May 17, 2013
Project 28645439

Mr. Dave Henderson
Samaritan Medical Center
2581 Samaritan Drive, Suite 300
San Jose, CA  95124

Subject: Geotechnical Investigation
Proposed Medical Office Building and Parking Structure
Samaritan Court
San Jose, California

Dear Mr. Henderson:

URS is pleased to submit this report presenting the results of our geotechnical investigation for the proposed medical office building (MOB) and parking structure (PS) at Samaritan Court in San Jose, California. The purpose of the investigation was to develop design recommendations regarding foundation support as well as opinions regarding other geotechnical aspects of site development. We drilled three exploratory borings, B1, B2 and B3, to supplement existing subsurface data at the site and adjacent to the site.

This report presents our engineering opinions and recommendations regarding the geotechnical factors influencing the design and construction of the proposed MOB and PS. The opinions and recommendations are based upon the results of our field exploration, laboratory testing, existing available information, engineering judgment, and local experience.

We are pleased to have been of service to you on this project. If you have any questions, please contact our office at your convenience.

Sincerely,

L. Allen Moore
Project Manager, G.E. 2607

Cc: Roy Holman, AIA, RBB Architects, Inc.
# TABLE OF CONTENTS

Section 1  Introduction..................................................................................................................... 1-1  
  1.1  Previous Studies.................................................................................................................. 1-1  
  1.2  Purpose and Scope of Work............................................................................................... 1-1  

Section 2  Project Description......................................................................................................... 2-1  

Section 3  Site and Subsurface Conditions ................................................................................... 3-1  
  3.1  Site and Surface Conditions............................................................................................... 3-1  
  3.2  Subsurface Conditions ....................................................................................................... 3-1  
      3.2.1  Existing Subsurface Information ............................................................................... 3-1  
      3.2.2  Field Exploration ................................................................................................... 3-1  
      3.2.3  Laboratory Testing .................................................................................................. 3-1  
      3.2.4  Soil Conditions......................................................................................................... 3-1  
      3.2.5  Groundwater Conditions......................................................................................... 3-2  

Section 4  Geologic Hazards ........................................................................................................ 4-1  
  4.1  Geologic Setting.................................................................................................................. 4-1  
  4.2  Geologic Hazards............................................................................................................... 4-2  
      4.2.1  Strong Ground Shaking.......................................................................................... 4-2  
      4.2.2  Fault-Related Ground Rupture ............................................................................ 4-2  
      4.2.3  Liquefaction .......................................................................................................... 4-2  
      4.2.4  Lateral Spreading ................................................................................................... 4-3  
      4.2.5  Landslide and Slope Failure ................................................................................... 4-3  
      4.2.6  Compressible Soils ................................................................................................. 4-3  
      4.2.7  Flooding .................................................................................................................. 4-3  

Section 5  Geotechnical Recommendations .................................................................................. 5-1  
  5.1  Seismic Data and CBC Recommendations ....................................................................... 5-1  
      5.1.1  Site Soil-Profile Type .............................................................................................. 5-1  
      5.1.2  Site Coefficients and Mapped Spectral Acceleration Periods.................................. 5-1  
  5.2  Foundations....................................................................................................................... 5-1  
      5.2.1  Spread Footings ....................................................................................................... 5-1  
      5.2.2  Estimated Settlement .............................................................................................. 5-2  
      5.2.3  Slabs-on-Grade ....................................................................................................... 5-2  
      5.2.4  Exterior Slabs .......................................................................................................... 5-2  
  5.3  Lateral Earth Pressure on Below Grade Walls ................................................................... 5-3  
      5.3.1  Static Loading .......................................................................................................... 5-3  
      5.3.2  Surcharge Loading .................................................................................................. 5-3  
      5.3.3  Wall Subdrainage ..................................................................................................... 5-3  
  5.4  Resistance to Lateral Loads ............................................................................................... 5-4  
  5.5  Pavement Design ............................................................................................................... 5-4  

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# TABLE OF CONTENTS

5.6 Earthwork ........................................................................................................... 5-5  
  5.6.1 Clearing and Stripping ........................................................................... 5-5  
  5.6.2 Excavations .......................................................................................... 5-6  
  5.6.3 Subgrade Preparation ........................................................................ 5-6  
  5.6.4 Fill Materials ....................................................................................... 5-6  
  5.6.5 Fill Placement and Compaction ...................................................... 5-6  
  5.6.6 Underground Utility Trenches ...................................................... 5-7  
  5.6.7 Surface Drainage .............................................................................. 5-7  

Section 6 Construction Considerations .......................................................................... 6-1  
  6.1 Temporary Construction Excavations .................................................. 6-1  
  6.2 Construction Dewatering ....................................................................... 6-1  

Section 7 Limitations .................................................................................................. 7-1  

Section 8 References .................................................................................................. 8-1  

## FIGURES

- Figure 1 Site Vicinity Map  
- Figure 2 Site and Boring Location Plan  
- Figure 3 Subdrain Detail for Below Grade Walls  

## APPENDICES

- Appendix A Boring Logs and Laboratory Test Results from Previous Investigation  
- Appendix B Field Exploration and Laboratory Tests for Current Study  
- Appendix C Guide Specifications for Site Earthwork
This report presents the results of our geotechnical investigation for the proposed medical office building (MOB) and parking structure (PS) at Samaritan Court in San Jose, California, as shown on the Site Vicinity Map, Figure 1. Included in this report are the logs of three recent exploratory borings and our geotechnical conclusions and recommendations for design and construction of the proposed MOB and PS. The borings were drilled to supplement existing subsurface data from the previous study cited below.

1.1 PREVIOUS STUDIES

We reviewed the April 1998 report prepared by Terratech, Inc., titled “Geotechnical Investigation, Samaritan Medical Center, San Jose, California.” The Terratech study included three exploratory borings, B-1 through B-3, completed on and adjacent to the project site.

1.2 PURPOSE AND SCOPE OF WORK

The purpose of this geotechnical investigation was to study the subsurface soil and groundwater conditions at the site, and to provide recommendations for foundation design as well as other geotechnical aspects of the project.

Our scope of services for the proposed MOB and PS included the following tasks:

- Review existing available subsurface data
- Drill three exploratory borings
- Characterize the geotechnical and geological conditions
- Evaluate potential geologic hazards
- Perform engineering analysis based on new and existing exploration data, including:
  - Geotechnical design parameters for shallow foundations;
  - Below grade wall support and groundwater considerations, including subdrainage details, if applicable;
  - Earthquake parameters consistent with the 2010 California Building Code;
  - Slab-on-grade support;
  - Assessment of the site liquefaction potential; and
  - Design of structural pavement sections.
- Provide opinions and recommendations regarding:
  - Feasible foundation types;
  - Foundation design capacity, including resistance to lateral loads;
  - Construction considerations such as temporary cut slope inclinations and the need for shoring; and
  - Earthwork, site grading, subgrade preparation, backfilling, and re-use of on-site soils.

These tasks above are discussed in the subsequent sections and appendices of this report. Corrosion and environmental studies were beyond the scope of this investigation.
We understand that a two-level MOB and a four-level PS are planned on the vacant parcels immediately south of Samaritan Court. The MOB will be approximately rectangular in plan with dimensions of about 130 x 220 feet; it will be located primarily on the east parcel and positioned near the existing site grade. The PS will occupy most of the west parcel, with access from both Samaritan Court and National Avenue; it will have plan dimensions of about 130 x 180 feet. We understand the lower 1½ levels of the PS will extend below grade. Structural loading information is not yet available; however the loads are expected to be comparable to other similar structures recently completed at Samaritan Medical Center. Some asphalt paving and portland cement concrete (PCC) flatwork are planned along the north side of the MOB and between the MOB and PS.

Based on the conceptual site plan provided (RBB Architects Inc., March 2013), we understand that the proposed PS is to be setback approximately 15 feet from National Avenue. Both the PS and MOB are to be setback 25 feet from the southern property line.
3.1 SITE AND SURFACE CONDITIONS

The site is located adjacent to and south of Samaritan Court and extends to Samaritan Drive in San Jose, California, as shown on Figure 1. At the time of our exploration, the site was being used as a construction staging area. The site is relatively flat and undeveloped with trees and bushes along the site perimeter; bare soil and low lying grass/weeds blanketed much of the site.

3.2 SUBSURFACE CONDITIONS

3.2.1 Existing Subsurface Information

Previous exploration in the vicinity of the proposed MOB and PS included three borings advanced during the 1998 investigation by others (Borings B-1 through B-3). Logs of these borings and laboratory test results are included in Appendix A. The previous explorations generally encountered native alluvial soils consisting predominantly of medium dense to very dense silty sand and silty gravel to the maximum depths explored below the ground surface (bgs) at each location (20 to 38 feet bgs). No fills were identified on the logs of these previous borings.

3.2.2 Field Exploration

To supplement the available subsurface information, we advanced three exploratory borings (B1 through B3) each to a terminal depth of about 44½ bgs on March 29, 2013, using truck-mounted hollow-stem auger drilling equipment. The approximate locations of these explorations are shown on the Site and Boring Location Plan, Figure 2. Logs of the recent borings as well as a detailed discussion of the field exploration program are presented in Appendix B.

3.2.3 Laboratory Testing

Selected samples recovered from the borings were tested in our laboratory to estimate pertinent engineering properties. These tests included Plasticity Index (PI), moisture content and dry unit weight. A more detailed discussion of the laboratory testing program is presented in Appendix B.

3.2.4 Soil Conditions

Boring B1 generally encountered medium dense to very dense silty gravel to a depth of 44½ feet bgs; an approximately 6-inch-thick lean clay interbed was encountered within the gravel at a depth of about 39 feet bgs. A Plasticity Index (PI) test performed on a sample of the surficial soil resulted in a PI of 3; such a low PI is indicative of very low expansion potential. Borings B2 and B3 generally encountered very stiff gravelly silt to depths of approximately 5 to 7 feet bgs, underlain by dense to very dense silty gravel to a depth of 44 ½ feet.
3.2.5 Groundwater Conditions

Free groundwater was not encountered in any of the borings advanced during the 1998 study or during the current study to the maximum depths explored at each location (20 to 44½ feet bgs).

