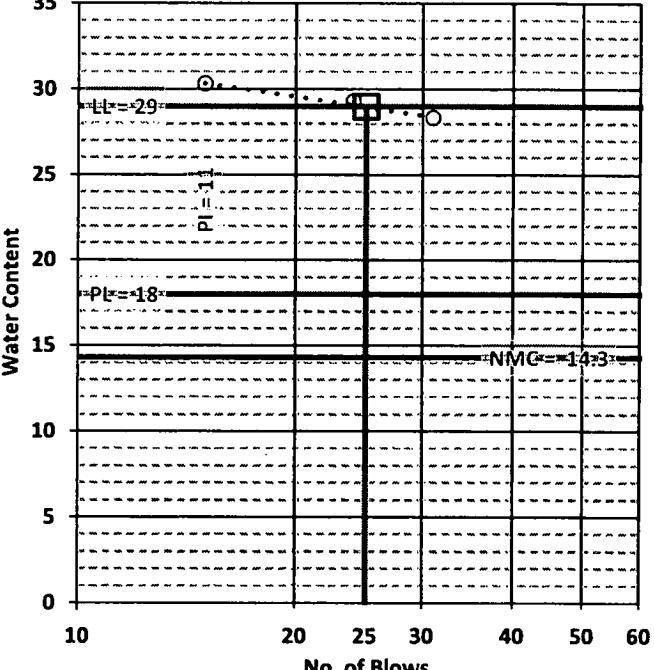
Date Tested: 10/12/15

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**LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS**  
**ASTM D 4318**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-2A
Client Project	153-121.0002 Closure Construction Central Waste	Depth	0.0'-4.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291009

Soil Description:  
 (-#40 Fraction)  
**YELLOWISH BROWN LEAN CLAY**

<b>AS-RECEIVED W.C.</b>			<b>SAMPLE SUMMARY</b>				
Tare Number	305		Activity Index = .49; Liquidity Index = -.34				
Wt. Tare & WS, gm	1136.10		Liquid Limit (LL), %	29			
Wt. Tare & DS, gm	1006.80		Plastic Limit (PL), %	18			
Wt. Tare, gm	100.50		Plasticity Index (PI)	11			
Water Content, %	14.3		USCS Group Symbol (-#40 Fraction)	CL			
			USCS Group Name (-#40 Fraction)	<b>LEAN CLAY</b>			
			Sample Color:	<b>YELLOWISH BROWN</b>			
<b>PLASTIC LIMIT</b>			<b>LIQUID LIMIT</b>				
Points Run	3 Points		3 Points				
Tare Number	255	222	224	203	262		
Wt. Tare & WS, gm	24.06	23.65	24.16	23.66	23.51		
Wt. Tare & DS, gm	22.79	22.46	22.24	21.96	21.90		
Wt. Tare, gm	15.93	15.88	15.91	16.16	16.22		
Water Content, %	18.5	18.1	30.3	29.3	28.3		
		# of Blows	15	24	31		
<b>PLASTICITY CHART</b>			<b>FLOW CURVE</b>				
Plasticity Index			Water Content				
			No. of Blows				

Input Validation: Yes

Reviewed By: SVG

Date Tested: 9/21/2015

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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-2A
Client Project	153-121.0002 Closure Construction Central Waste	Depth	0.0'-4.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291009

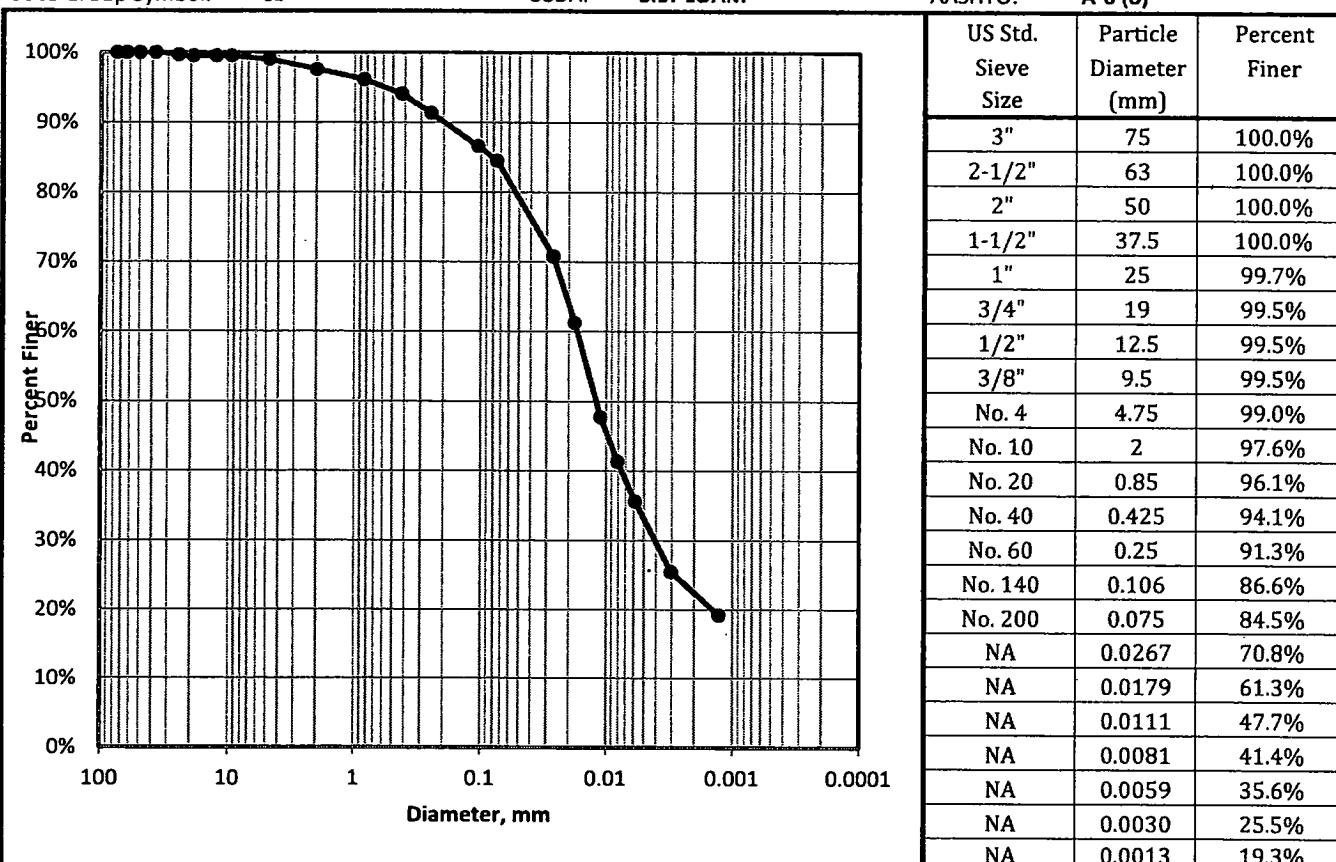
Sample Color: **YELLOWISH BROWN**

USCS Group Name: **LEAN CLAY WITH SAND**

USCS Group Symbol: **CL**

USDA: **SILT LOAM**

AASHTO: **A-6 (8)**



USCS SOIL CLASSIFICATION			USDA CLASSIFICATION				
<i>Corrected For 100% Passing a 3" Sieve</i>							
% Gravel (-3" & +#4)	1.0	Silt=51.2% Clay=33.1%	Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)		Corrected Percent of -2.0 mm Material for USDA
Coarse=0.5; Fine=0.5		D60, mm NA	100	100	Gravel	2.4	0
% Sand (-#4 & +#200)	14.5	D30, mm NA	2	97.6	Sand	18.5	18.9
Coarse=1.4; Medium=3.5; Fine=9.5		D10, mm NA	0.05	79.2	Silt	56.7	58.1
% Fines (-#200)	84.5	Cc NA	0.002	22.5	Clay	22.5	23.0
% Plus #200 (-3")	15.5	Cu NA			USDA Classification		
USCS Description					SILT LOAM		
LEAN CLAY WITH SAND							
USCS Group Symbol	Atterberg Limits Group Symbol						
CL	CL - LEAN CLAY						
Auxiliary Information	Wt Ret, gm	% Retained	% Finer				
12" Sieve - 300 mm	0	0.0	100.0				
6" Sieve - 150 mm	0	0.0	100.0				
3" Sieve - 75 mm	0	0.0	100.0				

### USDA CLASSIFICATION CHART

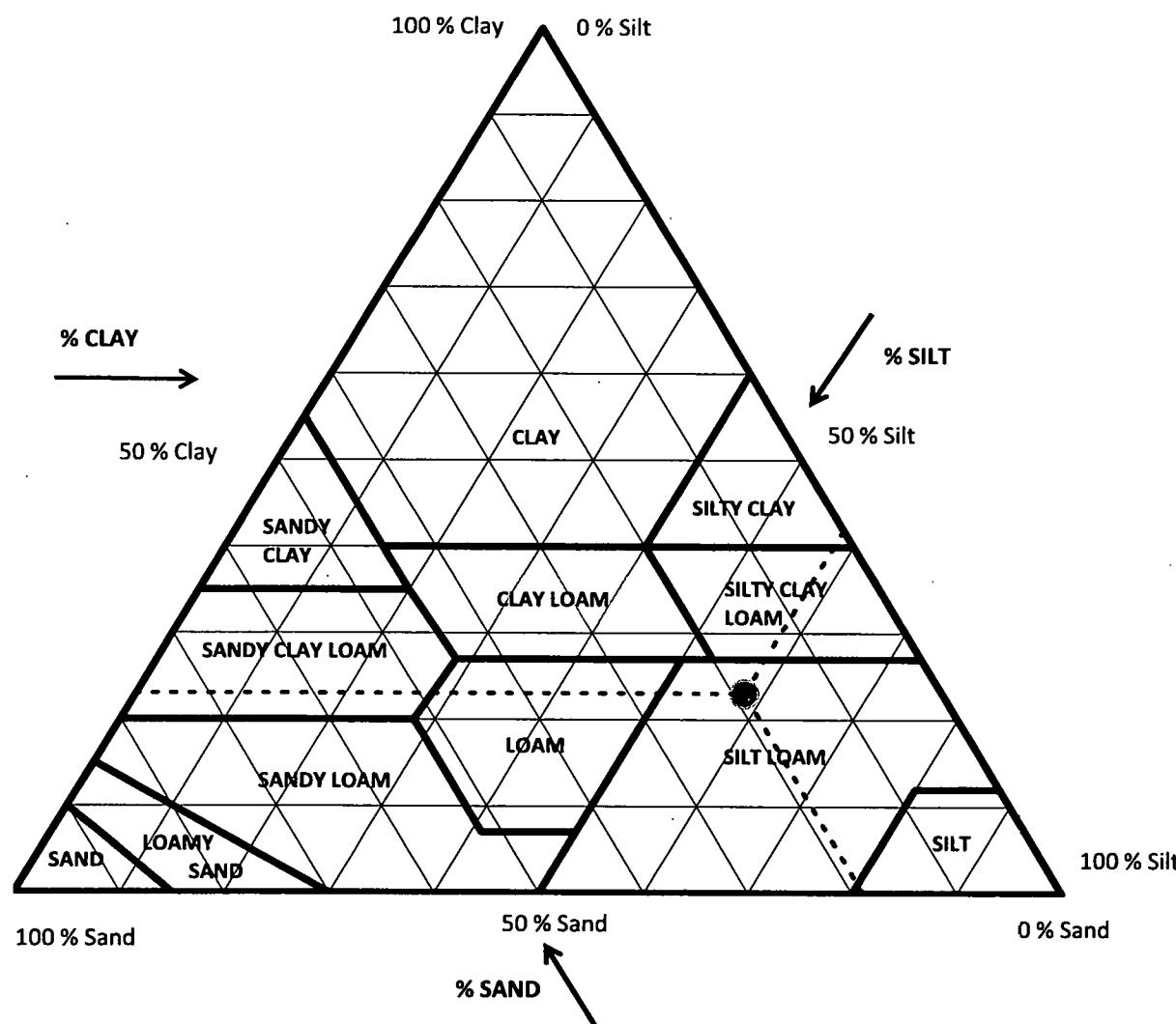
Client Civil & Environmental Consultants, Inc.  
 Client Project 153-121.0002 Closure Construction Central Waste  
 Project No. 36291  
 Boring TP-2A  
 Depth 0.0'-4.0'  
 Sample Bucket  
 Lab Sample 36291009

Sample Color: **YELLOWISH BROWN**  
 USCS Group Name: **LEAN CLAY WITH SAND**  
 USCS Group Symbol: **CL**

USDA: **SILT LOAM**

AASHTO: **A-6 (8)**

Corrected for 0% gravel		Sand Subsizes	
		Corrected Percentages	
Percent Gravel, %	0.0	Very Coarse Sand; 2-1	1.2
Percent Sand, %	18.9	Coarse Sand; 1-0.5	1.9
Percent Silt, %	58.1	Medium Sand; 0.5-0.25	3.3
Percent Clay, %	23.0	Fine Sand; 0.25-0.1	5.2
		Very Fine Sand; 0.1-0.05	7.3
		Total	18.9



## LABORATORY COMPACTION CHARACTERISTICS OF SOIL

Client Civil & Environmental Consultants, Inc. Boring TP-2B  
 Client Project 153-121.0002 Closure Construction Ce Depth 4.0'-8.0'  
 Project No. 36291 Sample Bucket  
 Lab Sample No. 36291010

Visual Description: YELLOWISH BROWN LEAN CLAY

WET DENSITY					TEST PARAMETERS			
Mold ID	D	C	D	C	Test Method	ASTM D1557		
Compaction Point #	1	2	3	4	Compaction Energy	Modified		
Wt. Mold & WS, gm.	6160	6239	6253	6212	Test Procedure	A		
Wt. Mold, gm.	4214	4216	4214	4216	Mold Diameter, in	4		
Wt. WS, gm.	1946	2023	2039	1996	Compacted Layers	5		
Mold Volume, cc	946	944	946	944	Blows Per Layer	25		
Wet Density, gm./cc	2.06	2.14	2.15	2.12	Rammer Weight / Fall	10 lbs / 18 in.		
Wet Density, pcf	128.3	133.8	134.5	132.0	Size of Material Used	-#4 Sieve		
					Use: <5% Retained on #4			
WATER CONTENT					OVERSIZE PARTICLE CORRECTION			
Tare Number	125	117	440	462	No Corrections Needed			
Wt. Tare & WS, gm.	689	780.8	713.6	719.3				
Wt. Tare & DS, gm.	630.8	701.2	629.5	624.1	Percent of Oversize Rock (+#4 Sieve) = <5%			
Wt. Tare, gm.	84.5	83.4	83.7	85.7	(Based on As-received Screening & Soaking)			
Water Content, %	10.7	12.9	15.4	17.7	W.C. of Finer Material, % (-#4 Sieve) = NA			
DRY DENSITY vs. WATER CONTENT					SAMPLE SUMMARY			
LABORATORY TEST VALUES								
Water Content, %	10.7	12.9	15.4	17.7	<i>Lab Optimum Water Content, %</i>			
Dry Density, pcf	116.0	118.5	116.5	112.2	<i>Lab Maximum Dry Density, pcf</i>			
<i>Note: Maximum Density and Optimum Water Content reported from estimated best fit smooth curve!</i>								
<i>Note: Compacted with automatic compaction machine</i>								

Input Validation: BLS

Reviewed By: AJD

Date Tested: 10/11/15

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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-2B
Client Project	153-121.0002 Closure Construction Central Waste	Depth	4.0'-8.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291010

Sample Color: **YELLOWISH BROWN**  
 USCS Group Name: **LEAN CLAY**

USCS Group Symbol: **CL**

USDA: **SILT LOAM**

AASHTO: **A-6 (11)**

MECHANICAL SIEVE										
Total Sample	Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained		% Finer		Project Specifications		
Total Sample Wet Wt, gm (-3")	21849	3"	75	0	0.0%	100.0%				
Sample Split on Sieve	3/4"	2-1/2"	63	0	0.0%	100.0%				
Coarse Washed Dry Sample, gm	23	2"	50	0	0.0%	100.0%				
Wet Wt Passing Split, gm	21826	1-1/2"	37.5	0	0.0%	100.0%				
Dry Wt. Passing Split, gm	18193	1"	25	0	0.0%	100.0%				
Total Sample Dry Wt, gm	18217	3/4"	19	23.32	0.1%	99.9%				
Split Sample - Passing 3/4"		1/2"	12.5	0	0.0%	99.9%				
Tare No.	902	3/8"	9.5	1.93	0.2%	99.6%				
Tare + WS., gm	1101.6	No. 4	4.75	2.28	0.3%	99.4%				
Tare + DS., gm	934.64	No. 10	2	3.73	0.4%	98.9%				
Tare, gm	98.4	No. 20	0.85	5.69	0.7%	98.2%				
Water Content of Split Sample	20.0%	No. 40	0.425	8.25	1.0%	97.3%				
Wt. of DS., gm	836.24	No. 60	0.25	12.01	1.4%	95.8%				
Wt. of +#200 Sample, gm	62.53	No. 140	0.106	20.26	24%	93.4%				
		No. 200	0.075	8.38	1.0%	92.4%				
HYDROMETER (-#200)										
Tare No.	3002	Wt. Dispers., gm	5	Specific Gravity		2.72				
Wt. Tare + DS., gm	229.68	Wt. Dry Soil, gm (-#200)	39.3	Tested						
Wt. Tare, gm	185.38	#10 Dispersed 1min in Hamilton Beach Mixer		a Factor		0.9846				
Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)		
2	40.5	22.5	4.5	36.0	0.0130	90.2	0.0284	83.3%		
5	36.5	22.5	4.5	32.0	0.0130	80.2	0.0186	74.1%		
15	30.5	22.3	4.6	25.9	0.0130	64.9	0.0113	60.0%		
30	27	22.3	4.6	22.4	0.0130	56.1	0.0082	51.9%		
60	23.5	22.2	4.6	18.9	0.0130	47.4	0.0059	43.8%		
250	17.5	21.2	4.9	12.6	0.0132	31.6	0.0031	29.2%		
1530	14	19.8	5.4	8.6	0.0134	21.5	0.0013	19.9%		
USCS SOIL CLASSIFICATION				USDA CLASSIFICATION						
Corrected For 100% Passing a 3" Sieve				Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)		Corrected Percent of -2.0 mm Material for USDA		
% Gravel (-3" & +#4)	0.6	Silt=52.2% Clay=40%				Gravel	1.1			
Coarse=0.1; Fine=0.5		D60, mm	NA	100	100			0		
% Sand (#4 & +#200)	7.0	D30, mm	NA			Sand	10.3			
Coarse=0.4; Medium=1.7; Fine=4.9		D10, mm	NA			Silt	64.0			
% Fines (#200)	92.4	Cc	NA			Clay	24.7			
% Plus #200 (-3")	7.6	Cu	NA	0.05	88.6			10.4		
USCS Description						Gravel	1.1			
LEAN CLAY						Sand	10.3			
USCS Group Symbol		Atterberg Limits Group Symbol				Silt	64.0			
CL		CL - LEAN CLAY				Clay	24.7			
Auxiliary Information		Wt Ret, gm	% Retained	USDA Classification						
12" Sieve - 300 mm		0	0.0	SILT LOAM						
6" Sieve - 150 mm		0	0.0							
3" Sieve - 75 mm		0	0.0							

Input Validation

Yes

Reviewed By: SVG

Date Tested

9/21/2015

## LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS

ASTM D 4318

<b>Client</b>	Civil & Environmental Consultants, Inc.	Boring	TP-2B
<b>Client Project</b>	153-121.0002 Closure Construction Central Waste	Depth	4.0'-8.0'
<b>Project No.</b>	36291	Sample	Bucket

**Soil Description:** YELLOWISH BROWN LEAN CLAY  
(-#40 Fraction)

**Input Validation:** Yes

**Reviewed By:**      **SVG**

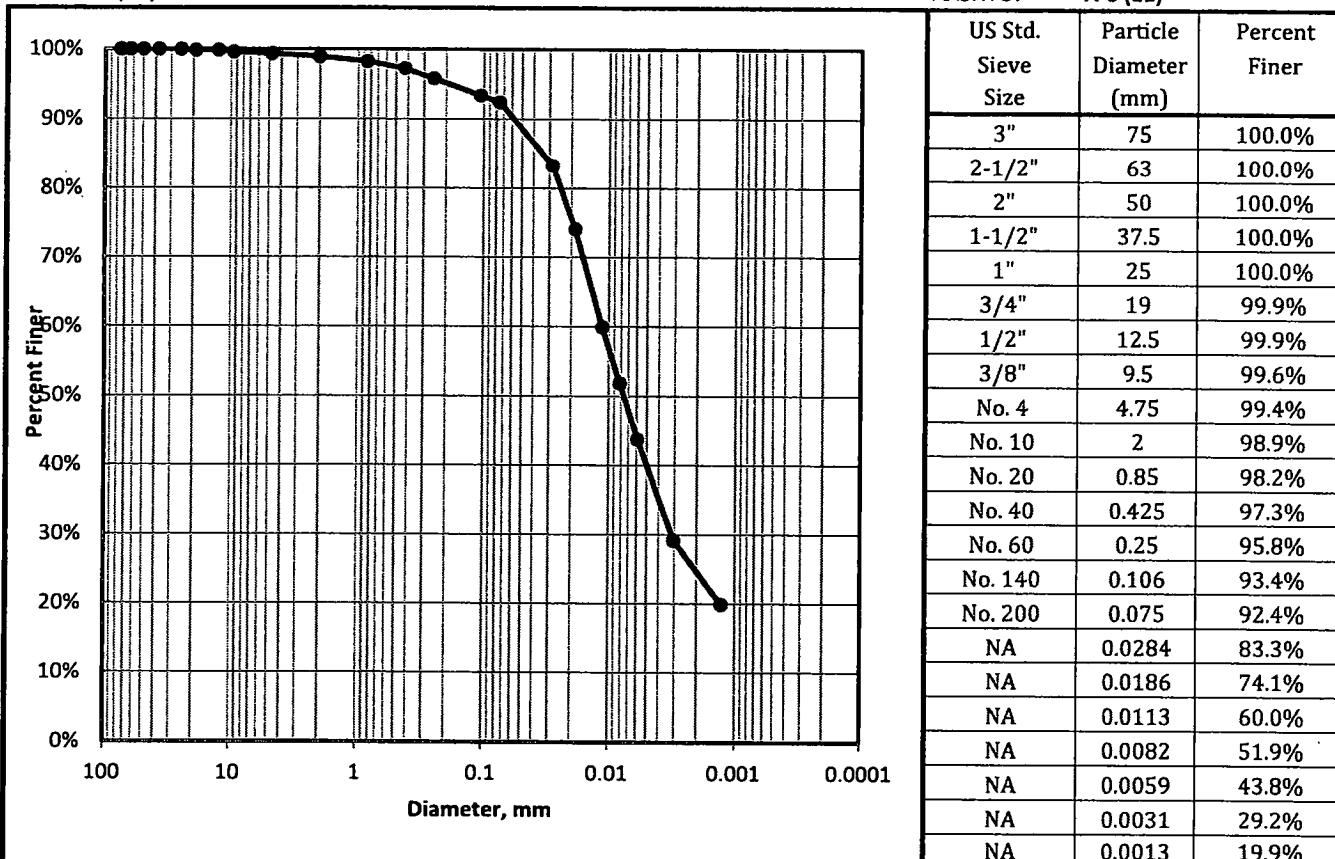
Date Tested: 9/21/2015

**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-2B
Client Project	153-121.0002 Closure Construction Central Waste	Depth	4.0'-8.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291010

Sample Color: **YELLOWISH BROWN**  
 USCS Group Name: **LEAN CLAY**  
 USCS Group Symbol: **CL**      USDA: **SILT LOAM**

AASHTO: **A-6 (11)**



USCS SOIL CLASSIFICATION			USDA CLASSIFICATION			
<i>Corrected For 100% Passing a 3" Sieve</i>						
% Gravel (-3" & +#4)	0.6	Silt=52.2% Clay=40%	Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)	Corrected Percent of -2.0 mm Material for USDA
Coarse=0.1; Fine=0.5		D60, mm NA	100	100	Gravel 1.1	0
% Sand (-#4 & +#200)	7.0	D30, mm NA	2	98.9	Sand 10.3	10.4
Coarse=0.4; Medium=1.7; Fine=4.9		D10, mm NA	0.05	88.6	Silt 64.0	64.7
% Fines (-#200)	92.4	Cc NA	0.002	24.7	Clay 24.7	24.9
% Plus #200 (-3")	7.6	Cu NA				
USCS Description			USDA Classification			
LEAN CLAY			SILT LOAM			
USCS Group Symbol	Atterberg Limits Group Symbol					
CL	CL - LEAN CLAY					
Auxiliary Information	Wt Ret, gm	% Retained	% Finer			
12" Sieve - 300 mm	0	0.0	100.0	USDA Classification		
6" Sieve - 150 mm	0	0.0	100.0	SILT LOAM		
3" Sieve - 75 mm	0	0.0	100.0			

### USDA CLASSIFICATION CHART

Client Civil & Environmental Consultants, Inc.  
 Client Project 153-121.0002 Closure Construction Central Waste  
 Project No. 36291  
 Boring TP-2B  
 Depth 4.0'-8.0'  
 Sample Bucket  
 Lab Sample 36291010

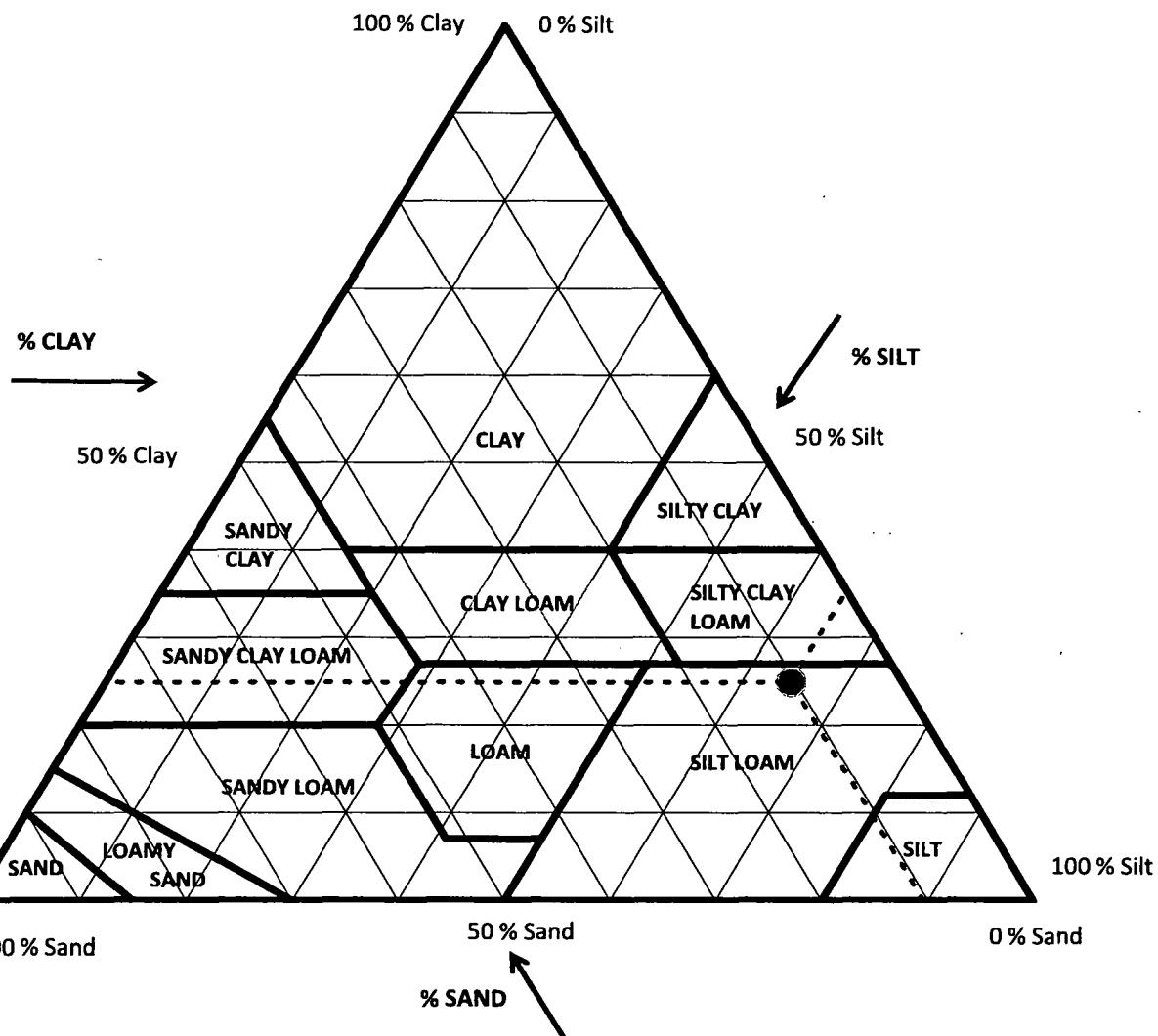
Sample Color: **YELLOWISH BROWN**  
 USCS Group Name: **LEAN CLAY**

USCS Group Symbol: **CL**

USDA: **SILT LOAM**

AASHTO: **A-6 (11)**

Corrected for 0% gravel		Sand Subsizes Corrected Percentages	
Percent Gravel, %	0.0	Very Coarse Sand; 2-1	0.6
Percent Sand, %	10.4	Coarse Sand; 1-0.5	0.9
Percent Silt, %	64.7	Medium Sand; 0.5-0.25	1.7
Percent Clay, %	24.9	Fine Sand; 0.25-0.1	2.6
		Very Fine Sand; 0.1-0.05	4.7
		Total	10.4



## LABORATORY COMPACTION CHARACTERISTICS OF SOIL

Client Civil & Environmental Consultants, Inc. Boring TP-3A  
 Client Project 153-121.0002 Closure Construction Ce Depth 0.0'-4.0'  
 Project No. 36291 Sample Bucket  
 Lab Sample No. 36291011  
 Visual Description: LIGHT OLIVE BROWN LEAN CLAY

WET DENSITY					TEST PARAMETERS	
Mold ID	C	C	D	C	Test Method	ASTM D1557
Compaction Point #	1	2	3	4	Compaction Energy	Modified
Wt. Mold & WS, gm.	6095	6204	6250	6251	Test Procedure	A
Wt. Mold, gm.	4216	4216	4214	4216	Mold Diameter, in	4
Wt. WS, gm.	1879	1988	2036	2035	Compacted Layers	5
Mold Volume, cc	944	944	946	944	Blows Per Layer	25
Wet Density, gm./cc	1.99	2.11	2.15	2.16	Rammer Weight / Fall	10 lbs / 18 in.
Wet Density, pcf	124.3	131.5	134.3	134.6	Size of Material Used	-#4 Sieve
					Use: <5% Retained on #4	
WATER CONTENT					OVERSIZE PARTICLE CORRECTION	
Tare Number	831	460	53	453	No Corrections Needed	
Wt. Tare & WS, gm.	899.7	870.6	779.6	713.7		
Wt. Tare & DS, gm.	828.2	780.9	689.4	623.9	Percent of Oversize Rock (+#4 Sieve) = <5%	
Wt. Tare, gm.	102.4	85.6	84.6	85.4	(Based on As-received Screening & Soaking)	
Water Content, %	9.9	12.9	14.9	16.7	W.C. of Finer Material, % (+#4 Sieve) = NA	
DRY DENSITY vs. WATER CONTENT					SAMPLE SUMMARY	
LABORATORY TEST VALUES						
Water Content, %	9.9	12.9	14.9	16.7	Lab Optimum Water Content, %	14.4
Dry Density, pcf	113.1	116.4	116.8	115.3	Lab Maximum Dry Density, pcf	116.9
<i>Note: Maximum Density and Optimum Water Content reported from estimated best fit smooth curve!</i>						
<i>Note: Compacted with automatic compaction machine</i>						

Input Validation: BLS

Reviewed By: AJD

Date Tested: 10/12/15

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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-3A
Client Project	153-121.0002 Closure Construction Central Waste	Depth	0.0'-4.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291011

Sample Color: **LIGHT OLIVE BROWN**  
 USCS Group Name: **LEAN CLAY**

USCS Group Symbol: **CL**

USDA: **SILTY CLAY LOAM**

AASHTO: **A-6 (19)**

MECHANICAL SIEVE												
Total Sample	Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained		Project Specifications						
Total Sample Wet Wt, gm (-3")	20942	3"	75	0.0%		100.0%						
Sample Split on Sieve	3/4"	2-1/2"	63	0.0%		100.0%						
Coarse Washed Dry Sample, gm	46	2"	50	0.0%		100.0%						
Wet Wt Passing Split, gm	20896	1-1/2"	37.5	0.0%		100.0%						
Dry Wt. Passing Split, gm	17781	1"	25	46.11	0.3%	99.7%						
Total Sample Dry Wt, gm	17827	3/4"	19	0	0.0%	99.7%						
Split Sample - Passing 3/4"												
Tare No.	507	1/2"	12.5	0	0.0%	99.7%						
Tare + WS., gm	1157.8	3/8"	9.5	4.01	0.4%	99.3%						
Tare + DS., gm	1000.48	No. 4	4.75	3.75	0.4%	98.9%						
Tare, gm	102.6	No. 10	2	7.93	0.9%	98.0%						
Water Content of Split Sample	17.5%	No. 20	0.85	10.06	1.1%	96.9%						
Wt. of DS., gm	897.88	No. 40	0.425	13.8	1.5%	95.3%						
Wt. of +#200 Sample, gm	108.54	No. 60	0.25	22.91	2.5%	92.8%						
		No. 140	0.106	35.01	3.9%	88.9%						
		No. 200	0.075	11.07	1.2%	87.7%						
HYDROMETER (#200)												
Tare No.	1011	Wt. Dispers., gm	5	Specific Gravity		2.71						
Wt. Tare + DS., gm	233.67	Wt. Dry Soil, gm (-#200)	36.54	Tested								
Wt. Tare, gm	192.13	#10 Dispersed 1min in Hamilton Beach Mixer			a Factor	0.9868						
Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)				
2	39	22.5	4.5	34.5	0.0130	93.2	0.0289	81.7%				
5	37	22.5	4.5	32.5	0.0130	87.8	0.0186	77.0%				
15	33	22.5	4.5	28.5	0.0130	77.0	0.0111	67.5%				
30	30	22.5	4.5	25.5	0.0130	68.9	0.0080	60.4%				
60	27	22.4	4.5	22.5	0.0131	60.8	0.0058	53.3%				
250	22.5	21.4	4.9	17.6	0.0132	47.5	0.0030	41.7%				
1530	18.5	19.8	5.4	13.1	0.0135	35.4	0.0013	31.0%				
USCS SOIL CLASSIFICATION				USDA CLASSIFICATION								
Corrected For 100% Passing a 3" Sieve				Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)	Corrected Percent of -2.0 mm Material for USDA					
% Gravel (-3" & +#4)	1.1	Silt=36.8% Clay=50.8%										
Coarse=0.3; Fine=0.9		D60, mm	NA	0.05	85.1	Gravel 2.0	0					
% Sand (-#4 & +#200)	11.2	D30, mm	NA									
Coarse=0.9; Medium=2.7; Fine=7.7		D10, mm	NA									
% Fines (-#200)	87.7	Cc	NA									
% Plus #200 (-3")	12.3	Cu	NA	0.002	36.8	Sand 12.9	13.1					
USCS Description												
LEAN CLAY												
USCS Group Symbol	Atterberg Limits Group Symbol											
CL	CL - LEAN CLAY											
Auxiliary Information	Wt Ret, gm	% Retained	% Finer	USDA Classification								
12" Sieve - 300 mm	0	0.0	100.0	SILTY CLAY LOAM								
6" Sieve - 150 mm	0	0.0	100.0									
3" Sieve - 75 mm	0	0.0	100.0									

Input Validation

Yes

Reviewed By: SVG

Date Tested

9/21/2015

**LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS**  
**ASTM D 4318**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-3A
Client Project	153-121.0002 Closure Construction Central Waste	Depth	0.0'-4.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291011

Soil Description: **LIGHT OLIVE BROWN LEAN CLAY**  
 (-#40 Fraction)

<b>AS-RECEIVED W.C.</b>			<b>SAMPLE SUMMARY</b>				
Tare Number	507		Activity Index = .57; Liquidity Index = -.07				
Wt. Tare & WS, gm	1157.80		Liquid Limit (LL), %	40			
Wt. Tare & DS, gm	1000.48		Plastic Limit (PL), %	19			
Wt. Tare, gm	102.60		Plasticity Index (PI)	21			
Water Content, %	17.5		USCS Group Symbol (-#40 Fraction)	CL			
			USCS Group Name (-#40 Fraction)	LEAN CLAY			
			Sample Color:	LIGHT OLIVE BROWN			
<b>PLASTIC LIMIT</b>			<b>LIQUID LIMIT</b>				
Points Run	3 Points		3 Points				
Tare Number	264	223	220	233	225		
Wt. Tare & WS, gm	21.91	22.45	22.98	23.13	22.79		
Wt. Tare & DS, gm	20.96	21.43	21.88	20.98	20.84		
Wt. Tare, gm	15.90	16.05	15.97	15.86	16.05		
Water Content, %	18.8	19.0	18.6	42.0	40.7		
			# of Blows	18	23		
					29		
<b>PLASTICITY CHART</b>			<b>FLOW CURVE</b>				
Plasticity Index	60 50 40 30 20 10 0		Water Content	45 40 35 30 25 20 15 10 5 0			
Liquid Limit	0 10 20 30 40 50 60 70 80 90 100		No. of Blows	10 20 30 40 50 60			

Input Validation: Yes

Reviewed By: SVG

Date Tested: 9/21/2015

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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-3A
Client Project	153-121.0002 Closure Construction Central Waste	Depth	0.0'-4.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291011

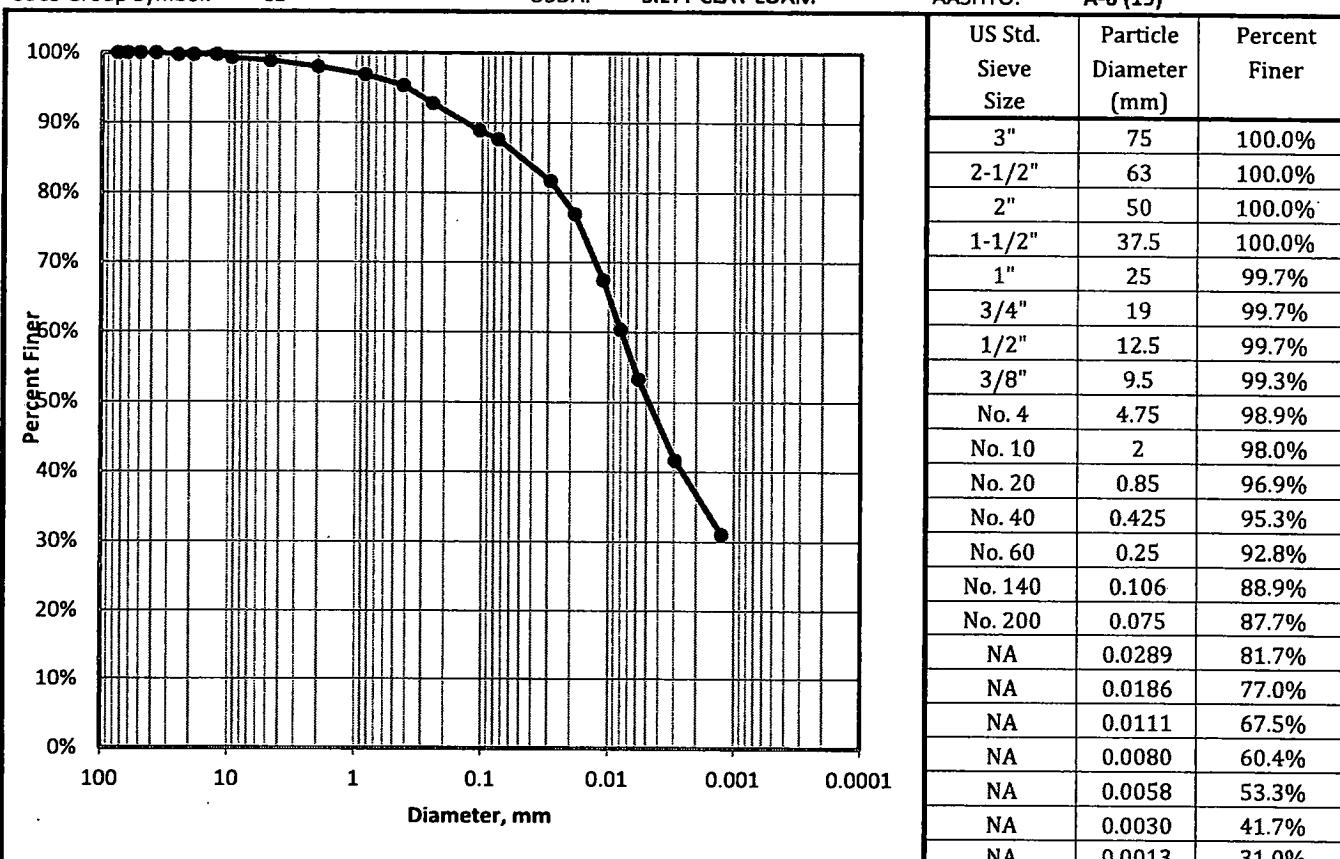
Sample Color: **LIGHT OLIVE BROWN**

USCS Group Name: **LEAN CLAY**

USCS Group Symbol: **CL**

USDA: **SILTY CLAY LOAM**

AASHTO: **A-6 (19)**



USCS SOIL CLASSIFICATION			USDA CLASSIFICATION			
<i>Corrected For 100% Passing a 3" Sieve</i>						
% Gravel (-3" & +#4)	1.1	Silt=36.8% Clay=50.8%	Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)	Corrected Percent of -2.0 mm Material for USDA
Coarse=0.3; Fine=0.9		D60, mm NA	100 2 0.05 0.002	100 98.0 85.1 36.8	Gravel 2.0 Sand 12.9 Silt 48.3 Clay 36.8	0 13.1 49.3 37.6
% Sand (#4 & +#200)	11.2	D30, mm NA				
Coarse=0.9; Medium=2.7; Fine=7.7		D10, mm NA				
% Fines (#200)	87.7	Cc NA				
% Plus #200 (-3")	12.3	Cu NA				
USCS Description			USDA Classification			
LEAN CLAY			SILTY CLAY LOAM			
USCS Group Symbol	Atterberg Limits Group Symbol					
CL	CL - LEAN CLAY					
Auxiliary Information	Wt Ret, gm	% Retained	% Finer			
12" Sieve - 300 mm	0	0.0	100.0			
6" Sieve - 150 mm	0	0.0	100.0			
3" Sieve - 75 mm	0	0.0	100.0			

### USDA CLASSIFICATION CHART

Client Civil & Environmental Consultants, Inc.  
 Client Project 153-121.0002 Closure Construction Central Waste  
 Project No. 36291  
 Boring TP-3A  
 Depth 0.0'-4.0'  
 Sample Bucket  
 Lab Sample 36291011

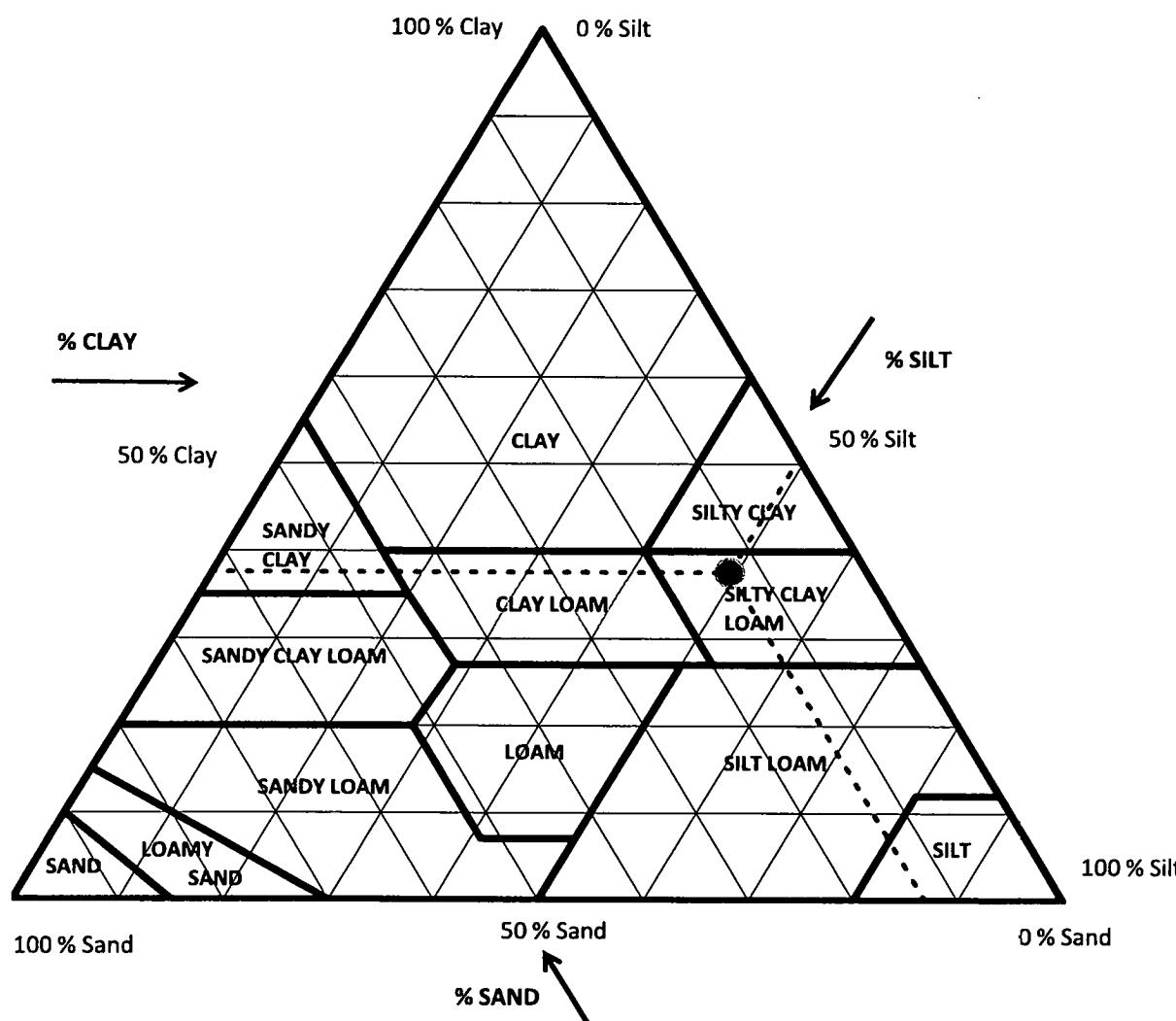
Sample Color: LIGHT OLIVE BROWN  
 USCS Group Name: LEAN CLAY

USCS Group Symbol: CL

USDA: SILTY CLAY LOAM

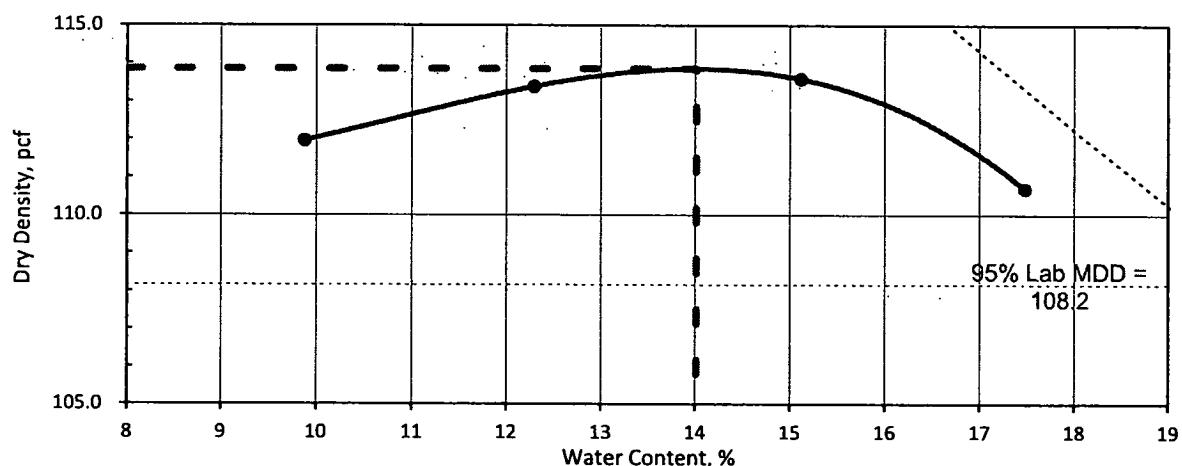
AASHTO: A-6 (19)

Corrected for 0% gravel		Sand Subsizes	
		Corrected Percentages	
Percent Gravel, %	0.0	Very Coarse Sand; 2-1	0.9
Percent Sand, %	13.1	Coarse Sand; 1-0.5	1.4
Percent Silt, %	49.3	Medium Sand; 0.5-0.25	3.0
Percent Clay, %	37.6	Fine Sand; 0.25-0.1	4.2
		Very Fine Sand; 0.1-0.05	3.6
		Total	13.1



## LABORATORY COMPACTION CHARACTERISTICS OF SOIL

Client	Civil & Environmental Consultants, Inc. Boring	TP-3B
Client Project	153-121.0002 Closure Construction Ce Depth	4.0'-8.0'
Project No.	36291	Sample
		Bucket
		Lab Sample No.
		36291012
Visual Description:	YELLOWISH BROWN LEAN CLAY WITH SAND	



*Note: Compacted using manual hammer.*

## **Input Validation: BLS**

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Reviewed By: AID

Date Tested: 10/06/15

REVIEWED BY: ADD DATE TESTED: 10/08/13  
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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-3B
Client Project	153-121.0002 Closure Construction Central Waste	Depth	4.0'-8.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291012

Sample Color: **YELLOWISH BROWN**  
 USCS Group Name: **LEAN CLAY WITH SAND**  
 USCS Group Symbol: **CL**

USDA: **SILT LOAM**

AASHTO: **A-6 (8)**

MECHANICAL SIEVE												
Total Sample	Sieve Size	Nominal Opening, mm	Dry Wt, gm	% Retained	Split Normalized % Finer	Project Specifications						
Total Sample Wet Wt, gm (-3")	25103	3/4"	3" 75 0	0.0%	100.0%							
Sample Split on Sieve	3/4"	2-1/2"	63 0	0.0%	100.0%							
Coarse Washed Dry Sample, gm	272	2"	50 0	0.0%	100.0%							
Wet Wt Passing Split, gm	24831	1-1/2"	37.5 0	0.0%	100.0%							
Dry Wt. Passing Split, gm	21464	1"	25 124.21	0.6%	99.4%							
Total Sample Dry Wt, gm	21736	3/4"	19 147.84	0.7%	98.7%							
Split Sample - Passing 3/4"												
Tare No.	520	1/2"	12.5 0	0.0%	98.7%							
Tare + WS., gm	1135.1	3/8"	9.5 7.29	0.8%	97.9%							
Tare + DS., gm	995	No. 4	4.75 8.94	1.0%	97.0%							
Tare, gm	101.9	No. 10	2 14.99	1.7%	95.3%							
Water Content of Split Sample	15.7%	No. 20	0.85 17.25	1.9%	93.4%							
Wt. of DS., gm	893.10	No. 40	0.425 17.15	1.9%	91.5%							
Wt. of +#200 Sample, gm	168.40	No. 60	0.25 27.4	3.0%	88.5%							
		No. 140	0.106 55.38	6.1%	82.3%							
		No. 200	0.075 20	2.2%	80.1%							
HYDROMETER (-#200)												
Tare No.	1009	Wt. Dispers., gm	5	Specific Gravity		2.66						
Wt. Tare + DS., gm	234.29	Wt. Dry Soil, gm (-#200)	34.38	Tested								
Wt. Tare, gm	194.91	-#10 Dispersed 1min in Hamilton Beach Mixer			a Factor	0.9977						
Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)				
2	35.5	22.5	4.5	31.0	0.0132	90.0	0.0302	72.1%				
5	32	22.5	4.5	27.5	0.0132	79.8	0.0196	63.9%				
15	28	22.5	4.5	23.5	0.0132	68.2	0.0116	54.6%				
30	24.5	22.6	4.5	20.0	0.0132	58.0	0.0084	46.5%				
60	22	22.4	4.5	17.5	0.0132	50.8	0.0061	40.7%				
250	17.5	21.3	4.9	12.6	0.0134	36.6	0.0031	29.3%				
1530	14.5	19.9	5.4	9.1	0.0137	26.4	0.0013	21.2%				
USCS SOIL CLASSIFICATION				USDA CLASSIFICATION								
Corrected For 100% Passing a 3" Sieve				Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)	Corrected Percent of -2.0 mm Material for USDA	0				
% Gravel (-3" & #4)	3.0	Silt=42.6% Clay=37.4%	D60, mm NA									
Coarse=1.3; Fine=1.8				0.05	76.5	Gravel 4.7	19.7	53.9				
% Sand (#4 & #200)	16.8	D30, mm NA										
Coarse=1.7; Medium=3.8; Fine=11.4		D10, mm NA										
% Fines (#200)	80.1	Cc NA										
% Plus #200 (-3")	19.9	Cu NA										
USCS Description				USDA Classification								
LEAN CLAY WITH SAND				SILT LOAM								
USCS Group Symbol	Atterberg Limits Group Symbol											
CL	CL - LEAN CLAY											
Auxiliary Information	Wt Ret, gm	% Retained	% Finer									
12" Sieve - 300 mm	0	0.0	100.0									
6" Sieve - 150 mm	0	0.0	100.0									
3" Sieve - 75 mm	0	0.0	100.0									

Input Validation

Yes

Reviewed By: SVG

Date Tested

9/21/2015

**LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS**

**ASTM D 4318**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-3B
Client Project	153-121.0002 Closure Construction Central Waste	Depth	4.0'-8.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291012

**Soil Description:** YELLOWISH BROWN LEAN CLAY  
 (-#40 Fraction)

AS-RECEIVED W.C.			SAMPLE SUMMARY		
Tare Number			Activity Index = .48; Liquidity Index = -.11		
Wt. Tare & WS, gm			Liquid Limit (LL), %		
Wt. Tare & DS, gm			29		
Wt. Tare, gm			Plastic Limit (PL), %		
Water Content, %			17		
			Plasticity Index (PI)		
			12		
			USCS Group Symbol (-#40 Fraction)		
			CL		
			USCS Group Name (-#40 Fraction)		
			LEAN CLAY		
			Sample Color:		
			YELLOWISH BROWN		
PLASTIC LIMIT			LIQUID LIMIT		
Points Run			3 Points		
Tare Number	201	218	222	221	265
Wt. Tare & WS, gm	23.25	22.57	23.34	23.18	22.93
Wt. Tare & DS, gm	22.24	21.56	22.26	21.50	21.36
Wt. Tare, gm	16.18	15.94	15.89	15.88	15.97
Water Content, %	16.7	18.0	17.0	29.9	29.1
			# of Blows	16	21
					29
PLASTICITY CHART			FLOW CURVE		

Input Validation: Yes

Reviewed By: SVG

Date Tested: 9/21/2015

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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

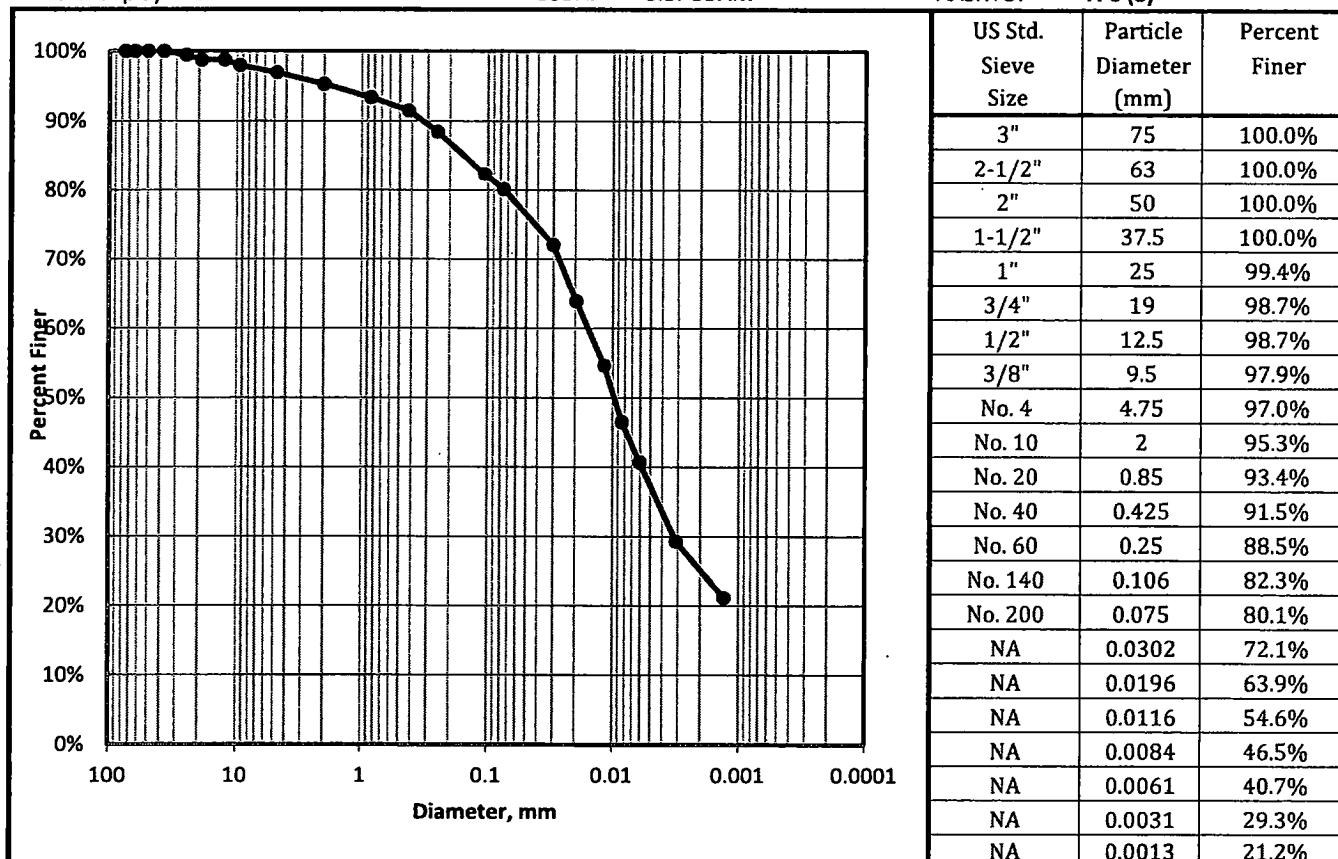
Client	Civil & Environmental Consultants, Inc.	Boring	TP-3B
Client Project	153-121.0002 Closure Construction Central Waste	Depth	4.0'-8.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291012

Sample Color: **YELLOWISH BROWN**

USCS Group Name: **LEAN CLAY WITH SAND**

USCS Group Symbol: **CL** USDA: **SILT LOAM**

AASHTO: **A-6 (8)**



USCS SOIL CLASSIFICATION			USDA CLASSIFICATION			
<i>Corrected For 100% Passing a 3" Sieve</i>						
% Gravel (-3" & +#4)	3.0	Silt=42.6% Clay=37.4%	Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)	Corrected Percent of -2.0 mm Material for USDA
Coarse=1.3; Fine=1.8		D60, mm NA	100	100	Gravel 4.7	0
% Sand (#4 & +#200)	16.8	D30, mm NA	2	95.3	Sand 18.7	19.7
Coarse=1.7; Medium=3.8; Fine=11.4		D10, mm NA	0.05	76.5	Silt 51.4	53.9
% Fines (#200)	80.1	Cc NA	0.002	25.2	Clay 25.2	26.4
% Plus #200 (-3")	19.9	Cu NA				
USCS Description			USDA Classification			
<b>LEAN CLAY WITH SAND</b>			<b>SILT LOAM</b>			
USCS Group Symbol	Atterberg Limits Group Symbol					
CL	<b>CL - LEAN CLAY</b>					
Auxiliary Information	Wt Ret, gm	% Retained	% Finer			
12" Sieve - 300 mm	0	0.0	100.0			
6" Sieve - 150 mm	0	0.0	100.0			
3" Sieve - 75 mm	0	0.0	100.0			

### USDA CLASSIFICATION CHART

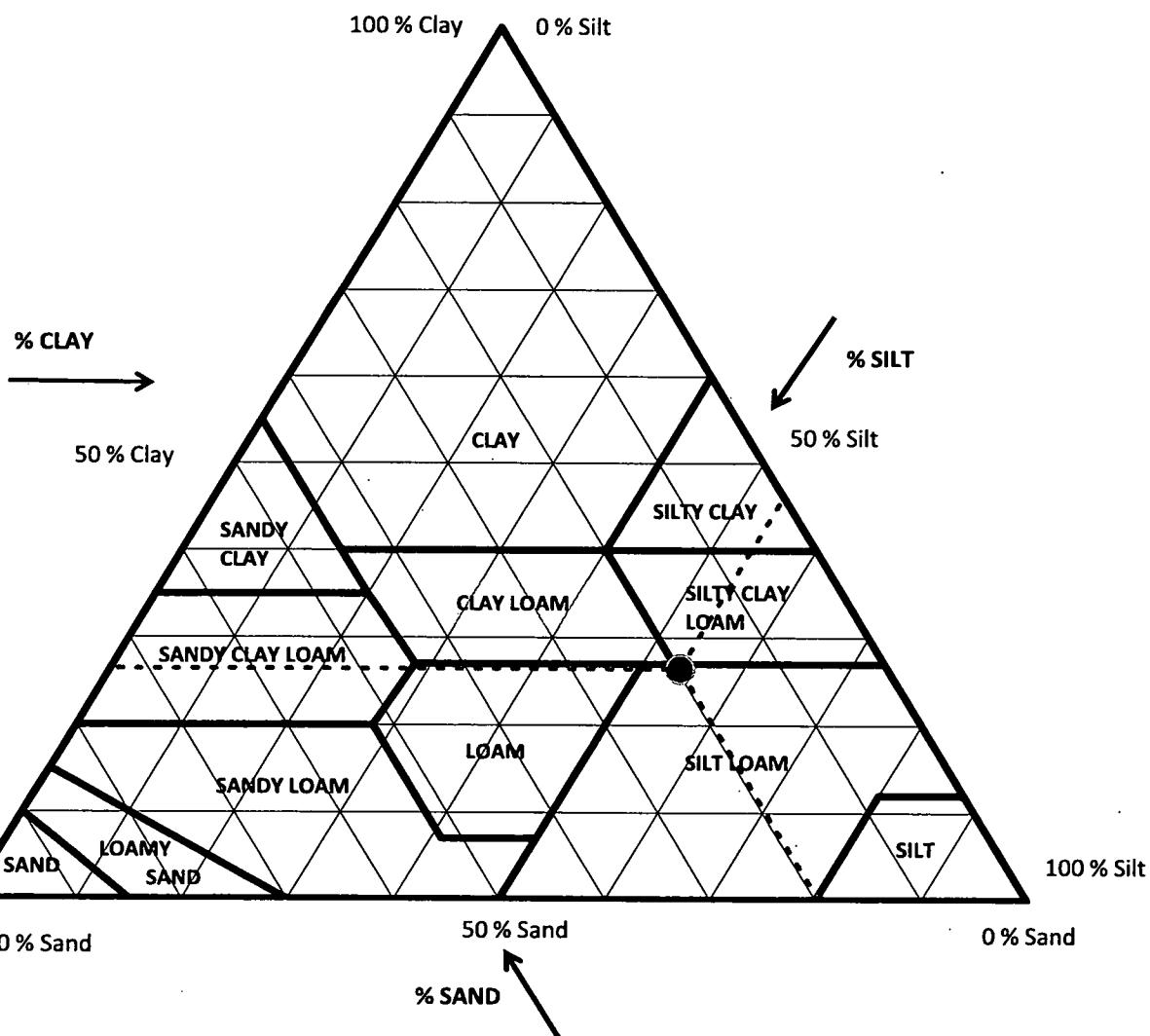
Client Civil & Environmental Consultants, Inc. Boring TP-3B  
 Client Project 153-121.0002 Closure Construction Central Waste Depth 4.0'-8.0'  
 Project No. 36291 Sample Bucket  
 Lab Sample 36291012

Sample Color: YELLOWISH BROWN  
 USCS Group Name: LEAN CLAY WITH SAND  
 USCS Group Symbol: CL

USDA: SILT LOAM

AASHTO: A-6 (8)

Corrected for 0% gravel		Sand Subsizes Corrected Percentages	
Percent Gravel, %	0.0	Very Coarse Sand; 2-1	1.6
Percent Sand, %	19.7	Coarse Sand; 1-0.5	1.9
Percent Silt, %	53.9	Medium Sand; 0.5-0.25	3.6
Percent Clay, %	26.4	Fine Sand; 0.25-0.1	6.8
		Very Fine Sand; 0.1-0.05	5.7
		Total	19.7



## LABORATORY COMPACTION CHARACTERISTICS OF SOIL

Client Civil & Environmental Consultants, Inc. Boring TP-4A  
 Client Project 153-121.0002 Closure Construction Ce Depth 0.0'-4.0'  
 Project No. 36291 Sample Bucket  
 Lab Sample No. 36291013

Visual Description: YELLOWISH BROWN LEAN CLAY WITH SAND

WET DENSITY					TEST PARAMETERS	
Mold ID	G	G	G	G	Test Method	ASTM D698
Compaction Point #	1	2	3	4	Compaction Energy	Standard
Wt. Mold & WS, gm.	6166	6245	6298	6306	Test Procedure	A
Wt. Mold, gm.	4368	4368	4368	4368	Mold Diameter, in	4
Wt. WS, gm.	1798	1877	1930	1938	Compacted Layers	3
Mold Volume, cc	943	943	943	943	Blows Per Layer	25
Wet Density, gm./cc	1.91	1.99	2.05	2.05	Rammer Weight / Fall	5.5 lbs / 12 in.
Wet Density, pcf	118.9	124.1	127.6	128.2	Size of Material Used	-#4 Sieve
					Use: <5% Retained on #4	
WATER CONTENT					OVERSIZE PARTICLE CORRECTION	
Tare Number	460	453	440	117	No Corrections Needed	
Wt. Tare & WS, gm.	720.8	687.7	842	826.4		
Wt. Tare & DS, gm.	654.5	614.7	736	706.7	Percent of Oversize Rock (+#4 Sieve) = <5%	
Wt. Tare, gm.	85.5	85.5	83.8	83.5	(Based on As-received Screening & Soaking)	
Water Content, %	11.7	13.8	16.3	19.2	W.C. of Finer Material, % (+#4 Sieve) = NA	
DRY DENSITY vs. WATER CONTENT					SAMPLE SUMMARY	
LABORATORY TEST VALUES						
Water Content, %	11.7	13.8	16.3	19.2	<i>Lab Optimum Water Content, %</i>	
Dry Density, pcf	106.5	109.1	109.8	107.5	<i>Lab Maximum Dry Density, pcf</i>	
<i>Note: Maximum Density and Optimum Water Content reported from estimated best fit smooth curve!</i>						
Dry Density, pcf						<i>95% Lab MDD = 104.4</i>
Water Content, %						<i>Note: Compacted using manual hammer.</i>

Input Validation: BLS

Reviewed By: AJD

Date Tested: 10/06/15

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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-4A
Client Project	153-121.0002 Closure Construction Central Waste	Depth	0.0'-4.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291013

Sample Color: **YELLOWISH BROWN**  
 USCS Group Name: **LEAN CLAY WITH SAND**  
 USCS Group Symbol: **CL**

USDA: **SILTY CLAY LOAM**

AASHTO: **A-6 (15)**

MECHANICAL SIEVE								
Total Sample	Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained		Project Specifications		
Total Sample Wet Wt, gm (-3")	25414	3/4"	75	0	0.0%	100.0%		
Sample Split on Sieve	3/4"	3"	0	0.0%	100.0%			
Coarse Washed Dry Sample, gm	41	2-1/2"	63	0	0.0%	100.0%		
Wet Wt Passing Split, gm	25373	2"	50	0	0.0%	100.0%		
Dry Wt. Passing Split, gm	21926	1-1/2"	37.5	0	0.0%	100.0%		
Total Sample Dry Wt, gm	21967	1"	25	0	0.0%	100.0%		
		3/4"	19	41	0.2%	99.8%		
Split Sample - Passing 3/4"		1/2"	12.5	0	0.0%	99.8%		
Tare No.	312	3/8"	9.5	0	0.0%	99.8%		
Tare + WS., gm	1140.4	No. 4	4.75	7.48	0.8%	99.0%		
Tare + DS., gm	998.77	No. 10	2	9.79	1.1%	97.9%		
Tare, gm	98	No. 20	0.85	13.02	1.4%	96.5%		
Water Content of Split Sample	15.7%	No. 40	0.425	16.4	1.8%	94.6%		
Wt. of DS., gm	900.77	No. 60	0.25	26.43	2.9%	91.7%		
Wt. of +#200 Sample, gm	142.78	No. 140	0.106	52.31	5.8%	85.9%		
		No. 200	0.075	17.35	1.9%	84.0%		
HYDROMETER (-#200)								
Tare No.	568	Wt. Dispers., gm	5	Specific Gravity		2.68		
Wt. Tare + DS., gm	241.61	Wt. Dry Soil, gm (-#200)	37.85	Tested				
Wt. Tare, gm	198.76	#10 Dispersed 1min in Hamilton Beach Mixer			a Factor	0.9933		
Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	39	20.9	5.0	34.0	0.0134	89.2	0.0297	74.9%
5	36.5	20.9	5.0	31.5	0.0134	82.7	0.0192	69.4%
15	31.5	20.9	5.0	26.5	0.0134	69.5	0.0115	58.4%
30	28.5	20.9	5.0	23.5	0.0134	61.7	0.0083	51.8%
60	26	21	5.0	21.0	0.0134	55.1	0.0060	46.3%
250	21.5	21	5.0	16.5	0.0134	43.3	0.0030	36.4%
1440	16.5	21	5.0	11.5	0.0134	30.2	0.0013	25.3%
USCS SOIL CLASSIFICATION				USDA CLASSIFICATION				
Corrected For 100% Passing a 3" Sieve				Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)	Corrected Percent of -2.0 mm Material for USDA	
% Gravel (-3" & +#4)	1.0	Silt=40.2% Clay=43.7%		100	100	Gravel 2.1		0
Coarse=0.2; Fine=0.8		D60, mm	NA	2	97.9	Sand 17.9	50.1	18.3
% Sand (-#4 & +#200)	15.0	D30, mm	NA	0.05	80.0	Silt 49.0		
Coarse=1.1; Medium=3.3; Fine=10.6		D10, mm	NA	0.002	31.0	Clay 31.0		31.7
% Fines (-#200)	84.0	Cc	NA					
% Plus #200 (-3")	16.0	Cu	NA					
USCS Description				USDA Classification				
LEAN CLAY WITH SAND				SILTY CLAY LOAM				
USCS Group Symbol	Atterberg Limits Group Symbol							
CL	CL - LEAN CLAY							
Auxiliary Information	Wt Ret, gm	% Retained	% Finer					
12" Sieve - 300 mm	0	0.0	100.0					
6" Sieve - 150 mm	0	0.0	100.0					
3" Sieve - 75 mm	0	0.0	100.0					

Input Validation Yes Reviewed By: SVG Date Tested 9/21/2015

**LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS**

ASTM D 4318

Client	Civil & Environmental Consultants, Inc.	Boring	TP-4A
Client Project	153-121.0002 Closure Construction Central Waste	Depth	0.0'-4.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291013

Soil Description: **YELLOWISH BROWN LEAN CLAY**  
 (-#40 Fraction)

AS-RECEIVED W.C.			SAMPLE SUMMARY		
Tare Number	312		Activity Index = .61; Liquidity Index = -.02		
Wt. Tare & WS, gm	1140.40		Liquid Limit (LL), %	35	
Wt. Tare & DS, gm	998.77		Plastic Limit (PL), %	16	
Wt. Tare, gm	98.00		Plasticity Index (PI)	19	
Water Content, %	15.7		USCS Group Symbol (-#40 Fraction)	CL	
			USCS Group Name (-#40 Fraction)	LEAN CLAY	
			Sample Color:	YELLOWISH BROWN	
PLASTIC LIMIT			LIQUID LIMIT		
Points Run	3 Points		3 Points		
Tare Number	249	205	246	215	213
Wt. Tare & WS, gm	23.30	22.31	22.49	22.87	22.77
Wt. Tare & DS, gm	22.27	21.46	20.74	21.14	21.03
Wt. Tare, gm	15.96	16.28	15.81	16.14	15.86
Water Content, %	16.3	16.4	35.5	34.6	33.7
	# of Blows		20	26	33
PLASTICITY CHART			FLOW CURVE		
Plasticity Index			Water Content		
60			40		
50			35		
40			30		
30			25		
20			20		
10			15		
0			0		
0	10	20	10	20	30
20	30	40	20	30	40
40	50	60	25	35	50
60	70	80	30	40	60
80	90	100	40	50	
100					
	Liquid Limit			No. of Blows	

Input Validation: Yes

Reviewed By: SVG

Date Tested: 9/21/2015

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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-4A
Client Project	153-121.0002 Closure Construction Central Waste	Depth	0.0'-4.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291013

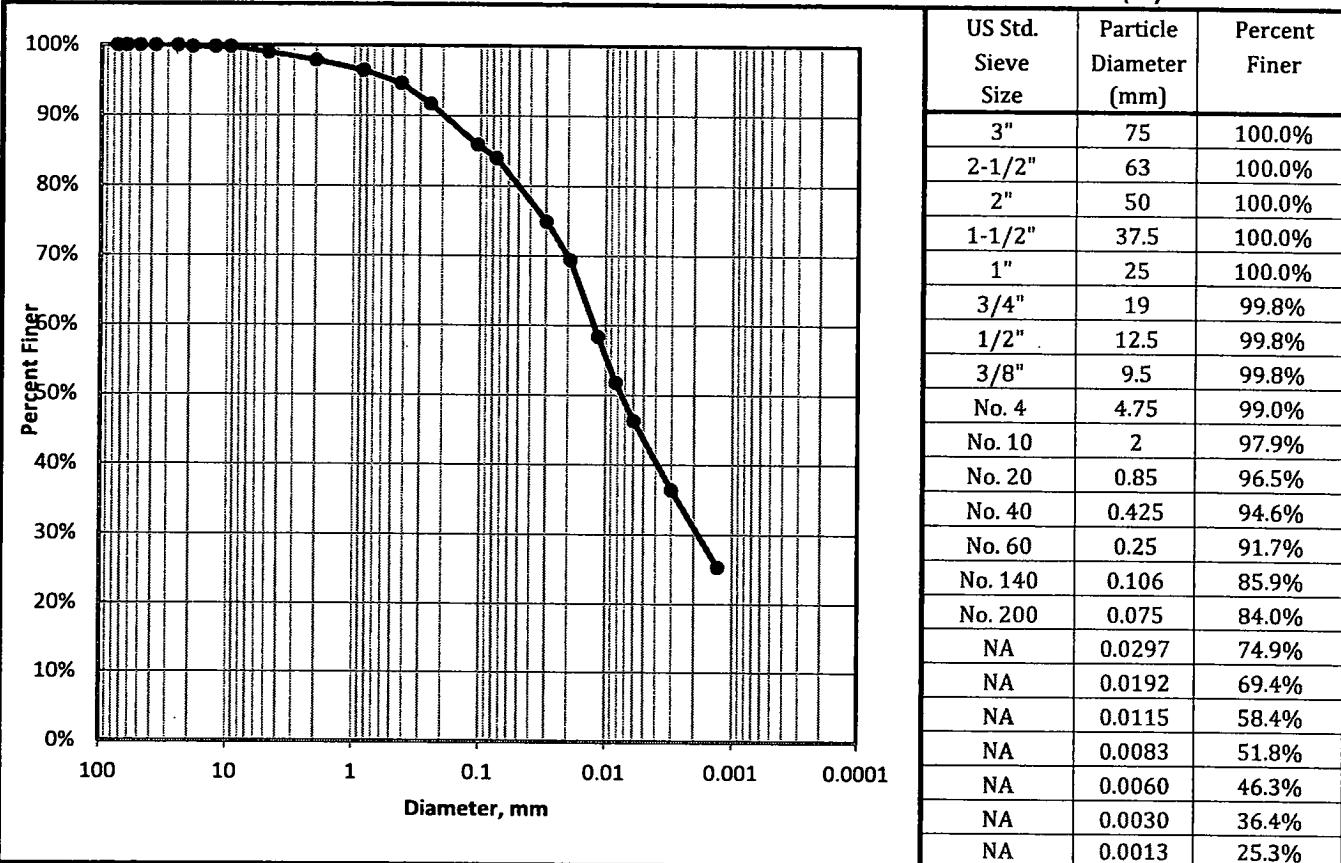
Sample Color: **YELLOWISH BROWN**

USCS Group Name: **LEAN CLAY WITH SAND**

USCS Group Symbol: **CL**

USDA: **SILTY CLAY LOAM**

AASHTO: **A-6 (15)**



USCS SOIL CLASSIFICATION			USDA CLASSIFICATION			
<i>Corrected For 100% Passing a 3" Sieve</i>						
% Gravel (-3" & +#4)	1.0	Silt=40.2% Clay=43.7%	Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)	Corrected Percent of -2.0 mm Material for USDA
Coarse=0.2; Fine=0.8		D60, mm NA	100	100	Gravel 2.1	0
% Sand (#4 & +#200)	15.0	D30, mm NA	2	97.9	Sand 17.9	18.3
Coarse=1.1; Medium=3.3; Fine=10.6		D10, mm NA	0.05	80.0	Silt 49.0	50.1
% Fines (#200)	84.0	Cc NA	0.002	31.0	Clay 31.0	31.7
% Plus #200 (-3")	16.0	Cu NA				
USCS Description			USDA Classification			
<b>LEAN CLAY WITH SAND</b>			<b>SILTY CLAY LOAM</b>			
USCS Group Symbol	Atterberg Limits Group Symbol					
CL	<b>CL - LEAN CLAY</b>					
Auxiliary Information	Wt Ret, gm	% Retained	% Finer			
12" Sieve - 300 mm	0	0.0	100.0			
6" Sieve - 150 mm	0	0.0	100.0			
3" Sieve - 75 mm	0	0.0	100.0			

### USDA CLASSIFICATION CHART

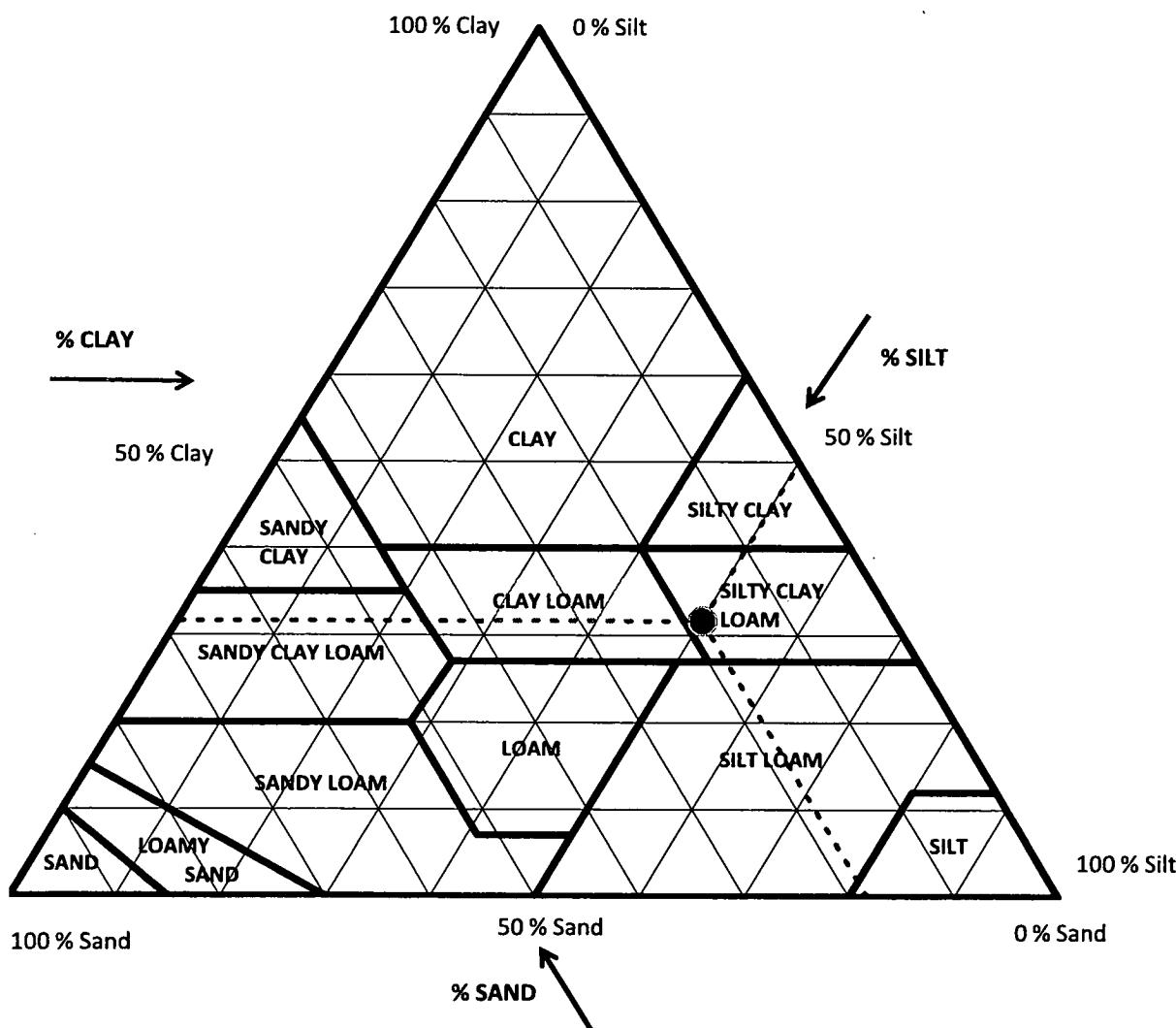
Client: Civil & Environmental Consultants, Inc.  
 Client Project: 153-121.0002 Closure Construction Central Waste  
 Project No.: 36291  
 Boring: TP-4A  
 Depth: 0.0'-4.0'  
 Sample: Bucket  
 Lab Sample: 36291013

Sample Color: YELLOWISH BROWN  
 USCS Group Name: LEAN CLAY WITH SAND  
 USCS Group Symbol: CL

USDA: SILTY CLAY LOAM

AASHTO: A-6 (15)

Corrected for 0% gravel		Sand Subsizes	
		Corrected Percentages	
Percent Gravel, %	0.0	Very Coarse Sand; 2-1	1.2
Percent Sand, %	18.3	Coarse Sand; 1-0.5	1.7
Percent Silt, %	50.1	Medium Sand; 0.5-0.25	3.4
Percent Clay, %	31.7	Fine Sand; 0.25-0.1	6.3
		Very Fine Sand; 0.1-0.05	5.7
		Total	18.3



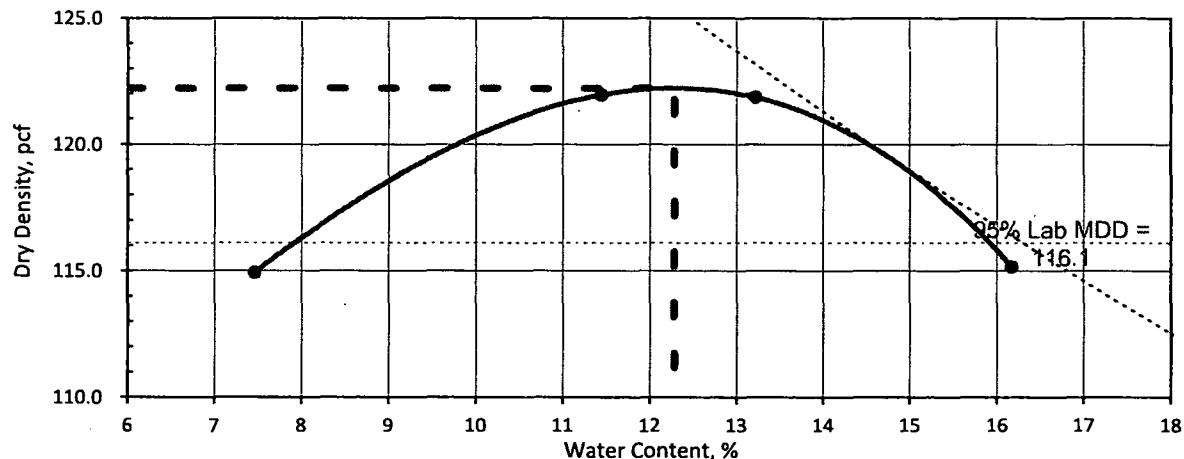
## LABORATORY COMPACTION CHARACTERISTICS OF SOIL

Client Civil & Environmental Consultants, Inc. Boring TP-4B  
 Client Project 153-121.0002 Closure Construction Ce Depth 4.0'-8.0'  
 Project No. 36291 Sample Bucket  
 Lab Sample No. 36291014

Visual Description: YELLOWISH BROWN LEAN CLAY

WET DENSITY				TEST PARAMETERS	
Mold ID	D	C	D	C	Test Method ASTM D1557
Compaction Point #	1	2	3	4	Compaction Energy Modified
Wt. Mold & WS, gm.	6087	6271	6306	6239	Test Procedure A
Wt. Mold, gm.	4214	4216	4214	4216	Mold Diameter, in 4
Wt. WS, gm.	1873	2055	2092	2023	Compacted Layers 5
Mold Volume, cc	946	944	946	944	Blows Per Layer 25
Wet Density, gm./cc	1.98	2.18	2.21	2.14	Rammer Weight / Fall 10 lbs / 18 in.
Wet Density, pcf	123.5	135.9	137.9	133.8	Size of Material Used -#4 Sieve
					Use: <5% Retained on #4
WATER CONTENT				OVERSIZE PARTICLE CORRECTION	
Tare Number	538	825	1003	552	No Corrections Needed
Wt. Tare & WS, gm.	920.5	713.5	903.4	892.8	
Wt. Tare & DS, gm.	869.9	650.8	820.3	796.1	Percent of Oversize Rock (+#4 Sieve) = <5%
Wt. Tare, gm.	191.8	102.8	191.5	198	(Based on As-received Screening & Soaking)
Water Content, %	7.5	11.4	13.2	16.2	W.C. of Finer Material, % (-#4 Sieve) = NA
DRY DENSITY vs. WATER CONTENT				SAMPLE SUMMARY	
LABORATORY TEST VALUES					
Water Content, %	7.5	11.4	13.2	16.2	Lab Optimum Water Content, % 12.3
Dry Density, pcf	114.9	121.9	121.8	115.2	Lab Maximum Dry Density, pcf 122.2

Note: Maximum Density and Optimum Water Content reported from estimated best fit smooth curve!



Note: Compacted with automatic compaction machine

Input Validation: BLS

Reviewed By: AJD

Date Tested: 10/08/15

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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-4B
Client Project	153-121.0002 Closure Construction Central Waste	Depth	4.0'-8.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291014

Sample Color: **YELLOWISH BROWN**  
 USCS Group Name: **LEAN CLAY**

USCS Group Symbol: **CL**

USDA: **SILT LOAM**

AASHTO: **A-4 (6)**

MECHANICAL SIEVE															
Total Sample	Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split % Retained	Normalized % Finer	Project Specifications									
Total Sample Wet Wt, gm (-3")	24733														
Sample Split on Sieve	3/4"	3"	75	0	0.0%	100.0%									
Coarse Washed Dry Sample, gm	147	2-1/2"	63	0	0.0%	100.0%									
Wet Wt Passing Split, gm	24586	2"	50	0	0.0%	100.0%									
Dry Wt. Passing Split, gm	21028	1-1/2"	37.5	114.13	0.5%	99.5%									
Total Sample Dry Wt, gm	21175	1"	25	22.73	0.1%	99.4%									
	3/4"	19	10.32	0.0%	99.3%										
	1/2"	12.5	2.28	0.3%	99.0%										
Tare No.	Q53	3/8"	9.5	1.5	0.2%	98.9%									
Tare + WS., gm	1204.8	No. 4	4.75	8.11	0.9%	97.9%									
Tare + DS., gm	1058.35	No. 10	2	10.71	1.2%	96.7%									
Tare, gm	192.8	No. 20	0.85	13.02	1.5%	95.2%									
Water Content of Split Sample	16.9%	No. 40	0.425	12.8	1.5%	93.7%									
Wt. of DS., gm	865.55	No. 60	0.25	18.52	2.1%	91.6%									
Wt. of +#200 Sample, gm	121.15	No. 140	0.106	39.19	4.5%	87.1%									
		No. 200	0.075	15.02	1.7%	85.4%									
HYDROMETER (-#200)															
Tare No.	1016	Wt. Dispers., gm	5		Specific Gravity	2.67									
Wt. Tare + DS., gm	238.07	Wt. Dry Soil, gm (-#200)	40.09		Tested										
Wt. Tare, gm	192.98	#10 Dispersed 1min in Hamilton Beach Mixer			a Factor	0.9955									
Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)							
2	40	21	5.0	35.0	0.0134	86.9	0.0295	74.2%							
5	36	21	5.0	31.0	0.0134	77.0	0.0193	65.7%							
15	29	21	5.0	24.0	0.0134	59.6	0.0117	50.9%							
30	25.5	20.9	5.0	20.5	0.0135	50.9	0.0085	43.5%							
60	22	21	5.0	17.0	0.0134	42.2	0.0062	36.1%							
250	17.5	21	5.0	12.5	0.0134	31.0	0.0031	26.5%							
1440	13	21	5.0	8.0	0.0134	19.9	0.0013	17.0%							
USCS SOIL CLASSIFICATION				USDA CLASSIFICATION											
Corrected For 100% Passing a 3" Sieve				Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)	Corrected Percent of -2.0 mm Material for USDA								
% Gravel (-3" & +#4)	2.1	Silt=52.1% Clay=33.2%		100 2 0.05 0.002	100 96.7 80.5 21.6	Gravel 3.3 Sand 16.2 Silt 59.0 Clay 21.6	0 16.7 61.0 22.3								
Coarse=0.7; Fine=1.4		D60, mm	NA												
% Sand (-#4 & +#200)	12.5	D30, mm	NA												
Coarse=1.2; Medium=3; Fine=8.3		D10, mm	NA												
% Fines (-#200)	85.4	Cc	NA												
% Plus #200 (-3")	14.6	Cu	NA	USDA Classification											
USCS Description				SILT LOAM											
LEAN CLAY															
USCS Group Symbol	Atterberg Limits Group Symbol														
CL	CL - LEAN CLAY														
Auxiliary Information	Wt Ret, gm	% Retained	% Finer												
12" Sieve - 300 mm	0	0.0	100.0												
6" Sieve - 150 mm	0	0.0	100.0												
3" Sieve - 75 mm	0	0.0	100.0												

Input Validation

Yes

Reviewed By: SVG

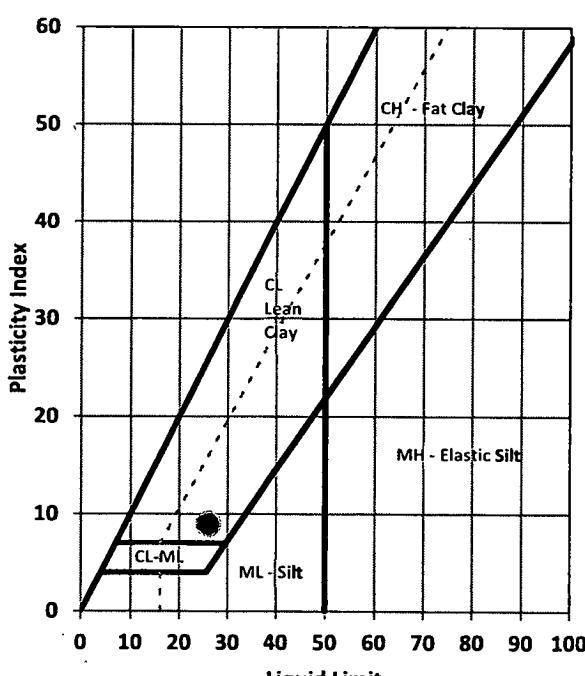
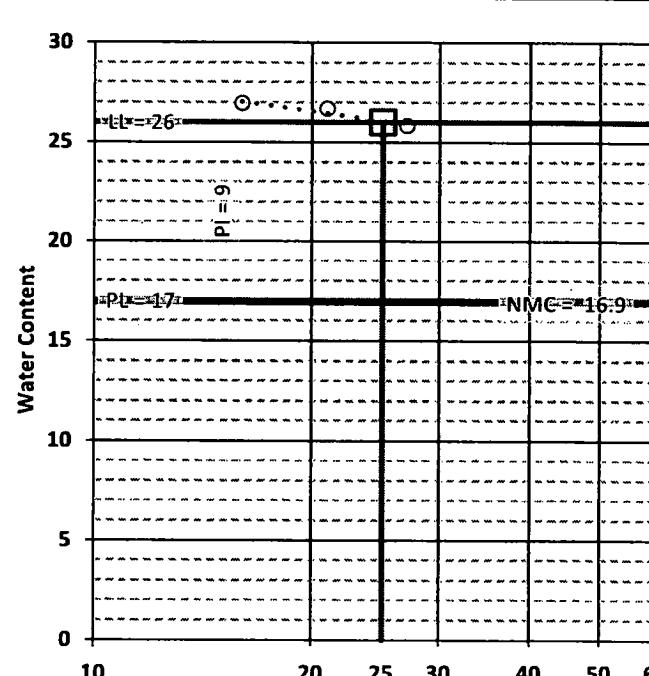
Date Tested

9/21/2015

**LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS**  
**ASTM D 4318**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-4B
Client Project	153-121.0002 Closure Construction Central Waste	Depth	4.0'-8.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291014

Soil Description: **YELLOWISH BROWN LEAN CLAY**  
(-#40 Fraction)

AS-RECEIVED W.C.			SAMPLE SUMMARY		
Tare Number			Activity Index = .42; Liquidity Index = -.01		
Wt. Tare & WS, gm			Liquid Limit (LL), %		
Wt. Tare & DS, gm			26		
Wt. Tare, gm			Plastic Limit (PL), %		
Water Content, %			17		
			Plasticity Index (PI)		
			9		
			USCS Group Symbol (-#40 Fraction)		
			CL		
			USCS Group Name (-#40 Fraction)		
			LEAN CLAY		
			Sample Color:		
			YELLOWISH BROWN		
PLASTIC LIMIT			LIQUID LIMIT		
Points Run			3 Points		
Tare Number	224	235	244	257	203
Wt. Tare & WS, gm	23.34	22.76	22.26	22.55	22.26
Wt. Tare & DS, gm	22.28	21.80	20.91	21.12	21.01
Wt. Tare, gm	15.92	15.98	15.90	15.76	16.17
Water Content, %	16.7	16.5	26.9	26.7	25.8
			# of Blows		
			16		
			21		
			27		
PLASTICITY CHART			FLOW CURVE		
					

Input Validation: Yes

Reviewed By: SVG

Date Tested: 9/21/2015

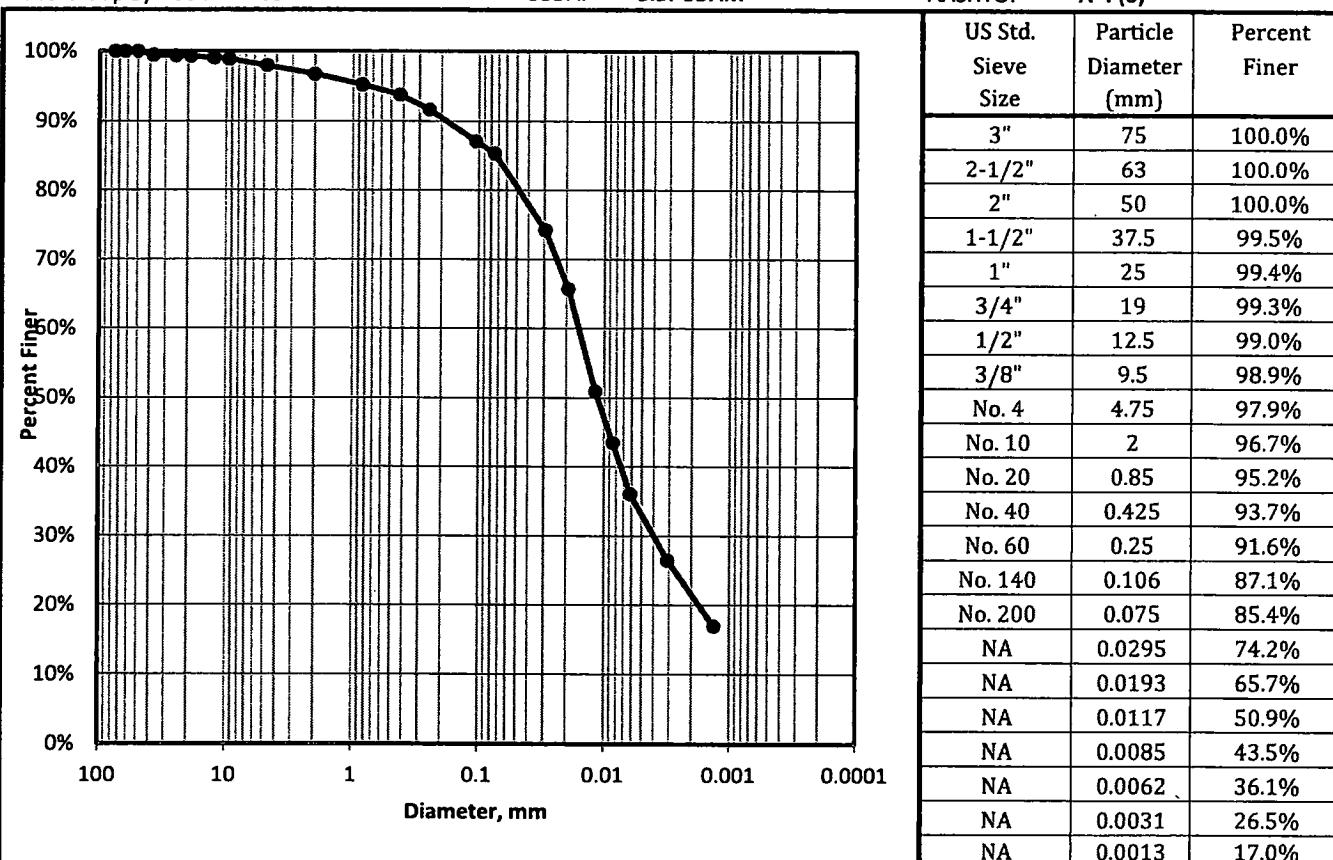
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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-4B
Client Project	153-121.0002 Closure Construction Central Waste	Depth	4.0'-8.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291014

Sample Color: **YELLOWISH BROWN**  
 USCS Group Name: **LEAN CLAY**  
 USCS Group Symbol: **CL**      USDA: **SILT LOAM**

AASHTO: **A-4 (6)**



USCS SOIL CLASSIFICATION			USDA CLASSIFICATION			
<i>Corrected For 100% Passing a 3" Sieve</i>						
% Gravel (-3" & +#4)	2.1	Silt=52.1% Clay=33.2%	Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)	Corrected Percent of -2.0 mm Material for USDA
Coarse=0.7; Fine=1.4		D60, mm NA	100	100	Gravel 3.3	0
% Sand (-#4 & +#200)	12.5	D30, mm NA	2	96.7	Sand 16.2	16.7
Coarse=1.2; Medium=3; Fine=8.3		D10, mm NA	0.05	80.5	Silt 59.0	61.0
% Fines (-#200)	85.4	Cc NA	0.002	21.6	Clay 21.6	22.3
% Plus #200 (-3")	14.6	Cu NA				
USCS Description			USDA Classification			
LEAN CLAY			SILT LOAM			
USCS Group Symbol	Atterberg Limits Group Symbol					
CL	CL - LEAN CLAY					
Auxiliary Information	Wt Ret, gm	% Retained	% Finer			
12" Sieve - 300 mm	0	0.0	100.0			
6" Sieve - 150 mm	0	0.0	100.0			
3" Sieve - 75 mm	0	0.0	100.0			

### USDA CLASSIFICATION CHART

Client Civil & Environmental Consultants, Inc.  
 Client Project 153-121.0002 Closure Construction Central Waste  
 Project No. 36291  
 Boring TP-4B  
 Depth 4.0'-8.0'  
 Sample Bucket  
 Lab Sample 36291014

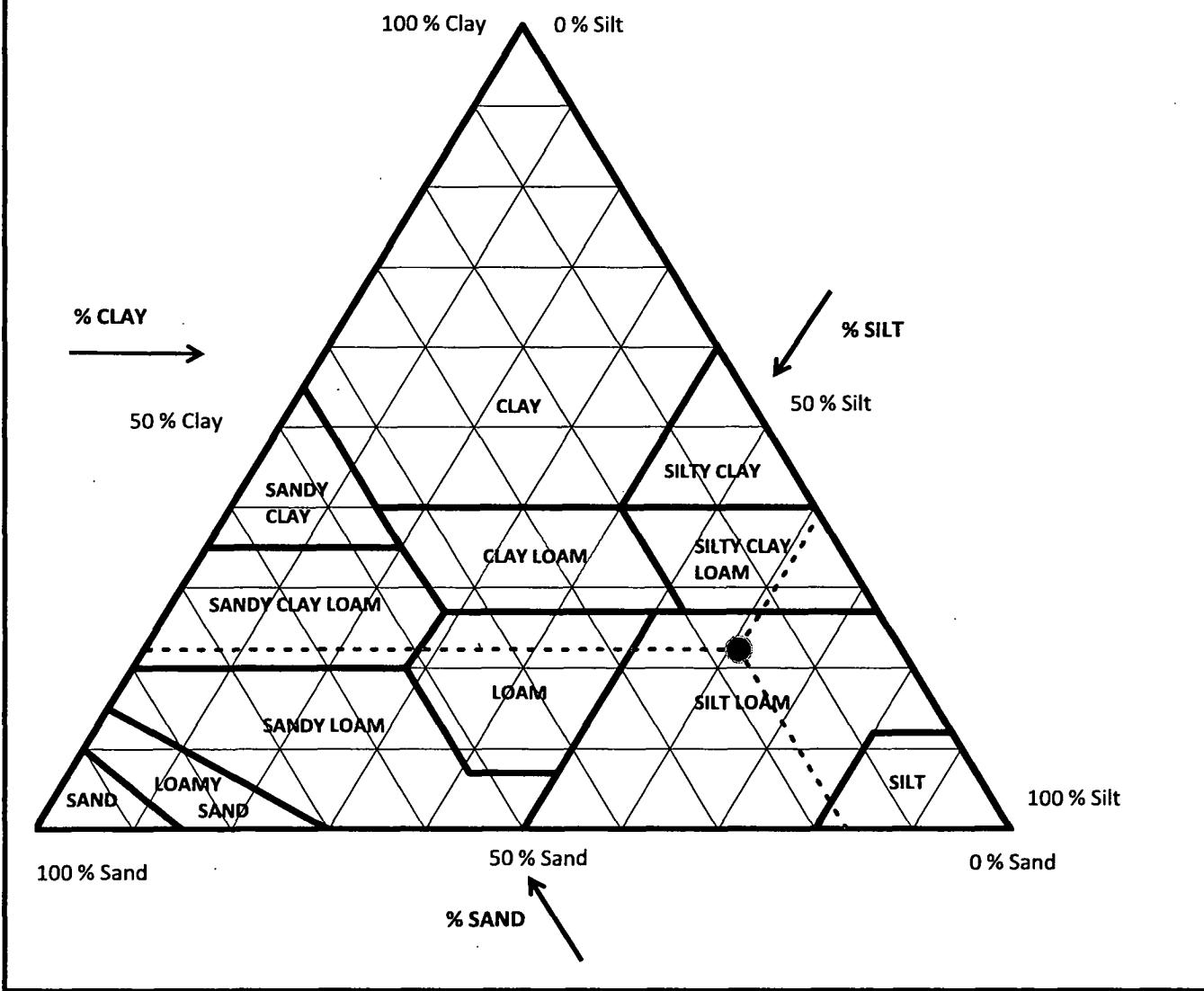
Sample Color: **YELLOWISH BROWN**  
 USCS Group Name: **LEAN CLAY**

USCS Group Symbol: **CL**

USDA: **SILT LOAM**

AASHTO: **A-4 (6)**

Corrected for 0% gravel		Sand Subsizes	
		Corrected Percentages	
Percent Gravel, %	0.0	Very Coarse Sand; 2-1	1.3
Percent Sand, %	16.7	Coarse Sand; 1-0.5	1.5
Percent Silt, %	61.0	Medium Sand; 0.5-0.25	2.6
Percent Clay, %	22.3	Fine Sand; 0.25-0.1	4.9
		Very Fine Sand; 0.1-0.05	6.5
		Total	16.7



## **LABORATORY COMPACTION CHARACTERISTICS OF SOIL**

Client	Civil & Environmental Consultants, Inc. Boring	TP-5A
Client Project	153-121.0002 Closure Construction Ce Depth	0.0'-4.0'
Project No.	36291	Sample
		Lab Sample No.
Mined Depth	LIGHT GRAY BROWN MEAN CLAM WITH SAND	

**Visual Description:** LIGHT OLIVE BROWN LEAN CLAY WITH SAND

## Input Validation: BLS

Reviewed By: AJD

Date Tested: 10/12/15

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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-5A
Client Project	153-121.0002 Closure Construction Central Waste	Depth	0.0'-4.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291015

Sample Color: **LIGHT OLIVE BROWN**  
 USCS Group Name: **LEAN CLAY WITH SAND**  
 USCS Group Symbol: **CL**

USDA: **SILTY CLAY LOAM**

AASHTO: **A-6 (14)**

MECHANICAL SIEVE					
Total Sample	Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split % Retained	Normalized % Finer
Total Sample Wet Wt, gm (-3")	25587	3"	75	0	100.0%
Sample Split on Sieve	3/4"	2-1/2"	63	0	100.0%
Coarse Washed Dry Sample, gm	107	2"	50	0	100.0%
Wet Wt Passing Split, gm	25480	1-1/2"	37.5	0	100.0%
Dry Wt. Passing Split, gm	22032	1"	25	0	100.0%
Total Sample Dry Wt, gm	22139	3/4"	19	107.39	99.5%
<b>Split Sample - Passing 3/4"</b>					
Tare No.	1017	1/2"	12.5	2.19	99.3%
Tare + WS., gm	1226.4	3/8"	9.5	2.79	99.0%
Tare + DS., gm	1086.59	No. 4	4.75	6.14	98.3%
Tare, gm	193.1	No. 10	2	10.45	97.1%
<b>Water Content of Split Sample</b>	<b>15.6%</b>	No. 20	0.85	12.42	95.7%
Wt. of DS., gm	893.49	No. 40	0.425	15.24	94.0%
Wt. of +#200 Sample, gm	136.39	No. 60	0.25	25.15	91.2%
		No. 140	0.106	45.1	86.2%
		No. 200	0.075	16.91	84.3%

HYDROMETER (-#200)								
Tare No.	565	Wt. Dispers., gm	5	Specific Gravity	2.7			
Wt. Tare + DS., gm	240.09	Wt. Dry Soil, gm (-#200)	38.1			Tested		
Wt. Tare, gm	196.99	-#10 Dispersed 1min in Hamilton Beach Mixer				a Factor	0.9889	
Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	41	21.1	5.0	36.0	0.0133	93.4	0.0290	78.8%
5	38.5	21.1	5.0	33.5	0.0133	87.0	0.0187	73.3%
15	34.5	21.1	5.0	29.5	0.0133	76.6	0.0112	64.6%
30	32	21.1	5.0	27.0	0.0133	70.1	0.0080	59.1%
60	28.5	21.2	4.9	23.6	0.0133	61.3	0.0058	51.7%
250	24.5	21.2	4.9	19.6	0.0133	50.9	0.0029	42.9%
1440	19	21.1	5.0	14.0	0.0133	36.3	0.0013	30.6%

USCS SOIL CLASSIFICATION			USDA CLASSIFICATION					
Corrected For 100% Passing a 3" Sieve			Percent of Each Component (Material) (%)					
% Gravel (-3" & +#4)	1.7	Silt=34.5% Clay=49.7%	Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)	Corrected Percent of -2.0 mm Material for USDA		
Coarse=0.5; Fine=1.2		D60, mm	NA					
% Sand (-#4 & +#200)	14.0	D30, mm	NA					
Coarse=1.2; Medium=3.1; Fine=9.7		D10, mm	NA					
% Fines (#200)	84.3	Cc	NA					
% Plus #200 (-3")	15.7	Cu	NA					
USCS Description			USDA Classification					
LEAN CLAY WITH SAND			SILTY CLAY LOAM					
USCS Group Symbol	Atterberg Limits Group Symbol		0.05	USDA Classification				
CL	CL - LEAN CLAY			SILTY CLAY LOAM				
Auxiliary Information	Wt Ret, gm	% Retained		SILTY CLAY LOAM				
12" Sieve - 300 mm	0	100.0		SILTY CLAY LOAM				
6" Sieve - 150 mm	0	100.0		SILTY CLAY LOAM				
3" Sieve - 75 mm	523	2.3		SILTY CLAY LOAM				

Input Validation Yes Reviewed By: SVG Date Tested 9/21/2015

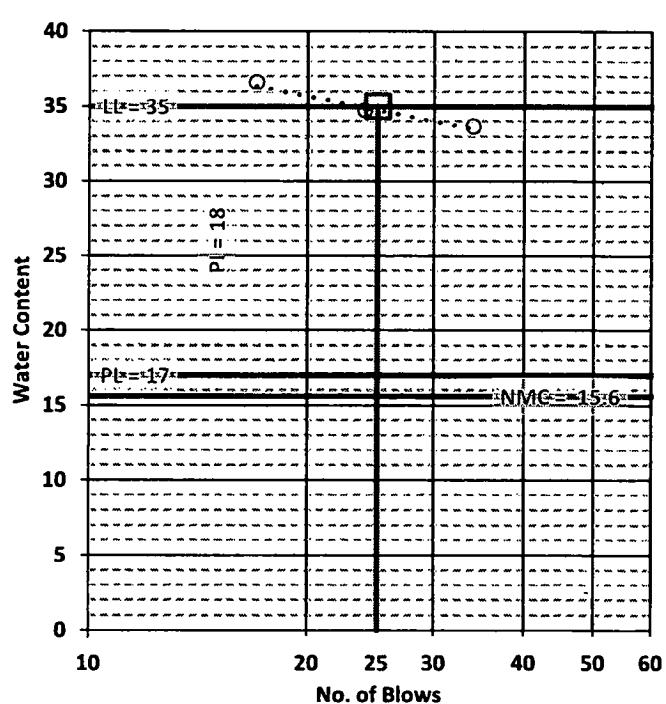
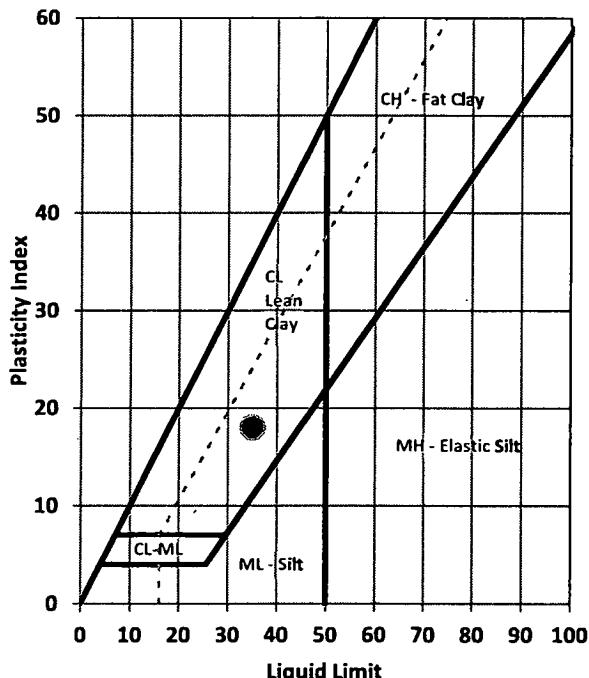
**LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS**

**ASTM D 4318**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-5A
Client Project	153-121.0002 Closure Construction Central Waste	Depth	0.0'-4.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291015

Soil Description:  
(-#40 Fraction)  
**LIGHT OLIVE BROWN LEAN CLAY**

AS-RECEIVED W.C.			SAMPLE SUMMARY				
Tare Number	1017		Activity Index = .48; Liquidity Index = -.08				
Wt. Tare & WS, gm	1226.40		Liquid Limit (LL), %	35			
Wt. Tare & DS, gm	1086.59		Plastic Limit (PL), %	17			
Wt. Tare, gm	193.10		Plasticity Index (PI)	18			
Water Content, %	15.6		USCS Group Symbol (-#40 Fraction)	CL			
			USCS Group Name (-#40 Fraction)	LEAN CLAY			
			Sample Color:	LIGHT OLIVE BROWN			
PLASTIC LIMIT			LIQUID LIMIT				
Points Run	3 Points		3 Points				
Tare Number	216	219	242	262	252		
Wt. Tare & WS, gm	22.25	22.16	22.80	22.89	22.86		
Wt. Tare & DS, gm	21.28	21.25	20.97	21.17	21.19		
Wt. Tare, gm	15.77	16.03	15.97	16.22	16.23		
Water Content, %	17.6	17.4	36.6	34.7	33.7		
		# of Blows	17	24	34		
PLASTICITY CHART			FLOW CURVE				
60			40				
50			35				
40			30				
30			25				
20			20				
10			15				
0			0				
Plasticity Index			Water Content				
60			40				
50			35				
40			30				
30			25				
20			20				
10			15				
0			0				
Liquid Limit			No. of Blows				
0			10				
10			20				
20			30				
30			40				
40			50				
50			60				



Input Validation: Yes

Reviewed By: SVG

Date Tested: 9/21/2015

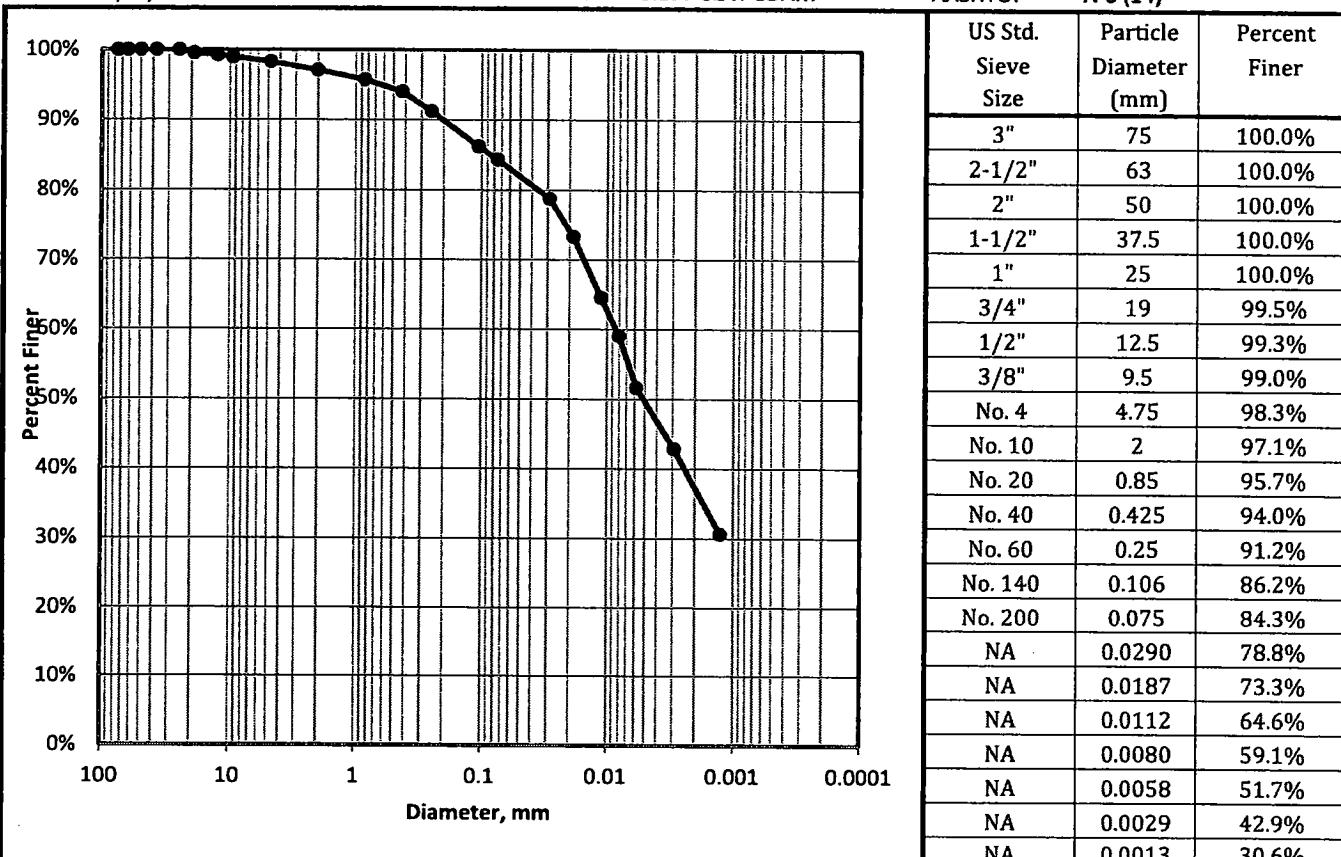
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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-5A
Client Project	153-121.0002 Closure Construction Central Waste	Depth	0.0'-4.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291015

Sample Color: **LIGHT OLIVE BROWN**  
 USCS Group Name: **LEAN CLAY WITH SAND**  
 USCS Group Symbol: **CL**      USDA: **SILTY CLAY LOAM**

AASHTO: **A-6 (14)**



USCS SOIL CLASSIFICATION			USDA CLASSIFICATION			
<i>Corrected For 100% Passing a 3" Sieve</i>						
% Gravel (-3" & +#4)	1.7	Silt=34.5% Clay=49.7%	Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)	Corrected Percent of -2.0 mm Material for USDA
Coarse=0.5; Fine=1.2		D60, mm NA	100	100	Gravel 2.9	0
% Sand (-#4 & +#200)	14.0	D30, mm NA	2	97.1	Sand 15.1	15.6
Coarse=1.2; Medium=3.1; Fine=9.7		D10, mm NA	0.05	82.0	Silt 44.7	46.0
% Fines (-#200)	84.3	Cc NA	0.002	37.3	Clay 37.3	38.4
% Plus #200 (-3")	15.7	Cu NA				
USCS Description			USDA Classification			
LEAN CLAY WITH SAND			SILTY CLAY LOAM			
USCS Group Symbol	Atterberg Limits Group Symbol					
CL	CL - LEAN CLAY					
Auxiliary Information	Wt Ret, gm	% Retained	% Finer			
12" Sieve - 300 mm	0	0.0	100.0			
6" Sieve - 150 mm	0	0.0	100.0			
3" Sieve - 75 mm	523	2.3	97.7			

