C. W. La Monte Company Inc.

Soil and Foundation Engineers

UPDATED GEOTECHNICAL INVESTIGATION REPORT
Village Run Condominiums
9914 through 9938 Buena Vista Avenue
Santee, California 92021
A.P.N. 384-042-22 and 23

JOB NO. 15 6561

January 4, 2016

Prepared for:

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SUBJECT: Updated Geotechnical Investigation Report
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References: *Report of Limited Geotechnical Investigation, Village Run Condominiums, 9914 through 9938 Buena Vista Avenue Santee, California 92021, A.P.N. 384-042-22 and 23, Job No. 15 6561, prepared by C.W. La Monte Company Inc., dated June 16, 2015.*

City of Santee, Village Run Condominiums, TM No. 2015-4 by Draper Engineering, undated

Addendum Report Of Limited Geotechnical Investigation, Seismic Hazard Study And Geologic Reconnaissance, Village Run Condominiums, 9914 through 9938 Buena Vista Avenue, Santee, California 92021, A.P.N. 384-042-22 and 2, by C.W. La Monte Company, Inc., dated December 31, 2015

In accordance with your request we are providing an update to the above referenced geotechnical reports. Our scope of work consisted of a recent visual site reconnaissance by our geotechnical personnel, review of the above referenced documents, and review of pertinent geotechnical reports and maps. Our observations indicate that the site conditions have not significantly changed (from a geotechnical standpoint) since the above referenced report was issued. The scope of the project has not changed significantly since the initial report and addendum reports were released. Modified and/or supplemental conclusions and/or recommendations are included in this report to reflect current building plans under review and the 2013 California Building Code. The recommendations presented in this report supersede those from prior releases.

If you should have any questions after reviewing this report, please do not hesitate to contact our office. This opportunity to be of professional service is sincerely appreciated.

Respectfully submitted,

C.W. La Monte Company Inc.

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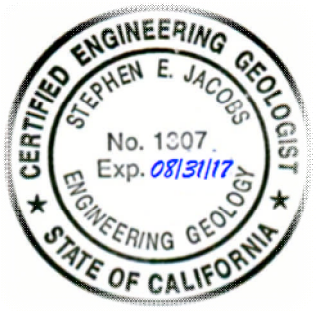

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UPDATED GEOTECHNICAL INVESTIGATION REPORT
Village Run Condominiums
9914 through 9938 Buena Vista Avenue
Santee, California 92021
A.P.N. 384-042-22 and 23

PROJECT DESCRIPTION

The following report presents the results of a limited geotechnical investigation performed for the proposed planned condominium development. The property is located at 9914 through 9938 Buena Vista Avenue in the City of Santee, San Diego County, California. Figure Number 1 (attached) provides a vicinity map showing the approximate location of the property. The property is rectangular-shaped and approximately two acres in size. The lot is presently occupied by two one-story, single family-residences and structures associated with a collision repair facility. The site is characterized by relatively level terrain.

It is our understanding the existing structures will be removed to make way for a 40-unit, condominium complex. The complex will consist of 8 separate buildings with five attached units each. The proposed structures will be a maximum of two-stories in height and will be of conventional construction materials with shallow foundations and concrete slab-on-grade floors. Grading for the project will consist of cuts and fills of less than 3 feet in depth.

To aid in the preparation of this report, we were provided with a *City of Santee, Development Review Permit, Conceptual Grading Plan for Village Run Condominiums,* by Draper Engineering, undated. This plan was used as the basis for our Plot Plan preparation and mapping and is included herewith as Figure Number 2.

This report has been prepared for the exclusive use of the stated client and his or her design consultants for specific application to the project described herein. Should the project be changed in any way, the modified plans should be submitted to C.W. La Monte Company, Inc. for review to determine their conformance with our recommendations and to determine if any additional subsurface investigation, laboratory testing and/or recommendations are necessary. Our professional services have been performed, our findings obtained and our recommendations prepared in accordance with generally accepted engineering principles and practices. This warranty is in lieu of all other warranties, expressed or implied.

SCOPE OF WORK

The scope of this investigation was limited to: surface reconnaissance, research of readily available geotechnical literature pertinent to the site; subsurface exploration, laboratory testing, engineering and geologic analysis of the field and laboratory data and preparation of this report. More specifically, the intent of this investigation was to:

- Identify the subsurface conditions of the site to the depths influenced by the proposed grading and construction.

- Based on laboratory testing, empirical evaluation and our experience with similar sites in the area, identify the engineering properties of the various strata that may influence the proposed construction, including the allowable soil bearing pressures, expansive characteristics and settlement potential.

- Describe the general geology of the site including possible geologic factors that could have an effect on the site development.

- Provide a site soil classification and mapped spectral acceleration parameters relative to the 2013 CBC.

- Address potential construction difficulties that may be encountered due to soil conditions, groundwater and provide recommendations concerning these problems.

- Develop soil engineering criteria for site grading.

- Recommend an appropriate foundation system for the type of structures anticipated and develop soil engineering design criteria for the recommended foundation designs.

- Present our opinions in this written report, which includes in addition to our findings and recommendations, a site plan showing the location of our subsurface explorations, logs of the test excavations and a summary of our laboratory test results.

We did not evaluate the site for hazardous materials contamination. Further, we did not perform laboratory tests to evaluate the chemical characteristics of the on-site

soils in regard to their potentially corrosive impact to on-grade concrete and below grade improvements.

FINDINGS

SITE DESCRIPTION

The subject site is a rectangular shaped parcel of land located at the northeast corner Mission Green Road and Buena Vista Avenue in the City of Santee, California. The site is also bounded on the north and east with a mobile home park. The property is rectangular-shaped and approximately two acres in size. The lot is presently occupied by two one-story, single family-residences and one-story structures associated with a collision repair facility. Vegetation consists of lawn grass, weeds, some landscape shrubs and several trees.

Topographically the site consists of relatively level terrain. Site elevations range from a low of approximately 346 feet above MSL (mean sea level) near the northeast corner of the property to a high of approximately 350 feet above MSL near the property's southeast corner.

DESCRIPTION OF SUBSURFACE SOIL AND GEOLOGIC CONDITIONS

The subject site is located in the El Cajon Valley and is underlain by older alluvium with associated topsoils. These soil types are described individually below in order of increasing age; also refer to the attached Test Excavation Logs, Figure 3A through 3D attached. The foundation bearing materials encountered in our test excavations generally possess a low expansion potential.

Topsoil: The site is underlain with a veneer of natural ground topsoil, approximately 1 to 2.5 feet in thickness. The topsoil consists primarily of dark reddish brown, loose to medium dense, silty sand. The loose topsoil is not suitable to support the proposed structures and improvements in its present loose condition and requires removal and recompaction in areas to receive structural improvements.

Old Alluvium (Qu): The above-described materials are underlain at depth with competent, old alluvium. The *Preliminary Geologic Map of the El Cajon 30' x 60' Quadrangle, Southern California* (Todd, 2004) describes this formation as "Alluvium

and colluvium, undivided (Holocene and Pleistocene) and older alluvium and colluvium not mapped separately." Tan (2002) described this formation as "Late Pleistocene alluvial deposits; moderately consolidated, poorly-sorted flood plain deposits consisting of gravelly, sandy silt and clay." The encountered old alluvial soils consist primarily of dark reddish brown, stiff sandy clay and dark reddish brown, medium dense to dense, clayey sand and silty sand.

Based on laboratory testing, our visual and textural classification plus our past experience with similar soils in the vicinity of the subject site, the materials described above are anticipated to possess a expansion potential ranging from "very low to medium" as determined by ASTM 4829.

GROUNDWATER

No groundwater was encountered in our test excavations to the maximum explored depth of approximately 5 feet at the time of our investigation. According to the California Department of Water Resources Water Data Library-Groundwater Level Reports (DWR, 2015), a groundwater depth of approximately 11 feet was measured in an observation well on October 20, 2015 located about 1 mile northwest of the site. But since this well is located within mapped younger alluvium, the depth to groundwater at the site (within mapped older alluvium) is probably much greater.

In addition, recent exploration was conducted approximately ½ mile north of the project site near Town Center Parkway and Cuyamaca Street, also a young alluvial site and located within the ancient river flood plain. This document includes findings of exploration at this site spanning from 1999 to 2015. The report concluded that the groundwater elevation is anticipated to range from 323 feet to 327 feet above MSL. The elevation of the Village Run project site is above 347 feet. Also keep in mind that the old alluvium underlying the site is well indurated and likely to be less influenced by the local groundwater table.

It should also be recognized that minor groundwater seepage problems might occur after development of a site even where none were present before development. These are usually minor phenomena and are often the result of an alteration in drainage patterns and/or an increase in irrigation water or rainfall. Based on the permeability characteristics of the soil and the anticipated usage and development, it is our opinion that any seepage problems, which may occur, will be minor in extent. It is further our opinion that these problems can be most effectively corrected on an individual basis if and when they occur.

STORMWATER INFILTRATION

Our scope of work did not include infiltration testing, since the location of any proposed LID improvements has not been provided at this time. However, a preliminary evaluation includes the following conclusions:

Soil Conditions: According to the soil group map from *County of San Diego, BMP Sizing Calculator (website),* the site is located in Hydrologic Soil Groups (HSG) Group "D". Characteristically, Group "D" soils have a slow infiltration rate when thoroughly wet. These are general classifications and not necessarily site specific.

Groundwater: We do not anticipate any limitations to surface bioretention systems, related to groundwater conditions. We anticipate groundwater levels will exceed 10 feet below the existing grade, based on an evaluation of the area topography and geology.

Conclusion: The upper portion of the formational deposits will likely possess poor infiltration characteristics and are likely not suitable for typical bioretention ponds designed for infiltration. LID systems designed more for storage-retention-filtration systems are appropriate for the project site.

It is our understanding LID's planned for the project are designed for minimal infiltration and are appropriate for the project conditions.

FAULTING AND SEISMICITY

No major faults are known to traverse the subject site but it should be noted that much of Southern California, including the San Diego County area, is characterized by a series of Quaternary-age fault zones, which typically consist of several individual, en echelon faults that generally strike in a southeasterly – northwesterly direction. Some of these fault zones (and the individual faults within the zones) are classified as active. According to the criteria of the California Division of Mines and Geology (currently California Geological Survey), active fault zones are those, which have shown conclusive evidence of faulting during the Holocene Epoch (the most recent 11,000 years). An excerpt from the *2010 Fault Activity Map of California* is attached as Figure Number 5.

