C. W. La Monte Company Inc.

REPORT OF LIMITED GEOTECHNICAL INVESTIGATION
2528 Island Avenue
San Diego, California
APN: 535-272-26

JOB NO. 18 7054

September 20, 2018

Prepared for:

Paula Financial Services, Inc.
1206 10th Street
Coronado, CA. 92118

4400 PALM AVENUE, SUITE C ♦ LA MESA, CALIFORNIA 91941
Phone: (619) 462-9861 ♦ Fax: (619) 462-9859

C. W. La Monte Company Inc.

Soil and Foundation Engineers

4400 PALM AVENUE, SUITE C ♦ LA MESA, CALIFORNIA 91941
Phone: (619) 462-9861 ♦ Fax: (619) 462-9859

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TO:

Paula Financial Services, Inc.
1206 10th Street
Coronado, CA. 92118

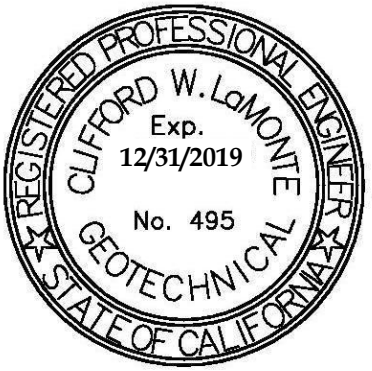
SUBJECT: Report of Limited Geotechnical Investigation
2528 Island Avenue
San Diego, California
APN: 535-272-26

In accordance with your request we have completed a geotechnical investigation for the subject site. In general, we found that the site is suitable for development with new construction. No adverse geotechnical conditions were encountered that cannot be mitigated provided the recommendations presented in our report are followed. Detailed earthwork and foundation recommendations are also included.

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.



Clifford W. La Monte,
R.C.E. 25241, G.E. 0495

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REPORT OF LIMITED GEOTECHNICAL INVESTIGATION
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PROJECT DESCRIPTION

The following report presents the results of a limited geotechnical investigation performed for the above subject project. The project site is an rectangular shaped lot located at **2528 Island Avenue**, **San Diego** California. The below vicinity map shows the approximate location of the site. Presently the property consists of a developed graded lot that is terraced in a west to east direction. A concrete masonry wall extends in a north to south direction near the middle of the property and extends north from the front of the property to approximately half the lot. At the time of the preparation of this report, C.W.La Monte (CWL) did not have a plans of the proposed development. This limited investigation will assume that the existing improvements will be removed and replaced with new construction. The proposed structure(s) at the site will be a maximum of two-stories stories in height and will be of typical wood-frame construction materials and founded on conventional shallow foundations with concrete slab on grade floors and that the proposed improvements will be constructed near the elevation of the existing grade and will require minor cuts and fills to create a level pad.

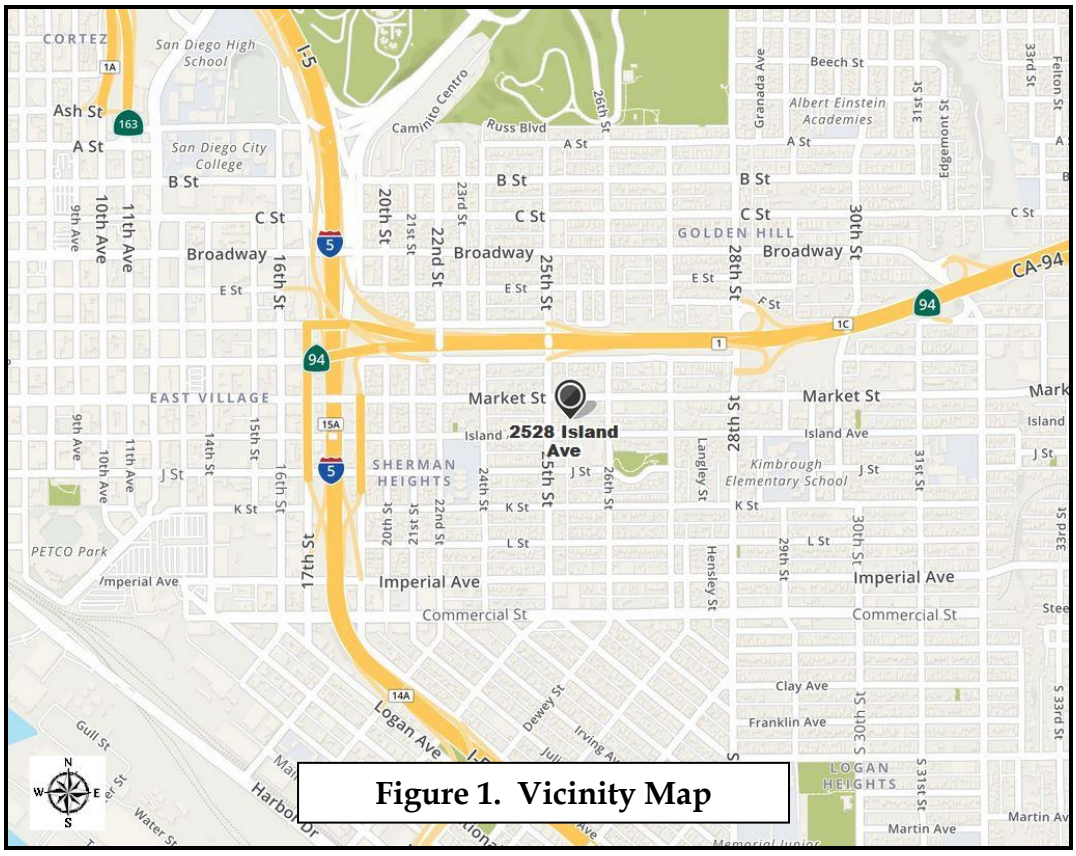


Figure 1. Vicinity Map

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, 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 improvements.

