FOSTER WHEELER ENVIRONMENTAL CORPORATION

October 3, 2001
SO-2449-100201-DD

Ms. Kae Lewis
Project Manager
California Energy Commission
1516 9th Street
Sacramento, CA 95814

SUBJECT: GEOLOGIC FOUNDATION CRITERIA AND SEIZMIC HAZARDS STUDY
RUSSELL CITY ENERGY CENTER PROJECT (01-AFC-07)

Dear Ms. Lewis:

Attached for filing with the California Energy Commission Docket Unit are an original and 12 copies of *Appendix 10G, Geologic and Foundation Design Criteria*, and a *Seismic Hazards Study* in support of the Application for Certification for the Calpine/Bechtel Joint Development's Russell City Energy Center (01-AFC-07).

Sincerely,

Douglas M. Davy, Ph.D.
AFC Project Manager

Attachment

cc: Alex Ameri, City of Hayward
Service list

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APPENDIX 10G
GEOLOGIC AND FOUNDATION CRITERIA

for the
APPLICATION FOR CERTIFICATION
RUSSELL CITY ENERGY CENTER
RUSSELL CITY, CALIFORNIA

prepared by

GEOTECHNICAL AND HYDRAULIC ENGINEERING SERVICES
BECHTEL POWER CORPORATION
FREDERICK, MARYLAND

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10G1.0 INTRODUCTION

This appendix includes the results of the preliminary subsurface investigation, laboratory testing program and geotechnical assessment for the Russell City Energy Center (RCEC) Project to support the Application for Certification (AFC).

This appendix contains a description of the site conditions, field and laboratory testing phases of the investigation, together with the ground water, and foundation related subsurface conditions. Preliminary engineering design properties derived from the results of the investigation are discussed. Soil related hazards addressed include soil liquefaction, seismically induced settlements, expansive soils, hydrocompaction (or collapsible soils), and slope instability. Preliminary foundation and earthwork considerations are addressed based on the results of the site investigation, observations by geotechnical personnel on site, and established geotechnical engineering practices.

Information contained in this appendix reflects the codes, standards, criteria and practices generally used in the design and construction of site and foundation engineering systems for the Facility. More specific project information will be developed during execution of the project to support the preparation of detailed design, engineering, material procurement specification and construction specifications.

10G2.0 SCOPE OF WORK

The scope of geotechnical services for the preparation of this appendix included:

- developing a boring location plan and specification for a field and laboratory investigation,
- selecting a drilling and testing subcontractor and technically monitoring the work in the field,
- assigning laboratory tests for representative soil samples,
- determining current ground water levels,
- preparing this appendix to include an assessment of soils-related hazards, a summary of preliminary foundation and earthwork considerations, and preliminary guidelines for inspection and monitoring of geotechnical aspects of construction.

10G3.0 SITE CONDITIONS

The power plant site is located at the southwestern corner of the intersection of Enterprise Avenue and Whitesell Street in Russell City to the west of Hayward, California, and less than 1 mile from the eastern shore of the San Francisco Bay.

Figure 10G-1 shows the site location with respect to Hayward and other San Francisco Bay area geographical features.

The power plant site consists of the Salem property, currently occupied by KFAX radio station towers, and the Runnels Industries property. Four existing radio station towers in the Salem property will be relocated to a capped landfill site about 1 mile north of the power plant site. The paragraphs that follow provide site conditions for the Salem and the Runnels Industries properties.

Runnels Property Site Conditions – The Runnels property is located at the intersection of Enterprise Avenue and Whitesell Street. The entrance gate is on Whitesell Street, near the intersection with Enterprise Avenue. The site is bounded on the west side by the Salem property, and railroad tracks are located just outside the southern site boundary. The railroad tracks end just west of the property, to the south of the Salem property. The site is very flat, and the ground surface is covered with loose gravel, or compacted soil/gravel mix. Some asphalt was also found. There is little vegetation, which is confined to narrow and isolated patches along the property boundary. There are several 1-story, pre-fabricated metal buildings on the property. Based on verbal information obtained at the site, the area, including the neighboring Salem property, was previously used as evaporative ponds for salt production. Two borings drilled at the site (B-105 and B-109) disclosed about 4 ft of miscellaneous fill.

Salem Property Site Conditions – The Salem property is located on the south side of Enterprise Avenue, next to the Runnels property. The entrance gate is on Enterprise Avenue near the northeastern property corner (near the Runnels property boundary). A large warehouse bounds the site on the west side, and railroad tracks coming from the east end are present about halfway along the southern site boundary. The site is fairly flat, with a 20-yd wide strip along Enterprise Avenue and the warehouse along the western site boundary being a few feet higher than the remainder of the site. Enterprise Avenue, the Runnels property and the warehouse along the western site boundary are all at elevations 3 to 5 feet higher than the existing elevations throughout most of the Salem property site. The ground surface is completely covered with grass and weeds that grow about 1 ft to 1.5 ft high. There are 4 radio towers located at the site and one 1-story, pre-fabricated metal building toward the north-central part of the property that serves as a control room. A gravel-surfaced access road connects the pre-fabricated metal building to the site gate. An overhead power line supplies electricity to the pre-fabricated metal building from a wooden pole on Enterprise Avenue.

10G4.0 SUBSURFACE INVESTIGATION

The site subsurface investigation described in this appendix was conducted at the site in May-June, 2001. The investigation was conducted in accordance with a specification prepared for this project, and followed the American Society for Testing and Materials (ASTM) and other applicable standards.

As shown on Figure 10G-2, 9 soil borings were drilled at selected locations to obtain soil samples, and to perform standard penetration testing (SPT). Harding ESE of Novato, California performed the subsurface investigation. Bechtel geotechnical personnel provided technical direction of all field operations.

A total of 1001 linear feet of soil were drilled in the 9 borings. The borings ranged in depth from 100 feet to 160 feet to provide a preliminary assessment of the subsurface conditions to depths of interest for foundation design and construction. A single ground water observation well was also installed to a depth of 32 feet in a borehole drilled about 5 feet to the south of boring B-107.

The borings were drilled using a truck-mounted Failing F1500 drill rig. All borings were drilled using rotary wash methods and a bentonite drilling fluid to maintain a positive pressure and a stable borehole. An Organic Vapor Analyzer was used to check for the presence of hydrocarbon contamination of soil samples. No detectable levels were measured in any of the borings drilled in the Runnels and in the Salem property. All drill cuttings and drilling mud were contained and stored in a bin, and were disposed of at an approved landfill offsite at the end of the subsurface investigation. All boreholes were grouted to the surface upon completion.

Standard Penetration Test (SPT) soil samples were obtained in accordance with ASTM D 1586 in the borings by driving a 2-inch OD split-barrel sampler 18 inches with a 140-pound, cathead-operated hammer falling freely through a distance of 30 inches. Continuous sampling was conducted to a depth of about 15 feet, and at 5-foot intervals thereafter. The standard penetration resistance value (N-value) is defined as the number of blows required to drive the split-barrel sampler a total distance of 12 inches, the count being started after a penetration of 6 inches. When the sampler could not be driven the required 12 inches, the standard penetration resistance was shown as the number of blows over the inches actually penetrated.

Undisturbed soil samples were obtained by pushing 3-inch OD Shelby tubes into the ground at select depths in accordance with ASTM D 1587. In each case, the Shelby tubes were pushed a total of 30 inches. The unconfined compressive strength of undisturbed samples was estimated in the field using a pocket penetrometer. The Shelby tubes were sealed with a microcrystalline wax, plastic cap and tape to preserve the natural moisture content of the soil samples.

10G5.0 SITE SUBSURFACE CONDITIONS

10G5.1 Physiography and Geology

The site physiography and geology are discussed in detail in Section 8.4 of the AFC.

10G5.2 Seismology

The site seismology is included in Section 8.4 of the AFC. The site is located in Seismic Zone 4 based on the 1998 California Building Code (Reference 1).

10G5.3 Stratigraphy

The available data from the borings completed at the site indicate that the subsurface stratigraphy throughout the site is characterized by an upper layer of fill and black clay underlain by predominantly clayey soils (Clay Stratum).

The subsurface profiles, as interpreted from the borings and laboratory test results, are shown on Figures 10G-3 through 10G-6. Figure 10G-3 describes the type of information shown on the profiles. The delineation between soil types shown between boring locations on the profiles is assumed, and the descriptions on the profiles represent an interpretation of the subsurface conditions at the boring locations. The subsurface conditions between boring locations may differ from those shown on the profiles. Detailed descriptions of the materials found at the boring locations are given on the boring logs shown in Attachment 10G-1.

Descriptions of the upper fill and black clay layer and the Clay Stratum are presented in the following paragraphs. Information on layer thickness, SPT blow counts, and unconfined compressive strength is also included.

Fill and Black Clay Layer – The upper fill was encountered in the borings drilled in the Reynolds property (B-105 and B-109), and black clay was encountered in all borings, including borings B-105 and B-109. The fill is mostly granular, and the black clay contains organics and is highly plastic. The thickness of this upper layer ranged from about 3 to 7.5 feet with an average of about 4.2 feet. SPT blow counts in this layer ranged from 6 blows/foot (bpf) to 17/3" (17 blows/3" of sampler penetration on a section of asphalt pavement) with an average of about 17 bpf.

Clay Stratum - The clay stratum was encountered beneath the upper fill and black clay layer, and extended to the termination depth of all borings. The clay is mostly brown and/or gray, and ranged from low to high plasticity. Silt seams were often encountered in the clay stratum, as well as occasional pockets of silty sand and clayey sand. SPT blow counts in this layer ranged from 1/15" to 53 bpf with an average of about 15 bpf. A zone of generally low SPT blow counts was observed at a depth of about 115-ft. However, visual observation of the recovered samples, and pocket penetrometer test results generally indicated a much stiffer behavior than suggested by the low SPT values. The undrained strength measured in the laboratory ranged from 134 psf to 2111 psf with an average of 733 psf. The laboratory measured undrained strength is lower than suggested by the SPT blow counts, and may reflect some degree of sample disturbance. Consolidation test results indicated some degree of overconsolidation with pre-consolidation pressures ranging from about 1,000 psf to over 5,000 psf. These results match the consistency of the clay stratum suggested by the SPT values.

10G5.4 Ground Water

Ground water levels were measured in observation well OW-107, which was installed about 5 feet to the south of boring B-107. The ground water observation well log is shown in Attachment 10G-2, and the available ground water level readings are summarized in Table 10G-1. No long-term measurements of ground water levels were taken.

The measured ground water depths in OW-107 ranged from about 4.2 to 4.6 ft below grade, or from about El. 1.3 to 1.7 ft NGVD.

The design ground water elevation will be selected taking into account seasonal ground water level fluctuations, and will be higher than the highest observed ground water elevation. Based on the limited available ground water data, a preliminary design ground water level not lower than El. 4 ft NGVD can be used for waterproofing and buoyancy considerations. Positive drainage, and the use of impervious backfill, will also be considered to avoid the accumulation of runoff water in foundation excavations.

10G5.5 Soil Profile Type

The available subsurface data indicate that the site average soil properties for the top 100 feet of soil profile are close to the controlling criteria for both CBC Soil Profile Type S_D (Stiff Soil Profile) and Soil Profile Type S_E (Soft Soil Profile). Additional subsurface investigation, at the start of detailed design, will determine the specific soil type.

10G6.0 FIELD ELECTRICAL RESISTIVITY SURVEY

No field electrical resistivity survey was conducted on the site during the investigation. Field resistivity surveys will be conducted during a future, structure-specific subsurface investigation to be performed at the site. A Wenner four-electrode resistivity array will be used in accordance with ASTM G 57.

10G7.0 LABORATORY TESTING PROGRAM

Laboratory tests were performed to determine the preliminary physical, chemical and engineering characteristics of the subsurface soils. These tests included chemical analyses (pH, sulfates and chlorides), grain size analyses, index properties, unconfined compression and consolidation. Bechtel geotechnical personnel assigned all testing. All testing was performed using applicable ASTM Standards or other accepted procedures. Laboratory test results, as they relate to the assessment of soil-related hazards, are discussed in Section 10G8.0. The laboratory test results are shown in Attachment 10G-3, and a summary is given in Table 10G-2.

10G8.0 ASSESSMENT OF SOIL-RELATED HAZARDS

10G8.1 Liquefaction

Soil liquefaction is a process by which loose, saturated, granular deposits lose a significant portion of their shear strength due to pore water pressure buildup resulting from cyclic loading, such as that caused by an earthquake. Soil liquefaction can lead to foundation bearing failures and excessive settlements when:

- the design ground acceleration is high;
- the water level is relatively shallow; and
- low SPT blow counts are measured in granular deposits (suggesting low soil density).

The results of the site subsurface investigation indicate that the site soils are mostly cohesive and therefore are not susceptible to liquefaction.

10G8.2 Seismically-Induced Settlements

Seismically induced settlements occur when ground shaking causes soil densification. Soils susceptible to seismic densification are granular, generally loose and uncemented. Soils below the final site grade will consist of compacted structural fill and mostly cohesive soils. Thus, the potential for seismically induced settlement at this site can be considered nil.

10G8.3 Expansive Soils

Soil expansion is a phenomenon by which clayey soils expand in volume as a result of an increase in moisture content. The same soils shrink in volume upon drying. Expansive soils are usually identified with index tests, such as percentage of clay particles and liquid limit. It is generally accepted that soils with liquid limits larger than about 50 percent, i.e., soils that classify as high plasticity clays (CH) or high plasticity silts (MH), may be susceptible to volume change when subjected to moisture variations.

Laboratory test results on representative soil samples indicate the upper black clay layer to be expansive. These soils will either be covered with compacted structural fill during site grading operations beneath piled foundations, or removed and replaced beneath non-pile supported foundations. Therefore, the expansive black clay layer is not expected to adversely affect shallow foundations.

10G8.4 Collapsible Soils

Soil collapse (hydrocompaction) is a phenomenon that results in relatively rapid settlement of soil deposits due to addition of water. This generally occurs in soils having a loose particle structure cemented together with soluble minerals or with small

quantities of clay. Water infiltration into such soils can break down the interparticle cementation, resulting in collapse of the soil structure. Collapsible soils are usually identified with index tests, such as dry density and liquid limit, and by consolidation tests where soil collapse potential is measured after inundation under load.

Based on the available data, the site soils are mostly cohesive and not susceptible to collapse.

10G8.5 Slope Stability

The site is very flat, and thus no natural slope stability hazards exist at the site. Future site grading operations will result in slopes no more than about 5 ft high, and these fill slopes will be designed to remain stable.

10G9.0 PRELIMINARY FOUNDATION CONSIDERATIONS

10G9.1 General Foundation Design Criteria

For satisfactory performance, the foundation of any structure must satisfy two independent design criteria. First, it must have an acceptable factor of safety against bearing failure in the foundation soils under maximum design load. Second, settlements during the life of the structure must not be of a magnitude that will cause structural damage, endanger piping connections or impair the operational efficiency of the facility. Selection of the foundation type to satisfy these criteria depends on the nature and magnitude of dead and live loads, the base area of the structure and the settlement tolerances. Where more than one foundation type satisfies these criteria, then cost, scheduling, material availability and local practice will probably influence or determine the final selection of the type of foundation.

An evaluation of the information collected from the SPT borings, laboratory testing, and visual observations made during the site subsurface investigation indicate that that no adverse foundation related subsurface and ground water conditions were encountered that would preclude the construction and operation of the proposed plant. Thus, the site can be considered suitable for development of the proposed plant, pursuant to the preliminary foundation and earthwork considerations discussed in this appendix.

10G9.2 Selection of Foundation Type

Based on the results of the subsurface investigation, it is anticipated that all heavy equipment and settlement sensitive structures will be pile supported. Lightly loaded and/or settlement tolerant structures and equipment can be supported on shallow foundations. Preliminary foundation recommendations are provided on the next sections.

10G9.3 Deep Foundations

It is anticipated that prestressed, precast concrete piles will be suitable for use at the site. Because no dense/hard bearing layer was encountered within a depth of 160 ft, piles will be designed to function as friction piles. Preliminary estimates indicate that 14-inch to 16-inch square piles installed to a depth of no more than 80 ft will develop allowable loads on the order of 60 tons in compression, 20 tons in uplift, and 4 tons laterally. These allowable loads will be further verified after a structure-specific subsurface investigation, and also through a field load test program to be completed during construction before production pile installation.

10G9.4 Shallow Foundations

Preliminary estimates indicate that loading up to 2000 psf can be placed on the site soils with acceptable levels of settlement. Shallow foundation construction will require the earthwork measures discussed in Section 10G10.0.

Allowable bearing pressures will include a safety factor of at least 3 against bearing failures. Settlements of footings are expected to be limited to 1 inch, and differential settlement between neighboring foundations to less than 1/2 inch. These allowable bearing pressure and settlement criteria will not apply to tanks, which can usually undergo much larger settlements.

Frost depth is estimated to be less than 6 inches at the site (Reference 2). Exterior foundations and foundations in unheated areas should be placed at a depth of at least 1 ft below the ground surface for protection. Interior footings in permanently heated areas can be also be placed at a minimum depth of 1 ft below the ground surface. The minimum recommended width is 3 feet for spread footings and 2 feet for wall footings.

10G9.5 Corrosion Potential and Ground Aggressiveness

The chloride content and pH laboratory test results, summarized on Table 10G-1, indicate the site soils to be mildly corrosive to very corrosive for buried steel. This is consistent with the site proximity to the San Francisco Bay. Also, based on verbal information obtained at the site during the subsurface investigation, the site was previously used as evaporative ponds for salt production. At the time of the subsurface investigation, the existing steel frame radio towers were starting to show signs of corrosion at the top of the tower foundations, another indication of aggressiveness to steel. Soil resisitivity tests will be performed during the structure-specific subsurface investigation to confirm these preliminary findings.

The sulfate content of the soil samples indicates that no special precautions are required for protection of the concrete foundations. Additional sulfate content tests will be performed during the structure-specific subsurface investigation to confirm these preliminary findings.

10G10.0 PRELIMINARY EARTHWORK CONSIDERATIONS

10G10.1 Site Preparation and Grading

After removal of all existing structures, radio towers, and debris from the site construction areas, the subgrade preparation should include the complete removal of all vegetation and topsoil. Topsoil can be stockpiled and may be reused in remote areas of the site where no future construction is expected.

Site grading will include the removal of the black clay layer from the beneath the footprint of all soil-supported foundations, and placement of fill to bring the site to a level grade. The site fill work should be performed as detailed below. All soil surfaces to receive structural fill should be proof rolled with a heavy roller or a fully loaded dump truck to detect soft areas.

10G10.2 Temporary Excavations

It is anticipated that confined temporary excavations at the site will be required during construction for the installation of the circulation water pipes and the cooling tower forebay. All excavations should be sloped in accordance with OSHA requirements. Sheet piling or shoring could also be used to support temporary excavations. The need for internal supports in the excavation will be determined based on the final depth of the excavation. Any excavation below the water table should have the ground water levels controlled by using well points or other dewatering methods installed prior to the start of excavation.

10G10.3 Permanent Slopes

At this time, only low permanent fill slopes are planned for the Russell City site. Permanent fill slopes less than 5 ft high can be made 3H:1V.

10G10.4 Backfill Requirements

All fill material must be free of organic matter, debris or clay balls, with a maximum size not exceeding 2 inches. Structural fill must also be well graded and granular. Granular material with similar specifications can be used for pipe bedding, except that the maximum size should not exceed 1/2 inch. Based on the available site grading, and the near surface soils disclosed by the borings, it is anticipated that no acceptable structural fill materials will be available from on-site.

Structural fill should be compacted to at least 95 percent of the maximum dry density as determined by ASTM D 1557 when used for roadway or foundation support. Fill placed behind retaining structures can be compacted to at least 90 percent of the maximum dry density as determined by ASTM D 1557. Common fill used to raise the grade throughout the site, or for rough grading, can be compacted to at least 85 percent of the maximum dry density as determined by ASTM D 1557. Initially, structural fill should be

placed in lifts not exceeding 8 inches loose thickness. Thicker lifts may be used for structural fill placement pursuant to approval based on results of field compaction performance. Thicker lifts can generally be used for the common fill. The moisture content of all compacted fill should fall within 3 percentage points of the optimum moisture content determined by ASTM D 1557.

Pipe bedding can be compacted in 12-inch lifts to 90 percent of the maximum dry density as determined by ASTM D 1557.

10G11.0 INSPECTION AND MONITORING

A California-registered Geotechnical Engineer or Engineering Geologist should monitor geotechnical aspects of foundation construction and/or installation, and fill placement. At a minimum the Geotechnical Engineer/Engineering Geologist should monitor the following activities:

- All surfaces to receive fill should be inspected prior to fill placement to verify that no pockets of loose/soft or otherwise unsuitable material were left in place and that the subgrade is suitable for structural fill placement.

- All fill placement operations should be monitored by an independent testing agency. Field compaction control testing should be performed regularly and in accordance with the applicable specification to be issued by the Geotechnical Engineer.

- The Geotechnical Engineer must witness all pile load testing and initial stages of production pile installation.

- Settlement monitoring of significant foundations and equipment is recommended on at least a quarterly basis during construction and the first year of operation, and then semi-annually for the next two years.

10G12.0 SITE DESIGN CRITERIA

10G12.1 General

The Facility will be located near the western limits of the City of Hayward, California. The approximate 12-acre (600 ft x 800 ft) site is relatively flat, with several existing permanent structures and 4 radio towers. The site is accessible from Enterprise Avenue and Whitesell Street.

10G12.2 Datum

The site grade varies between about El. 4.5 ft and 10 ft with respect to the 1929 National Geodetic Vertical Datum (NGVD). Final site grade will be from about El. 11.5 ft to El. 12 ft NGVD.

10G13.0 FOUNDATION DESIGN CRITERIA

10G13.1 General

Reinforced concrete structures (spread footings, mats and deep foundations) will be designed consistent with Appendix 10B, Structural Engineering Design Criteria.

Allowable soil bearing pressures for foundation design will be in accordance with this Appendix.

10G13.2 Ground Water Pressures

Hydrostatic pressures due to ground water or temporary water loads will be considered.

10G13.3 Factors of Safety

The factor of safety for structures, tanks and equipment supports with respect to overturning, sliding, and uplift due to wind and buoyancy will be as defined in Appendix 10B, Structural Engineering Design Criteria.

10G13.4 Load Factors and Load Combinations

For reinforced concrete structures and equipment supports, using the strength method, the load factors and load combinations will be in accordance with Appendix 10B, Structural Engineering Design Criteria.

10G14.0 REFERENCES

1. 1998 California Building Code.

2. Department of the Navy (1982). "Identification and Classification of Soil and Rock," Chapter 1 in *Soil Mechanics Design Manual 7.1*, Naval Facilities Engineering Command, Alexandria, VA.

Appendix 10G

Tables

Table 10G-1. Summary of Water Level Readings in OW-107

Date	Time	DTWT from TOC (ft)	WT Elevation (ft NGVD)	Comments
1-Jun-2001				Well Development, riser stickup = 21.5 in (1.79 ft)
4-Jun-2001	715	6.03	1.66	gs elev = 5.9 ft NGVD, riser casing elevation (5.9 + 1.79 = 7.69 ft)
5-Jun-2001	730	6.07	1.62	
6-Jun-2001	745	6.11	1.58	
7-Jun-2001	815	6.11	1.58	
11-Jun-2001	700	6.15	1.54	
12-Jun-2001	710	6.16	1.53	
13-Jun-2001	1445	6.15	1.54	
14-Jun-2001	1430	6.26	1.43	
15-Jun-2001	915	6.18	1.51	
11-Jul-2001	1200	6.39	1.30	
29-Aug-2001	1200	6.43	1.26	

NOTES:

OW = Observation well.
DTWT = Depth to water table.
TOC = Top of casing.
WT = Water table.
ft = Feet.
MSL = Mean Sea Level.
in = Inches.
gs = Ground surface.
elev = Elevation.
NGVD = National Geodetic Vertical Datum of 1929.

Table 10G-2. Summary of Laboratory Test Results

Boring Number	Sample		Laboratory Test										
	Depth (ft)	Type	USCS	% Fines	Sieve Analysis	Moisture Content %	Liquid Limit %	Plastic Limit %	Unconfined Compression (psf)	Consolidation	pH	Chloride (mg/kg)	Sulfate (mg/kg)
B-101	13.5 – 15.2	ST	SM	47		24.3	NV	NP	292				
	15.2 – 16.1	SS	SW-SM	9	a								
	29 – 30	SS	CL	75	a	21	44	21					
	49 – 50	SS	SM	34	a	23	NV	NP					
B-102	12 – 13	SS	CL	79	a								
	13 – 15.5	ST	CL/SC	60		23.9	29	18	747				
	22.5 – 25	ST	CL/SC	47		19.1	36	19	1474				
	59 – 60	SS	ML	88	a								
B-103	3 – 4	SS	CH	74		22	58	24			8.3	1,500	510
	12 – 14.5	ST	CL	67		28.6	44	19	267				
	15 – 16	SS	CL	69	a								
	54 – 55	SS	ML	68	a								
	64 – 65	SS	ML	79	a								
	104 – 105	SS	CH	96		54	73	25					
	109 – 110	SS	CH	99		53	74	27					
B-104	4.5 – 5.5	SS	CH	73		23	68	23			8.0	660	180
	6 – 8.5	ST	CH	85		26	68	27	372				
	13 – 15.5	ST	CL	68		21.8	41	20	872				
	38.5 – 40	SS	SP-SM	8	a	14	NV	NP					
	54 – 55	SS	SC	40	a								
	89 – 90	SS	CL	67	a								
	109 – 110	SS	CH	100		55	77	27					
	118.5 - 120	ST	CH	88		32.6	71	26	1429				
B-105	1 - 1.5	SS	CH	90		23	51	19			8.0	120	29
	11 – 14	ST	CL	77		18.6	43	20	2455	b			
	23.5 – 26	ST	CL	61		23.4	40	19	1354	b			
	43.5 – 46	ST	CH	87		21.6	73	28	3671	b			
	73.5 – 76	ST	CH	100		26	53	24	4221	b			
	114.5 – 115	SS	CH	89		50	79	29					
	118.5 - 121	ST	CH	91		47.5	79	31	3208				
B-106	12 – 14.5	ST	CL	62		22.2	41	20	657				
	54 - 55	SS	CL	76	a								

Table 10G-2. Summary of Laboratory Test Results

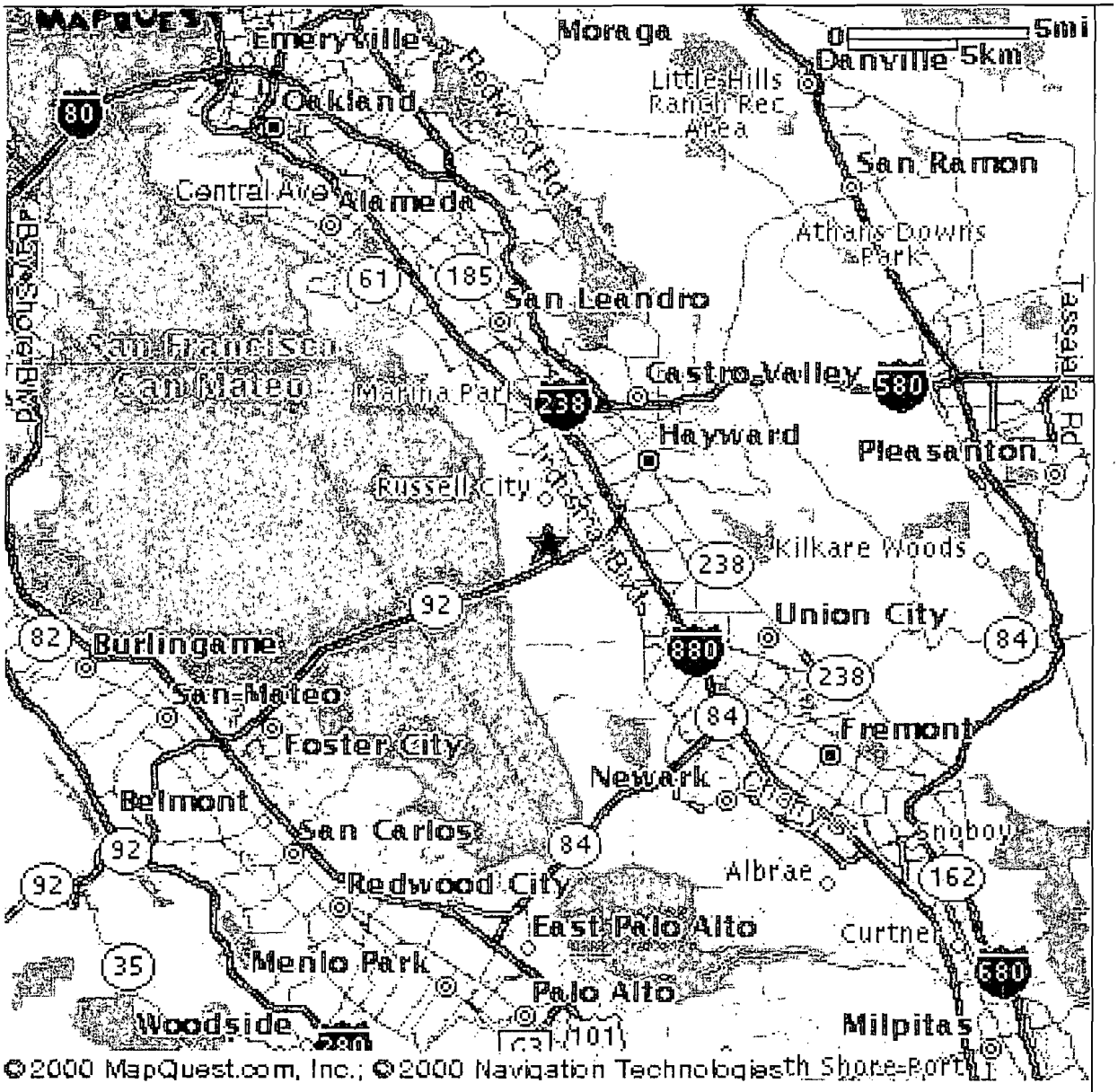
Boring Number	Sample		Laboratory Test										
	Depth (ft)	Type	USCS	% Fines	Sieve Analysis	Moisture Content %	Liquid Limit %	Plastic Limit %	Unconfined Compression (psf)	Consolidation	pH	Chloride (mg/kg)	Sulfate (mg/kg)
B-107	1 – 1.5	SS	CH	98		16	59	25			8.6	200	83
	4.5 – 7	ST	CH	84		26.3	57	24	1006	b			
	11 – 11.5	SS	CH	82	a	25	53	22					
	14 – 16.5	ST	CL	90		24.7	38	19	1194	b			
	39.5 – 40	SS	CL	60	a	23	47	22					
	84 – 84.5	SS	ML	70	a	22	NV	NP					
B-108	12.5 - 13	ST	CH	81		26.9	67	26	1064				
	54 – 55	SS	SC	50	a								
	84.5 – 85	SS	ML	78	a								
B-109	1 – 1.5	SS	CH	90		32	60	16			8.4	ND (15)	68
	7.5 – 10	ST	CL	85		23.6	70	28	1686	b			
	13 – 15.5	ST	CL	78		22.9	42	18	695				
	23.5 – 26	ST	SM	12		19.1	33	19	391	b			
	48.5 - 51	ST	CH	97		27.9	68	26	2274	b			

