

C. W. La Monte Company Inc.

Soil and Foundation Engineers

REPORT OF LIMITED GEOTECHNICAL INVESTIGATION
Proposed Residential Development and Driveway Improvements
957 Valborg Drive
San Marcos, California
A.P.N. 222-121-09-00

Job No. 12 6175
November 8, 2012

Prepared for:

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San Marcos, CA 92078

P12-0014
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957 VALBORG DR.

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CITY OF SAN MARCOS
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SUBJECT: REPORT OF LIMITED GEOTECHNICAL INVESTIGATION

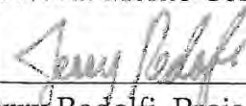
Proposed Residential Development and Driveway Improvements,
957 Valborg Drive, San Marcos, California
A.P.N. 222-121-09-00

In accordance with your request, we have performed a geotechnical investigation for the proposed residential development. We are presenting herein our findings and recommendations. In general, we found the residential lot suitable for the proposed project provided that the recommendations contained herein are adhered to. The building site is underlain with metamorphic bedrock with associated surficial slope wash and localized fills. The loose surface soils will require removal and/or recompaction during future grading operations, if not removed by site grading. Bedrock conditions may be encountered, which require special processing.

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.


Jerry Redolfi, Project Geologist


Clifford W. La Monte,
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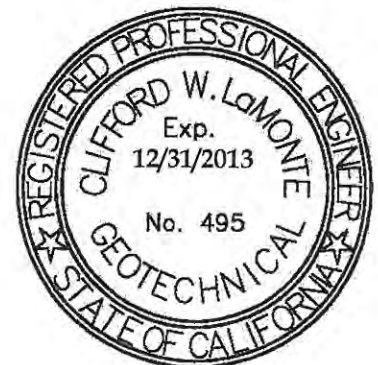
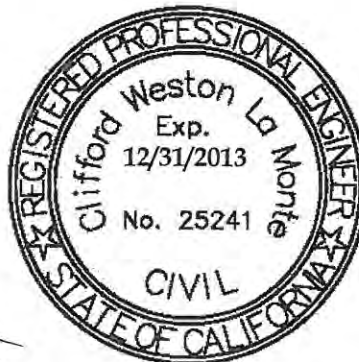


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REPORT OF LIMITED GEOTECHNICAL INVESTIGATION
Proposed Residential Development and Driveway Improvements
957 Valborg Drive
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A.P.N. 222-121-09-00

PROJECT DESCRIPTION

The following report presents the results of a geotechnical investigation performed for the proposed residential project. The property is located at 957 Valborg Drive in the City of San Marcos, County of San Diego, California. Figure Number 1 (attached) provides a vicinity map showing the location of the property. In general, the purpose of our investigation was to provide the foundation and grading recommendations for the proposed residential project.

The project consists of the development of a residential lot located on ridge top terrain. It is our understanding the existing improvements will be removed to make way for a new split-level single family residence. The proposed residence will be a maximum of two-stories in height, will be of typical frame construction materials, and founded on conventional shallow spread foundations and concrete slab on grade floors. The elevation differential between the house levels will be approximately 4 feet. A pool will be constructed southeast of and adjacent to the residence. A tennis court will be terraced into the hillside below the residence. Proposed grading to construct the improvements will be consists of cuts of less than 10 feet and fill slopes up to 20 feet in height. Retaining walls up to 6 feet in height will be incorporated into the proposed development.

To aid in the preparation of this report, we were provided with an undated, unreferenced site development plan and a topographic map, both provided by Dream Design Builders. These plans were used as the basis for our Site Plan and Geotechnical Map preparation and are included herewith as Figure Number 2A through 2C.

This report has been prepared for the exclusive use of the stated client and their 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 geological literature pertinent to the site; subsurface exploration, laboratory testing, engineering and geotechnical 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 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.
- Address potential construction difficulties that may be encountered due to soil conditions, and/or groundwater, and provide recommendations concerning these problems.
- Develop soil engineering criteria for site grading.
- Recommend an appropriate foundation system for the type of structure anticipated and develop soil engineering design criteria for the recommended foundation designs.
- Provide design criteria for the design of earth retaining walls.
- Provide mapped spectral acceleration parameters relative to the 2010 California Building Code.
- 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 trenches 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 project site consists of an irregular-shaped parcel of land, approximately 8.7 acres in size and located at the south end of Valborg Drive in the City of San Marcos, County of San Diego, California. A legal description of the property is Assessor's Parcel Number 222-121-09-00. The site is bounded on the north with a single family residence and on the east, west and south with undeveloped hillside terrain. The site is improved with a one-story single family residence with an attached carport and wooden deck. Other improvements include a pool with concrete decking, an isolated patio slab, an asphalt paved driveway, foundation and stem wall remnants of a prior structure, and a wooden shed. Retaining walls up to 5 feet in height are constructed along the property lines adjacent to the north and west sides of the developed residential area of the lot. The retaining walls are constructed of field stones and concrete slab debris, some dry placed and some mortared. Vegetation around the developed portion of the lot consists of scattered grasses and weeds, landscape shrubs, and several trees. Undeveloped hillside areas are vegetated with a moderate to heavy growth native and/or wild shrubs and localized groves of trees.

The existing improvements are constructed on gently sloping ridge top terrain forming the western portion of the lot. The eastern portion of the lot consists of incised sloping canyon terrain, which drains to the southeast. Elevations on the site range from a high of approximately 1347 feet (MSL) near the existing structure to a low of 1068 feet (MSL) at the south end of the property. Several, relatively small, hard rock outcrops are scattered over the site. Small rock fragments are scattered over the ground surface.

An existing earthen road was constructed on the hillside below the building pad. The road was graded with cut and fill slopes approximately 6 feet in max height. Portions of the cut slope were excavated at an approximate 1:1 (horizontal to vertical) inclination. Talus debris has accumulated along the toe of the cut slope.

Description of Site Geology and Subsurface Soil Conditions

The subject site is located in the Foothills Physiographic Province of San Diego County, which is underlain at depth with Mesozoic-aged metamorphic bedrock with associated slope wash and localized fill placement. These soil types are described individually below in order of increasing age. Refer the attached Test Excavation Logs, Figure 3A and 3B (attached) for a more detailed description of subsurface conditions. The units are mapped approximately as shown on the Plot Plan, Figure No. 2.

Artificial Fill (Qaf): A sliver of fill is associated with the access road construction along the east side of the building site. Also fills were placed along the perimeter of the existing building pad, which includes retaining wall backfill. The fills are about 5 feet in maximum thickness in areas adjacent to the retaining walls. The location of the fills is estimated on the attached Plot Plan and Geotechnical Map. The fills are anticipated to consist of silty sands and sandy silts with varying amounts of rock fragments derived from on site excavations. We anticipate some oversize rock debris will be mixed with the fill. The fills are assumed to be improperly placed and compacted and require remedial grading as discussed in the *Site Preparation* section of this report.

Slope Wash: Undisturbed hillside areas of the site are mantled with a thin veneer of natural ground slope wash materials. The slope wash generally ranges from about one foot to about 3 feet in thickness. The slope wash typically consist of dark reddish brown, loose, silty fine sand and sandy silts with some rock fragments. The slope wash materials are not suitable to support proposed structure and improvements in their present loose condition and require removal and recompaction in areas to receive grading and improvements.

Metasedimentary and Metavolcanic Rocks Undivided (Mzu): According to *Geologic Map of The Oceanside 30'x60' Quadrangle, California* (Kennedy and Tan-2005) the site is underlain at depth with Mesozoic-aged, low-grade metasedimentary rocks (conglomerate, sandstone and siltstone) interlayered and mixed with metavolcanic rocks consisting of flows, tuffs and volcaniclastic breccia. A map excerpt from this document is attached as Figure No. 4. These bedrock materials are out cropped, on-site, in the cut slope along access road and at scattered locations on the ridge top. Hard moderately to highly fractured bedrock is exposed in these outcrops. The material encountered is, typically, surficially weathered to a brown to light brown, firm, silty, fine sand and sandy silt material (SM-ML). Generally the extreme weathering will range from about 1 to 3 feet in thickness.

The bedrock material will stand well in proposed permanent cut slopes. However, due to the "blocky" fractured nature of the material a smooth slope face may be difficult to achieve in localized areas. If this condition is not acceptable we recommend over cutting the slope face and constructing a uniform compacted fill slope facing. Specific recommendations can be provided if such conditions arise.

