Appendix E: Geotechnical Investigation

TRC Lowney

Geotechnical Investigation

Proposed Wal-Mart Supercenter

Southwest Corner of Peterson Road and Walters Road

Suisun City, California

Report No. 2232-1B has been prepared for:

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GEOTECHNICAL INVESTIGATION

PROPOSED WAL-MART SUPERCENTER

SOUTHWEST CORNER OF PETERSON ROAD AND WALTERS ROAD

SUISUN CITY, CALIFORNIA

1.0 INTRODUCTION

This report presents the results of our geotechnical investigation for the proposed Wal-Mart Supercenter to be located in Suisun City, California. The location of the site is shown on the Vicinity Map, Figure 1. The purpose of our investigation was to evaluate the subsurface conditions at the site and to provide geotechnical recommendations for design and construction of the proposed development. For our use, we received a conceptual plan titled, "Conceptual Site Layout, Wal-Mart, Suisun City, California, CP10" prepared by Robert A. Karn & Associates, dated August 15, 2006.

With the exception of Parcels 1, 3, and 4, this report has been prepared in accordance with Wal-Mart's Geotechnical Investigation Specifications and Report Requirements dated July 5, 2006. In Parcels 1, 3, and 4 we geared our investigation towards determining the potential for settlement due to liquefaction, depth to ground water, plasticity index, and providing pavement recommendations. We also performed a Phase I Environmental Site Assessment, the results of which were presented in a separate report.

1.1 Project Description

We understand that you are planning on developing an approximately 18.3 acre site (Parcel 2) for the construction of an approximately 214,919 square foot, one-story (high bay) Wal-Mart Supercenter. We understand that Parcels, 1, 3, and 4 are not going to be developed by Wal-Mart. In reference to Parcels 1, 3 and 4, this report provides a brief summary of anticipated potential for settlement due to liquefaction, shink/swell potential, and anticipated pavement recommendations. Except as noted, our findings, conclusions, and recommendations in this report only refer to the main Wal-Mart parcel.

The new Wal-Mart Supercenter will likely be constructed of masonry block walls with slab-on-grade floors. Typical gravity loads for interior and exterior columns for the new store will be on the order of 85 kips and 50 kips, respectively; and up to 150 kips for severe live loading conditions. Concrete masonry wall gravity loads are estimated to range from 1.5 to 2.0 kips per linear foot for non-load bearing walls and 4.0 to 6.0 kips per lineal foot for load bearing walls. Maximum uniform floor slab live loads are anticipated to be 125 psf, with maximum concentrated loads of 5 kips.

Finish site grades have yet to be determined; however, we estimate that cuts and fills will likely range from about 1 to 5 feet. Associated surface parking, underground utilities and landscaping will be constructed. A layout of the proposed development is shown on the Site Plan, Figure 2.

1.2 Scope of Services

We provided the following services as presented in our agreement with you dated September 22, 2006:

- Exploration of subsurface conditions by drilling 51 exploratory borings and retrieving soil samples for observation and laboratory testing.
- Evaluation of physical and engineering properties of the subsurface soils by visually classifying the samples and performing various laboratory tests on selected samples.
- Engineering analysis to evaluate site earthwork, building foundations, slabs-on-grade, retaining walls, and pavements.
- Preparation of this report to summarize our findings and to present our conclusions and recommendations.

Per our electronic communication dated December 7th, 2006, we were requested to perform the following supplemental services regarding Parcels 1, 3, and 4:

- Exploration of subsurface conditions by advancing three Cone Penetration Tests (CPTs), measure the depth to ground water, and retrieve shallow soil samples for laboratory testing.
- Evaluation of physical and engineering properties of the subsurface soils by performing various laboratory tests on selected samples.
- Engineering analysis to evaluate the potential for settlement due to liquefaction, expansive potential of onsite soils, and pavement sections.
- Inclusion of our findings into this report.

Services related to off-site improvements were not included in the scope of this investigation.

2.0 SITE CONDITIONS

2.1 Surface

We performed a brief visual surface reconnaissance during our site exploration. The approximately 19.8-acre site includes Parcels 1, 2 and 3 and is located on the southwest corner of Peterson Road and Walters Road. It is bordered by Walters Road to the east, Peterson Road to the north, State Highway 12 to the south, and vacant land to the west.

The site appears to be approximately 2 to 4 feet lower around the site boundary than towards the middle. An approximately 5-feet-deep and 5 feet-wide drainage ditch runs roughly north-south from Peterson Road to the intersection of Walters Road and State Highway 12. At the time of our exploration program, the site was vacant and covered with vegetation, including tall grasses and reeds.

The approximately 3.1-acre Parcel 4 is located at the northeast corner of Highway 12 and Walters Road. The roughly triangular site is bordered by Walters Road to the northwest, Highway 12 to the southwest, and a barbed-wire fence to the east. This parcel appears to be upwards of approximately 1 to 3 feet lower than Walters Road and Highway 12. Similar to Parcels 1, 2 and 3, the site was vacant and covered with vegetation, including tall grasses and reeds at the time of our exploration program.

2.2 Exploration Program

The exploratory borings were performed between October 24 and 26, 2006 using conventional, truck-mounted, hollow-stem auger drilling equipment. We drilled 15 of the borings within the proposed building footprint to a depth of approximately 20 feet. One boring within the proposed building footprint was drilled to a depth of approximately 50 feet to provide data for a liquefaction evaluation. The remaining 35 borings were drilled to a depth of approximately 10 feet in the proposed parking areas.

We returned to the site on December 11th, 2006 and advanced four CPTs to depths of approximately 40 to 50 feet using conventional, truck-mounted CPT equipment. These CPTs were performed on Parcels 1, 3, and 4.

The borings and CPTs were permitted and backfilled in accordance with Solano County guidelines. The approximate locations of the borings are shown on the Site Plan, Figure 2. Boring and CPT logs and details regarding our field investigation are included in Appendix A; our laboratory tests are discussed in Appendix B.

2.3 Subsurface

In Parcel 2, some of our borings encountered approximately 1 to 4 feet of very stiff to hard lean clay with gravelly undocumented fill in the outlined portion of Figure 2. For all parcels, any undocumented fill, and the rest of the site, is primarily underlain by interbedded layers of stiff to hard lean clay with sand and lean clay with silt to a depth of approximately 50 feet, the maximum depth explored. Some of our borings encountered a medium dense to dense clayey sand layer between the approximate depths of 12 and 20 feet. Our CPTs generally agreed with our soil borings.

Two Plasticity Index (PI) tests were performed on samples of the surficial soils at a depth of 1½ feet, resulting in a PI of 36 and 40, indicating a high plasticity and shrink/swell potential. The results of these tests are shown on Figure B-1.

On Parcels 1, 3, and 4, a total of three Plasticity Index tests were performed on samples of the surficial soils at depths of approximately 0 to 1 foot. In Parcel 1 the test resulted in a PI of 8, indicating a low plasticity and shrink/swell potential. In Parcel 3 the test resulted in a PI of 15, indicating a low to moderate plasticity and shrink/swell potential. In Parcel 4 the test resulted in a PI of 5, indicating a low plasticity and shrink/swell potential. The results of these tests are shown on Figure B-1.

A UBC Expansion Index test was performed on a native clay sample at a depth of approximately 1 foot which resulted in an expansion index of 91 indicating a high expansion and shrink/swell potential. The result of this test is shown on Figure B-2.

An organic content test performed on a sample of the onsite native soils from Boring EB-15 at a depth of 1½ feet resulted in an organic content of 3.0 percent by weight, as shown on Figure B-3.

A compaction test performed on a sample of the near surface soils resulted in a maximum dry density of 121 pounds per cubic foot with an optimum moisture content of 9½ percent, as shown on Figure B-4.

2.4 Ground Water

For all parcels, we have prepared the following Table 1 summarizing the free ground water depths from the ground surface at the location of the boring or CPT.

Table 1. Depth to Free Ground Water

Boring	Initial Measured Depth to Ground Water (feet)[1]	Final Measured Depth to Ground Water (feet)	Approximate Time Between Initial and Final Ground Water Measurements (hour)
EB-1 : Parcel 2	NE	6.5	16
EB-9 : Parcel 2	NE	6.2	16
EB-14 : Parcel 2	7.3	7.1	41
CPT-1 : Parcel 1	NE	6.3	½
CPT-2 : Parcel 3	NE	6.0	½
CPT-3 : Parcel 4	NE	6.1	2
CPT-4 : Parcel 4	NE	5.8	2

Note 1: "NE" means free ground water was not encountered during drilling

Fluctuations in the level of the ground water may occur due to variations in rainfall, underground drainage patterns, and other factors not evident at the time our measurements were made.

3.0 GEOLOGIC HAZARDS

A brief qualitative evaluation of geologic hazards was made during this investigation. Our comments concerning these hazards are presented below.

3.1 Fault Rupture Hazard

A Regional Fault Map illustrating known active faults relative to the site is presented on Figure 3. The site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone (known formerly as a Special Studies Zone). Since no known surface expression of active faults is believed to cross the site, fault rupture through the site is not anticipated.

3.2 Ground Shaking

Strong ground shaking can be expected at the site during moderate to severe earthquakes in the general region. This is common to virtually all developments in the greater San Francisco Bay Area. The "Seismicity" section that follows summarizes potential levels of ground shaking at the site.

3.3 Liquefaction

3.3.1 General Discussion

Soils most susceptible to liquefaction are loose to moderately dense, saturated non-cohesive soils with poor drainage, such as sands and silts with interbedded or capping layers of relatively low permeability soil. During cyclic ground shaking, such as during earthquakes, cyclically induced stresses may cause increased pore water pressures within the soil matrix, resulting in liquefaction. Liquefied soil may loose shear strength that may lead to large shear deformations and/or flow failure under moderate to high shear stresses, such as beneath foundations or sloping ground (NCEER/NSF, 1998), and in many ways may behave more like a liquid than a solid. Liquefied soil can also settle (compact) as pore pressures dissipate following an earthquake. Limited field data is available on this subject; however, in some cases, settlement on the order of 2 to 3 percent of the thickness of the liquefied zone has been measured.

According to regional mapping of the site vicinity by the Association of Bay Area Governments (website, 2003), the potential for liquefaction at the site is low. Additionally, according to the liquefaction susceptibility map prepared by the USGS, the potential for liquefaction at the site is likewise low (USGS, 2006).

3.3.2 Analyses

As noted in the "Subsurface" section of this report, we encountered a loose layer of clayey sand below the design groundwater depth. These layers were evaluated to assess liquefaction potential and the effects liquefaction may have on the proposed development.

Our liquefaction analyses followed the methods presented by the 1998 NCEER Workshops (Youd, et al., 2001) in accordance with guidelines set forth in CDMG Special Publication 117 (CDMG, 1997). The NCEER method for SPT and CPT analysis update simplified procedures presented by Seed and Idriss (1971).

In broad terms, these methods are used to calculate a factor of safety against liquefaction triggering by comparing the resistance of the soil to cyclic shaking to the seismic demand that can be caused during seismic events. The analysis method compares the cyclic resistance ratio (CRR) with the earthquake-induced cyclic stress ratio (CSR) at different depths due to the estimated earthquake ground motions.

The resistance to cyclic shaking is quantified by the Cyclic Resistance Ratio (CRR), which is a function of soil density, layer depth, ground water depth, earthquake magnitude, and soil behavior.

For our analysis of Parcel 2, we calculated the CRR using the SPT method. We corrected the field SPT blow counts, known as "N" values, from our boring for overburden, stress reduction versus depth, fines content, hammer energy ratio, boring diameter, rod length, and sampling method (SPT sampler without liners) in accordance with the methods presented in the NCEER paper. The CRRs were then corrected for the design ground water level and magnitude scaling factors.

For our analysis of Parcels 1, 3, and 4 the CRR calculations are based on CPT tip resistance. Our CPT tip pressures were corrected for overburden and fines content. The CPT method utilizes the soil behavior type index (I_C) and the exponential factor "n" applied to the Normalized Cone Resistance "Q" to evaluate how plastic the soil behaves.

The Cyclic Stress Ratio (CSR) is used to quantify the stresses that are anticipated to develop during cyclic shaking. The formula for CSR is shown below:

$$CSR = 0.65(\frac{a_{\max}}{g})(\frac{\sigma_{vo}}{\sigma'_{vo}})r_d$$

where a_{max} is the peak horizontal acceleration at the ground surface generated by an earthquake, g is the acceleration of gravity, σ_{vo} and σ'_{vo} are total and effective overburden stresses, respectively, and r_d is a stress reduction coefficient. Our analysis was performed using a peak horizontal ground motion of 0.47g having a 10% chance of exceedance in 50 years (from computer program EZFRISK) and a Moment Magnitude of 6.5.

Soils that have significant amounts of plastic fines (greater than about 25 percent) with an I_C greater than 2.6 or corrected CPT tip resistances greater than 160 tons per square foot (tsf) are considered either too plastic or too dense to liquefy. Such soil layers have been screened out during our analysis and are not presented below.

The factor of safety (FS) against liquefaction is the ratio of the CRR to the CSR (cyclic stress ratio) or seismic demand on a soil layer based on the Seed and Idriss (1971) equation. If the FS for a soil layer is less than 1.0, it is possible that the soil layer may liquefy during a moderate to large seismic event.

$$FS = \frac{CRR}{CSR}$$

A summary of our analysis for both SPT and CPT data is presented in the tables below.

Table 2. Results of Liquefaction Analyses – SPT Method

Boring Number	Depth to Top of Sand/Silt Layer (feet)	Thickness of Layer (feet)	*SPT $(N_1)_{60CS}$	Factor of Safety	Potential for Liquefaction	Estimated Total Settlement (in.)	Estimated Differential Settlement (in.)
EB-8	17.5	3.5	22	1.15	Low	0.23	0.12
					Total =	**0.23**	**0.12**
EB-22	17.5	4.0	22	1.03	Moderate	0.35	0.18
					Total =	**0.35**	**0.18**

* SPT blow counts corrected for overburden, sampling methods, and fines content

Table 3. Results of Liquefaction Analyses – CPT Method

CPT Number	Depth to Top of Sand/Silt Layer (feet)	Layer Thickness (feet)	I_C	$*(q_{c1N})_{cs}$ (tsf)	Factor of Safety	Potential for Liquefaction	Estimated Total Settlement (in.)	Estimated Differential Settlement (in.)
CPT-1 Parcel 1	43.93	0.21	2.39	123	0.79	Likely	0.04	0.02
						Total =	**0.04**	**0.02**
CPT-2 Parcel 3	12.37	3.22	2.01	130	0.89	Likely	0.47	0.23
	28.94	0.22	2.5	143	1.01	Low	0.02	0.01
						Total =	**0.49**	**0.25**
CPT-3 Parcel 4	9.49	2.58	2.45	129	0.94	Likely	0.33	0.17
	14.16	0.36	2.54	143	1.09	Low	0.02	0.01
						Total =	**0.35**	**0.18**
CPT-4 Parcel 4	7.13	2.22	2.25	127	0.98	Likely	0.25	0.12
	10.04	1.53	2.33	118	0.78	Likely	0.29	0.15
	18.83	0.29	2.36	141	1.01	Low	0.03	0.01
	19.2	0.22	2.5	142	1.02	Low	0.02	0.01
	21	0.57	2.53	120	0.7	Likely	0.13	0.07
	31.5	0.27	2.49	139	0.95	Likely	0.03	0.02
						Total =	**0.75**	**0.38**

* CPT tip pressure corrected for overburden and fines content

3.3.3 Results

Post-liquefaction volumetric strains and settlements were estimated using Ishihara and Yoshimine (1990) method. As discussed in the SCEC (1999) report, anticipated differential settlements for level sites with deep sediments will be on the order of half of the total estimated settlements.

For Parcel 2, our analyses indicate that the sand layers theoretically can liquefy, resulting in about 0.35 inch of total surface settlement. In accordance with the SCEC report, differential settlements are anticipated to be on the order of 0.18 inch. With respect to the entire building, we believe that the liquefaction settlements will only affect very small, localized portions of the building and therefore can be excluded from the total settlement estimates.

For Parcel 1, our analyses indicate that a sand layer theoretically can liquefy, resulting in about 0.04 inch of total surface settlement. In accordance with the SCEC report, differential settlements are anticipated to be very low.

For Parcel 3, our analyses indicate that the sand layers theoretically can liquefy, resulting in about 0.5 inch of total surface settlement. In accordance with the SCEC report, differential settlements are anticipated to be on the order of ¼-inch.

For Parcel 4, our analyses indicate that the sand layers theoretically can liquefy, resulting in between 0.35 to 0.75 inch of total surface settlement. In accordance with the SCEC report, differential settlements are anticipated to be on the order of ¼-inch.

