Geotechnical Design
and
Construction Recommendations
Las Virgenes Road Scenic Corridor Widening
Agoura Road to Lost Hills Road
City of Calabasas, California

prepared for
City of Calabasas
Public Works Department
100 Civic Center Way
Calabasas, CA 91302

GORIAN
& ASSOCIATES, INC.

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February 26, 2015

City of Calabasas
Public Works Department
100 Civic Center Way
Calabasas, CA 91302

Work Order: 3022-0-0-100

Attention: Mr. Robert Yalda
Public Works Director

Subject: **GEOTECHNICAL DESIGN AND CONSTRUCTION RECOMMENDATIONS, LAS VIRGENES ROAD SCENIC CORRIDOR WIDENING, AGOURA ROAD TO LOST HILLS ROAD, CITY OF CALABASAS, CALIFORNIA**.

1. INTRODUCTION

The following report contains our geotechnical recommendations for design and construction of the Las Virgenes Road Scenic Corridor Completion Project. The project consists of the widening and slight realignment of Las Virgenes Road from Agoura Road to Lost Hills Road in the western portion of the City of Calabasas, California. The main areas for which we provide evaluation and recommendations herein are for a proposed soil nail retaining wall along the eastern side of Las Virgenes Road from roughly stations 69 to 72 and conventional retaining walls from roughly stations 21 to 25 and 27+00 to 29+87. In addition, recommendations are provided for rough grading and slope construction where needed along the road alignment and for new driveway approaches.

This report is based on our geological mapping of surface exposures within the areas of the retaining walls described above and our review of prior geotechnical reports addressing projects along Las Virgenes Road by this firm and others along with regional geologic reports. Gorian and Associates, Inc. reviewed the referenced reports (a complete listing of references used is attached) by others and supplemented the previously obtained data with our own subsequent field observations. We accept and use the prior data contained in the referenced reports.

Based on our site evaluation, the project is feasible from a geotechnical standpoint provided recommendations presented herein are implemented in the project design and construction. Descriptions of the site and geologic units along with our conclusions and recommendations are presented within the text of this report. Remedial grading will be necessary to prepare the site for the proposed development.

2. PROPOSED CORRIDOR WIDENING

As stated on the City of Calabasas website, the Las Virgenes Roadway Widening and Improvement project addresses design modifications needed to provide two travel lanes in each direction, bike lanes,

landscaped medians and continuous sidewalks along the eastern side of the road. The portion of Las Virgenes Road addressed herein starts at Agoura Road and extends to Lost Hills Road in the western portion of Calabasas. The improvements will widen the roadway along with minor softening of the road alignment in areas.

The proposed road construction is shown on the *Las Virgenes Road Street Improvement Plans Agoura Road to Lost Hills Road* by Diamond West Inc. (28 sheets). The construction starts at station 17+87 on sheet 4, which is roughly the southern edge of Agoura Road. Here the improvements are a new median and road widening along the western edge. On sheet 5, median construction continues along with widening of the road and construction of a conventional retaining wall and cut slope on the west side of the road between stations 22+77 to 25+00. This wall is proposed as a conventional wall per Caltrans standard plans and will have a 2(horizontal):1(vertical) cut slope above it. This wall is shown on our Plate 1. In addition, a new private driveway approach is proposed at 4647 Las Virgenes Road.

Median and widening continues on sheet 6 with a retaining wall also per Caltrans standard plans to support the sidewalk and widened street along the western side of the street. This conventional wall starts at station 27+00 and extends to station 29+87 and will support the road on the slope presently descending westward from the roadway.

On sheet 7, the improvements are mainly curb and median construction. However on sheet 8, the road is being moved to the west toward the existing western curb. Whereas on sheet 9, the road is being widened to the east.

On sheet 10, the improvements are mainly curb and median construction. On sheets 11 and 12 similar improvements are proposed with the exception that fill will be placed along the western side of the street to support walkway construction. The resulting fill slopes are proposed at shallow gradients of 3 to 4(horizontal):1(vertical). The proposed fill slopes are shown on our Plates 2 and 3. At the southern edge of sheet 12 a new driveway will be constructed for A.E. Wright School.

Sheet 13 and the northern portion of sheet 14 are primarily curb and median construction. Starting on page 14 and extending into sheet 15 is a proposed terraced soil nail wall on the east side of Las Virgenes Road. The soil nail will start at station 69+50 or roughly equal to the centerline of Meadow Creek Lane and extend southward to station 72+00. This wall is shown on our Plate 4. No significant grading is shown on the remaining of the improvement plans sheets 16 to 18 from a geotechnical standpoint.

3. SCOPE OF SERVICES

In accordance with our Proposal Number 5968-10, dated November 17, 2014 Gorian and Associates, Inc. conducted the following scope of services to provide the requested geotechnical design and construction recommendations. Our scope of services was conducted under the supervision of a State registered geotechnical engineer and certified engineering geologist. This evaluation included the following:

3.1. SITE RECONNAISSANCE AND GEOLOGIC MAPPING

The field portion of our scope of services was initiated by an overall site reconnaissance by the undersigned geotechnical engineer. In addition, a geologist from our office also performed geologic mapping where reasonably accessible of existing bedrock exposures in the areas of the proposed retaining walls. No subsurface exploration was performed for this scope of services.

3.2. ARCHIVAL REVIEW

Pertinent geologic/geotechnical data in our files addressing sites adjacent the road alignment and vicinity were reviewed including regional geologic maps as well as State geologic maps, geotechnical / geologic hazard maps.

3.3. LABORATORY TESTING
No laboratory testing was proposed or performed for this scope of services. Shear strengths and unit bedrock unit weights used in the analyses described herein were obtained from previous geotechnical evaluations performed adjacent Las Virgenes Road on similar earth materials.

3.4. GEOTECHNICAL ENGINEERING ANALYSIS
The results of our field and research programs were used in engineering analyses to develop geotechnical recommendations for design and construction of the road improvements. Pertinent cross sections were constructed through the central portion of the existing slopes and proposed walls to illustrate their relation to the geologic conditions and graphically depict the subsurface geologic structure. Slope stability analyses were performed to evaluate wall stability.

3.5. REPORT PREPARATION
The results of the archival review, field mapping program, and prior laboratory testing programs were used to evaluate geotechnical engineering factors affecting the road improvement plan. The results of our findings are provided in this geotechnical report that includes:

a) A description of the bedrock conditions as encountered in our surficial mapping and from our research. The compiled data is shown graphically on the attached geotechnical maps.

b) Discussion and recommendations regarding:

   i) Temporary excavations;

   ii) Site preparation and need for remedial earthwork;

   iii) Seismic setting of the site and seismic design criteria;

   iv) Bearing pressure, shear strength, and passive and active pressures for retaining wall design.

4. SITE LOCATION AND PHYSIOGRAPHY
Las Virgenes Road extends from the north side of the Ventura Freeway to the south were is becomes Malibu Canyon Road near Tapia County Park and finally terminating at Pacific Coast Highway. Due to its location, it provides a vital connection between the freeway and the coastal route. The section of road addressed herein extends between Agoura to Lost Hills Roads in the western portion of the City of Calabasas. This segment of the road runs along eastern edge of the Las Virgenes Creek floodplain.

The roadway is asphalt concrete paved and has been widened with curb and gutter in sections associated with development of adjacent residential and commercial projects. The project described herein will complete the widening of the road between Agoura and Lost Hills Roads. The western side of the road is developed with a combination of residential, commercial, and school structures. The eastern side of the road is a combination of residential, commercial, and open hillside and valley areas.

5. SITE GEOLOGY
The roadway right of way is underlain either at the surface or at depth by bedrock of the mid Miocene-age Calabasas Formation mantled locally with Quaternary-age alluvium, colluvium/topsoil (undifferentiated) and recent artificial fill soils. General descriptions of these units are presented below. The regional geologic setting is shown on the attached Regional Geologic Map (Figure 2).

5.1. CALABASAS FORMATION (Tc)
The sedimentary bedrock formation referred to the mid-Miocene age Calabasas Formation (after Yerkes and Campbell, 1992; equivalent to Upper Topanga Formation of Dibblee, 1992, see Figure 2) underlies the entire roadway at depth but is typically overlain by thin to thick sections of surficial soils. The bedrock is generally poorly exposed along the roadway corridor but is locally well exposed on existing cut slopes excavated into the adjacent hillside areas, mainly on the eastern side of the existing roadway. As

observed in the few natural outcrops on the slope above the roadway and (mainly) in cut slope excavations, the bedrock generally consists of light yellowish brown to grey silty fine-grained sandstone interbedded with yellowish brown to brown to gray clayey siltstone interbeds to partings. The sandstone typically is thin to thickly bedded and in a damp and dense yet locally friable condition. The clayey siltstone units are typically thinly bedded to fissile and in a damp to moist condition. Fracturing is common and although most fractures are tight, some iron oxide staining and gypsum crystal growth were observed coating/filling fractures.

All the bedrock units are weathered to slightly weathered near surface but become fresher with depth. Clayey siltstone units are typically deeply weathered and soil-like although some well indurated, resistant siltstone beds are exposed, as on the east facing cut slope in the vicinity of Station 24+00. The existing over steep, west facing cut slope between Stations 69+50 and 71+50 is so deeply weathered that several shallow surficial slumps (18"±) have occurred (see Plate 4.)

Structurally, regional geologic mapping (Dibblee 1992, Weber 1984) indicates the overall Calabasas Formation in the area is generally inclined northeasterly at moderate dips (25° to 45°) with local areas of tight folding. Bedding data from mapping along the existing roadway indicates bedding is generally devoid of plastic deformation within the area affecting the proposed improvements. The typical orientation of the bedrock is generally inclined easterly at dips of 10°-45°, a favorable orientation for excavations along the eastern side of the roadway but adversely oriented for excavations into bedrock on the western side of the roadway.

5.2. ALLUVIUM (Qal)

Quaternary-age alluvial deposits overly the bedrock along most of the subject portions of Las Virgenes Road and extend to the relatively flat lower reaches at the mouth of adjacent drainages. With coloring described as reddish brown to brown and yellowish brown, the alluvium consists of various admixtures of silty to clayey sands, sandy silts, and silty clay.

5.3. TOPSOIL / COLLUVIUM [undifferentiated]

Surficial soil referred to as topsoil/colluvium [undifferentiated] typically mantles the bedrock and alluvial deposits. While topsoil is specifically a residual, in-place soil profile development, the product of the weathering of the underlying parent material (bedrock or alluvium) and colluvium (or slopewash) is specifically an accumulation of topsoil and or bedrock/alluvial deposits subjected to down slope creep processes or minor erosion, these two surficial soil deposits are undifferentiated for the purpose of this evaluation. From a practical standpoint, however, topsoil is typical on slopes where bedrock is only 2 to 3 feet from the surface whereas thicker soil accumulations (topsoil and colluvium) are generally in drainages/draw areas with locally subdued topography. The topsoil/colluvium generally consists of yellowish brown clayey silt with fine sand to clayey silt to silty clay in a damp to moist and stiff to very stiff condition.

5.4. ARTIFICIAL FILL (af)

Artificial fill deposits, presumably compacted, were mapped associated with the existing Las Virgenes Road improvements including the existing drainage inlet structures. Additional deeper deposits of artificial fill may exist along the right of way but were not mapped or investigated as they are concealed. Regardless, any existing non-engineered fill deposits are considered not suitable for structural support and should be removed prior to placement of any structural/engineered fill.

5.5. GROUNDWATER

Groundwater along the road alignment will vary in depth and could be as high as 10 feet below the ground surface based on prior work within the Calabasas Blue project. Nevertheless, groundwater is not expected to affect the proposed roadway construction.

5.6. FAULTING AND SEISMICITY

Las Virgenes Road is in the Santa Monica Mountains, a seismically active region prone to occasional damaging earthquakes. The destructive power of earthquakes can be grouped into fault-rupture, ground shaking (strong motion), and secondary effects of ground shaking such as tsunami, liquefaction, settlement, landslides, etc. The hazard of fault-rupture is generally thought to be associated with a relatively narrow zone along well-defined preexisting active or potentially active faults. No doubt there are and will be exceptions to this, because it is not possible to predict the precise location of a new fault where none existed before (CDMG, 1975).

Active or potentially active faults are not known to cross the Site and the site is not currently within an Alquist-Priolo Earthquake Fault Zone as defined by the State Geologist (Bryant and Hart, 2007). The potential for ground rupture due to faulting onsite during the lifetime of the project is considered remote.

Nevertheless, the roadway will be subject to ground motion from occasional earthquakes in the region. Significant earthquakes have occurred within a 40-mile radius of the Site within the last 45 years. The 1994 Northridge earthquake produced strong ground motion at the Site and a peak horizontal acceleration of approximately 0.4 (g) for the stiff soil / soft bedrock site (Chang, et al., 1994). It is likely significant earthquakes will occur in this area within the life expectancy of the proposed project and the Site will experience strong ground shaking from these events.

Based on the latest United States Geological Survey (USGS) interactive web application, *2008 Interactive Deaggregations (Beta)* <http://eqint.cr.usgs.gov/seaggint/2008/>, probabilistic seismic hazard analyses (PSHA) predict the Design Basis Earthquake will be on the order of 0.39g for the soft rock (vs=475 m/sec) conditions of the Site (Lat. 34.13505°N, Long. 118.70232°W at its approximate midpoint). The Design Basis Ground Motion is defined as having a 10% chance of being exceeded in 50 years is based on probabilistic analyses. The mean magnitude from this PSHA is 6.8 (Mw) with a mean distance of 18.5 km from the property with a modal magnitude of 7.0 (Mw) and a modal distance of 12.4 km from the property. These USGS values were utilized in our evaluation.

Secondary effects of strong ground motion include tsunami, seiche, liquefaction, settlement, landslides, etc. Tsunami (seismic sea wave) and seiche (standing wave) are not hazards inherent to the Site due to its distant proximity to the ocean and large bodies of water. The potential for liquefaction and seismic induced settlement is discussed in the following section.

6. LIQUEFACTION

The majority of Las Virgenes Road lies along the eastern edge of an alluvial valley that is shown to be within an area susceptible to seismic induced liquefaction on the California Geological Survey (CGS) Seismic Hazard Zones Map for the Calabasas Quadrangle. Liquefaction is a seismic phenomenon were saturated soils lose strength when severely shaken and develop excess pore pressures. This phenomenon is currently understood to be of concern in the upper 50 feet of the subsurface profile. Therefore, there existing the possibility for seismic induced ground movement to occur within portions of Las Virgenes supported on the alluvial soils. However, evaluation of the potential for seismic induced ground movement is beyond the scope of services proposed for this geotechnical report.

7. SLOPE STABILITY

Stability of slopes associated with the retaining walls shown on Geotechnical Maps, Plates 1 and 4, were evaluated for this report. The static and pseudo-static slope stability analyses were performed using the computer program GSTABL7™ and user interface STEDwin™. GSTABL7 is a 2-dimensional, limit equilibrium slope stability program developed by Garry H. Gregory, P.E., which works in conjunction with STEDwin, a Graphical User Interface developed by Harald W. Van Aller, P.E. The slopes were evaluated for circular failure surfaces using the modified Bishop Method and where apparent out of slope bed-

ding was present (GAI 2-2') a search was done for a translational failure using the Simplified Janbu method.

Material strength for the bedrock was obtained from the prior report by GWV, 2007 which is a friction angle of 30 degrees and cohesion of 500 pounds per square foot. Along bedding strength of friction angle of 26 degrees and cohesion of 200 pounds per square foot were used. The slopes were modeled without resistance from the proposed retaining walls or soil nails.

The stability of slopes is commonly stated in terms of the calculated factor of safety. Pseudo-static analyses were completed using a horizontal acceleration coefficient of 0.2. The analyses for gross slope stability exceed the generally accepted lower limit factor of safety of 1.5 for static and surficial stability and 1.1 for pseudostatic stability. The results are presented in Appendix A. Soils with cohesion of less than 250 pounds per square foot should be considered prone to erosion per the City of Calabasas, (2010). Even though the surficial slope stability calculations show an acceptable factor of safety, there will be a potential for weathering and slumping of the surface of unmaintained slopes.

8. CONCLUSIONS AND RECOMMENDATIONS

8.1. GENERAL

Las Virgenes Road between Agoura and Lost Hills Roads was evaluated to provide geotechnical recommendations for design and construction of the proposed retaining walls and rough grading and slope construction where needed along the road alignment and for new driveway approaches. The roadway improvements may be developed from a geotechnical perspective, provided the geotechnical recommendations presented in the following sections are incorporated into the project design and construction. Grading should be performed in conformance with current City of Calabasas Grading Codes, under the geotechnical observations and testing of this firm.

8.2. SITE PREPARATION AND GRADING

8.2.1. General

Remedial grading will be necessary to widen or improve the roadway alignment. Recommendations for the remedial grading are presented below. All aspects of site grading including site preparation, fill placement, keying and benching should be in accordance with the City of Calabasas' grading ordinance or the recommendations of this report, whichever are more restrictive.

8.2.2. Site Clearing

Prior to starting earthwork, areas to be graded should be stripped of vegetation, trash, and debris. Minor vegetation may be blended with the soils during processing until it is not discernable from the fill. Roots over one-half inch in diameter should be included with removal of brush or trees.

8.2.3. Soil Removal

Removal of the upper soils will be necessary areas of grading to remove weathered or disturbed soils. The removal should be made to firm in-place soils and should include removal of unsuitable existing fill, topsoil/colluvium, and unsuitable alluvial deposits. Due to the possible varied nature of the areas to be graded the depths of removal will also vary. Therefore, a representative of this office should observe the removal areas to determine if sufficient soil removal has been made.

After the removals are completed as addressed above, the exposed soils should be observed by a representative of this office to evaluate if additional removals are necessary. Fill soils should not be placed until completion of the geotechnical observation. Observation of the removal areas by Gorian and Associates, Inc. does not waive inspections that may be required by the local grading department inspector.

The City of Calabasas may require a representative from the City observe the bottom of the soil removal areas.

8.2.4. Processing
Once the soil removals and undercutting recommended above have been completed, the bottoms of the removal and undercut areas should be observed by this office. Deeper removals may be required if uncertified fill or loose or soft zones are encountered. Prior to placing fill, the exposed surfaces should be processed. Processing consists of scarifying to a depth of 6 to 8 inches, conditioning to near optimum moisture content, and compacting to at least 90 percent relative compaction.

Though not anticipated for this project, deep soil removals could have moisture contents well above the optimum value. For wet soils to be used as fill, for some treatment will be necessary such as air drying, soil mixing, or lime treatment. If some type of stabilization of the removal bottom is necessary prior to placement of compacted fill stabilization methods may include the use of geotextile fabric, lime treatment, placement of gravel/rock or other approved alternative.

8.2.5. Fill Placement
Fill should be free of trash, debris, and significant vegetation, placed in thin lifts, moisture conditioned to slightly above the optimum moisture content, and compacted to at least 90 percent relative compaction. Material exceeding 12 inches in maximum dimension should be excluded from the fill. However, it may be desirable to keep rock larger than 3 inches outside of the upper 5 feet of the building area. Fill placed within building pad areas should be mixed and blended.

8.2.6. Fill Compaction
Fill soils should be compacted to a minimum of 90 percent relative compaction. Relative compaction is the ratio of the in-place dry soil density to the maximum dry soil density as determined in general accordance with ASTM test method D 1557.

8.2.7. Keying and Benching
Fills placed on slopes steeper than a 5(horizontal):1(vertical) gradient should be keyed and benched (horizontal benches) into competent in-place soil (after the required removals are made) or bedrock. Keyways for fill slopes should be a minimum of 15 feet wide and tilted into the slope, and should be observed by this firm prior to placing fill.

8.2.8. Utility Trenches
Utility trench backfill should be compacted to a minimum 90% relative compaction.

8.2.9. Temporary Excavations
Temporary excavations should conform to the requirements of CAL/OSHA. Excavations deeper than 4 feet should be shored or sloped. Surcharge loads should be setback sufficient distances from the tops of temporary excavations. Temporary excavations adjacent property line constraints should be shored.

During construction, the contractor is responsible for the excavation and maintenance of safe and stable slope angles considering the subsurface conditions and the methods of operation. Surcharge loads should be set back from the top of temporary excavations a minimum horizontal distance of 15 feet.

8.3. MANUFACTURED SLOPE CONSTRUCTION AND MAINTENANCE

8.3.1. General
Manufactured cut and fill slopes are shown at a maximum gradient of 2(horizontal):1(vertical). The following sections contain general recommendations for cut and fill slopes.