### USDA CLASSIFICATION CHART

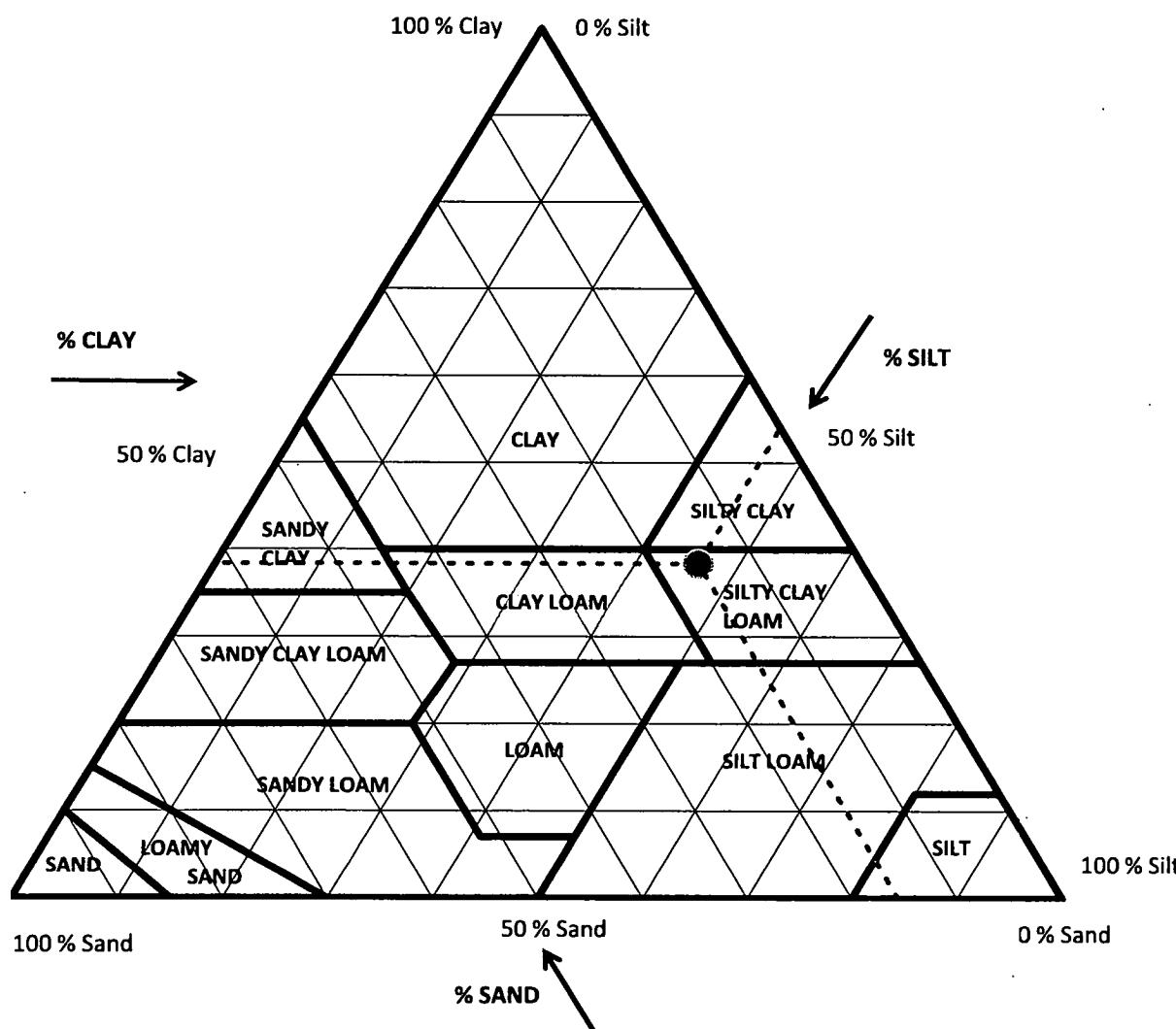
Client Civil & Environmental Consultants, Inc.  
 Client Project 153-121.0002 Closure Construction Central Waste  
 Project No. 36291  
 Boring TP-5A  
 Depth 0.0'-4.0'  
 Sample Bucket  
 Lab Sample 36291015

Sample Color: LIGHT OLIVE BROWN  
 USCS Group Name: LEAN CLAY WITH SAND  
 USCS Group Symbol: CL

USDA: SILTY CLAY LOAM

AASHTO: A-6 (14)

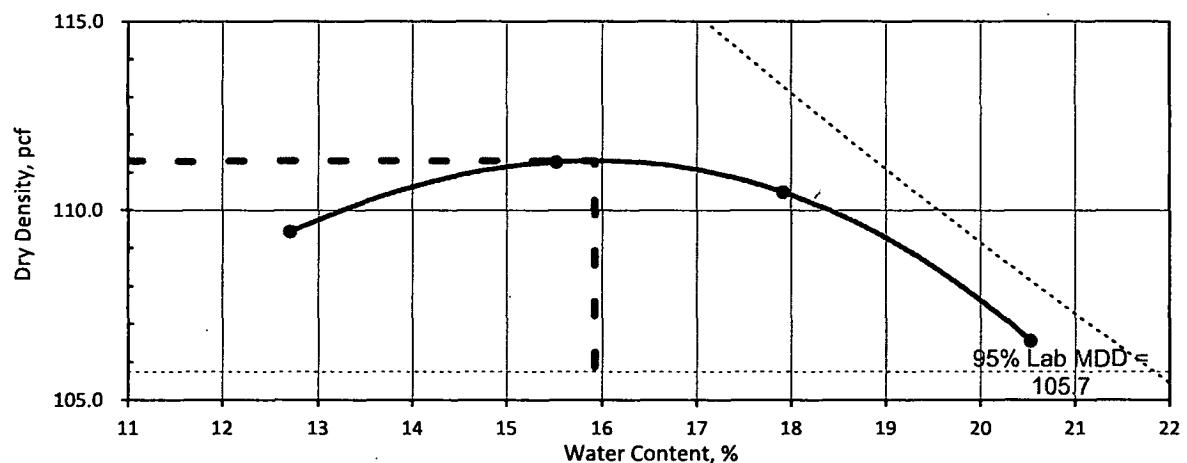
Corrected for 0% gravel		Sand Subsizes	
		Corrected Percentages	
Percent Gravel, %	0.0	Very Coarse Sand; 2-1	1.2
Percent Sand, %	15.6	Coarse Sand; 1-0.5	1.6
Percent Silt, %	46.0	Medium Sand; 0.5-0.25	3.3
Percent Clay, %	38.4	Fine Sand; 0.25-0.1	5.5
		Very Fine Sand; 0.1-0.05	4.0
		Total	15.6



## LABORATORY COMPACTION CHARACTERISTICS OF SOIL

Client	Civil & Environmental Consultants, Inc. Boring	TP-5B
Client Project	153-121.0002 Closure Construction Ce Depth	4.0'-8.0'
Project No.	36291 Sample	Bucket
		Lab Sample No. 36291016

**Visual Description:** LIGHT OLIVE BROWN LEAN CLAY



## Input Validation: BLS

Reviewed By: AJD

Date Tested: 10/08/15

REVIEWED BY: ABD DATE TESTED: 10/08/15

**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-5B
Client Project	153-121.0002 Closure Construction Central Waste	Depth	4.0'-8.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291016

Sample Color: **LIGHT OLIVE BROWN**  
 USCS Group Name: **LEAN CLAY**

USCS Group Symbol: **CL**

USDA: **SILTY CLAY LOAM**

AASHTO: **A-6 (9)**

MECHANICAL SIEVE								
Total Sample	Sieve Size	Nominal Opening, mm	Dry Wt, gm	% Retained	Split % Retained	Normalized % Finer	Project Specifications	
Total Sample Wet Wt, gm (-3")	27746	3"	75	0	0.0%	100.0%		
Sample Split on Sieve	3/4"	2-1/2"	63	0	0.0%	100.0%		
Coarse Washed Dry Sample, gm	242	2"	50	0	0.0%	100.0%		
Wet Wt Passing Split, gm	27504	1-1/2"	37.5	142.31	0.6%	99.4%		
Dry Wt. Passing Split, gm	23362	1"	25	70.21	0.3%	99.1%		
Total Sample Dry Wt, gm	23604	3/4"	19	29.68	0.1%	99.0%		
Split Sample - Passing 3/4"		1/2"	12.5	6.26	0.7%	98.3%		
Tare No.	301	3/8"	9.5	2.15	0.2%	98.1%		
Tare + WS., gm	1184.2	No. 4	4.75	6.07	0.7%	97.4%		
Tare + DS., gm	1020.45	No. 10	2	7.85	0.8%	96.6%		
Tare, gm	96.8	No. 20	0.85	11.21	1.2%	95.4%		
Water Content of Split Sample	17.7%	No. 40	0.425	12.24	1.3%	94.1%		
Wt. of DS., gm	923.65	No. 60	0.25	18.89	2.0%	92.0%		
Wt. of +#200 Sample, gm	113.80	No. 140	0.106	36.85	3.9%	88.1%		
		No. 200	0.075	12.28	1.3%	86.8%		
HYDROMETER (-#200)								
Tare No.	1026	Wt. Dispers., gm	5	5	Specific Gravity		2.69	
Wt. Tare + DS., gm	232.32	Wt. Dry Soil, gm (-#200)	37.91	37.91	Tested			
Wt. Tare, gm	189.41	#10 Dispersed 1min in Hamilton Beach Mixer			a Factor		0.9911	
Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	40	21.2	4.9	35.1	0.0133	91.8	0.0293	79.6%
5	37	21.1	5.0	32.0	0.0133	83.7	0.0190	72.6%
15	32	21.1	5.0	27.0	0.0133	70.6	0.0114	61.3%
30	28.5	21.1	5.0	23.5	0.0133	61.4	0.0083	53.3%
60	24.5	21.2	4.9	19.6	0.0133	51.2	0.0060	44.5%
250	20	21.2	4.9	15.1	0.0133	39.5	0.0030	34.3%
1440	14.5	21.1	5.0	9.5	0.0133	24.8	0.0013	21.6%
USCS SOIL CLASSIFICATION				USDA CLASSIFICATION				
Corrected For 100% Passing a 3" Sieve				Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)		Corrected Percent of -2.0 mm Material for USDA
% Gravel (-3" & +#4)	2.6	Silt=44.9% Clay=41.7%		100	100	Gravel	3.4	
Coarse=1; Fine=1.6		D60, mm	NA					
% Sand (#4 & +#200)	10.6	D30, mm	NA	2	96.6	Sand	12.9	13.3
Coarse=0.8; Medium=2.5; Fine=7.3		D10, mm	NA	0.05	83.7	Silt	55.7	57.7
% Fines (-#200)	86.8	Cc	NA					
% Plus #200 (-3")	13.2	Cu	NA	0.002	28.0	Clay	28.0	29.0
USCS Description				USDA Classification				
LEAN CLAY				SILTY CLAY LOAM				
USCS Group Symbol	Atterberg Limits Group Symbol							
CL	CL - LEAN CLAY							
Auxiliary Information	Wt Ret, gm	% Retained	% Finer					
12" Sieve - 300 mm	0	0.0	100.0					
6" Sieve - 150 mm	0	0.0	100.0					
3" Sieve - 75 mm	0	0.0	100.0					

Input Validation

Yes

Reviewed By: SVG

Date Tested

9/21/2015

**LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS**  
**ASTM D 4318**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-5B
Client Project	153-121.0002 Closure Construction Central Waste	Depth	4.0'-8.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291016

Soil Description: **LIGHT OLIVE BROWN LEAN CLAY**  
 (-#40 Fraction)

AS-RECEIVED W.C.			SAMPLE SUMMARY				
Tare Number	301		Activity Index = .43; Liquidity Index = -.03				
Wt. Tare & WS, gm	1184.20		Liquid Limit (LL), %	30			
Wt. Tare & DS, gm	1020.45		Plastic Limit (PL), %	18			
Wt. Tare, gm	96.80		Plasticity Index (PI)	12			
Water Content, %	17.7		USCS Group Symbol (-#40 Fraction)	CL			
			USCS Group Name (-#40 Fraction)	LEAN CLAY			
			Sample Color:	LIGHT OLIVE BROWN			
PLASTIC LIMIT			LIQUID LIMIT				
Points Run	3 Points		3 Points				
Tare Number	228	206	239	211	254		
Wt. Tare & WS, gm	22.16	22.59	22.86	22.94	23.66		
Wt. Tare & DS, gm	21.23	21.62	21.19	21.34	21.93		
Wt. Tare, gm	15.98	16.15	15.83	15.98	16.03		
Water Content, %	17.7	17.7	31.2	29.9	29.3		
		# of Blows	15	21	28		
PLASTICITY CHART			FLOW CURVE				

Input Validation: Yes

Reviewed By: SVG

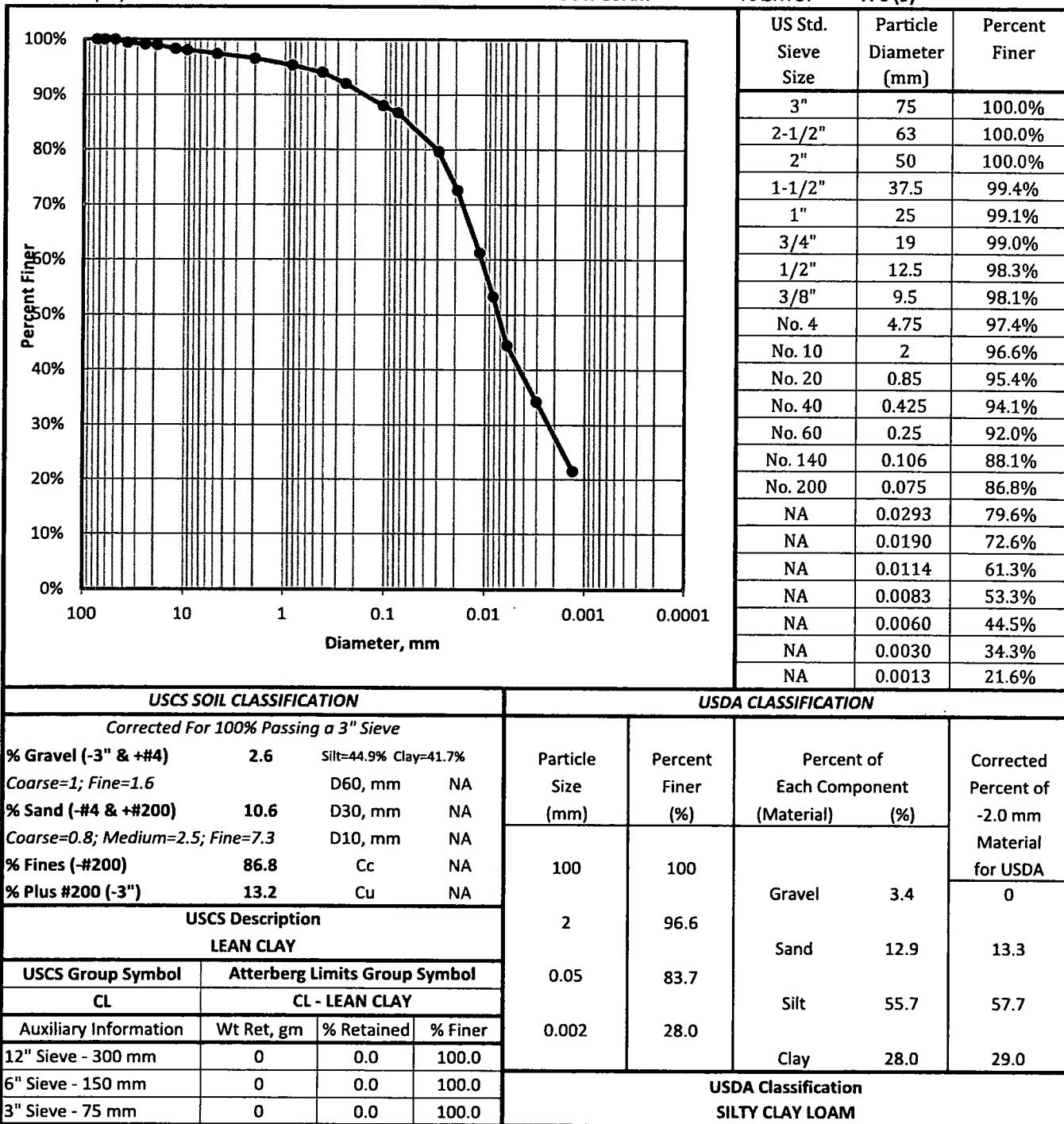
Date Tested: 9/21/2015

**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-5B
Client Project	153-121.0002 Closure Construction Central Waste	Depth	4.0'-8.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291016

Sample Color: **LIGHT OLIVE BROWN**  
 USCS Group Name: **LEAN CLAY**  
 USCS Group Symbol: **CL**      USDA: **SILTY CLAY LOAM**

AASHTO: **A-6 (9)**



### USDA CLASSIFICATION CHART

Client Civil & Environmental Consultants, Inc. Boring TP-5B  
 Client Project 153-121.0002 Closure Construction Central Waste Depth 4.0'-8.0'  
 Project No. 36291 Sample Bucket  
 Lab Sample 36291016

Sample Color: LIGHT OLIVE BROWN

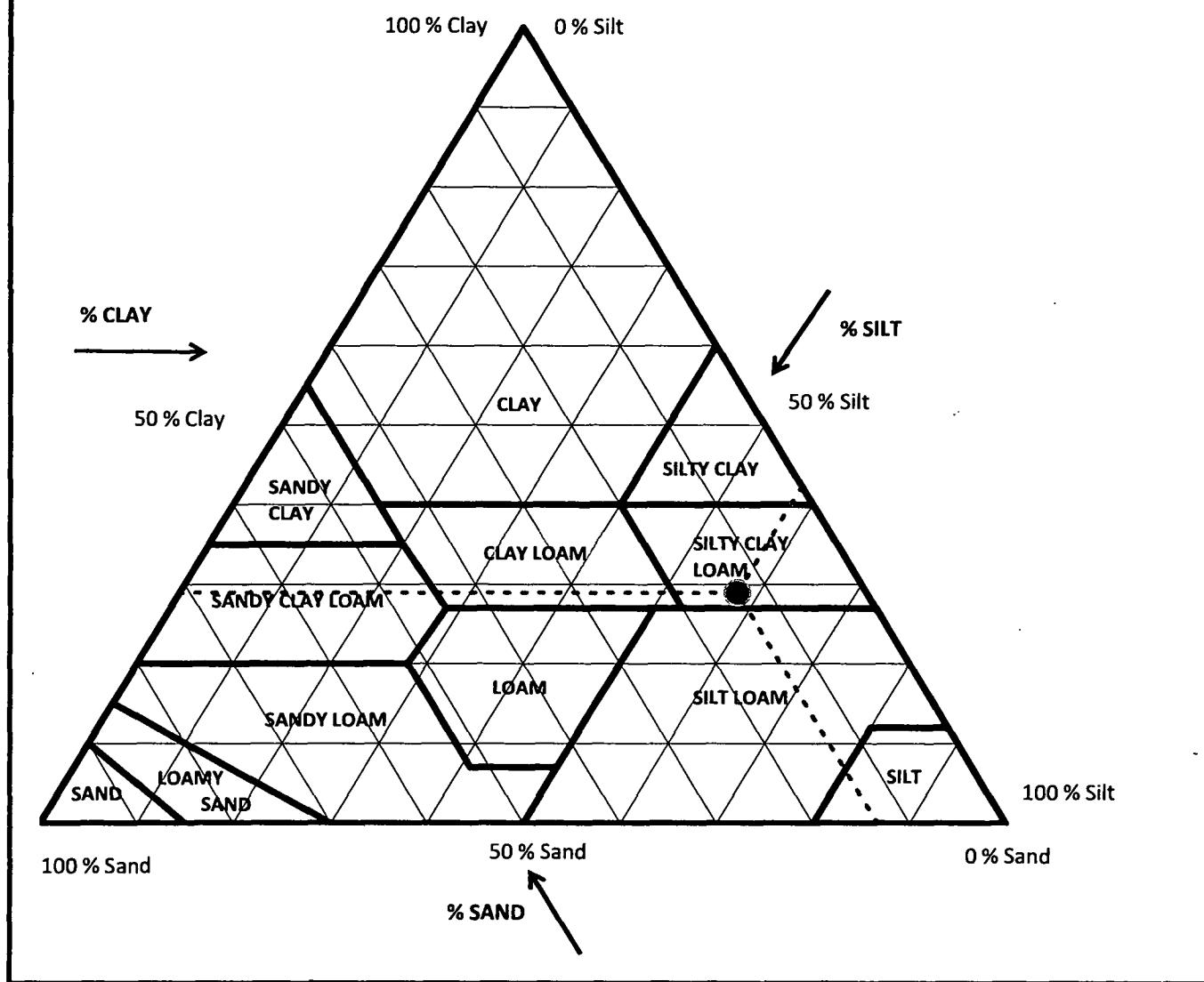
USCS Group Name: LEAN CLAY

USCS Group Symbol: CL

USDA: SILTY CLAY LOAM

AASHTO: A-6 (9)

Corrected for 0% gravel		Sand Subsizes
		Corrected Percentages
Percent Gravel, %	0.0	Very Coarse Sand; 2-1 1.0
Percent Sand, %	13.3	Coarse Sand; 1-0.5 1.3
Percent Silt, %	57.7	Medium Sand; 0.5-0.25 2.4
Percent Clay, %	29.0	Fine Sand; 0.25-0.1 4.3
		Very Fine Sand; 0.1-0.05 4.3
		Total 13.3



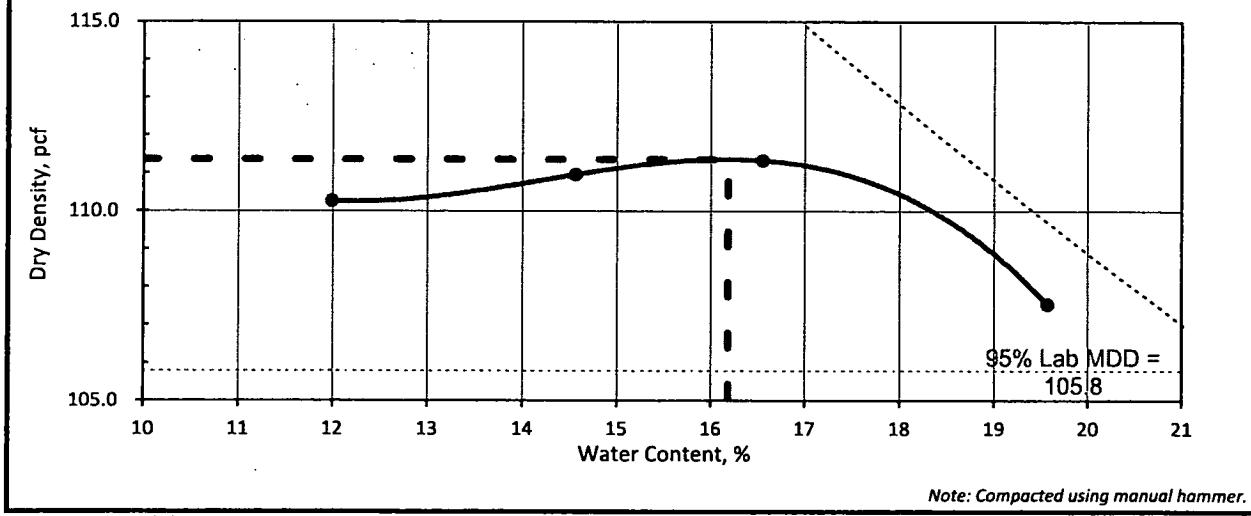
## LABORATORY COMPACTION CHARACTERISTICS OF SOIL

Client Civil & Environmental Consultants, Inc. Boring TP-6A  
 Client Project 153-121.0002 Closure Construction Ce Depth 0.0'-4.0'  
 Project No. 36291 Sample Bucket  
 Lab Sample No. 36291017

Visual Description: LIGHT OLIVE BROWN LEAN CLAY WITH SAND

WET DENSITY					TEST PARAMETERS	
Mold ID	G	G	G	G	Test Method	ASTM D698
Compaction Point #	1	2	3	4	Compaction Energy	Standard
Wt. Mold & WS, gm.	6235	6290	6330	6312	Test Procedure	A
Wt. Mold, gm.	4368	4368	4368	4368	Mold Diameter, in	4
Wt. WS, gm.	1867	1922	1962	1944	Compacted Layers	3
Mold Volume, cc	943	943	943	943	Blows Per Layer	25
Wet Density, gm./cc	1.98	2.04	2.08	2.06	Rammer Weight / Fall	5.5 lbs / 12 in.
Wet Density, pcf	123.5	127.1	129.8	128.6	Size of Material Used	-#4 Sieve
					Use: <5% Retained on #4	
WATER CONTENT					OVERSIZE PARTICLE CORRECTION	
Tare Number	809	825	1003	538	No Corrections Needed	
Wt. Tare & WS, gm.	915.8	881.3	915.7	1036.8		
Wt. Tare & DS, gm.	828.8	782.3	812.8	898.5	Percent of Oversize Rock (+#4 Sieve) = <5%	
Wt. Tare, gm.	103.2	102.6	191.3	191.8	(Based on As-received Screening & Soaking)	
Water Content, %	12.0	14.6	16.6	19.6	W.C. of Finer Material, % (-#4 Sieve) = NA	
DRY DENSITY vs. WATER CONTENT					SAMPLE SUMMARY	
LABORATORY TEST VALUES						
Water Content, %	12.0	14.6	16.6	19.6	Lab Optimum Water Content, %	16.2
Dry Density, pcf	110.3	111.0	111.3	107.5	Lab Maximum Dry Density, pcf	111.4

Note: Maximum Density and Optimum Water Content reported from estimated best fit smooth curve!



Input Validation: BLS

Reviewed By: AJD

Date Tested: 10/12/15

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Note: Compacted using manual hammer.

**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-6A
Client Project	153-121.0002 Closure Construction Central Waste	Depth	0.0'-4.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291017

Sample Color: **LIGHT OLIVE BROWN**  
 USCS Group Name: **LEAN CLAY WITH SAND**

USCS Group Symbol: **CL** USDA: **SILTY CLAY LOAM** AASHTO: **A-6 (12)**

MECHANICAL SIEVE								
Total Sample	Sieve Size	Nominal Opening, mm	Dry Wt, gm	% Retained	Split Normalized % Finer	Project Specifications		
Total Sample Wet Wt, gm (-3")	24930	3/4"	75	0	0.0%	100.0%		
Sample Split on Sieve	3/4"	3"	0	0.0%	100.0%			
Coarse Washed Dry Sample, gm	46	2-1/2"	63	0	0.0%			
Wet Wt Passing Split, gm	24884	2"	50	0	0.0%	100.0%		
Dry Wt. Passing Split, gm	21411	1-1/2"	37.5	0	0.0%	100.0%		
Total Sample Dry Wt, gm	21457	1"	25	0	0.0%	100.0%		
		3/4"	19	46.26	0.2%	99.8%		
<b>Split Sample - Passing 3/4"</b>		1/2"	12.5	3.57	0.3%	99.4%		
Tare No.	516	3/8"	9.5	5.04	0.5%	98.9%		
Tare + WS., gm	1296.9	No. 4	4.75	12.17	1.2%	97.8%		
Tare + DS., gm	1130.16	No. 10	2	15.78	1.5%	96.2%		
Tare, gm	102.2	No. 20	0.85	15.89	1.5%	94.7%		
<b>Water Content of Split Sample</b>	<b>16.2%</b>	No. 40	0.425	17.71	1.7%	93.0%		
Wt. of DS., gm	1027.96	No. 60	0.25	29.43	2.9%	90.1%		
Wt. of +#200 Sample, gm	178.29	No. 140	0.106	58.85	5.7%	84.4%		
		No. 200	0.075	19.85	1.9%	82.5%		

HYDROMETER (#200)								
Tare No.	Q57	Wt. Dispers., gm	5	Specific Gravity	2.68			
Wt. Tare + DS., gm	236.79	Wt. Dry Soil, gm (#200)	39.62				Tested	
Wt. Tare, gm	192.17	#10 Dispersed 1min in Hamilton Beach Mixer						a Factor 0.9933
Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	41	21.4	4.9	36.1	0.0133	90.5	0.0290	74.6%
5	39	21.4	4.9	34.1	0.0133	85.5	0.0187	70.5%
15	34.5	21.3	4.9	29.6	0.0133	74.2	0.0112	61.2%
30	31.5	21.3	4.9	26.6	0.0133	66.7	0.0081	55.0%
60	28.5	21.3	4.9	23.6	0.0133	59.2	0.0059	48.8%
250	23.5	21.4	4.9	18.6	0.0133	46.6	0.0030	38.5%
1440	18	20.9	5.0	13.0	0.0134	32.6	0.0013	26.9%

USCS SOIL CLASSIFICATION			USDA CLASSIFICATION							
<i>Corrected For 100% Passing a 3" Sieve</i>										
<i>Coarse=0.2; Fine=2</i>										
% Gravel (-3" & +#4)	2.2	Silt=36% Clay=46.4%	Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)	Corrected Percent of -2.0 mm Material for USDA				
Coarse=0.2; Fine=2		D60, mm	NA							
% Sand (-#4 & +#200)	15.3	D30, mm	NA							
Coarse=1.5; Medium=3.3; Fine=10.5		D10, mm	NA							
% Fines (#200)	82.5	Cc	NA							
% Plus #200 (-3")	17.5	Cu	NA							
USCS Description										
LEAN CLAY WITH SAND										
USCS Group Symbol	Atterberg Limits Group Symbol		0.05	79.1	Gravel 3.8 Sand 17.1 Silt 46.1 Clay 33.0	0				
CL	CL - LEAN CLAY									
Auxiliary Information	Wt Ret, gm	% Retained								
12" Sieve - 300 mm	0	0.0								
6" Sieve - 150 mm	0	0.0								
3" Sieve - 75 mm	0	0.0								
USDA Classification										
<b>SILTY CLAY LOAM</b>										

Input Validation Yes Reviewed By: SVG Date Tested 9/21/2015

## LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS

ASTM D 4318

Client	Civil & Environmental Consultants, Inc.	Boring	TP-6A
Client Project	153-121.0002 Closure Construction Central Waste	Depth	0.0'-4.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291017

**Soil Description:** LIGHT OLIVE BROWN LEAN CLAY  
(-#40 Fraction)

**Input Validation:** Yes

Reviewed By: **SVG**

Date Tested: 9/21/2015

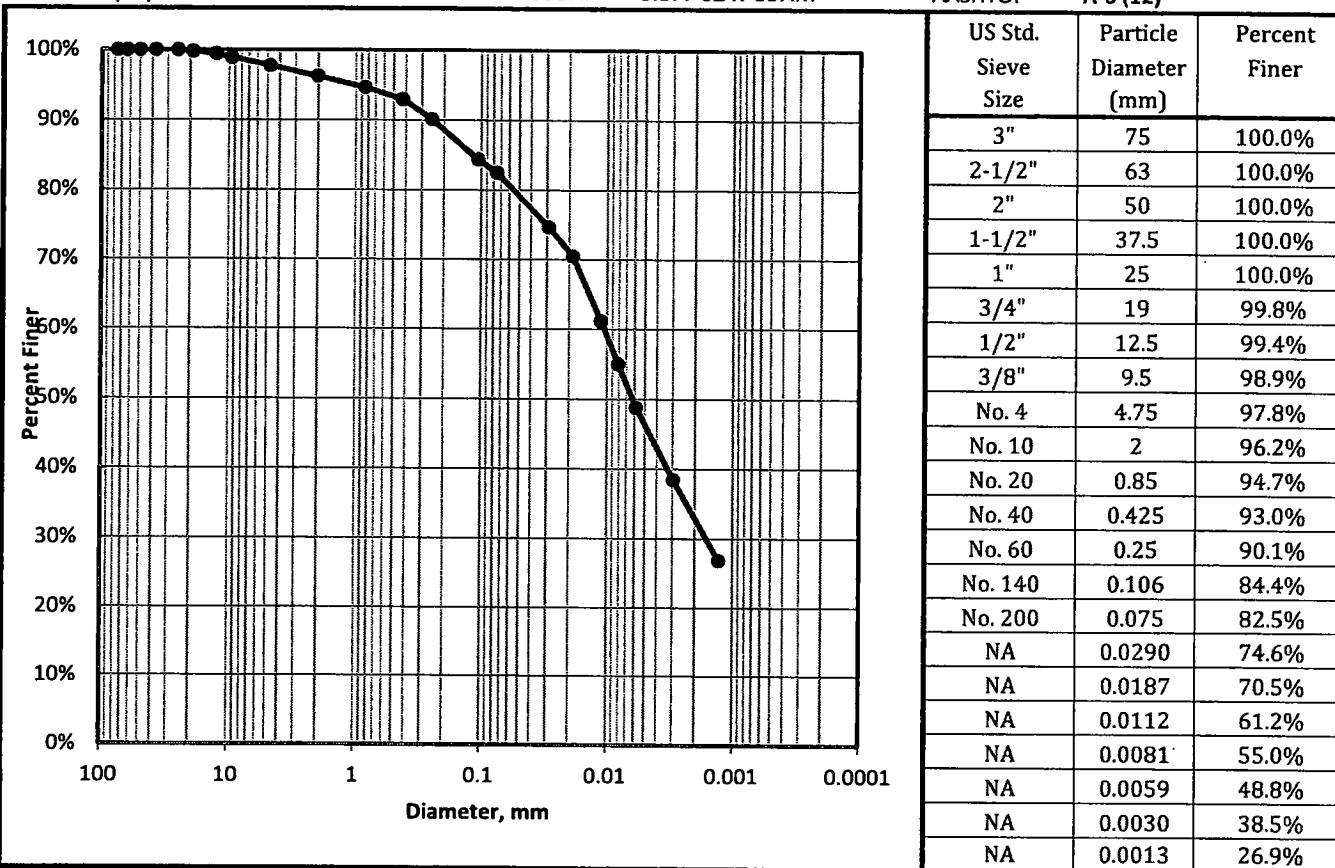
**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client Civil & Environmental Consultants, Inc. Boring TP-6A  
 Client Project 153-121.0002 Closure Construction Central Waste Depth 0.0'-4.0'  
 Project No. 36291 Sample Bucket  
 Lab Sample 36291017

Sample Color: LIGHT OLIVE BROWN  
 USCS Group Name: LEAN CLAY WITH SAND  
 USCS Group Symbol: CL

USDA: SILTY CLAY LOAM

AASHTO: A-6 (12)



USCS SOIL CLASSIFICATION			USDA CLASSIFICATION				
Corrected For 100% Passing a 3" Sieve			Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)		Corrected Percent of -2.0 mm Material for USDA
% Gravel (-3" & +#4)	2.2	Silt=36% Clay=46.4%			Gravel	3.8	
Coarse=0.2; Fine=2		D60, mm NA					
% Sand (-#4 & +#200)	15.3	D30, mm NA					
Coarse=1.5; Medium=3.3; Fine=10.5		D10, mm NA					
% Fines (-#200)	82.5	Cc NA					
% Plus #200 (-3")	17.5	Cu NA					
USCS Description							
LEAN CLAY WITH SAND							
USCS Group Symbol	Atterberg Limits Group Symbol						
CL	CL - LEAN CLAY						
Auxiliary Information	Wt Ret, gm	% Retained	% Finer				
12" Sieve - 300 mm	0	0.0	100.0				
6" Sieve - 150 mm	0	0.0	100.0				
3" Sieve - 75 mm	0	0.0	100.0				
USDA Classification							
SILTY CLAY LOAM							

### USDA CLASSIFICATION CHART

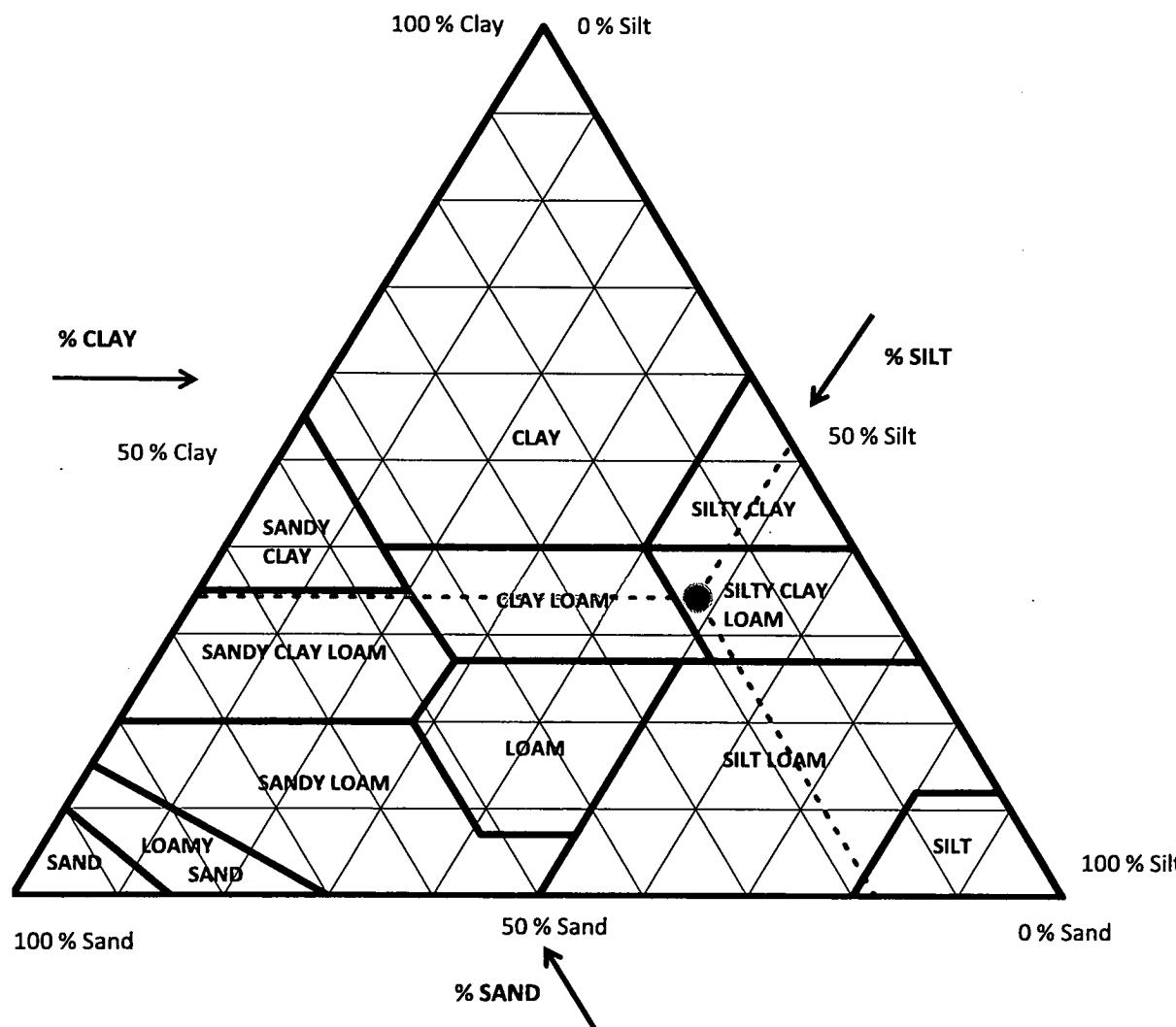
Client Civil & Environmental Consultants, Inc.  
 Client Project 153-121.0002 Closure Construction Central Waste  
 Project No. 36291  
 Boring TP-6A  
 Depth 0.0'-4.0'  
 Sample Bucket  
 Lab Sample 36291017

Sample Color: LIGHT OLIVE BROWN  
 USCS Group Name: LEAN CLAY WITH SAND  
 USCS Group Symbol: CL

USDA: SILTY CLAY LOAM

AASHTO: A-6 (12)

Corrected for 0% gravel		Sand Subsizes Corrected Percentages	
Percent Gravel, %	0.0	Very Coarse Sand; 2-1	1.3
Percent Sand, %	17.8	Coarse Sand; 1-0.5	1.7
Percent Silt, %	47.9	Medium Sand; 0.5-0.25	3.4
Percent Clay, %	34.3	Fine Sand; 0.25-0.1	6.3
		Very Fine Sand; 0.1-0.05	5.1
		Total	17.8

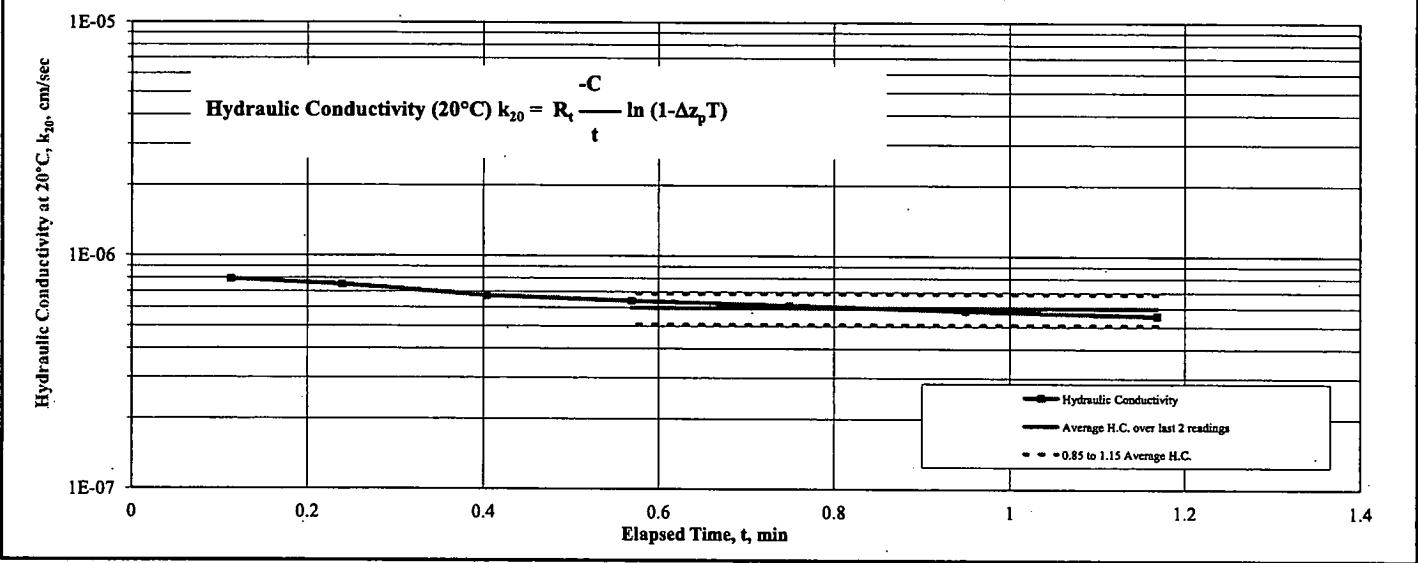


**MEASUREMENT OF HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIALS USING A FLEXIBLE WALL PERMEAMETER**  
 ASTM D5084-00 Method F; Mercury U-Tube Perrometer - Inflow Volume = Outflow Volume

Client Civil & Environmental Consultants, Inc. Boring TP-6A  
 Client Project 153-121.0002 Closure Construction Central Waste Depth 0'0"-4.0'  
 Project No. 36291 Sample Bucket  
 Visual Description LIGHT OLIVE BROWN LEAN CLAY WITH SAND Lab Sample No. 36291017  
 Sample Condition Remolded

SAMPLE CONDITIONS			TEST CONSTANTS & EQUATIONS			SAMPLE SUMMARY					
Sample Status	Initial	Final	Pipette Area, $a_0$ - cm <sup>2</sup>	0.031416	Avg. Hydraulic Conductivity, $k_{20}$ , cm/sec	6.0E-07					
Tare Number	40	2075	Annulus Area, $a_s$ , cm <sup>2</sup>	0.76712	Initial Water Content, %	18.0%					
Wt. Tare & WS, gm	176.2	809.78	Manometer Constant, $M_1 = a_s a_0 / (a_s + a_0)$ , cm <sup>2</sup>	0.03018	Initial Dry Density, pcf	106.4					
Wt. Tare & DS, gm	161.88	694.02	Manometer Constant, $M_2 = 1 + a_s / a_0$	1.0410	% Compaction	95.5%					
Wt. Tare, gm	82.5	152.55	Sample Constant, $S = L/A$ , cm <sup>-1</sup>	0.186	Sample Status	Remolded					
Moisture Content, %	18.0%	21.4%	Specific Gravity, $\delta = \delta_{hg} - \delta_w$ , gm/cc	12.562	B Parameter	95					
Wt. Tube & WS, gm	637.8	NA	Test Constant, $C = M_1 S / 8$	4.47E-04	Permeant	Deaired Water					
Wt. Of Tube, gm	0	NA	Mercury Level at Equilibrium, $R_{eq}$ , cm	3.1	Cell Pressure, psi	105					
Wt. Of WS, gm	637.8	655.9	Mercury Level of Pipette at t=0, $R_p$ , cm	11.3	Back Pressure, psi	100					
Length 1, in	3	3.045	Initial Head Difference, $z_i = (R_p - R_{eq})M_2$ , cm	8.54	Avg (Mid-Height) Confining Stress, psi	5					
Length 2, in	3	3.054	Trial Constant, $T = M_2 / z_i$ , cm	0.1220	Maximum Gradient	13.8					
Length 3, in	3	3.061	Temperature Correction for 20°C, $R_t$	0.976	Average Test Temperature, °C	21.0					
Top Diameter, in	2.864	2.883	TEST DATA								
Middle Diameter, in	2.865	2.881	t <sub>i</sub> Elapsed Time min	R <sub>pt</sub> Mercury Height cm	Δz <sub>p</sub> R <sub>p</sub> - R <sub>pt</sub> cm	i Gradient cm/cm	H <sub>t</sub> Head cm	ΔH <sub>t</sub> Percent of Initial Head from t=0 %	σ <sub>max</sub> Effective Stress Max psi	σ <sub>min</sub> Min psi	k <sub>20</sub> Hydraulic Conductivity cm/sec
Bottom Diameter, in	2.8655	2.836									
Average Length, L, cm	7.62	7.76									
Average Area, A, cm <sup>2</sup>	41.59	41.64									
Sample Volume, cc	316.9	322.9									
Unit Wet Wt., gm/cc	2.01	2.03									
Unit Wet Wt., pcf	125.6	126.7									
Unit Dry Wt., pcf	106.4	104.4									
Unit Dry Wt., gm/cc	1.71	1.67									
Specific Gravity, Assumed	2.7	2.7									
Void Ratio, e	0.583	0.614									
Porosity, n	0.368	0.380									
Pore Volume, cc	116.77	122.81									
Saturation, %	83.5%										

ELAPSED TIME vs. HYDRAULIC CONDUCTIVITY



Input Validation: ALO

Reviewed By: SVG

Date Tested:

11/17/2015

Note: The average Hydraulic Conductivity is calculated using the average of the last 4 determinations where all requisite flow and Hydraulic Conductivity conditions are achieved!

Prerequisites: Inflow / Outflow Ratio = 1 by definition of test procedure. Final Hydraulic Conductivity = +25% of average Hydraulic Conductivity when  $k > 1E-8$  cm/sec and +50% when  $k < 1E-8$  cm/sec.

## **LABORATORY COMPACTION CHARACTERISTICS OF SOIL**

Client	Civil & Environmental Consultants, Inc. Boring	TP-6B
Client Project	153-121.0002 Closure Construction Ce Depth	4.0'-8.0'
Project No.	36291	Sample
		Lab Sample No.
Visual Description:	YELLOWISH BROWN LEAN CLAY WITH SAND	

## Input Validation: BLS

Reviewed By: AJD

Date Tested: 10/11/15

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## LABORATORY COMPACTION CHARACTERISTICS OF SOIL

Client Civil & Environmental Consultants, Inc. Boring TP-6B  
 Client Project 153-121.0002 Closure Construction Ce Depth 4.0'-8.0'  
 Project No. 36291 Sample Bucket  
 Lab Sample No. 36291018

Visual Description: YELLOWISH BROWN LEAN CLAY WITH SAND

WET DENSITY					TEST PARAMETERS	
Mold ID	C	D	C	D	Test Method	ASTM D1557
Compaction Point #	1	2	3	4	Compaction Energy	Modified
Wt. Mold & WS, gm.	6191	6273	6296	6244	Test Procedure	A
Wt. Mold, gm.	4216	4214	4216	4214	Mold Diameter, in	4
Wt. WS, gm.	1975	2059	2080	2030	Compacted Layers	5
Mold Volume, cc	944	946	944	946	Blows Per Layer	25
Wet Density, gm./cc	2.09	2.18	2.20	2.15	Rammer Weight / Fall	10 lbs / 18 in.
Wet Density, pcf	130.6	135.8	137.5	133.9	Size of Material Used	-#4 Sieve
					Use: <5% Retained on #4	
WATER CONTENT					OVERSIZE PARTICLE CORRECTION	
Tare Number	809	523	1001	574	No Corrections Needed	
Wt. Tare & WS, gm.	862.9	885.5	910.3	918.7		
Wt. Tare & DS, gm.	800.6	804.2	822.3	817.9	Percent of Oversize Rock (+#4 Sieve) = <5%	
Wt. Tare, gm.	102.8	106.4	192.2	198.9	(Based on As-received Screening & Soaking)	
Water Content, %	8.9	11.7	14.0	16.3	W.C. of Finer Material, % (-#4 Sieve) = NA	
DRY DENSITY vs. WATER CONTENT					SAMPLE SUMMARY	
LABORATORY TEST VALUES						
Water Content, %	8.9	11.7	14.0	16.3	Lab Optimum Water Content, %	12.2
Dry Density, pcf	119.9	121.6	120.7	115.1	Lab Maximum Dry Density, pcf	121.7
<i>Note: Maximum Density and Optimum Water Content reported from estimated best fit smooth curve!</i>						
<i>Note: Compacted with automatic compaction machine</i>						

Input Validation: BLS

Reviewed By: AJD

Date Tested: 10/08/15

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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-6B
Client Project	153-121.0002 Closure Construction Central Waste	Depth	4.0'-8.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291018

Sample Color: **YELLOWISH BROWN**  
 USCS Group Name: **LEAN CLAY WITH SAND**  
 USCS Group Symbol: **CL**

USDA: **CLAY LOAM**

AASHTO: **A-6 (9)**

MECHANICAL SIEVE								
Total Sample	Sieve Size	Nominal Opening, mm	Dry Wt, gm	% Retained	Split % Retained	Normalized % Finer	Project Specifications	
Total Sample Wet Wt, gm (-3")	28305	3/4"	75	0	0.0%	100.0%		
Sample Split on Sieve	3/4"	3"	75	0	0.0%	100.0%		
Coarse Washed Dry Sample, gm	572	2-1/2"	63	0	0.0%	100.0%		
Wet Wt Passing Split, gm	27733	2"	50	260.37	1.1%	98.9%		
Dry Wt. Passing Split, gm	23912	1-1/2"	37.5	167.78	0.7%	98.3%		
Total Sample Dry Wt, gm	24484	1"	25	130.28	0.5%	97.7%		
	3/4"	19	13.6	0.1%	97.7%			
	1/2"	12.5	0	0.0%	97.7%			
<b>Split Sample - Passing 3/4"</b>								
Tare No.	968	3/8"	9.5	1.06	0.1%	97.5%		
Tare + WS., gm	1146.7	No. 4	4.75	10.6	1.2%	96.4%		
Tare + DS., gm	1002.89	No. 10	2	17.13	1.9%	94.5%		
Tare, gm	102.8	No. 20	0.85	18.46	2.0%	92.5%		
<b>Water Content of Split Sample</b>	<b>16.0%</b>	No. 40	0.425	19.56	2.1%	90.4%		
Wt. of DS., gm	900.09	No. 60	0.25	30.15	3.3%	87.1%		
Wt. of +#200 Sample, gm	172.52	No. 140	0.106	55.36	6.0%	81.1%		
		No. 200	0.075	20.2	2.2%	78.9%		
HYDROMETER (-#200)								
Tare No.	1014	Wt. Dispers., gm	5	Specific Gravity			2.67	
Wt. Tare + DS., gm	238.24	Wt. Dry Soil, gm (-#200)	38.42	Tested				
Wt. Tare, gm	194.82	#10 Dispersed 1min in Hamilton Beach Mixer			a Factor		0.9955	
Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	39.5	21.4	4.9	34.6	0.0134	89.7	0.0295	70.8%
5	37	21.4	4.9	32.1	0.0134	83.2	0.0190	65.7%
15	32.5	21.2	4.9	27.6	0.0134	71.5	0.0114	56.5%
30	29	21.2	4.9	24.1	0.0134	62.4	0.0083	49.3%
60	26	21.2	4.9	21.1	0.0134	54.7	0.0060	43.2%
250	21	21.4	4.9	16.1	0.0134	41.7	0.0030	32.9%
1440	16.5	20.9	5.0	11.5	0.0135	29.8	0.0013	23.5%
USCS SOIL CLASSIFICATION				USDA CLASSIFICATION				
Corrected For 100% Passing a 3" Sieve				Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)		Corrected Percent of -2.0 mm Material for USDA
% Gravel (-3" & +#4)	3.6	Silt=38.4% Clay=40.5%				Gravel	5.5	
Coarse=2.3; Fine=1.3		D60, mm	NA	100	100			0
% Sand (#4 & +#200)	17.5	D30, mm	NA			Sand	19.1	
Coarse=1.9; Medium=4.1; Fine=11.5		D10, mm	NA	2	94.5			20.3
% Fines (-#200)	78.9	Cc	NA			Silt	47.1	
% Plus #200 (-3")	21.1	Cu	NA	0.05	75.4			49.8
USCS Description						Clay	28.3	
LEAN CLAY WITH SAND				0.002	28.3			30.0
USCS Group Symbol	Atterberg Limits Group Symbol							
CL	CL - LEAN CLAY							
Auxiliary Information	Wt Ret, gm	% Retained	% Finer					
12" Sieve - 300 mm	0	0.0	100.0					
6" Sieve - 150 mm	0	0.0	100.0					
3" Sieve - 75 mm	0	0.0	100.0					
USDA Classification								
CLAY LOAM								

Input Validation

Yes

Reviewed By: SVG

Date Tested

9/21/2015

**LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS**  
**ASTM D 4318**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-6B
Client Project	153-121.0002 Closure Construction Central Waste	Depth	4.0'-8.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291018

Soil Description: **YELLOWISH BROWN LEAN CLAY**  
 (-#40 Fraction)

AS-RECEIVED W.C.			SAMPLE SUMMARY		
			Activity Index = .49; Liquidity Index = -.07		
Tare Number	968		Liquid Limit (LL), %	31	
Wt. Tare & WS, gm	1146.70		Plastic Limit (PL), %	17	
Wt. Tare & DS, gm	1002.89		Plasticity Index (PI)	14	
Wt. Tare, gm	102.80		USCS Group Symbol (-#40 Fraction)	CL	
Water Content, %	16.0		USCS Group Name (-#40 Fraction)	LEAN CLAY	
			Sample Color:	YELLOWISH BROWN	
PLASTIC LIMIT			LIQUID LIMIT		
Points Run			3 Points		
Tare Number	213	204	240	233	255
Wt. Tare & WS, gm	23.07	22.71	22.82	23.24	23.67
Wt. Tare & DS, gm	21.99	21.73	21.16	21.49	21.86
Wt. Tare, gm	15.89	16.03	15.98	15.87	15.93
Water Content, %	17.7	17.2	32.0	31.1	30.5
		# of Blows	18	24	29
PLASTICITY CHART			FLOW CURVE		

Input Validation: Yes

Reviewed By: SVG

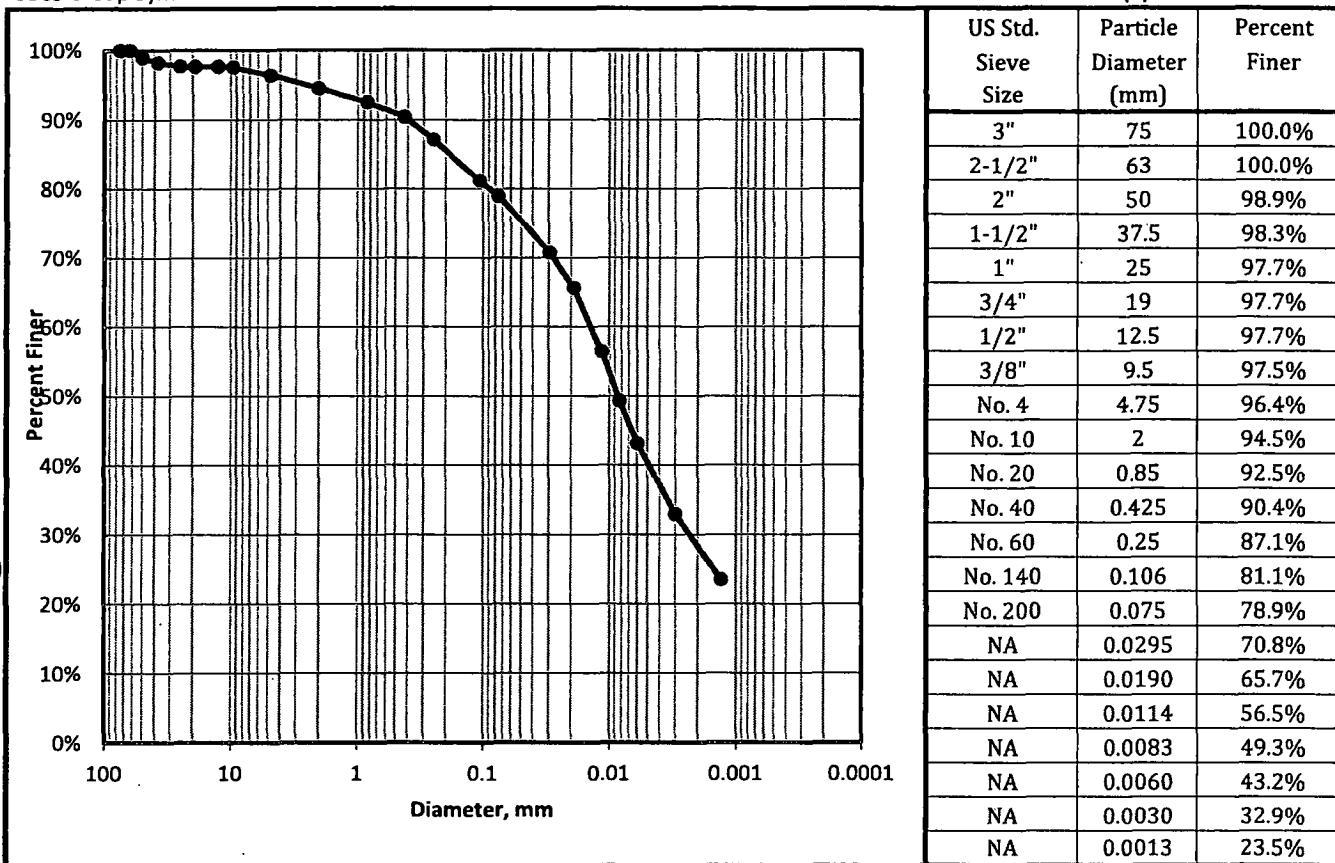
Date Tested: 9/21/2015

**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-6B
Client Project	153-121.0002 Closure Construction Central Waste	Depth	4.0'-8.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291018

Sample Color: **YELLOWISH BROWN**  
 USCS Group Name: **LEAN CLAY WITH SAND**  
 USCS Group Symbol: **CL**      USDA: **CLAY LOAM**

AASHTO: **A-6 (9)**



USCS SOIL CLASSIFICATION			USDA CLASSIFICATION			
<i>Corrected For 100% Passing a 3" Sieve</i>						
% Gravel (-3" & +#4)	3.6	Silt=38.4% Clay=40.5%	Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)	Corrected Percent of -2.0 mm Material for USDA
Coarse=2.3; Fine=1.3		D60, mm NA	100	100	Gravel 5.5	0
% Sand (#4 & +#200)	17.5	D30, mm NA	2	94.5	Sand 19.1	20.3
Coarse=1.9; Medium=4.1; Fine=11.5		D10, mm NA	0.05	75.4	Silt 47.1	49.8
% Fines (#200)	78.9	Cc NA	0.002	28.3	Clay 28.3	30.0
% Plus #200 (-3")	21.1	Cu NA				
USCS Description			USDA Classification			
<b>LEAN CLAY WITH SAND</b>			<b>CLAY LOAM</b>			
USCS Group Symbol	Atterberg Limits Group Symbol					
CL	<b>CL - LEAN CLAY</b>					
Auxiliary Information	Wt Ret, gm	% Retained	% Finer			
12" Sieve - 300 mm	0	0.0	100.0			
6" Sieve - 150 mm	0	0.0	100.0			
3" Sieve - 75 mm	0	0.0	100.0			

### USDA CLASSIFICATION CHART

Client Civil & Environmental Consultants, Inc.  
 Client Project 153-121.0002 Closure Construction Central Waste  
 Project No. 36291  
 Boring TP-6B  
 Depth 4.0'-8.0'  
 Sample Bucket  
 Lab Sample 36291018

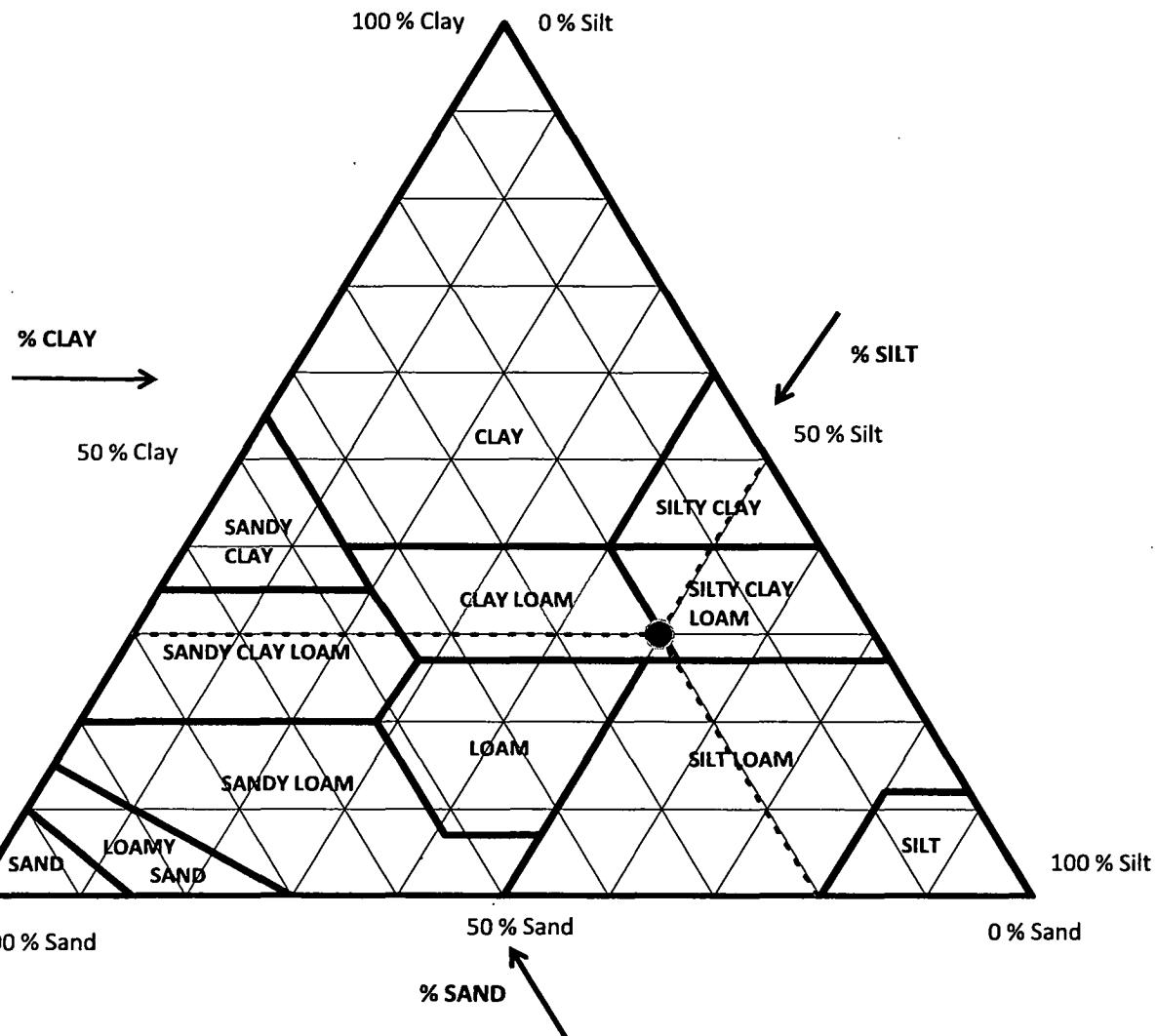
Sample Color: YELLOWISH BROWN  
 USCS Group Name: LEAN CLAY WITH SAND

USCS Group Symbol: CL

USDA: CLAY LOAM

AASHTO: A-6 (9)

Corrected for 0% gravel		Sand Subsizes Corrected Percentages	
Percent Gravel, %	0.0	Very Coarse Sand; 2-1	1.7
Percent Sand, %	20.3	Coarse Sand; 1-0.5	2.1
Percent Silt, %	49.8	Medium Sand; 0.5-0.25	4.0
Percent Clay, %	30.0	Fine Sand; 0.25-0.1	6.7
		Very Fine Sand; 0.1-0.05	5.7
		Total	20.3



## LABORATORY COMPACTION CHARACTERISTICS OF SOIL

Client	Civil & Environmental Consultants, Inc. Boring	TP-7A
Client Project	153-121.0002 Closure Construction Ce Depth	0.0'-4.0'
Project No.	36291	Sample
		Lab Sample No.
Visual Description:	YELLOWISH BROWN LEAN CLAY WITH SAND	

**Visual Description:** YELLOWISH BROWN LEAN CLAY WITH SAND

## **Input Validation: BLS**

Reviewed By: AJD

Date Tested: 10/07/15

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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-7A
Client Project	153-121.0002 Closure Construction Central Waste	Depth	0.0'-4.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291019

Sample Color: **YELLOWISH BROWN**  
 USCS Group Name: **LEAN CLAY WITH SAND**  
 USCS Group Symbol: **CL**

USDA: **SILT LOAM**

AASHTO: **A-4 (3)**

<b>MECHANICAL SIEVE</b>					
Total Sample	Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split % Retained	Normalized % Finer
Total Sample Wet Wt, gm (-3")	26466	3"	75	0	100.0%
Sample Split on Sieve	3/4"	2-1/2"	63	0	100.0%
Coarse Washed Dry Sample, gm	129	2"	50	0	100.0%
Wet Wt Passing Split, gm	26337	1-1/2"	37.5	0	100.0%
Dry Wt. Passing Split, gm	22894	1"	25	82.89	0.4%
Total Sample Dry Wt, gm	23023	3/4"	19	45.83	0.2%
<b>Split Sample - Passing 3/4"</b>					
Tare No.	531	1/2"	12.5	0	0.0%
Tare + WS., gm	1235.8	3/8"	9.5	1.99	99.2%
Tare + DS., gm	1100.23	No. 4	4.75	6.85	98.5%
Tare, gm	198.7	No. 10	2	7.67	97.6%
Water Content of Split Sample	15.0%	No. 20	0.85	10.09	96.5%
Wt. of DS., gm	901.53	No. 40	0.425	15.13	94.8%
Wt. of +#200 Sample, gm	205.33	No. 60	0.25	41.35	90.3%
		No. 140	0.106	94.87	79.8%
		No. 200	0.075	27.38	76.8%

<b>HYDROMETER (-#200)</b>							
Tare No.	Q58	Wt. Dispers., gm	5	Specific Gravity	2.67		
Wt. Tare + DS., gm	233.15	Wt. Dry Soil, gm (-#200)	34.56			Tested	
Wt. Tare, gm	193.59	#10 Dispersed 1min in Hamilton Beach Mixer				a Factor	0.9955
Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm) Adjusted % Finer (%)
2	33.5	21.4	4.9	28.6	0.0134	82.4	0.0310 63.3%
5	30.5	21.4	4.9	25.6	0.0134	73.7	0.0200 56.6%
15	25	21.2	4.9	20.1	0.0134	57.9	0.0120 44.5%
30	22	21.1	5.0	17.0	0.0134	49.0	0.0087 37.6%
60	18.5	21.1	5.0	13.5	0.0134	38.9	0.0063 29.9%
250	15	21.3	4.9	10.1	0.0134	29.1	0.0031 22.3%
1440	12	20.9	5.0	7.0	0.0135	20.2	0.0013 15.5%

<b>USCS SOIL CLASSIFICATION</b>			<b>USDA CLASSIFICATION</b>			
<b>Corrected For 100% Passing a 3" Sieve</b>						
% Gravel (-3" & +#4)	1.5	Silt=49.2% Clay=27.4%	Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)	Corrected Percent of -2.0 mm Material for USDA
Coarse=0.6; Fine=1		D60, mm NA	100	100	Gravel 2.4	0
% Sand (-#4 & +#200)	21.7	D30, mm NA	2	97.6	Sand 27.0	27.7
Coarse=0.8; Medium=2.8; Fine=18		D10, mm NA	0.05	70.6	Silt 51.9	53.1
% Fines (-#200)	76.8	Cc NA	0.002	18.7	Clay 18.7	19.2
% Plus #200 (-3")	23.2	Cu NA				
<b>USCS Description</b>			<b>USDA Classification</b>			
<b>LEAN CLAY WITH SAND</b>			<b>SILT LOAM</b>			
USCS Group Symbol	Atterberg Limits Group Symbol					
CL	CL - LEAN CLAY					
Auxiliary Information	Wt Ret, gm	% Retained	% Finer			
12" Sieve - 300 mm	0	0.0	100.0			
6" Sieve - 150 mm	0	0.0	100.0			
3" Sieve - 75 mm	0	0.0	100.0			

Input Validation Yes Reviewed By: SVG Date Tested 9/21/2015

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**LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS**  
**ASTM D 4318**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-7A
Client Project	153-121.0002 Closure Construction Central Waste	Depth	0.0'-4.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291019

Soil Description: **YELLOWISH BROWN LEAN CLAY**  
(-#40 Fraction)

<b>AS-RECEIVED W.C.</b>			<b>SAMPLE SUMMARY</b>		
Tare Number	531		Activity Index = .43; Liquidity Index = .13		
Wt. Tare & WS, gm	1235.80		Liquid Limit (LL), %	22	
Wt. Tare & DS, gm	1100.23		Plastic Limit (PL), %	14	
Wt. Tare, gm	198.70		Plasticity Index (PI)	8	
Water Content, %	15.0		USCS Group Symbol (-#40 Fraction)	CL	
			USCS Group Name (-#40 Fraction)	LEAN CLAY	
			Sample Color:	YELLOWISH BROWN	
<b>PLASTIC LIMIT</b>			<b>LIQUID LIMIT</b>		
Points Run	3 Points		3 Points		
Tare Number	255	234	257	258	243
Wt. Tare & WS, gm	23.60	23.17	23.01	24.15	23.17
Wt. Tare & DS, gm	22.65	22.30	21.65	22.66	21.86
Wt. Tare, gm	15.92	16.16	15.77	16.12	15.95
Water Content, %	14.1	14.2	23.1	22.8	22.2
		# of Blows	15	20	26
<b>PLASTICITY CHART</b>			<b>FLOW CURVE</b>		
Plasticity Index	60 50 40 30 20 10 0		Water Content	25 20 15 10 5 0	
	Liquid Limit			No. of Blows	
	0 10 20 30 40 50 60 70 80 90 100			10 20 30 40 50 60	

Input Validation: Yes

Reviewed By: SVG

Date Tested: 9/21/2015

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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

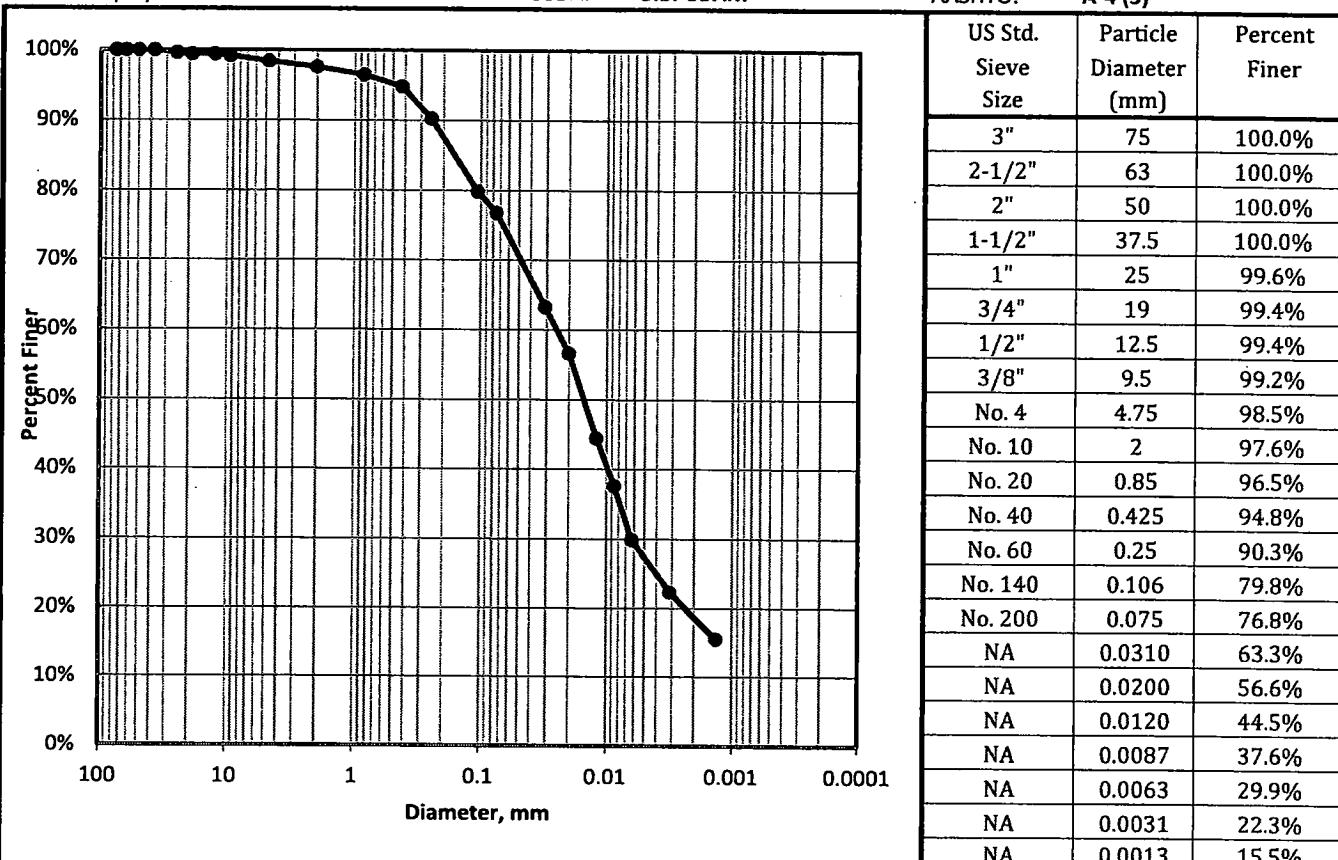
Client Civil & Environmental Consultants, Inc. Boring TP-7A  
 Client Project 153-121.0002 Closure Construction Central Waste Depth 0.0'-4.0'  
 Project No. 36291 Sample Bucket  
 Lab Sample 36291019

Sample Color: **YELLOWISH BROWN**

USCS Group Name: **LEAN CLAY WITH SAND**

USCS Group Symbol: **CL** USDA: **SILT LOAM**

AASHTO: **A-4 (3)**



USCS SOIL CLASSIFICATION			USDA CLASSIFICATION			
<i>Corrected For 100% Passing a 3" Sieve</i>						
% Gravel (-3" & +#4)	1.5	Silt=49.2% Clay=27.4%	Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)	Corrected Percent of -2.0 mm Material for USDA
Coarse=0.6; Fine=1		D60, mm NA	100	100	Gravel 2.4	0
% Sand (-#4 & #200)	21.7	D30, mm NA	2	97.6	Sand 27.0	27.7
Coarse=0.8; Medium=2.8; Fine=18		D10, mm NA	0.05	70.6	Silt 51.9	53.1
% Fines (#200)	76.8	Cc NA	0.002	18.7	Clay 18.7	19.2
% Plus #200 (-3")	23.2	Cu NA	USDA Classification			
USCS Description			SILT LOAM			
LEAN CLAY WITH SAND						
USCS Group Symbol	Atterberg Limits Group Symbol					
CL	CL - LEAN CLAY					
Auxiliary Information	Wt Ret, gm	% Retained	% Finer			
12" Sieve - 300 mm	0	0.0	100.0			
6" Sieve - 150 mm	0	0.0	100.0			
3" Sieve - 75 mm	0	0.0	100.0			

### USDA CLASSIFICATION CHART

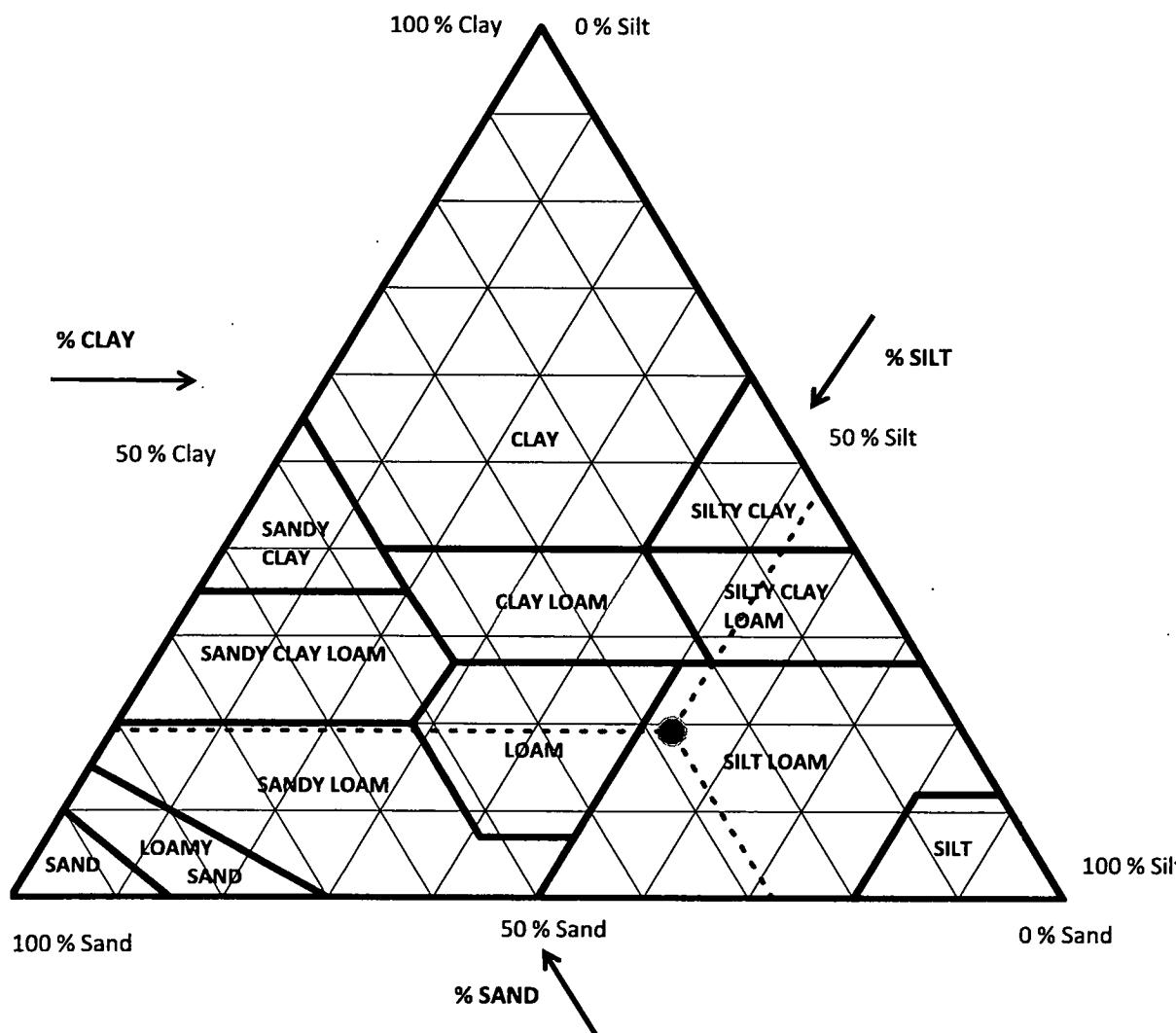
Client Civil & Environmental Consultants, Inc.  
 Client Project 153-121.0002 Closure Construction Central Waste  
 Project No. 36291  
 Boring TP-7A  
 Depth 0.0'-4.0'  
 Sample Bucket  
 Lab Sample 36291019

Sample Color: YELLOWISH BROWN  
 USCS Group Name: LEAN CLAY WITH SAND  
 USCS Group Symbol: CL

USDA: SILT LOAM

AASHTO: A-4 (3)

Corrected for 0% gravel		Sand Subsizes	
		Corrected Percentages	
Percent Gravel, %	0.0	Very Coarse Sand; 2-1	0.9
Percent Sand, %	27.7	Coarse Sand; 1-0.5	1.5
Percent Silt, %	53.1	Medium Sand; 0.5-0.25	5.1
Percent Clay, %	19.2	Fine Sand; 0.25-0.1	11.2
		Very Fine Sand; 0.1-0.05	8.9
		Total	27.7



## LABORATORY COMPACTION CHARACTERISTICS OF SOIL

Client Civil & Environmental Consultants, Inc. Boring TP-7B  
 Client Project 153-121.0002 Closure Construction Ce Depth 4.0'-8.0'  
 Project No. 36291 Sample Bucket  
 Lab Sample No. 36291020

Visual Description: YELLOWISH BROWN LEAN CLAY WITH SAND

WET DENSITY					TEST PARAMETERS	
Mold ID	G	G	G	G	Test Method	ASTM D698
Compaction Point #	1	2	3	4	Compaction Energy	Standard
Wt. Mold & WS, gm.	6233	6319	6357	6326	Test Procedure	A
Wt. Mold, gm.	4368	4368	4368	4368	Mold Diameter, in	4
Wt. WS, gm.	1865	1951	1989	1958	Compacted Layers	3
Mold Volume, cc	943	943	943	943	Blows Per Layer	25
Wet Density, gm./cc	1.98	2.07	2.11	2.08	Rammer Weight / Fall	5.5 lbs / 12 in.
Wet Density, pcf	123.3	129.0	131.5	129.5	Size of Material Used	-#4 Sieve
					Use: <5% Retained on #4	
WATER CONTENT					OVERSIZE PARTICLE CORRECTION	
Tare Number	117	552	457	440	No Corrections Needed	
Wt. Tare & WS, gm.	754.2	968.6	747.4	808.9		
Wt. Tare & DS, gm.	684.4	872.1	654.3	691.7	Percent of Oversize Rock (+#4 Sieve) = <5%	
Wt. Tare, gm.	83.7	197.9	85.4	83.4	(Based on As-received Screening & Soaking)	
Water Content, %	11.6	14.3	16.4	19.3	W.C. of Finer Material, % (-#4 Sieve) = NA	
DRY DENSITY vs. WATER CONTENT					SAMPLE SUMMARY	
LABORATORY TEST VALUES						
Water Content, %	11.6	14.3	16.4	19.3	Lab Optimum Water Content, %	15.5
Dry Density, pcf	110.5	112.9	113.0	108.6	Lab Maximum Dry Density, pcf	113.2
<i>Note: Maximum Density and Optimum Water Content reported from estimated best fit smooth curve!</i>						
Dry Density, pcf						
	Water Content, %					

Note: Compacted using manual hammer.

Input Validation: BLS

Reviewed By: AJD

Date Tested: 10/09/15

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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-7B
Client Project	153-121.0002 Closure Construction Central Waste	Depth	4.0'-8.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291020

Sample Color: **YELLOWISH BROWN**  
 USCS Group Name: **LEAN CLAY WITH SAND**  
 USCS Group Symbol: **CL**

USDA: **SILT LOAM**

AASHTO: **A-6 (8)**

MECHANICAL SIEVE										
Total Sample	Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained		Project Specifications				
Total Sample Wet Wt, gm (-3")	27158	3"	75	0	0.0%	100.0%				
Sample Split on Sieve	3/4"	2-1/2"	63	0	0.0%	100.0%				
Coarse Washed Dry Sample, gm	336	2"	50	232.49	1.0%	99.0%				
Wet Wt Passing Split, gm	26822	1-1/2"	37.5	0	0.0%	99.0%				
Dry Wt. Passing Split, gm	22773	1"	25	55.76	0.2%	98.8%				
Total Sample Dry Wt, gm	23110	3/4"	19	48.06	0.2%	98.5%				
Split Sample - Passing 3/4"		1/2"	12.5	7.26	0.8%	97.8%				
Tare No.	606	3/8"	9.5	2.26	0.2%	97.6%				
Tare + WS., gm	1263.8	No. 4	4.75	5.49	0.6%	97.0%				
Tare + DS., gm	1094.37	No. 10	2	11.63	1.2%	95.8%				
Tare, gm	141.3	No. 20	0.85	15.56	1.6%	94.2%				
Water Content of Split Sample	17.8%	No. 40	0.425	18.19	1.9%	92.3%				
Wt. of DS., gm	953.07	No. 60	0.25	31.7	3.3%	89.0%				
Wt. of +#200 Sample, gm	185.06	No. 140	0.106	68.91	7.1%	81.9%				
		No. 200	0.075	24.06	2.5%	79.4%				
HYDROMETER (-#200)										
Tare No.	554	Wt. Dispers., gm	5	Specific Gravity		2.68				
Wt. Tare + DS., gm	244.63	Wt. Dry Soil, gm (-#200)	42.72	Tested						
Wt. Tare, gm	196.91	#10 Dispersed 1min in Hamilton Beach Mixer		a Factor		0.9933				
Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm) Adjusted			
2	41.5	21.2	4.9	36.6	0.0134	85.1	0.0290 67.6%			
5	39	21.2	4.9	34.1	0.0134	79.3	0.0187 63.0%			
15	32	21	5.0	27.0	0.0134	62.8	0.0115 49.9%			
30	28.5	21	5.0	23.5	0.0134	54.6	0.0083 43.4%			
60	25	21	5.0	20.0	0.0134	46.5	0.0060 36.9%			
250	20	21.3	4.9	15.1	0.0133	35.1	0.0030 27.9%			
1440	15	20.9	5.0	10.0	0.0134	23.3	0.0013 18.5%			
USCS SOIL CLASSIFICATION				USDA CLASSIFICATION						
Corrected For 100% Passing a 3" Sieve				Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)	Corrected Percent of -2.0 mm Material for USDA			
% Gravel (-3" & +#4)	3.0	Silt=44.8% Clay=34.5%								
Coarse=1.5; Fine=1.6		D60, mm	NA	100	100	Gravel 4.2	0			
% Sand (#4 & +#200)	17.6	D30, mm	NA							
Coarse=1.2; Medium=3.5; Fine=12.9		D10, mm	NA	2	95.8	Sand 21.4	22.4			
% Fines (#200)	79.4	Cc	NA							
% Plus #200 (-3")	20.6	Cu	NA	0.05	74.4	Silt 51.2	53.4			
USCS Description LEAN CLAY WITH SAND										
USCS Group Symbol	Atterberg Limits Group Symbol			0.002	23.2	Clay 23.2	24.2			
CL	CL - LEAN CLAY									
Auxiliary Information	Wt Ret, gm	% Retained	% Finer	USDA Classification <b>SILT LOAM</b>						
12" Sieve - 300 mm	0	0.0	100.0							
6" Sieve - 150 mm	0	0.0	100.0							
3" Sieve - 75 mm	0	0.0	100.0							

Input Validation

Yes

Reviewed By: SVG

Date Tested

9/21/2015

**LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS**

ASTM D 4318

Client	Civil & Environmental Consultants, Inc.	Boring	TP-7B
Client Project	153-121.0002 Closure Construction Central Waste	Depth	4.0'-8.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291020

Soil Description: **YELLOWISH BROWN LEAN CLAY**  
(-#40 Fraction)

AS-RECEIVED W.C.			SAMPLE SUMMARY		
Tare Number	606		Activity Index = .52; Liquidity Index = .07		
Wt. Tare & WS, gm	1263.80		Liquid Limit (LL), %	29	
Wt. Tare & DS, gm	1094.37		Plastic Limit (PL), %	17	
Wt. Tare, gm	141.30		Plasticity Index (PI)	12	
Water Content, %	17.8		USCS Group Symbol (-#40 Fraction)	CL	
			USCS Group Name (-#40 Fraction)	LEAN CLAY	
			Sample Color:	YELLOWISH BROWN	
PLASTIC LIMIT			LIQUID LIMIT		
Points Run	3 Points		3 Points		
Tare Number	223	245	225	254	250
Wt. Tare & WS, gm	23.52	22.96	23.53	22.63	23.52
Wt. Tare & DS, gm	22.42	21.93	21.75	21.11	21.80
Wt. Tare, gm	16.06	15.89	16.06	16.05	15.88
Water Content, %	17.3	17.1	31.3	30.0	29.1
	# of Blows		15	20	27
PLASTICITY CHART			FLOW CURVE		
Plasticity Index	60 50 40 30 20 10 0		Water Content	35 30 25 20 15 10 5 0	
Liquid Limit	0 10 20 30 40 50 60 70 80 90 100		No. of Blows	10 20 30 40 50 60	

Input Validation: Yes

Reviewed By: SVG

Date Tested: 9/21/2015

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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-7B
Client Project	153-121.0002 Closure Construction Central Waste	Depth	4.0'-8.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291020

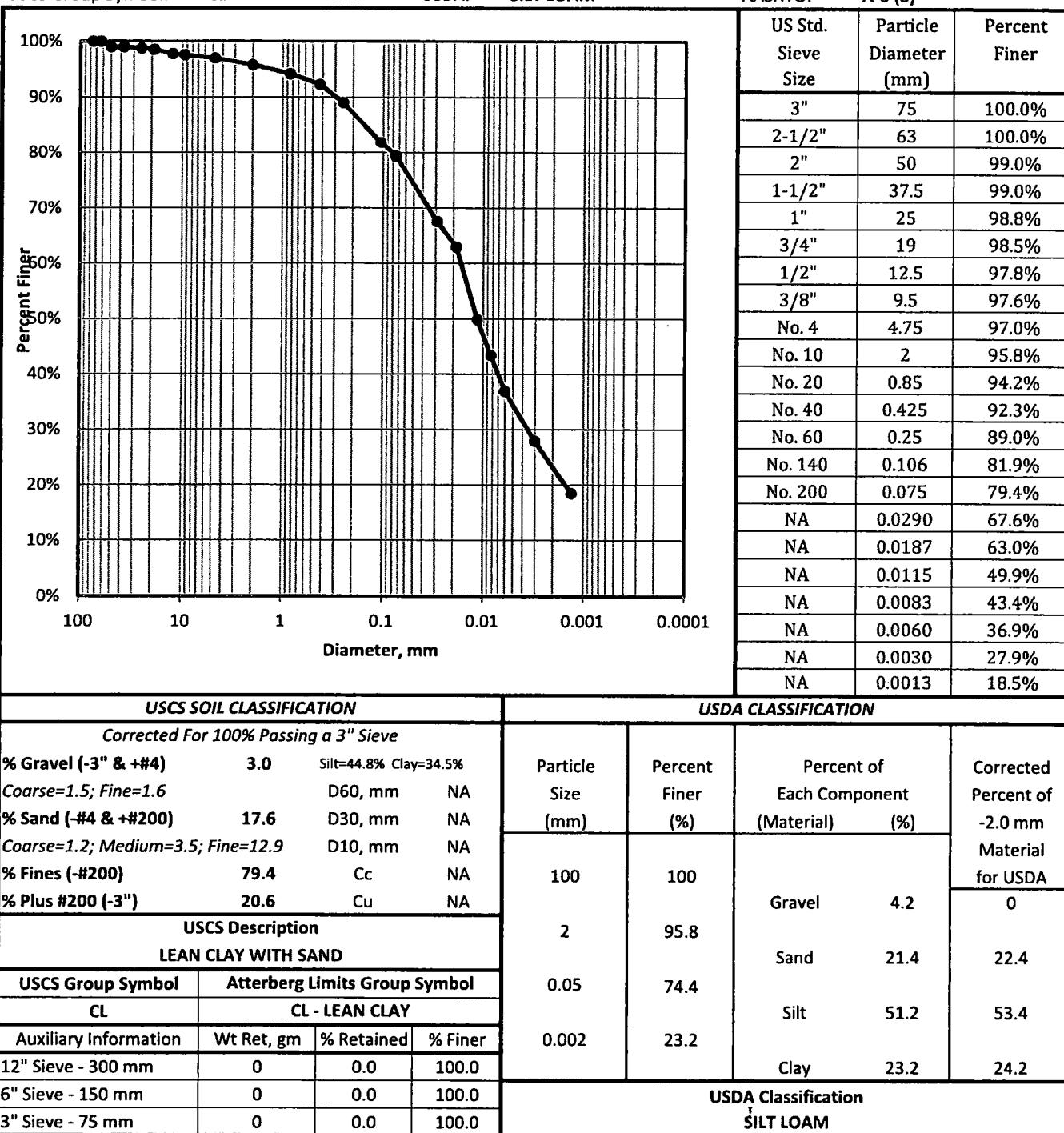
Sample Color: **YELLOWISH BROWN**

USCS Group Name: **LEAN CLAY WITH SAND**

USCS Group Symbol: **CL**

USDA: **SILT LOAM**

AASHTO: **A-6 (8)**



### USDA CLASSIFICATION CHART

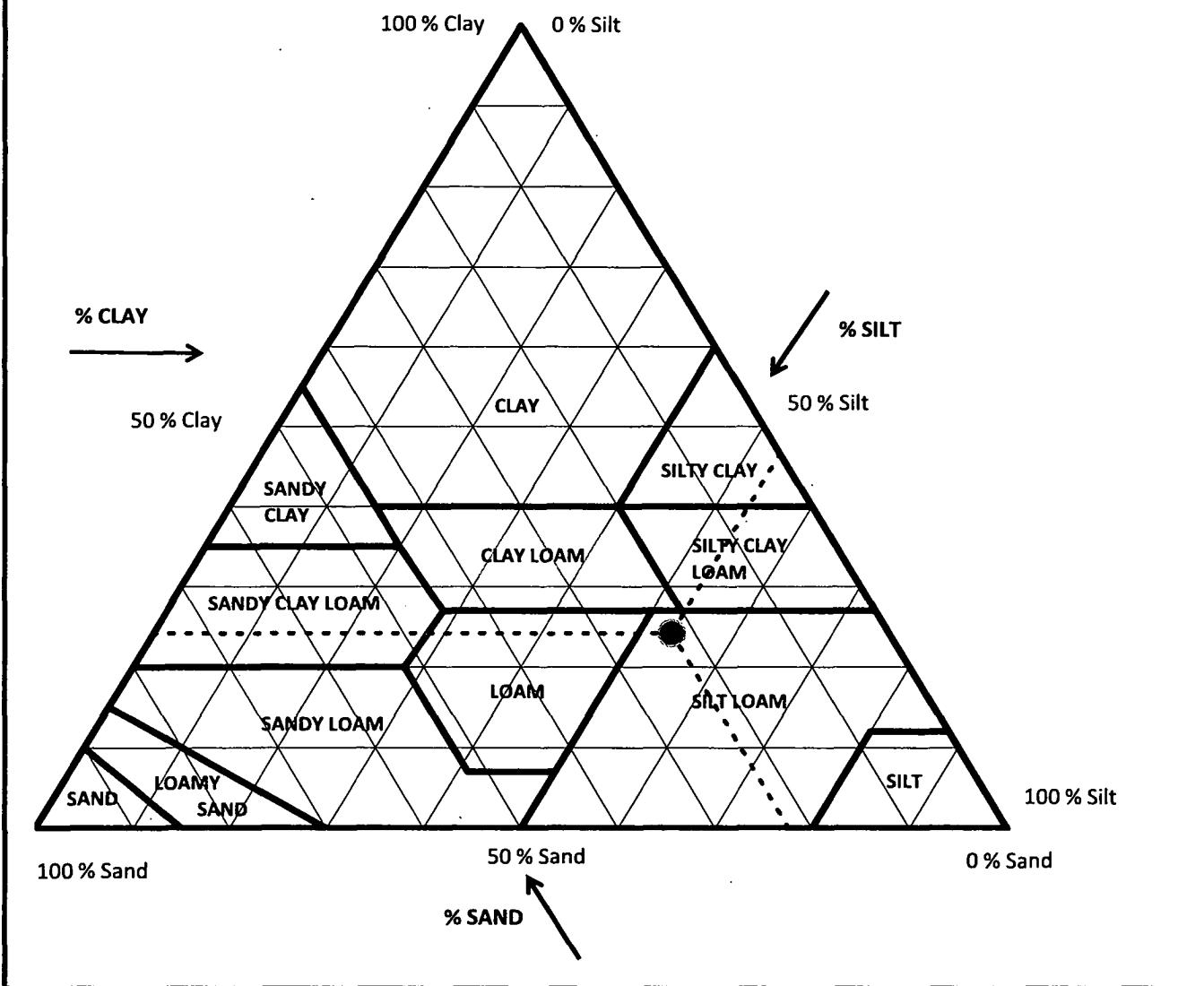
Client: Civil & Environmental Consultants, Inc.  
 Client Project: 153-121.0002 Closure Construction Central Waste  
 Project No.: 36291  
 Boring: TP-7B  
 Depth: 4.0'-8.0'  
 Sample: Bucket  
 Lab Sample: 36291020

Sample Color: YELLOWISH BROWN  
 USCS Group Name: LEAN CLAY WITH SAND  
 USCS Group Symbol: CL

USDA: SILT LOAM

AASHTO: A-6 (8)

Corrected for 0% gravel		Sand Subsizes	
		Corrected Percentages	
Percent Gravel, %	0.0	Very Coarse Sand; 2-1	1.4
Percent Sand, %	22.4	Coarse Sand; 1-0.5	1.8
Percent Silt, %	53.4	Medium Sand; 0.5-0.25	3.9
Percent Clay, %	24.2	Fine Sand; 0.25-0.1	7.9
		Very Fine Sand; 0.1-0.05	7.4
		Total	22.4



## **LABORATORY COMPACTION CHARACTERISTICS OF SOIL**

Client	Civil & Environmental Consultants, Inc. Boring	TP-8A
Client Project	153-121.0002 Closure Construction Ce Depth	0.0'-4.0'
Project No.	36291	Sample
		Lab Sample No.
Visual Description:	DARK YELLOWISH BROWN SANDY LEAN CLAY	36291021

## **Input Validation: BLS**

Reviewed By: AJD

Date Tested: 10/07/15

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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client Civil & Environmental Consultants, Inc. Boring TP-8A  
 Client Project 153-121.0002 Closure Construction Central Waste Depth 0.0'-4.0'  
 Project No. 36291 Sample Bucket  
 Lab Sample 36291021

Sample Color: DARK YELLOWISH BROWN  
 USCS Group Name: SANDY LEAN CLAY

USCS Group Symbol: CL

USDA: LOAM

AASHTO: A-6 (5)

MECHANICAL SIEVE								
Total Sample	Sieve Size	Nominal Opening, mm	Dry Wt, gm	% Retained	Split Normalized % Finer	Project Specifications		
Total Sample Wet Wt, gm (-3")	24995	3"	75	0	0.0%	100.0%		
Sample Split on Sieve	3/4"	75	0	0.0%	100.0%			
Coarse Washed Dry Sample, gm	449	2-1/2"	63	0	0.0%			
Wet Wt Passing Split, gm	24546	2"	50	0	0.0%	100.0%		
Dry Wt. Passing Split, gm	21099	1-1/2"	37.5	0	0.0%	100.0%		
Total Sample Dry Wt, gm	21549	1"	25	276.46	1.3%	98.7%		
	3/4"	19	172.91	0.8%	0.8%	97.9%		
	1/2"	12.5	13.54	1.3%	1.3%	96.6%		
Split Sample - Passing 3/4"								
Tare No.	573	3/8"	9.5	2.62	0.3%	96.4%		
Tare + WS., gm	1379.8	No. 4	4.75	18.97	1.8%	94.5%		
Tare + DS., gm	1213.58	No. 10	2	32.02	3.1%	91.5%		
Tare, gm	195.9	No. 20	0.85	40.96	3.9%	87.5%		
Water Content of Split Sample	16.3%	No. 40	0.425	43.76	4.2%	83.3%		
Wt. of DS., gm	1017.68	No. 60	0.25	55.93	5.4%	77.9%		
Wt. of +#200 Sample, gm	314.69	No. 140	0.106	83.83	8.1%	69.9%		
	No. 200	0.075	23.06	2.2%	2.2%	67.6%		

HYDROMETER (#200)								
Tare No.	1009	Wt. Dispers., gm	5	Specific Gravity	2.66	Tested		
Wt. Tare + DS., gm	233.26	Wt. Dry Soil, gm (-#200)	33.37				<i>a</i> Factor	
Wt. Tare, gm	194.89	#10 Dispersed 1min in Hamilton Beach Mixer			0.9977			
Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	32.5	21.4	4.9	27.6	0.0134	82.5	0.0313	55.8%
5	29.5	21.2	4.9	24.6	0.0134	73.6	0.0203	49.7%
15	24	21	5.0	19.0	0.0135	56.8	0.0122	38.4%
30	21.5	21	5.0	16.5	0.0135	49.3	0.0088	33.4%
60	18.5	20.9	5.0	13.5	0.0135	40.4	0.0063	27.3%
250	15	21.3	4.9	10.1	0.0134	30.2	0.0031	20.4%
1440	12	20.9	5.0	7.0	0.0135	20.9	0.0013	14.2%

USDA CLASSIFICATION								
Corrected For 100% Passing a 3" Sieve			Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)	Corrected Percent of -2.0 mm Material for USDA		
% Gravel (-3" & +#4)	5.5	Silt=42.5% Clay=25%						
Coarse=2.1; Fine=3.4		D60, mm	NA					
% Sand (#4 & +#200)	26.9	D30, mm	NA					
Coarse=3.1; Medium=8.2; Fine=15.7		D10, mm	NA					
% Fines (-#200)	67.6	Cc	NA					
% Plus #200 (-3")	32.4	Cu	NA					
USCS Description								
SANDY LEAN CLAY								
USCS Group Symbol	Atterberg Limits Group Symbol							
CL	CL - LEAN CLAY							
Auxiliary Information	Wt Ret, gm	% Retained	% Finer					
12" Sieve - 300 mm	0	0.0	100.0					
6" Sieve - 150 mm	0	0.0	100.0					
3" Sieve - 75 mm	0	0.0	100.0					
USDA Classification								
LOAM								

Input Validation Yes Reviewed By: SVG Date Tested 9/21/2015

## LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS

ASTM D 4318

Client	Civil & Environmental Consultants, Inc.	Boring	TP-8A
Client Project	153-121.0002 Closure Construction Central Waste	Depth	0.0'-4.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291021
Soil Description: (-#40 Fraction)	DARK YELLOWISH BROWN LEAN CLAY		

AS-RECEIVED W.C.			SAMPLE SUMMARY				
Tare Number	573		Activity Index = .7; Liquidity Index = .11				
Wt. Tare & WS, gm	1379.80		Liquid Limit (LL), %	27			
Wt. Tare & DS, gm	1213.58		Plastic Limit (PL), %	15			
Wt. Tare, gm	195.90		Plasticity Index (PI)	12			
Water Content, %	16.3		USCS Group Symbol (#40 Fraction)	CL			
			USCS Group Name (#40 Fraction)	LEAN CLAY			
			Sample Color:	DARK YELLOWISH BROWN			
PLASTIC LIMIT			LIQUID LIMIT				
Points Run	3 Points		3 Points				
Tare Number	224	218	209	215	203		
Wt. Tare & WS, gm	23.51	23.23	23.27	23.68	23.60		
Wt. Tare & DS, gm	22.50	22.26	21.70	22.08	22.06		
Wt. Tare, gm	15.91	15.94	16.06	16.16	16.19		
Water Content, %	15.3	15.3	27.8	27.0	26.2		
		# of Blows	17	24	31		
PLASTICITY CHART			FLOW CURVE				
Plasticity Index			Water Content				
60			30				
50			25				
40			20				
30			15				
20			10				
10			5				
0			0				
0	10	20	10	20	30		
CL-ML			25				
ML-Silt			30				
CH' - Fat Clay			35				
C - Lean Clay			40				
MH - Elastic Silt			45				
LI = 27			50				
PI = 15			55				
NMC = 16.3			60				
12			65				
15			70				
20			75				
25			80				
30			85				
35			90				
40			95				
45			100				
50			105				
55			110				
60			115				
65			120				
70			125				
75			130				
80			135				
85			140				
90			145				
95			150				
100			155				
105			160				
110			165				
115			170				
120			175				
125			180				
130			185				
135			190				
140			195				
145			200				
150			205				
160			210				
165			215				
170			220				
175			225				
180			230				
185			235				
190			240				
195			245				
200			250				
205			255				
210			260				
215			265				
220			270				
225			275				
230			280				
235			285				
240			290				
245			295				
250			300				
255			305				
260			310				
265			315				
270			320				
275			325				
280			330				
285			335				
290			340				
295			345				
300			350				

**Input Validation:** Yes

Reviewed By: **SVG**

Date Tested: 9/21/2015

**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client Civil & Environmental Consultants, Inc. Boring TP-8A  
 Client Project 153-121.0002 Closure Construction Central Waste Depth 0.0'-4.0'  
 Project No. 36291 Sample Bucket  
 Lab Sample 36291021

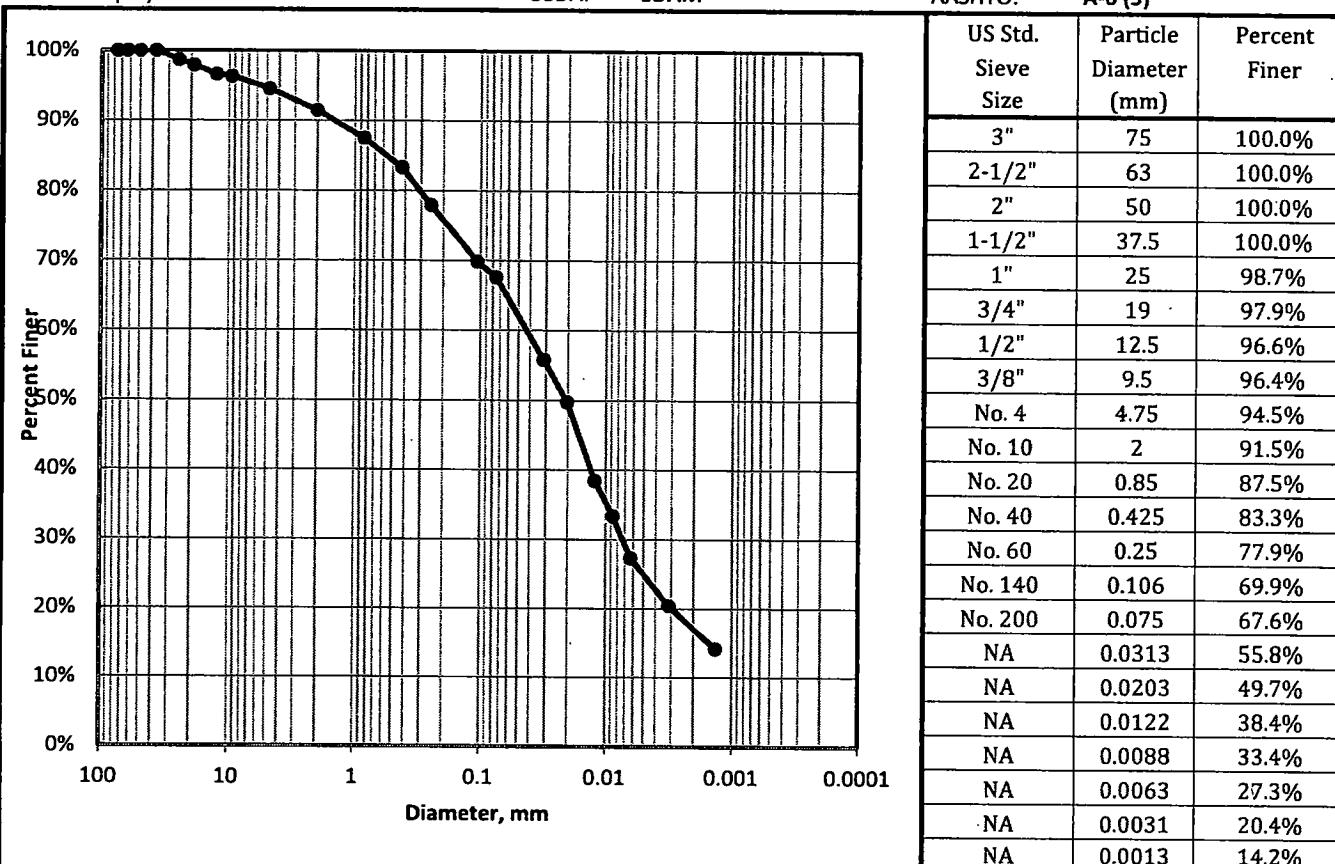
Sample Color: DARK YELLOWISH BROWN

USCS Group Name: SANDY LEAN CLAY

USCS Group Symbol: CL

USDA: LOAM

AASHTO: A-6 (5)



USCS SOIL CLASSIFICATION			USDA CLASSIFICATION							
Corrected For 100% Passing a 3" Sieve										
% Gravel (-3" & +#4)	5.5	Silt=42.5% Clay=25%	Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)		Corrected Percent of -2.0 mm Material for USDA			
Coarse=2.1; Fine=3.4		D60, mm NA	100	100	Gravel	8.5	0			
% Sand (#4 & +#200)	26.9	D30, mm NA	2	91.5	Sand	29.3	32.0			
Coarse=3.1; Medium=8.2; Fine=15.7		D10, mm NA	0.05	62.2	Silt	45.1	49.3			
% Fines (#200)	67.6	Cc NA	0.002	17.1	Clay	17.1	18.7			
% Plus #200 (-3")	32.4	Cu NA			USDA Classification					
USCS Description			LOAM							
SANDY LEAN CLAY										
USCS Group Symbol	Atterberg Limits Group Symbol									
CL	CL - LEAN CLAY									
Auxiliary Information	Wt Ret, gm	% Retained	% Finer							
12" Sieve - 300 mm	0	0.0	100.0							
6" Sieve - 150 mm	0	0.0	100.0							
3" Sieve - 75 mm	0	0.0	100.0							

### USDA CLASSIFICATION CHART

Client Civil & Environmental Consultants, Inc.  
 Client Project 153-121.0002 Closure Construction Central Waste  
 Project No. 36291  
 Boring TP-8A  
 Depth 0.0'-4.0'  
 Sample Bucket  
 Lab Sample 36291021

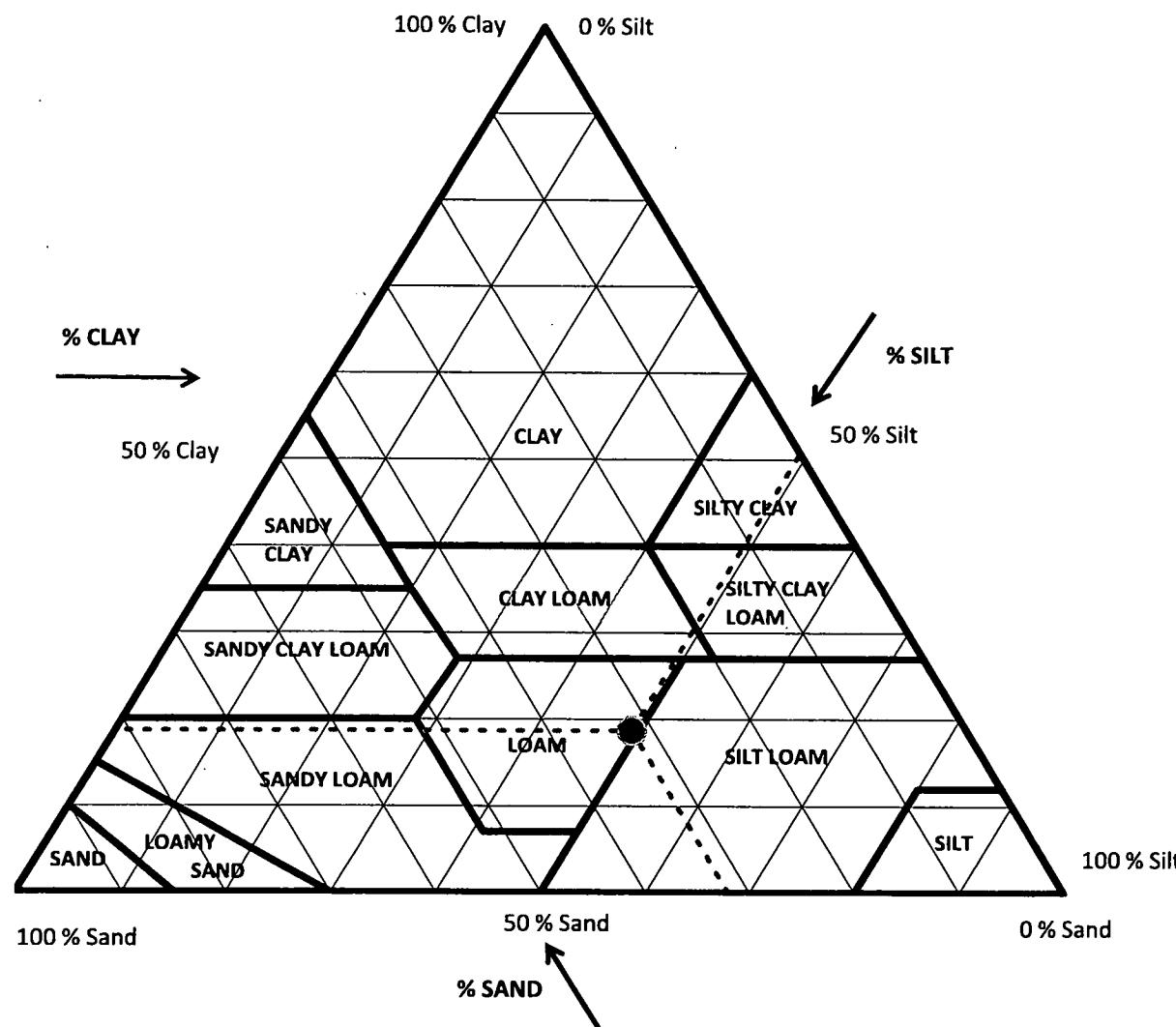
Sample Color: DARK YELLOWISH BROWN  
 USCS Group Name: SANDY LEAN CLAY

USCS Group Symbol: CL

USDA: LOAM

AASHTO: A-6 (5)

Corrected for 0% gravel		Sand Subsizes Corrected Percentages	
Percent Gravel, %	0.0	Very Coarse Sand; 2-1	3.5
Percent Sand, %	32.0	Coarse Sand; 1-0.5	4.3
Percent Silt, %	49.3	Medium Sand; 0.5-0.25	7.0
Percent Clay, %	18.7	Fine Sand; 0.25-0.1	9.2
		Very Fine Sand; 0.1-0.05	8.0
		Total	32.0



## LABORATORY COMPACTION CHARACTERISTICS OF SOIL

Client Civil & Environmental Consultants, Inc. Boring TP-8B  
 Client Project 153-121.0002 Closure Construction Ce Depth 4.0'-8.0'  
 Project No. 36291 Sample Bucket  
 Lab Sample No. 36291022

Visual Description: YELLOWISH BROWN SILT WITH SAND

WET DENSITY					TEST PARAMETERS	
Mold ID	C	D	D	C	Test Method	ASTM D1557
Compaction Point #	1	2	3	4	Compaction Energy	Modified
Wt. Mold & WS, gm.	6092	6205	6295	6254	Test Procedure	A
Wt. Mold, gm.	4216	4214	4214	4216	Mold Diameter, in	4
Wt. WS, gm.	1876	1991	2081	2038	Compacted Layers	5
Mold Volume, cc	944	946	946	944	Blows Per Layer	25
Wet Density, gm./cc	1.99	2.10	2.20	2.16	Rammer Weight / Fall	10 lbs / 18 in.
Wet Density, pcf	124.1	131.3	137.2	134.8	Size of Material Used	-#4 Sieve
					Use: <5% Retained on #4	
WATER CONTENT					OVERSIZE PARTICLE CORRECTION	
Tare Number	125	440	460	462	No Corrections Needed	
Wt. Tare & WS, gm.	958	835.8	633.6	1012.6		
Wt. Tare & DS, gm.	901.3	767.5	570	890.2	Percent of Oversize Rock (+#4 Sieve) = <5%	
Wt. Tare, gm.	84.6	101.4	85.6	85.8	(Based on As-received Screening & Soaking)	
Water Content, %	6.9	10.3	13.1	15.2	W.C. of Finer Material, % (-#4 Sieve) = NA	
DRY DENSITY vs. WATER CONTENT					SAMPLE SUMMARY	
LABORATORY TEST VALUES						
Water Content, %	6.9	10.3	13.1	15.2	Lab Optimum Water Content, %	12.7
Dry Density, pcf	116.0	119.1	121.3	117.0	Lab Maximum Dry Density, pcf	121.4
<i>Note: Maximum Density and Optimum Water Content reported from estimated best fit smooth curve!</i>						
<i>Note: Compacted with automatic compaction machine</i>						

Input Validation: BLS

Reviewed By: AJD

Date Tested: 10/12/15

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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-8B
Client Project	153-121.0002 Closure Construction Central Waste	Depth	4.0'-8.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291022

Sample Color: **YELLOWISH BROWN**  
 USCS Group Name: **SILTY CLAY WITH SAND**  
 USCS Group Symbol: **CL-ML**

USDA: **SILT LOAM**

AASHTO: **A-4 (3)**

**MECHANICAL SIEVE**

Total Sample	Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split % Retained	Normalized % Finer	Project Specifications
Total Sample Wet Wt, gm (-3") 27838	3"	75	0	0.0%	100.0%	
Sample Split on Sieve 3/4"	2-1/2"	63	0	0.0%	100.0%	
Coarse Washed Dry Sample, gm 110	2"	50	0	0.0%	100.0%	
Wet Wt Passing Split, gm 27728	1-1/2"	37.5	0	0.0%	100.0%	
Dry Wt. Passing Split, gm 23198	1"	25	44.66	0.2%	99.8%	
Total Sample Dry Wt, gm 23307	3/4"	19	64.97	0.3%	99.5%	
	1/2"	12.5	6.64	0.7%	98.9%	
<b>Split Sample - Passing 3/4"</b>	3/8"	9.5	1.79	0.2%	98.7%	
Tare No. 550	No. 4	4.75	4.85	0.5%	98.2%	
Tare + WS., gm 1359.7	No. 10	2	14.7	1.5%	96.7%	
Tare + DS., gm 1169.37	No. 20	0.85	17.85	1.8%	94.8%	
Tare, gm 194.9	No. 40	0.425	22.35	2.3%	92.6%	
<b>Water Content of Split Sample 19.5%</b>	No. 60	0.25	30.14	3.1%	89.5%	
Wt. of DS., gm 974.47	No. 140	0.106	52.08	5.3%	84.2%	
Wt. of +#200 Sample, gm 170.15	No. 200	0.075	19.75	2.0%	82.2%	

**HYDROMETER (-#200)**

Tare No. 3006	Wt. Dispers., gm 5	Specific Gravity 2.72
Wt. Tare + DS., gm 226.7	Wt. Dry Soil, gm (-#200) 38.82	Tested
Tare, gm 182.88	-#10 Dispersed 1min in Hamilton Beach Mixer	a Factor 0.9846

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	34.5	21.4	4.9	29.6	0.0132	75.1	0.0303	61.7%
5	29	21.4	4.9	24.1	0.0132	61.1	0.0199	50.2%
15	21.5	21.3	4.9	16.6	0.0132	42.1	0.0121	34.6%
30	18.5	21.2	4.9	13.6	0.0132	34.5	0.0088	28.3%
60	15.5	21.1	5.0	10.5	0.0132	26.6	0.0063	21.9%
250	12	21.4	4.9	7.1	0.0132	18.0	0.0031	14.8%
1440	9.5	21	5.0	4.5	0.0132	11.4	0.0013	9.4%