3.3.4 Potential for Ground Rupture/Sand Boils

The methods of analysis used to evaluate estimated total settlement do not take into account the possibility of surface ground rupture. In order for liquefaction induced sand boils or fissures to occur, the pore water pressure induced within the liquefied strata must exert a large enough force to break through the surface layer.

For all Parcels, based on work by Youd and Garris (1995), it is our opinion that there is enough of a cap of non-liquefiable material (about 7 feet of stiff clay) to prevent ground rupture at the site and that the above estimates of liquefaction induced settlement are therefore reasonable.

3.4 Differential Compaction

If near-surface soils vary in composition both vertically and laterally, strong earthquake shaking can cause non-uniform compaction of soil strata, resulting in movement of the near-surface soils. Because the near-surface soils encountered at the site are generally medium stiff to very stiff clays and medium dense to dense sands and do not appear to change in thickness or consistency abruptly over short distances, we judge the probability of significant differential compaction at the site to be low.

3.5 Lateral Spreading

Lateral spreading typically occurs as a form of horizontal displacement of relatively flat-lying alluvial material toward an open or "free" face such as an open body of water, channel, or excavation. Since there are no creeks or open bodies of water within an appropriate distance from the site for lateral spreading to occur, the probability of lateral spreading occurring at the site during a seismic event is low.

4.0 SEISMICITY

4.1 Regional Active Faults

The San Francisco Bay Area is one of the most seismically active regions in the United States. The significant earthquakes that occur in and around the Bay Area are generally associated with crustal movement along well-defined, active fault zones of the San Andreas Fault system, which regionally trend in a northwesterly direction. The closest active fault to the site is the Concord – Green Valley fault, which passes about 8 miles to the west. The potentially active Cordelia Fault passes about 7 miles to the west. Four other major active faults in the area are the West Napa Fault located about 15 miles to the southwest, the Greenville Fault located about 18½ miles south, the Rogers Creek Fault located about 22 miles southwest, and the Hayward Fault located about 26 miles southwest.

4.2 Maximum Estimated Ground Shaking

The Probabilistic Seismic Hazard Analysis (PSHA) reported by the computer program EZFRISK estimates a peak horizontal ground acceleration of 0.47g at the site with a 10 percent probability of exceedance in 50 years. This is based on a Magnitude 6.5 earthquake.

4.3 Future Earthquake Probabilities

Although research on earthquake prediction has greatly increased in recent years, seismologists cannot predict when or where an earthquake will occur. The U.S. Geological Survey's Working Group on California Earthquake Probabilities (2002), referred to as WG02, estimated that there is a 62 percent chance of at least one magnitude 6.7 or greater earthquake striking the San Francisco Bay region between 2003 and 2032. This result is an important outcome of WG02's work, because any major earthquake can cause damage throughout the region.

The 1989 Loma Prieta earthquake demonstrated this potential by causing severe damage in Oakland and San Francisco, more than 50 miles from the fault rupture. Although earthquakes can cause damage at a considerable distance, shaking will be very intense near the fault rupture. Therefore, earthquakes located in urbanized areas of the region have the potential to cause much more damage than the 1989 Loma Prieta earthquake.

4.4 2001 CBC Site Coefficients

The California Division of Mines and Geology (CDMG) has issued maps locating "Active Fault Near-Source Zones" to be used with the 2001 California Building Code. Faults are classified as either "A," "B," or "C" as shown in Table 4. Only faults classified as "A" or "B" are mapped since faults classified as "C" do not increase the near-source factor.

Table 4. Seismic Source Definitions

Seismic Source Type	Seismic Source Description	Seismic Source Definition*	
		Maximum Moment Magnitude, M	Slip Rate, SR (mm/yr)
A	Faults that are capable of producing large magnitude events and that have a high rate of seismic activity.	$M \geq 7.0$	$SR \geq 5$
B	All faults other than Types A and C.	$M \geq 7.0$ $M < 7.0$ $M \geq 6.5$	$SR < 5$ $SR > 2$ $SR < 2$
C	Faults that are not capable of producing large magnitude earthquakes and that have a relatively low rate of seismic activity.	$M < 6.5$	$SR \leq 2$

*Note: Both maximum moment magnitude and slip rate conditions must be satisfied concurrently when evaluating seismic source type.

The following table lists Type B faults within 25 kilometers (km) of the site; no Type A faults are located within 25 km:

Table 5. Approximate Distance to Seismic Sources

Fault	Seismic Source Type	Distance (kilometers)
Green Valley Fault	B	13
West Napa Fault	B	24

The California Building Code (CBC) describes the procedure for evaluating soil profile types S_A through S_F in accordance with Section 1636.2 and Table 16-J. Based on our borings and experience in the area, the site is generally underlain by stiff and dense soils to a depth of at least 100 feet. Therefore, the site can be characterized as soil profile type S_D generally described as a stiff soil profile with average Standard Penetration Test (N) values in the range of 15 to 50 blows per foot. Based on this information, the site may be characterized for design based on Chapter 16 of the 2001 CBC using the information in Table 6 below.

Table 6. 2001 CBC Site Categorization and Site Coefficients

Categorization/Coefficient	Design Value
Soil Profile Type (Table 16-J)	S_D
Seismic Zone (Figure 16-2)	4
Seismic Zone Factor (Table 16-I)	0.4
Seismic Source Name	Green Valley
Seismic Source Type (Table 16-U)	B
Distance to Seismic Source (kilometers)	13
Near Source Factor N_a (Table 16-S)	1.00
Near Source Factor N_v (Table 16-T)	1.00
Seismic Coefficient C_a (Table 16-Q)	0.44
Seismic Coefficient C_v (Table 16-R)	0.64

*Note: For Seismic Zone 4, the near-source factor N_a used to determine C_a need not exceed 1.1 for structures complying with all the conditions within CBC Section 1629.4.2.

According to Chapter 16 of the 2000 International Building Code (IBC), Table 1615.1.1, Site Class Definitions, the proposed site can be classified as having a site Class D, Stiff Soil Profile.

5.0 CORROSION EVALUATION

To evaluate the corrosion potential of the subsurface soils at the site we submitted three samples collected during our subsurface investigation to an analytical laboratory for pH, resistivity, soluble sulfate and chloride content testing. JDH Corrosion Consultants then prepared a brief evaluation of the potential for corrosion. The results of their evaluation can be found in Appendix D.

6.0 CONCLUSIONS AND DEVELOPMENT CONSIDERATIONS

6.1 Conclusions

From a geotechnical engineering viewpoint the proposed development may be constructed as planned, provided design and construction is performed in accordance with the recommendations presented in this report. The primary geotechnical concerns at the site are as follows:

- The presence of highly expansive soils blanketing the site
- The presence of undocumented fill
- The presence of a shallow ground water table

A brief summary of these concerns is presented below. Detailed recommendations are presented in the following sections of this report.

6.1.1 Expansion Potential of Surficial Soils

Highly expansive surficial soils were encountered on Parcel 2. Expansive soils undergo significant volume change with changes in moisture content. They shrink and harden when dried and expand and soften when wetted. To reduce the potential for damage to the planned structures, we recommend slabs-on-grade have sufficient reinforcement and be supported on a layer of non-expansive fill and that footings extend below the zone of seasonal moisture fluctuation.

Along with a proper foundation design, it is important to manage surface water runoff on the building pad. This should include drainage improvements to provide positive drainage away from building, and collect and channel surface water runoff to suitable outlets. In addition, prudent landscaping and irrigation are important for managing the moisture changes around structures.

6.1.2 Undocumented Fill

During our site reconnaissance and field exploration, we encountered approximately 1 to 4 feet of undocumented fill across approximately one-half of Parcel 2. According to the aerial photos acquired as part of our environmental research, the undocumented fill seemed to appear between the years of 1993 and 1998, which accompanies the construction of Walters Road between Peterson Road and Highway 12. The undocumented fill appears to consist primarily of high-plasticity clay with gravel and lean silt. According to our field blow counts and laboratory dry densities, we believe that the undocumented fill is relatively dense and compact. However, the undocumented fill has a significantly higher plasticity index, or shrink/swell potential, as well as a significantly lower R-value than the native soils. Recommendations regarding these concerns are presented in the following sections.

6.1.3 Shallow Ground Water

As previously discussed, ground water was encountered in our borings at depths as shallow as about 6 feet below the existing ground surface. The contractor should be aware that excavations/trenches extending near the ground water level may need to be stabilized and/or dewatered to facilitate placement of structures and/or placement and compaction of fill.

6.2 Plans, Specifications, and Construction Review

Because subsurface conditions may vary from those predicted by widely-spaced borings, and to check that our recommendations have been properly implemented, we recommend we be retained to 1) review final construction plans and specifications and 2) observe the earthwork and foundation construction. Also, geotechnical conditions can be affected by the construction process. For the above reasons our geotechnical

recommendations are contingent upon our firm providing geotechnical observation and testing services during construction.

7.0 EARTHWORK

7.1 Clearing and Site Preparation

The site should be cleared of all surface and subsurface deleterious materials including existing building foundations, slabs, pavements, fills and debris. Excavations extending below the planned finished site grades should be cleaned and backfilled with suitable material compacted as recommended in the "Compaction" section of this report.

After clearing, any vegetated areas should be stripped to sufficient depth to remove all surface vegetation and topsoil containing greater than 3 percent organic matter by weight. The stripped materials should be removed from the site or may be stockpiled for use in landscaped areas, if desired.

Alternatively, the site may be prepared for grading by mowing all surface vegetation so that only 1 to 2 inches of stubble remains. After removing the mowed vegetation from the site, the ground should be disked in two directions to a depth of at least 12 inches. In our opinion, this procedure should adequately mix the remaining organic root layer with the underlying soils prior to grading.

7.2 Subgrade Preparation

Assuming that the subgrade is stable, and after the site has been properly cleared, stripped, and necessary excavations have been made, exposed surface soils in those areas to receive fill, concrete slabs or asphalt pavements should be scarified to a depth of 8 inches, moisture conditioned, and compacted in accordance with the recommendations for fill presented in the "Compaction" section of this report. The finished compacted subgrade should be firm and non-yielding under the weight of compaction equipment.

7.3 Material for Fill

All on-site soils below the stripped layer having an organic content of less than 3 percent by weight should be suitable for use as fill at the site. In general, fill material should not contain rocks or lumps larger than 6 inches in greatest dimension, with no more than 15 percent larger than 2½ inches. Imported and select, non-expansive fill material should be inorganic and should have a Liquid Limit of 40 or less, and a Plasticity Index of 15 or less. Also, imported and select, non-expansive fill should have sufficient binder to prevent caving of the foundation and utility trenches. Proposed imported and non-expansive fill should be approved by a member of our staff at least four days prior to delivery to the site. Compliance testing for aggregate base may take up to ten days to complete.

Consideration should also be given to the environmental characteristics as well as the corrosion potential of imported fill. Laboratory testing, including pH, soluble sulfates, chlorides, and resistivity will provide information regarding corrosion potential. Import soils should not be more corrosive than the native materials.

7.4 Compaction

All fill, as well as scarified surface soils in those areas to receive fill, slabs-on-grade, or pavements should be compacted to at least 95 percent relative compaction as measured by ASTM Test Designation D1557, latest edition, at a moisture content near the laboratory optimum. Fill should be placed in lifts no greater than 8 inches in uncompacted thickness. Each successive lift should be firm and non-yielding under the weight of construction equipment.

7.5 Wet Weather Conditions

It should be understood that earthwork; such as fill placement, trench backfill or subgrade preparation may be very difficult during wet weather, especially for fill materials with a high clay content. If the native soils are significantly above the optimum moisture content, the soils will become soft, yielding, and difficult to compact. Therefore, we recommend that earthwork be performed during periods of suitable weather conditions, such as the "summer" construction season.

There are several alternatives to facilitate fill placement and trench backfill if earthwork is performed during the wet winter season, and/or the moisture content of the fill materials increases significantly above optimum moisture.

- Scarify and air dry until the fill materials have a suitable moisture content for compaction.
- Over-excavate the fill and replace with suitable on-site or import materials with an appropriate moisture content.
- Install a geo-synthetic (geotextile or geogrid) to reduce surface yielding and reinforce soft fill.
- Chemically treat with lime, kiln-dust, or cement to reduce the moisture content and increase the strength of the fill, as discussed in the "Lime Treating Native Soil" section of this report.

The implementation of these methods should be reviewed on a case-by-case basis so that a cost-effective approach may be used for the specific conditions at the time of construction.

7.6 Lime Treating Native Soil

As an alternative to potentially over-excavating any wet and/or unstable soils exposed at subgrade elevations, or importing non-expansive fill for slab-on-grade areas, the soils may be lime treated in-place. Lime treatment is a method of chemically altering a soil by adding and mixing with lime. It is most commonly used for roadway subgrade stabilization, but it is also used beneath buildings to reduce soil expansion potential. The benefits of lime treatment for predominantly clayey soils are well documented and include:

- A reduction in Plasticity Index (lower expansion potential),
- An increase in R-Value,
- And increase in unconfined compressive strength,

- Helps to "winterize" the soil to aid construction during wet weather.
- A reduction in pavement section thickness

As noted above, the engineering characteristics of the soil are significantly improved along with the workability. For lime treating to be effective it requires adding the proper amount of lime to adequately modify the soil characteristics and thorough mixing prior to compaction. To obtain substantial unconfined compressive strength and adequately reduce the Plasticity Index in highly expansive soils, the subgrade soils in building or pavement areas should be chemically treated with 5 percent quicklime. For dry-up/stabilization applications only, 3 percent quicklime may be used. The required mixing depth will depend on the application but is typically 12 to 18 inches. There should be two mixing periods, with the both mixes at the same depth. Both mixing periods should be monitored and verified by our field representative. The second mixing should occur at about 24 hours after the initial mixing. Compaction and grading of the subgrade should occur immediately after the second mixing. Minimum compaction requirement of the lime treated subgrade is 90 percent (ASTM D1557, latest edition), except for finish subgrade below pavement areas where 95 percent relative compaction should be obtained. Compaction test results for treated soil will be available the day following testing because moisture contents of lime-treated soil must be determined by oven-drying. Lime-treated materials should be avoided in landscaping areas as lime is generally detrimental to plants.

If the lime treatment alternative is desired, we recommend that additional laboratory testing be performed prior to construction to confirm the type and percent lime to be used.

7.7 Trench Backfill

Bedding and pipe embedment materials to be used around underground utility pipes should be well graded sand or gravel conforming to the pipe manufacturer's recommendations and should be placed and compacted in accordance with project specifications, local requirements, or governing jurisdiction. General fill to be used above pipe embedment materials should be placed and compacted in accordance with local requirements or the recommendations contained in this section, whichever is more stringent.

On-site soils may be used as general fill above pipe embedment materials provided they meet the requirements of "Material for Fill" section of this report. On-site general fill and imported fill should be placed in lifts not exceeding 8 inches in uncompacted thickness and should be compacted in accordance with the recommendations presented in the "Compaction" section of this report. Water jetting of trench backfill should not be allowed.

Utility trenches located adjacent to footings should not extend below an imaginary 1:1 (horizontal:vertical) plane projected downward from the footing bearing surface to the bottom edge of the trench. Where utility trenches will cross beneath footing bearing planes, the footing concrete should be deepened to encase the pipe or the utility trench should be backfilled with sand/cement slurry or lean concrete within the foundation bearing plane.

Where granular backfill is used in trenches, we recommend that a cut-off plug of impermeable (e.g. clay or slurry) material be placed where such trenches enter the building. This would reduce the likelihood of water entering the trenches from the landscaped areas and seeping through the trench backfill into the building.

7.8 Temporary Slopes and Trench Excavations

The contractor should be responsible for all temporary slopes and trenches excavated at the site and design of any required temporary shoring. Shoring, bracing, and benching should be performed by the contractor in accordance with the strictest governing safety standards.

7.9 Surface Drainage

Positive surface water drainage gradients (2 percent minimum) should be provided within 5 feet of the buildings to direct surface water away from foundations and slabs towards suitable discharge facilities. Ponding of surface water should not be allowed on or adjacent to structures, slabs-on-grade, or pavements. Due to the expansive nature of the site soils, it would be beneficial to connect roof downspouts to a closed conduit discharge system.

7.10 Landscaping Considerations

As the near-surface soils are highly expansive, we recommend restricting the amount of surface water infiltrating the soils near structures and slabs-on-grade. This may be accomplished by:

- Selecting landscaping that requires little or no watering, especially within 3 feet of structures, slabs-on-grade, or pavements,
- Using low precipitation sprinkler heads,
- Regulating the amount of water distributed to lawn or planter areas by installing timers on the sprinkler system,
- Providing surface grades to drain rainfall or landscape watering to appropriate collection systems and away from structures, slabs-on-grade, or pavements,
- Preventing water from draining toward or ponding near building foundations, slabs-on-grade, or pavements, and
- Avoiding open planting areas within 3 feet of the building perimeter.

