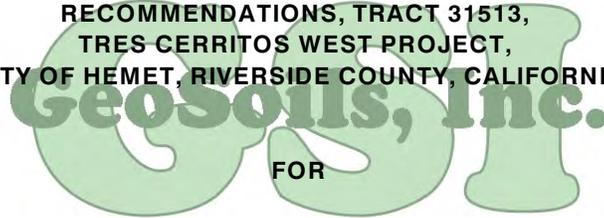


**AS-GRADED, INTERIM COMPACTION REPORT  
OF GRADING AND REMEDIAL EARTHWORK  
RECOMMENDATIONS, TRACT 31513,  
TRES CERRITOS WEST PROJECT,  
CITY OF HEMET, RIVERSIDE COUNTY, CALIFORNIA**



**FOR**

**JMP BIXBY HEMET, LLC  
3890 11<sup>TH</sup> STREET  
RIVERSIDE, CALIFORNIA 92501**

**W.O. 7676-B-SC**

**MARCH 5, 2021**



**Geotechnical • Geologic • Coastal • Environmental**

26590 Madison Avenue • Murrieta, California 92562 • (951) 677-9651 • FAX (951) 677-9301 • [www.geosoilsinc.com](http://www.geosoilsinc.com)

March 5, 2021

W.O. 7676-B-SC

**JMP Bixby Hemet, LLC**  
3890 11<sup>th</sup> Street  
Riverside, California 92408

Attention: Mr. Jon Myhre

Subject: As-Graded, Interim Compaction Report of Grading and Remedial Earthwork Recommendations, Tract 31513, Tres Cerritos West Project, City of Hemet, Riverside County, California

Dear Mr. Myhre:

In accordance with your request, GeoSoils, Inc. (GSI) is providing this compaction report of grading for the subject lots (177 lots) within Tract 31513 (Tres Cerritos West Project) in the City of Hemet, Riverside County, California. Based on the previous observations and testing performed by GSI, it is our opinion that the subject building pads and associated streets, in varying degrees of completion, appear suitable for their intended residential use. As previously recommended by GSI (2006), continued grading should conform to GSI recommendations, including rockfall mitigation along the rear of lots 66 to 73, 132 to 145, 147 to 166, and 170 to 177, with debris/impact walls, gabion baskets, catchment/deflection devices, and/or rockfall netting. Also, it is our understanding that the existing water tank water line is to be relocated during grading at the upper portion of the project. Unless specifically superseded by recommendations presented herein, the recommendations and conclusions contained in the referenced geotechnical reports (see Appendix A) remain pertinent and applicable, and should be appropriately implemented during remaining planning, design, and construction. During grading, line and grade was the responsibility of others, and not GSI.

### **BACKGROUND AND SUMMARY OF GRADING**

Grading within the subject portions of the project, under the purview of this report, began in early November 2005, and continued until mid November 2006 when funding from the previous owner was exhausted during the housing downturn, and project development production was terminated. The project is currently unfinished with a portion of the lots “at design grade” and a majority of lots “not at design grade.” Some lots were not graded at all during the 2005 to 2006 grading duration. According to our compaction test tables and mapping data, it appears that Lots, 22, 23 (partial), 66 through 73, 132 through 145, 159

through 163, Lot E, M, N, Q and upper streets did not have removals performed during previous grading (2005-2006). The site has remained fallow since 2006. In addition, just prior to grading on the site (2005) and during grading (2006), a soil borrow area was mined for soil to be placed on the adjacent development (Tract 31146) to the west. The borrow area was in the central, lower portion of the subject site (see Plate 1 for details) and from mapping data, appears to have been mined again during grading in the 2005-2006 time period. Removal bottoms were re-established on Lots 31 through 34, 56 through 58, and 74 through 77 at slightly higher cleanout elevations than previously established. Unfortunately, during grading of the subject tract, the central portion of the borrow area was not re-graded and portions of the excavation area remain to date. Generally, Lots 74 through 116, and Lot A are within the borrow area and no corrective grading appears to have occurred since the mining took place. Lots 1 through 21, 24 through 46, and 167 through 177 are currently assumed to be at “finish grade” since “finish grade” tests were taken and subject lots appear to be finished pads on Google Earth Imagery (2021). The remaining lots within the 177 lot subdivision, not listed above, will need initial grading or additional grading to bring them to “design grade.” The subject lots are divided into three (3) categories of development: Finished Lots (to grade), Grading Initiated on Lots (not to grade), and Not graded Lots (no removal depths surveyed). The table below summarizes the category of grading completed to date:

LOT GRADING CATEGORY	LOTS	MITIGATION REQUIRED
Finished Lots (to grade)	1-21, 24-46, and 167-177	Recommendations for Existing Surficial Soils
Grading Initiated on Lots (not to grade)	47-65, 74-106-131, 146-158, and 164-166	Recommendations for Existing Surficial Soils and then General Earthwork Construction Recommendations
Not Graded Lots (no removals)	22, 23 (partial), 66-73, 132-145, 159-163, and Lots E, M, N, Q	General Earthwork Construction Recommendations

### LOT DEVELOPMENT

The finished and un-finished lots have been sitting fallow for 15 years and will require upper soil mitigation before certifying lots at grade or additional grading can be resumed. Fluctuations in temperature and moisture cause the surface soils to become weathered and dried out below optimum soil moisture levels. The process to restore the lots to buildable pads will involve minor grading and moisture conditioning. When the finished lots have been restored, GSI will provide compaction testing to ensure the lots meet minimum standards of compaction (i.e. relative compaction of 90%) and soil moisture at optimum levels. The details and recommendations for the upper soil mitigation and grading across the project is detailed in the report sections: Earthwork Construction Recommendations for Existing Surficial Soils and General Earthwork Construction

Recommendations.

### **ENGINEERING GEOLOGY**

The geologic conditions exposed during the process of rough grading were observed on a full-time basis during rough grading operations. Observations during the process of rough grading included removals of potentially compressible surficial soils to dense old alluvial fan deposits and/or Cretaceous-age granitic bedrock of quartz monzonite to quartz diorite composition, as well as fill, and the general grading procedures of the contractor, in general accordance with the referenced reports by Engen Corporation (2003) and GSI (2006). The earth materials encountered during grading included undocumented artificial fill, near surface colluvium/topsoil, younger alluvium, and near surface weathered very old alluvial fan deposits and/or Cretaceous-age granitic bedrock of quartz monzonite to quartz diorite composition. Surficial soils and/or weathered fan or bedrock materials were completely removed, or removed and recompacted during grading, to expose the underlying old alluvial fan deposits and/or Cretaceous-age granitic bedrock materials on the graded lots where removals were performed.

### **GROUNDWATER**

Regional groundwater was not encountered during grading of the subject area under the purview of this report and generally should not affect the continued site development, provided our recommendations are properly implemented. Due to the contrasting nature of the onsite earth materials, the possibility of future, localized perched water conditions and minor seepage cannot be precluded, and should be anticipated. This potential should be disclosed to all interested/affected parties, homeowners, and any homeowners association.

### **PURPOSE OF EARTHWORK**

The purpose of grading was to provide relatively level building pads for the proposed wood-frame residential structures (one- to two-stories), along with the construction of associated interior roadways. Typical cut/fill grading techniques were utilized to attain the desired graded configurations. The geotechnical conditions exposed during the process of grading were observed on a full-time basis by representatives from our firm. Observations during the process of rough grading included removals of potentially compressible soils, and compacted fill placement, along with the general grading procedures of the contractor.

### **EARTHWORK CONSTRUCTION**

As indicated previously, rough grading in the areas under the purview of this report generally began in early November 2005, and continued until mid November 2006. Earthwork operations were partially completed within the site boundary areas under the purview of this report, with the exception of the soil borrow area and northern portion of the site, at that time, in general accordance with recommendations provided in the field, based upon conditions exposed, in accordance with the controlling authorities requirements, and recommendations provided in the appropriate reports listed in Appendix A. During grading of the site, GSI observed the following:

### **Preparation of Existing Ground**

1. Deleterious material, such as miscellaneous trash and debris, were stripped from the surface and disposed of offsite by the contractor, prior to the placement of any fill.
2. Compressible undocumented fill, colluvium/topsoil, young alluvium, and near surface potentially compressible old alluvial fan deposits and/or Cretaceous-age granitic bedrock of tonalite composition were removed to expose competent old alluvial fan deposits and/or Cretaceous-age granitic bedrock, as defined herein, and in the approved referenced reports by EnGEN (2003) and GSI (2006).
3. After remedial removals had been completed on graded lots, removal bottom tests were performed on the existing in-place earth materials to evaluate if potentially compressible materials had been removed. Bottom testing indicated that the alluvium, old alluvial fan deposits and/or Cretaceous-age granitic bedrock was above minimum density requirements of 105 pcf. Bottom tests are included in the enclosed Table 1 at the end of this report.
4. Subsequent to the above removals, the exposed subsoils were scarified to a depth of about 6 inches, brought to at least optimum moisture content, then compacted to a minimum relative compaction of 90 percent of the laboratory standard per ASTM Test Method D 1557.
5. All processing of original ground was observed by a representative of GSI.

### **Fill Placement**

1. Fill materials consisted of native onsite soils which were placed in 4- to 8-inch lifts, watered, and mixed to achieve at least optimum moisture conditions (see Table 1). Fills were mechanically compacted to a minimum relative compaction of 90 percent of the laboratory standard using earth scrapers, bulldozers, and water pulls/trucks. The approximate minimum to maximum depth of fill placed in the individual finished lots are presented in the attached Table 2 at the rear of the text. Some data may be missing due to incomplete status.

2. During the process of excavation, some rock fragments larger than 12 inches in diameter were generated. These oversize materials were locally incorporated into the fills at depths below 10 feet from finish grade per the approved report for the project (GSI, 2006) and the guidelines of the County of Riverside (2000). As such, proper disclosure to all interested/affected parties, homeowners, and any homeowners association, will be required regarding the potential for difficult excavation due to dense bedrock materials and/or oversize materials near finish grade, and their hold-down distances from finish grade, etc.
3. Fills placed on sloping surfaces steeper than 5:1 (horizontal to vertical [h:v]) based upon pre-existing topography, were keyed and benched into competent alluvium, old alluvial fan deposits and/or Cretaceous-age granitic bedrock, as defined herein, and in the approved referenced report by GSI (2006).

### **Field Testing**

1. Field density tests were performed using the nuclear (densometer) methods ASTM D 6938-10 (Procedure A), and the sand-cone method ASTM D 1556. The test results are presented in the enclosed Table 1. The approximate locations of the field density tests are presented on Plates 1 through 9, which utilize the 40-scale rough grading plans prepared by Mayers & Associates (MA, 2006), as a base map.
2. Field density tests were taken at periodic intervals and selected locations to check the compactive efforts provided by the contractor. Where test results indicated less than optimum moisture content, or less than 90 percent relative compaction, the contractor was notified and the area was reworked until retesting indicated at least optimum moisture and a minimum relative compaction of 90 percent were attained. Based upon the grading operations observed, the test results presented herein are considered representative of the compacted fill.
3. Visual classification, supplemented by laboratory testing, was the basis for evaluating which maximum density value to use for a given density test.
4. Compaction tests have been numbered in a continuous sequence for the entire tract. Since, this report is reporting both graded and interim lots, only lots currently at design grade with compaction testing to finish grade (FG) are considered complete. Compaction testing of the subject lots under the purview of this report and are included in the Table 1 at the end of this report.

### **Slopes**

1. Cut and fill slopes are designed at gradients of 2:1 (h:v) or flatter and were constructed up to approximately  $\pm 35$  and  $\pm 13$  feet in overall height, respectively.

2. All slopes were field observed, and/or tested, as appropriate, by GSI personnel and are considered grossly and surficially stable and should remain so under normal conditions of regular and periodic care, maintenance, and semi-arid rainfall. Slopes are considered erosive and may be subject to erosion/gullying under concentrated flows from heavy rain events, irrigation, and/or misdirected surface drainage. Landscaping of these slopes with the recommended plants and associated proper irrigation practices should be implemented as soon as possible, to mitigate such conditions. Other mitigation measures are presented in the “Development Criteria” section of this report.

**Subdrains**

No seepage or perched water was encountered during rough grading operations, in addition no significant canyon areas with flow line gradients or sufficient fill cover existed during rough grading operations within the tract. Therefore placement of canyon subdrains was not considered feasible. Generally, and based upon the available data to date, regional groundwater is not expected to be a major factor in the development of the site. However, perched groundwater and/or seepage may occur in the fill or along fractures and/or joints due to migration from adjacent drainage areas and development during and/or after periods of above normal or heavy precipitation or irrigation. This potential increases on shallow fill lots. Thus, perched groundwater conditions and/or seepage may occur in the future, and should be anticipated. This potential should be disclosed to all homeowners and homeowners associations. These observations reflect site conditions at the time of this report and do not preclude changes in local groundwater conditions in the future. If, in the future, perched water conditions are observed due to excessive irrigation, precipitation, or other factors not obvious during grading, GSI should be contacted for recommendations for mitigation.

**LABORATORY TESTING**

**Maximum Density Testing**

The laboratory maximum dry density and optimum moisture content for each of the major soil types was evaluated in general accordance with test method ASTM D 1557. The following table presents the results:

SOIL TYPE	DESCRIPTION	MAXIMUM DENSITY (PCF)	OPTIMUM MOISTURE CONTENT (%)
A	Import	121.0	13.0
B	Light Brown, Silty SAND	114.0	14.5
C	Dark Brown, Silty SAND	122.0	10.5

SOIL TYPE	DESCRIPTION	MAXIMUM DENSITY (PCF)	OPTIMUM MOISTURE CONTENT (%)
D	Brown, Silty SAND	131.5	7.5
E	Brown, Silty SAND	118.0	13.0
F	Brown, Silty SAND	109.5	16.5

### **Expansion Potential**

Representative samples of near-surface site soils were evaluated for expansion potential and yielded a range of results between an E.I. 0 to 14 (Very Low) during late grading operations at the site. Expansion index (E.I.) testing and expansion potential classification was performed in general accordance with ASTM Standard D 4829, the results of the expansion testing are presented in the Table 2 at the end of the text.

### **Soluble Sulfates/Corrosivity**

It appears that subsequent to site grading, no soil samples of the pad grade materials were analyzed for soluble sulfate and corrosion potentials. As such, additional soluble sulfate and corrosion testing should be conducted during, or shortly after, site grading, to further evaluate the sulfate/corrosion potential of the onsite soils. Based upon surficial sampling of the subject tract (Tract 31513), with results ranging from 0.0011 to 0.0128 for the soluble sulfate test results, and according to the American Concrete Institute (ACI, 2014a), the potential soluble sulfate content for the subject lots is "SO" (0.00 to 0.10 Water-Soluble Sulfate in Soil, Percentage by Mass), therefore, sulfate-resistant concrete is not required. Based on the results of the resistivity and pH testing of adjacent onsite soils, site soils are slightly to moderately alkaline (a pH of 7.4 to 7.8 is considered slightly alkaline and a pH of 7.9 to 8.4 is considered moderately alkaline) and moderately corrosive to corrosive ((a soil resistivity between and 2,000 ohm-cm is considered corrosive, a soil resistivity of 2,000 to 10,000 ohm-cm is considered moderately corrosive and a soil resistivity over 10,000 ohm-cm is considered mildly corrosive) to ferrous metals in a saturated state. Chloride levels ranged from 2 to 88, which are generally considered low.

Although the site soils are categorized as moderately to severely corrosive to ferrous metals, other than Exposure Classes S0, S2, W0, and C1, with exposure conditions indicated in Table 19.3.1.1 of the ACI (2014a) as warranted, based on tract laboratory testing. Therefore, no specialty concrete is deemed necessary. It is our understanding that ferrous metals embedded in properly placed and formed concrete should be adequately protected from these conditions. Typical development of this type does not generally use significant amounts of exposed metal piping and/or other buried metal improvements. Based on the conditions encountered, a consulting corrosion engineer should be considered to provide recommendations for foundations, piping, etc., as warranted.

## **SEISMIC DESIGN**

## General

It is important to keep in perspective that in the event of an upper bound (maximum probable) or credible earthquake occurring on any of the nearby major faults, strong ground shaking would occur in the subject site's general area. Potential damage to any structure(s) would likely be greatest from the vibrations and impelling force caused by the inertia of a structure's mass than from those induced by the hazards listed above. This potential would be no greater than that for other existing structures and improvements in the immediate vicinity.

## Seismic Shaking Parameters

The following table summarizes the reevaluated site-specific design criteria obtained from the 2019 CBC, Chapter 16 Structural Design, Section 1613, Earthquake Loads. The computer program Seismic Design Maps, provided by the California Office of Statewide Health Planning and Development (OSHPD, 2020) has now been utilized to aid in design (<https://seismicmaps.org>). Details of the seismicity data are included in Appendix B, at the rear of the text. The short spectral response utilizes a period of 0.2 seconds.

2019 CBC SEISMIC DESIGN PARAMETERS			
PARAMETER	OSHPD VALUE	SITE SPECIFIC VALUE PER ASCE 7-16	2019 CBC OR REFERENCE
Risk Category	II	II	Table 1604.5
Site Class	D (default)	D	Section 1613.2.2/Chap. 20 ASCE 7-16 (p. 203-204)
Spectral Response - (0.2 sec), $S_s$	1.704 g	1.09 g	Section 1613.2.1 Figure 1613.2.1(1)
Spectral Response - (1 sec), $S_1$	0.665 g	0.88 g	Section 1613.2.1 Figure 1613.2.1(2)
Site Coefficient, $F_a$	1.2	1.2	Table 1613.2.3(1)
Site Coefficient, $F_v$	null - see Section 11.48 ASCE 7-16	2.5 (Section 21.3)	Table 1613.2.3(2)
Maximum Considered Earthquake Spectral Response Acceleration (0.2 sec), $S_{MS}$	2.045 g	1.663 g	Section 1613.2.3 (Eqn 16-36)
Maximum Considered Earthquake Spectral Response Acceleration (1 sec), $S_{M1}$	null - see Section 11.48 ASCE 7-16	1.373 g (Section 21.4)	Section 1613.2.3 (Eqn 16-37)
5% Damped Design Spectral Response Acceleration (0.2 sec), $S_{DS}$	1.363 g	1.108 g	Section 1613.2.4 (Eqn 16-38)

2019 CBC SEISMIC DESIGN PARAMETERS			
PARAMETER	OSHPD VALUE	SITE SPECIFIC VALUE PER ASCE 7-16	2019 CBC OR REFERENCE
5% Damped Design Spectral Response Acceleration (1 sec), $S_{D1}$	null - see Section 11.48 ASCE 7-16	0.916 g (Section 21.4)	Section 1613.2.4 (Eqn 16-39)
$PGA_M$ - Probabilistic Vertical Ground Acceleration may be assumed as about 50% of these values.	0.721 g	0.831 g	ASCE 7-16 (Eqn 11.8.1)
Seismic Design Category	null - see Section 11.48 ASCE 7-16	D (Section 11.6)	Section 1613.2.5/ASCE 7-16 (p. 85: Table 11.6-1 or 11.6-2)

GENERAL SEISMIC PARAMETERS	
PARAMETER	VALUE
Distance to Seismic Source (A fault) <sup>(1)</sup>	4.4 mi (7.1 km) <sup>(2)</sup>
Upper Bound Earthquake (San Jacinto-San Jacinto Valley Fault)	$M_w = 6.9$ <sup>(1)</sup>
<sup>(1)</sup> - Cao, et al. (2003) <sup>(2)</sup> - Blake (2000)	

Conformance to the criteria above for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur in the event of a large earthquake. The primary goal of seismic design is to protect life, not to eliminate all damage, since such design may be economically prohibitive. Cumulative effects of seismic events are not addressed in the 2019 CBC (CBSC, 2019a) and regular maintenance and repair following locally significant seismic events (i.e.,  $M_w 5.5$ ) will likely be necessary, as is the case in all of Southern California.

## EARTHWORK CONSTRUCTION RECOMMENDATIONS FOR EXISTING SURFICIAL SOILS

### General

1. All grading should be performed in accordance with City/County guidelines.
2. Prior to the start of any lot reprocessing and/or grading operations, the areas should be cleaned of all vegetation (including roots), trash, construction and other deleterious materials.

3. Within areas proposed for settlement-sensitive improvements, earthwork recommendations are contained below for reprocessing and remedial grading of the site.
4. Periodic geotechnical observations and compaction testing services should be provided during reprocessing and surficial grading to aid the contractor during recommended reprocessing and in his effort to moisture condition and compact the near-surface fills. If necessary, based on our observations, additional moisture conditioning and/or remedial recommendations may be warranted.
5. Considering the nature of much of the onsite material, caving and sloughing may be anticipated to be a factor in all subsurface excavations and trenching. This would be primarily associated with trenches excavated for utilities, foundation systems, retaining wall and pool excavations. All trench excavations should minimally conform to Cal-OSHA and local safety codes.
6. Onsite materials may be reused as compacted fill provided that major concentrations of vegetation and debris are removed, and they are properly moisture conditioned prior to fill placement.

### **Limited Investigation of Surficial Soils**

A limited investigation of surficial soils was conducted on January 20 and 21, 2021, consisting of random pad testing across the project. Density testing was performed at the surface and within the upper 3 feet of surficial soils. Compaction results varied from 81.1% to 86.3% relative compaction and existing soil moisture ranged from 3.3% to 6.5%. Optimum moisture varies from 7.5% to 10.5%. As a result, surficial soil mitigation is warranted before grading can be resumed. The following recommendations should be implemented.

### **Treatment of Surficial Soils**

Due to the span of time since original grading, GSI recommends that, at a minimum, the upper 18 inches of the exposed subsoils across the lots and streets should be reprocessed and brought to at least optimum moisture content, and then recompact to a minimum relative compaction of 90 percent of the laboratory standard (ASTM D 1557). This may be achieved by the reprocessing of the upper 18 inches of the exposed surficial soils. This can be accomplished by ripping the exposed soils at depth, flooding the exposed soils with water, and allow to soak for several days or weeks before reprocessing. After soaking for several days to weeks, the section can be re-compacted. Reprocessing as described above, should also be conducted within the influence of all settlement sensitive improvements (i.e., building pads, walls, retaining walls, etc.). Moisture conditioning and surficial reprocessing (upper 18 inches) will also be required for City sidewalk and roadway improvements within the street right-of-way, per the requirements of the City of Hemet. All lots will need surficial soil mitigation prior to building pad certification and/or additional

grading. During the surficial soil mitigation process, a topographic survey should be completed to verify all lots being reported are at “design grade.”

## **GENERAL EARTHWORK CONSTRUCTION RECOMMENDATIONS**

### **Fill Placement**

1. Fill materials should be brought to at least optimum moisture, placed in thin 6- to 8-inch lifts and mechanically compacted to obtain a minimum relative compaction of 90 percent of the laboratory standard (ASTM D 1557).
2. Fill materials should be cleansed of major vegetation and debris prior to placement.
3. Any import materials should be evaluated and deemed suitable by the geotechnical consultant prior to importation or placement on the site. Foundation designs may be altered if import materials have a greater expansion and/or sulfate/corrosion value than the onsite materials previously tested during onsite grading.

### **General**

All earthwork should conform to the guidelines presented in the 2019 CBC (CBSC, 2019a), Appendix C (General Grading Guidelines), and the requirements of the City, except where specifically superceded in the text of this report. Prior to earthwork, a GSI representative should be present at the preconstruction meeting to provide additional earthwork guidelines, if needed, and review the earthwork schedule. This office should be notified in advance of any fill placement, supplemental regrading of the site, or backfilling underground utility trenches and retaining walls after rough earthwork has been completed. This includes grading for pools, driveway approaches, driveways, and exterior hardscape.

During earthwork construction, all site preparation and the general grading procedures of the contractor should be observed and the fill selectively tested by a representative(s) of GSI. If unusual or unexpected conditions are exposed in the field, they should be reviewed by this office and, if warranted, modified and/or additional recommendations will be offered. All applicable requirements of local and national construction and general industry safety orders, the Occupational Safety and Health Act (OSHA), and the Construction Safety Act should be met. It is the onsite general contractor and individual subcontractors responsibility to provide a safe working environment for our field staff who are onsite. GSI does not consult in the area of safety engineering.

### **Demolition/Grubbing**

1. Vegetation and any miscellaneous debris should be removed from the areas of proposed grading.

2. Any existing subsurface structures uncovered during the recommended removal should be observed by GSI so that appropriate remedial recommendations can be provided.
3. Cavities or loose soils remaining after demolition and site clearance should be cleaned out and observed by the soil engineer. The cavities should be replaced with fill materials that have been moisture conditioned to at least optimum moisture content and compacted to at least 90 percent of the laboratory standard.
4. Onsite septic systems (if encountered) should be removed in accordance with San Diego County Department of Environmental Health (DEH) standards/guidelines.

### **Treatment of Existing Ground**

1. Based on the previous report by GSI (2006), removals should consist of all surficial deposits of artificial fill, loose old alluvial fan deposits and weathered bedrock within the upper  $\pm 2.0$  to  $\pm 10.0$  feet on previously un-graded lots. Actual depths of removals will be evaluated in the field during grading by the soil engineer. Based on our site work, removals depths on the order of approximately  $\pm 3.0$  to  $\pm 6.0$  feet below existing grades should be anticipated throughout the most of the site, to provide a minimum 2 feet thick blanket of compacted fill beneath the proposed design footing depth (12" to 18" deep). Removed fill soils may be reused as fill, provided that the soil is cleansed of any deleterious material, moisture conditioned, and compacted to a minimum 90 percent relative compaction per ASTM D 1557. Removals should be completed throughout the site improvement areas, and minimally at least 5 feet beyond the limits of any settlement-sensitive improvement, or to a lateral distance equal to the depth of the removal beneath the improvement, whichever is greater.
2. In addition to removals within the building envelope, overexcavation of the underlying formational/bedrock soil should be performed in order to provide for at least 4 feet of compacted fill below finish grade, or 2 feet below the bottom of the deepest foundation, whichever is greater.
3. Subsequent to the above removals/overexcavation, the exposed bottom should be scarified to a depth of at least 8 inches, brought to at least optimum moisture content, and recompacted to a minimum relative compaction of 90 percent of the laboratory standard, prior to any fill placement.
4. Localized deeper removals may be necessary due to buried drainage channel meanders or dry porous materials, septic systems, etc., or deeper sections of the former reservoir that may be present. The project soils engineer/geologist should observe all removal areas during the grading.

5. Removed natural ground materials may be reused as compacted fill provided that major concentrations of vegetation and miscellaneous debris are removed from the site, prior to or during fill placement. See subsequent sections for a discussion of select grading.

### **Fill Suitability**

Surficial onsite soils (artificial fill) generally appear to consist of silty sands and clayey sands, with lesser quantities of silts locally. Oversize material (12-inch plus) is not anticipated. Existing fill soils exhibit very low expansive characteristics. Any soil import should be evaluated by this office prior to importing in order to assure compatibility with the onsite site soils and the recommendations presented in this report. Import soils, if used, should be relatively sandy and very low expansive (i.e., E.I. less than 20), if possible.

### **Shrinkage/Bulking**

Based on our experience, a preliminary value of 8 to 15 percent shrinkage for artificial fill, and highly weathered old alluvial fan deposits may be considered. Cuts in formation may result in nominal shrinkage (ranging to  $\pm 5$  percent).

### **Fill Placement**

1. Subsequent to ground preparation, fill materials should be brought to at least optimum moisture content, placed in thin 6- to 8-inch lifts, and mechanically compacted to obtain a minimum relative compaction of 90 percent of the laboratory standard.
2. Fill materials should be cleansed of major vegetation and debris prior to placement.

### **Perimeter Conditions**

It should be noted, that the 2019 CBC (CBSC, 2019a) indicates that removals of unsuitable soils be performed across all areas under the purview of the grading permit, not just within the influence of the proposed buildings. Relatively deep removals may also necessitate a special zone of consideration, on perimeter/confining areas.

Any proposed improvement or future homeowner improvements such as walls, swimming pools, house additions, etc. that are located above a 1:1 (h:v) projection up from the outermost limit of the remedial grading excavations will require deepened foundations that extend below this plane. Other site improvements, such as pavements, constructed above the aforementioned plane would retain some potential for settlement and associated distress, which may require increased maintenance/repair or replacement. This potential should be disclosed to all interested/affected parties should remedial grading excavations be constrained by property lines.

## **Fill Drainage**

Based on site grades and the planned construction, sub drainage is not anticipated.

## **Temporary Slopes**

Temporary slopes for excavations greater than 4 feet, but less than 20 feet in overall height should conform to CAL-OSHA and/or OSHA requirements for Type “B” soils. Temporary slopes, up to a maximum height of  $\pm 20$  feet, may be excavated at a 1:1 (h:v) gradient, or flatter, provided groundwater and/or running sands are not exposed. Construction materials or soil stockpiles should not be placed within  $H$  of any temporary slope where  $H$  equals the height of the temporary slope. All temporary slopes should be observed by a licensed engineering geologist and/or geotechnical engineer prior to worker entry into the excavation.

## **Rockfall Mitigation**

The potential for significant mass wasting (i.e., rockfall) to occur within the site is considered low, to perhaps moderate. Based on our review of the geotechnical/geological engineering study for the site (EnGEN, 2003) and our field geologic mapping and analysis, the potential for rockfall exists adjacent to prominent foothills which bound portions of the site. On a preliminary basis, and based on our engineering analysis, debris/impact walls, gabion baskets, catchment/deflection devices, and/or rockfall netting are specifically recommended behind Lots 66 to 73, 132 to 145, 147 to 166, and 170 to 177. Alternative devices may be considered by the design civil engineer. Any alternative devices proposed, should be reviewed, and subsequently approved by GSI. The potential for rockfall onsite should be further evaluated by the project design engineer and the geotechnical consultant during rough grading operations. Additional design parameters for the recommended debris/impact walls, gabion baskets, catchment/deflection devices, and/or rockfall netting can be provided upon request, depending on which rockfall protection option is chosen by the developer.

## **Rippability**

Based upon our experience in this area, and the seismic refraction data previously obtained (EnGEN, 2003), assuming a D9L, or equivalent, the granitic bedrock that bounds the site should be generally rippable (i.e., seismic velocities of less than about 6,000 feet per second [fps]) to depths ranging from about  $\pm 3$  feet to  $\pm 13$  feet. There are localized areas (core-stones or “floaters”) on the surface, which may potentially require very difficult ripping to possible blasting. Therefore, based on our review of planned cuts in bedrock areas (up to  $\pm 20$  feet), very difficult ripping to possible blasting should be anticipated within these localized areas to achieve design grades, and should be considered for preliminary planning and cost estimation purposes.

Using the 3,800 fps cut-off for non-rippable trenching, assuming a CAT 235 hoe, it is likely that very difficult ripping to possible blasting (e.g., “line-shooting”) may be necessary for trenching of utilities in bedrock areas. Seismic velocities near, or exceeding 3,800 fps generally occur at depths ranging from  $\pm 4$  feet to  $\pm 14$  feet. A conventional rubber tire backhoe would likely encounter refusal in these materials. As an alternate to blasting for utilities, overexcavation of streets (in bedrock areas) during mass grading to  $\pm 1$  foot below the depth of the lowest utility may be considered for planning and cost estimation purposes. This is not a geotechnical requirement, however.

## **FOUNDATION RECOMMENDATIONS**

### **General**

The proposed foundation systems should be designed and constructed in accordance with current standards of practice, the guidelines contained within the 2019 CBC, the ACI (2014a), and the differential settlement and expansion potential values provided herein. The onsite soils expansion potentials for the subject tract have been evaluated to be in the very low range (E.I. of 0 to 20).

Based on the as-graded pad configurations, conventional foundations may accommodate very low to low expansion conditions (E.I. of 0 to 50) where the Plastic index (P.I.) is  $\leq 15$ . For the purpose of our geotechnical review and analyses, GSI has assumed that the foundations and slab design loads are typical for single-family wood-frame structures. Therefore, residential wall loads for one- and two-story structures are anticipated to be 1 to 2 kips per lineal foot of wall and 20 to 30 psf of concrete floor load. Isolated column loads are anticipated to be in the range of 10 to 50 kips. All footings are recommended to embed into compacted fill, as indicated in this report.

This section presents minimum design criteria for the design of foundations, concrete slab-on-grade floors, and other elements possibly applicable to the project. These criteria should not be considered as substitutes for actual designs by the structural engineer. Recommendations by the project's design-structural engineer or architect, which may exceed the geotechnical consultant's recommendations, should take precedence over the following minimum requirements. The foundation systems recommended herein may be used to support the proposed residences provided they are entirely founded in engineered fill tested and approved by GSI that overlies dense formational earth materials. In the event that the information concerning the proposed development plan is not correct, or any changes in the design, location or loading conditions of the proposed structures are made, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report are modified or approved in writing by this office. Upon request, GSI could provide additional input/consultation regarding soil parameters, as they relate to foundation design.

General recommendations for foundations using either conventional or post-tension systems are provided in the following sections, and are not intended to preclude the transmission of water or water vapor through the foundations or slabs. Further discussion and recommendations are provided within the soil moisture transmission considerations section of this update report.

### **General Foundation Design**

1. The foundation systems should be designed and constructed in accordance with guidelines presented in the 2019 CBC CBC.
2. An allowable bearing value of 2,000 psf may be used for the design of footings that maintain a minimum width of 12 inches and a minimum depth of 12 inches (below the lowest adjacent grade) and are founded entirely into properly engineered fill. This value may be increased by 20 percent for each additional 12 inches in footing embedment to a maximum value of 2,500 psf. These values may be increased by one-third when considering short duration seismic or wind loads. Isolated pad footings should have a minimum dimension of at least 24 inches square and a minimum embedment of 18 inches below the lowest adjacent grade into properly engineered fill. Foundation embedment excludes any landscaped zones, concrete slabs-on-grade, and/or slab underlayment.
3. Passive earth pressure in properly compacted silty or clayey sand fill may be computed as an equivalent fluid having a density of 250 pcf, with a maximum earth pressure of 2,500 psf for footings founded into properly engineered fill. Lateral passive pressures for shallow foundations within 2019 CBC CBC setback zones or within the influence of retaining walls should be reduced following a review by the geotechnical engineer unless proper setbacks can be established.
4. For lateral sliding resistance, a 0.35 coefficient of friction may be utilized for a concrete to soil contact when multiplied by the dead load.
5. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one-third.
6. All footing setbacks from slopes should comply with Figure 1808.7.1 of the 2019 CBC. GSI recommends a minimum horizontal setback distance of 7 feet as measured from the bottom (i.e., bearing elevation), outboard edge of the footing to the slope face.
7. Footings for structures adjacent to retaining walls should be deepened so as to extend below a 1:1 projection from the heel of the wall should this condition occur. Alternatively, walls may be designed to accommodate structural loads from buildings or appurtenances as described in the “Wall Design Parameters” section of this report.

8. Isolated interior or exterior column footings and piers should be founded at a minimum depth of 18 inches, excluding the landscape zone (top 6 inches), and minimally connected in one direction for lots with very low expansive soils (E.I.  $\leq 20$ ) and two directions for low to medium expansive soils ([E.I.  $\geq 21$  to  $\leq 90$ ]).
9. Based on the very low expansive soils that underlie the subject lots, the slab thickness, reinforcement, and concrete utilized should comply with all applicable codes, and in accordance with the foundation designers' recommendations. These recommendations shall supercede GSI's prior recommendations for such, and may be less onerous than the previous recommendations by GSI.
10. The project structural engineer should consider the use of transverse and longitudinal control joints to help control slab cracking due to concrete shrinkage or expansion. Two of the best ways to control this movement are: 1) add a sufficient amount of reinforcing steel to increase the tensile strength of the slab; and 2) provide an adequate amount of control and/or expansion joints to accommodate anticipated concrete shrinkage and expansion. Transverse and longitudinal crack control joints should be spaced no more than 13 feet on center and constructed to a minimum depth of  $T/4$ , where "T" equals the slab thickness in inches. Per PCA and ACI guidelines, joints are commonly spaced at distances equal to 24 to 30 times the slab thickness. Joint spacing that is greater than 15 feet require the use of load transfer devices (dowels or diamond plates).

As an alternative to conventional foundations and slabs, for the purpose of improving foundation performance during static and/or seismic loading, an engineered post-tension foundation may be utilized. Post-tension design parameters for very low to low expansive soils (if subsequently encountered) are provided in the following section. Other foundation alternatives to comply with the 2019 CBC and to increase performance may also be provided, upon request.

### **POST-TENSIONED FOUNDATIONS**

The following foundation construction recommendations assume that soils in the upper 7 feet are low to medium expansive (if subsequently encountered) in accordance with 2019 CBC, Section 1803.5.3 for expansive soils mitigation. The post-tension foundation designer may exceed these minimal recommendation to increase slab stiffness performance.

Post-tension foundations may be used to mitigate the damaging effects of differential settlement and/or expansive soils on the planned residential foundations and slab-on-grade floors. The post-tension foundation designer may elect to exceed these minimal recommendations to increase slab stiffness performance. Post-tension (PT) design may be either ribbed or mat-type. The latter is also referred to as uniform thickness foundation (UTF). The use of a UTF is an alternative to the traditional ribbed-type. The UTF offers a

reduction in grade beams. That is to say a UTF typically uses a single perimeter grade beam and possible “shovel” footings, but has a thicker slab than the ribbed-type.

The information and recommendations presented in this section are not meant to supercede design by a registered structural engineer or civil engineer qualified to perform post-tensioned design. Post-tensioned foundations should be designed using sound engineering practice and be in accordance with local and 2019 CBC CBC requirements. Upon request, GSI can provide additional data/consultation regarding soil parameters as related to post-tensioned foundation design.

From a soil expansion/shrinkage standpoint, a common contributing factor to distress of structures using post-tensioned slabs is a "dishing" or "arching" of the slabs. This is caused by the fluctuation of moisture content in the soils below the perimeter of the slab primarily due to onsite and offsite irrigation practices, climatic and seasonal changes, and the presence of expansive soils. When the soil environment surrounding the exterior of the slab has a higher moisture content than the area beneath the slab, moisture tends to migrate inward, underneath the slab edges to a distance beyond the slab edges referred to as the moisture variation distance. When this migration of water occurs, the volume of the soils beneath the slab edges expands and causes the slab edges to lift in response. This is referred to as an edge-lift condition. Conversely, when the outside soil environment is drier, the moisture transmission regime is reversed and the soils underneath the slab edges lose their moisture and shrink. This process leads to dropping of the slab at the edges, which leads to what is commonly referred to as the center lift condition. A well-designed, post-tensioned slab having sufficient stiffness and rigidity provides a resistance to excessive bending that results from non-uniform swelling and shrinking slab subgrade soils, particularly within the moisture variation distance, near the slab edges. Other mitigation techniques typically used in conjunction with post-tensioned slabs consist of a combination of specific soil pre-saturation and the construction of a perimeter "cut-off" wall grade beam. Soil pre-saturation consists of moisture conditioning the slab subgrade soils prior to the post-tension slab construction. This effectively reduces soil moisture migration from the area located outside the building toward the soils underlying the post-tension slab. Perimeter cut-off walls are thickened edges of the concrete slab that impedes both outward and inward soil moisture migration.

### **Slab Subgrade Pre-Soaking**

Pre-moistening of the slab subgrade soil is recommended owing to potential expansive soil conditions at the site. The moisture content of the subgrade soils should be equal to or greater than optimum moisture to a depth equivalent to the perimeter grade beam or cut-off wall depth in the slab areas (typically 12 inches for very low to low expansive soil conditions, and 18 inches for medium expansive soil conditions).

Pre-moistening and/or pre-soaking should be evaluated by the soils engineer 72 hours prior to vapor retarder placement. In summary:

EXPANSION INDEX	PAD SOIL MOISTURE	CONSTRUCTION METHOD	SOIL MOISTURE RETENTION
Very Low (E.I. 0-20)	Upper 12 inches of pad at or above soil optimum moisture	Wetting and/or reprocessing	Periodically wet or cover with plastic after trenching. Evaluation 72 hours prior to placement of concrete.
Low (E.I. = 21-50)	Upper 12 inches of pad soil moisture 2 percent over optimum (or 1.2 times)	Wetting and/or reprocessing	Periodically wet or cover with plastic after trenching. Evaluation 72 hours prior to placement of concrete.

### Perimeter Cut-Off Walls

Perimeter cut-off walls should be at least 12 inches deep for very low to low expansive soil conditions. The cut-off walls may be integrated into the slab design or independent of the slab. The cut-off walls should be a minimum of 6 inches thick (wide). The bottom of the perimeter cut-off wall should be designed to resist tension, using cable or reinforcement per the structural engineer.

### Post-Tensioned Foundation Design

Expansive soils testing for the project was not completed for the finished pads when the project development was halted in 2006. A testing regimen of one expansion test for every 3-5 lots should be performed on the upper 18" of pad soils during lot recertification to determine foundation design requirements. Expansion indexes are currently in the very low range onsite. The following recommendations for design of post-tensioned slabs have been prepared in general compliance with the requirements of the recent Post Tensioning Institute's (PTI's) publication titled "Standard Requirements for Design and Analysis of Shallow Post-tensioned Concrete Foundations on Expansive Soils" (PTI, 2012), together with its subsequent erratas (PTI, 2013 and 2014).

### Soil Support Parameters

The recommendations for soil support parameters have been provided based on the typical soil index properties for soils that are very low to low in expansion potential. The soil index properties are typically the upper bound values based on our experience and practice in the southern California area. The following table presents suggested minimum coefficients to be used in the Post-Tensioning Institute design method.

Thornthwaite Moisture Index	-20 inches/year
Correction Factor for Irrigation	20 inches/year
Depth to Constant Soil Suction	7 feet or overexcavation depth, whichever is greater
Constant soil Suction (pf)	3.6
Moisture Velocity	0.7 inches/month
Plasticity Index (P.I.)*	15-45
* - The effective plasticity index should be evaluated for the upper 7 to 15 feet of earth materials.	

Based on the above, the recommended soil support parameters are tabulated below:

DESIGN PARAMETERS	VERY LOW TO LOW EXPANSION (E.I. = 0-50)
$e_m$ center lift	9.0 feet
$e_m$ edge lift	5.2 feet
$y_m$ center lift	0.4 inches
$y_m$ edge lift	0.7 inch
Bearing Value <sup>(1)</sup>	1,000 psf
Lateral Pressure	250 psf
Subgrade Modulus (k)	100 pci/inch
Minimum Perimeter Footing Embedment <sup>(2)</sup>	12 inches
<sup>(1)</sup> Internal bearing values within the perimeter of the post-tension slab may be increased to 1,500 psf for a minimum embedment of 12 inches, then by 20 percent for each additional foot of embedment to a maximum of 2,500 psf. <sup>(2)</sup> As measured below the lowest adjacent compacted subgrade surface without landscape layer or sand underlayment. Note: The use of open bottomed raised planters adjacent to foundations will require more onerous design parameters.	

The parameters are considered minimums and may not be adequate to represent all expansive soils and site conditions such as adverse drainage and/or improper landscaping and maintenance. The above parameters are applicable provided the structure has positive drainage that is maintained away from the structure. In addition, no trees with significant root systems are to be planted within 15 feet of the perimeter of foundations. Therefore, it is important that information regarding drainage, site maintenance, trees, settlements, and effects of expansive soils be passed on to future all interested/affected parties. The values tabulated above may not be appropriate to account for possible differential settlement of the slab due to other factors, such as excessive settlements. If a stiffer slab is desired, alternative Post-Tensioning Institute ([PTI] third edition) parameters may be recommended.

## Mat Foundations

In lieu of using a post-tensioned foundation to resist differential settlement and/or expansive soil effects, the Client may consider a mat foundation which uses steel bar reinforcement instead of post-tensioned cables. The structural engineer may supercede the following recommendations based on the planned building loads and use. WRI (Wire Reinforcement Institute) methodologies for design may be used.

### Mat Foundation Design

The design of mat foundations should incorporate the vertical modulus of subgrade reaction. This value is a unit value for a 1-foot square footing and should be reduced in accordance with the following equation when used with the design of larger foundations. This assumes that the bearing soils will consist of engineered fills with an average relative compaction of 90 percent of the laboratory (ASTM D 1557).

$$K_R = K_S \left[ \frac{B+1}{2B} \right]^2$$

where:  $K_S$  = unit subgrade modulus  
 $K_R$  = reduced subgrade modulus  
 $B$  = foundation width (in feet)

The modulus of subgrade reaction ( $K_S$ ) and effective plasticity index (P.I.) to be used in mat foundation design for various expansive soil conditions are presented in the following table.

VERY LOW TO LOW EXPANSION (E.I. = 21-50)
$K_S = 100$ pci/inch, PI < 15

Reinforcement bar sizing and spacing for mat slab foundations should be provided by the structural engineer. Mat slabs may be uniform thickness foundations (UTF) or may incorporate the use of edge footings for moisture cut-off barriers as recommended herein for post-tension foundations. Edge footings should be a minimum of 6 inches thick. The bottom of the edge footing should be designed to resist tension, using reinforcement per the structural engineer. The need and arrangement of interior grade beams (stiffening beams) will be in accordance with the structural consultant's recommendations. The recommendations for a mat type of foundation assume that the soils below the slab are compacted fill. The parameters herein are to mitigate the effects of expansive soils and

should be modified to mitigate the effects of the total and differential settlements reported in the “Foundation and Improvement Settlements” section of this report.

## **FOUNDATION AND IMPROVEMENT SETTLEMENTS**

In addition to designing slab systems (post-tension or other) for the soil conditions described herein, the estimated settlement and angular distortion values that an individual structure could be subjected to should be evaluated by a structural engineer. The levels of angular distortion were evaluated on a 40-foot length assumed as minimum dimension of buildings; if, from a structural standpoint, a decreased or increased length over which the tilt is assumed to occur is justified, this change should be incorporated into the design. The structures should be evaluated and designed for the combination of the soil parameters presented above, and the estimated total settlement, differential settlement and angular distortions provided herein.

The footings and/or slabs should be designed to accommodate a total static settlement of up to 2 inches and a static differential settlement of 1 inch (i.e., at least 1-inch in a 40-foot span). The structural engineer should consider these settlements and the performance of the foundation as well as the overlying structure. In addition to the above, the structural engineer should also consider estimated settlements due to short duration seismic loading and applicable load combinations, as required by the controlling authorities and/or the 2019 CBC.

These settlement estimates indicated above have been based on Riverside County overexcavation requirements, and do not preclude top of slope deformation (within Code setback zones) and settlement due to fills that have been saturated from utility leaks, pool leaks, prevailing climatic conditions, or excessive landscape irrigation.

Post-construction settlement of the fill should be mitigated by proper foundation design, provided the design parameters, provided herein, are properly utilized in final design of the residential foundation systems and improvements. In addition to the above, the structural engineer should also consider estimated settlements due to short duration seismic loading and applicable load combinations, as required by the City/County and/or the 2019 CBC .

## **SOIL MOISTURE TRANSMISSION CONSIDERATIONS**

GSI has evaluated the potential for vapor or water transmission through the concrete floor slab, in light of typical floor coverings and improvements. Please note that slab moisture emission rates range from about 2 to 27 lbs/24 hours/1,000 square feet from a typical slab (Kanare, 2005), while floor covering manufacturers generally recommend about 3 lbs/24 hours as an upper limit. The recommendations in this section are not intended to preclude the transmission of water or vapor through the foundation or slabs. Foundation

systems and slabs shall not allow water or water vapor to enter into the structure so as to cause damage to another building component or to limit the installation of the type of flooring materials typically used for the particular application (State of California, 2020). These recommendations may be exceeded or supplemented by a water “proofing” specialist, project architect, or structural consultant. Thus, the client will need to evaluate the following in light of a cost vs. benefit analysis (owner expectations and repairs/replacement), along with disclosure to all interested/affected parties. It should also be noted that vapor transmission will occur in new slab-on-grade floors as a result of chemical reactions taking place within the curing concrete. Vapor transmission through concrete floor slabs as a result of concrete curing has the potential to adversely affect sensitive floor coverings depending on the thickness of the concrete floor slab and the duration of time between the placement of concrete, and the floor covering. It is possible that a slab moisture sealant may be needed prior to the placement of sensitive floor coverings if a thick slab-on-grade floor is used and the time frame between concrete and floor covering placement is relatively short.

Considering the anticipated E.I. test results presented herein, and known soil conditions in the region, the anticipated typical water vapor transmission rates, floor coverings, and improvements (to be chosen by the Client and/or project architect) that can tolerate vapor transmission rates without significant distress, the following alternatives are provided:

- Concrete slab-on-grade floors (including garage slabs) should be thicker.
- Concrete slab underlayment should consist of a 15-mil vapor retarder, or equivalent, with all laps sealed per the 2019 CBC and the manufacturer’s recommendation. The vapor retarder should comply with the ASTM E 1745 - Class A criteria, and be installed in accordance with ACI 302.1R-04 and ASTM E 1643.
- The 15-mil vapor retarder (ASTM E 1745 - Class A) shall be installed per the recommendations of the manufacturer, including all penetrations (i.e., pipe, ducting, rebar, etc.).
- Concrete slabs, including garages, shall be underlain by 2 inches of clean, washed sand (S.E.  $\geq$  30) above a 15-mil vapor retarder (ASTM E 1745 - Class A, per Engineering Bulletin 119 [Kanare, 2005]). The vapor retarder shall in-turn, be underlain by 2 inches of sand (S.E.  $\geq$  30) placed directly on the prepared, moisture conditioned, subgrade. The vapor retarder should be sealed to provide a continuous retarder under the entire slab and should be installed per the recommendations of the manufacturer, including all penetrations (i.e., pipe, ducting, rebar, etc.). The manufacturer shall provide instructions for lap sealing, including minimum width of lap, method of sealing, and either supply or specify suitable products for lap sealing (ASTM E 1745), and per code.

ACI 302.1R-04 (2004) states “If a cushion or sand layer is desired between the vapor retarder and the slab, care must be taken to protect the sand layer from taking on additional water from a source such as rain, curing, cutting, or cleaning. Wet cushion or sand layer has been directly linked in the past to significant lengthening of time required for a slab to reach an acceptable level of dryness for floor covering applications.” Therefore, additional observation and/or testing will be necessary for the cushion or sand layer for moisture content, and relatively uniform thicknesses, prior to the placement of concrete.

- Additional concrete mix design recommendations should be provided by the structural consultant and/or waterproofing specialist. Concrete finishing and workability should be addressed by the structural consultant and a waterproofing specialist.
- Where concrete admixtures are utilized, the structural consultant should also make changes to the concrete in the grade beams and footings in kind, so that the concrete used in the foundation and slabs are designed and/or treated for more uniform moisture protection.
- The owner(s) should be specifically advised which areas are suitable for tile flooring, vinyl flooring, or other types of water/vapor-sensitive flooring and which are not suitable. In all planned floor areas, flooring shall be installed per the manufactures recommendations.
- Additional recommendations regarding water or vapor transmission should be provided by the architect/structural engineer/slab or foundation designer and should be consistent with the specified floor coverings indicated by the architect.

Regardless of the mitigation, some limited moisture/moisture vapor transmission through the slab should be anticipated. Construction crews may require special training for installation of certain product(s), as well as concrete finishing techniques. The use of specialized product(s) should be approved by the slab designer and water-proofing consultant. A technical representative of the flooring contractor should review the slab and moisture retarder plans and provide comment prior to the construction of the foundations or improvements. The vapor retarder contractor should have representatives onsite during the initial installation.

## **WALL DESIGN PARAMETERS**

### **General**

Based on our review (see Appendix A), the majority of onsite soil materials (topsoil, colluvium, alluvium, and old alluvial fan deposits, etc.) are derived from alluvial sediments

which exhibit a very low expansion potential (E.I. 0 - 20). These materials appear to predominantly consist of silty and clayey sands with minor to moderate amounts of clay content. Due to the variability of silt and clay content within earth materials at the site, the native soil parameters are non-uniform and therefore the recommendations provided herein consider these effects. Recommendations for the design and construction of conventional masonry retaining walls are provided herein. Recommendations for specialty walls (i.e., crib, earthstone, geogrid, etc.) can be provided upon request, and would be based on site specific conditions. If walls allow water to accumulate in the backfill or at their toe via a water quality basin, the water should be conveyed via a non-erosive device to an appropriate inlet, per the recommendations of the design civil engineer.

At this site, the potential for significant mass wasting (i.e., rockfall) to occur within the site is considered low, to perhaps moderate. Based on our review of the geotechnical/geological engineering study for the site (EnGEN, 2003) and our field geologic mapping and analysis, the potential for rockfall exists adjacent to prominent foothills which bound portions of the site. On a preliminary basis, and based on our engineering analysis, debris/impact walls, gabion baskets, catchment/deflection devices, and/or rockfall netting are specifically recommended behind Lots 66 to 73, 132 to 145, 147 to 166, and 170 to 177. Alternative devices may be considered by the design civil engineer. Any alternative devices proposed, should be reviewed, and subsequently approved by GSI. The potential for rockfall onsite should be further evaluated by the project design engineer and the geotechnical consultant during rough grading operations. Additional design parameters for the recommended debris/impact walls, gabion baskets, catchment/deflection devices, and/or rockfall netting can be provided upon request, depending on which rockfall protection option is chosen by the developer.

### **Conventional Retaining Walls**

The design parameters provided below assume that either very low expansive soils (typically Class 2 permeable filter material or Class 3 aggregate base) or native onsite materials with an expansion index up to a maximum E.I. of 50 are used to backfill any retaining wall. The type of backfill (i.e., select or native), should be specified by the wall designer, and clearly shown on the plans. Building walls, below grade, should be water-proofed. Waterproofing should also be provided for site retaining walls in order to reduce the potential for efflorescence staining.

### **Retaining Wall Foundation Design**

Foundation design for retaining walls should incorporate the following recommendations:

**Minimum Footing Embedment** - 18 inches below the lowest adjacent grade (excluding landscape layer [upper 6 inches]).

**Minimum Footing Width** - 24 inches

**Allowable Vertical Bearing Pressure** - An allowable vertical bearing pressure of 2,500 pcf may be used in the preliminary design of retaining wall foundations provided that the footing maintains a minimum width of 24 inches and extends at least 18 inches into approved engineered fill overlying dense formational materials. This pressure may be increased by one-third for short-term wind and/or seismic loads.