Current geologic literature indicates that the Rose Canyon Fault Zone is the nearest active fault zone with the nearest segment mapped approximately 15 miles southwest of the site. According to the 2008 *National Seismic Hazard Maps - Fault Parameters* (USGS website), the Maximum Magnitude earthquake on the Rose Canyon Fault Zone is 6.9 (Ellsworth) or 6.7 (Hanks) with a slip rate of 1.5. The Rose Canyon Fault Zone is currently classified as a Type "B" fault (*California Probabilistic Seismic Hazard Maps, June 2003).*

The Elsinore and San Jacinto Fault Zones located about 28 and 48 miles (respectively) northeast of the site. The City of San Diego Seismic Safety Element estimates the maximum probable earthquake for both the San Jacinto and the Elsinore fault zones is between M 6.9 and 7.3, with a repeat interval of approximately 100 years. The maximum credible earthquake for both fault zones is estimated at M 7.6.

Other active fault zones in the region that could possibly affect the site include the Coronado Bank, San Diego Trough and San Clemente Fault Zones to the southwest, and the Earthquake Valley Fault and San Andreas Fault Zones to the northeast. However, a Maximum Magnitude Earthquake on the Rose Canyon or Elsinore Fault Zones is anticipated to generate ground accelerations on the site, greater than any of these other nearby fault zones.

The nearest faults to the site as shown on Figure Number 5 are an unnamed Pre-Quaternary (inactive) fault and the potentially active La Nacion Fault Zone located approximately 2 and 10 miles (respectively) southwest of the site.

According to the *Official Map of Alquist-Priolo Earthquake Fault Zones* for the *La Jolla Quadrangle*, California, by the California Division of Mines and Geology (currently California Geological Survey) (CDMG, 1991) the site **IS NOT** located within or near an Alquist-Priolo Earthquake Fault Zone.

SEISMIC DESIGN PARAMETERS

We have determined the mapped spectral acceleration values for the site utilizing U.S. Seismic Design Maps, Version 3.1.0 (July 11, 2013) from the USGS website. The seismic design parameters are specific to the site and provide a solution for Section 1613 of the 2012 IBC (which uses USGS hazard data available in 2008).

The analysis included the following input parameters:

Design Code Reference Document: 2012 IBC

Site Soil Classification: Site Class D

Risk Category: I or II or III

Site Coordinates: 32.83478°N, -116.98078°W

The values generated by the *Design Map Report* are provided in the following table:

TABLE I

Site Coefficients and Spectral Response Acceleration Parameters

S_s	S_1	F_a	F_v	S_{ms}	S_{m1}	S_{ds}	S_{d1}
0.873	0.339	1.151	1.722	1.005	0.584	0.670	0.389

The Seismic Design Maps also yielded a value of 0.385g for peak ground acceleration PGA_M at the site.

Application to the criteria in Table I for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur if ever seismic shaking occurs. The primary goal of seismic design is to protect life, not to avoid all damage, since such design may be economically prohibitive.

GEOLOGIC HAZARDS

General: No geologic hazards of sufficient magnitude to preclude development of the site, as we presently contemplate it, are known to exist. In our professional opinion and to the best of our knowledge, the site is suitable for the proposed development.

Review of *Geotechnical/Seismic Hazard Study for the Safety Element of the Santee General Plan:* The *Geotechnical/Seismic Hazard Study for the Safety Element of the Santee General Plan* places the site in hazard category C3; and is assigned to areas with gently sloping topography. The **Soil Type** associated with C3 consists of terrace deposits or older alluvium. This classification category is only susceptible to landslide hazards when underlain with the landslide prone Friars Formation (which the site is not). The potential for seismically induced liquefaction in C3 areas is low to moderate. Expansive soil conditions are variable. According to the studies flood *Inundation Map* the site is located outside the inundation limits of the 100-year Floodplain and the reservoirs retained by the Chet Harrit Dam, the El Capitan Dam and the San Vicente Dam.

Ground Shaking: A likely geologic hazard to affect the site is ground shaking as a result of movement along one of the major active fault zones mentioned above. Probable ground shaking levels at the site could range from slight to severe, depending on such factors as the magnitude of the seismic event and the distance to the epicenter. It is likely that the site will experience the effects of at least one moderate to large earthquake during the life of the proposed structure. Construction in accordance with the minimum requirements of the California Building Code, the Structural Engineers Association of California lateral force design requirements, and local governing agencies should minimize potential damage due to seismic activity.

Landslide Potential: As part of this investigation we reviewed the publication, "*Landslide Hazards in the Southern Part of the San Diego Metropolitan Area*" by Tan (1995). This reference is a comprehensive study that classifies San Diego County into areas of relative landslide susceptibility. The subject site is located in an area classified as "Area 2." The "Area 2" classification is assigned to areas marginally susceptible to slope movement. This area includes gentle to moderate slopes, where slope angles are generally less than 15 degrees. Landslides and other slope failures are rare within this area.

Due to the site's underlying stable geologic units and gentle topography, deep-seated landsliding does not present a hazard to the site.

Soil Expansion: The foundation level materials at the site are considered to possess a low to moderate expansion potential.

Liquefaction: The materials of mostly medium dense to dense silty sand and clayey sand and some stiff sandy clay at the site are not subject to liquefaction due to such factors as soil density, grain-size distribution, and groundwater conditions.

Flooding and Dam Failure: According the Figure 8-1 of the City of Santee (2003) General Plan, the site is located outside of the 100-year Floodplain inundation area. Also, according to the Inundation Map (Figure 8-2 of City of Santee, 2003) from the Geotechnical/Seismic Hazard Study for the Safety Element of the Santee General Plan, the site is located outside the inundation limits of the reservoirs retained by the Chet Harrit Dam (Lake Jennings), the El Capitan Dam and the San Vicente Dam.

Tsunamis and Seiches: The site is not near the ocean coastline and not near any enclosed bodies of water such as lakes or reservoirs. Therefore, tsunami and seiche activity do not present a significant hazard to the site.

CONCLUSIONS

In general, our findings indicate that the subject property is suitable for the proposed development, provided the recommendations provided herein are followed. The most significant geotechnical conditions that will influence site development are summarized below:

- The lot is overlain with about 1 to 2.5 feet of potentially compressible topsoils. Therefore, an "undercut" grading operation is recommended to mitigate this condition. The loose surficial materials should be removed down to competent material and be replaced back in the excavation as compacted fill (as needed

to achieve design elevations). Where possible the removals should extend at least 5 feet beyond the perimeter of the structure.

- The expansive potential of the onsite materials is variable ranging from very low to medium (Expansion Index less than 90) as defined by ASTM 4829. The foundation recommendations provided in this report assume as-built conditions are moderately expansive.

RECOMMENDATIONS

EARTH WORK AND GRADING

General

All grading should conform to the guidelines presented in this report, Sections 1804, J107, J108, J109 and J110S of the 2013 California Building Code (as applicable), the minimum requirements of the City of Santee, and the Recommended Grading Specifications and Special Provisions (Appendix A) attached hereto, except where specifically superseded in the text of this report. Prior to grading, a representative of C.W. La Monte Company Inc. should be present at the preconstruction meeting to provide additional grading guidelines, if necessary, and to review the earthwork schedule.

Fill Suitability

On-site excavated materials may be used as compacted fill material or backfill. The on-site materials, typically, possess a very low to low expansion potential. Any potential import soil sites should be evaluated and approved by the Geotechnical Consultant prior to importation. At least two working days notice of a potential import source should be given to the Geotechnical Consultant so that appropriate testing can be accomplished. The type of material considered most desirable for import is a non-detrimentally expansive granular material with some silt or clay binder.

Observation of Grading

Observation and testing by the soil engineer is essential during the grading operations. This observation can range from continuous to an as-needed basis, based on the project situation. This allows the soil engineer to confirm the conditions anticipated by our investigation, to allow adjustments in design criteria to reflect the actual field

conditions exposed, and to determine that the grading progresses in general accordance with the recommendations contained herein.

Site Preparation

Site preparation should begin with the removal of the all structures designated for removal, vegetation and other deleterious materials from the portion of the lot that will be graded and that will receive improvements. This should include all root balls from the trees removed and all significant root material. The resulting materials should be disposed of off-site.

After clearing and grubbing, site preparation should continue with the removal all existing topsoil material from areas that will be graded or that will support settlement-sensitive improvements. Topsoil removals are expected to be about 2 to 3 feet, but may be thicker in localized areas. Where possible, the removals should extend laterally a minimum of 5 feet beyond the structure perimeter or to a distance equal to the depth of removals (whichever is greater). All removal areas should be approved by a representative of our office prior to the placement of additional fill or improvements. In areas where lateral removals are limited, due to property line constraints, deepened foundations may be used to compensate for this condition.

Prior to placing any fill soils or constructing any new improvements in areas that have been cleaned out to receive fill, the exposed soils should be scarified to a depth of approximately 6 inches, be moisture conditioned, and compacted to at least 90 percent relative compaction. Please note, due to shallow groundwater it is recomeneded vibratory compaction equipment or a heavy rubber-tired loader NOT be used to compact the processed excavation bottom.

Compaction and Method of Filling

All structural fill placed at the site and should be compacted to a minimum relative compaction of at least 90 percent of its maximum dry density as determined by ASTM Laboratory Test D1557. Fills should be placed at or slightly above optimum moisture content, in lifts six to eight inches thick, with each lift compacted by mechanical means. Fills should consist of approved earth material, free of trash or debris, roots, vegetation, or other materials determined to be unsuitable by our soil technicians or project geologist. All material should be free of rocks or lumps of soil in excess of twelve inches in maximum width. However, in the upper two feet of pad grade, no rocks or lumps of soil in excess of six inches should be allowed.

Utility trench backfill within five feet of the proposed structure and beneath all pavements and concrete flatwork should be compacted to a minimum of 90 percent of its maximum dry density. The upper one-foot of pavement subgrade and base material should be compacted to at least 95 percent relative density. All grading and

fill placement should be performed in accordance with the local Grading Ordinance, the California Building Code, and the Recommended Grading Specifications and Special Provisions attached hereto as Appendix A.

Temporary Cut Slopes

We anticipate no temporary cut slopes exceeding 5 feet in height and, therefore, specifications for temporary cuts are not provided at this time. It should be noted that the contractor is solely responsible for designing and constructing stable, temporary excavations and may need to shore, slope, or bench the sides of trench excavations as required to maintain the stability of the excavation sides where friable sands or loose soils are exposed. The contractor's "responsible person", as defined in the OSHA Construction Standards for Excavations, 29 CFR, Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety process. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations. Actual safe slope angles should be verified by the geotechnical consultant at the time of excavation.