Based on the map titled “Depth to First Groundwater for the Santa Clara Basin (Santa Clara Valley Water District, 2004), free groundwater in the vicinity of the site has been encountered at depths ranging from 20 to 50 feet bgs. Note that fluctuations in the groundwater level could occur due to variations in rainfall or other factors not in evidence at the time measurements were made.
Our Certified Engineering Geologist, Mark Schmoll, evaluated the site and geologic conditions to identify potential geologic hazards for the proposed MOB and PS. The geologic information that we reviewed for the project included:

- Geologic maps and reports published by the U.S. Geological Survey (USGS) and the California Geological Survey (CGS, formerly the California Division of Mines and Geology);
- Alquist-Priolo earthquake fault zone maps published by the CGS;
- City of San Jose fault hazard maps;
- On-line seismic hazard zone maps from the CGS;
- On-line geologic hazard zone maps from Santa Clara County;
- On-line flood hazard maps from Santa Clara Valley Water District and the Federal Emergency Management Agency; and
- Other sources of published geologic information.

### 4.1 GEOLOGIC SETTING

The project site is located within the western margins of the Santa Clara Valley, an alluvial basin located between the Santa Cruz Mountains to the southwest and the Diablo Range to the northeast (Bortugno et al., 1991). The Santa Clara Valley is located between the active San Andreas fault to the west, and the Hayward and Calaveras faults to the east. Each of these faults has produced damaging earthquakes during historic time. The valley margins are marked by belts of active thrust faults; the Foothills fault system to the southwest and the East Valley thrusts (southeast extension of the Hayward fault) to the northeast (Fenton and Hitchcock, 2002).

The Foothills fault system is a series of southwest-dipping thrust faults located along the range front of the Santa Cruz Mountains (Bürgmann et al., 1994). The Monte Vista-Shannon and Sargent faults are the main active faults in the Foothills thrust system. The Monte Vista-Shannon thrust is approximately 27 miles long and dips at a moderate angle to the southwest, merging with the San Andreas fault at depth (Caltrans, 2007). The Monte Vista-Shannon fault is mapped about 3,000 feet south-southwest of the project site. The Sargent fault is approximately 35 miles long and merges with the San Andreas fault near Loma Prieta.

The East Valley thrusts are a series of northeast-dipping thrust faults that mark the junction between the southern end of the Hayward fault and the southern and central segments of the Calaveras fault. These faults, which include the Quimby, Piercy, Evergreen and Silver Creek faults, are relatively short, less than 19 miles long, and appear to merge with the Hayward and Calaveras faults at relatively shallow depths (Jones et al., 1994). Recent geologic and geomorphic investigations along both the Foothills and East Valley thrust fault systems indicate that they are active and may be capable of generating damaging earthquakes (Hitchcock and Kelson, 1999; Fenton and Hitchcock, 2002).

The geology at the site has been mapped by Wentworth et al. (1998) as upper Pleistocene alluvial fan deposits. The geologic map of Santa Clara County, California (Brabb and Dibblee, 1974) maps the area as older alluvial fan deposits. These materials are described as interbedded sand, silt and clay with minor gravel.
Bedrock was not encountered in any of the previous drill holes completed at the site by Terratech, Inc. (1998) or in borings completed for this study. Based on California Department of Water Resources (1975) data, the depth to bedrock (non water-bearing rock) in the site vicinity is about 350 feet. The bedrock unit is likely the Franciscan Complex composed of a heterogeneous array of diverse rock types that were brought together in a subduction zone. Semi-consolidated sedimentary rock of Tertiary geologic age may overlie the Franciscan bedrock.

4.2 GEOLOGIC HAZARDS

On the basis of our evaluation, the only significant geologic hazards at the site are the effects of strong ground shaking as a result of a large earthquake on a nearby fault. The following sections describe the potential geologic hazards at the site.

4.2.1 Strong Ground Shaking

Based on the proximity of the proposed building site to the Hayward, Calaveras, and San Andreas 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. The site is also located within about 3,000 feet of a mapped branch of the Monte Vista-Shannon 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.

4.2.2 Fault-Related Ground Rupture

Surface fault rupture tends to recur along existing fault traces. The highest potential for surface faulting is along existing fault traces that have had Holocene fault displacement. The California Geological Survey has produced maps showing Alquist-Priolo Earthquake Fault Zones along faults with known Holocene activity that pose a potential surface faulting hazard. There are no Alquist-Priolo (A-P) zones mapped in the vicinity of the site (CGS, 2000). In addition, the City of San Jose Fault Hazard Map does not identify any fault hazard zones in the project area. The closest A-P zoned active fault to the site is the San Andreas fault located approximately 5.4 miles to the southwest (Bortugno, et al. 1991). The Evergreen fault within the East Valley thrust system, sometimes referred to as the southeast extension of the Hayward fault, is located 10.6 miles northeast of the site and the Calaveras fault is located about 14.2 miles northeast of the site. The closest Fault Rupture Hazard Zone mapped by Santa Clara County is a concealed branch of the Monte Vista-Shannon fault located about 3,000 feet to the southwest. The potential for surface fault rupture at the site is considered low.

4.2.3 Liquefaction

Liquefaction is a phenomenon whereby sediments temporarily lose shear strength and collapse. This condition is caused by cyclic loading during earthquake shaking that generates high pore water pressures within the sediments. The soil most susceptible to liquefaction is loose, cohesionless soil below the water table and within about 50 feet of the ground surface. Liquefaction can result in loss of foundation support and settlement of overlying structures, ground subsidence and translation due to lateral spreading, and differential settlement of affected
deposits. The project site is located in an area shown with a “low” liquefaction potential on the USGS liquefaction susceptibility map (Witter et al., 2006). The CGS seismic hazard zone map of the San Jose West quadrangle (2001) and the Santa Clara County Geologic Hazard Zones map (2002) show the site to be outside of the liquefaction hazard zone.

Previous and recent geotechnical investigations at the site encountered predominantly dense to very dense gravel with varying amounts of silt and clay. Groundwater was not encountered in any of the 1998 or recent borings to the maximum depths explored at each location. Based on high sample driving resistance and the depth of the water table, the soils at the site have a low potential for liquefaction, in our opinion.

4.2.4 Lateral Spreading

Lateral spreading occurs when a layer liquefies at depth and causes horizontal movement or displacement of the overburden mass toward a free face such as a stream bank or excavation, or toward an open body of water. Due to the low susceptibility of the site soils to liquefaction and no nearby incised drainage channels with a free face, the potential hazard from lateral spreading is low.

4.2.5 Landslide and Slope Failure

The project site is not within the mapped Santa Clara County Landslide Hazard Zone (2002) or the California Geological Survey Earthquake-Induced Landslide Hazard Zone (CGS, 2001). The area of the proposed office building and parking structure is relatively flat and no landslides are mapped on or near the site. We do not consider the site as being susceptible to landsliding.

4.2.6 Compressible Soils

Santa Clara County Geologic Hazard Zone maps (2002) show the site to be outside of a compressible soils hazard zone.

4.2.7 Flooding

The site is not located within the FEMA 100-year flood zone (i.e., the region that has an approximately 1% annual probability of flooding) as mapped by the Santa Clara Valley Water District. Therefore, we judge the flood hazard at the site to be low.
Based on our review of the available subsurface information and new borings, in our opinion, the proposed MOB and PS may be supported on spread footing foundations, provided that the geotechnical recommendations presented in this report are incorporated into the design and construction of the proposed development.

We understand that the proposed PS is to be located approximately 25 feet from the southern site boundary and 15 feet from National Avenue. Excavation for the PS is anticipated to be on the order of 15 to 20 feet deep to accommodate 1½ levels of below grade parking. Consideration should be given to the need for temporary shoring to protect the adjacent residential properties along the southern property line, and underground utilities and pavements along National Avenue, in the event that stable temporary slope inclinations cannot be achieved. Temporary excavation slopes, shoring alternatives and other construction considerations are discussed in more detail in Section 6 of this report.

5.1 SEISMIC DATA AND CBC RECOMMENDATIONS

5.1.1 Site Soil-Profile Type

The site is located in Seismic Zone 4 and can be classified, from a seismic standpoint, as being a very dense site with soil depth exceeding 100 feet. Therefore, the site is classified as Soil Profile Type $S_C$ as noted in Table 1613.5.2 of the 2010 California Building Code (CBC).

5.1.2 Site Coefficients and Mapped Spectral Acceleration Periods

Based on the 2010 CBC, we recommend the following values for use in design:

- Site Coefficient, $F_a = 1.0$ (Table 1613.5.3(1))
- Site Coefficient, $F_v = 1.3$ (Table 1613.5.3(2))
- Mapped spectral acceleration at short period, $S_s = 2.14 \text{ g}$
- Mapped spectral acceleration at 1-second period, $S_1 = 0.79 \text{ g}$

5.2 FOUNDATIONS

5.2.1 Spread Footings

The proposed buildings can be supported on isolated or continuous spread footing foundations bearing on undisturbed native soil or engineered fill, provided that the engineered fill is constructed in accordance with the recommendations presented in this report. The bottom of footings should extend at least 2 feet below the lowest adjacent finish grade, taken as bottom of interior slab on grade or adjacent exterior grade, whichever is lower. Footings should be designed for allowable bearing pressures of 3,000 pounds per square foot (psf) for dead loads, 4,500 psf for dead plus live loads, and 6,000 psf for total loads including wind or seismic. These allowable bearing pressures are based on an ultimate bearing capacity of 9,000 psf (factor of safety of 1.0).

Footings located near underground utilities should extend below an imaginary plane inclined at 1:1 (horizontal:vertical), sloping upward and away from the bottom edge of the utility trench. If
the bottom of the footing intersects the imaginary plane, the spread footings should be deepened accordingly.

The above recommendations are based on the assumption that a URS representative will observe site grading, test the compaction of any new fill, and examine the bottoms of all footing excavations before reinforcing steel or concrete is placed. Overexcavation might be required if localized loose or soft soils are encountered in the footing subgrade.

### 5.2.2 Estimated Settlement

We estimate that post-construction total and differential settlements of spread footings designed in accordance with our recommendations will be less than about 1½-inch and 1-inch, respectively. We should review these settlement estimates once column loads and column spacing are finalized.

### 5.2.3 Slabs-on-Grade

All concrete slab-on-grade floors for the MOB should be supported on a minimum of 6 inches of select quality fill. The select fill should be non-expansive fill material having a maximum plasticity index of 15. Surplus on-site material from the PS excavation will likely meet select fill requirements. Engineered fill constructed to support new slab-on-grade floors should be compacted to a minimum relative compaction of 95 percent in accordance with ASTM Test Designation D 1557, latest edition.