- Based on laboratory testing and/or empirical evaluation and our experience with similar sites in the area, identify the engineering properties of the various strata that may influence the proposed new 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 current 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 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 is 2528 Island Avenue, San Diego, California. The site is accessed via Island Avenue to the south and a driveway to an alley located to the north of the property. The site is bounded on the north and west by two unnamed alleyways, to the south by Island Avenue and to the east with a single-family residential property. The legal description of the property is Assessor's Parcel Number **535-272-26**. The property is rectangular-shaped and is currently occupied by a single-story wood frame raised wood floor structure. The south property line and approximately half of the west property lines are limited by a concrete masonry retaining wall that ranges in height to approximately 5 feet in height at the south side. The southern portion of the western wall retains the property and a portion of the wall retains approximately 2 feet of the alleyway side. An approximately 2 to 3 feet high; concrete masonry retaining wall, extends in a north to south direction near the middle of the property. This retaining wall extends north from the front of the property to approximately half the lot, to create a level pad for the existing residential structure. The Exposed surface consisted mainly of dirt with only concrete front and back porches. Vegetation consists of a light growth of grasses and several large mature trees along the eastern side of the property. A Site Map and Geotechnical Map are attached as Figure 3 with the test boring locations noted.

Based on Google Earth's elevation information the lot presently ranges in elevation from roughly +131 feet (msl) along the northwestern corner of the property toroughly +117 feet (msl) along the southeastern corner of the property. Topographic

maps of the area (USGS the National Map (2018)indicate that the site is located on the western flank of a north-south running canyon that descends in a southerly direction

Description of Subsurface Soil and Geologic Conditions

The site is located in the Peninsular Ranges Geologic Province of California (California Geological Survey, 2012 Note 36). This geologic province is described as a series of ranges is separated by northwest trending valleys, subparallel to faults branching from the San Andreas Fault. The trend of topography is similar to the Coast Ranges, but the geology is more like the Sierra Nevada, with granitic rock intruding the older metamorphic rocks. The Peninsular Ranges extend into Lower California and are bound on the east by the Colorado Desert. The Los Angeles Basin and the island group (Santa Catalina, Santa Barbara, and the distinctly terraced San Clemente and San Nicolas islands), together with the surrounding continental shelf (cut by deep submarine fault troughs), are included in this province.

Review of the available references (CGS, 2008, Geologic Map of the San Diego 30´ x 60´ Quadrangle, California, indicate that the subject site is located in an area near a contact between Tertiary San Diego Formation (Tsd undivided) and Very Old Paralic Deposits Unit 8 ($Qvop_8$). The San Diego Formation is described as a predominantly yellowish brown to gray fine to medium grained, poorly indurated sandstone. The Very Old Paralic Deposits Unit 8 are described as a poorly sorted, moderately permeable, reddish-brown, inter-fingered strandline, beach, estuarine and colluvial deposits composed of siltstone, sandstone and conglomerate. The site is underlain by the very old paralic deposits described above. Refer the attached Test Boring Logs, Figure No. 6a through 6g for a more detailed description of subsurface conditions. A Site Map and Geotechnical Map are attached as Plate Nos. 3 with the test boring locations. An excerpt from a regional geologic map is included as Figure No. 5.

The soil types are described individually below by increasing age:

Fill-Topsoil (undifferentiated): The site is capped with about 6-inches to 1.5-feet of fill/topsoil in the areas explored. The encountered fill/topsoil consists primarily of brown, loose to medium dense, silty sand (SM) some small rocks and some rootlets were encountered in these materials. These soils are moderately compressible and require remedial grading. These soils are unsuitable to support structural improvements in their current condition and should be removed and recompacted as discussed in the *Site Preparation* section of this report.

Colluvium: Underlying the fill-topsoil material we encountered a layer of colluvium/slopewash. This material was noted to consist of a clayey sand to sandy clay this material was noted to have a medium dense and stiff to very stiff consistency. This material was noted to extend from depths ranging from 1 foot to 3 feet below existing elevations. This clayey material yielded an expansion index E.I. of 64 which indicates a medium expansion potential.

Formation: The encountered formational material was noted to consist of red brown silty sandstone. This material was noted to be medium dense in the upper layers and increase in density to very dense at depth. Refer the attached Test Boring Logs, Figure No. 6a through 6g, for a more detailed description of the encountered subsurface conditions.

Ground Water

The site exists at an elevation of approximately +117 to +131 feet msl. We did not encounter groundwater or saturated soil conditions to the depths explored at the time of our investigation. Groundwater depth is expected to be deeper than 50 feet below existing elevations.

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.

FAULTING AND SEISMICITY

No faults are known to traverse the site thus it is not considered susceptible to surface rupture as a result of on-site faulting. The probability of soil cracking caused by shaking from close or distant fault sources is also considered to be low. 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 northerly to north-westerly direction. Some of these fault zones (and the individual faults within the zones) are classified as active while others are classified as only potentially active,

according to the criteria of the California Division of Mines and Geology (currently California Geological Survey). Active fault zones are those that have shown conclusive evidence of faulting during the Holocene Epoch (the most recent 11,000 years), while potentially active fault zones have demonstrated movement during the Pleistocene Epoch (11,000 to 2 million years before the present) but no movement during Holocene time. An excerpt from the 2010 Fault Activity Map of California is attached as Plate No. 6.

Current geologic literature indicates that the site is located at approximately 900 feet to the west-southwest of the mapped Texas Street Fault. This fault is considered potentially active. The easternmost splice of the Newport-Inglewood-Rose Canyon Fault Zone (Downtown San Diego Fault) is the nearest known active fault located at approximately 3,150 feet to the west of the subject site. Other active faults close to the site are the Coronado Bank Fault Zone with the fault strands located at approximately 14 to 15 miles to the west of the site; the San Diego Trough Fault Zone located at approximately 26 miles to the west-southwest of the site at the mapped closest point and the San Clemente Fault Zone located at approximately 53 miles to the west of the site.

The Elsinore and San Jacinto Fault Zones located about 40 and 62 miles (respectively) northeast of the site at the closest point. 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.

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 to 5 mm/year. The Rose Canyon Fault Zone is currently classified as a Type "B" fault (*California Probabilistic Seismic Hazard Maps,* June 2003.

Based on the *City of San Diego Seismic Safety Study Geologic Hazards and Faults,* grid tile 17, the subject site is located outside the Downtown Special Fault Zone. This study also indicates that the site is located in area 52, described as gently sloping to steep terrain, with favorable geologic structure and low risk.

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

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 2015 IBC (which uses USGS hazard data available in 2008).

The analysis included the following input parameters:

Design Code Reference Document: ASCE 7-10 Standard

Site Soil Classification: Site Class C

Risk Category: I or II or III

Site Coordinates: 32.7108°N, 117.1395°W

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

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}	PGA_M
1.192g	0.459g	1.000	1.341	1.192g	0.615g	0.794g	0.410g	0.531g

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.

