APPENDIX D

PRELIMINARY GEOTECHNICAL REPORT

PRELIMINARY GEOTECHNICAL REPORT

2270 BROADWAY DEVELOPMENT OAKLAND, ALAMEDA COUNTY, CA

Prepared for
Lakeshore Partners LLC
780 W. Grand Avenue, Suite 200
Oakland, CA 94612

November 07, 2014

URS

URS Corporation
1333 Broadway, Suite 800
Oakland, California 94612

26819122

URS

November 7, 2014

Mr. Thomas Peterson
Lakeshore Partners LLC
780 W. Grand Avenue, Suite 200
Oakland, CA 94612

Re: Preliminary Geotechnical Report
2270 Broadway Development
Oakland, California

Dear Mr. Peterson,

URS is pleased to present our preliminary geotechnical report for the proposed development at 2270 Broadway, Oakland, California. This report is in fulfillment of our proposal dated October 15, 2014 and your authorization dated October 17, 2014. Our scope of work includes evaluation of the subsurface conditions and provides recommendations of the foundation design and seismic design parameters.

We appreciate the opportunity to work with you on this project. If you have any questions regarding this submittal, please contact the undersigned at (510) 874-1723.

Sincerely,
URS CORPORATION

Philip Meymand, Ph.D., G.E.
Senior Project Manager

REGISTERED PROFESSIONAL ENGINEER
PHILIP J. MEYMAND
No. GE2596
Exp. 6-30-15
GEOTECHNICAL
STATE OF CALIFORNIA

TABLE OF CONTENTS

TABLE OF CONTENTS

Tables

Figures

Appendices

1.1 OBJECTIVES AND AUTHORIZATION

This Preliminary Geotechnical Report summarizes the results of our geotechnical study for the proposed development at 2270 Broadway in Oakland, California. The purpose of this study was to review the existing geotechnical information in the project vicinity, and to develop engineering properties for foundation analysis, develop seismic design parameters for the design of the building, evaluate geologic hazards associated with the site, and prepare criteria for foundation design and construction of the project. This study was performed by URS Corporation in accordance with our proposal dated October 15, and your authorization dated October 17, 2014. In connection with this study, we have spoken with the members of the design team, and reviewed our database of previous geotechnical reports for the site vicinity and specifically studied the geotechnical investigation data including boring logs and results of laboratory testing from two adjacent buildings provided to us by Lakeshore Partners LLC.

1.2 PROPOSED DEVELOPMENT

The proposed development site is located at 2270 Broadway, Oakland, California (Figure 1-1) bounded by Webster Street, Broadway, 23rd Street, and Grand Avenue. The site is currently an asphalt paved parking lot, and we understand the plan is to develop a 24-story residential tower with one underground parking level at the site. An existing multi-story building (80 Grand Avenue building) also exists in this block on the south site of the proposed building.

1.3 SCOPE OF WORK

Our scope of work for this portion of the project included:

- Review available geotechnical information including geologic literature and maps; and our database of previous geotechnical reports in the project vicinity;
- Review the boring logs and results of laboratory testing provided to us by Lakeshore Partners LLC from previous geotechnical investigations performed by AMEC (formerly Geomatrix Consultants Inc.) for two adjacent properties including the 100 Grand Avenue Development and the Caltrans District 4 Building. For reference, the 100 Grand Avenue building is across Webster Street on the east side of the proposed building. The Caltrans building is across Grand Avenue also on the east side of the proposed building and facing the 100 Grand Avenue building.
- Perform geologic and seismic hazard evaluations; engineering analyses for foundation design parameters; and prepare this Preliminary Geotechnical Report which includes:
    - Description of previous subsurface investigation programs including boring procedures and laboratory tests;
    - Discussion of site geology, soil characterization, nature and extent of foundation materials, and groundwater conditions;

- Discussion of known and potentially active faults, geologic hazards, liquefaction potential, and seismically-induced settlement potential;
- Evaluation of soil corrosivity, compressibility, and swell potential, including recommendations for mitigation, if required;
- Seismic Design Parameters as required by the 2013 California Building Code;
- Allowable bearing pressures for shallow mat foundations;
- Estimate of short and long-term foundation settlements;
- Coefficients of resistance against sliding for foundations;
- Subgrade modulus values for equivalent soil springs for use in foundation design;
- Lateral earth pressures for temporary shoring and permanent basement wall.
- Recommendations for control of groundwater and hydrostatic pressures, both during construction and for the completed project;
- Recommendations for waterproofing systems and/or drainage for the subgrade construction;
- Earthwork, fill and compaction requirements; and
- Site grading and compaction requirements including recommended backfill procedures.

1.4 PROJECT TEAM

The project team that contributed to the work presented in this report includes the following individuals:

- Philip Meymand, Registered Geotechnical Engineer and Project Manager
- Robert Green, Registered Geotechnical Engineer and Technical Reviewer
- David Simpson, Certified Engineering Geologist
- Najme Jalali, Registered Civil Engineer and Project Engineer
- Fabia Terra, Senior Seismologist
- Rose Abbors, Senior GIS Analyst
- Sherry Liu, Staff Engineer

2.1 SUBSURFACE EXPLORATION

URS has not performed new subsurface investigations at this site. However, the geotechnical information from two previous studies for the nearby buildings were provided to us and used for this study. On May 19 and 20, 2005, AMEC conducted a field exploration program at an adjacent property located at 100 Grand Avenue, at Webster Street, Oakland, California, consisting of drilling, logging and sampling three borings (G-1, G-2, and G-3). The boring location map is provided in Appendix A. The borings were drilled by Pitcher Drilling Company of East Palo Alto, California using rotary wash method with a truck-mounted Failing 1500 rig. The borings were drilled to approximately 121.5 feet, 51.5 feet and 60 feet below ground surface (bgs) for borings G-1, G-2, and G-3, respectively.

AMEC also performed a subsurface investigation at another adjacent building (Caltrans District 4 building) on Grand Avenue, at Webster Street, Oakland, California in January through February of 1990 consisting of drilling, logging and sampling five borings (Boring No. 1 through 5). The boring location map is provided in Appendix B. These borings were drilled with Hollow Stem Auger and rotary wash methods.

AMEC collected drive samples from the borings at both sites using a 2.5-inch or 2-inch inside diameter (ID) split-barrel Modified California sampler with brass tube liners. The samplers were driven 18 inches into the material at the bottom of the borehole with a 140-pound safety hammer falling 30 inches. Blow counts for the last 12 inches of driving were recorded for each sample taken, and are shown on the boring logs provided in Appendices A and B. Several Shelby tube samples with 3-inch outside diameter (OD) were also obtained.

2.2 LABORATORY TESTING

Laboratory test results from the field exploration programs performed by AMEC were reviewed. Representative soil samples obtained from the exploratory borings at the adjacent 100 Grand Avenue Development (2005) and also Caltrans District 4 Building (1990) sites were tested by AMEC to evaluate their physical characteristics and engineering properties. The laboratory testing program included Moisture Content, Unit Weight, Particle Size Distribution, Atterberg Limits, and Unconfined Compressive Strength, Unconsolidated Undrained (UU) Triaxial Compressive Strength, Consolidation, and Corrosion tests. The results of the laboratory testing are summarized on the logs of borings at the corresponding sample depths along with the sample blow counts. Laboratory test results are presented in Appendices A and B of this report.

The following sections summarize geologic conditions in the site vicinity based on available geologic literature, maps, and reports.

3.1 REGIONAL GEOLOGY

The regional geology is shown on Figure 3-1. The project site is at an elevation of about 25 feet NGVD 88 and is located at longitude 122.265 W and latitude 37.812 N. The site is located in the Coast Ranges province of California that is characterized by northwest-southeast trending valleys and ridges. These topographic features are controlled by folds and faults that resulted from the collision of the Farallon and North American plates and subsequent predominantly strike-slip faulting along the San Andreas fault system. Bedrock underlying much of the San Francisco Peninsula and East Bay hills is primarily of the Jurassic to mid-Cretaceous age (approximately 100 to 206 million years old) Franciscan Complex, that is characterized by a diverse assemblage of sandstone, shale, chert, greenstone, and sheared rock (mélange), with lesser amounts of limestone, conglomerate, calc-silicate rock, schist, and other metamorphic rocks.

Regional geologic mapping has been performed by Blake et al. (1974), Wagner et al. (1990), Knudsen et al. (2000) and Graymer et al. (2005). Graymer shows this portion of Oakland to be underlain by bedrock of the Franciscan Complex mantled by Holocene age (less than 11,000 years old) alluvial fan deposits, Holocene and Pleistocene age (up to 2.6 million years old) Merritt Sand and Pleistocene age (11,000 to 2.6 million years old) fluvial deposits and shallow water marine deposits (Figure 3-1). The Holocene and Pleistocene deposits are composed of alluvial and near shore marine materials that were derived from erosion of the Berkeley Hills. These sediments were deposited in a subsiding bay environment. This subsidence is thought to have begun, geologically, fairly recently and is dated at less than 500,000 years ago. The alluvial sediments consist primarily of stiff silty clay with minor sand, silt, and gravel.

Sandstone and shale of the Franciscan Complex were encountered at depths of about 170 to 180 feet below the ground surface in borings drilled on the Kaiser property on the north side of MacArthur Boulevard at 3600 Broadway (Woodward-Clyde-Sherard, 1967). More recent work at the Kaiser Permanente Hospital site on the block bounded by Broadway, MacArthur Boulevard, Piedmont Avenue, and I-580 by URS (2005) included 17 soil borings do depths of 40 to 131 feet that encountered primarily sandy clays and clayey sands. None of these borings went deep enough to encounter bedrock.

3.2 SURFACE AND SUBSURFACE CONDITIONS

The proposed development is currently an asphalt paved parking lot and the existing ground surface at the site is fairly level at approximate elevation of 25 feet (NGVD 88).

Based on the existing borings performed by AMEC at adjacent properties in 2005 and 1990, the site is underlain by fill underlain by native alluvial deposits consisting of alternating layers of stiff to hard sandy clay, clay with sand or silty clay (CL), and dense to very dense clayey sand (SC) or sand (SP, SW-SC). Variable amount of gravel was encountered throughout the fill and alluvial soils.

3.3 GROUNDWATER CONITIONS

Review of the previous field investigation data by AMEC shows that groundwater was encountered during drilling at approximate depths of 19 to 22 feet within borings drilled at the adjacent Caltrans building in January through February, 1990. In addition, it appears the groundwater was not measured due to mud rotary drilling method at the adjacent property at 100 Grand Avenue in May 2005. The design depth to groundwater is an unresolved issue at this time and needs to be assessed with further field investigation.

The currently planned basement excavation for the mat foundation is expected to extend to about 16 to 19 feet below ground surface. This includes an assumed 5 foot thick mat foundation (mat thickness not confirmed at this time) and also a total thickness of 1 foot for the floor slabs and the associated subgrade preparation. The existing groundwater data in the vicinity of the site suggests that the groundwater may be encountered during basement excavation. In order to maintain a dry working area, dewatering systems should be installed to lower the groundwater level during construction to a minimum of 5 feet below the proposed excavation depth.

For portions of the building where the basement finished floor is below groundwater, the basement walls and slabs should be waterproofed to reduce seepage into the basement due to hydrostatic pressures.

3.4 CORROSION POTENTIAL

Two soil samples from the adjacent 100 Grand Avenue Development site were chemically analyzed for corrosivity by Cooper Testing Laboratories for AMEC in 2005. Each sample was analyzed for chloride and sulfate concentration, pH, saturated resistivity, redox potential and moisture percentage. The corrosivity test results along with a corrosivity analysis are provided in Appendix A.

All buried iron, steel, cast iron, ductile iron, galvanized steel and dielectric coated steel or iron will need to be properly protected against corrosion. All buried metallic pressure piping such as ductile iron firewater pipelines will also need to be protected against corrosion.

3.5 EXPANSIVE SOIL POTENTIAL

Expansive soils are those that shrink or swell significantly with changes in moisture content. The clay content and porosity of the soil also influences its volume change characteristics, and higher plasticity index correlates to higher expansion potential. The shrinking and swelling caused by expansive clay-rich soils often results in damage to overlying structures.

Only two soil samples were tested for Liquid and Plastic limits from the adjacent 100 Grand Avenue Development site in 2005. The results of these tests showed the clayey soils encountered at that site are of medium to high plasticity, suggesting that the site soils should be considered moderately to highly expansive. The potentially expansive soils, however, are located within the basement excavation zone and therefore judged not to be of major concern.

4.1 STRONG GROUND SHAKING

Based on the proximity of the proposed building site to the San Andreas, Hayward, and Calaveras faults, there is a high potential for the site to experience moderate to strong ground shaking during a major earthquake on one of these faults. Figure 4-1 presents the major faults in the San Francisco Bay Area. The project site is located 4.9 km west of the Hayward Fault and 25.2 km east of the San Andreas Fault. The intensity of earthquake ground motion in the site vicinity will depend on the characteristics of the generating fault, the distance to the earthquake epicenter, the magnitude and duration of the earthquake, and site geologic conditions.

4.2 FAULT RUPTURE

Following California's Alquist-Priolo Special Studies Zone Act of 1972, construction of structures for human occupancy in designated Earthquake Fault Zones is not permitted until a site-specific evaluation of surface fault rupture and fault creep has been performed. These zones are established by the CGS along faults or segments of faults that are judged to be sufficiently active and well-defined as to constitute a potential hazard to structures from surface faulting or fault creep.

The proposed 2270 Broadway Development site is not close to any known active faults. No active faults have been mapped on the Oakland West quadrangle (Jennings, 1994; CDMG, 1997). The closest mapped active fault is the Hayward fault at a distance of about 4.9 km from the site. Considering the distance of the site from any active faults and the lack of observed historical faulting in the site vicinity, we judge the potential for fault rupture at the site to be negligible.

4.3 LIQUEFACTION EVALUATION

Liquefaction is a phenomenon whereby soil deposits temporarily lose shear strength and collapse. This condition is caused by cyclic loading during earthquake shaking that generates high pore water pressures within the soil deposits. The soil type most susceptible to liquefaction is loose, cohesionless, granular soil below the water table and within about 50 feet of the ground surface. Liquefaction can result in a loss of foundation support and settlement of overlying structures, ground subsidence and translation due to lateral spreading, lurch cracking, and differential settlement of affected deposits. Lateral spreading occurs when a soil layer liquefies at depth and causes horizontal movement or displacement of the overlying mass on sloping ground or towards a free face such as a stream bank or excavation.

Figure 4-2 shows the location of the site superimposed on the California Geologic Survey (CGS) Seismic Hazard Zones map for the Oakland West Quadrangle (CGS, 2003). The site is outside but at the margin of an area with potential liquefaction hazard.

