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July 29, 2014

Agoura Hills Center Properties, LLC
2985 E Hillcrest Drive #107
Thousand Oaks, CA 91362

Work Order: 2272-1-0-102

Attention: Mr. Steve Rice

Subject: **Geotechnical Response to City of Agoura Hills Review Sheet Dated April 18, 2014, Senior Housing Community, Vesting Tentative Tract Number 71742 (APN# 2061-001-025), 30800 Agoura Road, Agoura Hills, California.**

1. INTRODUCTION

This report was prepared to provide geotechnical engineering responses to the April 18, 2014 City of Agoura Hills - Geotechnical Review Sheet. The geotechnical review was of the referenced update report by this firm dated January 30, 2014 which was provided to address the currently proposed Senior Housing Community. In addition, the report included responses to a prior City review dated November 11, 2011. The current review letter is attached for reference.

2. RESPONSES TO GEODYNAMICS REVIEW LETTER DATED APRIL 18, 2014

PLANNING/FEASIBILITY COMMENTS

COMMENT 1

The Geotechnical map shows that three seven-foot deep trenches were excavated within the general area of Building A, with only one trench located within the building area. The trenches extended only about two feet into the Older Alluvium underlying the unsuitable surficial materials. Information regarding the type, depth and engineering characteristics of underlying alluvial deposits in the building area is limited. Considering that Building A is a structure of significant size that includes subterranean parking levels and retaining walls that extend to heights of eight feet, the consultant should discuss the adequacy of available information in this area and the need to provide additional, subsurface exploration and testing.

RESPONSE

The Older Alluvium underlying the entire site is part of a continuous alluvial deposit along the base of Ladyface Mountain that has been dissected by a series of drainages. While as the reviewer notes that only one trench was in the Building A footprint per se, the cut slope along Agoura Road just north of the proposed building provides another 10± feet of stratigraphic exposure of the Older Alluvium specific to the building area. All the exploratory trenches and borings excavated throughout the site encountered

Older Alluvium with boring B-1 (top elevation 963±) encountering the thickest section of Older Alluvium. In B-1, drilled approximately 150 east of proposed Building A, 33 feet of Older Alluvium was penetrated before encountering the underlying Calabasas Formation bedrock. While soil descriptions varied from clays and silts to clayey to silty sand and gravels, as noted in the boring and trench logs, the preponderance of the Older Alluvial soils are typically hard or very dense. This finding is substantiated by the three load consolidation tests performed on undisturbed samples of the Older Alluvial soils (Gorian 2003). Therefore for the purpose of this response, no additional exploration or testing of the Building A area is warranted at this time.

COMMENT 2
Cross-section C-C' does not seem to fully correspond with the grading plan. Specifically, the consultant should provide the basis for assuming that the subterranean garage does not extend to the outer limits of the building. Please reconcile this apparent discrepancy and revise the section as necessary.

RESPONSE
Portions of the above grade portion of the buildings have a slightly larger footprint than the underlying subterranean parking garage. The reviewer is directed to the architectural plans of which architectural exhibits for Buildings A and B are attached for reference as Figures 1 and 2.

COMMENT 3
New fills are proposed to derive support from existing fill along Agoura Road. Sufficient exploration and testing appears warranted to verify the adequacy of this existing fill to support the proposed improvements. If the fill needs to be removed, the consultant should provide specific recommendations to support the existing road during the fill removal.

Note: The consultant responded to this comment by stating that the new fill necessary to widen Agoura Road would be placed as part of a separate project to be undertaken by the City of Agoura Hills. Further the consultant explained that development of Building A does not require any fill to be placed along Agoura Road, and that development of Building B would require only the fill slope north of the building that would toe along the north property line. Access drives to both buildings would require only minor grading along Agoura Road that would have no impacts on the existing fill. GDI has the following comments regarding this response:

a) The toe of fill below Building B extends along the property line. Colluvium in this area is depicted as being only a few feet thick on Cross Section A-A'. The basis for interpreting such a thin section of colluvium in this area is not clear, and is contrary to normal colluvial configurations (colluvial wedges tend to thicken in the down slope direction). The inclination of the colluvial contact appears to be constrained at about 13 to 14 degrees between borings B-2 and B-6. Immediately north of B-6, the contact is depicted on Cross Section A-A' as flattening to about eight degrees. This change in inclination is unconstrained. A down slope continuation of the 13 to 14 degree dip constrained between B-2 and B-6 would result in a colluvial wedge closer to about 20 feet thick below the proposed toe of slope. The consultant should discuss how the recommended removals (all colluvium) will be accomplished if a thick section of colluvium is encountered below the toe of the proposed slope.

b) The consultant should discuss how the fill slope that descends from the property line between the two access drives will be constructed without widening Agoura Road. This fill appears to be necessary to construct the infiltration basin west of the Building B access, the storm drain headwall east of the Building A access, and the bioswale that extends between these two structures.

RESPONSE
Within the area of Building A, the natural grade ascends from Agoura Road and is comprised of Older Alluvial soils. Therefore, Building Pad A will not rely on Agoura Road for support. The fill slope

descending from Building Pad B can be built without widening of Agoura Road. The new slope can be constructed with only a minor cut along the existing slope toe to construct a keyway for the new slope. Removal of colluvial soils in this area are anticipated to be roughly 4 ± feet, which is roughly the depth a keyway would be constructed. The driveway for Building B can be benched into the slope from Agoura Road.

Agoura Road fronting the project is in good condition and does not have signs of deep seated movement or settlement of the road surface. Due to the good condition of the road and its age and usage, it is apparent the fills placed for the road are well consolidated. There is no reason to remove fills that have adequately supported Agoura Road.

- **PART A**

The depth of the Colluvium was determined based on the thicknesses observed in the borings and backhoe trenches excavated on site, including the latest infiltration test pit IP-1. The thickness of the Colluvium observed in our northernmost borings B-1, B-5, and B-6 is 7, 3, and 6 feet, respectively. Boring B-5 is roughly 50 feet from the present toe of slope descending from Agoura Road. In addition, no colluvium was noted in trenches T-3 and T-4. The Colluvium is 1.5 and 2.5 feet thick in trenches T-1 and T-2, respectively. In the most recent excavation IP-1, only a 4.5 foot thick layer of Topsoil/Colluvium was encountered over the Older Alluvium. Therefore, there is sufficient data to indicate the thickness of Colluvium does not thicken significantly toward Agoura Road and an interpretation of the colluvial thickness should not be made based on contact inclination. No deep colluvial removal is anticipated along Agoura Road.

- **PART B**

The fill slope that descends from the property line between the two access drives is only necessary for the widening of Agoura Road. The basin can simply be constructed larger with the northern side being the existing Agoura Road slope. [Note: Based on infiltration testing performed as part of this response, on-site soils at that location and grade do not meet minimum infiltration rate of 0.3 inches/hour and infiltration basin construction will likely be re-considered.]

COMMENT 4

The consultant should provide a more detailed discussion of stability issues where contorted Calabasas Formation will be exposed in cut-slopes and retaining walls. Cut-slopes and retaining walls depicted on the current plan appear likely to expose Calabasas Formation with bedding planes at least locally inclined northerly at low angles. The consultant should provide analyses to verify that the recommended equipment width stability fill will be adequate to mitigate the potential for translational failures along unsupported sections of bedding in the Calabasas Formation. Continuity of bedding should be assumed in critical areas unless sufficient field exploration is provided to demonstrate a lack of continuity. Mitigation measures should be recommended as necessary.

Note: The consultant responded to this comment by stating that the deeper cut would be supported with a soil nail wall, and that the wall had been analyzed. Rotational analyses appear to be based on shear strengths averaged to represent the overall mass of the Calabasas Formation. The consultant's approach of averaging shear strengths in the Calabasas Formation may be appropriate in considering a rotational failure in the bedrock; however, the consultant should also consider the potential for translational failures where short sections of adversely oriented, low-strength bedding may combine with tension cracks to form unsupported blocks of rock above adversely oriented surfaces. This analysis should be based on some reasonable estimate of the anticipated lateral continuity of adversely oriented structures that can be incorporated into generalized models for evaluation of the forces on the proposed soil nail wall.

RESPONSE
The only significant cut slope is proposed along the rear of Building B. The shallow cut along the rear of Building A will be supported by a retaining wall. The cut slope for Building B will daylight or have zero height at its western end. The slope will increase in height toward the east to a maximum height of roughly 17 feet. From its maximum height, the slope becomes eastward a cut slope over a soil nail wall as shown in cross section A-A'. The Older Alluvium was observed in boring B-2 to be 20 feet thick and therefore at the highest point of the cut slope the Calabasas Formation should not be exposed in the cut slope. Moving to the west, the Older Alluvium is slightly thinner at 17 feet in B-3. However, the slope also declines in height to the west. Therefore, the Calabasas Formation should not be exposed in the proposed finished cut slope to the south of Building B.

Previously, a stabilization fill was recommended for areas of alluvial areas or areas of recently deposited soils. This was intended to be a cautionary statement due to the possibility in any hillside grading project that a cut slope could be exposed with an undesirable slope surface. Stabilization fill are commonly used for repair of surficial slope conditions whereas buttresses are designed for deep seated potential failure conditions.

A recommendation for a stabilization fill was also made for conventional retaining walls that could extend into the Calabasas Formation bedrock. The reasoning for this is, a retaining wall backcut within the folded bedding would be steeper than a permanent slope and therefore could have surficial instability (localized pop outs).

For proposed soil nail wall, the contorted Calabasas Formation is anticipated to be encountered only within the deepest cut areas. As previously described, bedding is commonly massive to poorly defined and non-fissile. Based on experience with similar conditions on other projects in the area, continuous bedding orientations for extended lengths are typically not encountered. Nevertheless, the multidirectional bedding orientations along with minor tight fracturing associated with the plastic deformation as indicated in the boring logs, may result in localized "pop out" failures as opposed to longer translational type failures where exposed in vertical or near vertical excavations. Consequently, rotational analyses provide the best model of the stability of proposed excavations. Nonetheless, to demonstrate stability of the soil nail wall, a translational analysis was performed along an assumed failure surface that extending from the base of the wall up to the contact with the Conejo Volcanics at an angle of 11 degrees. The assumed failure surface then extended upwards along the contact with the Conejo Volcanics.

Since, the surface would pass through the folded nature of the Calabasas Formation a friction of 19 degrees and 380 pounds per square foot of cohesion was used in the analyses. The results of the translational analyses indicate adequate factors of safety and are included in Appendix A. Furthermore, since construction of a soil nail wall is performed generally in five foot vertical lifts, the exposed section susceptible to "pop outs" is restricted. Each of the vertical lifts can be observed and mapped by an engineering geologist from this office to verify structure and stratigraphy.

COMMENT 5
The contact between the Older Alluvium and the underlying Calabasas Formation is reported to be inclined northerly at an overall gradient of about 13 degrees, with variable material conditions. At some locations the contact was found to be abrupt. Other locations encountered residual soil of gray clay (B-1), or plastic clay seams within the uppermost part of the Calabasas Formation inclined roughly parallel to the contact (B-3). The consultant should discuss and evaluate as necessary the potential for translational deformation where this contact will be exposed in future cut-slopes or retaining wall back-cuts. Mitigation measures should be recommended as necessary.

Note: The consultant responded to this comment by referring to rotational stability analyses provided in the report. However, the rotational stability analyses provided do not address the potential for translational movement where the contact between the Older Alluvium and the underlying Calabasas Formation is inclined toward the back of the proposed wall at an angle of about 13 degrees. As noted in the earlier comment there are numerous indications that low strength materials are associated at least locally with this contact. These include *"clay soil", "plastic deformation"* and *"plastic, possibly polished clay seams"* noted near the contact in Borings B-1, B-2 and B-3, and indications of low-angle dips within the Calabasas Formation in Borings 4 and 6 (Boring 5 did not extend to the contact). The consultant describes a failure associated with the Qoal/Tc contact just northeast of the project. Inasmuch as construction of a soil nail wall tends to provide limited opportunity for evaluation during construction, it would appear prudent to provide sufficient subsurface exploration and analyses to better define the nature of this contact and the underlying bedrock prior to construction.

RESPONSE

The contact between the Older Alluvium and the Calabasas Formation is described as follows in the borings:

Boring 1

Residual soil consisting of grayish brown clay with gravel was encountered at the contact that required a crowd pull down to excavate the hard material [clasts and clay matrix material].

Boring 2

With cobbles common from 19 feet, contact at 20 feet is highly irregular, undulatory yet generally horizontal.

Boring 3

The contact is a silty fine to coarse sand with gravel, basal contact abrupt, planar.

Boring 4

The contact is very clayey silt with trace sand.

Boring 5

Boring B-5 did not expose the Older Alluvium/Calabasas Formation contact.

Boring 6

Soil near contact is silty clay with abundant calcium carbonate.

Based on the contacts observed in the borings as described above, the encountered soils at the contacts vary as to material type and structure (depositional environment - clear, erosional surfaces with lag deposits to residual, weathered in place soil) and there is no evidence to support a continuous slip surface at the contact between the Older Alluvium and Calabasas Formation. In addition, there is no continuous weak bed within either the Older Alluvium or Calabasas Formation that was observed.

As was previously mentioned in the response to Comment 4, construction of a soil nail wall is generally performed vertical lifts of five foot increments. Each of the vertical lifts can be observed and mapped by an engineering geologist from this office.

COMMENT 6

The consultant should evaluate the potential for topsoil/colluvium to exert creep pressure on the retaining walls (example: retaining wall in Cross-Section A-A'). Mitigation measures should be recommended as necessary.

RESPONSE

The Colluvium within the upper reaches of the site could have been referred to as a residual soil because the soils are generally described as hard or stiff and do not exemplify typical loose, unconsolidated colluvial sediments. Case in point, within boring B-2 which was excavated directly above the intended soil nail wall the colluvial soils are described as being damp and stiff. In boring B-3, the colluvium is described as hard. A coring barrel with a crowd was needed to excavate the Colluvium below 1 foot in boring B-4. In boring B-1, in place densities are higher in the Colluvium than in the Older Alluvium. In addition, there is no evidence of creep directly adjacent the area of development. Therefore, the surficial stability analysis provided in our reference report of January 30, 2014 is appropriate for the natural and manufactured surface conditions. That analysis resulted in a factor of safely above 1.50.