Excavation Characteristics

Based on our exploratory excavations, the subsurface materials at the site appear moderate to excavate with conventional earthmoving equipment and will generate good quality silty sand and clayey sand material. Deep excavations could encounter moderately cemented material. No significant amounts of oversize rock material are anticipated.

Surface Drainage

Per Section 1804 of the California Building Code, in general, the ground immediately adjacent to foundations shall be sloped away from the building at a slope of not less than one unit vertical in 20 units horizontal (5-percent slope) for a minimum distance of 10 feet (3048 mm) measured perpendicular to the face of the wall. If physical obstructions or lot lines prohibit 10 feet (3048 mm) of horizontal distance, a 5-percent slope shall be provided to an approved alternative method of diverting water away from the foundation. Swales used for this purpose shall be sloped a minimum of 2 percent where located within 10 feet (3048 mm) of the building foundation. Impervious surfaces within 10 feet (3048 mm) of the building foundation shall be sloped a minimum of 2 percent away from the building.

Exceptions are allowed where climatic or soil conditions warrant, the slope of the ground away from the building foundation shall be permitted to be reduced to not less than one unit vertical in 48 units horizontal (2-percent slope). The procedure

used to establish the final ground level adjacent to the foundation shall account for additional settlement of the backfill.

Erosion Control

In addition, appropriate erosion-control measures shall be taken at all times during construction to prevent surface runoff waters from entering footing excavations, ponding on finished building pad or pavement areas, or running uncontrolled over the tops of newly-constructed cut or fill slopes. Appropriate Best Management Practice (BMP) erosion control devices should be provided in accordance with local and federal governing agencies.

FOUNDATIONS

General

Foundations for the structure should consist of continuous strip footings and/or isolated spread footings founded in compacted fill or competent natural ground. Moderately expansive as-built conditions are assumed.

Foundation Embedment

Foundations should be constructed in accordance with the recommendations of the project structural engineer and the minimum requirements of the CBC. The following table provides suggested foundation dimensions.

TABLE II - FOUNDATION DIMENSIONS

Number of Floors Supported by The Foundation	Width of Footing (Inches)	Embedment Depth Below Lowest Adjacent Grade
1	12	18
2	15	18
3	18	24

Soil Bearing Value

The recommended allowable bearing capacity for foundations with minimum dimensions described herein is 2000 psf for footings bearing in competent formational deposits or properly compacted fill. The values presented herein are for

dead plus live loads and may be increased by one-third when considering transient loads due to wind or seismic forces.

Lateral Load Resistance

Lateral loads against foundations may be resisted by friction between the bottom of the footing and the supporting soil, and by the passive pressure against the footing. The coefficient of friction between concrete and soil may be considered to be 0.35 . The passive resistance may be considered to be equal to an equivalent fluid weight of 300 pounds per cubic foot in recompacted fill or firm natural ground material. This assumes the footings are poured tight against undisturbed soil. If a combination of the passive pressure and friction is used, the friction value should be reduced by one-third.

Foundation Reinforcement

It is recommended that continuous footings be reinforced with at least four No. 5 steel bars; two reinforcing bars shall be located near the top of the foundation, and two bars near the bottom.

The steel reinforcement will help prevent damage due to normal, post construction settlement or heaving, resulting from variations in the subsurface soil conditions. The minimum reinforcement recommended herein is based on soil characteristics only and is not intended to replace reinforcement required for structural considerations).

Anticipated Settlements

Based on our experience with the soil types on the subject site, the soils should experience settlement in the magnitude of less than 0.5 inch under proposed structural loads.

It should be recognized that minor hairline cracks normally occur in concrete slabs and foundations due to shrinkage during curing and/or redistribution of stresses and some cracks may be anticipated. Such cracks are not necessarily an indication of excessive vertical movements.

Pre-saturation

Assuming expansive clay subgrade conditions, the bottom of foundation excavations and slab subgrade requires pre-saturation prior to the placement of concrete. The subgrade encountered in our explorations was generally very moist to wet. However, subgrade moisture conditions can vary seasonal. Therefore, moisture conditioning may be necessary prior to placement of foundations and floor slabs. The

most important practice in reducing the potential for lifting of concrete slabs due to expansive soil is the pre-saturation of the soil prior to pouring concrete. A common specification is to attain moisture content 2% to 4% above optimum moisture content to a depth of at least 12". This moisture penetration should be verified by the soil engineer prior to the placement of concrete.

Foundation Excavation Observation

All foundation excavations should be observed by the Geotechnical Consultant prior to placing reinforcing steel and formwork in order to verify compliance with the foundation recommendations presented herein. All footing excavations should be excavated neat, level and square. All loose or unsuitable material should be removed prior to the placement of concrete.

Foundation Plan Review

The finalized, foundation plans should be submitted to this office for review to ascertain that the recommendations provided in this report have been followed and that the assumptions utilized in its preparation are still valid. Additional or amended recommendations may be issued based on this review.

CONCRETE SLABS-ON-GRADE

It is our understanding that the floor system of the proposed structure will consist of concrete slab-on-grade floors. We anticipate that the concrete slabs-on-grade will be supported by low to moderately expansive, properly compacted fill material. The following recommendations assume that the subgrade soils have been prepared in accordance with the recommendations presented in the "Grading and Earthwork" section of this report. In addition, the following recommendations are considered the minimum slab requirements based on the soil conditions and are not intended in lieu of structural considerations. All slabs should be designed by a qualified structural engineer.

Interior Floor Slabs

We recommend a minimum floor slab thickness of four inches (actual). The floor slabs should be reinforced with at least **No. 4 bars placed at 18 inches** on center each way. The slab reinforcing bars should extend at least six inches into the perimeter

footings. Slab reinforcing should be supported by chairs and be positioned at mid-height in the floor slab.

Exterior Concrete Flatwork

On-grade exterior concrete slabs for walks and patios should have a thickness of four inches and should be reinforced with at least No. 3 reinforcing bars placed at 18 inches on center each way. Exterior slab reinforcement should be placed approximately at mid-height of the slab. Reinforcement and control joints should be constructed in exterior concrete flatwork to reduce the potential for cracking and movement. Joints should be placed in exterior concrete flatwork to help control the location of shrinkage cracks. Spacing of control joints should be in accordance with the American Concrete Institute specifications. Foundations they should be doweled into the footings.

SLAB MOISTURE BARRIERS

A moisture barrier system is recommended beneath interior slab-on-grade floors with moisture sensitive floor coverings or coatings to help reduce the upward migration of moisture vapor from the underlying subgrade soil. A properly selected and installed vapor retarder is essential for long-term moisture resistance and can minimize the potential for flooring problems related to excessive moisture.

Interior floor slabs should be underlain by **a minimum** 15-mil thick moisture retarder product over a two-inch thick layer of clean sand (Please note, additional moisture reduction and/or prevention measures may be needed, depending on the performance requirements for future floor covering products). The moisture retarder product used should meet or exceed the performance standards dictated by ASTM E 1745 Class A material and be properly installed in accordance with ACI publication 302 (*Guide to Concrete Floor and Slab Construction*) and ASTM E1643 (*Standard Practice for Installation of Water Vapor Retarder Used in Contact with Earth or Granular Fill Under Concrete Slabs)*. Ultimately, the design of the moisture retarder system and recommendations for concrete placement and curing are purview of the structural engineer and/or architect, in consideration of the project requirements.

Moisture Retarders and Installation

Vapor retarder joints must have at least 12-inch-wide overlaps and be sealed with mastic or the manufacturer's recommended tape or compound. No heavy equipment, stakes or other puncturing instruments should be used on top of the liner before or during concrete placement. In actual practice, stakes are often driven through the

retarder material, equipment is dragged or rolled across the retarder, overlapping or jointing is not properly implemented, etc. All these construction deficiencies reduce the retarders' effectiveness. It is the responsibility of the contractor to ensure that the moisture retarder is properly placed in accordance with the project plans and specifications, and that the moisture retarder material is free of tears and punctures and is properly sealed prior to the placement of concrete.

Interior Slab Curing Time and Moisture Emissions Testing: It should also be understood that slab concrete contains free water and should be allowed to reach equilibrium in an environment similar to that anticipated in the completed structure prior to installing floor coverings. We recommend that the flooring installer perform standard moisture vapor emission rate (MVER) tests prior to the installation of all moisture-sensitive floor coverings in accordance with ASTM F1869 "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride". If particularly moisture sensitive floor covering products are used, we recommend relative humidity (RH) testing of the floor slab in conjunction with or in lieu of the MVER testing. RH testing can give a more useful picture of the actual moisture condition within the concrete regardless of mix, aggregate types, floor thickness, or surface conditions. Properly conducted RH and MVER testing can prevent premature installation or the use of an unsuitable flooring product.

DESIGN PARAMETERS FOR EARTH RETAINING STRUCTURES

Passive Pressure

The **passive pressure** for the prevailing soil conditions may be considered to **be 250 pounds per square foot** per foot of depth. This pressure may be increased one-third for seismic loading. The **coefficient of friction** for concrete to soil may be assumed to be **0.35** for the resistance to lateral movement. When combining frictional and passive resistance, the friction value should be reduced by one-third.

Active Pressure for Retaining Walls

Lateral pressures acting against masonry and cast-in-place concrete retaining walls can be calculated using soil equivalent fluid weight. The equivalent fluid weight value used for design depends on allowable wall movement. Walls that are free to rotate at least 0.5 percent of the wall height can be designed for the active equivalent fluid weight. Retaining walls that are restrained at the top (such as basement walls), or are sensitive to movement and tilting should be designed for the at-rest equivalent fluid weight.

Values given in the table below are derived from Section 1610.1 of the CBC and are in terms of equivalent fluid weight and assume a triangular distribution. The provided equivalent fluid weight values assume that onsite, sandy soils (SM, SC) with an Expansion Index (E.I.) of less than 50 will be used as backfill. Also, alternate values for select import backfill are provided (SP, SW, GP, GW). No clay soils (CL-CH) should be used as retaining wall backfill.