**USCS SOIL CLASSIFICATION**

Corrected For 100% Passing a 3" Sieve			USDA CLASSIFICATION				
% Gravel (-3" & +#4)	1.8	Silt=62.3% Clay=19.5%	Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)	Corrected Percent of -2.0 mm Material for USDA	
Coarse=0.5; Fine=1.4		D60, mm NA					
% Sand (-#4 & +#200)	16.0	D30, mm NA					
Coarse=1.5; Medium=4.1; Fine=10.4		D10, mm NA					
% Fines (-#200)	82.2	Cc NA					
% Plus #200 (-3")	17.8	Cu NA					
USCS Description			USDA Classification				
SILTY CLAY WITH SAND			SILT LOAM				
USCS Group Symbol	Atterberg Limits Group Symbol		USDA Classification				
CL-ML	CL-ML - SILTY CLAY		SILT LOAM				
Auxiliary Information	Wt Ret, gm	% Retained	% Finer				
12" Sieve - 300 mm	0	0.0	100.0				
12" Sieve - 150 mm	0	0.0	100.0				
3" Sieve - 75 mm	0	0.0	100.0				

Input Validation

Yes

Reviewed By: SVG

Date Tested

9/21/2015

## LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS

ASTM D 4318

Client Civil & Environmental Consultants, Inc. Boring TP-8B  
 Client Project 153-121.0002 Closure Construction Central Waste Depth 4.0'-8.0'  
 Project No. 36291 Sample Bucket  
 Lab Sample 36291022

Soil Description: YELLOWISH BROWN SILTY CLAY

(-#40 Fraction)

AS-RECEIVED W.C.			SAMPLE SUMMARY		
Tare Number 550			Activity Index = .5; Liquidity Index = .25		
Wt. Tare & WS, gm 1359.70			Liquid Limit (LL), % 24		
Wt. Tare & DS, gm 1169.37			Plastic Limit (PL), % 18		
Wt. Tare, gm 194.90			Plasticity Index (PI) 6		
Water Content, % 19.5			USCS Group Symbol (-#40 Fraction) CL-ML		
			USCS Group Name (-#40 Fraction) SILTY CLAY		
			Sample Color: YELLOWISH BROWN		
PLASTIC LIMIT			LIQUID LIMIT		
Points Run 3 Points			3 Points		
Tare Number 233	239	202	216	208	215
Wt. Tare & WS, gm 22.69	24.02	23.50	23.20	23.33	23.17
Wt. Tare & DS, gm 21.67	22.79	22.39	21.69	21.90	21.82
Wt. Tare, gm 15.93	15.86	16.07	15.81	16.16	16.19
Water Content, % 17.8	17.7	17.6	25.7	24.9	24.0
# of Blows 15			21	21	26
PLASTICITY CHART			FLOW CURVE		

Input Validation: Yes

Reviewed By: SVG

Date Tested: 9/21/2015

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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-8B
Client Project	153-121.0002 Closure Construction Central Waste	Depth	4.0'-8.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291022

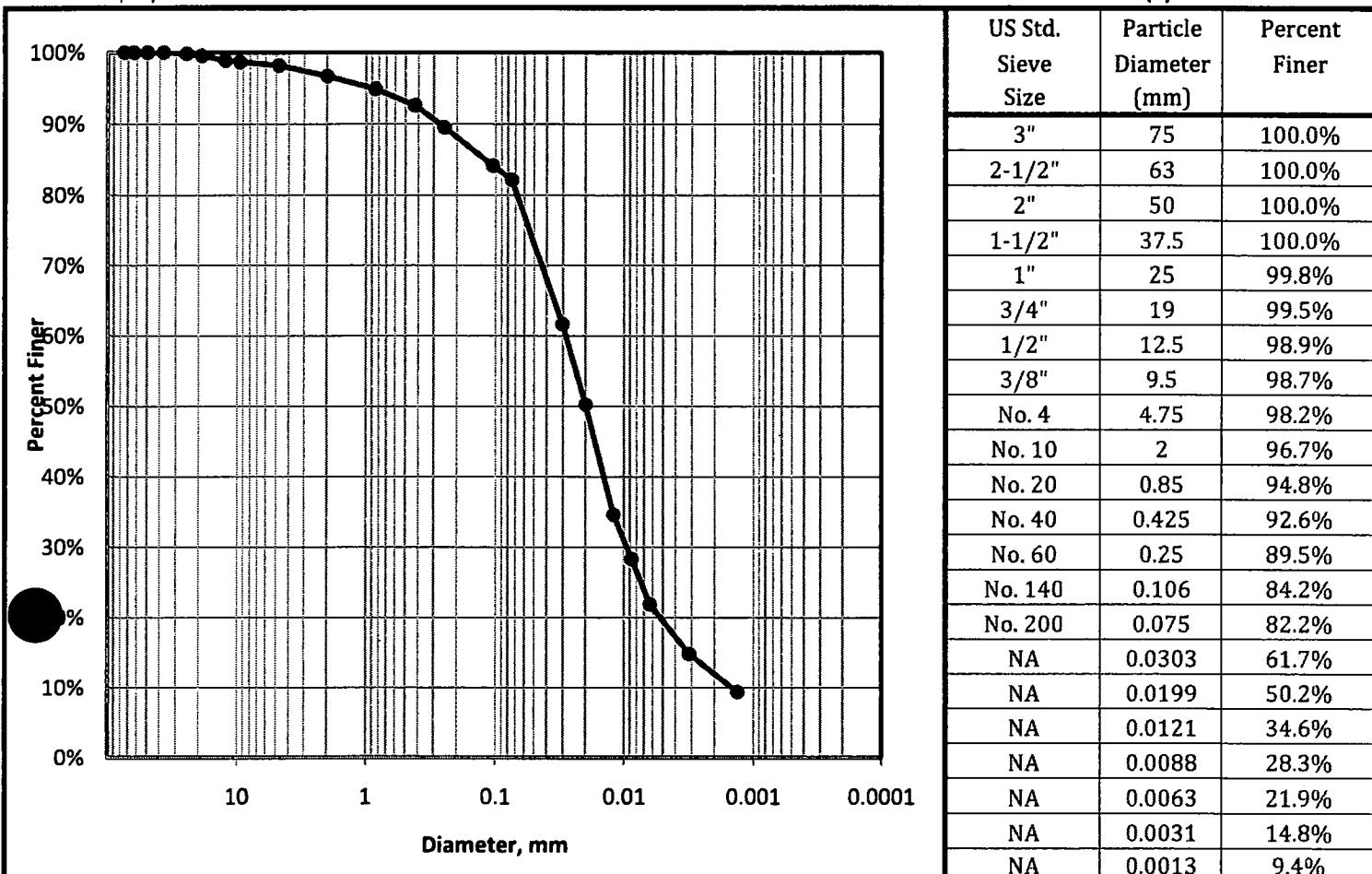
Sample Color: **YELLOWISH BROWN**

USCS Group Name: **SILTY CLAY WITH SAND**

USCS Group Symbol: **CL-ML**

USDA: **SILT LOAM**

AASHTO: **A-4 (3)**



USCS SOIL CLASSIFICATION			USDA CLASSIFICATION					
Corrected For 100% Passing a 3" Sieve								
% Gravel (-3" & +#4)	1.8	Silt=62.3% Clay=19.5%	Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)		Corrected Percent of -2.0 mm Material for USDA	
Coarse=0.5; Fine=1.4		D60, mm NA	100 2 0.05 0.002	100 96.7 73.0 11.9	Gravel 3.3		0 24.5 63.2 12.3	
% Sand (-#4 & +#200)	16.0	D30, mm NA			Sand 23.7			
Coarse=1.5; Medium=4.1; Fine=10.4		D10, mm NA			Silt 61.1			
% Fines (-#200)	82.2	Cc NA			Clay 11.9			
% Plus #200 (-3")	17.8	Cu NA	USDA Classification SILT LOAM					
USCS Description								
SILTY CLAY WITH SAND								
USCS Group Symbol	Atterberg Limits Group Symbol							
CL-ML	CL-ML - SILTY CLAY							
Auxiliary Information	Wt Ret, gm	% Retained	% Finer					
4" Sieve - 300 mm	0	0.0	100.0					
6" Sieve - 150 mm	0	0.0	100.0					
3" Sieve - 75 mm	0	0.0	100.0					

# USDA CLASSIFICATION CHART

Client: Civil & Environmental Consultants, Inc.  
 Client Project: 153-121.0002 Closure Construction Central Waste  
 Project No.: 36291  
 Boring: TP-8B  
 Depth: 4.0'-8.0'  
 Sample: Bucket  
 Lab Sample: 36291022

Sample Color: YELLOWISH BROWN

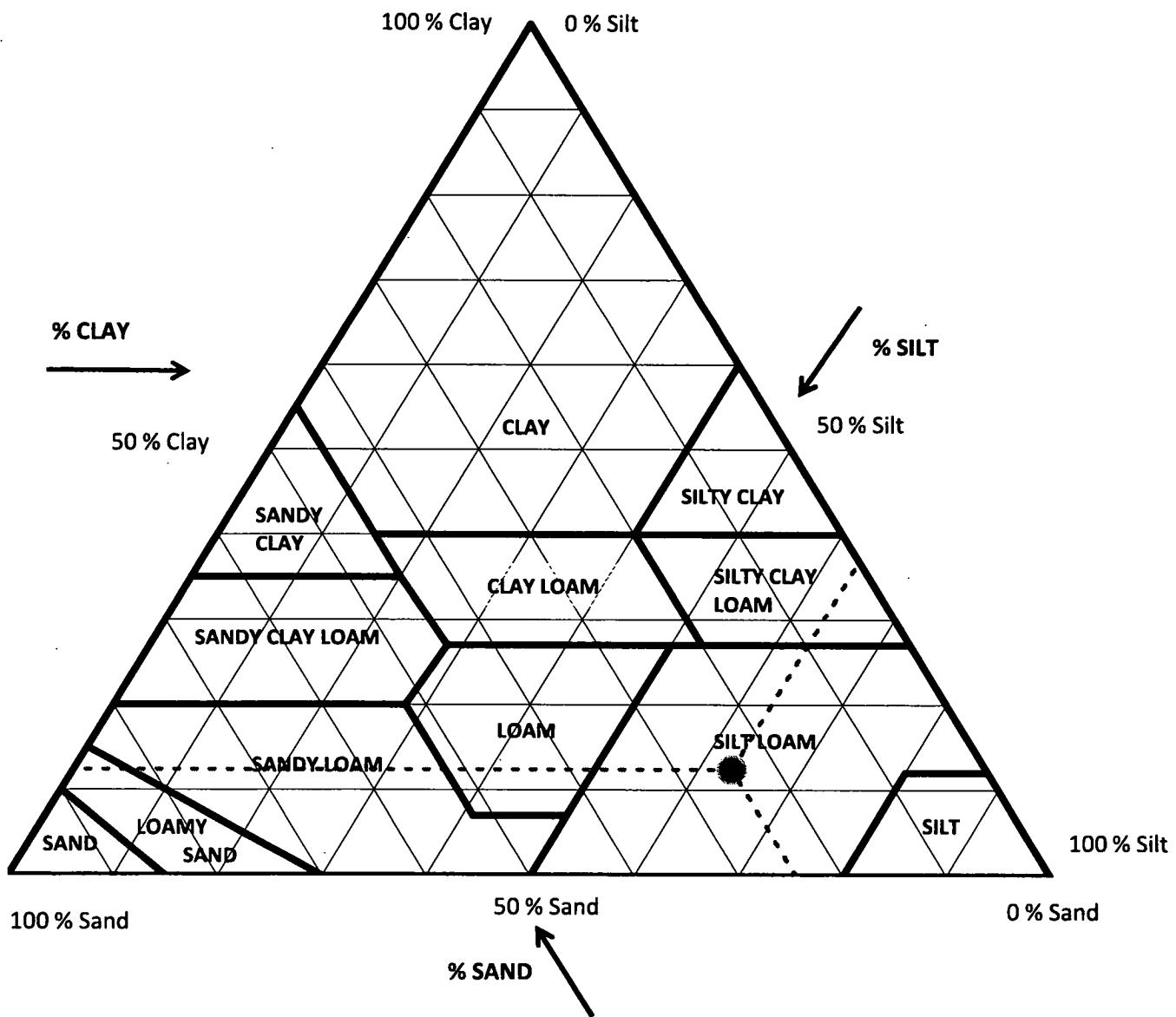
USCS Group Name: SILTY CLAY WITH SAND

USCS Group Symbol: CL-ML

USDA: SILT LOAM

AASHTO: A-4 (3)

Corrected for 0% gravel		Sand Subsizes Corrected Percentages	
Percent Gravel, %	0.0	Very Coarse Sand; 2-1	1.5
Percent Sand, %	24.5	Coarse Sand; 1-0.5	2.2
Percent Silt, %	63.2	Medium Sand; 0.5-0.25	3.7
Percent Clay, %	12.3	Fine Sand; 0.25-0.1	5.9
		Very Fine Sand; 0.1-0.05	11.2
		Total	24.5



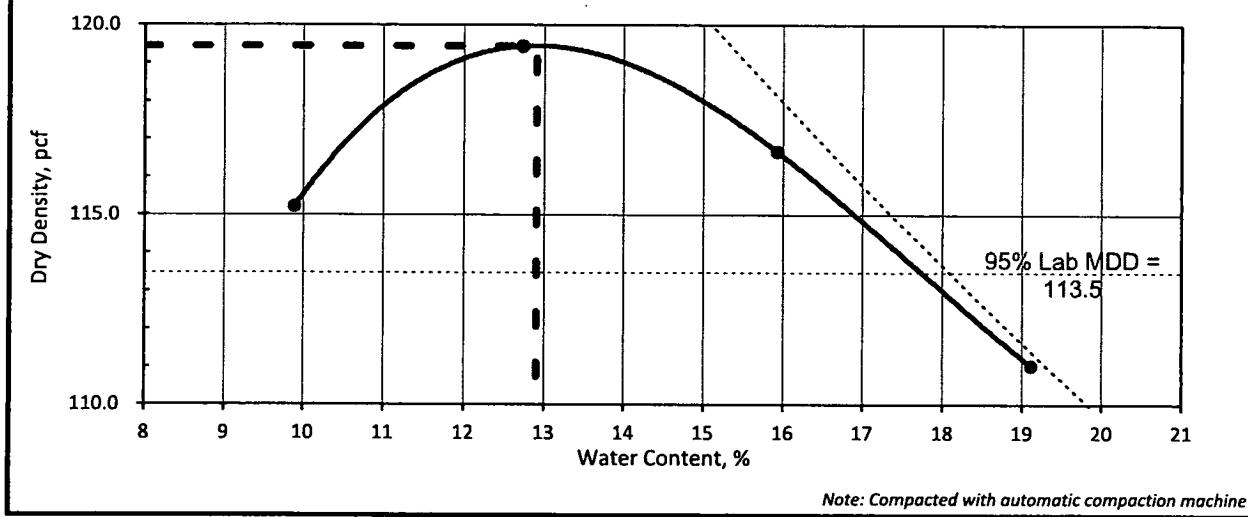
## LABORATORY COMPACTION CHARACTERISTICS OF SOIL

Client	Civil & Environmental Consultants, Inc. Boring	TP-9A
Client Project	153-121.0002 Closure Construction Ce Depth	0.0'-4.0'
Project No.	36291	Sample
		Bucket
		Lab Sample No.
Visual Description:	LIGHT OLIVE BROWN LEAN CLAY	

**Visual Description:** LIGHT OLIVE BROWN LEAN CLAY

WET DENSITY					TEST PARAMETERS	
Mold ID	D	C	D	C		ASTM D1557
Compaction Point #	1	2	3	4		Modified
Wt. Mold & WS, gm.	6134	6252	6265	6216		
Wt. Mold, gm.	4214	4216	4214	4216		A
Wt. WS, gm.	1920	2036	2051	2000		4
Mold Volume, cc	946	944	946	944		5
Wet Density, gm./cc	2.03	2.16	2.17	2.12		25
Wet Density, pcf	126.6	134.6	135.2	132.3		Rammer Weight / Fall Size of Material Used Use: <5% Retained on #4
WATER CONTENT					OVERSIZE PARTICLE CORRECTION	
Tare Number	920	503	923	553	No Corrections Needed	
Wt. Tare & WS, gm.	953.5	860.7	844.4	891.6		
Wt. Tare & DS, gm.	876.6	775.1	741.9	780.5		
Wt. Tare, gm.	98.8	102.6	98.4	199.3		
Water Content, %	9.9	12.7	15.9	19.1		
DRY DENSITY vs. WATER CONTENT					SAMPLE SUMMARY	
LABORATORY TEST VALUES						
Water Content, %	9.9	12.7	15.9	19.1	<i>Lab Optimum Water Content, %</i>	12.9
Dry Density, pcf	115.2	119.4	116.7	111.0	<i>Lab Maximum Dry Density, pcf</i>	119.4

Note: Maximum Density and Optimum Water Content reported from estimated best fit smooth curve



## Input Validation: BLS

Reviewed By: AJD

Date Tested: 10/08/15

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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-9A
Client Project	153-121.0002 Closure Construction Central Waste	Depth	0.0'-4.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291023

Sample Color: **LIGHT OLIVE BROWN**  
 USCS Group Name: **LEAN CLAY**

USCS Group Symbol: **CL**

USDA: **SILTY CLAY**

AASHTO: **A-6 (17)**

**MECHANICAL SIEVE**

Total Sample	Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split % Retained	Normalized % Finer	Project Specifications
Total Sample Wet Wt, gm (-3")	25630	3"	75	0	100.0%	
Sample Split on Sieve	3/4"	75	0	0.0%	100.0%	
Coarse Washed Dry Sample, gm	132	2-1/2"	63	0	100.0%	
Wet Wt Passing Split, gm	25498	2"	50	0	100.0%	
Dry Wt. Passing Split, gm	21951	1-1/2"	37.5	93.24	0.4%	99.6%
Total Sample Dry Wt, gm	22083	1"	25	0	0.0%	99.6%
	3/4"	19	38.99	0.2%	99.4%	
	1/2"	12.5	7.12	0.8%	98.6%	
<b>Split Sample - Passing 3/4"</b>	<b>3/8"</b>	<b>9.5</b>	<b>0</b>	<b>0.0%</b>	<b>98.6%</b>	
Tare No.	3008	No. 4	4.75	6.43	0.7%	97.9%
Tare + WS., gm	1244.1	No. 10	2	7.13	0.8%	97.1%
Tare + DS., gm	1096.76	No. 20	0.85	8.29	0.9%	96.2%
Tare, gm	184.8	No. 40	0.425	9.77	1.1%	95.2%
<b>Water Content of Split Sample</b>	<b>16.2%</b>	<b>No. 60</b>	<b>0.25</b>	<b>15.21</b>	<b>1.7%</b>	<b>93.5%</b>
Wt. of DS., gm	911.96	No. 140	0.106	27.84	3.0%	90.5%
Wt. of +#200 Sample, gm	91.64	No. 200	0.075	9.85	1.1%	89.4%

**HYDROMETER (#200)**

Tare No.	607	Wt. Dispers., gm	5	Specific Gravity	2.71
Wt. Tare + DS., gm	187.05	Wt. Dry Soil, gm (-#200)	40.58	Tested	
Wt. Tare, gm	141.47	-#10 Dispersed 1min in Hamilton Beach Mixer		a Factor	0.9868
Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor
					Percent
					Finer (%)
					Particle Diameter (mm)
					% Finer (%)
2	43.5	21.3	4.9	38.6	0.0132
5	41.5	21.3	4.9	36.6	0.0132
15	37.5	21.2	4.9	32.6	0.0132
30	34.5	21.2	4.9	29.6	0.0132
60	31.5	21.3	4.9	26.6	0.0132
250	26	21	5.0	21.0	0.0133
1440	20	20.9	5.0	15.0	0.0133

**USCS SOIL CLASSIFICATION**

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	2.1	Silt=33.8% Clay=55.5%	Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)	Corrected Percent of -2.0 mm Material for USDA
Coarse=0.6; Fine=1.5		D60, mm	NA			
% Sand (-#4 & +#200)	8.5	D30, mm	NA			
Coarse=0.8; Medium=2; Fine=5.8		D10, mm	NA			
% Fines (-#200)	89.4	Cc	NA			
% Plus #200 (-3")	10.6	Cu	NA			
USCS Description				100	100	2.9
LEAN CLAY				2	97.1	Sand
USCS Group Symbol	Atterberg Limits Group Symbol			0.05	87.1	10.0
CL	CL - LEAN CLAY					10.3
Auxiliary Information	Wt Ret, gm	% Retained	% Finer	0.002	39.8	47.3
12" Sieve - 300 mm	0	0.0	100.0			48.7
6" Sieve - 150 mm	0	0.0	100.0			41.0
3" Sieve - 75 mm	0	0.0	100.0			

**USDA Classification**

**SILTY CLAY**

Input Validation

Yes

Reviewed By: SVG

Date Tested

9/21/2015

**LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS**  
**ASTM D 4318**

Client Civil & Environmental Consultants, Inc.  
 Client Project 153-121.0002 Closure Construction Central Waste  
 Project No. 36291  
 Boring TP-9A  
 Depth 0.0'-4.0'  
 Sample Bucket  
 Lab Sample 36291023

Soil Description: LIGHT OLIVE BROWN LEAN CLAY  
 (-#40 Fraction)

AS-RECEIVED W.C.			SAMPLE SUMMARY				
Tare Number	3008		Activity Index = .48; Liquidity Index = -.15				
Wt. Tare & WS, gm	1244.10		Liquid Limit (LL), %	38			
Wt. Tare & DS, gm	1096.76		Plastic Limit (PL), %	19			
Wt. Tare, gm	184.80		Plasticity Index (PI)	19			
Water Content, %	16.2		USCS Group Symbol (-#40 Fraction)	CL			
			USCS Group Name (-#40 Fraction)	LEAN CLAY			
			Sample Color:	LIGHT OLIVE BROWN			
PLASTIC LIMIT			LIQUID LIMIT				
Points Run	3 Points		3 Points				
Tare Number	233	248	222	220	211		
Wt. Tare & WS, gm	22.88	22.75	22.21	22.27	22.33		
Wt. Tare & DS, gm	21.75	21.71	21.24	20.46	20.58		
Wt. Tare, gm	15.87	16.07	15.89	15.97	15.99		
Water Content, %	19.2	18.4	18.1	40.3	38.1		
			# of Blows	18	25		
					31		
PLASTICITY CHART			FLOW CURVE				
Plasticity Index	60		Water Content	45			
	50			40			
	40			35			
	30			30			
	20			25			
	10			20			
	0			15			
	0 10 20 30 40 50 60 70 80 90 100			10 20 30 40 50 60			
Plasticity Index	Liquid Limit		Water Content	No. of Blows			
	CL-ML			NMC = 16.2			
	ML-Silt			PL = 19			
	CL			LL = 38			
	Lean Clay						
	CH' - Fat Clay						
	MH - Elastic Silt						

Input Validation: Yes

Reviewed By: SVG

Date Tested: 9/21/2015

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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-9A
Client Project	153-121.0002 Closure Construction Central Waste	Depth	0.0'-4.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291023

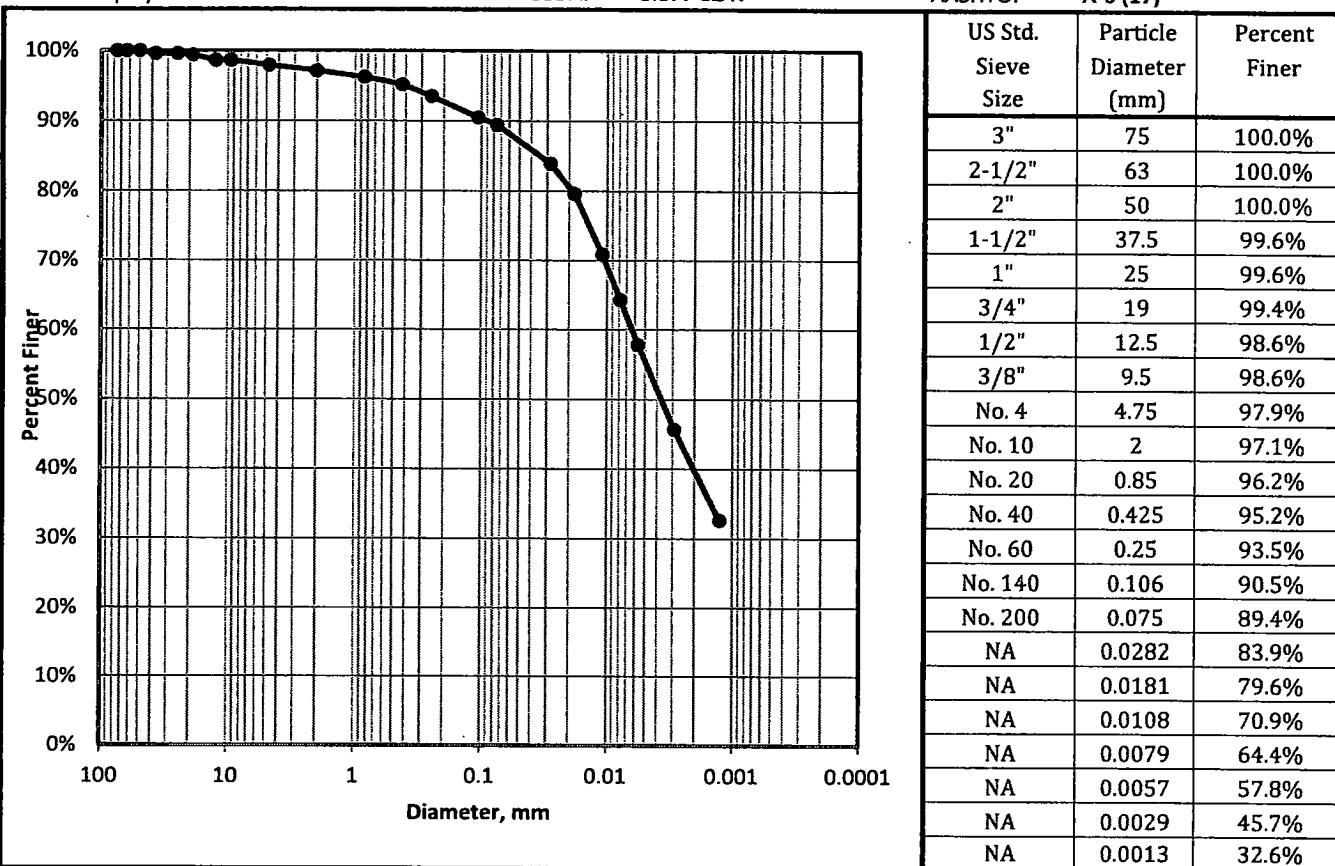
Sample Color: **LIGHT OLIVE BROWN**

USCS Group Name: **LEAN CLAY**

USCS Group Symbol: **CL**

USDA: **SILTY CLAY**

AASHTO: **A-6 (17)**



USCS SOIL CLASSIFICATION			USDA CLASSIFICATION					
<i>Corrected For 100% Passing a 3" Sieve</i>								
% Gravel (-3" & +#4)	2.1	Silt=33.8% Clay=55.5%	Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)		Corrected Percent of -2.0 mm Material for USDA	
Coarse=0.6; Fine=1.5		D60, mm NA	100	100	Gravel	2.9	0	
% Sand (-#4 & +#200)	8.5	D30, mm NA	2	97.1	Sand	10.0	10.3	
Coarse=0.8; Medium=2; Fine=5.8		D10, mm NA	0.05	87.1	Silt	47.3	48.7	
% Fines (-#200)	89.4	Cc NA	0.002	39.8	Clay	39.8	41.0	
% Plus #200 (-3")	10.6	Cu NA						
USCS Description			USDA Classification					
LEAN CLAY			SILTY CLAY					
USCS Group Symbol	Atterberg Limits Group Symbol							
CL	CL - LEAN CLAY							
Auxiliary Information	Wt Ret, gm	% Retained	% Finer					
12" Sieve - 300 mm	0	0.0	100.0					
6" Sieve - 150 mm	0	0.0	100.0					
3" Sieve - 75 mm	0	0.0	100.0					

### USDA CLASSIFICATION CHART

Client Civil & Environmental Consultants, Inc.  
 Client Project 153-121.0002 Closure Construction Central Waste  
 Project No. 36291  
 Boring TP-9A  
 Depth 0.0'-4.0'  
 Sample Bucket  
 Lab Sample 36291023

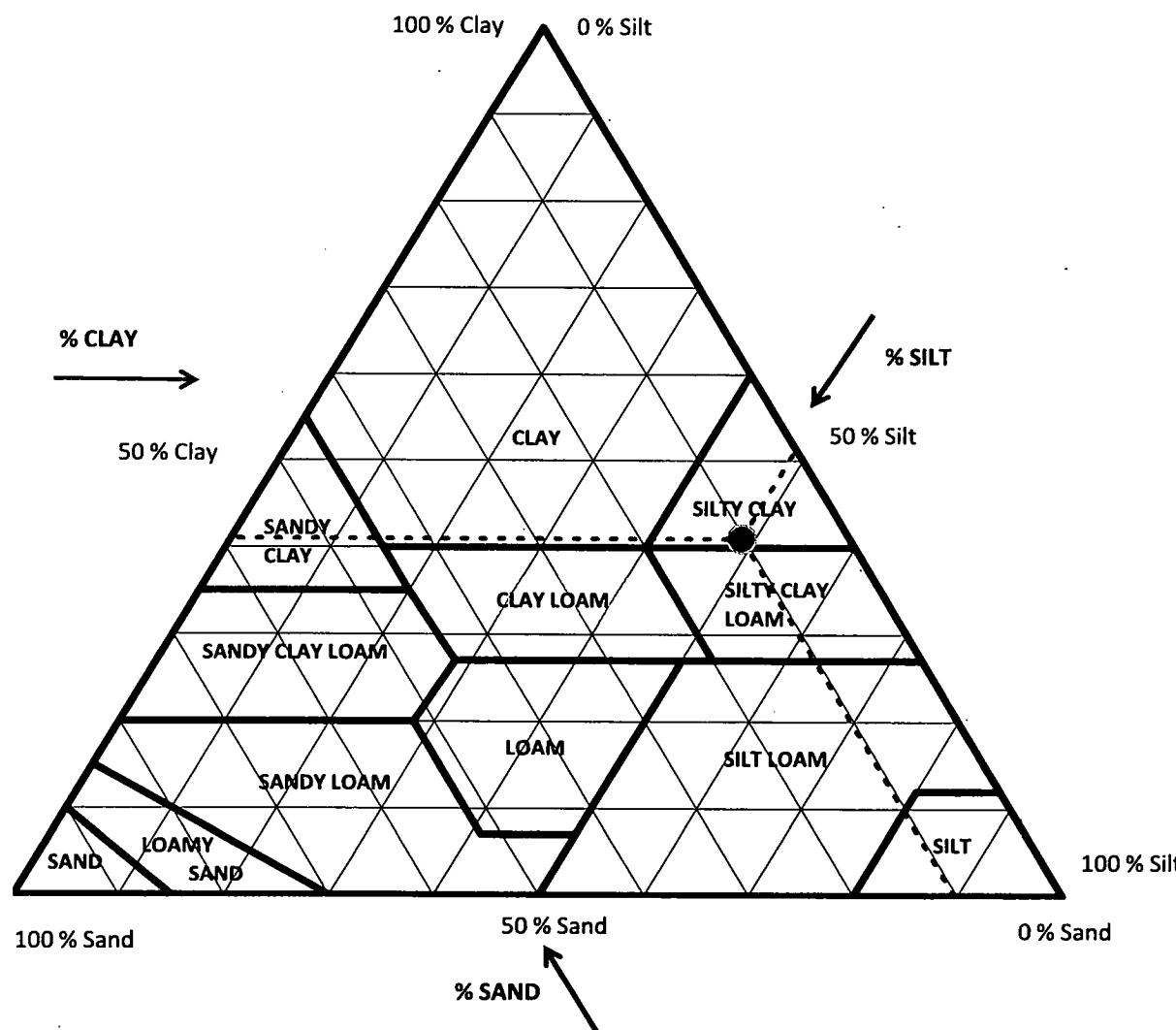
Sample Color: LIGHT OLIVE BROWN  
 USCS Group Name: LEAN CLAY

USCS Group Symbol: CL

USDA: SILTY CLAY

AASHTO: A-6 (17)

Corrected for 0% gravel		Sand Subsizes	
		Corrected Percentages	
Percent Gravel, %	0.0	Very Coarse Sand; 2-1	0.8
Percent Sand, %	10.3	Coarse Sand; 1-0.5	1.0
Percent Silt, %	48.7	Medium Sand; 0.5-0.25	2.0
Percent Clay, %	41.0	Fine Sand; 0.25-0.1	3.3
		Very Fine Sand; 0.1-0.05	3.3
		Total	10.3



## LABORATORY COMPACTION CHARACTERISTICS OF SOIL

Client Civil & Environmental Consultants, Inc. Boring TP-9B  
 Client Project 153-121.0002 Closure Construction Ce Depth 4.0'-8.0'  
 Project No. 36291 Sample Bucket  
 Lab Sample No. 36291024

Visual Description: LIGHT OLIVE BROWN LEAN CLAY

WET DENSITY					TEST PARAMETERS			
Mold ID	C	C	C	C	Test Method	ASTM D698		
Compaction Point #	1	2	3	4	Compaction Energy	Standard		
Wt. Mold & WS, gm.	6023	6088	6159	6124	Test Procedure	A		
Wt. Mold, gm.	4216	4216	4216	4216	Mold Diameter, in	4		
Wt. WS, gm.	1807	1872	1943	1908	Compacted Layers	3		
Mold Volume, cc	944	944	944	944	Blows Per Layer	25		
Wet Density, gm./cc	1.91	1.98	2.06	2.02	Rammer Weight / Fall	5.5 lbs / 12 in.		
Wet Density, pcf	119.5	123.8	128.5	126.2	Size of Material Used	-#4 Sieve		
					Use: <5% Retained on #4			
WATER CONTENT					OVERSIZE PARTICLE CORRECTION			
Tare Number	602	916	963	1028	No Corrections Needed			
Wt. Tare & WS, gm.	919.7	912.5	831.1	949.1				
Wt. Tare & DS, gm.	824.7	798.3	712.8	814.2	Percent of Oversize Rock (+#4 Sieve) = <5%			
Wt. Tare, gm.	142.8	98.9	103.4	194	(Based on As-received Screening & Soaking)			
Water Content, %	13.9	16.3	19.4	21.8	W.C. of Finer Material, % (-#4 Sieve) = NA			
DRY DENSITY vs. WATER CONTENT					SAMPLE SUMMARY			
LABORATORY TEST VALUES								
Water Content, %	13.9	16.3	19.4	21.8	Lab Optimum Water Content, %			
Dry Density, pcf	104.9	106.4	107.6	103.6	Lab Maximum Dry Density, pcf			
<i>Note: Maximum Density and Optimum Water Content reported from estimated best fit smooth curve!</i>								
<i>Note: Compacted using manual hammer.</i>								

Input Validation: BLS

Reviewed By: AJD

Date Tested: 10/08/15

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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-9B
Client Project	153-121.0002 Closure Construction Central Waste	Depth	4.0'-8.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291024

Sample Color: **LIGHT OLIVE BROWN**  
 USCS Group Name: **LEAN CLAY**  
 USCS Group Symbol: **CL**

USDA: **SILTY CLAY**

AASHTO: **A-6 (17)**

<b>MECHANICAL SIEVE</b>						
Total Sample	Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split % Retained	Normalized % Finer	Project Specifications
Total Sample Wet Wt, gm (-3")	24011	3"	75	0	100.0%	
Sample Split on Sieve	3/4"	2-1/2"	63	0	100.0%	
Coarse Washed Dry Sample, gm	253	2"	50	0	100.0%	
Wet Wt Passing Split, gm	23758	1-1/2"	37.5	123.94	99.4%	
Dry Wt. Passing Split, gm	19911	1"	25	80.88	99.0%	
Total Sample Dry Wt, gm	20164	3/4"	19	48.24	98.7%	
<b>Split Sample - Passing 3/4"</b>						
Tare No.	1002	1/2"	12.5	2.59	98.5%	
Tare + WS., gm	1355.3	3/8"	9.5	4.89	98.0%	
Tare + DS., gm	1166.36	No. 4	4.75	7.28	97.3%	
Tare, gm	188.4	No. 10	2	5.93	96.7%	
Water Content of Split Sample	19.3%	No. 20	0.85	9.48	95.7%	
Wt. of DS., gm	977.96	No. 40	0.425	9.88	94.7%	
Wt. of DS., gm	977.96	No. 60	0.25	14.05	93.3%	
Wt. of +#200 Sample, gm	85.81	No. 140	0.106	23.17	90.9%	
		No. 200	0.075	8.54	90.1%	

<b>HYDROMETER (-#200)</b>						
Tare No.	1011	Wt. Dispers., gm	5	Specific Gravity	2.74	
Wt. Tare + DS., gm	240	Wt. Dry Soil, gm (-#200)	42.43	Tested		
Wt. Tare, gm	192.57	#10 Dispersed 1min in Hamilton Beach Mixer		a Factor	0.9805	

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	46	21.3	4.9	41.1	0.0131	95.0	0.0273	85.6%
5	44	21.3	4.9	39.1	0.0131	90.4	0.0176	81.4%
15	40	21.2	4.9	35.1	0.0131	81.1	0.0105	73.1%
30	36	21.2	4.9	31.1	0.0131	71.9	0.0077	64.7%
60	33	21.3	4.9	28.1	0.0131	64.9	0.0056	58.5%
250	27	21.1	5.0	22.0	0.0131	50.8	0.0029	45.8%
1440	21	20.9	5.0	16.0	0.0132	37.0	0.0012	33.3%

<b>USCS SOIL CLASSIFICATION</b>			<b>USDA CLASSIFICATION</b>			
Corrected For 100% Passing a 3" Sieve						
% Gravel (-3" & +#4)	2.7	Silt=33.6% Clay=56.5%				
Coarse=1.3; Fine=1.5		D60, mm				
% Sand (#4 & +#200)	7.2	D30, mm				
Coarse=0.6; Medium=2; Fine=4.6		D10, mm				
% Fines (-#200)	90.1	Cc				
% Plus #200 (-3")	9.9	Cu				
<b>USCS Description</b>						
LEAN CLAY						
<b>USCS Group Symbol</b>	<b>Atterberg Limits Group Symbol</b>					
CL	CL - LEAN CLAY					
Auxiliary Information	Wt Ret, gm	% Retained	% Finer			
12" Sieve - 300 mm	0	0.0	100.0			
6" Sieve - 150 mm	0	0.0	100.0			
3" Sieve - 75 mm	0	0.0	100.0	<b>USDA Classification</b>		
				SILTY CLAY		

Input Validation Yes Reviewed By: SVG Date Tested 9/21/2015

**LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS**

**ASTM D 4318**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-9B
Client Project	153-121.0002 Closure Construction Central Waste	Depth	4.0'-8.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291024

**Soil Description:** LIGHT OLIVE BROWN LEAN CLAY  
 (-#40 Fraction)

AS-RECEIVED W.C.			SAMPLE SUMMARY				
Tare Number	1002		Activity Index = .47; Liquidity Index = .02				
Wt. Tare & WS, gm	1355.30		Liquid Limit (LL), %	38			
Wt. Tare & DS, gm	1166.36		Plastic Limit (PL), %	19			
Wt. Tare, gm	188.40		Plasticity Index (PI)	19			
Water Content, %	19.3		USCS Group Symbol (-#40 Fraction)	CL			
			USCS Group Name (-#40 Fraction)	LEAN CLAY			
			Sample Color:	LIGHT OLIVE BROWN			
PLASTIC LIMIT			LIQUID LIMIT				
Points Run	3 Points		3 Points				
Tare Number	252	261	251	253	235		
Wt. Tare & WS, gm	22.44	22.87	22.98	22.86	22.75		
Wt. Tare & DS, gm	21.43	21.72	20.95	20.97	20.91		
Wt. Tare, gm	16.25	15.89	15.80	16.09	15.97		
Water Content, %	19.5	19.7	39.4	38.7	37.2		
	# of Blows		18	24	30		
PLASTICITY CHART			FLOW CURVE				
Plasticity Index			Water Content				
60			45				
50			40				
40			35				
30			30				
20			25				
10			20				
0			15				
			10				
			5				
			0				
0	Liquid Limit		10	No. of Blows			
10			20				
20			30				
30			40				
40			50				
50			60				

Input Validation: Yes

Reviewed By: SVG

Date Tested: 9/21/2015

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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-9B
Client Project	153-121.0002 Closure Construction Central Waste	Depth	4.0'-8.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291024

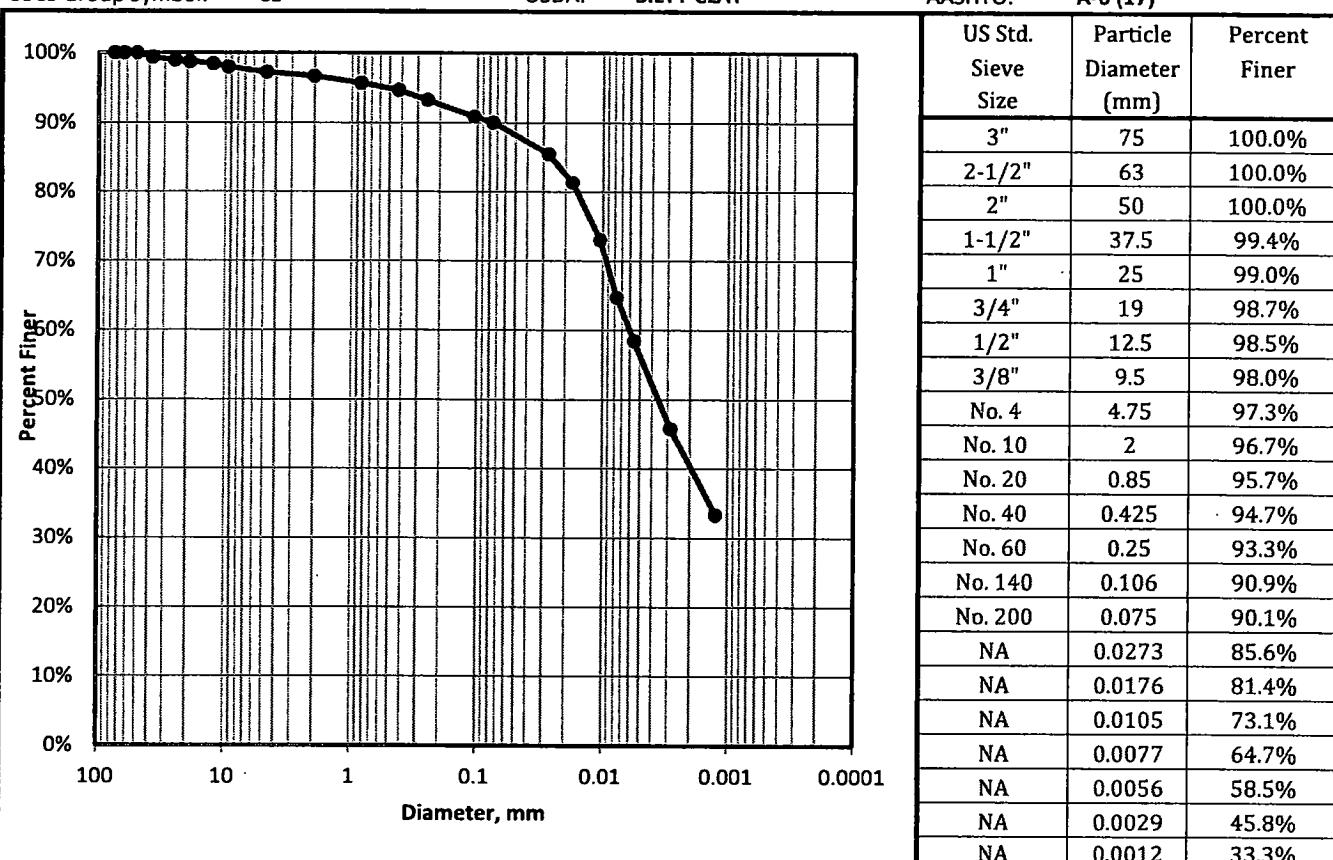
Sample Color: **LIGHT OLIVE BROWN**

USCS Group Name: **LEAN CLAY**

USCS Group Symbol: **CL**

USDA: **SILTY CLAY**

AASHTO: **A-6 (17)**



USCS SOIL CLASSIFICATION			USDA CLASSIFICATION			
Corrected For 100% Passing a 3" Sieve						
% Gravel (-3" & +#4)	2.7	Silt=33.6% Clay=56.5%	Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)	Corrected Percent of -2.0 mm Material for USDA
Coarse=1.3; Fine=1.5		D60, mm NA	100	100	Gravel 3.3	0
% Sand (#4 & +#200)	7.2	D30, mm NA	2	96.7	Sand 8.4	8.7
Coarse=0.6; Medium=2; Fine=4.6		D10, mm NA	0.05	88.3	Silt 47.8	49.5
% Fines (-#200)	90.1	Cc NA	0.002	40.5	Clay 40.5	41.9
% Plus #200 (-3")	9.9	Cu NA				
USCS Description			USDA Classification			
LEAN CLAY			SILTY CLAY			
USCS Group Symbol	Atterberg Limits Group Symbol					
CL	CL - LEAN CLAY					
Auxiliary Information	Wt Ret, gm	% Retained	% Finer			
12" Sieve - 300 mm	0	0.0	100.0			
6" Sieve - 150 mm	0	0.0	100.0			
3" Sieve - 75 mm	0	0.0	100.0			

### USDA CLASSIFICATION CHART

Client Civil & Environmental Consultants, Inc.  
 Client Project 153-121.0002 Closure Construction Central Waste  
 Project No. 36291  
 Boring TP-9B  
 Depth 4.0'-8.0'  
 Sample Bucket  
 Lab Sample 36291024

Sample Color: LIGHT OLIVE BROWN

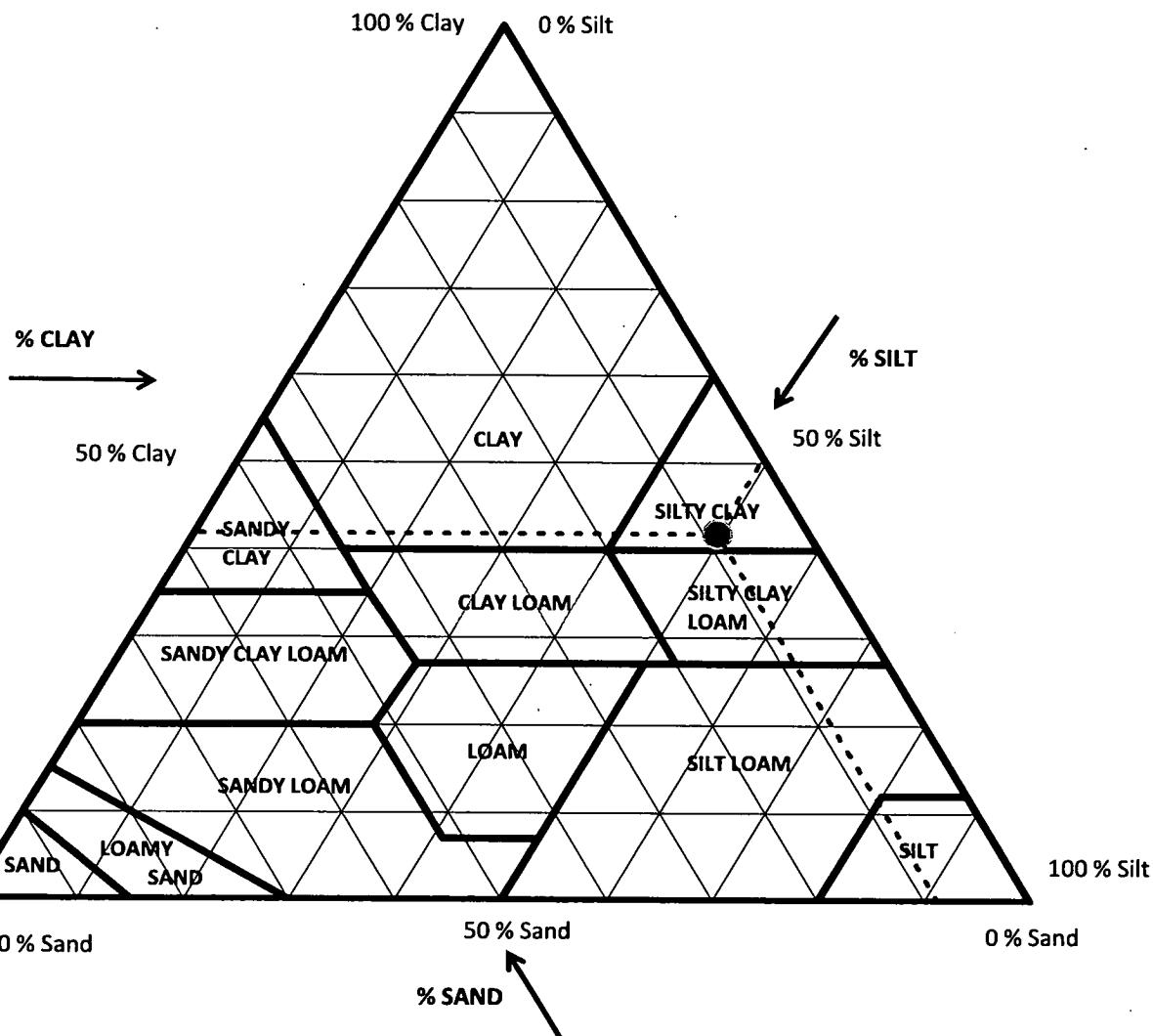
USCS Group Name: LEAN CLAY

USCS Group Symbol: CL

USDA: SILTY CLAY

AASHTO: A-6 (17)

Corrected for 0% gravel		Sand Subsizes
		Corrected Percentages
Percent Gravel, %	0.0	Very Coarse Sand; 2-1 0.8
Percent Sand, %	8.7	Coarse Sand; 1-0.5 1.0
Percent Silt, %	49.5	Medium Sand; 0.5-0.25 1.7
Percent Clay, %	41.9	Fine Sand; 0.25-0.1 2.6
		Very Fine Sand; 0.1-0.05 2.6
		Total 8.7



## **LABORATORY COMPACTION CHARACTERISTICS OF SOIL**

Client	Civil & Environmental Consultants, Inc. Boring	TP-10A
Client Project	153-121.0002 Closure Construction Ce Depth	0.0'-4.0'
Project No.	36291	Sample
		Lab Sample No.
Visual Description:	LIGHT OLIVE BROWN LEAN CLAY WITH SAND	

Visual Description: LIGHT OLIVE BROWN LEAN CLAY WITH SAND

WET DENSITY					TEST PARAMETERS	
Mold ID	G	G	G	G	Test Method	ASTM D698
Compaction Point #	1	2	3	4	Compaction Energy	Standard
Wt. Mold & WS, gm.	6190	6262	6351	6336	Test Procedure	A
Wt. Mold, gm.	4368	4368	4368	4368	Mold Diameter, in	4
Wt. WS, gm.	1822	1894	1983	1968	Compacted Layers	3
Mold Volume, cc	943	943	943	943	Blows Per Layer	25
Wet Density, gm./cc	1.93	2.01	2.10	2.09	Rammer Weight / Fall	5.5 lbs / 12 in.
Wet Density, pcf	120.5	125.3	131.2	130.2	Size of Material Used	-#4 Sieve
					Use: <5% Retained on #4	
WATER CONTENT					OVERSIZE PARTICLE CORRECTION	
Tare Number	509	517	832	3004	No Corrections Needed	
Wt. Tare & WS, gm.	968.4	852.5	786.6	951.9		
Wt. Tare & DS, gm.	891.1	771.3	698.1	839.9	Percent of Oversize Rock (+#4 Sieve) = <5%	
Wt. Tare, gm.	102.5	102.9	102.6	183.2	(Based on As-received Screening & Soaking)	
Water Content, %	9.8	12.1	14.9	17.1	W.C. of Finer Material, % (-#4 Sieve) = NA	
DRY DENSITY vs. WATER CONTENT					SAMPLE SUMMARY	
LABORATORY TEST VALUES						
Water Content, %	9.8	12.1	14.9	17.1	<i>Lab Optimum Water Content, %</i>	
Dry Density, pcf	109.7	111.7	114.2	111.2	<i>Lab Maximum Dry Density, pcf</i>	
Note: Maximum Density and Optimum Water Content reported from estimated best fit smooth curve!						
115.0						
110.0						
105.0						
8	9	10	11	12	13	14
Water Content, %	10	11	12	13	14	15
15	16	17	18	19		
Dry Density, pcf	109.7	111.7	114.2	111.2		
					95% Lab MDD =	
					108.5	

## Input Validation: BLS

Reviewed By: AJD

Date Tested: 10/06/15

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## PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422

Client	Civil & Environmental Consultants, Inc.	Boring	TP-10A
Client Project	153-121.0002 Closure Construction Central Waste	Depth	0.0'-4.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291025

**Sample Color:** LIGHT OLIVE BROWN  
**USCS Group Name:** LEAN CLAY WITH SAND  
**USCS Group Symbol:** CL

**USDA: CLAY LOAM**

AASHTO: A-6 (11)

MECHANICAL SIEVE						
Total Sample	Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split % Retained	Normalized % Finer	Project Specifications
Total Sample Wet Wt, gm (-3")	26850					
Sample Split on Sieve	3/4"	75	0	0.0%	100.0%	
Coarse Washed Dry Sample, gm	338	2-1/2"	63	0.0%	100.0%	
Wet Wt Passing Split, gm	26512	2"	50	189.33	0.8%	99.2%
Dry Wt. Passing Split, gm	23618	1-1/2"	37.5	104.74	0.4%	98.8%
Total Sample Dry Wt, gm	23957	1"	25	0	0.0%	98.8%
	3/4"	19	44.21	0.2%	98.6%	
<b>Split Sample - Passing 3/4"</b>		1/2"	12.5	0	0.0%	98.6%
Tare No.	817	3/8"	9.5	4.02	0.4%	98.2%
Tare + WS., gm	1167.6	No. 4	4.75	8.44	0.9%	97.3%
Tare + DS., gm	1051.22	No. 10	2	12.03	1.2%	96.0%
Tare, gm	101.2	No. 20	0.85	16.87	1.8%	94.3%
<b>Water Content of Split Sample</b>	<b>12.3%</b>	No. 40	0.425	17.97	1.9%	92.4%
Wt. of DS., gm	950.02	No. 60	0.25	30.41	3.2%	89.3%
Wt. of +#200 Sample, gm	174.49	No. 140	0.106	62.21	6.5%	82.8%
		No. 200	0.075	22.54	2.3%	80.5%

HYDROMETER (#200)								
Tare No.	1016	Wt. Dispers., gm	5	Specific Gravity		2.69		
Wt. Tare + DS., gm	236.28	Wt. Dry Soil, gm (#200)	38.39	Tested				
Wt. Tare, gm	192.89	#10 Dispersed 1min in Hamilton Beach Mixer		a Factor		0.9911		
Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent	Particle Diameter (mm)	Adjusted % Finer (%)
2	38.5	21.4	4.9	33.6	0.0133	86.7	0.0296	69.8%
5	36	21.4	4.9	31.1	0.0133	80.3	0.0191	64.6%
15	32	21.4	4.9	27.1	0.0133	70.0	0.0114	56.3%
30	29	21.4	4.9	24.1	0.0133	62.2	0.0082	50.1%
60	26	21.4	4.9	21.1	0.0133	54.5	0.0059	43.8%
250	21	21.1	5.0	16.0	0.0133	41.3	0.0030	33.2%
1440	16.5	20.9	5.0	11.5	0.0134	29.7	0.0013	23.9%

USCS SOIL CLASSIFICATION				USDA CLASSIFICATION			
<i>Corrected For 100% Passing a 3" Sieve</i>							
% Gravel (-3" & +#4)	2.7	Silt=39.2% Clay=41.2%		Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)	Corrected Percent of -2.0 mm Material for USDA
Coarse=1.4; Fine=1.3		D60, mm	NA				
% Sand (#4 & #200)	16.8	D30, mm	NA				
Coarse=1.2; Medium=3.6; Fine=12		D10, mm	NA				
% Fines (#200)	80.5	Cc	NA				
% Plus #200 (-3")	19.5	Cu	NA				
<b>USCS Description</b>							
<b>LEAN CLAY WITH SAND</b>							
<b>USCS Group Symbol</b>	<b>Atterberg Limits Group Symbol</b>						
CL	CL - LEAN CLAY						
Auxiliary Information	Wt Ret, gm	% Retained	% Finer				
12" Sieve - 300 mm	0	0.0	100.0				
6" Sieve - 150 mm	0	0.0	100.0				
3" Sieve - 75 mm	0	0.0	100.0				
				<b>USDA Classification</b>			
				<b>CLAY LOAM</b>			

## **Input Validation**

Yes

Reviewed By: SVG

**Date Tested**

9/21/2015

**LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS**

ASTM D 4318

Client	Civil & Environmental Consultants, Inc.	Boring	TP-10A
Client Project	153-121.0002 Closure Construction Central Waste	Depth	0.0'-4.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291025

Soil Description: LIGHT OLIVE BROWN LEAN CLAY  
(-#40 Fraction)

AS-RECEIVED W.C.			SAMPLE SUMMARY				
Tare Number	817		Activity Index = .56; Liquidity Index = -.23				
Wt. Tare & WS, gm	1167.60		Liquid Limit (LL), %	32			
Wt. Tare & DS, gm	1051.22		Plastic Limit (PL), %	16			
Wt. Tare, gm	101.20		Plasticity Index (PI)	16			
Water Content, %	12.3		USCS Group Symbol (-#40 Fraction)	CL			
			USCS Group Name (-#40 Fraction)	LEAN CLAY			
			Sample Color:	LIGHT OLIVE BROWN			
PLASTIC LIMIT			LIQUID LIMIT				
Points Run	3 Points		3 Points				
Tare Number	219	213	204	221	240		
Wt. Tare & WS, gm	23.33	23.16	22.54	23.78	23.17		
Wt. Tare & DS, gm	22.32	22.19	20.91	21.87	21.46		
Wt. Tare, gm	16.04	15.88	16.04	15.89	15.98		
Water Content, %	16.1	15.4	33.5	31.9	31.2		
		# of Blows	18	26	33		
PLASTICITY CHART			FLOW CURVE				
Plasticity Index	60		Water Content	40			
	50			35			
	40			30			
	30			25			
	20			20			
	10			15			
	0			10			
	0 10 20 30 40 50 60 70 80 90 100			0 10 20 30 40 50 60			
	Liquid Limit			No. of Blows			
CL-ML							
ML-Silt							
C - Lean Clay							
CH' - Fat Clay							
MH - Elastic Silt							

Input Validation: Yes

Reviewed By: SVG

Date Tested: 9/21/2015

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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client	Civil & Environmental Consultants, Inc.	Boring	TP-10A
Client Project	153-121.0002 Closure Construction Central Waste	Depth	0.0'-4.0'
Project No.	36291	Sample	Bucket
		Lab Sample	36291025

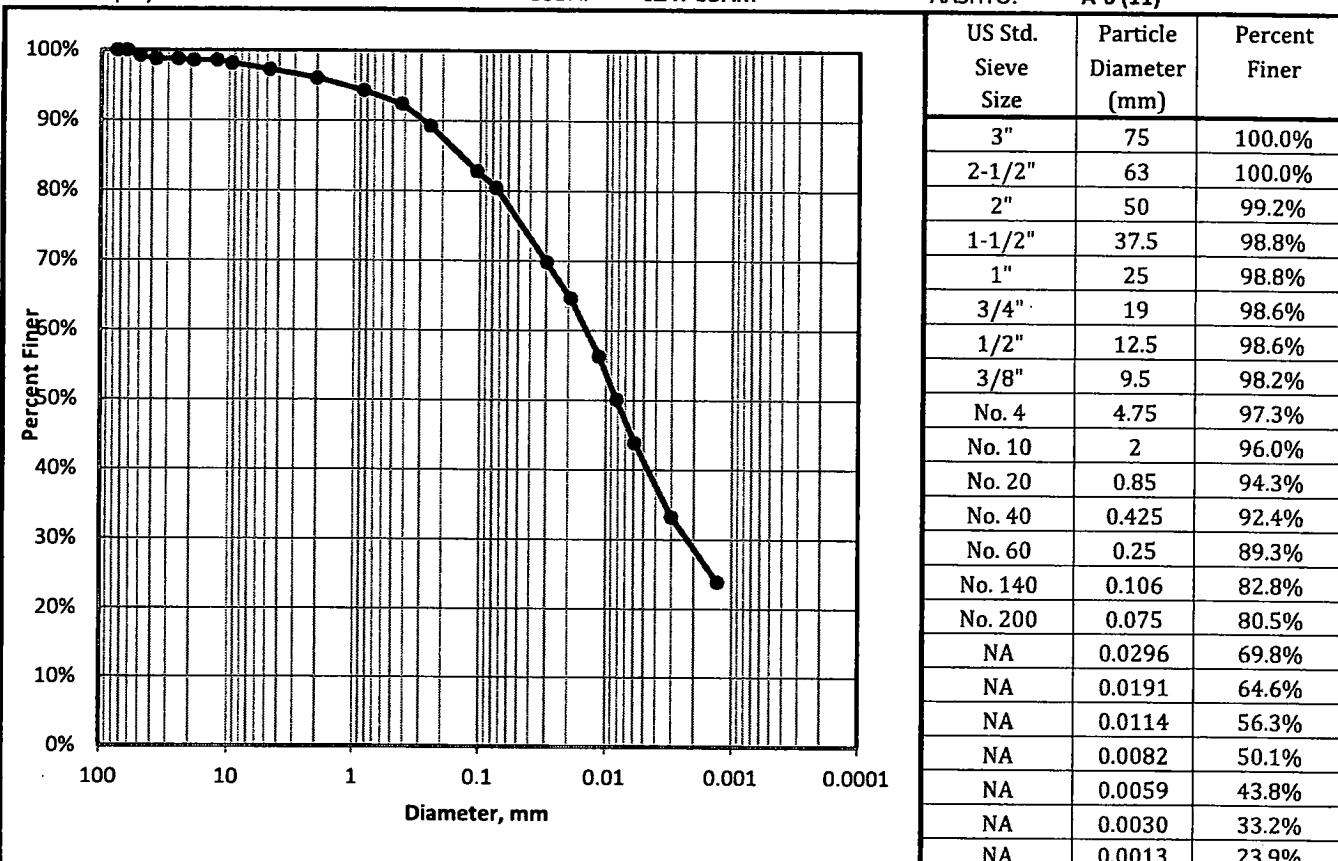
Sample Color: **LIGHT OLIVE BROWN**

USCS Group Name: **LEAN CLAY WITH SAND**

USCS Group Symbol: **CL**

USDA: **CLAY LOAM**

AASHTO: **A-6 (11)**



USCS SOIL CLASSIFICATION			USDA CLASSIFICATION			
<i>Corrected For 100% Passing a 3" Sieve</i>						
% Gravel (-3" & +#4)	2.7	Silt=39.2% Clay=41.2%	Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)	Corrected Percent of -2.0 mm Material for USDA
Coarse=1.4; Fine=1.3		D60, mm NA	100 2 0.05 0.002	100 96.0 75.8 28.7	Gravel 4.0 Sand 20.2 Silt 47.1 Clay 28.7	0 21.0 49.1 29.9
% Sand (-#4 & +#200)	16.8	D30, mm NA				
Coarse=1.2; Medium=3.6; Fine=12		D10, mm NA				
% Fines (-#200)	80.5	Cc NA				
% Plus #200 (-3")	19.5	Cu NA				
USCS Description			USDA Classification			
<b>LEAN CLAY WITH SAND</b>			<b>CLAY LOAM</b>			
USCS Group Symbol	Atterberg Limits Group Symbol					
CL	<b>CL - LEAN CLAY</b>					
Auxiliary Information	Wt Ret, gm	% Retained	% Finer			
12" Sieve - 300 mm	0	0.0	100.0			
6" Sieve - 150 mm	0	0.0	100.0			
3" Sieve - 75 mm	0	0.0	100.0			

### USDA CLASSIFICATION CHART

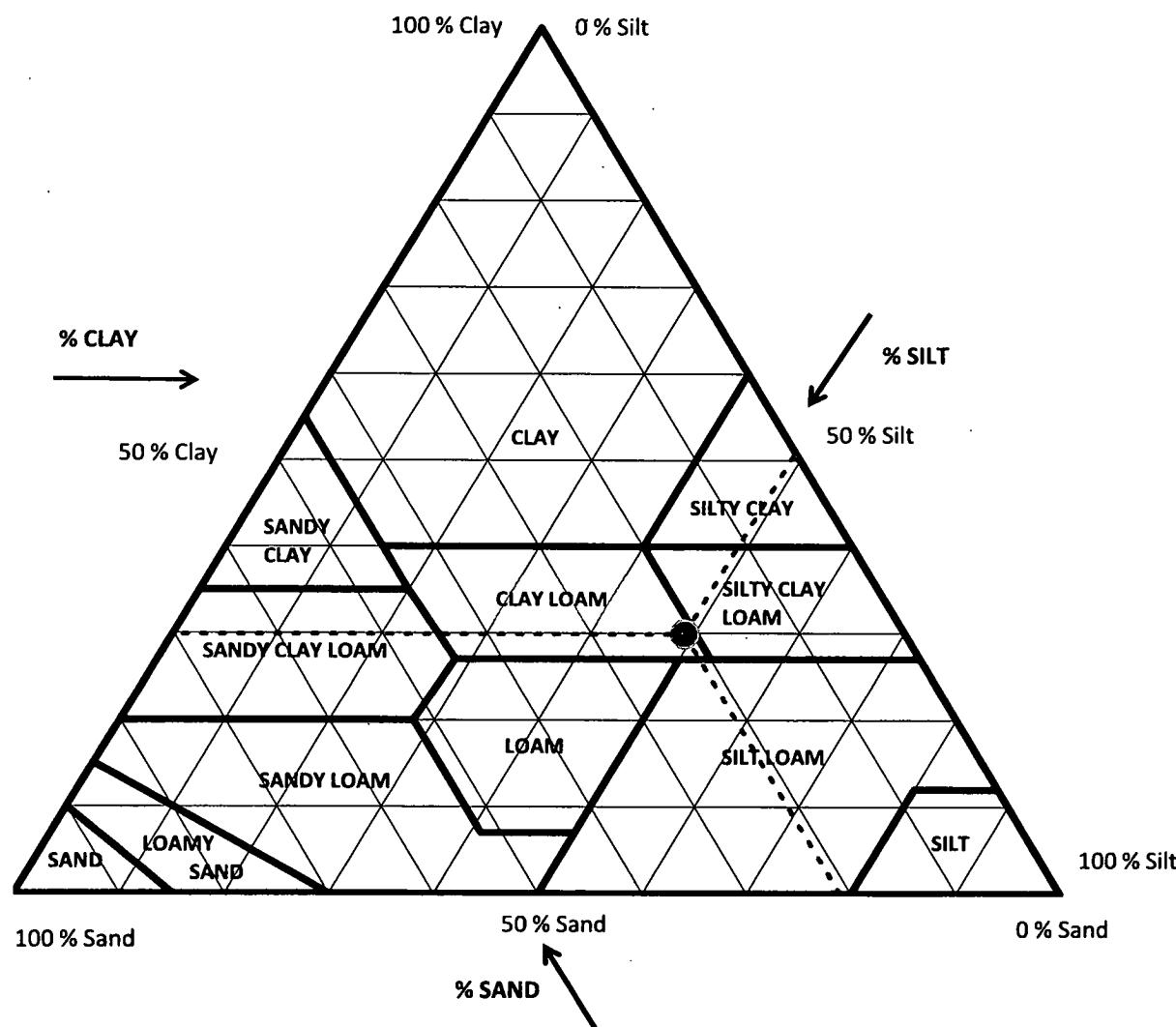
Client Civil & Environmental Consultants, Inc.  
 Client Project 153-121.0002 Closure Construction Central Waste  
 Project No. 36291  
 Boring TP-10A  
 Depth 0.0'-4.0'  
 Sample Bucket  
 Lab Sample 36291025

Sample Color: LIGHT OLIVE BROWN  
 USCS Group Name: LEAN CLAY WITH SAND  
 USCS Group Symbol: CL

USDA: CLAY LOAM

AASHTO: A-6 (11)

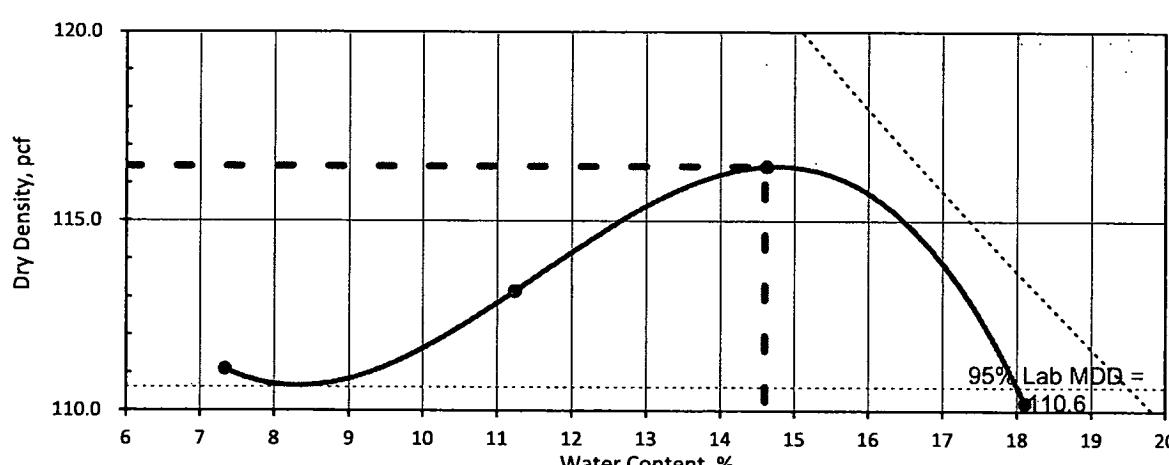
Corrected for 0% gravel		Sand Subsizes	
		Corrected Percentages	
Percent Gravel, %	0.0	Very Coarse Sand; 2-1	1.5
Percent Sand, %	21.0	Coarse Sand; 1-0.5	1.8
Percent Silt, %	49.1	Medium Sand; 0.5-0.25	3.7
Percent Clay, %	29.9	Fine Sand; 0.25-0.1	7.1
		Very Fine Sand; 0.1-0.05	6.9
		Total	21.0



## LABORATORY COMPACTION CHARACTERISTICS OF SOIL

Client Civil & Environmental Consultants, Inc. Boring TP-10B  
 Client Project 153-121.0002 Closure Construction Ce Depth 4.0'-8.0'  
 Project No. 36291 Sample Bucket  
 Lab Sample No. 36291026

Visual Description: BROWN LEAN CLAY WITH SAND

WET DENSITY					TEST PARAMETERS	
Mold ID	G	G	G	G	Test Method	ASTM D698
Compaction Point #	1	2	3	4	Compaction Energy	Standard
Wt. Mold & WS, gm.	6171	6271	6386	6336	Test Procedure	A
Wt. Mold, gm.	4368	4368	4368	4368	Mold Diameter, in	4
Wt. WS, gm.	1803	1903	2018	1968	Compacted Layers	3
Mold Volume, cc	943	943	943	943	Blows Per Layer	25
Wet Density, gm./cc	1.91	2.02	2.14	2.09	Rammer Weight / Fall	5.5 lbs / 12 in.
Wet Density, pcf	119.2	125.9	133.5	130.2	Size of Material Used	-#4 Sieve
					Use: <5% Retained on #4	
WATER CONTENT					OVERSIZE PARTICLE CORRECTION	
Tare Number	917	901	1003	971	No Corrections Needed	
Wt. Tare & WS, gm.	860.8	819.6	840.5	874.4		
Wt. Tare & DS, gm.	808.7	746.8	757.7	755.4	Percent of Oversize Rock (+#4 Sieve) = <5%	
Wt. Tare, gm.	98.6	98.9	191.5	98.1	(Based on As-received Screening & Soaking)	
Water Content, %	7.3	11.2	14.6	18.1	W.C. of Finer Material, % (-#4 Sieve) = NA	
DRY DENSITY vs. WATER CONTENT					SAMPLE SUMMARY	
LABORATORY TEST VALUES						
Water Content, %	7.3	11.2	14.6	18.1	Lab Optimum Water Content, %	14.6
Dry Density, pcf	111.1	113.1	116.4	110.2	Lab Maximum Dry Density, pcf	116.4
<i>Note: Maximum Density and Optimum Water Content reported from estimated best fit smooth curve!</i>						
						
<i>Note: Compacted using manual hammer.</i>						

Input Validation: BLS

Reviewed By: AJD

Date Tested: 10/06/15

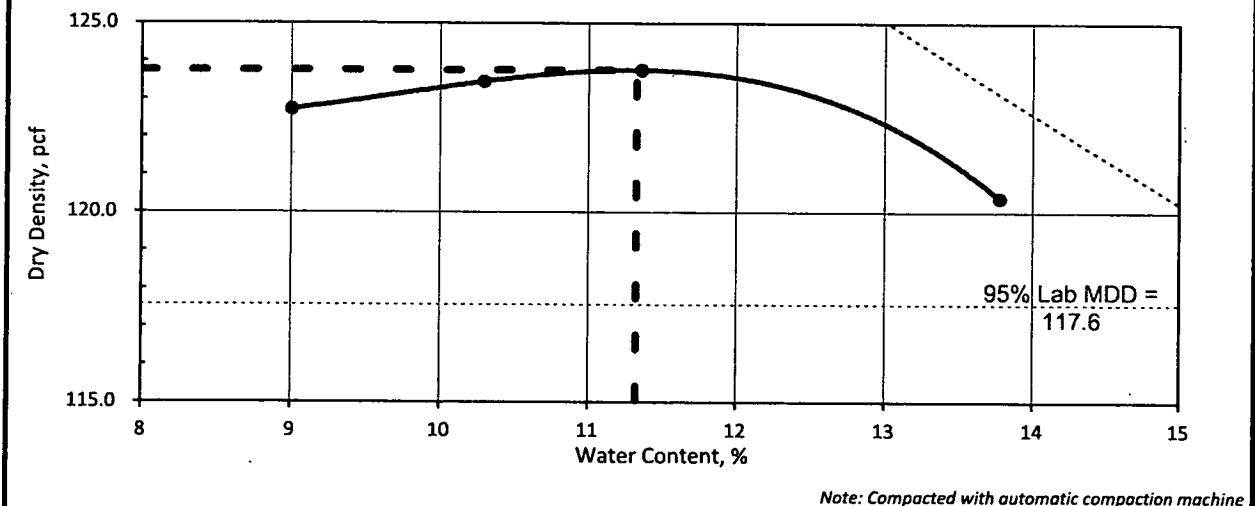
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## **LABORATORY COMPACTION CHARACTERISTICS OF SOIL**

<b>Client</b>	<b>Civil &amp; Environmental Consultants, Inc. Boring</b>	<b>TP-10B</b>
<b>Client Project</b>	<b>153-121.0002 Closure Construction Ce Depth</b>	<b>4.0'-8.0'</b>
<b>Project No.</b>	<b>36291</b>	<b>Sample</b>
		<b>Lab Sample No.</b>
<b>Visual Description:</b>	<b>BROWN LEAN CLAY WITH SAND</b>	

WET DENSITY					TEST PARAMETERS	
Mold ID	C	C	C	D	Test Method	ASTM D1557
Compaction Point #	1	2	3	4	Compaction Energy	Modified
Wt. Mold & WS, gm.	6239	6275	6300	6291	Test Procedure	A
Wt. Mold, gm.	4216	4216	4216	4214	Mold Diameter, in	4
Wt. WS, gm.	2023	2059	2084	2077	Compacted Layers	5
Mold Volume, cc	944	944	944	946	Blows Per Layer	25
Wet Density, gm./cc	2.14	2.18	2.21	2.19	Rammer Weight / Fall	10 lbs / 18 in.
Wet Density, pcf	133.8	136.2	137.8	137.0	Size of Material Used	-#4 Sieve
					Use: <5% Retained on #4	
WATER CONTENT					OVERSIZE PARTICLE CORRECTION	
Tare Number	457	453	509	971	No Corrections Needed	
Wt. Tare & WS, gm.	762.8	750	865.6	846.2		
Wt. Tare & DS, gm.	706.9	688	787.8	755.6		
Wt. Tare, gm.	86	85.7	102.7	98	Percent of Oversize Rock (+#4 Sieve) = <5% (Based on As-received Screening & Soaking)	
Water Content, %	9.0	10.3	11.4	13.8		
					W.C. of Finer Material, % (-#4 Sieve) = NA	
DRY DENSITY vs. WATER CONTENT					SAMPLE SUMMARY	
LABORATORY TEST VALUES						
Water Content, %	9.0	10.3	11.4	13.8	Lab Optimum Water Content, %	11.3
Dry Density, pcf	122.7	123.4	123.8	120.4	Lab Maximum Dry Density, pcf	123.8

**Note: Maximum Density and Optimum Water Content reported from estimated best fit smooth curve!**



**Note: Compacted with automatic compaction machine**

## Input Validation: BLS

Reviewed By: AJD

Date Tested: 10/12/15

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**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client Civil & Environmental Consultants, Inc. Boring TP-10B  
 Client Project 153-121.0002 Closure Construction Central Waste Depth 4.0'-8.0'  
 Project No. 36291 Sample Bucket  
 Lab Sample 36291026

Sample Color: BROWN  
 USCS Group Name: LEAN CLAY WITH SAND  
 USCS Group Symbol: CL

USDA: SILT LOAM AASHTO: A-4 (4)

**MECHANICAL SIEVE**

Total Sample	Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split % Retained	Normalized % Finer	Project Specifications
Total Sample Wet Wt, gm (-3")	26390					
Sample Split on Sieve	3/4"	3"	75	0	100.0%	
Coarse Washed Dry Sample, gm	138	2-1/2"	63	0	100.0%	
Wet Wt Passing Split, gm	26252	2"	50	0	100.0%	
Dry Wt. Passing Split, gm	22433	1-1/2"	37.5	55.57	0.2%	99.8%
Total Sample Dry Wt, gm	22571	1"	25	23.26	0.1%	99.7%
	3/4"	19	59.25	0.3%	99.4%	
<b>Split Sample - Passing 3/4"</b>		1/2"	12.5	6.73	0.7%	98.7%
Tare No.	503	3/8"	9.5	2.13	0.2%	98.5%
Tare + WS., gm	1253.3	No. 4	4.75	10.66	1.1%	97.4%
Tare + DS., gm	1085.92	No. 10	2	14	1.4%	96.0%
Tare, gm	102.6	No. 20	0.85	18.38	1.9%	94.1%
<b>Water Content of Split Sample</b>	<b>17.0%</b>	No. 40	0.425	17.25	1.7%	92.4%
Wt. of DS., gm	983.32	No. 60	0.25	26.87	2.7%	89.7%
Wt. of +#200 Sample, gm	181.86	No. 140	0.106	61.64	6.2%	83.5%
		No. 200	0.075	24.2	2.4%	81.0%

**HYDROMETER (#200)**

Tare No.	530	Wt. Dispers., gm	5	Specific Gravity	2.71			
Wt. Tare + DS., gm	237.24	Wt. Dry Soil, gm (-#200)	36.98	Tested				
Wt. Tare, gm	195.26	#10 Dispersed 1min in Hamilton Beach Mixer						
Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	36.5	21.3	4.9	31.6	0.0132	84.3	0.0299	68.3%
5	32	21.3	4.9	27.1	0.0132	72.3	0.0196	58.6%
15	26.5	21.2	4.9	21.6	0.0132	57.6	0.0118	46.7%
30	24	21.2	4.9	19.1	0.0132	51.0	0.0085	41.3%
60	21.5	21.3	4.9	16.6	0.0132	44.3	0.0061	35.9%
250	17	21	5.0	12.0	0.0133	32.0	0.0031	25.9%
1440	13	20.7	5.1	7.9	0.0133	21.1	0.0013	17.1%

**USCS SOIL CLASSIFICATION**

Corrected For 100% Passing a 3" Sieve			USDA CLASSIFICATION			
% Gravel (-3" & +#4)	2.6	Silt=47.8% Clay=33%	Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)	Corrected Percent of -2.0 mm Material for USDA
Coarse=0.6; Fine=2		D60, mm	NA			
% Sand (-#4 & +#200)	16.4	D30, mm	NA			
Coarse=1.4; Medium=3.6; Fine=11.4		D10, mm	NA			
% Fines (-#200)	81.0	Cc	NA			
% Plus #200 (-3")	19.0	Cu	NA			

**USCS Description**

LEAN CLAY WITH SAND

USCS Group Symbol	Atterberg Limits Group Symbol		
CL	CL - LEAN CLAY		
Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

**USDA Classification**

SILT LOAM

Input Validation Yes Reviewed By: SVG Date Tested 9/21/2015

## LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS

ASTM D 4318

<b>Client</b>	Civil & Environmental Consultants, Inc.	Boring	TP-10B
<b>Client Project</b>	153-121.0002 Closure Construction Central Waste	Depth	4.0'-8.0'
<b>Project No.</b>	36291	Sample	Bucket

**Soil Description:** BROWN LEAN CLAY  
(-#40 Fraction)

AS-RECEIVED W.C.			SAMPLE SUMMARY		
Tare Number	503		Activity Index = .37; Liquidity Index = .13		
Wt. Tare & WS, gm	1253.30		Liquid Limit (LL), %	24	
Wt. Tare & DS, gm	1085.92		Plastic Limit (PL), %	16	
Wt. Tare, gm	102.60		Plasticity Index (PI)	8	
Water Content, %	17.0		USCS Group Symbol (-#40 Fraction)	CL	
			USCS Group Name (-#40 Fraction)	LEAN CLAY	
			Sample Color:	BROWN	
PLASTIC LIMIT			LIQUID LIMIT		
Points Run	3 Points		3 Points		
Tare Number	252	219	224	259	265
Wt. Tare & WS, gm	23.56	23.16	22.88	23.21	23.75
Wt. Tare & DS, gm	22.55	22.17	21.45	21.75	22.23
Wt. Tare, gm	16.24	16.04	15.93	15.93	15.97
Water Content, %	16.0	16.2	25.9	25.1	24.3
		# of Blows	15	20	26
PLASTICITY CHART			FLOW CURVE		
Plasticity Index			Water Content		
60			30		
50			25		
40			20		
30			15		
20			10		
10			5		
0			0		
0	10	20	10	20	30
	Liquid Limit		No. of Blows		
CL - Lean Clay			PI = 16		NMC = 17
CH' - Fat Clay			LL = 24		PI = 24
ML - Silt			∞		LL = 25
MH - Elastic Silt			P		PI = 25
CL-ML					

**Input Validation:** Yes

Reviewed By: SVG

Date Tested: 9/21/2015

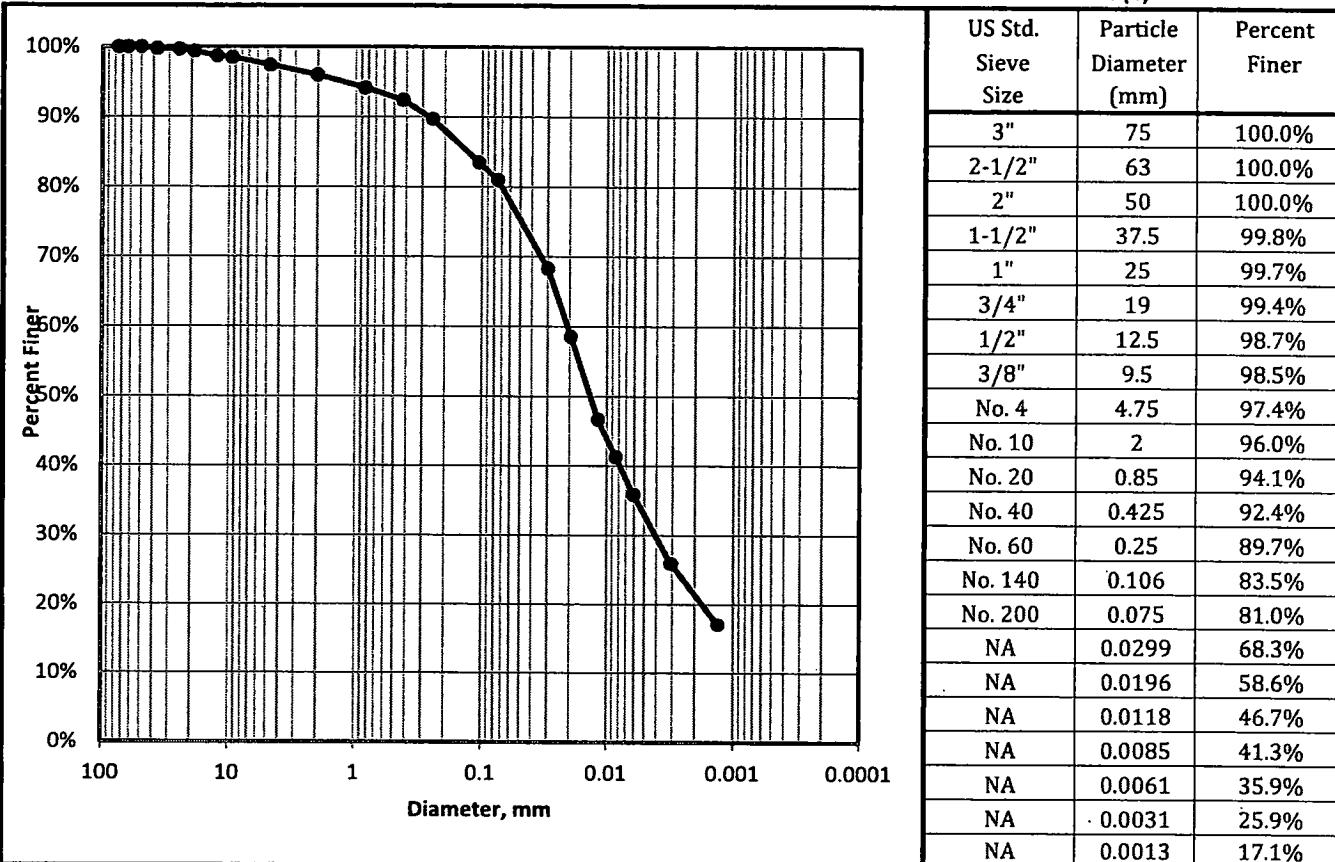
**PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422**

Client: Civil & Environmental Consultants, Inc.      Boring: TP-10B  
 Client Project: 153-121.0002 Closure Construction Central Waste      Depth: 4.0'-8.0'  
 Project No.: 36291      Sample: Bucket  
 Lab Sample: 36291026

Sample Color: BROWN  
 USCS Group Name: LEAN CLAY WITH SAND  
 USCS Group Symbol: CL

USDA: SILT LOAM

AASHTO: A-4 (4)



USCS SOIL CLASSIFICATION			USDA CLASSIFICATION				
Corrected For 100% Passing a 3" Sieve							
% Gravel (-3" & +#4)	2.6	Silt=47.8% Clay=33%	Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material) (%)		Corrected Percent of -2.0 mm Material for USDA
Coarse=0.6; Fine=2		D60, mm NA	100 2 0.05 0.002	100 96.0 75.4 21.4	Gravel Sand Silt Clay	4.0 20.6 54.0 21.4	0 21.5 56.2 22.3
% Sand (#4 & +#200)	16.4	D30, mm NA					
Coarse=1.4; Medium=3.6; Fine=11.4		D10, mm NA					
% Fines (#200)	81.0	Cc NA					
% Plus #200 (-3")	19.0	Cu NA					
USCS Description			USDA Classification				
LEAN CLAY WITH SAND			SILT LOAM				
USCS Group Symbol	Atterberg Limits Group Symbol						
CL	CL - LEAN CLAY						
Auxiliary Information	Wt Ret, gm	% Retained					
12" Sieve - 300 mm	0	0.0					
6" Sieve - 150 mm	0	0.0					
3" Sieve - 75 mm	0	0.0					

### USDA CLASSIFICATION CHART

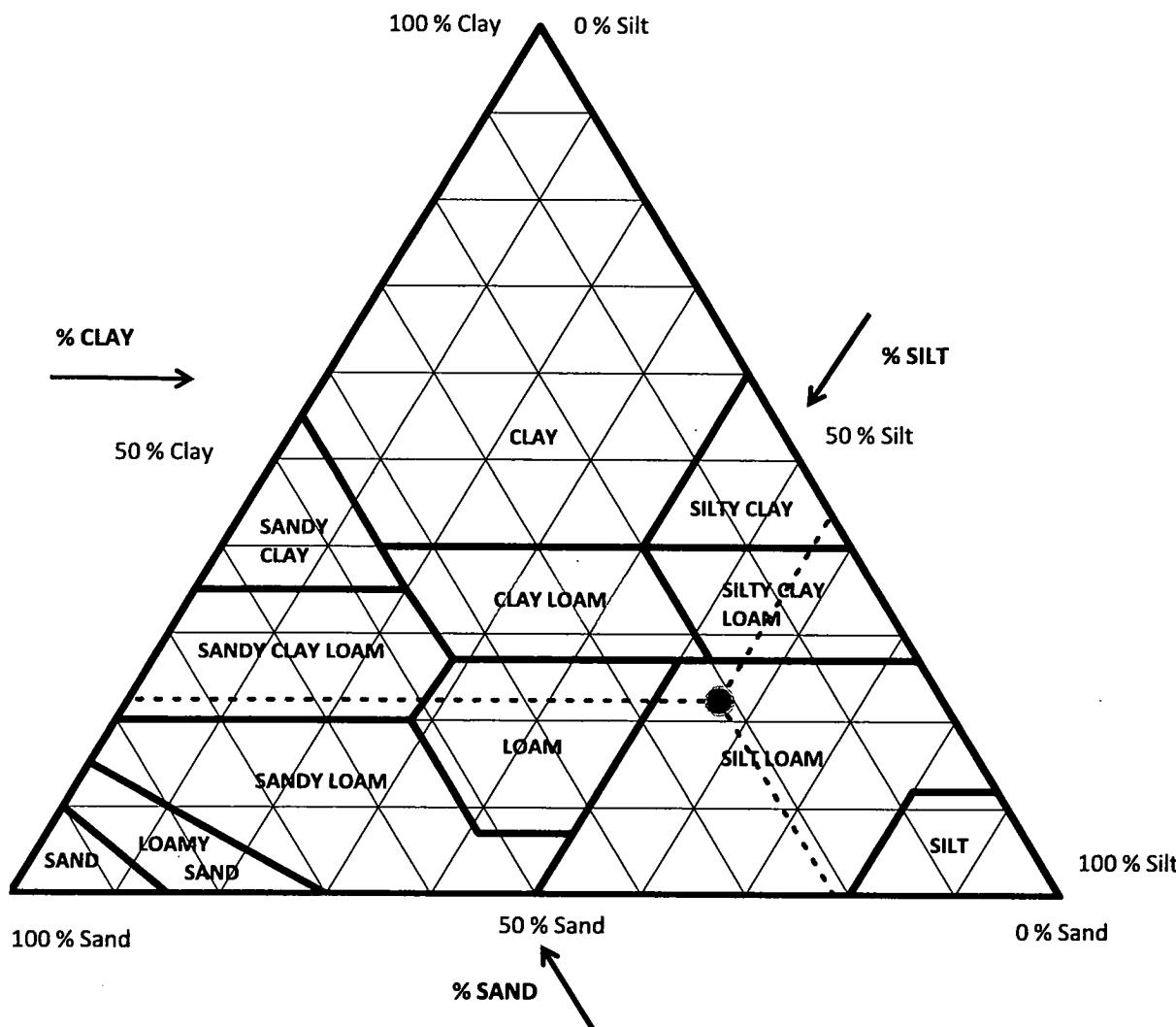
Client Civil & Environmental Consultants, Inc. Boring TP-10B  
 Client Project 153-121.0002 Closure Construction Central Waste Depth 4.0'-8.0'  
 Project No. 36291 Sample Bucket  
 Lab Sample 36291026

Sample Color: BROWN  
 USCS Group Name: LEAN CLAY WITH SAND  
 USCS Group Symbol: CL

USDA: SILT LOAM

AASHTO: A-4 (4)

Corrected for 0% gravel		Sand Subsizes Corrected Percentages	
Percent Gravel, %	0.0	Very Coarse Sand; 2-1	1.6
Percent Sand, %	21.5	Coarse Sand; 1-0.5	1.8
Percent Silt, %	56.2	Medium Sand; 0.5-0.25	3.3
Percent Clay, %	22.3	Fine Sand; 0.25-0.1	6.9
		Very Fine Sand; 0.1-0.05	8.0
		Total	21.5

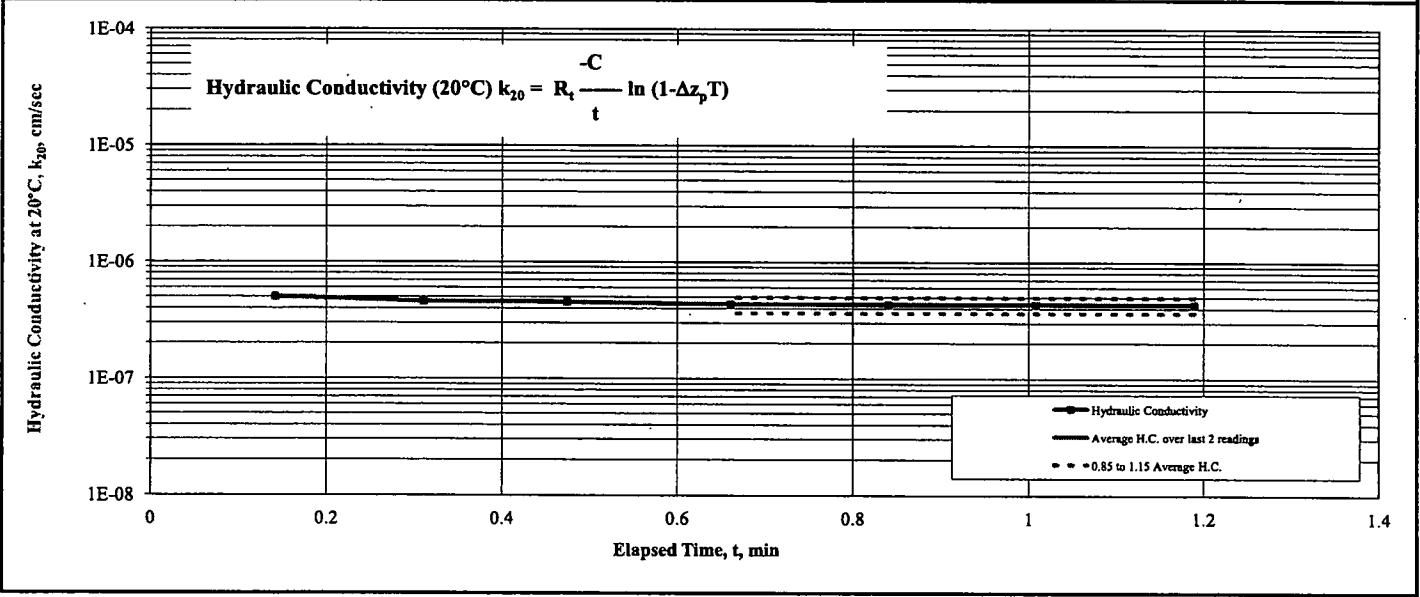


**MEASUREMENT OF HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIALS USING A FLEXIBLE WALL PERMEAMETER**  
 ASTM D5084-00 Method F; Mercury U-Tube Perrometer - Inflow Volume = Outflow Volume

Client	Civil & Environmental Consultants, Inc.	Boring	TP-10B
Client Project	153-121.0002 Closure Construction Central Waste	Depth	4.0'-8.0'
Project No.	36291	Sample	Bucket
Visual Description	BROWN LEAN CLAY WITH SAND	Lab Sample No.	36291026
Sample Condition	Remolded		

SAMPLE CONDITIONS			TEST CONSTANTS & EQUATIONS			SAMPLE SUMMARY				
Sample Status	Initial	Final	Pipette Area, $a_p$ - cm <sup>2</sup>	0.031416	Avg. Hydraulic Conductivity, $k_{20}$ , cm/sec	4.3E-07				
Tare Number	2051	38	Annulus Area, $a_a$ , cm <sup>2</sup>	0.76712	Initial Water Content, %	16.9%				
Wt. Tare & WS, gm	280.34	747.74	Manometer Constant, $M_1 = a_a a_v / (a_a + a_p)$ , cm <sup>2</sup>	0.03018	Initial Dry Density, pcf	109.7				
Wt. Tare & DS, gm	261.85	643.9	Manometer Constant, $M_2 = 1 + a_p/a_a$	1.0410	% Compaction	94.2%				
Wt. Tare, gm	152.29	84.23	Sample Constant, $S = L/A$ , cm <sup>-1</sup>	0.183	Sample Status	Remolded				
Moisture Content, %	16.9%	18.6%	Specific Gravity, $\delta = \delta_{wg} - \delta_{w}$ , gm/cc	12.562	B Parameter	97				
Wt. Tube & WS., gm	651.2	NA	Test Constant, $C = M_1 S / 6$	4.40E-04	Permeant	Deaired Water				
Wt. Of Tube, gm	0	NA	Mercury Level at Equilibrium, $R_{eq}$ , cm	3.1	Cell Pressure, psi	105				
Wt. Of WS., gm	651.2	660.5	Mercury Level of Pipette at t=0, $R_{p0}$ , cm	12.8	Back Pressure, psi	100				
Length 1, in	3	2.977	Initial Head Difference, $z_1 = (R_{p0} - R_{eq})M_2$ , cm	10.10	Avg.(Mid-Height) Confining Stress, psi	5				
Length 2, in	3	2.957	Trial Constant, $T = M_2 / z_1$ , cm	0.1031	Maximum Gradient	16.8				
Length 3, in	3	2.958	Temperature Correction for 20°C, $R_t$	0.931	Average Test Temperature, °C	23.0				
Top Diameter, in	2.864	2.849								
Middle Diameter, in	2.865	2.852								
Bottom Diameter, in	2.8655	2.842								
Average Length, L, cm	7.62	7.53								
Average Area, A, cm <sup>2</sup>	41.59	41.09								
Sample Volume, cc	316.9	309.3								
Unit Wet Wt., gm/cc	2.05	2.14								
Unit Wet Wt., pcf	128.2	133.2								
Unit Dry Wt., pcf	109.7	112.4								
Unit Dry Wt., gm/cc	1.76	1.80								
Specific Gravity, Assumed	2.7	2.7								
Void Ratio, e	0.536	0.499								
Porosity, n	0.349	0.333								
Pore Volume, cc	110.55	103.00								
Saturation, %	85.1%									

**ELAPSED TIME vs. HYDRAULIC CONDUCTIVITY**



Input Validation: ALO

Reviewed By: SVG

Date Tested:

11/10/2015

Note: The average Hydraulic Conductivity is calculated using the average of the last 4 determinations where all requisite flow and Hydraulic Conductivity conditions are achieved!

Prerequisites: Inflow / Outflow Ratio = 1 by definition of test procedure. Final Hydraulic Conductivity = +25% of average Hydraulic Conductivity when  $k > 1E-8$  cm/sec and +50% when  $k < 1E-8$  cm/sec.

SPECIFIC GRAVITY OF SOILS - ASTM D854 (B)

**Client** Civil & Environmental Consultants, Inc.  
**Client Project** 153-121.0002 Closure Construction Central Waste  
**Project No.** 36291

#### **Input Validation: tmp**

Reviewed By: SVG

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Date: 9/21/2015

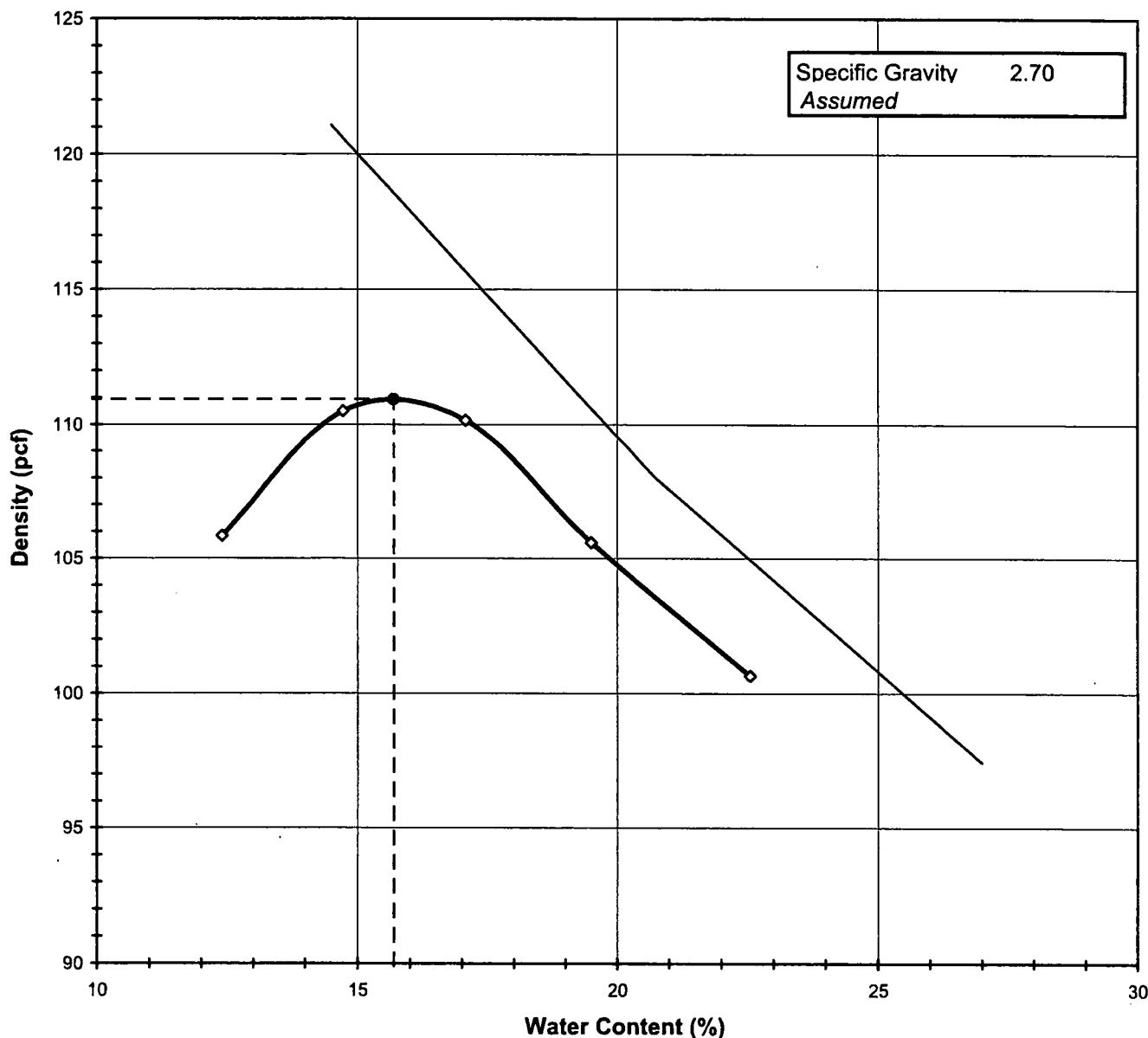
**MOISTURE DENSITY RELATIONSHIP**
*ASTM D698-12*

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-001

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-11A  
 Test Method: STANDARD

Visual Description: Brown Sandy Clay

**Optimum Water Content** 15.7  
**Maximum Dry Density** 111.0



Tested By	BS	Date	10/12/15	Checked By	KC	Date	10/13/15
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page 1 of 2 DCN:CT-S12 DATE:5/1/13 REVISION: 14

## MOISTURE - DENSITY RELATIONSHIP

ASTM D698-12

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	0-4
Project No.:	2015-506-001	Sample No.:	TP-11A
Lab ID:	2015-506-001-001		

Visual Description: Brown Sandy Clay

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.70
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	B

Test Type:	STANDARD
Rammer Weight (lb):	5.5
Rammer Drop (in):	12
Rammer Type:	MECHANICAL
Machine ID:	G 774
Mold ID:	G 1499
Mold diameter:	4"
Weight of the Mold (g):	4387
Volume of the Mold (cm <sup>3</sup> ):	940

### Mold / Specimen

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	6179	6297	6330	6288	6245
Weight of Mold (g):	4387	4387	4387	4387	4387
Weight of Wet Sample (g):	1792	1910	1943	1901	1858
Mold Volume (cm <sup>3</sup> ):	940	940	940	940	940

### Moisture Content / Density

Tare Number:	901	1724	887	891	537
Weight of Tare & Wet Sample (g):	548.10	491.80	550.60	533.50	472.40
Weight of Tare & Dry Sample (g):	499.80	439.30	486.30	464.50	400.60
Weight of Tare (g):	110.37	82.84	109.71	110.74	82.24
Weight of Water (g):	48.30	52.50	64.30	69.00	71.80
Weight of Dry Sample (g):	389.43	356.46	376.59	353.76	318.36

Wet Density (g/cm <sup>3</sup> ):	1.91	2.03	2.07	2.02	1.98
Wet Density (pcf):	119.0	126.8	129.0	126.2	123.3
Moisture Content (%):	12.4	14.7	17.1	19.5	22.6
Dry Density (pcf):	105.8	110.5	110.2	105.6	100.6

### Zero Air Voids

Moisture Content (%):	14.5	20.8	27.0
Dry Unit Weight (pcf):	121.1	108.0	97.4

Tested By	BS	Date	10/12/15	Checked By	KC
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## SPECIFIC GRAVITY

ASTM D 854-14

Client: CEC Boring No.: 9/17/15  
Client Reference: Central Waste Closure 153-121 Depth (ft): 0-4  
Project No.: 2015-506-001 Sample No.: TP-11A  
Lab ID: 2015-506-001-001 Visual Description: Brown Sandy Clay

(Minus No.4 sieve material, oven dried)

Replicate Number	1	2
Pycnometer ID:	G 1255	G 1504
Weight of Pycnometer & Soil & Water (g):	757.55	745.07
Temperature (°C):	26.9	26.6
Weight of Pycnometer & Water (g):	684.84	672.04
Tare Number:	503	923
Weight of Tare & Dry Soil (g):	209.02	215.52
Weight of Tare (g):	93.57	99.72
Weight of Dry Soil (g):	115.45	115.80
Specific Gravity of Soil @ Measured Temperature:	2.701	2.708
Specific Gravity of Water @ Measured Temperature:	0.99655	0.99663
Conversion Factor for Measured Temperature:	0.99834	0.99842
Specific Gravity @ 20° Celsius:	2.706	2.712

Average Specific Gravity @ 20° Celsius	2.71
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Tested By AMC Date 11/12/15 Checked By KC Date 11/13/15

DCN: CT-S5 Date: 3/5/14 Revision: 20

S:\Excel\Excel QA\Spreadsheets\Specific Gravity.xls

## ATTERBERG LIMITS

ASTM D 4318-10

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-001  
 Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-11A  
 Soil Description: BROWN LEAN CLAY

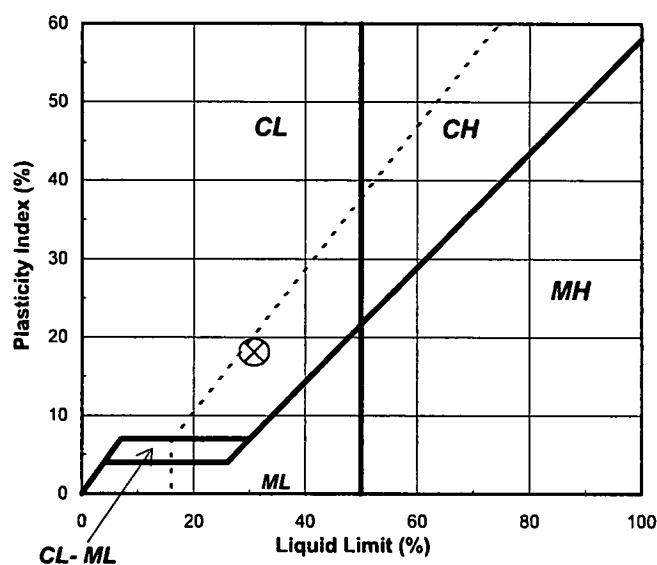
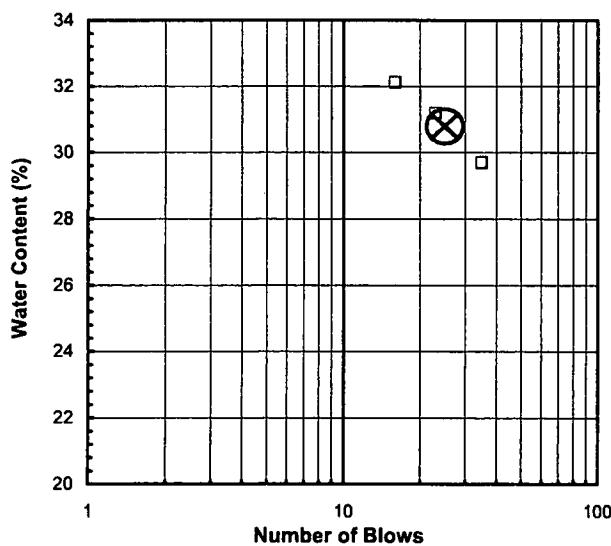
*Note: The USCS symbol used with this test refers only to the minus No. 40 (Minus No. 40 sieve material, Airdried) sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.*

Liquid Limit Test	1	2	3	
Tare Number:	196	166	199	M
Wt. of Tare & Wet Sample (g):	38.29	38.66	38.52	U
Wt. of Tare & Dry Sample (g):	33.29	33.84	33.91	L
Weight of Tare (g):	17.72	18.38	18.38	T
Weight of Water (g):	5.0	4.8	4.6	I
Weight of Dry Sample (g):	15.6	15.5	15.5	P
Moisture Content (%):	32.1	31.2	29.7	O
Number of Blows:	16	23	35	I
				N
				T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	184	185		Liquid Limit (%): 31
Wt. of Tare & Wet Sample (g):	25.86	25.57		Plastic Limit (%): 13
Wt. of Tare & Dry Sample (g):	25.14	24.88		Plasticity Index (%): 18
Weight of Tare (g):	19.64	19.38		USCS Symbol: CL
Weight of Water (g):	0.7	0.7		
Weight of Dry Sample (g):	5.5	5.5		
Moisture Content (%):	13.1	12.5	0.5	
Note: The acceptable range of the two Moisture contents is $\pm 2.6$				

Flow Curve

Plasticity Chart



Tested By RAL Date 10/8/15 Checked By CLK Date 10/9/15

page 1 of 1 DCN: CTS4B, REV. 4, 3/18/13

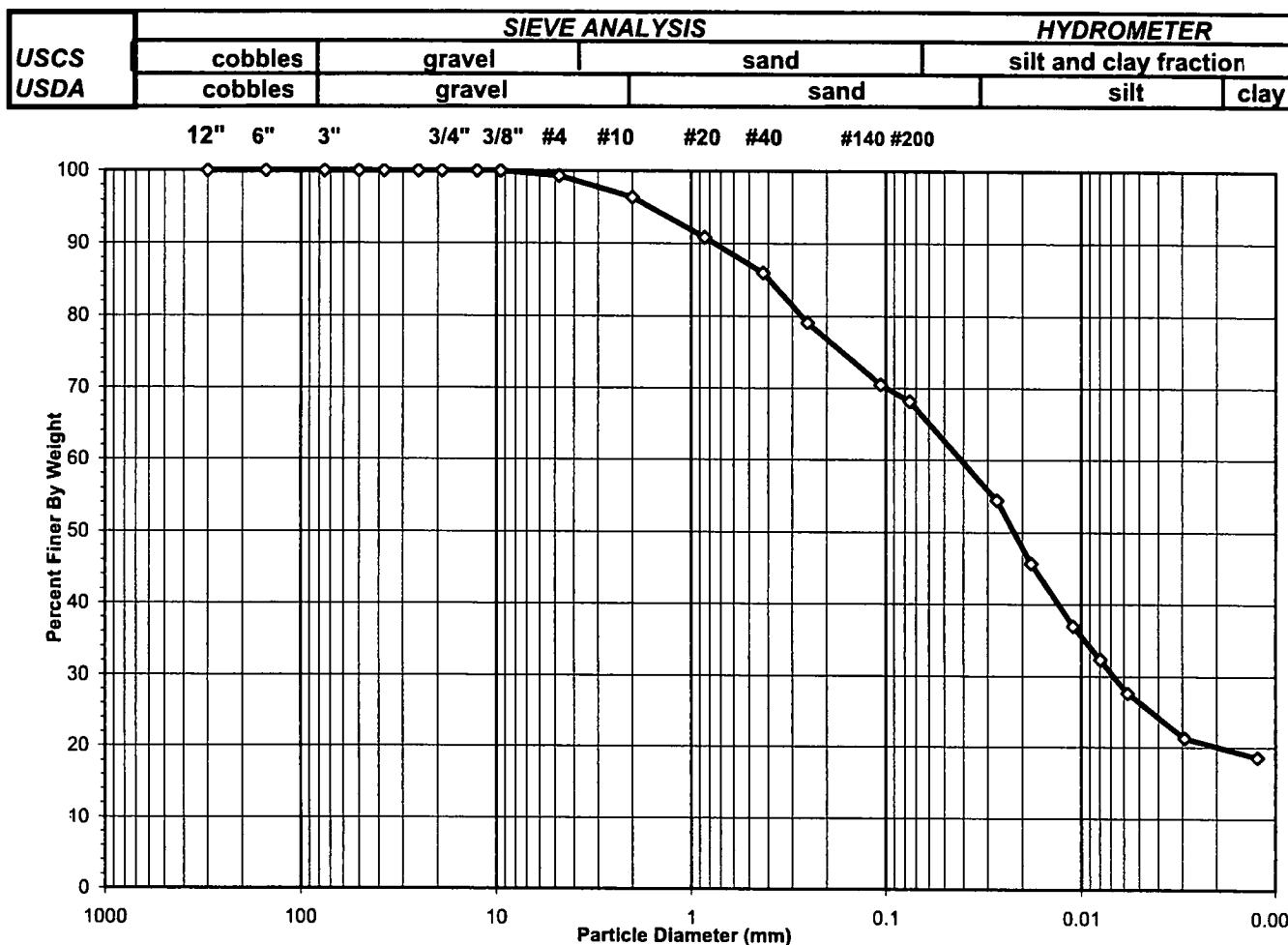
S:\Excel\Excel QA\Spreadsheets\Limit 3Pt.xls

**SIEVE AND HYDROMETER ANALYSIS**

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-001

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-11A  
 Soil Color: Brown

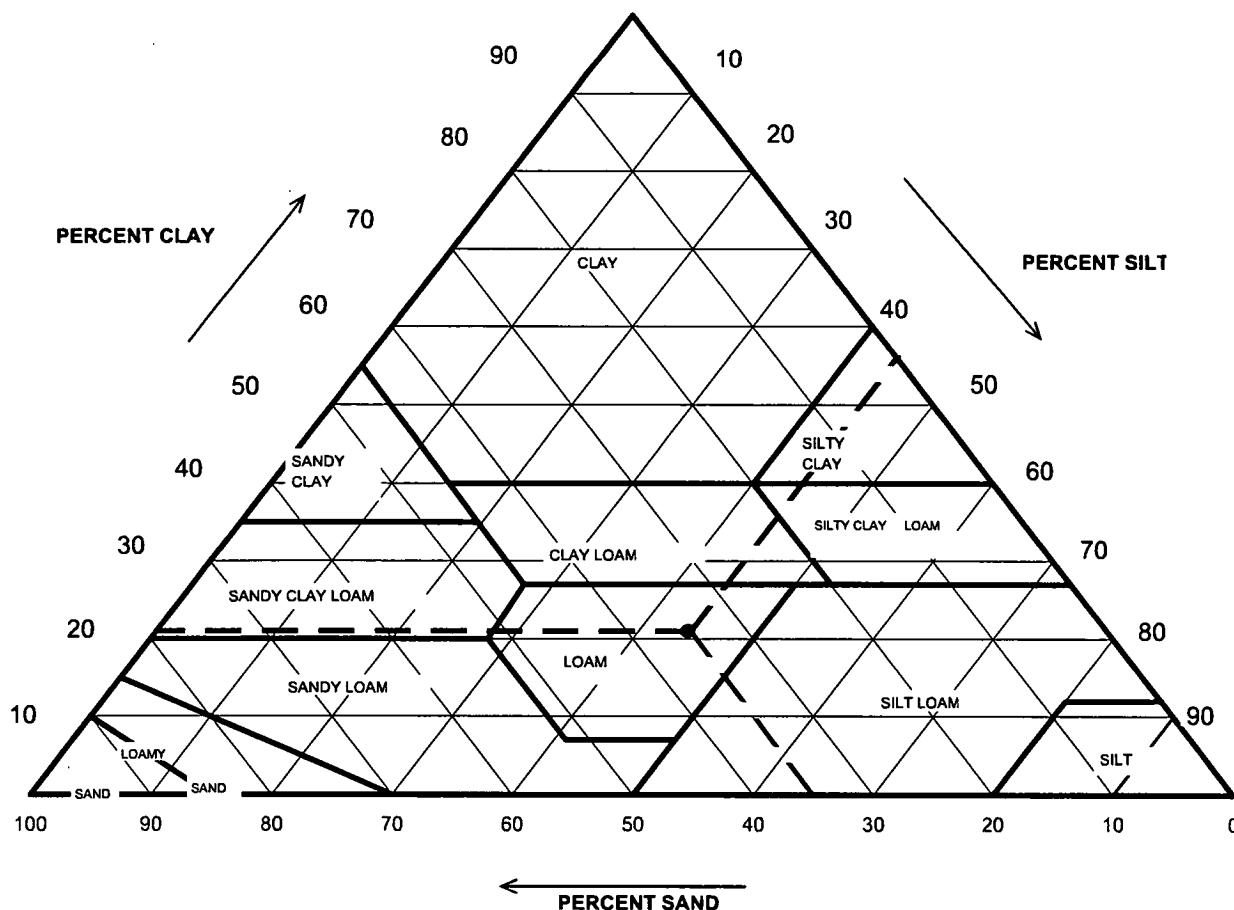


USCS Summary		
Sieve Sizes (mm)	Percentage	
Greater Than #4	Gravel	0.69
#4 To #200	Sand	31.14
Finer Than #200	Silt & Clay	68.17
<b>USCS Symbol:</b>		
<b>CL, TESTED</b>		
<b>USCS Classification:</b>		
<b>SANDY LEAN CLAY</b>		

## USDA CLASSIFICATION CHART

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-001

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-11A  
 Soil Color: Brown



Particle Size (mm)	Percent Finer (%)	USDA SUMMARY	Actual Percentage (%)	Corrected % of Minus 2.0 mm material for USDA Classificat.
(mm)	(%)		(%)	(%)
		<i>Gravel</i>	3.64	0.00
2	96.36	<i>Sand</i>	33.64	34.91
0.05	62.73	<i>Silt</i>	42.54	44.15
0.002	20.18	<i>Clay</i>	20.18	20.94
<b>USDA Classification: LOAM</b>				

## WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-001

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-11A  
 Soil Color: Brown

Moisture Content of Passing 3/4" Material			Water Content of Retained 3/4" Material		
Tare No.	49		Tare No.		NA
Weight of Tare & Wet Sample (g)	892.90		Weight of Tare & Wet Sample (g)		NA
Weight of Tare & Dry Sample (g)	817.60		Weight of Tare & Dry Sample (g)		NA
Weight of Tare (g)	199.59		Weight of Tare (g)		NA
Weight of Water (g)	75.30		Weight of Water (g)		NA
Weight of Dry Sample (g)	618.01		Weight of Dry Sample (g)		NA
<b>Moisture Content (%)</b>	<b>12.2</b>		<b>Moisture Content (%)</b>		NA
Wet Weight of -3/4" Sample (g)	NA		Weight of the Dry Sample (g)		618.01
Dry Weight of -3/4" Sample (g)	196.69		Weight of - #200 Material (g)		421.32
Wet Weight of +3/4" Sample (g)	NA		Weight of + #200 Material (g)		196.69
Dry Weight of +3/4" Sample (g)	0.00				
Total Dry Weight of Sample (g)	NA				
Sieve Size	Sieve Opening	Weight of Soil Retained	Percent Retained	Accumulated Percent Retained	Percent Finer
(mm)		(g)	(%)	(%)	(%)
12"	300	0.00	0.00	0.00	100.00
6"	150	0.00	0.00	0.00	100.00
3"	75	0.00	0.00	0.00	100.00
2"	50	0.00	0.00	0.00	100.00
1 1/2"	37.5	0.00	0.00	0.00	100.00
1"	25.0	0.00	0.00	0.00	100.00
3/4"	19.0	0.00	0.00	0.00	100.00
1/2"	12.5	0.00	0.00	0.00	100.00
3/8"	9.50	0.00	0.00	0.00	100.00
#4	4.75	4.26	0.69	0.69	99.31
#10	2.00	18.22	2.95	3.64	96.36
#20	0.85	33.62	5.44	9.08	90.92
#40	0.425	30.41	4.92	14.00	86.00
#60	0.250	42.40	6.86	20.86	79.14
#140	0.106	53.38	8.64	29.50	70.50
#200	0.075	14.40	2.33	31.83	68.17
Pan	-	421.32	68.17	100.00	-

Tested By	PC	Date	9/26/15	Checked By	KC
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page 3 of 4

DCN: CT-S3A DATE: 3/18/13 REVISION: 11

## HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-001

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-11A  
 Soil Color: Brown

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N'
0	NA	NA	NA	NA	NA	NA	NA	NA
2	46.5	23.4	5.86	40.6	79.8	0.01291	0.0269	54.4
5	40.0	23.4	5.86	34.1	67.0	0.01291	0.0180	45.7
15	33.5	23.4	5.86	27.6	54.3	0.01291	0.0110	37.0
30	30.0	23.4	5.86	24.1	47.4	0.01291	0.0080	32.3
60	26.5	23.3	5.89	20.6	40.5	0.01293	0.0058	27.6
250	22.0	22.9	6.04	16.0	31.3	0.01299	0.0029	21.4
1440	20.0	22.9	6.04	14.0	27.4	0.01299	0.0012	18.7

Soil Specimen Data		Other Corrections		
Tare No.	685			
Weight of Tare & Dry Material (g)	152.36	a - Factor		0.99
Weight of Tare (g)	96.93			
Weight of Deflocculant (g)	5.0	Percent Finer than # 200		68.17
Weight of Dry Material (g)	50.4	Specific Gravity	2.7	Assumed

**Note:** Hydrometer test is performed on - # 200 sieve material.

Tested By      TO      Date      9/30/15      Checked By      KC      Date      10/14/15

# PERMEABILITY TEST

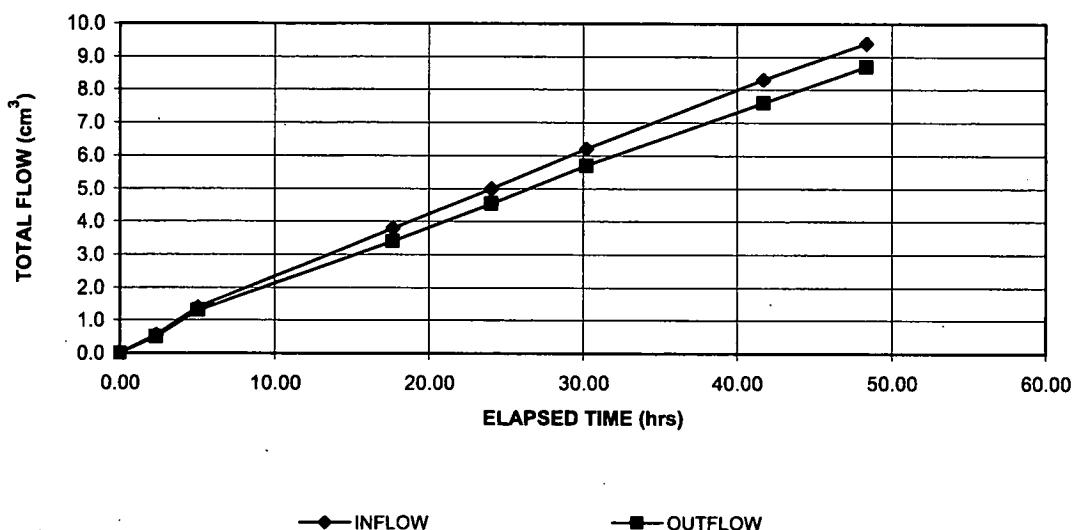
ASTM D 5084-10



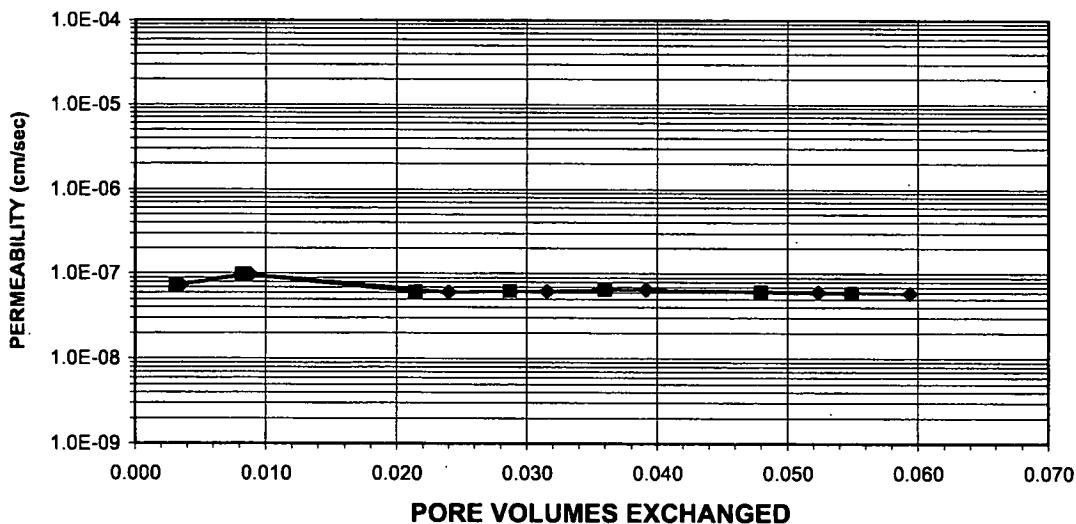
Client: CEC Boring No.: 9/17/15  
Client Project: Central Waste Closure 153-121 Depth (ft): 0-4  
Project No.: 2015-506-001 Sample No.: TP-11A  
Lab ID No.: 2015-506-001-001

AVERAGE PERMEABILITY = 6.2E-08 cm/sec @ 20°C  
AVERAGE PERMEABILITY = 6.2E-10 m/sec @ 20°C

## TOTAL FLOW vs. ELAPSED TIME



## PORE VOLUMES EXCHANGED vs. PERMEABILITY



Tested By: TRE

Date: 10/26/15 Checked By:

KC

Date: 10/30/15

Page 1 of 3

DCN: CT-22 DATE: 4/10/13 REVISION: 10

# PERMEABILITY TEST

ASTM D 5084-10



Client: CEC  
 Client Project: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID No.: 2015-506-001-001

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-11A

Specific Gravity: 2.70  
 Sample Condition: Assumed Remolded

Visual Description: Brown Sandy Clay

## **MOISTURE CONTENT:**

	<u>BEFORE TEST</u>	<u>AFTER TEST</u>
Tare Number	550	916
Weight of Tare & Wet Sample (g)	224.67	993.49
Weight of Tare & Dry Sample (g)	203.17	848.10
Weight of Tare (g)	81.61	109.81
Weight of Water (g)	21.50	145.39
Weight of Dry Sample (g)	121.56	738.29
Moisture Content (%)	17.7	19.7

## **SPECIMEN:**

	<u>BEFORE TEST</u>	<u>AFTER TEST</u>
Weight of Tube & Wet Sample (g)	2195.84	NA
Weight of Tube (g)	1344.00	NA
Weight of Wet Sample (g)	851.84	866.36
Length 1 (in)	3.998	3.989
Length 2 (in)	3.998	3.953
Length 3 (in)	3.998	3.988
Top Diameter (in)	2.870	2.885
Middle Diameter (in)	2.870	2.887
Bottom Diameter (in)	2.870	2.888
Average Length (in)	4.00	3.98
Average Area (in <sup>2</sup> )	6.47	6.54
Sample Volume (cm <sup>3</sup> )	423.96	426.47
Unit Wet Weight (g/cm <sup>3</sup> )	2.01	2.03
Unit Wet Weight (pcf)	125.4	126.8
Unit Dry Weight (pcf)	106.6	105.9
Unit Dry Weight (g/cm <sup>3</sup> )	1.71	1.70
Void Ratio, e	0.58	0.59
Porosity, n	0.37	0.37
Pore Volume (cm <sup>3</sup> )	155.9	158.4
Total Weight of Sample After Test (g)		884.6

Tested By: TRE Date: 10/26/15 Checked By: KC Date: 10/30/15

# PERMEABILITY TEST

ASTM D 5084-10



Client: CEC  
 Client Project: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID No.: 2015-506-001-001

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-11A

<u>Pressure Heads (Constant)</u>		<u>Final Sample Dimensions</u>	
Top Cap (psi)	67.5	Sample Length (cm), L	10.10
Bottom Cap (psi)	70.0	Sample Diameter (cm)	7.33
Cell (psi)	75.0	Sample Area ( $\text{cm}^2$ ), A	42.22
Total Pressure Head (cm)	175.8	Inflow Burette Area ( $\text{cm}^2$ ), a-in	0.860
Hydraulic Gradient	17.40	Outflow Burette Area ( $\text{cm}^2$ ), a-out	0.857
		B Parameter (%)	98

**AVERAGE PERMEABILITY = 6.2E-08 cm/sec @ 20°C**  
**AVERAGE PERMEABILITY = 6.2E-10 m/sec @ 20°C**

DATE (mm/dd/yy)	TIME (hr)	ELAPSED TIME t (hr)	TOTAL INFLOW ( $\text{cm}^3$ )	TOTAL OUTFLOW ( $\text{cm}^3$ )	TOTAL HEAD h (cm)	FLOW (0 flow) (1 stop)	TEMP. (°C)	INCREMENTAL PERMEABILITY @ 20°C ( $\text{cm/sec}$ )
10/27/15	13	37	0.000	0.0	201.4	0	20.6	NA
10/27/15	15	58	2.350	0.6	200.2	0	20.6	7.3E-08
10/27/15	18	40	5.050	1.4	198.3	0	21.6	9.8E-08
10/28/15	7	15	17.633	3.8	193.1	0	20.0	6.1E-08
10/28/15	13	42	24.083	5.0	190.3	0	21.0	6.2E-08
10/28/15	19	50	30.217	6.2	187.6	0	21.5	6.5E-08
10/29/15	7	20	41.717	8.3	183.0	0	20.8	6.1E-08
10/29/15	14	0	48.383	9.4	180.4	1	21.1	5.9E-08

Tested By: TRE Date: 10/26/15 Checked By: KC Date: 10/30/15

Page 3 of 3

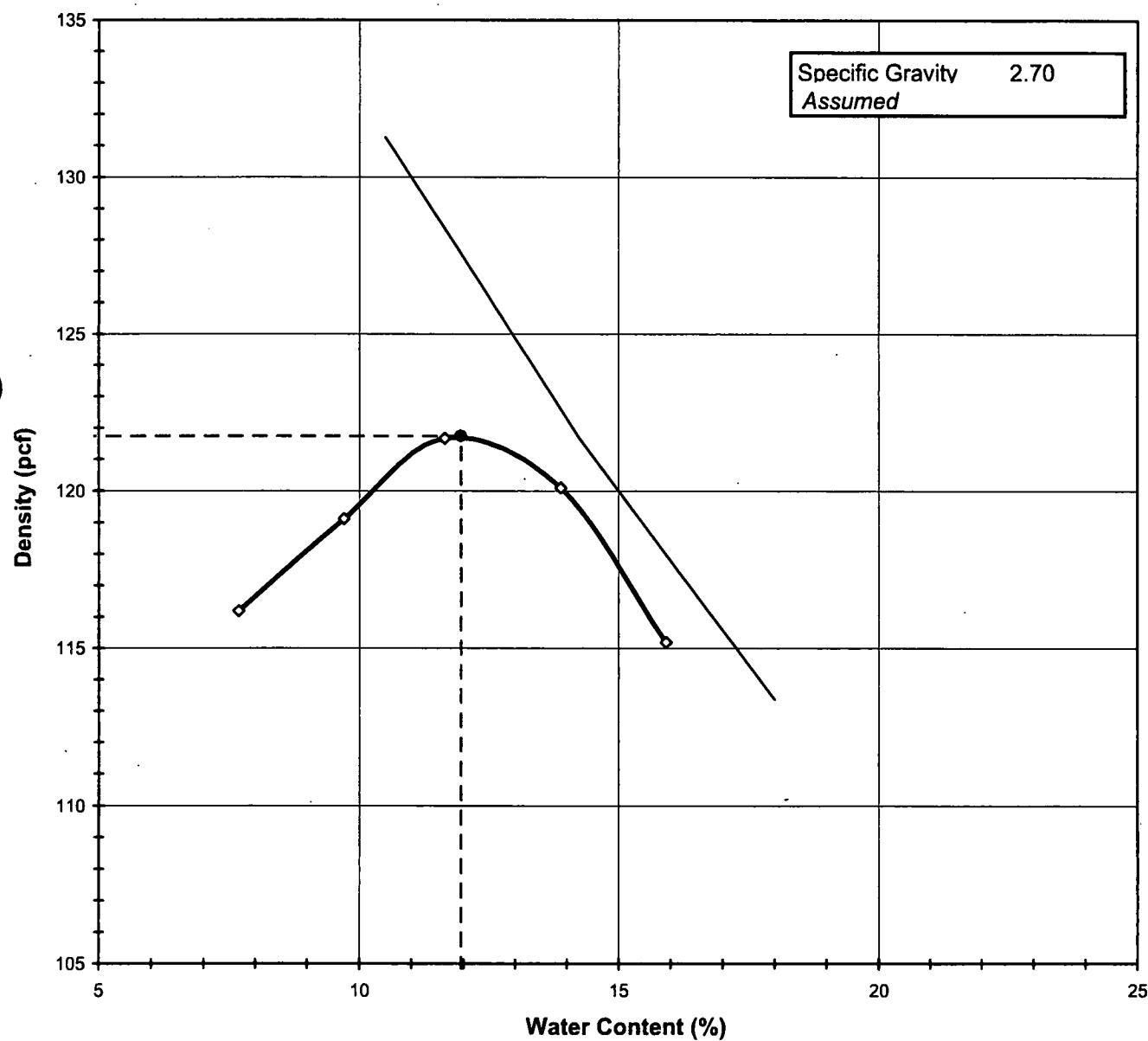
DCN: CT-22 DATE: 4/10/13 REVISION: 10

**MOISTURE DENSITY RELATIONSHIP**

ASTM D1557-12

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	4-8
Project No.:	2015-506-001	Sample No.:	TP-11B
Lab ID:	2015-506-001-002	Test Method	<b>MODIFIED</b>
Visual Description: Brown Sandy Clay with Rock Fragments			

**Optimum Water Content**      **12.0**  
**Maximum Dry Density**      **121.8**



<i>Tested By</i>	MLF	<i>Date</i>	10/16/15	<i>Checked By</i>	KC	<i>Date</i>	10/19/15
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page 1 of 2    DCN:CT-S12 DATE:5/1/13 REVISION: 14

**MOISTURE - DENSITY RELATIONSHIP**

ASTM D1557-12

Client: CEC Boring No.: 9/17/15  
 Client Reference: Central Waste Closure 153-121 Depth (ft): 4-8  
 Project No.: 2015-506-001 Sample No.: TP-11B  
 Lab ID: 2015-506-001-002

Visual Description: Brown Sandy Clay with Rock Fragments

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.70
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	C

Test Type:	MODIFIED
Rammer Weight (lb):	10.0
Rammer Drop (in):	18
Rammer Type:	MECHANICAL
Machine ID:	G 441
Mold ID:	G 1389
Mold diameter:	6"
Weight of the Mold (g):	6362
Volume of the Mold (cm <sup>3</sup> ):	2125

**Mold / Specimen**

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	10623	10812	10988	11020	10909
Weight of Mold (g):	6362	6362	6362	6362	6362
Weight of Wet Sample (g):	4261	4450	4626	4658	4547
Mold Volume (cm <sup>3</sup> ):	2125	2125	2125	2125	2125

**Moisture Content / Density**

Tare Number:	1722	578	1717	880	607
Weight of Tare & Wet Sample (g):	519.98	539.70	515.60	562.30	588.30
Weight of Tare & Dry Sample (g):	488.70	499.40	470.50	507.00	518.90
Weight of Tare (g):	81.39	84.26	83.10	108.80	82.73
Weight of Water (g):	31.28	40.30	45.10	55.30	69.40
Weight of Dry Sample (g):	407.31	415.14	387.40	398.20	436.17

Wet Density (g/cm <sup>3</sup> ):	2.01	2.09	2.18	2.19	2.14
Wet Density (pcf):	125.1	130.7	135.8	136.8	133.5
Moisture Content (%):	7.7	9.7	11.6	13.9	15.9
Dry Density (pcf):	116.2	119.1	121.7	120.1	115.2

**Zero Air Voids**

Moisture Content (%):	10.5	14.3	18.0
Dry Unit Weight (pcf):	131.3	121.7	113.4

Tested By	MLF	Date	10/16/15	Checked By	KC	Date	10/19/15
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## SPECIFIC GRAVITY

ASTM D 854-14

Client: CEC  
Client Reference: Central Waste Closure 153-121  
Project No.: 2015-506-001  
Lab ID: 2015-506-001-002

Boring No.: 9/17/15  
Depth (ft): 4-8  
Sample No.: TP-11B  
Visual Description: Brown Sandy Clay

(Minus No.4 sieve material, oven dried)

Replicate Number	1	2
Pycnometer ID:	G 1255	G 1504
Weight of Pycnometer & Soil & Water (g):	755.69	739.16
Temperature (°C):	26.1	26.0
Weight of Pycnometer & Water (g):	684.94	672.12
Tare Number:	672	664
Weight of Tare & Dry Soil (g):	207.62	200.59
Weight of Tare (g):	96.53	95.18
Weight of Dry Soil (g):	111.09	105.41
Specific Gravity of Soil @ Measured Temperature:	2.754	2.747
Specific Gravity of Water @ Measured Temperature:	0.99677	0.99679
Conversion Factor for Measured Temperature:	0.99856	0.99858
Specific Gravity @ 20° Celsius:	2.758	2.751

Average Specific Gravity @ 20° Celsius	2.75
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Tested By AMC Date 11/12/15 Checked By KC Date 11/13/15

DCN: CT-S5 Date: 3/5/14 Revision: 20

S:\Excel\Excel QA\Spreadsheets\Specific Gravity.xls

## ATTERBERG LIMITS

ASTM D 4318-10

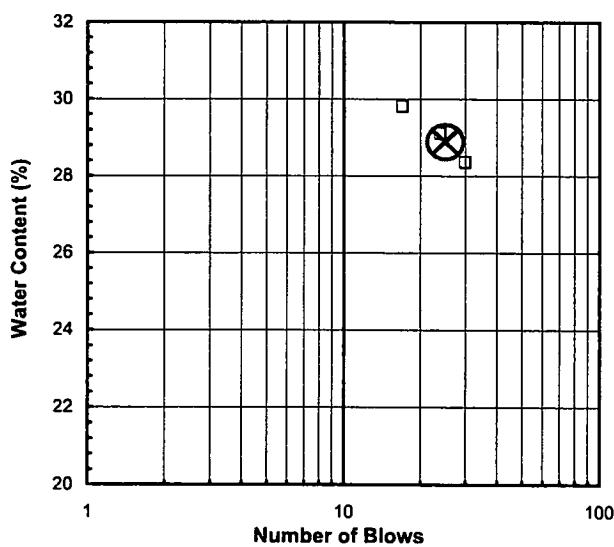
Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-002  
 Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-11B  
 Soil Description: BROWN LEAN CLAY

**Note:** The USCS symbol used with this test refers only to the minus No. 40 (Minus No. 40 sieve material, Airdried)  
 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

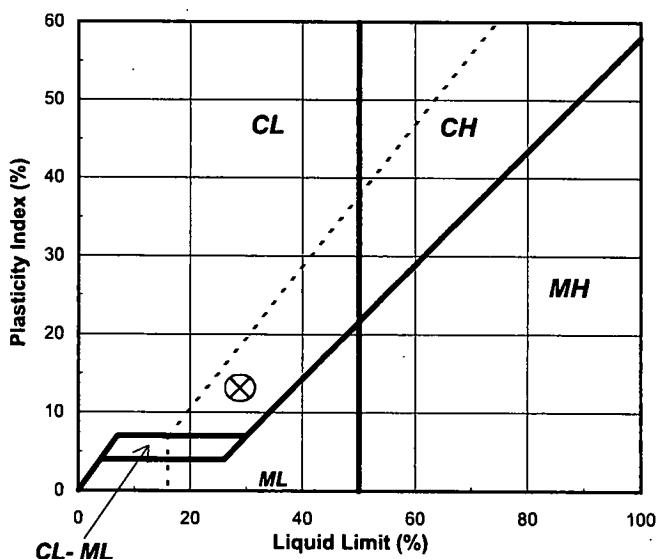
Liquid Limit Test	1	2	3	
Tare Number:	166	195	196	M
Wt. of Tare & Wet Sample (g):	39.42	34.21	38.16	U
Wt. of Tare & Dry Sample (g):	34.77	30.39	33.46	L
Weight of Tare (g):	18.37	17.26	17.69	T
Weight of Water (g):	4.7	3.8	4.7	I
Weight of Dry Sample (g):	16.4	13.1	15.8	P
Moisture Content (%):	28.4	29.1	29.8	O
Number of Blows:	30	24	17	I
				N
				T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	3	172		Liquid Limit (%): 29
Wt. of Tare & Wet Sample (g):	25.22	25.90		Plastic Limit (%): 16
Wt. of Tare & Dry Sample (g):	24.33	25.04		Plasticity Index (%): 13
Weight of Tare (g):	18.86	19.53		USCS Symbol: CL
Weight of Water (g):	0.9	0.9		
Weight of Dry Sample (g):	5.5	5.5		
Moisture Content (%):	16.3	15.6	0.7	
Note: The acceptable range of the two Moisture contents is $\pm 2.6$				

Flow Curve



Plasticity Chart



Tested By	TO	Date	Checked By	CLK	Date
page 1 of 1	DCN: CTS4B, REV. 4, 3/18/13	10/9/15			10/10/15

# SIEVE AND HYDROMETER ANALYSIS

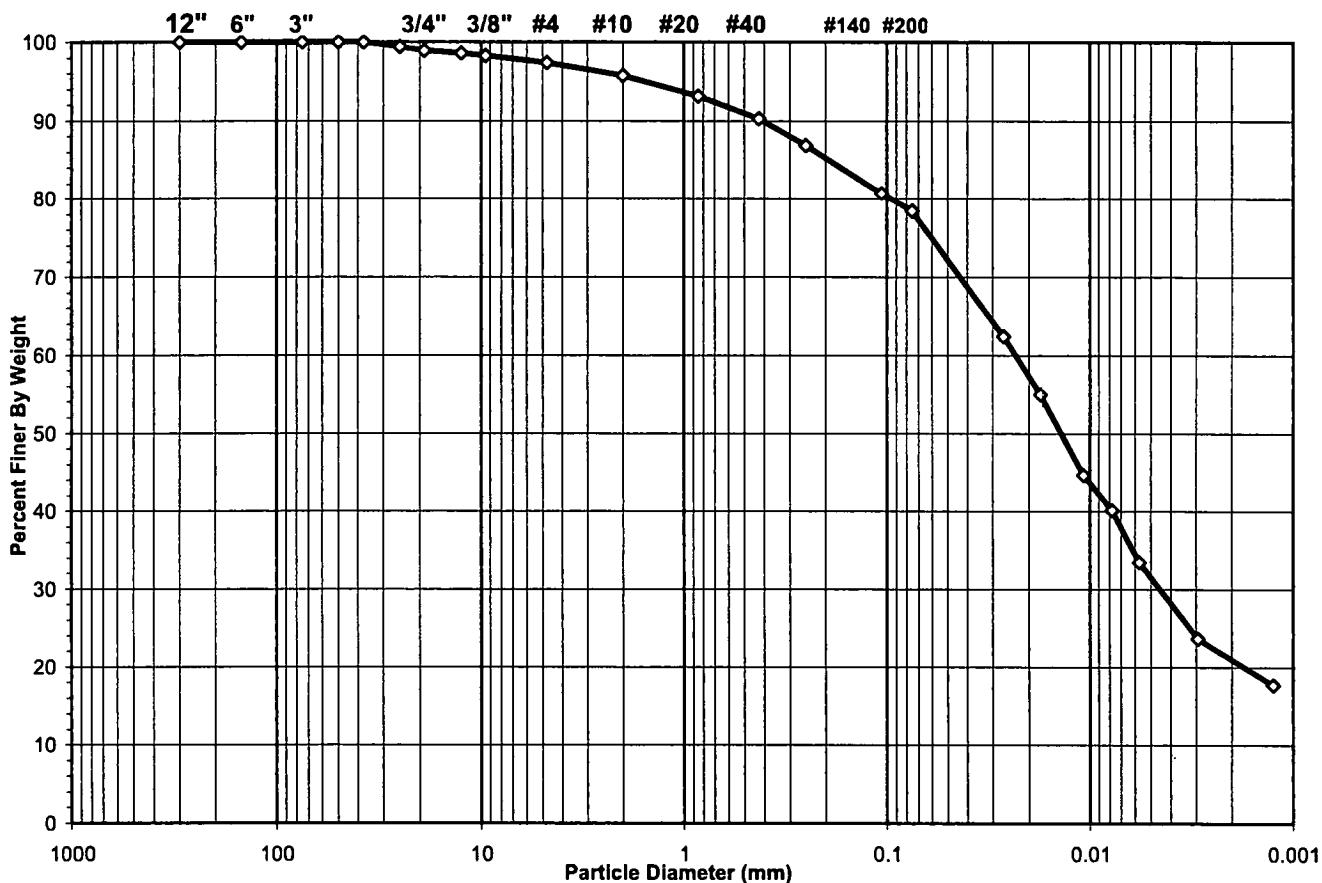
ASTM D 422-63 (2007)



Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-002

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-11B  
 Soil Color: Brown

USCS USDA	SIEVE ANALYSIS					HYDROMETER		
	cobbles	gravel	sand			silt and clay fraction		
	cobbles	gravel	sand			silt	clay	

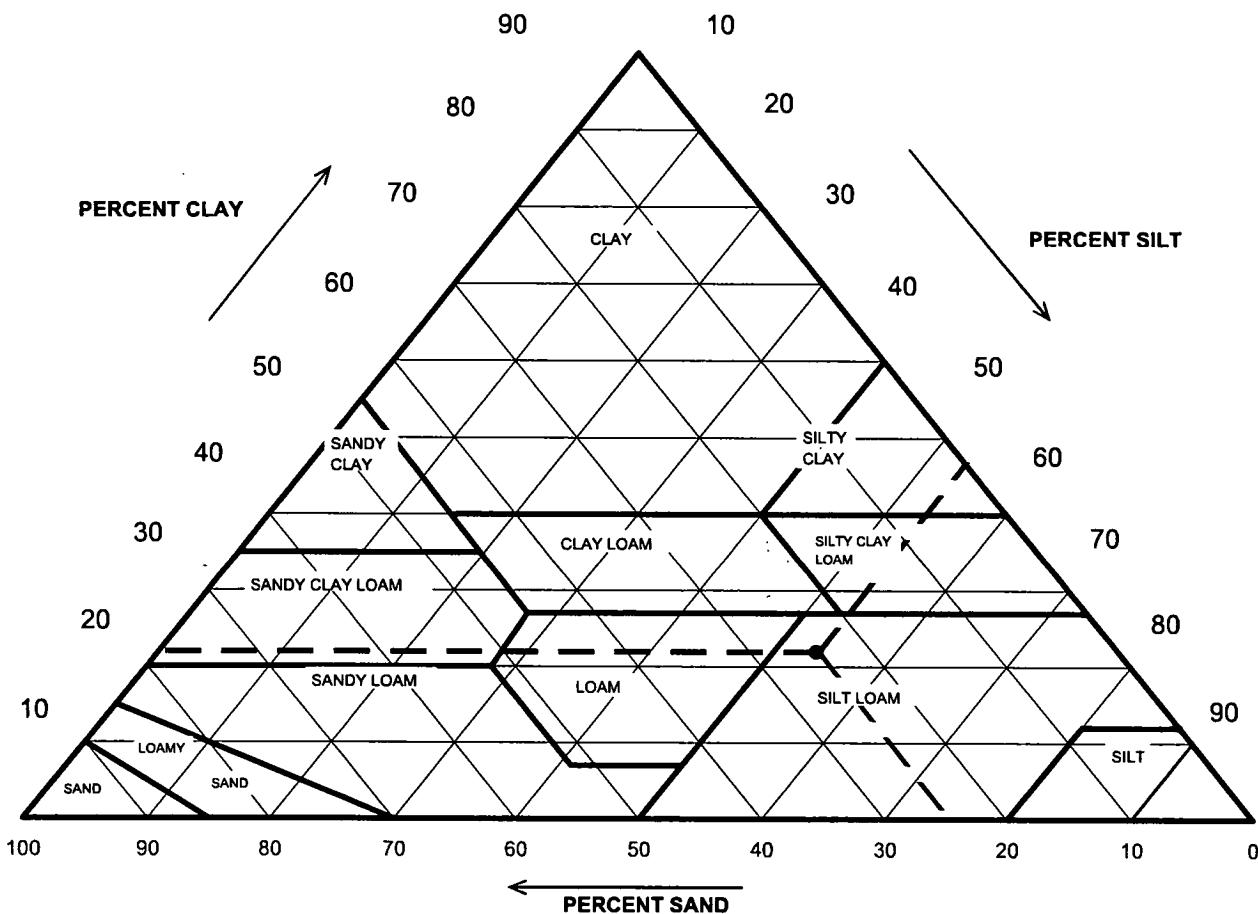


USCS Summary		
Sieve Sizes (mm)	Percentage	
Greater Than #4	Gravel	2.63
#4 To #200	Sand	18.88
Finer Than #200	Silt & Clay	78.49
<b>USCS Symbol:</b> <b>CL, TESTED</b>		
<b>USCS Classification:</b> <b>LEAN CLAY WITH SAND</b>		

## USDA CLASSIFICATION CHART

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-002

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-11B  
 Soil Color: Brown



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
2	95.73	Gravel	4.27	0.00
0.05	72.23	Sand	23.50	24.55
0.002	21.00	Silt	51.23	53.52
		Clay	21.00	21.94
<b>USDA Classification: SILT LOAM</b>				

# WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)



Client: CEC Boring No.: 9/17/15  
 Client Reference: Central Waste Closure 153-121 Depth (ft): 4-8  
 Project No.: 2015-506-001 Sample No.: TP-11B  
 Lab ID: 2015-506-001-002 Soil Color: Brown

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.:	13	Tare No.:	897
Wt. of Tare & Wet Sample (g):	1189.60	Weight of Tare & Wet Sample (g):	308.91
Wt. of Tare & Dry Sample (g):	1105.30	Weight of Tare & Dry Sample (g):	303.64
Weight of Tare (g):	203.07	Weight of Tare (g):	109.64
Weight of Water (g):	84.30	Weight of Water (g):	5.27
Weight of Dry Soil (g):	902.23	Weight of Dry Soil (g):	194.00
<b>Moisture Content (%):</b>	<b>9.3</b>	<b>Moisture Content (%):</b>	<b>2.7</b>

Wet Weight of -3/4" Sample (g):	19285	Weight of the Dry Sample (g):	902.23
Dry Weight of - 3/4" Sample (g):	17637.1	Weight of Minus #200 Material (g):	715.92
Wet Weight of +3/4" Sample (g):	199.27	Weight of Plus #200 Material (g):	186.31
Dry Weight of + 3/4" Sample (g):	194.00		
Total Dry Weight of Sample (g):	17831.1	<b>J - Factor (Percent Finer than 3/4"):</b>	<b>0.9891</b>

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Finer (%)
12"	300	0.00	0.00	0.00	100.00	100.00
6"	150	0.00	0.00	0.00	100.00	100.00
3"	75	0.00	0.00	0.00	100.00	100.00
2"	50	0.00	(*)	0.00	100.00	100.00
1 1/2"	37.5	0.00	0.00	0.00	100.00	100.00
1"	25.0	110.84	0.61	0.61	99.39	99.39
3/4"	19.0	88.43	0.48	1.09	98.91	98.91
1/2"	12.5	3.02	0.33	0.33	99.67	98.58
3/8"	9.50	2.64	0.29	0.63	99.37	98.29
#4	4.75	8.45	0.94	1.56	98.44	97.37
#10	2.00	14.92	1.65	3.22	96.78	95.73
#20	0.85	23.86	(**) 2.64	5.86	94.14	93.11
#40	0.425	25.66	2.84	8.71	91.29	90.30
#60	0.250	31.27	3.47	12.17	87.83	86.87
#140	0.106	55.67	6.17	18.34	81.66	80.77
#200	0.075	20.82	2.31	20.65	79.35	78.49
Pan	-	715.92	79.35	100.00	-	-

**Notes :** (\*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample  
 (\*\*) The - 3/4" sieve analysis is based on the Weight of the Dry Sample

Tested By	PC	Date	Checked By	KC	Date	10/14/15
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page 3 of 4

DCN: CT-S3B DATE09/14/2015 REAS100 PROJECTS1CEC12015-506-001 Central Waste\2015-506-001-002 Grain JSieveHyd.xls\Print Sheet

**HYDROMETER ANALYSIS**

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-002

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-11B  
 Soil Color: Brown

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	48.0	23.4	5.86	42.1	79.6	0.01291	0.0265	62.4
5	43.0	23.4	5.86	37.1	70.1	0.01291	0.0176	55.0
15	36.0	23.4	5.86	30.1	56.9	0.01291	0.0107	44.7
30	33.0	23.4	5.86	27.1	51.2	0.01291	0.0078	40.2
60	28.5	23.3	5.89	22.6	42.7	0.01293	0.0057	33.5
250	22.0	22.9	6.04	16.0	30.1	0.01299	0.0029	23.7
1440	18.0	22.9	6.04	12.0	22.6	0.01299	0.0013	17.7

Soil Specimen Data		Other Corrections	
Tare No.:	1092		
Wt. of Tare & Dry Material (g):	156.44	a - Factor:	0.99
Weight of Tare (g):	99		
Weight of Deflocculant (g):	5.0	Percent Finer than # 200:	78.49
Weight of Dry Material (g):	52.44	Specific Gravity:	2.7 Assumed

**Note:** Hydrometer test is performed on - # 200 sieve material.

Tested By	TO	Date	9/30/15	Checked By	KC	Date	10/14/15
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page 4 of 4

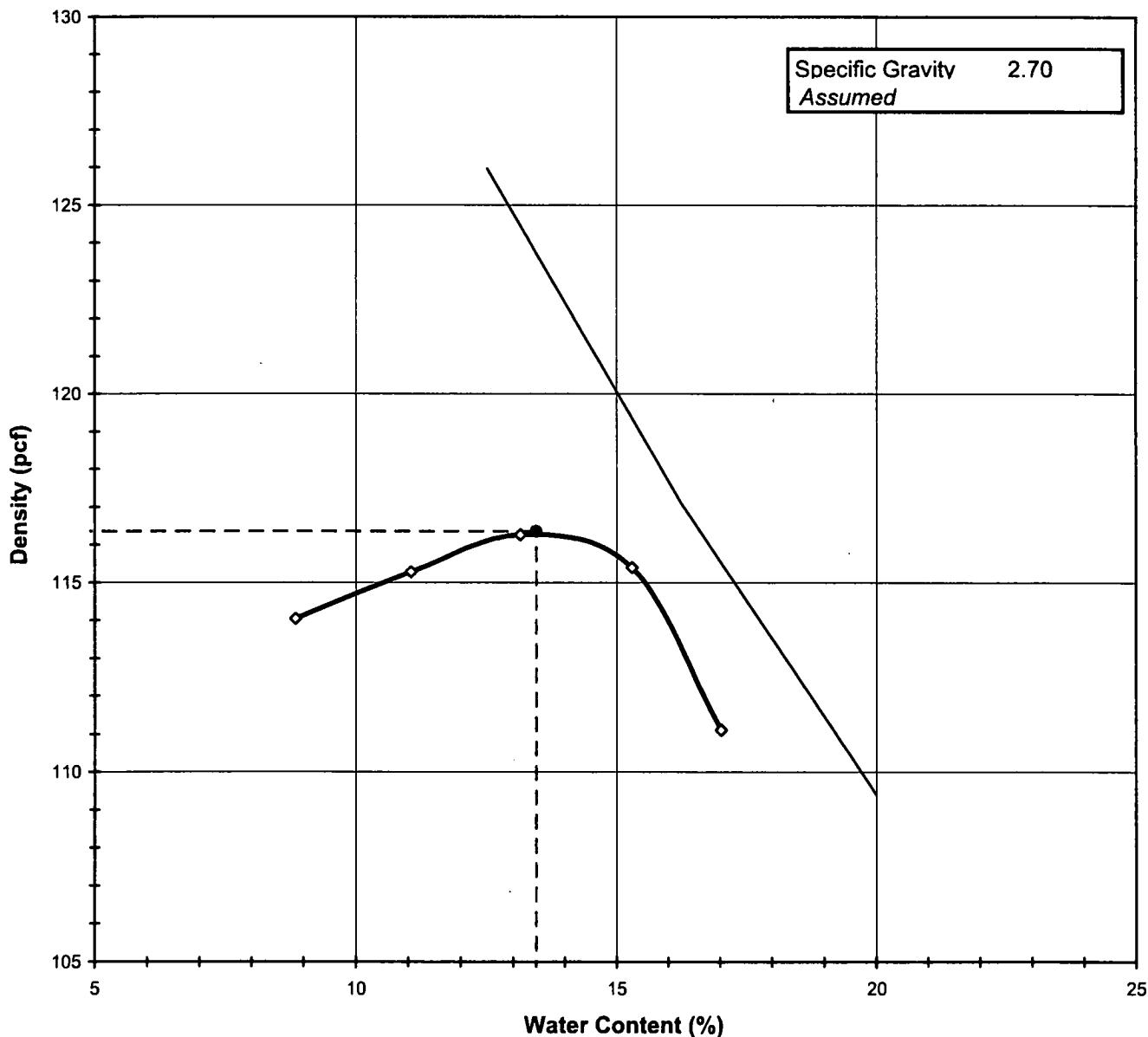
DCN: CT-S3B DATE09/30/2015 BY ASIAH BRON/GECTS/CEC/2015-506-001 Central Waste/2015-506-001-002 Grain JSieveHyd.xls|Print Sheet

**MOISTURE DENSITY RELATIONSHIP**

ASTM D1557-12

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-003  
  
 Visual Description: Brown Clay with small amount of Rock Fragments  
  
 Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-12A  
 Test Method: MODIFIED

**Optimum Water Content**      13.5  
**Maximum Dry Density**      116.4



Tested By	SGB	Date	10/13/15	Checked By	KC	Date	10/14/15
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page 1 of 2 DCN:CT-S12 DATE:5/1/13 REVISION: 14

**MOISTURE - DENSITY RELATIONSHIP**

ASTM D1557-12

Client: CEC Boring No.: 9/17/15  
 Client Reference: Central Waste Closure 153-121 Depth (ft): 0-4  
 Project No.: 2015-506-001 Sample No.: TP-12A  
 Lab ID: 2015-506-001-003

Visual Description: Brown Clay with small amount of Rock Fragments

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.70
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	B

Test Type:	<b>MODIFIED</b>
Rammer Weight (lb):	10.0
Rammer Drop (in):	18
Rammer Type:	MECHANICAL
Machine ID:	G 441
Mold ID:	G 606
Mold diameter:	4"
Weight of the Mold (g):	4139
Volume of the Mold (cm <sup>3</sup> ):	943

**Mold / Specimen**

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	6015	6074	6127	6150	6104
Weight of Mold (g):	4139	4139	4139	4139	4139
Weight of Wet Sample (g):	1876	1935	1988	2011	1965
Mold Volume (cm <sup>3</sup> ):	943	943	943	943	943

**Moisture Content / Density**

Tare Number:	1706	1458	886	545	562
Weight of Tare & Wet Sample (g):	409.30	452.30	481.70	439.30	440.10
Weight of Tare & Dry Sample (g):	382.75	415.50	438.50	392.00	388.36
Weight of Tare (g):	82.75	82.64	109.71	82.86	84.27
Weight of Water (g):	26.55	36.80	43.20	47.30	51.74
Weight of Dry Sample (g):	300.00	332.86	328.79	309.14	304.09

Wet Density (g/cm <sup>3</sup> ):	1.99	2.05	2.11	2.13	2.08
Wet Density (pcf):	124.1	128.0	131.5	133.1	130.0
Moisture Content (%):	8.9	11.1	13.1	15.3	17.0
Dry Density (pcf):	114.0	115.3	116.3	115.4	111.1

**Zero Air Voids**

Moisture Content (%):	12.5	16.3	20.0
Dry Unit Weight (pcf):	126.0	117.1	109.4

<i>Tested By</i>	SGB	<i>Date</i>	10/13/15	<i>Checked By</i>	KC	<i>Date</i>	10/14/15
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page 2 of 2

DCN:CT-S12 DATE:5/1/13 REVISION: 14

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## SPECIFIC GRAVITY

ASTM D 854-14

Client: CEC Boring No.: 9/17/15  
Client Reference: Central Waste Closure 153-121 Depth (ft): 0-4  
Project No.: 2015-506-001 Sample No.: TP-12A  
Lab ID: 2015-506-001-003 Visual Description: Brown Clay

(Minus No.4 sieve material, oven dried)

Replicate Number	1	2
Pycnometer ID:	G 1255	G 1504
Weight of Pycnometer & Soil & Water (g):	750.69	735.7
Temperature (°C):	26.2	26.5
Weight of Pycnometer & Water (g):	684.93	672.05
Tare Number:	1920	2331
Weight of Tare & Dry Soil (g):	201.33	194.22
Weight of Tare (g):	97.3	93.45
Weight of Dry Soil (g):	104.03	100.77
Specific Gravity of Soil @ Measured Temperature:	2.718	2.715
Specific Gravity of Water @ Measured Temperature:	0.99674	0.99666
Conversion Factor for Measured Temperature:	0.99853	0.99845
Specific Gravity @ 20° Celsius:	2.722	2.719

Average Specific Gravity @ 20° Celsius 2.72

Tested By AMC Date 11/12/15 Checked By KC Date 11/13/15

DCN: CT-S5 Date: 3/5/14 Revision: 20

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## ATTERBERG LIMITS

ASTM D 4318-10

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-003

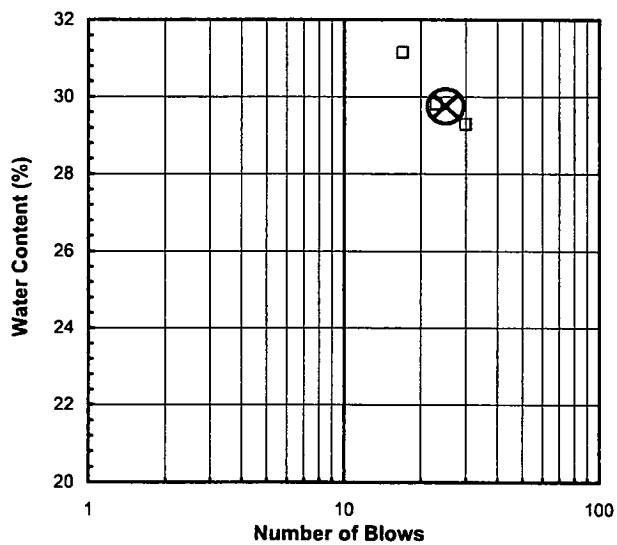
Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-12A  
 Soil Description: BROWN LEAN CLAY

**Note:** The USCS symbol used with this test refers only to the minus No. 40 sieve material, Airdried  
 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

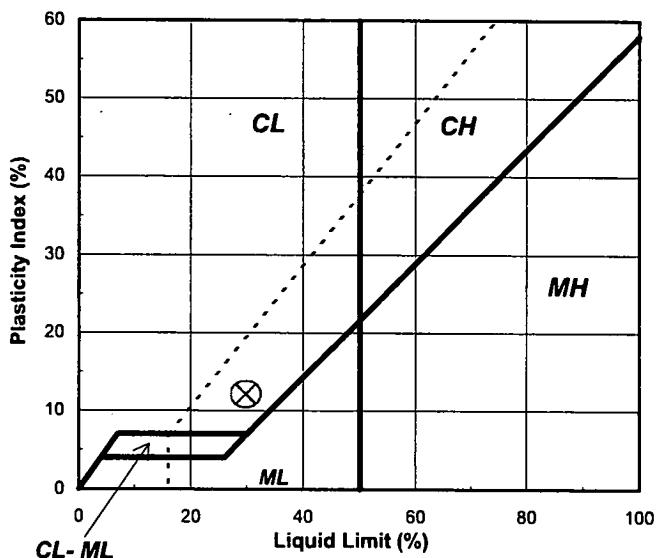
Liquid Limit Test	1	2	3	
Tare Number:	35	163	242	M
Wt. of Tare & Wet Sample (g):	40.57	40.11	40.82	U
Wt. of Tare & Dry Sample (g):	35.55	35.05	35.67	L
Weight of Tare (g):	18.40	18.07	19.13	T
Weight of Water (g):	5.0	5.1	5.2	I
Weight of Dry Sample (g):	17.2	17.0	16.5	P
Moisture Content (%):	29.3	29.8	31.1	O
Number of Blows:	30	23	17	N
				T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	167	215		Liquid Limit (%): 30
Wt. of Tare & Wet Sample (g):	24.75	24.76		Plastic Limit (%): 18
Wt. of Tare & Dry Sample (g):	23.83	23.78		Plasticity Index (%): 12
Weight of Tare (g):	18.42	18.35		USCS Symbol: CL
Weight of Water (g):	0.9	1.0		
Weight of Dry Sample (g):	5.4	5.4		
Moisture Content (%):	17.0	18.0	-1.0	
<i>Note: The acceptable range of the two Moisture contents is ± 2.6</i>				

Flow Curve



Plasticity Chart



Tested By	JP	Date	10/8/15	Checked By	CLK	Date	10/9/15
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page 1 of 1 DCN: CTS4B, REV. 4, 3/18/13

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# SIEVE AND HYDROMETER ANALYSIS

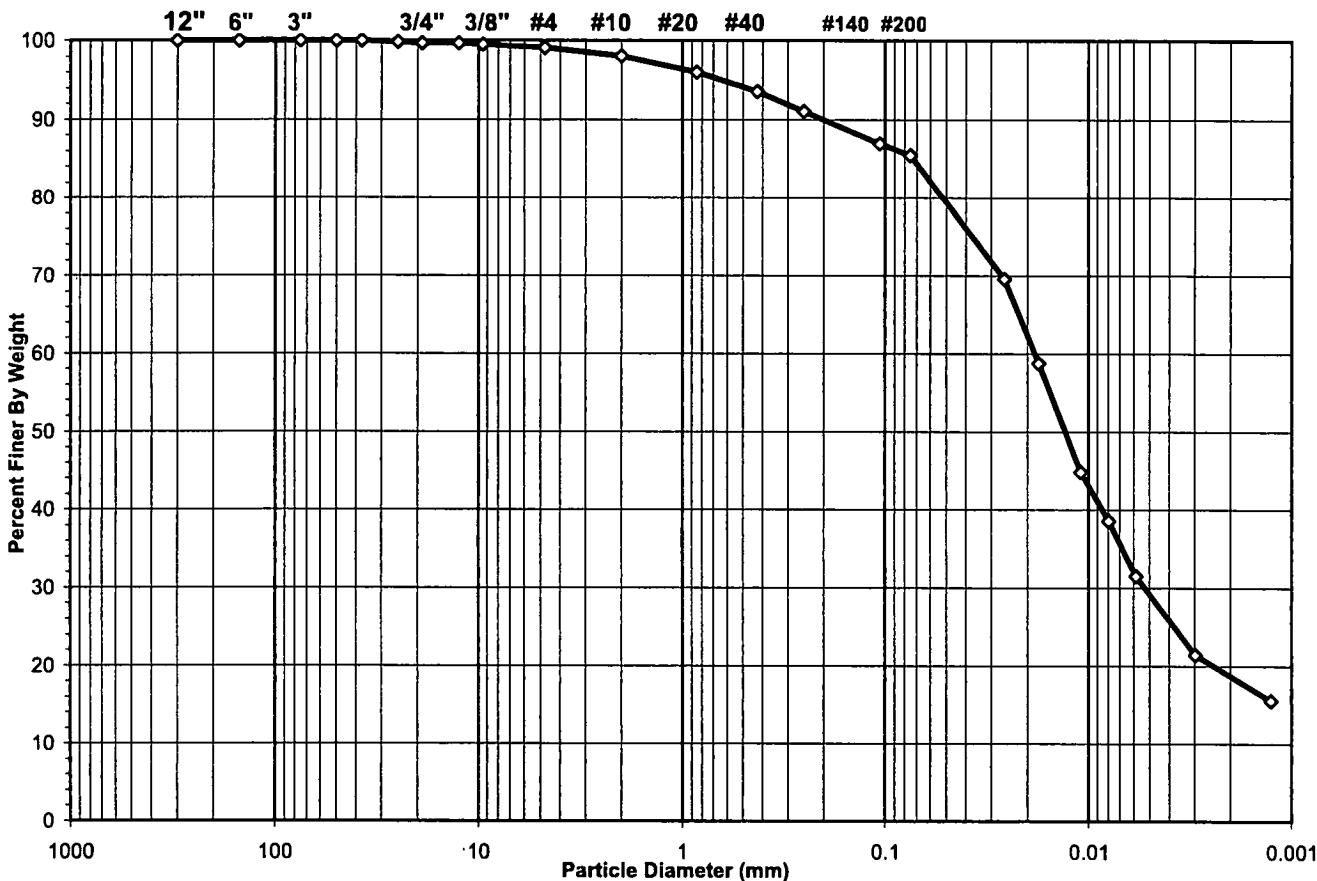
ASTM D 422-63 (2007)



Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-003

Boring No.: 9/17/16  
 Depth (ft): 0-4  
 Sample No.: TP-12A  
 Soil Color: Brown

USCS USDA	SIEVE ANALYSIS					HYDROMETER		
	cobbles	gravel	sand			silt and clay fraction		
	cobbles	gravel	sand			silt	clay	

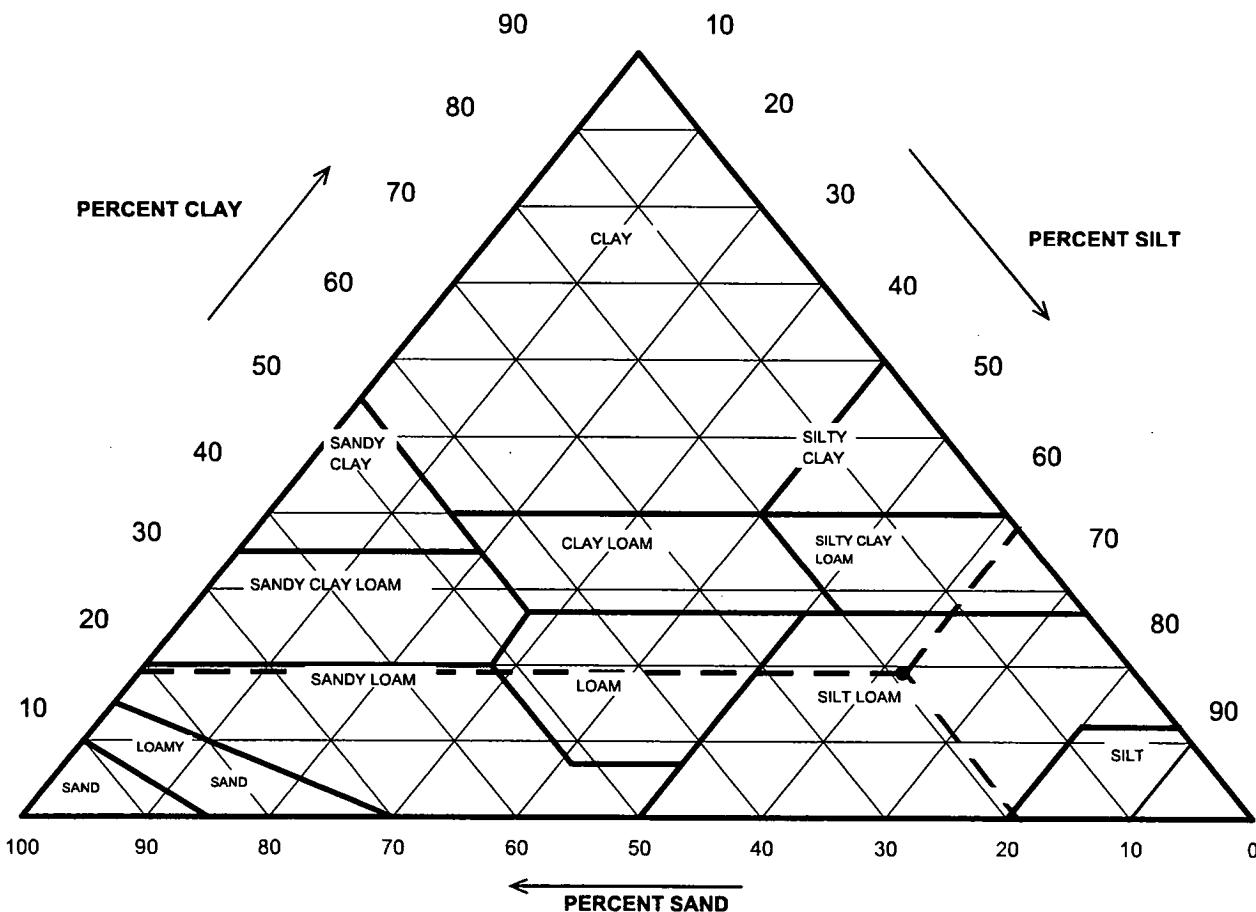


USCS Summary		
Sieve Sizes (mm)	Percentage	
Greater Than #4	Gravel	0.89
#4 To #200	Sand	13.63
Finer Than #200	Silt & Clay	85.49
<b>USCS Symbol:</b> <b>CL, TESTED</b>		
<b>USCS Classification:</b> <b>LEAN CLAY</b>		

## USDA CLASSIFICATION CHART

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-003

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-12A  
 Soil Color: Brown



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
2	98.02	Gravel	1.98	0.00
0.05	79.44	Sand	18.59	18.96
0.002	18.71	Silt	60.73	61.95
		Clay	18.71	19.09
<b>USDA Classification: SILT LOAM</b>				

# WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)



Client: CEC Boring No.: 9/17/15  
 Client Reference: Central Waste Closure 153-121 Depth (ft): 0-4  
 Project No.: 2015-506-001 Sample No.: TP-12A  
 Lab ID: 2015-506-001-003 Soil Color: Brown

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.:	26	Tare No.:	3057
Wt. of Tare & Wet Sample (g):	1029.90	Weight of Tare & Wet Sample (g):	87.65
Wt. of Tare & Dry Sample (g):	955.30	Weight of Tare & Dry Sample (g):	84.97
Weight of Tare (g):	200.60	Weight of Tare (g):	6.46
Weight of Water (g):	74.60	Weight of Water (g):	2.68
Weight of Dry Soil (g):	754.70	Weight of Dry Soil (g):	78.51
<b>Moisture Content (%):</b>	<b>9.9</b>	<b>Moisture Content (%):</b>	<b>3.4</b>
Wet Weight of -3/4" Sample (g):	23502	Weight of the Dry Sample (g):	754.70
Dry Weight of - 3/4" Sample (g):	21387.9	Weight of Minus #200 Material (g):	647.55
Wet Weight of +3/4" Sample (g):	81.19	Weight of Plus #200 Material (g):	107.15
Dry Weight of + 3/4" Sample (g):	78.51		
Total Dry Weight of Sample (g):	21466.4	<b>J - Factor (Percent Finer than 3/4"):</b>	<b>0.9963</b>

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Finer (%)
12"	300	0.00	0.00	0.00	100.00	100.00
6"	150	0.00	0.00	0.00	100.00	100.00
3"	75	0.00	0.00	0.00	100.00	100.00
2"	50	0.00	( *)	0.00	100.00	100.00
1 1/2"	37.5	0.00		0.00	100.00	100.00
1"	25.0	28.68	0.13	0.13	99.87	99.87
3/4"	19.0	52.51	0.24	0.37	99.63	99.63
1/2"	12.5	0.00	0.00	0.00	100.00	99.63
3/8"	9.50	0.95	0.13	0.13	99.87	99.51
#4	4.75	2.99	0.40	0.52	99.48	99.11
#10	2.00	8.26	1.09	1.62	98.38	98.02
#20	0.85	15.12	( **)	2.00	96.38	96.03
#40	0.425	18.56		2.46	93.92	93.58
#60	0.250	19.56		2.59	91.33	90.99
#140	0.106	30.71		4.07	87.26	86.94
#200	0.075	11.00		1.46	14.20	85.80
Pan	-	647.55	85.80	100.00	-	-

**Notes :** (\*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample

(\*\*) The - 3/4" sieve analysis is based on the Weight of the Dry Sample

Tested By	PC	Date	Checked By	KC	Date	10/14/15
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page 3 of 4

DCN: CT-S3B DATE:2015-09-14 BY:RASABERD/ECTS/CEC/2015-506-001 Central Waste[2015-506-001-003 Grain JSieveHyd.xls]Print Sheet

**HYDROMETER ANALYSIS**

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-003

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-12A  
 Soil Color: Brown

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	51.0	22.9	6.04	45.0	81.4	0.01299	0.0259	69.6
5	44.0	22.9	6.04	38.0	68.7	0.01299	0.0175	58.8
15	35.0	22.9	6.04	29.0	52.4	0.01299	0.0109	44.8
30	31.0	22.9	6.04	25.0	45.2	0.01299	0.0079	38.6
60	26.5	22.7	6.11	20.4	36.9	0.01302	0.0058	31.6
250	20.0	22.6	6.15	13.9	25.1	0.01303	0.0030	21.4
1440	16.0	23.1	5.97	10.0	18.2	0.01296	0.0013	15.5

Soil Specimen Data		Other Corrections	
Tare No.:	644		
Wt. of Tare & Dry Material (g):	159.21	a - Factor:	0.99
Weight of Tare (g):	99.54		
Weight of Deflocculant (g):	5.0	Percent Finer than # 200:	85.49
Weight of Dry Material (g):	54.67	Specific Gravity:	2.7 Assumed

**Note:** Hydrometer test is performed on - # 200 sieve material.

Tested By TO Date 9/30/15 Checked By KC Date 10/14/15

page 4 of 4

DCN: CT-S3B DATE 2015-09-30 BY JASPER PROJECT CEC 2015-506-001 Central Waste 2015-506-001-003 Grain JSieveHyd.xls Print Sheet

**MOISTURE DENSITY RELATIONSHIP**

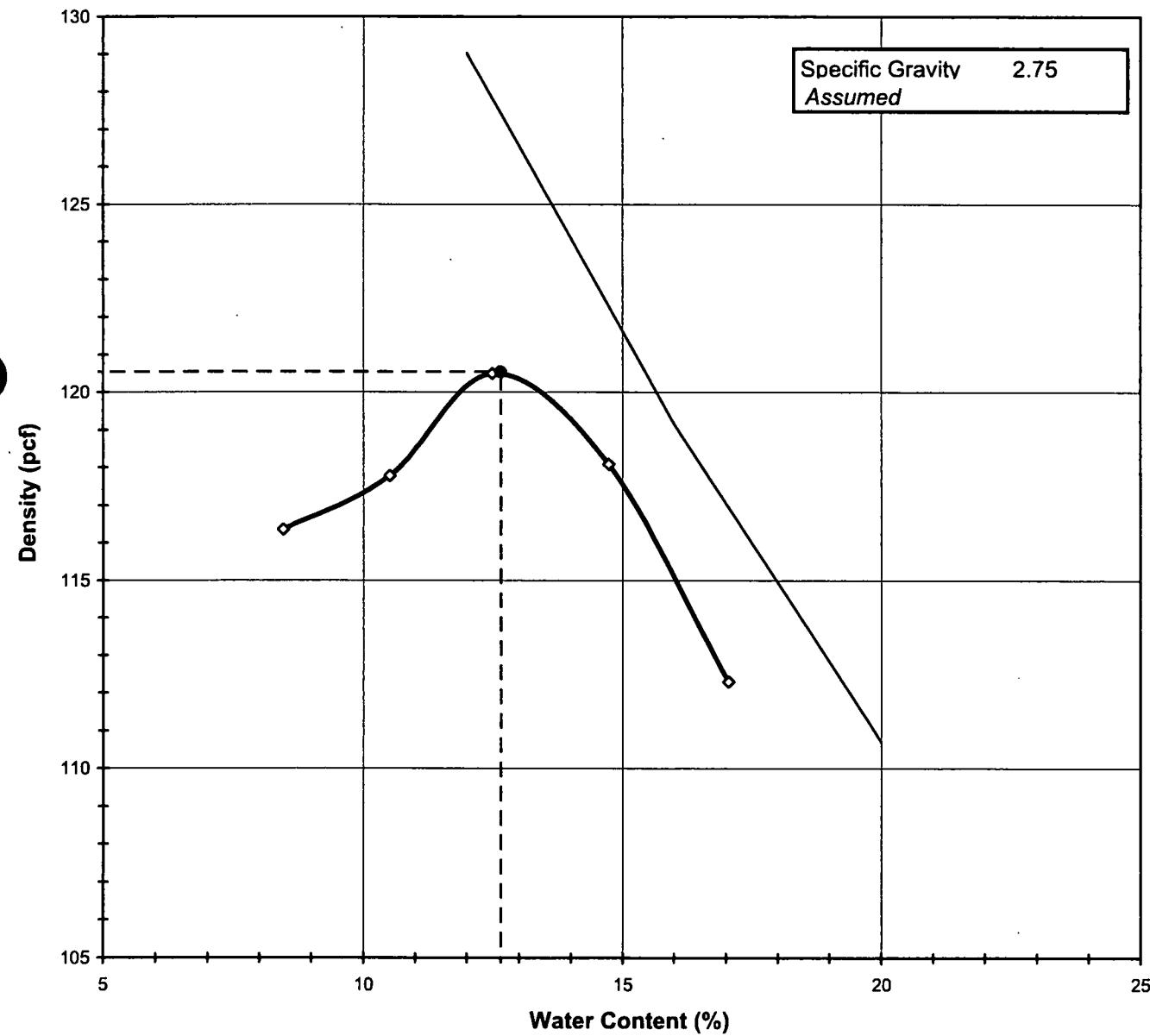
ASTM D698-12

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	4-8
Project No.:	2015-506-001	Sample No.:	TP-12B
Lab ID:	2015-506-001-004	Test Method	<b>STANDARD</b>
Visual Description: Brown Silty Clay			

**Optimum Water Content  
Maximum Dry Density**

12.7

120.6



Tested By

MF

Date

10/13/15

Checked By

KC

Date

10/14/15

## MOISTURE - DENSITY RELATIONSHIP

ASTM D698-12

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	4-8
Project No.:	2015-506-001	Sample No.:	TP-12B
Lab ID:	2015-506-001-004		

Visual Description: Brown Silty Clay

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.75
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	B

Test Type:	STANDARD
Rammer Weight (lb):	5.5
Rammer Drop (in):	12
Rammer Type:	MECHANICAL
Machine ID:	G 441
Mold ID:	G 1499
Mold diameter:	4"
Weight of the Mold (g):	4385
Volume of the Mold (cm <sup>3</sup> ):	940

### Mold / Specimen

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	6286	6346	6427	6426	6365
Weight of Mold (g):	4385	4385	4385	4385	4385
Weight of Wet Sample (g):	1901	1961	2042	2041	1980
Mold Volume (cm <sup>3</sup> ):	940	940	940	940	940

### Moisture Content / Density

Tare Number:	627	610	585	1122	1743
Weight of Tare & Wet Sample (g):	450.80	506.90	528.20	518.70	509.90
Weight of Tare & Dry Sample (g):	422.40	466.60	479.00	462.90	447.80
Weight of Tare (g):	86.58	83.32	85.29	84.29	83.58
Weight of Water (g):	28.40	40.30	49.20	55.80	62.10
Weight of Dry Sample (g):	335.82	383.28	393.71	378.61	364.22

Wet Density (g/cm <sup>3</sup> ):	2.02	2.09	2.17	2.17	2.11
Wet Density (pcf):	126.2	130.2	135.6	135.5	131.4
Moisture Content (%):	8.5	10.5	12.5	14.7	17.1
Dry Density (pcf):	116.4	117.8	120.5	118.1	112.3

### Zero Air Voids

Moisture Content (%):	12.0	16.0	20.0
Dry Unit Weight (pcf):	129.0	119.2	110.7

Tested By	MF	Date	10/13/15	Checked By	KC	Date	10/14/15
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page 2 of 2

DCN:CT-S12 DATE:5/1/13 REVISION: 14

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## SPECIFIC GRAVITY

ASTM D 854-14

Client: CEC  
Client Reference: Central Waste Closure 153-121  
Project No.: 2015-506-001  
Lab ID: 2015-506-001-004

Boring No.: 9/17/15  
Depth (ft): 4-8  
Sample No.: TP-12B  
Visual Description: Brown Silty Clay

(Minus No.4 sieve material, oven dried)

Replicate Number	1	2
Pycnometer ID:	G 1255	G 1504
Weight of Pycnometer & Soil & Water (g):	749.66	739.19
Temperature (°C):	26.1	26.4
Weight of Pycnometer & Water (g):	684.94	672.06
Tare Number:	2327	637
Weight of Tare & Dry Soil (g):	197.91	202.88
Weight of Tare (g):	95.55	96.82
Weight of Dry Soil (g):	102.36	106.06
Specific Gravity of Soil @ Measured Temperature:	2.719	2.724
Specific Gravity of Water @ Measured Temperature:	0.99677	0.99669
Conversion Factor for Measured Temperature:	0.99856	0.99848
Specific Gravity @ 20° Celsius:	2.723	2.728

Average Specific Gravity @ 20° Celsius	2.73
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Tested By AMC Date 11/12/15 Checked By KC Date 11/13/15

DCN: CT-S5 Date: 3/5/14 Revision: 20

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## ATTERBERG LIMITS

ASTM D 4318-10

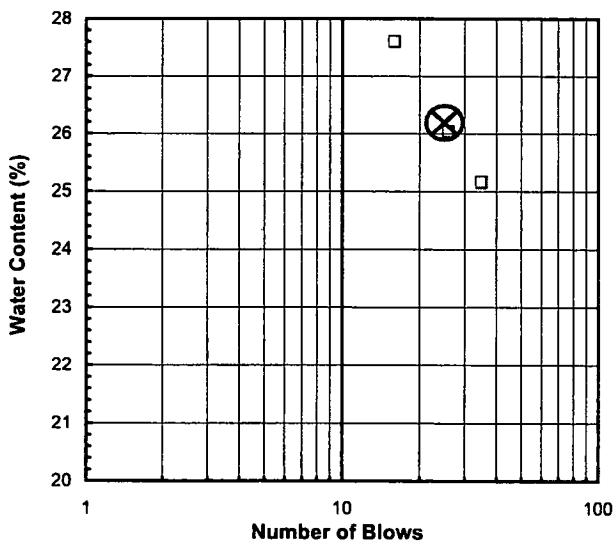
Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	4-8
Project No.:	2015-506-001	Sample No.:	TP-12B
Lab ID:	2015-506-001-004	Soil Description: BROWN LEAN CLAY	

**Note:** The USCS symbol used with this test refers only to the minus No. 40 (Minus No. 40 sieve material, Airdried) sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

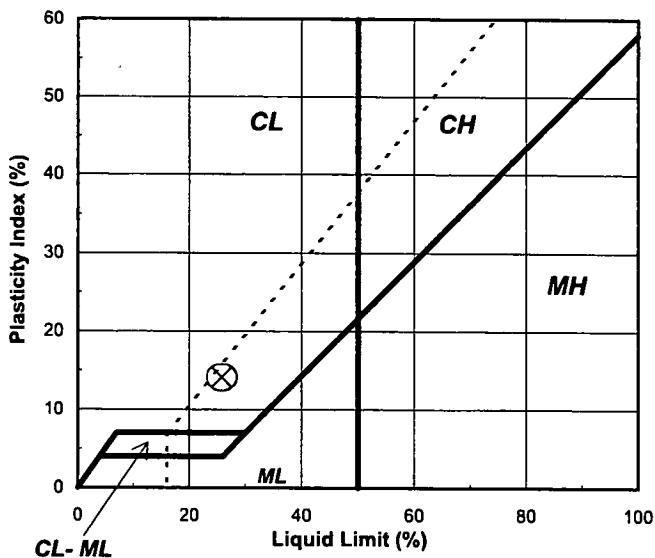
Liquid Limit Test	1	2	3	
Tare Number:	203	144	191	M
Wt. of Tare & Wet Sample (g):	39.48	38.17	38.36	U
Wt. of Tare & Dry Sample (g):	35.12	34.00	34.18	L
Weight of Tare (g):	19.32	17.98	17.56	T
Weight of Water (g):	4.4	4.2	4.2	I
Weight of Dry Sample (g):	15.8	16.0	16.6	P
Moisture Content (%):	27.6	26.0	25.2	O
Number of Blows:	16	26	35	I
				N
				T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	116	178		Liquid Limit (%): 26
Wt. of Tare & Wet Sample (g):	24.38	24.55		Plastic Limit (%): 12
Wt. of Tare & Dry Sample (g):	23.75	23.90		Plasticity Index (%): 14
Weight of Tare (g):	18.24	18.41		USCS Symbol: CL
Weight of Water (g):	0.6	0.7		
Weight of Dry Sample (g):	5.5	5.5		
Moisture Content (%):	11.4	11.8	-0.4	
<i>Note: The acceptable range of the two Moisture contents is <math>\pm 2.6</math></i>				

**Flow Curve**



**Plasticity Chart**



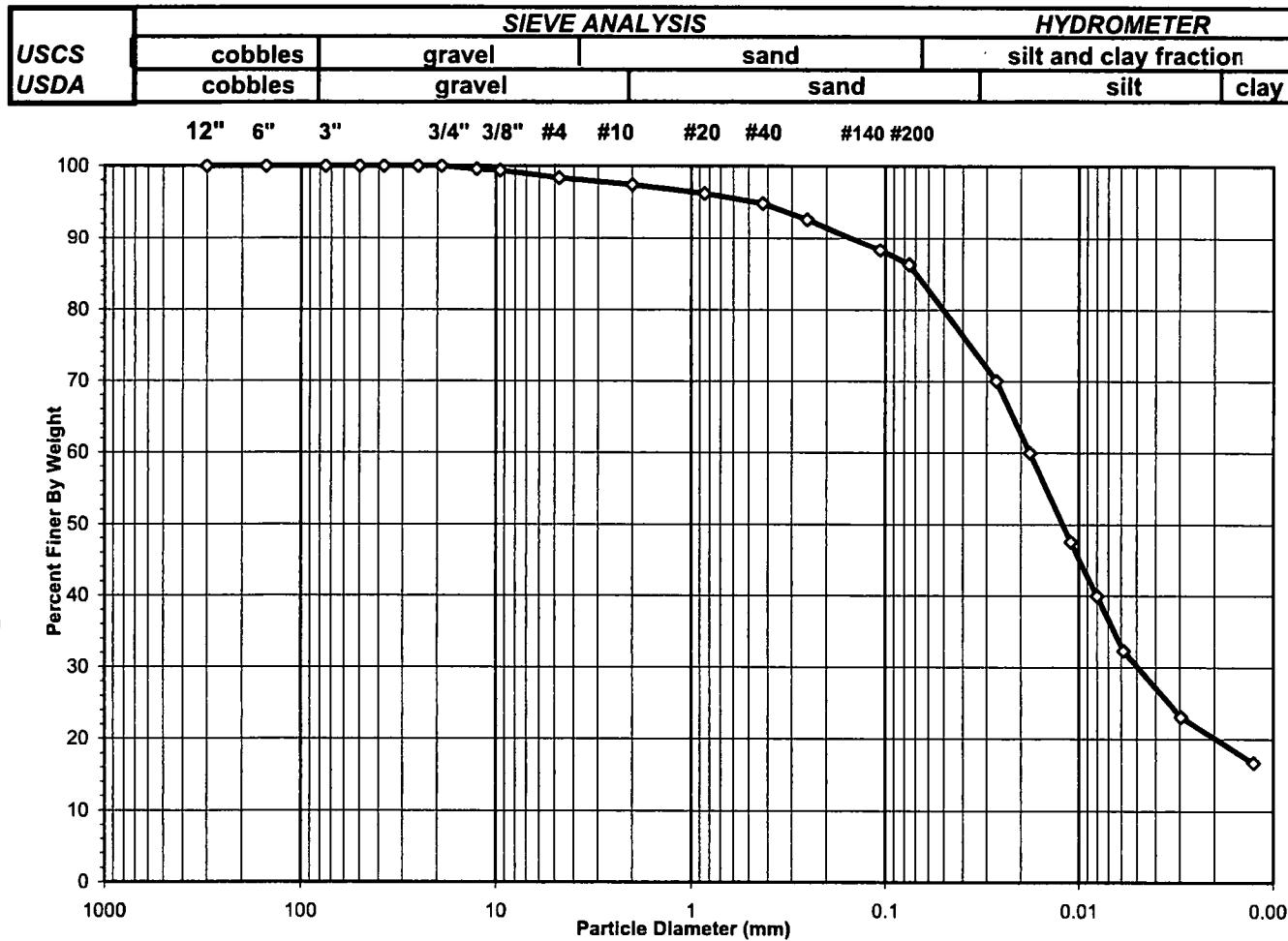
Tested By	RAL	Date	10/8/15	Checked By	CLK	Date	10/9/15
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**SIEVE AND HYDROMETER ANALYSIS**

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-004

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-12B  
 Soil Color: Brown

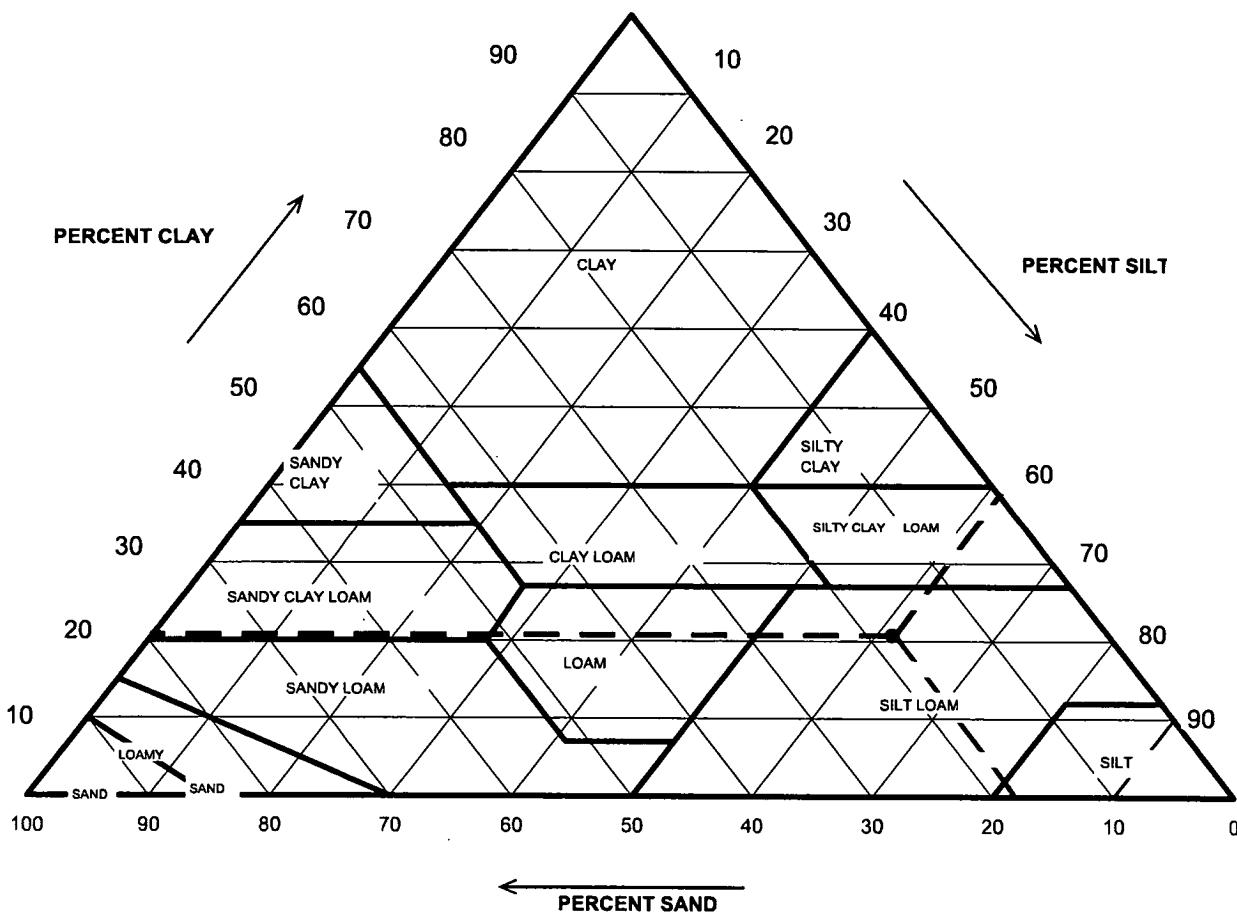


USCS Summary		
Sieve Sizes (mm)	Percentage	
Greater Than #4	Gravel	1.59
#4 To #200	Sand	12.05
Finer Than #200	Silt & Clay	86.35
<b>USCS Symbol:</b>		
<b>CL, TESTED</b>		
<b>USCS Classification:</b>		
<b>LEAN CLAY</b>		

### USDA CLASSIFICATION CHART

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-004

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-12B  
 Soil Color: Brown



Particle Size (mm)	Percent Finer (%)	USDA SUMMARY	Actual Percentage (%)	Corrected % of Minus 2.0 mm material for USDA Classificat.
		<i>Gravel</i>	2.58	0.00
2	97.42	<i>Sand</i>	17.46	17.92
0.05	79.96	<i>Silt</i>	59.79	61.37
0.002	20.17	<i>Clay</i>	20.17	20.71
<b>USDA Classification: SILT LOAM</b>				

## WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-004

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-12B  
 Soil Color: Brown

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.	31	Tare No.	NA
Weight of Tare & Wet Sample (g)	1033.80	Weight of Tare & Wet Sample (g)	NA
Weight of Tare & Dry Sample (g)	967.20	Weight of Tare & Dry Sample (g)	NA
Weight of Tare (g)	203.32	Weight of Tare (g)	NA
Weight of Water (g)	66.60	Weight of Water (g)	NA
Weight of Dry Sample (g)	763.88	Weight of Dry Sample (g)	NA
<b>Moisture Content (%)</b>	<b>8.7</b>	<b>Moisture Content (%)</b>	<b>NA</b>
Wet Weight of -3/4" Sample (g)	NA	Weight of the Dry Sample (g)	763.88
Dry Weight of -3/4" Sample (g)	104.25	Weight of - #200 Material (g)	659.63
Wet Weight of +3/4" Sample (g)	NA	Weight of + #200 Material (g)	104.25
Dry Weight of +3/4" Sample (g)	0.00		
Total Dry Weight of Sample (g)	NA		

Sieve Size	Sieve Opening	Weight of Soil Retained	Percent Retained	Accumulated Percent Retained	Percent Finer	Accumulated Percent Finer
	(mm)	(g)	(%)	(%)	(%)	(%)
12"	300	0.00	0.00	0.00	100.00	100.00
6"	150	0.00	0.00	0.00	100.00	100.00
3"	75	0.00	0.00	0.00	100.00	100.00
2"	50	0.00	0.00	0.00	100.00	100.00
1 1/2"	37.5	0.00	0.00	0.00	100.00	100.00
1"	25.0	0.00	0.00	0.00	100.00	100.00
3/4"	19.0	0.00	0.00	0.00	100.00	100.00
1/2"	12.5	3.05	0.40	0.40	99.60	99.60
3/8"	9.50	1.54	0.20	0.60	99.40	99.40
#4	4.75	7.58	0.99	1.59	98.41	98.41
#10	2.00	7.52	0.98	2.58	97.42	97.42
#20	0.85	9.33	1.22	3.80	96.20	96.20
#40	0.425	10.65	1.39	5.19	94.81	94.81
#60	0.250	16.97	2.22	7.41	92.59	92.59
#140	0.106	32.89	4.31	11.72	88.28	88.28
#200	0.075	14.72	1.93	13.65	86.35	86.35
Pan	-	659.63	86.35	100.00	-	-

Tested By	PC	Date	9/28/15	Checked By
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## HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-004

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-12B  
 Soil Color: Brown

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	48.0	22.9	6.04	42.0	81.1	0.01299	0.0267	70.1
5	42.0	22.9	6.04	36.0	69.5	0.01299	0.0178	60.0
15	34.5	22.9	6.04	28.5	55.0	0.01299	0.0109	47.5
30	30.0	22.9	6.04	24.0	46.3	0.01299	0.0080	40.0
60	25.5	22.7	6.11	19.4	37.5	0.01302	0.0059	32.4
250	20.0	22.6	6.15	13.9	26.8	0.01303	0.0030	23.1
1440	16.0	23.1	5.97	10.0	19.4	0.01296	0.0013	16.8

Soil Specimen Data		Other Corrections		
Tare No.	520			
Weight of Tare & Dry Material (g)	147.70	a - Factor		0.99
Weight of Tare (g)	91.49			
Weight of Deflocculant (g)	5.0	Percent Finer than # 200		86.35
Weight of Dry Material (g)	51.2	Specific Gravity	2.7	Assumed

**Note:** Hydrometer test is performed on - # 200 sieve material.

Tested By	TO	Date	10/1/15	Checked By	KC	Date	10/14/15
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page 4 of 4

DCN: CT-S3A DATE: 3/18/13 REVISION: 11

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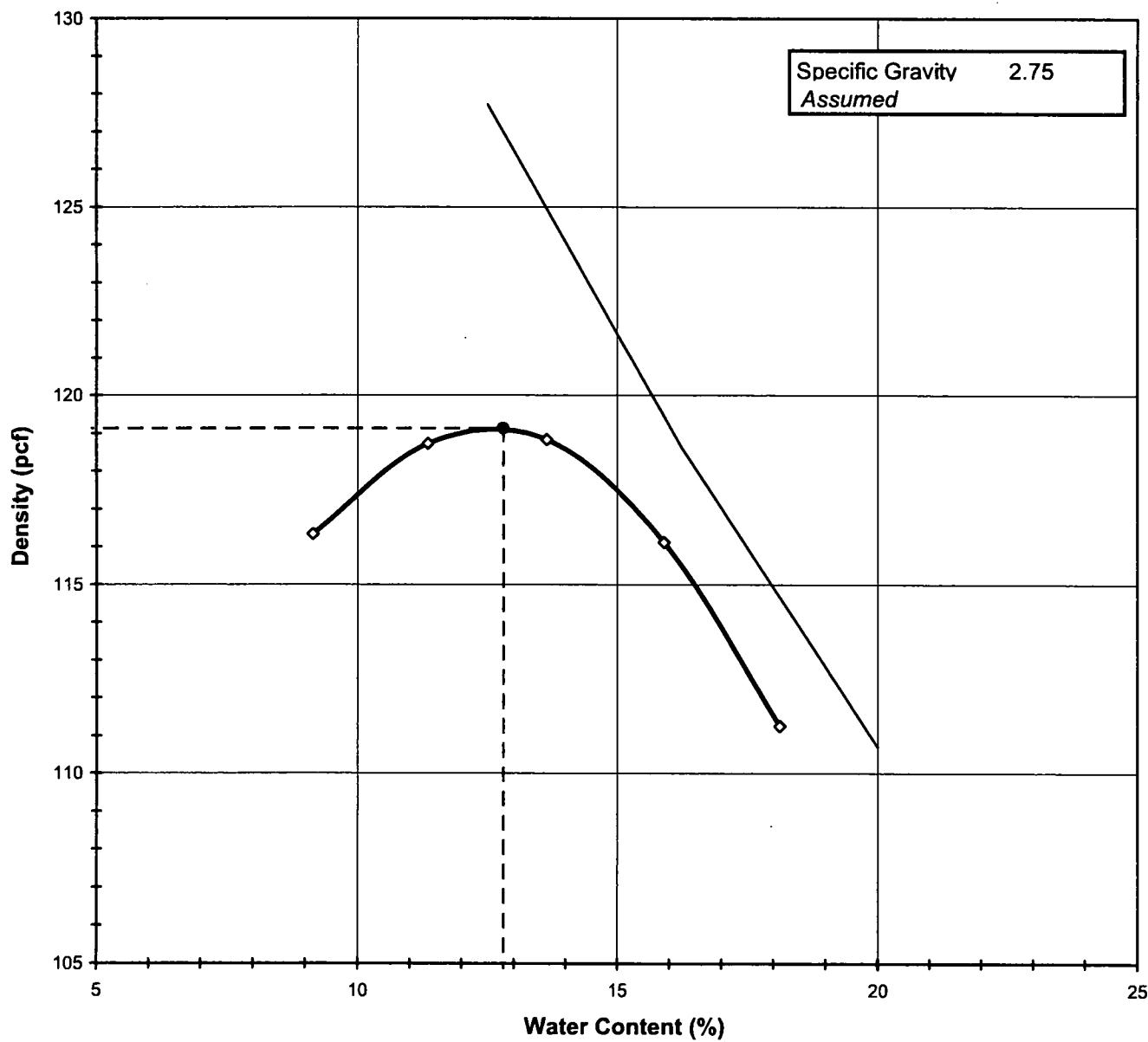
**MOISTURE DENSITY RELATIONSHIP**

ASTM D1557-12

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-005  
  
 Visual Description: Brown Clay

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-13A  
 Test Method: MODIFIED

**Optimum Water Content**      **12.8**  
**Maximum Dry Density**      **119.1**



Tested By	MF	Date	10/13/15	Checked By	KC	Date	10/14/15
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page 1 of 2 DCN:CT-S12 DATE:5/1/13 REVISION: 14

**MOISTURE - DENSITY RELATIONSHIP**

ASTM D1557-12

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-005

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-13A

Visual Description: Brown Clay

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.75
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	B

Test Type:	<b>MODIFIED</b>
Rammer Weight (lb):	10.0
Rammer Drop (in):	18
Rammer Type:	MECHANICAL
Machine ID:	G 441
Mold ID:	G 606
Mold diameter:	4"
Weight of the Mold (g):	4139
Volume of the Mold (cm <sup>3</sup> ):	943

**Mold / Specimen**

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	6058	6137	6180	6173	6125
Weight of Mold (g):	4139	4139	4139	4139	4139
Weight of Wet Sample (g):	1919	1998	2041	2034	1986
Mold Volume (cm <sup>3</sup> ):	943	943	943	943	943

**Moisture Content / Density**

Tare Number:	546	623	554	581	902
Weight of Tare & Wet Sample (g):	433.50	409.40	433.50	423.80	446.20
Weight of Tare & Dry Sample (g):	404.30	376.16	391.17	377.08	394.75
Weight of Tare (g):	85.14	83.41	80.92	83.38	110.80
Weight of Water (g):	29.20	33.24	42.33	46.72	51.45
Weight of Dry Sample (g):	319.16	292.75	310.25	293.70	283.95

Wet Density (g/cm <sup>3</sup> ):	2.03	2.12	2.16	2.16	2.11
Wet Density (pcf):	127.0	132.2	135.1	134.6	131.4
Moisture Content (%):	9.1	11.4	13.6	15.9	18.1
Dry Density (pcf):	116.3	118.7	118.8	116.1	111.3

**Zero Air Voids**

Moisture Content (%):	12.5	16.3	20.0
Dry Unit Weight (pcf):	127.7	118.6	110.7

<i>Tested By</i>	MF	Date	10/13/15	<i>Checked By</i>	KC	Date	10/14/15
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page 2 of 2

DCN:CT-S12 DATE:5/1/13 REVISION: 14

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## SPECIFIC GRAVITY

ASTM D 854-14

Client: CEC                      Boring No.: 9/17/15  
Client Reference: Central Waste Closure 153-121              Depth (ft): 0-4  
Project No.: 2015-506-001              Sample No.: TP-13A  
Lab ID: 2015-506-001-005              Visual Description: Brown Clay

(Minus No.4 sieve material, oven dried)

Replicate Number	1	2
Pycnometer ID:	G 1255	G 1504
Weight of Pycnometer & Soil & Water (g):	747.64	735.19
Temperature (°C):	27.2	27.2
Weight of Pycnometer & Water (g):	684.79	671.95
Tare Number:	528	967
Weight of Tare & Dry Soil (g):	190.93	200.28
Weight of Tare (g):	92.07	100.41
Weight of Dry Soil (g):	98.86	99.87
Specific Gravity of Soil @ Measured Temperature:	2.745	2.726
Specific Gravity of Water @ Measured Temperature:	0.99647	0.99647
Conversion Factor for Measured Temperature:	0.99826	0.99826
Specific Gravity @ 20° Celsius:	2.750	2.731

Average Specific Gravity @ 20° Celsius	2.74
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Tested By    AMC    Date    11/11/15    Checked By    CLK    Date    11/12/15

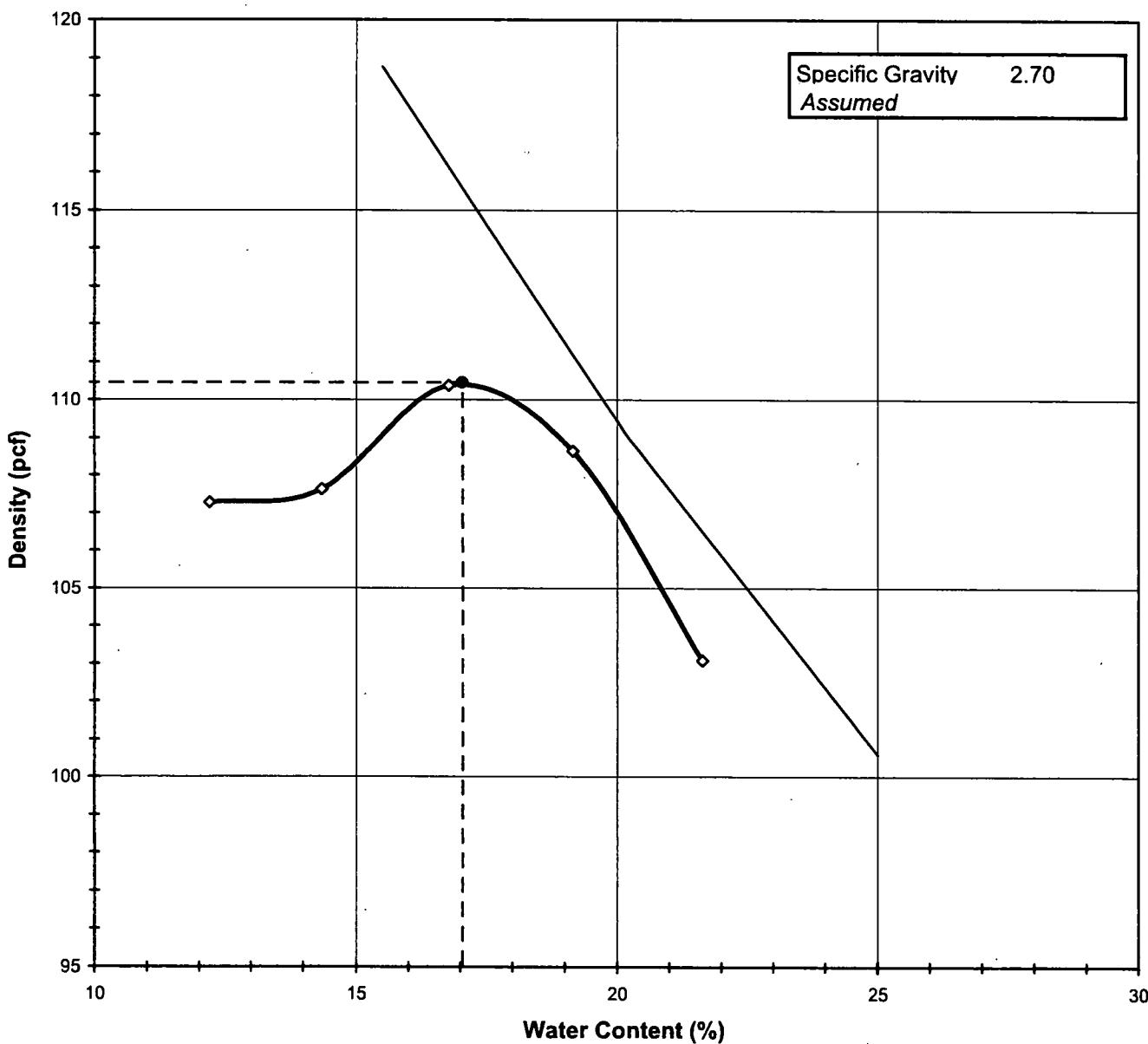
DCN: CT-S5 Date: 3/5/14 Revision: 20

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**MOISTURE DENSITY RELATIONSHIP**
*ASTM D698-12*

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-005  
 Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-13A  
 Test Method: STANDARD  
 Visual Description: Brown Clay

**Optimum Water Content** 17.1  
**Maximum Dry Density** 110.5



Tested By BS Date 10/12/15 Checked By KC Date 10/13/15  
 page 1 of 2 DCN:CT-S12 DATE:5/1/13 REVISION: 14

## MOISTURE - DENSITY RELATIONSHIP

ASTM D698-12

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	0-4
Project No.:	2015-506-001	Sample No.:	TP-13A
Lab ID:	2015-506-001-005		
Visual Description: Brown Clay			

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.70
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	B

Test Type:	STANDARD
Rammer Weight (lb):	5.5
Rammer Drop (in):	12
Rammer Type:	MECHANICAL
Machine ID:	G 774
Mold ID:	G 1499
Mold diameter:	4"
Weight of the Mold (g):	4387
Volume of the Mold (cm <sup>3</sup> ):	940

### Mold / Specimen

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	6200	6241	6329	6337	6276
Weight of Mold (g):	4387	4387	4387	4387	4387
Weight of Wet Sample (g):	1813	1854	1942	1950	1889
Mold Volume (cm <sup>3</sup> ):	940	940	940	940	940

### Moisture Content / Density

Tare Number:	785	903	909	878	582
Weight of Tare & Wet Sample (g):	525.00	543.90	544.20	478.40	514.00
Weight of Tare & Dry Sample (g):	477.20	489.40	481.70	419.20	437.50
Weight of Tare (g):	85.36	109.64	109.34	110.28	83.98
Weight of Water (g):	47.80	54.50	62.50	59.20	76.50
Weight of Dry Sample (g):	391.84	379.76	372.36	308.92	353.52

Wet Density (g/cm <sup>3</sup> ):	1.93	1.97	2.07	2.07	2.01
Wet Density (pcf):	120.4	123.1	128.9	129.4	125.4
Moisture Content (%):	12.2	14.4	16.8	19.2	21.6
Dry Density (pcf):	107.3	107.6	110.4	108.6	103.1

### Zero Air Voids

Moisture Content (%):	15.5	20.3	25.0
Dry Unit Weight (pcf):	118.8	108.9	100.6

Tested By	BS	Date	10/12/15	Checked By	KC	Date	10/13/15
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## ATTERBERG LIMITS

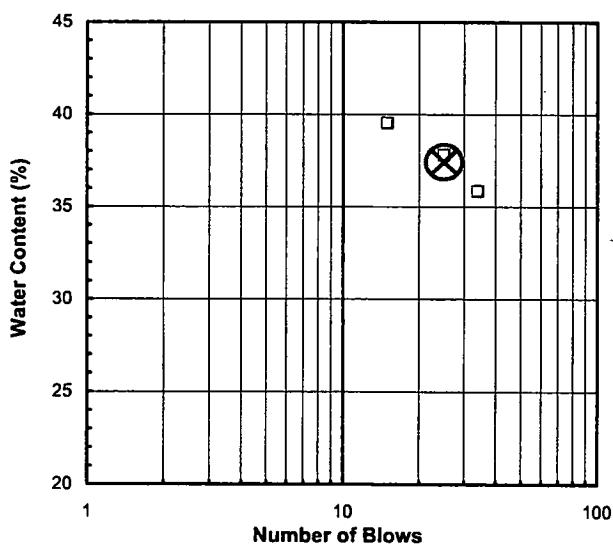
ASTM D 4318-10

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	0-4
Project No.:	2015-506-001	Sample No.:	TP-13A
Lab ID:	2015-506-001-005	Soil Description: BROWN LEAN CLAY	
<b>Note:</b> The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.			

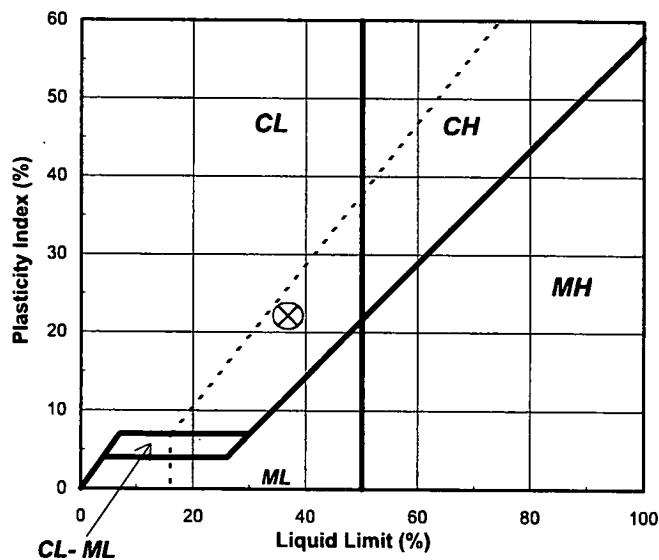
Liquid Limit Test	1	2	3	
Tare Number:	240	161	202	M
Wt. of Tare & Wet Sample (g):	38.15	37.93	37.42	U
Wt. of Tare & Dry Sample (g):	32.42	32.42	32.11	L
Weight of Tare (g):	17.92	17.84	17.29	T
Weight of Water (g):	5.7	5.5	5.3	I
Weight of Dry Sample (g):	14.5	14.6	14.8	P
Moisture Content (%):	39.5	37.8	35.8	O
Number of Blows:	15	25	34	I
				N
				T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	357	189		Liquid Limit (%): 37
Wt. of Tare & Wet Sample (g):	26.80	26.11		Plastic Limit (%): 15
Wt. of Tare & Dry Sample (g):	25.98	25.24		Plasticity Index (%): 22
Weight of Tare (g):	20.46	19.67		USCS Symbol: CL
Weight of Water (g):	0.8	0.9		
Weight of Dry Sample (g):	5.5	5.6		
Moisture Content (%):	14.9	15.6	-0.8	
<i>Note: The acceptable range of the two Moisture contents is <math>\pm 2.6</math></i>				

**Flow Curve**



**Plasticity Chart**



Tested By	RAL	Date	10/8/15
Checked By		CLK	Date 10/9/15

page 1 of 1 DCN: CTS4B, REV. 4, 3/18/13

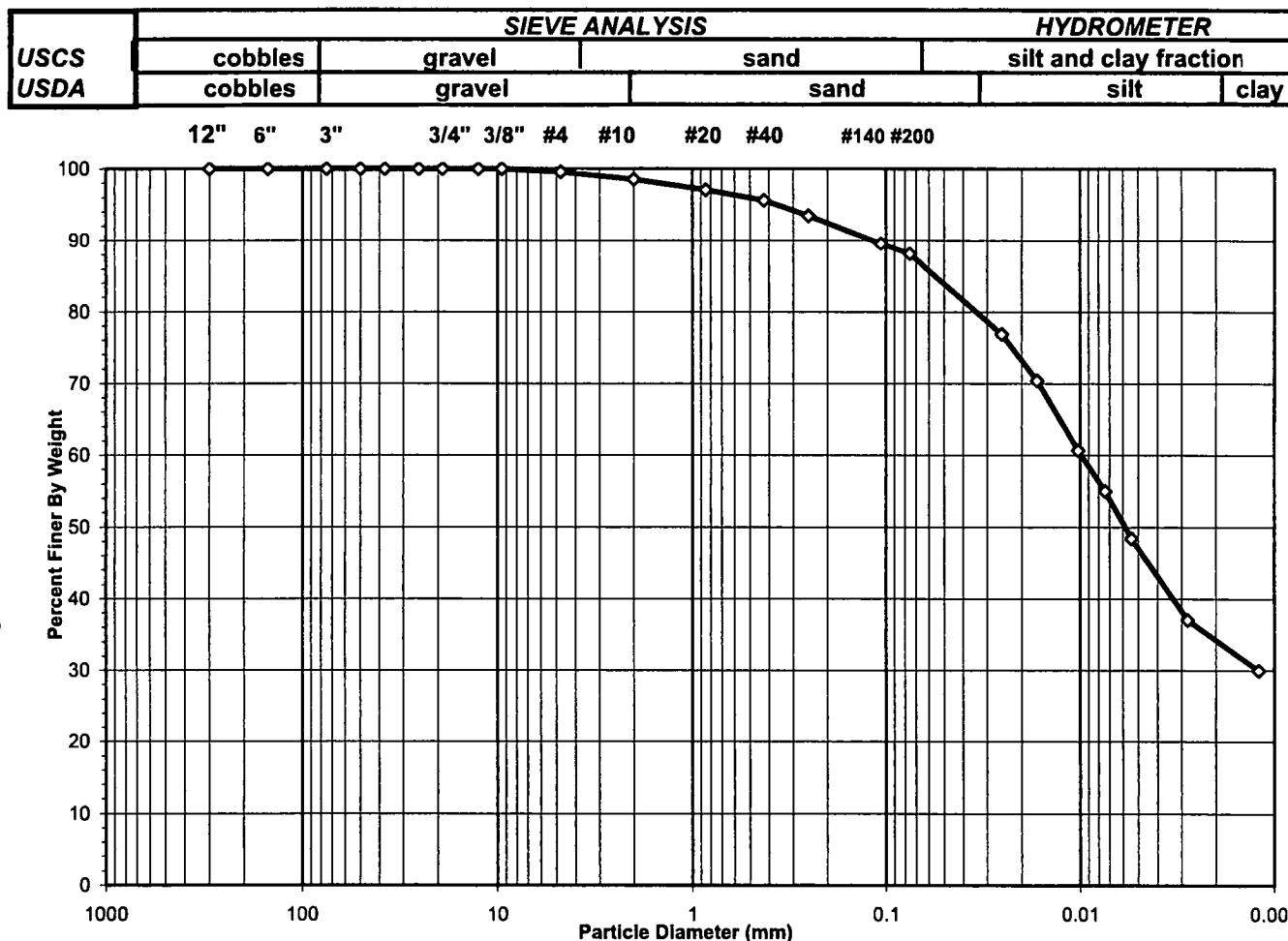
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**SIEVE AND HYDROMETER ANALYSIS**

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-005

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-13A  
 Soil Color: Brown

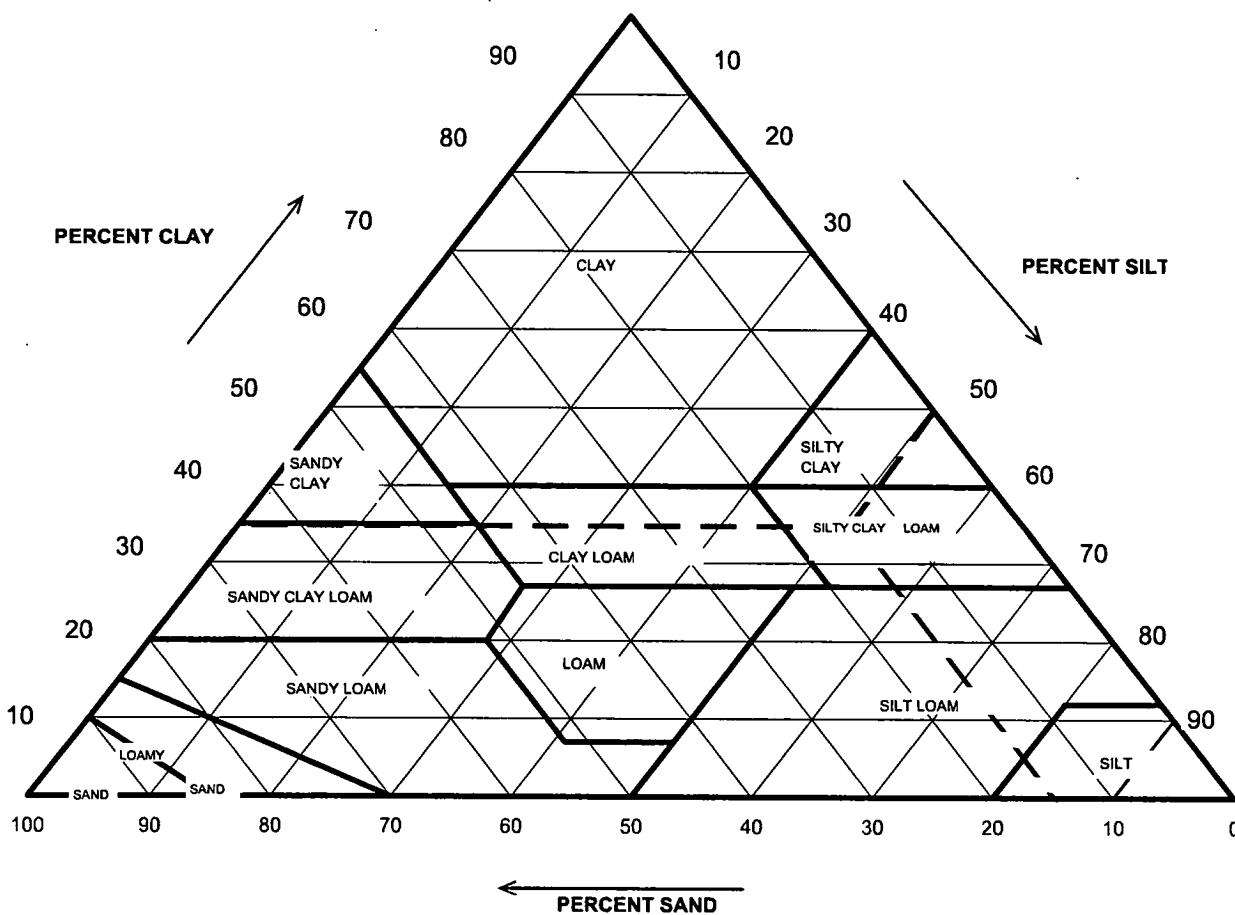


USCS Summary		
Sieve Sizes (mm)	Percentage	
Greater Than #4	Gravel	0.45
#4 To #200	Sand	11.40
Finer Than #200	Silt & Clay	88.15
<b>USCS Symbol:</b>		
<b>CL, TESTED</b>		
<b>USCS Classification:</b>		
<b>LEAN CLAY</b>		

## USDA CLASSIFICATION CHART

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-005

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-13A  
 Soil Color: Brown



Particle Size (mm)	Percent Finer (%)	USDA SUMMARY	Actual Percentage (%)	Corrected % of Minus 2.0 mm material for USDA Classificat.
		<i>Gravel</i>	(%)	(%)
2	98.52	<i>Sand</i>	1.48	0.00
0.05	83.97	<i>Silt</i>	14.55	14.76
0.002	34.26	<i>Clay</i>	49.71	50.46
			34.26	34.78
<b>USDA Classification: SILTY CLAY LOAM</b>				

## WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-005

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-13A  
 Soil Color: Brown

Moisture Content of Passing 3/4" Material			Water Content of Retained 3/4" Material		
Tare No.	67		Tare No.		NA
Weight of Tare & Wet Sample (g)	972.90		Weight of Tare & Wet Sample (g)		NA
Weight of Tare & Dry Sample (g)	899.10		Weight of Tare & Dry Sample (g)		NA
Weight of Tare (g)	199.76		Weight of Tare (g)		NA
Weight of Water (g)	73.80		Weight of Water (g)		NA
Weight of Dry Sample (g)	699.34		Weight of Dry Sample (g)		NA
<b>Moisture Content (%)</b>	<b>10.6</b>		<b>Moisture Content (%)</b>		<b>NA</b>
Wet Weight of -3/4" Sample (g)	NA		Weight of the Dry Sample (g)		699.34
Dry Weight of -3/4" Sample (g)	82.90		Weight of - #200 Material (g)		616.44
Wet Weight of +3/4" Sample (g)	NA		Weight of + #200 Material (g)		82.90
Dry Weight of +3/4" Sample (g)	0.00				
Total Dry Weight of Sample (g)	NA				
Sieve Size	Sieve Opening	Weight of Soil Retained	Percent Retained	Accumulated Percent Retained	
(mm)	(mm)	(g)	(%)	(%)	Percent Finer
12"	300	0.00	0.00	0.00	100.00
6"	150	0.00	0.00	0.00	100.00
3"	75	0.00	0.00	0.00	100.00
2"	50	0.00	0.00	0.00	100.00
1 1/2"	37.5	0.00	0.00	0.00	100.00
1"	25.0	0.00	0.00	0.00	100.00
3/4"	19.0	0.00	0.00	0.00	100.00
1/2"	12.5	0.00	0.00	0.00	100.00
3/8"	9.50	0.00	0.00	0.00	100.00
#4	4.75	3.18	0.45	0.45	99.55
#10	2.00	7.20	1.03	1.48	98.52
#20	0.85	10.09	1.44	2.93	97.07
#40	0.425	10.31	1.47	4.40	95.60
#60	0.250	15.12	2.16	6.56	93.44
#140	0.106	26.87	3.84	10.41	89.59
#200	0.075	10.13	1.45	11.85	88.15
Pan	-	616.44	88.15	100.00	-

Tested By	PC	Date	9/28/15	Checked By	KC	Date	10/14/15
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## HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-005

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-13A  
 Soil Color: Brown

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	53.5	22.9	6.04	47.5	87.3	0.01299	0.0252	76.9
5	49.5	22.9	6.04	43.5	79.9	0.01299	0.0166	70.4
15	43.5	22.9	6.04	37.5	68.9	0.01299	0.0102	60.7
30	40.0	22.9	6.04	34.0	62.4	0.01299	0.0074	55.0
60	36.0	22.7	6.11	29.9	55.0	0.01302	0.0054	48.4
250	29.0	22.6	6.15	22.9	42.0	0.01303	0.0028	37.0
1440	24.5	23.1	5.97	18.5	34.1	0.01296	0.0012	30.0

Soil Specimen Data		Other Corrections		
Tare No.	704			
Weight of Tare & Dry Material (g)	151.88	a - Factor		0.99
Weight of Tare (g)	93.03			
Weight of Deflocculant (g)	5.0	Percent Finer than # 200		88.15
Weight of Dry Material (g)	53.9	Specific Gravity	2.7	Assumed

**Note:** Hydrometer test is performed on - # 200 sieve material.

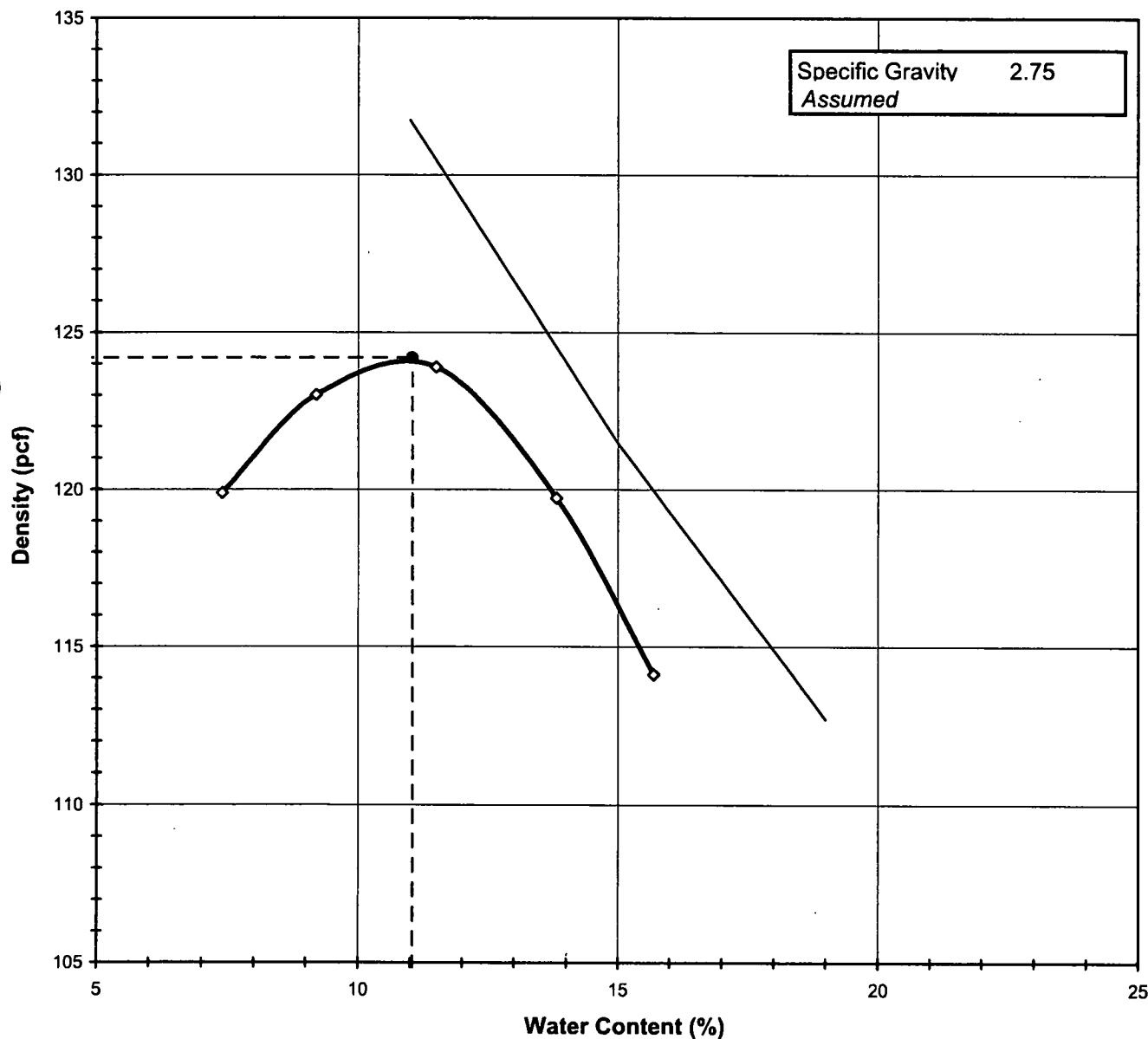
Tested By	TO	Date	10/1/15	Checked By	KC	Date	10/14/15
page 4 of 4			DCN: CT-S3A DATE: 3/18/13 REVISION: 11			S:\Excel\Excel QA\Spreadsheets\SieveHyd.xls	

## MOISTURE DENSITY RELATIONSHIP

ASTM D1557-12

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	4-8
Project No.:	2015-506-001	Sample No.:	TP-13B
Lab ID:	2015-506-001-006	Test Method	<b>MODIFIED</b>
Visual Description: Brown Clay with Rock Fragments			

**Optimum Water Content**      **11.1**  
**Maximum Dry Density**      **124.2**



<i>Tested By</i>	MLF	<i>Date</i>	10/15/15	<i>Checked By</i>	JCM	<i>Date</i>	10/27/15
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**MOISTURE - DENSITY RELATIONSHIP**

ASTM D1557-12

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-006

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-13B

Visual Description: Brown Clay with Rock Fragments

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.75
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	C

Test Type:	MODIFIED
Rammer Weight (lb):	10.0
Rammer Drop (in):	18
Rammer Type:	MECHANICAL
Machine ID:	G 441
Mold ID:	G 1607
Mold diameter:	6"
Weight of the Mold (g):	5870
Volume of the Mold (cm <sup>3</sup> ):	2122

**Mold / Specimen**

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	10248	10438	10568	10504	10360
Weight of Mold (g):	5870	5870	5870	5870	5870
Weight of Wet Sample (g):	4378	4568	4698	4634	4490
Mold Volume (cm <sup>3</sup> ):	2122	2122	2122	2122	2122

**Moisture Content / Density**

Tare Number:	1723	828	606	577	630
Weight of Tare & Wet Sample (g):	525.10	418.19	429.71	519.40	552.60
Weight of Tare & Dry Sample (g):	494.70	392.17	394.18	466.60	488.80
Weight of Tare (g):	83.12	109.12	85.36	84.40	82.20
Weight of Water (g):	30.40	26.02	35.53	52.80	63.80
Weight of Dry Sample (g):	411.58	283.05	308.82	382.20	406.60

Wet Density (g/cm <sup>3</sup> ):	2.06	2.15	2.21	2.18	2.12
Wet Density (pcf):	128.7	134.3	138.2	136.3	132.0
Moisture Content (%):	7.4	9.2	11.5	13.8	15.7
Dry Density (pcf):	119.9	123.0	123.9	119.7	114.1

**Zero Air Voids**

Moisture Content (%):	11.0	15.0	19.0
Dry Unit Weight (pcf):	131.7	121.5	112.7

Tested By	MLF	Date	10/15/15	Checked By	JCM	Date	10/27/15
page 2 of 2		DCN:CT-S12 DATE:5/1/13 REVISION: 14				S:Excel\Excel Qa\Spreadsheets\Proctor.xls	



## SPECIFIC GRAVITY

ASTM D 854-14

Client: CEC    Boring No.: 9/17/15  
Client Reference: Central Waste Closure 153-121                                  Depth (ft): 4-8  
Project No.: 2015-506-001                                  Sample No.: TP-13B  
Lab ID: 2015-506-001-006                                  Visual Description: Brown Clay

(Minus No.4 sieve material, oven dried)

Replicate Number	1	2
Pycnometer ID:	G 1255	G 1504
Weight of Pycnometer & Soil & Water (g):	749.48	735.5
Temperature (°C):	26.3	26.5
Weight of Pycnometer & Water (g):	684.92	672.05
Tare Number:	968	2324
Weight of Tare & Dry Soil (g):	202.35	198.08
Weight of Tare (g):	100.66	97.42
Weight of Dry Soil (g):	101.69	100.66
Specific Gravity of Soil @ Measured Temperature:	2.739	2.705
Specific Gravity of Water @ Measured Temperature:	0.99671	0.99666
Conversion Factor for Measured Temperature:	0.99850	0.99845
Specific Gravity @ 20° Celsius:	2.743	2.709

Average Specific Gravity @ 20° Celsius	2.73
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Tested By    AMC      Date    11/11/15      Checked By    CLK      Date    11/12/15