We recommend that the landscape architect incorporate these items into the landscaping plans.

7.11 Construction Observation

All grading and earthwork should be performed under the observation of our representative to check that the site is properly prepared, that selected fill materials are satisfactory, and that placement and compaction of fills is performed in accordance with our recommendations and the project specifications. Sufficient

notification to us prior to earthwork is essential. The project plans and specifications should incorporate all recommendations contained in this report.

8.0 FOUNDATIONS

8.1 Footings

The proposed building may be supported on conventional shallow, continuous perimeter and isolated interior spread footings bearing on natural, undisturbed soil or compacted fill.

All footings should have a minimum width of 18 inches and should extend at least 24 inches below lowest adjacent finished grade. Lowest adjacent finished grade may be taken as the bottom of interior slab-on-grade or the finished exterior grade, excluding landscape topsoil, whichever is lower.

Footings constructed in accordance with the above recommendations would be capable of supporting maximum allowable bearing pressures of 2,000 pounds per square foot (psf) for dead loads, 3,000 psf for combined dead and live loads, and 4,000 psf for all loads including wind or seismic. These allowable bearing pressures are based upon factors of safety of 3.0, 2.0, and 1.5 for dead, dead plus live, and seismic loads, respectively.

These maximum allowable bearing pressures are net values; the weight of the footing may be neglected for design purposes. All footings located adjacent to utility trenches should have their bearing surfaces below an imaginary 1:1 (horizontal:vertical) plane projected upward from the bottom edge of the trench to the footing.

All continuous footings should be reinforced with top and bottom steel to provide structural continuity and to help span local irregularities. It is essential that we observe all footing excavations before reinforcing steel is placed.

Based on the maximum allowable bearing pressures recommended above, we estimate that total foundation movement under static loads will be on the order of ¾-inch, with post-construction differential movement on the order of ½-inch over a distance of approximately 40 feet along continuous wall footings or between adjacent columns.

On a preliminary level, Parcels 1, 3, and 4 appear to be suitable to receive improvements. Given the anticipated settlements due to liquefaction, parcels 1 and 3 can anticipate having a similar foundation system as Parcel 2, as described above. Parcel 4 had slightly higher settlements due to liquefaction. Depending upon the type of structure and the loading scenario, either ground improvements or deep foundations may be necessary. We can provide actual design foundation criteria after performing additional subsurface explorations.

8.2 Lateral Loads

Lateral loads may be resisted by friction between the footings and the supporting subgrade. A maximum allowable frictional resistance of 0.30 may be used for design. In addition, lateral resistance may be provided by passive pressure acting against foundations poured neat against competent soil. We recommend that an allowable

passive pressure based on an equivalent fluid pressure of 300 pounds per cubic foot be used for design.

8.3 Slab-on-Grade Floors

Due to the high expansion potential of the near surface soils, we recommend that slabs-on-grade used in conjunction with shallow footings be supported on at least 24 inches of select, non-expansive fill, or lime treated native soils to reduce the likelihood of slab damage from heave. The upper 6 inches of select, non-expansive fill should be subbase. For exposed slabs, the subbase should consist of 4 inches of coarse aggregate meeting the gradation requirements of Caltrans Class 2 permeable material, covered with 2 inches of fine aggregate meeting the following gradation:

Std. Sieve Size	Percent Passing
No. 4	85 – 100
No. 8	75 – 95
No. 16	55 – 75
No. 50	22 – 45
No. 100	10 – 30
No. 200	6 - 12

The coarse and fine subbase should be consolidated in place with vibratory equipment.

Post-construction cracking of concrete slabs-on-grade is inherent in any project. In our opinion, consideration should be given toward a maximum control joint spacing of 10 feet in both directions for the interior slab-on-grade construction. Adequate slab reinforcement should be provided to satisfy the anticipated use and loading requirements.

If desired to limit moisture rise through slab-on-grade floors, the guidelines presented in the following section should be considered.

8.4 Moisture Protection Considerations

Since the long-term performance of concrete slabs-on-grade depends on good design, workmanship, and materials, the following general guidelines are presented for consideration by the owner, design team, and contractor. We note that some of these guidelines are different from local practice, and emphasize that they should be considered as an owner's option.

The purpose of these guidelines is to aid in producing concrete slabs of sufficient quality to allow successful installation of floor coverings and reduce the potential for floor covering failures due to moisture-related problems associated with slab construction. These guidelines may be supplemented, as necessary, based on the specific project requirements.

- A minimum 10-mil thick vapor barrier meeting ASTM E 1745, Class C requirements should be placed directly below the slab-on-grade floors (no sand) and above the subbase. A higher quality vapor barrier (Class A or B) may be used at the owner's option. The vapor barrier should extend to the edge of the slab-on-grade floors, and should be sealed at all seams and penetrations.

- The concrete water/cement ratio should not exceed 0.45. Midrange plasticizers could be used to facilitate concrete placement and workability.

- Water should not be added after initial batching, unless the slump of the concrete is less than specified, and the resulting water/cement ratio will not exceed 0.45.

- If possible, hard troweling to a polished finish should be avoided since it can seal the slab surface and trap excessive moisture inside the concrete to be later released.

- All concrete surfaces to receive any type of floor covering should be moist cured for a minimum of seven days. Moist curing methods may include frequent sprinkling, or using coverings such as burlap, cotton mats, or carpet. The covering should be placed as soon as the concrete surface is firm enough to resist surface damage. The covering should be kept continuously wet and not allowed to dry out during the required curing period. The use of chemical curing compounds is not advised in areas where moisture-sensitive floor coverings will be placed, unless the slab surface is shot blasted to remove the compound prior to placing the floor covering.

- Water vapor emission levels and pH should be measured as required by the manufacturers of the floor covering materials before floor installation. Measurements and calculations should be made according to ASTM F1869-98 and F710-98 protocol.

The guidelines presented above are based on information obtained from various technical sources, including the American Concrete Institute (ACI) and Portland Cement Association (PCA), and are intended to present information that can be used to reduce potential long-term impacts from slab moisture infiltration.

9.0 RETAINING WALLS

9.1 Lateral Earth Pressures

Any proposed retaining walls (such as for truck loading docks) should be designed to resist lateral earth pressures from adjoining natural materials, backfill, and surcharge loads. Provided that adequate drainage is provided as recommended below, we recommend that walls restrained from movement at the top be designed to resist an equivalent fluid pressure of 45 pounds per cubic foot (pcf) plus a uniform pressure of 8H pounds per square foot, where H is the distance in feet between the bottom of the footing and the top of the retained soil. Restrained walls should also be designed to resist an additional uniform pressure equivalent to one-half of any surcharge loads applied at the surface. Any unrestrained retaining walls with adequate drainage should be designed to resist an equivalent fluid pressure of 45 pcf plus one-third of any surcharge loads.

The above lateral earth pressures assume level backfill conditions and sufficient drainage behind the walls to prevent build-up of hydrostatic pressure from surface water infiltration and/or a rise in the ground water level. If adequate drainage is not provided, we recommend an equivalent fluid pressure of 40 pcf be added to the values recommended above for both restrained and unrestrained walls. Damp proofing of

the walls should be included in areas where wall moisture and efflorescence would be undesirable.

9.2 Drainage

Adequate drainage may be provided by a subdrain system behind the walls. This system should consist of a 4-inch minimum diameter perforated pipe placed near the base of the wall (perforations placed downward). The pipe should be bedded and backfilled with Class 2 Permeable Material per Caltrans Standard Specifications, latest edition. The permeable backfill should extend at least 2 feet out from the wall and to within 2 feet of outside finished grade. Alternatively, ½-inch to ¾-inch crushed rock may be used in place of the Class 2 Permeable Material provided the crushed rock and pipe are enclosed in filter fabric, such as TCMirafi 140N or equivalent. The upper 2 feet of wall backfill should consist of relatively impervious compacted on-site clayey soil. The subdrain outlet should be connected to a free-draining outlet or sump.

Miradrain, Geotech Drainage Panels, or Enkadrain drainage matting may be used for wall drainage as an alternative to the Class 2 Permeable Material or drain rock backfill. The drainage panel should be connected to the perforated pipe at the base of the wall.

9.3 Backfill

Backfill placed behind the walls should be compacted in accordance with the recommendations in the "Compaction" section of this report using light compaction equipment. If heavy compaction equipment is used, the walls should be temporarily braced.

9.4 Foundation

Retaining walls may be supported on a continuous spread footing designed in accordance with the recommendations presented in the "Footings" section of this report. Lateral load resistance for the walls may be developed in accordance with the "Lateral Loads" section of this report.

10.0 PAVEMENTS

10.1 Asphalt Concrete

For Parcel 2, based on laboratory R-value testing, we judged an R-value of 5 to be applicable for design. We developed the following recommended pavement sections based on Procedure 608 of the Caltrans Highway Design Manual, presented in Table 10. The following recommendations were prepared assuming a 20-year design life and 18 kip Equivalent Single Axle Loads (ESAL's) of 109,500 for standard-duty pavements and 335,800 for heavy-duty pavements in accordance with Wal-Mart's Geotechnical Investigation Specifications and Report Requirements dated July 5, 2006. This traffic frequency is approximately equivalent to 15 and 46 ESAL's per day for an equivalent design period of 20 years for standard and heavy-duty pavements, respectively. Because the native soils at the site are highly expansive, some increased maintenance and reduction in pavement life can be expected.

Table 10. Recommended Asphalt Concrete Pavement Sections
Pavement Components
Design R–Value = 5

Wal-Mart Pavement Type	Design 20 yr ESAL's	Design Traffic Index	Asphalt Concrete (Inches)	Aggregate Baserock* (Inches)
Standard-Duty	109,500	7.0	4.0	15.5
Heavy-Duty	335,800	8.0	5.0	17.5

*Caltrans Class 2 aggregate base; minimum R-value equal to 78.

For Parcels 1, 3, and 4, based on laboratory R-value testing and the variability of the onsite soils, we judged an R-value of 5 to be applicable for design. Using estimated traffic indices for various pavement-loading requirements, we developed the following recommended pavement sections based on Procedure 608 of the Caltrans Highway Design Manual, presented in Table 11.

Table 11. Recommended Asphalt Concrete Pavement Design Alternatives
Pavement Components
Design R–Value = 5

General Traffic Condition	Design Traffic Index	Asphalt Concrete (Inches)	Aggregate Baserock* (Inches)	Total Thickness (Inches)
Automobile Parking	4.0	2.5	7.5	10.0
	4.5	2.5	9.5	12.0
Automobile Drive Aisle	5.0	3.0	10.0	13.0
	5.5	3.0	12.0	15.0
Truck Access & Parking Areas	6.0	3.5	12.5	16.0
	6.5	4.0	14.0	18.0

*Caltrans Class 2 aggregate base; minimum R-value equal to 78.

For Parcels 1, 3, and 4, the traffic indices used in our pavement design are considered reasonable values for typical small retail developments. The traffic parameters used for design were selected based on engineering judgment and not on information furnished to us such as an equivalent wheel load analysis or a traffic study.

If desired to lime-treat parking area subgrade, the aggregate baserock thickness can likely be reduced. If this alternative is desired, we should be contracted to perform supplemental laboratory testing and prepare the alternate design recommendations.

10.2 Portland Cement Concrete

As above, based on laboratory R-value testing, we judged an R-value of 5 to be applicable for design. We developed the following recommended pavement sections based on Portland Cement Association design procedures, presented in Table 12. The following recommendations were prepared assuming a 20-year design life and 18 kip Equivalent Single Axle Loads (ESAL's) of 109,500 for standard-duty pavements and 335,800 for heavy-duty pavements in accordance with Wal-Mart's Geotechnical Investigation Specifications and Report Requirements dated July 5, 2006. This traffic frequency is approximately equivalent to 15 and 46 ESAL's per day for an equivalent design period of 20 years for standard and heavy-duty pavements, respectively.

Table 12. Recommended Minimum PCC Pavement Thickness

Wal-Mart Pavement Type	Design Daily ESALs	Minimum PCC Pavement Thickness (inches)
Standard-Duty	15	6
Heavy-Duty	46	7

Our design is based on a 28-day unconfined compressive strength for concrete of at least 3,500 pounds per square inch. In addition, our design assumes that pavements are restrained laterally by a concrete shoulder or curb and that all PCC pavements are underlain by at least 6 inches of Class 2 aggregate base compacted to a minimum of 95 percent relative compaction in accordance with ASTM Test Method D1557, latest edition. We recommend that adequate construction and control joints be used in design of the PCC pavements to control the cracking inherent in this construction.

10.3 Exterior Concrete Flatwork

Exterior slabs-on-grade, such as sidewalks, will experience seasonal movement due to the native expansive soils; therefore, some cracking or vertical movement of conventional slabs should be anticipated. There are several alternatives for mitigating the impacts of expansive soils beneath concrete flatwork. We are providing recommendations to reduce distress to concrete flatwork that includes moisture conditioning the subgrade soils, using non-expansive fill, and providing adequate construction and control joints to control cracks that do occur. It should be noted that minor slab movement or localized cracking and/or distress could still occur.

1. The minimum recommendation for concrete flatwork constructed on expansive soils is to properly prepare the clayey soils prior to placing concrete. This is typically achieved by scarifying, moisture conditioning, and re-compacting the subgrade soil. Native expansive soil should be moisture conditioned to at least the laboratory optimum and compacted using moderate compaction effort to 95 percent of maximum dry density (ASTM Test Method D1557). Since the near surface soils will have been previously compacted and tested, the subgrade soils could possibly be moisture conditioned by gradually wetting the soil, depending on the time of year slab construction occurs. This should not include flooding or excessively watering the soil, which would likely result in a soft, unstable subgrade condition, and possible delays in the construction while waiting for the soil to dry out. In general, the subgrade should be saturated, yet relatively firm and non-yielding prior to placing concrete.

2. Concrete flatwork, excluding pavements that would be subject to wheel loads, should be at least 4 inches thick and underlain by at least 12 inches of select, non-expansive fill. Select, non-expansive fill may include aggregate base, crushed rock, lime-treated native soil, or imported soil with a Liquid Limit of 40 or less, and a Plasticity of 15 or less. Select, non-expansive fill should be compacted to at least 95 percent of maximum dry density within 2 percent of optimum moisture.

3. Use a maximum control joint spacing of no more than 8 feet in each direction and a construction joint spacing of 10 to 12 feet. Construction joints that abut the foundations should include a felt strip, or approved equivalent, that

extends the full depth of the exterior slab. This will help to reduce the potential for permanent vertical offset between the slabs due to friction between the concrete edges. We recommend that exterior slabs be isolated from adjacent foundations.

At your option, if desired to reduce the potential for vertical offset or widening of concrete cracks, consideration should be given to using reinforcing steel, such as No. 3 rebar spaced at 18 inches on center each direction.

10.4 Pavement Cutoff

Surface water infiltration beneath pavements can significantly reduce the pavement design life. While the amount of reduction in pavement life is difficult to quantify, in our opinion, the normal design life of 20 years may be reduced to less than 10 years. Therefore, long-term maintenance greater than normal may be required.

To limit the need for additional long-term maintenance, it would be beneficial to protect at-grade pavements from landscape water infiltration by means of a concrete cut-off wall, deepened curbs, redwood header, "Deep-Root Moisture Barrier," or equivalent. However, if reduced pavement life and greater than normal pavement maintenance are acceptable, the cutoff barrier may be eliminated. If desired to install pavement cutoff barriers, they should be considered where pavement areas lie adjacent to any landscape areas that are to be sprinklered or irrigated, and should extend to a depth of at least 4 inches below the base rock layer.

10.5 Asphalt Concrete, Aggregate Base, and Subgrade

Asphalt concrete and aggregate base should conform to and be placed in accordance with the requirements of Caltrans Standard Specifications, latest edition, except that ASTM Test Designation D1557 should be used to measure the maximum dry density and optimum moisture content of the aggregate base. Pavement subgrade should be prepared and compacted as described in the "Earthwork" section of this report.

11.0 LIMITATIONS

This report has been prepared for the sole use of Robert A. Karn and Associates and Wal-Mart Stores, Inc., specifically for design of the Wal-Mart Supercenter in Suisun City, California. The opinions presented in this report have been formulated in accordance with generally accepted geotechnical engineering practices that exist in the greater San Francisco Bay Area at the time this report was prepared. No other warranty, expressed or implied, is made or should be inferred. We are not responsible for data presented by others.