8.3.2. Cut Slopes
Cut slopes may be constructed at a maximum gradient of 2(horizontal):1(vertical). All cut slopes should be observed by an engineering geologist from this office for adverse geologic conditions. Where topsoil/colluvium is present at the top of a cut slope, the top of the slope should be “laid back” or rounded.

8.3.3. Fill Slopes
Fill slopes may be constructed at a maximum gradient of 2(horizontal):1(vertical). Fill slopes should be keyed and benched into firm in-place soil or bedrock. Fill slope keyways should be a minimum of 10 feet wide (or as directed by this office based on field conditions) and cut to a minimum depth of 2 feet at the toe into competent in-place materials. The keyway should be tilted into the slope and should be at least 2 feet deep at the heel (measured from below the slope toe elevation). The keyway should be observed by this office prior to placing fill.

Where possible, the outer slope faces should be overfilled and trimmed back to provide for firm, well-compacted surfaces. If the slopes are not overfilled and trimmed, it will be necessary to sheepsfoot and/or grid-roll the slopes. Slope faces should be tested and reworked as necessary to achieve the required 90 percent relative compaction. Select grading may be necessary so that fill slopes are constructed with materials with adequate surficial stability. The outer portions of slopes over a gradient of 3(horizontal):1(vertical) should be constructed with material having at least 250 psf of cohesion and a friction angle of 30 degrees.

8.3.4. Slope Maintenance
Slopes will require maintenance to reduce the risk of erosion and degradation with time due to natural or man-made conditions. Future performance of the slopes will depend on the control of the burrowing animals and maintenance of the brow ditches, drainage structures, and the slope vegetation as discussed below.

All graded or exposed natural slopes should be maintained with dense, deep rooting (minimum 2± feet deep), drought resistant ground cover and shrubs or trees. A reliable irrigation system should be installed on the slopes where necessary, adjusted so over watering does not occur, and periodically checked for leakage. Care should be taken to maintain a uniform, near optimum moisture content in the slopes, and to avoid over drying, or excess irrigation. Excess watering of slopes should be avoided to reduce the risk of erosion and surficial failures. Slopes should not be watered before forecasted rain.

All drainage structures should be kept in good condition and clean the entire length to the outlet. Final grading of the site should provide positive drainage away from slopes, and water should not be allowed to pond or gather in a slope area. Burrowing animals, particularly ground squirrels, can destroy slopes; therefore, where present, immediate measures should be taken to evict them.

8.4. SOIL EXPANSIVENESS
Native soils along the road alignment are anticipated to range generally from low to moderately expansive. However, highly expansive soils may also be encountered in the areas with high clay concentrations. Expansive soils contain clay particles that change in volume (shrink or swell) due to a change in the soil moisture content. The amount of volume change depends upon the soil swell potential, availability of water, and the soil restraining pressure. Swelling occurs when clay soils become wet due to excessive water.

8.5. RETAINING WALL DESIGN

8.5.1. General
Retaining walls will support the proposed road widening. The walls will be of conventional or soil nail construction and should be designed per the following recommendations.

8.5.2. Foundations
Continuous reinforced concrete retaining wall footings founded below level ground may be designed to impose a uniform allowable soil bearing pressure of 2000 psf. The bearing pressure may be increased by one third for short term loading. Retaining wall footings should be embedded a minimum of 24 inches into engineered compacted fill or competent native soils and have a minimum width of 24 inches. Deeper foundation embedment will be required for footings on or near descending slopes to conform to setback requirements. Footing reinforcement should be per the structural engineer's recommendations.

8.5.3. Lateral Resistance
Lateral forces on foundations may be resisted by passive earth pressure and base friction. Lateral passive earth pressure may be considered equal to an equivalent fluid having a density of 250 pounds per cubic foot (pcf) with a maximum of 2,000 psf. The passive pressure should be reduced to 200 pcf for footings on a descending slope. Passive pressure may be increased by one third for short term loading. Base friction may be computed at 0.4 times the normal load. Lateral passive earth pressure should be reduced by one third when combined with base friction. A factor of safety of 1 is provided for these values.

8.5.4. Footings on Slopes
Footings on slopes should be deepened or setback to provide footing support and to reduce the impact of changes that can occur on slope faces. Changes to the slope, such as erosion, slumping, over watering and expansive soil action can affect the support of footings on or near descending slopes. Setbacks should be per Figure 1805.3.1 of the California Building Code with a minimum setback of 5 feet.

8.5.5. Footing Excavations
Footings should be cut square and level, and cleaned of slough prior to casting concrete. Soil excavated from the footing trenches should not be spread over areas of construction unless properly placed and compacted. Footing excavations should be observed by a representative of this office prior to placing reinforcing steel. Footings should be cast as soon as possible to avoid deterioration of the footing subsoils.

8.5.6. Premoistening
Footing subgrade soils should be premoistened to 3% over the optimum moisture content for a depth of 18 inches prior to concrete placement. All saturated soils should be removed from the footing excavation prior to casting the footings. This office should observe the subgrade soil moisture prior to placing concrete.

8.5.7. Active Pressures
Retaining walls should be designed to resist active pressure exerted by low to moderately expansive compacted backfill or retained soil. Retaining walls that may yield at the top may be designed for an equivalent fluid pressure of 45 and 60 pounds per cubic foot (pcf) for a level and 2(horizontal):1(vertical) sloping backfill, respectively. If highly expansive soils or bedrock are exposed in the backcut, a redesign of the retaining walls will be required using higher active pressures or the backcut removed and replaced with lessor expansive materials. Retaining wall backcuts should be observed by an engineering geologist from this office.

In addition to the active pressures discussed above, retaining walls over 6 feet high are expected to experience additional surcharge pressure due to backfill inertia. An inverted triangular seismic pressure of 40 and 60 pounds per cubic foot should be used for level and 2(horizontal):1(vertical) sloping backfill, respectively. The result of the seismic pressure should be considered to act at 0.67H from the base of the wall, where H is the height of the wall measured from the base of the footing to the top of the backfill.

The above active pressures are not designed to resist expansion of the backfill. Therefore, if water is allowed to saturate backfill or backcut materials consisting of clayey soils, the expansion pressure could exceed the active pressures provided. In addition, the above active pressures are not designed to retain an adverse geologic condition.

8.5.8. Retaining Wall Drainage and Backfill

Retaining walls should be provided with drainage consisting of a composite drain board or a minimum 1 foot wide continuous section of clean gravel (½ to ¾ inch) or equivalent drain material wrapped in filter fabric. The drain material should extend from the base of the wall to within 2 feet of the top of wall. The upper 2 feet of exterior wall backfill should consist of compacted native soils. The drain material should be drained by a perforated drainpipe placed holes down on a maximum of 2 inches of drain material. The invert of the pipe should be a minimum of 6 inches below the lowest adjacent grade. Retaining walls should be waterproofed.

Wall backfill may consist of non to low expansive soils. The soil should be compacted to a minimum of 90 percent relative compaction using light equipment.

8.6. SOIL NAIL WALL DESIGN

A soil nail wall is proposed starting at station 69+50 or roughly equal to the centerline of Meadow Creek Lane and extend southward to station 72+00. Bedding is dipping into the slope as shown on the cross section on Plate 4. However, jointing can occur within this bedrock unit, which often occurs sub-perpendicular to bedding. A lower shear strength should be used along the joint surface than for cross bedding. Joint shear strength may be taken as 26 degrees of friction and cohesion of 200 pounds per cubic foot as similarly recommended for the Calabasas Blue project with similar bedrock conditions.

Cross bedding may be used for the design of soil nails inward from the active wedge. A shear strength of 30 degrees friction and cohesion of 500 pounds per square foot may be used for cross bedding strength in the Upper Topanga Formation. A unit weight of 120 pounds per cubic foot may be used in the wall design.

Soil nail walls should be constructed with maximum vertical excavations lifts of five feet. The locations of the soil nails and test nest should be shown on a profile of the wall. The minimum number of test nails should be 5 percent of the wall nails. A backdrain should be installed between the vertical nail rows with shotcrete placed directly against the temporary cut.

8.7. SITE DRAINAGE

Positive drainage should be provided away from slopes and structures during and after construction. Site drainage should be in conformance with the grading plan or applicable building codes. Landscape planting and trees should be kept away from foundations or flatwork to avoid roots extending beneath foundations and slabs.

8.8. PLAN REVIEW

As the development process continues and finalized grading plans and specifications are developed, they should be reviewed by Gorian and Associates, Inc. Additional geotechnical recommendations may be warranted at that time.

8.9. CONSTRUCTION OBSERVATIONS AND TESTING

All aspects of the construction addressed from a geotechnical standpoint should be observed and tested when appropriate by this firm.

8.10. SECTION 111

It is the opinion of this office that if the project is constructed in accordance with our recommendations and properly maintained, the proposed roadway will be safe against hazard from landslide, settlement, or slippage, and that the proposed construction will have no adverse effect on the geologic stability of property outside of the right of way. Test findings and statements of professional opinion do not constitute a guarantee or warranty, express or implied.

9. CLOSURE

This report was prepared under the direction of a registered geotechnical engineer and certified engineering geologist. No warranty, express or implied, is made as to conclusions and professional advice included in this report. Gorian and Associates, Inc. disclaim responsibility and liability for problems that may occur if recommendations presented herein are not followed.

This report was prepared for the City of Calabasas Public Works Department and their design consultants solely for design and construction of the project described herein. It may not contain sufficient information for other uses or the purposes of other parties. These recommendations should not be extrapolated to other areas or used for other facilities without consulting Gorian and Associates, Inc.

Recommendations herein are based on interpretations of the subsurface conditions concluded from the scope of services performed as outlined herein. These interpretations may differ from actual subsurface conditions, which can vary horizontally and vertically across the site. Therefore, persons using this report for bidding or construction purposes should perform such independent evaluations, as they deem necessary.

Grading and foundation work at the site should be performed per the current city of Calabasas Building Code. Due to possible subsurface variations, all aspects of field construction addressed in this report should be observed by this office.

The scope of the services provided by Gorian and Associates, Inc. and its staff, excludes responsibility and/or liability for work conducted by others. Such work includes, but is not limited to, means and methods of work performance, quality control of the work, superintendence, sequencing of construction and safety in, on, or about the jobsite.

-oOo-

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

Respectfully,

Gorian and Associates, Inc.

By: Jerome J. Blunck, GE 151
Principal Geotechnical Engineer

William F. Cavan, Jr., CEG 1161
Principal Engineering Geologist

Distribution: Addressee (6)

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APPENDIX A

SLOPE STABILITY ANALYSES

WO 3022-0-0-100 Section GAI1 - GAI1'

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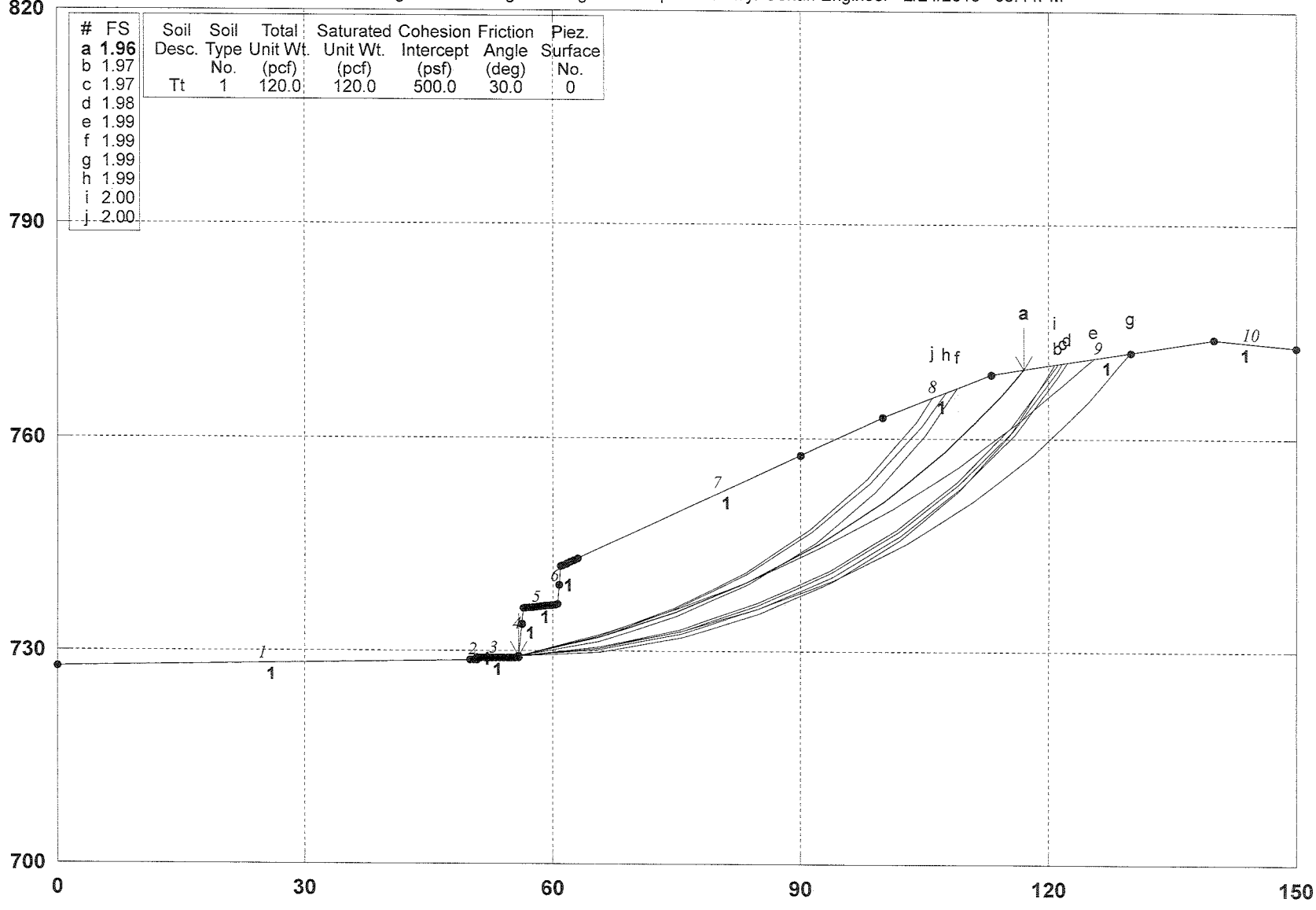

GSTABL7 v.2 FSmin=1.96

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

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                    *** 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:        2/24/2015
Time of Run:              03:44PM
Run By:                   Gorian Engineer
Input Data Filename:      X:\3022 Las Virgenes Road\Engin Calcs\GAI1 static.dat
Output Filename:          X:\3022 Las Virgenes Road\Engin Calcs\GAI1 static.OUT
Unit System:              English
Plotted Output Filename:  X:\3022 Las Virgenes Road\Engin Calcs\GAI1 static.PLT
PROBLEM DESCRIPTION:  WO 3022-0-0-100
                      Section GAI1 - GAI1'
BOUNDARY COORDINATES
   10 Top   Boundaries
   10 Total Boundaries
Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
   No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
    1         0.00     727.75      50.75     728.75        1
```

2	50.75	728.75	50.80	729.00	1
3	50.80	729.00	55.80	729.00	1
4	55.80	729.00	56.50	736.00	1
5	56.50	736.00	60.50	736.50	1
6	60.50	736.50	61.00	742.00	1
7	61.00	742.00	100.00	763.00	1
8	100.00	763.00	113.00	769.00	1
9	113.00	769.00	140.00	774.00	1
10	140.00	774.00	150.00	773.00	1

User Specified Y-Origin = 700.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)
ISOTROPIC SOIL PARAMETERS
1 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	120.0	120.0	500.0	30.0	0.00	0.0	0

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
3000 Trial Surfaces Have Been Generated.
100 Surface(s) Initiate(s) From Each Of 30 Points Equally Spaced
Along The Ground Surface Between X = 50.00(ft)
and X = 63.00(ft)
Each Surface Terminates Between X = 90.00(ft)
and X = 130.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 3000
Number of Trial Surfaces With Valid FS = 3000
Statistical Data On All Valid FS Values:
FS Max = 12.116 FS Min = 1.963 FS Ave = 2.687
Standard Deviation = 0.658 Coefficient of Variation = 24.49 %
Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.828	729.276
2	65.481	731.885
3	74.833	735.427
4	83.791	739.871
5	92.271	745.171
6	100.190	751.278
7	107.471	758.132
8	114.045	765.667
9	116.940	769.730

Circle Center At X = 34.126 ; Y = 828.756 ; and Radius = 101.820
Factor of Safety
*** 1.963 ***
Individual data on the 13 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	0.7	263.9	0.0	0.0	0.	0.	0.0	0.0	0.0
2	4.0	3000.9	0.0	0.0	0.	0.	0.0	0.0	0.0
3	0.5	518.6	0.0	0.0	0.	0.	0.0	0.0	0.0
4	4.5	6414.2	0.0	0.0	0.	0.	0.0	0.0	0.0
5	9.4	14896.3	0.0	0.0	0.	0.	0.0	0.0	0.0
6	9.0	15277.7	0.0	0.0	0.	0.	0.0	0.0	0.0
7	8.5	14280.7	0.0	0.0	0.	0.	0.0	0.0	0.0
8	7.7	11841.8	0.0	0.0	0.	0.	0.0	0.0	0.0
9	0.2	269.6	0.0	0.0	0.	0.	0.0	0.0	0.0

10	7.3	8792.8	0.0	0.0	0.	0.	0.0	0.0	0.0
11	5.5	4261.6	0.0	0.0	0.	0.	0.0	0.0	0.0
12	1.0	505.4	0.0	0.0	0.	0.	0.0	0.0	0.0
13	2.9	612.4	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.828	729.276
2	65.748	730.537
3	75.436	733.013
4	84.745	736.668
5	93.530	741.444
6	101.658	747.269
7	109.004	754.054
8	115.456	761.694
9	120.915	770.073
10	121.125	770.505

Circle Center At X = 50.660 ; Y = 809.783 ; and Radius = 80.673

Factor of Safety

*** 1.966 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.828	729.276
2	65.764	730.400
3	75.482	732.761
4	84.826	736.321
5	93.652	741.024
6	101.818	746.796
7	109.196	753.545
8	115.670	761.167
9	121.138	769.539
10	121.656	770.603

Circle Center At X = 51.938 ; Y = 808.562 ; and Radius = 79.382

Factor of Safety

*** 1.971 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.828	729.276
2	65.780	730.247
3	75.528	732.480
4	84.911	735.937
5	93.777	740.562
6	101.981	746.280
7	109.389	752.997
8	115.880	760.604
9	121.349	768.977
10	122.183	770.701

Circle Center At X = 53.322 ; Y = 807.147 ; and Radius = 77.911

Factor of Safety

*** 1.977 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.828	729.276
2	65.393	732.193
3	74.737	735.755
4	83.816	739.947
5	92.588	744.747
6	101.013	750.135
7	109.050	756.084
8	116.664	762.568
9	123.817	769.556
10	125.365	771.290

Circle Center At X = 18.176 ; Y = 870.146 ; and Radius = 145.815

Factor of Safety

```
      ***    1.986   ***
Failure Surface Specified By  8 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
    1         55.828       729.276
    2         65.607       731.363
    3         74.996       734.807
    4         83.805       739.539
    5         91.861       745.465
    6         99.001       752.465
    7        105.085       760.402
    8        108.845       767.082
Circle Center At X =    46.148 ; Y =   798.927 ; and Radius =    70.320
       Factor of Safety
      ***    1.986   ***
Failure Surface Specified By 10 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
    1         55.828       729.276
    2         65.751       730.510
    3         75.498       732.747
    4         84.966       735.964
    5         94.058       740.128
    6        102.679       745.195
    7        110.739       751.114
    8        118.156       757.822
    9        124.851       765.250
   10        129.883       772.126
Circle Center At X =    48.778 ; Y =   826.875 ; and Radius =    97.854
       Factor of Safety
      ***    1.988   ***
Failure Surface Specified By  8 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
    1         55.828       729.276
    2         65.464       731.948
    3         74.687       735.812
    4         83.350       740.808
    5         91.315       746.854
    6         98.454       753.856
    7        104.655       761.702
    8        107.535       766.478
Circle Center At X =    39.850 ; Y =   806.019 ; and Radius =    78.388
       Factor of Safety
      ***    1.993   ***
Failure Surface Specified By 10 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
    1         55.828       729.276
    2         65.810       729.874
    3         75.607       731.876
    4         85.024       735.243
    5         93.870       739.906
    6        101.969       745.772
    7        109.157       752.723
    8        115.292       760.620
    9        120.249       769.305
   10        120.693       770.425
Circle Center At X =    56.671 ; Y =   799.646 ; and Radius =    70.375
       Factor of Safety
      ***    1.997   ***
Failure Surface Specified By  8 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
    1         55.828       729.276
    2         65.448       732.004
    3         74.633       735.958
```