The bedrock appears rippable to marginally rippable to the intended depths of excavation. The rock is generally very hard, however, to the fractured condition of the material will facilitate excavation. Excavations will generate abundant rock material, some will be considered "oversize" (greater than 8 inches in width). Refer to the *Earthwork* section of this report for recommendations regarding rock disposal. Localized rock out crops may be encountered that require demolition equipment, chemical breaking, and/or blasting to facilitate removal.

Ground Water

No groundwater was encountered in our test excavations at the time of our investigation. 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. 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.

SEISMICITY AND FAULTING

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 south easterly - 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, active fault zones are those, which have shown conclusive evidence of faulting during the Holocene Epoch (the most recent 11,000 years).

A review of available geologic maps indicates that the Rose Canyon/Newport - Inglewood Fault Zone is the nearest active fault and is located about 18 kilometers west of the site. An excerpt from the 2010 *Fault Activity Map of California Geological*

Survey, *Geologic Data Map No. 5*, is attached as Figure No. 5. According to California Department of Conservation, Division of Mines and Geology, *Open-File Report 96-08 / U.S. Department of the Interior, U.S. Geological Survey Open-File Report 96-706*, a 7.2 magnitude would be the maximum event along the Rose Canyon Fault Zone. The Rose Canyon Fault is considered a type "B" fault with a slip-rate of 1.5 mm/year.

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

According to *Digital Images of Official Maps of Alquist-Priolo Earthquake Fault Zones, of California, Southern Region (DMG CD 2000-003)*, by the California Department of Conservation, the site IS NOT located in or near an Alquist-Priolo Earthquake Fault Zone. The nearest Alquist-Priolo Earthquake Fault Zone designated by this publication is a section of the Rose Canyon Fault Zone located about 30 kilometers southwest of the subject site.

SEISMIC DESIGN PARAMETERS

We have determined the mapped spectral acceleration values for the site utilizing a program titled "*Seismic Hazard Curves, Response Parameters and Design Parameters-v5.1.0*," provided by the USGS. For this determination, we have assigned a **Site Soil Classification of "C"**. The response parameters for design are presented in the following Table I.

TABLE I
Mapped Spectral Acceleration Values and Design Parameters

S_s	S_1	F_a	F_v	S_{ms}	S_{m1}	S_{ds}	S_{d1}
1.04	0.39	1.0	1.41	1.04	0.55	0.69	0.37

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 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

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. A discussion of potential geological hazards is listed below.

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 and Slope Stability: As part of this investigation we reviewed the publication, *"Landslide Hazards in the Southern Part of the San Diego Metropolitan Area"* by Tan and Giffen, 1995. This reference is a comprehensive study that classifies San Diego County into areas of relative landslide susceptibility. The subject building site is located in an area classified as 3-1 (portions of the canyon terrain open space areas are located in 3-2). The 3-1 is a general classification assigned to areas generally susceptible to slope movement. Slopes within the 3-1 classification are considered at or near their stability limits due to steep slopes and can be expected to fail locally when adversely modified. Sites Within this classification are located outside the boundaries of known landslides but may contain observably unstable slopes that may be underlain by weak materials and/or adverse geologic structure. It should be noted that that this reference, typically classifies most hillside terrain, (that is not underlain by landslides or landslide prone formations) within the 3 category.

Due to the sites underlying, competent bedrock, deep-seated landslide hazards are considered nominal.

Liquefaction: The materials at the site are not subject to liquefaction due to such factors as soil density, grain-size distribution, and groundwater conditions.

Soil Expansion: The materials underlying the site are considered “non-expansive” with an Expansion Index of less than 25.

Flooding: The site is located outside the boundaries of both the 100-year and the 500-year flood plains according to the maps prepared by the Federal Emergency Management Agency.

Other Hazards: The probability of the occurrence of other geologic hazards such as volcano, tsunami and seiche activity is considered very low to non-existent.

CONCLUSIONS

In general, our findings indicate that the subject property is suitable for the proposed development, provided the recommendations provided herein are followed. Our conclusions regarding major site development considerations are listed below:

- The site is underlain at relatively shallow depths with metamorphosed bedrock materials. Though variable throughout the site, the rock material is generally consists of highly weathered or decomposed material within the upper portions of the bedrock section and becomes denser with depth. Our site investigation indicates that the bedrock materials underlying the site are generally rippable to the intended depths of removal. However, rippability characteristics will vary with the depth of excavation and degree of rock fracturing. It should be noted that relatively small areas of hard rock outcrops encroach onto the proposed building site. It should be anticipated that the grading operations could encounter some non-rippable material and/or partially buried boulders. Also, excavations could expose hard rock outcrops that may require chemical breaking, demolition equipment and/or blasting to excavate. Oversize rock material generated by the excavations shall be handled in accordance with the recommendations provided in the “Oversize Rock Disposal” section of this report.
- Above the competent underlying bedrock material, the site is capped by fill and slope wash materials that typically range from 2 to 3 feet in thickness. Also localized areas of undocumented fills have been placed on the site (See Figure 2A for the estimated location of existing fills) and may range up to 5 feet in thickness. These loose surficial soils are considered unsuitable in their

present condition to support additional fill and/or settlement sensitive improvements. As such, all slope wash, and undocumented fill materials not removed by planned site grading will need to be removed from areas to support fills and/or settlement sensitive improvements and, where necessary to achieve planned site grades, be replaced as compacted fill.

- Based on our estimated site grades, the building pad may be traversed by a cut/fill transition. A typical solution to mitigate the potential for differential settlement of the proposed structure is to undercut the cut portion of the building pad (as discussed in the "Transition Conditions" section of this report). However, due to hard rock conditions, undercutting may not be practical. Where undercutting the pads is not practical, minor transitions (less than 15 feet) can also be mitigated with the placement of additional reinforcing steel (in lieu of an undercutting operation).
- If non-rippable bedrock is exposed as finish pad grades; it may be possible to incorporate some of the bedrock into the foundation system by doweling the foundation to rock outcrops in lieu of excavated foundation embedment.
- The San Diego County Department of Environmental Health requires septic systems to be setback a "5 to 1" distance from the top of cut slopes. Therefore, no future excavations should be placed in areas that will impact the approved septic field location.

RECOMMENDATIONS

Earth Work and Grading

General

All grading should conform to the guidelines presented in the 2010 California Building Code, the minimum requirements of the City of San Marcos, and the Recommended Grading Specifications and Special Provisions 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. On-site materials typically possess 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 proceeds in general accordance with the recommendations contained herein.

Site Preparation

Site preparation should begin with the removal of all structures designated for removal, vegetation and other deleterious materials from the portion of 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.

The existing septic tank will likely need to be replaced. If the septic tank is abandoned and will underlie structural improvements it should be cleaned and demolished and the resultant void backfilled with compacted fill. If the area will be landscaped the tank may remain after cleaning and be backfilled with crushed rock or slurry, or any other method approved by the San Diego County Department of Environmental Health.

After clearing and grubbing, site preparation should continue with the removal all existing loose slope wash and fill material from areas that will be graded or that will support settlement-sensitive improvements. As the project is presently planned, slope wash removals are, generally, expected to vary from about 1 to 5 feet, but may be thicker in localized areas. The majority of existing fills is confined to the perimeter s of the existing building pads, the dirt access road and as retaining wall backfill. The loose soil shall be removed to expose firm natural ground as determined by our field representative during grading.

In areas to support fill slopes, keys should be cut into the competent supporting materials. The keys should be at least ten feet wide and be sloped back into the hillside at least two-percent. The keys should extend at least one foot into the competent supporting materials. All removal areas should be approved by a representative of our office prior to the placement of fill or improvements.

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 to 12 inches, be moisture conditioned, and compacted to at least 90 percent relative compaction.

Compaction and Method of Filling

All structural fill placed at the site should be compacted to a relative compaction of at least 90 percent of its maximum dry density as determined by ASTM Laboratory Test D1557 guidelines. 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.

Excavation Characteristics

The on-site bedrock material is likely to be excavated with moderate to difficult effort using large excavating equipment. Localized large, hard rock floaters and/or crystalline bedrock could be encountered during excavating operations, which could require demolition, chemical fracturing and/or blasting for removal. We anticipate planned site excavations will generate some oversize rock debris (rock material over 8 inches in width is considered to be oversize).