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

A review of the geologic hazards map indicates there are no known deep or suspected ancient landslides located on the site. Due to the underlying dense and competent formational material, landslide hazards do not appear to present a significant risk.

Liquefaction

Liquefaction of soils can be caused by strong vibratory motion in response to earthquakes. Both research and historical data indicate that loose mostly fine sands or predominantly granular soils are susceptible to liquefaction, while the stability of rock is not as adversely affected by vibratory motion. Liquefaction is generally known to occur primarily in cohesionless silt, sand, and fine-grained gravel deposits of Holocene to late Pleistocene age in areas where the groundwater is shallower than about 50 feet (DMG Special Publication 117). Is also a function of relative density, soil type and probable intensity and duration of ground shaking. Based on the results of our field investigation, the subject site is underlain by shallow very dense formational material. As such the potential for liquefaction at the site is non-existent.

Flooding

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

Soil Expansion: The laboratory testing of sampled foundation level materials at the site yielded an expansion index of 64 which indicate that the sampled soils have a medium expansion potential in the areas tested. If encountered, clayey soils should be removed and replaced or mixed with granular soils.

Tsunamis and Seiches

Tsunamis are large sea waves produced by submarine earthquakes or volcanic eruptions. Based on the project's inland and elevated location, the site is considered to possess a very low risk potential from tsunamis. Seiches are periodic oscillations in large bodies of water such as lakes, harbors, bays or reservoirs. The site is considered to have a very low risk potential for damage caused by seiches.

CONCLUSIONS

In general, we found the subject property suitable for developing, provided the recommendations provided herein are followed. The most significant findings and geotechnical conditions that will influence site development are summarized below. Detailed recommendations for precede this section of the report.

- The building site is essentially a terraced "cut" lot, underlain with competent formational "bedrock". The formation is overlain with a thin veneer of fill-topsoil and colluvium soils of approximately 1 to 3 feet in thickness. Therefore, the site may be developed by simply processing the upper 2 to 3 feet of materials within the proposed building envelope and extending 5 feet beyond the building foundations, to create a uniform building pad.

- The formational materials underlying the site are very dense in consistency. Excavating refusal with the hand auger was reached at a depths ranging from 2 to 4.5 feet below the existing grade in all excavations within the areas tested. Deep excavations may be difficult and may require large equipment in good condition to facilitate excavation.

- The soils encountered at foundation level in our explorations are considered to be of low to medium expansion potential as classified by ASTM D4829 and therefore, it appears an appropriate foundation system will be required to mitigate potentially expansive soil conditions. Alternately, processing of these soils can be considered. This option would include removal of the expansive clay soil and replacement with sandy soils; or removal and mixing the clay soils with granular soils to create a non-expansive mix.

RECOMMENDATIONS

EARTH WORK AND GRADING

General

All grading should conform to the guidelines presented in this report, Sections 1804 and Appendix "J" of the 2016 California Building Code, the minimum requirements of the City of San Diego 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 low to medium 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 any improvements designated for removal, vegetation, and any 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 fill, topsoil and colluvium from areas that will be graded or that will support settlement-sensitive improvements. The overburden removals are expected to be about 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). We recommend a removal depth of at least 18 inches in pavement and flatwork areas. 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.

Any remaining surficial fill and prior to placing any additional fill soils in areas that have been cleaned out to receive fill, the exposed soils should be scarified to a depth of approximately 8 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 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

The on-site material is likely to be excavated with moderate to difficult effort using large excavating equipment. Localized, lithified rock concretions could be encountered during excavating operations. We anticipate that the planned site excavations may generate some large rock debris (rock material over 6 inches in width is considered to be large). Large rock should be disposed off-site or used as landscape features without any special preparation.

Surface Drainage

Generally, drainage shall be prepared in accordance with Section 1804 of the California Building Code and/or the requirements of the City of Chula Vista. Surface runoff into graded areas should be minimized. Where possible, drainage should be directed to suitable disposal areas via non-erodible devices such as paved swales, gunited 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 structures may be supported by conventional continuous and isolated spread footings. The on-site materials generally possess a low expansive potential, although as noted previously, localized areas containing expansive clays may be encountered within the proposed building pads. As such we recommend that these clayey soils if encountered be removed and replaced with granular low expansion soils. Consideration for heaving soils is included in our recommendations.

Dimensions and Embedment

Conventional shallow foundations may be utilized in the support of the proposed structures when founded on firm natural ground or properly compacted fill soils. Foundations should be constructed in accordance with the recommendations of the project structural engineer. The table provided below is suggests minimum foundation dimensions:

TABLE II
Foundation Embedment

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

Soil Bearing Value

A bearing capacity of **2000 psf** may be assumed for footings when founded a minimum of 18 inches into firm natural ground or properly compacted fill. 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 0.3. The passive resistance may be considered to be equal to an equivalent fluid weight of 350 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 (4) 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.

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.

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 slightly moist to dry. 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 a 110% to 120% of optimum moisture content to a depth of at least 12 inches. This moisture penetration should be verified by the soil engineer 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 non-detrimentally expansive, competent formation and/or 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 10-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, in consideration of the project requirements provided by the project architect and developer.

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 **0.3** 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 (if proposed)

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 onsite or imported, sandy soils (SP, SM, SC) with an Expansion Index (E.I.) of less than 20 will be used as backfill. No clay soils (CL-CH) should be used as retaining wall backfill. The retaining walls should be provided with adequate drainage. Expansion Index (E.I.) of less than 50 will be used as backfill.

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

Conditions	Native Backfill (SM-SP)
Active	35 pcf
At-Rest	70 pcf

Retaining Wall Foundations (if planned on site)

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

Waterproofing and Subdrain Observation

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. 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. 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. Expansive or clayey soils should not be used for backfill material. The wall should not be backfilled until the masonry has reached an adequate strength.

FIELD INVESTIGATION

Seven (7) test explorations were placed on the lot, using a hand auger sampling system. The excavations were placed specifically in areas where representative soil conditions were expected and/or where the structures could 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. 6a through 6g. 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

An expansion index test E.I. was performed on a representative sample of the foundation soils. The test yielded an E.I. of 64 indicating a medium expansion potential for the foundation soils at the site.