COMMENT 7

The proposed development includes the construction of an approximately 27ft-high, soil nail retaining wall. The slope stability analyses of the soil nail wall indicate that nail lengths of 25 to 35 ft are required. However, it is not clear if this length includes the resistance length. The consultant should provide a section through the soil nail retaining wall. The section should depict soil/geologic units behind the retaining wall, the wedge to be supported by the retaining wall (example: Rankin Zone), backdrain system, the soil nail resistance zone, and other soil nail geotechnical design considerations.

RESPONSE

The analyses of the proposed soil nail wall were provided to show that a soil nail wall is feasible as shown in cross section A-A'. The nail length given is an estimate and does not represent the final design. Typically the entire nail is used for resistance since the wall is basically a reinforced soil mass that acts as a gravity wall. Detailed analyses and design of a soil nail wall should be performed by an engineer who specializes in this type of wall design.

The soil nails may be designed using a pull out resistance of 30 pounds per square foot. Material strength within and behind the soil nail wall should be limited to a friction of 19 degrees and 380 pounds per square foot of cohesion. Maximum vertical excavation lifts should not exceed five feet. The minimum number of test (sacrificial) nails should be equal to or greater than five percent of the total number of required support nails. The locations of test (sacrificial) nails should be shown on the wall plans. Shotcrete may be placed directly against the temporary cut and backfill is not anticipated for the soil nail walls. The design of a soil nail wall may be analyzed as a slope where the nails provide reinforcement of the vertical portion of the slope. This firm should review the final design of the soil nail wall.

COMMENT 8

Areas behind soil nail walls should be designated a Restricted Use Areas (RUA) as per the County of Los Angeles Geotechnical Guidelines.

RESPONSE

The requirement is acknowledged by this firm. However, the restricted use area should be determined after the wall has been designed by an engineer who specializes in soil nail walls. The project civil engineer should indicate the restricted use area on the grading plans or other required plans once the nail length has been determined.

COMMENT 9

The consultant provides earthquake parameters (peak ground acceleration and earthquake magnitude) based on a seismic event that has a 10% probability of exceedance in 50 years. The consultant should revise these parameters to comply with the 2013 edition of the California Building Code (and by adoption, the City of Agoura Hills Building Code). Mitigation measures should be recommended as necessary.

RESPONSE
Peak ground acceleration and earthquake magnitude as indicated by the reviewer were determined and presented for a seismic event that has a 10% probability of exceedance in 50 years. These parameters were determined using the United States Geological Survey (USGS) interactive web application, *2008 Interactive Deaggregations.* <https://geohazards.usgs.gov/deaggint/2008/>

Seismic design parameters complying with the 2013 edition of the California Building Code were also supplied in the reference Gorian report of January 30, 2014. The initial parameters S_s and S_1 are determined from the .2 and 1 second spectral response accelerations shown on the Risk-Targeted Maximum Considered Earthquake maps shown within the building code. However, due to the difficulty reading the maps it is common to use the United States Geological Survey (USGS) interactive web application, *Seismic Design Maps and Tools for Engineers, U.S. Design Maps Web Application*. <http://geohazards.usgs.gov/designmaps/us/> to determine the seismic design parameters. Seismic design parameters where provided in the reference Gorian report of January 30, 2014 based on ASCE/SEI 7-5 and -10. The appropriate set of parameters used will depend upon which version of the building code the building was or is to be designed under.

COMMENT 10
Considering the presence of silty fine- to coarse-grained sand within the older alluvium that underlies most of the site; the relatively shallow depth to groundwater, and the severe ground shaking (that is: relatively high peak ground acceleration) anticipated at the site, the consultant should discuss and evaluate as necessary the potential for liquefaction and related hazards to occur at the site. Mitigation measures should be recommended as necessary.

RESPONSE
For granular soils to liquefy, they must be in a loose state so that the build up of hydrostatic pressures during a significant seismic event will cause the soils to loose strength or act more like a liquid than an soil hence the term liquefy. However, groundwater was found within the alluvial soils that are a well consolidated as demonstrated by the load consolidation tests performed on the soils that will underlie the completed buildings. In addition, the site is not within an area having a potential for seismic induced permanent ground displacement on the California Division of Mines and Geology (CDMG) [now California Geological Survey (CGS)], 2000, *Seismic Hazard Zones, Thousand Oaks Quadrangle*. Therefore in conclusion, the building areas and site have a negliable potential for liquefaction or seismic induced settlement.

COMMENT 11
The consultant indicates on page 18 of the above-referenced report that "a Building Pad Over-Excavation Detail is attached in Appendix D." This detail, as well as other details (see page 20 of the above- referenced report) are missing. All missing details should be provided for review.

RESPONSE
The details from the reference report are attached hereto in Appendix B.

COMMENT 12
The grading plan depicts "Bioswale" and an "infiltration basin". The consultant should discuss and evaluate as necessary the impact of the proposed on-site water infiltration on the stability of the site. Mitigation measures should be recommended as necessary.

RESPONSE
A stormwater infiltration test was performed at the bottom of the proposed basin as discussed in our response to Comment 13. The basin and bioswale are not intended to be retention devices and

therefore water should not be held for a sufficient period of time to saturate the low permeable soils. Consequently, the bioswale and infiltration basin should not have a negative affect on the proposed development.

COMMENT 13

The consultant should perform a geotechnical evaluation, including subsurface exploration in the proposed on-site infiltration areas in accordance with the County of Los Angles Guidelines and Manuals.

RESPONSE

- **GENERAL**

A shallow infiltration test pit (IP-1) was excavated in the proposed basin in the southwest corner of Agoura Road and the proposed driveway to Building B. The approximate location of the infiltration pit is shown on Plate 1. A one foot square test pit was excavated into the Older Alluvium at the bottom of the 5.75 foot deep pit and developed as a test hole in which to perform stormwater infiltration testing in general accordance with the County of Los Angeles Guidelines for Design, Investigation, and Reporting Low Impact Development Stormwater Infiltration (LID).

- **TEST PROCEDURE**

The developed test hole was filled with water and a tank and float system was installed to presoak the hole prior to testing for infiltration rates. On the following day (day of testing) the test hole was again initially filled to the initial water depth. After thirty minutes, the drop in water level was recorded and water added back to the initial water depth. The test readings were then repeated until a stabilized rate of drop was obtained.

- **TEST RESULTS**

The test results were recorded in tabular form and are attached in Appendix C. The measured rate was then adjusted to account for discharge of water from both the sides and bottom of the hole to develop a representative infiltration rate. The final rate was determined to be 0.09 inches per hour.

- **INFILTRATION SYSTEM RECOMMENDATIONS**

The results of the infiltration testing are a rate of 0.09 inches per hour, which is less than the minimum requirement of 0.3 inches per hour in the County's LID manual. In addition, the invert of the infiltration is to be a minimum of 10 feet above the groundwater level. However, the Seismic Hazards Zone Report indicates groundwater at a depth of 10 feet along Agoura Road. Therefore, for these reasons stormwater infiltration on site does not appear to be feasible.

REPORT REVIEW COMMENTS AND PLAN-CHECK COMMENTS

The Report Review Comments 1 and 2 as well as the Plan Check Comments 1 through 9 are acknowledged and will be complied with at the appropriate design stage and by the appropriate design professional as the entitlement process moves forward.

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Please contact us if you have questions concerning this geotechnical report or require additional information.

Respectfully,
Gorian and Associates, Inc.

By: Jerome J. Blunck, GE151
Principal Geotechnical Engineer

William F. Cavan, Jr., CEG1161
Principal Engineering Geologist

Attachment: Review Letter of April 18, 2014
Figures 1 and 2 - Architectural Exhibits
Appendix A: Slope Stability Analyses
Appendix B: Typical Construction Details
Appendix C: Stormwater Infiltration Test Result
Plate 1: Geotechnical Map
Plate 2: Geotechnical Cross Sections

REFERENCES

Agoura Hills, City of (2002), *Review of the EIR Data Base Submittals for the Park at Ladyface (a Senior Housing Project).* Dated October 30, 2002.

Bryant, W.A. and E.W. Hart, 2007, Fault Rupture Hazard Zones in California. California Geological Survey Special Publication 42 (rev. 2007 Interim Revision).

Cao, T., Bryant, W.A., Rowshandel, B., Brannum, D., and Willis, C.J., June 2003, *The Revised 2002 California Probabilistic Seismic Hazard Maps*.

California Division of Mines and Geology (CDMG) [now California Geological Survey (CGS)], 1975, *Guidelines for Evaluating the Hazard of Surface Rupture*. California Division of Mines and Geology Note Number 49.

California Division of Mines and Geology (CDMG) [now California Geological Survey (CGS)], 1995, *Supplement No. 1 to Special Publication 42 (1994 edition)*.

California Division of Mines and Geology (CDMG) [now California Geological Survey (CGS)], 2000, *Seismic Hazard Zones, Thousand Oaks Quadrangle*. Official map released November 17, 2000.

California Division of Mines and Geology (CDMG) [now California Geological Survey (CGS)], 2000, Revised 2006, *Seismic Hazard Zone Report for the Thousand Oaks 7.5-minute Quadrangle, Ventura and Los Angeles Counties, California.* CDMG Seismic Hazard Zone Report 042.

California Division of Mines and Geology (CDMG) [now California Geological Survey (CGS)], 2000, *Digital Images of Official Maps of Alquist-Priolo Earthquake Fault Zones of California, Southern Region*. CD-ROM, Division of Mines and Geology CD 2000-003.

California Geological Survey (CGS), 2008, *Guidelines for Evaluating and Mitigating Seismic Hazards in California.* California Division of Mines and Geology Special Publication 117A revised March 2009.

Campbell, R. H., 1975 *Soil Slips, Debris Flows and Rainstorms in the Santa Monica Mountains and Vicinity, Southern California*. U.S. Geological Survey Professional Paper 851.

Chang, S.W., Bray, J.D., and Seed, R.B., 1994, *Ground Motions and Local Site Effects*. in Stewart, J.P., Bray, J.D., Seed, R.B. and Sitar, N. eds., *Preliminary Report on the Principal Geotechnical Aspects of the January 17, 1994 Northridge Earthquake*, Earthquake Engineering Research Center, University of California at Berkeley, Report No. UBC/EERC-94/08

Dibblee, Thomas W. Jr., (1992), *Geologic Map of the Calabasas Quadrangle, Los Angeles and Ventura Counties.* Dibblee Geological Foundation Map #DF-37

GeoDynamics, Inc. (2011), *City of Agoura Hills - Geotechnical Review Sheet.* GDI #11.00103.0183, dated November 11, 2011.

GeoDynamics, Inc. (2014), *City of Agoura Hills - Geotechnical Review Sheet.* GDI #11.00103.0183, dated April 18, 2014.

Gorian and Associates, Inc., (1979), Geologic and Soil Engineering Investigation, Agoura Parcel, Reyes Adobe and Agoura Roads, County of Los Angeles. Work Order: 1069-1-10, Log Number: 5901R, Dated October 15, 1979.

Gorian and Associates, Inc. (1999), *Cursory Geologic Feasibility Evaluation, Khantzis/Agoura Hills Project, APN#2061-001-025 and 30800 Block of Agoura Road, Agoura Hills, California, Ware & Malcomb Project No. 993-025.00*. Work Order: 2272-0-0-10, Log Number: 19926, Dated November 30, 1999.

Gorian and Associates, Inc. (2000a), *Geologic And Geotechnical Engineering Evaluation, Agoura Hills Project, APN# 2061-001-025 and 30800 Block of Agoura Road, Agoura Hills, California.* Work Order: 2272-1-0-11, Log Number: 20349, Dated June 19, 2000.

Gorian and Associates, Inc. (2000b), *Results of Preliminary Geotechnical Investigation, Agoura Hills Project, APN#2061-001-025 and 30800 Block of Agoura Road, Agoura Hills, California*. Work Order: 2272-1-0-11, Log Number: 20524, Dated October 12, 2000.

Gorian and Associates, Inc. (2000c), *Response to Memorandum dated October 10, 2000 Regarding Agoura Hills Project, APN#2061-001-025 and 30800 Block of Agoura Road*. Work Order: 2272-1-0-13, Log Number: 20609, Dated October 18, 2000.

Gorian and Associates, Inc. (2003), *Geotechnical Update Study – The Park at Ladyface Mountain, Senior Housing Community, APN# 2061-001-025 and 30800 Block of Agoura Road*. Work Order: 2272-1-0-13, Log Number: 22287, Dated February 21, 2003

Gorian and Associates, Inc. (2007), *Geotechnical Update Study, Senior Housing Community, APN# 2061-001-025 30800 Agoura Road*. Work Order: 2272-1-0-100, Dated September 7, 2007.

Gorian and Associates, Inc. (2014), *Geotechnical Site Evaluation Update Report and Response to City of Agoura Hills Review Sheet Dated November 11, 2011, Senior Housing Community, Vesting Tentative Tract Number 71742 (APN# 2061-001-025), 30800 Agoura Road, Agoura Hills, California*. Work Order: 2272-1-0-101, Dated January 30, 2014.

HMK Engineering, Inc. (2012), *Vesting Tentative Tract Map Number 71742, Located in a Corporated Territory of the County of Los Angeles, State of California.* Dated September 2012

Jennings, C.W., Compiler, 1994, *Fault Activity Map of California and Adjacent Areas*. California Division of Mines and Geology, California Geologic Data Map Series, Map No. 8.

Weber, Harold F. 1984, *Geology of the Calabasas-Agoura-Eastern Thousand Oaks Area, Los Angeles and Ventura Counties, California*. California Division of Mines and Geology, Open-File Report 84-1 LA.

Yerkes, R.F. and Campbell, R.H. 1979, *Stratigraphic Nomenclature of the Central Santa Monica Mountains, Los Angeles County, California*. U.S. Geologic Survey Bulletin 1457-E.`

United States Geological Survey (USGS) interactive web application, *2008 Interactive Deaggregations.* <https://geohazards.usgs.gov/deaggint/2008/>

United States Geological Survey (USGS) interactive web application, *Seismic Design Maps and Tools for Engineers, U.S. Design Maps Web Application*. <http://geohazards.usgs.gov/designmaps/us/>

GeoDynamics, Inc.