Disposal of Oversize Rock

The following list provides our recommendations for placement of oversize rock in structural fills. Please note that the following rock disposal recommendations must be approved by the City of San Marcos prior to implementation. Also refer to the attached Figure No. 6.

- No oversize rock should be placed within fifteen (15) feet, measured horizontally, from the face of fill slopes.
- No oversize rock should be placed within five (5) feet of finish pad grade on fill pads. In addition, no rock should be placed within three (3) feet of the bottom of the lowest utilities in street areas.
- Oversize rock up to two feet in average dimension may be placed in uniform lifts across the fill area in an unnested manner. Prior to placing each subsequent lift, sand material with a Sand Equivalent (SE) of at least 25 should be spread over the rock. This material should be flooded into the voids between the rocks and should cover the rock by at least six inches. The top of each lift should be smoothed out with a dozer and be wheel rolled with a loaded scraper or other suitable heavy compaction equipment approved by the geotechnical consultant.
- Rocks two to four feet in average dimension may be placed in windrows. The windrows should be at least 12 feet apart to allow compaction equipment to move between the rows. As the fill is brought up between the windrows, sand material with a SE of at least 25 should be flooded between and around the rocks to fill all voids. There should be at least one foot of cover over the top of windrows before the next windrows are started. The windrows placed above previously placed windrows should be staggered halfway between the lower windrows.
- Rocks larger than two feet in average dimension may also be individually placed. This placement should consist of excavating a trench or ditch to a depth of at least one-third the diameter of the rock and rolling the rock into the excavation. Such rocks should be spaced at least 12 feet apart in order to allow compaction equipment to move around the rock. As the fill is brought up around the rock, sand material with a SE of at least 25 should be flooded against the lower third of the rock. Above this, the compaction equipment should compact the fill against and over the rock.

- Sufficient compaction effort should be made such that all fill material placed around and between the oversize rocks is compacted to at least 90 percent of maximum dry density as determined by ASTM D1557.
- The placement of all fill and all oversize rock disposals, including flooding, should be continuously observed by a representative of the geotechnical consultant. This is required to allow us to provide a professional opinion after grading that the fill and rock disposal was done in accordance with the recommendations contained herein.

Also rock material may be used as landscape features without any special preparation.

Transition Conditions

Our review of the project indicates that the structure may be partially founded on cuts into dense natural ground, and partially on compacted fill. Structures founded on such transition conditions can undergo minor distress as a result of differential settlement between portions of the structure founded on undisturbed natural ground and portions on compacted fill materials. Although the fills may be properly placed and compacted, they possess a considerably greater potential for anticipated post construction settlement than the denser, natural ground. Such distress can manifest itself as minor wall, slab and foundation cracking.

The cut portion of any building pad that will be traversed by a cut/fill transition line should be undercut at least three feet below finish grade. **As an alternative, additional reinforcing steel may be placed in footings supported by fill material to mitigate the potential for differential settlement for transitions that do not exceed 15 feet of differential.** Specific reinforcement recommendations are provided in the "Footing Reinforcement" section of this report.

Additionally, the grading for the proposed cut pads and cut street sections may expose hard rock that cannot be excavated with light trenching equipment. If this is the case, consideration should be given to undercutting hard rock areas in the building pad and utility alleys to at least six inches below the bottom of the foundations and utilities and replacing the excavated material with compacted fill material.

The bottom of all over-excavated areas should be sloped in such a manner that water does not become trapped in the over-excavated zone. Prior to replacing the excavated materials, the soils exposed at the bottom of the excavation should be

scarified to a depth of six inches, moisture conditioned and compacted to at least 90 percent relative compaction.

Manufactured Slope Construction

Proposed cut and fill slopes that may be constructed should be constructed at an inclination of 2:1 or flatter (horizontal to vertical). Compaction of slopes should be performed by back-rolling with a sheepsfoot compactor at vertical intervals of four feet or less as the fill is being placed, and track-walking the face of the slope when the slope is completed. As an alternative, the fill slopes may be overfilled by at least three feet and then cut back to the compacted core at the design line and grade.

Temporary Cut Slopes

We anticipate temporary slopes placed in the granitic bedrock may be cut at a minimum inclination of 0.75: 1, (horizontal to vertical) for heights of up to 10 feet. However, any surficial topsoil, fill, or residual soil overlying the bedrock should be inclined at a 1.0:1.0 slope angle. Actual safe slope angles should be verified by the geotechnical consultant at the time of excavation.

Temporary cut slopes should be observed by the Geotechnical Consultant during grading to ascertain that no unforeseen adverse conditions exist. No surcharge loads such as stockpiles, vehicles, etc. should be allowed within a distance from the top of temporary slopes equal to half the slope height.

Temporary slopes at the subject site shall be constructed in accordance with the latest addition of *Construction Safety Orders*, issued by OSHA. The contractor is solely responsible for designing and constructing stable, temporary excavations and will need to shore the sides of trench excavations as required to maintain the stability of the excavation sides. 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. Temporary cut slopes should be constructed in accordance with the recommendations presented in this section. In no other case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

Surface Drainage

Surface runoff into graded areas should be minimized. Where possible, drainage should be directed to suitable disposal areas via non-erodible devices such as rock lined or paved swales or brow ditches, and storm drains. Pad drainage should be

designed to collect and direct surface water away from proposed structures and the top of slopes and toward approved drainage areas. For earth areas, a minimum gradient of one percent should be maintained.

The ground around the proposed buildings should be graded so that surface water flows rapidly away from the buildings without ponding. In general, we recommend that the ground adjacent to buildings slope away at a gradient of at least two-percent. Densely vegetated areas where runoff can be impaired should have a minimum gradient of five percent within the first five feet from the structure.

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.

Grading Plans Review

The finalized grading 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.

FOUNDATIONS

General

Based on the findings of our investigation, it is our opinion the proposed structure may be supported on conventional continuous and isolated spread footings. The on site soils are predominately non-expansive and therefore no special consideration and design for heaving soils will be required.

Dimensions and 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 EMBEDMENT

Number of Floors Supported by The Foundation	Width of Footing (Inches)	Embedment Depth Below Undisturbed Ground Surface (Inches)
1	12	12
2	15	18
3	18	24

Isolated pad footings should have a minimum width of 24 inches.

If grading for the building pad exposes non-rippable granitic material and the pad is not undercut, hardrock may be encountered in the footing excavation. In this case, it may be necessary to dowel the foundation to the rock. Site-specific recommendations for doweling should be provided by the geotechnical engineer and/or structural engineer as these conditions arise.

Soil Bearing Value

A bearing capacity of **2500 psf** may be assumed for said footings when founded a minimum of 12 inches into firm natural ground or properly compacted fill. This bearing capacity may be increased by one-third, when considering wind and/or seismic loading.

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 0.40. The passive resistance may be considered to be equal to an equivalent fluid weight of 350 pounds per cubic foot. 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

Reinforcement requirements for foundations should be provided by a structural engineer. However, based on the existing soil conditions and provided the transition building pads are undercut as recommended above, we recommend that the minimum reinforcing for continuous footings consist of at least two No. 5 bars, one

bar positioned three inches above the bottom of the footing and one No. 5 bar positioned approximately three inches below the top of the footing.

Where transition building pads are not undercut, footings should also have a minimum reinforcing of at least two No. 5 bars positioned three inches above the bottom of the footing and two No. 5 bars positioned approximately two inches below the top of the footing.

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 inches 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.

Foundations Setback from Top of Slopes

Where buildings or other improvements are planned near the top of a slope steeper than 3:1 (horizontal to vertical), special foundations and/or design considerations are recommended due to the tendency for lateral soil movement to occur in the areas adjacent to slope face.). In general, the minimum setback from the slope face recommended is 7 feet from slopes 0 to 15 feet high. For slopes higher than 15 feet building footings should be deepened such that the bottom outside edge of the footing is at least $H/3$, where H equals the vertical distance from the top of the slope to the toe (Refer to the attached Figure No. 4). The setback distance need not exceed 40 feet.

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

Interior Floor Slabs

The minimum floor slab thickness the floor slab should be four inches. The floor slabs should be reinforced with at least No. 3 bars placed at 18 inches on center each way. Slab reinforcing should be supported by chairs and be positioned at mid-height in the floor slab.