DCN: CT-S5 Date: 3/5/14 Revision: 20

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## ATTERBERG LIMITS

ASTM D 4318-10

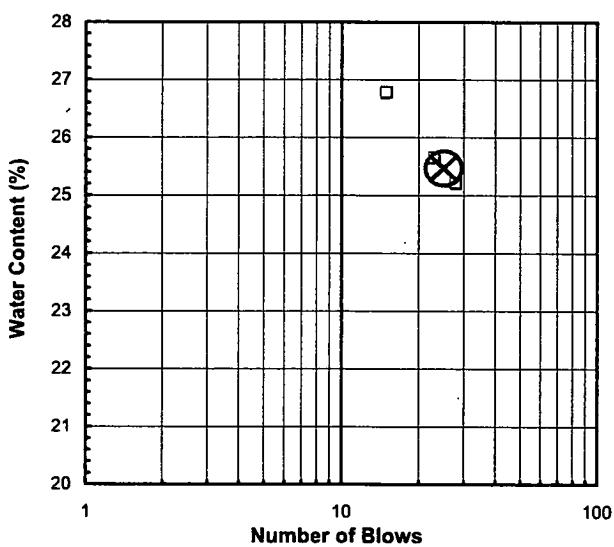
Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-006  
 Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-13B  
 Soil Description: BROWN LEAN CLAY

**Note:** The USCS symbol used with this test refers only to the minus No. 40 (Minus No. 40 sieve material, Airdried) sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

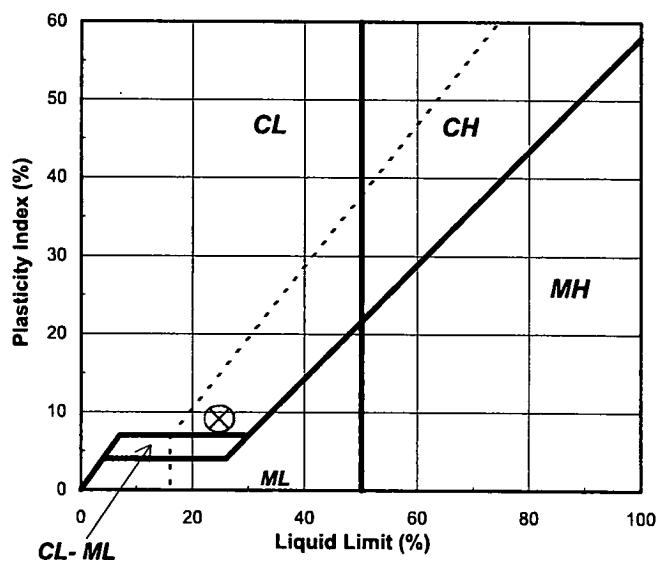
Liquid Limit Test	1	2	3	
Tare Number:	1271	2289	396	M
Wt. of Tare & Wet Sample (g):	47.70	45.02	42.50	U
Wt. of Tare & Dry Sample (g):	42.48	40.00	37.26	L
Weight of Tare (g):	21.77	20.42	17.69	T
Weight of Water (g):	5.2	5.0	5.2	I
Weight of Dry Sample (g):	20.7	19.6	19.6	P
Moisture Content (%):	25.2	25.6	26.8	O
Number of Blows:	28	23	15	I
				N
				T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	142	457		Liquid Limit (%): 25
Wt. of Tare & Wet Sample (g):	24.92	18.68		Plastic Limit (%): 16
Wt. of Tare & Dry Sample (g):	24.07	17.87		Plasticity Index (%): 9
Weight of Tare (g):	18.68	12.61		USCS Symbol: CL
Weight of Water (g):	0.9	0.8		
Weight of Dry Sample (g):	5.4	5.3		
Moisture Content (%):	15.8	15.4	0.4	
<i>Note: The acceptable range of the two Moisture contents is <math>\pm 2.6</math></i>				

Flow Curve



Plasticity Chart



Tested By TO Date 10/8/15 Checked By CLK Date 10/9/15

page 1 of 1 DCN: CTS4B, REV. 4, 3/18/13

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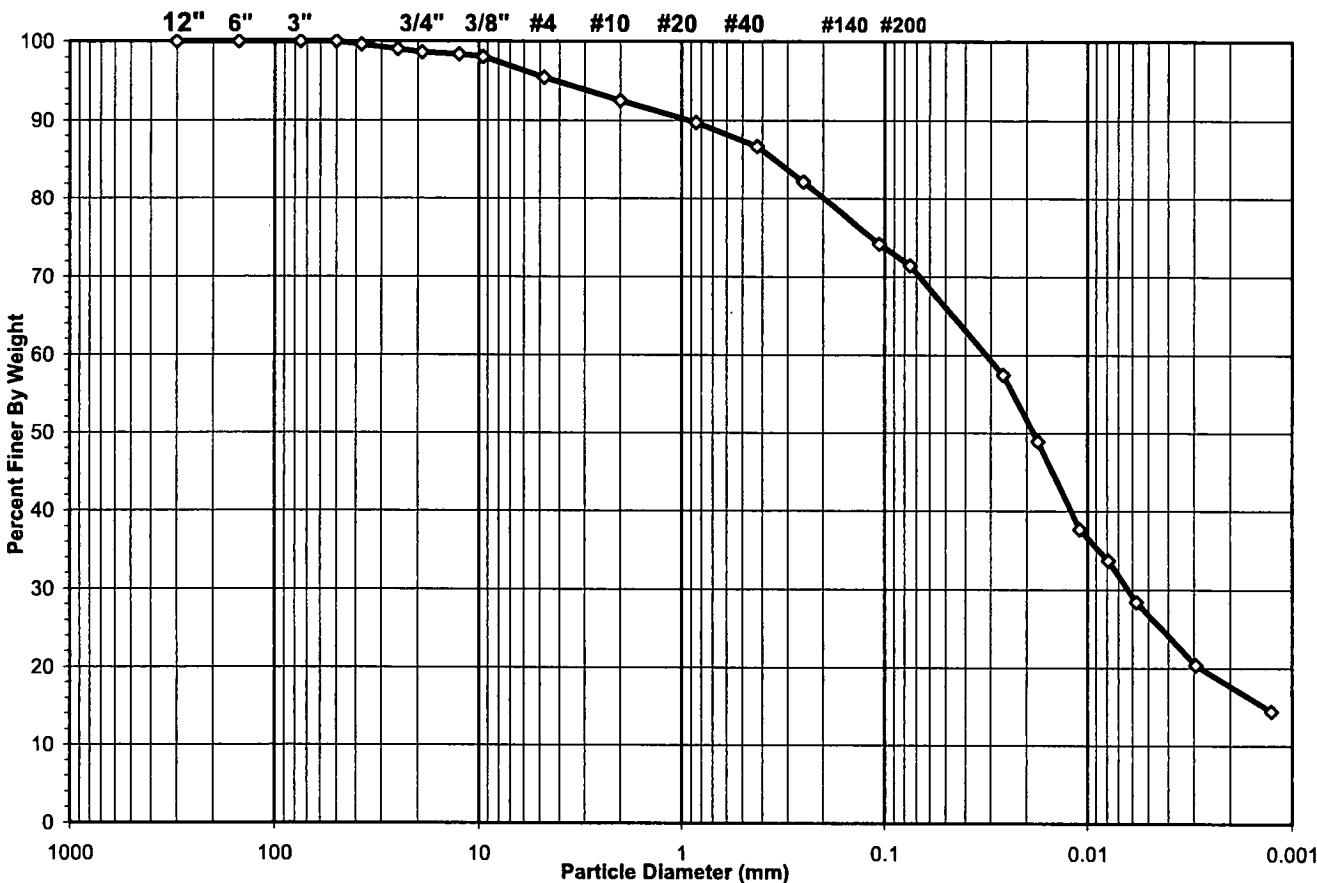
**SIEVE AND HYDROMETER ANALYSIS**  
ASTM D 422-63 (2007)



Client: CEC  
Client Reference: Central Waste Closure 153-121  
Project No.: 2015-506-001  
Lab ID: 2015-506-001-006

Boring No.: 9/17/15  
Depth (ft): 4-8  
Sample No.: TP-13B  
Soil Color: Brown

USCS USDA	SIEVE ANALYSIS					HYDROMETER					
	cobbles	gravel	sand			silt and clay fraction					
	cobbles	gravel	sand			silt	clay				
	12"	6"	3"	3/4"	3/8"	#4	#10	#20	#40	#140	#200

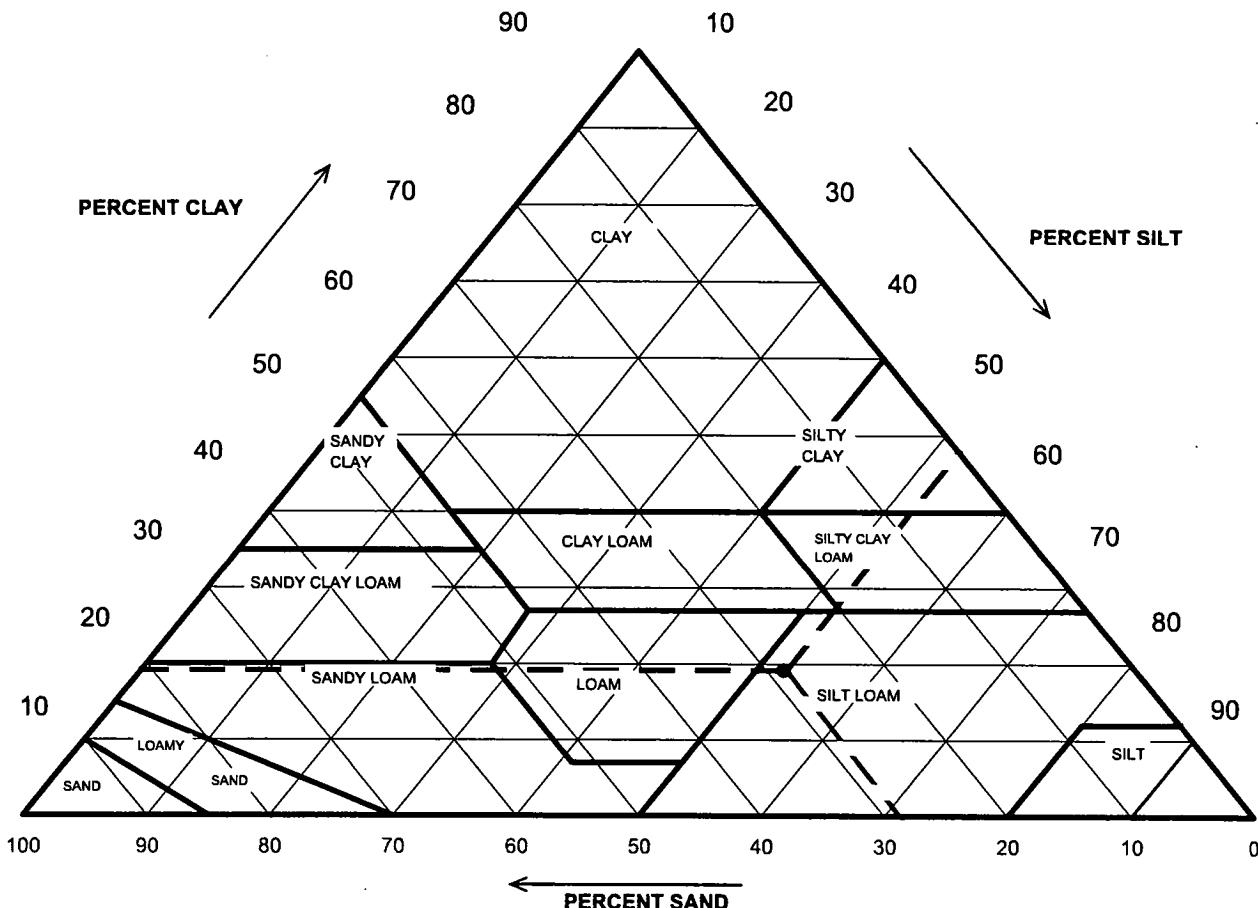


USCS Summary		
Sieve Sizes (mm)	Percentage	
Greater Than #4	Gravel	4.58
#4 To #200	Sand	23.95
Finer Than #200	Silt & Clay	71.47
<b>USCS Symbol:</b> <b>CL, TESTED</b>		
<b>USCS Classification:</b> <b>LEAN CLAY WITH SAND</b>		

## USDA CLASSIFICATION CHART

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-006

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-13B  
 Soil Color: Brown



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
2	92.52	Gravel	7.48	0.00
0.05	66.10	Sand	26.42	28.56
0.002	17.68	Silt	48.42	52.33
		Clay	17.68	19.11
<b>USDA Classification: SILT LOAM</b>				

# WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)



Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-006

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-13B  
 Soil Color: Brown

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.:	20	Tare No.:	874
Wt. of Tare & Wet Sample (g):	1281.40	Weight of Tare & Wet Sample (g):	444.60
Wt. of Tare & Dry Sample (g):	1195.90	Weight of Tare & Dry Sample (g):	433.80
Weight of Tare (g):	204.44	Weight of Tare (g):	110.35
Weight of Water (g):	85.50	Weight of Water (g):	10.80
Weight of Dry Soil (g):	991.46	Weight of Dry Soil (g):	323.45
<b>Moisture Content (%):</b>	<b>8.6</b>	<b>Moisture Content (%):</b>	<b>3.3</b>
Wet Weight of -3/4" Sample (g):	24660	Weight of the Dry Sample (g):	991.46
Dry Weight of - 3/4" Sample (g):	22702.2	Weight of Minus #200 Material (g):	718.74
Wet Weight of +3/4" Sample (g):	334.29	Weight of Plus #200 Material (g):	272.72
Dry Weight of + 3/4" Sample (g):	323.49		
Total Dry Weight of Sample (g):	23025.7	<b>J - Factor (Percent Finer than 3/4"):</b>	<b>0.9860</b>

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Finer (%)
12"	300	0.00	0.00	0.00	100.00	100.00
6"	150	0.00	0.00	0.00	100.00	100.00
3"	75	0.00	0.00	0.00	100.00	100.00
2"	50	0.00	( *)	0.00	100.00	100.00
1 1/2"	37.5	99.34	0.42	0.42	99.58	99.58
1"	25.0	131.92	0.55	0.97	99.03	99.03
3/4"	19.0	103.03	0.43	1.40	98.60	98.60
1/2"	12.5	2.46	0.25	0.25	99.75	98.35
3/8"	9.50	2.72	0.27	0.52	99.48	98.08
#4	4.75	26.74	2.70	3.22	96.78	95.42
#10	2.00	29.18	2.94	6.16	93.84	92.52
#20	0.85	28.17	( **)	2.84	91.00	89.72
#40	0.425	30.43		3.07	87.93	86.69
#60	0.250	44.46		4.48	83.44	82.27
#140	0.106	80.44		8.11	75.33	74.27
#200	0.075	28.12		2.84	72.49	71.47
Pan	-	718.74	72.49	100.00	-	-

**Notes :** (\*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample

(\*\*) The - 3/4" sieve analysis is based on the Weight of the Dry Sample

Tested By	PC	Date	9/28/15	Checked By	KC	Date	10/14/15
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**HYDROMETER ANALYSIS**

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-006

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-13B  
 Soil Color: Brown

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	49.5	23.4	5.86	43.6	80.4	0.01291	0.0261	57.5
5	43.0	23.4	5.86	37.1	68.4	0.01291	0.0176	48.9
15	34.5	23.4	5.86	28.6	52.8	0.01291	0.0109	37.7
30	31.5	23.4	5.86	25.6	47.3	0.01291	0.0079	33.8
60	27.5	23.3	5.89	21.6	39.8	0.01293	0.0057	28.5
250	21.5	22.9	6.04	15.5	28.5	0.01299	0.0029	20.4
1440	17.0	22.9	6.04	11.0	20.2	0.01299	0.0013	14.4

Soil Specimen Data		Other Corrections	
Tare No.:	692		
Wt. of Tare & Dry Material (g):	155.14	a - Factor:	0.99
Weight of Tare (g):	96.42	Percent Finer than # 200:	71.47
Weight of Deflocculant (g):	5.0	Specific Gravity:	2.7 Assumed
Weight of Dry Material (g):	53.72		

**Note:** Hydrometer test is performed on - # 200 sieve material.

Tested By	TO	Date	9/30/15	Checked By	KC	Date	10/14/15
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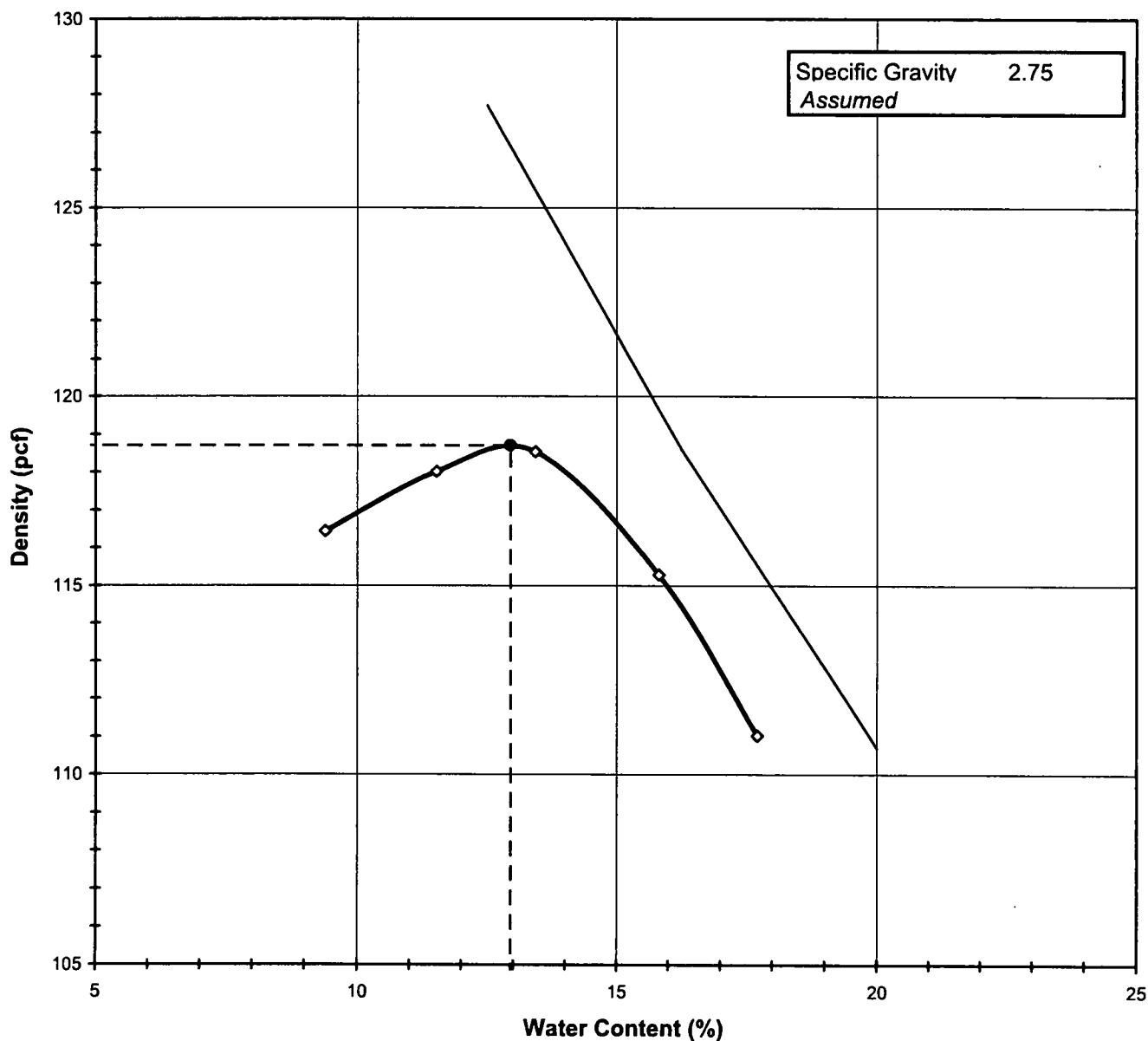
**MOISTURE DENSITY RELATIONSHIP**

ASTM D1557-12

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-007  
  
 Visual Description: Brown Silty Clay

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-14A  
 Test Method: MODIFIED

**Optimum Water Content**      13.0  
**Maximum Dry Density**      118.7



Tested By

SGB

Date

10/13/15

Checked By

KC

Date

10/14/15

**MOISTURE - DENSITY RELATIONSHIP**

ASTM D1557-12

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-007

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-14A

Visual Description: Brown Silty Clay

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.75
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	B

Test Type:	<b>MODIFIED</b>
Rammer Weight (lb):	10.0
Rammer Drop (in):	18
Rammer Type:	<b>MECHANICAL</b>
Machine ID:	G 441
Mold ID:	G 606
Mold diameter:	4"
Weight of the Mold (g):	4139
Volume of the Mold (cm <sup>3</sup> ):	943

**Mold / Specimen**

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	6064	6128	6171	6157	6114
Weight of Mold (g):	4139	4139	4139	4139	4139
Weight of Wet Sample (g):	1925	1989	2032	2018	1975
Mold Volume (cm <sup>3</sup> ):	943	943	943	943	943

**Moisture Content / Density**

Tare Number:	905	611	1459	594	907
Weight of Tare & Wet Sample (g):	495.60	447.40	459.70	449.70	434.70
Weight of Tare & Dry Sample (g):	462.50	409.70	414.60	399.30	385.90
Weight of Tare (g):	109.98	82.61	78.80	80.78	110.40
Weight of Water (g):	33.10	37.70	45.10	50.40	48.80
Weight of Dry Sample (g):	352.52	327.09	335.80	318.52	275.50

Wet Density (g/cm <sup>3</sup> ):	2.04	2.11	2.15	2.14	2.09
Wet Density (pcf):	127.4	131.6	134.5	133.5	130.7
Moisture Content (%):	9.4	11.5	13.4	15.8	17.7
Dry Density (pcf):	116.4	118.0	118.5	115.3	111.0

**Zero Air Voids**

Moisture Content (%):	12.5	16.3	20.0
Dry Unit Weight (pcf):	127.7	118.6	110.7

Tested By	SGB	Date	10/13/15	Checked By	KC	Date	10/14/15
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page 2 of 2

DCN:CT-S12 DATE:5/1/13 REVISION: 14

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## SPECIFIC GRAVITY

ASTM D 854-14

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	0-4
Project No.:	2015-506-001	Sample No.:	TP-14A
Lab ID:	2015-506-001-007	Visual Description: Brown Silty Clay	

(Minus No.4 sieve material, oven dried)

Replicate Number	1	2
Pycnometer ID:	G 1255	G 1504
Weight of Pycnometer & Soil & Water (g):	746.79	734.63
Temperature (°C):	26.3	25.9
Weight of Pycnometer & Water (g):	684.92	672.13
Tare Number:	2471	694
Weight of Tare & Dry Soil (g):	196.97	194.05
Weight of Tare (g):	98.36	94.19
Weight of Dry Soil (g):	98.61	99.86
Specific Gravity of Soil @ Measured Temperature:	2.684	2.673
Specific Gravity of Water @ Measured Temperature:	0.99671	0.99682
Conversion Factor for Measured Temperature:	0.99850	0.99861
Specific Gravity @ 20° Celsius:	2.688	2.677

Average Specific Gravity @ 20° Celsius	2.68
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Tested By	TO	Date	10/1/15	Checked By	CLK	Date	10/2/15
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DCN: CT-S5 Date: 3/5/14 Revision: 20

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## ATTERBERG LIMITS

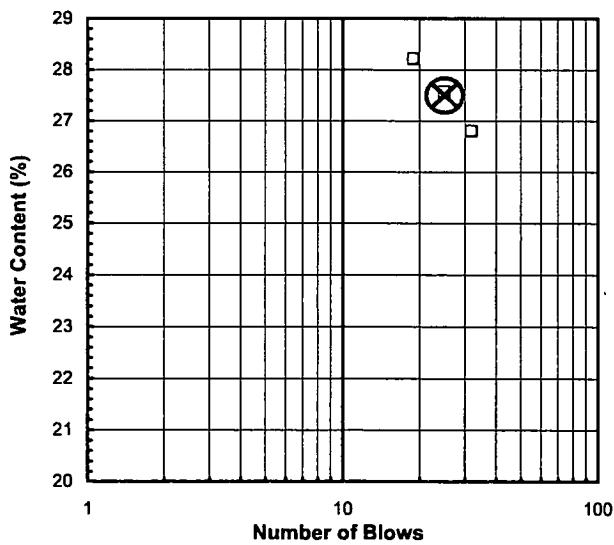
ASTM D 4318-10

Client: CEC      Boring No.: 9/17/15  
 Client Reference: Central Waste Closure 153-121      Depth (ft): 0-4  
 Project No.: 2015-506-001      Sample No.: TP-14A  
 Lab ID: 2015-506-001-007      Soil Description: BROWN LEAN CLAY  
*Note: The USCS symbol used with this test refers only to the minus No. 40 (Minus No. 40 sieve material, Airdried) sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.*

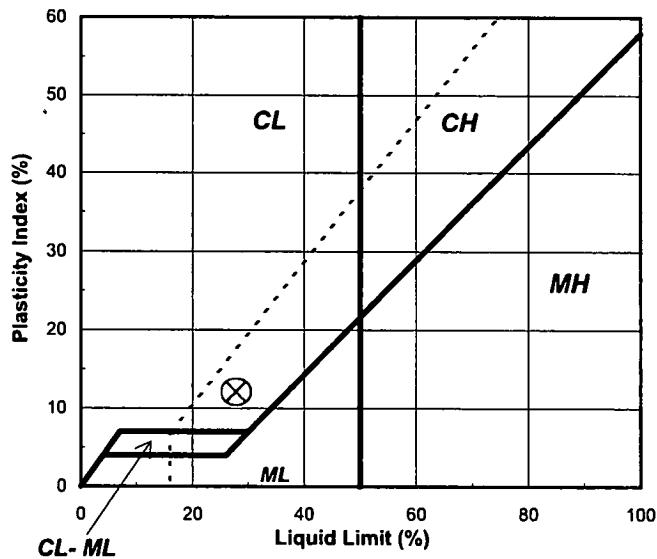
Liquid Limit Test	1	2	3	
Tare Number:	201	204	209	M
Wt. of Tare & Wet Sample (g):	39.64	40.39	39.75	U
Wt. of Tare & Dry Sample (g):	34.91	35.66	35.25	L
Weight of Tare (g):	17.26	18.50	19.30	T
Weight of Water (g):	4.7	4.7	4.5	I
Weight of Dry Sample (g):	17.7	17.2	16.0	P
Moisture Content (%):	26.8	27.6	28.2	O
Number of Blows:	32	25	19	I
				N
				T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	2	3		Liquid Limit (%): 28
Wt. of Tare & Wet Sample (g):	25.55	24.88		Plastic Limit (%): 16
Wt. of Tare & Dry Sample (g):	24.73	24.07		Plasticity Index (%): 12
Weight of Tare (g):	19.46	18.88		USCS Symbol: CL
Weight of Water (g):	0.8	0.8		
Weight of Dry Sample (g):	5.3	5.2		
Moisture Content (%):	15.6	15.6	0.0	
<i>Note: The acceptable range of the two Moisture contents is ± 2.6</i>				

Flow Curve



Plasticity Chart



Tested By JP Date 10/8/15 Checked By CLK Date 10/9/15

page 1 of 1 DCN: CTS4B, REV. 4, 3/18/13

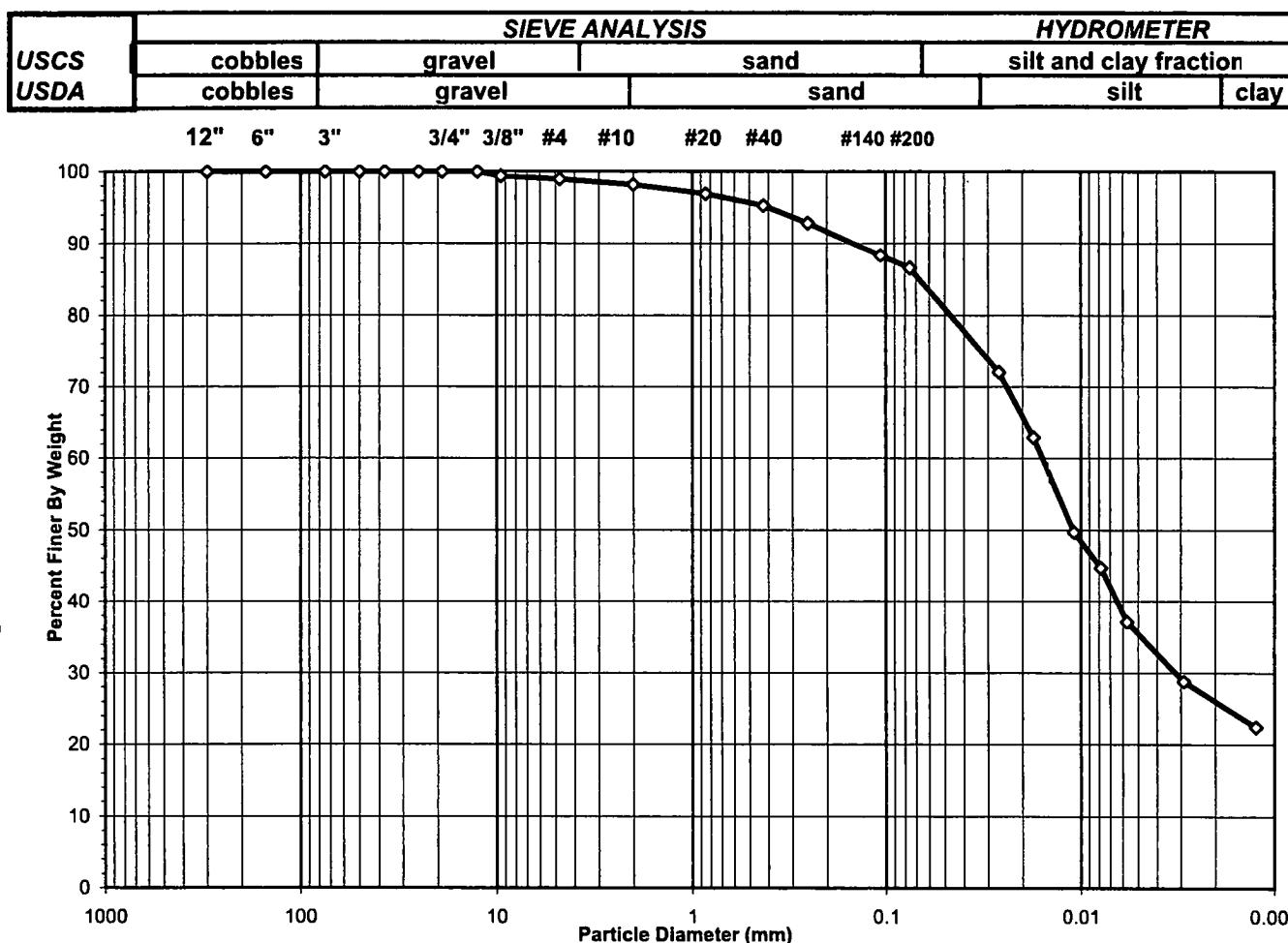
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**SIEVE AND HYDROMETER ANALYSIS**

- ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-007

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-14A  
 Soil Color: Brown

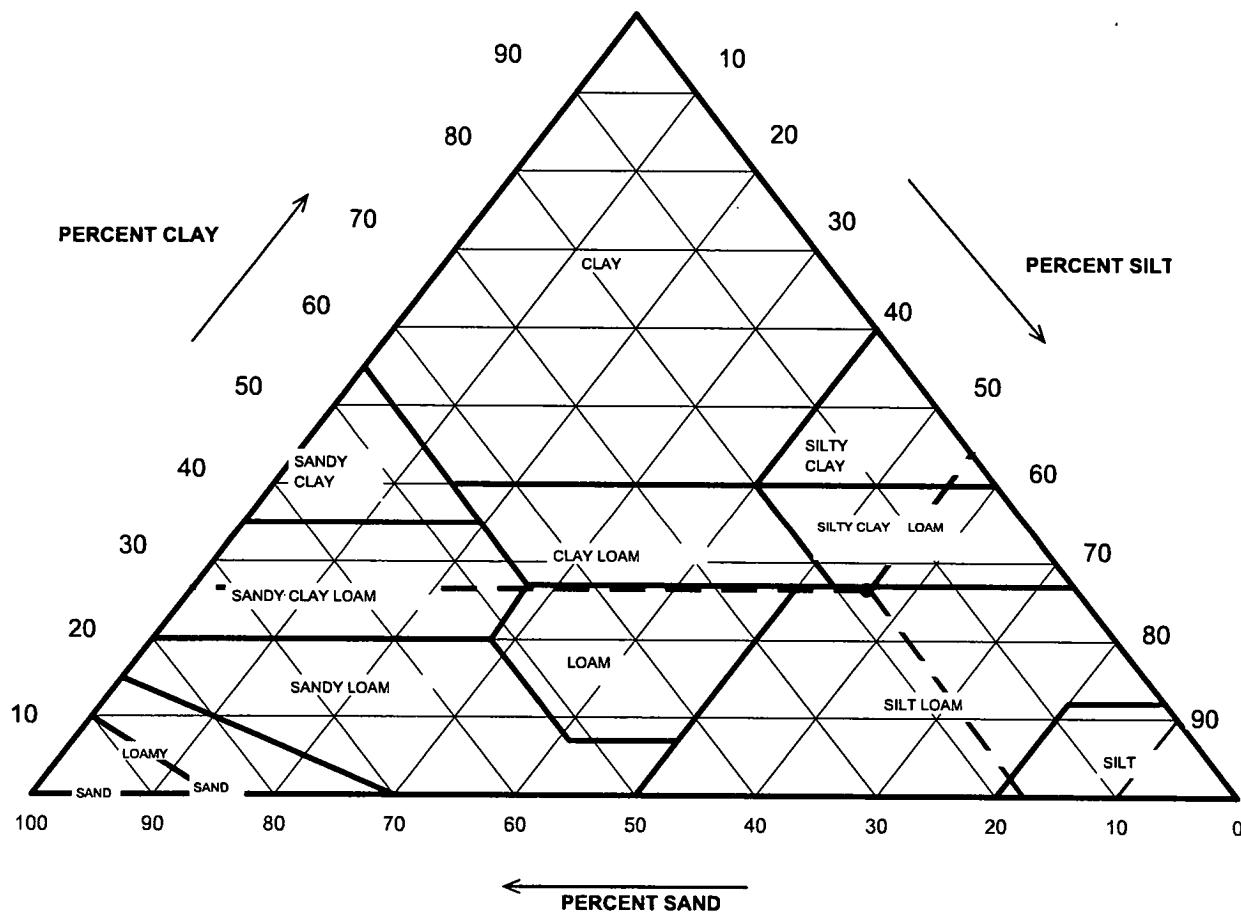


USCS Summary		
Sieve Sizes (mm)	Percentage	
Greater Than #4	Gravel	1.07
#4 To #200	Sand	12.33
Finer Than #200	Silt & Clay	86.59
<b>USCS Symbol:</b>		
<b>CL, TESTED</b>		
<b>USCS Classification:</b>		
<b>LEAN CLAY</b>		

### USDA CLASSIFICATION CHART

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-007

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-14A  
 Soil Color: Brown



Particle Size (mm)	Percent Finer (%)	USDA SUMMARY	Actual Percentage (%)	Corrected % of Minus 2.0 mm material for USDA Classificat.
2	98.17	Gravel	1.83	0.00
0.05	80.97	Sand	17.20	17.52
0.002	26.00	Silt	54.97	56.00
		Clay	26.00	26.48
<b>USDA Classification: SILT LOAM</b>				

## WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-007

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-14A  
 Soil Color: Brown

Moisture Content of Passing 3/4" Material			Water Content of Retained 3/4" Material				
Tare No.	64		Tare No.				NA
Weight of Tare & Wet Sample (g)	1112.50		Weight of Tare & Wet Sample (g)				NA
Weight of Tare & Dry Sample (g)	1003.80		Weight of Tare & Dry Sample (g)				NA
Weight of Tare (g)	200.69		Weight of Tare (g)				NA
Weight of Water (g)	108.70		Weight of Water (g)				NA
Weight of Dry Sample (g)	803.11		Weight of Dry Sample (g)				NA
<b>Moisture Content (%)</b>	<b>13.5</b>		<b>Moisture Content (%)</b>				<b>NA</b>
Wet Weight of -3/4" Sample (g)	NA		Weight of the Dry Sample (g)				803.11
Dry Weight of -3/4" Sample (g)	107.66		Weight of - #200 Material (g)				695.45
Wet Weight of +3/4" Sample (g)	NA		Weight of + #200 Material (g)				107.66
Dry Weight of +3/4" Sample (g)	0.00						
Total Dry Weight of Sample (g)	NA						
Sieve Size	Sieve Opening	Weight of Soil Retained	Percent Retained	Accumulated Percent Retained		Percent Finer	Accumulated Percent Finer
	(mm)	(g)	(%)	(%)		(%)	(%)
12"	300	0.00	0.00	0.00		100.00	100.00
6"	150	0.00	0.00	0.00		100.00	100.00
3"	75	0.00	0.00	0.00		100.00	100.00
2"	50	0.00	0.00	0.00		100.00	100.00
1 1/2"	37.5	0.00	0.00	0.00		100.00	100.00
1"	25.0	0.00	0.00	0.00		100.00	100.00
3/4"	19.0	0.00	0.00	0.00		100.00	100.00
1/2"	12.5	0.00	0.00	0.00		100.00	100.00
3/8"	9.50	4.60	0.57	0.57		99.43	99.43
#4	4.75	4.01	0.50	1.07		98.93	98.93
#10	2.00	6.10	0.76	1.83		98.17	98.17
#20	0.85	9.87	1.23	3.06		96.94	96.94
#40	0.425	13.60	1.69	4.75		95.25	95.25
#60	0.250	19.08	2.38	7.13		92.87	92.87
#140	0.106	36.36	4.53	11.66		88.34	88.34
#200	0.075	14.04	1.75	13.41		86.59	86.59
Pan	-	695.45	86.59	100.00		-	-

Tested By

PC

Date

9/28/15

Checked By

KC

Date

10/14/15

## HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-007

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-14A  
 Soil Color: Brown

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N'
0	NA	NA	NA	NA	NA	NA	NA	NA
2	49.5	22.9	6.04	43.5	83.2	0.01299	0.0263	72.0
5	44.0	22.9	6.04	38.0	72.7	0.01299	0.0175	62.9
15	36.0	22.9	6.04	30.0	57.4	0.01299	0.0108	49.7
30	33.0	22.9	6.04	27.0	51.6	0.01299	0.0078	44.7
60	28.5	22.7	6.11	22.4	42.9	0.01302	0.0057	37.1
250	23.5	22.6	6.15	17.4	33.2	0.01303	0.0029	28.8
1440	19.5	23.1	5.97	13.5	25.9	0.01296	0.0012	22.4

Soil Specimen Data		Other Corrections		
Tare No.	528			
Weight of Tare & Dry Material (g)	149.12	a - Factor		0.99
Weight of Tare (g)	92.40			
Weight of Deflocculant (g)	5.0	Percent Finer than # 200		86.59
Weight of Dry Material (g)	51.7	Specific Gravity	2.7	Assumed

**Note:** Hydrometer test is performed on - # 200 sieve material.

Tested By	TO	Date	10/1/15	Checked By	KC	Date	10/14/15
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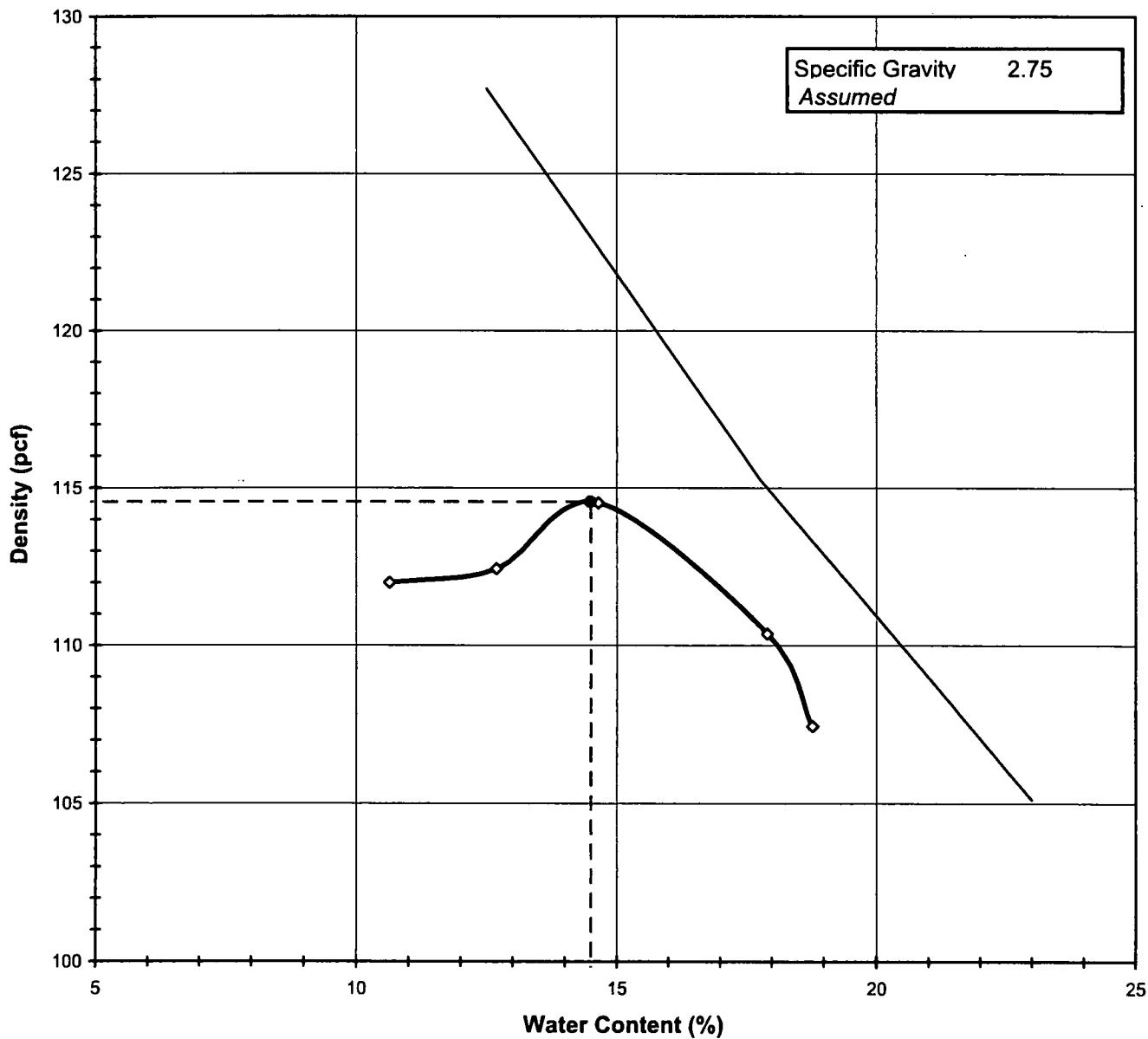
**MOISTURE DENSITY RELATIONSHIP**

ASTM D698-12

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-008  
  
 Visual Description: Brown Clay with Rock Fragments

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-14B  
 Test Method: STANDARD

**Optimum Water Content**      14.5  
**Maximum Dry Density**      114.6




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Tested By HL Date 10/13/15 Checked By KC Date 10/14/15

**MOISTURE - DENSITY RELATIONSHIP**

ASTM D698-12

Client: CEC Boring No.: 9/17/15  
 Client Reference: Central Waste Closure 153-121 Depth (ft): 4-8  
 Project No.: 2015-506-001 Sample No.: TP-14B  
 Lab ID: 2015-506-001-008

Visual Description: Brown Clay with Rock Fragments

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.75
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	C

Test Type:	<b>STANDARD</b>
Rammer Weight (lb):	5.5
Rammer Drop (in):	12
Rammer Type:	MECHANICAL
Machine ID:	G 774
Mold ID:	G 1389
Mold diameter:	6"
Weight of the Mold (g):	6363
Volume of the Mold (cm <sup>3</sup> ):	2125

**Mold / Specimen**

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	10583	10678	10834	10795	10709
Weight of Mold (g):	6363	6363	6363	6363	6363
Weight of Wet Sample (g):	4220	4315	4471	4432	4346
Mold Volume (cm <sup>3</sup> ):	2125	2125	2125	2125	2125

**Moisture Content / Density**

Tare Number:	550	1701	1731	1694	ZY
Weight of Tare & Wet Sample (g):	481.80	474.10	477.90	469.30	479.90
Weight of Tare & Dry Sample (g):	443.30	429.80	427.50	410.70	417.50
Weight of Tare (g):	81.60	80.90	83.40	83.50	85.20
Weight of Water (g):	38.50	44.30	50.40	58.60	62.40
Weight of Dry Sample (g):	361.70	348.90	344.10	327.20	332.30

Wet Density (g/cm <sup>3</sup> ):	1.99	2.03	2.10	2.09	2.05
Wet Density (pcf):	123.9	126.7	131.3	130.1	127.6
Moisture Content (%):	10.6	12.7	14.6	17.9	18.8
Dry Density (pcf):	112.0	112.4	114.5	110.4	107.4

**Zero Air Voids**

Moisture Content (%):	12.5	17.8	23.0
Dry Unit Weight (pcf):	127.7	115.3	105.1

Tested By	HL	Date	10/13/15	Checked By	KC	Date	10/14/15
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page 2 of 2

DCN:CT-S12 DATE:5/1/13 REVISION: 14

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## SPECIFIC GRAVITY

ASTM D 854-14

Client: CEC Boring No.: 9/17/15  
Client Reference: Central Waste Closure 153-121 Depth (ft): 4-8  
Project No.: 2015-506-001 Sample No.: TP-14B  
Lab ID: 2015-506-001-008 Visual Description: Brown Clay

(Minus No.4 sieve material, oven dried)

### Replicate Number

	1	2
Pycnometer ID:	G 1255	G 1504
Weight of Pycnometer & Soil & Water (g):	748.1	735.34
Temperature (°C):	26.3	26.5
Weight of Pycnometer & Water (g):	684.92	672.05
Tare Number:	924	700
Weight of Tare & Dry Soil (g):	200.6	189.5
Weight of Tare (g):	99.81	88.62
Weight of Dry Soil (g):	100.79	100.88
Specific Gravity of Soil @ Measured Temperature:	2.680	2.684
Specific Gravity of Water @ Measured Temperature:	0.99671	0.99666
Conversion Factor for Measured Temperature:	0.99850	0.99845
Specific Gravity @ 20° Celsius:	2.684	2.688

Average Specific Gravity @ 20° Celsius                    2.69

Tested By      TO      Date      10/1/15      Checked By      CLK      Date      10/2/15

DCN: CT-S5 Date: 3/5/14 Revision: 20

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## ATTERBERG LIMITS

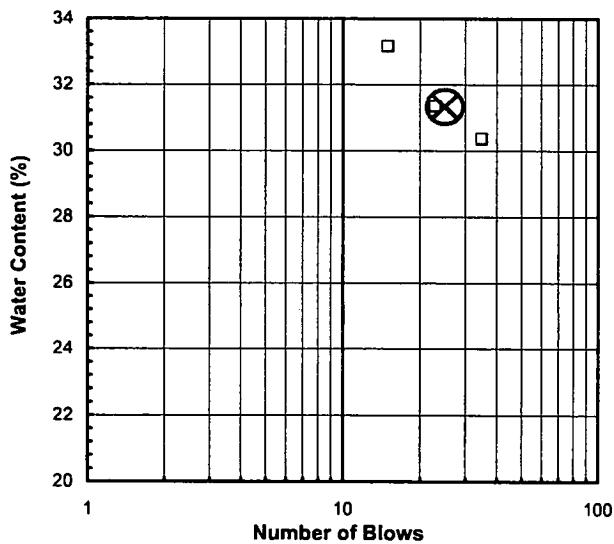
ASTM D 4318-10

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	4-8
Project No.:	2015-506-001	Sample No.:	TP-14B
Lab ID:	2015-506-001-008	Soil Description: BROWN LEAN CLAY	
<b>Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material, Airdried)</b>			(Minus No. 40 sieve material, Airdried)
<b>sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description .</b>			

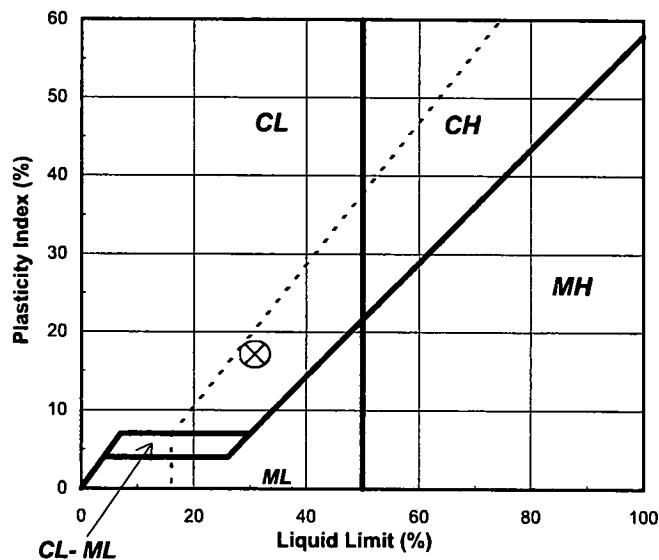
Liquid Limit Test	1	2	3	
Tare Number:	157	115	1101	M
Wt. of Tare & Wet Sample (g):	38.45	39.54	38.30	U
Wt. of Tare & Dry Sample (g):	33.23	34.68	33.62	L
Weight of Tare (g):	17.49	19.17	18.20	T
Weight of Water (g):	5.2	4.9	4.7	I
Weight of Dry Sample (g):	15.7	15.5	15.4	P
Moisture Content (%):	33.2	31.3	30.4	O
Number of Blows:	15	23	35	I
				N
				T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	182	449		Liquid Limit (%): 31
Wt. of Tare & Wet Sample (g):	25.48	29.29		Plastic Limit (%): 14
Wt. of Tare & Dry Sample (g):	24.71	28.54		Plasticity Index (%): 17
Weight of Tare (g):	19.38	23.28		USCS Symbol: CL
Weight of Water (g):	0.8	0.8		
Weight of Dry Sample (g):	5.3	5.3		
Moisture Content (%):	14.4	14.3	0.2	
<i>Note: The acceptable range of the two Moisture contents is <math>\pm 2.6</math></i>				

**Flow Curve**



**Plasticity Chart**



Tested By	RAL	Date	10/8/15	Checked By	CLK	Date	10/9/15
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page 1 of 1 DCN: CTS4B, REV. 4, 3/18/13

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# SIEVE AND HYDROMETER ANALYSIS

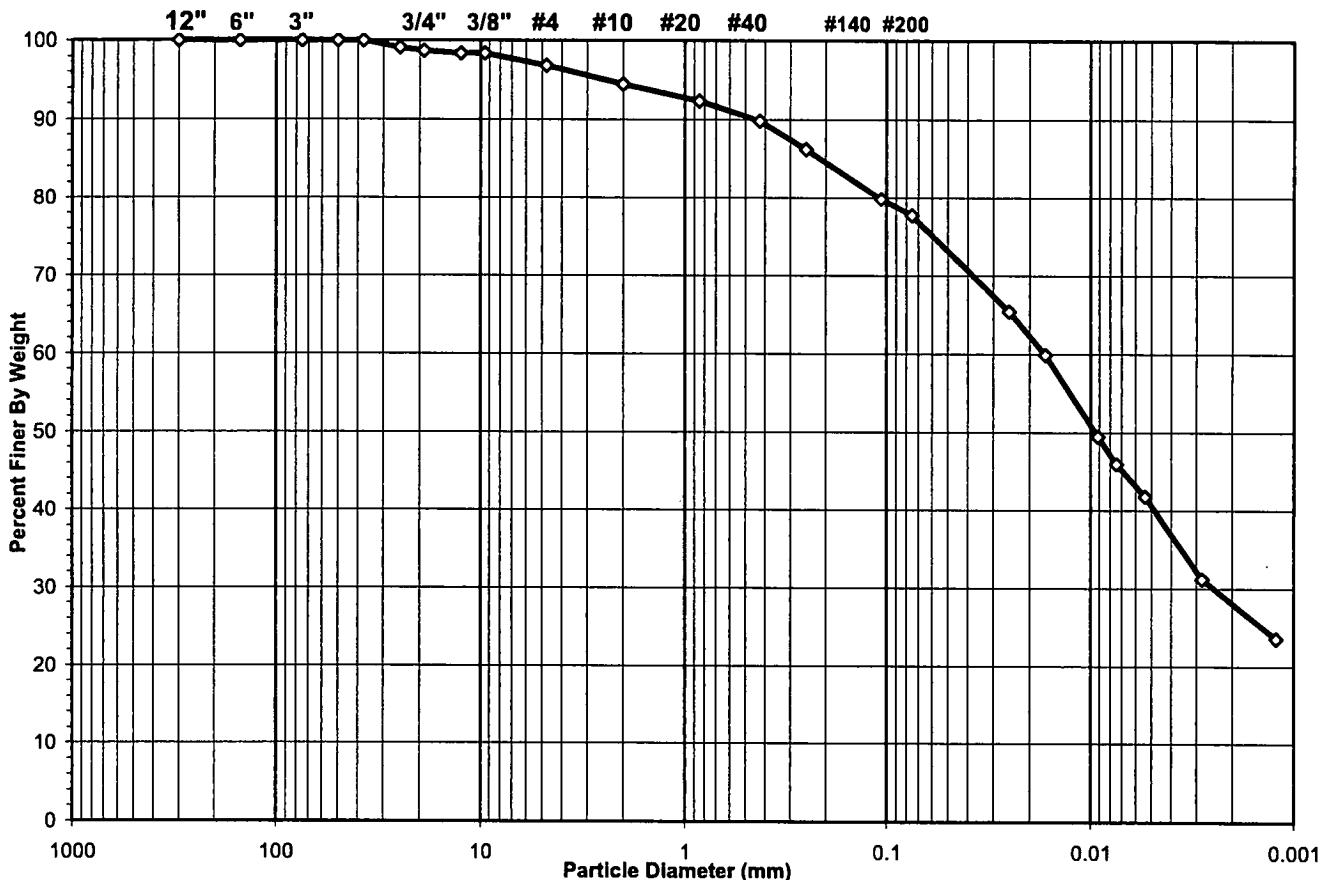
ASTM D 422-63 (2007)



Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-008

Boring No.: 9/17/13  
 Depth (ft): 4-8  
 Sample No.: TP-14B  
 Soil Color: Brown

USCS USDA	SIEVE ANALYSIS					HYDROMETER					
	cobbles	gravel	sand		silt and clay fraction						
	cobbles	gravel	sand		silt	clay					
	12"	6"	3"	3/4"	3/8"	#4	#10	#20	#40	#140	#200

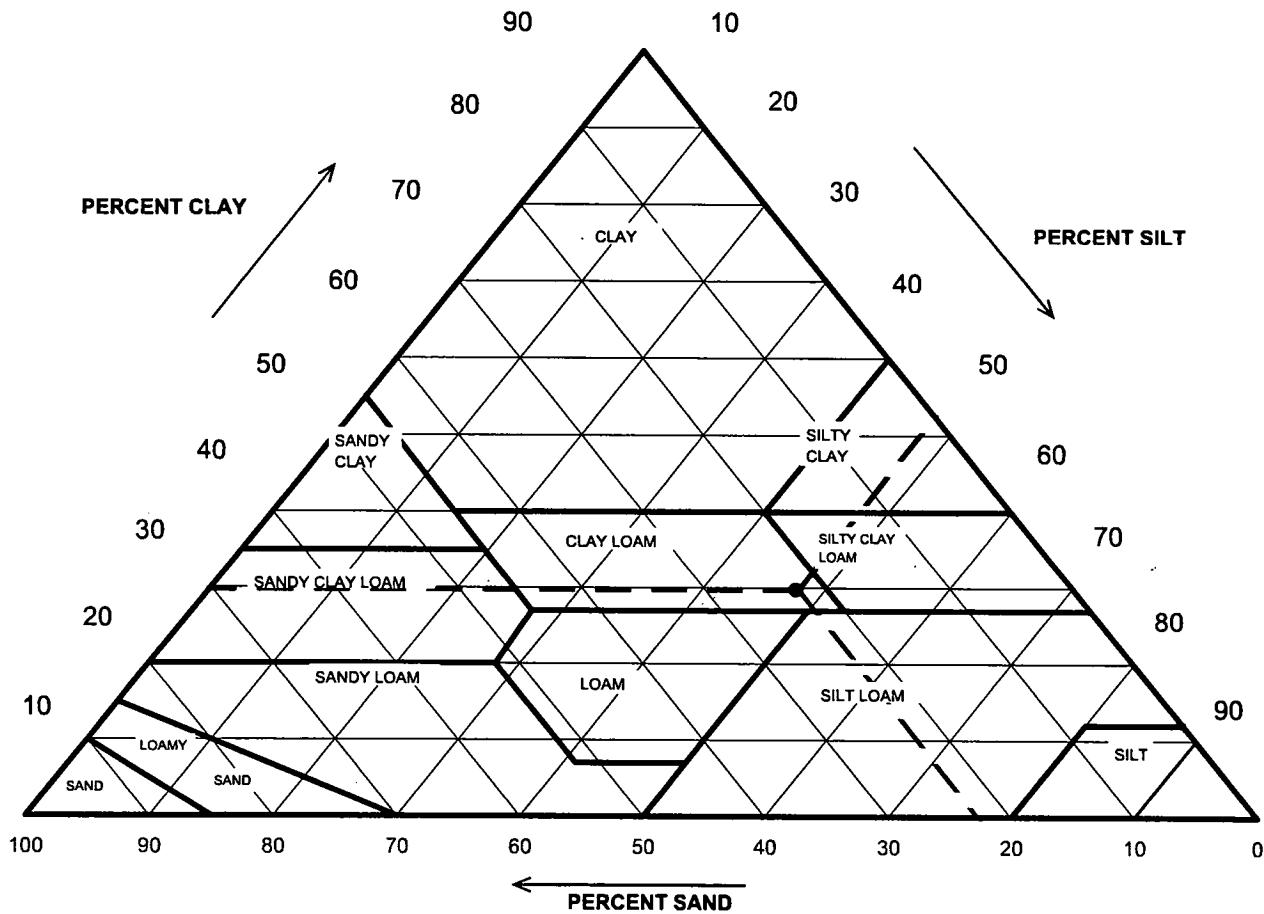


USCS Summary		
Sieve Sizes (mm)	Percentage	
Greater Than #4	Gravel	3.15
#4 To #200	Sand	19.12
Finer Than #200	Silt & Clay	77.73
<u>USCS Symbol:</u> <i>CL, TESTED</i>		
<u>USCS Classification:</u> <i>LEAN CLAY WITH SAND</i>		

## USDA CLASSIFICATION CHART

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-008

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-14B  
 Soil Color: Brown



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	5.50	0.00
2	94.50	Sand	21.33	22.57
0.05	73.16	Silt	45.05	47.68
0.002	28.11	Clay	28.11	29.75
<b>USDA Classification: CLAY LOAM</b>				

# WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)



Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-008

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-14B  
 Soil Color: Brown

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.:	59	Tare No.:	1705
Wt. of Tare & Wet Sample (g):	1149.10	Weight of Tare & Wet Sample (g):	364.25
Wt. of Tare & Dry Sample (g):	1075.50	Weight of Tare & Dry Sample (g):	361.05
Weight of Tare (g):	200.46	Weight of Tare (g):	83.07
Weight of Water (g):	73.60	Weight of Water (g):	3.20
Weight of Dry Soil (g):	875.04	Weight of Dry Soil (g):	277.98
<b>Moisture Content (%):</b>	<b>8.4</b>	<b>Moisture Content (%):</b>	<b>1.2</b>

Wet Weight of -3/4" Sample (g):	22353	Weight of the Dry Sample (g):	875.04
Dry Weight of - 3/4" Sample (g):	20618.7	Weight of Minus #200 Material (g):	689.36
Wet Weight of +3/4" Sample (g):	281.18	Weight of Plus #200 Material (g):	185.68
Dry Weight of + 3/4" Sample (g):	277.98		
Total Dry Weight of Sample (g):	20896.7	<b>J - Factor (Percent Finer than 3/4"):</b>	<b>0.9867</b>

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Finer (%)
12"	300	0.00	0.00	0.00	100.00	100.00
6"	150	0.00	0.00	0.00	100.00	100.00
3"	75	0.00	0.00	0.00	100.00	100.00
2"	50	0.00	(*)	0.00	100.00	100.00
1 1/2"	37.5	0.00		0.00	100.00	100.00
1"	25.0	197.40	0.93	0.93	99.07	99.07
3/4"	19.0	83.78	0.40	1.33	98.67	98.67
1/2"	12.5	2.82	0.32	0.32	99.68	98.35
3/8"	9.50	0.00	0.00	0.32	99.68	98.35
#4	4.75	13.33	1.52	1.85	98.15	96.85
#10	2.00	20.86	2.38	4.23	95.77	94.50
#20	0.85	19.43	(**) 2.22	6.45	93.55	92.31
#40	0.425	21.88	2.50	8.95	91.05	89.84
#60	0.250	32.04	3.66	12.61	87.39	86.23
#140	0.106	56.19	6.42	19.03	80.97	79.89
#200	0.075	19.13	2.19	21.22	78.78	77.73
Pan	-	689.36	78.78	100.00	-	-

**Notes :** (\*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample

(\*\*) The - 3/4" sieve analysis is based on the Weight of the Dry Sample

Tested By	PC	Date	9/26/15	Checked By	KC	Date	10/14/15
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**HYDROMETER ANALYSIS**

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-008

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-14B  
 Soil Color: Brown

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	53.0	23.4	5.86	47.1	84.2	0.01291	0.0252	65.4
5	49.0	23.4	5.86	43.1	77.0	0.01291	0.0166	59.9
19	41.5	23.4	5.86	35.6	63.6	0.01291	0.0091	49.5
30	39.0	23.4	5.86	33.1	59.2	0.01291	0.0074	46.0
60	36.0	23.3	5.89	30.1	53.8	0.01293	0.0054	41.8
250	28.5	22.9	6.04	22.5	40.1	0.01299	0.0028	31.2
1440	23.0	22.9	6.04	17.0	30.3	0.01299	0.0012	23.5

Soil Specimen Data		Other Corrections	
Tare No.:	637		
Wt. of Tare & Dry Material (g):	157.46	a - Factor:	0.99
Weight of Tare (g):	97.02		
Weight of Deflocculant (g):	5.0	Percent Finer than # 200:	77.73
Weight of Dry Material (g):	55.44	Specific Gravity:	2.7 Assumed

**Note:** Hydrometer test is performed on - # 200 sieve material.

Tested By	TO	Date	9/30/15	Checked By	KC	Date	10/14/15
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page 4 of 4

DCN: CT-S3B DATE 2015-09-30 TO 2015-10-14 BY KCEC153-121-001 Central Waste Lab 2015-506-001-008 Grain JSieveHyd.xls Print Sheet

# PERMEABILITY TEST

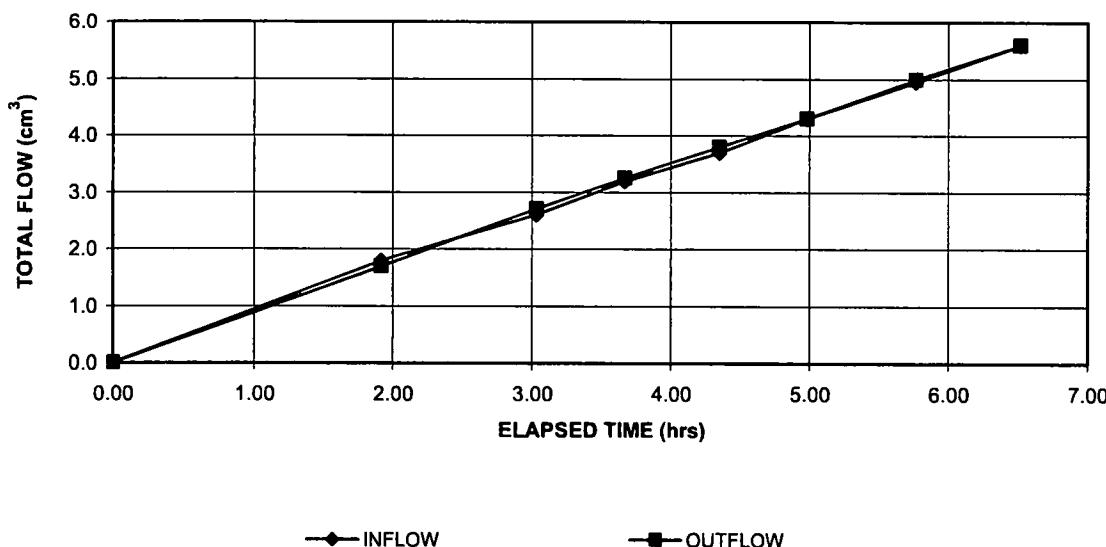
ASTM D 5084-10



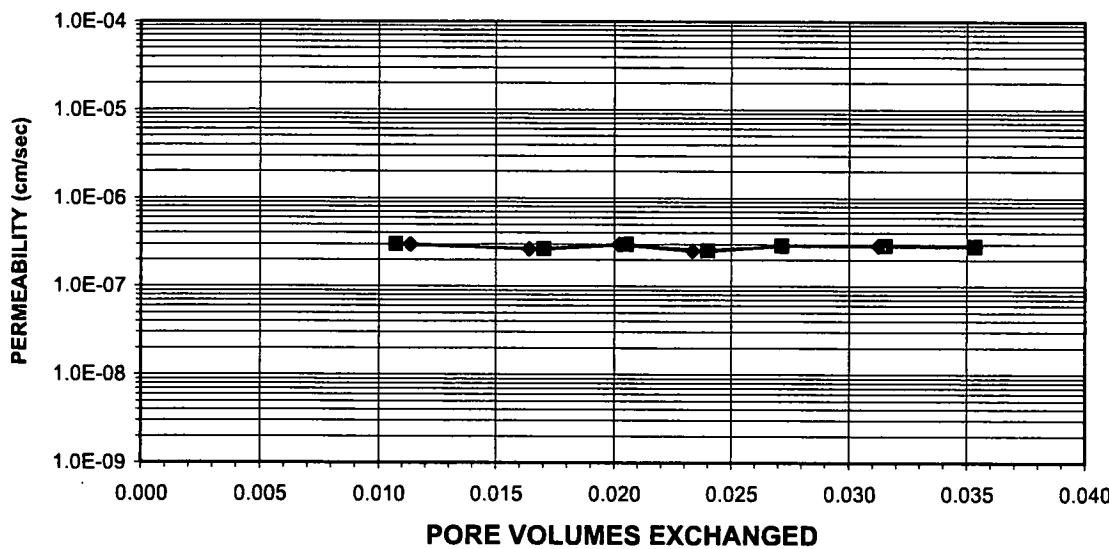
Client: CEC Boring No.: 9/17/15  
Client Project: Central Waste Closure 153-121 Depth (ft): 4 - 8  
Project No.: 2015-506-001 Sample No.: TP-14B  
Lab ID No.: 2015-506-001-008

AVERAGE PERMEABILITY = 2.8E-07 cm/sec @ 20°C  
AVERAGE PERMEABILITY = 2.8E-09 m/sec @ 20°C

## TOTAL FLOW vs. ELAPSED TIME



## PORE VOLUMES EXCHANGED vs. PERMEABILITY



Tested By: TRE

Date: 10/23/15 Checked By:

KC

Date: 10/27/15

Page 1 of 3

DCN: CT-22 DATE: 4/10/13 REVISION: 10

# PERMEABILITY TEST

ASTM D 5084-10



Client: CEC  
 Client Project: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID No.: 2015-506-001-008

Boring No.: 9/17/15

Depth (ft): 4 - 8

Sample No.: TP-14B

Specific Gravity:

2.70 Assumed

Sample Condition:

Remolded

Visual Description: Brown Sandy Clay

## **MOISTURE CONTENT:**

### BEFORE TEST

### AFTER TEST

Tare Number	1731	2728
Weight of Tare & Wet Sample (g)	237.12	980.40
Weight of Tare & Dry Sample (g)	218.44	831.40
Weight of Tare (g)	83.39	85.08
Weight of Water (g)	18.68	149.00
Weight of Dry Sample (g)	135.05	746.32
Moisture Content (%)	13.8	20.0

## **SPECIMEN:**

### BEFORE TEST

### AFTER TEST

Weight of Tube & Wet Sample (g)	2193.27	NA
Weight of Tube (g)	1344.00	NA
Weight of Wet Sample (g)	849.27	895.02
Length 1 (in)	3.998	4.019
Length 2 (in)	3.998	4.028
Length 3 (in)	3.998	4.030
Top Diameter (in)	2.870	2.890
Middle Diameter (in)	2.870	2.899
Bottom Diameter (in)	2.870	2.901
Average Length (in)	4.00	4.03
Average Area ( $\text{in}^2$ )	6.47	6.59
Sample Volume ( $\text{cm}^3$ )	423.96	434.74
Unit Wet Weight ( $\text{g}/\text{cm}^3$ )	2.00	2.06
Unit Wet Weight (pcf)	125.0	128.5
Unit Dry Weight (pcf)	109.8	107.1
Unit Dry Weight ( $\text{g}/\text{cm}^3$ )	1.76	1.72
Void Ratio, e	0.53	0.57
Porosity, n	0.35	0.36
Pore Volume ( $\text{cm}^3$ )	147.6	158.4
Total Weight of Sample After Test (g)		895.4

Tested By: TRE

Date: 10/23/15 Checked By:

KC

Date: 10/27/15

# PERMEABILITY TEST

ASTM D 5084-10



Client: CEC  
 Client Project: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID No.: 2015-506-001-008

Boring No.: 9/17/15  
 Depth (ft): 4 - 8  
 Sample No.: TP-14B

### Pressure Heads (Constant)

Top Cap (psi)	67.5
Bottom Cap (psi)	70.0
Cell (psi)	75.0
Total Pressure Head (cm)	175.8
Hydraulic Gradient	17.19

### Final Sample Dimensions

Sample Length (cm), L	10.23
Sample Diameter (cm)	7.36
Sample Area ( $\text{cm}^2$ ), A	42.52
Inflow Burette Area ( $\text{cm}^2$ ), a-in	0.861
Outflow Burette Area ( $\text{cm}^2$ ), a-out	0.851
B Parameter (%)	95

**AVERAGE PERMEABILITY = 2.8E-07 cm/sec @ 20°C**

**AVERAGE PERMEABILITY = 2.8E-09 m/sec @ 20°C**

DATE (mm/dd/yy)	TIME (hr)	ELAPSED TIME t (hr)	TOTAL INFLOW ( $\text{cm}^3$ )	TOTAL OUTFLOW ( $\text{cm}^3$ )	TOTAL HEAD h (cm)	FLOW (0 flow) (1 stop)	TEMP. (°C)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
10/24/15	11	40	0.000	0.0	201.1	0	21.0	NA
10/24/15	13	35	1.917	1.8	197.0	1	21.0	3.0E-07
10/26/15	8	13	1.917	1.8	201.3	0	20.6	NA
10/26/15	9	20	3.033	2.6	199.2	0	20.6	2.6E-07
10/26/15	9	58	3.667	3.2	197.9	0	20.8	3.0E-07
10/26/15	10	39	4.350	3.7	196.7	0	20.8	2.5E-07
10/26/15	11	17	4.983	4.3	195.4	0	20.8	2.9E-07
10/26/15	12	4	5.767	5.0	193.8	0	20.8	2.9E-07
10/26/15	12	49	6.517	5.6	192.4	1	20.8	2.8E-07

Tested By:

TRE

Date: 10/23/15

Checked By:

KC

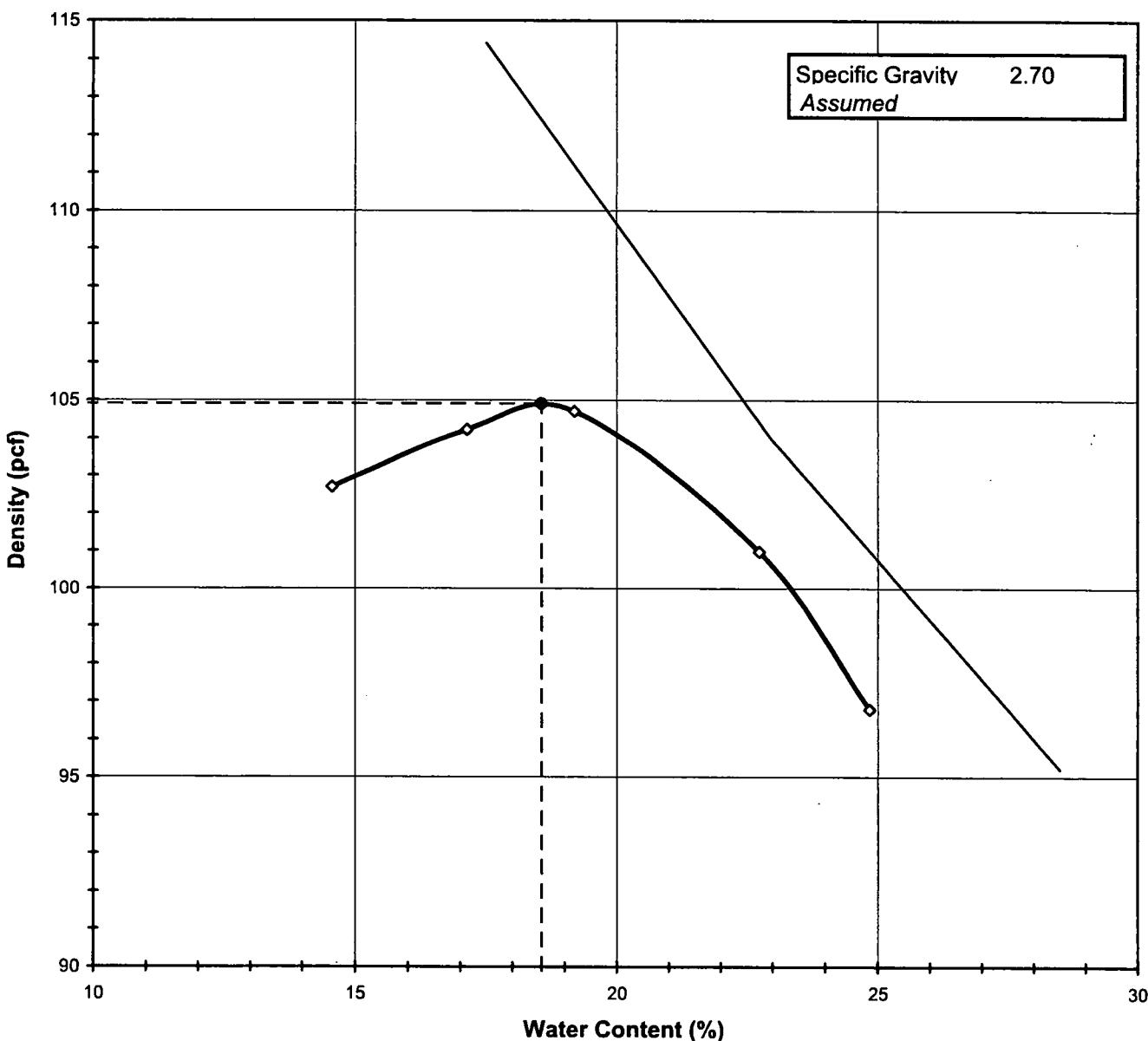
Date: 10/27/15

**MOISTURE DENSITY RELATIONSHIP**
*ASTM D698-12*

Client: CEC                      Boring No.: 9/17/15  
 Client Reference: Central Waste Closure 153-121      Depth (ft): 0-4  
 Project No.: 2015-506-001      Sample No.: TP-15A  
 Lab ID: 2015-506-001-009      Test Method: STANDARD

Visual Description: Brown Clay with small amount of Rock Fragments

**Optimum Water Content**      18.6  
**Maximum Dry Density**      104.9



Tested By	SGB	Date	10/12/15	Checked By	KC	Date	10/13/15
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page 1 of 2    DCN:CT-S12 DATE:5/1/13 REVISION: 14

**MOISTURE - DENSITY RELATIONSHIP**

ASTM D698-12

Client: CEC Boring No.: 9/17/15  
 Client Reference: Central Waste Closure 153-121 Depth (ft): 0-4  
 Project No.: 2015-506-001 Sample No.: TP-15A  
 Lab ID: 2015-506-001-009

Visual Description: Brown Clay with small amount of Rock Fragments

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.70
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	B

Test Type:	<b>STANDARD</b>
Rammer Weight (lb):	5.5
Rammer Drop (in):	12
Rammer Type:	MECHANICAL
Machine ID:	G 774
Mold ID:	G 606
Mold diameter:	4"
Weight of the Mold (g):	4139
Volume of the Mold (cm <sup>3</sup> ):	943

**Mold / Specimen**

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	5917	5984	6025	6012	5965
Weight of Mold (g):	4139	4139	4139	4139	4139
Weight of Wet Sample (g):	1778	1845	1886	1873	1826
Mold Volume (cm <sup>3</sup> ):	943	943	943	943	943

**Moisture Content / Density**

Tare Number:	729	550	1458	1718	587
Weight of Tare & Wet Sample (g):	388.25	367.47	352.83	324.41	360.81
Weight of Tare & Dry Sample (g):	349.86	325.66	309.33	279.53	305.37
Weight of Tare (g):	86.21	81.58	82.67	82.20	82.19
Weight of Water (g):	38.39	41.81	43.50	44.88	55.44
Weight of Dry Sample (g):	263.65	244.08	226.66	197.33	223.18

Wet Density (g/cm <sup>3</sup> ):	1.89	1.96	2.00	1.99	1.94
Wet Density (pcf):	117.7	122.1	124.8	123.9	120.8
Moisture Content (%):	14.6	17.1	19.2	22.7	24.8
Dry Density (pcf):	102.7	104.2	104.7	101.0	96.8

**Zero Air Voids**

Moisture Content (%):	17.5	23.0	28.5
Dry Unit Weight (pcf):	114.4	103.9	95.2

Tested By	SGB	Date	10/12/15	Checked By	KC	Date	10/13/15
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## SPECIFIC GRAVITY

ASTM D 854-14

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-009

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-15A  
 Visual Description: Brown Clay

(Minus No.4 sieve material, oven dried)

Replicate Number	1	2
Pycnometer ID:	G 1255	G 1504
Weight of Pycnometer & Soil & Water (g):	748.02	734.68
Temperature (°C):	26.1	26.2
Weight of Pycnometer & Water (g):	684.94	672.09
Tare Number:	952	1019
Weight of Tare & Dry Soil (g):	202.82	201.27
Weight of Tare (g):	101.94	101.27
Weight of Dry Soil (g):	100.88	100.00
Specific Gravity of Soil @ Measured Temperature:	2.669	2.673
Specific Gravity of Water @ Measured Temperature:	0.99677	0.99674
Conversion Factor for Measured Temperature:	0.99856	0.99853
Specific Gravity @ 20° Celsius:	2.672	2.677

Average Specific Gravity @ 20° Celsius	2.67
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Tested By	TO	Date	10/5/15	Checked By	CLK	Date	10/9/15
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DCN: CT-S5 Date: 3/5/14 Revision: 20

S:\Excel\Excel QA\Spreadsheets\Specific Gravity.xls

## ATTERBERG LIMITS

ASTM D 4318-10

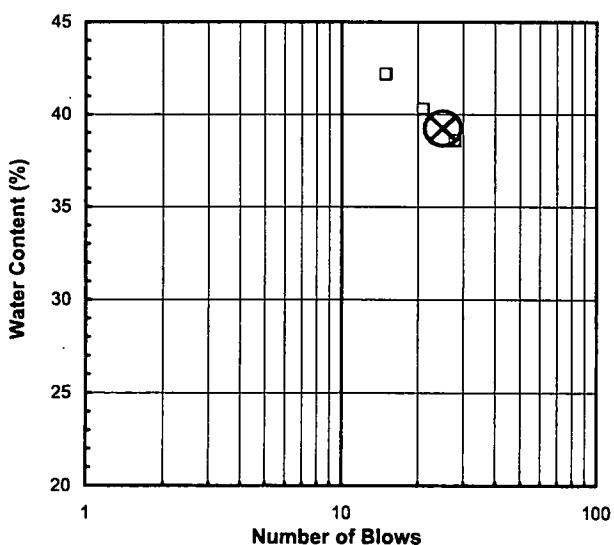
Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	0-4
Project No.:	2015-506-001	Sample No.:	TP-15A
Lab ID:	2015-506-001-009	Soil Description: BROWN LEAN CLAY	

**Note: The USCS symbol used with this test refers only to the minus No. 40  
sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description .**

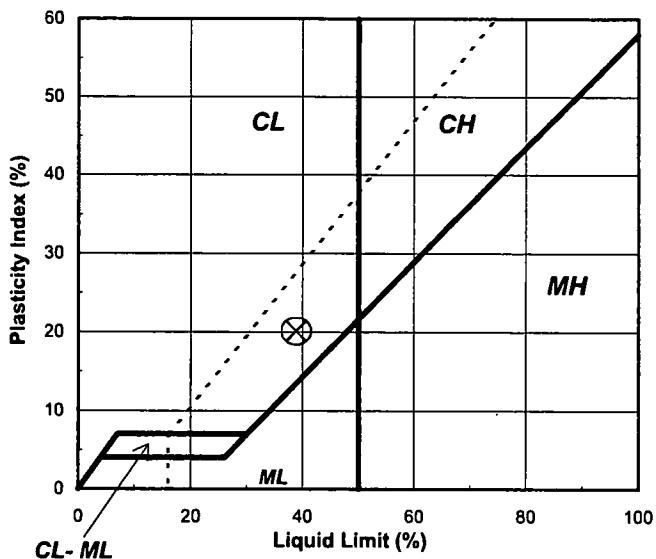
Liquid Limit Test	1	2	3	M
Tare Number:	43	117	394	U
Wt. of Tare & Wet Sample (g):	43.61	44.75	38.02	L
Wt. of Tare & Dry Sample (g):	36.77	37.70	30.92	T
Weight of Tare (g):	19.03	20.20	14.08	I
Weight of Water (g):	6.8	7.1	7.1	P
Weight of Dry Sample (g):	17.7	17.5	16.8	O
<b>Moisture Content (%):</b>	<b>38.6</b>	<b>40.3</b>	<b>42.2</b>	N
<b>Number of Blows:</b>	<b>28</b>	<b>21</b>	<b>15</b>	T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	1265	143		Liquid Limit (%): 39
Wt. of Tare & Wet Sample (g):	24.19	26.06		Plastic Limit (%): 19
Wt. of Tare & Dry Sample (g):	23.16	25.10		Plasticity Index (%): 20
Weight of Tare (g):	17.75	19.98		USCS Symbol: CL
Weight of Water (g):	1.0	1.0		
Weight of Dry Sample (g):	5.4	5.1		
<b>Moisture Content (%):</b>	<b>19.0</b>	<b>18.7</b>	<b>0.3</b>	
<i>Note: The acceptable range of the two Moisture contents is ± 2.6</i>				

**Flow Curve**



**Plasticity Chart**



Tested By	TO	Date	10/9/15	Checked By	CLK	Date	10/10/15
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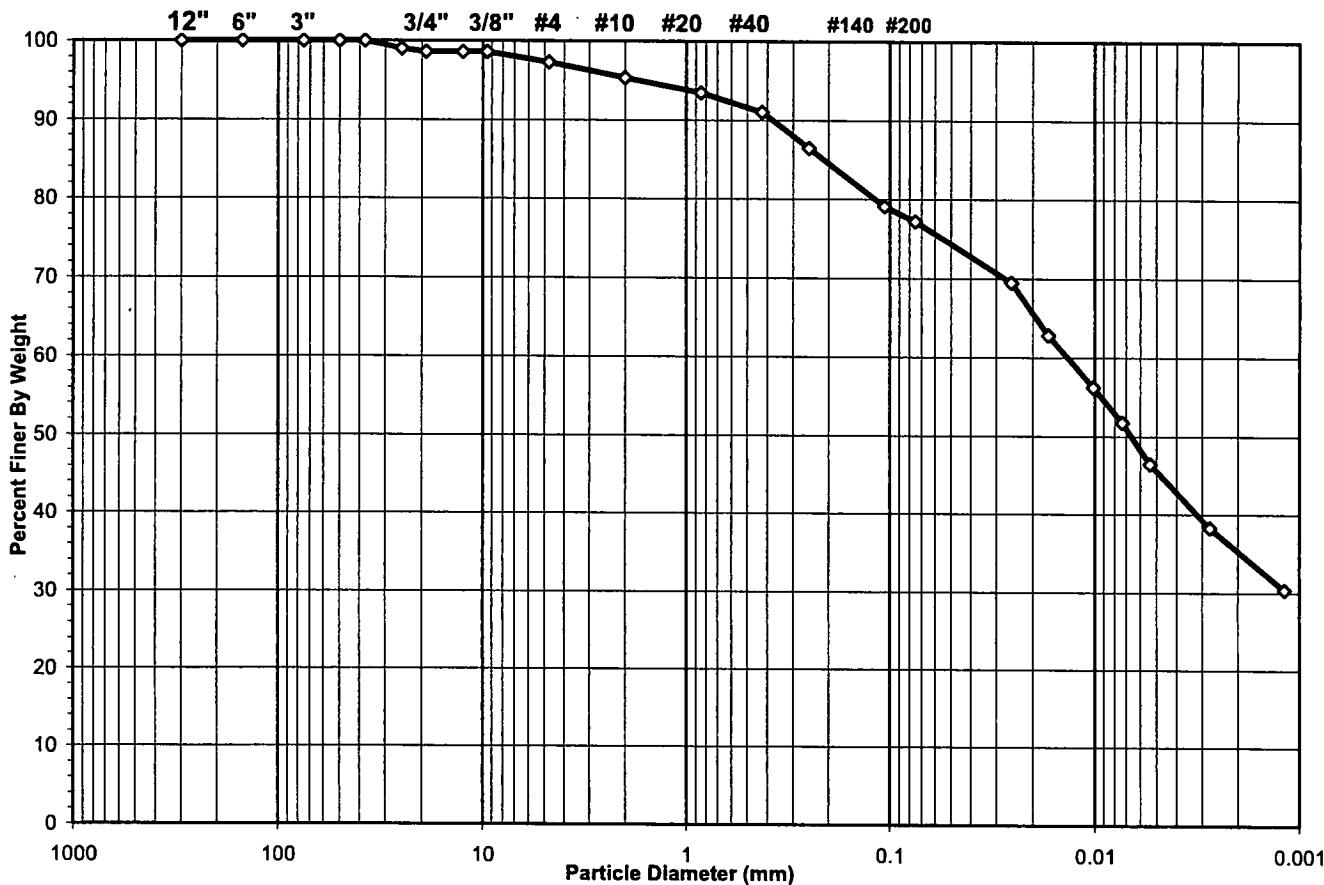
**SIEVE AND HYDROMETER ANALYSIS**  
ASTM D 422-63 (2007)



Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-009

Boring No.: 9/17/16  
 Depth (ft): 0-4  
 Sample No.: TP-15A  
 Soil Color: Brown

USCS USDA	SIEVE ANALYSIS				HYDROMETER						
	cobbles	gravel	sand	silt and clay fraction							
	cobbles	gravel	sand	silt	clay						
	12"	6"	3"	3/4"	3/8"	#4	#10	#20	#40	#140	#200

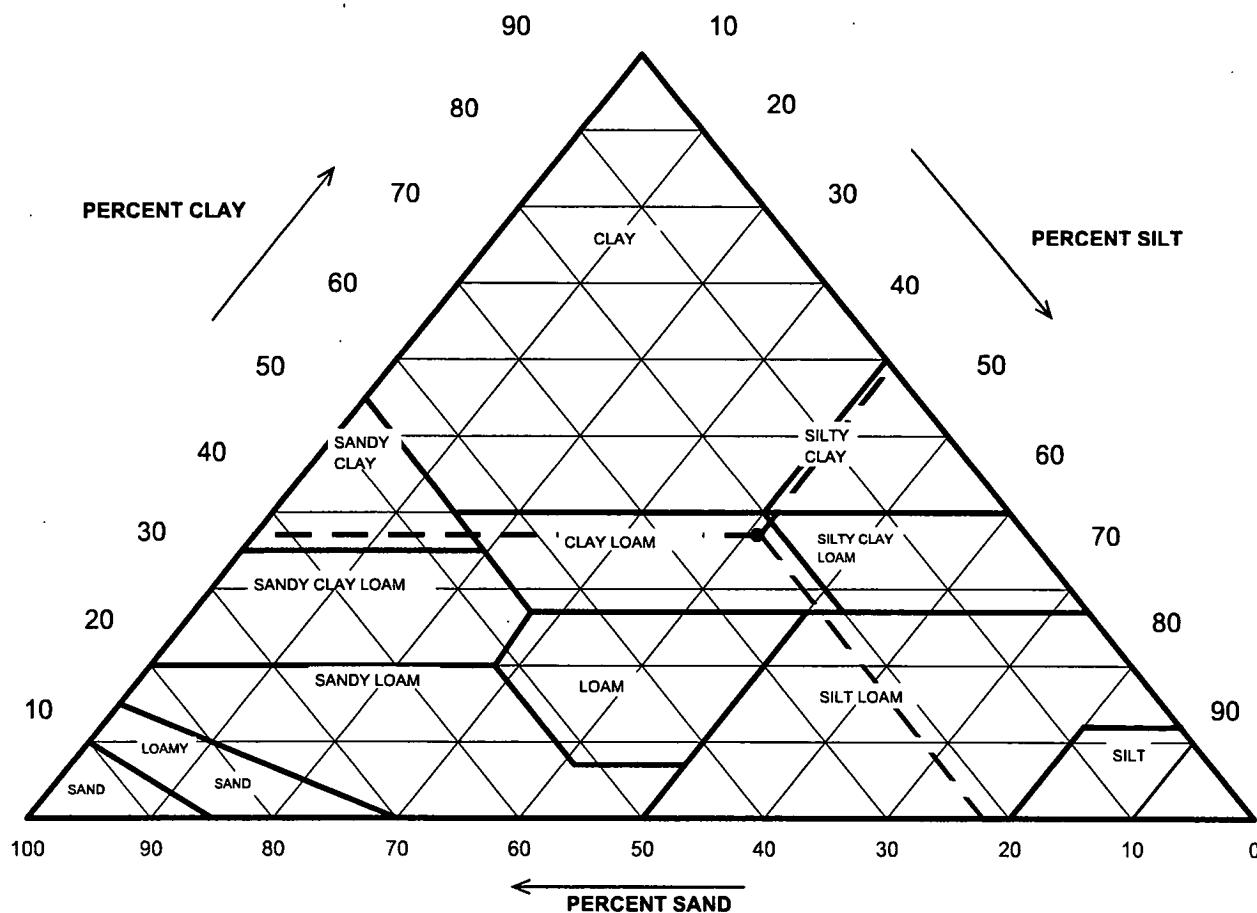


USCS Summary		
Sieve Sizes (mm)	Percentage	
Greater Than #4	Gravel	2.69
#4 To #200	Sand	20.02
Finer Than #200	Silt & Clay	77.29
<b>USCS Symbol:</b>		
<b>CL, TESTED</b>		
<b>USCS Classification:</b>		
<b>LEAN CLAY WITH SAND</b>		

## USDA CLASSIFICATION CHART

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-009

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-15A  
 Soil Color: Brown



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
2	95.35	Gravel	4.65	0.00
0.05	74.39	Sand	20.96	21.98
0.002	35.33	Silt	39.06	40.96
		Clay	35.33	37.06
<b>USDA Classification: CLAY LOAM</b>				



# WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)



Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-009

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-15A  
 Soil Color: Brown

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.:	47	Tare No.:	627
Wt. of Tare & Wet Sample (g):	1185.30	Weight of Tare & Wet Sample (g):	347.82
Wt. of Tare & Dry Sample (g):	1148.50	Weight of Tare & Dry Sample (g):	345.99
Weight of Tare (g):	203.21	Weight of Tare (g):	86.58
Weight of Water (g):	36.80	Weight of Water (g):	1.83
Weight of Dry Soil (g):	945.29	Weight of Dry Soil (g):	259.41
<b>Moisture Content (%):</b>	<b>3.9</b>	<b>Moisture Content (%):</b>	<b>0.7</b>

Wet Weight of -3/4" Sample (g):	19128	Weight of the Dry Sample (g):	945.29
Dry Weight of - 3/4" Sample (g):	18411.3	Weight of Minus #200 Material (g):	740.90
Wet Weight of +3/4" Sample (g):	261.24	Weight of Plus #200 Material (g):	204.39
Dry Weight of + 3/4" Sample (g):	259.41		
Total Dry Weight of Sample (g):	18670.7	<b>J - Factor (Percent Finer than 3/4"):</b>	<b>0.9861</b>

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100.00
6"	150	0.00	0.00	0.00	100.00	100.00
3"	75	0.00	0.00	0.00	100.00	100.00
2"	50	0.00	( * )	0.00	100.00	100.00
1 1/2"	37.5	0.00		0.00	100.00	100.00
1"	25.0	185.51	0.99	0.99	99.01	99.01
3/4"	19.0	75.73	0.40	1.39	98.61	98.61
1/2"	12.5	0.00	0.00	0.00	100.00	98.61
3/8"	9.50	0.00	0.00	0.00	100.00	98.61
#4	4.75	12.44	1.32	1.32	98.68	97.31
#10	2.00	18.85	1.99	3.31	96.69	95.35
#20	0.85	17.66	( ** )	1.87	94.82	93.50
#40	0.425	23.65		2.50	92.32	91.04
#60	0.250	43.40		4.59	12.27	87.73
#140	0.106	70.35		7.44	19.71	80.29
#200	0.075	18.04		1.91	21.62	78.38
Pan	-	740.90	78.38	100.00	-	-

**Notes :** (\*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample  
 (\*\*) The - 3/4" sieve analysis is based on the Weight of the Dry Sample

Tested By	HL	Date	10/1/15	Checked By	KC	Date	10/14/15
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## HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client: CEC Boring No.: 9/17/15  
Client Reference: Central Waste Closure 153-121 Depth (ft): 0-4  
Project No.: 2015-506-001 Sample No.: TP-15A  
Lab ID: 2015-506-001-009 Soil Color: Brown

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	53.0	22.9	6.04	47.0	90.0	0.01299	0.0253	69.5
5	48.5	22.9	6.04	42.5	81.3	0.01299	0.0168	62.9
15	44.0	22.9	6.04	38.0	72.7	0.01299	0.0101	56.2
30	41.0	22.9	6.04	35.0	67.0	0.01299	0.0073	51.8
60	37.5	22.7	6.11	31.4	60.1	0.01302	0.0054	46.5
250	32.0	22.6	6.15	25.9	49.5	0.01303	0.0027	38.3
1440	26.5	23.1	5.97	20.5	39.3	0.01296	0.0012	30.4

Soil Specimen Data		Other Corrections	
Tare No.:	932		
Wt. of Tare & Dry Material (g):	154.53	a - Factor:	0.99
Weight of Tare (g):	97.85		
Weight of Deflocculant (g):	5.0	Percent Finer than # 200:	77.29
Weight of Dry Material (g):	51.68	Specific Gravity:	2.7 Assumed

**Note:** Hydrometer test is performed on - # 200 sieve material.

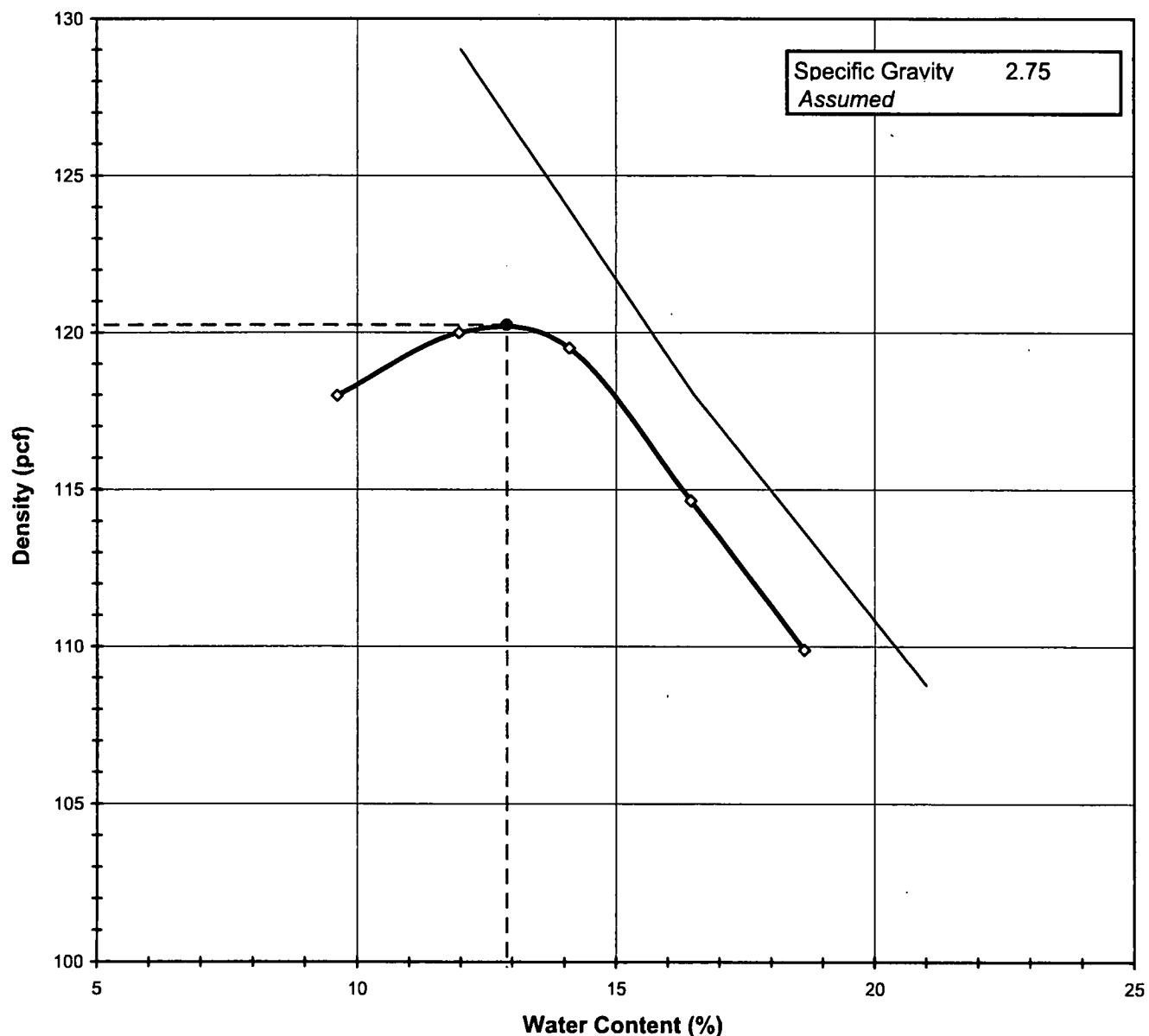
Tested By TO Date 10/1/15 Checked By KC Date 10/14/15  
page 4 of 4 DCN: CT-S3B DATE 2015-09-14 BY ASIAN PROJECTS\CEC\2015-506-001 Central Waste\2015-506-001-009 Grain JSieveHyd.xls\Print Sheet

**MOISTURE DENSITY RELATIONSHIP**

ASTM D1557-12

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	4-8
Project No.:	2015-506-001	Sample No.:	TP-15B
Lab ID:	2015-506-001-010	Test Method	<b>MODIFIED</b>
Visual Description:		Brown Sandy with small amount of Rock Fragments	

**Optimum Water Content**      **12.9**  
**Maximum Dry Density**      **120.3**



<i>Tested By</i>	MF	<i>Date</i>	10/16/15	<i>Checked By</i>	KC	<i>Date</i>	10/19/15
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page 1 of 2    DCN:CT-S12 DATE:5/1/13 REVISION: 14

**MOISTURE - DENSITY RELATIONSHIP**

ASTM D1557-12

Client: CEC Boring No.: 9/17/15  
 Client Reference: Central Waste Closure 153-121 Depth (ft): 4-8  
 Project No.: 2015-506-001 Sample No.: TP-15B  
 Lab ID: 2015-506-001-010

Visual Description: Brown Sandy with small amount of Rock Fragments

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.75
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	B

Test Type:	<b>MODIFIED</b>
Rammer Weight (lb):	10.0
Rammer Drop (in):	18
Rammer Type:	<b>MECHANICAL</b>
Machine ID:	G 441
Mold ID:	G 1499
Mold diameter:	4"
Weight of the Mold (g):	4386
Volume of the Mold (cm <sup>3</sup> ):	940

**Mold / Specimen**

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	6334	6410	6440	6397	6350
Weight of Mold (g):	4386	4386	4386	4386	4386
Weight of Wet Sample (g):	1948	2024	2054	2011	1964
Mold Volume (cm <sup>3</sup> ):	940	940	940	940	940

**Moisture Content / Density**

Tare Number:	606	585	544	552	886
Weight of Tare & Wet Sample (g):	428.90	437.30	433.80	432.00	453.40
Weight of Tare & Dry Sample (g):	398.79	399.67	390.64	382.47	399.42
Weight of Tare (g):	85.39	85.33	84.42	81.31	109.79
Weight of Water (g):	30.11	37.63	43.16	49.53	53.98
Weight of Dry Sample (g):	313.40	314.34	306.22	301.16	289.63

Wet Density (g/cm <sup>3</sup> ):	2.07	2.15	2.19	2.14	2.09
Wet Density (pcf):	129.3	134.4	136.4	133.5	130.4
Moisture Content (%):	9.6	12.0	14.1	16.4	18.6
Dry Density (pcf):	118.0	120.0	119.5	114.6	109.9

**Zero Air Voids**

Moisture Content (%):	12.0	16.5	21.0
Dry Unit Weight (pcf):	129.0	118.0	108.8

Tested By	MF	Date	10/16/15	Checked By	KC	Date	10/19/15
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page 2 of 2

DCN:CT-S12 DATE:5/1/13 REVISION: 14

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## SPECIFIC GRAVITY

ASTM D 854-14

Client: CEC Boring No.: 9/17/15  
Client Reference: Central Waste Closure 153-121 Depth (ft): 4-8  
Project No.: 2015-506-001 Sample No.: TP-15B  
Lab ID: 2015-506-001-010 Visual Description: Brown Clay

(Minus No.4 sieve material, oven dried)

### Replicate Number

1

2

Pycnometer ID:	G	1255	G	1504
Weight of Pycnometer & Soil & Water (g):		748.01		735.26
Temperature (°C):		25.3		25.2
Weight of Pycnometer & Water (g):		685.05		672.22
Tare Number:		672		970
Weight of Tare & Dry Soil (g):		196.94		201.51
Weight of Tare (g):		96.24		100.77
Weight of Dry Soil (g):		100.70		100.74
Specific Gravity of Soil @ Measured Temperature:		2.668		2.672
Specific Gravity of Water @ Measured Temperature:		0.99698		0.99700
Conversion Factor for Measured Temperature:		0.99877		0.99879
Specific Gravity @ 20° Celsius:		2.672		2.675

Average Specific Gravity @ 20° Celsius 2.67

Tested By TO Date 10/5/15 Checked By CLK Date 10/9/15

DCN: CT-S5 Date: 3/5/14 Revision: 20

S:\Excel\Excel QA\Spreadsheets\Specific Gravity.xls

## ATTERBERG LIMITS

ASTM D 4318-10

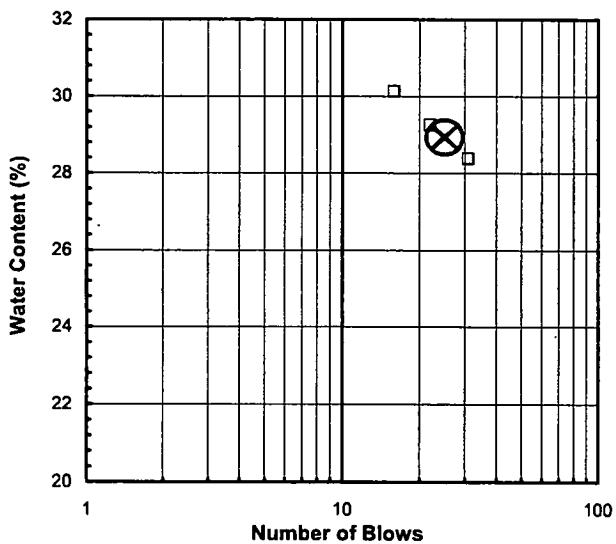
Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	4-8
Project No.:	2015-506-001	Sample No.:	TP-15B
Lab ID:	2015-506-001-010	Soil Description: BROWN LEAN CLAY	

**Note:** The USCS symbol used with this test refers only to the minus No. 40 (Minus No. 40 sieve material, Airdried) sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

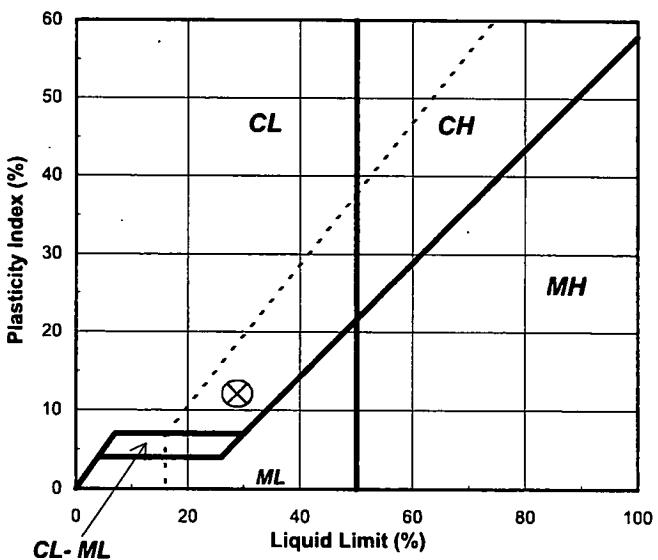
Liquid Limit Test	1	2	3	
Tare Number:	171	177	180	M
Wt. of Tare & Wet Sample (g):	39.19	37.79	38.29	U
Wt. of Tare & Dry Sample (g):	34.75	33.81	33.97	L
Weight of Tare (g):	19.10	20.20	19.63	T
Weight of Water (g):	4.4	4.0	4.3	I
Weight of Dry Sample (g):	15.7	13.6	14.3	P
Moisture Content (%):	28.4	29.2	30.1	O
Number of Blows:	31	22	16	I
				N
				T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	131	186		Liquid Limit (%): 29
Wt. of Tare & Wet Sample (g):	25.84	24.70		Plastic Limit (%): 17
Wt. of Tare & Dry Sample (g):	24.97	23.81		Plasticity Index (%): 12
Weight of Tare (g):	19.70	18.50		USCS Symbol: CL
Weight of Water (g):	0.9	0.9		
Weight of Dry Sample (g):	5.3	5.3		
Moisture Content (%):	16.5	16.8	-0.3	
<i>Note: The acceptable range of the two Moisture contents is <math>\pm 2.6</math></i>				

Flow Curve



Plasticity Chart



Tested By	JP	Date	10/8/15	Checked By	CLK	Date	10/9/15
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page 1 of 1 DCN: CTS4B, REV. 4, 3/18/13

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# SIEVE AND HYDROMETER ANALYSIS

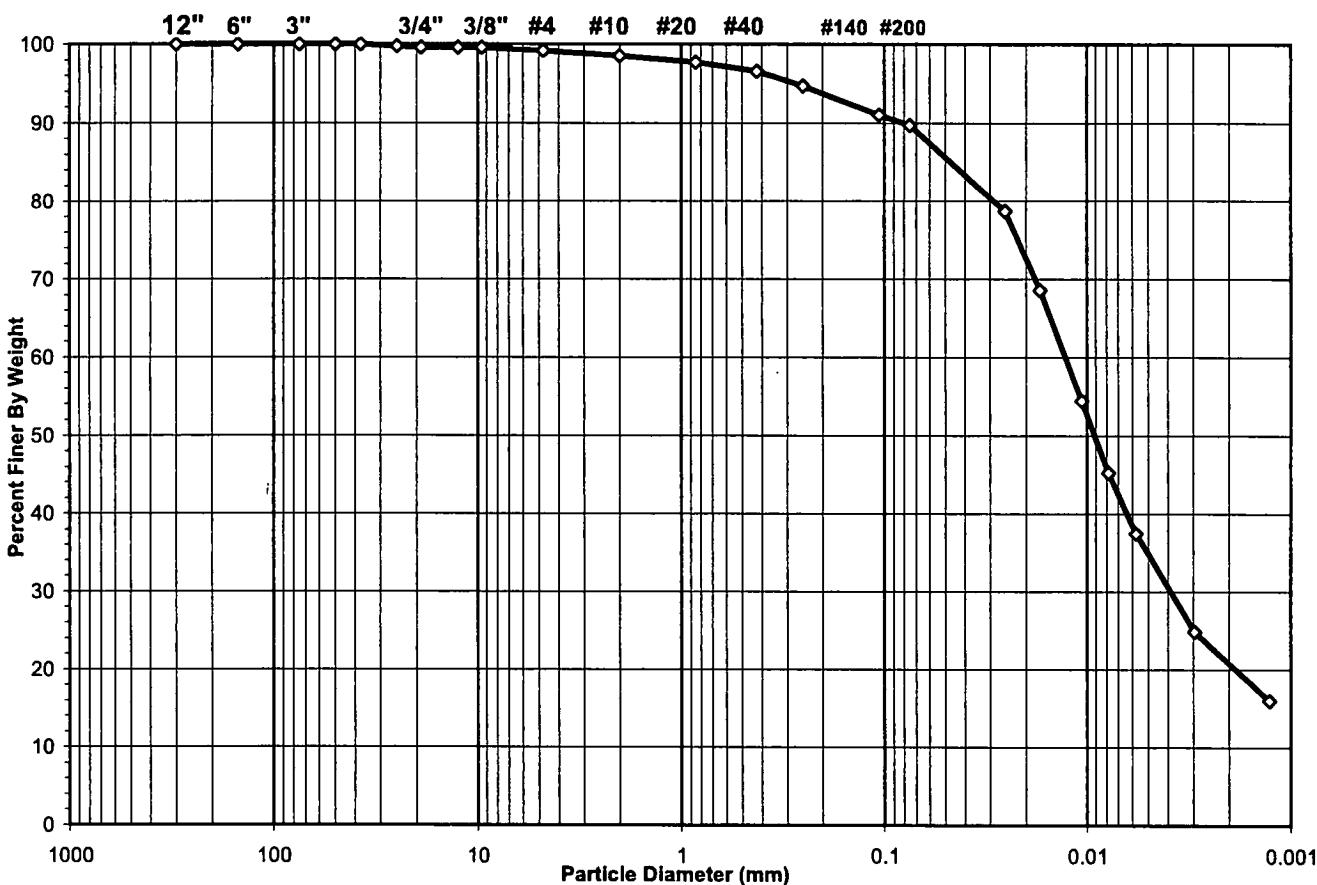
ASTM D 422-63 (2007)



Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-010

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-15B  
 Soil Color: Brown

USCS USDA	SIEVE ANALYSIS					HYDROMETER	
	cobbles	gravel	sand		silt and clay fraction		
	cobbles	gravel	sand		silt	clay	

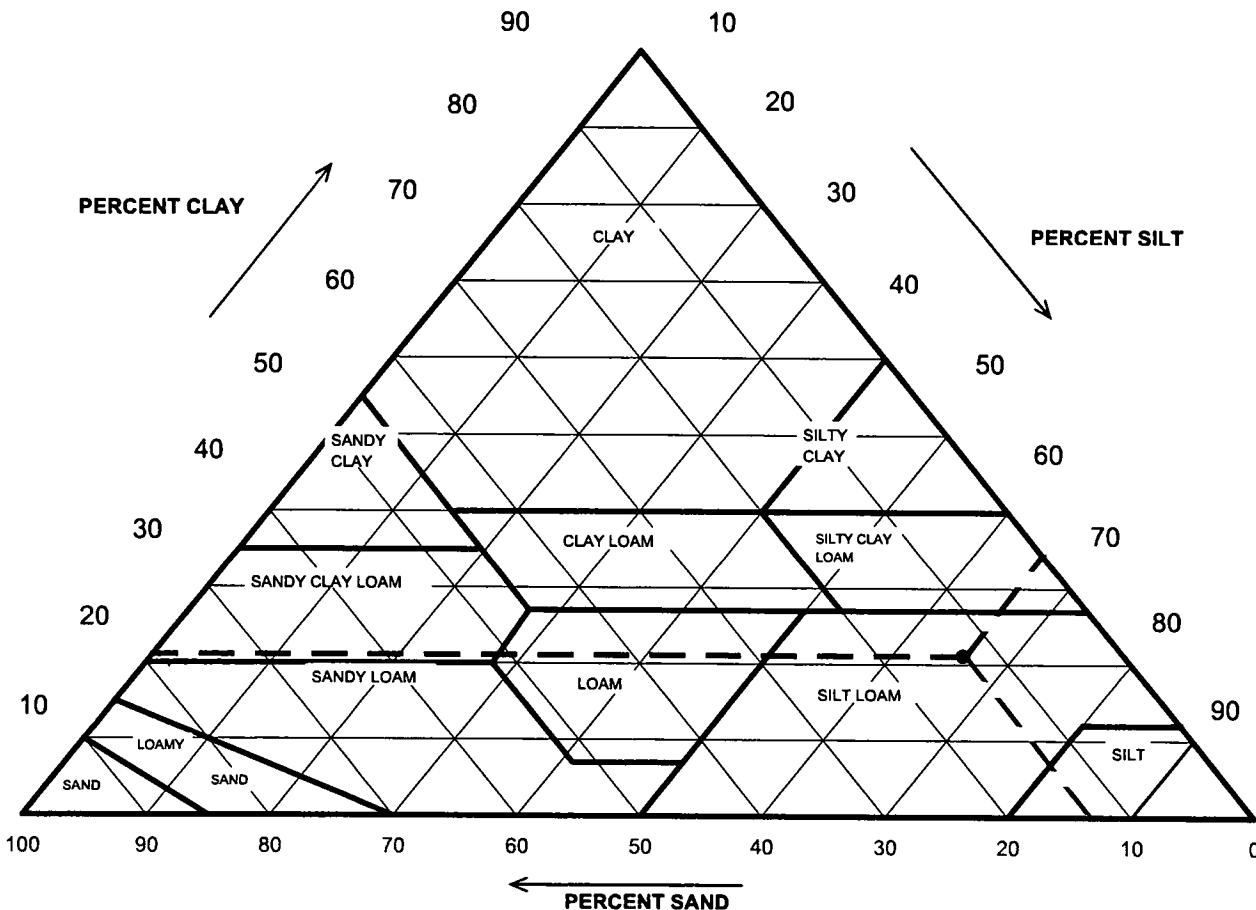


USCS Summary		
Sieve Sizes (mm)	Percentage	
Greater Than #4	Gravel	0.84
#4 To #200	Sand	9.43
Finer Than #200	Silt & Clay	89.73
<b>USCS Symbol:</b>		
<b>CL, TESTED</b>		
<b>USCS Classification:</b>		
<b>LEAN CLAY</b>		

## USDA CLASSIFICATION CHART

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-010

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-15B  
 Soil Color: Brown



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
2	98.53	Gravel	1.47	0.00
0.05	85.62	Sand	12.91	13.10
0.002	20.79	Silt	64.83	65.80
		Clay	20.79	21.10
<b>USDA Classification: SILT LOAM</b>				

# WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)



Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-010

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-15B  
 Soil Color: Brown

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.:	49	Tare No.:	51
Wt. of Tare & Wet Sample (g):	1009.30	Weight of Tare & Wet Sample (g):	92.95
Wt. of Tare & Dry Sample (g):	985.00	Weight of Tare & Dry Sample (g):	92.50
Weight of Tare (g):	199.56	Weight of Tare (g):	6.86
Weight of Water (g):	24.30	Weight of Water (g):	0.45
Weight of Dry Soil (g):	785.44	Weight of Dry Soil (g):	85.64
<b>Moisture Content (%):</b>	<b>3.1</b>	<b>Moisture Content (%):</b>	<b>0.5</b>

Wet Weight of -3/4" Sample (g):	21094	Weight of the Dry Sample (g):	785.44
Dry Weight of - 3/4" Sample (g):	20461.0	Weight of Minus #200 Material (g):	707.74
Wet Weight of +3/4" Sample (g):	86.09	Weight of Plus #200 Material (g):	77.70
Dry Weight of + 3/4" Sample (g):	85.64		
Total Dry Weight of Sample (g):	20546.6	<b>J - Factor (Percent Finer than 3/4"):</b>	<b>0.9958</b>

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100.00
6"	150	0.00	0.00	0.00	100.00	100.00
3"	75	0.00	0.00	0.00	100.00	100.00
2"	50	0.00	( *)	0.00	100.00	100.00
1 1/2"	37.5	0.00		0.00	100.00	100.00
1"	25.0	46.41	0.22	0.22	99.78	99.78
3/4"	19.0	39.68	0.19	0.42	99.58	99.58
1/2"	12.5	0.00	0.00	0.00	100.00	99.58
3/8"	9.50	0.00	0.00	0.00	100.00	99.58
#4	4.75	3.34	0.43	0.43	99.57	99.16
#10	2.00	4.98	0.63	1.06	98.94	98.53
#20	0.85	6.24	( **)	0.79	98.15	97.74
#40	0.425	8.87		1.13	97.02	96.61
#60	0.250	14.83		1.89	95.13	94.73
#140	0.106	29.04		3.70	91.43	91.05
#200	0.075	10.40		1.32	90.11	89.73
Pan	-	707.74	90.11	100.00	-	-

**Notes :** (\*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample  
 (\*\*) The - 3/4" sieve analysis is based on the Weight of the Dry Sample

Tested By	HL	Date	10/1/15	Checked By	KC	Date	10/14/15
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## HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client: CEC  
Client Reference: Central Waste Closure 153-121  
Project No.: 2015-506-001  
Lab ID: 2015-506-001-010

Boring No.: 9/17/15  
Depth (ft): 4-8  
Sample No.: TP-15B  
Soil Color: Brown

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	53.0	22.9	6.04	47.0	87.7	0.01299	0.0253	78.7
5	47.0	22.9	6.04	41.0	76.5	0.01299	0.0170	68.7
15	38.5	22.9	6.04	32.5	60.6	0.01299	0.0106	54.4
30	33.0	22.9	6.04	27.0	50.4	0.01299	0.0078	45.2
60	28.5	22.7	6.11	22.4	41.8	0.01302	0.0057	37.5
250	21.0	22.6	6.15	14.9	27.7	0.01303	0.0030	24.9
1440	15.5	23.1	5.97	9.5	17.8	0.01296	0.0013	16.0

Soil Specimen Data		Other Corrections	
Tare No.:	706		
Wt. of Tare & Dry Material (g):	157.05	a - Factor:	0.99
Weight of Tare (g):	99.05		
Weight of Deflocculant (g):	5.0	Percent Finer than # 200:	89.73
Weight of Dry Material (g):	53	Specific Gravity:	2.7 Assumed

Note: Hydrometer test is performed on - # 200 sieve material.