```
    4         83.228      741.070
    5         91.086      747.255
    6         98.075      754.408
    7        104.076      762.406
    8        105.963      765.752
Circle Center At X =    40.049 ; Y =   803.656 ; and Radius =    76.036
       Factor of Safety
      ***    1.998   ***
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WO 3022-0-0-100 pseudo-static Section GAI1 - GAI1'

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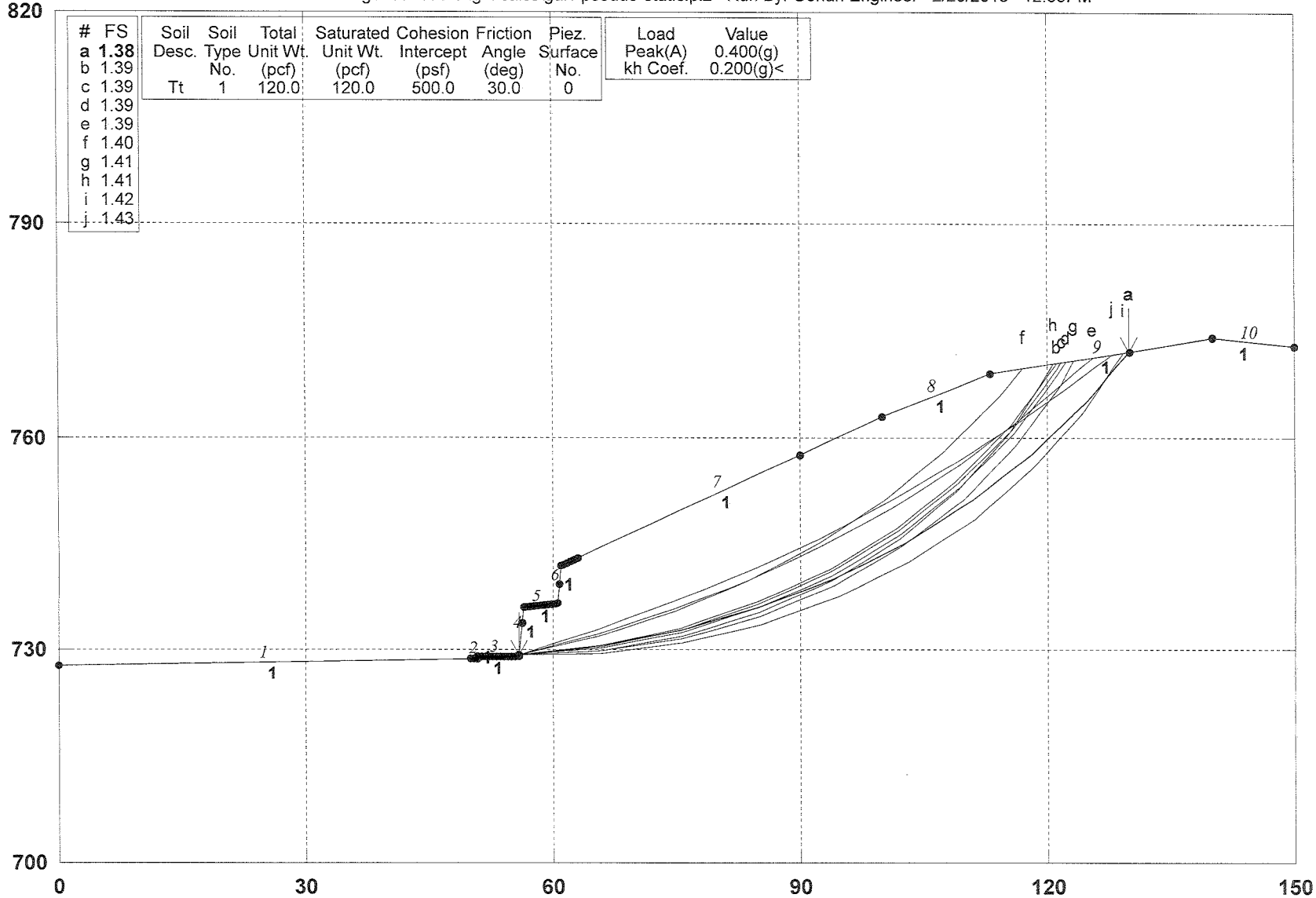

GSTABL7 v.2 FSmin=1.38

Safety Factors Are Calculated By The Modified Bishop 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.
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Run By:                   Gorian Engineer
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Unit System:              English
Plotted Output Filename:  X:\3022 Las Virgenes Road\Engin Calcs\gai1 pseudo-static.PLT
PROBLEM DESCRIPTION:  WO 3022-0-0-100     pseudo-static
                      Section GAI1 - GAI1'
BOUNDARY COORDINATES
   10 Top   Boundaries
   10 Total Boundaries
Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
   No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
    1         0.00     727.75      50.75     728.75        1
    2        50.75     728.75      50.80     729.00        1
    3        50.80     729.00      55.80     729.00        1
    4        55.80     729.00      56.50     736.00        1
    5        56.50     736.00      60.50     736.50        1
    6        60.50     736.50      61.00     742.00        1
    7        61.00     742.00     100.00     763.00        1
    8       100.00     763.00     113.00     769.00        1
    9       113.00     769.00     140.00     774.00        1
   10       140.00     774.00     150.00     773.00        1
User Specified Y-Origin =       700.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)
ISOTROPIC SOIL PARAMETERS
 1 Type(s) of Soil
Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
 No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
  1   120.0    120.0     500.0     30.0     0.00      0.0      0
Specified Peak Ground Acceleration Coefficient (A) =   0.400(g)
Specified Horizontal Earthquake Coefficient (kh) =   0.200(g)
Specified Vertical Earthquake Coefficient (kv) =   0.000(g)
Specified Seismic Pore-Pressure Factor =   0.000
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
3000 Trial Surfaces Have Been Generated.
 100 Surface(s) Initiate(s) From Each Of    30 Points Equally Spaced
Along The Ground Surface Between  X =  50.00(ft)
                              and  X =  63.00(ft)
Each Surface Terminates Between   X =  90.00(ft)
                              and   X = 130.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is  Y =      0.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
      Failure Surfaces Evaluated. They Are
      Ordered - Most Critical First.
      * * Safety Factors Are Calculated By The Modified Bishop Method * *
      Total Number of Trial Surfaces Attempted =  3000
      Number of Trial Surfaces With Valid FS = 3000
```

Statistical Data On All Valid FS Values:
FS Max = 8.746 FS Min = 1.377 FS Ave = 1.886
Standard Deviation = 0.464 Coefficient of Variation = 24.61 %

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.828	729.276
2	65.751	730.510
3	75.498	732.747
4	84.966	735.964
5	94.058	740.128
6	102.679	745.195
7	110.739	751.114
8	118.156	757.822
9	124.851	765.250
10	129.883	772.126

Circle Center At X = 48.778 ; Y = 826.875 ; and Radius = 97.854
Factor of Safety
*** 1.377 ***

Individual data on the 14 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	0.7	267.9	0.0	0.0	0.	0.	53.6	0.0	0.0
2	4.0	3188.1	0.0	0.0	0.	0.	637.6	0.0	0.0
3	0.5	561.7	0.0	0.0	0.	0.	112.3	0.0	0.0
4	4.8	7448.9	0.0	0.0	0.	0.	1489.8	0.0	0.0
5	9.7	18192.0	0.0	0.0	0.	0.	3638.4	0.0	0.0
6	9.5	20451.9	0.0	0.0	0.	0.	4090.4	0.0	0.0
7	9.1	21063.8	0.0	0.0	0.	0.	4212.8	0.0	0.0
8	5.9	13922.9	0.0	0.0	0.	0.	2784.6	0.0	0.0
9	2.7	6175.2	0.0	0.0	0.	0.	1235.0	0.0	0.0
10	8.1	17354.4	0.0	0.0	0.	0.	3470.9	0.0	0.0
11	2.3	4433.3	0.0	0.0	0.	0.	886.7	0.0	0.0
12	5.2	8653.8	0.0	0.0	0.	0.	1730.8	0.0	0.0
13	6.7	7262.3	0.0	0.0	0.	0.	1452.5	0.0	0.0
14	5.0	1794.7	0.0	0.0	0.	0.	358.9	0.0	0.0

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.828	729.276
2	65.748	730.537
3	75.436	733.013
4	84.745	736.668
5	93.530	741.444
6	101.658	747.269
7	109.004	754.054
8	115.456	761.694
9	120.915	770.073
10	121.125	770.505

Circle Center At X = 50.660 ; Y = 809.783 ; and Radius = 80.673
Factor of Safety
*** 1.387 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.828	729.276
2	65.764	730.400
3	75.482	732.761
4	84.826	736.321
5	93.652	741.024
6	101.818	746.796
7	109.196	753.545
8	115.670	761.167
9	121.138	769.539
10	121.656	770.603

Circle Center At X = 51.938 ; Y = 808.562 ; and Radius = 79.382
Factor of Safety
*** 1.389 ***
Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.828	729.276
2	65.780	730.247
3	75.528	732.480
4	84.911	735.937
5	93.777	740.562
6	101.981	746.280
7	109.389	752.997
8	115.880	760.604
9	121.349	768.977
10	122.183	770.701

Circle Center At X = 53.322 ; Y = 807.147 ; and Radius = 77.911
Factor of Safety
*** 1.392 ***
Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.828	729.276
2	65.393	732.193
3	74.737	735.755
4	83.816	739.947
5	92.588	744.747
6	101.013	750.135
7	109.050	756.084
8	116.664	762.568
9	123.817	769.556
10	125.365	771.290

Circle Center At X = 18.176 ; Y = 870.146 ; and Radius = 145.815
Factor of Safety
*** 1.392 ***
Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.828	729.276
2	65.481	731.885
3	74.833	735.427
4	83.791	739.871
5	92.271	745.171
6	100.190	751.278
7	107.471	758.132
8	114.045	765.667
9	116.940	769.730

Circle Center At X = 34.126 ; Y = 828.756 ; and Radius = 101.820
Factor of Safety
*** 1.399 ***
Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.828	729.276
2	65.817	729.741
3	75.648	731.568
4	85.137	734.725
5	94.105	739.150
6	102.382	744.761
7	109.814	751.452
8	116.259	759.098
9	121.598	767.553
10	123.103	770.871

Circle Center At X = 57.565 ; Y = 801.668 ; and Radius = 72.413
Factor of Safety
*** 1.409 ***
Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.828	729.276
2	65.810	729.874
3	75.607	731.876
4	85.024	735.243
5	93.870	739.906
6	101.969	745.772
7	109.157	752.723
8	115.292	760.620
9	120.249	769.305
10	120.693	770.425

Circle Center At X = 56.671 ; Y = 799.646 ; and Radius = 70.375

Factor of Safety

*** 1.410 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.828	729.276
2	65.826	729.438
3	75.723	730.874
4	85.354	733.562
5	94.564	737.458
6	103.202	742.498
7	111.125	748.598
8	118.205	755.661
9	124.325	763.569
10	129.281	772.015

Circle Center At X = 59.574 ; Y = 807.326 ; and Radius = 78.140

Factor of Safety

*** 1.416 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.828	729.276
2	65.205	732.749
3	74.405	736.668
4	83.407	741.022
5	92.191	745.803
6	100.735	750.999
7	109.021	756.598
8	117.029	762.587
9	124.741	768.953
10	127.808	771.742

Circle Center At X = -11.410 ; Y = 925.481 ; and Radius = 207.406

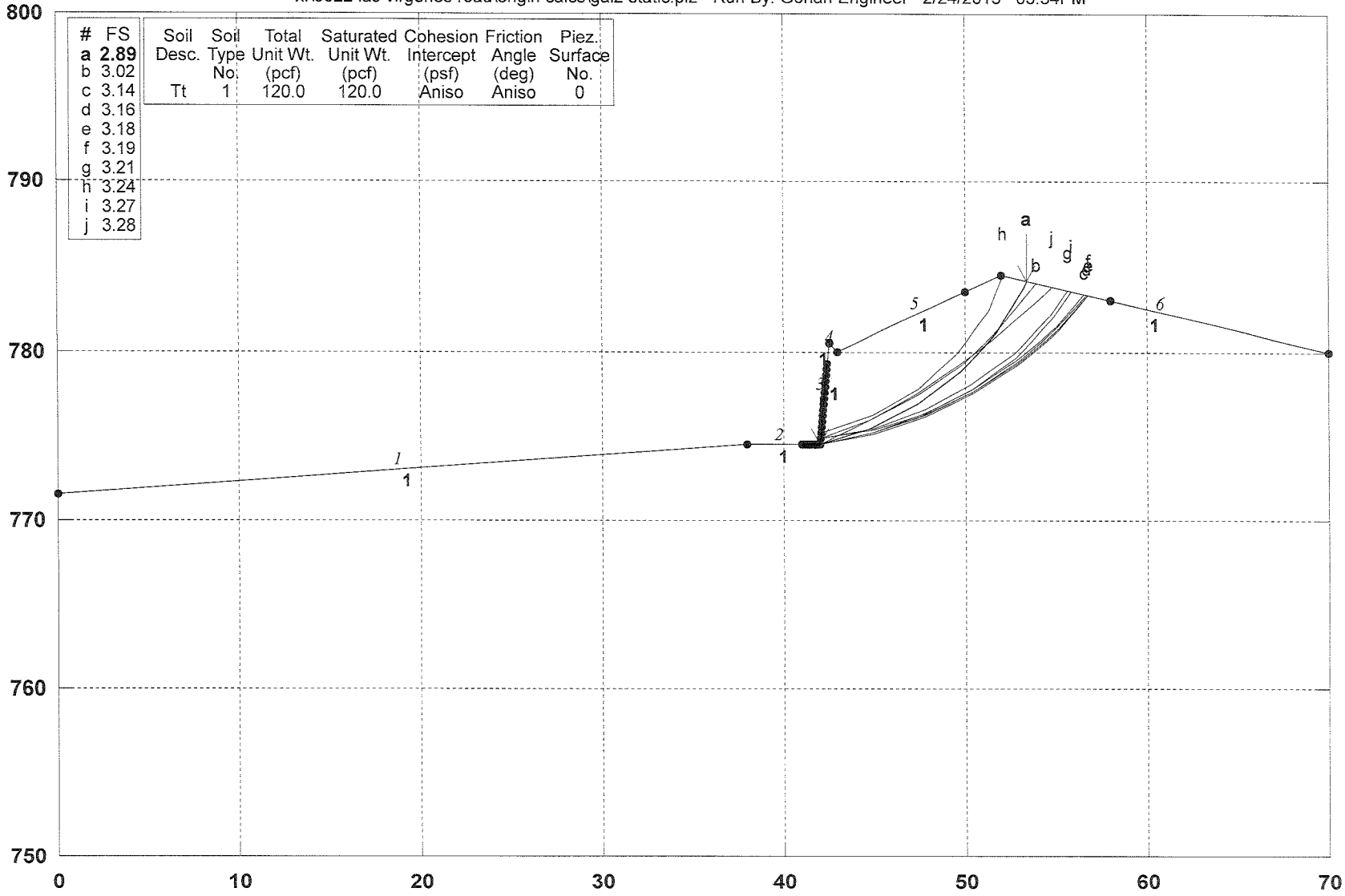
Factor of Safety

*** 1.425 ***

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

WO 3022-0-0-100 Section GAI2 - GAI2'

x:\3022 las virgenes road\engin calcs\gai2 static.pl2 Run By: Gorian Engineer 2/24/2015 03:54PM



GSTABL7 v.2 FSmin=2.89

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

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                    ***  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.
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Analysis Run Date:        2/24/2015
Time of Run:              03:54PM
Run By:                   Gorian Engineer
Input Data Filename:      X:\3022 Las Virgenes Road\Engin Calcs\gai2 static.dat
Output Filename:          X:\3022 Las Virgenes Road\Engin Calcs\gai2 static.OUT
Unit System:              English
Plotted Output Filename:  X:\3022 Las Virgenes Road\Engin Calcs\gai2 static.PLT
PROBLEM DESCRIPTION:  WO 3022-0-0-100
                      Section GAI2 - GAI2'
BOUNDARY COORDINATES
    6 Top   Boundaries
    6 Total Boundaries
Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
   No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
    1         0.00     771.50      38.00     774.50        1
    2        38.00     774.50      42.00     774.50        1
    3        42.00     774.50      42.50     780.50        1
    4        42.50     780.50      43.00     780.00        1
    5        43.00     780.00      52.00     784.50        1
    6        52.00     784.50      70.00     780.00        1
User Specified Y-Origin =       750.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)
ISOTROPIC SOIL PARAMETERS
 1 Type(s) of Soil
Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
 No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
  1   120.0    120.0     500.0     30.0    0.00       0.0      0
ANISOTROPIC STRENGTH PARAMETERS
    1 soil type(s)
Soil Type  1 Is Anisotropic
Number Of Direction Ranges Specified =  3
Direction    Counterclockwise     Cohesion     Friction
  Range       Direction Limit    Intercept      Angle
   No.            (deg)            (psf)        (deg)
    1             18.0             500.00        30.00
    2             22.0             200.00        26.00
    3             90.0             500.00        30.00
ANISOTROPIC SOIL NOTES:
   (1) An input value of 0.01 for C and/or Phi will cause Aniso
       C and/or Phi to be ignored in that range.
   (2) An input value of 0.02 for Phi will set both Phi and
       C equal to zero, with no water weight in the tension crack.
   (3) An input value of 0.03 for Phi will set both Phi and
       C equal to zero, with water weight in the tension crack.
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
2500 Trial Surfaces Have Been Generated.
  50 Surface(s) Initiate(s) From Each Of    50 Points Equally Spaced
Along The Ground Surface Between  X =  41.00(ft)
                             and  X =  42.40(ft)
Each Surface Terminates Between   X =  50.00(ft)
                            and   X =  58.00(ft)
```

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(ft)
3.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 2500
Number of Trial Surfaces With Valid FS = 2500
Statistical Data On All Valid FS Values:
FS Max = 31.519 FS Min = 2.891 FS Ave = 5.237
Standard Deviation = 1.678 Coefficient of Variation = 32.04 %
Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	42.000	774.500
2	44.840	775.467
3	47.461	776.927
4	49.778	778.832
5	51.716	781.122
6	53.212	783.722
7	53.368	784.158

Circle Center At X = 38.068 ; Y = 790.709 ; and Radius = 16.679
Factor of Safety
*** 2.891 ***
Individual data on the 9 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	0.5	174.9	0.0	0.0	0.	0.	0.0	0.0	0.0
2	0.5	329.7	0.0	0.0	0.	0.	0.0	0.0	0.0
3	1.8	1171.6	0.0	0.0	0.	0.	0.0	0.0	0.0
4	2.6	1691.5	0.0	0.0	0.	0.	0.0	0.0	0.0
5	2.3	1370.8	0.0	0.0	0.	0.	0.0	0.0	0.0
6	1.9	906.1	0.0	0.0	0.	0.	0.0	0.0	0.0
7	0.3	104.3	0.0	0.0	0.	0.	0.0	0.0	0.0
8	1.2	244.3	0.0	0.0	0.	0.	0.0	0.0	0.0
9	0.2	4.4	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	42.029	774.843
2	44.812	775.963
3	47.419	777.447
4	49.803	779.268
5	51.922	781.392
6	53.735	783.782
7	53.876	784.031

Circle Center At X = 35.122 ; Y = 796.024 ; and Radius = 22.279
Factor of Safety
*** 3.020 ***
Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	42.000	774.500
2	44.907	775.240
3	47.702	776.331
4	50.342	777.756
5	52.786	779.495
6	54.999	781.521
7	56.567	783.358