**Passive Earth Pressure** - A passive earth pressure of 250 pcf with a maximum earth pressure of 2,500 psf may be used in the preliminary design of retaining wall foundations provided the foundation is embedded into properly compacted silty to clayey sand fill.

**Lateral Sliding Resistance** - A 0.35 coefficient of friction may be utilized for a concrete to soil contact when multiplied by the dead load. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one-third.

**Backfill Soil Density** - A soil density of 125 pcf may be used in the design of retaining wall foundations. This assumes an average engineered fill compaction of at least 90 percent of the laboratory standard (ASTM D 1557).

**Settlement** - Provided that the earthwork and foundation recommendations in this report are adhered, foundations bearing on approved non-detrimentally expansive, engineered fill should be minimally designed to accommodate a total static settlement of 2 inches and a differential static settlement of 1 inch over a 40-foot horizontal span (angular distortion = 1/480).

Any retaining wall footings near the perimeter of the site, or not within areas of placed compacted fills will likely need to be deepened into unweathered dense formational materials for adequate vertical and lateral bearing support. All retaining wall footing setbacks from slopes should comply with Figure 1808.7.1 of the 2019 CBC. GSI recommends a minimum horizontal setback distance of 7 feet as measured from the bottom, outboard edge of the footing to the 2:1 (h:v) slope face.

## **Restrained Walls**

Any retaining walls that will be restrained prior to placing and compacting backfill material or that have re-entrant or male corners, should be designed for an at-rest equivalent fluid pressure (EFP) of 55 pcf and 65 pcf for select and very low expansive (E.I.  $\leq$  50, P.I.  $<$  15) native (onsite) backfill, respectively. The design should include any applicable surcharge loading. For areas of male or re-entrant corners, the restrained wall design should extend a minimum distance of twice the height of the wall (2H) laterally from the corner.

## Cantilevered Walls

The recommendations presented below are for cantilevered retaining walls up to 10 feet high. Design parameters for walls less than 3 feet in height may be superseded by Riverside County regional standard design. Active earth pressure may be used for retaining wall design, provided the top of the wall is not restrained from minor deflections. An equivalent fluid pressure approach may be used to compute the horizontal pressure against the wall. Appropriate fluid unit weights are given below for specific slope gradients of the retained material. These do not include other superimposed loading conditions due to traffic, structures, seismic events or adverse geologic conditions. When wall configurations are finalized, the appropriate loading conditions for superimposed loads can be provided upon request.

For preliminary planning purposes, the structural consultant/wall designer should incorporate the surcharge of traffic loads on the back of retaining walls where vehicular traffic could occur within horizontal distance “H” from the back of the retaining wall (where “H” equals the wall height). The traffic surcharge may be taken as 100 psf/ft in the upper 5 feet of backfill for light truck and cars traffic. This does not include the surcharge of parked vehicles which should be evaluated at a higher surcharge to account for the effects of seismic loading. Equivalent fluid pressures for the design of cantilevered retaining walls are provided in the following table:

SURFACE SLOPE OF RETAINED MATERIAL (HORIZONTAL:VERTICAL)	EQUIVALENT FLUID WEIGHT P.C.F. (SELECT BACKFILL) <sup>(2)</sup>	EQUIVALENT FLUID WEIGHT P.C.F. (NATIVE BACKFILL) <sup>(3)</sup>
Level <sup>(1)</sup>	38	50
2 to 1	55	65

<sup>(1)</sup> Level backfill behind a retaining wall is defined as compacted earth materials, properly drained, without a slope for a distance of 2H behind the wall, where H is the height of the wall.  
<sup>(2)</sup> SE  $\geq$  30, P.I. < 15, E.I. < 21, and  $\leq$  10% passing No. 200 sieve.  
<sup>(3)</sup> E.I. = 0 to 50, SE  $\geq$  30, P.I. < 15, E.I. < 21, and  $\leq$  15% passing No. 200 sieve. Assumes 1 to 2 feet of gravel drain backfill be incorporated (see Details herein).

## Seismic Surcharge

For engineered retaining walls with more than 6 feet of retained materials, as measured vertically from the bottom of the wall footing at the heel to daylight, GSI recommends that the walls be evaluated for a seismic surcharge (in general accordance with 2019 CBC CBC requirements). The site walls in this category should maintain an overturning Factor-of-Safety (FOS) of approximately 1.25 when the seismic surcharge (increment), is applied. For restrained walls, the seismic surcharge should be applied as a uniform surcharge load from the bottom of the footing (excluding shear keys) to the top of the backfill

at the heel of the wall footing. This seismic surcharge pressure (seismic increment) may be taken as 25H where "H" for retained walls is the dimension previously noted as the height of the backfill to the bottom of the footing. The resultant force should be applied at a distance 0.6 H up from the bottom of the footing. For the evaluation of the seismic surcharge, the bearing pressure may exceed the static value by one-third, considering the transient nature of this surcharge. For cantilevered walls, the pressure should be applied as an inverted triangular distribution using 25H. For restrained walls, the pressure should be applied as a rectangular distribution. Please note this is for local wall stability only.

The 25H is derived from a Mononobe-Okabe solution for both restrained cantilever walls. This accounts for the increased lateral pressure due to shakedown or movement of the sand fill soil in the zone of influence from the wall or roughly a 45° - φ/2 plane away from the back of the wall. The 25H seismic surcharge is derived from the formula:

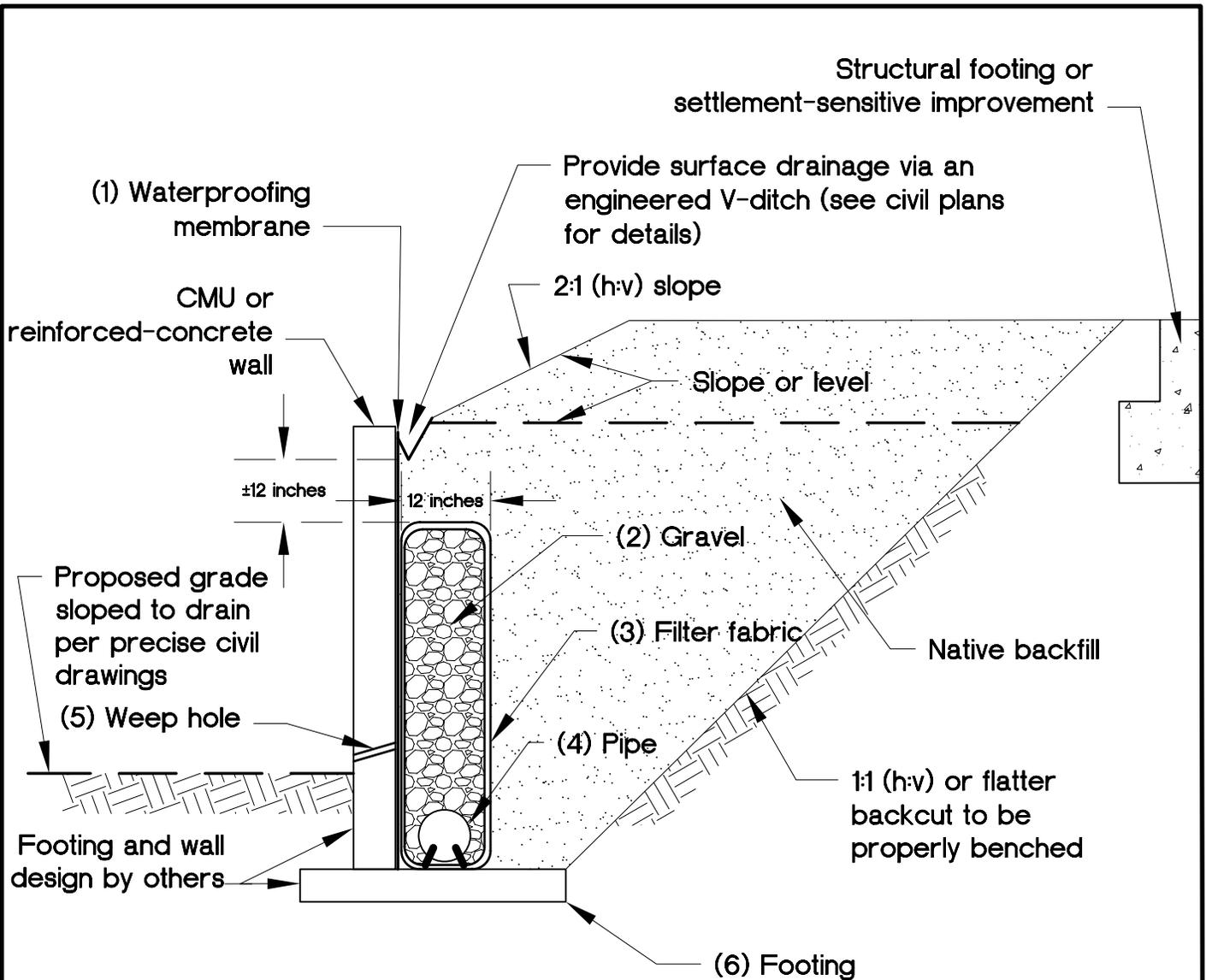
$$P_h = \frac{3}{8} \cdot a_h \cdot \gamma_t H$$

Where:

$P_h$	=	Seismic increment
$a_h$	=	Probabilistic horizontal site acceleration with a percentage of "g" and equivalent to at least $SD_g/2.5$ .
$\gamma_t$	=	total unit weight (115 pcf for site soils @ 90% relative compaction).
H	=	Height of the wall from the bottom of the footing or point of pile fixity.

### **Retaining Wall Backfill and Drainage**

Positive drainage must be provided behind all retaining walls in the form of gravel wrapped in geofabric and outlets. A backdrain system is considered necessary for retaining walls that are 2 feet or greater in height. Details 1, 2, and 3, present the backdrainage options discussed below. Backdrains should consist of a 4-inch diameter perforated PVC or ABS pipe encased in either Class 2 permeable filter material or 3/4-inch to 1 1/2-inch gravel wrapped in approved filter fabric (Mirafi 140 or equivalent). For select backfill, the filter material should extend a minimum of 1 horizontal foot behind the base of the walls and upward at least 1 foot. For native backfill that has up to E.I. = 50 (P.I. < 15), continuous Class 2 permeable drain materials should be used behind the wall. This material should be continuous (i.e., full height) behind the wall, and it should be constructed in accordance with the enclosed Detail 1 (Typical Retaining Wall Backfill and Drainage Detail). For limited access and confined areas, (panel) drainage behind the wall may be constructed in accordance with Detail 2 (Retaining Wall Backfill and Subdrain Detail Geotextile Drain). Materials with an expansion index (E.I.) potential of greater than 50 and/or P.I. > 15 should not be used as backfill for retaining walls. Retaining wall backfill materials should be moisture conditioned and mixed to achieve the soil's optimum moisture content, placed in relatively thin lifts (6 to 10 inches) with relatively light equipment, and compacted to at least 90 percent relative compaction. For more onerous expansive situations, backfill and drainage behind the retaining wall should conform with Detail 3 (Retaining Wall And Subdrain Detail Clean Sand Backfill).



(1) Waterproofing membrane.

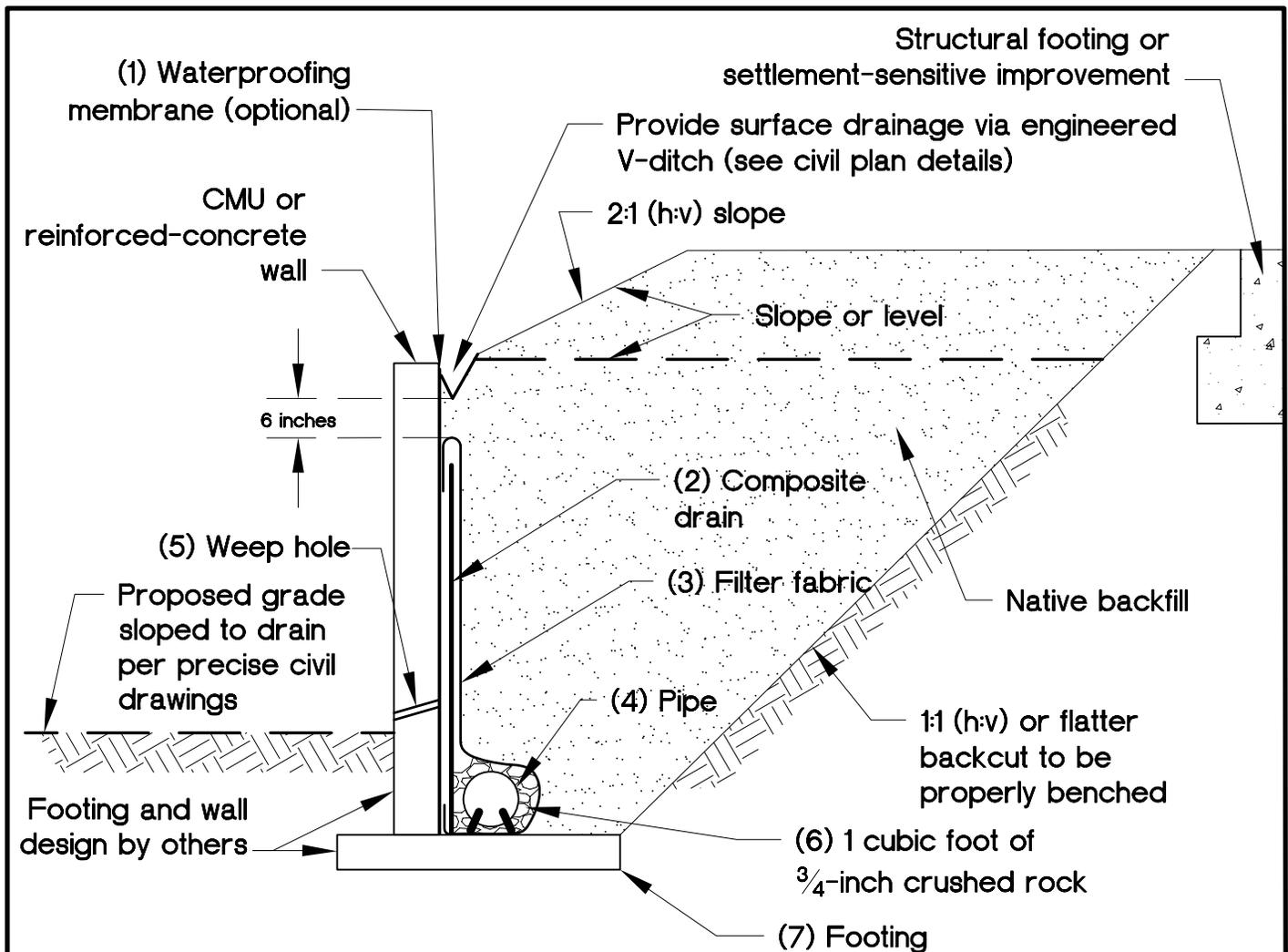
(2) Gravel: Clean, crushed,  $\frac{3}{4}$  to  $1\frac{1}{2}$  inch.

(3) Filter fabric: Mirafi 140N or approved equivalent.

(4) Pipe: 4-inch-diameter perforated PVC, Schedule 40, or approved alternative with minimum of 1 percent gradient sloped to suitable, approved outlet point (perforations down).

(5) Weep hole: Minimum 2-inch diameter placed at 20-foot centers along the wall and placed 3 inches above finished surface. Design civil engineer to provide drainage at toe of wall. No weep holes for below-grade walls.

(6) Footing: If bench is created behind the footing greater than the footing width, use level fill or cut natural earth materials. An additional "heel" drain will likely be required by geotechnical consultant.



(1) Waterproofing membrane (optional): Liquid boot or approved mastic equivalent.

(2) Drain: Miradrain 6000 or J-drain 200 or equivalent for non-waterproofed walls; Miradrain 6200 or J-drain 200 or equivalent for waterproofed walls (all perforations down).

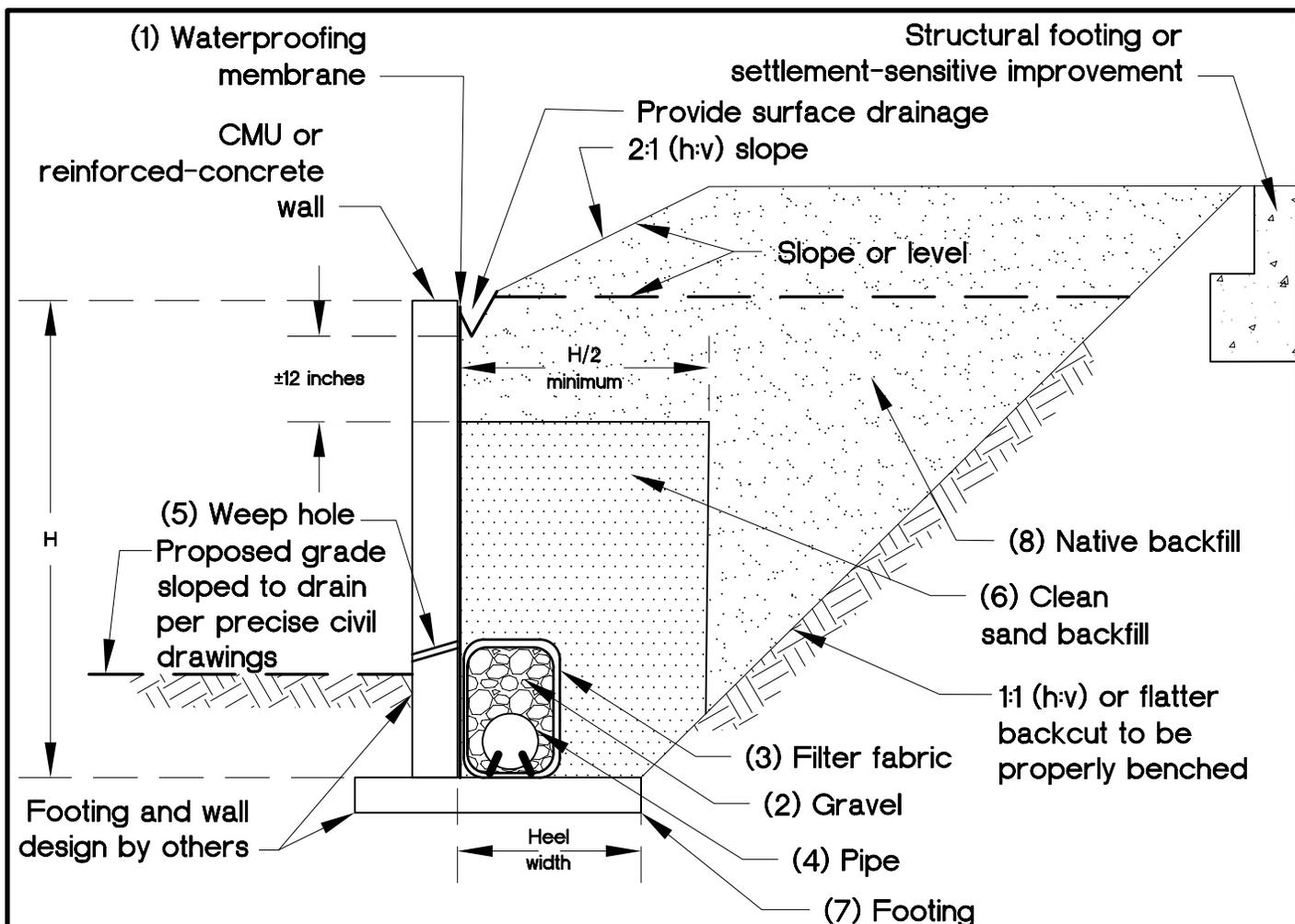
(3) Filter fabric: Mirafi 140N or approved equivalent; place fabric flap behind core.

(4) Pipe: 4-inch-diameter perforated PVC, Schedule 40, or approved alternative with minimum of 1 percent gradient to proper outlet point (perforations down).

(5) Weep hole: Minimum 2-inch diameter placed at 20-foot centers along the wall and placed 3 inches above finished surface. Design civil engineer to provide drainage at toe of wall. No weep holes for below-grade walls.

(6) Gravel: Clean, crushed,  $\frac{3}{4}$  to  $1\frac{1}{2}$  inch.

(7) Footing: If bench is created behind the footing greater than the footing width, use level fill or cut natural earth materials. An additional "heel" drain will likely be required by geotechnical consultant.



(1) Waterproofing membrane: Liquid boot or approved mastic equivalent.

(2) Gravel: Clean, crushed,  $\frac{3}{4}$  to  $1\frac{1}{2}$  inch.

(3) Filter fabric: Mirafi 140N or approved equivalent.

(4) Pipe: 4-inch-diameter perforated PVC, Schedule 40, or approved alternative with minimum of 1 percent gradient to proper outlet point (perforations down).

(5) Weep hole: Minimum 2-inch diameter placed at 20-foot centers along the wall and placed 3 inches above finished surface. Design civil engineer to provide drainage at toe of wall. No weep holes for below-grade walls.

(6) Clean sand backfill: Must have sand equivalent value (S.E.) of 35 or greater; can be densified by water jetting upon approval by geotechnical engineer.

(7) Footing: If bench is created behind the footing greater than the footing width, use level fill or cut natural earth materials. An additional "heel" drain will likely be required by geotechnical consultant.

(8) Native backfill: If E.I.  $< 21$  and S.E.  $> 35$  then all sand requirements also may not be required and will be reviewed by the geotechnical consultant.

Outlets should consist of a 4-inch diameter solid PVC or ABS pipe spaced no greater than  $\pm 100$  feet apart, with a minimum of two outlets, one on each end. The use of weep holes, only, in walls higher than 2 feet, is not recommended. The surface of the backfill should be sealed by pavement or the top 18 inches compacted with native soil ( $E.I. \leq 50$  and  $P.I. < 15$ ). Proper surface drainage should also be provided. For additional mitigation, consideration should be given to applying a water-proof membrane to the back of all retaining structures. The use of a waterstop should be considered for all concrete and masonry joints.

### **Wall/Retaining Wall Footing Transitions**

Site walls are anticipated to be founded on footings designed in accordance with the recommendations in this report. Should wall footings transition from cut to fill, the structural consultant/wall designer may specify either:

- a) A minimum of a 2-foot overexcavation and recompaction of cut materials for a distance of  $2H$ , from the point of transition.
- b) Increase of the amount of reinforcing steel and wall detailing (i.e., expansion joints or crack control joints) such that an angular distortion of  $1/360$  for a distance of  $2H$  on either side of the transition may be accommodated. Expansion joints should be placed no greater than 20 feet on-center, in accordance with the structural engineer's/wall designer's recommendations, regardless of whether or not transition conditions exist. Expansion joints should be sealed with a flexible, non-shrink grout.
- c) Embed the footings entirely into native formational material (i.e., deepened footings).

If transitions from cut to fill transect the wall footing alignment at an angle of less than 45 degrees (plan view), then the designer should follow recommendation "a" (above) and until such transition is between 45 and 90 degrees to the wall alignment.

### **Slope Setback Considerations for Footings**

Footings should maintain a horizontal distance,  $X$ , between any adjacent descending slope face and the bottom outer edge of the footing, and minimally comply with the guidelines depicted on Figure 1808.7.1 of the 2019 CBC. The horizontal distance,  $X$ , may be calculated by using  $X = h/3$ , where  $h$  is the height of the slope.  $X$  should not be less than 7 feet, nor need not be greater than 40 feet.  $X$  may be maintained by deepening the footings.

## **ONSITE INFILTRATION-RUNOFF RETENTION SYSTEMS**

The conclusions and recommendations for site specific basin design, included in the report by GSI (2019), should be implemented into project design. The following geotechnical guidelines should be considered when utilizing onsite infiltration-runoff retention systems (OIRRS):

- It is not good engineering practice to allow water to saturate soils, especially near slopes or improvements; however, the controlling agency/authority is now requiring this for OIRRS purposes on many projects.
- Impermeable liners used in conjunction with basins should consist of a 30-mil polyvinyl chloride (PVC) membrane that is covered by a minimum of 12-inches of clean soil, free from rocks and debris, at a maximum inclination of 4:1 (h:v), and meets the following minimum specifications:

Specific Gravity (ASTM D792): 1.2 (g/cc [min.]); Tensile (ASTM D882): 73 (lb/in-width [min.]); Elongation at Break (ASTM D882): 380 (% [min.]); Modulus (ASTM D882): 30 (lb/in-width [min.]); and Tear Strength (ASTM D1004): 8 (lbs [min.]); Seam Shear Strength (ASTM D882) 58.4 (lb/in [min.]); Seam Peel Strength (ASTM D882) 15 (lb/in [min.]).

- Subdrains should consist of at least a 4-inch diameter Schedule 40 or SDR 35 drain pipe with perforations oriented down. The drain pipe should be sleeved with a filter sock.
- Infiltrations systems should not be installed adjacent to pavement and/or hardscape improvements. Alternatively, deepened/thickened edges and curbs and/or impermeable liners may be utilized in areas adjoining the OIRRS. Backfill (to 10 feet outside of the basins) should consist of a two-sack mix of slurry, including deep inlets.
- Any proposed utility backfill materials (i.e., inlet/outlet piping and/or other subsurface utilities) located within or near the proposed area of the OIRRS may become saturated. This is due to the potential for piping, water migration, and/or seepage along the utility trench line backfill. If utility trenches cross and/or are proposed near the OIRRS, cut-off walls or other water barriers will need to be installed to mitigate the potential for piping and excess water entering the utility backfill materials. Planned or existing utilities may also be subject to piping of fines into open-graded gravel backfill layers unless separated from overlying or adjoining OIRRS by geotextiles and/or slurry backfill.

## **DRIVEWAY, CONCRETE APRONS, FLATWORK, AND OTHER IMPROVEMENTS**

The soil materials on site may be expansive. The effects of expansive soils are cumulative, and typically occur over the lifetime of any improvements. On relatively level areas, when the soils are allowed to dry, the dessication and swelling process tends to cause heaving and distress to flatwork and other improvements. The resulting potential for distress to improvements may be reduced, but not totally eliminated. To that end, it is recommended that the developer should notify any owners and/or interested/affected parties of this long-term potential for distress. To reduce the likelihood of distress, the following recommendations are presented for all exterior flatwork:

1. The subgrade area for concrete slabs should be compacted to achieve a minimum 90 percent relative compaction, and then be presoaked to 2 to 3 percentage points above (or 125 percent of) the soils' optimum moisture content, to a depth of 18 inches below subgrade elevation. If very low expansive soils are present, only optimum moisture content, or greater, is required and specific presoaking is not warranted. The moisture content of the subgrade should be proof tested within 72 hours prior to concrete placement.
2. Exterior concrete slabs should be cast over a non-yielding surface, consisting of a 4-inch layer of Class 2 base, crushed rock, gravel, or clean sand (or City/County minimum, whichever is greater), that should be compacted and level prior to placement of concrete. If very low expansive soils are present, the base, rock, gravel, or sand may be deleted. The layer or subgrade should be wet-down completely prior to placement of concrete, to minimize loss of concrete moisture to the surrounding earth materials.
3. Exterior slabs should be a minimum of 4 inches thick. Driveway slabs and approaches should additionally have a thickened edge (12 inches) adjacent to all landscape areas, to help impede infiltration of landscape water under the slab. Trash disposal (dumpster) area aprons should be a minimum of 6 inches thick and meet minimum City/County standards, as necessary.
4. The use of transverse and longitudinal control joints are recommended to help control slab cracking due to concrete shrinkage or expansion. Two ways to mitigate such cracking are: a) add a sufficient amount of reinforcing steel, increasing tensile strength of the slab; and, b) provide an adequate amount of control and/or expansion joints to accommodate anticipated concrete shrinkage and expansion.

In order to reduce the potential for unsightly cracks, slabs should be reinforced at mid-height with a minimum of No. 3 bars placed at 18 inches on center, in each direction. If subgrade soils within the top 7 feet from finish grade are very low expansive soils (i.e., E.I.  $\leq 20$ ), then 6x6-W1.4xW1.4 welded-wire mesh may be substituted for the rebar, provided the reinforcement is placed on chairs, at slab mid-height. The exterior slabs should be scored or saw cut,  $\frac{1}{2}$  to  $\frac{3}{8}$  inches deep, often enough so that no section is greater than 10 feet by 10 feet. For sidewalks or narrow slabs, control joints should be provided at intervals of every 6 feet. The slabs should be separated from the foundations and sidewalks with expansion joint filler material.

5. No traffic should be allowed upon the newly placed concrete slabs until they have been properly cured to within 75 percent of design strength. Concrete compression strength should be a minimum of 2,500 psi.

6. Driveways, sidewalks, and patio slabs adjacent to the structure should be separated from the structure with thick expansion joint filler material. In areas directly adjacent to a continuous source of moisture (i.e., irrigation, planters, etc.), all joints should be additionally sealed with flexible mastic.
7. Planters and walls (sound walls or retaining walls) should not be tied to the structure.
8. Overhang structures should be supported on the slabs, or structurally designed with continuous footings tied in at least two directions.
9. Any masonry landscape or sound walls that are to be constructed throughout the property should be grouted and articulated in segments no more than 20 feet long. These segments should be keyed or doweled together.
10. If settlement concerns or expansive soils are present, utilities may be enclosed within a closed utilidor (vault) or designed with flexible connections to accommodate differential settlement and expansive soil conditions.
11. Positive site drainage should be maintained at all times. Finish grade on the building pad should provide a minimum of 1 to 2 percent fall to the street, as indicated herein. It should be kept in mind that drainage reversals could occur, including post-construction settlement, if relatively flat drainage gradients are not periodically maintained by the owner and/or interested/affected parties.
12. Air conditioning (A/C) units should be supported by slabs that are incorporated into the building foundation or constructed on a rigid slab with flexible couplings for plumbing and electrical lines. A/C waste water lines should be drained to a suitable non-erosive outlet.
13. Shrinkage cracks could become excessive if proper finishing and curing practices are not followed. Finishing and curing practices should be performed per the Portland Cement Association (PCA) guidelines. Mix design should incorporate rate of curing for climate and time of year, sulfate content of soils, corrosion potential of soils, and fertilizers used on site.

## **DEVELOPMENT CRITERIA**

### **Maintenance and Planting**

Water has been shown to weaken the inherent strength of all earth materials. Slope stability is significantly reduced by overly wet conditions. Positive surface drainage away from slopes should be maintained and only the amount of irrigation necessary to sustain plant life should be provided for planted slopes. Over-watering should be avoided as it adversely affects site

improvements, and causes perched groundwater conditions. Graded slopes constructed utilizing onsite materials would be erosive. Eroded debris may be minimized and surficial slope stability enhanced by establishing and maintaining a suitable vegetation cover soon after construction. Compaction to the face of fill slopes would tend to minimize short-term erosion until vegetation is established. Plants selected for landscaping should be light weight, deep rooted types that require little water and are capable of surviving the prevailing climate. Jute-type matting or other fibrous covers may aid in allowing the establishment of a sparse plant cover. Utilizing plants other than those recommended above will increase the potential for perched water, staining, mold, etc., to develop. A rodent control program to prevent burrowing should be implemented. Irrigation of natural (ungraded) slope areas is generally not recommended. These recommendations regarding plant type, irrigation practices, and rodent control should be provided to the owner and/or other interested/affected parties. Over-steepening of slopes should be avoided during building construction activities and landscaping.

## **Drainage**

Adequate lot surface drainage is a very important factor in reducing the likelihood of adverse performance of foundations, hardscape, and slopes. Surface drainage should be sufficient to prevent ponding of water anywhere on the pad, and especially near structures and tops of slopes. Lot surface drainage should be carefully taken into consideration during fine grading, landscaping, and building construction. Therefore, care should be taken that future landscaping or construction activities do not create adverse drainage conditions. Positive site drainage within pads and common areas should be provided and maintained at all times. Post earthquake settlements and/or static fill settlements may cause drainage reversal(s) if drainage areas are relatively flat-lying. Drainage should not flow uncontrolled down any descending slope. Water should be directed away from foundations and not allowed to pond and/or seep into the ground. In general, the area within 5 feet around a structure should slope away from the structure. We recommend that unpaved lawn and landscape areas have a minimum gradient of 1 percent sloping away from structures, and whenever possible, should be above adjacent paved areas. Consideration should be given to avoiding construction of planters adjacent to structures (buildings, walls, etc.). Pad drainage should be directed toward the street or other approved area(s). Although not a geotechnical requirement, roof gutters, down spouts, or other appropriate means may be utilized to control roof drainage. Down spouts, or drainage devices should outlet a minimum of 5 feet from structures or into a subsurface drainage system. Areas of seepage may develop due to irrigation or heavy rainfall, and should be anticipated. Minimizing irrigation will lessen this potential. If areas of seepage develop, recommendations for minimizing this effect could be provided upon request.

## **Erosion Control**

Cut and fill slopes will be subject to surficial erosion during and after grading. Onsite earth materials have a moderate to high erosion potential. Consideration should be given to

providing hay bales and silt fences for the temporary control of surface water, from a geotechnical viewpoint.

### **Landscape Maintenance**

Only the amount of irrigation necessary to sustain plant life should be provided. Over-watering of landscape areas will adversely affect proposed site improvements. We would recommend that any proposed open-bottom planters adjacent to proposed structures be eliminated for a minimum distance of 10 feet. As an alternative, closed-bottom type planters could be utilized. An outlet placed in the bottom of the planter, could be installed to direct drainage away from structures or any exterior concrete flatwork. If planters are constructed adjacent to structures, the sides and bottom of the planter should be provided with a moisture retarder to prevent penetration of irrigation water into the subgrade. Provisions should be made to drain the excess irrigation water from the planters without saturating the subgrade below or adjacent to the planters. Graded slope areas should be planted with drought resistant vegetation. Consideration should be given to the type of vegetation chosen and their potential effect upon surface improvements (i.e., some trees will have an effect on concrete flatwork with their extensive root systems). From a geotechnical standpoint leaching is not recommended for establishing landscaping. If the surface soils are processed for the purpose of adding amendments, they should be recompact to 90 percent minimum relative compaction.

### **Gutters and Downspouts**

As previously discussed in the drainage section, the installation of gutters and downspouts should be considered to collect roof water that may otherwise infiltrate the soils adjacent to the structures. If utilized, the downspouts should be drained into PVC collector pipes or other non-erosive devices (e.g., paved swales or ditches; below grade, solid tight-lined PVC pipes; etc.), that will carry the water away from the structure, to an appropriate outlet, in accordance with the recommendations of the design civil engineer. Downspouts and gutters are not a requirement; however, from a geotechnical viewpoint, provided that positive drainage is incorporated into project design (as discussed previously).

### **Subsurface and Surface Water**

Subsurface and surface water are generally not anticipated to affect site development, provided that the recommendations contained in this report are incorporated into final design and construction and that prudent surface and subsurface drainage practices are incorporated into the construction plans. Perched groundwater conditions along zones of contrasting permeabilities may not be precluded from occurring in the future due to site irrigation, poor drainage conditions, or damaged utilities, and should be anticipated. Should perched groundwater conditions develop, this office could assess the affected area(s) and provide the appropriate recommendations to mitigate the observed groundwater conditions. Groundwater conditions may also change with the introduction of irrigation, rainfall, or other factors not obvious at the time of our field investigation.

## **Site Improvements**

If in the future, any additional improvements (e.g., walls, trash enclosures, pools/spas, etc.) are planned for the site, recommendations concerning the geological or geotechnical aspects of design and construction of said improvements could be provided upon request. These types of improvements should not be constructed without specific design and construction recommendations from GSI. This is especially true for pools/spas and improvements next to slopes. GSI should be notified in advance of any fill placement, grading of the site, or trench backfilling after rough grading has been completed. This includes any grading, utility trench and retaining wall backfills, flatwork, etc. These recommendations and advisories should be anticipated and disclosed to all owners and interested/affected parties.

## **Tile Flooring**

Tile flooring can crack, reflecting cracks in the concrete slab below the tile, although small cracks in a concrete slab may not be significant. Therefore, the designer should consider additional steel reinforcement for concrete slabs-on-grade where tile will be placed. The tile installer should consider installation methods that reduce possible cracking of the tile such as slipsheets. Slipsheets or a vinyl crack isolation membrane (approved by the Tile Council of America/Ceramic Tile Institute) are recommended between tile and concrete slabs on grade.

## **Additional Grading**

This office should be notified in advance of any fill placement, supplemental re-grading of the site, or trench backfilling after rough grading has been completed. Any grading should conform to the City grading guidelines and current OSHA regulations.

## **Footing Trench Excavation**

All footing excavations should be observed by a representative of this firm subsequent to trenching and prior to concrete form and reinforcement placement. The purpose of the observations is to evaluate that the excavations have been made into the recommended bearing material and to the minimum widths and depths recommended for construction. If loose or compressible materials are exposed within the footing excavation, a deeper footing or removal and recompaction of the subgrade materials would be recommended at that time. Footing trench spoil and any excess soils generated from utility trench excavations should be compacted to a minimum relative compaction of 90 percent, if not removed from the site.

## **Trenching/Temporary Construction Backcuts**

As indicated previously, unsupported excavations should be constructed in accordance with criteria established in Article 6 of the California, Code of Regulations (1996), Construction

Safety Orders (CAL-OSHA) for Type “C” soils. If excavations penetrate through properly compacted fill into the underlying fan deposits, and/or expose seepage conditions, the excavation walls should also be constructed for Type “C” soils.

Heavy equipment and/or stockpiles should not be placed within 5 feet, or “H” whichever is greater (where “H” is the height of the temporary slope or trench excavation), of any temporary slope or trench excavation. Additionally, heavy equipment should not be operated within 5 feet from the top of any temporary slope or trench excavation. Temporary slopes and trench excavations should be further evaluated during site grading. The possibility of inclining temporary slopes to a flatter gradient may be recommended if adverse soil conditions are observed. If the required gradient of any temporary slope or trench excavation conflicts with property boundaries, shoring may be necessary. If seepage is present, this recommendation should be altered to 10 feet or “2H.” Trench safety engineering is not within the area of expertise of GSI. Therefore, site safety, including shoring and trenching, should be incorporated into the site safety plan by the trenching contractor, with purview by the general contractor and by a qualified safety engineer. Should adverse conditions exist, appropriate recommendations would be offered at that time. The above recommendations should be provided to any contractors, subcontractors, owners, and/or interested/affected parties, etc., that may perform or be associated with such work.

### **Utility Trench Backfill**

1. All interior utility trench backfill should be brought to at least 2 percent above optimum moisture content and then compacted to obtain a minimum relative compaction of 90 percent of the laboratory standard. As an alternative for shallow (12-inch to 18-inch) under-slab trenches, sand having a sand equivalent (S.E.) value of 30 or greater may be utilized and jetted or flooded into place. Observation, probing, and testing should be provided to evaluate the desired results.
2. Exterior trenches adjacent to, and within areas extending below a 1:1 plane projected from the outside bottom edge of the footing, and all trenches beneath hardscape features and in slopes, should be compacted to at least 90 percent of the laboratory standard (ASTM D 1557). Sand backfill, unless excavated from the trench, should not be used in these backfill areas. Compaction testing and observations, along with probing, should be accomplished to evaluate the desired results.
3. As indicated above, all trench excavations should conform to CAL-OSHA, state, and local safety codes.
4. Utilities crossing grade beams, perimeter beams, or footings should either pass below the footing or grade beam utilizing a hardened collar or foam spacer, or pass

through the footing or grade beam in accordance with the recommendations of the structural engineer.

### **SUMMARY OF RECOMMENDATIONS REGARDING GEOTECHNICAL OBSERVATION AND TESTING**

We recommend that observation and/or testing be performed by GSI at each of the following construction stages:

- During grading/recertification.
- During excavation.
- During placement of subdrains, toe drains, or other subdrainage devices, prior to placing fill and/or backfill.
- After excavation of building footings, retaining wall footings, and free standing walls footings, prior to the placement of reinforcing steel or concrete.
- Prior to pouring any slabs or flatwork, after presoaking/presaturation of building pads and other flatwork subgrade, before the placement of concrete, reinforcing steel, capillary break (i.e., sand, pea-gravel, etc.), or vapor retarders.
- During retaining wall subdrain installation, prior to backfill placement.
- During placement of backfill for area drains, interior plumbing, utility line trenches, and retaining wall backfill.
- During slope construction/repair.
- When any unusual soil conditions are encountered during any construction operations, subsequent to the issuance of this report.
- When any developer or owner improvements, such as flatwork, foundations, walls, etc., are proposed, prior to construction. GSI should review and approve such plans, prior to construction
- A report of geotechnical observation and testing should be provided at the conclusion of each of the above stages, in order to provide concise and clear documentation of site work, and/or to comply with code requirements.
- GSI should review project sales documents to owners and interested/affected parties for geotechnical aspects, including irrigation practices, the conditions outlined above,

etc., prior to any sales. At that stage, GSI can provide owners and interested/affected parties maintenance guidelines which should be incorporated into such documents.

### **OTHER DESIGN PROFESSIONALS/CONSULTANTS**

The design civil engineer, structural engineer, post-tension designer, architect, landscape architect, wall designer, etc., should review the recommendations provided herein, incorporate those recommendations into all their respective plans, and by explicit reference, make this report part of their project plans. This report presents minimum design criteria for the design of slabs, foundations and other elements possibly applicable to the project. These criteria should not be considered as substitutes for actual designs by the structural engineer/designer. Please note that the recommendations contained herein are not intended to preclude the transmission of water or vapor through the slab or foundation. The structural engineer/foundation and/or slab designer should provide recommendations to not allow water or vapor to enter into the structure so as to cause damage to another building component, or so as to limit the installation of the type of flooring materials typically used for the particular application, per the State of California (2021).

The structural engineer/designer should analyze actual soil-structure interaction and consider, as needed, bearing, expansive soil influence, and strength, stiffness and deflections in the various slab, foundation, and other elements in order to develop appropriate, design-specific details. As conditions dictate, it is possible that other influences will also have to be considered. The structural engineer/designer should consider all applicable codes and authoritative sources where needed. If analyses by the structural engineer/designer result in less critical details than are provided herein as minimums, the minimums presented herein should be adopted. It is considered likely that some, more restrictive details will be required.

If the structural engineer/designer has any questions or requires further assistance, they should not hesitate to call or otherwise transmit their requests to GSI. In order to mitigate potential distress, the foundation and/or improvement's designer should confirm to GSI and the governing agency, in writing, that the proposed foundations and/or improvements can tolerate the amount of differential settlement and/or expansion characteristics and other design criteria specified herein.

### **PLAN REVIEW**

Final project plans (grading, foundation, pool, block wall, pavement, landscaping, etc.), should be reviewed by this office prior to construction, so that construction is in accordance with the conclusions and recommendations of this report. Based on our review, supplemental recommendations and/or further geotechnical studies may be warranted.

## **LIMITATIONS**

The materials encountered on the project site and utilized for our analysis are believed representative of the area; however, soil and bedrock materials vary in character between excavations and natural outcrops or conditions exposed during mass grading. Site conditions may vary due to seasonal changes or other factors.

Inasmuch as our study is based upon our review and engineering analyses and laboratory data, the conclusions and recommendations are professional opinions. These opinions have been derived in accordance with current standards of practice, and no warranty, either express or implied, is given. Standards of practice are subject to change with time. GSI assumes no responsibility or liability for work or testing performed by others, or their inaction; or work performed when GSI is not requested to be onsite, to evaluate if our recommendations have been properly implemented. Use of this report constitutes an agreement and consent by the user to all the limitations outlined above, notwithstanding any other agreements that may be in place. In addition, this report may be subject to review by the controlling authorities. Thus, this report brings to completion our scope of services for this portion of the project.

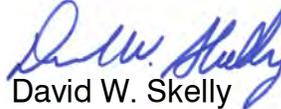
The opportunity to be of service is sincerely appreciated. If you should have any questions, please do not hesitate to contact our office.

Respectfully submitted,

**GeoSoils, Inc.**



Todd M. Page  
Engineering Geologist, CEG 2083



David W. Skelly  
Civil Engineer, RCE 47857



TMP/JPF/DWS/mn

Enclosures: Table 1 - Field Density Test Results  
Table 2 - As-Graded Conditions  
Appendix A - References  
Appendix B - Seismic Parameters  
Appendix C- General Earthwork, Grading Guidelines and Preliminary Criteria  
Plates 1 through 9 - Compaction Test Location Maps

Distribution: (3) Addressee (2 wet signed for governing agency and pdf copy)

**Table 1**

**FIELD DENSITY TEST RESULTS**

TEST NO.	DATE	TEST LOCATION	TRACT NO.	ELEV OR	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	REL COMP (%)	TEST METHOD	SOIL TYPE
				DEPTH (ft)					
BT-1	11/7/2005	Lot 33	31513	1595.0	6.6	117.1		ND	
BT-2	11/7/2005	Lot 58	31513	1495.5	8.9	113.8		ND	
BT-3	11/7/2005	Lot 74	31513	1498.5	7.9	116.9		ND	
4	11/7/2005	Lot 33	31513	1496.0	13.3	111.4	92.1	ND	A
5	11/7/2005	Lot 57	31513	1496.0	13.0	110.5	91.3	ND	A
6	11/7/2005	Lot 58	31513	1497.0	13.4	112.0	92.6	ND	A
7	11/7/2005	Lot 56	31513	1496.5	13.1	109.5	90.5	ND	A
8	11/7/2005	Street "B" 06+75	31513	1496.0	13.5	110.6	91.4	ND	A
9	11/7/2005	Street "B" 07+00	31513	1498.0	13.6	110.1	91.0	ND	A
10	11/10/2005	Lot 32	31513	1498.0	13.6	109.6	90.6	ND	A
11	11/10/2005	Lot 97	31513	1501.0	13.1	113.1	93.5	SC	A
12	11/10/2005	Lot 57	31513	1498.0	13.5	111.5	92.1	ND	A
BT-13	11/10/2005	Lot 101	31513	1508.5	4.7	129.5		ND	
14	11/14/2005	Lot 75	31513	1500.0	13.6	111.0	91.7	ND	A
15	11/14/2005	Lot 77	31513	1501.5	13.1	112.0	92.6	SC	A
16	11/14/2005	Lot 76	31513	1501.0	13.2	110.8	91.6	ND	A
17	11/14/2005	Lot 56	31513	1498.0	13.4	114.1	94.3	ND	A
18	11/14/2005	Lot 33	31513	1500.0	13.5	111.8	92.4	ND	A
19	11/15/2005	Lot 58	31513	1500.0	13.4	109.5	90.5	ND	A
20	11/15/2005	Lot 59	31513	1499.0	13.1	109.9	90.8	ND	A
21	11/15/2005	Lot 31	31513	1500.5	13.2	111.6	92.2	ND	A
22	11/15/2005	Lot 74	31513	1502.0	13.5	110.4	91.2	ND	A
23	11/15/2005	Lot 94	31513	1504.0	13.0	113.0	93.4	ND	A
24	11/17/2005	Lot 32	31513	1501.0	13.1	115.0	95.0	ND	A
25	11/17/2005	Street "B" 06+00	31513	1502.0	13.5	112.3	92.8	ND	A
26*	11/17/2005	Lot 57	31513	1501.0	10.0	108.3	89.5	ND	A
26A	11/17/2005	Lot 57	31513	1501.0	13.6	110.5	91.3	ND	A
27	11/17/2005	Lot 74	31513	1503.0	14.0	111.4	92.1	SC	A
28	11/17/2005	Lot 97	31513	1505.0	13.1	112.0	92.6	SC	A
29	11/17/2005	Street "D" 06+00	31513	1509.0	13.3	109.9	90.8	ND	A
30	11/18/2005	Lot 93	31513	1503.0	13.1	113.0	93.4	ND	A
31	11/18/2005	Lot 95	31513	1506.0	13.2	112.0	92.6	ND	A
32	11/18/2005	Lot 96	31513	1507.0	13.5	111.5	92.1	ND	A
33	11/18/2005	Lot 93	31513	1506.0	13.0	111.9	92.5	ND	A
34	11/21/2005	Lot 33	31513	1502.0	13.5	112.5	93.0	ND	A
35	11/21/2005	Lot 58	31513	1502.5	13.4	115.1	95.1	ND	A
36	11/21/2005	Lot 31	31513	1503.0	13.0	114.0	94.2	ND	A
37	11/22/2005	Lot 34	31513	1500.0	13.3	113.1	93.5	ND	A
38	11/22/2005	Lot 55	31513	1502.0	13.0	114.0	94.2	ND	A
39	11/22/2005	Lot 76	31513	1503.5	13.2	112.3	92.8	ND	A
40	12/28/2005	Lot 56	31513	1500.0	10.1	120.5	92.7	ND	F
41	12/28/2005	Lot 34	31513	1501.0	9.8	121.4	93.4	ND	F
42	12/29/2005	Street "B" 06+50	31513	1500.5	10.1	122.4	94.2	ND	F
43	12/29/2005	Lot 14	31513	1499.0	9.5	123.8	95.2	ND	F
44	12/30/2005	Lot 57	31513	1502.0	9.9	121.4	93.4	ND	F
45	12/30/2005	Lot 32	31513	1502.0	10.4	123.0	94.6	ND	F
46	12/30/2005	Lot 15	31513	1500.0	9.7	119.8	92.2	ND	F
BT-1'	8/28/2006	Lot 77	31513	1498.0	7.1	114.8		ND	
BT-2'	8/28/2006	Lot 101	31513	1508.5	4.7	129.5		ND	

**Table 1****FIELD DENSITY TEST RESULTS**

TEST NO.	DATE	TEST LOCATION	TRACT NO.	ELEV OR DEPTH (ft)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	REL COMP (%)	TEST METHOD	SOIL TYPE
BT-3'	8/28/2006	Lot 95	31513	1505.5	6.5	112.3		ND	
4'	8/28/2006	Burgos St 6+00	31513	1509.0	13.3	109.9	90.8	ND	A
5'	8/28/2006	Lot "B"	31513	1503.0	13.1	113.0	93.4	ND	A
6'	8/28/2006	Lot 97	31513	1501.0	13.1	113.1	93.5	ND	A
7'	8/28/2006	Basque St 6+75	31513	1498.0	13.5	110.6	91.4	ND	A
8'	8/28/2006	Lot 94	31513	1504.0	13.0	113.0	93.4	SC	A
9'	8/29/2006	Lot 76	31513	1501.0	13.2	110.8	91.6	ND	A
10'	8/29/2006	Lot 75	31513	1500.0	13.6	111.0	91.7	ND	A
11'	8/29/2006	Lot 77	31513	1501.5	13.1	112.0	92.6	SC	A
12*'	8/29/2006	Lot 96	31513	1504.0	12.8	106.3	87.9	ND	A
12A'	8/29/2006	Lot 96	31513	1504.0	13.9	110.5	91.3	ND	A
13'	8/29/2006	Lot 95	31513	1506.0	13.2	112.0	92.7	ND	A
14'	8/29/2006	Lot 76	31513	1503.0	13.7	109.5	90.5	ND	A
15'	8/29/2006	Lot 97	31513	1509.0	13.9	112.1	92.7	ND	A
16'	8/29/2006	Lot 96	31513	1507.0	13.4	110.2	91.1	ND	A
17'	8/29/2006	Burgos St 4+30	31513	1508.0	13.9	109.8	90.8	SC	A
18'	8/30/2006	Lot 103	31513	1509.0	13.8	110.3	91.2	ND	A
19'	8/30/2006	Lot 94	31513	1508.0	13.3	109.6	90.6	ND	A
20*'	8/30/2006	Lot 100	31513	1510.0	12.5	107.1	88.6	ND	A
20A'	8/30/2006	Lot 100	31513	1510.0	13.1	110.4	91.3	ND	A
21'	8/30/2006	Lot 77	31513	1505.0	15.4	105.3	92.4	ND	B
22'	8/30/2006	Lot 75	31513	1507.0	14.6	104.5	91.7	ND	B
23'	8/30/2006	Lot 96	31513	1510.0	15.0	104.7	91.9	ND	B
24'	8/30/2006	Lot 94	31513	1511.0	10.5	110.4	90.5	SC	C
25'	8/31/2006	Lot 75	31513	1509.0	10.8	111.6	91.5	ND	C
26'	8/31/2006	Lot 77	31513	1511.0	11.3	110.8	90.8	ND	C
27'	8/31/2006	Lot 76	31513	1512.0	11.9	112.4	92.2	ND	C
28'	8/31/2006	Lot 77	31513	1513.0	11.1	111.2	91.2	SC	C
29'	8/31/2006	Lot 97	31513	1512.0	10.9	110.6	90.7	ND	C
BT-30'	8/31/2006	Lot 96	31513	1512.0	10.6	111.4	91.4	ND	C
BT-31'	8/31/2006	Lot 34	31513	1494.0	8.6	112.8		ND	
BT-32'	8/31/2006	Lot 54	31513	1495.0	7.4	120.7		ND	
BT-33'	8/31/2006	Lot 76	31513	1497.0	9.1	110.5		ND	
34'	8/31/2006	Lot 36	31513	1496.0	15.3	103.3	90.6	ND	B
35'	8/31/2006	Lot 56	31513	1497.0	14.8	104.1	91.3	ND	B
36'	8/31/2006	Lot 53	31513	1497.0	14.6	103.7	91.0	ND	B
37'	8/31/2006	Lot 76	31513	1500.0	15.0	105.0	92.1	SC	B
38'	9/1/2006	Lot 55	31513	1498.0	14.8	103.9	91.2	ND	B
39'	9/1/2006	Basque St 8+15	31513	1500.0	15.3	103.4	90.7	ND	B
40'	9/1/2006	Lot 37	31513	1499.0	15.1	106.3	93.3	SC	B
41*'	9/1/2006	Lot 34	31513	1498.0	14.3	99.7	87.5	ND	B
41A'	9/1/2006	Lot 34	31513	1498.0	14.8	103.7	91.0	ND	B
42'	9/1/2006	Cantabria Wy 2+20	31513	1502.0	15.5	105.0	92.2	ND	B
43'	9/1/2006	Lot 76	31513	1502.0	15.7	105.6	92.7	ND	B
44'	9/1/2006	Lot 56	31513	1499.0	14.9	104.2	91.5	ND	B
45'	9/1/2006	Lot 36	31513	1500.0	15.1	104.7	91.9	SC	B
46'	9/1/2006	Lot 37	31513	1498.0	15.4	103.3	90.6	ND	B
47	9/5/2006	Basque St 8+60	31513	1503.0	10.8	113.9	93.4	ND	C
48	9/5/2006	Lot 55	31513	1501.0	11.0	111.8	91.7	ND	C