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

EXPANSION INDEX: Expansion Index testing was performed in accordance with ASTM 4829 as a guideline. The results are presented in the below table.

TABLE IV - EXPANSION INDEX TEST

Sample Location:	B2+B3+B4+B5 at 2-3′
Initial Moisture Content:	11.5
Initial Dry Density:	103.5
Expansion Index:	64
ASTM Classification:	Medium

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,

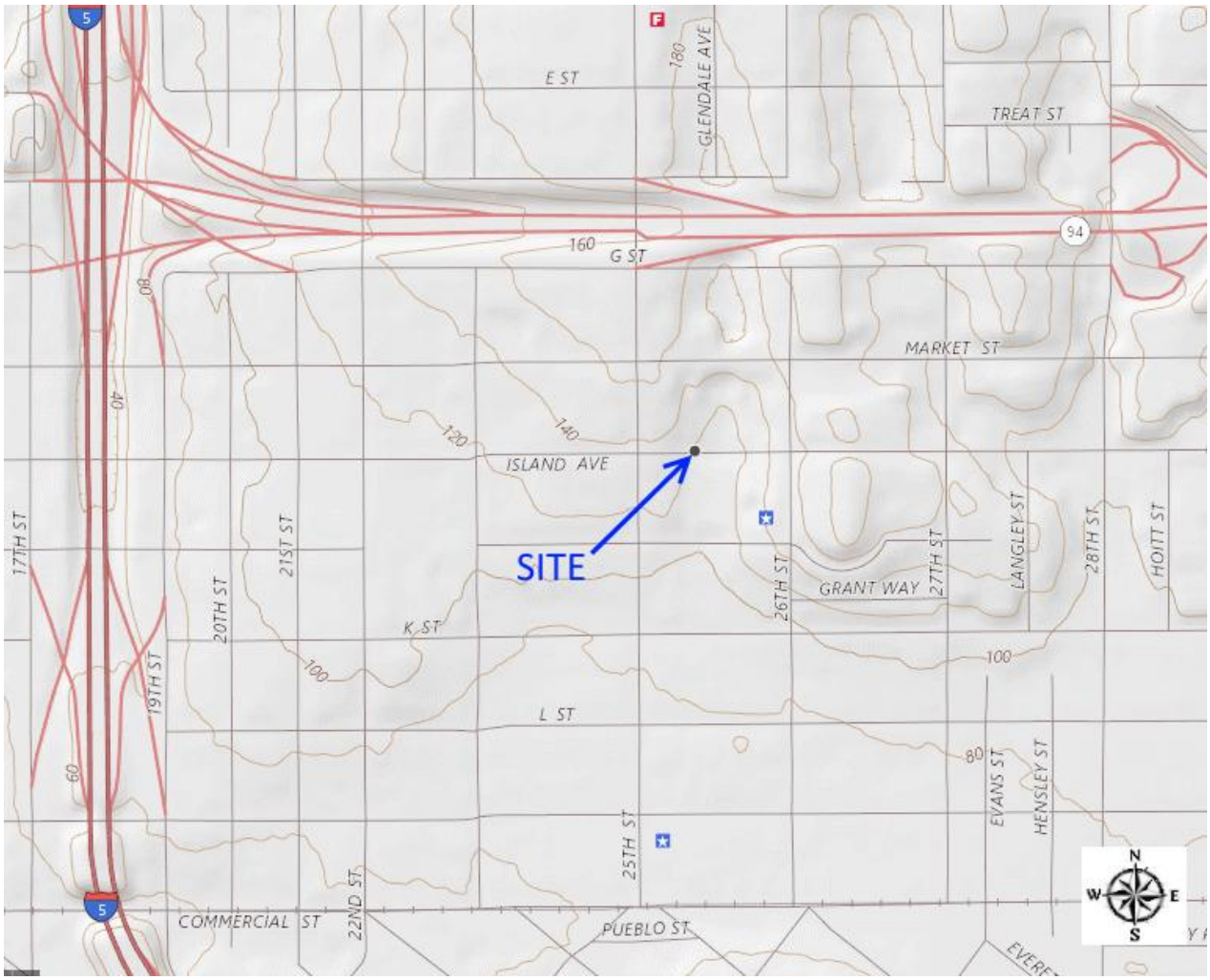
changes in the Standards-of-Practice and/or Government Codes may occur. Due to such changes, the findings of this report may be invalidated wholly or in part by changes beyond our control. Therefore, this report should not be relied upon after a period of two years without a review by us verifying the 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