Circle Center At X = 37.449 ; Y = 798.471 ; and Radius = 24.399
Factor of Safety
*** 3.136 ***
Failure Surface Specified By 7 Coordinate Points
Point X-Surf Y-Surf

```
   No.          (ft)         (ft)
    1          42.000       774.500
    2          44.920       775.190
    3          47.728       776.245
    4          50.379       777.649
    5          52.831       779.378
    6          55.043       781.404
    7          56.673       783.332
Circle Center At X =    38.052 ; Y =   797.733 ; and Radius =    23.566
       Factor of Safety
      ***    3.161   ***
Failure Surface Specified By  7 Coordinate Points
  Point       X-Surf       Y-Surf
   No.          (ft)         (ft)
    1          42.000       774.500
    2          44.921       775.184
    3          47.733       776.228
    4          50.392       777.618
    5          52.855       779.331
    6          55.083       781.340
    7          56.777       783.306
Circle Center At X =    38.042 ; Y =   798.004 ; and Radius =    23.835
       Factor of Safety
      ***    3.175   ***
Failure Surface Specified By  7 Coordinate Points
  Point       X-Surf       Y-Surf
   No.          (ft)         (ft)
    1          42.000       774.500
    2          44.932       775.134
    3          47.755       776.150
    4          50.419       777.529
    5          52.877       779.249
    6          55.087       781.279
    7          56.778       783.306
Circle Center At X =    38.691 ; Y =   796.911 ; and Radius =    22.654
       Factor of Safety
      ***    3.190   ***
Failure Surface Specified By  7 Coordinate Points
  Point       X-Surf       Y-Surf
   No.          (ft)         (ft)
    1          42.029       774.843
    2          44.958       775.489
    3          47.756       776.573
    4          50.356       778.069
    5          52.699       779.943
    6          54.730       782.151
    7          55.687       783.578
Circle Center At X =    39.267 ; Y =   794.334 ; and Radius =    19.685
       Factor of Safety
      ***    3.208   ***
Failure Surface Specified By  6 Coordinate Points
  Point       X-Surf       Y-Surf
   No.          (ft)         (ft)
    1          42.057       775.186
    2          44.873       776.220
    3          47.413       777.818
    4          49.564       779.908
    5          51.235       782.400
    6          52.069       784.483
Circle Center At X =    38.640 ; Y =   788.905 ; and Radius =    14.138
       Factor of Safety
      ***    3.241   ***
Failure Surface Specified By  7 Coordinate Points
  Point       X-Surf       Y-Surf
   No.          (ft)         (ft)
    1          42.029       774.843
    2          44.986       775.347
```

```
    3          47.817       776.341
    4          50.440       777.796
    5          52.781       779.672
    6          54.775       781.914
    7          55.796       783.551
Circle Center At X =    40.530 ; Y =   792.569 ; and Radius =    17.789
       Factor of Safety
      ***    3.268   ***
Failure Surface Specified By  7 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
    1          42.000       774.500
    2          44.654       775.899
    3          47.208       777.473
    4          49.650       779.216
    5          51.969       781.119
    6          54.154       783.174
    7          54.748       783.813
Circle Center At X =    22.579 ; Y =   814.565 ; and Radius =    44.524
       Factor of Safety
      ***    3.279   ***
          **** END OF GSTABL7 OUTPUT ****
```

WO 3022-0-0-100 pseudo-static Section GAI2 - GAI2'

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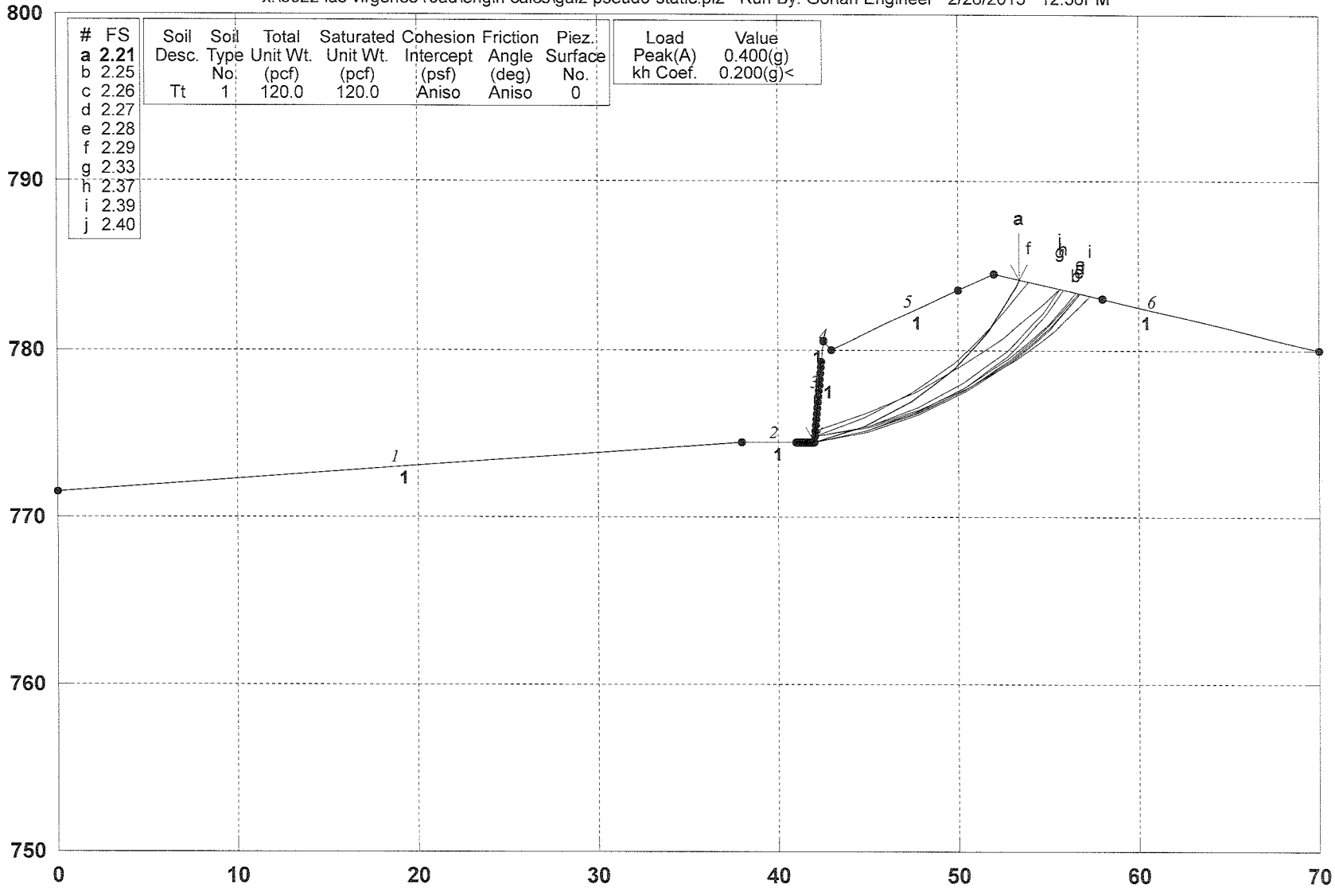

GSTABL7 v.2 FSmin=2.21

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

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                    ***  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.
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Analysis Run Date:        2/26/2015
Time of Run:              12:36PM
Run By:                   Gorian Engineer
Input Data Filename:      X:\3022 Las Virgenes Road\Engin Calcs\gai2 pseudo-static.dat
Output Filename:          X:\3022 Las Virgenes Road\Engin Calcs\gai2 pseudo-static.OUT
Unit System:              English
Plotted Output Filename:  X:\3022 Las Virgenes Road\Engin Calcs\gai2 pseudo-static.PLT
PROBLEM DESCRIPTION:  WO 3022-0-0-100     pseudo-static
                      Section GAI2 - GAI2'
BOUNDARY COORDINATES
    6 Top   Boundaries
    6 Total Boundaries
Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
   No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
    1         0.00     771.50      38.00     774.50        1
    2        38.00     774.50      42.00     774.50        1
    3        42.00     774.50      42.50     780.50        1
    4        42.50     780.50      43.00     780.00        1
    5        43.00     780.00      52.00     784.50        1
    6        52.00     784.50      70.00     780.00        1
User Specified Y-Origin =       750.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)
ISOTROPIC SOIL PARAMETERS
 1 Type(s) of Soil
Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
 No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
  1   120.0    120.0     500.0     30.0    0.00       0.0      0
ANISOTROPIC STRENGTH PARAMETERS
    1 soil type(s)
Soil Type  1 Is Anisotropic
Number Of Direction Ranges Specified =  3
Direction    Counterclockwise     Cohesion     Friction
  Range       Direction Limit    Intercept      Angle
   No.            (deg)            (psf)        (deg)
    1             18.0             500.00        30.00
    2             22.0             200.00        26.00
    3             90.0             500.00        30.00
ANISOTROPIC SOIL NOTES:
   (1) An input value of 0.01 for C and/or Phi will cause Aniso
       C and/or Phi to be ignored in that range.
   (2) An input value of 0.02 for Phi will set both Phi and
       C equal to zero, with no water weight in the tension crack.
   (3) An input value of 0.03 for Phi will set both Phi and
       C equal to zero, with water weight in the tension crack.
Specified Peak Ground Acceleration Coefficient (A) =   0.400(g)
Specified Horizontal Earthquake Coefficient (kh) =   0.200(g)
Specified Vertical Earthquake Coefficient (kv) =   0.000(g)
Specified Seismic Pore-Pressure Factor =   0.000
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
2500 Trial Surfaces Have Been Generated.
  50 Surface(s) Initiate(s) From Each Of    50 Points Equally Spaced
```

Along The Ground Surface Between X = 41.00(ft)
and X = 42.40(ft)
Each Surface Terminates Between X = 50.00(ft)
and X = 58.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(ft)
3.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 2500
Number of Trial Surfaces With Valid FS = 2500
Statistical Data On All Valid FS Values:
FS Max = 22.738 FS Min = 2.214 FS Ave = 3.631
Standard Deviation = 1.027 Coefficient of Variation = 28.27 %

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	42.000	774.500
2	44.840	775.467
3	47.461	776.927
4	49.778	778.832
5	51.716	781.122
6	53.212	783.722
7	53.368	784.158

Circle Center At X = 38.068 ; Y = 790.709 ; and Radius = 16.679
Factor of Safety
*** 2.214 ***
Individual data on the 9 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	0.5	174.9	0.0	0.0	0.	0.	35.0	0.0	0.0
2	0.5	329.7	0.0	0.0	0.	0.	65.9	0.0	0.0
3	1.8	1171.6	0.0	0.0	0.	0.	234.3	0.0	0.0
4	2.6	1691.5	0.0	0.0	0.	0.	338.3	0.0	0.0
5	2.3	1370.8	0.0	0.0	0.	0.	274.2	0.0	0.0
6	1.9	906.1	0.0	0.0	0.	0.	181.2	0.0	0.0
7	0.3	104.3	0.0	0.0	0.	0.	20.9	0.0	0.0
8	1.2	244.3	0.0	0.0	0.	0.	48.9	0.0	0.0
9	0.2	4.4	0.0	0.0	0.	0.	0.9	0.0	0.0

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	42.000	774.500
2	44.907	775.240
3	47.702	776.331
4	50.342	777.756
5	52.786	779.495
6	54.999	781.521
7	56.567	783.358

Circle Center At X = 37.449 ; Y = 798.471 ; and Radius = 24.399
Factor of Safety
*** 2.253 ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	42.000	774.500
2	44.920	775.190
3	47.728	776.245
4	50.379	777.649
5	52.831	779.378
6	55.043	781.404
7	56.673	783.332

Circle Center At X = 38.052 ; Y = 797.733 ; and Radius = 23.566

```
       Factor of Safety
      ***    2.264   ***
Failure Surface Specified By  7 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
    1         42.000       774.500
    2         44.921       775.184
    3         47.733       776.228
    4         50.392       777.618
    5         52.855       779.331
    6         55.083       781.340
    7         56.777       783.306
Circle Center At X =    38.042 ; Y =   798.004 ; and Radius =    23.835
       Factor of Safety
      ***    2.269   ***
Failure Surface Specified By  7 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
    1         42.000       774.500
    2         44.932       775.134
    3         47.755       776.150
    4         50.419       777.529
    5         52.877       779.249
    6         55.087       781.279
    7         56.778       783.306
Circle Center At X =    38.691 ; Y =   796.911 ; and Radius =    22.654
       Factor of Safety
      ***    2.279   ***
Failure Surface Specified By  7 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
    1         42.029       774.843
    2         44.812       775.963
    3         47.419       777.447
    4         49.803       779.268
    5         51.922       781.392
    6         53.735       783.782
    7         53.876       784.031
Circle Center At X =    35.122 ; Y =   796.024 ; and Radius =    22.279
       Factor of Safety
      ***    2.285   ***
Failure Surface Specified By  7 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
    1         42.029       774.843
    2         44.958       775.489
    3         47.756       776.573
    4         50.356       778.069
    5         52.699       779.943
    6         54.730       782.151
    7         55.687       783.578
Circle Center At X =    39.267 ; Y =   794.334 ; and Radius =    19.685
       Factor of Safety
      ***    2.330   ***
Failure Surface Specified By  7 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
    1         42.029       774.843
    2         44.986       775.347
    3         47.817       776.341
    4         50.440       777.796
    5         52.781       779.672
    6         54.775       781.914
    7         55.796       783.551
Circle Center At X =    40.530 ; Y =   792.569 ; and Radius =    17.789
       Factor of Safety
      ***    2.365   ***
```

```
Failure Surface Specified By  7 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
    1         42.029       774.843
    2         44.961       775.475
    3         47.801       776.441
    4         50.511       777.728
    5         53.055       779.319
    6         55.398       781.193
    7         57.348       783.163
Circle Center At X =    38.033 ; Y =   800.503 ; and Radius =    25.969
       Factor of Safety
      ***    2.388   ***
Failure Surface Specified By  7 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
    1         42.057       775.186
    2         44.876       776.213
    3         47.587       777.497
    4         50.167       779.028
    5         52.594       780.792
    6         54.846       782.773
    7         55.621       783.595
Circle Center At X =    32.436 ; Y =   805.977 ; and Radius =    32.259
       Factor of Safety
      ***    2.398   ***
          **** END OF GSTABL7 OUTPUT ****
```

WO 3022-0-0-100 Section GAI2 - GAI2'

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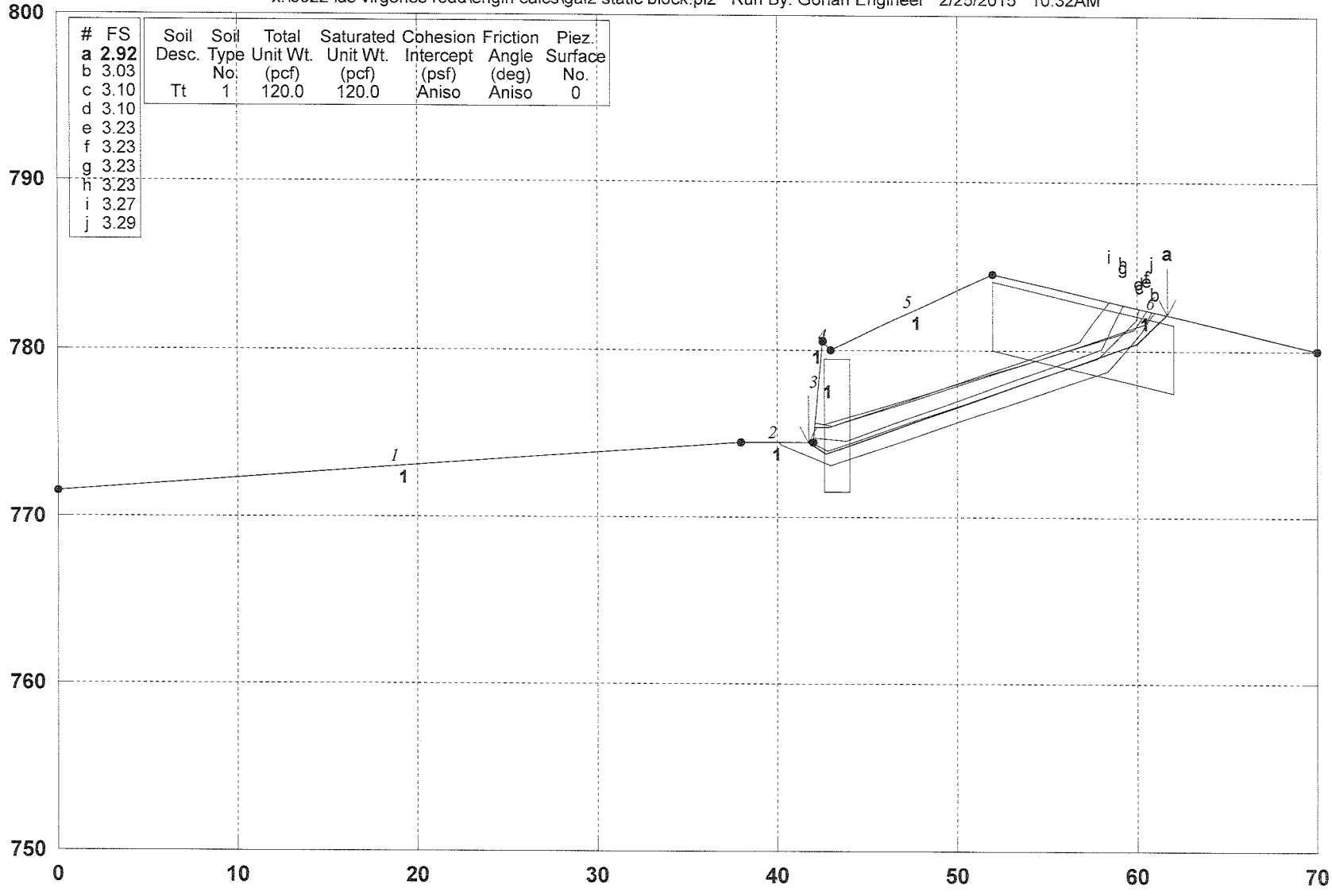


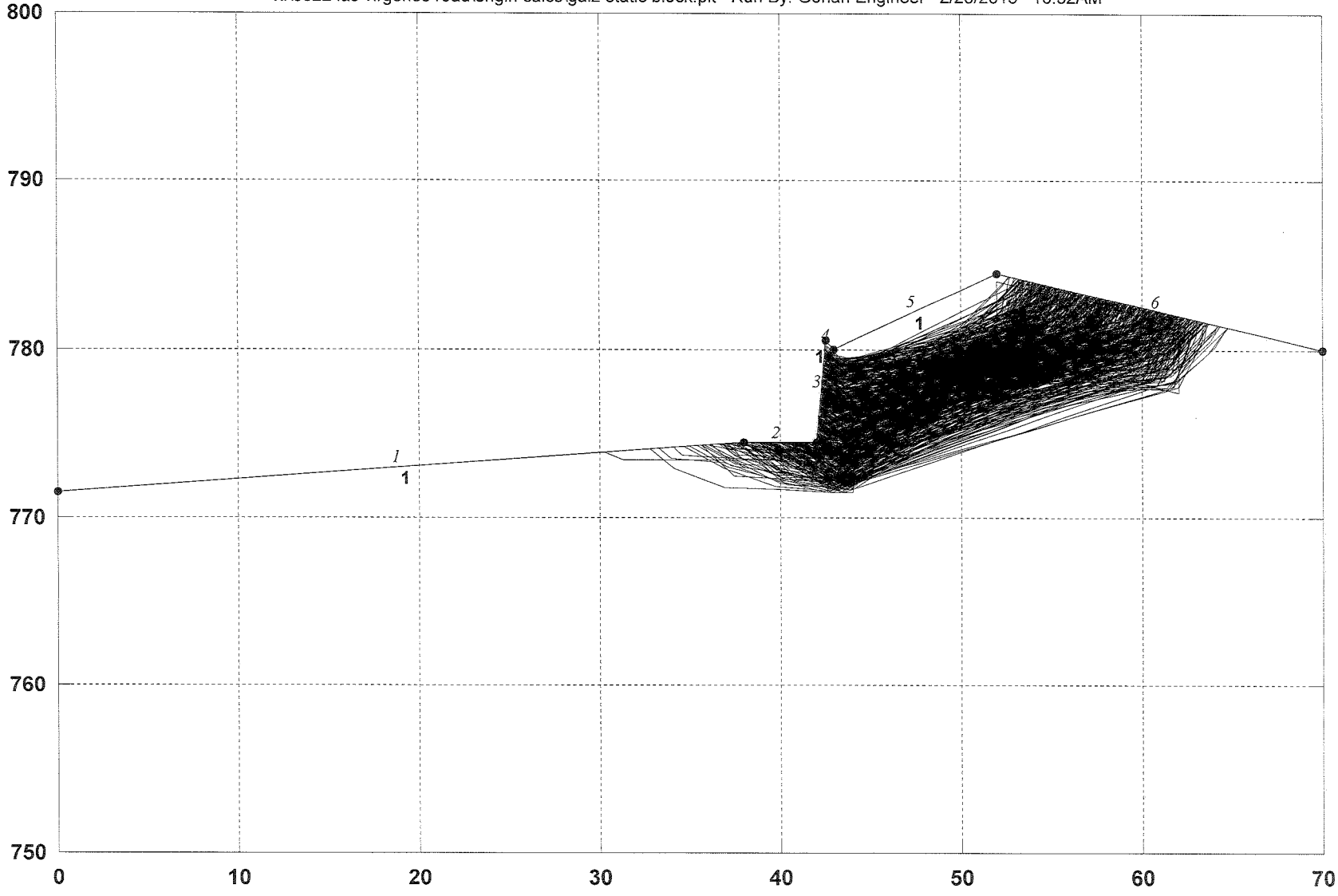
GSTABL7 v.2 FSmin=2.92

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

GSTABL7

WO 3022-0-0-100 Section GAI2 - GAI2'

x:\3022 las virgenes road\engin calcs\gai2 static block.plt Run By: Gorian Engineer 2/25/2015 10:32AM



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:        2/25/2015
Time of Run:              10:32AM
Run By:                   Gorian Engineer
Input Data Filename:      X:\3022 Las Virgenes Road\Engin Calcs\gai2 static block.dat
Output Filename:          X:\3022 Las Virgenes Road\Engin Calcs\gai2 static block.OUT
Unit System:              English
Plotted Output Filename:  X:\3022 Las Virgenes Road\Engin Calcs\gai2 static block.PLT
PROBLEM DESCRIPTION:  WO 3022-0-0-100
                      Section GAI2 - GAI2'
BOUNDARY COORDINATES
    6 Top   Boundaries
    6 Total Boundaries
Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
   No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
    1         0.00     771.50      38.00     774.50        1
    2        38.00     774.50      42.00     774.50        1
    3        42.00     774.50      42.50     780.50        1
    4        42.50     780.50      43.00     780.00        1
    5        43.00     780.00      52.00     784.50        1
    6        52.00     784.50      70.00     780.00        1
User Specified Y-Origin =       750.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)
ISOTROPIC SOIL PARAMETERS
 1 Type(s) of Soil
Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
 No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
  1   120.0    120.0     500.0     30.0    0.00       0.0      0
ANISOTROPIC STRENGTH PARAMETERS
    1 soil type(s)
Soil Type  1 Is Anisotropic
Number Of Direction Ranges Specified =  3
Direction    Counterclockwise     Cohesion     Friction
  Range       Direction Limit    Intercept      Angle
   No.            (deg)            (psf)        (deg)
    1             18.0             500.00        30.00
    2             22.0             200.00        26.00
    3             90.0             500.00        30.00
ANISOTROPIC SOIL NOTES:
   (1) An input value of 0.01 for C and/or Phi will cause Aniso
       C and/or Phi to be ignored in that range.
   (2) An input value of 0.02 for Phi will set both Phi and
       C equal to zero, with no water weight in the tension crack.
   (3) An input value of 0.03 for Phi will set both Phi and
       C equal to zero, with water weight in the tension crack.
Janbus Empirical Coef is being used for the case of  c & phi both > 0
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Sliding Block Surfaces, Has Been
Specified.
1000 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of
Sliding Block Is   3.0
```