**Table 1****FIELD DENSITY TEST RESULTS**

TEST NO.	DATE	TEST LOCATION	TRACT NO.	ELEV OR DEPTH (ft)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	REL COMP (%)	TEST METHOD	SOIL TYPE
49	9/5/2006	Lot 37	31513	1502.0	11.4	112.0	91.8	SC	C
50	9/5/2006	Lot 53	31513	1502.0	13.9	106.8	90.6	ND	E
51	9/5/2006	Lot 35	31513	1500.0	13.2	107.9	91.5	ND	E
52*	9/5/2006	Basque St 7+20	31513	1503.0	12.8	103.2	87.5	ND	E
52A	9/5/2006	Basque St 7+20	31513	1503.0	13.6	107.2	90.9	ND	E
53	9/5/2006	Lot 56	31513	1502.0	11.1	113.1	92.7	SC	C
54	9/5/2006	Lot 54	31513	1503.0	13.4	108.0	91.5	ND	E
55	9/5/2006	Lot 34	31513	1502.0	10.9	112.5	92.2	ND	C
BT-56	9/5/2006	Lot 12	31513	1493.0	9.3	118.3		ND	
BT-57	9/5/2006	Lot 10	31513	1494.0	10.4	112.6		ND	
BT-58	9/5/2006	Lot 8	31513	1494.0	8.8	115.9		ND	
59	9/6/2006	Lot 13	31513	1495.0	14.0	108.1	91.6	SC	E
60	9/6/2006	Baeza St 5+90	31513	1496.0	13.8	107.0	90.8	ND	E
61*	9/6/2006	Lot 9	31513	1496.0	12.6	104.9	89.0	ND	E
61A	9/6/2006	Lot 9	31513	1496.0	13.3	107.2	90.9	ND	E
62	9/6/2006	Lot 7	31513	1497.0	11.5	112.9	92.6	ND	C
63	9/6/2006	Lot 12	31513	1497.0	11.1	111.6	91.5	SC	C
64	9/6/2006	Lot 10	31513	1498.0	14.2	107.0	90.7	ND	E
65	9/6/2006	Lot 8	31513	1498.0	13.9	107.8	91.4	ND	E
66	9/11/2006	Baeza St 7+50	31513	1499.0	11.3	111.0	91.0	ND	C
67	9/11/2006	Lot 53	31513	1505.0	10.6	113.1	92.7	ND	C
68	9/11/2006	Lot 35	31513	1504.0	11.1	112.3	92.1	SC	C
69	9/11/2006	Basque St 7+40	31513	1505.0	14.2	106.9	90.6	ND	E
70	9/11/2006	Lot 36	31513	1504.0	10.8	111.4	91.3	ND	C
71	9/11/2006	Lot 56	31513	1504.0	11.6	110.0	90.2	ND	C
BT-72	9/11/2006	Lot 6	31513	1491.0	7.7	122.0		ND	
BT-73	9/11/2006	Lot 4	31513	1492.0	6.9	121.4		ND	
BT-74	9/11/2006	Lot 2	31513	1491.0	3.5	120.5		ND	
75	9/12/2006	Lot 11	31513	1499.0	11.4	111.6	91.5	SC	C
76	9/12/2006	Baeza St 8+10	31513	1501.0	10.8	112.9	92.6	ND	C
77	9/12/2006	Baeza St 10+60	31513	1498.0	11.1	110.3	90.4	ND	C
78	9/12/2006	Lot 7	31513	1500.0	14.3	107.0	90.7	ND	E
79	9/12/2006	Lot 10	31513	1501.0	13.7	107.9	91.5	ND	E
80*	9/12/2006	Lot 13	31513	1500.0	12.5	103.7	87.9	ND	E
80A	9/12/2006	Lot 13	31513	1500.0	13.4	107.7	91.3	ND	E
81	9/12/2006	Baeza St 9+40	31513	1499.0	11.1	112.4	92.2	SC	C
82	9/12/2006	Baeza St 8+60	31513	1503.0	13.5	108.3	91.8	ND	E
83	9/12/2006	Lot 11	31513	1503.0	13.3	106.6	90.4	ND	E
84	9/13/2006	Lot 13	31513	1498.0	13.6	107.7	91.3	ND	E
85	9/13/2006	Lot 9	31513	1501.0	14.1	107.1	90.8	ND	E
86	9/13/2006	Lot 5	31513	1493.0	10.9	113.1	92.7	ND	C
87	9/13/2006	Lot 3	31513	1492.0	11.4	111.6	91.5	SC	C
88*	9/13/2006	Lot 2	31513	1493.0	9.3	106.4	87.2	ND	C
88A	9/13/2006	Lot 2	31513	1493.0	10.7	111.0	91.0	ND	C
89	9/13/2006	Slope Lot 6	31513	1495.0	10.9	112.6	92.3	ND	C
90	9/13/2006	Baeza St 12+20	31513	1494.0	10.6	110.5	90.6	ND	C
91	9/14/2006	Lot 13	31513	1502.0	15.6	104.2	91.4	ND	B
92	9/14/2006	Lot 12	31513	1503.0	11.1	113.0	92.6	SC	C
93	9/14/2006	Lot 10	31513	1504.0	10.8	111.1	91.1	ND	C

**Table 1****FIELD DENSITY TEST RESULTS**

TEST NO.	DATE	TEST LOCATION	TRACT NO.	ELEV OR DEPTH (ft)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	REL COMP (%)	TEST METHOD	SOIL TYPE
94	9/14/2006	Lot 4	31513	1494.0	11.4	112.5	92.3	ND	C
95	9/14/2006	Lot 8	31513	1502.0	13.6	106.1	90.0	ND	E
96	9/14/2006	Lot 1	31513	1495.0	14.1	107.7	91.3	ND	E
97	9/14/2006	Lot "D"	31513	1497.0	11.4	111.8	91.7	SC	C
98	9/14/2006	Lot 3	31513	1496.0	10.6	110.8	90.8	ND	C
99	9/14/2006	Baeza St 12+90	31513	1496.0	10.9	112.9	92.6	ND	C
100	9/15/2006	Lot 11	31513	1505.0	10.8	113.1	92.7	ND	C
101	9/15/2006	Lot 6	31513	1497.0	13.6	106.2	90.1	ND	E
102	9/15/2006	Lot 9	31513	1505.0	11.1	112.2	92.0	SC	C
103	9/15/2006	Lot 1	31513	1498.0	13.4	108.6	92.1	ND	E
104*	9/15/2006	Lot 4	31513	1498.0	12.0	102.9	87.2	ND	E
104A	9/15/2006	Lot 4	31513	1498.0	13.1	106.8	90.6	ND	E
105	9/15/2006	Lot 5	31513	1499.0	10.9	111.4	91.3	ND	C
106*	9/15/2006	Lot 6	31513	1500.0	9.8	107.9	88.5	ND	C
106A	9/15/2006	Lot 6	31513	1500.0	10.9	111.8	91.7	ND	C
107	9/15/2006	Lot 11	31513	1507.0	11.4	112.5	92.2	SC	C
108	9/15/2006	Lot 13	31513	1505.0	10.7	110.3	90.4	ND	C
109	9/15/2006	Lot 9	31513	1503.0	11.8	111.3	91.3	ND	C
110	9/15/2006	Lot 12	31513	1504.0	10.6	112.8	92.5	ND	C
111	9/18/2006	Lot 3	31513	1500.0	10.8	111.7	91.6	ND	C
112	9/18/2006	Lot 2	31513	1501.0	11.5	110.0	90.2	ND	C
113	9/18/2006	Baeza St 14+95	31513	1500.0	11.4	113.1	92.7	SC	C
114	9/18/2006	Lot 5	31513	1503.0	8.2	120.7	91.8	ND	D
115	9/18/2006	Lot 7	31513	1504.0	8.6	122.8	93.4	ND	D
116	9/18/2006	Lot 12	31513	1507.0	7.7	119.3	90.8	ND	D
117	9/18/2006	Lot 13	31513	1509.0	8.0	121.1	92.1	ND	D
118	9/18/2006	Lot 10	31513	14507.0	8.1	120.4	91.6	SC	D
119*	9/18/2006	Lot 8	31513	1506.0	7.3	115.7	88.0	ND	D
119A	9/18/2006	Lot 8	31513	1506.0	7.9	118.6	90.2	ND	D
120	9/18/2006	Lot 11	31513	1509.0	8.2	120.6	91.7	ND	D
BT-121	9/18/2006	Lot 39	31513	1494.0	6.5	116.9		ND	
BT-122	9/18/2006	Lot 41	31513	1492.5	7.5	119.3		ND	
BT-123	9/18/2006	Lot 43	31513	1495.0	7.2	114.7		ND	
BT-124	9/18/2006	Lot 45	31513	1497.0	8.4	120.5		ND	
125	9/19/2006	Lot 9	31513	1508.0	7.9	119.3	90.7	ND	D
126	9/19/2006	Lot 10	31513	1510.0	8.4	122.1	92.9	SC	D
127	9/19/2006	Lot 7	31513	1508.0	8.0	121.7	92.6	ND	D
128	9/19/2006	Lot 2	31513	1503.0	8.2	119.5	90.9	ND	D
129	9/19/2006	Lot 4	31513	1505.0	8.6	120.0	91.3	ND	D
130	9/19/2006	Lot 1	31513	1502.0	7.7	118.6	90.2	ND	D
131	9/19/2006	Lot 6	31513	1506.0	7.9	122.9	93.5	ND	D
132	9/19/2006	Lot 42	31513	1495.0	11.4	112.3	92.1	SC	C
133*	9/19/2006	Lot 43	31513	1496.0	10.3	108.6	89.1	ND	C
133A	9/19/2006	Lot 43	31513	1496.0	10.8	110.3	90.4	ND	C
134	9/19/2006	Lot 39	31513	1496.0	14.0	106.1	90.0	SC	E
135	9/19/2006	Baeza St 11+50	31513	1496.0	14.6	108.1	91.6	ND	E
136	9/20/2006	Lot 38	31513	1497.0	11.7	112.2	92.0	SC	C
137	9/20/2006	Lot 40	31513	1497.0	11.1	110.5	90.6	ND	C
138	9/20/2006	Lot 44	31513	1499.0	11.6	111.4	91.3	ND	C

**Table 1****FIELD DENSITY TEST RESULTS**

TEST NO.	DATE	TEST LOCATION	TRACT NO.	ELEV OR DEPTH (ft)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	REL COMP (%)	TEST METHOD	SOIL TYPE
139	9/20/2006	Lot 42	31513	1499.0	10.9	111.6	91.5	ND	C
140	9/20/2006	Lot 39	31513	1499.0	8.4	120.3	91.5	SC	D
141	9/20/2006	Baeza St 13+75	31513	1500.0	8.0	121.7	92.6	ND	D
142	9/20/2006	Lot 38	31513	1501.0	8.6	120.2	91.4	ND	D
143	9/20/2006	Lot 40	31513	1500.0	7.9	121.8	92.7	ND	D
144	9/20/2006	Lot 45	31513	1501.0	7.6	120.6	91.8	ND	D
145	9/20/2006	Lot 43	31513	1501.0	11.3	110.1	90.3	ND	C
146	9/20/2006	Lot 45	31513	1503.0	11.9	112.1	92.0	ND	C
147	9/20/2006	Lot 39	31513	1503.0	11.4	111.7	91.6	SC	C
BT-148	9/20/2006	Lot 52	31513	1495.0	7.4	115.2		ND	
BT-149	9/20/2006	Lot 50	31513	1494.0	7.7	119.0		ND	
BT-150	9/20/2006	Lot 48	31513	1494.0	7.9	116.5		ND	
BT-151	9/20/2006	Lot 46	31513	1502.0	6.4	121.4		ND	
152	9/21/2006	Lot 51	31513	1495.0	8.4	121.7	92.6	SC	D
153	9/21/2006	Lot 49	31513	1496.0	11.6	112.0	91.8	ND	C
154*	9/21/2006	Lot 47	31513	1498.0	10.3	106.6	87.4	ND	C
154A	9/21/2006	Lot 47	31513	1498.0	10.7	111.4	91.4	ND	C
155	9/21/2006	Lot 52	31513	1497.0	11.3	110.6	90.7	ND	C
156	9/21/2006	Baeza St 9+85	31513	1503.0	8.4	120.0	91.3	SC	D
157	9/21/2006	Lot 42	31513	1503.0	8.2	119.3	90.8	ND	D
158	9/21/2006	Lot 41	31513	1502.0	8.8	119.9	91.2	ND	D
159	9/21/2006	Lot 44	31513	1503.0	7.9	119.1	90.6	ND	D
160	9/21/2006	Lot 45	31513	1505.0	8.1	120.2	91.4	ND	D
161*	9/21/2006	Lot 38	31513	1505.0	7.0	116.8	88.9	ND	D
161A	9/21/2006	Lot 38	31513	1505.0	7.7	119.5	90.9	ND	D
162	9/22/2006	Lot 8	31513	1510.0	7.7	119.2	90.7	ND	D
163	9/22/2006	Lot 6	31513	1510.0	8.2	122.1	92.9	ND	D
164	9/22/2006	Lot 1	31513	1504.0	8.4	120.4	91.6	ND	D
165	9/22/2006	Lot 5	31513	1506.0	7.6	119.0	90.5	ND	D
166	9/22/2006	Lot 3	31513	1505.0	8.4	123.2	93.7	SC	D
167	9/22/2006	Lot 51	31513	1498.0	13.9	107.4	91.0	ND	E
168	9/22/2006	Lot 48	31513	1502.0	14.1	108.8	92.2	ND	E
169	9/22/2006	Lot 47	31513	1500.0	13.3	108.1	91.6	ND	E
170*	9/25/2006	Lot 52	31513	1500.0	7.5	116.3	88.5	ND	D
170A	9/25/2006	Lot 52	31513	1500.0	7.9	120.0	91.3	ND	D
171	9/25/2006	Lot 50	31513	1497.0	8.1	118.5	90.2	ND	D
172	9/25/2006	Lot 46	31513	1503.0	11.3	111.8	91.7	ND	C
173	9/25/2006	Lot 49	31513	1499.0	10.8	109.8	90.0	SC	C
174	9/25/2006	Basque St 9+75	31513	1501.0	10.6	111.7	91.6	ND	C
175	9/25/2006	Lot 50	31513	1501.0	11.9	112.6	92.4	ND	C
176	9/25/2006	Lot 47	31513	1504.0	11.0	112.0	91.8	ND	C
177	9/25/2006	Lot 49	31513	1503.0	11.4	112.2	92.0	SC	C
178	9/25/2006	Lot 46	31513	1505.0	10.7	111.7	91.6	ND	C
179	9/25/2006	Lot 48	31513	1505.0	11.6	110.3	90.4	ND	C
180	9/25/2006	Basque St 12+95	31513	1506.0	11.3	110.9	90.9	ND	C
181	9/25/2006	Lot 51	31513	1503.0	10.9	112.4	92.2	ND	C
BT-182	9/26/2006	Lot 21	31513	1493.5	7.7	116.4		ND	
BT-183	9/26/2006	Lot 19	31513	1493.0	6.9	119.0		ND	
BT-184	9/26/2006	Lot 17	31513	1493.0	8.1	116.9		ND	

**Table 1****FIELD DENSITY TEST RESULTS**

TEST NO.	DATE	TEST LOCATION	TRACT NO.	ELEV OR DEPTH (ft)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	REL COMP (%)	TEST METHOD	SOIL TYPE
BT-185	9/26/2006	Lot 15	31513	1494.0	8.6	115.2		ND	
186	9/26/2006	Lot 51	31513	1504.0	11.3	112.0	91.8	ND	C
187	9/26/2006	Lot 50	31513	1505.0	10.7	110.3	90.4	ND	C
188	9/26/2006	Lot 47	31513	1507.0	11.1	113.1	92.7	SC	C
189	9/26/2006	Lot 52	31513	1505.0	10.8	111.4	91.3	ND	C
190	9/26/2006	Lot 46	31513	1508.0	8.4	120.6	91.8	ND	D
191	9/26/2006	Lot 48	31513	1507.0	8.8	121.4	92.4	ND	D
192	9/26/2006	Lot 15	31513	1495.0	10.6	111.0	91.0	ND	C
193	9/26/2006	Lot 17	31513	1495.0	11.6	112.4	92.2	ND	C
194	9/26/2006	Lot 20	31513	1496.0	11.4	111.8	91.7	SC	C
195	9/27/2006	Lot 19	31513	1496.0	13.4	108.1	91.7	SC	E
196*	9/27/2006	Lot 16	31513	1496.0	12.1	102.9	87.2	ND	E
196A	9/27/2006	Lot 16	31513	1496.0	13.1	107.4	91.0	ND	E
197	9/27/2006	Lot 43	31513	1505.0	11.0	113.6	93.1	ND	C
198	9/27/2006	Lot 47	31513	1509.0	11.4	110.5	90.6	SC	C
199	9/27/2006	Lot 40	31513	1505.0	7.9	121.9	92.7	ND	D
200	9/27/2006	Lot 51	31513	1495.0	8.3	119.6	91.0	ND	D
201	9/27/2006	Lot 52	31513	1497.0	8.2	121.2	92.2	ND	D
202	9/27/2006	Lot 37	31513	1506.0	7.7	120.4	91.6	ND	D
203	9/27/2006	Lot 50	31513	1506.0	8.8	121.1	92.1	ND	D
204	9/28/2006	Rose Rd	31513	1501.5	8.3	119.7	91.0	ND	D
205	9/28/2006	Rose Rd	31513	1502.0	8.0	121.2	92.2	ND	D
206	9/28/2006	Rose Rd	31513	1502.0	8.8	119.1	90.6	ND	D
207	9/28/2006	Rose Rd	31513	1500.0	7.5	122.8	93.4	ND	D
208	9/28/2006	Rose Rd	31513	1501.0	7.9	121.6	92.5	SC	D
209	9/28/2006	Rose Rd	31513	1501.5	9.0	118.6	90.2	ND	D
210	9/28/2006	Rose Rd	31513	1501.0	8.5	120.6	91.7	ND	D
211	9/29/2006	Alturas	31513	1501.0	8.8	120.1	91.3	ND	D
212	9/29/2006	Alturas	31513	1500.0	7.9	121.9	92.7	ND	D
213	9/29/2006	Rose Rd	31513	1503.0	8.2	120.3	91.5	ND	D
214	9/29/2006	Rose Rd	31513	1503.0	9.0	118.9	90.4	ND	D
215	9/29/2006	Rose Rd	31513	1503.0	8.4	119.8	91.1	ND	D
216	9/29/2006	Rose Rd	31513	1504.0	8.0	122.3	93.0	ND	D
217	10/2/2006	Lot 43	31513	1507.0	11.4	112.0	91.8	ND	C
218	10/2/2006	Lot 41	31513	1507.0	11.0	112.9	92.5	ND	C
219	10/2/2006	Lot 39	31513	1506.5	12.1	110.3	90.4	ND	C
220	10/2/2006	Lot 36	31513	1506.0	10.8	114.3	93.7	ND	C
221	10/2/2006	Lot 56	31513	1504.0	10.5	115.3	94.5	SC	C
222	10/2/2006	Lot 53	31513	1507.0	11.7	111.1	91.1	ND	C
223	10/2/2006	Rose Rd	31513	1504.0	7.9	122.3	93.0	ND	D
224	10/2/2006	Rose Rd	31513	1503.5	8.6	119.5	90.9	ND	D
BT-225	10/3/2006	Lot 177	31513	1497.0	7.1	116.8		ND	
BT-226	10/3/2006	Lot 175	31513	1501.0	6.8	119.3		ND	
227	10/3/2006	Slope Lot 177	31513	1497.0	11.2	114.2	93.6	ND	C
228	10/3/2006	Alturas 3+15	31513	1501.0	10.9	111.6	91.5	ND	C
229	10/3/2006	Lot 176	31513	1498.0	8.4	121.5	92.4	SC	D
230	10/3/2006	Lot 177	31513	1500.0	7.7	119.3	90.8	ND	D
231*	10/3/2006	Alturas 1+70	31513	1500.0	9.9	107.7	88.3	ND	C
231A	10/3/2006	Alturas 1+70	31513	1500.0	10.8	111.7	91.6	ND	C

**Table 1****FIELD DENSITY TEST RESULTS**

TEST NO.	DATE	TEST LOCATION	TRACT NO.	ELEV OR DEPTH (ft)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	REL COMP (%)	TEST METHOD	SOIL TYPE
232	10/3/2006	Lot 176	31513	1504.0	11.3	112.5	92.2	ND	C
233	10/3/2006	Slope Lot 177	31513	1502.0	11.1	112.0	91.8	SC	C
234	10/3/2006	Lot 175	31513	1503.0	7.9	122.3	93.0	ND	D
235	10/3/2006	Rose Rd 11+70	31513	1502.0	11.8	110.5	90.6	ND	C
236	10/3/2006	Rose Rd 10+75	31513	1504.0	10.7	112.3	92.1	ND	C
237*	10/3/2006	Rose Rd 10+25	31513	1506.0	10.5	106.8	87.6	ND	C
237A	10/3/2006	Rose Rd 10+25	31513	1506.0	10.8	110.5	90.6	ND	C
BT-238	10/3/2006	Lot 79	31513	1499.0	8.9	110.4		ND	
BT-239	10/3/2006	Lot 81	31513	1497.0	9.3	109.6		ND	
BT-240	10/3/2006	Lot 90	31513	1501.0	7.2	116.0		ND	
241	10/4/2006	Lot 177	31513	1502.0	7.9	120.3	91.5	ND	D
242	10/4/2006	Lot 174	31513	1505.0	8.6	121.7	92.6	ND	D
243	10/4/2006	Altura St 2+70	31513	1505.0	8.4	119.8	91.1	SC	D
244	10/4/2006	Lot 177	31513	1504.0	8.0	118.9	90.4	ND	D
245	10/4/2006	Lot 2	31513	1507.0	11.1	113.1	92.7	ND	C
246	10/4/2006	Baeze St 12+80	31513	1504.0	10.6	110.1	90.3	ND	C
247	10/4/2006	Lot 4	31513	1508.0	8.8	121.7	92.6	ND	D
248	10/4/2006	Lot 3	31513	1509.0	8.0	120.6	91.8	SC	D
249	10/4/2006	Lot 175	31513	1506.0	7.7	123.1	93.7	ND	D
250	10/4/2006	Slope Lot 177	31513	1506.0	8.4	121.0	92.0	SC	D
251	10/4/2006	Lot 174	31513	1508.0	8.2	120.3	91.5	ND	D
252	10/4/2006	Lot 1	31513	1507.0	8.6	120.8	91.9	ND	D
BT-253	10/5/2006	Lot 173	31513	1508.0	6.4	119.5		ND	
BT-254	10/5/2006	Lot 171	31513	1510.0	7.2	117.3		ND	
BT-255	10/5/2006	Lot 169	31513	1511.0	6.9	120.4		ND	
BT-256	10/5/2006	Lot 167	31513	1513.0	6.7	118.3		ND	
257	10/5/2006	Lot 176	31513	1507.0	8.0	121.8	92.7	ND	D
258	10/5/2006	Lot 173	31513	1506.0	7.8	123.3	93.8	SC	D
259	10/5/2006	Lot 170	31513	1512.0	8.2	119.8	91.1	ND	D
260	10/5/2006	Lot 172	31513	1510.0	8.0	119.2	90.7	ND	D
261*	10/5/2006	Lot 175	31513	1509.0	6.9	117.3	89.2	ND	D
261A	10/5/2006	Lot 175	31513	1509.0	7.7	120.0	91.3	ND	D
262	10/5/2006	Lot 177	31513	1509.0	8.0	121.2	92.2	SC	D
263	10/5/2006	Lot 171	31513	1512.0	8.3	119.0	90.5	ND	D
264	10/5/2006	Lot 14	31513	1497.0	13.6	107.7	91.3	ND	E
265	10/5/2006	Slope Lot 19	31513	1498.0	13.9	109.4	92.7	ND	E
266	10/5/2006	Lot 15	31513	1498.0	14.4	107.8	91.4	ND	E
267	10/5/2006	Lot 20	31513	1498.0	11.6	112.0	91.8	ND	C
268	10/5/2006	Lot 18	31513	1500.0	11.8	112.2	92.0	ND	C
269	10/5/2006	Lot 14	31513	1500.0	11.1	110.6	90.7	SC	C
BT-270	10/5/2006	Lot 98	31513	1504.0	8.4	116.0		ND	
BT-271	10/5/2006	Lot 83	31513	1503.0	7.3	119.2		ND	
BT-272	10/5/2006	Lot 89	31513	1510.0	7.7	118.4		ND	
BT-273	10/5/2006	Lot 87	31513	1508.0	6.6	120.1		ND	
BT-274	10/5/2006	Lot 85	31513	1509.0	7.3	117.6		ND	
275	10/6/2006	Lot 21	31513	1499.0	11.3	111.4	91.4	ND	C
276	10/6/2006	Baeza St 4+25	31513	1499.0	11.6	110.6	90.7	ND	C
277	10/6/2006	Lot 16	31513	1501.0	11.4	113.1	92.8	SC	C
278	10/6/2006	Lot 19	31513	1501.0	10.9	111.1	91.1	ND	C

**Table 1**

**FIELD DENSITY TEST RESULTS**

TEST NO.	DATE	TEST LOCATION	TRACT NO.	ELEV OR DEPTH (ft)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	REL COMP (%)	TEST METHOD	SOIL TYPE
279	10/6/2006	Lot 5	31513	1510.0	8.5	121.4	92.3	ND	D
280	10/6/2006	Lot 1	31513	1510.0	7.7	120.4	91.6	ND	D
281	10/6/2006	Lot 167	31513	1514.0	8.0	121.7	92.6	SC	D
282	10/6/2006	Lot 168	31513	1515.0	7.9	118.7	90.3	ND	D
283	10/6/2006	Lot 176	31513	1511.0	8.5	121.2	92.2	ND	D
284	10/6/2006	Lot 173	31513	1512.0	8.8	120.3	91.5	ND	D
285	10/6/2006	Lot 169	31513	1515.0	7.8	121.0	92.0	ND	D
286	10/6/2006	Lot 166	31513	1516.0	8.4	122.4	93.1	SC	D
287*	10/6/2006	Lot 177	31513	1510.0	7.4	114.2	86.9	ND	D
287A	10/6/2006	Lot 177	31513	1510.0	7.6	119.2	90.7	ND	D
288	10/9/2006	Lot 4	31513	1511.0	8.2	120.6	91.7	ND	D
289	10/9/2006	Lot 3	31513	1511.0	8.7	119.0	90.5	ND	D
290	10/9/2006	Lot 1	31513	1512.0	8.4	119.3	90.8	SC	D
291	10/9/2006	Lot 2	31513	1512.0	7.9	121.7	92.6	ND	D
292	10/9/2006	Lot 174	31513	1511.0	8.3	120.3	91.5	ND	D
293	10/9/2006	Lot 176	31513	1512.0	8.8	121.0	92.0	ND	D
294	10/9/2006	Lot 91	31513	1503.0	7.6	120.0	91.3	ND	D
295	10/9/2006	Lot 89	31513	1507.0	8.8	121.7	92.6	SC	D
296	10/9/2006	Lot 90	31513	1505.0	8.0	120.6	91.8	ND	D
297	10/9/2006	Lot 172	31513	1513.0	8.4	121.7	92.6	SC	D
298	10/9/2006	Lot 167	31513	1518.0	7.9	120.5	91.7	ND	D
299	10/9/2006	Alturas St 5+60	31513	1513.0	8.3	122.0	92.8	ND	D
300	10/10/2006	Lot 175	31513	1513.0	7.6	121.8	92.7	ND	D
301	10/10/2006	Lot 170	31513	1514.0	8.0	120.2	91.4	SC	D
302*	10/10/2006	Lot 168	31513	1517.0	7.4	115.8	88.1	ND	D
302A	10/10/2006	Lot 168	31513	1517.0	7.7	120.4	91.6	ND	D
303	10/10/2006	Lot 170	31513	1516.0	7.9	122.1	92.9	ND	D
304	10/10/2006	Lot 171	31513	1515.0	8.3	118.9	90.5	ND	D
305	10/10/2006	Lot 174	31513	1514.0	8.8	123.1	93.6	SC	D
306	10/10/2006	Lot 172	31513	1515.0	8.1	119.9	91.2	ND	D
307	10/10/2006	Alturas St 4+25	31513	1505.0	7.9	121.2	92.2	ND	D
308	10/10/2006	Alturas St 6+85	31513	1509.0	7.6	122.3	93.0	ND	D
309	10/10/2006	Lot 91	31513	1506.0	8.6	121.5	92.4	ND	D
310	10/10/2006	Lot 88	31513	1510.0	8.4	119.1	90.6	SC	D
311	10/10/2006	Lot 89	31513	1512.0	8.0	120.3	91.5	ND	D
312	10/11/2006	Lot 91	31513	1508.0	8.0	122.9	93.5	SC	D
313	10/11/2006	Lot 90	31513	1508.0	8.4	120.4	91.6	ND	D
314	10/11/2006	Lot 88	31513	1514.0	8.2	120.6	91.8	ND	D
315	10/11/2006	Lot 90	31513	1511.0	8.9	118.8	90.4	ND	D
316	10/11/2006	Lot 91	31513	1510.0	7.7	121.2	92.2	ND	D
317	10/11/2006	Lot 89	31513	1511.0	8.4	120.4	91.6	SC	D
318*	10/11/2006	Lot 90	31513	1514.0	7.3	117.0	89.0	ND	D
318A	10/11/2006	Lot 90	31513	1514.0	8.8	119.6	91.0	ND	D
319	10/11/2006	Lot 87	31513	1511.0	7.6	121.0	92.0	ND	D
320	10/11/2006	Lot 20	31513	1501.0	11.1	111.6	91.5	SC	C
321	10/11/2006	Lot 15	31513	1502.0	10.8	112.5	92.3	ND	C
322	10/11/2006	Lot 14	31513	1504.0	11.3	110.8	90.8	ND	C
323	10/11/2006	Lot 18	31513	1502.0	11.0	111.4	91.4	ND	C
BT-324	10/11/2006	Lot 158	31513	1538.0	6.4	122.8		ND	

**Table 1****FIELD DENSITY TEST RESULTS**

TEST NO.	DATE	TEST LOCATION	TRACT NO.	ELEV OR DEPTH (ft)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	REL COMP (%)	TEST METHOD	SOIL TYPE
BT-325	10/11/2006	Lot 156	31513	1545.0	7.1	120.5		ND	
326	10/12/2006	Lot 17	31513	1502.0	10.8	111.7	91.6	ND	C
327	10/12/2006	Slope Lot 18	31513	1501.0	11.6	110.3	90.4	ND	C
328	10/12/2006	Lot 21	31513	1503.0	11.1	112.8	92.5	SC	C
329	10/12/2006	Lot 16	31513	1504.0	11.5	112.0	91.8	ND	C
330	10/12/2006	Lot 19	31513	1504.0	10.7	112.7	92.4	ND	C
331	10/12/2006	Slope Lot 21	31513	1503.0	11.9	111.0	91.0	ND	C
332	10/12/2006	Lot 18	31513	1504.0	11.3	111.4	91.3	ND	C
BT-333	10/12/2006	Lot 23	31513	1493.0	8.6	113.4		ND	
BT-334	10/12/2006	Lot 27	31513	1495.0	9.3	111.7		ND	
BT-335	10/12/2006	Lot 29	31513	1494.0	8.8	110.8		ND	
336	10/13/2006	Lot 157	31513	1544.0	8.4	121.6	92.5	SC	D
337	10/13/2006	Lot 158	31513	1541.0	7.9	120.0	91.3	ND	D
338	10/13/2006	Lot 155	31513	1549.0	8.6	121.4	92.4	ND	D
339	10/13/2006	Lot 157	31513	1546.0	8.3	121.2	92.2	ND	D
340	10/13/2006	Lot 156	31513	1548.0	7.7	120.6	91.7	ND	D
341	10/13/2006	Lot 158	31513	1544.0	8.0	123.3	93.8	SC	D
342	10/13/2006	Lot 20	31513	1505.0	11.6	112.5	92.3	ND	C
343	10/13/2006	Lot 17	31513	1506.0	10.8	110.6	90.7	ND	C
344	10/13/2006	Slope Lot E	31513	1495.0	11.4	111.4	91.3	SC	C
345	10/13/2006	Lot 15	31513	1506.0	11.8	112.7	92.4	ND	C
346	10/13/2006	Slope Rose Rd 7+40	31513	1498.0	10.6	114.2	93.6	ND	C
347	10/13/2006	Lot 19	31513	1506.0	10.9	112.0	91.8	ND	C
BT-348	10/13/2006	Lot 31	31513	1495.0	9.4	109.9		ND	
BT-349	10/13/2006	Lot 33	31513	1494.0	10.1	113.6		ND	
350	10/16/2006	Lot 21	31513	1506.0	10.8	111.6	91.5	ND	C
351	10/16/2006	Lot 18	31513	1507.0	11.1	113.1	92.8	SC	C
352	10/16/2006	Lot 14	31513	1508.0	10.7	110.6	90.7	ND	C
353	10/16/2006	Lot 16	31513	1508.0	11.3	110.3	90.5	ND	C
354	10/16/2006	Valor St 2+40	31513	1496.0	11.5	112.5	92.2	ND	C
355	10/16/2006	Lot 27	31513	1497.0	13.5	110.8	91.6	SC	A
356*	10/16/2006	Lot 30	31513	1496.0	12.6	103.9	85.9	ND	A
356A	10/16/2006	Lot 30	31513	1496.0	13.5	109.4	90.5	ND	A
357	10/16/2006	Lot 32	31513	1497.0	13.8	111.4	92.1	SC	A
358	10/16/2006	Lot 31	31513	1498.0	11.4	111.7	91.6	ND	C
359	10/16/2006	Lot 26	31513	1499.0	13.7	111.3	92.0	ND	A
360	10/16/2006	Baeza St 1+40	31513	1498.0	10.8	111.6	91.5	ND	C
361*	10/16/2006	Lot 29	31513	1498.0	10.0	107.5	88.2	ND	C
361A	10/16/2006	Lot 29	31513	1498.0	10.7	111.3	91.3	ND	C
362	10/16/2006	Baeza St 5+60	31513	1498.0	13.7	112.0	92.6	ND	A
363	10/16/2006	Lot 33	31513	1499.0	13.3	110.6	91.5	ND	A
364	10/16/2006	Lot 30	31513	1500.0	11.4	111.8	91.7	SC	C
365	10/16/2006	Lot 28	31513	1499.0	11.1	110.9	90.9	ND	C
366	10/17/2006	Lot 89	31513	1516.0	11.3	112.7	92.4	ND	C
367	10/17/2006	Basque St 12+35	31513	1508.0	10.8	110.5	90.6	ND	C
368	10/17/2006	Lot 91	31513	1512.0	11.1	113.6	93.1	SC	C
369	10/17/2006	Lot 45	31513	1507.0	11.6	113.1	92.8	ND	C
370	10/17/2006	Lot 42	31513	1509.0	10.6	112.4	92.2	ND	C
371	10/17/2006	Lot 51	31513	1507.0	11.5	111.8	91.7	ND	C

**Table 1**

**FIELD DENSITY TEST RESULTS**

TEST NO.	DATE	TEST LOCATION	TRACT NO.	ELEV OR DEPTH (ft)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	REL COMP (%)	TEST METHOD	SOIL TYPE
372	10/17/2006	Lot 44	31513	1508.0	11.9	110.3	90.4	ND	C
373	10/17/2006	Lot 49	31513	1508.0	11.7	113.4	93.0	ND	C
374	10/17/2006	Lot 40	31513	1508.0	11.4	113.2	92.8	SC	C
375	10/17/2006	Lot 46	31513	1510.0	11.0	111.7	91.6	ND	C
376	10/17/2006	Lot 48	31513	1510.0	10.7	110.7	90.8	ND	C
377	10/17/2006	Lot 52	31513	1509.0	11.3	110.2	90.4	ND	C
378	10/17/2006	Lot 38	31513	1509.0	11.4	112.5	92.3	SC	C
379	10/17/2006	Lot 45	31513	1510.0	10.9	111.7	91.6	ND	C
380	10/18/2006	Lot 41	31513	1510.0	10.6	110.3	90.5	ND	C
381	10/18/2006	Lot 39	31513	1510.0	10.7	112.3	92.1	ND	C
382	10/18/2006	Lot 46	31513	1511.0	11.5	111.7	91.6	ND	C
383*	10/18/2006	Lot 44	31513	1512.0	9.9	105.8	86.7	ND	C
383A	10/18/2006	Lot 44	31513	1512.0	11.1	111.2	91.2	ND	C
384	10/18/2006	Lot 42	31513	1511.0	10.8	112.7	92.4	SC	C
385	10/18/2006	Lot 51	31513	1510.0	10.5	111.0	91.0	ND	C
386	10/18/2006	Lot 49	31513	1512.0	11.3	113.1	92.7	ND	C
387	10/18/2006	Lot 47	31513	1512.0	10.8	111.4	91.3	ND	C
388	10/18/2006	Lot 46	31513	1514.0	11.4	112.0	91.8	SC	C
389	10/18/2006	Lot 91	31513	1514.0	10.7	110.4	90.5	ND	C
390	10/18/2006	Lot 48	31513	1513.0	11.3	110.1	90.3	ND	C
391	10/18/2006	Lot 46	31513	1515.0	11.6	113.1	92.7	ND	C
BT-392	10/18/2006	Lot 24	31513	1497.0	7.0	121.3		ND	
BT-393	10/18/2006	Lot 65	31513	1497.0	8.4	118.7		ND	
BT-394	10/18/2006	Lot 63	31513	1496.0	7.2	120.5		ND	
BT-395	10/18/2006	Lot 61	31513	1497.0	7.7	120.0		ND	
396	10/19/2006	Lot 45	31513	1512.0	10.8	111.4	91.4	ND	C
397	10/19/2006	Lot 34	31513	1503.0	11.2	113.1	92.8	ND	C
398	10/19/2006	Lot 55	31513	1506.0	11.6	111.0	91.1	ND	C
399	10/19/2006	Lot 27	31513	1501.0	11.4	110.5	90.6	SC	C
400	10/19/2006	Lot 31	31513	1501.0	11.0	113.9	93.4	ND	C
401	10/19/2006	Lot 32	31513	1502.0	10.5	112.4	92.2	ND	C
402	10/19/2006	Lot 29	31513	1502.0	11.1	112.0	91.8	SC	C
403*	10/19/2006	Baeza St 1+95	31513	1500.0	10.2	108.6	89.1	ND	C
403A	10/19/2006	Baeza St 1+95	31513	1500.0	11.8	111.2	91.2	ND	C
404	10/19/2006	Lot 26	31513	1502.0	11.3	111.8	91.7	ND	C
405	10/19/2006	Lot 30	31513	1503.0	11.6	112.8	92.5	ND	C
406	10/19/2006	Lot 59	31513	1504.0	11.7	113.1	92.7	SC	C
407	10/19/2006	Lot 62	31513	1498.0	13.9	110.8	91.6	ND	A
408	10/19/2006	Lot 64	31513	1499.0	13.3	109.0	90.1	ND	A
409	10/19/2006	Lot 57	31513	1504.0	13.9	110.3	91.2	ND	A
410	10/19/2006	Lot 23	31513	1499.0	14.0	109.6	90.6	SC	A
411	10/19/2006	Lot 28	31513	1503.0	13.6	110.0	90.9	ND	A
412	10/20/2006	Lot 32	31513	1503.0	10.8	110.3	90.4	ND	C
413	10/20/2006	Lot 27	31513	1505.0	11.3	112.9	92.6	ND	C
414	10/20/2006	Lot 60	31513	1499.0	10.9	111.1	91.1	ND	C
415	10/20/2006	Lot 31	31513	1505.0	11.4	110.7	90.8	SC	C
416	10/20/2006	Lot 23	31513	1502.0	11.8	111.6	91.5	ND	C
417	10/20/2006	Lot 58	31513	1506.0	10.6	113.4	93.0	ND	C
418	10/20/2006	Lot 34	31513	1506.0	11.1	112.4	92.2	SC	C

**Table 1****FIELD DENSITY TEST RESULTS**

TEST NO.	DATE	TEST LOCATION	TRACT NO.	ELEV OR DEPTH (ft)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	REL COMP (%)	TEST METHOD	SOIL TYPE
419	10/20/2006	Lot 54	31513	1508.0	11.7	111.8	91.7	ND	C
420	10/20/2006	Lot 35	31513	1508.0	12.3	110.3	90.5	ND	C
421	10/20/2006	Lot 50	31513	1512.0	10.8	112.0	91.9	ND	C
422	10/20/2006	Lot 49	31513	1513.0	11.7	113.2	92.8	ND	C
423	10/20/2006	Lot 37	31513	1510.0	11.3	112.2	92.0	ND	C
424	10/20/2006	Lot 52	31513	1512.0	11.1	111.7	91.6	SC	C
BT-425	10/20/2006	Lot 106	31513	1500.0	8.0	119.3		ND	
BT-426	10/20/2006	Lot 104	31513	1507.0	8.4	120.4		ND	
BT-427	10/20/2006	Lot 99	31513	1510.0	7.6	117.3		ND	
428	10/23/2006	Lot 25	31513	1501.0	13.6	107.5	91.1	ND	E
429*	10/23/2006	Lot 36	31513	1509.0	11.6	104.2	88.4	ND	E
429A	10/23/2006	Lot 36	31513	1509.0	14.4	107.1	90.8	ND	E
430	10/23/2006	Lot 33	31513	1507.0	11.1	112.5	92.3	SC	C
431	10/23/2006	Lot 34	31513	1509.0	10.6	110.5	90.6	ND	C
432	10/23/2006	Lot 29	31513	1505.0	10.9	111.6	91.5	ND	C
433	10/23/2006	Lot 30	31513	1507.0	11.7	112.0	91.8	ND	C
434	10/23/2006	Lot 32	31513	1508.0	13.9	108.1	91.6	ND	E
435	10/23/2006	Lot 28	31513	1507.0	10.8	112.6	92.4	SC	C
436	10/23/2006	Lot 61	31513	1501.0	10.9	111.8	91.7	ND	C
437	10/23/2006	Lot 62	31513	1502.0	11.1	112.5	92.2	ND	C
438	10/23/2006	Lot 60	31513	1503.0	11.5	110.3	90.4	ND	C
439	10/23/2006	Lot 57	31513	1508.0	11.4	112.2	92.0	SC	C
440	10/23/2006	Lot 55	31513	1510.0	10.8	111.7	91.6	ND	C
441	10/23/2006	Lot 58	31513	1508.0	10.8	111.8	91.7	ND	C
442*	10/23/2006	Lot 61	31513	1505.0	10.3	108.7	89.2	ND	C
442A	10/23/2006	Lot 61	31513	1505.0	11.0	110.7	90.8	ND	C
443	10/23/2006	Lot 59	31513	1506.0	11.4	112.7	92.4	SC	C
444	10/23/2006	Lot 53	31513	1512.0	11.1	111.7	91.6	ND	C
445	10/23/2006	Lot 57	31513	1510.0	11.6	112.2	92.0	ND	C
446	10/23/2006	Lot 167	31513	FG	7.6	121.8	92.7	ND	D
447	10/23/2006	Lot 168	31513	FG	8.1	120.0	91.3	ND	D
448	10/23/2006	Lot 169	31513	FG	7.7	121.9	92.8	ND	D
449	10/23/2006	Lot 170	31513	FG	8.4	120.3	91.5	ND	D
450	10/23/2006	Lot 171	31513	FG	7.9	119.3	90.8	ND	D
451	10/23/2006	Lot 172	31513	FG	7.5	120.8	91.9	ND	D
452	10/23/2006	Lot 173	31513	FG	8.8	119.0	90.5	ND	D
453	10/23/2006	Lot 174	31513	FG	8.5	121.1	92.1	ND	D
454*	10/24/2006	Lot 106	31513	1500.0	12.0	103.2	87.5	ND	E
454A	10/24/2006	Lot 106	31513	1500.0	13.3	107.7	91.3	ND	E
455	10/24/2006	Lot 63	31513	1499.0	11.9	110.5	90.6	ND	C
456	10/24/2006	Lot G	31513	1498.0	11.7	113.1	92.7	SC	C
457	10/24/2006	Lot 102	31513	1510.0	11.8	111.6	91.5	ND	C
458	10/24/2006	Lot 105	31513	1506.0	13.6	108.8	92.2	ND	E
459	10/24/2006	Lot 100	31513	1510.0	7.9	119.3	90.8	ND	D
460	10/24/2006	Lot 85	31513	1512.0	7.8	120.0	91.3	ND	D
461*	10/24/2006	Lot 24	31513	1501.0	7.0	116.2	88.4	SC	D
461A	10/24/2006	Lot 24	31513	1501.0	8.0	119.3	90.7	SC	D
462	10/24/2006	Lot 106	31513	1504.0	8.4	121.5	92.4	ND	D
463	10/24/2006	Lot 63	31513	1503.0	7.8	120.4	91.6	ND	D

**Table 1****FIELD DENSITY TEST RESULTS**

TEST NO.	DATE	TEST LOCATION	TRACT NO.	ELEV OR DEPTH (ft)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	REL COMP (%)	TEST METHOD	SOIL TYPE
464	10/24/2006	Lot 65	31513	1503.0	8.2	119.3	90.8	ND	D
465	10/24/2006	Lot 104	31513	1509.0	8.6	122.4	93.1	ND	D
466	10/24/2006	Lot 101	31513	1511.0	8.0	121.6	92.5	SC	D
467	10/24/2006	Basque St 2+15	31513	1502.0	7.8	119.9	91.3	ND	D
468	10/24/2006	Lot 24	31513	1500.0	8.4	120.7	91.8	ND	D
469	10/24/2006	Lot 62	31513	1504.0	8.8	118.5	90.2	ND	D
470	10/24/2006	Lot 86	31513	1511.0	7.6	120.6	91.7	ND	D
471	10/24/2006	Lot 175	31513	FG	8.8	122.9	93.5	SC	D
472	10/24/2006	Lot 176	31513	FG	8.3	122.0	92.8	ND	D
473	10/24/2006	Lot 177	31513	FG	7.9	118.8	90.4	ND	D
474	10/24/2006	Lot 1	31513	FG	11.4	112.4	92.2	ND	C
475	10/24/2006	Lot 2	31513	FG	10.9	111.7	91.6	ND	C
476	10/24/2006	Lot 3	31513	FG	11.6	110.7	90.8	ND	C
477	10/24/2006	Lot 4	31513	FG	11.1	111.8	91.7	SC	C
478	10/25/2006	Lot 106	31513	1508.0	11.6	111.4	91.4	ND	C
479	10/25/2006	Lot 103	31513	1511.0	10.9	113.1	92.8	ND	C
480	10/25/2006	Lot 100	31513	1513.0	11.1	110.5	90.6	ND	C
481	10/25/2006	Lot 101	31513	1513.0	11.4	111.4	91.3	SC	C
482	10/25/2006	Lot 102	31513	1512.0	11.7	112.2	92.0	ND	C
483	10/25/2006	Burgos St 1+70	31513	1505.0	10.8	111.6	91.5	SC	C
484	10/25/2006	Lot 105	31513	1510.0	10.6	114.4	93.8	ND	C
485	10/25/2006	Lot 104	31513	1511.0	10.9	111.2	91.2	ND	C
486	10/25/2006	Lot 106	31513	1510.0	11.3	111.8	91.7	ND	C
487	10/25/2006	Lot 64	31513	1505.0	11.9	112.6	92.4	ND	C
488	10/25/2006	Lot 60	31513	1507.0	11.1	110.3	90.5	SC	C
489	10/25/2006	Lot 25	31513	1504.0	11.8	112.0	91.8	ND	C
490*	10/25/2006	Baeza St 1+00	31513	1502.0	10.3	107.2	87.9	ND	C
490A	10/25/2006	Baeza St 1+00	31513	1502.0	10.9	110.0	90.2	ND	C
491	10/25/2006	Lot 5	31513	FG	11.3	112.9	92.6	ND	C
492	10/25/2006	Lot 6	31513	FG	10.6	111.4	91.3	ND	C
493	10/25/2006	Lot 7	31513	FG	10.9	112.0	91.8	ND	C
494	10/25/2006	Lot 8	31513	FG	11.5	112.4	92.2	ND	C
495	10/25/2006	Lot 9	31513	FG	11.8	110.6	90.7	ND	C
496	10/25/2006	Lot 10	31513	FG	10.7	111.4	91.3	ND	C
497	10/25/2006	Lot 11	31513	FG	11.1	111.0	91.0	ND	C
498	10/26/2006	Lot 75	31513	1506.0	10.8	111.0	91.0	ND	C
499	10/26/2006	Lot 92	31513	1505.0	11.6	111.6	91.5	ND	C
500	10/26/2006	Lot 95	31513	1510.0	11.1	110.7	90.8	SC	C
501	10/26/2006	Lot 74	31513	1506.0	7.8	121.8	92.7	ND	D
502	10/26/2006	Lot "G"	31513	1504.0	8.4	120.0	91.3	ND	D
503	10/26/2006	Lot 27	31513	1507.0	11.3	111.4	91.3	ND	C
504	10/26/2006	Lot 59	31513	1508.0	11.4	112.9	92.6	SC	C
505*	10/26/2006	Lot 24	31513	1503.0	105.0	104.8	86.0	ND	C
505A	10/26/2006	Lot 24	31513	1503.0	10.9	111.2	91.2	ND	C
506	10/26/2006	Lot 25	31513	1506.0	11.6	110.3	90.5	ND	C
507	10/26/2006	Lot 23	31513	1506.0	10.8	111.3	91.3	ND	C
508	10/26/2006	Lot 58	31513	1510.0	11.5	110.7	90.8	ND	C
509	10/27/2006	Lot 93	31513	1506.0	11.8	111.7	91.6	ND	C
510	10/27/2006	Lot 94	31513	1508.0	10.7	112.8	92.5	ND	C

**Table 1****FIELD DENSITY TEST RESULTS**

TEST NO.	DATE	TEST LOCATION	TRACT NO.	ELEV OR DEPTH (ft)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	REL COMP (%)	TEST METHOD	SOIL TYPE
511	10/27/2006	Lot 92	31513	1507.0	11.5	110.7	90.8	ND	C
512	10/27/2006	Lot 74	31513	1508.0	11.3	110.3	90.5	ND	C
513	10/27/2006	Lot 92	31513	1510.0	11.1	113.1	92.7	SC	C
514	10/27/2006	Lot 93	31513	1509.0	11.9	111.3	91.3	ND	C
515	10/27/2006	Lot 93	31513	1510.0	12.0	111.8	91.7	ND	C
516	10/27/2006	Slope Lot 74	31513	1509.0	10.8	110.3	90.4	SC	C
517	10/27/2006	Lot 75	31513	1511.0	10.5	112.9	92.6	ND	C
518	10/27/2006	Lot 60	31513	1509.0	10.7	111.1	91.1	ND	C
519	10/27/2006	Lot 63	31513	1507.0	11.6	111.4	91.3	ND	C
520	10/27/2006	Lot 26	31513	1508.0	11.9	110.5	90.6	ND	C
521	10/27/2006	Lot 65	31513	1506.0	11.1	113.3	92.9	SC	C
522	10/27/2006	Basque St 3+45	31513	1504.0	11.4	111.6	91.5	ND	C
523	10/30/2006	Lot 62	31513	1509.0	10.8	111.8	91.7	SC	C
524	10/30/2006	Lot 65	31513	1508.0	11.0	112.5	92.2	ND	C
525	10/30/2006	Lot 64	31513	1509.0	11.3	110.2	90.4	ND	C
526*	10/30/2006	Lot 24	31513	1508.0	10.0	107.7	88.3	ND	C
526A	10/30/2006	Lot 24	31513	1508.0	10.7	111.4	91.4	ND	C
527	10/30/2006	Lot 25	31513	1508.0	11.1	110.7	90.8	SC	C
BT-528	10/30/2006	Lot 130	31513	1508.0	8.9	117.4		ND	
BT-529	10/30/2006	Lot 128	31513	1510.0	7.6	115.1		ND	
BT-530	10/30/2006	Lot 126	31513	1518.5	9.3	118.2		ND	
BT-531	10/30/2006	Lot 124	31513	1522.0	8.8	116.9		ND	
BT-532	10/30/2006	Lot 122	31513	1531.0	9.6	115.5		ND	
533	10/30/2006	Lot 130	31513	1507.0	10.8	112.5	92.3	ND	C
534	10/30/2006	Lot 129	31513	1511.0	11.4	111.7	91.6	SC	C
535	10/30/2006	Lot 127	31513	1516.0	11.6	112.0	91.9	ND	C
536	10/30/2006	Lot 125	31513	1522.0	10.8	110.1	90.3	ND	C
537	10/30/2006	Lot 124	31513	1529.0	7.7	121.8	92.7	ND	D
538	10/30/2006	Lot 122	31513	1534.0	7.5	119.9	91.2	ND	D
539	10/30/2006	Slope Lot 123	31513	1530.0	8.0	120.6	91.8	SC	D
540	10/30/2006	Lot 126	31513	1520.0	10.6	112.9	92.6	ND	C
541	10/30/2006	Lot 129	31513	1509.0	11.5	111.6	91.5	ND	C
542	10/30/2006	Lot 128	31513	1516.0	11.8	110.7	90.8	ND	C
543	10/30/2006	Lot 123	31513	1528.0	11.1	112.5	92.3	SC	C
BT-544	10/30/2006	Lot 113	31513	1519.5	7.4	110.5		ND	
BT-545	10/30/2006	Lot 112	31513	1513.0	8.3	115.2		ND	
BT-546	10/30/2006	Lot 110	31513	1511.0	8.0	113.6		ND	
BT-547	10/30/2006	Lot 108	31513	1509.0	9.2	117.3		ND	
BT-548	10/30/2006	Lot 131	31513	1505.0	7.9	114.2		ND	
549	10/31/2006	Lot 129	31513	1511.0	11.7	111.0	91.0	ND	C
550	10/31/2006	Lot 127	31513	1518.0	10.5	112.6	92.4	ND	C
551	10/31/2006	Lot 126	31513	1523.0	10.9	110.5	90.6	ND	C
552	10/31/2006	Lot 123	31513	1531.0	10.6	111.4	91.3	ND	C
553	10/31/2006	Lot 122	31513	1532.0	10.8	112.4	92.2	SC	C
554	10/31/2006	Lot 125	31513	1526.0	11.5	112.0	91.8	ND	C
555	10/31/2006	Lot 130	31513	1508.0	11.8	113.1	92.8	ND	C
556	10/31/2006	Lot 127	31513	1519.0	10.7	110.4	90.5	ND	C
557*	10/31/2006	Lot 131	31513	1506.0	9.9	107.8	88.4	ND	C
557A	10/31/2006	Lot 131	31513	1506.0	10.6	111.8	91.7	ND	C