TABLE III
Equivalent Fluid Weights (efw) For Calculating Lateral Earth Pressures
(Using Non-detrimentally Expansive Backfill)

Conditions	Native Backfill (SM-SC)	Select Backfill (SP, SW, GP, GW)
Active	45 pcf	30 pcf
At-Rest	100 pcf	60 pcf

In the case of **vehicular loads** coming closer than one-half the height of the wall, we recommend a live load surcharge pressure equal to not less than 2 feet of soil surcharge with an average unit weight of 125 pcf.

Pressures for Seismic Ground Motions: Using a K_h value of 0.13 the modified equivalent fluid pressure (EFP) due to earthquake ground motion **is 16 pcf**. This is an inverted triangular distribution. The point of application of the resultant force of the seismic EFP is located at approximately 0.6H (H=Height of the retaining wall) above the base of the wall. The above seismic force should be used in addition to the "static" or at-rest earth pressure.

Retaining Wall Foundations

Retaining wall foundations shall be designed by the structural engineer based on the appropriate parameters provided in this report.

Waterproofing and Drainage

In general, retaining walls should be provided with a drainage system adequate to prevent the buildup of hydrostatic forces and waterproofed as specified by the project architect. **Also refer to American Concrete Institute ACI 515.R (A Guide to the Use of Waterproofing, Damp Proofing, Protective and Decorative Barriers Systems for Concrete).**

Positive drainage for retaining walls should consist of a vertical layer of permeable material positioned between the retaining wall and the soil backfill. Such permeable material may be composed of a composite drainage geosynthetic or a natural permeable material such as crushed rock or clean sand at least 12 inches thick and capped with at least 12 inches of backfill soil. The gravel should be wrapped in a geosynthetic filter fabric. Provisions should be made for the discharge of any accumulated groundwater. The selected drainage system should be provided with a perforated collection and discharge pipe placed along the bottom of the permeable material near the base of the wall. The drain pipe should discharge to a suitable drainage facility. A typical retaining wall detail is attached as Figure No. 7A. If lateral space (due to property line constraints) is insufficient to allow installation of the gravel-wrapped "burrito" drain, a geocomposite system may be used in lieu of the typical gravel and pipe subdrain system. TenCate's MiraDrain (and similar products) provide a "low-profile" drainage system that requires minimal lateral clearance for installation. See Figure No. 7B for a typical MiraDrain detail, which is provided by the manufacturer. MiraDRAIN and similar products may also be incorporated into a waterproofing system and provide a slab drainage system (Please note that supplemental manufacturer's details will be required to provide a waterproofed system).

Backfill

All backfill soils should be compacted to at least 90% relative compaction. Any backfill soils supporting first story areas that overhang the basement shall be compacted to at least 95 percent. The typical on-site silty sand (SM) materials are suitable for retaining wall backfill. The wall should not be backfilled until the masonry has reached an adequate strength. Soil with an expansion index (EI) of greater than 50 should not be used as backfill material behind retaining walls.

FIELD INVESTIGATION

Seven manually excavated test borings were placed on the site, specifically in areas where representative soil conditions were expected and where the proposed addition will be located. Our investigation also included a visual site reconnaissance. The excavations were visually inspected and logged by our field geologist, and samples were taken of the predominant soils throughout the field operation. Test excavation logs have been prepared on the basis of our inspection and the results have been summarized on Figures No. 3 A and 3D. The predominant soils have been classified in conformance with the Unified Soil Classification System (refer to Appendix B). In

addition, a verbal textural description, the wet color, the apparent moisture and the density or consistency are provided. The density of granular soils is given as very loose, loose, medium dense, dense or very dense. The density of cohesive soils is given as either very soft, soft, medium stiff, stiff, very stiff, and hard. Disturbed and relatively undisturbed samples of typical and representative soils were obtained from the test excavations and transported to the laboratory for testing.

LABORATORY TESTS AND SOIL INFORMATION

Laboratory tests were performed in accordance with the generally accepted American Society for Testing and Materials (ASTM) test methods or suggested procedures. A brief description of the tests performed is presented below:

CLASSIFICATION: Field classifications were verified in the laboratory by visual examination. The final soil classifications are in accordance with the Unified Soil Classification System.

MOISTURE-DENSITY: In-place moisture contents and dry densities were determined for representative soil samples. This information was an aid to classification and permitted recognition of variations in material consistency with depth. The dry unit weight is determined in pounds per cubic foot, and the in-place moisture content is determined as a percentage of the soil's dry weight. The results are summarized in the test excavation logs.

MAXIMUM DRY DENSITY: The maximum dry density and optimum moisture content of a typical soil were determined in the laboratory in accordance with ASTM Standard Test Pounds per square foot-1557, Method A. The results of this test are presented on the following page.

Sample Location	B-1 @ 1′ to 3′
Sample Description	Dark Brown, silty sand (SM)
Maximum Density	126 pcf
Optimum Moisture	9.8%

EXPANSION INDEX: Expansion Index testing on a remolded sample was performed on a representative sample of the existing clayey subsoil. The test was performed on the portion of the sample passing the #4 standard sieve. The sample was brought to near optimum moisture content. The specimen was then compacted in a 4-inch-diameter mold in two equal layers by means of a tamper, then trimmed to a final height of 1 inch, and brought to a saturation of approximately 50 percent. The

specimen was placed in a consolidometer with porous stones at the top and bottom; a total normal load of 12.63 pounds was placed (144.7 psf). The sample was saturated, and the change in vertical movement was recorded until the rate of expansion became nominal. The expansion index is reported below as the total vertical displacement.

TABLE IV
EXPANSION INDEX TEST

Sample Location:	B-3, 1-2'	B-5, 2-4'
Initial Moisture Content:	13.4%	11.5%
Initial Dry Density:	108.0	110.0
Final Moisture Content:	23%	22%
Expansion Index:	67	35
UBC Classification:	Medium	low

LIMITATIONS

The recommendations presented in this report are contingent upon our review of final plans and specifications. Such plans and specifications should be made available to the Geotechnical Engineer and Engineering Geologist so that they may review and verify their compliance with this report and with Appendix A and the current California Building Code. It is recommended that C.W. La Monte Company Inc. be retained to provide soil-engineering services during the construction operations. This is to verify compliance with the design concepts, specifications or recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to start of construction.

The recommendations and opinions expressed in this report reflect our best estimate of the project requirements based on an evaluation of the subsurface soil conditions encountered at the subsurface exploration locations and on the assumption that the soil conditions do not deviate appreciably from those encountered. It should be recognized that the performance of the foundations and/or cut and fill slopes may be influenced by undisclosed or unforeseen variations in the soil conditions that may occur in the intermediate and unexplored areas. Any unusual conditions not covered in this report that may be encountered during site development should be brought to the attention of the Geotechnical Engineer so that he may make modifications if necessary.

This office should be advised of any changes in the project scope or proposed site grading so that we may determine if the recommendations contained herein are

appropriate. It should be verified in writing if the recommendations are found to be appropriate for the proposed changes or our recommendations should be modified by a written addendum.

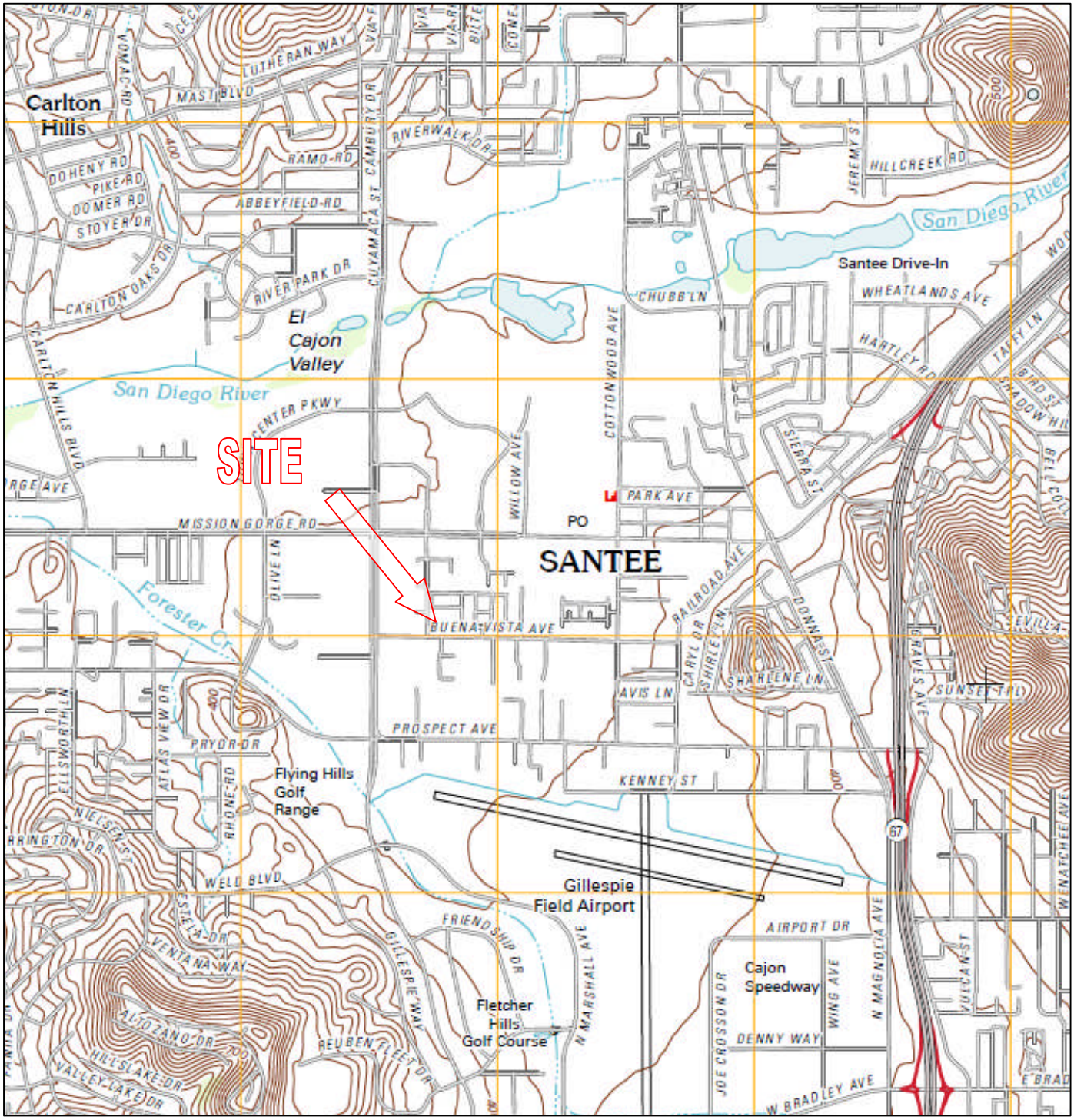
The findings of this report are valid as of this date. Changes in the condition of a property can, however, occur with the passage of time, whether they are due to natural processes or the work of man on this or adjacent properties. In addition, changes in the Standards-of-Practice and/or Government Codes may occur. Due to such changes, the findings of this report may be invalidated wholly or in part by changes beyond our control. Therefore, this report should not be relied upon after a period of two years without a review by us verifying the suitability of the conclusions and recommendations.