The opinions, conclusions and recommendations contained in this report are based upon information obtained from borings at widely separated locations, site reconnaissance, review of data made available to us, and upon local experience and engineering judgment. The recommendations presented in this report are based on the assumption that soil and geologic conditions at or between borings do not deviate substantially from those encountered. In addition, geotechnical issues may arise that are not apparent at this time.

The geotechnical engineer should be retained to review final plans and specifications when they are available to verify these documents are consistent with the intent of the geotechnical recommendations. The recommendations provided in this report are based on the assumption that we will be retained to provide observation and testing services during construction in order to evaluate compliance with our recommendations. If we are not retained for these services, TRC Lowney cannot assume any responsibility for any potential claims that may arise during or after construction as a result of misuse or misinterpretation of TRC Lowney's report by others. Furthermore, TRC Lowney will cease to be the Geotechnical-Engineer-of-Record at the time another consultant is retained for follow-up service to this report.

The opinions presented in this report are valid as of the present date for the property evaluated. Changes in the condition of a property can occur with the passage of time, whether due to natural processes or the works of man, on this or adjacent properties. In addition, changes in applicable standards of practice can occur, whether from legislation or the broadening of knowledge. Accordingly, the opinions presented in this report may be invalidated, wholly or partially, by changes outside of our control. Therefore, this report is subject to review and should not be relied upon after a period of three years, nor should it be used, or is it applicable, for any property other than that evaluated.

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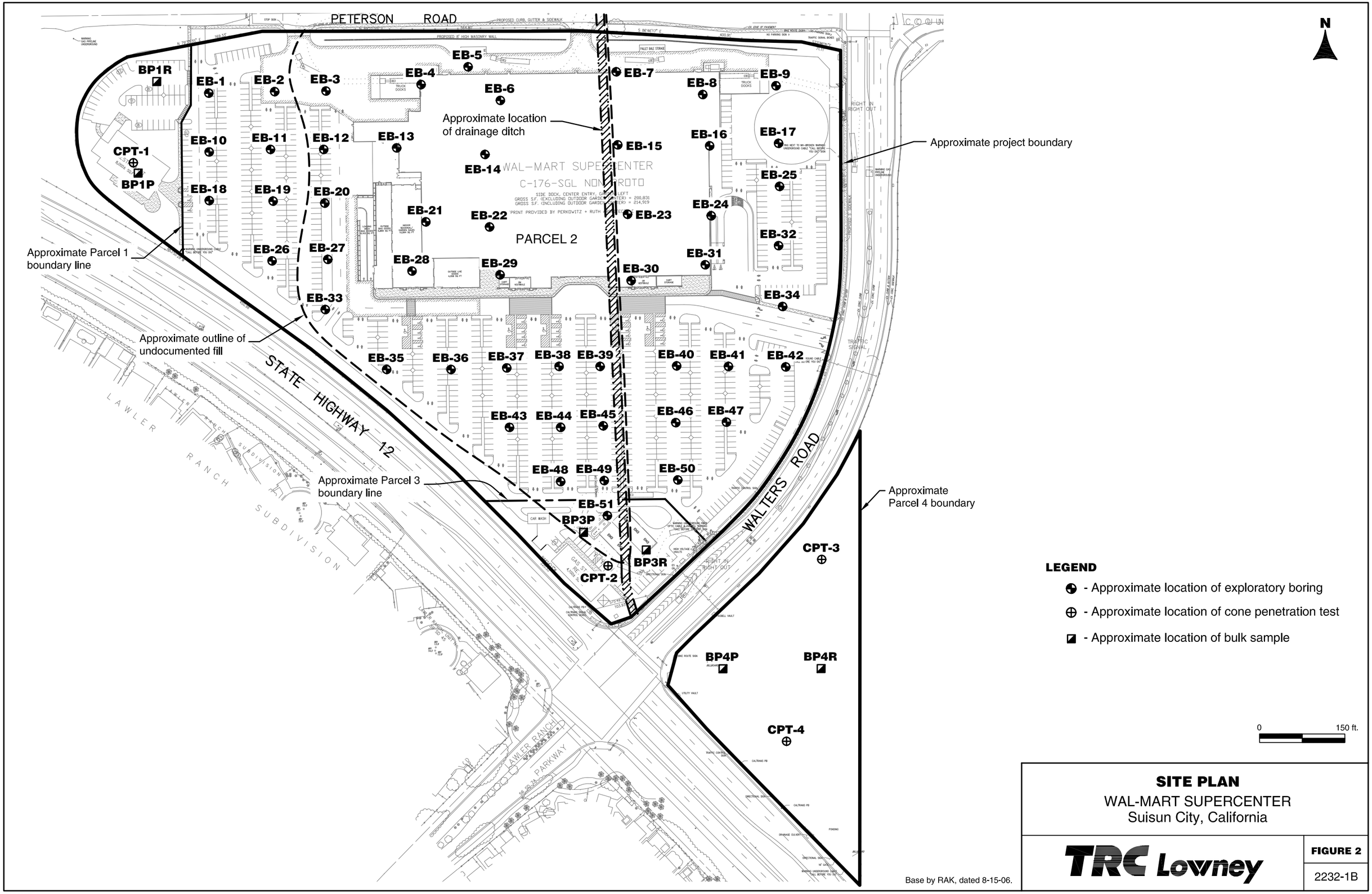
11/06*EB

VICINITY MAP

WAL-MART SUPERCENTER
Suisun City, California

TRC Lowney

FIGURE 1
2232-1B



LEGEND

- ◕ - Approximate location of exploratory boring
- ⊕ - Approximate location of cone penetration test
- ◪ - Approximate location of bulk sample

0 150 ft.

Base by RAK, dated 8-15-06.

SITE PLAN

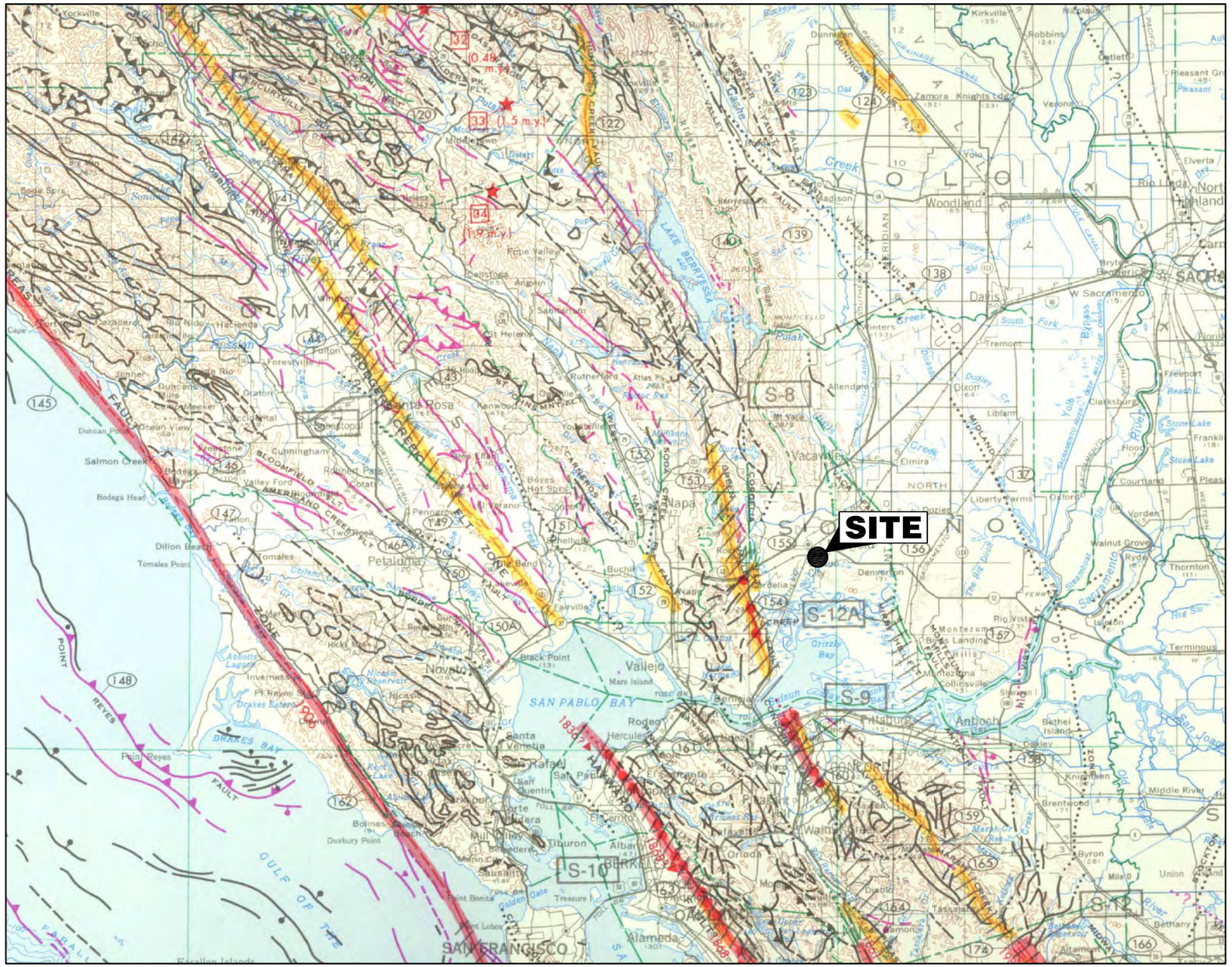
WAL-MART SUPERCENTER
Suisun City, California

TRC Lowney

FIGURE 2

2232-1B

11/06*EB



Geologic Time Scale			Years Before Present (Approx.)	Fault Symbol	Recency of Movement	DESCRIPTION	
						ON LAND	OFFSHORE
Quaternary	Late Quaternary	Holocene Historic				Displacement during historic time (e.g. San Andreas fault 1906). Includes areas of known fault creep.	
			200			Displacement during Holocene time.	Fault offsets seafloor sediments or strata of Holocene age.
		Pleistocene	10,000			Faults showing evidence of displacement during late Quaternary time.	Fault cuts strata of Pleistocene age.
	Early Quaternary		700,000			Undivided Quaternary faults – most faults in this category show evidence of displacement during the last 1,600,000 years; possible exceptions are faults which displace rocks of undifferentiated Plio-Pleistocene age.	Fault cuts strata of Quaternary age.
			1,600,000			Late Cenozoic faults within the Sierra Nevada, including parts of, but not restricted to, the Foothills fault system. These faults may have been active in Quaternary time.	
Pre-Quaternary			4.5 billion			Faults without recognized Quaternary displacement or showing evidence of no displacement during Quaternary time. Not necessarily inactive. Pre-Quaternary faults not shown in Nevada and Oregon.	Fault cuts strata of Pliocene or older age.

Fault traces on land are indicated by solid lines where well located, by dashed lines where approximately located or inferred, and by dotted lines where concealed by younger rocks or by lakes or bays. Fault traces are queried where continuation or existence is uncertain. Concealed faults in the Great Valley are based on maps of selected subsurface horizons, so locations shown are approximately and may indicate structural trend only. All offshore faults based on seismic reflection profile records are shown as solid lines where well defined, dashed where inferred, queried where uncertain.

0 10 20 Miles

Base from "Fault Activity Map of California and Adjacent Areas", Division of Mines and Geology by Charles W. Jennings, 1994.

REGIONAL FAULT MAP

WAL-MART SUPERCENTER
Suisun City, California

TRC Lowney

FIGURE 3

P15981

11/06*EB

APPENDIX A

FIELD INVESTIGATION

Our investigation consisted of a surface reconnaissance and a subsurface exploration program using both conventional borings and Cone Penetration Tests (CPTs). Four CPTs were hydraulically advanced to a maximum depth of 50 feet. CPT data were obtained at approximately 1-inch intervals, and consisted of cone tip resistance, local friction, pore pressure and other parameters. The data obtained were correlated using the references cited, to estimate the indicated soil type, shear strength, equivalent Standard Penetration Test (SPT), N-value (blows per foot), and other parameters.

Fifty-one borings were drilled between approximately 10 to 50 feet using truck-mounted drilling equipment with 8-inch outside-diameter hollow-stem augers. The approximate locations of the borings are shown on Figure 2. The soils encountered were continuously logged in the field by our representative and described in accordance with the Unified Soil Classification System (ASTM D2488). The logs of the borings as well as a key to the classification of the soil, are included as part of this appendix.

The locations of the borings and CPTs were paced from existing site boundaries. The locations of the borings and CPTs should be considered accurate only to the degree implied by the method used.

Representative soil samples were obtained from the borings at selected depths. All samples were returned to our laboratory for evaluation and appropriate testing. The standard penetration resistance blow counts were obtained by dropping a 140-pound hammer through a 30-inch free fall. The 2-inch O.D. split spoon sampler was driven 18 inches and the number of blows was recorded for each 6 inches of penetration (ASTM D1586). In addition, 2.5-inch I.D. samples were obtained using a Modified California Sampler driven into the soil with the 140-pound hammer previously described. Unless otherwise indicated, the blows per foot recorded on the boring logs represent the accumulated number of blows required to drive the last 12 inches. The various samplers are denoted at the appropriate depth on the boring logs and symbolized as shown on Figure A-1.

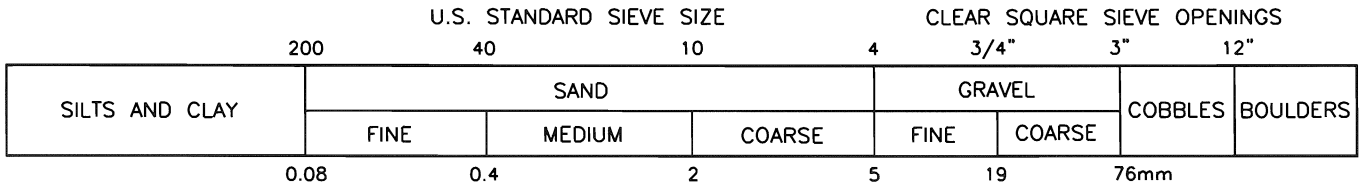
Field tests included an evaluation of the unconfined compressive strength of the soil samples using a pocket penetrometer device. The results of these tests are presented on the individual boring logs at the appropriate sample depths.

The attached boring logs and related information depict subsurface conditions only at the locations indicated and at the particular date designated on the logs. Subsurface conditions at other locations may differ from conditions occurring at these boring and CPT locations. The passage of time may result in altered subsurface conditions due to environmental changes. In addition, any stratification lines on the logs represent the approximate boundary between soil types and the transition may be gradual.

* * * * * * * * * * * * *

PRIMARY DIVISIONS			SOIL TYPE		SECONDARY DIVISIONS
COARSE GRAINED SOILS (MORE THAN HALF OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE)	GRAVELS (MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE)	CLEAN GRAVELS (Less than 5% Fines)	GW		Well graded gravels, gravel-sand mixtures, little or no fines
			GP		Poorly graded gravels or gravel-sand mixtures, little or no fines
		GRAVEL WITH FINES	GM		Silty gravels, gravel-sand-silt mixtures, plastic fines
			GC		Clayey gravels, gravel-sand-clay mixtures, plastic fines
	SANDS (MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE)	CLEAN SANDS (Less than 5% Fines)	SW		Well graded sands, gravelly sands, little or no fines
			SP		Poorly graded sands or gravelly sands, little or no fines
		SANDS WITH FINES	SM		Silty sands, sand-silt-mixtures, non-plastic fines
			SC		Clayey sands, sand-clay mixtures, plastic fines
FINE GRAINED SOILS (MORE THAN HALF OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE)	SILTS AND CLAYS (LIQUID LIMIT IS LESS THAN 50 %)		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 AND CLAYS (LIQUID LIMIT IS 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 silts
HIGHLY ORGANIC SOILS			PT		Peat and other highly organic soils

DEFINITION OF TERMS



GRAIN SIZES

SAMPLERS

SAND AND GRAVEL	BLOWS/FOOT*
VERY LOOSE	0-4
LOOSE	4-10
MEDIUM DENSE	10-30
DENSE	30-50
VERY DENSE	OVER 50

RELATIVE DENSITY

SILTS AND CLAYS	STRENGTH+	BLOWS/FOOT*
VERY SOFT	0-1/4	0-2
SOFT	1/4-1/2	2-4
MEDIUM STIFF	1/2-1	4-8
STIFF	1-2	8-16
VERY STIFF	2-4	16-32
HARD	OVER 4	OVER 32

CONSISTENCY

*Number of blows of 140 pound hammer falling 30 inches to drive a 2-inch O.D. (1-3/8 inch I.D.) split spoon (ASTM D-1586).
+Unconfined compressive strength in tons/sq.ft. as determined by laboratory testing or approximated by the standard penetration test (ASTM D-1586), pocket penetrometer, torvane, or visual observation.

KEY TO EXPLORATORY BORING LOGS

Unified Soil Classification System (ASTM D-2487)

TRC Lowney

FIGURE A-1

EXPLORATORY BORING: EB-1

Sheet 1 of 1

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-25-06 FINISH DATE: 10-25-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 10.0 FT.

This log is a part of a report by TRC Lowney, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	0		SURFACE ELEVATION:						
			LEAN CLAY WITH SAND (CL) hard, moist, brown, moderate plasticity	CL	26				
	5		color to light brown, stiff		14				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED
▼: FREE GROUND WATER MEASURED FOLLOWING DRILLING AT 6.5 FEET

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-2

Sheet 1 of 1

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-26-06 FINISH DATE: 10-26-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 10.0 FT.

This log is a part of a report by TRC Lowney, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	0		SURFACE ELEVATION:						
			LEAN CLAY WITH SILT (CL) hard, moist, brown, moderate plasticity	CL	44				
	5								
			stiff		5				
	10								
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-3

Sheet 1 of 1

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-25-06 FINISH DATE: 10-25-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 10.0 FT.

This log is a part of a report by TRC Lowney, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	0		SURFACE ELEVATION:						
	0		**FAT CLAY WITH GRAVEL (CH) [FILL]** hard, moist, dark brown, moderate plasticity	CH, FILL	25				
	5		**LEAN CLAY WITH SAND (CL)** very stiff, moist, light brown, moderate plasticity	CL	32				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
▽: FREE GROUND WATER MEASURED DURING DRILLING AT 6.5 FEET

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-4

Sheet 1 of 1

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-25-06 FINISH DATE: 10-25-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 20.0 FT.

This log is a part of a report by TRC Lowney, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	0		SURFACE ELEVATION:						
			LEAN CLAY WITH GRAVEL (CL) [FILL] hard, moist, dark brown, moderate plasticity	CL, FILL	37		13	108	
			LEAN CLAY WITH SILT (CL) very stiff, moist, brown, low plasticity		12		18	92	
	5				36		16	114	
					28		24	99	
	10			CL					
					21		18	110	
	15								
			LEAN CLAY WITH SAND (CL) very stiff, moist, light brown, low plasticity	CL					
	20				20		21	107	
			Bottom of Boring at 20 feet						
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
▽: FREE GROUND WATER MEASURED DURING DRILLING AT 17.0 FEET

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-5

Sheet 1 of 1

DRILL RIG: MOBILE B-53	PROJECT NO: 2232-1B
BORING TYPE: 8 INCH HOLLOW-STEM AUGER	PROJECT: WAL-MART SUPERCENTER
LOGGED BY: LM	LOCATION: SUISUN, CA
START DATE: 10-25-06 FINISH DATE: 10-25-06	COMPLETION DEPTH: 10.0 FT.

This log is a part of a report by TRC Lowney, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	0		SURFACE ELEVATION:						
			LEAN CLAY WITH GRAVEL (CL) [FILL] hard, moist, dark brown, moderate plasticity	CL, FILL	33				
	5		**LEAN CLAY WITH SAND (CL)** very stiff, moist, brown, moderate plasticity	CL	20				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)

- ○ Pocket Penetrometer
- △ Torvane
- ● Unconfined Compression
- ▲ U-U Triaxial Compression

1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

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TRC Lowney

EXPLORATORY BORING: EB-6

Sheet 1 of 1

DRILL RIG: MOBILE B-53	PROJECT NO: 2232-1B
BORING TYPE: 8 INCH HOLLOW-STEM AUGER	PROJECT: WAL-MART SUPERCENTER
LOGGED BY: LM	LOCATION: SUISUN, CA
START DATE: 10-24-06 FINISH DATE: 10-24-06	COMPLETION DEPTH: 20.0 FT.

This log is a part of a report by TRC Lowney, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
		SURFACE ELEVATION:						
	0	**FAT CLAY WITH GRAVEL (CH) [FILL]** hard, moist, brown, moderate plasticity	CH, FILL	29		11	117	
		LEAN CLAY WITH SILT (CL) hard, moist, brown, moderate plasticity	CL	9		17	110	
	5			29		16	110	
		LEAN CLAY WITH SAND (CL) hard, brown, low plasticity						
		increase sand	CL	18		19	111	
	10							
		LEAN CLAY (CL) very stiff, moist, light brown with light gray mottles, low plasticity		13		18		
	15		CL					
				10		23		
	20	Bottom of Boring at 20 feet						
	25							
	30							

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
▽: FREE GROUND WATER MEASURED DURING DRILLING AT 19.0 FEET

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-7

Sheet 1 of 1

DRILL RIG: MOBILE B-53	PROJECT NO: 2232-1B
BORING TYPE: 8 INCH HOLLOW-STEM AUGER	PROJECT: WAL-MART SUPERCENTER
LOGGED BY: LM	LOCATION: SUISUN, CA
START DATE: 10-24-06 FINISH DATE: 10-24-06	COMPLETION DEPTH: 21.5 FT.

This log is a part of a report by TRC Lowney, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	SURFACE ELEVATION:							
	0	**FAT CLAY (CH)** very stiff, moist, dark brown, moderate plasticity	CL	19		20	100	
	5	**LEAN CLAY WITH SILT (CL)** very stiff, moist, light brown, moderate plasticity	CL	15		28	88	
				13		31	90	
				9		25	100	
	10	**LEAN CLAY WITH SAND (CL)** stiff, moist, light brown, fine sand, moderate plasticity	CL					
		POORLY GRADED SAND WITH CLAY (SP-SC) medium dense, wet, brown, medium sand	SP-SC	7		25		
	15			15		22		11
		coarse sand		21		17		
	20			25		18		
		LEAN CLAY (CL) hard, moist, brown, moderate plasticity	CL					
		Bottom of Boring at 21½ feet						
	25							
	30							

Undrained Shear Strength (ksf)
- ○ Pocket Penetrometer
- △ Torvane
- ● Unconfined Compression
- ▲ U-U Triaxial Compression

1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-8

Sheet 1 of 1

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-24-06 FINISH DATE: 10-24-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 21.5 FT.

This log is a part of a report by TRC Lowney, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	0	SURFACE ELEVATION:						
	0	**LEAN CLAY (CL)** hard, moist, brown, moderate plasticity	CL	20		16	102	
				23		20	106	
	5			19		26	95	
				4		32		
	10							
		LEAN CLAY WITH SAND (CL) stiff, moist, brown, fine sand	CL	8		25		
	15							
		POORLY GRADED SAND WITH CLAY (SP-SC) medium dense, moist, brown, medium sand	SP-SC	22		20	97	
	20			19		19		
		LEAN CLAY (CL) very stiff, moit, light brown, moderate plasticity	CL					
		Bottom of Boring at 21½ feet						
	25							
	30							

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA CORP GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-9

Sheet 1 of 1

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-25-06 FINISH DATE: 10-25-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 10.0 FT.

This log is a part of a report by TRC Lowney, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
			SURFACE ELEVATION:						
	0		**FAT CLAY WITH SILT (CL)** very stiff, moist, dark brown, moderate plasticity	CH					
			LEAN CLAY WITH SILT (CL) stiff, moist, brown, moderate plasticity		30				
	5		color to light brown	CL					
			color to light brown with light gray mottles		8				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED
▼: FREE GROUND WATER MEASURED FOLLOWING DRILLING AT 6.2 FEET

LA CORP GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-10

Sheet 1 of 1

DRILL RIG: MOBILE B-53	PROJECT NO: 2232-1B
BORING TYPE: 8 INCH HOLLOW-STEM AUGER	PROJECT: WAL-MART SUPERCENTER
LOGGED BY: LM	LOCATION: SUISUN, CA
START DATE: 10-25-06 FINISH DATE: 10-25-06	COMPLETION DEPTH: 10.0 FT.

This log is a part of a report by TRC Lowney, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	0		SURFACE ELEVATION:						
			LEAN CLAY WITH SILT (CL) very stiff, moist, brown, moderate plasticity	CL	23				
	5								
					12				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA_CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-11

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-25-06 FINISH DATE: 10-25-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 10.0 FT.

This log is a part of a report by TRC Lowney, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
			SURFACE ELEVATION:						
	0		**LEAN CLAY WITH SILT (CL)** hard, moist, brown, moderate plasticity						
	5			CL	27				
			very stiff		15				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA_CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-12

Sheet 1 of 1

DRILL RIG: MOBILE B-53	PROJECT NO: 2232-1B
BORING TYPE: 8 INCH HOLLOW-STEM AUGER	PROJECT: WAL-MART SUPERCENTER
LOGGED BY: LM	LOCATION: SUISUN, CA
START DATE: 10-25-06 FINISH DATE: 10-25-06	COMPLETION DEPTH: 10.0 FT.

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ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
			SURFACE ELEVATION:						
	0		**FAT CLAY WITH GRAVEL (CH) [FILL]** hard, moist, dark brown, moderate plasticity, fine gravel	CH, FILL	15				
	5		**LEAN CLAY WITH SAND (CL)** very stiff, moist, light brown, moderate plasticity	CL	22				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-13

Sheet 1 of 1

DRILL RIG: MOBILE B-53	PROJECT NO: 2232-1B
BORING TYPE: 8 INCH HOLLOW-STEM AUGER	PROJECT: WAL-MART SUPERCENTER
LOGGED BY: LM	LOCATION: SUISUN, CA
START DATE: 10-25-06 FINISH DATE: 10-25-06	COMPLETION DEPTH: 20.0 FT.

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ELEVATION (FT)	DEPTH (FT)	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
		SURFACE ELEVATION:						
	0	**FAT CLAY WITH GRAVEL (CH) [FILL]** hard, moist, dark brown, moderate plasticity	CH, FILL	57		11	91	
		LEAN CLAY (CL) very stiff, moist, brown, moderate plasticity	CL	12		18	103	
	5	**LEAN CLAY WITH SILT (CL)** very stiff, moist, light brown, moderate plasticity		41		20	104	
		stiff		14		24	100	
	10		CL					
	15			25		21	105	
				25		24	103	
	20	Bottom of Boring at 20 feet						
	25							
	30							

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
▽: FREE GROUND WATER MEASURED DURING DRILLING AT 18.0 FEET

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-14

Sheet 1 of 1

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-24-06 FINISH DATE: 10-24-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 20.0 FT.

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ELEVATION (FT)	DEPTH (FT)	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
		SURFACE ELEVATION:						
	0	**FAT CLAY WITH GRAVEL (CH) [FILL]** hard, moist, dark brown with light brown mottles, moderate plasticity	CH, FILL	39		12	109	
		LEAN CLAY (CL) very stiff, moist, dark brown, moderate plasticity	CL	14		19	101	
	5	**LEAN CLAY WITH SILT (CL)** very stiff, moist, brown, moderate plasticity		23		21	103	
			CL	6		28		
	10							
		LEAN CLAY WITH SAND (CL) medium stiff, moist, brown, low plasticity, fine sand		8		26	98	
	15		CL					
		stiff		47		22	106	
	20	Bottom of Boring at 20 feet						
	25							
	30							

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED
▼: FREE GROUND WATER MEASURED FOLLOWING DRILLING AT 7.2 FEET

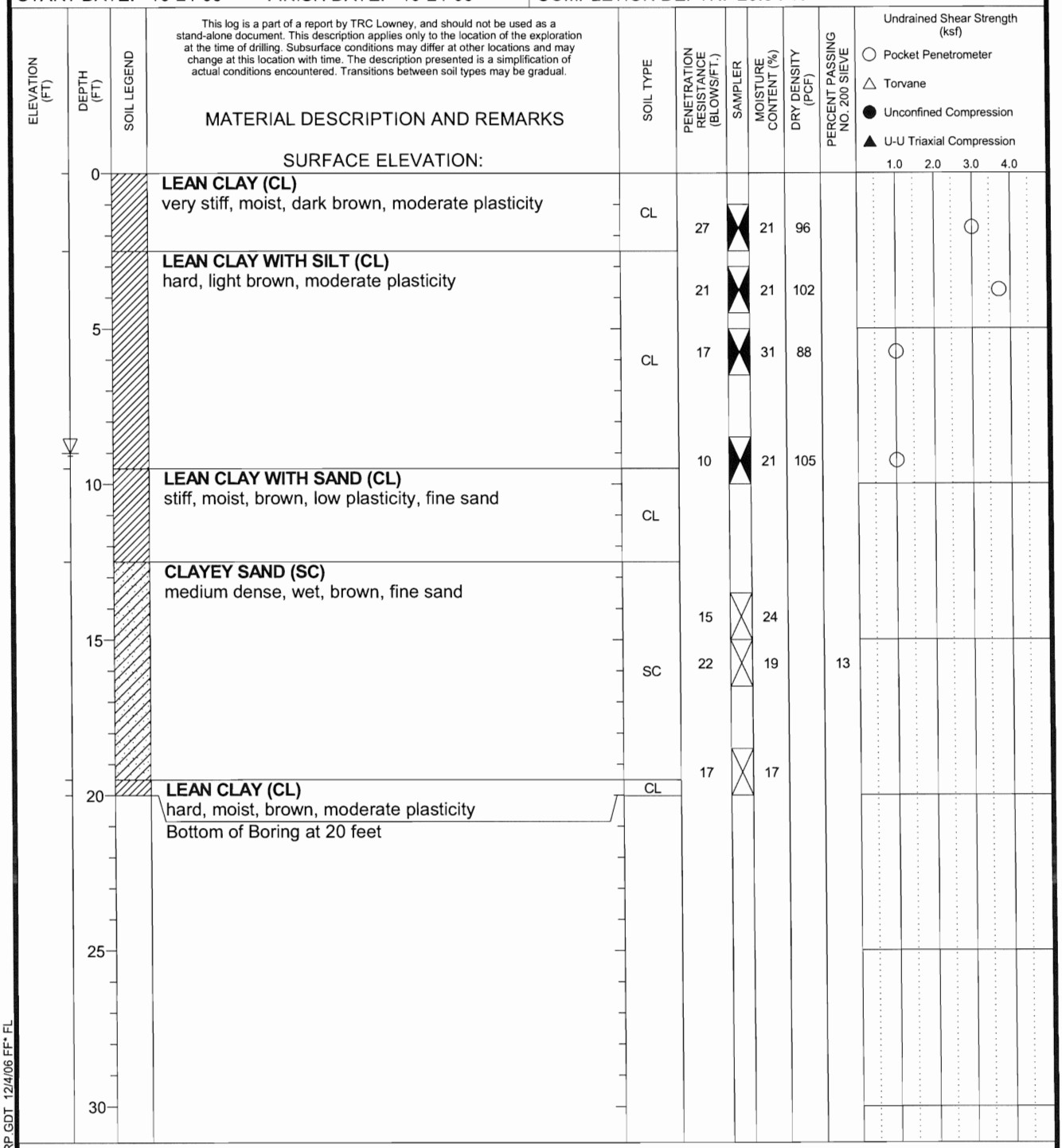
LA_CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-15

Sheet 1 of 1

DRILL RIG: MOBILE B-53	PROJECT NO: 2232-1B
BORING TYPE: 8 INCH HOLLOW-STEM AUGER	PROJECT: WAL-MART SUPERCENTER
LOGGED BY: LM	LOCATION: SUISUN, CA
START DATE: 10-24-06 FINISH DATE: 10-24-06	COMPLETION DEPTH: 20.0 FT.



GROUND WATER OBSERVATIONS:

▽: FREE GROUND WATER MEASURED DURING DRILLING AT 9.0 FEET

LA_CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-16

Sheet 1 of 1

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-24-06 FINISH DATE: 10-24-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 20.0 FT.

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ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	0		SURFACE ELEVATION:						
			FAT CLAY WITH SILT (CH) very stiff, moist, dark brown, moderate plasticity Plasticity Index = 36, Liquid Limit = 52	CH	25		18	90	
					24		25	99	
	5				14		29	92	
▽	10				5		31		
			CLAYEY SAND (SC) medium dense, moist, brown, fine sand	SC	11		23		
	15		very dense		55		20		
	20		Bottom of Boring at 20 feet						
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
▽: FREE GROUND WATER MEASURED DURING DRILLING AT 10.0 FEET

LA CORP GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-17

Sheet 1 of 1

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-26-06 FINISH DATE: 10-26-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 10.0 FT.

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ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	0		SURFACE ELEVATION:						
			LEAN CLAY (CL) hard, moist, brown, moderate plasticity	CL	27				
	5								
			LEAN CLAY WITH SAND (CL) medium stiff, moist, light brown with light gray mottles, low plasticity	CL	9				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
▽: FREE GROUND WATER MEASURED DURING DRILLING AT 9.0 FEET

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-18

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-26-06 FINISH DATE: 10-26-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 10.0 FT.

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ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	0		SURFACE ELEVATION:						
			LEAN CLAY (CL) hard, moist, brown, moderate plasticity	CL	29				
	5								
			very stiff, brown with reddish brown mottles		27				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-19

Sheet 1 of 1

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-26-06 FINISH DATE: 10-26-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 10.0 FT.

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ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	0		SURFACE ELEVATION:						
			LEAN CLAY (CL) hard, moist, brown, moderate plasticity	CL	31				
	5								
					11				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-20

Sheet 1 of 1

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-25-06 FINISH DATE: 10-25-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 10.0 FT.

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ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	0		SURFACE ELEVATION:						
	0		**LEAN SILT (ML) [FILL]** hard, moist, grayish brown, low plasticity	ML, FILL	64				
	5		**LEAN CLAY WITH SILT (CL)** very stiff, moist, light brown, moderate plasticity	CL					
			stiff		6				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-21

Sheet 1 of 1

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-24-06 FINISH DATE: 10-24-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 20.0 FT.

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ELEVATION (FT)	DEPTH (FT)	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	0	SURFACE ELEVATION:						
		FAT CLAY WITH GRAVEL (CH) [FILL] hard, moist, grayish brown, low plasticity	CH, FILL	52		8	108	
		LEAN CLAY WITH SILT (CL) very stiff, moist, light brown, low plasticity		30		17	105	
	5		CL	47		16	113	
		LEAN CLAY (CL) very stiff, moist, light brown, moderate plasticity		16		20	106	
	10	light brown with light gray mottles	CL	24		20	115	
	15							
				14		24		
	20	Bottom of Boring at 20 feet						
	25							
	30							

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
▽: FREE GROUND WATER MEASURED DURING DRILLING AT 17.0 FEET

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-22

Sheet 1 of 1

DRILL RIG: MOBILE B-53	PROJECT NO: 2232-1B
BORING TYPE: 8 INCH HOLLOW-STEM AUGER	PROJECT: WAL-MART SUPERCENTER
LOGGED BY: LM	LOCATION: SUISUN, CA
START DATE: 10-24-06 FINISH DATE: 10-24-06	COMPLETION DEPTH: 24.5 FT.

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ELEVATION (FT)	DEPTH (FT)	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
		SURFACE ELEVATION:						
	0	**LEAN SILT (ML) [FILL]** hard, moist, light brown, with trace gravel, low plasticity	ML, FILL	64		7	114	
				34		14	100	
	5	**LEAN CLAY (CL)** hard, moist, dark brown, moderate plasticity	CL	28		19	104	
		LEAN CLAY WITH SILT (CL) very stiff, dark brown, moderate plasticity						
		color changes to light brown with light gray mottles, stiff		16		27	95	
	10		CL					
				7		29		
	15							
		POORLY GRADED SAND WITH CLAY (SP-SC) medium dense, moist, brown, medium and coarse sand		9		22	107	
	20		SP-SC	15		19		
				27				
		LEAN CLAY (CL) hard, moist, brown, moderate plasticity	CL	26				
	25	Bottom of Boring at 24½ feet						
	30							

Undrained Shear Strength (ksf)
- ○ Pocket Penetrometer
- △ Torvane
- ● Unconfined Compression
- ▲ U-U Triaxial Compression

1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-23

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-24-06 FINISH DATE: 10-24-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 51.5 FT.

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ELEVATION (FT)	DEPTH (FT)	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
		SURFACE ELEVATION:						
	0	**FAT CLAY WITH SILT (CH)** very stiff, moist, light brown, moderate plasticity	CH	32		21	99	
				25		24	96	
	5			22		26	100	
	10	**LEAN CLAY WITH SAND (CL)** medium stiff, moist, light brown, fine sand, low plasticity	CL	6		25	97	
	15	**POORLY GRADED SAND WITH CLAY (SP-SC)** medium dense, moist, brown, fine and medium sand	SP-SC	29		21	105	9
	20	**CLAYEY SILT (ML)** very stiff, moist, light brown and light gray mottled, low plasticity	ML	21		18	112	
	25			19		19	108	
	30	**LEAN CLAY (CL)** very stiff, moist, brown, moderate plasticity	CL	27		31	92	

Continued Next Page

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
▽: FREE GROUND WATER MEASURED DURING DRILLING AT 10.0 FEET

LA_CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-23 Cont'd

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-24-06 FINISH DATE: 10-24-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 51.5 FT.

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ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE	Undrained Shear Strength (ksf)
	30		**LEAN CLAY (CL)** very stiff, moist, brown, moderate plasticity							○ Pocket Penetrometer △ Torvane ● Unconfined Compression ▲ U-U Triaxial Compression 1.0 2.0 3.0 4.0
	35			CL	33		32	91		
	40				30		29	87		
	45				30		35	88		
			POORLY GRADED SAND WITH CLAY (SP-SC) medium dense, wet, medium and coarse sand	SP-SC	46		18	111	12	
	50				15		18			
			Bottom of Boring at 51½ feet							
	55									
	60									

GROUND WATER OBSERVATIONS:
▽: FREE GROUND WATER MEASURED DURING DRILLING AT 10.0 FEET

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-24

Sheet 1 of 1

DRILL RIG: MOBILE B-53	PROJECT NO: 2232-1B
BORING TYPE: 8 INCH HOLLOW-STEM AUGER	PROJECT: WAL-MART SUPERCENTER
LOGGED BY: LM	LOCATION: SUISUN, CA
START DATE: 10-24-06 FINISH DATE: 10-24-06	COMPLETION DEPTH: 22.5 FT.

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ELEVATION (FT)	DEPTH (FT)	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	SURFACE ELEVATION:							
	0	**LEAN CLAY WITH SILT (CL)** hard, moist, dark brown, moderate plasticity	CL	41		14		
		color changes to tan		17		25	90	
	5	**LEAN CLAY (CL)** stiff, moist, light brown, moderate plasticity		11		28	95	
		color changes to brown with gray mottles	CL	5		31	90	
	10 ▽							
	15	**LEAN CLAY WITH SAND (CL)** stiff, moist, brown, fine sand	CL	8		24		
	20	**POORLY GRADED SAND WITH CLAY (SP-SC)** medium dense, wet, brown, medium sand	SP-SC	24		22		
				14		20		
		LEAN CLAY (CL) stiff, moist, brown, moderate plasticity	CL					
	25	Bottom of Boring at 22½ feet						
	30							

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
▽: FREE GROUND WATER MEASURED DURING DRILLING AT 10.0 FEET

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-25

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-26-06 FINISH DATE: 10-26-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 10.0 FT.

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ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	0		SURFACE ELEVATION:						
			LEAN CLAY (CL) hard, moist, brown, moderate plasticity	CL	28				
	5		color changes to light brown with light gray mottles, stiff		9				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-26

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-26-06 FINISH DATE: 10-26-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 10.0 FT.

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ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
			SURFACE ELEVATION:						
	0		**LEAN CLAY WITH SILT (CL)** hard, moist, brown, moderate plasticity		27				
	5			CL					
			very stiff		16				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-27

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-25-06 FINISH DATE: 10-25-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 10.0 FT.

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ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	0		SURFACE ELEVATION:						
			LEAN SILT (ML) [FILL] hard, moist, grayish brown, moderate plasticity	ML, FILL	37				
	5		**LEAN CLAY WITH SILT (CL)** very stiff, moist, light brown, low plasticity	CL					
			LEAN CLAY WITH SAND (CL) stiff, moist, light brown, low plasticity	CL	22				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-28

Sheet 1 of 1

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-25-06 FINISH DATE: 10-25-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 20.0 FT.

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ELEVATION (FT)	DEPTH (FT)	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
		SURFACE ELEVATION:						
	0	**LEAN CLAY WITH GRAVEL (CL) [FILL]** hard, moist, brownish gray, moderate plasticity	CL					
		LEAN CLAY WITH SILT (CL) hard, moist, brown, low plasticity		48		9	105	
				43		12	110	
	5	very stiff		36		21	103	
		color changes to light brown with light gray mottles		16		21	110	
	10		CL					
				32		21	109	
	15							
				12		22		
	20	Bottom of Boring at 20 feet						
	25							
	30							

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
▽: FREE GROUND WATER MEASURED DURING DRILLING AT 19.0 FEET

LA_CORP GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-29

Sheet 1 of 1

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-24-06 FINISH DATE: 10-24-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 20.0 FT.

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ELEVATION (FT)	DEPTH (FT)	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
		SURFACE ELEVATION:						
	0	**FAT CLAY WITH GRAVEL (CH) [FILL]** hard, moist, dark brown, moderate plasticity	CH, FILL	28		12	108	
		LEAN CLAY (CL) very stiff, moist, dark brown, moderate plasticity	CL	27		23	97	
	5	**LEAN CLAY WITH SILT (CL)** very stiff, moist, brown, moderate plasticity	CL	27		22	102	
				13		28	97	
	10	**LEAN CLAY WITH SAND (CL)** medium stiff, moist, brown, moderate plasticity	CL	7		26	102	
	15	**CLAYEY SAND (SC)** medium dense, moist, brown, moderate plasticity	SC	13		19		
	20	**LEAN CLAY (CL)** hard, moist, brown, moderate plasticity Bottom of Boring at 20 feet	CL					
	25							
	30							

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
▽: FREE GROUND WATER MEASURED DURING DRILLING AT 9.0 FEET

LA_CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-30

Sheet 1 of 1

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-24-06 FINISH DATE: 10-24-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 20.0 FT.

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ELEVATION (FT)	DEPTH (FT)	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
		SURFACE ELEVATION:						
	0	**FAT CLAY (CH)** hard, moist, dark brown, moderate plasticity Plasticity Index = 40, Liquid Limit = 55	CH	20		20	101	
	5	**LEAN CLAY WITH SILT (CL)** stiff, moist, light brown, low plasticity	CL	20		25	97	
				17		28	96	
	10	**LEAN CLAY WITH SAND (CL)** stiff, moist, light brown, low plasticity	CL	8		26	98	
	15	**CLAYEY SAND (SC)** medium dense, wet, brown, fine sand	SC	10				
				55		20		
	20	**LEAN CLAY (CL)** hard, moist, light brown, moderate plasticity Bottom of Boring at 20 feet	CL	32		17		
	25							
	30							

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
▽: FREE GROUND WATER MEASURED DURING DRILLING AT 8.0 FEET

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-31

Sheet 1 of 1

DRILL RIG: MOBILE B-53	PROJECT NO: 2232-1B
BORING TYPE: 8 INCH HOLLOW-STEM AUGER	PROJECT: WAL-MART SUPERCENTER
LOGGED BY: LM	LOCATION: SUISUN, CA
START DATE: 10-24-06 FINISH DATE: 10-24-06	COMPLETION DEPTH: 20.0 FT.

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ELEVATION (FT)	DEPTH (FT)	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	SURFACE ELEVATION:							
	0	**FAT CLAY (CH)** hard, moist, dark brown, moderate plasticity	CH	25		19	102	
				23		23	100	
	5	**LEAN CLAY WITH SILT (CL)** very stiff, moist, light brown, moderate plasticity	CL	20		25	101	
	10			9		30	92	
	15	**CLAYEY SAND (SC)** medium dense, wet, brown, fine sand	SC	10		21		13
				12		22		
	20	dense		34		22		
		Bottom of Boring at 20 feet						
	25							
	30							

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
▽: FREE GROUND WATER MEASURED DURING DRILLING AT 10.0 FEET

LA_CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-32

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-26-06 FINISH DATE: 10-26-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 10.0 FT.

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ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
			SURFACE ELEVATION:						
	0		**LEAN CLAY (CL)** hard, moist, brown, moderate plasticity		36				
	5			CL					
			stiff		11				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA_CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-33

Sheet 1 of 1

DRILL RIG: MOBILE B-53	PROJECT NO: 2232-1B
BORING TYPE: 8 INCH HOLLOW-STEM AUGER	PROJECT: WAL-MART SUPERCENTER
LOGGED BY: LM	LOCATION: SUISUN, CA
START DATE: 10-25-06 FINISH DATE: 10-25-06	COMPLETION DEPTH: 10.0 FT.

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ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	0		SURFACE ELEVATION:						
			LEAN SILT (ML) [FILL] hard, moist, grayish brown, low plasticity	ML, FILL					
			LEAN CLAY (CL) hard, moist, dark brown, moderate plasticity	CL	22				
	5		**LEAN CLAY WITH SAND (CL)** stiff, moist, light brown, moderate plasticity	CL	10				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)

○ Pocket Penetrometer

△ Torvane

● Unconfined Compression

▲ U-U Triaxial Compression

1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:

NO FREE GROUND WATER ENCOUNTERED

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-34

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-26-06 FINISH DATE: 10-26-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 10.0 FT.

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ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
			SURFACE ELEVATION:						
	0		**LEAN CLAY (CL)** very stiff, moist, brown, moderate plasticity						
			very stiff	CL	31				
	5								
			stiff		9				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA_CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-35

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-25-06 FINISH DATE: 10-25-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 10.0 FT.

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ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
			SURFACE ELEVATION:						
	0		**LEAN SILT (ML) [FILL]** hard, moist, grayish brown, low plasticity	ML, FILL	22				
	5		**LEAN CLAY (CL)** hard, moist, dark brown, moderate plasticity	CL					
			color changes to light brown, stiff		9				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-36

Sheet 1 of 1

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-25-06 FINISH DATE: 10-25-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 10.0 FT.

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ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
			SURFACE ELEVATION:						
	0		**FAT CLAY (CH) [FILL]** hard, moist, grayish brown, low plasticity	CH, FILL	21				
			LEAN CLAY (CL) hard, moist, dark brown, moderate plasticity						
	5			CL					
			stiff		11				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA_CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-37

Sheet 1 of 1

DRILL RIG: MOBILE B-53	PROJECT NO: 2232-1B
BORING TYPE: 8 INCH HOLLOW-STEM AUGER	PROJECT: WAL-MART SUPERCENTER
LOGGED BY: LM	LOCATION: SUISUN, CA
START DATE: 10-25-06 FINISH DATE: 10-25-06	COMPLETION DEPTH: 10.0 FT.

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ELEVATION (FT)	DEPTH (FT)	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	SURFACE ELEVATION:							
	0	**FAT CLAY WITH GRAVEL (CH) [FILL]** hard, moist, grayish brown, low plasticity	CH, FILL					
		LEAN CLAY (CL) hard, moist, dark brown, moderate plasticity	CL	24				
	5							
		LEAN CLAY WITH SAND (CL) stiff, moist, light brown with light gray mottles, low plasticity, fine sand	CL	8				
	10	Bottom of Boring at 10 feet						
	15							
	20							
	25							
	30							

Undrained Shear Strength (ksf)

- ○ Pocket Penetrometer
- △ Torvane
- ● Unconfined Compression
- ▲ U-U Triaxial Compression

1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:

NO FREE GROUND WATER ENCOUNTERED

LA_CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-38

Sheet 1 of 1

DRILL RIG: MOBILE B-53	PROJECT NO: 2232-1B
BORING TYPE: 8 INCH HOLLOW-STEM AUGER	PROJECT: WAL-MART SUPERCENTER
LOGGED BY: LM	LOCATION: SUISUN, CA
START DATE: 10-25-06 FINISH DATE: 10-25-06	COMPLETION DEPTH: 10.0 FT.

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ELEVATION (FT)	DEPTH (FT)	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER
		SURFACE ELEVATION:			
	0	**FAT CLAY WITH GRAVEL (CH) [FILL]** hard, moist, grayish brown, moderate plasticity	CH, FILL	27	
	5	**LEAN CLAY (CL)** hard, moist, dark brown, moderate plasticity	CL		
		color changes to light brown with light gray mottles		11	
	10	**LEAN CLAY WITH SAND (CL)** medium stiff, moist, light brown, low plasticity	CL		
		Bottom of Boring at 10 feet			
	15				
	20				
	25				
	30				

MOISTURE CONTENT (%) | DRY DENSITY (PCF) | PERCENT PASSING NO. 200 SIEVE

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA_CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-39

Sheet 1 of 1

DRILL RIG: MOBILE B-53	PROJECT NO: 2232-1B
BORING TYPE: 8 INCH HOLLOW-STEM AUGER	PROJECT: WAL-MART SUPERCENTER
LOGGED BY: LM	LOCATION: SUISUN, CA
START DATE: 10-25-06 FINISH DATE: 10-25-06	COMPLETION DEPTH: 10.0 FT.

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ELEVATION (FT)	DEPTH (FT)	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
		SURFACE ELEVATION:						
	0	**FAT CLAY WITH GRAVEL (CH) [FILL]** hard, moist, grayish brown, moderate plasticity	CH, FILL					
		LEAN CLAY (CL) very stiff, moist, dark brown, moderate plasticity		25				
	5	color changes to light brown with light gray mottles, stiff	CL					
		LEAN CLAY WITH SAND (CL) medium stiff, moist, brown, low plasticity	CL	8				
	10	Bottom of Boring at 10 feet						
	15							
	20							
	25							
	30							

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA_CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-40

Sheet 1 of 1

DRILL RIG: MOBILE B-53	PROJECT NO: 2232-1B
BORING TYPE: 8 INCH HOLLOW-STEM AUGER	PROJECT: WAL-MART SUPERCENTER
LOGGED BY: LM	LOCATION: SUISUN, CA
START DATE: 10-26-06 FINISH DATE: 10-26-06	COMPLETION DEPTH: 10.0 FT.

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ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	SURFACE ELEVATION:								
	0		**LEAN CLAY (CL)** very stiff, moist, light grayish brown, moderate plasticity						
					26				
	5			CL					
			color changes to light brown with light gray mottles, medium stiff		6				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA_CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-41

Sheet 1 of 1

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-26-06 FINISH DATE: 10-26-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 10.0 FT.

This log is a part of a report by TRC Lowney, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	0		SURFACE ELEVATION:						
			LEAN CLAY (CL) very stiff, moist, brown, moderate plasticity	CL	30				
	5								
			LEAN CLAY WITH SAND (CL) medium stiff, moist, brown, low plasticity	CL	9				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-42

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-26-06 FINISH DATE: 10-26-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 10.0 FT.

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ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	0		SURFACE ELEVATION:						
			LEAN CLAY WITH SILT (CL) very stiff, moist, brown, moderate plasticity	CL	31				
	5								
			LEAN CLAY WITH SAND (CL) stiff, moist, brown, low plasticity, fine sand	CL	11				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-43

Sheet 1 of 1

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-25-06 FINISH DATE: 10-25-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 10.0 FT.

This log is a part of a report by TRC Lowney, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
			SURFACE ELEVATION:						
	0		**FAT CLAY (CH)** very stiff, moist, dark brown, moderate plasticity	CH	20				
	5		**LEAN CLAY (CL)** stiff, moist, brown, moderate plasticity	CL					
			color changes to light brown with light gray mottles, medium stiff		13				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-44

Sheet 1 of 1

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-25-06 FINISH DATE: 10-25-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 10.0 FT.

This log is a part of a report by TRC Lowney, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
			SURFACE ELEVATION:						
	0		**FAT CLAY (CH)** very stiff, moist, dark brown, moderate plasticity	CH	22				
	5		**LEAN CLAY (CL)** stiff, moist, brown, moderate plasticity	CL					
			color changes to light brown with light gray mottles, medium stiff		6				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-45

Sheet 1 of 1

DRILL RIG: MOBILE B-53	PROJECT NO: 2232-1B
BORING TYPE: 8 INCH HOLLOW-STEM AUGER	PROJECT: WAL-MART SUPERCENTER
LOGGED BY: LM	LOCATION: SUISUN, CA
START DATE: 10-25-06 FINISH DATE: 10-25-06	COMPLETION DEPTH: 10.0 FT.

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ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
			SURFACE ELEVATION:						
	0		**FAT CLAY WITH GRAVEL (CH) [FILL]** hard, moist, grayish brown, moderate plasticity	CH, FILL					
			LEAN CLAY (CL) stiff, moist, dark brown, moderate plasticity		19				
	5		color to light brown	CL					
					13				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)

○ Pocket Penetrometer

△ Torvane

● Unconfined Compression

▲ U-U Triaxial Compression

1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:

NO FREE GROUND WATER ENCOUNTERED

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-46

Sheet 1 of 1

DRILL RIG: MOBILE B-53	PROJECT NO: 2232-1B
BORING TYPE: 8 INCH HOLLOW-STEM AUGER	PROJECT: WAL-MART SUPERCENTER
LOGGED BY: LM	LOCATION: SUISUN, CA
START DATE: 10-25-06 FINISH DATE: 10-25-06	COMPLETION DEPTH: 10.0 FT.

This log is a part of a report by TRC Lowney, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	0		SURFACE ELEVATION:						
			LEAN CLAY WITH SILT (CL) very stiff, moist, brown, moderate plasticity	CL	22				
	5		**LEAN CLAY WITH SAND (CL)** medium stiff, moist, brown, low plasticity, fine sand	CL	5				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA_CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-47

Sheet 1 of 1

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-25-06 FINISH DATE: 10-25-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 10.0 FT.

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ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	0		SURFACE ELEVATION:						
			LEAN CLAY (CL) hard, moist, brown, moderate plasticity	CL	42				
	5								
			LEAN CLAY WITH SAND (CL) stiff, moist, brown, low plasticity	CL	20				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-48

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-25-06 FINISH DATE: 10-25-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 10.0 FT.

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ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	0		SURFACE ELEVATION:						
			FAT CLAY (CH) very stiff, moist, dark brown, moderate plasticity	CH	28				
	5		**LEAN CLAY (CL)** stiff, moist, brown, moderate plasticity	CL					
			LEAN CLAY WITH SAND (CL) medium stiff, moist, brown, low plasticity	CL	8				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-49

Sheet 1 of 1

DRILL RIG: MOBILE B-53	PROJECT NO: 2232-1B
BORING TYPE: 8 INCH HOLLOW-STEM AUGER	PROJECT: WAL-MART SUPERCENTER
LOGGED BY: LM	LOCATION: SUISUN, CA
START DATE: 10-25-06 FINISH DATE: 10-25-06	COMPLETION DEPTH: 10.0 FT.

This log is a part of a report by TRC Lowney, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
			SURFACE ELEVATION:						
	0		**LEAN CLAY (CL)** very stiff, moist, dark brown, moderate plasticity	CL					
			LEAN CLAY (CL) very stiff, moist, dark brown, moderate plasticity		29				
	5		medium stiff, color to light brown with light gray mottles	CL					
					9				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)

○ Pocket Penetrometer

△ Torvane

● Unconfined Compression

▲ U-U Triaxial Compression

1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:

NO FREE GROUND WATER ENCOUNTERED

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-50

Sheet 1 of 1

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-26-06 FINISH DATE: 10-26-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 10.0 FT.

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ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
			SURFACE ELEVATION:						
	0		**LEAN CLAY (CL)** hard, moist, dark brown, moderate plasticity		27				
	5		color to light brown	CL					
			stiff		10				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA CORP.GDT 12/4/06 FF* FL

TRC Lowney

EXPLORATORY BORING: EB-51

Sheet 1 of 1

DRILL RIG: MOBILE B-53
BORING TYPE: 8 INCH HOLLOW-STEM AUGER
LOGGED BY: LM
START DATE: 10-25-06 FINISH DATE: 10-25-06

PROJECT NO: 2232-1B
PROJECT: WAL-MART SUPERCENTER
LOCATION: SUISUN, CA
COMPLETION DEPTH: 10.0 FT.

This log is a part of a report by TRC Lowney, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
			SURFACE ELEVATION:						
	0		**FAT CLAY WITH GRAVEL (CH) [FILL]** hard, moist, grayish brown, moderate plasticity	CH, FILL					
			LEAN CLAY (CL) very stiff, moist, dark brown, moderate plasticity		23				
	5		color to light brown with light gray mottles	CL					
			stiff		11				
	10		Bottom of Boring at 10 feet						
	15								
	20								
	25								
	30								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
NO FREE GROUND WATER ENCOUNTERED

LA CORP.GDT 12/4/06 FF* FL

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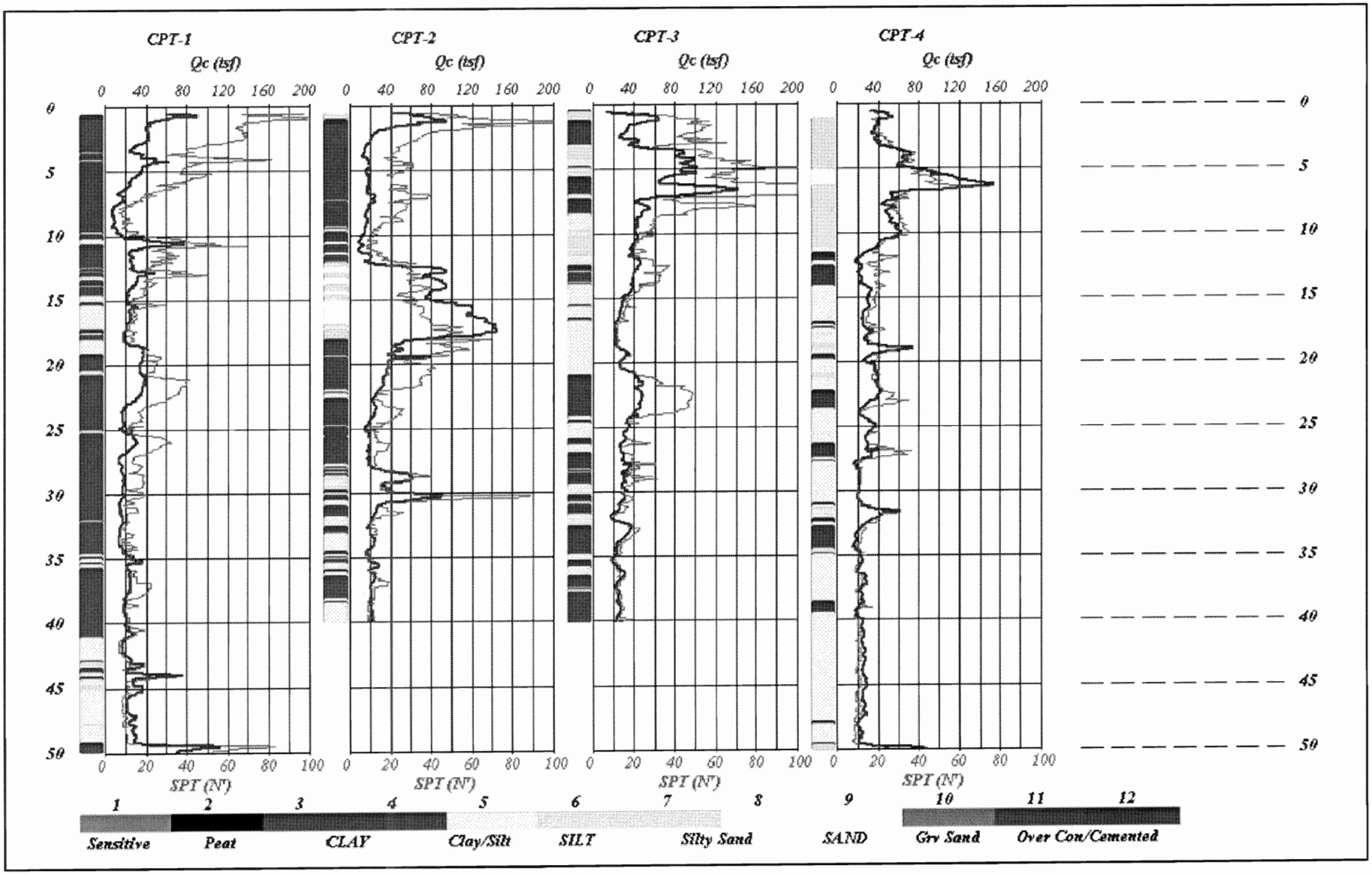


12/06*EB

CONE PENETRATION TEST - CPT-1, CPT-2, CPT-3, CPT-4

WAL-MART SUPERCENTER
Suisun City, California

TRC Lowney

2232-1B

APPENDIX B

LABORATORY PROGRAM

The laboratory testing program was directed toward a quantitative and qualitative evaluation of the physical and mechanical properties of the soils underlying the site and to aid in verifying soil classification.

Moisture Content: The natural water content was measured (ASTM D2216) on selected soil samples recovered from the borings. These water contents are recorded on the boring logs at the appropriate sample depths.

Dry Densities: In place dry density measurements (ASTM D2937) were performed on selected soil samples to measure the unit weight of the subsurface soils. Results of these tests are shown on the boring logs at the appropriate sample depths.

Plasticity Index: Plasticity Index tests (ASTM D4318) were performed on two samples of the subsurface soil from Parcel 2 and one sample each from Parcel 1, 3 and 4 to measure the range of water contents over which the material exhibits plasticity. The Plasticity Index was used to classify the soil in accordance with the Unified Soil Classification System and to evaluate the soil expansion potential. The results of the tests are presented on Figure B-1 and on the logs of the borings at the appropriate sample depths.

Unconfined Compression: Unconfined compression tests (ASTM D2166) were performed on nine undisturbed samples of the clayey subsurface soils to evaluate the undrained shear strengths of these materials. Samples tested had a diameter of 2.8 inches and a height-to-diameter ratio of at least 2. Failure was taken as the peak normal stress. Results of these tests are presented on the boring logs at the appropriate sample depths.

UBC Expansion Index: One UBC Expansion Index test (UBC 18-2) was performed on a representative sample from one boring. This test can assist in understanding the potential for expansion due to wetting of the materials. The result of this test is presented on Figure B-2.

Organic Content: One test was performed (ASTM D2974) to measure the percent of organic material in a selected soil sample. The test of a sample from Boring 15 at a depth of 1.5 feet showed an organic content of 3.0%.

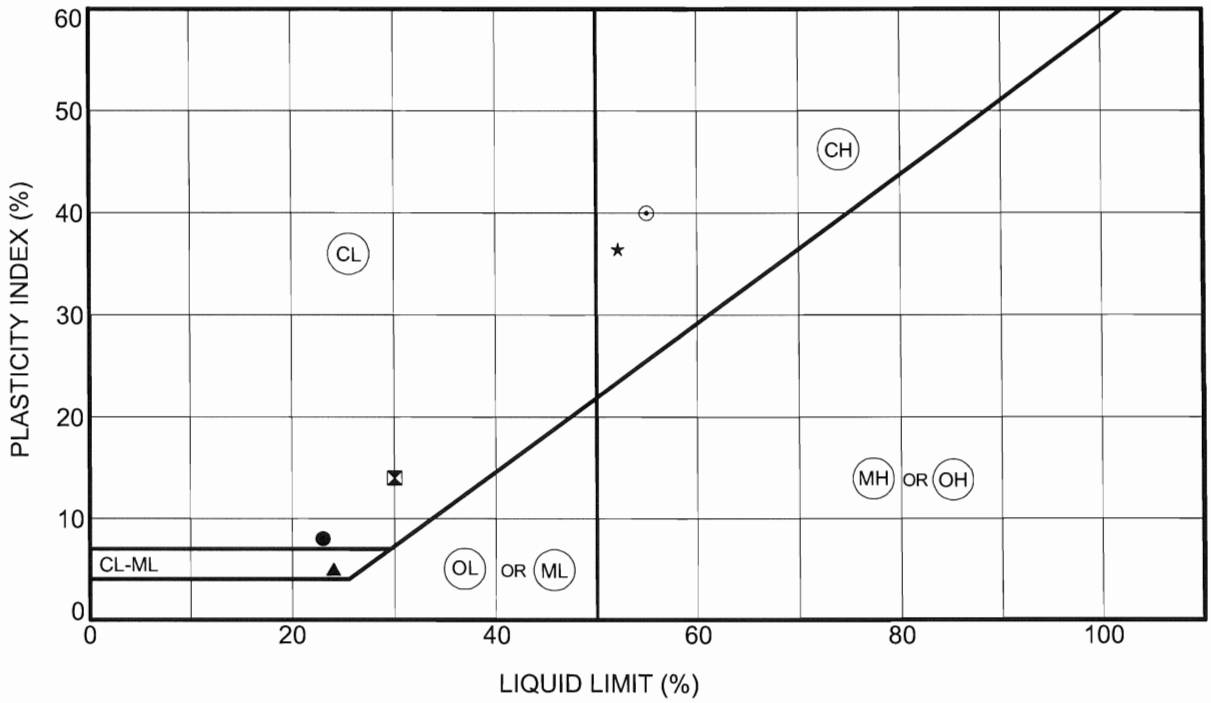
Compaction: A laboratory compaction test (ASTM D1557) was performed on a representative sample of the subsurface soil to measure the maximum dry density and optimum moisture content. Results of the test are presented graphically on Figure B-3.

Washed Sieve Analyses: The percent soil fraction passing the No. 200 sieve (ASTM D1140) was measured on five samples of the subsurface soils to aid in the classification of these soils. Results of these tests are shown on the boring logs at the appropriate sample depths.