As stated in Section 3.3, the groundwater table was measured at an approximate depth of 19 to 22 feet below the ground surface in January and February of 1990. The subsurface soil conditions at the site as discussed in Section 3.2 consist of alternate layers of stiff to hard clay or dense to very dense sandy soils. We therefore conclude that the potential for liquefaction at the site is low. Furthermore, because the risk of liquefaction at the project site is low, we conclude the risk of seismically induced settlements and lateral spreading at the site is also negligible.

4.4 SEISMIC DESIGN CRITERIA

Based on the subsurface conditions encountered in Borings G-1 through G-3 and Boring No.1 through No.5 from previous studies by AMEC, the site should be classified as Site Class D in accordance with the latest provision of ASCE 7-10.

The following table presents the spectral acceleration parameters.

Table 4-1. Spectral Response Acceleration Parameters

S_S	1.807 g
S_1	0.722 g
F_a	1.0
F_v	1.5
S_{MS}	1.807 g
S_{M1}	1.083 g
S_{DS}	1.205 g
S_{D1}	0.722 g
T_L	8 seconds
PGA_M	0.697 g
Seismic Design Category	D

Notes:

S_S = mapped Maximum Considered Earthquake (MCE), spectral response acceleration parameter at short periods.
S_1 = mapped MCE spectral response acceleration parameter at a period of 1 second.
F_a = spectral response acceleration parameter at short period

F_v = spectral response acceleration parameter at long period (1-seconds spectral acceleration)
S_{MS} = F_a x S_s, the MCE spectral response acceleration parameter at short periods adjusted or site class effects.

S_{M1}= F_v x S_1, the MCE spectral response acceleration parameter at a period of 1 s adjusted for site class effects.

S_{DS} = 2/3 x S_{MS}, design spectral response acceleration parameter at short periods.

S_{D1} = 2/3 x S_{M1}, design spectral response acceleration parameter at 1 second period.

T_L = long-period transition period (s) used to define design response spectrum.
PGA_M = Mean Peak Ground Acceleration adjusted for site class effects.

5.1 GENERAL

Preliminary architectural plans of the proposed building were provided to us by the project architect, David Delasantos of MBH Architects, via email on October 21, 2014. The footprint of the proposed building is 227’-5” long on the north side (along 23rd St.) and 251.13’ on the south side. The proposed building is 70’ wide on the east side (along Broadway) and 95.71’ on the west side (along Webster St.) with a 17.72’ widening step in the middle of the structure.

The proposed structure will be a 24 story building with one level basement which is 10’ deep on the west side (Broadway) and 12’-9” deep on the east side (Webster St.). The structural loads for the new development building have not been provided to us at this time. However, we understand that this 24-story building will likely be supported on a shallow mat foundation. The subsurface soils at the site as discussed in Section 3.2 consist of competent materials which are capable of supporting the proposed building on mat foundations provided the total and differential settlements can be tolerated or incorporated into the building design. It is likely that the new utility lines be accommodated between the mat foundation at the bottom and slabs-on-grade on top. Recommendations for a mat foundation system, slabs-on-grade and temporary shoring system used during construction as well at the permanent basement retaining walls will be provided in the following sections.

5.2 MAT FOUNDATIONS

5.2.1 Settlement and Allowable Bearing Pressure

We understand that the current plan is to support the proposed building on a mat foundation. The columns loads have not been provided to us yet and therefore the corresponding contact stress is unknown at this time. Foundation settlements for the mat foundation will be evaluated once we receive the structural loading. It should be noted that since the proposed construction involves excavating an estimated 16 to 19 feet of soil (approximate 10 to 13-ft-deep basement with an assumed 5-ft-thick mat and 1-ft-thick floor slab) and placing 5 feet of concrete, negative bearing pressure corresponding to the excavation volume will effectively reduce the net pressure acting at the base of the foundation.

It should be noted that the basement excavation may cause an upward heave of the unloaded subgrade soils, thereby altering the existing conditions at the site. Our previous records for a similar subsurface soil profile indicate that heave magnitudes of ½- to ¾-inch for every 10 feet of excavation were measured at the Kaiser Center Building site near Lake Merritt in Oakland. Such magnitudes of heave would occur during excavation and within the first 2 to 3 months after unloading. Subsequent application of the building loads would reduce the tendency for further heave. Since the heaved soils will be leveled during construction of the foundations, heave is not judged to be a design issue.

A preliminary allowable bearing pressure of 5,000 psf can be used for design of the mat foundation. The recommended allowable bearing pressure is for the total of dead plus live loads, and may be increased by one-third for transient loading conditions including wind and seismic forces.

As mentioned above, the structural building loads are not provided to us at this time and since the settlement criteria might control the design, the allowable bearing pressure for the mat foundation will be revisited for the final design once loading data becomes available.

5.2.2 Modulus of Subgrade Reaction

We understand that the Structural Engineer will use a modulus of subgrade reaction to analyze the mat for bending. The value of the modulus of subgrade reaction depends on the planned foundation configurations, embedment depth and stiffness properties of the soils. We recommend that a modulus of subgrade reaction of 150 kcf (kips per cubic foot) be used for this purpose.

5.2.3 Lateral Load Resistance

Resistance to lateral loads can be developed by a combination of passive earth pressure acting against the sides of the mat foundations and friction between the bottom of the mat and the supporting soil. For passive resistance, an ultimate equivalent fluid pressure of 350 pounds per cubic foot (pcf) can be used. However, the passive pressure should be limited to a maximum value of 4,000 psf. Frictional resistance can be computed using a base friction coefficient of 0.35. The passive pressure and base friction coefficient values may be used in combination. It should be noted that these values are ultimate and a factor of safety of at least 1.5 should be included when calculating for sliding and overturning resistance.

5.3 BASEMENT RETAINING WALLS

It is anticipated that the basement walls will be restrained from movement by the basement and ground floor slabs and will not be free to deflect under soil pressures. As a result, soil pressures approaching the at-rest condition will act on the walls.

As discussed in Section 3.3, the design groundwater is unresolved at this time and needs further evaluations. Therefore, the bottom of the basement retaining walls may be below groundwater level in which case the basement walls should be designed to withstand hydrostatic pressure below the design groundwater level. It is recommended that permanent basement walls be designed for pressures due to an equivalent fluid having a unit weight of 55 pcf down to design groundwater level and 90 pcf below the design groundwater level. Restrained walls subject to surcharge loads from vehicular traffic within 20 feet of the walls should be designed for a uniform pressure of 100 psf extending 15 feet below the roadway surface. This value should be increased to 150 psf in areas where heavy truck traffic is anticipated.

To control wall moisture and to provide drainage, we recommend that a drainage system be installed behind basement walls. If the proposed construction will require little or no backfill behind the walls, it is recommended that a prefabricated drainage system such as Voltex or equal, be used behind basement walls. Depending on the type of shoring system used, the prefabricated drainage system should be installed during installation of the shoring.

5.4 SITE GRADING AND EARTHWORK

The on-site excavation will likely encounter both fill and native deposits. All reworked native material and all fill placed to support building foundations, walkways, and pavements must be compacted to minimize any post-construction settlements (compression) of the fill. We recommend that site preparation, excavation, and filling be done under the observation of URS and in accordance with the recommendations contained in this report. The following additional requirements should be included in the project plans and specifications.

5.4.1 Site Clearing and Excavation

The design team should determine the previous use of the site and whether any information exists as to the presence of existing foundations, tanks, or other underground structures from previous developments at the site. The site clearing will consist of removal of the existing pavement of the current parking lot area; debris; and any existing foundations. The materials generated by site clearing should be hauled off-site. As the site is excavated for the proposed basement and foundation construction, any surplus material not considered to be used later as fill materials should be hauled off-site.

We recommend that all foundation excavations to be observed by a representative of the Geotechnical Engineer to confirm that the satisfactory subgrade soils have been encountered.

It is recommended that the time during which the foundation bearing surfaces are exposed be short to reduce the potential for soil disturbance. Any loosened soil in the bottom of the foundation excavations should be removed down to dense, undisturbed native soils prior to construction of the foundations. A recommended option to protect undisturbed natural soils in foundation excavations during placement of reinforcing steel is to over excavate the area about 2 to 3 inches and place a concrete mud slab immediately after the foundation soils have been approved. Any water in the foundation excavations should be removed to allow proper cleaning of the excavations. It is recommended that the footing excavations be observed by URS prior to placing reinforcing steel bars and concrete, to verify that the recommendations of this report have been followed, and that an appropriate bearing stratum is encountered. Recommendations regarding dewatering of the site during construction are presented in a separate section of this report.

5.4.2 Subgrade Preparation

We recommend that all foundation excavations be observed by the Geotechnical Engineer prior to the placement of reinforcing steel and concrete to confirm that the foundation bearing soils encountered in the excavations are those assumed in our analyses. After the required excavation, if in the opinion of the Geotechnical Engineer the subgrade in the concrete slab-on-grade areas is disturbed, the exposed soil surface should be scarified to a minimum depth of 6 inches, moisture conditioned and recompacted to a minimum of 95 percent compaction based on test method ASTM D 1557. However, mat foundation should be placed on undisturbed native soils. These areas will require over excavation and replacement with lean concrete to design grade if necessary. Recompaction of the bearing soils will not be allowed.

5.4.3 Fill Materials and Compaction Requirements

If possible, preparation of areas to receive fill, and fill placement, should be performed during dry weather conditions. Compaction should take place immediately after subgrade preparation, and the newly prepared areas should be protected against saturation from precipitation. If protective measures are not provided, and the subgrade soils become saturated and spongy due to rain and/or construction traffic, the required relative compaction may not be achievable. In such an event, soft soils should be removed from the area, and lean concrete or imported sand and gravel should be placed and compacted to bring the affected area up to the proposed grades.

Structural Fill should consist of material imported from an off-site source, or acceptable on-site material, or a mixture of the on-site and imported material that meet the following criteria: Materials for use as Structural Fill should not contain rocks or hard lumps greater than 3 inches in maximum dimension and should have at least 80 percent passing the ¾-inch sieve. No perishable, spongy, hazardous, or other improper materials should be used. Structural Fill materials should be free of organic material, debris, or other deleterious materials, and should have a PI of less than 15 as per ASTM D4318.

Any materials used to backfill behind retaining walls should be granular free-draining sand or combinations of sand and gravel. Fill should be spread in lifts not to exceed a maximum uncompacted thickness of 8 inches, moisture conditioned, and compacted using appropriate compaction equipment. Fill compaction requirements should be a minimum of 95 percent in all areas, except within five feet behind basement walls where a minimum of 90 percent compaction is recommended. Compaction acceptance shall be based on test method ASTM D 1557. The procedure to achieve proper density of a compacted fill depends on the size and type of compacting equipment, the number of passes, thickness of the layer being compacted, and soil properties. When the size of the excavation restricts the use of heavy equipment, smaller equipment can be used, but the soil must be placed in thin enough layers to achieve the required compaction.

5.4.4 Slabs-on-Grade

Preparation of areas beneath concrete slabs-on-grade should be performed in accordance with the recommendations provided in this section. The Structural Engineer should compute the thickness and reinforcing details of the slab-on-grade. To prevent moisture migration through the floor slabs, it is recommended that the floor slabs be waterproofed where the lower finished floor slab is below groundwater level. Detailed recommendations for the waterproofing system are presented in the following section. The basement floor slabs should also be designed to resist hydrostatic uplift pressure, as discussed below.

Where the lower finished floor slab is at least two feet above design groundwater level, the slab should be underlain by 6 inches of open-graded gravel to reduce moisture vapor transmission. The open-graded gravel should consist of clean subrounded or subangular gravel that meets the following requirements:

Sieve Size	Percentage Passing Sieve
1”	100
¾”	90 - 100
No. 4	0 – 10

As an alternative, or in areas where moisture could be detrimental to equipment or floor coverings inside the proposed building, 4 inches of open-graded gravel may be covered with a vapor barrier exhibiting the following properties: ASTM E 1745 Class A, at least 10-mil thick per ACI 302, and a permeance of 0.012 Perms or less as tested by ASTM E 96. Installation should be in accordance with manufacturer’s instructions and ASTM E 1643-98.

5.4.5 Waterproofing and Permanent Dewatering

We recommend that appropriate concrete quality control be adopted when constructing basement walls and floor slabs to avoid porous pockets. Where the finished floor slab is at least two feet above design groundwater level, the floor slabs, elevator pits, and exterior basement walls should be waterproofed using Volclay panels, Hydrotech 6125, or equivalent products with equal (or better) waterproofing capability on the earth side. The waterproofing should be carefully installed in accordance with the manufacturer's installation procedures, including proper overlaps and joint seals. The floor slab waterproofing should be connected to the basement wall waterproofing system to provide continuous waterproofing of the structure (i.e., a partial “bathtub” condition). To further reduce the potential for water seepage, the inside faces of exterior basement walls may be coated with Xypex or equivalent concrete waterproofing.

Depending on the selected design, only a portion of the building may be required to be waterproofed. It is our opinion that waterproofing will likely be more cost-effective than a permanent dewatering system. In addition, both the waterproofing and permanent dewatering systems will not be required where the finished floor slab is at least two feet above the design groundwater level. If for some reasons a permanent dewatering system is desired, we should be consulted for the appropriate recommendations.

5.4.6 Site Drainage

We recommend that construction drainage measures be employed to prevent foundation excavations from becoming wet. Surface runoff can be controlled during construction by careful grading practices. Typically, these include the construction of shallow, upgrade perimeter ditches or low earthen berms and the use of temporary sumps to collect runoff and prevent water from damaging exposed subgrades. Perched groundwater can typically be removed by sump pumps or a well point system. All collected water should be directed to a positive and permanent discharge system. Long-term drainage measures should be provided such that water does not collect at the location of the building foundations.

5.5 CONSTRUCTION CONSIDERATIONS

5.5.1 Excavation Shoring

In order to protect adjacent streets, structures, and buried utilities, and for safety reasons, shoring will be required for the proposed basement construction. It is essential that the shoring system be designed and constructed to control lateral deflections, so that adjacent structures are not distressed. Depending on the groundwater level during construction, soil nail walls or drilled-in solider piles and laggings are the anticipated shoring systems to be selected. However, the contractor may select other systems.

It will be essential to determine the specific foundation system for the adjacent 80 Grand Avenue building and evaluate how that foundation system interacts with this proposed structure for both temporary shoring, permanent basement walls, and foundation capacities of both structures. Temporary underpinning of the 80 Grand Avenue Structure may be required during construction of this project.