**Table 1****FIELD DENSITY TEST RESULTS**

TEST NO.	DATE	TEST LOCATION	TRACT NO.	ELEV OR DEPTH (ft)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	REL COMP (%)	TEST METHOD	SOIL TYPE
558	10/31/2006	Lot 109	31513	1512.0	11.4	112.5	92.3	SC	C
559	10/31/2006	Lot 112	31513	1515.0	11.2	110.7	90.8	ND	C
560	10/31/2006	Lot 107	31513	1508.0	11.8	111.7	91.6	ND	C
561	10/31/2006	Lot 108	31513	1511.0	12.0	112.3	92.1	ND	C
BT-562	10/31/2006	Lot 151	31513	1566.0	6.8	117.3		ND	
BT-563	10/31/2006	Lot 153	31513	1556.5	5.5	115.8		ND	
564	10/31/2006	Lot 155	31513	1552.0	7.9	119.6	91.0	ND	D
565	10/31/2006	Lot 154	31513	1554.0	8.8	121.7	92.6	SC	D
566	10/31/2006	Lot 153	31513	1559.0	8.5	119.0	90.5	ND	D
567	10/31/2006	Lot 152	31513	1564.0	9.1	119.5	90.9	ND	D
568	10/31/2006	Lot 151	31513	1568.0	8.6	120.3	91.5	ND	D
569	10/31/2006	Lot 12	31513	FG	11.5	113.1	92.7	ND	C
570	10/31/2006	Lot 13	31513	FG	10.8	112.0	91.8	ND	C
571	10/31/2006	Lot 14	31513	FG	11.4	113.8	93.3	SC	C
572	10/31/2006	Lot 15	31513	FG	12.3	111.7	91.6	ND	C
573	10/31/2006	Lot 16	31513	FG	10.7	110.8	90.8	ND	C
574	10/31/2006	Lot 17	31513	FG	11.1	113.0	92.7	SC	C
575	11/1/2006	Lot 107	31513	1510.0	8.4	123.1	93.6	SC	D
576	11/1/2006	Lot 111	31513	1513.0	9.3	120.3	91.5	ND	D
577	11/1/2006	Lot 110	31513	1512.0	10.8	112.5	92.2	ND	C
578	11/1/2006	Lot 131	31513	1509.0	11.6	111.6	91.5	ND	C
579	11/1/2006	Lot 111	31513	1515.0	12.3	111.0	91.0	ND	C
580	11/1/2006	Lot 112	31513	1517.0	11.1	112.3	92.0	SC	C
581	11/1/2006	Lot 108	31513	1512.0	7.9	120.5	91.7	ND	D
582	11/1/2006	Lot 109	31513	1514.0	10.8	113.2	92.8	ND	C
583	11/1/2006	Lot 113	31513	1517.0	11.6	111.7	91.6	ND	C
584	11/1/2006	Lot 158	31513	1543.0	8.0	118.8	90.4	SC	D
585*	11/1/2006	Lot 158	31513	1545.0	7.3	117.3	89.2	ND	D
585A	11/1/2006	Lot 158	31513	1545.0	7.7	120.0	91.3	ND	D
586	11/1/2006	Lot 157	31513	1548.0	8.4	118.5	90.2	ND	D
587	11/1/2006	Lot 156	31513	1550.0	8.1	120.6	91.7	ND	D
588	11/1/2006	Lot 155	31513	1551.0	8.3	119.1	90.6	ND	D
589	11/1/2006	Slope Lot 154	31513	1558.0	7.7	121.0	92.1	ND	D
590	11/1/2006	Lot 154	31513	1555.0	8.0	120.6	91.8	SC	D
591	11/1/2006	Lot 156	31513	1552.0	8.2	120.3	91.5	ND	D
592	11/2/2006	Lot 130	31513	1512.0	7.9	121.7	92.6	ND	D
593	11/2/2006	Lot 131	31513	1511.0	8.8	120.0	91.3	SC	D
594	11/2/2006	Lot 110	31513	1514.0	8.3	120.6	91.7	ND	D
595	11/2/2006	Lot 107	31513	1512.0	7.6	118.8	90.4	ND	D
596	11/2/2006	Lot 111	31513	1517.0	8.4	121.7	92.6	ND	D
597	11/2/2006	Lot 112	31513	1518.0	7.9	122.1	92.9	ND	D
598	11/2/2006	Lot 99	31513	1511.0	8.7	120.8	91.9	ND	D
599	11/2/2006	Lot 86	31513	1513.0	8.0	119.0	90.5	SC	D
600*	11/2/2006	Lot 87	31513	1513.0	9.3	107.9	88.5	ND	C
600A	11/2/2006	Lot 87	31513	1513.0	11.6	111.4	91.3	ND	C
601	11/2/2006	Lot 99	31513	1513.0	11.9	112.2	92.0	ND	C
602	11/2/2006	Lot 85	31513	1514.0	11.4	111.8	91.7	SC	C
603	11/3/2006	Lot 86	31513	1515.0	11.4	110.5	90.6	SC	C
604*	11/3/2006	Lot 85	31513	1516.0	10.0	108.8	89.2	ND	C

**Table 1****FIELD DENSITY TEST RESULTS**

TEST NO.	DATE	TEST LOCATION	TRACT NO.	ELEV OR DEPTH (ft)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	REL COMP (%)	TEST METHOD	SOIL TYPE
604A	11/3/2006	Lot 85	31513	1516.0	10.7	111.4	91.3	ND	C
605	11/3/2006	Lot 87	31513	1517.0	8.8	120.6	91.8	ND	D
606	11/3/2006	Lot 86	31513	1517.0	9.1	121.6	92.5	ND	D
607	11/3/2006	Lot 85	31513	1518.0	8.6	119.2	90.7	ND	
BT-608	11/3/2006	Lot 146	31513	1554.0	6.8	114.6		ND	
BT-609	11/3/2006	Lot 148	31513	1562.0	5.5	117.2		ND	
610	11/3/2006	Lot 146	31513	1556.0	8.0	120.7	91.8	SC	D
611	11/3/2006	Lot 148	31513	1567.0	8.4	121.4	92.4	ND	D
612	11/3/2006	Lot 148	31513	1564.0	7.7	118.7	90.3	ND	D
613	11/3/2006	Lot 147	31513	1558.0	8.2	120.5	91.7	ND	D
BT-614	11/3/2006	Lot 116	31513	1516.0	6.2	113.8		ND	
BT-615	11/3/2006	Lot 114	31513	1519.0	7.4	115.0		ND	
616	11/6/2006	Lot 155	31513	1553.0	7.9	121.7	92.6	ND	D
617	11/6/2006	Lot 154	31513	1557.0	8.4	120.0	91.3	ND	D
618	11/6/2006	Lot 153	31513	1561.0	8.0	123.8	94.2	SC	D
619	11/6/2006	Lot 150	31513	1573.0	8.6	123.0	93.6	ND	D
620	11/6/2006	Lot 151	31513	1570.0	9.1	120.3	91.5	ND	D
621	11/6/2006	Lot 152	31513	1566.0	9.3	118.8	90.4	ND	D
622	11/6/2006	Lot 150	31513	1575.0	8.6	121.7	92.6	ND	D
623*	11/6/2006	Lot 150	31513	1576.0	7.3	114.9	87.4	ND	D
623A	11/6/2006	Lot 150	31513	1576.0	8.1	119.2	90.7	ND	D
624	11/6/2006	Lot 149	31513	1569.0	8.8	120.6	91.8	SC	D
625	11/6/2006	Lot 147	31513	1562.0	9.0	121.5	92.5	ND	D
626	11/6/2006	Lot 149	31513	1572.0	8.6	122.8	93.4	ND	D
627	11/6/2006	Lot 146	31513	1558.0	8.0	119.9	91.2	SC	D
628	11/6/2006	Lot 147	31513	1563.0	9.3	120.8	91.9	ND	D
BT-629	11/6/2006	Lot 120	31513	1540.0	5.2	119.5		ND	
BT-630	11/6/2006	Lot 117	31513	1534.0	7.3	116.2		ND	
631*	11/7/2006	Lot 148	31513	1569.0	7.6	114.1	86.8	SC	D
631A	11/7/2006	Lot 148	31513	1569.0	7.9	119.2	90.7	SC	D
632	11/7/2006	Lot 149	31513	1574.0	8.2	121.4	92.4	ND	D
633	11/7/2006	Lot 149	31513	1574.0	8.8	120.6	91.7	ND	D
634	11/7/2006	Lot 148	31513	1569.0	8.0	119.5	90.9	ND	D
635	11/7/2006	Park Site A	31513	1527.0	9.1	121.6	92.5	ND	D
636	11/7/2006	Lot 116	31513	1518.0	8.5	120.0	91.3	SC	D
637	11/7/2006	Lot 114	31513	1521.0	8.7	121.7	92.6	ND	D
638	11/7/2006	Lot 115	31513	1519.0	7.7	119.6	91.0	ND	D
639	11/7/2006	Park Site A	31513	1531.0	8.0	120.8	91.9	SC	D
640	11/7/2006	Lot 117	31513	1532.0	8.5	121.0	92.1	ND	D
641	11/7/2006	Lot 118	31513	1538.0	8.1	120.5	91.7	ND	D
642	11/7/2006	Slope Lot 115	31513	1528.0	7.5	121.2	92.2	ND	D
643	11/8/2006	Lot 114	31513	1523.0	8.6	121.8	92.7	ND	D
644	11/8/2006	Lot 115	31513	1521.0	7.8	120.3	91.5	ND	D
645	11/8/2006	Lot 116	31513	1520.0	8.0	120.8	91.9	SC	D
646	11/8/2006	Lot 129	31513	1513.0	8.3	119.3	90.7	ND	D
647*	11/8/2006	Lot 129	31513	1515.0	9.7	106.7	87.5	ND	C
647A	11/8/2006	Lot 129	31513	1515.0	11.5	111.6	91.5	ND	C
648	11/8/2006	Lot 128	31513	1518.0	10.7	112.9	92.6	ND	C
649	11/8/2006	Lot 127	31513	1521.0	11.4	111.0	91.0	SC	C

**Table 1****FIELD DENSITY TEST RESULTS**

TEST NO.	DATE	TEST LOCATION	TRACT NO.	ELEV OR DEPTH (ft)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	REL COMP (%)	TEST METHOD	SOIL TYPE
650*	11/8/2006	Lot 126	31513	1524.0	7.8	116.0	88.2	ND	D
650A	11/8/2006	Lot 126	31513	1524.0	8.3	120.1	91.3	ND	D
651	11/8/2006	Lot 125	31513	1527.0	8.8	121.9	92.7	ND	D
652	11/8/2006	Lot 124	31513	1528.0	7.9	119.8	91.1	ND	D
653	11/8/2006	Lot 124	31513	1530.0	8.4	121.0	92.0	SC	D
654	11/8/2006	Lot 123	31513	1533.0	7.5	120.4	91.6	ND	D
655	11/8/2006	Lot 122	31513	1536.0	8.5	118.7	90.3	ND	D
656	11/8/2006	Lot 18	31513	FG	10.6	111.8	91.7	ND	C
657	11/8/2006	Lot 19	31513	FG	11.8	111.4	91.4	ND	C
658	11/8/2006	Lot 20	31513	FG	11.4	112.6	92.3	SC	C
659	11/8/2006	Lot 21	31513	FG	11.7	111.6	91.5	ND	C
660	11/8/2006	Lot 24	31513	FG	10.8	110.4	90.6	ND	C
661	11/8/2006	Lot 25	31513	FG	11.0	111.3	91.3	ND	C
662	11/8/2006	Lot 26	31513	FG	10.7	113.7	93.2	ND	C
663	11/8/2006	Lot 27	31513	FG	11.1	112.4	92.2	SC	C
664	11/9/2006	Slope Lot 114	31513	1530.0	8.8	121.8	92.7	SC	D
665	11/9/2006	Lot 117	31513	1534.0	7.9	120.3	91.5	ND	D
666	11/9/2006	Lot 118	31513	1538.0	8.3	120.8	91.9	ND	D
667	11/9/2006	Slope Lot 117	31513	1536.0	8.9	119.1	90.6	ND	D
668	11/9/2006	Lot 118	31513	1540.0	8.4	119.5	90.9	ND	D
669	11/9/2006	Lot 121	31513	1540.0	8.0	121.0	92.0	SC	D
670	11/9/2006	Lot 122	31513	1538.0	7.7	120.4	91.6	ND	D
671	11/9/2006	Lot 117	31513	1538.0	8.6	121.5	92.4	ND	D
672	11/9/2006	Lot 120	31513	1545.0	8.0	120.3	91.5	SC	D
673	11/9/2006	Lot 121	31513	1543.0	7.9	120.6	91.8	ND	D
674	11/9/2006	Lot 117	31513	1541.0	8.3	118.7	90.3	ND	D
675	11/9/2006	Lot 118	31513	1542.0	8.8	121.6	92.5	ND	D
676	11/10/2006	Slope Lot 122	31513	1536.0	7.7	122.8	93.4	ND	D
677	11/10/2006	Lot 120	31513	1544.0	8.4	119.3	90.8	ND	D
678	11/10/2006	Lot 121	31513	1546.0	7.6	119.1	90.6	ND	D
679	11/10/2006	Lot 118	31513	1546.0	9.1	120.8	91.9	ND	D
680	11/10/2006	Slope Lot 117	31513	1540.0	8.4	122.0	92.8	SC	D
681	11/10/2006	Lot 118	31513	1544.0	8.9	120.3	91.5	ND	D
682	11/10/2006	Lot 117	31513	1543.0	11.3	111.6	91.5	ND	C
683	11/10/2006	Lot 113	31513	1519.0	8.0	118.7	90.3	SC	D
684	11/10/2006	Lot 121	31513	1547.0	8.7	121.7	92.6	ND	D
685	11/10/2006	Lot 28	31513	FG	11.5	112.5	92.2	ND	C
686	11/10/2006	Lot 29	31513	FG	10.6	111.4	91.4	ND	C
687	11/10/2006	Lot 30	31513	FG	10.9	112.9	92.6	ND	C
688	11/10/2006	Lot 31	31513	FG	11.3	111.0	91.0	ND	C
689	11/10/2006	Lot 32	31513	FG	11.0	110.6	90.7	SC	C
690	11/13/2006	Lot 17	31513	1545.0	7.9	120.2	91.4	ND	D
691	11/13/2006	Lot 120	31513	1548.0	8.9	118.5	90.1	ND	D
692*	11/13/2006	Lot 118	31513	1548.0	7.3	114.2	86.9	SC	D
692A	11/13/2006	Lot 118	31513	1548.0	8.0	120.3	91.5	SC	D
693	11/13/2006	Lot 120	31513	1550.0	9.3	120.8	91.9	ND	D
694	11/13/2006	Rose Rd 34+60	31513	1504.0	8.6	121.6	92.5	ND	D
695	11/13/2006	Rose Rd 32+20	31513	1504.0	7.7	119.3	90.8	ND	D
696	11/13/2006	Rose Rd 29+75	31513	1502.0	8.8	120.4	91.6	SC	D

**Table 1**

**FIELD DENSITY TEST RESULTS**

TEST NO.	DATE	TEST LOCATION	TRACT NO.	ELEV OR DEPTH (ft)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	REL COMP (%)	TEST METHOD	SOIL TYPE
697	11/14/2006	Rose Rd 33+50	31513	1505.0	8.8	121.4	92.3	SC	D
698	11/14/2006	Rose Rd 35+25	31513	1506.0	7.5	118.9	90.5	ND	D
699	11/14/2006	Rose Rd 30+80	31513	1504.0	9.1	120.6	91.7	ND	D
700	11/14/2006	Rose Rd 32+65	31513	1506.0	8.2	120.8	91.9	ND	D
701	11/14/2006	Rose Rd 34+25	31513	1507.0	7.8	119.1	90.6	ND	D
702	11/14/2006	Rose Rd 33+05	31513	1507.0	8.4	121.0	92.0	SC	D
703	11/15/2006	Rose Rd 35+05	31513	1507.0	8.0	120.6	91.7	ND	D
704	11/15/2006	Rose Rd 34+00	31513	1508.0	8.3	118.8	90.4	SC	D
705	11/15/2006	Alturas St 5+65	31513	1511.0	7.8	121.0	92.0	ND	D
706	11/15/2006	Alturas St 1+90	31513	1507.0	7.6	121.7	92.6	ND	D
707	11/15/2006	Alturas St 7+75	31513	1515.0	8.4	120.6	91.8	SC	D
708	11/15/2006	Alturas St 4+85	31513	1510.0	8.2	122.4	93.1	ND	D
BT-709	11/15/2006	Lot 165	31513	1415.0	6.4	119.3		ND	
710	11/16/2006	Lot 165	31513	1515.0	11.6	110.9	91.0	ND	C
711	11/16/2006	Lot 164	31513	1518.0	10.9	110.3	90.4	ND	C
712	11/16/2006	Lot 166	31513	1518.0	11.4	113.0	92.6	SC	C
713	11/17/2006	Baeza St 11+70	31513	1506.0	7.7	119.3	90.8	ND	D
714	11/17/2006	Baeza St 13+30	31513	1508.0	8.0	121.4	92.4	SC	D
715	11/17/2006	Baeza St 4+80	31513	1503.0	11.3	111.7	91.6	ND	C
716	11/17/2006	Baeza St 2+55	31513	1504.0	10.8	110.3	90.5	ND	C
717	11/18/2006	Lot 33	31513	FG	11.3	111.4	91.3	ND	C
718	11/18/2006	Lot 34	31513	FG	11.9	113.1	92.8	ND	C
719	11/18/2006	Lot 35	31513	FG	11.4	110.5	90.6	SC	C
720	11/18/2006	Lot 36	31513	FG	10.8	111.3	91.3	ND	C
721	11/18/2006	Lot 37	31513	FG	11.7	112.7	92.4	ND	C
722	11/18/2006	Lot 38	31513	FG	7.6	122.1	92.9	ND	D
723	11/18/2006	Lot 39	31513	FG	8.4	120.5	91.7	ND	D
724	11/18/2006	Lot 40	31513	FG	7.9	120.8	91.9	ND	D
725	11/18/2006	Lot 41	31513	FG	8.0	122.0	92.8	SC	D
726	11/18/2006	Lot 42	31513	FG	8.1	118.9	90.5	ND	D
727	11/18/2006	Lot 43	31513	FG	8.4	120.0	91.3	ND	D
728	11/18/2006	Lot 44	31513	FG	7.9	121.1	92.1	ND	D
729	11/18/2006	Lot 45	31513	FG	9.0	119.9	91.3	SC	D
730	11/18/2006	Lot 46	31513	FG	8.6	120.8	91.9	ND	D

**LEGEND**

- \* = Failing Test
- A = Retest
- FG = Finish Grade
- ND = Nuclear Densometer Test
- SC = Sand Cone Test
- ' = Repeated Test Number

**Table 2**  
**LOT SUMMARY - AS-GRADED CONDITIONS**

LOT NUMBER	MINIMUM DEPTH OF FILL (ft)	MAXIMUM DEPTH OF FILL (ft)	EXPANSION POTENTIAL <sup>(2)</sup>		SOLUBLE SULFATE		CHLORIDE CONTENT <sup>(4)</sup> (ppm)	PLASTICITY INDEX <sup>(5)</sup>	pH AND USDA CLASS. <sup>(6)</sup>	SATURATED RESISTIVITY (FERROUS METALS)		
			EXPANSION INDEX	ASTM/CBC CLASS.	CONTENT (% by Wt)	ACI/CBC CLASS. <sup>(3)</sup>				(ohm-cm)	CATEGORY <sup>(7)</sup>	
1	19	22	6	Very Low	0.0011	S0	4		8.0	Moderately Alkaline	14,400	Mildly Corrosive
2	18½	22½	6	Very Low	0.0011	S0	4		8.0	Moderately Alkaline	1,000	Corrosive
3	19½	22	6	Very Low	0.0011	S0	4		8.0	Moderately Alkaline	2,000	Moderately Corrosive
4	20	21½	9	Very Low	0.0012	S0	2		7.9	Moderately Alkaline	13,600	Mildly Corrosive
5	19½	21½	9	Very Low	0.0012	S0	2		7.9	Moderately Alkaline	13,600	Mildly Corrosive
6	19	20½	9	Very Low	0.0012	S0	2		7.9	Moderately Alkaline	13,600	Mildly Corrosive
7	17½	18	0	Very Low	0.0073	S0	13		8.1	Moderately Alkaline	2,400	Moderately Corrosive
8	17	17½	0	Very Low	0.0073	S0	13		8.1	Moderately Alkaline	2,400	Moderately Corrosive
9	16½	17½	0	Very Low	0.0073	S0	13		8.1	Moderately Alkaline	2,400	Moderately Corrosive
10	16½	17½	0	Very Low	0.0051	S0	13		8.0	Moderately Alkaline	4,800	Moderately Corrosive
11	16½	17	0	Very Low	0.0051	S0	13		8.0	Moderately Alkaline	4,800	Moderately Corrosive
12	16	16½	0	Very Low	0.0051	S0	13		8.0	Moderately Alkaline	4,800	Moderately Corrosive
13	16	16½	4	Very Low	0.0045	S0	20		8.0	Moderately Alkaline	3,920	Moderately Corrosive
14	15	16	4	Very Low	0.0045	S0	20		8.0	Moderately Alkaline	3,920	Moderately Corrosive
15	15	15½	4	Very Low	0.0045	S0	20		8.0	Moderately Alkaline	3,920	Moderately Corrosive

(1) All field measurements approximate

(2) Test and Classification per ASTM D 4829 and CBC (2019)

(3) Classification per Table 19.3.1.1 of ACI (2014a) and CBC (2019)

(4) Chloride Content as per CTM 422

(5) Plasticity Index per ASTM 4318 and CBC (2019)

NP = Non-Plastic

ND\* = No Detection

(6) pH per CTM 643 and Classification per USDA (1993)

(7) Corrosivity to ferrous metals only, per CTM 643. There are no exposure conditions that relate to Tables 19.3.1.1 or 19.3.2.1 of ACI (2014a)

**Table 2**  
**LOT SUMMARY - AS-GRADED CONDITIONS**

LOT NUMBER	MINIMUM DEPTH OF FILL (ft)	MAXIMUM DEPTH OF FILL (ft)	EXPANSION POTENTIAL <sup>(2)</sup>		SOLUBLE SULFATE		CHLORIDE CONTENT <sup>(4)</sup> (ppm)	PLASTICITY INDEX <sup>(5)</sup>	pH AND USDA CLASS. <sup>(6)</sup>	SATURATED RESISTIVITY (FERROUS METALS)		
			EXPANSION INDEX	ASTM/CBC CLASS.	CONTENT (% by Wt)	ACI/CBC CLASS. <sup>(3)</sup>				(ohm-cm)	CATEGORY <sup>(7)</sup>	
16	14½	15½	10	Very Low	0.0034	S0	88		7.9	Moderately Alkaline	1,360	Corrosive
17	15½	15½	10	Very Low	0.0034	S0	88		7.9	Moderately Alkaline	1,360	Corrosive
18	14	15	10	Very Low	0.0034	S0	88		7.9	Moderately Alkaline	1,360	Corrosive
19	13½	14½	4	Very Low	0.0086	S0	84		8.0	Moderately Alkaline	1,640	Corrosive
20	13	13½	4	Very Low	0.0086	S0	84		8.0	Moderately Alkaline	1,640	Corrosive
21	13	13½	4	Very Low	0.0086	S0	84		8.0	Moderately Alkaline	1,640	Corrosive
22												
23	14½	15										
24	12	12½	12	Very Low	0.0025	S0	8		8.0	Moderately Alkaline	4,800	Moderately Corrosive
25	11½	13½	12	Very Low	0.0025	S0	8		8.0	Moderately Alkaline	4,800	Moderately Corrosive
26	12½	14	12	Very Low	0.0025	S0	8		8.0	Moderately Alkaline	4,800	Moderately Corrosive
27	13½	14	7	Very Low	0.0026	S0	19		7.8	Slightly Alkaline	4,800	Moderately Corrosive
28	13½	14	7	Very Low	0.0026	S0	19		7.8	Slightly Alkaline	4,800	Moderately Corrosive
29	3	3½	7	Very Low	0.0026	S0	19		7.8	Slightly Alkaline	4,800	Moderately Corrosive
30	13½	22½	5	Very Low	0.0037	S0	12		7.9	Moderately Alkaline	5,600	Moderately Corrosive

(1) All field measurements approximate

(2) Test and Classification per ASTM D 4829 and CBC (2019)

(3) Classification per Table 19.3.1.1 of ACI (2014a) and CBC (2019)

(4) Chloride Content as per CTM 422

(5) Plasticity Index per ASTM 4318 and CBC (2019)

NP = Non-Plastic

ND\* = No Detection

(6) pH per CTM 643 and Classification per USDA (1993)

(7) Corrosivity to ferrous metals only, per CTM 643. There are no exposure conditions that relate to Tables 19.3.1.1 or 19.3.2.1 of ACI (2014a)

**Table 2**  
**LOT SUMMARY - AS-GRADED CONDITIONS**

LOT NUMBER	MINIMUM DEPTH OF FILL (ft)	MAXIMUM DEPTH OF FILL (ft)	EXPANSION POTENTIAL <sup>(2)</sup>		SOLUBLE SULFATE		CHLORIDE CONTENT <sup>(4)</sup> (ppm)	PLASTICITY INDEX <sup>(5)</sup>	pH AND USDA CLASS. <sup>(6)</sup>	SATURATED RESISTIVITY (FERROUS METALS)		
			EXPANSION INDEX	ASTM/CBC CLASS.	CONTENT (% by Wt)	ACI/CBC CLASS. <sup>(3)</sup>				(ohm-cm)	CATEGORY <sup>(7)</sup>	
31	13½	14½	5	Very Low	0.0037	S0	12		7.9	Moderately Alkaline	5,600	Moderately Corrosive
32	13	14½	5	Very Low	0.0037	S0	12		7.9	Moderately Alkaline	5,600	Moderately Corrosive
33	14½	16	14	Very Low	0.0790	S0	36		7.8	Slightly Alkaline	560	Severely Corrosive
34	15½	16½	14	Very Low	0.0790	S0	36		7.8	Slightly Alkaline	560	Severely Corrosive
35	15½	16	14	Very Low	0.0790	S0	36		7.8	Slightly Alkaline	560	Severely Corrosive
36	15½	16½	8	Very Low	0.0128	S0	22		8.0	Moderately Alkaline	2,160	Moderately Corrosive
37	16	17	8	Very Low	0.0128	S0	22		8.0	Moderately Alkaline	2,160	Moderately Corrosive
38	16	17	8	Very Low	0.0128	S0	22		8.0	Moderately Alkaline	2,160	Moderately Corrosive
39	16½	18	4	Very Low	0.0108	S0	37		7.9	Moderately Alkaline	2,480	Moderately Corrosive
40	18	19	4	Very Low	0.0108	S0	37		7.9	Moderately Alkaline	2,480	Moderately Corrosive
41	18	19	4	Very Low	0.0108	S0	37		7.9	Moderately Alkaline	2,480	Moderately Corrosive
42	18½	19½	14	Very Low	0.0251	S0	67		7.9	Moderately Alkaline	1,160	Corrosive
43	17½	19½	14	Very Low	0.0251	S0	67		7.9	Moderately Alkaline	1,160	Corrosive
44	16	18	14	Very Low	0.0251	S0	67		7.9	Moderately Alkaline	1,160	Corrosive
45	13	16½	16	Very Low	0.0077	S0	45		7.4	Slightly Alkaline	2,160	Moderately Corrosive

(1) All field measurements approximate

(2) Test and Classification per ASTM D 4829 and CBC (2019)

(3) Classification per Table 19.3.1.1 of ACI (2014a) and CBC (2019)

(4) Chloride Content as per CTM 422

(5) Plasticity Index per ASTM 4318 and CBC (2019)

NP = Non-Plastic

ND\* = No Detection

(6) pH per CTM 643 and Classification per USDA (1993)

(7) Corrosivity to ferrous metals only, per CTM 643. There are no exposure conditions that relate to Tables 19.3.1.1 or 19.3.2.1 of ACI (2014a)

**Table 2**  
**LOT SUMMARY - AS-GRADED CONDITIONS**

LOT NUMBER	MINIMUM DEPTH OF FILL (ft)	MAXIMUM DEPTH OF FILL (ft)	EXPANSION POTENTIAL <sup>(2)</sup>		SOLUBLE SULFATE		CHLORIDE CONTENT <sup>(4)</sup> (ppm)	PLASTICITY INDEX <sup>(5)</sup>	pH AND USDA CLASS. <sup>(6)</sup>		SATURATED RESISTIVITY (FERROUS METALS)	
			EXPANSION INDEX	ASTM/CBC CLASS.	CONTENT (% by Wt)	ACI/CBC CLASS. <sup>(3)</sup>			(ohm-cm)	CATEGORY <sup>(7)</sup>		
46	14½	19½	16	Very Low	0.0077	S0	45		7.4	Slightly Alkaline	2,160	Moderately Corrosive
47			16	Very Low	0.0077	S0	45		7.4	Slightly Alkaline	2,160	Moderately Corrosive
48			9	Very Low	0.0029	S0	9		7.5	Slightly Alkaline	5,200	Moderately Corrosive
49			9	Very Low	0.0029	S0	9		7.5	Slightly Alkaline	5,200	Moderately Corrosive
50			9	Very Low	0.0029	S0	9		7.5	Slightly Alkaline	5,200	Moderately Corrosive
51			7	Very Low	0.0025	S0	8		7.6	Slightly Alkaline	7,200	Moderately Corrosive
52			7	Very Low	0.0025	S0	8		7.6	Slightly Alkaline	7,200	Moderately Corrosive
53			7	Very Low	0.0025	S0	8		7.6	Slightly Alkaline	7,200	Moderately Corrosive
54			10	Very Low	0.0090	S0	17		7.9	Moderately Alkaline	5,200	Moderately Corrosive
55			10	Very Low	0.0090	S0	17		7.9	Moderately Alkaline	5,200	Moderately Corrosive
56			10	Very Low	0.0090	S0	17		7.9	Moderately Alkaline	5,200	Moderately Corrosive
57			6	Very Low	0.0039	S0	7		8.0	Moderately Alkaline	4,800	Moderately Corrosive
58			6	Very Low	0.0039	S0	7		8.0	Moderately Alkaline	4,800	Moderately Corrosive
59			6	Very Low	0.0039	S0	7		8.0	Moderately Alkaline	4,800	Moderately Corrosive
60			11	Very Low	0.0036	S0	25		7.9	Moderately Alkaline	3,880	Moderately Corrosive

(1) All field measurements approximate

(2) Test and Classification per ASTM D 4829 and CBC (2019)

(3) Classification per Table 19.3.1.1 of ACI (2014a) and CBC (2019)

(4) Chloride Content as per CTM 422

(5) Plasticity Index per ASTM 4318 and CBC (2019)

NP = Non-Plastic

ND\* = No Detection

(6) pH per CTM 643 and Classification per USDA (1993)

(7) Corrosivity to ferrous metals only, per CTM 643. There are no exposure conditions that relate to Tables 19.3.1.1 or 19.3.2.1 of ACI (2014a)

**Table 2**  
**LOT SUMMARY - AS-GRADED CONDITIONS**

LOT NUMBER	MINIMUM DEPTH OF FILL (ft)	MAXIMUM DEPTH OF FILL (ft)	EXPANSION POTENTIAL <sup>(2)</sup>		SOLUBLE SULFATE		CHLORIDE CONTENT <sup>(4)</sup> (ppm)	PLASTICITY INDEX <sup>(5)</sup>	pH AND USDA CLASS. <sup>(6)</sup>	SATURATED RESISTIVITY (FERROUS METALS)		
			EXPANSION INDEX	ASTM/CBC CLASS.	CONTENT (% by Wt)	ACI/CBC CLASS. <sup>(3)</sup>				(ohm-cm)	CATEGORY <sup>(7)</sup>	
61			11	Very Low	0.0036	S0	25		7.9	Moderately Alkaline	3,880	Moderately Corrosive
62			11	Very Low	0.0036	S0	25		7.9	Moderately Alkaline	3,880	Moderately Corrosive
63			3	Very Low	0.0023	S0	11		8.0	Moderately Alkaline	4,400	Moderately Corrosive
64			3	Very Low	0.0023	S0	11		8.0	Moderately Alkaline	4,400	Moderately Corrosive
65			3	Very Low	0.0023	S0	11		8.0	Moderately Alkaline	4,400	Moderately Corrosive
66												
67												
68												
69												
70												
71												
72												
73												
74												
75												

(1) All field measurements approximate

(2) Test and Classification per ASTM D 4829 and CBC (2019)

(3) Classification per Table 19.3.1.1 of ACI (2014a) and CBC (2019)

(4) Chloride Content as per CTM 422

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**Table 2**  
**LOT SUMMARY - AS-GRADED CONDITIONS**

LOT NUMBER	MINIMUM DEPTH OF FILL (ft)	MAXIMUM DEPTH OF FILL (ft)	EXPANSION POTENTIAL <sup>(2)</sup>		SOLUBLE SULFATE		CHLORIDE CONTENT <sup>(4)</sup> (ppm)	PLASTICITY INDEX <sup>(5)</sup>	pH AND USDA CLASS. <sup>(6)</sup>	SATURATED RESISTIVITY (FERROUS METALS)		
			EXPANSION INDEX	ASTM/CBC CLASS.	CONTENT (% by Wt)	ACI/CBC CLASS. <sup>(3)</sup>				(ohm-cm)	CATEGORY <sup>(7)</sup>	
76												
77												
78												
79												
80												
81												
82												
83												
84												
85												
86			2	Very Low	0.0015	S0	11		7.7	Slightly Alkaline	8,400	Moderately Corrosive
87			2	Very Low	0.0015	S0	11		7.7	Slightly Alkaline	8,400	Moderately Corrosive
88			2	Very Low	0.0015	S0	11		7.7	Slightly Alkaline	8,400	Moderately Corrosive
89			3	Very Low	0.0336	S0	224		7.7	Slightly Alkaline	760	Severely Corrosive
90			3	Very Low	0.0336	S0	224		7.7	Slightly Alkaline	760	Severely Corrosive

(1) All field measurements approximate

(2) Test and Classification per ASTM D 4829 and CBC (2019)

(3) Classification per Table 19.3.1.1 of ACI (2014a) and CBC (2019)

(4) Chloride Content as per CTM 422

(5) Plasticity Index per ASTM 4318 and CBC (2019)

NP = Non-Plastic

ND\* = No Detection

(6) pH per CTM 643 and Classification per USDA (1993)

(7) Corrosivity to ferrous metals only, per CTM 643. There are no exposure conditions that relate to Tables 19.3.1.1 or 19.3.2.1 of ACI (2014a)

**Table 2**  
**LOT SUMMARY - AS-GRADED CONDITIONS**

LOT NUMBER	MINIMUM DEPTH OF FILL (ft)	MAXIMUM DEPTH OF FILL (ft)	EXPANSION POTENTIAL <sup>(2)</sup>		SOLUBLE SULFATE		CHLORIDE CONTENT <sup>(4)</sup> (ppm)	PLASTICITY INDEX <sup>(5)</sup>	pH AND USDA CLASS. <sup>(6)</sup>	SATURATED RESISTIVITY (FERROUS METALS)		
			EXPANSION INDEX	ASTM/CBC CLASS.	CONTENT (% by Wt)	ACI/CBC CLASS. <sup>(3)</sup>				(ohm-cm)	CATEGORY <sup>(7)</sup>	
91			3	Very Low	0.0336	S0	224		7.7	Slightly Alkaline	760	Severely Corrosive
92												
93												
94												
95												
96												
97												
98												
99												
100												
101												
102												
103												
104												
105												

(1) All field measurements approximate

(2) Test and Classification per ASTM D 4829 and CBC (2019)

(3) Classification per Table 19.3.1.1 of ACI (2014a) and CBC (2019)

(4) Chloride Content as per CTM 422

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NP = Non-Plastic

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(6) pH per CTM 643 and Classification per USDA (1993)

(7) Corrosivity to ferrous metals only, per CTM 643. There are no exposure conditions that relate to Tables 19.3.1.1 or 19.3.2.1 of ACI (2014a)

**Table 2**  
**LOT SUMMARY - AS-GRADED CONDITIONS**

LOT NUMBER	MINIMUM DEPTH OF FILL (ft)	MAXIMUM DEPTH OF FILL (ft)	EXPANSION POTENTIAL <sup>(2)</sup>		SOLUBLE SULFATE		CHLORIDE CONTENT <sup>(4)</sup> (ppm)	PLASTICITY INDEX <sup>(5)</sup>	pH AND USDA CLASS. <sup>(6)</sup>	SATURATED RESISTIVITY (FERROUS METALS)		
			EXPANSION INDEX	ASTM/CBC CLASS.	CONTENT (% by Wt)	ACI/CBC CLASS. <sup>(3)</sup>				(ohm-cm)	CATEGORY <sup>(7)</sup>	
106												
107			3	Very Low	0.0094	S0	100		7.7	Slightly Alkaline	1,240	Corrosive
108			3	Very Low	0.0094	S0	100		7.7	Slightly Alkaline	1,240	Corrosive
109			3	Very Low	0.0094	S0	100		7.7	Slightly Alkaline	1,240	Corrosive
110			1	Very Low	0.0604	S0	70		7.5	Slightly Alkaline	920	Severely Corrosive
111			1	Very Low	0.0604	S0	70		7.5	Slightly Alkaline	920	Severely Corrosive
112			1	Very Low	0.0604	S0	70		7.5	Slightly Alkaline	920	Severely Corrosive
113			1	Very Low	0.0001	S0	70		7.5	Slightly Alkaline	920	Severely Corrosive
114			3	Very Low	0.0012	S0	7		7.9	Moderately Alkaline	4,400	Moderately Corrosive
115			3	Very Low	0.0012	S0	7		7.9	Moderately Alkaline	4,400	Moderately Corrosive
116			3	Very Low	0.0012	S0	7		7.9	Moderately Alkaline	4,400	Moderately Corrosive
117			3	Very Low	0.0011	S0	22		7.6	Slightly Alkaline	6,520	Moderately Corrosive
118			3	Very Low	0.0011	S0	22		7.6	Slightly Alkaline	6,520	Moderately Corrosive
119			3	Very Low	0.0011	S0	22		7.6	Slightly Alkaline	6,520	Moderately Corrosive
120			7	Very Low	0.0014	S0	17		7.8	Slightly Alkaline	4,800	Moderately Corrosive

(1) All field measurements approximate

(2) Test and Classification per ASTM D 4829 and CBC (2019)

(3) Classification per Table 19.3.1.1 of ACI (2014a) and CBC (2019)

(4) Chloride Content as per CTM 422

(5) Plasticity Index per ASTM 4318 and CBC (2019)

(6) pH per CTM 643 and Classification per USDA (1993)

(7) Corrosivity to ferrous metals only, per CTM 643. There are no exposure conditions that relate to Tables 19.3.1.1 or 19.3.2.1 of ACI (2014a)

NP = Non-Plastic

ND\* = No Detection

**Table 2**  
**LOT SUMMARY - AS-GRADED CONDITIONS**

LOT NUMBER	MINIMUM DEPTH OF FILL (ft)	MAXIMUM DEPTH OF FILL (ft)	EXPANSION POTENTIAL <sup>(2)</sup>		SOLUBLE SULFATE		CHLORIDE CONTENT <sup>(4)</sup> (ppm)	PLASTICITY INDEX <sup>(5)</sup>	pH AND USDA CLASS. <sup>(6)</sup>	SATURATED RESISTIVITY (FERROUS METALS)		
			EXPANSION INDEX	ASTM/CBC CLASS.	CONTENT (% by Wt)	ACI/CBC CLASS. <sup>(3)</sup>				(ohm-cm)	CATEGORY <sup>(7)</sup>	
121			7	Very Low	0.0014	S0	17		7.8	Slightly Alkaline	4,800	Moderately Corrosive
122			7	Very Low	0.0014	S0	17		7.8	Slightly Alkaline	4,800	Moderately Corrosive
123			8	Very Low	0.0011	S0	3		8.1	Moderately Alkaline	10,000	Mildly Corrosive
124			8	Very Low	0.0011	S0	3		8.1	Moderately Alkaline	10,000	Mildly Corrosive
125			8	Very Low	0.0011	S0	3		8.1	Moderately Alkaline	10,000	Mildly Corrosive
126			4	Very Low	0.0007	S0	4		8.1	Moderately Alkaline	7,600	Moderately Corrosive
127			4	Very Low	0.0007	S0	4		8.1	Moderately Alkaline	7,600	Moderately Corrosive
128			4	Very Low	0.0007	S0	4		8.1	Moderately Alkaline	7,600	Moderately Corrosive
129			5	Very Low	0.0032	S0	15		8.0	Moderately Alkaline	4,800	Moderately Corrosive
130			5	Very Low	0.0032	S0	15		8.0	Moderately Alkaline	4,800	Moderately Corrosive
131			5	Very Low	0.0032	S0	15		8.0	Moderately Alkaline	4,800	Moderately Corrosive
132												
133												
134												
135												

(1) All field measurements approximate

(2) Test and Classification per ASTM D 4829 and CBC (2019)

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(6) pH per CTM 643 and Classification per USDA (1993)

(7) Corrosivity to ferrous metals only, per CTM 643. There are no exposure conditions that relate to Tables 19.3.1.1 or 19.3.2.1 of ACI (2014a)

**Table 2**  
**LOT SUMMARY - AS-GRADED CONDITIONS**

LOT NUMBER	MINIMUM DEPTH OF FILL (ft)	MAXIMUM DEPTH OF FILL (ft)	EXPANSION POTENTIAL <sup>(2)</sup>		SOLUBLE SULFATE		CHLORIDE CONTENT <sup>(4)</sup> (ppm)	PLASTICITY INDEX <sup>(5)</sup>	pH AND USDA CLASS. <sup>(6)</sup>		SATURATED RESISTIVITY (FERROUS METALS)	
			EXPANSION INDEX	ASTM/CBC CLASS.	CONTENT (% by Wt)	ACI/CBC CLASS. <sup>(3)</sup>					(ohm-cm)	CATEGORY <sup>(7)</sup>
136												
137												
138												
139												
140												
141												
142												
143												
144												
145												
146			7	Very Low	0.0012	S0	4		7.9	Moderately Alkaline	11,200	Mildly Corrosive
147			7	Very Low	0.0012	S0	4		7.9	Moderately Alkaline	11,200	Mildly Corrosive
148			7	Very Low	0.0012	S0	4		7.9	Moderately Alkaline	11,200	Mildly Corrosive
149			8	Very Low	0.0016	S0	4		7.6	Slightly Alkaline	14,800	Mildly Corrosive
150			8	Very Low	0.0016	S0	4		7.6	Slightly Alkaline	14,800	Mildly Corrosive

(1) All field measurements approximate

(2) Test and Classification per ASTM D 4829 and CBC (2019)

(3) Classification per Table 19.3.1.1 of ACI (2014a) and CBC (2019)

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**Table 2**  
**LOT SUMMARY - AS-GRADED CONDITIONS**

LOT NUMBER	MINIMUM DEPTH OF FILL (ft)	MAXIMUM DEPTH OF FILL (ft)	EXPANSION POTENTIAL <sup>(2)</sup>		SOLUBLE SULFATE		CHLORIDE CONTENT <sup>(4)</sup> (ppm)	PLASTICITY INDEX <sup>(5)</sup>	pH AND USDA CLASS. <sup>(6)</sup>		SATURATED RESISTIVITY (FERROUS METALS)	
			EXPANSION INDEX	ASTM/CBC CLASS.	CONTENT (% by Wt)	ACI/CBC CLASS. <sup>(3)</sup>			(ohm-cm)	CATEGORY <sup>(7)</sup>		
151			8	Very Low	0.0016	S0	4		7.6	Slightly Alkaline	14,800	Mildly Corrosive
152			0	Very Low	0.0027	S0	7		7.6	Slightly Alkaline	7,600	Moderately Corrosive
153			0	Very Low	0.0027	S0	7		7.6	Slightly Alkaline	7,600	Moderately Corrosive
154			0	Very Low	0.0027	S0	7		7.6	Slightly Alkaline	7,600	Moderately Corrosive
155			5	Very Low	0.0014	S0	8		7.9	Moderately Alkaline	6,400	Moderately Corrosive
156			5	Very Low	0.0014	S0	8		7.9	Moderately Alkaline	6,400	Moderately Corrosive
157			5	Very Low	0.0014	S0	8		7.9	Moderately Alkaline	6,400	Moderately Corrosive
158												
159												
160												
161												
162												
163												
164												
165												

(1) All field measurements approximate

(2) Test and Classification per ASTM D 4829 and CBC (2019)

(3) Classification per Table 19.3.1.1 of ACI (2014a) and CBC (2019)

(4) Chloride Content as per CTM 422

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(7) Corrosivity to ferrous metals only, per CTM 643. There are no exposure conditions that relate to Tables 19.3.1.1 or 19.3.2.1 of ACI (2014a)

**Table 2**  
**LOT SUMMARY - AS-GRADED CONDITIONS**

LOT NUMBER	MINIMUM DEPTH OF FILL (ft)	MAXIMUM DEPTH OF FILL (ft)	EXPANSION POTENTIAL <sup>(2)</sup>		SOLUBLE SULFATE		CHLORIDE CONTENT <sup>(4)</sup> (ppm)	PLASTICITY INDEX <sup>(5)</sup>	pH AND USDA CLASS. <sup>(6)</sup>	SATURATED RESISTIVITY (FERROUS METALS)		
			EXPANSION INDEX	ASTM/CBC CLASS.	CONTENT (% by Wt)	ACI/CBC CLASS. <sup>(3)</sup>				(ohm-cm)	CATEGORY <sup>(7)</sup>	
166												
167			10	Very Low	0.0033	S0	15		7.4	Slightly Alkaline	2,840	Moderately Corrosive
168			10	Very Low	0.0033	S0	15		7.4	Slightly Alkaline	2,840	Moderately Corrosive
169			10	Very Low	0.0033	S0	15		7.4	Slightly Alkaline	2,840	Moderately Corrosive
170			4	Very Low	0.0030	S0	19		7.8	Slightly Alkaline	4,400	Moderately Corrosive
171			4	Very Low	0.0030	S0	19		7.8	Slightly Alkaline	4,400	Moderately Corrosive
172			4	Very Low	0.0030	S0	19		7.8	Slightly Alkaline	4,400	Moderately Corrosive
173			8	Very Low	0.0024	S0	13		7.6	Slightly Alkaline	7,600	Moderately Corrosive
174			8	Very Low	0.0024	S0	13		7.6	Slightly Alkaline	7,600	Moderately Corrosive
175	8½	16½	8	Very Low	0.0020	S0	13		7.6	Slightly Alkaline	7,600	Moderately Corrosive
176	11½	18	6	Very Low	0.002	S0	5		7.7	Slightly Alkaline	8800	Moderately Corrosive
177	13½	16	6	Very Low	0.0020	S0	5		7.7	Slightly Alkaline	8,800	Moderately Corrosive

(1) All field measurements approximate

(2) Test and Classification per ASTM D 4829 and CBC (2019)

(3) Classification per Table 19.3.1.1 of ACI (2014a) and CBC (2019)

(4) Chloride Content as per CTM 422

(5) Plasticity Index per ASTM 4318 and CBC (2019)

NP = Non-Plastic

ND\* = No Detection

(6) pH per CTM 643 and Classification per USDA (1993)

(7) Corrosivity to ferrous metals only, per CTM 643. There are no exposure conditions that relate to Tables 19.3.1.1 or 19.3.2.1 of ACI (2014a)

**APPENDIX A**

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## **APPENDIX A**

### **REFERENCES**

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**APPENDIX B**

**SEISMIC PARAMETERS**

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\* E Q F A U L T \*  
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\* Versi on 3.00 \*  
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DETERMINISTIC ESTIMATION OF  
PEAK ACCELERATION FROM DIGITIZED FAULTS

JOB NUMBER: 7676-A1-SC

DATE: 01-20-2021

JOB NAME: JMP Bixby Hemet, LLC

CALCULATION NAME: Test Run Analysis

FAULT-DATA-FILE NAME: C:\Program Files\EQFAULT1\CGSFLTE.DAT

SITE COORDINATES:

SITE LATITUDE: 33.7547

SITE LONGITUDE: 117.0292

SEARCH RADIUS: 62.2 mi

ATTENUATION RELATION: 13) Bozorgnia Campbell Ni azi (1999) Hor. -Hard Rock-Cor.