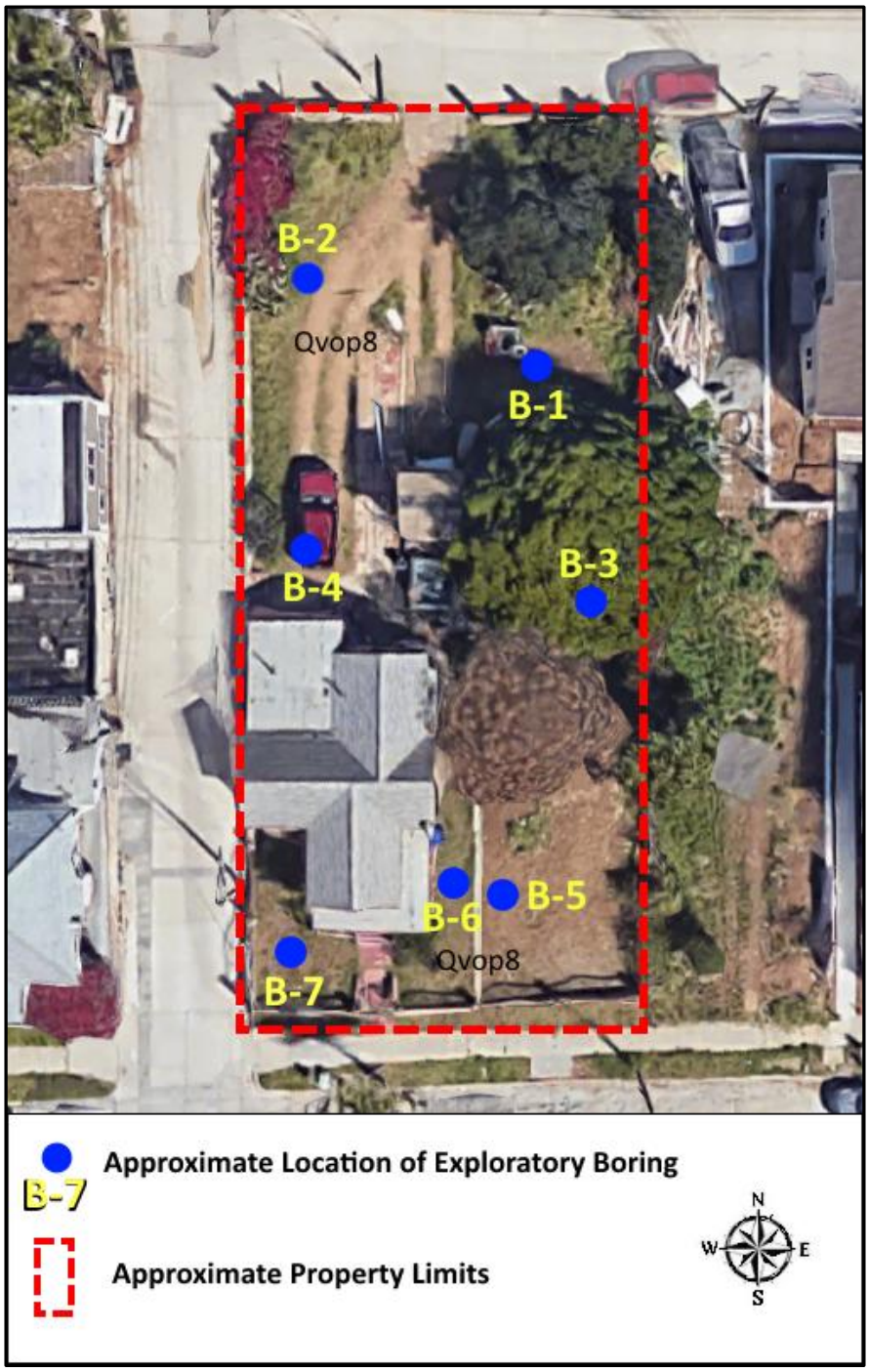


Modified from USGS "The National Map"
San Diego Quadrangle, 7.5 Minute Series

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

Figure No. 2

SITE MAP AND GEOTECHNICAL MAP

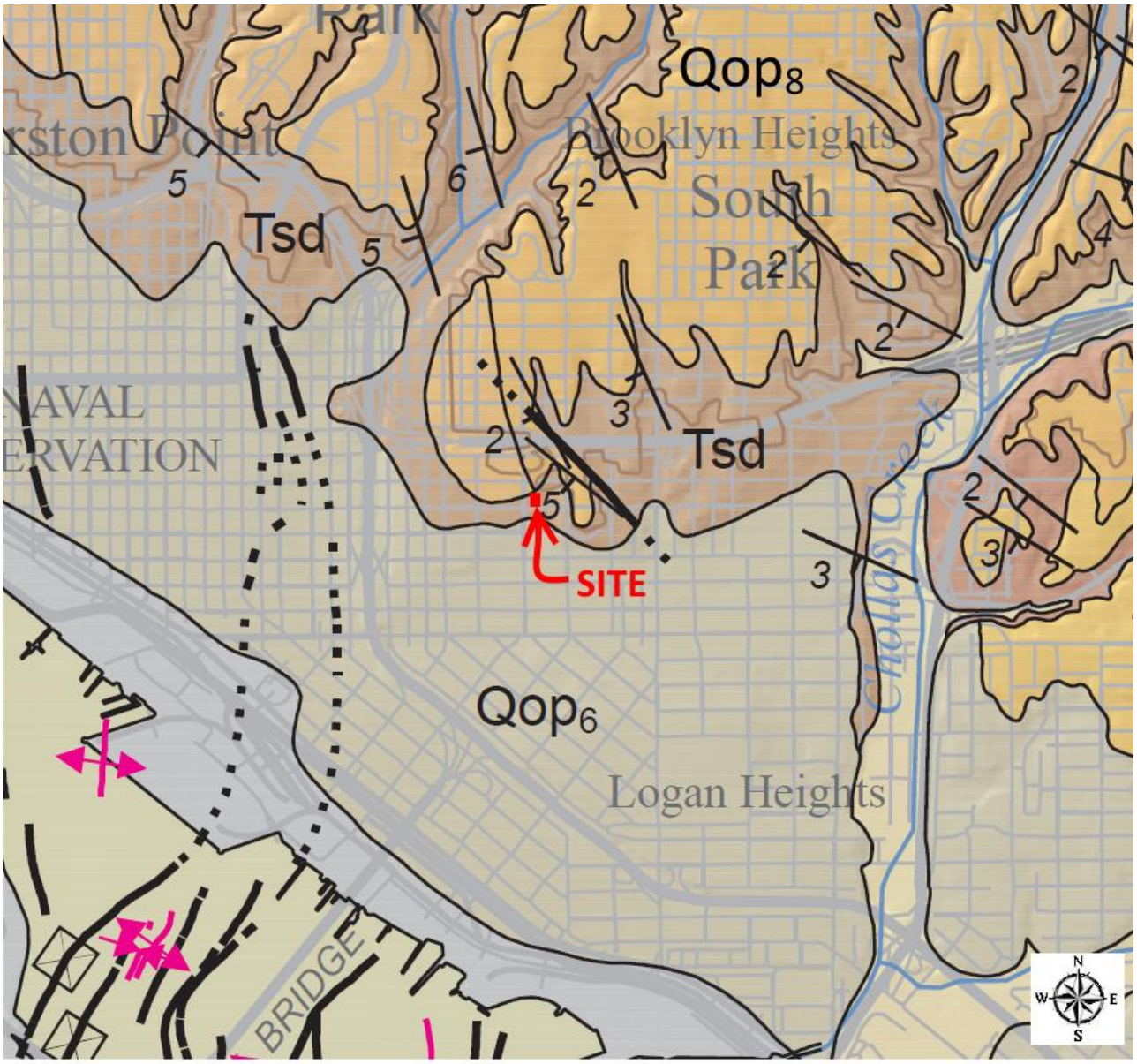


Qvop8 = Quaternary Very Old Paralic Deposits Unit 8, mantled by 1 to 3 feet of Artificial Fill and Colluvium (not mapped)