Exterior Concrete Flatwork

Exterior slabs should have a minimum thickness of four inches. Reinforcement and control joints should be constructed in exterior concrete flatwork to reduce the potential for cracking and movement. Exterior slabs should be reinforced with at least No. 3 bars placed at 24 inches on center each way. Slab reinforcing should be supported by chairs and be positioned at mid-height in the floor slab. 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. When patio walks and porch slabs abut perimeter 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 or barrier is essential for long-term moisture resistance and can minimize the potential for flooring and environmental problems related to excessive moisture.

"Above-grade" interior floor slabs should be underlain by a minimum 10-mil thick moisture retarder product over a two-inch thick layer of clean sand or native sand material. **A minimum 15 mil moisture barrier is recommended for any basement slabs.** (Please note additional moisture reduction and/or prevention measures may be needed, depending on the performance requirements for future floor covering products). All moisture retarder/moisture barrier products 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*).

The above described section is considered a moisture retarder and does not necessarily provide a waterproof floor system. If full waterproofing is desired, an appropriate moisture retarder product should be selected and incorporated into the overall basement waterproofing system.

Moisture Retarders and Installation

Vapor retarder joints must have at least 6-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

Following placement of concrete floor slabs, sufficient drying time must be allowed prior to placement of floor coverings. Premature placement of floor coverings may result in degradation of adhesive materials and loosening of the finish floor materials. Prior to installation, standardized testing (calcium chloride test and/or relative humidity) should be performed to determine if the slab moisture emissions are within the limits recommended by the manufacturer of the specified floor-covering product.

DESIGN PARAMETERS FOR EARTH RETAINING STRUCTURES

Passive Pressure: The passive pressure for the prevailing soil conditions may be considered to be **350 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 **0.40** 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 in terms of equivalent fluid weight and assume a triangular distribution. The provided equivalent fluid weight values assume that on site, sandy soils (SM, ML) will be used as backfill. No clay soils (CL-CH) may be used as retaining wall backfill.

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

Conditions	Level Backfill (pcf)
Active	45
At-Rest	100

Vehicular Loads: 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 0.14 the modified equivalent fluid pressure (EFP) due to earthquake ground motion is **17 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 be

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. 8A. 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. 8B 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) and sandy silt (ML) 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

A total of four test explorations were placed on the lot, using manual methods. The fieldwork was conducted under the observation of our engineering geology personnel. The excavations were placed specifically in areas where representative soil conditions were expected and/or where the proposed development will be located. Our investigation also included a visual site reconnaissance, including observations of existing cut slopes and natural exposures. 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. A and 3B. The soils are described in accordance with the Unified Soils 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 consistency of silts or clays is given as either very soft, soft, medium stiff, stiff, very stiff, or hard.

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 D-1557, Method A. The results of this test are presented on the following page.

Soil Type Location	B-4 @ 2-3'
Sample Description	Light-brown, silty sand/sandy silt (SM-ML)
Maximum Density	123 pcf
Optimum Moisture	11.4 %

EXPANSION INDEX: An Expansion Index test on a remolded sample was performed on a representative sample of the soil present at finish grade. The test was performed on the portion of the sample passing the #4 standard sieve. The

sample was brought to optimum moisture content and then dried back to a constant moisture content for 12 hours at 230 + 9 degrees Fahrenheit. 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), and the sample was allowed to consolidate for a period of 10 minutes. 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 times the fraction of the sample passing the #4 sieve times 1000.

Sample Location:	B-4 @ 1'
Initial Moisture:	11.1%
Initial Dry Density:	113 pcf
Final Moisture:	22%
Expansion Index:	15 (Very Low)

CONSTRUCTION NOTES

It is the responsibility of the Owner and/or Developer to ensure that the recommendations summarized in this report are carried out in the field operations. This firm does not practice or consult in the field of safety engineering. We do not direct the Contractor's operations, and we cannot 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.

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, Appendix A, and Chapter 18 of the California Building Code.

It is recommended that C.W. La Monte Company Inc. be retained to provide continuous soil engineering services during the earthwork 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.

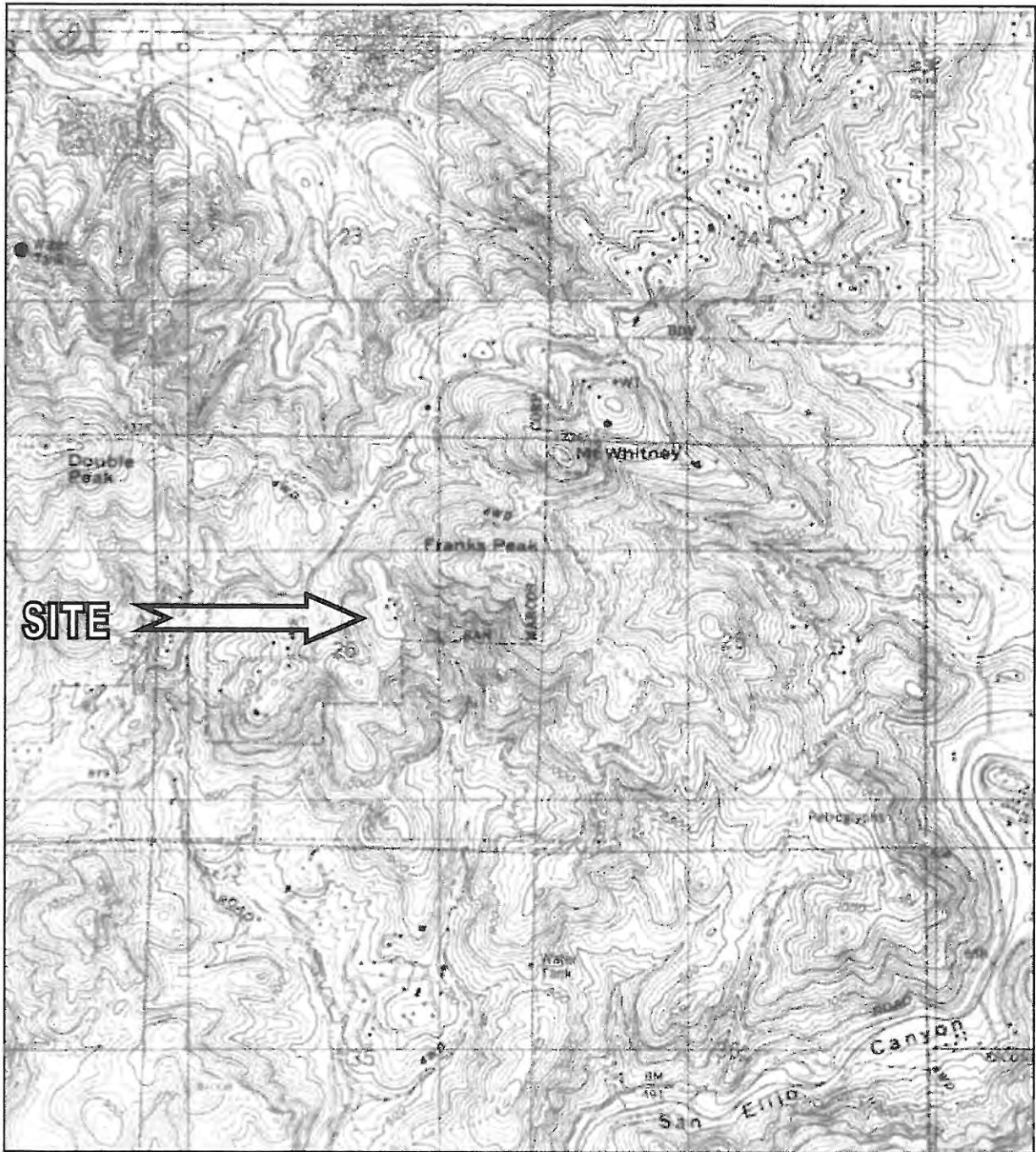
It is the responsibility of the stated client or their representatives to ensure that the information and recommendations contained herein are brought to the attention of the structural engineer and architect for the project and incorporated into the

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 patters, which occur subsequent to the issuance of this report.