In the performance of our professional services, we comply with that level of care and skill ordinarily exercised by members of our profession currently practicing under similar conditions and in the same locality. The client recognizes that subsurface conditions may vary from those encountered at the locations where our borings, surveys, and explorations are made, and that our data, interpretations, and recommendations are based solely on the information obtained by us. We will be responsible for those data, interpretations, and recommendations, but shall not be responsible for the interpretations by others of the information developed. Our services consist of professional consultation and observation only, and no warranty of any kind whatsoever, express or implied, is made or intended in connection with the work performed or to be performed by us, or by our proposal for consulting or other services, or by our furnishing of oral or written reports or findings.

Our firm will not be responsible for the safety of personnel other than our own on the site; the safety of others is the responsibility of the Contractor. The Contractor should notify the Owner if he considers any of the recommended actions presented herein to be unsafe.

It is the responsibility of the stated client or their representatives to ensure that the information and recommendations contained herein are brought to the attention of the structural engineer and architect for the project and incorporated into the project's plans and specifications. It is further their responsibility to take the necessary measures to insure that the contractor and his subcontractors carry out such recommendations during construction. The firm of C.W. La Monte Co. Inc. shall not be held responsible for changes to the physical condition of the property, such as addition of fill soils or changing drainage patterns, which occur subsequent to the issuance of this report.

SITE LOCATION AND TOPOGRAPHIC MAP



Excerpt from USGS Topographic Map
El Cajon Quadrangle, 7.5-Minute Series, 2012

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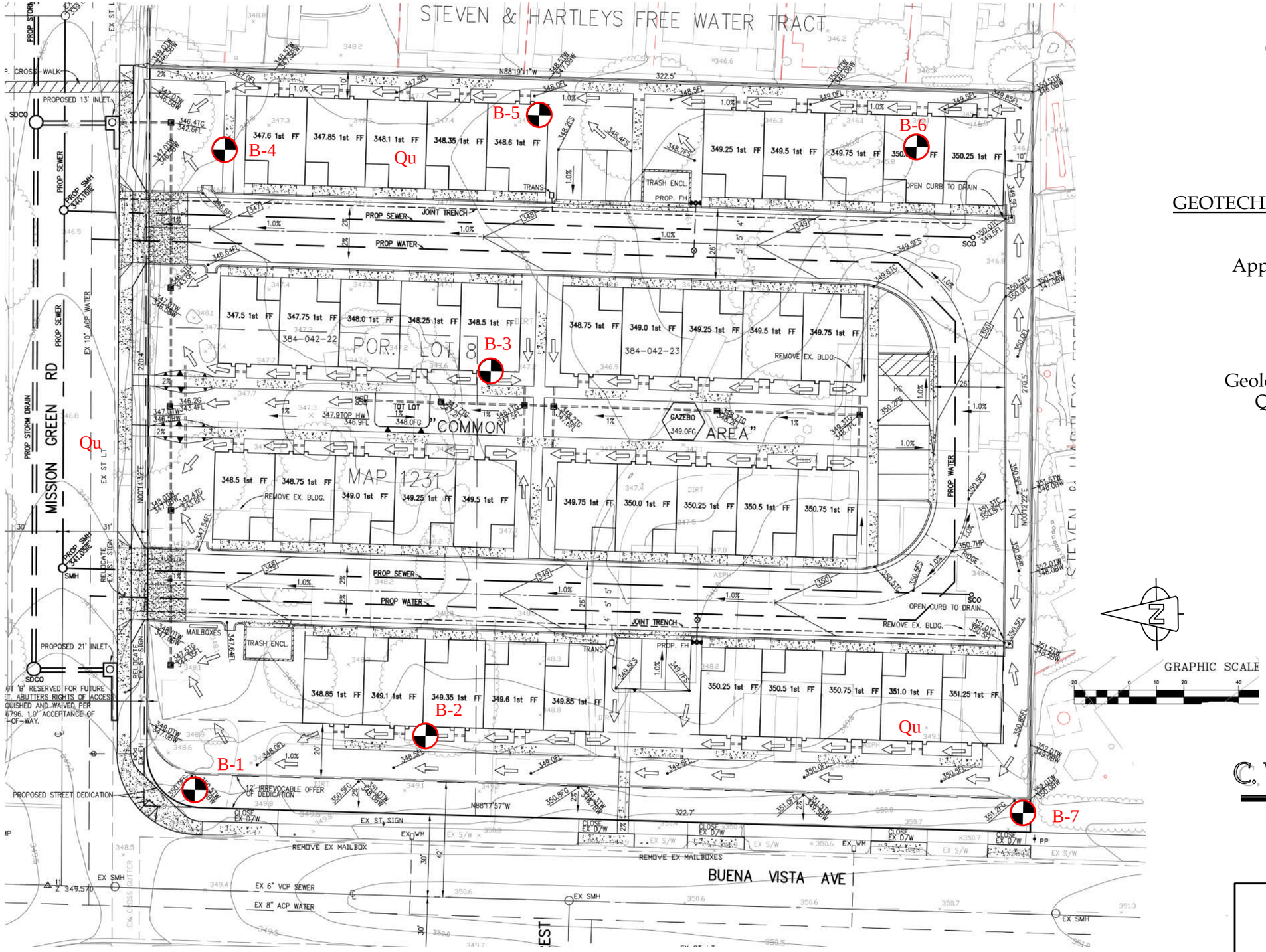
Figure No. 1

PLOT PLAN AND GEOTECHNICAL MAP



GEOTECHNICAL LEGEND

Approximate Test Boring Location

B-2

Geologic Unit
Qu = Old Alluvium

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FIGURE NO. 2

TEST EXCAVATION NO. B-1

Elevation: **Date:** 05/31/2015 **Logged By:** JBR **Excavation Method :** Hand Auger

DEPTH (FEET)	SAMPLE TYPE: BULK	SAMPLE TYPE: UNDISTURBED	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	u.s.c.s.	SOIL DESCRIPTION
					SM	TOPSOIL Dark reddish brown, slightly moist, loose to medium dense, silty sand.
1						
2						OLD ALLUVIUM (Qu)
3					SC	Dark reddish brown, slightly moist, medium dense to dense, very clayey, silty sand
4						
5						EXCAVATION BOTTOM
6						
7						

TEST EXCAVATION NO. B-2

Elevation: **Date:** 05/31/2015 **Logged By:** JBR **Excavation Method :** Hand Auger

DEPTH (FEET)	SAMPLE TYPE: BULK	SAMPLE TYPE: UNDISTURBED	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	u.s.c.s.	SOIL DESCRIPTION
					SM	TOPSOIL Dark reddish brown, slightly moist, loose to medium dense, silty sand.
1						
2						OLD ALLUVIUM (Qu)
3					SC	Dark reddish brown, slightly moist, medium dense to dense, very clayey, silty sand
4						
5						EXCAVATION BOTTOM
6						
7						

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FIGURE NO. 3 A

TEST EXCAVATION NO. B-3

Elevation: **Date:** 05/31/2015 **Logged By:** JBR **Excavation Method :** Hand Auger

DEPTH (FEET)	SAMPLE TYPE: BULK	SAMPLE TYPE: UNDISTURBED	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	u.s.c.s.	SOIL DESCRIPTION
					SM	TOPSOIL
1						Dark reddish brown, slightly moist, loose to medium dense, silty sand.
			111	10.1	CL	
2						OLD ALLUVIUM (Qu)
3					SM	Dark reddish brown, moist, stiff, sandy clay
4						Dark reddish brown, slightly moist, medium dense to dense, silty sand
5						EXCAVATION BOTTOM
6						
7						

TEST EXCAVATION NO. B-4

Elevation: **Date:** 05/31/2015 **Logged By:** JBR **Excavation Method :** Hand Auger

DEPTH (FEET)	SAMPLE TYPE: BULK	SAMPLE TYPE: UNDISTURBED	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	u.s.c.s.	SOIL DESCRIPTION
					SM	TOPSOIL
1						Dark reddish brown, slightly moist, loose to medium dense, silty sand.
			114	5.0	SM	
2						OLD ALLUVIUM (Qu)
3						Dark reddish brown, slightly moist, medium dense to dense, silty fine sand
4						EXCAVATION BOTTOM
5						
6						
7						

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FIGURE NO. 3 B

TEST EXCAVATION NO. B-5

Elevation: **Date:** 05/31/2015 **Logged By:** JBR **Excavation Method :** Hand Auger

DEPTH (FEET)	SAMPLE TYPE BULK	SAMPLE TYPE UNDISTURBED	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	u.s.c.s.	SOIL DESCRIPTION
1					SM	TOPSOIL Dark reddish brown, slightly moist, loose to medium dense, silty sand.
2 3 4					SC CL	OLD ALLUVIUM (Qu) Dark reddish brown, slightly moist, medium dense to dense/stiff sandy clay and clayey sand
5 6 7						EXCAVATION BOTTOM

TEST EXCAVATION NO. B-6

Elevation: **Date:** 05/31/2015 **Logged By:** JBR **Excavation Method :** Hand Auger

DEPTH (FEET)	SAMPLE TYPE BULK	SAMPLE TYPE UNDISTURBED	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	u.s.c.s.	SOIL DESCRIPTION
1 2					SM	TOPSOIL Dark reddish brown, slightly moist, loose to medium dense, silty sand.
3 4					CL	OLD ALLUVIUM (Qu) Dark reddish brown, moist, stiff, sandy clay
5 6 7						EXCAVATION BOTTOM

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FIGURE NO. 3 C

TEST EXCAVATION NO. B-7

Elevation: **Date:** 05/31/2015 **Logged By:** JBR **Excavation Method :** Hand Auger