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

Figure No. 3

GEOLOGIC MAP



Qop6 Quaternary old paralic deposits unit 6

Tsd Tertiary San Diego Formation

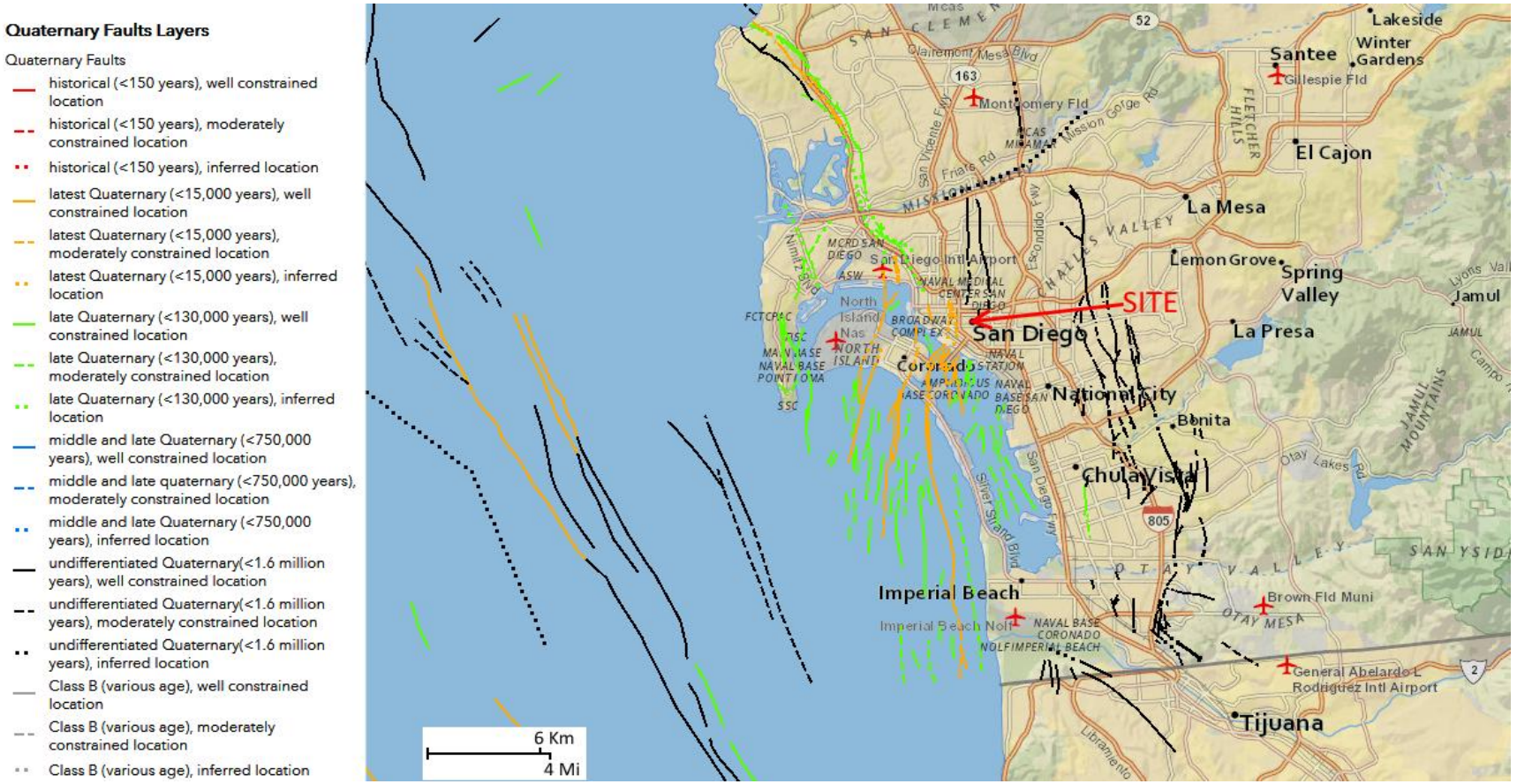
Qvop8 Quaternary very old paralic deposits unit 8

Modified from: California Geological Survey, 2008 Geologic Map of the San Diego 30´ x 60´ Quadrangle, California,

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

Figure No. 4

QUATERNARY FAULTS OF SAN DIEGO



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

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

Figure No. 5

EXCAVATION LOG

Equipment:	Dimension and Type of Excavation:	Logged By:	Date
Hand Auger	4-inch Diameter	HE	8/30/2018
Elevation	**Groundwater Depth:**		**Boring No.**
Existing Elevation	NONE ENCOUNTERED		**B-1**

DEPTH (FT.)	SYMBOL	BAG SAMPLE	SAMPLE	BLOW COUNTS / FT.	CHANGE DEPTH (@)	FIELD SOIL DESCRIPTION AND CLASSIFICATION Description and Remarks (Grain Size, Density, Moisture, Color)	U.S.C.S.
0						**Fill/Topsoil:** Silty Sand, Loose, Dry, Brown, Organics, Rootlets.	SM
1							
2						**Colluvium:** Silty Sand to Clayey Sand, Medium Dense, Moist, Brown.	SM SC
3						**Formation:** Silty Sandstone, Fine to Medium Grained, Very Dense, Moist, Red-Brown	SM
4						Refusal at 3 ft.	
5							
6							
7							
8							
9							
10							
11							
12							
- -							
- -							

TOTAL DEPTH 3.0 FT.
NO GROUNDWATER
NO CAVING
BACKFILLED 8/30/2018

Equipment:	Dimension and Type of Excavation:	Logged By:	Date
Hand Auger	4-inch Diameter	HE	8/30/2018
Elevation	**Groundwater Depth:**		**Boring No.**
Existing Elevation	NONE ENCOUNTERED		**B-2**

DEPTH (FT.)	SYMBOL	BAG SAMPLE	SAMPLE	BLOW COUNTS / FT.	CHANGE DEPTH (@)	FIELD SOIL DESCRIPTION AND CLASSIFICATION Description and Remarks (Grain Size, Density, Moisture, Color)	U.S.C.S.
0						**Fill/Topsoil:** Silty Sand, Loose, Dry, Brown, Organics, Rootlets, Some Small Cobble Rock.	SM
1							
2						**Colluvium:** Clayey Sand to Sandy Clay, Medium Dense to Very Stiff, Moist, Brown to Red Brown	SC CL
3						**Formation:** Silty Sandstone, Fine to Medium Grained, Very Dense, Moist, Red-Brown	SM
4						Refusal at 4.5 ft.	
5							
6							
7							
8							
9							
10							
11							
12							
- -							
- -							