NOTES:

a = See Particle Size Analysis Test Report Graphs (ASTM D 422-63) in Appendix B for details.
b = See Consolidation Test Report Graphs (ASTM D 2435) in Appendix B for details.
ft = Feet
mg/kg = Milligrams per kilogram
psf = Pounds per square foot
USCS = Unified Soil Classification System
CH = See Plate A-1
CL = See Plate A-1
ML = See Plate A-1
SC = See Plate A-1
SM = See Plate A-1
SP-SM = Dual Classification, See Plate A-1
SW-SM = Dual Classification, See Plate A-1
NP = Non Plastic
NV = Non Viscous
ST = Shelby Tube
SS = Split Spoon

Appendix 10G

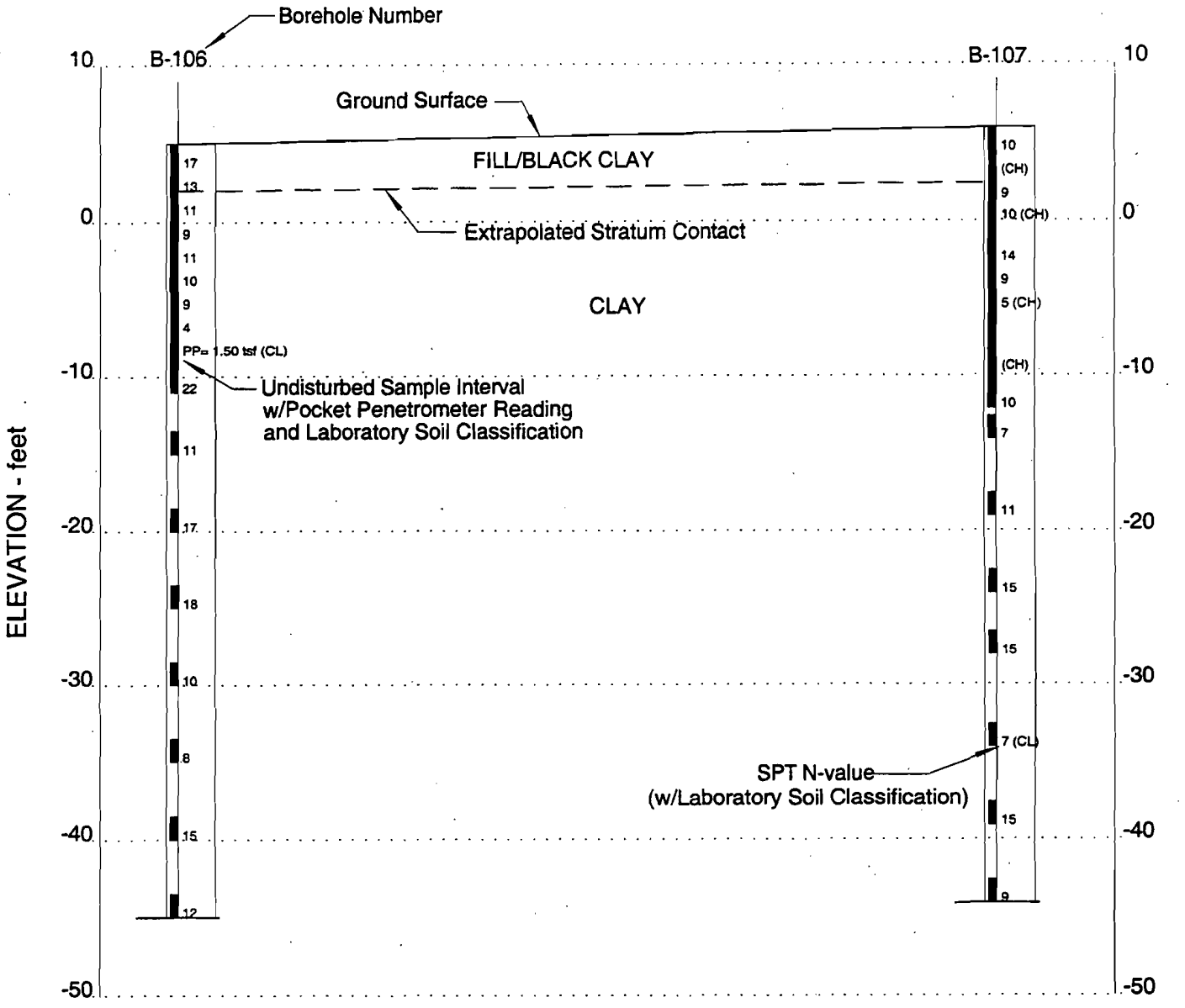
Figures



Note: The red star designates the site location.

BECHTEL POWER CORPORATION FREDERICK, MARYLAND		
RUSSELL CITY ENERGY CENTER		
SITE LOCATION MAP		
JOB NO.	FIGURE NO.	REV
24405	10G-1	0

Figure 10G-2 is shown as Drawing No. CY-0100-00001, Rev. C



NOTE:

Subsurface data have been obtained only at the actual borehole locations. The stratification shown between the boreholes is based on extrapolation of the data obtained from the boreholes. Actual stratification between the boreholes may differ from that shown.

0 20 40

HORIZONTAL SCALE - FEET

BECHTEL POWER CORPORATION

FREDERICK, MARYLAND

RUSSELL CITY ENERGY CENTER

SUBSURFACE PROFILE LEGEND

JOB NO.	DRAWING NO	REV.
24405	FIGURE 10G-3	

Appendix 10G

Attachment 10G-1 - Boring Logs

MAJOR DIVISIONS			SYMBOLS	TYPICAL NAMES
COARSE-GRAINED SOILS OVER 50% > No.200 SIEVE SIZE	GRAVELS MORE THAN 1/2 OF COARSE FRACTION > No.4 SIEVE SIZE	CLEAN GRAVELS WITH LESS THAN 5% FINES	GW	Well-graded gravels or gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels or gravel-sand mixtures, little or no fines
		GRAVELS WITH OVER 15% FINES	GM	Silty gravels, gravel-sand mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS MORE THAN 1/2 OF COARSE FRACTION < No.4 SIEVE SIZE	CLEAN SANDS WITH LESS THAN 5% FINES	SW	Well-graded sand or gravelly sands, little or no fines
			SP	Poorly graded sands or gravelly sands, little or no fines
		SANDS WITH OVER 15% FINES	SM	Silty sand, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS OVER 50% < No.200 SIEVE SIZE	SILTS & CLAYS LIQUID LIMIT 50% OR LESS		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic silts and organic silty clays of low plasticity
	SILTS & CLAYS LIQUID LIMIT GREATER THAN 50%		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silty clays, organic silts
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils

UNIFIED SOIL CLASSIFICATION SYSTEM - ASTM D2488-93

☒	Bulk or classification sample
■	Sample preserved for possible laboratory analysis
□	No Recovery
Perm	Permeability
Consol	Consolidation
LL	Liquid Limit (%)
PI	Plastic Index (%)
Gs	Specific Gravity
MA	Particle Size Analysis
-200=55%	Percent Passing No. 200 Sieve

CLASSIFICATION	RANGE OF GRAIN SIZES	
	U.S. Standard Sieve Size	Grain Size in Millimeters
BOULDERS	Above 12"	Above 305
COBBLES	12" to 3"	305 to 76.2
GRAVEL	3" to No. 4	76.2 to 4.75
coarse	3" to 3/4"	76.2 to 19.1
fine	3/4" to No. 4	19.1 to 4.75
SAND	No. 4 to No. 200	4.75 to 0.075
coarse	No. 4 to No. 10	4.75 to 2.00
medium	No. 10 to No. 40	2.00 to 0.425
fine	No. 40 to No. 200	0.425 to 0.075
SILT & CLAY	Below No. 200	Below 0.075

KEY TO TEST DATA*

Source: ASTM D 2488-90, based on Unified Soil Classification system

*. Not part of ASTM Classification System

SOIL_CLASS_GEOL_HARDINGESE 53483.GPJ GEOL.GDT 7/26/01

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Soil Classification Chart and Key to Test Data PLATE

Russell City Energy Center
Hayward, California

A-1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		7/01	

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Relative Density	Standard Penetration Test Blow Count (blows per foot)
very loose	<4
loose	4-10
medium dense	10-30
dense	30-50
very dense	>50

CONSISTENCY OF FINE-GRAINED SOILS

Consistency	Approximate Blows/foot (SPT)	Undrained Shear Strength (psf)
very soft	<2	0 - 250
soft	2-4	250 - 500
medium stiff	4-8	500 - 1,000
stiff	8-15	1,000 - 2,000
very stiff	15-30	2,000 - 4,000
hard	>30	>4,000

NATURAL MOISTURE CONTENT

Dry - Requires considerable moisture to obtain optimum moisture content for compaction

Moist - Near the optimum moisture content for compaction

Wet - Requires drying to obtain optimum moisture content for compaction

Note: Where laboratory data are not available, the field classifications given above provide a general indication of material properties; the classifications may require modification based on judgment or laboratory testing.

53483001.DWG 1.0
20010724.1425

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Physical Properties Criteria for Soil Classification

Russell City Energy Center
Hayward, California

PLATE
A-2

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		6/01	

Date 6/6/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by M. Phelps Datum MSL
Surface Elevation 7 ft.
Northing 2057024.3 Easting 6089280.2

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log	
Switched to wash method after taking the first 2 samples. No groundwater level reading was taken.					16	0			DARK GRAY SANDY CLAY (CL) Very stiff, dry, dessicated, with roots from 1-3 ft.
					16				@ 2 ft.: Change to moist, with 5% sand
					10				@ 3.5 ft.: Color change to OLIVE GRAY (5Y 3/2)
					11	5			@ 5 ft.: Change to stiff, moderate to high plasticity
					10				GRAYISH BROWN FAT CLAY (CH) (5Y4 3/2) Stiff, wet, high plasticity
					7				GRAYISH BROWN SILTY CLAY (CL) Medium stiff, wet, low to moderate plasticity
					13	10			
					6				GRAYISH BROWN MOTTLED SILTY CLAY (CL) Medium stiff, wet, low plasticity
					3				SILTY SAND (SM)
UC=292 -200=47%	24.3	102.0							
					12	15			BROWN WELL GRADED SAND WITH SILT (SW-SM) Medium dense, wet
									BROWN SILTY CLAY (CL) Stiff, wet
					9	20			
					9	25			DARK YELLOWISH BROWN SANDY SILTY CLAY (CL) Stiff, wet, low plasticity, 60% fines, 40% sand
					16	30			DARK YELLOWISH BROWN LEAN CLAY (CL) Very stiff, wet, high plasticity, some cemented material within clay
					15	35			YELLOWISH BROWN SANDY SILT (ML) Stiff to very stiff, wet, 50% fines, 50% sand @ 31.5 ft.: Observed sand in cuttings

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Log of Boring 101
Cooling Tower (Salem Property)
Russell City Energy Center
Hayward, California

PLATE
B-101

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 6/6/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by M. Phelps Datum MSL
Surface Elevation 7 ft.
Northing 2057024.3 Easting 6089280.2

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log
						35		
								@ 36.5 ft.: Increasing sand content
					17	40		OLIVE GRAY FAT CLAY (CH) (5Y 3/2) Stiff to very stiff, wet, high plasticity
					9	45		@ 46.5 ft.: Sandy layer
					21	50		GRAY BROWN MOTTLED SILTY SAND (SM) Medium dense, wet
					10	55		MODERATE OLIVE BROWN SANDY SILT (ML) Firm, wet, 20% sand
					18	60		@ 58.5-63 ft.: Interbedded clays and sands OLIVE GRAY FAT CLAY (CH) (5Y 3/2) Very stiff, wet, high plasticity
					14	65		@ 63 ft.: Change to stiff
					12	70		

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Log of Boring 101
Cooling Tower (Salem Property)
Russell City Energy Center
Hayward, California

PLATE
B-101

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 6/6/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by M. Phelps Datum MSL
Surface Elevation 7 ft.
Northing 2057024.3 Easting 6089280.2

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log	
						70			
					12	75			Interbedded with thin sand layers
					20	80			OLIVE GRAY SAND WITH SILT (SP-SM) (5Y 3/2) Medium dense, wet OLIVE GRAY FAT CLAY (CH) Very stiff, wet, high plasticity
					15	85			
					15	90			OLIVE GRAY SILTY CLAY (CL) Stiff to very stiff, wet, low plasticity @ 91.5 ft.: Harder drilling
					17	95			OLIVE BROWN FAT CLAY (CH) 5Y 4/4) Very stiff, wet
					23	100			@ 99 ft.: Color change to OLIVE GRAY Bottom of boring at 100 ft. Tremie grouted with cement grout.

GEOTECH_BORING_NEW_HARDINGESE 53483.GPJ GEOTECH.GDT 8/16/01

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Log of Boring 101
Cooling Tower (Salem Property)
Russell City Energy Center
Hayward, California

PLATE
B-101

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 6/12/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by M. Phelps Datum MSL
Surface Elevation 7.6 ft.
Northing 2056982.8 Easting 6089495.7

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log	
						0			BLACK CLAY (CL) Stiff to very stiff, dry to moist, dessication cracks with pinhole voids, (TOPSOIL)
Switch to rotary wash method using 4-5/8 in. drag bit at about 4 ft. Did not measure water level during drilling.					15				
					21				
					13				DARK BROWN TO BLACK CLAY (CH) Very stiff, moist, with organics, fine roots, dessication cracks
					13	5			@ 4 ft.: Color change to BROWN TO DARK GRAY, stiff, high plasticity
					12				
					9				@ 8 ft.: Rootlets
			1.25		180 psi	10			
					7				BROWN LEAN CLAY WITH SAND (CL) Medium stiff, wet
	23.9	99.8	1.0		80-110 psi				@ 12.5 ft.: Increase in sand content BROWN CLAYEY SAND (SC)
UC=747 -200=60%						15			
									BROWN SANDY SILT (ML) Medium stiff, wet
					6	20			BROWN SILTY CLAY - CLAYEY SILT (ML-CL) Medium stiff, wet
									BROWN LEAN SANDY CLAY (CL)
UC=1474 -200=47%	19.1	106.9	2.9		60-100 psi	25			@ 24.5 to 25 ft.: Clayey sand
					16	30			BROWN FAT CLAY (CH) Very stiff, wet, with gray streaks, slightly porous
					17	35			

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Log of Boring 102
Switchyard Area (Salem Property)
Russell City Energy Center
Hayward, California

PLATE
B-102

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 6/12/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by M. Phelps Datum MSL
Surface Elevation 7.6 ft.
Northing 2056982.8 Easting 6089495.7

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log	
						35			@ 35 ft.: Calcite stringers
Easier/faster drilling					16	40			
					11	45			OLIVE GRAY SILTY CLAY (CL) Stiff, wet, interbedded with silty sand layers, little to moderate plasticity
					19	50			@ 50 ft.: Change to very stiff
					16	55			@ 56-57 ft.: Layer of coarse sand, fine gravel
					21	60			OLIVE GRAY SILT (ML) Very stiff, wet, little plasticity @ 58.5-60.5 ft.: Interbedded with sand seams 2-4 in. thick
					16	65			DARK BROWN FAT CLAY (CH) Very stiff, wet, high plasticity, with blocky structure OLIVE GRAY CLAYEY SILT WITH SAND (ML) Hard, wet, low to moderate plasticity
					16	70			OLIVE GRAY FAT CLAY (CH) Very stiff, wet, high plasticity

GEOTECH_BORING_NEW_HARDINGESE 53483.GPJ GEOTECH.GDT 8/16/01

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Log of Boring 102
Switchyard Area (Salem Property)
Russell City Energy Center
Hayward, California

PLATE
B-102

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 6/12/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by M. Phelps Datum MSL
Surface Elevation 7.6 ft.
Northing 2056982.8 Easting 6089495.7

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log	
						70			
					19	75			@ 75 ft.: Olive gray mottling
					17	80			MOTTLED GRAY OLIVE BROWN SILTY CLAY (CL) Very stiff, wet, moderate plasticity @ 80 ft.: Sand seam
					20	85			GRAY BROWN OLIVE SILTY FAT CLAY (CH) Very stiff, wet
					21	90			MOTTLED OLIVE GRAY CLAYEY SILT(ML) Very stiff, wet, trace sand
					18	95			MOTTLED OLIVE GRAY FAT CLAY (CH) Very stiff, wet, high plasticity
					22	100			Bottom of boring at 100 ft. Tremie grouted with cement grout.

GEOTECH_BORING_NEW_HARDINGESE 53483.GPJ GEOTECH.GDT 8/16/01

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Log of Boring 102
Switchyard Area (Salem Property)
Russell City Energy Center
Hayward, California

PLATE
B-102

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 6/6/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by M. Phelps Datum MSL
Surface Elevation 5.8 ft.
Northing 2056895.6 Easting 6089063.2

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log	
						0			BLACK CLAY (CL) (N1) Stiff, dry to moist, organics, (TOPSOIL)
Switched to wash method after taking the first 2 samples and used a 4-7/8 in. tricone bit. No groundwater level reading was taken.					12				@ 1.5 ft.: Color change to GRAY BROWN (5YR 3/2), roots, very stiff
					17				BLACK CLAY (CH) (N1)
					12				
					9	5			OLIVE GRAY FAT CLAY (CH) (5Y 3/2) Firm, wet
					10				
					10				@ 8 ft.: Trace sand
					13	10			
					3				OLIVE BROWN LEAN CLAY WITH SAND (CL) (5Y 4/4) Soft, wet
UC=267 -200=67%	28.6	92.4	0.5		40-140 psi				
					5	15			@ 15 ft.: Change to medium stiff
									OLIVE BROWN CLAYEY SILT WITH SAND (ML) (5Y 4/4) Soft, wet
					17	20			OLIVE BROWN SILTY CLAY (CL) 5Y 4/4) Very stiff, wet, low to moderate plasticity, trace sand
					12	25			OLIVE BROWN FAT CLAY (CH) (5Y 4/4) Stiff, wet, high plasticity
					16	30			@ 29 ft.: Color change to DARK YELLOWISH BROWN (10YR 4/2), Very stiff
					10	35			@ 34 ft.: Change to stiff

GEOTECH_BORING_NEW_HARDINGESE 53483.GPJ GEOTECH.GDT 8/16/01

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Log of Boring 103
City Water Treatment Area (Salem Property)
Russell City Energy Center
Hayward, California

PLATE
B-103

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 6/6/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by M. Phelps Datum MSL
Surface Elevation 5.8 ft.
Northing 2056895.6 Easting 6089063.2

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log	
						35			
					9	40			@ 39 ft.: Color change to OLIVE GRAY (5Y 3/2) some thin seams of silt
					18	45			@ 44 ft.: Change to very stiff
					14	50			@ 49 ft.: Change to stiff
					18	55			OLIVE GRAY SANDY SILT (ML) (5Y 3/2) Very stiff, wet, low plasticity
					12	60			OLIVE GRAY FAT CLAY (CH) Stiff, wet, high plasticity
					12	65			OLIVE GRAY SILTY CLAY (CL) OLIVE GRAY SILT WITH SAND (ML) (5Y 3/2) Stiff, wet, low plasticity
					10	70			OLIVE GRAY FAT CLAY (CH) (5Y 3/2) Stiff, wet

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Log of Boring 103
City Water Treatment Area (Salem Property)
Russell City Energy Center
Hayward, California

PLATE
B-103

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 6/6/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by M. Phelps Datum MSL
Surface Elevation 5.8 ft.
Northing 2056895.6 Easting 6089063.2

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log	
						70			
					17	75			@ 74 ft.: Change to very stiff
					20	80			
Becoming harder drilling					18	85			@ 84-101 ft.: Color change to MOTTLED BROWN GRAY (5YR 4/4), samples are blocky and fissured
					15	90			OLIVE GRAY SILTY SANDY CLAY (CL) (5Y 3/2) Stiff to very stiff, wet
					20	95			OLIVE GRAY FAT CLAY (CH) (5Y 3/2) Very stiff, wet, high plasticity
					18	100			@ 101.5 ft.: Shells observed in drill cuttings
					5	105			@ 104 ft.: Change to medium soft

GEOTECH_BORING_NEW_HARDINGESE 53483.GPJ GEOTECH.GDT 8/16/01

Harding ESE
A MACTEC COMPANY

Log of Boring 103
City Water Treatment Area (Salem Property)
Russell City Energy Center
Hayward, California

PLATE
B-103

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 6/6/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by M. Phelps Datum MSL
Surface Elevation 5.8 ft.
Northing 2056895.6 Easting 6089063.2

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log	
						105			
					8	110			@ 109 ft.: Change to medium stiff to stiff @ 112.5 ft.: Shells observed in cuttings
					10	115			GRAY CLAYEY SAND WITH SHELLS (SC) Loose to medium dense, wet, <40% fines @ 117 ft.: Harder
					47	120			OLIVE GRAY FAT CLAY (CH) Hard, wet, high plasticity Bottom of boring at 120 ft. Tremie grouted with cement grout.

GEOTECH_BORING_NEW_HARDINGESE 53483.GPJ GEOTECH.GDT 8/16/01

Harding ESE
A MACTEC COMPANY

Log of Boring 103
City Water Treatment Area (Salem Property)
Russell City Energy Center
Hayward, California

PLATE
B-103

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 6/4/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by M. Phelps Datum MSL
Surface Elevation 6.6 ft.
Northing 2056699.5 Easting 6089495.6

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log	
						0			BLACK SANDY CLAY (CL) (1N/) Stiff, moist, organics
Switched to rotary wash method after taking the first 2 samples. No groundwater level reading was taken.					12				
					11				
					11				OLIVE GRAY FAT CLAY WITH SAND (CH) (5Y 4/1) Stiff, wet
					9	5			
									GRAY BLACK CLAY (CH) Very stiff, wet, high plasticity
UC=372 -200=85%	26.0	97.7	1.33		160 psi				
					10				@ 9 ft.: Color change to OLIVE GRAY (5Y 4/1)
					7	10			@ 10 ft.: Color change to GRAY BROWN, soft
					3				@ 12 ft.: Change to very soft
UC=872 -200=68%	21.8	103.4	0.33		80 psi				BROWN SANDY LEAN CLAY (CL)) (5YR 3/2) Very soft, wet
					16	15			@ 16 ft.: Change to GRAYISH BROWN CLAY (CL) (5YR 3/2), very stiff, moderate to high plasticity
					7				@ 19 ft.: Change to soft
						20			
					10				@ 24 ft.: Change to stiff, some cemented intervals
						25			
					14				@ 29 ft.: Change to moderate plasticity, black and white streaks
						30			@ 30 ft.: Change to moderate to high plasticity
					11	35			

GEOTECH_BORING_NEW_HARDINGESE 53483.GPJ GEOTECH.GDT 8/16/01

Harding ESE
A MACTEC COMPANY

Log of Boring 104
Combustion Turbine-West Unit (Salem Property)
Russell City Energy Center
Hayward, California

PLATE
B-104

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log
						35		
					30	40		
					8	45		
					14	50		
					10	55		
					11	60		
					17	65		
					15	70		

Date 6/4/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. **Drop** 30 in.
Logged by M. Phelps **Datum** MSL
Surface Elevation 6.6 ft.
Northing 2056699.5 **Easting** 6089495.6

@ 36.5 ft.: Enountered sand

@ 37.5 ft.: Mixture of sand and gravel, gravel less than 1/2 in. diameter

BROWN WELL GRADED SAND WITH SILT (SP-SM) Medium dense to dense, wet, 75% sand, 25% gravel to 3/8 in. diameter

@ 40.5 - 42 ft.: Interbedded sands becoming clays with 4-6 in. lenses

OLIVE GRAY CLAY (CL) (5Y 4/1) Medium stiff to stiff, wet, high plasticity

@ 49 ft.: Change to stiff

@ 51 - 54 ft.: Interbedded sand and clay lenses

OLIVE GRAY CLAYEY SAND (SC) (5Y 4/1) Loose to medium dense, wet, <30% fines

OLIVE GRAY CLAY (CL) (5Y 4/1) Stiff, wet, moderate to high plasticity

@ 64 ft.: Change to very stiff

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Harding ESE
A MACTEC COMPANY

Log of Boring 104
Combustion Turbine-West Unit (Salem Property)
Russell City Energy Center
Hayward, California

PLATE
B-104

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 6/4/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by M. Phelps Datum MSL
Surface Elevation 6.6 ft.
Northing 2056699.5 Easting 6089495.6

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log	
						70			@ 69 ft.: Change to stiff to very stiff, trace sand, moderate plasticity
					20	75			No recovery
					20	80			@ 79 ft.: Change to very stiff, high plasticity
					19	85			
					17	90			OLIVE GRAY SANDY LEAN CLAY (CL) (5Y 4/1) Medium dense, wet, low plasticity @ 89 - 98 ft.: Alternating layers of sandy silty and silty sand
					18	95			OLIVE GRAY SANDY SILT (ML) Hard, wet, low plasticity
					23	100			OLIVE GRAY FAT CLAY (CH) Hard, wet, moderate to high plasticity
					15	105			DARK GREENISH GRAY CLAY (CH) (5GY 4/1) Firm to hard, wet, moderate plasticity, 40%

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Log of Boring 104
Combustion Turbine-West Unit (Salem Property)
Russell City Energy Center
Hayward, California

PLATE **B-104**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 6/4/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by M. Phelps Datum MSL
Surface Elevation 6.6 ft.
Northing 2056699.5 Easting 6089495.6

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log
						105		
shells, 60% fines DARK GREENISH GRAY FAT CLAY (CH) 5GY 4/1) Firm, wet, high plasticity					9	110		
SS-27 advanced 12 in. by weight of hammer and rods			2.0		7	115		
@ 114 ft.: Color change to MEDIUM DARK GRAY (N3), soft @ 116 ft.: Change to firm								
UC=1429 -200=88%	32.6	88.9	1.75		60-120 psi			
SS-28 advanced 6 in. by weight of hammer and rods					20	120		
@ 121.5 ft.: Getting harder @ 124 - 126 ft.: Easier drilling						125		
@ 126 ft.: Harder drilling								
BROWN SILTY CLAY WITH SAND (CL) Hard, wet, trace sand					16	130		
						135		
					19	140		

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Log of Boring 104
Combustion Turbine-West Unit (Salem Property)
Russell City Energy Center
Hayward, California

PLATE
B-104

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 6/4/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by M. Phelps Datum MSL
Surface Elevation 6.6 ft.
Northing 2056699.5 Easting 6089495.6

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log	
						140			@ 139 ft.: Color change to OLIVE GRAY (5Y 4/1) with red brown oxidation
						145			DARK GRAY SANDY SILT (ML) (N3) Very hard, wet
					53	150			DARK GRAY SILT (SP-SM) Very dense, wet
									@ 152 - 154 ft.: Encountered sandy layer
						155			
					34	160			MEDIUM DARK GRAY FAT CLAY (CH) (4/ N4) Very hard, wet, high plasticity
									Bottom of boring at 160 ft.

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Log of Boring 104
Combustion Turbine-West Unit (Salem Property)
Russell City Energy Center
Hayward, California

PLATE
B-104

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 5/29/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by F. Drewes Datum MSL
Surface Elevation 9.8 ft.
Northing 2056959 Easting 6089812

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log	
					17/3"	0			ASPHALT OLIVE BROWN SANDY CLAY (CH) (2.5Y 4/4) Stiff, dry, 30% fine sand, (FILL)
Boring was located to the north of the proposed warehouse/ maintenance shop because of existing structures.					34				
					9				BLACK CLAY (CH) (2.5/1) Stiff, moist, high plasticity
					14	5			@ 5 ft.: Organics present
					12				@ 6.5 ft.: Color change to DARK OLIVE GRAY (5Y 3/2), mottled
					12				
Cored 3 in. of gravel/ asphalt before taking first sample.					12				
					8	10			
									BLACK LEAN CLAY WITH SAND (CL)
UC=2455 -200=77% Consol (see Appendix)	18.6	111.1	4.5						
Add bentonite, conductor casing set @ 14 ft. Shelby tube sample #9 was wet. Water started running up the borehole after the sample was retrieved. Groundwater measured at a depth of 8 ft. before switching to wash method. Groundwater at 7 ft. before start of work on 5/30/2001.	18.6	102.0			12				OLIVE BROWN CLAYEY SILT (ML) (2.5Y 4/4) Stiff, wet, 30% fines
						15			OLIVE BROWN SILTY CLAY (CL) (2.5Y 4/4) Stiff, wet, 20% fines
					14				
						20			
Consol (see Appendix) UC=1354 -200=61%	23.4		0.75			25			
					12				@ 27 ft.: Color change to LIGHT OLIVE BROWN (2.5Y 5/4)
					15	30			
					15	35			

GEOTECH_BORING_NEW_HARDINGESE 53483.GPJ GEOTECH.GDT 8/16/01

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Log of Boring 105
Warehouse/Maintenance Shop (Runnels Property)
Russell City Energy Center
Hayward, California

PLATE
B-105

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483.003		8/01	

Date 5/29/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by F. Drewes Datum MSL
Surface Elevation 9.8 ft.
Northing 2056959 Easting 6089812

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log	
						35			@ 34.5 ft.: Increasing silt
					10	40			@ 39.5 ft.: Decreasing silt
			2.5		200 psi	45			BROWN FAT CLAY (CH)
					16				@ 47 ft.: Change to very stiff
					11				@ 48 ft.: Fine sand present
						50			
					23				@ 54.5 ft.: Increasing silt, fine sand present
						55			
					17	60			LIGHT OLIVE BROWN CLAYEY SILT (ML) (2.5Y 5/4) Very stiff, moist, moderate plasticity, 30% fines
					16	65			LIGHT OLIVE BROWN SILTY SAND (SM) Medium dense, wet, fine sand, 30% fines LIGHT OLIVE BROWN SANDY SILT (ML) (2.5Y 5/4) Stiff, wet, moderate to low plasticity, 30% fine sand
					17	70			LIGHT OLIVE BROWN SILTY CLAY (CL) (2.5Y 5/4) Very stiff, moist, moderate to high plasticity, 20% fines

GEOTECH_BORING_NEW_HARDINGESE 53483.GPJ GEOTECH.GDT 8/16/01

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Log of Boring 105
Warehouse/Maintenance Shop (Runnels Property)
Russell City Energy Center
Hayward, California

PLATE
B-105

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 5/29/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by F. Drewes Datum MSL
Surface Elevation 9.8 ft.
Northing 2056959 Easting 6089812

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log
						70		
			2.25		180 psi	75		
					24			
					19	80		
					24	85		
					17	90		
					17	95		
					16	100		
					15	105		

DARK OLIVE GRAY CLAY (CH) (5Y 3/2) Very stiff, wet, high plasticity

DARK OLIVE GRAY SILTY CLAY (CL) (5Y 3/2) Stiff, wet, moderate plasticity, 20% fines

DARK OLIVE GRAY CLAYEY SAND (SC) (5Y 3/2) Medium dense, wet, fine-grained, 30% fines

DARK OLIVE GRAY SILTY CLAY (CL) (5Y 3/2) Very stiff, wet, moderate to high plasticity

@ 94 ft.: Increasing silt

GEOTECH_BORING_NEW_HARDINGESE 53483.GPJ GEOTECH.GDT 8/16/01

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Log of Boring 105
Warehouse/Maintenance Shop (Runnels Property)
Russell City Energy Center
Hayward, California

PLATE
B-105

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 5/29/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by F. Drewes Datum MSL
Surface Elevation 9.8 ft.
Northing 2056959 Easting 6089812

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log
						105		
					11	110		
* One blow drove the split spoon 15" then 3 blows drove the split spoon 3"					"1/15" "3/3"	115		
			1.75		200 psi	120		

@ 104.5 ft.: Decreasing silt

@ 110 ft.: Color change to GREENISH GRAY (5G 5/1)

@ 113 ft.: Sand present

GREENISH GRAY FAT CLAY (CH) (5G 5/1)

@ 115 ft.: Very soft

GREENISH GRAY FAT CLAY (CH) (5G 5/1)

@ 120 ft.: Increasing fine sand
Color change to DARK GREENISH GRAY (5G 4/1)

Bottom of boring at 121 ft.
Tremie grouted with cement grout.

GEOTECH_BORING_NEW_HARDINGESE_53483.GPJ GEOTECH.GDT 8/16/01

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Log of Boring 105
Warehouse/Maintenance Shop (Runnels Property)
Russell City Energy Center
Hayward, California

PLATE
B-105

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 6/8/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by M. Phelps Datum MSL
Surface Elevation 5.02 ft.
Northing 2056602.7 Easting 6089113.8

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log	
						0			BLACK SILTY CLAY (CL) (N1) Stiff to very stiff, dry (TOPSOIL)
Switched to rotary wash method using 4-7/8 in. drag bit at 4 ft. Did not measure water level.					17				
					13				@ 1.5-3.0 ft.: No sample recovery
					11				OLIVE GRAY FAT CLAY (CH) (5Y 4/1) Stiff, moist, high plasticity
					9	5			
					11				@ 6.5 ft.: Change to wet
					10				@ 8 ft.: Change color to OLIVE BROWN (5Y 4/4)
					9				BROWN SANDY LEAN CLAY (CL) (10YR 4/2) Stiff, wet, moderate plasticity
					4	10			
UC=657 -200=62%	22.2	101.7	1.5		180 psi				
					22	15			LIGHT BROWN CLAYEY SILT (ML) Very stiff, dry to moist, low plasticity, silt exhibits a blocky texture
					11	20			BROWN SILTY CLAY (CL) Stiff, wet, moderate plasticity
					17	25			GRAY BROWN SILTY FAT CLAY (CH) Very stiff, wet, high plasticity
					18	30			@ 29.5 ft.: Color change to BROWN, increase in sand
									@ 32.5 ft.: More sand
					10	35			BROWN SILTY CLAY WITH SAND (CL) Stiff, wet, low to moderate plasticity

GEOTECH_BORING_NEW_HARDINGESE 53483.GPJ GEOTECH.GDT 8/16/01

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Log of Boring 106

Russell City Energy Center
Hayward, California

PLATE
B-106

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 6/8/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by M. Phelps Datum MSL
Surface Elevation 5.02 ft.
Northing 2056602.7 Easting 6089113.8

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log	
						35			
					8	40			OLIVE GRAY CLAYEY SILT WITH SAND (ML) Medium stiff to stiff, wet,
Slower, harder drilling					15	45			OLIVE GRAY CLAY (CL) Stiff to very stiff, wet, moderate plasticity
					12	50			@ 49 ft.: Color change to OLIVE BROWN, hard, cemented nodules < 3/8 in. diameter @ 51.5 - 52 ft.: Sandy interval
					17	55			BROWN TO GRAY MOTTLED LEAN CLAY WITH SAND (CL) Very stiff, wet, cemented nodules < 1/4 in. diameter
					13	60			MOTTLED BROWN AND GRAY FAT CLAY (CH) Stiff, wet, blocky - fissured
					15	65			OLIVE GRAY SILT WITH SAND (ML) Stiff to very stiff, wet
					17	70			OLIVE GRAY FAT CLAY (CH) Very stiff, wet, high plasticity

GEOTECH_BORING_NEW_HARDINGESE 53483.GPJ GEOTECH.GDT 8/16/01

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Log of Boring 106

Russell City Energy Center
Hayward, California

PLATE
B-106

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 6/8/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by M. Phelps Datum MSL
Surface Elevation 5.02 ft.
Northing 2056602.7 Easting 6089113.8

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log	
						70			
					14	75			OLIVE GRAY SILTY CLAY WITH SAND (CL) Stiff, wet, low to moderate plasticity
					13	80			
					20	85			OLIVE GRAY SILTY FAT CLAY (CH) Very stiff, wet, high plasticity
					18	90			
					24	95			@ 94 ft.: Color change to OLIVE BROWN
					18	100			@ 98.5 ft.: Color change to OLIVE GRAY Bottom of boring at 100 ft. Tremie grouted with cement grout.

GEOTECH_BORING_NEW_HARDINGESE 53483.GPJ GEOTECH.GDT 8/16/01

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Log of Boring 106

Russell City Energy Center
Hayward, California

PLATE
B-106

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 6/1/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by M. Phelps Datum MSL
Surface Elevation 5.9 ft.
Northing 2056528.1 Easting 6089280.2

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log	
						0			TOP SOIL SAND BLACK FAT CLAY (CH) (2.5/1) Stiff, dry, roots
Switched to wash method after taking the first 2 samples. No drilling mud (bentonite or synthetic) was used in the upper 34 ft.					10 10 9				DARK GRAYISH BROWN CLAY WITH SAND (CH) (2.5Y 4/2) Stiff, wet, moderate to high plasticity, 15% fine to medium sand
Consol (see Appendix) UC=1006 -200=84%	26.3 26.3	99.3 97.0	1.75		160 psi 14 9	5			DARK GRAYISH BROWN CLAY (CH) 2.5Y 4/2) Stiff, wet, high plasticity
Driller reported water loss in the upper 8 ft. during drilling to 32.5 ft. No recovery from 11.5 - 14 ft.					5	10			@ 10 ft.: Change to medium stiff DARK GRAYISH BROWN LEAN CLAY (CL)
Consol (see Appendix) UC=1194 -200=90%	25.2	102.3	1.0		220 psi	15			
No recovery from 15.5 - 16.5 ft. OW-107 was installed to 32 ft., and the borehole was relocated 5 ft. to the south to continue sampling below 34 ft. Refer to OW-107 for well installation log.	24.7	101.5			10 7	20			DARK GRAYISH BROWN SILTY CLAY (CL) (2.5Y 4/2) Stiff, wet, moderate to high plasticity, 30% fines @ 19.5 ft.: Color change to OLIVE BROWN (2.5Y 4/3), fine to medium sand
					11	25			
					15	30			
					15	35			@ 33.5 ft.: Increasing silt

GEOTECH_BORING_NEW_HARDINGESE 53483.GPJ GEOTECH.GDT 8/16/01

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Log of Boring 107
Cooling Tower Forebay (Salem Property)
Russell City Energy Center
Hayward, California

PLATE
B-107

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 6/1/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by M. Phelps Datum MSL
Surface Elevation 5.9 ft.
Northing 2056528.1 Easting 6089280.2

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log
						35		
					7	40		
					15	45		
					9	50		
					20	55		
					11	60		
					13	65		
					13	70		

OLIVE GRAY SANDY LEAN CLAY (CL) (5Y 4/2) Medium stiff, wet, 50% fine sand, moderate plasticity

OLIVE GRAY CLAY (CH) (5Y 4/2) Stiff, wet, high plasticity

OLIVE GRAY SILTY CLAY (CL) (5Y 4/2) Stiff, wet, 30% fines, moderate to high plasticity

@ 55-56 ft.: Gravel present, very stiff

DARK GRAY CLAY (CH) (2.5Y 4/1) Stiff, wet, high plasticity

DARK GRAY SILTY CLAY (CL) (5Y 4/2) Stiff, wet, 30% fines, moderate to high plasticity

Drill rate increases between 65.5 to 67.0 ft.

GEOTECH_BORING_NEW_HARDINGESE 53483.GPJ GEOTECH.GDT 8/16/01

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Log of Boring 107
Cooling Tower Forebay (Salem Property)
Russell City Energy Center
Hayward, California

PLATE
B-107

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 6/1/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by M. Phelps Datum MSL
Surface Elevation 5.9 ft.
Northing 2056528.1 Easting 6089280.2

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log
						70		
					19	75		
					24	80		
					21	85		
					21	90		
					20	95		
					22	100		

@ 74 ft.: Color change to OLIVE GRAY (5Y 4/2), very stiff, low to moderate plasticity

GRAYISH BROWN SANDY SILT (ML) (5Y4 3/2) Medium dense, wet, 40-50% fines, very fine sand, low plasticity

OLIVE GRAY FAT CLAY (CH) (5Y 4/1) Very stiff, wet, high plasticity

OLIVE GRAY SILTY SANDY CLAY (CL) (5Y 4/1) Very stiff, wet, moderate plasticity

DARK GREENISH GRAY FAT CLAY (CH) (5GY 4/1) Very stiff, wet, high plasticity

Bottom of boring at 100 ft.
Tremie grouted with cement grout.

GEOTECH_BORING_NEW_HARDINGESE 53483.GPJ GEOTECH.GDT 8/16/01

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Log of Boring 107
Cooling Tower Forebay (Salem Property)
Russell City Energy Center
Hayward, California

PLATE
B-107

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 6/11/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by M. Phelps Datum MSL
Surface Elevation 7.0 ft.
Northing 2056506.9 Easting 6089495.6

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log	
					6	0			BLACK SAND (SP) Loose, dry, roots (TOPSOIL)
Switch to rotary wash method using 4-5/8 in. drag bit at –4 ft. Did not observe water in boring.					17				BLACK CLAY (CL) Very stiff, moist
					12				BLACK FAT CLAY (CH) Stiff, moist, organics, fine, rootlets
					12	5			@ 5 ft.: Color change to OLIVE BROWN, wet
					8				@ 6.5-7.0 ft.: BROWN SILTY CLAY (CL) Medium stiff
					10				OLIVE GRAY FAT CLAY (CH) Stiff, wet, mottled
					10	10			
UC=1064 -200=81%	26.9	95.6	1.3		80-100 psi				@ 11 ft.: Color change to OLIVE BROWN
					10				@ 14 ft.: Color change to GRAY BROWN
						15			
					9				@ 19 ft.: Color change to BROWN SILTY FAT CLAY (CH), high plasticity
						20			
					9				
						25			
					15				@ 29 ft.: Change to stiff to very stiff, slightly porous and minor organics
						30			
					17				
						35			

GEOTECH_BORING_NEW_HARDINGESE 53483.GPJ GEOTECH.GDT 8/16/01

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Log of Boring 108
West HSRG (Salem Property)
Russell City Energy Center
Hayward, California

PLATE
B-108

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 6/11/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by M. Phelps Datum MSL
Surface Elevation 7.0 ft.
Northing 2056506.9 Easting 6089495.6

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log	
Easier drilling						35			@ 34 ft.: Color change to OLIVE BROWN AND GRAY MOTTLED FAT CLAY (CH) Very stiff
					10	40			OLIVE BROWN SILTY CLAY WITH SAND (CL) Stiff, wet, moderate plasticity
					20	45			OLIVE GRAY FAT CLAY (CH) Very stiff, wet
					25	50			@ 49 ft.: Iron oxide staining
Faster drilling									BROWN CLAYEY SAND (SC))
Split Sample					15	55			BROWN SILTY CLAYEY SAND (SC-SM) Medium dense, wet, > 65% sand, some interbedded silty sand and clays from 51.5 - 57 ft.
					16	60			OLIVE GRAY FAT CLAY (CH) Very stiff, wet, high plasticity
					20	65			OLIVE GRAY CLAYEY SILT (ML) Very stiff, trace sand
					13	70			OLIVE GRAY SILTY FAT CLAY (CH) Stiff, wet, fisures - blocky texture

GEOTECH_BORING_NEW_HARDINGESE 53483.GPJ GEOTECH.GDT 8/16/01

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Log of Boring 108
West HSRG (Salem Property)
Russell City Energy Center
Hayward, California

PLATE
B-108

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 6/11/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by M. Phelps Datum MSL
Surface Elevation 7.0 ft.
Northing 2056506.9 Easting 6089495.6

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log
						70		
					18	75		
					24	80		
					18	85		
					19	90		
					17	95		
					21	100		

@ 74 ft.: Change to very stiff

OLIVE GRAY BROWN SILTY CLAY (CL) Very stiff, wet

@ 84-84.5 ft.: Lens of OLIVE GRAY BROWN SANDY SILT (ML) Medium dense, wet, > 60% sand

OLIVE GRAY BROWN SILTY CLAY (CL)

OLIVE GRAY FAT CLAY (CH) Very stiff, wet, high plasticity

@ 94 ft.: Mottled OLIVE BROWN GRAY

@ 99 ft.: Color change to OLIVE GRAY

Bottom of boring at 100 ft.
Tremie grouted with cement grout.

GEOTECH_BORING_NEW_HARDINGESE 53483.GPJ GEOTECH.GDT 8/16/01

Harding ESE
A MACTEC COMPANY

Log of Boring 108
West HSRG (Salem Property)
Russell City Energy Center
Hayward, California

PLATE
B-108

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 5/30/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by F. Drewes Datum MSL
Surface Elevation 8.7 ft.
Northing 2056457.7 Easting 6089771.7

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Graphic Log
Borehole was relocated about 1 ft. to the south because of obstruction (scrap metal?) at a depth of about 6 in.					28	0	DARK GRAYISH BROWN SANDY SILT WITH SAND AND GRAVEL (ML) Stiff, 30% fine to medium sand (FILL)
					12		
					8		BLACK FAT CLAY (CH) (2.5/1) Stiff, moist, high plasticity, roots, mottled
					11	5	
					12		▽ DARK OLIVE (5Y 3/2)
UC=1686 -200=85%	23.6	101.4	2.5		200 psi		
					14	10	@ 10 ft.: Set conductor casing and begin rotary wash
					10		▽ DARK OLIVE LEAN CLAY WITH SAND (CL) (5Y 3/2) Stiff, wet, moderate to high plasticity, 30% fines
Shelby tube sample was wet. Water started running up the borehole after sample was retrieved. UC=695 -200=78% Groundwater measured at a depth of 7 ft. before switching to wash method.	22.9	104.1	3.25		100 psi		Add gel-x drilling mud
					33	15	@ 16.5 ft.: Change to LIGHT OLIVE BROWN (2.5Y 5/4), increasing silt, hard
					10		
						20	@ 20 ft.: Stiff
							BROWN SILTY SAND (SM) Soft, with fine to coarse sand
UC=391 -200=12% Rig had electrical/ mechanical problems and was replaced by another truck-mounted Failing F-1500 rig at the start of work on 5/31/2001.	19.1	110.2	4.0		180 psi	25	
					32		@ 27.5 ft.: Very stiff, coarse sand present
					19	30	
							@ 32 ft.: Gravel present
					22	35	

GEOTECH_BORING_NEW_HARDINGESE 53483.GPJ GEOTECH.GDT 8/16/01

Harding ESE
A MACTEC COMPANY

Log of Boring 109

Russell City Energy Center
Hayward, California

PLATE
B-109

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 5/30/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by F. Drewes Datum MSL
Surface Elevation 8.7 ft.
Northing 2056457.7 Easting 6089771.7

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log
						35		
					16	40		
					14	45		
UC=2274 -200=97%	27.9	95.4	1.25		180 psi	50		
					15			
					27	55		
					24	60		
					16	65		
					20	70		

@ 40 ft.: Gray mottling

@ 45 ft.: Color change to DARK GRAYISH BROWN (2.5Y 4/2)

@ 48.5 ft.: High plasticity (CH)

@ 52.5 ft.: Decreasing silt, increasing plasticity

DARK GRAYISH BROWN CLAYEY SILT (ML) (2.5Y 4/2) Stiff, moist, moderate to low plasticity, 30% fines

@ 60 ft.: Sand lenses present.

DARK GRAY SILTY CLAY (CH) (2.5Y 4/1) Stiff, moist, high plasticity, 20% fines

DARK GRAY SILTY CLAY (CL) (2.5Y 4/1) Stiff, moist, moderate to high plasticity, 30% fines

GEOTECH_BORING_NEW_HARDINGESE 53483.GPJ GEOTECH.GDT 8/16/01

Harding ESE
A MACTEC COMPANY

Log of Boring 109

Russell City Energy Center
Hayward, California

PLATE
B-109

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Date 5/30/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler SPT, Shelby
Hammer Weight 140 lb. Drop 30 in.
Logged by F. Drewes Datum MSL
Surface Elevation 8.7 ft.
Northing 2056457.7 Easting 6089771.7

Other Tests/Drilling Notes	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf)	Torvane (Tsf)	Blows per Foot	Depth (ft.)	Sampler Type	Graphic Log
						70		
					18	75		
					21	80		
					15	85		
					24	90		
					17	95		
					27	100		

@ 73.5 ft.: Change to DARK OLIVE GRAY (5Y 3/2), increasing plasticity

OLIVE BROWN CLAYEY SILT WITH FINE SAND (ML) (2.5Y 4/4) Very stiff, moderate to low plasticity, 20% fines, 15% fine sand

OLIVE GRAY FAT CLAY (CH) (5Y 4/2) Very stiff, moist, high plasticity, 20% fines

Bottom of boring at 100 ft.
Tremie grouted with cement grout.

GEOTECH_BORING_NEW_HARDINGESE 53483.GPJ GEOTECH.GDT 8/16/01

Harding ESE
A MACTEC COMPANY

Log of Boring 109

Russell City Energy Center
Hayward, California

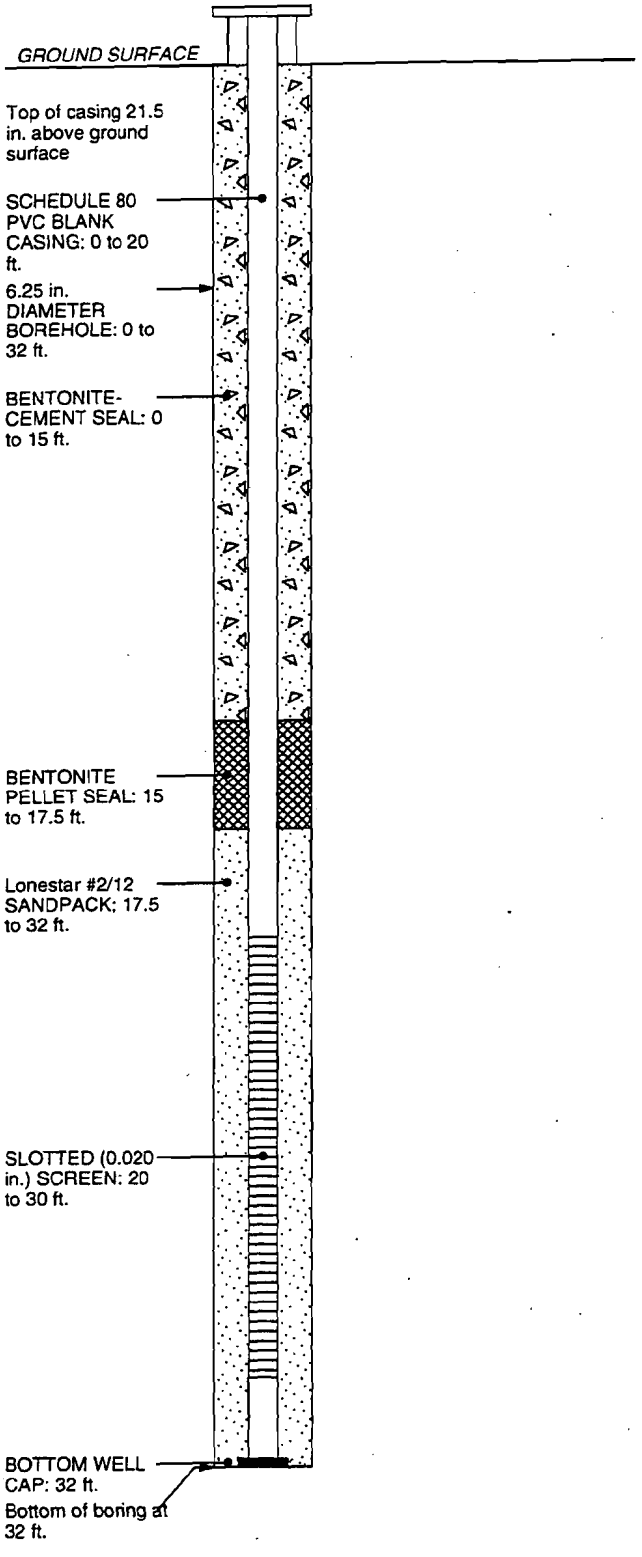
PLATE
B-109

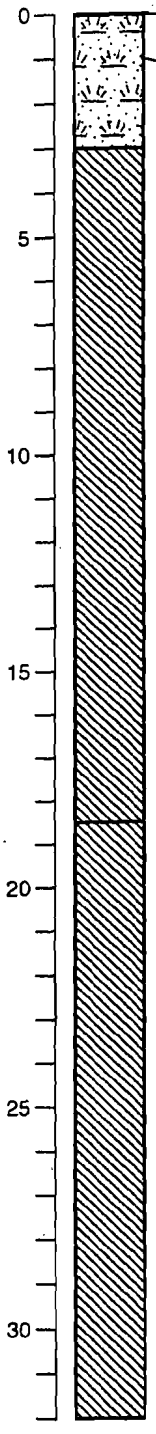
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Appendix 10G

Attachment 10G-2 - Ground Water Observation Well Log

Date 6/1/01
Equipment Failing F1500
Drilling Method mud rotary
Sampler
Hammer Weight 140 lb. Drop 30 in.
Logged by J. Clemente Datum MSL
Surface Elevation 5.9 ft.
Northing 2056523.1 Easting 6089280.2





TOPSOIL and gray fine sand to 6 in.
Black clay with roots below 6 in.
No drilling mud was used in the borehole.
Driller reported water loss in the upper 8 ft.

DARK GRAYISH BROWN SANDY CLAY, some roots

No roots below 4.5 ft.

@ 8.5-10 ft.: Gray/brown mottling

@ 10-11.5 ft.: Sandy

OLIVE BROWN SILTY CLAY (CL), with fine sand

@ 28.5-30 ft.: Little sand

Bottom of boring at 32 ft.
See B-107 for sampling information.
Bailed water to 18 ft. BGS after installing well. Water rose to 5 ft. BGS in 10 min.
See Table 2 for water level data.

BORING_WELL2_HARDINGESE 53483.GPJ GEOL.GDT 8/16/01

Harding ESE
A MACTEC COMPANY

Well Construction Details and Log of Boring 107B
Cooling Tower Forebay (Salem Property)
Russell City Energy Center
Hayward, California

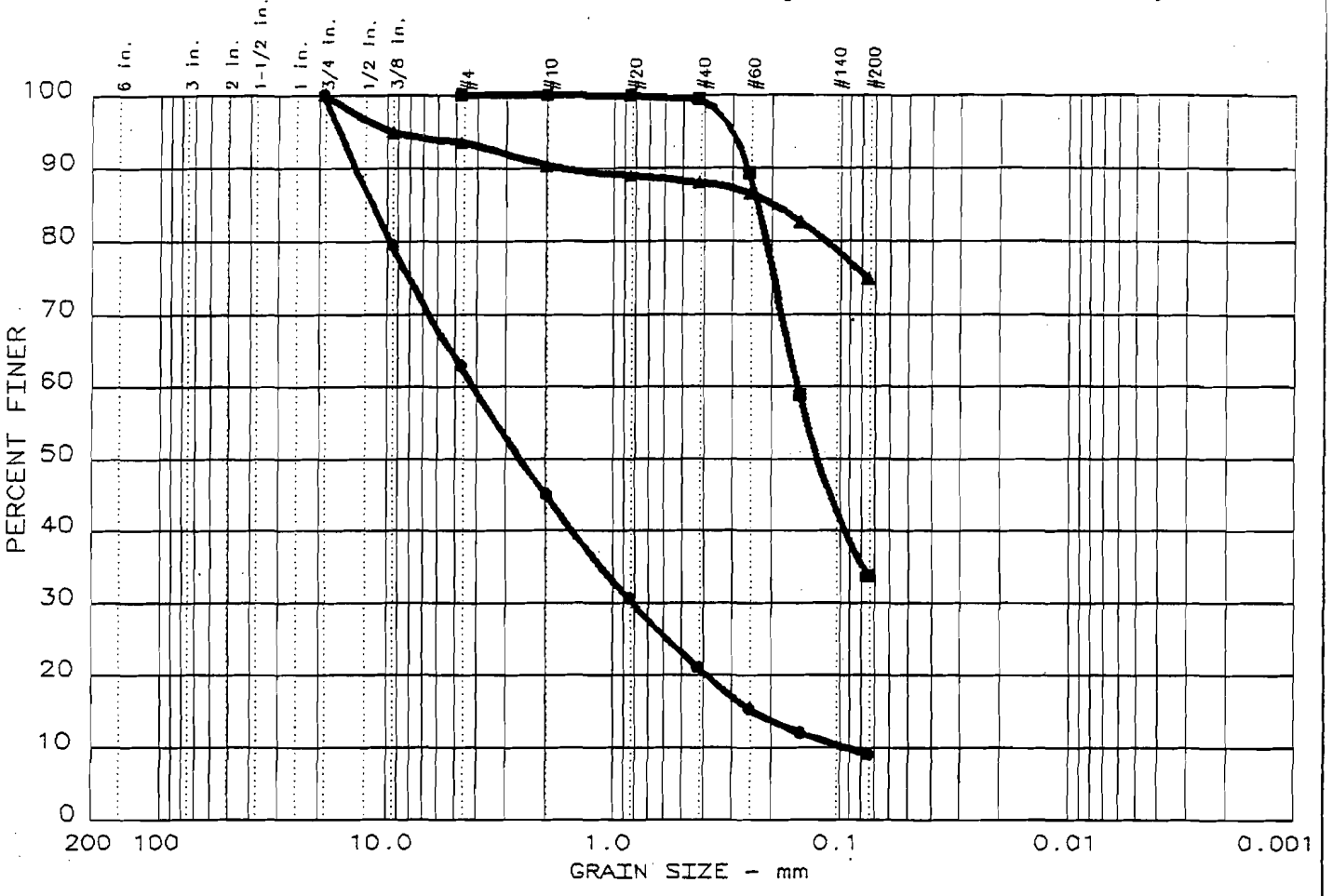
PLATE
OW-107

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	53483 003		8/01	

Appendix 10G

Attachment 10G-3 - Laboratory Test Results

PARTICLE SIZE ANALYSIS (ASTM D 422-63)



	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	37.1	53.8	9.1		SW-SM		
▲	0.0	6.6	18.5	74.9		CL		
■	0.0	0.0	66.2	33.8		SM		

SIEVE inches size	PERCENT FINER ●	▲	■
0.75	100.0	100.0	
0.375	79.5	94.9	
	GRAIN SIZE		
D_{60}	4.16		0.15
D_{30}	0.81		
D_{10}	0.09		
	COEFFICIENTS		
C_c	1.68		
C_u	44.2		

SIEVE number size	PERCENT FINER ●	▲	■
4	62.9	93.4	100.0
10	45.0	90.3	100.0
20	30.6	88.8	99.8
40	21.0	87.9	99.4
60	15.3	86.5	89.3
100	12.0	82.5	58.8
200	9.1	74.9	33.8

Sample information:

● B-101 15.2-16.1'
Dk. brn. f-c SAND w/gravel

▲ B-101 29.0-30.0'
Brown silty CLAY with c-caliche inclusions.