DEPTH (FEET)	SAMPLE TYPE: BULK	SAMPLE TYPE: UNDISTURBED	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	u.s.c.s.	SOIL DESCRIPTION
1					SM	TOPSOIL Dark reddish brown, slightly moist, loose to medium dense, silty sand.
2 3					SC	OLD ALLUVIUM (Qu) Dark reddish brown, slightly moist, medium dense to dense, clayey sand
4 5 6 7						EXCAVATION BOTTOM

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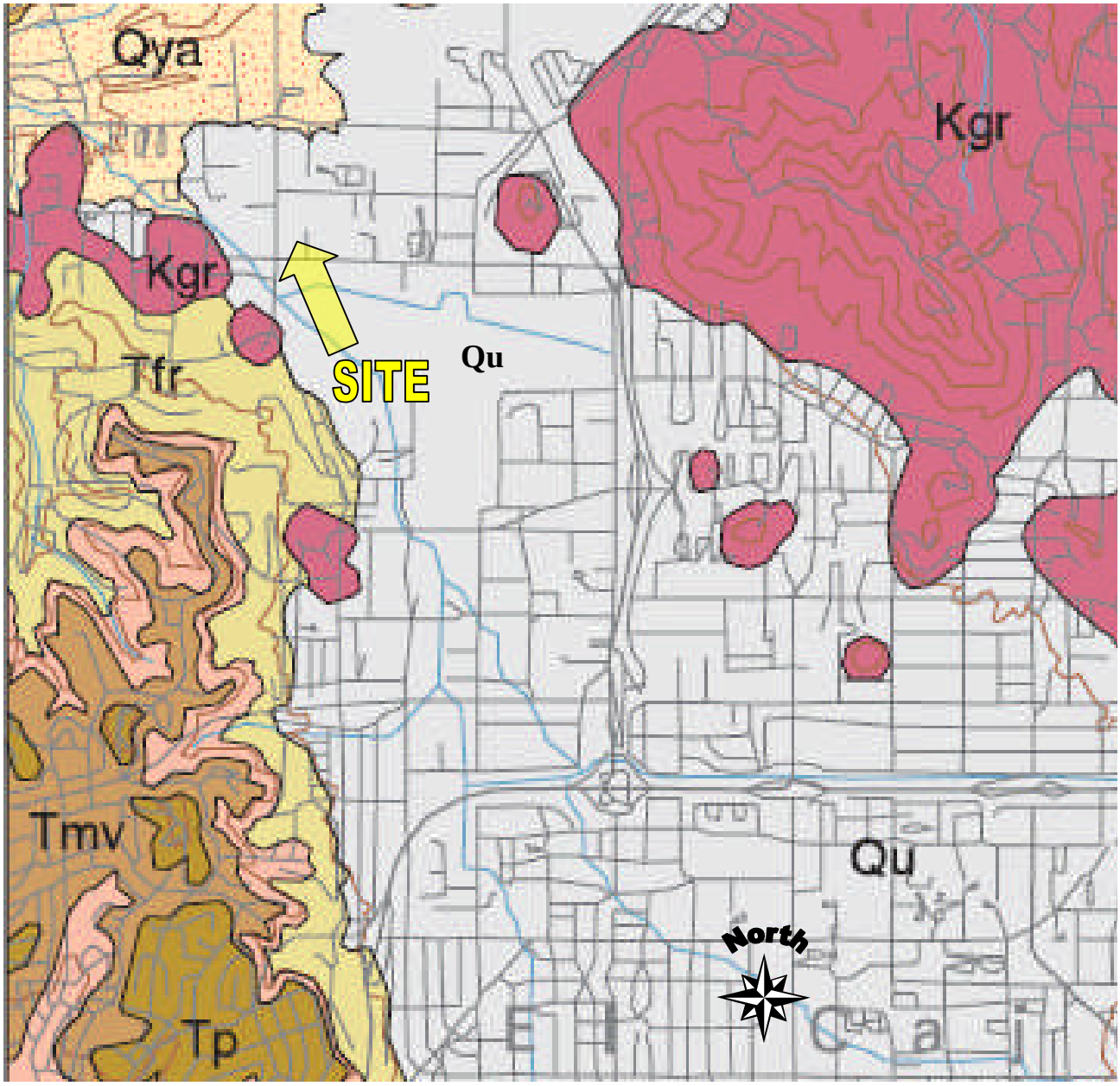
FIGURE NO. 3 D

GEOLOGIC MAP EXCERPT



Excerpt from *Preliminary Geologic Map of the El Cajon 30' x 60' Quadrangle, Southern California (Todd, 2004).*

LEGEND (Localized)

Qya = Young Alluvium

Qu = Alluvium and colluvium, undivided

Kgr = Granatoid Rock

Fault - Solid where well defined; dashed where approximately located, dotted where concealed

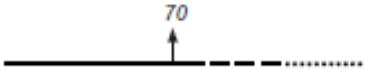


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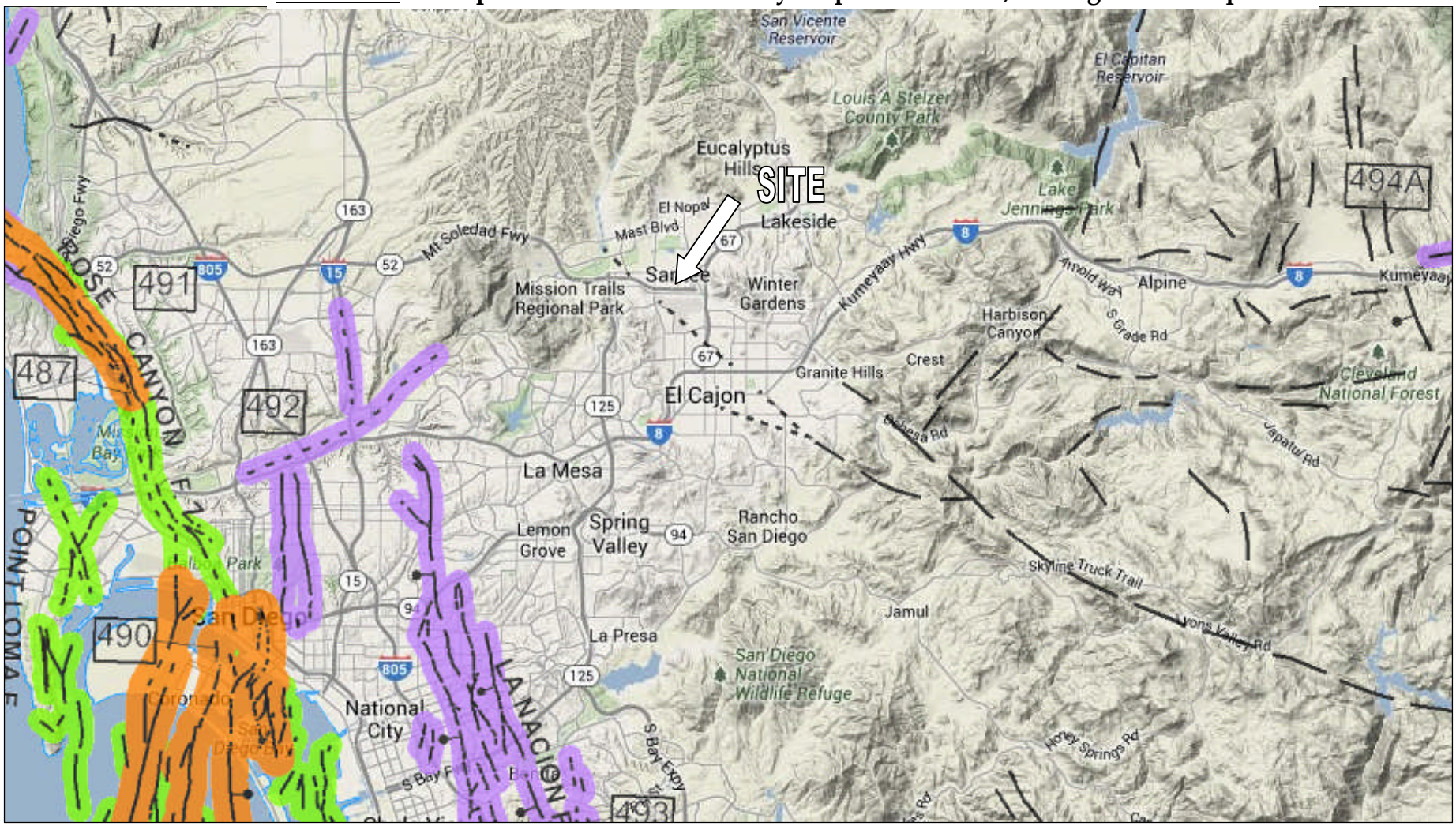
Figure No. 4

FIGURE 5 - Excerpt from: 2010 Fault Activity Map of California, Geologic Data Map No. 6