SITE LOCATION MAP

Proposed Residential Development
957 Valborg Drive
San Marcos, California



C.W. La Monte Company Inc.
Soil and Foundation Engineers

Figure No. 1



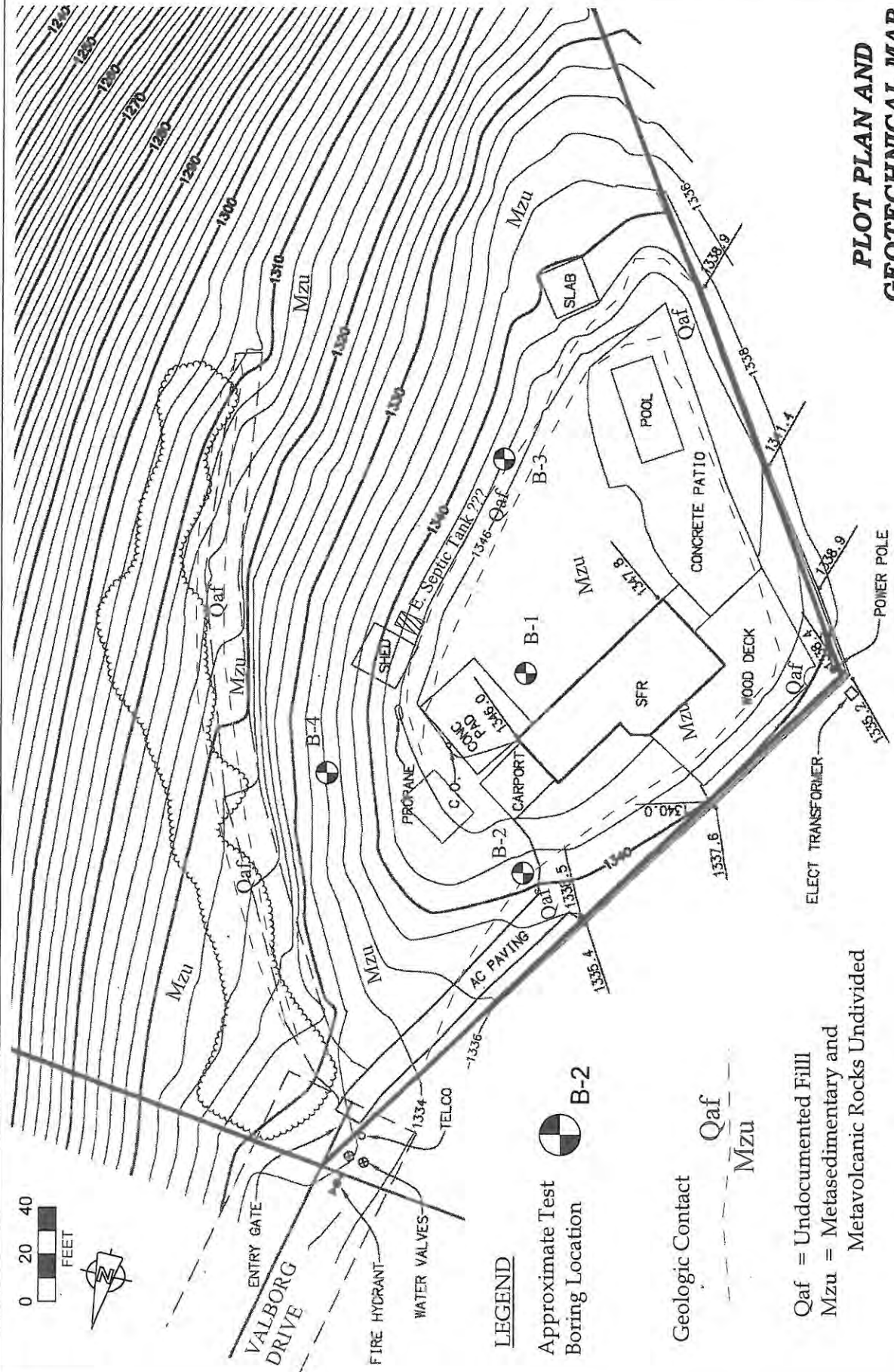
Property Layout and Existing Topographic Map

C. W. La Monte Company Inc.

Soil and Foundation Engineers

See Figure 2B for Project Area Detail

957 Valborg Drive San Marcos, California	
JOB NO. 12 6175	FIGURE NO. 2 A



PLOT PLAN AND GEOTECHNICAL MAP

957 Valborg Drive San Marcos, California	JOB NO. 12 6175	FIGURE NO. 2 B
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C. W. La Monte Company Inc.
Soil and Foundation Engineers