■ B-101 49.0-50.0'
Gray silty f-SAND.

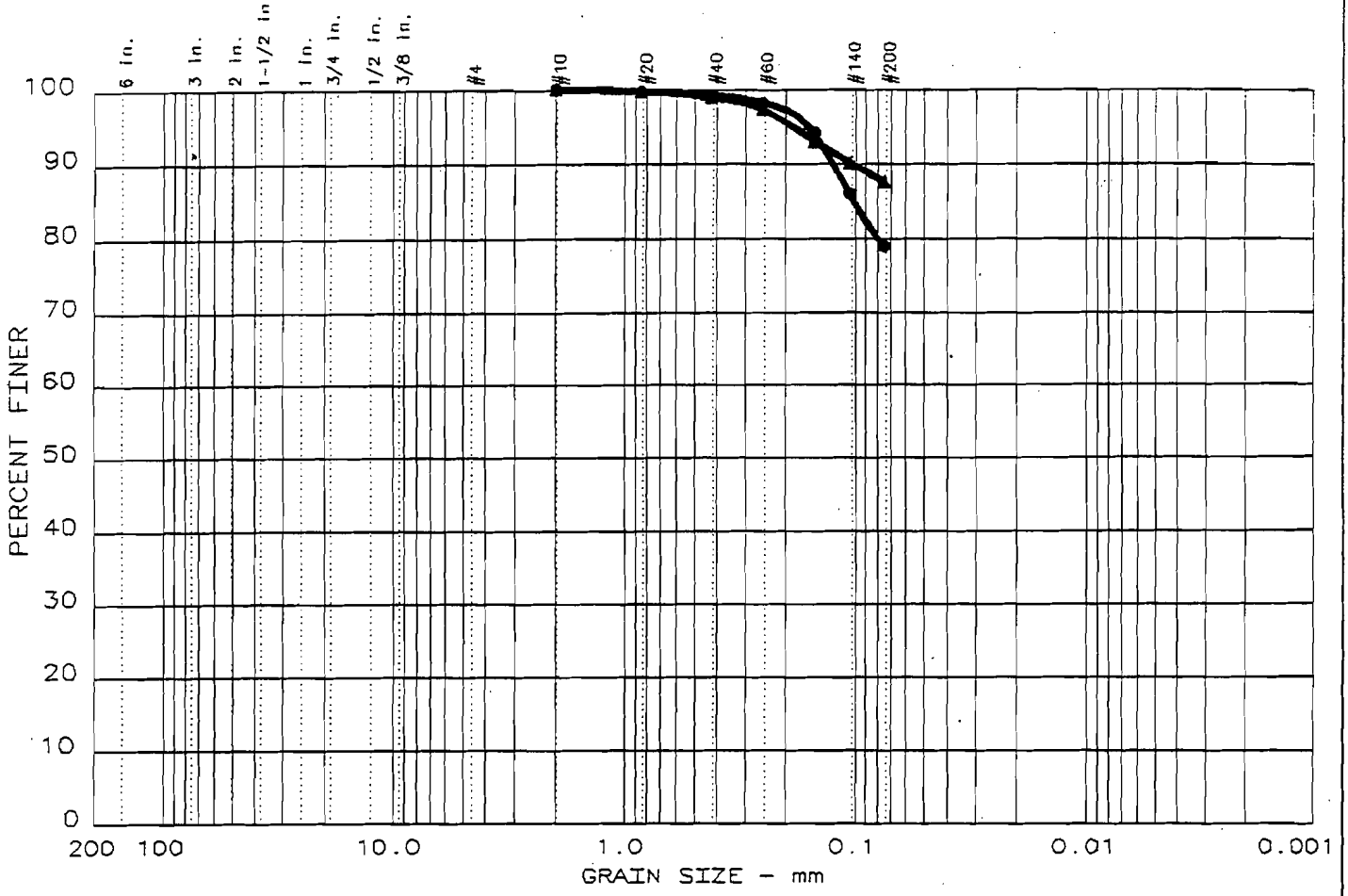
Remarks:

Soil Mechanics Lab

Project No.: 53483
Project: Russell City Energy Center

Date: 6-29-01 Data Sheet No. ——

PARTICLE SIZE ANALYSIS (ASTM D 422-63)



	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	0.0	21.1	78.9		CL		
▲	0.0	0.0	12.4	87.6		ML		

SIEVE inches size	PERCENT FINER ●	▲
	GRAIN SIZE	
D_{60}		
D_{30}		
D_{10}		
	COEFFICIENTS	
C_c		
C_u		

SIEVE number size	PERCENT FINER ●	▲
10	100.0	100.0
20	99.8	99.7
40	99.3	98.9
60	98.1	97.2
100	94.0	92.9
140	86.0	90.1
200	78.9	87.6

Sample information:

● B-102 12-13'
Dk.brn. sandy CLAY.

▲ B-102 59-60'
Dk.gray clayey SILT.

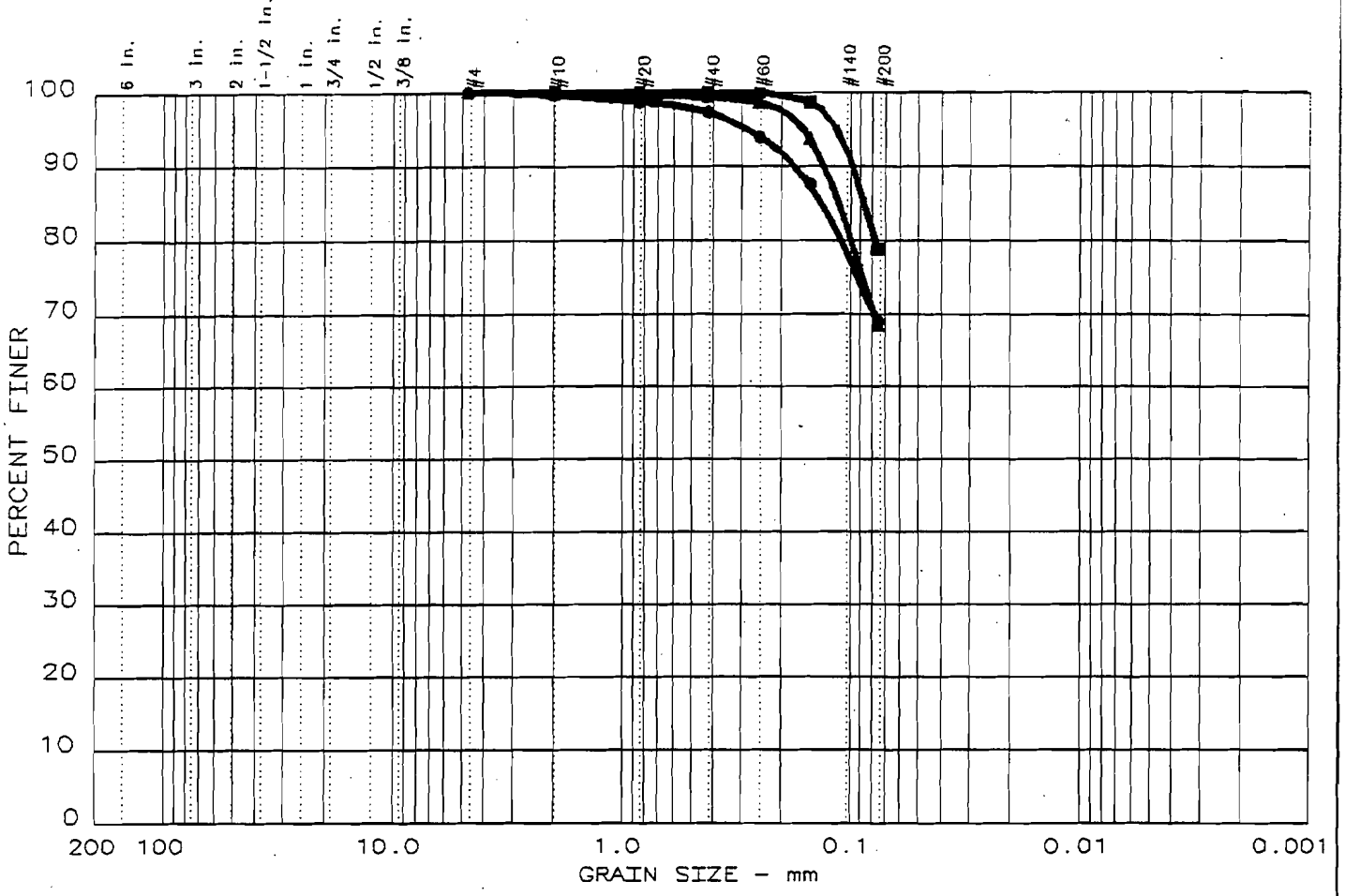
Remarks:

Soil Mechanics Lab

Project No.: 53483
Project: Russell City Energy Center

Date: 6-27-01 Data Sheet No. ____

PARTICLE SIZE ANALYSIS (ASTM D 422-63)



	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	0.0	31.1	68.9		CL		
▲	0.0	0.0	31.7	68.3		ML		
■	0.0	0.0	21.3	78.7		ML		

SIEVE inches size	PERCENT FINER ●	▲	■
	GRAIN SIZE		
D_{60} D_{30} D_{10}			
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ●	▲	■
4	100.0	100.0	
10	99.6	99.9	100.0
20	98.6	99.5	99.9
40	97.3	99.3	99.9
60	93.9	98.5	99.8
100	87.4	93.7	98.5
200	68.9	68.3	78.7

Sample information:

● B-103 15.0-16.0'
Olive brn. sandy CLAY w/caliche

▲ B-103 54.0-55.0'
Olive brn. sandy SILT w/caliche

■ B-103 64.0-65.0'
Olive brn. sandy SILT w/caliche

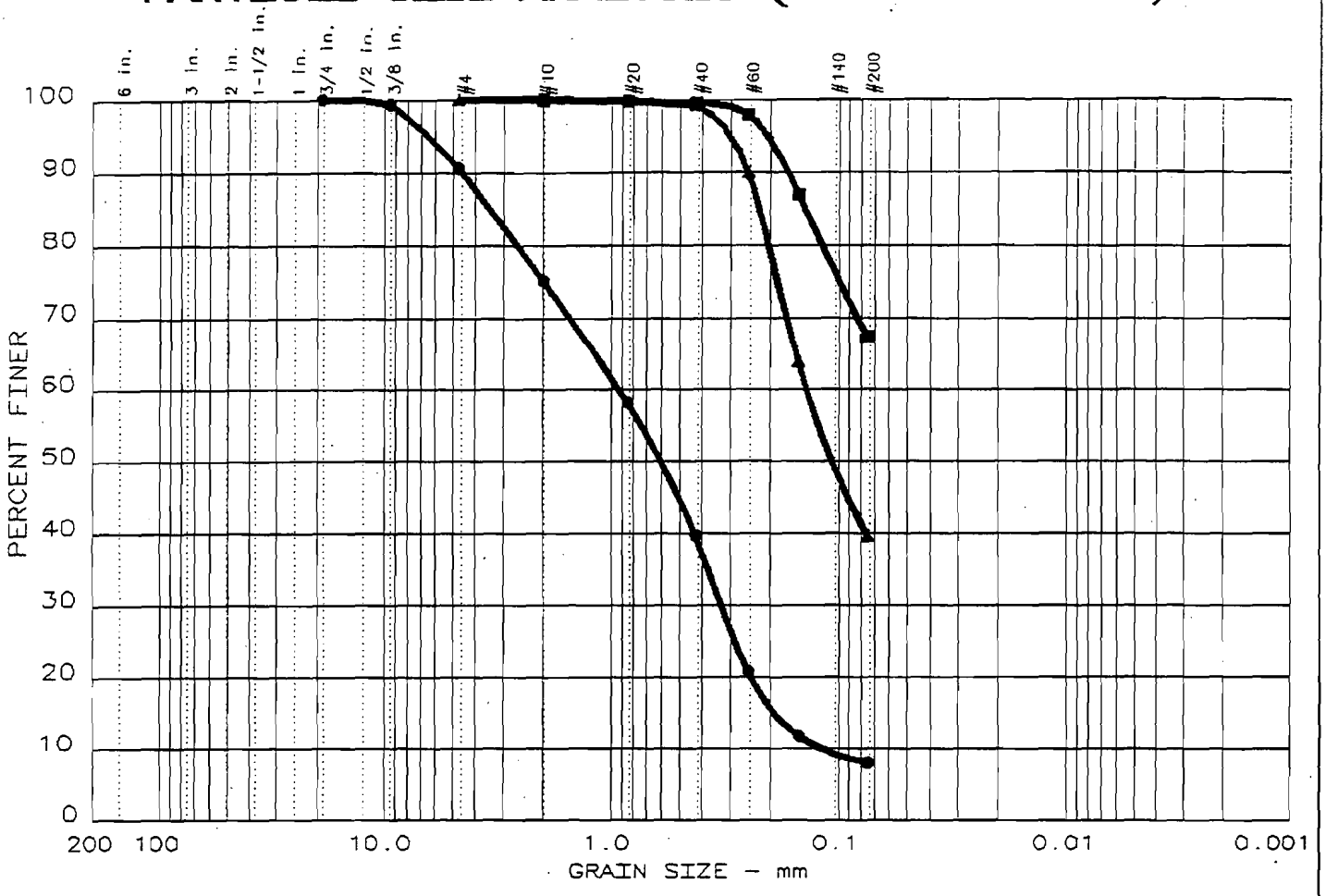
Remarks:

Soil Mechanics Lab

Project No.: 53483
Project: Russell City Energy Center

Date: 6-29-01 Data Sheet No. ____

PARTICLE SIZE ANALYSIS (ASTM D 422-63)



	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	9.4	82.6	8.0		SP-SM		
▲	0.0	0.0	60.4	39.6		SC		
■	0.0	0.0	32.8	67.2		CL		

SIEVE inches size	PERCENT FINER ●	▲	■
0.75	100.0		
0.375	99.4		
	GRAIN SIZE		
D_{60}	0.92	0.14	
D_{30}	0.33		
D_{10}	0.11		
	COEFFICIENTS		
C_c	0.98		
C_u	7.8		

SIEVE number size	PERCENT FINER ●	▲	■
4	90.6	100.0	
10	75.1	99.9	100.0
20	58.2	99.8	99.7
40	39.7	99.2	99.4
60	20.8	89.9	97.7
100	11.8	63.8	86.9
200	8.0	39.6	67.2

Sample information:

● B-104 38.5-40.0'
V.dk.brn. f-c SAND w/gravel.

▲ B-104 54.0-55.0'
Olive brn. clayey SAND.

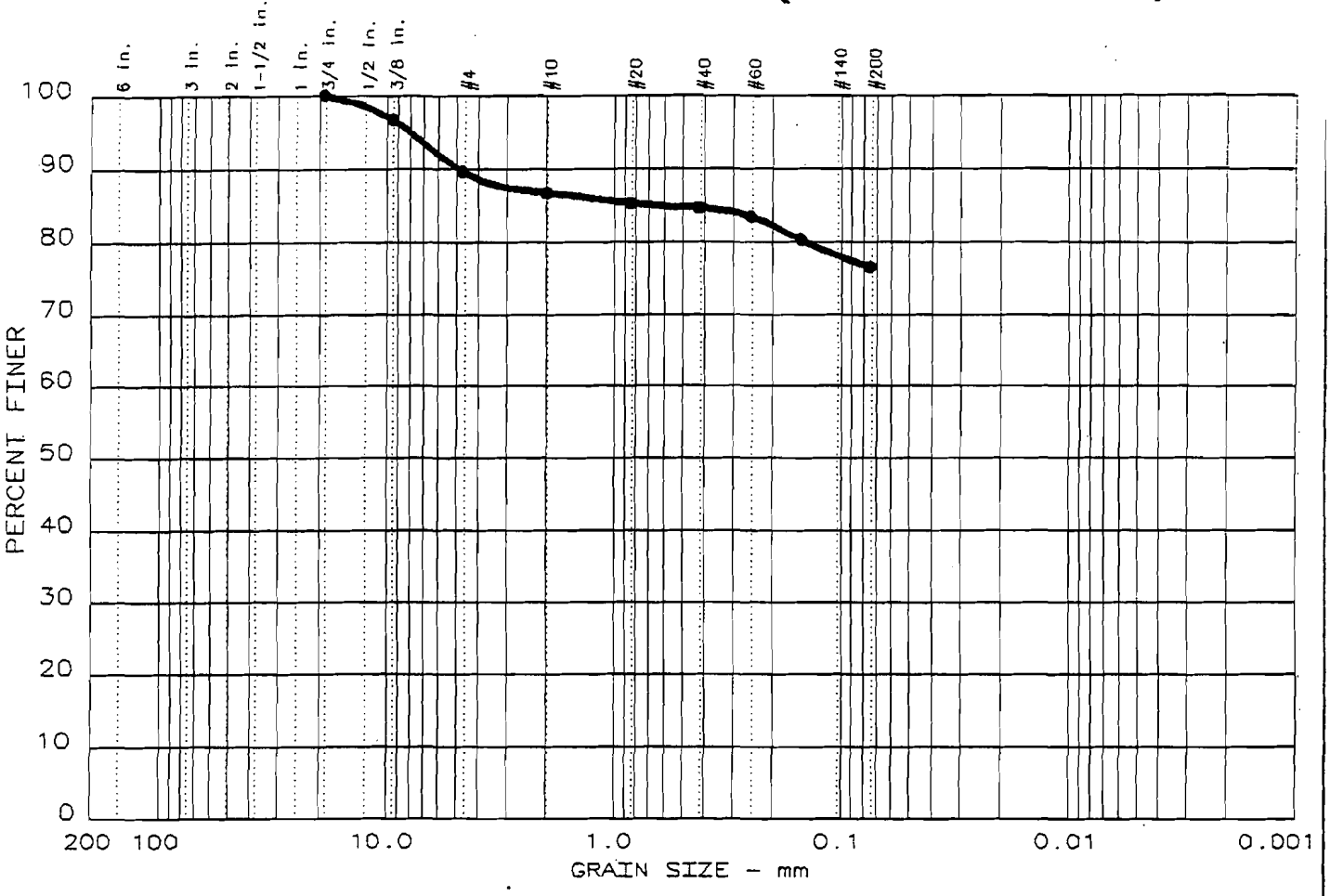
■ B-104 89.0-90.0'
Dk.gray sandy CLAY.

Remarks:

Soil Mechanics Lab

Project No.: 53483
Project: Russell City Energy Center
Date: 6-29-01 Data Sheet No. ____

PARTICLE SIZE ANALYSIS (ASTM D 422-63)



	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	10.4	13.2	76.4		CL		

SIEVE inches size	PERCENT FINER ●		
0.75	100.0		
0.375	96.6		
	GRAIN SIZE		
D_{60}			
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ●
4	89.6
10	86.7
20	85.2
40	84.6
60	83.4
100	80.2
200	76.4

Sample information:

● B-106 54.0-55.0'
Olive brown sandy CLAY w/caliche.

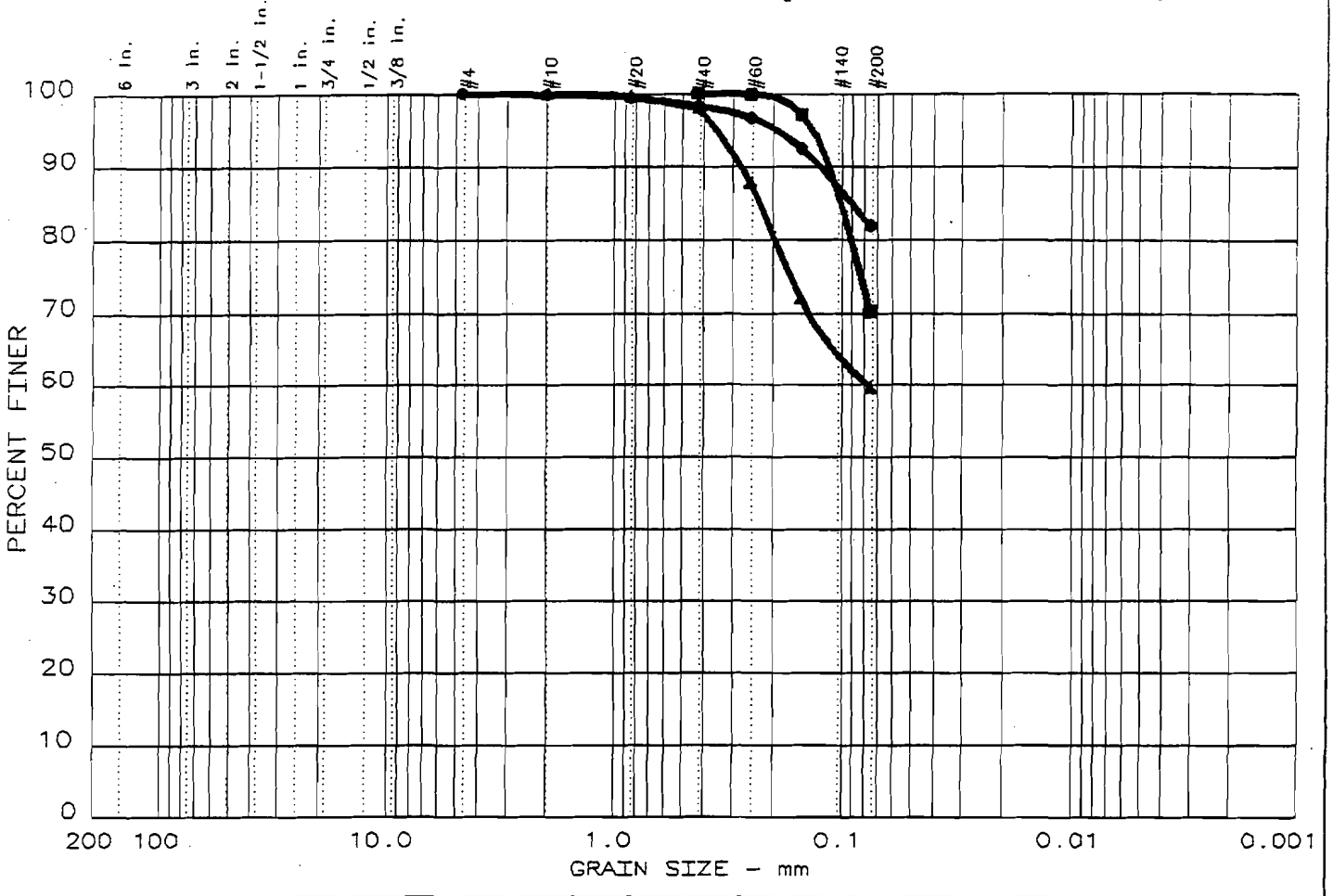
Remarks:

Soil Mechanics Lab

Project No.: 53483
Project: Russell City Energy Center

Date: 6-29-01 Data Sheet No. ——

PARTICLE SIZE ANALYSIS (ASTM D 422-63)



	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	0.0	18.1	81.9		CH		
▲	0.0	0.0	40.4	59.6		CL		
■	0.0	0.0	29.8	70.2		ML		

SIEVE inches size	PERCENT FINER ●	▲	■
GRAIN SIZE			
D_{60}		0.08	
D_{30}			
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ●	▲	■
4	100.0		
10	99.9	100.0	
20	99.5	99.7	
40	98.2	98.0	100.0
60	96.6	87.8	99.9
100	92.4	72.0	97.1
200	81.9	59.6	70.2

Sample information:

● B-107 11.0-11.5'
Olive brown FAT CLAY w/sand.

▲ B-107 39.5-40.0'
Olive gray sandy CLAY.

■ B-107 84.0-84.5'
Olive gray sandy SILT.

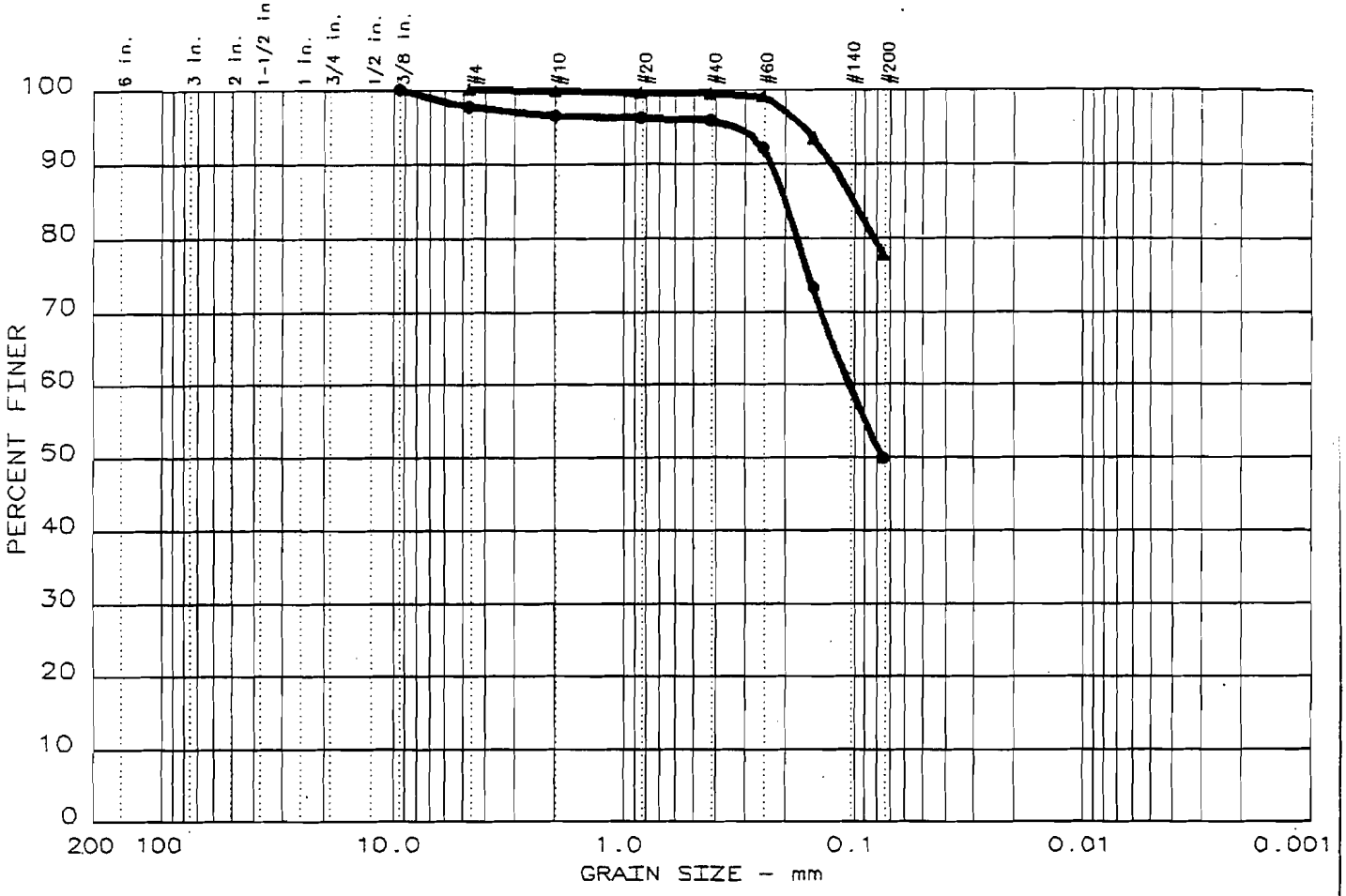
Remarks:

Soil Mechanics Lab

Project No.: 53483
Project: Russell City Energy Center

Date: 6-29-01 Data Sheet No. ____

PARTICLE SIZE ANALYSIS (ASTM D 422-63)



	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	2.4	47.8	49.8		SC		
▲	0.0	0.0	22.2	77.8		ML		

SIEVE inches size	PERCENT FINER ●	▲
0.375	100.0	
GRAIN SIZE		
D_{60}	0.10	
D_{30}		
D_{10}		
COEFFICIENTS		
C_c		
C_u		

SIEVE number size	PERCENT FINER ●	▲
4	97.6	100.0
10	96.4	99.8
20	96.1	99.5
40	95.8	99.4
60	92.1	99.0
100	73.2	93.4
200	49.8	77.8

Sample information:

● B-108 54.5-55.0'
Olive gray clayey SAND.