R-Value: An R-value resistance test (California Test Method No. 301) was performed on a representative sample of the surface soils within each of the Parcels to provide data for the pavement design. The reported R-values at an exudation pressure of 300 pounds per square inch are summarized in the table below.

Parcel Number	R-value
1	36
2	8
3	19
4	12

* * * * * * * * * * * * *



Symbol	Boring No.	Depth (ft.)	Natural Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing No. 200 Sieve	Unified Soil Classification Description
●	**BP1P**	**1.0**		**23**	**15**	**8**		**LEAN CLAYEY SAND**
⊠	**BP3P**	**1.0**		**30**	**16**	**14**		**LEAN CLAYEY SAND**
▲	**BP4P**	**0.5**		**24**	**19**	**5**		**SILTY CLAYEY SAND**
★	**EB-16**	**1.5**	**18**	**52**	**16**	**36**		**FAT CLAY (CH)**
⊙	**EB-30**	**1.5**		**55**	**15**	**40**		**FAT CLAY (CH)**

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PLASTICITY CHART AND DATA

Project: WAL-MART SUPERCENTER

Location: SUISUN, CA

Project No.: 2232-1B

FIGURE B-1

CTL Job No.:		Boring:	EB-23	Date:	11/15/2006
Client:		Sample:	Bulk #1	By:	PJ
Project Name:	Suisun Wal-Mart	Depth:	0-2'		
Project No:	P15981				
Visual Description:	Brown Sandy CLAY				

Processing:

Percent Passing #4 Sieve	
Total Air Dry Weight:	
Wt. Retained on #4 Sieve:	
% Retained	N/A
% Passing #4 Sieve:	N/A

Sample Dimensions

Height (in.)= 1.001 Diameter (in.) = 4.017

Moisture Calcs

	Initial	Final
Tare #		
Wet Wt. + Tare, (gm)	605.5	659
Dry Wt. + Tare, (gm)	561.2	561.2
Tare Wt., (gm)	238.1	238.1
Wt. Of Water, (gm)	44.3	97.8
% Water	13.7	30.3

Remolding:

Tamp two lifts, 15 blows/lift @ slightly below optimum moisture content

	Initial	Final	
Ring & Sample:	563.1	616.6	grams
Ring:	195.7	195.7	grams
Remolded Wet Wt.:	367.4	420.9	grams
Wet Density	110.3	115.8	pcf
Dry Density	97.0	88.9	pcf
% Sat. = $\frac{(2.7)(\text{dry dens.})(\text{m/c})}{168.48 - (\text{dry dens.})}$	50.3	91.3	UBC 49<Sat%<51 / ASTM (40-60%)

Expansion Test:

Date	Time	Dial	Delta h, %
11/6/2006	16:29	0.0000	0.000
11/6/2006	16:32	-0.0045	0.450
11/6/2006	16:44	-0.0148	1.479
11/7/2006	6:38	-0.0839	8.382
11/8/2006	11:41	-0.0872	8.711
11/9/2006	12:30	-0.0887	8.861
11/10/2006	10:23	-0.0896	8.951
11/13/2006	11:21	-0.0912	9.111
11/13/2006	14:08	-0.0912	9.111
		Total Dial	9.1

Tested with 1 psi Surcharge

Remarks:

Expansion Index

$\frac{\text{initial dial - final dial}}{\text{initial sample height}} \times 1000$

Results

EI= **91**

This test is a simplified index test and may not show the full potential for expansion and/or shrinkage. Use result with caution! See ASTM D 3877

Note: Per ASTM D4829 if the degree of saturation is within the range of 40-60%, EI @ 50% can be calculated as follows:

$$EI_{50} = EI_{meas} - (50 - S_{meas}) \quad \frac{65 + EI_{meas}}{220 - S_{meas}}$$

EXPANSION INDEX

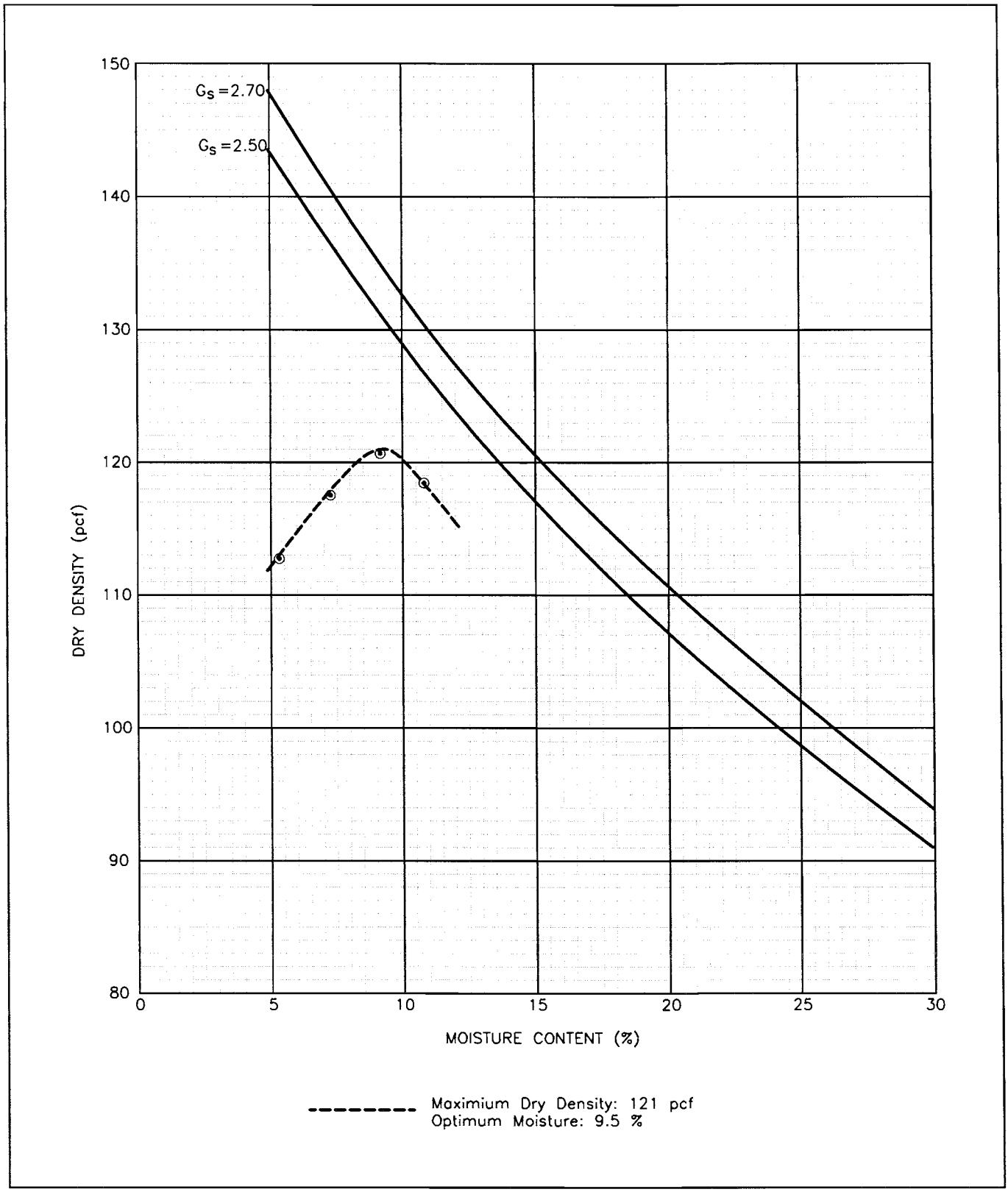
WAL-MART SUPERCENTER

Suisun City, California

TRC Lowney

FIGURE B-2

P15981



11/06-EB

COMPACTION CURVE

WAL-MART SUPERCENTER
Suisun City, California

TRC Lowney

FIGURE B-3
P15981

APPENDIX C

GEOTECHNICAL INVESTIGATION FACT SHEET
FOUNDATION DESIGN CRITERIA
FOUNDATION SUBSURFACE PREPARATION

GEOTECHNICAL INVESTIGATION FACT SHEET

Include this form in the Geotechnical Report as an Appendix.

PROJECT LOCATION: Wal-Mart Supercenter, Suisun City, California

Civil Engineer: Robert A. Karn & Associates, Inc. **Phone #:** (707) 435-9999

Geotechnical Engineering Co.: TRC Lowney **Report Date:** December 18, 2006

Ground Water Depth: 6.2' **Fill Soils Characteristics:** Select Fill

Date Groundwater Measured: 10/26/06 **Maximum Liquid Limit:** 55

Topsoil/Stripping Depth: see report **Maximum Plasticity Index:** 40

Undercut (If Required): N/A **Specified Compaction:** 95% ASTM D1557

Modified Proctor Results: Plot Attached **Moisture Content Range:** ±2% optimum

Recommended Compaction Control Tests:

1 Test for Each 5,000 Sq. Ft. each Lift (bldg. area)
1 Test for Each 5,000 Sq. Ft. each Lift (parking area)

Structural Fill Maximum Lift Thickness 8 in. (Measured loose)

Subgrade Design R-value = 5

COMPONENT	ASPHALT		CONCRETE	
	Standard	Heavy	Standard	Heavy
Base Material (Stone, Sand/Shell, etc.)	15.5 inches	17.5 inches	6.0 inches	6.0 inches
Asphalt Base Course	N/A	N/A	N/A	N/A
Leveling Binder Course	N/A	N/A	N/A	N/A
Surface Course	4.0 inches	5.0 inches	6.0 inches	7.0 inches

FOUNDATION DESIGN CRITERIA

PROJECT LOCATION: Wal-Mart Supercenter, Suisun City, California

Engineer: Robert A. Karn & Associates, Inc. **Phone #:** (707) 435-9999

Geotechnical Engineering Co.: TRC Lowney **Report Date:** December 18, 2006

Foundation type: Conventional and/or Isolated Spread Footings

Allowable bearing pressure: 3,000 pounds per square foot (Dead plus live)

Factor of Safety: 2 (dead plus live)

Minimum footing dimensions: Individual: 18-inches **Continuous:** 18-inches

Minimum footing embedment: Exterior: 24 inches **Interior:** 24 inches

Frost depth: N/A

Maximum foundation settlements: Total: ¾-inch

Differential: ½-inch

Slab: N/A

Capillary Break (not a vapor barrier) describe: Caltrans Class 2 permeable material

Active Equivalent Fluid Pressures: 45 pcf

Passive Equivalent Fluid Pressures: 300 pcf

Perimeter Drains (describe): Building: N/A
Retaining Walls: See Report

Cement Type: Type II

Retaining Wall: At rest pressure: 45 pcf + 8H psf
Coefficient of friction: 0.30

COMMENTS:

FOUNDATION SUBSURFACE PREPARATION

Wal-Mart Supercenter
Peterson Road at Walters Road
Suisun City, California
December 18, 2006

Unless specifically indicated otherwise in the drawings and/or specifications, the limits of this subsurface preparation are considered to be that portion of the site directly beneath and 10 feet beyond the building footprint and appurtenances. Appurtenances are those items attached to the building proper, typically including, but not limited to, the building sidewalks, garden center, porches, ramps, stoops, truck wells/docks, concrete aprons at the automotive center, compactor pad, etc. The subbase and the vapor barrier, where required, do not need to extend beyond the limits of the actual building and the appurtenances.

Establish the final subgrade elevation at 4 or 5½ inches below finished floor elevation to allow for a 4 or 5½ inch slab, respectively, or at 10 or 11½ inches below the finished floor elevation to allow for a 4 or 5½ inch slab, respectively, to allow for the slab thickness and a 6 inch subbase layer. For exposed slabs, the subbase shall consist of 4 inches of coarse aggregate meeting the gradation requirements of Caltrans Class 2 permeable material, covered with 2 inches of fine aggregate meeting the gradation requirements of the "Slab-on-Grade" section of the geotechnical report. The contractor shall be responsible for obtaining accurate measurements for all cut and fill depths required.

Existing foundations, slabs, pavements and below grade structures shall be removed from the building area. Remove surface vegetation, topsoil, root systems, organic material, existing fill, and soft or otherwise unsuitable material from the building area. Prior to placing fill in building and parking areas, the upper 8 inches of the surficial soils shall be recompacted. Proofroll exposed subgrade. Remove and replace unsuitable and undocumented fill areas with suitable material. Imported fill material shall be free of organic and other deleterious materials and shall meet the following requirements: Liquid Limit of 40 or less, and a Plasticity Index of 15 or less.

All fill, as well as scarified surface soils in those areas to receive fill, slabs-on-grade, or pavements should be compacted to at least 95 percent relative compaction as measured by ASTM Test Designation D1557, latest edition, at a moisture content near the laboratory optimum. Fill should be placed in lifts no greater than 8 inches in uncompacted thickness. Each successive lift should be firm and non-yielding under the weight of construction equipment.

The foundation system shall be isolated spread footings at columns and continuous spread footings at walls.

This foundation subsurface preparation does not constitute a complete site work specification. In case of conflict, information covered in this preparation shall take precedence over the Wal-Mart specifications. Refer to the specifications for specific information not covered in this preparation. Additional recommendations may also be found in the geotechnical report prepared by TRC Lowney dated December 18, 2006 (Geotechnical report is for information only and is not a construction specification).

Email address for Geotechnical Engineer: sfitinghoff@lowney.com

APPENDIX D

CORROSION EVALUATION

JDH Corrosion Consultants
Incorporated

November 16, 2006

Cooper Testing Laboratory
937 Commercial Street
Palo Alto, CA 94303

Attention: **Mr. Peter Jacke**

Subject: **Site Corrosivity Evaluation**
Suisun Wal-Mart
Project No. P15981

Dear Mr. Jacke,

In accordance with your request, we have reviewed the laboratory soils data for the above referenced project site. Our evaluation of these results and our corresponding recommendations for corrosion control for reinforced concrete in contact with these soils and buried site utilities are presented herein for your consideration.

SOIL TESTING & ANALYSIS

Soil Chemical Analysis

Three (3) soil samples from the project site were chemically analyzed for corrosivity by your laboratory. Each sample was analyzed for chloride and sulfate concentration, pH, saturated resistivity and moisture percentage in accordance with Caltrans Standards. The test results are presented in Cooper Testing Laboratories *Corrosivity Test Summary* dated 11/6/06. A summary of the results of the chemical analysis is as follows:

Soil Laboratory Analysis

Chemical Analysis	Range of Results	Corrosion Classification*
Chlorides	<2 - 277 mg/kg	Non-corrosive
Sulfates	<5 – 147 mg/kg	Non-corrosive **
pH	7.3 – 7.8	Non-corrosive**
Moisture (%)	12.1 – 28.8	Not-applicable
Minimum Resistivity	589 – 1,543 ohm-cm	Corrosive
Redox		

* With respect to bare steel or ductile iron.
** With respect to mortar coated steel

DISCUSSION

Reinforced Concrete

The presence of water-soluble sulfate and chloride ions in the soils tested were at a fairly low level. However, they were sufficient to warrant the use of Type II modified cement for the concrete foundations with a maximum water-to-cement ratio of 0.55. Also, it is recommended to use a minimum depth of cover of 3" over the reinforcing bars, especially in the areas where the foundation is more than a few feet deep.

Underground Metallic Pipelines

The soils at the project site are considered to be "corrosive" to ductile/cast iron, steel and dielectric coated steel based on the resistivity measurements. Therefore, corrosion control in the form of coatings and cathodic protection is warranted for all buried metallic pressure pipelines, such as domestic and fire water pipelines, planned for use at this site depending upon the critical nature of the structures. All underground pipelines should also be electrically isolated from above grade structures, reinforced concrete structures and copper lines in order to avoid potential galvanic corrosion problems.

LIMITATIONS

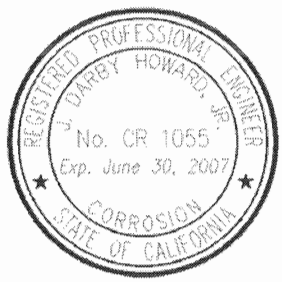
The conclusions and recommendations contained in this report are based on the information and assumptions referenced herein. All services provided herein were performed by persons who are experienced and skilled in providing these types of services and in accordance with the standards of workmanship in this profession. No other warrantees or guarantees, expressed or implied, are provided.

We thank you for the opportunity to be of service to ***Cooper Testing Laboratory*** on this project and trust that you find the enclosed information satisfactory.

If you have any questions or if we can be of any additional assistance, please feel free to contact us at (925) 927-6630.

Respectfully submitted,

J. Darby Howard, Jr.



J. Darby Howard, Jr., P.E.
JDH Corrosion Consultants, Inc.
Principal

cc: File 26179