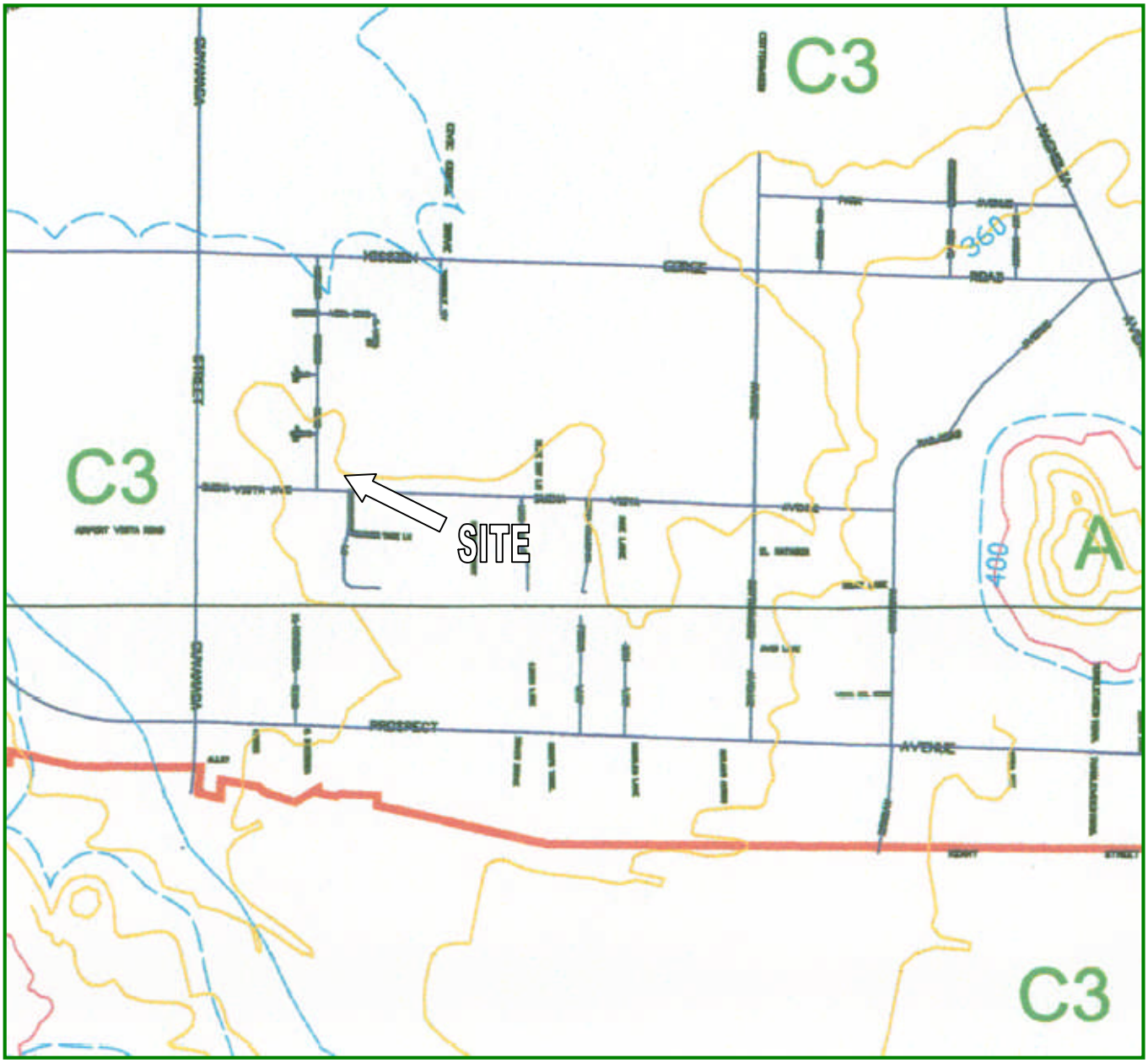
SUMMARY EXPLANATION

Fault traces on land are indicated by solid lines where well located, by dashed lines where approximately located or inferred, and by dotted lines where concealed by younger rocks or by lakes or bays. Fault traces are queried where continuation or existence is uncertain.

FAULT CLASSIFICATION COLOR CODE (Indicating Recency of Movement)

- Historic Fault (last 200 years)
- Holocene fault (during past 11,700 years) without historic record.
- Quaternary fault (age undifferentiated)
- Late Quaternary fault (during past 700,000 years).
- Pre-Quaternary fault (older that 1.6 million years) or fault without recognized Quaternary displacement.

EXCERPT FROM: Geotechnical/Seismic Hazard Study for the Safety Element of the Santee General Plan: The Geotechnical/Seismic Hazard Study for the Safety Element of the Santee General Plan



Legend	Soil Type	Location	Relative Landslide Susceptibility	Liquefaction Hazard	Expansion Condition
C3	Terrace Deposits/ Older Alluvium	Gentle Slopes Western Area, Flanks of the San Diego River Valley (Carlton Oaks Drive), Central Area (Woodpark Drive)	Generally To Marginally susceptible (Where Underlain by Friars Formation)	Low to Moderate	Variable

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Figure No. 6

TYPICAL RETAINING WALL SECTION

(No Scale)

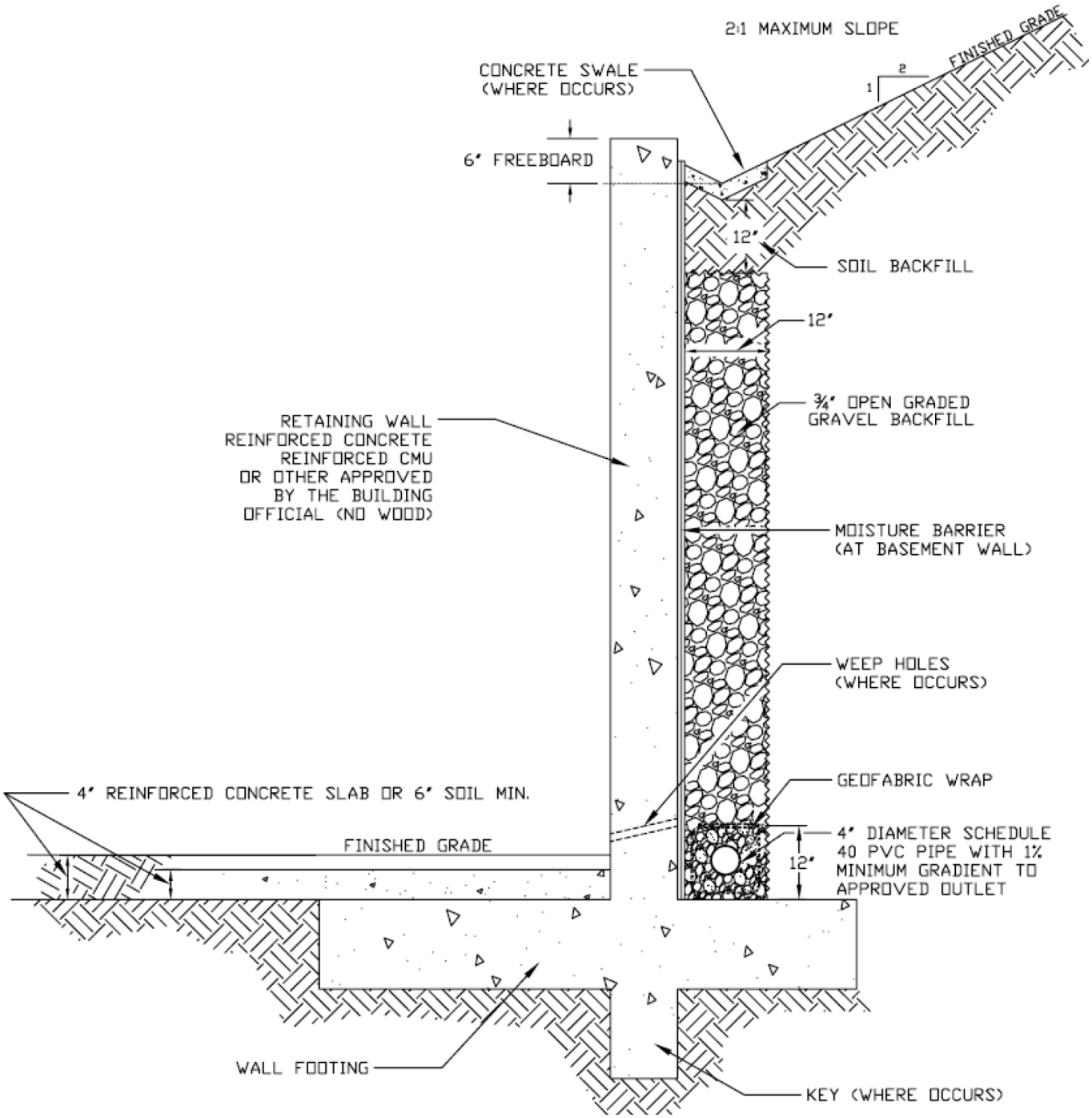
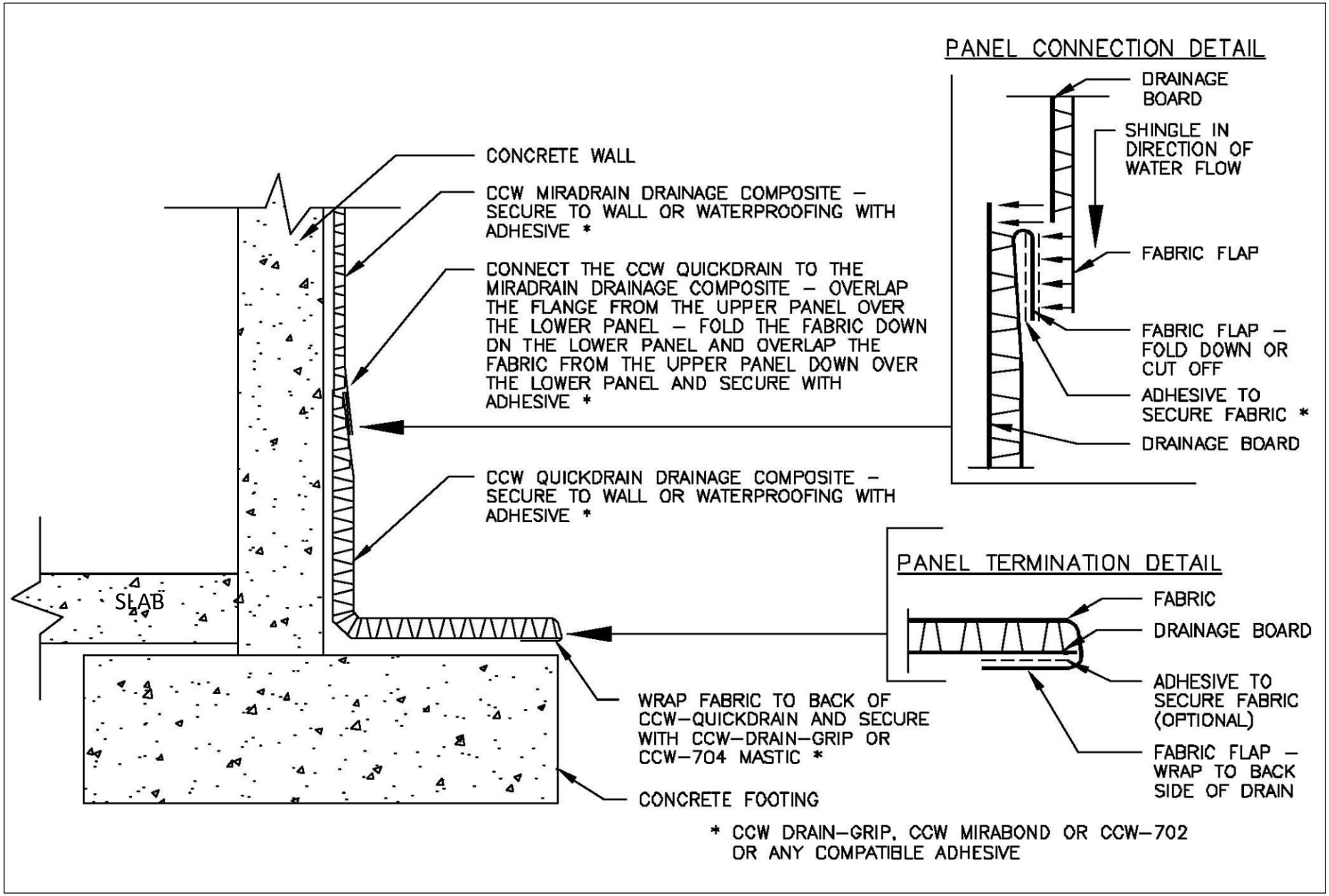


Figure No. 7A

Mira Drain Detail



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SPREAD FOOTING DETAIL

Figure 7B

Appendix "A"

STANDARD GRADING AND CONSTRUCTION SPECIFICATIONS

Appendix "A"

STANDARD GRADING AND CONSTRUCTION SPECIFICATIONS

These specifications present the usual and minimum requirements for projects on which C.W. La Monte Company is the geotechnical consultant. No deviation from these specifications will be allowed, except where specifically superseded in the preliminary geology and soils report or in other written communication signed by the Soils Engineer or Engineering Geologist of record.

GENERAL

A. The Soils Engineer and Engineering Geologist is the Owner's or Builders' representative on the Project. For the purpose of these specifications, participation by the Soils Engineer includes that observation performed by any person or persons employed by, and responsible to, the licensed Civil Engineer signing the soils reports.

B. All clearing, site preparation, or earthwork performed on the project shall be conducted by the Contractor under the supervision of the Soils Engineer.

C. It is the Contractor's responsibility to prepare the ground surface to receive the fills to the satisfaction of the Soils Engineer and to place, spread, mix, water, and compact the fill in accordance with the specifications of the Soils Engineer. The Contractor shall also remove all material considered unsatisfactory by the Soils Engineer.

D. It is also the Contractor's responsibility to have suitable and sufficient compaction equipment on the job site to handle the amount of fill being placed. If necessary, excavation equipment will be shut down to permit completion of compaction. Sufficient watering apparatus will also be provided by the Contractor, with due consideration for the fill material, rate of placement, and time of year.

E. A final report shall be issued by the Soils Engineer attesting to the Contractor's conformance with these specifications.

SITE PREPARATION

A. All vegetation and deleterious material shall be disposed of off site. This removal shall be concluded prior to placing fill.

B. Soil, alluvium, or bedrock materials determined by the Soils Engineer, as being unsuitable for placement in compacted fills shall be removed from the site. The Soils Engineer must approve any material incorporated as a part of a compacted fill.

C. After the ground surface to receive fill has been cleared, it shall be scarified, disced, or bladed by the Contractor until it is uniform and free from ruts, hollows, hummocks, or other uneven features which may prevent uniform compaction.

   The scarified ground surface shall then be brought to optimum moisture, mixed as required, and compacted as specified. If the scarified zone is greater than 12 inches in depth, the excess shall be removed and placed in lifts restricted to 6 inches.

   Prior to placing fill, the ground surface to receive fill shall be inspected, tested as necessary, and approved by the Soils Engineer.

D. Any underground structures such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipe lines, or others are to be removed or treated in a manner prescribed by the Soils Engineer and /or governing agency.

E. In order to provide uniform bearing conditions in cut-fill transition lots and where cut lots are partially in soil, colluvium, or un-weathered bedrock materials, the bedrock portion of the lot extending a minimum of 3 feet outside of building lines shall be over excavated a minimum of 3 feet and replaced with compacted fill.

COMPACTED FILLS

A. Any material imported or excavated on the property may be utilized in the fill, provided each material has been determined to be suitable by the Soils Engineer. Roots, tree branches, and other matter missed during clearing shall be removed from the fill as directed by the Soils Engineer.

B. Rock fragments less than 6 inches in diameter may be utilized in the fill, provided:

1. They are not placed in concentrated pockets.
2. There is a sufficient percentage of fine-grained material to surround the rocks.
3. The Soils Engineer shall supervise the distribution of rocks.

C. Rocks greater than 6 inches in diameter shall be taken off site, or placed in accordance with the recommendations of the Soils Engineer in areas designated as suitable for rock disposal.

D. Material that is spongy, subject to decay or otherwise considered unsuitable should not be used in the compacted fill.

E. Representative samples of material to be utilized as compacted fill shall be analyzed by the laboratory of the Soils Engineer to determine their physical properties. If any material other than that previously tested is encountered during grading, the appropriate analysis of this material shall be conducted by the Soils Engineer as soon as possible.

F. Material used in the compaction process shall be evenly spread, watered processed, and compacted in thin lifts not to exceed 6 inches in thickness to obtain a uniformly dense layer. The fill shall be placed and compacted on a horizontal plane, unless otherwise approved by the Soils Engineer.

G. If the moisture content or relative density varies from that required by the Soils Engineer, the Contractor should re-work the fill until the Soils Engineer approves it.

H. Each layer shall be compacted to 90 percent of the maximum density in compliance with the testing method specified by the controlling governmental agency. (In general, ASTM D-1557-91, the five-layer method will be used.)

If compaction to a lesser percentage is authorized by the controlling governmental agency because of a specific land use or expansive soils condition, the area to receive fill compacted to less than 90 percent shall either be delineated on the grading plan or appropriate reference made to the area in the soils report.

H. All fills shall be keyed and benched through all topsoil, colluvium, alluvium or creep material, into sound bedrock or firm material except where the slope receiving fill exceeds a ratio of five horizontal to one vertical, in accordance with the recommendations of the Soils Engineer.

I. The key for hillside fills should be a minimum of 15 feet in width and within bedrock or similar materials, unless otherwise specified in the soil report.

K. Subdrainage devices shall be constructed in compliance with the ordinances of the controlling governmental agency, or with the recommendations of the Soils Engineer or Engineering Geologist.

L. The contractor will be required to obtain a minimum relative compaction of 90 percent out to the finish slope face of fill slopes, buttresses, and stabilization fills. This may be achieved by either overbuilding the slope and cutting back to the compacted core, or by direct compaction of the slope face with suitable equipment, or by any other procedure which produces the required compaction.

M. All fill slopes should be planted or protected from erosion or by other methods specified in the soils report.

N. Fill-over-cut slopes shall be properly keyed through topsoil, colluvium or creep material into rock or firm materials, and the transition shall be stripped of all soil prior to placing fill.

CUT SLOPES

A. The Engineering Geologist shall inspect all cut slopes at vertical intervals not exceeding 10 feet.

B. If any conditions not anticipated in the preliminary report such as perched water, seepage, lenticular or confined strata of a potentially adverse nature, unfavorably inclined bedding, joints or fault planes are encountered during grading, these conditions shall be analyzed by the Engineering Geologist and Soils Engineer, and recommendations shall be made to treat these problems.

C. Cut slopes that face in the same direction as the prevailing drainage shall be protected from slope wash by a non-erodible interceptor swale placed at the top of the slope.

Unless otherwise specified in the soils and geological report, no cut slopes shall be excavated higher or steeper than that allowed by the ordinances of controlling governmental agencies.

Drainage terraces shall be constructed in compliance with the ordinances of controlling governmental agencies, or with the recommendations of the Soils Engineer or Engineering Geologist.

GRADING CONTROL

A. Observation of the fill placement shall be provided by the Soils Engineer during the progress of grading.

B. In general, density tests should be made at intervals not exceeding 2 feet of fill height or every 500 cubic yards of fill placement. This criteria will vary, depending on soil conditions and the size of the job. In any event, an adequate number of field density tests shall be made to verily that the required compaction is being achieved.

C. Density tests may also be conducted on the surface material to receive fills as determined by the Soils Engineer.

D. All clean-outs, processed ground to receive fill, key excavations, subdrains, and rock disposals must be inspected and approved by the Soils Engineer or Engineering Geologist prior to placing any fill. It shall be the Contractor's responsibility to notify the Soils Engineer when such areas are ready for inspection.

CONSTRUCTION CONSIDERATIONS

A. The Contractor shall provide necessary erosion control measures, during grading and prior to the completion and construction of permanent drainage controls.

B. Upon completion of grading and termination of inspections by the Soils Engineer, no further filling or excavating, including that necessary for footings, foundations, large tree wells, retaining walls, or other features shall be performed without the approval of the Soils Engineer or Engineering Geologist.

C. Care shall be taken by the Contractor during final grading to preserve any berms, drainage terraces, interceptor swales, or other devices of permanent nature on or adjacent to the property.

D. In the event that temporary ramps or pads are constructed of uncontrolled fill soils during a future grading operation, the location and extent of the loose fill soils shall be noted by the on-site representative of a qualified soil engineering firm. These materials shall be removed and properly recompacted prior to completion of grading operations.

E. Where not superseded by specific recommendations presented in this report, trenches, excavations, and temporary slopes at the subject site shall be constructed in accordance with section 1541 of Title 8, Construction Safety Orders, issued by OSHA.

APPENDIX " B"

UNIFIED SOIL CLASSIFICATION CHART

SOI L DESC RI PTI ON

I . COARSE GRAINED: More than half of material is larger than No. 200 sieve size.

GRAVELS: More than half of coarse fraction is larger than No. 4 sieve size but smaller than 3".

	GROUP SYMBOL	TYPICAL NAMES
CLEAN GRAVELS	GW	Well graded gravels, gravel-sand mixtures, little or no fines.
	GP	Poorly graded gravels, gravel sand mixtures, little or no fines
GRAVELS WITH FINES (Appreciable amount of fines)	GM	Silty gravels, poorly graded gravel- sand-silt mixtures
	GC	Clayey gravels, poorly graded gravel sand, clay mixtures.

SANDS: More than half of coarse fraction is smaller than No. 4 sieve size

CLEAN SANDS	SW	Well graded sand, gravelly sands, little or no fines
	SP	Poorly graded sands, gravelly sands, little or no fines
SANDS WITH FINES (Appreciable amount of fines	SM	Silty sands, poorly graded sand and silty mixtures.
	SC	Clayey sands, poorly graded sand and clay **mixtures**

II. FINE GRAINED: More than half of material is smaller than No. 200 sieve size

SILTS AND CLAYS	ML	Inorganic silts and very fine sands, rock flour, sandy silt - or clayey-silt with slight plasticity.
Liquid Limit Less than 50	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
	OL	Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silt
Liquid Limit greater than 50	CH	Inorganic clays of high plasticity, fat clays.
	OH	Organic clays of medium to high plasticity.
HIGHLY ORGANIC SOILS	PT	Peat and other highly organic soils.