Qaf = Undocumented Fill
Mzu = Metasedimentary and
Metavolcanic Rocks Undivided

LEGEND

Approximate Test
Boring Location

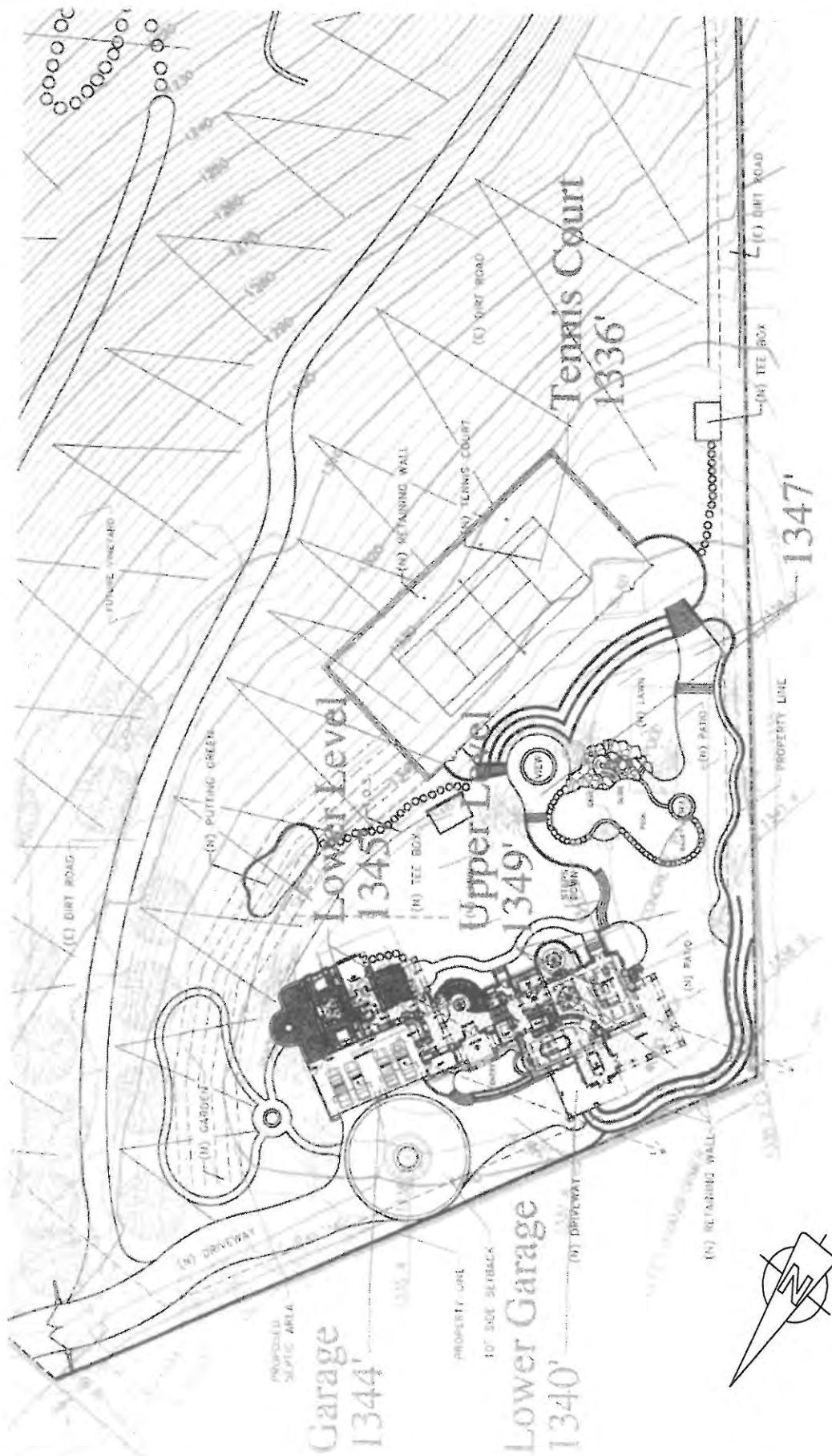


B-2

Geologic Contact

Qaf
Mzu





SITE PLAN
PROPOSED DEVELOPMENT

C. W. La Monte Company Inc.
Soil and Foundation Engineers

957 Valborg Drive
San Marcos, California

JOB NO. 12 6175

FIGURE NO. 2 C

DEPTH (FEET)	SAMPLE TYPE		DRY DENSITY (PCF)	MOISTURE CONTENT (%)	U.S.C.S.	Test Excavation No. B - 1		
	BULK	UNDISTURBED				Elevation: ± 1348' Date: 11/1/2012 Excavation Method : Manual By: JBR		
						SOIL DESCRIPTION		
1					<u>ML</u>	<u>UNDIFFERENTIATED FILL AND SLOPE WASH (Qsw)</u> Dark reddish brown, dry, loose, sandy silt and silty fine sand with rock fragments		
2						<u>META-VOLCANIC BEDROCK (Mzu)</u> Brown to light brown, , fine grained, very hard, rock. Moderately fractured, moderately weathered		
3						Excavation Bottom		
4								
5								
DEPTH (FEET)	SAMPLE TYPE		DRY DENSITY (PCF)	MOISTURE CONTENT (%)	U.S.C.S.	Test Excavation No. B - 2		
	BULK	UNDISTURBED				Elevation: ± 1342' Date: 11/1/2012 Excavation Method : Manual By: JBR		
						SOIL DESCRIPTION		
1					<u>ML</u>	<u>SLOPE WASH (Qsw)</u> Dark reddish brown, dry, loose, sandy silt with rock fragments		
2					<u>ML</u>	<u>META-VOLCANIC BEDROCK (Mzu)</u> Brown to light brown, , fine grained, very hard, rock. Moderately fractured, moderately weathered		
3						Excavation Bottom		
4								
5								

C. W. La Monte Company Inc. Soil and Foundation Engineers		957 Valborg Drive San Marcos, California Job No. 126175	Figure 3 A
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Test Excavation No. B - 3

Elevation: ± 1344' Date: 11/1/2012

Excavation Method : Manual

By: JBR

SOIL DESCRIPTION

SLOPE WASH (Qsw)

Dark reddish brown, dry, loose, sandy silt and silty fine sand with rock fragments

META-VOLCANIC BEDROCK (Mzu)

Brown to light brown, hard, bedrock , highly weathered to a sandy silt.-silty sand

Excavation Bottom

Test Excavation No. B - 4

Elevation: ± 1332' Date: 11/1/2012

Excavation Method : Manual

By: JBR

SOIL DESCRIPTION

SLOPE WASH (Qsw)

Dark reddish brown, dry, loose, sandy silt with rock fragments

META-VOLCANIC BEDROCK (Mzu)

Brown to light brown, hard, bedrock , highly weathered to a sandy silt.-silty sand

Brown to light brown, , fine grained, very hard, rock. Moderately fractured, moderately weathered

Excavation Bottom

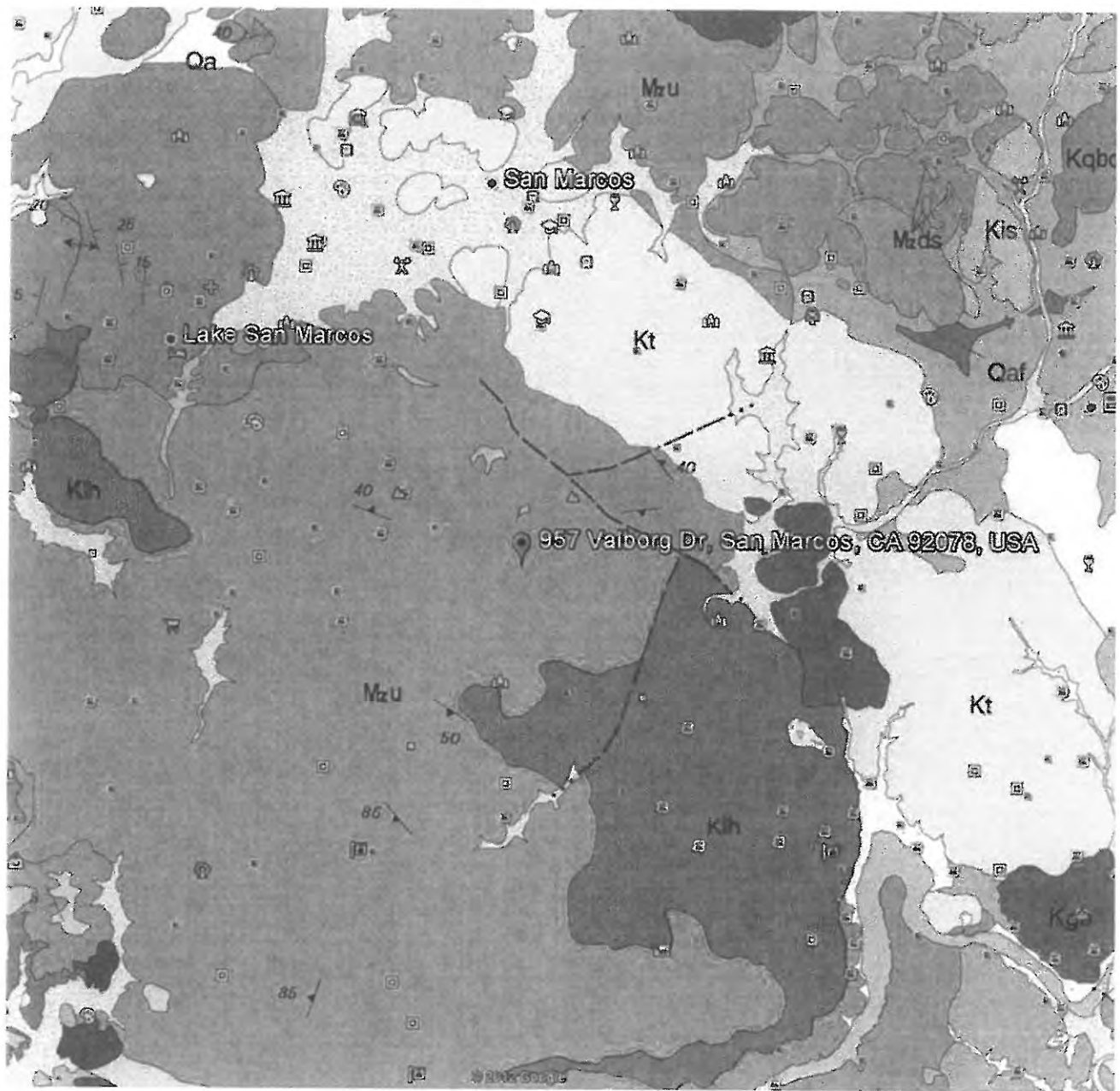
C. W. La Monte Company Inc.

Soil and Foundation Engineers

957 Valborg Drive
San Marcos, California

Job No. 126175

Figure 3 B



Excerpt from:
 DIGITAL GEOLOGIC MAP OF THE OCEANSIDE 30' X 60'
 QUADRANGLE, SOUTHERN CALIFORNIA (2005)
 By Kennedy – Tan, 2005



C. W. La Monte Company Inc.
 Soil and Foundation Engineers

LEGEND (Localized)

Kt = Tonalite, undivided (Cretaceous)

Mzu = Metasedimentary and metavolcanic rocks
 undivided, (Mesozoic)

Klh = Leucogranodiorite of Lake Hodges
 (mid-Cretaceous)

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)

Historic Fault (last 200 years)

Holocene fault (during past 11,700 years)

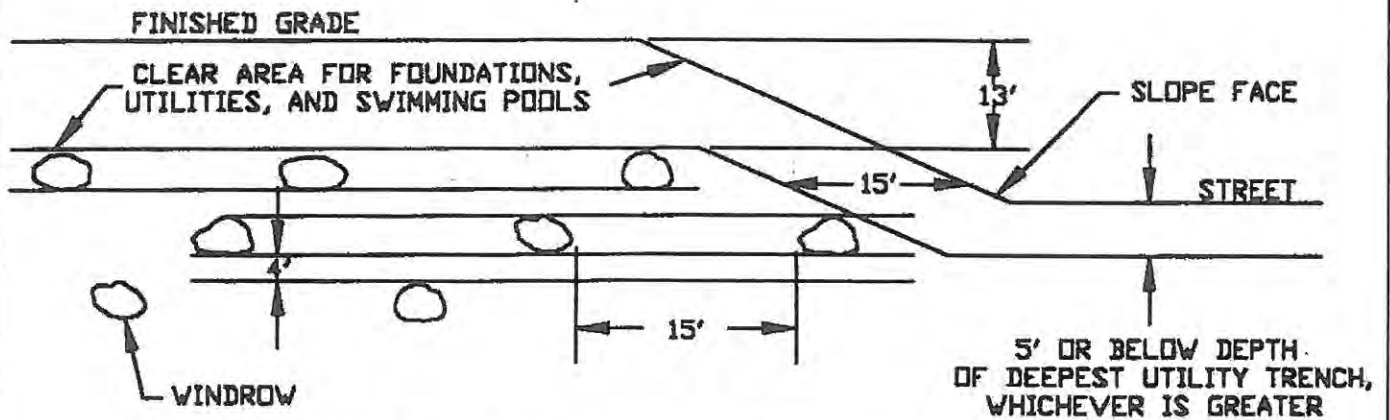
without historic record.