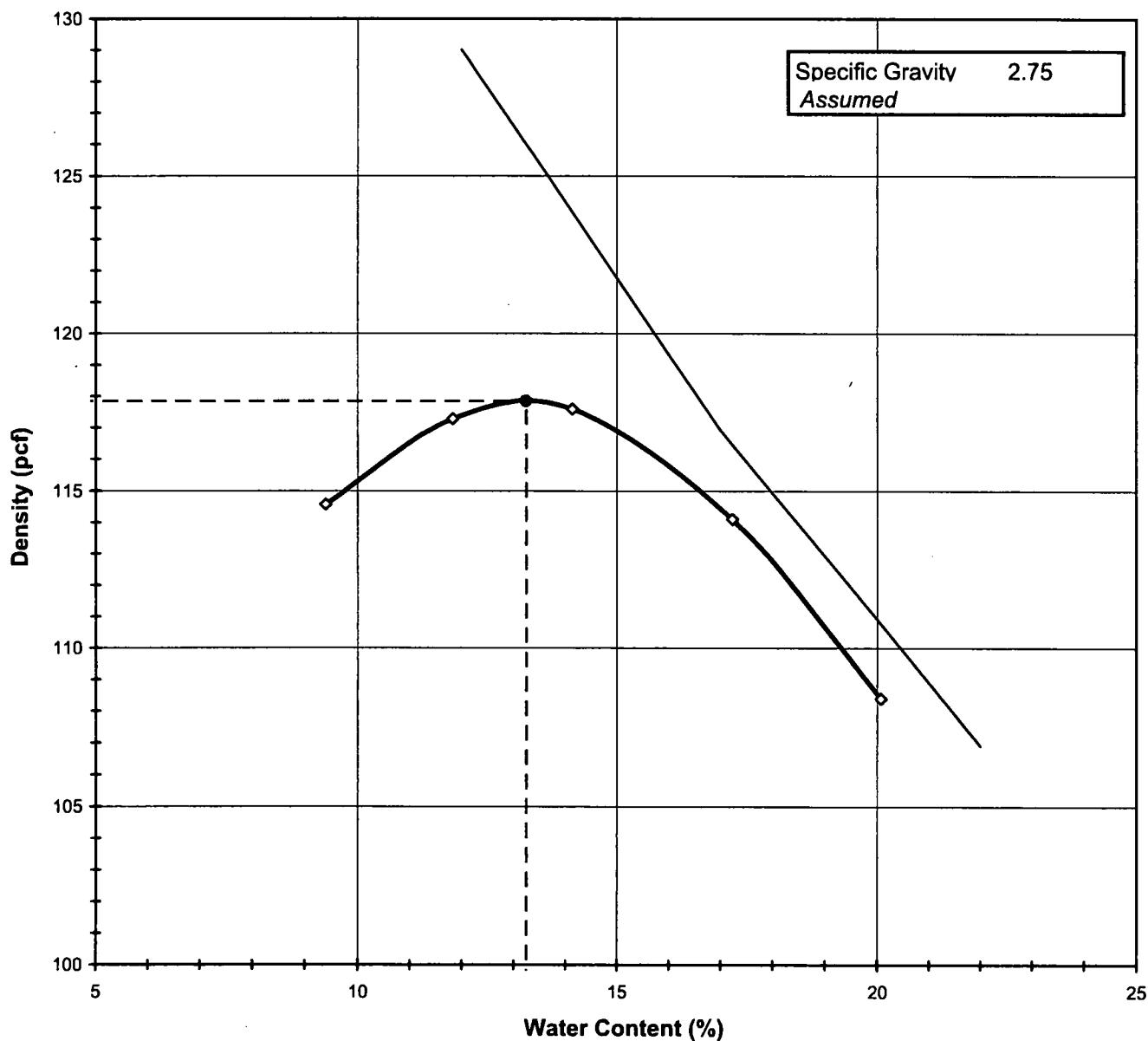
Tested By TO Date 10/1/15 Checked By KC Date 10/14/15  
page 4 of 4 DCN: CT-S3B DATE 09/17/15 BY KARLA PROJECTS CEC|2015-506-001 Central Waste|2015-506-001-010 Grain JSieveHyd.xls|Print Sheet

**MOISTURE DENSITY RELATIONSHIP**
*ASTM D1557-12*

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-011  
 Visual Description: Brown Clay

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-16A  
 Test Method: MODIFIED

**Optimum Water Content** 13.3  
**Maximum Dry Density** 117.9




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Tested By MF Date 10/16/15 Checked By KC Date 10/19/15  
 page 1 of 2 DCN:CT-S12 DATE:5/1/13 REVISION: 14

**MOISTURE - DENSITY RELATIONSHIP**

ASTM D1557-12

Client: CEC Boring No.: 9/17/15  
 Client Reference: Central Waste Closure 153-121 Depth (ft): 0-4  
 Project No.: 2015-506-001 Sample No.: TP-16A  
 Lab ID: 2015-506-001-011

Visual Description: Brown Clay

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.75
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	B

Test Type:	<b>MODIFIED</b>
Rammer Weight (lb):	10.0
Rammer Drop (in):	18
Rammer Type:	MECHANICAL
Machine ID:	G 441
Mold ID:	G 1499
Mold diameter:	4"
Weight of the Mold (g):	4386
Volume of the Mold (cm <sup>3</sup> ):	940

**Mold / Specimen**

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	6274	6362	6408	6401	6347
Weight of Mold (g):	4386	4386	4386	4386	4386
Weight of Wet Sample (g):	1888	1976	2022	2015	1961
Mold Volume (cm <sup>3</sup> ):	940	940	940	940	940

**Moisture Content / Density**

Tare Number:	599	1728	565	1723	887
Weight of Tare & Wet Sample (g):	408.10	420.90	403.75	428.10	427.40
Weight of Tare & Dry Sample (g):	380.29	384.98	363.97	377.40	374.27
Weight of Tare (g):	84.00	81.44	82.73	83.18	109.74
Weight of Water (g):	27.81	35.92	39.78	50.70	53.13
Weight of Dry Sample (g):	296.29	303.54	281.24	294.22	264.53

Wet Density (g/cm <sup>3</sup> ):	2.01	2.10	2.15	2.14	2.09
Wet Density (pcf):	125.3	131.2	134.2	133.8	130.2
Moisture Content (%):	9.4	11.8	14.1	17.2	20.1
Dry Density (pcf):	114.6	117.3	117.6	114.1	108.4

**Zero Air Voids**

Moisture Content (%):	12.0	17.0	22.0
Dry Unit Weight (pcf):	129.0	116.9	106.9

Tested By	MF	Date	10/16/15	Checked By	KC	Date	10/19/15
page 2 of 2							



## SPECIFIC GRAVITY

ASTM D 854-14

Client: CEC  
Client Reference: Central Waste Closure 153-121  
Project No.: 2015-506-001  
Lab ID: 2015-506-001-011

Boring No.: 9/17/15  
Depth (ft): 0-4  
Sample No.: TP-16A  
Visual Description: Brown Clay

(Minus No.4 sieve material, oven dried)

### Replicate Number

	1	2
Pycnometer ID:	G 1255	G 1504
Weight of Pycnometer & Soil & Water (g):	747.89	735.12
Temperature (°C):	23.7	23.8
Weight of Pycnometer & Water (g):	685.25	672.40
Tare Number:	2337	1465
Weight of Tare & Dry Soil (g):	195.06	197.57
Weight of Tare (g):	95.36	97.71
Weight of Dry Soil (g):	99.70	99.86
Specific Gravity of Soil @ Measured Temperature:	2.690	2.689
Specific Gravity of Water @ Measured Temperature:	0.99738	0.99735
Conversion Factor for Measured Temperature:	0.99917	0.99914
Specific Gravity @ 20° Celsius:	2.693	2.691

Average Specific Gravity @ 20° Celsius	2.69
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Tested By      TO      Date      10/2/15      Checked By      CLK      Date      10/9/15

DCN: CT-S5 Date: 3/5/14 Revision: 20

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## ATTERBERG LIMITS

ASTM D 4318-10

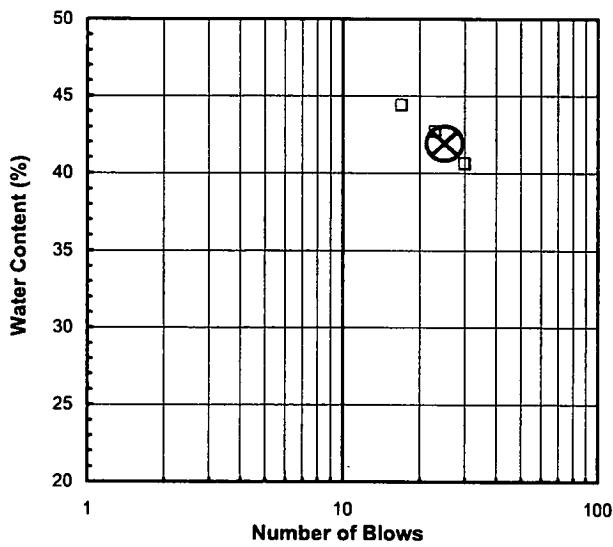
Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-011  
 Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-16A  
 Soil Description: BROWN LEAN CLAY

*Note: The USCS symbol used with this test refers only to the minus No. 40 (Minus No. 40 sieve material, Airdried) sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.*

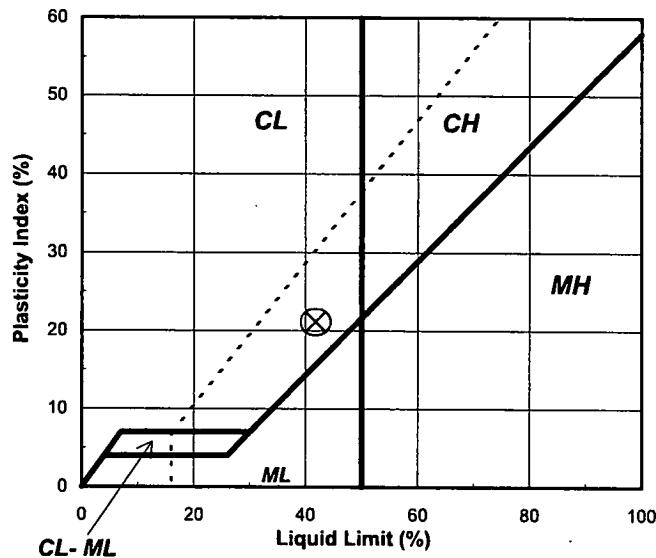
Liquid Limit Test	1	2	3	
Tare Number:	401	347	457	M
Wt. of Tare & Wet Sample (g):	40.72	39.84	34.67	U
Wt. of Tare & Dry Sample (g):	34.87	33.56	27.89	L
Weight of Tare (g):	20.45	18.84	12.61	T
Weight of Water (g):	5.9	6.3	6.8	I
Weight of Dry Sample (g):	14.4	14.7	15.3	P
Moisture Content (%):	40.6	42.7	44.4	O
Number of Blows:	30	23	17	I
				N
				T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	316	1273		Liquid Limit (%): 42
Wt. of Tare & Wet Sample (g):	24.62	27.97		Plastic Limit (%): 21
Wt. of Tare & Dry Sample (g):	23.54	26.92		Plasticity Index (%): 21
Weight of Tare (g):	18.34	21.88		USCS Symbol: CL
Weight of Water (g):	1.1	1.1		
Weight of Dry Sample (g):	5.2	5.0		
Moisture Content (%):	20.8	20.8	-0.1	
<i>Note: The acceptable range of the two Moisture contents is ± 2.6</i>				

Flow Curve



Plasticity Chart



Tested By TO Date 10/9/15 Checked By CLK Date 10/10/15

page 1 of 1 DCN: CTS4B, REV. 4, 3/18/13

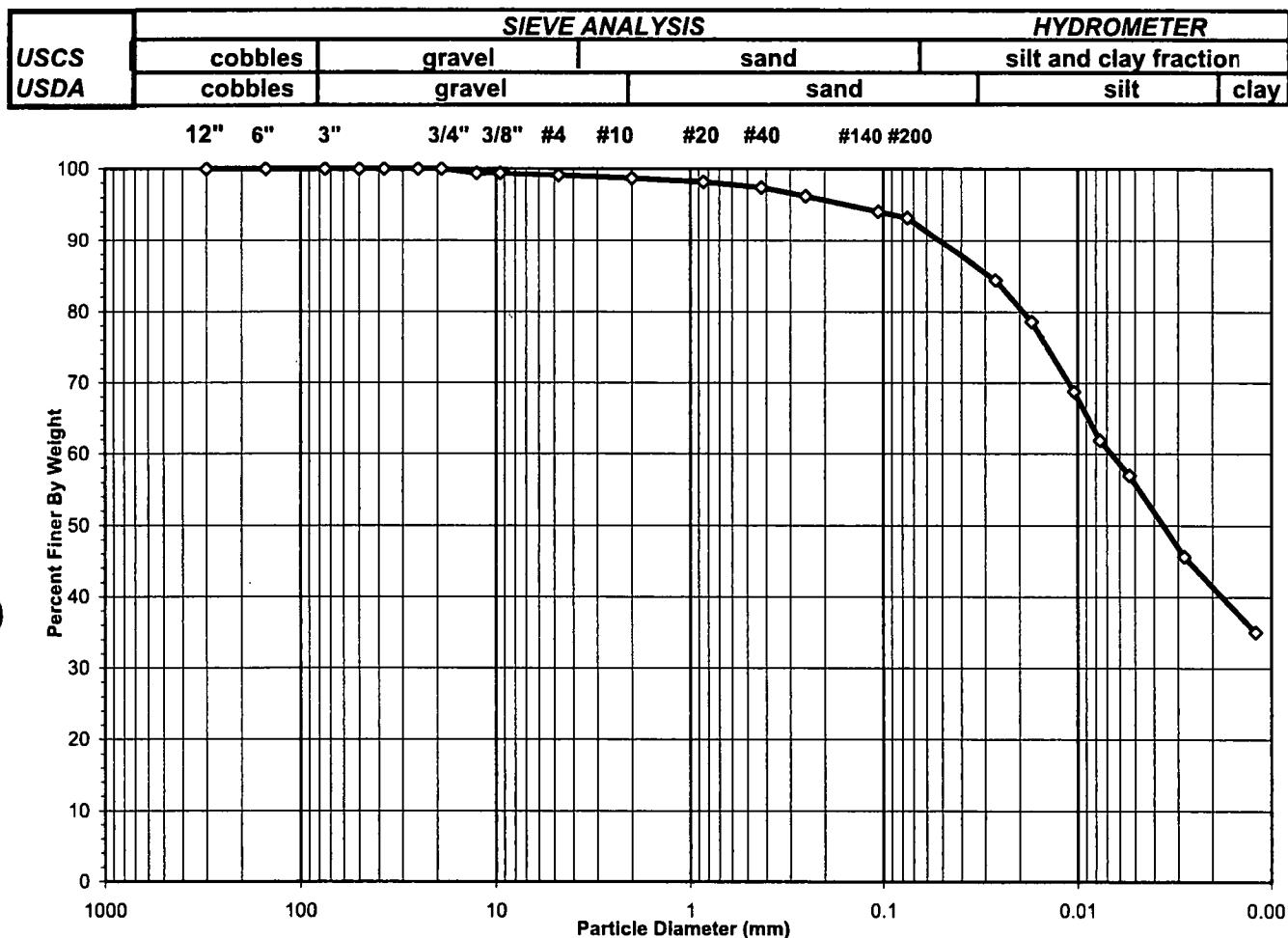
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**SIEVE AND HYDROMETER ANALYSIS**

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-011

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-16A  
 Soil Color: Brown

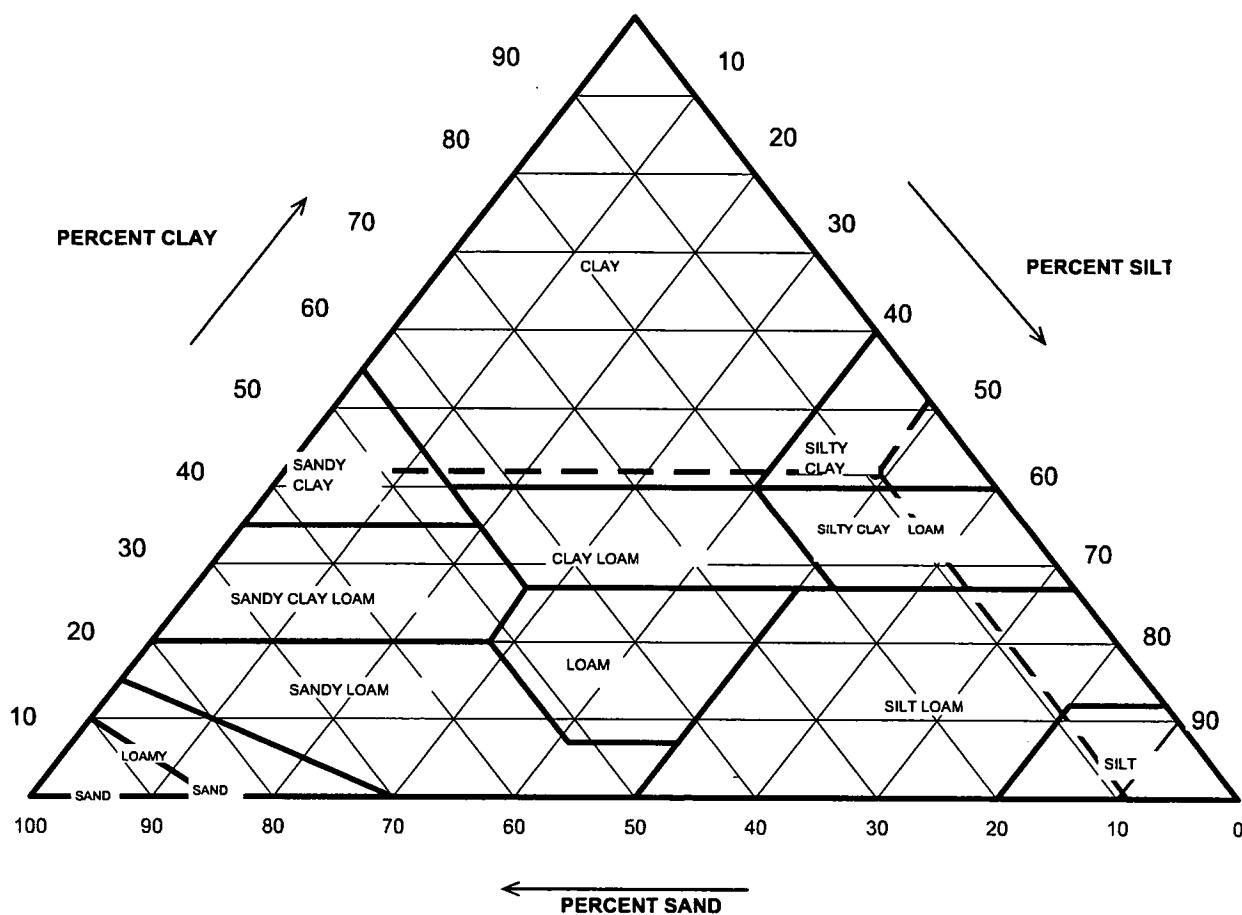


USCS Summary		
Sieve Sizes (mm)	Percentage	
Greater Than #4	Gravel	0.82
#4 To #200	Sand	5.93
Finer Than #200	Silt & Clay	93.25
<b>USCS Symbol:</b>		
<b>CL, TESTED</b>		
<b>USCS Classification:</b>		
<b>LEAN CLAY</b>		

### USDA CLASSIFICATION CHART

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-011

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-16A  
 Soil Color: Brown



Particle Size (mm)	Percent Finer (%)	USDA SUMMARY	Actual Percentage (%)	Corrected % of Minus 2.0 mm material for USDA Classificat.
2	98.72	Gravel	1.28	0.00
0.05	89.81	Sand	8.91	9.03
0.002	41.49	Silt	48.31	48.94
		Clay	41.49	42.03
<b>USDA Classification: SILTY CLAY</b>				

## WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-011

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-16A  
 Soil Color: Brown

Moisture Content of Passing 3/4" Material			Water Content of Retained 3/4" Material				
Tare No.	12		Tare No.				NA
Weight of Tare & Wet Sample (g)	1091.70		Weight of Tare & Wet Sample (g)				NA
Weight of Tare & Dry Sample (g)	1058.90		Weight of Tare & Dry Sample (g)				NA
Weight of Tare (g)	202.67		Weight of Tare (g)				NA
Weight of Water (g)	32.80		Weight of Water (g)				NA
Weight of Dry Sample (g)	856.23		Weight of Dry Sample (g)				NA
<b>Moisture Content (%)</b>	<b>3.8</b>		<b>Moisture Content (%)</b>				<b>NA</b>
Wet Weight of -3/4" Sample (g)	NA		Weight of the Dry Sample (g)				856.23
Dry Weight of -3/4" Sample (g)	57.82		Weight of - #200 Material (g)				798.41
Wet Weight of +3/4" Sample (g)	NA		Weight of + #200 Material (g)				57.82
Dry Weight of +3/4" Sample (g)	0.00						
Total Dry Weight of Sample (g)	NA						
Sieve Size	Sieve Opening	Weight of Soil Retained	Percent Retained	Accumulated Percent Retained		Percent Finer	Accumulated Percent Finer
	(mm)	(g)	(%)	(%)		(%)	(%)
12"	300	0.00	0.00	0.00		100.00	100.00
6"	150	0.00	0.00	0.00		100.00	100.00
3"	75	0.00	0.00	0.00		100.00	100.00
2"	50	0.00	0.00	0.00		100.00	100.00
1 1/2"	37.5	0.00	0.00	0.00		100.00	100.00
1"	25.0	0.00	0.00	0.00		100.00	100.00
3/4"	19.0	0.00	0.00	0.00		100.00	100.00
1/2"	12.5	5.24	0.61	0.61		99.39	99.39
3/8"	9.50	0.00	0.00	0.61		99.39	99.39
#4	4.75	1.77	0.21	0.82		99.18	99.18
#10	2.00	3.96	0.46	1.28		98.72	98.72
#20	0.85	4.62	0.54	1.82		98.18	98.18
#40	0.425	6.17	0.72	2.54		97.46	97.46
#60	0.250	10.72	1.25	3.79		96.21	96.21
#140	0.106	18.50	2.16	5.95		94.05	94.05
#200	0.075	6.84	0.80	6.75		93.25	93.25
Pan	-	798.41	93.25	100.00		-	-

Tested By	PC	Date	10/2/15	Checked By	KC	Date	10/14/15
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## HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-011

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-16A  
 Soil Color: Brown

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N'
0	NA	NA	NA	NA	NA	NA	NA	NA
2	49.5	22.1	6.33	43.2	90.5	0.01311	0.0265	84.4
5	46.5	22.1	6.33	40.2	84.2	0.01311	0.0173	78.6
15	41.5	22.1	6.33	35.2	73.8	0.01311	0.0104	68.8
30	38.0	22.1	6.33	31.7	66.4	0.01311	0.0076	61.9
63	35.5	22.1	6.33	29.2	61.2	0.01311	0.0053	57.0
250	29.5	22.6	6.15	23.4	49.0	0.01303	0.0028	45.7
1440	24.0	22.9	6.04	18.0	37.7	0.01299	0.0012	35.1

Soil Specimen Data		Other Corrections		
Tare No.	1092			
Weight of Tare & Dry Material (g)	151.29	a - Factor		0.99
Weight of Tare (g)	99.08			
Weight of Deflocculant (g)	5.0	Percent Finer than # 200		93.25
Weight of Dry Material (g)	47.2	Specific Gravity	2.7	Assumed

**Note:** Hydrometer test is performed on - # 200 sieve material.

Tested By	TO	Date	10/6/15	Checked By	KC	Date	10/14/15
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page 4 of 4

DCN: CT-S3A DATE: 3/18/13 REVISION: 11

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**MOISTURE DENSITY RELATIONSHIP**

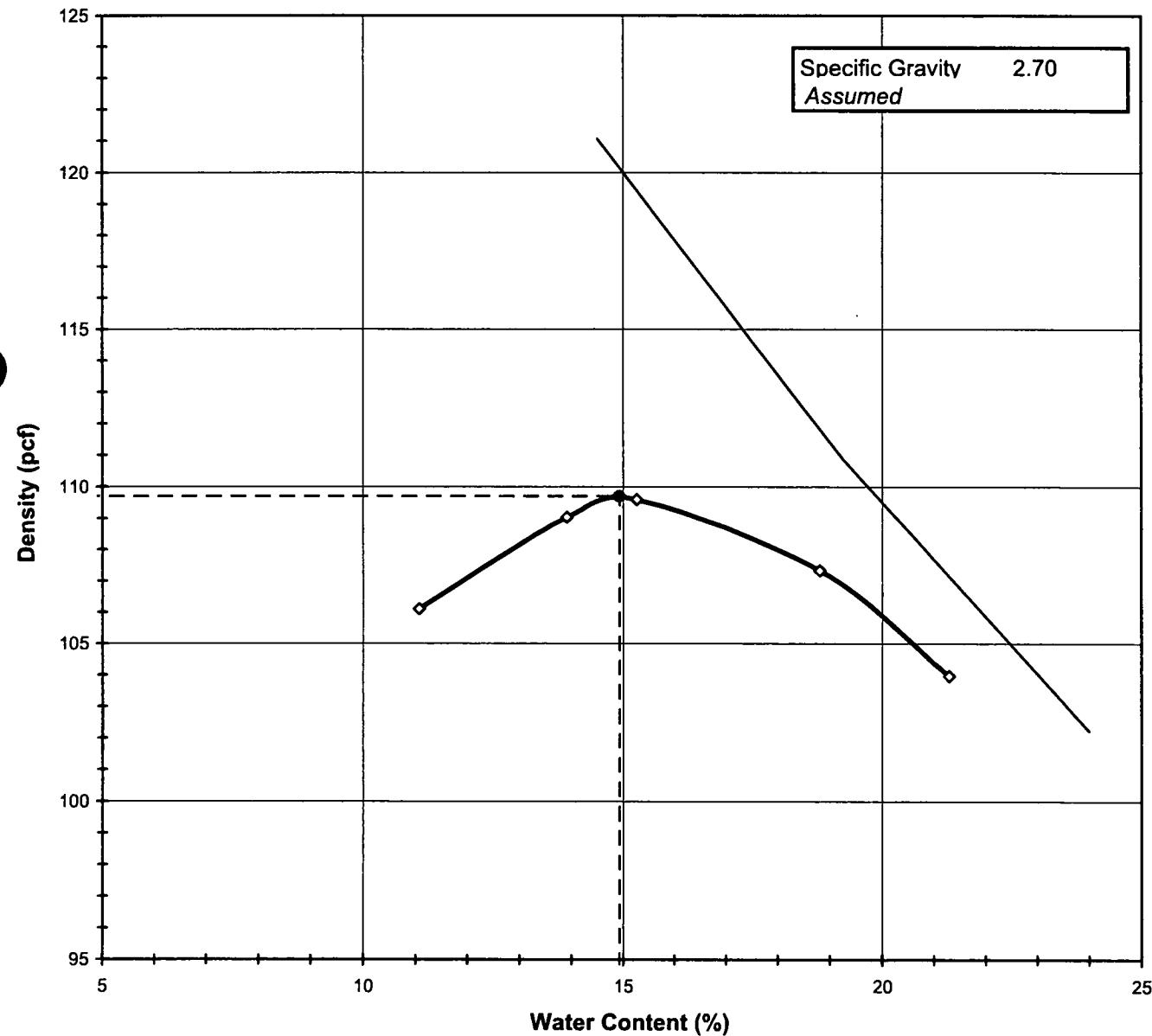
ASTM D698-12

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	4-8
Project No.:	2015-506-001	Sample No.:	TP-16B
Lab ID:	2015-506-001-012	Test Method	<b>STANDARD</b>
Visual Description: Brown Clay			

**Optimum Water Content  
Maximum Dry Density**

14.9

109.7



Tested By

SGB

Date

10/12/15

Checked By

KC

Date

10/13/15

**MOISTURE - DENSITY RELATIONSHIP**

ASTM D698-12

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-012

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-16B

Visual Description: Brown Clay

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.70
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	B

Test Type:	<b>STANDARD</b>
Rammer Weight (lb):	5.5
Rammer Drop (in):	12
Rammer Type:	MECHANICAL
Machine ID:	G 774
Mold ID:	G 606
Mold diameter:	4"
Weight of the Mold (g):	4139
Volume of the Mold (cm <sup>3</sup> ):	943

**Mold / Specimen**

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	5920	6016	6048	6066	6045
Weight of Mold (g):	4139	4139	4139	4139	4139
Weight of Wet Sample (g):	1781	1877	1909	1927	1906
Mold Volume (cm <sup>3</sup> ):	943	943	943	943	943

**Moisture Content / Density**

Tare Number:	569	1710	1706	917	562
Weight of Tare & Wet Sample (g):	339.45	328.71	382.70	388.98	346.99
Weight of Tare & Dry Sample (g):	313.88	298.58	342.97	344.81	300.85
Weight of Tare (g):	83.03	82.06	82.75	109.87	84.30
Weight of Water (g):	25.57	30.13	39.73	44.17	46.14
Weight of Dry Sample (g):	230.85	216.52	260.22	234.94	216.55

Wet Density (g/cm <sup>3</sup> ):	1.89	1.99	2.02	2.04	2.02
Wet Density (pcf):	117.9	124.2	126.3	127.5	126.1
Moisture Content (%):	11.1	13.9	15.3	18.8	21.3
Dry Density (pcf):	106.1	109.0	109.6	107.3	104.0

**Zero Air Voids**

Moisture Content (%):	14.5	19.3	24.0
Dry Unit Weight (pcf):	121.1	110.9	102.2

Tested By	SGB	Date	10/12/15	Checked By	KC	Date	10/13/15
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## SPECIFIC GRAVITY

ASTM D 854-14

Client: CEC Boring No.: 9/17/15  
Client Reference: Central Waste Closure 153-121 Depth (ft): 4-8  
Project No.: 2015-506-001 Sample No.: TP-16B  
Lab ID: 2015-506-001-012 Visual Description: Brown Clay

(Minus No.4 sieve material, oven dried)

### Replicate Number

1

2

Pycnometer ID:	G	1255	G	1504
Weight of Pycnometer & Soil & Water (g):		748.14		734.36
Temperature (°C):		26.1		26.5
Weight of Pycnometer & Water (g):		684.94		672.05
Tare Number:		950		1681
Weight of Tare & Dry Soil (g):		200.4		197.24
Weight of Tare (g):		99.6		97.71
Weight of Dry Soil (g):		100.80		99.53
Specific Gravity of Soil @ Measured Temperature:		2.681		2.674
Specific Gravity of Water @ Measured Temperature:		0.99677		0.99666
Conversion Factor for Measured Temperature:		0.99856		0.99845
Specific Gravity @ 20° Celsius:		2.684		2.678

Average Specific Gravity @ 20° Celsius

2.68

Tested By      TO      Date      10/2/15      Checked By      CLK      Date      10/9/15

DCN: CT-S5 Date: 3/5/14 Revision: 20

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**ATTERBERG LIMITS**

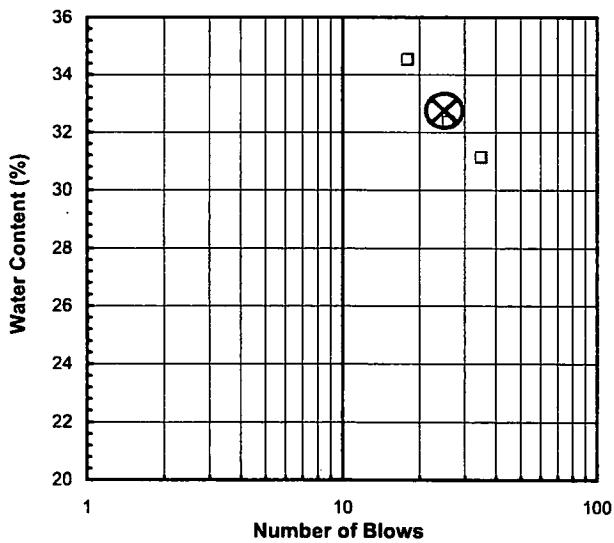
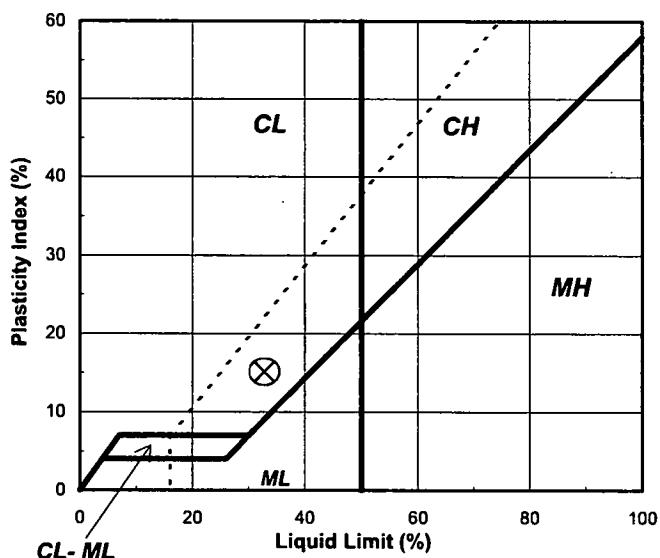
ASTM D 4318-10

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-012  
 Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-16B  
 Soil Description: BROWN LEAN CLAY

*Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material, Airdried*  
*sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.*

Liquid Limit Test	1	2	3	
Tare Number:	241	161	144	M
Wt. of Tare & Wet Sample (g):	38.85	38.66	38.56	U
Wt. of Tare & Dry Sample (g):	33.63	33.57	33.46	L
Weight of Tare (g):	18.51	17.84	17.07	T
Weight of Water (g):	5.2	5.1	5.1	I
Weight of Dry Sample (g):	15.1	15.7	16.4	P
Moisture Content (%):	34.5	32.4	31.1	O
Number of Blows:	18	26	35	N
				T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	335	2		Liquid Limit (%): 33
Wt. of Tare & Wet Sample (g):	25.80	25.58		Plastic Limit (%): 18
Wt. of Tare & Dry Sample (g):	24.87	24.64		Plasticity Index (%): 15
Weight of Tare (g):	19.70	19.47		USCS Symbol: CL
Weight of Water (g):	0.9	0.9		
Weight of Dry Sample (g):	5.2	5.2		
Moisture Content (%):	18.0	18.2	-0.2	
Note: The acceptable range of the two Moisture contents is $\pm 2.6$				

**Flow Curve**

**Plasticity Chart**


Tested By RAL Date 10/9/15 Checked By CLK Date 10/10/15

page 1 of 1 DCN: CTS4B, REV. 4, 3/18/13

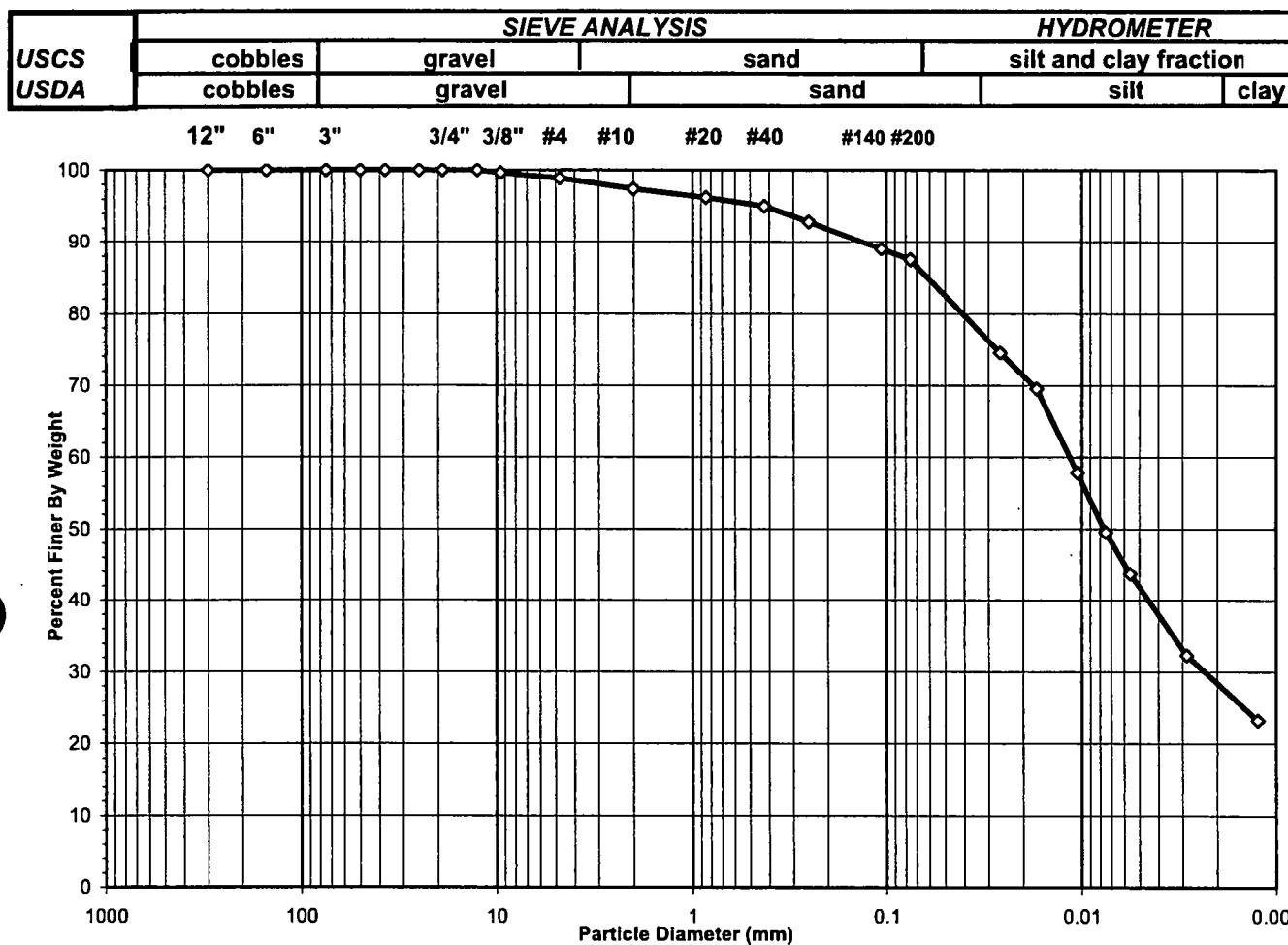
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**SIEVE AND HYDROMETER ANALYSIS**

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-012

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-16B  
 Soil Color: Brown

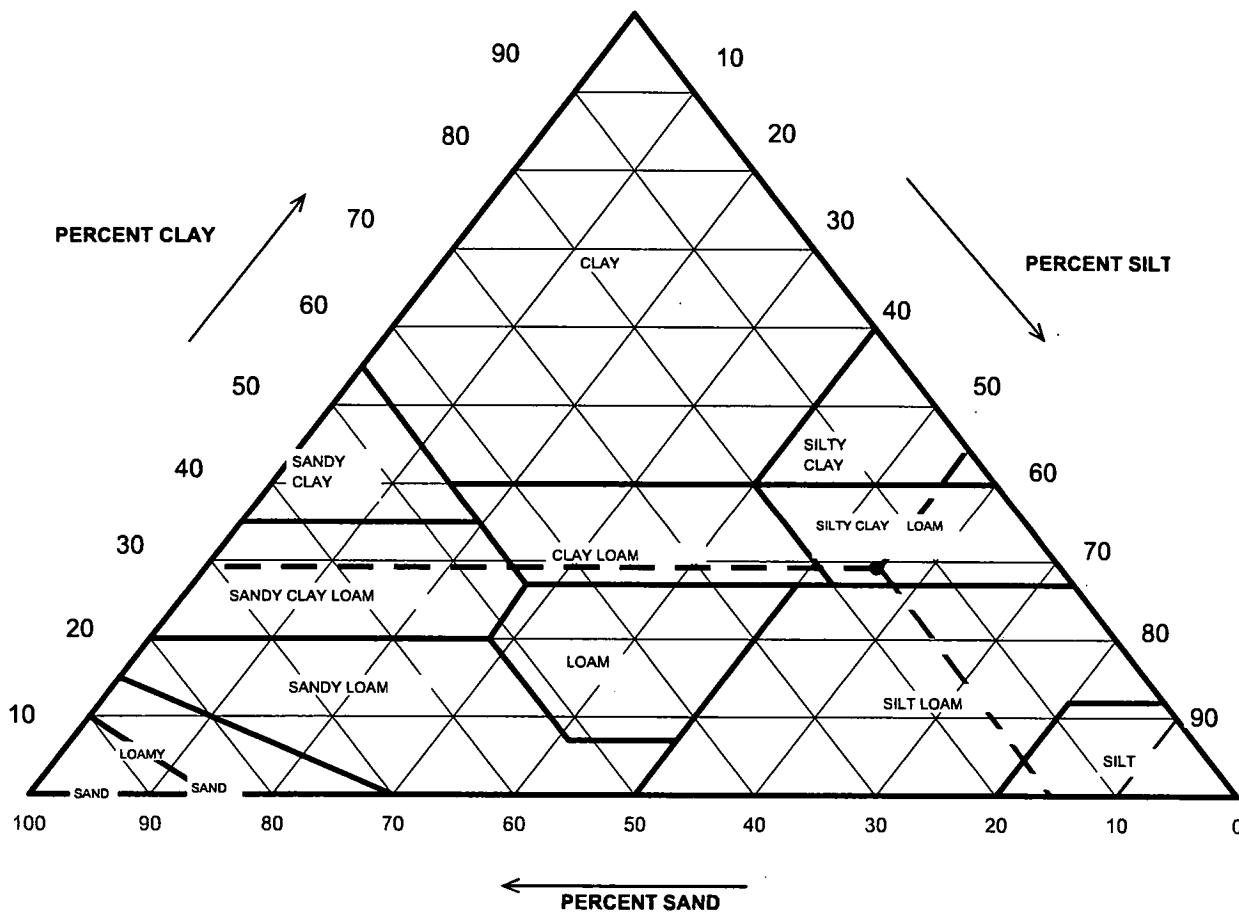


USCS Summary		
Sieve Sizes (mm)	Percentage	
Greater Than #4	Gravel	1.11
#4 To #200	Sand	11.38
Finer Than #200	Silt & Clay	87.51
<b>USCS Symbol:</b>		
<b>CL, TESTED</b>		
<b>USCS Classification:</b>		
<b>LEAN CLAY</b>		

### USDA CLASSIFICATION CHART

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-012

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-16B  
 Soil Color: Brown



Particle Size (mm)	Percent Finer (%)	USDA SUMMARY	Actual Percentage (%)	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	2.57	(%)
2	97.43	Sand	14.90	0.00
0.05	82.53	Silt	54.09	15.29
0.002	28.45	Clay	28.45	55.51
<b>USDA Classification:</b> <b>SILTY CLAY LOAM</b>				

## WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-012

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-16B  
 Soil Color: Brown

Moisture Content of Passing 3/4" Material			Water Content of Retained 3/4" Material				
Tare No.	55		Tare No.				NA
Weight of Tare & Wet Sample (g)	1052.70		Weight of Tare & Wet Sample (g)				NA
Weight of Tare & Dry Sample (g)	1022.30		Weight of Tare & Dry Sample (g)				NA
Weight of Tare (g)	203.83		Weight of Tare (g)				NA
Weight of Water (g)	30.40		Weight of Water (g)				NA
Weight of Dry Sample (g)	818.47		Weight of Dry Sample (g)				NA
<b>Moisture Content (%)</b>	<b>3.7</b>		<b>Moisture Content (%)</b>				<b>NA</b>
Wet Weight of -3/4" Sample (g)	NA		Weight of the Dry Sample (g)				818.47
Dry Weight of -3/4" Sample (g)	102.21		Weight of - #200 Material (g)				716.26
Wet Weight of +3/4" Sample (g)	NA		Weight of + #200 Material (g)				102.21
Dry Weight of +3/4" Sample (g)	0.00						
Total Dry Weight of Sample (g)	NA						
Sieve Size	Sieve Opening	Weight of Soil Retained	Percent Retained	Accumulated Percent Retained		Percent Finer	Accumulated Percent Finer
	(mm)	(g)	(%)	(%)		(%)	(%)
12"	300	0.00	0.00	0.00		100.00	100.00
6"	150	0.00	0.00	0.00		100.00	100.00
3"	75	0.00	0.00	0.00		100.00	100.00
2"	50	0.00	0.00	0.00		100.00	100.00
1 1/2"	37.5	0.00	0.00	0.00		100.00	100.00
1"	25.0	0.00	0.00	0.00		100.00	100.00
3/4"	19.0	0.00	0.00	0.00		100.00	100.00
1/2"	12.5	0.00	0.00	0.00		100.00	100.00
3/8"	9.50	2.49	0.30	0.30		99.70	99.70
#4	4.75	6.58	0.80	1.11		98.89	98.89
#10	2.00	11.94	1.46	2.57		97.43	97.43
#20	0.85	9.77	1.19	3.76		96.24	96.24
#40	0.425	10.19	1.25	5.01		94.99	94.99
#60	0.250	17.16	2.10	7.10		92.90	92.90
#140	0.106	31.90	3.90	11.00		89.00	89.00
#200	0.075	12.18	1.49	12.49		87.51	87.51
Pan	-	716.26	87.51	100.00		-	-

Tested By	PC	Date	10/2/15	Checked By	KC	Date	10/14/15
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## HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-012

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-16B  
 Soil Color: Brown

Elapsed Time (min)	R Measured (°C)	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	51.0	22.1	6.33	44.7	85.2	0.01311	0.0261	74.6
5	48.0	22.1	6.33	41.7	79.5	0.01311	0.0170	69.6
15	41.0	22.1	6.33	34.7	66.1	0.01311	0.0105	57.9
32	36.0	22.1	6.33	29.7	56.6	0.01311	0.0075	49.5
60	32.5	22.1	6.33	26.2	49.9	0.01311	0.0056	43.7
250	25.5	22.6	6.15	19.4	36.9	0.01303	0.0029	32.3
1440	20.0	22.9	6.04	14.0	26.6	0.01299	0.0012	23.3

Soil Specimen Data		Other Corrections		
Tare No.	952			
Weight of Tare & Dry Material (g)	158.88	a - Factor		0.99
Weight of Tare (g)	101.97			
Weight of Deflocculant (g)	5.0	Percent Finer than # 200		87.51
Weight of Dry Material (g)	51.9	Specific Gravity	2.7	Assumed

**Note:** Hydrometer test is performed on - # 200 sieve material.

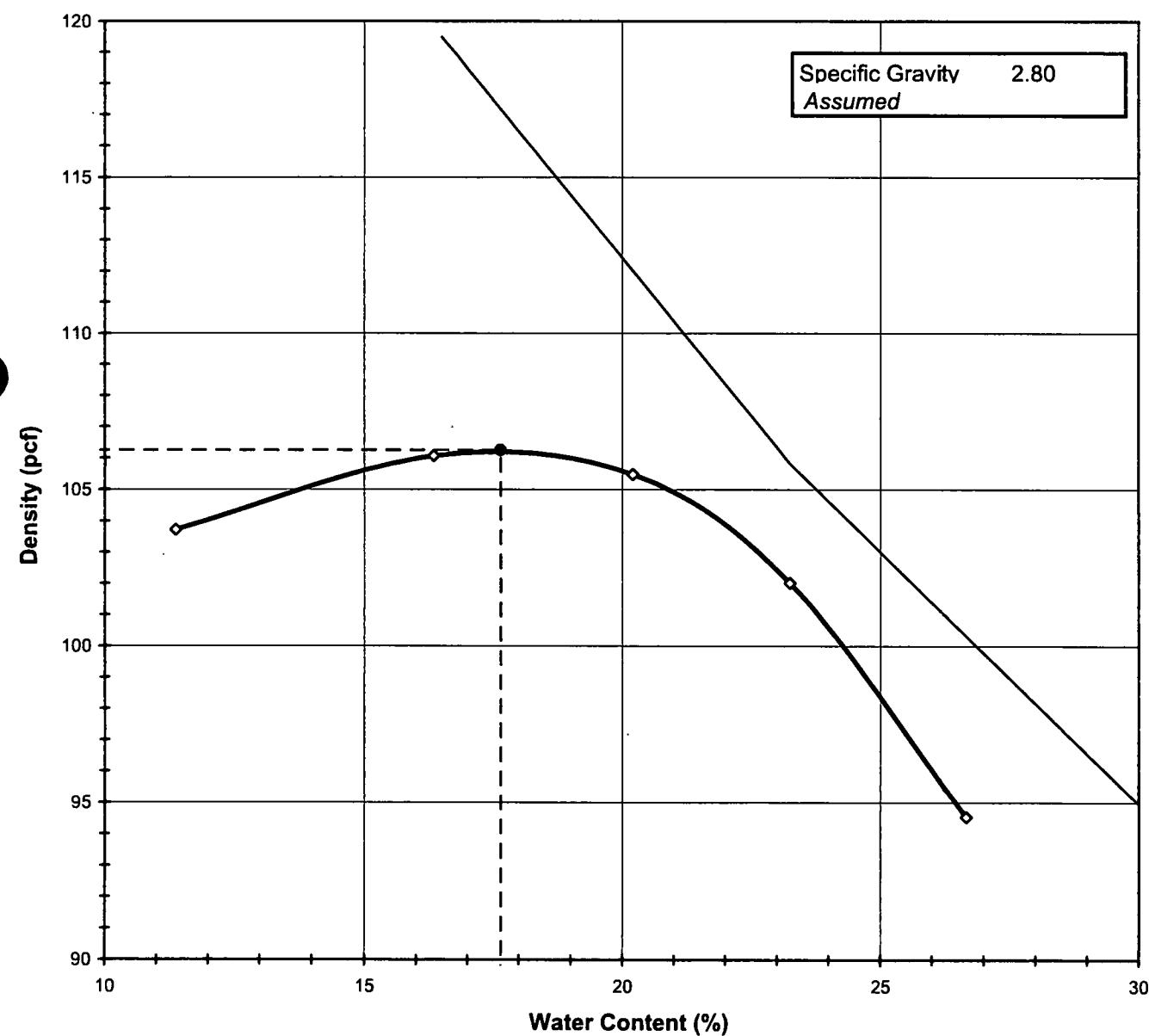
**MOISTURE DENSITY RELATIONSHIP**

ASTM D698-12

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	0-4
Project No.:	2015-506-001	Sample No.:	TP-17A
Lab ID:	2015-506-001-013	Test Method	<b>STANDARD</b>

Visual Description: Brown Clay with small amount of Rock Fragments

<b>Optimum Water Content</b>	<b>17.7</b>
<b>Maximum Dry Density</b>	<b>106.3</b>



Tested By	HL	Date	10/12/15	Checked By	KC	Date	10/13/15
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page 1 of 2 DCN:CT-S12 DATE:5/1/13 REVISION: 14

**MOISTURE - DENSITY RELATIONSHIP**

ASTM D698-12

Client: CEC                              Boring No.: 9/17/15  
 Client Reference: Central Waste Closure 153-121              Depth (ft): 0-4  
 Project No.: 2015-506-001              Sample No.: TP-17A  
 Lab ID: 2015-506-001-013

Visual Description: Brown Clay with small amount of Rock Fragments

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.80
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	B

Test Type:	<b>STANDARD</b>
Rammer Weight (lb):	5.5
Rammer Drop (in):	12
Rammer Type:	MECHANICAL
Machine ID:	G 774
Mold ID:	G 1499
Mold diameter:	4"
Weight of the Mold (g):	4388
Volume of the Mold (cm <sup>3</sup> ):	940

**Mold / Specimen**

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	6128	6247	6298	6282	6192
Weight of Mold (g):	4388	4388	4388	4388	4388
Weight of Wet Sample (g):	1740	1859	1910	1894	1804
Mold Volume (cm <sup>3</sup> ):	940	940	940	940	940

**Moisture Content / Density**

Tare Number:	881	7	898	1701	596
Weight of Tare & Wet Sample (g):	482.70	433.80	452.10	450.70	452.00
Weight of Tare & Dry Sample (g):	444.70	383.35	394.60	380.95	374.76
Weight of Tare (g):	110.39	74.70	109.90	81.00	85.20
Weight of Water (g):	38.00	50.45	57.50	69.75	77.24
Weight of Dry Sample (g):	334.31	308.65	284.70	299.95	289.56

Wet Density (g/cm <sup>3</sup> ):	1.85	1.98	2.03	2.01	1.92
Wet Density (pcf):	115.5	123.4	126.8	125.7	119.8
Moisture Content (%):	11.4	16.3	20.2	23.3	26.7
Dry Density (pcf):	103.7	106.1	105.5	102.0	94.5

**Zero Air Voids**

Moisture Content (%):	16.5	23.3	30.0
Dry Unit Weight (pcf):	119.5	105.8	95.0

Tested By	HL	Date	10/12/15	Checked By	KC	Date	10/13/15
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page 2 of 2

DCN:CT-S12 DATE:5/1/13 REVISION: 14

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## SPECIFIC GRAVITY

ASTM D 854-14

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	0-4
Project No.:	2015-506-001	Sample No.:	TP-17A
Lab ID:	2015-506-001-013	Visual Description: Brown Clay	

(Minus No.4 sieve material, oven dried)

### Replicate Number

	1	2
Pycnometer ID:	G      1255	G      1504
Weight of Pycnometer & Soil & Water (g):	747.8	735.1
Temperature (°C):	26.3	26.7
Weight of Pycnometer & Water (g):	684.92	672.02
Tare Number:	637	2485
Weight of Tare & Dry Soil (g):	196.95	191.39
Weight of Tare (g):	96.92	90.85
Weight of Dry Soil (g):	100.03	100.54
Specific Gravity of Soil @ Measured Temperature:	2.693	2.684
Specific Gravity of Water @ Measured Temperature:	0.99671	0.99660
Conversion Factor for Measured Temperature:	0.99850	0.99839
Specific Gravity @ 20° Celsius:	2.697	2.688

Average Specific Gravity @ 20° Celsius	2.69
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Tested By	TO	Date	10/2/15	Checked By	CLK	Date	10/9/15
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DCN: CT-S5 Date: 3/5/14 Revision: 20

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## ATTERBERG LIMITS

ASTM D 4318-10

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-013

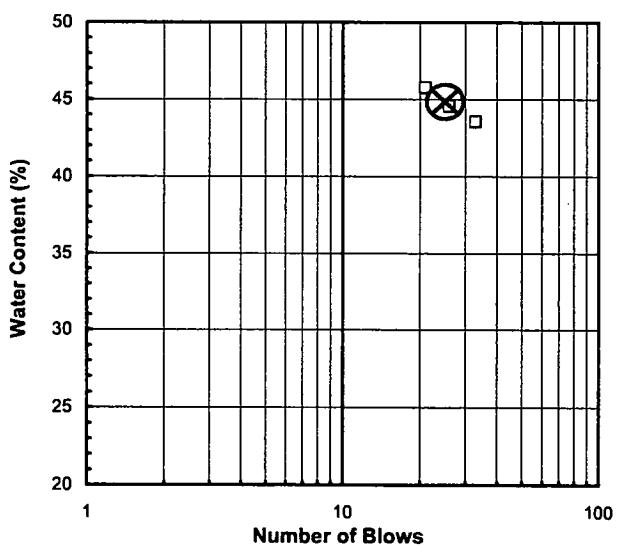
Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-17A  
 Soil Description: BROWN LEAN CLAY

**Note:** The USCS symbol used with this test refers only to the minus No. 40 (Minus No. 40 sieve material, Airdried) sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

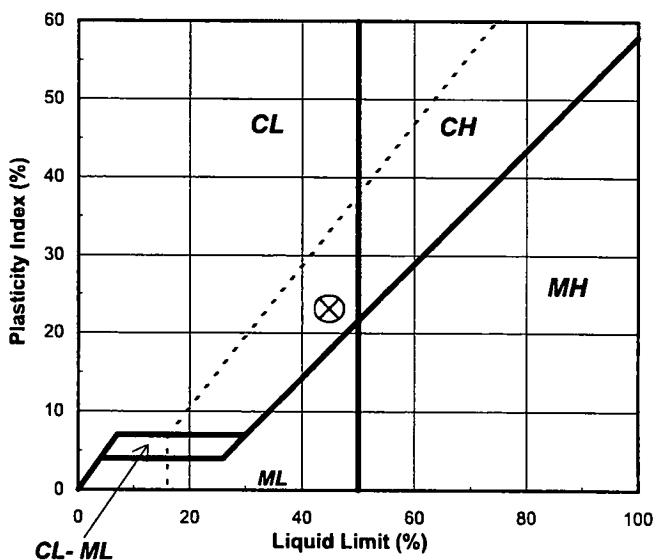
Liquid Limit Test	1	2	3	
Tare Number:	103	146	242	M
Wt. of Tare & Wet Sample (g):	39.16	39.24	40.83	U
Wt. of Tare & Dry Sample (g):	32.64	32.99	34.02	L
Weight of Tare (g):	17.66	18.95	19.13	T
Weight of Water (g):	6.5	6.3	6.8	I
Weight of Dry Sample (g):	15.0	14.0	14.9	P
Moisture Content (%):	43.5	44.5	45.7	O
Number of Blows:	33	26	21	N
				T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	12	222		Liquid Limit (%): 45
Wt. of Tare & Wet Sample (g):	26.02	24.82		Plastic Limit (%): 22
Wt. of Tare & Dry Sample (g):	24.89	23.72		Plasticity Index (%): 23
Weight of Tare (g):	19.74	18.60		USCS Symbol: CL
Weight of Water (g):	1.1	1.1		
Weight of Dry Sample (g):	5.2	5.1		
Moisture Content (%):	21.9	21.5	0.5	
<i>Note: The acceptable range of the two Moisture contents is ± 2.6</i>				

Flow Curve



Plasticity Chart



Tested By JP Date 10/9/15 Checked By CLK Date 10/10/15

page 1 of 1 DCN: CTS4B, REV. 4, 3/18/13

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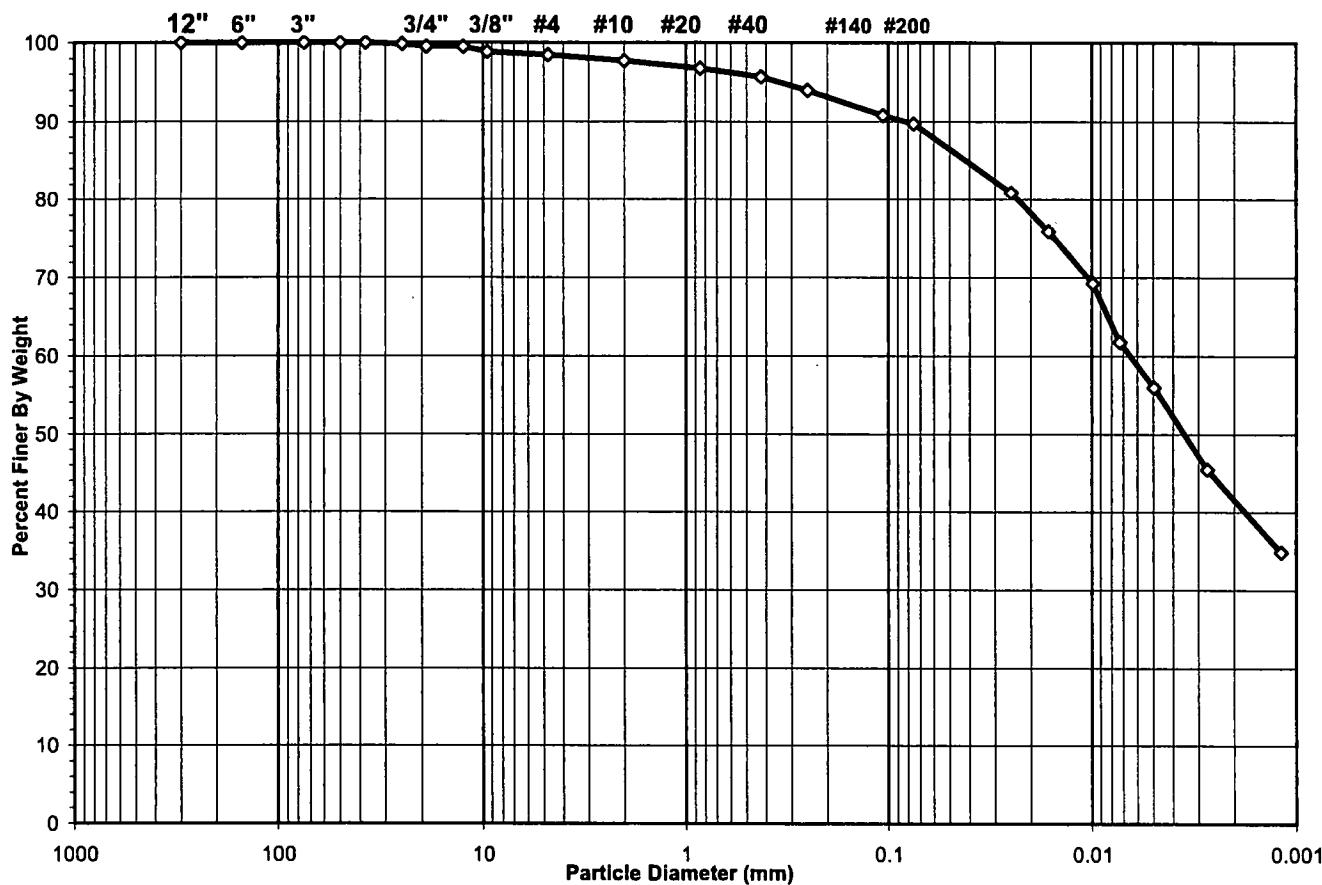
**SIEVE AND HYDROMETER ANALYSIS**  
ASTM D 422-63 (2007)



Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-013

Boring No.: 9/17/16  
 Depth (ft): 0-4  
 Sample No.: TP-17A  
 Soil Color: Brown

USCS USDA	SIEVE ANALYSIS					HYDROMETER		
	cobbles	gravel	sand			silt and clay fraction		
	cobbles	gravel	sand			silt	clay	



USCS Summary		
Sieve Sizes (mm)	Percentage	
Greater Than #4	Gravel	1.56
#4 To #200	Sand	8.72
Finer Than #200	Silt & Clay	89.72

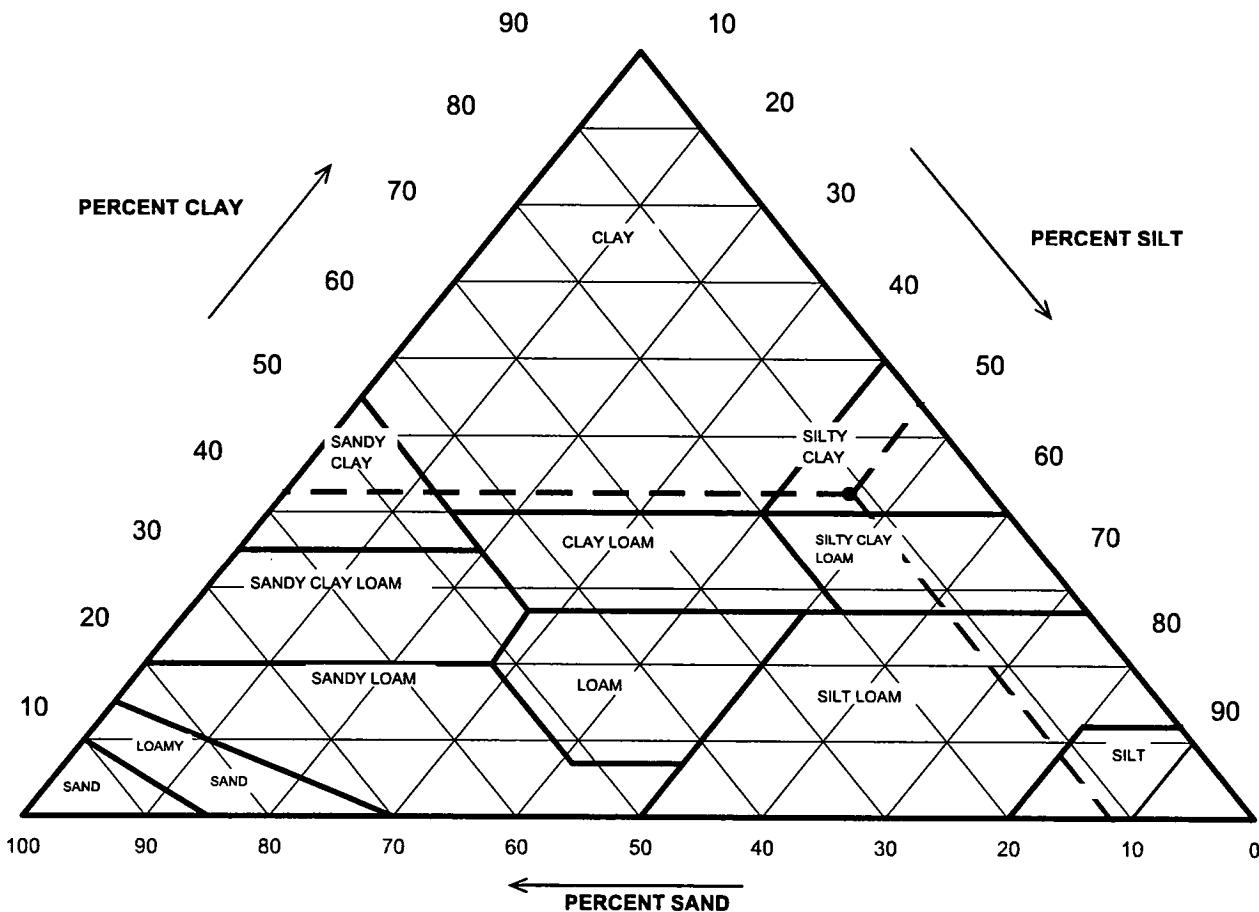
  

<b>USCS Symbol:</b> <i>CL, TESTED</i>
<b>USCS Classification:</b> <i>LEAN CLAY</i>

## USDA CLASSIFICATION CHART

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-013

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-17A  
 Soil Color: Brown



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
2	97.76	Gravel	2.24	0.00
0.05	86.47	Sand	11.29	11.55
0.002	41.59	Silt	44.88	45.91
		Clay	41.59	42.54
<b>USDA Classification: SILTY CLAY</b>				

# WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)



Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-013

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-17A  
 Soil Color: Brown

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.:	1451	Tare No.:	18
Wt. of Tare & Wet Sample (g):	1059.90	Weight of Tare & Wet Sample (g):	95.27
Wt. of Tare & Dry Sample (g):	1028.70	Weight of Tare & Dry Sample (g):	93.24
Weight of Tare (g):	144.80	Weight of Tare (g):	6.87
Weight of Water (g):	31.20	Weight of Water (g):	2.03
Weight of Dry Soil (g):	883.90	Weight of Dry Soil (g):	86.37
<b>Moisture Content (%):</b>	<b>3.5</b>	<b>Moisture Content (%):</b>	<b>2.4</b>

Wet Weight of -3/4" Sample (g):	16959	Weight of the Dry Sample (g):	883.90
Dry Weight of - 3/4" Sample (g):	16380.8	Weight of Minus #200 Material (g):	797.24
Wet Weight of +3/4" Sample (g):	88.40	Weight of Plus #200 Material (g):	86.66
Dry Weight of + 3/4" Sample (g):	86.37		
Total Dry Weight of Sample (g):	16467.2	<b>J - Factor (Percent Finer than 3/4"):</b>	<b>0.9948</b>

Sieve Size	Sieve Opening	Weight of Soil Retained	Percent Retained	Accumulated Percent Retained	Percent Finer	Accumulated Percent Finer
	(mm)	(g)	(%)	(%)	(%)	(%)
12"	300	0.00	0.00	0.00	100.00	100.00
6"	150	0.00	0.00	0.00	100.00	100.00
3"	75	0.00	0.00	0.00	100.00	100.00
2"	50	0.00	(*)	0.00	100.00	100.00
1 1/2"	37.5	0.00		0.00	100.00	100.00
1"	25.0	32.74	0.19	0.19	99.81	99.81
3/4"	19.0	55.66	0.33	0.52	99.48	99.48
1/2"	12.5	0.00	0.00	0.00	100.00	99.48
3/8"	9.50	5.28	0.60	0.60	99.40	98.88
#4	4.75	3.88	0.44	1.04	98.96	98.44
#10	2.00	6.12	0.69	1.73	98.27	97.76
#20	0.85	8.83	(**) 1.00	2.73	97.27	96.76
#40	0.425	9.34	1.06	3.78	96.22	95.71
#60	0.250	15.72	1.78	5.56	94.44	93.94
#140	0.106	27.67	3.13	8.69	91.31	90.83
#200	0.075	9.82	1.11	9.80	90.20	89.72
Pan	-	797.24	90.20	100.00	-	-

**Notes :** (\*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample

(\*\*) The - 3/4" sieve analysis is based on the Weight of the Dry Sample

Tested By	HL	Date	10/1/15	Checked By	KC	Date	10/14/15
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page 3 of 4

DCN: CT-S3B DATE09/14/2015 BY REASIBRO/ECTS/CEC/2015-506-001 Central Waste(2015-506-001-013 Grain JSieveHyd.xls)Print Sheet

# HYDROMETER ANALYSIS

ASTM D 422-63 (2007)



**Client:** CEC  
**Client Reference:** Central Waste Closure 153-121  
**Project No.:** 2015-506-001  
**Lab ID:** 2015-506-001-013

Boring No.: 9/17/15  
Depth (ft): 0-4  
Sample No.: TP-17A  
Soil Color: Brown

Elapsed Time		R Measured	Temp.	Composite Correction	R Corrected	N	K Factor	Diameter	N'
(min)			(°C)			(%)		(mm)	(%)
0		NA	NA	NA	NA	NA	NA	NA	NA
2		55.0	22.1	6.33	48.7	90.2	0.01311	0.0250	80.9
5		52.0	22.1	6.33	45.7	84.6	0.01311	0.0163	75.9
15		48.0	22.1	6.33	41.7	77.2	0.01311	0.0098	69.3
30		43.5	22.1	6.33	37.2	68.9	0.01311	0.0072	61.8
68		40.0	22.1	6.33	33.7	62.4	0.01311	0.0050	56.0
250		33.5	22.6	6.15	27.4	50.7	0.01303	0.0027	45.5
1440		27.0	22.9	6.04	21.0	38.8	0.01299	0.0012	34.8

Soil Specimen Data		Other Corrections	
Tare No.:	2471		
Wt. of Tare & Dry Material (g):	156.83	a - Factor:	0.99
Weight of Tare (g):	98.39		
Weight of Deflocculant (g):	5.0	Percent Finer than # 200:	89.72
Weight of Dry Material (g):	53.44	Specific Gravity:	2.7 Assumed

**Note:** Hydrometer test is performed on - # 200 sieve material.

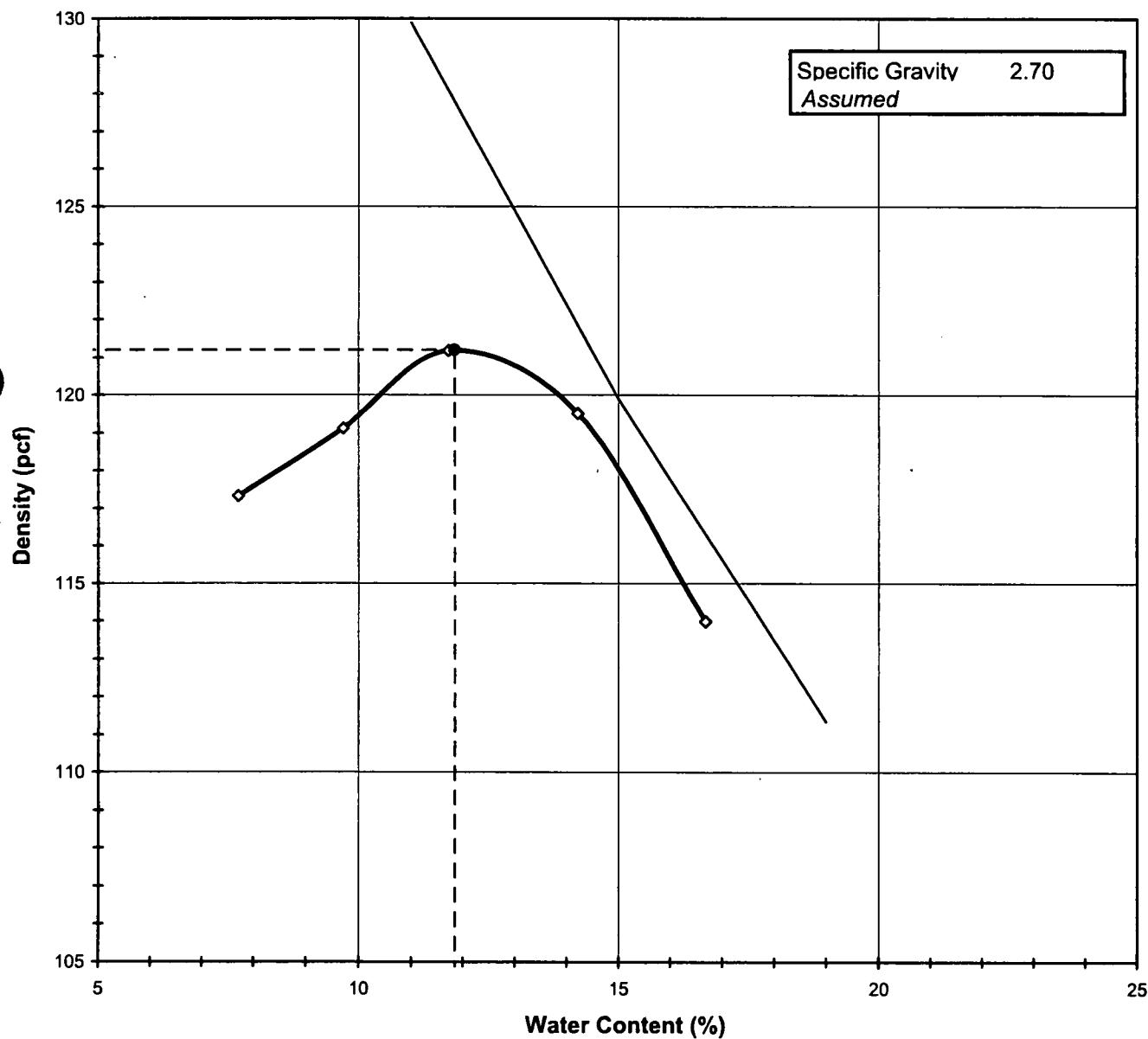
Tested By TO Date 10/6/15 Checked By KC Date 10/14/15  
 page 4 of 4 DCN: CT-S3B DATE20150916REV001 ECTS1CEC2015-506-001 Central Waste\2015-506-001-013 Grain JSieveHvd.xls\Print Sheet

**MOISTURE DENSITY RELATIONSHIP**

ASTM D1557-12

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	4-8
Project No.:	2015-506-001	Sample No.:	TP-17B
Lab ID:	2015-506-001-014	Test Method	<b>MODIFIED</b>
Visual Description: Brown Clay with small amount of Rock Fragments			

**Optimum Water Content**      **11.8**  
**Maximum Dry Density**      **121.2**



<i>Tested By</i>	MF	<i>Date</i>	10/13/15	<i>Checked By</i>	KC	<i>Date</i>	10/15/15
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**MOISTURE - DENSITY RELATIONSHIP**

ASTM D1557-12

Client: CEC                      Boring No.: 9/17/15  
 Client Reference: Central Waste Closure 153-121              Depth (ft): 4-8  
 Project No.: 2015-506-001              Sample No.: TP-17B  
 Lab ID: 2015-506-001-014

Visual Description: Brown Clay with small amount of Rock Fragments

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.70
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	B

Test Type:	<b>MODIFIED</b>
Rammer Weight (lb):	10.0
Rammer Drop (in):	18
Rammer Type:	<b>MECHANICAL</b>
Machine ID:	G 441
Mold ID:	G 606
Mold diameter:	4"
Weight of the Mold (g):	4139
Volume of the Mold (cm <sup>3</sup> ):	943

**Mold / Specimen**

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	6049	6114	6185	6202	6149
Weight of Mold (g):	4139	4139	4139	4139	4139
Weight of Wet Sample (g):	1910	1975	2046	2063	2010
Mold Volume (cm <sup>3</sup> ):	943	943	943	943	943

**Moisture Content / Density**

Tare Number:	1696	1710	605	630	582
Weight of Tare & Wet Sample (g):	411.10	419.10	412.10	425.60	430.00
Weight of Tare & Dry Sample (g):	387.60	389.27	377.93	382.84	380.53
Weight of Tare (g):	83.00	82.10	86.52	82.18	83.89
Weight of Water (g):	23.50	29.83	34.17	42.76	49.47
Weight of Dry Sample (g):	304.60	307.17	291.41	300.66	296.64

Wet Density (g/cm <sup>3</sup> ):	2.03	2.09	2.17	2.19	2.13
Wet Density (pcf):	126.4	130.7	135.4	136.5	133.0
Moisture Content (%):	7.7	9.7	11.7	14.2	16.7
Dry Density (pcf):	117.3	119.1	121.2	119.5	114.0

**Zero Air Voids**

Moisture Content (%):	11.0	15.0	19.0
Dry Unit Weight (pcf):	129.9	119.9	111.4

Tested By	MF	Date	10/13/15	Checked By	KC	Date	10/15/15
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page 2 of 2

DCN:CT-S12 DATE:5/1/13 REVISION: 14

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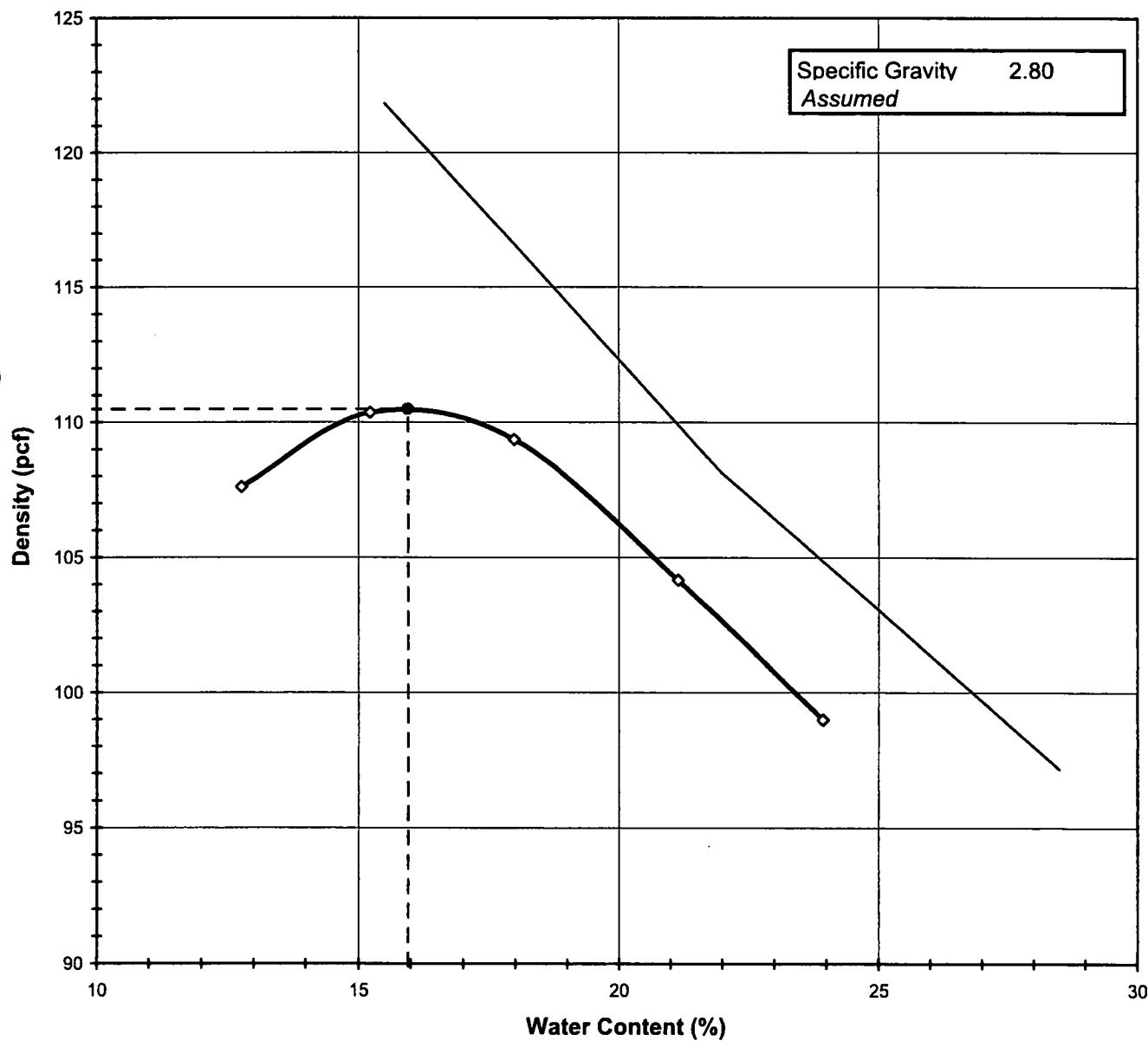
**MOISTURE DENSITY RELATIONSHIP**

ASTM D698-12

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-014  
  
 Visual Description: Brown Clay with small amount of Rock Fragments

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-17B  
 Test Method: STANDARD

**Optimum Water Content** 16.0  
**Maximum Dry Density** 110.5




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<i>Tested By</i>	SGB	<i>Date</i>	10/12/15	<i>Checked By</i>	KC	<i>Date</i>	10/13/15
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page 1 of 2 DCN:CT-S12 DATE:5/1/13 REVISION: 14

**MOISTURE - DENSITY RELATIONSHIP**

ASTM D698-12

Client: CEC Boring No.: 9/17/15  
 Client Reference: Central Waste Closure 153-121 Depth (ft): 4-8  
 Project No.: 2015-506-001 Sample No.: TP-17B  
 Lab ID: 2015-506-001-014

Visual Description: Brown Clay with small amount of Rock Fragments

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.80
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	B

Test Type:	<b>STANDARD</b>
Rammer Weight (lb):	5.5
Rammer Drop (in):	12
Rammer Type:	MECHANICAL
Machine ID:	G 774
Mold ID:	G 606
Mold diameter:	4"
Weight of the Mold (g):	4139
Volume of the Mold (cm <sup>3</sup> ):	943

**Mold / Specimen**

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	5973	6061	6089	6046	5993
Weight of Mold (g):	4139	4139	4139	4139	4139
Weight of Wet Sample (g):	1834	1922	1950	1907	1854
Mold Volume (cm <sup>3</sup> ):	943	943	943	943	943

**Moisture Content / Density**

Tare Number:	902	1728	627	575	560
Weight of Tare & Wet Sample (g):	430.50	459.70	432.10	380.83	348.03
Weight of Tare & Dry Sample (g):	394.30	409.70	379.43	328.74	296.75
Weight of Tare (g):	110.73	81.43	86.58	82.39	82.49
Weight of Water (g):	36.20	50.00	52.67	52.09	51.28
Weight of Dry Sample (g):	283.57	328.27	292.85	246.35	214.26

Wet Density (g/cm <sup>3</sup> ):	1.94	2.04	2.07	2.02	1.97
Wet Density (pcf):	121.4	127.2	129.0	126.2	122.7
Moisture Content (%):	12.8	15.2	18.0	21.1	23.9
Dry Density (pcf):	107.6	110.4	109.4	104.2	99.0

**Zero Air Voids**

Moisture Content (%):	15.5	22.0	28.5
Dry Unit Weight (pcf):	121.8	108.1	97.2

Tested By	SGB	Date	10/12/15	Checked By	KC	Date	10/13/15
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page 2 of 2

DCN:CT-S12 DATE:5/1/13 REVISION: 14

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## SPECIFIC GRAVITY

ASTM D 854-14

Client: CEC Boring No.: 9/17/15  
Client Reference: Central Waste Closure 153-121 Depth (ft): 4-8  
Project No.: 2015-506-001 Sample No.: TP-17B  
Lab ID: 2015-506-001-014 Visual Description: Brown Clay

(Minus No.4 sieve material, oven dried)

Replicate Number	1	2
Pycnometer ID:	G 1255	G 1504
Weight of Pycnometer & Soil & Water (g):	747.27	735.3
Temperature (°C):	26.7	26.5
Weight of Pycnometer & Water (g):	684.86	672.05
Tare Number:	692	975
Weight of Tare & Dry Soil (g):	195.00	196.91
Weight of Tare (g):	96.46	96.09
Weight of Dry Soil (g):	98.54	100.82
Specific Gravity of Soil @ Measured Temperature:	2.727	2.683
Specific Gravity of Water @ Measured Temperature:	0.99660	0.99666
Conversion Factor for Measured Temperature:	0.99839	0.99845
Specific Gravity @ 20° Celsius:	2.732	2.688

Average Specific Gravity @ 20° Celsius 2.71

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Tested By TO Date 10/2/15 Checked By CLK Date 10/9/15

DCN: CT-S5 Date: 3/5/14 Revision: 20

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## ATTERBERG LIMITS

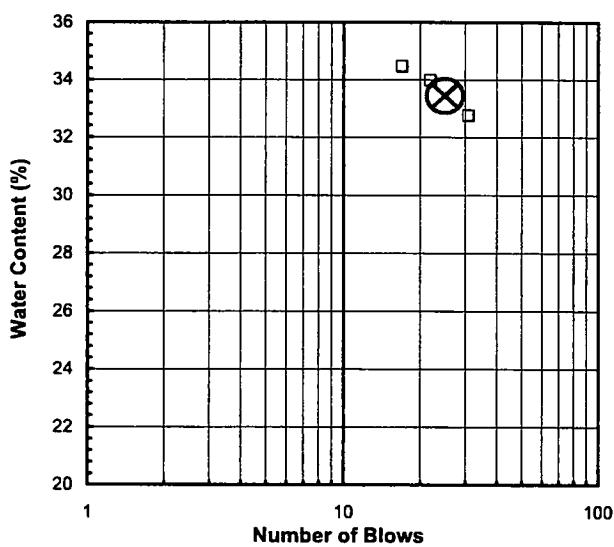
ASTM D 4318-10

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	4-8
Project No.:	2015-506-001	Sample No.:	TP-17B
Lab ID:	2015-506-001-014	Soil Description: BROWN LEAN CLAY	
<i>Note: The USCS symbol used with this test refers only to the minus No. 40          sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.</i>			

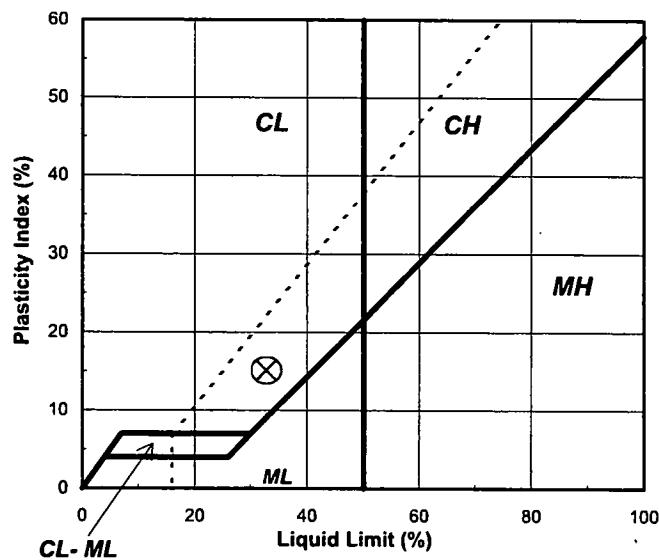
Liquid Limit Test	1	2	3	
Tare Number:	279	147	312	M
Wt. of Tare & Wet Sample (g):	31.07	33.72	31.71	U
Wt. of Tare & Dry Sample (g):	27.71	30.35	28.53	L
Weight of Tare (g):	17.45	20.43	19.30	T
Weight of Water (g):	3.4	3.4	3.2	I
Weight of Dry Sample (g):	10.3	9.9	9.2	P
Moisture Content (%):	32.7	34.0	34.5	O
Number of Blows:	31	22	17	I
				N
				T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	2294	1279		Liquid Limit (%): 33
Wt. of Tare & Wet Sample (g):	26.12	20.52		Plastic Limit (%): 18
Wt. of Tare & Dry Sample (g):	25.11	19.51		Plasticity Index (%): 15
Weight of Tare (g):	19.68	14.00		USCS Symbol: CL
Weight of Water (g):	1.0	1.0		
Weight of Dry Sample (g):	5.4	5.5		
Moisture Content (%):	18.6	18.3	0.3	
<i>Note: The acceptable range of the two Moisture contents is <math>\pm 2.6</math></i>				

Flow Curve



Plasticity Chart



Tested By	TO	Date	10/9/15	Checked By	CLK	Date	10/10/15
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page 1 of 1 DCN: CTS4B, REV. 4, 3/18/13

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# SIEVE AND HYDROMETER ANALYSIS

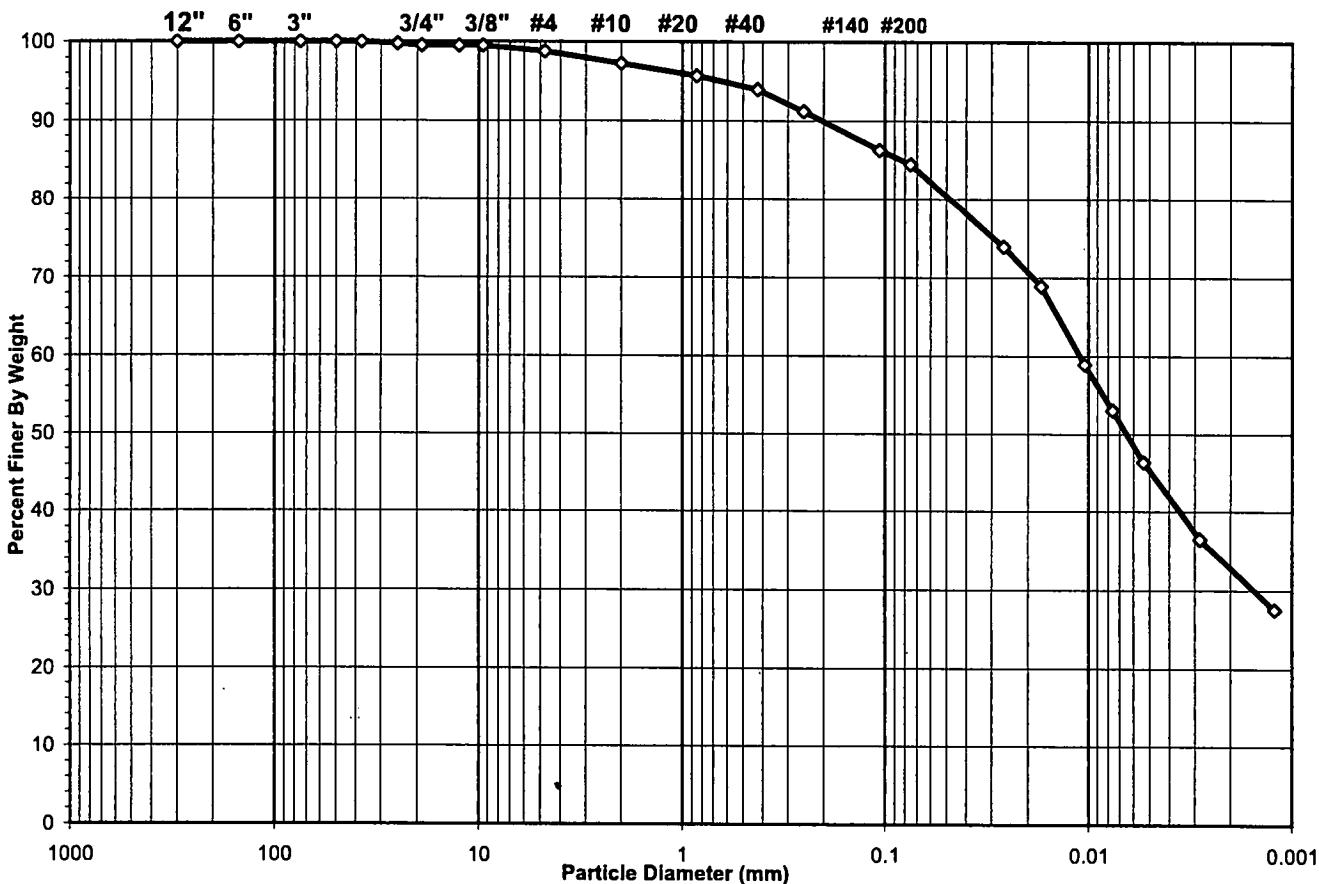
ASTM D 422-63 (2007)



Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-014

Boring No.: 9/17/16  
 Depth (ft): 4-8  
 Sample No.: TP-17B  
 Soil Color: Brown

USCS USDA	SIEVE ANALYSIS					HYDROMETER					
	cobbles	gravel	sand		silt and clay fraction						
	cobbles	gravel	sand		silt	clay					
	12"	6"	3"	3/4"	3/8"	#4	#10	#20	#40	#140	#200

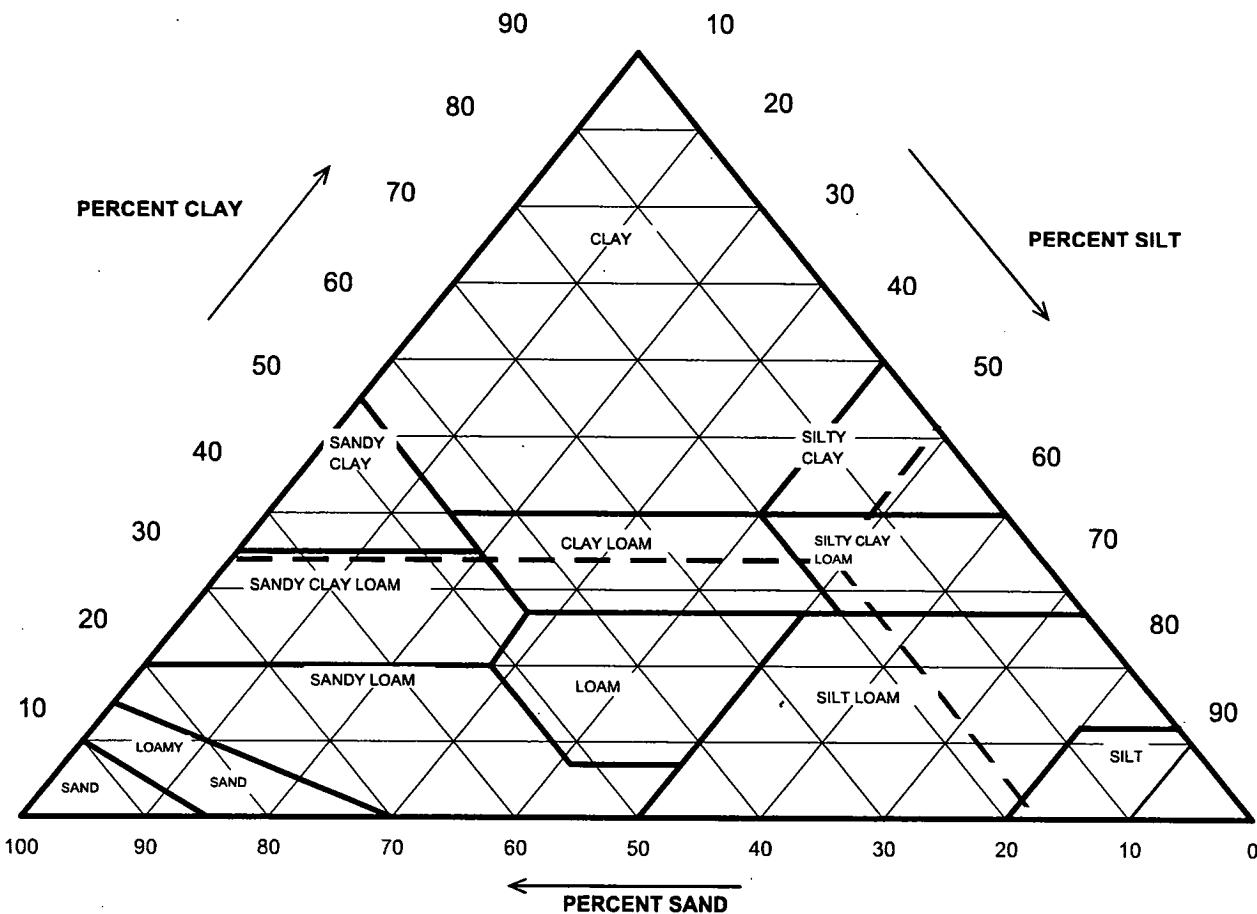


USCS Summary		
Sieve Sizes (mm)	Percentage	
Greater Than #4	Gravel	1.21
#4 To #200	Sand	14.26
Finer Than #200	Silt & Clay	84.53
<b>USCS Symbol:</b>		
<b>CL, TESTED</b>		
<b>USCS Classification:</b>		
<b>LEAN CLAY WITH SAND</b>		

## USDA CLASSIFICATION CHART

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-014

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-17B  
 Soil Color: Brown



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
2	97.27	Gravel	2.73	0.00
0.05	80.47	Sand	16.80	17.27
0.002	32.93	Silt	47.54	48.88
		Clay	32.93	33.85
<b>USDA Classification: SILTY CLAY LOAM</b>				

## **WASH SIEVE ANALYSIS**

ASTM D 422-63 (2007)



**Client:** CEC  
**Client Reference:** Central Waste Closure 153-121  
**Project No.:** 2015-506-001  
**Lab ID:** 2015-506-001-014

Boring No.: 9/17/15  
Depth (ft): 4-8  
Sample No.: TP-17B  
Soil Color: Brown

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.:	37	Tare No.:	5
Wt. of Tare & Wet Sample (g):	1210.70	Weight of Tare & Wet Sample (g):	119.75
Wt. of Tare & Dry Sample (g):	1164.20	Weight of Tare & Dry Sample (g):	118.30
Weight of Tare (g):	206.20	Weight of Tare (g):	6.85
Weight of Water (g):	46.50	Weight of Water (g):	1.45
Weight of Dry Soil (g):	958.00	Weight of Dry Soil (g):	111.45
<b>Moisture Content (%):</b>	<b>4.9</b>	<b>Moisture Content (%):</b>	<b>1.3</b>

Wet Weight of -3/4" Sample (g):	22636	Weight of the Dry Sample (g):	958.00
Dry Weight of - 3/4" Sample (g):	21588.1	Weight of Minus #200 Material (g):	813.97
Wet Weight of +3/4" Sample (g):	112.90	Weight of Plus #200 Material (g):	144.03
Dry Weight of + 3/4" Sample (g):	111.45		
Total Dry Weight of Sample (g):	21699.6	<b>J - Factor (Percent Finer than 3/4"):</b>	<b>0.9949</b>

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)	
12"	300	0.00	0.00	0.00	100.00	100.00	
6"	150	0.00	0.00	0.00	100.00	100.00	
3"	75	0.00	0.00	0.00	100.00	100.00	
2"	50	0.00	( *)	0.00	100.00	100.00	
1 1/2"	37.5	0.00		0.00	100.00	100.00	
1"	25.0	57.92	0.26	0.26	99.74	99.74	
3/4"	19.0	54.98	0.25	0.51	99.49	99.49	
1/2"	12.5	0.00	0.00	0.00	100.00	99.49	
3/8"	9.50	0.00	0.00	0.00	100.00	99.49	
#4	4.75	6.69	0.70	0.70	99.30	98.79	
#10	2.00	14.68	1.53	2.23	97.77	97.27	
#20	0.85	15.21	( **)	1.59	3.82	96.18	95.69
#40	0.425	16.82		1.76	5.57	94.43	93.94
#60	0.250	26.38		2.75	8.33	91.67	91.20
#140	0.106	47.49		4.96	13.28	86.72	86.27
#200	0.075	16.76		1.75	15.03	84.97	84.53
Pan	-	813.97	84.97	100.00	-	-	

**Notes :**    (\*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample  
              (\*\*) The - 3/4" sieve analysis is based on the Weight of the Dry Sample

Tested By HL Date 10/1/15 Checked By KC Date 10/14/15

**HYDROMETER ANALYSIS**

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-014

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-17B  
 Soil Color: Brown

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	50.5	22.1	6.33	44.2	87.6	0.01311	0.0263	74.0
5	47.5	22.1	6.33	41.2	81.6	0.01311	0.0171	69.0
15	41.5	22.1	6.33	35.2	69.7	0.01311	0.0104	58.9
30	38.0	22.1	6.33	31.7	62.8	0.01311	0.0076	53.1
65	34.0	22.1	6.33	27.7	54.9	0.01311	0.0053	46.4
250	28.0	22.6	6.15	21.9	43.3	0.01303	0.0028	36.6
1440	22.5	22.9	6.04	16.5	32.6	0.01299	0.0012	27.6

Soil Specimen Data		Other Corrections	
Tare No.:	700		
Wt. of Tare & Dry Material (g):	143.63	a - Factor:	0.99
Weight of Tare (g):	88.68		
Weight of Deflocculant (g):	5.0	Percent Finer than # 200:	84.53
Weight of Dry Material (g):	49.95	Specific Gravity:	2.7 Assumed

**Note:** Hydrometer test is performed on - # 200 sieve material.

Tested By	TO	Date	10/6/15	Checked By	KC	Date	10/14/15
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**MOISTURE DENSITY RELATIONSHIP**

ASTM D1557-12

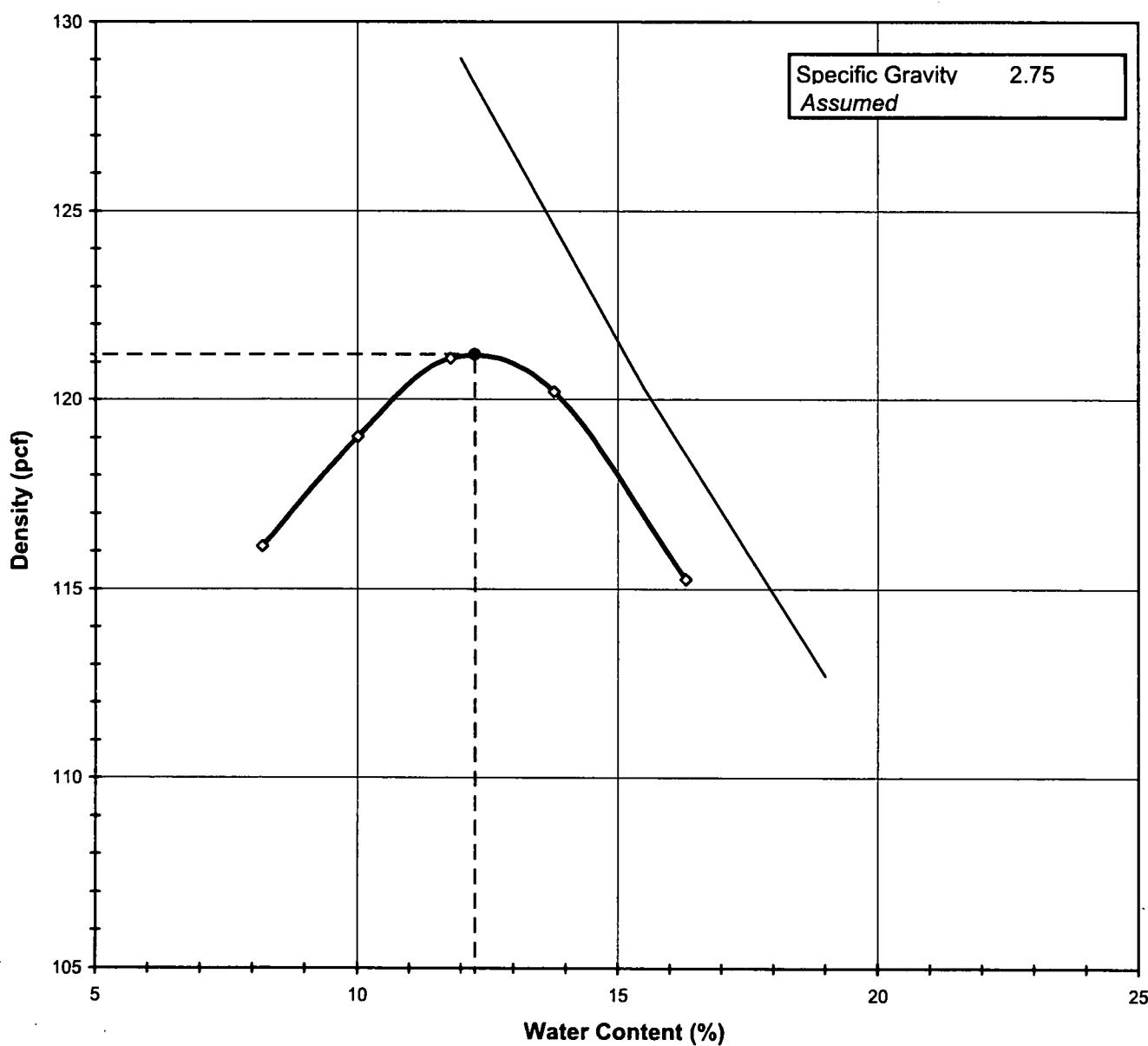
Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	0-4
Project No.:	2015-506-001	Sample No.:	TP-18A
Lab ID:	2015-506-001-015	Test Method	<b>MODIFIED</b>
Visual Description: Brown Clay with Rock Fragments			

**Optimum Water Content**  
**Maximum Dry Density**

12.3

121.2

Specific Gravity	2.75
Assumed	



Tested By

MF

Date

10/14/15

Checked By

KC

Date

10/15/15

**MOISTURE - DENSITY RELATIONSHIP**

ASTM D1557-12

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-015

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-18A

Visual Description: Brown Clay with Rock Fragments

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.75
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	B

Test Type:	<b>MODIFIED</b>
Rammer Weight (lb):	10.0
Rammer Drop (in):	18
Rammer Type:	<b>MECHANICAL</b>
Machine ID:	G 441
Mold ID:	G 1607
Mold diameter:	4"
Weight of the Mold (g):	5870
Volume of the Mold (cm <sup>3</sup> ):	2122

**Mold / Specimen**

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	10143	10323	10474	10521	10429
Weight of Mold (g):	5870	5870	5870	5870	5870
Weight of Wet Sample (g):	4273	4453	4604	4651	4559
Mold Volume (cm <sup>3</sup> ):	2122	2122	2122	2122	2122

**Moisture Content / Density**

Tare Number:	594	538	903	552	909
Weight of Tare & Wet Sample (g):	545.80	508.20	549.20	501.60	558.70
Weight of Tare & Dry Sample (g):	510.60	469.40	502.80	450.70	495.70
Weight of Tare (g):	80.78	81.85	109.61	81.26	109.39
Weight of Water (g):	35.20	38.80	46.40	50.90	63.00
Weight of Dry Sample (g):	429.82	387.55	393.19	369.44	386.31

Wet Density (g/cm <sup>3</sup> ):	2.01	2.10	2.17	2.19	2.15
Wet Density (pcf):	125.7	130.9	135.4	136.8	134.1
Moisture Content (%):	8.2	10.0	11.8	13.8	16.3
Dry Density (pcf):	116.1	119.0	121.1	120.2	115.3

**Zero Air Voids**

Moisture Content (%):	12.0	15.5	19.0
Dry Unit Weight (pcf):	129.0	120.3	112.7

Tested By	MF	Date	10/14/15	Checked By	KC	Date	10/15/15
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## SPECIFIC GRAVITY

ASTM D 854-14

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	0-4
Project No.:	2015-506-001	Sample No.:	TP-18A
Lab ID:	2015-506-001-015	Visual Description:	Brown Clay

(Minus No.4 sieve material, oven dried)

Replicate Number	1	2
Pycnometer ID:	G 1255	G 1504
Weight of Pycnometer & Soil & Water (g):	747.42	734.71
Temperature (°C):	25.9	25.8
Weight of Pycnometer & Water (g):	684.97	672.14
Tare Number:	693	685
Weight of Tare & Dry Soil (g):	193.61	197.59
Weight of Tare (g):	93.52	97.14
Weight of Dry Soil (g):	100.09	100.45
Specific Gravity of Soil @ Measured Temperature:	2.659	2.652
Specific Gravity of Water @ Measured Temperature:	0.99682	0.99684
Conversion Factor for Measured Temperature:	0.99861	0.99864
Specific Gravity @ 20° Celsius:	2.663	2.655

Average Specific Gravity @ 20° Celsius	2.66
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Tested By	TO	Date	10/2/15	Checked By	CLK	Date	10/9/15
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DGN: CT-S5 Date: 3/5/14 Revision: 20

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## ATTERBERG LIMITS

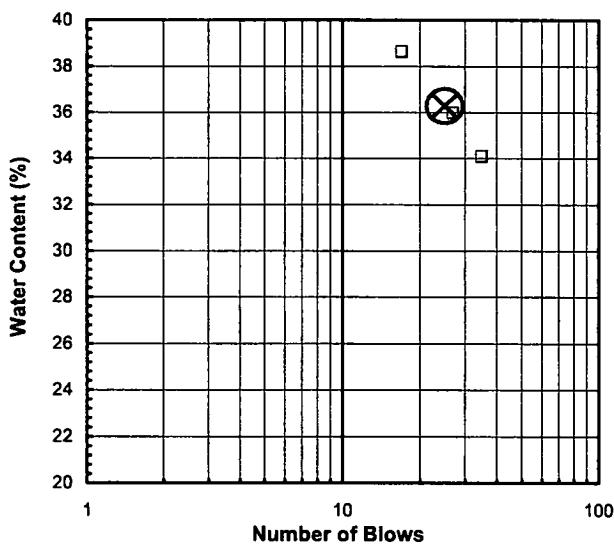
ASTM D 4318-10

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-015  
 Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-18A  
 Soil Description: BROWN LEAN CLAY  
*Note: The USCS symbol used with this test refers only to the minus No. 40 (Minus No. 40 sieve material, Airdried) sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.*

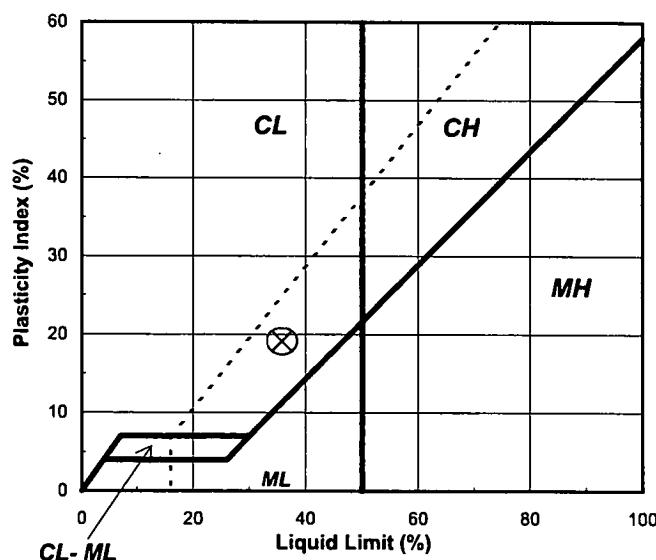
Liquid Limit Test	1	2	3	
Tare Number:	198	208	190	M
Wt. of Tare & Wet Sample (g):	37.67	39.80	38.78	U
Wt. of Tare & Dry Sample (g):	31.90	34.32	33.52	L
Weight of Tare (g):	16.96	19.08	18.08	T
Weight of Water (g):	5.8	5.5	5.3	I
Weight of Dry Sample (g):	14.9	15.2	15.4	P
Moisture Content (%):	38.6	36.0	34.1	O
Number of Blows:	17	27	35	I
				N
				T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	183	1286		Liquid Limit (%): 36
Wt. of Tare & Wet Sample (g):	25.77	26.71		Plastic Limit (%): 17
Wt. of Tare & Dry Sample (g):	24.85	25.84		Plasticity Index (%): 19
Weight of Tare (g):	19.29	20.64		USCS Symbol: CL
Weight of Water (g):	0.9	0.9		
Weight of Dry Sample (g):	5.6	5.2		
Moisture Content (%):	16.5	16.7	-0.2	
<i>Note: The acceptable range of the two Moisture contents is ± 2.6</i>				

Flow Curve



Plasticity Chart



Tested By	RAL	Date	10/8/15	Checked By	CLK	Date	10/9/15
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page 1 of 1 DCN: CTS4B, REV. 4, 3/18/13

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# SIEVE AND HYDROMETER ANALYSIS

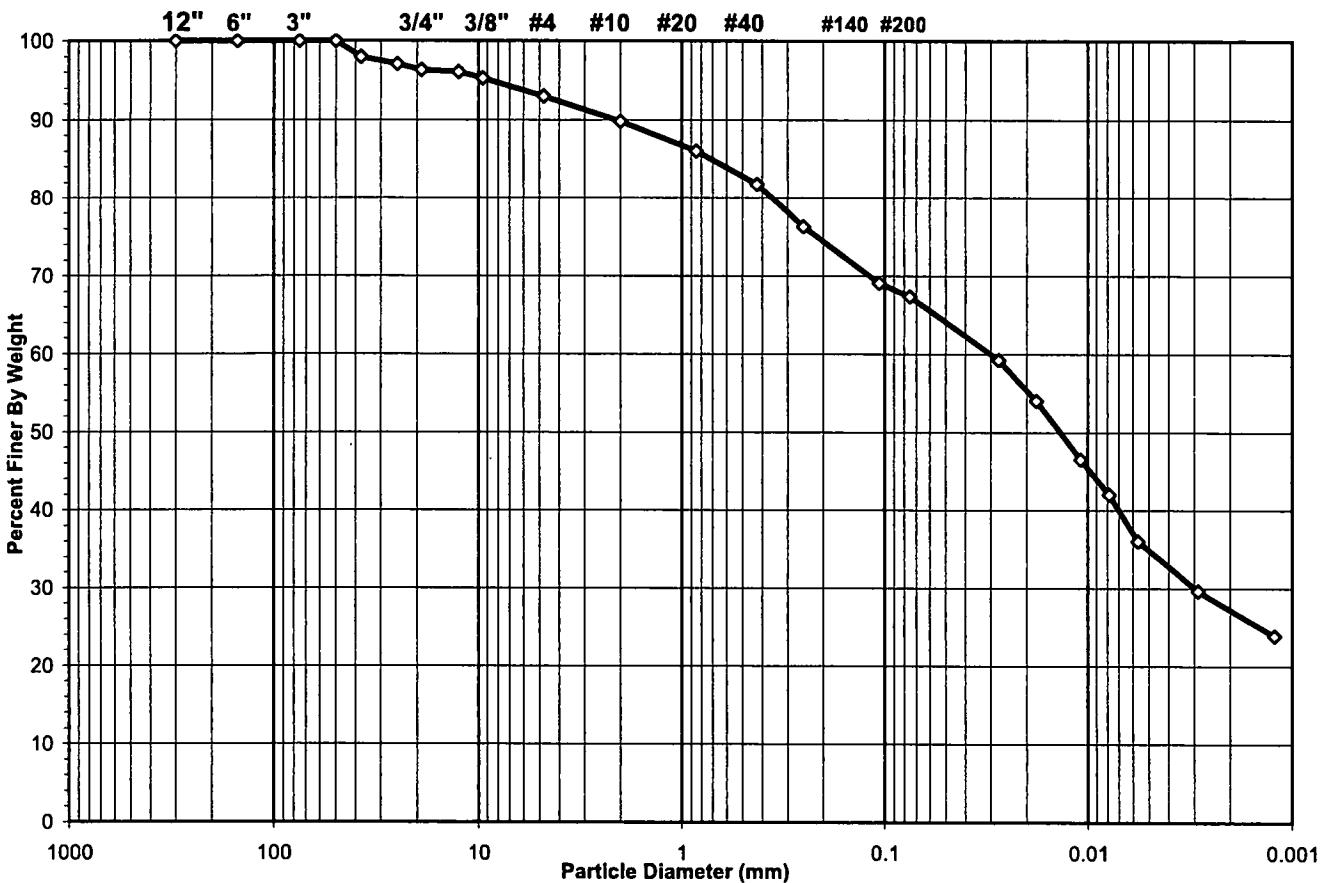
ASTM D 422-63 (2007)



Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-015

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-18A  
 Soil Color: Brown

USCS USDA	SIEVE ANALYSIS					HYDROMETER		
	cobbles	gravel	sand			silt and clay fraction		
	cobbles	gravel	sand			silt	clay	

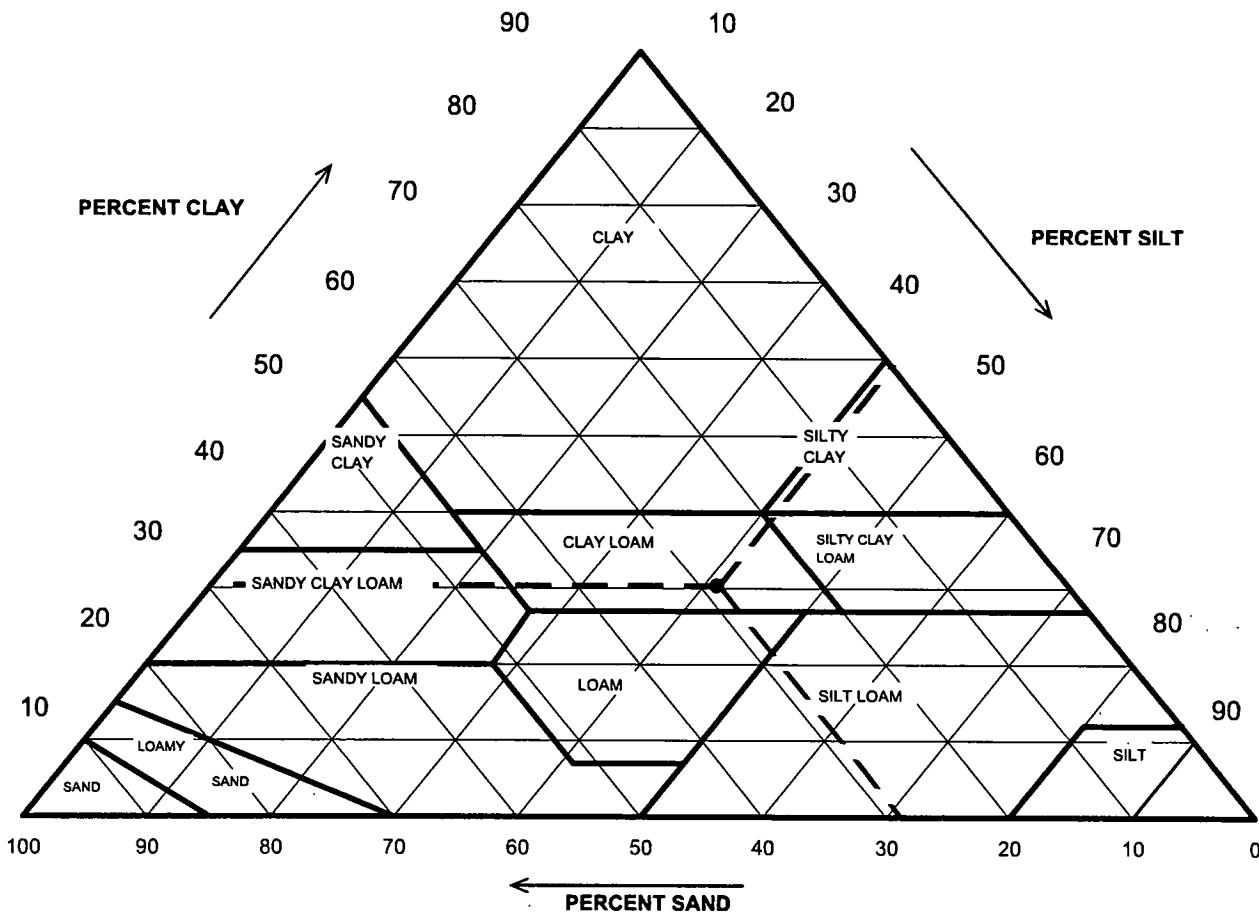


USCS Summary		
Sieve Sizes (mm)	Percentage	
Greater Than #4	Gravel	7.01
#4 To #200	Sand	25.56
Finer Than #200	Silt & Clay	67.43
<b>USCS Symbol:</b>		
<b>CL, TESTED</b>		
<b>USCS Classification:</b>		
<b>SANDY LEAN CLAY</b>		