Applied Earth Sciences
Geotechnical Engineering & Engineering Geology Consultants

CITY OF AGOURA HILLS

2014 APR 21 PM 12: 41

CITY CLERK

Date: April 18, 2014
GDI #: 11.00103.0183

CITY OF AGOURA HILLS - GEOTECHNICAL REVIEW SHEET

To: Doug Hooper

Project Location: 30800 Agoura Road, Agoura Hills, California.

Building & Safety #: 08-CUP-001

Geotechnical Report: Gorian & Associates, Inc. (2014), "Geotechnical Site Evaluation Update Report and Response to City of Agoura Hills Review Sheet Dated November 11, 2011, Senior Housing Community, Vesting Tentative Tract Number 71742 (APN# 2061-001-025), 30800 Agoura Road, Agoura Hills, California," Log Number: 2272-1-0-101, dated January 30, 2014..

Gorian & Associates, Inc. (2007), "Geotechnical Update Study, Senior Housing Community, APN# 2061-001-025, 30800 Agoura Road, Agoura Hills, California," Log Number: 2272-1-0-100, dated September 7, 2007.

Gorian & Associates, Inc. (2003), "Geotechnical Update Study – The Park at Ladyface Mountain, Senior Housing Community, APN# 2061-001-025 and 30800 Block of Agoura Road, Agoura Hills, California," Work Order: 2272-1-0-13, dated February 21, 2003.

Gorian & Associates, Inc. (2000), "Results of Preliminary Geotechnical Investigation, Agoura Hills Project, APN# 2061-001-025 and 30800 Block of Agoura Road, Agoura Hills, California," Work Order: 2272-1-0-11, dated October 12, 2000.

Plans: Hardy Engineering (2014), "Vesting Tentative Tract Map Number 71742 & Preliminary Grading Plan, A Corporated Territory of The County of Los Angeles," Scales; 1"=20' and 1"=40', Date March 2014.

HMK Engineering, Inc. (2003), "Preliminary Grading Plan, Tentative Tract Map No. 71742, County of Los Angeles," Scale 1"=40', W.O. 01-537, Plot Date August 18, 2003.

Previous Reviews: November 11, 2011.

FINDINGS

Planning/Feasibility Issues

☐ Acceptable as Presented

☒ Response Required

Geotechnical Report

☐ Acceptable as Presented

☒ Response Required

REMARKS

Gorian and Associates, Inc. (GAI; consultant) provided a "Geotechnical Site Evaluation Update Report and Response" for the proposed development at the site located at 30800 Agoura Road in the City of Agoura Hills, California. The report also includes a response to a geotechnical review letter by the City of Agoura Hills dated November 11, 2011 prepared for the site. The development currently proposed is significantly changed relative to the last submittal (HMK 2003), and includes the construction of two residential buildings with subterranean parking, retaining walls with a maximum height of 27 ft, associated infrastructure improvements, and widening of Agoura Road. Other associated improvements include access and landscaping areas.

The City of Agoura Hills – Planning Department reviewed the referenced report from a geotechnical perspective for compliance with applicable codes, guidelines, and standards of practice. GeoDynamics, Inc. (GDI) performed the geotechnical review on behalf of the City. Based upon a review of the submitted reports, the

558 Saint Charles Drive, Suite 116, Thousand Oaks, California 91360
Tel: (805) 496-1222 Fax: (805) 496-1225

consultant shall adequately respond to the following Planning/Feasibility comments prior to consideration by the Planning Commission of approval of Case # 08-CUP-001. The Consultant should respond to the following Report Review comments prior to Building Plan-Check Approval. Plan-Check comments should be addressed in Building & Safety Plan Check. A separate geotechnical submittal is not required for plan-check comments.

Notes to City:

1. *The grading plan shows proposed retaining walls higher than 6 ft. The City code limits the height of retaining walls to 6 ft or less. Variances for retaining wall heights may be required for approval of the grading plan. No justification for deviation from the code requirements were provided in the referenced reports.*

2. *The consultant has responded to a previous comment by indicating that some improvements shown on the current development plan (widening of Agoura Road) will be completed as a separate project by the Cityof Agoura Hills.*

Planning/Feasibility Comments

1. The Geotechnical map shows that three seven-foot deep trenches were excavated within the general area of Building A, with only one trench located within the building area. The trenches extended only about two feet into the Older Alluvium underlying the unsuitable surficial materials. Information regarding the type, depth and engineering characteristics of underlying alluvial deposits in the building area is limited. Considering that Building A is a structure of significant size that includes subterranean parking levels and retaining walls that extend to heights of eight feet, the consultant should discuss the adequacy of available information in this area and the need to provide additional, subsurface exploration and testing.

2. Cross-section C-C' does not seem to fully correspond with the grading plan. Specifically, the consultant should provide the basis for assuming that the subterranean garage does not extend to the outer limits of the building. Please reconcile this apparent discrepancy and revise the section as necessary.

3. New fills are proposed to derive support from existing fill along Agoura Road. Sufficient exploration and testing appears warranted to verify the adequacy of this existing fill to support the proposed improvements. If the fill needs to be removed, the consultant should provide specific recommendations to support the existing road during the fill removal.

   Note: The consultant responded to this comment by stating that the new fill necessary to widen Agoura Road would be placed as part of a separate project to be undertaken by the City of Agoura Hills. Further the consultant explained that development of Building A does not require any fill to be placed along Agoura Road, and that development of Building B would require only the fill slope north of the building that would toe along the north property line. Access drives to both buildings would require only minor grading along Agoura Road that would have no impacts on the existing fill. GDI has the following comments regarding this response:

   a) The toe of fill below Building B extends along the property line. Colluvium in this area is depicted as being only a few feet thick on Cross Section A-A'. The basis for interpreting such a thin section of colluvium in this area is not clear, and is contrary to normal colluvial configurations (colluvial wedges tend to thicken in the downslope direction). The inclination of the colluvial contact appears to be constrained at about 13 to 14 degrees between borings B-2 and B-6. Immediately north of B-6, the contact is depicted on Cross Section A-A' as flattening to about eight degrees. This change in inclination is unconstrained. A downslope continuation of the 13 to 14 degree dip constrained between B-2 and B-6 would result in a colluvial wedge closer to about 20 feet thick below the proposed toe of slope. The consultant should discuss how the recommended removals (all colluvium) will be accomplished if a thick section of colluvium is encountered below the toe of the proposed slope.

   b) The consultant should discuss how the fill slope that descends from the property line between the two access drives will be constructed without widening Agoura Road. This fill appears to be necessary to construct the infiltration basin west of the Building B access, the stormdrain headwall east of the Building A access, and the bioswale that extends between these two structures.

4. The consultant should provide a more detailed discussion of stability issues where contorted Calabasas Formation will be exposed in cut-slopes and retaining walls. Cut-slopes and retaining walls depicted on the current plan appear likely to expose Calabasas Formation with bedding planes at least locally inclined

northerly at low angles. The consultant should provide analyses to verify that the recommended equipment width stability fill will be adequate to mitigate the potential for translational failures along unsupported sections of bedding in the Calabasas Formation. Continuity of bedding should be assumed in critical areas unless sufficient field exploration is provided to demonstrate a lack of continuity. Mitigation measures should be recommended as necessary.

Note: The consultant responded to this comment by stating that the deeper cut would be supported with a soil nail wall, and that the wall had been analyzed. Rotational analyses appear to be based on shear strengths averaged to represent the overall mass of the Calabasas Formation. The consultant's approach of averaging shear strengths in the Calabasas Formation may be appropriate in considering a rotational failure in the bedrock; however, the consultant should also consider the potential for translational failures where short sections of adversely oriented, low-strength bedding may combine with tension cracks to form unsupported blocks of rock above adversely oriented surfaces. This analysis should be based on some reasonable estimate of the anticipated lateral continuity of adversely oriented structures that can be incorporated into generalized models for evaluation of the forces on the proposed soil nail wall.

5. The contact between the Older Alluvium and the underlying Calabasas Formation is reported to be inclined northerly at an overall gradient of about 13 degrees, with variable material conditions. At some locations the contact was found to be abrupt. Other locations encountered residual soil of gray clay (B-1), or plastic clay seams within the uppermost part of the Calabasas Formation inclined roughly parallel to the contact (B-3). The consultant should discuss and evaluate as necessary the potential for translational deformation where this contact will be exposed in future cut-slopes or retaining wall back-cuts. Mitigation measures should be recommended as necessary.

   Note: The consultant responded to this comment by referring to rotational stability analyses provided in the report. However, the rotational stability analyses provided do not address the potential for translational movement where the contact between the Older Alluvium and the underlying Calabasas Formation is inclined toward the back of the proposed wall at an angle of about 13 degrees. As noted in the earlier comment there are numerous indications that low strength materials are associated at least locally with this contact. These include "*clay soil*", "*plastic deformation*" and "*plastic, possibly polished clay seams*" noted near the contact in Borings B-1, B-2 and B-3, and indications of low-angle dips within the Calabasas Formation in Borings 4 and 6 (Boring 5 did not extend to the contact). The consultant describes a failure associated with the Qoal/Tc contact just northeast of the project. Inasmuch as construction of a soil nail wall tends to provide limited opportunity for evaluation during construction, it would appear prudent to provide sufficient subsurface exploration and analyses to better define the nature of this contact and the underlying bedrock prior to construction.

6. The consultant should evaluate the potential for topsoil/colluvium to exert creep pressure on the retaining walls (example: retaining wall in Cross-Section A-A'). Mitigation measures should be recommended as necessary.

7. The proposed development includes the construction of an approximately 27ft-high, soil nail retaining wall. The slope stability analyses of the soil nail wall indicate that nail lengths of 25 to 35 ft are required. However, it is not clear if this length includes the resistance length. The consultant should provide a section through the soil nail retaining wall. The section should depict soil/geologic units behind the retaining wall, the wedge to be supported by the retaining wall (example: Rankin Zone), backdrain system, the soil nail resistance zone, and other soil nail geotechnical design considerations.

8. Areas behind soil nail walls should be designated a Restricted Use Areas (RUA) as per the County of Los Angeles Geotechnical Guidelines.

9. The consultant provides earthquake parameters (peak ground acceleration and earthquake magnitude) based on a seismic event that has a 10% probability of exceedance in 50 years. The consultant should revise these parameters to comply with the 2013 edition of the California Building Code (and by adoption, the City of Agoura Hills Building Code). Mitigation measures should be recommended as necessary.

10. Considering the presence of silty fine- to coarse-grained sand within the older alluvium that underlies most of the site; the relatively shallow depth to groundwater, and the severe ground shaking (that is: relatively high peak ground acceleration) anticipated at the site, the consultant should discuss and evaluate as necessary the potential for liquefaction and related hazards to occur at the site. Mitigation measures should be recommended as necessary.

11. The consultant indicates on page 18 of the above-referenced report that "a Building Pad Over-Excavation Detail is attached in Appendix D." This detail, as well as other details (see page 20 of the above-referenced report) are missing. All missing details should be provided for review.

12. The grading plan depicts "Bioswales" and an "infiltration basin". The consultant should discuss and evaluate as necessary the impact of the proposed on-site water infiltration on the stability of the site. Mitigation measures should be recommended as necessary.

13. The consultant should perform a geotechnical evaluation, including subsurface exploration in the proposed on-site infiltration areas in accordance with the County of Los Angles Guidelines and Manuals.

Report Review Comments

1. The consultant should review final development plans, including the grading plans when they become available. A copy of the grading plan should be used as a base map for an updated geotechnical map. Additional geotechnical recommendations should be provided as necessary to address the various aspects of the development/grading plans.

2. The consultant should evaluate the potential for interaction between retaining walls and adjacent foundations/structures. Mitigation measures should be recommended as necessary.

Plan-Check Comments

1. The name, address, and phone number of the Consultant and a list of all the applicable geotechnical reports shall be included on the building/grading plans.

2. The following note must appear on the grading and foundation plans: *"All retaining wall excavations shall be reviewed by the project engineering geologist for the presence of adversely oriented joint surfaces. Adverse surfaces shall be evaluated and supported in accordance with recommendations of the project geotechnical engineer."*

3. The grading plan should include the limits and depths of overexcavation for the swimming pool, the road and flatwork areas as recommended by the Consultant.

4. The following note must appear on the grading and foundation plans: "*Excavations shall be made in compliance with CAL/OSHA Regulations.*"

5. The following note must appear on the foundation plans: "*All foundation excavations must be observed and approved, in writing, by the Project Geotechnical Consultant prior to placement of reinforcing steel.*"

6. Foundation plans and foundation details shall clearly depict the embedment material and minimum depth of embedment for the foundations.

7. Drainage plans depicting all surface and subsurface non-erosive drainage devices, flow lines, and catch basins shall be included on the building plans.