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	42.60	775.50	44.00	775.50	8.00
2	52.00	782.00	62.00	779.50	4.00

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Simplified Janbu Method * *
Total Number of Trial Surfaces Attempted = 1000
Number of Trial Surfaces With Valid FS = 1000
Statistical Data On All Valid FS Values:
FS Max = 202.344 FS Min = 2.922 FS Ave = 9.067
Standard Deviation = 11.371 Coefficient of Variation = 125.40 %

Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	41.730	774.500
2	42.740	773.800
3	59.985	780.425
4	61.644	782.089

Factor of Safety
*** 2.922 ***

Individual data on the 7 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	0.3	3.0	0.0	0.0	0.	0.	0.0	0.0	0.0
2	0.5	201.6	0.0	0.0	0.	0.	0.0	0.0	0.0
3	0.2	186.9	0.0	0.0	0.	0.	0.0	0.0	0.0
4	0.3	196.2	0.0	0.0	0.	0.	0.0	0.0	0.0
5	9.0	7150.7	0.0	0.0	0.	0.	0.0	0.0	0.0
6	8.0	4417.8	0.0	0.0	0.	0.	0.0	0.0	0.0
7	1.7	206.8	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	42.072	775.366
2	42.843	775.343
3	60.527	781.546
4	60.945	782.264

Factor of Safety
*** 3.032 ***

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	41.931	774.500
2	42.768	774.007
3	57.881	779.571
4	59.909	781.781
5	60.128	782.468

Factor of Safety
*** 3.102 ***

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	41.931	774.500
2	42.768	774.007
3	57.881	779.571
4	59.909	781.781
5	60.128	782.468

Factor of Safety
*** 3.102 ***

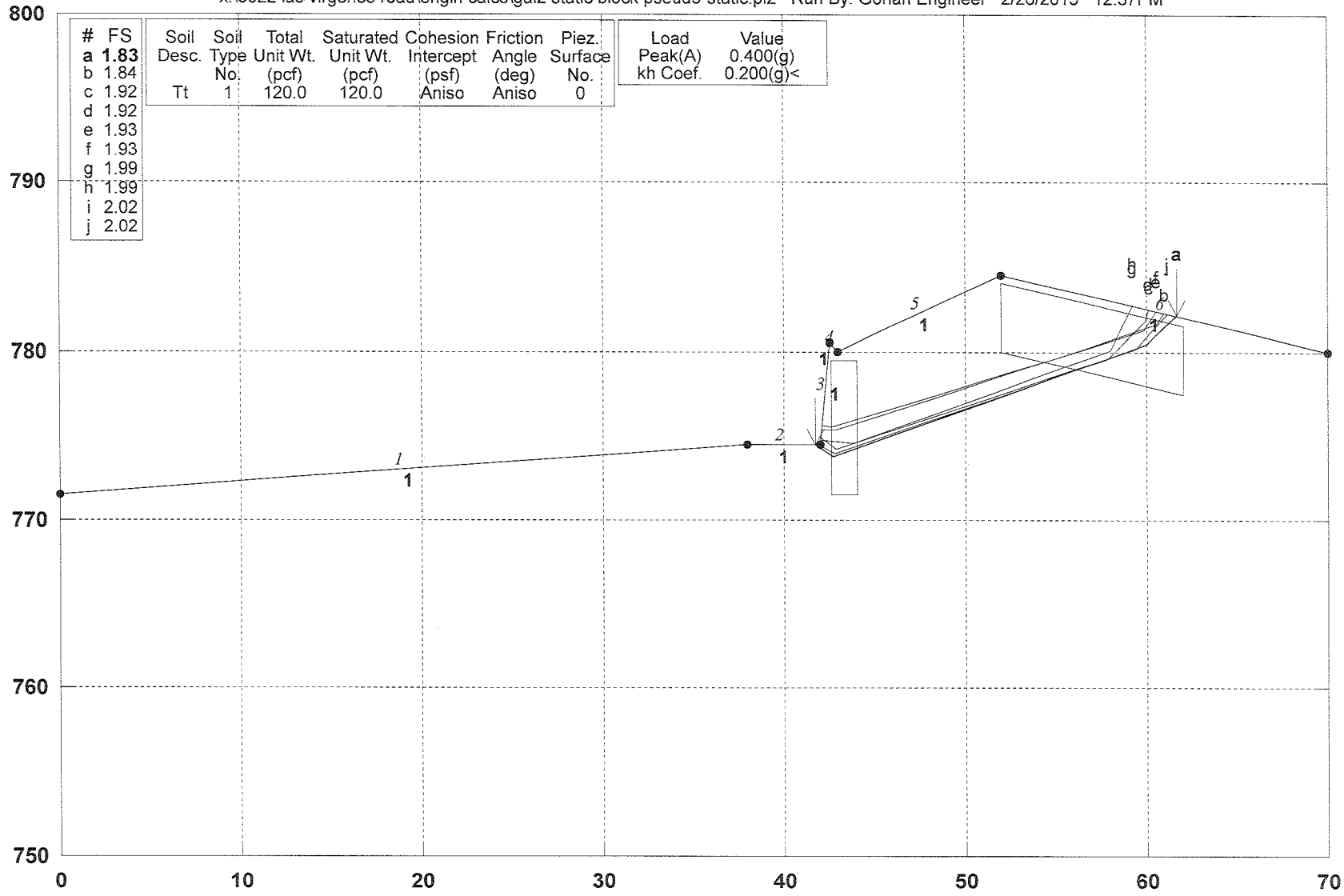
Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	42.092	775.603

```
    2          42.634      775.554
    3          59.892      781.279
    4          60.585      782.354
       Factor of Safety
      ***    3.226   ***
Failure Surface Specified By  4 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
    1          42.092      775.603
    2          42.634      775.554
    3          59.892      781.279
    4          60.585      782.354
       Factor of Safety
      ***    3.226   ***
Failure Surface Specified By  4 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
    1          42.023      774.774
    2          43.847      774.566
    3          58.052      780.104
    4          59.242      782.690
       Factor of Safety
      ***    3.229   ***
Failure Surface Specified By  4 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
    1          42.023      774.774
    2          43.847      774.566
    3          58.052      780.104
    4          59.242      782.690
       Factor of Safety
      ***    3.229   ***
Failure Surface Specified By  4 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
    1          42.096      775.649
    2          43.071      775.466
    3          56.824      780.557
    4          58.480      782.880
       Factor of Safety
      ***    3.273   ***
Failure Surface Specified By  6 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
    1          40.043      774.500
    2          40.221      774.323
    3          42.963      773.105
    4          58.374      778.824
    5          60.260      781.158
    6          60.773      782.307
       Factor of Safety
      ***    3.291   ***
          **** END OF GSTABL7 OUTPUT ****
```

WO 3022-0-0-100 Section GAI2 - GAI2'

x:\3022 las virgenes road\engin calcs\gai2 static block pseudo-static.pl2 Run By: Gorian Engineer 2/26/2015 12:37PM



GSTABL7 v.2 FSmin=1.83

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

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:        2/26/2015
Time of Run:              12:37PM
Run By:                   Gorian Engineer
Input Data Filename:      X:\3022 Las Virgenes Road\Engin Calcs\gai2 static block pseu
do-static.dat
Output Filename:          X:\3022 Las Virgenes Road\Engin Calcs\gai2 static block pseu
do-static.OUT
Unit System:              English
Plotted Output Filename:  X:\3022 Las Virgenes Road\Engin Calcs\gai2 static block pseu
do-static.PLT
PROBLEM DESCRIPTION:  WO 3022-0-0-100
                      Section GAI2 - GAI2'
BOUNDARY COORDINATES
    6 Top   Boundaries
    6 Total Boundaries
Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
   No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
    1         0.00     771.50      38.00     774.50        1
    2        38.00     774.50      42.00     774.50        1
    3        42.00     774.50      42.50     780.50        1
    4        42.50     780.50      43.00     780.00        1
    5        43.00     780.00      52.00     784.50        1
    6        52.00     784.50      70.00     780.00        1
User Specified Y-Origin =       750.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)
ISOTROPIC SOIL PARAMETERS
 1 Type(s) of Soil
Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
 No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
  1   120.0    120.0     500.0     30.0    0.00       0.0      0
ANISOTROPIC STRENGTH PARAMETERS
    1 soil type(s)
Soil Type  1 Is Anisotropic
Number Of Direction Ranges Specified =  3
Direction    Counterclockwise     Cohesion     Friction
  Range       Direction Limit    Intercept      Angle
   No.            (deg)            (psf)        (deg)
    1             18.0             500.00        30.00
    2             22.0             200.00        26.00
    3             90.0             500.00        30.00
ANISOTROPIC SOIL NOTES:
   (1) An input value of 0.01 for C and/or Phi will cause Aniso
       C and/or Phi to be ignored in that range.
   (2) An input value of 0.02 for Phi will set both Phi and
       C equal to zero, with no water weight in the tension crack.
   (3) An input value of 0.03 for Phi will set both Phi and
       C equal to zero, with water weight in the tension crack.
Specified Peak Ground Acceleration Coefficient (A) =   0.400(g)
Specified Horizontal Earthquake Coefficient (kh) =   0.200(g)
Specified Vertical Earthquake Coefficient (kv) =   0.000(g)
Specified Seismic Pore-Pressure Factor =   0.000
Janbus Empirical Coef is being used for the case of  c & phi both > 0
```

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Sliding Block Surfaces, Has Been
Specified.
1000 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of
Sliding Block Is 3.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	42.60	775.50	44.00	775.50	8.00
2	52.00	782.00	62.00	779.50	4.00

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Simplified Janbu Method * *
Total Number of Trial Surfaces Attempted = 1000
Number of Trial Surfaces With Valid FS = 1000
Statistical Data On All Valid FS Values:
FS Max = 11.682 FS Min = 1.826 FS Ave = 4.370
Standard Deviation = 1.881 Coefficient of Variation = 43.04 %

Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	41.730	774.500
2	42.740	773.800
3	59.985	780.425
4	61.644	782.089

Factor of Safety
*** 1.826 ***

Individual data on the 7 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	0.3	3.0	0.0	0.0	0.	0.	0.6	0.0	0.0
2	0.5	201.6	0.0	0.0	0.	0.	40.3	0.0	0.0
3	0.2	186.9	0.0	0.0	0.	0.	37.4	0.0	0.0
4	0.3	196.2	0.0	0.0	0.	0.	39.2	0.0	0.0
5	9.0	7150.7	0.0	0.0	0.	0.	1430.1	0.0	0.0
6	8.0	4417.8	0.0	0.0	0.	0.	883.6	0.0	0.0
7	1.7	206.8	0.0	0.0	0.	0.	41.4	0.0	0.0

Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	42.072	775.366
2	42.843	775.343
3	60.527	781.546
4	60.945	782.264

Factor of Safety
*** 1.836 ***

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	41.931	774.500
2	42.768	774.007
3	57.881	779.571
4	59.909	781.781
5	60.128	782.468

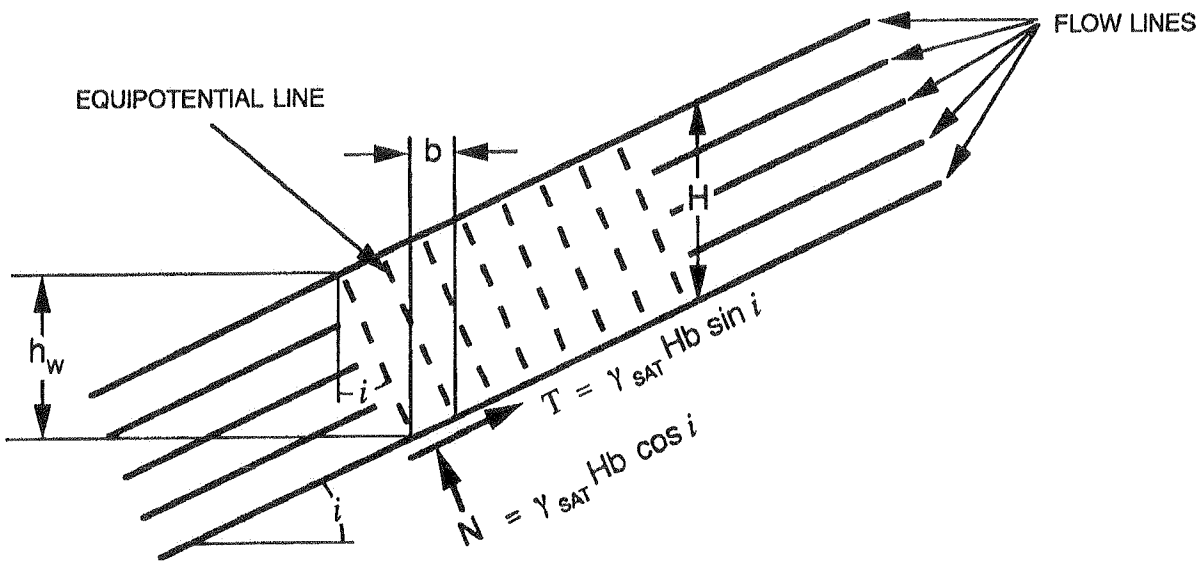
Factor of Safety
*** 1.921 ***

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	41.931	774.500
2	42.768	774.007
3	57.881	779.571
4	59.909	781.781