TOTAL DEPTH 4.5 ft.
NO GROUNDWATER
NO CAVING
BACKFILLED 8/30/2018

▼	Water Table
⊠	Bulk Sample
◪	SPT Sample
■	Drive Sample
#	Disturbed Blowcount No.
*	Disturbed Sample
**	No Sample Recovery
———	Geologic Contact
- - - -	Soils Change

C. W. La Monte Company Inc.

JOB NAME: 2528 Island Ave

JOB ADDRESS: 2528 Island Ave., San Diego, CA

Fig. No. 6a-b

EXCAVATION LOG

Equipment:	Dimension and Type of Excavation:	Logged By:	Date
Hand Auger	4-inch Diameter	HE	8/30/2018
Elevation	**Groundwater Depth:**		**Boring No.**
Existing Elevation	NONE ENCOUNTERED		**B-3**

DEPTH (FT.)	SYMBOL	BAG SAMPLE	SAMPLE	BLOW COUNTS / FT.	CHANGE DEPTH (@)	FIELD SOIL DESCRIPTION AND CLASSIFICATION Description and Remarks (Grain Size, Density, Moisture, Color)	U.S.C.S.
0						**Fill/Topsoil:** Silty Sand, Loose, Dry, Brown, Organics, Rootlets, Some Small Cobble Rock.	SM
1						**Colluvium:** Clayey Sand to Sandy Clay, Medium Dense to Very Stiff, Moist, Brown to Red Brown	SC CL
2							
3						**Formation:** Silty Sandstone, Fine to Medium Grained, Dense to Very Dense, Moist, Red-Brown.	SM
4						Refusal at 4 ft	
5							
6						TOTAL DEPTH 4.0 FT. NO GROUNDWATER NO CAVING BACKFILLED 8/30/2018	
7							
8							
9							
10							
11							
12							

Equipment:	Dimension and Type of Excavation:	Logged By:	Date
Hand Auger	4-inch Diameter	HE	8/30/2018
Elevation	**Groundwater Depth:**		**Boring No.**
Existing Elevation	NONE ENCOUNTERED		**B-4**

DEPTH (FT.)	SYMBOL	BAG SAMPLE	SAMPLE	BLOW COUNTS / FT.	CHANGE DEPTH (@)	FIELD SOIL DESCRIPTION AND CLASSIFICATION Description and Remarks (Grain Size, Density, Moisture, Color)	U.S.C.S.
0						**Fill/Topsoil:** Silty Sand, Loose, Dry, Brown, Organics, Rootlets, Some Small Cobble Rock.	SM
1						**Colluvium:** Clayey Sand to Sandy Clay, Medium Dense to Very Stiff, Moist, Brown to Red Brown	SC CL
2						**Formation:** Silty Sandstone, Fine to Medium Grained, Very Dense, Moist, Red-Brown	SM
3							SM
4						Refusal at 2 feet	
5							
6						TOTAL DEPTH 2.0 ft. NO GROUNDWATER NO CAVING BACKFILLED 8/30/2018	
7							
8							
9							
10							
11							
12							

▼ Water Table
⊠ Bulk Sample
◪ SPT Sample
■ Drive Sample
\# Disturbed Blowcount No.
* Disturbed Sample
** No Sample Recovery
Geologic Contact
Soils Change

C. W. La Monte Company Inc.

JOB NAME: 2528 Island Ave

JOB ADDRESS: 2528 Island Ave., San Diego, CA

Fig. No. 6c-d

EXCAVATION LOG

Equipment:	Dimension and Type of Excavation:	Logged By:	Date
Hand Auger	4-inch Diameter	HE	8/30/2018
Elevation Existing Elevation	**Groundwater Depth:** NONE ENCOUNTERED		**Boring No.** B-5

DEPTH (FT.)	SYMBOL	BAG SAMPLE	SAMPLE	BLOW COUNTS / FT.	CHANGE DEPTH (@)	FIELD SOIL DESCRIPTION AND CLASSIFICATION Description and Remarks (Grain Size, Density, Moisture, Color)	U.S.C.S.
0						**Fill/Topsoil:** Silty Sand, Loose to Medium Dense, Dry, Brown, Organics, Rootlets.	SM
1							
2						**Colluvium:** Sandy Clay to Clayey Sand, Stiff to Very Stiff, Medium Dense, Moist, Brown.	CL SC
3						**Formation:** Silty Sandstone, Fine to Medium Grained, Very Dense, Moist, Red-Brown	SM
4						Refusal at 2.5 ft.	
5							
6						TOTAL DEPTH 2.5 FT. NO GROUNDWATER NO CAVING BACKFILLED 8/30/2018	
7							
8							
9							
10							
11							
12							

Equipment:	Dimension and Type of Excavation:	Logged By:	Date
Hand Auger	4-inch Diameter	HE	8/30/2018
Elevation Existing Elevation	**Groundwater Depth:** NONE ENCOUNTERED		**Boring No.** B-6

DEPTH (FT.)	SYMBOL	BAG SAMPLE	SAMPLE	BLOW COUNTS / FT.	CHANGE DEPTH (@)	FIELD SOIL DESCRIPTION AND CLASSIFICATION Description and Remarks (Grain Size, Density, Moisture, Color)	U.S.C.S.
0						**Fill/Topsoil:** Silty Sand, Loose, Dry, Brown, Organics, Rootlets, Some Small Cobble Rock.	SM
1							
2						**Colluvium:** Silty Sand, Loose to Medium Dense, Dry, Light Brown Some Gravel.	SM
3					3.0 ft.	Becomes Clayey Sand to Sandy Clay, Medium Dense to Very Stiff, Moist, Brown to Red Brown	SC CL
4						**Formation:** Silty Sandstone, Fine to Medium Grained, Very Dense, Moist, Red-Brown	SM
5						Refusal at 3.5 ft.	
6							
7						TOTAL DEPTH 3.5 ft. NO GROUNDWATER NO CAVING BACKFILLED 8/30/2018	
8							
9							
10							
11							
12							