## USDA CLASSIFICATION CHART

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-015

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-18A  
 Soil Color: Brown



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
2	89.85	Gravel	10.15	0.00
0.05	64.14	Sand	25.71	28.61
0.002	27.22	Silt	36.92	41.09
		Clay	27.22	30.29
<b>USDA Classification: CLAY LOAM</b>				

# WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)



Client: CEC Boring No.: 9/17/15  
 Client Reference: Central Waste Closure 153-121 Depth (ft): 0-4  
 Project No.: 2015-506-001 Sample No.: TP-18A  
 Lab ID: 2015-506-001-015 Soil Color: Brown

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.:	27	Tare No.:	609
Wt. of Tare & Wet Sample (g):	1216.10	Weight of Tare & Wet Sample (g):	919.90
Wt. of Tare & Dry Sample (g):	1153.90	Weight of Tare & Dry Sample (g):	908.00
Weight of Tare (g):	204.80	Weight of Tare (g):	81.16
Weight of Water (g):	62.20	Weight of Water (g):	11.90
Weight of Dry Soil (g):	949.10	Weight of Dry Soil (g):	826.84
<b>Moisture Content (%):</b>	<b>6.6</b>	<b>Moisture Content (%):</b>	<b>1.4</b>
Wet Weight of -3/4" Sample (g):	23395	Weight of the Dry Sample (g):	949.10
Dry Weight of - 3/4" Sample (g):	21956.1	Weight of Minus #200 Material (g):	664.10
Wet Weight of +3/4" Sample (g):	838.80	Weight of Plus #200 Material (g):	285.00
Dry Weight of + 3/4" Sample (g):	826.90	<b>J - Factor (Percent Finer than 3/4"):</b>	
Total Dry Weight of Sample (g):	22783.0	<b>0.9637</b>	

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100.00
6"	150	0.00	0.00	0.00	100.00	100.00
3"	75	0.00	0.00	0.00	100.00	100.00
2"	50	0.00	(*)	0.00	100.00	100.00
1 1/2"	37.5	466.20	2.02	2.02	97.98	97.98
1"	25.0	203.84	0.88	2.90	97.10	97.10
3/4"	19.0	168.76	0.73	3.63	96.37	96.37
1/2"	12.5	2.78	0.29	0.29	99.71	96.09
3/8"	9.50	7.72	0.81	1.11	98.89	95.30
#4	4.75	22.78	2.40	3.51	96.49	92.99
#10	2.00	30.93	3.26	6.77	93.23	89.85
#20	0.85	37.23	(**) 3.92	10.69	89.31	86.07
#40	0.425	41.41	4.36	15.05	84.95	81.87
#60	0.250	53.98	5.69	20.74	79.26	76.38
#140	0.106	71.65	7.55	28.29	71.71	69.11
#200	0.075	16.52	1.74	30.03	69.97	67.43
Pan	-	664.10	69.97	100.00	-	-

**Notes :** (\*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample

(\*\*) The - 3/4" sieve analysis is based on the Weight of the Dry Sample

Tested By	HL	Date	10/1/15	Checked By	KC	Date	10/14/15
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page 3 of 4

DCN: CT-S3B DATE: 10/14/2015 BY: HL PROJECT: CEC 2015-506-001 Central Waste\2015-506-001-015 Grain JSieveHyd.xls\Print Sheet

**HYDROMETER ANALYSIS**

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-015

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-18A  
 Soil Color: Brown

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	46.0	22.1	6.33	39.7	87.9	0.01311	0.0274	59.3
5	42.5	22.1	6.33	36.2	80.1	0.01311	0.0179	54.0
15	37.5	22.1	6.33	31.2	69.1	0.01311	0.0108	46.6
30	34.5	22.1	6.33	28.2	62.4	0.01311	0.0078	42.1
61	30.5	22.1	6.33	24.2	53.6	0.01311	0.0056	36.1
250	26.0	22.6	6.15	19.9	44.0	0.01303	0.0029	29.7
1440	22.0	22.9	6.04	16.0	35.4	0.01299	0.0012	23.8

Soil Specimen Data		Other Corrections	
Tare No.:	672		
Wt. of Tare & Dry Material (g):	145.97	a - Factor:	0.99
Weight of Tare (g):	96.28		
Weight of Deflocculant (g):	5.0	Percent Finer than # 200:	67.43
Weight of Dry Material (g):	44.69	Specific Gravity:	2.7 Assumed

**Note:** Hydrometer test is performed on - # 200 sieve material.

Tested By	TO	Date	10/6/15	Checked By	KC	Date	10/14/15
page 4 of 4							

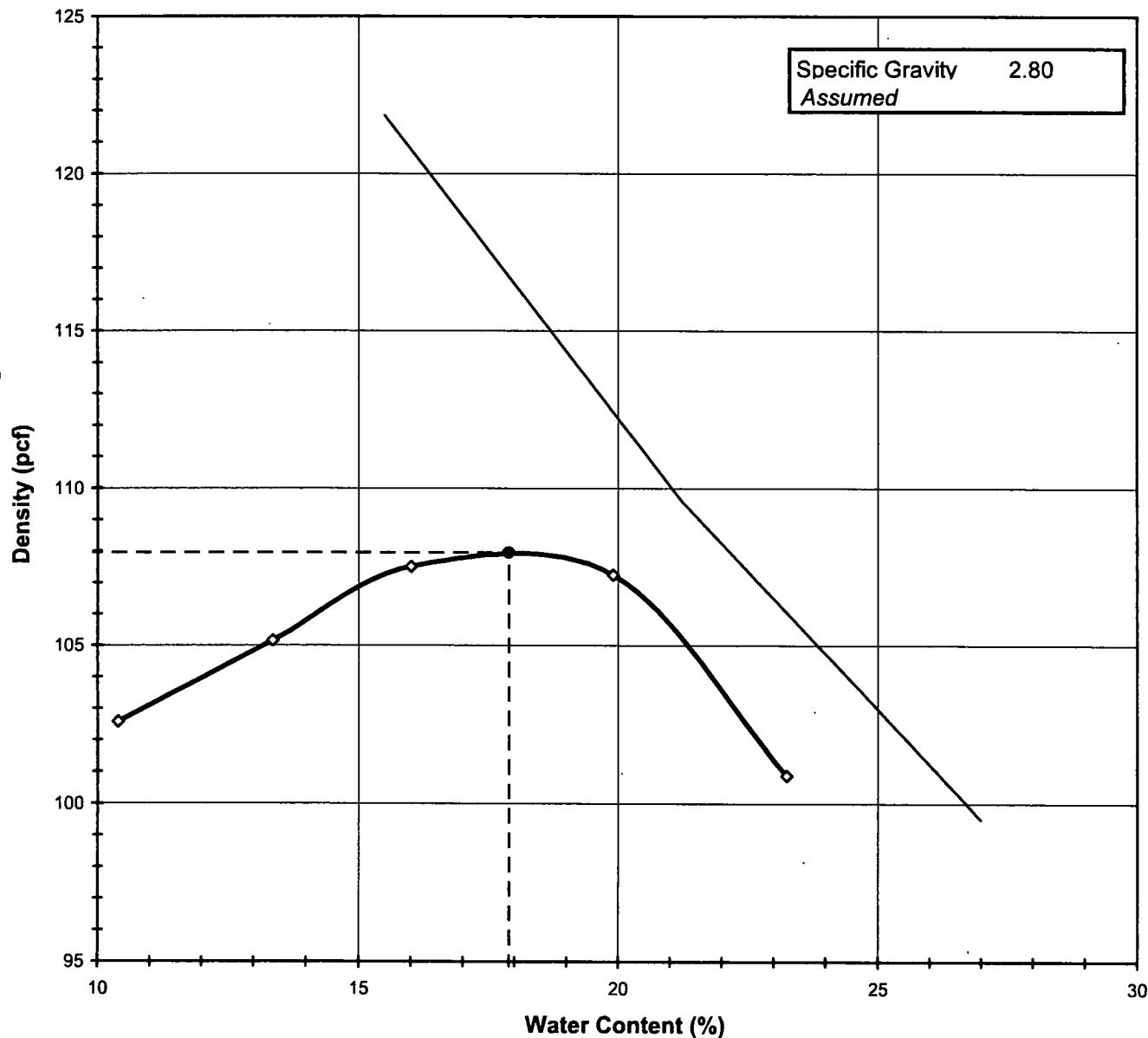
DCN: CT-S3B DATE 10/14/15 BY KARINA RODRIGUEZ/CCEC|2015-506-001 Central Waste|2015-506-001-015 Grain JSieveHyd.xls|Print Sheet

**MOISTURE DENSITY RELATIONSHIP**

ASTM D698-12

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	4-8
Project No.:	2015-506-001	Sample No.:	TP-18B
Lab ID:	2015-506-001-016	Test Method	<b>STANDARD</b>
Visual Description: Brown Clay with small amount of Rock Fragments			

<b>Optimum Water Content</b>	<b>17.9</b>
<b>Maximum Dry Density</b>	<b>108.0</b>



<i>Tested By</i>	HL	<i>Date</i>	10/12/15	<i>Checked By</i>	KC	<i>Date</i>	10/13/15
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page 1 of 2 DCN:CT-S12 DATE:5/1/13 REVISION: 14

**MOISTURE - DENSITY RELATIONSHIP**

ASTM D698-12

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-016

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-18B

Visual Description: Brown Clay with small amount of Rock Fragments

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.80
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	B

Test Type:	<b>STANDARD</b>
Rammer Weight (lb):	5.5
Rammer Drop (in):	12
Rammer Type:	MECHANICAL
Machine ID:	G 774
Mold ID:	G 1499
Mold diameter:	4"
Weight of the Mold (g):	4391
Volume of the Mold (cm <sup>3</sup> ):	940

**Mold / Specimen**

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	6097	6187	6270	6328	6264
Weight of Mold (g):	4391	4391	4391	4391	4391
Weight of Wet Sample (g):	1706	1796	1879	1937	1873
Mold Volume (cm <sup>3</sup> ):	940	940	940	940	940

**Moisture Content / Density**

Tare Number:	578	542	1122	872	914
Weight of Tare & Wet Sample (g):	460.40	479.00	443.30	494.20	491.80
Weight of Tare & Dry Sample (g):	425.00	432.20	393.73	430.50	419.80
Weight of Tare (g):	84.30	82.13	84.30	110.48	110.20
Weight of Water (g):	35.40	46.80	49.57	63.70	72.00
Weight of Dry Sample (g):	340.70	350.07	309.43	320.02	309.60

Wet Density (g/cm <sup>3</sup> ):	1.81	1.91	2.00	2.06	1.99
Wet Density (pcf):	113.2	119.2	124.7	128.6	124.3
Moisture Content (%):	10.4	13.4	16.0	19.9	23.3
Dry Density (pcf):	102.6	105.2	107.5	107.2	100.9

**Zero Air Voids**

Moisture Content (%):	15.5	21.3	27.0
Dry Unit Weight (pcf):	121.8	109.5	99.5

Tested By	HL	Date	10/12/15	Checked By	KC	Date	10/13/15
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page 2 of 2

DCN:CT-S12 DATE:5/1/13 REVISION: 14

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**SPECIFIC GRAVITY**

ASTM D 854-14

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	4-8
Project No.:	2015-506-001	Sample No.:	TP-18B
Lab ID:	2015-506-001-016	Visual Description: Brown Clay	

(Minus No.4 sieve material, oven dried)

Replicate Number	1	2
Pycnometer ID:	G 1255	G 1504
Weight of Pycnometer & Soil & Water (g):	747.05	734.98
Temperature (°C):	24.9	24.8
Weight of Pycnometer & Water (g):	685.10	672.27
Tare Number:	963	633
Weight of Tare & Dry Soil (g):	199.55	196.1
Weight of Tare (g):	100.79	96.15
Weight of Dry Soil (g):	98.76	99.95
Specific Gravity of Soil @ Measured Temperature:	2.683	2.684
Specific Gravity of Water @ Measured Temperature:	0.99708	0.99710
Conversion Factor for Measured Temperature:	0.99887	0.99889
Specific Gravity @ 20° Celsius:	2.686	2.687

Average Specific Gravity @ 20° Celsius	2.69
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Tested By	TO	Date	10/5/15	Checked By	CLK	Date	10/9/15
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DCN: CT-S5 Date: 3/5/14 Revision: 20

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**ATTERBERG LIMITS**

ASTM D 4318-10

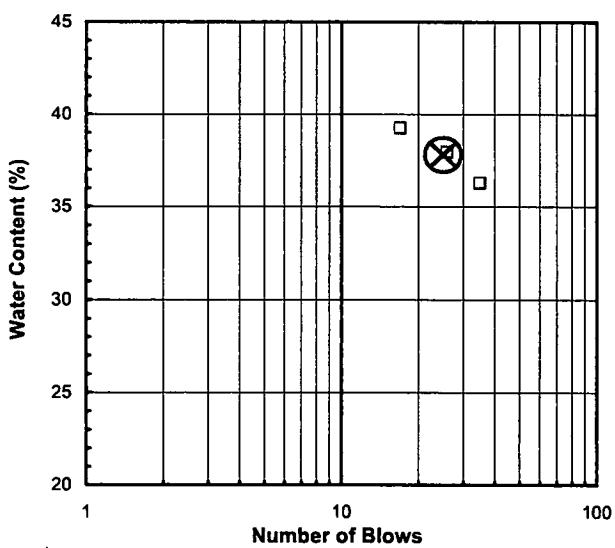
Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-016  
 Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-18B  
 Soil Description: BROWN LEAN CLAY

*Note: The USCS symbol used with this test refers only to the minus No. 40  
 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.*

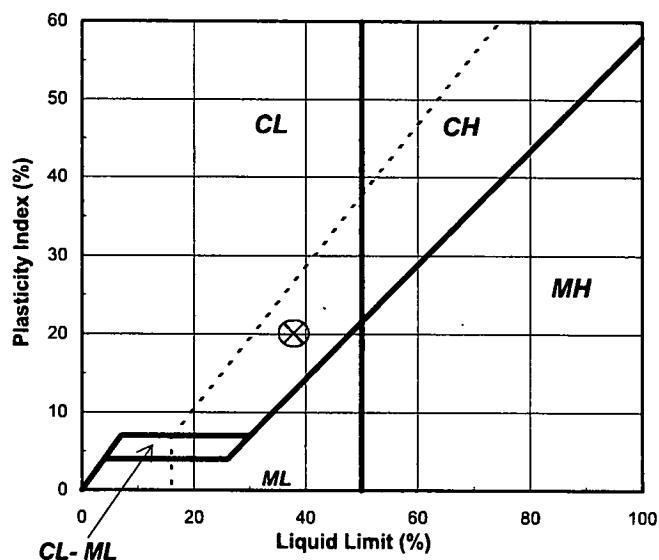
Liquid Limit Test	1	2	3	
Tare Number:	108	1291	110	M
Wt. of Tare & Wet Sample (g):	39.20	37.82	40.04	U
Wt. of Tare & Dry Sample (g):	33.31	32.24	34.60	L
Weight of Tare (g):	18.30	17.53	19.60	T
Weight of Water (g):	5.9	5.6	5.4	I
Weight of Dry Sample (g):	15.0	14.7	15.0	P
Moisture Content (%):	39.2	37.9	36.3	O
Number of Blows:	17	26	35	N
				T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	234	4		Liquid Limit (%): 38
Wt. of Tare & Wet Sample (g):	26.28	25.03		Plastic Limit (%): 18
Wt. of Tare & Dry Sample (g):	25.32	24.11		Plasticity Index (%): 20
Weight of Tare (g):	19.87	18.90		USCS Symbol: CL
Weight of Water (g):	1.0	0.9		
Weight of Dry Sample (g):	5.5	5.2		
Moisture Content (%):	17.6	17.7	0.0	
Note: The acceptable range of the two Moisture contents is $\pm 2.6$				

Flow Curve



Plasticity Chart



Tested By RAL Date 10/9/15 Checked By CLK Date 10/10/15

page 1 of 1 DCN: CTS4B, REV. 4, 3/18/13

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# SIEVE AND HYDROMETER ANALYSIS

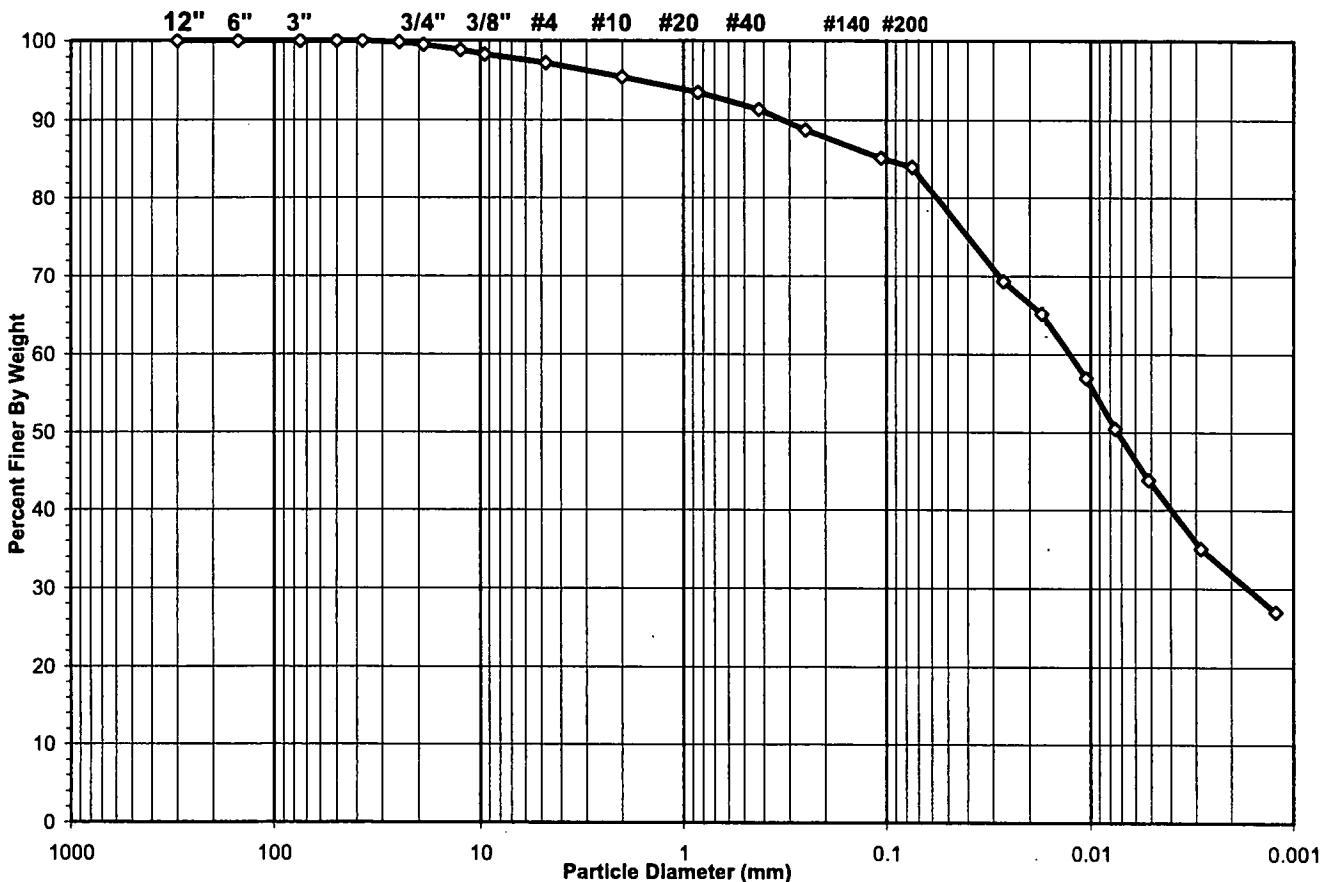
ASTM D 422-63 (2007)



Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-016

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-18B  
 Soil Color: Brown

USCS USDA	SIEVE ANALYSIS					HYDROMETER					
	cobbles	gravel	sand			silt and clay fraction					
	cobbles	gravel	sand			silt	clay				
	12"	6"	3"	3/4"	3/8"	#4	#10	#20	#40	#140	#200

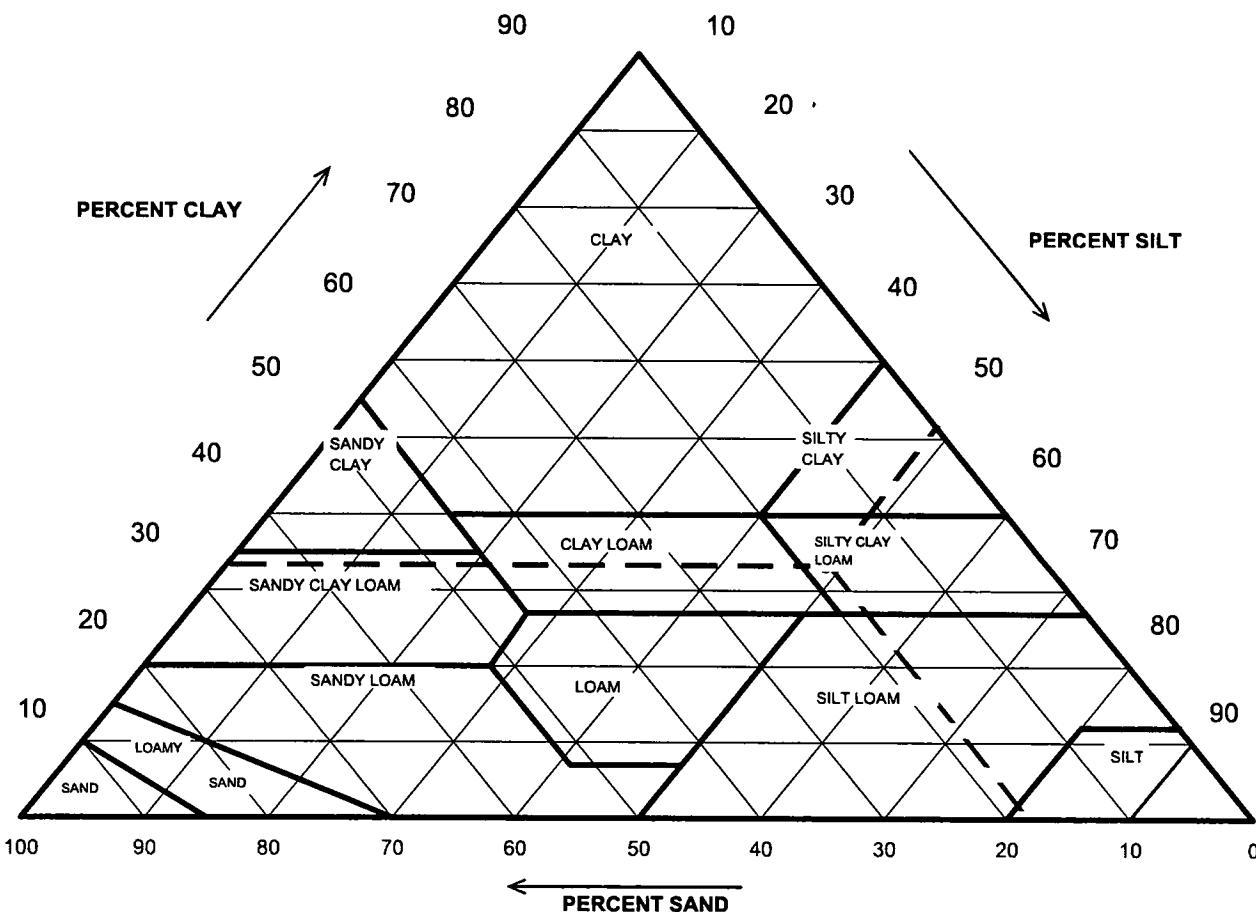


USCS Summary		
Sieve Sizes (mm)	Percentage	
Greater Than #4	Gravel	2.77
#4 To #200	Sand	13.23
Finer Than #200	Silt & Clay	84.00
<b>USCS Symbol:</b>		
<b>CL, TESTED</b>		
<b>USCS Classification:</b>		
<b>LEAN CLAY WITH SAND</b>		

## USDA CLASSIFICATION CHART

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-016

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-18B  
 Soil Color: Brown



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
2	95.40	Gravel	4.60	0.00
0.05	78.22	Sand	17.18	18.01
0.002	31.79	Silt	46.43	48.66
		Clay	31.79	33.33
<b>USDA Classification: SILTY CLAY LOAM</b>				

# WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)



Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-016

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-18B  
 Soil Color: Brown

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.:	2471	Tare No.:	26
Wt. of Tare & Wet Sample (g):	980.30	Weight of Tare & Wet Sample (g):	104.08
Wt. of Tare & Dry Sample (g):	945.40	Weight of Tare & Dry Sample (g):	103.39
Weight of Tare (g):	98.42	Weight of Tare (g):	7.02
Weight of Water (g):	34.90	Weight of Water (g):	0.69
Weight of Dry Soil (g):	846.98	Weight of Dry Soil (g):	96.37
<b>Moisture Content (%):</b>	<b>4.1</b>	<b>Moisture Content (%):</b>	<b>0.7</b>

Wet Weight of -3/4" Sample (g):	21048	Weight of the Dry Sample (g):	846.98
Dry Weight of - 3/4" Sample (g):	20215.0	Weight of Minus #200 Material (g):	714.88
Wet Weight of +3/4" Sample (g):	97.06	Weight of Plus #200 Material (g):	132.10
Dry Weight of + 3/4" Sample (g):	96.37		
Total Dry Weight of Sample (g):	20311.4	<b>J - Factor (Percent Finer than 3/4"):</b>	<b>0.9953</b>

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100.00
6"	150	0.00	0.00	0.00	100.00	100.00
3"	75	0.00	0.00	0.00	100.00	100.00
2"	50	0.00	(*)	0.00	100.00	100.00
1 1/2"	37.5	0.00	0.00	0.00	100.00	100.00
1"	25.0	28.90	0.14	0.14	99.86	99.86
3/4"	19.0	68.16	0.33	0.47	99.53	99.53
1/2"	12.5	6.01	0.71	0.71	99.29	98.82
3/8"	9.50	4.79	0.57	1.28	98.72	98.26
#4	4.75	8.73	1.03	2.31	97.69	97.23
#10	2.00	15.57	1.84	4.14	95.86	95.40
#20	0.85	16.47	(**) 1.94	6.09	93.91	93.47
#40	0.425	17.96	2.12	8.21	91.79	91.36
#60	0.250	21.88	2.58	10.79	89.21	88.78
#140	0.106	30.95	3.65	14.45	85.55	85.15
#200	0.075	9.74	1.15	15.60	84.40	84.00
Pan	-	714.88	84.40	100.00	-	-

**Notes :** (\*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample  
 (\*\*) The - 3/4" sieve analysis is based on the Weight of the Dry Sample

Tested By	HL	Date	10/1/15	Checked By	KC	Date	10/14/15
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**HYDROMETER ANALYSIS**

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-016

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-18B  
 Soil Color: Brown

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	48.5	22.1	6.33	42.2	82.5	0.01311	0.0268	69.3
5	46.0	22.1	6.33	39.7	77.6	0.01311	0.0173	65.2
15	41.0	22.1	6.33	34.7	67.8	0.01311	0.0105	57.0
31	37.0	22.1	6.33	30.7	60.0	0.01311	0.0075	50.4
71	33.0	22.1	6.33	26.7	52.2	0.01311	0.0051	43.8
250	27.5	22.6	6.15	21.4	41.8	0.01303	0.0028	35.1
1440	22.5	22.9	6.04	16.5	32.2	0.01299	0.0012	27.1

Soil Specimen Data		Other Corrections	
Tare No.:	690		
Wt. of Tare & Dry Material (g):	150.8	a - Factor:	0.99
Weight of Tare (g):	95.2		
Weight of Deflocculant (g):	5.0	Percent Finer than # 200:	84.00
Weight of Dry Material (g):	50.6	Specific Gravity:	2.7 Assumed

**Note:** Hydrometer test is performed on - # 200 sieve material.

Tested By TO Date 10/6/15 Checked By KC Date 10/14/15

page 4 of 4

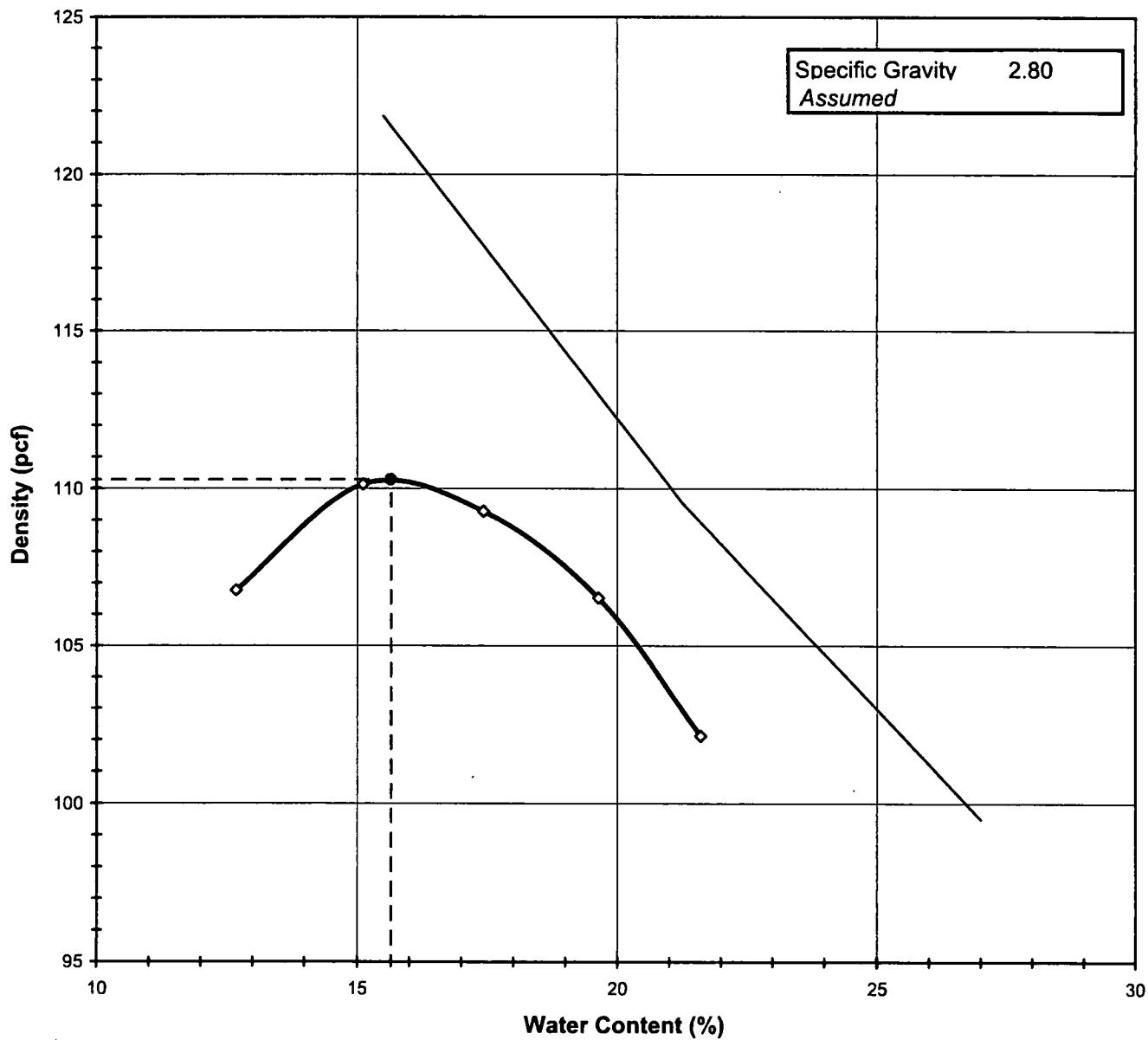
DCN: CT-S3B DATE2015081410AS16RD/ECTS1CEC12015-506-001 Central Waste\2015-506-001-016 Grain JSieveHyd.xls\Print Sheet

**MOISTURE DENSITY RELATIONSHIP**

ASTM D698-12

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	0-4
Project No.:	2015-506-001	Sample No.:	TP-19A
Lab ID:	2015-506-001-017	Test Method	<b>STANDARD</b>
Visual Description: Brown Clay with small amount of Rock Fragments			

**Optimum Water Content**      **15.7**  
**Maximum Dry Density**      **110.3**



<i>Tested By</i>	SGB	<i>Date</i>	10/12/15	<i>Checked By</i>	KC	<i>Date</i>	10/13/15
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page 1 of 2    DCN:CT-S12 DATE:5/1/13 REVISION: 14

**MOISTURE - DENSITY RELATIONSHIP**

ASTM D698-12

Client: CEC                              Boring No.: 9/17/15  
 Client Reference: Central Waste Closure 153-121              Depth (ft): 0-4  
 Project No.: 2015-506-001              Sample No.: TP-19A  
 Lab ID: 2015-506-001-017

Visual Description: Brown Clay with small amount of Rock Fragments

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.80
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	B

Test Type:	<b>STANDARD</b>
Rammer Weight (lb):	5.5
Rammer Drop (in):	12
Rammer Type:	<b>MECHANICAL</b>
Machine ID:	G 774
Mold ID:	G 606
Mold diameter:	4"
Weight of the Mold (g):	4139
Volume of the Mold (cm <sup>3</sup> ):	943

**Mold / Specimen**

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	5957	6055	6078	6065	6016
Weight of Mold (g):	4139	4139	4139	4139	4139
Weight of Wet Sample (g):	1818	1916	1939	1926	1877
Mold Volume (cm <sup>3</sup> ):	943	943	943	943	943

**Moisture Content / Density**

Tare Number:	581	607	871	630	875
Weight of Tare & Wet Sample (g):	325.65	439.70	385.12	424.80	382.66
Weight of Tare & Dry Sample (g):	298.39	392.80	344.34	368.57	334.11
Weight of Tare (g):	83.29	82.71	110.31	82.17	109.44
Weight of Water (g):	27.26	46.90	40.78	56.23	48.55
Weight of Dry Sample (g):	215.10	310.09	234.03	286.40	224.67

Wet Density (g/cm <sup>3</sup> ):	1.93	2.03	2.06	2.04	1.99
Wet Density (pcf):	120.3	126.8	128.3	127.4	124.2
Moisture Content (%):	12.7	15.1	17.4	19.6	21.6
Dry Density (pcf):	106.8	110.1	109.3	106.5	102.1

**Zero Air Voids**

Moisture Content (%):	15.5	21.3	27.0
Dry Unit Weight (pcf):	121.8	109.5	99.5

Tested By	SGB	Date	10/12/15	Checked By	KC	Date	10/13/15
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page 2 of 2

DCN:CT-S12 DATE:5/1/13 REVISION: 14

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## SPECIFIC GRAVITY

ASTM D 854-14

Client: CEC Boring No.: 9/17/15  
Client Reference: Central Waste Closure 153-121 Depth (ft): 0-4  
Project No.: 2015-506-001 Sample No.: TP-19A  
Lab ID: 2015-506-001-017 Visual Description: Brown Clay

(Minus No.4 sieve material, oven dried)

### Replicate Number

	1	2
Pycnometer ID:	G 1255	G 1504
Weight of Pycnometer & Soil & Water (g):	747.58	734.43
Temperature (°C):	25.7	25.3
Weight of Pycnometer & Water (g):	685.00	672.21
Tare Number:	2331	927
Weight of Tare & Dry Soil (g):	193.79	197.43
Weight of Tare (g):	93.74	97.85
Weight of Dry Soil (g):	100.05	99.58
Specific Gravity of Soil @ Measured Temperature:	2.670	2.665
Specific Gravity of Water @ Measured Temperature:	0.99687	0.99698
Conversion Factor for Measured Temperature:	0.99866	0.99877
Specific Gravity @ 20° Celsius:	2.674	2.669

Average Specific Gravity @ 20° Celsius                    2.67

Tested By      TO      Date      10/5/15      Checked By      CLK      Date      10/9/15

DCN: CT-S5 Date: 3/5/14 Revision: 20

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## ATTERBERG LIMITS

ASTM D 4318-10

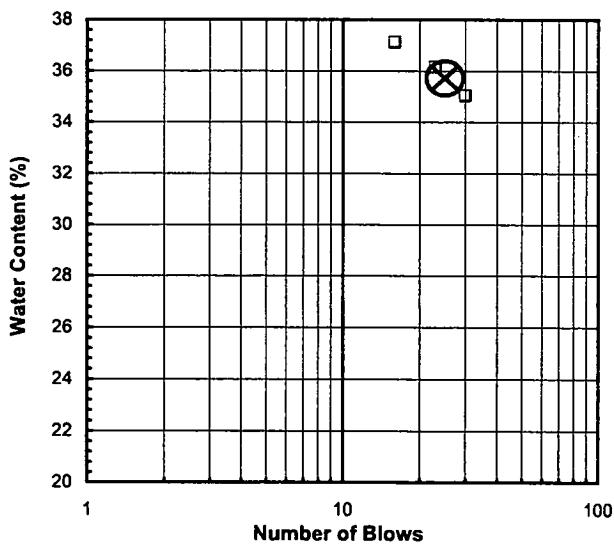
Client: CEC      Boring No.: 9/17/15  
 Client Reference: Central Waste Closure 153-121      Depth (ft): 0-4  
 Project No.: 2015-506-001      Sample No.: TP-19A  
 Lab ID: 2015-506-001-017      Soil Description: BROWN LEAN CLAY

**Note:** The USCS symbol used with this test refers only to the minus No. 40 (Minus No. 40 sieve material, Airdried)  
 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

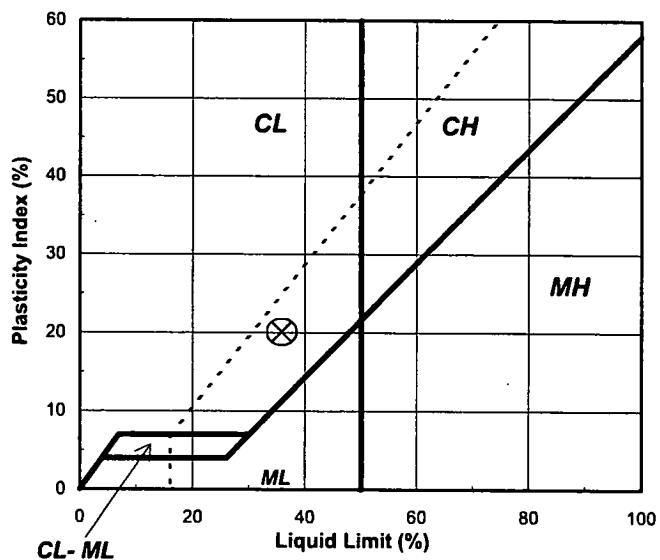
Liquid Limit Test	1	2	3	
Tare Number:	250	5	201	M
Wt. of Tare & Wet Sample (g):	37.79	36.95	37.96	U
Wt. of Tare & Dry Sample (g):	32.20	31.60	32.59	L
Weight of Tare (g):	17.14	16.80	17.26	T
Weight of Water (g):	5.6	5.4	5.4	I
Weight of Dry Sample (g):	15.1	14.8	15.3	P
Moisture Content (%):	37.1	36.1	35.0	O
Number of Blows:	16	23	30	I
				N
				T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	143	444		Liquid Limit (%): 36
Wt. of Tare & Wet Sample (g):	24.83	22.53		Plastic Limit (%): 16
Wt. of Tare & Dry Sample (g):	23.98	21.58		Plasticity Index (%): 20
Weight of Tare (g):	18.59	15.99		USCS Symbol: CL
Weight of Water (g):	0.8	1.0		
Weight of Dry Sample (g):	5.4	5.6		
Moisture Content (%):	15.8	17.0	-1.2	
Note: The acceptable range of the two Moisture contents is $\pm 2.6$				

Flow Curve



Plasticity Chart



Tested By	RAL	Date	10/9/15	Checked By	CLK	Date	10/10/15
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page 1 of 1 DCN: CTS4B, REV. 4, 3/18/13

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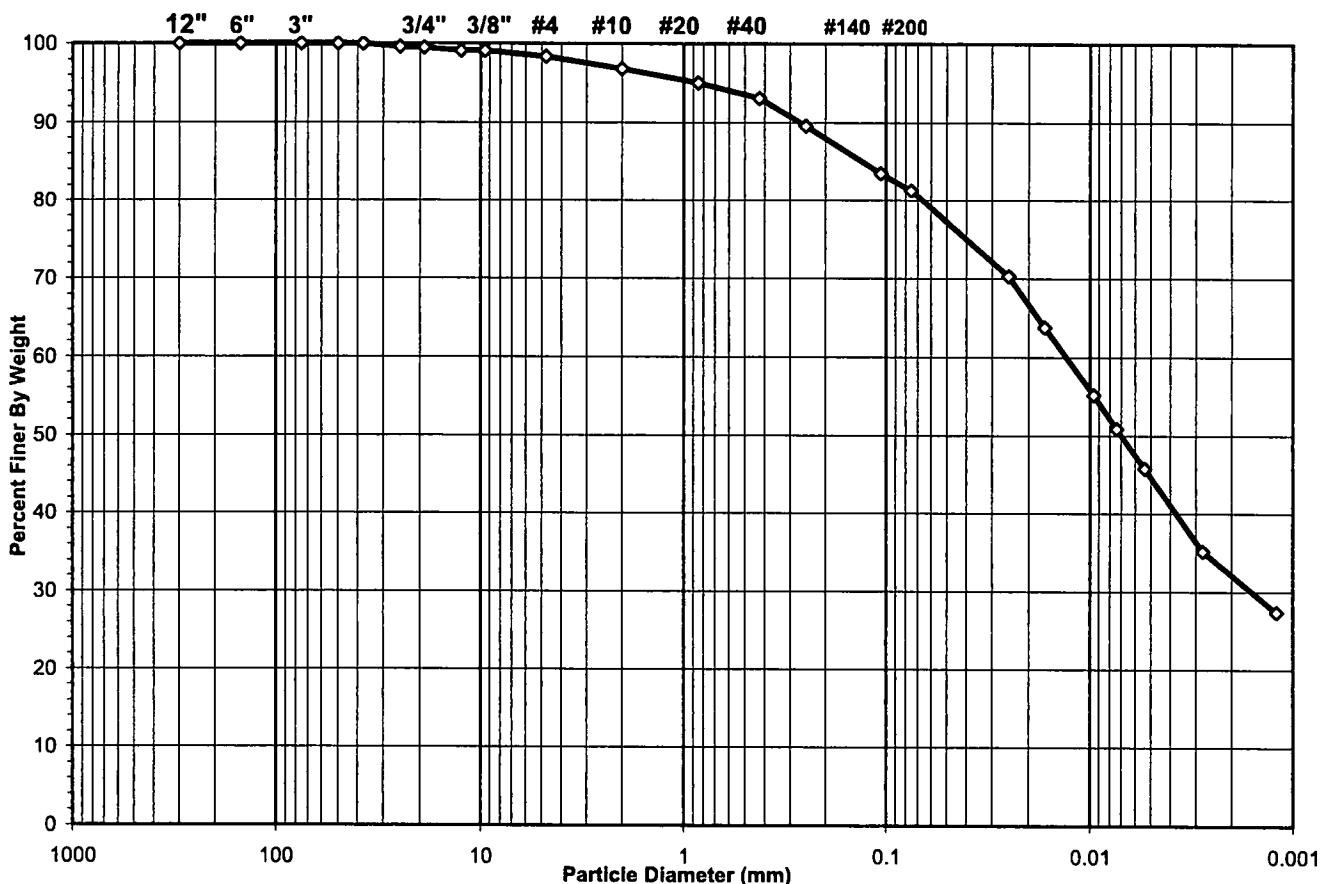
**SIEVE AND HYDROMETER ANALYSIS**  
ASTM D 422-63 (2007)



Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-017

Boring No.: 9/17/16  
 Depth (ft): 0-4  
 Sample No.: TP-19A  
 Soil Color: Brown

USCS USDA	SIEVE ANALYSIS				HYDROMETER						
	cobbles	gravel	sand	silt and clay fraction							
	cobbles	gravel	sand	silt	clay						
	12"	6"	3"	3/4"	3/8"	#4	#10	#20	#40	#140	#200

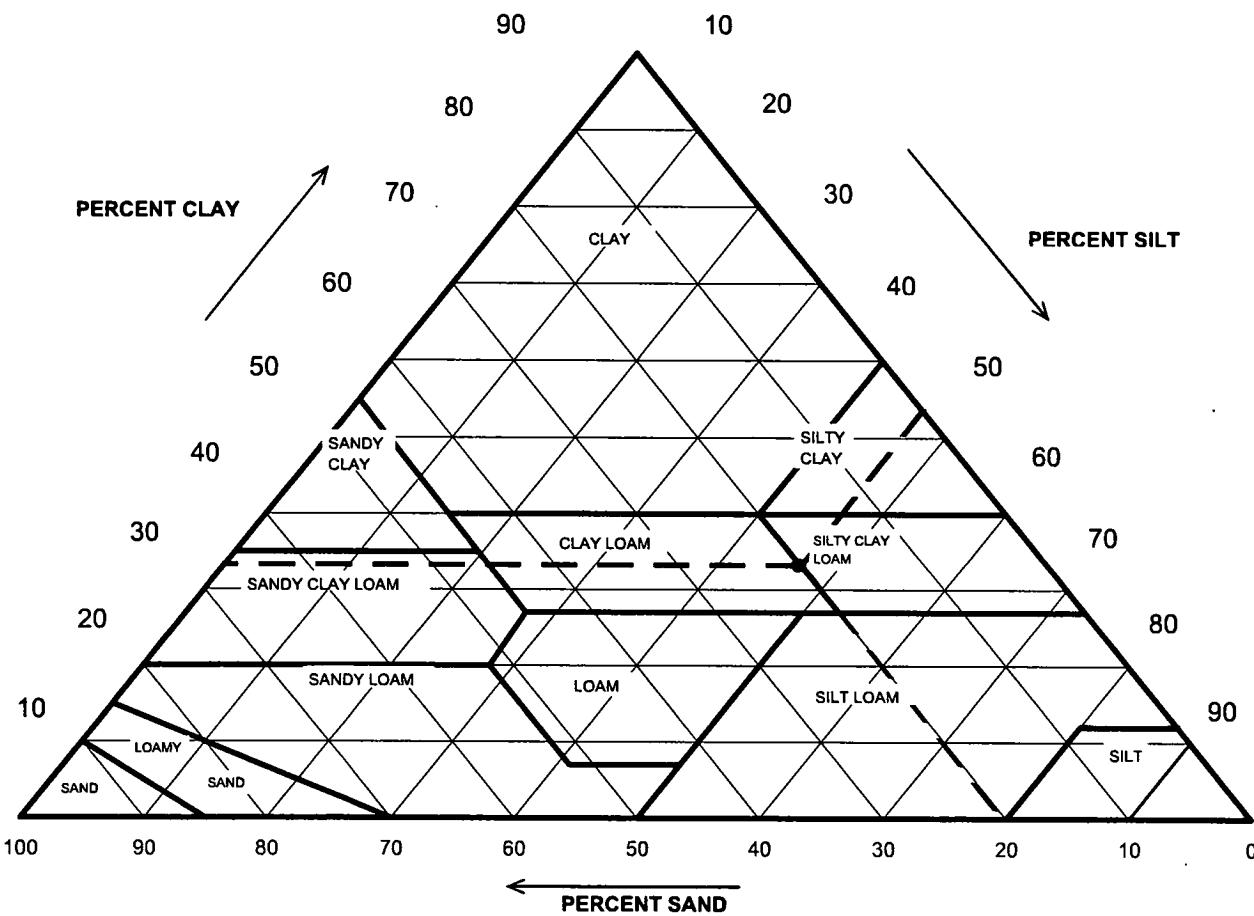


USCS Summary		
Sieve Sizes (mm)	Percentage	
Greater Than #4	Gravel	1.61
#4 To #200	Sand	17.03
Finer Than #200	Silt & Clay	81.37
<b>USCS Symbol:</b>		
<b>CL, TESTED</b>		
<b>USCS Classification:</b>		
<b>LEAN CLAY WITH SAND</b>		

## USDA CLASSIFICATION CHART

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-017

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-19A  
 Soil Color: Brown



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
2	96.81	Gravel	3.19	0.00
0.05	77.30	Sand	19.52	20.16
0.002	32.18	Silt	45.12	46.61
		Clay	32.18	33.23
<b>USDA Classification: CLAY LOAM</b>				

# WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)



Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-017

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-19A  
 Soil Color: Brown

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.:	700	Tare No.:	28
Wt. of Tare & Wet Sample (g):	934.70	Weight of Tare & Wet Sample (g):	94.57
Wt. of Tare & Dry Sample (g):	907.40	Weight of Tare & Dry Sample (g):	94.10
Weight of Tare (g):	88.74	Weight of Tare (g):	6.88
Weight of Water (g):	27.30	Weight of Water (g):	0.47
Weight of Dry Soil (g):	818.66	Weight of Dry Soil (g):	87.22
<b>Moisture Content (%):</b>	<b>3.3</b>	<b>Moisture Content (%):</b>	<b>0.5</b>

Wet Weight of -3/4" Sample (g):	18464	Weight of the Dry Sample (g):	818.66
Dry Weight of - 3/4" Sample (g):	17868.1	Weight of Minus #200 Material (g):	669.39
Wet Weight of +3/4" Sample (g):	87.69	Weight of Plus #200 Material (g):	149.27
Dry Weight of + 3/4" Sample (g):	87.22		
Total Dry Weight of Sample (g):	17955.4	<b>J - Factor (Percent Finer than 3/4"):</b>	<b>0.9951</b>

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100.00
6"	150	0.00	0.00	0.00	100.00	100.00
3"	75	0.00	0.00	0.00	100.00	100.00
2"	50	0.00	( *)	0.00	100.00	100.00
1 1/2"	37.5	0.00		0.00	100.00	100.00
1"	25.0	72.96	0.40	0.40	99.60	99.60
3/4"	19.0	14.73	0.08	0.49	99.51	99.51
1/2"	12.5	3.28	0.40	0.40	99.60	99.12
3/8"	9.50	0.00	0.00	0.40	99.60	99.12
#4	4.75	5.93	0.72	1.13	98.87	98.39
#10	2.00	13.00	1.59	2.71	97.29	96.81
#20	0.85	14.42	( **)	1.76	95.53	95.06
#40	0.425	16.67		2.04	93.49	93.04
#60	0.250	28.74		3.51	89.98	89.54
#140	0.106	49.67		6.07	83.91	83.50
#200	0.075	17.56		2.14	18.23	81.77
Pan	-	669.39	81.77	100.00	-	-

**Notes :** (\*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample

(\*\*) The - 3/4" sieve analysis is based on the Weight of the Dry Sample

Tested By	HL	Date	10/1/15	Checked By	KC	Date	10/14/15
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## HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client: CEC  
Client Reference: Central Waste Closure 153-121  
Project No.: 2015-506-001  
Lab ID: 2015-506-001-017

Boring No.: 9/17/15  
Depth (ft): 0-4  
Sample No.: TP-19A  
Soil Color: Brown

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	55.0	22.1	6.33	48.7	86.5	0.01311	0.0250	70.3
5	50.5	22.1	6.33	44.2	78.5	0.01311	0.0166	63.8
17	44.5	22.1	6.33	38.2	67.8	0.01311	0.0095	55.2
30	41.5	22.1	6.33	35.2	62.5	0.01311	0.0074	50.8
60	38.0	22.1	6.33	31.7	56.3	0.01311	0.0054	45.8
250	30.5	22.6	6.15	24.4	43.3	0.01303	0.0028	35.2
1440	25.0	22.9	6.04	19.0	33.7	0.01299	0.0012	27.4

Soil Specimen Data		Other Corrections	
Tare No.:	1681		
Wt. of Tare & Dry Material (g):	158.65	a - Factor:	0.99
Weight of Tare (g):	97.91		
Weight of Deflocculant (g):	5.0	Percent Finer than # 200:	81.37
Weight of Dry Material (g):	55.74	Specific Gravity:	2.7 Assumed

Note: Hydrometer test is performed on - # 200 sieve material.

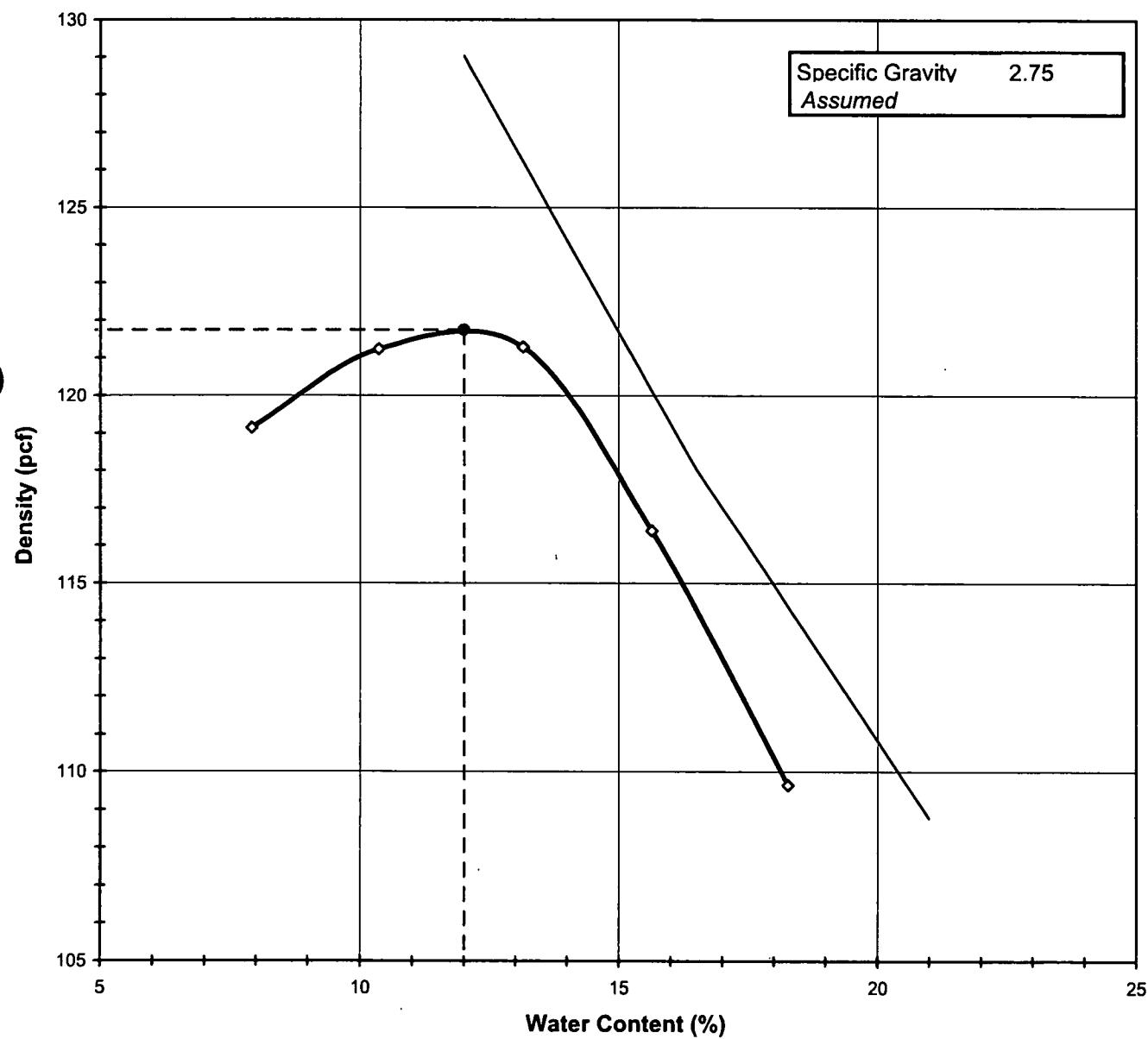
Tested By TO Date 10/6/15 Checked By KC Date 10/14/15  
page 4 of 4 DCN: CT-S3B DATE20150824DASIGRC/ECTS/CEC/2015-506-001 Central Waste\2015-506-001-017 Grain JSieveHyd.xls\Print Sheet

**MOISTURE DENSITY RELATIONSHIP**

ASTM D1557-12

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	4-8
Project No.:	2015-506-001	Sample No.:	TP-19B
Lab ID:	2015-506-001-018	Test Method	<b>MODIFIED</b>
Visual Description: Brown Clay with small amount of Rock Fragments			

**Optimum Water Content**      **12.0**  
**Maximum Dry Density**      **121.7**



<i>Tested By</i>	MF	<i>Date</i>	10/13/15	<i>Checked By</i>	KC	<i>Date</i>	10/15/15
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page 1 of 2    DCN:CT-S12 DATE:5/1/13 REVISION: 14

## MOISTURE - DENSITY RELATIONSHIP

ASTM D1557-12

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	4-8
Project No.:	2015-506-001	Sample No.:	TP-19B
Lab ID:	2015-506-001-018		

Visual Description: Brown Clay with small amount of Rock Fragments

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.75
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	B

Test Type:	MODIFIED
Rammer Weight (lb):	10.0
Rammer Drop (in):	18
Rammer Type:	MECHANICAL
Machine ID:	G 441
Mold ID:	G 606
Mold diameter:	4"
Weight of the Mold (g):	4139
Volume of the Mold (cm <sup>3</sup> ):	943

### Mold / Specimen

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	6082	6161	6213	6173	6099
Weight of Mold (g):	4139	4139	4139	4139	4139
Weight of Wet Sample (g):	1943	2022	2074	2034	1960
Mold Volume (cm <sup>3</sup> ):	943	943	943	943	943

### Moisture Content / Density

Tare Number:	909	878	575	573	580
Weight of Tare & Wet Sample (g):	419.60	418.30	422.00	421.40	422.90
Weight of Tare & Dry Sample (g):	396.86	389.36	382.52	375.55	370.58
Weight of Tare (g):	109.41	110.28	82.40	82.27	84.27
Weight of Water (g):	22.74	28.94	39.48	45.85	52.32
Weight of Dry Sample (g):	287.45	279.08	300.12	293.28	286.31

Wet Density (g/cm <sup>3</sup> ):	2.06	2.14	2.20	2.16	2.08
Wet Density (pcf):	128.6	133.8	137.2	134.6	129.7
Moisture Content (%):	7.9	10.4	13.2	15.6	18.3
Dry Density (pcf):	119.1	121.2	121.3	116.4	109.7

### Zero Air Voids

Moisture Content (%):	12.0	16.5	21.0
Dry Unit Weight (pcf):	129.0	118.0	108.8

Tested By	MF	Date	Checked By	KC	Date	10/15/15
page 2 of 2		DCN:CT-S12 DATE:5/1/13 REVISION: 14				S:\Excel\Excel Qa\Spreadsheets\Proctor.xls

## SPECIFIC GRAVITY

ASTM D 854-14

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	4-8
Project No.:	2015-506-001	Sample No.:	TP-19B
Lab ID:	2015-506-001-018	Visual Description: Brown Clay	

(Minus No.4 sieve material, oven dried)

Replicate Number	1	2
Pycnometer ID:	G 1255	G 1504
Weight of Pycnometer & Soil & Water (g):	747.96	734.49
Temperature (°C):	26.1	26.4
Weight of Pycnometer & Water (g):	684.94	672.06
Tare Number:	1092	694
Weight of Tare & Dry Soil (g):	199.94	194.26
Weight of Tare (g):	99.14	94.18
Weight of Dry Soil (g):	100.80	100.08
Specific Gravity of Soil @ Measured Temperature:	2.668	2.658
Specific Gravity of Water @ Measured Temperature:	0.99677	0.99669
Conversion Factor for Measured Temperature:	0.99856	0.99848
Specific Gravity @ 20° Celsius:	2.672	2.662

Average Specific Gravity @ 20° Celsius	2.67
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Tested By	TO	Date	10/5/15	Checked By	CLK	Date	10/9/15
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DCN: CT-S5 Date: 3/5/14 Revision: 20

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## ATTERBERG LIMITS

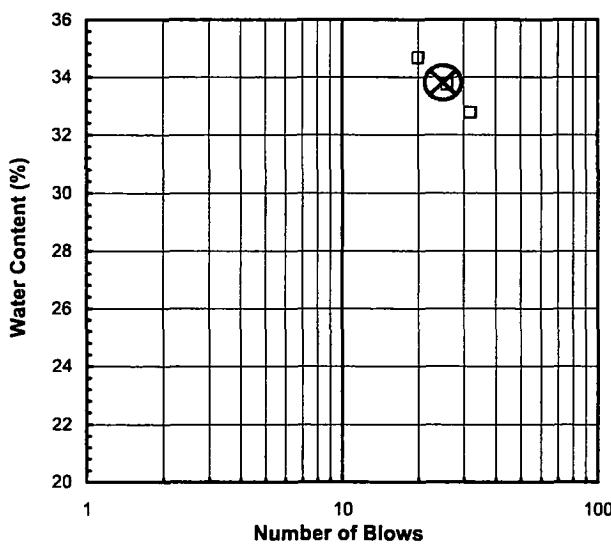
ASTM D 4318-10

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-018  
 Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-19B  
 Soil Description: BROWN LEAN CLAY  
 Note: The USCS symbol used with this test refers only to the minus No. 40 (Minus No. 40 sieve material, Airdried)  
 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

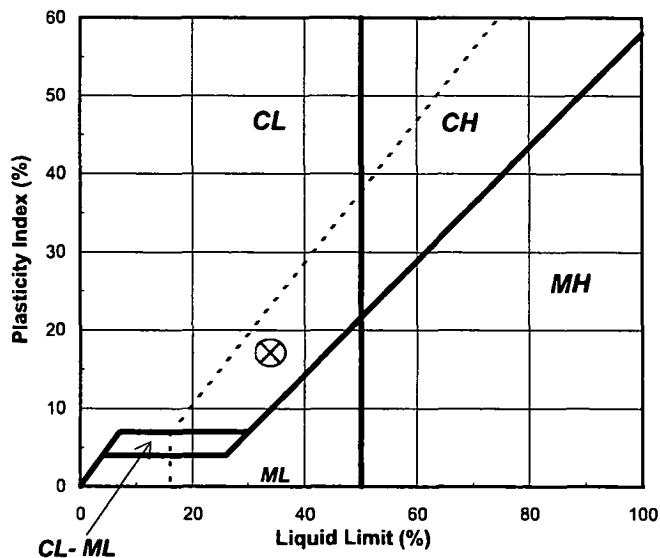
Liquid Limit Test	1	2	3	
Tare Number:	155	213	243	M
Wt. of Tare & Wet Sample (g):	38.98	40.64	40.84	U
Wt. of Tare & Dry Sample (g):	33.90	35.07	35.19	L
Weight of Tare (g):	18.39	18.56	18.89	T
Weight of Water (g):	5.1	5.6	5.7	I
Weight of Dry Sample (g):	15.5	16.5	16.3	P
Moisture Content (%):	32.8	33.7	34.7	O
Number of Blows:	32	26	20	I
				N
				T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	169	187		Liquid Limit (%): 34
Wt. of Tare & Wet Sample (g):	25.30	25.21		Plastic Limit (%): 17
Wt. of Tare & Dry Sample (g):	24.43	24.30		Plasticity Index (%): 17
Weight of Tare (g):	19.29	19.09		USCS Symbol: CL
Weight of Water (g):	0.9	0.9		
Weight of Dry Sample (g):	5.1	5.2		
Moisture Content (%):	16.9	17.5	-0.5	
Note: The acceptable range of the two Moisture contents is $\pm 2.6$				

Flow Curve



Plasticity Chart



Tested By JP Date 10/8/15 Checked By CLK Date 10/9/15

page 1 of 1 DCN: CTS4B, REV. 4, 3/18/13

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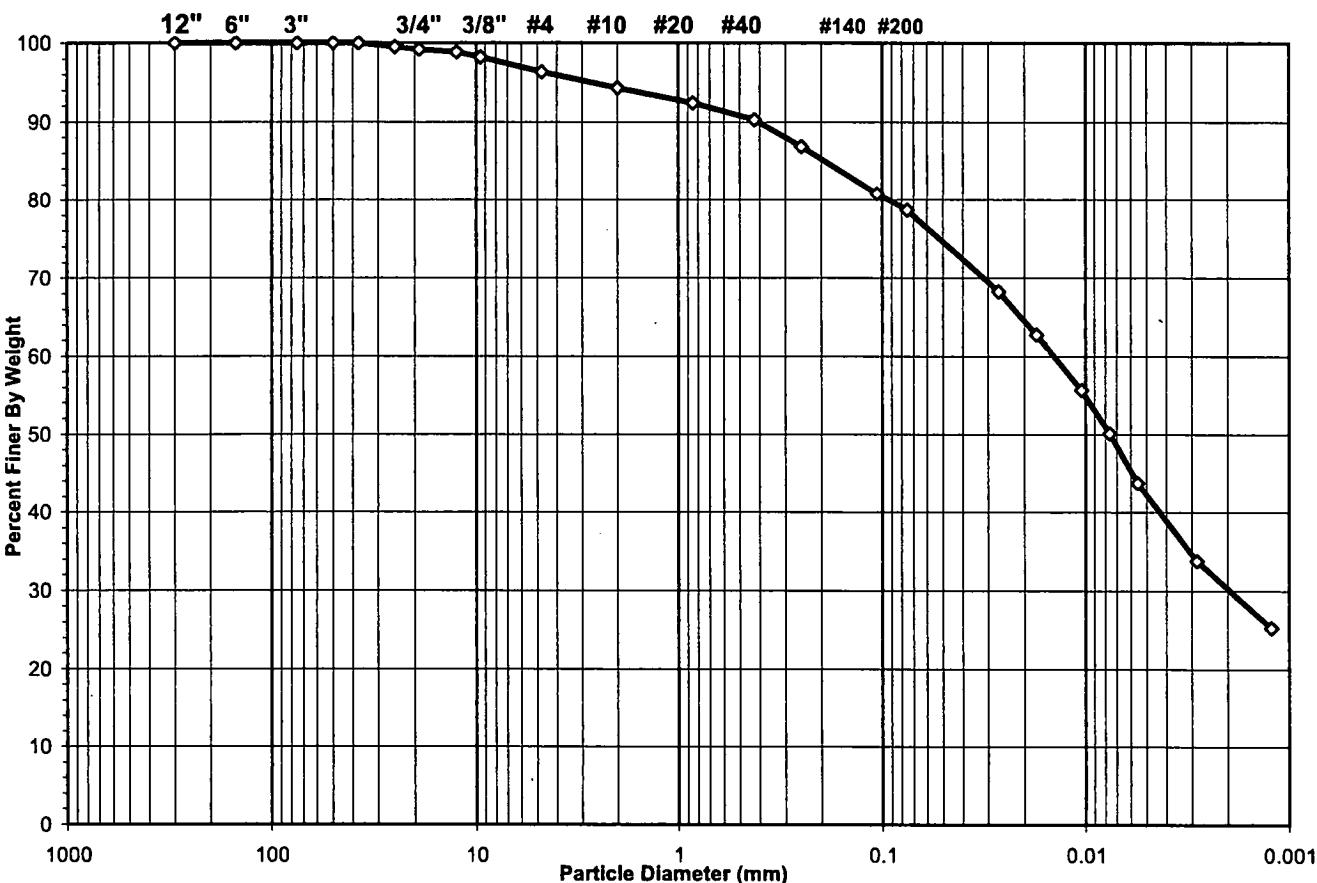
**SIEVE AND HYDROMETER ANALYSIS**  
ASTM D 422-63 (2007)



Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-018

Boring No.: 9/17/13  
 Depth (ft): 4-8  
 Sample No.: TP-19B  
 Soil Color: Brown

USCS USDA	SIEVE ANALYSIS				HYDROMETER		
	cobbles	gravel	sand		silt and clay fraction		
	cobbles	gravel	sand		silt	clay	

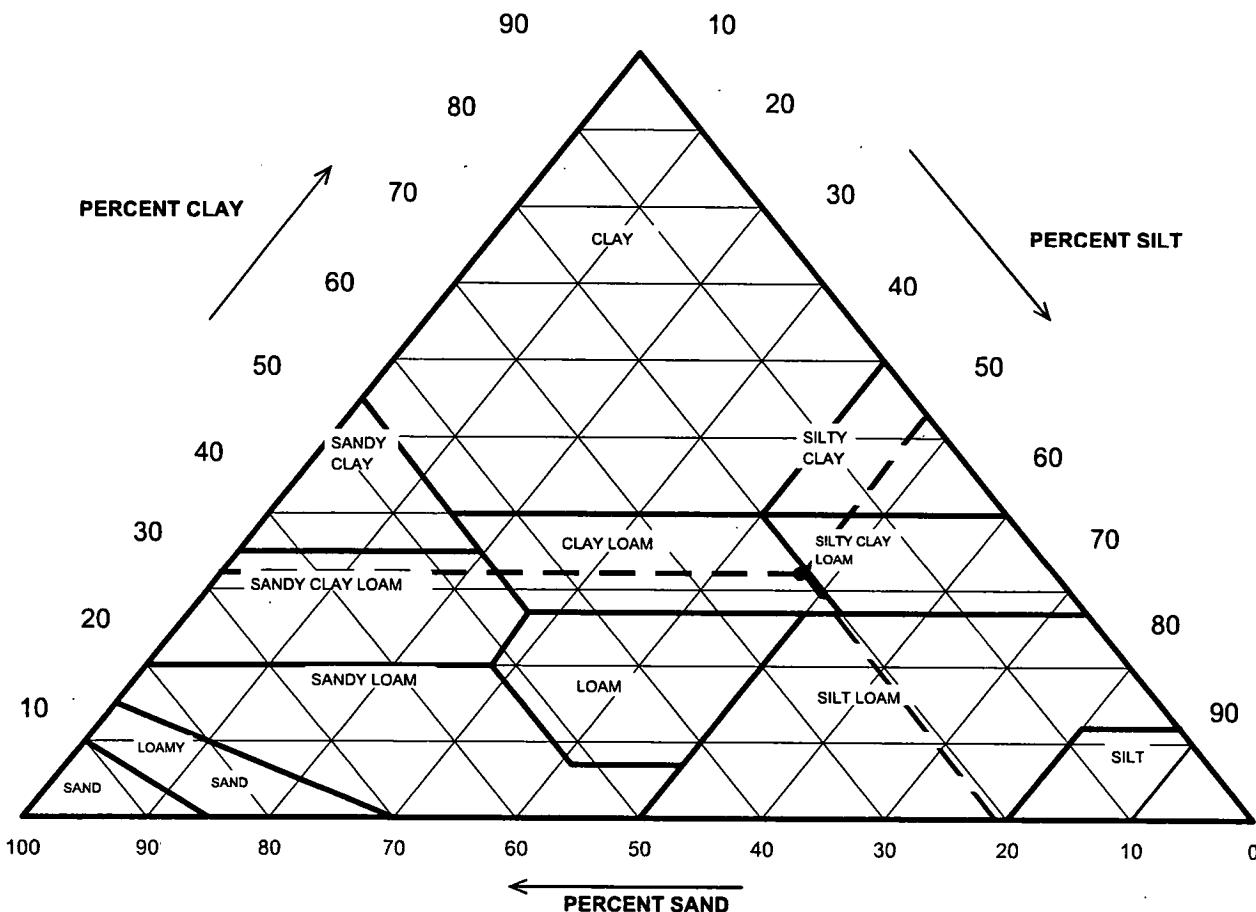


USCS Summary		
Sieve Sizes (mm)	Percentage	
Greater Than #4	Gravel	3.65
#4 To #200	Sand	17.62
Finer Than #200	Silt & Clay	78.72
<b>USCS Symbol:</b> <i>CL, TESTED</i>		
<b>USCS Classification:</b> <i>LEAN CLAY WITH SAND</i>		

## USDA CLASSIFICATION CHART

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-018

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-19B  
 Soil Color: Brown



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
2	94.27	Gravel	5.73	0.00
0.05	74.66	Sand	19.61	20.80
0.002	30.27	Silt	44.39	47.09
		Clay	30.27	32.11
<b>USDA Classification: CLAY LOAM</b>				

# WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)



Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-018

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-19B  
 Soil Color: Brown

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.:	18	Tare No.:	46
Wt. of Tare & Wet Sample (g):	1152.00	Weight of Tare & Wet Sample (g):	159.13
Wt. of Tare & Dry Sample (g):	1127.70	Weight of Tare & Dry Sample (g):	158.49
Weight of Tare (g):	202.67	Weight of Tare (g):	6.91
Weight of Water (g):	24.30	Weight of Water (g):	0.64
Weight of Dry Soil (g):	925.03	Weight of Dry Soil (g):	151.58
<b>Moisture Content (%):</b>	<b>2.6</b>	<b>Moisture Content (%):</b>	<b>0.4</b>
Wet Weight of -3/4" Sample (g):	19846	Weight of the Dry Sample (g):	925.03
Dry Weight of - 3/4" Sample (g):	19338.0	Weight of Minus #200 Material (g):	733.91
Wet Weight of +3/4" Sample (g):	152.22	Weight of Plus #200 Material (g):	191.12
Dry Weight of + 3/4" Sample (g):	151.58		
Total Dry Weight of Sample (g):	19489.6	J - Factor (Percent Finer than 3/4"):	0.9922

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100.00
6"	150	0.00	0.00	0.00	100.00	100.00
3"	75	0.00	0.00	0.00	100.00	100.00
2"	50	0.00	( *)	0.00	100.00	100.00
1 1/2"	37.5	0.00	0.00	0.00	100.00	100.00
1"	25.0	97.48	0.50	0.50	99.50	99.50
3/4"	19.0	54.74	0.28	0.78	99.22	99.22
1/2"	12.5	3.09	0.33	0.33	99.67	98.89
3/8"	9.50	6.44	0.70	1.03	98.97	98.20
#4	4.75	17.29	1.87	2.90	97.10	96.35
#10	2.00	19.37	2.09	4.99	95.01	94.27
#20	0.85	17.50	( **)	1.89	93.11	92.39
#40	0.425	19.61		2.12	90.99	90.29
#60	0.250	31.87		3.45	87.55	86.87
#140	0.106	56.23		6.08	81.47	80.84
#200	0.075	19.72		2.13	20.66	78.72
Pan	-	733.91	79.34	100.00	-	-

**Notes :** (\*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample  
 (\*\*) The - 3/4" sieve analysis is based on the Weight of the Dry Sample

Tested By	HL	Date	10/1/15	Checked By	KC	Date	10/14/15
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**HYDROMETER ANALYSIS**

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-018

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-19B  
 Soil Color: Brown

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	49.5	22.1	6.33	43.2	86.8	0.01311	0.0265	68.3
5	46.0	22.1	6.33	39.7	79.7	0.01311	0.0173	62.8
15	41.5	22.1	6.33	35.2	70.7	0.01311	0.0104	55.7
30	38.0	22.1	6.33	31.7	63.7	0.01311	0.0076	50.1
60	34.0	22.1	6.33	27.7	55.6	0.01311	0.0055	43.8
250	27.5	22.6	6.15	21.4	42.9	0.01303	0.0028	33.8
1440	22.0	22.9	6.04	16.0	32.1	0.01299	0.0012	25.3

Soil Specimen Data		Other Corrections	
Tare No.:	2331		
Wt. of Tare & Dry Material (g):	147.91	a - Factor:	0.99
Weight of Tare (g):	93.65		
Weight of Deflocculant (g):	5.0	Percent Finer than # 200:	78.72
Weight of Dry Material (g):	49.26	Specific Gravity:	2.7 Assumed

**Note:** Hydrometer test is performed on - # 200 sieve material.

Tested By TO Date 10/6/15 Checked By KC Date 10/14/15

page 4 of 4

DCN: CT-S3B DATE20150614TO20150614BYAS19RC1000/ECTS1CEC12015-506-001 Central Waste[2015-506-001-018 Grain JSieveHyd.xls]Print Sheet

# PERMEABILITY TEST

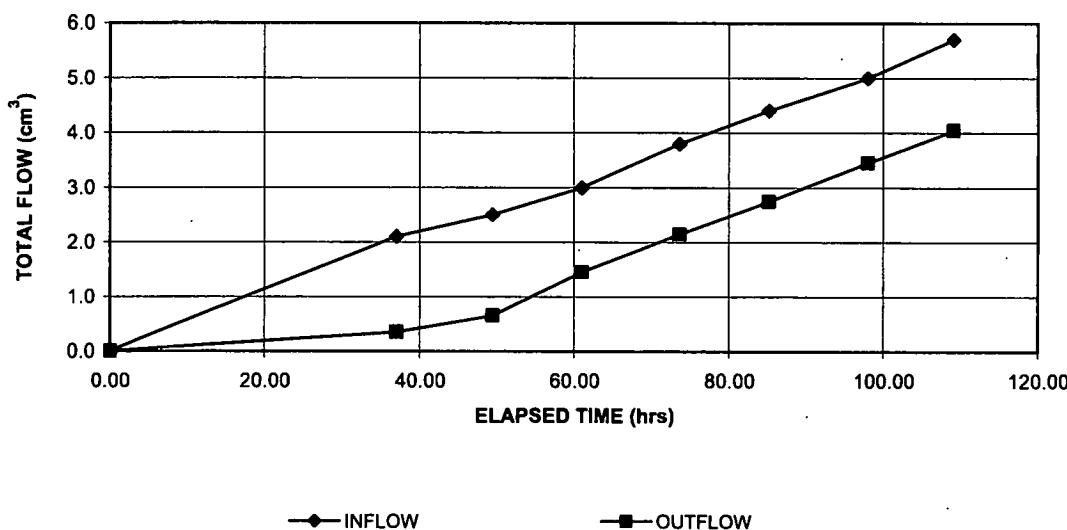
ASTM D 5084-10



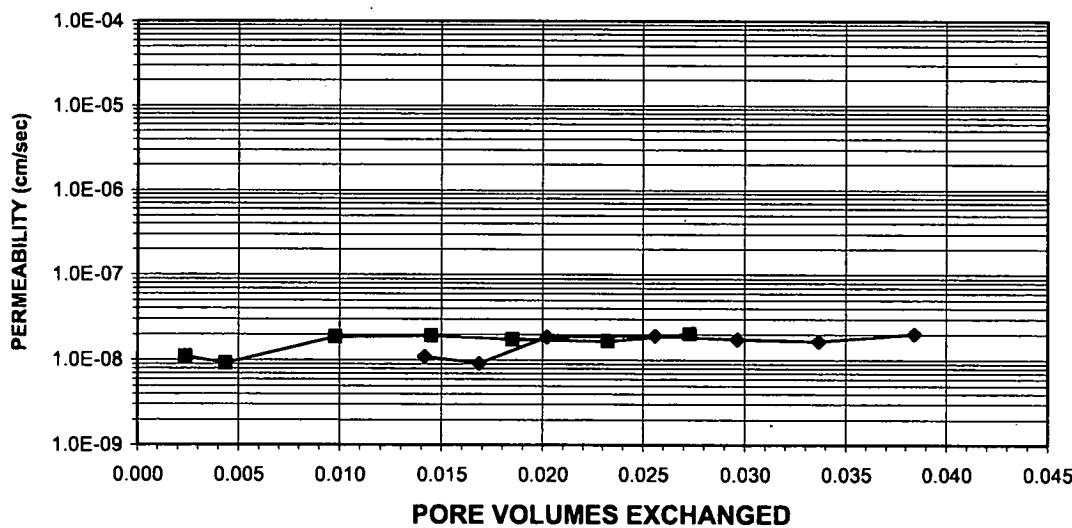
Client: CEC Boring No.: 9/17/15  
Client Project: Central Waste Closure 153-121 Depth (ft): 4-8  
Project No.: 2015-506-001 Sample No.: TP-19B  
Lab ID No.: 2015-506-001-018

AVERAGE PERMEABILITY = 1.8E-08 cm/sec @ 20°C  
AVERAGE PERMEABILITY = 1.8E-10 m/sec @ 20°C

## TOTAL FLOW vs. ELAPSED TIME



## PORE VOLUMES EXCHANGED vs. PERMEABILITY



Tested By: TRE

Date: 10/22/15 Checked By:

KC

Date: 11/2/15

Page 1 of 3

DCN: CT-22 DATE: 4/10/13 REVISION: 10

# PERMEABILITY TEST

ASTM D 5084-10



Client: CEC  
 Client Project: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID No.: 2015-506-001-018

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-19B

Specific Gravity: 2.70 Assumed  
 Sample Condition: Remolded

Visual Description: Brown Sandy Clay

## MOISTURE CONTENT:

### BEFORE TEST

### AFTER TEST

Tare Number	1731	729
Weight of Tare & Wet Sample (g)	237.12	1037.50
Weight of Tare & Dry Sample (g)	218.44	892.40
Weight of Tare (g)	83.39	86.28
Weight of Water (g)	18.68	145.10
Weight of Dry Sample (g)	135.05	806.12
Moisture Content (%)	13.8	18.0

## SPECIMEN:

### BEFORE TEST

### AFTER TEST

Weight of Tube & Wet Sample (g)	2245.50	NA
Weight of Tube (g)	1344.00	NA
Weight of Wet Sample (g)	901.50	934.51
Length 1 (in)	3.998	4.022
Length 2 (in)	3.998	4.026
Length 3 (in)	3.998	4.031
Top Diameter (in)	2.870	2.920
Middle Diameter (in)	2.870	2.921
Bottom Diameter (in)	2.870	2.918
Average Length (in)	4.00	4.03
Average Area (in <sup>2</sup> )	6.47	6.70
Sample Volume (cm <sup>3</sup> )	423.96	441.74
Unit Wet Weight (g/cm <sup>3</sup> )	2.13	2.12
Unit Wet Weight (pcf)	132.7	132.1
Unit Dry Weight (pcf)	116.6	111.9
Unit Dry Weight (g/cm <sup>3</sup> )	1.87	1.79
Void Ratio, e	0.45	0.51
Porosity, n	0.31	0.34
Pore Volume (cm <sup>3</sup> )	130.6	148.4
Total Weight of Sample After Test (g)		951.3

Tested By: TRE Date: 10/22/15 Checked By: KC Date: 11/2/15

# PERMEABILITY TEST

ASTM D 5084-10



Client: CEC  
 Client Project: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID No.: 2015-506-001-018

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-19B

<u>Pressure Heads (Constant)</u>		<u>Final Sample Dimensions</u>	
Top Cap (psi)	67.5	Sample Length (cm), L	10.23
Bottom Cap (psi)	70.0	Sample Diameter (cm)	7.42
Cell (psi)	75.0	Sample Area ( $\text{cm}^2$ ), A	43.19
Total Pressure Head (cm)	175.8	Inflow Burette Area ( $\text{cm}^2$ ), a-in	0.891
Hydraulic Gradient	17.19	Outflow Burette Area ( $\text{cm}^2$ ), a-out	0.915
		B Parameter (%)	96

AVERAGE PERMEABILITY = **1.8E-08 cm/sec @ 20°C**

AVERAGE PERMEABILITY = **1.8E-10 m/sec @ 20°C**

DATE (mm/dd/yy)	TIME (hr)	ELAPSED TIME t (hr)	TOTAL INFLOW ( $\text{cm}^3$ )	TOTAL OUTFLOW ( $\text{cm}^3$ )	TOTAL HEAD h (cm)	FLOW (0 flow) (1 stop)	TEMP. (°C)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
10/25/15	18	14	0.000	0.0	200.0	0	20.5	NA
10/27/15	7	15	37.017	2.1	197.3	0	20.4	1.1E-08
10/27/15	19	40	49.433	2.5	196.5	0	21.6	9.0E-09
10/28/15	7	15	61.017	3.0	195.1	0	20.0	1.9E-08
10/28/15	19	55	73.683	3.8	193.4	0	21.5	1.9E-08
10/29/15	7	25	85.183	4.4	192.1	0	20.8	1.7E-08
10/29/15	20	15	98.017	5.0	190.7	0	21.5	1.7E-08
10/30/15	7	20	109.100	5.7	189.2	1	20.0	2.0E-08

Tested By:

TRE

Date: 10/22/15

Checked By:

KC

Date: 11/2/15

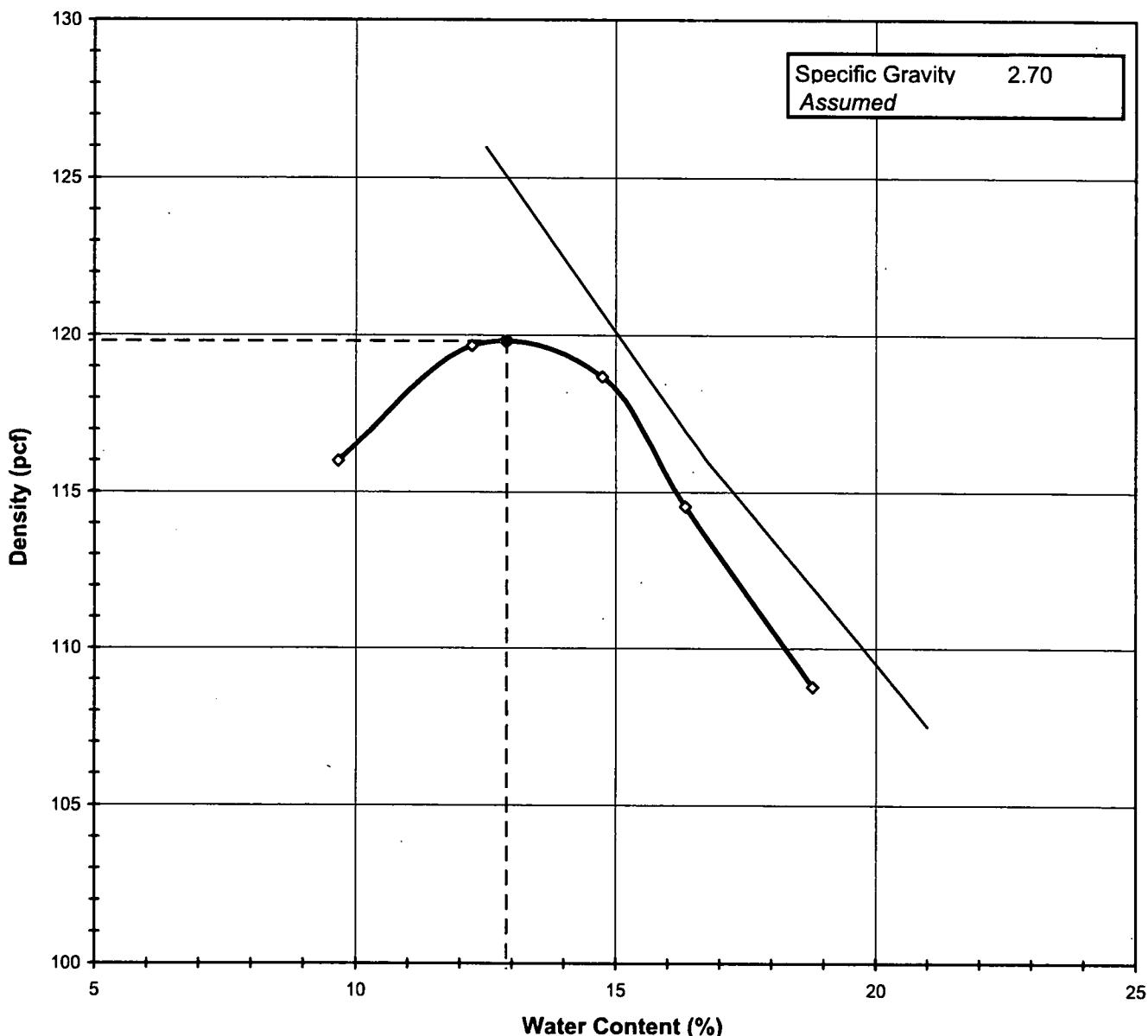
**MOISTURE DENSITY RELATIONSHIP**

ASTM D1557-12

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	0-4
Project No.:	2015-506-001	Sample No.:	TP-20A
Lab ID:	2015-506-001-019	Test Method	<b>MODIFIED</b>

Visual Description: Brown Clay with Rock Fragments

<b>Optimum Water Content</b>	<b>12.9</b>
<b>Maximum Dry Density</b>	<b>119.8</b>



<i>Tested By</i>	AMC	Date	10/10/15	<i>Checked By</i>	KC	Date	10/12/15
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page 1 of 2 DCN:CT-S12 DATE:5/1/13 REVISION: 14

**MOISTURE - DENSITY RELATIONSHIP**

ASTM D1557-12

Client: CEC Boring No.: 9/17/15  
 Client Reference: Central Waste Closure 153-121 Depth (ft): 0-4  
 Project No.: 2015-506-001 Sample No.: TP-20A  
 Lab ID: 2015-506-001-019

Visual Description: Brown Clay with Rock Fragments

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.70
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	C

Test Type:	<b>MODIFIED</b>
Rammer Weight (lb):	10.0
Rammer Drop (in):	18
Rammer Type:	MECHANICAL
Machine ID:	G 441
Mold ID:	G 1389
Mold diameter:	6"
Weight of the Mold (g):	6364
Volume of the Mold (cm <sup>3</sup> ):	2125

**Mold / Specimen**

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	10696	10938	11002	10902	10764
Weight of Mold (g):	6364	6364	6364	6364	6364
Weight of Wet Sample (g):	4332	4574	4638	4538	4400
Mold Volume (cm <sup>3</sup> ):	2125	2125	2125	2125	2125

**Moisture Content / Density**

Tare Number:	785	1459	1718	594	604
Weight of Tare & Wet Sample (g):	676.70	600.70	599.20	609.50	608.30
Weight of Tare & Dry Sample (g):	624.60	543.80	532.80	535.30	525.80
Weight of Tare (g):	85.60	78.90	82.40	81.10	86.70
Weight of Water (g):	52.10	56.90	66.40	74.20	82.50
Weight of Dry Sample (g):	539.00	464.90	450.40	454.20	439.10

Wet Density (g/cm <sup>3</sup> ):	2.04	2.15	2.18	2.14	2.07
Wet Density (pcf):	127.2	134.3	136.2	133.3	129.2
Moisture Content (%):	9.7	12.2	14.7	16.3	18.8
Dry Density (pcf):	116.0	119.7	118.7	114.5	108.8

**Zero Air Voids**

Moisture Content (%):	12.5	16.8	21.0
Dry Unit Weight (pcf):	126.0	116.0	107.5

Tested By	AMC	Date	10/10/15	Checked By	KC	Date	10/12/15
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## SPECIFIC GRAVITY

ASTM D 854-14

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	0-4
Project No.:	2015-506-001	Sample No.:	TP-20A
Lab ID:	2015-506-001-019	Visual Description: Brown Clay	

(Minus No.4 sieve material, oven dried)

Replicate Number		1	2
Pycnometer ID:	G	1255	G 1504
Weight of Pycnometer & Soil & Water (g):		747.36	734.55
Temperature (°C):		24.8	24.8
Weight of Pycnometer & Water (g):		685.11	672.27
Tare Number:		690	924
Weight of Tare & Dry Soil (g):		194.87	200.05
Weight of Tare (g):		95.23	99.73
Weight of Dry Soil (g):		99.64	100.32
Specific Gravity of Soil @ Measured Temperature:		2.665	2.637
Specific Gravity of Water @ Measured Temperature:		0.99710	0.99710
Conversion Factor for Measured Temperature:		0.99889	0.99889
Specific Gravity @ 20° Celsius:		2.668	2.640

Average Specific Gravity @ 20° Celsius	2.65
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Tested By	TO	Date	10/5/15	Checked By	CLK	Date	10/9/15
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DCN: CT-S5 Date: 3/5/14 Revision: 20

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## ATTERBERG LIMITS

ASTM D 4318-10

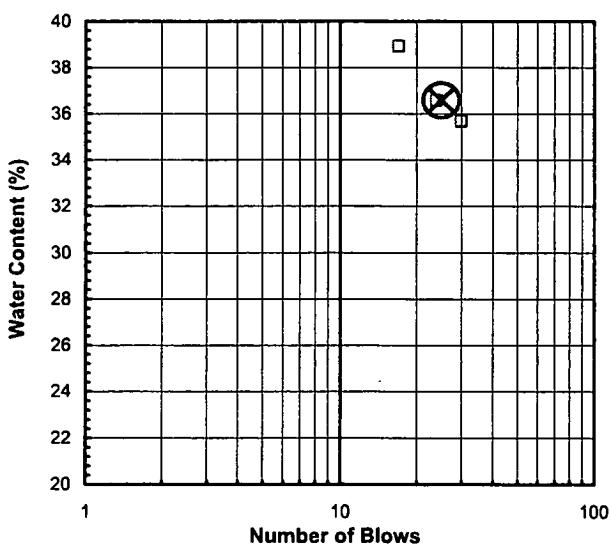
Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-019  
 Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-20A  
 Soil Description: BROWN LEAN CLAY

*Note: The USCS symbol used with this test refers only to the minus No. 40 (Minus No. 40 sieve material, Airdried) sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.*

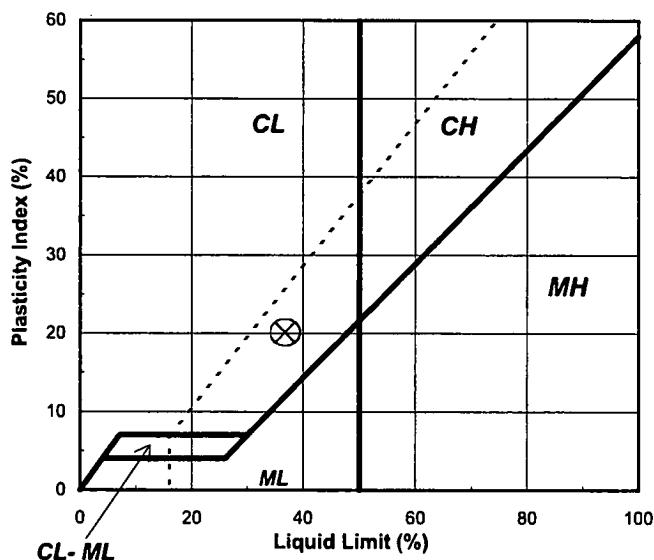
Liquid Limit Test	1	2	3	
Tare Number:	313	210	1223	M
Wt. of Tare & Wet Sample (g):	38.64	38.62	30.89	U
Wt. of Tare & Dry Sample (g):	32.97	33.23	25.60	L
Weight of Tare (g):	18.40	18.49	10.77	T
Weight of Water (g):	5.7	5.4	5.3	I
Weight of Dry Sample (g):	14.6	14.7	14.8	P
Moisture Content (%):	38.9	36.6	35.7	O
Number of Blows:	17	24	30	I
				N
				T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	216	237		Liquid Limit (%): 37
Wt. of Tare & Wet Sample (g):	25.49	25.31		Plastic Limit (%): 17
Wt. of Tare & Dry Sample (g):	24.55	24.36		Plasticity Index (%): 20
Weight of Tare (g):	19.22	18.78		USCS Symbol: CL
Weight of Water (g):	0.9	0.9		
Weight of Dry Sample (g):	5.3	5.6		
Moisture Content (%):	17.6	17.0	0.6	
<i>Note: The acceptable range of the two Moisture contents is ± 2.6</i>				

Flow Curve



Plasticity Chart



Tested By RAL Date 10/9/15 Checked By CLK Date 10/10/15

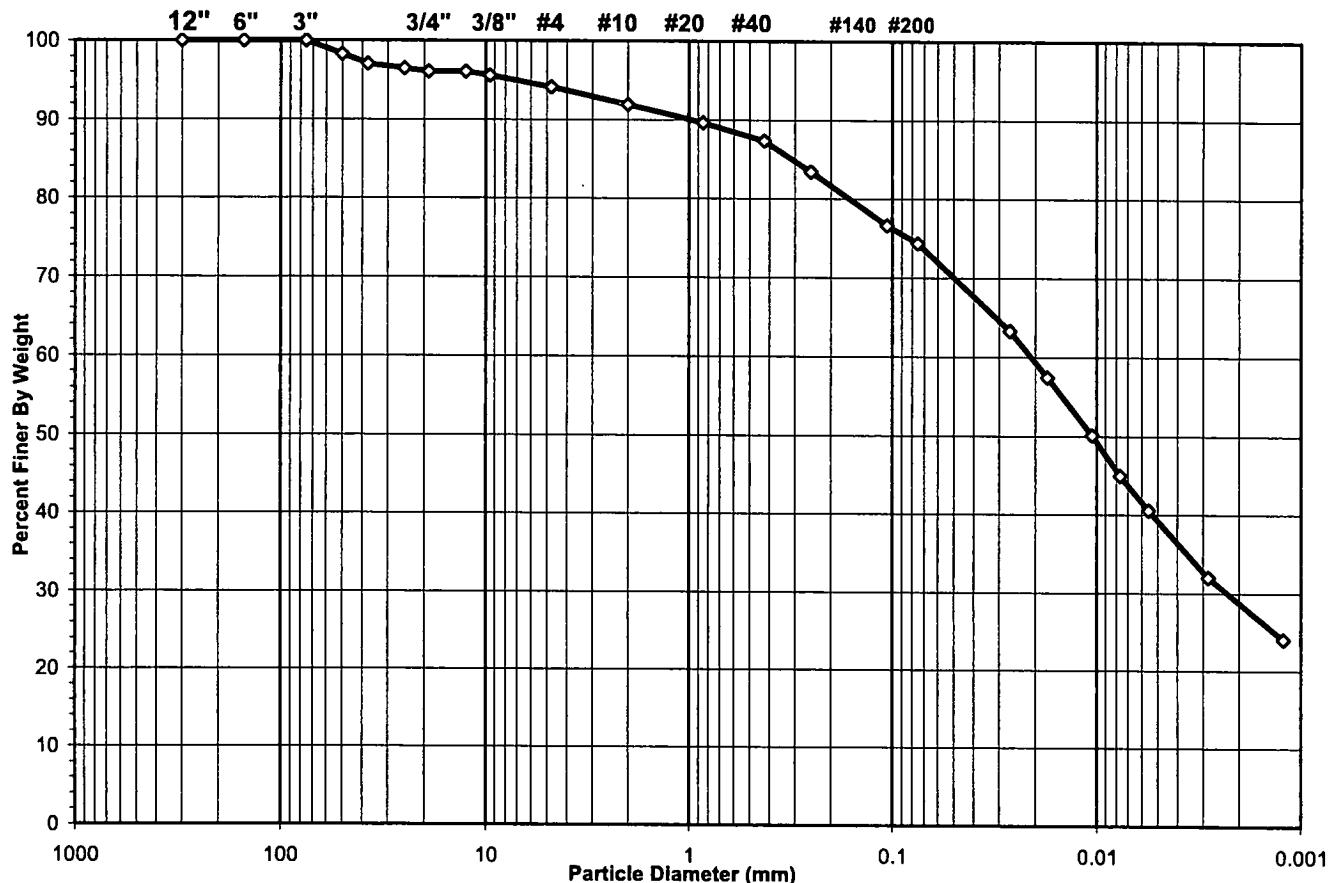
**SIEVE AND HYDROMETER ANALYSIS**  
ASTM D 422-63 (2007)



Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-019

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-20A  
 Soil Color: Brown

USCS USDA	SIEVE ANALYSIS				HYDROMETER	
	cobbles	gravel	sand	silt and clay fraction		
	cobbles	gravel	sand	silt	clay	

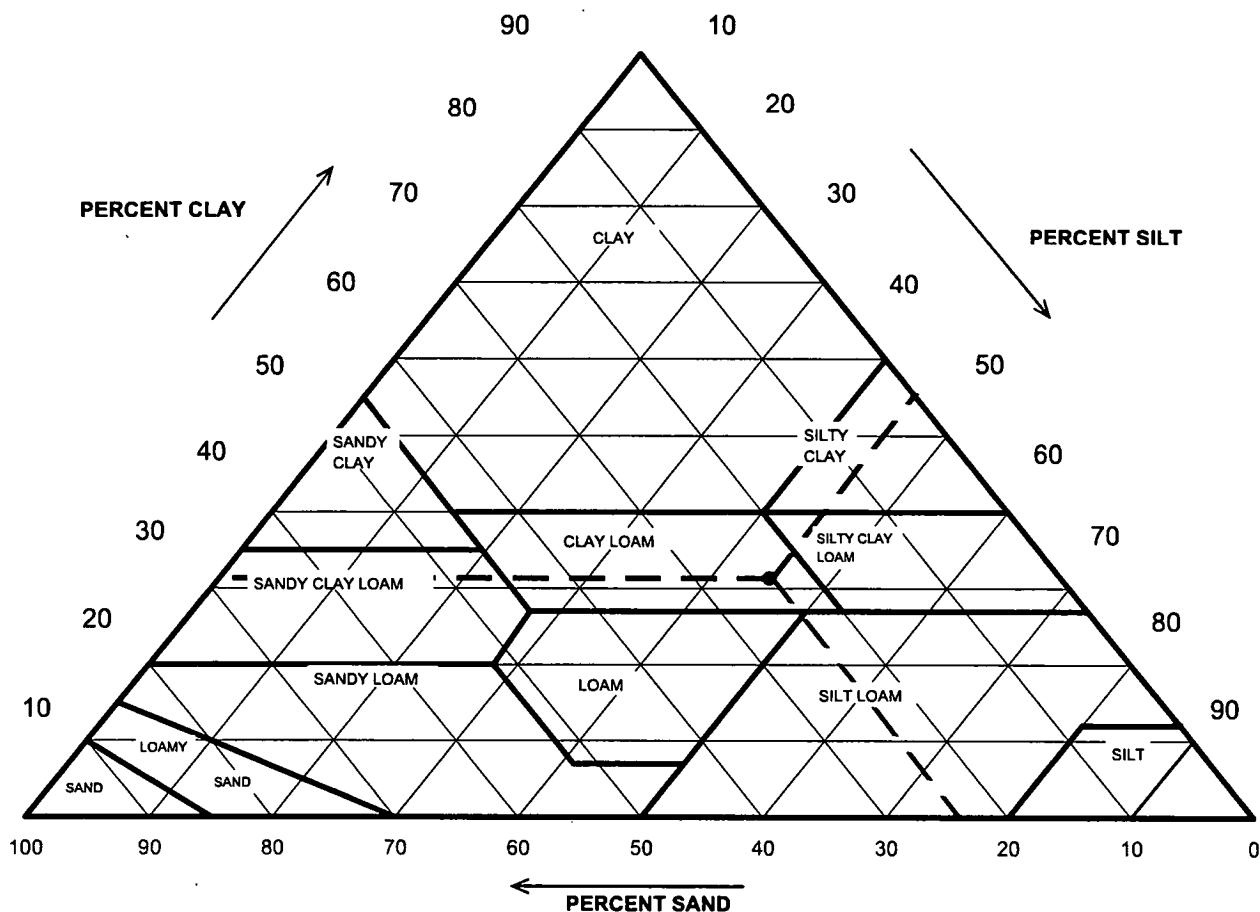


USCS Summary		
Sieve Sizes (mm)	Percentage	
Greater Than #4	Gravel	5.90
#4 To #200	Sand	19.70
Finer Than #200	Silt & Clay	74.40
<b>USCS Symbol:</b>		
<b>CL, TESTED</b>		
<b>USCS Classification:</b>		
<b>LEAN CLAY WITH SAND</b>		

## USDA CLASSIFICATION CHART

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-019

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-20A  
 Soil Color: Brown



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
2	91.92	Gravel	8.08	0.00
0.05	70.07	Sand	21.85	23.77
0.002	28.81	Silt	41.26	44.89
		Clay	28.81	31.34
<b>USDA Classification: CLAY LOAM</b>				

# WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)



Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-019

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-20A  
 Soil Color: Brown

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.:	1431	Tare No.:	1694
Wt. of Tare & Wet Sample (g):	1040.30	Weight of Tare & Wet Sample (g):	893.90
Wt. of Tare & Dry Sample (g):	960.00	Weight of Tare & Dry Sample (g):	883.60
Weight of Tare (g):	144.41	Weight of Tare (g):	83.56
Weight of Water (g):	80.30	Weight of Water (g):	10.30
Weight of Dry Soil (g):	815.59	Weight of Dry Soil (g):	800.04
<b>Moisture Content (%):</b>	<b>9.8</b>	<b>Moisture Content (%):</b>	<b>1.3</b>

Wet Weight of -3/4" Sample (g):	21788	Weight of the Dry Sample (g):	815.59
Dry Weight of -3/4" Sample (g):	19835.1	Weight of Minus #200 Material (g):	631.30
Wet Weight of +3/4" Sample (g):	810.31	Weight of Plus #200 Material (g):	184.29
Dry Weight of +3/4" Sample (g):	800.01		
Total Dry Weight of Sample (g):	20635.1	<b>J - Factor (Percent Finer than 3/4"):</b>	<b>0.9612</b>

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100.00
6"	150	0.00	0.00	0.00	100.00	100.00
3"	75	0.00	0.00	0.00	100.00	100.00
2"	50	364.05	(*) 1.74	1.74	98.26	98.26
1 1/2"	37.5	251.43	1.20	2.94	97.06	97.06
1"	25.0	109.86	0.53	3.47	96.53	96.53
3/4"	19.0	84.97	0.41	3.88	96.12	96.12
1/2"	12.5	0.00	0.00	0.00	100.00	96.12
3/8"	9.50	4.18	0.51	0.51	99.49	95.63
#4	4.75	12.99	1.59	2.11	97.89	94.10
#10	2.00	18.53	2.27	4.38	95.62	91.92
#20	0.85	19.12	(**) 2.34	6.72	93.28	89.66
#40	0.425	19.51	2.39	9.11	90.89	87.36
#60	0.250	33.48	4.11	13.22	86.78	83.42
#140	0.106	57.10	7.00	20.22	79.78	76.69
#200	0.075	19.38	2.38	22.60	77.40	74.40
Pan	-	631.30	77.40	100.00	-	-

**Notes :** (\*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample

(\*\*) The - 3/4" sieve analysis is based on the Weight of the Dry Sample

Tested By	PC	Date	Checked By	KC	Date	10/14/15
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## HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-019

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-20A  
 Soil Color: Brown

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	49.5	22.1	6.33	43.2	85.1	0.01311	0.0265	63.3
5	45.5	22.1	6.33	39.2	77.2	0.01311	0.0174	57.4
15	40.5	22.1	6.33	34.2	67.3	0.01311	0.0105	50.1
30	37.0	22.1	6.33	30.7	60.4	0.01311	0.0077	45.0
60	34.0	22.1	6.33	27.7	54.5	0.01311	0.0055	40.6
250	28.0	22.6	6.15	21.9	43.1	0.01303	0.0028	32.0
1440	22.5	22.9	6.04	16.5	32.4	0.01299	0.0012	24.1

Soil Specimen Data		Other Corrections	
Tare No.:	950		
Wt. of Tare & Dry Material (g):	154.93	a - Factor:	0.99
Weight of Tare (g):	99.68	Percent Finer than # 200:	74.40
Weight of Deflocculant (g):	5.0	Specific Gravity:	2.7 Assumed
Weight of Dry Material (g):	50.25		

**Note:** Hydrometer test is performed on - # 200 sieve material.

Tested By	TO	Date	10/6/15	Checked By	KC	Date	10/14/15
page 4 of 4							

DCN: CT-S3B DATE09/15/2015 BY ASI PROJECTS CEC 2015-506-001 Central Waste/2015-506-001-019 Grain JSieveHyd.xls/Print Sheet

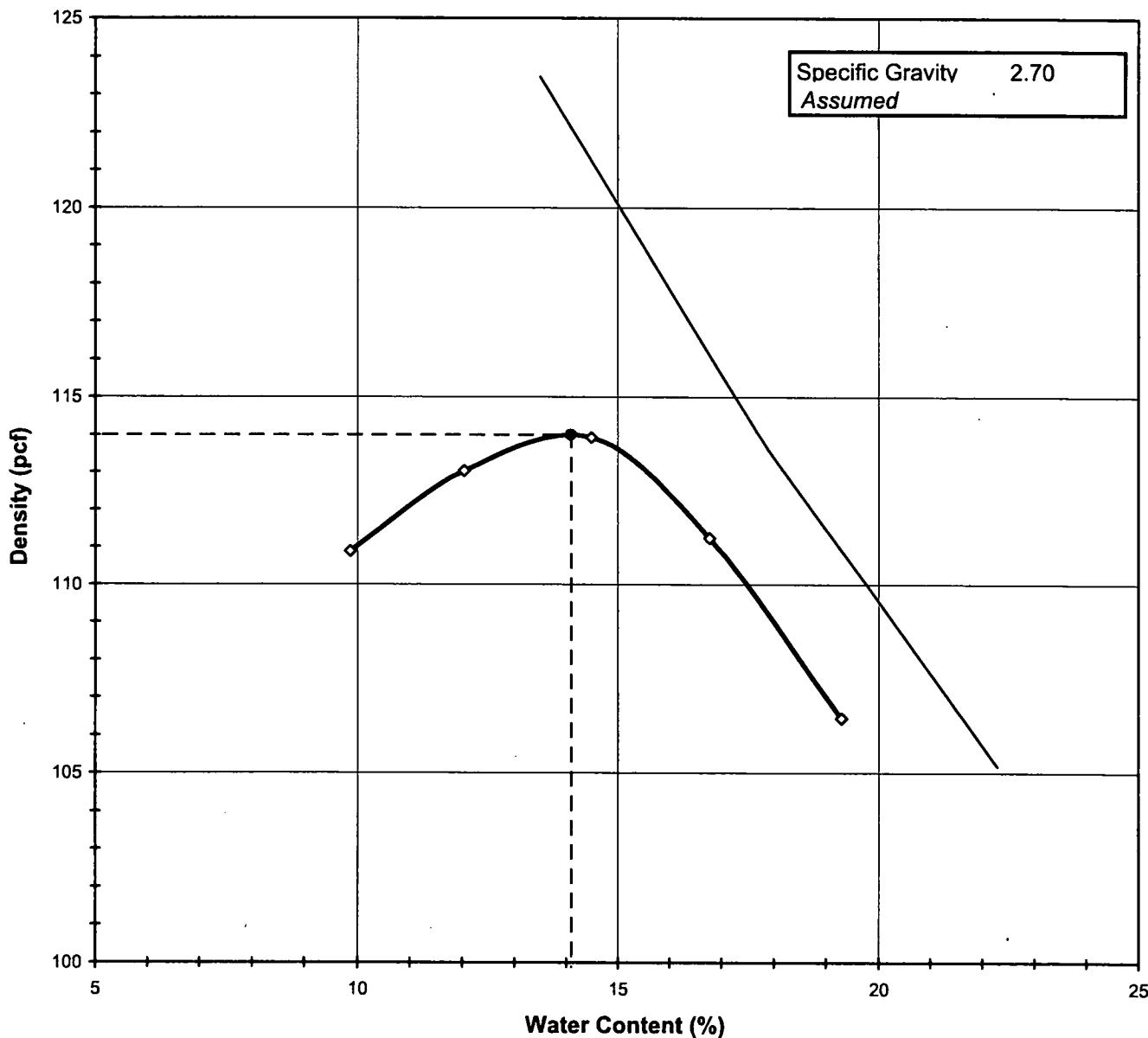
**MOISTURE DENSITY RELATIONSHIP**
*ASTM D698-12*

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-020

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-20B  
 Test Method: STANDARD

Visual Description: Brown Clay with small amount of Rock Fragments

Optimum Water Content                            14.1  
 Maximum Dry Density                            114.0



Tested By      SGB      Date      10/10/15      Checked By      KC      Date      10/12/15

page 1 of 2      DCN:CT-S12 DATE:5/1/13 REVISION: 14

## MOISTURE - DENSITY RELATIONSHIP

ASTM D698-12

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	4-8
Project No.:	2015-506-001	Sample No.:	TP-20B
Lab ID:	2015-506-001-020		

Visual Description: Brown Clay with small amount of Rock Fragments

Total Weight of the Sample (g):	NA	Test Type:	STANDARD
As Received Water Content (%):	NA	Rammer Weight (lb):	5.5
Assumed Specific Gravity:	2.70	Rammer Drop (in):	12
Percent Retained on 3/4":	NA	Rammer Type:	MECHANICAL
Percent Retained on 3/8":	NA	Machine ID:	G 774
Percent Retained on #4:	NA	Mold ID:	G 606
Oversize Material:	Not included	Mold diameter:	4"
Procedure Used:	B	Weight of the Mold (g):	4139
		Volume of the Mold (cm <sup>3</sup> ):	943

### Mold / Specimen

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	5980	6053	6110	6102	6058
Weight of Mold (g):	4139	4139	4139	4139	4139
Weight of Wet Sample (g):	1841	1914	1971	1963	1919
Mold Volume (cm <sup>3</sup> ):	943	943	943	943	943

### Moisture Content / Density

Tare Number:	917	599	587	1706	1705
Weight of Tare & Wet Sample (g):	391.89	351.39	372.72	362.89	380.94
Weight of Tare & Dry Sample (g):	366.57	322.64	335.96	322.65	332.78
Weight of Tare (g):	109.88	83.97	82.22	82.80	83.14
Weight of Water (g):	25.32	28.75	36.76	40.24	48.16
Weight of Dry Sample (g):	256.69	238.67	253.74	239.85	249.64

Wet Density (g/cm <sup>3</sup> ):	1.95	2.03	2.09	2.08	2.03
Wet Density (pcf):	121.8	126.7	130.4	129.9	127.0
Moisture Content (%):	9.9	12.0	14.5	16.8	19.3
Dry Density (pcf):	110.9	113.0	113.9	111.2	106.4

### Zero Air Voids

Moisture Content (%):	13.5	17.9	22.3
Dry Unit Weight (pcf):	123.5	113.6	105.2

Tested By	SGB	Date	10/10/15	Checked By	KC	Date	10/12/15
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## SPECIFIC GRAVITY

ASTM D 854-14

Client: CEC  
Client Reference: Central Waste Closure 153-121  
Project No.: 2015-506-001  
Lab ID: 2015-506-001-020

Boring No.: 9/17/15  
Depth (ft): 4-8  
Sample No.: TP-20B  
Visual Description: Brown Clay

(Minus No.4 sieve material, oven dried)

### Replicate Number

	1	2
Pycnometer ID:	G 1255	G 1504
Weight of Pycnometer & Soil & Water (g):	747.63	734.88
Temperature (°C):	26.4	26.7
Weight of Pycnometer & Water (g):	684.90	672.02
Tare Number:	2471	700
Weight of Tare & Dry Soil (g):	198.5	189.21
Weight of Tare (g):	98.32	88.64
Weight of Dry Soil (g):	100.18	100.57
Specific Gravity of Soil @ Measured Temperature:	2.675	2.667
Specific Gravity of Water @ Measured Temperature:	0.99669	0.99660
Conversion Factor for Measured Temperature:	0.99848	0.99839
Specific Gravity @ 20° Celsius:	2.679	2.671

Average Specific Gravity @ 20° Celsius                    2.67

Tested By      TO      Date      10/5/15      Checked By      CLK      Date      10/9/15

DCN: CT-S5 Date: 3/5/14 Revision: 20

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## ATTERBERG LIMITS

ASTM D 4318-10

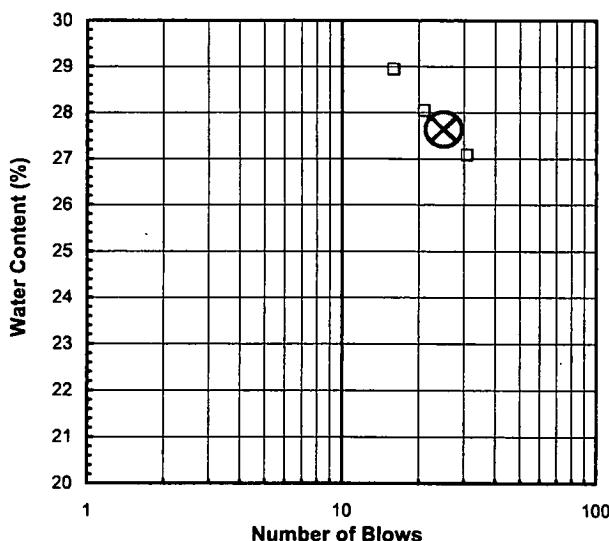
Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	4-8
Project No.:	2015-506-001	Sample No.:	TP-20B
Lab ID:	2015-506-001-020	Soil Description: BROWN LEAN CLAY	

**Note: The USCS symbol used with this test refers only to the minus No. 40 (Minus No. 40 sieve material, Airdried) sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description .**

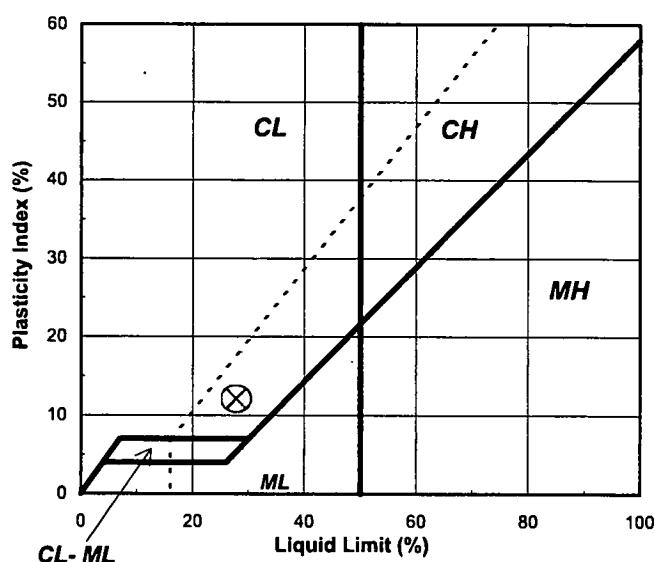
Liquid Limit Test	1	2	3	M U L T I P O I N T
Tare Number:	193	197	213	
Wt. of Tare & Wet Sample (g):	39.73	39.36	41.46	
Wt. of Tare & Dry Sample (g):	35.10	34.56	36.32	
Weight of Tare (g):	18.00	17.44	18.56	
Weight of Water (g):	4.6	4.8	5.1	
Weight of Dry Sample (g):	17.1	17.1	17.8	
Moisture Content (%):	27.1	28.0	28.9	
Number of Blows:	31	21	16	

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	231	234		Liquid Limit (%): 28
Wt. of Tare & Wet Sample (g):	25.95	25.91		Plastic Limit (%): 16
Wt. of Tare & Dry Sample (g):	25.07	25.09		Plasticity Index (%): 12
Weight of Tare (g):	19.66	19.88		USCS Symbol: CL
Weight of Water (g):	0.9	0.8		
Weight of Dry Sample (g):	5.4	5.2		
Moisture Content (%):	16.3	15.7	0.5	
<i>Note: The acceptable range of the two Moisture contents is ± 2.6</i>				

Flow Curve



Plasticity Chart



Tested By	JP	Date	9/30/15	Checked By	KC	Date	10/1/15
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page 1 of 1 DCN: CTS4B, REV. 4, 3/18/13