8. Final grading, drainage, and foundation plans shall be reviewed, signed, and wet stamped by the consultant.

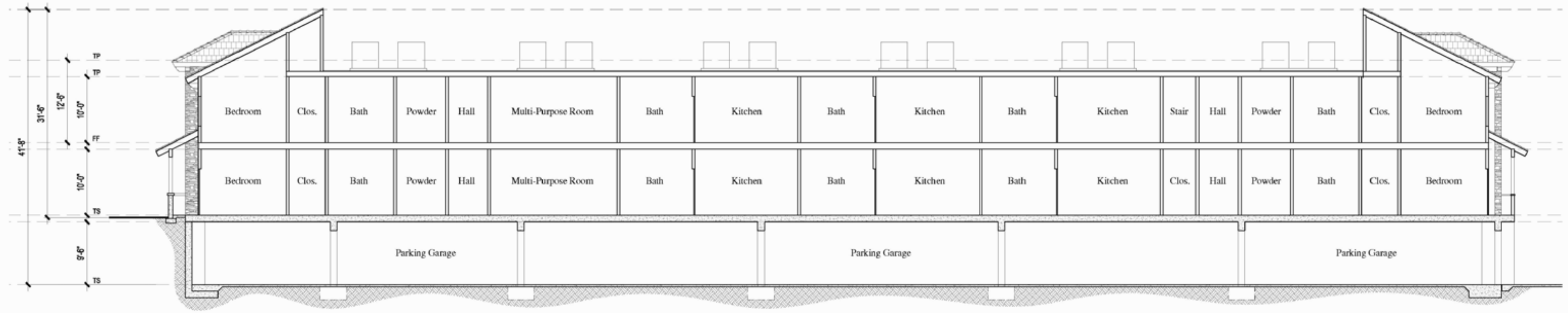
9. Provide a note on the grading and foundation plans that states: "*An as-built report shall be submitted to the City for review. This report prepared by the Geotechnical Consultant must include the results of all compaction tests as well as a map depicting the limits of fill, locations of all density tests, outline and elevations of all removal bottoms, keyway locations and bottom elevations, locations of all subdrains and flow line elevations, and location and elevation of all retaining wall backdrains and outlets. Geologic conditions exposed during grading must be depicted on an as-built geologic map.*"

If you have any questions regarding this review letter, please contact GDI at (805) 496-1222.

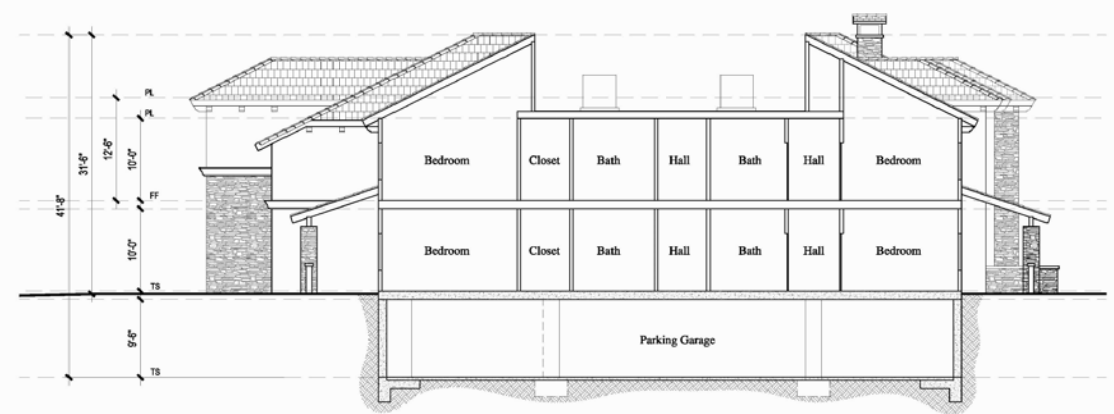
Respectfully Submitted,
GeoDynamics, INC.

Ali Abdel-Haq
Geotechnical Engineering Reviewer
GE 2308 (exp. 12/31/15)

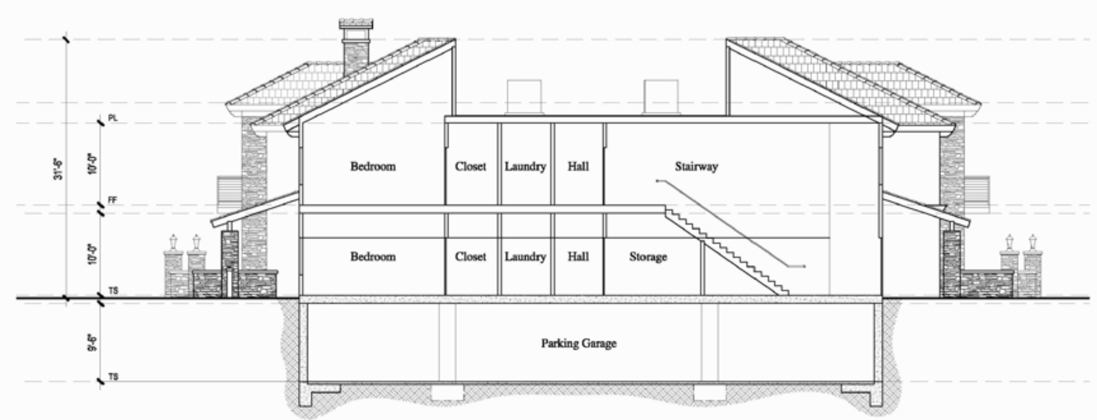
Christopher J. Sexton
Engineering Geologic Reviewer
CEG 1441 (exp. 11/30/14)



SECTION C



SECTION B



SECTION A

BUILDING "A" BUILDING SECTIONS

SCALE: 1/8" = 1'-0"

REVISIONS: | DATE:

VILLARRUEL ARCHITECTS
ARCHITECTURE + PLANNING + INTERIORS

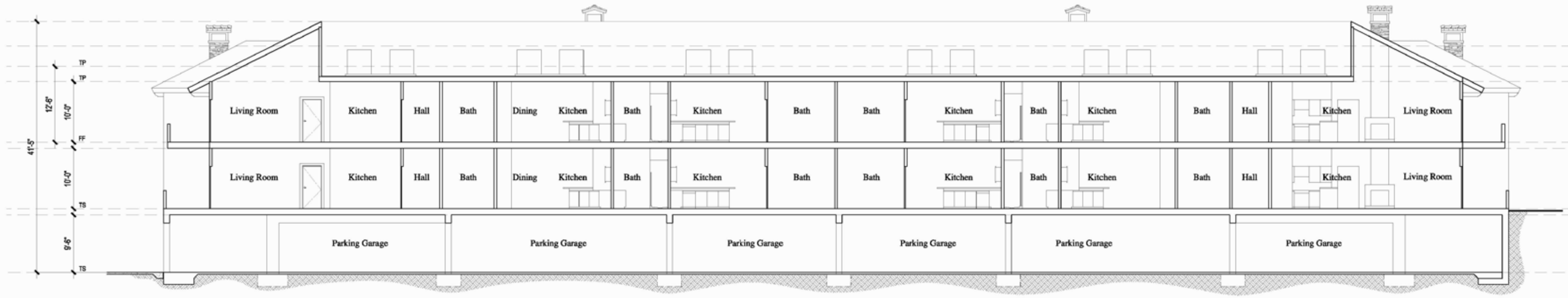
BUILDING SECTIONS
NEW APARTMENT
AGOURA HILLS CENTER PROPERTIES
STEVE RICE & CARLOS KHANTZIS
PROJECT ADDRESS
AGOURA HILLS, CA 91301

DATE: 09/11/13
DRAWN: CEA
CHKD: AV
PM: --
JOB NO. 13-01

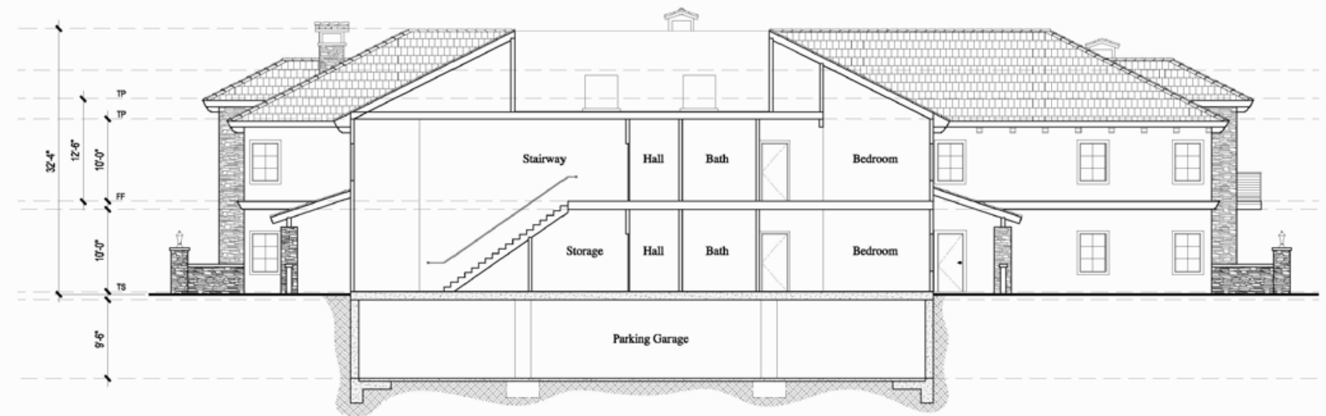
A4.0
SHEET NO. 2 OF -

Gorian & Associates, Inc.
Applied Earth Sciences

Job No: 2272-1-0-102
Date: July 2014
Drawn by:
Approved by:
Scale: NTS
Figure 1



SECTION C



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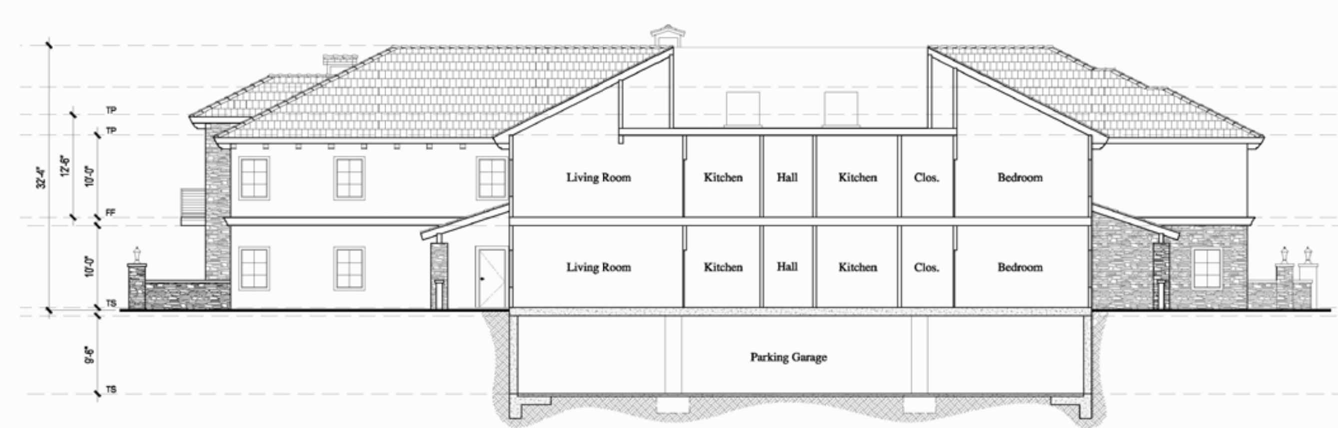

SECTION A

BUILDING "B" BUILDING SECTIONS

SCALE: 1/8" = 1'-0"

REVISIONS:

DATE:

VILLARRUEL ARCHITECTS

ARCHITECTURE + PLANNING + INTERIORS

BUILDING SECTIONS

NEW APARTMENT

AGOURA HILLS CENTER PROPERTIES

STEVE RICE & CARLOS KHANTZIS

PROJECT ADDRESS

AGOURA HILLS, CA 91301

DATE: 09/11/13

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A4.0

SHEET NO. 2 OF -

Gorian & Associates, Inc.

Applied Earth Sciences

Job No: 2272-1-0-102

Date: July 2014

Drawn by:

Approved by:

Scale: NTS

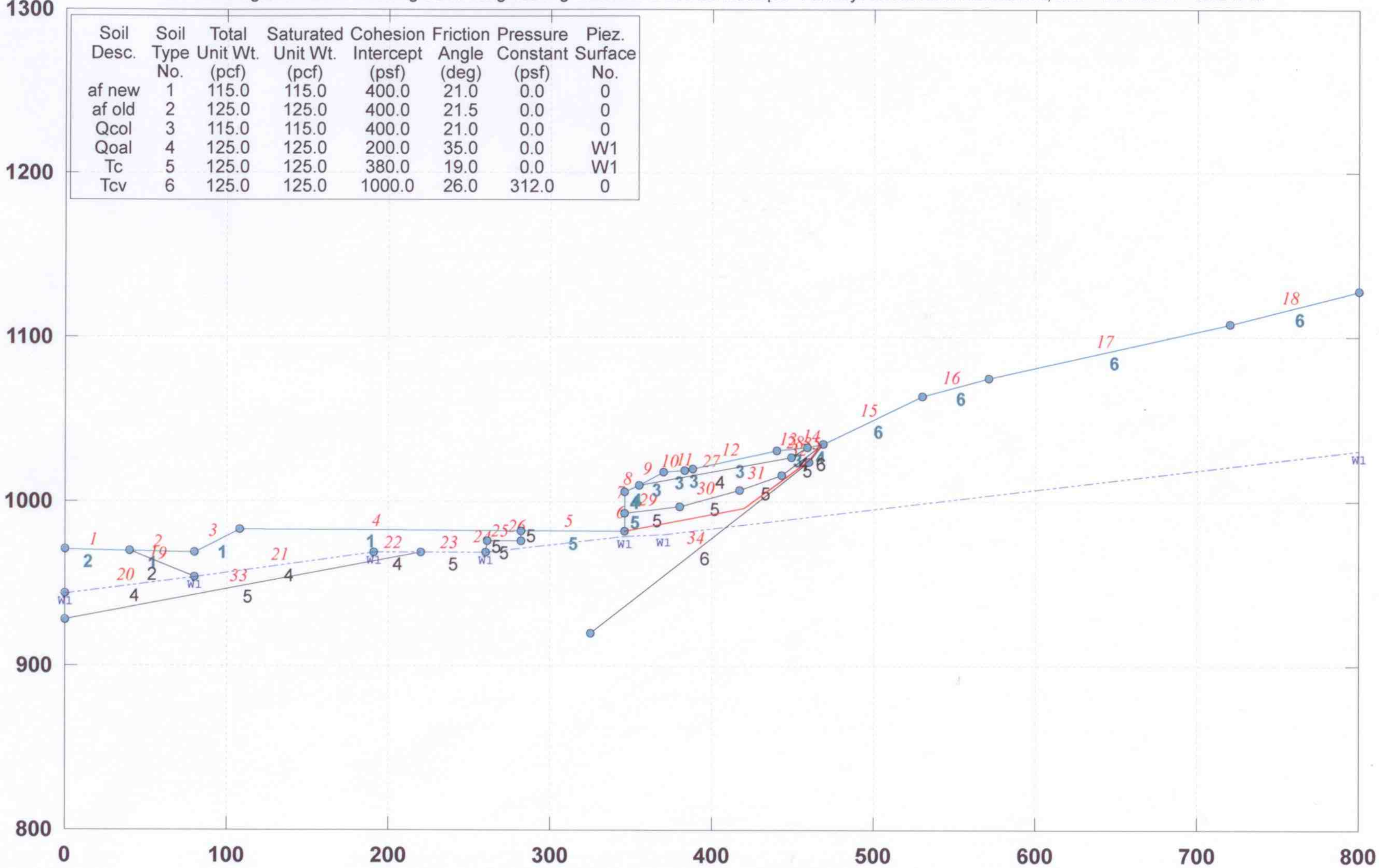
Figure 2

APPENDIX A

SLOPE STABILITY ANALYSES

WO 2272-1-0-101 Section A-A'

x:\2272-1 agoura hills sr housing comm\engineering calcs\2272 sec aa wall2.plt Run By: Gorian and Associates, Inc. 1/21/2014 02:21PM



Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pressure Constant (psf)	Piez. Surface No.
af new	1	115.0	115.0	400.0	21.0	0.0	0
af old	2	125.0	125.0	400.0	21.5	0.0	0
Qcol	3	115.0	115.0	400.0	21.0	0.0	0
Qoal	4	125.0	125.0	200.0	35.0	0.0	W1
Tc	5	125.0	125.0	380.0	19.0	0.0	W1
Tcv	6	125.0	125.0	1000.0	26.0	312.0	0

GSTABL7 v.2 FSmin=1.51

Factor Of Safety Is Calculated By The Simplified Janbu Method

GSTABL7

```
                    ***   GSTABL7   ***
          ** GSTABL7 by Garry H. Gregory, P.E. **
 ** Original Version 1.0, January 1996; Current Version 2.005, Sept. 2006 **
         (All Rights Reserved-Unauthorized Use Prohibited)
*********************************************************************************
               SLOPE STABILITY ANALYSIS SYSTEM
      Modified Bishop, Simplified Janbu, or GLE Method of Slices.
      (Includes Spencer & Morgenstern-Price Type Analysis)
      Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
      Nonlinear Undrained Shear Strength, Curved Phi Envelope,
      Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
      Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
*********************************************************************************
   Analysis Run Date:        1/21/2014
   Time of Run:              02:21PM
   Run By:                   Gorian and Associates, Inc.
   Input Data Filename:      X:\2272-1 Agoura Hills Sr Housing Comm\engineering calcs\227
2 sec aa wall2.dat
   Output Filename:          X:\2272-1 Agoura Hills Sr Housing Comm\engineering calcs\227
2 sec aa wall2.OUT
   Unit System:              English
   Plotted Output Filename:  X:\2272-1 Agoura Hills Sr Housing Comm\engineering calcs\227
2 sec aa wall2.PLT
   PROBLEM DESCRIPTION:  WO 2272-1-0-101
                         Section A-A'
   BOUNDARY COORDINATES
      18 Top   Boundaries
      35 Total Boundaries
```

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	971.00	40.00	970.00	2
2	40.00	970.00	80.00	969.00	1
3	80.00	969.00	108.00	983.00	1
4	108.00	983.00	282.00	982.00	1
5	282.00	982.00	346.00	982.00	5
6	346.00	982.00	346.20	993.00	5
7	346.20	993.00	346.50	1006.00	4
8	346.50	1006.00	355.00	1010.00	4
9	355.00	1010.00	370.00	1018.00	3
10	370.00	1018.00	383.00	1019.00	3
11	383.00	1019.00	388.00	1020.00	3
12	388.00	1020.00	440.00	1031.00	3
13	440.00	1031.00	459.00	1033.00	3
14	459.00	1033.00	469.00	1035.00	4
15	469.00	1035.00	530.00	1064.00	6
16	530.00	1064.00	571.00	1075.00	6
17	571.00	1075.00	720.00	1108.00	6
18	720.00	1108.00	800.00	1128.00	6
19	40.00	970.00	80.00	954.00	2
20	0.00	944.00	80.00	954.00	4
21	80.00	954.00	191.00	969.00	4
22	191.00	969.00	220.00	969.00	4
23	220.00	969.00	260.00	969.00	5
24	260.00	969.00	261.00	976.00	5
25	261.00	976.00	281.90	976.00	5
26	281.90	976.00	282.00	982.00	5
27	355.00	1010.00	449.00	1027.00	4
28	449.00	1027.00	459.00	1033.00	4
29	346.20	993.00	380.00	997.00	5
30	380.00	997.00	417.00	1007.00	5
31	417.00	1007.00	443.00	1016.00	5
32	443.00	1016.00	469.00	1035.00	5
33	0.00	928.00	220.00	969.00	5
34	325.00	920.00	460.00	1024.00	6
35	460.00	1024.00	469.00	1035.00	6

User Specified Y-Origin = 800.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)
ISOTROPIC SOIL PARAMETERS
6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	115.0	115.0	400.0	21.0	0.00	0.0	0
2	125.0	125.0	400.0	21.5	0.00	0.0	0
3	115.0	115.0	400.0	21.0	0.00	0.0	0
4	125.0	125.0	200.0	35.0	0.00	0.0	1
5	125.0	125.0	380.0	19.0	0.00	0.0	1
6	125.0	125.0	1000.0	26.0	0.00	312.0	0

1 PIEZOMETRIC SURFACE(S) SPECIFIED
Unit Weight of Water = 62.40 (pcf)
Piezometric Surface No. 1 Specified by 7 Coordinate Points
Pore Pressure Inclination Factor = 0.50

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	944.00
2	80.00	954.00
3	191.00	969.00
4	260.00	969.00
5	346.50	979.00
6	370.00	980.00
7	800.00	1031.00

Trial Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

1	346.000	982.000
2	420.000	996.400
3	460.000	1025.000
4	468.000	1034.800

* * Factor Of Safety Is Calculated By The Simplified Janbu Method * *
Factor Of Safety For The Preceding Specified Surface = 1.510

Table 1 - Individual Data on the 16 Slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	0.2	137.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.3	653.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	8.5	26642.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	15.0	53583.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	10.0	37950.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	3.0	11118.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	5.0	18434.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	29.0	107715.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	3.0	11229.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	20.0	62272.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	3.0	7104.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	6.0	12170.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	10.0	14457.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	1.0	1057.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	6.9	4026.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	1.1	73.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 2 - Base Stress Data on the 16 Slices

Slice No. *	Alpha (deg)	X-Coord. Slice Cntr (ft)	Base Leng. (ft)	Available Shear Strength (psf)	Mobilized Shear Stress (psf)
1	11.01	346.10	0.20	600.77	130.86
2	11.01	346.35	0.31	1102.55	416.21
3	11.01	350.75	8.66	1423.47	598.72
4	11.01	362.50	15.28	1570.50	682.34
5	11.01	375.00	10.19	1645.33	724.89
6	11.01	381.50	3.06	1615.48	707.92
7	11.01	385.50	5.09	1609.00	704.23
8	11.01	402.50	29.54	1618.23	709.48
9	11.01	418.50	3.06	1627.96	715.01
10	35.56	430.00	24.59	1534.79	1810.95
11	35.56	441.50	3.69	1263.44	1377.30
12	35.56	446.00	7.38	1139.86	1179.80
13	35.56	454.00	12.29	927.78	840.86
14	35.56	459.50	1.23	786.38	614.89
15	50.77	463.46	10.95	717.06	450.31
16	50.77	467.46	1.70	250.25	53.30

Sum of the Resisting Forces (including Pier/Pile, Tieback, Reinforcing Soil Nail, and Applied Forces if applicable) = 190909.75 (lbs)
Average Available Shear Strength (including Tieback, Pier/Pile, Reinforcing, Soil Nail, and Applied Forces if applicable) = 1391.35(psf)
Sum of the Driving Forces = 126468.62 (lbs)
Average Mobilized Shear Stress = 921.71(psf)
Total length of the failure surface = 137.21(ft)

**** END OF GSTABL7 OUTPUT ****

APPENDIX C

STORMWATER INFILTRATION TEST RESULTS

INFILTRATION TESTING

InfiltrationTesting Field Log

Work Order: 2272-1-0-102
Date 7/15/2014

Project Location	Agoura Hills Senior Ctr	Trench/Test Number	TP-1
Earth Description	Qoal si clay to cl silt	Trench dimensions	1' x 1' x 1'
Tested By	BC/LW	Depth of Trench	5.75 feet
Liquid Description	clean water	Casing Dimensions	11"
Measurement Method	tape	Depth to Water Table	50+
Depth to Invert of BMP		Depth to Initial Water Depth	
Time Interval Standard:		Initial Water Depth (d_1) (inches)	12
Start Time for Pre-Soak	7/15/2014 12:45	Water Remaining in Boring (Y/N)	y
Start Time for Standard	7/16/2014 10:30	Std Time Interval Btween Rdngs	30 min

Reading Number	Time Start / End (hh:mm)	Elapsed Time Δ time (mins)	Water Drop During Standard Time Interval, Δd (feet)	(inches)	Percolation Rate for Reading (in / hr)	Soil Description/ Notes/Comments
1	10:30 11:00	30		0.25	0.50	
2	11:00 11:30	30		0.25	0.50	
3	11:30 12:00	30		0.125	0.25	
4	12:00 12:30	30		0.125	0.25	
5	12:30 13:00	30		0.125	0.25	
6	13:00 13:30	30		0.125	0.25	
7						
8						
			average rate		0.25	

Reduction Factor, $R_f = \left[\frac{2\,d_1 - \Delta d}{13.5}\right] + 1 = 2.77$

Infiltration Rate = (Percolation Rate) / (Reduction Factor) 0.09 in / hour

GORIAN AND ASSOCIATES, INC.