▼ Water Table
⊠ Bulk Sample
◪ SPT Sample
■ Drive Sample
\# Disturbed Blowcount No.
* Disturbed Sample
** No Sample Recovery
Geologic Contact
Soils Change

C. W. La Monte Company Inc.

JOB NAME: 2528 Island Ave

JOB ADDRESS: 2528 Island Ave., San Diego, CA

Fig. No. 6e-f

EXCAVATION LOG

Equipment:	Dimension and Type of Excavation:	Logged By:	Date
Hand Auger	4-inch Diameter	HE	8/30/2018
Elevation Existing Elevation	**Groundwater Depth:**	NONE ENCOUNTERED	**Boring No.** B-7

DEPTH (FT.)	SYMBOL	BAG SAMPLE	SAMPLE	BLOW COUNTS / FT.	CHANGE DEPTH (@)	FIELD SOIL DESCRIPTION AND CLASSIFICATION Description and Remarks (Grain Size, Density, Moisture, Color)	U.S.C.S.
0						**Fill/Topsoil:** Silty Sand, Loose, Dry, Brown, Organics, Rootlets.	SM
1							
2							
3						**Formation:** Silty Sandstone, Fine to Medium Grained, Very Dense, Moist, Red-Brown	SM
4						Refusal at 3 ft.	
5							
6						TOTAL DEPTH 3.0 FT. NO GROUNDWATER NO CAVING BACKFILLED 8/30/2018	
7							
8							
9							
10							
11							
12							

Equipment:	Dimension and Type of Excavation:	Logged By:	Date
Hand Auger	4-inch Diameter		8/30/2018
Elevation Existing Elevation	**Groundwater Depth:**		**Boring No.**

DEPTH (FT.)	SYMBOL	BAG SAMPLE	SAMPLE	BLOW COUNTS / FT.	CHANGE DEPTH (@)	FIELD SOIL DESCRIPTION AND CLASSIFICATION Description and Remarks (Grain Size, Density, Moisture, Color)	U.S.C.S.
0							
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

▼ Water Table
⊠ Bulk Sample
◪ SPT Sample
■ Drive Sample
\# Disturbed Blowcount No.
* Disturbed Sample
** No Sample Recovery
Geologic Contact
Soils Change

C. W. La Monte Company Inc.

JOB NAME: 2528 Island Ave

JOB ADDRESS: 2528 Island Ave., San Diego, CA

Fig. No. 6g

TYPICAL RETAINING WALL SECTION

(No Scale)

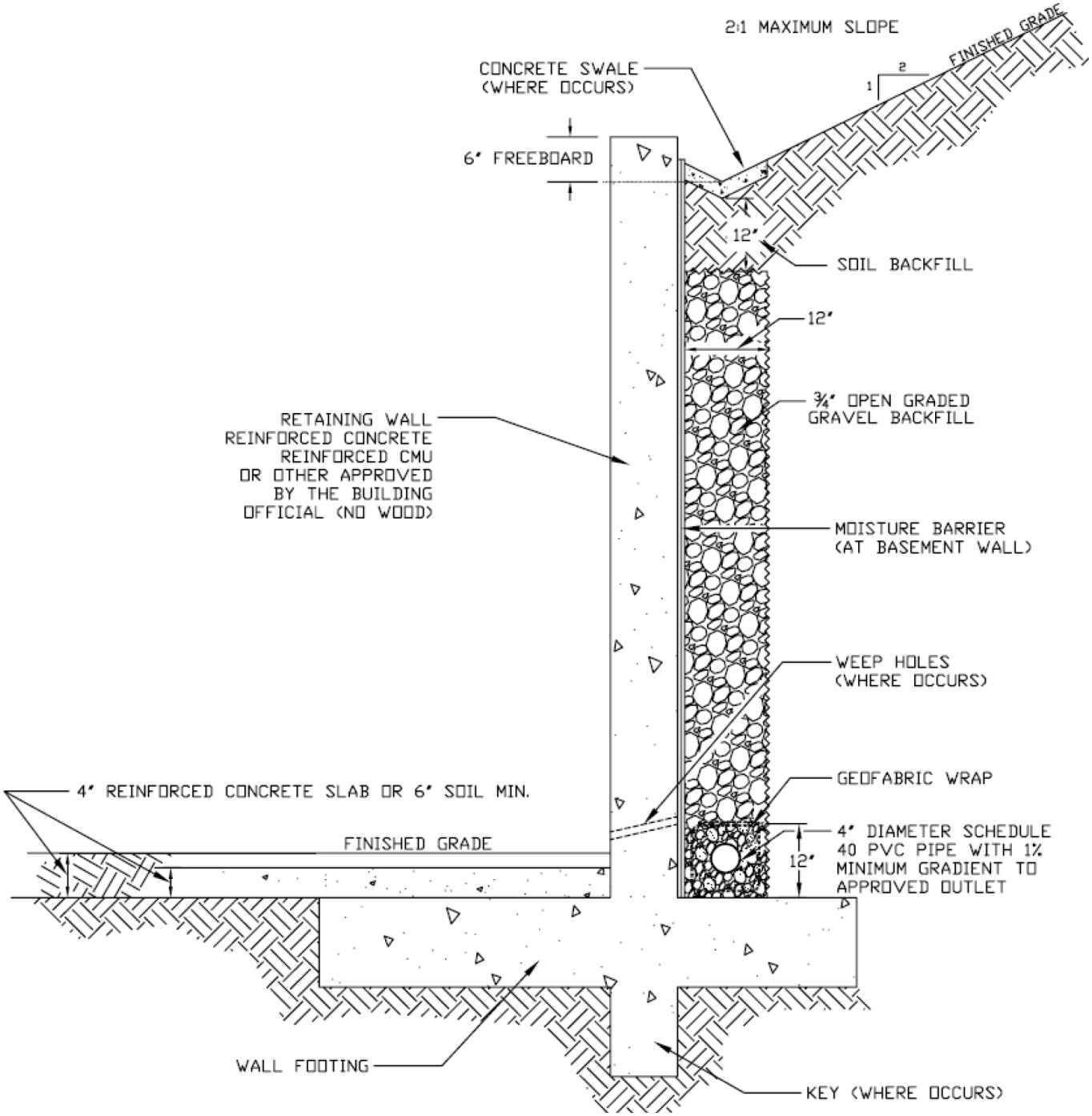


Figure No. 7A

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.