```
     5          60.128      782.468
        Factor of Safety
      ***    1.921   ***
Failure Surface Specified By  4 Coordinate Points
  Point       X-Surf      Y-Surf
   No.         (ft)        (ft)
    1          42.092      775.603
    2          42.634      775.554
    3          59.892      781.279
    4          60.585      782.354
        Factor of Safety
      ***    1.926   ***
Failure Surface Specified By  4 Coordinate Points
  Point       X-Surf      Y-Surf
   No.         (ft)        (ft)
    1          42.092      775.603
    2          42.634      775.554
    3          59.892      781.279
    4          60.585      782.354
        Factor of Safety
      ***    1.926   ***
Failure Surface Specified By  4 Coordinate Points
  Point       X-Surf      Y-Surf
   No.         (ft)        (ft)
    1          42.023      774.774
    2          43.847      774.566
    3          58.052      780.104
    4          59.242      782.690
        Factor of Safety
      ***    1.987   ***
Failure Surface Specified By  4 Coordinate Points
  Point       X-Surf      Y-Surf
   No.         (ft)        (ft)
    1          42.023      774.774
    2          43.847      774.566
    3          58.052      780.104
    4          59.242      782.690
        Factor of Safety
      ***    1.987   ***
Failure Surface Specified By  4 Coordinate Points
  Point       X-Surf      Y-Surf
   No.         (ft)        (ft)
    1          42.038      774.951
    2          42.903      774.224
    3          59.451      780.185
    4          61.171      782.207
        Factor of Safety
      ***    2.024   ***
Failure Surface Specified By  4 Coordinate Points
  Point       X-Surf      Y-Surf
   No.         (ft)        (ft)
    1          42.038      774.951
    2          42.903      774.224
    3          59.451      780.185
    4          61.171      782.207
        Factor of Safety
      ***    2.024   ***
          **** END OF GSTABL7 OUTPUT ****
```

SURFICIAL SLOPE STABILITY



cohesion	c	=	200	psf
angle of internal friction	ϕ	=	26	degrees
	tan ϕ	=	0.488	
slope angle (h:v)			2.0	h : 1 v
slope angle	i	=	26.6	degrees
	sin i	=	0.447	
	cos i	=	0.894	
	tan i	=	0.500	
	$\cos^2 i$	=	0.800	
vertical depth of slip surface	H	=	4	feet
	γ_{SAT}	=	120	pcf
	γ'	=	57.6	pcf

Factor of Safety = $\dfrac{c + \gamma' H \cos^2 i \tan \phi}{\gamma H \sin i \cos i} = \dfrac{289.90}{192} =$ **1.51**

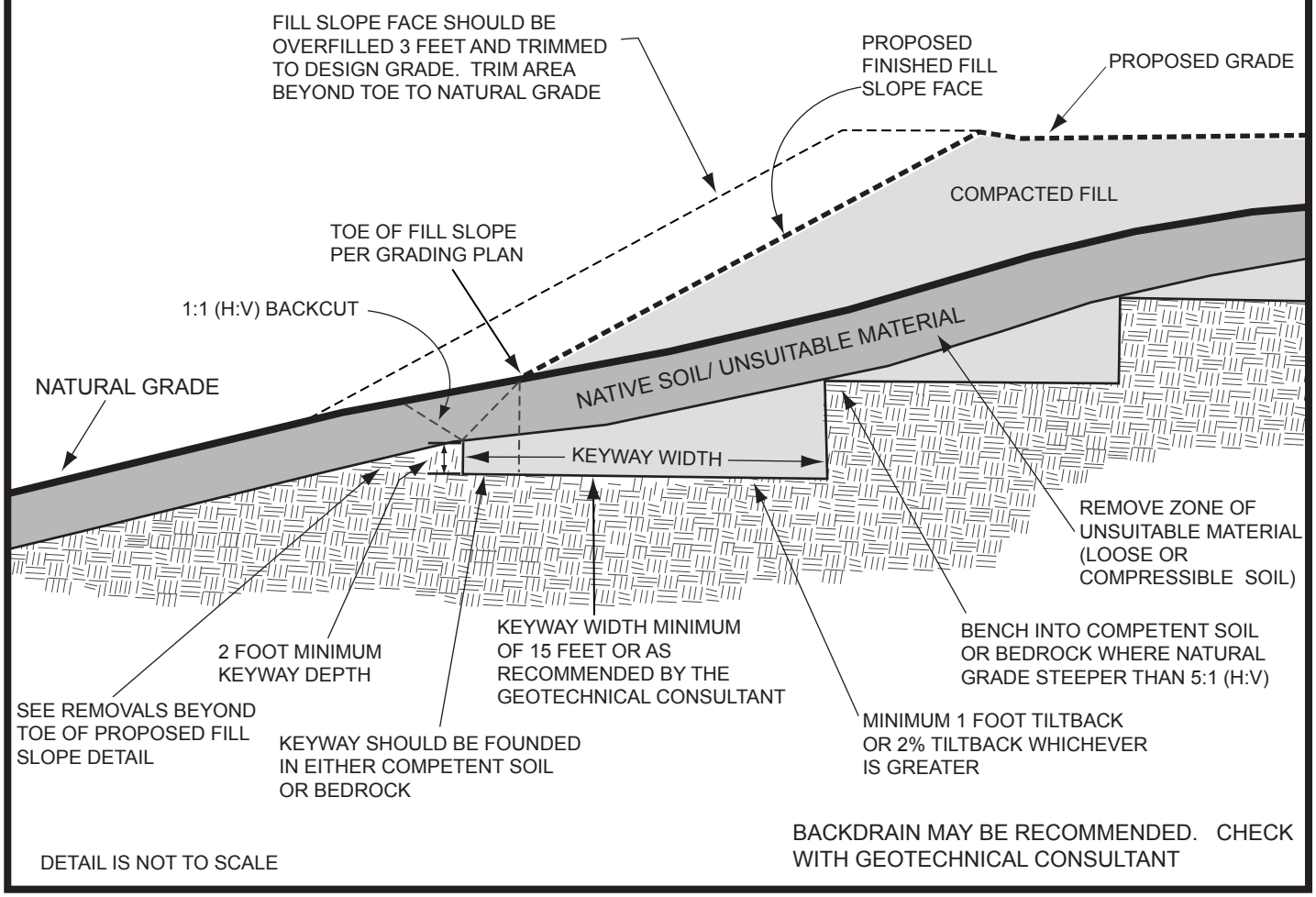
APPENDIX B

TYPICAL CONSTRUCTION DETAILS

FILL SLOPE ABOVE NATURAL SLOPE

TYPICAL DETAIL

(PROFILE VIEW)



BACKDRAIN MAY BE RECOMMENDED. CHECK WITH GEOTECHNICAL CONSULTANT

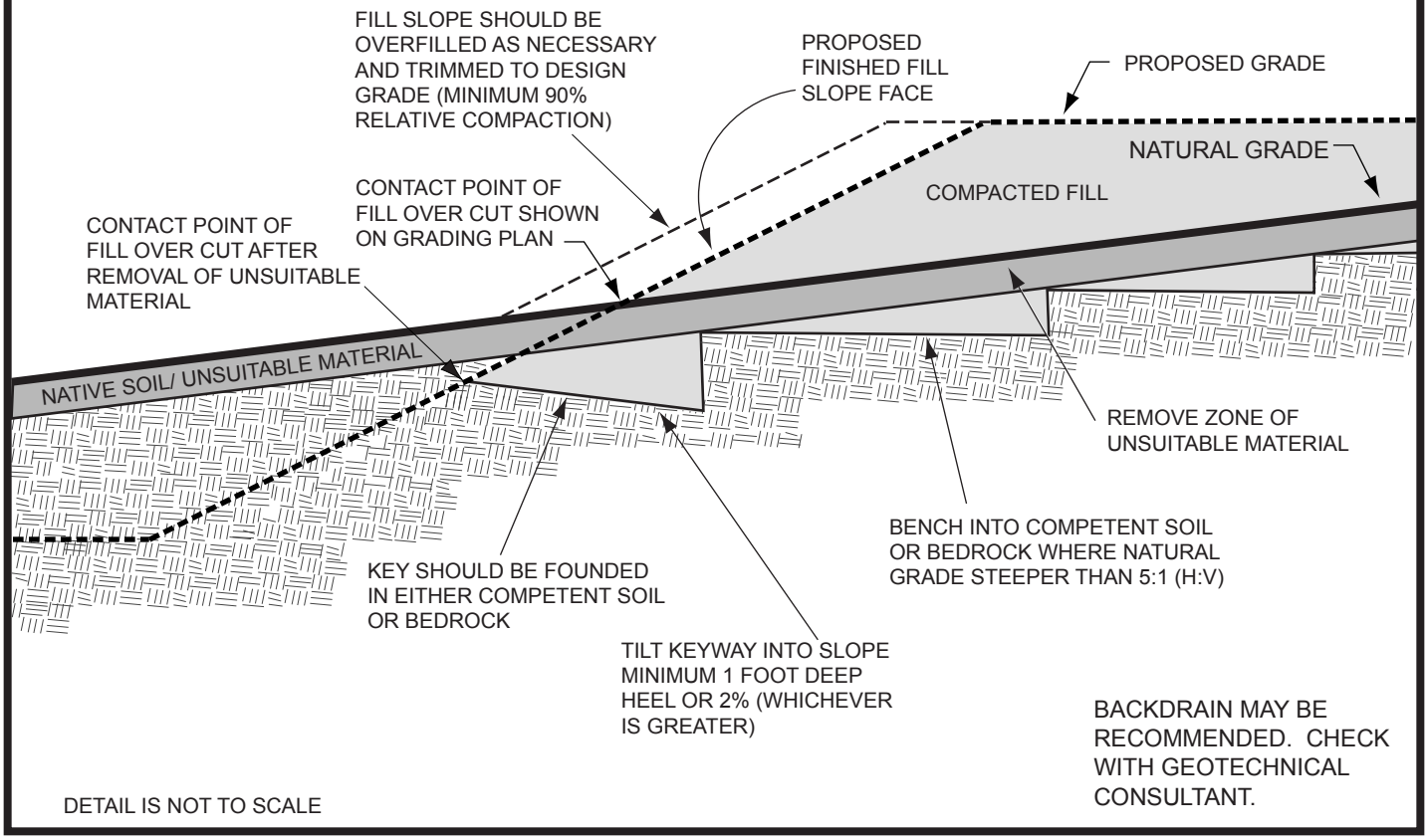
DETAIL IS NOT TO SCALE

GORIAN & ASSOCIATES, INC.

FilNatv1.ai

FILL SLOPE OVER CUT SLOPE AND BENCHING

TYPICAL DETAIL



BACKDRAIN MAY BE RECOMMENDED. CHECK WITH GEOTECHNICAL CONSULTANT.

DETAIL IS NOT TO SCALE

Filcut1.ai

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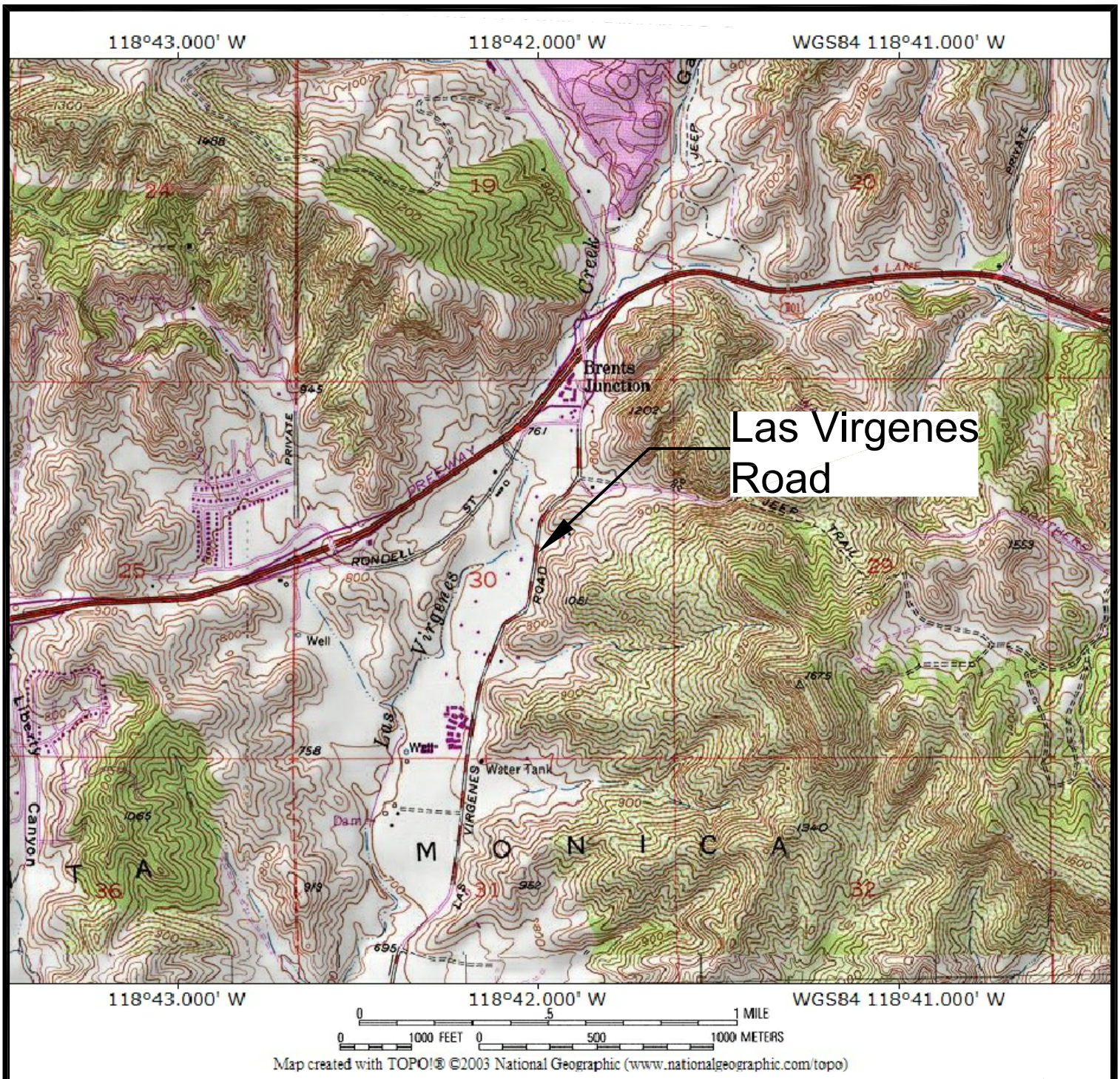


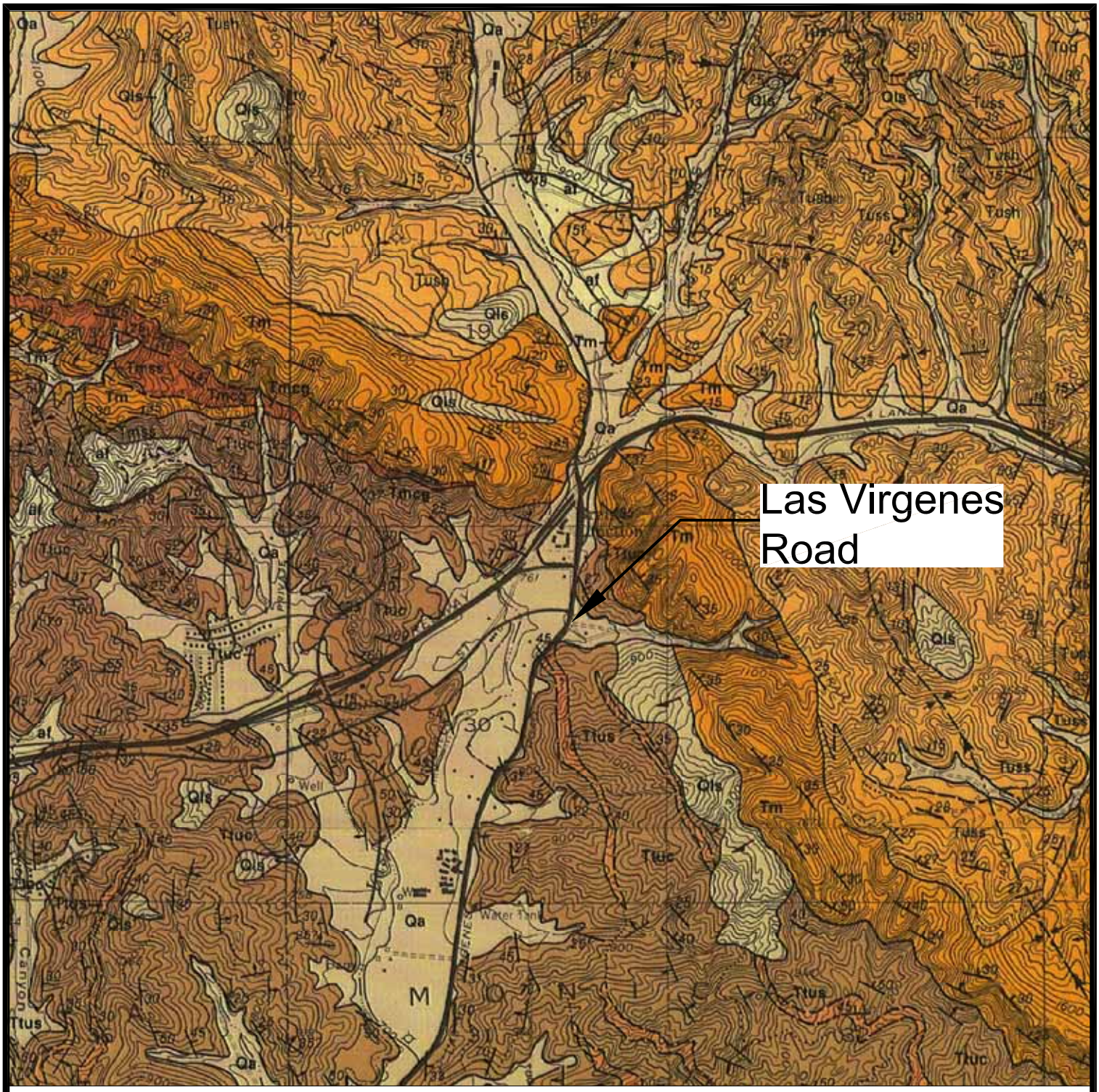
VICINITY MAP

Las Virgenes Road
Calabasas, California

Source
USGS Calabasas Quadrangle, 7.5 minute Series (Topographic)

Gorian & Associates, Inc.
Applied Earth Sciences

Job No: 3022-0-0-100		Date: Feb. 2015
	Drawn by:	Figure 1
	Approved by:	



Explanation

Qa - Surficial Sediments. Alluvial gravel, sand and clay of valley areas.

Ttuc - Upper Topanga Formation. Gray claystone, bedded, crumbly with ellipsoidal fractures.

Ttus - Upper Topanga Formation. Light gray sandstone, semi friable, thick bedded.

Source

Dibblee, Thomas W. Jr., & Ehrenspeck, Helmut E., 1996. Geologic Map of the Calabasas Quadrangle, Los Angeles and Ventura Counties, California.

Dibblee Geological Foundation Map # 37

REGIONAL GEOLOGIC MAP

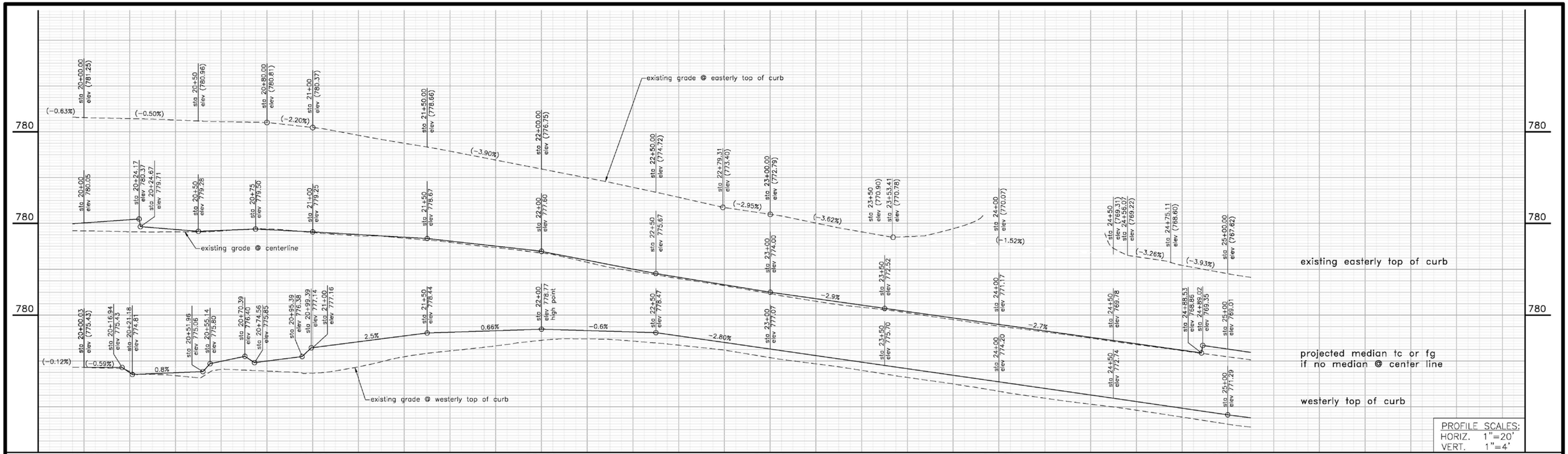
Las Virgenes Road

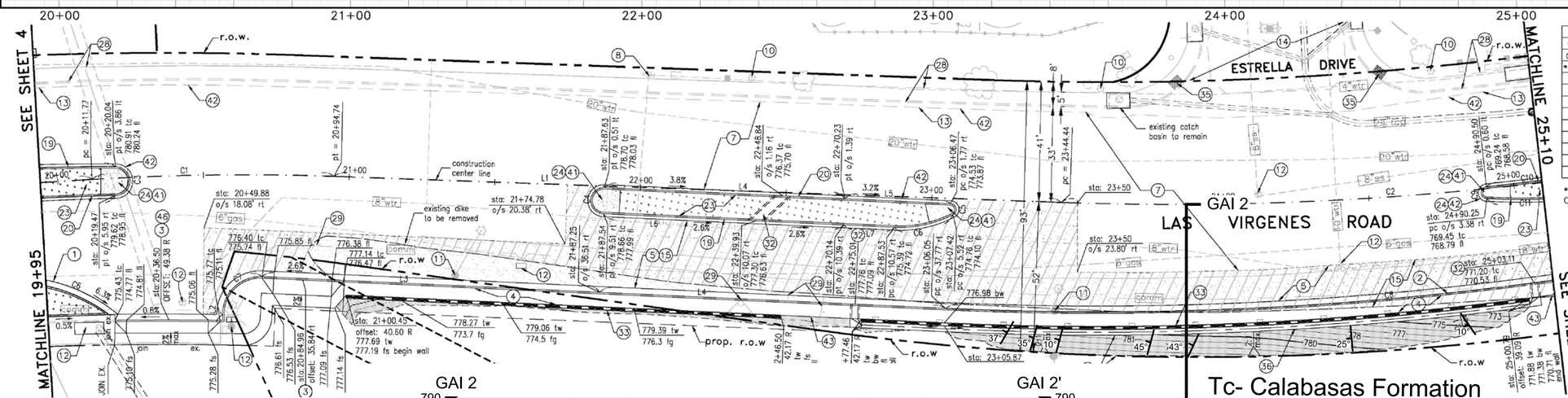
Calabasas, California.

Gorian & Associates, Inc.

Applied Earth Sciences

Job No: 3022-0-0-100		Date: Feb. 2015
	Drawn by:	Figure 2
	Approved by:	





CURVE TABLE				
Curve	Radius	Length	Delta Angle	Tangent
C1/CL	855.00'	82.96'	5°33'34"	41.51'
*C2/CL	1089.00'	578.51'	31°00'24"	296.53'
C3	4.91'	15.44'	180°00'00"	INFINITE
C4	4.91'	14.14'	180°00'03"	INFINITE
C5	2.00'	5.25'	150°16'32"	7.54'
C6	35.00'	33.80'	55°20'06"	18.35'
C7	13.00'	21.15'	93°11'42"	13.75'
C8	1127.0'	621.29'	31°36'41"	319.03'
C9	2.00'	5.99'	171°41'29"	27.54'
*C10	1186.00'	36.12'	1°44'42"	18.06'
*C11	204.18'	44.17'	12°23'45"	22.17'

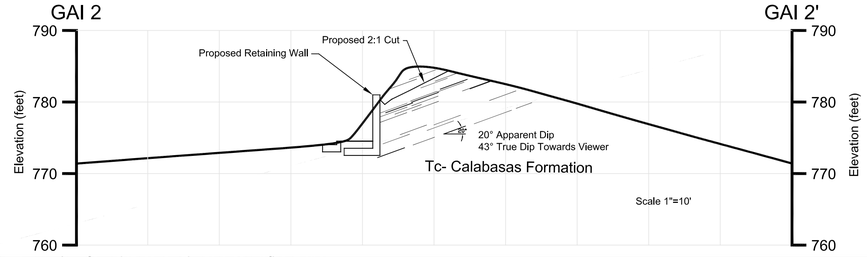
LINE TABLE		
LINE	LENGTH	BEARING
L1/CL	249.70'	S37°14'41"W
L2	1.87'	S55°20'44"E
L3	115.87'	S37°50'58"W
L4	118.69'	N37°50'58"E
L5	36.24'	N37°50'58"E
L6	82.60'	N37°50'58"E
L7	17.40'	S37°50'58"W

* Denotes curve length continues on next sheet.
Curves are to face of curb, unless otherwise noted.

NORTH

20' 0 20' 40'
GRAPHICAL SCALE: 1" = 20'

Geotechnical Map



CONSTRUCTION NOTES:

1. Construct 8" pcc curb and 24" gutter type B2-8(200) per SPPWC standard plan 120-2. over 8" aggregate base compaction at 95% relative density.
2. Construct 8" pcc curb and 24" gutter type B3-8(200) per SPPWC standard plan 120-2 over 8" aggregate base compaction at 95% relative density. modified to provide reverse gutter slope per plans, (typical).
3. Construct driveway apron per SPPWC std. plan 110-2 case "B".
4. Construct 4" thick, 5'-0" wide PCC sidewalk, on 12" compacted subgrade at 95% relative density per SPPWC Standard plan 112-1.
5. Construct 4" ac pavement and crushed aggregate base per typical street sections sheet 2. (contractor to verify prior construction)
6. ~~Construct 4' wide longitudinal gutter per SPPWC std. plan 122-2.~~
7. Mill 2" existing pavement and construct variable thickness AC pavement overlay, (t=2" min.) match existing grade/cross slope or as noted on plan.
8. Existing Fire Hydrant to remain in place, adjust base if required.
9. ~~Existing sign to remain, see signing on striping plan.~~
10. Existing utility pole/street light pole or traffic signal pole to remain in place. Adjust base if required.
11. Existing utility pole/street light to be removed or relocated. by others.
12. Existing utility manhole, valve or vault to remain, adjust/relocate existing utility if required.
13. Existing curb and gutter to remain.
14. Existing driveway to remain.
15. Existing pavement section, to be removed.
16. Existing curb and gutter to be removed.
17. Existing sign to be relocated if applicable, see signing and striping plan.
18. Existing street light to be removed. contractor to coordinate with SCE prior to removal.
19. Construct 8" pcc curb and gutter W=12" per SPPWC standard plan 120-2, type B2-8.
20. Construct 8" pcc curb and gutter W=12" per SPPWC standard plan 120-2, type

Geotechnical Explanation

25 Strike and Dip of Bedding

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REVISIONS				
No.	DESCRIPTION	REVISED BY:	APPROVED BY:	DATE

RECORD DRAWING

I HEREBY CERTIFY THAT THE WORK SHOWN ON DRAWING No. _____ SHEET No._____THROUGH_____MARKED AS "RECORD DRAWING", HAS BEEN CONSTRUCTED IN CONFORMANCE WITH LINES AND GRADES AS SHOWN ON SAID PLANS, DRAWINGS, REFERENCED SPECIFICATIONS, AND APPROVED CHANGE ORDERS, AS INDICATED IN THE REVISION BLOCK.

DATE SIGNATURE

NAME INSPECTOR

AS-BUILT DRAWING

I HEREBY CERTIFY THAT THE WORK SHOWN HEREON, MARKED AS "AS-BUILT", HAS BEEN CONSTRUCTED IN CONFORMANCE WITH LINES AND GRADES AS SHOWN ON SAID PLANS, DRAWINGS, REFERENCED SPECIFICATIONS, AND APPROVED CHANGE ORDERS, AS INDICATED IN THE REVISION BLOCK.

PROJECT ENGINEER'S SIGNATURE DATE

PROJECT ENGINEER'S NAME CITY LAND DEVELOPMENT REP.

ACCEPTED FOR CONSTRUCTION:

ROBERT YALDA, P.E., CITY ENGINEER/PUBLIC WORKS DIRECTOR DATE

PREPARED BY:
DIAMOND WEST INCORPORATED
24005 Ventura Boulevard, Suite 100
Calabasas, California 91302
Voice: (818) 444-1800
Facsimile: (818) 223-9215
civil engineering • land surveying • land planning
www.diamondwest.net
REGISTERED PROFESSIONAL ENGINEER WILLIAM C. CUNNINGHAM No. 80129 Exp. 09/30/16 CIVIL STATE OF CALIFORNIA
SIGNATURE DATE

Gorian & Associates, Inc.
Applied Earth Sciences

Job No: 3022-0-0-100		Date: Feb. 2015
Scale: 1" = 20'	Drawn by: / Approved by:	PLATE 1

CITY of CALABASAS
PUBLIC WORKS DEPARTMENT
100 CIVIC CENTER WAY