Moisture will come into contact with the floor slab due to moisture vapor migration and/or capillary water rise through the soil. In areas where moisture vapor transmission through building floors would be undesirable, or if moisture-susceptible floor coverings are to be used, a moisture barrier should be provided beneath the slab. If sand and gravel are used as part of a moisture barrier system, they can be considered as part of the recommended select engineered fill section beneath the slab-on-grade floor. The potential long-term impact of moisture migration should be evaluated by a qualified moisture protection consultant, and additional protective measures should be incorporated as needed.

The slab-on-grade for the PS basement should consist of at least 5 inches of PCC underlain by at least 6 inches of Class 2 aggregate base. Reinforcing steel should be provided within the slab as necessary to accommodate the anticipated vehicle loads. We understand that the 5-inch-thick PCC slab with reinforcing steel at approximately 15 inches on center has performed well at the nearby parking structure expansion at the Samaritan Medical Center.

### 5.2.4 Exterior Slabs

We recommend that exterior concrete walkways be supported on a minimum of 6 inches of select quality engineered fill. The fill should consist of a granular material such as Class 2 aggregate base (Caltrans Specifications, latest edition).
5.3 LATERAL EARTH PRESSURE ON BELOW GRADE WALLS

5.3.1 Static Loading

Retaining walls that are free to deflect at the top in response to lateral loads should be designed for "active" earth pressures. Typically, for dense granular soils located behind a retaining wall, a horizontal movement of approximately 0.004H (where H is the height of the wall) would be needed to develop “active” earth pressures. If these vertical deflections behind the wall are not acceptable to the Structural Engineer, or if retaining walls are sufficiently stiff to prevent these deflections, then the wall should be designed for "at-rest" conditions.

Water could infiltrate behind the walls and produce a build-up of hydrostatic pressure if they are not properly drained. Therefore, we recommend that basement retaining walls be designed for full hydrostatic pressure for the entire height of the wall, unless a subdrain system is installed as described in Section 5.3.3.

For the two wall drainage conditions, the following equivalent fluid pressures should be used for design of walls with horizontal backfill:

<table>
<thead>
<tr>
<th></th>
<th>With Wall Drainage</th>
<th>Without Wall Drainage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Condition</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>At-rest Condition</td>
<td>60</td>
<td>90</td>
</tr>
</tbody>
</table>

5.3.2 Surcharge Loading

Permanent surcharge loads adjacent to below-grade walls will result in additional lateral earth pressure on the walls. This additional pressure should be estimated by multiplying the permanent surcharge pressure by a coefficient of lateral pressure of 0.3 and 0.5 for "active" and "at-rest" conditions, respectively.

We recommend the surcharge effects of traffic be idealized as an additional 2 feet of soil backfill.

5.3.3 Wall Subdrainage

Even though it is unlikely that the groundwater table would rise to the level of the PS basement, water from other sources, such as broken water pipes, runoff from the parking deck, and rainfall infiltration, may create a perched water condition, resulting in a build-up of hydrostatic pressures behind basement retaining walls. Therefore, we recommend that subsurface drainage be installed behind retaining walls which exceed 4 feet in height.

To intercept seepage and provide a path for water to reach the subsurface drain, a continuous layer of granular filter material, at least 12 inches wide, should be placed along the back of the wall, up to a depth of 24 inches below the ground surface. As an alternative to the granular filter section, a prefabricated, synthetic multi-layer drainage material (such as Miradrain 6000 or equivalent) could be used behind walls. If such a synthetic drain system is used, it should be continuous from the drain pipe to within 24 inches of the ground surface. For lower level perimeter walls the backfill should be capped with 24 inches of compacted impervious soil. A 4-inch diameter, perforated drain pipe encased in granular filter material should be placed behind
the bottom of the wall. The drain pipe should be connected to a free draining outlet or sump pump. These wall subdrain details are shown schematically on Figure 3. Except for the layer of granular filter material, backfill behind retaining walls could be native soils derived from the building area excavation or imported select fill.

Granular filter material to be used behind below-grade walls should conform to the gradation for Class 2 Permeable Material, Section 68 of the State of California, Department of Transportation, Standard Specification (latest edition).

5.4 RESISTANCE TO LATERAL LOADS

Resistance to static earth pressure loads at retaining walls and to transient lateral loads from wind or earthquakes can be developed by friction between the bottom of the footings and the soil, and passive resistance acting on the front face of the footings poured neat against undisturbed native soil or engineered fill. For design purposes, we recommend a static coefficient of friction of 0.45 for the PS and 0.40 for the MOB (ultimate). Ultimate passive resistance of the soil should be estimated using an equivalent fluid weight of 350 pounds per cubic foot (pcf) acting against the face of MOB footings; this value can be increased to 400 pcf for PS basement footings bearing 10 feet or more below existing grade. The upper 1-foot of embedment should be neglected for resistance for foundations located adjacent to unpaved or landscaped areas. The recommended values presented above are ultimate values and should be used with an appropriate factor of safety.

5.5 PAVEMENT DESIGN

The near surface native soils across the site consist primarily of medium dense to very dense silty gravel and gravelly silt. Test results from 1998 study at the site resulted in an R-value of 42 for the on-site soils. The following recommended pavement sections are based on placing the pavement on the existing native soils or engineered fill using a design R-value of approximately 30. These recommendations pertain to surface pavements adjacent to the MOB and PS.

<table>
<thead>
<tr>
<th>Traffic Type</th>
<th>Recommended Pavement Section (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Portland Cement Concrete (PCC)</td>
</tr>
<tr>
<td>Automobile Traffic and Parking Lot Thoroughfares</td>
<td>-</td>
</tr>
<tr>
<td>Truck Access and Parking</td>
<td>-</td>
</tr>
<tr>
<td>Truck Access and Parking*</td>
<td>8</td>
</tr>
</tbody>
</table>

* We recommend that PCC pavement be used in heavy truck traffic areas such as loading docks and trash enclosures.

All pavement sections should be constructed in accordance with City of San Jose Standard Specifications, latest edition, except that relative compaction should be based on ASTM Test.
Geotechnical Recommendations

Designation D1557, latest edition. The top six inches of subgrade below all pavements and all aggregate base should be compacted to at least 95 percent relative compaction. These recommended pavement sections are based on a 20-year pavement design life.

Additional recommendations for PCC pavement are as follows:

- Concrete should have a minimum modulus of rupture of at least 550 pounds per square inch (psi) (equivalent to an unconfined compressive strength of 3,700 psi) before the pavement is subjected to traffic.

- Expansion joints should be provided between buildings and pavements; the Contractor should provide a shop drawing indicating the proposed joint material and joint locations.

- Weakened plane contraction joints should be provided on a maximum 12-foot grid spacing by either saw cutting to a minimum depth of 3 inches or installing preformed material for the full concrete depth; the purpose of these joints is to relieve tensile stresses, thereby minimizing the potential for volunteer cracking elsewhere in the pavement.
  - Saw cut width should be the minimum possible and less than ¼-inch.
  - Saw cut should occur within time period specified in Caltrans Specification Section 40-1.08B (1). Timing of the saw cutting is of the utmost importance since it is necessary to saw the joint before volunteer cracking occurs. Typically, this is within 12 to 24 hours after concrete placement.
  - All joints should be sealed with joint filler in accordance with Caltrans Section 40-1.08B (1).

- The length of any given panel should not exceed the width by more than 25 percent.

- Provide 6X6-W1.5XW1.5 welded wire mesh.
  - Place in middle of slab.
  - Do not place across joints.

A representative of URS should be retained during construction to review the soil conditions encountered at the pavement subgrade and the pavement construction procedures.

5.6 EARTHWORK

All site preparation and earthwork should be done under the observation of a URS representative and in accordance with the recommendations presented below. Suggested guide specifications for "Site Earthwork" are presented in Appendix C.

5.6.1 Clearing and Stripping

Areas to be graded should be stripped and cleared of all surface vegetation and improvements designated for removal. We estimate that a stripping depth of 2 to 4 inches could be required. Tree and bush root bulbs should be removed in their entirety along with all roots 1-inch in diameter or greater. Materials resulting from clearing and stripping operations should be removed from the site.

Any loose soils encountered during construction should be removed. The final depths of clearing and stripping should be determined by a URS representative during grading. Native
soils removed during clearing may be stockpiled, if desired, for use as engineered fill underneath the proposed foundations provided they are free of organics or other deleterious matter.

5.6.2 Excavations

All excavations should be made to the lines and grades shown on the project plans and in the specifications. If unsuitable materials are encountered during excavation, this material should be removed in its entirety and replaced with well-compacted engineered fill. A representative of URS should review the final excavation depths and lateral dimensions during construction.

Due to the cohesionless nature of the subsurface material, sloughing and raveling of slopes should be expected and could require shoring or flattening of the temporary excavation slopes. Equipment and stockpiles should not be located within 15 feet from the edge of any excavation.

5.6.3 Subgrade Preparation

In areas to receive new fill or pavement, the exposed surface soils should be scarified to a minimum depth of 6 inches, moisture conditioned and recompacted to at least 95 percent relative compaction per ASTM Test Method D1557, latest edition.

5.6.4 Fill Materials

All general fill material should be a soil or soil-rock mixture that is free of organic matter and other deleterious substances. It should not contain rocks or lumps over 6 inches in greatest dimension, and not more than 15 percent larger than 2½ inches.

In areas where select fill material is required, it should be a low plasticity, non-expansive soil or soil-rock material having a Plasticity Index not greater than 15. The on-site soils removed from the parking structure excavation are expected to meet these criteria.

Import fill should meet the requirements for select fill and have a pH between 6 and 8.

5.6.5 Fill Placement and Compaction

Fill material should be spread in uniform lifts not exceeding 8 inches in uncompacted thickness where heavy equipment is used, and not more than 4 inches where light, hand-operated compactors are used. Before compaction begins, the fill should be brought to a moisture content that will permit proper compaction by either aerating the material if it is too wet, or spraying the material with water if it is too dry. Each lift should be thoroughly mixed before compaction to ensure a uniform distribution of water content. To prevent drying of the subgrade soils, placement of fill should start immediately after the surface preparation and should proceed in a continuous operation until the site is brought to grade.