▲ B-108 84.5-85.0'
Olive gray sandy SILT.

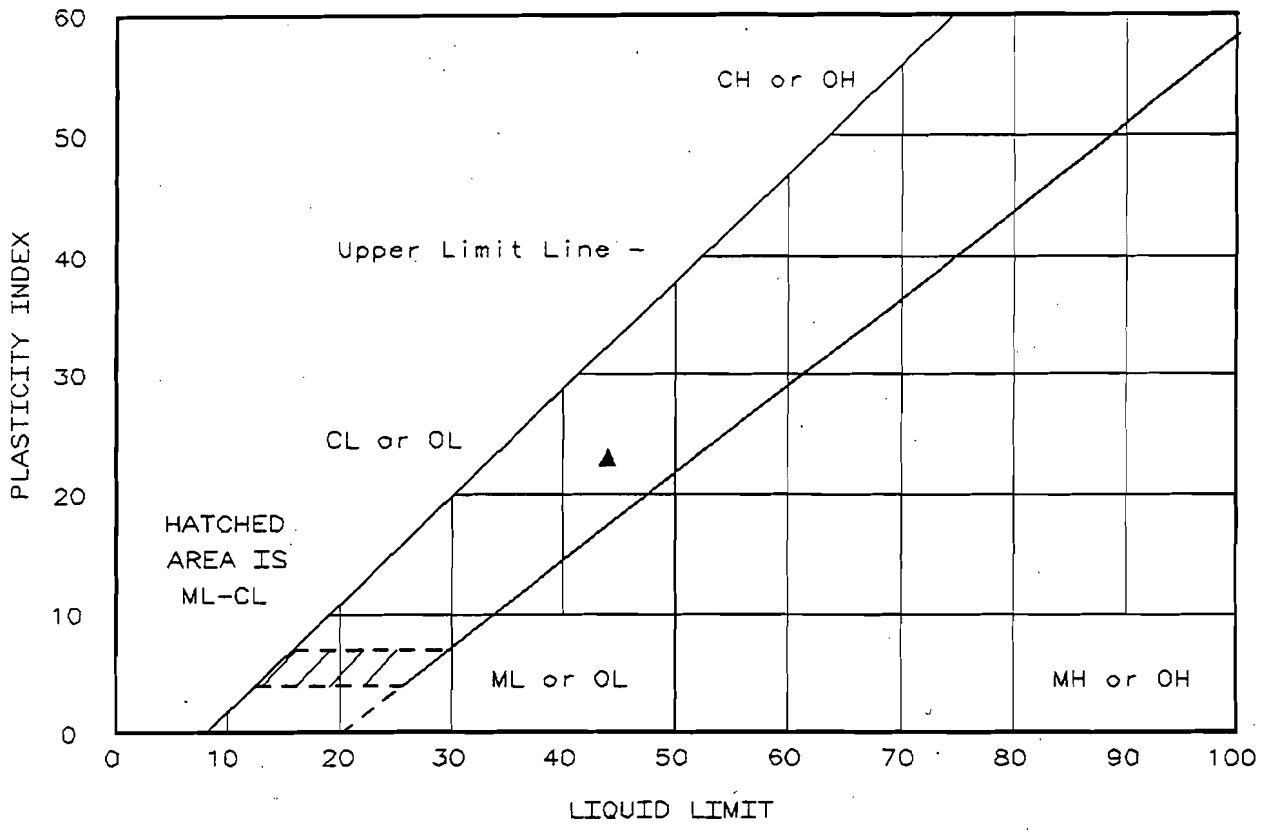
Remarks:

Soil Mechanics Lab

Project No.: 53483
Project: Russell City Energy Center

Date: 6-29-01 Data Sheet No. ____

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	ASTM D 2487-90
●	B-101 @ 13.5-15.2':Dark gray f-c SAND(SM)w/gravel Trace palstic fines.	NV	NP		47	SM, Silty sand
▲	B-101 @ 29-30':Brn.silty CLAY(CL) Wn=21%	44	21	23	75%	CL, Lean clay with sand
■	B-101 @ 49-50':Gray silty F-SAND(SM) Wn=23%	NV	NP		34	SM, Silty sand

NV - Non-Viscous NP - Non-Plastic

Project No.: 53483
Project: Russell City Energy Center

Client: Harding ESE
Location:

Date: 6-27-01

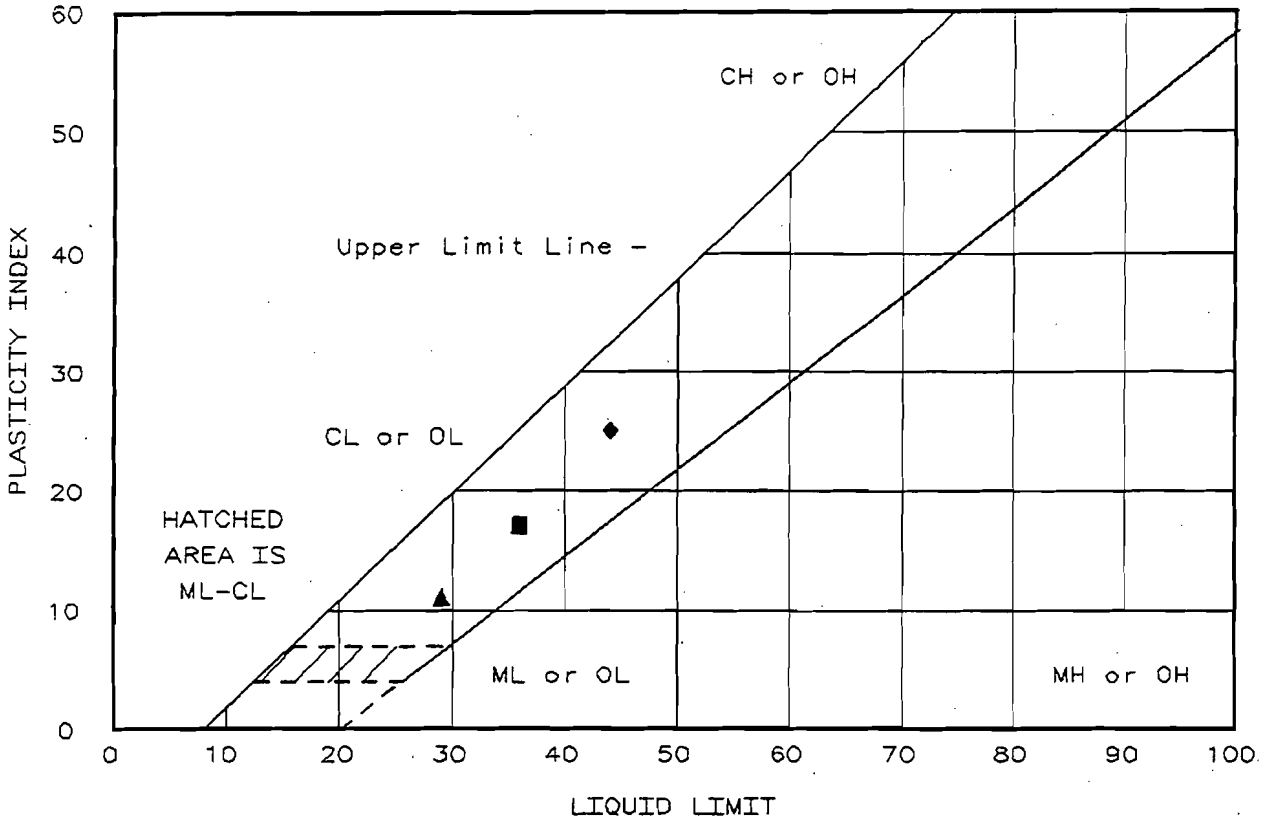
Remarks:
ASTM D 4318

LIQUID AND PLASTIC LIMITS TEST REPORT

Soil Mechanics Lab

Fig. No. _____

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	ASTM D 2487-90
◆	B-101 @ 13.5-15.2':Dark gray f-c SAND(SM)w/gravel Trace plastic fines.	NV	NP			
▲	B-102 @ 13-15.5':Olive br clayey SAND(SC)	29	18	11		
■	B-102 @ 22.5-25':Olive br sandy CLAY(CL)	36	19	17		
◆	B-103 @ 12-14.5':Olive br sandy CLAY(CL)	44	19	25		

NV - Non-Viscous NP - Non-Plastic

Project No.: 53483
Project: Russell City Energy Center

Client: Harding ESE
Location:

Date: 6-27-01

Remarks:

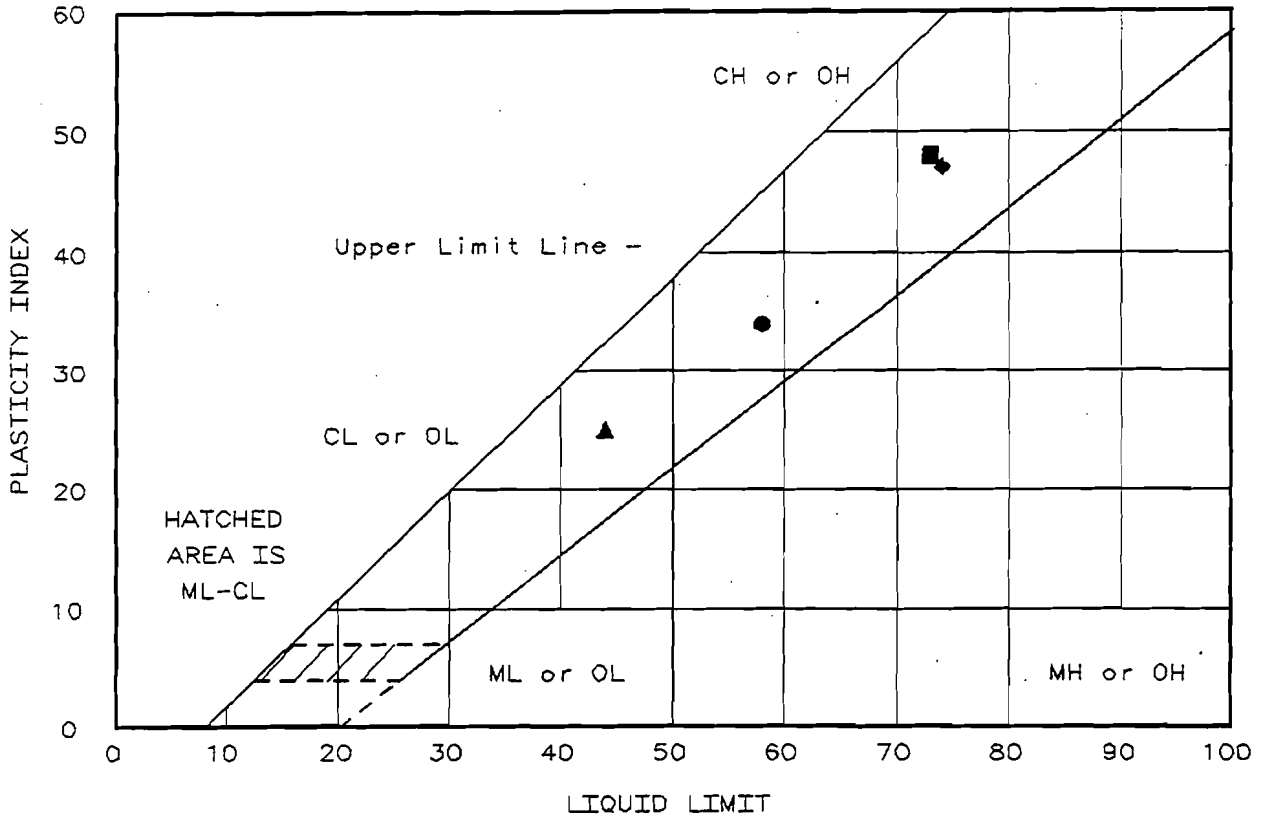
ASTM D 4318

LIQUID AND PLASTIC LIMITS TEST REPORT

Soil Mechanics Lab

Fig. No. _____

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	ASTM D 2487-90
●	B-103 @ 3-4':Gray FAT CLAY(CH)w/sand. Wn=22%	58	24	34	74	CH, Fat clay with sand
▲	B103 @ 12-14.5':Olive brn sandy CLAY(CL)	44	19	25	67	CL, Sandy lean clay
■	B-103 @ 104-105':Gray FAT CLAY(CH) Wn=54%	73	25	48	96	CH, Fat clay
◆	B-103 @ 109-110':Bluish gray FAT CLAY(CH) Wn=53%	74	27	47	99	CH, Fat clay

Project No.: 53483
Project: Russell City Energy Center

Client: Harding ESE
Location:

Date: 6-27-01

Remarks:

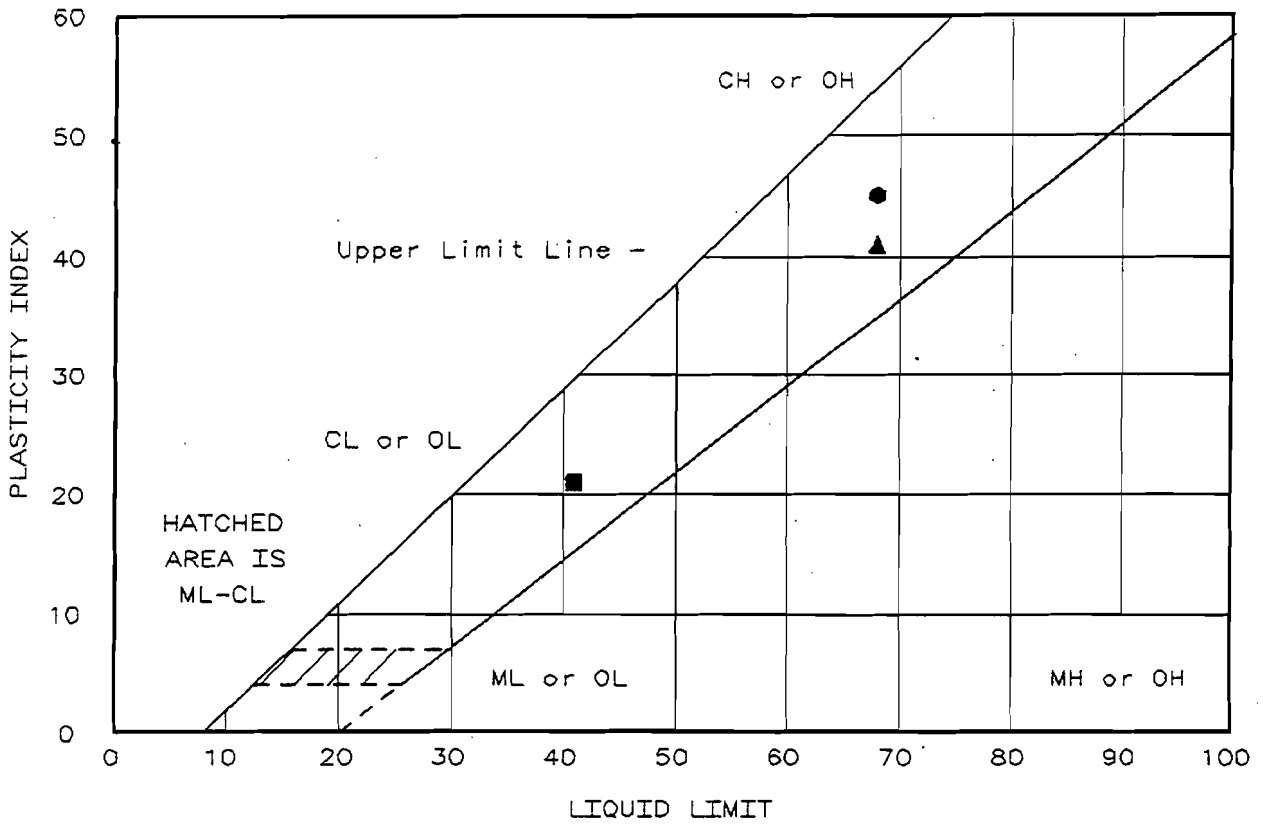
ASTM D 4318

LIQUID AND PLASTIC LIMITS TEST REPORT

Soil Mechanics Lab

Fig. No. _____

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	ASTM D 2487-90
●	B-104 @ 4.5-5.5':Dark olv gray FAT CLAY(CH) Wn=23%	68	23	45	73	CH, Fat clay with sand
▲	B-104 @ 6-8.5':V.dk.gray FAT CLAY(CH)	68	27	41	85	CH, Fat clay with sand
■	B-104 @ 13-15.5':Olive brown sandy CLAY(CL)	41	20	21	68	CL, Sandy lean clay

Project No.: 53483
Project: Russell City Energy Center

Client: Harding ESE
Location:

Date: 6-27-01

LIQUID AND PLASTIC LIMITS TEST REPORT

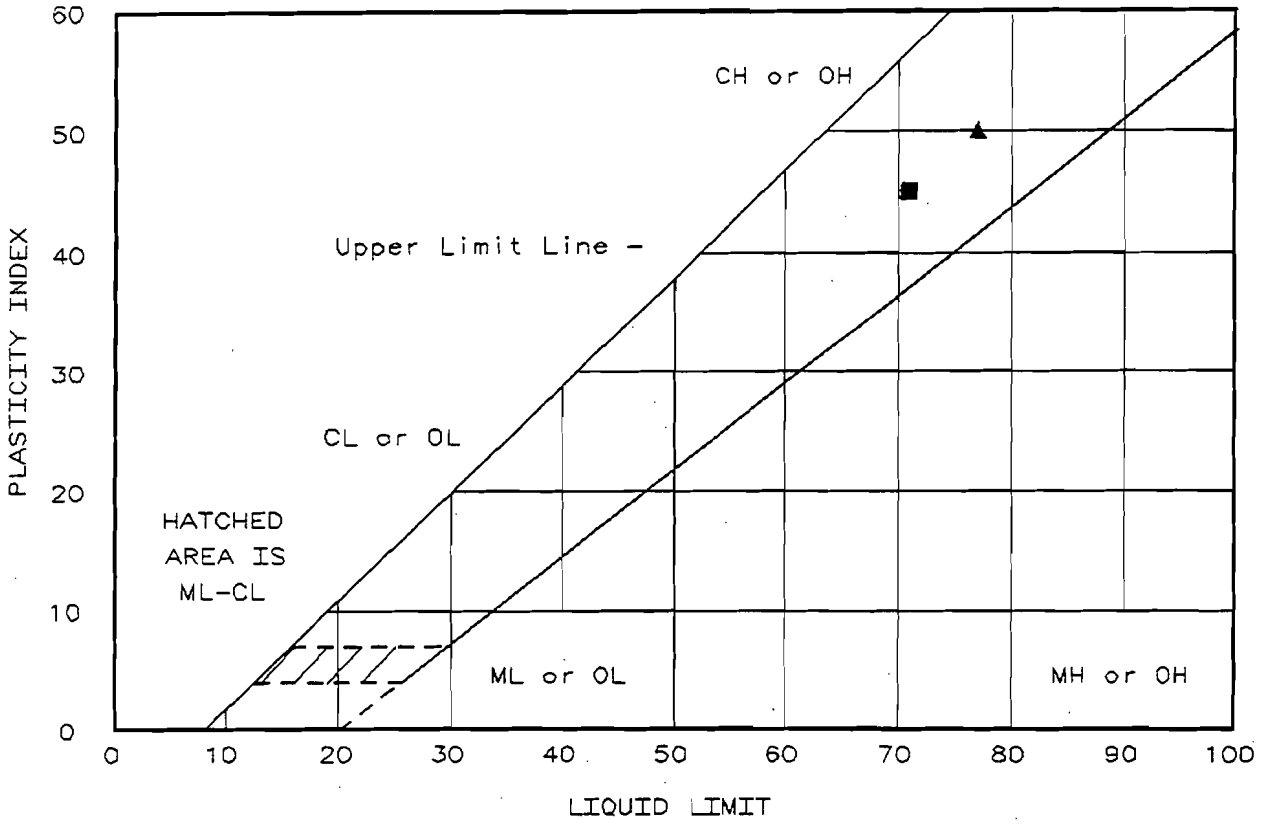
Soil Mechanics Lab

Remarks:

ASTM D 4318

Fig. No. _____

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	ASTM D 2487-90
●	B-104 @ 38.5-40':V.dark brn.silty f-c SAND(SM) w/gravel. Wn=14%	NV	NP		8	SP-SM, Poorly graded sand with silt
▲	B-104 @ 109-110':Bluish gray FAT CLAY(CH) Wn=55%	77	27	50	100	CH, Fat clay
■	B-104 @ 118.5-120':Dark gray FAT CLAY(CH)w/sand seams.	71	26	45	88	CH, Fat clay

NV - Non-Viscous NP - Non-Plastic

Project No.: 53483
Project: Russell City Energy Center

Client: Harding ESE
Location:

Date: 6-27-01

Remarks:

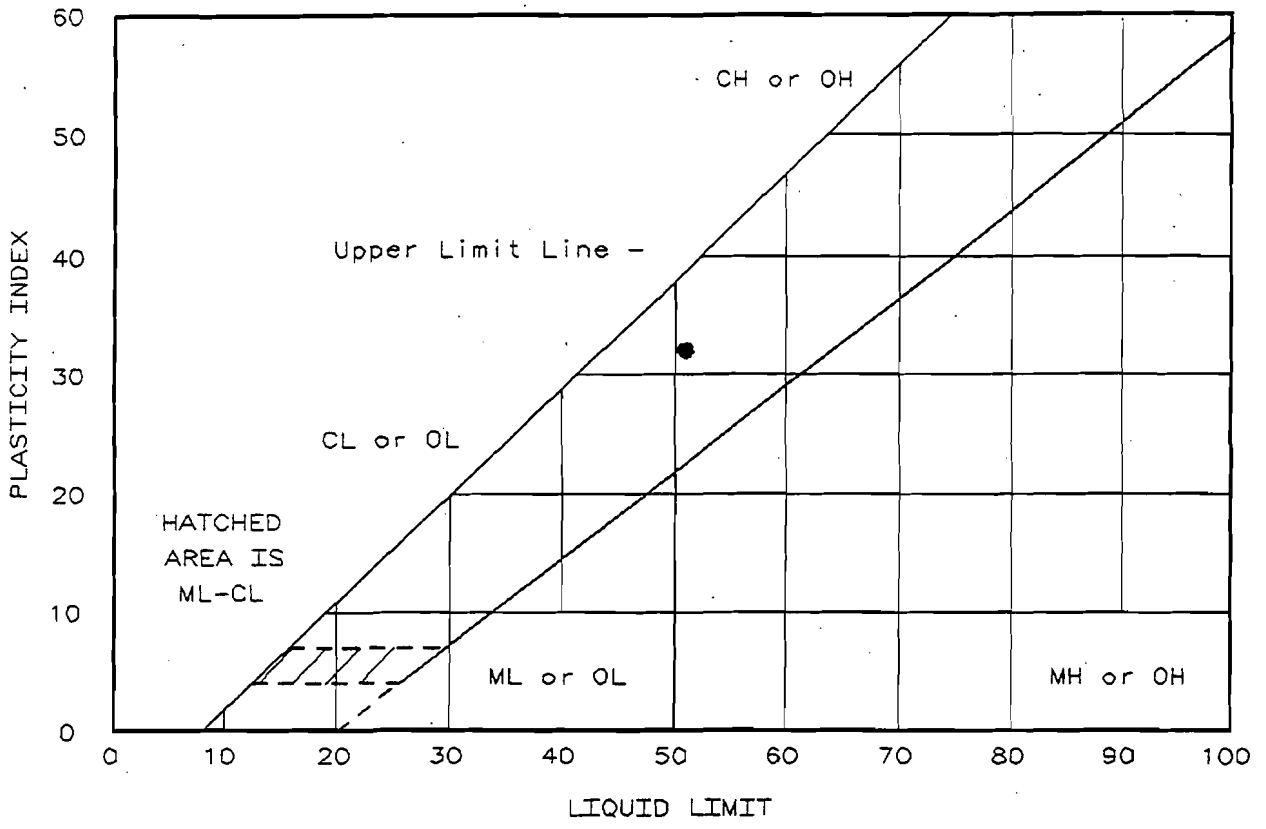
ASTM D 4318

LIQUID AND PLASTIC LIMITS TEST REPORT

Soil Mechanics Lab

Fig. No. _____

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	ASTM D 2487-90
●	B-105 @ 6.5':Dk. gray FAT CLAY(CH)w/caliche Wn=23%	51	19	32	90	CH, Fat clay

Project No.: 53483
Project: Russell City Energy Center

Client: Harding ESE
Location:

Date: 7-11-01

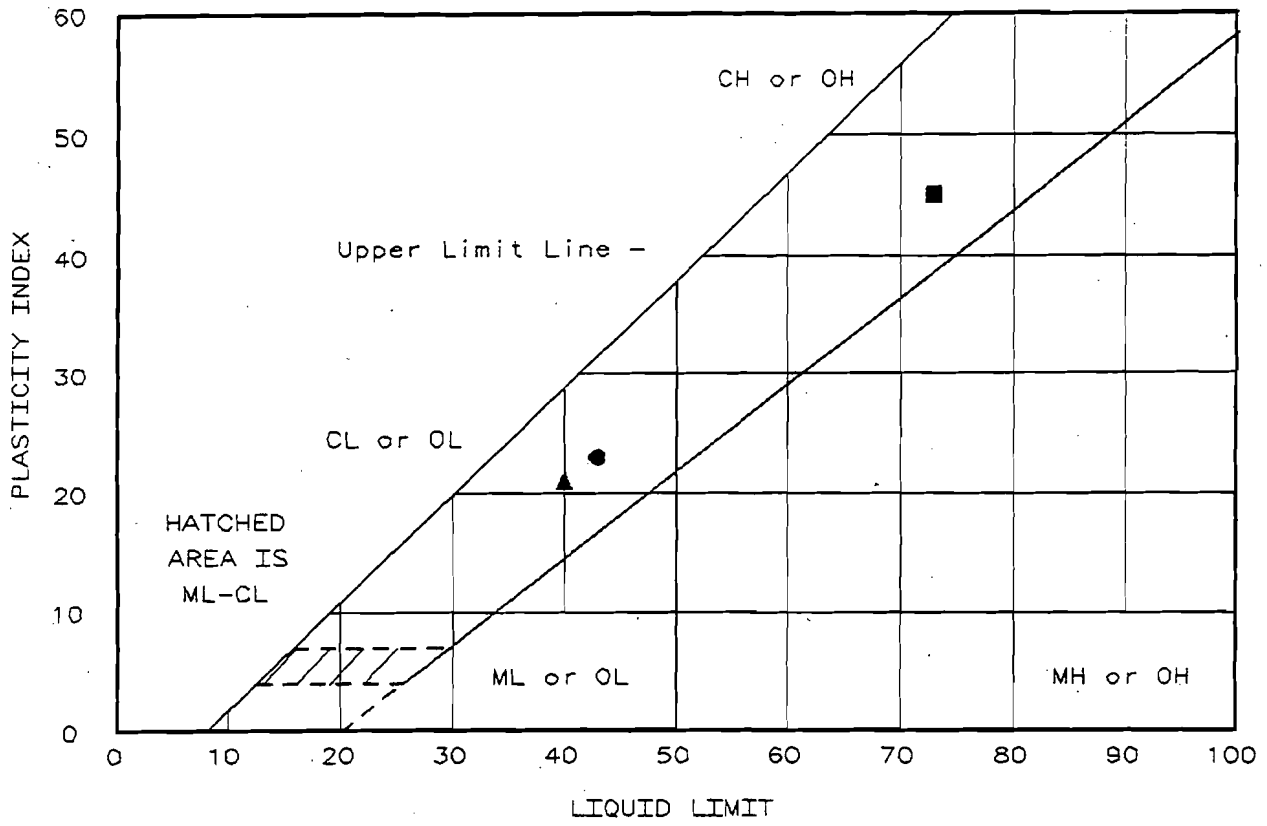
Remarks:
ASTM D 4318

LIQUID AND PLASTIC LIMITS TEST REPORT

Soil Mechanics Lab

Fig. No. _____

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	ASTM D 2487-90
●	B-105 @ 11-14':Olive brn. sandy CLAY(CL)	43	20	23	77	CL, Lean clay with sand
▲	B-105 @ 23.5-26':Olive gr/brn.sandy CLAY(CL)	40	19	21	61	CL, Sandy lean clay
■	B-105 @ 43.5-46':Dk.gray FAT CLAY(CH)	73	28	45	87	CH, Fat clay

Project No.: 53483
Project: Russell City Energy Center

Client: Harding ESE
Location:

Date: 6-27-01

LIQUID AND PLASTIC LIMITS TEST REPORT

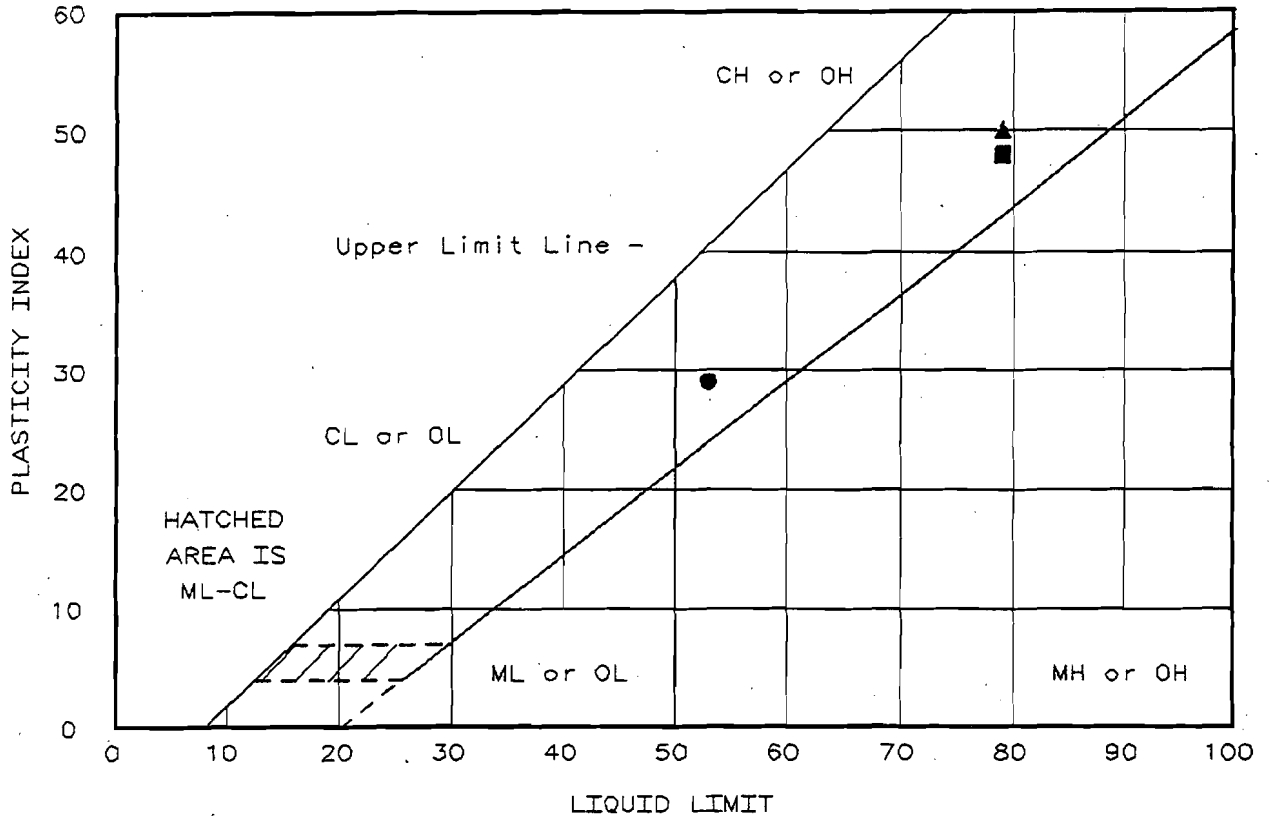
Soil Mechanics Lab

Remarks:

ASTM D 4318

Fig. No. _____

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	ASTM D 2487-90
●	B-105 @ 73.5-76':Olive gr FAT CLAY(CH)	53	24	29	100	CH, Fat clay
▲	B-105 @ 114.5-115':Bluish gray FAT CLAY(CH)	79	29	50	89	CH, Fat clay
■	B-105 @ 118.5-121':Dark gray FAT CLAY(CH)	79	31	48	91	CH, Fat clay

Project No.: 53483
Project: Russell City Energy Center

Client: Harding ESE
Location:

Date: 6-27-01

LIQUID AND PLASTIC LIMITS TEST REPORT

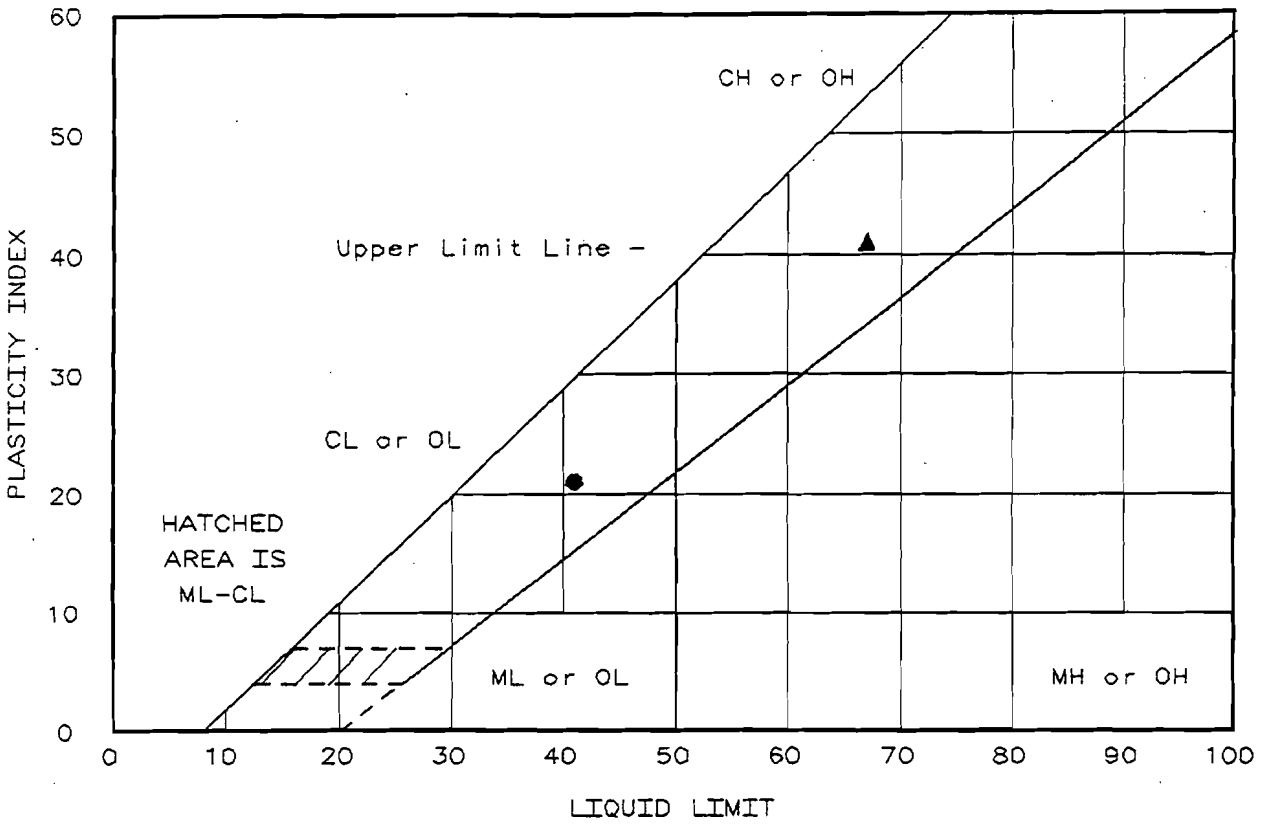
Soil Mechanics Lab

Remarks:

ASTM D 4318

Fig. No. _____

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	ASTM D 2487-90
●	B-106 @ 12-14.5':Dk.gray brn. sandy CLAY(CL)	41	20	21		
▲	B-108 @ 12.5':Dk. gray FAT CLAY(CH)	67	26	41		

Project No.: 53483
Project: Russell City Energy Center

Client: Harding ESE
Location:

Date: 6-27-01

LIQUID AND PLASTIC LIMITS TEST REPORT

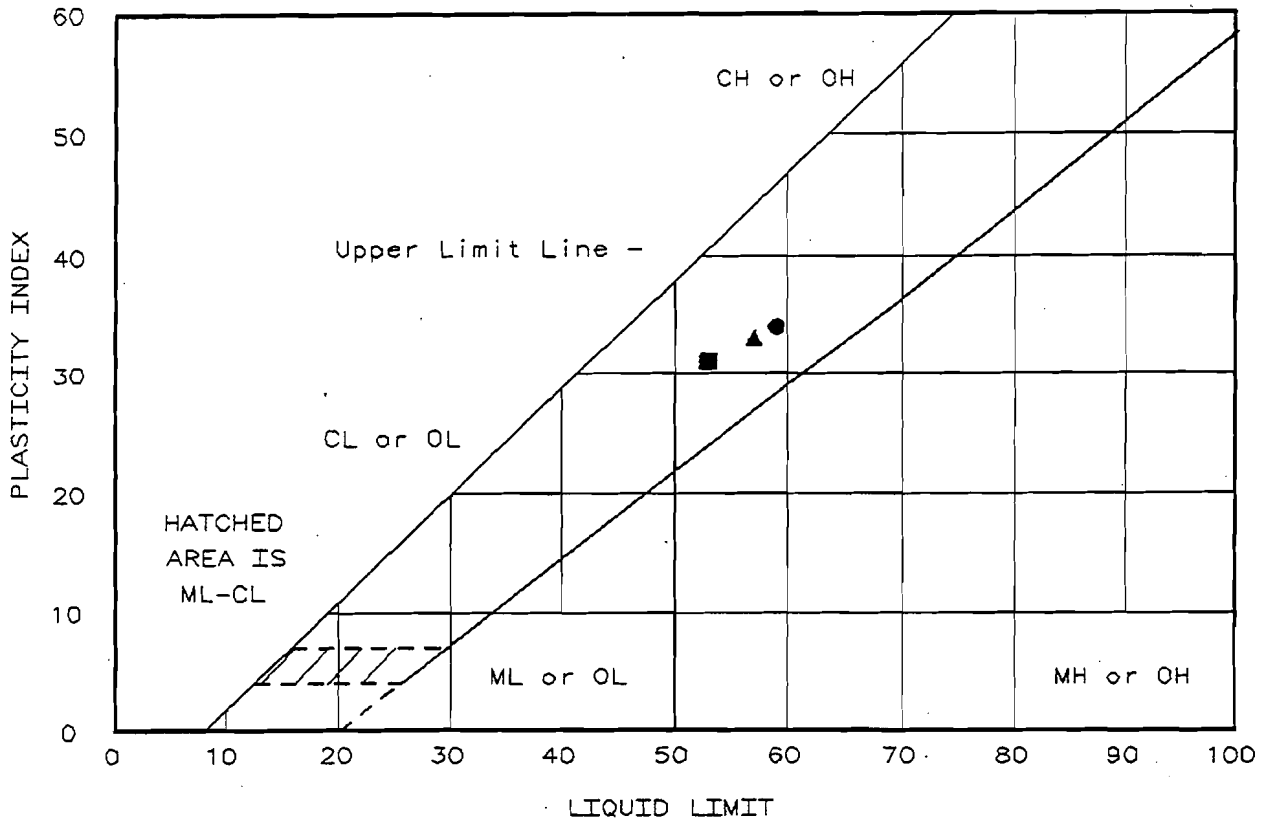
Soil Mechanics Lab

Remarks:

ASTM D 4318

Fig. No. _____

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	ASTM D 2487-90
●	B-107 @ 1-1.5':Brownish blk. FAT CLAY(CH)	59	25	34	98	CH, Fat clay
▲	B-107 @ 4.5-7':Dk.gray FAT CLAY(CH)	57	24	33	84	CH, Fat clay with sand
■	B-107 @ 11-11.5':Olv.brn. FAT CLAY(CH)w/sand. Wn=25%	53	22	31	82	CH, Fat clay with sand

Project No.: 53483
Project: Russell City Energy Center

Client: Harding ESE
Location:

Date: 6-27-01

Remarks:

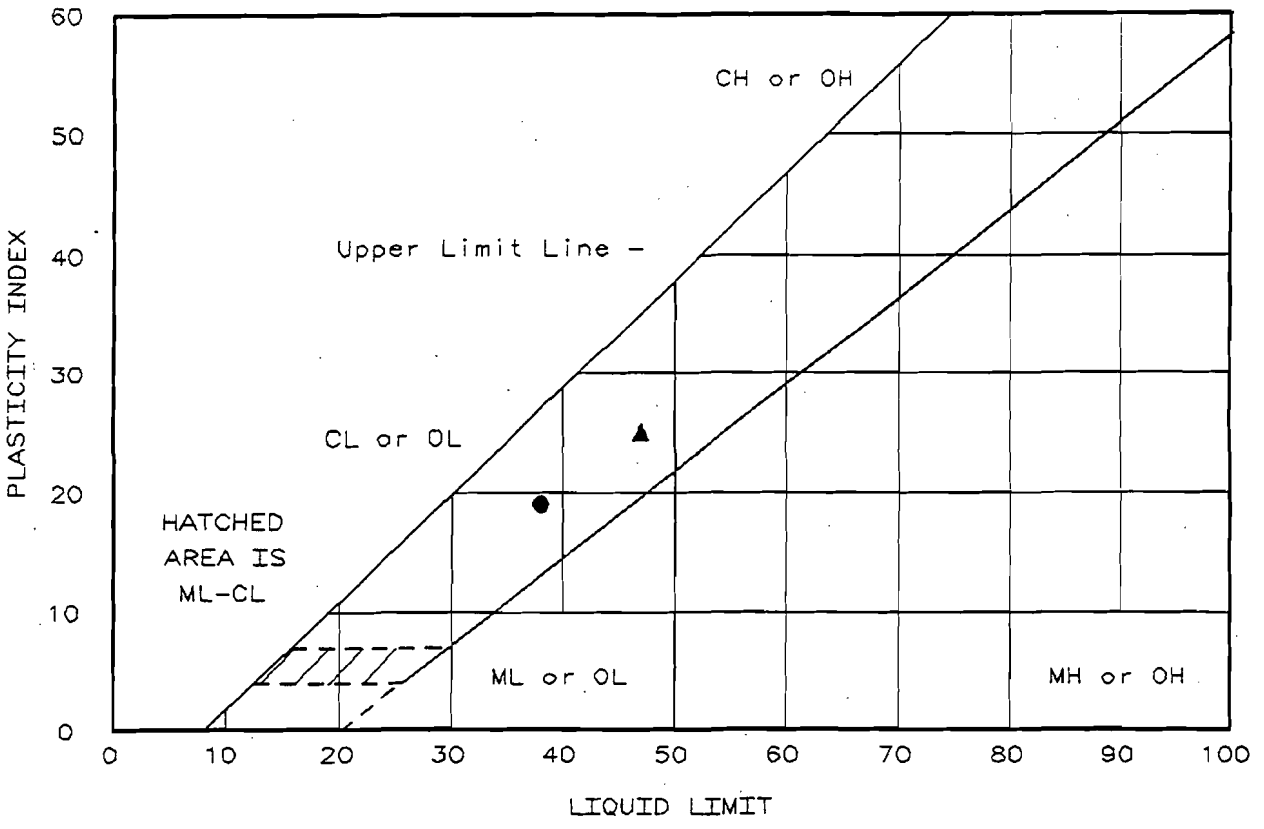
ASTM D 4318

LIQUID AND PLASTIC LIMITS TEST REPORT

Soil Mechanics Lab

Fig. No. _____

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	ASTM D 2487-90
●	B-107 @ 14-16.5':Olive brn. sandy CLAY(CL)	38	19	19	90	CL, Lean clay
▲	B-107 @ 39.5-40':Olive gray sandy CLAY(CL) Wn=23%	47	22	25	82	CL, Lean clay with sand
■	B-107 @ 84-84.5':Olive gray f-sandy SILT(ML) Wn=22%	NV	NP		70	ML, Sandy silt

NV - Non-Viscous NP - Non-Plastic

Project No.: 53483
Project: Russell City Energy Center

Client: Harding ESE
Location:

Date: 6-27-01

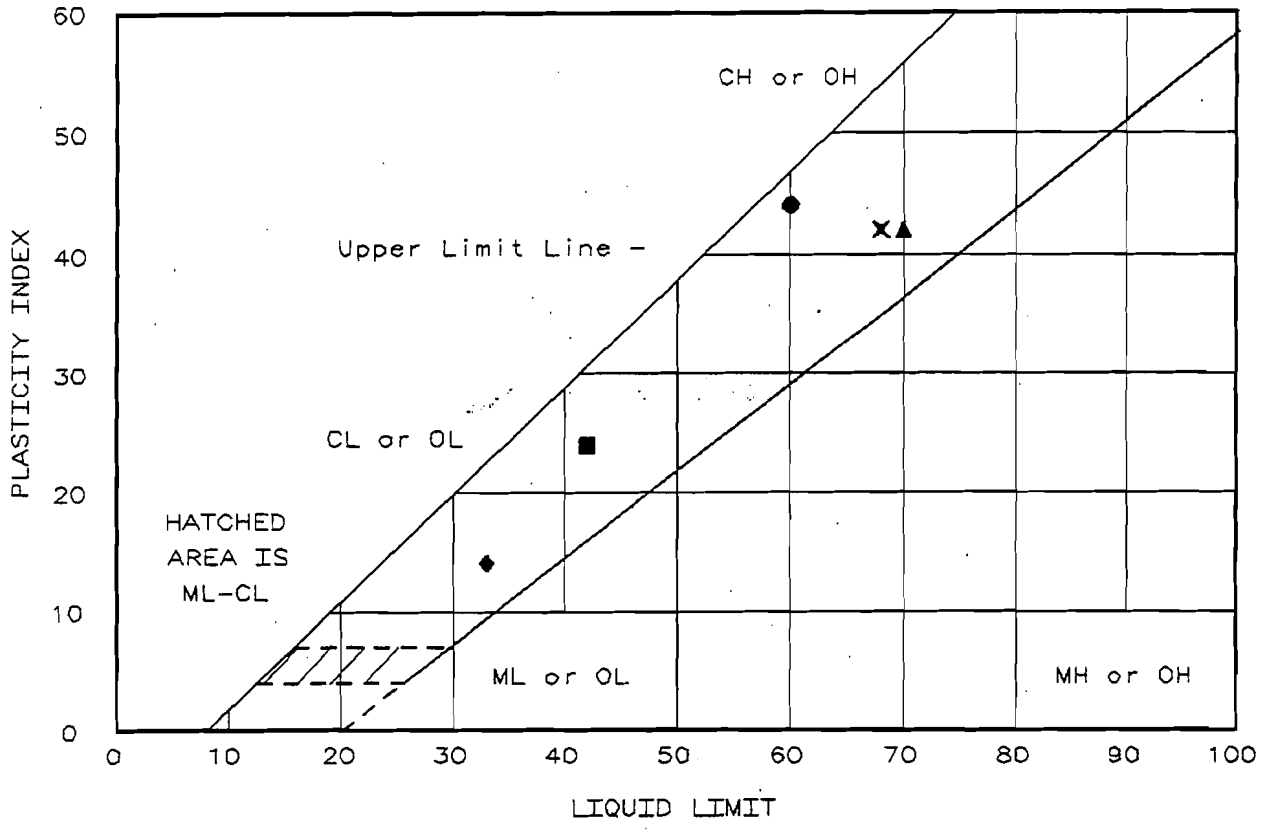
Remarks:
ASTM D 4318

LIQUID AND PLASTIC LIMITS TEST REPORT

Soil Mechanics Lab

Fig. No. _____

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	ASTM D 2487-90
●	B-109 @ 4-4.5'Brownish blk.FAT CLAY(CH) Wn=32%	60	16	44	90	CH, Fat clay
▲	B-109 @ 7.5-10':V.dk.gray FAT CLAY(CH)	70	28	42		
■	B-109 @ 13-15.5':Olive br sandy CLAY(CL)	42	18	24	78	CL, Lean clay with sand
◆	B-109 @ 23.5-26':Olive br sandy CLAY(CL)portion of tube.(See cons.)	33	19	14		
X	B-109 @ 48.5-51':Olive gr FAT CLAY(CH)	68	26	42	97	CH, Fat clay

Project No.: 53483
Project: Russell City Energy Center

Client: Harding ESE
Location:

Date: 6-27-01

Remarks:

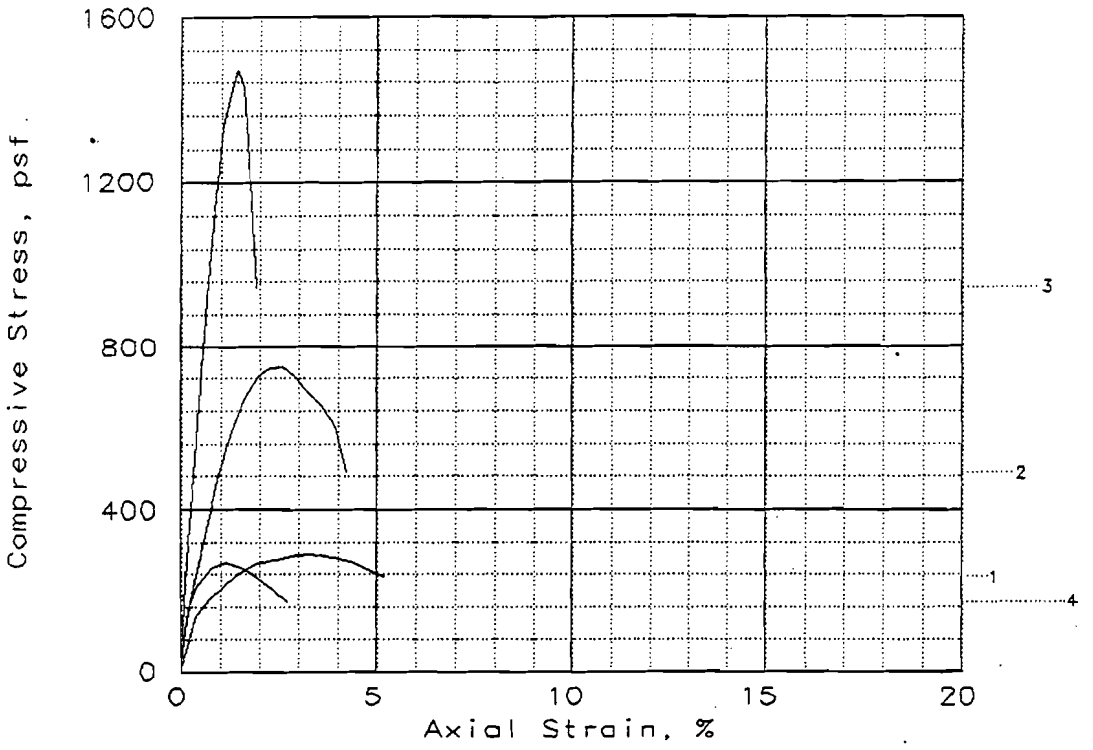
ASTM D 4318

LIQUID AND PLASTIC LIMITS TEST REPORT

Soil Mechanics Lab

Fig. No. _____

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1	2	3	4
Unconfined strength, psf	292	747	1474	267
Undrained shear strength, psf	146	374	737	134
Failure strain, %	3.3	2.6	1.4	1.2
Strain rate, in/min	0.0750	0.0750	0.0750	0.0750
Water content, %	24.3	23.9	19.1	28.6
Wet density, pcf	126.8	123.6	127.4	118.9
Dry density, pcf	102.0	99.8	106.9	92.4
Saturation, %	100.6	93.6	89.6	93.8
Void ratio	0.6531	0.6892	0.5764	0.8237
Specimen diameter, in	2.88	2.88	2.88	2.88
Specimen height, in	5.40	6.12	5.64	5.10
Height/diameter ratio	1.88	2.13	1.96	1.77

1) Description: Sa.1/B-101 @14.5': Sft.,olv.brn. (SC) -#200=47%

2) Description: Sa.2/B-102 @ 15':Stf.brn.(CL) -#200=60%

3) Description: Sa.3/B-102 @ 24.5':Dns.olv.gry(SC)-#200=47%

4) Description: Sa.4/B-103 @ 14':Sft.,brn. sandy(CL) -#200=67%

GS= 2.7 | Type: Shelby

Project No.: 53483.001
Date: 6-19-01
Remarks:

Fig. No.: ——

Client: Harding ESE

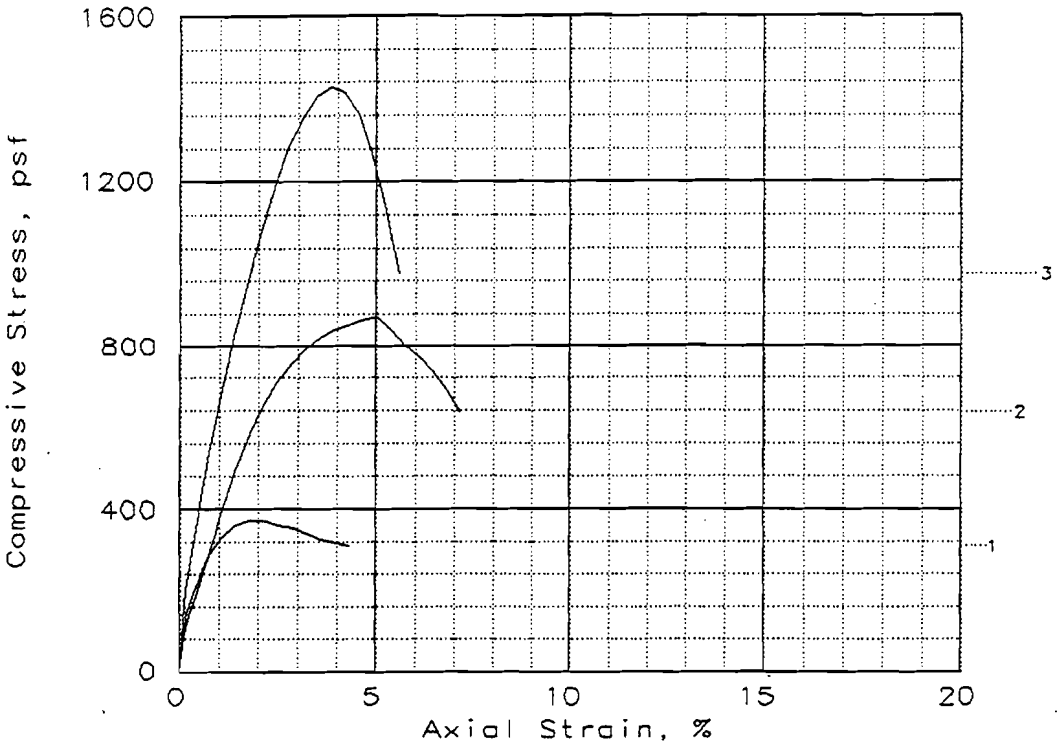
Project: Russell City Energy Center

Location: B-101,102 & 103

UNCONFINED COMPRESSION TEST

Soil Mechanics Lab

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1	2	3
Unconfined strength, psf	372	872	1429
Undrained shear strength, psf	186	436	714
Failure strain, %	1.8	5.0	3.9
Strain rate, in/min	0.0750	0.0750	0.0750
Water content, %	26.0	21.8	32.6
Wet density, pcf	123.1	126.0	117.8
Dry density, pcf	97.7	103.4	88.8
Saturation, %	96.9	93.6	98.2
Void ratio	0.7248	0.6305	0.8974
Specimen diameter, in	2.88	2.88	2.88
Specimen height, in	5.54	5.57	5.70
Height/diameter ratio	1.93	1.94	1.98

1) Description: Sa.1/8':Frm.dk.gr/ brn.(CH) -#200=85%

2) Description: Sa.2/15':Frm.brn.sandy(CL) -#200=68%

3) Description: Sa.3/118':Stf,dk.gry(CH)w/snd.seams. -#200=88%

4) Description:

GS= 2.7 | Type: Shelby

Project No.: 53483.001
Date: 6-19-01
Remarks:

Client: Harding ESE

Project: Russell City Energy Center

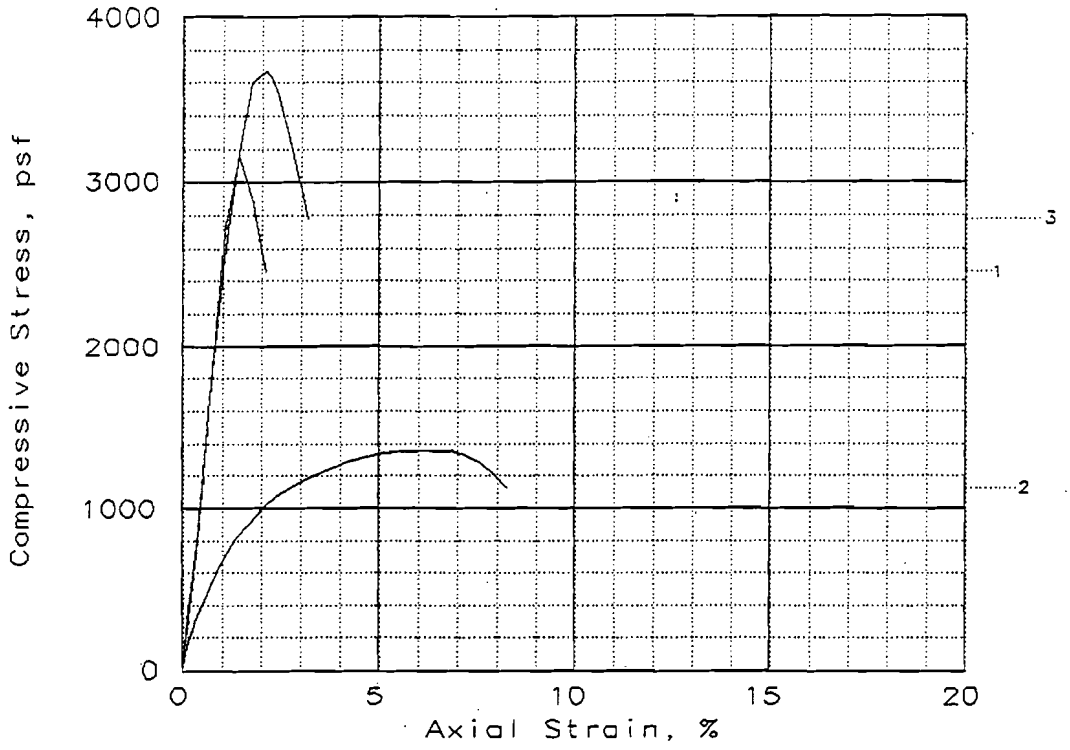
Location: B-104 @ 8,15 & 118'