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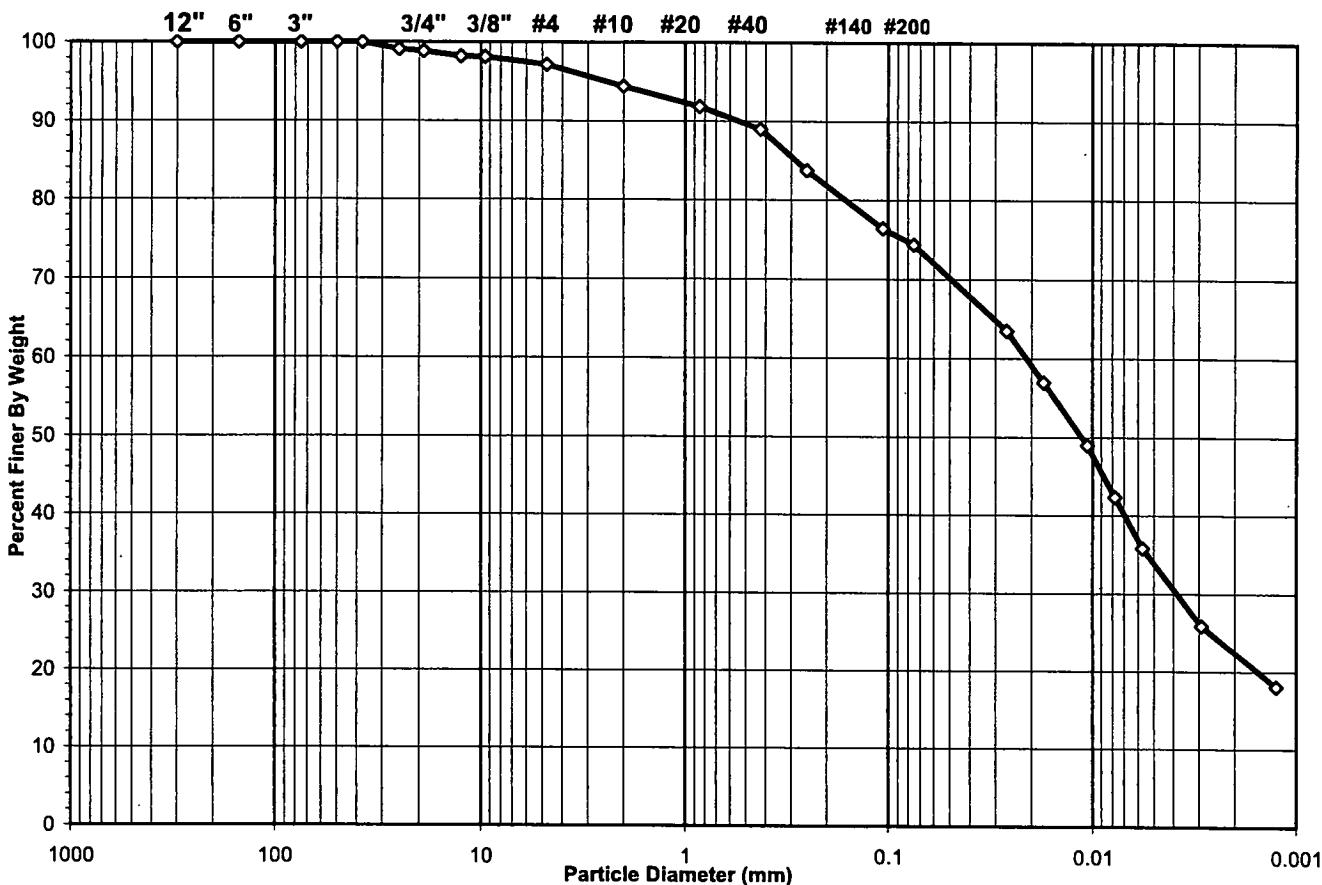
**SIEVE AND HYDROMETER ANALYSIS**  
ASTM D 422-63 (2007)



Client: CEC  
Client Reference: Central Waste Closure 153-121  
Project No.: 2015-506-001  
Lab ID: 2015-506-001-020

Boring No.: 9/17/14  
Depth (ft): 4-8  
Sample No.: TP-20B  
Soil Color: Brown

USCS USDA	SIEVE ANALYSIS				HYDROMETER	
	cobbles	gravel	sand	silt and clay fraction		
	cobbles	gravel	sand	silt	clay	

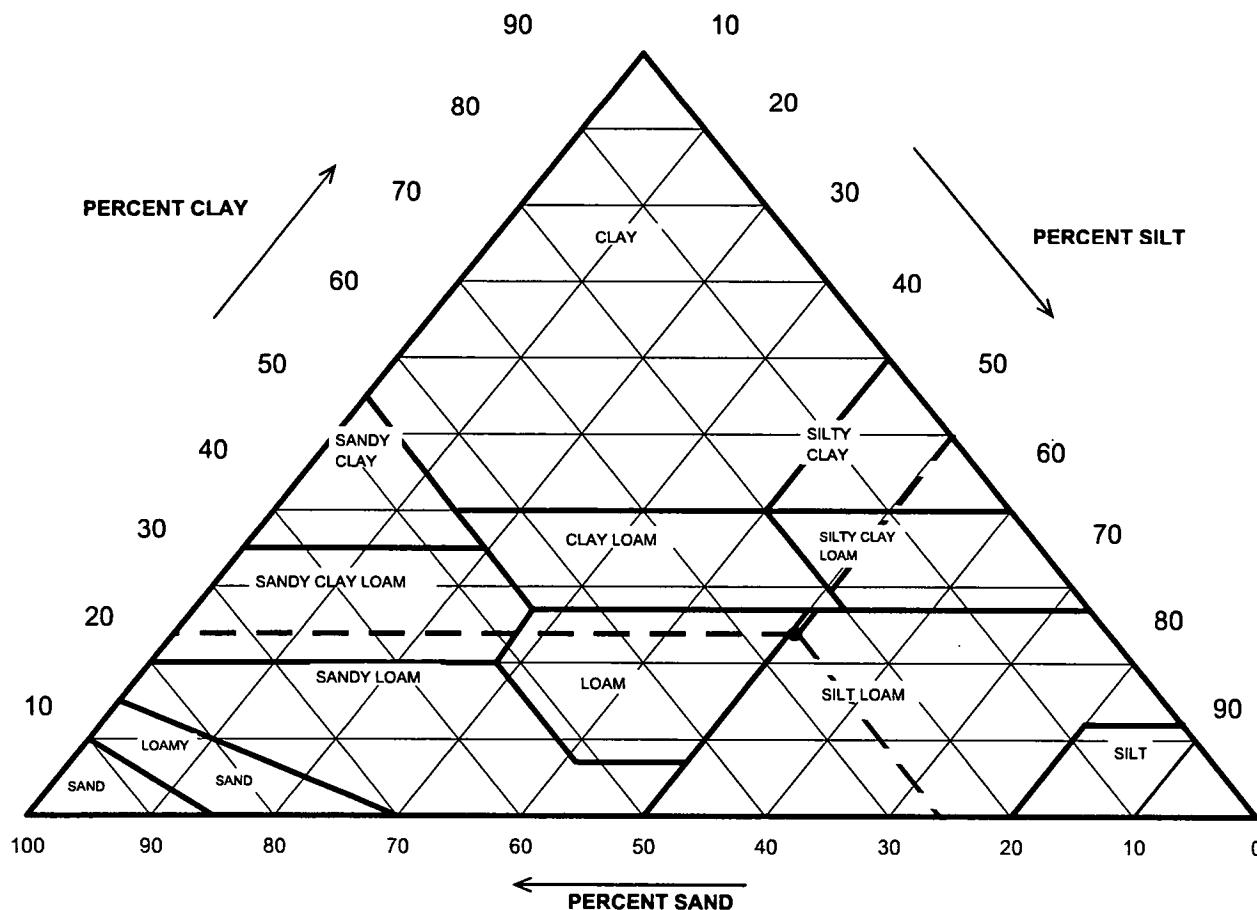


USCS Summary		
Sieve Sizes (mm)	Percentage	
Greater Than #4	Gravel	2.87
#4 To #200	Sand	22.75
Finer Than #200	Silt & Clay	74.37
<b>USCS Symbol:</b>		
<b>CL, TESTED</b>		
<b>USCS Classification:</b>		
<b>LEAN CLAY WITH SAND</b>		

## USDA CLASSIFICATION CHART

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-020

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-20B  
 Soil Color: Brown



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	5.64	0.00
2	94.36	Sand	24.22	25.67
0.05	70.15	Silt	47.64	50.49
0.002	22.50	Clay	22.50	23.85
<b>USDA Classification: SILT LOAM</b>				

# WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)



Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-020

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-20B  
 Soil Color: Brown

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.:	1423	Tare No.:	2873
Wt. of Tare & Wet Sample (g):	971.70	Weight of Tare & Wet Sample (g):	245.42
Wt. of Tare & Dry Sample (g):	880.50	Weight of Tare & Dry Sample (g):	230.30
Weight of Tare (g):	143.99	Weight of Tare (g):	6.74
Weight of Water (g):	91.20	Weight of Water (g):	15.12
Weight of Dry Soil (g):	736.51	Weight of Dry Soil (g):	223.56
<b>Moisture Content (%):</b>	<b>12.4</b>	<b>Moisture Content (%):</b>	<b>6.8</b>
Wet Weight of -3/4" Sample (g):	21688	Weight of the Dry Sample (g):	736.51
Dry Weight of -3/4" Sample (g):	19298.3	Weight of Minus #200 Material (g):	554.12
Wet Weight of +3/4" Sample (g):	238.68	Weight of Plus #200 Material (g):	182.39
Dry Weight of +3/4" Sample (g):	223.56		
Total Dry Weight of Sample (g):	19521.9	<b>J - Factor (Percent Finer than 3/4"):</b>	<b>0.9885</b>

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100.00
6"	150	0.00	0.00	0.00	100.00	100.00
3"	75	0.00	0.00	0.00	100.00	100.00
2"	50	0.00	( *)	0.00	100.00	100.00
1 1/2"	37.5	0.00		0.00	100.00	100.00
1"	25.0	188.33	0.90	0.90	99.10	99.10
3/4"	19.0	50.35	0.24	1.15	98.85	98.85
1/2"	12.5	4.59	0.62	0.62	99.38	98.24
3/8"	9.50	1.03	0.14	0.76	99.24	98.10
#4	4.75	7.24	0.98	1.75	98.25	97.13
#10	2.00	20.60	2.80	4.54	95.46	94.36
#20	0.85	18.68	( **)	2.54	92.92	91.86
#40	0.425	21.55		2.93	89.99	88.96
#60	0.250	38.46		5.22	84.77	83.80
#140	0.106	55.05		7.47	77.30	76.41
#200	0.075	15.19		2.06	24.76	75.24
Pan	-	554.12	75.24	100.00	-	-

**Notes :** (\*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample

(\*\*) The - 3/4" sieve analysis is based on the Weight of the Dry Sample

Tested By	PC	Date	Checked By	KC	Date	10/14/15
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## HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-020

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-20B  
 Soil Color: Brown

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N'
0	NA	NA	NA	NA	NA	NA	NA	NA
2	50.0	22.1	6.33	43.7	85.3	0.01311	0.0264	63.5
5	45.5	22.1	6.33	39.2	76.6	0.01311	0.0174	56.9
15	40.0	22.1	6.33	33.7	65.8	0.01311	0.0106	48.9
30	35.5	22.1	6.33	29.2	57.0	0.01311	0.0077	42.4
60	31.0	22.1	6.33	24.7	48.2	0.01311	0.0057	35.9
250	24.0	22.6	6.15	17.9	34.9	0.01303	0.0029	26.0
1440	18.5	22.9	6.04	12.5	24.4	0.01299	0.0012	18.1

Soil Specimen Data		Other Corrections	
Tare No.:	2337		
Wt. of Tare & Dry Material (g):	151.12	a - Factor:	0.99
Weight of Tare (g):	95.46	Percent Finer than # 200:	74.37
Weight of Deflocculant (g):	5.0	Specific Gravity:	2.7 Assumed
Weight of Dry Material (g):	50.66		

**Note:** Hydrometer test is performed on - # 200 sieve material.

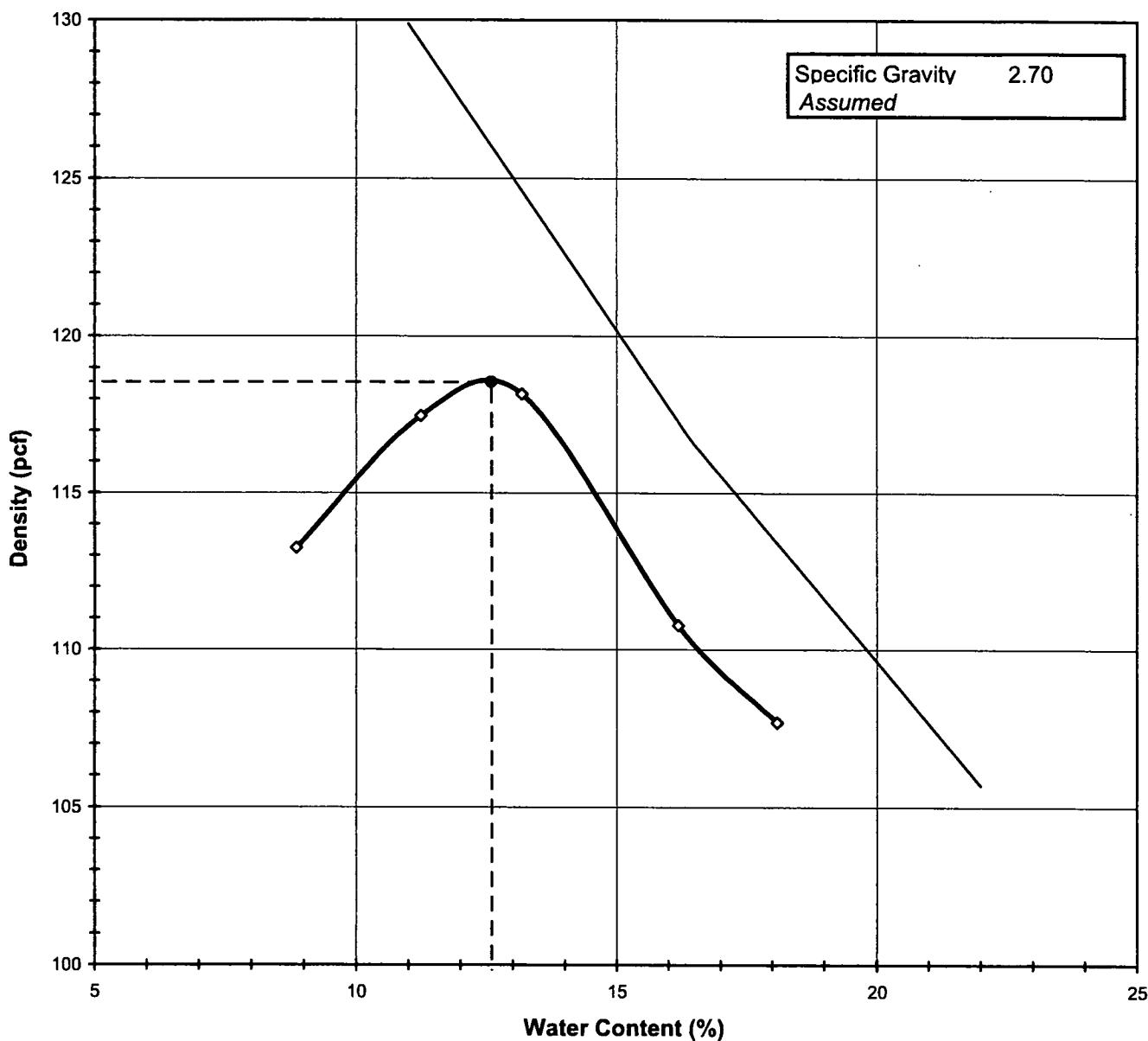
Tested By	TO	Date	10/6/15	Checked By	KC	Date	10/14/15
page 4 of 4							

DCN: CT-S3B DATE02/05/2015 BY AS16RQ/ECTS/CEC/2015-506-001 Central Waste/2015-506-001-020 Grain JSieveHyd.xls/Print Sheet

**MOISTURE DENSITY RELATIONSHIP**
*ASTM D698-12*

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-021  
 Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-21A  
 Test Method: STANDARD  
 Visual Description: Brown Sandy Clay

**Optimum Water Content** 12.6  
**Maximum Dry Density** 118.6



Tested By	SGB	Date	10/10/15	Checked By	KC	Date	10/12/15
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page 1 of 2 DCN:CT-S12 DATE:5/1/13 REVISION: 14

**MOISTURE - DENSITY RELATIONSHIP**

ASTM D698-12

Client: CEC Boring No.: 9/17/15  
 Client Reference: Central Waste Closure 153-121 Depth (ft): 0-4  
 Project No.: 2015-506-001 Sample No.: TP-21A  
 Lab ID: 2015-506-001-021

Visual Description: Brown Sandy Clay

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.70
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	B

Test Type:	<b>STANDARD</b>
Rammer Weight (lb):	5.5
Rammer Drop (in):	12
Rammer Type:	MECHANICAL
Machine ID:	G 774
Mold ID:	G 606
Mold diameter:	4"
Weight of the Mold (g):	4139
Volume of the Mold (cm <sup>3</sup> ):	943

**Mold / Specimen**

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	6002	6114	6160	6084	6061
Weight of Mold (g):	4139	4139	4139	4139	4139
Weight of Wet Sample (g):	1863	1975	2021	1945	1922
Mold Volume (cm <sup>3</sup> ):	943	943	943	943	943

**Moisture Content / Density**

Tare Number:	916	1693	878	565	611
Weight of Tare & Wet Sample (g):	362.76	359.82	385.89	337.71	330.39
Weight of Tare & Dry Sample (g):	342.18	331.82	353.79	302.17	292.44
Weight of Tare (g):	109.88	82.95	110.28	82.72	82.70
Weight of Water (g):	20.58	28.00	32.10	35.54	37.95
Weight of Dry Sample (g):	232.30	248.87	243.51	219.45	209.74

Wet Density (g/cm <sup>3</sup> ):	1.98	2.09	2.14	2.06	2.04
Wet Density (pcf):	123.3	130.7	133.7	128.7	127.2
Moisture Content (%):	8.9	11.3	13.2	16.2	18.1
Dry Density (pcf):	113.2	117.5	118.2	110.8	107.7

**Zero Air Voids**

Moisture Content (%):	11.0	16.5	22.0
Dry Unit Weight (pcf):	129.9	116.6	105.7

Tested By	SGB	Date	10/10/15	Checked By	KC	Date	10/12/15
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**SPECIFIC GRAVITY**  
ASTM D 854-14

Client: CEC  
Client Reference: Central Waste Closure 153-121  
Project No.: 2015-506-001  
Lab ID: 2015-506-001-021

Boring No.: 9/17/15  
Depth (ft): 0-4  
Sample No.: TP-21A  
Visual Description: Brown Sandy Clay

(Minus No.4 sieve material, oven dried)

Replicate Number	1	2
Pycnometer ID:	G 1255	G 1504
Weight of Pycnometer & Soil & Water (g):	747.43	735.1
Temperature (°C):	25.5	25.5
Weight of Pycnometer & Water (g):	685.02	672.18
Tare Number:	694	927
Weight of Tare & Dry Soil (g):	194.73	199.36
Weight of Tare (g):	94.11	97.7
Weight of Dry Soil (g):	100.62	101.66
Specific Gravity of Soil @ Measured Temperature:	2.633	2.624
Specific Gravity of Water @ Measured Temperature:	0.99692	0.99692
Conversion Factor for Measured Temperature:	0.99871	0.99871
Specific Gravity @ 20° Celsius:	2.637	2.627

Average Specific Gravity @ 20° Celsius                    2.63

Tested By      TO      Date      10/6/15      Checked By      CLK      Date      10/9/15

DCN: CT-S5 Date: 3/5/14 Revision: 20

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## ATTERBERG LIMITS

ASTM D 4318-10

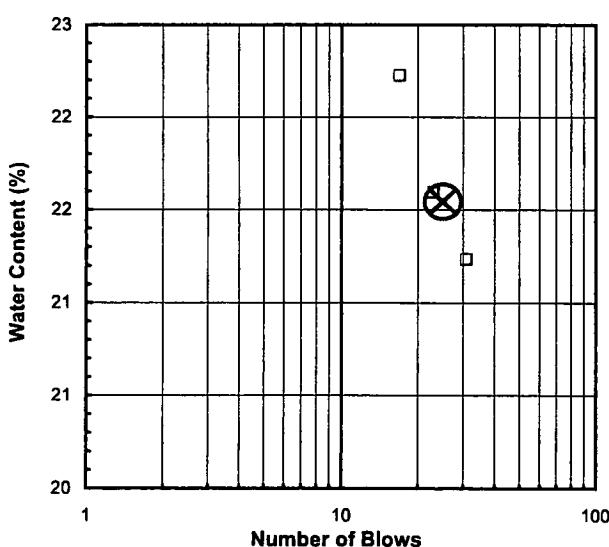
Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-021  
 Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-21A  
 Soil Description: BROWN LEAN CLAY

**Note:** The USCS symbol used with this test refers only to the minus No. 40 (Minus No. 40 sieve material, Airdried) sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

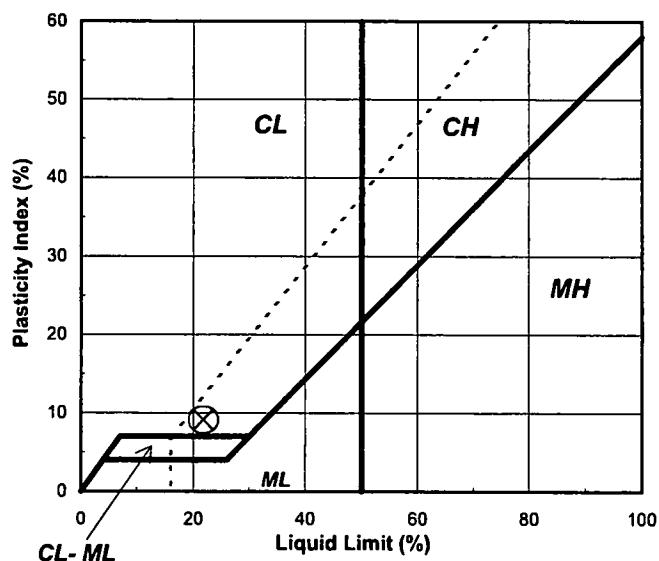
Liquid Limit Test	1	2	3	
Tare Number:	156	206	248	M
Wt. of Tare & Wet Sample (g):	40.51	42.06	40.31	U
Wt. of Tare & Dry Sample (g):	36.72	37.86	36.15	L
Weight of Tare (g):	18.87	18.41	17.43	T
Weight of Water (g):	3.8	4.2	4.2	I
Weight of Dry Sample (g):	17.9	19.5	18.7	P
Moisture Content (%):	21.2	21.6	22.2	O
Number of Blows:	31	23	17	I
				N
				T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	168	173		Liquid Limit (%): 22
Wt. of Tare & Wet Sample (g):	25.61	26.19		Plastic Limit (%): 13
Wt. of Tare & Dry Sample (g):	24.84	25.42		Plasticity Index (%): 9
Weight of Tare (g):	19.10	19.60		USCS Symbol: CL
Weight of Water (g):	0.8	0.8		
Weight of Dry Sample (g):	5.7	5.8		
Moisture Content (%):	13.4	13.2	0.2	
Note: The acceptable range of the two Moisture contents is $\pm 2.6$				

Flow Curve



Plasticity Chart



Tested By JP Date 9/30/15 Checked By KC Date 10/1/15

page 1 of 1 DCN: CTS4B, REV. 4, 3/18/13

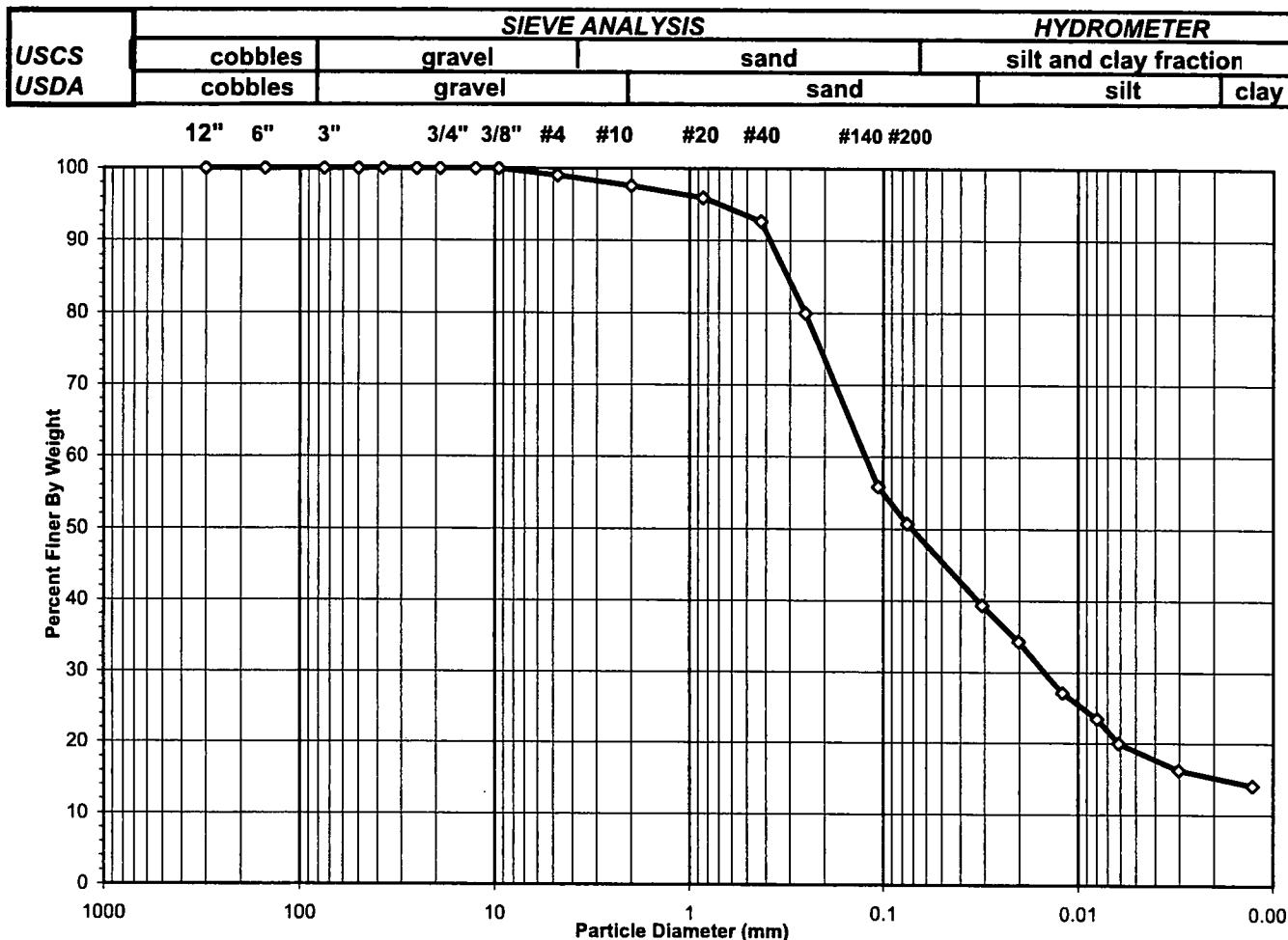
S:\Excel\Excel QA\Spreadsheets\Limit 3Pt.xls

**SIEVE AND HYDROMETER ANALYSIS**

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-021

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-21A  
 Soil Color: Brown

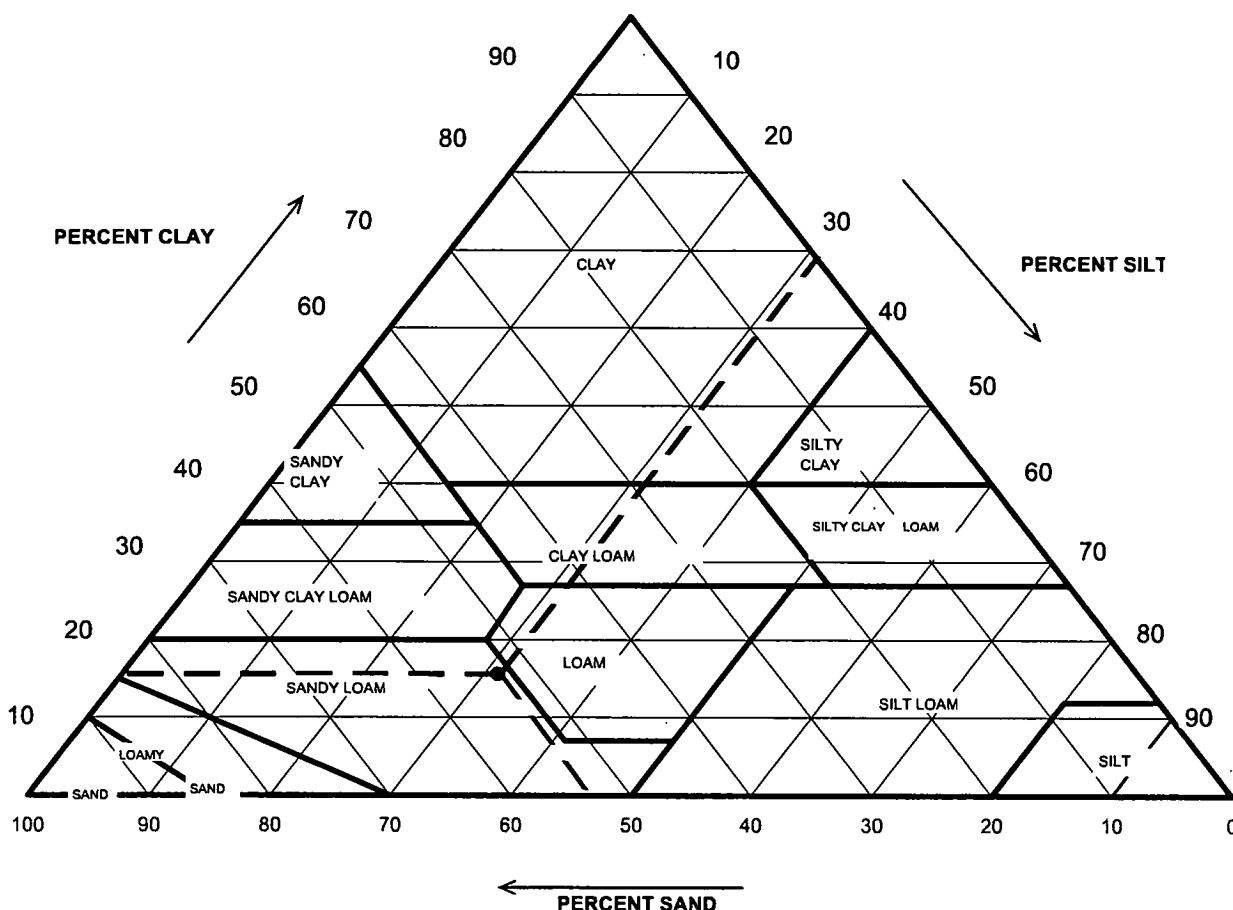


USCS Summary		
Sieve Sizes (mm)	Percentage	
Greater Than #4	Gravel	0.98
#4 To #200	Sand	48.29
Finer Than #200	Silt & Clay	50.74
<b>USCS Symbol:</b>		
<b>CL, TESTED</b>		
<b>USCS Classification:</b>		
<b>SANDY LEAN CLAY</b>		

## USDA CLASSIFICATION CHART

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-021

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-21A  
 Soil Color: Brown



Particle Size	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
(mm)	(%)		(%)	(%)
		Gravel	2.41	0.00
2	97.59	Sand	52.02	53.31
0.05	45.57	Silt	30.38	31.13
0.002	15.19	Clay	15.19	15.56

**USDA Classification: SANDY LOAM**

## WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-021

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-21A  
 Soil Color: Brown

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material					
Tare No.	1417	Tare No.	NA				
Weight of Tare & Wet Sample (g)	1031.10	Weight of Tare & Wet Sample (g)	NA				
Weight of Tare & Dry Sample (g)	941.30	Weight of Tare & Dry Sample (g)	NA				
Weight of Tare (g)	146.74	Weight of Tare (g)	NA				
Weight of Water (g)	89.80	Weight of Water (g)	NA				
Weight of Dry Sample (g)	794.56	Weight of Dry Sample (g)	NA				
<b>Moisture Content (%)</b>	<b>11.3</b>	<b>Moisture Content (%)</b>	<b>NA</b>				
Wet Weight of -3/4" Sample (g)	NA	Weight of the Dry Sample (g)	794.56				
Dry Weight of -3/4" Sample (g)	391.42	Weight of - #200 Material (g)	403.14				
Wet Weight of +3/4" Sample (g)	NA	Weight of + #200 Material (g)	391.42				
Dry Weight of +3/4" Sample (g)	0.00						
Total Dry Weight of Sample (g)	NA						
Sieve Size	Sieve Opening	Weight of Soil Retained	Percent Retained	Accumulated Percent Retained		Percent Finer	Accumulated Percent Finer
	(mm)	(g)	(%)	(%)		(%)	(%)
12"	300	0.00	0.00	0.00		100.00	100.00
6"	150	0.00	0.00	0.00		100.00	100.00
3"	75	0.00	0.00	0.00		100.00	100.00
2"	50	0.00	0.00	0.00		100.00	100.00
1 1/2"	37.5	0.00	0.00	0.00		100.00	100.00
1"	25.0	0.00	0.00	0.00		100.00	100.00
3/4"	19.0	0.00	0.00	0.00		100.00	100.00
1/2"	12.5	0.00	0.00	0.00		100.00	100.00
3/8"	9.50	0.00	0.00	0.00		100.00	100.00
#4	4.75	7.76	0.98	0.98		99.02	99.02
#10	2.00	11.39	1.43	2.41		97.59	97.59
#20	0.85	12.91	1.62	4.03		95.97	95.97
#40	0.425	25.77	3.24	7.28		92.72	92.72
#60	0.250	101.24	12.74	20.02		79.98	79.98
#140	0.106	191.50	24.10	44.12		55.88	55.88
#200	0.075	40.85	5.14	49.26		50.74	50.74
Pan	-	403.14	50.74	100.00		-	-

Tested By	PC	Date	10/2/15	Checked By
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## HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-021

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-21A  
 Soil Color: Brown

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N'
0	NA	NA	NA	NA	NA	NA	NA	NA
2	34.0	20.7	6.83	27.2	77.7	0.01333	0.0309	39.4
5	30.5	20.7	6.83	23.7	67.7	0.01333	0.0200	34.3
15	25.5	20.7	6.83	18.7	53.4	0.01333	0.0120	27.1
35	23.0	20.7	6.83	16.2	46.2	0.01333	0.0080	23.5
60	20.5	21.1	6.68	13.8	39.5	0.01327	0.0062	20.0
250	17.5	22.1	6.33	11.2	31.9	0.01311	0.0030	16.2
1440	16.0	22.2	6.29	9.7	27.8	0.01310	0.0013	14.1

Soil Specimen Data		Other Corrections		
Tare No.	633			
Weight of Tare & Dry Material (g)	135.71	a - Factor		0.99
Weight of Tare (g)	96.08			
Weight of Deflocculant (g)	5.0	Percent Finer than # 200		50.74
Weight of Dry Material (g)	34.6	Specific Gravity	2.7	Assumed

**Note:** Hydrometer test is performed on - # 200 sieve material.

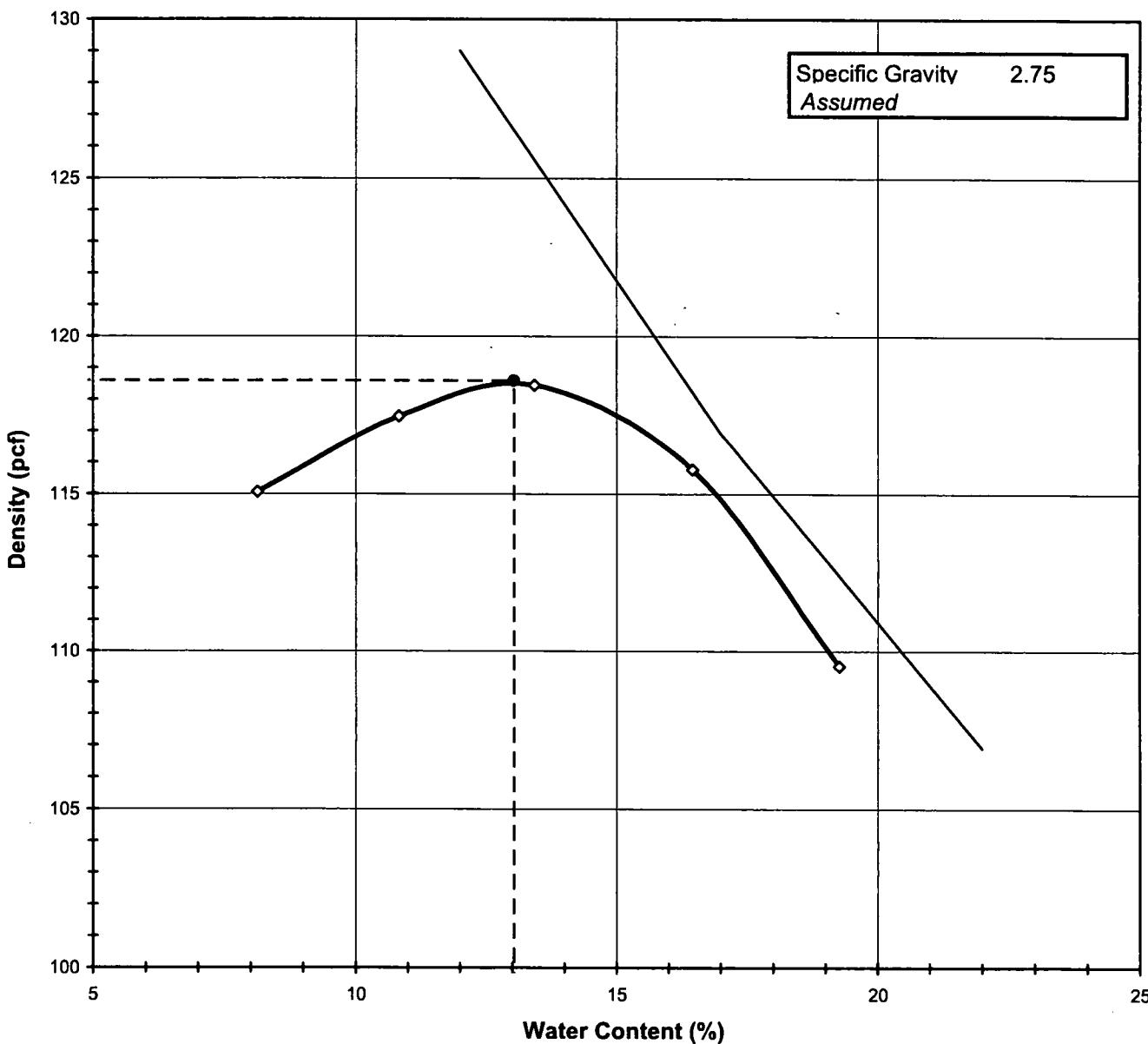
Tested By	TO	Date	10/12/15	Checked By	KC	Date	10/14/15
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**MOISTURE DENSITY RELATIONSHIP**

ASTM D1557-12

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	4-8
Project No.:	2015-506-001	Sample No.:	TP-21B
Lab ID:	2015-506-001-022	Test Method	<b>MODIFIED</b>
Visual Description:		Brown Clay	

**Optimum Water Content**      13.0  
**Maximum Dry Density**      118.6



<i>Tested By</i>	AMC	Date	10/10/15	<i>Checked By</i>	KC	Date	10/12/15
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page 1 of 2    DCN:CT-S12 DATE:5/1/13 REVISION: 14

## MOISTURE - DENSITY RELATIONSHIP

ASTM D1557-12

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	4-8
Project No.:	2015-506-001	Sample No.:	TP-21B
Lab ID:	2015-506-001-022		
Visual Description:	Brown Clay		

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.75
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	B

Test Type:	<b>MODIFIED</b>
Rammer Weight (lb):	10.0
Rammer Drop (in):	18
Rammer Type:	MECHANICAL
Machine ID:	G 441
Mold ID:	G 1192
Mold diameter:	4"
Weight of the Mold (g):	4170
Volume of the Mold (cm <sup>3</sup> ):	945

### Mold / Specimen

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	6054	6142	6205	6212	6148
Weight of Mold (g):	4170	4170	4170	4170	4170
Weight of Wet Sample (g):	1884	1972	2035	2042	1978
Mold Volume (cm <sup>3</sup> ):	945	945	945	945	945

### Moisture Content / Density

Tare Number:	1741	907	899	1692	1125
Weight of Tare & Wet Sample (g):	592.80	684.50	591.60	554.10	652.50
Weight of Tare & Dry Sample (g):	554.50	628.40	534.60	487.50	560.70
Weight of Tare (g):	83.20	110.60	110.20	82.70	84.00
Weight of Water (g):	38.30	56.10	57.00	66.60	91.80
Weight of Dry Sample (g):	471.30	517.80	424.40	404.80	476.70

Wet Density (g/cm <sup>3</sup> ):	1.99	2.09	2.15	2.16	2.09
Wet Density (pcf):	124.4	130.2	134.4	134.8	130.6
Moisture Content (%):	8.1	10.8	13.4	16.5	19.3
Dry Density (pcf):	115.1	117.5	118.5	115.8	109.5

### Zero Air Voids

Moisture Content (%):	12.0	17.0	22.0
Dry Unit Weight (pcf):	129.0	116.9	106.9

Tested By	AMC	Date	10/10/15	Checked By	KC	Date	10/12/15
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## SPECIFIC GRAVITY

ASTM D 854-14

Client: CEC  
Client Reference: Central Waste Closure 153-121  
Project No.: 2015-506-001  
Lab ID: 2015-506-001-022

Boring No.: 9/17/15  
Depth (ft): 0-4  
Sample No.: TP-21B  
Visual Description: Brown Clay

(Minus No.4 sieve material, oven dried)

Replicate Number	1	2
Pycnometer ID:	G 1255	G 1504
Weight of Pycnometer & Soil & Water (g):	748.01	734.91
Temperature (°C):	25.7	26.1
Weight of Pycnometer & Water (g):	685.00	672.10
Tare Number:	924	1019
Weight of Tare & Dry Soil (g):	200.13	201.35
Weight of Tare (g):	99.71	101.26
Weight of Dry Soil (g):	100.42	100.09
Specific Gravity of Soil @ Measured Temperature:	2.685	2.685
Specific Gravity of Water @ Measured Temperature:	0.99687	0.99677
Conversion Factor for Measured Temperature:	0.99866	0.99856
Specific Gravity @ 20° Celsius:	2.688	2.688

Average Specific Gravity @ 20° Celsius 2.69

Tested By TO Date 10/6/15 Checked By CLK Date 10/9/15

DCN: CT-S5 Date: 3/5/14 Revision: 20

S:\Excel\Excel QA\Spreadsheets\Specific Gravity.xls

## ATTERBERG LIMITS

ASTM D 4318-10

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-022

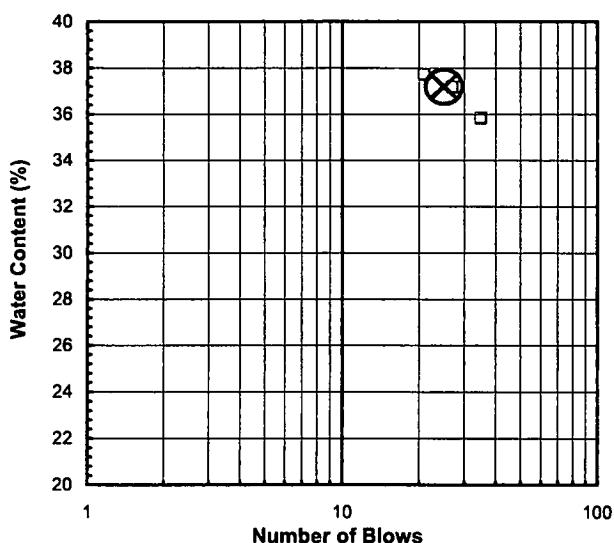
Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-21B  
 Soil Description: BROWN LEAN CLAY

**Note:** The USCS symbol used with this test refers only to the minus No. 40 (Minus No. 40 sieve material, Airdried) sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

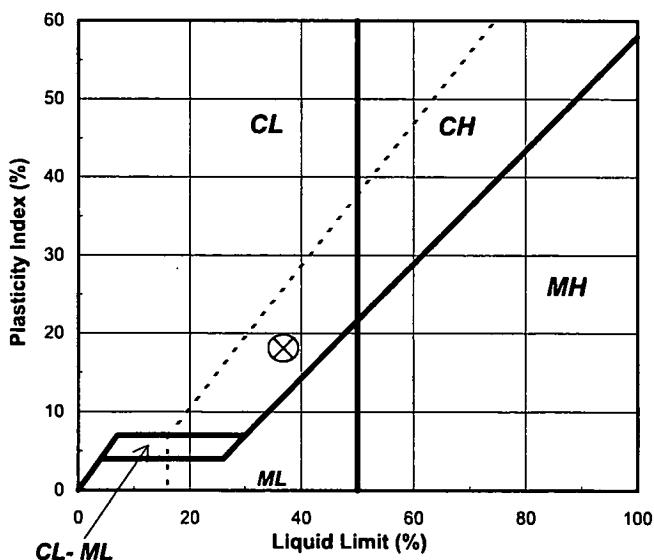
Liquid Limit Test	1	2	3	
Tare Number:	101	207	213	M
Wt. of Tare & Wet Sample (g):	39.16	40.21	39.45	U
Wt. of Tare & Dry Sample (g):	33.60	34.29	33.73	L
Weight of Tare (g):	18.08	18.36	18.56	T
Weight of Water (g):	5.6	5.9	5.7	I
Weight of Dry Sample (g):	15.5	15.9	15.2	P
Moisture Content (%):	35.8	37.2	37.7	O
Number of Blows:	35	27	21	I
				N
				T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	188	320		Liquid Limit (%): 37
Wt. of Tare & Wet Sample (g):	24.52	25.92		Plastic Limit (%): 19
Wt. of Tare & Dry Sample (g):	23.54	24.95		Plasticity Index (%): 18
Weight of Tare (g):	18.27	19.89		USCS Symbol: CL
Weight of Water (g):	1.0	1.0		
Weight of Dry Sample (g):	5.3	5.1		
Moisture Content (%):	18.6	19.2	-0.6	
Note: The acceptable range of the two Moisture contents is $\pm 2.6$				

Flow Curve



Plasticity Chart



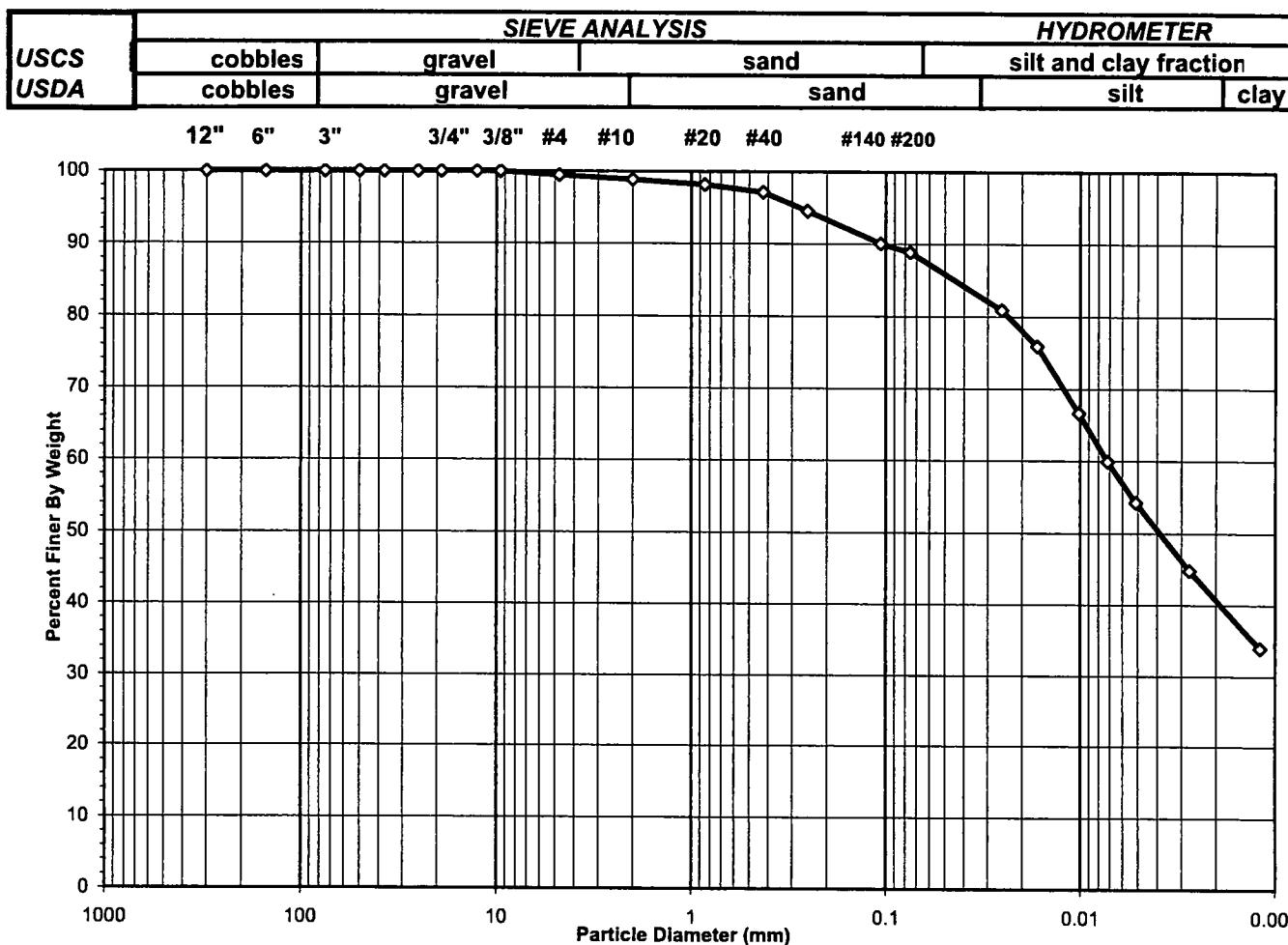
Tested By JP Date 10/9/15 Checked By CLK Date 10/10/15

**SIEVE AND HYDROMETER ANALYSIS**

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-022

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-21B  
 Soil Color: Brown

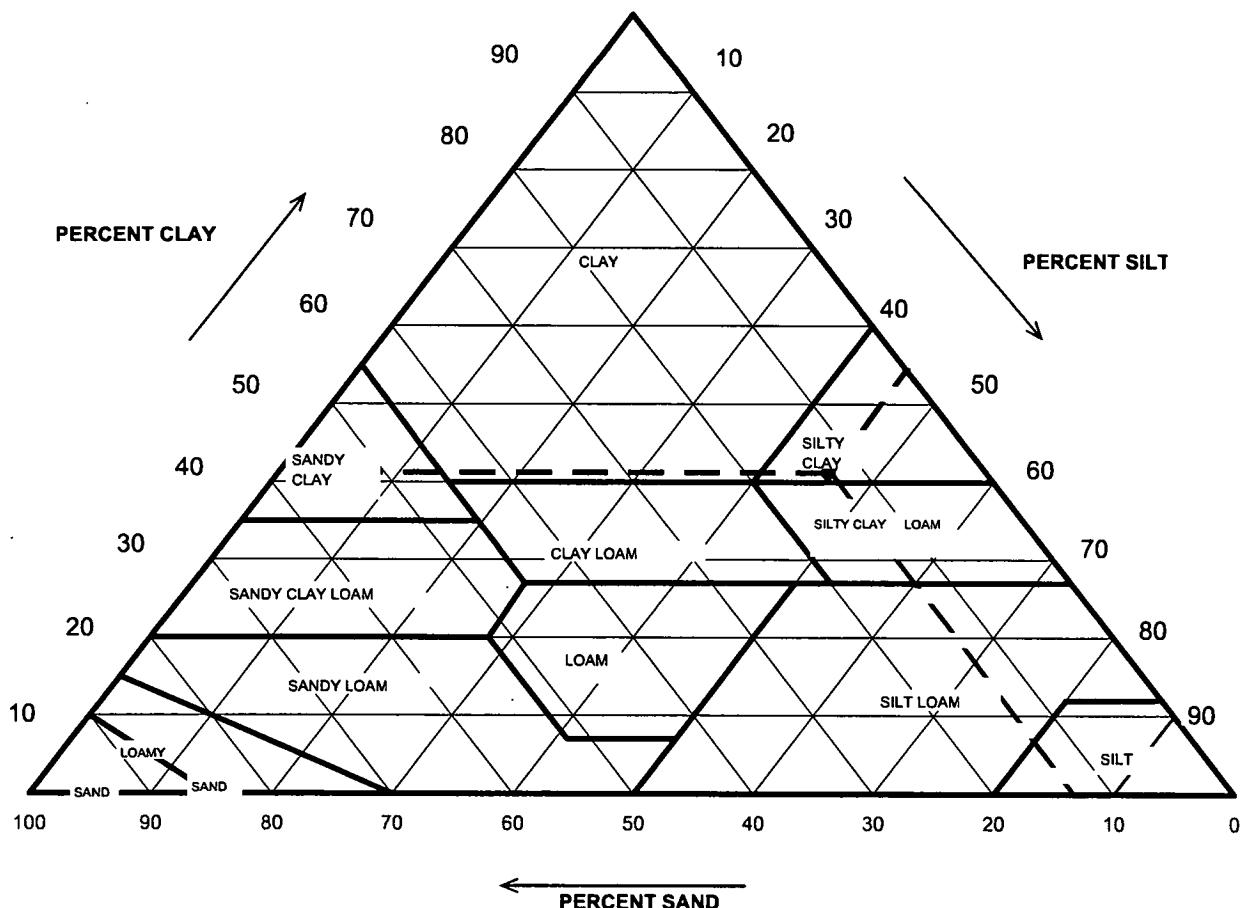


USCS Summary		
Sieve Sizes (mm)	Percentage	
Greater Than #4	Gravel	0.51
#4 To #200	Sand	10.57
Finer Than #200	Silt & Clay	88.92
<b>USCS Symbol:</b>		
<b>CL, TESTED</b>		
<b>USCS Classification:</b>		
<b>LEAN CLAY</b>		

## USDA CLASSIFICATION CHART

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-022

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-21B  
 Soil Color: Brown



Particle Size (mm)	Percent Finer (%)	USDA SUMMARY	Actual Percentage (%)	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	(%)	(%)
2	98.89	Sand	1.11	0.00
0.05	85.92	Silt	12.97	13.11
0.002	40.71	Clay	45.21	45.72
			40.71	41.17
<b>USDA Classification: SILTY CLAY</b>				

## WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-022

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-21B  
 Soil Color: Brown

Moisture Content of Passing 3/4" Material			Water Content of Retained 3/4" Material		
Tare No.	1446		Tare No.		NA
Weight of Tare & Wet Sample (g)	958.98		Weight of Tare & Wet Sample (g)		NA
Weight of Tare & Dry Sample (g)	887.10		Weight of Tare & Dry Sample (g)		NA
Weight of Tare (g)	145.12		Weight of Tare (g)		NA
Weight of Water (g)	71.88		Weight of Water (g)		NA
Weight of Dry Sample (g)	741.98		Weight of Dry Sample (g)		NA
<b>Moisture Content (%)</b>	<b>9.7</b>		<b>Moisture Content (%)</b>		<b>NA</b>
Wet Weight of -3/4" Sample (g)	NA		Weight of the Dry Sample (g)		741.98
Dry Weight of -3/4" Sample (g)	82.20		Weight of - #200 Material (g)		659.78
Wet Weight of +3/4" Sample (g)	NA		Weight of + #200 Material (g)		82.20
Dry Weight of +3/4" Sample (g)	0.00				
Total Dry Weight of Sample (g)	NA				
Sieve Size	Sieve Opening	Weight of Soil Retained	Percent Retained	Accumulated Percent Retained	
(mm)	(mm)	(g)	(%)	(%)	Percent Finer
12"	300	0.00	0.00	0.00	100.00
6"	150	0.00	0.00	0.00	100.00
3"	75	0.00	0.00	0.00	100.00
2"	50	0.00	0.00	0.00	100.00
1 1/2"	37.5	0.00	0.00	0.00	100.00
1"	25.0	0.00	0.00	0.00	100.00
3/4"	19.0	0.00	0.00	0.00	100.00
1/2"	12.5	0.00	0.00	0.00	100.00
3/8"	9.50	0.00	0.00	0.00	100.00
#4	4.75	3.76	0.51	0.51	99.49
#10	2.00	4.45	0.60	1.11	98.89
#20	0.85	5.01	0.68	1.78	98.22
#40	0.425	8.07	1.09	2.87	97.13
#60	0.250	18.66	2.51	5.38	94.62
#140	0.106	33.55	4.52	9.91	90.09
#200	0.075	8.70	1.17	11.08	88.92
Pan	-	659.78	88.92	100.00	-

Tested By

PC

Date

10/2/15

Checked By

KC

Date

10/14/15

## HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-022

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-21B  
 Soil Color: Brown

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N'
0	NA	NA	NA	NA	NA	NA	NA	NA
2	55.0	20.7	6.83	48.2	91.0	0.01333	0.0254	80.9
5	52.0	20.7	6.83	45.2	85.3	0.01333	0.0166	75.9
15	46.5	20.7	6.83	39.7	75.0	0.01333	0.0101	66.6
32	42.5	20.7	6.83	35.7	67.4	0.01333	0.0072	59.9
66	39.0	21.1	6.68	32.3	61.1	0.01327	0.0051	54.3
250	33.0	22.1	6.33	26.7	50.4	0.01311	0.0027	44.8
1440	26.5	22.2	6.29	20.2	38.2	0.01310	0.0012	34.0

Soil Specimen Data		Other Corrections		
Tare No.	925			
Weight of Tare & Dry Material (g)	157.32	a - Factor		0.99
Weight of Tare (g)	99.92			
Weight of Deflocculant (g)	5.0	Percent Finer than # 200		88.92
Weight of Dry Material (g)	52.4	Specific Gravity	2.7	Assumed

**Note:** Hydrometer test is performed on - # 200 sieve material.

Tested By	TO	Date	10/12/15	Checked By	KC	Date	10/14/15
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page 4 of 4

DCN: CT-S3A DATE: 3/18/13 REVISION: 11

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# PERMEABILITY TEST

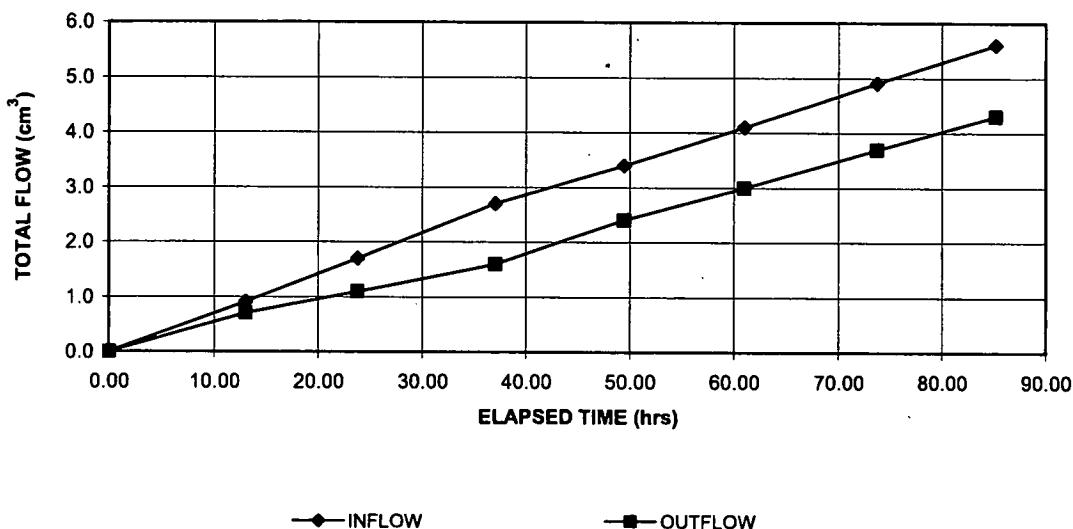
ASTM D 5084-10



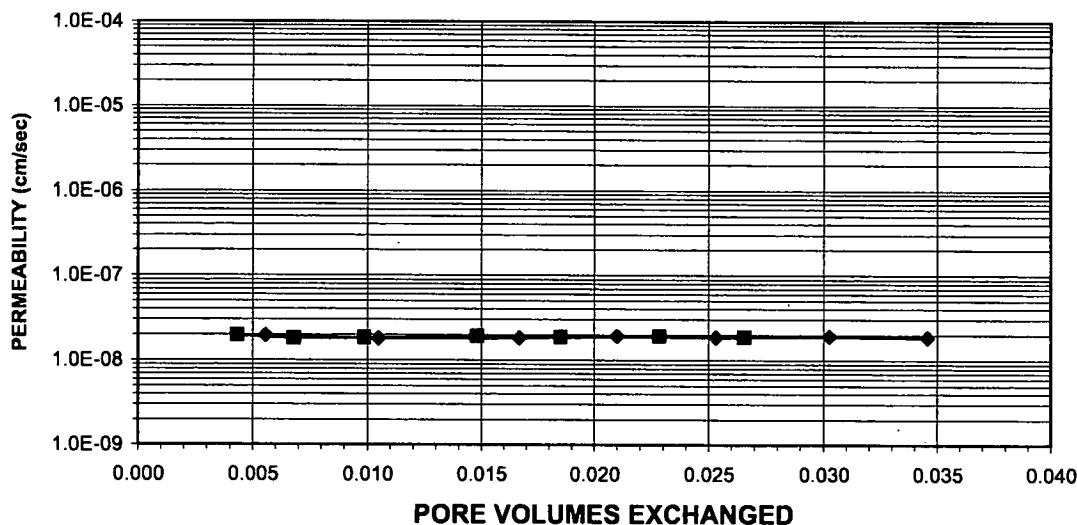
Client: CEC Boring No.: 9/17/15  
Client Project: Central Waste Closure 153-121 Depth (ft): 4-8  
Project No.: 2015-506-001 Sample No.: TP-21B  
Lab ID No.: 2015-506-001-022

AVERAGE PERMEABILITY = 1.9E-08 cm/sec @ 20°C  
AVERAGE PERMEABILITY = 1.9E-10 m/sec @ 20°C

## TOTAL FLOW vs. ELAPSED TIME



## PORE VOLUMES EXCHANGED vs. PERMEABILITY



Tested By: TRE

Date: 10/22/15 Checked By:

KC

Date: 10/30/15

Page 1 of 3

DCN: CT-22 DATE: 4/10/13 REVISION: 10

# PERMEABILITY TEST

ASTM D 5084-10



Client: CEC  
 Client Project: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID No.: 2015-506-001-022

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-21B

Specific Gravity: 2.70      Assumed  
 Sample Condition: Remolded

Visual Description: Brown Sandy Clay

<b>MOISTURE CONTENT:</b>	<u>BEFORE TEST</u>	<u>AFTER TEST</u>
Tare Number	591	581
Weight of Tare & Wet Sample (g)	220.42	972.78
Weight of Tare & Dry Sample (g)	202.94	822.60
Weight of Tare (g)	87.39	83.28
Weight of Water (g)	17.48	150.18
Weight of Dry Sample (g)	115.55	739.32
Moisture Content (%)	15.1	20.3
<b>SPECIMEN:</b>	<u>BEFORE TEST</u>	<u>AFTER TEST</u>
Weight of Tube & Wet Sample (g)	2232.57	NA
Weight of Tube (g)	1344.00	NA
Weight of Wet Sample (g)	888.57	928.59
Length 1 (in)	3.998	4.053
Length 2 (in)	3.998	4.060
Length 3 (in)	3.998	4.063
Top Diameter (in)	2.870	2.920
Middle Diameter (in)	2.870	2.930
Bottom Diameter (in)	2.870	2.934
Average Length (in)	4.00	4.06
Average Area (in <sup>2</sup> )	6.47	6.73
Sample Volume (cm <sup>3</sup> )	423.96	447.83
Unit Wet Weight (g/cm <sup>3</sup> )	2.10	2.07
Unit Wet Weight (pcf)	130.8	129.4
Unit Dry Weight (pcf)	113.6	107.6
Unit Dry Weight (g/cm <sup>3</sup> )	1.82	1.72
Void Ratio, e	0.48	0.57
Porosity, n	0.33	0.36
Pore Volume (cm <sup>3</sup> )	138.1	162.0
Total Weight of Sample After Test (g)		946.6

Tested By: TRE      Date: 10/22/15      Checked By: KC      Date: 10/30/15

# PERMEABILITY TEST

ASTM D 5084-10



Client: CEC  
 Client Project: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID No.: 2015-506-001-022

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-21B

<u>Pressure Heads (Constant)</u>	
Top Cap (psi)	67.5
Bottom Cap (psi)	70.0
Cell (psi)	75.0
Total Pressure Head (cm)	175.8
Hydraulic Gradient	17.05

<u>Final Sample Dimensions</u>	
Sample Length (cm), L	10.31
Sample Diameter (cm)	7.44
Sample Area (cm <sup>2</sup> ), A	43.44
Inflow Burette Area (cm <sup>2</sup> ), a-in	0.899
Outflow Burette Area (cm <sup>2</sup> ), a-out	0.876
B Parameter (%)	96

AVERAGE PERMEABILITY = 1.9E-08 cm/sec @ 20°C  
 AVERAGE PERMEABILITY = 1.9E-10 m/sec @ 20°C

DATE (mm/dd/yy)	TIME (hr)	ELAPSED TIME t (hr)	TOTAL INFLOW (cm <sup>3</sup> )	TOTAL OUTFLOW (cm <sup>3</sup> )	TOTAL HEAD h (cm)	FLOW (0 flow) (1 stop)	TEMP. (°C)	INCREMENTAL PERMEABILITY @ 20°C
								(cm/sec)
10/25/15	18	13	0.000	0.0	206.0	0	20.5	NA
10/26/15	7	15	13.033	0.9	204.2	0	20.5	2.0E-08
10/26/15	18	0	23.783	1.7	202.9	0	20.4	1.8E-08
10/27/15	7	15	37.033	2.7	201.2	0	20.4	1.8E-08
10/27/15	19	40	49.450	3.4	199.5	0	21.6	1.9E-08
10/28/15	7	15	61.033	4.1	198.0	0	20.0	1.9E-08
10/28/15	19	55	73.700	4.9	196.3	0	21.5	1.9E-08
10/29/15	7	25	85.200	5.6	194.8	1	20.8	1.9E-08

Tested By:

TRE

Date: 10/22/15

Checked By:

KC

Date:

10/30/15

**MOISTURE DENSITY RELATIONSHIP**

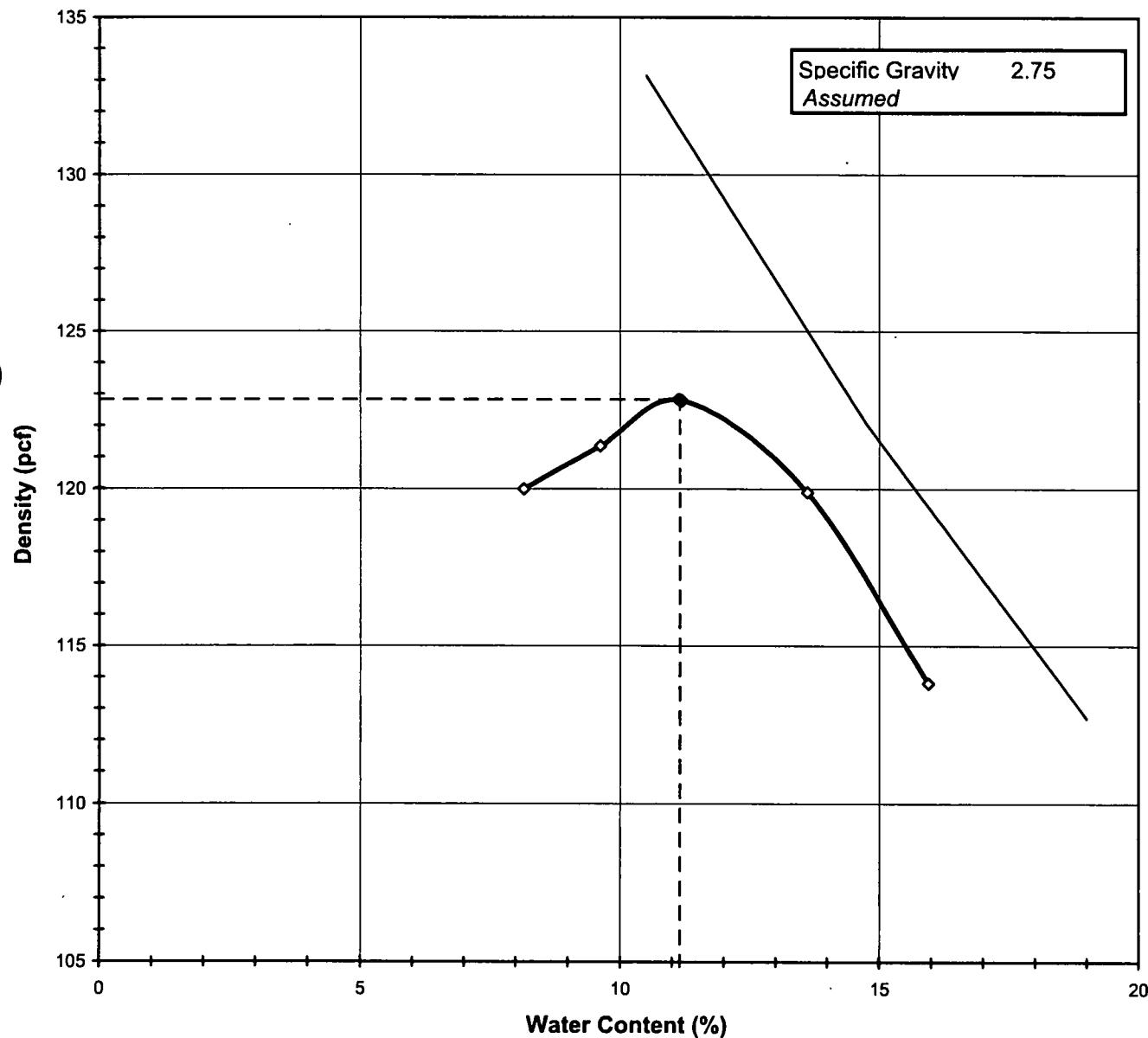
ASTM D1557-12

Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	0-4
Project No.:	2015-506-001	Sample No.:	TP-22A
Lab ID:	2015-506-001-023	Test Method	<b>MODIFIED</b>
Visual Description: Brown Silty Clay with small amount of Rock Fragments			

**Optimum Water Content  
Maximum Dry Density**

11.2

122.8



Tested By	PC / MF	Date	10/8/15	Checked By	KC	Date	10/12/15
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page 1 of 2 DCN:CT-S12 DATE:5/1/13 REVISION: 14

**MOISTURE - DENSITY RELATIONSHIP**

ASTM D1557-12

Client: CEC Boring No.: 9/17/15  
 Client Reference: Central Waste Closure 153-121 Depth (ft): 0-4  
 Project No.: 2015-506-001 Sample No.: TP-22A  
 Lab ID: 2015-506-001-023

Visual Description: Brown Silty Clay with small amount of Rock Fragments

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.75
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	B

Test Type:	<b>MODIFIED</b>
Rammer Weight (lb):	10.0
Rammer Drop (in):	18
Rammer Type:	<b>MECHANICAL</b>
Machine ID:	G 774
Mold ID:	G 1499
Mold diameter:	4"
Weight of the Mold (g):	4385
Volume of the Mold (cm <sup>3</sup> ):	940

**Mold / Specimen**

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	6340	6389	6442	6437	6373
Weight of Mold (g):	4385	4385	4385	4385	4385
Weight of Wet Sample (g):	1955	2004	2057	2052	1988
Mold Volume (cm <sup>3</sup> ):	940	940	940	940	940

**Moisture Content / Density**

Tare Number:	917	899	1723	569	545
Weight of Tare & Wet Sample (g):	410.80	413.50	419.30	422.70	410.90
Weight of Tare & Dry Sample (g):	388.09	386.86	385.43	382.00	365.76
Weight of Tare (g):	109.90	110.02	83.15	83.08	82.84
Weight of Water (g):	22.71	26.64	33.87	40.70	45.14
Weight of Dry Sample (g):	278.19	276.84	302.28	298.92	282.92

Wet Density (g/cm <sup>3</sup> ):	2.08	2.13	2.19	2.18	2.11
Wet Density (pcf):	129.8	133.0	136.5	136.2	132.0
Moisture Content (%):	8.2	9.6	11.2	13.6	16.0
Dry Density (pcf):	120.0	121.4	122.8	119.9	113.8

**Zero Air Voids**

Moisture Content (%):	10.5	14.8	19.0
Dry Unit Weight (pcf):	133.2	122.1	112.7

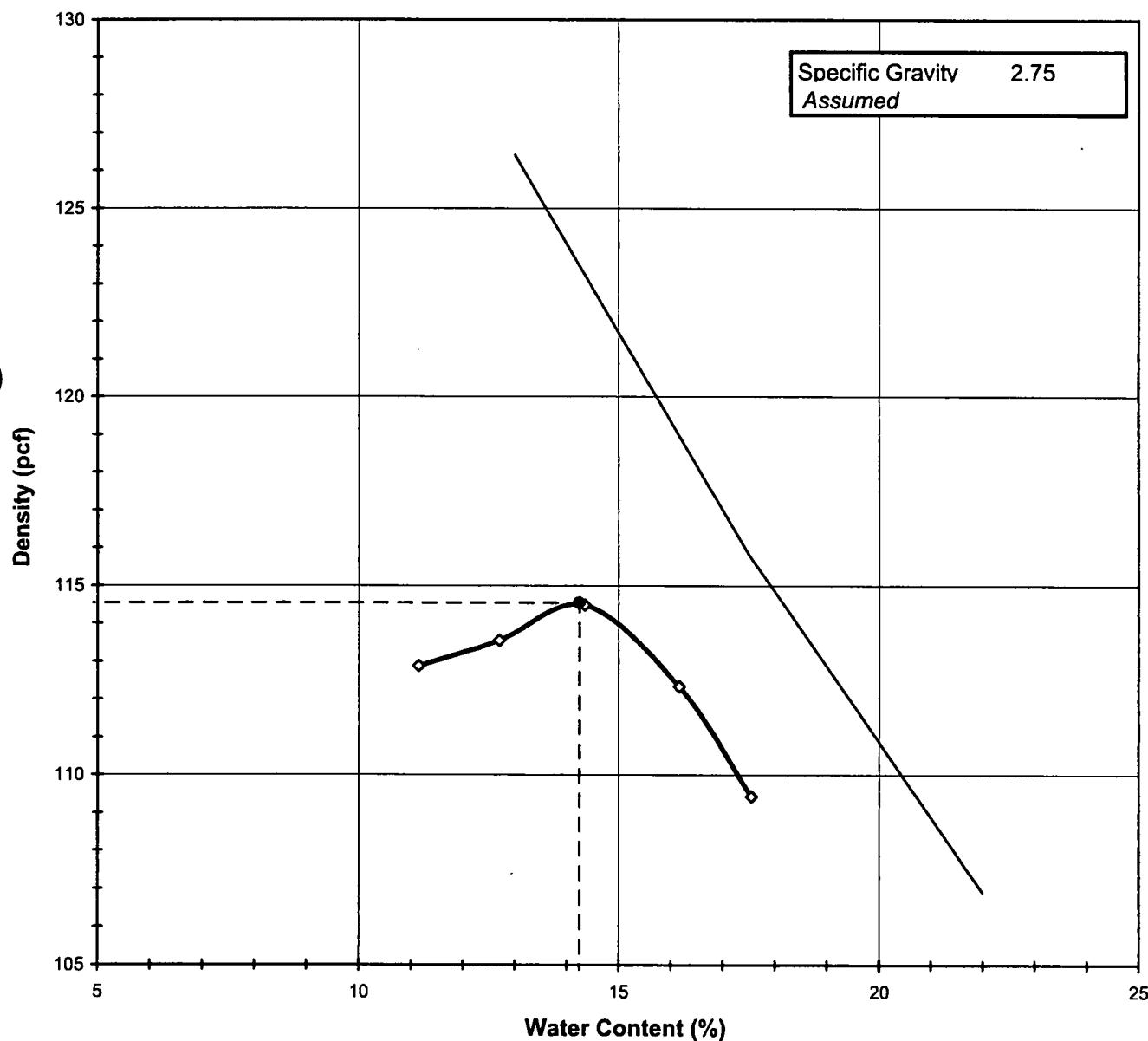
Tested By	PC / MF	Date	10/8/15	Checked By	KC	Date	10/12/15
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**MOISTURE DENSITY RELATIONSHIP**

ASTM D698-12

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-023  
 Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-22A  
 Test Method **STANDARD**  
 Visual Description: Brown Silty Clay with small amount of Rock Fragments

**Optimum Water Content**      **14.3**  
**Maximum Dry Density**      **114.5**




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<i>Tested By</i>	PC	Date	10/8/15	<i>Checked By</i>	KC	Date	10/12/15
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**MOISTURE - DENSITY RELATIONSHIP**

ASTM D698-12

Client: CEC                              Boring No.: 9/17/15  
 Client Reference: Central Waste Closure 153-121              Depth (ft): 0-4  
 Project No.: 2015-506-001              Sample No.: TP-22A  
 Lab ID: 2015-506-001-023

Visual Description: Brown Silty Clay with small amount of Rock Fragments

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.75
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	B

Test Type:	<b>STANDARD</b>
Rammer Weight (lb):	5.5
Rammer Drop (in):	12
Rammer Type:	MECHANICAL
Machine ID:	G 774
Mold ID:	G 1499
Mold diameter:	4"
Weight of the Mold (g):	4385
Volume of the Mold (cm <sup>3</sup> ):	940

**Mold / Specimen**

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	6275	6313	6357	6351	6323
Weight of Mold (g):	4385	4385	4385	4385	4385
Weight of Wet Sample (g):	1890	1928	1972	1966	1938
Mold Volume (cm <sup>3</sup> ):	940	940	940	940	940

**Moisture Content / Density**

Tare Number:	916	550	1731	878	1728
Weight of Tare & Wet Sample (g):	403.50	402.40	409.30	405.80	405.70
Weight of Tare & Dry Sample (g):	374.04	366.23	368.43	364.66	357.27
Weight of Tare (g):	109.87	81.59	83.61	110.24	81.39
Weight of Water (g):	29.46	36.17	40.87	41.14	48.43
Weight of Dry Sample (g):	264.17	284.64	284.82	254.42	275.88

Wet Density (g/cm <sup>3</sup> ):	2.01	2.05	2.10	2.09	2.06
Wet Density (pcf):	125.5	128.0	130.9	130.5	128.7
Moisture Content (%):	11.2	12.7	14.3	16.2	17.6
Dry Density (pcf):	112.9	113.6	114.5	112.3	109.4

**Zero Air Voids**

Moisture Content (%):	13.0	17.5	22.0
Dry Unit Weight (pcf):	126.4	115.8	106.9

Tested By	PC	Date	10/8/15	Checked By	KC	Date	10/12/15
page 2 of 2							



## SPECIFIC GRAVITY

ASTM D 854-14

Client: CEC Boring No.: 9/17/15  
Client Reference: Central Waste Closure 153-121 Depth (ft): 0-4  
Project No.: 2015-506-001 Sample No.: TP-22A  
Lab ID: 2015-506-001-023 Visual Description: Brown Silty Clay

(Minus No.4 sieve material, oven dried)

### Replicate Number

	1	2
Pycnometer ID:	G 1255	G 1504
Weight of Pycnometer & Soil & Water (g):	747.22	734.63
Temperature (°C):	26.4	26.1
Weight of Pycnometer & Water (g):	684.90	672.10
Tare Number:	970	633
Weight of Tare & Dry Soil (g):	200.55	196.53
Weight of Tare (g):	100.75	96.03
Weight of Dry Soil (g):	99.80	100.50
Specific Gravity of Soil @ Measured Temperature:	2.662	2.647
Specific Gravity of Water @ Measured Temperature:	0.99669	0.99677
Conversion Factor for Measured Temperature:	0.99848	0.99856
Specific Gravity @ 20° Celsius:	2.667	2.650

Average Specific Gravity @ 20° Celsius                    2.66

Tested By      TO      Date      10/6/15      Checked By      CLK      Date      10/9/15

DCN: CT-S5 Date: 3/5/14 Revision: 20

S:\Excel\Excel QA\Spreadsheets\Specific Gravity.xls

## ATTERBERG LIMITS

ASTM D 4318-10

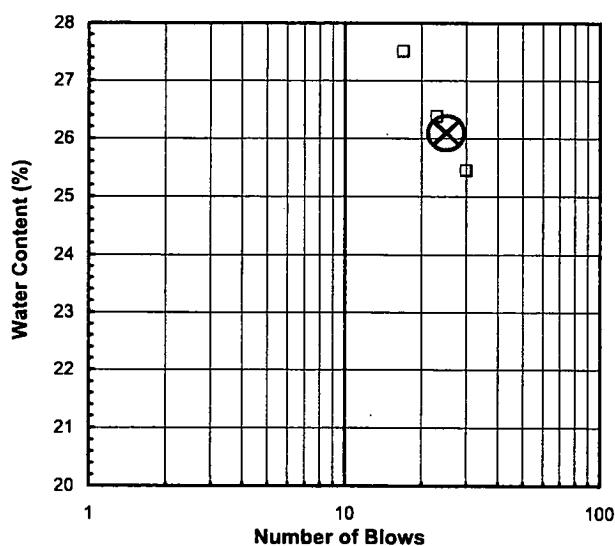
Client:	CEC	Boring No.:	9/17/15
Client Reference:	Central Waste Closure 153-121	Depth (ft):	0-4
Project No.:	2015-506-001	Sample No.:	TP-22A
Lab ID:	2015-506-001-023	Soil Description: BROWN SILTY CLAY	

**Note:** The USCS symbol used with this test refers only to the minus No. 40 (Minus No. 40 sieve material, Airdried) sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

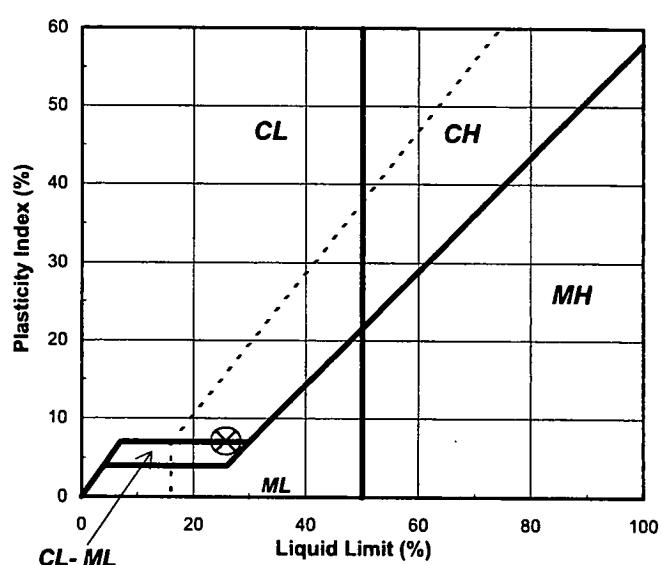
Liquid Limit Test	1	2	3	
Tare Number:	475	473	1244	M
Wt. of Tare & Wet Sample (g):	33.98	46.75	36.38	U
Wt. of Tare & Dry Sample (g):	29.53	41.48	31.36	L
Weight of Tare (g):	12.04	21.50	13.11	T
Weight of Water (g):	4.5	5.3	5.0	I
Weight of Dry Sample (g):	17.5	20.0	18.3	P
Moisture Content (%):	25.4	26.4	27.5	O
Number of Blows:	30	23	17	I
				N
				T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	442	1274		Liquid Limit (%): 26
Wt. of Tare & Wet Sample (g):	22.66	29.65		Plastic Limit (%): 19
Wt. of Tare & Dry Sample (g):	21.62	28.66		Plasticity Index (%): 7
Weight of Tare (g):	16.05	23.29		USCS Symbol: CL-ML
Weight of Water (g):	1.0	1.0		
Weight of Dry Sample (g):	5.6	5.4		
Moisture Content (%):	18.7	18.4	0.2	
<i>Note: The acceptable range of the two Moisture contents is <math>\pm 2.6</math></i>				

Flow Curve



Plasticity Chart



Tested By	TO	Date	10/9/15	Checked By	CLK	Date	10/10/15
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page 1 of 1 DCN: CTS4B, REV. 4, 3/18/13

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# SIEVE AND HYDROMETER ANALYSIS

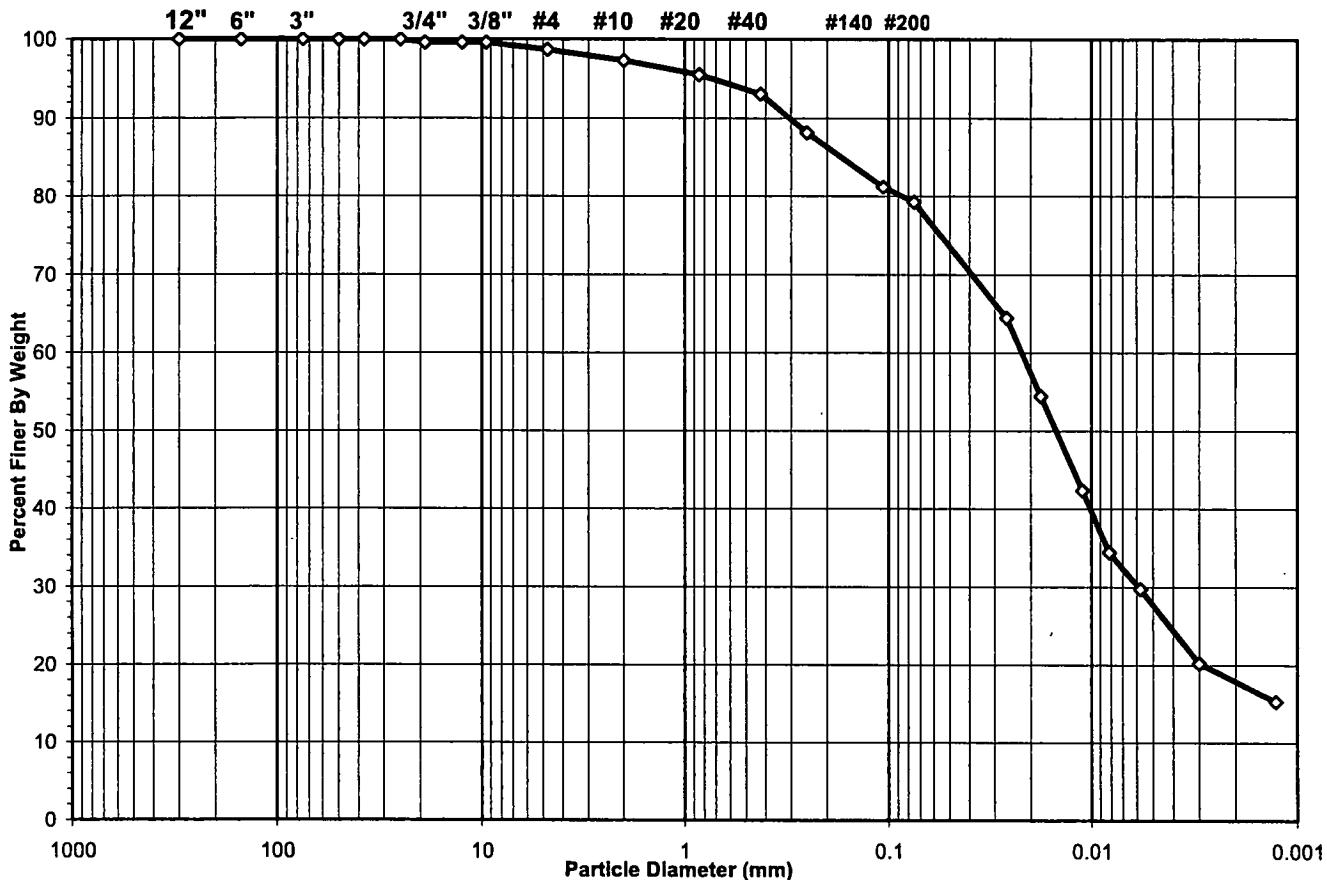
ASTM D 422-63 (2007)



Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-023

Boring No.: 9/17A  
 Depth (ft): 0-4  
 Sample No.: TP-22A  
 Soil Color: Brown

USCS USDA	SIEVE ANALYSIS					HYDROMETER	
	cobbles	gravel	sand			silt and clay fraction	
	cobbles	gravel	sand		silt	clay	

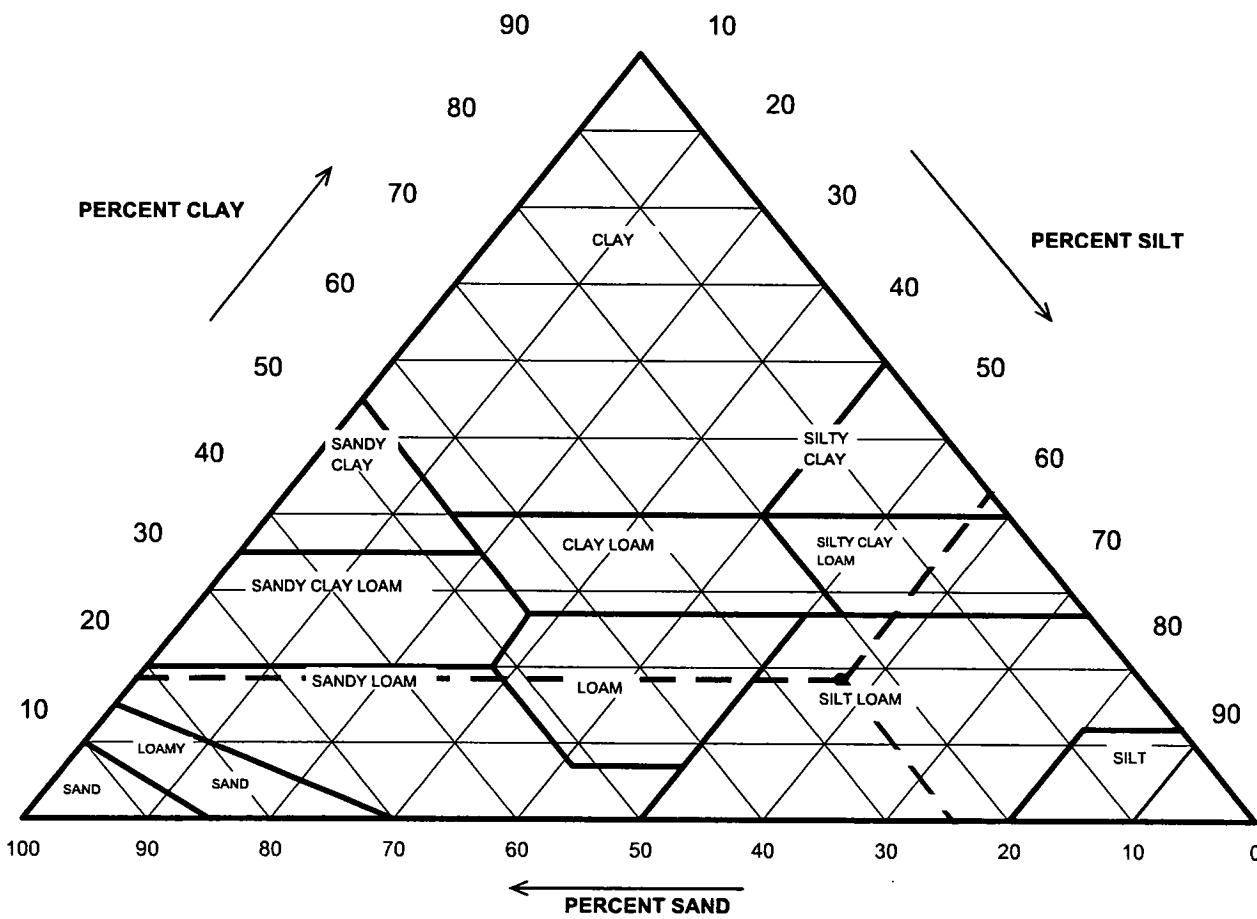


USCS Summary		
Sieve Sizes (mm)	Percentage	
Greater Than #4	Gravel	1.28
#4 To #200	Sand	19.44
Finer Than #200	Silt & Clay	79.28
<b>USCS Symbol:</b> <i>CL, TESTED</i>		
<b>USCS Classification:</b> <i>LEAN CLAY WITH SAND</i>		

## USDA CLASSIFICATION CHART

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-023

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-22A  
 Soil Color: Brown



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
2	97.28	Gravel	2.72	0.00
0.05	73.55	Sand	23.73	24.39
0.002	17.92	Silt	55.63	57.19
		Clay	17.92	18.42
<b>USDA Classification: SILT LOAM</b>				

# WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)



Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-023

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-22A  
 Soil Color: Brown

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.:	1416	Tare No.:	3003
Wt. of Tare & Wet Sample (g):	1030.70	Weight of Tare & Wet Sample (g):	100.75
Wt. of Tare & Dry Sample (g):	939.10	Weight of Tare & Dry Sample (g):	96.28
Weight of Tare (g):	145.68	Weight of Tare (g):	6.55
Weight of Water (g):	91.60	Weight of Water (g):	4.47
Weight of Dry Soil (g):	793.42	Weight of Dry Soil (g):	89.73
<b>Moisture Content (%):</b>	<b>11.5</b>	<b>Moisture Content (%):</b>	<b>5.0</b>
Wet Weight of -3/4" Sample (g):	24855	Weight of the Dry Sample (g):	793.42
Dry Weight of - 3/4" Sample (g):	22282.5	Weight of Minus #200 Material (g):	631.55
Wet Weight of +3/4" Sample (g):	94.20	Weight of Plus #200 Material (g):	161.87
Dry Weight of + 3/4" Sample (g):	89.73		
Total Dry Weight of Sample (g):	22372.2	<b>J - Factor (Percent Finer than 3/4"):</b>	<b>0.9960</b>

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100.00
6"	150	0.00	0.00	0.00	100.00	100.00
3"	75	0.00	0.00	0.00	100.00	100.00
2"	50	0.00	(*)	0.00	100.00	100.00
1 1/2"	37.5	0.00		0.00	100.00	100.00
1"	25.0	0.00		0.00	100.00	100.00
3/4"	19.0	94.20	0.40	0.40	99.60	99.60
1/2"	12.5	0.00	0.00	0.00	100.00	99.60
3/8"	9.50	0.00	0.00	0.00	100.00	99.60
#4	4.75	6.98	0.88	0.88	99.12	98.72
#10	2.00	11.49	1.45	2.33	97.67	97.28
#20	0.85	14.13	(**) 1.78	4.11	95.89	95.51
#40	0.425	19.53	2.46	6.57	93.43	93.05
#60	0.250	38.80	4.89	11.46	88.54	88.18
#140	0.106	54.89	6.92	18.38	81.62	81.29
#200	0.075	16.05	2.02	20.40	79.60	79.28
Pan	-	631.55	79.60	100.00	-	-

**Notes :** (\*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample  
 (\*\*) The - 3/4" sieve analysis is based on the Weight of the Dry Sample

Tested By	PC	Date	Checked By	KC	Date	10/14/15
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page 3 of 4

DCN: CT-S3B DATE07/15/2015 BY ASI/BR/ECTS/CEC/2015-506-001 Central Waste\2015-506-001-023 Grain JSieveHyd.xls\Print Sheet

**HYDROMETER ANALYSIS**

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-023

Boring No.: 9/17/15  
 Depth (ft): 0-4  
 Sample No.: TP-22A  
 Soil Color: Brown

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	52.0	20.7	6.83	45.2	81.3	0.01333	0.0263	64.5
5	45.0	20.7	6.83	38.2	68.7	0.01333	0.0178	54.5
15	36.5	20.7	6.83	29.7	53.4	0.01333	0.0111	42.4
30	31.0	20.7	6.83	24.2	43.5	0.01333	0.0082	34.5
63	27.5	21.1	6.68	20.8	37.5	0.01327	0.0057	29.7
250	20.5	22.1	6.33	14.2	25.5	0.01311	0.0030	20.2
1440	17.0	22.2	6.29	10.7	19.3	0.01310	0.0013	15.3

Soil Specimen Data		Other Corrections	
Tare No.:	963		
Wt. of Tare & Dry Material (g):	160.78	a - Factor:	0.99
Weight of Tare (g):	100.79		
Weight of Deflocculant (g):	5.0	Percent Finer than # 200:	79.28
Weight of Dry Material (g):	54.99	Specific Gravity:	2.7 Assumed

**Note:** Hydrometer test is performed on - # 200 sieve material.

Tested By	TO	Date	10/12/15	Checked By	KC	Date	10/14/15
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page 4 of 4

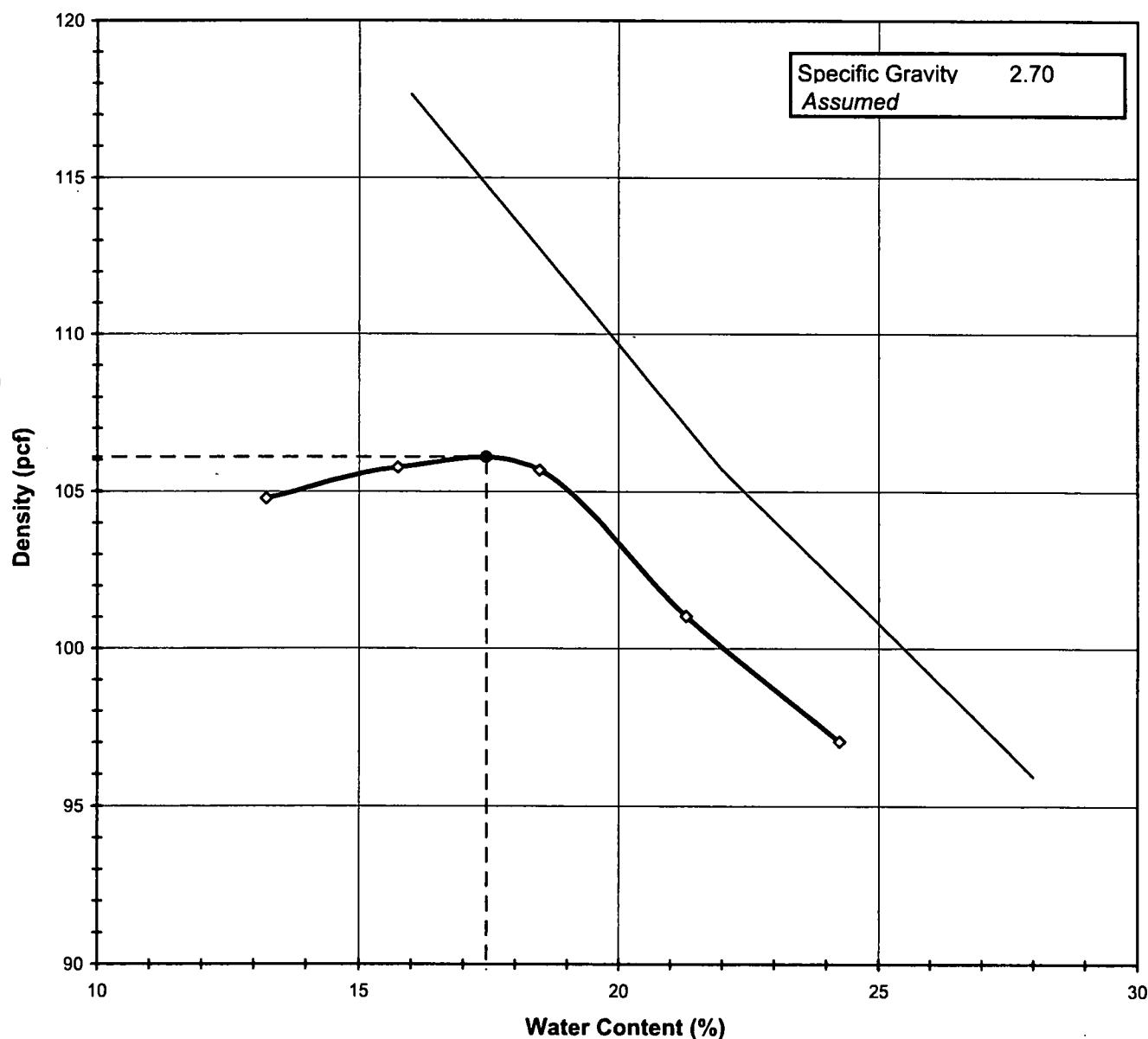
DCN: CT-S3B DATE09/12/2015 BY KRC PROJECTS1CEC12015-506-001 Central Waste12015-506-001-023 Grain JSieveHyd.xls|Print Sheet

**MOISTURE DENSITY RELATIONSHIP**
*ASTM D698-12*

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-024  
 Visual Description: Brown Silt

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-22B  
 Test Method: STANDARD

**Optimum Water Content** 17.5  
**Maximum Dry Density** 106.1



Tested By *MF* Date 10/27/15 Checked By *KC* Date 10/28/15

page 1 of 2 DCN:CT-S12 DATE:5/1/13 REVISION: 14

**MOISTURE - DENSITY RELATIONSHIP**

ASTM D698-12

Client: CEC Boring No.: 9/17/15  
 Client Reference: Central Waste Closure 153-121 Depth (ft): 4-8  
 Project No.: 2015-506-001 Sample No.: TP-22B  
 Lab ID: 2015-506-001-024

Visual Description: Brown Silt

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.70
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	B

Test Type:	<b>STANDARD</b>
Rammer Weight (lb):	5.5
Rammer Drop (in):	12
Rammer Type:	<b>MECHANICAL</b>
Machine ID:	G 441
Mold ID:	G 606
Mold diameter:	4"
Weight of the Mold (g):	4139
Volume of the Mold (cm <sup>3</sup> ):	943

**Mold / Specimen**

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	5932	5989	6031	5991	5961
Weight of Mold (g):	4139	4139	4139	4139	4139
Weight of Wet Sample (g):	1793	1850	1892	1852	1822
Mold Volume (cm <sup>3</sup> ):	943	943	943	943	943

**Moisture Content / Density**

Tare Number:	581	887	585	1706	1710
Weight of Tare & Wet Sample (g):	438.20	423.70	413.00	422.80	420.80
Weight of Tare & Dry Sample (g):	396.74	380.98	361.91	363.07	354.68
Weight of Tare (g):	83.35	109.68	85.33	82.74	82.05
Weight of Water (g):	41.46	42.72	51.09	59.73	66.12
Weight of Dry Sample (g):	313.39	271.30	276.58	280.33	272.63

Wet Density (g/cm <sup>3</sup> ):	1.90	1.96	2.01	1.96	1.93
Wet Density (pcf):	118.6	122.4	125.2	122.6	120.6
Moisture Content (%):	13.2	15.7	18.5	21.3	24.3
Dry Density (pcf):	104.8	105.8	105.7	101.0	97.0

**Zero Air Voids**

Moisture Content (%):	16.0	22.0	28.0
Dry Unit Weight (pcf):	117.7	105.7	95.9

Tested By	MF	Date	10/27/15	Checked By	KC	Date	10/28/15
page 2 of 2							



## SPECIFIC GRAVITY

ASTM D 854-14

Client: CEC Boring No.: 9/17/15  
Client Reference: Central Waste Closure 153-121 Depth (ft): 4-8  
Project No.: 2015-506-001 Sample No.: TP-22B  
Lab ID: 2015-506-001-024 Visual Description: Brown Silt

(Minus No.4 sieve material, oven dried)

### Replicate Number

	1	2
Pycnometer ID:	G 1255	G 1504
Weight of Pycnometer & Soil & Water (g):	747.16	734.65
Temperature (°C):	26.6	26.5
Weight of Pycnometer & Water (g):	684.88	672.05
Tare Number:	706	963
Weight of Tare & Dry Soil (g):	199.22	201.4
Weight of Tare (g):	99.04	100.77
Weight of Dry Soil (g):	100.18	100.63
Specific Gravity of Soil @ Measured Temperature:	2.644	2.646
Specific Gravity of Water @ Measured Temperature:	0.99663	0.99666
Conversion Factor for Measured Temperature:	0.99842	0.99845
Specific Gravity @ 20° Celsius:	2.648	2.650

Average Specific Gravity @ 20° Celsius                    2.65

Tested By      TO      Date      10/6/15      Checked By      CLK      Date      10/9/15

DCN: CT-S5 Date: 3/5/14 Revision: 20

S:\Excel\Excel QA\Spreadsheets\Specific Gravity.xls

## ATTERBERG LIMITS

ASTM D 4318-10

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-024

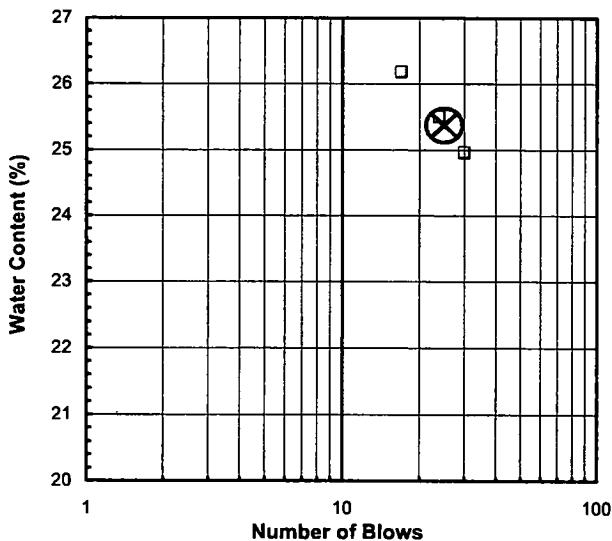
Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-22B  
 Soil Description: BROWN LEAN CLAY

**Note:** The USCS symbol used with this test refers only to the minus No. 40 sieve material, Airdried  
 (Minus No. 40 sieve material, Airdried)  
 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

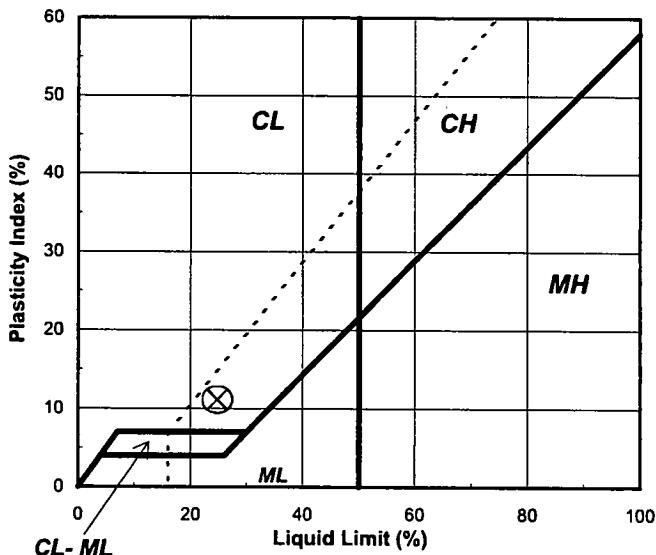
Liquid Limit Test	1	2	3	
Tare Number:	211	157	240	M
Wt. of Tare & Wet Sample (g):	38.73	37.68	38.00	U
Wt. of Tare & Dry Sample (g):	34.46	33.58	33.99	L
Weight of Tare (g):	18.15	17.50	17.92	T
Weight of Water (g):	4.3	4.1	4.0	I
Weight of Dry Sample (g):	16.3	16.1	16.1	P
Moisture Content (%):	26.2	25.5	25.0	O
Number of Blows:	17	24	30	I
				N
				T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	239	168		Liquid Limit (%): 25
Wt. of Tare & Wet Sample (g):	26.54	25.47		Plastic Limit (%): 14
Wt. of Tare & Dry Sample (g):	25.75	24.69		Plasticity Index (%): 11
Weight of Tare (g):	20.19	19.11		USCS Symbol: CL
Weight of Water (g):	0.8	0.8		
Weight of Dry Sample (g):	5.6	5.6		
Moisture Content (%):	14.2	14.0	0.2	
Note: The acceptable range of the two Moisture contents is $\pm 2.6$				

Flow Curve



Plasticity Chart



Tested By RAL Date 10/9/15 Checked By CLK Date 10/10/15  
 page 1 of 1 DCN: CTS4B, REV. 4, 3/18/13

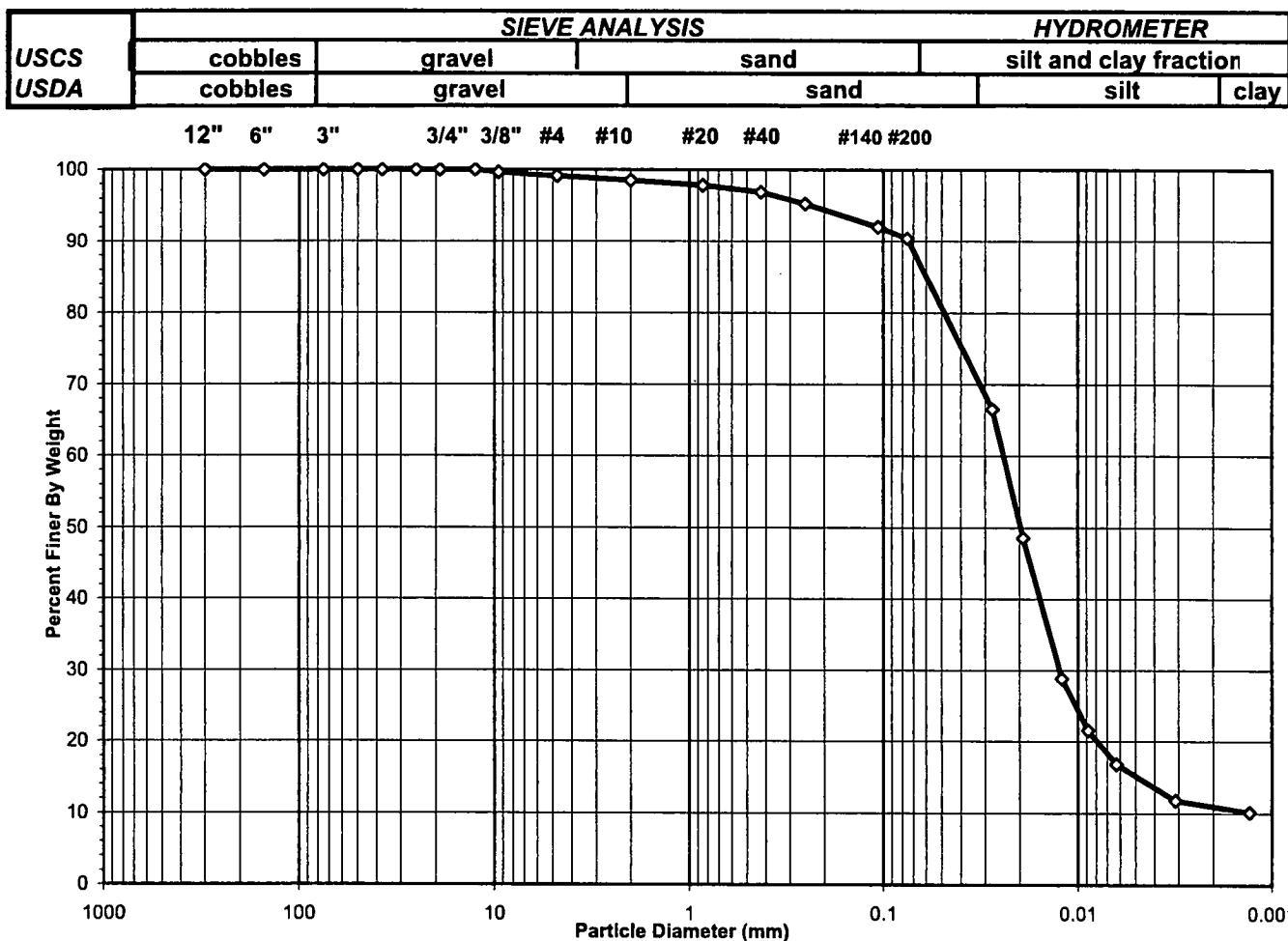
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**SIEVE AND HYDROMETER ANALYSIS**

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-024

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-22B  
 Soil Color: Brown

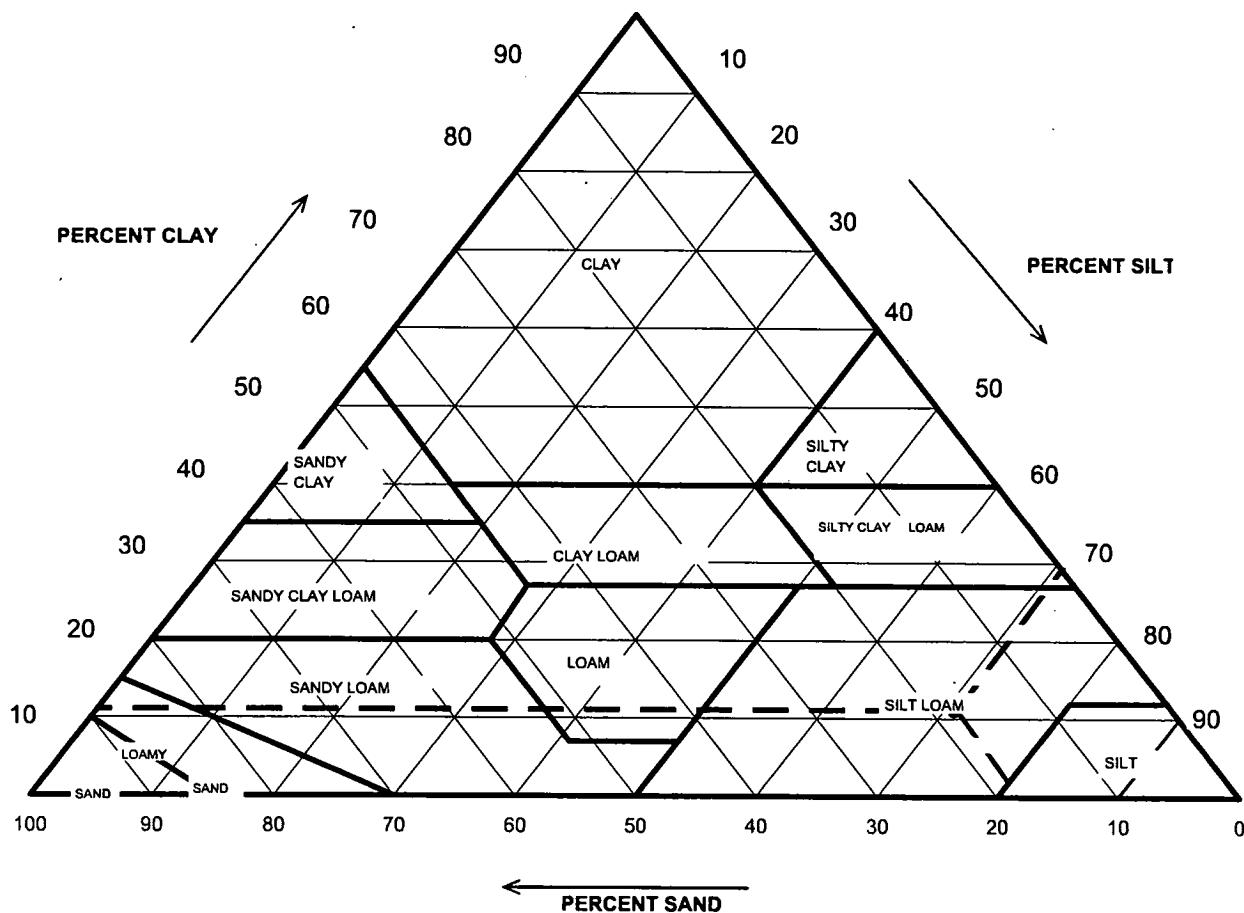


USCS Summary		
Sieve Sizes (mm)	Percentage	
Greater Than #4	Gravel	0.87
#4 To #200	Sand	8.71
Finer Than #200	Silt & Clay	90.42
<b>USCS Symbol:</b>		
<b>CL, TESTED</b>		
<b>USCS Classification:</b>		
<b>LEAN CLAY</b>		

### USDA CLASSIFICATION CHART

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-024

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-22B  
 Soil Color: Brown



Particle Size (mm)	Percent Finer (%)	USDA SUMMARY	Actual Percentage (%)	Corrected % of Minus 2.0 mm material for USDA Classificat.
2	98.51	Gravel	1.49	0.00
0.05	80.78	Sand	17.73	18.00
0.002	10.94	Silt	69.84	70.89
		Clay	10.94	11.11
<b>USDA Classification: SILT LOAM</b>				

## WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client: CEC  
 Client Reference: Central Waste Closure 153-121  
 Project No.: 2015-506-001  
 Lab ID: 2015-506-001-024

Boring No.: 9/17/15  
 Depth (ft): 4-8  
 Sample No.: TP-22B  
 Soil Color: Brown

Moisture Content of Passing 3/4" Material			Water Content of Retained 3/4" Material		
Tare No.	1453		Tare No.		NA
Weight of Tare & Wet Sample (g)	720.60		Weight of Tare & Wet Sample (g)		NA
Weight of Tare & Dry Sample (g)	636.70		Weight of Tare & Dry Sample (g)		NA
Weight of Tare (g)	137.48		Weight of Tare (g)		NA
Weight of Water (g)	83.90		Weight of Water (g)		NA
Weight of Dry Sample (g)	499.22		Weight of Dry Sample (g)		NA
<b>Moisture Content (%)</b>	<b>16.8</b>		<b>Moisture Content (%)</b>		<b>NA</b>
Wet Weight of -3/4" Sample (g)	NA		Weight of the Dry Sample (g)	499.22	
Dry Weight of -3/4" Sample (g)	47.83		Weight of - #200 Material (g)	451.39	
Wet Weight of +3/4" Sample (g)	NA		Weight of + #200 Material (g)	47.83	
Dry Weight of +3/4" Sample (g)	0.00				
Total Dry Weight of Sample (g)	NA				
Sieve Size	Sieve Opening	Weight of Soil Retained	Percent Retained	Accumulated Percent Retained	Percent Finer
	(mm)	(g)	(%)	(%)	(%)
12"	300	0.00	0.00	0.00	100.00
6"	150	0.00	0.00	0.00	100.00
3"	75	0.00	0.00	0.00	100.00
2"	50	0.00	0.00	0.00	100.00
1 1/2"	37.5	0.00	0.00	0.00	100.00
1"	25.0	0.00	0.00	0.00	100.00
3/4"	19.0	0.00	0.00	0.00	100.00
1/2"	12.5	0.00	0.00	0.00	100.00
3/8"	9.50	1.86	0.37	0.37	99.63
#4	4.75	2.49	0.50	0.87	99.13
#10	2.00	3.08	0.62	1.49	98.51
#20	0.85	3.37	0.68	2.16	97.84
#40	0.425	4.49	0.90	3.06	96.94
#60	0.250	8.43	1.69	4.75	95.25
#140	0.106	15.88	3.18	7.93	92.07
#200	0.075	8.23	1.65	9.58	90.42
Pan	-	451.39	90.42	100.00	-

Tested By

PC

Date

10/2/15

Checked By

KC

Date

10/14/15

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HYDROMETER ANALYSIS

ASTM D 422-63 (2007)



Client: CEC  
Client Reference: Central Waste Closure 153-121  
Project No.: 2015-506-001  
Lab ID: 2015-506-001-024

Boring No.: 9/17/15  
Depth (ft): 4-8  
Sample No.: TP-22B  
Soil Color: Brown

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	47.5	20.7	6.83	40.7	73.6	0.01333	0.0275	66.6
5	36.5	20.7	6.83	29.7	53.7	0.01333	0.0191	48.6
15	24.5	20.7	6.83	17.7	32.0	0.01333	0.0121	28.9
30	20.0	20.7	6.83	13.2	23.8	0.01333	0.0088	21.6
60	17.0	21.1	6.68	10.3	18.7	0.01327	0.0063	16.9
250	13.5	22.1	6.33	7.2	13.0	0.01311	0.0031	11.7
1440	12.5	22.2	6.29	6.2	11.2	0.01310	0.0013	10.2

Soil Specimen Data		Other Corrections		
Tare No.	970			
Weight of Tare & Dry Material (g)	160.49	a - Factor		0.99
Weight of Tare (g)	100.79			
Weight of Deflocculant (g)	5.0	Percent Finer than # 200		90.42
Weight of Dry Material (g)	54.7	Specific Gravity	2.7	Assumed

Note: Hydrometer test is performed on - # 200 sieve material.

Tested By TO Date 10/12/15 Checked By KC Date 10/14/15

page 4 of 4

DCN: CT-S3A DATE: 3/18/13 REVISION: 11

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