GEOTECHNICAL PLAN REVIEW UPDATE
AND RESPONSE TO CITY OF SAN DIEGO CYCLE ISSUES
PROPOSED TWO-LOT RESIDENTIAL DEVELOPMENT
BEELER CANYON ROAD
SAN DIEGO, CALIFORNIA

July 7, 2020

Prepared For:

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Project No. GI-20-06-121

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Geotechnical Plan Review Update And Response to City of San Diego Cycle Issues
Proposed Two-Lot Residential Development, Beeler Canyon Road, San Diego, California

Pursuant to your request, ***SMS*** **Geotechnical Solutions, Inc.** has completed the attached report of Geotechnical Plan Review Update and Response to City of San Diego Cycle Issues (LDR-Geology, Cycle 2, dated April 16, 2020) for the proposed two-lot residential development project at the above-referenced property.

The following report summarizes the results of our research and review of the project pertinent documents and previous geotechnical reports, and provides updated, revised or amended conclusions and recommendations for the proposed development based on the current plans, applicable codes and engineering standards, as understood. From a geotechnical engineering standpoint, it is our opinion that the project property remains suitable for the proposed two-lot residential development, provided the recommendations presented in this report are incorporated into the design and reconstruction of the project.

If you have any questions or need clarification, please do not hesitate to contact this office. Reference to our **Project No. GI-20-06-121** will help to expedite our response to your inquiries.

We appreciate this opportunity to be of service to you.

SMS **Geotechnical Solutions, Inc.**

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I. INTRODUCTION AND BACKGROUND

The project property evaluated in this geotechnical plan review update effort consists of a rectangular-shaped hillside parcel characterized by gentle to modest natural terrain, located south of Beeler Canyon Road near the southern reaches of the City of Poway within the limits of the City of San Diego. The approximate location of the project property is shown on a Regional Index Map attached to this report as Figure 1. The approximate property coordinates are 32.9272°N latitude and -117.0406°W longitude.

Project property was originally considered for a three-lot subdivision (2005), which was subsequently modified to a two-lot (2008) and then a single lot development (2014). Previously studies were completed by other consultants in support of the three-lot and then a two-lot subdivision map, and subsequent single lot development. Their findings, conclusions, and development recommendations were provided in the following technical reports:

A. "Response to City Comments," prepared by Allied Earth Technology (AET), Project No. 14-1210E2, report dated November 24, 2015.

B. "Update of Report of Geotechnical Investigation, Proposed Residential Building Site, 11275 Beeler Canyon Road, San Diego, California," prepared by Allied Earth Technology (AET), Project No. 14-1210E2, report dated June 24, 2014.

C. "Geotechnical Update and Grading Plan Review, Tentative Parcel Map 266071, 2-Lot Subdivision, Beeler Canyon Road, City of San Diego, California (A.P.N. 320-030-31)," prepared by Vinje & Middleton Engineering, Inc. (VME), Job #05-276-P, report dated January 2, 2008.

D. "Preliminary Geotechnical Investigation, Proposed 3-Lot Development, 2.8 Acre Parcel, Beeler Canyon Road, San Diego County (A.P.N. 320-030-31)," prepared by Vinje & Middleton Engineering, Inc. (VME), Job #05-276-P, report dated June 27, 2005

The preceding reports were reviewed in connection with this update effort. A copy of each report is enclosed herein as Appendix A through D respectively.

We are also in receipt of the City of San Diego LDR-Geology comments provided in a Cycle Issues, (Cycle 2) dated April 16, 2020. A copy is attached with this transmittal as Appendix E.

II. SITE DESCRIPTION

Based on a site visit by our project geologist on June 22, 2020, surface and topographic conditions at the project property remain substantially unchanged from those described in the referenced reports. The property is located on the southern flank of Beeler Canyon. Topographically, the site ascends from Beeler Canyon Road in a southerly direction with overall gradients generally approaching 4:1 maximum. Steeper terrain characterizes off-site areas to the south. Flowline topography marks the southwest corner with a canyon that flows northward, tributary to Beeler Canyon. The property is presently mantled by a thick covering of native trees, bushes and plants.

III. PROPOSED DEVELOPMENT

Project most current Site Plan/Grading Plan prepared by Carl Fiorica, PE, dated April 2020 was provided to us and is reproduced (Sheet 2 of 14) herein as a Geotechnical Map Figure 2. The new Site Plan/Grading Plan (Figure 2) propose a revised development schemes from those considered as a basis of prior geotechnical studies (see references). As shown on Figure 2, the northern portion of the property is planned for a two-lot residential development. Each lot will be developed into split level building pads, supporting single-family residential dwellings on the upper southerly pads and accessory dwelling units on lower northerly pads adjacent to Beeler Canyon Road. Associated improvements include underground utilities and a shared driveway that provides access to each residential structure from Beeler Canyon Road.

Relatively modest cutting and filling will be needed to achieve final design grades shown on Figure 2. Proposed vertical cutting and filling depths will be on the order of 10 feet maximum. Associated graded cut and fill slopes will approach 12 feet and 20 feet in maximum vertical heights, respectively and are programmed for 2:1 or flatter gradients. New graded slopes will include fill over cut embankments.

Building foundation plans and details are unavailable. However, future building construction for both the dwellings and accessory units are expected to consist of conventional wood frame structures with exterior stucco supported on shallow stiff continuous strip and spread pad footings and slab-on-grade floor foundations.

IV. GEOTECHNICAL CONDITIONS

Geotechnical conditions at the project property remain substantially the same as presented in referenced reports. In general, the site is underlain by well-cemented and massive pebble to cobble conglomerate in a sandy matrix commonly known as Stadium Conglomerate (Tst). Difficult excavations and back hoe refusal were reported at shallow depths during exploratory trenching into the hard and well-cement formational rocks (see Test Trench logs, Reference D). A thin cover of sandy topsoil in a loose condition mantles the underlying conglomerate formational rocks.

Exiting topographic conditions and proposed development at the project property are shown on the enclosed Geotechnical Map Figure 2. Approximate location of pertinent exploratory test pits are also transferred and depicted on the Figure 2. Logs of the test trenches are included as Plates 3 through 5 in the enclosed Appendix D (VME report dated June 27, 2005). Pertinent geotechnical data and engineering properties of the underlying soils are provided in the referenced report(s). New Geologic Cross-Sections A-A' and B-B' depicting existing/proposed grades and subsurface conditions are included as Figure 3.

V. REGIONAL GEOLOGY

The project site is situated at the western margin of the Peninsular Ranges Geomorphic Province of southern California. In general, the Peninsular Ranges consist of rugged mountains underlain by Mesozoic era (67 to 245 million years old) metamorphic and crystalline rocks to the east and a dissected coastal plain underlain by Cenozoic era (up to 67 million years old) sediments. The mountain ranges of this geomorphic province are generally northwest-trending and separated by subparallel fault zones, and are largely composed of granitic and related rocks and smaller amounts of metamorphic rocks. The coastal portions of this geomorphic province in the San Diego region are typically comprised of marine and non-marine sedimentary rocks that have been deposited within a northwest-trending basin known as the San Diego Embayment. The Peninsular Ranges are traversed by several major active faults. Right-lateral, strike-slip movement is the major tectonic activity associated with faults in the regional tectonic framework. Earthquakes along these faults have the potential for generating strong seismic ground motions in the region. A Geologic Map showing mapped units at the project site and surrounding areas is attached as Figure 4.

VI. SITE CLASSIFICATION FOR SEISMIC DESIGN

Site soils are classified based on the upper 100 feet maximum of site subsoil profile. In the absence of sufficient or specific site data, appropriate soil properties are permitted to be estimated by the project geotechnical consultant based on known geotechnical conditions, and Site Class D is typically used as a "default," unless otherwise noted. Site Classes A and B shall not be assigned to a site, if there is more than 10 feet of soil (or fill) between the top of the underlying rock surface and bottom of the foundation.

Site Classes A and B are most commonly supported by shear wave velocity determination (υ_s, ft/s). Site Class F, which may require a site response analysis, consists of liquefiable or collapsible soils and highly sensitive clayey soil profile. Site Classes C, D, and E soils may be classified using an average field Standard Penetration Resistance ($\tilde{N}$) method for soil layers based on Section 20.4.2 of ASCE 7-16. Where refusal is met for a rock layer (blow counts of 50 or greater for 6 inches or less penetration), Ni is taken as 100 blows per foot. Site Classification is then established based on Table 20.3-1 of ASCE 7-16.

Requirements provided below are also applicable and should be incorporated in the project designs where appropriate:

1. Site specific hazard analysis is required (see Section 11.4.8) in accordance with Chapter 21.2 of ASCE 7-16 for structures on Site Class E sites with values of Ss greater than or equal to 1.0g, and structures on Site Class D and E sites with values of S1 greater than or equal to 0.2g. However, the following three exceptions are permitted for Equivalent Lateral Force design (ELF) using conservative values of seismic design parameters in lieu of performing a site specific ground motion analysis:

   * Structures on Site Class E sites with Ss greater than or equal to 1.0, provided the site coefficient Fa is taken as equal to that of Site Class C.

   * For structures on Site Class D sites with S1 greater than or equal to 0.2, a long period coefficient (Fv) of 1.7 may be utilized for calculation of Ts, provided that the value of Seismic Response Coefficient (Cs) is determined by Equation (12.8-2) for values of the fundamental period of the building (T) less than or equal to 1.5Ts, and taken as 1.5 times the value computed in accordance with either Equation 12.8-3 for T greater than 1.5 Ts and less than or equal to TL or Equation 12.8-4 for T greater than TL.

   * Structures on Site Class E sites with S1 greater than or equal to 0.2, provided that T is less than or equal to Ts and the equivalent static force procedure is used for the design.

2. Where Site Class B is recommended, and a site specific measurement is not provided, the site coefficients Fa, Fv, and FPGA shall be taken as unity (1.0) in accordance to Section 11.4.3 of ASCE 7-16.

3. Where Site Class D is selected as the "default" site class per Section 11.4.3 of ASCE 7-16, the value of Fa shall not be less than 1.2. Where the simplified procedure of Section 12.4 is used, the value of Fa shall be determined in accordance with Section 12.14.8.1, and the values of Fv, SMS and SM1 need not to be determined.

At the project property massive dense, cement and competent Eocene Age formational rocks occur beneath site at very shallow to shallow depths on the order of 1.0 to 7.0 feet maximum below existing ground surfaces (BGS), and based on our past experience with similar deposits, Site Class D (Stiff Soil), can be conservatively considered for the project site subsoil profile, unless otherwise noted.

VII. SEISMIC DESIGN VALUES

Seismic design values are presented in the attached Appendix F in accordance with Chapter 16, Section 1613 of the 2019 California Building Code (CBC) and ASCE 7-16 Standard. Presented values are generated using ASCE developed web interface that uses the United States Geological Survey (USGS) web services and retrieves the seismic design data in a report format.

VIII. GEOLOGIC HAZARDS

The project property is situated within Geologic Hazard Category #53 (low to moderate risk), as shown on Figure 5 (an excerpt of Grid Tile #40 from the City of San Diego Seismic Safety Study). Conditions which could result in potential geologic hazards are known in areas of San Diego County. The following potential geologic hazards at the project site were evaluated as part of this effort in accordance with the Title 24, California Code of Regulations, 2019 California Building Code (CBC) and California Geologic Survey (CGS) Note 48 guidelines:

A. **Seismicity:** Moderate to locally heavy levels of ground shaking can be anticipated during rare events along an active fault over the lifetime of the development. Details of the project's seismic environment are given in the referenced reports. The project shall be designed and constructed in accordance with the seismic design requirements of the 2019 California Building Code (CBC) and ASCE 7-16 Standard.

B. **Faulting:** Faults or significant shear zones are not indicated within the limits of project site. The project is not located in proximity to Alquist - Priolo earthquake fault zone areas associated with active faults.

C. **Flood Inundation:** Potential flood hazards at the project site were evaluated using the ASCE Hazards Tool and a review of FEMA National Flood Hazard Layer FIRMette. A copy of the ASCE Hazards Report including the pertinent FEMA National Flood Hazard Layer FIRMette is attached herein as Appendix G. Based on our review, the project site is located in Zone X, which defined as an Area of Minimal Flood Hazard, according to the FEMA National Flood Hazard Layer FIRMette. Beeler Creek runs along the north side of Beeler Canyon Road across from the project site. Portions of Beeler Creek include potential flood areas, but they are removed from the site and not expected to pose a significant flood hazard. In addition, planned building pads are all elevated above Beeler Canyon Road.

   Dams or significant water retention structures are not located within sufficient distance to the project site to create a flood inundation, a catastrophic erosion or related hazard. Site flooding due to natural sheetflow or street flooding is also considered remote and the site is sufficiently removed from the coast and hazards due to large bodies of water including Tsunami or Seiche are considered extremely remote.

D. **Liquefaction:** Soil liquefaction or related ground failures can adversely impact manmade structures and improvements at the site where subsoils consist of loose sandy alluvial deposits inundated with groundwater. Liquefaction is the sudden loss of soil strength in response to ground shaking during an earthquake event.

At the project site, massive dense and competent formational rock deposits occur at very shallow depths, and static groundwater conditions were not encountered to the depths explored. Under these circumstances, the possibility of liquefaction and associated secondary effects within the underlying natural formational rock deposits is considered extremely remote to none.

E. **Slope Stability:** The property consists of modest to gentle terrain that is underlain by stable formational rock deposits. New graded cut and fill slopes are programmed for 2:1 maximum gradients and will be grossly stable with respect to deep seated and surficial stability for the indicated maximum design vertical heights. Consequently, slope stability is not considered a major geotechnical concern in the proposed development, provided our grading and development recommendations are followed.

All graded slopes should be provided with well-constructed drainage berm along the top.

F. **Settlement:** Potential static settlement of upper loose and compressible surficial soil is an important factor in the future performance of the planned new buildings. At the project property dense and stable formational rocks occur at very shallow depths and upper surficial soil mantle and weathered near surface exposures of the underlying formational rocks are recommended for over-excavation and recompaction.

Settlement of foundation bearing soils is not considered a major geotechnical concern in the planned development provided recommendations presented in this report are followed. Post construction foundation bearing soil settlements are expected to be less than approximately 1-inch and should occur below the heaviest loaded footing(s). The magnitude of post construction differential settlements, as expressed in terms of angular distortion, is not anticipated to exceed ½-inch in a distance between similarly loaded adjacent structural elements (spread pad or column footings) or a maximum distance of 20 feet (continuous footings), whichever applicable.

G. **Collapsible Soils:** Buildings and improvements founded on collapsible soils may be damaged by sudden and often large induced settlement when these soils are saturated after construction. Collapsible soils are typified by low values of dry unit weight and natural water content. The amount of settlement depends on the applied vertical stresses and the extent of the wetting and availability of water.

Dense and competent formational rocks underlie the property at very shallow depths and upper surficial soil mantle and weathered near surface exposures of the underlying formational rocks are recommended for removal and recompaction. As a result, soil collapse is not considered a major geotechnical concern in the planned redevelopment provided our recommendations are followed.

H. **Expansive Soils:** Based upon available laboratory test results, onsite soils are cobbly deposits with a sandy matrix with very low expansive potential (based on ASTM D4829). Locally, site natural topsoils include minor amounts of sandy clay deposits that range to medium expansion potential (Expansion Index less than 90). These soils are expected to be minor in overall quantities and are recommended for burial in deeper fills, or mixing with an abundance of onsite very low expansive soil for manufacturing fills, using select grading techniques. Expansive soils will not be a major geotechnical concern in the planned development provided our select grading recommendations are followed.

IX. CONCLUSIONS AND RECOMMENDATIONS

Based on our review of the attached reports (Appendices A through D) and current site observations, development of the project property, as currently proposed on the new Site Plan And Grading Plan (Figure 2), is substantially feasible from a geotechnical viewpoint. Geotechnical conditions reported in the referenced reports generally remain unchanged. All conclusions and recommendations provided in the referenced reports remain valid and should be considered in the final designs and implemented during the construction phase, except where specifically superseded or amended below. The following are appropriate:

A. Project designs and earthworks including excavations, grading, bearing soil preparations, foundation trenching and related constructions shall be completed in accordance with Chapter 18 (Soils and Foundations) and Appendix "J" (Grading) of the 2019 California Building Code (CBC), ASCE 7-16, the Standard Specifications for Public Works Construction, City of San Diego Ordinances, the requirements of the governing agencies, referenced documents and this update report, wherever relevant and as applicable.

B. Site grading and earthworks are not expected to impact the adjacent properties, improvements and public right-of-ways provided development recommendations given in the referenced reports and this update transmittal are incorporated into the final designs and implemented during the construction phase. Added field recommendations, however, may also be necessary and should be given by the project geotechnical consultant for the protection of adjacent properties and improvements, and should be anticipated.

C. Removal (over-excavation) depths (1.5 to 7 feet BGS, or 2.0 feet below the bottom of deepest footing, whichever is more) and recompaction procedure remains the same as specified in the referenced repots. Locally, deeper removals may also be necessary and should be anticipated. A Typical Over-Excavation And Recompaction Detail is included in attached Figure 6.

   Bottom of all removals should be additionally prepared, ripped and recompacted to a minimum depth of 6 inches, as a part of initial fill lift placement, and as directed in the field. The exposed bottom of over-excavation should be observed and dense and competent formational rocks below the weathered zone approved by the project geotechnical consultant or his designated field representative prior to fill or backfill placement.

D. The cut portion of cut-fill transition pads plus 10 feet outside the building envelop, where possible and as directed in the field, should be undercut to a sufficient depth to provide for a minimum 4 feet of compacted fill mat below rough finish grades, or at least 24 inches of compacted fill below the bottom of deepest footing(s), whichever is more. Cut-fill daylight (transition) mitigation method and undercutting should be carried out in substantial accordance with the enclosed Typical Undercutting Detail, Figure 7.

E. Undermining existing nearby improvements, structures and adjacent public and private properties by the site over-excavations and removal operations shall not be allowed. For this purpose, adequate excavation set backs shall be maintained and excavation slopes laid back at safe gradients as specified herein and directed in the field.

   Trenching and temporary excavation slopes, or portions thereof, developed into site upper topsoil sections should be laid back at 1:1 maximum gradients. Excavation slope and trenching exposing competent formational rocks may be development at near vertical gradients to maximum vertical height of 5, unless otherwise noted or directed in the field. Larger temporary excavation slopes exposing competent formational rocks may be development at near vertical gradients within the lower 5.0 feet and laid back at1:1 maximum gradients within the upper portions. The laid back slope should then be properly benched out and new fills/backfills tightly keyed-in as the backfilling progresses.

   All trenching and temporary construction slopes require geotechnical observations during the excavation operations. More specific recommendations should be given in the field by the project geotechnical consultant based on actual exposures. Revised temporary construction slope and trenching recommendations including flatter laid back gradients, larger setbacks and the need for temporary shoring/trench shield support may also become necessary and should be anticipated.

The project contractor shall also obtain appropriate permits, as needed, and conform to Cal-OSHA and local governing agencies' requirements for trenching/open excavations and safety of the workmen during construction. Appropriate permits for offsite grading or excavation encroachments into neighboring private properties and/or public right-of-ways, if any required or necessary, should also be obtained as appropriate from respective owners and agencies.

F. Excavation characteristic, earth materials, preparation of ground receiving new fills/backfills, fill soil manufacturing and processing procedures, select grading and compaction requirements remain the same as specified in the referenced reports (see Appendix D report dated June 27, 2005). Potentially expansive soils, where they are encountered, should be buried in deeper fills at least a minimum of 4, or throughly mixed with an abundance of sandy soils generated from the site formational rock excavations to manufacture a very low expansive fill mixture.

Import soils, if used to improve quality of the onsite rocky soils or required to complete grading, should be good quality sandy granular non-corrosive D.G. type deposits (SM/SW) with very low expansion potential conforming to the requirements of the referenced reports (see Appendix C report, dated January 2, 2008). All grading and earthworks should be continuously observed and tested by the project geotechnical consultant and summarized in the final as-graded compaction report.

G. New graded cut and fill slopes are planned at 2:1 maximum gradients. Grade cut and fill slopes should be constructed as specified in the referenced report(s). However, fill slope toe keyways should not be less that 15 feet wide. A toe subdrain may also be required at the base of the graded cut slopes and should be anticipated, in accordance with the requirements of the referenced report(s), and as directed in the field.

The attached Figures 8 through 13 depict general details for developing the project graded slopes, where applicable. Added care will be required when developing mid-height ("flying") keyways for upper fill section constructed atop of lower cut portions for fill-over-cut slopes (see Typical Fill-Over-Cut Detail, Figure 10). The entire finish face of the fill-over-cut slopes should be track-walked or backrolled at the completion of construction.

H. Select grading procedures are recommended for developing the level building pads at the project property. Final bearing and subgrade soils are expected to predominantly consist of cobbly to gravelly silty sand to silty sandy gravels (GM/SW) deposits with very low expansion potential (expansion index less than 20) based on ASTM D4829 classification.

I. Future residential buildings and accessory units on the new graded building pads may be supported on shallow stiff concrete footings and slab-on-grade floor type foundations, consistent with the anticipated as-graded geotechnical conditions. All footings should be supported on well-compacted fills placed in accordance with the requirements of the attached References and this update report. Cut portions of cut-fill transition pads should be undercut and reconstructed to design grades with compacted fills as specified herein. Foundation trenching should be completed in substantial conformance with the Typical Foundation Formwork Detail included in the attached Figure 6.

1. Perimeter and interior continuous strip foundations should be sized at least 15 inches wide and 18 inches deep for single and two-story structures. Spread pad footings, if any, should be at least 30 inches square and 18 inches deep. Footing depths are measured from the lowest adjacent ground surface, not including the sand/gravel layer beneath the floor slabs. Exterior continuous footings should enclose the entire building perimeter.

   Continuous interior and exterior foundations should be reinforced with a minimum of four #4 reinforcing bars. Place 2-#4 bars 3 inches above the bottom of the footing and 2-#4 bars 3 inches below the top of the footing. Reinforcement details for spread pad footings should be provided by the project architect/structural engineer.

2. Interior slabs should be a minimum 4.5 inches in thickness, reinforced with #3 reinforcing bars spaced 16 inches on center each way, placed mid-height in the slab. Interior slabs should be underlain by 4 inches of clean sand (SE 30 or greater) which is provided with a well performing moisture barrier/vapor retardant (minimum 10-mil Stego) placed mid-height in the sand. Alternatively, a 4-inch thick base of compacted ½-inch clean aggregate provided with the vapor barrier (minimum 15-mil Stego) in direct contact with (beneath) the concrete may also be considered only if a concrete mix which can address bleeding, shrinkage and curling is used.

   Provide re-entrant corner (270 degrees corners) reinforcement and "softcut" contraction/control joints for all interior slabs, as specified in the referenced reports (see Plate 8 of Appendix D report).

3. Adequate setbacks or deepened foundations shall be required for all foundations and improvements constructed on or near the top of descending slopes to maintain minimum horizontal distances to daylight or adjacent slope face. There should be a minimum of 7.0 feet or ⅓ of slope height, whichever is more, horizontal setback from the bottom outside edge of the footing to daylight for foundations. Larger setbacks (minimum 10 feet to daylight) shall be required for more sensitive structures and improvements (such as swimming pools) which cannot tolerate minor movements. Concrete flat woks and site improvements near the top of descending slopes should be provided with a thickened edge to satisfy this requirement, unless otherwise specified or approved.

4. Foundation trenches and slab subgrade soils should be observed and tested for proper moisture and specified compaction levels and approved by the project geotechnical consultant prior to the placement of steel reinforcement or concrete pour.

J. Soil design parameters will stay the same as specified in the referenced reports (see Page 17 of Appendix D report). An additional seismic force due to seismic increments of earth pressure should also be considered in the project designs, if appropriate and where applicable. A seismic lateral inverted triangular earth pressure of 15 pcf (EFP), acting at 0.6H (H is the retained height) above the base of the wall should be considered. Alternatively, seismic loading based on Mononobe-Okake (M-O) coefficients may be considered for seismic force due to seismic increments of earth pressure. The following relationships and design values are appropriate:

Wall Condition	Total Lateral Pressure	Seismic Lateral Pressure	K_A	K_O	K_h	K_{AE}	K_{OE}	Υ (pcf)
Unrestrained	$P_{AE}=P_A+P_{AE}$	$\Delta P_{AE}=\frac{3}{8}K_h \Upsilon H^2$	0.29	-	0.13	0.42	-	120
Restrained	$P_{OE}=P_O+P_{OE}$	$\Delta P_{OE}=K_h \Upsilon H^2$	-	0.46	0.13	-	0.59	120

K. All exterior concrete slabs, sidewalks and flatworks should be a minimum of 4 inches in thickness, reinforced with #3 bars at 18 inches on centers in both directions placed mid-height in the slab. Subgrade soils underneath the exterior slabs should be moisture reconditioned and recompacted to minimum 90% compaction levels at the time of fine grading and before placing the slab reinforcement.

Reinforcements lying on subgrade will be ineffective and shortly corrode due to lack of adequate concrete cover. Reinforcing bars should be correctly placed extending through the construction joints tying the slab panels. In construction practices where the reinforcements are discontinued or cut at the construction joints, slab panels should be tied together with minimum 18 inches long #3 dowels at 18 inches on centers placed mid-height in the slab (9 inches on either side of the joint).

Provide "tool joint" or "softcut" contraction/control joints spaced 10 feet on center (not to exceed 12 feet maximum) each way. The larger dimension of any panel shall not exceed 125% of the smaller dimension. Tool or cut as soon as slab will support weight, and can be operated without disturbing the final finish which is normally within two hours after final finish at each control joint location or 150 psi to 800 psi. Tool or softcuts should be a minimum of ¾-inch but should not exceed 1-inch deep maximum. In case of softcut joints, anti-ravel skid plates should be used and replaced with each blade to avoid spalling and raveling. Avoid wheeled equipment across cuts for at least 24 hours.

Joints shall intersect free-edges at a 90° angle and shall extend straight for a minimum of 1.5 feet from the edge. The minimum angle between any two intersecting joints shall be 80°. Align joints of adjacent panels. Also, align joints in attached curbs with joints in slab panels. Provide adequate curing using approved methods (curing compound maximum coverage rate = 200 sq. ft./gal.).

Subgrade soils should be tested for proper moisture and specified compaction levels and approved by the project geotechnical consultant prior to the placement of concrete.

L. Specific pavement designs can best be provided at the completion of rough grading based on testing of the actual finish subgrade soils; however, the following structural sections may be considered for initial planning phase:

1. A minimum pavement structural section of 3.0 inches of hot mix asphalt concrete (HMA) over 6.0 inches of Class 2 aggregate base (AB), or the minimum structural section required by City of San Diego, whichever is more, may be considered for the onsite asphalt concrete paving surfaces outside the private and public right-of-way. In public roadways and right-of-ways, a minimum section of 4 inches of HMA over 6 inches of Class 2 aggregate base (AB), or the minimum structural section required by City of San Diego, whichever is more may be considered for initial planning purposes. Actual designs will depend on final subgrade R-value and design TI, and the approval of the City of San Diego.

   In the areas where the longitudinal grades exceed 10%, 0.3-inch HMA should be added to the design thickness for each 1% increase in grade or portion thereof. PCC paving should be considered for longitudinal street grades over 15%. Maximum lift for asphalt concrete shall not exceed 3.0 inches. The 4-inch asphalt concrete layer, where required, should consist of 2.5 inches of a binder/base course (¾-inch aggregate) and 1.5 inches of finish top course (½-inch aggregate) topcoat, placed in accordance with the applicable local and regional codes and standards.

   The Class 2 aggregate or recycled base (AB) shall meet or exceed the requirements set forth in the current California Standard Specification (Caltrans Section 26-1.02). Base materials should be compacted to a minimum 95% of the corresponding maximum dry density (ASTM D1557). Subgrade soils beneath the asphalt paving surfaces should also be compacted to a minimum 95% of the corresponding maximum dry density within the upper 12 inches. Base materials and subgrade soils should be tested for proper moisture and minimum 95% compaction levels and approved by the project geotechnical consultant prior to the placement of the base or asphalt layers.

2. Residential PCC pavings on very low expansive subgrade soils should be a minimum 5 inches in thickness, reinforced with #3 reinforcing bars at 18 inches on centers each way placed at mid-height in the slab. Subgrade soils beneath the PCC pavings should also be moisture reconditioned and recompacted to minimum 90% compaction levels at the time of fine grading and before placing the slab reinforcement.

   Reinforcing bars should be correctly placed extending through the construction (cold) joints tying the slab panels. In construction practices where the reinforcements are discontinued or cut at the construction joints, slab panels should be tied together with minimum 18-inch long (9.0 inches on either side of the joint) similar size dowels, placed at the same spacing as the slab reinforcement.

   In the areas where longitudinal grades exceed 10%, also provide a minimum 8.0 inches wide by 8.0 inches deep pavement anchors constructed perpendicular to the pavement longitudinal profile into the approved subgrade at each 20-foot interval maximum. The pavement anchors should be poured monolithically with the concrete paving surfaces.

   Provide "tool joint" or "softcut" contraction/control joints spaced 10 feet on center (not to exceed 15 feet maximum) each way. The larger dimension of any panel shall not exceed 125% of the smaller dimension. Tool or cut as soon as the slab will support the weight and can be operated without disturbing the final finish which is normally within two hours after final finish at each control joint location or 150 psi to 800 psi. Tool or softcuts should be a minimum of 1-inch in depth but should not exceed 1¼-inches deep maximum. In case of softcut joints, anti-ravel skid plates should be used and replaced with each blade to avoid spalling and ravelings. Avoid wheeled equipment across cuts for at least 24 hours.

   Joints shall intersect free edges at a 90° angle and shall extend straight for a minimum of 1½ feet from the edge. The minimum angle between any two intersecting joints shall be 80°. Align joints of adjacent panels. Also, align joints in attached curbs with joints in slab panels. Provide adequate curing using approved method (curing compound maximum coverage rate = 200 sq. ft./gal.)

   Subgrade preparations and base materials requirements under curb and gutters will remain the same as provided in the referenced reports. As a minimum, use Green Book (Standard Specifications For Public Works Construction) 560-C-3250 Concrete Class for PCC pavings.

X. GENERAL RECOMMENDATIONS

A. The minimum foundation design and steel reinforcement provided herein are based on soil characteristics and are not intended to be in lieu of reinforcement necessary for structural consideration.

B. Adequate staking and grading control is a critical factor in properly completing the recommended remedial and site grading operations. Grading control and staking should be provided by the project grading contractor or surveyor/civil engineer, and is beyond the geotechnical engineering services. Staking should apply the required setbacks shown on the approved plans and conform to setback requirements established by the governing agencies and applicable codes for off-site private and public properties and property lines, utility easements, right-of-ways, nearby structures and improvements, leach fields and septic systems, and graded embankments. Inadequate staking and/or lack of grading control may result in unnecessary additional grading which will increase construction costs.

C. Open or backfilled trenches parallel with a footing shall not be below a projected plane having a downward slope of 1-unit vertical to 2 units horizontal (50%) from a line 9.0 inches above the bottom edge of the footing, and not closer than 18 inches from the face of such footing. The Typical Trench Adjacent to Foundation is provided in the enclosed Figure 14 and may be used as a general guideline.

D. Where pipes cross under-footings, the footings shall be specially designed. Pipe sleeves shall be provided where pipes cross through footings or footing walls, and sleeve clearances shall provide for possible footing settlement, but not less than 1-inch all around the pipe. A schematic detail entailed Pipes Through or Below Foundations is included on the enclosed Figure 14.

E. Expansive clayey soils should not be used for backfilling of any retaining structure. All retaining walls should be provided with a 1:1 wedge of granular, compacted backfill measured from the base of the wall footing to the finished surface and a well-constructed back drain system as shown on the enclosed Typical retaining Wall Back Drainage, Figure 15. Planting large trees behind site retaining walls should be avoided.

F. All underground utility and plumbing trenches should be mechanically compacted to a minimum of 90% of the maximum dry density of the soil unless otherwise specified or required by the governing agencies. Care should be taken not to crush the utilities or pipes during the compaction of the soil. Very low expansive, granular import backfill soils should be used. Trench backfill materials and compaction beneath pavements within the public right-of-way shall conform to the requirements of governing agencies.

G. Finish ground surfaces immediately adjacent to the building foundations shall be sloped away from the building at a minimum 5% for a minimum horizontal distance of 10 feet measured perpendicular to face of the building wall (CBC 1804.4 Site Grading). If physical obstructions or property lines prohibit 10 feet of horizontal distance, a 5% slope shall be provided with an alternative method for diverting water away from the foundation. Swales used for this purpose shall be sloped not less than 2% where located within 10 feet of the building foundation. Impervious surfaces (concrete sidewalks) within 10 feet of the building foundation shall also be sloped at minimum 2% away from the building.

H. Care should be taken during the construction, improvements, and fine grading phases not to disrupt the designed drainage patterns. Roof lines of the buildings should be provided with roof gutters. Roof water should be collected and directed away from the buildings and structures to a suitable location.

I. All foundation trenches should be observed to ensure adequate footing embedment and confirm competent bearing soils. Foundation and slab reinforcements should also be observed and approved by the project geotechnical consultant.

J. The amount of shrinkage and related cracks that occur in the concrete slab-on-grades, flatworks and driveways depend on many factors, the most important of which is the amount of water in the concrete mix. The purpose of the slab reinforcement is to keep normal concrete shrinkage cracks closed tightly. The amount of concrete shrinkage can be minimized by reducing the amount of water in the mix. To keep shrinkage to a minimum the following should be considered:

   1. Use the stiffest mix that can be handled and consolidated satisfactorily.

   2. Use the largest maximum size of aggregate that is practical. For example, concrete made with ⅜-inch maximum size aggregate usually requires about 40-lbs. more (nearly 5-gal.) water per cubic yard than concrete with 1-inch aggregate.

   3. Cure the concrete as long as practical.

   The amount of slab reinforcement provided for conventional slab-on-grade construction considers that good quality concrete materials, proportioning, craftsmanship, and control tests where appropriate and applicable are provided.

K. A preconstruction meeting between representatives of this office, the property owner or planner, city inspector as well as the grading contractor/builder is recommended in order to discuss grading and construction details associated with site development.

XI. RESPONSE TO CITY OF SAN DIEGO CYCLE ISSUES

The following provide added information, clarifications and our response to the comments outlined in the City of San Diego LDR-Geology Cycle Issues, (Cycle 2) dated April 16, 2020. Our responses are provided in the same order as in the Cycle Issues (Appendix E):

Issue #1: The project site is located within Hazard Zone 53, as shown on Figure 5. Zone 53 is defined as level to sloping terrain with unfavorable geologic structure and low to moderate risk. The project property is underlain with a massive, stable and competent cobble conglomerate that exhibits no evidence of instability. New graded embankments are also expected to be grossly stable to design maximum heights and gradients, provided our grading and slope development recommendations are followed.

Issues #2 & 3: Pertinent reports are attached to this transmittal. Project current Site Plan and Grading Plan was used a base map for preparing Geotechnical Map, Figure 2.

Issue #4: This report updates all previous reports and addresses current geologic conditions, and is specific to the new development plans.

Issue #5: This report was prepared in accordance with San Diego City's Guideline for Geotechnical Reports.

Issue #6: Quality hard copies of the referenced reports (References) are attached to this transmittal. Digital (pdf) copies of all geotechnical reports (References) and this transmittal are provided on a USB flash drive to the client for submittal.

XII. GEOTECHNICAL ENGINEER OF RECORD (GER)

SMS **Geotechnical Solutions, Inc.** is the geotechnical engineer of record (GER) for providing a specific scope of work or professional service under a contractual agreement unless it is terminated or canceled by either the client or our firm. In the event a new geotechnical consultant or soils engineering firm is hired to provide added engineering services, professional consultations, engineering observations and compaction testing, ***SMS*** **Geotechnical Solutions, Inc.** will no longer be the geotechnical engineer of the record. Project transfer should be completed in accordance with the California Geotechnical Engineering Association (CGEA) Recommended Practice for Transfer of Jobs Between Consultants.

The new geotechnical consultant or soils engineering firm should review all previous geotechnical documents, conduct an independent study, and provide appropriate confirmations, revisions or design modifications to his own satisfaction. The new geotechnical consultant or soils engineering firm should also notify in writing ***SMS* Geotechnical Solutions, Inc.** and submit proper notification to the City of San Diego for the assumption of responsibility in accordance with the applicable codes and standards (1997 UBC Section 3317.8).

XIII. LIMITATIONS

The conclusions and recommendations provided herein have been based on available data obtained from the review of pertinent reports and plans, available subsurface exploratory test pit excavations, surface exposures as well as our experience with the soils and formational rocks in the areas of MiraCosta Oceanside campus. The materials encountered at the project site and utilized in laboratory testing are believed representative of the total area; however, earth materials may vary in characteristics between excavations.

Of necessity, we must assume a certain degree of continuity between excavations and/or natural exposures. It is necessary, therefore, that all observations, conclusions, and recommendations be verified during the site excavations and grading operations. In the event discrepancies are noted, we should be contacted immediately so that an observation can be made and additional recommendations issued, if required.

The recommendations made in this report are applicable to the site at the time this report was prepared. It is the responsibility of the owner/developer to ensure that these recommendations are carried out in the field.

It is almost impossible to predict with certainty the future performance of a property. The future behavior of the site is also dependent on numerous unpredictable variables, such as earthquakes, rainfall, and onsite drainage patterns.

The firm of ***SMS* Geotechnical Solutions, Inc.**, shall not be held responsible for changes to the physical conditions of the property such as addition of fill soils, added cuts or changing drainage patterns which occur without our observation or control.

This report should be considered valid for a period of one year and is subject to review by our firm following that time. If significant modifications are made to your tentative construction plan, especially with respect to finish pad elevations and final building layout, this report must be presented to us for review and possible revision.

This report is issued with the understanding that the client or his representative is responsible for ensuring that the information and recommendations are provided to the project architect and civil/structural engineers so that they can be incorporated into the final designs and construction plans. Necessary steps shall be taken to ensure that the project general contractor and all subcontractors carry out such recommendations during construction.

The project geotechnical engineer should be provided the opportunity for a general review of the project final design plans and specifications in order to ensure that the recommendations provided in this report are properly interpreted and implemented. If the project geotechnical engineer is not provided the opportunity of making these reviews, he can assume no responsibility for misinterpretation of his recommendations.

SMS **Geotechnical Solutions, Inc.**, warrants that this report has been prepared within the limits prescribed by our client with the usual thoroughness and competence of the engineering profession. No other warranty or representation, either expressed or implied, is included or intended.

Once again, should any questions arise concerning this report, please do not hesitate to contact this office. Reference to our **Project No. GI-20-06-121** will help to expedite our response to your inquiries.

We appreciate this opportunity to be of service to you.

SMS **Geotechnical Solutions, Inc.**

REGISTERED PROFESSIONAL ENGINEER
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GEOTECHNICAL
STATE OF CALIFORNIA

Mehdi S. Shariat, GE #2885
Principal Geotechnical Engineer

PROFESSIONAL GEOLOGIST
STEVEN JAY MELZER
No. 2362
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Steven J. Melzer, CEG#2362
Chief Engineering Geologist

Distribution: Addressee (1, e-mail)
Carl Fiorica, PE (2, USB Flash Drive, e-mail)

REFERENCES

- Annual Book of ASTM Standards, Section 4 - Construction, Volume 04.08: Soil and Rock (I); D420 - D5876, 2019.
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- Jennings, C.W., 1994, Fault Activity Map of California and Adjacent Areas, California Division of Mines and Geology, Geologic Data Map Series, No. 6.

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- "An Engineering Manual For Slope Stability Studies," J.M. Duncan, A.L. Buchignani and Marius De Wet, Virginia Polytechnic Institute and State University, March 1987.

- "Procedure To Evaluate Earthquake-Induced Settlements In Dry Sandy Soils," Daniel Pradel, ASCE Journal Of Geotechnical & Geoenvironmental Engineering, Volume 124, #4, 1998.

- "Minimum Design Loads For Buildings and Other Structures," ASCE 7-16, American Society of Civil Engineers (ASCE).

- "Seismic Constraints on The Architecture of The Newport-Ingelwood/Rose Canyon Fault: Implications For The Length And Magnitude of Future Earthquakes," Sahakian, V., Bormann, J., Driscoll, N., Harding, A. Kent, G. Wesnousky, S. (2017), AGU. doi:10.1002/2016JB 013467.

APPENDIX A

ALLIED EARTH TECHNOLOGY

7915 SILVERTON AVENUE, SUITE 317
SAN DIEGO, CALIFORNIA 92126
TEL : (858) 586-1665 (619) 447-4747
E-MAIL : ROBERTAET@AOL.COM

ROBERT CHAN, P.E.

November 24, 2015

Mr. Roman Tivyan
8834 Capcano Road
San Diego, Ca.92126

Subject : Project No. 14-1210E2
Response to City Comments
Update of "Preliminary Geotechnical Investigation for Proposed 3-Lot Development, 2.8 Acre Parcel, Beeler Canyon Road, County of San Diego"
Proposed Residential Building Site
11275 Beeler Canyon Road
San Diego, California

Dear Mr. Tivyan :

The follow are response to City of San Diego comments :

4. *The geotechnical consultant must indicate that they agree with the data and conclusions contained in the referenced geotechnical report dated June 27, 2005.*

   We agree with the data and conclusions contained in the referenced geotechnical report dated June 27, 2005.

5. *Provide a geologic map and geologic cross section*

   See attached.

6. *Determine if the site is safe from geologic hazards*

   The site is safe from geologic hazards.

7. *Indicate if unfavorable geologic structure exists at the site.*

   No unfavorable geologic structure exists at the site.

8. *The project's geotechnical consultant must indicate if storm water infiltration or percolation from the proposed Storm Water Treatment Swale LID would result in adverse impacts on the proposed improvements or adjacent properties. Revise the plans accordingly or provide details that show the proposed Storm Water Treatment Swale LID is designed with an impermeable liner.*

   See revised grading plan where the Storm Water Treatment Swale LID is designed with an impermeable liner.

9. *Geotechnical reports must be prepared in accordance with the City's Guidelines for Geotechnical Reports.*

   Noted

Respectfully submitted,
ALLIED EARTH TECHNOLOGY

ROBERT CHAN, P.E.

REGISTERED PROFESSIONAL ENGINEER
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No C-24613
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ROBERT CHAN
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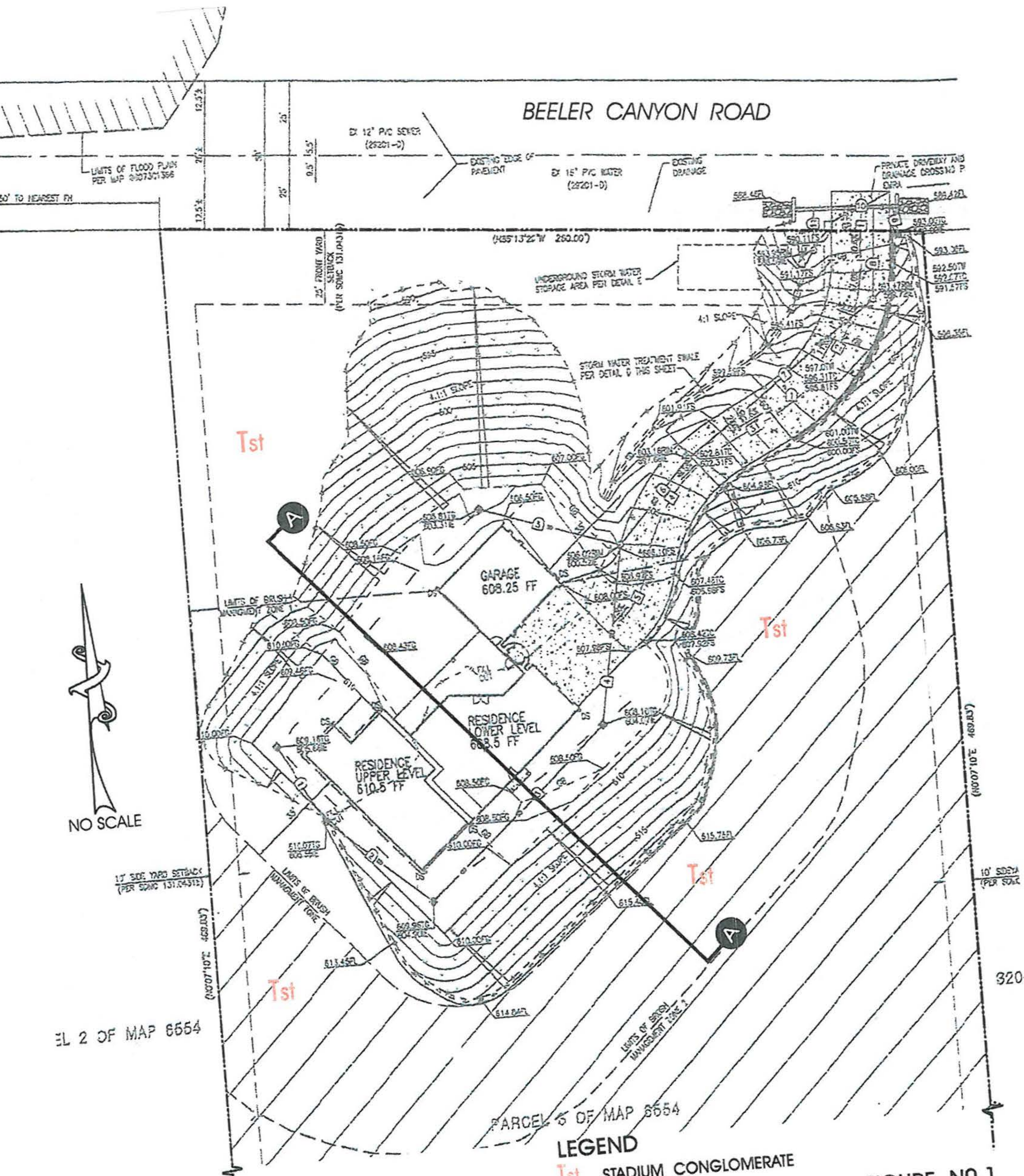
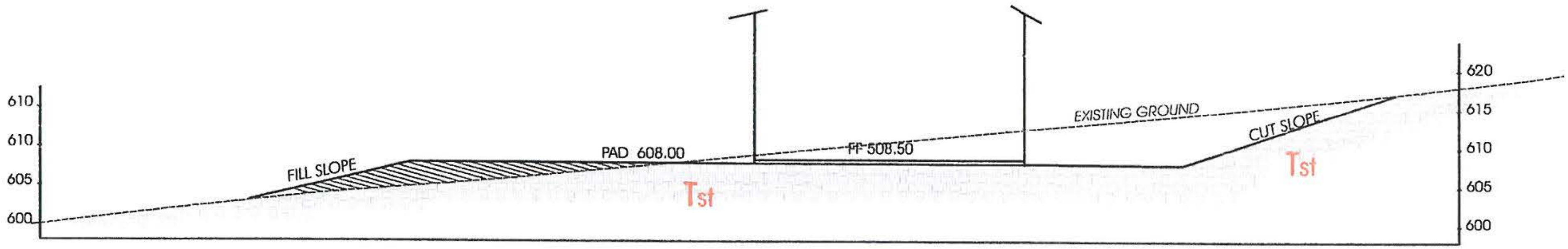
STATE OF CALIFORNIA



PROJECT NO. 14-1210 E2



SECTION "AA"

SCALE 1"=20'

LEGEND

Tst STADIUM CONGLOMERATE

PROJECT N0. 14-1210 E2

FIGURE N0.2

APPENDIX B

ALLIED EARTH TECHNOLOGY
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SAN DIEGO, CALIFORNIA 92126
PH. (858) 586-1665 FAX (858) 586-1660
(619) 447-4747

ROBERT CHAN, P.E.

UPDATE

OF

REPORT OF GEOTECHNICAL INVESTIGATION

PROPOSED RESIDENTIAL BUILDING SITE

11275 BEELER CANYON ROAD

SAN DIEGO, CALIFORNIA

FOR

MR. ROMAN TIVYAN

PROJECT NO.14-1210E2

JUNE 24, 2014

ALLIED EARTH TECHNOLOGY

7915 SILVERTON AVENUE, SUITE 317
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ROBERT CHAN, P.E.

June 24, 2014

Mr. Roman Tivyan
8834 Capcano Road
San Diego, CA.92126

Subject : Project No. 14-1210E2
Update of "Preliminary Geotechnical Investigation for Proposed 3-Lot Development, 2.8 Acre Parcel, Beeler Canyon Road, County of San Diego"
Proposed Residential Building Site
11275 Beeler Canyon Road
San Diego, California

Dear Mr. Tivyan :

In accordance with your request, we have performed geotechnical engineering services for subject property, more specifically referred to as being Parcel 3 of Parcel Map No. 6554 (APN 320-030-31-00), in the City of San Diego, State of California.

The approximate location of subject property is shown on Figure No. 1, entitled, "Site Location Map".

The purpose of our work is to prepare an update report with current geotechnical recommendations for the site development as presently proposed. The scope of our work includes a visit to the site, and a review of the following plans and documents :

"Preliminary Geotechnical Investigation, Proposed 3-Lot Development,2.8 Acre Parcel, Beeler Canyon Road, County of San Diego", prepared by Vinje & Middleton Engineering, Inc. (Job No. 05-276-P, dated June 27, 2005).

"Site Plan/Grading Plan, Tivyan Residence, Parcel 3 of Parcel Map No. 6554 " prepared by Burkett & Wong, Engineers, San Diego, California.

PROPOSED DEVELOPMENT

The preparation of the above-mentioned Geotechnical Investigation Report was associated with the potential subdivision of the 2.8 acre parcel. The subdivision plan was abandoned, and the current development plan for the site will consist grading of a building pad to support a two-level single-family residence, with a two-car detached garage.

Estimated earthwork quantities for grading of the building pad are 1,356 cubic yards of excavation; with 542 cubic yards of fill, and 815 cubic yards of export. Maximum height of cut slope is on the order of 5 feet, with slope ratio of 2 : 1 (horizontal : vertical) or flatter. Maximum height of fill slope is on the order of 10 feet, with slope ratio of 3 : 1 (horizontal : vertical) oir flatter.

FIELD INSPECTION

An inspection of the property on June 20, 2014, indicates that the site was found to be generally of the same condition when the field investigation was conducted in May, 2005.

From Beeler Canyon Road, the natural ground on the site ascends in a southerly direction at gradients on the order of 10 to 15 percent to a ridge located in the central portion of the property. Beyond this ridge top, the natural ground slopes in a general westerly direction at gradients as steep as 25 percent. The pad for the proposed residence will be situated in the front, northerly portion of the property.

The property is currently vacant, and covered with a dense growth of weeds and chaparral. The site is bounded on the north by Beeler Canyon Road and the Vulcan Materials Plant beyond; and on the east, west and south by vacant land.

ON-SITE SOIL CONDITIONS

A review of the geologic map of Poway Quadrangle indicates that the site is underlain by Tertiary Stadium Conglomerate, consisting of pebbles and cobbles in a sandy matrix. The Stadium Conglomerate was overlain by a thin layer of topsoils, consisting of mostly cobbly silt sands; except in the front of the property adjacent to Beeler Canyon Road, where topsoils consisting of clayey sands were encountered.

GROUNDWATER

No groundwater was encountered in the exploratory trenches to the maximum depth of exploration at 10 feet, and no major groundwater related problems, either during or after construction, are anticipated. However, it should be recognized that minor seepage problems may occur after development of a site even where none were present before development. These are usually minor phenomena and are often the results of an alteration of the permeability characteristics of the soils; an alteration in drainage patterns due to grading; and an increase in the use of irrigation water. Based on the permeability characteristics of the soils and anticipated usage of the 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 develop.

GEOLOGIC HAZARDS

A review of available literature did not indicate the presence of any active faults or ancient landslides at the site or in the immediate vicinity. The active Rose Canyon Fault zone has been mapped approximately 20.3 km (12.7 miles) to the west. The active Elsinore Fault Zone lies approximately 41.5 km (25.9 miles) to the northeast. It is our opinion that the site could be subject to moderate shaking in the event of a major earthquake along any of the above-mentioned fault zones; however, the site is not considered to possess any greater seismic risk than that of the surrounding development.

SOIL LIQUEFACTION

It is our opinion that due to the relatively high density of the competent natural prevalent at the site; the lack of near-surface groundwater and the grain size characteristics of the in-situ soils, the risk for seismically induced soil liquefaction is very low.

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

In general, we concur and agree with the findings, conclusions and recommendations presented in the above-mentioned Report, and said findings, conclusions and recommendations are still valid and applicable for the proposed site development.

The following addendum recommendations are made, however, as supplement to the recommendations presented in the subject Report. If there are discrepancies, the addendum recommendations herein will prevail.

Expansiveness of On-site Soils

1. The soils encountered on the site possess vewry low to medium expansion potential (Expansion Indices of 2 and 81). All the soil types in the proposed building area consist of soils having very low expansion potential.

Sulfate Content of On-Site Soils

2. The soils encountered on the site are subject to negligible sulfate exposure (sulfate content of 10 ppm).

Earthwork

3. It is recommended that all earthwork be accomplished in accordance with the Grading Ordinance of the City of San Diego, the 2013 edition of the California Building Code, Appendix I attached hereto, entitled, "General Grading and Earthwork Specifications", and recommendations as presented in this Section.

4. Where the recommendations of this Section of the report conflict with those of

Appendix I, this Section of the report takes precedence.

5. Grading operations should begin with the clearing and grubbing of the grading area, and hauling away of the debris to an approved dump site.

6. It is recommended that a keyway be excavated along the toe of the proposed fill slope, extending through the any residual/topsoils at least 12 inches into the underlying competent natural soils.

7. Fill soils generated on site should be properly moistened, and uniformly compacted in layers not to exceed 8 inches until finished grade is achieved.

8. The proposed residence may be founded partly on the cut portion, and partly on the fill portion of the building pad, provided that the natural soils to a depth of 3 feet, or 12 inches below the bottom of the deepest foundation, are removed and uniformly recompacted in order to provide uniform settlement characteristics to the proposed structure.

9. All fill soils are to be compacted to at least 90 percent of maximum dry density at approximately 120% of optimum moisture content in accordance with ASTM D1557.

10. Approximately 815 cubic yards of excess soils will be generated. It is recommended that these excess soils be exported to a City approved dump site.

Foundation and Slab

11. It is recommended that a safe allowable soil bearing value of 2,000 pounds per square foot be used in the design and checking of continuous footings that are 12 inches in minimum horizontal dimension, and isolated per footings that are 15 inches in minimum horizontal dimension, and are embedded at least 12 inches (for single-story) or 18 inches (for two stories) below the lowest adjacent ground surface. .

12. The above safe allowable soil bearing value may be further increased by one third when considering wind and/or seismic forces.

13. The settlements of foundation, when designed and loaded as outlined above, are expected to be less than ¾ inch total and ½ inch differential over a span of 25 feet.

14. The concrete slab for the proposed residential structure should be at least 4 inches net in thickness, and be reinforced with a minimum of #3 rebars at 18 inches on center in both directions, placed at mid-height of concrete slab. The concrete slab should be underlain by 4 inches of clean sand and a vapor barrier in moisture sensitive areas.

15. The continuous footings should be reinforced with a minimum of 4 #4 rebars; two rebars located near the top, and the other two rebars near the bottom of the footings. Isolated pier footings should be reinforced with 2 #4 rebars in both

directions, placed near the bottom of the footings. Please note that the above slab and foundation reinforcements are based on soil characteristics only, and should be superseded by the requirements of the project architect or structural engineer.

16 . It is further recommended that the foundation trench excavations be inspected by our firm prior to the placement of concrete. Any loose and/or unsuitable soils encountered should be removed and/or replaced under our direction.

Retaining Wall Design

17. It is recommended that retaining walls be designed to withstand the pressure exerted by equivalent fluid weights given below :

Backfill Surface (horizontal : vertical)	Equivalent Fluid Pressure (pcf)
Level	35
2 : 1	50
1 ½ : 1	58

The above values assume that the retaining walls are unrestrained from movement, and have a granular backfill. For retaining walls restrained from movement at the top, such as basement retaining walls, an uniform horizontal pressure of 7H (where H is the height of the retaining wall in feet) should be applied in addition to the active pressures recommended above.

18. All retaining walls should be supplied with a backfill drainage system adequate to

prevent the buildup of hydrostatic pressure. The subdrain should consist of one-inch gravel and a perforated pipe near the bottom of the retaining wall. The width of this subdrain should be at least 12 inches, and extend at least 2/3 height of the retaining wall. The subdrain should be enclosed in a geotextile fabric such as Mirafi 140N or equal.

19. All backfill soils behind the retaining walls should be compacted to at least 90 percent of maximum dry density in accordance with ASTM D1557. Special care should be exercised during compaction of the backfill soils so that the retaining walls are not damaged by the compaction equipment.

Seismic Earth Pressure

20. Seismic earth pressures can be taken as an inverted triangular distribution with Kh equal to 0.32. This pressure is in addition to the static design wall load. The allowable passive pressure and bearing capacity can be increased by 1/3 in determining the stability of the wall. A factor-of-safety of 1.2 can be used in determining the stability of the retaining wall under seismic conditions.

UBC Seismic Coefficients

21. The seismic design factors were determined in accordance with the 2012 California Building Code, and presented on the following page :

Site Coordinates :		Latitude	=	32.9272
		Longitude	=	-117.0406
Site Class :			=	C
Site Coefficient Fa			=	1.002
Site Coefficient Fv			=	1.445
Spectral Response Acceleration				
At Short Periods		Ss	=	0.995
Spectral Response Acceleration				
At 1-second Period		S1	=	0.355
Sms	=	FaSs	=	0.997
Sm1	=	FvS1	=	0.513
Sds	=	2/3*Sms	=	0.665
Sd1	=	2/3*Sm1	=	0.342

Structural Pavement Section

Flexible Asphaltic Concrete (AC) Section

22. For the proposed on-site driveway, it is it is recommended that a structural pavement section of 3 inches of asphaltic concrete over 6 inches of Class II base material over compacted subgrade be used.

23. The base material and the upper 8 inches of the subgrade should be compacted to at least 95 percent of maximum dry density at near optimum moisture content.

Rigid Portland Cement Concrete (PCC)

24. If PCC pavements are used, it is recommended that the Portland cement concrete section be 5 inches in thickness. The subgrade soils should be compacted to at least 95 percent of maximum dry density in accordance with ASTM D1557.

25. The PCC pavement should be reinforced with a minimum of #3 rebars spaced 18

inches on center in both directions, placed at mid-height of slab.

26. The concrete compressive strength should be at least 3,000 psi.

27. A thickened edge or integral curb should be constructed on the outside of concrete slabs subjected to wheel loads. The thickened edge should be 1.2 times the slab thickness with a minimum increase of 2 inches at the slab edge and tapered back to the recommended slab thickness 3 feet behind the face of the slab. Reinforcing steel will not be necessary within the concrete curb.

28. To control the location and spread of concrete shrinkage cracks, crack-control joints (weakened plane joints) should be included in the design of the concrete pavement slab. Crack-control joints should not exceed 30 times the recommended slab thickness, with a maximum spacing of 15 feet, and should be sealed with an appropriate sealant to prevent the migration of water through the control joint to the subgrade materials

29. To provide load transfer between adjacent pavement slab sections, a trapezoidal-keyed construction joint is recommended. As an alternative to the keyed joint, dowelling is recommended between construction joints. Dowels should be located at the midpoint of the slab, spaced at 12 inches on center and lubricated to allow joint movement while still transferring loads.

30. The performance of pavements is highly dependent upon providing positive

¼ inch weakened plane contraction joints at 5-foot intervals.

LIMITATIONS

The opinions and recommendations presented in this report are based upon surficial observations and logical projections inferred from observed conditions and the assumption that the soil conditions do not deviate appreciably from those encountered. Should conditions vary from those presented herein be encountered during the developmental construction phase, this firm should be notified immediately so that a qualified soil engineer can inspect the site conditions and evaluate the potential effects and present recommendations.

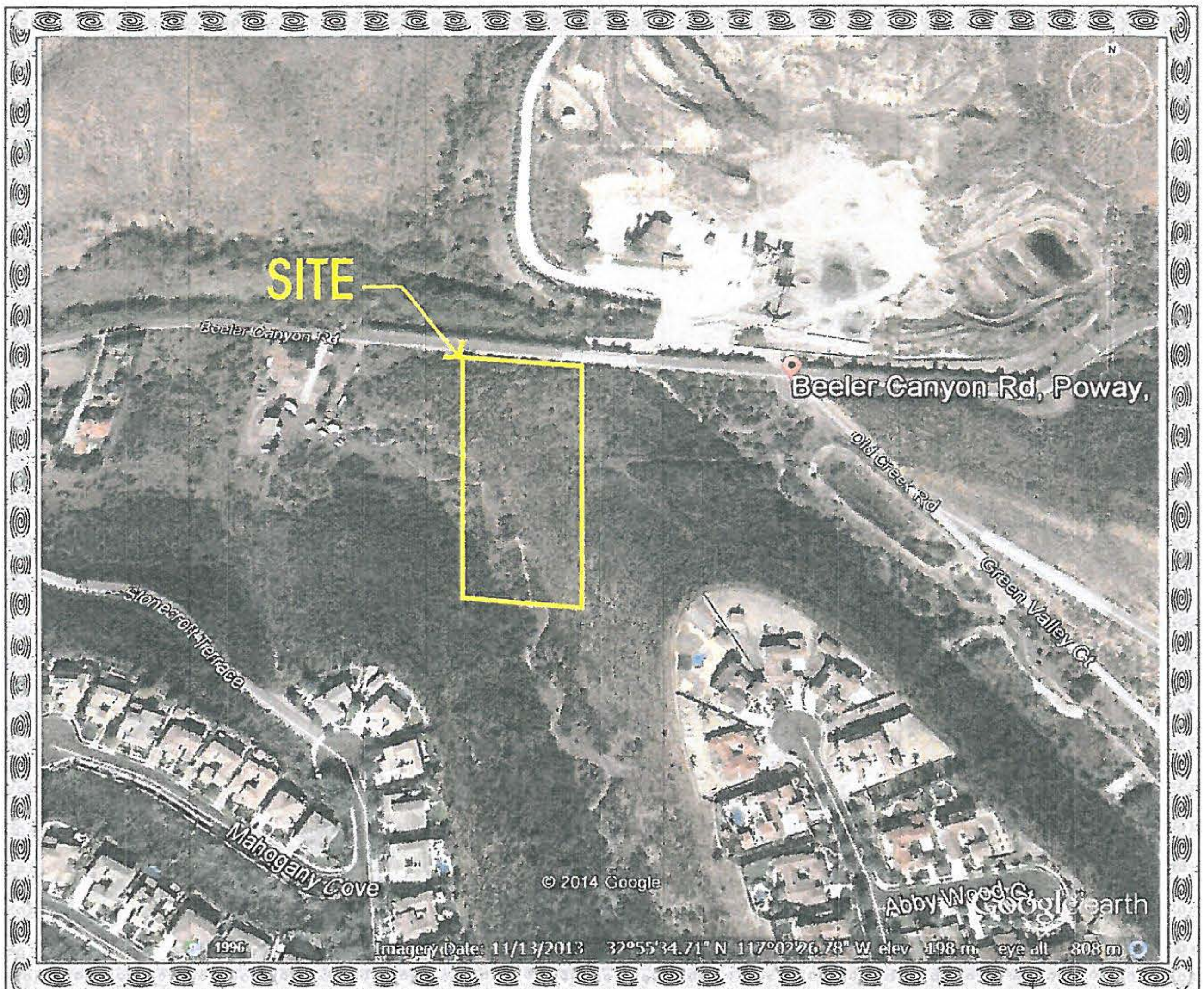
This report has been prepared in accordance with generally accepted standards of geotechnical engineering practice at the time of its preparation. No other warranties, expressed or implied, are made as to the professional consultation and recommendations contained herein. This report is provided for the exclusive use of the client or his authorized agent.

Respectfully submitted,
ALLIED EARTH TECHNOLOGY

ROBERT CHAN, P.E.

No. C-24613
Exp. 12/31/15

No. G-00198
Exp. 12/31/15



SITE LOCATION MAP

PROJECT NO. 14 - 1210 E2

FIGURE NO. 1

APPENDIX C

Geotechnical Update
And Grading Plan Review

Tentative Parcel Map 266071
2-Lot Subdivision, Beeler Canyon Road,
City of San Diego, California
(APN 320-030-31)

January 2, 2008

Prepared For:
MR. JOHN R. WARD
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January 2, 2008

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GEOTECHNICAL UPDATE AND GRADING PLAN REVIEW, TENTATIVE PARCEL MAP 266071, 2-LOT SUBDIVISION, BEELER CANYON ROAD, CITY OF SAN DIEGO, CA (APN 320-030-31)

Pursuant to your request, Vinje and Middleton Engineering, Inc., has completed the enclosed Geotechnical Update And Grading Plan Review Report for the above-referenced project site.

The following report summarizes the results of our research and review of previous pertinent geotechnical reports and maps, current field observations and provides update conclusions and recommendations for the proposed development consistent with the project current plans as understood. From a geotechnical engineering standpoint, it is our opinion that the site remains suitable for the planned minor residential subdivision and associated improvements as proposed provided the recommendations presented in this report are incorporated into the design and construction of the project.

The conclusions and recommendations provided in this study are consistent with the indicated site geotechnical conditions and are intended to aid in preparation of final development plans and allow more accurate estimates of development costs.

If you have any questions or need clarification, please do not hesitate to contact this office. Reference to our **Job #05-276-P** will help to expedite our response to your inquiries.

We appreciate this opportunity to be of service to you.

VINJE & MIDDLETON ENGINEERING, INC.

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GEOTECHNICAL UPDATE AND GRADING PLAN REVIEW
TENTATIVE PARCEL MAP 266071, 2-LOT SUBDIVISION
BEELER CANYON ROAD
CITY OF SAN DIEGO, CALIFORNIA
(APN 320-030-31)

I. INTRODUCTION

An updated Grading Plan in support of a residential development at the above-referenced property has recently been completed by CDS Civil Engineers (dated December 12, 2007). A copy of the plan is enclosed with this report as Figure 1. The plan outlines a revised development scheme which now includes minor cut-fill grading for the creation of two building pads and access driveways to support future single-family dwelling constructions.

Reference is made to the following geotechnical report in support of the project previously prepared by this office:

Preliminary Geotechnical Investigation
Proposed 3-Lot Development, 2.8 Acre Parcel
Beeler Canyon Road, County of San Diego

The report was reviewed in connection with this work and a copy is enclosed herein as Appendix A.

The purpose of this report is to review the enclosed Grading Plan (Figure 1) and to ensure its compatibility to site geotechnical conditions and recommendations given in the referenced report. Updated and added recommendations that are consistent with the enclosed plan and current codes and standards are also presented herein and will supplement or supersede those provided in the Appendix "A" report where specifically indicated.

II. GEOTECHNICAL CONDITIONS

Based upon a recent site inspection, physical and geotechnical conditions at the project site remain the same as reported in the referenced report. The site is underlain by weakly cemented pebble to cobble conglomerate in a sandy matrix. A thin cover of sandy topsoil in a loose condition mantles the underlying conglomerate. Detail subsurface conditions are presented on Test Trench Logs included in the enclosed Appendix A (Plates 3-5). Approximate Test Trench locations are shown on the enclosed Figure 1.

Slope instability or other forms of geotechnical hazard are not indicated at the property.

III. PROPOSED DEVELOPMENT

The new revised plan (Figure 1) indicates the creation of two individual residential lots. Minor cut-fill grading will construct level building surfaces on the northern half of the new lots as shown. Planned graded slopes are programmed for 2:1 gradients and reach a maximum vertical height of 11 feet. Individual concrete driveways with the indicated longitudinal profiles of 18% to 19.4% will provide access on to each lot from Beeler Canyon Road. Details of each lot grading relative to the project subsurface profile are shown on Geologic Cross-Sections X-X' and Y-Y' included on the enclosed Figure 1.

Detailed foundation and building plans are not yet available. However, the use of conventional wood-frame with exterior stucco buildings supported on shallow stiff foundations with stem walls and slab-on-grade floors or slab-on-ground with turned-down footings are anticipated.

IV. SEISMIC GROUND MOTION VALUES

Detailed seismic environment at the project site was discussed in the referenced report. However, site specific seismic ground motion values were re-evaluated as part of this effort in accordance with the California Building Code (CBC). The following parameters are consistent with the indicated project seismic environment and our experience with similar earth deposits in the vicinity of the project site, and may be utilized for project design work:

TABLE 1

Site Class	S_s	S_1	F_a	F_v	S_{MS}	S_{M1}	S_{DS}	S_{D1}
D	0.995	0.355	1.102	1.689	1.096	0.600	0.731	0.400
According to Chapter 16, Section 1613 of the 2007 California Building Code.								

Explanation:

S_s: Mapped MCE, 5% damped, spectral response acceleration parameter at short periods.

S_1: Mapped MCE, 5% damped, spectral response acceleration parameter at a period of 1-second.

F_a: Site coefficient for mapped spectral response acceleration at short periods.

F_v: Site coefficient for mapped spectral response acceleration at 1-second period.

S_{MS}: The MCE, 5% damped, spectral response acceleration at short periods adjusted for site class effects ($S_{MS}=F_aS_s$).

S_{M1}: The MCE, 5% damped, spectral response acceleration at a period of 1-second adjusted for site class effects ($S_{M1}=F_vS_1$).

S_{DS}: Design, 5% damped, spectral response acceleration parameter at short periods ($S_{DS}=\frac{2}{3}S_{MS}$).

S_{D1}: Design, 5% damped, spectral response acceleration parameter at a period of 1-second ($S_{D1}=\frac{2}{3}S_{M1}$).

V. CONCLUSIONS AND RECOMMENDATIONS

The project site remains substantially unchanged from conditions reported in the referenced Preliminary Geotechnical Investigation.

Based on our review of new drawings made available to us (Figure 1), and from a geotechnical engineering point of view, the project revised grading plan represents a feasible design and is in substantial compliance with the referenced report. The conclusions and recommendations put forth in the referenced report (Appendix A) remain valid and should be considered in final designs and implemented during the construction phase except where specifically amended or superceded herein.

All grading and earthworks should be completed in accordance with the Appendix J of the California Building Code (CBC), City of San Diego Ordinances, the Standard Specifications for Public Works Construction, and the requirements of the referenced soils report as amended or modified in the following sections.

1. Site upper topsoils occur in a dry and loose condition and are recommended for removal and recompaction in connection with the site grading. Upper loose soils cover should be excavated to dense and competent formational rocks as approved in the field, and placed back as properly compacted fills.

   Specific removal depths should be given in the field by the project geotechnical consultant or his designated field representative based on the actual exposures. Estimated removal depths consistent with the planned new development are given in Table 2. Locally deeper removals may be necessary as determined in the field and should be anticipated.

TABLE 2

Trench No or Location	Total Depth of Trench (ft)	Estimated Removal depths (ft)	Estimated Depth of Groundwater (ft)	Comments
T-1	5'	2½'	not encountered	Parcel 2. Fill slope areas. Depth of keyway/benching excavation may govern.
T-2	2½'	not applicable	not encountered	Parcel 2. Outside the planned new construction/development areas.
T-3	2½'	1'	not encountered	Parcel 2. Cut slope areas. Depth of cut will govern.
T-4	2½'	not applicable	not encountered	Parcel 1. Outside the planned new construction/development areas.

TABLE 2 (continued)

T-5	10'	1'	not encountered	Parcel 1. Cut pad/slope areas. Depth of cut/undercut may govern.
T-6	8'	not applicable	not encountered	Parcel 1. Outside the planned new construction/development areas.

Notes:

1. See Figure 1 for approximate test trench locations.
2. All depths are measured from the existing ground levels.
3. Actual depths may vary at the time of construction based on subsurface field exposures.
4. Bottom of all removals should be additionally prepared, moisture conditioned and recompacted in-lace to a minimum depth of 6 inches prior to fill placement as directed in the field.
5. All grounds steeper than 5:1 receiving fills/backfills should be properly benched and keyed as directed in the field.
6. Exploratory trenches at the indicated locations were backfilled with loose and uncompacted deposits. The loose/uncompacted backfill soils within these trenches shall also be re-excavated and placed back as properly compacted fills as a part of the project grading operations.

2. Planned pad constructions will create cut-fill transition lots. The cut portion of cut-fill lots should be adequately undercut and reconstructed to design grades with compacted fills as specified in the referenced report.

3. Excavations and removals of site earth materials will generate rocky materials with 70% to 90% pebbles and cobbles which are typically difficult to manufacture into a suitable mixture to place, compact and perform quantitative testing control. These deposits may be considered for reuse as site new compacted fills and backfills provided larger rock debris (plus 6 inches for fills and plus 3 inches for trench and wall backfills) are selectively excluded from the fill matrix and the specified minimum fines to rock ratio are achieved. For this purpose, some screening of the excavated soils and separation and disposal of larger rock sizes will be required. Improving the quality of the fill matrix with mixing with good quality sandy import soils should also be anticipated.

4. Earth materials containing a high percentage of gravels, pebbles and cobble size fragments typically require added trenching and excavation efforts. Excavations into these types of materials generally result in a rough trench and excavation sidewalls causing disturbance of larger fragments, thereby creating a zone of loosened materials within the exposed sidewalls prone to instability, sloughing failure and possible widening of the trench or excavations. Excluding larger rocks from the fill matrix will help trenching and excavations within these deposits and improve stability of the trench and excavation sidewalls.

5. Project fills shall be clean deposits free of vegetation, trash, debris and deleterious matter consisting of minus 6-inch particles, and include at least 40% finer than #4 sieve materials by weight as approved in the field by the project geotechnical consultant or his designated representative. Trench and wall backfills shall consist of minus 3-inch particles.

   Uniform bearing soils conditions should be constructed at the site by the grading operations. Site soils should be adequately processed, thoroughly mixed, moisture conditioned to slightly (2%-3%) above the optimum moisture levels as directed in the field, placed in thin (8 inches maximum) uniform horizontal lifts and mechanically compacted to a minimum 90% of the corresponding laboratory maximum dry density per ASTM D-1557, unless otherwise specified.

   Import soils, if used to complete wall and trench backfilling, cap the building pads, or needed to improve the quality of site rocky fills mixture, should be sandy granular non-corrosive deposits (SM/SW) with very low expansion potential (100% passing the ½-inch sieve, more than 50% passing the #4 sieve and less than 18% passing #200 sieve with expansion index less than 21). Import soils should be inspected, tested as necessary, and approved by the project geotechnical engineer prior to delivery to the site. Import soils should also meet or exceed engineering characteristic and soil design parameters as specified in the following sections.

6. Post construction settlements after remedial grading works as specified herein, is not expected to exceed approximately ½-inch, and should occur below the heaviest loaded footings. The magnitude of post construction differential settlements of site fill deposits (as expressed in terms of angular distortion) is not anticipated to exceed ¼-inch between similar elements in a 25-foot span.

7. Foundations and slab designs as well as design soil parameters will stay the same as provided in the referenced report (Appendix A).

8. Open or backfilled trenches parallel with a footing shall not be below a projected plane having a downward slope of 1-unit vertical to 2-units horizontal (50%) from a line 9 inches above the bottom edge of the footing, and not closer than 18 inches from the face of such footing.

9. Where pipes cross under-footings, the footings shall be specially designed. Pipe sleeves shall be provided where pipes cross through footings or footing walls, and sleeve clearances shall provide for possible footing settlement but not less than 1-inch all around the pipe.

10. Foundations where the surface of the ground slopes more than 1-unit vertical in 10 units horizontal (10% slope) shall be level or shall be stepped so that both top and bottom of such foundations are level. Individual steps in continuous footings shall not exceed 18 inches in height and the slope of a series of such steps shall not exceed 1-unit vertical to 2-units horizontal (50%) unless otherwise specified. The steps shall be detailed on the structural drawings. The local effects due to the discontinuity of the steps shall also be considered in the design of foundations as appropriate and applicable.

11. Preliminary pavement designs are provided in the referenced report (Appendix A) and chiefly remain the same as specified. Project PCC pavings, however, should be a minimum of 5½ inches thick. Final design will depend on the engineering properties of actual subgrade soils which can only be provided at the completion of rough grading subject to approval of governing agencies.

    In the areas where the longitudinal grades exceed 10%, ½-inch asphalt should be added to the design AC thickness for each 2% increase in grade or portions thereof.

    PCC paving are recommended for longitudinal grades over 15%. In the areas where longitudinal grades exceed 15%, provide a minimum 8 inches wide by 8 inches deep pavement anchors dug perpendicular to the pavement longitudinal profile into the approved subgrade at each 25 feet intervals maximum. The pavement anchors should be poured monolithically with the concrete paving surfaces.

    Provide "tool joint" or "softcut" contraction/control joints spaced 10 feet on center (not to exceed 15 feet maximum) each way for all PCC pavings. The larger dimension of any panel shall not exceed 125% of the smaller dimension. Tool or cut as soon as the slab will support the weight and can be operated without disturbing the final finish which is normally within 2 hours after final finish at each control joint location or 150 psi to 800 psi. Tool or softcuts should be a minimum of 1-inch in depth but should not exceed 1¼-inches deep maximum. In case of softcut joints, anti-ravel skid plates should be used and replaced with each blade to avoid spalling and raveling. Avoid wheeled equipments across cuts for at least 24 hours.

    Joints shall intersect free-edges at a 90° angle and shall extend straight for a minimum of 1½ feet from the edge. The minimum angle between any two intersecting joints shall be 80°. Align joints of adjacent panels. Also, align joints in attached curbs with joints in slab panels.

Provide adequate curing using approved methods (curing compound maximum coverage rate = 200 sq. ft. / gal.).

12. All grading operations including removals, excavations, undercuts, suitability of earth deposits used as compacted fill, and compaction procedures should be continuously observed and tested by the project geotechnical consultant and presented in the final as graded compaction report. The nature of finished subgrade soils should also be confirmed in the final compaction report at the completion of grading.

VI. LIMITATIONS

The conclusions and recommendations provided herein have been based on all available data obtained from the review of pertinent geotechnical documents, current site observations, as well as our experience with the soils and formational materials located in the general area. The materials encountered on the project site and utilized in laboratory testing are believed representative of the total area; however, earth materials may vary in characteristics between exposures.

Of necessity we must assume a certain degree of continuity between available exploratory excavations and/or natural exposures. It is necessary, therefore, that all observations, conclusions, and recommendations be verified during the grading operation. In the event discrepancies are noted, we should be contacted immediately so that an inspection can be made and additional recommendations issued if required. The recommendations made in this report are applicable to the site at the time this report was prepared. It is the responsibility of the owner/developer to ensure that these recommendations are carried out in the field.

It is almost impossible to predict with certainty the future performance of a property. The future behavior of the site is also dependent on numerous unpredictable variables, such as earthquakes, rainfall, and on-site drainage patterns.

The firm of VINJE & MIDDLETON ENGINEERING, INC., shall not be held responsible for changes to the physical conditions of the property such as addition of fill soils, added cut slopes, or changing drainage patterns which occur without our inspection or control.

The property owner(s) should be aware that the development of cracks in all concrete surfaces such as floor slabs and exterior stucco are associated with normal concrete shrinkage during the curing process. These features depend chiefly upon the condition of concrete and weather conditions at the time of construction and do not reflect detrimental ground movement. Hairline stucco cracks will often develop at window/door corners, and floor surface cracks up to ⅛-inch wide in 20 feet may develop as a result of normal concrete shrinkage (according to the American Concrete Institute).

This report should be considered valid for a period of one year and is subject to review by our firm following that time. If significant modifications are made to your tentative development plan, especially with respect to the height and location of cut and fill slopes, this report must be presented to us for review and possible revision.

This report is issued with the understanding that the owner or his representative is responsible to ensure that the information and recommendations are provided to the project architect/structural engineer so that they can be incorporated into the plans. Necessary steps shall be taken to ensure that the project general contractor and subcontractors carry out such recommendations during construction.

The project soils engineer should be provided the opportunity for a general review of the project final design plans and specifications in order to ensure that the recommendations provided in this report are properly interpreted and implemented. The project soils engineer should also be provided the opportunity to field verify the foundations prior to placing the concrete. If the project soils engineer is not provided the opportunity of making this review, he can assume no responsibility for misinterpretation of his recommendations.

Vinje & Middleton Engineering, Inc., warrants that this report has been prepared within the limits prescribed by our client with the usual thoroughness and competence of the engineering profession. No other warranty or representation, either expressed or implied, is included or intended.

If you have any questions or need clarification, please do not hesitate to contact our office. Reference to our **Job #05-276-P** will help to expedite our response to your inquiries.

We appreciate this opportunity to be of service to you.

VINJE & MIDDLETON ENGINEERING, INC.

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Distribution: Addressee (3)

CDS Civil Engineers (2)

Attachments: Grading Plan
Appendix A

c:/jt/myfiles/05updates/05-276-P

REFERENCES

- Annual Book of ASTM Standards, Section 4 - Construction, Volume 04.08: Soil And Rock (I); D 420 - D 5611, 2005.
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APPENDIX D

Preliminary Geotechnical Investigation

Proposed 3-Lot Development
2.8 Acre Parcel
Beeler Canyon Road
County of San Diego

(A.P.N. 320-030-31)

June 27, 2005

Prepared For:
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June 27, 2005

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PRELIMINARY GEOTECHNICAL INVESTIGATION, PROPOSED 3-LOT DEVELOPMENT, BEELER CANYON ROAD, POWAY (A.P.N. 320-030-31)

Pursuant to your request, Vinje and Middleton Engineering, Inc., has completed the enclosed Preliminary Geotechnical Investigation Report for the subject site.

The following report summarizes the results of our field investigation, including laboratory analyses and conclusions, and provides recommendations for the proposed development as understood. From a geotechnical engineering standpoint, it is our opinion that the site is suitable for the planned 3-lot residential development with the associated pavement and underground utility improvements provided the recommendations presented in this report are incorporated into the design and construction of the project.

The conclusions and recommendations provided in this study are consistent with the site geotechnical conditions and are intended to aid in preparation of final development plans and allow more accurate estimates of development costs.

If you have any questions or need clarification, please do not hesitate to contact this office. Reference to our Job #05-276-P will help to expedite our response to your inquiries.

We appreciate this opportunity to be of service to you.

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PRELIMINARY GEOTECHNICAL INVESTIGATION
PROPOSED 3-LOT DEVELOPMENT
2.8 ACRE PARCEL - BEELER CANYON ROAD
COUNT OF SAN DIEGO
(A.P.N. 320-030-31)

I. INTRODUCTION

The property investigated in this work includes 2.8 acres of gentle hillside terrain located along the south flank of Beeler Canyon located near the southern reaches of the City of Poway in the County of San Diego. The project location is depicted on a Regional Index Map enclosed with this report as Plate 1. We understand that the site is planned for subdivision into 3 individual lots which will support single-family dwellings and an entrance roadway. Consequently, the purpose of this work was to determine geologic and soils conditions beneath the property and their impacts on the proposed development. Test hole digging, soil sampling and testing were among the activities conducted in this work which resulted in construction recommendations provided herein.

II. SITE DESCRIPTION

The project site is a rectangular-shaped parcel characterized by gentle north-facing terrain along the south flank of Beeler Canyon. Site topographic conditions are shown on a Geotechnical Map enclosed with this report as Plate 2. Gentle surface areas ascend southward from Beeler Canyon Road at gradients that approach 8:1 (horizontal to vertical). Steeper terrain characterize off-site areas to the south. Flowline topography marks the southwest corner with a canyon that flows northward, tributary to Beeler Canyon.

Surface areas are mantled by a modest cover of native brush. Site drainage sheetflows northward. Excessive erosion resulting from concentrated run-off is not in evidence.

III. SITE INVESTIGATION

Geotechnical conditions beneath the project site were chiefly determined from the excavation of 6 test trenches dug with a tractor-mounted backhoe. All of the trenches were logged by our project geologist who also retained representative soil samples at selected locations, and frequent intervals for subsequent laboratory testing. Trench locations are shown on Plate 2. Logs of the test trenches are included with this report as Plates 3-5. Laboratory test results are summarized in a following section herein.

IV. PROPOSED DEVELOPMENT

Preliminary development plans for the project site are also depicted on Plate 2. As shown, 3 individual building sites will be created at the property by cut-fill grading. Entrance driveways will provide access from Beeler Canyon Road. Graded cut-fill slopes are programed at 2:1 gradients and reach a maximum vertical height of 15 feet.

Detailed foundation and building plans are not yet available. However, the use of conventional wood-frame with exterior stucco buildings supported on shallow stiff continuous strip and spread pad concrete footings and slab-on-grade floor foundation is anticipated.

V. FINDINGS

The project site is gentle hillside terrain underlain by sedimentary formational rocks at shallow depths. Slope instability is not indicated at the site or in nearby areas. The following geotechnical conditions are unique to the property:

A. Earth Materials

Natural formational rocks at the project site consist chiefly of conglomerate units including up to 70% pebbles to cobbles in a sandy matrix. Near-surface exposures are typically well cemented grading to friable in deeper exposures. Exposed formational rocks appear massive and lack notable structure. However, nearby quarry excavations north of Beeler Canyon suggest near-horizontal bedding along sandstone contacts elsewhere in the section.

Formational rocks at the site are mantled by a thin cover of unconsolidated sandy to rocky and locally clayey topsoil.

Details of earth materials underlying the project site are given on the enclosed Test Trench Logs, Plates 3-5, and further defined in a following section herein. A Geologic Cross-Section which depicts subsurface conditions and proposed grading levels is enclosed with this report as Plate 6.

B. Groundwater

Subsurface water was not encountered in project test trenches nor is it expected to impact site construction. However, like all graded hillside lots, the proper control of site drainage is an important factor in the continued stability of the property. Surface drainage should preclude ponding and overwatering of site vegetation should be avoided.

C. Slope Stability

The property is characterized by gentle topography underlain by flat-lying sandy conglomerate units. Slope instability is not indicated nor expected under these circumstances. Planned cut excavations are also expected to perform well to the proposed embankment heights.

D. Faults / Seismicity

Faults or significant shear zones are not indicated on or near proximity to the project site.

As with most areas of California, the San Diego region lies within a seismically active zone; however, coastal areas of the county are characterized by low levels of seismic activity relative to inland areas to the east. During a 40-year period (1934-1974), 37 earthquakes were recorded in San Diego coastal areas by the California Institute of Technology. None of the recorded events exceeded a Richter magnitude of 3.7, nor did any of the earthquakes generate more than modest ground shaking or significant damages. Most of the recorded events occurred along various offshore faults which characteristically generate modest earthquakes.

Historically, the most significant earthquake events which affect local areas originate along well known, distant fault zones to the east and the Coronado Bank Fault to the west. Based upon available seismic data, compiled from California Earthquake Catalogs, the most significant historical event in the area of the study site occurred in 1800 at an estimated distance of 16 miles from the project area. This event, which is thought to have occurred along an off-shore fault, reached an estimated magnitude of 6.5 with estimated bedrock acceleration values of 0.14g at the project site. The following list represents the most significant faults which commonly impact the region. Estimated ground acceleration data compiled from Digitized California Faults (Computer Program EQFAULT VERSION 3.00 updated) typically associated with the fault is also tabulated.

TABLE 1

Fault Zone	Distance from Site	Maximum Probable Acceleration (R.H.)
Elsinore - Julian	25.8 miles	0.135g
Newport - Inglewood	47.8 miles	0.072g
Rose Canyon	26.0 miles	0.158g
Coronado Bank	12.5 miles	0.209g

The location of significant faults and earthquake events relative to the study site are depicted on a Fault - Epicenter Map enclosed with this report as Plate 7.

More recently, the number of seismic events which affect the region appears to have heightened somewhat. Nearly 40 earthquakes of magnitude 3.5 or higher have been recorded in coastal regions between January 1984 and August 1986. Most of the earthquakes are thought to have been generated along offshore faults. For the most part, the recorded events remain moderate shocks which typically resulted in low levels of ground shaking to local areas. A notable exception to this pattern was recorded on July 13, 1986. An earthquake of magnitude 5.3 shook County coastal areas with moderate to locally heavy ground shaking resulting in $700,000 in damages, one death, and injuries to 30 people. The quake occurred along an offshore fault located nearly 30 miles southwest of Oceanside.

A series of notable events shook County areas with a (maximum) magnitude 7.4 shock in the early morning of June 28, 1992. These quakes originated along related segments of the San Andreas Fault approximately 90 miles to the north. Locally high levels of ground shaking over an extended period of time resulted; however, significant damages to local structures were not reported. The increase in earthquake frequency in the region remains a subject of speculation among geologists; however, based upon empirical information and the recorded seismic history of County areas, the 1986 and 1992 events are thought to represent the highest levels of ground shaking which can be expected at the study site as a result of seismic activity.

In recent years, the Rose Canyon Fault has received added attention from geologists. The fault is a significant structural feature in metropolitan San Diego which includes a series of parallel breaks trending southward from La Jolla Cove through San Diego Bay toward the Mexican border. Test trenching along the fault in Rose Canyon indicated that at that location the fault was last active 6,000 to 9,000 years ago. More recent work suggests that segments of the fault are younger having been last active 1000 - 2000 years ago. Consequently, the fault has been classified as active and included within an Alquist-Priolo Special Studies Zone established by the State of California.

Fault zones tabulated in the preceding table are considered most likely to impact the region of the study site during the lifetime of the project. The faults are periodically active and capable of generating moderate to locally high levels of ground shaking at the site. Ground separation as a result of seismic activity is not expected at the property.

For design purposes, site specific seismic parameters were determined as part of this investigation in accordance with the California Building Code. The following parameters are consistent with the indicated project seismic environment and may be utilized for project design work:

TABLE 2

Site Soil Profile Type	Seismic Zone	Seismic Zone Factor	Seismic Source Type	Seismic Response Coefficients					
				Na	Nv	Ca	Cv	Ts	To
SD	4	0.4	B	1.0	1.0	0.44	0.64	0.582	0.116
According to Chapter 16A, Divisions IV & V of the 2001 California Building Code.									

E. Geologic Hazards

Geologic hazards are not presently indicated at the project site. Exposed slopes do not indicate gross geologic instability. The most significant geologic hazards at the property will be those associated with ground shaking in the event of a major seismic event. Liquefaction or related ground rupture failures are not anticipated.

F. Laboratory Testing / Results

Earth deposits encountered in our exploratory test excavations were closely examined and sampled for laboratory testing. Based upon our test trench and field exposures site soils have been grouped into the following soil types:

TABLE 3

Soil Type	Description
1	Cobbles in a silty to clayey sand matrix - Topsoil/Formational Rock
2	Sandy clay - Topsoil

The following tests were conducted in support of this investigation:

1. **Grain Size Analysis:** Grain size analysis was performed on a representative sample of Soil Type 1. The test result is presented in Table 4.

TABLE 4

Sieve Size		1½"	1"	¾"	½"	#4	#10	#20	#40	#200
Location	Soil Type	Percent Passing								
T-3 @ 2'	1	65	49	39	24	10	8	6	5	3

2. **Maximum Dry Density and Optimum Moisture Content:** The maximum dry density and optimum moisture content of Soil Type 1 was determined in accordance with ASTM D-1557. The test result is presented in Table 5.

TABLE 5

Location	Soil Type	Maximum Dry Density (γ_m-pcf)	Optimum Moisture Content (ω_{opt}-%)
T-3 @ 2'	1	117.2	13.1

3. **Moisture-Density Tests (Undisturbed Chunk Samples):** In-place dry density and moisture content of representative soil deposits beneath the site were determined from relatively undisturbed chunk samples using the water displacement test method. The test results are presented in Table 6 and tabulated on the enclosed Test Trench Logs (Plates 3-5).

TABLE 6

Sample Location	Soil Type	Field Moisture Content (ω-%)	Field Dry Density (γ_d-pcf)	Max. Dry Density (γ_m-pcf)	Ratio Of In-Place Dry Density To Max. Dry Density* ($\gamma_d/\gamma_m \times 100$)
T-5 @ 1½'	1	8.0	112.8	117.2	96.3
T-6 @ 4½'	2	17.2	100.9	-	-

* Designated as relative compaction for structural fills.
Required relative compaction for structural fill is 90% or greater unless otherwise specified.

4. **Expansion Index Test:** Two expansion index tests were performed on representative samples of Soil Types 1 and 2 in accordance with the Uniform Building Code Standard 18-2. The test results are presented in Table 7.

TABLE 7

Sample Location	Soil Type	Remolded ω (%)	Saturation (%)	Saturated ω (%)	Expansion Index (EI)	Expansion Potential
T-3 @ 2'	1	12.4	50.9	19.4	2	very low
T-6 @	2	16.3	49.9	34.7	81	medium

(ω) = moisture content in percent.

5. **Direct Shear Test:** One direct shear test was performed on a representative sample of Soil Type 1. The prepared specimen was soaked overnight, loaded with normal loads of 1, 2, and 4 kips per square foot respectively, and sheared to failure in an undrained condition. The test result is presented in Table 8.

TABLE 8

Sample Location	Soil Type	Sample Condition	Wet Density (γ_w-pcf)	Angle of Int. Fric. (Φ-Deg.)	Apparent Cohesion (c-psf)
T-3 @ 2'	1	remolded to 90% of γ_m @ % ωopt	119.7	33	277

6. **pH and Resistivity Test:** pH and resistivity of a representative sample of Soil Type 1 collected at selected locations were determined using "Method for Estimating the Service Life of Steel Culverts," in accordance with the California Test 643. The test result is presented in Table 9.

TABLE 9

Sample Location	Soil Type	Minimum Resistivity (OHM-CM)	pH
T-1 @ 2'	1	2912	6.3

7. **Sulfate Test:** One sulfate test was performed on a representative sample of Soil Type 1 in accordance with the California Test 417. The test result is presented in Table 10.

TABLE 10

Sample Location	Soil Type	Amount of Water Soluble Sulfate (so4) In Soil (% by Weight)
T-1 @ 2'	1	0.001

VI. CONCLUSIONS

Based on the foregoing study, development of the study site for a 3-Lot residential construction, is feasible from a geotechnical viewpoint. The project site is underlain at shallow to locally modest depths with competent formational rocks. Geotechnical factors presented below are unique to the project property and will most influence its development and associated construction costs:

* On-site natural hillside terrain are geologically stable. Landslides or other forms of geologic instability which could preclude site development are not indicated. Site formational rocks are competent, stable and dense deposits that will provide adequate support for the future structures, improvements and compacted fills.

* The project site is mantled by a thin cover of topsoil, which is not suitable for the support of the planed site structures, improvements or compacted fills in their present conditions. These soils should be regraded as recommended in the following sections. Added removals of upper cut areas and reconstruction to design grades with compacted fills are recommended in case of cut-fill transition pads in order to facilitate trenching and construct uniform bearing and subgrade soil conditions under the planned structures and improvements.

* Site formational units are highly cemented cobble conglomerate units which may create some excavations and handling difficulties. Cut excavations are expected be achieved using larger bulldozers (Caterpillar D-8 or greater). The need for blasting or special excavation techniques are currently not expected.

* The overall stability of graded building surfaces developed over sloping terrain is most dependent upon adequate keying and benching of fill into the undisturbed rock units during the grading operations. At the project site, added care should be given to proper construction of keyways and benching during the grading operations.

* Earth materials at the site consist predominantly of very low expansive pebbles and cobbles in a sandy matrix. Locally, some expansive clayey topsoils also occur at the site which are expected in minor quantities. Clayey soils, where encountered, should be selectively buried in deeper fills or thoroughly mixed with an abundant of very low expansive soils available from site excavations in order to manufacture a very low expansive mixture.

* Soil generated from the site excavations and removals are generally considered suitable for reuse as properly compacted fill provided larger rock sizes are excluded from the mixture as recommended below. Added processing and moisture conditioning efforts should also be expected for manufacturing the generated deposits into a uniform fill mixture.

* Based upon grading and pad construction recommendations provided herein, final bearing and subgrade soils are anticipated to consist of gravelly silty sands to silty sandy gravels (GW/SW) with very low expansion potential (expansion index less

than 21) according to the California Building Code classification (Table 18A-I-B). Actual classification and expansion characteristics of the finish grade soil mix can only be provided in the final as-graded compaction report based on proper testing of foundation bearing and subgrade soils when rough finish grades are achieved.

* In general, natural groundwater is not expected to impact project grading or the long term stability of the developed lot. Slope toe drains may be useful in protecting moisture sensitive improvements constructed near ascending cut embankments.

* Liquefaction and seismically induced settlements will not be factors in the development of the project site.

* Post construction total and differential settlements will not be a factor in the construction of the planned structures and improvements provided our remedial grading and foundation recommendations are followed.

* Soil collapse will not be a factor in the project construction provided our remedial grading recommendations are followed.

VII. RECOMMENDATIONS

The following recommendations are consistent with the indicated geotechnical conditions at the project property and should be reflected in the final plans and implemented during the construction phase. Added or modified recommendations may also be appropriate and can be provided at the final plan review phase:

A. Grading / Earthworks

Cut-fill and remedial grading techniques may be used in order to achieve final design grades and construct stable building surfaces. All grading and earthworks should be completed in accordance with Appendix Chapter 33 of the California Building Code, County of San Diego Grading Ordinances, the Standard Specifications for Public Works Construction and the requirements of the following sections wherever applicable:

1. **Cleaning and Grubbing:** Surface vegetation, debris and other deleterious/unsuitable materials should be removed from within the project grading and construction areas planned for new fills, structures and improvements plus 10 feet outside the perimeter, unless otherwise approved in the field. Ground preparations should be inspected and approved by the project geotechnical engineer or his designated field representative prior to grading.

Abandoned underground structures, pipes and utility lines should be properly removed or plugged as appropriate and approved in the field. Voids created by the removals of the abandoned underground tanks, pipes and structures should be properly backfilled with compacted fills in accordance with the requirements of this report.

2. **Removals and Over-excavations:** The most effective method to mitigate upper loose compressible topsoils will utilize removal and recompaction remedial grading techniques. Site existing topsoils should be removed to the underlying competent formational rocks as approved in the field in all areas to receive new fills, structures and improvements plus a minimum of 10 feet outside the perimeter, unless otherwise approved, and recompacted.

   Typical removal depths in the vicinity of individual exploratory test sites are shown in Table 11. The tabulated values are subject to changes by the project geotechnical consultant in the field at the time of remedial grading. Locally deeper removals may be necessary based on the actual field exposures and should be anticipated.

TABLE 11

Test Trench Location	Total Depth (ft)	Estimated Depth to Groundwater (ft)	Estimated Removal Depths (ft)	Comments
T-1	5'	not encountered	2½'	Parcel 3 driveway. Depth of driveway cut / undercut will govern.
T-2	2½'	not encountered	1'	Parcel 3 cut areas. Depth of cut / undercut will govern. Backhoe refusal at 2½'.
T-3	2½'	not encountered	1'	Parcel 3 driveway/fill areas. Backhoe refusal at 2½'.
T-4	2½'	not encountered	1'	Parcel 1 cut areas. Depth of cut / undercut will govern. Backhoe refusal at 2½'.
T-5	10'	not encountered	1½'	Parcel 2 cut areas. Depth of cut / undercut will govern.
T-6	8'	not encountered	7'	Parcel 2 fill slope areas. Remove and recompact entire section of topsoil. Depth of fill slope keyway will govern.

Notes:
1. All removal depths recommended for remedial grading are measured from the existing ground levels.
2. Actual depths may vary at the time of construction based on actual subsurface exposures.

3. Bottom of all removals should be additionally prepared and recompacted to a minimum depth of 6 inches as directed in the field.
4. Exploratory Test Trenches excavated in connection with our study at the indicated locations were backfilled with loose and uncompacted deposits. The loose/uncompacted backfill soils within these trenches shall also be re-excavated and placed back as properly compacted fills as a part of the project remedial grading operations.
5. All grounds steeper than 5:1 receiving fills/backfills should be properly benched and keyed as directed in the field.

3. **Excavation Characteristics:** Formational rock units at the site occur in well-cemented and massive conditions, however, planned cuts are modest and deep excavations are not expected. Project formational rock units will likely excavate to design grades as well as undercut depths with larger size bulldozers (Caterpillar D-8 or greater). Utilizing larger excavation equipments will also increase production levels and improve the quality of the generated fills.

4. **Non-uniform Bearing Soils Transitioning:** Ground transition from excavated cut to compacted fill should not be permitted underneath the proposed structures and improvements. Building foundations and floor slabs should be supported entirely on compacted fills or founded entirely on competent formational rock units. Transition pads will require special treatment. The cut portion of the cut-fill pads plus 10 feet outside the perimeter should be undercut to a sufficient depth to provide for a minimum of 3 feet of compacted fill mat below rough finish grades, or at least 12 inches of compacted fill beneath the deepest footing whichever is more. In the roadways, driveway, parking and on-grade slabs/improvement transition areas there should be a minimum of 12 inches of compacted soils below rough finish subgrade.

   Undercutting the cut portion of the building pads will also accommodate excavation of the foundation and underground utility trenches in an otherwise harder and cemented formational units. In the case of deeper utility trenches, undercutting to a minimum of 6 inches below the proposed inverts may be considered.

5. **Fill Materials, Select Grading and Compaction:** Soils generated from site removals and excavations are considered suitable for reuse as new compacted site fills provided all trash, debris, larger rocks and unsuitable materials are selectively removed and properly disposed of to the satisfaction of the project geotechnical engineer.

   The removals of on-site topsoils, however, will locally generate some clayey deposits. Clayey site soils, where encountered, should be selectively buried in deeper fills a minimum of 3 feet below rough finish grades, or may be thoroughly mixed with an abundant of very low expansive sandy to gravelly soils available from site excavations in order to manufacture a very low expansive mixture as directed in the field. Clayey soils and larger cobble sizes should not occur within the upper pad grades or used in wall backfills. Added processing, mixing and moisture conditioning efforts should also be expected for manufacturing a uniform fill and backfill mixture.

Project fills shall be clean deposits consisting of minus 6-inch particles and include at least 40% finer than #4 sieve materials by weight. Rocks larger than 6 inches should be excluded from the site fills. Wall backfills shall consist of minus 3 inches particles. Import soils, if required to improve the quality of generated rocky fills or complete grading, should be very low expansive granular sandy deposits (100% passing ¾-inch sieve, more than 90% passing sieve #4 sieve and less than 20% passing sieve #200 with expansion index less than 21) inspected and approved by the project geotechnical consultant prior to delivery to the site.

Uniform bearing soil conditions should be constructed at the site by the grading operations. Site soils should be adequately processed, thoroughly mixed, moisture conditioned to slightly (2%-3%) above the optimum moisture levels as directed in the field, manufactured into a uniform mixture, placed in thin uniform horizontal lifts and mechanically compacted to a minimum 90% of the corresponding laboratory maximum dry density per ASTM D-1557, unless otherwise specified.

A minimum 90% compaction levels will be required for all structural fills and wall/trench backfills. In the improvement areas, fills should also be compacted to a minimum 90% with the exception of the upper 12 inches under the asphalt paving surfaces where a minimum 95% compaction levels will be required.

6. **Permanent Graded Slopes:** Planned new cut-fill slopes should be constructed at 2:1 gradients maximum. Graded slopes constructed as recommended herein will be grossly stable with respect to deep seated and surficial failures for the indicated maximum vertical heights.

   All fill slopes shall be provided with a lower keyway. The keyway should maintain a minimum depth of 2 feet into the competent formational rock with a minimum width of 12 feet. The keyway should expose firm materials throughout with the bottom heeled back a minimum of 2% into the natural hillside and inspected and approved by the project geotechnical engineer. Additional level benches should be constructed into the firm natural hillside as the fill slope construction progresses. Fill slopes should also be compacted to

90% (minimum) of the laboratory standard out to the slope face. Over-building and cutting back to the compacted core, or backrolling a minimum of 4-foot vertical increments and "track-walking" at the completion of grading is recommended for site fill slope construction. Geotechnical engineering inspections and testing will be necessary to confirm adequate compaction levels within the fill slope face.

Cut slopes should be inspected and approved by the project geotechnical consultant during the grading to confirm stability. Additional recommendations will be provided at that time in the event adverse geologic conditions such as unfavorable geologic features are noted.

7. **Cut Slope Toe Drainage:** Graded cut slopes at the project may discharge up-slope run-off along the toe. Sensitive pad improvements located near the slope can best be protected by a toe drain constructed along the base of the cut slope. Slope toe drains, if appropriate, should consist a minimum 4-inch diameter, Schedule 40 (SDR 35) perforated pipe surrounded in a minimum of 2.25 cubic feet, per foot, of ¾-inch crushed rocks (1½ feet by 1½ feet trench), wrapped in filter fabric (Mirafi 140-N), or Caltrans Class 2 permeable aggregate. Filter fabric can be eliminated if Caltrans Class 2 permeable material is used. The subdrain shall be installed at suitable elevation to ensure positive drainage into an approved drainage facility. The need for slope toe drains can best be evaluated after rough grading and based on final improvement plans.

8. **Surface Drainage and Erosion Control:** A critical element to the continued stability of the building pads and slopes is an adequate surface drainage system and protection of the slope face. This can most effectively be achieved by appropriate vegetation cover and the installation of the following systems:

   * Drainage swales should be provided at the top and toe of slopes per the project civil engineer design.

   * Building pad surface run-off should be collected and directed away from the planned buildings and improvements to a selected location in a controlled manner. Area drains should be installed.

   * The finished slopes should be planted soon after completion of grading. Unprotected slope faces will be subject to severe erosion and should not be allowed. Over-watering of the slope faces should also not be allowed. Only the amount of water to sustain vegetation should be provided.

* Temporary erosion control facilities and silt fences should be installed during the construction phase periods and until landscaping is established as indicated and specified on the approved project grading/erosion control plans.

9. **Engineering Inspections:** All grading operations including removals, suitability of earth deposits used as compacted fill, and compaction procedures should be continuously inspected and tested by the project geotechnical consultant and presented in the final as-graded compaction report. The nature of finished subgrade soils should also be confirmed in the final compaction report at the completion of grading.

   Geotechnical engineering inspections shall include but not limited to the following:

   * Initial Inspection - After the grading/brushing limits have been staked but before grading/brushing starts.

   * Keyway/bottom of over-excavation inspection - After formational rock is exposed and prepared to receive fill but before fill is placed.

   * Cut slope/excavation inspection - After the excavation is started but before the vertical depth of excavation is more than 5 feet. Local and Cal-OSHA safety requirements for open excavations apply.

   * Fill/backfill inspection - After the fill/backfill placement is started but before the vertical height of fill/backfill exceeds 2 feet. A minimum of one test shall be required for each 100 lineal feet maximum in every 2 feet vertical gain with the exception of wall backfills where a minimum of one test shall be required for each 25 lineal feet maximum. Wall backfills should consist of minus 3-inch materials, and also mechanically compacted to a minimum 90% compaction levels unless otherwise specified. Finish rough and final pad grade tests shall be required regardless of fill thickness.

   * Foundation trench inspection - After the foundation trench excavations but before steel placement.

   * Foundation bearing/slab subgrade soils inspection - Prior to the placement of concrete for proper moisture and specified compaction levels.

* Geotechnical foundation/slab steel inspection - After the steel placement is completed but before the scheduled concrete pour.

* Subdrain/wall back drain inspection - After the trench excavations but during the actual placement. All material shall conform to the project material specifications and approved by the project geotechnical engineer.

* Underground utility/plumbing trench inspection - After the trench excavations but before placement of pipe bedding or installation of the underground facilities. Local and Cal-OSHA safety requirements for open excavations apply. Inspection of the pipe bedding may also be required by the project geotechnical engineer.

* Underground utility/plumbing trench backfill inspection - After the backfill placement is started above the pipe zone but before the vertical height of backfill exceeds 2 feet. Testing of the backfill within the pipe zone may also be required by the governing agencies. Pipe bedding and backfill materials shall conform to the governing agencies' requirements and project soils report if applicable. All trench backfills shall be mechanically compacted to a minimum 90% compaction levels unless otherwise specified. Plumbing trenches over 12 inches deep maximum under the interior floor slabs should be mechanically compacted and tested for a minimum 90% compaction levels. Flooding or jetting techniques as a means of compaction method shall not be allowed.

* Pavement/improvements subgrade and basegrade inspections - Prior to the placement of concrete or asphalt for proper moisture and specified compaction levels.

B. Foundations and Slab-on-Grade Floors

The following recommendations are consistent with very low expansive (expansion index less than 21) gravelly silty sands to silty sandy gravels (GW/SW), foundation bearing soil and site specific geotechnical conditions. Additional recommendations may also be required and should be given at the plan review phase. All design recommendations should also be further confirmed and/or revised at the completion of rough grading based on the expansion characteristics of the foundation bearing soils and as-graded site geotechnical conditions, and presented in the final as-graded compaction report:

1. The proposed buildings and structures may be supported on shallow stiff concrete foundations. The shallow foundations should be uniformly supported on certified very low expansive compacted fills or founded entirely on undisturbed competent formational rocks. Acceptable building foundations may include a system of spread pad and strip footings with slab-on-grade floors.

2. Continuous strip concrete foundations should be sized at least 12 inches wide and a minimum of 12 inches deep for single-story buildings and at least 15 inches wide and a minimum of 18 inches deep for two-story buildings. Isolated pad footings should be at least 24 inches square and 12 inches deep. Footing depths are measured from the lowest adjacent ground surface, not including the sand/gravel beneath floor slabs. Exterior continuous footings should enclose the entire building perimeter.

3. Continuous interior and exterior foundations should be reinforced by at least two #4 reinforcing bars. Place a minimum of 1-#4 bar 3 inches above the bottom of the footing and a minimum of 1-#4 bar 3 inches below the top of the footing. Reinforcement details for spread pad footings should be provided by the project architect/structural engineer.

4. Interior floor slabs should be a minimum of 4 inches in thickness, reinforced with #3 reinforcing bars spaced 18 inches on center each way placed mid-height in the slab. Slabs should be underlain by 4 inches of clean sand (SE 30 or greater) which is provided with a well performing moisture barrier/vapor retardant (minimum 10-mil plastic) placed mid-height in the sand.

5. Provide "softcut" contraction/control joints consisting of sawcuts spaced 10 feet on centers each way for all interior slabs. Cut as soon as the slab will support the weight of the saw and operate without disturbing the final finish which is normally within 2 hours after final finish at each control joint location or 150 psi to 800 psi. The sawcuts should be a minimum of 1-inch in depth but should not exceed 1¼-inches deep maximum. Anti-ravel skid plates should be used and replaced with each blade to avoid spalling and raveling. Avoid wheeled equipments across cuts for at least 24 hours.

6. Provide re-entrant corner reinforcement for all interior slabs. Re-entrant corners will depend on slab geometry and/or interior column locations. The enclosed Plate 8 may be used as a general guideline.

7. Foundation trenches and slab subgrade soils should be inspected and tested for proper moisture and specified compaction levels and approved by the project geotechnical consultant prior to the placement of concrete.

C. Exterior Concrete Slabs / Flatworks

1. All exterior slabs (walkways, and patios) should be a minimum of 4 inches in thickness reinforced with 6x6/10x10 welded wire mesh carefully placed mid-height in the slab.

2. Provide "tool joint" or "softcut" contraction/control joints spaced 10 feet on center (not to exceed 12 feet maximum) each way. Tool or cut as soon as the slab will support weight and can be operated without disturbing the final finish which is normally within 2 hours after final finish at each control joint location or 150 psi to 800 psi. Tool or softcuts should be a minimum of 1-inch but should not exceed 1¼-inches deep maximum. In case of softcut joints, anti-ravel skid plates should be used and replaced with each blade to avoid spalling and raveling. Avoid wheeled equipments across cuts for at least 24 hours.

3. All exterior slab designs should be confirmed in the final as-graded compaction report.

4. Subgrade soils should be tested for proper moisture and specified compaction levels and approved by the project geotechnical consultant prior to the placement of concrete.

D. Soil Design Parameters

The following soil design parameters are based on laboratory testing of representative samples obtained from the subsurface exploratory excavations. All parameters should be re-evaluated when the characteristics of the final as-graded soils have been specifically determined:

* Design wet density of soil = 120 pcf.
* Design angle of internal friction of soil = 33 degrees.
* Design active soil pressure for retaining structures = 35 pcf (EFP), level backfill, cantilever, unrestrained walls.
* Design at-rest soil pressure for retaining structures = 55 pcf (EFP), non-yielding, restrained walls.
* Design passive soil resistance for retaining structures = 406 pcf (EFP), level surface at the toe.
* Net allowable foundation pressure for certified compacted fills (minimum 12 inches wide by 12 inches deep footings) = 1750 psf.
* Net allowable foundation pressure for competent undisturbed formational rock units (minimum 12 inches wide by 12 inches deep footings) = 2500 psf.
* Allowable lateral bearing pressure (all structures except retaining walls) for compacted fill = 150 psf/ft.

Notes:

* Use a minimum safety factor of 1.5 for wall over-turning and sliding stability. However, because large movements must take place before maximum passive resistance can be developed, a safety factor of 2 may be considered for sliding stability where sensitive structures and improvements are planned near or on top of retaining walls.

* When combining passive pressure and frictional resistance the passive component should be reduced by one-third.

* The net allowable foundation pressure provided herein was determined for footings having the indicated minimum width and depth. The indicated value may be increased by 20% for each additional foot of depth and 20% for each additional foot of width to a maximum of 4500 psf, if needed. The allowable foundation pressure provided herein also applies to dead plus live loads and may be increased by one-third for wind and seismic loading.

* The allowable lateral bearing earth pressures may be increased by the amount of the designated value for each additional foot of depth to a maximum of 1500 pounds per square foot.

E. Asphalt and PCC Pavement Design

Specific pavement designs can best be provided at the completion of rough grading based on R-value tests of the actual finish subgrade soils. However, the following structural sections may be considered for initial planning phase cost estimating purposes only (not for construction):

1. A minimum section of 3 inches asphalt on 6 inches Caltrans Class 2 aggregate base or the minimum structural section required by the County of San Diego, whichever is more, may be considered for on-site asphalt paving surfaces outside public and private right-of-way. Actual designs will depend on the final R-value, design TI and approval of the County of San Diego.

   Base materials should be compacted to a minimum 95% of the corresponding maximum dry density (ASTM D-1557). Subgrade soils beneath the asphalt paving surfaces should also be compacted to a minimum 95% of the corresponding maximum dry density within the upper 12 inches.

2. Residential PCC driveways and parking supported on very low expansive (expansion index less than 21) granular subgrade soils should be a minimum of 5 inches in thickness, reinforced with #3 reinforcing bars at 18 inches on centers each way, placed mid-height in the slab. Subgrade soils beneath the PCC driveways and parking should be compacted to a minimum 90% of the corresponding maximum dry density within the upper 6 inches.

   Provide "tool joint" or "softcut" contraction/control joints spaced 10 feet on center (not to exceed 15 feet maximum) each way. Tool or cut as soon as the slab will support weight and can be operated without disturbing the final finish which is normally within 2 hours after final finish at each control joint location or 150 psi to 800 psi. Tool or softcuts should be a minimum of 1-inch but should not exceed 1¼ inches deep maximum. In case of softcut joints, anti-ravel skid plates should be used and replaced with each blade to avoid spalling and raveling. Avoid wheeled equipments across cuts for at least 24 hours.

3. Subgrade and basegrade soils should be tested for proper moisture and specified compaction levels and approved by the project geotechnical consultant prior to placement of the base or asphalt/PCC finish surface.

4. Base section and subgrade preparations per structural section design, will be required for all surfaces subject to traffic including roadways, travelways, drive lanes, driveway approaches and ribbon (cross) gutters. Driveway approaches within the public right-of-way should have 12 inches subgrade compacted to a minimum 95% compaction levels and provided with a 95% compacted Class 2 base section per the structural section design. Base layer under curb and gutters should be compacted to a minimum 95%, while subgrade soils under curb and gutters, and base and subgrade under sidewalks should be compacted to a minimum 90% compaction levels. Base section may not be required under curb and gutters, and sidewalks in the case of very low expansive subgrade soils (expansion index less than 21 and SE greater than 30). Site specific recommendations should be given in the final as-graded compaction report.

F. General Recommendations

1. The minimum foundation design and steel reinforcement provided herein are based on soil characteristics and are not intended to be in lieu of reinforcement necessary for structural considerations.

2. Adequate staking and grading control is a critical factor in properly completing the recommended remedial and site grading operations. Grading control and staking should be provided by the project grading contractor or surveyor/civil engineer and is beyond the geotechnical engineering services. Inadequate staking and/or lack of grading control may result in unnecessary additional grading which will increase construction costs.

3. Footings located on or adjacent to the top of slopes should be extended to a sufficient depth to provide a minimum horizontal distance of 7 feet or one-third of the slope height, whichever is greater (need not exceed 40 feet maximum) between the bottom edge of the footing and face of slope. This requirement applies to all improvements and structures including fences, posts, pools, spas, etc. Concrete and AC improvements should be provided with a thickened edge to satisfy this requirement.

4. Expansive clayey soils should not be used for backfilling of any retaining structure. All retaining walls should be provided with a 1:1 wedge of granular, compacted backfill measured from the base of the wall footing to the finished surface. Retaining walls should be provided with a back drainage in general accordance with the enclosed Plate 9.

5. All underground utility and plumbing trenches should be mechanically compacted to a minimum 90% of the maximum dry density of the soil unless otherwise specified. Care should be taken not to crush the utilities or pipes during the compaction of the soil. Non-expansive, granular backfill soils should be used.

6. Site drainage over the finished pad surfaces should flow away from structures onto the street in a positive manner. Care should be taken during the construction, improvements, and fine grading phases not to disrupt the designed drainage patterns. Roof lines of the buildings should be provided with roof gutters. Roof water should be collected and directed away from the buildings and structures to a suitable location. Consideration should be given to adequately damp-proof/waterproof the basement walls/foundations and provide the planter areas adjacent to the foundations with an impermeable liner and a subdrainage system.

7. Based on the result of the tested soil sample, the amount of water soluble sulfate (SO4) was found to be 0.001 percent by weight which is considered negligible according to the California Building Code Table No. 19-A-4. Portland cement Type II may be used.

8. Table 12 is appropriate based on the pH-Resistivity test result:

TABLE 12

Design Soil Type	Gage	18	16	14	12	10	8
1	Years to Perforation of Steel Culverts	16	20	25	35	44	54

9. Final plans should reflect preliminary recommendations given in this report. Final foundations and grading plans may also be reviewed by the project geotechnical consultant for conformance with the requirements of the geotechnical investigation report outlined herein. More specific recommendations may be necessary and should be given when final grading and architectural/structural drawings are available.

10. All foundation trenches should be inspected to ensure adequate footing embedment and confirm competent bearing soils.

11. The amount of shrinkage and related cracks that occurs in the concrete slab-on-grades, flatworks and driveways depend on many factors, the most important of which is the amount of water in the concrete mix. The purpose of the slab reinforcement is to keep normal concrete shrinkage cracks closed tightly. The amount of concrete shrinkage can be minimized by reducing the amount of water in the mix. To keep shrinkage to a minimum the following should be considered:

    * Use the stiffest mix that can be handled and consolidated satisfactorily.

    * Use the largest maximum size of aggregate that is practical. For example, concrete made with ⅜-inch maximum size aggregate usually requires about 40-lbs. more (nearly 5-gal.) water per cubic yard than concrete with 1-inch aggregate.

    * Cure the concrete as long as practical.

    The amount of slab reinforcement provided for conventional slab-on-grade construction considers that good quality concrete materials, proportioning, craftsmanship, and control tests where appropriate and applicable are provided.

12. A preconstruction meeting between representatives of this office, the property owner or planner, city inspector and the grading contractor/builder is recommended in order to discuss grading/construction details associated with site development.

VIII. LIMITATIONS

The conclusions and recommendations provided herein have been based on available data obtained from pertinent reports and plans, subsurface exploratory excavations as well as our experience with the soils and formational materials located in the general area. The materials encountered on the project site and utilized in our laboratory testing are believed representative of the total area; however, earth materials may vary in characteristics between excavations.

Of necessity we must assume a certain degree of continuity between exploratory excavations and/or natural exposures. It is necessary, therefore, that all observations, conclusions, and recommendations be verified during the grading operation. In the event discrepancies are noted, we should be contacted immediately so that an inspection can be made and additional recommendations issued if required.

The recommendations made in this report are applicable to the site at the time this report was prepared. It is the responsibility of the owner/developer to ensure that these recommendations are carried out in the field.

It is almost impossible to predict with certainty the future performance of a property. The future behavior of the site is also dependent on numerous unpredictable variables, such as earthquakes, rainfall, and on-site drainage patterns.

The firm of VINJE & MIDDLETON ENGINEERING, INC., shall not be held responsible for changes to the physical conditions of the property such as addition of fill soils, added cut slopes, or changing drainage patterns which occur without our inspection or control.
The property owner(s) should be aware that the development of cracks in all concrete surfaces such as floor slabs and exterior stucco are associated with normal concrete shrinkage during the curing process. These features depend chiefly upon the condition of concrete and weather conditions at the time of construction and do not reflect detrimental ground movement. Hairline stucco cracks will often develop at window/door corners, and floor surface cracks up to ⅛-inch wide in 20 feet may develop as a result of normal concrete shrinkage (according to the American Concrete Institute).

This report should be considered valid for a period of one year and is subject to review by our firm following that time. If significant modifications are made to your tentative development plan, especially with respect to the height and location of cut and fill slopes, this report must be presented to us for review and possible revision.

Vinje & Middleton Engineering, Inc., warrants that this report has been prepared within the limits prescribed by our client with the usual thoroughness and competence of the engineering profession. No other warranty or representation, either expressed or implied, is included or intended.

Once again, should any questions arise concerning this report, please do not hesitate to contact this office. Reference to our Job #05-276-P will help to expedite our response to your inquiries.

We appreciate this opportunity to be of service to you.

VINJE & MIDDLETON ENGINEERING, INC.

Dennis Middleton
CEG #980

REGISTERED GEOLOGIST
DENNIS MIDDLETON
CEG 980
CERTIFIED
ENGINEERING
STATE OF CALIFORNIA

S. Mehdi S. Shariat
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SEYED M. SAMSAM SHARIAT
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STEVEN JAY MELZER
No. 6953
Exp. 5-31-07
STATE OF CAL FORNIA

DM/SMSS/SJM/jt

Distribution: Addressee (5)

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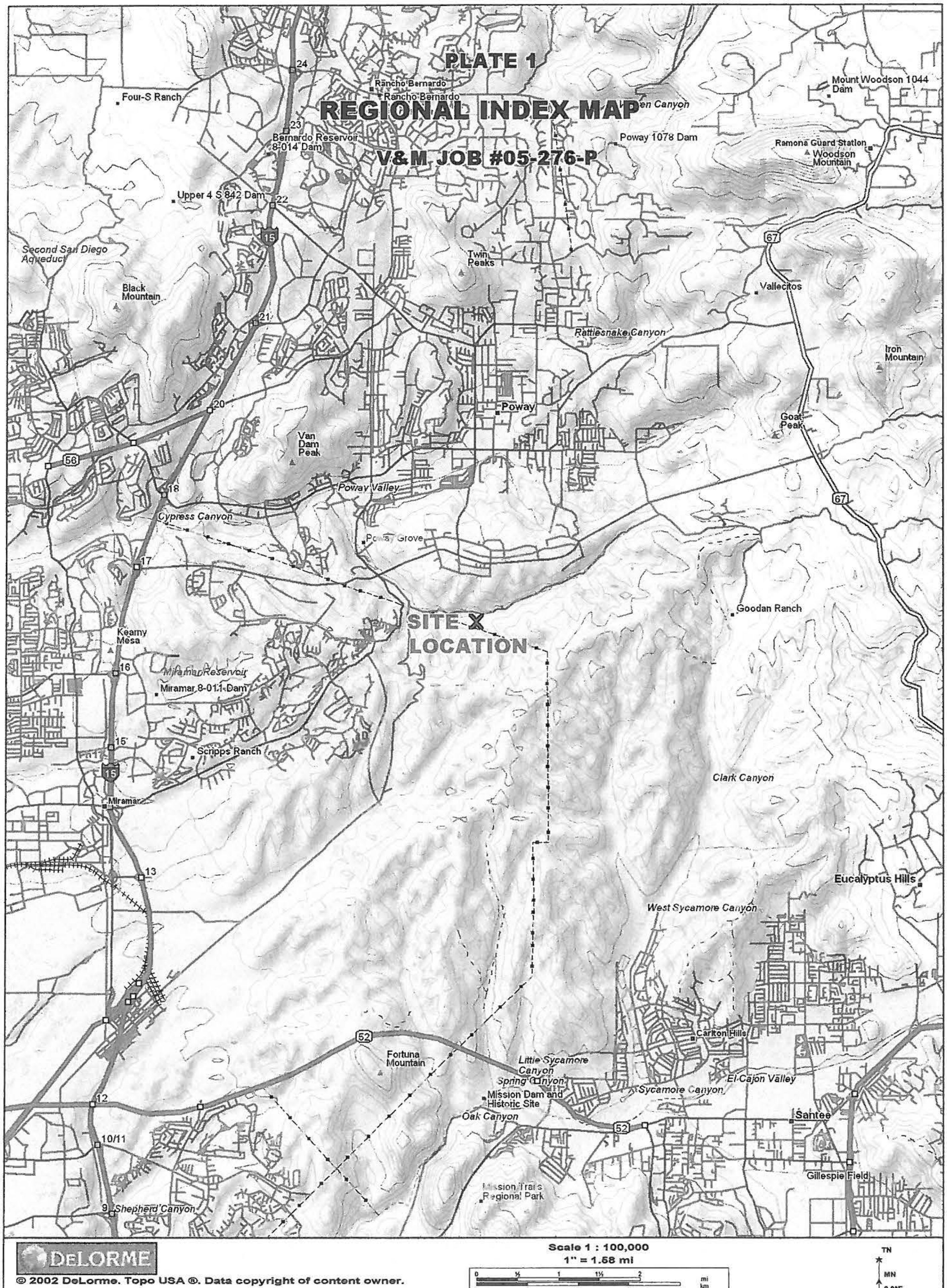
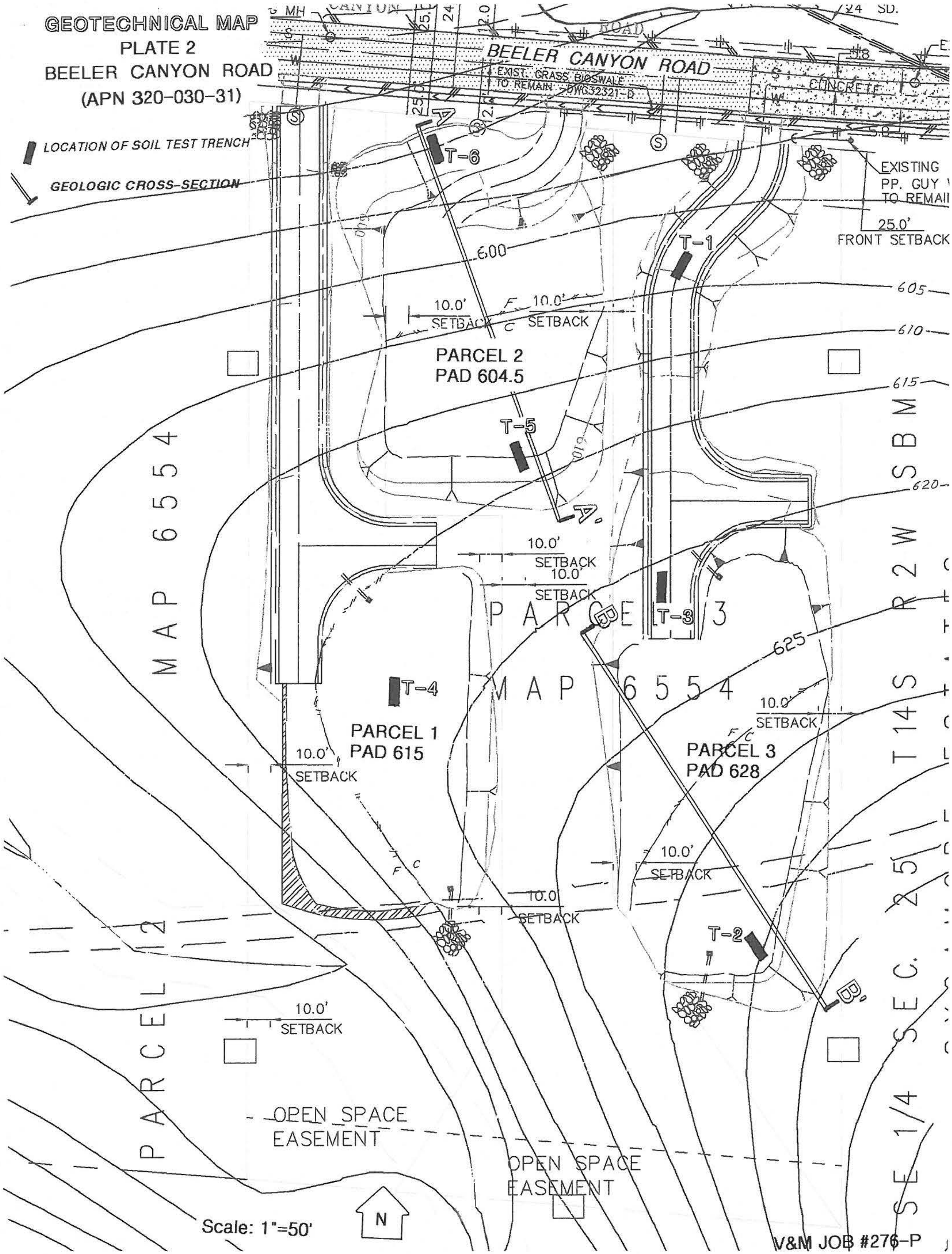


PLATE 1
REGIONAL INDEX MAP
V&M JOB #05-276-P
SITE LOCATION
Rancho Bernardo
Four-S Ranch
Bernardo Reservoir 8-014 Dam
Upper 4 S 842 Dam
Poway 1078 Dam
Mount Woodson 1044 Dam
Ramona Guard Station
Woodson Mountain
Second San Diego Aqueduct
Black Mountain
Twin Peaks
Vallecitos
Rattlesnake Canyon
Iron Mountain
Poway
Van Dam Peak
Goat Peak
Poway Valley
Cypress Canyon
Poway Grove
Goodan Ranch
Kearny Mesa
Miramar Reservoir
Miramar 8-011 Dam
Scripps Ranch
Miramar
Clark Canyon
Eucalyptus Hills
West Sycamore Canyon
Carlton Hills
Fortuna Mountain
Little Sycamore Canyon
Spring Canyon
Mission Dam and Historic Site
El Cajon Valley
Sycamore Canyon
Santee
Oak Canyon
Gillespie Field
Mission Trails Regional Park
Shepherd Canyon
DeLORME
Scale 1 : 100,000
1" = 1.58 mi
TN
MN
0.0°E

GEOTECHNICAL MAP
PLATE 2
BEELER CANYON ROAD
(APN 320-030-31)



PRIMARY DIVISIONS			GROUP SYMBOL	SECONDARY DIVISIONS
COARSE GRAINED SOILS 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	CLEAN GRAVELS (LESS THAN 5% FINES)	GW	Well graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly graded gravels or gravel-sand mixtures, little or no fines.
		GRAVEL WITH FINES	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines.
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines.
	SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS (LESS THAN 5% FINES)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES	SM	Silty sands, sand-silt mixtures, non-plastic fines.
			SC	Clayey sands, sand-clay mixtures, plastic fines.
FINE GRAINED SOILS MORE THAN HALF OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS LIQUID LIMIT IS LESS THAN 50%		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
			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 LIQUID LIMIT IS GREATER THAN 50%		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils.

GRAIN'SIZES U.S. STANDARD SERIES SIEVE — CLEAR SQUARE SIEVE OPENINGS

200 | 40 | 10 | 4 | 3/4" | 3" | 12"

SILTS AND CLAYS	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

RELATIVE DENSITY

SANDS, GRAVELS AND NON-PLASTIC SILTS	BLOWS/FOOT
VERY LOOSE	0 - 4
LOOSE	4 - 10
MEDIUM DENSE	10 - 30
DENSE	30 - 50
VERY DENSE	OVER 50

CONSISTENCY

CLAYS AND PLASTIC SILTS	STRENGTH	BLOWS/FOOT
VERY SOFT	0 - ¼	0 - 2
SOFT	¼ - ½	2 - 4
FIRM	½ - 1	4 - 8
STIFF	1 - 2	8 - 16
VERY STIFF	2 - 4	16 - 32
HARD	OVER 4	OVER 32

1. Blow count, 140 pound hammer falling 30 inches on 2 inch O.D. split spoon sampler (ASTM D-1586)
2. Unconfined compressive strength per SOILTEST pocket penetrometer CL-700

▼ Sand Cone Test — ■ Bulk Sample — | $^{2}4_{6}$ = Standard Penetration Test (SPT) (ASTM D-1586) with blow counts per 6 inches

□ Chunk Sample — ○ Driven Rings — || $^{2}4_{6}$ = California Sampler with blow counts per 6 inches

VINJE & MIDDLETON ENGINEERING, INC.

2450 Vineyard Ave., #102
Escondido, CA 92029-1229

KEY TO EXPLORATORY BORING LOGS
Unified Soil Classification System (ASTM D-2487)

PROJECT NO.	DATE	KEY

Date: 5-12-05						Logged by: SJM
DEPTH (ft)	SAMPLE	T-1 DESCRIPTION	USCS SYMBOL	FIELD MOISTURE (%)	FIELD DRY DENSITY (pcf)	RELATIVE COMPACTION (%)
- 1 - - 2 -	■	**TOPSOIL:** Cobbles (70%) in silty fine sand. Brown color. Dry. Loose. ST-1	GP/GM			
- 3 - - 4 - - 5 -		**FORMATIONAL ROCK:** Cobble conglomerate. 60% +cobbles in a fine to medium grained sandy matrix with a trace of clay. Yellow - tan color. Moderately cemented. Difficult to excavate. ST-1	GW/GM			
- 6 - - 7 - - 8 -		End Test Trench at 5'. No caving. No groundwater.				

Date: 5-12-05						Logged by: SJM
DEPTH (ft)	SAMPLE	T-2 DESCRIPTION	USCS SYMBOL	FIELD MOISTURE (%)	FIELD DRY DENSITY (pcf)	RELATIVE COMPACTION (%)
- 1 - - 2 -		**TOPSOIL:** Cobbles (60%) in silty fine sand. Brown color. Dry. Loose. ST-1	SM/GM			
- 3 - - 4 - - 5 -		**FORMATIONAL ROCK:** Cobble conglomerate. 70% cobbles in a fine to medium grained sandy matrix with a trace of clay. Yellow-tan to brown color. Well cemented. Hard. Refusal at 2½'. ST-1	GW/GM			
- 6 - - 7 - - 8 -		End Test Trench at 2½' - Refusal. No caving. No groundwater.				

VINJE & MIDDLETON ENGINEERING, INC
2450 Vineyard Avenue, Suite 102
Escondido, California 92029-1229
Office 760-743-1214 Fax 760-739-0343

TEST TRENCH LOGS

BEELER CANYON ROAD
COUNTY OF SAN DIEGO

PROJECT NO. 05-276-P PLATE 3

▼ Sand Cone Test ■ Bulk Sample ❑ Chunk Sample ○ Driven Rings

Date: 5-12-05						Logged by: SJM
DEPTH (ft)	SAMPLE	T-3 DESCRIPTION	USCS SYMBOL	FIELD MOISTURE (%)	FIELD DRY DENSITY (pcf)	RELATIVE COMPACTION (%)
0 – 2	■	**TOPSOIL:** Cobbles (30%) in silty fine sand. Brown color. Dry. Loose. ST-1	GP/GM			
2 – 5		**FORMATIONAL ROCK:** Cobble conglomerate. 70% cobbles in a fine to sandy matrix with trace of clay. Yellow - tan color. Well cemented. Hard. ST-1	GW/GM			
5 – 8		End Test Trench at 2½'. No caving. No groundwater.				

Date: 5-12-05						Logged by: SJM
DEPTH (ft)	SAMPLE	T-4 DESCRIPTION	USCS SYMBOL	FIELD MOISTURE (%)	FIELD DRY DENSITY (pcf)	RELATIVE COMPACTION (%)
0 – 2		**TOPSOIL:** Cobbles (40%) in silty fine sand. Brown color. Dry. Loose. ST-1	SM/GM			
3 – 6		**FORMATIONAL ROCK:** Cobble conglomerate. 75% cobbles in a fine sandy matrix with trace of clay. Yellow-tan to red-brown color. Well cemented. Hard. Refusal at 2½'. ST-1	GW/GM			
6 – 8		End Test Trench at 2½' - Refusal. No caving. No groundwater.				

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TEST TRENCH LOGS

BEELER CANYON ROAD
COUNTY OF SAN DIEGO

PROJECT NO. 05-276-P PLATE 4

▼ Sand Cone Test ■ Bulk Sample ❑ Chunk Sample ❍ Driven Rings

Date: 5-12-05 **Logged by: SJM**

DEPTH (ft)	SAMPLE	T-5 DESCRIPTION	USCS SYMBOL	FIELD MOISTURE (%)	FIELD DRY DENSITY (pcf)	RELATIVE COMPACTION (%)
0 - 1	■	**TOPSOIL:** Cobbles (20%) in silty fine sand. Brown color. Dry. Loose. ST-1	SM/GM			
1 - 2	❑			8.0	112.8	96.3
2 - 10	■	**FORMATIONAL ROCK:** Cobble conglomerate. 40% cobbles in a fine to medium grained sandy matrix with trace of clay. Yellow-tan to red-brown color. Moderately cemented. Irregular shaped, discontinuous grey siltstone lens at 4'-5'. ST-1	GM/GC			
10 - 15		End Test Trench at 10'. No caving. No groundwater.				

Date: 5-12-05 **Logged by: SJM**

DEPTH (ft)	SAMPLE	T-6 DESCRIPTION	USCS SYMBOL	FIELD MOISTURE (%)	FIELD DRY DENSITY (pcf)	RELATIVE COMPACTION (%)
0 - 2		**TOPSOIL:** Cobbles (15%) in silty fine sand. Dark brown to tan color. Slightly moist. Loose. ST-1	SM/GM			
2 - 3.5		Sandy clay. Grey color. Some rust-colored staining. 5% cobbles. Moist. Stiff. Plastic. ST-2				
3.5 - 7	❑	**FORMATIONAL ROCK:** Cobble conglomerate. 70% cobbles in a fine to medium grained sandy matrix with clay. Yellow-tan to red-brown color. Cemented hard. ST-1	GW/GM	17.2	100.9	-
7 - 8		End Test Trench at 8'. No caving. No groundwater.				

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TEST TRENCH LOGS

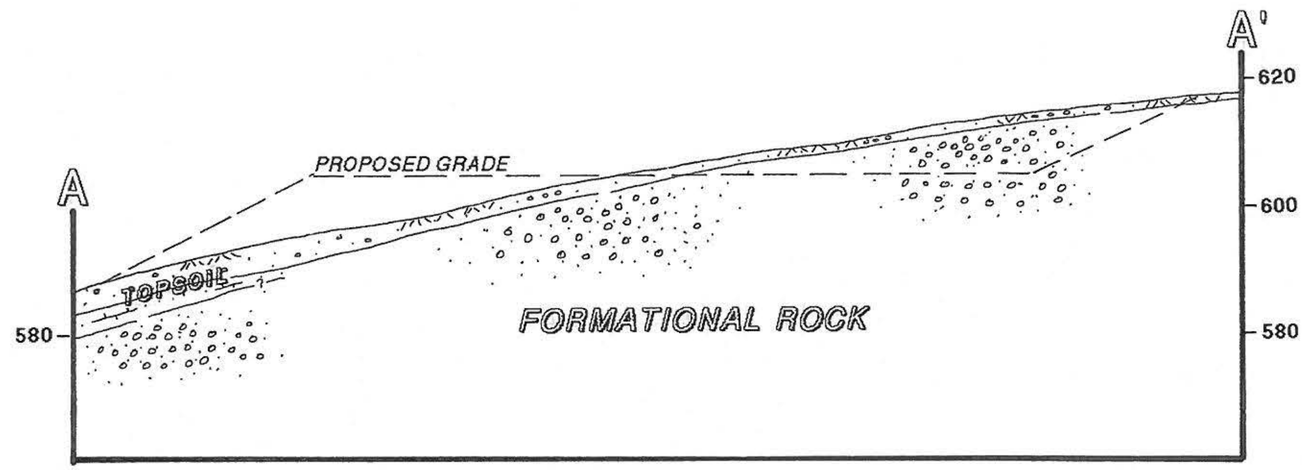
BEELER CANYON ROAD
COUNTY OF SAN DIEGO

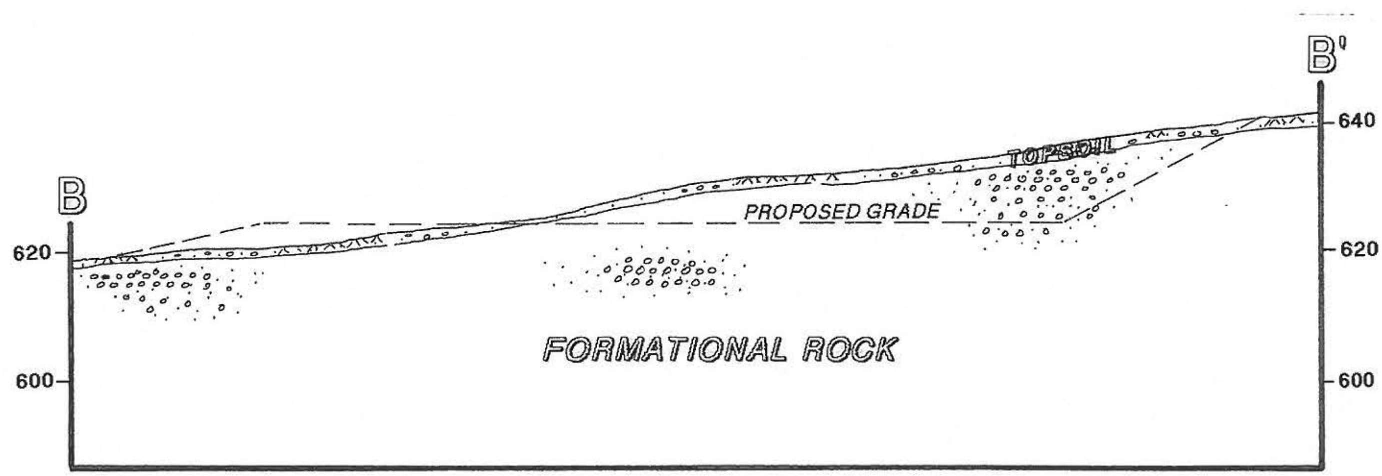
PROJECT NO. 05-276-P PLATE 5

▼ Sand Cone Test ■ Bulk Sample ❑ Chunk Sample ○ Driven Rings

GEOLOGIC CROSS-SECTIONS

PLATE 6





SCALE: 1"=30'

FAULT - EPICENTER MAP

SAN DIEGO COUNTY REGION

INDICATED EARTHQUAKE EVENTS THROUGH 75 YEAR PERIOD (1900-1974)

Map data is compiled from various sources including California Division of Mines and Geology, California Institute of Technology and the National Oceanic and Atmospheric Administration. Map is reproduced from California Division of Mines and Geology, "Earthquake Epicenter Map of California; Map Sheet 39."

Earthquake Magnitude

- .... 4.0 TO 4.9
- .... 5.0 TO 5.9
- .... 6.0 TO 6.9
- .... 7.0 TO 7.9
- ----- Fault.

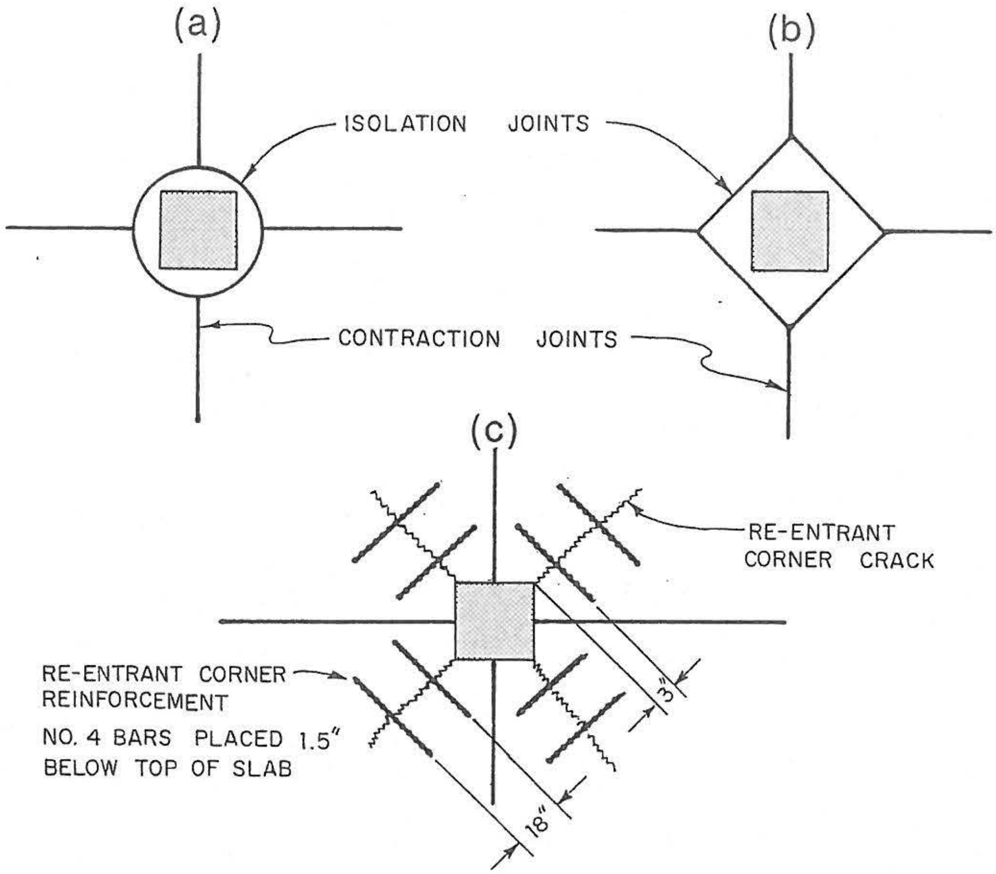
PROJECT: **Job #05-276-P**

BEELER CANYON ROAD, COUNTY OF SAN DIEGO

PLATE: **7**

ISOLATION JOINTS AND RE-ENTRANT CORNER REINFORCEMENT

Typical - no scale



NOTES:

1. Isolation joints around the columns should be either circular as shown in (a) or diamond shaped as shown in (b). If no isolation joints are used around columns, or if the corners of the isolation joints do not meet the contraction joints, radial cracking as shown in (c)may occur (reference ACI).

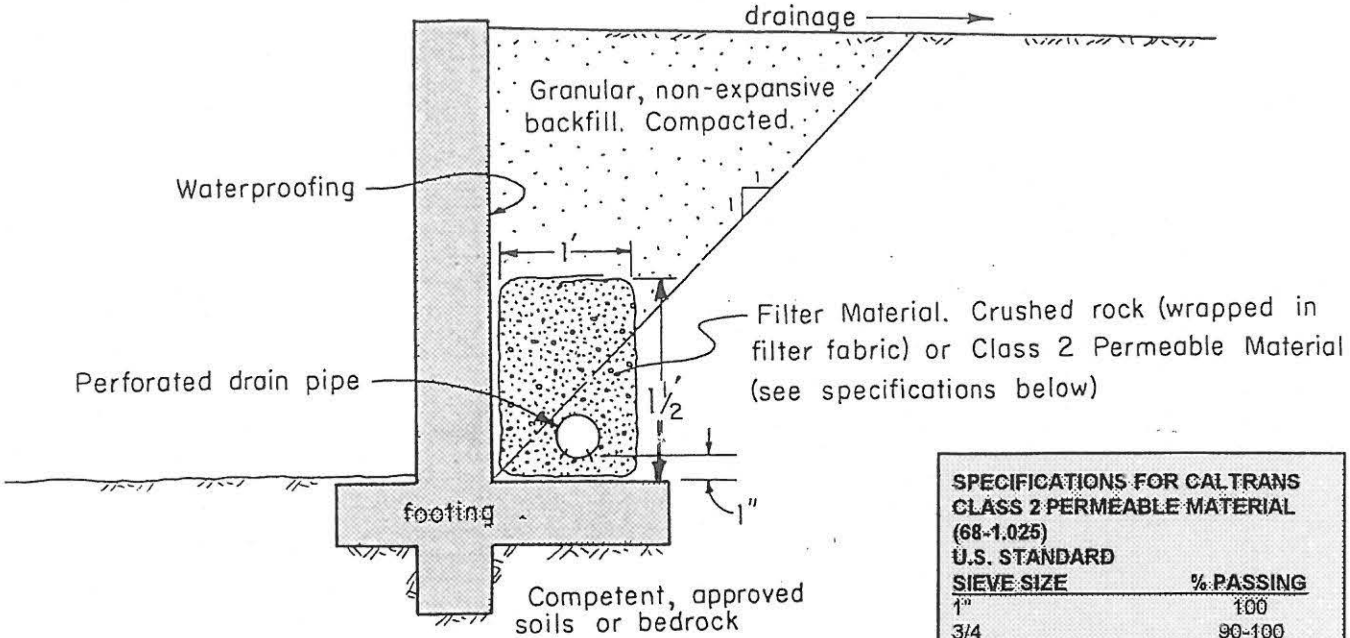
2. In order to control cracking at the re-entrant corners (±270° corners), provide reinforcement as shown in (c).

3. Re-entrant corner reinforcement shown herein is provided as a general guideline only and is subject to verification and changes by the project architect and/or structural engineer based upon slab geometry, location, and other engineering and construction factors.

VINJE & MIDDLETON ENGINEERING, INC.

RETAINING WALL DRAIN DETAIL

Typical - no scale



SPECIFICATIONS FOR CALTRANS CLASS 2 PERMEABLE MATERIAL (68-1.025) U.S. STANDARD SIEVE SIZE	% PASSING
1"	100
3/4	90-100
3/8	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

Sand Equivalent > 75

CONSTRUCTION SPECIFICATIONS:

1. Provide granular, non-expansive backfill soil in 1:1 gradient wedge behind wall. Compact backfill to minimum 90% of laboratory standard.

2. Provide back drainage for wall to prevent build-up of hydrostatic pressures. Use drainage openings along base of wall or back drain system as outlined below.

3. Backdrain should consist of 4" diameter PVC pipe (Schedule 40 or equivalent) with perforations down. Drain to suitable outlet at minimum 1%. Provide ¾" - 1½" crushed gravel filter wrapped in filter fabric (Mirafi 140N or equivalent). Delete filter fabric wrap if Caltrans Class 2 permeable material is used. Compact Class 2 material to minimum 90% of laboratory standard.

4. Seal back of wall with waterproofing in accordance with architect's specifications.

5. Provide positive drainage to disallow ponding of water above wall. Lined drainage ditch to minimum 2% flow away from wall is recommended.

* Use 1½ cubic foot per foot with granular backfill soil and 4 cubic foot per foot if expansive backfill soil is used.

VINJE & MIDDLETON ENGINEERING, INC.

APPENDIX E

Review Information

Cycle Type:	2 Submitted (Multi-Discipline)	**Submitted:**	02/26/2020	Deemed Complete on 02/28/2020
Reviewing Discipline:	LDR-Geology	**Cycle Distributed:**	02/28/2020	
Reviewer:	Thomas, Patrick (619) 446-5296 pathomas@sandiego.gov	**Assigned:**	02/28/2020	
		Started:	04/01/2020	
		Review Due:	03/27/2020	
Hours of Review:	4.00	**Completed:**	04/09/2020	COMPLETED LATE
Next Review Method:	Submitted (Multi-Discipline)	**Closed:**	04/16/2020	

. The review due date was changed to 04/02/2020 from 04/02/2020 per agreement with customer.
. The reviewer has indicated they want to review this project again. Reason chosen by the reviewer: New Document Required.
. We request a 2nd complete submittal for LDR-Geology on this project as: Submitted (Multi-Discipline).
. The reviewer has requested more documents be submitted.
. Your project still has 6 outstanding review issues with LDR-Geology (all of which are new).
. Last month LDR-Geology performed 78 reviews, 44.9% were on-time, and 74.6% were on projects at less than < 3 complete submittals.

649699-2 (4/9/2020)

Information

Cleared?	Issue Num	Issue Text
☐	1	The project site is located within geologic hazards zone 53 as shown on the City's Seismic Safety Study. Zone 53 is characterized by level or sloping to steep terrain with unfavorable geologic structure, low to moderate risk. (New Issue)

References

Cleared?	Issue Num	Issue Text
☐	2	Preliminary Geotechnical Investigation, Proposed 3-Lot Development, 2.8 Acre Parcel, Beeler Canyon Road, County of San Diego (A.P.N. 320-030-31), prepared by Vinje & Middleton Engineering, Inc., dated June 27, 2005 (their project no. 05-276-P). Report of Geotechnical Investigation, Proposed Residential Building Site, 11275 Beeler Canyon Road, San Diego, California, prepared by Allied Earth Technology, dated June 24, 2014 (their project no. 14-1210E2). (New Issue)
☐	3	Response to City Comments, Update of "Preliminary Geotechnical Investigation, Proposed 3-Lot Development, 2.8 Acre Parcel, Beeler Canyon Road, County of San Diego," Proposed Residential Building Site, 11275 Beeler Canyon Road, San Diego, California, prepared by Allied Earth Technology, dated November 24, 2015 (their project no. 14-1210E2). Site Plan and Grading Plan, Beeler Canyon Road, Parcel 3 of Map 6554, San Diego, California, prepared by Carl M. Fiorica, Civil Engineer, License No. 64715, dated August, 2019. (New Issue)

Comments

Cleared?	Issue Num	Issue Text
☐	4	The referenced geotechnical reports are over three years old. Submit an update geotechnical report that addresses the current geologic conditions at the site with respect to the currently proposed development (PTS No. 649699). (New Issue)
☐	5	Geotechnical reports must be prepared in accordance with the City's "Guidelines for Geotechnical Reports." https://www.sandiego.gov/sites/default/files/legacy/development-services/pdf/industry/geoguidelines.pdf (New Issue)
☐	6	Submit original quality prints and digital copies (on CD/DVD/or USB data storage device) of the geotechnical reports listed as "References" and the requested update geotechnical document for our review and for our records. (New Issue)

APPENDIX F

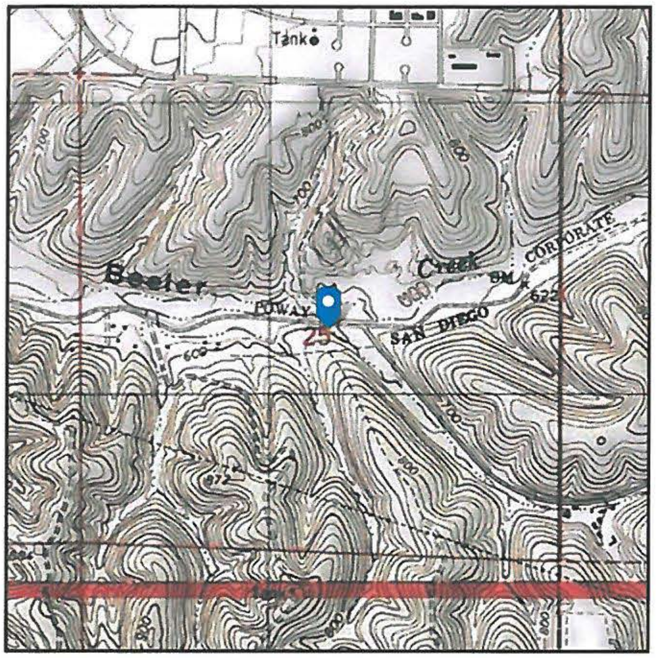
ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

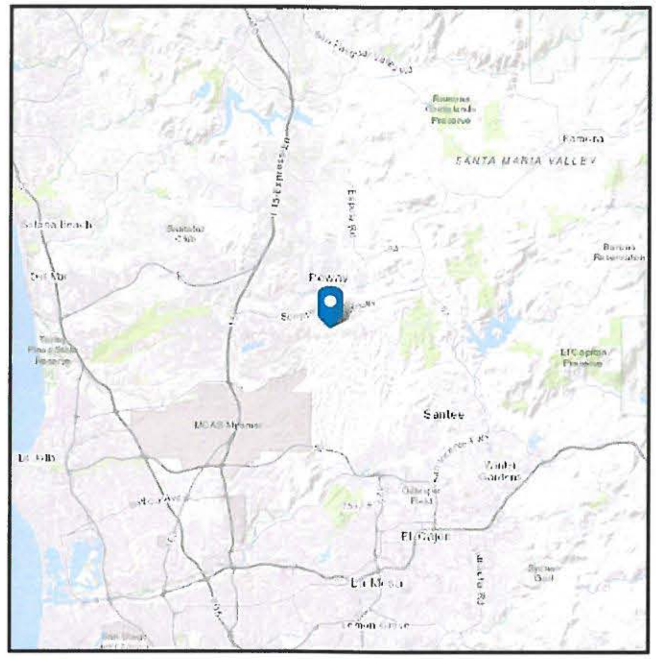
ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Stiff Soil

Elevation: 605.61 ft (NAVD 88)
Latitude: 32.9272
Longitude: -117.0406





ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

Seismic

Site Soil Class: D - Stiff Soil

Results:

S_S :	0.793	S_{D1} :	N/A
S_1 :	0.292	T_L :	8
F_a :	1.183	PGA :	0.34
F_v :	N/A	PGA_M :	0.428
S_{MS} :	0.938	F_{PGA} :	1.26
S_{M1} :	N/A	I_e :	1
S_{DS} :	0.625	C_v :	1.197

Ground motion hazard analysis may be required. See ASCE/SEI 7-16 Section 11.4.8.

Data Accessed: Mon Jun 29 2020

Date Source: USGS Seismic Design Maps

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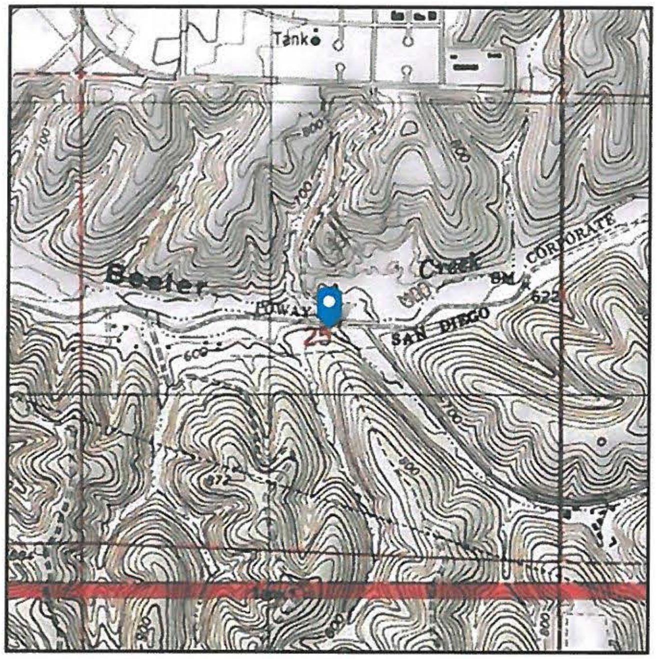
APPENDIX G

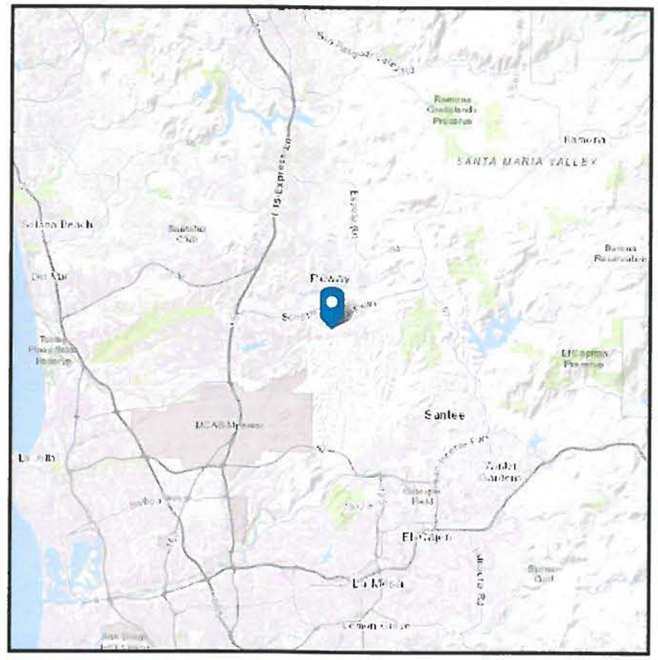
ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Stiff Soil

Elevation: 605.61 ft (NAVD 88)
Latitude: 32.9272
Longitude: -117.0406





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Flood

Results:

Flood Zone Categorization: X (unshaded)

Base Flood Elevation:

Data Source: FEMA National Flood Hazard Layer - Effective Flood Hazard Layer for US, where modernized (https://msc.fema.gov/portal/search)

Date Accessed: Mon Jun 29 2020

FIRM Panel: If available, download FIRM panel here

Insurance Study Note: Download FEMA Flood Insurance Study for this area here

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National Flood Hazard Layer FIRMette

FEMA

117°2'48"W 32°55'53"N

Feet 0 250 500 1,000 1,500 2,000

1:6,000

117°2'10"W 32°55'23"N

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 6/29/2020 at 5:38 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.