Fig. No.: ——

UNCONFINED COMPRESSION TEST

Soil Mechanics Lab

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1	2	3
Unconfined strength, psf	2455	1354	3671
Undrained shear strength, psf	1228	677	1836
Failure strain, %	2.1	6.2	2.1
Strain rate, in/min	0.0750	0.0750	0.0750
Water content, %	18.6	23.4	21.6
Wet density, pcf	131.7	125.8	128.7
Dry density, pcf	111.1	101.9	105.8
Saturation, %	97.0	96.6	98.3
Void ratio	0.5173	0.6537	0.5930
Specimen diameter, in	2.88	2.88	2.88
Specimen height, in	5.61	5.80	5.64
Height/diameter ratio	1.95	2.02	1.96

1) Description: Sa.1/12.5':Mtl.brn sndy(CL) -#200=77%

2) Description: Sa.2/25.5':Mtld.brn.sandy(CL) -#200=61%

3) Description: Sa.3/45.5':Stf,dk.gry(CH)w/caliche. -#200=87%

4) Description:

GS= 2.7 | Type: Shelby

Project No.: 53483.001

Date: 6-19-01

Remarks:

Client: Harding ESE

Project: Russell City Energy Center

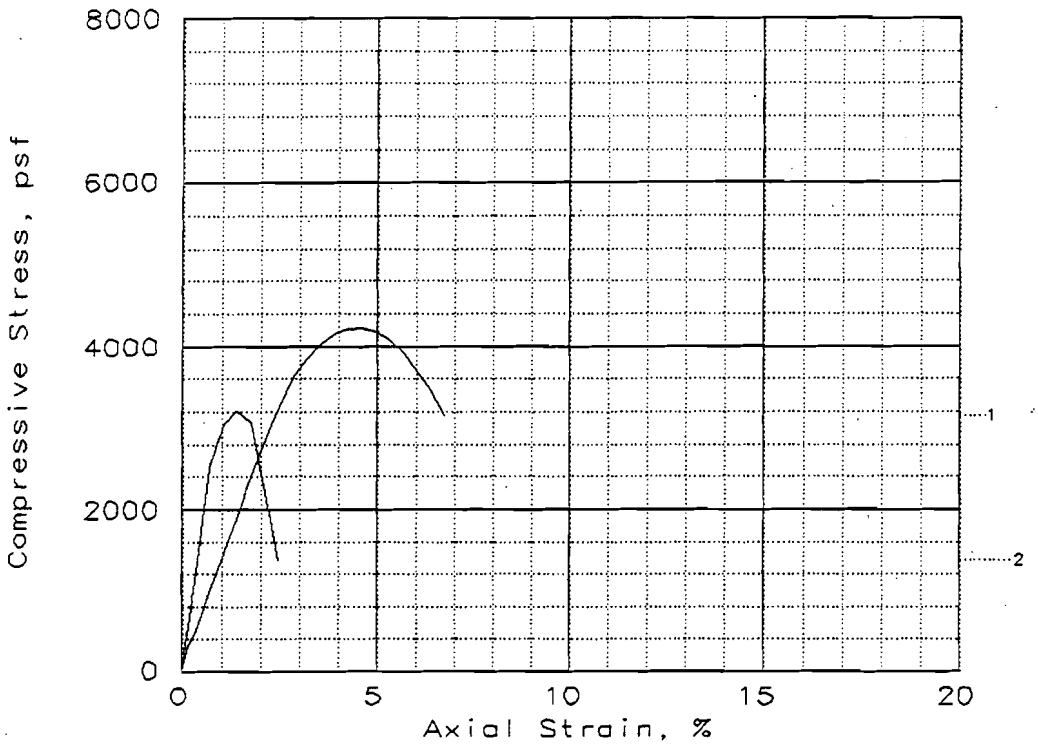
Location: B-105 @ 12.5,25.5 & 45.5'

Fig. No.: ——

UNCONFINED COMPRESSION TEST

Soil Mechanics Lab

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1	2		
Unconfined strength, psf	4221	3208		
Undrained shear strength, psf	2110	1604		
Failure strain, %	4.6	1.4		
Strain rate, in/min	0.0750	0.0750		
Water content, %	26.0	47.5		
Wet density, pcf	126.1	109.3		
Dry density, pcf	100.1	74.1		
Saturation, %	102.5	100.6		
Void ratio	0.6844	1.2750		
Specimen diameter, in	2.88	2.88		
Specimen height, in	5.62	5.67		
Height/diameter ratio	1.95	1.97		
1) Description: Sa.1/75.5':Stf.dk. gr.(CH) - #200=100%				
2) Description: Sa.2/120.5':Stf.dk.gr.(CH) -#200=91%				
3) Description:				
4) Description:				
		GS= 2.7	Type: Shelby	

Project No.: 53483.001
Date: 6-19-01
Remarks:

Fig. No.: ——

Client: Harding ESE

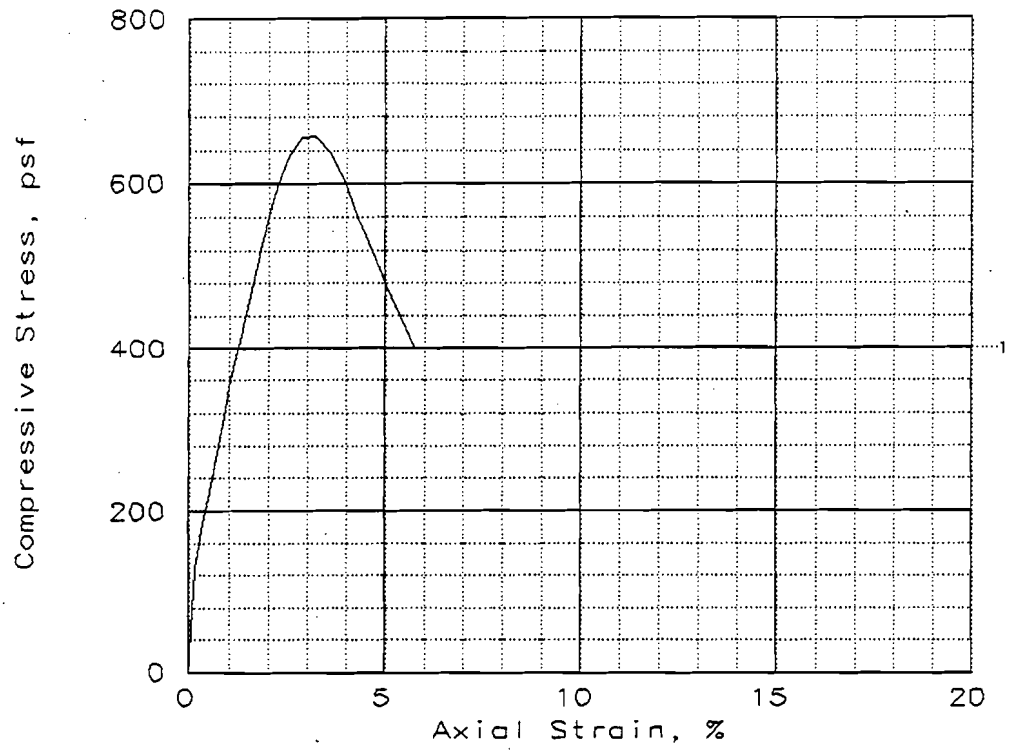
Project: Russell City Energy Center

Location: B-105 @ 75.5 & 120.5'

UNCONFINED COMPRESSION TEST

Soil Mechanics Lab

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	657			
Undrained shear strength, psf	328			
Failure strain, %	3.2			
Strain rate, in/min	0.0750			
Water content, %	22.2			
Wet density, pcf	124.3			
Dry density, pcf	101.7			
Saturation, %	91.0			
Void ratio	0.6571			
Specimen diameter, in	2.88			
Specimen height, in	5.55			
Height/diameter ratio	1.93			

1) Description: Firm,dk.gray/brn. sndy(CL) -#200=62%

2) Description:

3) Description:

4) Description:

			GS= 2.7	Type: Shelby

Project No.: 53483.001

Date: 6-19-01

Remarks:

Fig. No.: ——

Client: Harding ESE

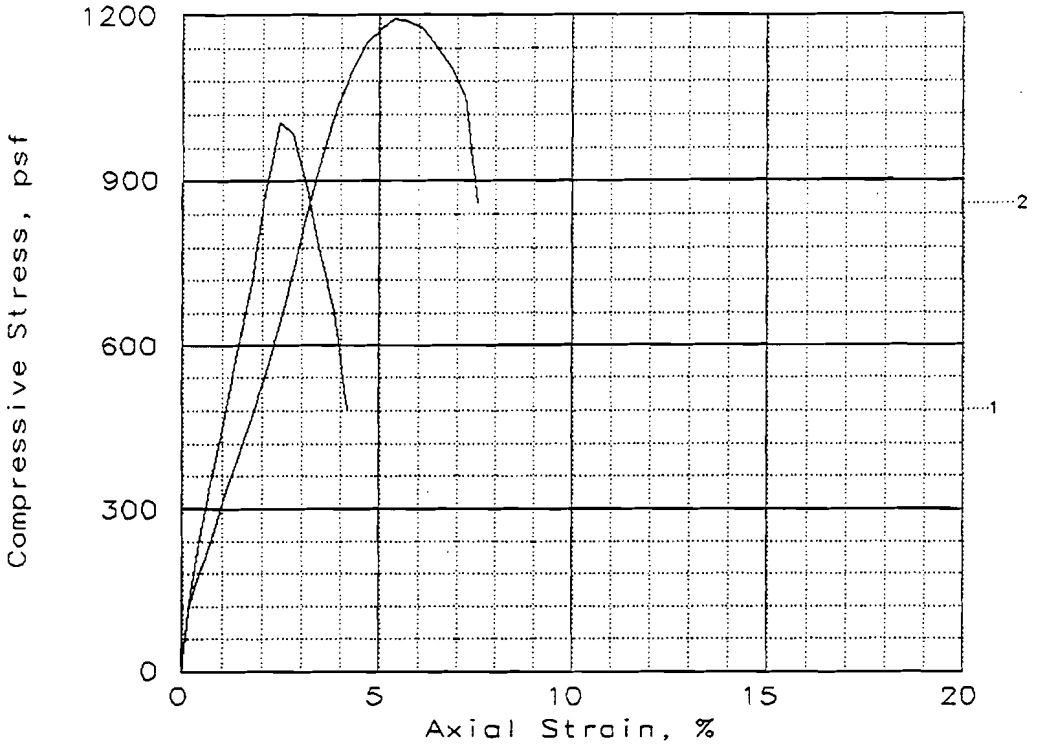
Project: Russell City Energy Center

Location: B-106 12.5'

UNCONFINED COMPRESSION TEST

Soil Mechanics Lab

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1	2		
Unconfined strength, psf	1006	1194		
Undrained shear strength, psf	503	597		
Failure strain, %	2.5	5.4		
Strain rate, in/min	0.0750	0.0750		
Water content, %	26.3	24.7		
Wet density, pcf	122.5	126.5		
Dry density, pcf	97.0	101.5		
Saturation, %	96.1	100.8		
Void ratio	0.7383	0.6609		
Specimen diameter, in	2.88	2.88		
Specimen height, in	5.70	5.54		
Height/diameter ratio	1.98	1.93		

1) Description: Sa.1/6.5':Frm.dk. gr. (CH) -#200=84%

2) Description: Sa.2/15':Stf.,olv.brn.sandy(CL) -#200=90%

3) Description:

4) Description:

GS= 2.7 | Type: Shelby

Project No.: 53483.001

Date: 6-19-01

Remarks:

Client: Harding ESE

Project: Russell City Energy Center

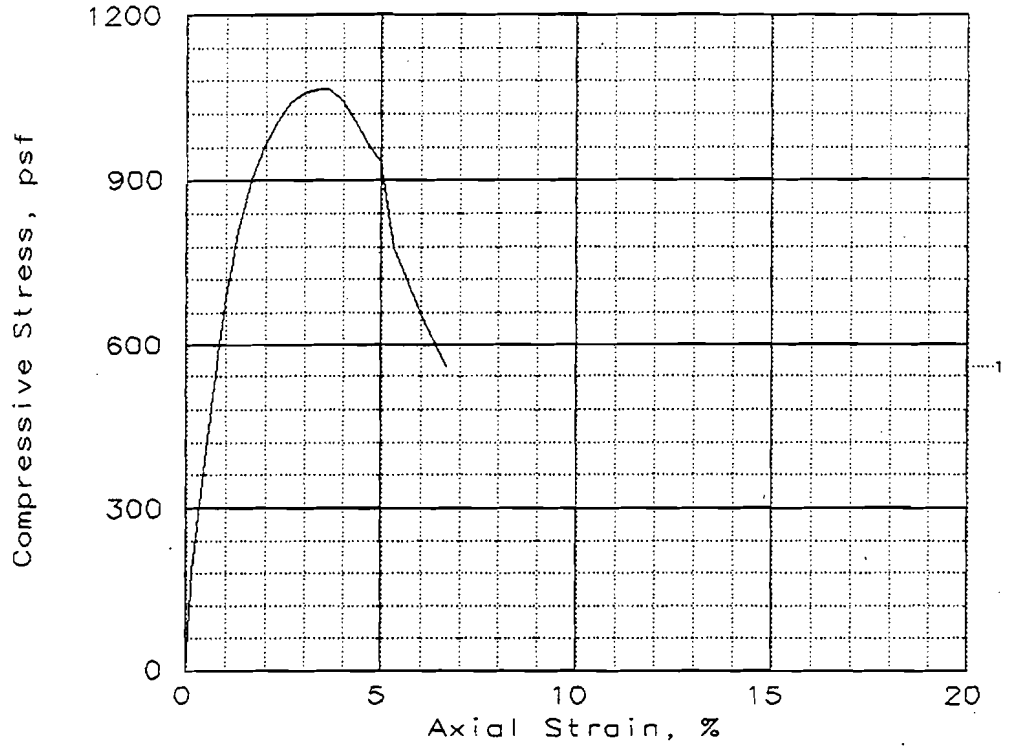
Location: B-107 @ 6.5 & 15'

UNCONFINED COMPRESSION TEST

Soil Mechanics Lab

Fig. No.: ——

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1			
Unconfined strength, psf	1064			
Undrained shear strength, psf	532			
Failure strain, %	3.7			
Strain rate, in/min	0.0750			
Water content, %	26.9			
Wet density, pcf	121.4			
Dry density, pcf	95.6			
Saturation, %	95.2			
Void ratio	0.7623			
Specimen diameter, in	2.88			
Specimen height, in	6.00			
Height/diameter ratio	2.09			

1) Description: Stf.dk.gray (CH) -#200=81%

2) Description:

3) Description:

4) Description:

GS= 2.7 | Type: Shelby

Project No.: 53483.001
Date: 6-19-01
Remarks:

Client: Harding ESE

Project: Russell City Energy Center

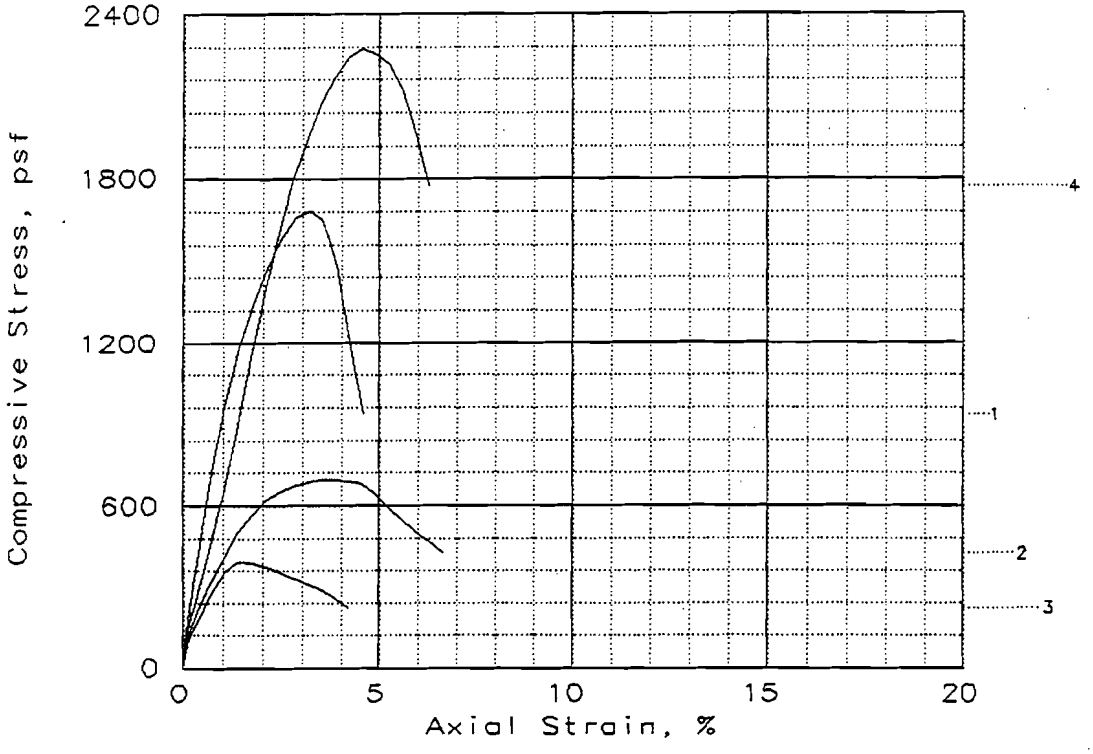
Location: B-108 12.5'

Fig. No.: ____

UNCONFINED COMPRESSION TEST

Soil Mechanics Lab

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1	2	3	4
Unconfined strength, psf	1686	695	391	2274
Undrained shear strength, psf	843	348	196	1137
Failure strain, %	3.2	3.9	1.4	4.6
Strain rate, in/min	0.0750	0.0750	0.0750	0.0750
Water content, %	23.6	22.9	19.1	27.9
Wet density, pcf	125.3	128.0	131.2	122.1
Dry density, pcf	101.4	104.1	110.2	95.4
Saturation, %	96.3	99.9	97.4	98.4
Void ratio	0.6628	0.6191	0.5302	0.7667
Specimen diameter, in	2.88	2.88	2.88	2.88
Specimen height, in	5.65	5.70	5.70	5.70
Height/diameter ratio	1.97	1.98	1.98	1.98

1) Description: Sa.1/9.5':Stf.v.dk gr. sndy(CL) -#200=85%

2) Description: Sa.2/15':Sft.olv.brn.sndy(CL) -#200=78%

3) Description: Sa.3/24':Sft.brn. silty f-c (SM) -#200=12%

4) Description: Sa.4/50.5':Stf.gr. ln.(CH) -#200=97%

GS= 2.7 | Type: Shelby

Project No.: 53483.001

Date: 6-19-01

Remarks:

Client: Harding ESE

Project: Russell City Energy Center

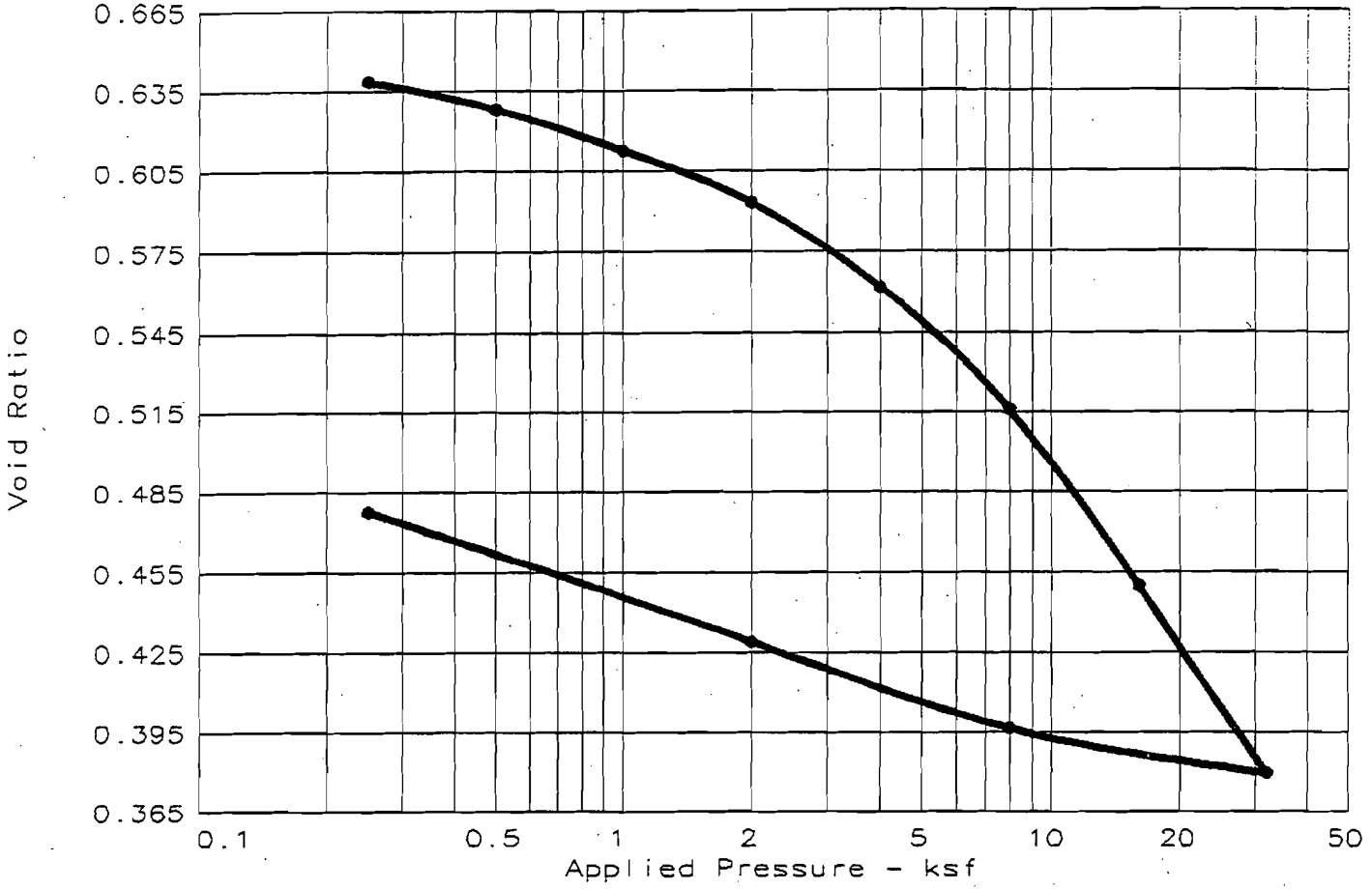
Location: B-109 @ 9.5,15,24 & 50.5'

UNCONFINED COMPRESSION TEST

Soil Mechanics Lab

Fig. No.: ——

CONSOLIDATION TEST REPORT ASTM D 2435



Coeffs. of Consolidation (sq. ft./day) & Secondary Consolidation											
No.	Load	Cv	Cα	No.	Load	Cv	Cα	No.	Load	Cv	Cα

Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Precons. (ksf)	C_c	e_o
77.0 %	18.6 %	102.0			2.700	5.00	0.23	0.6521

TEST RESULTS

Compression Index = 0.23

MATERIAL DESCRIPTION

Stiff, mottled brown sandy CLAY.

Class: CL

Project No.: 53483.001
Project: Russell City Energy Center
Location: B-105 13.5'

Date: 6-26-01

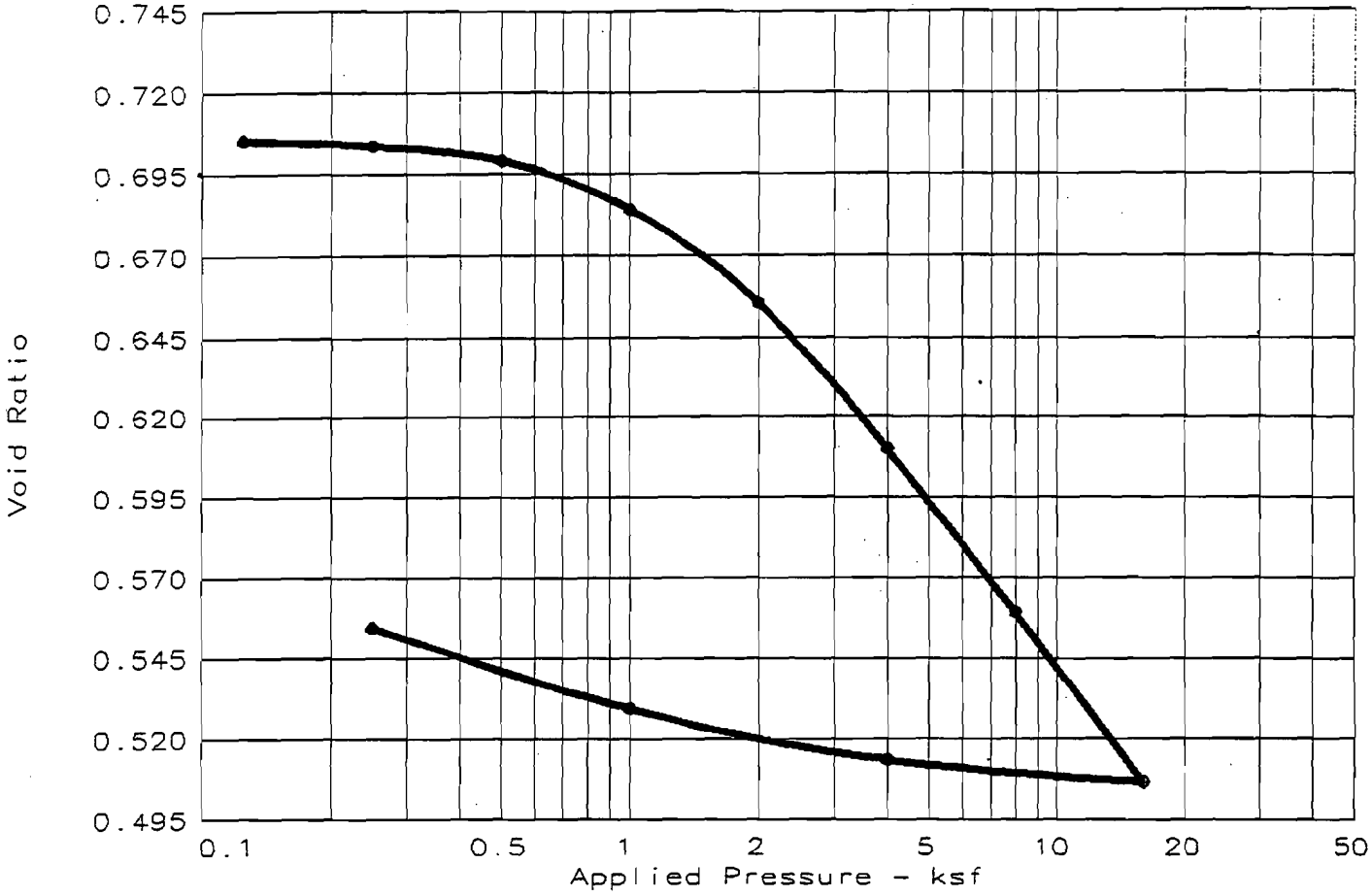
Remarks:

CONSOLIDATION TEST REPORT ASTM D 2435

Soil Mechanics Lab

Fig. No. ____

CONSOLIDATION TEST REPORT ASTM D 2435



Coeffs. of Consolidation (sq. ft./day) & Secondary Consolidation										
No.	Load	Cv	Cα	No.	Load	Cv	Cα	No.	Load	Cv	Cα

Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Precons. (ksf)	C_c	e_o
89.5 %	23.4 %	98.8			2.700	1.54	0.17	0.7058

TEST RESULTS

Compression Index = 0.17

MATERIAL DESCRIPTION

Mottled brown sandy CLAY w/caliche incls'n.