UNCERTAINTY (M=Median, S=Sigma): S Number of Sigmas: 1.0

DISTANCE MEASURE: cdist

SCOND: 1

Basement Depth: 5.00 km Campbell SSR: 0 Campbell SHR: 1

COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED: C:\Program Files\EQFAULT1\CGSFLTE.DAT

MINIMUM DEPTH VALUE (km): 3.0

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EQFAULT SUMMARY  
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DETERMINISTIC SITE PARAMETERS  
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Page 1

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT		
		MAXIMUM EARTHQUAKE MAG. (Mw)	PEAK SITE ACCEL. g	EST. SITE INTENSITY MOD. MERC.
SAN JACINTO-SAN JACINTO VALLEY	4.4 ( 7.1)	6.9	0.636	X
SAN JACINTO-ANZA	6.8 ( 10.9)	7.2	0.534	X
ELSINORE (TEMECULA)	18.3 ( 29.5)	6.8	0.160	VIII
ELSINORE (GLEN IVY)	19.9 ( 32.1)	6.8	0.146	VIII
SAN ANDREAS - Whole M-1a	20.7 ( 33.3)	8.0	0.325	IX
SAN ANDREAS - SB-Coach. M-2b	20.7 ( 33.3)	7.7	0.263	IX
SAN ANDREAS - San Bernardino M-1	20.7 ( 33.3)	7.5	0.229	IX
SAN ANDREAS - SB-Coach. M-1b-2	20.7 ( 33.3)	7.7	0.263	IX
SAN JACINTO-SAN BERNARDINO	21.8 ( 35.1)	6.7	0.125	VII
ELSINORE (JULIAN)	26.2 ( 42.1)	7.1	0.135	VIII
PINTO MOUNTAIN	27.3 ( 44.0)	7.2	0.139	VIII
CHINO-CENTRAL AVE. (El sinore)	32.1 ( 51.6)	6.7	0.117	VII
SAN ANDREAS - Coachella M-1c-5	34.2 ( 55.1)	7.2	0.110	VII
NORTH FRONTAL FAULT ZONE (West)	34.7 ( 55.8)	7.2	0.153	VIII
NORTH FRONTAL FAULT ZONE (East)	35.5 ( 57.1)	6.7	0.105	VII
WHITTIER	35.5 ( 57.2)	6.8	0.080	VII
SAN JACINTO-COYOTE CREEK	36.4 ( 58.5)	6.6	0.068	VI
CLEGHORN	37.9 ( 61.0)	6.5	0.061	VI
BURNT MTN.	38.8 ( 62.4)	6.5	0.059	VI
CUCAMONGA	39.6 ( 63.8)	6.9	0.107	VII
SAN JOAQUIN HILLS	40.0 ( 64.3)	6.6	0.087	VII
EUREKA PEAK	42.0 ( 67.6)	6.4	0.051	VI
HELENDALE - S. LOCKHARDT	43.6 ( 70.1)	7.3	0.092	VII
LANDERS	44.6 ( 71.8)	7.3	0.089	VII
NEWPORT-INGLEWOOD (Offshore)	44.9 ( 72.2)	7.1	0.077	VII
SAN ANDREAS - 1857 Rupture M-2a	45.8 ( 73.7)	7.8	0.125	VII
SAN ANDREAS - Mojave M-1c-3	45.8 ( 73.7)	7.4	0.093	VII
SAN ANDREAS - Cho-Moj M-1b-1	45.8 ( 73.7)	7.8	0.125	VII
SAN JOSE	45.9 ( 73.8)	6.4	0.066	VI
LENWOOD-LOCKHART-OLD WOMAN SPRGS	47.2 ( 76.0)	7.5	0.097	VII
EARTHQUAKE VALLEY	47.2 ( 76.0)	6.5	0.048	VI
SIERRA MADRE	48.6 ( 78.2)	7.2	0.107	VII
ROSE CANYON	49.2 ( 79.2)	7.2	0.075	VII
PUENTE HILLS BLIND THRUST	49.7 ( 80.0)	7.1	0.098	VII
JOHNSON VALLEY (Northern)	50.7 ( 81.6)	6.7	0.051	VI
NEWPORT-INGLEWOOD (L. A. Basin)	52.5 ( 84.5)	7.1	0.065	VI
EMERSON So. - COPPER MTN.	55.0 ( 88.5)	7.0	0.058	VI
CLAMSHELL-SAWPIT	59.4 ( 95.6)	6.5	0.053	VI
CALICO - HIDALGO	60.6 ( 97.6)	7.3	0.065	VI
CORONADO BANK	61.2 ( 98.5)	7.6	0.080	VII

DETERMINISTIC SITE PARAMETERS

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ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT		
		MAXIMUM EARTHQUAKE MAG. (Mw)	PEAK SITE ACCEL. g	EST. SITE INTENSITY MOD. MERC.
SAN JACINTO - BORREGO	61.5 ( 98.9)	6.6	0.039	V
PALOS VERDES	61.6 ( 99.2)	7.3	0.063	VI

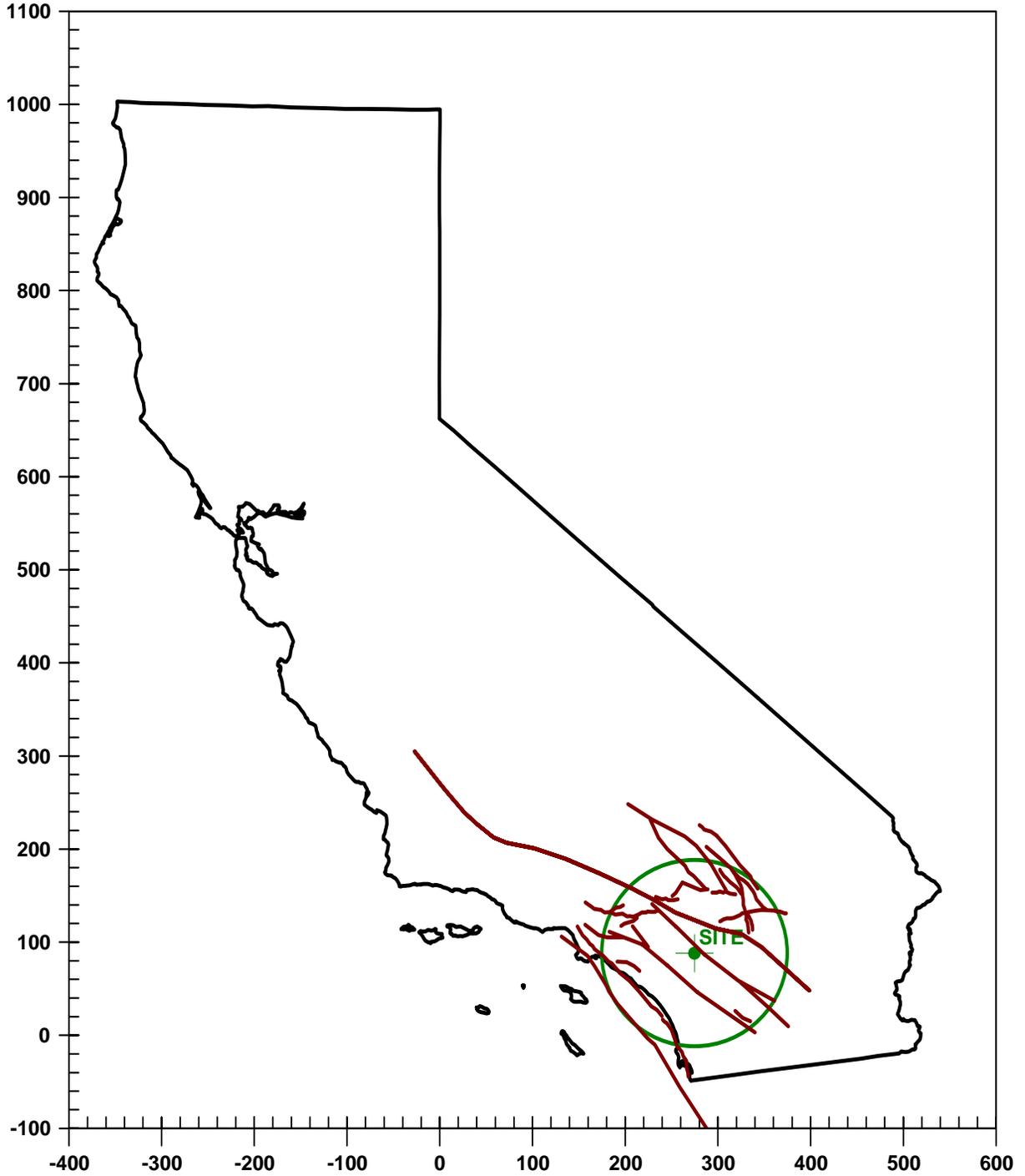
\*\*\*\*\*  
 -END OF SEARCH- 42 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE SAN JACINTO-SAN JACINTO VALLEY FAULT IS CLOSEST TO THE SITE.  
 IT IS ABOUT 4.4 MILES (7.1 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.6363 g

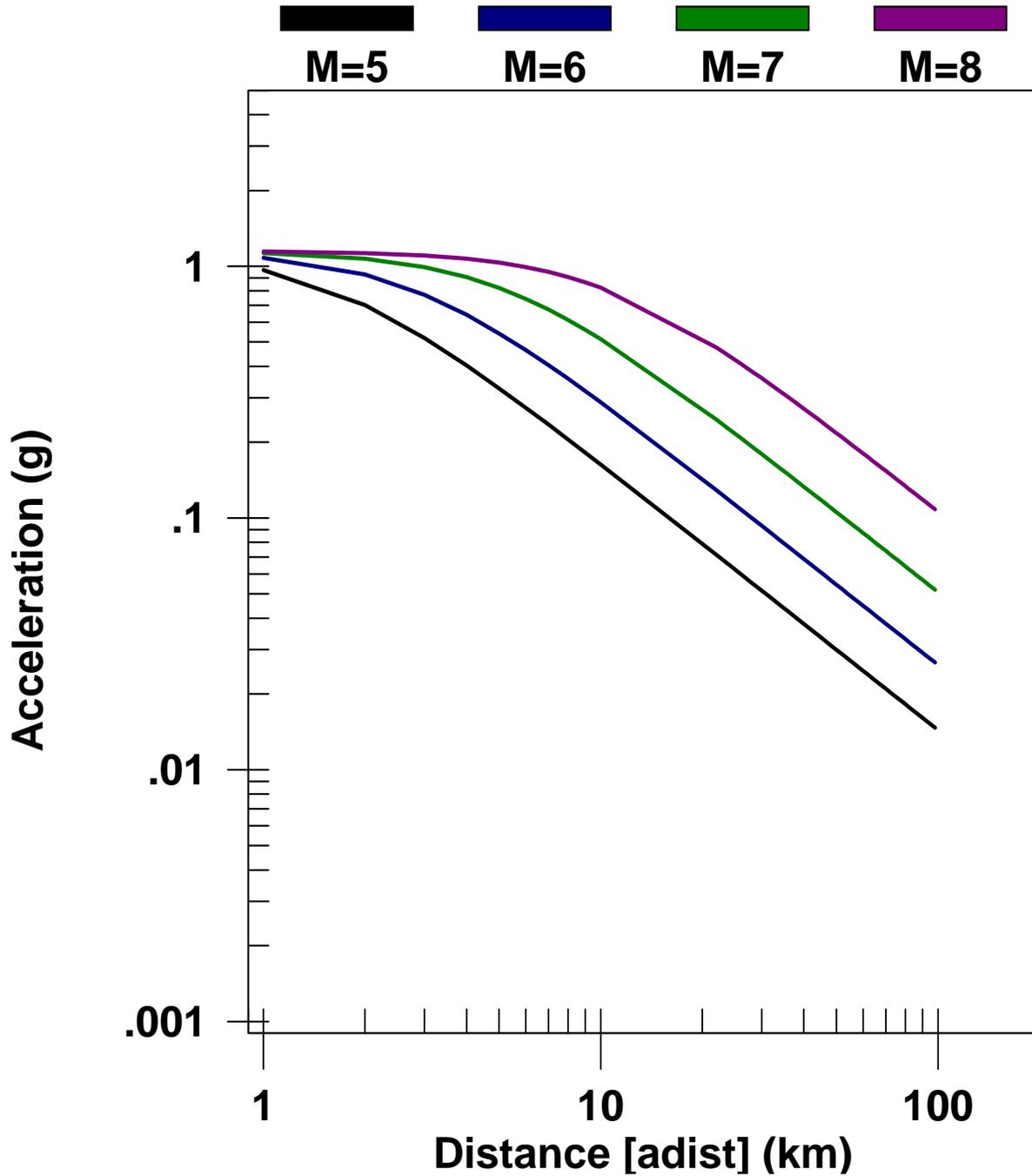
# CALIFORNIA FAULT MAP

JMP Bixby Hemet, LLC



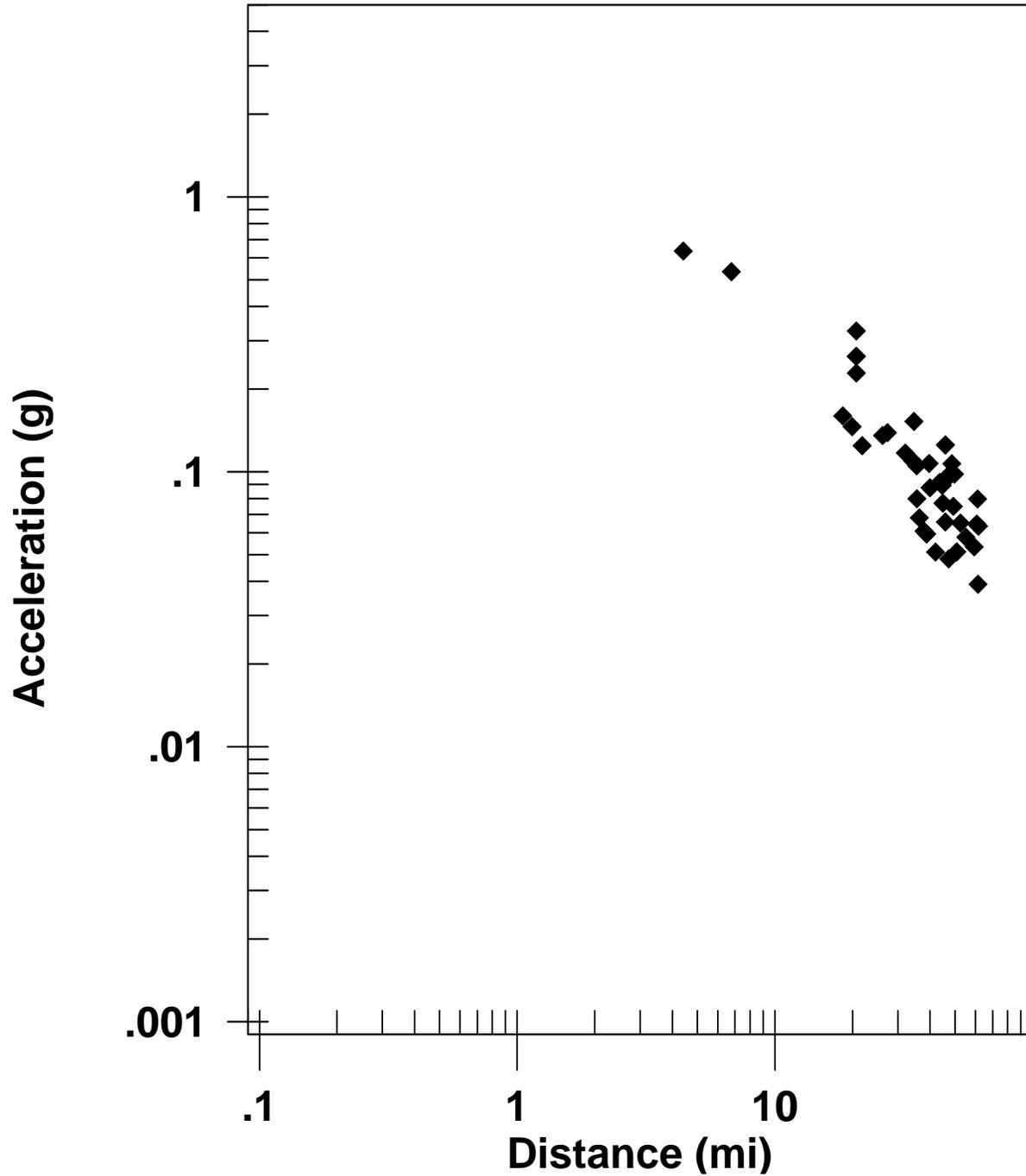
# STRIKE-SLIP FAULTS

13) Bozorgnia Campbell Niazi (1999) Hor.-Hard Rock-Cor.



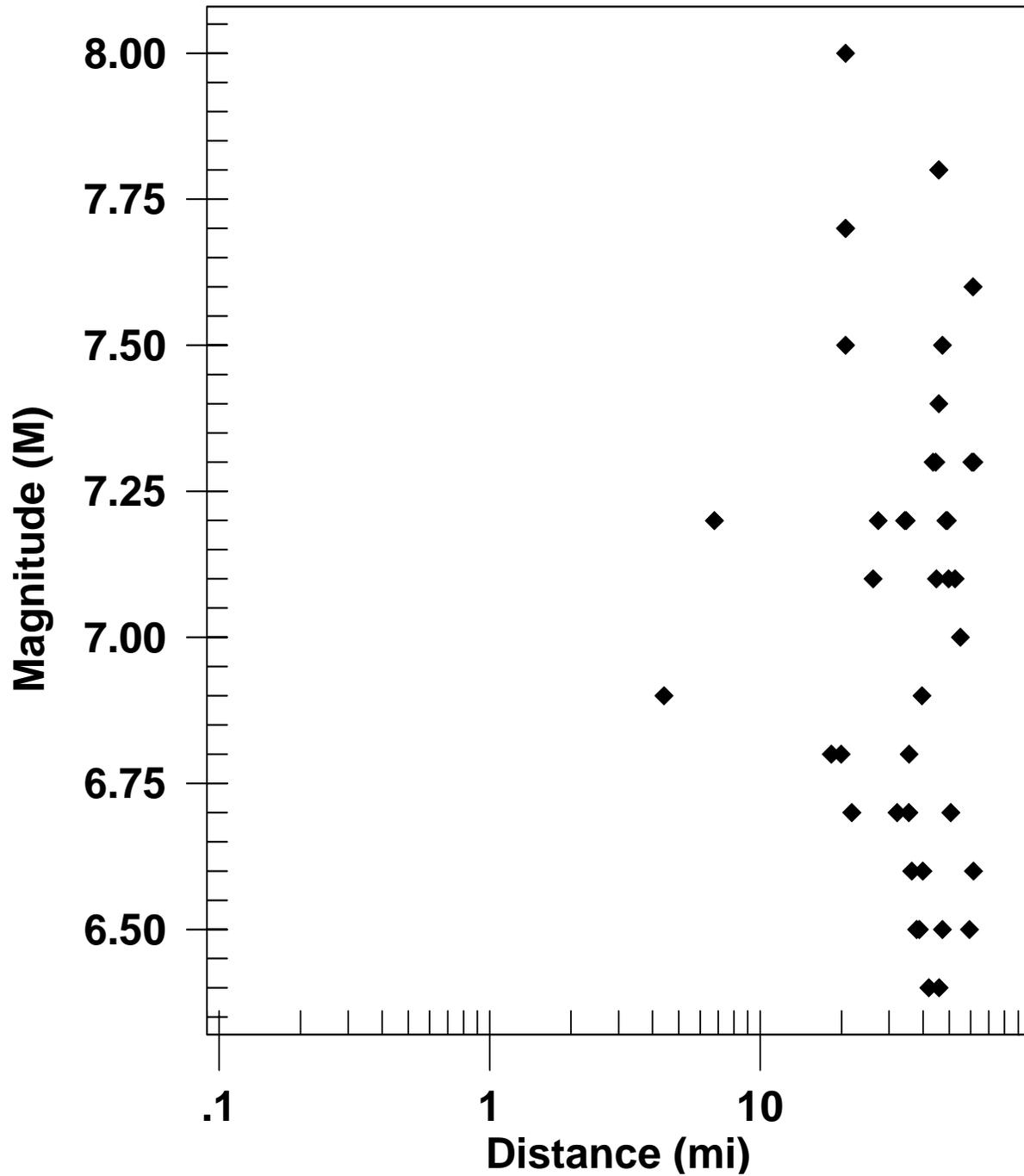
# MAXIMUM EARTHQUAKES

JMP Bixby Hemet, LLC



# EARTHQUAKE MAGNITUDES & DISTANCES

JMP Bixby Hemet, LLC



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\* E Q S E A R C H \*  
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\* Versi on 3. 00 \*  
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ESTIMATION OF  
PEAK ACCELERATION FROM  
CALIFORNIA EARTHQUAKE CATALOGS

JOB NUMBER: 7676-A1-SC

DATE: 01-20-2021

JOB NAME: JMP Bixby Hemet LLC

EARTHQUAKE-CATALOG-FILE NAME: ALLQUAKE.DAT

SITE COORDINATES:

SITE LATITUDE: 33.7547  
SITE LONGITUDE: 117.0292

SEARCH DATES:

START DATE: 1800  
END DATE: 2015

SEARCH RADIUS:

62.2 mi  
100.1 km

ATTENUATION RELATION: 13) Bozorgnia Campbell Niazi (1999) Hor. -Hard Rock-Cor.  
UNCERTAINTY (M=Median, S=Sigma): S Number of Sigmas: 1.0  
ASSUMED SOURCE TYPE: SS [SS=Strike-slip, DS=Reverse-slip, BT=Blind-thrust]  
SCOND: 1 Depth Source: A  
Basement Depth: 5.00 km Campbell SSR: 0 Campbell SHR: 1  
COMPUTE PEAK HORIZONTAL ACCELERATION

MINIMUM DEPTH VALUE (km): 3.0

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EARTHQUAKE SEARCH RESULTS  
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Page 1

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	33. 7500	117. 0000	06/06/1918	2232 0. 0	0. 0	5. 00	0. 211	VII	1. 7( 2. 7)
DMG	33. 7500	117. 0000	04/21/1918	223225. 0	0. 0	6. 80	0. 851	XI	1. 7( 2. 7)
DMG	33. 8000	117. 0000	12/25/1899	1225 0. 0	0. 0	6. 40	0. 537	X	3. 5( 5. 7)
DMG	33. 7100	116. 9250	09/23/1963	144152. 6	16. 5	5. 00	0. 124	VII	6. 7( 10. 8)
DMG	33. 9000	117. 2000	12/19/1880	0 0 0. 0	0. 0	6. 00	0. 124	VII	14. 0( 22. 6)
DMG	33. 9500	116. 8500	09/28/1946	719 9. 0	0. 0	5. 00	0. 055	VI	16. 9( 27. 3)
DMG	34. 0000	117. 2500	07/23/1923	73026. 0	0. 0	6. 25	0. 095	VII	21. 1( 34. 0)
DMG	33. 7000	117. 4000	05/15/1910	1547 0. 0	0. 0	6. 00	0. 079	VII	21. 6( 34. 8)
DMG	33. 7000	117. 4000	05/13/1910	620 0. 0	0. 0	5. 00	0. 043	VI	21. 6( 34. 8)
DMG	33. 7000	117. 4000	04/11/1910	757 0. 0	0. 0	5. 00	0. 043	VI	21. 6( 34. 8)
DMG	33. 9760	116. 7210	06/12/1944	104534. 7	10. 0	5. 10	0. 042	VI	23. 4( 37. 6)
DMG	33. 9940	116. 7120	06/12/1944	111636. 0	10. 0	5. 30	0. 045	VI	24. 6( 39. 5)
DMG	34. 1000	116. 8000	10/24/1935	1448 7. 6	0. 0	5. 10	0. 036	V	27. 2( 43. 8)
DMG	33. 6990	117. 5110	05/31/1938	83455. 4	10. 0	5. 50	0. 044	VI	27. 9( 44. 9)
MGI	34. 1000	117. 3000	07/15/1905	2041 0. 0	0. 0	5. 30	0. 039	V	28. 4( 45. 8)
PAS	33. 9980	116. 6060	07/08/1986	92044. 5	11. 7	5. 60	0. 045	VI	29. 5( 47. 5)
GSP	34. 1630	116. 8550	06/28/1992	144321. 0	6. 0	5. 30	0. 037	V	29. 9( 48. 1)
DMG	34. 1800	116. 9200	01/16/1930	02433. 9	0. 0	5. 20	0. 034	V	30. 0( 48. 3)
DMG	34. 1800	116. 9200	01/16/1930	034 3. 6	0. 0	5. 10	0. 033	V	30. 0( 48. 3)
DMG	34. 1000	116. 7000	02/07/1889	520 0. 0	0. 0	5. 30	0. 036	V	30. 4( 48. 9)
GSP	33. 5290	116. 5720	06/12/2005	154146. 5	14. 0	5. 20	0. 034	V	30. 5( 49. 2)
DMG	34. 2000	117. 1000	09/20/1907	154 0. 0	0. 0	6. 00	0. 054	VI	31. 0( 49. 9)
MGI	34. 0000	117. 5000	12/16/1858	10 0 0. 0	0. 0	7. 00	0. 103	VII	31. 9( 51. 3)
GSP	34. 1950	116. 8620	08/17/1992	204152. 1	11. 0	5. 30	0. 034	V	31. 9( 51. 3)
MGI	33. 8000	117. 6000	04/22/1918	2115 0. 0	0. 0	5. 00	0. 028	V	32. 9( 52. 9)
GSN	34. 2030	116. 8270	06/28/1992	150530. 7	5. 0	6. 70	0. 080	VII	33. 0( 53. 2)
GSP	33. 5080	116. 5140	10/31/2001	075616. 6	15. 0	5. 10	0. 028	V	34. 2( 55. 0)
PAS	33. 5010	116. 5130	02/25/1980	104738. 5	13. 6	5. 50	0. 036	V	34. 5( 55. 4)
DMG	33. 5000	116. 5000	09/30/1916	211 0. 0	0. 0	5. 00	0. 026	V	35. 1( 56. 5)
GSP	34. 2390	116. 8370	07/09/1992	014357. 6	0. 0	5. 30	0. 031	V	35. 2( 56. 6)
DMG	34. 0170	116. 5000	07/25/1947	04631. 0	0. 0	5. 00	0. 026	V	35. 3( 56. 8)
DMG	34. 0170	116. 5000	07/24/1947	221046. 0	0. 0	5. 50	0. 035	V	35. 3( 56. 8)
DMG	34. 0170	116. 5000	07/26/1947	24941. 0	0. 0	5. 10	0. 027	V	35. 3( 56. 8)
DMG	34. 0170	116. 5000	07/25/1947	61949. 0	0. 0	5. 20	0. 029	V	35. 3( 56. 8)
DMG	34. 2670	116. 9670	08/29/1943	34513. 0	0. 0	5. 50	0. 035	V	35. 5( 57. 2)
GSP	34. 2900	116. 9460	02/10/2001	210505. 8	9. 0	5. 10	0. 026	V	37. 3( 60. 0)
DMG	34. 2000	117. 4000	07/22/1899	046 0. 0	0. 0	5. 50	0. 033	V	37. 4( 60. 1)
GSG	33. 4200	116. 4890	07/07/2010	235333. 5	14. 0	5. 50	0. 032	V	38. 7( 62. 3)
DMG	33. 9330	116. 3830	12/04/1948	234317. 0	0. 0	6. 50	0. 059	VI	39. 0( 62. 8)
GSG	34. 3100	116. 8480	02/22/2003	121910. 6	1. 0	5. 20	0. 026	V	39. 7( 63. 9)
GSP	34. 3400	116. 9000	11/27/1992	160057. 5	1. 0	5. 30	0. 026	V	41. 1( 66. 1)
DMG	33. 2000	116. 7000	01/01/1920	235 0. 0	0. 0	5. 00	0. 021	IV	42. 7( 68. 8)
GSP	34. 3690	116. 8970	12/04/1992	020857. 5	3. 0	5. 30	0. 025	V	43. 1( 69. 3)
GSP	33. 9610	116. 3180	04/23/1992	045023. 0	12. 0	6. 10	0. 041	V	43. 2( 69. 5)
GSP	34. 1080	116. 4040	06/29/1992	141338. 8	9. 0	5. 40	0. 026	V	43. 3( 69. 7)
GSP	34. 1390	116. 4310	06/28/1992	123640. 6	10. 0	5. 10	0. 022	IV	43. 3( 69. 7)
GSP	34. 0640	116. 3610	09/15/1992	084711. 3	9. 0	5. 20	0. 023	IV	43. 8( 70. 5)
GSP	33. 9020	116. 2840	07/24/1992	181436. 2	9. 0	5. 00	0. 021	IV	43. 9( 70. 7)
GSG	33. 9530	117. 7610	07/29/2008	184215. 7	14. 0	5. 30	0. 024	V	44. 1( 71. 0)

Page 2

GSP	33. 8760	116. 2670	06/29/1992	160142. 8	1. 0	5. 20	0. 023	IV	44. 5( 71. 6)
GSP	34. 0290	116. 3210	08/21/1993	014638. 4	9. 0	5. 00	0. 020	IV	44. 8( 72. 1)
DMG	34. 0670	116. 3330	05/18/1940	55120. 2	0. 0	5. 20	0. 022	IV	45. 3( 73. 0)
DMG	34. 0670	116. 3330	05/18/1940	72132. 7	0. 0	5. 00	0. 020	IV	45. 3( 73. 0)

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EARTHQUAKE SEARCH RESULTS  
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Page 2

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DI STANCE mi [km]
MGI	33. 2000	116. 6000	10/12/1920	1748 0. 0	0. 0	5. 30	0. 024	IV	45. 6( 73. 3)
GSN	34. 2010	116. 4360	06/28/1992	115734. 1	1. 0	7. 60	0. 108	VII	45. 9( 73. 8)
DMG	34. 2700	117. 5400	09/12/1970	143053. 0	8. 0	5. 40	0. 025	V	46. 0( 74. 1)
DMG	34. 3000	117. 5000	07/22/1899	2032 0. 0	0. 0	6. 50	0. 049	VI	46. 3( 74. 5)
GSP	34. 1400	117. 7000	02/28/1990	234336. 6	5. 0	5. 20	0. 022	IV	46. 7( 75. 2)
DMG	34. 0830	116. 3000	05/18/1940	5 358. 5	0. 0	5. 40	0. 024	V	47. 5( 76. 5)
DMG	33. 3430	116. 3460	04/28/1969	232042. 9	20. 0	5. 80	0. 030	V	48. 5( 78. 1)
DMG	33. 4000	116. 3000	02/09/1890	12 6 0. 0	0. 0	6. 30	0. 041	V	48. 6( 78. 2)
GSP	34. 3410	116. 5290	06/28/1992	124053. 5	6. 0	5. 20	0. 020	IV	49. 6( 79. 8)
DMG	34. 3000	117. 6000	07/30/1894	512 0. 0	0. 0	6. 00	0. 033	V	49. 8( 80. 2)
DMG	33. 4080	116. 2610	03/25/1937	1649 1. 8	10. 0	6. 00	0. 033	V	50. 3( 80. 9)
GSP	34. 2680	116. 4020	06/16/1994	162427. 5	3. 0	5. 00	0. 018	IV	50. 4( 81. 2)
GSP	34. 3320	116. 4620	07/01/1992	074029. 9	9. 0	5. 40	0. 022	IV	51. 4( 82. 7)
PAS	34. 3270	116. 4450	03/15/1979	21 716. 5	2. 5	5. 20	0. 019	IV	51. 8( 83. 3)
MGI	33. 0000	117. 0000	09/21/1856	730 0. 0	0. 0	5. 00	0. 017	IV	52. 1( 83. 9)
GSP	33. 9325	117. 9158	03/29/2014	040942. 2	5. 1	5. 10	0. 018	IV	52. 3( 84. 2)
DMG	33. 0000	117. 3000	11/22/1800	2130 0. 0	0. 0	6. 50	0. 042	V	54. 4( 87. 5)
DMG	33. 6170	117. 9670	03/11/1933	154 7. 8	0. 0	6. 30	0. 036	V	54. 7( 88. 0)
DMG	34. 3700	117. 6500	12/08/1812	15 0 0. 0	0. 0	7. 00	0. 057	VI	55. 4( 89. 1)
DMG	33. 5750	117. 9830	03/11/1933	518 4. 0	0. 0	5. 20	0. 018	IV	56. 2( 90. 4)
DMG	33. 6170	118. 0170	03/14/1933	19 150. 0	0. 0	5. 10	0. 016	IV	57. 5( 92. 6)
MGI	34. 0000	118. 0000	12/25/1903	1745 0. 0	0. 0	5. 00	0. 015	IV	58. 2( 93. 6)
DMG	34. 2000	117. 9000	08/28/1889	215 0. 0	0. 0	5. 50	0. 020	IV	58. 6( 94. 3)
DMG	33. 2830	116. 1830	03/23/1954	41450. 0	0. 0	5. 10	0. 016	IV	58. 6( 94. 3)
DMG	33. 2830	116. 1830	03/19/1954	95556. 0	0. 0	5. 00	0. 015	IV	58. 6( 94. 3)
DMG	33. 2830	116. 1830	03/19/1954	102117. 0	0. 0	5. 50	0. 020	IV	58. 6( 94. 3)
DMG	33. 2830	116. 1830	03/19/1954	95429. 0	0. 0	6. 20	0. 032	V	58. 6( 94. 3)
DMG	33. 6830	118. 0500	03/11/1933	658 3. 0	0. 0	5. 50	0. 020	IV	58. 8( 94. 7)
DMG	33. 7000	118. 0670	03/11/1933	85457. 0	0. 0	5. 10	0. 016	IV	59. 7( 96. 1)
DMG	33. 7000	118. 0670	03/11/1933	51022. 0	0. 0	5. 10	0. 016	IV	59. 7( 96. 1)
DMG	34. 2500	116. 1670	03/20/1945	2155 7. 0	0. 0	5. 00	0. 015	IV	60. 0( 96. 6)
DMG	33. 7500	118. 0830	03/11/1933	910 0. 0	0. 0	5. 10	0. 016	IV	60. 5( 97. 3)
DMG	33. 7500	118. 0830	03/13/1933	131828. 0	0. 0	5. 30	0. 018	IV	60. 5( 97. 3)
DMG	33. 7500	118. 0830	03/11/1933	230 0. 0	0. 0	5. 10	0. 016	IV	60. 5( 97. 3)
DMG	33. 7500	118. 0830	03/11/1933	2 9 0. 0	0. 0	5. 00	0. 015	IV	60. 5( 97. 3)
DMG	33. 7500	118. 0830	03/11/1933	323 0. 0	0. 0	5. 00	0. 015	IV	60. 5( 97. 3)
PAS	34. 5160	116. 4950	06/01/1975	13849. 2	4. 5	5. 20	0. 016	IV	60. 8( 97. 8)
DMG	33. 2000	116. 2000	05/28/1892	1115 0. 0	0. 0	6. 30	0. 032	V	61. 2( 98. 5)
DMG	34. 0000	116. 0000	09/05/1928	1442 0. 0	0. 0	5. 00	0. 015	IV	61. 4( 98. 8)
DMG	34. 0000	116. 0000	04/03/1926	20 8 0. 0	0. 0	5. 50	0. 019	IV	61. 4( 98. 8)

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-END OF SEARCH- 93 EARTHQUAKES FOUND WITHIN THE SPECIFIED SEARCH AREA.

TIME PERIOD OF SEARCH: 1800 TO 2015

LENGTH OF SEARCH TIME: 216 years

THE EARTHQUAKE CLOSEST TO THE SITE IS ABOUT 1.7 MILES (2.7 km) AWAY.

LARGEST EARTHQUAKE MAGNITUDE FOUND IN THE SEARCH RADIUS: 7.6

LARGEST EARTHQUAKE SITE ACCELERATION FROM THIS SEARCH: 0.851 g

COEFFICIENTS FOR GUTENBERG & RICHTER RECURRENCE RELATION:

a-value= 1.206

b-value= 0.360

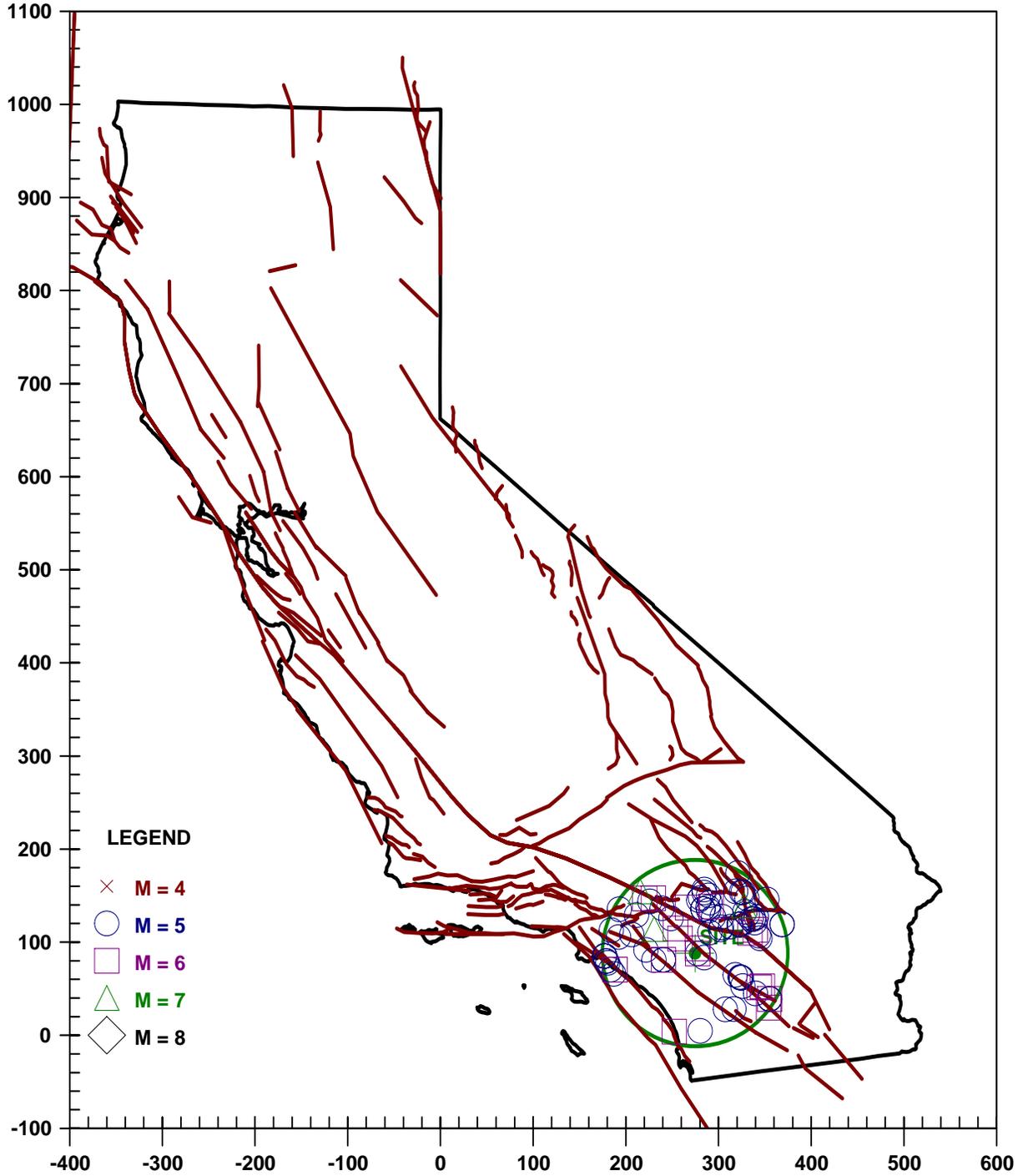
beta-value= 0.828

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TABLE OF MAGNITUDES AND EXCEEDANCES:  
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Earthquake Magnitude	Number of Times Exceeded	Cumulative No. / Year
4.0	93	0.43256
4.5	93	0.43256
5.0	93	0.43256
5.5	32	0.14884
6.0	20	0.09302
6.5	8	0.03721
7.0	3	0.01395
7.5	1	0.00465

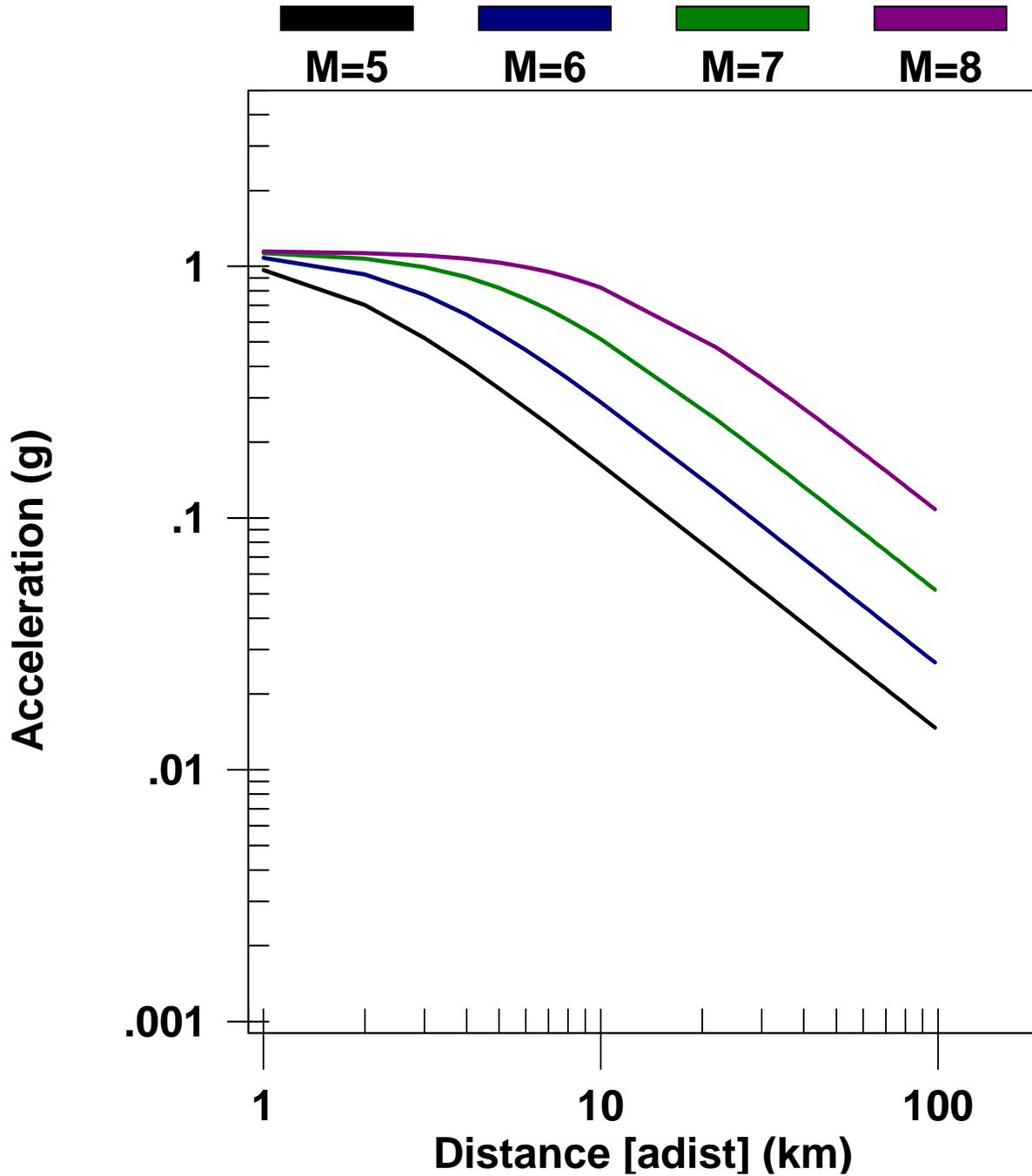
# EARTHQUAKE EPICENTER MAP

JMP Bixby Hemet LLC



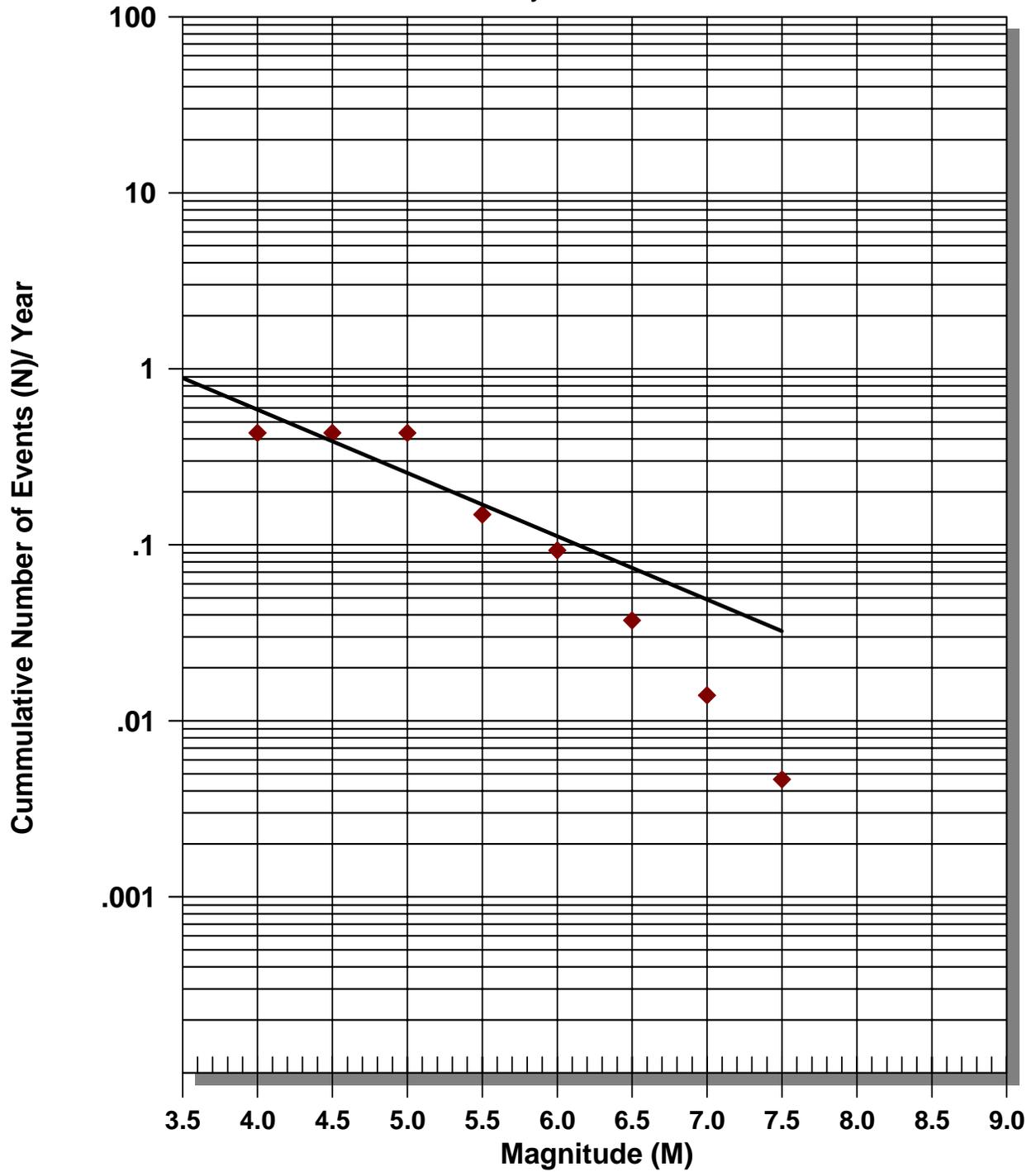
# STRIKE-SLIP FAULTS

13) Bozorgnia Campbell Niazi (1999) Hor.-Hard Rock-Cor.



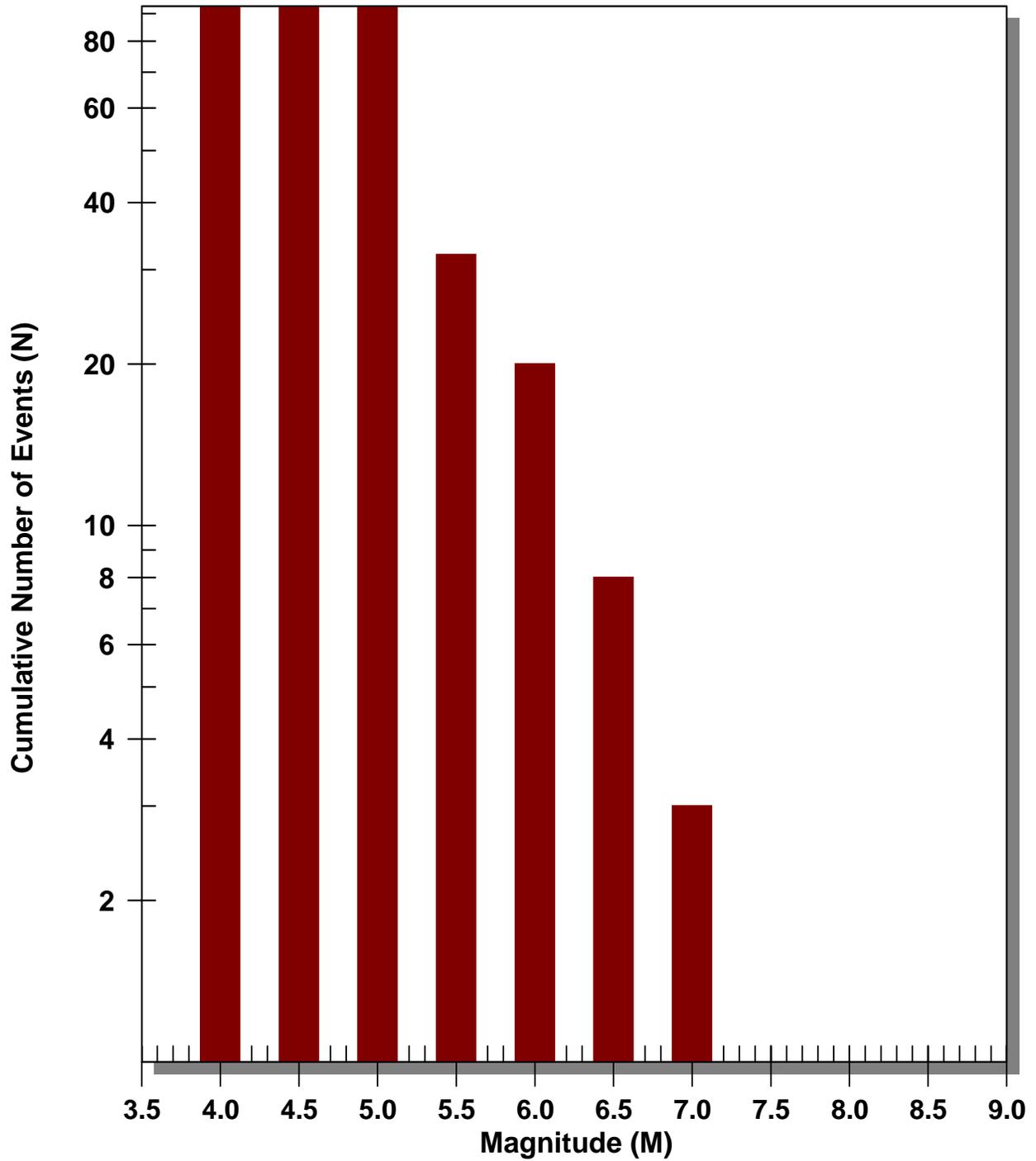
# EARTHQUAKE RECURRENCE CURVE

JMP Bixby Hemet LLC



# Number of Earthquakes (N) Above Magnitude (M)

JMP Bixby Hemet LLC



**APPENDIX C**

**GENERAL EARTHWORK, GRADING GUIDELINES  
AND PRELIMINARY CRITERIA**

## **GENERAL EARTHWORK, GRADING GUIDELINES, AND PRELIMINARY CRITERIA**

### **General**

These guidelines present general procedures and requirements for earthwork and grading as shown on the approved grading plans, including preparation of areas to be filled, placement of fill, installation of subdrains, excavations, and appurtenant structures or flatwork. The recommendations contained in the geotechnical report are part of these earthwork and grading guidelines and would supercede the provisions contained hereafter in the case of conflict. Evaluations performed by the consultant during the course of grading may result in new or revised recommendations which could supercede these guidelines or the recommendations contained in the geotechnical report. Generalized details follow this text.

The contractor is responsible for the satisfactory completion of all earthwork in accordance with provisions of the project plans and specifications and latest adopted code. In the case of conflict, the most onerous provisions shall prevail. The project geotechnical engineer and engineering geologist (geotechnical consultant), and/or their representatives, should provide observation and testing services, and geotechnical consultation during the duration of the project.

## **EARTHWORK OBSERVATIONS AND TESTING**

### **Geotechnical Consultant**

Prior to the commencement of grading, a qualified geotechnical consultant (soil engineer and engineering geologist) should be employed for the purpose of observing earthwork procedures and testing the fills for general conformance with the recommendations of the geotechnical report(s), the approved grading plans, and applicable grading codes and ordinances.

The geotechnical consultant should provide testing and observation so that an evaluation may be made that the work is being accomplished as specified. It is the responsibility of the contractor to assist the consultants and keep them apprised of anticipated work schedules and changes, so that they may schedule their personnel accordingly.

All remedial removals, clean-outs, prepared ground to receive fill, key excavations, and subdrain installation should be observed and documented by the geotechnical consultant prior to placing any fill. It is the contractor's responsibility to notify the geotechnical consultant when such areas are ready for observation.

### **Laboratory and Field Tests**

Maximum dry density tests to determine the degree of compaction should be performed in accordance with American Standard Testing Materials test method ASTM designation D-1557. Random or representative field compaction tests should be performed in accordance

with test methods ASTM designation D-1556, D-2937 or D-2922, and D-3017, at intervals of approximately  $\pm 2$  feet of fill height or approximately every 1,000 cubic yards placed. These criteria would vary depending on the soil conditions and the size of the project. The location and frequency of testing would be at the discretion of the geotechnical consultant.

### **Contractor's Responsibility**

All clearing, site preparation, and earthwork performed on the project should be conducted by the contractor, with observation by a geotechnical consultant, and staged approval by the governing agencies, as applicable. It is the contractor's responsibility to prepare the ground surface to receive the fill, to the satisfaction of the geotechnical consultant, and to place, spread, moisture condition, mix, and compact the fill in accordance with the recommendations of the geotechnical consultant. The contractor should also remove all non-earth material considered unsatisfactory by the geotechnical consultant.

Notwithstanding the services provided by the geotechnical consultant, it is the sole responsibility of the contractor to provide adequate equipment and methods to accomplish the earthwork in strict accordance with applicable grading guidelines, latest adopted codes or agency ordinances, geotechnical report(s), and approved grading plans. Sufficient watering apparatus and compaction equipment should be provided by the contractor with due consideration for the fill material, rate of placement, and climatic conditions. If, in the opinion of the geotechnical consultant, unsatisfactory conditions such as questionable weather, excessive oversized rock or deleterious material, insufficient support equipment, etc., are resulting in a quality of work that is not acceptable, the consultant will inform the contractor, and the contractor is expected to rectify the conditions, and if necessary, stop work until conditions are satisfactory.

During construction, the contractor shall properly grade all surfaces to maintain good drainage and prevent ponding of water. The contractor shall take remedial measures to control surface water and to prevent erosion of graded areas until such time as permanent drainage and erosion control measures have been installed.

### **SITE PREPARATION**

All major vegetation, including brush, trees, thick grasses, organic debris, and other deleterious material, should be removed and disposed of off-site. These removals must be concluded prior to placing fill. In-place existing fill, soil, alluvium, colluvium, or rock materials, as evaluated by the geotechnical consultant as being unsuitable, should be removed prior to any fill placement. Depending upon the soil conditions, these materials may be reused as compacted fills. Any materials incorporated as part of the compacted fills should be approved by the geotechnical consultant.

Any underground structures such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines, or other structures not located prior to grading, are to be removed

or treated in a manner recommended by the geotechnical consultant. Soft, dry, spongy, highly fractured, or otherwise unsuitable ground, extending to such a depth that surface processing cannot adequately improve the condition, should be overexcavated down to firm ground and approved by the geotechnical consultant before compaction and filling operations continue. Overexcavated and processed soils, which have been properly mixed and moisture conditioned, should be re-compacted to the minimum relative compaction as specified in these guidelines.

Existing ground, which is determined to be satisfactory for support of the fills, should be scarified (ripped) to a minimum depth of 6 to 8 inches, or as directed by the geotechnical consultant. After the scarified ground is brought to optimum moisture content, or greater and mixed, the materials should be compacted as specified herein. If the scarified zone is greater than 6 to 8 inches in depth, it may be necessary to remove the excess and place the material in lifts restricted to about 6 to 8 inches in compacted thickness.

Existing ground which is not satisfactory to support compacted fill should be overexcavated as required in the geotechnical report, or by the on-site geotechnical consultant. Scarification, disc harrowing, or other acceptable forms of mixing should continue until the soils are broken down and free of large lumps or clods, until the working surface is reasonably uniform and free from ruts, hollows, hummocks, mounds, or other uneven features, which would inhibit compaction as described previously.

Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical [h:v]), the ground should be stepped or benched. The lowest bench, which will act as a key, should be a minimum of 15 feet wide and should be at least 2 feet deep into firm material, and approved by the geotechnical consultant. In fill-over-cut slope conditions, the recommended minimum width of the lowest bench or key is also 15 feet, with the key founded on firm material, as designated by the geotechnical consultant. As a general rule, unless specifically recommended otherwise by the geotechnical consultant, the minimum width of fill keys should be equal to  $\frac{1}{2}$  the height of the slope.

Standard benching is generally 4 feet (minimum) vertically, exposing firm, acceptable material. Benching may be used to remove unsuitable materials, although it is understood that the vertical height of the bench may exceed 4 feet. Pre-stripping may be considered for unsuitable materials in excess of 4 feet in thickness.

All areas to receive fill, including processed areas, removal areas, and the toes of fill benches, should be observed and approved by the geotechnical consultant prior to placement of fill. Fills may then be properly placed and compacted until design grades (elevations) are attained.

## **COMPACTED FILLS**

Any earth materials imported or excavated on the property may be utilized in the fill provided that each material has been evaluated to be suitable by the geotechnical consultant. These materials should be free of roots, tree branches, other organic matter, or other deleterious materials. All unsuitable materials should be removed from the fill as directed by the geotechnical consultant. Soils of poor gradation, undesirable expansion potential, or substandard strength characteristics may be designated by the consultant as unsuitable and may require blending with other soils to serve as a satisfactory fill material.