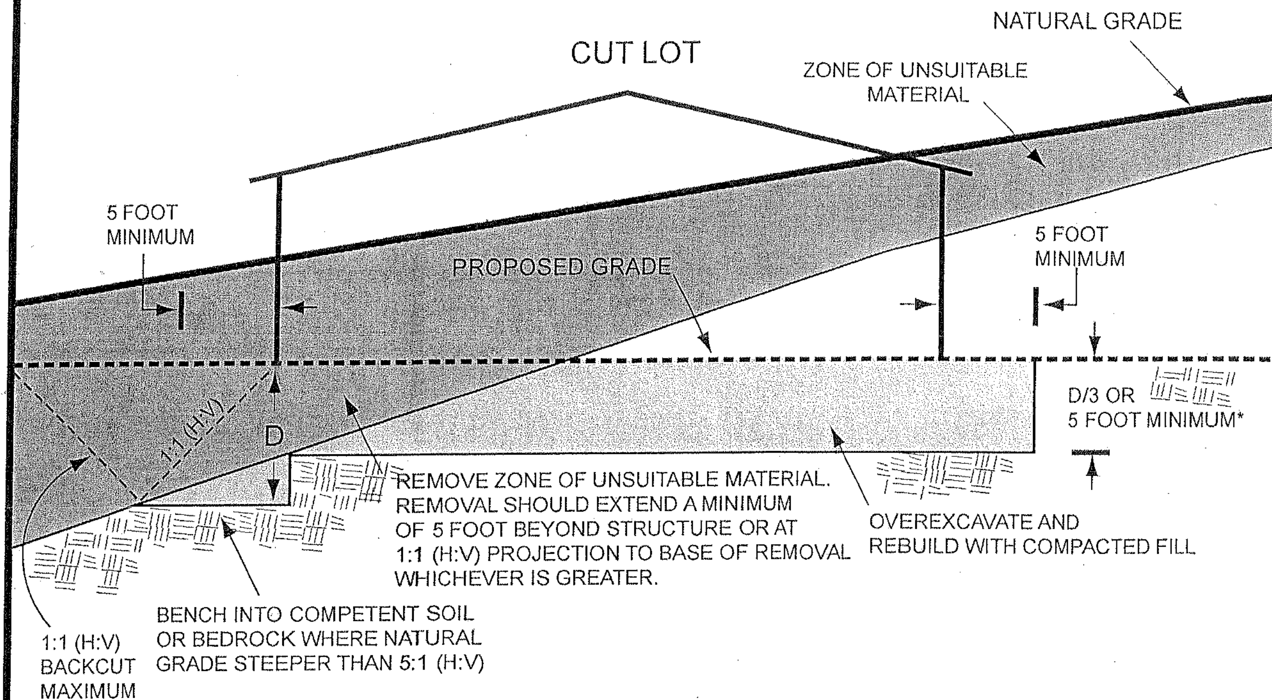
APPENDIX D

TYPICAL CONSTRUCTION DETAILS

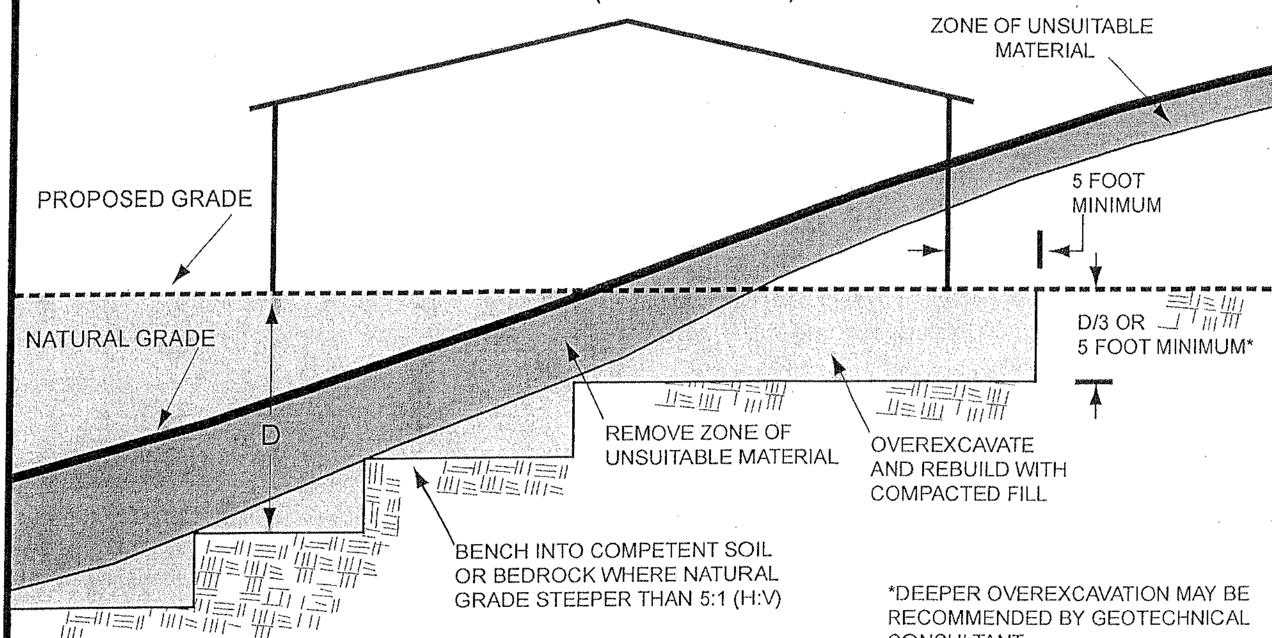
BUILDING PAD OVEREXCAVATION

TYPICAL DETAIL

CUT LOT



CUT-FILL (TRANSITION) LOT



DETAIL IS NOT TO SCALE

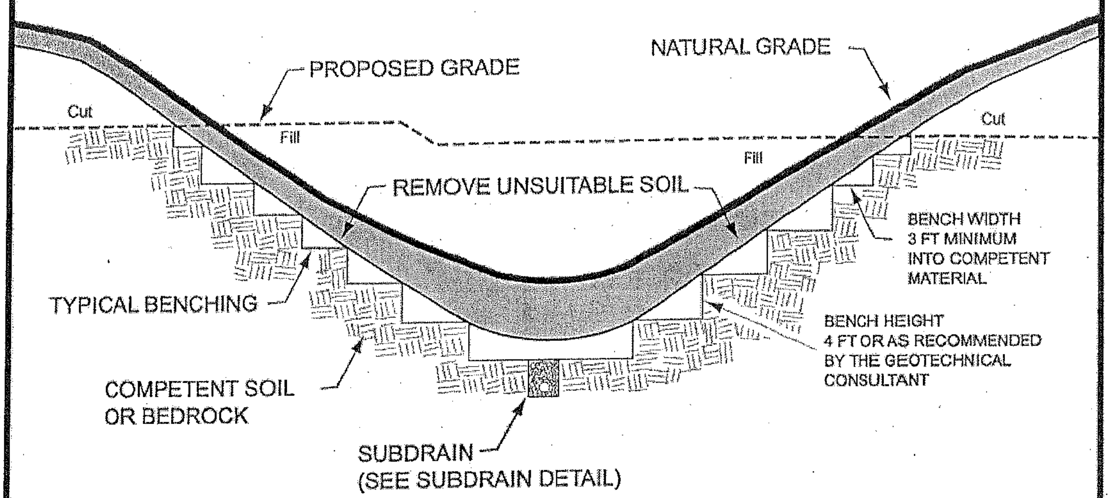
*DEEPER OVEREXCAVATION MAY BE RECOMMENDED BY GEOTECHNICAL CONSULTANT

GORIAN & ASSOCIATES, INC.

CANYON CLEANOUT AND BENCHING

TYPICAL DETAIL

(GENERALIZED TRANSVERSE SECTION)

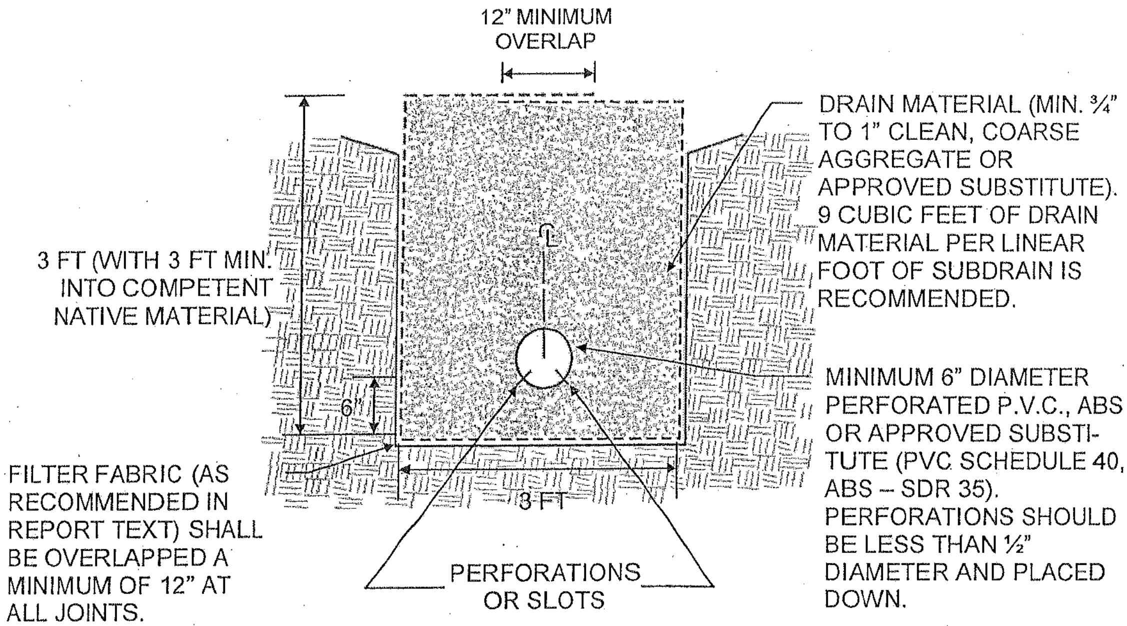


DETAIL IS NOT TO SCALE

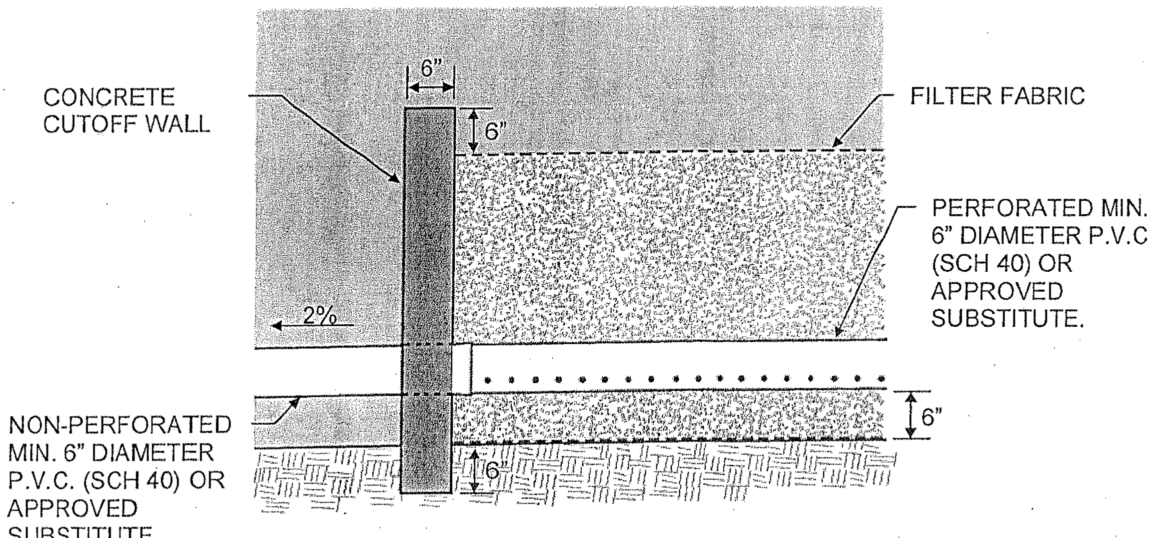
GORIAN & ASSOCIATES, INC.

CANYON SUBDRAIN AND CUTOFF WALL

TYPICAL DETAIL



NOTE: CUTOFF WALL SHOULD EXTEND MINIMUM 6" BEYOND SUBDRAIN MATERIAL (IN ALL DIRECTIONS)

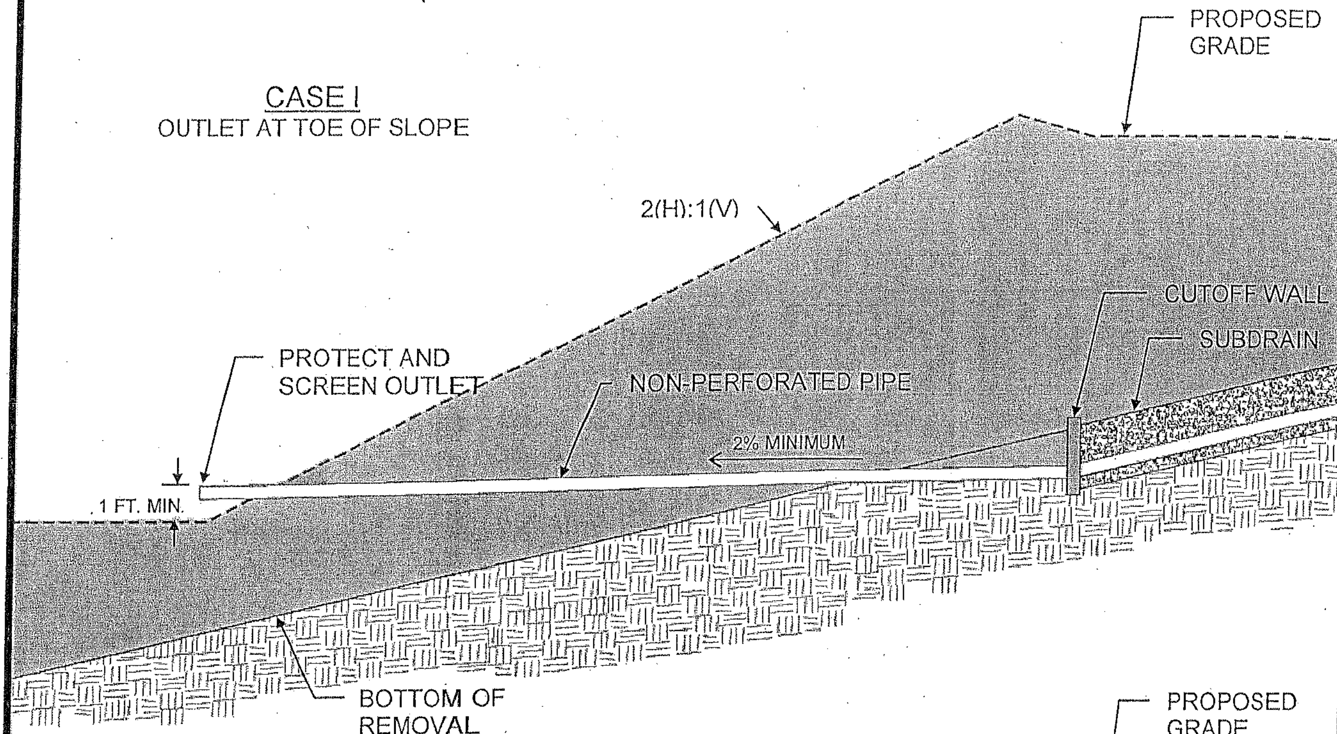


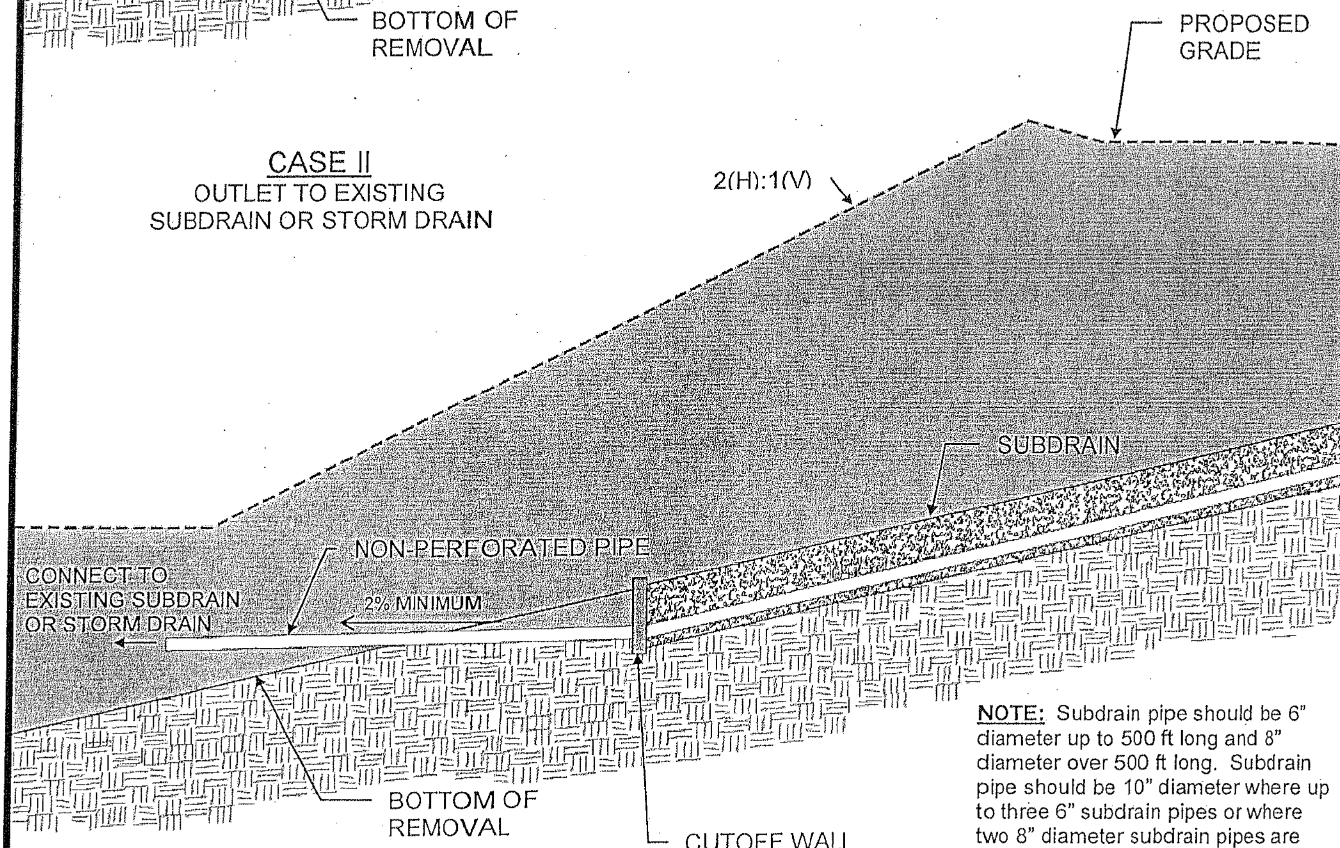
DETAIL IS NOT TO SCALE

NOTE: Subdrain pipe should be 6" diameter up to 500 ft long and 8" diameter over 500 ft long. Subdrain pipe should be 10" diameter where up to three 6" subdrain pipes or where two 8" diameter subdrain pipes are confluent unless specified otherwise by the geotechnical consultant. (See soils report)