Class: CL

Project No.: 53483.001
Project: Russell City Energy Center
Location: B-105 25'

Date: 6-26-01

Remarks:

CONSOLIDATION TEST REPORT ASTM D 2435

Soil Mechanics Lab

Fig. No. _____

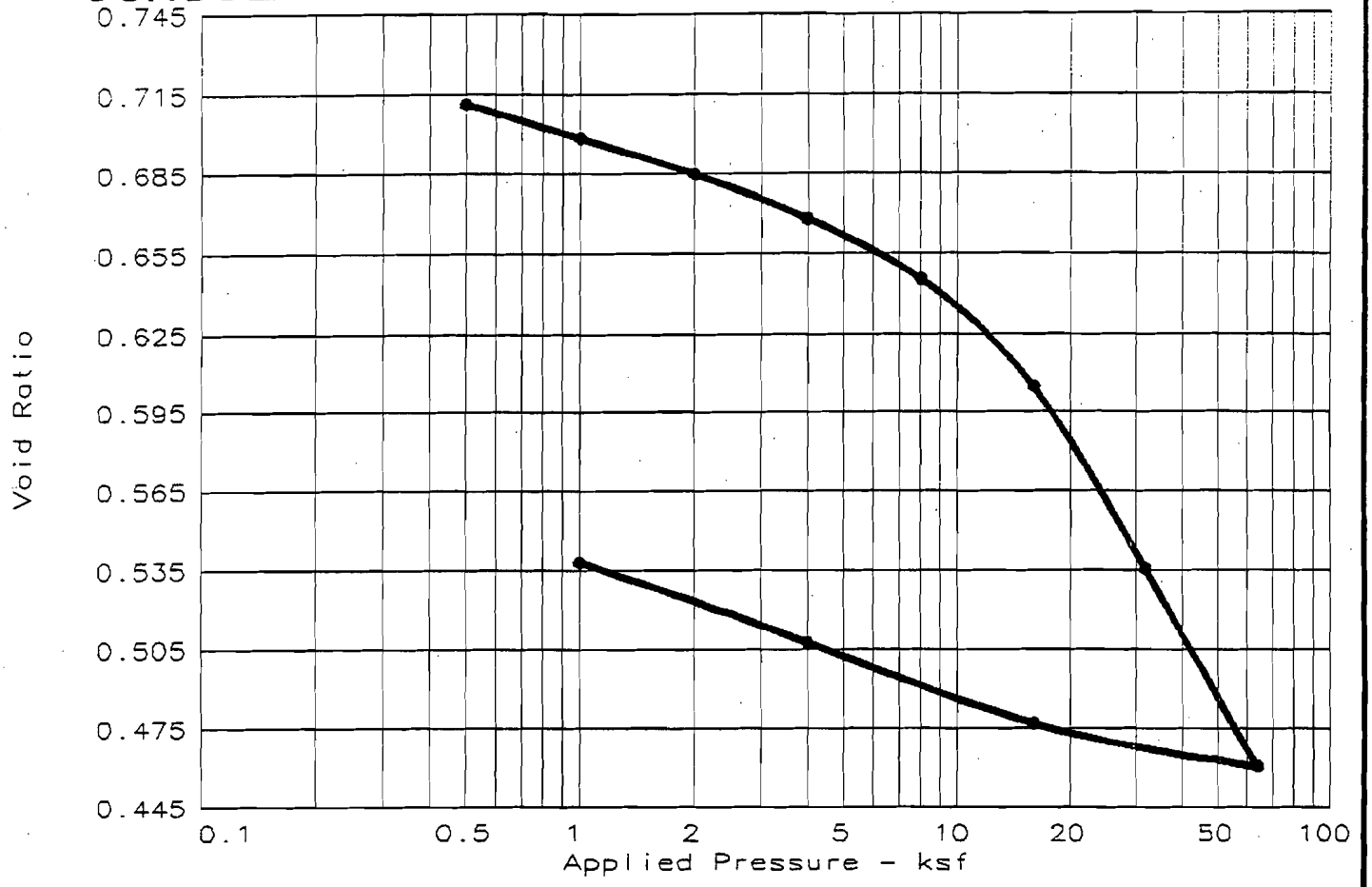
CONSOLIDATION TEST REPORT ASTM D 2435

Coeffs. of Consolidation (sq. ft./day) & Secondary Consolidation										
No.	Load	Cv	Cα	No.	Load	Cv	Cα	No.	Load	Cv	Cα

Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Precons. (ksf)	C_c	e_o
91.0 %	22.0 %	102.0			2.700	9.98	0.23	0.6527

TEST RESULTS	MATERIAL DESCRIPTION
Compression Index = 0.23	Olive gray silty CLAY.
	Class: CL
Project No.: 53483.001 Project: Russell City Energy Center Location: B-105 45' Date: 6-26-01	Remarks:
CONSOLIDATION TEST REPORT ASTM D 2435 Soil Mechanics Lab	Fig. No. ____

CONSOLIDATION TEST REPORT ASTM D 2435



Coeffs. of Consolidation (sq. ft./day) & Secondary Consolidation										
No.	Load	Cv	Cα	No.	Load	Cv	Cα	No.	Load	Cv	Cα

Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Precons. (ksf)	C_c	e_o
93.6 %	24.8 %	98.2			2.700	13.06	0.25	0.7157

TEST RESULTS

Compression Index = 0.25

MATERIAL DESCRIPTION

Olive gray silty CLAY

Class: CL

Project No.: 53483.001
Project: Russell City Energy Center
Location: B-105 75.0'

Date: 6-26-01

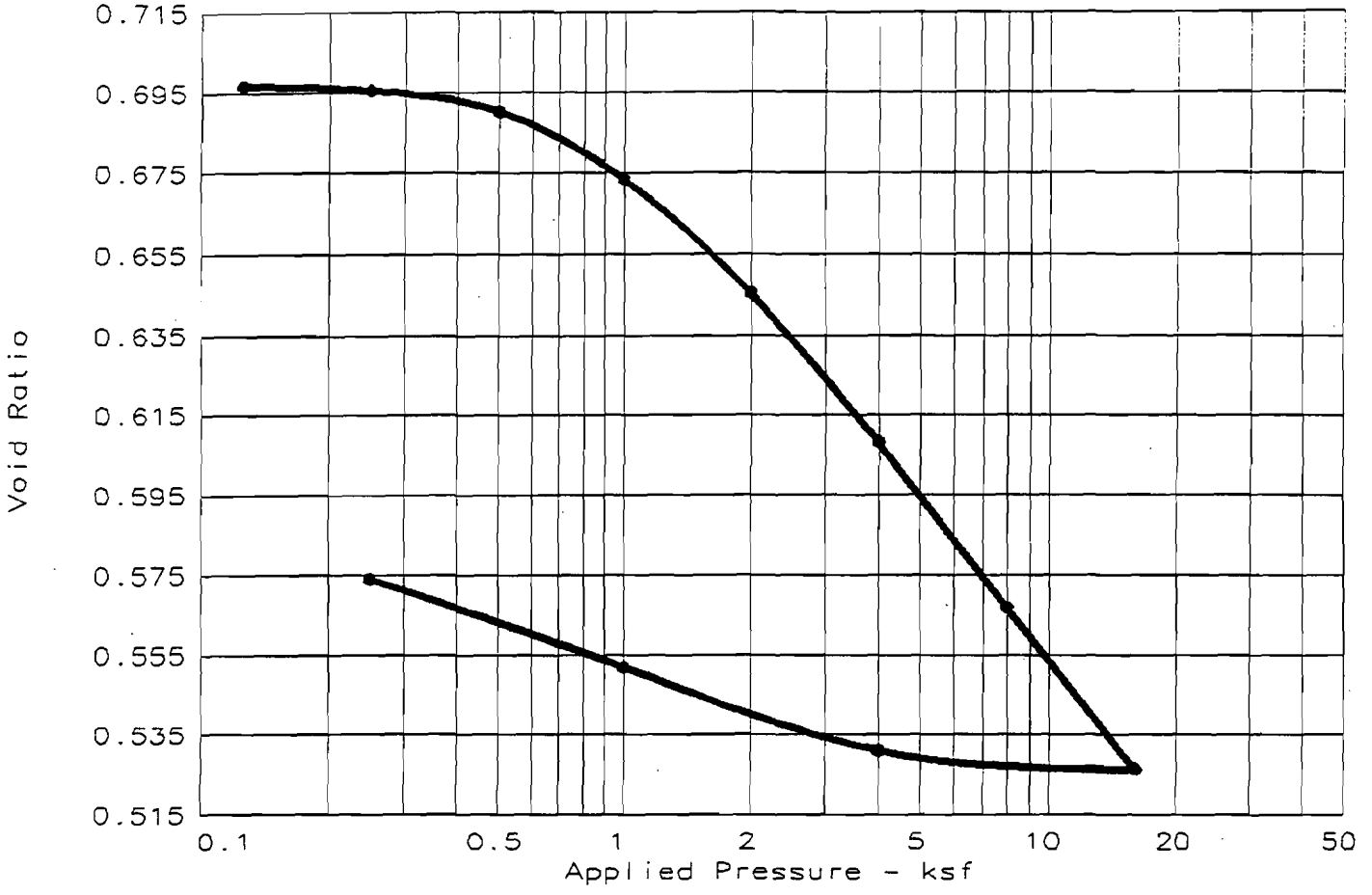
Remarks:

CONSOLIDATION TEST REPORT ASTM D 2435

Soil Mechanics Lab

Fig. No. _____

CONSOLIDATION TEST REPORT ASTM D 2435



Coeffs. of Consolidation (sq. ft./day) & Secondary Consolidation											
No.	Load	Cv	Cα	No.	Load	Cv	Cα	No.	Load	Cv	Cα

Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Precons. (ksf)	C_c	e_o
101.9 %	26.3 %	99.3			2.700	1.09	0.13	0.6968

TEST RESULTS

Compression Index = 0.13

Project No.: 53483.001
Project: Russell City Energy Center
Location: B-107 6'

Date: 6-26-01

CONSOLIDATION TEST REPORT ASTM D 2435

Soil Mechanics Lab

MATERIAL DESCRIPTION

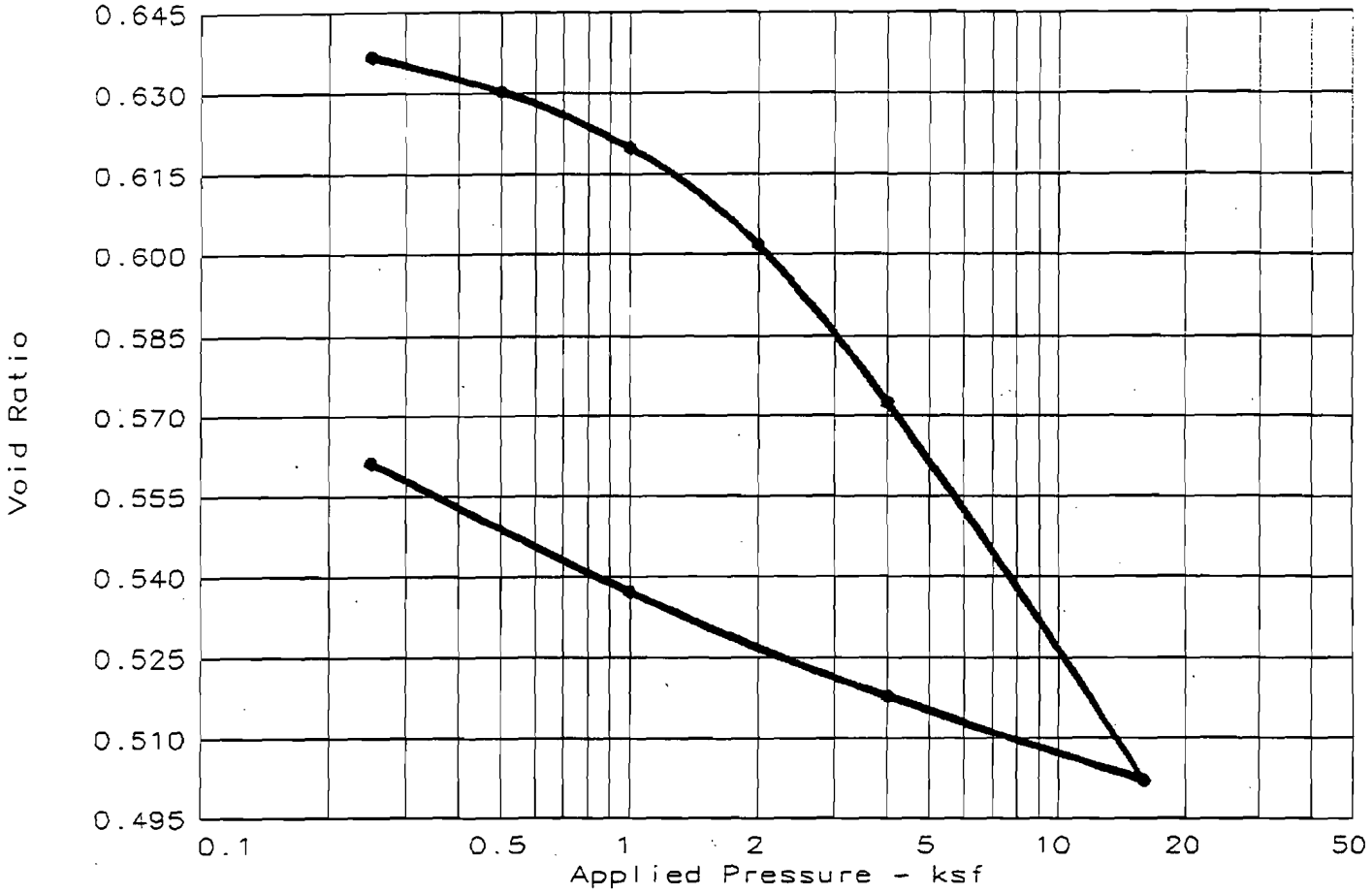
Gray to v.dk.gray sandy CLAY.

Class: CL-CH

Remarks:

Fig. No. _____

CONSOLIDATION TEST REPORT ASTM D 2435

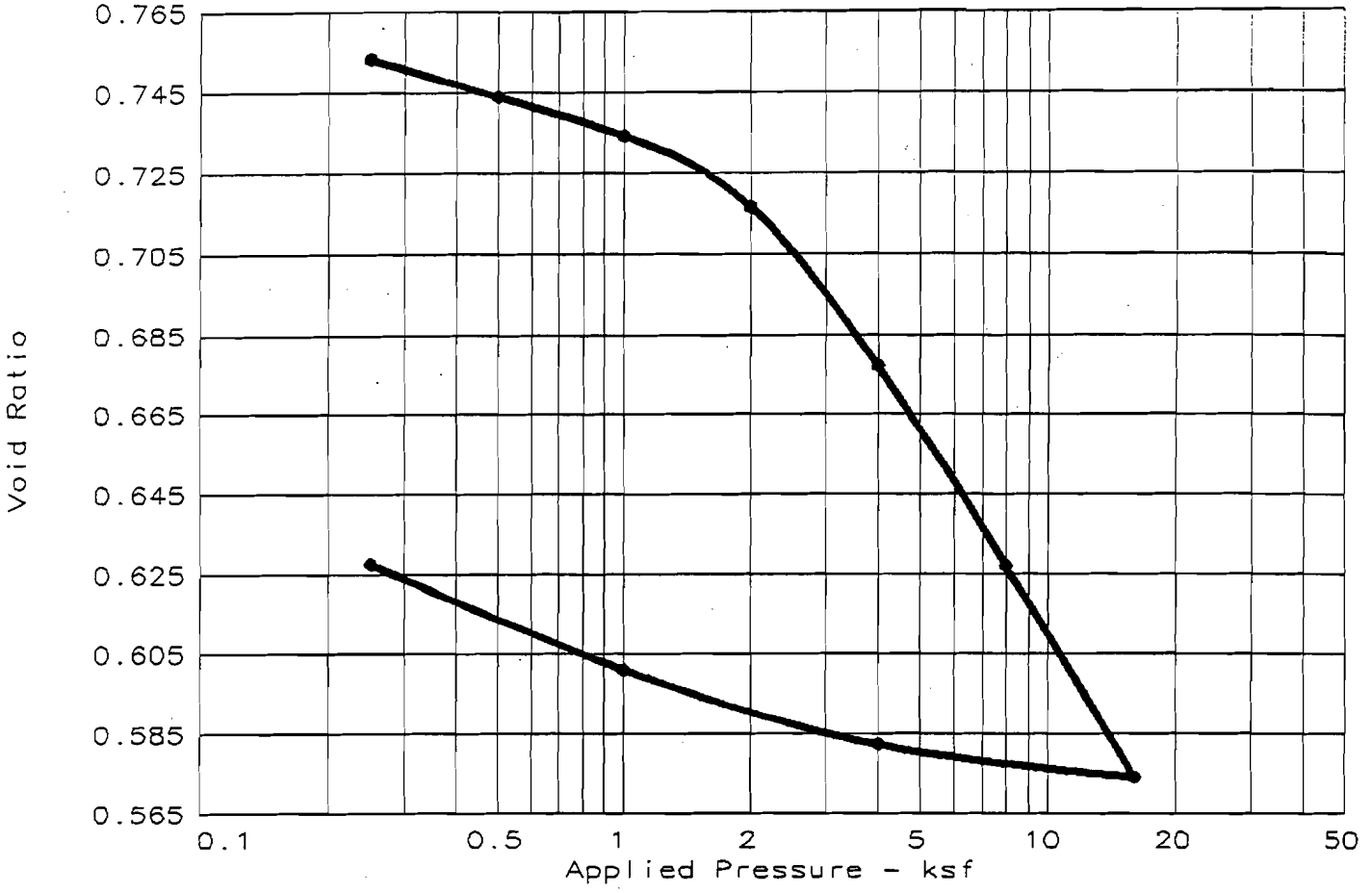


Coeffs. of Consolidation (sq. ft./day) & Secondary Consolidation										
No.	Load	Cv	Cα	No.	Load	Cv	Cα	No.	Load	Cv	Cα

Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Precons. (ksf)	C_c	e_o
105.2 %	25.2 %	102.3			2.700	1.79	0.12	0.6470

TEST RESULTS	MATERIAL DESCRIPTION
Compression Index = 0.12	Olive gr/brn.silty CLAY Class: CL
Project No.: 53483.001 Project: Russell City Energy Center Location: B-107 14.5' Date: 6-26-01	Remarks:
CONSOLIDATION TEST REPORT ASTM D 2435 Soil Mechanics Lab	Fig. No. ____

CONSOLIDATION TEST REPORT ASTM D 2435



Coeffs. of Consolidation (sq. ft./day) & Secondary Consolidation											
No.	Load	Cv	Cα	No.	Load	Cv	Cα	No.	Load	Cv	Cα

Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Precons. (ksf)	C_c	e_o
88.4 %	25.0 %	95.6			2.700	2.44	0.18	0.7632

TEST RESULTS

Compression Index = 0.18

MATERIAL DESCRIPTION

Dark gray FAT CLAY.

Class: CH

Project No.: 53483.001
Project: Russell City Energy Center
Location: B-109 8.0'

Date: 6-26-01

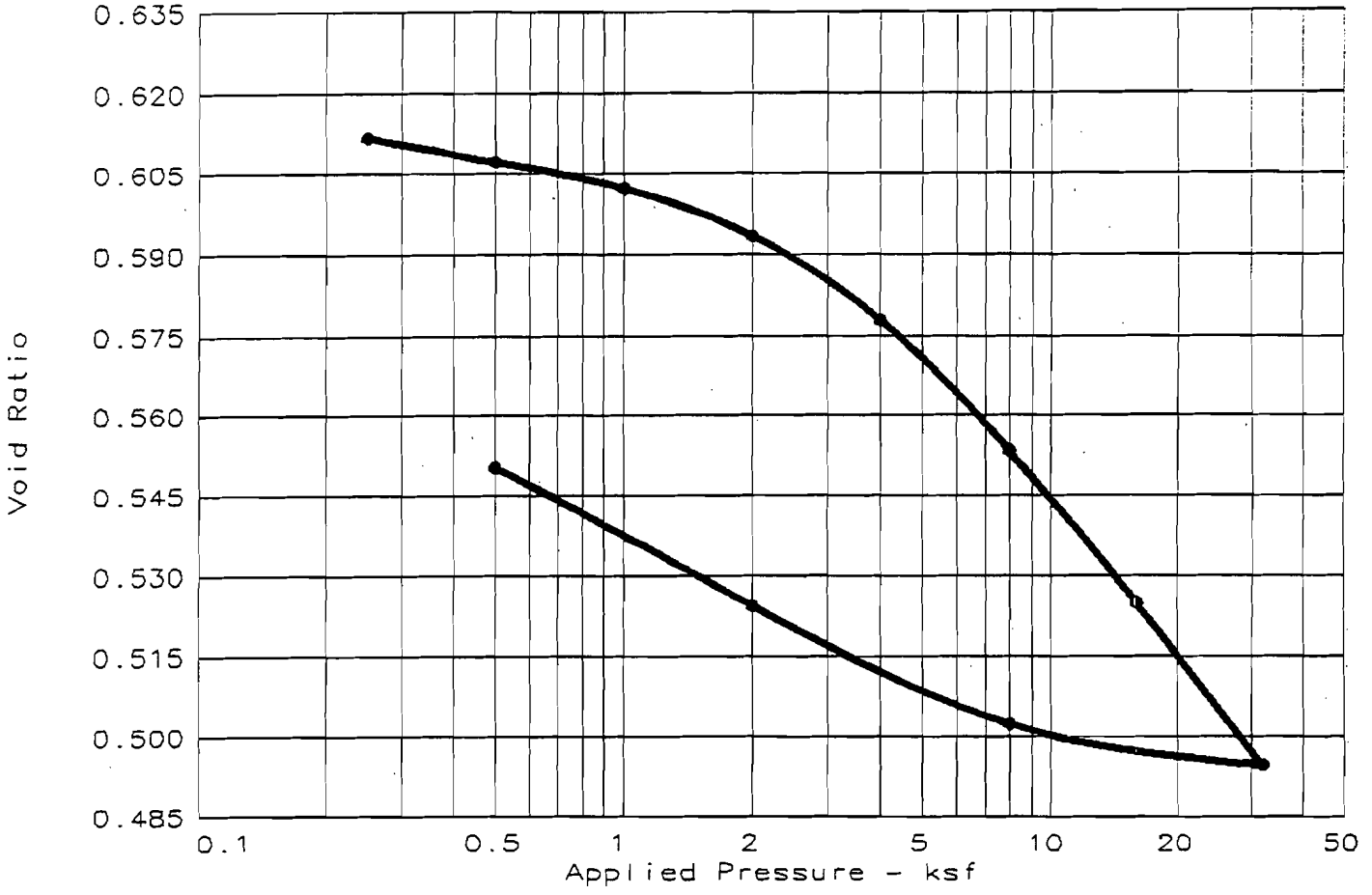
Remarks:

CONSOLIDATION TEST REPORT ASTM D 2435

Soil Mechanics Lab

Fig. No. _____

CONSOLIDATION TEST REPORT ASTM D 2435



Coeffs. of Consolidation (sq. ft./day) & Secondary Consolidation										
No.	Load	Cv	Cα	No.	Load	Cv	Cα	No.	Load	Cv	Cα

Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Precons. (ksf)	C_c	e_o
90.0 %	20.7 %	104.0			2.700	3.51	0.10	0.6214

TEST RESULTS

Compression Index = 0.10

MATERIAL DESCRIPTION

Mottled, olive gray/brn. sandy CLAY.*

Class: CL

Project No.: 53483.001
Project: Russell City Energy Center
Location: B-109 26.0'

Date: 6-26-01

Remarks:

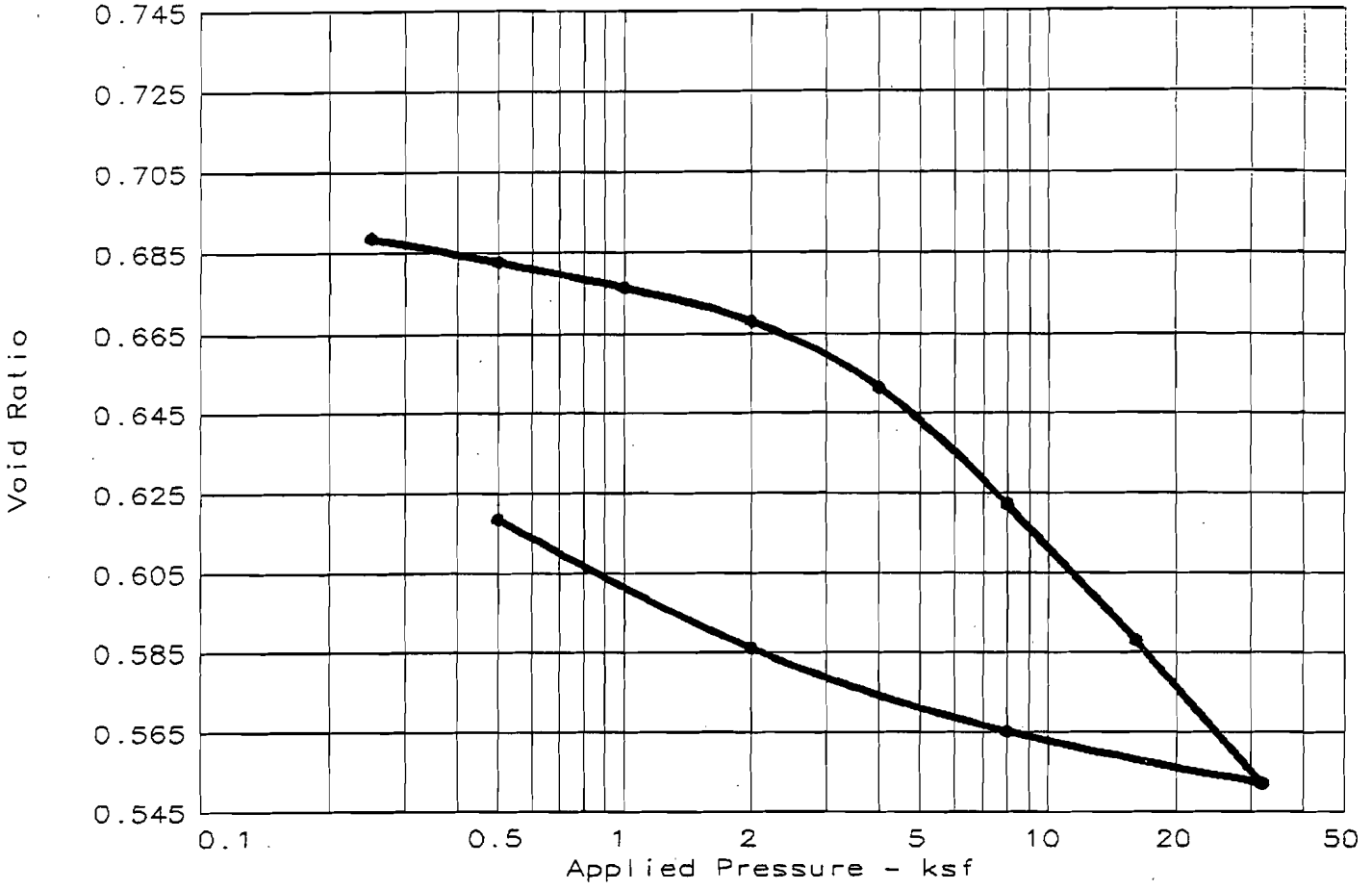
*Test on bott. clay portion.

CONSOLIDATION TEST REPORT ASTM D 2435

Soil Mechanics Lab

Fig. No. _____

CONSOLIDATION TEST REPORT ASTM D 2435



Coeffs. of Consolidation (sq. ft./day) & Secondary Consolidation											
No.	Load	Cv	Cα	No.	Load	Cv	Cα	No.	Load	Cv	Cα

Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Precons. (ksf)	C_c	e_o
96.1 %	24.7 %	99.5			2.700	4.00	0.12	0.6936

TEST RESULTS	MATERIAL DESCRIPTION
Compression Index = 0.12	Olive gray silty CLAY. Class: CL
Project No.: 53483.001 Project: Russell City Energy Center Location: B-109 49.5' Date: 6-26-01	Remarks:
CONSOLIDATION TEST REPORT ASTM D 2435 Soil Mechanics Lab	Fig. No. _____

CERCO Analytical, Inc.
3942-A Valley Avenue, Pleasanton, CA 94566-4715 (925) 462-2771 Fax (925) 462-2775

FINAL RESULTS

Client:	Soil Mechanics Lab	Date Sampled:	Not Indicated
Client's Project No.:	53483.001	Date Received:	25-Jun-2001
Client's Project Name:	Russel City Energy Center	Date of Report:	6-Jul-2001
Authorization:	Transmittal	Matrix:	Soil

Job/Sample No.	Sample I.D.	Redox (mV)	pH	Conductivity (umhos/cm)*	Resistivity (100% Saturation) (ohms-cm)	Sulfide (mg/kg)*	Chloride (mg/kg)*	Sulfate (mg/kg)*
0106176-001	B-103 @ 3-4'	-	8.3	-	-	-	1,500	510
0106176-002	B-104 @ 4.5-5.5'	-	8.0	-	-	-	660	180
0106176-003	B-105 @ 1-1.5'	-	8.0	-	-	-	120	29
0106176-004	B-107 @ 2.5-3'	-	8.6	-	-	-	200	83
0106176-005	B-109 @ 1-1.5'	-	8.4	-	-	-	N.D.	68

Method:	ASTM D1498	ASTM D4972	ASTM D1125M	ASTM G57	ASTM D4658M	ASTM D4327	ASTM D4327
Detection Limit:	-	-	10	-	50	15	15
Date Analyzed:	-	2-Jul-2001	-	-	-	3-Jul-2001	3-Jul-2001

Cheryl McMillen
Laboratory Director

* Results Reported on "As Received" Basis
N.D. - None Detected

Quality Control Summary - All laboratory quality control parameters were found to be within established limits