Fill materials derived from benching operations should be dispersed throughout the fill area and blended with other approved material. Benching operations should not result in the benched material being placed only within a single equipment width away from the fill/bedrock contact.

Oversized materials defined as rock, or other irreducible materials, with a maximum dimension greater than 12 inches, should not be buried or placed in fills unless the location of materials and disposal methods are specifically approved by the geotechnical consultant. Oversized material should be taken offsite, or placed in accordance with recommendations of the geotechnical consultant in areas designated as suitable for rock disposal. GSI anticipates that soils to be utilized as fill material for the subject project may contain some rock. Appropriately, the need for rock disposal may be necessary during grading operations on the site. From a geotechnical standpoint, the depth of any rocks, rock fills, or rock blankets, should be a sufficient distance from finish grade. This depth is generally the same as any overexcavation due to cut-fill transitions in hard rock areas, and generally facilitates the excavation of structural footings and substructures. Should deeper excavations be proposed (i.e., deepened footings, utility trenching, swimming pools, spas, etc.), the developer may consider increasing the hold-down depth of any rocky fills to be placed, as appropriate. In addition, some agencies/jurisdictions mandate a specific hold-down depth for oversize materials placed in fills. The hold-down depth, and potential to encounter oversize rock, both within fills, and occurring in cut or natural areas, would need to be disclosed to all interested/affected parties. Once approved by the governing agency, the hold-down depth for oversized rock (i.e., greater than 12 inches) in fills on this project is provided as 10 feet, unless specified differently in the text of this report. The governing agency may require that these materials need to be deeper, crushed, or reduced to less than 12 inches in maximum dimension, at their discretion.

To facilitate future trenching, rock (or oversized material), should not be placed within the hold-down depth feet from finish grade, the range of foundation excavations, future utilities, or underground construction unless specifically approved by the governing agency, the geotechnical consultant, and/or the developer's representative.

If import material is required for grading, representative samples of the materials to be utilized as compacted fill should be analyzed in the laboratory by the geotechnical consultant to evaluate its physical properties and suitability for use onsite. Such testing

should be performed three (3) days prior to importation. If any material other than that previously tested is encountered during grading, an appropriate analysis of this material should be conducted by the geotechnical consultant as soon as possible.

Approved fill material should be placed in areas prepared to receive fill in near horizontal layers, that when compacted, should not exceed about 6 to 8 inches in thickness. The geotechnical consultant may approve thick lifts if testing indicates the grading procedures are such that adequate compaction is being achieved with lifts of greater thickness. Each layer should be spread evenly and blended to attain uniformity of material and moisture suitable for compaction.

Fill layers at a moisture content less than optimum should be watered and mixed, and wet fill layers should be aerated by scarification, or should be blended with drier material. Moisture conditioning, blending, and mixing of the fill layer should continue until the fill materials have a uniform moisture content at, or above, optimum moisture.

After each layer has been evenly spread, moisture conditioned, and mixed, it should be uniformly compacted to a minimum of 90 percent of the maximum density as evaluated by ASTM test designation D-1557, or as otherwise recommended by the geotechnical consultant. Compaction equipment should be adequately sized and should be specifically designed for soil compaction, or of proven reliability to efficiently achieve the specified degree of compaction.

Where tests indicate that the density of any layer of fill, or portion thereof, is below the required relative compaction, or improper moisture is in evidence, the particular layer or portion shall be re-worked until the required density and/or moisture content has been attained. No additional fill shall be placed in an area until the last placed lift of fill has been tested and found to meet the density and moisture requirements, and is approved by the geotechnical consultant.

In general, per the latest adopted version of the California Building Code (CBC), fill slopes should be designed and constructed at a gradient of 2:1 (h:v), or flatter. Compaction of slopes should be accomplished by over-building a minimum of 3 feet horizontally, and subsequently trimming back to the design slope configuration. Testing shall be performed as the fill is elevated to evaluate compaction as the fill core is being developed. Special efforts may be necessary to attain the specified compaction in the fill slope zone. Final slope shaping should be performed by trimming and removing loose materials with appropriate equipment. A final evaluation of fill slope compaction should be based on observation and/or testing of the finished slope face. Where compacted fill slopes are designed steeper than 2:1 (h:v), prior approval from the governing agency, specific material types, a higher minimum relative compaction, special reinforcement, and special grading procedures will be recommended.

If an alternative to over-building and cutting back the compacted fill slopes is selected, then special effort should be made to achieve the required compaction in the outer 10 feet of each lift of fill by undertaking the following:

1. An extra piece of equipment consisting of a heavy, short-shanked sheepsfoot should be used to roll (horizontal) parallel to the slopes continuously as fill is placed. The sheepsfoot roller should also be used to roll perpendicular to the slopes, and extend out over the slope to provide adequate compaction to the face of the slope.
2. Loose fill should not be spilled out over the face of the slope as each lift is compacted. Any loose fill spilled over a previously completed slope face should be trimmed off or be subject to re-rolling.
3. Field compaction tests will be made in the outer (horizontal)  $\pm 2$  to  $\pm 8$  feet of the slope at appropriate vertical intervals, subsequent to compaction operations.
4. After completion of the slope, the slope face should be shaped with a small tractor and then re-rolled with a sheepsfoot to achieve compaction to near the slope face. Subsequent to testing to evaluate compaction, the slopes should be grid-rolled to achieve compaction to the slope face. Final testing should be used to evaluate compaction after grid rolling.
5. Where testing indicates less than adequate compaction, the contractor will be responsible to rip, water, mix, and recompact the slope material as necessary to achieve compaction. Additional testing should be performed to evaluate compaction.

### **SUBDRAIN INSTALLATION**

Subdrains should be installed in approved ground in accordance with the approximate alignment and details indicated by the geotechnical consultant. Subdrain locations or materials should not be changed or modified without approval of the geotechnical consultant. The geotechnical consultant may recommend and direct changes in subdrain line, grade, and drain material in the field, pending exposed conditions. The location of constructed subdrains, especially the outlets, should be recorded/surveyed by the project civil engineer. Drainage at the subdrain outlets should be provided by the project civil engineer.

### **EXCAVATIONS**

Excavations and cut slopes should be examined during grading by the geotechnical consultant. If directed by the geotechnical consultant, further excavations or overexcavation and refilling of cut areas should be performed, and/or remedial grading of cut slopes should be performed. When fill-over-cut slopes are to be graded, unless otherwise approved, the cut portion of the slope should be observed by the geotechnical consultant prior to placement of materials for construction of the fill portion of the slope. The geotechnical consultant should observe all cut slopes, and should be notified by the contractor when excavation of cut slopes commence.

If, during the course of grading, unforeseen adverse or potentially adverse geologic conditions are encountered, the geotechnical consultant should investigate, evaluate, and make appropriate recommendations for mitigation of these conditions. The need for cut slope buttressing or stabilizing should be based on in-grading evaluation by the geotechnical consultant, whether anticipated or not.

Unless otherwise specified in geotechnical and geological report(s), no cut slopes should be excavated higher or steeper than that allowed by the ordinances of controlling governmental agencies. Additionally, short-term stability of temporary cut slopes is the contractor's responsibility.

Erosion control and drainage devices should be designed by the project civil engineer and should be constructed in compliance with the ordinances of the controlling governmental agencies, and/or in accordance with the recommendations of the geotechnical consultant.

### **COMPLETION**

Observation, testing, and consultation by the geotechnical consultant should be conducted during the grading operations in order to state an opinion that all cut and fill areas are graded in accordance with the approved project specifications. After completion of grading, and after the geotechnical consultant has finished observations of the work, final reports should be submitted, and may be subject to review by the controlling governmental agencies. No further excavation or filling should be undertaken without prior notification of the geotechnical consultant or approved plans.

All finished cut and fill slopes should be protected from erosion and/or be planted in accordance with the project specifications and/or as recommended by a landscape architect. Such protection and/or planning should be undertaken as soon as practical after completion of grading.

### **PRELIMINARY OUTDOOR POOL/SPA DESIGN RECOMMENDATIONS**

The following preliminary recommendations are provided for consideration in pool/spa design and planning. Actual recommendations should be provided by a qualified geotechnical consultant, based on site specific geotechnical conditions, including a subsurface investigation, differential settlement potential, expansive and corrosive soil potential, proximity of the proposed pool/spa to any slopes with regard to slope creep and lateral fill extension, as well as slope setbacks per Code, and geometry of the proposed improvements. Recommendations for pools/spas and/or deck flatwork underlain by expansive soils, or for areas with differential settlement greater than 1/4-inch over 40 feet horizontally, will be more onerous than the preliminary recommendations presented below.

The 1:1 (h:v) influence zone of any nearby retaining wall site structures should be delineated on the project civil drawings with the pool/spa. This 1:1 (h:v) zone is defined as a plane up

from the lower-most heel of the retaining structure, to the daylight grade of the nearby building pad or slope. If pools/spas or associated pool/spa improvements are constructed within this zone, they should be re-positioned (horizontally or vertically) so that they are supported by earth materials that are outside or below this 1:1 plane. If this is not possible given the area of the building pad, the owner should consider eliminating these improvements or allow for increased potential for lateral/vertical deformations and associated distress that may render these improvements unusable in the future, unless they are periodically repaired and maintained. The conditions and recommendations presented herein should be disclosed to all homeowners and any interested/affected parties.

## **General**

1. The equivalent fluid pressure to be used for the pool/spa design should be 60 pounds per cubic foot (pcf) for pool/spa walls with level backfill, and 75 pcf for a 2:1 sloped backfill condition. In addition, backdrains should be provided behind pool/spa walls subjacent to slopes.
2. Passive earth pressure may be computed as an equivalent fluid having a density of 150 pcf, to a maximum lateral earth pressure of 1,000 pounds per square foot (psf).
3. An allowable coefficient of friction between soil and concrete of 0.30 may be used with the dead load forces.
4. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one-third.
5. Where pools/spas are planned near structures, appropriate surcharge loads need to be incorporated into design and construction by the pool/spa designer. This includes, but is not limited to landscape berms, decorative walls, footings, built-in barbeques, utility poles, etc.
6. All pool/spa walls should be designed as “free standing” and be capable of supporting the water in the pool/spa without soil support. The shape of pool/spa in cross section and plan view may affect the performance of the pool, from a geotechnical standpoint. Pools and spas should also be designed in accordance with the latest adopted Code. Minimally, the bottoms of the pools/spas, should maintain a distance  $H/3$ , where  $H$  is the height of the slope (in feet), from the slope face. This distance should not be less than 7 feet, nor need not be greater than 40 feet.
7. The soil beneath the pool/spa bottom should be uniformly moist with the same stiffness throughout. If a fill/cut transition occurs beneath the pool/spa bottom, the cut portion should be overexcavated to a minimum depth of 48 inches, and replaced with compacted fill, such that there is a uniform blanket that is a minimum of 48 inches below the pool/spa shell. If very low expansive soil is used for fill, the fill should be placed at a minimum of 95 percent relative compaction, at optimum

moisture conditions. This requirement should be 90 percent relative compaction at over optimum moisture if the pool/spa is constructed within or near expansive soils. The potential for grading and/or re-grading of the pool/spa bottom, and attendant potential for shoring and/or slot excavation, needs to be considered during all aspects of pool/spa planning, design, and construction.

8. If the pool/spa is founded entirely in compacted fill placed during rough grading, the deepest portion of the pool/spa should correspond with the thickest fill on the lot.
9. Hydrostatic pressure relief valves should be incorporated into the pool and spa designs. A pool/spa under-drain system is also recommended, with an appropriate outlet for discharge.
10. All fittings and pipe joints, particularly fittings in the side of the pool or spa, should be properly sealed to prevent water from leaking into the adjacent soils materials, and be fitted with slip or expandible joints between connections transecting varying soil conditions.
11. An elastic expansion joint (flexible waterproof sealant) should be installed to prevent water from seeping into the soil at all deck joints.
12. A reinforced grade beam should be placed around skimmer inlets to provide support and mitigate cracking around the skimmer face.
13. In order to reduce unsightly cracking, deck slabs should minimally be 4 inches thick, and reinforced with No. 3 reinforcing bars at 18 inches on-center. All slab reinforcement should be supported to ensure proper mid-slab positioning during the placement of concrete. Wire mesh reinforcing is specifically not recommended. Deck slabs should not be tied to the pool/spa structure. Pre-moistening and/or pre-soaking of the slab subgrade is recommended, to a depth of 12 inches (optimum moisture content), or 18 inches (120 percent of the soil's optimum moisture content, or 3 percent over optimum moisture content, whichever is greater), for very low to low, and medium expansive soils, respectively. This moisture content should be maintained in the subgrade soils during concrete placement to promote uniform curing of the concrete and minimize the development of unsightly shrinkage cracks. Slab underlayment should consist of a 1- to 2-inch leveling course of sand (S.E. >30) and a minimum of 4 to 6 inches of Class 2 base compacted to 90 percent. Deck slabs within the H/3 zone, where H is the height of the slope (in feet), will have an increased potential for distress relative to other areas outside of the H/3 zone. If distress is undesirable, improvements, deck slabs or flatwork should not be constructed closer than H/3 or 7 feet (whichever is greater) from the slope face, in order to reduce, but not eliminate, this potential.
14. Pool/spa bottom or deck slabs should be founded entirely on competent bedrock, or properly compacted fill. Fill should be compacted to achieve a minimum 90 percent relative compaction, as discussed above. Prior to pouring concrete, subgrade soils

below the pool/spa decking should be thoroughly watered to achieve a moisture content that is at least 2 percent above optimum moisture content, to a depth of at least 18 inches below the bottom of slabs. This moisture content should be maintained in the subgrade soils during concrete placement to promote uniform curing of the concrete and minimize the development of unsightly shrinkage cracks.

15. In order to reduce unsightly cracking, the outer edges of pool/spa decking to be bordered by landscaping, and the edges immediately adjacent to the pool/spa, should be underlain by an 8-inch wide concrete cutoff shoulder (thickened edge) extending to a depth of at least 12 inches below the bottoms of the slabs to mitigate excessive infiltration of water under the pool/spa deck. These thickened edges should be reinforced with two No. 4 bars, one at the top and one at the bottom. Deck slabs may be minimally reinforced with No. 3 reinforcing bars placed at 18 inches on-center, in both directions. All slab reinforcement should be supported on chairs to ensure proper mid-slab positioning during the placement of concrete.
16. Surface and shrinkage cracking of the finish slab may be reduced if a low slump and water-cement ratio are maintained during concrete placement. Concrete utilized should have a minimum compressive strength of 4,000 psi. Excessive water added to concrete prior to placement is likely to cause shrinkage cracking, and should be avoided. Some concrete shrinkage cracking, however, is unavoidable.
17. Joint and sawcut locations for the pool/spa deck should be determined by the design engineer and/or contractor. However, spacings should not exceed 6 feet on center.
18. Considering the nature of the onsite earth materials, it should be anticipated that caving or sloughing could be a factor in subsurface excavations and trenching. Shoring or excavating the trench walls/backcuts at the angle of repose (typically 25 to 45 degrees), should be anticipated. All excavations should be observed by a representative of the geotechnical consultant, including the project geologist and/or geotechnical engineer, prior to workers entering the excavation or trench, and minimally conform to Cal/OSHA ("Type C" soils may be assumed), state, and local safety codes. Should adverse conditions exist, appropriate recommendations should be offered at that time by the geotechnical consultant. GSI does not consult in the area of safety engineering and the safety of the construction crew is the responsibility of the pool/spa builder.
19. It is imperative that adequate provisions for surface drainage are incorporated by the homeowners into their overall improvement scheme. Ponding water, ground saturation and flow over slope faces, are all situations which must be avoided to enhance long term performance of the pool/spa and associated improvements, and reduce the likelihood of distress.
20. Regardless of the methods employed, once the pool/spa is filled with water, should it be emptied, there exists some potential that if emptied, significant distress may

occur. Accordingly, once filled, the pool/spa should not be emptied unless evaluated by the geotechnical consultant and the pool/spa builder.

21. For pools/spas built within (all or part) of the Code setback and/or geotechnical setback, as indicated in the site geotechnical documents, special foundations are recommended to mitigate the affects of creep, lateral fill extension, expansive soils and settlement on the proposed pool/spa. Most municipalities or County reviewers do not consider these effects in pool/spa plan approvals. As such, where pools/spas are proposed on 20 feet or more of fill, medium or highly expansive soils, or rock fill with limited “cap soils” and built within Code setbacks, or within the influence of the creep zone, or lateral fill extension, the following should be considered during design and construction:

OPTION A: Shallow foundations with or without overexcavation of the pool/spa “shell,” such that the pool/spa is surrounded by 5 feet of very low to low expansive soils (without irreducible particles greater than 6 inches), and the pool/spa walls closer to the slope(s) are designed to be free standing. GSI recommends a pool/spa under-drain or blanket system (see attached Typical Pool/Spa Detail). The pool/spa builders and owner in this optional construction technique should be generally satisfied with pool/spa performance under this scenario; however, some settlement, tilting, cracking, and leakage of the pool/spa is likely over the life of the project.

OPTION B: Pier supported pool/spa foundations with or without overexcavation of the pool/spa shell such that the pool/spa is surrounded by 5 feet of very low to low expansive soils (without irreducible particles greater than 6 inches), and the pool/spa walls closer to the slope(s) are designed to be free standing. The need for a pool/spa under-drain system may be installed for leak detection purposes. Piers that support the pool/spa should be a minimum of 12 inches in diameter and at a spacing to provide vertical and lateral support of the pool/spa, in accordance with the pool/spa designers recommendations current applicable Codes. The pool/spa builder and owner in this second scenario construction technique should be more satisfied with pool/spa performance. This construction will reduce settlement and creep effects on the pool/spa; however, it will not eliminate these potentials, nor make the pool/spa “leak-free.”

22. The temperature of the water lines for spas and pools may affect the corrosion properties of site soils, thus, a corrosion specialist should be retained to review all spa and pool plans, and provide mitigative recommendations, as warranted. Concrete mix design should be reviewed by a qualified corrosion consultant and materials engineer.
23. All pool/spa utility trenches should be compacted to 90 percent of the laboratory standard, under the full-time observation and testing of a qualified geotechnical

consultant. Utility trench bottoms should be sloped away from the primary structure on the property (typically the residence).

24. Pool and spa utility lines should not cross the primary structure's utility lines (i.e., not stacked, or sharing of trenches, etc.).
25. The pool/spa or associated utilities should not intercept, interrupt, or otherwise adversely impact any area drain, roof drain, or other drainage conveyances. If it is necessary to modify, move, or disrupt existing area drains, subdrains, or tightlines, then the design civil engineer should be consulted, and mitigative measures provided. Such measures should be further reviewed and approved by the geotechnical consultant, prior to proceeding with any further construction.
26. The geotechnical consultant should review and approve all aspects of pool/spa and flatwork design prior to construction. A design civil engineer should review all aspects of such design, including drainage and setback conditions. Prior to acceptance of the pool/spa construction, the project builder, geotechnical consultant and civil designer should evaluate the performance of the area drains and other site drainage pipes, following pool/spa construction.
27. All aspects of construction should be reviewed and approved by the geotechnical consultant, including during excavation, prior to the placement of any additional fill, prior to the placement of any reinforcement or pouring of any concrete.
28. Any changes in design or location of the pool/spa should be reviewed and approved by the geotechnical and design civil engineer prior to construction. Field adjustments should not be allowed until written approval of the proposed field changes are obtained from the geotechnical and design civil engineer.
29. Disclosure should be made to homeowners and builders, contractors, and any interested/affected parties, that pools/spas built within about 15 feet of the top of a slope, and/or  $H/3$ , where  $H$  is the height of the slope (in feet), will experience some movement or tilting. While the pool/spa shell or coping may not necessarily crack, the levelness of the pool/spa will likely tilt toward the slope, and may not be esthetically pleasing. The same is true with decking, flatwork and other improvements in this zone.
30. Failure to adhere to the above recommendations will significantly increase the potential for distress to the pool/spa, flatwork, etc.
31. Local seismicity and/or the design earthquake will cause some distress to the pool/spa and decking or flatwork, possibly including total functional and economic loss.

32. The information and recommendations discussed above should be provided to any contractors and/or subcontractors, or homeowners, interested/affected parties, etc., that may perform or may be affected by such work.

## **JOB SAFETY**

### **General**

At GSI, getting the job done safely is of primary concern. The following is the company's safety considerations for use by all employees on multi-employer construction sites. On-ground personnel are at highest risk of injury, and possible fatality, on grading and construction projects. GSI recognizes that construction activities will vary on each site, and that site safety is the prime responsibility of the contractor; however, everyone must be safety conscious and responsible at all times. To achieve our goal of avoiding accidents, cooperation between the client, the contractor, and GSI personnel must be maintained.

In an effort to minimize risks associated with geotechnical testing and observation, the following precautions are to be implemented for the safety of field personnel on grading and construction projects:

**Safety Meetings:** GSI field personnel are directed to attend contractor's regularly scheduled and documented safety meetings.

**Safety Vests:** Safety vests are provided for, and are to be worn by GSI personnel, at all times, when they are working in the field.

**Safety Flags:** Two safety flags are provided to GSI field technicians; one is to be affixed to the vehicle when on site, the other is to be placed atop the spoil pile on all test pits.

**Flashing Lights:** All vehicles stationary in the grading area shall use rotating or flashing amber beacons, or strobe lights, on the vehicle during all field testing. While operating a vehicle in the grading area, the emergency flasher on the vehicle shall be activated.

In the event that the contractor's representative observes any of our personnel not following the above, we request that it be brought to the attention of our office.

### **Test Pits Location, Orientation, and Clearance**

The technician is responsible for selecting test pit locations. A primary concern should be the technician's safety. Efforts will be made to coordinate locations with the grading contractor's authorized representative, and to select locations following or behind the established traffic pattern, preferably outside of current traffic. The contractor's authorized representative (supervisor, grade checker, dump man, operator, etc.) should direct

excavation of the pit and safety during the test period. Of paramount concern should be the soil technician's safety, and obtaining enough tests to represent the fill.

Test pits should be excavated so that the spoil pile is placed away from oncoming traffic, whenever possible. The technician's vehicle is to be placed next to the test pit, opposite the spoil pile. This necessitates the fill be maintained in a driveable condition. Alternatively, the contractor may wish to park a piece of equipment in front of the test holes, particularly in small fill areas or those with limited access.

A zone of non-encroachment should be established for all test pits. No grading equipment should enter this zone during the testing procedure. The zone should extend approximately 50 feet outward from the center of the test pit. This zone is established for safety and to avoid excessive ground vibration, which typically decreases test results.

When taking slope tests, the technician should park the vehicle directly above or below the test location. If this is not possible, a prominent flag should be placed at the top of the slope. The contractor's representative should effectively keep all equipment at a safe operational distance (e.g., 50 feet) away from the slope during this testing.

The technician is directed to withdraw from the active portion of the fill as soon as possible following testing. The technician's vehicle should be parked at the perimeter of the fill in a highly visible location, well away from the equipment traffic pattern. The contractor should inform our personnel of all changes to haul roads, cut and fill areas or other factors that may affect site access and site safety.

In the event that the technician's safety is jeopardized or compromised as a result of the contractor's failure to comply with any of the above, the technician is required, by company policy, to immediately withdraw and notify his/her supervisor. The grading contractor's representative will be contacted in an effort to affect a solution. However, in the interim, no further testing will be performed until the situation is rectified. Any fill placed can be considered unacceptable and subject to reprocessing, recompaction, or removal.

In the event that the soil technician does not comply with the above or other established safety guidelines, we request that the contractor bring this to the technician's attention and notify this office. Effective communication and coordination between the contractor's representative and the soil technician is strongly encouraged in order to implement the above safety plan.

### **Trench and Vertical Excavation**

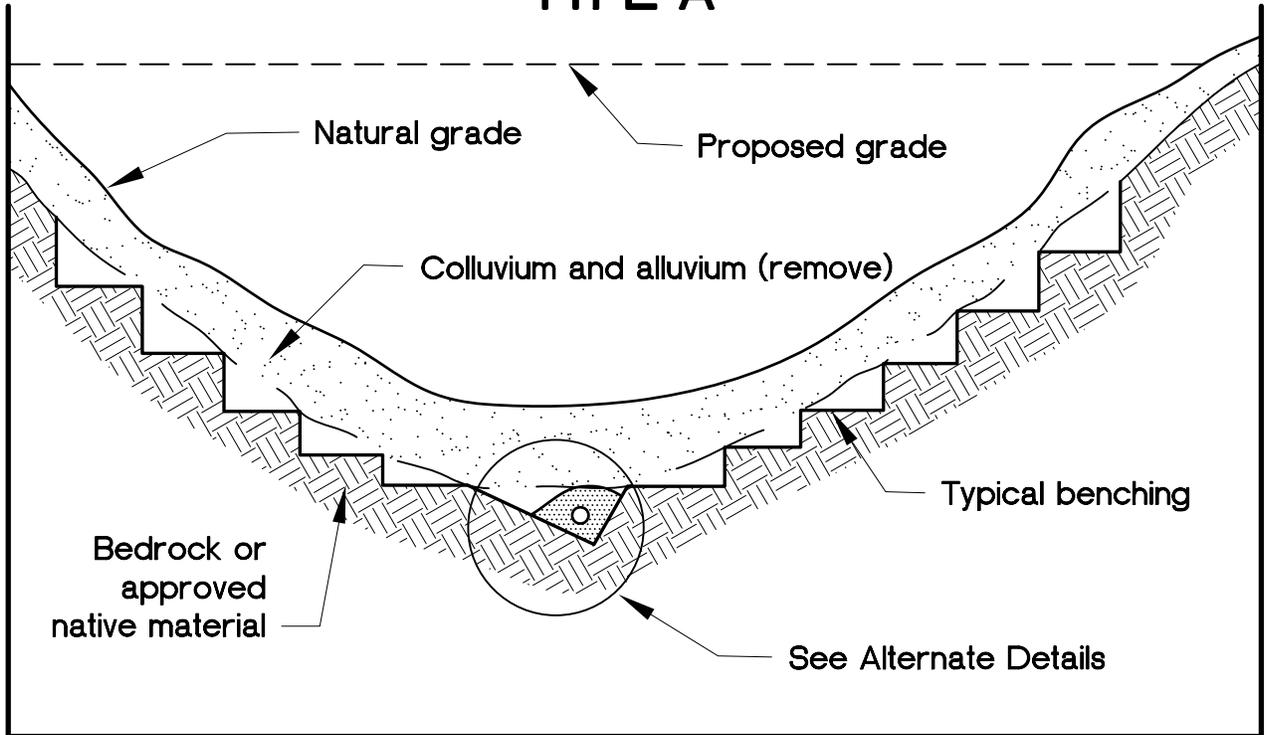
It is the contractor's responsibility to provide safe access into trenches where compaction testing is needed. Our personnel are directed not to enter any excavation or vertical cut which: 1) is 5 feet or deeper unless shored or laid back; 2) displays any evidence of instability, has any loose rock or other debris which could fall into the trench; or 3) displays any other evidence of any unsafe conditions regardless of depth.

All trench excavations or vertical cuts in excess of 5 feet deep, which any person enters, should be shored or laid back. Trench access should be provided in accordance with Cal/OSHA and/or state and local standards. Our personnel are directed not to enter any trench by being lowered or “riding down” on the equipment.

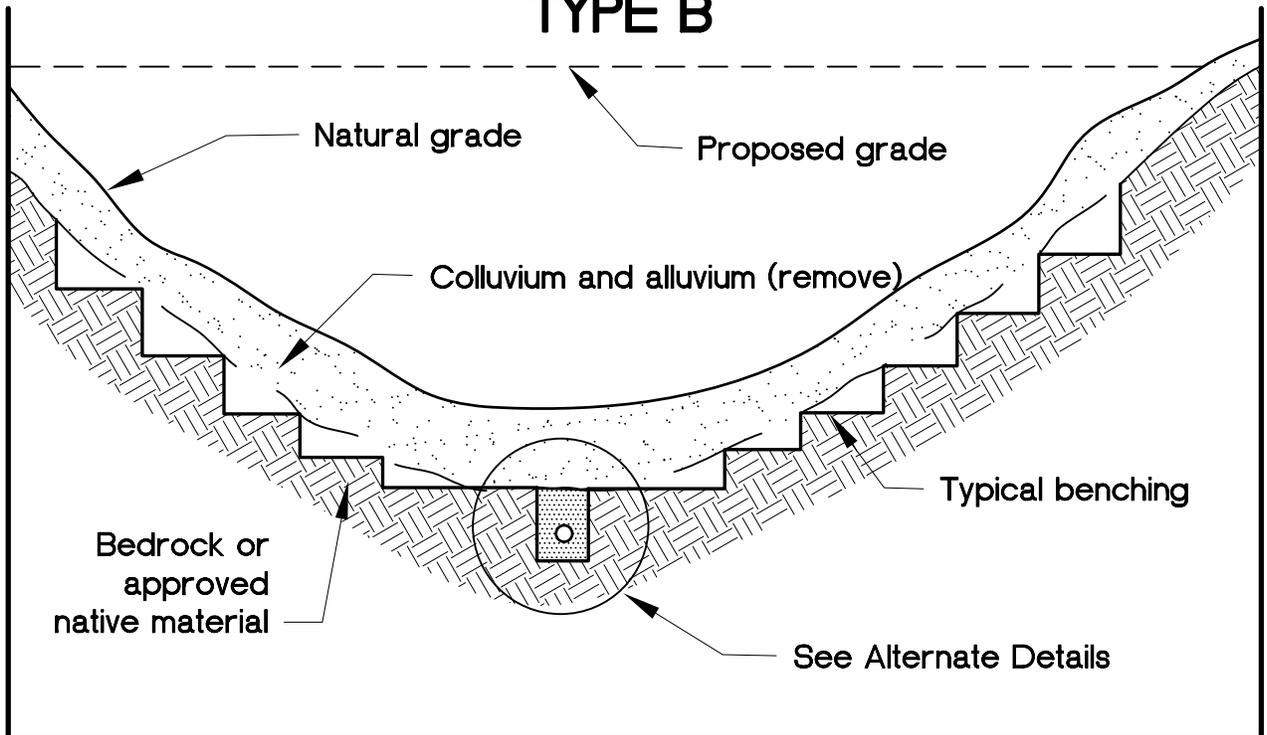
If the contractor fails to provide safe access to trenches for compaction testing, our company policy requires that the soil technician withdraw and notify his/her supervisor. The contractor’s representative will be contacted in an effort to affect a solution. All backfill not tested due to safety concerns or other reasons could be subject to reprocessing and/or removal.

If GSI personnel become aware of anyone working beneath an unsafe trench wall or vertical excavation, we have a legal obligation to put the contractor and owner/developer on notice to immediately correct the situation. If corrective steps are not taken, GSI then has an obligation to notify Cal/OSHA and/or the proper controlling authorities.

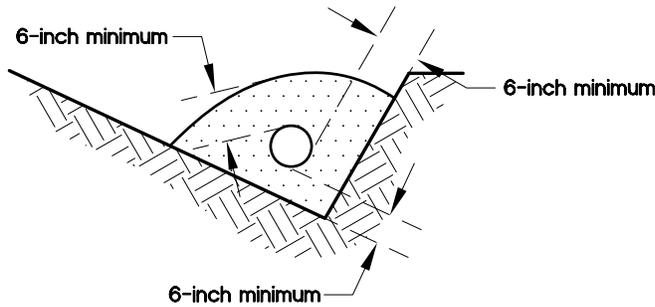
# TYPE A



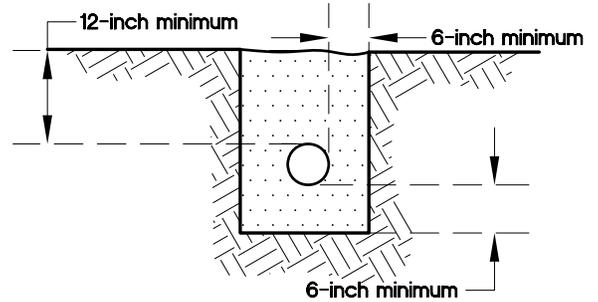
# TYPE B



Selection of alternate subdrain details, location, and extent of subdrains should be evaluated by the geotechnical consultant during grading.



**A-1**



**B-1**

Filter material: Minimum volume of 9 cubic feet per lineal foot of pipe.

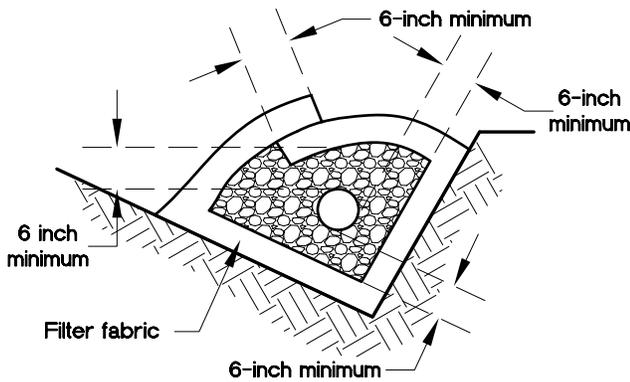
Perforated pipe: 6-inch-diameter ABS or PVC pipe or approved substitute with minimum 8 perforations ( $\frac{1}{4}$ -inch diameter) per lineal foot in bottom half of pipe (ASTM D-2751, SDR-35, or ASTM D-1527, Schd. 40).

For continuous run in excess of 500 feet, use 8-inch-diameter pipe (ASTM D-3034, SDR-35, or ASTM D-1785, Schd. 40).

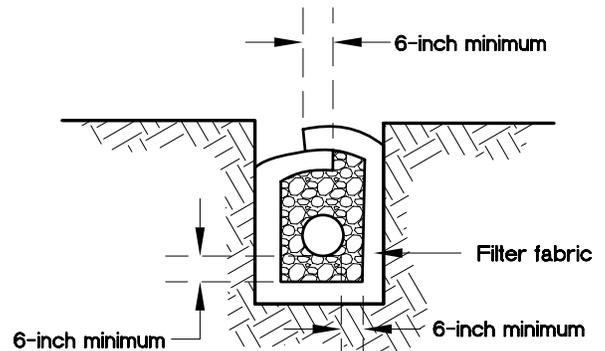
**FILTER MATERIAL**

Sieve Size	Percent Passing
1 inch	100
$\frac{3}{4}$ inch	90-100
$\frac{3}{8}$ inch	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

**ALTERNATE 1: PERFORATED PIPE AND FILTER MATERIAL**



**A-2**



**B-2**

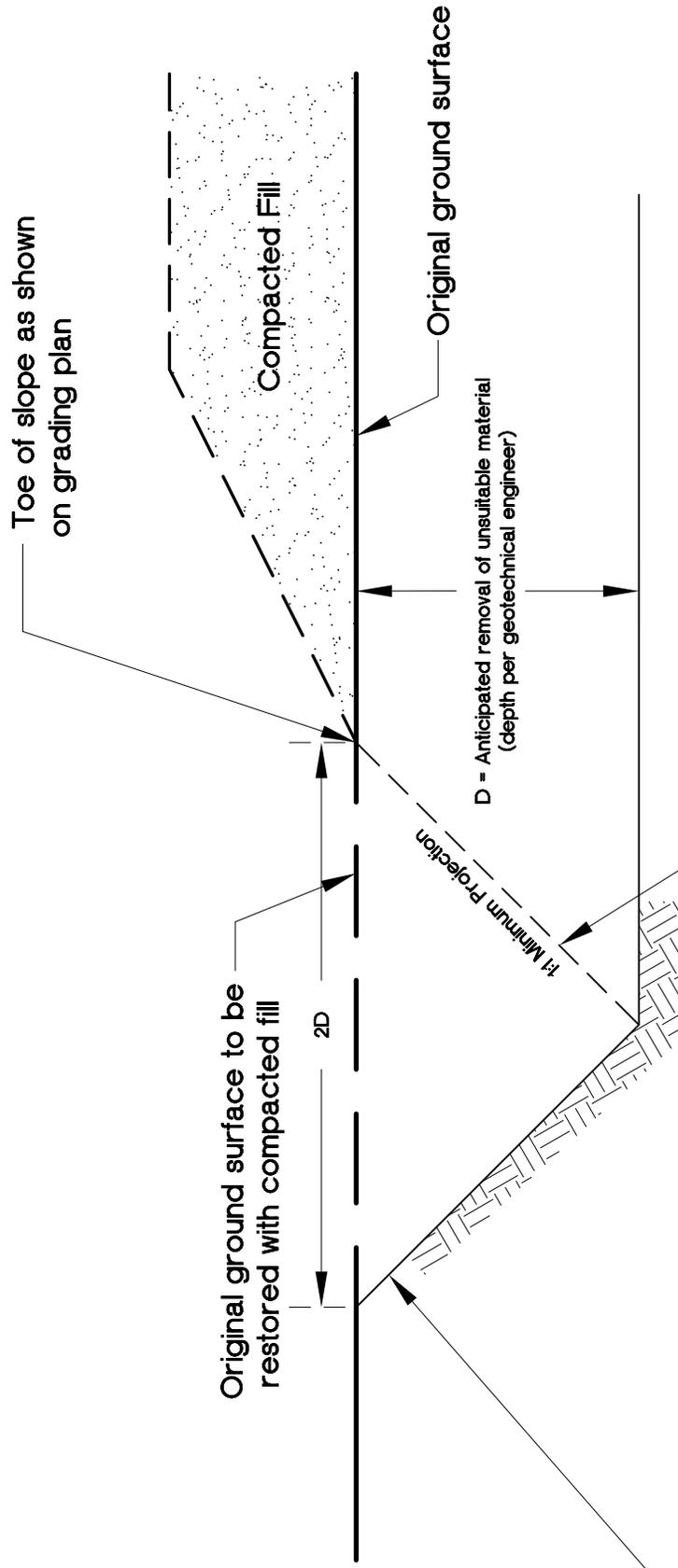
Gravel Material: 9 cubic feet per lineal foot.

Perforated Pipe: See Alternate 1

Gravel: Clean  $\frac{3}{4}$ -inch rock or approved substitute.

Filter Fabric: Mirafi 140 or approved substitute.

**ALTERNATE 2: PERFORATED PIPE, GRAVEL, AND FILTER FABRIC**



Original ground surface to be restored with compacted fill

2D

1:1 Minimum Projection

D = Anticipated removal of unsuitable material (depth per geotechnical engineer)

Original ground surface

Compacted Fill

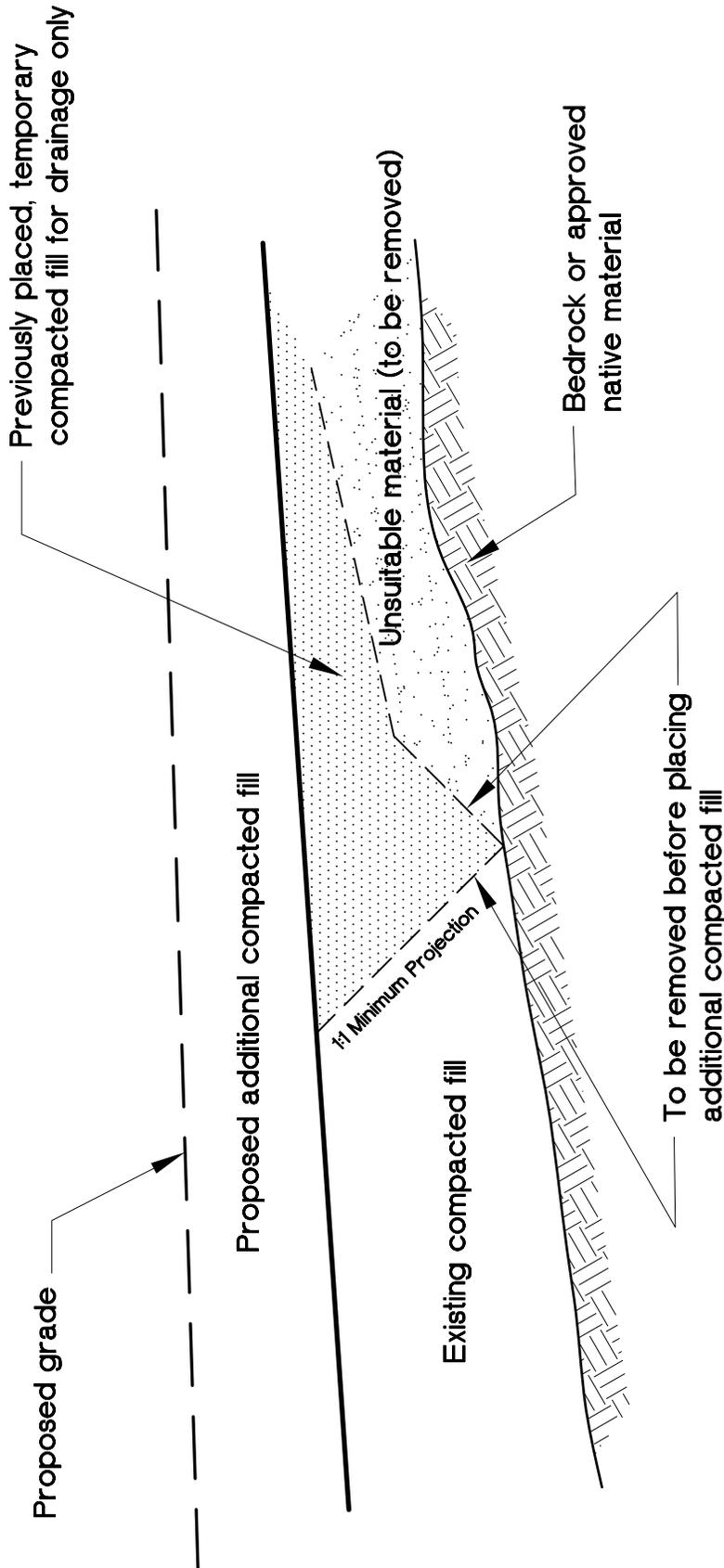
Toe of slope as shown on grading plan

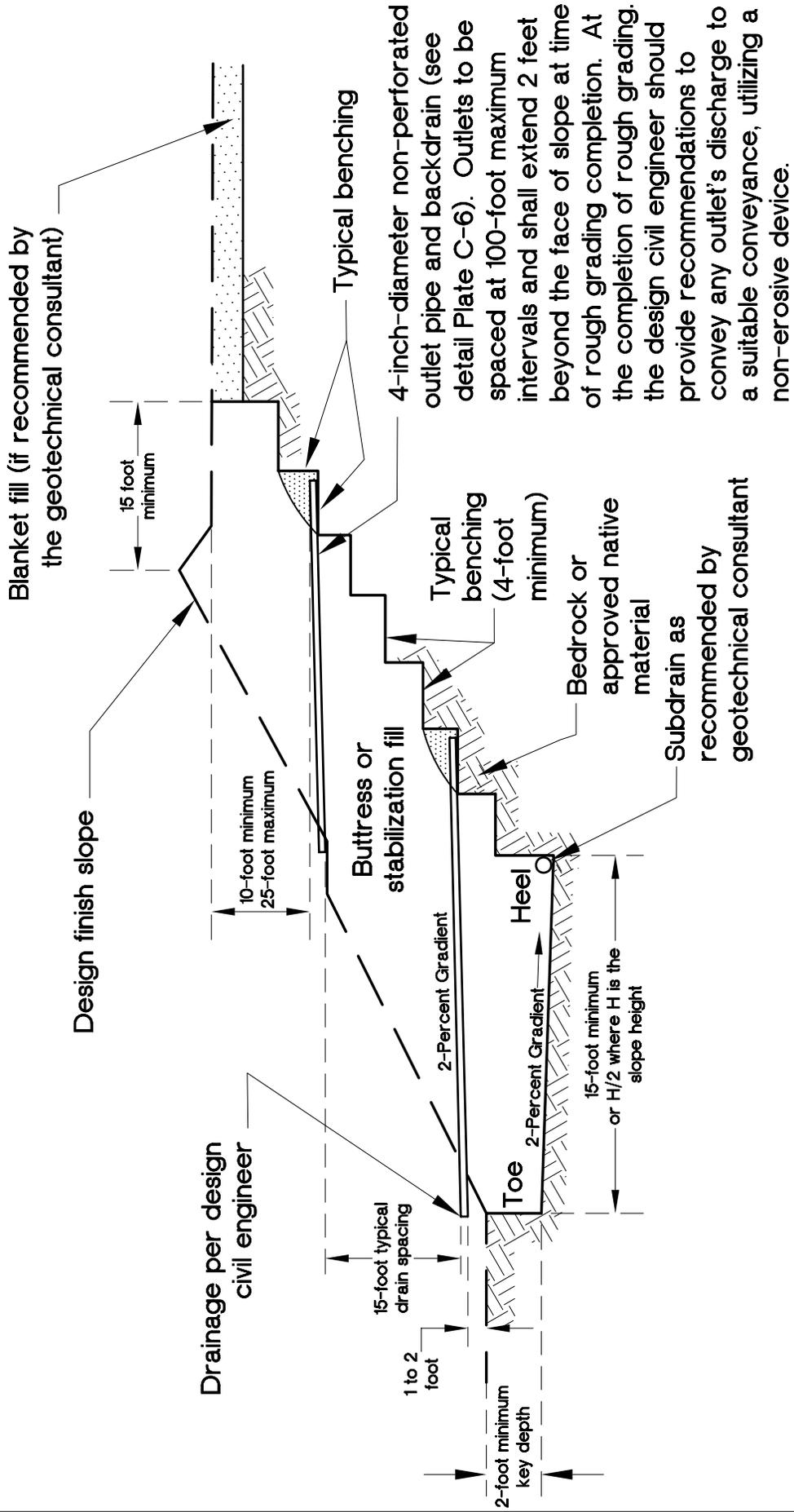
Back-cut varies. For deep removals, backcut should be made no steeper than 1:1 (H:V), or flatter as necessary for safety considerations.

Provide a 1:1 (H:V) minimum projection from toe of slope as shown on grading plan to the recommended removal depth. Slope height, site conditions, and/or local conditions could dictate flatter projections.



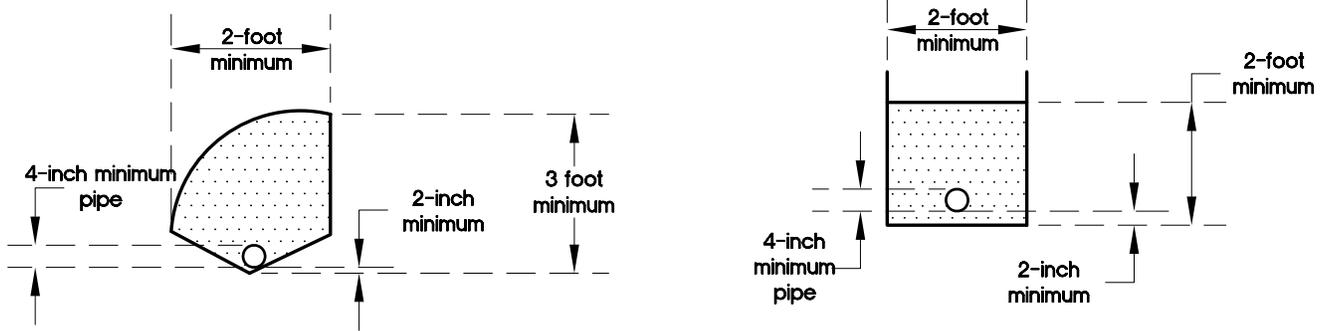
FILL SLOPE TOEING OUT ON FLAT ALLUVIATED CANYON DETAIL





TYPICAL STABILIZATION / BUTTRESS FILL DETAIL





**Filter Material:** Minimum of 5 cubic feet per lineal foot of pipe or 4 cubic feet per lineal feet of pipe when placed in square cut trench.

**Alternative in Lieu of Filter Material:** Gravel may be encased in approved filter fabric. Filter fabric shall be Mirafi 140 or equivalent. Filter fabric shall be lapped a minimum of 12 inches in all joints.

**Minimum 4-Inch-Diameter Pipe:** ABS-ASTM D-2751, SDR 35; or ASTM D-1527 Schedule 40, PVC-ASTM D-3034, SDR 35; or ASTM D-1785 Schedule 40 with a crushing strength of 1,000 pounds minimum, and a minimum of 8 uniformly-spaced perforations per foot of pipe. Must be installed with perforations down at bottom of pipe. Provide cap at upstream end of pipe. Slope at 2 percent to outlet pipe. Outlet pipe to be connected to subdrain pipe with tee or elbow.

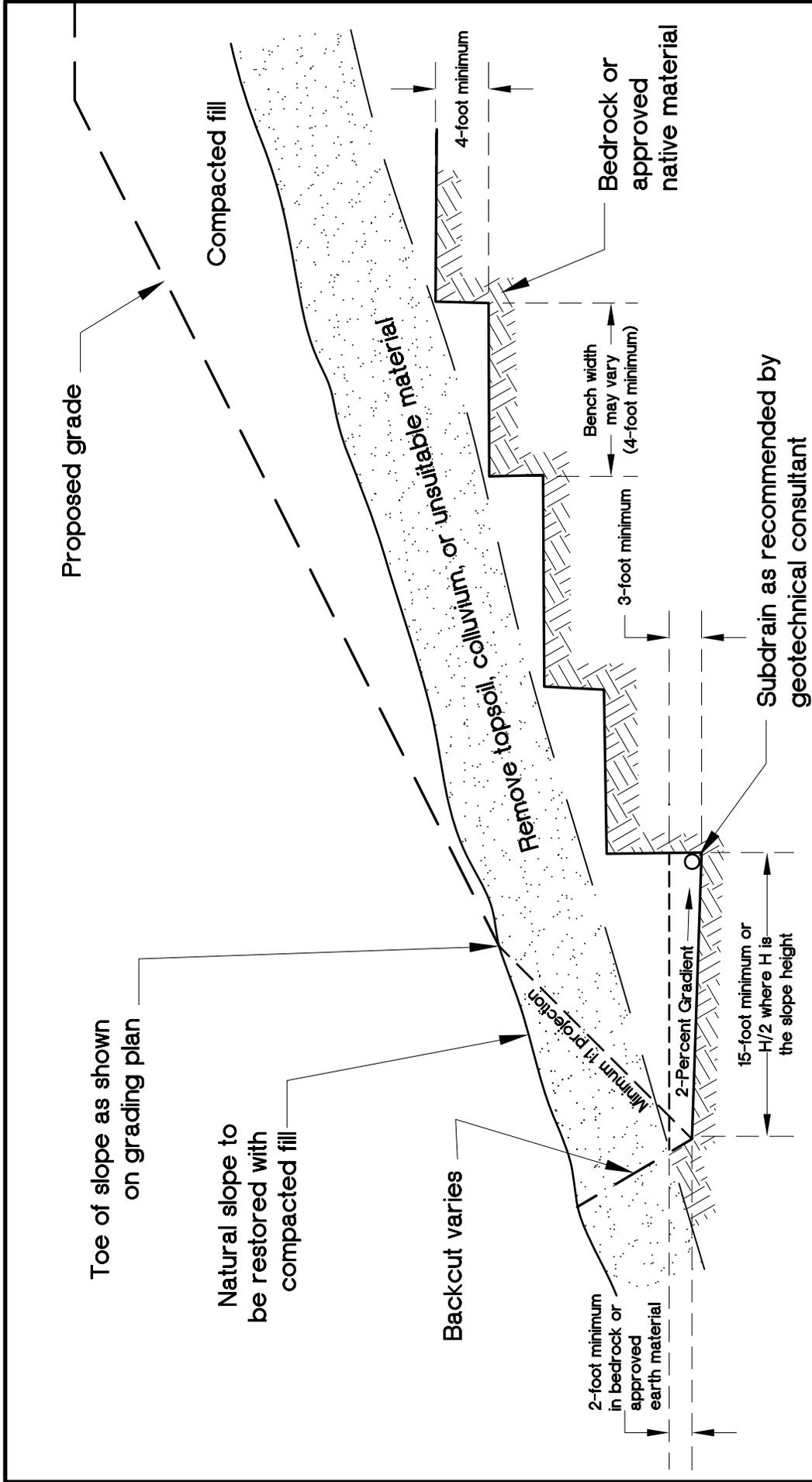
- Notes:**
1. Trench for outlet pipes to be backfilled and compacted with onsite soil.
  2. Backdrains and lateral drains shall be located at elevation of every bench drain. First drain located at elevation just above lower lot grade. Additional drains may be required at the discretion of the geotechnical consultant.

Filter Material shall be of the following specification or an approved equivalent.