CANYON SUBDRAIN OUTLET
TYPICAL DETAIL

(GENERALIZED LONGITUDINAL SECTION)





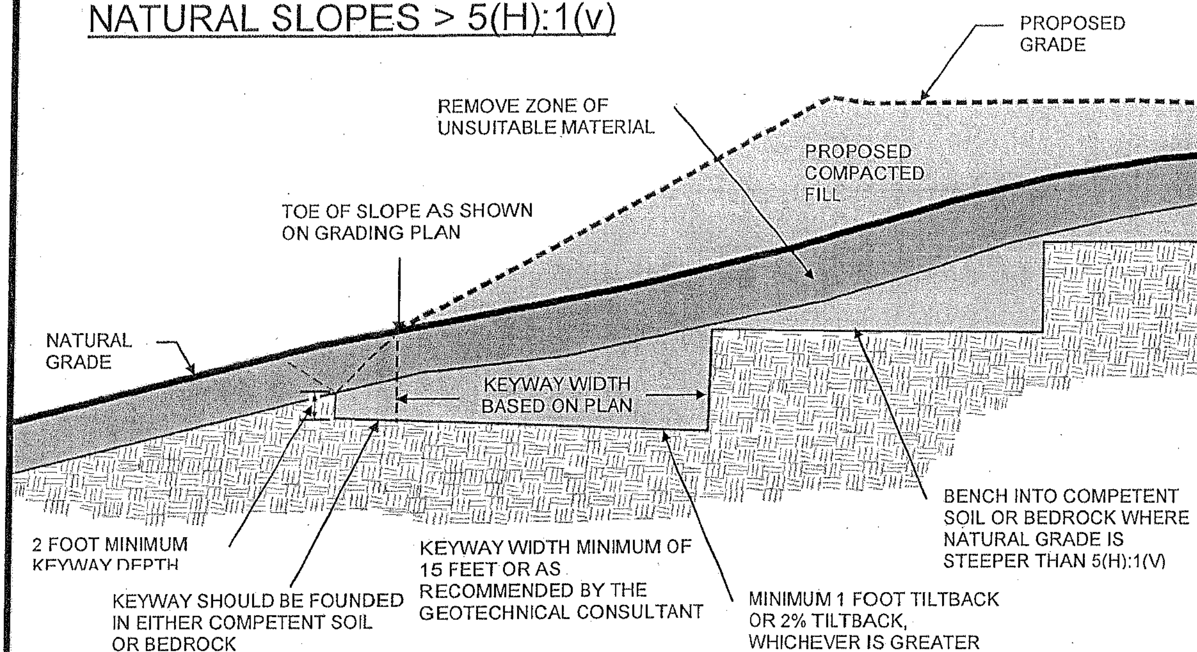
NOTE: Subdrain pipe should be 6" diameter up to 500 ft long and 8" diameter over 500 ft long. Subdrain pipe should be 10" diameter where up to three 6" subdrain pipes or where two 8" diameter subdrain pipes are confluent unless specified otherwise by the geotechnical consultant.

DETAIL IS NOT TO SCALE

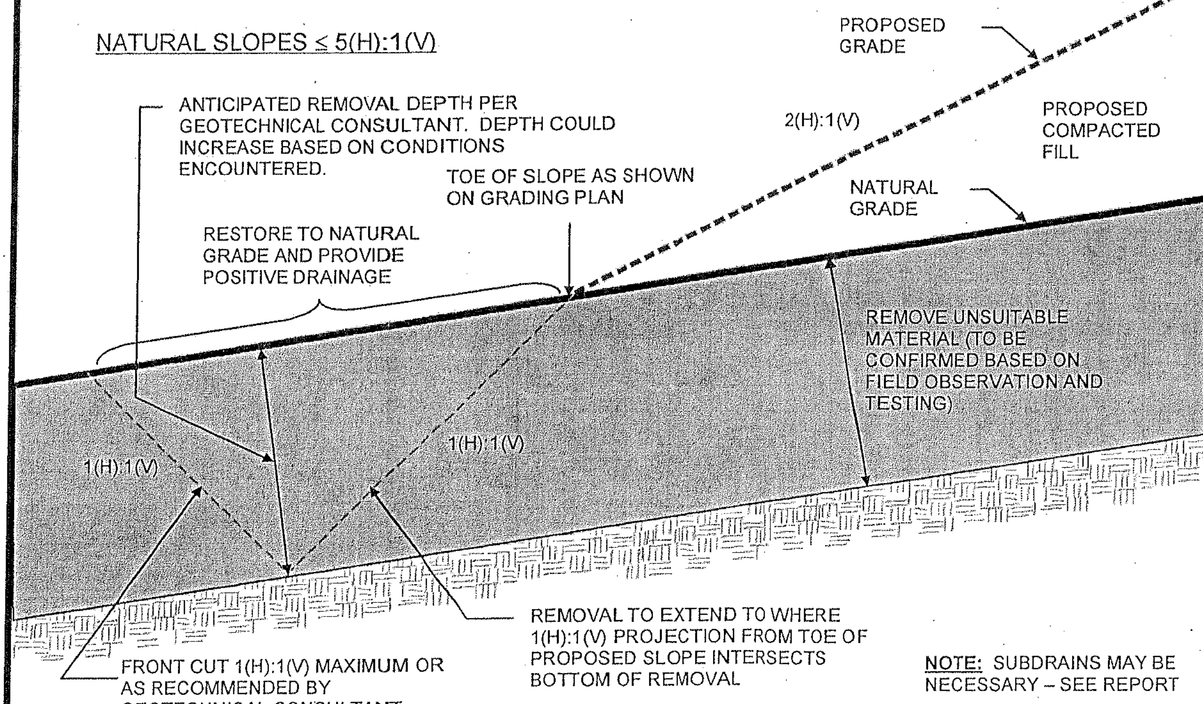
REMOVALS BEYOND TOE OF PROPOSED FILL SLOPES

TYPICAL DETAIL

NATURAL SLOPES > 5(H):1(v)



NATURAL SLOPES ≤ 5(H):1(V)



NOTE: SUBDRAINS MAY BE NECESSARY – SEE REPORT

DETAIL IS NOT TO SCALE

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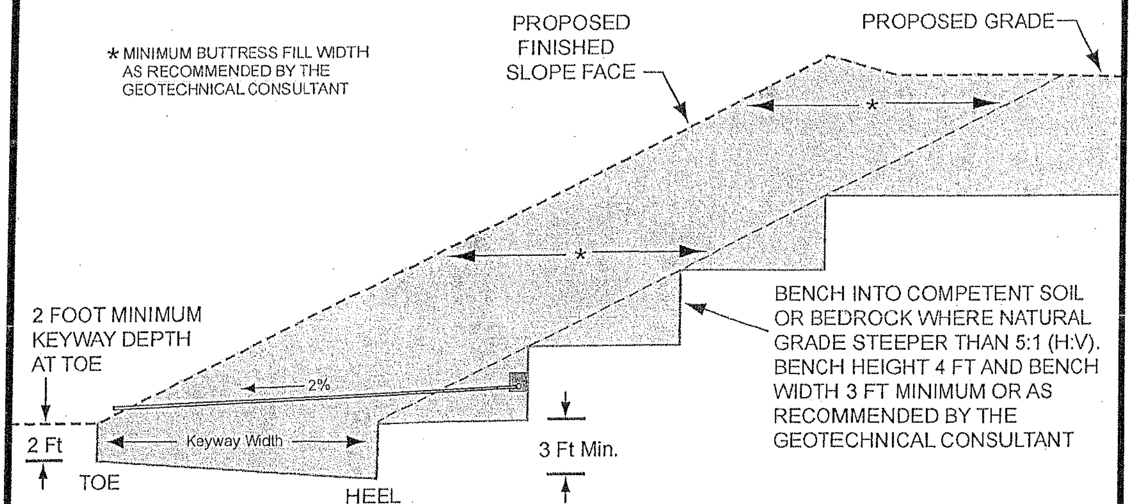
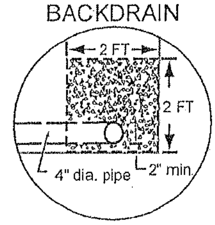
BUTTRESS FILL

TYPICAL DETAIL

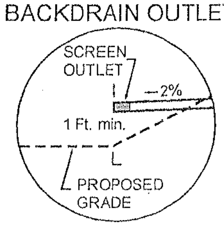


NOTES:
1. KEYWAY MINIMUM WIDTH AS RECOMMENDED BY THE GEOTECHNICAL CONSULTANT. KEYWAY SHOULD BE FOUNDED IN BEDROCK.
2. TILT KEYWAY INTO SLOPE; HEEL MINIMUM 1 FOOT DEEPER THAN TOE OR 2% GRADE TOWARD HEEL (WHICHEVER IS GREATER).
3. TYPICAL BACKDRAIN 4 CUBIC FEET OF CLEAN 3/4 INCH GRAVEL PER LINEAL FOOT OF BACKDRAIN. GRAVEL SHOULD BE WRAPPED IN FILTER FABRIC AND PLACED AT BACK OF KEYWAY AND EVERY 30 FEET (VERTICAL).
4. PIPE SHOULD BE 4 INCH PVC, ABS, OR APPROVED SUBSTITUTE (PVC SCHEDULE 40, ABS - SDR 35).
5. BACKDRAIN PIPE SHOULD BE PERFORATED AND PERFORATIONS SHOULD BE PLACED FACING DOWN.
6. OUTLET PIPE SHOULD BE NON-PERFORATED AND CONNECTED TO THE PERFORATED PIPE BY "L" OR "T" JOINTS.
7. BACKDRAIN SHOULD EXTEND LENGTH OF BUTTRESS FILL, SHOULD BE SLOPED TOWARD OUTLETS, AND OUTLETS PROVIDED EVERY 100 FEET OR AS SPECIFIED BY THE GEOTECHNICAL CONSULTANT. (MIN. 2 OUTLETS)

BACKDRAIN



BACKDRAIN OUTLET

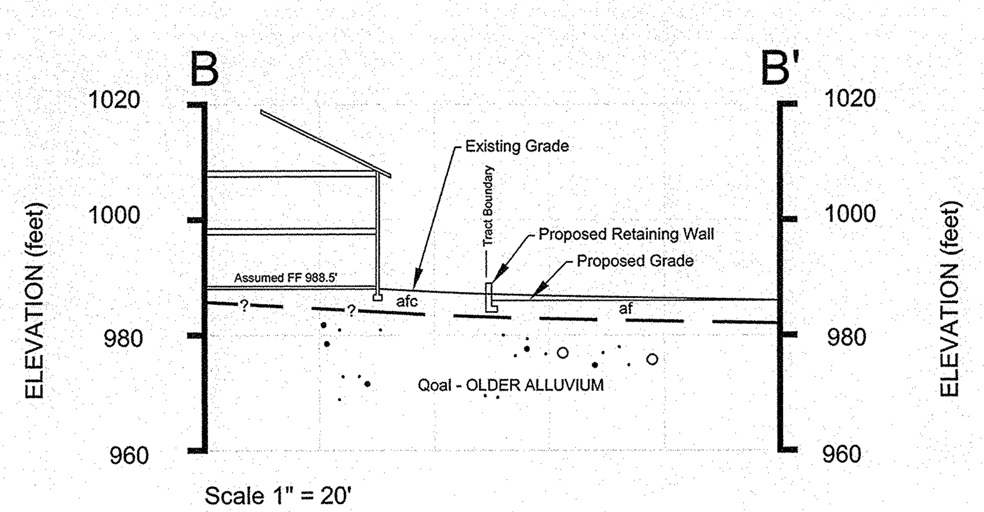


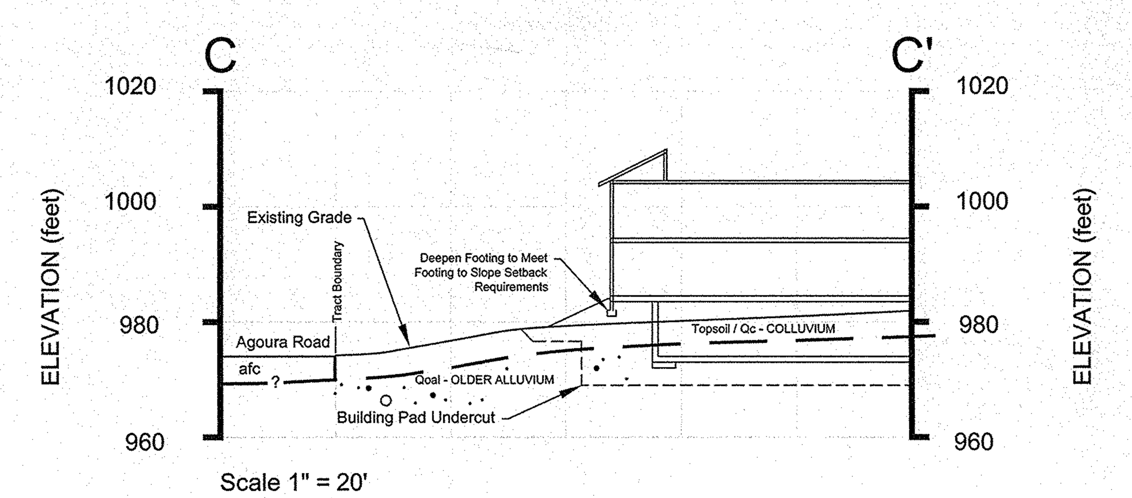
DETAIL IS NOT TO SCALE

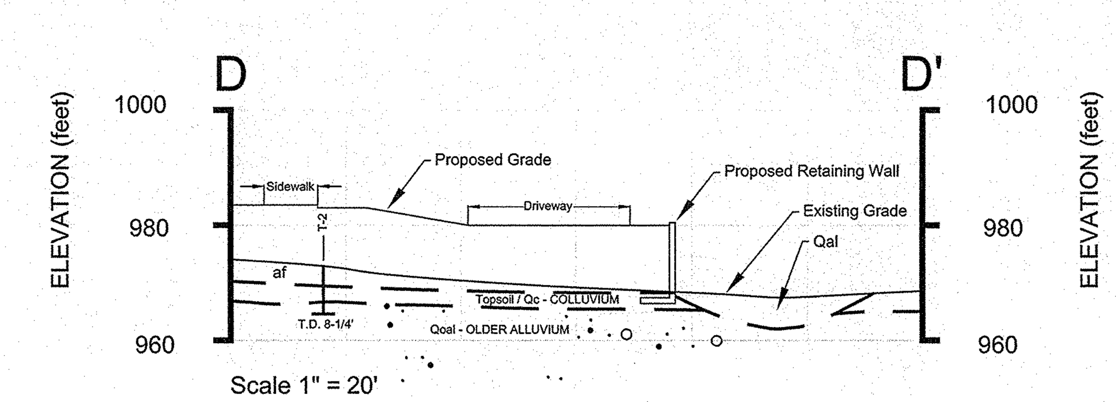
GORIAN & ASSOCIATES, INC.