Quaternary fault (age undifferentiated)

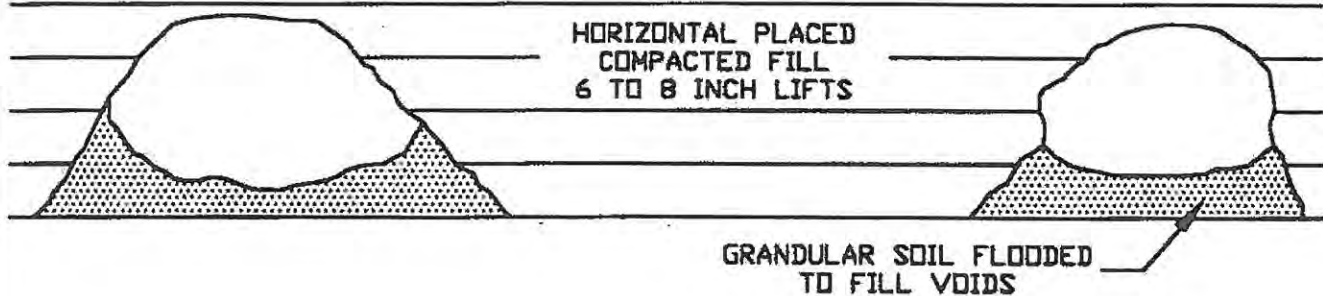
Late Quaternary fault (during past 700,000 years).

Pre-Quaternary fault (older than 1.6 million years) or fault without recognized Quaternary displacement.

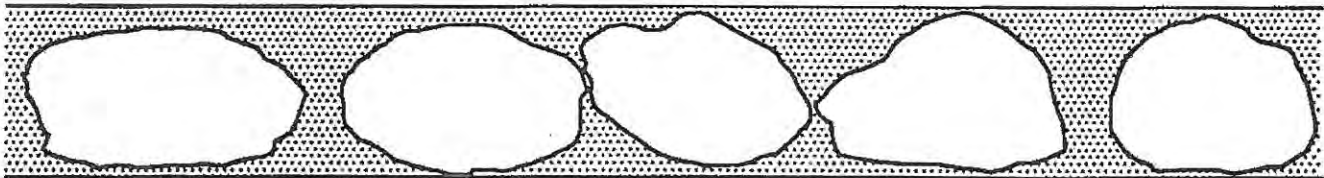
TYPICAL ROCK DISPOSAL DETAIL



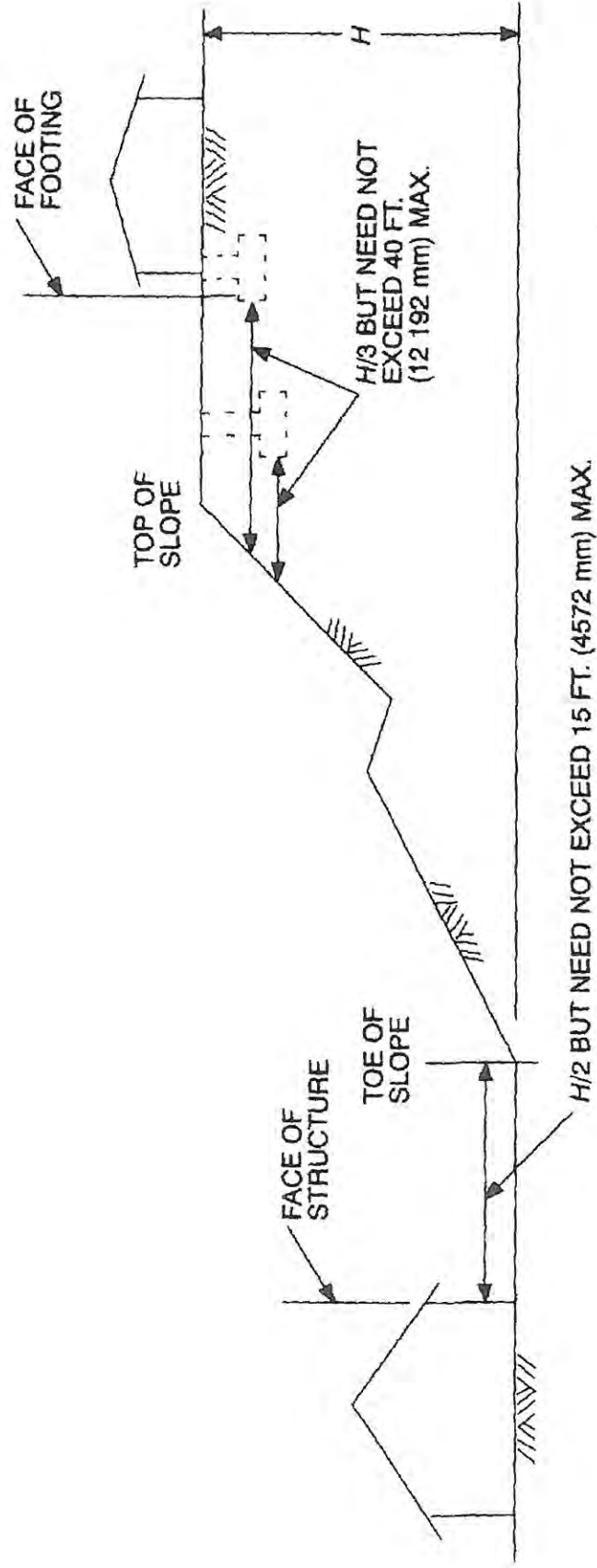
TYPICAL WINDROW DETAIL (END VIEW)



PROFILE VIEW



FOUNDATION SETBACK FROM SLOPES



This drawing is derived from Figure 1805A.3.1 of the California Building Code.