<u>Sieve Size</u>	<u>Percent Passing</u>
1 inch	100
3/4 inch	90-100
3/8 inch	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

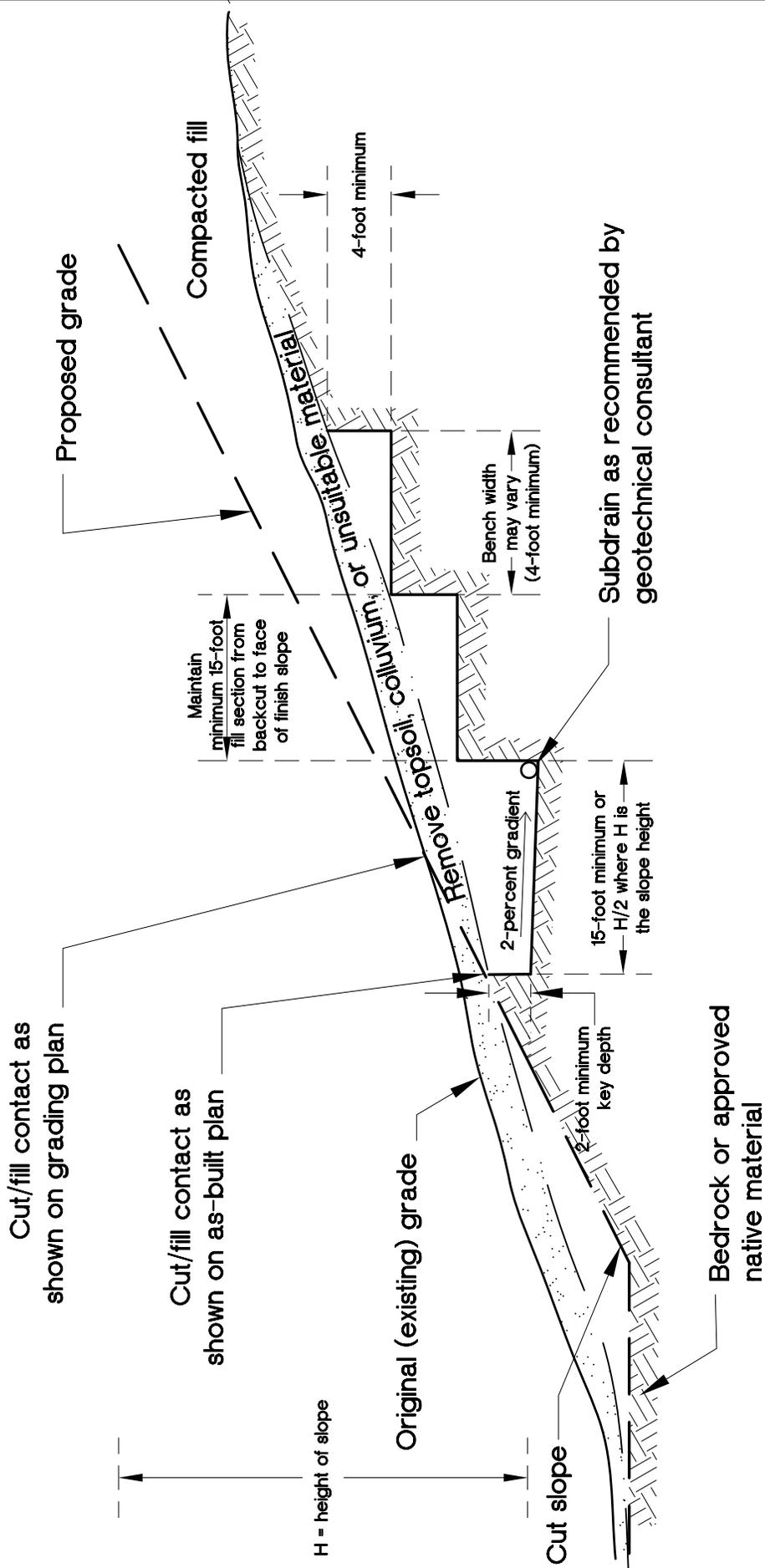
Gravel shall be of the following specification or an approved equivalent.

<u>Sieve Size</u>	<u>Percent Passing</u>
1 1/2 inch	100
No. 4	50
No. 200	8

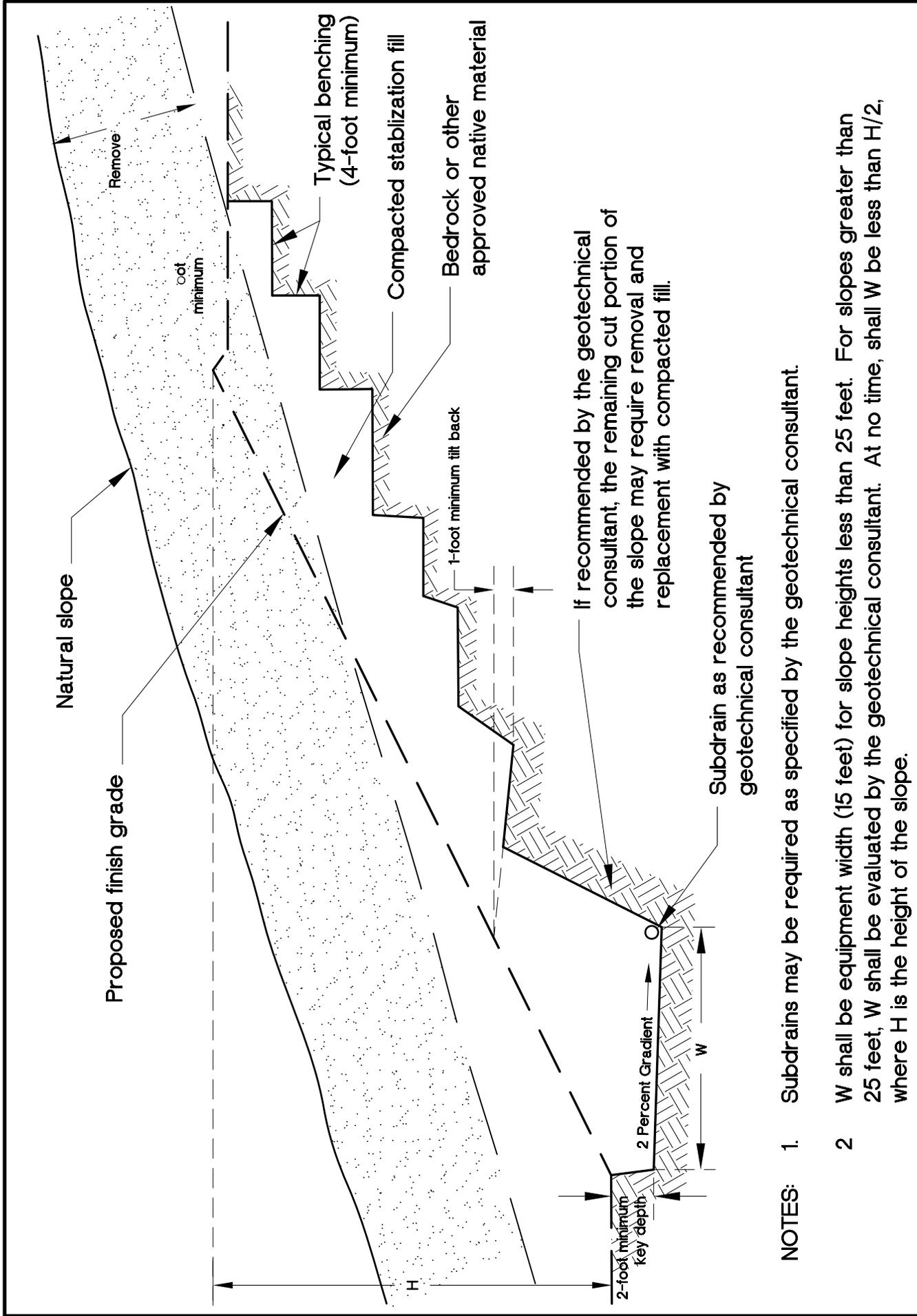


**NOTES:**

1. Where the natural slope approaches or exceeds the design slope ratio, special recommendations would be provided by the geotechnical consultant.
2. The need for and disposition of drains should be evaluated by the geotechnical consultant, based upon exposed conditions.



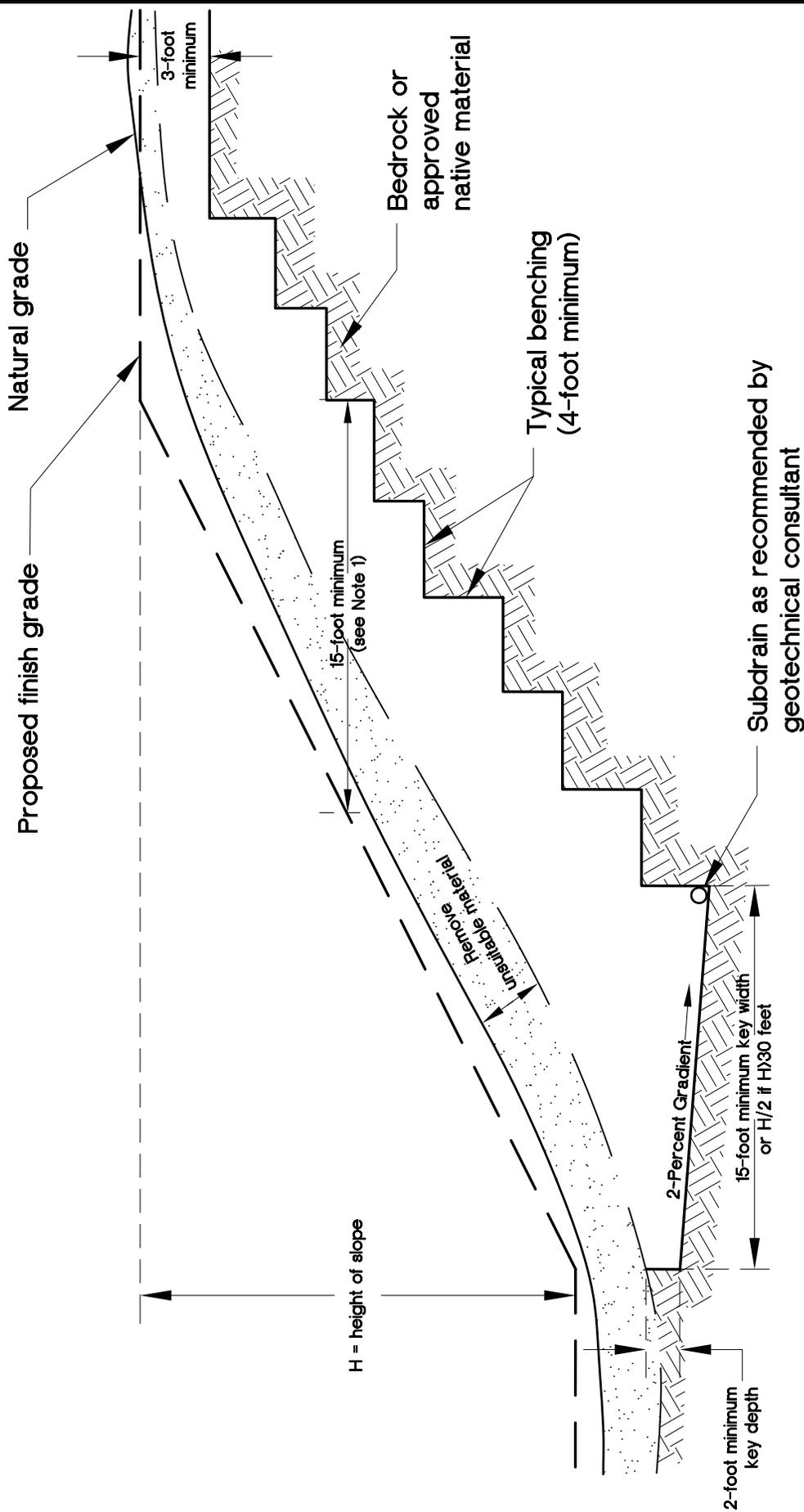
NOTE: The cut portion of the slope should be excavated and evaluated by the geotechnical consultant prior to construction of the fill portion.



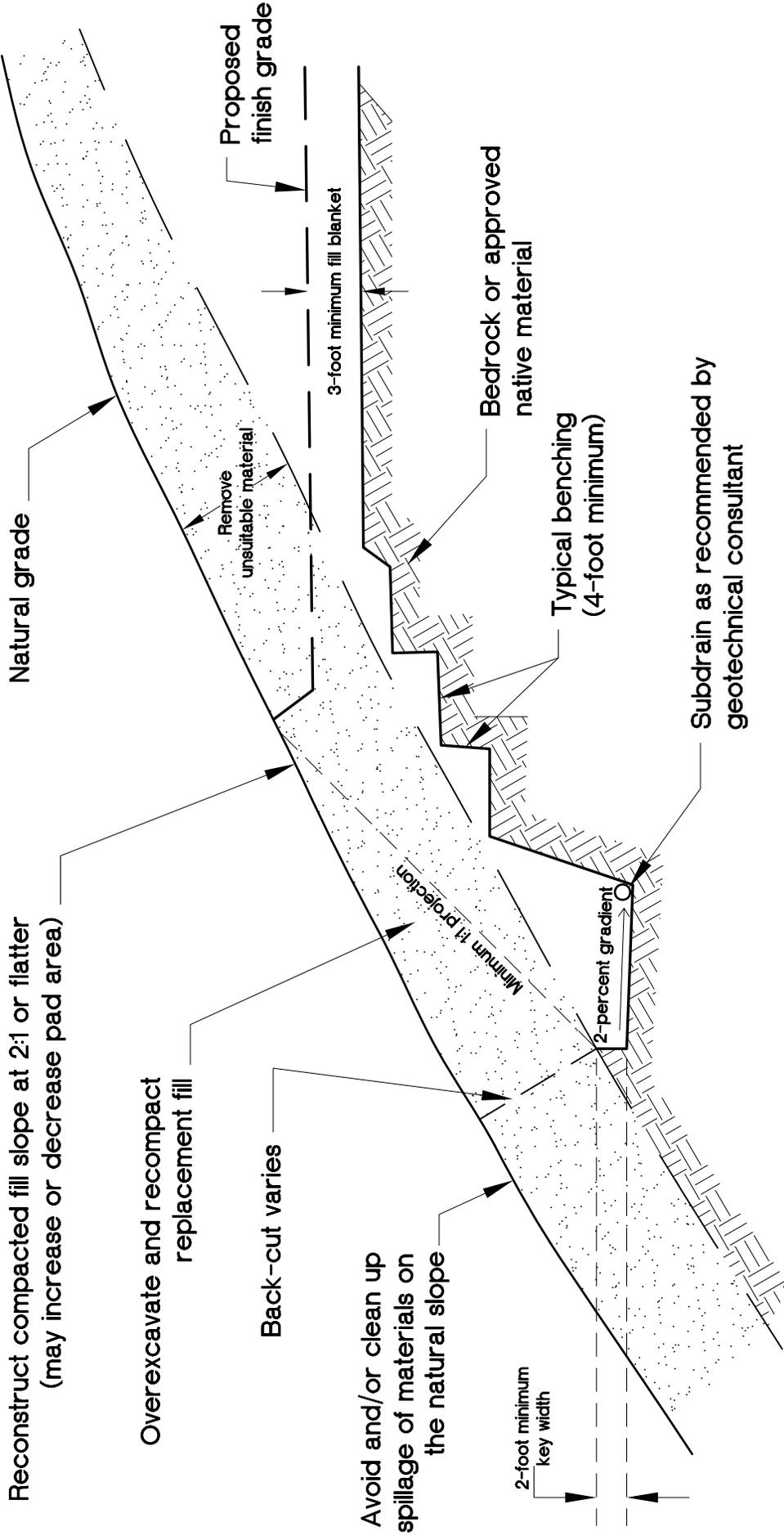
NOTES: 1. Subdrains may be required as specified by the geotechnical consultant.

2. W shall be equipment width (15 feet) for slope heights less than 25 feet. For slopes greater than 25 feet, W shall be evaluated by the geotechnical consultant. At no time, shall W be less than H/2, where H is the height of the slope.





- NOTES:**
1. 15-foot minimum to be maintained from proposed finish slope face to backcut.
  2. The need and disposition of drains will be evaluated by the geotechnical consultant based on field conditions.
  3. Pad overexcavation and recompaction should be performed if evaluated to be necessary by the geotechnical consultant.



Reconstruct compacted fill slope at 2:1 or flatter (may increase or decrease pad area)

Overexcavate and recompact replacement fill

Back-cut varies

Avoid and/or clean up spillage of materials on the natural slope

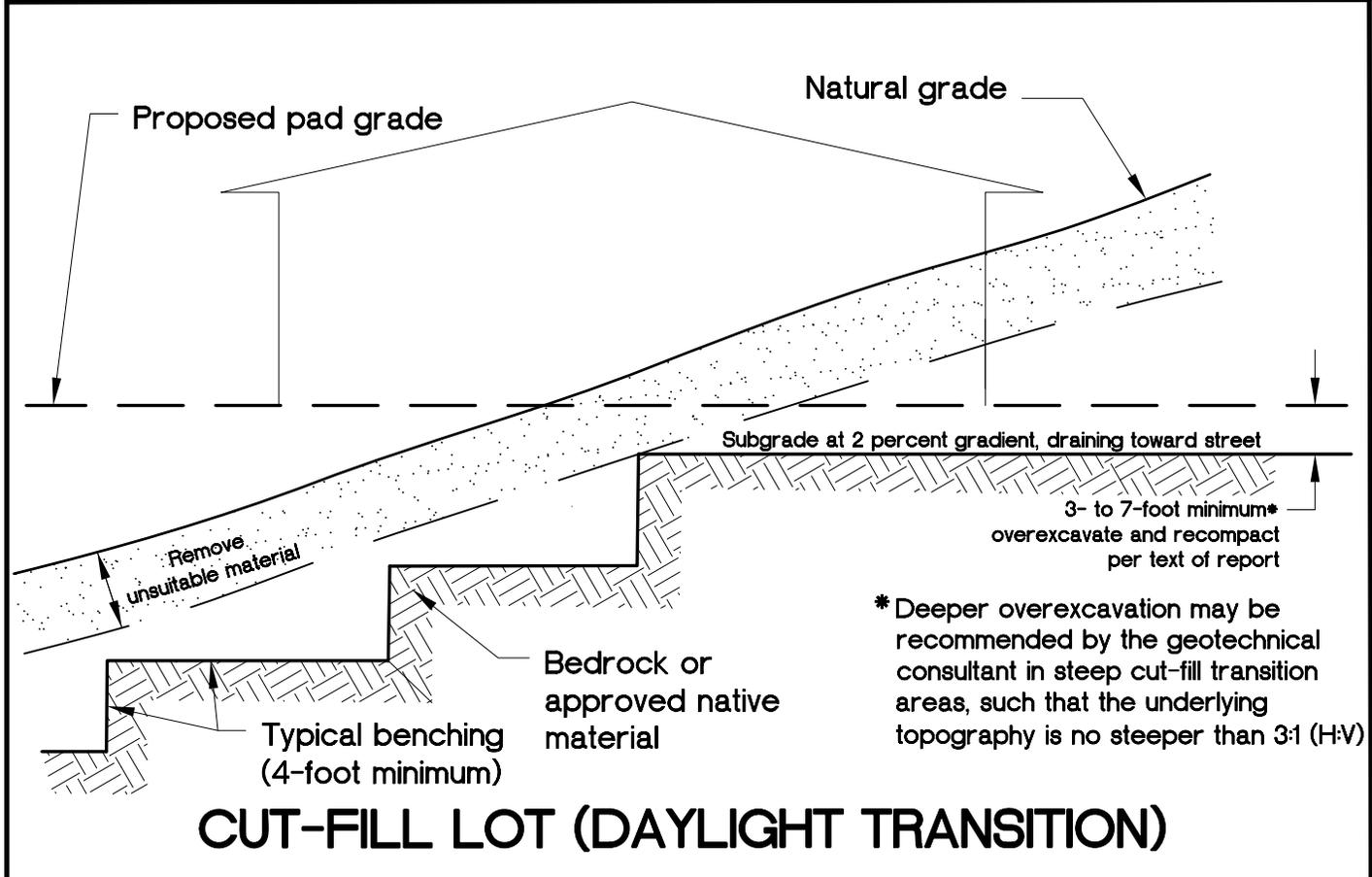
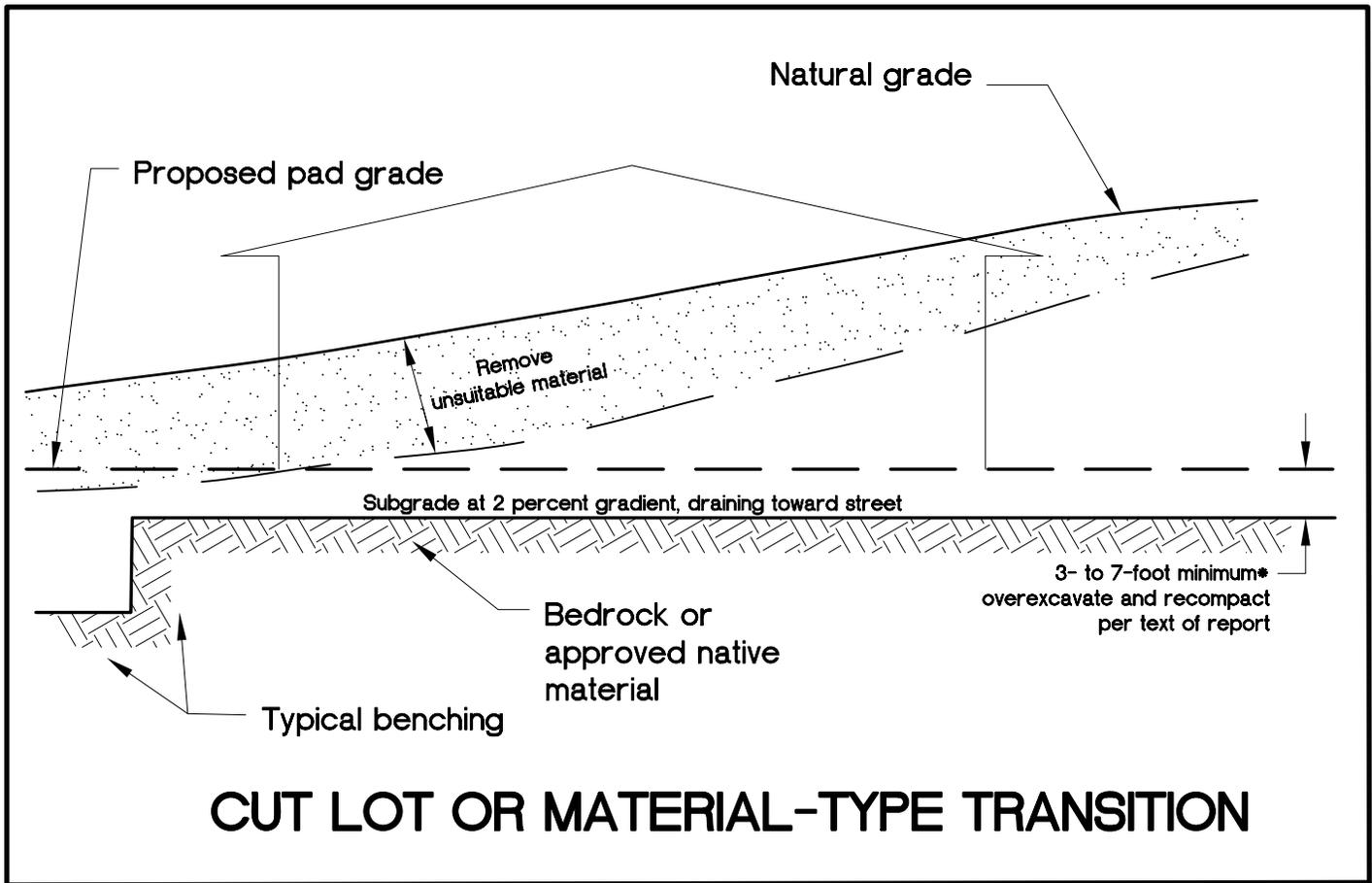
2-foot minimum key width

Minimum 1% protection

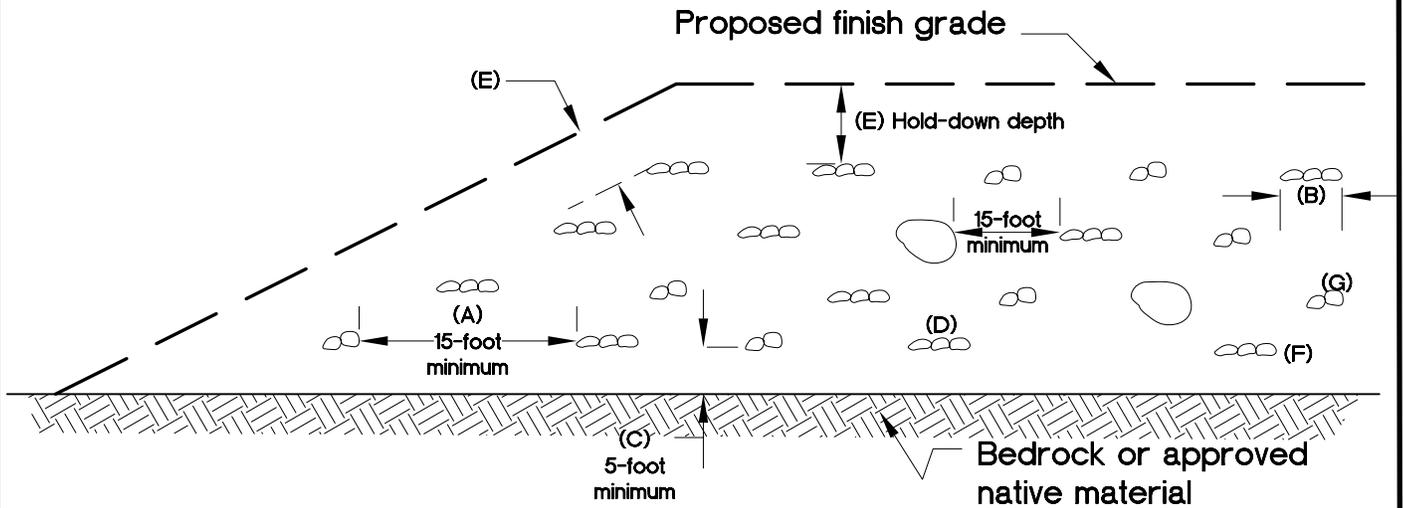
Subdrain as recommended by geotechnical consultant

NOTES: 1. Subdrain and key width requirements will be evaluated based on exposed subsurface conditions and thickness of overburden.

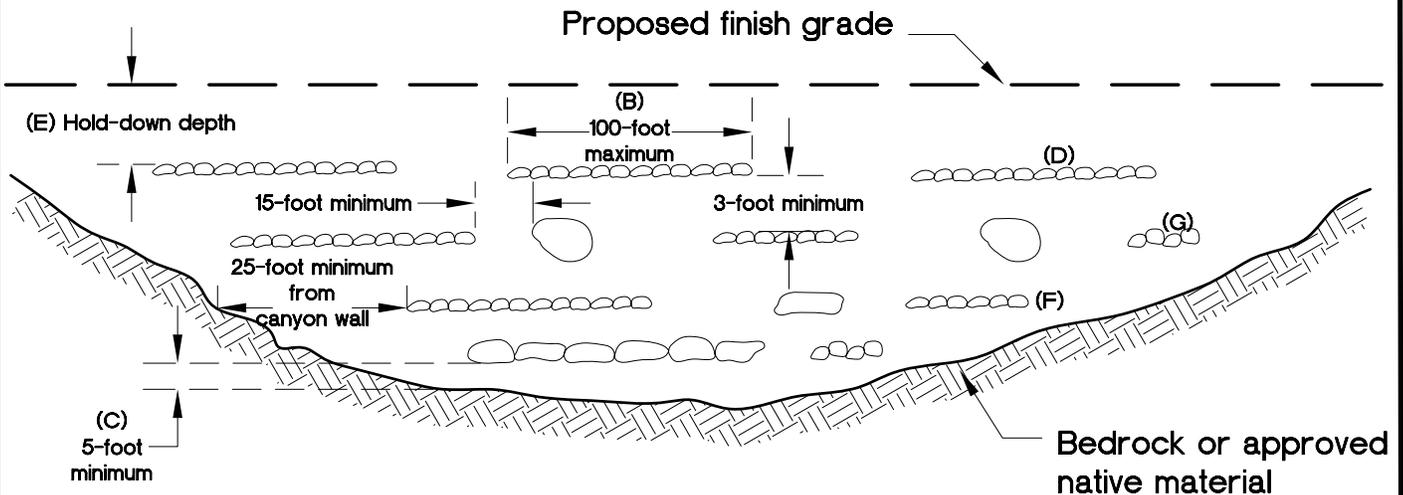
2. Pad overexcavation and recompaction should be performed if evaluated necessary by the geotechnical consultant.



## VIEW NORMAL TO SLOPE FACE



## VIEW PARALLEL TO SLOPE FACE



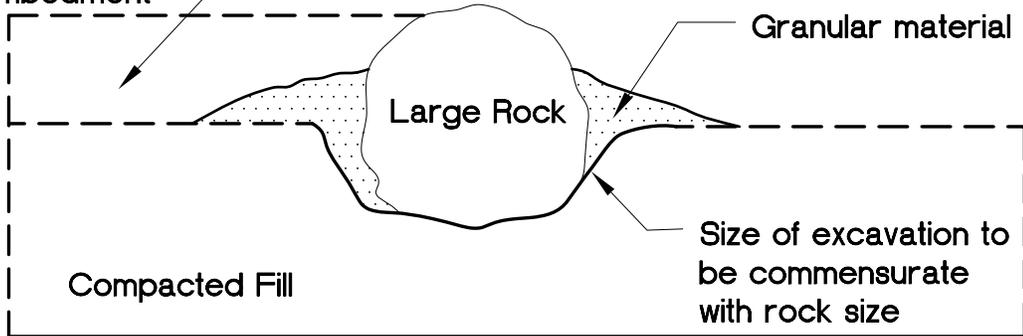
### NOTES:

- A. One equipment width or a minimum of 15 feet between rows (or windrows).
- B. Height and width may vary depending on rock size and type of equipment. Length of windrow shall be no greater than 100 feet.
- C. If approved by the geotechnical consultant, windrows may be placed directly on competent material or bedrock, provided adequate space is available for compaction.
- D. Orientation of windrows may vary but should be as recommended by the geotechnical engineer and/or engineering geologist. Staggering of windrows is not necessary unless recommended.
- E. Clear area for utility trenches, foundations, and swimming pools; Hold-down depth as specified in text of report, subject to governing agency approval.
- F. All fill over and around rock windrow shall be compacted to at least 90 percent relative compaction or as recommended.
- G. After fill between windrows is placed and compacted, with the lift of fill covering windrow, windrow should be proof rolled with a D-9 dozer or equivalent.

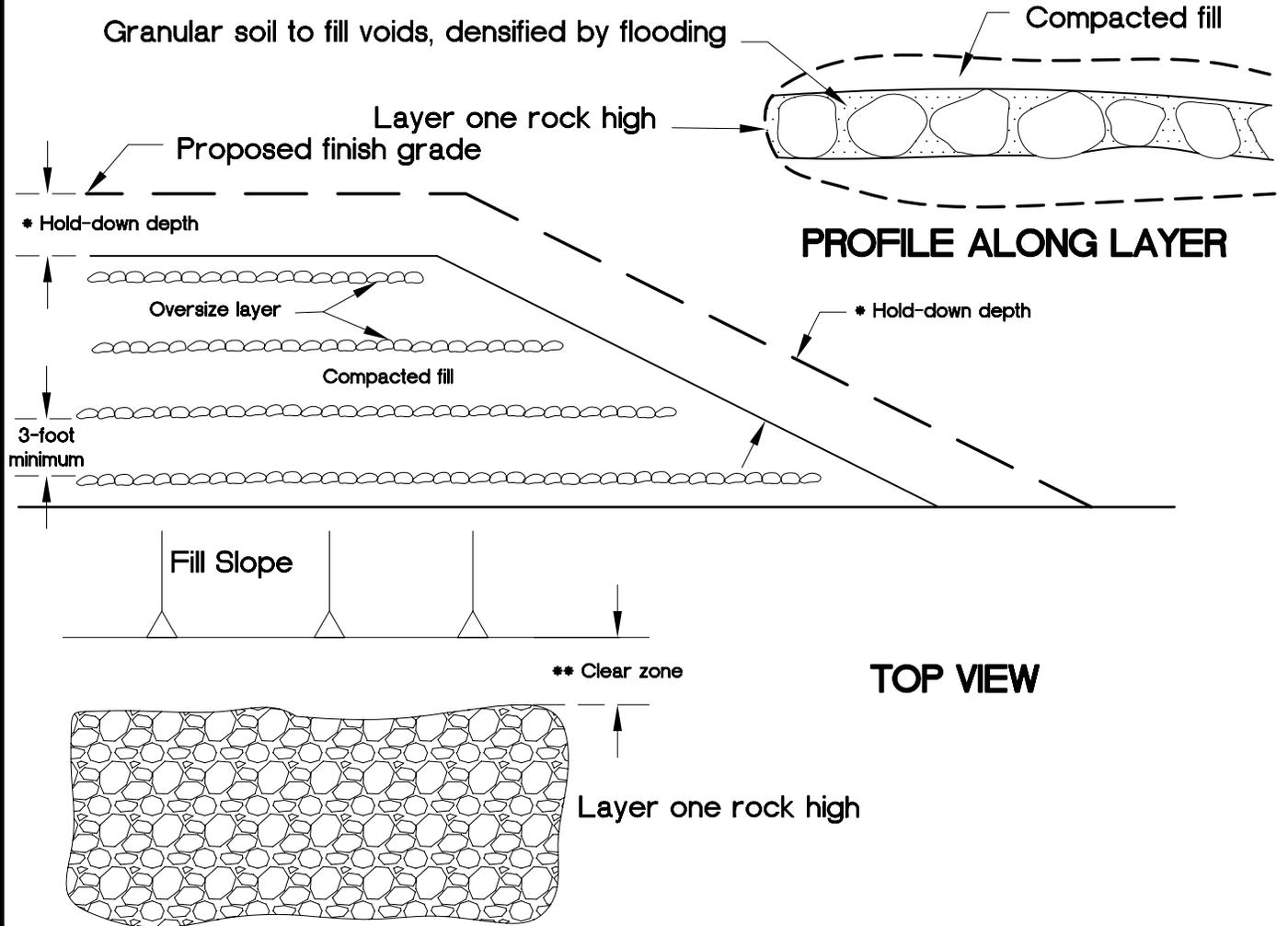
VIEWS ARE DIAGRAMMATIC ONLY AND MAY BE SUPERSEDED BY REPORT RECOMMENDATIONS OR CODE  
ROCK SHOULD NOT TOUCH AND VOIDS SHOULD BE COMPLETELY FILLED

# ROCK DISPOSAL PITS

Fill lifts compacted over rock after embedment



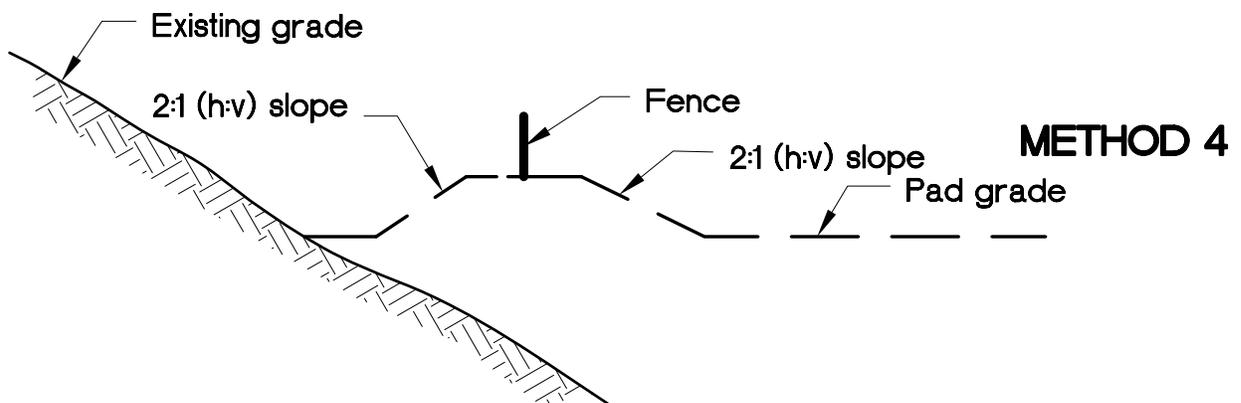
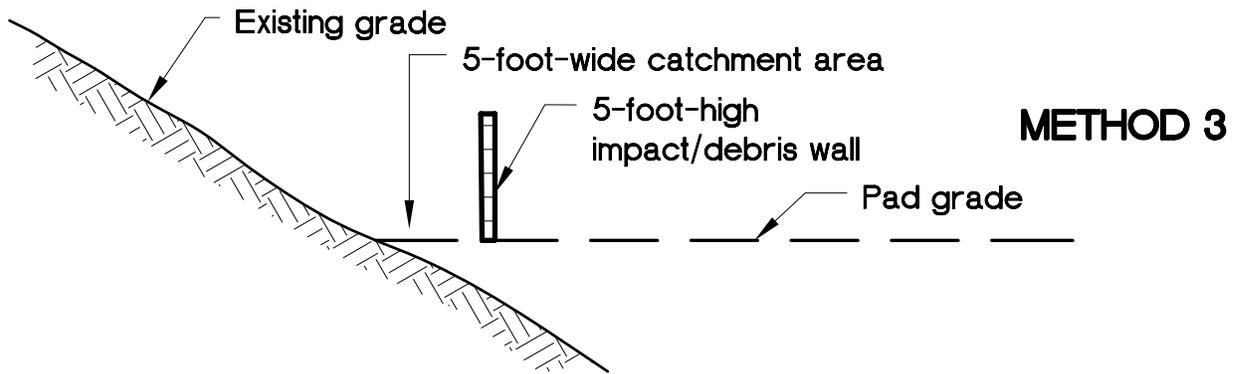
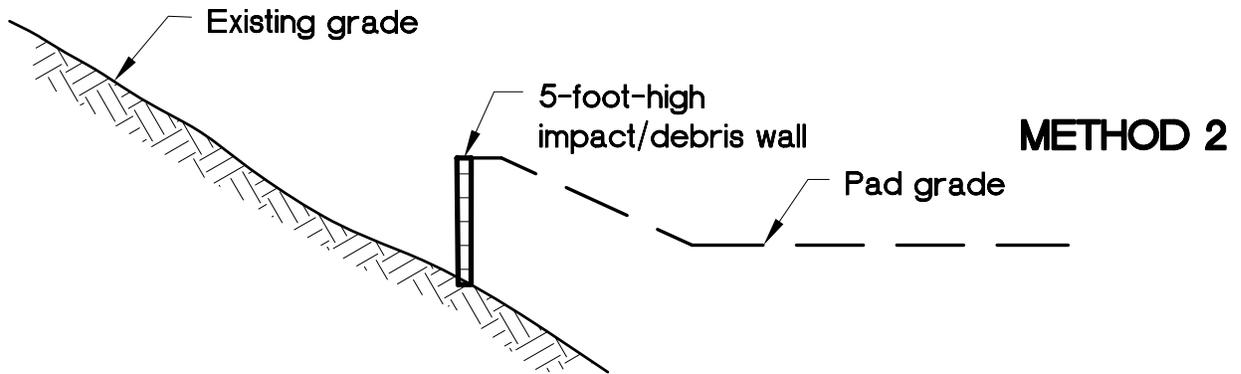
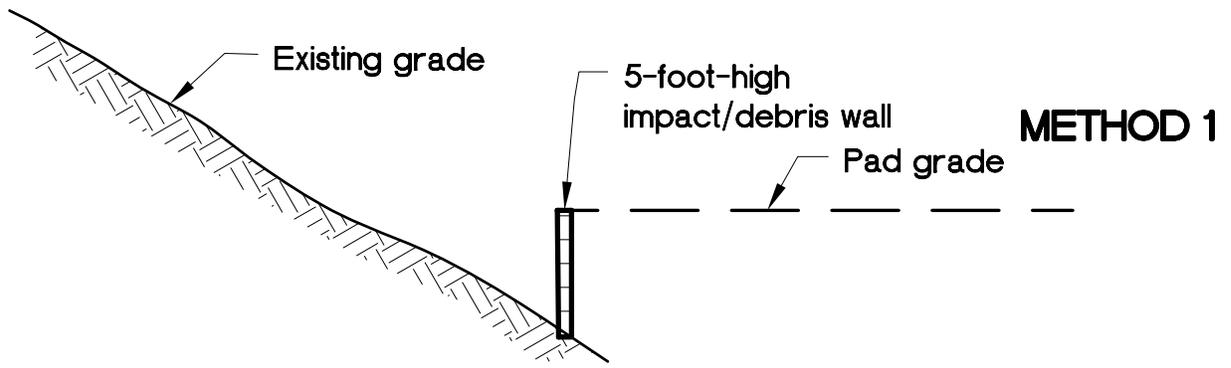
# ROCK DISPOSAL LAYERS



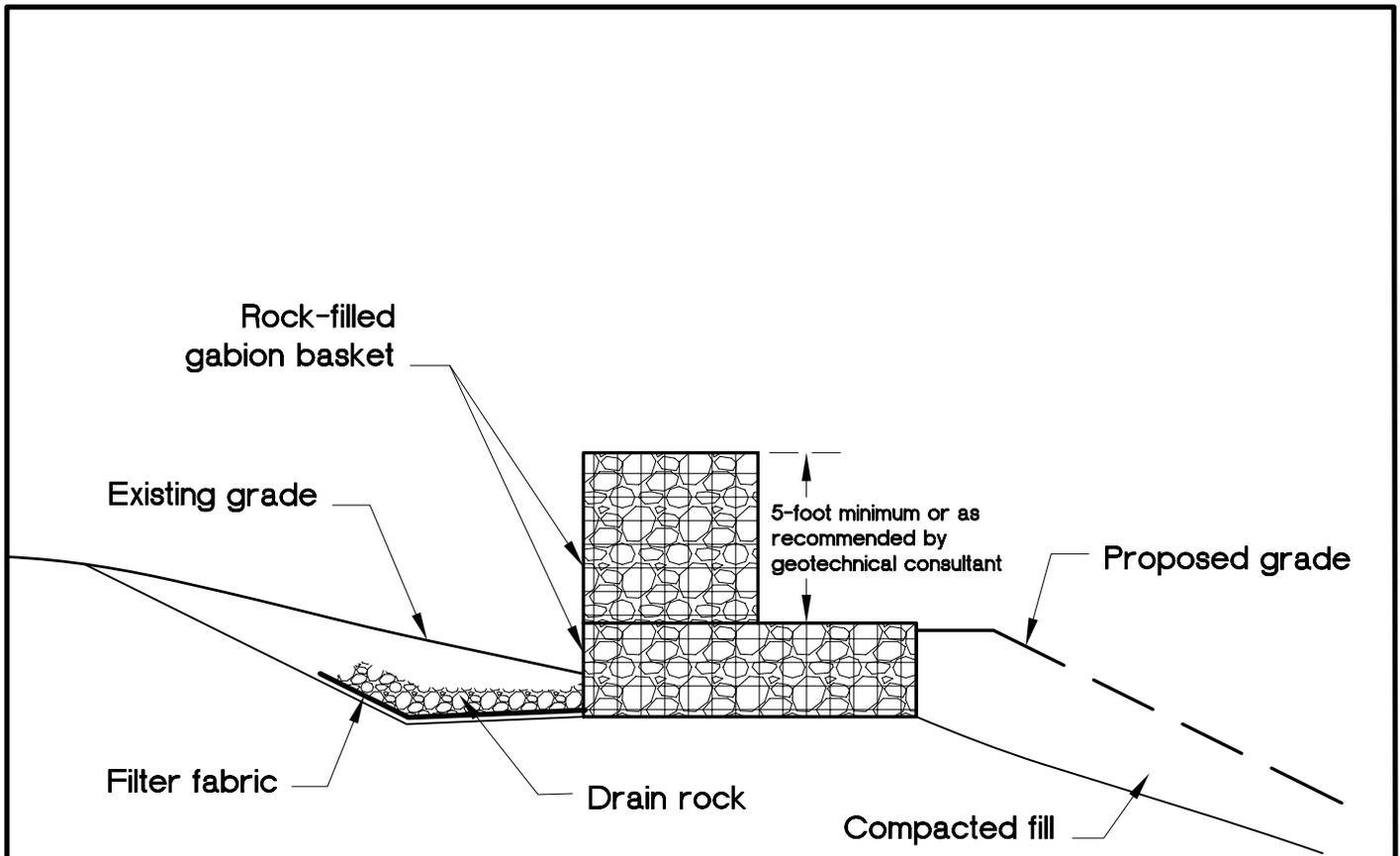
\* Hold-down depth or below lowest utility as specified in text of report, subject to governing agency approval.

\*\* Clear zone for utility trenches, foundations, and swimming pools, as specified in text of report.

VIEWS ARE DIAGRAMMATIC ONLY AND MAY BE SUPERSEDED BY REPORT RECOMMENDATIONS OR CODE  
ROCK SHOULD NOT TOUCH AND VOIDS SHOULD BE COMPLETELY FILLED IN



NOT TO SCALE

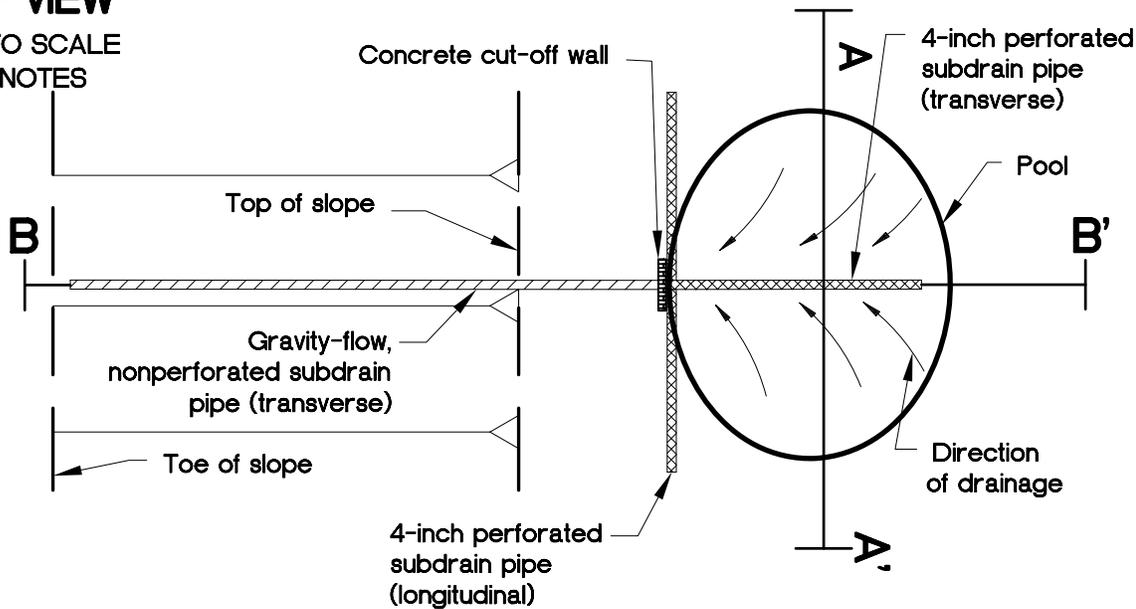


Gabion impact or diversion wall should be constructed at the base of the ascending slope subject to rock fall. Walls need to be constructed with high segments that sustain impact and mitigate potential for overtopping, and low segment that provides channelization of sediments and debris to desired depositional area for subsequent clean-out. Additional subdrain may be recommended by geotechnical consultant.

From GSA, 1987

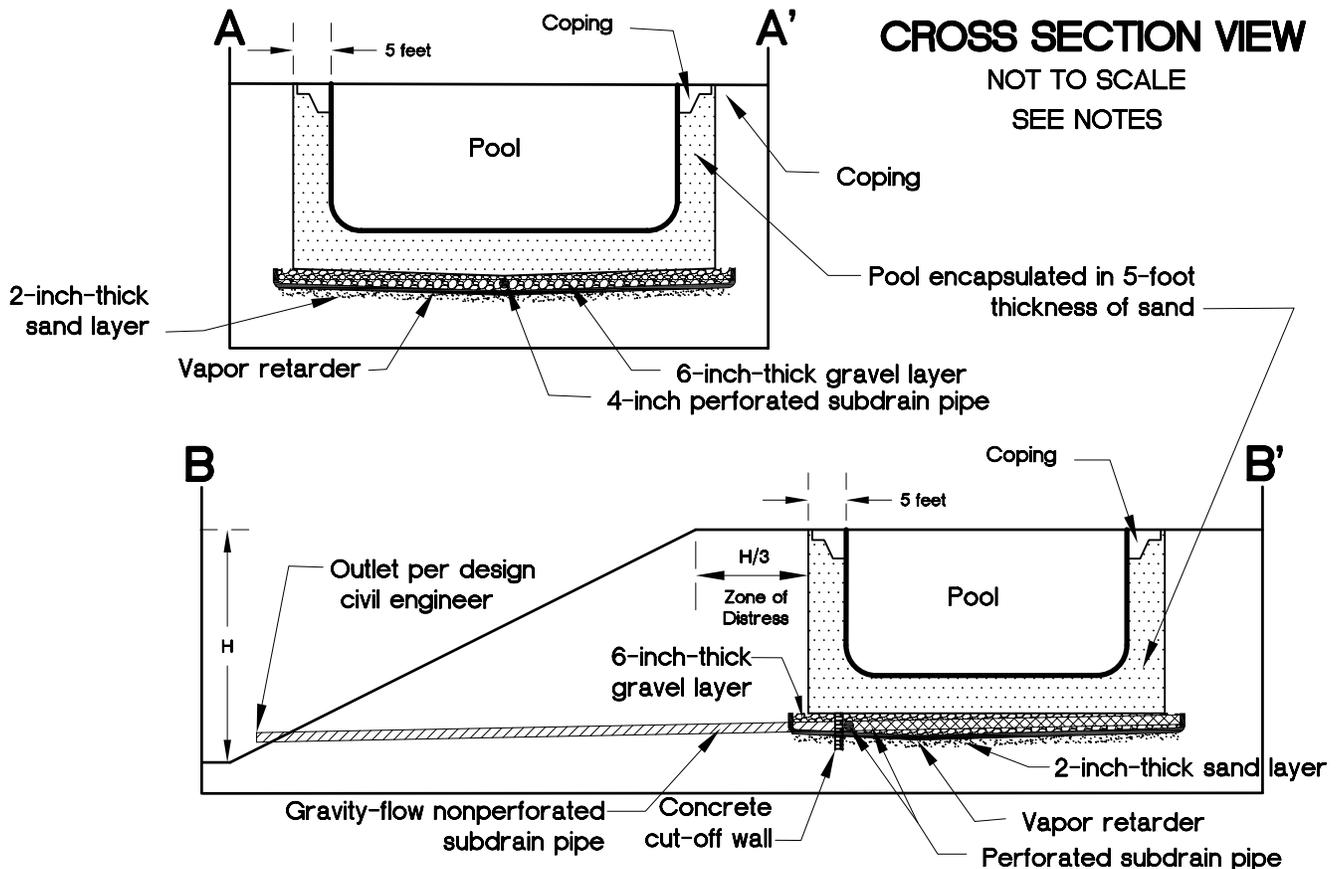
## MAP VIEW

NOT TO SCALE  
SEE NOTES



## CROSS SECTION VIEW

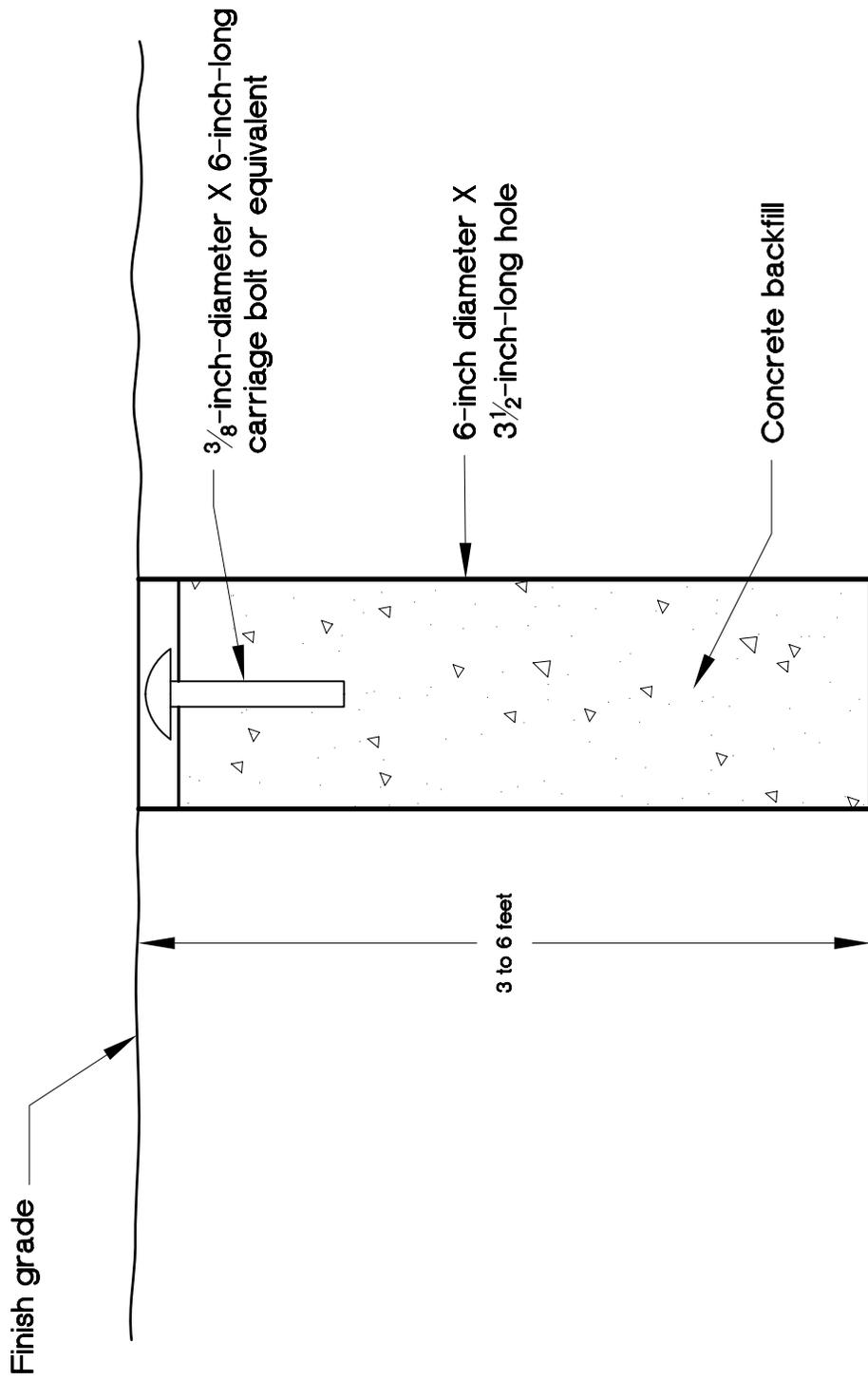
NOT TO SCALE  
SEE NOTES



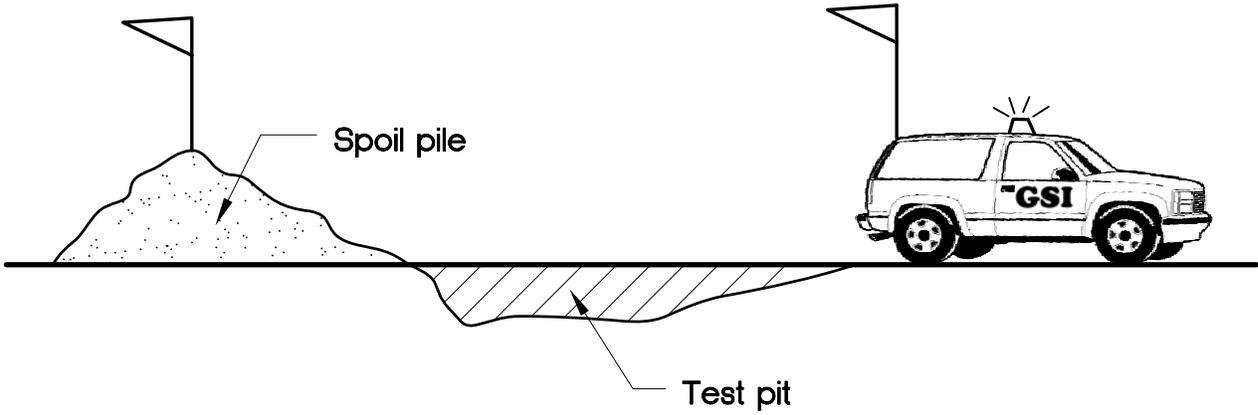
### NOTES:

1. 6-inch-thick, clean gravel ( $\frac{3}{4}$  to  $1\frac{1}{2}$  inch) sub-base encapsulated in Mirafi 140N or equivalent, underlain by a 15-mil vapor retarder, with 4-inch-diameter perforated pipe longitudinal connected to 4-inch-diameter perforated pipe transverse. Connect transverse pipe to 4-inch-diameter nonperforated pipe at low point and outlet or to sump pump area.
2. Pools on fills thicker than 20 feet should be constructed on deep foundations; otherwise, distress (tilting, cracking, etc.) should be expected.
3. Design does not apply to infinity-edge pools/spas.