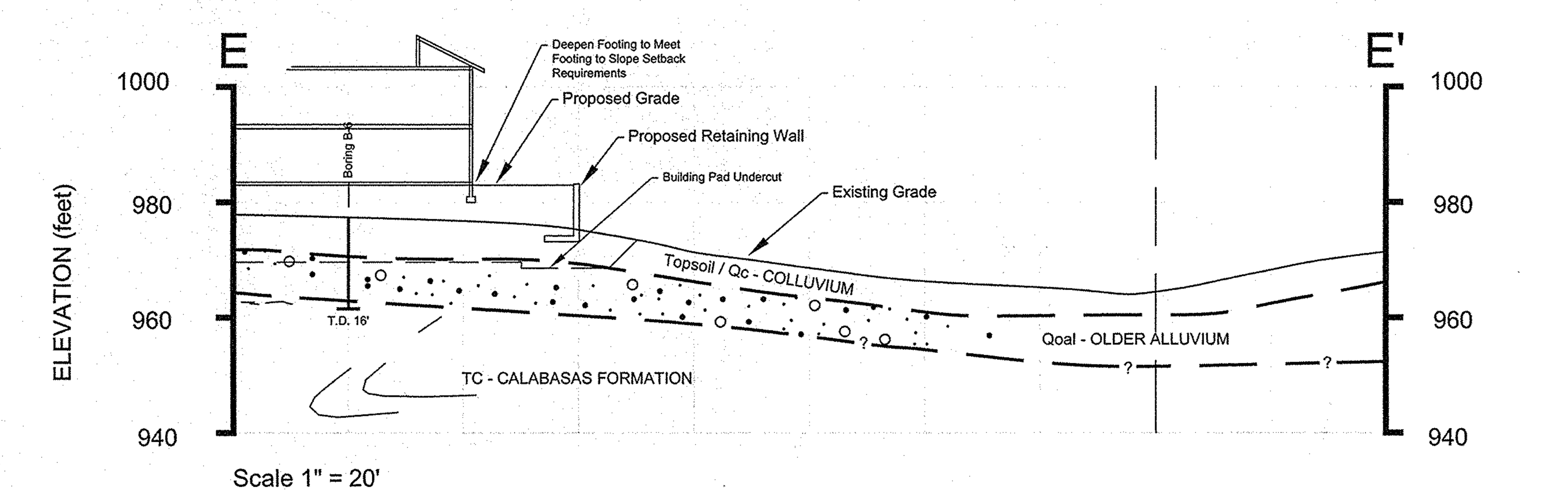
Buttressfill.ai


BENCHMARK
RDBM TAG IN CONC CB 42 FEET WEST OF CENTERLINE OF KANAN ROAD AND 64 FEET NORTH OF CENTERLINE OF AGOURA ROAD.
BM NO.: CY10004A
ELEVATION: 961.97
ADJ.: 1988
FLOOD PLAIN NOTE
COUNTY: LOS ANGELES
ASSESSOR PARCEL #: 2061-001-025
FLOOD ZONE: X
COMMUNITY NAME: AGOURA HILLS
COMMUNITY #: 065037
COMMENT: MINIMAL FLOOD HAZARD
MAP NUMBER: 065037C1243F
MAP DATE: SEPTEMBER 26, 2008
LEGAL DESCRIPTION
PARCEL 2 OF PARCEL MAP 15762, IN THE CITY OF AGOURA HILLS, AS PER MAP FILED IN BOOK 175 PAGES 6 AND 7 OF PARCEL MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.
EXCEPT THEREFROM AN UNDIVIDED ONE-HALF INTEREST IN ALL OIL, GAS, MINERALS AND OTHER HYDROCARBON SUBSTANCES LYING BELOW THE SURFACE OF SAID LAND; BUT WITH NO RIGHT OF SURFACE ENTRY THERETO, AS PROVIDED IN THE DEED RECORDED DECEMBER 26, 1960 AS INSTRUMENT NO. 1450 IN BOOK D1076 PAGE 565, OFFICIAL RECORDS.
ALSO EXCEPT THEREFROM AN UNDIVIDED ONE-HALF INTEREST IN ALL OIL, GAS, MINERALS AND OTHER HYDROCARBON SUBSTANCES LYING BELOW THE SURFACE OF SAID LAND; BUT WITH NO RIGHT OF SURFACE ENTRY THERETO, AS PROVIDED IN THE DEED RECORDED DECEMBER 29, 1960 AS INSTRUMENT NO. 1452 IN BOOK D1076 PAGE 568, OFFICIAL RECORDS.
ALSO EXCEPT THEREFROM AN UNDIVIDED ONE-HALF INTEREST IN ALL OIL, GAS, MINERALS AND OTHER HYDROCARBON SUBSTANCES LYING BELOW THE SURFACE OF SAID LAND, BUT WITH NO RIGHT OF SURFACE ENTRY THERETO, AS PROVIDED IN THE DEED RECORDED MARCH 4, 1983 AS INSTRUMENT NO. 83-248390.
BASIS OF BEARINGS
THE BEARING SOUTH 79° 24' 46" EAST OF THE CENTERLINE OF AGOURA RD, AS SHOWN ON PARCEL MAP NO. 15762, AS FILED IN BOOK 175, PAGES 6 AND 7 OF PARCEL MAPS, RECORDS OF LOS ANGELES COUNTY, WAS TAKEN AS THE BASIS OF BEARINGS SHOWN ON THIS MAP.
VICINITY MAP
THOMAS GUIDE PAGE: 557 F-6
8-FT WIDE ACCEL/DECEL/BIKE LANE SOUTH SIDE
200-FT TRANSITION (100 TO 1) FROM 8-FT ACCEL/DECEL/BIKE LANE TO 6-FT WIDE BIKE LANE ON SOUTH SIDE
6-FT WIDE BIKE LANE
9-FT WIDE SIDEWALK ON SOUTH SIDE
AGOURA
ROAD
Qoal
Qal
af
afc?
Tcvag
BUILDING A
GARAGE FF = 974.0
GARAGE PAD = 973.5
FIRST FLOOR FF = 954.5
BUILDING B
GARAGE FF = 973.0
GARAGE PAD = 973.5
FIRST FLOOR FF = 983.5
PROPOSED RECREATIONAL PARK
ENCROACHES INTO RIPARIAN
NATURAL DRAINAGE COURSE
BIOSWALE
B-1
B-2
B-3
B-4
B-5
B-6
T-1
IP-1
ST-1
ST-2
ST-3
PARCEL 1 OF PARCEL MAP NO. 35034
Existing Tennis Court
Existing Tennis Court
CONSTRUCTION NOTES:
1 CONSTRUCT 3 INCHES OF A.C. OVER 10 INCHES OF AGGREGATE BASE
2 CONSTRUCT 3 INCHES OF A.C. OVER 7 INCHES OF AGGREGATE BASE.
3 DECORATIVE CONCRETE, 7 INCHES WITH NO. 3 BARS AT 18 INCHES ON CENTER IN BOTH DIRECTIONS OVER 4 INCHES OF CLASS 2 AGGREGATE BASE. SEE SECTION HEREON.
4 FIRELANE PER L.A.C.F.D. REQUIREMENTS.
5 6" CONC. CURB PER APWA STD. PLAN 120-1
6 6" CONC. CURB AND 18" GUTTER PER APWA STD. PLAN 120-1
7 RETAINING WALLS BY SEPARATE PERMIT
8 HANDICAP RAMP PER APWA STD. 111-2
9 6" ROLLED CURB PER APWA STD. PLAN 121-1
Geotechnical Map
Gorian & Associates, Inc.
Applied Earth Sciences
Job No: 2272-0-0-102
Date: July 2014
Scale: 1" = 40'
Drawn by:
Approved by:
PLATE 1
EXPLANATION
afc Certified Engineered Fill
Qal Alluvium
Qoal Older Alluvium
Tc Calabasas Formation
Tcvag Conejo Volcanics (Agglomerate)
Approximate Contact Between Geologic Units
T-4 Approximate Location of Exploratory Backhoe Pit
IP-4 Approximate Location of Stormwater Infiltration Test Pit
B-6 Approximate Location of 24" Diameter Exploratory Boring
Strike and Dip of Bedding
Groundwater
ST-3 Approximate Location of Seismic Traverse
A A' Geotechnical Cross Section
SECTION A-A
EXISTING STREET SECTION
NOT TO SCALE
SECTION B-B
PROPOSED STREET SECTION
NOT TO SCALE
SECTION C-C
PROPOSED STREET SECTION
NOT TO SCALE
SECTION D-D
PROPOSED STREET SECTION
NOT TO SCALE
BIOSWALE DETAIL
NOT TO SCALE
SECTION E-E
NOT TO SCALE
SECTION F-F
NOT TO SCALE
#3 REBAR POSITIONED AT 18" O.C. IN EACH DIRECTION
7" P.C.C.
4" CLASS 2 AGGREGATE BASE
COMPACT TO 95%
DECORATIVE CONCRETE PAVEMENT SECTION
NOT TO SCALE
LEGEND
PUBLIC UTILITIES / SERVICES
WATER: LAS VIRGENES MUNICIPAL WATER DIST. 4232 LAS VIRGENES ROAD CALABASAS, CA 91302 (818) 880-4110
ELECTRICAL: SOUTHERN CALIFORNIA EDISON 3589 FOOTHILL DRIVE THOUSAND OAKS, CA 91361 (805) 494-7016
TELEPHONE: SBC (PAC BELL) 16201 RAYMER STREET, #115 VAN NUYS, CA 91406 (818) 373-6889
GAS: SOUTHERN CALIFORNIA GAS 9400 OAKDALE AVENUE CHATSWORTH, CA 91313 (818) 701-3324
SEWER: LA COUNTY, DEPT. OF PUBLIC WORKS SEWER MAINTENANCE DIVISION 1000 S. FREMONT AVENUE, BLDG A9 EAST ALHAMBRA, CA 91803 (626) 300-3308
CABLE: TIME WARNER CABLE 2323 TELLER ROAD NEWBURY PARK, CA 91320 (805) 375-5213
CABLE: CHARTER COMMUNICATIONS 3806 CROSSCREEK ROAD MALIBU, CA 90265 (310) 456-9010
CALTRANS: CALTRANS 5660 RESEDA BOULEVARD TARZANA, CA 91356 (805) 388-1426
UTILITY NOTE
UTILITY INFORMATION SHOWN HEREON WAS COMPILED FROM PUBLIC RECORDS. NO LIABILITY IS ASSUMED OR INFERRED BY HMK ENGINEERING AS TO THE ACCURACY OF SAID INFORMATION.
BOUNDARY DATUM
ESTABLISHED FROM THE LOCAL CITY OR COUNTY ENGINEERING BUREAU'S BOUNDING MONUMENTED CENTERLINES OR FROM POINTS OF RECORD AS SHOWN. IF ELEVATIONS ARE SHOWN, THEY ARE FOR INFORMATION ONLY AND ARE NOT FOR CERTIFICATION OF GRADE, DRAINAGE OR ANY OTHER ITEM WHICH MAY BE CONNECTED TO VERTICAL DATUM.
SCALE: 1"=40'
HMK ENGINEERING INC.
CIVIL ENGINEERS · LAND SURVEYORS · LAND PLANNERS
1552 EIGHTEENTH STREET
SANTA MONICA, CA 90404 PHONE (310) 449-5511
No. 38538
EXP. JUNE 30, 2014
(OWNER& DEVELOPER)
AGOURA HILLS CENTER PROPERTIES, LLC
2965 E. HILLCREST DRIVE #107
THOUSAND OAKS, CA. 91362
(818) 865-0200 CONTACT: STEVE RICE
VESTING TENTATIVE TRACT MAP NUMBER 71742
LOCATED IN A CORPORATED TERRITORY OF
THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA
SEPTEMBER 2012
SHEET 1 OF 1









GEOTECHNICAL CROSS SECTIONS

Gorian & Associates, Inc.
Applied Earth Sciences

Job No: 2272-0-0-102	Date: July 2014
Scale: 1" = 40'	Drawn by: / Approved by:
	PLATE 2