All fill material should be compacted to a minimum relative compaction of 92 percent in accordance with ASTM D1557. Furthermore, engineered fill beneath and around footings, behind below-grade walls and in all pavement subgrades should be compacted to at least 95 percent relative compaction. Aggregate base for asphalt concrete or PCC pavements should be compacted to a minimum relative compaction of 95 percent.
5.6.6 Underground Utility Trenches

For purposes of this section of the report, bedding is defined as material placed in a trench up to 1-foot above a utility pipe and backfill is all material placed in the trench above the bedding. Unless concrete bedding is required around utility pipes, free-draining sand should be used as bedding. Sand proposed for use in bedding should be tested in our laboratory to verify its suitability and to measure its compaction characteristics. Sand bedding should have a pH between 6 and 8. Sand bedding should be compacted by mechanical means to achieve at least 95 percent relative compaction based on ASTM D1557.

Approved on-site, inorganic soil or imported material may be used as utility trench backfill. Proper compaction of trench backfill will be necessary under and adjacent to structural fill, building foundations, concrete slabs and vehicle pavements. In these areas, backfill should be moisture conditioned (or aerated to dry) to produce a soil-water content near the laboratory optimum moisture content. All backfill should be placed in horizontal layers not exceeding 6 inches in thickness (before compaction). Each layer should be compacted to a minimum relative compaction of 92 percent based on ASTM D1557. The upper 6 inches of pavement subgrade should be compacted to 95 percent relative compaction based on ASTM D1557.

Where any trench crosses the perimeter foundation line, the trench should be backfilled with compacted imported lean clay soil, lean concrete or control density fill (CDF) for a horizontal distance of at least 2 feet on either side of the foundation. The purpose of the clay backfill is to minimize the potential for water entry beneath the building.

5.6.7 Surface Drainage

Surface drainage gradients should be planned to prevent ponding and to promote drainage of surface water away from building foundations, slabs, edges of pavements and sidewalks, and towards suitable collection and discharge facilities.

Water seepage or the spread of extensive root systems into the soil subgrades of foundations, slabs, or pavements could cause differential movements and consequent distress in these structural elements. This potential risk should be given due consideration in the design and construction of landscaping.
6.1 TEMPORARY CONSTRUCTION EXCAVATIONS

Safety standards set by OSHA limit the height of unshored vertical excavations to 5 feet if construction personnel will be working in the excavations. The latest set of guidelines published by OSHA classifies soils in detail as Type A, B or C. In general, Type A soils are stronger, Type B soils are intermediate, and Type C soils are weaker. Based on the soil type, depth, duration the excavation is open, and sequence of soils exposed in excavations, OSHA recommends maximum allowable slopes. For example, for excavations in homogeneous soils 20 feet or less in depth, OSHA requires that maximum allowable slopes (horizontal to vertical) should be ¾ to 1 (horizontal to vertical), 1 to 1, and 1½ to 1 for Types A, B and C soils, respectively. Based on boring data from the current and previous studies, the soils at the site are predominantly granular and are considered to be OSHA Type C. If the maximum 1½:1 (H:V) temporary slope inclination cannot be accommodated due to the proximity to property lines, roadways, underground utilities or other restrictions, then temporary shoring such as use of soldier piles with wood lagging could be used to support vertical excavations.

Due to the cohesionless nature of the native soils, sloughing or raveling of temporary slopes should be expected. Equipment and stockpiles should not be located within 15 feet from the edge of excavations.

URS should be retained to review the conditions as they are exposed during construction and review plans and calculations for any required shoring. Additional recommendations could be provided at that time regarding the advisability of different temporary slope inclinations in particular areas.

6.2 CONSTRUCTION DEWATERING

It is unlikely that free groundwater will be encountered in excavations for the proposed construction. However, during the rainy season surface runoff water could collect in excavations. In that event, we anticipate that dewatering can be accomplished with standard sumping procedures.
The recommendations contained in this report are based on the information obtained from three exploratory borings, our review of existing data, and upon local experience and engineering judgment. The borings were approximately located relative to fence lines and adjacent roadways.

If any variations or undesirable soil conditions are encountered during construction, or if the proposed construction will differ from that proposed at the present time, URS should be notified so that supplementary recommendations, if necessary, can be provided. URS should review the foundation, grading plans and project specifications prior to construction. All earthwork, temporary shoring, grading, paving and foundation excavations also should be done under the direct observation of a URS representative.

No environmental or corrosion studies were performed by URS for this project.

The recommendations presented in this report were developed with the standard care commonly used in this profession. No other warranties are included, either express or implied, as to the professional advice included in this report.
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Figures
LEGEND:

B-1
Approximate Boring Location
(Terratech, 1998)

B1
Approximate Boring Location
(URS, 2013)

Samaritan Court
Samaritan Medical Center

SITE AND BORING LOCATION PLAN

URS
Samaritan Court Medical
Office Building and
Parking Structure
San Jose, California

RBB ARCHITECTS INC
3/15/13
JOB #114100
MAY 2013

NOT TO SCALE
Figure
2
Exterior Grade

24" (Impervious Soil Cap at Perimeter Wall)

Prefabricated Drainage Panels
(Miradrain 6000 or Equivalent)

or

Class 2 Permeable Material (12" wide)

Perforated Drain Pipe

Basement Wall

Interior Finished Floor

Job # 28645439
Logs of Explorations and Laboratory Test Results from Previous Study
# Key to Exploratory Boring Logs

## Soil Classification

<table>
<thead>
<tr>
<th>Primary Divisions</th>
<th>Group Symbol</th>
<th>Secondary Divisions</th>
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<tbody>
<tr>
<td><strong>Coarse Grained Soils</strong></td>
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<tr>
<td>Gravels More than half of coarse fraction is larger than No. 4 sieve</td>
<td>Clean Gravels (less than 5% fines)</td>
<td>GW: Well graded gravels, gravel-sand mixtures, little or no fines.</td>
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<td>Gravel with fines</td>
<td>GP: Poorly graded gravels, gravel-sand mixtures, little or no fines.</td>
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<tr>
<td>Sands More than half of coarse fraction is smaller than No. 4 Sieve</td>
<td>Clean Sands (less than 5% fines)</td>
<td>GM: Silty gravels, gravel-sand-silt mixtures, non-plastic fines.</td>
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<td>Sands with fines</td>
<td>GC: Clayey gravels, gravel-sand-clay mixtures, plastic fines.</td>
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<td><strong>Fine Grained Soils</strong></td>
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<tr>
<td>Silts and Clays Liquid Limit is less than 35 (“lean”)</td>
<td>ML: Inorganic silts, clayey silts, rock flour, very silty fine sands.</td>
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<td>CL: Inorganic clays of low plasticity, gravelly clays of low plasticity.</td>
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<td>OL: Organic silts and organic silty clays of low plasticity.</td>
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<tr>
<td>Silts and Clays Liquid Limit is between 35 and 50</td>
<td>MI: Inorganic silts, clayey silts and silty fine sands of intermediate plasticity.</td>
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<td>CI: Inorganic clays, gravelly clays, sandy clays and silty clays of intermediate plasticity.</td>
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<td>OI: Organic clays and silty clays of intermediate plasticity.</td>
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<tr>
<td>Silts and Clays Liquid Limit is greater than 50 (“fat”)</td>
<td>MH: Inorganic silts, clayey silts, elastic silts, micaeous or diatomaceous silty or fine sandy soils.</td>
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<td>CH: Inorganic clays of high plasticity.</td>
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<td>OH: Organic clays and silts of high plasticity.</td>
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### Highly Organic Soils

Pt: Peat, meadow mat, highly organic soils.

## Soil Consistency

<table>
<thead>
<tr>
<th>Sands and Gravels (non-cohesive)</th>
<th>Blows per Foot</th>
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<tbody>
<tr>
<td>Very Loose</td>
<td>0 - 4</td>
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<td>Loose</td>
<td>4 - 10</td>
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<tr>
<td>Medium Dense</td>
<td>10 - 30</td>
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<td>Dense</td>
<td>30 - 50</td>
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<tr>
<td>Very Dense</td>
<td>over 50</td>
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<thead>
<tr>
<th>Silts and Clays</th>
<th>Unconfined Shear Strength (PSF)</th>
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<tr>
<td>Very Soft</td>
<td>0 - 250</td>
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<td>Soft</td>
<td>250 - 500</td>
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<td>Firm</td>
<td>500 - 1000</td>
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<td>Stiff</td>
<td>1000 - 2000</td>
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<td>Very Stiff</td>
<td>2000 - 4000</td>
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<td>Hard</td>
<td>4000+</td>
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See "Notes" and "Symbols & Abbreviations" on following page.
KEY TO EXPLORATORY BORING LOGS (Continued)

NOTES

1. FINES - Material smaller than No. 200 sieve size.

2. BLOWS per FOOT - Resistance to the advancement of the soil sampler-number of blows of a 140 pound hammer falling 30 inches to drive a 2 inch O.D. (1¾ inch I.D.) split spoon sampler (ASTM D1586-84).

3. The stratification lines on the logs represent the approximate boundary between soil types, and the transition may be gradual.


6. Continuous Core - 3½ O.D. (3 inch I.D.) CME brand split spoon sampler (5 foot long); advances with augers.

SYMBOLS & ABBREVIATIONS

\[\downarrow\] Initial ground water level

\[\uparrow\] Final ground water level

ppm - Parts per million

/ - Soil sample collected

X - Sample retained for possible testing

I - Continuous core sample

S - Slough

N/R - No Recovery
<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>SOIL TYPE</th>
<th>DEPTH</th>
<th>SAMPLE</th>
<th>BLOWS PER FOOT</th>
<th>POCKET TEST (MP)</th>
<th>LIQUID LIMIT (%)</th>
<th>PLASTIC LIMIT (%)</th>
<th>DRY DENSITY (%)</th>
<th>FAILURE STRAIN (%)</th>
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<td>SILTY SAND WITH GRAVEL; brown slightly moist, medium dense; about 60 percent sand, 25 percent gravel and 15 percent silt and clay.</td>
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<td>SILTY GRAVEL WITH SAND; brown, slightly moist, dense; about 50 percent gravel, 35 percent sand and 15 percent fines.</td>
<td>GM</td>
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Bottom of Hole at 20 feet.
No Ground Water Encountered.
Project # 101250