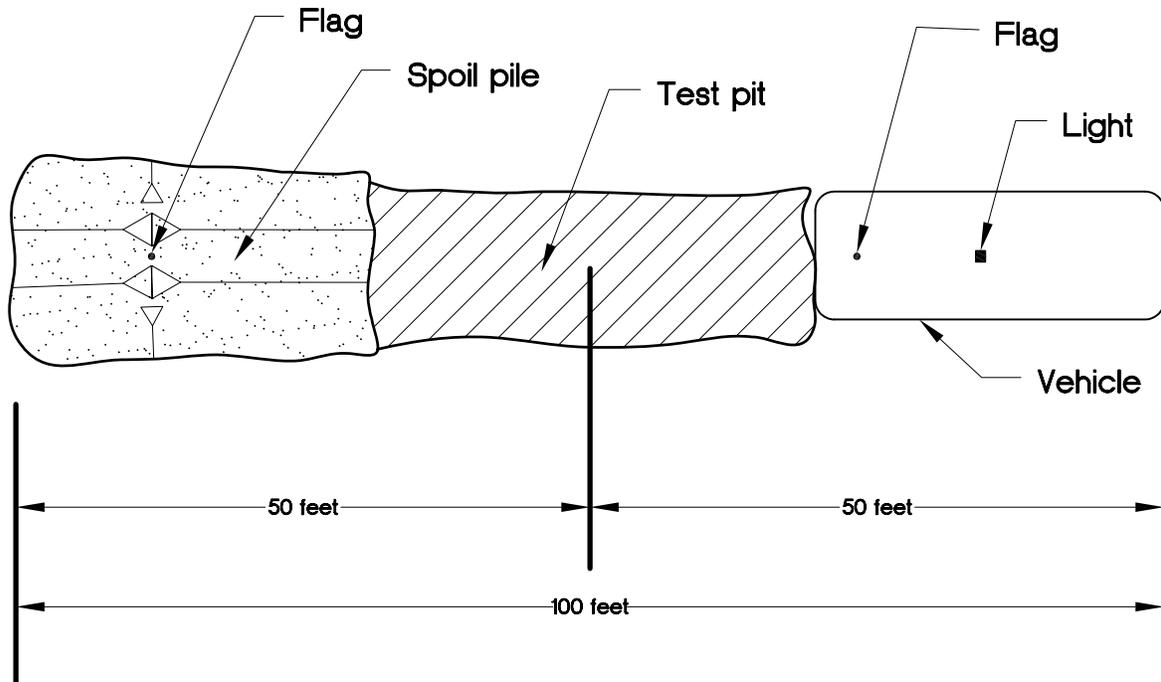




# SIDE VIEW



# TOP VIEW



**GEOTECHNICAL MAP**

Plate 1

SCALE: 1"=40'

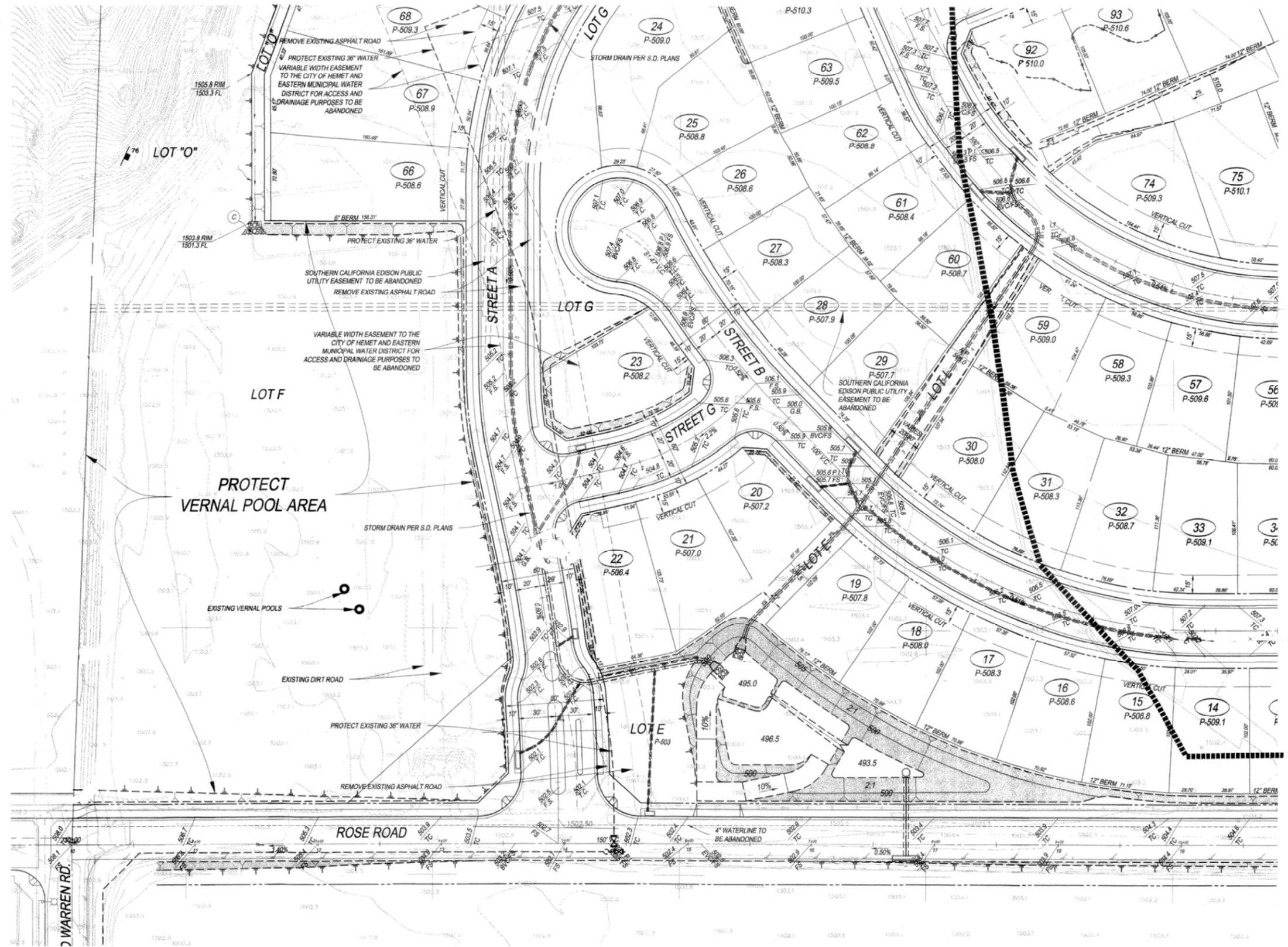
SEE SHEET 6

**CONSTRUCTION NOTES**

- (A) CONSTRUCT 10' INTERCEPTOR V-DITCH DRAIN PER DETAIL ON SHEET 2
- (C) CONSTRUCT 10'X10' RIP-RAP PER DETAIL ON SHEET 2



GRAPHIC SCALE  
(IN FEET)  
SCALE: 1" = 40'



SEE SHEET 4

**UNDERGROUND SERVICE ALERT**

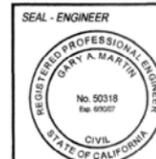
Call: Toll FREE  
1-800-227-2600  
TWO WORKING DAYS  
BEFORE YOU DIG  
CAUTION: Remember that the USA Center notifies only those utilities belonging to the center. There could be other utilities present at the work site. The center will inform you of whom they will notify.

**BENCH MARK**

STD. ALUMINUM 3" DIA. DISK STAMPED 14-17 JULY 1985 ONE MILE ± NLY ALONG WARREN RD. FROM THE INTERSECTION OF STATE HIGHWAY 74 (FLORIDA AVE.) AND WARREN RD.; 43 FEET ± ELY OF CENTERLINE WARREN RD.; 80 FEET ± NLY OF THE CORNER OF A 4' HIGH T-BAR FENCE; SET A STD. 3" DIA. ALUMINUM DISK FLUSH IN THE NLY SIDE OF A CONCRETE BASE OF A 3" DIA. X 86 TALL ELECTRICAL TRANSMISSION TOWER - 115 KV (TOWER LABELED BANNING, GARNETT, MARASHINO, NELSON, WINDFORM)  
ELEVATION: 1508.908 DATE: 8-27-85

**BASIS OF BEARINGS**

BASIS OF BEARINGS FOR THIS MAP IS THE CENTERLINE OF CAWSTON AVENUE BETWEEN DEVONSHIRE AVENUE AND MENLO AVENUE TAKEN AS N00°58'59"E PER P.M. 148/85-88.



REVISIONS		
DESIGNED BY:	DRAWN BY: JC	CHECKED BY: GM

APPROVED BY:	GARY A. MARTIN R.C.E. 50318 EXP. 6-30-07
DATE:	
APPROVED BY:	JORGE BIAGIONI R.C.E. 33751 EXP. 6-30-06
DATE:	1/28/06
<b>CITY OF HEMET</b>	

**MAYERS & ASSOCIATES**  
Civil Engineering, Inc.  
PLANNING • ENGINEERING • SURVEYING  
19 Spectrum Pointe Drive • Suite 699  
Lake Forest, CA 92630  
(949) 599-0870  
(949) 599-0880 Fax

SCALE: AS SHOWN  
BENCH MARK:  

**TRACT NO. 31513**  
**ROUGH GRADING PLAN**

DATE: 1/28/06  
W.C.      F.B.

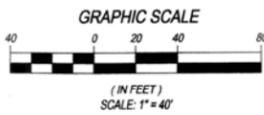
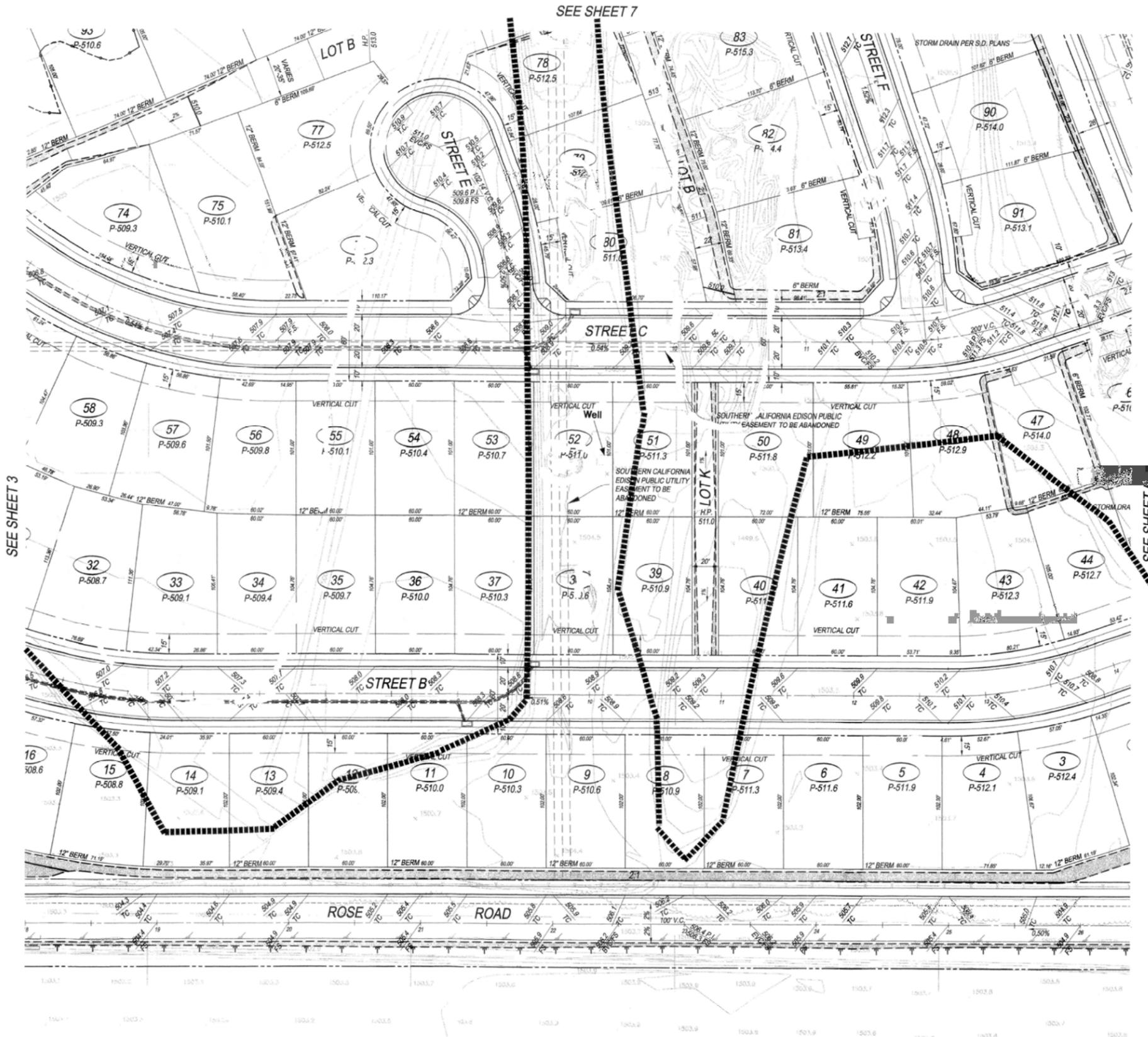
DWG NO. **3**  
OF 11 SHEETS  
FILE NO.

**GEOTECHNICAL MAP**

Plate 2

W.O. 4665-A-SC DATE 6/06 SCALE 1"=40'

See Plate 1 for LEGEND



**UNDERGROUND SERVICE ALERT**

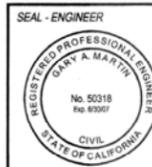
Call/Toll FREE  
1-800-227-2600  
TWO WORKING DAYS  
BEFORE YOU DIG  
"CAUTION": Remember that the USA Center notifies only those utilities belonging to the center. There could be other utilities present at the work site. The center will inform you of whom they will notify.

**BENCH MARK**

STD. ALUMINUM 3" DIA. DISK STAMPED H-47 JULY 1985 ONE MILE ± NLY ALONG WARREN RD. FROM THE INTERSECTION OF STATE HIGHWAY 74 (FLORIDA AVE.) AND WARREN RD.; 43 FEET ± ELY OF CENTERLINE WARREN RD.; 80 FEET ± NLY OF THE CORNER OF A 4" HIGH T-BAR FENCE; SET A STD. 3" DIA. ALUMINUM DISK FLUSH IN THE WLY SIDE OF A CONCRETE BASE OF A 3" DIA. X 66 TALL ELECTRICAL TRANSMISSION TOWER - 115 KV (TOWER LABELED BANNING, GARNETT, MARASHINO, NELSON, WINDFORM)  
ELEVATION: 1506.908 DATE: 8-27-85

**BASIS OF BEARINGS**

BASIS OF BEARINGS FOR THIS MAP IS THE CENTERLINE OF CAWSTON AVENUE BETWEEN DEVONSHIRE AVENUE AND MENLO AVENUE TAKEN AS N00°58'59"E PER P.M. 14865-68.



REVISIONS	
DESIGNED BY:	DRAWN BY: JC
	CHECKED BY: GM

APPROVED BY:	GARY A. MARTIN R.C.E. 50318 EXP. 6-30-07
DATE:	
APPROVED BY:	JORGE BIAGIONI R.C.E. 33751 EXP. 6-30-08
DATE:	
<b>CITY OF HEMET</b>	

<b>MAYERS &amp; ASSOCIATES</b> Civil Engineering, Inc. PLANNING • ENGINEERING • SURVEYING	
SCALE:	AS SHOWN
DATE:	1/26/05
BENCH MARK:	

<b>TRACT NO. 31513</b> <b>ROUGH GRADING PLAN</b>	
W.O.	F.B.

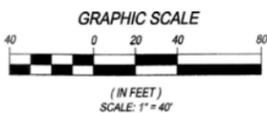
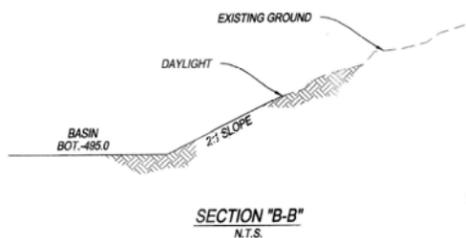
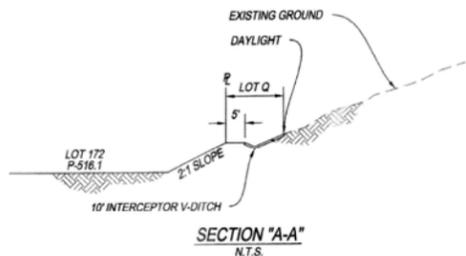
DWG NO.	<b>4</b>
OF 11 SHEETS	
FILE NO.	

**GEOTECHNICAL MAP**

Plate 3

W.O. \_\_\_\_\_ DATE \_\_\_\_\_ SCALE 1"=40'

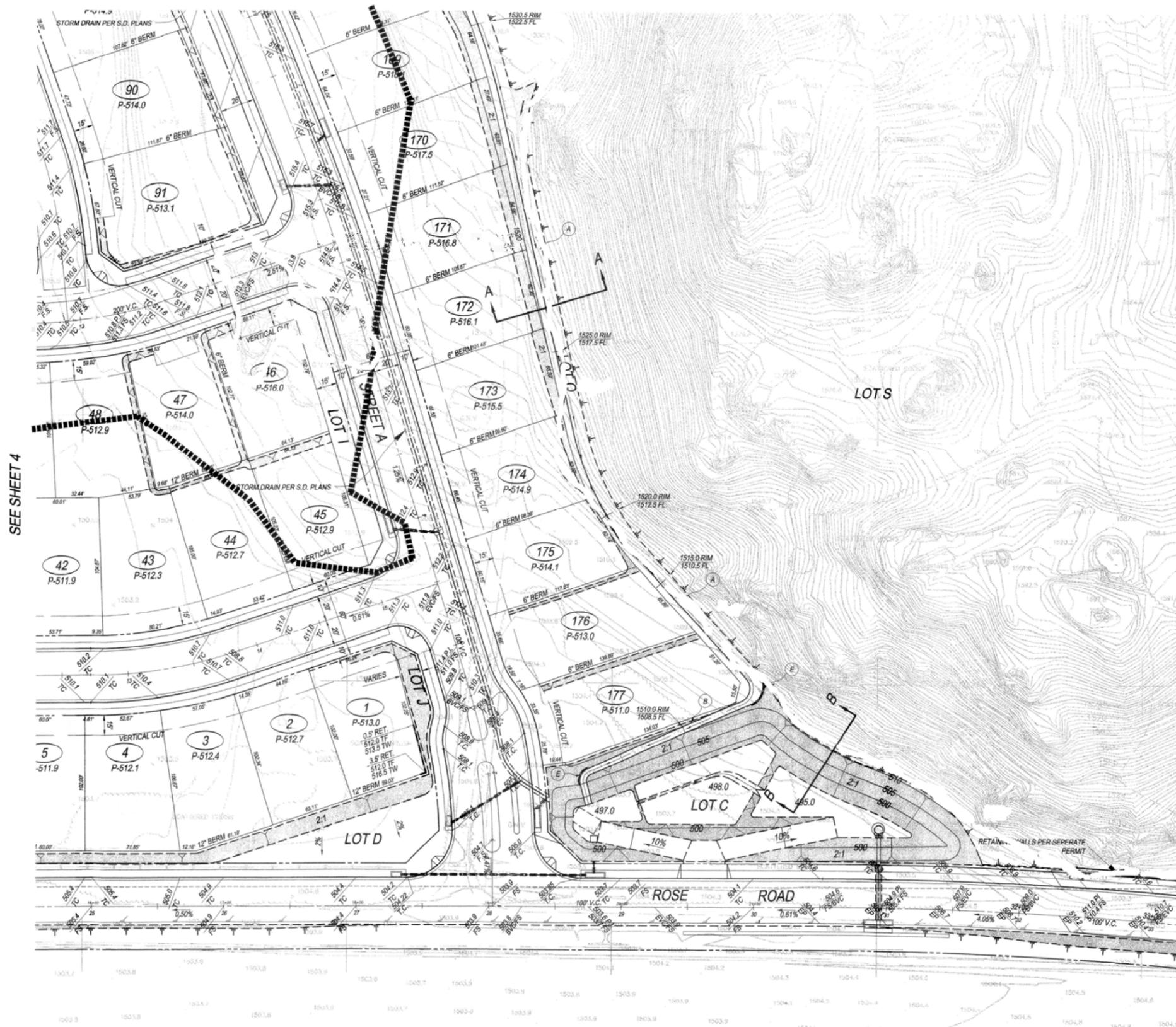
See Plate 1 for LEGEND



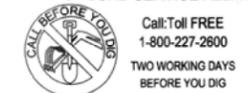
**CONSTRUCTION NOTES**

- CONSTRUCT 10' INTERCEPTOR V-DITCH DRAIN PER DETAIL ON SHEET 2

SEE SHEET 7



**UNDERGROUND SERVICE ALERT**



**BENCH MARK**

STD. ALUMINUM 3" DIA. DISK STAMPED H-47 JULY 1985 ONE MILE ± N/WY ALONG WARREN RD. FROM THE INTERSECTION OF STATE HIGHWAY 74 (FLORIDA AVE.) AND WARREN RD. 43 FEET ± ELY OF CENTERLINE WARREN RD., 80 FEET ± N/WY OF THE CORNER OF A 4" HIGH T-BAR FENCE; SET A STD. 3" DIA. ALUMINUM DISK FLUSH IN THE WLY SIDE OF A CONCRETE BASE OF A 3" DIA. X 66 TALL ELECTRICAL TRANSMISSION TOWER - 115 KV (TOWER LABELED BANNING, GARNETT, MARASHING, NELSON, WIND-CRIS) ELEVATION: 1506.908 DATE: 8-28-86

**BASIS OF BEARINGS**

BASIS OF BEARINGS FOR THIS MAP IS THE CENTERLINE OF CAMSTON AVENUE BETWEEN DEVONSHIRE AVENUE AND MENLO AVENUE TAKEN AS N00°58'59"E PER P.M. 14865-68.



REVISIONS		
DESIGNED BY:	DRAWN BY: JC	CHECKED BY: GM

APPROVED BY:	GARY A. MARTIN R.C.E. 50318 EXP. 6-30-07
DATE:	
APPROVED BY:	JORGE BIAGIONI R.C.E. 33781 EXP. 6-30-06
DATE:	
<b>CITY OF HEMET</b>	

<b>MAYERS &amp; ASSOCIATES</b> Civil Engineering, Inc. PLANNING • ENGINEERING • SURVEYING	
SCALE:	AS SHOWN
BENCH MARK:	
DATE:	1/26/05

<b>TRACT NO. 31513</b> <b>ROUGH GRADING PLAN</b>	
W.O.	F.B.

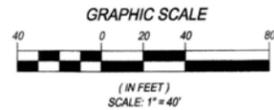
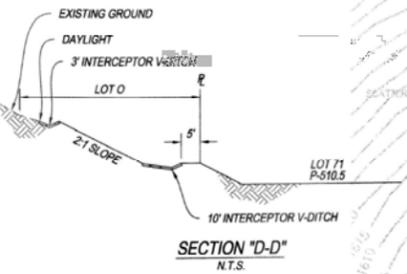
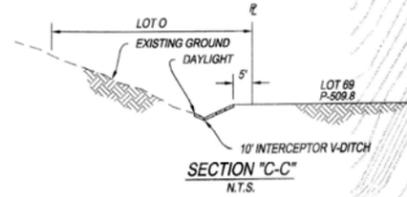
DWG NO.	<b>5</b>
FILE NO.	

GEOTECHNICAL MAP

Plate 4

W.O. \_\_\_\_\_ DATE \_\_\_\_\_ SCALE 1"=40'

See Plate 1 for LEGEND



CONSTRUCTION NOTES

- A - CONSTRUCT 10' INTERCEPTOR V-DITCH DRAIN PER DETAIL ON SHEET 2
- B - CONSTRUCT 3' INTERCEPTOR V-DITCH PER DETAIL ON SHEET 2

UNDERGROUND SERVICE ALERT



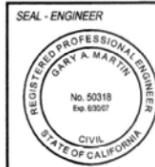
CAUTION: Remember that the USA Center notifies only those utilities belonging to the center. There could be other utilities at the work site. The center will return you of whom they notify.

BENCH MARK

STD. ALUMINUM 3" DIA. DISK STAMPED: H-47 JULY 1985 ONE MILE ± NLY ALONG WARREN RD. FROM THE INTERSECTION OF STATE HIGHWAY 74 (FLORIDA AVE.) AND WARREN RD.; 43 FEET ± ELY OF CENTERLINE WARREN RD.; 80 FEET ± NLY OF THE CORNER OF A 4' HIGH T-BAR FENCE; SET A STD. 3" DIA. ALUMINUM DISK FLUSH IN THE WLY SIDE OF A CONCRETE BASE OF A 3" DIA. X 66 TALL ELECTRICAL TRANSMISSION TOWER - 115 KV (TOWER LABELED BANNING, GARNETT, MARASHINO, NELSON, WINDFORM) ELEVATION: 1506.908 DATE: 8-27-85

BASIS OF BEARINGS

BASIS OF BEARINGS FOR THIS MAP IS THE CENTERLINE OF CAWSTON AVENUE BETWEEN DEVONSHIRE AVENUE AND MENLO AVENUE TAKEN AS N00°58'59"E PER P.M. 148-65-68.



REVISIONS		
DESIGNED BY:	DRAWN BY: JC	CHECKED BY: GM

APPROVED BY:	GARY A. MARTIN R.C.E. 90318 EXP. 6-30-07
DATE:	
APPROVED BY:	JORGE BIAGIONI R.C.E. 33561 EXP. 6-30-06
DATE:	
CITY OF HEMET	

<b>MAYERS &amp; ASSOCIATES</b> Civil Engineering, Inc. PLANNING • ENGINEERING • SURVEYING	
SCALE: AS SHOWN	BENCH MARK:
DATE: 1/26/05	
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TRACT NO. 31513 ROUGH GRADING PLAN	
W.O.	F.B.

DWG NO.	6
OF 11 SHEETS	
FILE NO.	

SEE SHEET 8

SEE SHEET 3

SEE SHEET 7

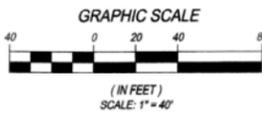
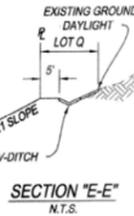
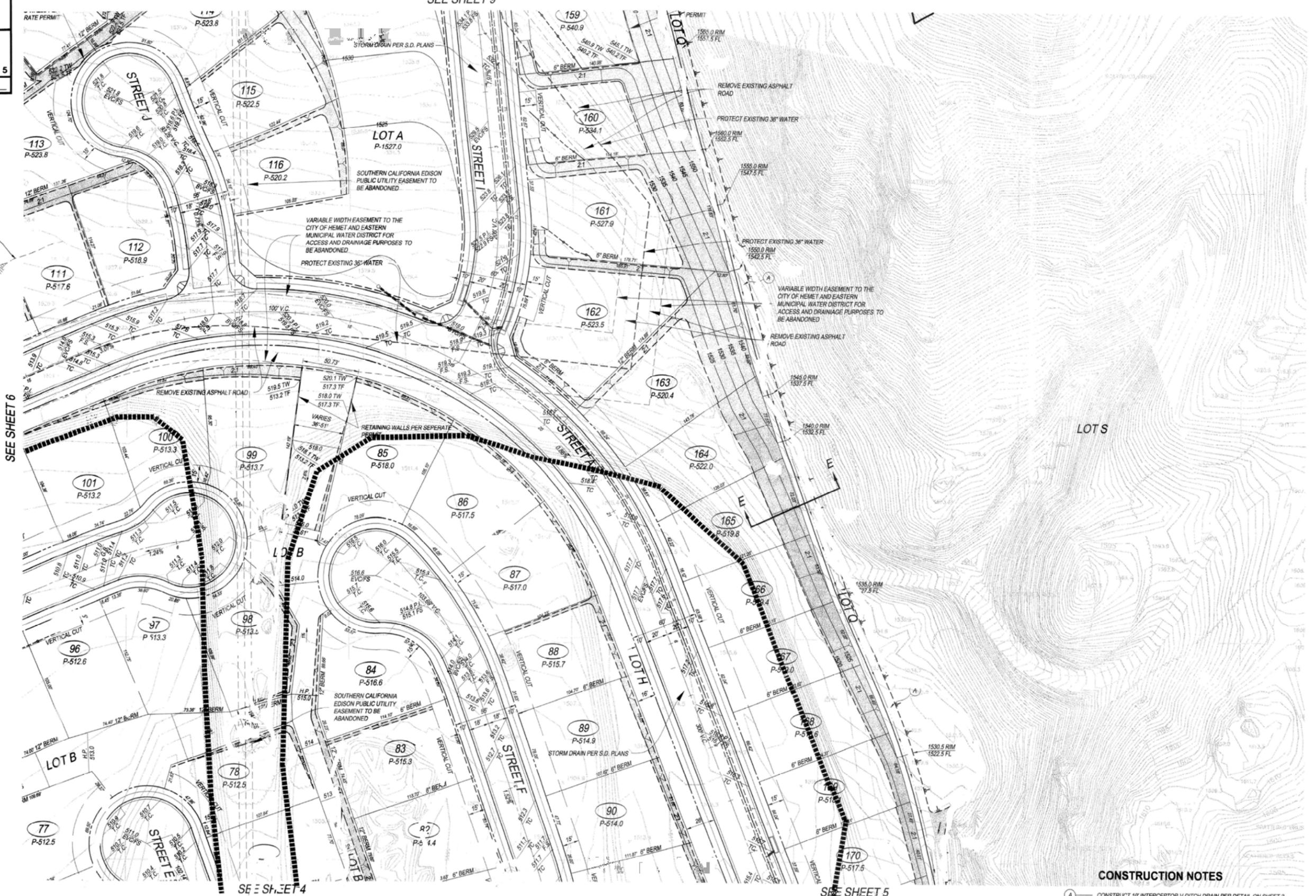
GEOTECHNICAL MAP

Plate 5

W.O. \_\_\_\_\_ DATE \_\_\_\_\_ SCALE 1"=40'

See Plate 1 for LEGEND

SEE SHEET 9



CONSTRUCTION NOTES

A — CONSTRUCT 10' INTERCEPTOR V-DITCH DRAIN PER DETAIL ON SHEET 2

UNDERGROUND SERVICE ALERT



Call Toll FREE  
1-800-227-2600  
TWO WORKING DAYS  
BEFORE YOU DIG

CAUTION: Remember that the USA Center notifies only those utilities belonging to the center. There could be other utilities present at the work site. The center will inform you of whom they will notify.

BENCH MARK

STD. ALUMINUM 3" DIA. DISK STAMPED H-47 JULY 1985 ONE MILE ± NLY ALONG WARREN RD. FROM THE INTERSECTION OF STATE HIGHWAY 74 (FLORIDA AVE.) AND WARREN RD. 43 FEET ELY OF CENTERLINE WARREN RD. 80 FEET ± NLY OF THE CORNER OF A 4" HIGH T-BAR BENCH. SET A STD. 3" DIA. ALUMINUM DISK FLUSH IN THE WLY SIDE OF A CONCRETE BASE OF A 3" DIA. X 66 TALL ELECTRICAL TRANSMISSION TOWER. 115 KV (TOWER LABELED BANNING, GARNETT, MARASHINO, NELSON, WINDFORM) ELEVATION: 1506.908 DATE: 8-27-85

BASIS OF BEARINGS

BASIS OF BEARINGS FOR THIS MAP IS THE CENTERLINE OF GAWSTON AVENUE BETWEEN DEVONSHIRE AVENUE AND MENLO AVENUE TAKEN AS N00°58'59" E PER P.M. 148160-68.



Table with columns: REVISIONS, DESIGNED BY, DRAWN BY, CHECKED BY. Includes entries for JC and GM.

Table with columns: APPROVED BY, DATE. Includes entries for Gary A. Martin and Jorge Biagioni.

Logo for Mayers & Associates Civil Engineering, Inc. with contact information: 19 Spectrum Pointe Drive • Suite 609, Lake Forest, CA 92639, (949) 599-0870, (949) 599-0880 Fax.

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ROUGH GRADING PLAN  
SCALE: AS SHOWN  
BENCH MARK: DATE: 1/28/05

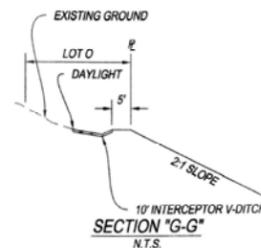
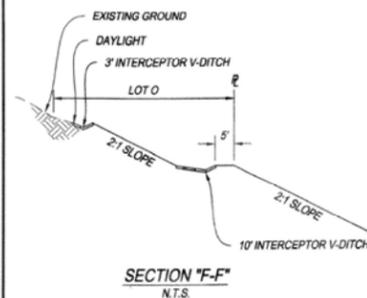
DWG NO. 7 OF 11 SHEETS FILE NO.

GEOTECHNICAL MAP

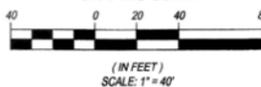
Plate 6

W.O. 4665-A-SC DATE 6/06 SCALE 1"=40'

See Plate 1 for LEGEND



GRAPHIC SCALE



CONSTRUCTION NOTES

- (A) CONSTRUCT 10' INTERCEPTOR V-DITCH DRAIN PER DETAIL ON SHEET 2
(B) CONSTRUCT 3' INTERCEPTOR V-DITCH PER DETAIL ON SHEET 2

UNDERGROUND SERVICE ALERT

Call: Toll FREE 1-800-227-2600
TWO WORKING DAYS BEFORE YOU DIG
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BENCH MARK

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BASIS OF BEARINGS

BASIS OF BEARINGS FOR THIS MAP IS THE CENTERLINE OF CAWSTON AVENUE BETWEEN DEVONSHIRE AVENUE AND MENLO AVENUE TAKEN AS N00°08'09"E PER P.M. 14895-68.

SEAL - ENGINEER
GARY A. MARTIN
No. 50318 Exp. 8/30/07
CIVIL
STATE OF CALIFORNIA

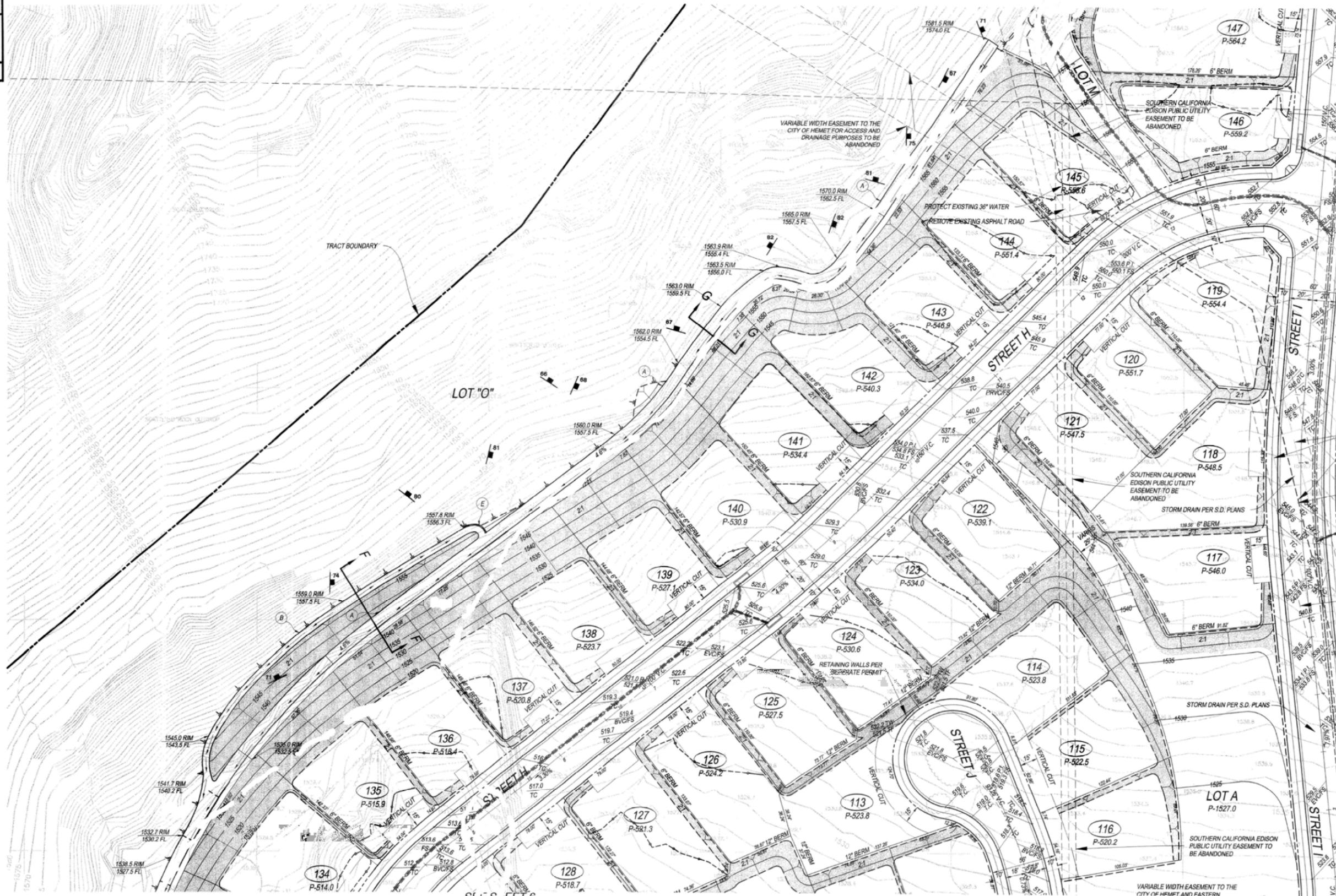
Table with columns: REVISIONS, DESIGNED BY, DRAWN BY: JC, CHECKED BY: GM

APPROVED BY: GARY A. MARTIN R.C.E. 50318 EXP. 8-30-07
DATE:
APPROVED BY: JORGE BACIGONI R.C.E. 33751 EXP. 8-30-06
DATE:
CITY OF HEMET

MAYERS & ASSOCIATES
Civil Engineering, Inc.
19 Spectrum Pointe Drive • Suite 609
Lake Forest, CA 92650
(949) 599-0870
(949) 599-0888 Fax
SCALE: AS SHOWN BENCH MARK:
DATE: 1/26/05

TRACT NO. 31513
ROUGH GRADING PLAN
W.O. F.B.

DWG NO. 8
OF 11 SHEETS
FILE NO.



SEE SHEET 10

SEE SHEET 6

SEE SHEET 7

SEE SHEET 9



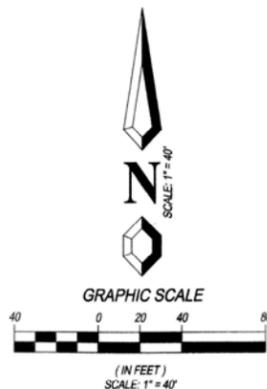
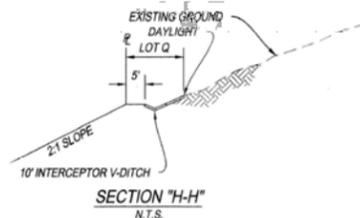
RIVERSIDE CO.  
ORANGE CO.  
SAN DIEGO CO.

# GEOTECHNICAL MAP

Plate 7

W.O. DATE SCALE 1"=40'

See Plate 1 for LEGEND



### CONSTRUCTION NOTES

CONSTRUCT 10' INTERCEPTOR V-DITCH DRAIN PER DETAIL ON SHEET 2



### UNDERGROUND SERVICE ALERT

Call: Toll FREE 1-800-227-2600  
TWO WORKING DAYS BEFORE YOU DIG

\*CAUTION: Remember that the USA Center notifies only those utilities belonging to the center. There could be other utilities present at the work site. The center will inform you of whom they will notify.

### BENCHMARK

STD. ALUMINUM 3" DIA. DISK STAMPED H-47 JULY 1985 ONE MILE ± NLY ALONG WARREN RD. FROM THE INTERSECTION OF STATE HIGHWAY 74 (FLORIDA AVE.) AND WARREN RD.; 43 FEET ± ELY OF CENTERLINE WARREN RD.; 80 FEET ± NLY OF THE CORNER OF A 4' HIGH T-BAR FENCE; SET A STD. 3" DIA. ALUMINUM DISK FLUSH IN THE WLY SIDE OF A CONCRETE BASE OF A 3" DIA. X 86 TALL ELECTRICAL TRANSMISSION TOWER - 115 KV (TOWER LABELED BANNING, GARNETT, MARASHINO, NELSON, WINDFORM) ELEVATION: 1506.908 DATE: 8-27-85

### BASIS OF BEARINGS

BASIS OF BEARINGS FOR THIS MAP IS THE CENTERLINE OF CAWSTON AVENUE BETWEEN DEVONSHIRE AVENUE AND MENLO AVENUE TAKEN AS N00°58'59"E PER P.M. 14865-88.



REVISIONS		
DESIGNED BY:	DRAWN BY: JC	CHECKED BY: GM

APPROVED BY:	GARY A. MARTIN R.C.E. 50318 EXP. 6-30-07
DATE:	
APPROVED BY:	JORGE BIAGIONI R.C.E. 33751 EXP. 6-30-06
DATE:	
CITY OF HEMET	

**MAYERS & ASSOCIATES**  
Civil Engineering, Inc.  
PLANNING • ENGINEERING • SURVEYING

19 Spectrum Pointe Drive • Suite 609  
Lago Forest, CA 92630  
(949) 599-0870  
(949) 599-0880 Fax

SCALE: AS SHOWN BENCH MARK:      DATE: 1/26/05

**TRACT NO. 31513  
ROUGH GRADING PLAN**

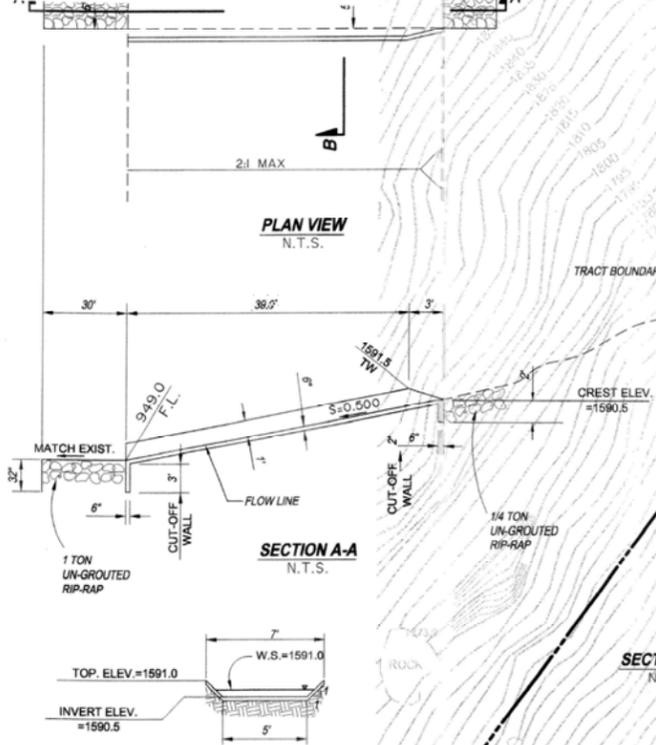
DWG NO. **9**  
OF 11 SHEETS  
FILE NO.      W.O.      F.B.

GEOTECHNICAL MAP

Plate 8

W.O. DATE SCALE 1"=40'

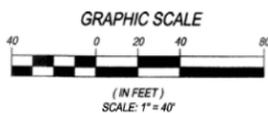
See Plate 1 for LEGEND



OFFSITE INLET TRAPEZOIDAL CHANNEL  
N.T.S.

CONSTRUCTION NOTES

- (A) CONSTRUCT 10' INTERCEPTOR V-DITCH DRAIN PER DETAIL ON SHEET 2
- (D) CONSTRUCT EMERGENCY SPILLWAY PER DETAIL ON SHEET 2
- (F) CONSTRUCT OFFSITE INLET TRAPEZOID PER DETAIL HEREON



SEE SHEET 8

SEE SHEET 9

UNDERGROUND SERVICE ALERT

Call/Toll FREE  
1-800-227-2600

TWO WORKING DAYS  
BEFORE YOU DIG

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BENCH MARK

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ELEVATION: 1508.908 DATE: 9-27-85

BASIS OF BEARINGS

BASIS OF BEARINGS FOR THIS MAP IS THE CENTERLINE OF CAWSTON AVENUE BETWEEN DEVONSHIRE AVENUE AND MENLO AVENUE TAKEN AS N00°58'59" E PER P.M. 14865-68.



REVISIONS		

APPROVED BY:	GARY A. MARTIN R.C.E. 50318 EXP. 8-30-07
DATE:	
APPROVED BY:	JORGE BIAGIONI R.C.E. 33751 EXP. 6-30-06
DATE:	1/26/05
DESIGNED BY:	
DRAWN BY:	JC
CHECKED BY:	GM
CITY OF HEMET	

**MAYERS & ASSOCIATES**  
Civil Engineering, Inc.  
PLANNING • ENGINEERING • SURVEYING

19 Spectrum Pointe Drive • Suite 609  
Lake Forest, CA 92630  
(949) 594-0870  
(949) 599-0880 Fax

SCALE: AS SHOWN  
BENCH MARK

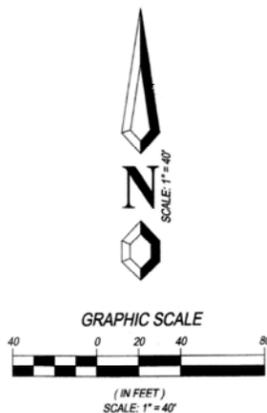
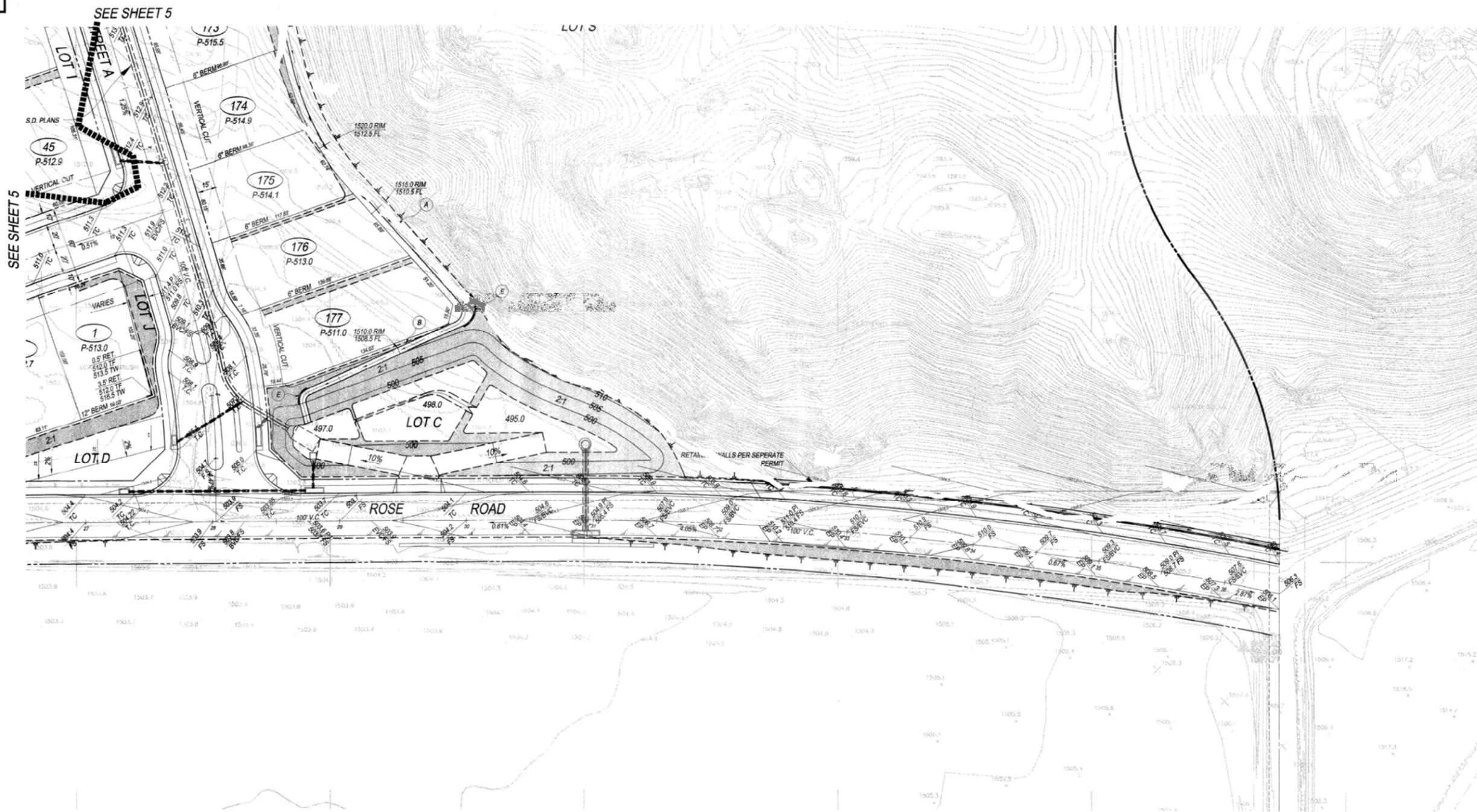
TRACT NO. 31513 ROUGH GRADING PLAN		DWG NO.
10		OF 11 SHEETS
FILE NO.		
W.O.	F.B.	

GEOTECHNICAL MAP

Plate 9

W.O. DATE SCALE 1"=40'

See Plate 1 for LEGEND



CONSTRUCTION NOTES

- (A) CONSTRUCT 10' INTERCEPTOR V-DITCH DRAIN PER DETAIL ON SHEET 2
- (D) CONSTRUCT EMERGENCY SPILLWAY PER DETAIL ON SHEET 2

UNDERGROUND SERVICE ALERT



Call Toll FREE  
1-800-227-2600  
TWO WORKING DAYS  
BEFORE YOU DIG

CAUTION: Remember that the USA Center notifies only those utilities belonging to the center. There could be other utilities present at the work site. The center will inform you of whom they will notify.

BENCH MARK

STD. ALUMINUM 3" DIA. DISK STAMPED H-47 JULY 1985 ONE MILE ± NLY ALONG WARREN RD. FROM THE INTERSECTION OF STATE HIGHWAY 74 (FLORIDA AVE.) AND WARREN RD.; 43 FEET ± ELY OF CENTERLINE WARREN RD.; 60 FEET ± NLY OF THE CORNER OF A 4' HIGH T-BAR FENCE; SET A STD. 3" DIA. ALUMINUM DISK FLUSH IN THE WLY SIDE OF A CONCRETE BASE OF A 3" DIA. X 66 TALL ELECTRICAL TRANSMISSION TOWER - 115 KV (TOWER LABELED BANNING, GARNETT, MARASHINO, NELSON, WINDFORM)  
ELEVATION: 1506.908  
DATE: 8-27-85

BASIS OF BEARINGS

BASIS OF BEARINGS FOR THIS MAP IS THE CENTERLINE OF CAWSTON AVENUE BETWEEN DEVONSHIRE AVENUE AND MENLO AVENUE TAKEN AS N00°58'59"E PER P.M. 148/65-68.



REVISIONS		
DESIGNED BY:	DRAWN BY: JC	CHECKED BY: GM

APPROVED BY:	GARY A. MARTIN R.C.E. 50318 EXP. 6-30-07
DATE:	
APPROVED BY:	JORGE BIAGIONI R.C.E. 33751 EXP. 6-30-06
DATE:	1/26/05
CITY OF HEMET	

**MAYERS & ASSOCIATES**  
Civil Engineering, Inc.  
PLANNING • ENGINEERING • SURVEYING

19 Spectrum Pointe Drive • Suite 609  
Lake Forest, CA 92630  
(949) 599-0870  
(949) 599-0880 Fax

SCALE: AS SHOWN  
BENCH MARK:  

TRACT NO. 31513  
ROUGH GRADING PLAN

W.O. F.R.

DWG NO.  
**11**  
OF 11 SHEETS  
FILE NO.