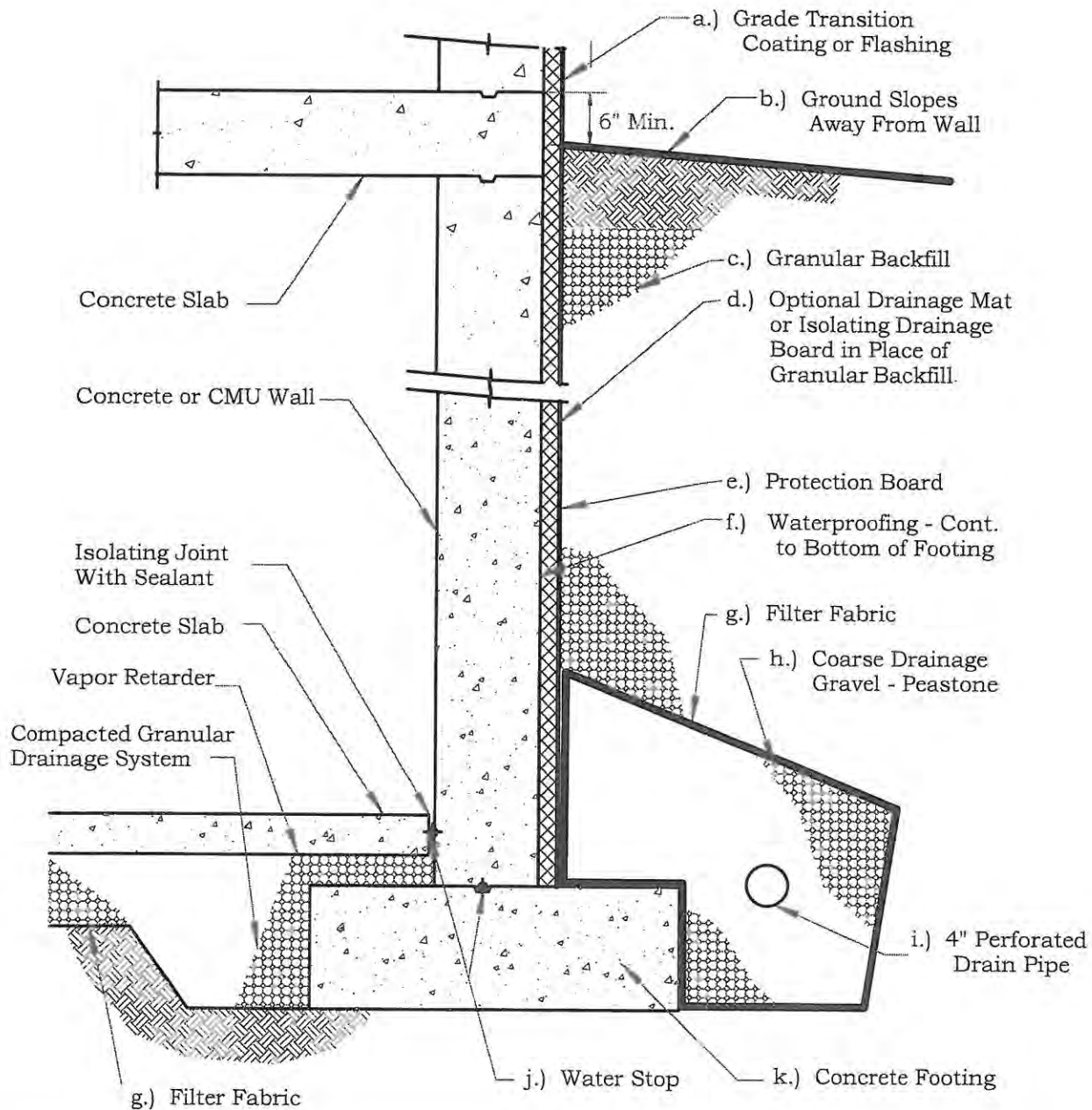
C. W. La Monte Company

Soil and Foundation Engineers

Figure No. 7

Retaining Wall Detail

(no scale)



a.) Provides continuity between upper building envelope weather shield & below grade waterproofing

f.) Prevents moisture transmission / penetration through wall and into the building.

j.) Prevents moisture migration through cold joint @ wall / footing.

b.) Directs building face sheet runoff & roof gutter overspill away from below grade waterproofing and drainage system.

g.) Protect soil from contaminating "clogging" drainage layer.

k.) Transfers wall load to subgrade.

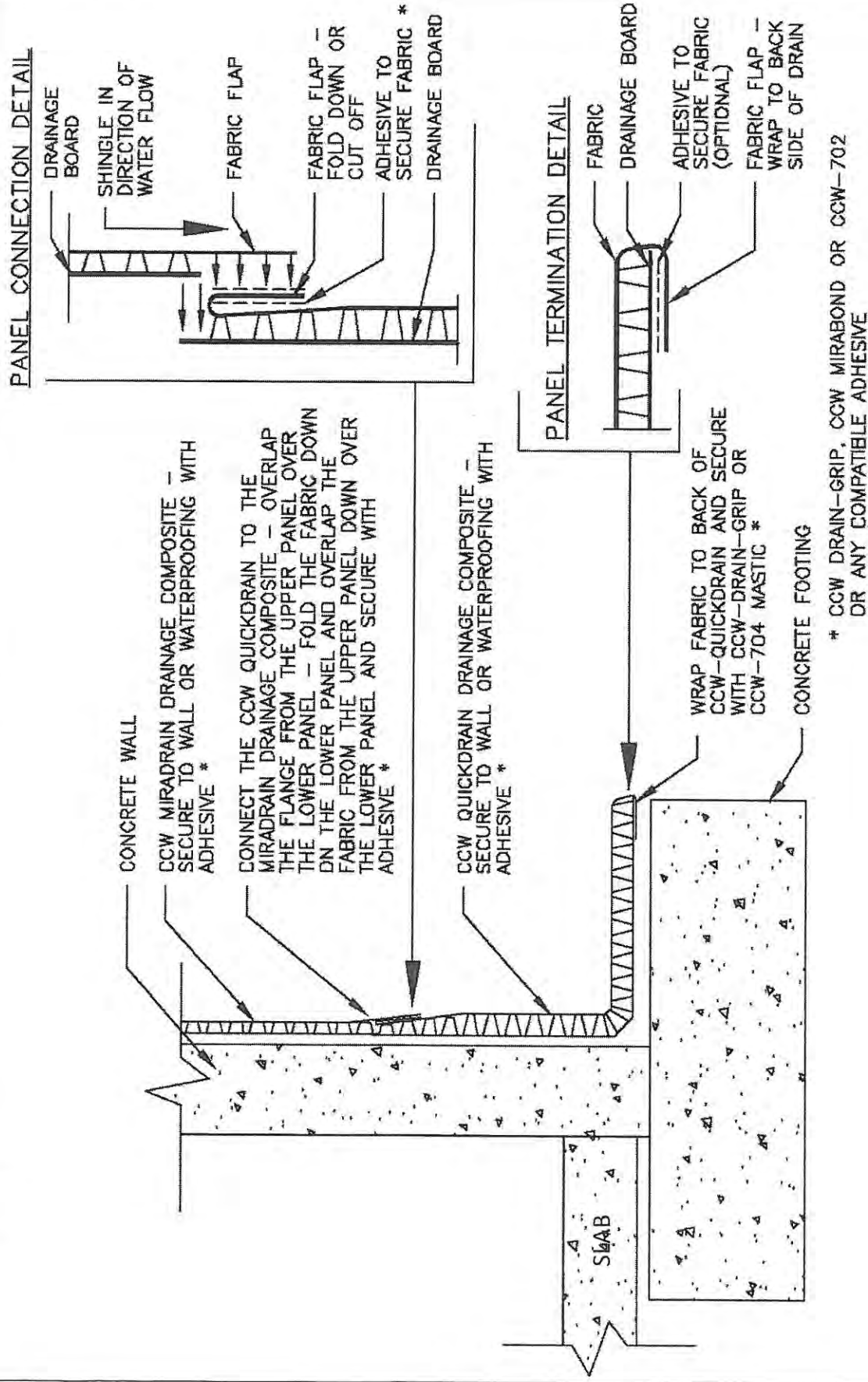
c./d.) Reduces/prevents liquid water buildup against wall; serves as a flow path to drain pipe.

h.) Provides a flow path for water to exit into drain pipe.

e.) Protects membrane from construction damage.

i.) Provides a channeled flow to the discharge system.

Mira Drain Detail



SPREAD FOOTING DETAIL

Figure 8B

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 verify 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

SOIL DESCRIPTION

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".

	<u>GROUP SYMBOL</u>	<u>TYPICAL NAMES</u>
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.

APPENDIX C

SEISMIC HAZARD CURVES AND HAZARD RESPONSE SPECTRA

Conterminous 48 States

2005 ASCE 7 Standard

Latitude = 33.103592

Longitude = -117.16301300000002

Spectral Response Accelerations S_s and S_1

S_s and S_1 = Mapped Spectral Acceleration Values

Site Class B - $F_a = 1.0$, $F_v = 1.0$

Data are based on a 0.01 deg grid spacing

Period S_a

(sec) (g)

0.2 1.040 (S_s , Site Class B)

1.0 0.390 (S_1 , Site Class B)

Conterminous 48 States

2005 ASCE 7 Standard

Latitude = 33.103592

Longitude = -117.16301300000002

Spectral Response Accelerations S_M s and S_{M1}

S_M s = $F_a \times S_s$ and $S_{M1} = F_v \times S_1$

Site Class C - $F_a = 1.0$, $F_v = 1.41$

Period S_a

(sec) (g)

0.2 1.040 (S_M s, Site Class C)

1.0 0.551 (S_{M1} , Site Class C)

Conterminous 48 States

2005 ASCE 7 Standard

Latitude = 33.103592

Longitude = -117.16301300000002

Design Spectral Response Accelerations S_D s and S_{D1}

S_D s = $2/3 \times S_M$ s and $S_{D1} = 2/3 \times S_{M1}$

Site Class C - $F_a = 1.0$, $F_v = 1.41$

Period S_a

(sec) (g)

0.2 0.693 (S_D s, Site Class C)

1.0 0.367 (S_{D1} , Site Class C)

Design Spectrum S_a Vs S_d