TERRATECH, INC.
<table>
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<tr>
<th>DESCRIPTION</th>
<th>SOIL TYPE</th>
<th>DEPTH</th>
<th>SAMPLE</th>
<th>BLOWN PER FOOT</th>
<th>POCKET PEN (M)</th>
<th>TORKVANE (K)</th>
<th>LIQUID LIMIT (%)</th>
<th>WATER CONTENT (%)</th>
<th>PLASTIC LIMIT (%)</th>
<th>DRY DENSITY (SPG)</th>
<th>FAILURE STRAIN (%)</th>
<th>SURFACE</th>
<th>HOLE ELEVATION</th>
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<tbody>
<tr>
<td>SILTY SAND WITH GRAVEL; brown, slightly moist, medium dense; about 60 percent sand, 30 percent gravel and 20 percent silt and clay.</td>
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SILTY GRAVEL WITH SAND; brown, slightly moist, dense; about 50 percent gravel, 35 percent sand and 15 percent fines.
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<tr>
<th>DESCRIPTION</th>
<th>SOIL TYPE</th>
<th>DEPTH</th>
<th>BLASTS PER FOOT</th>
<th>POCKET PEN (IN)</th>
<th>TORVANE (A)</th>
<th>LIQUID LIMIT (%)</th>
<th>WATER CONTENT (%)</th>
<th>DRY DENSITY (g/cc)</th>
<th>FAILURE STRAIN (%)</th>
<th>UNCONSOLIDATED COMPRESSION (%)</th>
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<tbody>
<tr>
<td>SILTY GRAVEL WITH SAND; brown, slightly moist, dense; about 50 percent gravel, 35 percent sand and 15 percent fines.</td>
<td>GM</td>
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<td>Bottom of Boring at 38 Feet.</td>
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Project # 101250
<table>
<thead>
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<th>DESCRIPTION</th>
<th>SOIL TYPE</th>
<th>DEPTH</th>
<th>SAMPLE</th>
<th>BLOWS PER FOOT</th>
<th>POCKET POK (m)</th>
<th>TORKVTE (°p)</th>
<th>LIQUID LIMIT (%)</th>
<th>WATER CONTENT (%)</th>
<th>DRY DENSITY (ps)</th>
<th>PLASTIC LIMIT (%)</th>
<th>DRY DENSITY STRAIN (%)</th>
<th>FAILURE STRAIN (%)</th>
<th>UNDRAINED CgüHSTRENGTH (%)</th>
<th>UNDRAINED CgüHSTRENGTH (%)</th>
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<tbody>
<tr>
<td><strong>SILTY SAND WITH GRAVEL; brown slightly moist, medium dense; about 60 percent sand, 25 percent gravel and 15 percent silt and clay.</strong></td>
<td>SM</td>
<td>1</td>
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<tr>
<td><strong>SILTY GRAVEL WITH SAND; brown, slightly moist, dense; about 50 percent gravel, 35 percent sand and 15 percent fines.</strong></td>
<td>GM</td>
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**TERRATECH, INC.**

**GRAIN SIZE DISTRIBUTION**

**Project:** Samaritan Medical Center  
**Client:** Samaritan Medical Center  
**Source/Location:** B-3 at 15'  
**Material Description:** Silty SAND with Gravel, brown

<table>
<thead>
<tr>
<th>CLAY-TO-SILT</th>
<th>SAND</th>
<th>GRAVEL</th>
<th>COBBLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Passing</td>
<td></td>
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<tr>
<td>Grain Size (mm)</td>
<td>#200</td>
<td>#100</td>
<td>#50</td>
</tr>
</tbody>
</table>

**Date:** 4/15/98  
**Project #:** 101250  
**Lab #:** J11246  
**Date Tested:** 4/13/88

Reported By: Gary A. Bomberger, Lab Manager
R-VALUE REPORT
ASTM D2844, CTM 301

Project: SMC - Medical Office
Date: 3/24/98

Project #: 101250
Lab #: J11192

Sample #: Bulk
Sample Date: 3/13/98

Material Description: Brown Clayey GRAVEL with Sand
Sampled By: SAF

---

**Graph:**
- **R-VALUE** vs. **EXP. PRESS.**

---

**Table:**

<table>
<thead>
<tr>
<th>Specimen No.</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exudation Pressure, psi</td>
<td>103</td>
<td>159</td>
<td>422</td>
</tr>
<tr>
<td>Expansion Pressure, psf</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>R-Value</td>
<td>10</td>
<td>32</td>
<td>49</td>
</tr>
<tr>
<td>Moisture Content at Test, %</td>
<td>10.8</td>
<td>9.7</td>
<td>8.6</td>
</tr>
<tr>
<td>Dry Density at Test,pcf</td>
<td>129.9</td>
<td>130.4</td>
<td>133.2</td>
</tr>
</tbody>
</table>

**R-Value @ 300 psi Exudation Pressure =** 42

Expansion Pressure @ 300 psi Exudation, psf = 0

Minimum R-Value Requirement:

Comments:

---

Report By: Seppo Fuller
FIELD EXPLORATION PROGRAM

Exploratory Borings B1, B2 and B3 were drilled at the approximate locations shown on the Site and Boring Location Plan, Figure 2. The borings were drilled to a depth of about 44½ feet below the existing ground surface using a truck-mounted drill rig with an 8-inch hollow stem auger. The drilling was performed by Exploration Geoservices, Inc. of San Jose, California. At the completion of the exploratory borings, the holes were backfilled with cement grout in accordance with Santa Clara Valley Water District guidelines. The borings were drilled on March 29, 2013, under the observation of Mr. Charles Rambo of URS.

Samples of the soil encountered in the exploratory borings were collected with a modified California sampler (2-inch I.D., 2½-inch O.D.) and the Standard Penetration Test sampler (1⅜-inch I.D., 2-inch O.D.). The samplers were driven into the soil at the bottom of the borehole with a 140-lb hammer falling 30 inches. Typically, the sampler was driven 18 inches through soil, and the blow count was recorded for the final 12 inches. When very dense or hard materials were encountered and the blow count exceeds 50 blows per 6 inches, the driller indicated that refusal was met. The amount of penetration was then recorded along with the blow count.

After advancing the sampler to the desired depth, the sampler was withdrawn from the borehole. The exposed soil was examined and classified, and the brass liners containing the samples were sealed to preserve the natural moisture. The samples then were taken to our geotechnical laboratory in San Jose, California for further examination and testing.

Preliminary soil classifications were made in the field in accordance with the Unified Soil Classification System shown on Figure B-1, and were verified by further examination of the samples in the laboratory. Logs of the borings were prepared based on the field and laboratory test data and are presented as Figures B-3 through B-5. Figure B-2 presents a Boring Log Legend sheet.

LABORATORY TESTING

A laboratory testing program was performed on selected representative soil samples recovered during the field exploration. All the laboratory tests were performed by URS at our geotechnical laboratory in San Jose, California.

Moisture Content and Dry Unit Weight

Moisture content and dry unit weight determinations were made on samples of soil in the borings. These tests were conducted in accordance with ASTM D2116 and D2850. The results of the individual tests are presented on the boring logs, Figures B-3 through B-5, at the corresponding sample locations.

Plasticity Index

The Plasticity Index of the native soil was determined for one selected sample by performing Liquid Limit and Plastic Limit tests generally in accordance with ASTM test methods D423 and D424. The results are shown on the log of Boring B1.
**SAMPLE CLASSIFICATION CHART**

**UNIFIED SOIL CLASSIFICATION SCHEME**

<table>
<thead>
<tr>
<th>MAJOR DIVISIONS</th>
<th>SYMBOLS</th>
<th>TYPICAL NAMES</th>
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</thead>
<tbody>
<tr>
<td>GRAVELS</td>
<td>GW</td>
<td>Wall-graded gravels and gravel-sand mixtures, little or no fines</td>
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<tr>
<td></td>
<td>GP</td>
<td>Poorly graded gravel or gravel-sand mixtures, little or no fines</td>
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<tr>
<td></td>
<td>GM</td>
<td>Silty gravels, gravel-sand-silt mixtures</td>
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<tr>
<td></td>
<td>GC</td>
<td>Clayey gravels, gravel-sand-clay mixtures</td>
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<tr>
<td></td>
<td>SW</td>
<td>Well-graded sands or gravelly sands, little or no fines</td>
</tr>
<tr>
<td></td>
<td>SP</td>
<td>Poorly graded sands or gravelly sands, little or no fines</td>
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<tr>
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<td>SM</td>
<td>Silty sands, sand-silt mixtures</td>
</tr>
<tr>
<td></td>
<td>SC</td>
<td>Clayey sands, sand-clay mixtures</td>
</tr>
<tr>
<td>SAND</td>
<td>ML</td>
<td>Inorganic silts and very fine sands, rock flour, silty or clayey, fine sands or clayey silts with slight plasticity</td>
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<tr>
<td></td>
<td>CL</td>
<td>Inorganic clays of low to medium plasticity, gravelly silts, sandy clays, silty clays, lean clays</td>
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<td></td>
<td>OL</td>
<td>Organic silts and organic silty clays of low plasticity</td>
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<td></td>
<td>MH</td>
<td>Inorganic silts, micaeous or distomaceous fine sandy or silty soils, elastic silts</td>
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<td>CH</td>
<td>Inorganic clays of high plasticity, fat clays</td>
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<td>OH</td>
<td>Organic clays of medium to high plasticity, organic clays</td>
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<tr>
<td>HIGHLY ORGANIC SOILS</td>
<td>Pr</td>
<td>Peat and other highly organic soils</td>
</tr>
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</table>

**PLASTICITY CHART**

**GRAIN SIZE CLASSIFICATION**

<table>
<thead>
<tr>
<th>CLASSIFICATION</th>
<th>RANGE OF GRAIN SIZES</th>
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<tr>
<td></td>
<td>U.S. Standard Sieve Size</td>
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<tr>
<td>BOULDERS</td>
<td>Above 12&quot;</td>
</tr>
<tr>
<td>COBBLES</td>
<td>12&quot; to 3&quot;</td>
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<tr>
<td>GRAVEL</td>
<td>3&quot; to No. 4</td>
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<tr>
<td>coarse (c)</td>
<td>3/4&quot; to No. 4</td>
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<tr>
<td>fine (f)</td>
<td>No. 4 to No. 10</td>
</tr>
<tr>
<td>SAND</td>
<td>No. 4 to No. 200</td>
</tr>
<tr>
<td>coarse (c)</td>
<td>No. 4 to No. 10</td>
</tr>
<tr>
<td>medium (m)</td>
<td>No. 10 to No. 40</td>
</tr>
<tr>
<td>fine (f)</td>
<td>No. 40 to No. 200</td>
</tr>
<tr>
<td>SILT &amp; CLAY</td>
<td>Below No. 200</td>
</tr>
</tbody>
</table>

**MOISTURE CONTENT**

- **DRY**
  - No sign of water and soil dry to touch
- **MOIST**
  - Signs of water and soil definite dry to touch
- **WET**
  - Signs of water and soil definitely wet to touch; granular soil exhibits some fine water when densified