If the groundwater is anticipated to be encountered below the bottom of basement excavation and a soil nailing shoring system is selected, we recommend that the following soil parameters be used for preliminary design:

Total Unit Weight (Pcf)	Cohesion (psf)	Angle of Internal Friction (degree)
125	2500	0

Drilled-in soldier piles and lagging may also be considered as the shoring system. Due to presence of busy streets and also the 80 Grand Avenue building adjacent to the proposed building, drilled-in tiebacks or internal bracing such as rakers should be used to provide additional support for a soldier pile and lagging shoring system to limit the lateral deformations. For preliminary design purposes, active shoring pressures should be estimated using a uniform active pressure of 600 psf for walls with two or more levels of support and an excavation depth of up to about 25 feet. The shoring design should also be checked for intermediate excavation stages using the 38 pcf earth pressures. These design pressures are based on the assumption that groundwater behind the shoring will be drawn down to below the excavation level.

It should be assumed that surcharge pressures from construction equipment will be applied behind the shoring. These pressures should be incorporated into the preliminary design as a uniform horizontal pressure of 150 psf applied to the upper 15 feet of the shoring. It is recommended that ultimate passive soil pressures due to an equivalent fluid weight of 400 pcf acting against twice the width of the diameter of the concrete-encased soldier pile be used for preliminary design. The upper 2 feet of passive resistance below the excavation level should be neglected to account for potential over excavation and disturbance.

The above shoring design criteria are preliminary and may require revision for final design. Additional geotechnical recommendations and design parameters may be developed after the selection of the shoring systems. The Contractor is responsible for final shoring design, and providing adequate excavation support. The shoring design should be signed and stamped by the contactor's engineer and submitted to the Geotechnical Engineer for review and approval.

5.5.2 Dewatering

Groundwater may be encountered in the basement and elevator pit excavations, so a construction dewatering system will be required to maintain a dry working area. We anticipate that control of groundwater can be accomplished during construction by sump pumps or by lowering the water level with a series of dewatering wells along the perimeter of the foundation excavation. Groundwater should be drawn down to at least 5 feet below the lowest excavation levels. The dewatering system should be designed by the Contractor, who should provide details of the proposed dewatering system to the Geotechnical Engineer for approval. Water removed by the dewatering system will be required to be tested and likely treated before discharge. When no longer needed, all dewatering wells should be grouted and abandoned in accordance with City and County regulations.

5.5.3 Monitoring Program

It is recommended that a monitoring program be conducted both before and during the proposed construction. The purpose of the monitoring program is to ensure the integrity of the proposed construction and confirm that the construction has no adverse impact on adjacent and nearby structures. The potential hazard to these structures is settlements caused by the basement excavation, which can primarily be controlled by limiting lateral deflections of the excavation shoring system. Another hazard may be the settlements from dewatering the working area for the basement excavation. Prior to construction, a detailed baseline survey of the adjacent buildings, sidewalks, and roadways should be conducted to establish the existing conditions. During construction, the shoring and benchmarks should be monitored on a regular basis to check for unusual movements. A high-order survey should be performed around the perimeter of the site, with particular attention to vertical movements.

We recommend that URS be hired to perform the monitoring program. This type of work is not as effectively performed when it is within the Contractor's scope of work. In this fashion, the data collected from the monitoring program will be immediately available to the Geotechnical Engineer and transmitted to the Structural Engineer for evaluation. The readings should indicate whether the site is performing as predicted. The data obtained should be plotted to assess the trends so that construction modifications could be made if necessary, to reduce the potential for damage to adjacent buildings and streets. Heave readings may also be used to adjust the predicted long-term settlement estimates.

5.5.4 Recommendations for Additional Investigations

The recommendations in this report are preliminary and based on existing data from the nearby properties. We recommend additional geotechnical investigation to be performed in order to obtain site specific subsurface conditions and groundwater level. The proposed field investigation can include drilling soil borings with installation of groundwater monitoring wells; or performing Cone Penetration Test (CPT) soundings.

Another important issue that needs further assessment is the 80 Grand Avenue building which is located inside the same property limits as the proposed structure and will be adjacent to it. The foundation system of this structure needs to be determined and the interaction of the two structures will need further evaluations.

This preliminary geotechnical study was performed in accordance with the standard of care commonly used as state-of-practice in our profession. Specifically, our services have been performed in accordance with generally accepted principles and practices of the geological profession. This warranty is in lieu of all other warranties, either expressed or implied. The conclusions presented in this report are professional opinions based on the indicated project criteria and data available at the time this report was prepared.

The conclusions presented in this report are intended only for the purpose, site location, and project indicated. The recommendations made in this report are based on the assumption that the subsurface soil and groundwater conditions do not deviate appreciably from those disclosed in the nearby exploratory borings. The site conditions should be verified by site specific explorations. If any variations or undesirable conditions are encountered during construction, we should be notified so that additional recommendations can be made.

We should be informed of any changes that are made in the assumptions described in this report (such as the location and configuration of the proposed structures, and the design loads) so that additional recommendations may be provided, if necessary. We recommend that URS be given the opportunity to review the construction plans and specifications prepared by the design team to ensure that the intent of our recommendations is adequately incorporated therein. As has been the case throughout the duration of the project, we are available to attend meetings with the design team to discuss preparation of the construction documents. We also recommend that URS be retained to observe the foundation construction.

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FIGURES

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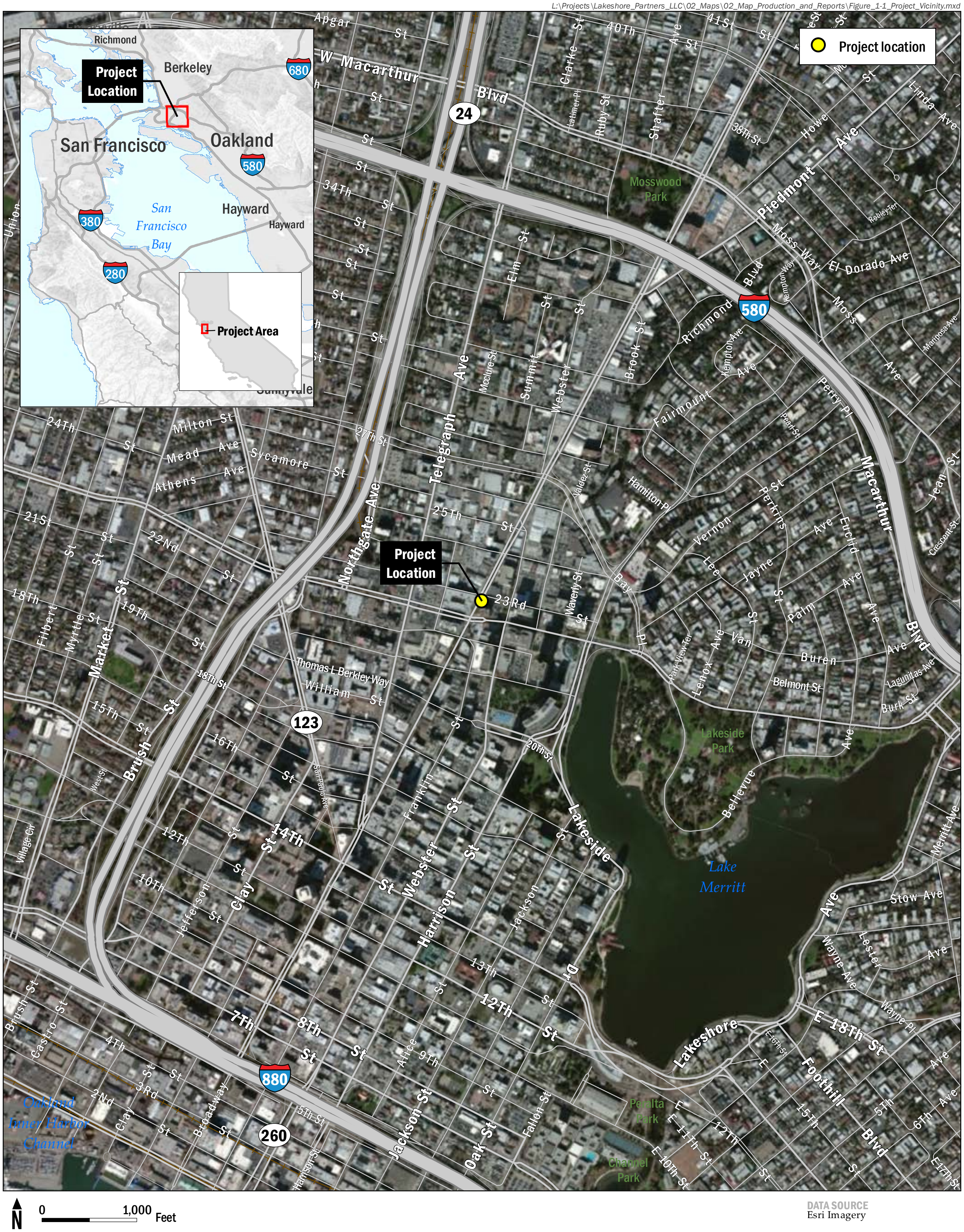

DATA SOURCE
Esri Imagery

Lakeshore Partners LLC
2270 Broadway Development

VICINITY MAP

Figure 1-1

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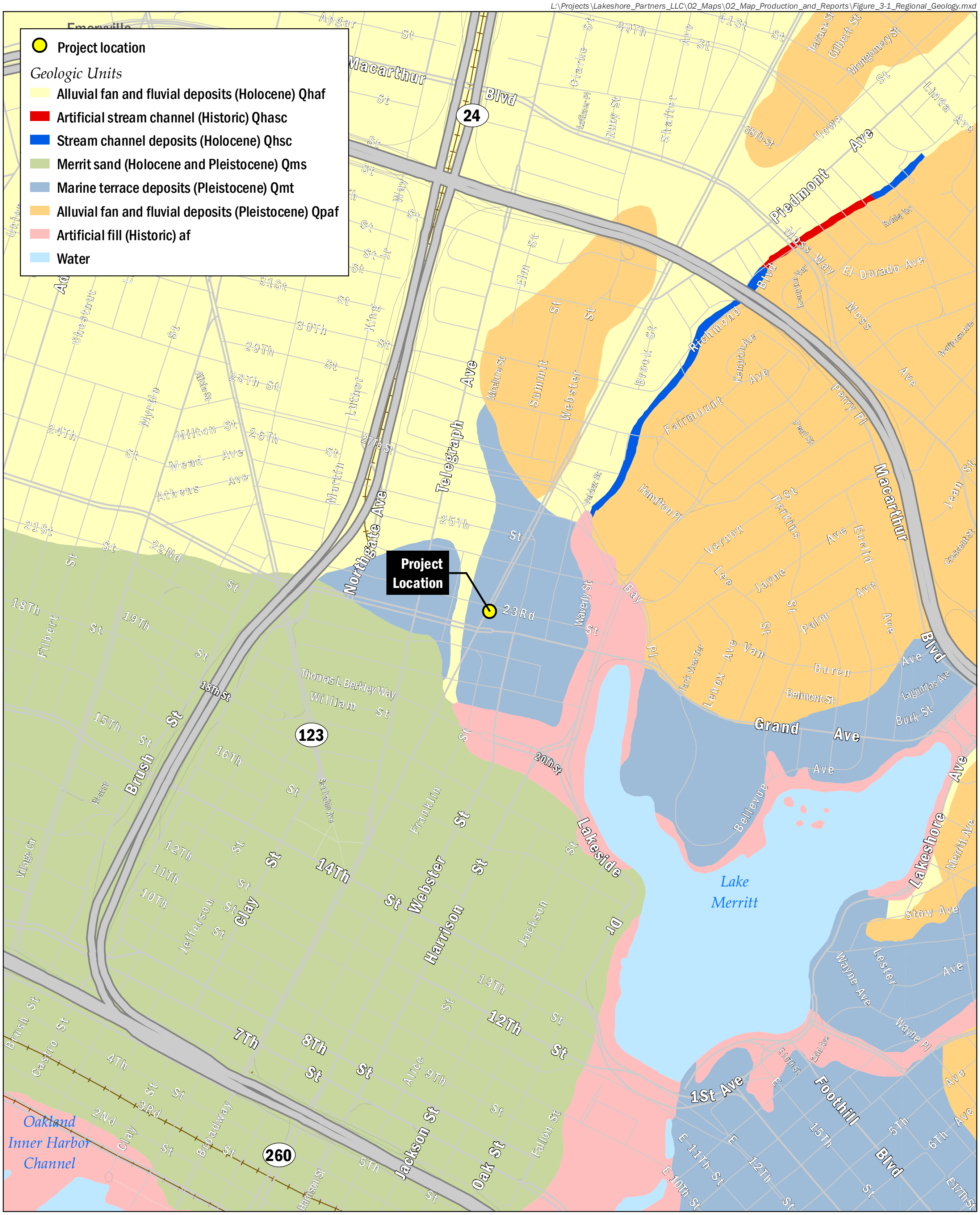


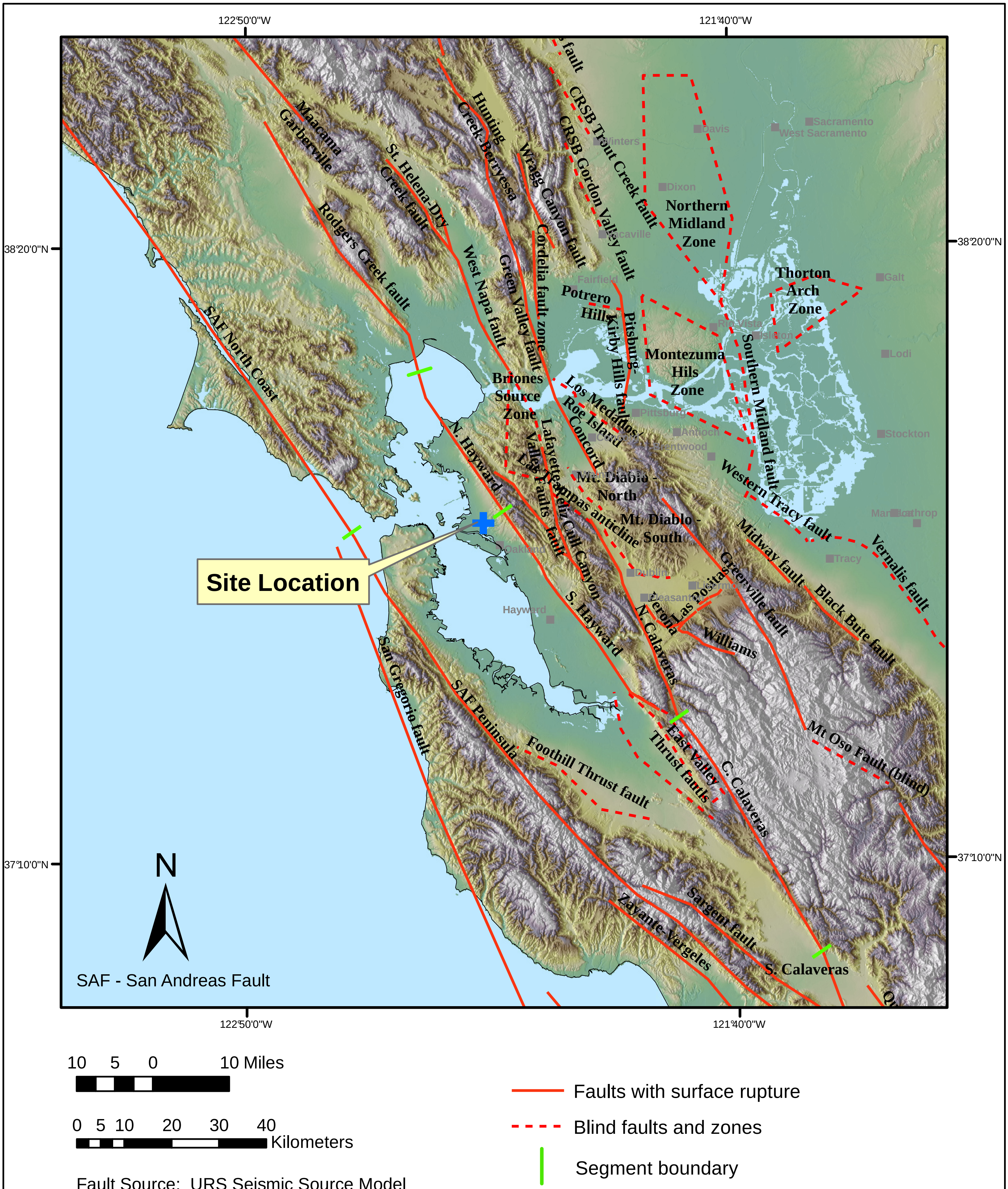
N
0 1,000 Feet

DATA SOURCE
USGS (Geology);
Esri (Roads).

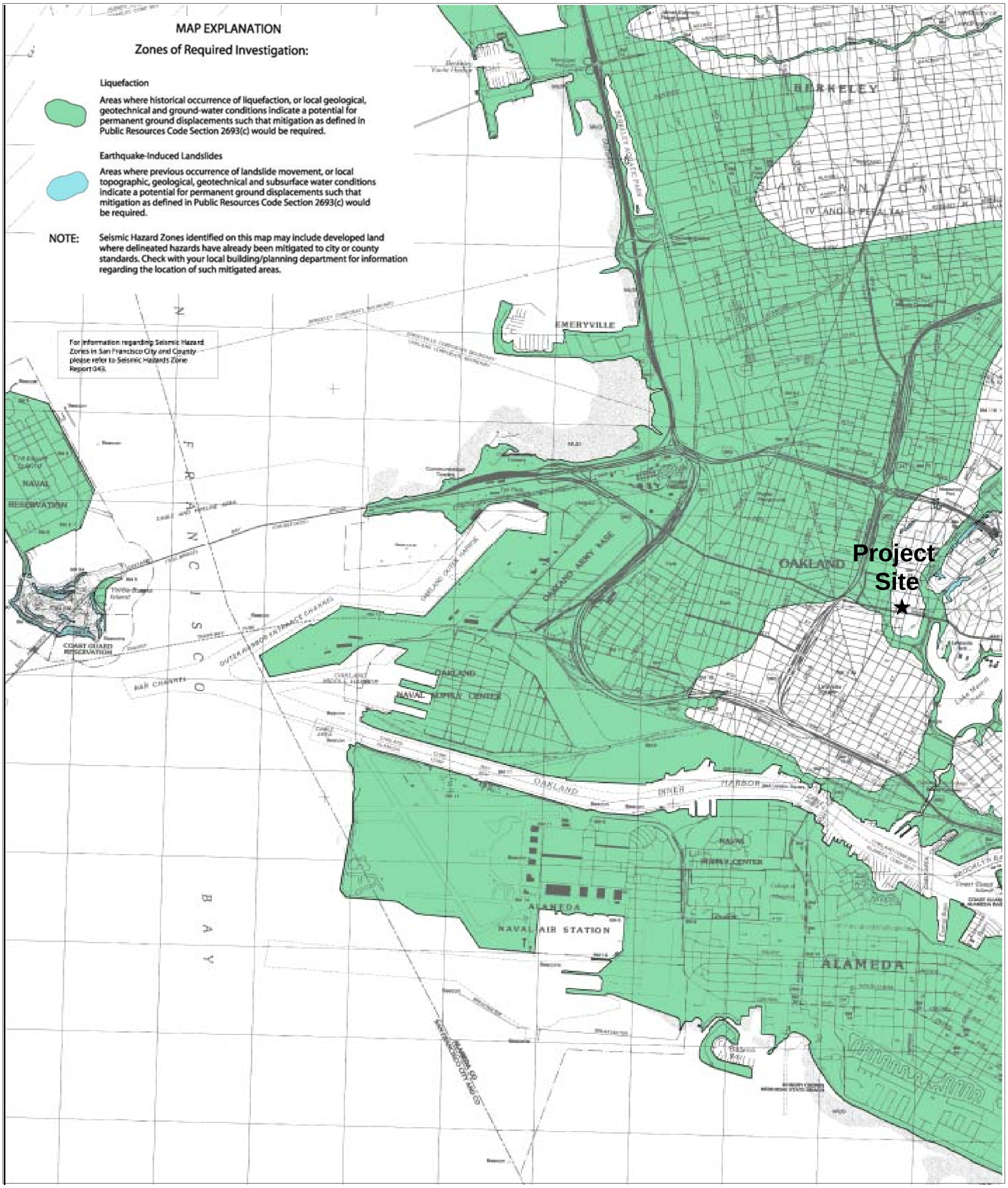
Lakeshore Partners LLC
2270 Broadway Development

REGIONAL GEOLOGY MAP

Figure 3-1



URS	Project No. 26819122	MAP OF MAJOR FAULTS IN THE SAN FRANCISCO BAY AREA	Figure
	2270 Broadway Development Project		4-1



Source:
Seismic Hazard Zone Report of the Oakland West 7.5-Minute Quadrangle, Alameda County, California
California Geologic Survey, Seismic Hazards Zone Report 081 issued February 14, 2003.

URS	Project No. 26819122.00001 2270 Broadway Development	**Liquefaction Susceptibility Map**	Figure 4-2

APPENDIX A

Previous Subsurface Investigations for 100 Grand Avenue Development by AMEC (2005)

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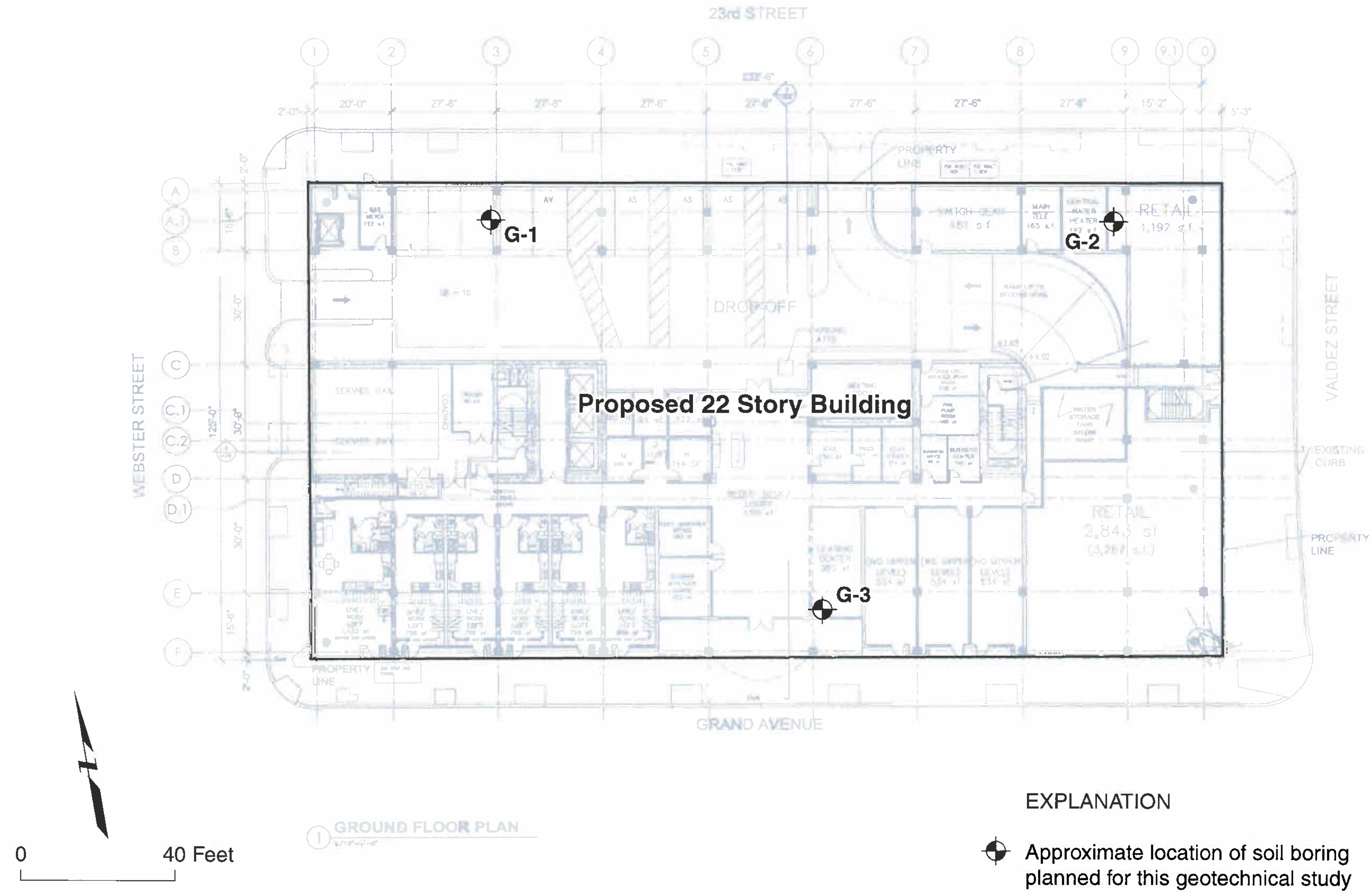


EXPLANATION

Approximate location of soil boring planned for this geotechnical study

GEOMATRIX

SITE PLAN AND BORING LOCATIONS
100 Grand Avenue
Oakland, California

Project No. 10534.000

Figure 2

PROJECT: Grand at Webster, Essex
100 Grand Avenue
Oakland, California

Boring Log Explanation

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ foot	MATERIAL DESCRIPTION	LABORATORY TESTS: Moisture Content (%)	Dry Density (pcf)	Other
		☒		Modified California drive sampler, 3-inch outside diameter, 2 1/2-inch inside diameter (with liners)			
			23	Blow count for last 12 inches of drive, or as noted			
			45*/3"	Blow count for entire drive, total drive less than 6 inches			
				Distinct contact			
				Gradual or uncertain contact			
				ATD ▽			
				Measured groundwater level prior to backfill or after well completion ▼			
				LL=Liquid limit; PI=Plastic index			LL=27 PI=4
				Sample tested for corrosivity potential			Corr
				Unconfined compressive strength in psf			UC=1300
				Fine content (percentage of soil passing No. 200 sieve)			<200=44%
				Consolidation			Consol
				Unconsolidated-undrained triaxial test, shear strength in psf (confining pressure in psf)			UU=500 (300)

NOTES:

1. The stratification lines shown on the boring logs represent the approximate boundaries between material types. The actual transitions between materials may be gradual.
2. These logs of the test borings and related information depict subsurface conditions only at the specific locations and at the particular time the boring was made.
3. Soil conditions at other locations may differ from conditions occurring at these locations. Also, the passage of time may result in changes in the soil and groundwater conditions at these locations.
4. Soil colors from Munsell Soil Color Charts.

PROJECT: Grand at Webster, Essex 100 Grand Avenue Oakland, California	**Log of Boring No. G-1**	
BORING LOCATION: See Figure 2	ELEVATION AND DATUM:	
DRILLING CONTRACTOR: Pitcher Drilling Company	DATE STARTED: 5/19/2005	DATE FINISHED: 5/19/2005
DRILLING EQUIPMENT: Failing 1500	TOTAL DEPTH (feet): 121.5	MEASURING POINT: Ground Surface
DRILLING METHOD: 4-inch diameter rotary wash	DEPTH TO FREE WATER FIRST ENCOUNTERED (feet): N/A	
SAMPLING METHOD: See Log Explanation, Figure A-1	DEPTH TO WATER AT COMPLETION (feet, date/time): N/A	
HAMMER WEIGHT: 140 lbs / HAMMER DROP: 30 inches	LOGGED BY: D. Etheredge	

DEPTH (feet)	Sample No.	Sample	Blows/ foot	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	Other
0–0.5				ASPHALT (6 inches)			
0.5–3				SAND with CLAY and GRAVEL (SW-SC) Medium dense to dense, brown (7.5YR 4/4) mottled with reddish yellow (7.5 YR 7/8), moist, low plasticity fines, contains rubble, broken brick [FILL]			
3–7				SANDY CLAY (CL) Very stiff, brown (10YR 4/3), moist, low plasticity, fine sand			
6	1	X	47		17	116	UC=8560
7–10				SANDY CLAY (CL) Very stiff, yellow (10YR 6/6) mottled with black (10YR 2/1), moist, medium plasticity, fine sand, specks of carbon			
9	2	X	59		14	120	
10–16				CLAY (CL) Very stiff to hard, brown (7.5 YR 5/4) mottled with black (10 YR 2/1), moist, medium plasticity, specks of carbon			
11	3	X	68		18	112	UC=7280 PI=25 LL=41
16	4	X	58		15	120	UC=3030
16–17+				CLAYEY SAND (SC) Dense, pale brown (10YR 6/3) mottled with brownish yellow (10YR 6/8) and gray (10YR 6/2), moist, low to medium plasticity fines, specks of carbon			

PROJECT: Grand at Webster, Essex
100 Grand Avenue
Oakland, California

Log of Boring No. G-1 cont.

DEPTH (feet)	Sample No.	Sample	Blows/ foot	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	Other
18				CLAYEY SAND (SC) Cont'd.			
19							
20							
21	5	X	55		17	115	<#200=45%
22							
23							
24							
25							
26	6	X	43		19	111	UC=4370
27							
28							
29				CLAYEY SAND with GRAVEL (SC) Dense to very dense, grayish brown (10YR 5/2) mottled with strong brown (7.5YR 5/8) and black (10YR 2/1), moist, low to medium plasticity fine, gravel are rounded clasts of chert, sandstone, 2-inch in diameter, large flakes of charcoal			
30							
31	7	X	78		15	118	
32							
33				- contains layers CLAYEY SAND (SC), light yellowish brown (2.5 YR 6/4), moist, low to medium plasticity fines, fine sand			
34							
35							
36							
37							
38							
39							

GES-8/01 10534 LOGS.GPJ GES32003-7.GDT 7/27/05

GT-2 (8/01)

PROJECT: Grand at Webster, Essex
100 Grand Avenue
Oakland, California

Log of Boring No. G-1 cont.

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ foot	MATERIAL DESCRIPTION	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other
				CLAYEY SAND with GRAVEL (SC) Cont'd.			
40	8	X	50/3"		15	118	<#200=32%
41							
42							
43							
44							
45							
46							
47							
48							
49							
50	9	X	50/5"	SANDY CLAY/CLAYEY SAND (CL/SC) Hard/very dense, yellowish brown (10YR 5/8) mottled with pale yellow (5Y 7/3), low to medium plasticity fines, fine sand, flecks of carbon	18	114	UU=8460 (5040)
51							
52							
53							
54							
55							
56							
57							
58							
59							
60	10	X	50/5"		19	110	

GES-8/01 10534 LOGS.GPJ GES32003-7.GDT 7/27/05

GT-2 (8/01)

PROJECT: Grand at Webster, Essex
100 Grand Avenue
Oakland, California

Log of Boring No. G-1 cont.

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ foot	MATERIAL DESCRIPTION	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other
61		X		SANDY CLAY/CLAYEY SAND (CL/SC) Cont'd.			
62							
63							
64							
65							
66							
67							
68							
69							
70	11	X	50/5"		20	108	UC=4140
71				SAND (SP) Very dense, yellowish brown (10YR 5/4), moist, medium sand composed of rounded lithics and quartz			
72							
73				CLAY with SAND (CL) Very stiff to hard, yellowish brown (10YR 5/8) mottled with pale yellow (5Y 7/3), low to medium plasticity fine sand, flecks of carbon, with occasional sand (SP) lenses			
74							
75							
76							
77							
78							
79							
80	12	X	50/4"		20	107	
81							
82							

PROJECT: Grand at Webster, Essex
100 Grand Avenue
Oakland, California

Log of Boring No. G-1 cont.

DEPTH (feet)	Sample No.	Sample	Blows/ foot	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	Other
				CLAY with SAND (CL) Cont'd.			
83							
84							
85							
86							
87							
88							
89							
90	13	X	50/4"		22	106	
91							
92							
93							
94							
95							
96							
97							
98							
99							
100	14	X	54		26	98	UC=4730
101							
102							
103							

GES-8/01 10534 LOGS.GPJ GES32003-7.GDT 7/27/05

GT-2 (8/01)

PROJECT: Grand at Webster, Essex
100 Grand Avenue
Oakland, California

Log of Boring No. G-1 cont.

DEPTH (feet)	Sample No.	Sample	Blows/ foot	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	Other
104				CLAY with SAND (CL) Cont'd.			
105							
106							
107							
108							
109							
110	15	X	50/6"		23	103	
111							
112							
113							
114							
115							
116							
117							
118							
119							
120	16	X	83		25	102	
121				Bottom of borehole at 121.5 feet, borehole grouted with a cement/bentonite mixture.			

PROJECT: Grand at Webster, Essex 100 Grand Avenue Oakland, California	# Log of Boring No. G-2
BORING LOCATION: See Figure 2	ELEVATION AND DATUM:
DRILLING CONTRACTOR: Pitcher Drilling Company	DATE STARTED: 5/20/2005 / DATE FINISHED: 5/20/2005
DRILLING EQUIPMENT: Failing 1500	TOTAL DEPTH (feet): 51.5 / MEASURING POINT: Ground Surface
DRILLING METHOD: 4-inch diameter rotary wash	DEPTH TO FREE WATER FIRST ENCOUNTERED (feet): N/A
SAMPLING METHOD: See Log Explanation, Figure A-1	DEPTH TO WATER AT COMPLETION (feet, date/time): N/A
HAMMER WEIGHT: 140 lbs / HAMMER DROP: 30 inches	LOGGED BY: D. Etheredge

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ foot	MATERIAL DESCRIPTION	LABORATORY TESTS Moisture Content (%)	Dry Density (pcf)	Other
0–0.5				ASPHALT (6 inches)			
0.5–3				CLAY with GRAVEL (CL) Very stiff, dark yellowish brown (10YR 4/6), moist, pebbles less than 1/2 in in diameter, specks of carbon, medium plasticity [FILL?]			
3–8				SANDY CLAY (CL) Very stiff, brown (10YR 4/3), moist, low plasticity, fine sand			
6	1	X	83		15	119	UC=14350 PI=12 LL=29
8–17				CLAY (CL) Stiff, dark yellowish brown (10YR 4/6) mottled with reddish yellow (7.5YR 6/8), moist, specks of carbon, low to medium plasticity			
11	2	X	48		21	109	UU=4860 (1440)
16	3	X	39		20	109	

PROJECT: Grand at Webster, Essex
100 Grand Avenue
Oakland, California

Log of Boring No. G-2 cont.

DEPTH (feet)	Sample No.	Sample	Blows/ foot	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	Other
18				CLAY (CL) Cont'd.			
20–21	4	X	33	- same as above, also mottled with greenish gray (10Y 6/1)	9	115	UC=4060
25–26	5	X	56		18	113	
26				CLAYEY SAND with GRAVEL (SC) Very dense, yellowish light brown (2.5Y 6/3) mottled with strong brown (7.5YR 5/8), gravels are 1/4 to 1/2 in in diameter, rounded chert and sandstone, flecks of carbon, low to medium plasticity fines			
30–31	6	X	68		27	98	
32.5				CLAY (CL) Very stiff to hard, dark yellowish brown (10YR 4/6) mottled with reddish yellow (7.5YR 6/8) and greenish gray (10Y 6/1), moist, specks of carbon, low to medium plasticity			
35	7	X	50/5"				
39							

GES-8/01 10534 LOGS.GPJ GES32003-7.GDT 7/27/05

GT-2 (8/01)

PROJECT: Grand at Webster, Essex
100 Grand Avenue
Oakland, California

Log of Boring No. G-2 cont.

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ foot	MATERIAL DESCRIPTION	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other
40–41	8	X	57	CLAYEY SAND (SC) Dense, dark yellowish brown (10YR 4/6) mottled with reddish yellow (7.5YR 6/8) and greenish gray (10Y 6/1), moist, specks of carbon, low to medium plasticity fines - increasing fine sand content			<#200=31%
42				SAND (SP) Dense to very dense, yellowish brown (10YR 5/6), moist, fine to medium sand, subrounded quartz and lithics, flecks of carbon			
45–46	9	X	82				
50–51	10	X	50/6"	GRAVEL with SAND (GW) Dense, very dard gray (10YR 3/1), moist, gravels are 1/4 to 1/2 inch in diameter chert, sandstone, coarse sand			
				Bottom of borehole at 51.5 feet, borehole grouted with a cement/bentonite mixture.			

PROJECT: Grand at Webster, Essex 100 Grand Avenue Oakland, California	**Log of Boring No. G-3**	
BORING LOCATION: See Figure 2	ELEVATION AND DATUM:	
DRILLING CONTRACTOR: Pitcher Drilling Company	DATE STARTED: 5/19/2005	DATE FINISHED: 5/20/2005
DRILLING EQUIPMENT: Failing 1500	TOTAL DEPTH (feet): 60	MEASURING POINT: Ground Surface
DRILLING METHOD: 4-inch diameter rotary wash	DEPTH TO FREE WATER FIRST ENCOUNTERED (feet): N/A	
SAMPLING METHOD: See Log Explanation, Figure A-1	DEPTH TO WATER AT COMPLETION (feet, date/time): N/A	
HAMMER WEIGHT: 140 lbs / HAMMER DROP: 30 inches	LOGGED BY: D. Etheredge	

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ foot	MATERIAL DESCRIPTION	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other
0				ASPHALT (5 INCHES)			
0.5–3				CLAY with SAND (CL) Medium stiff to stiff, brown (10YR 4/3), moist, low to medium plasticity, fine sand, flecks of carbon [FILL]			
3–6				SANDY CLAY (CL) Very stiff, brown (10YR 4/3), moist, low plasticity, fine sand			
5–6.5	1	X	42		21	108	UC=7360
6–17				CLAYEY SAND/SANDY CLAY (SC/CL) Dense/very stiff, yellowish brown (10YR 5/4) mottled with brownish yellow (10YR 6/8) and gray (10YR 6/1), fine sand, abundant flecks of carbon, low to medium plasticity fines			
10–11	2	X	50/6"		12	122	<#200=49.7%
15				- becoming less sandy			
15–16.5	3	X	48		17	115	UC=7690

GES-8/01 10534 LOGS.GPJ GES32003-7.GDT 7/27/05

GT-1 (8/01)

PROJECT: Grand at Webster, Essex 100 Grand Avenue Oakland, California	**Log of Boring No. G-3 cont.**

DEPTH (feet)	Sample No.	Sample	Blows/ foot	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	Other
18				CLAYEY SAND/SANDY CLAY (SC/CL) Cont'd.			
21	4	P		- pockets of SAND (SP), brown (7.5YR 4/2), fine to coarse sand, trace of fine gravel up to 1/4 inch	22 16	104 116	Consol UU=4740 (2880) <#200=77%
27				CLAY with SAND (CL) Very stiff, light yellowish brown (2.5Y 6/3) mottled with reddish yellow (7.5YR 6/8), moist, gravel mostly 1/4 to 1/2 inch in diameter with maximum up to 2 inch, gravel of chert and sandstone, fine sand, low to medium plasticity fines			
31	5		59		23	103	<#200=81%
36				CLAYEY SAND (SC) Very dense, strong brown (7.5YR 5/6) mottled with light brownish gray (10YR 6/2), moist, fine to medium sand, low to medium plasticity			
39							

GT-2 (8/01)

GES-8/01 10534 LOGS.GPJ GES32003-7.GDT 7/27/05

PROJECT: Grand at Webster, Essex
100 Grand Avenue
Oakland, California

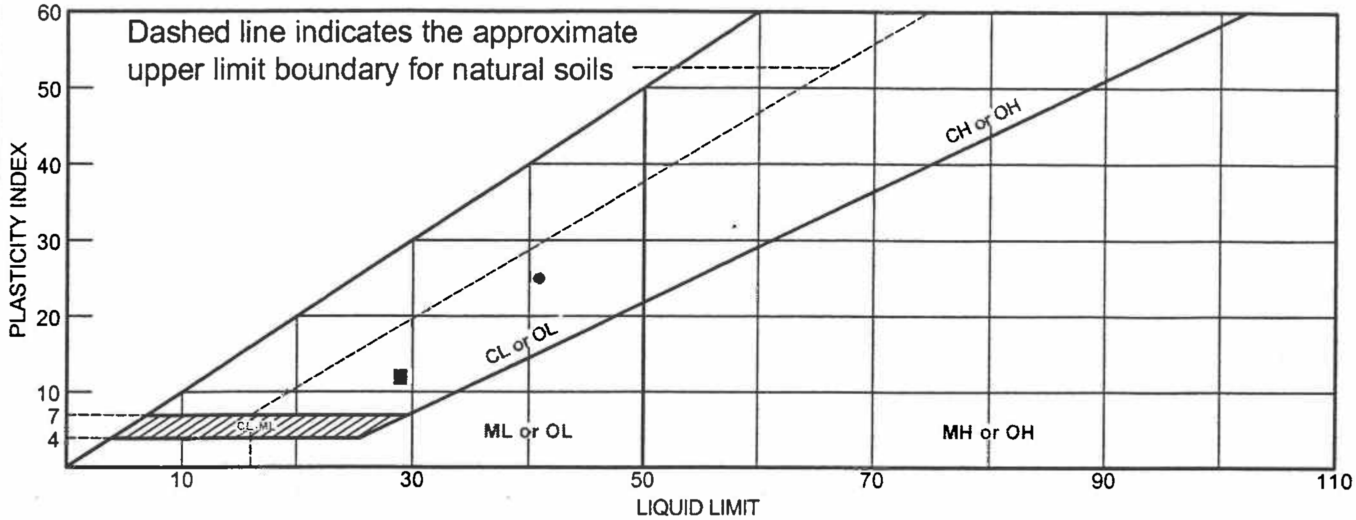
Log of Boring No. G-3 cont.

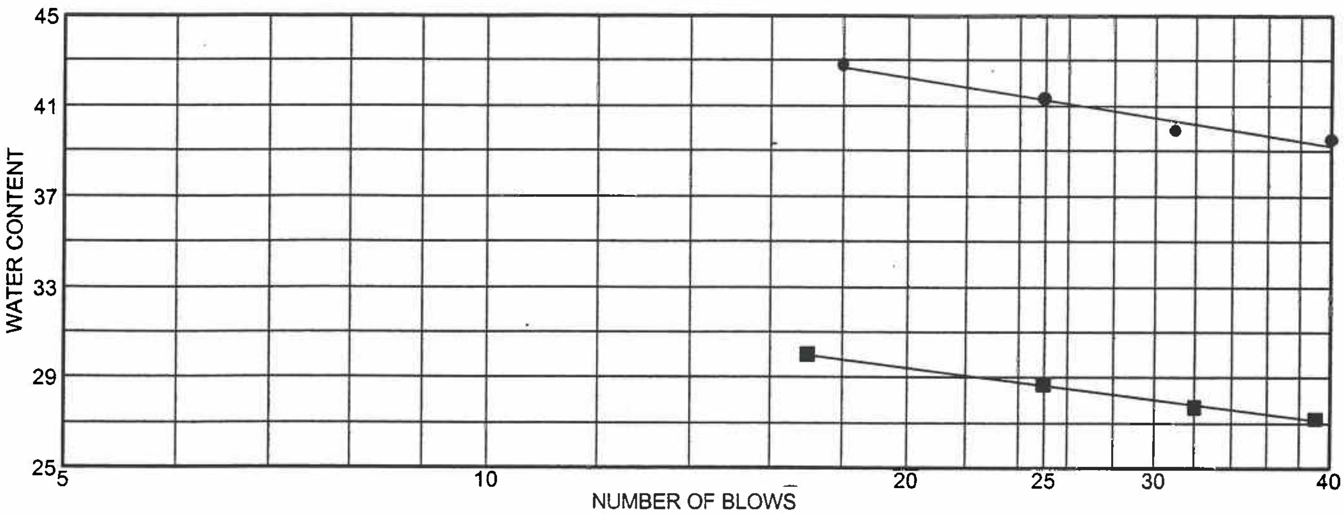
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ foot	MATERIAL DESCRIPTION	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other
				CLAYEY SAND (SC) Cont'd.			
40							
41	6	X	71		16	116	
42							
43							
44							
45							
46							
47							
48							
49							
50				- becoming silty			
51	7	X	58	CLAY (CL) Stiff, yellowish brown (10YR 5/6), moist, flecks of carbon, trace of fines sand, low to medium plasticity	24	102	UC=1090
52							
53							
54							
55							
56							
57							
58							
59							
60				Bottom of borehole at 60 feet; borehole grouted with a cement/bentonite mixture.			

GES-8/01 10534 LOGS.GPJ GES32003-7.GDT 7/27/05

GT-2 (8/01)

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown Lean CLAY	41	16	25			
■	Reddish Brown Sandy Lean CLAY	29	17	12			

Project No. 109-451 **Client:** Geomatrix Consultants

Project: Grand at Webster - 10534

● **Source:** G-1 **Sample No.:** 3-4 **Elev./Depth:** 10'

■ **Source:** G-2 **Sample No.:** 1-3 **Elev./Depth:** 5'

Remarks:

●

■

LIQUID AND PLASTIC LIMITS TEST REPORT

COOPER TESTING LABORATORY

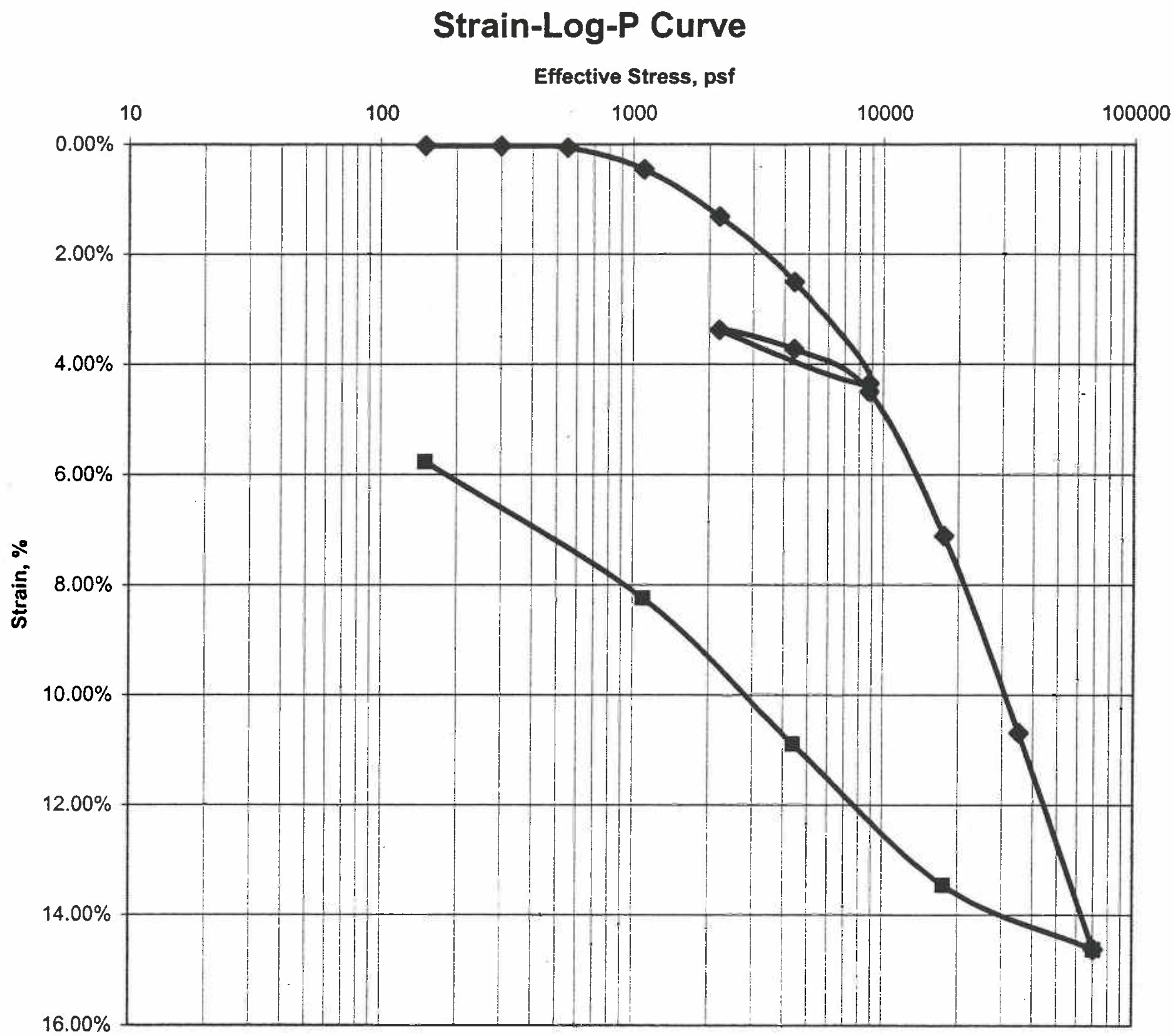
Figure

Figure B-1

Consolidation Test

ASTM D2435

Job No.:	109-451	**Boring:**	G-3	**Run By:**	MD
Client:	Geomatrix Consultants	**Sample:**	4	**Reduced:**	MJ
Project:	Grand at Webster - 10534	**Depth, ft.:**	20-22 (tip minus 19")	**Checked:**	PJ
Soil Type:	Yellowish Brown CLAY (silty) w/ Sand and pockets of Sand & small Gravel			**Date:**	6/21/2005



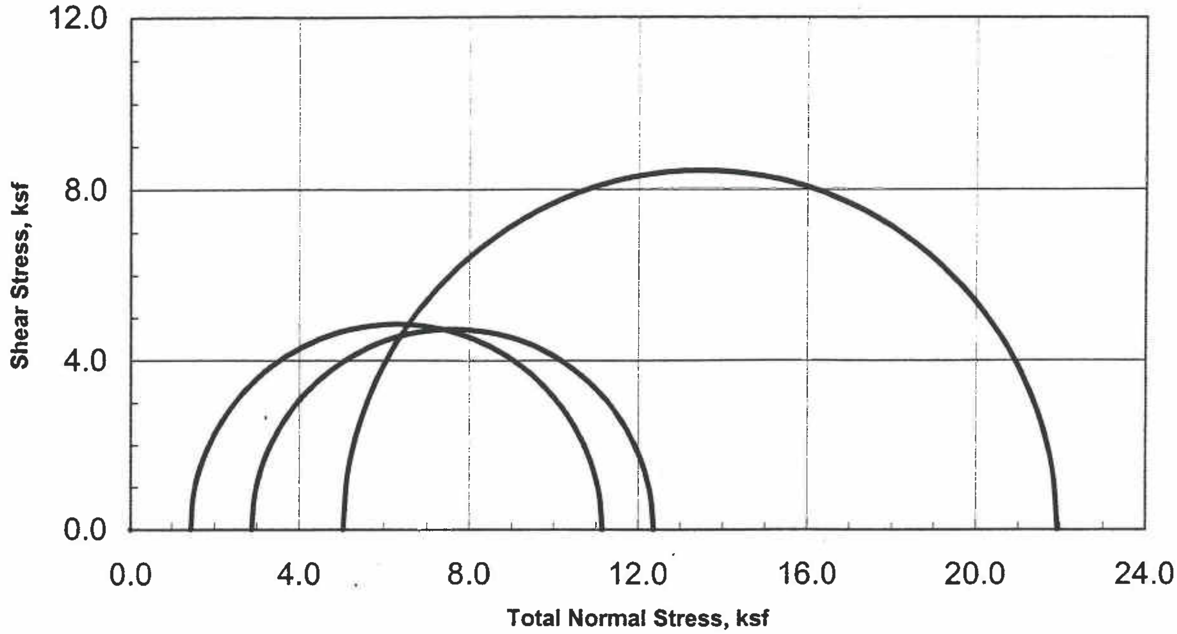
Ass. Gs = 2.7	Initial	Final
Moisture %:	21.8	20.5
Density, pcf:	103.9	108.6
Void Ratio:	0.622	0.552
% Saturation:	94.8	100

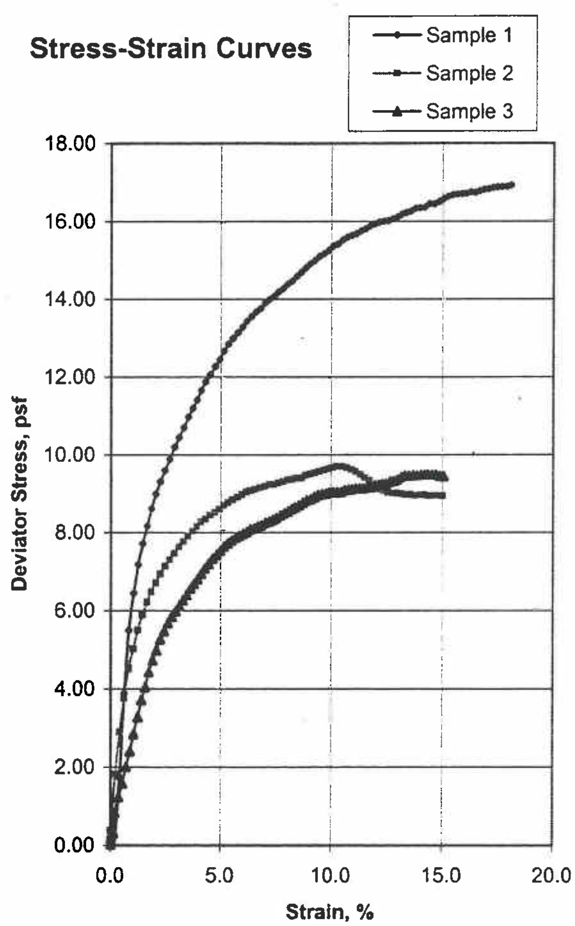
Remarks:

Figure B-2

Unconsolidated-Undrained Triaxial Test

ASTM D-2850





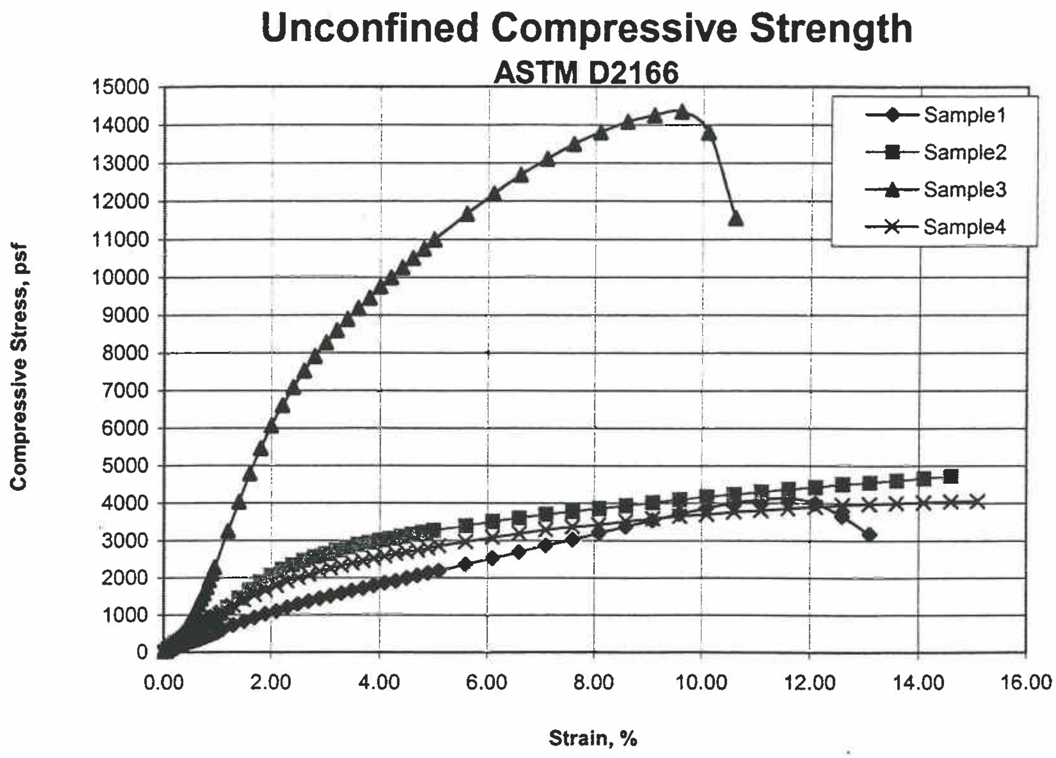
Sample Data	1	2	3	4
Moisture %	17.7	20.5	16.3	
Dry Den,pcf	113.7	108.7	116.2	
Void Ratio	0.482	0.579	0.450	
Saturation %	98.9	97.6	98.0	
Height in	4.99	5.02	6.02	
Diameter in	2.42	2.42	2.86	
Cell psi	35.0	10.0	20.0	
Strain %	18.10	10.30	13.70	
Deviator, ksf	16.926	9.713	9.489	
Rate %/min	1.20	1.20	1.00	
in/min	0.060	0.060	0.060	
Job No.:	109-451			
Client:	Geomatrix Consultants			
Project:	Grand at Webster - 10534			
Boring:	G-1	G-2	G-3	
Sample:	9-4	2-4	4	
Depth ft:	50	10	20-22 (tip)	

Visual Soil Description

Sample #	
1	Brown Clayey SAND
2	Grayish Brown CLAY
3	Brown Clayey SAND
4	

Remarks:

Figure B-3



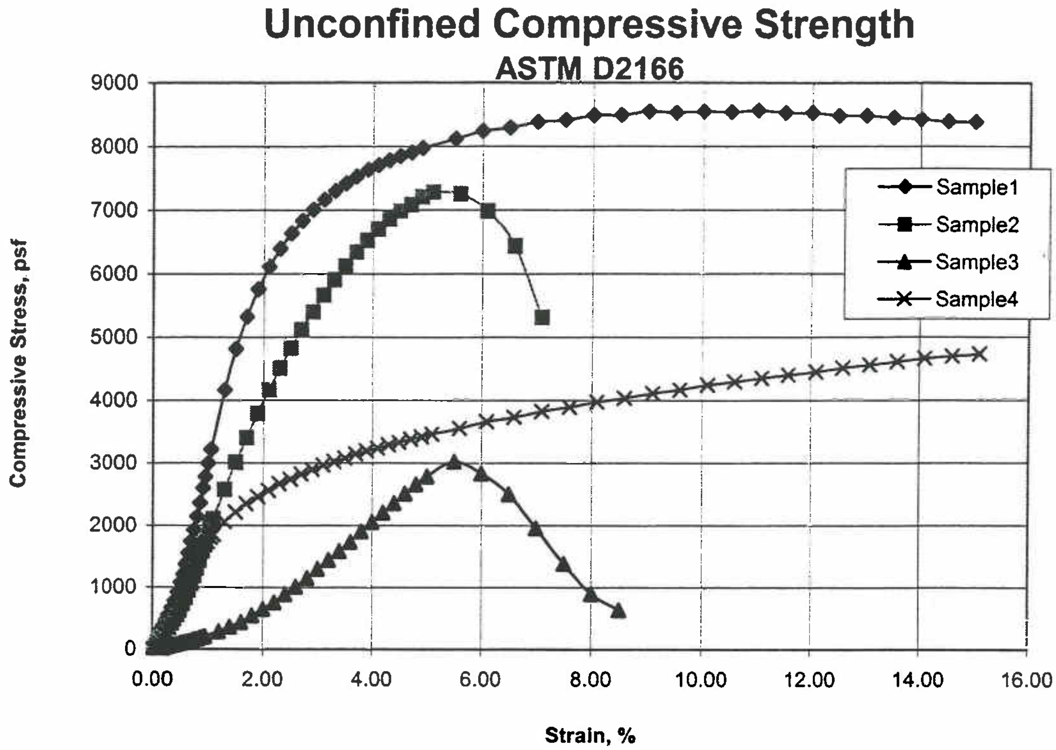
Sample No.:	1	2	3	4	
Unconfined Compressive Strength, psf	4141	4728	14351	4057	
Unconfined Compressive Strength, psi	28.8	32.8	99.7	28.2	
Undrainded Shear Strength, psf	2071	2364	7176	2029	
Failure Strain, %	11.6	14.6	9.6	9.6	
Strain Rate, % per minute	1.0	1.0	1.0	1.0	
Strain Rate, inches/minute	0.05	0.05	0.05	0.05	
Moisture Content, %	20.4	26.1	14.9	9.4	
Dry Density, pcf	107.8	98.2	118.9	115.3	
Saturation, %	97.7	98.3	96.7	55.1	
Void Ratio	0.563	0.716	0.418	0.462	
Specimen Diameter, inches	2.424	2.417	2.410	2.416	
Specimen Height, inches	5.00	5.00	5.02	5.00	
Height to Diameter Ratio	2.1	2.1	2.1	2.1	
Assumed Specific Gravity	2.70	2.70	2.70	2.70	

Sample Location				
	Boring	Sample	Depth, ft.	Soil Description
1	G-1	11-4	70	Brown CLAY grading to Clayey SAND
2	G-1	14-4	100	Pale Yellow CLAY
3	G-2	1-4	5	Brown Sandy CLAY grading to Clayey SAND
4	G-2	4-4	20	Light Greenish Gray CLAY

Job No.:	109-451b	Type of Sample	Undisturbed
Client:	Geomatrix Consultants		
Project:	Grand at Webster - 10534	Remarks:	
Date:	6/20/2005 By: MD/MJ		

COOPER

Figure B-4



Sample No.:	1	2	3	4	
Unconfined Compressive Strength, psf	8562	7284	3028	4733	
Unconfined Compressive Strength, psi	59.5	50.6	21.0	32.9	
Undrainded Shear Strength, psf	4281	3642	1514	2366	
Failure Strain, %	11.0	5.1	5.5	5.5	
Strain Rate, % per minute	1.0	1.0	1.0	1.0	
Strain Rate, inches/minute	0.05	0.05	0.05	0.05	
Moisture Content, %	16.7	18.1	14.6	18.5	
Dry Density, pcf	115.7	111.6	119.6	111.2	
Saturation, %	98.7	95.6	96.1	97.1	
Void Ratio	0.456	0.511	0.409	0.516	
Specimen Diameter, inches	2.426	2.420	2.422	2.421	
Specimen Height, inches	5.02	5.03	4.99	4.96	
Height to Diameter Ratio	2.1	2.1	2.1	2.0	
Assumed Specific Gravity	2.70	2.70	2.70	2.70	

Sample Location				
	Boring	Sample	Depth, ft.	Soil Description
1	G-1	1-4	5	Brown Sandy CLAY (very stiff)
2	G-1	3-4	10	Brown Lean CLAY (very stiff)
3	G-1	4-3	15	Brown Clayey SAND with Gravel
4	G-1	6-4	25	Brown Sandy CLAY near Clayey SAND

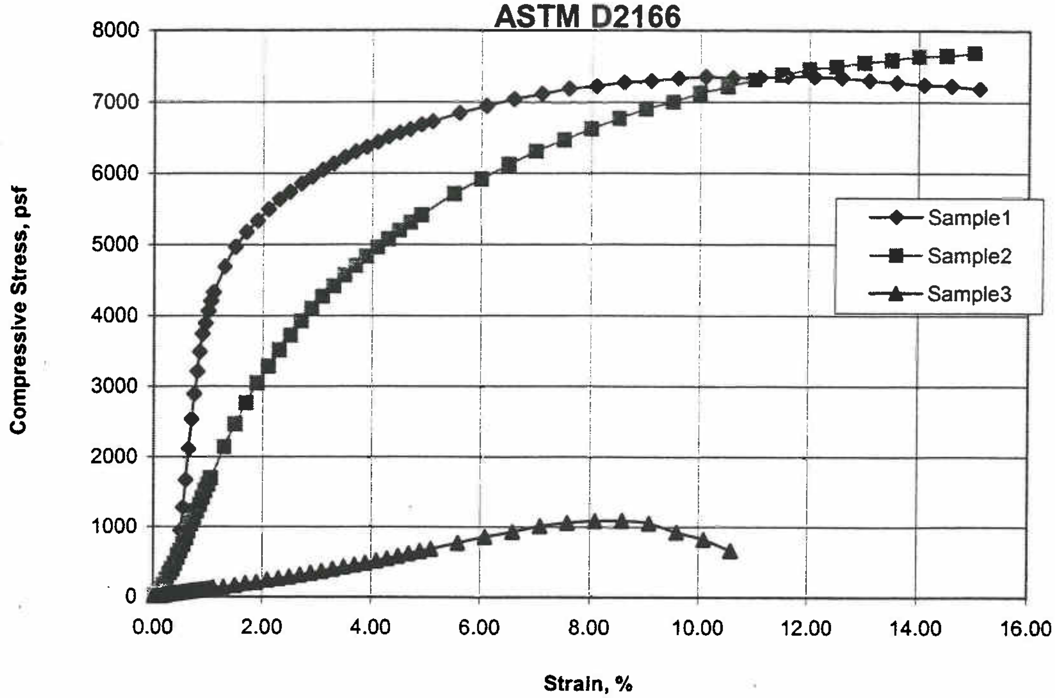
Job No.:	109-451a	Type of Sample	Undisturbed
Client:	Geomatrix Consultants		
Project:	Grand at Webster - 10534	Remarks:	
Date:	6/20/2005 By: MD/MJ		

COOPER

Figure B-5

Unconfined Compressive Strength

ASTM D2166



Sample No.:	1	2	3	4	
Unconfined Compressive Strength, psf	7360	7694	1093		
Unconfined Compressive Strength, psi	51.1	53.4	7.6		
Undrainded Shear Strength, psf	3680	3847	547		
Failure Strain, %	11.6	15.0	8.6		
Strain Rate, % per minute	1.0	1.0	1.0		
Strain Rate, inches/minute	0.05	0.05	0.05		
Moisture Content, %	20.5	17.1	24.2		
Dry Density, pcf	108.3	114.5	101.5		
Saturation, %	99.6	97.4	98.8		
Void Ratio	0.556	0.473	0.660		
Specimen Diameter, inches	2.401	2.417	2.421		
Specimen Height, inches	4.99	5.01	4.97		
Height to Diameter Ratio	2.1	2.1	2.1		
Assumed Specific Gravity	2.70	2.70	2.70	2.70	

Sample Location				
	Boring	Sample	Depth, ft.	Soil Description
1	G-3	1-4	5	Brown CLAY
2	G-3	3-4	15	Brown CLAY with Sand
3	G-3	7-3	50	Brown Sandy SILT near Silty SAND
4				

Job No.:	109-451c	Type of Sample	Undisturbed
Client:	Geomatrix Consultants		
Project:	Grand at Webster - 01534	Remarks:	
Date:	6/20/2005 By: MD/MJ		

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Figure B-6

COOPER TESTING LABORATORY

#200 Sieve Wash Analysis

ASTM D 1140

Job No.: 109-451 | **Project No.:** 10534 | **Run By:** MD

Client: Geomatrix Consultants | **Date:** 6/15/2005 | **Checked By:** DC

Project: Grand at Webster

Boring:	G-1	G-1	G-2	G-3	G-3	G-3	
Sample:	5-3	8-4	8-3	2-4	4	5-3	
Depth, ft.:	20	40	40	10	20-22 (tip minus 19")	30	
Soil Type:	Light Brown Clayey SAND	Light Greenish Gray Clayey SAND, trace Gravel	Reddish Brown Clayey SAND	Reddish Brown Clayey SAND	Tan CLAY (silty) with Sand and pockets of Sand & small Gravel (consolidation test trimmings)	Olive Brown CLAY with Sand	
Wt of Dish & Dry Soil, gm	416.6	444.8	360.3	455.3	421.5	397.2	
Weight of Dish, gm	83.5	80.4	83.6	81.2	79.8	82.3	
Weight of Dry Soil, gm	333.1	364.4	276.7	374.1	341.7	314.9	
Wt. Ret. on #4 Sieve, gm	6.7	48.8	0.0	2.7	0.3	6.8	
Wt. Ret. on #200 Sieve, gm	181.9	248.4	189.7	188.0	80.1	60.9	
% Gravel	**2.0**	**13.4**	**0.0**	**0.7**	**0.1**	**2.2**	
% Sand	**52.6**	**54.8**	**68.6**	**49.5**	**23.4**	**17.2**	
% Silt & Clay	**45.4**	**31.8**	**31.4**	**49.7**	**76.6**	**80.7**	

Remarks: As an added benefit to our clients, the gravel fraction may be included in this report. Whether or not it is included is dependent upon both the technician's time available and if there is a significant enough amount of gravel. The gravel is always included in the percent retained on the #200 sieve but may not be weighed separately to determine the percentage, especially if there is only a trace amount, (5% or less).

Figure B-7

JDH Corrosion Consultants
Incorporated

July 7, 2005

Geomatrix Consultants Inc.
2101 Webster Street, 12th Floor
Oakland, CA 94612

Attention: **Mr. Youzhi Ma**

Subject: **Site Corrosivity Evaluation**
Grand at Webster
Project No. 10534

Dear Mr. Ma,

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

Two (2) soil samples from the project site were chemically analyzed for corrosivity by ***Cooper Testing Laboratories***. Each sample was analyzed for chloride and sulfate concentration, pH, saturated resistivity, redox potential and moisture percentage. The test results are presented in Cooper Testing Laboratories *Corrosivity Test Summary* dated 6/20/05. The results of the chemical analysis were as follows:

Soil Laboratory Analysis

Chemical Analysis	Range of Results	Corrosion Classification*
Chlorides	6 - 28 mg/kg	Non-corrosive
Sulfates	<5 - 8 mg/kg	Non-corrosive **
pH	5.5 – 7.0	corrosive**
Moisture (%)	15.3 - 20	Not-applicable
Saturated Resistivity	879 – 1,378 ohm-cm	Corrosive
Redox	296 - 397	Non-corrosive

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

DISCUSSION

Reinforced Concrete

Due to the low amount of water-soluble sulfates determined in all samples tested, special sulfate resistant concrete is not a requirement at this site. However, Type II cement with a maximum water-to-cement ratio of 0.55 is recommended for use at this site and the minimum depth of cover for the reinforcing steel should be as specified in the current edition of UBC.

Underground Metallic Pipelines

The soils at the project site are considered to be "corrosive" to ductile/cast iron, steel and dielectric coated steel. Therefore, corrosion control in the form of coatings and cathodic protection is warranted for all buried metallic pipelines planned for use at this site depending upon the critical nature of the structure. 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 ***Geomatrix Consultants, Inc.*** 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 25107

COOPER

Corrosivity Test Summary

CTL # 109-451 **Date:** 6/20/2005 **Tested By:** PJ **Checked:** PJ

Client: Geomatrix Consultants **Project:** Grand at Webster **Proj. No:** 10534

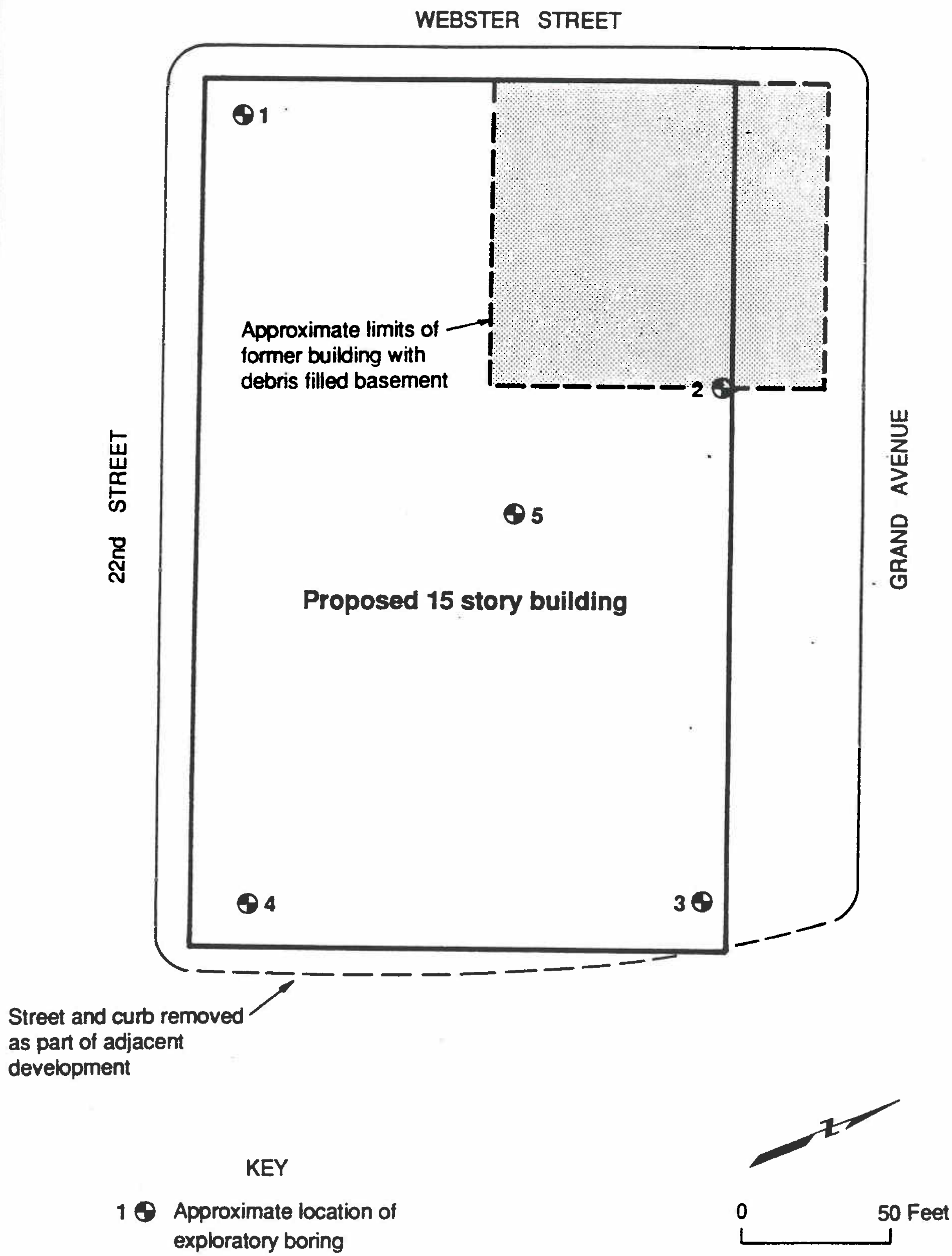
Remarks:

Sample Location or ID			Resistivity @ 15.5 °C (Ohm-cm)			Chloride	Sulfate-(water soluble)		pH	ORP	Moisture	Soil Visual Description
Boring	Sample, No.	Depth, ft.	As Rec.	Minimum	Saturated	mg/kg	mg/kg	%		(Redox)	As Received	
						Dry Wt.	Dry Wt.	Dry Wt.		mv	%	
			ASTM G57	Cal 643	ASTM G57	Cal 422-mod.	Cal 417-mod.	Cal 417-mod.	ASTM G51	SM 2580B	ASTM D2216	
G-2	3-4	15	-	-	1,378	6	8	0.0008	7.0	296	20.0	Mottled Brown CLAY with Sand
G-3	1-3	5	-	-	879	28	<5	<0.0005	5.5	397	15.3	Mottled Grayish Brown CLAY with Sand

APPENDIX B

Previous Subsurface Investigations

for Caltrans District 4 Building by AMEC (1990)



KEY

1 Approximate location of exploratory boring

GEOMATRIX

SITE AND BORING LOCATION PLAN
Caltrans Building
Oakland, California

Figure 1

Project No. 1557

PROJECT: CALTRANS BUILDING
Oakland, California

Log of Boring No. 1

BORING LOCATION:

DATE STARTED: 1/27/90 | DATE FINISHED: 1/27/90 | NOTES:

DRILLING METHOD: Hollow stem auger/rotary wash

HAMMER WEIGHT: 140 lbs. | DROP: 30"

SAMPLER: 2" ID modified California and 3" OD Shelby tube

DEPTH (feet)	Sample No.	Blows/ Foot	MATERIAL DESCRIPTION (Surface Elevation: 20± feet)	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)
0–1			3" AC surfacing			
1–3			SILTY CLAY FILL Light brown, moist, with wood, concrete and glass			
3–10			SANDY CLAY (CL) Very stiff to hard, dark brown, moist			
5	1-1	54				
~8			Large gravel			
10–14			CLAYEY SAND (SC) Dense, brown, moist			
10	1-2	40				
14–20			SILTY CLAY (CL) Stiff,brown, moist, with trace of sand			
15	1-3	22				
20			ATD ▽			
20–30			SANDY CLAY (CL) Stiff to very stiff, orange-brown, with rock fragments			
20	1-4	47				
~24			Large gravel			
~25			Commence rotary wash drilling			
25	1-5	39	Becoming clayey sand (SC) interbedded with silty clay (CL)	18	112	3070
30						

gt-1-88

Project No. 1557 | **Geomatrix Consultants** | Figure A-2

PROJECT: CALTRANS BUILDING
Oakland, California

Log of Boring No. 1 con't.

DEPTH (feet)	Sample No.	Blows/ Foot	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)
	1-6	23				
			SANDY CLAY (CL) Very stiff, tan			
35	1-7	Pushed				
			Sand lense			
40	1-8	58		19	109	4680
			CLAYEY SAND (SC) Very dense, brown, with some gravel and large rock fragments			
45	1-9	59		19	110	1220
50	1-10	50		17	115	1560
55						
			SILTY CLAY (CL) Stiff to very stiff, tan			
60	1-11	28		29	96	

gt-2-88

PROJECT: CALTRANS BUILDING
Oakland, California

Log of Boring No. 1 con't.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	MATERIAL DESCRIPTION	LABORATORY TESTS: Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)
65				SILTY CLAY (CL) Very stiff to stiff, tan			
70	1-12	☒	48		22	103	7410
				Bottom of hole at 71' 6"			
75							
80							
85							
90							
95							

gt-2-88

PROJECT: CALTRANS BUILDING
Oakland, California

Log of Boring No. 2

BORING LOCATION:

DATE STARTED: 2/3/90 | DATE FINISHED: 2/4/90 | NOTES:

DRILLING METHOD: Hollow stem auger/rotary wash

HAMMER WEIGHT: 140 lbs. | DROP: 30"

SAMPLER: 2" ID modified California

DEPTH (feet)	Sample No.	Sample	Blows/ Foot	MATERIAL DESCRIPTION (Surface Elevation: 22.5± feet)	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)
0				3" AC surfacing			
1	2-1	X	16	Mixed CLAY and GRAVEL FILL Dark brown, moist with metal, concrete and debris			
5				SILTY CLAY (CL) Very stiff, brown, moist			
10	2-2	X	39		20	107	
15	2-3	X	14	Sand lens, becoming tan			
18.5				ATD ▽			
20	2-4	X	21		20	110	
22				Increasing rock fragments			
25	2-5	X	18		20	110	4580
26				SANDY CLAY (CL) Very stiff, brown			
30							

gt-1-88

PROJECT: CALTRANS BUILDING
Oakland, California

Log of Boring No. 2 con't.

DEPTH (feet)	Sample No.	Blows/ Foot	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)
	2-6	65/ 9"	SANDY CLAY Very stiff			
			Increasing gravel			
			Less gravel			
35	2-7	27		25	100	7020
			Becoming hard			
40	2-8	51		16	118	17,450
			SILTY GRAVEL (GM) Very dense, brown with gray			
45	2-9	64				
			SILTY CLAY (CL) Stiff, orange-brown			
50	2-10	23		29	95	2830
55			SILTY GRAVEL (GM) Very dense, brown			
60	2-11	67				
			Bottom of hole 61' 6"			

gt-2-88

Project No. 1557

Geomatrix Consultants

Figure A-6

PROJECT: CALTRANS BUILDING
Oakland, California

Log of Boring No. 3

BORING LOCATION:

DATE STARTED: 1/27/90	DATE FINISHED: 1/28/90	NOTES:
DRILLING METHOD: Hollow stem auger/rotary wash		
HAMMER WEIGHT: 140 lbs.	DROP: 30"	
SAMPLER: 2" ID modified California and 3" OD Shelby tube		

DEPTH (feet)	Sample No.	Blows/ Foot	MATERIAL DESCRIPTION (Surface Elevation: 23± feet)	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)
			3" AC surfacing			
1	3-1	9	SILTY CLAY (CL) Medium stiff, dark brown, moist			
			Becoming tan and very stiff			
5	3-2	53		16	107	5410
10	3-3	37		16	109	
15	3-4	31		18	113	6240
			SANDY CLAY (CL) Very stiff, tan, moist			
20	3-5	32		19	109	5210
			ATD ▽			
			Commence rotary wash drilling			
25	3-6	39	Becoming sandy and gravelly, some lenses of clayey gravel	18	112	
30						

gt-1-88

Project No. 1557 | Geomatrix Consultants | Figure A-7

PROJECT: CALTRANS BUILDING
Oakland, California

Log of Boring No. 3 con't.

DEPTH (feet)	Sample No.	Sample	Blows/ Foot	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)
					LABORATORY TESTS		
	3-7		79	SANDY CLAY (CL) Very stiff, tan, with lenses of clayey gravel	20	106	
				SILTY CLAY (CL) Very stiff, tan, with some gravel			
35	3-8		24		28	93	6090
40	3-9		Pushed				
45	3-10		20		33	89	4970
50	3-11		31		28	96	3650
55							
60	3-12		32		28	98	2100

gt-2-88

Project No. 1557 | Geomatrix Consultants | Figure A-8

PROJECT: CALTRANS BUILDING
Oakland, California

Log of Boring No. 3 con't.

DEPTH (feet)	Sample No.	Sample	Blows/ Foot	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)
					LABORATORY TESTS		
65				SILTY CLAY (CL) Very stiff to hard, tan			
70	3-13	X	63		21	106	10,190
75							
				Some gravel			
80	3-14	X	33		29	95	5700
				Bottom of hole at 81' 6"			
85							
90							
95							

gt-2-88

PROJECT: CALTRANS BUILDING
Oakland, California

Log of Boring No. 4

BORING LOCATION:

DATE STARTED: 1/28/90 | DATE FINISHED: 1/28/90

NOTES:

DRILLING METHOD: Hollow stem auger/rotary wash

HAMMER WEIGHT: 140 lbs. | DROP: 30"

SAMPLER: 2" ID modified California

Surface Elevation: 22.5± feet

DEPTH (feet)	Sample No.	Sample	Blows/ Foot	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)
0				3" AC surfacing			
1	4-1	X	14	SILTY CLAY (CL) Stiff, dark brown, moist, with gravel	16	102	1120
5	4-2	X	38	SANDY CLAY (CL) Very stiff, tan, moist, with gravel	13	114	
10	4-3	X	25		17	108	
15	4-4	X	16		20	108	6720
20	4-5	X	21		23	105	6380
ATD ▽				CLAYEY SAND (SC) Medium dense, brown, fine to coarse sand with gravel			
25	4-6	X	24				
				SANDY CLAY (CL) Very stiff, tan, with some gravel			
30							

gt-1-88

PROJECT: CALTRANS BUILDING
Oakland, California

Log of Boring No. 4 con't.

DEPTH (feet)	Sample No.	Blows/Foot	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)
	4-7	37	SANDY CLAY (CL) Very stiff, tan, with some gravel	16	118	5460
			Increasing gravel			
35	4-8	67				
			No gravel			
40	4-9	29		20	109	4290
			SILTY CLAY (CL) Very stiff, brown			
45	4-10	31		22	106	6680
50	4-11	31		23	103	5900
55						
			Sand lenses			
60	4-12	28		23	104	
			Less sand			

gt-2-88

PROJECT: CALTRANS BUILDING
Oakland, California

Log of Boring No. 4 con't.

DEPTH (feet)	Sample No.	Sample	Blows/Foot	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)
65				SILTY CLAY (CL) Very stiff, brown			
70	4-13	☒	46		25	99	
				Bottom of hole at 71' 6"			
75							
80							
85							
90							
95							

gt-2-88

PROJECT: CALTRANS BUILDING Oakland, California	Log of Boring No. 5

BORING LOCATION:

DATE STARTED: 2/3/90 | DATE FINISHED: 2/3/90 | NOTES:

DRILLING METHOD: Hollow stem auger/rotary wash

HAMMER WEIGHT: 140 lbs. | DROP: 30"

SAMPLER: 2" ID modified California

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	MATERIAL DESCRIPTION (Surface Elevation: 23± feet)	LABORATORY TESTS: Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)
				3" AC surfacing			
1	5-1	X	4	SILTY CLAY (CL) Stiff, dark brown, moist, fill with brick fragments			
				SILTY CLAY (CL) Very stiff, tan, moist, with some gravel			
5	5-2	X	4				
10	5-3	X	28		17	109	10,040
				Becoming brown with some sand			
15	5-4	X	19		20	105	4780
				SANDY CLAY (CL) Very stiff, brown, with lenses of sand			
20	5-5	X	27	ATD ▽	18	112	
				Increasing gravel			
25	5-6	X	29		17	113	3460
30							

gt-1-88

PROJECT: CALTRANS BUILDING
Oakland, California

Log of Boring No. 5 con't.

DEPTH (feet)	Sample No.	Sample	Blows/ Foot	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)
	5-7	X	32	SILTY CLAY (CL) Very stiff, brown, with some gravel	17	115	6580
35	5-8	X	34		22	105	7700
				SANDY CLAY (CL) Very stiff, tan mottled with orange and gray			
40	5-9	X	34		18	112	
				SILTY SAND/SAND (SM - SP) Medium dense to dense, brown			
45	5-10	X	28				
				Some gravel			
50	5-11	X	19	SILTY CLAY (CL) Stiff, mottled brown and gray, low plasticity with some sand	27	94	980
55							
60	5-12	X	29		25	100	

gt-2-88

PROJECT: CALTRANS BUILDING
Oakland, California

Log of Boring No. 5 con't.

DEPTH (feet)	Sample No.	Sample	Blows/ Foot	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	Uncont. Comp. Str. (psf)
					LABORATORY TESTS		
65				SILTY CLAY (CL) Stiff, mottled brown and gray			
70	5-13	X	37	Becoming brown, hard, with some gravel	21	105	9450
75							
80	5-14	X	34		30	93	5560
85							
				CLAYEY SAND (SC) Very dense, brown, with gravel			
90	5-15	X	50/6"				
95				SILTY CLAY (CL) Hard, brown			

gt-2-88

PROJECT: CALTRANS BUILDING
Oakland, California

Log of Boring No. 5 con't.

DEPTH (feet)	Sample No.	Sample	Blows/Foot	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	Uncont. Comp. Str. (psf)
100	5-16	X	72	SILTY CLAY (CL) Hard, brown	20	110	13,600
				Bottom of hole 101' 6"			
105							
110							
115							
120							
125							
130							

gt-2-88