CALABASAS, CA 91302
PHONE 818.224.1600
FAX 818.225.7338
WWW.CITYOFCALABASAS.COM

LAS VIRGENES ROAD
STA 19+95 to STA 25+10

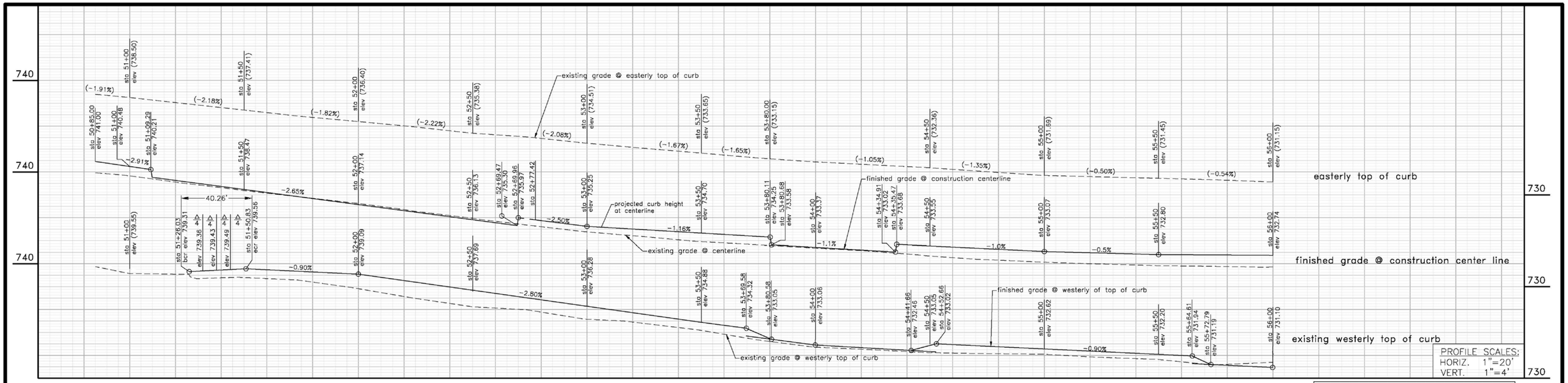
Las Virgenes Road
Street Improvement Plans
Agoura Road to Lost Hills Road

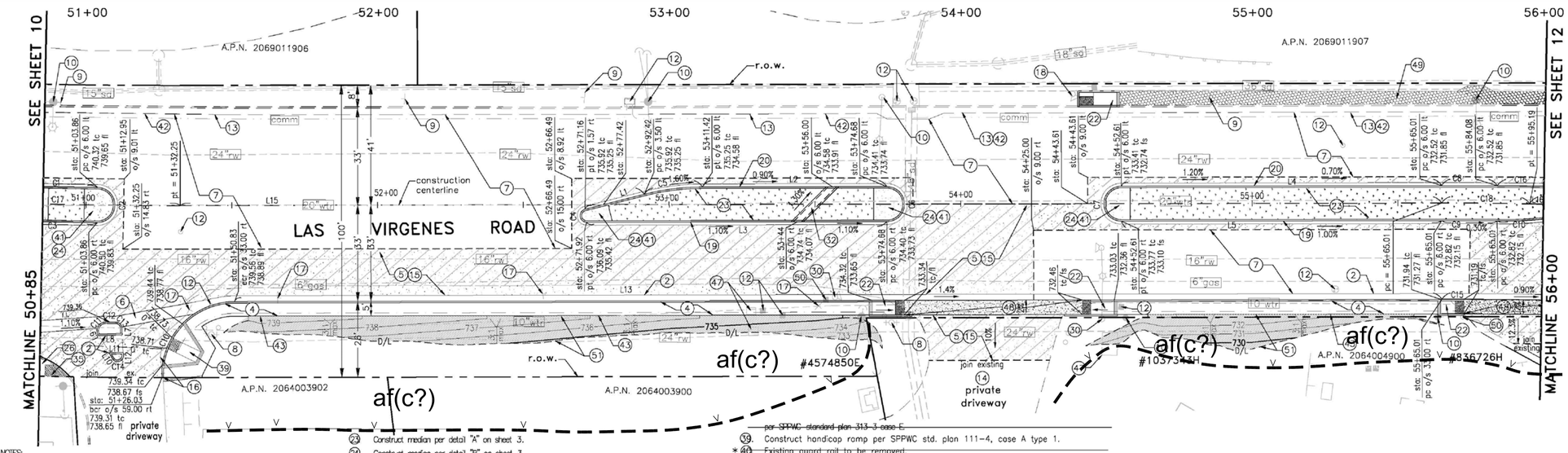
PREPARED FOR:

City of Calabasas
100 Civic Center Way
Calabasas, CA 91302

DESIGNED BY:	PR
CHECKED BY:	MH
DRAWN BY:	PR
SCALE:	1"=20'
SHEET NO.	5 of 28

DRAWING NUMBER: 12-1013





CONSTRUCTION NOTES:

1. ~~Construct 8" pcc curb and 24" gutter type B2-8(200) per SPPWC standard plan 120-2.~~ over 8" aggregate base compaction at 95% relative density.
2. Construct 8" pcc curb and 24" gutter type B3-8(200) per SPPWC standard plan 120-2 over 8" aggregate base compaction at 95% relative density. modified to provide reverse gutter slope per plans, (typical).
3. ~~Construct driveway apron per SPPWC std. plan 110-2 case "B".~~
4. Construct 4" thick, 5'-0" wide PCC sidewalk, on 12" compacted subgrade at 95% relative density per SPPWC Standard plan 112-1.
5. Construct 4" ac pavement and crushed aggregate base per typical street sections sheet 2. (contractor to verify prior construction)
6. Construct 4' wide longitudinal gutter per SPPWC std. plan 122-2.
7. Mill 2" existing pavement and construct variable thickness AC pavement overlay, (t=2" min.) match existing grade/cross slope or as noted on plan.
8. Existing Fire Hydrant to remain in place, adjust base if required.
9. Existing sign to remain, see signing on striping plan.
10. Existing utility pole/street light pole or traffic signal pole to remain in place. Adjust base if required.
11. ~~Existing utility pole/street light to be removed or relocated by others.~~
12. Existing utility manhole, valve or vault to remain, adjust/relocate existing utility if required.
13. Existing curb and gutter to remain.
14. ~~Existing driveway to remain.~~
15. Existing pavement section, to be removed.
16. Existing curb and gutter to be removed.
17. Existing sign to be relocated if applicable, see signing and striping plan.
18. Existing street light to be removed. contractor to coordinate with SCE prior to removal.
19. Construct 8" pcc curb and gutter W=12" per SPPWC standard plan 120-2, type B2-8.
20. Construct 8" pcc curb and gutter W=12" per SPPWC standard plan 120-2, type B3-8, with reverse gutter slope.
21. ~~Install 4" solid pvc pipe for area drainage.~~
22. Construct modified handicap ramp per SPPWC std. plan 111-4, case D type 2.
23. Construct median per detail "A" on sheet 3.
24. Construct median per detail "B" on sheet 3.
25. ~~Existing fire hydrant to be relocated, contractor to coordinate with LVMWD for this relocation.~~
26. Existing curb ramp to remain.
27. ~~Saw cut and remove A.C.P 2' beyond. Join ex A.C.P shown on plan and replace with full depth A.C.P per detail G sheet 3.~~
28. ~~Existing sidewalk to remain.~~
29. ~~Existing sign to be removed.~~
30. Existing traffic signal pole to be removed or relocated, see traffic signal plan.
31. ~~Existing fence to be removed and disposed.~~
32. Construct parkway drain per SPPWC std. plan 151-2 , inlet type 2, S=24".
33. ~~Construct retaining wall per Caltrans std. plan B3-7A.~~
34. ~~Install curb cut openings per detail E sheet 3. Quantity shown on plan.~~
35. Construct truncated domes per Caltrans std plan no. A88A. See detail F sheet 3 for additional information.
36. ~~Construct 24" conc. v gutter per detail C sheet 3.~~
37. ~~Existing curb, gutter, ramp, sidewalk, remove inferring portions.~~
38. ~~Construct curb opening catch basin per SPPWC std. plan 300-3, W=7. Construct local depression per SPPWC standard plan 313-3 case E.~~
39. Construct handicap ramp per SPPWC std. plan 111-4, case A type 1.
40. Existing guard rail to be removed.
41. Construct cobble stone at nose of median per landscape plans. (by others).
42. Saw cut and remove 2' of existing pavement and replace it with full depth new AC, see detail H sheet 3.
43. Construct thickened edge conc sidewalk where abbuts dirt or landscape, per detail D sheet 3.
44. ~~Construct 8" pcc curb per SPPWC std. plan 120-2, type A1-8(200).~~
45. ~~Construct handicap ramp per SPPWC std. plan 111-4, case A type 3.~~
46. ~~Existing driveway to be removed.~~
47. Existing utility cabinet/box to be relocate if required, contractor to coordinate with SCE.
48. 6" thick conc. pavement with #3 rebars at 18 o.c. each way on 12" soil compacted to minimum 95% of relative density.
49. DG surface see landscape plans for information.
50. Existing utility to be relocated.
51. Contractor to remove and replace existing lawn and any damaged irrigation system like for like.
52. ~~Construct 18" R.C.P. (2000 D-Load) storm drain pipe.~~

* Denotes: note not used

NOTE:
Contractor to install all improvements per City Of Calabasas standard specifications and special provisions. coordinate with City Of Calabasas Public Works Department.

NOTE:
medians shall be constructed per grading info in plan view see sheet 24 to 28 for design reference.

CURVE TABLE				
CURVE	LENGTH	RADIUS	DELTA ANGLE	TANGENT
*C1	20.77'	1985.00'	0°35'59"	10.39'
C2	18.85'	6.00'	180°00'00"	INFINITE
*C3	20.93'	1957.90'	0°36'45"	10.47'
C4	6.52'	2.25'	165°57'50"	18.28'
C5	20.81'	81.75'	14°09'25"	10.16'
C6	18.85'	6.00'	180°00'00"	INFINITE
C7	18.85'	6.00'	180°00'00"	INFINITE
C8	19.15'	1277.18'	0°51'33"	9.58'
C9	19.11'	1276.26'	0°51'28"	9.55'
*C10	26.18'	1306.22'	13°06'22"	13.15'
C11	6.40'	3.00'	122°17'28"	5.44'
C12	3.50'	2029.46'	0°05'56"	1.75'
C13	3.00'	2.00'	85°55'11"	1.86'
C14	5.30'	2.00'	151°53'17"	7.99'
*C15	79.35'	2782.76'	1°38'02"	39.68'
*C16	30.31'	1473.00'	1°10'14"	15.15'
*C17/CL	384.19'	1991.00'	11°03'22"	192.69'
C18/CL	30.19'	1467.00'	1°10'44"	15.09'

Geotechnical Map

Gorian & Associates, Inc.
Applied Earth Sciences

Job No: 3022-0-0-100		Date: Feb. 2015
Scale: 1" = 20'	Drawn by:	PLATE 2
	Approved by:	

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PUBLIC WORKS DEPARTMENT
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NORTH

20' 0 20' 40'
GRAPHICAL SCALE: 1" = 20'

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ACCEPTED FOR CONSTRUCTION:

ROBERT YALDA, P.E., CITY ENGINEER/PUBLIC WORKS DIRECTOR DATE

PREPARED BY:
DIAMOND WEST INCORPORATED
24005 Ventura Boulevard, Suite 100
Calabasas, California 91302
Voice: (818) 444-1800
Facsimile: (818) 223-9215
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REGISTERED PROFESSIONAL ENGINEER WILLIAM C. CUNNINGHAM No. 80129 Exp. 09/30/16 CIVIL STATE OF CALIFORNIA

SIGNATURE DATE

LAS VIRGENES ROAD
STA 50+85 to STA 56+00

Las Virgenes Road
Street Improvement Plans
Agoura Road to Lost Hills Road

PREPARED FOR:
City of Calabasas
100 Civic Center Way
Calabasas, CA 91302

DESIGNED BY: PR/SB
CHECKED BY: WC
DRAWN BY: PR/SB
SCALE: 1"=20'
SHEET NO. 11 of 28

DRAWING NUMBER: 12-013

REVISIONS

No.	DESCRIPTION	REVISED BY:	APPROVED BY:	DATE

RECORD DRAWING

I HEREBY CERTIFY THAT THE WORK SHOWN ON DRAWING No. _____ SHEET No. _____ THROUGH _____ MARKED AS "RECORD DRAWING", HAS BEEN CONSTRUCTED IN CONFORMANCE WITH LINES AND GRADES AS SHOWN ON SAID PLANS, DRAWINGS, REFERENCED SPECIFICATIONS, AND APPROVED CHANGE ORDERS, AS INDICATED IN THE REVISION BLOCK.

DATE SIGNATURE

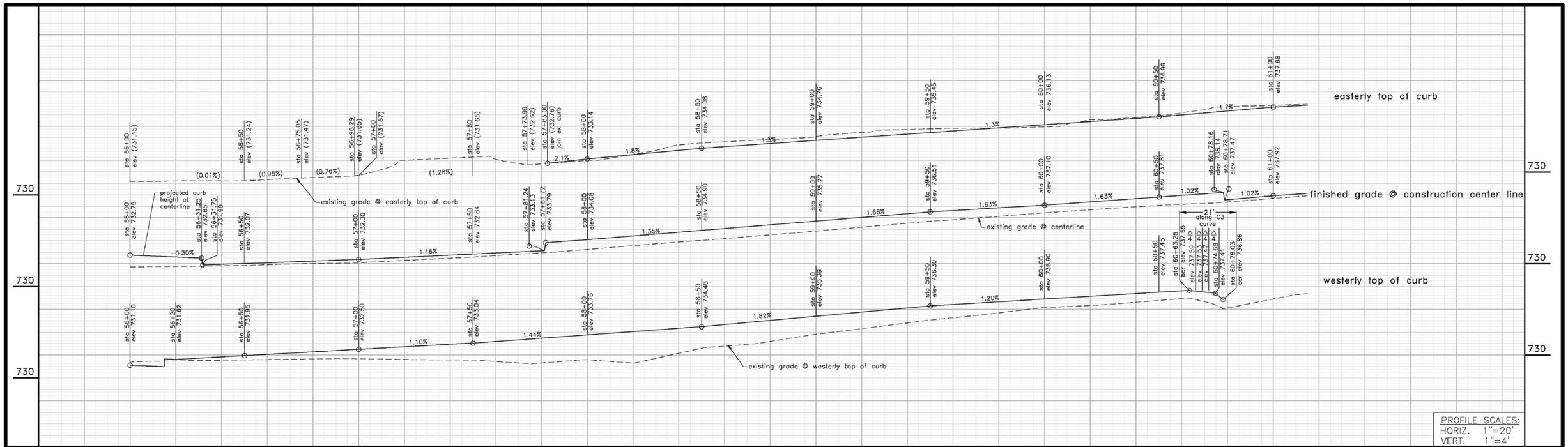
NAME INSPECTOR

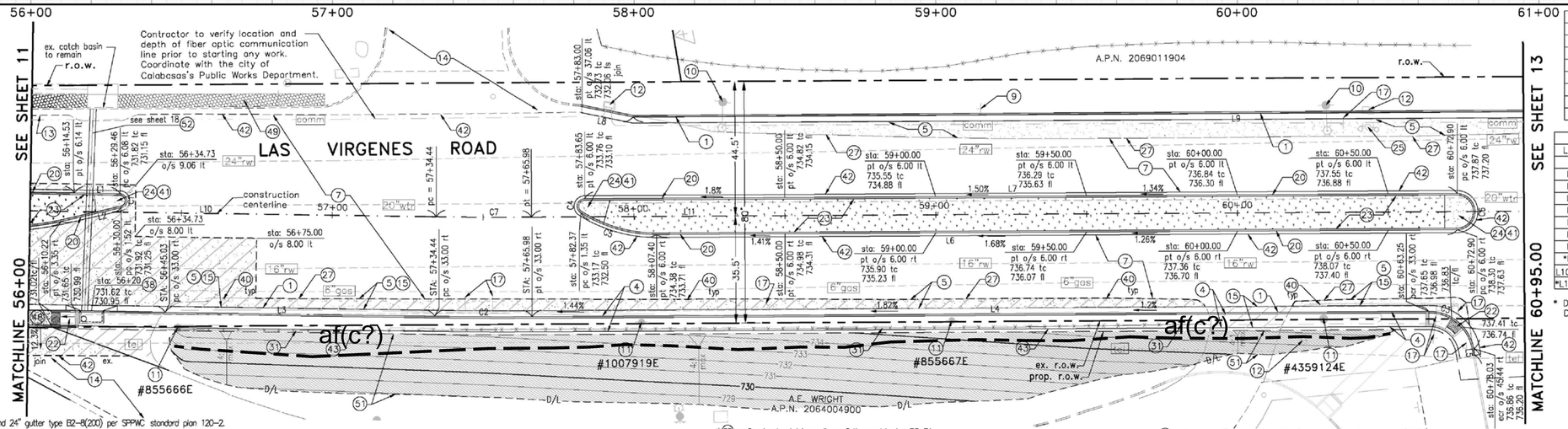
AS-BUILT DRAWING

I HEREBY CERTIFY THAT THE WORK SHOWN HEREON, MARKED AS "AS-BUILT", HAS BEEN CONSTRUCTED IN CONFORMANCE WITH LINES AND GRADES AS SHOWN ON SAID PLANS, DRAWINGS, REFERENCED SPECIFICATIONS, AND APPROVED CHANGE ORDERS, AS INDICATED IN THE REVISION BLOCK.

PROJECT ENGINEER'S SIGNATURE DATE

PROJECT ENGINEER'S NAME CITY LAND DEVELOPMENT REP.





CURVE TABLE				
Curve	Radius	Length	Delta Angle	Tangent
C1	2.31'	6.71'	165°56'54"	18.78'
C2	1566.00	32.22'	1°10'44"	16.11'
C3	15.00'	21'	80°09'27"	12.62'
C4	2.50'	6.51'	149°07'52"	9.05'
C5	47.37'	26.43'	31°58'09"	13.57'
C6	6.00'	18.43'	176°00'11"	171.95'
C7/CL	1533.00'	31.54'	1°10'44"	15.77'

LINE TABLE		
LINE	LENGTH	BEARING
L1	15.11'	S12°10'40"W
L2	20.37'	N01°52'26"W
L3	139.24'	S11°57'21"W
L4	297.27'	S10°46'36"W
L5	2.26'	N89°03'57"W
L6	265.51'	S10°46'34"W
L7	289.26'	N10°46'39"E
L8	17.24'	N22°35'06"E
*L9	400.69'	S10°46'36"W