**SOIL CONSISTENCY/RELATIVE DENSITY**

<table>
<thead>
<tr>
<th>SILT, SAND</th>
<th>BLOWS/FT</th>
<th>SILT OR CLAY</th>
<th>UNCONFINED COMPRRESSIVE STRENGTH (psf)</th>
<th>THUMB PENETRATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>AND GRAVEL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very loose</td>
<td>&lt;4</td>
<td>Very Soft</td>
<td>&lt; 500</td>
<td>Very easily</td>
</tr>
<tr>
<td>Loose</td>
<td>5-10</td>
<td>Soft</td>
<td>500 - 1000</td>
<td>Easily</td>
</tr>
<tr>
<td>Medium Dense</td>
<td>11-30</td>
<td>Medium (firm)</td>
<td>1000 - 2000</td>
<td>Moderate</td>
</tr>
<tr>
<td>Dense</td>
<td>31-80</td>
<td>Stiff</td>
<td>2000 - 4000</td>
<td>Indented easily</td>
</tr>
<tr>
<td>Very Dense</td>
<td>&gt;80</td>
<td>Very Stiff</td>
<td>4000 - 8000</td>
<td>Indented by nail</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hard</td>
<td>&gt; 8000</td>
<td>Difficult by nail</td>
</tr>
</tbody>
</table>

**CLASSIFICATION MODIFIERS**

- **TRACE** 0 - 12%
- **SOME** 12 - 30%
- **± MODIFIERS**

*Figure B-1*
**Log of Boring**

**Project:** Medical Office Bldg and Parking Structure  
**Location:** Samaritan Court, San Jose

<table>
<thead>
<tr>
<th>Depth, Feet</th>
<th>Samples</th>
<th>Blows/Ft</th>
<th>Graphic Log</th>
<th>MATERIAL DESCRIPTION</th>
<th>Other Tests/Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>Arrow denotes bottom of fill layer</td>
<td>FILL</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td>2 inch inside diameter Modified California sample</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td>2 inch outside diameter Standard Split Spoon sample (Standard Penetration Test)</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>29</td>
<td></td>
<td>3 inch outside diameter Shelby tube sample</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td>Hydraulic Pressure required to push Shelby tube sampler</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td>Blow count with 140-lb hammer falling 30 inches for 12 inches of penetration</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td></td>
<td></td>
<td></td>
<td>Blow count with 140-lb hammer falling 30 inches for 5 inches of penetration</td>
<td></td>
</tr>
<tr>
<td>50/5&quot;</td>
<td></td>
<td></td>
<td></td>
<td>Groundwater level at time of drilling</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td></td>
<td></td>
<td></td>
<td>Groundwater at a time after drilling (as specified)</td>
<td></td>
</tr>
</tbody>
</table>

**KEY TO LABORATORY TESTS**

- PP = Pocket Penetrometer reading in tons per square foot (tsf)  
  - PP = 3.0tsf
- LL = Liquid Limit (%)  
  - LL = 42
- PI = Plasticity Index (%)  
  - PI = 21
- #4 = Percentage of material retained on #4 sieve  
  - #4 = 13%
- #200 = Percentage of material passing #200 sieve  
  - #200 = 10%
#### LOG OF BORING B1

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>SOIL DESCRIPTION</th>
<th>MATERIAL DESCRIPTION</th>
<th>ELEVATION</th>
<th>FIELD TESTS</th>
<th>SAMPLES</th>
<th>INDEX PROPERTIES</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.7</td>
<td>Silty GRAVEL (GM)</td>
<td>Medium dense, moist, brown</td>
<td>1</td>
<td>12 11 118</td>
<td></td>
<td></td>
<td>LL=21 Pl=3</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td>2</td>
<td>23</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>Very dense, moist, brown and grayish brown</td>
<td>3</td>
<td>50/6 13 111</td>
<td></td>
<td></td>
<td>Harder drilling</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>Light brown</td>
<td>4</td>
<td>53</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>Brown to grayish brown</td>
<td>6</td>
<td>50/6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BORING LOCATION:** Samaritan Court, San Jose, CA  
**GROUND SURFACE ELEVATION (ft):** N/A  
**TOP OF WELL CASING ELEVATION (ft):** N/A  
**DATE STARTED:** 3/29/13  
**DATE FINISHED:** 3/29/13  
**COMPLETION DATE:** N/A  
**DEPTH (ft):** BORING: 44.5  
**WELL: N/A**  
**HAMMER/DROP:** 140lb/30in  
**NUMBER OF SAMPLES:** DIST: UNDIST:  
**TYPE OF PERFORATION:** N/A  
**FROM:** N/A  
**TO:** N/A  
**WATER LEVEL:** N/A  
**24 hr:** N/A  
**LOGGED BY:** C.Rambo  
**CHECKED BY:** L.A.Moore  
**PROJECT NO.: 28645439**  
**Figure: B-3**
Medical Office Bldg and Parking Structure
Samaritan Court, San Jose

LOG OF BORING B1
Continued- Sheet 2 of 2

<table>
<thead>
<tr>
<th>DEPTH (feet)</th>
<th>SOIL GRAPHIC</th>
<th>MATERIAL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>Lean CLAY (CL) Medium, very moist, brown Silty GRAVEL (GM) with sand Very dense, moist, brown and grayish brown Reddish brown</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td></td>
<td>BOTTOM OF BORING AT 44-1/2 FEET Boring dry ATD</td>
</tr>
</tbody>
</table>

PROJECT NO. 28645439
Figure: B-3
**Medical Office Bldg and Parking Structure; Samaritan Court, San Jose**

**BOURING LOCATION:** Samaritan Court, San Jose, CA

**GROUND SURFACE ELEVATION (ft):** N/A

**DATE STARTED:** 3/29/13

**DATE FINISHED:** 3/29/13

**COMPLETION:** BORING: 44.5 (ft)

**DEPTH:** WELL: N/A (ft)

**HACKER/ DROP:** 140lb/30in

**NUMBER OF SAMPLES:** N/A

**WATER DEPTH (ft):** FIRST: N/A

**COMP.: N/A**

**24 hr.: N/A**

**Logged by:** C. Rambo

**CHECKED BY:** L.A. Moore

<table>
<thead>
<tr>
<th>TYPE OF SEAL</th>
<th>TYPE</th>
<th>FROM</th>
<th>TO</th>
<th>TYPE</th>
<th>FROM</th>
<th>TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 1: Cement</td>
<td>0</td>
<td>44.5'</td>
<td>No. 3: N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>No. 2: N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>No. 4: N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**LOG OF BORING B2**

**MATERIAL DESCRIPTION**

- Gravelly Silt (ML) with sand:
  - Very stiff, moist, dark brown
  - Depth: 5 feet

- Silty Gravel (GM) with sand:
  - Dense, moist, brown and grayish brown, gravel to 2 inches
  - Depth: 10 to 15 feet

- Very dense
  - Depth: 15 to 20 feet

**FIELD TESTS**

- ELEVATION
- POCKET PEN
- POCKET TV
- STRAIN AT FAILURE
- MOISTURE CONTENT
- DENSITY

**SAMPLES**

- Number
- Recovery
- Blows
- Unconfined Compressive Strength

<table>
<thead>
<tr>
<th>ELEVATION</th>
<th>POCKET PEN</th>
<th>POCKET TV</th>
<th>STRAIN AT FAILURE</th>
<th>MOISTURE CONTENT</th>
<th>DENSITY</th>
<th>UNCONFINED COMPR. STRENGTH</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>10</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>10</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PROJECT NO. 28645439**

Figure: B-4
Medical Office Bldg and Parking Structure; Samaritan Court, San Jose

BORING LOCATION: Samaritan Court, San Jose, CA
GROUND SURFACE ELEVATION (ft): N/A
TOP OF WELL CASING ELEVATION (ft): N/A
DATE STARTED: 3/29/13
DATE FINISHED: 3/29/13
COMPLETION BORING: 44.5 ft
DEPTHS WELL: N/A (ft)
DRILLING AGENCY: Exploration Geoservices, Inc.
DRILLER: John Collins
DRILLING EQUIPMENT: Mobile B40
DRILLING METHOD: Hollow Stem Auger
DRILL BIT: 8-inch
HAMMER/DROP: 140lb/30in
SIZE AND TYPE OF CASING: N/A
NUMBER OF SAMPLES: DIST: UNDIST;
TYPE OF PERFORATION: N/A
FROM N/A TO N/A
WATER DEPTH (ft): FIRST: N/A COMPL.: N/A 24 hr.: N/A
SIZE AND TYPE OF PACK: N/A
FROM N/A TO N/A
LOGGED BY: C.Rambo
CHECKED BY: L.A.Moore

TYPE OF SEAL
No. 1: Cement
No. 2: N/A

LOG OF BORING B3
(Sheet 1 of 2)

DEPT (ft)

SOIL GRAPHIC

MATERIAL DESCRIPTION

Silty GRAVEL to Gravely SILT (GM/ML)
Medium dense and very stiff, moist, brown to dark brown

4.0

FIELD TESTS

ELEVATION (ft)

SOCKET PEN (psi)

POCKET TV (in)

STRAIN AT PULL (psi)

PULL LEVEL

DEPTH (ft)

NUMBER RECOVERY (%)

BLOWES

MOISTURE CONTENT (%)

DENSITY (pcf)

UNCONSOLIDATED SAMPLES:

NOTES

Very dense

5

Silty GRAVEL (GM)
Dense, moist, brown and grayish brown

3

2

15

S

9

No recovery

Very dense

10

15

20

50/8

120

75

50/8

8

40

35

8

15

9

4
## LOG OF BORING B3

### Medical Office Bldg and Parking Structure
Samaritan Court, San Jose

<table>
<thead>
<tr>
<th>DEPTH (feet)</th>
<th>MATERIAL DESCRIPTION</th>
<th>ELEVATION (ft)</th>
<th>FIELD TESTS</th>
<th>SAMPLES</th>
<th>INDEX PROPERTIES</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>BOTTOM OF BORING AT 44-1/2 FEET</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>55</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Boring dry ADT

**PROJECT NO. 28645439**

Figure: B-5
The following section incorporates geotechnical input in general conformance with CSI format. The Architect, Structural Engineer and Civil Engineer should thoroughly review the section to confirm its applicability to the proposed medical office building and parking structure and make the necessary revisions.
SECTION 31 00 00

EARTHWORK

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 1 - Specification sections, apply to work of this section

1.02 SUMMARY

A. Section Includes:
   1. Earthwork as shown on the drawings for the following:
      a. General site grading, cut, fill and finish.
      b. Excavation and backfill for structure construction.
      c. Preparation of subgrade for concrete flatwork, ramps and pavements.
      d. Distribution of stockpiled topsoil.
      e. Structural fills for foundation support.
      f. Utility line trenching and backfilling within building lines.
   2. Related Sections
      a. Subsurface Information: Section ____
      b. Site Clearing: Section _____
      c. Demolition, Removals and Abandonment: Section _____
      d. Trenching and Backfilling for Utilities: Section _____
      e. Shoring and Underpinning: Section _____
      f. Sedimentation Control: Section _____
      g. Asphalt Concrete Paving: Section _____
      h. Concrete: Division 03 sections

1.03 SUBMITTALS

A. Test Reports-Excavating, Filling and Grading
B. The following tests and observations will be performed by the Owner's Geotechnical Engineer, with copies to the Contractor:
   1. Field density reports for fills and backfills.
   2. Testing reports on borrow material, including mechanical analysis, moisture-density curve and plasticity index.
   3. One optimum moisture-maximum density curve for each type of soil encountered.
   4. Verification of each footing subgrade.
C. Calculations and Shop Drawings: Contractor shall submit all design calculations and shop drawings for any excavation stabilization methods proposed to be used at the site. This includes, but is not limited to, any shoring, bracing, or
underpinning. The calculations shall be prepared and signed by a Civil Engineer registered in the State of California.

1.04 QUALITY ASSURANCE

A. Codes and Standards: Perform excavation work in compliance with applicable requirements of authorities having jurisdiction.

B. Geotechnical Services: The Geotechnical Engineer will be the Owner's Representative to observe the grading operations both during preparation of the site and the compaction of engineered fill. Visits to the site will be made to become generally familiar with the progress and quality of the work. Field observations and tests will be made to enable the Geotechnical Engineer to form an opinion regarding the adequacy of the site preparation, the acceptability of fill materials and the extent to which the earthwork construction and the relative compaction comply with the specification requirements. The Geotechnical Engineer also will observe all footing construction to confirm the design intent is met.

1.05 PROJECT/SITE CONDITIONS

A. Site Information: Soil Investigation and test reports are available for examination as set forth in Section _____.

B. Additional soil borings and other exploratory operations may be made by the Contractor at no cost to the Owner.

C. Existing Utilities: Locate existing underground utilities in the areas of work as specified in Section _____. If utilities are to remain in place, provide adequate means of protection during earthwork operations.

D. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult the utility owner immediately for directions. Cooperate with Owner and utility companies in keeping utilities in operation. Repair damaged utilities to satisfaction of utility owner.

E. Do not interrupt existing utilities serving facilities occupied and used by Owner or others, except when permitted in writing by Architect and then only after acceptable temporary utility services have been provided.

F. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shut-off of services if lines are active.

G. Use of Explosives: The use of explosives is not permitted.

H. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights. Operate warning lights as recommended by authorities having jurisdiction.

I. Protect structures, utilities, sidewalks, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.
J. Cleaning: Maintain adjacent streets free of dirt accumulation arising out of work of this section. Use suitable means to clean equipment, streets or both and to meet requirements of authorities having jurisdiction.

1.06 DEFINITIONS

A. Excavation: Consists of removal of material encountered to subgrade elevations indicated and subsequent disposal or approved reuse of materials removed.
B. Engineered Fill: Fill, as approved by the Geotechnical Engineer, which has been placed and compacted in accordance with the requirements presented in these specifications.
C. Unauthorized Excavation: Consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Owner’s Representative. Unauthorized excavation, as well as remedial work directed by Architect, shall be at Contractor's expense.
D. Subgrade: Undisturbed earth or the compacted soil layer immediately below granular subbase, drainage fill, or topsoil materials.
E. Structure: Buildings, foundations, slabs, tanks, curbs, or other manmade stationary features occurring above or below ground surface.
F. Structural Fill: Material, as approved by the Geotechnical Engineer, placed and compacted around structures in accordance with the requirements presented in these specifications.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

A. Soil materials, whether from sources on or off site must be approved by the Geotechnical Engineer as suitable for intended use and specifically for required location or purpose.
B. General Fill: General fill material shall be a soil or soil-rock mixture free of organic matter or other deleterious substances. The fill material shall not contain rocks or lumps over 6 inches in maximum dimension and not more than 15% larger than 2½ inches. Materials from the site, if free of organic matter, rubble or other deleterious substances, are suitable for use in general fills.
C. Select Material or Structural Fill: In addition to the above requirements for general fill, select material shall be a low plasticity, non-expansive soil or soil-rock mixture having a Plasticity Index not greater than 15.
D. Imported Material: All imported material shall be of select quality. All imported material, including pipe bedding, shall have a pH between 6 and 8. The Contractor shall give at least 4 days notice prior to bringing imported material to the site to enable the Geotechnical Engineer to sample and test the material.
E. Impervious Backfill: Backfill consisting of imported cohesive soil as approved by the Geotechnical Engineer.
F. Aggregate Base: Aggregate base for use beneath pavements, steps and walks shall conform to the requirements of Class 2 aggregate base, ¾ inch maximum size as defined in Section 26 of the Caltrans Standard Specifications.

G. Unclassified Backfill: Satisfactory off-site soil materials or on-site materials acceptable to Geotechnical Engineer, free of rock or gravel larger than 2 inches in any dimension, debris, waste, vegetable and other deleterious matter.

H. Class 2 Permeable Material: Class 2 Permeable Material Type A, (maximum size 1 inch) as defined in Section 68-1.025 of the Caltrans Standard Specifications.

I. Filter Fabric: Type 140N by TC Mirafi, or approved equal.

J. Stabilization Fabric: Type 600X by TC Mirafi, or approved equal.

K. Bridging Material:
   1. Bridging material for use in stabilizing soft subgrade soil conditions shall consist of a reasonably well graded mixture of angular gravel and cobble size rock fragments conforming to the following gradation:

<table>
<thead>
<tr>
<th>Sieve Size (inches)</th>
<th>Percentage Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>0-50</td>
</tr>
<tr>
<td>¾</td>
<td>0-10</td>
</tr>
</tbody>
</table>

2. In addition to the gradation requirements presented above, Bridging Material shall have a minimum Durability Index of 40.

2.02 OTHER MATERIALS

A. Prefabricated Drainage Panels: Prefabricated synthetic multi-layer drainage material such as TC Miradrain 6000 or equivalent, as acceptable to the Geotechnical Engineer.

B. Controlled Density Fill: CDF shall consist of furnishing, transporting, and placing CDF at the locations shown on the Drawings, as specified in these Specifications and as directed by the Geotechnical Engineer.

1. CDF shall be a mixture of portland cement, fly ash, aggregates, water and admixtures proportioned to provide a non-segregating, self-consolidating, free-flowing and excavatable material that will result in a hardened, dense, non-settling fill.

2. CDF shall conform to the following requirements:
   a. Portland Cement: ASTM C150, Types I or II.
   b. Aggregate: Sand with or without fine gravel, maximum size 1-inch. Aggregate shall be free of foreign material or organic matter and shall have less than 10 percent finer than the No. 200 sieve.
   c. Water: Potable
   d. Fly Ash: Class F ASTM C618, unless otherwise approved by the Geotechnical Engineer.

3. CDF shall be proportioned to be a flowable, low-shrink slurry with an unconfined compressive strength of 100 psi (+50 psi, -20 psi) at 28 days. The maximum density shall be 130 pcf.
4. The Contractor and its supplier shall determine the materials and proportions used to meet the requirements of the Specifications. The Contractor shall make daily checks of the aggregate gradation and adjust the mix design as required to meet these Specifications. The CDF mix shall be modified as necessary to meet the flowability, pumpability and set time requirements for each individual pour.

5. At least 7 days before placing the CDF, the Contractor shall submit to the Geotechnical Engineer a mix design for the CDF to be used. No CDF shall be placed until the Geotechnical Engineer has approved the mix design. The Geotechnical Engineer’s approval of the mix design shall be understood to indicate conditional acceptance. Final acceptance will be based on tests conducted on field samples and conformance with these Specifications.

PART 3 - EXECUTION

3.01 SITE PREPARATION

A. Utility pipelines, conduits, manholes, catch basins, or other deleterious materials such as debris, asphalt, concrete, foundation remnants, underground tanks, trees, shrubs, organic laden topsoil and any other improvements designated for removal shall be removed in their entirety.

B. In general, topsoil shall be removed where structures are to be built, trenches dug, and roads constructed within areas presently covered with topsoil. Prior to beginning any excavation or fill placement, remove topsoil to a depth as indicated on the Drawings and stockpile for future use. Topsoil shall be stored clear of the construction area. Take reasonable care to prevent topsoil from becoming mixed with subsoil.

C. Abandoned utility pipelines may be left in place within 15 feet outside and beneath the building pad limits with Owner’s written prior approval and if completely backfilled with concrete or cement grout and appropriately plugged to prevent settlement or undermining of the structures and adjacent improvements.

D. Soft or weak areas within existing grades to receive fill shall be over-excavated to a depth acceptable to the Geotechnical Engineer during grading.

E. Obtain the Geotechnical Engineer’s acceptance of subgrade preparation before any fill is placed.

3.02 EXCAVATION

A. Excavation Classifications: All excavation is to be considered as "unclassified".

B. Unauthorized Excavation: Backfill and compact unauthorized excavations as specified for authorized excavation of same classification, unless otherwise stated by Owner’s Representative.

C. Under footings, foundation bases, and retaining walls, fill unauthorized excavation by extending the indicated bottom elevation of the footing or base to the excavation bottom, without altering required top elevation. CDF or lean Excavation...
concrete fill may be used to bring elevations to proper grades, when acceptable to
the Geotechnical Engineer.

D. Additional Excavation: When excavation has reached required subgrade
elevations, notify the Geotechnical Engineer to observe the conditions.

E. If unsuitable bearing materials are encountered at the required subgrade
elevations, carry excavations deeper and replace the excavated material as
directed by the Geotechnical Engineer.

F. Stability of Excavations: Slope sides of excavations to comply with local codes
and ordinances having jurisdiction. Shore and brace where sloping is not possible
because of space restrictions or stability of material excavated.

G. Maintain sides and slopes of excavations in a safe condition until completion of
backfilling. All shoring, stabilization and erosion protection, if required, shall be
provided by the Contractor.

H. Shoring, Bracing and Underpinning: The Contractor shall furnish, put in place
and maintain such shoring, bracing, underpinning, etc., as may be necessary to
support the sides of the excavation and to prevent any movement of earth which
could in any way diminish the width of the excavation to less than necessary for
proper construction, or could otherwise injure or delay the work, or endanger the
integrity of adjacent utilities, structures or slopes.

I. Dewatering: Prevent surface water and subsurface or groundwater from flowing
into excavations and from flooding project site and surrounding areas.

1. Do not allow water to accumulate in excavations. Remove water to
prevent softening of foundation bottoms, and soil changes detrimental to
stability of subgrades and foundations.

2. Provide and maintain pumps, well points, sumps, suction and discharge
lines, and other dewatering system components necessary to convey water
away from excavations.

3. Convey water removed from excavations and rain water to collecting or
run-off areas. Establish and maintain temporary drainage ditches and
other diversions outside excavation limits for each structure.

4. Do not use foundation trench excavations as temporary drainage ditches.

5. Excavated Material Storage: Stockpile satisfactory excavated materials
where directed, until required for backfill or fill.

J. Place, grade and shape stockpiles for proper drainage.

K. Locate and retain soil materials away from edge of excavations.

3.03 EXCAVATION FOR STRUCTURES

A. Conform to elevations and dimensions shown within a tolerance of ±0.10 foot;
the final lateral extent of excavation for engineered fill construction, and CDF or
lean concrete placement shall be approved by the Geotechnical Engineer.

B. Foundations: In excavating for footings and foundations, take care not to disturb
bottom of excavation. The last 2 feet of excavation shall be made by equipment
supported above the final subgrade level. Excavate by hand to final grade just
before concrete reinforcement is placed. Remove all loose materials at final
subgrade. Trim bottoms to required lines and grades to leave solid base to receive concrete.

C. Replacement Zone: Remove existing man-made fill materials from all areas of the building to a point at least 5 feet beyond the building line.

D. Fill material may be cleaned to remove trash, debris, organic materials and rocks over 3 inches in any dimension and used for backfill or disposed of off-site at Contractor's option.

E. Conform to elevations and dimensions indicated within a tolerance of ±0.10 foot, plus a sufficient distance to permit placing and removal of concrete formwork, installation of services, and other construction and for inspection. Do not disturb bottom of excavations intended for bearing surface.

F. Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations and grades as shown.

G. Leave subgrades at elevations required for subgrade preparation, base courses and paving shown on drawings.

3.04 EXCAVATION FOR TRENCHES (UTILITIES WITHIN BUILDING LINES)

A. Excavate trenches to uniform width, sufficiently wide to provide ample working room but not less than 9 inches on either side of pipe or conduit.

B. Excavate trenches to the depth indicated or required. Place bedding and piping to establish the indicated flow lines and invert elevations. Beyond the building perimeter, keep bottoms of trenches sufficiently below finish grade to avoid freeze-ups.

3.05 BACKFILL AND FILL

A. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface and scarify prior to placement of fills. Plow, strip, or break-up to 6 inches depth sloped surfaces to receive more than 6 feet of fill if steeper than 1 vertical to 5 horizontal so that fill material will bond with existing surface and step or bench the slope as required.

1. When existing ground surface has a relative compaction less than that specified under "Compaction" for the particular area classification, scarify, pulverize, moisture-condition to the optimum moisture content, and compact to required depth and percentage of maximum dry density.

B. Placement and Backfill: Place acceptable soil material in layers to required subgrade elevations for each classification listed below, using specified materials:

1. In over-excavation and replacement zone beneath foundations, use satisfactory select quality onsite material or imported borrow.

2. In areas not subject to structural loads, provide unclassified backfill around structures beyond 5 feet from foundation wall and for embankments and landscape areas with top 6 inches being topsoil stockpiled on site.

3. For foundation wall backfill, use select quality granular fill within 5 feet from wall.
4. Under walks, steps and pavements, use aggregate base material, for upper 4 inches to 8 inches and select quality backfill or imported borrow material where additional fill is required.

5. Backfill trenches with CDF where trench excavations pass within 18 inches of column or wall footing and which are carried below bottom of such footing. Place concrete to level of bottom of adjacent spread footing.

C. Do not backfill trenches until tests and inspections have been made and backfilling authorized by Owner’s Representative. Use care in backfilling to avoid damage or displacement of pipe systems.

D. No jetting or pumping of backfill material is permitted.

E. Provide a 4-inch thick concrete base slab support for piping or conduit less than 2 feet - 6 inches below surface of roadways. After installation and testing of piping or conduit, provide minimum 4-inch thick encasement (sides and top) on concrete prior to backfilling or placement of roadway subbase.

F. Backfill excavations as promptly as work permits, but not until completion of the following:
   1. Acceptance of construction below finish grade including, where applicable, damp proofing, waterproofing, perimeter insulation, and first floor slabs unless foundations are braced to prevent damage and movement.
   2. Inspection, testing, approval, and recording locations of underground utilities.

G. Place backfill and fill materials in layers not more than 8 inches in loose thickness for material compacted by heavy compaction equipment, and not more than 4 inches in loose thickness for material compacted by hand-operated tampers.

H. Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content. Compact each layer to required percentage of maximum dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy.

I. Place backfill and fill materials evenly adjacent to structures, to required elevations. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around structure to approximately same elevation in each lift.

J. CDF Placement: CDF batching, mixing and placing shall be a continuous operation as is practicable and may be started if weather conditions are favorable, when the air temperature is 38°F and rising. At the time of placement, CDF must have a temperature of at least 40°F. Mixing and placing shall stop when the air temperature drops below 38°F.
   1. Excavations to be filled with CDF shall be contained at either end of the excavation by bulkheads. CDF shall be discharged from a mixer by any means acceptable to the Geotechnical Engineer into the area to be filled. CDF shall be brought up uniformly on all sides of pipes or structures to the elevations indicated.
   2. The Contractor shall completely backfill the space between excavation side slopes or shoring and the structure or piping.
3.06 COMPACTION

A. Control fill compaction during construction, providing minimum percentage of dry density specified for each area classification. Correct improperly compacted areas or lifts as directed by the Geotechnical Engineer if soil density tests indicate inadequate compaction.

B. Relative Compaction Requirements: Compact soil to not less than the following percentage of maximum dry density determined in accordance with ASTM D1557:

1. Structural Fills: Compact top 6 inches of subgrade and each layer of backfill or fill material to 95% of maximum dry density.
2. Below grade Wall Backfill: Compact each layer of backfill material to 95% of maximum dry density.
3. Exterior Slabs, Steps, Walkways, Pavements: Compact top 6 inches of subgrade and each layer of backfill and aggregate base material to 95% of maximum dry density.
4. Unpaved Areas: Compact top 6 inches of subgrade and each layer of backfill or fill material to 92% of maximum dry density.

C. Moisture Control: Where subgrade or layer or soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer or soil material, to prevent free water appearing on surface during or subsequent to compaction operations. Remove and replace, or scarify and air dry soil material that is too wet to permit compaction to specified density.

D. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by disking, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

3.07 GRADING

A. Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between such points and existing grades.

B. Round top and bottom of slopes and feather into undisturbed natural terrain. Avoid abrupt grade changes making smooth transitions from slopes to more level areas.

C. Site Drainage: The site shall, at all times, be graded (and ditched, as necessary) to provide positive surface runoff. Water shall not be allowed to pond or collect within the construction limits or staging area. Any soil which becomes wet or saturated more than 2 percent above optimum moisture content shall be removed and replaced with compacted structural fill. The above requirements may be modified with Owner’s written approval.

D. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes, and within 0.10 foot of required subgrade or finish grade elevations. Make minor modifications as necessary to provide adequate drainage.
E. Spread stockpiled topsoil and compact to minimum 6 inches depth at all areas not designated for walks, paving or structures.

F. Grading Surface or Fill under Concrete Flatwork: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 0.5 inch when tested with a 10 foot straightedge.

G. Compaction: After grading, compact subgrade surfaces to the depth and stated requirements for each area of classification.

3.08 FIELD QUALITY CONTROL

A. The Geotechnical Engineer will:
   1. Sample and test fill material from sources designated by Contractor.
   2. Observe and report on site preparation, excavation, placement and compaction of fill, backfill, controlled density fill or lean concrete. Such observations will include all tests deemed necessary to ascertain if the work is in compliance with specifications.
   3. Approve methods of compaction.
   4. Issue final report to Owner on grading, excavation and compaction work.

B. The Contractor shall:
   1. Grade, excavate and place backfill on the site in conformance with these specifications.
   2. Furnish access to site and facilities for observations and testing.
   3. Furnish and install shoring or bracing, as required by local codes and ordinances, to provide safe access to areas for Geotechnical Engineer.
   4. Notify the Geotechnical Engineer at least 48 hours prior to any fill or backfill operations.
   5. Pay costs for additional compaction, observations and tests due to non-compliance with Contract Documents based on reports of geotechnical testing and observations.

3.09 EROSION CONTROL

A. Provide erosion control methods in accordance with requirements of authorities having jurisdiction.

B. In addition, the following measures shall be implemented during all phases of construction to minimize short-term air quality impacts:
   1. All active construction areas shall be watered twice daily, or more often if necessary, to keep these areas free of dirt and debris. Increased watering frequency shall be required whenever wind speeds exceed 15 miles-per-hour.
   2. Stockpiles of debris, soil, sand, and any other materials that can be windblown shall be covered. Trucks transporting these materials shall be covered.
   3. The site shall be damp swept daily, or more often as necessary, to keep all paved construction areas and adjacent streets free of dust and debris.
4. Subsequent to clearing, grading, or excavating, exposed portions of the site shall be watered, landscaped, treated with soil stabilizers, or covered as soon as possible within 72 hours of exposure.

5. Traffic speeds shall not exceed 15 miles-per-hour on unpaved roads.

6. Sandbags or other erosion control measures shall be installed to prevent silt runoff to public roadways.

7. Vegetation in disturbed areas shall be replanted within 30 days after the completion of construction.

8. Provide erosion control methods in accordance with requirements of authorities having jurisdiction.

9. Temporary sediment and siltation facilities shall be provided by the Contractor as needed to prevent on-site silting into excavations and silting downstream of the project site.

3.10 MAINTENANCE

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

B. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerance.

C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.

D. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.11 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Remove excess excavated materials, trash, debris and waste materials and dispose of it off the Owner's property.

END OF SECTION 31 00 00