L10/CL	139.24'	S11°57'21"W
*L11/CL	434.60'	S10°46'36"W

* Denotes LINE length L9,L11 continues on next sheet.
Denote LINE length L10 continues on sheet 11.

NORTH

GRAPHICAL SCALE: 1" = 20'

Geotechnical Map

CONSTRUCTION NOTES:

1. Construct 8" pcc curb and 24" gutter type B2-8(200) per SPPWC standard plan 120-2. over 8" aggregate base compaction at 95% relative density.
2. ~~Construct 8" pcc curb and 24" gutter type B3-8(200) per SPPWC standard plan 120-2 over 8" aggregate base compaction at 95% relative density, modified to provide reverse gutter slope per plans, (typical).~~
3. ~~Construct driveway apron per SPPWC std. plan 110-2 case "H".~~
4. Construct 4" thick, 5'-0" wide PCC sidewalk, on 12" compacted subgrade at 95% relative density per SPPWC Standard plan 112-1.
5. Construct 4" ac pavement and crushed aggregate base per typical street sections sheet 2. (contractor to verify prior construction)
6. ~~Construct 4' wide longitudinal gutter per SPPWC std. plan 122-2.~~
7. Mill 2" existing pavement and construct variable thickness AC pavement overlay, (t=2" min.) match existing grade/cross slope or as noted on plan.
8. ~~Existing Fire Hydrant to remain in place, adjust base if required.~~
9. Existing sign to remain, see signing on striping plan.
10. Existing utility pole/street light pole or traffic signal pole to remain in place. Adjust base if required.
11. Existing utility pole/street light to be removed or relocated. by others.
12. Existing utility manhole, valve or vault to remain, adjust/relocate existing utility if required.
13. Existing curb and gutter to remain.
14. Existing driveway to remain.
15. Existing pavement section, to be removed.
16. Existing curb and gutter to be removed.
17. Existing sign to be relocated if applicable, see signing and striping plan.
18. ~~Existing street light to be removed. contractor to coordinate with SCE prior to removal.~~
19. ~~Construct 8" pcc curb and gutter W=12" per SPPWC standard plan 120-2, type B2-8.~~
20. Construct 8" pcc curb and gutter W=12" per SPPWC standard plan 120-2, type B3-8, with reverse gutter slope.
21. ~~Install 4" solid pvc pipe for area drainage.~~
22. Construct modified handicap ramp per SPPWC std. plan 111-4. case D type 2.
23. Construct median per detail "A" on sheet 3.
24. Construct median per detail "B" on sheet 3.
25. Existing fire hydrant to be relocated, contractor to coordinate with LVMWD for this relocation.
26. ~~Existing curb ramp to remain.~~
27. Saw cut and remove A.C.P 2' beyond. Join ex A.C.P shown on plan and replace with full depth A.C.P per detail G sheet 3.
28. Existing sidewalk to remain.
29. Existing sign to be removed.
30. ~~Existing traffic signal pole to be removed or relocated, see traffic signal plan.~~
31. ~~Existing fence to be removed and disposed.~~
32. Construct parkway drain per SPPWC std. plan 151-2 , inlet type 2, S=24".
33. ~~Construct retaining wall per Caltrans std. plan B3-7A.~~
34. ~~Install curb cut openings per detail E sheet 3. Quantity shown on plan.~~
35. ~~Construct truncated domes per Caltrans std plan no. A88A. See detail F sheet 3 for additional information.~~
36. ~~Construct 24" conc. v-gutter per detail C sheet 3.~~
37. ~~Existing curb, gutter, ramp, sidewalk, remove inferring portions.~~
38. Construct curb opening catch basin per SPPWC std. plan 300-3, W=7. Construct local depression per SPPWC standard plan 313-3 case E.
39. ~~Construct handicap ramp per SPPWC std. plan 111-4, case A type 1.~~
40. Existing guard rail to be removed.
41. Construct cobble stone at nose of median per landscape plans. (by others).
42. Saw cut and remove 2' of existing pavement and replace it with full depth new AC, see detail H sheet 3.
43. Construct thickened edge conc sidewalk where abbuts dirt or landscape, per detail D sheet 3.
44. ~~Construct 8" pcc curb per SPPWC std. plan 120-2, type A1-8(200).~~
45. ~~Construct handicap ramp per SPPWC std. plan 111-4, case A type 3.~~
46. ~~Existing driveway to be removed.~~
47. ~~Existing utility cabinet/box to be relocate if required, contractor to coordinate with SCE.~~
48. 6" thick conc. pavement with #3 rebars at 18 o.c. each way on 12" soil compacted to minimum 95% of relative density.
49. DG surface see landscape plans for information.
50. ~~Existing utility to be relocated.~~
51. Contractor to remove and replace existing lawn and any damaged irrigation system like for like.
52. Construct 18" R.C.P. (2000 D-Load) storm drain pipe.

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ACCEPTED FOR CONSTRUCTION:

ROBERT YALDA, P.E., CITY ENGINEER/PUBLIC WORKS DIRECTOR DATE

SIGNATURE DATE

PREPARED BY:
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24005 Ventura Boulevard, Suite 100
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civil engineering • land surveying • land planning
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REGISTERED PROFESSIONAL ENGINEER WILLIAM C. CUNNINGHAM No. 80129 Exp. 09/30/16 CIVIL STATE OF CALIFORNIA

REVISIONS

No.	DESCRIPTION	REVISED BY:	APPROVED BY:	DATE

RECORD DRAWING

I HEREBY CERTIFY THAT THE WORK SHOWN ON DRAWING No. _____ SHEET No._____THROUGH_____MARKED AS "RECORD DRAWING", HAS BEEN CONSTRUCTED IN CONFORMANCE WITH LINES AND GRADES AS SHOWN ON SAID PLANS, DRAWINGS, REFERENCED SPECIFICATIONS, AND APPROVED CHANGE ORDERS, AS INDICATED IN THE REVISION BLOCK.

DATE SIGNATURE

NAME INSPECTOR

AS-BUILT DRAWING

I HEREBY CERTIFY THAT THE WORK SHOWN HEREON, MARKED AS "AS-BUILT", HAS BEEN CONSTRUCTED IN CONFORMANCE WITH LINES AND GRADES AS SHOWN ON SAID PLANS, DRAWINGS, REFERENCED SPECIFICATIONS, AND APPROVED CHANGE ORDERS, AS INDICATED IN THE REVISION BLOCK.

PROJECT ENGINEER'S SIGNATURE DATE

PROJECT ENGINEER'S NAME CITY LAND DEVELOPMENT REP.

Gorian & Associates, Inc.
Applied Earth Sciences

Job No: 3022-0-0-100		Date: Feb. 2015
Scale: 1" = 20'	Drawn by:	PLATE 3
	Approved by:	

CITY of CALABASAS
PUBLIC WORKS DEPARTMENT
100 CIVIC CENTER WAY
CALABASAS, CA 91302
PHONE 818.224.1600
FAX 818.225.7338
WWW.CITYOFCALABASAS.COM

LAS VIRGENES ROAD
STA 56+00 to STA 61+15

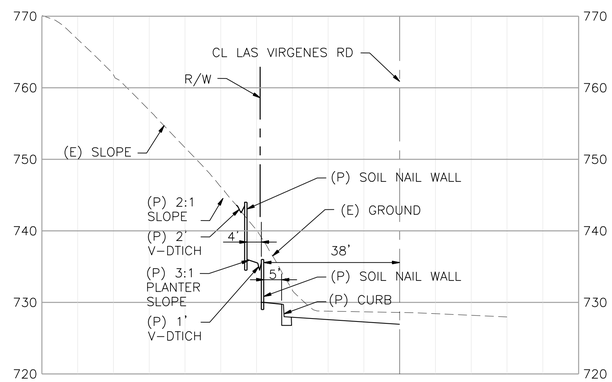
Las Virgenes Road
Street Improvement Plans
Agoura Road to Lost Hills Road

PREPARED FOR:

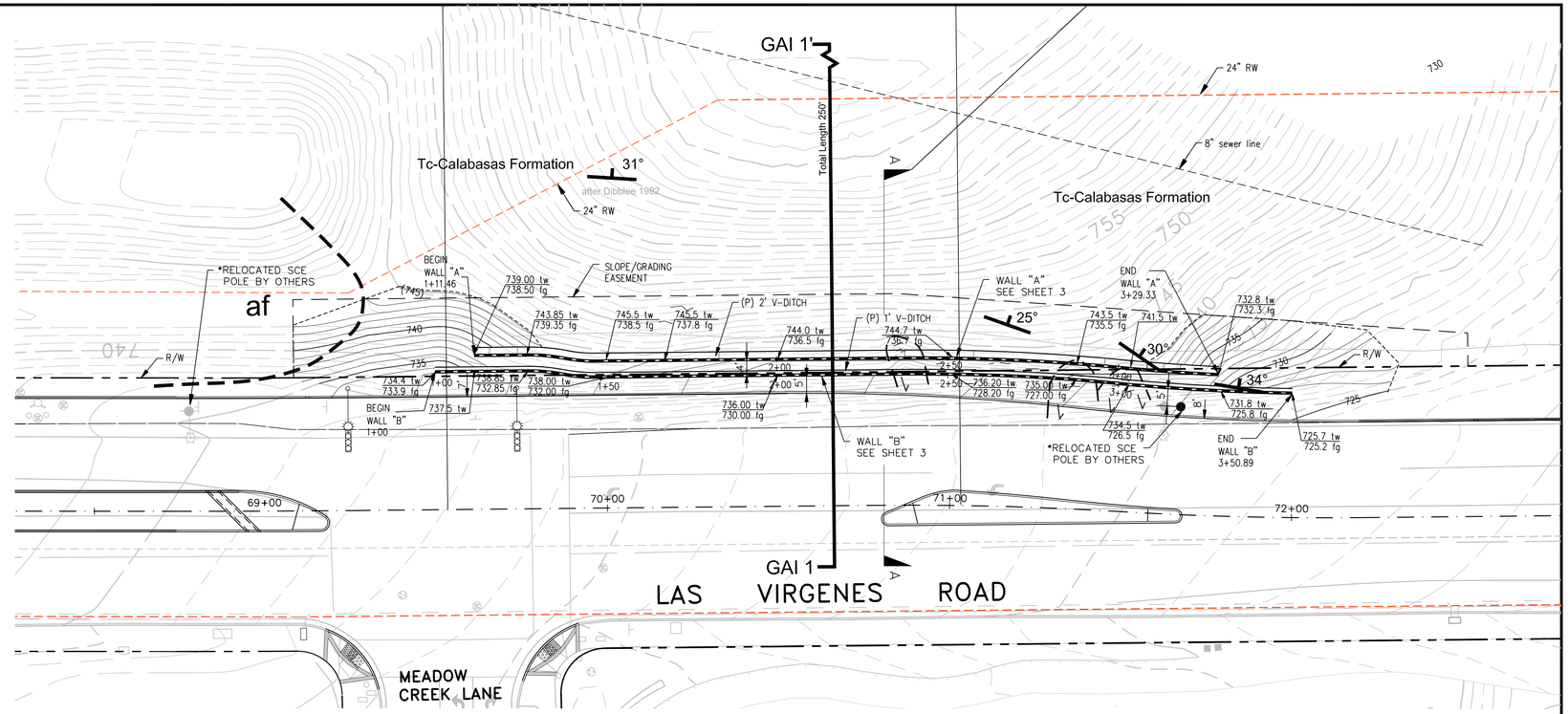
City of Calabasas
100 Civic Center Way
Calabasas, CA 91302

DESIGNED BY:	SB/PR
CHECKED BY:	WC
DRAWN BY:	SB/PR
SCALE:	1"=20'
SHEET NO.	12 of 28

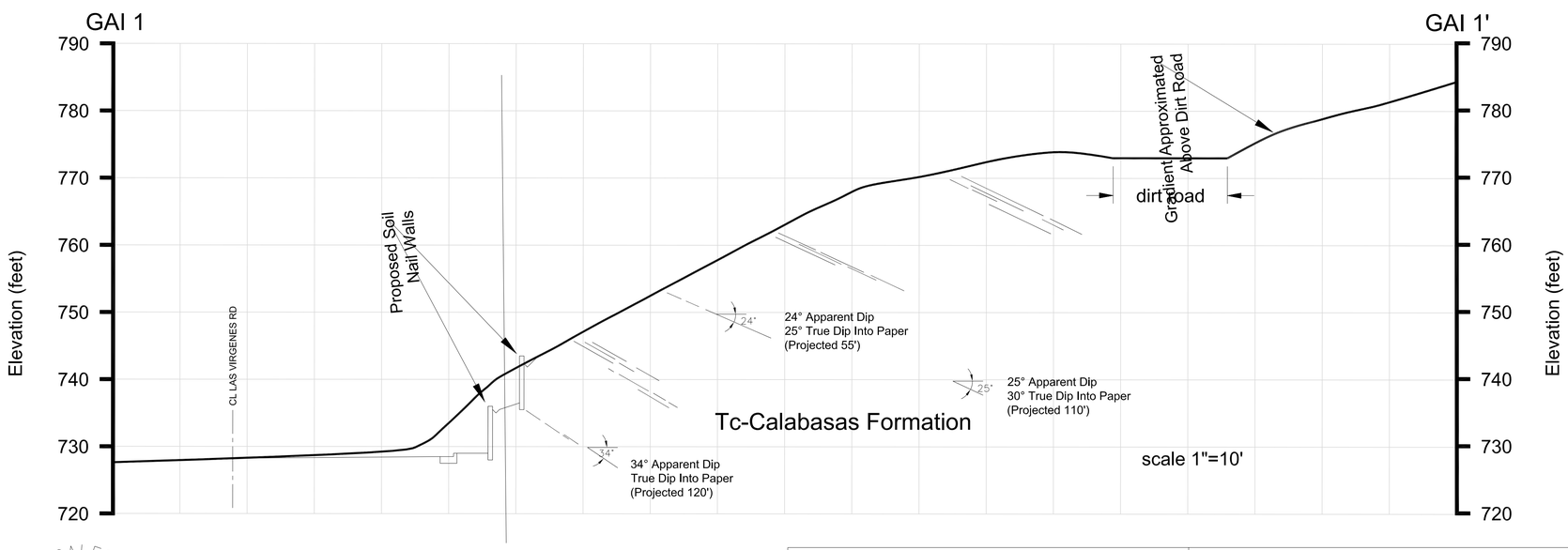
DRAWING NUMBER:



Section A–A



Plan View



Geotechnical Explanation

25° Strike and Dip of Bedding

0 20 40 60
GRAPHICAL SCALE: 1"=20'

Geotechnical Map

Gorian & Associates, Inc.
Applied Earth Sciences

Job No: 3022-0-0-100		Date: Feb. 2015
Scale: 1" = 20'	Drawn by:	PLATE 4
	Approved by:	

REGISTERED PROFESSIONAL ENGINEER WILLIAM C. CUNNINGHAM No. 80129 Exp. 09/30/16 CIVIL STATE OF CALIFORNIA

DIGALERT
DIAL TOLL FREE
1-800-422-4133
AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT (USA) OF SOUTHERN CALIFORNIA

REVISIONS

No.	DESCRIPTION	REVISED BY:	APPROVED BY:	DATE

AS–BUILT DRAWING

I HEREBY CERTIFY THAT THE WORK SHOWN HEREON, MARKED AS "AS-BUILT", HAS BEEN CONSTRUCTED IN CONFORMANCE WITH LINES AND GRADES AS SHOWN ON SAID PLANS, DRAWINGS, REFERENCED SPECIFICATIONS, AND APPROVED CHANGE ORDERS, AS INDICATED IN THE REVISION BLOCK.

PROJECT ENGINEER'S SIGNATURE DATE

PROJECT ENGINEER'S NAME CITY LAND DEVELOPMENT REP.

REVIEWED BY
IN ACCORDANCE WITH CITY POLICIES AND CONDITIONS OF APPROVAL.

SIGNATURE DATE

APPROVED FOR CONSTRUCTION:

COMMUNITY DEVELOPMENT DIRECTOR DATE

APPROVED FOR CONSTRUCTION:

ROBERT YALDA, P.E., CITY ENGINEER/PUBLIC WORKS DIRECTOR DATE

PREPARED BY:
DIAMOND WEST INCORPORATED
civil engineering • land surveying • land planning
24005 Ventura Boulevard, Suite 100
Calabasas, California 91302
Voice: (818) 444-1800
Facsimile: (818) 223-9215
www.diamondwest.net

CITY of CALABASAS
PUBLIC WORKS DEPARTMENT
100 CIVIC CENTER WAY
CALABASAS, CA 91302
PHONE 818.224.1600
FAX 818.225.7338
WWW.CITYOFCALABASAS.COM

GRADING AND DRAINAGE PLAN

Soil Nail Wall at Meadow Creek Lane

PREPARED FOR:
City of Calabasas
100 Civic Center Way
Calabasas, CA 91302

DESIGNED BY: SDG
CHECKED BY: WC
DRAWN BY: SDG
SCALE: 1"20'
SHEET NO: 2 of 3

DRAWING NUMBER: