City of Calabasas

SR4 Development LLC Residence: Dry Canyon Cold Creek Road (APN 2072-001-018)

Draft

Initial Study / Mitigated Negative Declaration

December 2008

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Initial Study/
Mitigated Negative Declaration

Prepared by:

City of Calabasas
Planning Division
100 Civic Center Way
Calabasas, CA 91302
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December 2008

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INITIAL STUDY

Project Title: SR4 Development LLC. Residence: Dry Canyon Cold Creek Road (APN 2072-001-018)
(CUP 600-019, OTP 006-019)

Lead Agency: City of Calabasas
100 Civic Center Way
Calabasas, California 91302
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Contact Person: Isidro Figueroa, Planner

Project Location: The project site is located in the western portion of Los Angeles County, in the City of Calabasas. Figure 1 illustrates the regional location of the project site. The project site includes one approximately 4.5 acre parcel, Assessor's Parcel Number 2072-001-018, which is located on Dry Canyon Cold Creek Road, on undeveloped land adjacent to the Calabasas Highlands neighborhood. The project site is located on the south side of Dry Canyon Cold Creek Road, 0.07 miles southeast of the intersection with Mulholland Highway. Regional access to the site is provided from the Ventura Freeway via interchanges at Parkway Calabasas to the west and Mulholland Drive to the east. Figure 2 illustrates the local project vicinity.

Project Sponsor's Name and Address: SR-4 Development
8245 Rennet Avenue
Canoga Park, California 91304

Existing Land Use: The project site consists of vacant land with disturbed and native vegetation. A scraped access road occurs along the western portion of the site and a drainage course occurs across the southern portion of the site and along the eastern boundary. Photos of the site can be seen on Figure 3.

General Plan and Zoning: The project site is zoned as Hillside Mountainous (HM), designated by the General Plan as Rural Residential (RR), and is within a Scenic Corridor (-SC) overlay zone.

Surrounding Land Uses: The project site is bordered on east and west with undeveloped open space, single-family residences to the south, and the Viewpoint private school across Dry Canyon Cold Creek Road to the north. Mulholland

Highway is located to the east beyond the open space and adjacent to the Viewpoint School.

DESCRIPTION OF PROJECT

The proposed project involves the construction of an approximately 8,513 square foot (sf), three story (including basement), single family residence with a 2,192 sf garage, first and second story decks totaling approximately 2,625 sf, and a 1,600 sf swimming pool and deck area on a 195,644 sf lot (~4.5-acres). The building footprint of the proposed residence is 5,837 square feet, with a total non-pervious surface area of approximately 21,663 sf (11.1% of the project site). The proposed site plan can be seen on Figure 4.

Access to the proposed development is provided by an approximately 511-foot long driveway with a fire department turnaround area with parking provided in an attached garage on the basement level of the residence. An automatic gate and additional entry features are proposed for the entrance to the driveway at Dry Canyon Cold Creek Road. Additionally, a 154-foot long retaining wall will be constructed to the east of the residence. Proposed retaining walls are limited to a maximum of six feet in height. The project would require approximately 3,730 cubic yards of cut and 3,458 cubic yards of fill, for a net export of 272 cubic yards of soil.

As illustrated on Figure 5, the project site landscaping includes both native and non-native ornamental vegetation along the length of the driveway and in the general vicinity of the structures and building pad.

As illustrated on Figure 6a the basement level of the residential structure would include the garage, maid's quarters, electrical and mechanical rooms, garbage room, laundry, storage, and a media room.

The first level of proposed residence would include a living room, office, dining room, kitchen, family room, breakfast nook, pantry, wine closet, entry way, gallery, and the primary deck and pool.

The second level of the proposed residence includes the master bedroom with an attached retreat, master bathroom, closet, gallery, three additional bedrooms, and a veranda, shown on Figure 6b. It should be noted that a stairway and elevator exist side by side and run from the basement level up to the second level.

The proposed project elevations are shown on Figures 7a and 7b.

PUBLIC AGENCIES WHOSE APPROVAL MAY BE REQUIRED FOR SUBSEQUENT ACTION:

City of Calabasas

General Plan Consistency Review

Applicable General Plan Policies	Consistency Analysis	Consistent/Not Consistent
General Plan Consistency Review Program **Project Site Planning**		
1. The overall project design/layout shall adapt to the natural hillside topography and maximize view opportunities to, as well as from the development. The project should fit the hillside rather than altering the hillside to fit the project.	The proposed project would adapt to the natural hillside topography with implementation of Mitigation Measures AES-1 through AES-8.	Consistent
3. Site design should utilize varying setbacks, structure heights, innovative building techniques, and retaining walls to blend structures into the terrain and allow for different lot shapes and sizes, with the prime determinant being natural terrain. Structures shall be sited in a manner that will: • Fit into the hillside's contour and relate to the form of the terrain; • Retain outward views while maintaining the natural character of the hillside; and • Preserve vistas of natural hillside areas and ridgelines from Mulholland Highway.	The proposed structure would generally blend into the hillside environment, and Mitigation Measures AES-1 through AES-8 would preserve views of ridgelines and natural hillside areas from Mulholland Highway.	Consistent
Architectural Design		
1. The overall scale and massing of structures shall respect the natural surroundings and unique visual resources of the area by incorporating designs which minimize bulk and mass, follow natural topography, and minimize visual intrusion on the natural landscape.	Based on the building plans, bulk and mass are not minimized. However, Mitigation Measure AES-1 through AES-8 would minimize visual intrusion on the natural landscape.	Consistent
2. The overall height of the building is an important aspect of how well it fits into the existing character of the neighborhood and its hillside environment. Structures should be stepped down hillsides and contained within a limited envelope parallel to the natural grade, rather than "jutting out" over natural slopes.	Surrounding structures are similar in height. The building plans show that the proposed structure would be parallel to the natural grade.	Consistent
3. Building forms shall be scaled to the particular environmental setting so as to complement the hillside character and to avoid excessively massive forms that fail to enhance the hillside character.	With Mitigation Measures AES-1 through AES-8, the proposed project would generally enhance the hillside character.	Consistent
4. Building facades shall change plane or use overhangs as a means to create changing shadow lines to further break up massive forms.	Based on elevation plans, it appears that there are several overhangs that would change shadow lines.	Consistent

General Plan Consistency Review

Applicable General Plan Policies	Consistency Analysis	Consistent/Not Consistent
5. Wall surfaces facing towards viewshed areas shall be minimized through the use of single story elements, setbacks, roof pitches and landscaping.	Mitigation measure AES-1 in the *Aesthetics* section of the Initial Study, would require that trees and shrubs be planted to reduce impacts viewshed areas.	Consistent
6. Collective mass roof lines and elements shall reflect the naturally occurring ridgeline silhouettes and topographical variation, or create an overall variety, that blends with the hillside.	Based on the Roof Level Plan, rooflines would generally blend with the hillside.	Consistent
7. Based upon the graphic principle that dark colors recede and light colors project, medium to dark colors which blend with the surrounding environment should be used for building elevations and roof materials in view-sensitive areas.	Mitigation Measure AES-6 in the *Aesthetics* section of the Initial Study would require that medium to dark colors are used for building elevations and roof materials.	Consistent
8. Architectural style, including materials and colors, should be compatible with the natural setting. The use of colors, textures, materials and forms which attract attention by not relating to other elements in the surrounding neighborhood is to be avoided.	Mitigation Measure AES-6 in the *Aesthetics* section of the Initial Study would require that the colors, textures, materials and forms are compatible with the natural setting and surrounding residences.	Consistent
9. Exposed structural and mechanical elements (unless well integrated into the design concept) are unsightly and are to be avoided. Exposed structures are often eyesores for people who are lower downhill.	Based on building plans, structural and mechanical elements are not exposed.	Consistent
10. Roof materials shall be of fire-retardant material. Special attention to coordinating roof design with the underlying contour of the land is important because of their dominating appearance.	Mitigation Measure HAZ-2 in the *Hazards and Hazardous Materials* section of the Initial Study would require that fire retardant roof materials are used and the Roof Level Plan shows that the varying rooflines would blend with the hillside.	Consistent
Slope Maintenance		
1. New development within hillside areas shall be conditioned upon the preparation and recordation of declaration of covenants, conditions and restrictions providing for the development and maintenance of manufactured slopes.	Recommendations in an approved Geotechnical Report, standard City-required grading techniques and construction Best Management Practices (BMPs) would be implemented. Refer to the *Geology* section of the Initial Study for additional information.	Consistent
Landscape Treatment		
1. The interface between developments and open space is critical and shall be given special attention. Slope plantings should create a gradual transition from developed slope areas into natural	Mitigation Measure AES-3 requires that new landscape blend with natural vegetation by extending fingers of plantings into existing and sculptured slopes. Refer to the *Aesthetics* section of the Initial Study	Consistent

General Plan Consistency Review

Applicable General Plan Policies	Consistency Analysis	Consistent/Not Consistent
areas. By extending fingers of planting into existing and sculptured slopes, the new landscape should blend in with natural vegetation.	for more information.	
2. Planting along the slope side of development shall be designed to allow controlled views out, yet partially screen and soften the architecture. In general, 50 percent screening with plant materials should be accomplished.	Mitigation Measure AES-1 requires that plant materials shall screen at least 50% of the architecture. Refer to the *Aesthetics* section of the Initial Study and Mitigated Negative Declaration for more information.	Consistent
3. Trees are to be arranged in informal masses and shall be placed selectively to reduce the scale of long, steep slopes.	Based on the proposed Planting Plan (Figure 5), informal masses of trees are not being proposed. However, Mitigation Measure AES-2 requires that trees are arranged in informal masses and placed selectively to reduce the scale of long, steep slopes. Refer to the *Aesthetics* section of the Initial Study for more information.	Consistent
4. Shrubs are to be randomly placed in masses.	The proposed Planting Plan (Figure 5) is consistent with this standard. Furthermore, Mitigation Measure AES-4 requires that shrubs be randomly placed in masses. Refer to the *Aesthetics* section of the Initial Study for more information.	Consistent
5. Skyline plantings shall be used along recontoured secondary ridgelines to create the linear silhouette and to act as a backdrop for structures. Trees shall be planted to create a continuous linear silhouette since gaps in the planting will not give the desired effect.	Mitigation Measure AES-5 requires that skyline plantings be used along secondary ridgelines. Refer to the *Aesthetics* section of the Initial Study for more information.	Consistent
6. For fire prevention purposes, a fuel management zone shall consist of at least 100 feet, and have a fire-sensitive groundcover. Larger trees and shrubs must be pruned.	Mitigation Measure HAZ-1 requires a 100-foot fuel management zone with a fire-sensitive groundcover. Refer to the *Hazards and Hazardous Materials* section of the Initial Study for more information.	Consistent
Resource Performance Standards		
1. To meet the City's overall water conservation performance objective, projects will be reviewed to assess their compliance with the following: • Incorporation of drought tolerant and low water using plants; maximize preservation of natural vegetation. • Incorporation of water conservation techniques into the design of the irrigation system through such techniques as mulching, installation of drip	Mitigation Measure UTL-1 in the *Utilities and Service Systems* section along with standard water quality measures in the *Hydrology and Water Quality* section of the Initial Study would require compliance with the City's water conservation performance objective and prevent pollutants and sediment from entering the watershed.	Consistent

General Plan Consistency Review

Applicable General Plan Policies	Consistency Analysis	Consistent/Not Consistent
irrigation systems, landscape design to group plants of similar water demand, rain sensors and automatic irrigation systems. • Clustering of landscaped areas to maximize the efficiency of the irrigation system; design of irrigation systems to eliminate watering of impervious surfaces. • Installation of water conserving kitchen and bathroom fixtures and appliances, installation of thermostatically controlled mixing valves for baths and showers, and insulation of hot water lines. • As part of developments subject to Water Resources Performance Standards, proposed development projects shall prepare a "Runoff Mitigation Plan" that illustrates Best Management Practices that will be employed to prevent pollutants and sediments from running off the built project. The plan shall be designed to ensure that no new sediments or pollutants will wash off the site during rainfall event. If the project site is over 5 acres in size, a Storm Water Pollution Prevention Plan as prepared for the NPDES may be acceptable to the City in place of the Runoff Mitigation Plan. • To slow runoff and maximize infiltration, at least seventy (70%) percent of the proposed development site must either be landscaped or constructed with pervious paving materials. • Swales, berms, green filter strips, infiltration pits, and/or sediment traps shall be provided, where feasible, as part of site stormwater runoff management systems to slow runoff and direct runoff to permeable or landscaped areas, thereby reducing pollutant loading in area waterways.		
Erosion Control Performance Standards		
1. Concurrent with submittal of a grading plan, submittal of water erosion and dust control plans to the city are required. Erosion control plans will be reviewed concurrently with the grading plan.	Mitigation measures WQ-1 through WQ-3 in the *Hydrology and Water Quality* section of the Initial Study, recommendations in the Geotechnical Report, standard City-required grading techniques, and	Consistent

General Plan Consistency Review

Applicable General Plan Policies	Consistency Analysis	Consistent/Not Consistent
• Erosion control plans shall be prepared and shall cover all areas impacted by proposed grading. • The erosion control plans shall address methods of control (e.g., detention basins, check dams, sandbagging), and interim storm drain construction if required. • Grading plans shall include appropriate and feasible measure to minimize dust. • Erosion control measures shall be in place prior to the rainy season. • Erosion control measure shall be implemented as soon as grading operations commence, and shall remain in operation until improvement construction has begun within the controlled area.	construction Best Management Practices (BMPs) would reduce impacts associated with dust and erosion to a less than significant level.	
2. New development should balance onsite cut and fill, so as to minimize the transporting of soils on- or off-site.	Onsite cut and fill material are balanced to the maximum extent feasible.	Consistent
3. The physical extent of graded areas shall be minimized. Cleared areas are to be landscaped with temporary groundcover as soon as it is feasible after grading. Such measures are to remain in place until permanent landscaping can be installed.	Standard City-required grading permits, techniques and construction Best Management Practices (BMPs) would minimize grading and implement erosion control measures.	Consistent
Fire Hazard Management Performance Standards		
1. Within rural areas, new development may be provided with a seven minute response time [instead of the standard 5 minute response time] if structures intended for human occupancy are sprinklered.	Mitigation Measure HAZ-3 in the *Hazards and Hazardous Materials* section of the Initial Study requires all final plans be reviewed and approved by the Los Angeles County Consolidated Fire Districts to determine if more active fire protection measures are need such as the installation of sprinklers.	Consistent
2. Roadways and internal circulation systems shall be designed to accommodate fire suppression equipment with adequate turn-around areas as determined by the Los Angeles County Consolidated Fire Districts. Where necessary, existing fire hydrants are to be tested to confirm adequate fire flows.	Site plans and building plans would be submitted to the Los Angeles County Consolidated Fire Districts for review.	Consistent
3. Fire hydrants are to be provided as required by the Los Angeles County Consolidated Fire Districts, as shall "blue dots" to identify fire hydrants.	Site plans and building plans would be submitted to the Los Angeles County Consolidated Fire Districts for review.	Consistent

General Plan Consistency Review

Applicable General Plan Policies	Consistency Analysis	Consistent/Not Consistent
4. This development is designated within Fire Hazard Zone IV by the Los Angeles County Consolidated Fire Districts. This zone includes wildland fire hazard areas defined as watershed lands that contain native growth and vegetation. Development located in or within 500 feet of native vegetation is subject to the following development provisions: • Use of special, fire-resistant roofing materials; • Installation of chimney spark arresters and other fire protection devices; and • Maintenance of fuel management zones.	Mitigation Measure HAZ-2 in the *Hazards and Hazardous Materials* section of the Initial Study requires that fire-resistant roofing materials, fire protection devices and fuel management zones are part of the project design.	Consistent
6. Within rural areas, structures intended for human occupancy are to be located along a paved, all weather, and publicly accessible road as in a manner which avoids the need for firefighter to move equipment onto properties without adequate turn-around space. If a structure can't feasibly be sited in this manner, it is to be sprinklered.	Mitigation Measure HAZ-3 in the *Hazards and Hazardous Materials* section of the Initial Study requires site plans and building plans be submitted to the Los Angeles County Consolidated Fire Districts for review in order to determine if sprinklers are required to be installed if project site does not include adequate turnaround space for firefighting equipment.	Consistent
7. Prior to approval of a building permit for new structures intended for human occupancy within areas subject to wildland fires, applicants should meet with the County Consolidated Fire Districts to determine the most fire-safe location for the structure. New structures intended for human occupancy within areas subject to wildland fires are generally to be located on the lowest portion of the site. In addition, adequate setbacks from topes of slopes having natural vegetation shall be maintained so as to reduce the spread of wildland fires to structures.	Site plans and building plans would be submitted to the Los Angeles County Consolidated Fire Districts for review.	Consistent
8. Proposals for new development will be referred to the Los Angeles Consolidated Fire Districts to determine projected response times to the project site to provide appropriate fire hazard management recommendations for inclusion by the City as project conditions of approval/	Site plans and building plans would be submitted to the Los Angeles County Consolidated Fire Districts for review.	Consistent

ENVIRONMENTAL FACTORS AFFECTED

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is "Potentially Significant" or "Potentially Significant Unless Mitigation Incorporated" as indicated by the checklist on the following pages.

■	Aesthetics	■	Hazards and Hazardous Materials	☐	Public Services
☐	Agricultural Resources	■	Hydrology and Water Quality	☐	Recreation
☐	Air Quality	☐	Land Use and Planning	☐	Transportation/Traffic
■	Biological Resources	☐	Energy and Mineral Resources	■	Utilities and Service Systems
■	Cultural Resources	☐	Noise	☐	Mandatory Findings of Significance
■	Geology and Soils	☐	Population and Housing		

DETERMINATION

On the basis of this initial evaluation:

☐ I find that the proposed project **COULD NOT** have a significant effect on the environment, and a **NEGATIVE DECLARATION** will be prepared.

■ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because the mitigation measures described on an attached sheet have been added to the project. A **MITIGATED NEGATIVE DECLARATION** will be prepared.

☐ I find that the proposed project **MAY** have a significant effect on the environment, and an **ENVIRONMENTAL IMPACT REPORT** is required.

☐ I find that the proposed project **MAY** have a significant effect(s) on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets, if the effect is a "potentially significant impact" or "potentially significant unless mitigated." An **ENVIRONMENTAL IMPACT REPORT** is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, there **WILL NOT** be a significant effect in this case because all potential significant effects (a) have been analyzed adequately in an earlier EIR pursuant to applicable standards and (b) have been avoided or mitigated pursuant to that earlier EIR, including revisions or mitigation measures that are imposed upon the proposed project.

[signature]
Tom Bartlett
City of Calabasas
City Planner

12-16-08
Date

Environmental Checklist

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
I. AESTHETICS -- Would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	■	☐	☐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	■	☐	☐
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	■	☐	☐
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	■	☐	☐

a. A key concept of the City of Calabasas General Plan is to maintain the public views and natural character of hillsides by only allowing hillside development that does not visually dominate the natural features (City of Calabasas General Plan FEIR, 1995). In order to maintain public views and natural character of hillsides, proposed projects must comply with the General Plan Consistency Review Program. The proposed project would add development to a hillside area that has been previously graded in some places, but is largely undeveloped, vacant land with native and non-native vegetation (see Figure 3 for site photos). Impacts would be **potentially significant unless mitigation is incorporated.**

b. There is no state scenic highway within the vicinity of the project site, but the site is located within a scenic corridor (-SC) overlay zone as it can be seen from the Mulholland Highway, a City-designated scenic corridor (City of Calabasas General Plan FEIR, 1995). Native oak trees play a significant role in the Calabasas landscape (City of Calabasas General Plan FEIR, 1995). Section 17.26.070 of the City of Calabasas Municipal Code requires that an Oak Tree Permit be obtained for the alteration of any healthy oak tree greater than 2 inches in diameter. According to the Oak Tree Report prepared by Arbor Essence February 28, 2006 (Appendix B), one 20 inch trunk diameter coast live oak tree would be removed, and a total of 12 trees would be encroached as a result of the proposed project. An Oak Tree Permit would be required. Recommendations made by Arbor Essence and Mitigation Measure BIO-2 would be required to mitigate impacts to a less than significant level. Impacts would be **potentially significant unless mitigation is incorporated.**

c. The City's General Plan Consistency Review requires that the existing visual character is maintained to the maximum extent feasible. Building plans indicate that the proposed project would generally comply with the City's General Plan policies, however, current building plans do not fully implement many of the applicable policies. The proposed building plans do not show that wall surfaces facing towards viewsheds areas would be adequately screened by landscaping. Proposed landscaping has the potential to blend poorly with natural vegetation. A continuous linear silhouette may not be accomplished as the proposed Planting Plan does not include skyline plantings along secondary ridgelines. Also, the proposed colors, textures, materials and forms may not be compatible with the natural setting. Therefore, impacts to the visual quality of the site and its surroundings would be **potentially significant unless mitigation is incorporated.**

d. The proposed project would introduce lighting where none currently exists. In addition, surfaces, such as windows and roofs, could be a substantial source of glare. Consequently, light and glare associated with the proposed project has the potential to adversely affect views in the area. Impacts would be **potentially significant unless mitigation is incorporated.**

Mitigation Measures

The following measures would reduce impacts to visual resources to a less than significant level.

AES-1 **Plant Screening.** Plant materials shall screen at least 50% of all architecture. Wall surfaces facing viewsheds shall be screened to the maximum extent feasible.

AES-2 **Informal Tree Masses.** Trees shall be arranged in informal masses and shall be placed selectively to reduce the scale of long, steep slopes.

AES-3 **Slope Plantings.** Slope plantings shall create a gradual transition from developed slope areas into natural areas. Landscaping shall include fingers of plantings that extend into existing and sculptured slopes.

AES-4 **Random Shrub Placement.** Shrubs shall be randomly placed in masses.

AES-5 **Skyline Plantings.** Skyline plantings shall be planted to create a continuous linear silhouette along recontoured secondary ridgelines.

AES-6 **Natural Building Colors.** All colors, textures, materials and forms shall be compatible with the natural setting. Medium to dark colors, which blend with the surrounding environment, shall be used for building elevations and roof materials.

AES-7 **Low Reflectivity Glass.** Project design and architectural treatments shall incorporate additional techniques to reduce light and glare, such as use of low reflectivity glass.

AES-8 **Driveway and Retaining Wall Landscaping.** Landscaping shall be planted so as to shield retaining walls and driveway in order to preserve natural appearance of hillside from Mulholland Highway, a designated scenic corridor.

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
II. AGRICULTURAL RESOURCES -- Would the project:				
a) Convert Prime Farmland, Unique Farmland, Farmland of Statewide Importance, as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency to non-agricultural use?	☐	☐	☐	■
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	■
c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use?	☐	☐	☐	■

a. According to the California Department of Conservation Farmland Mapping and Monitoring Program (2002), the project site is designated as Other Land. Therefore, **no impact** to important farmland would occur.

b. The project area is not zoned for agricultural use; the project area is zoned as Hillside Mountainous (HM). The Williamson Act does not apply to the project site and **no impact** would occur.

c. No farming activity occurs at or adjacent to the site (City of Calabasas, 2008). Therefore, **no impacts** related to the conversion of farmland to non-agricultural use would occur.

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
III. AIR QUALITY -- Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	■	☐

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
III. <u>AIR QUALITY</u> -- Would the project:				
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☐	■
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☐	■	☐
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	■	☐
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☐	■

The project site is located within the South Coast Air Basin and is under the jurisdiction of the South Coast Air Quality Management District (SCAQMD). The SCAQMD is subject to compliance with the South Coast Air Quality Management Plan (2003). The South Coast Air Basin is currently in non-attainment status of state regulatory standards for ozone (O_3) and fine particulate matter (PM_{10}), and is currently designated as a non-attainment area for federal regulatory standards for O_3, PM_{10}, and carbon monoxide (CO). A project's impact to air quality is significant if it exceeds any of the following thresholds for criteria pollutants found in Table 1.

Table 1
Air Quality Thresholds

Pollutant	Construction	Operation
NO_x	100 lbs/day	55 lbs/day
VOC	75 lbs/day	55 lbs/day
PM_{10}	150 lbs/day	150 lbs/day
SO_x	150 lbs/day	150 lbs/day
CO	550 lbs/day	550 lbs/day
Lead	3 lbs/day	3 lbs/day

Source: SCAQMD CEQA Air Quality Handbook, 1993.

a. The proposed project involves one single family residence. Although the proposed project includes the construction of a new housing unit, the increase in City's population would not exceed population forecasts of the South Coast Air Quality Management Plan (AQMP) for the

City of Calabasas. Therefore, the construction of one single residence would not conflict with any regional air quality management plans and **impacts would be less than significant**.

b. The proposed single family residence would generate an estimated 10 daily vehicle trips. This increase in traffic would not adversely affect operations at area intersections or increase concentrations of pollutants such as carbon monoxide. Therefore, the project would not violate the state or federal air quality standards. **No impact** would occur.

c. Project implementation would generate temporary air pollutant emissions during construction and long-term emissions due to vehicle traffic and energy use. Each of these is discussed below.

Construction Emissions. Construction vehicles and equipment traveling along unpaved roads, grading, trenching, and stockpiled soils have the potential to generate fugitive dust (PM_{10}) through the exposure of soil to wind erosion and dust entrainment. In addition, exhaust emissions associated with heavy construction equipment would potentially degrade air quality. PM_{10} and exhaust emissions associated with construction activities are considered to be temporary air quality impacts.

Temporary construction emissions were estimated using the URBEMIS 2007 v.9.2.4 computer model (see Appendix A for air quality data). The number and type of equipment to be used during construction were estimated based on URBEMIS default amounts for similar construction projects. During project site preparation, the soils that underlie portions of the site could be turned over and pushed around, exposing the soil to wind erosion and dust entrainment by onsite operating equipment. The majority of emissions associated with construction activities on site come from off-road vehicles such as cranes and backhoes, but some emissions are also associated with construction worker trips and the application of architectural coatings, which release volatile or reactive organic gases (ROG) during the drying phase. Table 2 shows the worst-case daily construction emissions.

Table 2
Maximum Daily Construction Emissions
(pounds per day)

Emission Source	ROG	NO_x	CO	PM_{10}
Construction Emissions	8.99	66.90	36.56	26.42
Threshold (peak day)	*75*	*100*	*550*	*150*
Impact?	***No***	***No***	***No***	***No***

Source: URBEMIS 2007 v.9.2.4. .

As indicated in Table 2, maximum construction emissions are below SCAQMD thresholds for ROG, NOx, and CO, and PM10. Although PM10 emissions would be below SCAQMD thresholds, Rule 403 of the SCAQMD Handbook requires minimization of particulate emissions for all dust-generating activity during construction.

In addition to the regional air quality thresholds shown in Table 1, SCAQMD has developed Localized Significance Thresholds (LSTs) in response to the Governing Board's Environmental Justice Enhancement Initiative (1-4), which was prepared to update the SCAQMD's CEQA Air Quality Handbook. LSTs were devised in response to concern regarding exposure of individuals to criteria pollutants in local communities. LSTs represent the maximum emissions from a project that will not cause or contribute to an air quality exceedance of the most stringent applicable federal or state ambient air quality standard at the nearest sensitive receptor, taking into consideration ambient concentrations in each source receptor area (SRA), project size, distance to the sensitive receptor, etc. However, LSTs only apply to emissions within a fixed stationary location, including idling emissions during both project construction and operation, and LSTs have been developed only for NO_x, CO, PM_{10} and $PM_{2.5}$. LSTs are not applicable to mobile sources such as cars on a roadway (Final Localized Significance Threshold Methodology, SCAQMD, June 2003). As such, LSTs for operational emissions would not apply to the proposed project as the majority of emissions would be generated by cars on the roadways.

LSTs have been developed for emissions within areas up to 5 acres in size, with air pollutant modeling recommended for activity within larger areas. The SCAQMD provides lookup table for project sites that measure 1, 2 or 5 acres. The project site measures approximately 4.5 acres and is located in Source Receptor Area 6 (SRA-6) which is designated by the SCAQMD as the West San Fernando Valley and includes the City of Calabasas. The LST construction emission thresholds shown in Table 3 are from the LST lookup tables for 5-acre project sites.

Table 3
SCAQMD LSTs for Construction in SRA-6

Pollutant	Allowable Emissions 82 Feet from the 5-acre Site Boundary (lbs/day)
Gradual conversion of NO_x to NO_2	295
CO	1,014
PM_{10} (10.4 mg/m^3)	11
$PM_{2.5}$ (10.4 mg/m^3)	6

Source: http://www.aqmd.gov/CEQA/handbook/LST/appC.pdf, accessed online June 2008.

A comparison of estimated construction emissions using the SCAQMD's spreadsheet for LSTs is shown in Table 4. As indicated, the estimated daily construction emissions of criteria pollutants are below the LSTs for this location.

Table 4
Total On-Site Construction Criteria Pollutant Emissions Compared to Localized Significance Thresholds

	CO	**NO_x**	**PM_{10}**	**$PM_{2.5}$**
Demolition	N/A	N/A	N/A	N/A
Site Preparation	47.4	95.6	9.5	5.5
Grading	34.8	76.6	7.0	4.4
Building	22.6	52.4	3.1	2.9
Arch Coating and Paving	18.4	38.1	2.7	2.4
Localized Significance Threshold*	1,014	295	11	6
Exceed Significance?	**No**	**No**	**No**	**No**

Source: SCAQMD's Sample Construction Scenarios spreadsheet for LST analysis. See Appendix A for full spreadsheets.
**LSTs are for a five-acre project in SRA-6 at a distance of 82 feet from the site boundary.*
Please consult http://www.aqmd.gov/ceqa/handbook/LST/LST.html for the Methodology Paper for applicable LSTs.

Because emissions generated by the construction of the proposed project would be below both SCAQMD regional thresholds and Localized Significance Thresholds, impacts would be **less than significant.** Nevertheless, Rule 403 of the SCAQMD Handbook requires implementation of measures to minimize emissions for all dust-generating activity, regardless of whether it exceeds the thresholds. The non-attainment status of the South Coast Air Basin for PM_{10} dust emissions requires that Best Available Control Measures (BACMs) such as adequate watering and the utilization of vegetative covering be implemented to minimize regional cumulative PM_{10} impacts from all construction activities, even if any single project does not cause the thresholds to be exceeded. Additionally, the non-attainment basin status and the cumulative impact of all construction suggests that all reasonably available control measures for diesel exhaust shall be implemented even if individual thresholds are not exceeded. Implementation of SCAQMD rules would further ensure that construction impacts to air quality would be **less than significant.**

<u>Operational Emissions</u>. Long-term emissions associated with the proposed project, were estimated based using the California Air Resources Board's (ARB's) URBEMIS 2007 v.9.2.4 computer model. Operational emissions were determined based on the proposed single-family residence, with a trip generation rate of 9.57 trips/single-family detached housing unit (Institute of Transportation Engineers, 2006). Project emissions estimates as determined in the modeling analysis are presented in Table 5. Mobile emissions are those associated with vehicle trips, while the use of natural gas and landscaping maintenance equipment are included in the area emissions.

Table 5
Operational Emissions

Emission Source	**Emissions (lbs/day)**			
	ROG	**NO_x**	**CO**	**PM_{10}**
Mobile Emissions	0.11	0.14	1.31	0.20
Area Emissions	0.06	0.02	0.06	0.00
Total	**0.17**	**0.16**	**1.37**	**0.2**
SCAQMD Thresholds	*55*	*55*	*550*	*150*
Impact?	***No***	***No***	***No***	***No***

Source: URBEMIS 2007 v.9.2.4 (See Appendix A for model assumptions and results).

As shown, the emissions generated by the proposed project would not exceed the SCAQMD's daily operational thresholds for any pollutant and would not significantly affect regional air quality. Impacts would be less **than significant.**

d. Certain population groups are considered more sensitive to air pollution than others. Children, the elderly and chronically ill persons, especially those with cardio-respiratory diseases, are particularly vulnerable. Sensitive land uses include those locations where such individuals are concentrated, such as hospitals, schools, and residences. Sensitive receptors in the vicinity of the proposed site include the private residences and the Viewpoint School located approximately 250 feet north and south of the site boundary. However, as shown in Tables 2 and 3, the emissions generated by the proposed project would not exceed the SCAQMD's daily operational thresholds for any pollutant. Therefore, impacts to sensitive receptors would be **less than significant**.

e. The proposed project would be used for residential purposes and would not generate objectionable odors. **No impact** related to odors would occur.

	Potentially Significant Impact	**Potentially Significant Unless Mitigation Incorporated**	**Less than Significant Impact**	**No Impact**
IV. BIOLOGICAL RESOURCES -- Would the project:				
a) Have a substantial adverse effect on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	■	☐	☐

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
IV. BIOLOGICAL RESOURCES -- Would the project:				
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	■	☐
c) Have a substantial effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	■	☐
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	■	☐	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	■	☐	☐
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	■	☐

A Biological Resources Assessment and an Oak Tree Report were prepared for the project site by Compliance Biology, Inc. and Arbor Essence respectively. The following analysis is partially based on these reports, dated June 2006 and February 2006, respectively, which can be found in their entirety in Appendix B.

a. The project site encompasses an area of approximately 4.5 acres, of which only about 0.5 acres would be developed non-permeable surfaces. Planned landscape would exist around the driveway and residential structure (See Figure 5). The remainder would remain in its current condition. According to the biological evaluation, the project site is not located in a designated environmentally sensitive area and is not known to serve as a significant wildlife corridor. The drainage on site is likely to be used for wildlife movement, however, due to the relatively small size and location of the drainage, localized wildlife movement would not be substantially impeded in the area.

A literature and site reconnaissance was completed as part of the Biological Resource Evaluation. The literature search revealed that a total of 13 special-status plant species have been recorded from the project region. Additionally, 20 special-status wildlife species were listed in the California Natural Diversity Database (CNDDB) and/or are otherwise known from the area. However, no special-status species were directly detected on the site during the surveys conducted July 8 and 9, 2006 (Compliance Biology, 2006, Appendix B).
Focused surveys for special-status plants were not conducted as part of the biological assessment and the timing of the surveys was not conducive to finding most potentially occurring special-status plant species. However, the report notes that although occurrences of some rare plants have been documented in the project vicinity, none of the special-status plant species known from the area is considered to have a high potential for occurrence on site due to specific environmental factors including soil types, canopy density, solar aspect, etc.

Three special-status wildlife species have a high potential to occur on site. These being the Sharp-shinned Hawk (*Accipiter striatus*), Cooper's Hawk (*Accipiter cooperii*), and the San Diego Woodrat (*Neotoma lepida intermedia*). None of these potentially occurring species are listed as threatened or endangered by State or Federal regulatory agencies. The two potentially occurring raptor species are not expected to be dependent upon resources within the site boundaries for their survival though both have some potential to nest on site (Compliance Biology, 2006). The San Diego desert woodrat also has a high potential to occur on site, however, there are approximately 70,000 acres of available habitat (coastal sage scrub) for this species in Los Angeles County (FRAP data, California Department of Forestry, 2002), of which the approximately 4.5 acres of available habitat onsite accounts for 0.006%. Loss of habitat would be considered significant if it constitutes more than approximately 0.1-1% of the regional supply of suitable habitat. Given that the site acreage would constitute less than 0.1%, this impact is considered adverse, but not significant even if the San Diego desert woodrat is present onsite. Therefore, given the relatively common occurrence of this species in the region, the abundance of suitable habitat in the area, and the relatively small amount of habitat that is expected to be disturbed by the proposed development, impacts to the San Diego desert woodrat would be less than significant. However, there is potential for the two special-status raptor species to nest on the project site, thus impacts to the raptor species would be **potentially significant unless mitigation is incorporated.**

b. The project site is not located in an area containing significant sensitive biological resources (See a,d, above) and is not subject to an adopted Habitat Conservation Plan or Natural Community Conservation Plan.

However, the proposed project would require earth moving and clearing onsite. Vegetation on the project site includes areas of disturbed vegetation, coastal sage scrub, non-riparian trees and shrubs, and a riparian area. Development of the project site would occur in the western portion of the site and the construction boundaries would not encroach into the riparian drainage on along the eastern portion of the property. The onsite drainage is not recorded as a perennial or intermittent "blue-line" stream on the US Geological Survey topographic map of the area. This drainage contains riparian vegetation and sparse non-native vegetation. As discussed in a and b, above, this riparian area is not a significant corridor for wildlife movement. The drainage did have measurable flowing water at the time of the survey in July of 2006; however, it was determined by the Biological Resource Assessment that the perennial flow was not present historically and is sustained by irrigated landscaping and/or other artificial sources of water upstream of the property. Implementation of the regulation requirements discussed under Section VIII, *Hydrology and Water Quality*, would ensure that impacts to the riparian area associated with water quality and quantity are less than significant.

Development of the project site would occur primarily over areas classified as disturbed ruderal grasslands and a portion of Purple Coastal Sage Scrub. The Biological Resource Assessment concluded that no sensitive habitat communities existed on the project site. Impacts would be **less than significant.**

c. The proposed project would require earth moving activities in the western portion of the project site. Areas where riparian or hydrological flows have been known to exist occur on the eastern portion of the project site. The proposed project has established a construction limit line and does not propose any grading, construction, or landscaping in this area. Conditions would be undisturbed near the drainage. Additionally, the drainage, as discussed in b above, is not a drainage defined on local topographic maps. Impacts would be **less than significant.**

d. Please see discussion under item a.

e. As discussed in *Aesthetics*, native oak trees play a significant role in the Calabasas landscape (City of Calabasas Genera Plan FEIR, 1995). Section 17.26.070 of the City of Calabasas Municipal Code requires that an Oak Tree Permit be obtained for the alteration of any healthy oak tree greater than 2 inches in diameter. According to the Oak Tree Report performed by Arbor Essence (dated February 28, 2006, Appendix B), project implementation would remove 1 oak tree and encroach onto 12 oak trees. Encroachment onto these trees is minor and the trees can reasonably be preserved in place with little to no impact (Arbor Essence, 2006). Therefore, an Oak Tree Permit would be required and mitigation approved by the City's Oak Tree Consultant would be required. Arbor Essence also discusses fuel modification and brush clearance as required by the Los Angeles County Fire Department, which could result in adverse affects on surrounding vegetation. Mitigation Measure BIO-3 would help ensure that brush clearance and fuel modification do not adversely affect native vegetation when feasible. Impacts would be **potentially significant unless mitigation is incorporated**.

f. Please see discussion under item b.

Mitigation Measures

The following mitigation measures would be required to reduce impacts to biological resources to a less than significant level.

BIO-1 **Nesting Birds.** To ensure potentially significant impacts to actively nesting birds are minimized to the greatest extent feasible, all vegetation removal and/or other site preparation activities should be timed to avoid the active nesting period occurring between February 1 and July 30. Should such timing not be feasible, no earlier than 7 days prior to such activities, all areas proposed to be grubbed of vegetation, plus a 150-foot buffer radius, should be closely surveyed for active nests. Should any active nests be identified, a 50-foot buffer (150 feet of raptors) shall be established around the nest and fenced off with clearly visible construction fencing. The exclusionary fencing should remain in place until the young have fully fledged, and/or until a qualified biologist determines that the nest is no longer active.

BIO-2 **Oak Tree Mitigation.** Mitigation to reduce impacts to onsite oak trees were sourced from the Oak Tree Report (Appendix B). These mitigation measures include the following:

- *Install protective fencing around all protected oak trees and scrub oak habitat, fencing shall be installed at the tree protection zone or edge of construction boundary as indicated on plans.*
- *All approved work or excavation performed within the tree protection zone shall be performed with hand tools under the direct supervision of the project arborist.*
- *Any drainage systems that are installed must dump well outside the tree protection zone.*
- *All roots that are pruned shall be cut cleanly and performed under the direct supervision of the project arborist.*
- *Any pruning shall be performed by a qualified arborist under the supervision of the applicant's oak tree consultants. All pruning must meet ISA and ANSI 300 standards.*
- *Prune trees as recommended to remove deadwood and stubs only.*
- *No irrigation shall be installed within the dripline of any oak tree.*
- *No planting is recommended within the protection zone of any oak tree. Any planting within the protection zone shall consist of oak associated natives of the Santa Monica Mountains.*
- *No equipment, construction materials or debris shall be stored or disposed of within the protected zone of any tree.*
- *No changes in soil grade shall be made within the tree protection zone.*

BIO-3 **Fuel Modification.** In order to reduce adverse affects on existing vegetation from brush clearing and fuel modification as required by LACo.FD, the following guidelines shall be implemented to aid in compliance:

- *The first thirty feet out from structures shall be cleared of all vegetation except ornamentals*
- *Remaining area 30'-200' from structures shall be thinned out to achieve an approximately 15-foot spacing between all shrubs.*
- *Large shrubs and trees shall have their crowns raised off the ground to approximately 1/3rd their overall height, this applies to vegetation over eaight feet in height.*

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
V. CULTURAL RESOURCES -- Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	☐	☐	☐	■
b) Cause a substantial adverse change in the significance of an archaeological resource as defined in §15064.5?	☐	■	☐	☐
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	■	☐	☐
d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	■	☐	☐

A Phase I Archaeological Investigation was conducted for the project site by Compass Rose Archaeological, Inc. dated September 29, 2006. The following analysis is partially based on this study, which can be found in it entirety in Appendix C.

a. The proposed project involves the construction of 12,305 square feet of residential development (including garage and pool deck) on a vacant 4.5-acre site. No historical resources are known to occur on site or adjacent to the proposed development. **No impact** would occur.

b-d. Ground disturbance within the project area would include grading and excavation. The Phase I Archaeological Investigation a records search and field survey indicated no archaeological or paleontological resources, or human remains present onsite. However, with any ground-disturbing activity, project grading and excavation would have the potential to adversely affect undiscovered cultural resources, including human remains. Therefore, impacts would be **potentially significant unless mitigation is incorporated.**

Mitigation Measures

The following measures would reduce impacts relating to the possible discovery of as yet undetected cultural resource remains during grading to a less than significant level.

CR-1 Resource Recovery Procedures. If unanticipated cultural resource remains are encountered during construction or land modification activities, the developer shall follow the applicable procedures established by the Advisory Council on Historic Preservation concerning protection and preservation of Historic and Cultural Properties (36 CFR 8700). In this event, the developer/construction contractor shall cease work until the nature, extent, and possible significance of any cultural remains can be assessed and, if necessary, remediated. Such assessment and remediation shall be implemented by the developer and shall be subject to review and approval by the Deputy Director/City Planner prior to commencement with onsite construction/grading activities. If remediation is needed, possible techniques include removal, documentation, or avoidance of the resource, depending upon the nature of the find.

CR-2 Human Remains Recovery Procedures. In the event that human remains are discovered during construction or land modification activities, the developer shall follow the procedures in Section 7050.5 of the California Health and Safety Code. These procedures require notification of the County coroner and the Native American Heritage Commission if the coroner determines the remains to be those of Native American ancestry. Onsite construction/grading shall not commence until evidence has been presented to the City manager that the developer has adhered to these procedures.

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
VI. GEOLOGY AND SOILS – Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?	☐	☐	■	☐
ii) Strong seismic ground shaking?	☐	☐	■	☐
iii) Seismic-related ground failure, including liquefaction?	☐	☐	■	☐
iv) Landslides?	☐	■	☐	☐
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	■	☐
c) Be located on a geologic unit or soil that is unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	☐	☐	■	☐
d) Be located on expansive soil, as defined in Table 1-B of the Uniform Building Code, creating substantial risks to life or property?	☐	■	☐	☐

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
VI. GEOLOGY AND SOILS – Would the project:				
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	■

A Feasibility Level Geologic and Geotechnical Engineering Site Investigation was prepared for the project site in December 2004, a subsequent Supplemental Geotechnical Investigation and Slope Stability Evaluation was prepared in January 2005, and subsequently a Geotechnical Evaluation of Revised Grading Plans was prepared for the proposed project in April 2006. All three were prepared by Gorian & Associates, Inc. and are included as Appendix D. These reports were used in part for analysis of the project's impacts related to Geology and Soils.

a(i-ii). The project site does not lie within an Earthquake Fault Studies Zone and the site is not known to be underlain by active or potentially active faults (Calabasas General Plan EIR, 1995). The project site is currently not located within an Alquist-Priolo Earthquake Fault Zone as defined by the State Geologist (Hart and Bryant, 1999). The potential for substantial adverse effects related to fault rupture is low. Like most of Southern California the proximity of active faults is such that the site has experienced and will continue to experience strong seismically induced ground motion. However, development would be subject to the Uniform Building Code (UBC), the California Building Code (CBC) (2007) and/or County of Los Angeles Building Code with City of Calabasas amendments, and would be required to adhere to recommendations in the approved site-specific soils and geotechnical engineering reports. As such, the design and construction of new structures would be engineered to withstand the expected ground acceleration and seismic shaking that may occur on-site. Therefore, impacts would be **less than significant**.

a(iii). Liquefaction describes the phenomenon in which ground shaking works cohesionless soil particles into a tighter packing which induces excess pore pressure. These soils may acquire a high degree of mobility that can lead to structurally damaging deformations. Liquefaction begins below the water table in areas where the groundwater is less than 40 feet from the surface and where the soils are composed of poorly consolidated fine to medium sand. Liquefaction occurs in saturated cohesionless soils where pore pressure build up during groundshaking can result in the partial or complete loss in strength. Due to the pore pressure build up, soils immediately above the liquefiable layers may be also affected. The proposed project is not within an area shown to have a potential for liquefaction on the State's Seismic Hazard Zones Map (California Division of Mines and Geology, 1998). According to the geotechnical study prepared for the proposed project, groundwater was not encountered during soil exploration on-site, and subsurface exploration and laboratory testing programs confirmed that the on site earth materials are not susceptible to liquefaction. Therefore, liquefaction hazards would be **less than significant.**

a(iv). The geologic character of an area determines its potential for landslides. Steep slopes, the extent of erosion, and the rock composition of a hillside all contribute to the potential for slope failure and landslide events. In order to fail, unstable slopes need to be disturbed. Common triggering mechanisms of slope failure include undercutting slopes by erosion or grading, saturation of marginally stable slopes by rainfall or irrigation, and shaking of marginally stable slopes during earthquakes.

The proposed project and associated hillside grading involves natural slopes and constructing both cut and fill slopes. Natural slopes within the site consist of predominantly thin to thick beds of sandstone with interbeds of fin-grained materials. Soil and alluvial deposits of variable thickness mantle the bedrock. Stability analyses were performed on natural slopes with potential adverse geologic conditions that are adjacent to the proposed development. Certain areas of the proposed development have slopes with factor of safety less than 1.5 (1-1.5 required) under static conditions. Where the factor of safety is less than required, an appropriate stabilization fill has been recommended in the Geotechnical report. Two areas of remediate have been identified, the shallow landslide below the proposed building pad and the proposed cut slope along the western property line. However implementation of the slope stability recommendations contained in the geotechnical study prepared for the proposed project, as well as adherence to all standards of the UBC and CBC, and implementation of all recommendations in the approved site-specific soils and geotechnical engineering reports would reduce potential impacts to a **less than significant** level**.**

b, c. The project site is entirely underlain by the Miocene-age Calabasas Formation. Overlying the bedrock, surficial deposits within the site include minor undocumented fill, undifferentiated residual soil/colluvial deposits, and landslide/surficial slump debris. The soils are poorly consolidated and within the low expansion index range. The erosion hazard potential for this soil is relatively low. Construction activities would include the excavation and grading of the site, which would cause the disruption and displacement of on-site soils. Limitations exist on the amounts of infiltration relative to manufactured slope stability in that the slopes are not intended to receive large amounts of water. Structural damage to the slope can occur if too much water is received to these areas. Although the potential for on-site erosion is not high, construction activities could result in increased erosion and offsite sedimentation. Implementation of all appropriate recommendations in the approved Geotechnical Reports, mitigation measures WQ-1 through WQ-5, (in *Hydrology and Water Quality*), standard City-required erosion control techniques and construction Best Management Practices (BMPs) would reduce soil erosion effects to a **less than significant** level.

d. Expansive soils contain clay particles that change in volume (shrink or swell) due to change in the soil moisture content. The amount of volume change depends upon: the soil swell potential; availability of water' and restraining pressure on the soil. Swelling occurs when clay soils become wet due to excessive water, which can be caused by poor surface drainage, over irrigation of lawns and planters, and sprinkler or plumbing leaks. An expansion index test performed on a sample of the upper soil/bedrock profile located near the southwest corner of the building footprint between the building and proposed cut slope resulted in an expansion index of 120. This coincides with Gorian and Associates, Inc. past experience within this general area that indicated the excavated material can often yield high expansion ranges. Due to the relatively light foundation loads anticipated, expansive clay soils could cause distress both as uplift and shrinkage or settlement. Expansive soil movement can be on the order of one to two inches when exposed to excessive water or drying out. Therefore, impacts related to expansive soil are **potentially significant unless mitigation is incorporated**.

e. The proposed project would utilize connection to the City sewer system. A septic system would not be installed in association with the proposed project. **No impact** would occur.

Mitigation Measures

The following mitigation measures are required to reduce the potential for expansive soil to a less than significant level.

GEO-1 **Expansive Soil Testing.** Due to the extent of proposed grading, additional expansion testing shall be performed for the proposed finished building pad to find the extent of expansive soils onsite. For areas where expansive soils occur, depending on their expansion index, grading and foundation designs shall be engineered to withstand the proposed project. An expansion index test shall be performed at the conclusion of grading for the building pad, results of the tests shall be provided to the City Engineer prior to approval of building permits.

GEO-2 **Ongoing Site Maintenance.** In order to reduce future impacts form the underlying expansive soils, the following shall be maintained within the site:

- *Positive drainage shall be continuously provided and maintained away from all structures. Water shall not be allowed to pond or accumulate around buildings or the edges of hardscape allowing water migration into the subgrade.*
- *Excessive watering or excessive drying of soils shall be avoided.*
- *Sprinkler or plumbing leaks shall be immediately repaired so the subgrade soils underlying or adjacent to the structured do not become saturated.*
- *Information regarding the care and maintenance of improvements located on expansive soils shall be passed on to future owners of the property.*

GEO-3 **Expansive Soils Drainage Design.** Drainage shall be designed to minimize impacts relative to expansive soils. This shall include transporting runoff away from structures. This is accomplished by intercepting and conveying flows to impermeable media (concrete swales, pipes, basins) away from structural foundations. Additionally, landscape planting and trees should be kept away from foundations or flatwork to avoid ground saturation near foundations and roots extending beneath foundations and slabs. The grading and drainage system shall be reviewed and approved by the City Engineer prior to approval of building permits.

GEO-4 **Conditions Communication.** Information about expansive soils, including construction restrictions and maintenance, shall be conveyed to both the initial property owner and subsequent property owners through a Covenant Codes & Restrictions (CC&R). The CC&R shall be issued to the potential property owners prior to ownership. The CC&R shall be reviewed and approved by the City Engineer prior to issuance of a building permit.

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
VII. HAZARDS AND HAZARDOUS MATERIALS - Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☐	■
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☐	■
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within ¼ mile of an existing or proposed school?	☐	☐	☐	■
d) Be located on a site which is included on a list of hazardous material sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	■
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	■
f) For a project in the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the area?	☐	☐	☐	■
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	■
h) Expose people or structures to a	☐	■	☐	☐

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
VII. HAZARDS AND HAZARDOUS MATERIALS - Would the project:				
significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?				

a-c. The proposed project is a single family residence that would not involve the storage, use, or disposal of any hazardous substances or materials. The project would not create a significant hazard to the public or the environment from such. The nearest school, Viewpoint School, is located across Dry Canyon Cold Creek Road and would not be affected by any emissions, materials, substances or waste from the project. **No impact** related to the use, storage, transportation, storage or emissions of hazardous materials would occur.

d. The following databases were checked for known hazardous materials contamination at the project site:

- *Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) database*
- *Geotracker search for leaking underground fuel tanks, Spills-Leaks-Investigations- Cleanups (SLIC) and Landfill sites*
- *Cortese list of Hazardous Waste and Substances Sites*
- *The Department of Toxic Substances Control's Site Mitigation and Brownfields Database*

The project site does not appear on any of the above lists. In addition, the site and surrounding properties do not appear to, and are not known to, have supported industrial or other uses that are likely to have resulted in soil or groundwater contamination. **No impact** would occur.

e, f. The project site is not in the vicinity of an airstrip and the closest airport is the Van Nuys Airport, located approximately 9 miles northeast of the site. **No impact** would occur.

g. The proposed single-family residential development would not interfere with an emergency response/evacuation plan. **No impact** would occur.

h. The entire City of Calabasas is located in Fire Zone IV, which is characterized by watershed lands that contain native growth and vegetation (City of Calabasas General Plan, 1995). The project site is adjacent to native vegetation with a potential fire hazard, impacts related to wildland fire are considered **potentially significant unless mitigation is incorporated.**

Mitigation Measures

The following measures would reduce impacts associated with wildland fire to a less than significant level.

HAZ-1 Fuel Management Zone. A fuel management zone shall consist of at least 100 feet and have a fire sensitive groundcover. Larger trees and shrubs must be pruned.

HAZ-2 Fire District Development Standards. The following development provisions, along with any other provisions set forth by the Los Angeles County Consolidated Fire Districts, shall be implemented:

- *Fire-resistant roofing materials shall be used*
- *Chimney spark arresters and other fire protection devices shall be installed*
- *Fuel management zones with fire-sensitive groundcover shall be maintained*

HAZ-3 Fire Sprinklers. All structures intended for human occupancy must be sprinklered if the Los Angeles County Consolidated Fire Districts finds that the proposed project may be provided with a seven minute response time (instead of the standard 5 minute response time) or if the driveway does not provide adequate turnaround space for firefighting equipment`.

HAZ-4 Building Plan Review. Prior to approval of a building permit, building plans shall be reviewed by the Los Angeles County Consolidated Fire Districts.

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
VIII. <u>HYDROLOGY AND WATER QUALITY</u> -- Would the project:				
a) Violate any water quality standards or waste discharge requirements?	☐	☐	■	☐
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering or the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	■	☐
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a				

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
VIII. HYDROLOGY AND WATER QUALITY -- Would the project:				
manner which would result in substantial erosion or siltation?	☐	■	☐	☐
d) Substantially alter the existing drainage pattern of the site or area, including the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	☐	■	☐	☐
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	■	☐
f) Otherwise substantially degrade water quality?	☐	☐	■	☐
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	■
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☐	☐	☐	■
i) Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☐	■
j) Inundation by seiche, tsunami, or mudflow?	☐	☐	☐	■

a. Section 303 of the federal Clean Water Act requires states to develop water quality standards to protect the beneficial uses of receiving waters. In accordance with California's Porter/Cologne Act, the Regional Water Quality Control Boards (RWQCBs) of the State Water Resources Control Board (SWRCB) are required to develop water quality objectives that ensure their region meets the requirements of Section 303 of the Clean Water Act. Calabasas is within the jurisdiction of the Los Angeles RWQCB. The Los Angeles RWQCB adopted water quality objectives in its Stormwater Quality Management Plan (SQMP). This SQMP is designed to ensure that stormwater generated by a development does not exceed the limitations of receiving waters, and thus does not exceed water quality standards. Section 402 of the Clean

Water Act ensures compliance with the SQMP. Under this section, municipalities are required to obtain permits for the water pollution generated by stormwater in their jurisdiction. These permits are part of the National Pollutant Discharge Elimination System (NPDES) permit program, and are known as Municipal Separate Storm Sewer Systems (MS4) permits. Under this MS4, each permitted municipality is required to implement the SQMP. In accordance with the County-wide MS4 permit, all new developments must comply with the SQMP. In addition, as required by the MS4 permit, the City of Calabasas has adopted a City Runoff Mitigation Plan (RMP) ordinance to ensure new developments comply with SQMP. The City's RMP ordinance requires new developments to implement Best Management Practices (BMPs) that reduce water quality impacts, including erosion and siltation, to the maximum extent practicable. This ordinance also requires new developments to submit a plan to the City Engineer that demonstrates how the project will comply with the City's RMP and identifies the project-specific BMPs that will be implemented. Compliance with standard City requirements would reduce impacts to surface water quality to a **less than significant** level.

b. The City of Calabasas does not contain any groundwater recharge areas (City of Calabasas General Plan FEIR 1995). Impervious surfaces would cover approximately 21,663 square feet, or about 11% of the 195,633 square foot project site. The relatively small amount of area on-site that would be covered with impervious surfaces would not result in a significant reduction in groundwater recharge. Impacts would be **less than significant.**

c, d. The project site is located within the Arroyo Calabasas Watershed which eventually drains into the Pacific Ocean. A drainage course flows across the southern portion of the site and along the eastern boundary toward and under Dry Canyon Cold Creek Road and subsequently into Dry Canyon Creek, which is listed impaired under CWA section 303(d) by the Los Angeles RWQCB. This listing requires that measures are developed to ensure that the proposed project does not contribute to the pollutant load in the creek. Upon completion of the proposed project, runoff would continue to flow into the Creek. The project site, as it currently exists, is undeveloped and any disturbances such as the removal of vegetation, compaction of soils, and paving over of permeable surfaces would have the potential to create a significant impact on the hydrology of the watershed. The project consists of grading, clearing and the construction of a single-family residence with a swimming pool, driveway, etc., as described in the Project Description. Although all proposed development activities would be located in areas of the site away from the drainage course, the development of currently undeveloped land would increase surface water runoff. The proposed project would be subject to the requirements of the Los Angeles County Stormwater Ordinance and the City's RMP ordinance. Because the proposed project would contribute to increased runoff increased onsite impervious surface, impacts would be **potentially significant unless mitigation incorporated**.

e. As previously mentioned, the proposed project would convert approximate 11% of the property from pervious to impervious surfaces. This increase in impervious surface area would incrementally increase the flow of stormwater and pollutant loads. Grading activities would be subject to the City's RMP ordinance and implementation of standard erosion control BMPs, as described in the City of Calabasas Municipal Code Chapter 17.54, would reduce water quality impacts. Dry Canyon Creek is one of the headwaters of the Los Angeles River. The owners shall be responsible to meet all safety requirements and EPA approved measures to keep the water clean. All Total Maximum Daily loads (TMDL) applicable to Los Angeles River are applicable to Dry Canyon Creek and thus a responsibility of the property owner(s). The design must consider all TMDLs applicable to the area to ensure the site would not exceed targets adopted by the EPA or State Water Resource Control Board. Adherence to all applicable regulations and requirements would reduce impacts to water quality to the maximum extent practicable and impacts would be **less than significant.**

f. Please see discussion under item a.

g-i. The project site is not located within a 100-year flood hazard area (City of Calabasas General Plan FEIR, 1995). The proposed project would not expose people or structures to a significant risk of loss, injury, or death involving flooding. **No impacts** associated with flooding would occur.

j. Inundation by a seiche or tsunami is not expected to occur, as there are no major bodies of water in the vicinity of the project site. See Section VI, Geology and Soils, for a discussion on landslides. **No impacts** would occur.

Mitigation Measures

The following measures are required to mitigate potential impacts relating to increased surface runoff and potential downstream flooding in Dry Canyon Creek, which is listed impaired under CWA section 303(d) by the Los Angeles RWQCB.

HWQ-1 **Rain Gutters.** Install rain gutters that convey runoff away from building structures, driveways, or non-permeable surfaces. Design drainage system so that runoff penetrates the ground in areas that would not result in potential geological conflicts. Review and approval by the City Engineer of the drainage system shall be completed prior to issuance of a building permit.

HWQ-2 **Grades.** Modify grades of property to divert flows to an impermeable conveyance system which feeds into permeable surfaces away from structures to minimize geologic impacts and storm water leaving the project site. Review and approval by the City Engineer of the drainage system shall be completed prior to issuance of a building permit.

HWQ-3 **Sediment Traps.** As a temporary construction BMP, use sediment traps to intercept runoff from drainage areas and hold or slowly release the runoff, with sediments held in the trap for later removal.

HWQ-4 **Retention.** Use detention structures or design rooftops to store peak flow runoff. The project design shall incorporate features such as impermeable structures (pipes, tanks, lined basins) to reduce peak flow runoff discharges to storm drains. Cisterns are also a possible storage mechanism for reuse. These features shall not release flows near structural foundations or sensitive slopes. Review and approval by the City Engineer of the drainage system shall be completed prior to issuance of a building permit.

HWQ-5 **Site Design.** Design curbs, berms or the like so as to avoid impacts to the foundation or slopes onsite. Impermeable water conveyance shall be implemented that transports flows to permeable areas of the site where impacts would be reduced. Implement the use of pervious asphalt, grassy swales and berms near the terminal drainage to the maximum extent feasible.

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
IX. LAND USE AND PLANNING - Would the proposal:				
a) Physically divide an established community?	☐	☐	☐	■
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	■
c) Conflict with an applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	■

a. The project site is currently vacant and undeveloped. The proposed single family residence would not physically divide an established community. **No impact** would occur.

b. The project site is zoned Hillside Mountainous (HM), designated Rural Residential (RR) by the General Plan, and located in a Scenic Corridor (-SC) overlay zone (City of Calabasas General Plan, 1993). The proposed single-family residence would be consistent with this designation. **No impact** would occur.

c. The proposed project would not conflict with any habitat conservation plan or natural community conservation plan as the project site is not located in an area where these plans exist. **No impact** would occur.

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
X. MINERAL RESOURCES -- Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	■	☐
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	☐	☐	■	☐

a, b. The project site is located in an area classified as Mineral Resource Zone 3 (MRZ-3) (City of Calabasas General Plan FEIR, 1995). MRZ-3 areas contain mineral deposits for which the significance cannot be evaluated from available data and are not protected by the City or the State (City of Calabasas General Plan FEIR, 1995). The proposed project would not result in the loss of availability of a mineral resource of local, regional, or statewide importance. Impacts to mineral resources would be **less than significant.**

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
XI. NOISE -- Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	■	☐
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	■	☐
c) A substantial permanent increase in ambient noise levels above levels existing without the project?	☐	☐	☐	■
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	■	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use				

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
XI. NOISE -- Would the project result in:				
airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	■
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise?	☐	☐	☐	■

a. The proposed single-family residence would not expose people, either on- or off-site, to noise levels that exceed City standards. A noise measurement taken onsite on July 1, 2008 indicated a Leq of 56 dBA. This would be within the recommended noise level of up to 60 dBA Leq for rural residential development (Calabasas General Plan, 1995). Upon completion of the proposed project, there would be no substantial permanent increase in ambient noise levels in the project vicinity. Impacts associated with the increase in permanent noise levels would be **less than significant.**

b. Construction of the proposed project would entail site grading, clearing, and building activities. Construction-related activities associated with the project have the potential to create temporary noise and groundborne vibration in the immediate vicinity for adjacent residences, which are considered sensitive receptors. Typical noise levels associated with the use of heavy equipment at construction sites can range from about 78 to 88 dBA at 50 feet from the source, depending upon the types of equipment in operation at any given time and phase of construction (Bolt, Beranek and Newman, 1971). The closest residences and Viewpoint School buildings are about 250 feet from the project site, where maximum construction-related noise levels are expected to be less than 76 dBA. However, construction-related impacts are considered **less than significant** because they are temporary in nature.

c. Please see discussion under item a.

d. Please see discussion under item b.

e, f. The proposed project would not expose people to excessive noise levels generated by air traffic as there is no airport or private airstrip in the City of Calabasas. The closest airport is the Van Nuys Airport, located approximately 9 miles northeast of the project site. **No impact** would occur.

Mitigation Measures

Although construction impacts would not be significant due to their temporary nature, the following measures are recommended to minimize construction impacts at night, when people are more sensitive to noise and to reduce daytime construction noise to the extent feasible.

N-1 **Hours of Construction Activity**. Construction activity for site preparation and development shall be limited to the hours between 7:00 a.m. and 4:00 p.m., Monday through Friday. No construction shall occur on State holidays (e.g., Thanksgiving, Labor Day). Construction equipment maintenance shall be limited to the same hours. Non-noise generating construction activities, such as interior painting, are not subject to these restrictions.

N-2 **Stationary Construction Equipment**. Stationary construction equipment that generates noise which exceeds 65 dBA at the project boundaries shall be shielded and located as far away from residences and other noise sensitive uses to the maximum extent feasible.

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
XII. POPULATION AND HOUSING — Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	■	☐
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	■
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	■

a. The proposed project involves the construction of a single-family residence on a vacant lot that is zoned Hillside Mountainous (HM) and designated Rural Residential (RR). The project would not require substantial infrastructure improvements or generate new permanent employment opportunities that would induce population growth. Population growth-related impacts would be **less than significant.**

b, c. The project site is currently vacant and undeveloped. The proposed project would not displace housing or people. **No impact** would occur.

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
XIII. PUBLIC SERVICES				
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
i) Fire protection?	☐	☐	■	☐
ii) Police protection?	☐	☐	■	☐
iii) Schools?	☐	☐	■	☐
iv) Parks?	☐	☐	■	☐
v) Other public facilities?	☐	☐	■	☐

a (i). The closest fire station to the project site is Station #68 which is located at 24130 Calabasas Road. Station #68 is part of the Los Angeles County Fire Department. The development of one single-family residence would not cause a strain on existing fire protection services, and improvements to fire protection infrastructure would not be required (Captain Hill, July 2006). Impacts to fire protection services would be **less than significant.**

a (ii). The Los Angeles County Sheriff's Department provides police service to residents of Calabasas. An increase in population incrementally creates the need for more police services. However, the proposed single-family residence would not cause a strain on the Los Angeles County Sheriffs Department services, and improvements to police protection infrastructure would not be required (Sergeant Price, August 2008). Impacts to police protection services would be **less than significant**.

a (iii). The proposed project involves the development of one single-family residence and the project would not induce substantial growth in the project area. Therefore, the project would not directly or indirectly generate a substantial increase in new students in the area, result in any adverse physical impacts, or impede performance objectives for any of local schools. The developer would be required to pay State-mandated school impact fees for the single-family residence. **Impacts would be less than significant.**

a (iv). The proposed project involves the development of one single-family residence and the project would not induce substantial growth in the project area. Therefore, the project would not directly or indirectly generate a substantial increase in new residents in the area, result in any adverse physical impacts, or impede performance objectives for any of local parks. **Impacts would be less than significant.**

a (v). The proposed project would not have a significant impact on any other public facilities. **Impacts would be less than significant.**

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
XIV. RECREATION —				
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	■	☐
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	■	☐

a. The proposed single-family residence would not substantially increase the population of Calabasas. Although the addition of a family to the population of Calabasas may incrementally increase the use of existing neighborhood and regional parks/recreation facilities, this would not result in or accelerate substantial physical deterioration of the facilities. Impacts would be **less than significant.**

b. The proposed single-family residence does not include public recreational facilities. The construction or expansion of existing recreational facilities would not be warranted as the local population would not substantially increase as a result of the proposed project. Impacts would **be less than significant.**

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
XV. TRANSPORTATION / TRAFFIC — Would the project:				
a) Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at	☐	☐	■	☐

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
XV. TRANSPORTATION / TRAFFIC — Would the project:				
intersections)?				
b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?	☐	☐	■	☐
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	■
d) Substantially increase hazards due to a design feature (e.g. sharp curves or dangerous intersections) or incompatible use (e.g. farm equipment)?	☐	☐	☐	■
e) Result in inadequate emergency access?	☐	☐	☐	■
f) Result in inadequate parking capacity?	☐	☐	☐	■
g) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?	☐	☐	☐	■

a, b. The proposed project involves the construction of a single-family residence on 4.5 acres. Access to the project site would be via Mulholland Highway continuing on to Dry Canyon Cold Creek Road. Based on average trip generation rates for single-family detached residences, as reported by the Institute of Transportation Engineers (ITE), the proposed project would generate approximately 10 daily vehicle trips on weekdays, including 1 trip during the AM peak hour and 1 trip during the PM peak hour (ITE, Trip Generation, 7th Edition, 2003). Such an increase would not significantly affect levels of service at area intersections or on area roadways. Impacts would be **less than significant.**

c. The closest airport to the project site is the Van Nuys Airport, located approximately 9 miles to the northeast. **No impact** associated with air traffic would occur.

d. The proposed single-family residence would comply with all applicable building codes, including the latest edition of the California Building Code (2007) and/or County of Los Angeles Building Code with City of Calabasas amendments, and would not introduce any design hazards that would be expected to substantially increase hazards. **No impact** would occur.

e. The proposed project includes a paved driveway from Dry Canyon Cold Creek Road to the residence. In compliance with all applicable fire codes and regulations, a turnaround area would be located at the end of the driveway near the house. Emergency access would be adequate and all final plans would be reviewed and approved by the Los Angeles County Consolidated Fire District prior to permit distribution. **No impact** would occur.

f. The proposed project includes a three-car garage on the basement level with surface parking available on the driveway. Parking would meet the project's needs and the two garage spaces required by the City of Calabasas Municipal Code (§17.28.040). **No impact** would occur.

g. The nearest major thoroughfare, Mulholland Highway, is a narrow regional highway that is used almost exclusively by personal vehicles. The proposed project would not conflict with any alternative transportation plans. **No impact** would occur.

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
XVI. <u>UTILITIES AND SERVICE SYSTEMS</u> — Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	□	□	■	□
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	□	□	■	□
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	□	□	■	□
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	□	■	□	□
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	□	□	■	□

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	■	☐
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	■	☐

a, b. The proposed project involves construction of an approximately 8,500 square foot single-family residence. Waste water generated by the City of Calabasas is treated at the Tapia Water Reclamation Facility, operated by Las Virgenes Municipal Water District (LVMWD). The Tapia Water Reclamation Facility has a capacity of 16 million gallons per day (mgd) and currently treats an average of 9.5 mgd (LVMWD, 2005). Therefore, there is a surplus capacity of 6.5 mgd. Based on the wastewater generation factor for a single-family residential unit, the proposed project would generate approximately 230 gallons per day or 0.00023 mgd (City of Los Angeles CEQA Thresholds Guide, 2006). Wastewater generated by the proposed project would account for less than 0.01% of the Tapia Water Reclamation Facility's surplus treatment capacity. Therefore, impacts to wastewater treatment systems would be **less than significant.**

c. Project development would convert approximately 4.5 acres of vacant land to residential use, of which approximately 0.5 acres would be developed with impervious surfaces, thereby increasing the amount of runoff that would be conveyed to the storm drain system. This topic is discussed under Section VIII e., *Hydrology and Water Quality*. Implementation of the requirements of the Los Angeles County Stormwater Ordinance and the City's RMP (Runoff Mitigation Plan) ordinance would reduce impacts to a **less than significant** level**.**

d. The proposed project would generate water demand. The residential development water use factor is 625 gpd per single family residential unit (2007 Integrated Potable Water Master Plan Update, LVMWD, 2007). The project's water supply would be provided by the Las Virgenes Municipal Water District (LVMWD). According to the 2007 Integrated Potable Water System Report (IPWSR), total water usage for the entire LVMWD service area is projected to increase from 20,946 AFY in 2005 to 30,700 AFY in 2030. The current peak demand is 36.3 mgd (July 25, 2006). These projections are based on a population of 69,335 persons in 2005 and 90,828 persons in 2030 for the LVMWD service area. The project's anticipated water demand would represent less than 0.0001% of the projected water demand. Therefore, the project would not result in a significant impact to the water supply of the City of Calabasas. However, because the project does not incorporate the City's water conservation performance objectives, impacts to water conservation would be **potentially significant unless mitigation is incorporated.**

e. Please see discussion under item a, b.

f, g. The Calabasas Landfill, located adjacent to the Ventura Freeway on Lost Hills Road, would receive the solid waste generated by the proposed project. The total capacity of the Calabasas

Landfill is 29.9 million tons and its remaining capacity is 8 million tons. Currently the Calabasas Landfill has a daily capacity of 3,500 tons/day and the average daily intake is 1,800 tons/day. Therefore, there is a surplus of 1,700 tons/day. Based on current intake rates, the Calabasas Landfill is expected to reach capacity in 2020. An increase in the population of the City of Calabasas would incrementally reduce the available capacity at the Calabasas Landfill. However, the solid waste generated by the proposed single-family residence would not have a significant impact on the permitted remaining capacity of the Calabasas Landfill. Furthermore the proposed project would be required to comply with the City of Calabasas Municipal Code regulations (§17.20.190) requiring recycling containers to reduce the amount solid waste directed to the landfill. Impacts would be **less than significant.**

Mitigation Measures

The following mitigation measure would reduce impacts to water conservation to a less than significant level.

U-1 **Water Conservation Techniques.** In order to meet the City's water conservation performance objectives, the following techniques shall be included:

- *Incorporation of drought tolerant and low water using plants; maximize preservation of natural vegetation.*
- *Incorporation of water conservation techniques into the design of the irrigation system through such techniques as mulching, installation of drip irrigation systems, landscape design to group plants of similar water demand, rain sensors and automatic irrigation systems.*
- *Clustering of landscaped areas to maximize the efficiency of the irrigation system; design of irrigation systems to eliminate watering of impervious surfaces.*
- *Installation of water conserving kitchen and bathroom fixtures and appliances, installation of thermostatically controlled mixing valves for baths and showers, and insulation of hot water lines.*

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
XVII. <u>MANDATORY FINDINGS OF SIGNIFICANCE</u> —				
a) Does the project have the potential to substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	■	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, and the effects of probable future projects)?	☐	☐	■	☐
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	■	☐

a. The proposed project would not have the potential to significantly degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory. The proposed project has the potential to adversely affect as-yet undiscovered cultural resources if they are found to exist within the project area. The project would result in the removal of one coast live oak tree, and has the potential to impact nesting bird species. These impacts are reduced to a less than significant level through incorporation of mitigation measures CR-1 through CR-2, and BIO-1 through BIO-2 respectively. Please refer to *Biological Resources* and *Cultural Resources* sections of this document for additional information that supports this finding.

b. The proposed project involves the construction of an approximately 8,500 square feet of single-family residential development in an area that the City of Calabasas has designated and zoned as Rural Residential, which allows residential uses. The project would not contribute to cumulative impacts.

c. The proposed project has significant, but mitigable environmental effects associated with geology and hazards, including hazards associated with wildfire . These effects can be mitigated to a level of insignificance through incorporation of mitigation measures as they are listed and discussed under each section. Refer to the discussions under each of these sections for additional information that supports this finding. No significant residual effects would occur after implementing the recommended mitigation.

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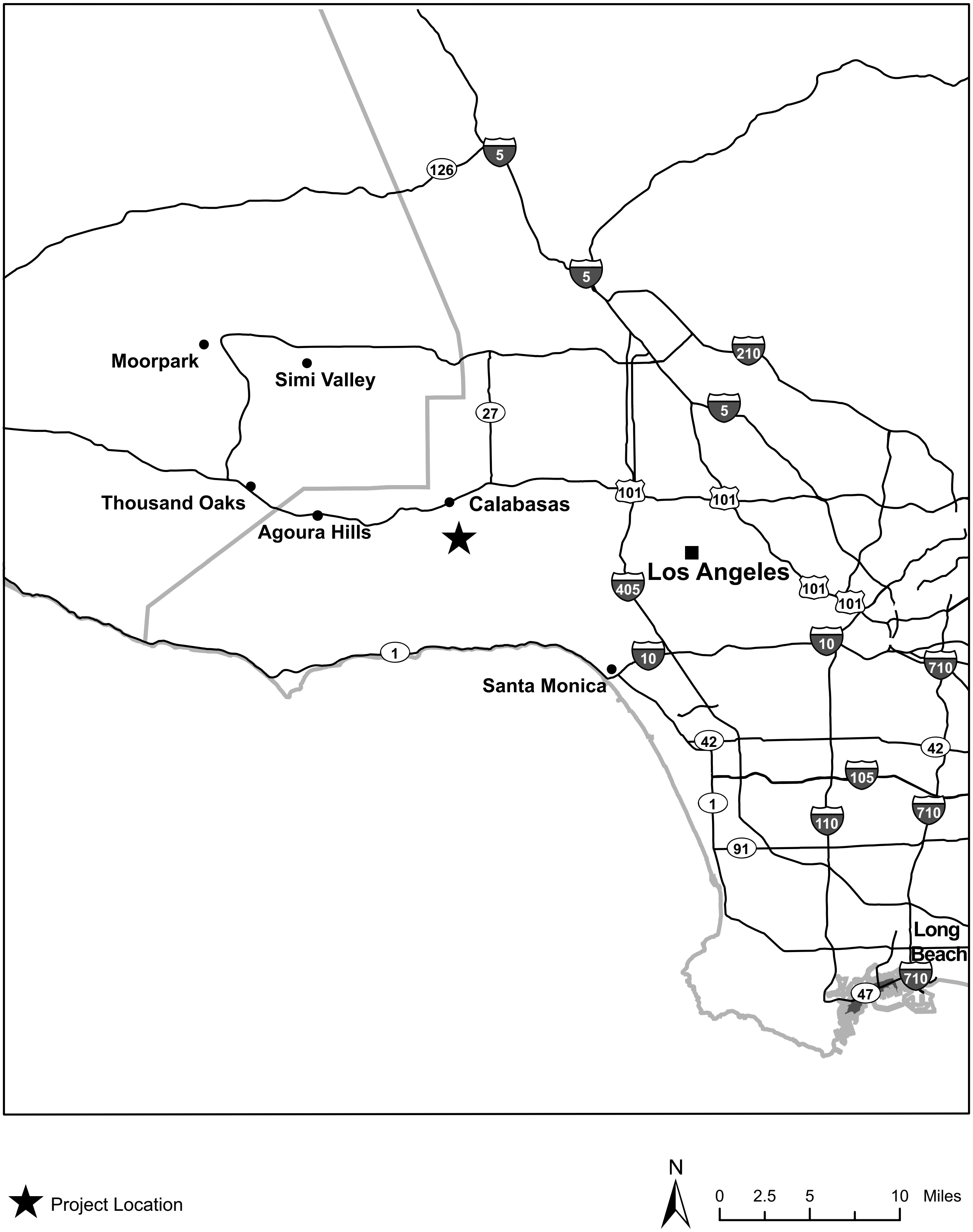
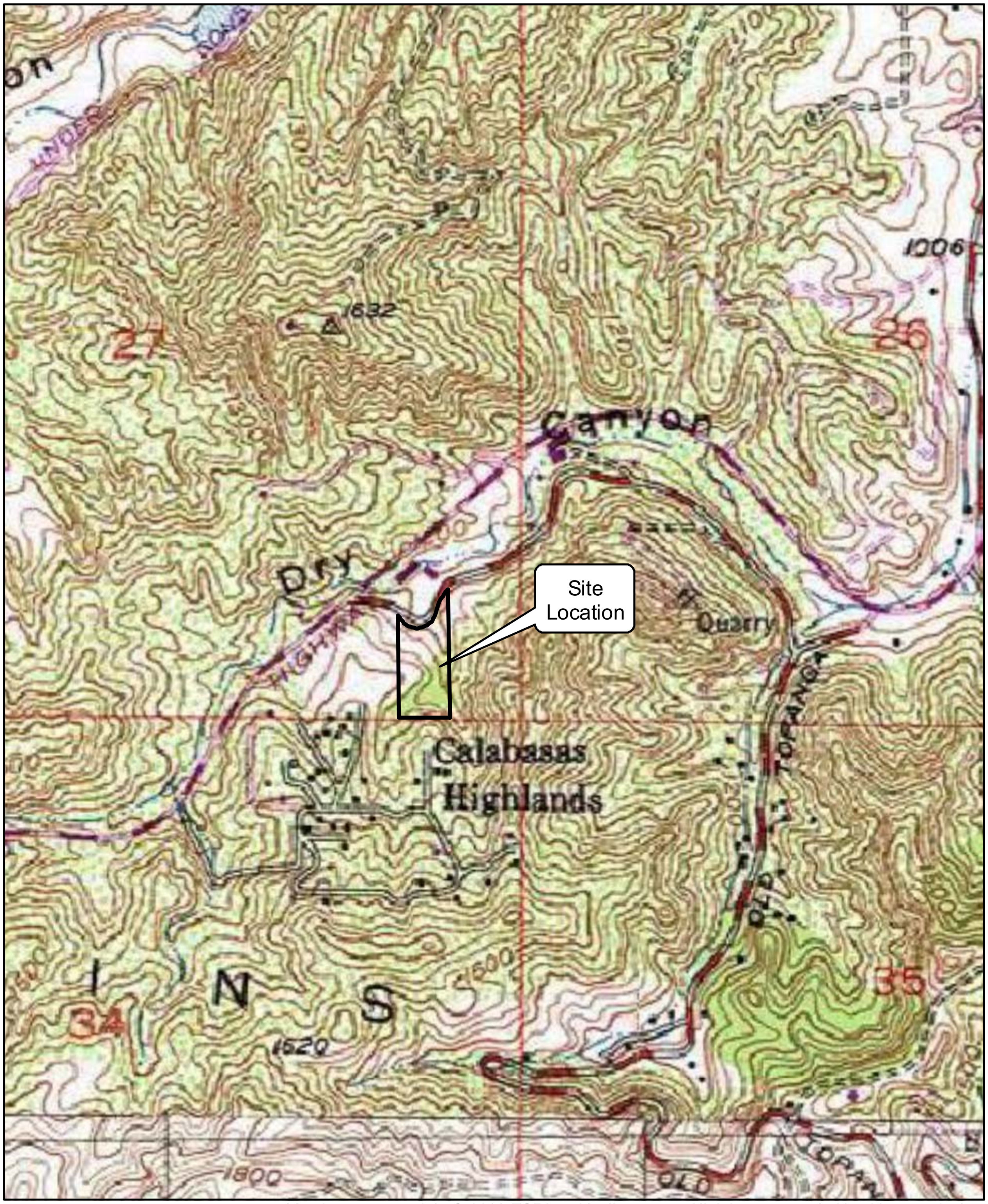
South Coast Air Quality Management District website, http://www.aqmd.gov/ceqa/handbook/LST/LST.html, accessed online June 2008.

Sergeant Price, Los Angeles County Sheriffs Department, Malibu/Lost Hills Station, August 26, 2008



Regional Location

Figure 1



Project Boundary

N

0 1,000 2,000 Feet

Site Location

Figure 2

City of Calabasas

Photo 1 - View of site from Dry Canyon Cold Creek Road.

Photo 2 - View of site and over Dry Canyon Cold Creek Road looking north.

Photo 3 - View of site and adjacent residences (Calabasas Highlands) looking south.

Photo 4 - View of site and adjacent residences (Calabasas Highlands) looking west/southwest.

Site Photos

Figure 3

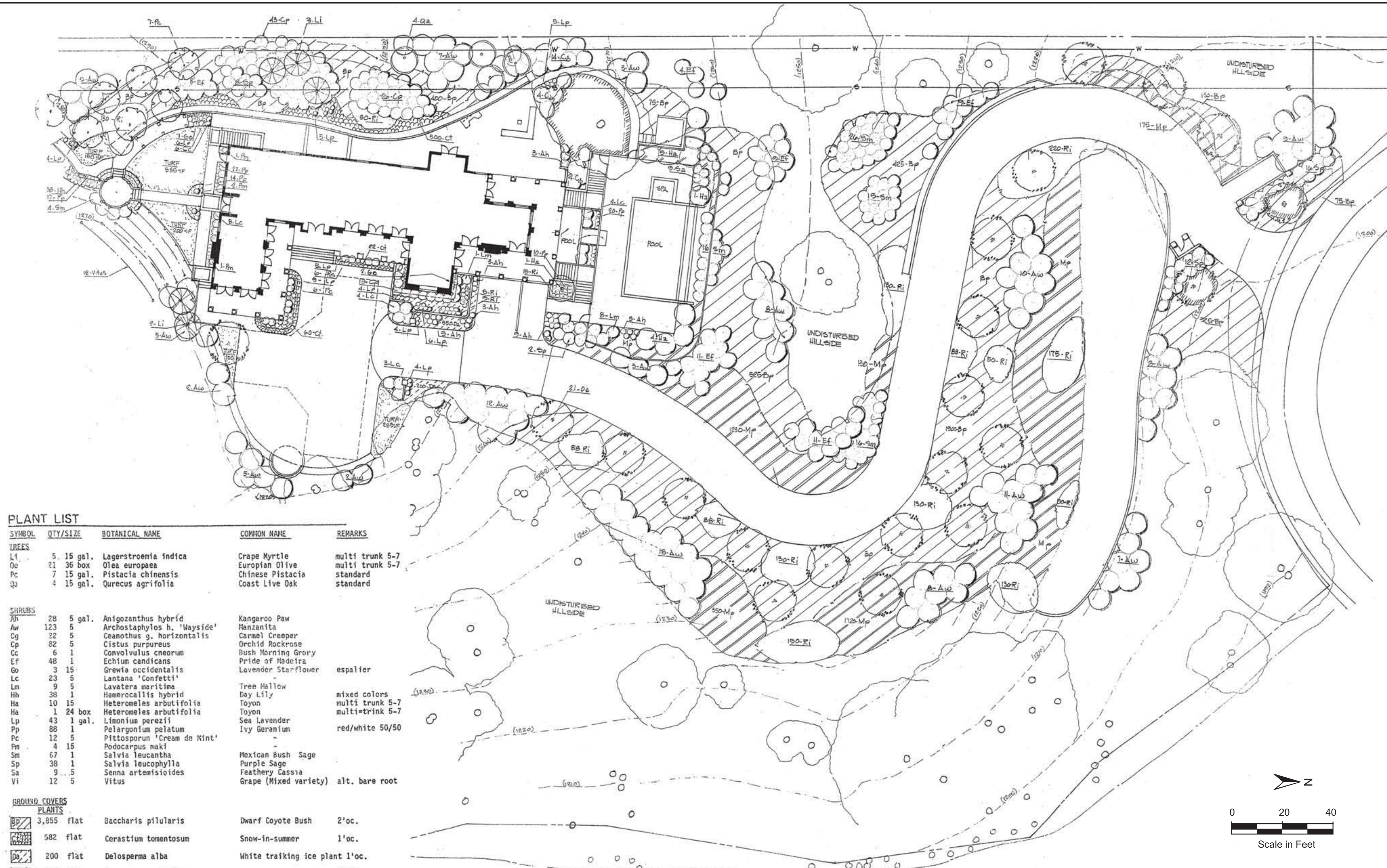
NOTES

1. Swimming pool 20' X 36' with 3' shallow end and 8' deep end. Finish with white plaster and tile to be selected by owner. Spa 8' X 8' with the same finish and tile.
2. Concrete decking 3½-4" thick with 3/8" rebar at 18" oc ea. way over 2" sand base. Color by L.M. Scofield Co. A-53-P Arizona Tan with slate finish. 3" satin brass drain grates by NDS #909B.
3. Concrete paving 3½-4" thick over 2" sand base. Color by L.M. SCofield Co. Arizona Tan with smooth steel trowel finish.
4. Concrete driveway by others.
5. Flagstone paving with 3/8" to ½" grout joints over 3½-4" concrete base with 3/8" rebar at 18" oc. ea. way. Color to be selected by owner.
6. Concrete paving 3½-4" thick over 2" sand base. Natural concrete with smooth trowel finish with 3/8" rebar at 18" oc. ea. way.
7. Wall see engineering drawings. Finish and color to match residence. Alternate: finish with 1/8" parge coat of portland cement plaster with 1/8" stucco coat over. Texture to match residence. Waterproofing by AVM system 500 (Aussie membrane): Waterproofing EXperts., Canoga Park, Ca. (818) 592-0505. Apply 2 coats to all surfaces below grade and 6" above grade. Install protection board on all sides in contact with soil.
8. CMU wall below paving, see engineering drawings.
9. CMU wall with concrete drain see engineer drawings.
10. Steps by Stepstone Inc. garden step, 18" X 24" with 3 X 4 X 24" riser
11. Natural concrete steps. Alt. landscape ties.
12. Steps see architectural drawings.
13. 3" perforated PVC pipe with gravel around, min. 4" all sides and a filter blanket between soil and gravel. Filter fabric by: Trevira spundond, Spartanberg, SC (800 845 -7597. See engineering drawings.
14. Sleeves see irrigation drawings. PVC sch. 40 see irrigation notes. Min. 3 sleeves at each location.
15. Handrail 36" high with pickets 4" min space between. Paint 2 coats primer and 2 coats color. Color to be selected by owner.
16. Coblestones 3-5" diameter.
17. Decomposed granite (DG) path 2" thick: level, water and roll.
18. Gazebo see detail. Tile floor or alt. flagstone see note 5.
19. Arbor see detail.
20. Arbor see detail.
21. Pool and falls see detail.
22. Barbecue see detail.
23. Pool security fence 5'-0" high with self closing and latching gates
24. CMU wall 8X8X16 see note #7.
25. Fireplace see detail.
26. Finial sphere on column see detail.

Site Plan

Figure 4

Drawing Source: Leslie A Dievendorf Architech, August 2007.



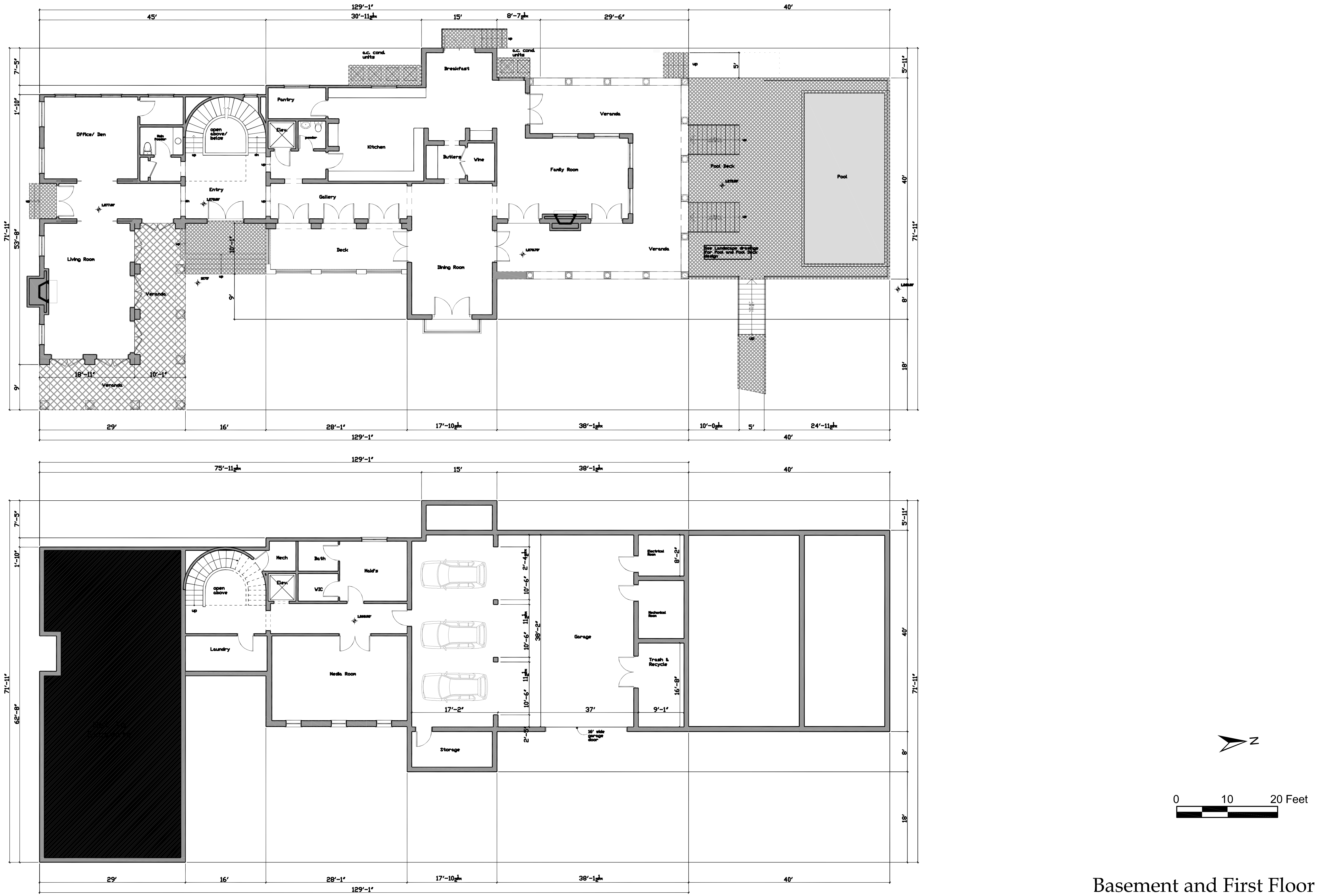
PLANT LIST

SYMBOL	QTY/SIZE		BOTANICAL NAME	COMMON NAME	REMARKS
TREES					
Li	5	15 gal.	Lagerstroemia indica	Crape Myrtle	multi trunk 5-7
Oe	21	36 box	Olea europaea	Europian Olive	multi trunk 5-7
Pc	7	15 gal.	Pistacia chinensis	Chinese Pistacia	standard
Qa	4	15 gal.	Qurecus agrifolia	Coast Live Oak	standard
SHRUBS					
Ah	28	5 gal.	Anigozanthus hybrid	Kangaroo Paw	
Aw	123	5	Archostaphylos h. 'Wayside'	Manzanita	
Cg	22	5	Ceanothus g. horizontalis	Carmel Creeper	
Cp	82	5	Cistus purpureus	Orchid Rockrose	
Cc	6	1	Convolvulus cneorum	Bush Morning Grory	
Ef	48	1	Echium candicans	Pride of Madeira	
Go	3	15	Grewia occidentalis	Lavender Starflower	espalier
Lc	23	5	Lantana 'Confetti'	-	
Lm	9	5	Lavatera maritima	Tree Mallow	
Hh	38	1	Hemerocallis hybrid	Day Lily	mixed colors
Ha	10	15	Heteromeles arbutifolia	Toyon	multi trunk 5-7
Ha	1	24 box	Heteromeles arbutifolia	Toyon	multi=trink 5-7
Lp	43	1 gal.	Limonium perezii	Sea Lavender	
Pp	88	1	Pelargonium pelatum	Ivy Geranium	red/white 50/50
Pc	12	5	Pittosporun 'Cream de Mint'	-	
Pm	4	15	Podocarpus maki	-	
Sm	67	1	Salvia leucantha	Mexican Bush Sage	
Sp	38	1	Salvia leucophylla	Purple Sage	
Sa	9	5	Senna artemisioides	Feathery Cassia	
Vi	12	5	Vitus	Grape (Mixed variety)	alt. bare root
GROUND COVERS	PLANTS				
Bp	3,855	flat	Baccharis pilularis	Dwarf Coyote Bush	2'oc.
Ct	582	flat	Cerastium tomentosum	Snow-in-summer	1'oc.
Da	200	flat	Delosperma alba	White traiking ice plant	1'oc.
Mp	3,505	flat	Myoporum parvifolium	-	1'-6" oc.
Ri	1,631	flat	Rosmarinus 'Irene'	Rosemary	1'-6" oc.
Turf	1,260	sf. sod	Marathon II		
	200	sf.	Annual color (in season)		1' oc.

Drawing Source: Leslie A Dievendorf Architech, August 2007.

Planting Plan

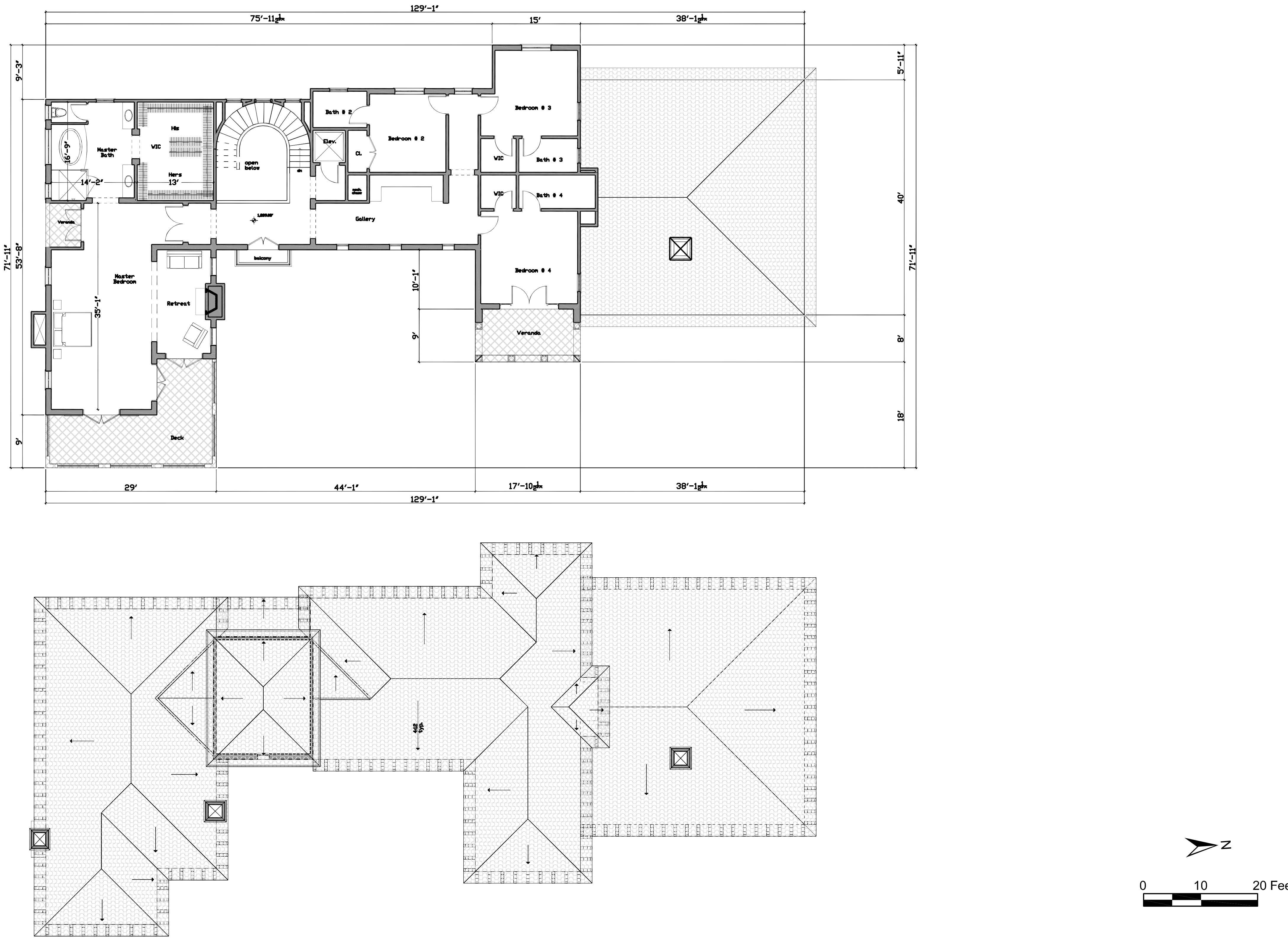
Figure 5



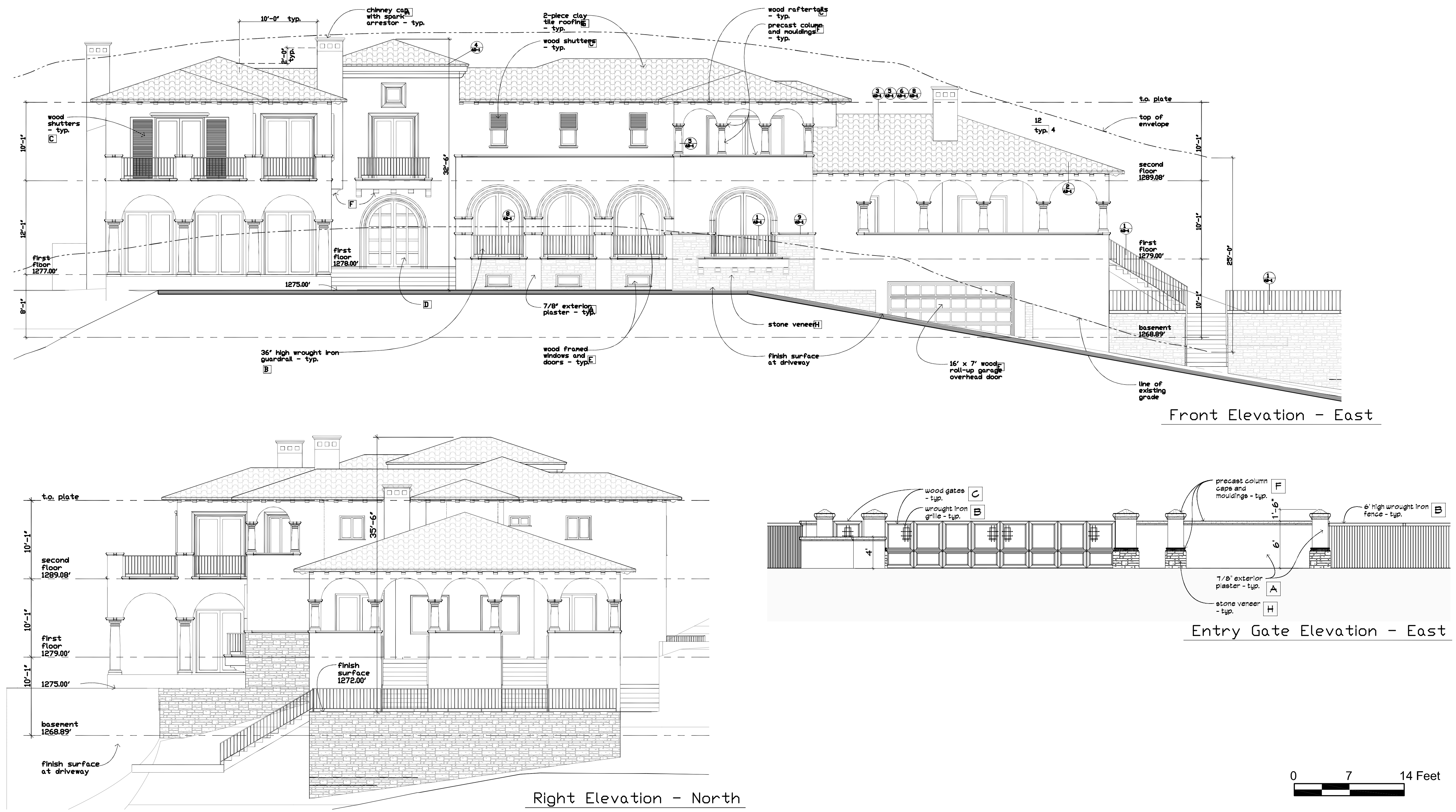
Basement and First Floor Plans

Figure 6a

Drawing Source: SIA Architural Design, May 2008.



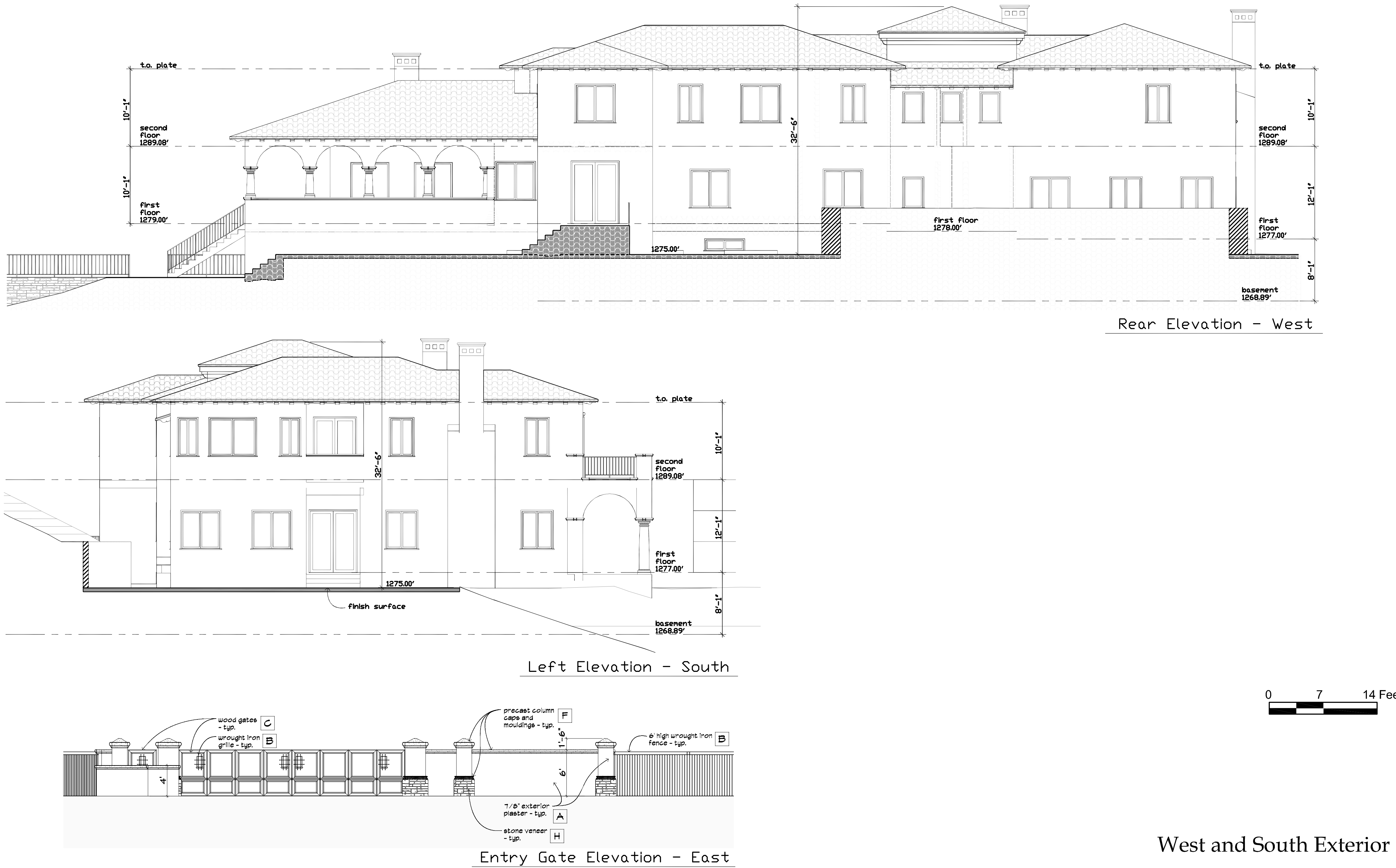
Second Floor and Roof Plan



East and North Exterior Elevations

Figure 7a

Drawing Source: SIA Architectural Design, May 2008.



West and South Exterior Elevations

Drawing Source: SIA Archirural Design, May 2008.

Figure 7b

Appendix A

Air Quality Data

rincon

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Urbemis 2007 Version 9.2.4

Combined Summer Emissions Reports (Pounds/Day)

File Name: L:\ESP\LA Co\Calabasas\06-60410 SR-4 Residence IS-MND\Other\URBEMIS.urb924

Project Name: SR 4 Residence - Calabasas

Project Location: South Coast AQMD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

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Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2008 TOTALS (lbs/day unmitigated)	8.99	66.90	36.56	0.01	22.43	3.99	26.42	4.69	3.67	8.36	5,817.14
2009 TOTALS (lbs/day unmitigated)	6.96	35.04	23.48	0.00	0.02	2.77	2.78	0.01	2.55	2.55	3,249.92

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	0.06	0.02	0.06	0.00	0.00	0.00	20.86

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	0.11	0.14	1.31	0.00	0.20	0.04	119.79

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	0.17	0.16	1.37	0.00	0.20	0.04	140.65

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

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Time Slice 11/3/2008-11/28/2008 Active Days: 20	3.35	28.07	14.77	0.00	22.41	1.41	23.82	4.68	1.30	5.98	2,371.80
Fine Grading 11/03/2008-12/15/2008	3.35	28.07	14.77	0.00	22.41	1.41	23.82	4.68	1.30	5.98	2,371.80
Fine Grading Dust	0.00	0.00	0.00	0.00	22.40	0.00	22.40	4.68	0.00	4.68	0.00
Fine Grading Off Road Diesel	3.31	28.00	13.56	0.00	0.00	1.41	1.41	0.00	1.30	1.30	2,247.32
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.04	0.07	1.21	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.49
Time Slice 12/1/2008-12/12/2008 Active Days: 10	5.72	48.26	24.45	0.00	22.41	2.42	24.83	4.68	2.22	6.91	4,210.93
Fine Grading 11/03/2008-12/15/2008	3.35	28.07	14.77	0.00	22.41	1.41	23.82	4.68	1.30	5.98	2,371.80
Fine Grading Dust	0.00	0.00	0.00	0.00	22.40	0.00	22.40	4.68	0.00	4.68	0.00
Fine Grading Off Road Diesel	3.31	28.00	13.56	0.00	0.00	1.41	1.41	0.00	1.30	1.30	2,247.32
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.04	0.07	1.21	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.49
Trenching 12/01/2008-12/15/2008	2.37	20.19	9.68	0.00	0.01	1.00	1.01	0.00	0.92	0.92	1,839.12
Trenching Off Road Diesel	2.33	20.12	8.46	0.00	0.00	1.00	1.00	0.00	0.92	0.92	1,714.64
Trenching Worker Trips	0.04	0.07	1.21	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.49

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Time Slice 12/15/2008-12/15/2008 Active Days: 1	8.99	66.90	36.56	0.01	22.43	3.99	26.42	4.69	3.67	8.36	5,817.14
Asphalt 12/15/2008-01/09/2009	3.27	18.64	12.11	0.00	0.01	1.57	1.59	0.01	1.45	1.45	1,606.21
Paving Off-Gas	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	2.99	17.76	9.40	0.00	0.00	1.54	1.54	0.00	1.41	1.41	1,272.04
Paving On Road Diesel	0.05	0.73	0.29	0.00	0.00	0.03	0.03	0.00	0.03	0.03	85.20
Paving Worker Trips	0.08	0.15	2.43	0.00	0.01	0.01	0.02	0.00	0.01	0.01	248.97
Fine Grading 11/03/2008-12/15/2008	3.35	28.07	14.77	0.00	22.41	1.41	23.82	4.68	1.30	5.98	2,371.80
Fine Grading Dust	0.00	0.00	0.00	0.00	22.40	0.00	22.40	4.68	0.00	4.68	0.00
Fine Grading Off Road Diesel	3.31	28.00	13.56	0.00	0.00	1.41	1.41	0.00	1.30	1.30	2,247.32
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.04	0.07	1.21	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.49
Trenching 12/01/2008-12/15/2008	2.37	20.19	9.68	0.00	0.01	1.00	1.01	0.00	0.92	0.92	1,839.12
Trenching Off Road Diesel	2.33	20.12	8.46	0.00	0.00	1.00	1.00	0.00	0.92	0.92	1,714.64
Trenching Worker Trips	0.04	0.07	1.21	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.49
Time Slice 12/16/2008-12/31/2008 Active Days: 12	3.27	18.64	12.11	0.00	0.01	1.57	1.59	0.01	1.45	1.45	1,606.21
Asphalt 12/15/2008-01/09/2009	3.27	18.64	12.11	0.00	0.01	1.57	1.59	0.01	1.45	1.45	1,606.21
Paving Off-Gas	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	2.99	17.76	9.40	0.00	0.00	1.54	1.54	0.00	1.41	1.41	1,272.04
Paving On Road Diesel	0.05	0.73	0.29	0.00	0.00	0.03	0.03	0.00	0.03	0.03	85.20
Paving Worker Trips	0.08	0.15	2.43	0.00	0.01	0.01	0.02	0.00	0.01	0.01	248.97

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Time Slice 1/1/2009-1/2/2009 Active Days: 2	3.08	17.66	11.79	0.00	0.01	1.49	1.51	0.01	1.37	1.38	1,606.10
Asphalt 12/15/2008-01/09/2009	3.08	17.66	11.79	0.00	0.01	1.49	1.51	0.01	1.37	1.38	1,606.10
Paving Off-Gas	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	2.81	16.83	9.27	0.00	0.00	1.46	1.46	0.00	1.34	1.34	1,272.04
Paving On Road Diesel	0.05	0.69	0.26	0.00	0.00	0.03	0.03	0.00	0.03	0.03	85.20
Paving Worker Trips	0.07	0.14	2.25	0.00	0.01	0.01	0.02	0.00	0.01	0.01	248.86
Time Slice 1/5/2009-1/9/2009 Active Days: 5	6.96	35.04	23.48	0.00	0.02	2.77	2.78	0.01	2.55	2.55	3,249.92
Asphalt 12/15/2008-01/09/2009	3.08	17.66	11.79	0.00	0.01	1.49	1.51	0.01	1.37	1.38	1,606.10
Paving Off-Gas	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	2.81	16.83	9.27	0.00	0.00	1.46	1.46	0.00	1.34	1.34	1,272.04
Paving On Road Diesel	0.05	0.69	0.26	0.00	0.00	0.03	0.03	0.00	0.03	0.03	85.20
Paving Worker Trips	0.07	0.14	2.25	0.00	0.01	0.01	0.02	0.00	0.01	0.01	248.86
Building 01/05/2009-10/09/2009	3.88	17.38	11.68	0.00	0.00	1.28	1.28	0.00	1.17	1.17	1,643.82
Building Off Road Diesel	3.87	17.35	11.50	0.00	0.00	1.28	1.28	0.00	1.17	1.17	1,621.20
Building Vendor Trips	0.00	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.70
Building Worker Trips	0.01	0.01	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.92
Time Slice 1/12/2009-9/11/2009 Active Days: 175	3.88	17.38	11.68	0.00	0.00	1.28	1.28	0.00	1.17	1.17	1,643.82
Building 01/05/2009-10/09/2009	3.88	17.38	11.68	0.00	0.00	1.28	1.28	0.00	1.17	1.17	1,643.82
Building Off Road Diesel	3.87	17.35	11.50	0.00	0.00	1.28	1.28	0.00	1.17	1.17	1,621.20
Building Vendor Trips	0.00	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.70
Building Worker Trips	0.01	0.01	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.92

Time Slice 9/14/2009-10/9/2009 Active Days: 20	4.54	17.38	11.72	0.00	0.00	1.28	1.28	0.00	1.17	1.18	1,647.60
Building 01/05/2009-10/09/2009	3.88	17.38	11.68	0.00	0.00	1.28	1.28	0.00	1.17	1.17	1,643.82
Building Off Road Diesel	3.87	17.35	11.50	0.00	0.00	1.28	1.28	0.00	1.17	1.17	1,621.20
Building Vendor Trips	0.00	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.70
Building Worker Trips	0.01	0.01	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.92
Coating 09/14/2009-10/09/2009	0.66	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.78
Architectural Coating	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.78

Phase Assumptions

Phase: Fine Grading 11/3/2008 - 12/15/2008 - Default Fine Site Grading/Excavation Description

Total Acres Disturbed: 4.5

Maximum Daily Acreage Disturbed: 1.12

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

1 Graders (174 hp) operating at a 0.61 load factor for 6 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Trenching 12/1/2008 - 12/15/2008 - Default Trenching Description

Off-Road Equipment:

2 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

1 Other General Industrial Equipment (238 hp) operating at a 0.51 load factor for 8 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 0 hours per day

Phase: Paving 12/15/2008 - 1/9/2009 - Default Paving Description

Acres to be Paved: 1.12

Off-Road Equipment:

4 Cement and Mortar Mixers (10 hp) operating at a 0.56 load factor for 6 hours per day

1 Pavers (100 hp) operating at a 0.62 load factor for 7 hours per day

1 Paving Equipment (104 hp) operating at a 0.53 load factor for 8 hours per day

1 Rollers (95 hp) operating at a 0.56 load factor for 7 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

Phase: Building Construction 1/5/2009 - 10/9/2009 - Default Building Construction Description

Off-Road Equipment:

1 Cranes (399 hp) operating at a 0.43 load factor for 6 hours per day

2 Forklifts (145 hp) operating at a 0.3 load factor for 6 hours per day

1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

3 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 9/14/2009 - 10/9/2009 - Default Architectural Coating Description

Rule: Residential Interior Coatings begins 1/1/2005 ends 6/30/2008 specifies a VOC of 100

Rule: Residential Interior Coatings begins 7/1/2008 ends 12/31/2040 specifies a VOC of 50

Rule: Residential Exterior Coatings begins 1/1/2005 ends 6/30/2008 specifies a VOC of 250

Rule: Residential Exterior Coatings begins 7/1/2008 ends 12/31/2040 specifies a VOC of 100

Rule: Nonresidential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Nonresidential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

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Area Source Unmitigated Detail Report:

AREA SOURCE EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

Source	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
Natural Gas	0.00	0.02	0.01	0.00	0.00	0.00	20.79
Hearth - No Summer Emissions							
Landscape	0.01	0.00	0.05	0.00	0.00	0.00	0.07
Consumer Products	0.05						
Architectural Coatings	0.00						
TOTALS (lbs/day, unmitigated)	0.06	0.02	0.06	0.00	0.00	0.00	20.86

Area Source Changes to Defaults

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
Single family housing	0.11	0.14	1.31	0.00	0.20	0.04	119.79
TOTALS (lbs/day, unmitigated)	0.11	0.14	1.31	0.00	0.20	0.04	119.79

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2009 Temperature (F): 80 Season: Summer

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Single family housing	4.50	11.43	dwelling units	1.00	11.43	115.48
					11.43	115.48

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	51.6	1.4	98.2	0.4
Light Truck < 3750 lbs	7.4	2.7	93.2	4.1
Light Truck 3751-5750 lbs	22.9	0.4	99.6	0.0
Med Truck 5751-8500 lbs	10.6	0.9	99.1	0.0
Lite-Heavy Truck 8501-10,000 lbs	1.6	0.0	81.2	18.8
Lite-Heavy Truck 10,001-14,000 lbs	0.5	0.0	60.0	40.0
Med-Heavy Truck 14,001-33,000 lbs	0.9	0.0	22.2	77.8
Heavy-Heavy Truck 33,001-60,000 lbs	0.5	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.1	0.0	0.0	100.0
Motorcycle	2.8	71.4	28.6	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.9	0.0	88.9	11.1

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	12.7	7.0	9.5	13.3	7.4	8.9

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Rural Trip Length (miles)	17.6	12.1	14.9	15.4	9.6	12.6
Trip speeds (mph)	30.0	30.0	30.0	30.0	30.0	30.0
% of Trips - Residential	32.9	18.0	49.1			

% of Trips - Commercial (by land use)

Summary of Five Acre Site Example Results By Phase

Total On-Site

	CO	NOx	PM10	PM2.5
Demolition	23.4	46.0	2.7	2.4
Site Preparation	47.4	95.6	9.5	5.5
Grading	34.8	76.6	7.0	4.4
Building	22.6	52.4	3.1	2.9
Arch Coating and Paving	18.4	38.1	2.7	2.4
Localized Significance Threshold*	1014	295	11	6
Exceed Significance?	NO	NO	NO	NO

* For illustration purposes only, this analysis is based on the most stringent LSTs. Please consult App. C of the Methodology Paper for applicable LSTs.

Summary of Five Acre Site Example Results By Phase and Equipment

Demolition of Existing 164,00 Square Foot Structure

Vehicle Description	No. of Vehicle	Hours	Trips	Length	CO	NOx	PM10	PM2.5
Concrete/Industrial Saws	1	7.0			3.14	5.35	0.45	0.41
Rubber Tired Dozers	1	8.0			13.56	27.31	1.18	1.08
Tractors/Loaders/Backhoes	2	8.0			6.63	13.29	1.02	0.94
Haul Trucks			10	0.1	0.03	0.09	0.005	0.004
Total Onsite Emissions					**23.4**	**46.0**	**2.7**	**2.4**
Localized Significance Threshold*					**1014**	**295**	**11**	**6**
Exceed Significance?					**NO**	**NO**	**NO**	**NO**

Site Preparation

Vehicle Description	No. of Vehicle	Hours	Trips	Length	CO	NOx	PM10	PM2.5
Rubber Tired Dozers	3	7.0			35.59	71.70	4.79	3.20
Tractors/Loaders/Backhoes	4	7.0			11.60	23.25	4.64	2.25
Haul Trucks			44	0.1	0.13	0.42	0.020	0.019
Water Trucks			3	0.7	0.06	0.20	0.01	0.01
Total Onsite Emissions					**47.4**	**95.6**	**9.5**	**5.5**
Localized Significance Threshold*					**1014**	**295**	**11**	**6**
Exceed Significance?					**NO**	**NO**	**NO**	**NO**

Grading

Vehicle Description	No. of Vehicle	Hours	Trips	Length	CO	NOx	PM10	PM2.5
Rubber Tired Dozers	1	8.0			13.56	27.31	1.18	1.08
Graders	2	8.0			10.74	27.52	1.42	1.30
Tractors/Loaders/Backhoes	3	8.0			9.94	19.93	4.21	1.97
Haul Trucks			7	0.1	0.02	0.07	0.006	0.003
Water Trucks			3	6.4	0.56	1.81	0.17	0.08
Total Onsite Emissions					**34.8**	**76.6**	**7.0**	**4.4**
Localized Significance Threshold*					**1014**	**295**	**11**	**6**
Exceed Significance?					**NO**	**NO**	**NO**	**NO**

Building of 164,00 Square Foot Structure

Vehicle Description	No. of Vehicle	Hours	Trips	Length	CO	NOx	PM10	PM2.5
Cranes	1	7.0			4.46	11.86	0.53	0.49
Forklifts	3	8.0			5.99	15.43	0.83	0.76
Tractors/Loaders/Backhoes	3	7.0			8.70	17.44	1.34	1.24
Generator Sets	1	8.0			2.84	5.80	0.36	0.33
Electric Welders	1	8.0			N/A	N/A	N/A	N/A
Haul Trucks			3	0.1	0.01	0.03	0.0014	0.0013
Water Trucks			3	6.4	0.56	1.81	0.09	0.08
Total Onsite Emissions					**22.6**	**52.4**	**3.1**	**2.9**
Localized Significance Threshold*					**1014**	**295**	**11**	**6**
Exceed Significance?					**NO**	**NO**	**NO**	**NO**

* Illustration purpose showing the most stringent LSTs. Please consult App. C of the Methodology Paper for applicable LSTs.

Summary of Five Acre Site Example Results By Phase and Equipment

Architectural Coating and Asphalt Paving of Parking Lot

Vehicle Description	No. of Vehicle	Hours	Trips	Length	CO	NOx	PM10	PM2.5
Pavers	1	8.0			4.80	9.03	0.64	0.59
Rollers	1	8.0			3.54	7.26	0.50	0.46
Paving Equipment	2	6.0			5.63	12.40	0.85	0.78
Cement and Mortar Mixers	2	6.0			0.55	0.83	0.06	0.05
Tractors/Loaders/Backhoes	1	8.0			3.31	6.64	0.51	0.47
Haul Trucks			9	0.1	0.03	0.08	0.004	0.004
Water Trucks			3	6.4	0.56	1.81	0.09	0.08
Total Onsite Emissions					**18.4**	**38.1**	**2.7**	**2.4**
Localized Significance Threshold*					**1014**	**295**	**11**	**6**
Exceed Significance?					**NO**	**NO**	**NO**	**NO**

* For illustration purposes only, this analysis is based on the most stringent LSTs. Please consult App. C of the Methodology Paper for

Five Acre Site Example - Demolition Phase

Example		Construction Activity
Five Acre Site		Demolition of Existing 0 Square Foot Structure[a]
Demolition Schedule -	20 days[a]	

Equipment Type[a,b]	No. of Equipment	hr/day	Crew Size
Concrete/Industrial Saws	1	7.0	8
Rubber Tired Dozers	1	8.0	
Tractors/Loaders/Backhoes	2	8.0	

Construction Equipment Emission Factors

Equipment Type[c]	CO lb/hr	NOx lb/hr	PM10 lb/hr
Concrete/Industrial Saws	0.449	0.764	0.064
Rubber Tired Dozers	1.695	3.414	0.147
Tractors/Loaders/Backhoes	0.414	0.830	0.064

Building Dimensions

Description[a]	Width of Building ft	Length of Building ft	Height of Building ft
Total Project	40	120	50

Fugitive Dust Material Handling

Aerodynamic Particle Size Multiplier[d]	Mean Wind Speed[e] mph	Moisture Content[f]	Debris Handled[g] ton/day
0.35	10	2.0	0

Construction Vehicle (Mobile Source) Emission Factors

	CO lb/mile	NOx lb/mile	PM10 lb/mile
Heavy-Duty Truck[h]	0.014462	0.047182	0.002309

Five Acre Site Example - Demolition Phase

Construction Worker Number of Trips and Trip Length

Vehicle	No. of One-Way Trips/Day	Trip Length (miles)
Haul Truck	10	0.1

Incremental Increase in Onsite Combustion Emissions from Construction Equipment

Equation: Emission Factor (lb/BHP-hr) x No. of Equipment x Work Day (hr/day) x Equipment rating (hp) x Load Factor (%/100) = Onsite Construction Emissions (lb/day)

Equipment Type	CO lb/day	NOx lb/day	PM10 lb/day
Concrete/Industrial Saws	3.14	5.35	0.45
Rubber Tired Dozers	13.56	27.31	1.18
Tractors/Loaders/Backhoes	6.63	13.29	1.02
Total	**23.3**	**45.9**	**2.6**

Incremental Increase in Onsite Fugitive Dust Emissions from Construction Equipment

Material Handling[k]: (0.0032 x Aerodynamic Particle Size Multiplier x (wind speed (mph)/5)$^{1.3}$/(moisture content/2)$^{1.4}$ x debris handled (ton/day)) x (1 - control efficiency) = PM10 Emissions (lb/day)

Description	Control Efficiency %	PM10 Mitigated[m] lb/day
Material Handling (Demolition)[l]	68	0.00
Material Handling (Debris)	68	0.00
Total		**0.00**

Incremental Increase in Onsite Combustion Emissions from Onroad Mobile Vehicles

Equation: Emission Factor (lb/mile) x No. of One-Way Trips/Day x 2 x Trip length (mile) = Mobile Emissions (lb/day)

Vehicle	CO lb/day	NOx lb/day	PM10 lb/day
Offsite (Haul Truck)	0.03	0.09	0.005
Total	**0.03**	**0.09**	**0.005**

Five Acre Site Example - Demolition Phase

Total Incremental Localized Emissions from Construction Activities			
	CO	**NOx**	**PM10**
Sources	lb/day	lb/day	lb/day
On-site Emissions (Mitigated)	**23.4**	**46.0**	**2.7**
Significance Threshold[n]	*1014*	*295*	*11*
Exceed Significance?	**NO**	**NO**	**NO**

Combustion and Fugitive Summary	**PM2.5 Fraction**[o]	**PM10**	**PM2.5**
		lb/day	lb/day
Combustion (Offroad)	0.92	2.6	2.4
Combustion (Onroad)	0.96	0.00	0.00
Fugitive	0.21	0.00	0.00
Total		**2.7**	**2.4**
Significance Threshold[n]			**6**
Exceed Significance?			**NO**

Five Acre Site Example - Demolition Phase

Notes:

Project specific data may be entered into shaded cells. Changing the values in the shaded cells will not affect the integrity of the worksheets. Verify that units of values entered match units for cell.

Adding lines or entering values with units different than those associated with the shaded cells may alter the integrity of the sheets or produce incorrect results.

a) SCAQMD, estimated from survey data, Sept 2004

b) Equipment name must match CARB Off-Road Model (see Off-Road Model EF worksheet) equipment name for sheet to look up EFs automatically.

c) SCAB values provided by the ARB, Oct 2006. Assumed equipment is diesel fueled.

d) USEPA, AP-42, Jan 1995, Section 13.2.4 Aggregate Handling and Storage Piles, p 13.2.4-3 Aerodynamic particle size multiplier for < 10 µm

e) Mean wind speed - maximum of daily average wind speeds reported in 1981 meteorological data.

f) USEPA, Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures, equation 2-13, p 2-28

g) USEPA, Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures, p 2-28. Debris weight to area ratio = 0.046 ton/sq ft
(0,000 sq ft x 0.046 ton/sq ft)/20 days = 0 ton/day

h) CARB, EMFAC2007 (version 2.3) Burden Model, Winter 2007, 75 F, 40% RH: EF, lb/yr = (EF, ton/yr x 2,000 lb/ton)/VMT

i) Assumed 30 cubic yd truck capacity [(0 tons/day x 2,000 lb/ton x cyd/1,620 lb = 0 cyd)/30 cyd/truck = 10 one-way truck trips/day, where building debris density is assumed to be 1,620 lb/cyd]
Mulitple trucks may be used.

j) Assumed trucks travel 0.1 mile through project site.

k) USEPA, Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures, equation 2-13, p 2-28. EPA suggusts using the material handling equation for demolition emission estimates.

l) EPA suggests using the material handling equation for demolition emission estimates.

m) Includes watering at least three times a day per Rule 403 (68% control efficiency)

n) Illustration purpose showing the most stringent LSTs. Please consult App. C of the Methodology Paper for applicable LSTs.

o) ARB's CEIDARS database PM2.5 fractions - construction dust category for fugitive and diesel vehicle exhaust category for combustion.

Five Acre Site Example - Site Preparation Phase

Example	Construction Activity	
Five Acre Site	Site Preparation	21,663 Square Feet[a]

Site Preparation Schedule - 5 days[a]

Equipment Type[a,b]	No. of Equipment	hr/day	Crew Size
Rubber Tired Dozers	3	7.0	10
Tractors/Loaders/Backhoes	4	7.0	

Construction Equipment Emission Factors

Equipment Type[c]	CO lb/hr	NOx lb/hr	PM10 lb/hr
Rubber Tired Dozers	1.695	3.414	0.147
Tractors/Loaders/Backhoes	0.414	0.830	0.064

Fugitive Dust Clearing Parameters

Silt Content[d]	Moisture Content[d]
6.9	7.9

Fugitive Dust Stockpiling Parameters

Silt Content[d]	Precipitation Days[e]	Mean Wind Speed Percent[f]	TSP Fraction	Area[g] (acres)
6.9	10	100	0.5	0.21

Fugitive Dust Material Handling

Aerodynamic Particle Size Multiplier[h]	Mean Wind Speed[i] mph	Moisture Content[d]	Dirt Handled[a] cy	Debris Handled[a] cy	Dirt Handled[j] lb/day
0.35	10	7.9	6,287	185	3,143,500

Construction Vehicle (Mobile Source) Emission Factors

	CO lb/mile	NOx lb/mile	PM10 lb/mile
Heavy-Duty Truck[k]	0.014462	0.047182	0.002309

Five Acre Site Example - Site Preparation Phase

Construction Worker Number of Trips and Trip Length

Vehicle	No. of One-Way Trips/Day	One WayTrip Length (miles)
Haul Truck[l]	44	0.1
Water Truck[m]	3	0.7

Incremental Increase in Onsite Combustion Emissions from Construction Equipment

Equation: Emission Factor (lb/BHP-hr) x No. of Equipment x Work Day (hr/day) x Equipment rating (hp) x Load Factor (%/100) = Onsite Construction Emissions (lb/day)

Equipment Type	CO lb/day	NOx lb/day	PM10 lb/day
Rubber Tired Dozers	35.59	71.70	3.10
Tractors/Loaders/Backhoes	11.60	23.25	1.79
Total	**47.2**	**94.9**	**4.89**

Incremental Increase in Fugitive Dust Emissions from Construction Operations

Equations:

Clearing[n]: PM10 Emissions (lb/day) = 0.75 x (silt content$^{1.5}$)/(moisture content$^{1.4}$) x hours operated (hr/day) x (1 - control efficiency)

Storage Piles[o]: PM10 Emissions (lb/day) = 1.7 x (silt content/1.5) x ((365-precipitation days)/235) x wind speed percent/15 x TSP fraction x Area) x (1 - control efficiency)

Material Handling[p]: PM10 Emissions (lb/day) = (0.0032 x aerodynamic particle size multiplier x (wind speed (mph)/5)$^{1.3}$/(moisture content/2)$^{1.4}$ x dirt handled (lb/day)/2,000 (lb/ton)
(1 - control efficiency)

Description	Control Efficiency %	PM10[q] lb/day
Clearing	68	1.69
Storage Piles	68	2.65
Material Handling	68	0.20
Total		**4.54**

Five Acre Site Example - Site Preparation Phase

Incremental Increase in Onsite Combustion Emissions from Onroad Mobile Vehicles

Equation: Emission Factor (lb/mile) x No. of One-Way Trips/Day x 2 x Trip length (mile) = Mobile Emissions (lb/day)

	CO	NOx	PM10
Vehicle	lb/day	lb/day	lb/day
Haul Truck	0.13	0.42	0.02
Water Truck	0.06	0.2	0.01
Total	**0.19**	**0.62**	**0.03**

Total Incremental Localized Emissions from Construction Activities

	CO	NOx	PM10
Sources	lb/day	lb/day	lb/day
On-site Emissions	**47.4**	**95.6**	**9.5**
Significance Threshold[r]	*1014*	*295*	*11*
Exceed Significance?	NO	NO	NO

Combustion and Fugitive Summary	PM2.5 Fraction[s]	PM10	PM2.5
		lb/day	lb/day
Combustion (Offroad)	0.92	4.9	4.5
Combustion (Onroad)	0.96	0.03	0.03
Fugitive	0.21	4.5	1.0
Total		**9.5**	**5.5**
Significance Threshold[r]			**6**
Exceed Significance?			**NO**

Notes:

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a) SCAQMD, estimated from survey data, Sept 2004

b) Equipment name must match CARB Off-Road Model (see Off-Road Model EF worksheet) equipment name for sheet to look up EFs automatically.

c) SCAB values provided by the ARB, Oct 2006. Assumed equipment is diesel fueled.

d) USEPA, AP-42, July 1998, Table 11.9-3 Typical Values for Corection Factors Applicable to the Predictive Emission Factor Equations

e) Table A9-9-E2, SCAQMD CEQA Air Quality Handbook, 1993

f) Mean wind speed percent - percent of time mean wind speed exceeds 12 mph

g) Assumed storage piles are 0.21 acres in size

h) USEPA, AP-42, Jan 1995, Section 13.2.4 Aggregate Handling and Storage Piles, p 13.2.4-3 Aerodynamic particle size multiplier for < 10 µm

i) Mean wind speed - maximum of daily average wind speeds reported in 1981 meteorological data.

j) Assuming 6,287 cubic yards of dirt handled [(6,287 cyd x 2,500 lb/cyd)/5 days = 3,143,500 lb/day]

Five Acre Site Example - Site Preparation Phase

k) CARB, EMFAC2007 (version 2.3) Burden Model, Winter 2007, 75 F, 40% RH: EF, lb/yr = (EF, ton/yr x 2,000 lb/ton)/VMT

l) Assumed 30 cubic yd truck capacity 6,287 cyd of dirt and 185 cyd of debris [(6,472 cyd x truck/30 cyd)/5 days = 44 one-way truck trips]. Assumed haul truck travels 0.1 miles through facility

m) Assumed six foot wide water truck traverses over 21,663 square feet of disturbed area

n) USEPA, AP-42, July 1998, Table 11.9-1, Equation for bulldozer, overburden, ≤ 10 μm

o) USEPA, AP-42, Jan 1995, Section 13.2.4 Aggregate Handling and Storage Piles, Equation 1

p) USEPA, Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures, Sept 1992, EPA-450/2-92-004, Equation 2-12

q) Includes watering at least three times a day per Rule 403 (68% control efficiency).

r) Illustration purpose showing the most stringent LSTs. Please consult App. C of the Methodology Paper for applicable LSTs.

s) ARB's CEIDARS database PM2.5 fractions - construction dust category for fugitive and diesel vehicle exhaust category for combustion.

Five Acre Site Example - Grading Phase

Example	Construction Activity	
Five Acre Site	Grading	21,663 Square Feet[a]
Grading Schedule - 30 days[a]		

Equipment Type[a,b]	No. of Equipment	hr/day	Crew Size
Rubber Tired Dozers	1	8.0	8
Graders	2	8.0	
Tractors/Loaders/Backhoes	3	8.0	

Construction Equipment Emission Factors

	CO	NOx	PM10
Equipment Type[c]	lb/hr	lb/hr	lb/hr
Rubber Tired Dozers	1.695	3.414	0.147
Graders	0.671	1.720	0.089
Tractors/Loaders/Backhoes	0.414	0.830	0.064

Fugitive Dust Grading Parameters

Vehicle Speed (mph)[d]	Vehicle Miles Traveled[e]
3	0.01

Fugitive Dust Stockpiling Parameters

Silt Content[f]	Precipitation Days[g]	Mean Wind Speed Percent[h]	TSP Fraction	Area[i] (acres)
6.9	10	100	0.5	0.21

Fugitive Dust Material Handling

Aerodynamic Particle Size Multiplier[j]	Mean Wind Speed[k]	Moisture Content[f]	Dirt Handled[a]	Dirt Handled[l]
	mph		cy	lb/day
0.35	10	7.9	6,287	523,917

Construction Vehicle (Mobile Source) Emission Factors

	CO	NOx	PM10
	lb/mile	lb/mile	lb/mile
Heavy-Duty Truck[m]	0.014462	0.047182	0.002309

Five Acre Site Example - Grading Phase

Construction Worker Number of Trips and Trip Length

Vehicle	No. of One-Way Trips/Day	One WayTrip Length (miles)
Haul Truck[n]	7	0.1
Water Truck[o]	3	6.4

Incremental Increase in Onsite Combustion Emissions from Construction Equipment

Equation: Emission Factor (lb/BHP-hr) x No. of Equipment x Work Day (hr/day) x Equipment rating (hp) x Load Factor (%/100) = Onsite Construction Emissions (lb/day)

Equipment Type	CO lb/day	NOx lb/day	PM10 lb/day
Rubber Tired Dozers	13.56	27.31	1.18
Graders	10.74	27.52	1.42
Tractors/Loaders/Backhoes	9.94	19.93	1.53
Total	**34.2**	**74.8**	**4.13**

Incremental Increase in Fugitive Dust Emissions from Construction Operations

Equations:

Gradingp: PM10 Emissions (lb/day) = 0.60 x 0.051 x mean vehicle speed$^{2.0}$ x VMT x (1 - control efficiency)

Storage Piles[q]: PM10 Emissions (lb/day) = 1.7 x (silt content/1.5) x ((365-precipitation days)/235) x wind speed percent/15 x TSP fraction x Area) x (1 - control efficiency)

Material Handling[r]: PM10 Emissions (lb/day) = (0.0032 x aerodynamic particle size multiplier x (wind speed (mph)/5)$^{1.3}$/(moisture content/2)$^{1.4}$ x dirt handled (lb/day)/2,000 (lb/ton) (1 - control efficiency)

Description	Control Efficiency %	Unmitigated PM10[s] lb/day
Earthmoving	68	0
Storage Piles	68	2.65
Material Handling	68	0.03
Total		**2.68**

Incremental Increase in Onsite Combustion Emissions from Onroad Mobile Vehicles

Equation: Emission Factor (lb/mile) x No. of One-Way Trips/Day x 2 x Trip length (mile) = Mobile Emissions (lb/day)

	CO	NOx	PM10
Vehicle	lb/day	lb/day	lb/day
Haul Truck	0.02	0.07	0.00
Water Truck	0.56	1.81	0.09
Total	**0.58**	**1.88**	**0.09**

Total Incremental Localized Emissions from Construction Activities

	CO	NOx	PM10
Sources	lb/day	lb/day	lb/day
On-site Emissions	**34.8**	**76.6**	**6.9**
Significance Threshold[t]	*1014*	*295*	*11*
Exceed Significance?	NO	NO	NO

Combustion and Fugitive Summary	PM2.5 Fraction[u]	PM10	PM2.5
		lb/day	lb/day
Combustion (Offroad)	0.92	4.1	3.8
Combustion (Onroad)	0.96	0.09	0.09
Fugitive	0.21	2.7	1
Total		**6.9**	**4.5**
Significance Threshold[t]			**6**
Exceed Significance?			**NO**

Notes:

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Adding lines or entering values with units different than those associated with the shaded cells may alter the integrity of the sheets or produce incorrect results.

a) SCAQMD, estimated from survey data, Sept 2004

b) Equipment name must match CARB Off-Road Model (see Off-Road Model EF worksheet) equipment name for sheet to look up EFs automatically

c) SCAB values provided by the ARB, Oct 2006. Assumed equipment is diesel fueled.

d) Caterpillar Performance Handbook, Edition 33, October 2003 Operating Speeds, p 2-3.

e) Assuming 6,287 cubic yards of dirt handled [(6,287 cyd x 2,500 lb/cyd)/30 days = 523,917 lb/day]

f) USEPA, AP-42, July 1998, Table 11.9-3 Typical Values for Corection Factors Applicable to the Predictive Emission Factor Equations

g) Table A9-9-E2, SCAQMD CEQA Air Quality Handbook, 1993

h) Mean wind speed percent - percent of time mean wind speed exceeds 12 mph. At least one meteorological site recorded wind speeds greater than 12 mph over a 24-hour period in 1981.

i) Assumed storage piles are 0.21 acres in size

j) USEPA, AP-42, Jan 1995, Section 13.2.4 Aggregate Handling and Storage Piles, p 13.2.4-3 Aerodynamic particle size multiplier for < 10 µm

k) Mean wind speed - maximum of daily average wind speeds reported in 1981 meteorological data.
l) Assuming 6,287 cubic yards of dirt handled [(6,287 cyd x 2,500 lb/cyd)/30 days = 523,917 lb/day]
m) CARB, EMFAC2007 (version 2.3) Burden Model, Winter 2007, 75 F, 40% RH: EF, lb/yr = (EF, ton/yr x 2,000 lb/ton)/VMT
n) Assumed 30 cubic yd truck capacity 6,287 cyd of dirt [(6,287 cyd x truck/30 cyd)/30 days = 7 one-way truck trips/day]. Assumed haul truck travels 0.1 miles through facility
o) Assumed six foot wide water truck traverses over 21,663 square feet of disturbed area
p) USEPA, AP-42, July 1998, Table 11.9-1, Equation for Site Grading ≤ 10 µm
q) USEPA, AP-42, Jan 1995, Section 13.2.4 Aggregate Handling and Storage Piles, Equation 1
r) USEPA, Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures, Sept 1992, EPA-450/2-92-004, Equation 2-12
s) Includes watering at least three times a day per Rule 403 (68% control efficiency).
t) Illustration purpose showing the most stringent LSTs. Please consult App. C of the Methodology Paper for applicable LSTs.
u) ARB's CEIDARS database PM2.5 fractions - construction dust category for fugitive and diesel vehicle exhaust category for combustion.

Five Acre Site Example - Structure Construction

Example	Construction Activity
Five Acre Site	Building 14,932 Square Foot Structure[a]

Construction Schedule

Equipment Type[a,b]	No. of Equipment	hr/day	Crew Size
Cranes	1	7.0	14
Forklifts	3	8.0	
Tractors/Loaders/Backhoes	3	7.0	
Generator Sets	1	8.0	
Electric Welders	1	8.0	

Construction Equipment Combustion Emission Factors

	CO	NOx	PM10
Equipment Type[c]	lb/hr	lb/hr	lb/hr
Cranes	0.637	1.695	0.075
Forklifts	0.250	0.643	0.035
Tractors/Loaders/Backhoes	0.414	0.830	0.064
Generator Sets	0.355	0.725	0.045
Electric Welders	N/A	N/A	N/A

Construction Vehicle (Mobile Source) Emission Factors

	CO	NOx	PM10
	lb/mile	lb/mile	lb/mile
Heavy-Duty Truck[d]	0.014462	0.047182	0.002309

Construction Worker Number of Trips and Trip Length

Vehicle	No. of One-Way Trips/Day	Trip Length (miles)
Flatbed Truck[a,e]	3	0.1
Water Truck[f]	3	6.4

Five Acre Site Example - Structure Construction

Incremental Increase in Onsite Combustion Emissions from Construction Equipment

Equation: Emission Factor (lb/BHP-hr) x No. of Equipment x Work Day (hr/day) x Equipment rating (hp) x Load Factor (%/100) = Onsite Construction Emissions (lb/day)

Equipment Type	CO lb/day	NOx lb/day	PM10 lb/day
Cranes	4.46	11.86	0.53
Forklifts	5.99	15.43	0.83
Tractors/Loaders/Backhoes	8.70	17.44	1.34
Generator Sets	2.84	5.80	0.36
Electric Welders	N/A	N/A	N/A
Total	**22.0**	**50.5**	**3.1**

Incremental Increase in Onsite Combustion Emissions from Onroad Mobile Vehicles

Equation: Emission Factor (lb/mile) x No. of One-Way Trips/Day x 2 x Trip length (mile) = Mobile Emissions (lb/day)

Vehicle	CO lb/day	NOx lb/day	PM10 lb/day
Flatbed Truck	0.01	0.03	0.00
Water Truck	0.56	1.81	0.09
Total	**0.57**	**1.84**	**0.09**

Total Incremental Combustion Emissions from Construction Activities

Sources	CO lb/day	NOx lb/day	PM10 lb/day
On-Site Emissions	**22.6**	**52.4**	**3.1**
Significance Threshold[g]	*1014*	*295*	*11*
Exceed Significance?	**NO**	**NO**	**NO**

Combustion and Fugitive Summary	PM2.5 Fraction[h]	PM10 lb/day	PM2.5 lb/day
Combustion (Offroad)	0.92	3.1	2.8
Combustion (Onroad)	0.96	0.09	0.09
Fugitive	0.21	0	0
Total		**3.1**	**2.9**
Significance Threshold[g]			**6**
Exceed Significance?			**NO**

Five Acre Site Example - Structure Construction

Notes:

Project specific data may be entered into shaded cells. Changing the values in the shaded cells will not affect the integrity of the worksheets. Verify that units of values entered match units for cell.

Adding lines or entering values with units different than those associated with the shaded cells may alter the integrity of the sheets or produce incorrect results.

a) SCAQMD, estimated from survey data, Sept 2004

b) Equipment name must match CARB Off-Road Model (see Off-Road Model EF worksheet) equipment name for sheet to look up EFs automatically

c) SCAB values provided by the ARB, Oct 2006. Assumed equipment is diesel fueled except the welders which are powered by the generator.

d) CARB, EMFAC2007 (version 2.3) Burden Model, Winter 2007, 75 F, 40% RH: EF, lb/yr = (EF, ton/yr x 2,000 lb/ton)/VMT

e) Assumed haul truck travels 0.1 miles through facility

f) Assumed six foot wide water truck traverses over 200,000 square feet of disturbed area

g) Illustration purpose showing the most stringent LSTs. Please consult App. C of the Methodology Paper for applicable LSTs.

h) ARB's CEIDARS database PM2.5 fractions - construction dust category for fugitive and diesel vehicle exhaust category for combustion.

Five Acre Site Example - Architectural Coating and Asphalt Paving

Example	**Construction Activity**
Five Acre Site	Architectural Coating and Asphalt Paving of Parking Lot
Construction Schedule -	18 days[a]

Equipment Type[a,b]	**No. of Equipment**	**hr/day**	**Crew Size**
Pavers	1	8.0	8
Rollers	1	8.0	
Paving Equipment	2	6.0	
Cement and Mortar Mixers	2	6.0	
Tractors/Loaders/Backhoes	1	8.0	

Construction Equipment Combustion Emission Factors

Equipment Type[c]	**CO** lb/hr	**NOx** lb/hr	**PM10** lb/hr
Pavers	0.600	1.129	0.080
Rollers	0.442	0.907	0.063
Paving Equipment	0.469	1.033	0.071
Cement and Mortar Mixers	0.046	0.069	0.005
Tractors/Loaders/Backhoes	0.414	0.830	0.064

Construction Vehicle (Mobile Source) Emission Factors

	CO lb/mile	**NOx** lb/mile	**PM10** lb/mile
Heavy-Duty Truck[d]	0.014462	0.047182	0.002309

Construction Worker Number of Trips and Trip Length

Vehicle	**No. of One-Way Trips/Day**	**Trip Length (miles)**
Delivery Truck[e]	9	0.1
Water Truck[f]	3	6.4

Five Acre Site Example - Architectural Coating and Asphalt Paving

Incremental Increase in Onsite Combustion Emissions from Construction Equipment

Equation: Emission Factor (lb/BHP-hr) x No. of Equipment x Work Day (hr/day) x Equipment rating (hp) x Load Factor (%/100) = Onsite Construction Emissions (lb/day)

Equipment Type	**CO** lb/day	**NOx** lb/day	**PM10** lb/day
Pavers	4.80	9.03	0.64
Rollers	3.54	7.26	0.50
Paving Equipment	5.63	12.40	0.85
Cement and Mortar Mixers	0.55	0.83	0.06
Tractors/Loaders/Backhoes	3.31	6.64	0.51
Total	**17.8**	**36.2**	**2.6**

Incremental Increase in Onsite Combustion Emissions from Onroad Mobile Vehicles

Equation: Emission Factor (lb/mile) x No. of One-Way Trips/Day x 2 x Trip length (mile) = Mobile Emissions (lb/day)

Vehicle	**CO** lb/day	**NOx** lb/day	**PM10** lb/day
Delivery Truck	0.03	0.08	0.00
Water Truck	0.56	1.81	0.09
Total	**0.59**	**1.89**	**0.09**

Total Incremental Combustion Emissions from Construction Activities

Sources	**CO** lb/day	**NOx** lb/day	**PM10** lb/day
On-Site Emissions	**18.4**	**38.1**	**2.7**
Significance Threshold[g]	*1014*	*295*	*11*
Exceed Significance?	**NO**	**NO**	**NO**

Combustion and Fugitive Summary	**PM2.5 Fraction[h]**	**PM10** lb/day	**PM2.5** lb/day
Combustion (Offroad)	0.92	2.6	2.4
Combustion (Onroad)	0.96	0.09	0.09
Fugitive	0.21	0	0
Total		**2.7**	**2.4**
Significance Threshold[g]			**6**
Exceed Significance?			**NO**

Five Acre Site Example - Architectural Coating and Asphalt Paving

Notes:

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d) CARB, EMFAC2007 (version 2.3) Burden Model, Winter 2007, 75 F, 40% RH: EF, lb/yr = (EF, ton/yr x 2,000 lb/ton)/VMT

e) Assumed haul truck travels 0.1 miles through facility

f) Assumed six foot wide water truck traverses over 200,000 square feet of disturbed area

g) Illustration purpose showing the most stringent LSTs. Please consult App. C of the Methodology Paper for applicable LSTs.

h) ARB's CEIDARS database PM2.5 fractions - construction dust category for fugitive and diesel vehicle exhaust category for combustion.

Appendix B

Biological Resource Evaluation
& Oak Tree Report

compliance·biology inc

June 17, 2006

Mr. Amir Rudyan
SR-4 Development
8245 Rennet Avenue
Canoga Park, CA 91304

SUBJECT: Biological Resource Evaluation, 23604 Dry Canyon Cold Creek Road, Calabasas, California

Dear Mr. Rudyan,

This letter report details findings of a biological resource evaluation conducted on a property located at 23604 Dry Canyon Cold Creek Road (APN 2072-001-004) in the City of Calabasas (**Exhibit 1**). Specifically, the subject parcel is situated within Township 1 North, Range 17 West, in the southeast quarter of Section 27 on the Calabasas, California 7.5′ USGS quadrangle map (**Exhibit 2**). The primary purpose of this study was to evaluate existing on site biological conditions with respect to their potential to support special-status species. As a general biological assessment, this report does not provide an exhaustive inventory of all plant and animal species that can occur on the site, and did not include focused surveys for listed endangered or threatened species following regulatory agency protocol methods, but provides a general assessment of the existing conditions on site. It is our understanding that a complete oak tree survey has already been completed on the subject property.

Introduction

This report is intended to provide the project applicant and the City of Calabasas (City) with general information regarding current on-site biological conditions and the suitability of on-site habitats to support sensitive biological resources.

Methods

Literature Search

Documentation pertinent to the biological resources near the site was reviewed and analyzed. Information reviewed included: (1) the Federal Register listing package for the federally listed species known to occur in the area; (2) literature pertaining to habitat requirements of sensitive species potentially occurring on the project site; and (3) the California Natural Diversity Data Base (CNDDB

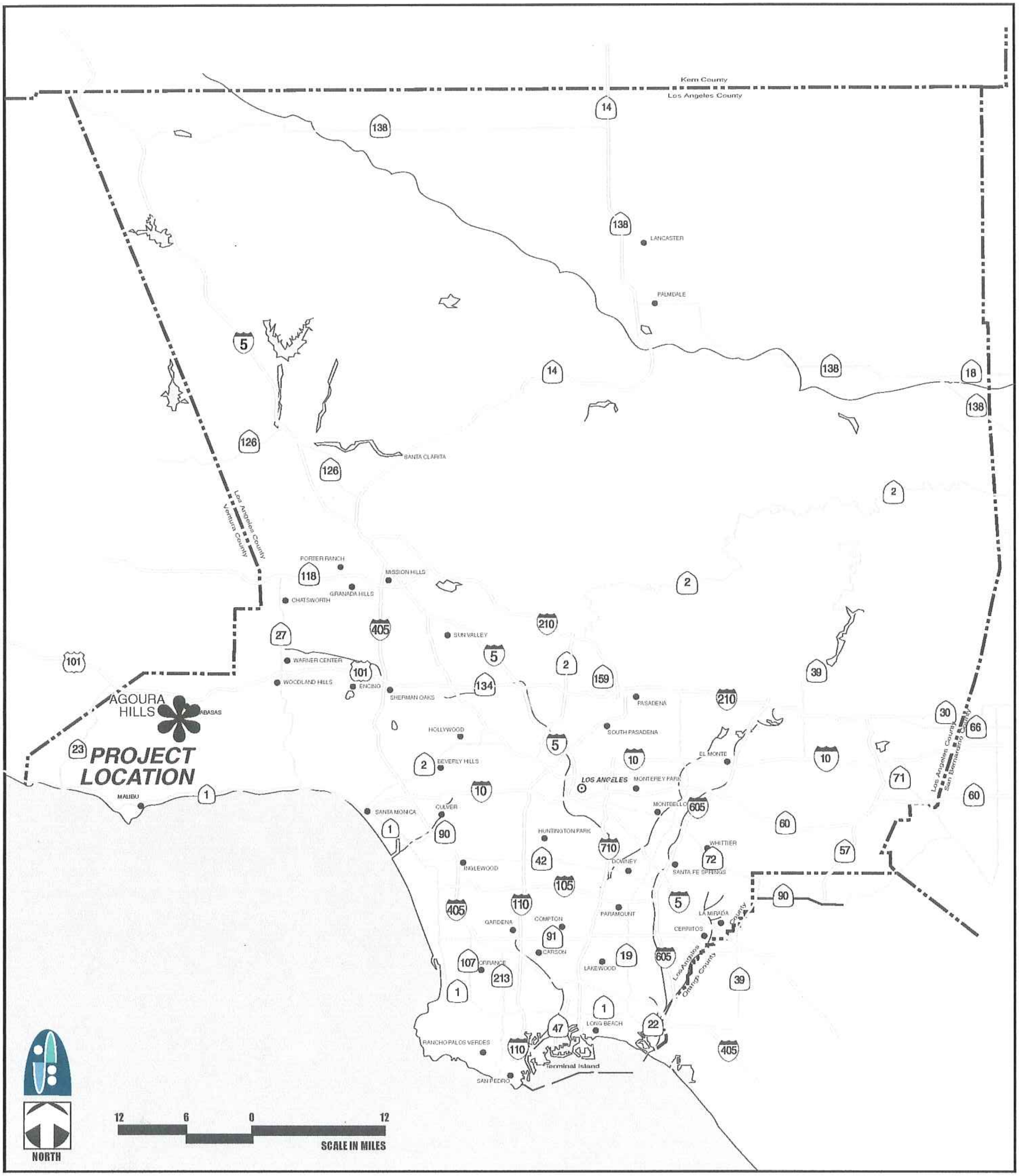


exhibit 1
Regional Location

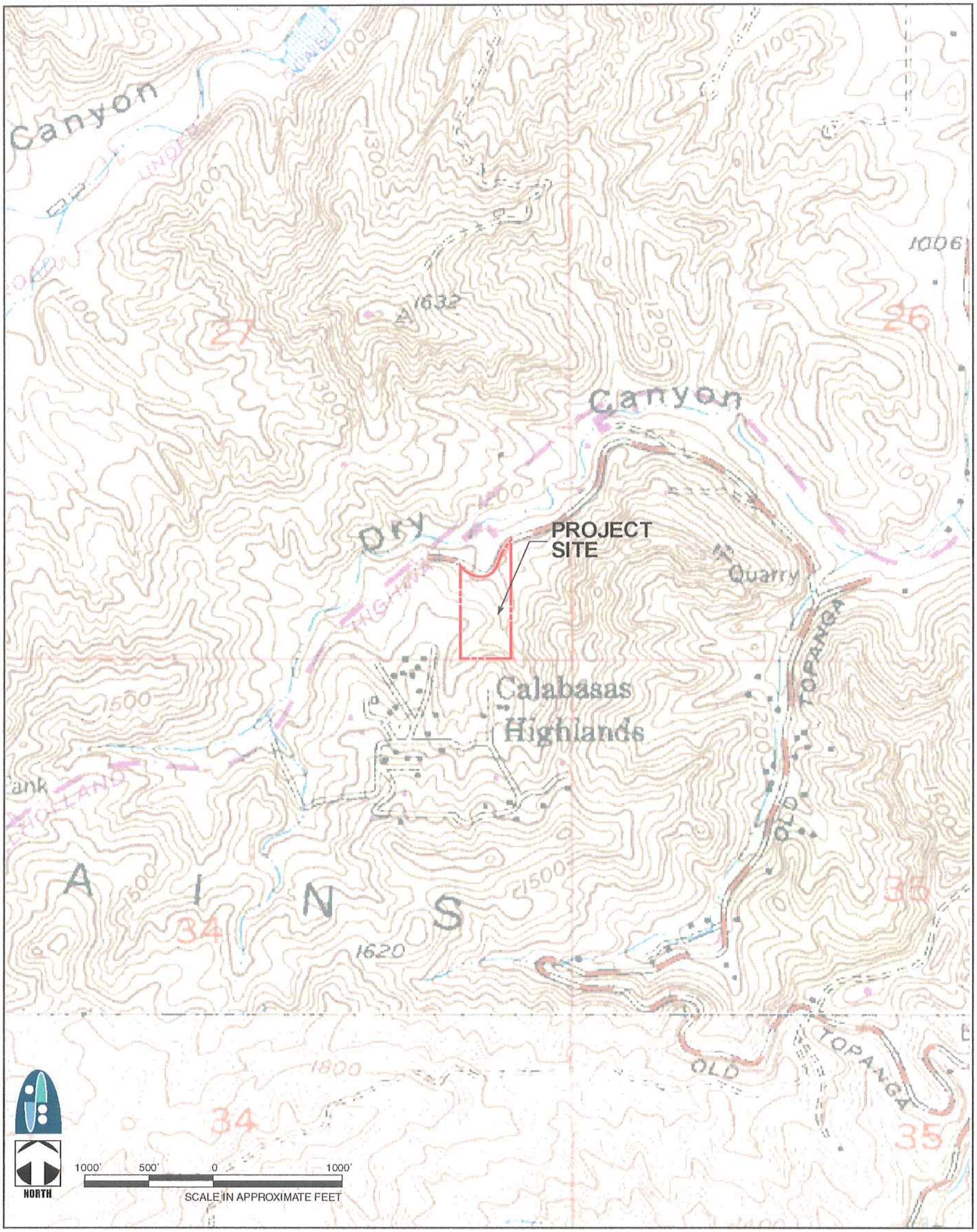


exhibit 2

PROJECT LOCATION

2006) information regarding sensitive species potentially occurring on and near the project site in a computer report format for the Calabasas, Canoga Park and Malibu Beach, California USGS 7.5 – minute quadrangle maps.

<u>Field Surveys</u>

Field surveys were conducted July 8 and 9, 2006 on the subject site to map existing vegetation communities and evaluate existing habitats with respect to their potential to support special-status plant and wildlife species. The entire site was surveyed on foot. All plants and animals observed during the site visits were recorded.

Results

<u>Literature Search</u>

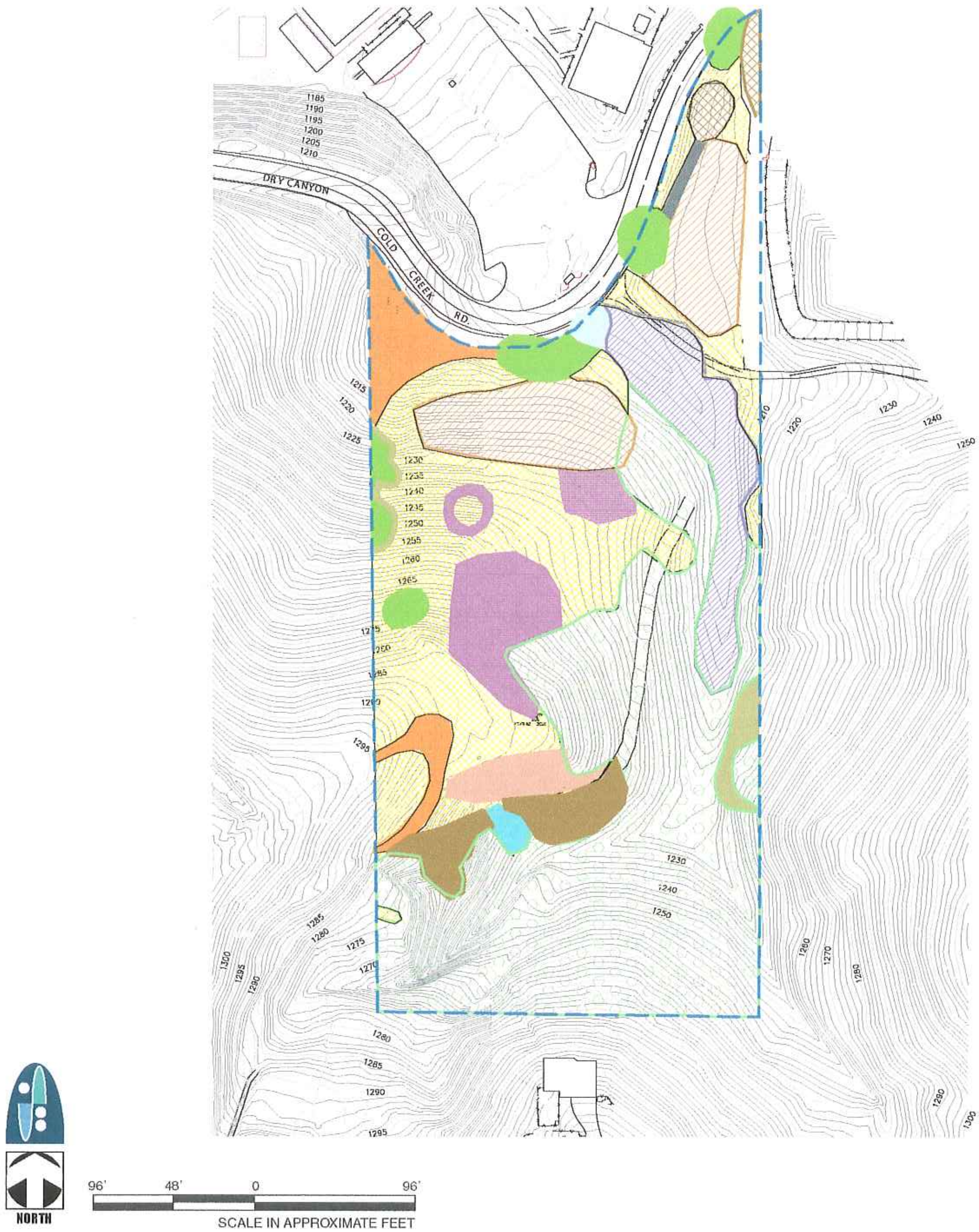
The literature search revealed that a total of 13 special-status plant species have been recorded from the project region. **Attachment A** provides details regarding each of these plant species including their potential to occur on the subject site. Additionally, 20 special-status wildlife species were listed in the CNDDB and/or are otherwise known from the area. **Attachment B** provides details regarding each of these special-status wildlife species including their potential to occur on site.

<u>Field Survey</u>

The subject property is currently situated in a rural residential area with existing residential development to the north, northeast, and south. The site is located on the south side of Dry Canyon Cold Creek Road, southeast of Mulholland Highway in the City of Calabasas. The lot is characterized as sloping upward from Dry Canyon Cold Creek Road to a relatively flat pad in the western central portion of the site. Elevations range from approximately 1,300 feet at the pad area, down to about 1,180 feet at the road level. There were no obvious indications of recent fire on the site. **Attachment C** provides photographic illustration of typical on-site conditions.

Vegetation

About half of the site consists of vegetation that is subject to ongoing disturbance through clearing, or shows evidence of intense disturbance in the past. Horse trailer storage and two elliptical fenced areas indicate previous use of the site by equestrians. A scraped access road occurs along the western portion of the site that provides access to the southern portions of the site and an adjacent western parcel. A drainage course flows across the southern portion of the site and along the eastern boundary toward and under Dry Canyon Cold Creek Road. Four primary vegetation associations were identified on site during the site surveys and are described in the following text. **Exhibit 3** illustrates the distribution of vegetation types on site.



LEGEND

- Disturbed: Cleared
- Disturbed: Ruderal
- Disturbed: Ruderal Grassland
- Coastal Sage Scrub: California Sagebrush - Purple Sage
- Coastal Sage Scrub: Purple Sage
- Coastal Sage Scrub: California Encelia
- Coastal Sage Scrub: California Encelia - Laurel Sumac
- Non-Riparian Trees: Coast Live Oak
- Non-Riparian Trees: Peruvian Pepper (Not Native)
- Isolated Shrubs: Laurel Sumac
- Riparian: Mulefat Scrub
- Riparian: Willow - Oak Woodland
- Riparian: Oak Forest
- Old Irrigated Planter Box
- Planted Hedge (ornamental - not native)

exhibit 3

PLANT COMMUNITIES

Disturbed and Planted –Vegetation within the existing fenced enclosures is classified as Ruderal (disturbed) because of dominance by weedy forbs, such as mustard (*Brassica nigra, Hirschfeldia incana*) and yellow star thistle (*Centaurea solstitalis*) typical of once heavily used areas that have been abandoned. Outside of the fenced enclosures, non-native annual grasses such as wild oat (*Avena* sp.) are more prevalent and the vegetation is classified as Ruderal or Non-native Grassland. Native grassland forbs such as common tarplant (*Hemizonia fasciculata*), narrow-leaf milkweed (*Asclepias fascicularis*), and kotolo milkweed (*Asclepias eriocarpa*) are present but uncommon. Elsewhere, adjacent to sections of the northeast site boundary, a hedge planted on the adjoining property has encroached onto the site, and there is evidence of some past attempt at irrigating a planted terrace or box that overlooks the main road.

Coastal Sage Scrub – Small patches of coastal sage scrub occur on the site, primarily on steeper slopes surrounding trails. Species diversity is low in most of these shrub patches, ranging from solid stands of California encelia (*Encelia californica*) or purple sage (*Salvia leucophylla*) to stands which also include laurel sumac (*Malosma laurina*) or California sagebrush (*Artemisia californica*). Native herbaceous understory species such foothill needlegrass (*Nassella lepida*) and blue-eyed grass (*Sisyrinchium bellum*) persist in areas of coastal sage scrub adjacent to oak stands.

Non-Riparian Trees and Shrubs – Coast live oak (*Quercus agrifolia*) and laurel sumac occur as isolated individuals or in small hilltop stands separate from the main drainage on site and are therefore classified as non-riparian. Peruvian pepper (*Schinus molle*), a non-native tree, occurs with native oak trees at the northern border of the site.

Riparian – The main drainage on site had measurable flowing water at the time of the July survey. The drainage is not recorded as a perennial or intermittent "blue-line" stream on the U.S. Geological Survey topographic map of the area, and no springs are shown on the map. Therefore it is assumed that the perennial flow was not present historically and is sustained by irrigated landscaping and/or other artificial sources of water upstream of the property. A dense, closed-canopy forest of coast live oak is associated with this stream across the south and east sections of the site. Coast live oak is not an obligate riparian species but in this circumstance appears to be opportunistically taking advantage of increased water availability during summer, and has expanded to highly robust, dense stands. In the lower reach of the drainage approaching Dry Canyon Cold Creek Road, the oak canopy is more open and becomes co-dominant with willows, primarily arroyo willow (*Salix lasiolepis*), red willow (*S. laevigata*) and Gooding's willow (*S. goodingii*). Non-native invasive species such as palm and oleander are present but currently uncommon. A small stand of mulefat (*Baccharis salicifolia*) occupies a narrow ephemeral tributary to the main drainage.

Wildlife

The existing conditions on the upland portions of the subject property suggests it likely supports a relatively low to moderate diversity of wildlife because of the disturbed nature of habitat. Most of the wildlife occurring on site are expected to be associated with the on-site oak trees and riparian habitat that exists along the eastern and southern portions of the site.

During the field surveys relatively common wildlife species were observed or detected including western fence lizard (*Sceloporus occidentalis*), side-blotched lizard (*Uta stansburiana*), desert cottontail (*S. auduboni*), California ground squirrel (*Spermophilus beecheyi*), coyote (*Canis latrans*), mule deer (*Odocoileus hemionus*), and numerous common (non-special status) avian species typically associate with scrub habitats including Anna's hummingbird (*Calypte annae*), scrub jay (*Aphelocoma coerulescens*), bushtit (*Psaltriparus minimus*), Bewick's wren (*Thryomanes bewickii*), California towhee (*Pipilo crissalis*), spotted towhee (*P. maculatus*), wrentit (*Chamaea fasciata*), and lesser goldfinch (*Carduelis psaltria*).

Special-Status Resources

Special-status Plants

No special-status plant species were directly detected on the subject parcel at the time of this survey, However, focused surveys for special-status plants were not conducted as part of this assessment and the timing of the surveys was not conducive to finding most potentially occurring special-status plant species. As discussed, 13 special-status plant species have been recorded from the project region.

Attachment A provides detail regarding those special-status plant species known from the area including their current status, habitat requirements, and their potential to occur on the subject property.

Despite the documented occurrences of some rare plants in the project vicinity, none of the special-status plant species known from the area is considered to have a high potential for occurrence on site due to specific environmental factors including soil types, canopy density, solar aspect, etc.

Native Trees

The City of Calabasas strives to protect certain native trees. Several coast live oak trees (*Quercus agrifolia*) occur on site both individually and as a riparian canopy. A separate oak tree report has been prepared for this site and, as such, oak trees are not discussed further in this report other than with regard to their potential to support wildlife.

Special-Status Wildlife

No special-status wildlife were directly observed or otherwise detected during the site surveys. Attachment B provides details regarding locally recorded special-status wildlife species including their current status, habitat requirements, and their potential to occur on the subject property. The following provides discussion regarding each special-status species that has a high potential to occur on site.

Sharp-shinned hawk (*Accipiter striatus*), ***California Species of Special Concern.*** Sharp-shinned hawks are most commonly found in mixed woodland habitats, but will venture to nearby scrub habitats to hunt for small birds. Few sharp-shins nest in southern California, but the habitats on site provide suitable wintering habitat for roosting and foraging.

Cooper's hawk (*Accipiter cooperii*), ***California Species of Special Concern.*** This species is a common winter migrant and occasional summer resident in southern California. It breeds in oak woodland habitats and southern cottonwood-willow riparian woodland. Food items include small birds, reptiles and amphibians, and mammals. There is suitable nesting habitat associated with the oak trees on site and suitable foraging habitat is present on site. No Cooper's hawks were observed on site during site surveys and no current or remnant nests were observed.

San Diego desert woodrat (*Neotoma lepida intermedia*), ***California Species of Special Concern.*** San Diego desert woodrat is associated with moderate to dense scrub canopies, rock crevices, and in other protected areas where nest building materials are available. This species is highly adaptable and may depend upon succulents for water. Desert woodrats likely occur in low numbers in the less disturbed scrub habitat and oak woodlands.

Wildlife Movement Corridors

Wildlife movement corridors link together areas of suitable wildlife habitat that are otherwise separated by rugged terrain, changes in vegetation, by human disturbance, or by the encroachment of urban development. Movement corridors are important as the combination of topography and other natural factors, in addition to urbanization, has fragmented or separated large open space areas. The fragmentation of natural habitat creates isolated 'islands' of vegetation that may not provide sufficient area to accommodate sustainable populations and can adversely impact genetic and species diversity. Corridors mitigate the effects of this fragmentation by (1) allowing animals to move between remaining habitats, which allows depleted populations to be replenished and promotes genetic exchange with separate population; (2) providing escape routes from fire, predators, and human disturbances, thus reducing the risk that catastrophic events (such as fire, flood, or disease) will result in population or species extinction; and (3) serving as travel paths for individual animals as they wander about or disperse from their home ranges in search of food, water, mates, and other needs.

The project site is situated within a rural residential development area. Surrounding development includes an existing residential neighborhood to the south, northwest, and northeast, and a school across Dry Canyon Cold Creek Road to the north.

The subject site is not considered to be a part of an important regional corridor connecting large open space habitats. The site does, however, support portions of a drainage channel and oak woodlands that are utilized for local wildlife movement. Notwithstanding, based on existing nearby development and proposed site plans for the subject property, localized movement of wildlife occurring in the immediate vicinity would not be expected to be substantially impeded by implementation of the proposed project.

Conclusions

The subject property currently supports moderate quality biological resources including a mosaic of disturbed, scrub, and oak riparian habitat types. The proposed development envelope is generally within existing disturbed areas.

The evaluation of existing habitats on site suggest there is little potential for special-status plant species to occur on the subject property. Three special-status wildlife species have a high potential to occur on site. None of those potentially occurring on site are listed as threatened or endangered by State or Federal regulatory agencies. However, impacts to other special-status species must be considered when evaluating any projects through the California Environmental Qualty Act (CEQA).

Two potentially occurring special-status wildlife species are raptors that are not expected to be dependent upon resources within the site boundaries for their survival though both have some potential to nest on site. The San Diego desert woodrat also has a high potential to occur on site in limited areas. If any of these species do occur on site, there is some potential for impacts resulting from fuel abatement requirements as existing habitats would be modified. However, due to the relatively common occurrence of these species in the region, the abundance of suitable habitat in the area, and the relatively small amount of habitat that is expected to be impacted by this and any potentially occurring adjacent development, impacts to these species are expected to be less than signficant.

Recommended Actions

Required mitigation measures for impacts determined to be significant or potentially significant will be determined by the City, as lead agency in the environmental review for the project. Standard mitigations set forth by the City are expected to include protection of oak trees and setbacks from the drainage course. As proposed development woul occur largely within existing disturbed areas, such measures would appear to be incorporated into the development design. However, to further reduce potential impacts to special-status wildlife, the following measures are recommended to be incorporated into the project approval conditions:

A. To ensure potentially significant impacts to actively nesting birds are minimized to the greatest extent feasible, all vegetation removal and/or other site preparation activities should be timed to avoid the active nesting period occurring between February 1 and July 30. Should such timing not be feasible, no earlier than 7 days prior to such activities, all areas proposed to be grubbed of vegetation, plus a 150-foot buffer radius, should be closely surveyed for active nests. Should any active nests be identified, a 50-foot buffer (150 feet for raptors) shall be established around the nest and fenced off with clearly visible construction fencing. The exclusionary fencing should remain in place until the young have fully fledged, and/or until a qualified biologist determines that the nest is no longer active.

B. To ensure potentially significant impacts to natural areas from increased lighting are reduced to a less than significant level, all exterior lighting should be designed to be downcast and positioned such that no nighttime lighting of natural areas occurs.

Thank you for the opportunity to provide you with biological services. If you have any questions regarding the information presented in this report, please feel free to contact me.

Very truly yours,

Dave Crawford
President/Principal Biologist
Compliance Biology, Inc.

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Attachment A
Summary of Special Status Plant Species Recorded From the Project Region

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Attachment A

Summary of Special Status Plant Species Recorded From the Project Region

Scientific and Common Name	Status			Habitat Requirements	Elevation Range, Life Form, and Flowering Period	Potential Occurrence
	Federal	State	CNPS			
Braunton's milk-vetch *Astragalus brauntonii*	FE	--	1B	Closed-cone conif, chap, CS, v&f grassland/ recent burns or disturbed areas- often carbonate	4-640m PH March-July	**LowPotential:** Carbonate soil not present. This does not necessarily exclude potential for species, but no individuals of the genus *Astragalus* were observed during survey. This species typically only lives up to 3 yrs following fire [USFWS Jan 1997.]
Malibu baccharis *Baccharis malibuensis*	--	--	1B	Chaparral, cismontane woodlands, coastal scrub	150-260m S (d) August	**Not Expected:** Site is situated well above known elevation distribution of species.
Slender mariposa lily *Calochortus clavatus* var. *gracilis*	--	--	1B	Chaparral and oak woodlands; associated with shaded canyons and grassy slopes. .	360-1000m. PH(b) March-May	**Low to Moderate Potential:** Suitable vegetation association exists on site, but past history of intense disturbance has reduced habitat quality.
Plummer's mariposa lily *Calochortus plummerae*	--	--	1B	Chaparral, cismontane woodlands, coastal scrub, Lower coniferous forests, and grasslands; associated with granitic soils.	100-1700m PH (b) May-July	**Low Potential:** Suitable habitat exists on site, but none was observed during site surveys and species is known to be blooming in region at time of surveys.
San Fernando Valley spineflower *Chorizanthe parryi* ssp. *fernandina*	FC	CE	1B	Coastal scrub; associated with open, sandy soil habitats.	150-1220m AH April-June	**Not Expected:** No suitable habitat on site; dense weed infestation on site is unsuitable habitat for this species.
Santa Susana tarplant *Deinandra minthornii*	--	CR	1B	Chaparral and coastal scrub; associated with sandstone outcroppings and rocky areas.	280-760m S (d) July-November	**Not Expected:** Typical habitat is not present onsite and none observed during site surveys.
Blochman's dudleya *Dudleya blochmaniae* ssp. *blochmaniae*	--	--	1B	Coastal bluff scrub, coastal scrub, and grasslands; often associated with clay or serpentinite soils.	5-450m PH April-June	**Low Potential:** Only marginally suitable habitat present on site. No suitable soils.

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Attachment A (continued)

Summary of Special Status Plant Species Recorded From the Project Region

Scientific and Common Name	Status			Habitat Requirements	Elevation Range, Life Form, and Flowering Period	Potential Occurrence
	Federal	State	CNPS			
Marcescent dudleya *Dudleya cymosa* ssp. *marcescens*	FT	CR	1B	Chaparral; occurs on the lower reaches of sheer volcanic cliffs and canyon walls near perennial streams.	200-500m PH May-June	**Low Potential:** Only marginally suitable habitat present on site. No suitable soils.
Santa Monica Mountains dudleya *Dudleya cymosa* ssp. *ovatifolia*	FT	--	1B	Chaparral on shaded, rocky north-facing slopes; associated with rocky outcrops of sedimentary conglomerate or volcanic breccia.	150-1675m PH May-June	**Low Potential:** Only marginally suitable habitat present on site. No suitable soils.
Many-stemmed dudleya *Dudleya multicaulis*	--	--	1B	Chaparral, coastal scrub, and grasslands; often associated with clay soils.	15-790m PH April-July	**Low Potential:** No suitable habitat exists on site; dense weed infestation is unsuitable for this species
Round-leaved filaree *Erodium macrophyllum*	--	--	2	Cismontane woodland, valley and foothill grassland; clay soils	15-1200m AH March-May	**Not Expected:** No suitable habitat exists on site; dense weed infestation is unsuitable for this species.
Chaparral nolina *Nolina cismontana*	--	--	1B	Chaparral, coastal scrub/ sandstone or gabbro soils	140-1275m S May-July	**Not Expected:** Only marginally suitable habitat present on site. No suitable soils and not observed during survey.
Lyon's pentachaeta *Pentachaeta lyonii*	FE	CE	1B	Chaparral (openings), coastal scrub, valley and foothill grasslands; associated with ecotonal areas with clay soils.	30-630m AH March-August	**Low Potential:** Only marginally suitable habitat present on site. No suitable soils.

STATUS KEY:

Federal
FE: Federally Endangered
FT: Federally Threatened Species
FC: Federal Candidate Species for listing

State
CE: State Endangered
CR: State Rare

CNPS
List 1B: Plants rare and endangered in California and elsewhere
List 2: Plants rare and endangered in California, but more common elsewhere

LIFE FORM KEY:

AH: Annual Herb
PH: Perennial Herb
S: Shrub
(d): deciduous
(b): bulb

Attachment B

Summary of Special Status Wildlife Species Recorded From the Project Region

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Attachment B

Special-Status Wildlife Species Recorded From the Project Region

Common Name *Scientific Name*	Status Federal	 State	Habitat Requirements	Potential Occurrence on the Project Site
INVERTEBRATES				
Monarch butterfly (wintering sites) *Danaus plexippus*	--	*sa*	Winter roost sites located in wind-protected tree groves (gum trees, Monterey pine, and cypress trees), with nectar and water sources nearby.	**Not Expected**: Individual monarchs likely occur on the subject property, but there is no suitable winter roosting habitat present.
FISHES				
Arroyo chub *Gila orcutti*	--	CSC	Slow-moving or backwater sections of warm to cool streams with mud or sand substrates.	**Low Potential**: The on-site drainage is seasonal in nature and arroyo chubs are not likely to be able to head upstream if they are present in the 2nd and 3rd order streams to which this drainage is a tributary.
Steelhead rainbow trout (So. CA ESU) *Oncorhynchus mykiss*	FE	CSC (So. steelhead trout)	Coastal rivers and upper tributary streams with cobbly substrate.	**Not Expected**: The on-site drainage is not a tributary to a drainage that has unobstructed access to the sea.
Tidewater goby *Eucyclogobius newberryi*	FE	CSC	Shallow lagoons and lower coastal stream reaches with salinities from brackish to fresh	**Not Expected**: No suitable habitat on site.
REPTILES				
Southwestern pond turtle *Clemmys marmorata pallida*	--	CSC, CP (full species)	Streams, ponds, freshwater marshes, and lakes with growth of aquatic vegetation.	**Low Potential**: The drainage course on site is seasonal in nature, and though some water was present at the time of surveys, no suitable pools or basking sites were present on site.

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Appendix B (continued)

Special-Status Wildlife Species Recorded From the Project Region

Common Name *Scientific Name*	Status Federal	 State	Habitat Requirements	Potential Occurrence on the Project Site
Coast horned lizard *Phrynosoma coronatum*	--	CSC, CP (full species)	Relatively open grasslands, scrublands, and woodlands with fine, loose soil.	**Low Potential**: This species is known to occur in the project vicinity. However, vegetation on most of the site is much more dense than those habitats known to support horned lizards.
Coastal whiptail *Cnemidophorus tigris multiscutatus*	--	*sa*	Open areas in semiarid grasslands, scrublands, and woodlands.	**Moderate Potential**: Limited suitable habitat occurs on site to support this species in the patches of scrub habitat. None observed during surveys.
Silvery legless lizard *Anniella pulchra pulchra*	--	CSC	Stabilized dunes, beaches, dry washes, pine, oak, and riparian woodlands, and chaparral; associated with sparse vegetation with sandy or loose, loamy soils.	**Moderate Potential**: Suitable habitat occurs on site in association with oak tree leaf litter. However, historic equestrian and other land use practices, as well as surrounding development, decreases the quality of habitat conditions.
Coast patch-nosed snake *Salvadora hexalepis virgultea*	--	CSC	Shrublands with low structure and minimum density. Generally occurs with whiptails (primary prey item)	**Low Potential**: Very limited suitable habitat occurs on site in scrub habitats near the drainage course. Most of the vegetation on site is far too dense to support this and its prey species.
Two-striped garter snake *Thamnophis hammondii*	--	CSC, CP	Perennial and intermittent streams having rocky or sandy beds and artificially-created aquatic habitats (man-made lakes and stock ponds); requires dense riparian vegetation.	**Low to Moderate Potential**: Though the drainage course on site is seasonal in nature, at the time of the site surveys it supported marginally suitable habitat for this species.

Appendix B (continued)

Special-Status Wildlife Species Recorded From the Project Region

Common Name *Scientific Name*	Status Federal	 State	Habitat Requirements	Potential Occurrence on the Project Site
San Diego mountain kingsnake *Lampropeltis zonata pulchra*	--	CSC, CP	In low elevations and the coastal ranges, occurs in riparian woodlands, and the adjacent chaparral and coastal sage scrub vegetation; associated with rock outcrops.	**Moderate Potential**: Marginally suitable habitat is present on site in association with riparian woodlands. No rock outcrops present.
BIRDS				
Northern harrier (nesting) *Circus cyaneus*	--	CSC	Coastal salt marsh, freshwater marsh, grasslands, and agricultural fields.	**Moderate Potential**: This species may periodically forage over the scrub habitat on site. Harriers are not expected to nest in the project vicinity.
Sharp-shinned hawk (nesting) *Accipiter striatus*	--	CSC	Woodlands and forages over dense chaparral and scrublands.	**High Potential**: This species is known from the project area and there are several suitable nesting sites on the subject property.
Cooper's hawk (nesting) *Accipiter cooperi*	--	CSC	Dense stands of live oaks and riparian woodlands.	**High Potential**: This species is known from the project area and there are several suitable nesting sites on the subject property.
Golden eagle (nesting & wintering) *Aquila chrysaetos*	--	CSC,CFP	Mountains, deserts, and open country.	**Moderate Potential**: Golden eagles are known from the Santa Monica Mountains area and suitable roosting and foraging habitats exist on site. This species is not expected t nest on site.
S. California rufous-crowned sparrow *Aimophila ruficeps canescens*	--	CSC	Coastal sage scrub.	**Moderate Potential**: This species is known from the project area but suitable nesting habitat is very limited on site.
Tricolored blackbird (nesting colony) *Agelaius tricolor*	[FSC], MNBMC	CSC	Freshwater marshes and riparian scrub.	**Not Expected**: No suitable habitat on site.

Appendix B (continued)

Special-Status Wildlife Species Recorded From the Project Region

Common Name *Scientific Name*	Status		Habitat Requirements	Potential Occurrence on the Project Site
	Federal	State		
MAMMALS				
San Diego desert woodrat *Neotoma lepida intermedia*	--	CSC	Chaparral and coastal sage scrub.	**High Potential**: This species is relatively common in scrub habitats in the project vicinity.
Ringtail *Bassariscus astutus*	--	CFP	Prefers a mixture of forest and shrubland habitats in close association with rocky areas or riparian habitats.	**Moderate Potential**: Suitable habitat occurs on site for this species, but proximity of existing development may preclude this secretive species from occurring in vicinity.
American badger *Taxidea taxus*	--	*sa*	Drier open stages of shrub, forest, and herbaceous habitats with friable soils.	**Low Potential**: Some suitable habitat present on site, but no burrows or other sign of species observed on site during surveys.

KEY:

(nesting) = For most taxa the CNDDB is interested in sightings for the presence of resident populations. For some species (primarily birds), the CNDDB only tracks certain parts of the species range or life history (e.g., nesting locations). The area or life stage is indicated in parenthesis after the common name.

Status:

Federal -- U.S. Fish and Wildlife Service

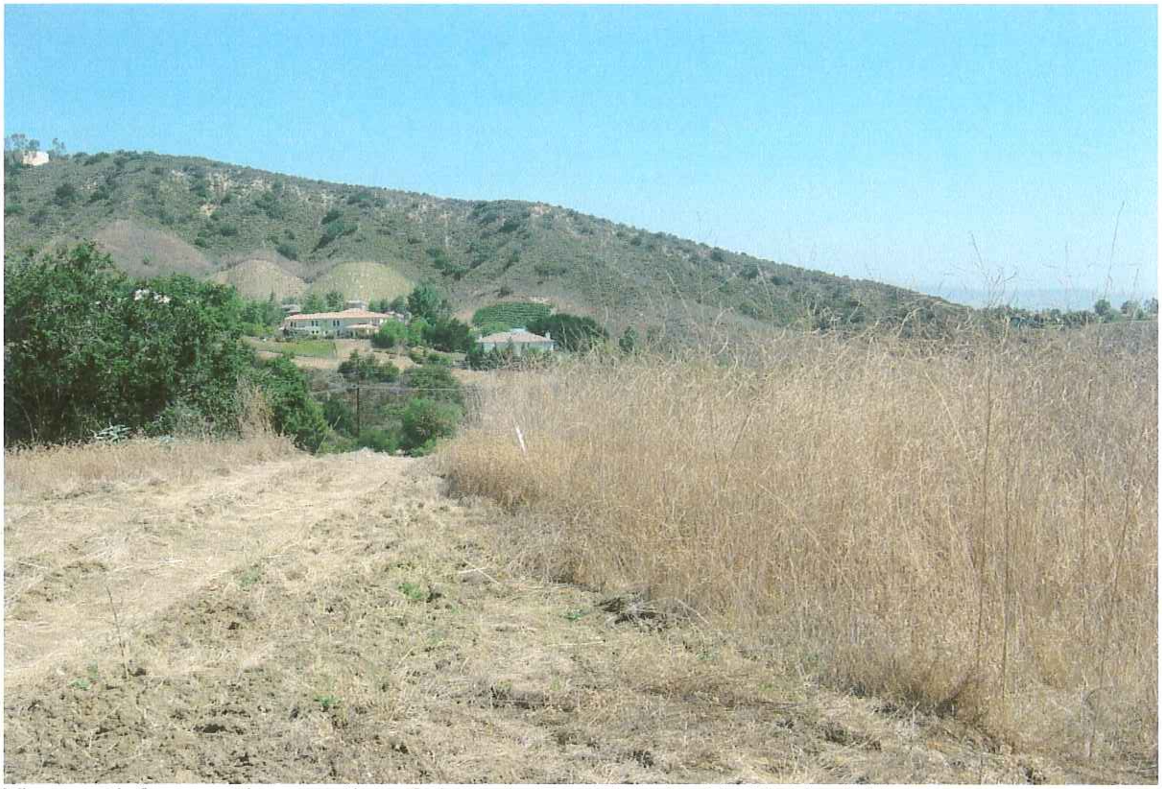
FE: Federally Endangered

State -- California Department of Fish and Game

CFP: California Fully Protected
CP: California Protected
CSC: California Species of Special Concern

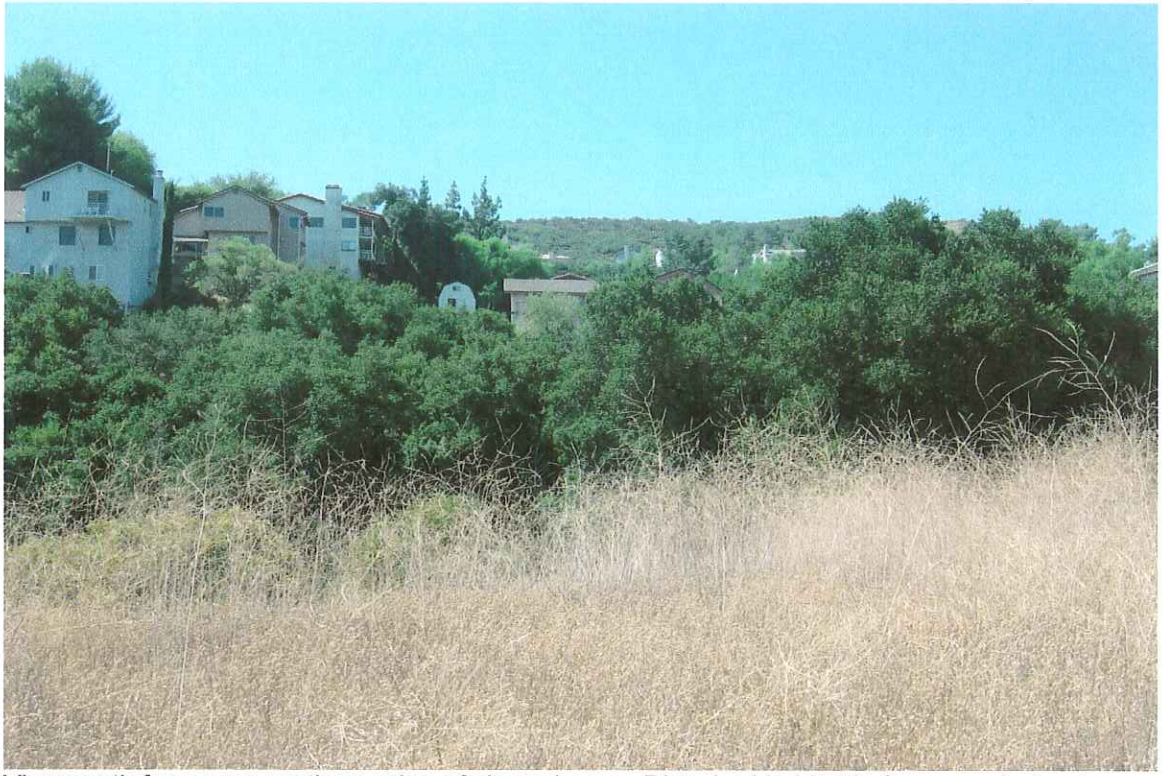
sa : California Special Animal (species with no official federal or state status, but are included on CDFG's Special Animals list)

Attachment C
Site Photographs



View north from northern portion of cleared area. Disturbed habitat to right.

View east across northern third of site. Ruderal and coastal sage in foreground, riparian in background.



View south from near southern edge of cleared area. Disturbed habitat in foreground, riparian and existing development in background.

View west from cleared area.

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View south from road. Horse trailer and old corral visible in foreground.

View NE along western edge of riparian canopy

Attachment D
Vascular Plant Species Observed On Site

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Attachment D

Vascular Plant Species Observed On Site

Scientific Name	Common Name	Native/Exotic
Anacardiaceae	**Sumac or Cashew Family**	
Malosma laurina	Laurel sumac	Native
Schinus molle	Peruvian pepper	Exotic
Toxicodendron diversilobum	Poison oak	Native
Apiaceae	**Carrot Family**	
Foeniculum vulgare	Fennel	Exotic
Areacea	**Palm Family**	
Washingtonia filifera	California fan palm	Exotic -in this region. Native to CA southeast deserts but widely planted as ornamental elsewhere; highly invasive)
Asclepiadaceae	**Milkweed Family**	
Asclepias fascicularis	Narrow-leaf milkweed	Native
Asclepias eriocarpa	Kotolo milkweed	Native
Asteraceae	**Sunflower Family**	
Artemisia californica	California sagebrush	Native
Artemisia douglasiana	Mugwort	Native
Baccharis pilularis	Coyote brush	Native
Baccharis salicifolia	Mulefat	Native
Centaurea maculosa	Spotted knapweed	Exotic
Centaurea solstitalis	Yellow star-thistle	Exotic
Cirsium vulgare	Bull thistle	Exotic
Conyza canadensis	Mare's tail	Native
Encelia californica	California encelia	Native
Eriophyllum confertiflorum	Golden yarrow	Native
Gnaphalium canescens	Felt leaf everlasting	Native
Helianthus annuus	Sunflower	Native
Hemizonia fasciculata	Common tarweed	Native
Heterotheca grandiflora	Telegraph weed	Native
Isocoma menziesii	Goldenbush	Native
Lessingia filaginifolia	Cudweed aster	Native
Picris echioides	Bristly ox-tongue	Exotic
Sonchus oleraceus	Sow thistle	Exotic
Brassicaceae	**Mustard Family**	
Brassica sp.	Mustard	Exotic
Hirschfeldia incana	Shortpod mustard	Exotic
Caprifoliaceae	**Honeysuckle Family**	
Sambucus mexicana	Blue elderberry	Native
Convolvulaceae	**Morning-glory Family**	
Convolvulus arvensis	Field bindweed	Exotic
Fabaceae	**Legume Family**	
Lotus scoparius	California broom	Native
Fagaceae	**Oak Family**	
Quercus agrifolia	Coast live oak	Native

Attachment D (continued)
Vascular Plant Species Observed On Site

Scientific Name	Common Name	Native/Exotic
Geraniaceae	**Geranium Family**	
Erodium cicutarium	Red-stemmed filaree	Exotic
Lamiaceae	**Mint Family**	
Salvia leucophylla	Purple sage	Native
Malvaceae	**Mallow Family**	
Malacothamnus fasciculatus	Bush mallow	Native
Poaceae	**Grass Family**	
Avena sp.	Wild oats	Exotic
Leymus condensatus	Wild rye	Native
Nassella cf. *lepida*	Needlegrass	Native
Polypogon monspeliensis	Rabbitfoot grass	Native
Polygonaceae	**Buckwheat Family**	
Rumex crispus	Curly dock	Exotic
Primulaceae	**Primrose Family**	
Anagallis arvensis	Scarlet pimpernel	Exotic
Rhamnaceae	**Buckthorn Family**	
Ceanothus spinosus	Greenbark ceanothus	Native
Rhamnus californica	Coffeeberry	Native
Rosaceae	**Rose Family**	
Heteromeles arbutifolia	Toyon	Native
Prunus ilicifolia	Holly-leafed cherry	Native
Salicaceae	**Willow Family**	
Salix goodingii	Gooding's willow	Native
Salix laevigata	Red willow	Native
Salix lasiolepis	Arroyo willow	Native
Scrophulariaceae	**Figwort Family**	
Mimulus auranticus	Bush monkey flower	Native

Arbor Essence

February 28, 2006

Mr. Amir Rudyan
8245 Remmet Ave.
Canoga Park, CA 91304

Regarding: Oak Tree Report
APN #2072-001-004
23604 Dry Canyon Cold Creek Rd.
Calabasas, CA

Dear Mr. Rudyan,

At your request I visited the above referenced site on August 12 & 15, 2005, to collect information required to prepare the oak tree report. The purpose of this visit was to perform an inventory and evaluation of all oak trees and scrub oak habitat associated with the project, evaluate their current condition, assess the level of impact due to proposed construction and where applicable, provide mitigation measures or recommendations for their preservation.

My inspection was visual only and performed from ground level. No extensive or invasive diagnostic procedures were used during this tree study. Trunk diameters are measured at 54 inches above soil grade, height is visually estimated. All oak trees included in this report have been identified by numbered metal tags attached to the north side of the trunk. Tree location, dripline, and protection zone are indicated on site plans; scrub oak habitat is indicated on plans with red shading. Appraised tree values are based on calculations using the "PRC" method as outlined by the city of Calabasas. An X or O next to the tree numbers are symbols use by the city that indicate whether a tree that is to be preserved in place or proposed to be removed.

Summary

Calculated oak tree canopy cover for the overall site is 28%. A total of (51) oak trees have been tagged and evaluated as part of this study, these include (45) coast live oak (*Quercus agrifolia*) and (6) scrub oak (*Quercus berberidifolia*). Heritage trees include #11, 26, 27, 31, 47 & 49. Only one (1) tree (coast live oak #38) is being requested for removal due to proposed development.

10523 Burbank Blvd., Suite 204 North Hollywood, CA 91601 Phone & Fax 818.506.6222

A total of twelve (12) trees will be encroached, these include trees #11, 31, 33, 35, 37, 37A, 37C, 39, 40, 43, 44 & 49; encroachment on these trees is minor and the trees can reasonably be preserved in place. All other trees will not suffer any encroachment and are to be preserved in place with little to no impact.

Observations

The site is approx. 4.5 acres of undeveloped land consisting of natural oak woodland and riparian zone tree species near the creek. There are an estimated total of 300 oak trees on-site. Terrain is mostly steep slope with a large open area at the upper southwest portion of the lot. The trees and plants on-site have never received any type of maintenance and naturally are full of deadwood and stubs. The primary tree species includes coast live oak (*Quercus agrifolia*) and scrub oak (*Quercus berberidifolia*). Other native plant species are also present such as willow (*Salix* sp.), California pepper (*Schinus molle*), toyon (*Heteromeles arbutifolia*) as well as native chaparral plants. Several of the oak trees have developed poor structural form due to growing in a grove setting and being over crowded. A beehive was observed in the trunk near ground level of oak tree #49.

Tree Condition Rating System

A – Outstanding: A healthy, sound and vigorous tree characteristic of its species and reasonably free of any visible signs of stress, structural problems, disease or pest infestation

B – Above average: A healthy, sound and vigorous tree with minor signs of stress, disease and or pest infestation

C – Average: Although healthy in overall appearance there exists an abnormal amount of stress, pest infestation or visual signs of minor structural problems.

D – Below Average/Poor: This tree is characterized by exhibiting a great degree of stress, pests or diseases, and appears to be in a rapid state of decline. The degree of decline can vary greatly and may include dieback or advanced stages of pests or diseases. There may also be visual signs of structural problems such as cavities, decay or damaged roots

F – Dead: This tree exhibits no sign of life whatsoever

Tree Conditions

Currently trees on the site are not being maintained and have not received any maintenance for several years now, as the result excessive amounts of deadwood and dead stubs exist in the trees. Several of the oak trees have developed poor structural form due to growing in a grove setting and being over crowded. Wood decay fungi was observed on the side of the trunk of tree #49 and a beehive was also observed in its trunk near ground level. Oak tree #31 clearly has a major trunk deformity, a large cavity and area of decay was also observed about 6 feet up on the southeast side of the trunk.

More specific information on the trees can be found on individual "Tree Evaluation Forms" and in spreadsheets. Indicated canopy spread on spreadsheet is averaged, or dripline at its widest point.

Proposed Construction and Potential Tree Impacts

Proposed development: single-family residence, garage, retaining walls, pool, and driveway. Major grading will be performed for proposed building pad.

Tree #11 - Grading operations with fill of 2'-3' feet will encroach the TPZ on the west side of the tree by approx. 2' feet, work is outside the dripline by 13' feet and maintains a distance of over 40' feet from the trunk of the tree. This work is a safe distance from the tree and will not have any significant impact.

Tree #31 - A soil cut of approx. 2'-3' feet will encroach the TPZ by about 10' feet on the west side of the tree; work remains outside the dripline of the tree, work is outside the dripline by 8' feet and maintains a distance of over 35' feet from the trunk of the tree. This work is a safe distance from the tree and can be completed without significant impact.

Tree #33 - Grading operations with a cut of 3' feet will encroach the dripline of tree #33 by approx. 5' feet on its west side, grading will maintain a distance of approx. 7' feet from the trunk of the tree. Although some small tree roots may be encountered proposed work can be completed with minimal impact to the tree.

Tree #35 - Grading operations will encroach the TPZ on the west side by 2'-3' feet but remain outside the dripline. It is not expected that any significant tree roots will be encountered during grading and that proposed work can be completed with minimal impact.

Tree #37 - Grading operations with a soil cut of 1'-3' feet will encroach the dripline on the SW side of the tree by 13' feet, maintaining a distance of 7' feet from the trunk. Area of encroachment is only about 20% of the root zone. Although some tree root may be encountered the work can be completed with minimal impact.

Tree #37A - A soil cut of approx. 2' feet will encroach the TPZ up to within 2' feet of the trunk on the SW side of the tree. This is a very small scrub oak; although significant roots may be encountered during grading I believe the tree can reasonably be preserved by employing proper root pruning procedures and using hand tools.

Tree #37C - A soil cut of approx. 1' foot will encroach the TPZ by 2' feet on the SW side of the tree. Work remains outside the dripline of the tree and I do not expect that any significant tree roots will be encountered in the area. Work can be completed with little to no impact to the tree.

Tree #38 - Grading, and construction of driveway will require the removal of coast live oak #38, grading operations will result in cut and fill on either sides of the tree; a cut of up to 3' will be made within the dripline on the west side of the tree, and fill of up to 4' feet on the east side including 1'-2' of fill around the trunk.

Tree #39 will suffer encroachment of its dripline by about 2' feet on the northwest side due to grading operations for driveway. Work maintains a distance of 8' feet from the trunk. The small portion of fill soil at the edge of the dripline will not have any significant impact on the tree.

Tree #40 - Construction of pool area and retaining wall encroach the dripline by approx. 11' feet on the NE side of the tree. Construction maintains a distance of about 10' feet from the trunk of the tree. Less than 10% of the critical root zone will suffer encroachment. Although it is expected that some sizeable roots may be encountered during grading and excavation for retailing walls, employing mitigation measures such as hand excavation and proper root pruning, I believe the tree can reasonably be preserved with minor impact and little risk.

Tree #43 - Grading operations will encroach the TPZ of tree #43 by about 5' feet on the NE side at the edge of the dripline at 10' feet from the trunk. Required grading in this area is less than 1' +/- and will not have any significant impact on the tree.

Tree #44 - Grading operations of less than 1' foot +/- will encroach the TPZ by approx. 5' feet on the east side of the tree but remain outside the dripline. Required grading in this area is less than 1' +/- and will not have any significant impact on the tree.

Tree #49 - Grading operations of less than 1' foot +/- will encroach the TPZ by approx. 8' feet on the east side of the tree but remain well outside the dripline of the tree. Grading operation in this area is less than 1' foot +/- and are well outside the critical root zone. It is doubtful that any significant tree roots will be encountered in this area, and the work can be completed with little to no impact to the tree.

Remaining trees, including the oak woodlands at the SE corner of the property are well out side the area of development and will not be encroached upon or impacted in any way.

Conclusion and justification statement

The proposed design for development was conceived giving strong consideration to tree preservation. With only one oak tree being requested for removal I believe that the proposed development is both reasonable and ecological. Calculated oak tree canopy cover for the overall site is 28%, proposed removal of tree #38 will only reduce canopy cover by a total of 962 sq. ft. Several trees that might warrant removal due to their poor structural condition and high risk for failure will be preserved as natural habitat.

Fuel Modification and Brush Clearance

As required, part of the mitigation requirements is to provide brush clearance and fuel modification in the area 200 feet out from all structures. Following are some guidelines to aid in your compliance. Brush clearance and fuel modification measures must meet those as outlined by the L. A. County Fire Dept., Fuel Modification Unit available at www.lacofd.org.

The first thirty feet out from structures must be cleared of all vegetation except ornamentals. Remaining area 30'-200' must be thinned out and cleared to achieve an approx. 15 foot spacing between all shrubs. In addition, large shrubs and trees must have their crowns raised off the ground to approx. 1/3rd their overall height, in general terms this applies to vegetation over 8 feet in height.

Recommendations and Mitigation Measures

1. Install protective fencing around all protected oak trees and scrub oak habitat, fencing shall be installed at the tree protection zone or edge of construction boundary as indicated on plans.
2. All approved work or excavation performed within the tree protection zone shall be performed with hand tools under the direct supervision of the project arborist.
3. Any drainage systems that are installed must dump well outside the tree protection zone.
4. All roots that are pruned shall be cut cleanly and performed under the direct supervision of the project arborist.
5. Any pruning shall be performed by a qualified arborist under the supervision of the applicant's oak tree consultant. All pruning must be meet ISA and ANSI 300 standards.
6. Prune trees as recommended to remove deadwood and stubs only.
7. No irrigation shall be installed within the dripline of any oak tree.
8. No planting is recommended within the protection zone of any oak tree. Any planting within the protection zone shall consist of oak associated natives of the Santa Monica Mountains.
9. No equipment, construction materials or debris shall be stored or disposed of within the protected zone of any tree.
10. No changes in soil grade shall be made within the tree protection zone.

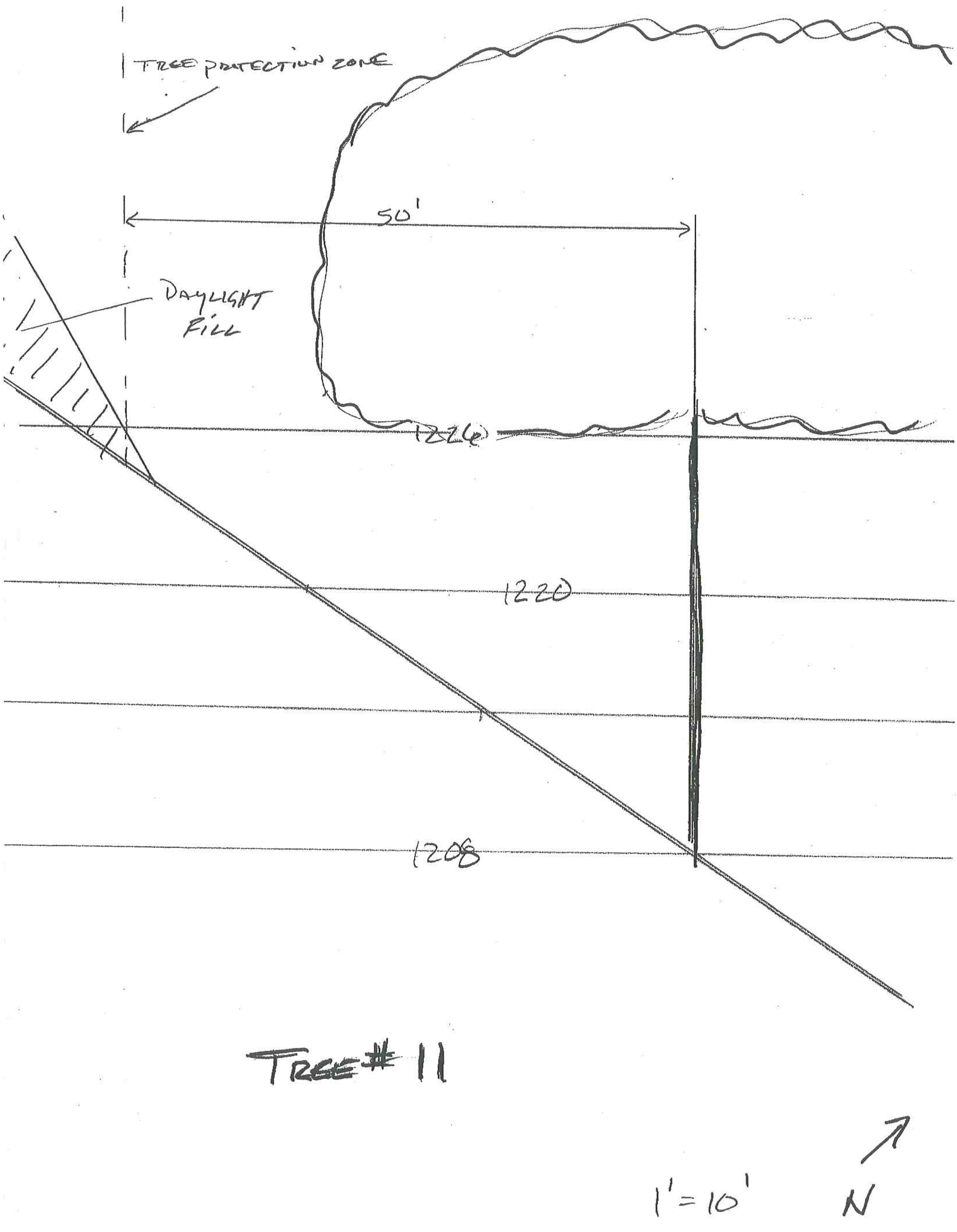
It should be noted that the study of trees is not an exact science and arboriculture does not detect or predict with any certainty. The arborist therefore is not responsible for tree defects or soil conditions that cannot be identified by a prudent and reasonable inspection.

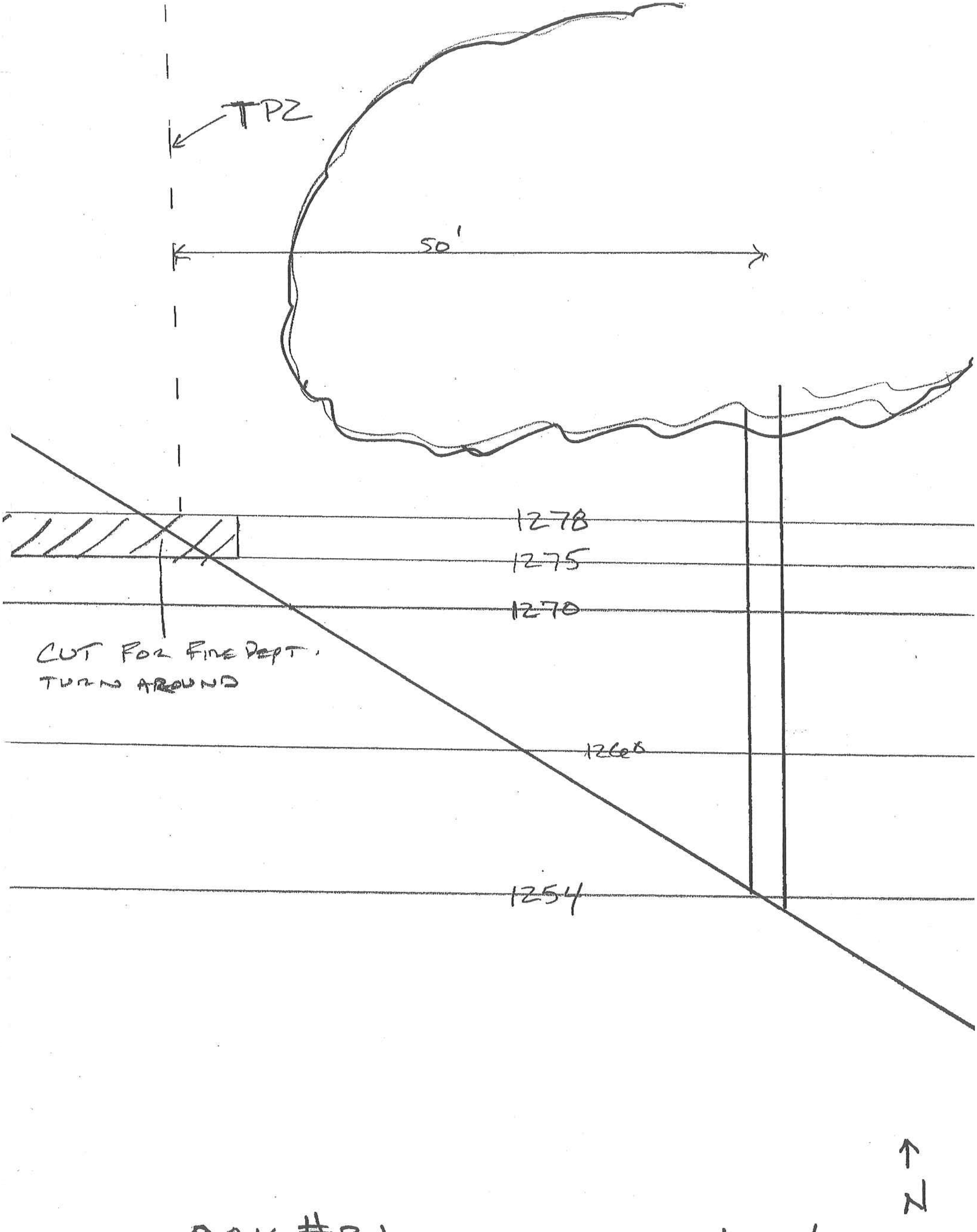
If you have any questions or require other services please contact me at the number listed below.

Respectfully,
Arbor Essence

Kerry Norman
ISA Board-Certified Master Arborist #WC-3643B
ASCA member, American Society of Consulting Arborists

Enclosed
Oak tree report, Photos
Spreadsheets, Tree evaluation forms
Site plan/tree map

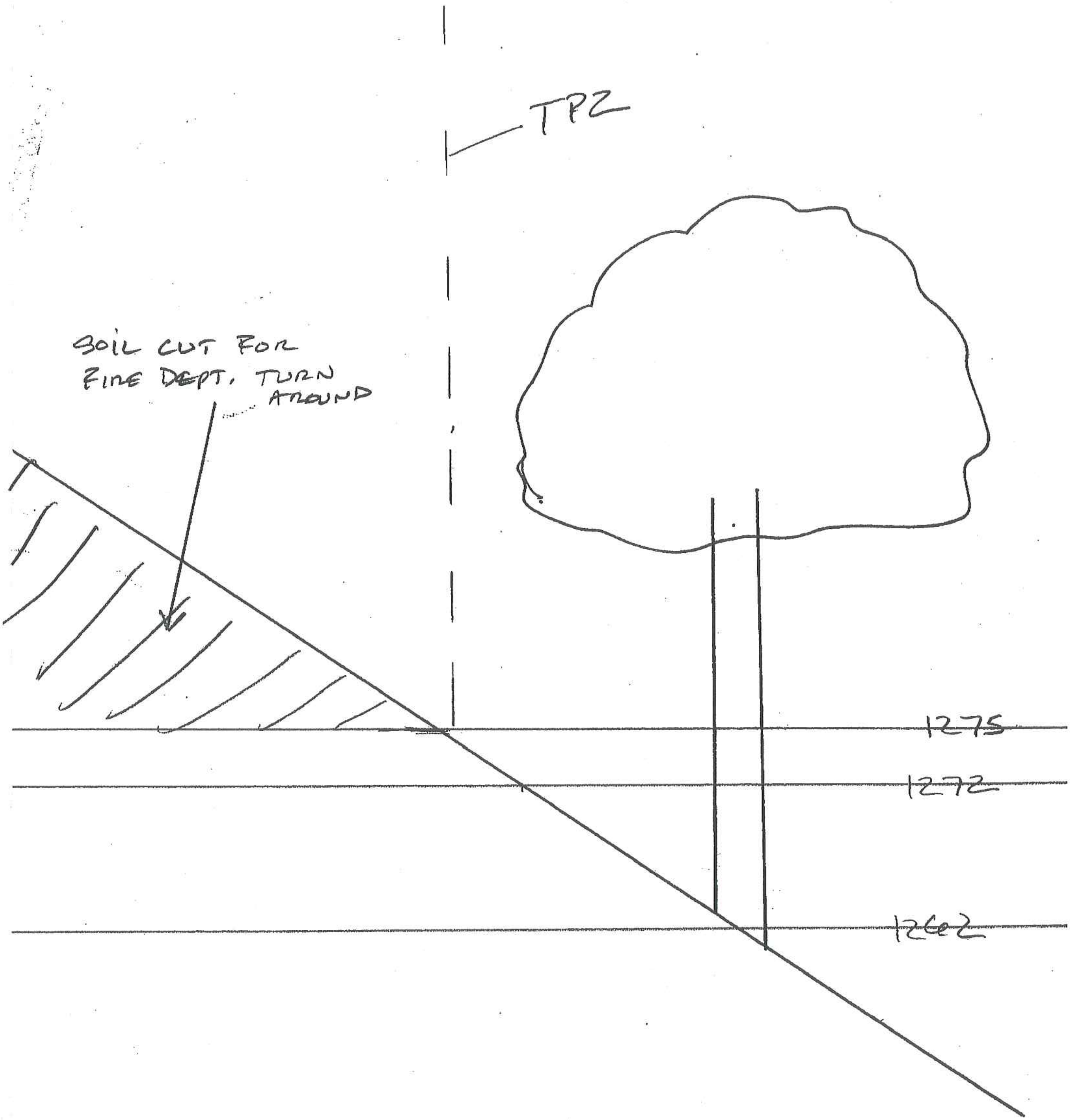

TREE PROTECTION ZONE
50'
DAYLIGHT FILL
1226
1220
1208
TREE # 11
1' = 10'
N



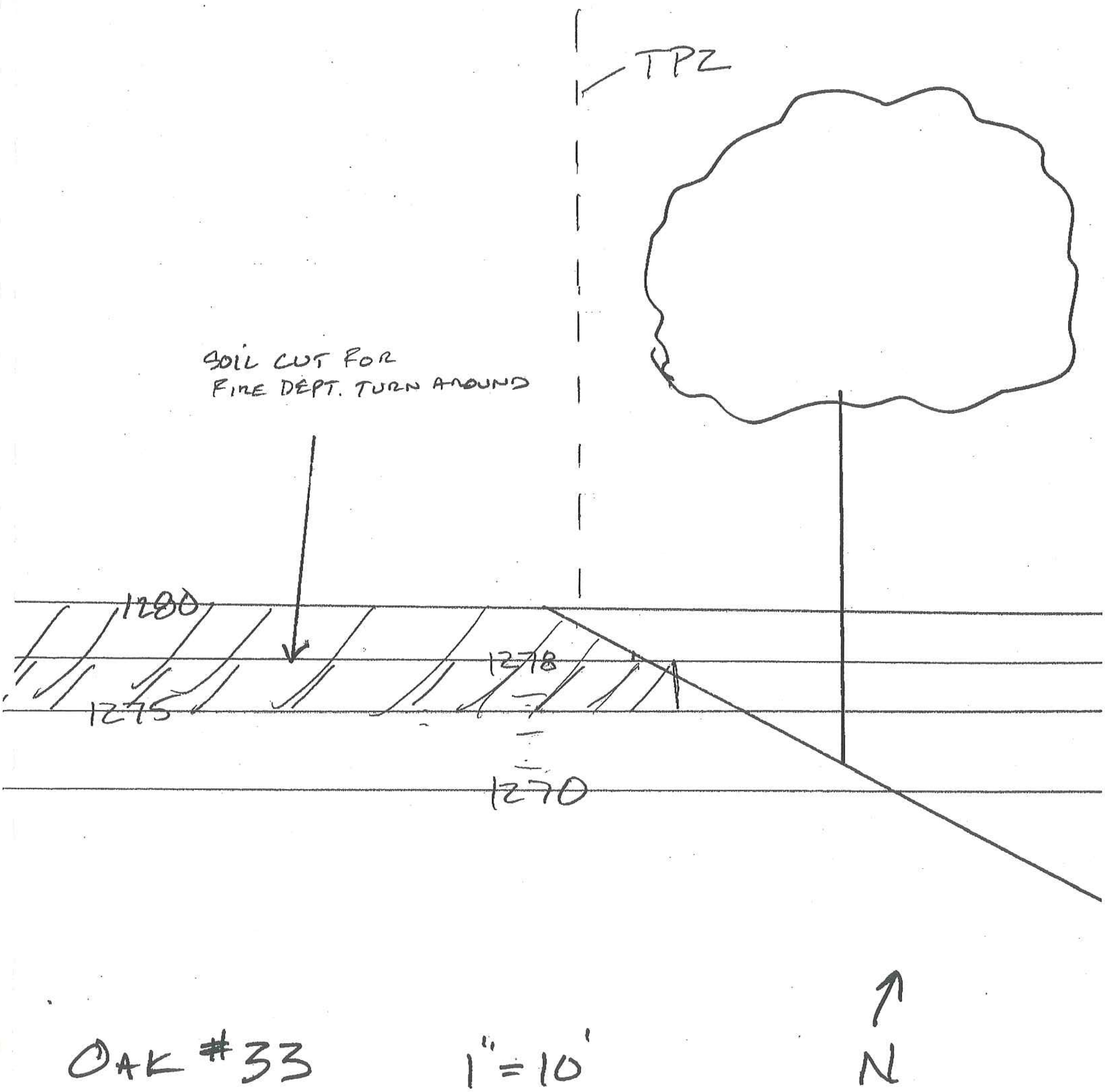
TPZ
50'
1278
1275
1270
CUT FOR FIRE DEPT.
TURN AROUND
1260
1254
N

OAK #31

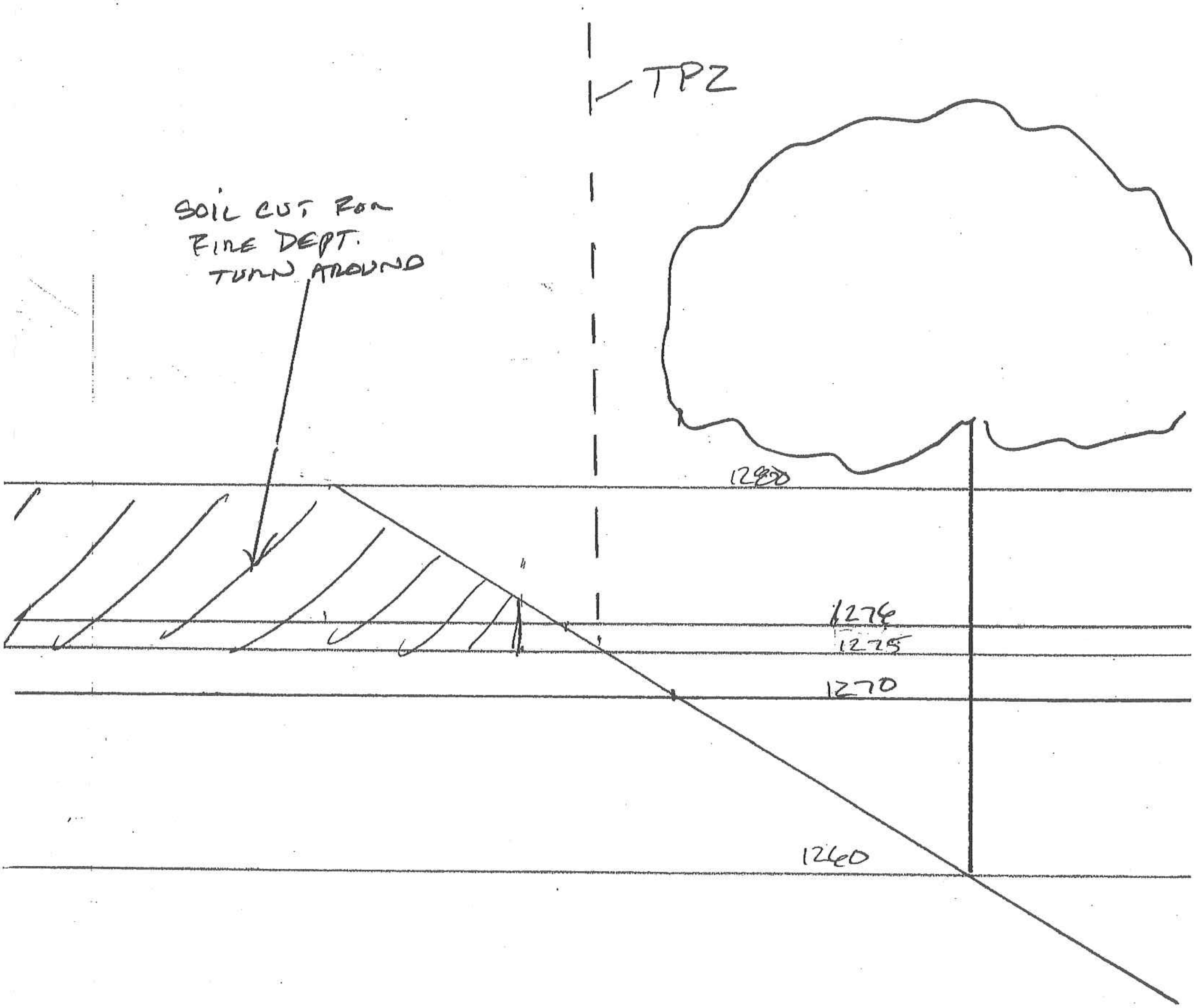
1" = 10'



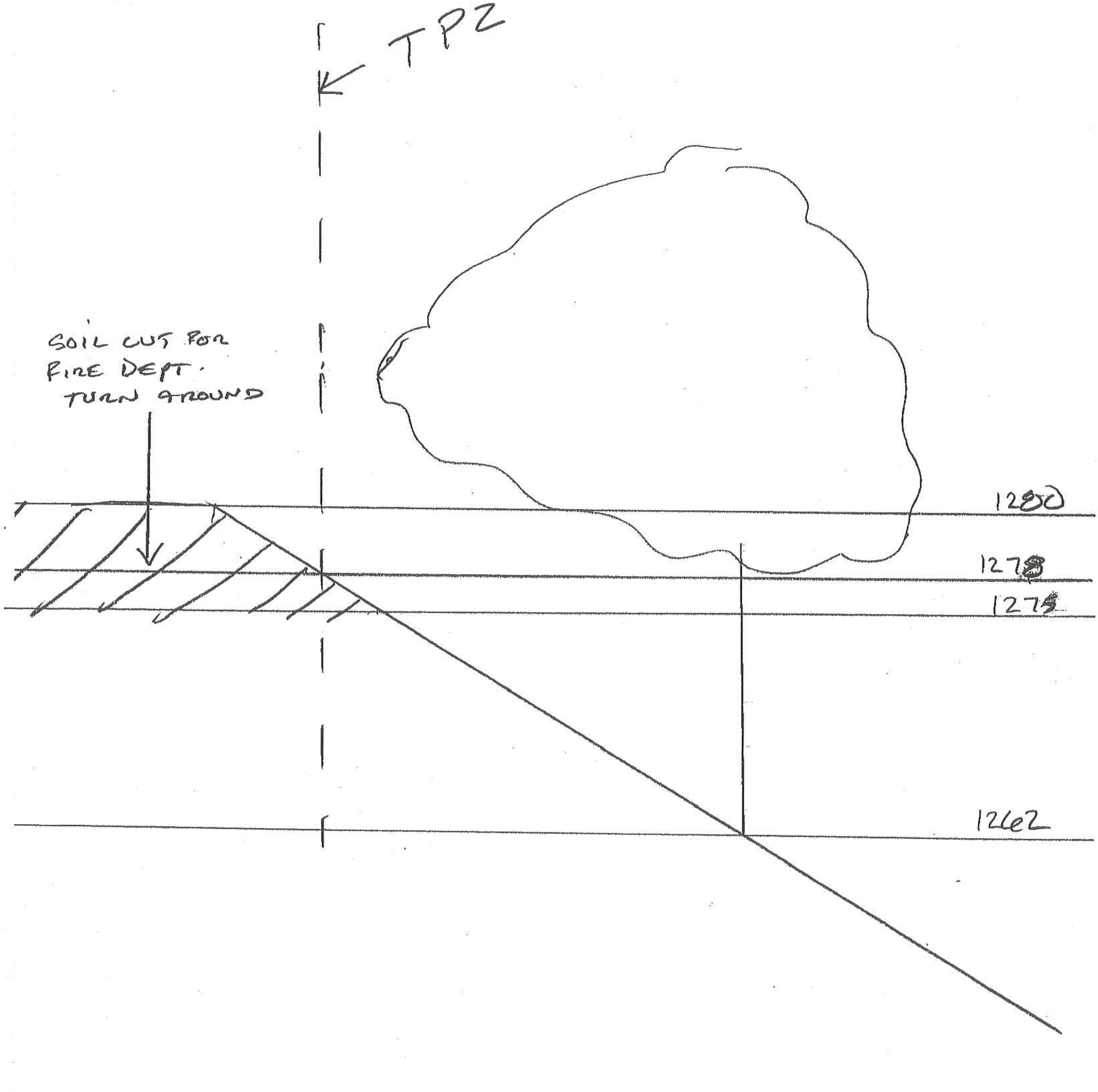
OAK #32 1" = 10' ↑ N



OAK #33 1" = 10'

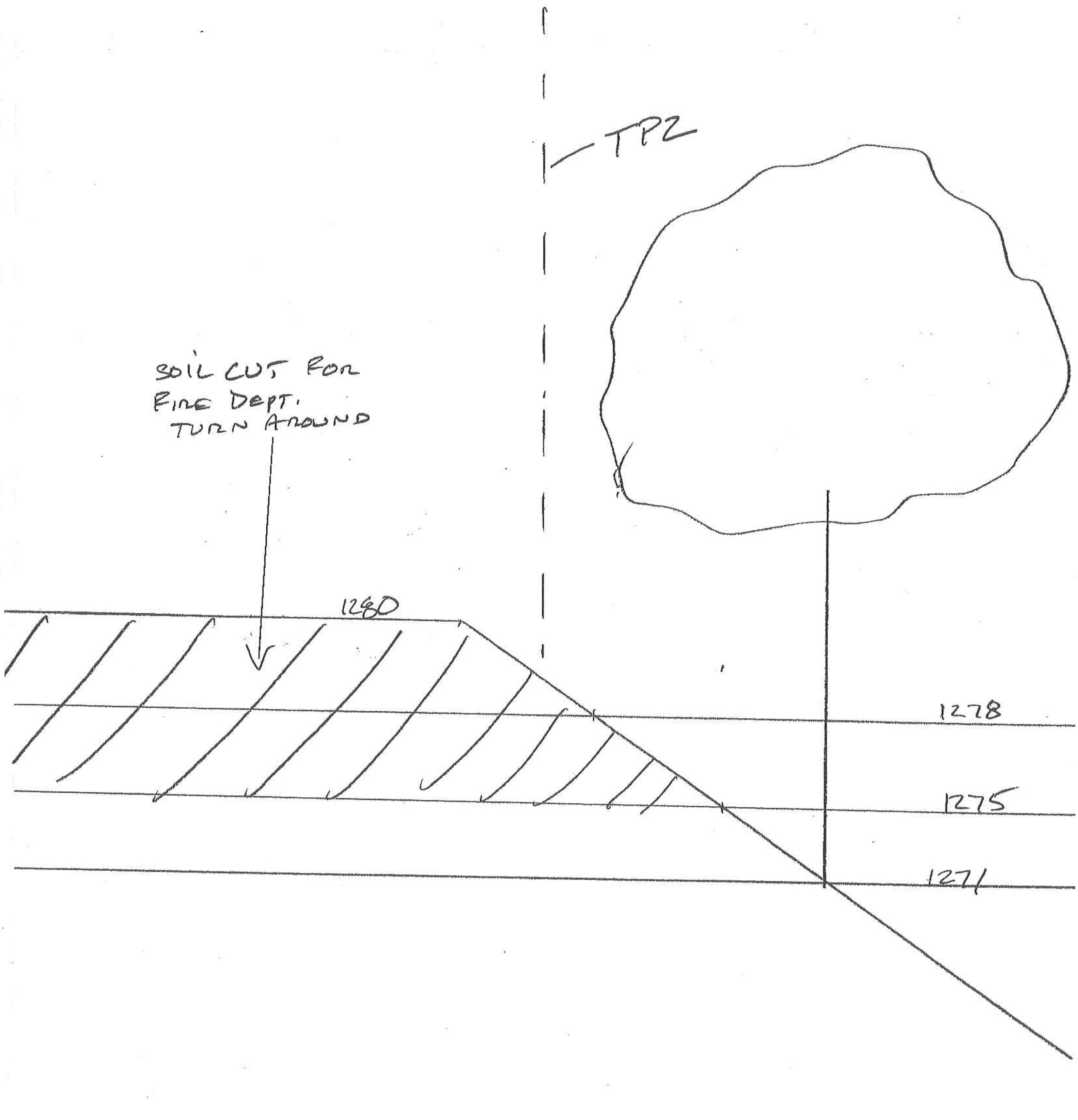

TPZ
SOIL CUT FOR
FIRE DEPT.
TURN AROUND
12890
1276
1275
1270
1260

OAK #34 1"=10'



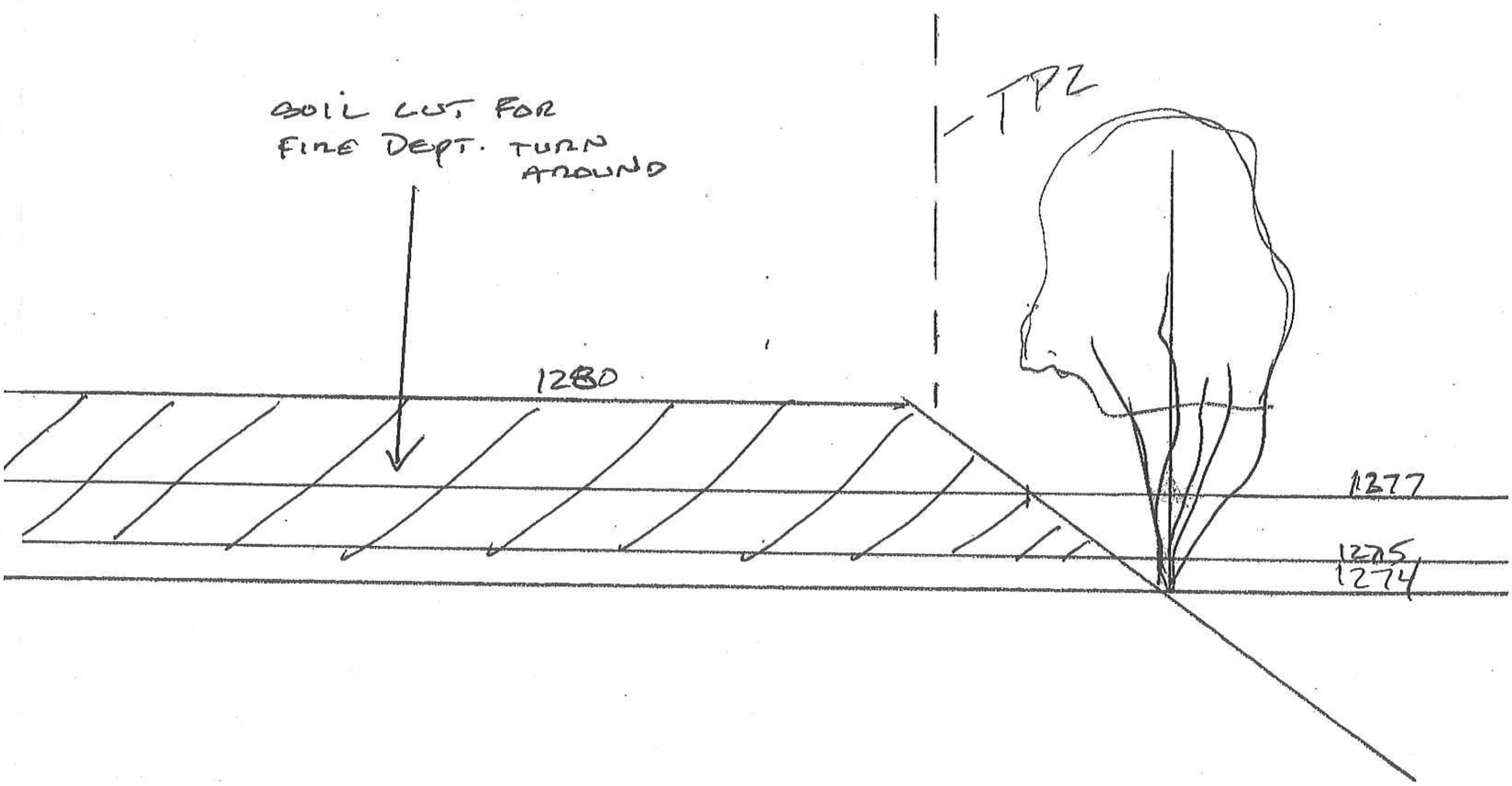
N

OAK #35 1" = 10'

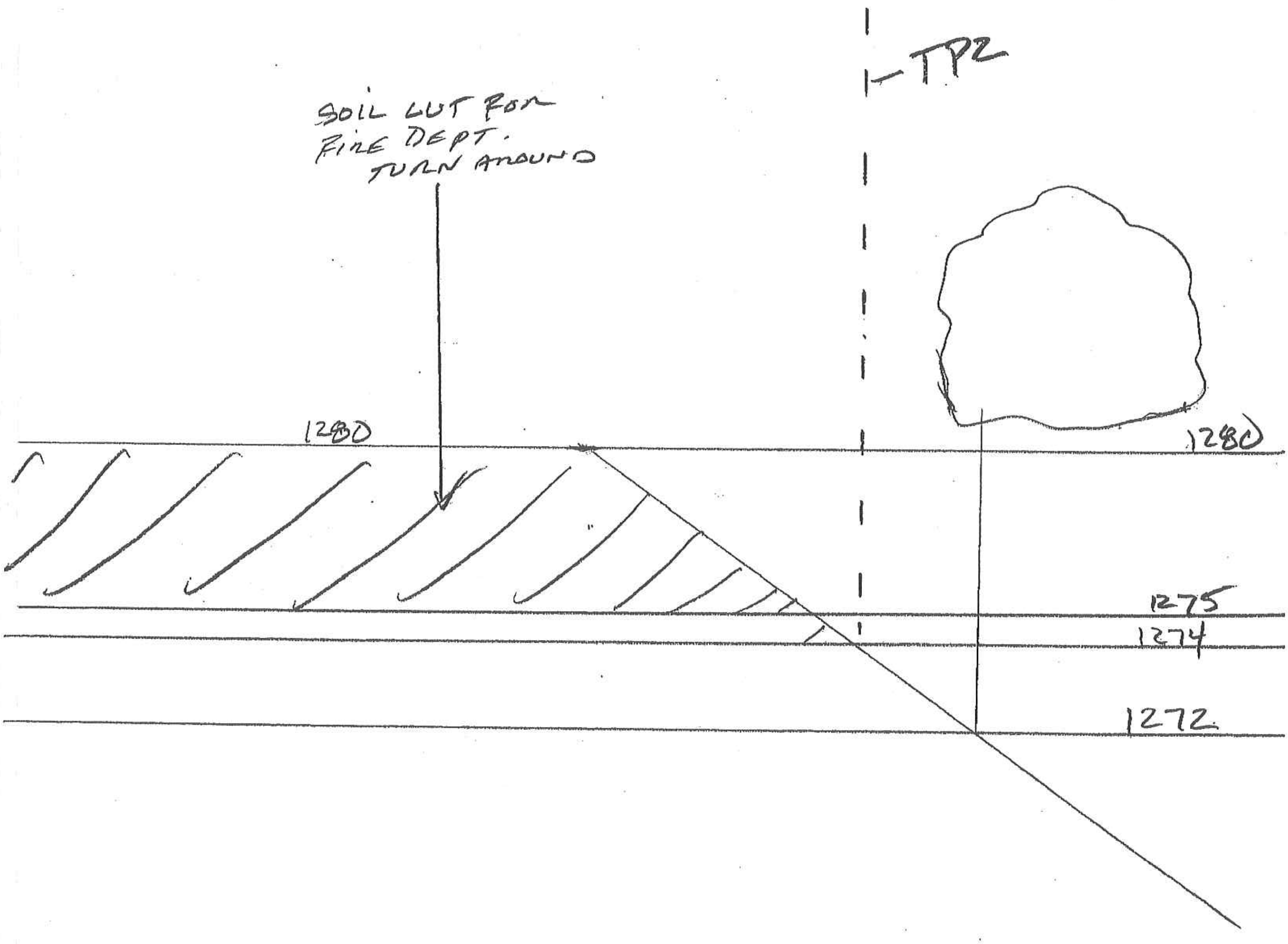


OAK #37 1" = 10'

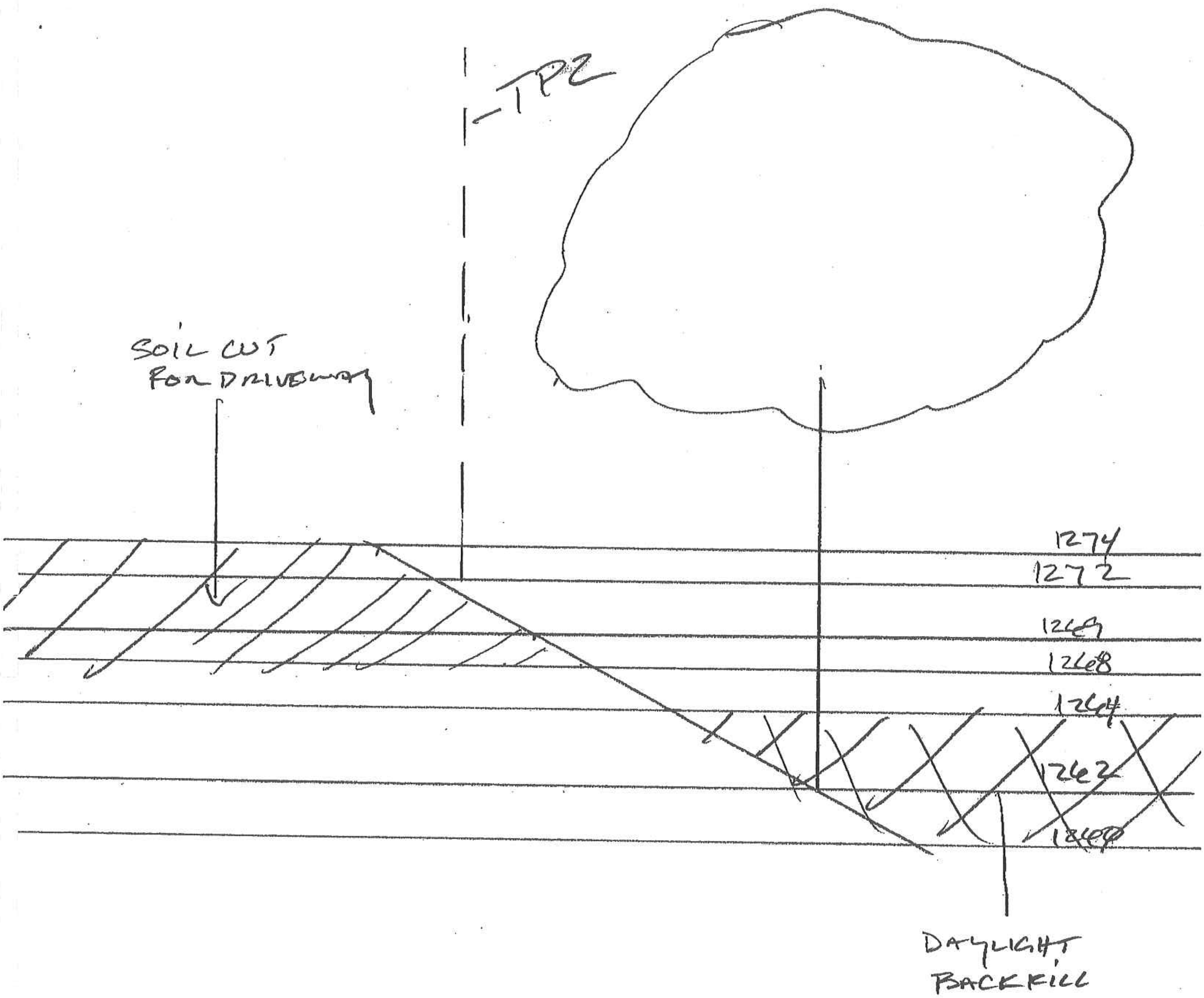
N →



OAK #37A 1" = 10' N →

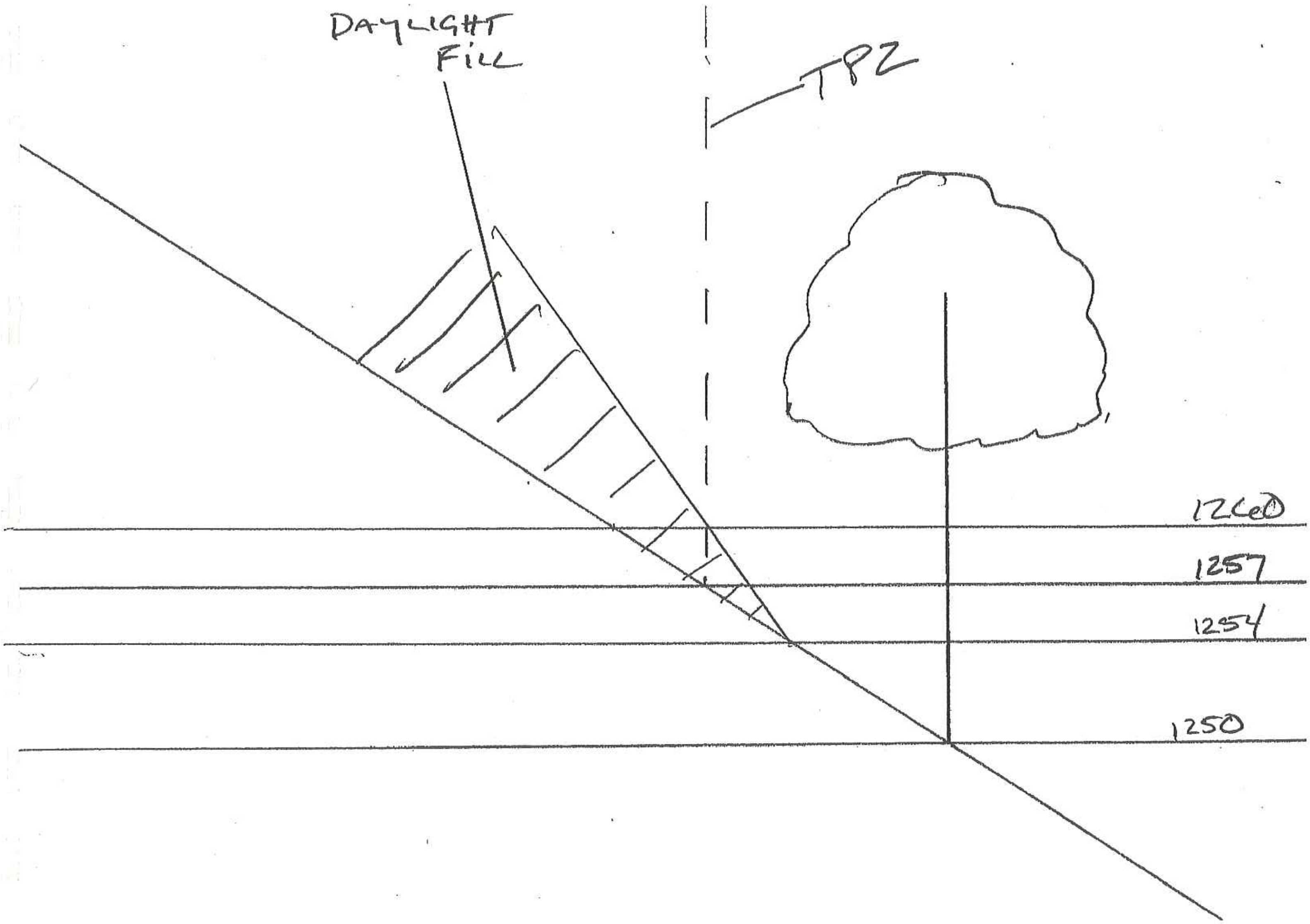

TP2
SOIL CUT FOR
FIRE DEPT.
TURN AROUND
1280
1280
1275
1274
1272

OAK #37 C 1" = 10' N


TPZ
SOIL CUT
FOR DRIVEWAY
1274
1272
1268
1264
1262
DAYLIGHT
BACKFILL

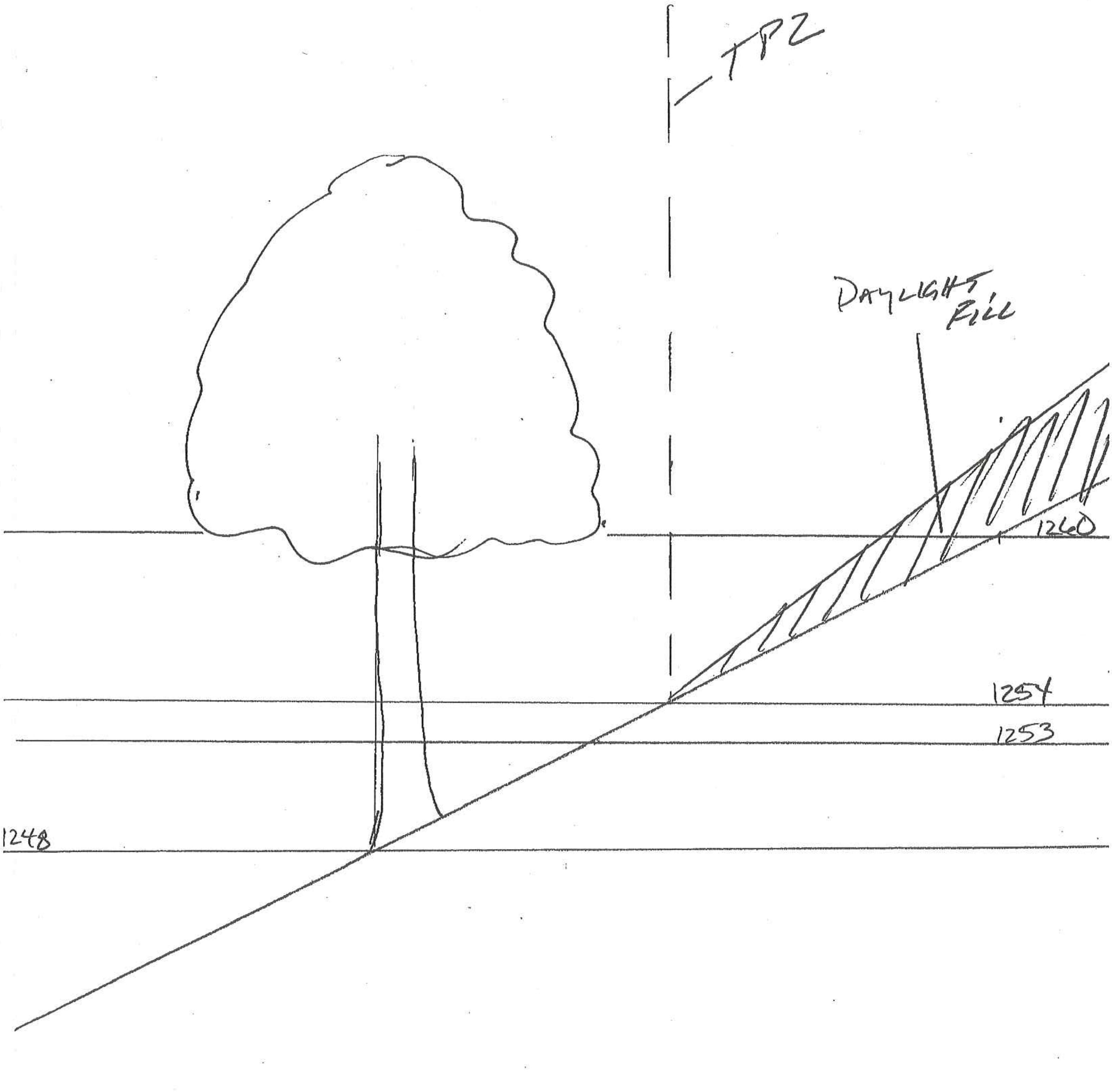
OAK #38 1" = 10'

N ↗



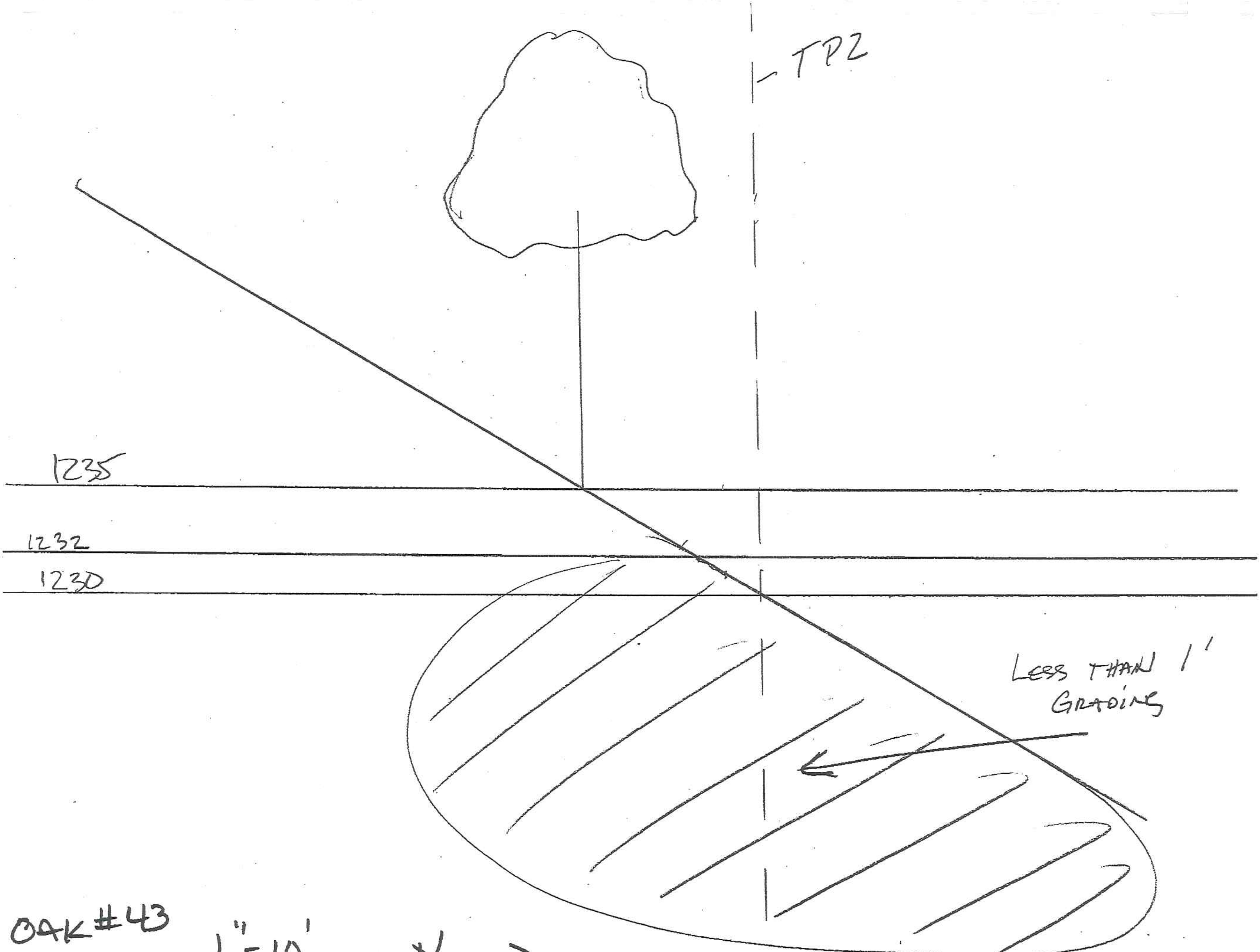
OAK #39 1" = 10'

N ↗

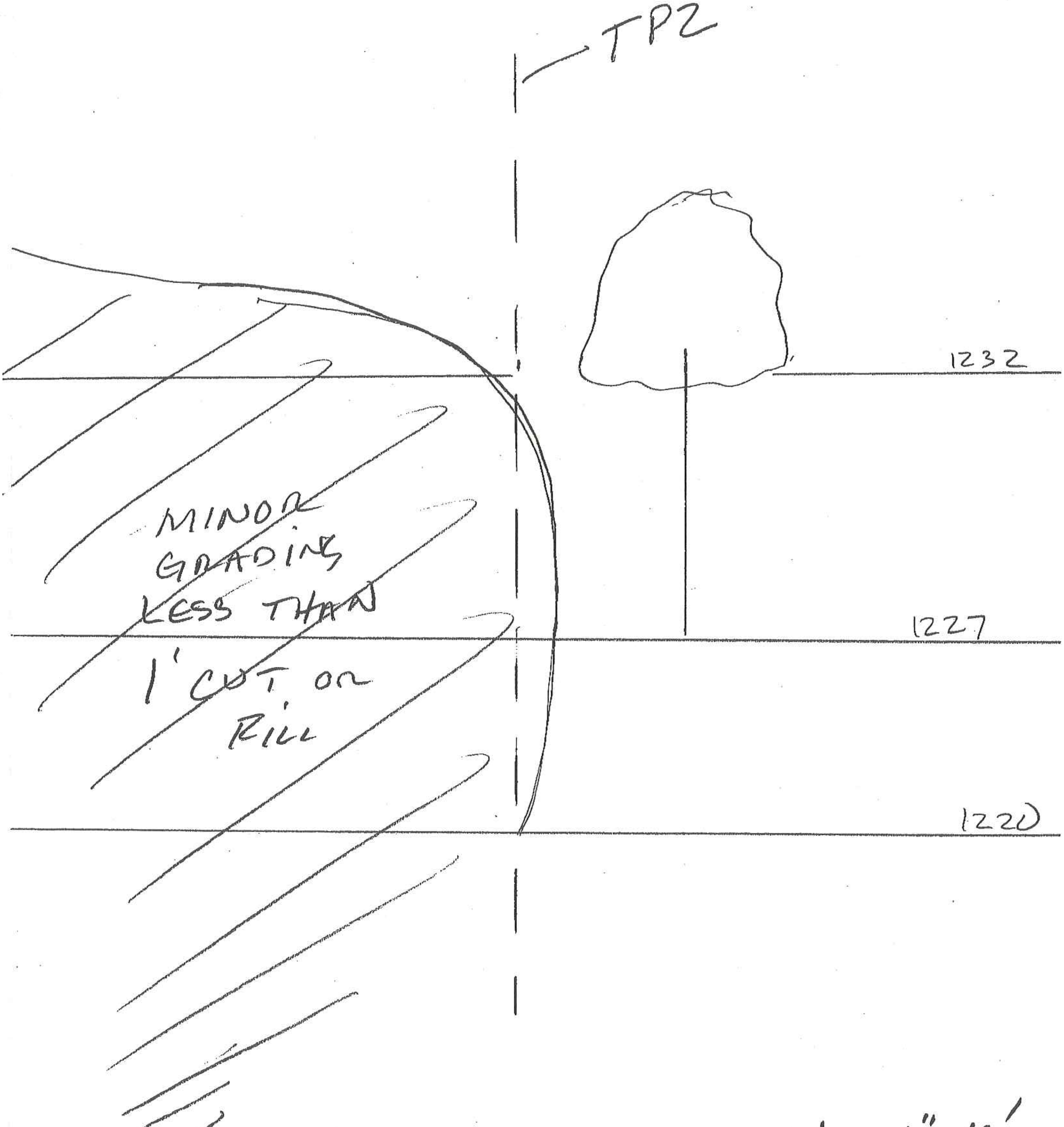


OAK #41 1" = 10'

← N

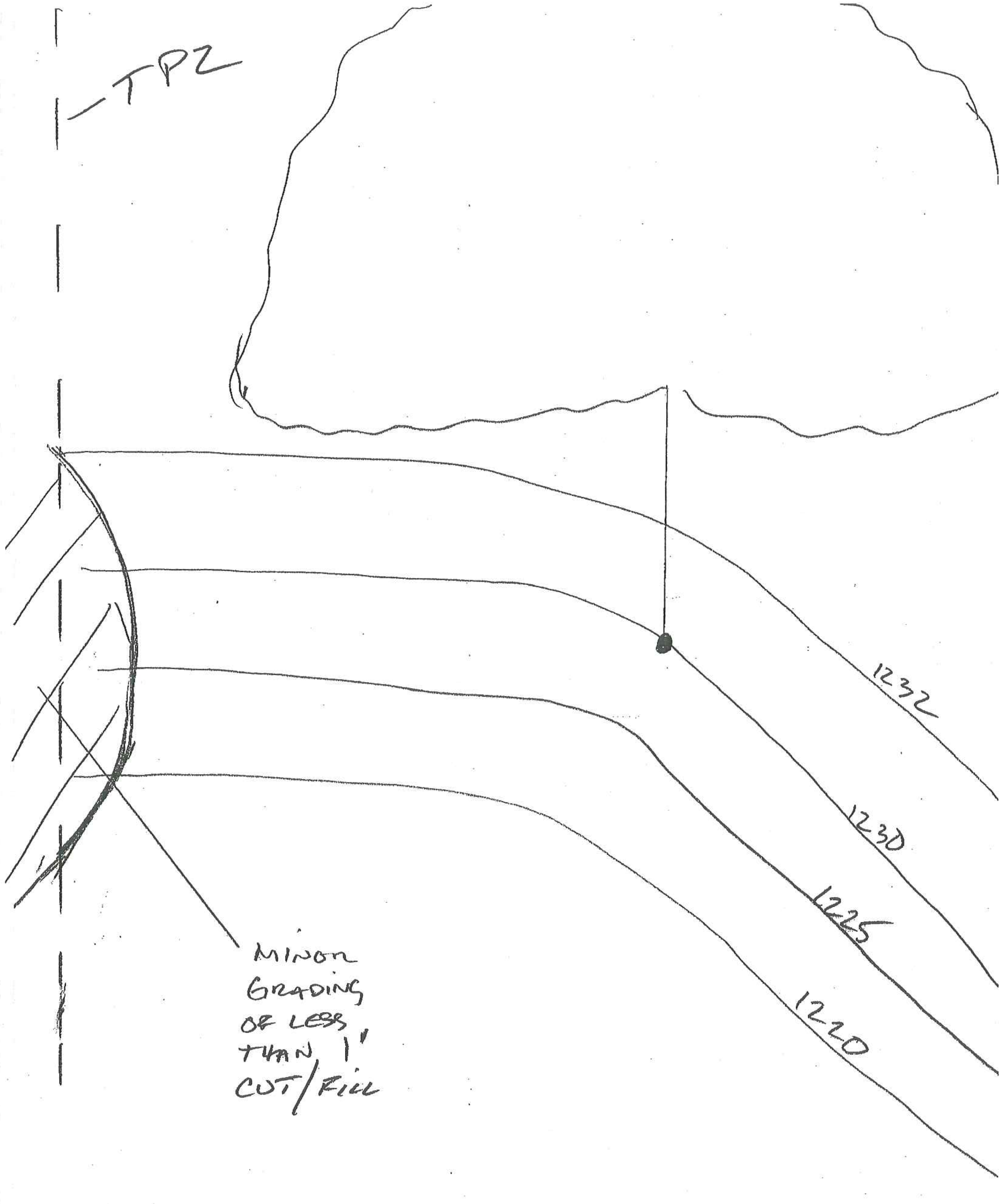


OAK #43 1" = 10' N →



OAK #44 1"=10'

↓ N



OAK #49 1"=10' N

Appendix C

Phase I Archaeological Investigation

COMPASS ROSE
ARCHAEOLOGICAL, INC.
6206 PEACH AVENUE, VAN NUYS, CA 91411
(818) 989-0656 - OFFICE & FAX
jrcompass@earthlink.net

Phase I Archaeological Investigation at 23604 Dry Canyon Cold Creek Road, Calabasas, County of Los Angeles, California APN 2072-001-004

I. Project Location and Description

At the request of Amir Rudyan, Compass Rose Archaeological, Inc. completed a Phase I archaeological investigation for an approximately 4.0 acres parcel, APN 2072-001-004, located at 23604 Dry Canyon Cold Creek Road, in the City of Calabasas, Los Angeles County (Figure 1). The property is located adjacent to 23406 Dry Canyon Cold Creek Road and across the road from the View Point School. The proposed project will consist of the construction of a private residence, with an associated driveway, and swimming pool.

II. Study Findings

Although no prehistoric or historical cultural resources were observed within the project property during the field reconnaissance, ground visibility was very poor due to vegetation. Therefore, it is recommended that the parcel be resurveyed subsequent to removal of vegetation and prior to earth disturbing activities.

III. Introduction

This study was conducted in accordance with the California Environmental Quality Act (CEQA) guidelines (revised, to date), and the California Register of Historical Resources. This report has been prepared in accordance with state guidelines for the preparation of Archaeological Resource Management Reports (ARMR), proposed in the State of California Preservation Planning Bulletin No. 4(a) (State of California 1989) entitled *Archaeological Resource Management Reports (ARMR): Recommended Contents and Format.*

Name of Surveyor	Qualifications	Date of Fieldwork
Catherine Girod	B.A. Anthropology, 7 years of professional archaeological experience in California.	28 September 2006

Present Environment

The project property is located on the south side of Dry Canyon Cold Creek Road, within the City of Calabasas. The vacant property, which is generally along a southeast facing natural slope, is densely vegetated with coastal live oak, scrub oak, thistle, Indian tobacco, as well as 3-4 feet high grasses that limited ground surface visibility to less than 10 percent. A small dry creek extends along the southern and eastern portions of the property. Soils consist of grayish brown sandy clay colluvium along the lower elevations, which grades to yellowish brown sandy clay on the higher areas, with granitic and sandstone cobbles scattered throughout the property. A minimally graded roadway extends to the top of the hill where some geological soils tests have been completed in the area of the proposed construction.

Ethnography

At the time of European contact, Chumashan-speaking peoples occupied an area that extended south along the California coast from San Luis Obispo County into Los Angeles County, and east to the fringes of the San Joaquin Valley, and included the Channel Islands of San Miguel, Santa Rosa, Santa Cruz and Anacapa (Glassow 1980; Grant 1978a). The project area is within the territory occupied at that time by native peoples speaking one of six major dialects of the Chumash language. Known as the Ventureno Chumash, this group was subdivided from their culturally similar neighbors to the north and west, the Ynezeno and Barbareno Chumash, on the basis of linguistic deviations rather than on any apparent difference in social or economic organization. The Ventureno (so named because of their association with Mission San Buenaventura) were the southernmost of the Chumash peoples and spoke one of four Chumashan dialects considered as forming a core group of more closely related forms (Grant 1978b; Kroeber 1953). Chumash society developed over the course of some 9,000 years and has been described as having achieved a level of social, political, and economic complexity not ordinarily associated with hunting and gathering groups.

IV. Sources Consulted

National Register of Historic Places	Month and Year 1979/1989 and supplements to date
California Inventory of Historic Resources	Year 1976

California Historical Landmarks	Year
	1990

Archaeological Site Records: Name(s) of Institution(s)

A records search was completed by W. H. Bonner at the South Central Coastal Information Center, California Historical Resources Information System, Department of Anthropology, California State University, Fullerton.

Results

Based on the records search, no prehistoric or historical sites have been recorded within a 0.25 mile radius of the subject property. Four previous cultural resource investigations (Bemor 1979, LA-580; Pence 1980, LA-1394; Department of Forestry and Fire Prevention 1988, L-2349; Duke 1999, LA-4602) have been conducted within the 0.25 mile radius, of which one (Pence 1980, LA-1394) did assess the subject parcel with negative results.

In addition, no listings were found for the *National Register of Historic Places* (NRHP), the *California State Historic Resources Inventory* (HRI), the *California State Historical Landmarks* (CHL), or the *California Points of Historical Interest* (PHI), within the 0.25 mile radius of the project property.

V. Field Methods

The project parcel was opportunistically walked as terrain and vegetation would allow, given the steep slopes and dense vegetation. Ground surface visibility was generally less than 10 percent in the accessible areas of the parcel, and burrowing animal backdirt piles were inspected for the potential presence of cultural materials.

VI. Remarks

No prehistoric or historical cultural resources were observed within the limits of the project parcel. However, due to the lack of ground visibility, it is recommended that the parcel be resurveyed subsequent to removal of vegetation and prior to earth disturbing activities. Additionally, if any cultural resources are encountered during the earth disturbing activities, all work must halt at that location until such resources can be properly evaluated by a qualified archaeologist. Further, if human remains are unearthed during construction, State Health and Safety Code Section 7050.5 states that "...no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and distribution pursuant to Public Resources Code Section 5097.98."

VII. Certification

Prepared by: Catherine Girod
Submitted by: John F. Romani, Principal Investigator, Compass Rose Archaeological Inc.

Signature	Date: September 29, 2006

VIII. Maps

Location USGS 7.5' Calabasas (1952, photorevised 1967); Project Map Attached: X
Quadrangle Name/Date

IX. Photographs

Yes: (__________) No: Attached: (Optional)

X. References

Bemor, R.L.
1979 Archaeological Resource and Impact Evaluation for Tentative Tract 35794, Los Angeles County, California (LA-580).

Department of Forestry and Fire Protection
1988 Vegetation and Watershed Management Archeological Review: First VMP, Calabasas (LA-2349).

Duke, C.
1999 Cultural Resource Assessment for Pacific Bell Mobile Services Facility LA 870-02, in the County of Los Angeles, California (LA-4602)

Glassow, Michael A.
1980 Recent Developments in the Archaeology of the Channel Islands. In *The California Islands*, edited by D. Power, pp. 79-99. Santa Barbara Museum of Natural History, Santa Barbara.

Grant, Campbell
1978a Chumash: Introduction. In *California*, edited by Robert F. Heizer, pp. 505-508. Handbook of North American Indians, vol. 8, William G. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

1978b Eastern Coastal Chumash. In *California*, edited by Robert F. Heizer, pp. 509-519. Handbook of North American Indians, vol. 8, William G. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Kroeber, A. L.
1953 *Handbook of the Indians of California.* California Book Company, Ltd. Berkeley.

Pence, R.L.
1980 Archaeological Assessment for Parcel Maps 11384 and 8257, Calabasas Area, Los Angeles County (LA-1394).

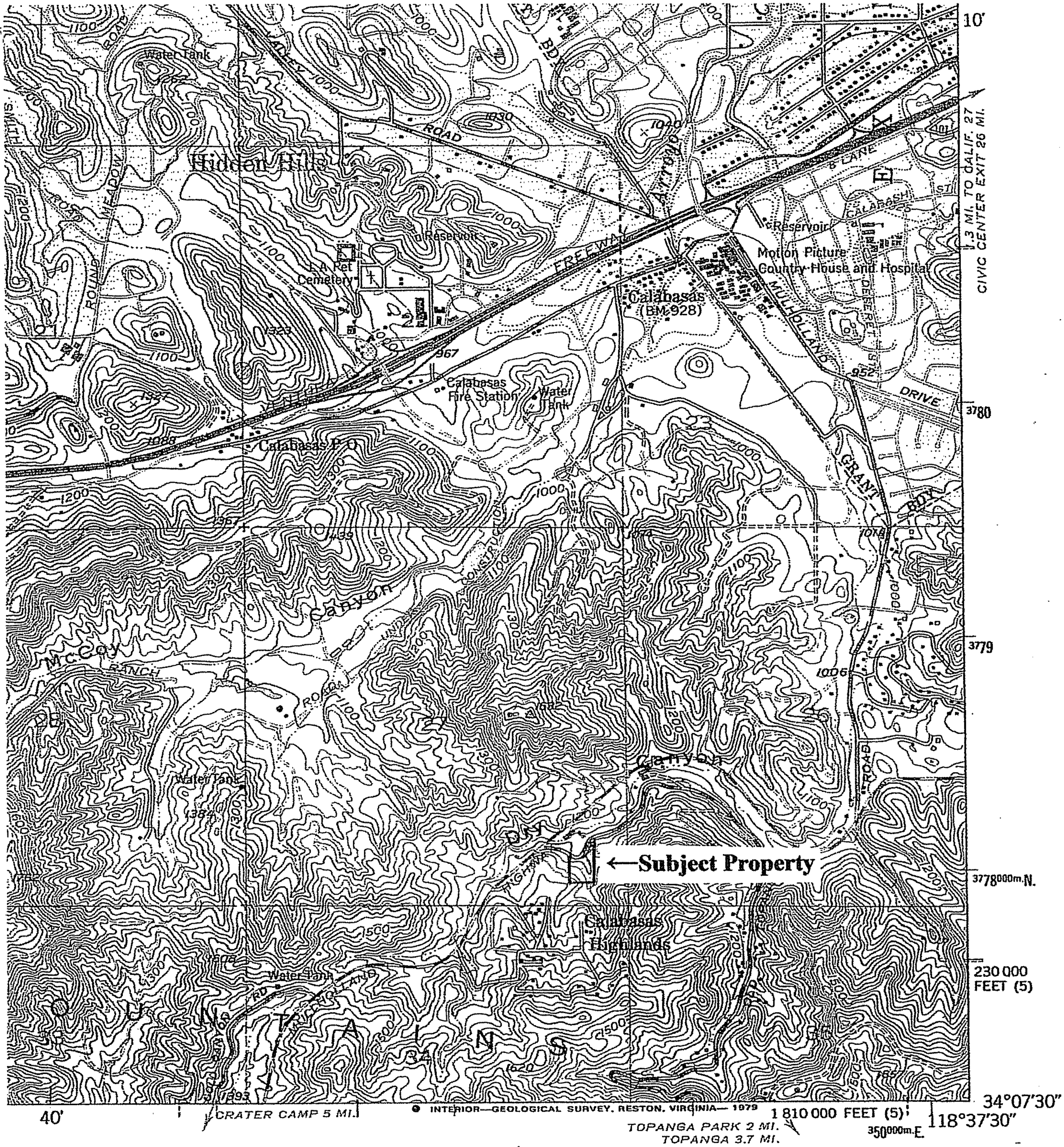


Figure 1
23604 Dry Canyon Cold Creek Road,
Calabasas, Los Angeles County, California
APN 2072-001-004
Portion of USGS Calabasas 7.5' Quadrangle
Scale 1:24,000

Appendix D

Geotechnical Reports

rincon

FEASIBILITY LEVEL GEOLOGIC AND GEOTECHNICAL ENGINEERING SITE INVESTIGATION

PROPOSED RESIDENTIAL DEVELOPMENT

APN 2072-001-004
23604 DRY CANYON COLD CREEK ROAD
CITY OF CALABASAS, CALIFORNIA

Prepared For

AMIR RUDYAN
8245 REMMET AVENUE
CANOGA PARK, CALIFORNIA 91304

GORIAN
& ASSOCIATES, INC.

TABLE OF CONTENTS

ATTACHMENTS

GORIAN
& ASSOCIATES, INC.

Applied Earth Sciences
Geotechnical
Engineers
and Geologists

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California 91320-2122
805 375-9262
818 889-2137
Fax: 805 375-9263

December 17, 2004

Amir Rudyan
8245 Remmet Avenue
Canoga Park, California 91304

Work Order: 2189-2-0-10
Log Number: 23412

Subject: **FEASIBILITY LEVEL GEOLOGIC AND GEOTECHNICAL ENGINEERING SITE INVESTIGATION, PROPOSED RESIDENTIAL DEVELOPMENT, APN 2072-001-004, 23604 DRY CANYON- COLD CREEK ROAD, CITY OF CALABASAS, CALIFORNIA.**

INTRODUCTION

The following report contains the results of our feasibility level geologic and geotechnical engineering evaluation of the subject site (hereafter, Site) located just east of the southeast corner of Mulholland Highway and Dry Canyon Cold Creek Road in the City of Calabasas (Figure 1). The purpose of this study was to assess the existing geologic conditions of this site, determine geologic and geotechnical engineering factors that affect the current proposed conceptual development plans, and provide recommendations to reduce or avoid the impact of adverse geotechnical factors on the proposed development. Our understanding of the proposed detached single-family residential site development is based on discussions with you, Mr. Victor Haddad, Mr. Karl Hinderer, AICP of Karl Hinderer & Associates, and Mr. David LaFaille of Diamond West Engineering, Inc. (DWE) as well as a conceptual grading plan titled *Grading Study "B"* prepared by DWE. (Undated, 1"=30' scale). This map serves as base for our attached Geotechnical Map, Plate 1.

In preparing this report, we reviewed pertinent geotechnical reports for the area and the adjacent site (Vesting Tentative Tract No. 54152; currently under review by the City of Calabasas). In addition, we have had discussions Mr. James O'Tousa, CEG of RJR Engineering Group, the consultant geotechnical reviewer for the City of Calabasas, regarding previous geotechnical evaluations and reviews within the adjacent Calabasas Highlands development.

This report incorporates pertinent data from previous referenced reports (in the vicinity of the Site), comments from previous city reviews of adjacent developments, and our supplemental exploration, laboratory testing and analyses to provide a comprehensive geotechnical evaluation of the site and proposed residential development.

Development of the proposed residential project considered a number of geologic / geotechnical engineering factors that may affect local areas of the site. The chief factors include: 1) the presence of a postulated major landslide underlying the entire site and adjacent Calabasas Highlands Development, as well as localized small scale shallow failures on-site, 2) adverse geologic structure for slope stability, 3) occasional strong ground motion from regional earthquakes, 4) localized occurrences of expansive soil, and 5) localized areas of artificial fill and debris. Notwithstanding these and other routine engineering / geotechnical considerations, the site may be developed from a geotechnical perspective, provided these local factors are avoided, alleviated, or mitigated where they would impact the planned development.

PROPOSED DEVELOPMENT

The proposed project is shown on the previously cited Grading Study "B" conceptual grading plan developed by DWE, the site will be developed for 1 single-family residential lot. Access to the residence will be via a curvilinear driveway ascending southward from Dry Canyon Cold Creek Road.

Conventional cut and fill grading and retaining wall construction will be necessary to create the proposed driveway and 15,500 S.F. building pad. Cut and fill slopes are proposed at a 2(h):1(v) gradient. Maximum proposed slope heights for cut and fill slopes are approximately 24 feet for each. Proposed retaining walls appear to be on the order of 6-feet maximum. Sewage disposal will be accomplished by connection to the existing public sewer system within Dry Canyon Cold Creek Road.

PROJECT CONSIDERATIONS

Based on a review of regional topographic and geologic maps, the Site is characterized by relatively gentle, low rolling hillside terrain descending towards Dry Canyon. The topography becomes slightly steeper within the Calabasas Highlands area to the south of the Site, but is noticeably less steep than surrounding hillsides, refer to Figure 1. Based on our review of previous evaluations of the Site and vicinity, the main geologic and geotechnical concern for the proposed development is slope stability, both natural and manufactured, since the entire site, as well as the adjacent Calabasas Highlands Development, lies within *"a feature of about 50-acres on the south side of Dry Canyon that is suggestive of an ancient northwest-facing landslide..."* [Weber, 1984; Landslide L-133, see Figure 2]. Consequently, the global stability issue could significantly impact the viability for development on the site.

Recently our office completed a detailed evaluation for the development of the western adjacent 14.5 acre parcel that is also within the suggested Landslide L-133 (Gorian 2004 a, b, c). This evaluation for Vesting Tentative Tract 54152 is currently in review by the City of Calabasas. Based on the work performed for that evaluation that included deep subsurface exploration and detailed geotechnical engineering analyses it was concluded that the postulated Landslide L-133 did not exist. Rather, complex folding and faulting in this area resulted in differential weathering and locally hummocky topography that combined with the weathered variable bedding attitudes exposed on road cuts could be interpreted as a landslide based on geomorphic expression.

It is with the professional finding that the area of Landslide L-133 is not an ancient northwest-facing landslide and that the global stability of the entire Calabasas Highlands area is not an issue, that our evaluation of the Site is performed.

The proposed site grading does however include cut slopes that may locally expose adverse geologic conditions, a slope stability concern. As discussed later in this report a remedial stabilization fill is recommended at a cut slope between the proposed residence and the westerly property line. Depending on the geologic structure exposed during grading it is possible that other cut slopes could expose adversely oriented planes that would require at least an equipment width stabilization fill.

SCOPE OF WORK

Gorian and Associates, Inc. strived to conduct the geotechnical investigation in a manner generally consistent with the current state of practice of the geotechnical profession within the area. The scope of work was conducted by or under the direct supervision of a California Registered Civil Engineer and

Certified Engineering Geologist. This investigation was performed in general conformance with our authorized proposal dated May 4, 2004. A program of archival review, shallow subsurface exploration, laboratory testing, and engineering geologic and geotechnical engineering analyses was performed to determine development feasibility and provide preliminary design and grading recommendations. The following detailed scope of services was performed to address the issues described above:

Archival Research
Pertinent geotechnical data in our files was reviewed including regional geologic maps. Readily available geologic and geotechnical reports for the site and vicinity on file at the city of Calabasas were also reviewed and utilized in our evaluation.

Field Mapping
A geologist from our office performed geologic mapping of existing surface exposures and road cuts on the site to supplement the geologic data obtained during the subsurface exploration.

Aerial Photograph Interpretation
Recent aerial photographic stereo-pairs by Air Photo Services (flight 21-03, 03027/DRC M232, frames 1-1, 1-2, and 1-3 at a scale of 1:3600) were studied to aid evaluation of landslides and geologic structure. In addition the following historic stereo-pair aerial photos were reviewed:

- Fairchild Aerial Surveys, 1928, Flight C-300, Frames J-91 and J-92, approximate scale 1"=1700';
- United States Department of Agriculture, 1/31/52, Flight AXJ-2K, Frames 8 and 9, approximate scale 1"=800';
- U-2 Photograph, 1973, Flight 73-036, Portion of Frames 39 and 40, approximate scale 1"=1300' (original scale approximately 1"=2600')

Subsurface Exploration
A program of subsurface exploration was performed to obtain geologic data needed to evaluate site stability and to provide appropriate preliminary geotechnical recommendations for conceptual grading design and foundation construction.

To obtain on-site geologic structural and stratigraphic data six (6) backhoe test pits were excavated to a maximum depth of 9.5 feet (TP-3) below the existing ground surface (bgs). A subcontractor supplied and operated 4-wheel drive rubber tired backhoe equipped with a 24-inch bucket was utilized to excavate the test pits. A geologist from our office logged the test pits and obtained relatively undisturbed drive samples as well as bulk samples of the encountered earth materials for selected geotechnical laboratory testing.

Per State mandated protocol, prior to excavation on the site, the excavation locations were marked in the field and Underground Service Alert (USA) was contacted to locate existing utilities. The exploratory excavations were backfilled with the excavated materials from the test pits at the completion of the exploratory operations. It should be recognized that although some compactive effort was provided by wheel rolling the backfill from the surface, the backfill may settle with time and therefore the site's owner or representative should periodically check the excavation locations and backfill any depressions should they develop.

Laboratory Testing
A program of laboratory testing was performed to evaluate the geotechnical properties of the samples obtained during the exploratory operations. The geotechnical laboratory testing included: in-situ moisture and density determinations, compaction characteristics, expansion potential, and determination

of both undisturbed and remolded shear strength. In addition a selected sample of the near ground surface soils was tested for corrosion potential by an independent laboratory.

Geologic Analyses
The data obtained from the archival research, air photo evaluation, geologic mapping, and subsurface exploration are presented on the attached Geotechnical Map (Plate 1) along with the approximate location of exploratory test pits, and pertinent cross sections. A detailed structural analysis of all the data available was performed to interpret the subsurface conditions underlying the site in order to understand the potential effects of development on the global and local stability issues. Cross-sections were constructed to illustrate the proposed building area in relation to the geologic hazards and graphically depict the subsurface geologic structure.

A seismic hazard evaluation for the Site was also performed utilizing probabilistic analysis following California Division of Mines and Geology (CDMG) Note 49 and Special Publication 117. Geotechnical input for design per the 2001 California Building Code minimum is also provided.

Geotechnical Analyses
Pertinent data from the current and previous evaluations of the surrounding area were utilized in our geotechnical evaluation to provide recommendations for site development. The focus of the current subsurface exploration was principally to address proposed development specific geotechnical concerns. Our interpretation of subsurface geologic conditions was used in our geotechnical analysis of the plan specific stability issues.

Report
This formal report was prepared to summarize the site's geologic setting, description of geologic units, geologic structure (including faulting and mass wasting [landslides]), ground water conditions, seismicity, stability analyses, and geotechnical conclusions and recommendations for site development and construction. This geotechnical report has been completed with a Geotechnical Map (Plate 1), Geotechnical Cross Sections (Plates 2, 3, and 4), Logs of Subsurface Data (Appendix A), Laboratory Testing (Appendix B), Slope Stability Analyses (Appendix C), and Preliminary Construction Details (Appendix D).

BACKGROUND

Due to the extent of the area potentially affected by the postulated Weber (1984) Landslide L-133 numerous proximal projects in the Calabasas Highlands Development have been investigated by various geotechnical firms for signs of gross instability. The information available in these reports is significant in the role it plays regarding the issue of global stability affecting Site development. As previously stated this evaluation does not address the global stability of the Calabasas Highlands area. Nevertheless a brief summary of information obtained from reports within the area affected by postulated landslide L-133 is presented below for completeness, starting with work performed for the adjacent 14.5 acre parcel.

- California Geo/Systems, Inc. (CGS) completed a preliminary feasibility level soils and engineering geologic investigation of the adjacent site of Vesting Tentative Tract 54152 in February 1988. This feasibility level investigation did not evaluate any specific development scheme. It included: field mapping of geologic structure and units; the excavation, logging, and sampling of twenty-one (21) crawler backhoe trenches to a maximum depth of 12.5 feet below the existing ground surface; laboratory analysis of samples; and geologic / soils engineering analyses. The geologic conditions were described as folded east-west trending broad bedrock synform (U-shaped fold) with general bedding inclinations of vertical to 19 degrees. Traversing the Site from Mulholland Highway the bedrock is inclined southward closer to Mulholland with dip reversals northward ranging from 36 to 41 degrees proceeding to the south. It was concluded that the site was grossly stable with bedding orientation mostly favorable from a geotechnical standpoint and that active faults or landslides did not underlie the site.

- A Geotechnical Review of 1"=40' Grading Plans for Vested Tentative Tract 46397 was completed by GeoSoils Incorporated (GSI), dated April 7, 1989. No additional field exploration was performed and geologic interpretations were made based on the previous subsurface work by CGS. The geologic interpretation made by GSI was that bedding was moderately contorted due to past folding, shearing and intrusions. The report concludes that building sites and offsite areas should be safe from hazardous landslides provided their advice and recommendations were implemented during construction.

- Two addendum reports were prepared by GSI (dated April 20, 1989 and August 3, 1989) addressing minor revisions of the by then (August) County of Los Angeles approved Tentative Tract Map 46397.

- Additional subsurface investigation (nine (9) backhoe test pits), laboratory testing and engineering analyses were performed and presented in a December 14, 1989 report by GSI. The purpose of the supplemental work was to confirm data reported by CGS (1988) and obtain additional data for future use in plan reviews and grading operations. Previous work was confirmed,"...bedding within the bedrock is structurally complex due to folding, shearing, and minor intrusions..."and new data indicated need for an equipment-width stabilization fill for one of the proposed cut slopes.

- A report dated March 7, 1991 by GSI provided a geotechnical review of the possible impact of two proposed sewer lines to future residential development of Vested Tentative Tract 46397.

- This office prepared Geotechnical reports for Lots 3-7, Block 9, of Tract 8550 in the Calabasas Highlands area that addressed landslide L-133 (Gorian 1991 and 1992). The 1991 report stated that "the geologic structure as shown on Weber's map (Weber, 1984) and locally on the subject site is not conducive for landsliding. In place beds of sandstone and siltstone directly above the slide feature are dipping 30 to 70 degrees, too steep for a block glide failure to occur. If this feature represented a rotational failure, the slide plane would be at depths of over 300 feet in the vicinity of the site." Subsequent slope stability analysis indicated, "factors of safety equal to, or greater than 1.5 and 1.1 for static and dynamic analysis respectively, were obtained" (Gorian, 1991).

  Additional geotechnical analyses were presented in a subsequent report in Gorian, 1992 including research and report review. A brief summary of the research presented in the referenced report is presented herein for completeness. GeoSoils (1978) reported, "no signs of geologic instabilities". Brian A. Robinson and Associates, Inc. (1981) "Regional mapping of the site indicates the structural complexity is related to intrusive igneous rocks...Weber...has suggested a possible landslide origin of the geologic structure. We find no evidence to support this hypothesis". Earth Group, Inc. (1982) "No evidence of major faulting or deep rooted landslides". Westland Geological (1986) reported that "Geologic data compiled during our investigation as well as what is contained in the referenced reports for the parcel, do not indicate the presence of a landslide. Consultants' reports submitted for approved projects over the past ten years in the Highlands do not support the existence of the hypothetical landslide". Finally, California Geo/Systems, Inc. (1987) "Ancient or recent landslides were not observed on the property". Geologic mapping of the Calabasas Highlands found a continuous unbroken basaltic intrusion across the suspected slide area in the approximate area as shown on the Weber map, further supporting the conclusion that the Calabasas Highlands is not situated on a deep seated landslide (Gorian, 1992).

- Another geotechnical report pertaining to the global stability issue of landslide L-133 was prepared by C.Y.Geotech (1998) for Lot 4, of Tract 8550 (a.k.a. 23657 Aster Trail), as a response to the City of Calabasas Review letter dated 2/5/98. The report concluded that there was lacking geologic evidence supporting a landslide at depth under Lot 4 and stability analysis indicated a factor of safety of 2.41 for the site (C.Y.Geotech, 1998).

- A geotechnical report was prepared by GeoSoils, Inc. (2003) for Tract 51644-02 (aka 3562 and 3570 Locust Drive), as a response to the City of Calabasas Review (Bing Yen and Associates and Leighton and Associates) letter dated 11/6/02. This report stated that "we acknowledge and agree with the generally accepted opinion within the geologic community, that there is geomorphic evidence that the entire Calabasas Highlands area could be located on a very large ancient landslide. On the other hand, there has been no historical movement on the feature, in spite of sustained widespread onsite sewage disposal until approximately 1992. Surface and subsurface mapping on the property by the previous consultants indicate a consistent trend to bedding orientation on the property in keeping with the regional trend of the Topanga Anticline. The bedrock below a relatively shallow weathered zone appears to be dense and in-tact. It also appears to be unoxidized relatively close to the surface" (GeoSoils, 2003).

- A recent geologic and geotechnical engineering investigation was performed by this office for the residential development of a property on Clover Trail [Lot 19 of Tract 8550]. This lot is located at the headward limit of the postulated Landslide L-133. To supplement previous mapping and shallow test pits and an exploratory boring by others (MEC 1998, 1999), a deep subsurface 70.5-ft deep 24" diameter exploratory bucket auger boring was drilled. Although the boring encountered sandstone and siltstone bedrock that was fractured and exhibited multidirectional shearing within faulted siltstone units, no evidence suggestive of landsliding was observed. The report concludes that "Our geotechnical analysis of the complex geologic structure from our recent boring as well as a review of nearly 2 decades of geotechnical reports for the Calabasas Highlands area indicates that the suggested Landslide L-133, proposed by Weber is not present on the property" (Gorian 2003b).

SITE DESCRIPTION

LOCATION AND PHYSIOGRAPHY

The subject Site is located on Dry Canyon Cold Creek Road southeast of the intersection with Mulholland Highway, in the Calabasas Highlands area of the City of Calabasas, County of Los Angeles, California. The roughly rectangular parcel is bounded on the north by Dry Canyon Cold Creek Road, undeveloped land under separate ownership to the east and west, and existing single-family residences of the Calabasas Highlands Development to the south. The Site is currently vacant and remains largely natural although some minor cut and fills have been performed associated with site access roads and corral area. Access is via a graded dirt road from Dry Canyon Cold Creek Road or from the south via Gladiola Drive above the Site [and traversing vacant property under different ownership].

Topography on the Site is dominated by an east west trending spur ridge and well defined north-northeasterly drainage courses below the ridge and proximal to the eastern property boundary. A relatively flat bench at approximately elevation 1284 exists on the ridgeline at the proposed building area. Slope gradients over the majority of the Site are on the order of 3(H) or 5(H):1(V) with locally steeper natural slope gradients, approaching 1(H):1(V), on the southeast facing slope below the building pad. At the northwest corner of the Site, adjacent Dry Canyon Cold Creek Road, a portion of the descending slope is also steep with gradients of 1½ (V):1(H) to locally 1(H):1(V). These steeper areas represent cut slopes constructed during grading of Dry Canyon Cold Creek Road.

The majority of the property is covered with a moderate growth of seasonal weeds and grasses with some thicket areas of heavy brush and scrub oak. Oak trees are concentrated adjacent to the and within the Site drainages.

REGIONAL GEOLOGIC SETTING

The site is in the Santa Monica Mountains that is an east-west trending mountain range along the southern edge of the Transverse Ranges geomorphic province. This geomorphic province is dominated by active compressional tectonics (crustal shortening) and is characterized by roughly east-west trending ranges and ridges with intervening canyons and valleys. The Santa Monica Mountains consist of a west plunging anticline (a convex upward-shaped fold) and the Site is on the northern limb of this anticline. This anticline of the Santa Monica Mountains generally consists of Cretaceous and Tertiary rocks with a core of Jurassic metasediments and Cretaceous granitic rocks.

SITE GEOLOGY

The Calabasas Highlands in general is situated on the northwestern flank of sinuous but generally north-northeasterly trending ridge (Figure 1). Based on a review of regional geologic maps (Weber, 1984, and Dibblee, 1992) the Highlands area is located on the north limb of the Topanga Anticline. Tertiary sedimentary rocks underlie the area and are herein referred to the Miocene-age Calabasas Formation following the nomenclature of Yerkes and Campbell (1979, 1980) [which is equivalent to the Upper Topanga Formation designation of Weber and Dibblee]. The Calabasas Formation is characterized by thickly bedded to massive sandstone interbedded with thinly to thickly bedded siltstone, clayey siltstone, and claystone. Also in this area, igneous bedrock (basalt) associated with the Miocene-age Conejo Volcanics locally intrude or are intercalated with the sedimentary rocks (see Figures 2 and 3).

The generally hummocky topographic expression within the Calabasas Highlands is suggestive of a large landslide complex designated as Landslide L-133 (Weber, 1984). As described in the Background section herein, the structural complexity of the area is believed to be related to intrusive igneous rocks. Based on subsurface exploration performed on-site as well as on the adjacent parcel to the west, and within the Highlands Development to the south, geologic structure is further complicated by numerous inactive bedrock faults.

Overlying the bedrock, surficial deposits within the Site include minor undocumented fill, undifferentiated residual soil (topsoil) / colluvial deposits, and landslide / surficial slump debris. The distribution of bedrock and surficial deposits (excluding undifferentiated topsoil / colluvium) is illustrated on the attached Geotechnical Map, Plate 1 and Geotechnical Cross Sections, Plates 2, 3, and 4. General descriptions of the geologic units encountered on Site are presented in the following sections. Subsurface excavation specific details (both current and pertinent previous exploratory excavations) are provided in the attached Appendix A -- Logs of Subsurface Exploration.

CALABASAS FORMATION

The Miocene-age Calabasas Formation underlies the Site. Consisting of marine sedimentary rocks, surficial exposures of the bedrock are rare, restricted mainly to man-made exposures and within drainages where soil cover has been locally eroded. As encountered in surficial exposures and within the subsurface exploratory excavations both on and within close proximity to the Site, the Calabasas Formation consists chiefly of thin to thickly bedded silty fine to coarse-grained sandstone with thin interbeds of siltstone, clayey siltstone and claystone. Sandstone colors range from white, pale yellow, brownish yellow to light yellowish brown where oxidized and bluish gray to dark gray where unoxidized. Siltstone and claystone colors vary from yellowish brown, brown, and gray where oxidized and greenish to bluish gray and black where unoxidized.

Basalt bedrock was encountered on-site in test pit TP-2 as well as off-site to the west (CGS Trenches T-5, T-9, T-20, and Gorian boring B-1) and to the south occurring as intrusive bodies and/or intercalated units. The basaltic intrusions are shown on the attached Regional Geologic Maps (Figures 2 and 3) by Weber and Dibblee, respectively. Basalt was also encountered in the investigation of Lot 4, Block 16 (aka 23657 Aster Trail) in the Calabasas Highlands Development by other consultants (C.Y.Geotech, 1998).

As encountered on-site the bedrock is typically weathered near surface becoming fresher and locally harder with depth. Randomly oriented, discontinuous fracturing is common, especially in the fine-grained units. However, fracturing was tight with no open fractures observed. Iron oxide staining and manganese oxide coatings are common on both fracture surfaces and disseminated within the formation. Trace occurrences of gypsum as veins / veinlets and calcium carbonate nodules / fracture coatings were encountered locally, mainly in siltstone and claystone units.

In general sandstones are thin to thickly bed and moderately to very well indurated. Siltstones are often thinly bedded to laminated and exhibit blocky fracturing were indurated. Clayey siltstone and claystone units vary from massive to thinly bedded / laminated. Typically the clayey units exhibit moderate to intensive, multidirectional shearing. Where thinly bedded or laminated, irregular, highly contorted zones of plastic deformation were observed particularly adjacent faults.

ALLUVIUM

Alluvial soils were observed in the low areas of drainage courses. These soils generally consist of clayey and silty sands in a loose to medium dense condition.

UNDIFFERENTIATED RESIDUAL SOIL (TOPSOIL) / COLLUVIUM

Residual soil commonly mantles the bedrock over most of the Site and is typically on the order of 1-3.5 feet in thickness. The topsoil generally consists of dark brown to gray brown silty to sandy silty clays in damp to moist and medium stiff to very stiff condition. This soil zone is desiccated, and slightly porous with occasional to locally abundant roots, rootlets and roothairs. Typically the topsoil contact with underlying earth units is gradational.

ARTIFICIAL FILL

Undocumented artificial fill has been placed along the northernmost portion of the Site adjacent Dry Canyon Cold Creek Road. The construction of the unimproved trail within the Site has also resulted in generating minor amounts of artificial fills consisting of reworked on-site materials. In addition, fills have been placed associated with the existing sewer and water lines along the western property boundary, and in conjunction with backfilling of current subsurface exploration excavations. All artificial fills are considered unsuitable for structural support and should be removed to competent underlying materials prior to structural fill placement.

GEOLOGIC STRUCTURE

As mentioned previously, regional maps by Dibblee and Weber show the bedrock of the surrounding area situated to be on the north flank of the Topanga Anticline with bedding orientations moderately to steeply inclined (30° to 70°) to the northeast. Subsurface data obtained from geologic studies on Site as well as to the south in the Calabasas Highlands Development (various consultants, Gorian 2003b) and to the east (Gorian, 2003a) indicate greater complexity in the geologic structure -- tight folding, faulting, and basalt intrusions that complicate the regional regular northeasterly bedding trend.

Borings performed as part of our investigation to the west for Vesting Tentative Tract 54152 revealed bedding orientations generally north and northeasterly at shallow (16°) to steep (78°) inclinations [Borings B-1 through B-4] as well as a tight northwesterly trending antiform with steep limbs in boring B-5. Several bedrock faults were also encountered with general north-south and east-west trends. It was observed that bedding orientations were often distinctly different above and below the faults. Structural projection and analyses of the deep boring faults, along with lithologic correlation and bedding orientation data from borings and previous trenches yield distinct structural blocks, each with generally consistent bedding orientations separated by the faults. Based on the exploratory trenches performed as part of this evaluation the complicated structural trends extend to the Site. Our interpretation of the Site's geologic structure is shown on the attached Geotechnical Map, Plate 1 and Cross sections, Plates 2-4.

MASS WASTING

The down-slope movement or transport of soil and rock under the direct influence of gravity is known as mass wasting and includes such phenomena as landslides, debris flows, and soil creep. Several forms of mass wasting have been identified within the site that can, for the purposes of this discussion, be divided into deep-seated and surficial failures.

Deep-seated -- The Site, as well as the adjacent Calabasas Highlands Development, lies within *"a feature of about 50-acres on the south side of Dry Canyon that is suggestive of an ancient northwest-facing landslide; in order not to imply directly that the area is a landslide, however, it is not outlined as a landslide on the large scale geologic map (Plate IIc), only on the geologic terranes map (Plate IV); scarplike feature along the upper part of the area may be headwall scarp; Dry Canyon Creek is apparently deflected around the base of the feature; and basalt which is apparently offset about 150 feet by a fault at the southwest corner of the feature may instead be offset by landsliding (see Plate IIc); if the feature is a landslide it may be partially stabilized at its toe in Dry Canyon by buttressing by alluvium and fill of the canyon; bedrock consists principally of sandstone (Ttss) of the Topanga Formation that dips north."* [Weber, 1984; Landslide L-133, see Figure 2]

Borings B-1 through B-5 (Gorian 2004a) were drilled specifically to determine the presence or absence of this feature. The boring program was designed to provide overlapping stratigraphic coverage to a depth of at least 50 feet below Mulholland Highway in the direction of movement of the postulated Landslide L-133. Four of the five borings penetrated through the oxidized bedrock zone to hard or indurated unoxidized bedrock 60-90 feet bgs.

Based on our subsurface exploration the area of this postulated landslide is in a zone of complex folding (including soft sediment deformation) associated with faulting and volcanic rock intrusions within the Calabasas Formation as discussed previously. No continuous weak beds or basal failure planes, open fracturing, zones of brecciation, anomalous groundwater conditions, or any other features indicative of deep-seated failure were observed. Structural discontinuities/dislocations are clearly attributed to fault tectonics as opposed to landslide movement. Fracturing, although common, is tight. Shearing within clayey bed is randomly oriented and discontinuous exhibiting no preferred orientation. Fault orientations observed on Site are somewhat inconsistent to what might be expected if the dislocations were related to a northwesterly failing translational or rotational failure.

Our recent boring drilled at the postulated headscarp area within the Highlands Development (Gorian 2003b) did not encounter graben materials or landslide debris. Rather, in-place albeit structurally complex faulted bedrock similar to the structurally complex faulted bedrock encountered on this Site was revealed. This finding, combined with data from our current exploration program and the preponderance of data from nearly 2 decades of geotechnical evaluations for the Calabasas Highlands area provide strong evidence that Weber's postulated Landslide L-133 does not exist. The complex folding and faulting in this area on-site resulted in differential weathering and locally hummocky topography that combined with the weathered, variable bedding attitudes exposed on road cuts can be interpreted as a large scale landslide based on geomorphic expression.

Shallow / Surficial Failures -- Although the large landslide (L-133) was determined not to exist, two (2) smaller surficial failures or soil slumps were encountered locally on the southeast facing slope below the proposed building area on the attached Geotechnical Map (Plate 1). These features are mainly the result of concentration of upslope surface drainage over the slope. The south westernmost shallow slope failure is outside of the area of proposed development and consequently does not impact development. The failure in the vicinity of Section E-E' will need geotechnical remedial measures to implement the proposed construction as described in a subsequent section.

GROUNDWATER

Surficial flows or seeps were not encountered on Site during our current field investigation.

FAULTING AND SEISMICITY

The subject site, located in the Santa Monica Mountains area, is in 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 pre-existing 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).

Although several bedrock faults were encountered on and in the vicinity of the site as discussed in previous sections, active or potentially active faults are not known to cross the site. The project site is currently not located within an Alquist-Priolo Earthquake Fault Zone as defined by the State Geologist (Hart and Bryant, 1999). The potential for ground rupture on-site due to faulting during the time period of concern is considered remote.

Nevertheless, the property will be subjected to ground motion from occasional earthquakes in the region. Significant earthquakes have occurred within a 40-mile radius of the site within the last 25 years. The 1994 Northridge earthquake produced strong ground motion at the site and a peak horizontal acceleration of approximately 0.30 (g) for the bedrock site (Chang, et al., 1994). It is likely that significant earthquakes will occur in this area within the life expectancy of the proposed project and that the site will experience strong ground shaking from these events.

In 1996, the California Division of Mines and Geology (CDMG) and US Geologic Survey (USGS) published a statewide probabilistic seismic hazard assessment, Petersen et al., 1996. Subsequently, as a result of the State's ongoing Seismic Hazard Mapping Program, more detailed maps and supporting evaluation reports have been published, e.g., *Seismic Hazard Evaluation of the Calabasas 7.5 Minute Quadrangle, Los Angeles County, California* (CDMG Seismic Hazard Report 006) and *Seismic Shaking Hazard Maps of California* (Petersen et al., 1999). Based on the Seismic Hazard Evaluation Report for the Calabasas Quadrangle, probabilistic analyses predict that the peak horizontal site acceleration (PGA) having a 10% exceedance in 50 years (the Design Basis Earthquake) will be on the order of 0.40 (g) for the soft rock conditions of the site and vicinity. A predominant earthquake magnitude of 7.3 (Mw) at a predominant distance of 12 kilometers was identified as contributing most to the Design Basis

Earthquake on alluvial site conditions. These Simplified Prescribed Parameter Values (SPPVs) were considered in our site seismic hazard evaluation per State Guidelines (CDMG 1997).

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 any large bodies of water. Earthquake induced landslides, liquefaction, and seismic settlement affecting the proposed site development is discussed below.

GEOTECHNICAL ANALYSIS

SLOPE STABILITY

The proposed development and hillside grading involves natural slopes and constructing both cut and fill slopes. Cut slopes are proposed at 2(h):1(v) gradients with fill slopes proposed at variable gradients with a maximum 2(h):1(v) gradient. Stability of the native and proposed slopes was evaluated and specific slopes were analyzed where geologic structure or material strength parameters suggested possible instability. The following sections discuss each type of slope.

Natural Slopes

Natural slopes within the site consist of predominantly thin to thick beds of sandstone with interbeds of fine-grained materials (siltstone and clayey siltstone/ claystone). Soil and alluvial deposits of variable thickness mantle the bedrock. A detailed discussion of the bedrock and geologic structure was presented in previous sections.

Stability analyses were performed on natural slopes with potential adverse geologic conditions that are adjacent to the proposed development. As discussed in the following section the natural and proposed 2(h):1(v) cut slope along the west side of building pad is one such example. The geologic structure behind this proposed cut is adverse and requires a stabilization fill. Discussions of the individual slope stability analyses and the results are provided in Appendix C.

Cut Slopes

The safety and stability of cut slopes exposing bedrock will depend on the orientation of the cut with respect to the bedrock structure. The geologic structure behind this proposed 2(h):1(h) cut slope along the west side of the building pad is adverse and will require remedial grading for stabilization. In these instances, the overall stability of the slope has been evaluated. Results and a discussion of the stability analyses are provided in Appendix C.

It is possible that the north facing cut slope at the first bend in the driveway could expose adversely oriented planes of weakness along finer-grained units. It should be anticipated that an equipment width stabilization fill will be required at these locations depending geologic structure exposed during site grading. See *Typical Stabilization Fill Detail* for additional information.

Fill Slopes

Fill slopes are proposed at a 2(H):1(V)l ratio or flatter. Properly placed and compacted soil with adequate cohesion is considered grossly stable at this slope ratio. A slope stability analysis was performed on the highest proposed fill slope to evaluate the slope's factor of safety. Results and a discussion of the stability analyses are provided in Appendix C.

LIQUEFACTION

The proposed development is not within an area shown to have a potential for liquefaction on the State's Seismic Hazard Zones Map (CDMG, 1998). Our subsurface exploration and laboratory testing programs confirm that the on-site earth materials are not susceptible to liquefaction.

SEISMIC INDUCED SETTLEMENT

Seismic induced settlement is the phenomena where poorly compacted soils densify during a seismic event. The proposed residential development will be in an area underlain by either bedrock or engineered fill soils. Both bedrock and engineered fill soils are not typically subject to seismic induced settlement.

HYDROCONSOLIDATION

Hydroconsolidation is the phenomena where naturally occurring soils collapse or consolidate upon inundation with water. The proposed residential development will be in areas underlain by either bedrock or engineered fill soils. Both bedrock and engineered fill soils are not subject to hydroconsolidation.

CONCLUSIONS AND RECOMMENDATIONS

GENERAL

The subject site was evaluated from a geotechnical standpoint for the proposed residential construction and driveway as described herein. Adverse geologic conditions (shallow landslides, localized faulting, and adversely oriented planes of weakness) will affect proposed site development. Our geotechnical evaluation of the proposed residential project considered a number of geologic / geotechnical engineering factors that may affect local areas of the site. The chief factors included: 1) the presence of a postulated major landslide underlying the entire site and adjacent Calabasas Highlands Development, 2) adverse geologic structure for slope stability, 3) occasional strong ground motion from regional earthquakes, 4) localized areas of expansive soils, and 5) localized areas of artificial fill and debris. Notwithstanding these and other routine engineering / geotechnical considerations, the site may be developed from a geotechnical perspective, provided these local factors are avoided, alleviated, or mitigated where they would impact the planned development.

Preliminary foundation design recommendations contained in this report for this plan are subject to finalization. The final design of foundations, slabs, and pavements should be based on the engineering characteristics and expansion potential of the actual subgrade soils exposed at the completion of grading. In addition, final grading, building locations, layouts, and specific structural loading are not known at this time, however, when available should be reviewed by this office.

All grading operations should be performed in conformance with current City of Calabasas Grading Codes, under the geotechnical observations and testing of this firm.

GEOTECHNICAL FACTORS AFFECTING SITE DEVELOPMENT

- **Faulting and Seismicity**
  The site is within a seismically active region prone to occasional damaging earthquakes.
- **Mass Wasting and Slope Stability**
  Certain areas of the proposed development have slopes with factors of safety less than 1.5 under static conditions. Where the factor of safety is less than required, an appropriate stabilization fill has

been recommended. Two areas of remediation have been identified, the shallow landslide below the pad at Section E-E' and the proposed cut slope along the western property line.

- **Hard Rock**
  Although subsurface exploration on –site was accomplished to a depth of approximately 10 feet bgs and to over 100 feet bgs on the adjacent parcel to the west, local areas of hard rock or cemented materials cannot be precluded within the Calabasas Formation. However, since the maximum depth of excavation is on the order of 15 to 20 feet bgs [including overexcavation] and in a limited area, it is likely that cuts for this project can be made with conventional grading equipment.

- **Expansive Materials**
  Clayey soils and finer-grained bedrock are expected to be moderately to highly expansive.

- **Undercutting**
  The building pad is expected to expose contrasting materials (including fault zones) and therefore should be over-excavated (undercut) and re-built with an engineered compacted fill blanket (cap).

- **Removal and Recompaction of Unsuitable Soils**
  Low density, artificial (existing) fill, and possible compressible soils are anticipated within the site and where present will need to be removed from the construction areas and areas to receive engineered fill.

- **Hydrology and Erosion**
  Both surface and subsurface water can be expected to affect potential development of the site. Design of surface drainage should be provided by the design civil engineer. Design of surface water drainage should consider erodiblity of the materials affected by concentrated flow. Subsurface water was not encountered in the currently proposed development areas. Earth materials are considered erodible under concentrated water flows.

- **Foundation Design**
  Following proper site development, as discussed below, conventional foundations may be used for support of the proposed lightly loaded residential structures.

GEOTECHNICAL SEISMIC DESIGN

As previously discussed, active faults as identified by the State are not present on-site nor is the site within an Alquist-Priolo Earthquake Fault Zone (formerly Special Studies Zone). Nevertheless, the site is within a seismically active region prone to occasional damaging earthquakes. The California Division of Mines and Geology Simplified Prescribed Parameter Values presented in the Faulting and Seismicity section of this report were utilized in our seismic hazard evaluation and should be used for seismic design purposes.

The 2001 California Building Code (CBC) provides geotechnical seismic design requirements. Proposed residential construction within the subject lot may be design per the minimum seismic design presented in the 2001 CBC per Chapter 16, Division IV with the understanding that the site acceleration could be higher than that addressed by code values. The seismic design parameters provided in the following table are based on the 2001 CBC, Chapter 16.

2001 CBC Seismic Design Parameters							
Seismic Zone Factor	Soil Profile Type	Source	Fault Type	Seismic Coefficients		Near Source Acceleration Factor	Near Source Velocity Factor
16-I	16-J	16-U		16-Q	16-R	16-S	16-T
Z		Malibu Coast Fault	B	C_a	C_v	N_a	N_v
0.40	S_D			$0.40N_a$	$0.56N_v$	1.0	1.1

The California Building Code (CBC) provides seismic design standards that are intended to prevent catastrophic structural collapse and safeguard against loss of life during a severe earthquake. However, there may be significant architectural and cosmetic damage as well as loss of function. It should be noted that the CBC provisions are intended as minimum requirements and the level of protection can be increased. We suggest that the project's structural engineer and architect balance the benefits and costs of seismic design above code minimum values.

MASS WASTING AND SLOPE STABILITY

Based on our stability analyses (see Appendix C), the proposed development may have areas with factors of safety less than the minimum required. The cut slope between the proposed building pad and the western property line was determined to have possible adverse geologic structure such that without some remediation the static factor of safety would be less than 1.5. In this instance, an equipment (15-foot) width stabilization fill has been recommended. We understand that the existing sewerline at this location is buried deep and should not be affected by remedial grading but its presence needs to be taken into consideration prior to beginning excavation. A waterline shown on plans is an unknown and should be addressed as the design process progresses. See *Typical Stabilization Fill Detail* in Appendix D for additional information.

Our field exploration at T-5 indicated favorable geologic conditions however, it is possible that the north facing retaining wall / cut slope along the first bend in the driveway could expose adversely oriented planes of weakness. The need for remedial measures should be determined based on the geologic structure exposed during site grading

As thoroughly discussed earlier in the Mass Wasting section of this report, the presence of the suggested landslide L-133 (Weber, 1984) below the site is not considered to be a concern for this project. There is a shallow landslide below the pad at Cross Section E-E'. Where this shallow landslide affects the stability of the building pad or where it will be constructed on the slide material will need to be removed and replaced with engineered compacted fill.

GEOTECHNICAL GRADING RECOMMENDATIONS

Site Preparation

All areas to be graded should be stripped of significant vegetation and other deleterious materials (including trash and debris). Roots over ½ inch in diameter should be removed along with any trees or brush. Minor roots may be blended with the soils during processing.

Removals

The majority of the development will be constructed by making cuts in bedrock areas. However, there is a sizable fill slope proposed for the driveway. Low density and possible compressible soils are anticipated in the areas of the proposed fills. Where present, these soils should be removed from the construction areas and areas to receive engineered fill. This includes all artificial (existing) fill soils, mapped and unmapped, and unsuitable topsoil, alluvium, colluvium, and weathered bedrock existing at the site.

The actual depths of removals should be determined during construction by this firm. The anticipated removal depths are 1 to 5 feet in canyon areas and 1 to 2 feet along the existing ridges where bedrock is near or exposed at the ground surface. Deeper removals may be necessary if existing fills exceed the anticipated depths. A *Typical Detail for Canyon Cleanout and Benching* is provided in Appendix D.

Septic Systems and Wells

Septic systems or water wells if encountered on-site should be removed or abandoned per Los Angeles County Environmental Health Division or Los Angeles County Water Resources Division standards, respectively.

Hard Rock

Hard rock was encountered in the recent field exploration program within the Calabasas Formation. Locally cemented zones within the sandstone or the volcanic intrusions of the Calabasas Formation may be present that could be difficult to excavate with conventional grading equipment. In addition, local zones of hard rock could produce rock too large for placement in engineered compacted fill.

Fill containing excavated rock up to 12-inch size may be used for engineered compacted fill, providing the following procedures are implemented. Rock should not be permitted to nest with unfilled voids. The fill should contain less than 30% of material from 6 to 8 inch maximum diameters. The rock fills should be placed in maximum 12 inch thick lifts, at slightly over optimum moisture content (of the matrix material), and compacted with vibratory and/or heavy construction equipment. A *Typical Rock Fill Detail* is attached in Appendix D. Additional evaluation and recommendations for rock fill areas can be provided at the grading plan level phase of development submittals.

Undercutting

Bedrock cut areas (including fault zones) i.e., the building pad, should be overexcavated (undercut) and capped with engineered compacted fill to facilitate excavation of utilities and footings. Over-excavation should extend to the footing depth or to one foot below utility trenches, whichever is deeper. The undercut zone should extend a minimum of 5 feet beyond the building area. The excavated rock may be reused as fill providing it is mixed and blended and does not contain rocks over 12 inches in maximum dimension.

Transition Pads

The subject grading study "B" plan does not currently include a transition pad which would have incorporated both cut and fill material. If added latter, the cut portions a transition pad, within building areas and 5 feet beyond should be undercut at least 3 feet below the bottom of the footings and capped with engineered compacted fill (refer to *Typical Overexcavation of Daylight Line* detail in Appendix D.) Also, the undercut should be at least one-third the deepest fill within the building area. The cap should consist of soil that is similar to the fill portion of the pad.

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. Once the areas are approved and prior to placing any 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.

Fill Placement

Fill should be free of trash, debris, and significant vegetation, placed in 8 to 12 inch thick lifts, and compacted to at least 90 percent relative compaction. Material exceeding 12 inches in maximum dimension should be excluded from the fill.

Fill Compaction

All fill soil 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 Method D 1557.

Keying and Benching

All fills placed on slopes steeper than a 5(h):1(v) gradient should be keyed and benched (horizontal benches) into competent in-place soil (after all required removals are made) or bedrock. Keyways should be a minimum of 15 feet wide and tilted into the slope, and should be observed by this firm prior to placing fill. A *Typical Fill Above Natural Slope Detail* and *Typical Fill Over Cut Detail* illustrating recommended keying and benching is presented in Appendix D.

Utility Trenches

The backfill of all utility trenches within building areas, and parking and drive areas should be compacted to a minimum 90% relative compaction.

Shrinkage, Bulking, and Subsidence

Shrinkage or bulking is considered to be the volume loss or gain from cut to fill, including soils excavated and recompacted within removal areas. Subsidence is considered to account for stripping of vegetation and densification of the upper 8 inches of surface soils over the site. The shrinkage and bulking values are based on an average compaction of 93% relative compaction. The actual in-place compacted density can vary with the type of material compacted, the compactive effort, and moisture content. Estimates of shrinkage, bulking, and subsidence are presented in the following paragraph and table:

MATERIAL	SHRINKAGE/BULKING
Topsoil/ Colluvium	10-15% Shrinkage
Artificial Fills	10-15% Shrinkage
Calabasas Formation Bedrock	0-5% Bulking

Subsidence of on-site surficial soil is estimated at 0.1 to 0.3 feet. Removal of vegetation may result in higher surficial loss. These estimates are provided for planning purposes only. If quantities are critical, the grading contractor and grading plan designer should observe actual quantities during grading to evaluate the necessity of grade changes, and/or import or export.

MANUFACTURED SLOPE CONSTRUCTION AND MAINTENANCE

Cut Slopes

Where adverse geologic conditions are not encountered, manufactured cut slopes may be constructed at maximum gradients of 2(h):1(v). Where adverse geologic conditions are encountered, stabilization fills and or grade changes will be necessary. An equipment width stabilization fill is recommended as described in the following section.

Stabilization Fill Slopes

Based on our stability analyses (see Appendix C) a minimum equipment width stabilization fill is required at the cut slope proposed on the west side of the building pad. Our field exploration at T-5 indicated favorable geologic conditions however; depending on geologic structure exposed during site grading it is possible that the north-facing cut slope at the first bend in the driveway could expose adversely oriented planes of weakness that would require an equipment width stabilization fill.

Where necessary, stabilization fill slopes should be constructed at a maximum gradient of 2(h): 1(v). Stabilization slopes should be keyed and benched into firm in-place soil or bedrock as determined by this office. Keyways should be tilted into the slope and should be at least 3 feet deep at the heel (measured from below the slope toe elevation). The project-engineering geologist and/or geotechnical engineer prior to placing any fill should observe the keyway. As fill progresses, horizontal benches should be cut into any adjacent hillside area. The fill may taper to meet the proposed top of slope.

The predominant soil used for stabilization fills should have shear strength parameters of at least 330 lbs./sq. ft. cohesion and 20 degrees friction or greater. The outer surface of the slope should be constructed with soils have a minimum cohesion of at least 300 lbs./sq. ft. Selective grading may be necessary in some areas.

Stabilization fill slopes should be constructed with a backdrain placed at the heel of the fill and at minimum vertical spacing of 25 feet. The backdrain should consist of a 24 inch square section of rock (1/2"-3/4") wrapped in filter cloth. A perforated 4 inch diameter PVC schedule 40 pipe should be installed at the base of the gravel material. Non-perforated outlet pipes should be provided at intervals not exceeding 100 feet. The elevation of the drains should be adjusted so that the outlet pipes (non-perforated) may be installed with a minimum 2 percent fall. The outlets should be roughly 12 inches above the toe of slope or tied into the storm drain system. The outlets at the surface should be protected with a concrete monument and the ends should be covered with a slotted cap to prevent rodent entry.

The stabilization fill 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. A *Typical Stabilization Fill Detail* is provided in Appendix D.

Fill Slopes

Fill slopes may be constructed at a maximum gradient of 2(h):1(v). Fill slopes should be keyed and benched into firm in-place soil or bedrock. Fill slope keyways should be a minimum of 15 feet wide 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 3 feet deep at the heel (measured from below the slope toe elevation). This office should observe the keyways prior to fill placement.

Where possible, slope faces should be overfilled and trimmed back to provide for firm, well-compacted surfaces. If the slopes are not overfilled and trimmed, it may 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.

Berms

Compacted earthen berms should be constructed on pads adjacent descending slopes to direct water away from the slope or the pads should be positively sloped away from the top of slope.

Slope Maintenance

All 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. Pads should be graded to drain water away from the top of slope or compacted earthen berms should be constructed adjacent to descending slopes to direct water away from the slope.

All graded or exposed natural slopes should be maintained with dense, deep rooting (minimum 2± feet deep), drought resistant groundcover and shrubs or trees. Where necessary, a reliable irrigation system should be installed on the slopes, adjusted so over watering does not occur, and periodically checked for leakage. Excess watering of the slopes can cause erosion and surficial failures, and should be avoided. Slopes should not be over watered and should not be watered before forecasted rain. All drainage structures should be kept in good condition and clean the entire length.

Final grading of the site should provide positive drainage away from slopes, and water should not be allowed to pond or gather above a slope area. Compacted earthen berms should be constructed on pads adjacent to descending slopes to direct water away from the slope. Burrowing animals, particularly ground squirrels, can destroy slopes; therefore, where present, immediate measures should be taken to evict them.

SOIL CORROSIVITY

A sample of the soil obtained during the site investigation was sent to ConCeCo Engineering, Inc. for corrosion testing. The soil chemistry analyses of the tested samples and associated comments will be provided in a subsequent report

SOIL EXPANSIVENESS

Due to the extent of the proposed grading additional expansion testing will need to be performed for the finished pad. An expansion index test performed on a sample of the upper soil/bedrock profile resulted in an expansion index of 120. This coincides with our past experience within this general area that has indicated that the excavated material can often yield high expansion ranges. For preliminary design, we have recommended the 91 to 130 - expansion index range for foundation design. An expansion index test should be performed at the conclusion of grading for the building pad area.

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: (1) the soil swell potential; (2) availability of water; and (3) restraining pressure on the soil. Swelling occurs when clay soils become wet due to excessive water. Excessive water can be caused by poor surface drainage, over-irrigation of lawns and planters, and sprinkler or plumbing leaks.

Due to the relatively light foundation loads anticipated, expansive clay soils can cause distress both as uplift and shrinkage or settlement. Construction on expansive soil has an inherent risk that should be acknowledged and understood by the builder and property owner. The geotechnical recommendations presented in this report are intended to reduce the potential for expansive soil action. However, these recommendations are not intended, nor designed to provide complete and full mitigation of expansive soil conditions. Additional recommendations can be provided to further reduce the risk of expansive soil movement; however additional costs will be incurred to implement these recommendations. Expansive soil movement can be on the order of 1 to 2 inches when exposed to excessive water or drying out. Therefore, the following should be maintained within the site.

a) Positive drainage should be continuously provided and maintained away from all structures. Water should not be allowed to pond or accumulate around buildings or the edges of hardscape allowing water migration into the subgrade.

b) Excessive watering or excessive drying of soils will cause movement and should be avoided.

c) Sprinkler or plumbing leaks should be immediately repaired so the subgrade soils underlying or adjacent the structures do not become saturated.

d) Information regarding the care and maintenance of improvements located on expansive soils should be passed on to future owners of the property.

RESIDENTIAL FOUNDATIONS

Based on the proposed site development and grading plan, the proposed building pad will expose highly variable conditions. Uniform supporting soil conditions should be provided for the building area as discussed in the Geotechnical Grading Recommendations section. All foundations for proposed structure should be supported in engineered fill. The information and geotechnical recommendations presented herein are not meant to supercede design by the project's structural engineer.

For preliminary design purposes, we suggest classifying the materials at the site as highly expansive in the 91 to 130 expansion index range.

Conventional Footings and Slabs

Shallow foundations consisting of continuous or spread footings embedded entirely into engineered compacted fill, may be used to support the proposed structures. The footings may be designed to impose a maximum allowable bearing pressure of 1,800 pounds per square foot (psf) for engineered fill. Footings should have a minimum embedment depth and reinforcement according to the following table:

Soil Expansion Range	Minimum Footing Depth	Reinforcement for Continuous Footing
91-130	30"	2 - #4 bars top and bottom

The footings should have a minimum width of 12 and 24 inches for continuous and spread footings, respectively.

From a geotechnical standpoint, the slab thickness and reinforcement should be according to the following table:

Soil Expansion Range	Concrete Slab Thickness	Concrete Slab Reinforcement
91-130	4"	#3 bar @ 24" each way

The slab steel reinforcement should be extended into the foundations to within 3 inches of the footing bottom. The slab should be underlain by minimum 10-mil plastic membrane to retard moisture vapor through the slab. The membrane should be overlain by 2 inches of clean sand to aid in concrete curing; and underlain by 4 inches of clean sand. Slab subgrade soil disturbed during footing construction, utility installation, or natural weathering should be removed or recompacted prior to placing the sand sub-base.

Water should not be allowed to infiltrate underneath the building slabs. The above recommendations for foundation design should be considered the minimum standard for geotechnical concerns only and the design should be supplemented with the appropriate structural design.

Concrete mixing, placement, finishing, and curing should be performed per the American Concrete Institute Guide for Concrete Floor and Slab Construction (ACI 302.1R-89). The concrete slump for a Class 1 Floor is 5 inches in the ACI 302.1R-89 guide. Concrete slump in the Portland Concrete Association Design and Control of Concrete Mixtures bulletin is recommended at 4 inches for reinforced slabs. These published concrete slumps should be considered in the design of the concrete slabs-on-grade. Concrete shrinkage cracks could become excessive if water is added to the concrete above the allowable limit, and proper finishing and curing practices are not followed.

Setback Requirements

Footings on or near a slope should be deepened or setback to provide footing support and to reduce the impact of changes that can occur on slope faces. Deepened footings or setbacks should be used for all buildings and accessory structures including walls or fences sensitive to differential movement. Minimum setbacks should be per Chapter 18 of the CBC. The setback from descending slopes should be at least 1/3 the slope height from the face of the slope (but need not exceed 40 feet), with a minimum setback of 5 feet. Where expansive soils are present, the minimum setback should be 10 feet. The setback for ascending slopes should be at least 1/2 the slope height (but need not exceed 15 feet). Accessory structures such as concrete walkways, garden walls, and fences that are sensitive to differential movement should be supported on setback foundations.

Lateral Resistance

Lateral forces exerted by retained soil or compacted fill may be resisted by passive soil pressure and friction. The passive soil pressure may be taken as an equivalent fluid pressure of 350 psf per foot of depth where the footing is on level ground. Where footings are on a 2(h):1(v) slope the passive pressure should be limited to an equivalent fluid pressure of 200 psf per foot of depth, not to exceed 1500 psf. Friction between the bottom of the footings and soil may be taken as 0.35. Passive resistance and friction may be combined provided the passive resistance is reduced by one-half.

Settlement

Settlements of relatively lightly loaded residential footings should not exceed 0.5 to 1 inch and are expected to occur rapidly as loads are applied. The estimated settlement may be reevaluated when the actual foundation loads and house locations are available. Differential settlement between adjacent footings with similar static loading is anticipated to be half the estimated settlement or less.

Floor Covering

Tile flooring can crack, reflecting cracks in the concrete slab below the tile. Therefore, the slab designer should consider additional steel reinforcement in concrete slabs-on-grade that will directly support tile. The tile installer should consider installation methods that reduce possible cracking of the tile. A vinyl crack isolation membrane (approved by the Tile Council of America/Ceramic Tile Institute) is recommended between tile and concrete slabs on-grade per the Portland Cement Association

Specifications. The concrete slab-on-grade should be tested for moisture where organic flooring such as wool carpeting or wood flooring is used. The slab moisture should be within the specifications of the flooring manufacturer or the slab should be sealed per the manufacturers' specifications.

Moisture Penetration

The conventional footing and slab-on-grade subgrade soils should be moistened to a minimum of 3% over the optimum moisture content to a minimum depth of 18 inches. A representative of this office prior to casting the concrete should observe the subgrade soil moisture. Soils silted into the footing excavations during premoistening should be removed prior to casting the concrete.

Footing Excavations

All footings should be cut square and level, and cleaned of slough and soils silted into the excavations during the premoistening operations. Soil excavated from the footing trenches should not be spread over areas of construction unless placed as a properly compacted fill. A representative of this office should observe the footing excavations prior to placing reinforcing steel or forms. The footings should be poured as soon as possible to avoid deep desiccation of the footing subsoil.

RETAINING WALL DESIGN

Foundations

Continuous footings founded below level ground may be designed to impose a uniform allowable soil bearing pressure of 1800 psf. The maximum pressure under the toe should not exceed the allowable bearing pressure. The resultant of the retaining wall footing pressure should pass within the middle third of the width of the footing. The footings (outside the structures) should be embedded a minimum of 24 inches into firm bedrock or engineered fill and have a minimum width of 24 inches. Footing reinforcement should be per the structural engineer's recommendations.

Adjacent walls should be spaced to satisfy the criteria illustrated on Figure 5. These criteria may be difficult to satisfy for tiered walls that are close together. In cases where the upper wall footing would be excessively deep, a single crib wall may be a viable alternative.

Wall foundations may be designed using the passive pressure and base friction values presented earlier in this report. To develop the full passive pressure in front of the foundation, level ground consisting of competent native material or engineered compacted fill should extend a distance of at least 1½ times the footing depth in front of the footing. For tiered walls, to avoid imposing passive pressure from the upper wall onto the stem of the adjacent lower wall, lateral forces should be resisted by base friction alone, ignoring the passive pressure on the toe. Foundations should be setback from slopes as previously recommended.

Active Pressures

Retaining walls should be designed to resist an active pressure exerted by compacted backfill or retained soil. Retaining walls that may yield at the top may be designed for an equivalent fluid pressure of 42 and 50 psf per foot of depth for a level and 2(h):1(v) sloping backfill, respectively for non to low expansive soils. Retaining walls restrained at the top should be designed for a lateral earth pressure of 60 psf per foot of depth for a level backfill. Footings behind a retaining wall should be embedded below a 2(h):1(v) line extending up from the base of the wall or the wall should be designed to support the footing surcharge.

Retaining wall backcuts in bedrock should be observed for adverse geologic conditions by the project geotechnical consultant. The above active pressures are not designed to retain an adverse geologic condition.

Retaining Wall Drainage and Backfill

Retaining walls should be provided with a drainage system consisting of a composite drain board or a minimum 1-foot wide continuous section of No. 4 rock (or pea gravel) and sand at a 1:1 ratio or equivalent. 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. A layer of filter cloth should be placed between the drain material and 2 foot soil cap to minimize the migration of fines into the drain material. 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 where moisture infiltration through the wall would be a problem or where the wall face is stucco covered.

Wall backfill may consist of on-site soil or sand and gravel. The soil or gravel should be compacted to a minimum of 90 percent of the maximum dry soil density using light equipment.

Temporary Cuts

Temporary cuts for retaining wall construction may be made at 3/4(h):1(v). The cuts should be observed by the project engineering geologist to evaluate possible adverse geologic conditions that might require flatter back cuts, or other remedial measures.

Heavy equipment and storage loads should be kept away from the tops of cuts a minimum distance equal to the height of the cut, or 10 feet, whichever is more.

PRELIMINARY DRIVEWAY PAVEMENT STRUCTURAL SECTIONS

The following pavement structural section was developed for preliminary planning purposes. The following estimated pavement structural section for the subject development is based on an anticipated resistance (R) value for fill soil of 30 or less. Based on an R-value of 30 and an assumed traffic index of 4, the structural section would consist of 3 inches of asphalt on 6 inches of aggregate base.

The structural section should be confirmed after the conclusion of grading based on actual subgrade soils. The upper 12 inches of subgrade and the base materials should be compacted just prior to placing the asphalt. All planter areas should be graded so excess water drains onto and not beneath the adjacent AC pavement and curbs.

SITE DRAINAGE

Positive drainage consistent with regional patterns should be provided away from slopes and structures during and after construction. Planters near a structure should be constructed so irrigation water will not saturate the soils underlying the building footings and slabs. A building pad should be graded at a minimum gradient of two percent away from the building toward an approved drainage course or provide alternate drainage. Landscape planting and trees should be kept away from foundations or flatwork to avoid roots extending beneath foundations and slabs. Irrigation lines and landscape watering should be kept well away from building lines.

PLAN REVIEW

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

CONSTRUCTION OBSERVATIONS AND TESTING

All aspects of the construction addressed from a geotechnical standpoint (i.e., subgrades, fill placement, backdrain emplacement, backfill, and footings) should be observed (and tested when appropriate) by this firm.

CLOSURE

This report was prepared within the scope of generally accepted geotechnical engineering practices under the direction of a licensed civil 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 Mr. Rudyan and his 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 information gained from subsurface explorations and a surficial site reconnaissance. The 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 investigations, 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 the project geotechnical consultant. Services of the geotechnical consultant should not be construed to relieve the owner of contractors of their responsibilities or liabilities.

oOo

We appreciate the opportunity to be of service to you on this project. Please do not hesitate to call if you have any questions or comments regarding items presented in this report.

Respectfully submitted,

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APPENDIX A

LOGS OF SUBSURFACE DATA

APPENDIX B

LABORATORY TESTING

General

Laboratory test results on selected relatively undisturbed and bulk samples are presented below. Tests were performed to evaluate the physical and engineering properties of the encountered earth materials, including field moisture and density, compaction characteristics, expansion potential, and shear strength.

Field Density and Moisture Tests

In situ dry density and moisture content were determined from the relatively undisturbed samples obtained during drilling operations. The test results and a detailed description of the soils encountered are shown on the attached Logs of Subsurface Data, Appendix A.

Direct Shear Tests

Strain controlled direct shear testing was performed on relatively undisturbed samples and remolded samples of the earth materials encountered during our exploratory program. Bulk samples were remolded to approximately 90% of the maximum density. The sample sets were saturated prior to shearing under axial loads ranging from 920 to 3,680 psf. The shear strength results are attached as graphic summaries.

Maximum Density-Optimum Moisture

A maximum density/optimum moisture test (compaction characteristics) was performed on selected samples of the encountered materials. Each test was performed per ASTM D 1557 test method. The results are as follows:

Sample Identification	Visual Soil Classification	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
TP-1 @ 2'	Grayish brown silty clay	100.5	21.5
TP-3 @ 0'	Dark brown silty clay	106.5	17.5
Maximum Density-Optimum Moisture (from Gorian, 2004a)			
B-1 @ 7'	Light brown silty sand	119.5	11.0

Soil Expansion Tests

A sample of the encountered soil was tested for expansiveness using the Expansion Index Test method (UBC 18-2). The results are as follows:

Sample Identification	Visual Soil Classification	Expansion Index	Expansion Index Range	Expansiveness
TP-1 @ 2'	Grayish brown silty clay	120	91-130	High

Adopted Laboratory Testing

Laboratory test results, specifically direct shear test results; from previous investigations for the adjacent site (Gorian, 2004a) have been included in the following graphic summaries.

APPENDIX C

SLOPE STABILITY ANALYSIS

Section A-A'	**Through Synclinal Structure**	**Figure C1.1 to C1.19**
	Through Syncline / Toe	**Figure C2.1 to C2.19**
	Through Toe	**Figure C3.1 to C3.20**
Section E-E'	**Steep Natural Slope**	**Figure C4.1 to C4.15**
Section A-A'	**Highest Fill Slope**	**Figure C5.1 to C5. 24**
Section D-D'	**Highest Cut/Eqpt. Width Stab. Fill (under)**	**Figure C6.1 to C6.16**
	Highest Cut/Eqpt. Width Stab. Fill (through)	**Figure C7.1 to C7.14**

Discussion of Stability Analyses

As discussed in the body of this report, natural slopes within the proposed development have a potential slope instability due to existing conditions (previously suggested landsliding) or adverse geologic structure. Geotechnical sections have been prepared, using geologic sections and data, through natural slopes within and adjacent to the proposed development area. A discussion of each of the geotechnical sections, results of the stability analyses, and proposed remedial grading solutions, if necessary, are presented below.

Our analyses considered postulated planar or rotational type failures with the use of the computer program GSTABL7 with the 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. GSTABL7 originates from an early version of STABL by Purdue University.

The stability analyses were performed using the Simplified Janbu Method. This method divides the postulated failure mass into a series of slices; however, interslice forces are not taken into account. Groundwater was not encountered during our field exploration program and was therefore not included in our stability analyses. Numerous trial surfaces were analyzed for each section. The stability of slopes is commonly stated in terms of the slopes calculated factor of safety. The ten trial surfaces with the lowest factors of safety are presented graphically and listed in our computer output files. Pseudostatic analyses were completed using a horizontal acceleration coefficient of 0.15. The generally accepted lower limit for factor of safety is 1.5 and 1.1 for static and pseudostatic conditions, respectively. Where calculated factors of safety are less than the accepted lower limit, remedial measures were analyzed. In each case evaluated herein, the minimum factor of safety was greater than 1.5 and 1.1 for static and pseudostatic conditions, respectively.

Material strengths for the bedrock and compacted fill, indicated on the subject cross-sections, were developed using data obtained from our laboratory direct shear testing of both relatively undisturbed and remolded samples. To evaluate the global stability of the natural slope descending from the building pad material strengths were required for unsupported bedding (residual strengths) as well as cross-bedding bedding. The test results are presented in Appendix B of this report. The strengths used in our slope stability analyses are provided below:

Earth Material	Ultimate Cohesion (psf)	Ultimate Friction Angle (deg)
Cross-Bedding		
Calabasas Formation – Claystone / Siltstone Gorian, 2004a	**560**	**29**
Along Bedding (Shear/Reshear)		
Calabasas Formation – Claystone / Siltstone Gorian, 2004a	**600**	**13**
Calabasas Presumptive Slide Plane 50% reduction of Along Bedding cohesion	**300**	**13**
Other		
Remolded / Compacted Fill T-	**330**	**20**

Section A-A' – Natural Slope

Section A-A' bisects the northern portion of subject parcel from the proposed building pad to Dry Canyon Cold Creek Road. The moderately inclined topography descends from south to north. This section was drawn to show the geologic structure relative to a synclinal structure within the Calabasas Formation. The thickest section of fill used to construct the driveway is also depicted on this section. Our stability analysis modeled the synclinal structure with several zones of anisotropic material strengths to account for weaker along bedding plane strengths at several different bedding plane inclinations throughout the syncline.

Slope stability analyses were performed on potential slip surfaces that were generated from three exit search box scenarios through the lower portions of the cross-section. The first scenario used several search boxes to model potential failure planes through the syncline structure. The second scenario positioned an exit search box further downslope near the vicinity of the toe of slope. The third and last scenario positioned an exit search box at the toe and beyond. This third scenario considered the influence of the flatter bedding planes depicted at the toe.

Each of the analyses completed indicates minimum factors of safety in excess of 1.5 and 1.1 for static and pseudostatic conditions, respectively. The results of our analyses are summarized below.

Section	Conditions	Static FS	Seismic FS	Figure No.
A-A'	Exit pathways through syncline	2.44	1.49	C1
	Exit pathways through syncline or toe	1.82	1.15	C2
	Exit pathways through toe or beyond	1.87	1.19	C3

Section E-E – Steep Natural Slope'

Section E-E' is through the natural slope that descends from the south side of the proposed building pad. The geologic structure is tightly folded within the upper portion of the section and transitions to a near dip-slope inclination. Our analyses conservatively ignored the folded portion in the upper portion of the section and considered potential failure paths inclined same as the lower portion of the section with bedding plane strength up to the building pad. Each of the analyses completed indicates minimum factors of safety in excess of 1.5 and 1.1 for static and pseudostatic conditions, respectively. The results of our analyses are summarized below.

Section	Conditions	Static FS	Seismic FS	Figure No.
E-E'	Exit pathways through toe or beyond	2.02	1.43	C4

Highest Fill Slope

The highest fill slope is proposed midway along the meandering driveway. The fill slope is designed at a 2(h):1(v) gradient with a height of 24 feet. It is assumed surface terrace drains will be added as needed to the final designed slope. A rotational analysis was performed with remolded soil strengths. The stability analyses completed indicate minimum factors of safety in excess of 1.5 and 1.1 for static and pseudostatic conditions, respectively. The results of our analyses are summarized below.

Section	Conditions	Static FS	Seismic FS	Figure No.
--	Highest fill slope	1.91	1.40	C5

Section D-D' – Highest Cut Slope

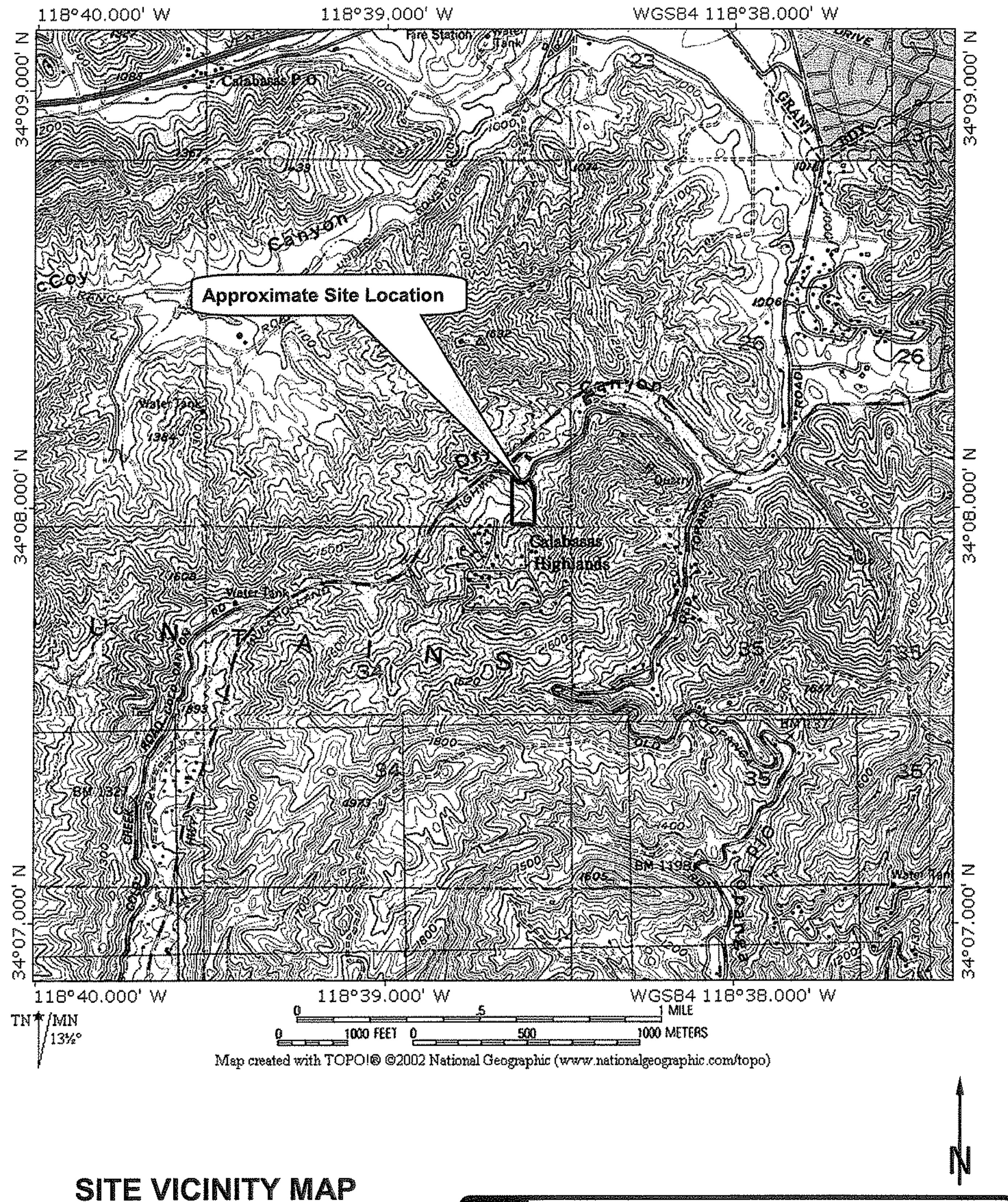
Section D-D' is through the proposed 2(h):1(v) cut slope along the west side of building pad. The geologic structure behind this proposed cut slope is adverse and requires a stabilization fill. Our analyses considered potential failure paths through and under the proposed stabilization fill. The stabilization fill was modeled with a 15-foot wide keyway that was 4 feet deep at the toe. The backcut should be cut 1(h):1(v) with the recommended benching. See *Typical Stabilization Fill Detail.* A sewerline has been installed near the top of the recommended stabilization fill. Preliminary research has indicated the pipe is relatively deep in the ground and may not be encountered during the remedial grading. A waterline shown on plans is an unknown and should be addressed as the design process progresses. These pipelines will need to be carefully evaluated and if needed rerouted during the construction of the recommended stabilization fill.

Each of the analyses completed indicates minimum factors of safety in excess of 1.5 and 1.1 for static and pseudostatic conditions, respectively. The results of our analyses are summarized below.

Section	Conditions	Static FS	Seismic FS	Figure No.
D-D'	Below stabilization fill 4' deep X 15' wide keyway	1.97	1.35	C6
	Through stabilization fill-High 4' deep X 15' wide keyway	1.97	1.33	C7

Surficial Stability

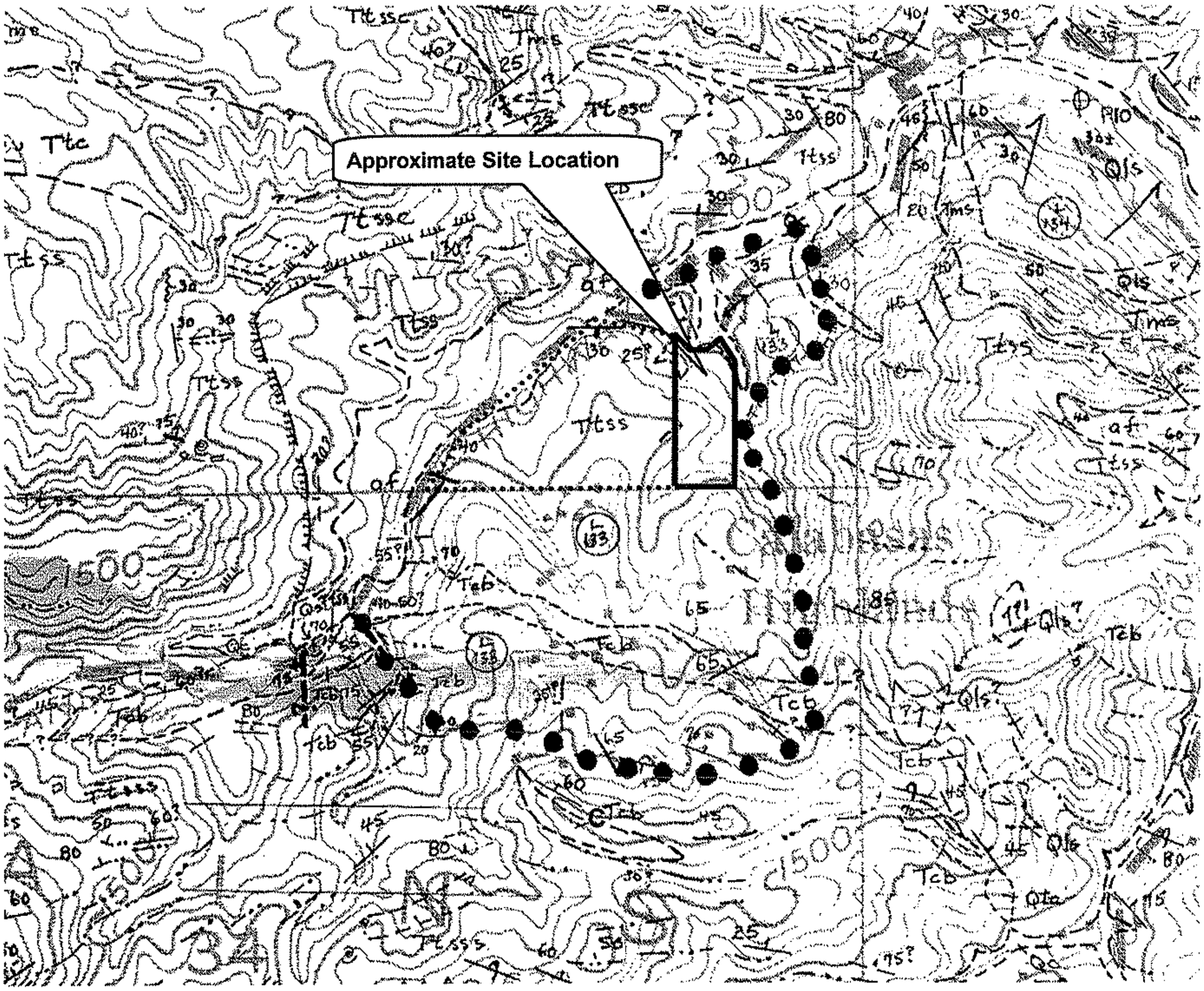
A surficial stability analysis was completed using an approximate one-third reduction in the cohesive strength parameter for engineered fill (cohesion = 225 psf). The analyses assume the slopes are infinite in length and that seepage is parallel to the slope face. The vertical depth of the soil saturation zone was assumed to be 4 feet below the slope surface even though our field mapping indicated the soil profile could be thinner. The calculations are presented in Appendix C and indicate that the surficial stability factor of safety is satisfactory.



SITE VICINITY MAP

23604 Dry Canyon Cold Creek,
Calabasas, County of Los Angeles,
California

GORIAN & ASSOCIATES, INC. — ***Applied Earth Sciences*** Geotechnical Engineers and Geologists		**Figure 1**
Work Order No.: 2189-2-0-10		Date: 12/17/04
Scale: 1" = 2000±	Drawn By: EAB Approved By:	Log No.: 23412



REGIONAL GEOLOGIC MAP

23604 Dry Canyon Cold Creek,
Calabasas, County of Los Angeles,
California

Explanation

Ttss – Upper Topanga Formation
Tcb – Conejo Volcanics
L 133 – Postulated Landslide shown on Geologic Terranes Map, Plate IV, Weber 1984

N

Reference: ***Plate IIC*** from Weber, Harold F., 1984, Geology of the Calabasas-Agoura-Eastern Thousand Oaks Area, Los Angeles and Ventura Counties, California. CDMG Open–File Report 84-1 LA

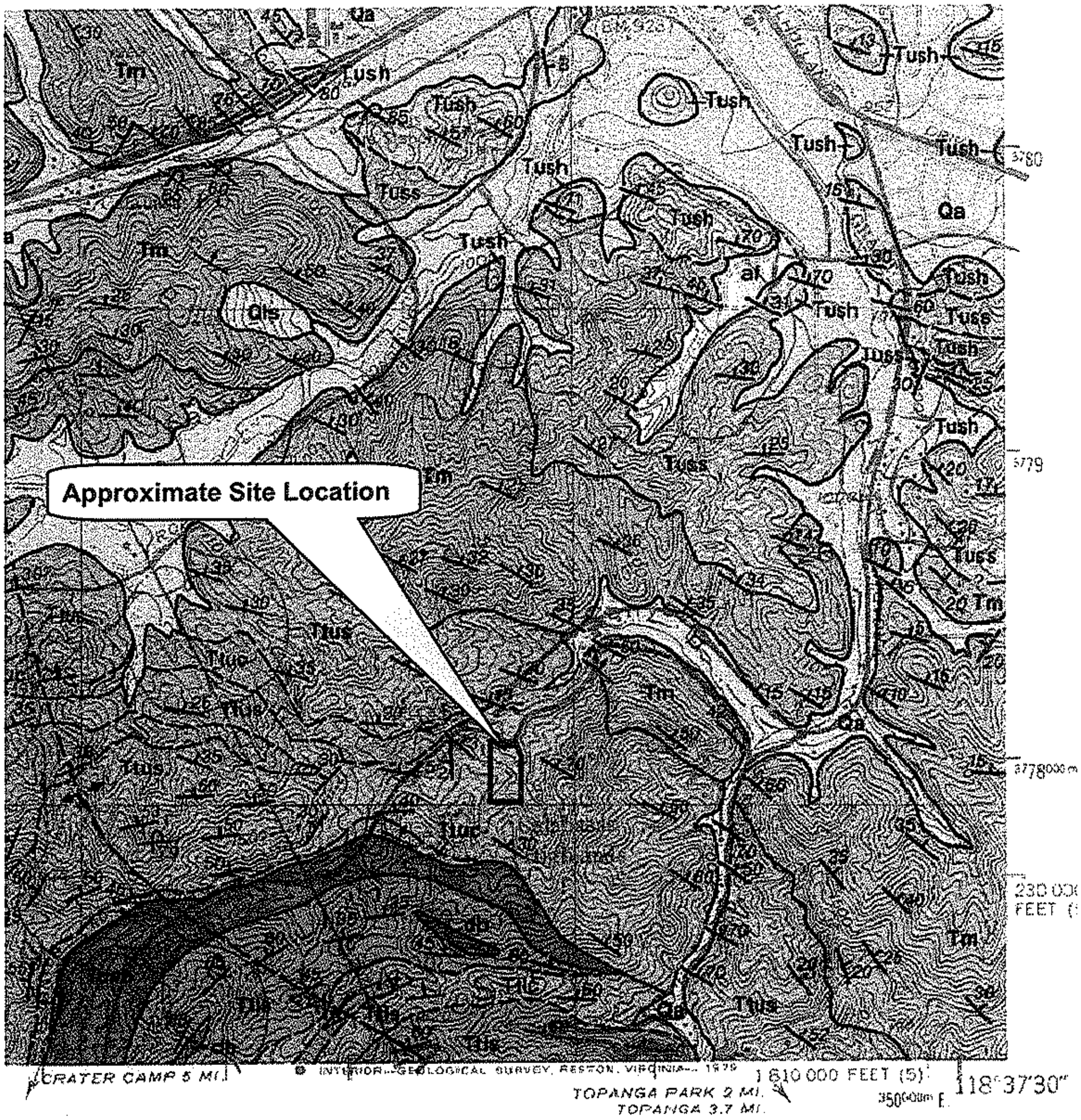
GORIAN ASSOCIATES INC

Applied Earth Sciences
Geotechnical Engineers
and Geologists

Figure 2

Work Order No.: 2189-0-0-10	Date: 12/17/04
Scale: 1" = 800± / Drawn By: EAB / Approved By:	Log No.: 23412

23412 fig3



REGIONAL GEOLOGIC MAP

23604 Dry Canyon Cold Creek,
Calabasas, County of Los Angeles,
California

Explanation

Ttus – Upper Topanga Formation
Tcvb – Conejo Volcanics
db - Diabase

N

Reference:

GEOLOGIC MAP OF THE CALABASAS QUADRANGLE
LOS ANGELES AND VENTURA COUNTIES, CALIFORNIA
BY THOMAS W. DIBBLEE, JR., 1992
EDITED BY HELMUT E. EHRENSPECK

GORIAN & ASSOCIATES, INC.	***Applied Earth Sciences*** Geotechnical Engineers and Geologists	**Figure 3**
Work Order No.: 2189-2-0-10		Date: 12/17/04
Scale: 1" = 2000±	Drawn By: EAB Approved By:	Log No.: 23412

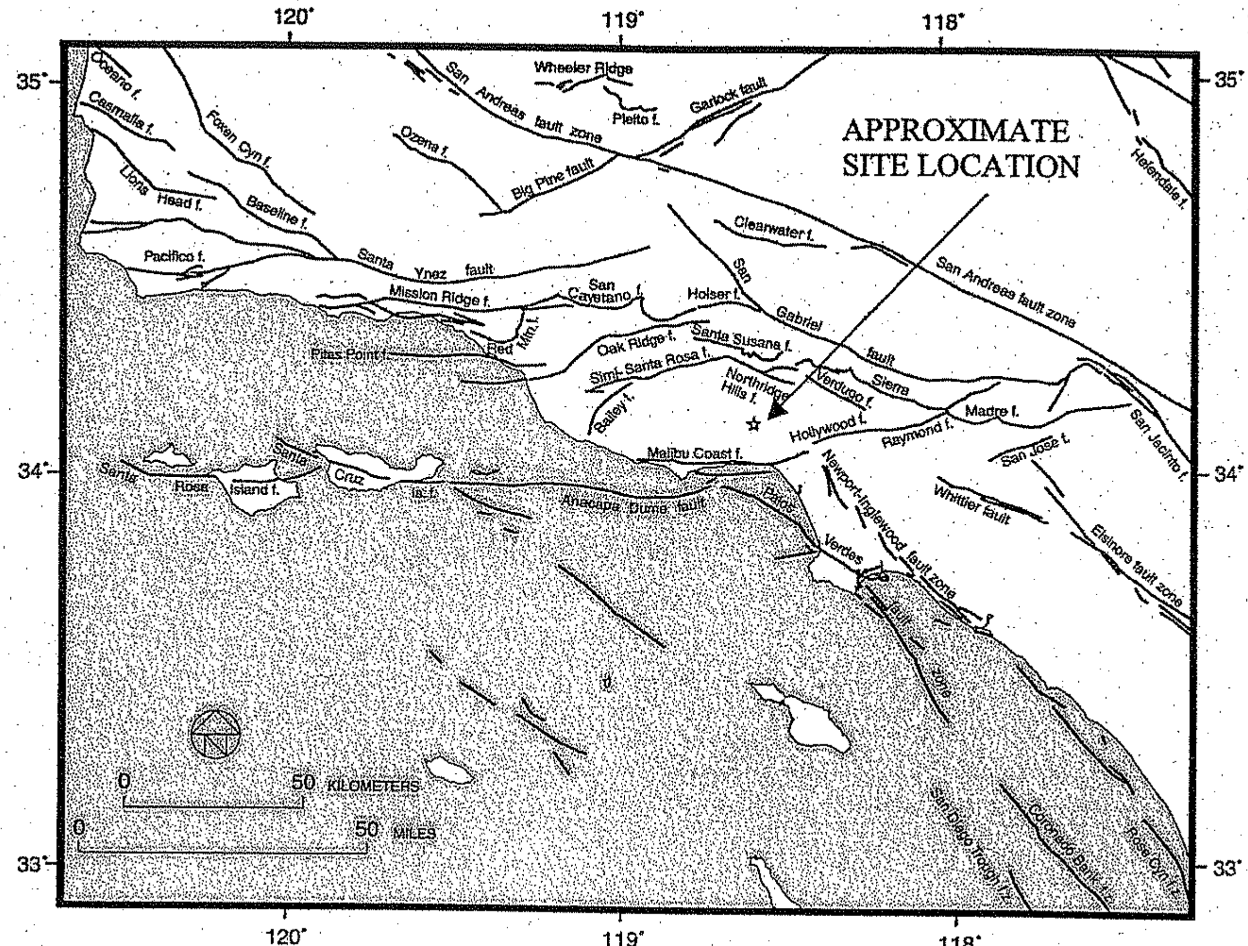


Figure 4. Regional map showing location site with respect to prominent Quaternary faults.

APPENDIX A

LOGS OF SUBSURFACE DATA

GORIAN & ASSOCIATES, INC.

Project: Rudyan
Dry Canyon Cold Creek Road, Calabasas

Work Order: 2189-2-0-10
Report Log: 23412

SUBSURFACE LOG

Excavation Number: TP-1

Page Number: 1

Date(s) Excavated 8/27/04	Logged By CHD	Excavation Location See Geotechnical Map	Approximate Surface Elevation 1286'±
Excavation Dimension 24"	Equipment Contractor D. Carroll	Equipment Type Backhoe	Hammer Data

Elevation / Depth (ft.)	Bulk	Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
0						CL		RESIDUAL SOIL: Light olive brown (2.5Y 5/4) silty CLAY (damp, stiff). Desiccated.	
1285								CALABASAS FORMATION: Dark gray (5Y 4/1) to olive brown (2.5Y 4/4) CLAYSTONE and clayey SILTSTONE interbedded with SILTSTONE (moist). Highly fractured, common calcium carbonate filled fractures and along bedding. Thinly bedded. Fissile. Tightly folded.	Attitude On Bedding @ 2' N25°W/85°NE @ 4' N42°W/67°SW @ 5½' N25°W/73°SW
	■			20.2	97				
		■		22.0	83				
5									
1280								Total Depth 6' No caving, No groundwater	
10									
1275									
15									
1270									
20									
1265									
25									
1260									
30									
1255									
35									
1250									

GORIAN & ASSOCIATES, INC.

Project: Rudyan
Dry Canyon Cold Creek Road, Calabasas

Work Order: 2189-2-0-10
Report Log: 23412

SUBSURFACE LOG

Excavation Number: TP-2

Page Number: 1

Date(s) Excavated 8/27/04	Logged By CHD	Excavation Location See Geotechnical Map	Approximate Surface Elevation 1287'±
Excavation Dimension 24"	Equipment Contractor D. Carroll	Equipment Type Backhoe	Hammer Data

Elevation / Depth (ft.)	Bulk	Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
0						CL		RESIDUAL SOIL: Yellowish brown (10YR 5/4) sandy CLAY (damp, stiff). Desiccated. Common roothairs.	
1285	■	■		16.0	90			BASALTIC INTRUSION: Dark yellowish brown (10YR 4/4) fine-grained Basalt (weathered, fractured). Common iron oxide staining. Locally contains irregular clasts of claystone. 1/4" baked zone surrounds the clasts. Clasts up to 2' long by 9" thick. Some calcium carbonate to 3'. No apparent bedding. Chaotic. Clasts consist of dark gray (5Y 4/1) claystone.	
5		■		18.5	95				
1280								Total Depth 6' No caving, No groundwater	
10									
1275									
15									
1270									
20									
1265									
25									
1260									
30									
1255									
35									
1250									

GORIAN & ASSOCIATES, INC.

Project: Rudyan
Dry Canyon Cold Creek Road, Calabasas

Work Order: 2189-2-0-10
Report Log: 23412

SUBSURFACE LOG

Excavation Number: TP-3

Page Number: 1

Date(s) Excavated 8/27/04	Logged By CHD	Excavation Location See Geotechnical Map	Approximate Surface Elevation 1248'±
Excavation Dimension 24"	Equipment Contractor D. Carroll	Equipment Type Backhoe	Hammer Data

Elevation / Depth (ft.)	Bulk	Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
0	■					CL	▨	TOPSOIL: Very dark grayish brown (10YR 3/2) sandy silty CLAY (damp, very stiff). Highly desiccated. Some roots.	
1245								CALABASAS FORMATION (Highly weathered): Light olive gray (5Y 6/2) CLAYSTONE (moist). Highly fractured. Common calcium carbonate veinlets and nodules.	
	■	■		16.7	95				
5								Below 5'; becoming fresh. Claystone as above interbedded with 1" thick pale yellow (2.5Y 7/3) silty fine-grained sandstone. Less fractured. Less Weathered. Uniformly stratified.	Attitude On Bedding @ 6½' N5°W/37°NE
1240									
		■		11.0	102			Below 8½'; pale yellow (2.5Y 7/3) silty fine-grained SANDSTONE.	
10								Total Depth 9½' No caving, No groundwater	
1235									
15									
1230									
20									
1225									
25									
1220									
30									
1215									
35									
1210									

GORIAN & ASSOCIATES, INC.

Project: Rudyan
Dry Canyon Cold Creek Road, Calabasas

Work Order: 2189-2-0-10
Report Log: 23412

SUBSURFACE LOG

Excavation Number: TP-4

Date(s) Excavated 8/27/04	Logged By CHD	Excavation Location See Geotechnical Map	Approximate Surface Elevation 1229'±
Excavation Dimension 24"	Equipment Contractor D. Carroll	Equipment Type Backhoe	Hammer Data

Elevation / Depth (ft.)	Bulk	Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
0						CL		TOPSOIL: Very dark grayish brown (10YR 3/2) silty CLAY, trace sand, (damp, very stiff).	
		■		10.5	106			CALABASAS FORMATION: Dark yellowish brown (10YR 4/4) to dark gray (5Y 4/1) CLAYSTONE and SILTSTONE interbedded with pale yellow (2.5Y 7/4) silty fine-grained SANDSTONE (damp to moist). Some calcium carbonate. Fractured. Weathered. Becoming fresh with depth. Uniformly bedded.	
1225 / 5	■	■		11.5	111				Attitude On Bedding @ 4½' N32°W/18°SW
7								Total Depth 7 No caving, No groundwater	

Elevation scale: 1225, 1220, 1215, 1210, 1205, 1200, 1195, 1190
Depth scale: 0, 5, 10, 15, 20, 25, 30, 35

GORIAN & ASSOCIATES, INC.

Project: Rudyan
Dry Canyon Cold Creek Road, Calabasas

Work Order: 2189-2-0-10
Report Log: 23412

SUBSURFACE LOG

Excavation Number: TP-5

Page Number: 1

Date(s) Excavated 8/27/04	Logged By CHD	Excavation Location See Geotechnical Map	Approximate Surface Elevation 1236'±
Excavation Dimension 24"	Equipment Contractor D. Carroll	Equipment Type Backhoe	Hammer Data

Elevation / Depth (ft.)	Bulk	Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
1235 / 0						CL		TOPSOIL: Very dark grayish brown (10YR 3/2) silty CLAY, trace sand, (damp, hard). Highly desiccated.	
		■		14.2	106				
1230 / 5		■		14.5	99			CALABASAS FORMATION: Light olive brown (2.5YH 5/3 to 5/4) to gray (5Y 5/1) CLAYSTONE and clayey SILTSTONE (highly weathered). Common calcium carbonate veinlets. Below 4½'; becoming fresh. Uniformly bedded. Fractured. (Moist).	Attitude on Bedding @ N65°E/62°S
								Total Depth 6½' No caving, No groundwater	

Elevation scale: 1235, 1230, 1225, 1220, 1215, 1210, 1205, 1200; Depth scale: 0, 5, 10, 15, 20, 25, 30, 35

GORIAN & ASSOCIATES, INC.

Project: Rudyan
Dry Canyon Cold Creek Road, Calabasas

Work Order: 2189-2-0-10
Report Log: 23412

SUBSURFACE LOG

Excavation Number: TP-5

Page Number: 1

Date(s) Excavated 8/27/04	Logged By CHD	Excavation Location See Geotechnical Map	Approximate Surface Elevation 1236'±
Excavation Dimension 24"	Equipment Contractor D. Carroll	Equipment Type Backhoe	Hammer Data

Elevation / Depth (ft.)	Bulk	Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
0						CL		TOPSOIL:	
1235								Very dark grayish brown (10YR 3/2) silty CLAY, trace sand, (damp, hard). Highly desiccated.	
		■		14.2	106				
		■		14.5	99			CALABASAS FORMATION: Light olive brown (2.5YH 5/3 to 5/4) to gray (5Y 5/1) CLAYSTONE and clayey SILTSTONE (highly weathered). Common calcium carbonate veinlets.	
5									
1230								Below 4½'; becoming fresh. Uniformly bedded. Fractured. (Moist).	Attitude On Bedding @ 5½' N65°E/62°SE
								Total Depth 6½' No caving, No groundwater	
10									
1225									
15									
1220									
20									
1215									
25									
1210									
30									
1205									
35									
1200									

GORIAN & ASSOCIATES, INC.

Project: Rudyan
Dry Canyon Cold Creek Road, Calabasas

Work Order: 2189-2-0-10
Report Log: 23412

SUBSURFACE LOG

Excavation Number: TP-6

Page Number: 1

Date(s) Excavated 8/27/04	Logged By CHD	Excavation Location See Geotechnical Map	Approximate Surface Elevation 1202'±
Excavation Dimension 24"	Equipment Contractor D. Carroll	Equipment Type Backhoe	Hammer Data

Elevation / Depth (ft.)	Bulk	Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
0 / 1202						CL	▨	ARTIFICIAL FILL: Very dark grayish brown (10YR 3/2) silty CLAY mottled with yellowish brown (10YR 5/4) silty SAND (moist, stiff). Porous. Some concrete, wood, and wire. Organic odor.	
						CL	▨	TOPSOIL: Very dark grayish brown (10YR 3/2) silty CLAY, trace sand, (damp, very stiff).	
5		■		21.4	88			CALABASAS FORMATION: Dark gray (5Y 4/1) to yellowish brown (10YR 5/4) CLAYSTONE and clayey SILTSTONE. Thinly bedded. Slightly fissile. (Moist). Fractured. Common iron oxide staining. Uniform bedding.	Attitude On Bedding @ 6' N55°E/32°NW
								Total Depth 7' No caving, No groundwater	

Elevation scale: 1200, 1195, 1190, 1185, 1180, 1175, 1170, 1165

Depth scale: 0, 5, 10, 15, 20, 25, 30, 35

GORIAN & ASSOCIATES, INC.
Applied Earth Sciences

Project: T.H. Investments, Calabasas
Drill Co. and Rig Type: Tri-Valley, Earthdrill 42LHD
Hammer: See Note At Bottom Logged by: CHD
Boring Diameter: 24" Surface Elevation: 1318'±

Work Order: 2471-0-0-10
Report Log No.: 22770
Date: 7/21-22/03

Depth (ft)	Undisturbed	SPT	Bulk	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	Penetrometer (tsf)	USCS	Soil/ Lithology	Description
0								CL		TOPSOIL At 0 to 1½'; very dark grayish brown (2.5Y 3/2) sandy silty clay (damp to very moist, stiff).
				P U S H						CALABASAS FORMATION At 1½' to 8'; light yellowish brown (2.5Y 6/4) silty fine- to coarse-grained sandstone (moist). At 2½'; becoming interbedded with light olive brown (2.5Y 5/4) to gray (5Y 5/1) claystone (very moist). Weathered.
				P U S H	7.2	109				[Attitude on bedding at 3½'; EW/28°N] [Attitude on bedding at 4½'; N85°E/24°NW]
5				P U S H	24.9	100				[Approximate Attitude on bedding at 6'; N70°E/20°NW]
										At 7½'; interbedded with olive brown (2.5Y 4/4) claystone. Some iron oxide and manganese oxide staining. Uniformly bedded. [Attitude on bedding at 7½'; N80°W/23°NE]
										At 8' to 15'; highly irregularly bedded clay within sandstone matrix. Clay appears to be squeezed into sandstone zone. Incoherent bedding. Erosional channels cut in sand from 9' to 11'.
10				2/ 12"	15.9	99				
15				5/ 12"	37.7	86				At 15' to 23'; becoming gray (5Y 5/1) claystone (very moist). Irregular contact at top of unit. Generally massive. Few rip up clasts of sandstone. Some calcium carbonate.

GORIAN & ASSOCIATES, INC.
Applied Earth Sciences

Project: T.H. Investments, Calabasas
Drill Co. and Rig Type: Tri-Valley, Earthdrill 42LHD
Hammer: See Note At Bottom Logged by: CHD
Boring Diameter: 24" Surface Elevation: 1318'±

Work Order: 2471-0-0-10
Report Log No.: 22770
Date: 7/21-22/03

Depth (ft)	Undisturbed	SPT	Bulk	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	Penetrometer (tsf)	USCS	Soil/ Lithology	Description
20	■			7/ 12"	31.2	92				At 20'; becoming mottled with dark yellowish brown (10YR 3/4) to very dark gray (10YR 3/1) claystone (damp). Common multi-directional shearing.
										At 23' to 27'; very dark gray (10YR 3/1) claystone (damp) (½ of boring). Reddish brown fine-grained Basalt (½ of boring). Baked and altered contacts. Fractured. Seepage at 24'. Claystone highly sheared. Basalt ends at 27'. [Approximate attitude on Basalt Contact; N30°W/90°]
25	■			2/ 12"	23.3	102				
			■							At 27' to 29'; bluish gray (10B 5/1) claystone (moist). Highly sheared.
										At 29' to 32'; (½ of boring) dark gray (5Y 4/1) Basalt. Fractured. Common iron oxide staining. Baked contacts.
30	■			8/ 12"	19.5	109				
										At 32' to 37'; light yellowish brown (2.5Y 6/4) silty fine- to coarse-grained sandstone interbedded with gray (5Y 5/1) to very dark grayish brown (2.5Y 3/2) claystone. (Moist).
										At 34'; seepage. Becoming bluish gray (10B 6/1) silty fine- to coarse-grained sandstone. Altered and baked contacts. Caving in hole.
35	■			12/ 12"	14.3	116				
										At 37'; becoming interbedded with very dark grayish brown

GORIAN & ASSOCIATES, INC.
Applied Earth Sciences

Project: T.H. Investments, Calabasas
Drill Co. and Rig Type: Tri-Valley, Earthdrill 42LHD
Hammer: See Note At Bottom Logged by: CHD
Boring Diameter: 24" Surface Elevation: 1318'±

Work Order: 2471-0-0-10
Report Log No.: 22770
Date: 7/21-22/03

Depth (ft)	Undisturbed	SPT	Bulk	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	Penetrometer (tsf)	USCS	Soil/ Lithology	Description
										At 37'; becoming interbedded with very dark grayish brown (2.5Y 3/2) claystone and siltstone. Highly contorted. Irreguarly bedding. Common iron oxide staining. [Attitude On Shear at 37'; N25°W/40°NE]
40	■			6/ 12"	20.3	112				
										At 41'; becoming very dark gray (10YR 3/1) claystone and siltstone (damp). Bedding becoming more regular.
										At 43' and below; occasional interbeds of bluish gray (10B 6/1) silty fine-grained sandstone.
45	■			7/ 12"	11.2	106				
50	■			7/ 12"	15.2	110				
55				5/ 12"						At 55'; becoming interbedded with bluish gray (10B 6/1) silty fine-grained sandstone (indurated).

GORIAN & ASSOCIATES, INC.
Applied Earth Sciences

Project: T.H. Investments, Calabasas
Drill Co. and Rig Type: Tri-Valley, Earthdrill 42LHD
Hammer: See Note At Bottom Logged by: CHD
Boring Diameter: 24" Surface Elevation: 1318'±

Work Order: 2471-0-0-10
Report Log No.: 22770
Date: 7/21-22/03

Depth (ft)	Undisturbed	SPT	Bulk	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	Penetrometer (tsf)	USCS	Soil/ Lithology	Description
										At approximately 56½'; brittle tar in very dark gray (10YR 3/1) claystone.
60	■			18/ 12"	23.5	108				At 60'; some silty fine-grained sandstone interbeds (damp, indurated).
	■			14/ 12"	30.9					At 64'; claystone as above.
65				19/ 12"						Total depth 65'

Downhole logged to 39', Extensive caving below 34'; Seepage at 34'.

Note: KELLY WEIGHTS

Full Kelly 5952# 0 to 30', Triple Kelly 3921# 30' to 37', Double Kelly 2531# 57' to 65'

GI / SYSTEMS, INC.

JOB NO. GS 87-1251

LOGGED BY SBM

PROJECT MULHOLLAND HWY. AT COLD CREEK DRY CANYON ROAD

DATE 1-11-88

TRENCH LOG NO. 1-4

LITHOLOGY	BEDDING	FAULTING	JOINTS
1) NS = NATIVE SOIL = SILTY CLAY, FINE GRAINED, PLASTIC, MOIST, SLIGHTLY DENSE, MEDIUM BROWN. 2) WEATHERED BEDROCK = COMBINATION OF SANDSTONE FRAGMENTS IN NATIVE SOIL MATRIX. 3) BEDROCK = SILTSTONE = ORANGE & GREY, THINLY LAMINATED, MODERATELY BEDDED, MODERATELY CEMENTED, MOIST TO DAMP, SLIGHTLY FRACTURED. SANDSTONE = ORANGE BROWN TO WHITE, MEDIUM GRAINED, MODERATELY CEMENTED, DENSE, DAMP, INTERNALLY MASSIVE.			

SCALE 1" = 5'

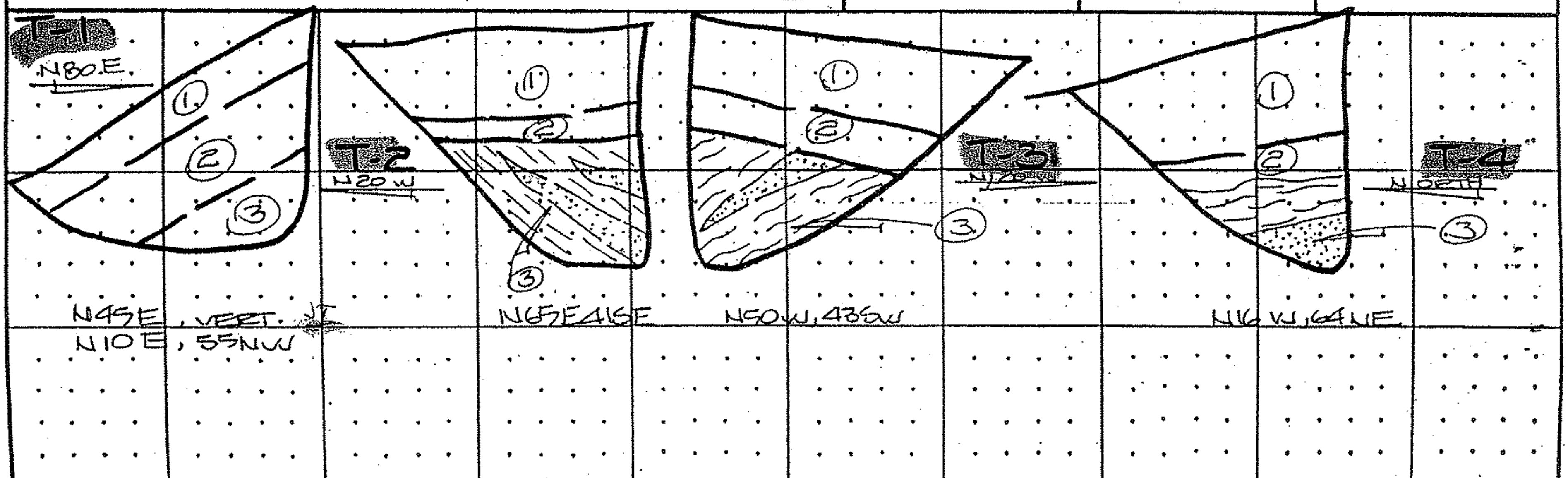


PLATE 5

GEO/SYSTEMS, INC.

TRENCH LOG NO. 5-8

JOB NO. GS 87-1251

LOGGED BY SBM

PROJECT MULHOLLAND HWY. AT COLD CREEK DRY CANYON RD.

DATE 1-11-88

LITHOLOGY	BEDDING	FAULTING	JOINTS
1) NS = NATIVE SOIL : SILTY CLAY; FINE - GRAINED, PLASTIC, MOIST, SLIGHTLY DENSE MEDIUM GRAINED. 2) SANDSTONE = ORANGE BROWN TO WHITE, MEDIUM GRAINED, MODERATELY CEMENTED, DENSE, DAMP, INTERNALLY MASSIVE. 3) BST = BASALTS = FINE GRAINED, MASSIVE, HIGHLY WEATHERED, DAMP, FRACTURED, BROWN TO PEACOCK BLUE. 4) CST = CLAYSTONE = GREENISH BLUE, STIFF, MOIST, INTERNALLY MASSIVE. T-5 N15E T-6 N75W	T-7 N60W	N45W	T-8

SCALE 1" = 5'

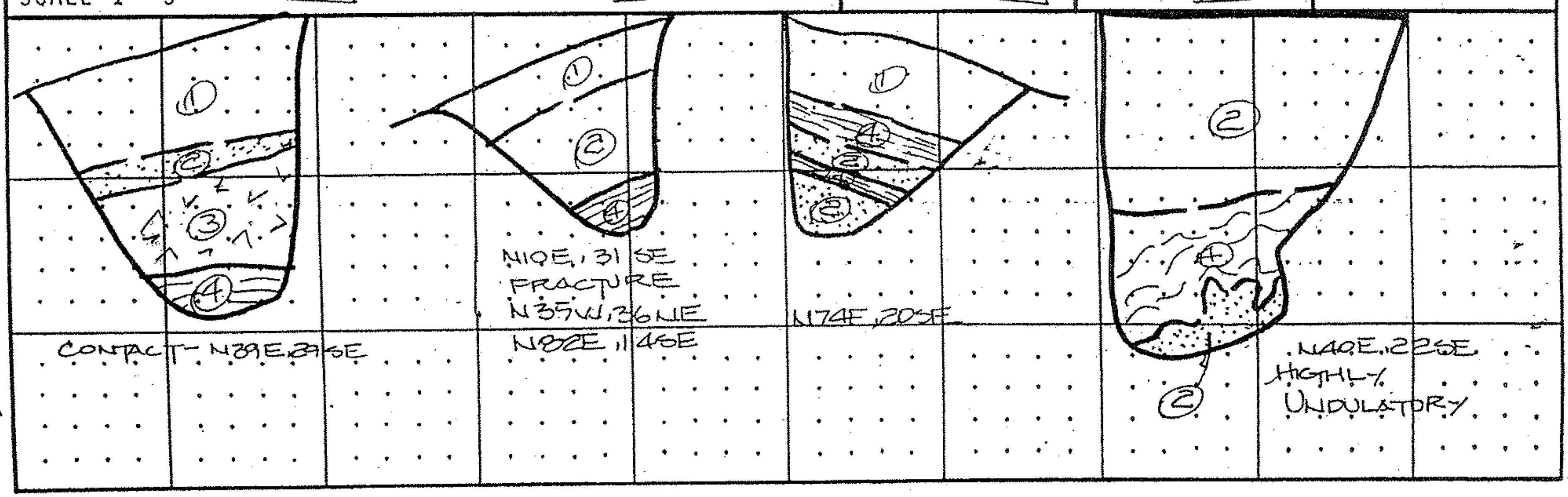


PLATE 6

GeJ SYSTEMS, INC.

JOB NO. GS 87-1251

LOGGED BY SBM

TRENCH LOG NO. 9

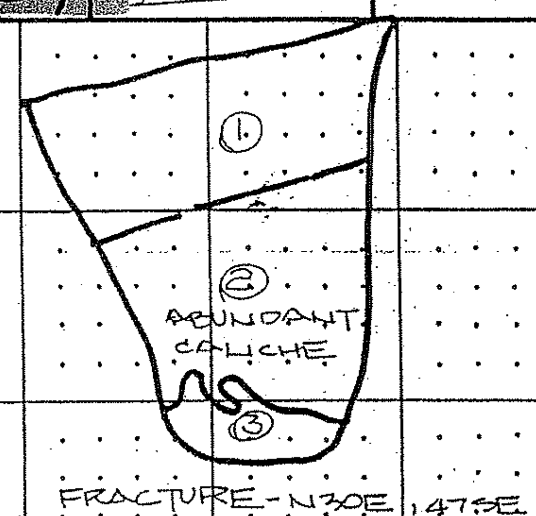
PROJECT MULHOLLAND HWY AT COLD CREEK/ DRY CANYON RD.

DATE 1-11-88

LITHOLOGY	BEDDING	FAULTING	JOINTS
1) SOIL: SANDY CLAY; RED BROWN, MODERATELY DENSE, PLASTIC, FIRM, DAMP TO MOIST. 2) COLLUVIUM: SILTY SAND; DARK RED BROWN FIRM TO TIGHT, DENSE, DAMP, WELL-CONSOLIDATED. 3) BST: BASALTS: FINE GRAINED, MASSIVE, HIGHLY WEATHERED, DAMP, FRACTURED, BROWN TO PEACOCK BLUE.			

SCALE 1" = 5'

T-9 NORTH



GEO/SYSTEMS, INC.

JOB NO. GS 87-1251

LOGGED BY SBM

TRENCH LOG NO. 10

PROJECT MULHOLLAND AT COLD CREEK DRY CYN. RD.

DATE 1/11/88

LITHOLOGY	BEDDING	FAULTING	JOINTS
1) SOIL = SANDY CLAY; RED BROWN, MODERATELY DENSE, PLASTIC, FIRM, DAMP TO MOIST. 2) COLLUVIUM = SILTY SAND; DARK REDBROWN FIRM TO TIGHT, DENSE, DAMP, WELL CONSOLIDATED. 3) BEDROCK = SANDSTONE = TAN BROWN, DENSE, TIGHT, MEDIUM GRAINED, MODERATELY CEMENTED, MASSIVE, HIGHLY WEATHERED. 4) CST = CLAYSTONE; GREENISH BLUE, STIFF, MOIST, INTERNALLY MASSIVE.			

SCALE 1" = 5'

N29E T-10

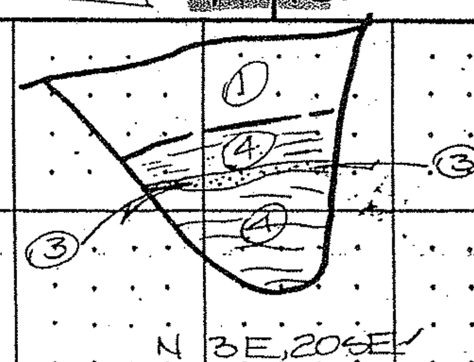


PLATE 5

GEO/SYSTEMS, INC.

TRENCH LOG NO. 12

JOB NO. GS 87-1251

LOGGED BY SBM

PROJECT MULHOLLAND HWY. AT COLD CREEK DRY CANYON ROAD

DATE 1-11-88

LITHOLOGY	BEDDING	FAULTING	JOINTS
1) NS = NATIVE SOIL = SILTY CLAY, FINE GRAINED, PLASTIC, MOIST, SLIGHTLY DENSE, MEDIUM BROWN. 2) WEATHERED BEDROCK = COMBINATION OF SANDSTONE FRAGMENTS IN NATIVE SOIL MATRIX. 3) BEDROCK = SILTSTONE = ORANGE & GREY, THINLY LAMINATED, MODERATELY BEDDED, MODERATELY CEMENTED, MOIST TO DAMP, SLIGHTLY FRACTURED. SANDSTONE = ORANGE BROWN TO WHITE, MEDIUM GRAINED, MODERATELY CEMENTED, DENSE, DAMP, INTERNALLY MASSIVE.			

SCALE 1" = 5'

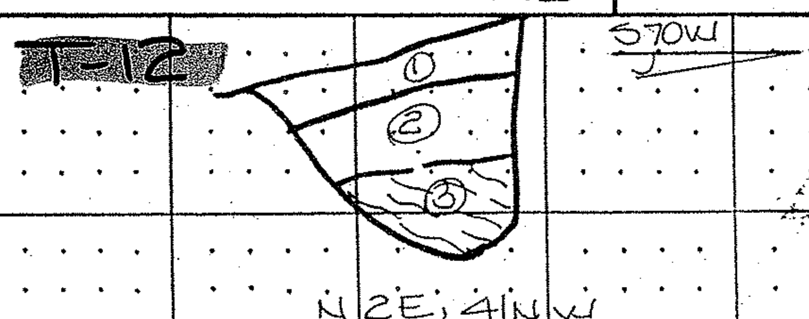
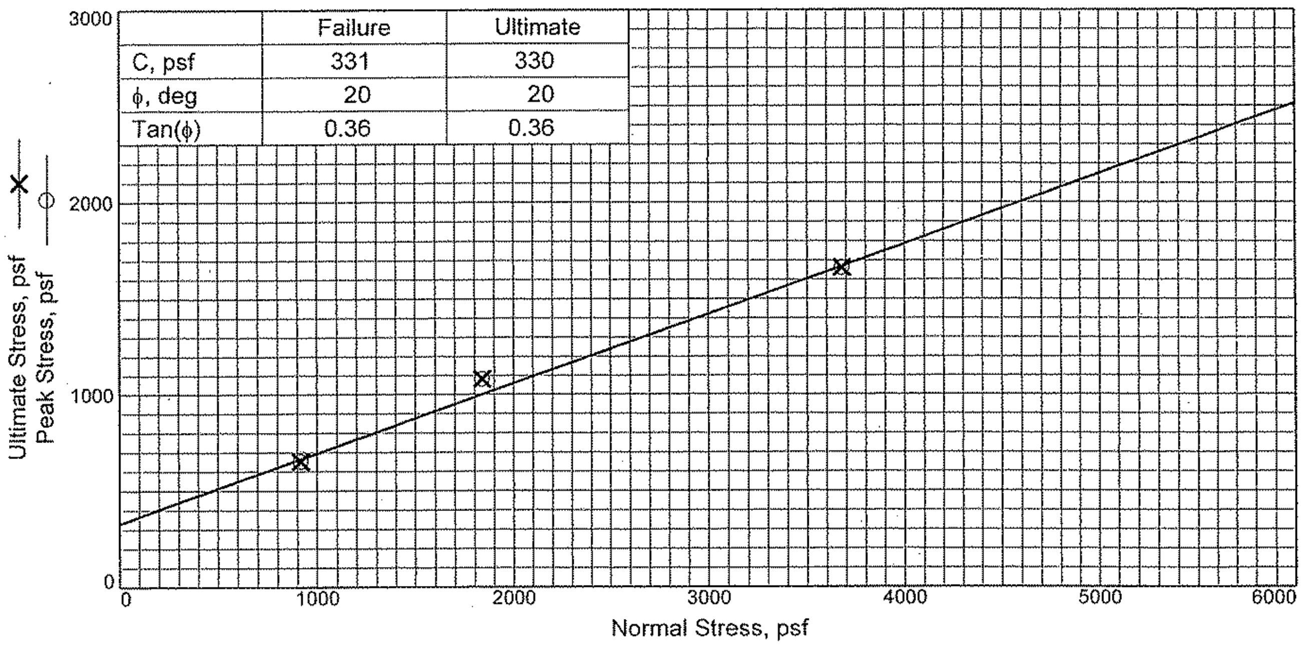


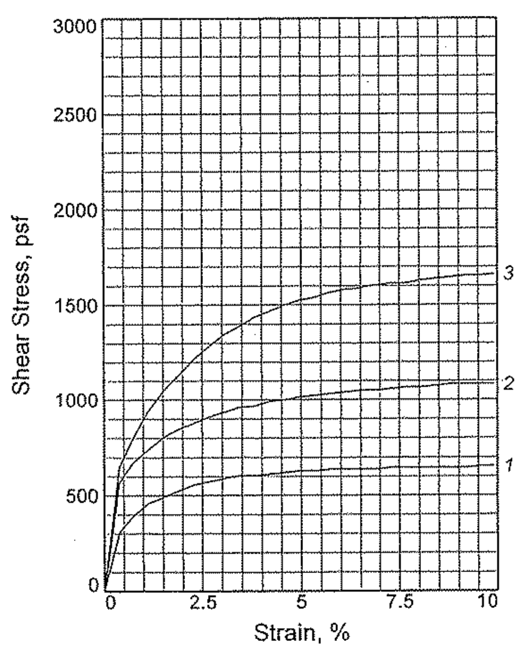
PLATE 10

Adopted Laboratory Testing by other Consultants

Laboratory test results, specifically direct shear test results, from previous investigations for the subject our an adjacent site have been included in the following graphic summaries.



	Failure	Ultimate
C, psf	331	330
ϕ, deg	20	20
Tan(ϕ)	0.36	0.36



	Sample No.	1	2	3
Initial	Water Content, %	N/A	N/A	N/A
	Dry Density, pcf	N/A	N/A	N/A
	Saturation, %	N/A	N/A	N/A
	Void Ratio	N/A	N/A	N/A
	Diameter, in.	2.62	2.62	2.62
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	N/A	N/A	N/A
	Dry Density, pcf			
	Saturation, %			
	Void Ratio			
	Diameter, in.			
	Height, in.			
	Normal Stress, psf	920	1840	3680
	Peak Stress, psf	654	1081	1662
	Strain, %	9.5	8.8	9.9
	Ultimate Stress, psf	654	1081	1662
	Strain, %	9.5	9.9	9.9
	Strain rate, in./min.	0.02	0.02	0.02

Sample Type: Remolded, Saturated

Description: Clay

LL= **PL=** **PI=**

Assumed Specific Gravity=

Remarks:

Figure ________

Client: Rudyan

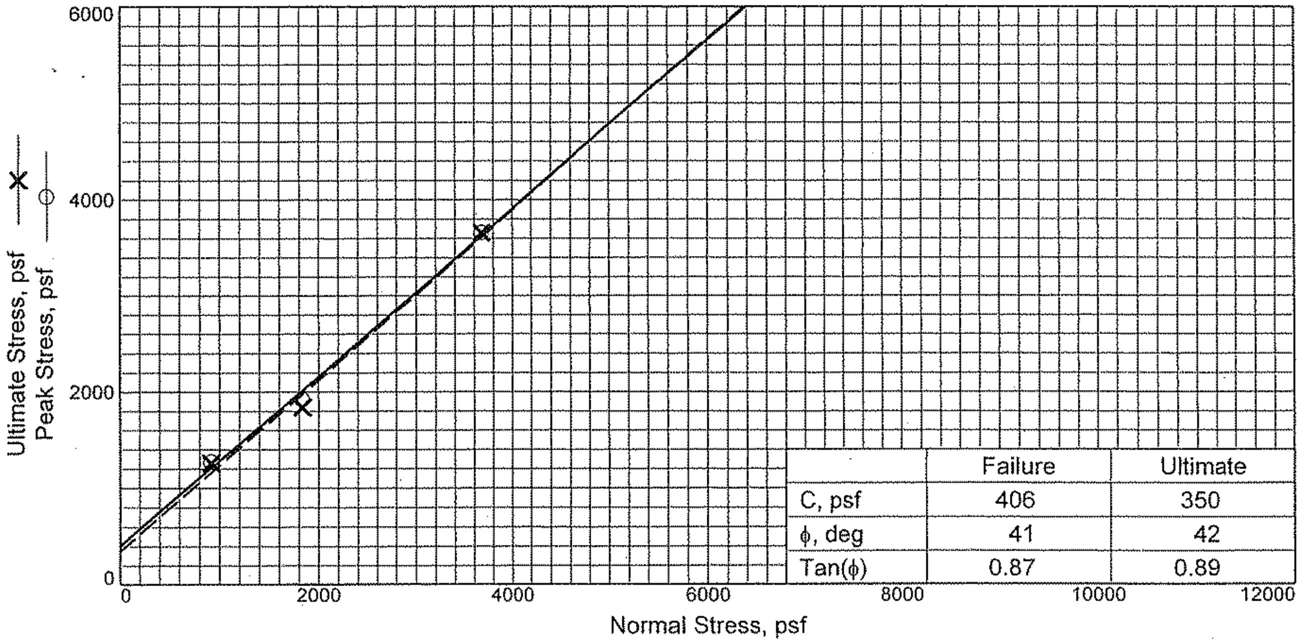
Project: Rudyan - Dry Canyon - Cold Creek Road, Calabasas

Source of Sample: TP-1 **Depth:** 2

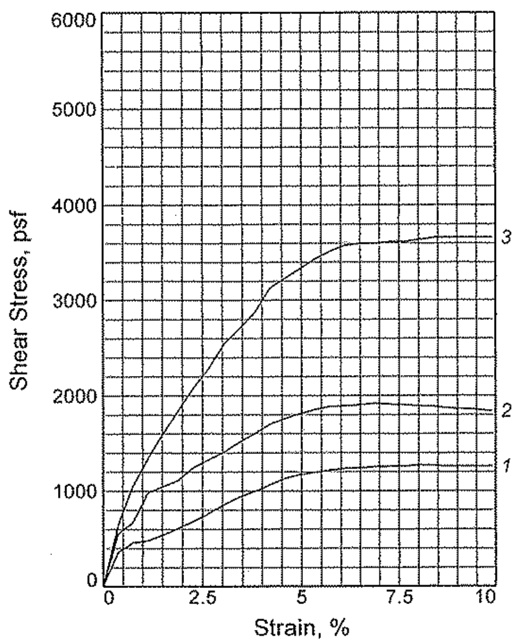
Proj. No.: 2189-2-0-10 **Date:**

DIRECT SHEAR TEST REPORT

GORIAN & ASSOCIATES, INC.



	Failure	Ultimate
C, psf	406	350
ϕ, deg	41	42
Tan(ϕ)	0.87	0.89



	Sample No.	1	2	3
Initial	Water Content, %	N/A	N/A	N/A
	Dry Density, pcf	N/A	N/A	N/A
	Saturation, %	N/A	N/A	N/A
	Void Ratio	N/A	N/A	N/A
	Diameter, in.	2.62	2.62	2.62
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	N/A	N/A	N/A
	Dry Density, pcf			
	Saturation, %			
	Void Ratio			
	Diameter, in.			
	Height, in.			
	Normal Stress, psf	920	1840	3680
	Peak Stress, psf	1275	1921	3658
	Strain, %	8.0	6.9	8.4
	Ultimate Stress, psf	1259	1840	3658
	Strain, %	9.9	9.9	9.9
	Strain rate, in./min.	0.02	0.02	0.02

Sample Type: Undisturbed, Saturated
Description: Fine-grained Basalt

LL= **PL=** **PI=**
Assumed Specific Gravity=
Remarks:

Figure ________

Client: Rudyan

Project: Rudyan - Dry Canyon - Cold Creek Road, Calabasas

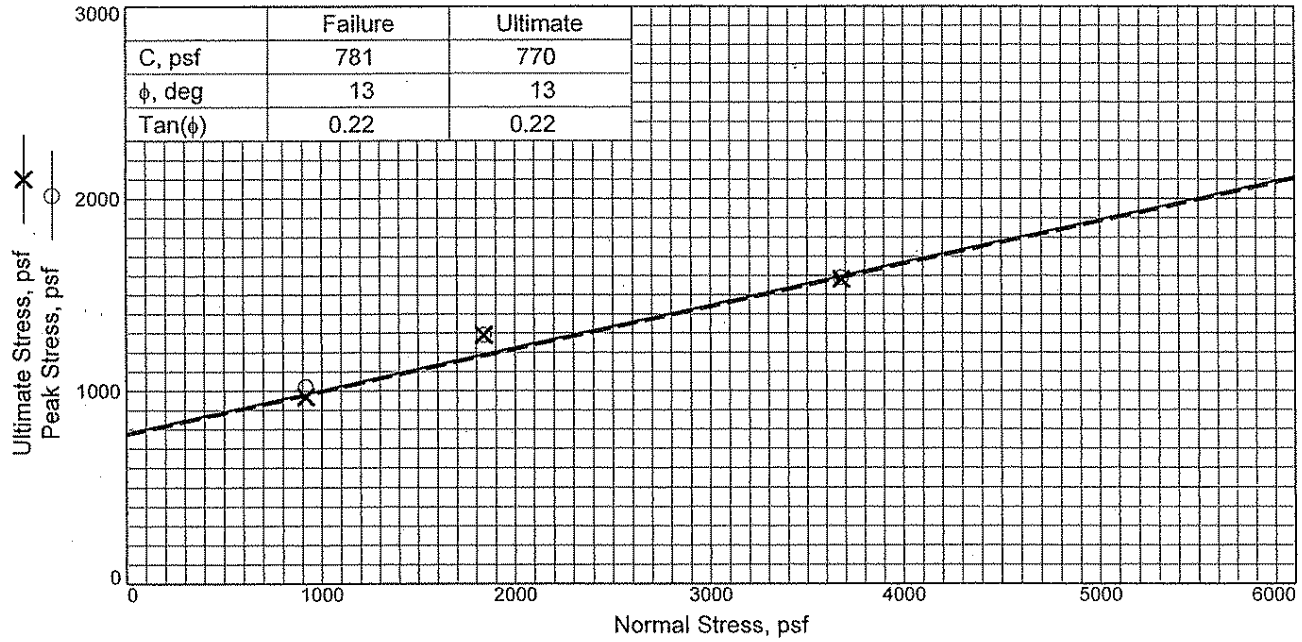
Source of Sample: TP-2 **Depth:** 4

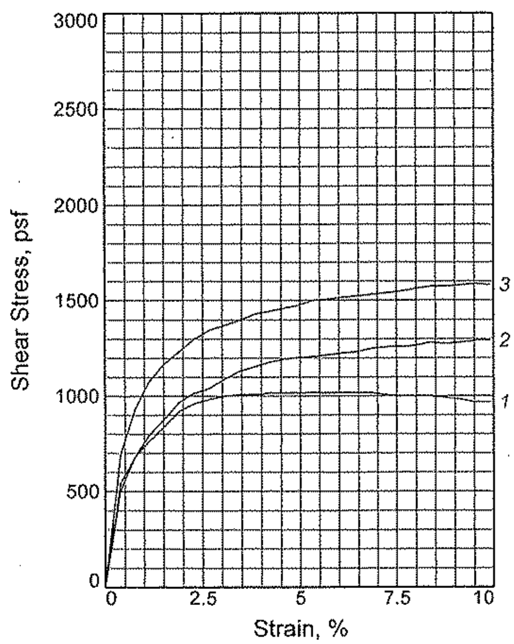
Proj. No.: 2189-2-0-10 **Date:**

DIRECT SHEAR TEST REPORT

GORIAN & ASSOCIATES, INC.

	Failure	Ultimate
C, psf	781	770
ϕ, deg	13	13
Tan(ϕ)	0.22	0.22





Sample No.		1	2	3
Initial	Water Content, %	N/A	N/A	N/A
	Dry Density, pcf	N/A	N/A	N/A
	Saturation, %	N/A	N/A	N/A
	Void Ratio	N/A	N/A	N/A
	Diameter, in.	2.62	2.62	2.62
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	N/A	N/A	N/A
	Dry Density, pcf			
	Saturation, %			
	Void Ratio			
	Diameter, in.			
	Height, in.			
Normal Stress, psf		920	1840	3680
Peak Stress, psf		1021	1291	1590
Strain, %		5.3	9.9	9.5
Ultimate Stress, psf		968	1291	1582
Strain, %		9.9	9.9	9.9
Strain rate, in./min.		0.02	0.02	0.02

Sample Type: Undisturbed, Saturated
Description: Clay

LL= **PL=** **PI=**
Assumed Specific Gravity=
Remarks:

Figure ________

Client: Rudyan

Project: Rudyan - Dry Canyon - Cold Creek Road, Calabasas

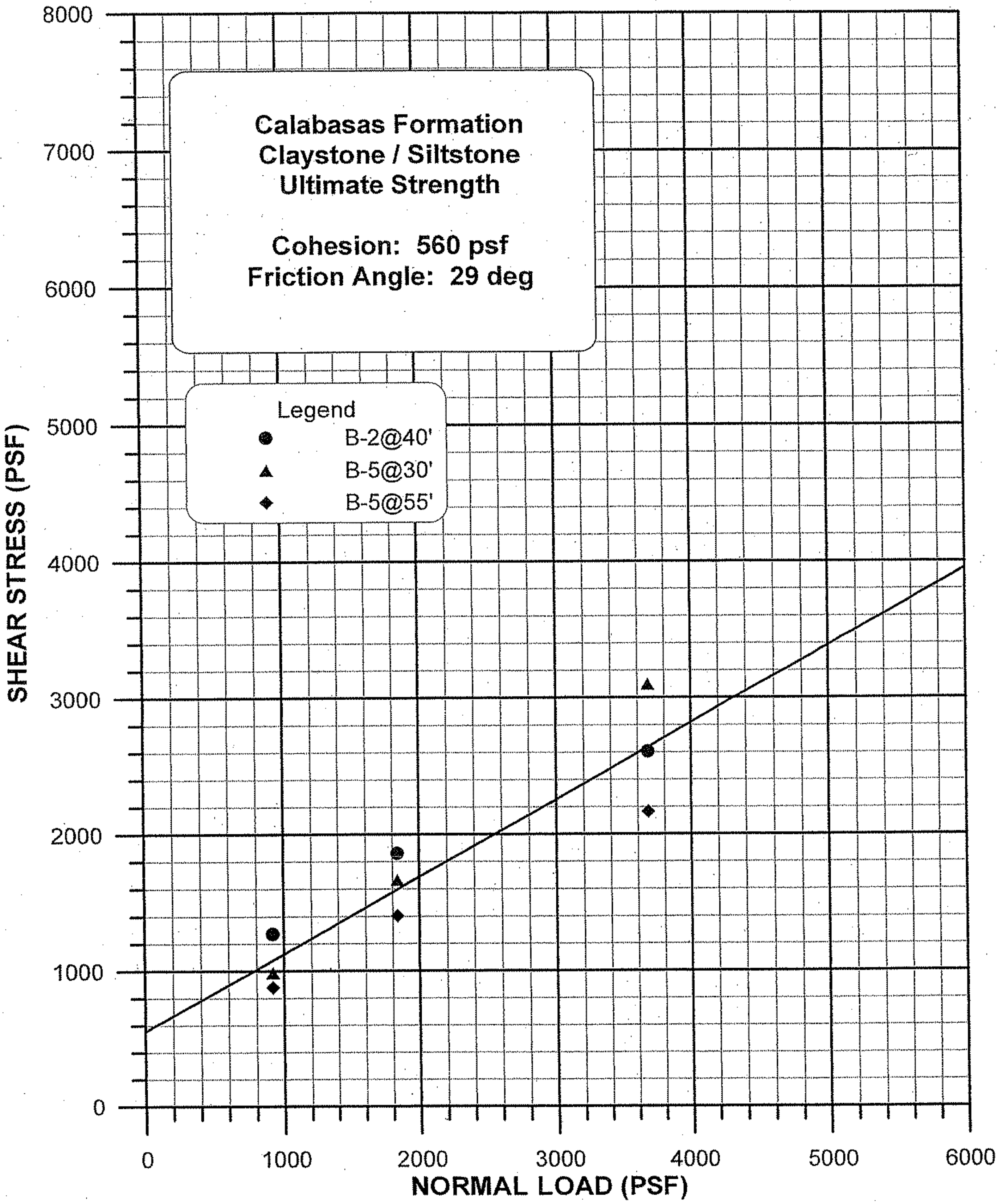
Source of Sample: TP-5 **Depth:** 2

Proj. No.: 2189-2-0-10 **Date:**

DIRECT SHEAR TEST REPORT

GORIAN & ASSOCIATES, INC.

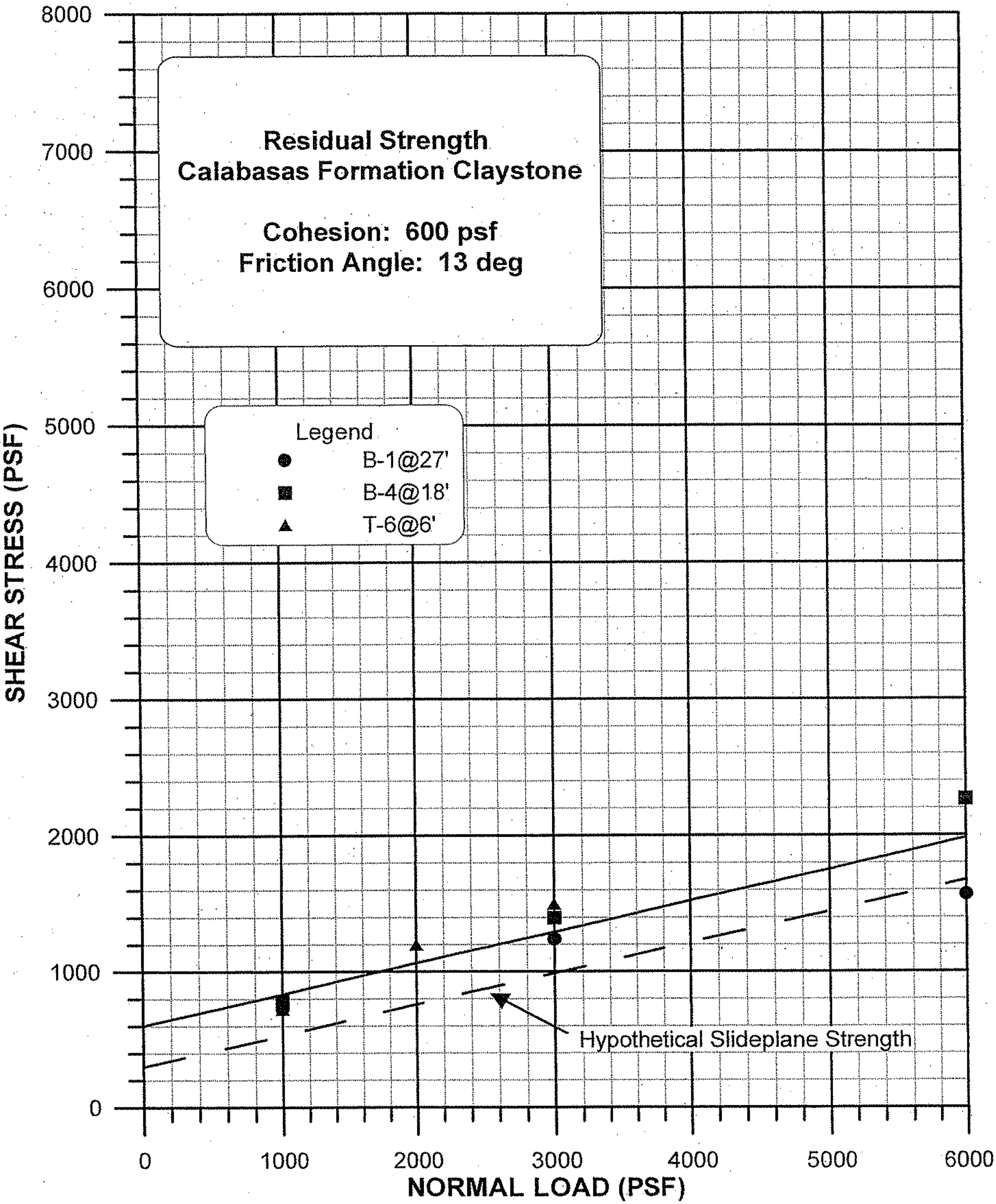
RESULTS OF DIRECT SHEAR TEST
UNDISTURBED, SATURATED SAMPLES



Explanation: B-9 @ 12' = Sample taken from Boring 9 at a depth of 12'

Work Order: 2471-0-0-10
GORIAN AND ASSOCIATES, INC.

RESULTS OF DIRECT SHEAR TEST
UNDISTURBED, SATURATED SAMPLES



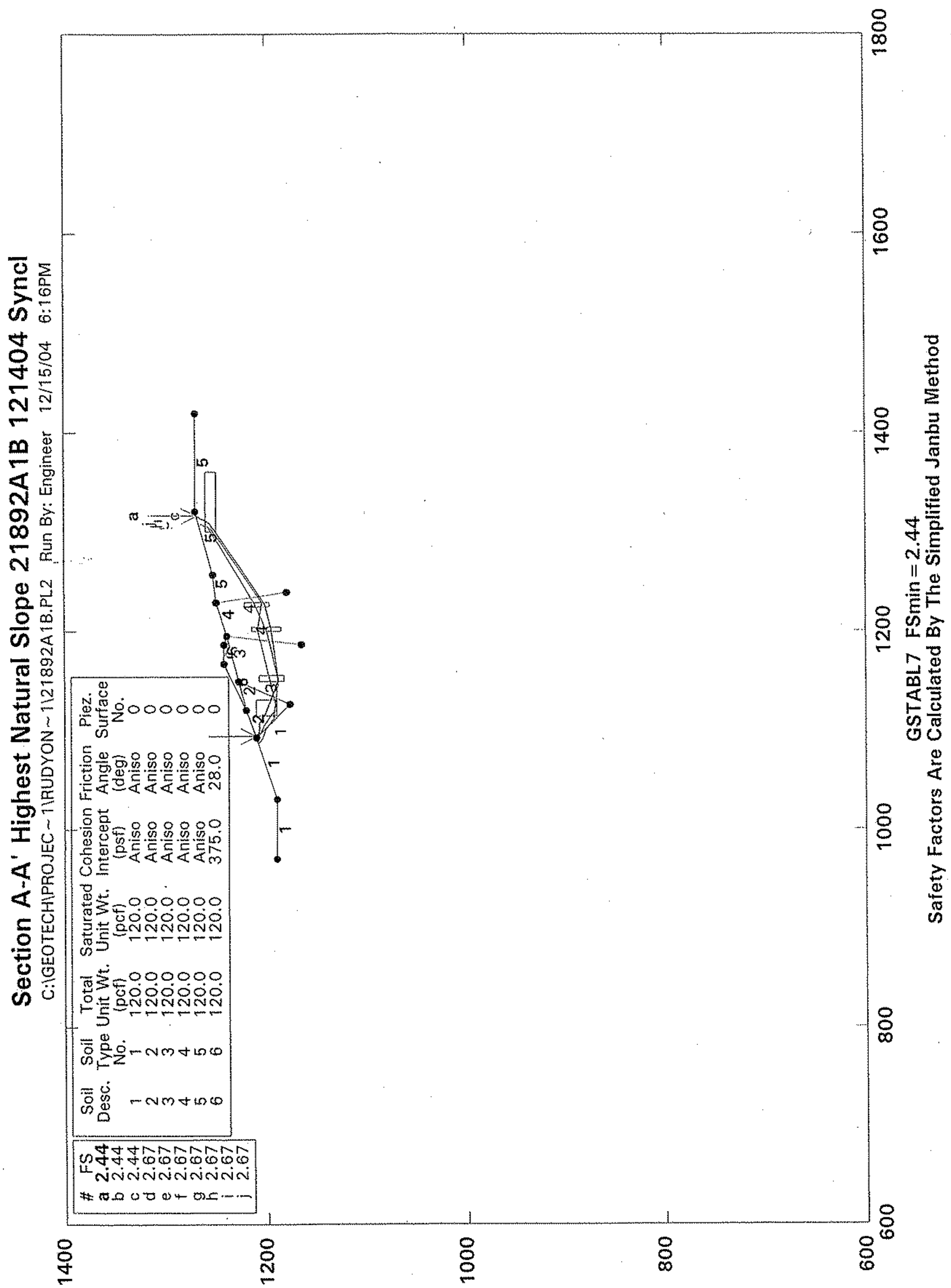
Explanation: B-9 @ 12' = Sample taken from Boring 9 at a depth of 12'

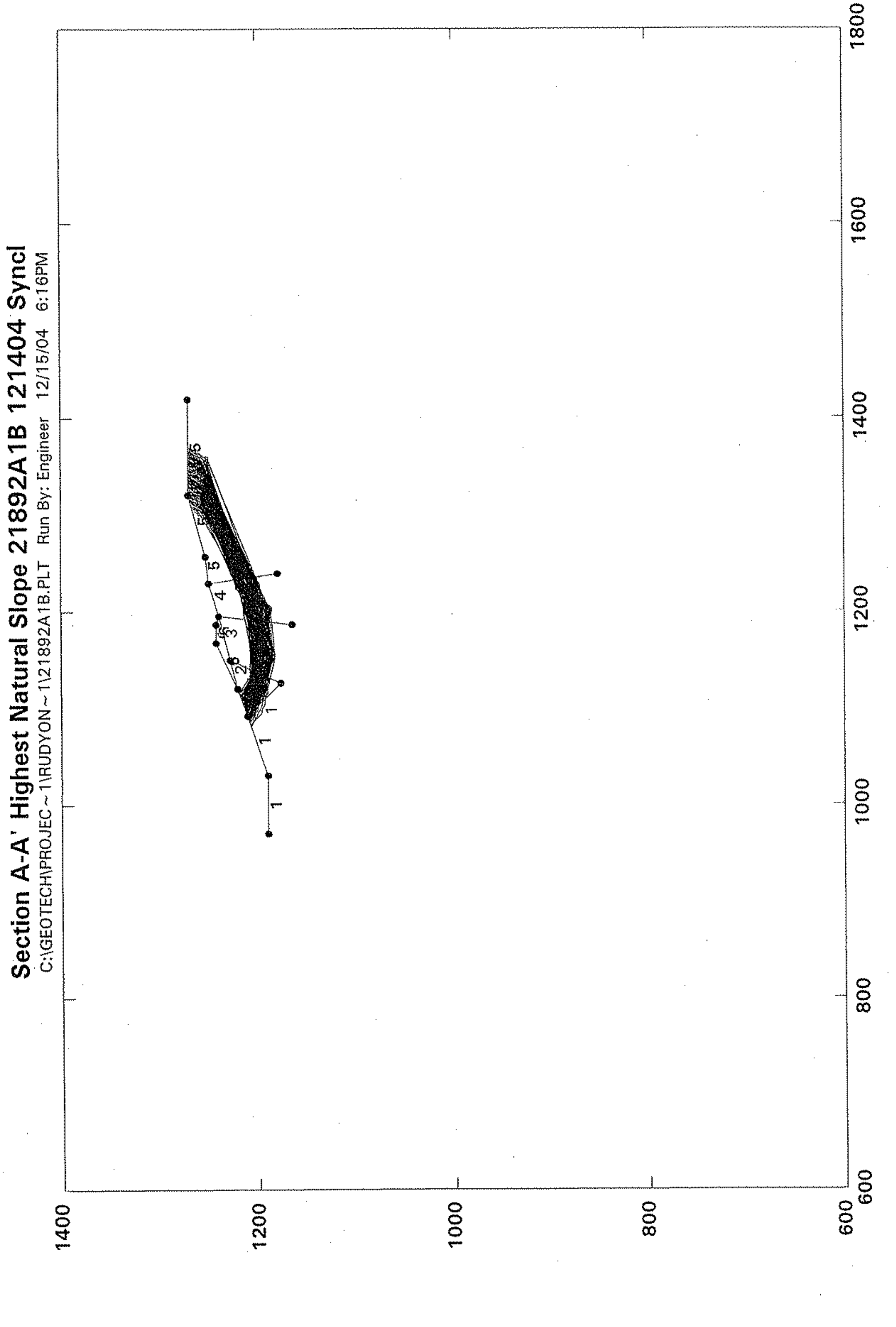
Work Order: 2471-0-0-10
GORIAN AND ASSOCIATES, INC.

APPENDIX C

SLOPE STABILITY ANALYSIS

Section A-A'	**Thru Synclinal Structure**	**Figure C1.1 to C1.19**
	Thru Syncl / Toe	**Figure C2.1 to C2.19**
	Thru Toe	**Figure C3.1 to C3.20**
Section E-E'	**Steep Natural Slope**	**Figure C4.1 to C4.15**
Section A-A'	**Highest Fill Slope**	**Figure C5.1 to C5. 24**
Section D-D'	**Highest Cut/Eq. Width Stab. Fill (under)**	**Figure C6.1 to C6.16**
	Highest Cut/Eq. Width Stab. Fill (thru)	**Figure C7.1 to C7.14**


Section A-A' Highest Natural Slope 21892A1B 121404 Syncl
C:\GEOTECH\PROJEC~1\RUDYON~1\21892A1B.PL2 Run By: Engineer 12/15/04 6:16PM
FS
a 2.44
b 2.44
c 2.44
d 2.67
e 2.67
f 2.67
g 2.67
h 2.67
i 2.67
j 2.67
Soil Desc. | Soil Type No. | Total Unit Wt. (pcf) | Saturated Unit Wt. (pcf) | Cohesion Intercept (psf) | Friction Angle (deg) | Piez. Surface No.
1 1 120.0 120.0 Aniso Aniso 0
2 2 120.0 120.0 Aniso Aniso 0
3 3 120.0 120.0 Aniso Aniso 0
4 4 120.0 120.0 Aniso Aniso 0
5 5 120.0 120.0 Aniso Aniso 0
6 6 120.0 120.0 375.0 28.0 0
1400
1200
1000
800
600
600
800
1000
1200
1400
1600
1800
GSTABL7 FSmin=2.44
Safety Factors Are Calculated By The Simplified Janbu Method


Section A-A' Highest Natural Slope 21892A1B 121404 Syncl
C:\GEOTECH\PROJEC~1\RUDYON~1\21892A1B.PLT Run By: Engineer 12/15/04 6:16PM
1400
1200
1000
800
600
800
1000
1200
1400
1600
1800

```
                  ***  GSTABL7  ***

         ** GSTABL7 by Garry H. Gregory, P.E. **

    ** Version 1.0, January 1996; Version 1.16, May 2000 **

                --Slope Stability Analysis--
              Simplified Janbu, Modified Bishop
                or Spencer`s Method of Slices
          (Based on STABL6-1986, by Purdue University)

    Run Date:                  12/15/04
    Time of Run:               6:16PM
    Run By:                    Engineer
    Input Data Filename:       C:21892a1b.dta
    Output Filename:           C:21892a1b.OUT
    Unit System:               English

    Plotted Output Filename:   C:21892a1b.PLT


    PROBLEM DESCRIPTION    Section A-A' Highest Natural Slope
                           21892A1B 121404 Syncl


    BOUNDARY COORDINATES

       10 Top   Boundaries
       16 Total Boundaries
```

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	370.00	589.00	430.00	589.00	1
2	430.00	589.00	492.00	610.00	1
3	492.00	610.00	520.00	620.00	2
4	520.00	620.00	568.00	642.00	6
5	568.00	642.00	586.00	642.00	6
6	586.00	642.00	595.00	639.00	6
7	595.00	639.00	630.00	650.00	4
8	630.00	650.00	658.00	653.00	5
9	658.00	653.00	721.00	670.00	5
10	721.00	670.00	820.00	670.00	5
11	520.00	620.00	550.00	628.00	2
12	550.00	628.00	595.00	639.00	3
13	492.00	610.00	526.00	577.00	1
14	526.00	577.00	550.00	628.00	3
15	586.00	565.00	595.00	639.00	4
16	630.00	650.00	640.00	580.00	4

1

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	13.0	0.00	0.0	0
2	120.0	120.0	300.0	13.0	0.00	0.0	0

3	120.0	120.0	300.0	13.0	0.00	0.0	0
4	120.0	120.0	300.0	13.0	0.00	0.0	0
5	120.0	120.0	300.0	13.0	0.00	0.0	0
6	120.0	120.0	375.0	28.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
5 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-4.0	560.0	29.0
2	0.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-45.0	560.0	29.0
2	-41.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 4

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-21.0	560.0	29.0
2	-17.0	300.0	13.0
3	0.0	560.0	29.0
4	90.0	560.0	29.0

Soil Type 4 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	12.0	560.0	29.0
2	16.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 5 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	31.0	560.0	29.0
2	35.0	300.0	13.0
3	90.0	560.0	29.0

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

750 Trial Surfaces Have Been Generated.

5 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 5.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	515.00	600.00	530.00	600.00	20.00
2	550.00	595.00	555.00	595.00	25.00
3	600.00	600.00	605.00	600.00	30.00
4	625.00	610.00	630.00	610.00	25.00
5	700.00	655.00	760.00	655.00	10.00

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	493.96	610.70
2	497.52	607.73
3	502.52	607.63
4	507.45	606.79
5	511.35	603.66
6	515.56	600.97
7	551.78	588.19
8	603.97	595.68
9	627.24	601.31
10	709.64	655.86
11	711.86	660.33
12	713.70	664.98
13	716.96	668.78
14	717.04	668.93

*** 2.443 ***

Individual data on the 23 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	3.6	904.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	5.0	3110.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	4.9	4393.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	3.9	5145.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	4.2	7758.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	4.4	10126.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	14.2	44860.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	15.8	73084.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	1.8	9734.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	16.2	95245.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	18.0	108403.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	3.5	20065.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	5.5	30423.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	9.0	48845.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	23.3	131175.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	2.8	15673.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	6.1	33146.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	21.9	98205.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	51.6	131365.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	2.2	2438.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	1.8	1131.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	3.3	621.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	0.1	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	493.96	610.70
2	497.52	607.73
3	502.52	607.63
4	507.45	606.79
5	511.35	603.66
6	515.56	600.97
7	551.78	588.19
8	603.97	595.68
9	627.24	601.31
10	709.64	655.86
11	711.86	660.33
12	713.70	664.98
13	716.96	668.78
14	717.04	668.93

*** 2.443 ***

1

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	493.96	610.70
2	497.52	607.73
3	502.52	607.63

4	507.45	606.79
5	511.35	603.66
6	515.56	600.97
7	551.78	588.19
8	603.97	595.68
9	627.24	601.31
10	709.64	655.86
11	711.86	660.33
12	713.70	664.98
13	716.96	668.78
14	717.04	668.93

*** 2.443 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	486.65	608.19
2	490.24	604.86
3	494.93	603.14
4	499.49	601.09
5	503.94	598.81
6	508.09	596.02
7	511.70	592.56
8	516.69	592.18
9	550.03	587.89
10	600.97	600.19
11	628.21	611.85
12	704.29	657.63
13	705.34	662.52
14	707.54	666.37

*** 2.666 ***

1

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	486.65	608.19
2	490.24	604.86
3	494.93	603.14
4	499.49	601.09
5	503.94	598.81
6	508.09	596.02
7	511.70	592.56
8	516.69	592.18
9	550.03	587.89
10	600.97	600.19
11	628.21	611.85
12	704.29	657.63
13	705.34	662.52
14	707.54	666.37

*** 2.666 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	486.65	608.19
2	490.24	604.86
3	494.93	603.14
4	499.49	601.09
5	503.94	598.81
6	508.09	596.02
7	511.70	592.56
8	516.69	592.18
9	550.03	587.89
10	600.97	600.19
11	628.21	611.85
12	704.29	657.63
13	705.34	662.52
14	707.54	666.37

*** 2.666 ***

1

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	486.65	608.19
2	490.24	604.86
3	494.93	603.14
4	499.49	601.09
5	503.94	598.81
6	508.09	596.02
7	511.70	592.56
8	516.69	592.18
9	550.03	587.89
10	600.97	600.19
11	628.21	611.85
12	704.29	657.63
13	705.34	662.52
14	707.54	666.37

*** 2.666 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	489.75	609.24
2	491.33	607.81
3	496.32	607.50
4	499.97	604.09
5	504.65	602.32
6	509.15	600.14
7	513.03	596.99
8	516.74	593.63

9	520.32	590.15
10	552.18	596.29
11	601.55	608.39
12	629.73	604.63
13	703.82	654.12
14	706.56	658.30
15	707.37	663.23
16	709.34	666.85

*** 2.668 ***

1

Failure Surface Specified By 16 Coordinate Points

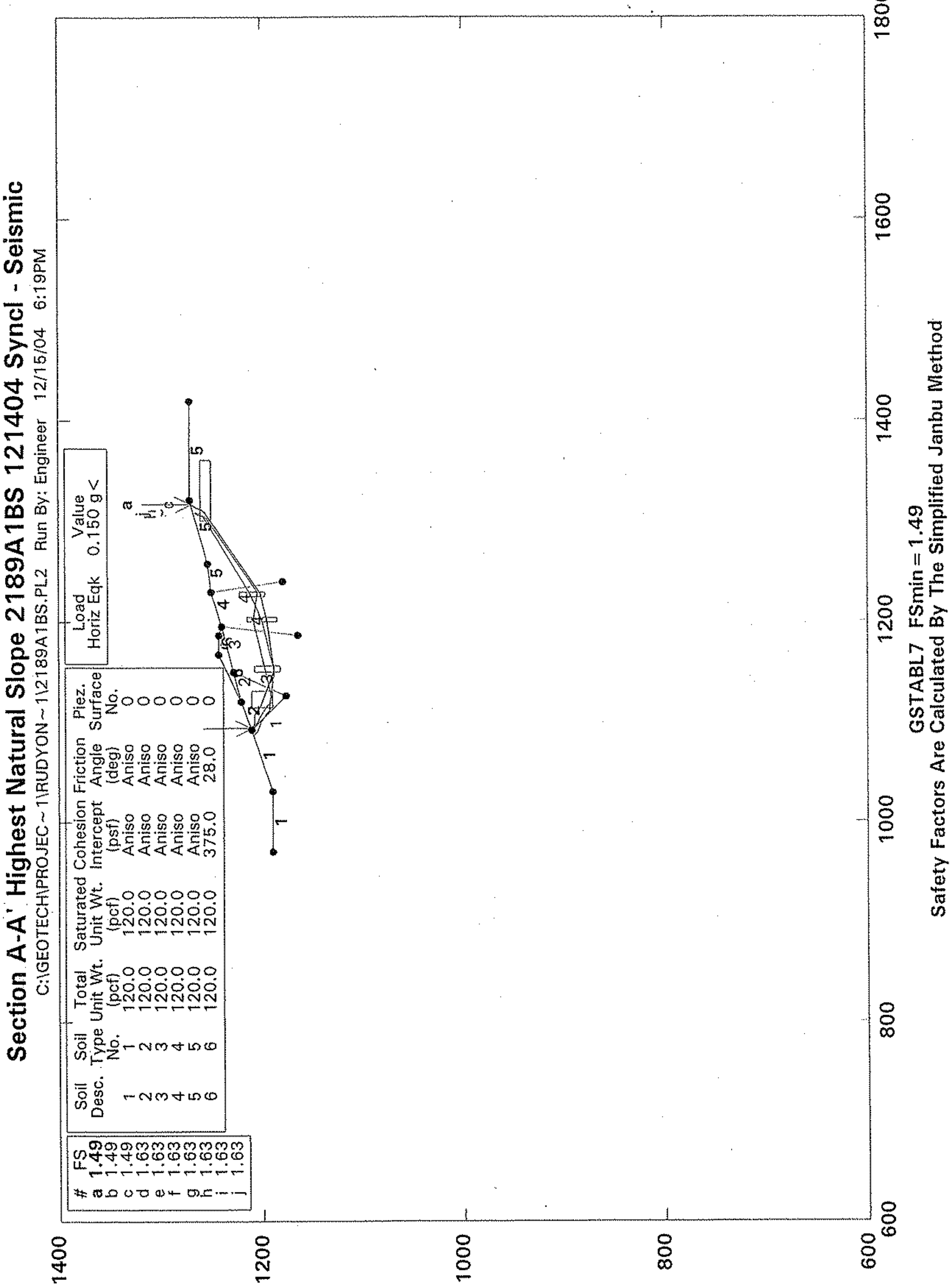
Point No.	X-Surf (ft)	Y-Surf (ft)
1	489.75	609.24
2	491.33	607.81
3	496.32	607.50
4	499.97	604.09
5	504.65	602.32
6	509.15	600.14
7	513.03	596.99
8	516.74	593.63
9	520.32	590.15
10	552.18	596.29
11	601.55	608.39
12	629.73	604.63
13	703.82	654.12
14	706.56	658.30
15	707.37	663.23
16	709.34	666.85

*** 2.668 ***

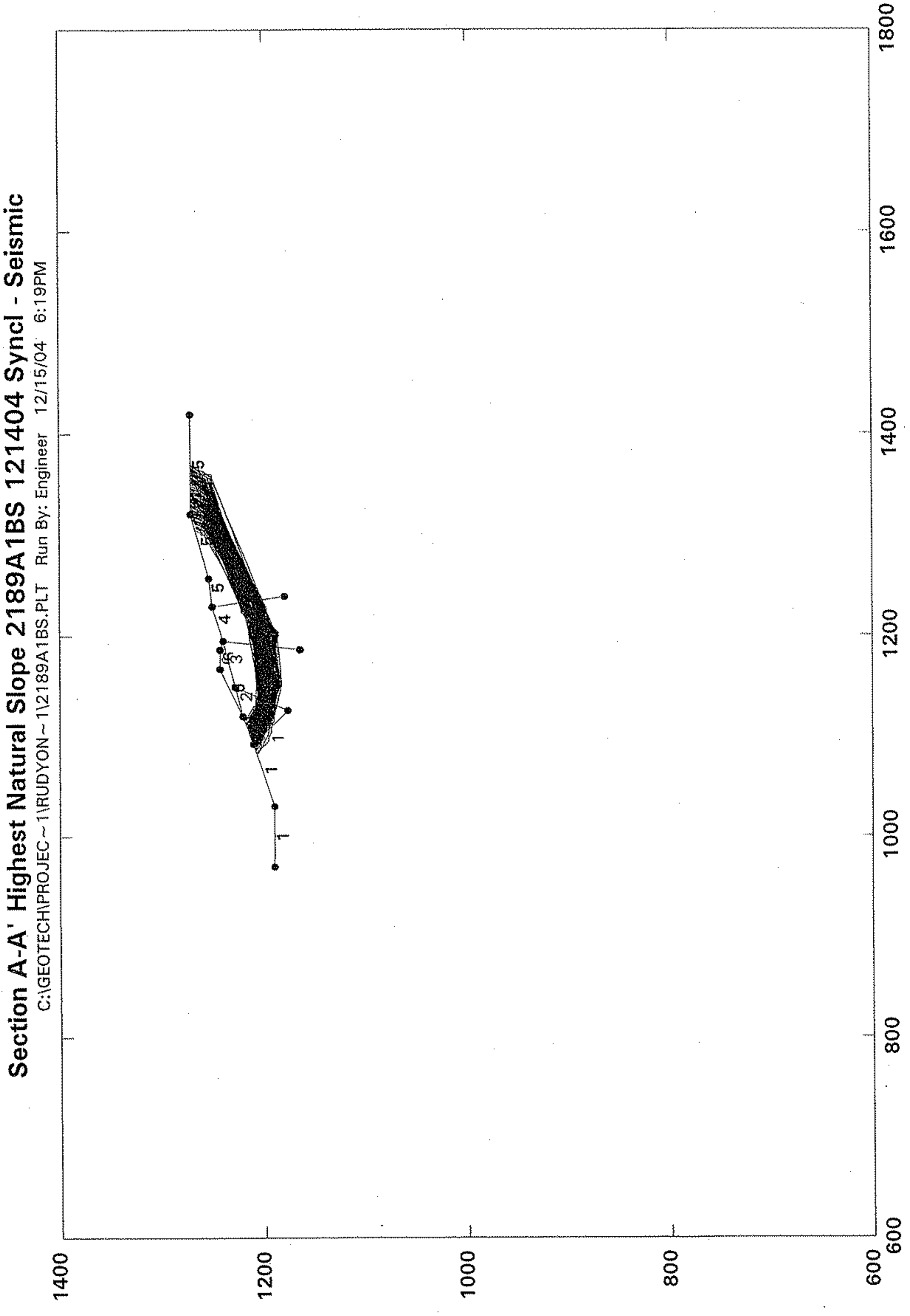
Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	489.75	609.24
2	491.33	607.81
3	496.32	607.50
4	499.97	604.09
5	504.65	602.32
6	509.15	600.14
7	513.03	596.99
8	516.74	593.63
9	520.32	590.15
10	552.18	596.29
11	601.55	608.39
12	629.73	604.63
13	703.82	654.12
14	706.56	658.30
15	707.37	663.23
16	709.34	666.85

*** 2.668 ***


Section A-A' Highest Natural Slope 2189A1BS 121404 Syncl - Seismic
C:\GEOTECH\PROJEC~1\RUDYON~1\2189A1BS.PL2 Run By: Engineer 12/15/04 6:19PM
FS
a 1.49
b 1.49
c 1.49
d 1.63
e 1.63
f 1.63
g 1.63
h 1.63
i 1.63
j 1.63
Soil Desc. | Soil Type No. | Total Unit Wt. (pcf) | Saturated Unit Wt. (pcf) | Cohesion Intercept (psf) | Friction Angle (deg) | Piez. Surface No.
1 1 120.0 120.0 Aniso Aniso 0
2 2 120.0 120.0 Aniso Aniso 0
3 3 120.0 120.0 Aniso Aniso 0
4 4 120.0 120.0 Aniso Aniso 0
5 5 120.0 120.0 Aniso Aniso 0
6 6 120.0 120.0 375.0 28.0 0
Load Value
Horiz Eqk 0.150 g<
1400
1200
1000
800
600
600
800
1000
1200
1400
1600
1800
GSTABL7 FSmin=1.49
Safety Factors Are Calculated By The Simplified Janbu Method

Work Order 2189-2-0-10
Cross-Section A-A', Pseudostatic – Thru Synclinal Structure
Figure C1.11



*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Version 1.0, January 1996; Version 1.16, May 2000 **

--Slope Stability Analysis--
Simplified Janbu, Modified Bishop
or Spencer`s Method of Slices
(Based on STABL6-1986, by Purdue University)

Run Date: 12/15/04
Time of Run: 6:19PM
Run By: Engineer
Input Data Filename: C:2189a1bs.dta
Output Filename: C:2189a1bs.OUT
Unit System: English

Plotted Output Filename: C:2189a1bs.PLT

PROBLEM DESCRIPTION Section A-A' Highest Natural Slope
2189A1BS 121404 Syncl - Seismic

BOUNDARY COORDINATES

10 Top Boundaries
16 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	370.00	589.00	430.00	589.00	1
2	430.00	589.00	492.00	610.00	1
3	492.00	610.00	520.00	620.00	2
4	520.00	620.00	568.00	642.00	6
5	568.00	642.00	586.00	642.00	6
6	586.00	642.00	595.00	639.00	6
7	595.00	639.00	630.00	650.00	4
8	630.00	650.00	658.00	653.00	5
9	658.00	653.00	721.00	670.00	5
10	721.00	670.00	820.00	670.00	5
11	520.00	620.00	550.00	628.00	2
12	550.00	628.00	595.00	639.00	3
13	492.00	610.00	526.00	577.00	1
14	526.00	577.00	550.00	628.00	3
15	586.00	565.00	595.00	639.00	4
16	630.00	650.00	640.00	580.00	4

1

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	13.0	0.00	0.0	0
2	120.0	120.0	300.0	13.0	0.00	0.0	0

3	120.0	120.0	300.0	13.0	0.00	0.0	0
4	120.0	120.0	300.0	13.0	0.00	0.0	0
5	120.0	120.0	300.0	13.0	0.00	0.0	0
6	120.0	120.0	375.0	28.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
5 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-4.0	560.0	29.0
2	0.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-45.0	560.0	29.0
2	-41.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 4

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-21.0	560.0	29.0
2	-17.0	300.0	13.0
3	0.0	560.0	29.0
4	90.0	560.0	29.0

Soil Type 4 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	12.0	560.0	29.0
2	16.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 5 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	31.0	560.0	29.0
2	35.0	300.0	13.0
3	90.0	560.0	29.0

A Horizontal Earthquake Loading Coefficient
Of0.150 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0(psf)

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

750 Trial Surfaces Have Been Generated.

5 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 5.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	515.00	600.00	530.00	600.00	20.00
2	550.00	595.00	555.00	595.00	25.00
3	600.00	600.00	605.00	600.00	30.00
4	625.00	610.00	630.00	610.00	25.00
5	700.00	655.00	760.00	655.00	10.00

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	493.96	610.70
2	497.52	607.73
3	502.52	607.63
4	507.45	606.79
5	511.35	603.66
6	515.56	600.97
7	551.78	588.19
8	603.97	595.68
9	627.24	601.31

10	709.64	655.86
11	711.86	660.33
12	713.70	664.98
13	716.96	668.78
14	717.04	668.93

*** 1.486 ***

Individual data on the 23 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	3.6	904.8	0.0	0.0	0.0	0.0	135.7	0.0	0.0
2	5.0	3110.4	0.0	0.0	0.0	0.0	466.6	0.0	0.0
3	4.9	4393.7	0.0	0.0	0.0	0.0	659.1	0.0	0.0
4	3.9	5145.2	0.0	0.0	0.0	0.0	771.8	0.0	0.0
5	4.2	7758.7	0.0	0.0	0.0	0.0	1163.8	0.0	0.0
6	4.4	10126.9	0.0	0.0	0.0	0.0	1519.0	0.0	0.0
7	14.2	44860.7	0.0	0.0	0.0	0.0	6729.1	0.0	0.0
8	15.8	73084.2	0.0	0.0	0.0	0.0	10962.6	0.0	0.0
9	1.8	9734.8	0.0	0.0	0.0	0.0	1460.2	0.0	0.0
10	16.2	95245.0	0.0	0.0	0.0	0.0	14286.7	0.0	0.0
11	18.0	108403.7	0.0	0.0	0.0	0.0	16260.6	0.0	0.0
12	3.5	20065.8	0.0	0.0	0.0	0.0	3009.9	0.0	0.0
13	5.5	30423.5	0.0	0.0	0.0	0.0	4563.5	0.0	0.0
14	9.0	48845.8	0.0	0.0	0.0	0.0	7326.9	0.0	0.0
15	23.3	131175.0	0.0	0.0	0.0	0.0	19676.3	0.0	0.0
16	2.8	15673.9	0.0	0.0	0.0	0.0	2351.1	0.0	0.0
17	6.1	33146.4	0.0	0.0	0.0	0.0	4972.0	0.0	0.0
18	21.9	98205.0	0.0	0.0	0.0	0.0	14730.8	0.0	0.0
19	51.6	131365.2	0.0	0.0	0.0	0.0	19704.8	0.0	0.0
20	2.2	2438.6	0.0	0.0	0.0	0.0	365.8	0.0	0.0
21	1.8	1131.4	0.0	0.0	0.0	0.0	169.7	0.0	0.0
22	3.3	621.7	0.0	0.0	0.0	0.0	93.3	0.0	0.0
23	0.1	0.6	0.0	0.0	0.0	0.0	0.1	0.0	0.0

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	493.96	610.70
2	497.52	607.73
3	502.52	607.63
4	507.45	606.79
5	511.35	603.66
6	515.56	600.97
7	551.78	588.19
8	603.97	595.68
9	627.24	601.31
10	709.64	655.86
11	711.86	660.33
12	713.70	664.98
13	716.96	668.78
14	717.04	668.93

*** 1.486 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	493.96	610.70
2	497.52	607.73
3	502.52	607.63
4	507.45	606.79
5	511.35	603.66
6	515.56	600.97
7	551.78	588.19
8	603.97	595.68
9	627.24	601.31
10	709.64	655.86
11	711.86	660.33
12	713.70	664.98
13	716.96	668.78
14	717.04	668.93

*** 1.486 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	489.75	609.24
2	491.33	607.81
3	496.32	607.50
4	499.97	604.09
5	504.65	602.32
6	509.15	600.14
7	513.03	596.99
8	516.74	593.63
9	520.32	590.15
10	552.18	596.29
11	601.55	608.39
12	629.73	604.63
13	703.82	654.12
14	706.56	658.30
15	707.37	663.23
16	709.34	666.85

*** 1.632 ***

1

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	489.75	609.24
2	491.33	607.81
3	496.32	607.50
4	499.97	604.09
5	504.65	602.32
6	509.15	600.14
7	513.03	596.99

8	516.74	593.63
9	520.32	590.15
10	552.18	596.29
11	601.55	608.39
12	629.73	604.63
13	703.82	654.12
14	706.56	658.30
15	707.37	663.23
16	709.34	666.85

*** 1.632 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	489.75	609.24
2	491.33	607.81
3	496.32	607.50
4	499.97	604.09
5	504.65	602.32
6	509.15	600.14
7	513.03	596.99
8	516.74	593.63
9	520.32	590.15
10	552.18	596.29
11	601.55	608.39
12	629.73	604.63
13	703.82	654.12
14	706.56	658.30
15	707.37	663.23
16	709.34	666.85

*** 1.632 ***

1

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	489.75	609.24
2	491.33	607.81
3	496.32	607.50
4	499.97	604.09
5	504.65	602.32
6	509.15	600.14
7	513.03	596.99
8	516.74	593.63
9	520.32	590.15
10	552.18	596.29
11	601.55	608.39
12	629.73	604.63
13	703.82	654.12
14	706.56	658.30
15	707.37	663.23
16	709.34	666.85

*** 1.632 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	486.65	608.19
2	490.24	604.86
3	494.93	603.14
4	499.49	601.09
5	503.94	598.81
6	508.09	596.02
7	511.70	592.56
8	516.69	592.18
9	550.03	587.89
10	600.97	600.19
11	628.21	611.85
12	704.29	657.63
13	705.34	662.52
14	707.54	666.37

*** 1.635 ***

1

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	486.65	608.19
2	490.24	604.86
3	494.93	603.14
4	499.49	601.09
5	503.94	598.81
6	508.09	596.02
7	511.70	592.56
8	516.69	592.18
9	550.03	587.89
10	600.97	600.19
11	628.21	611.85
12	704.29	657.63
13	705.34	662.52
14	707.54	666.37

*** 1.635 ***

Failure Surface Specified By 14 Coordinate Points

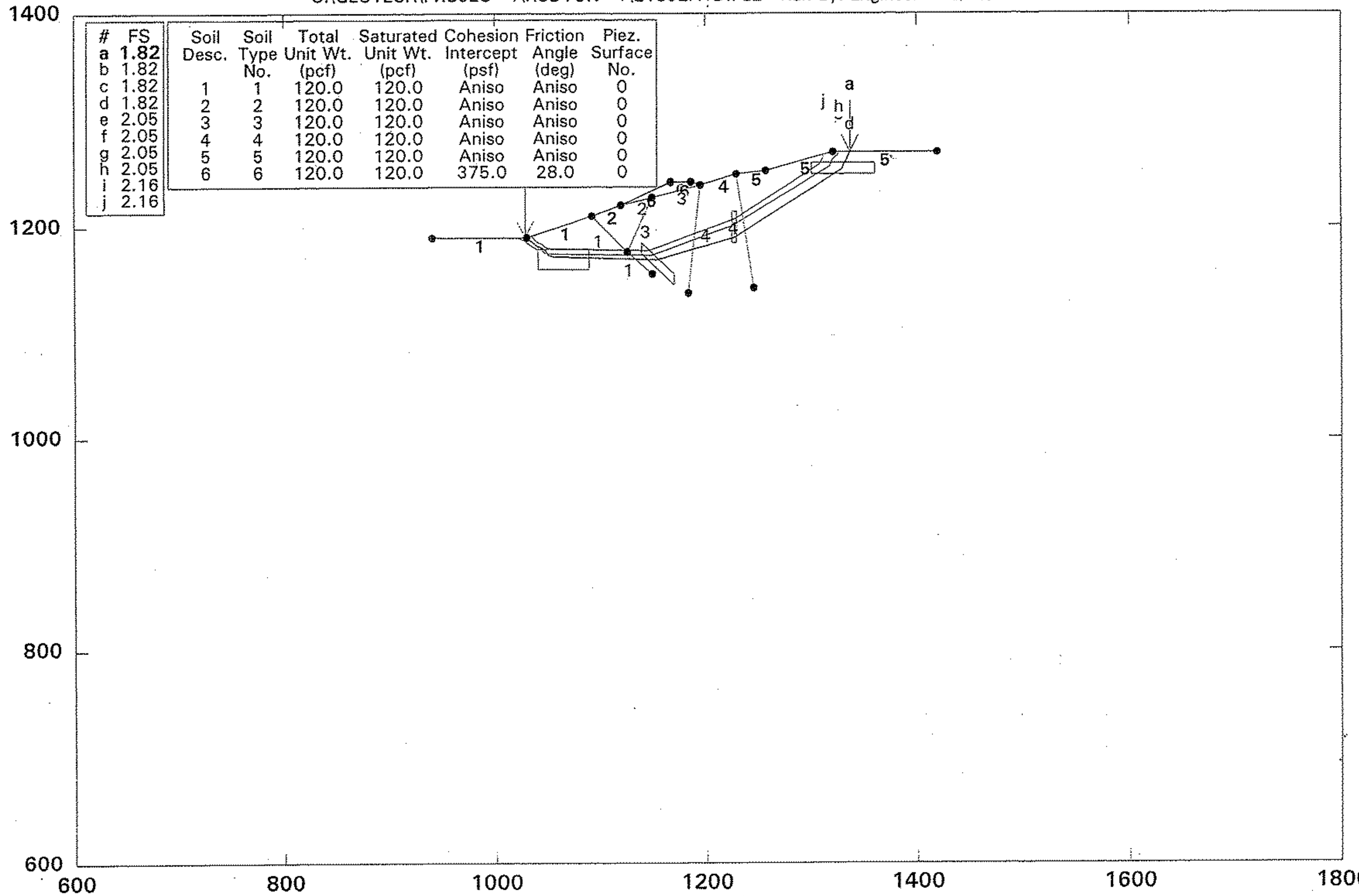
Point No.	X-Surf (ft)	Y-Surf (ft)
1	486.65	608.19
2	490.24	604.86
3	494.93	603.14
4	499.49	601.09
5	503.94	598.81
6	508.09	596.02

7	511.70	592.56
8	516.69	592.18
9	550.03	587.89
10	600.97	600.19
11	628.21	611.85
12	704.29	657.63
13	705.34	662.52
14	707.54	666.37

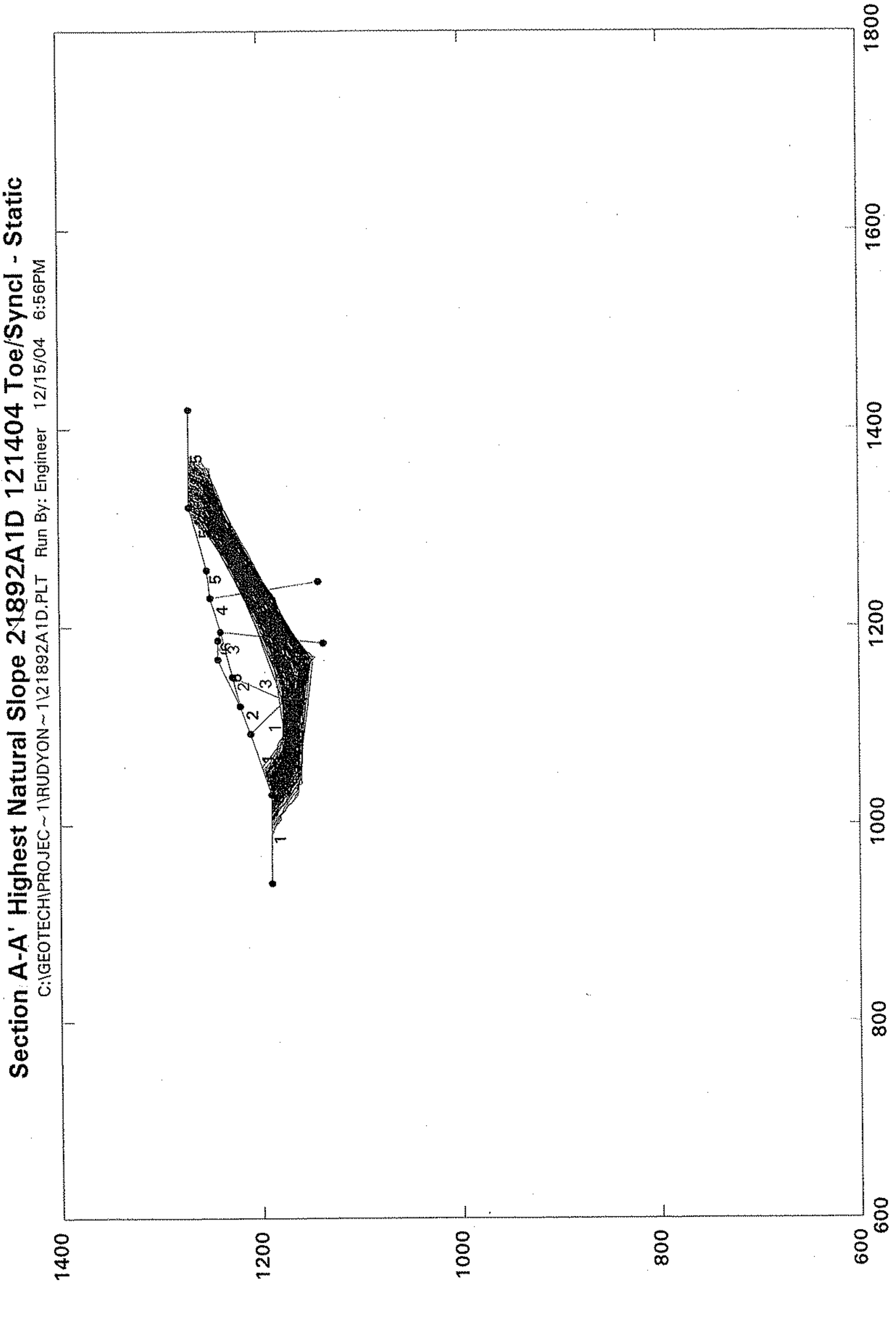
*** 1.635 ***

Section A-A' Highest Natural Slope 21892A1D 121404 Toe/Syncl - Static

C:\GEOTECH\PROJEC~1\RUDYON~1\21892A1D.PL2 Run By: Engineer 12/15/04 6:56PM



GSTABL7 FSmin = 1.82
Safety Factors Are Calculated By The Simplified Janbu Method


Section A-A' Highest Natural Slope 21892A1D 121404 Toe/Syncl - Static
C:\GEOTECH\PROJEC~1\RUDYON~1\21892A1D.PLT Run By: Engineer 12/15/04 6:56PM
600
800
1000
1200
1400
1600
1800
1400
1200
1000
800
600

*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Version 1.0, January 1996; Version 1.16, May 2000 **

--Slope Stability Analysis--
Simplified Janbu, Modified Bishop
or Spencer`s Method of Slices
(Based on STABL6-1986, by Purdue University)

Run Date:	12/15/04
Time of Run:	6:56PM
Run By:	Engineer
Input Data Filename:	C:21892A1D.DTA
Output Filename:	C:21892A1D.OUT
Unit System:	English
Plotted Output Filename:	C:21892A1D.PLT

PROBLEM DESCRIPTION Section A-A' Highest Natural Slope
21892A1D 121404 Toe/Syncl - Static

BOUNDARY COORDINATES

10 Top Boundaries
17 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	340.00	589.00	430.00	589.00	1
2	430.00	589.00	492.00	610.00	1
3	492.00	610.00	520.00	620.00	2
4	520.00	620.00	568.00	642.00	6
5	568.00	642.00	586.00	642.00	6
6	586.00	642.00	595.00	639.00	6
7	595.00	639.00	630.00	650.00	4
8	630.00	650.00	658.00	653.00	5
9	658.00	653.00	721.00	670.00	5
10	721.00	670.00	820.00	670.00	5
11	520.00	620.00	550.00	628.00	2
12	550.00	628.00	595.00	639.00	3
13	492.00	610.00	526.00	577.00	1
14	526.00	577.00	550.00	628.00	3
15	583.00	538.00	595.00	639.00	4
16	630.00	650.00	646.00	542.00	4
17	526.00	577.00	550.00	555.00	1

1

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	13.0	0.00	0.0	0

2	120.0	120.0	300.0	13.0	0.00	0.0	0
3	120.0	120.0	300.0	13.0	0.00	0.0	0
4	120.0	120.0	300.0	13.0	0.00	0.0	0
5	120.0	120.0	300.0	13.0	0.00	0.0	0
6	120.0	120.0	375.0	28.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
5 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-4.0	560.0	29.0
2	0.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-45.0	560.0	29.0
2	-41.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 4

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-21.0	560.0	29.0
2	-17.0	300.0	13.0
3	0.0	560.0	29.0
4	90.0	560.0	29.0

Soil Type 4 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	12.0	560.0	29.0
2	16.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 5 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	31.0	560.0	29.0
2	35.0	300.0	13.0
3	90.0	560.0	29.0

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

750 Trial Surfaces Have Been Generated.

4 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 5.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	440.00	570.00	490.00	570.00	20.00
2	540.00	580.00	570.00	550.00	10.00
3	625.00	600.00	630.00	600.00	30.00
4	700.00	655.00	760.00	655.00	10.00

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	429.66	589.00
2	431.62	588.12
3	435.69	585.22
4	439.45	581.92
5	444.32	580.76
6	448.12	577.51
7	451.74	574.07
8	456.00	571.44
9	554.51	568.57
10	627.36	589.01
11	730.13	653.93
12	730.93	658.86
13	733.85	662.93
14	735.67	667.59
15	737.68	670.00

*** 1.823 ***

Individual data on the 28 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	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	1.6	154.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	4.1	1745.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	3.8	3609.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	4.9	6819.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	3.8	7011.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	3.6	8680.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	4.3	12426.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	36.0	142488.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	28.0	151244.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	6.0	37356.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	8.6	56932.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	15.4	113551.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	4.5	35777.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	13.5	110815.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	18.0	144971.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	1.7	13376.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	7.3	53398.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	32.4	231462.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	2.6	18947.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	8.0	55169.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	20.0	119467.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	63.0	251247.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	9.1	20760.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	0.8	1314.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	2.9	3180.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	1.8	1037.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	2.0	291.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	429.66	589.00
2	431.62	588.12
3	435.69	585.22
4	439.45	581.92
5	444.32	580.76
6	448.12	577.51
7	451.74	574.07
8	456.00	571.44
9	554.51	568.57
10	627.36	589.01
11	730.13	653.93
12	730.93	658.86
13	733.85	662.93
14	735.67	667.59
15	737.68	670.00

*** 1.823 ***

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Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	429.66	589.00
2	431.62	588.12
3	435.69	585.22
4	439.45	581.92
5	444.32	580.76
6	448.12	577.51
7	451.74	574.07
8	456.00	571.44
9	554.51	568.57
10	627.36	589.01
11	730.13	653.93
12	730.93	658.86
13	733.85	662.93
14	735.67	667.59
15	737.68	670.00

*** 1.823 ***

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Point No.	X-Surf (ft)	Y-Surf (ft)
1	429.66	589.00
2	431.62	588.12
3	435.69	585.22
4	439.45	581.92
5	444.32	580.76
6	448.12	577.51
7	451.74	574.07
8	456.00	571.44
9	554.51	568.57
10	627.36	589.01
11	730.13	653.93
12	730.93	658.86
13	733.85	662.93
14	735.67	667.59
15	737.68	670.00

*** 1.823 ***

1

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	421.97	589.00
2	426.61	587.73
3	430.86	585.10
4	434.66	581.86
5	438.86	579.14
6	443.85	578.81
7	447.39	575.29
8	549.52	573.12
9	625.85	600.75
10	718.04	657.67

11	719.89	662.32
12	723.35	665.92
13	726.43	669.86
14	726.46	670.00

*** 2.048 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	421.97	589.00
2	426.61	587.73
3	430.86	585.10
4	434.66	581.86
5	438.86	579.14
6	443.85	578.81
7	447.39	575.29
8	549.52	573.12
9	625.85	600.75
10	718.04	657.67
11	719.89	662.32
12	723.35	665.92
13	726.43	669.86
14	726.46	670.00

*** 2.048 ***

1

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Point No.	X-Surf (ft)	Y-Surf (ft)
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2	426.61	587.73
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4	434.66	581.86
5	438.86	579.14
6	443.85	578.81
7	447.39	575.29
8	549.52	573.12
9	625.85	600.75
10	718.04	657.67
11	719.89	662.32
12	723.35	665.92
13	726.43	669.86
14	726.46	670.00

*** 2.048 ***

Failure Surface Specified By 14 Coordinate Points

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

1	421.97	589.00
2	426.61	587.73
3	430.86	585.10
4	434.66	581.86
5	438.86	579.14
6	443.85	578.81
7	447.39	575.29
8	549.52	573.12
9	625.85	600.75
10	718.04	657.67
11	719.89	662.32
12	723.35	665.92
13	726.43	669.86
14	726.46	670.00

*** 2.048 ***

1

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	434.52	590.53
2	436.20	588.93
3	440.05	585.73
4	444.67	583.83
5	448.34	580.42
6	453.29	579.78
7	458.22	578.93
8	546.35	578.09
9	627.38	607.51
10	707.72	659.59
11	711.10	663.27
12	711.48	667.43

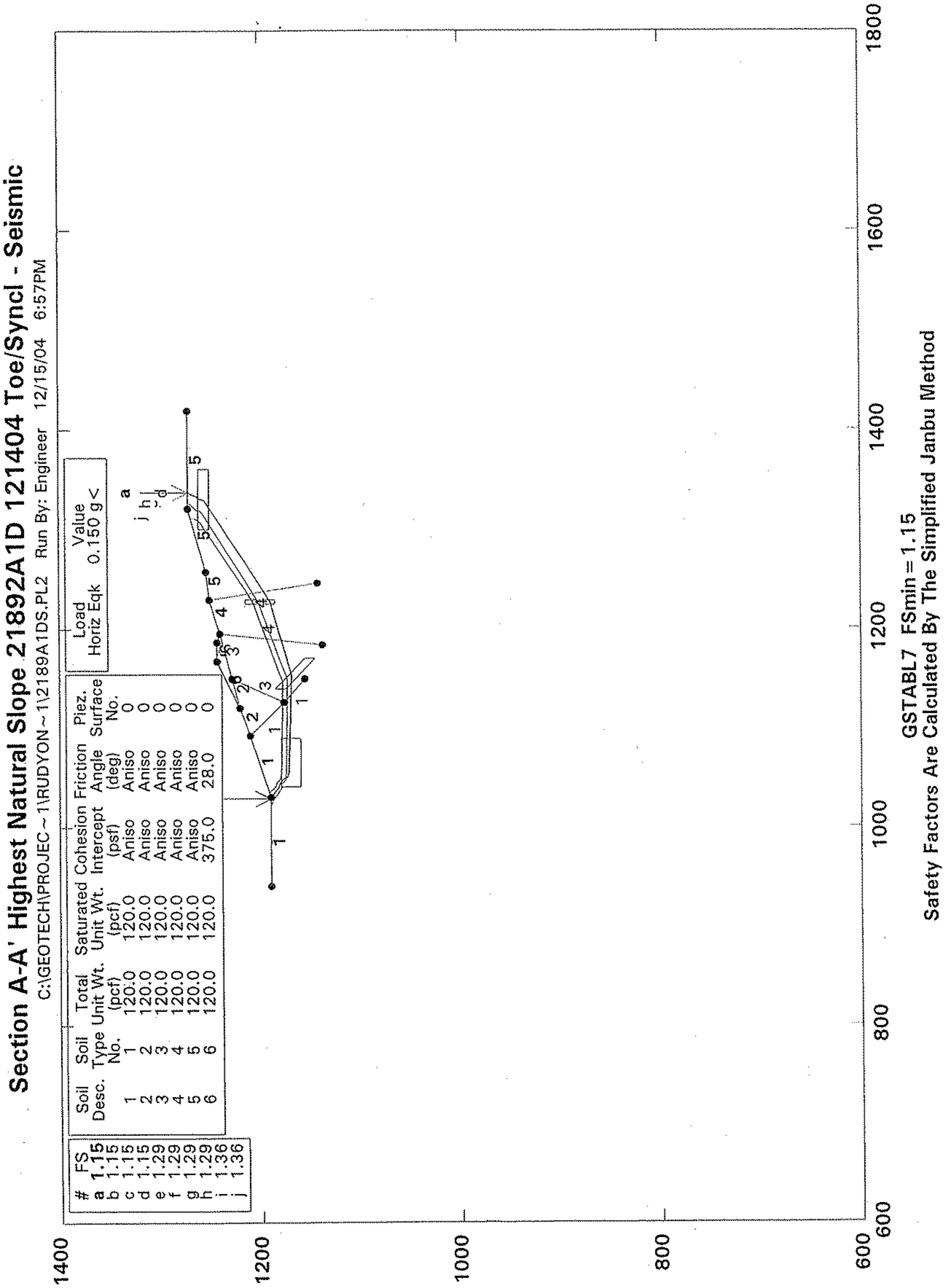
*** 2.162 ***

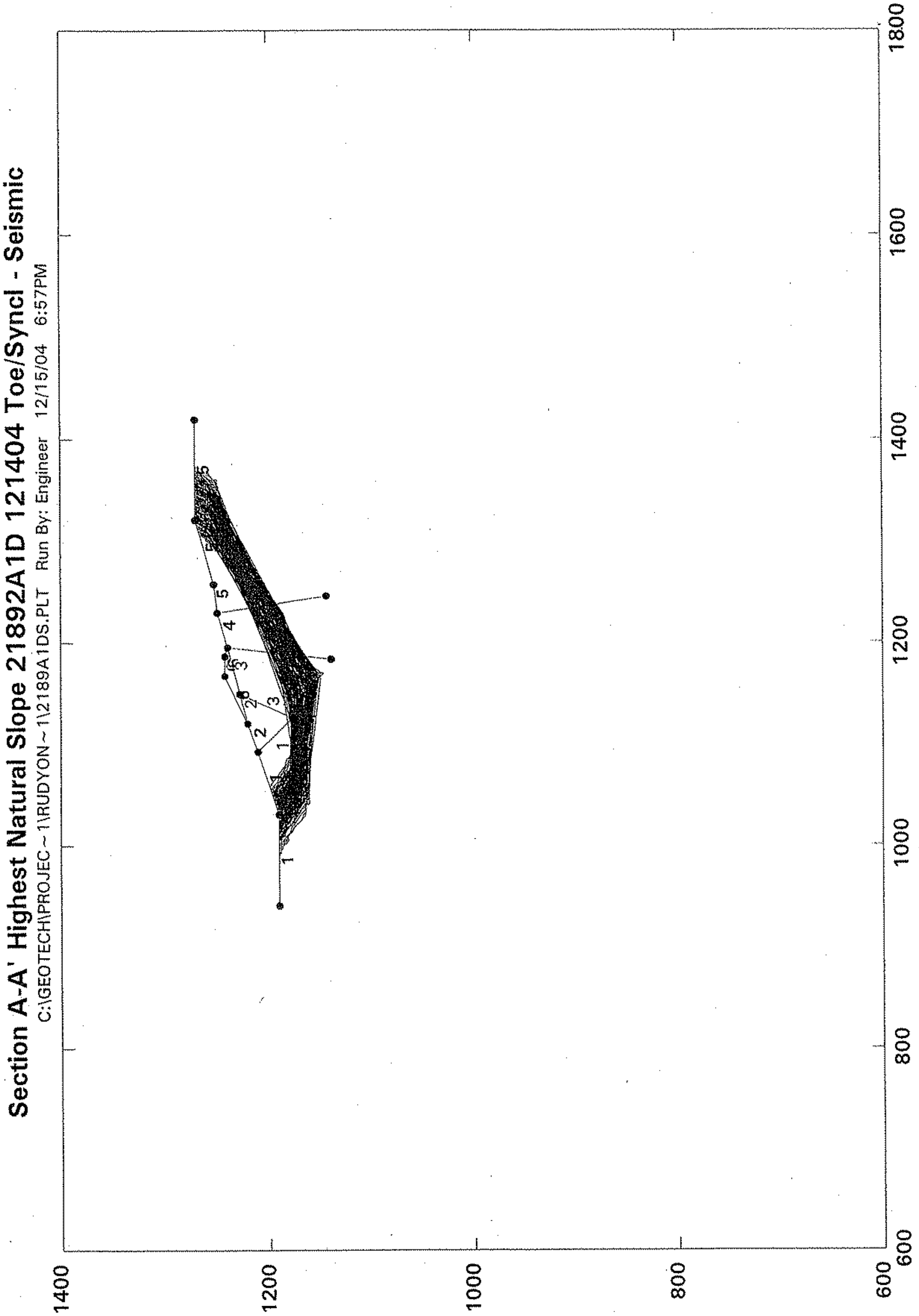
Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	434.52	590.53
2	436.20	588.93
3	440.05	585.73
4	444.67	583.83
5	448.34	580.42
6	453.29	579.78
7	458.22	578.93
8	546.35	578.09
9	627.38	607.51
10	707.72	659.59
11	711.10	663.27
12	711.48	667.43

*** 2.162 ***

Work Order 2189-2-0-10
Cross-Section A-A', Pseudostatic – Synclinal/Toe Structure
Figure C2.10




Section A-A' Highest Natural Slope 21892A1D 121404 Toe/Syncl - Seismic
C:\GEOTECH\PROJEC~1\RUDYON~1\2189A1DS.PLT Run By: Engineer 12/15/04 6:57PM
1400
1200
1000
800
600
600
800
1000
1200
1400
1600
1800

```
                  ***  GSTABL7  ***

        ** GSTABL7 by Garry H. Gregory, P.E. **

  ** Version 1.0, January 1996; Version 1.16, May 2000 **

               --Slope Stability Analysis--
             Simplified Janbu, Modified Bishop
               or Spencer`s Method of Slices
        (Based on STABL6-1986, by Purdue University)

  Run Date:                 12/15/04
  Time of Run:              6:57PM
  Run By:                   Engineer
  Input Data Filename:      C:2189A1DS.DTA
  Output Filename:          C:2189A1DS.OUT
  Unit System:              English

  Plotted Output Filename:  C:2189A1DS.PLT


  PROBLEM DESCRIPTION    Section A-A' Highest Natural Slope
                         21892A1D 121404 Toe/Syncl - Seismic


  BOUNDARY COORDINATES

     10 Top   Boundaries
     17 Total Boundaries
```

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	340.00	589.00	430.00	589.00	1
2	430.00	589.00	492.00	610.00	1
3	492.00	610.00	520.00	620.00	2
4	520.00	620.00	568.00	642.00	6
5	568.00	642.00	586.00	642.00	6
6	586.00	642.00	595.00	639.00	6
7	595.00	639.00	630.00	650.00	4
8	630.00	650.00	658.00	653.00	5
9	658.00	653.00	721.00	670.00	5
10	721.00	670.00	820.00	670.00	5
11	520.00	620.00	550.00	628.00	2
12	550.00	628.00	595.00	639.00	3
13	492.00	610.00	526.00	577.00	1
14	526.00	577.00	550.00	628.00	3
15	583.00	538.00	595.00	639.00	4
16	630.00	650.00	646.00	542.00	4
17	526.00	577.00	550.00	555.00	1

1

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.

1	120.0	120.0	300.0	13.0	0.00	0.0	0
2	120.0	120.0	300.0	13.0	0.00	0.0	0
3	120.0	120.0	300.0	13.0	0.00	0.0	0
4	120.0	120.0	300.0	13.0	0.00	0.0	0
5	120.0	120.0	300.0	13.0	0.00	0.0	0
6	120.0	120.0	375.0	28.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
5 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-4.0	560.0	29.0
2	0.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-45.0	560.0	29.0
2	-41.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 4

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-21.0	560.0	29.0
2	-17.0	300.0	13.0
3	0.0	560.0	29.0
4	90.0	560.0	29.0

Soil Type 4 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	12.0	560.0	29.0
2	16.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 5 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	31.0	560.0	29.0
2	35.0	300.0	13.0
3	90.0	560.0	29.0

A Horizontal Earthquake Loading Coefficient
Of0.150 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0(psf)

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

750 Trial Surfaces Have Been Generated.

4 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 5.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	440.00	570.00	490.00	570.00	20.00
2	540.00	580.00	570.00	550.00	10.00
3	625.00	600.00	630.00	600.00	30.00
4	700.00	655.00	760.00	655.00	10.00

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

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Point No.	X-Surf (ft)	Y-Surf (ft)
1	429.66	589.00
2	431.62	588.12
3	435.69	585.22
4	439.45	581.92
5	444.32	580.76
6	448.12	577.51

7	451.74	574.07
8	456.00	571.44
9	554.51	568.57
10	627.36	589.01
11	730.13	653.93
12	730.93	658.86
13	733.85	662.93
14	735.67	667.59
15	737.68	670.00

*** 1.150 ***

Individual data on the 28 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	3.2	0.0	0.0	0.0	0.0	0.5	0.0	0.0
2	1.6	154.2	0.0	0.0	0.0	0.0	23.1	0.0	0.0
3	4.1	1745.3	0.0	0.0	0.0	0.0	261.8	0.0	0.0
4	3.8	3609.1	0.0	0.0	0.0	0.0	541.4	0.0	0.0
5	4.9	6819.6	0.0	0.0	0.0	0.0	1022.9	0.0	0.0
6	3.8	7011.0	0.0	0.0	0.0	0.0	1051.7	0.0	0.0
7	3.6	8680.6	0.0	0.0	0.0	0.0	1302.1	0.0	0.0
8	4.3	12426.4	0.0	0.0	0.0	0.0	1864.0	0.0	0.0
9	36.0	142488.4	0.0	0.0	0.0	0.0	21373.3	0.0	0.0
10	28.0	151244.3	0.0	0.0	0.0	0.0	22686.6	0.0	0.0
11	6.0	37356.2	0.0	0.0	0.0	0.0	5603.4	0.0	0.0
12	8.6	56932.3	0.0	0.0	0.0	0.0	8539.8	0.0	0.0
13	15.4	113551.9	0.0	0.0	0.0	0.0	17032.8	0.0	0.0
14	4.5	35777.0	0.0	0.0	0.0	0.0	5366.6	0.0	0.0
15	13.5	110815.2	0.0	0.0	0.0	0.0	16622.3	0.0	0.0
16	18.0	144971.5	0.0	0.0	0.0	0.0	21745.7	0.0	0.0
17	1.7	13376.9	0.0	0.0	0.0	0.0	2006.5	0.0	0.0
18	7.3	53398.2	0.0	0.0	0.0	0.0	8009.7	0.0	0.0
19	32.4	231462.5	0.0	0.0	0.0	0.0	34719.4	0.0	0.0
20	2.6	18947.4	0.0	0.0	0.0	0.0	2842.1	0.0	0.0
21	8.0	55169.4	0.0	0.0	0.0	0.0	8275.4	0.0	0.0
22	20.0	119467.0	0.0	0.0	0.0	0.0	17920.1	0.0	0.0
23	63.0	251247.7	0.0	0.0	0.0	0.0	37687.2	0.0	0.0
24	9.1	20760.8	0.0	0.0	0.0	0.0	3114.1	0.0	0.0
25	0.8	1314.9	0.0	0.0	0.0	0.0	197.2	0.0	0.0
26	2.9	3180.4	0.0	0.0	0.0	0.0	477.1	0.0	0.0
27	1.8	1037.2	0.0	0.0	0.0	0.0	155.6	0.0	0.0
28	2.0	291.7	0.0	0.0	0.0	0.0	43.8	0.0	0.0

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	429.66	589.00
2	431.62	588.12
3	435.69	585.22
4	439.45	581.92
5	444.32	580.76
6	448.12	577.51
7	451.74	574.07
8	456.00	571.44
9	554.51	568.57
10	627.36	589.01
11	730.13	653.93

12	730.93	658.86
13	733.85	662.93
14	735.67	667.59
15	737.68	670.00

*** 1.150 ***

1

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	429.66	589.00
2	431.62	588.12
3	435.69	585.22
4	439.45	581.92
5	444.32	580.76
6	448.12	577.51
7	451.74	574.07
8	456.00	571.44
9	554.51	568.57
10	627.36	589.01
11	730.13	653.93
12	730.93	658.86
13	733.85	662.93
14	735.67	667.59
15	737.68	670.00

*** 1.150 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	429.66	589.00
2	431.62	588.12
3	435.69	585.22
4	439.45	581.92
5	444.32	580.76
6	448.12	577.51
7	451.74	574.07
8	456.00	571.44
9	554.51	568.57
10	627.36	589.01
11	730.13	653.93
12	730.93	658.86
13	733.85	662.93
14	735.67	667.59
15	737.68	670.00

*** 1.150 ***

1

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	421.97	589.00
2	426.61	587.73
3	430.86	585.10
4	434.66	581.86
5	438.86	579.14
6	443.85	578.81
7	447.39	575.29
8	549.52	573.12
9	625.85	600.75
10	718.04	657.67
11	719.89	662.32
12	723.35	665.92
13	726.43	669.86
14	726.46	670.00

*** 1.294 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	421.97	589.00
2	426.61	587.73
3	430.86	585.10
4	434.66	581.86
5	438.86	579.14
6	443.85	578.81
7	447.39	575.29
8	549.52	573.12
9	625.85	600.75
10	718.04	657.67
11	719.89	662.32
12	723.35	665.92
13	726.43	669.86
14	726.46	670.00

*** 1.294 ***

1

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	421.97	589.00
2	426.61	587.73
3	430.86	585.10
4	434.66	581.86
5	438.86	579.14
6	443.85	578.81
7	447.39	575.29
8	549.52	573.12
9	625.85	600.75
10	718.04	657.67

11	719.89	662.32
12	723.35	665.92
13	726.43	669.86
14	726.46	670.00

*** 1.294 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	421.97	589.00
2	426.61	587.73
3	430.86	585.10
4	434.66	581.86
5	438.86	579.14
6	443.85	578.81
7	447.39	575.29
8	549.52	573.12
9	625.85	600.75
10	718.04	657.67
11	719.89	662.32
12	723.35	665.92
13	726.43	669.86
14	726.46	670.00

*** 1.294 ***

1

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	434.52	590.53
2	436.20	588.93
3	440.05	585.73
4	444.67	583.83
5	448.34	580.42
6	453.29	579.78
7	458.22	578.93
8	546.35	578.09
9	627.38	607.51
10	707.72	659.59
11	711.10	663.27
12	711.48	667.43

*** 1.364 ***

Failure Surface Specified By 12 Coordinate Points

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

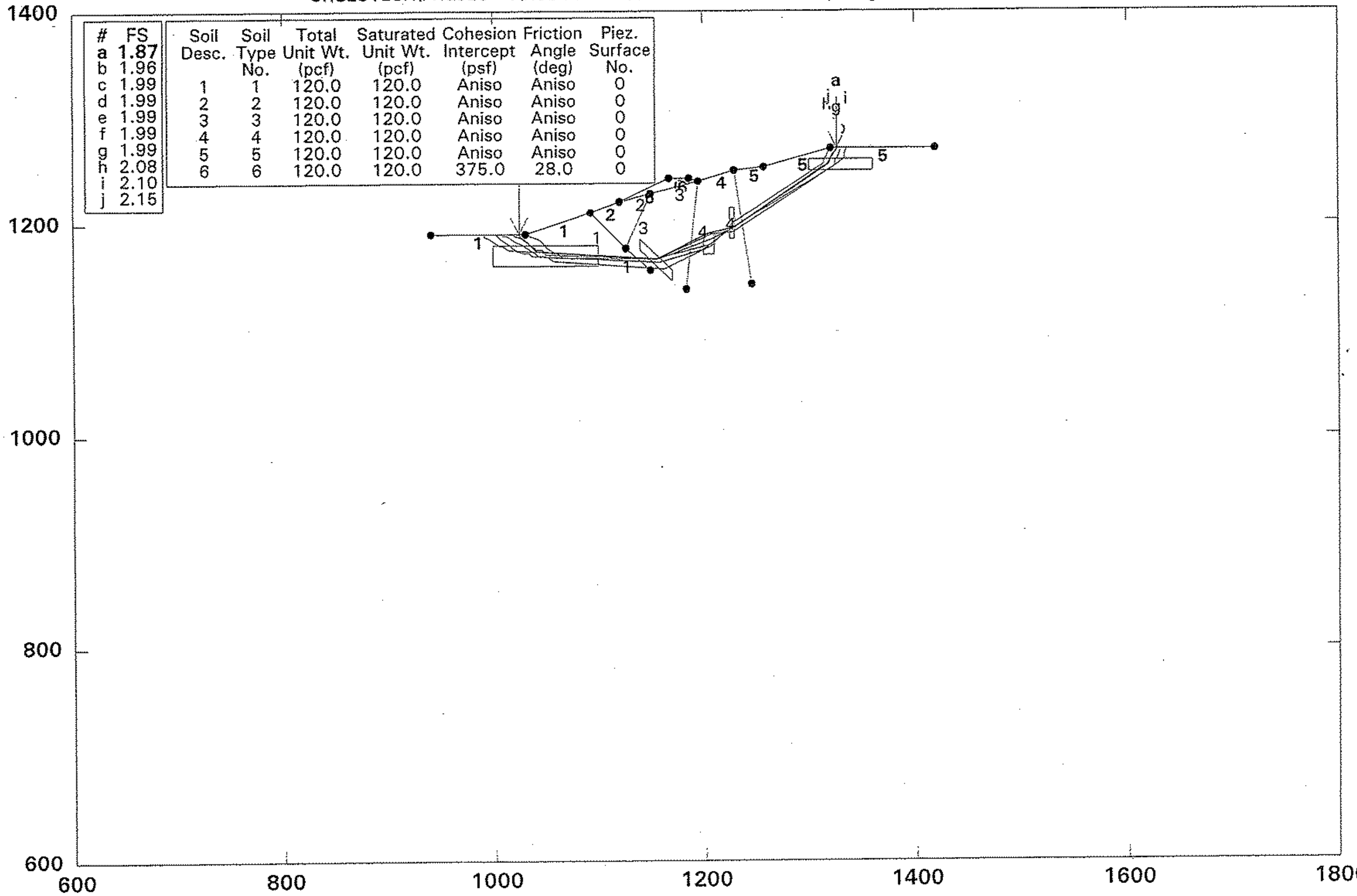
1	434.52	590.53
2	436.20	588.93
3	440.05	585.73
4	444.67	583.83
5	448.34	580.42
6	453.29	579.78
7	458.22	578.93
8	546.35	578.09
9	627.38	607.51
10	707.72	659.59
11	711.10	663.27
12	711.48	667.43

*** 1.364 ***

Work Order 2189-2-0-10
Cross-Section A-A', Static – Thru Toe
Figure C3.1

Section A-A' Highest Natural Slope 21892A1C 121404 Toe Failure - Static

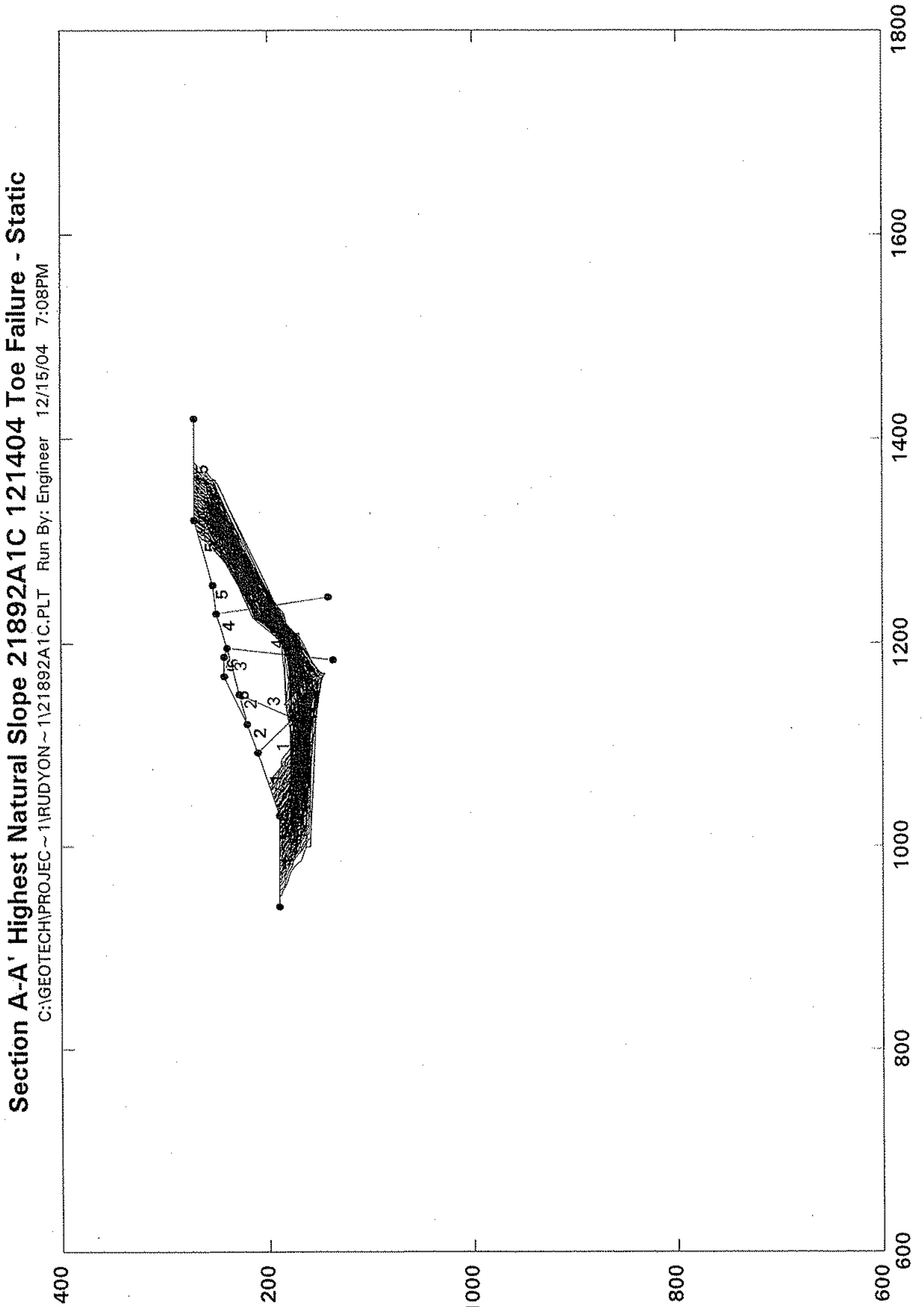
C:\GEOTECH\PROJEC~1\RUDYON~1\21892A1C.PL2 Run By: Engineer 12/15/04 7:08PM



#	FS
a	**1.87**
b	1.96
c	1.99
d	1.99
e	1.99
f	1.99
g	1.99
h	2.08
i	2.10
j	2.15

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
1	1	120.0	120.0	Aniso	Aniso	0
2	2	120.0	120.0	Aniso	Aniso	0
3	3	120.0	120.0	Aniso	Aniso	0
4	4	120.0	120.0	Aniso	Aniso	0
5	5	120.0	120.0	Aniso	Aniso	0
6	6	120.0	120.0	375.0	28.0	0

GSTABL7 FSmin = 1.87
Safety Factors Are Calculated By The Simplified Janbu Method


Section A-A' Highest Natural Slope 21892A1C 121404 Toe Failure - Static
C:\GEOTECH\PROJEC~1\RUDYON~1\21892A1C.PLT Run By: Engineer 12/15/04 7:08PM
1400
1200
1000
800
600
600
800
1000
1200
1400
1600
1800

*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Version 1.0, January 1996; Version 1.16, May 2000 **

--Slope Stability Analysis--
Simplified Janbu, Modified Bishop
or Spencer`s Method of Slices
(Based on STABL6-1986, by Purdue University)

Run Date: 12/15/04
Time of Run: 7:08PM
Run By: Engineer
Input Data Filename: C:21892a1c.dta
Output Filename: C:21892a1c.OUT
Unit System: English

Plotted Output Filename: C:21892a1c.PLT

PROBLEM DESCRIPTION Section A-A' Highest Natural Slope
21892A1C 121404 Toe Failure - Static

BOUNDARY COORDINATES

10 Top Boundaries
17 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	340.00	589.00	430.00	589.00	1
2	430.00	589.00	492.00	610.00	1
3	492.00	610.00	520.00	620.00	2
4	520.00	620.00	568.00	642.00	6
5	568.00	642.00	586.00	642.00	6
6	586.00	642.00	595.00	639.00	6
7	595.00	639.00	630.00	650.00	4
8	630.00	650.00	658.00	653.00	5
9	658.00	653.00	721.00	670.00	5
10	721.00	670.00	820.00	670.00	5
11	520.00	620.00	550.00	628.00	2
12	550.00	628.00	595.00	639.00	3
13	492.00	610.00	526.00	577.00	1
14	526.00	577.00	550.00	628.00	3
15	583.00	538.00	595.00	639.00	4
16	630.00	650.00	646.00	542.00	4
17	526.00	577.00	550.00	555.00	1

1

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	13.0	0.00	0.0	0

2	120.0	120.0	300.0	13.0	0.00	0.0	0
3	120.0	120.0	300.0	13.0	0.00	0.0	0
4	120.0	120.0	300.0	13.0	0.00	0.0	0
5	120.0	120.0	300.0	13.0	0.00	0.0	0
6	120.0	120.0	375.0	28.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
5 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-4.0	560.0	29.0
2	0.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-45.0	560.0	29.0
2	-41.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 4

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-21.0	560.0	29.0
2	-17.0	300.0	13.0
3	0.0	560.0	29.0
4	90.0	560.0	29.0

Soil Type 4 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	12.0	560.0	29.0
2	16.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 5 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	31.0	560.0	29.0
2	35.0	300.0	13.0
3	90.0	560.0	29.0

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

750 Trial Surfaces Have Been Generated.

5 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 5.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	400.00	570.00	500.00	570.00	20.00
2	540.00	580.00	570.00	550.00	10.00
3	600.00	580.00	610.00	580.00	20.00
4	625.00	600.00	630.00	600.00	30.00
5	700.00	655.00	760.00	655.00	10.00

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	424.57	589.00
2	426.30	587.30
3	429.98	583.91
4	433.51	580.37
5	437.10	576.89
6	441.01	573.77
7	556.10	566.45
8	603.78	589.77
9	628.89	595.77
10	719.80	655.85
11	720.99	660.71
12	724.42	664.34
13	726.53	668.88
14	727.06	670.00

*** 1.872 ***

Individual data on the 27 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	1.7	176.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	3.7	1499.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	13.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	3.5	3147.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	3.6	5235.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	3.9	7852.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	51.0	178755.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	28.0	152419.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	6.0	38030.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	10.1	69278.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	13.9	105391.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	6.1	50118.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	11.9	99861.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	18.0	141107.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	2.2	16188.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	6.8	45614.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	8.8	55576.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	25.1	159502.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	1.1	7158.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	7.2	44604.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	20.8	109087.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	61.8	192132.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	1.2	1645.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	0.0	14.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	3.4	3068.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	2.1	855.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	0.5	36.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	390.88	589.00
2	392.77	587.12
3	397.07	584.57
4	401.49	582.23
5	405.18	578.86
6	410.17	578.47
7	413.79	575.03
8	552.68	566.69
9	606.25	578.60
10	628.57	594.78
11	724.56	654.68
12	725.52	659.59
13	727.84	664.02
14	730.15	668.45
15	731.35	670.00

*** 1.962 ***

1

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	402.88	589.00
2	403.60	588.61
3	407.46	585.43
4	411.43	582.40
5	415.22	579.14
6	419.33	576.28
7	423.38	573.36
8	428.24	572.16
9	433.21	571.67
10	436.93	568.33
11	557.98	563.43
12	600.60	574.72
13	626.10	593.88
14	717.82	656.64
15	721.28	660.26
16	722.73	665.04
17	726.24	668.61
18	727.29	670.00

*** 1.985 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	402.88	589.00
2	403.60	588.61
3	407.46	585.43
4	411.43	582.40
5	415.22	579.14
6	419.33	576.28
7	423.38	573.36
8	428.24	572.16
9	433.21	571.67
10	436.93	568.33
11	557.98	563.43
12	600.60	574.72
13	626.10	593.88
14	717.82	656.64
15	721.28	660.26
16	722.73	665.04
17	726.24	668.61
18	727.29	670.00

*** 1.985 ***

1

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	402.88	589.00
2	403.60	588.61
3	407.46	585.43
4	411.43	582.40
5	415.22	579.14

6	419.33	576.28
7	423.38	573.36
8	428.24	572.16
9	433.21	571.67
10	436.93	568.33
11	557.98	563.43
12	600.60	574.72
13	626.10	593.88
14	717.82	656.64
15	721.28	660.26
16	722.73	665.04
17	726.24	668.61
18	727.29	670.00

*** 1.985 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	402.88	589.00
2	403.60	588.61
3	407.46	585.43
4	411.43	582.40
5	415.22	579.14
6	419.33	576.28
7	423.38	573.36
8	428.24	572.16
9	433.21	571.67
10	436.93	568.33
11	557.98	563.43
12	600.60	574.72
13	626.10	593.88
14	717.82	656.64
15	721.28	660.26
16	722.73	665.04
17	726.24	668.61
18	727.29	670.00

*** 1.985 ***

1

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	402.88	589.00
2	403.60	588.61
3	407.46	585.43
4	411.43	582.40
5	415.22	579.14
6	419.33	576.28
7	423.38	573.36
8	428.24	572.16
9	433.21	571.67
10	436.93	568.33
11	557.98	563.43
12	600.60	574.72
13	626.10	593.88

14	717.82	656.64
15	721.28	660.26
16	722.73	665.04
17	726.24	668.61
18	727.29	670.00

*** 1.985 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	419.01	589.00
2	420.07	587.94
3	424.83	586.38
4	429.01	583.65
5	432.70	580.27
6	437.35	578.43
7	441.03	575.04
8	446.00	574.59
9	449.60	571.12
10	556.80	566.29
11	608.39	584.61
12	625.88	593.66
13	709.96	652.02
14	713.40	655.65
15	715.04	660.37
16	717.63	664.65
17	718.33	669.28

*** 2.082 ***

1

Failure Surface Specified By 17 Coordinate Points

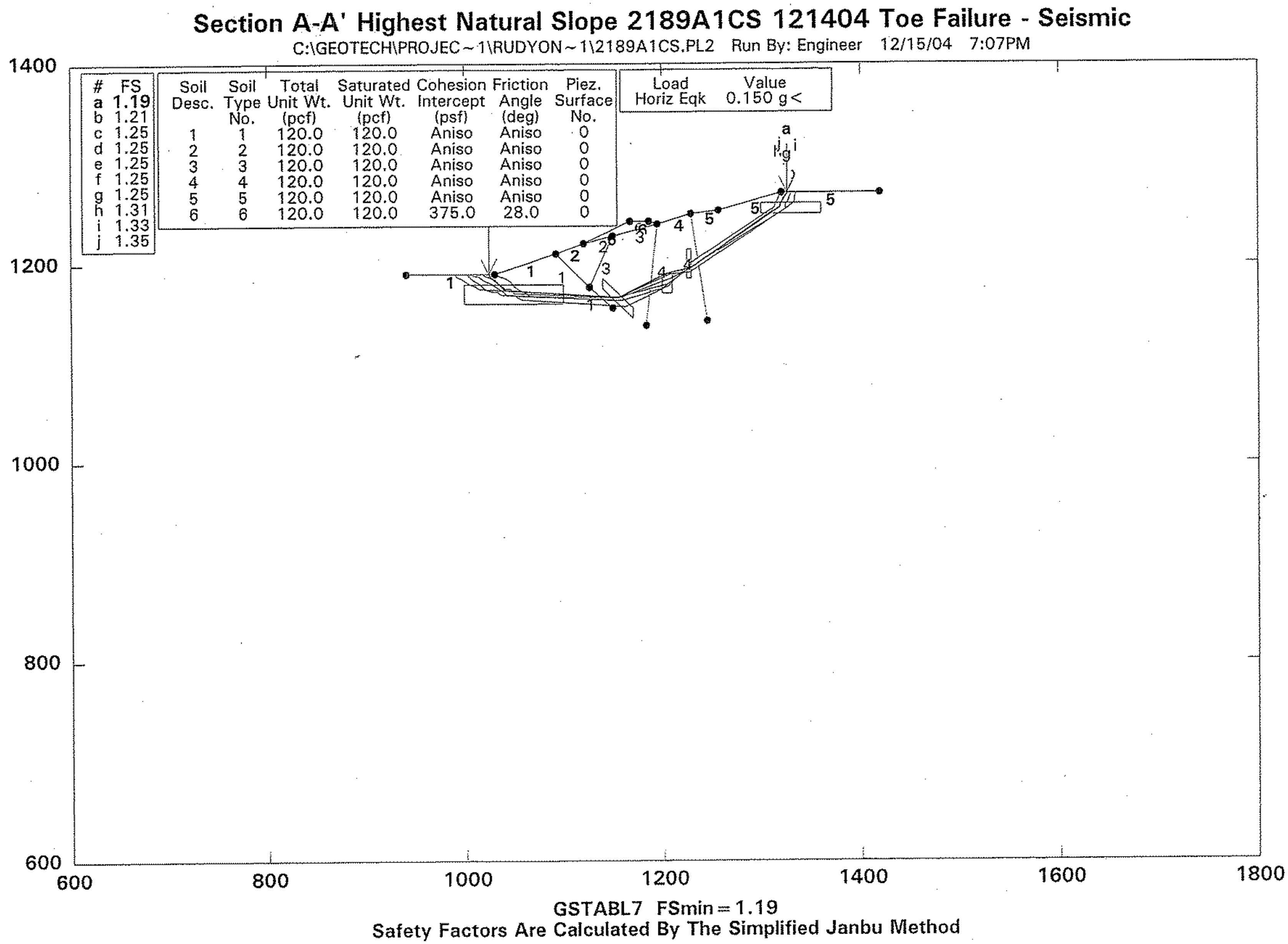
Point No.	X-Surf (ft)	Y-Surf (ft)
1	429.51	589.00
2	432.77	587.70
3	437.62	586.48
4	442.39	584.98
5	446.15	581.70
6	449.95	578.44
7	454.02	575.53
8	457.68	572.13
9	462.57	571.07
10	466.16	567.59
11	555.09	566.05
12	609.03	589.68
13	627.28	591.30
14	730.20	657.60
15	733.51	661.35
16	733.81	666.34
17	735.72	670.00

*** 2.103 ***

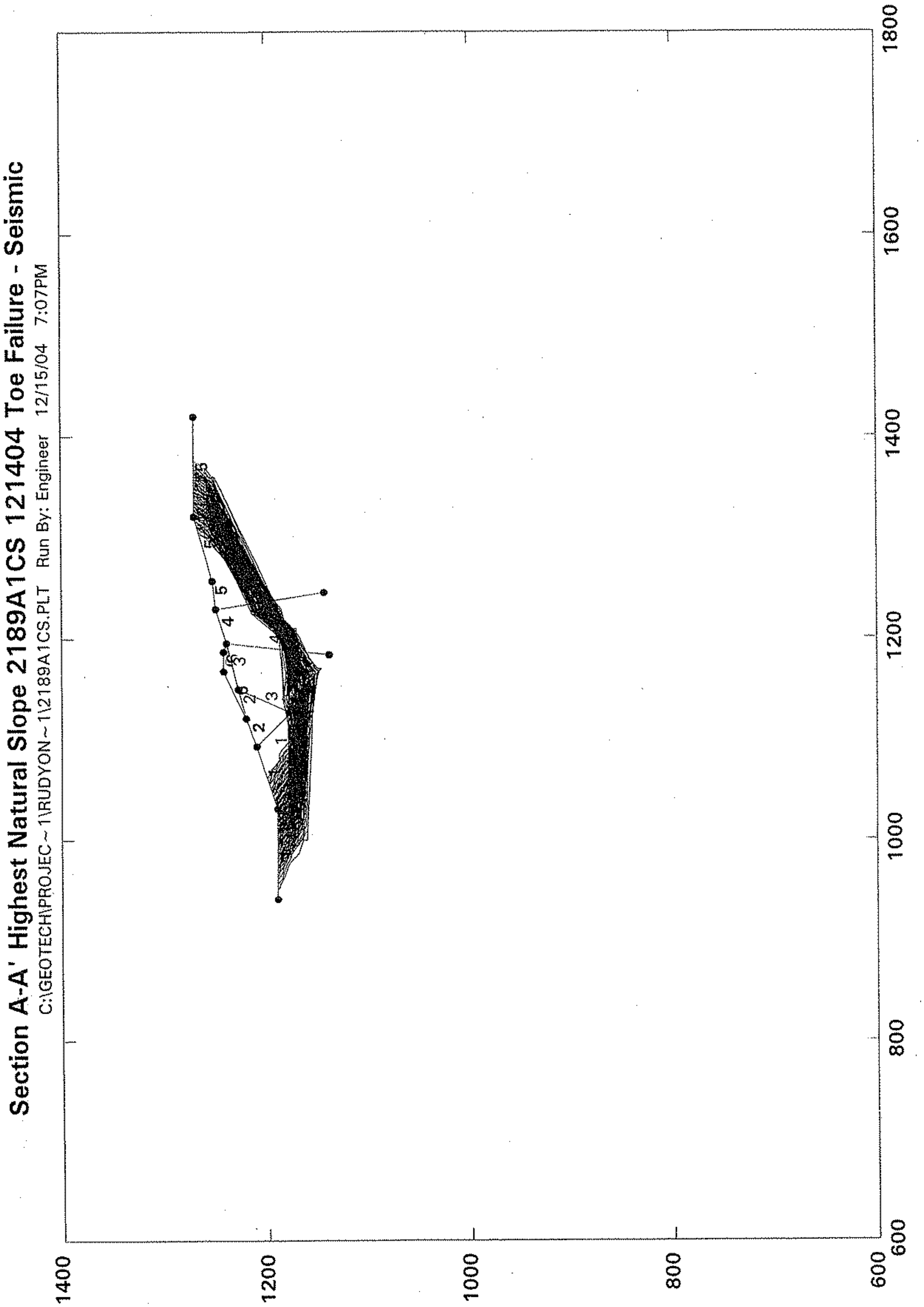
Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	407.90	589.00
2	408.49	588.51
3	413.42	587.68
4	417.47	584.75
5	421.65	582.01
6	426.38	580.39
7	430.71	577.90
8	434.35	574.47
9	438.80	572.19
10	442.76	569.13
11	447.74	568.71
12	452.54	567.29
13	456.81	564.69
14	563.36	557.44
15	606.88	577.79
16	627.58	600.25
17	713.81	655.29
18	714.31	660.27
19	717.56	664.07
20	719.90	668.49
21	720.03	669.74

*** 2.147 ***


Section A-A' Highest Natural Slope 2189A1CS 121404 Toe Failure - Seismic
C:\GEOTECH\PROJEC~1\RUDYON~1\2189A1CS.PL2 Run By: Engineer 12/15/04 7:07PM
FS
a 1.19
b 1.21
c 1.25
d 1.25
e 1.25
f 1.25
g 1.25
h 1.31
i 1.33
j 1.35
Soil Desc. | Soil Type No. | Total Unit Wt. (pcf) | Saturated Unit Wt. (pcf) | Cohesion Intercept (psf) | Friction Angle (deg) | Piez. Surface No.
1 1 120.0 120.0 Aniso Aniso 0
2 2 120.0 120.0 Aniso Aniso 0
3 3 120.0 120.0 Aniso Aniso 0
4 4 120.0 120.0 Aniso Aniso 0
5 5 120.0 120.0 Aniso Aniso 0
6 6 120.0 120.0 375.0 28.0 0
Load Value
Horiz Eqk 0.150 g<
1400
1200
1000
800
600
600
800
1000
1200
1400
1600
1800
GSTABL7 FSmin = 1.19
Safety Factors Are Calculated By The Simplified Janbu Method

Work Order 2189-2-0-10
Cross-Section A-A', Pseudostatic – Thru Toe
Figure C3.12



*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Version 1.0, January 1996; Version 1.16, May 2000 **

--Slope Stability Analysis--
Simplified Janbu, Modified Bishop
or Spencer`s Method of Slices
(Based on STABL6-1986, by Purdue University)

Run Date:	12/15/04
Time of Run:	7:07PM
Run By:	Engineer
Input Data Filename:	C:2189a1cs.dta
Output Filename:	C:2189a1cs.OUT
Unit System:	English

Plotted Output Filename: C:2189a1cs.PLT

PROBLEM DESCRIPTION Section A-A' Highest Natural Slope
2189A1CS 121404 Toe Failure - Seismic

BOUNDARY COORDINATES

10 Top Boundaries
17 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	340.00	589.00	430.00	589.00	1
2	430.00	589.00	492.00	610.00	1
3	492.00	610.00	520.00	620.00	2
4	520.00	620.00	568.00	642.00	6
5	568.00	642.00	586.00	642.00	6
6	586.00	642.00	595.00	639.00	6
7	595.00	639.00	630.00	650.00	4
8	630.00	650.00	658.00	653.00	5
9	658.00	653.00	721.00	670.00	5
10	721.00	670.00	820.00	670.00	5
11	520.00	620.00	550.00	628.00	2
12	550.00	628.00	595.00	639.00	3
13	492.00	610.00	526.00	577.00	1
14	526.00	577.00	550.00	628.00	3
15	583.00	538.00	595.00	639.00	4
16	630.00	650.00	646.00	542.00	4
17	526.00	577.00	550.00	555.00	1

1

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	13.0	0.00	0.0	0

2	120.0	120.0	300.0	13.0	0.00	0.0	0
3	120.0	120.0	300.0	13.0	0.00	0.0	0
4	120.0	120.0	300.0	13.0	0.00	0.0	0
5	120.0	120.0	300.0	13.0	0.00	0.0	0
6	120.0	120.0	375.0	28.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
5 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-4.0	560.0	29.0
2	0.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-45.0	560.0	29.0
2	-41.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 4

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-21.0	560.0	29.0
2	-17.0	300.0	13.0
3	0.0	560.0	29.0
4	90.0	560.0	29.0

Soil Type 4 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	12.0	560.0	29.0
2	16.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 5 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	31.0	560.0	29.0
2	35.0	300.0	13.0
3	90.0	560.0	29.0

A Horizontal Earthquake Loading Coefficient
Of0.150 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0(psf)

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

750 Trial Surfaces Have Been Generated.

5 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 5.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	400.00	570.00	500.00	570.00	20.00
2	540.00	580.00	570.00	550.00	10.00
3	600.00	580.00	610.00	580.00	20.00
4	625.00	600.00	630.00	600.00	30.00
5	700.00	655.00	760.00	655.00	10.00

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	424.57	589.00
2	426.30	587.30
3	429.98	583.91
4	433.51	580.37
5	437.10	576.89
6	441.01	573.77
7	556.10	566.45
8	603.78	589.77

9	628.89	595.77
10	719.80	655.85
11	720.99	660.71
12	724.42	664.34
13	726.53	668.88
14	727.06	670.00

*** 1.187 ***

Individual data on the 27 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	1.7	176.4	0.0	0.0	0.0	0.0	26.5	0.0	0.0
2	3.7	1499.4	0.0	0.0	0.0	0.0	224.9	0.0	0.0
3	0.0	13.9	0.0	0.0	0.0	0.0	2.1	0.0	0.0
4	3.5	3147.4	0.0	0.0	0.0	0.0	472.1	0.0	0.0
5	3.6	5235.2	0.0	0.0	0.0	0.0	785.3	0.0	0.0
6	3.9	7852.0	0.0	0.0	0.0	0.0	1177.8	0.0	0.0
7	51.0	178755.5	0.0	0.0	0.0	0.0	26813.3	0.0	0.0
8	28.0	152419.2	0.0	0.0	0.0	0.0	22862.9	0.0	0.0
9	6.0	38030.2	0.0	0.0	0.0	0.0	5704.5	0.0	0.0
10	10.1	69278.6	0.0	0.0	0.0	0.0	10391.8	0.0	0.0
11	13.9	105391.4	0.0	0.0	0.0	0.0	15808.7	0.0	0.0
12	6.1	50118.7	0.0	0.0	0.0	0.0	7517.8	0.0	0.0
13	11.9	99861.7	0.0	0.0	0.0	0.0	14979.3	0.0	0.0
14	18.0	141107.7	0.0	0.0	0.0	0.0	21166.2	0.0	0.0
15	2.2	16188.5	0.0	0.0	0.0	0.0	2428.3	0.0	0.0
16	6.8	45614.6	0.0	0.0	0.0	0.0	6842.2	0.0	0.0
17	8.8	55576.4	0.0	0.0	0.0	0.0	8336.5	0.0	0.0
18	25.1	159502.4	0.0	0.0	0.0	0.0	23925.4	0.0	0.0
19	1.1	7158.4	0.0	0.0	0.0	0.0	1073.8	0.0	0.0
20	7.2	44604.7	0.0	0.0	0.0	0.0	6690.7	0.0	0.0
21	20.8	109087.5	0.0	0.0	0.0	0.0	16363.1	0.0	0.0
22	61.8	192132.5	0.0	0.0	0.0	0.0	28819.9	0.0	0.0
23	1.2	1645.0	0.0	0.0	0.0	0.0	246.8	0.0	0.0
24	0.0	14.2	0.0	0.0	0.0	0.0	2.1	0.0	0.0
25	3.4	3068.7	0.0	0.0	0.0	0.0	460.3	0.0	0.0
26	2.1	855.1	0.0	0.0	0.0	0.0	128.3	0.0	0.0
27	0.5	36.1	0.0	0.0	0.0	0.0	5.4	0.0	0.0

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	390.88	589.00
2	392.77	587.12
3	397.07	584.57
4	401.49	582.23
5	405.18	578.86
6	410.17	578.47
7	413.79	575.03
8	552.68	566.69
9	606.25	578.60
10	628.57	594.78
11	724.56	654.68
12	725.52	659.59
13	727.84	664.02
14	730.15	668.45
15	731.35	670.00

*** 1.213 ***

1

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	402.88	589.00
2	403.60	588.61
3	407.46	585.43
4	411.43	582.40
5	415.22	579.14
6	419.33	576.28
7	423.38	573.36
8	428.24	572.16
9	433.21	571.67
10	436.93	568.33
11	557.98	563.43
12	600.60	574.72
13	626.10	593.88
14	717.82	656.64
15	721.28	660.26
16	722.73	665.04
17	726.24	668.61
18	727.29	670.00

*** 1.247 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	402.88	589.00
2	403.60	588.61
3	407.46	585.43
4	411.43	582.40
5	415.22	579.14
6	419.33	576.28
7	423.38	573.36
8	428.24	572.16
9	433.21	571.67
10	436.93	568.33
11	557.98	563.43
12	600.60	574.72
13	626.10	593.88
14	717.82	656.64
15	721.28	660.26
16	722.73	665.04
17	726.24	668.61
18	727.29	670.00

*** 1.247 ***

1

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	402.88	589.00
2	403.60	588.61
3	407.46	585.43
4	411.43	582.40
5	415.22	579.14
6	419.33	576.28
7	423.38	573.36
8	428.24	572.16
9	433.21	571.67
10	436.93	568.33
11	557.98	563.43
12	600.60	574.72
13	626.10	593.88
14	717.82	656.64
15	721.28	660.26
16	722.73	665.04
17	726.24	668.61
18	727.29	670.00

*** 1.247 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	402.88	589.00
2	403.60	588.61
3	407.46	585.43
4	411.43	582.40
5	415.22	579.14
6	419.33	576.28
7	423.38	573.36
8	428.24	572.16
9	433.21	571.67
10	436.93	568.33
11	557.98	563.43
12	600.60	574.72
13	626.10	593.88
14	717.82	656.64
15	721.28	660.26
16	722.73	665.04
17	726.24	668.61
18	727.29	670.00

*** 1.247 ***

1

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	402.88	589.00
2	403.60	588.61
3	407.46	585.43

4	411.43	582.40
5	415.22	579.14
6	419.33	576.28
7	423.38	573.36
8	428.24	572.16
9	433.21	571.67
10	436.93	568.33
11	557.98	563.43
12	600.60	574.72
13	626.10	593.88
14	717.82	656.64
15	721.28	660.26
16	722.73	665.04
17	726.24	668.61
18	727.29	670.00

*** 1.247 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	419.01	589.00
2	420.07	587.94
3	424.83	586.38
4	429.01	583.65
5	432.70	580.27
6	437.35	578.43
7	441.03	575.04
8	446.00	574.59
9	449.60	571.12
10	556.80	566.29
11	608.39	584.61
12	625.88	593.66
13	709.96	652.02
14	713.40	655.65
15	715.04	660.37
16	717.63	664.65
17	718.33	669.28

*** 1.314 ***

1

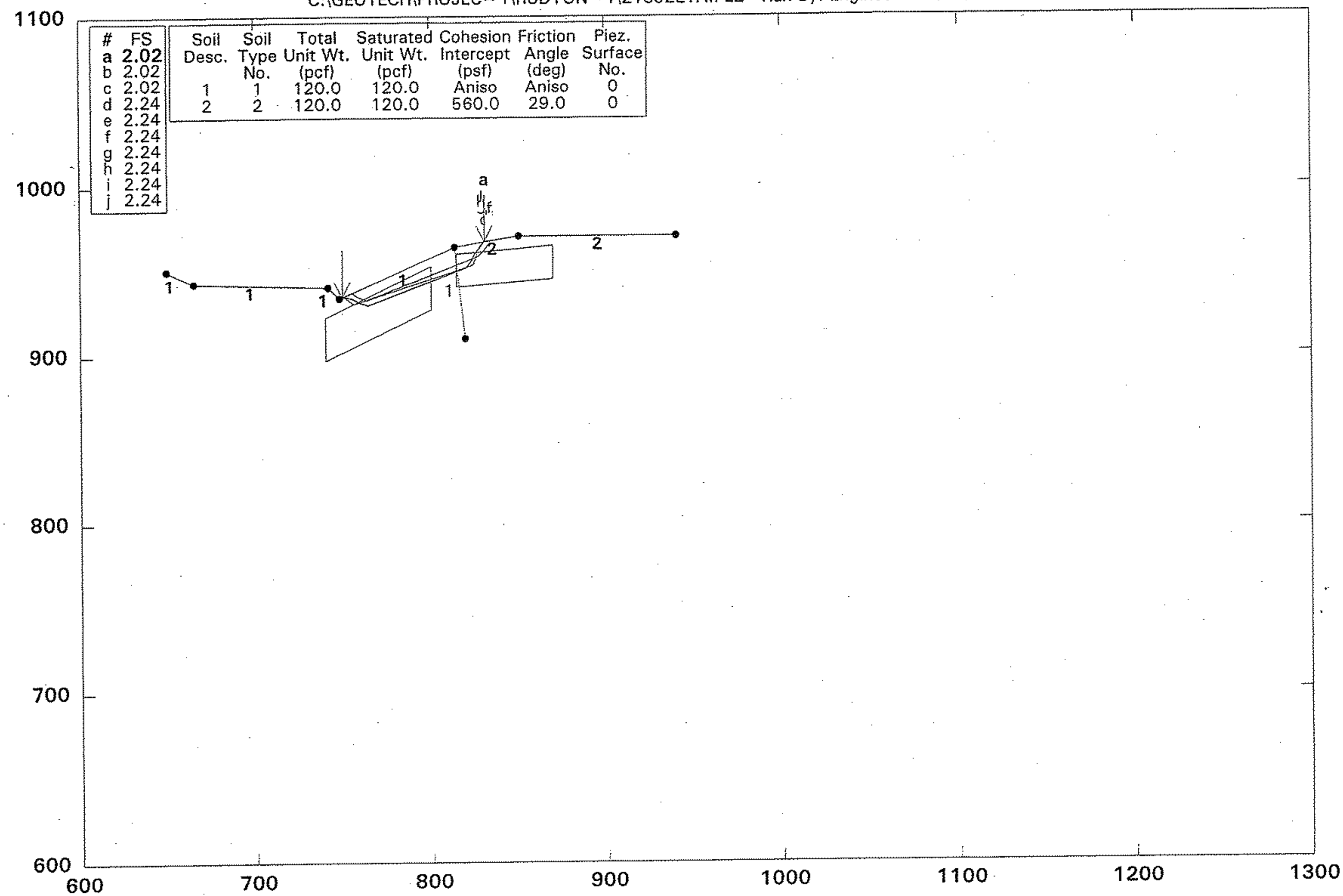
Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	429.51	589.00
2	432.77	587.70
3	437.62	586.48
4	442.39	584.98
5	446.15	581.70
6	449.95	578.44
7	454.02	575.53
8	457.68	572.13
9	462.57	571.07
10	466.16	567.59
11	555.09	566.05
12	609.03	589.68

Work Order 2189-2-0-10
Cross-Section E-E', Static
Figure C4.1

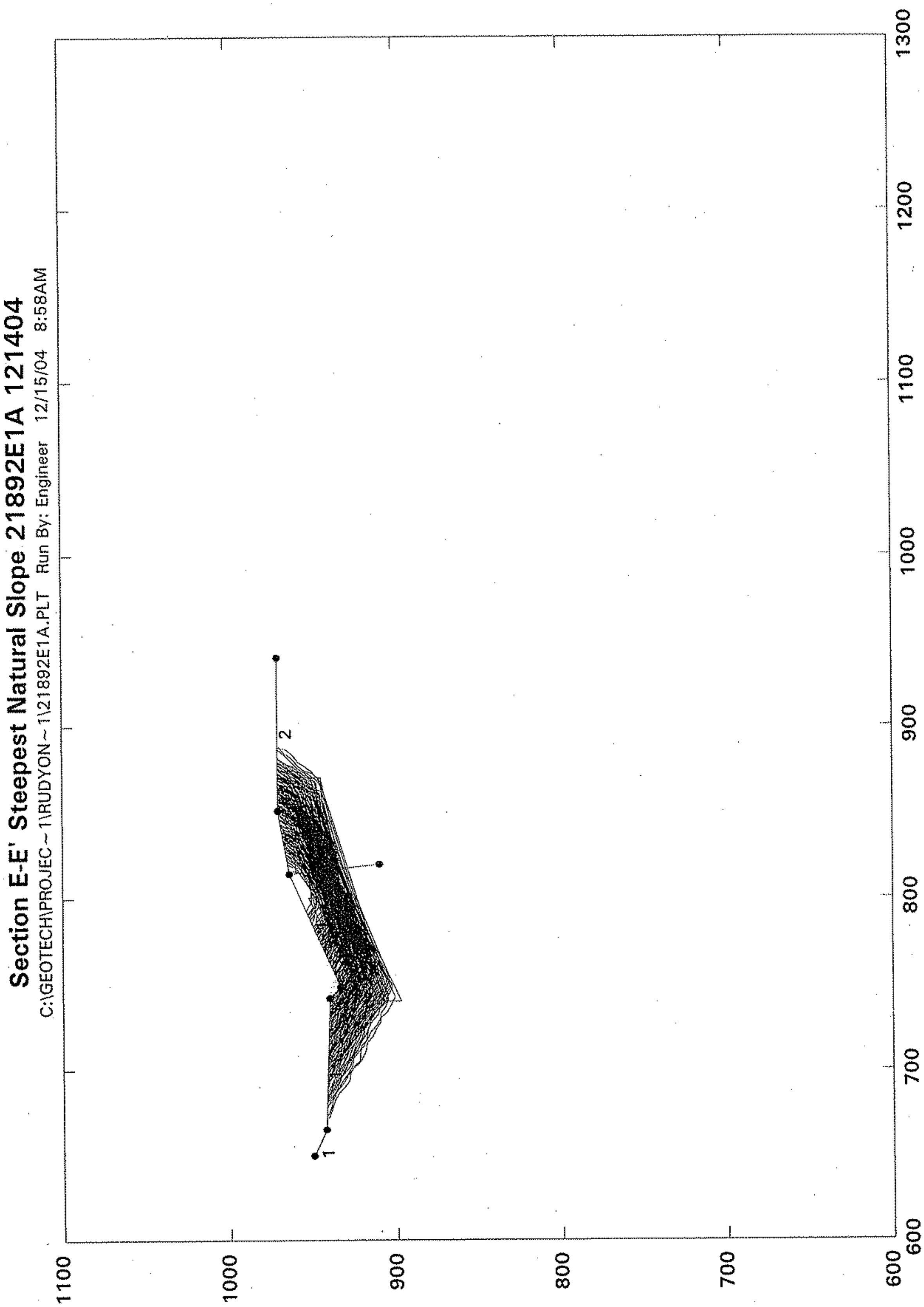
Section E-E' Steepest Natural Slope 21892E1A 121404

C:\GEOTECH\PROJEC~1\RUDYON~1\21892E1A.PL2 Run By: Engineer 12/15/04 8:58AM



GSTABL7 FSmin = 2.02
Safety Factors Are Calculated By The Simplified Janbu Method

Work Order 2189-2-0-10
Cross-Section E-E', Static
Figure C4.2



*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Version 1.0, January 1996; Version 1.16, May 2000 **

--Slope Stability Analysis--
Simplified Janbu, Modified Bishop
or Spencer`s Method of Slices
(Based on STABL6-1986, by Purdue University)

Run Date:	12/15/04
Time of Run:	8:58AM
Run By:	Engineer
Input Data Filename:	C:21892e1a.dta
Output Filename:	C:21892e1a.OUT
Unit System:	English
Plotted Output Filename:	C:21892e1a.PLT

PROBLEM DESCRIPTION Section E-E' Steepest Natural Slope
21892E1A 121404

BOUNDARY COORDINATES

6 Top Boundaries
7 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	50.00	350.00	65.00	343.00	1
2	65.00	343.00	142.00	340.00	1
3	142.00	340.00	148.00	334.00	1
4	148.00	334.00	214.00	364.00	1
5	214.00	364.00	251.00	370.00	2
6	251.00	370.00	340.00	370.00	2
7	214.00	364.00	220.00	310.00	1

1

ISOTROPIC SOIL PARAMETERS

2 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	600.0	13.0	0.00	0.0	0
2	120.0	120.0	560.0	29.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	18.0	560.0	29.0
2	24.0	300.0	13.0
3	90.0	560.0	29.0

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

750 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 5.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	140.00	310.00	200.00	340.00	25.00
2	215.00	350.00	270.00	355.00	20.00

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	150.01	334.91
2	150.46	334.47
3	155.43	333.89
4	159.58	331.11
5	164.43	329.89
6	220.72	351.26
7	223.55	355.38
8	225.32	360.05
9	228.49	363.92
10	231.19	366.79

*** 2.023 ***

Individual data on the 11 slices

Water Water Tie Tie Earthquake

Slice No.	Width (ft)	Weight (lbs)	Force Top (lbs)	Force Bot (lbs)	Force Norm (lbs)	Force Tan (lbs)	Force Hor (lbs)	Force Ver (lbs)	Surcharge Load (lbs)
1	0.5	17.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	5.0	1230.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	4.2	2899.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	4.8	5742.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	49.6	79937.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	1.6	2958.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	5.1	8780.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	2.8	4077.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	1.8	1693.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	3.2	1565.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	2.7	394.1	0.0	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	150.01	334.91
2	150.46	334.47
3	155.43	333.89
4	159.58	331.11
5	164.43	329.89
6	220.72	351.26
7	223.55	355.38
8	225.32	360.05
9	228.49	363.92
10	231.19	366.79

*** 2.023 ***

1

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	150.01	334.91
2	150.46	334.47
3	155.43	333.89
4	159.58	331.11
5	164.43	329.89
6	220.72	351.26
7	223.55	355.38
8	225.32	360.05
9	228.49	363.92
10	231.19	366.79

*** 2.023 ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	155.39	337.36
2	158.65	334.52

3	163.46	333.15
4	227.35	357.90
5	230.74	361.58
6	233.37	365.83
7	234.65	367.35

*** 2.241 ***

1

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	155.39	337.36
2	158.65	334.52
3	163.46	333.15
4	227.35	357.90
5	230.74	361.58
6	233.37	365.83
7	234.65	367.35

*** 2.241 ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	155.39	337.36
2	158.65	334.52
3	163.46	333.15
4	227.35	357.90
5	230.74	361.58
6	233.37	365.83
7	234.65	367.35

*** 2.241 ***

1

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	149.67	334.76
2	152.54	333.89
3	156.09	330.38
4	224.57	353.42
5	226.31	358.10
6	227.57	362.94
7	229.61	366.53

*** 2.244 ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	149.67	334.76
2	152.54	333.89
3	156.09	330.38
4	224.57	353.42
5	226.31	358.10
6	227.57	362.94
7	229.61	366.53

*** 2.244 ***

1

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	149.67	334.76
2	152.54	333.89
3	156.09	330.38
4	224.57	353.42
5	226.31	358.10
6	227.57	362.94
7	229.61	366.53

*** 2.244 ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	149.67	334.76
2	152.54	333.89
3	156.09	330.38
4	224.57	353.42
5	226.31	358.10
6	227.57	362.94
7	229.61	366.53

*** 2.244 ***

Section E-E' Steepest Natural Slope 21892E1A 121404 - Seismic

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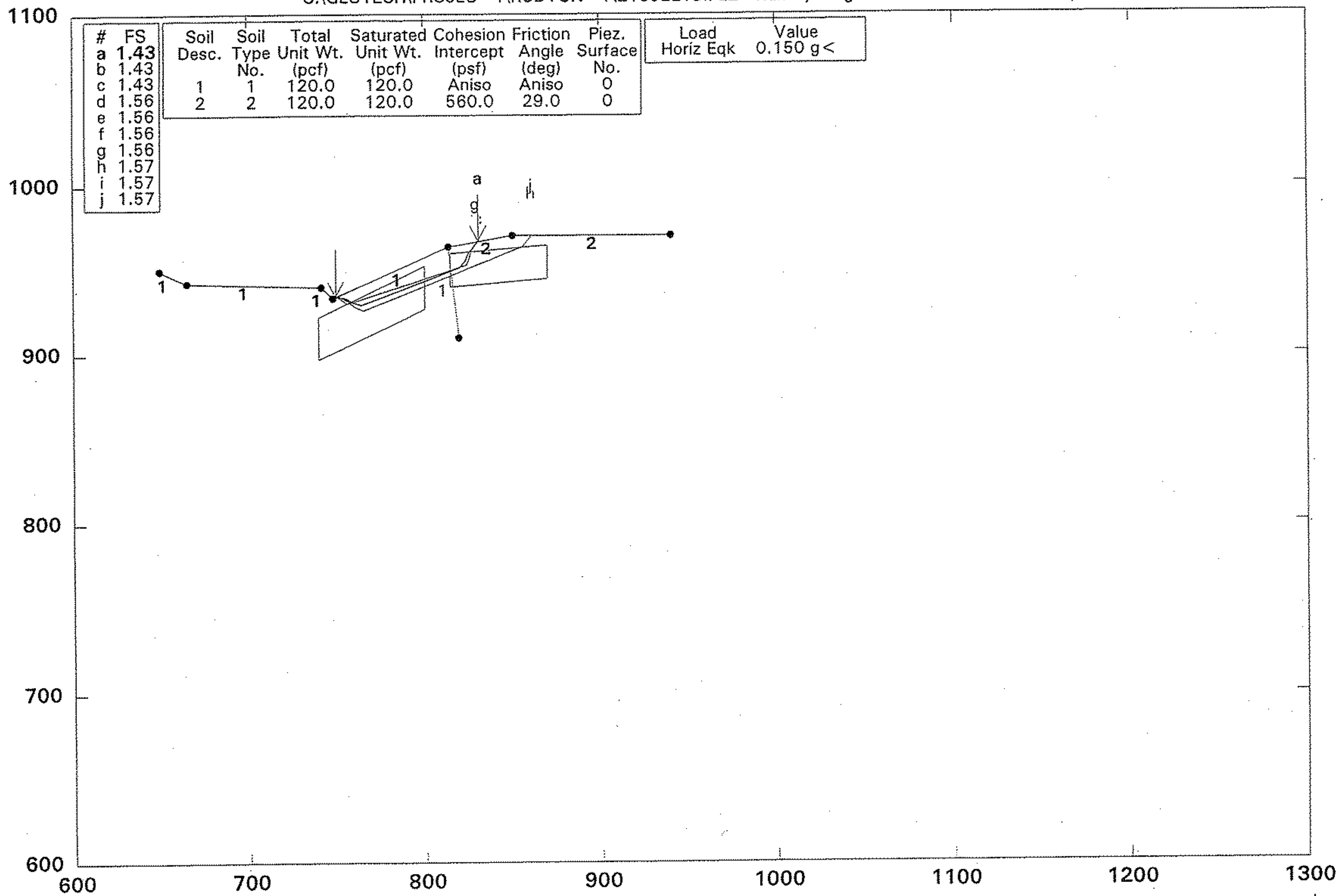


#	FS
a	1.43
b	1.43
c	1.43
d	1.56
e	1.56
f	1.56
g	1.56
h	1.57
i	1.57
j	1.57

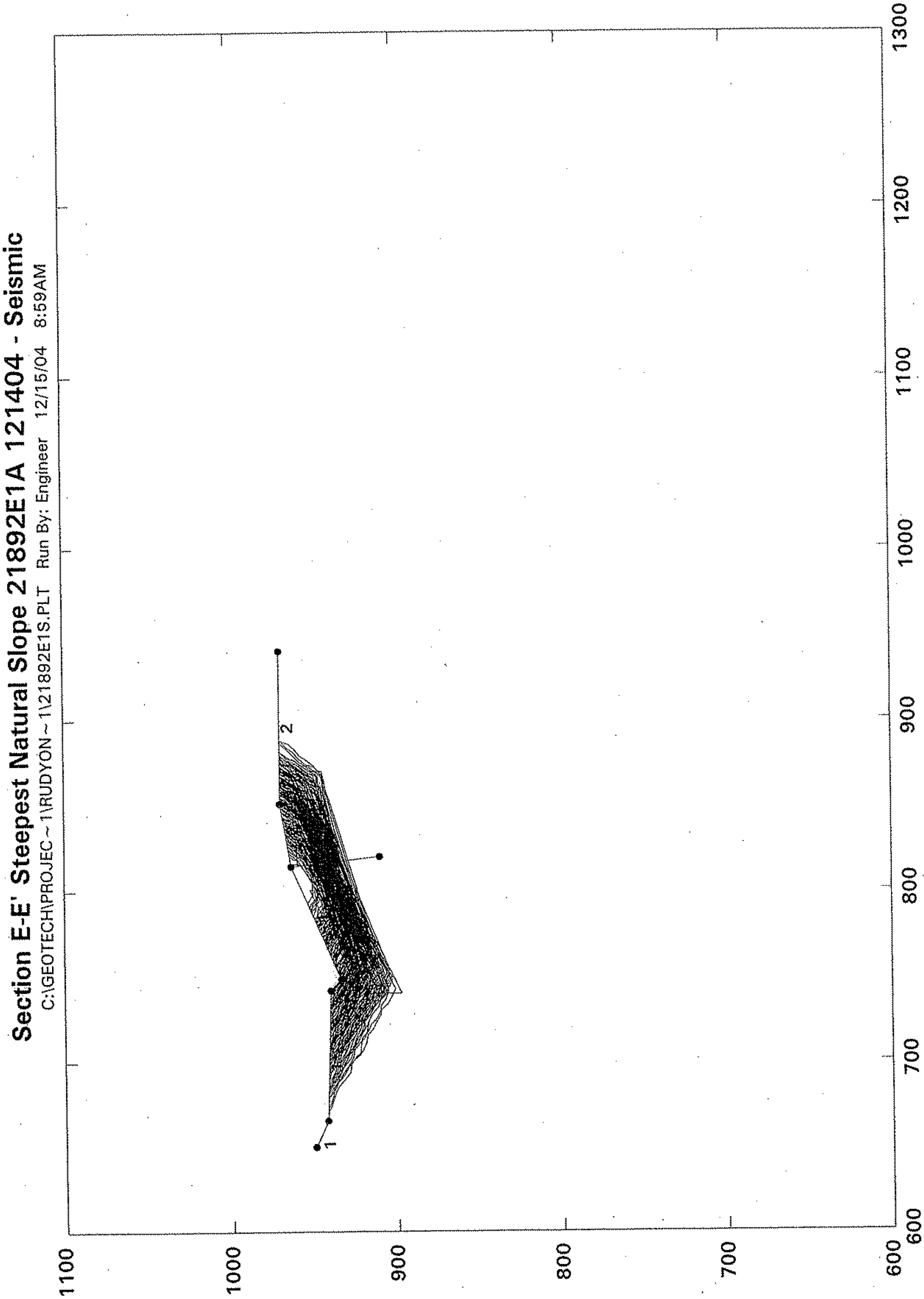
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
1	1	120.0	120.0	Aniso	Aniso	0
2	2	120.0	120.0	560.0	29.0	0

Load	Value
Horiz Eqk	0.150 g<

GSTABL7 FSmin = 1.43

Safety Factors Are Calculated By The Simplified Janbu Method

Work Order 2189-2-0-10
Cross-Section E-E', Static
Figure C4.9



*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Version 1.0, January 1996; Version 1.16, May 2000 **

--Slope Stability Analysis--
Simplified Janbu, Modified Bishop
or Spencer`s Method of Slices
(Based on STABL6-1986, by Purdue University)

Run Date:	12/15/04
Time of Run:	8:59AM
Run By:	Engineer
Input Data Filename:	C:21892e1s.dta
Output Filename:	C:21892e1s.OUT
Unit System:	English
Plotted Output Filename:	C:21892e1s.PLT

PROBLEM DESCRIPTION Section E-E' Steepest Natural Slope
21892E1A 121404 - Seismic

BOUNDARY COORDINATES

6 Top Boundaries
7 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	50.00	350.00	65.00	343.00	1
2	65.00	343.00	142.00	340.00	1
3	142.00	340.00	148.00	334.00	1
4	148.00	334.00	214.00	364.00	1
5	214.00	364.00	251.00	370.00	2
6	251.00	370.00	340.00	370.00	2
7	214.00	364.00	220.00	310.00	1

1

ISOTROPIC SOIL PARAMETERS

2 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	600.0	13.0	0.00	0.0	0
2	120.0	120.0	560.0	29.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	18.0	560.0	29.0
2	24.0	300.0	13.0
3	90.0	560.0	29.0

A Horizontal Earthquake Loading Coefficient
Of0.150 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0(psf)

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

750 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 5.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	140.00	310.00	200.00	340.00	25.00
2	215.00	350.00	270.00	355.00	20.00

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	150.01	334.91
2	150.46	334.47
3	155.43	333.89
4	159.58	331.11
5	164.43	329.89
6	220.72	351.26
7	223.55	355.38
8	225.32	360.05
9	228.49	363.92
10	231.19	366.79

*** 1.434 ***

Individual data on the 11 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	17.8	0.0	0.0	0.0	0.0	2.7	0.0	0.0
2	5.0	1230.9	0.0	0.0	0.0	0.0	184.6	0.0	0.0
3	4.2	2899.4	0.0	0.0	0.0	0.0	434.9	0.0	0.0
4	4.8	5742.3	0.0	0.0	0.0	0.0	861.4	0.0	0.0
5	49.6	79937.5	0.0	0.0	0.0	0.0	11990.6	0.0	0.0
6	1.6	2958.0	0.0	0.0	0.0	0.0	443.7	0.0	0.0
7	5.1	8780.9	0.0	0.0	0.0	0.0	1317.1	0.0	0.0
8	2.8	4077.6	0.0	0.0	0.0	0.0	611.6	0.0	0.0
9	1.8	1693.2	0.0	0.0	0.0	0.0	254.0	0.0	0.0
10	3.2	1565.2	0.0	0.0	0.0	0.0	234.8	0.0	0.0
11	2.7	394.1	0.0	0.0	0.0	0.0	59.1	0.0	0.0

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	150.01	334.91
2	150.46	334.47
3	155.43	333.89
4	159.58	331.11
5	164.43	329.89
6	220.72	351.26
7	223.55	355.38
8	225.32	360.05
9	228.49	363.92
10	231.19	366.79

*** 1.434 ***

i

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	150.01	334.91
2	150.46	334.47
3	155.43	333.89
4	159.58	331.11
5	164.43	329.89
6	220.72	351.26
7	223.55	355.38
8	225.32	360.05
9	228.49	363.92
10	231.19	366.79

*** 1.434 ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	149.67	334.76
2	152.54	333.89
3	156.09	330.38
4	224.57	353.42
5	226.31	358.10
6	227.57	362.94
7	229.61	366.53

*** 1.560 ***

1

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	149.67	334.76
2	152.54	333.89
3	156.09	330.38
4	224.57	353.42
5	226.31	358.10
6	227.57	362.94
7	229.61	366.53

*** 1.560 ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	149.67	334.76
2	152.54	333.89
3	156.09	330.38
4	224.57	353.42
5	226.31	358.10
6	227.57	362.94
7	229.61	366.53

*** 1.560 ***

1

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	149.67	334.76

2	152.54	333.89
3	156.09	330.38
4	224.57	353.42
5	226.31	358.10
6	227.57	362.94
7	229.61	366.53

*** 1.560 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	151.05	335.39
2	152.13	334.31
3	156.74	332.36
4	160.59	329.17
5	165.00	326.82
6	256.80	363.69
7	259.62	367.82
8	261.60	370.00

*** 1.567 ***

1

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	151.05	335.39
2	152.13	334.31
3	156.74	332.36
4	160.59	329.17
5	165.00	326.82
6	256.80	363.69
7	259.62	367.82
8	261.60	370.00

*** 1.567 ***

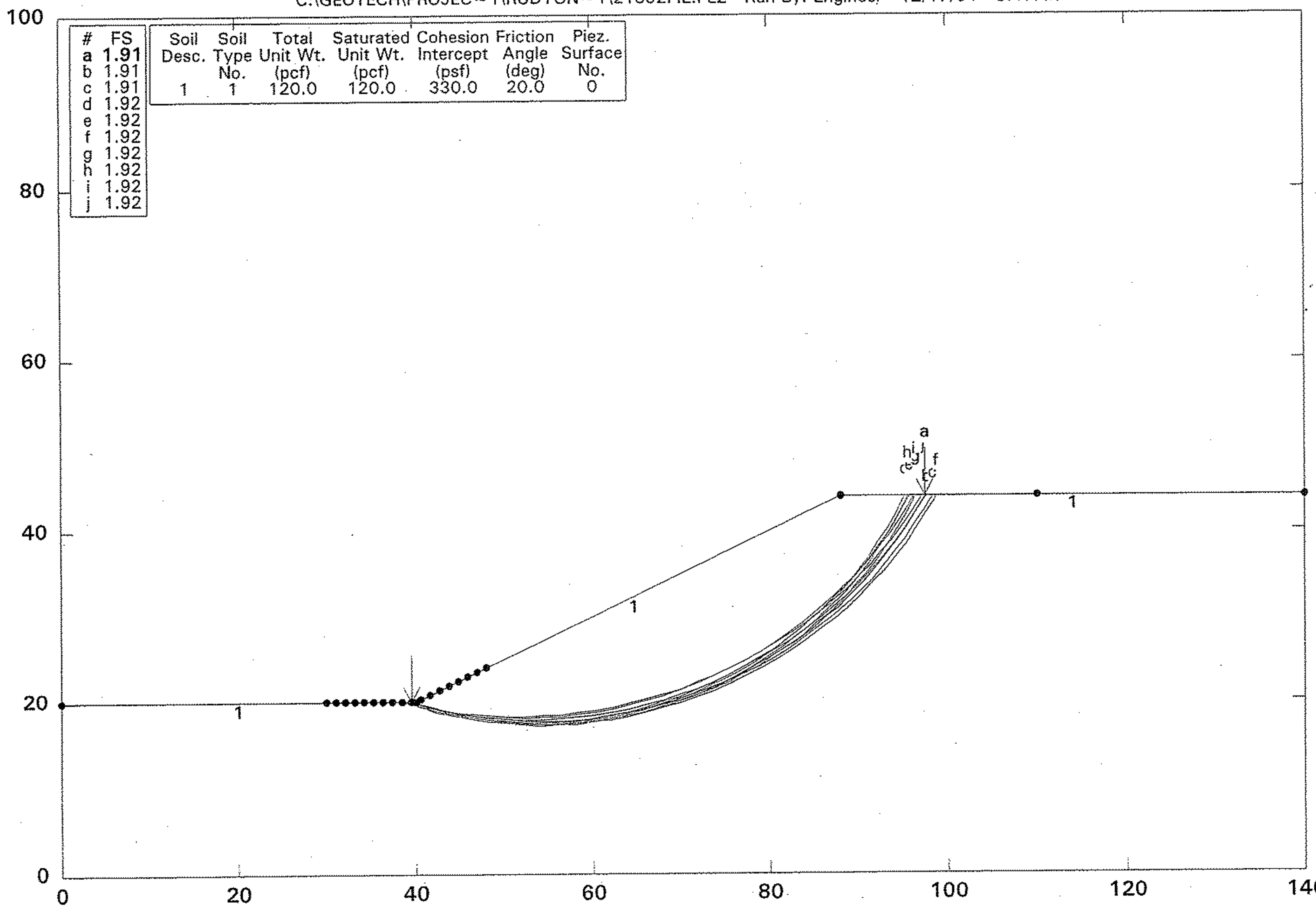
Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	151.05	335.39
2	152.13	334.31
3	156.74	332.36
4	160.59	329.17
5	165.00	326.82
6	256.80	363.69
7	259.62	367.82
8	261.60	370.00

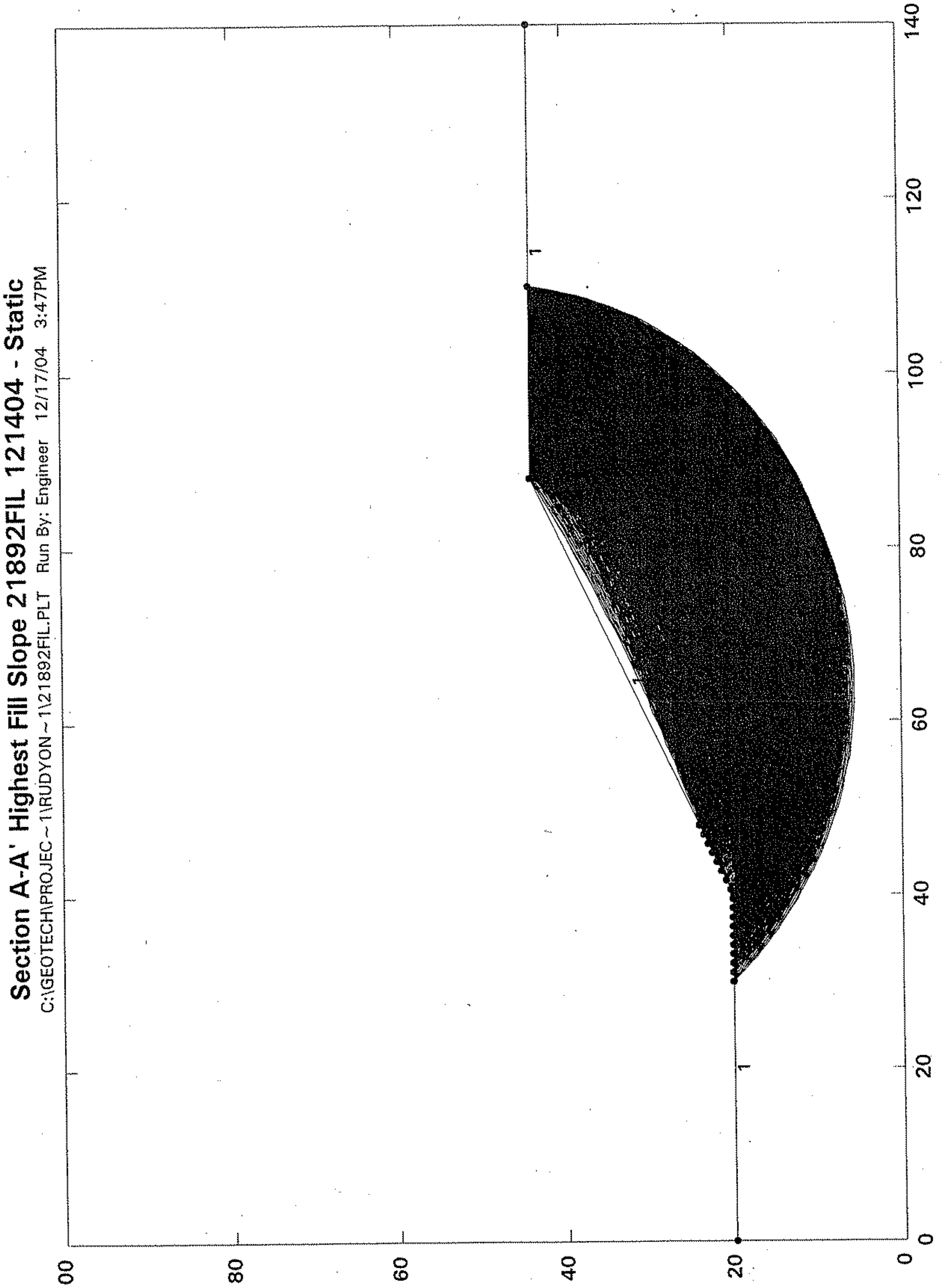
*** 1.567 ***

Section A-A' Highest Fill Slope 21892FIL 121404 - Static

C:\GEOTECH\PROJEC~1\RUDYON~1\21892FIL.PL2 Run By: Engineer 12/17/04 3:47PM



GSTABL7 FSmin = 1.91
Safety Factors Are Calculated By The Modified Bishop Method


Section A-A' Highest Fill Slope 21892FIL 121404 - Static
C:\GEOTECH\PROJEC~1\RUDYON~1\21892FIL.PLT Run By: Engineer 12/17/04 3:47PM
0
20
40
60
80
100
120
140
1
1
1

```
                    ***  GSTABL7  ***

      ** GSTABL7 by Garry H. Gregory, P.E. **

 ** Version 1.0, January 1996; Version 1.16, May 2000 **

             --Slope Stability Analysis--
           Simplified Janbu, Modified Bishop
             or Spencer`s Method of Slices
        (Based on STABL6-1986, by Purdue University)

 Run Date:                  12/17/04
 Time of Run:               3:47PM
 Run By:                    Engineer
 Input Data Filename:       C:21892FIL.DTA
 Output Filename:           C:21892FIL.OUT
 Unit System:               English

 Plotted Output Filename:   C:21892FIL.PLT


 PROBLEM DESCRIPTION   Section A-A' Highest Fill Slope
                       21892FIL 121404 - Static


 BOUNDARY COORDINATES

     3 Top   Boundaries
     3 Total Boundaries

 Boundary     X-Left      Y-Left     X-Right     Y-Right     Soil Type
   No.         (ft)        (ft)       (ft)        (ft)       Below Bnd

    1           0.00       20.00       40.00       20.00         1
    2          40.00       20.00       88.00       44.00         1
    3          88.00       44.00      140.00       44.00         1
1

 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     330.0    20.0     0.00      0.0       0
1

 A Critical Failure Surface Searching Method, Using A Random
 Technique For Generating Circular Surfaces, Has Been Specified.

 7200 Trial Surfaces Have Been Generated.

 400 Surfaces Initiate From Each Of 18 Points Equally Spaced
 Along The Ground Surface Between  X =  30.00(ft)
                              and  X =  48.00(ft)
```

Each Surface Terminates Between X = 88.00(ft)
and X = 110.00(ft)

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(ft)

2.00(ft) Line Segments Define Each Trial Failure Surface.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 36 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	39.53	20.00
2	41.45	19.43
3	43.38	18.93
4	45.34	18.52
5	47.31	18.19
6	49.30	17.94
7	51.29	17.77
8	53.29	17.68
9	55.29	17.68
10	57.29	17.76
11	59.28	17.92
12	61.27	18.16
13	63.24	18.49
14	65.20	18.90
15	67.14	19.38
16	69.06	19.95
17	70.95	20.59
18	72.81	21.32
19	74.65	22.11
20	76.45	22.99
21	78.21	23.94
22	79.93	24.95
23	81.61	26.04
24	83.24	27.20
25	84.82	28.42
26	86.35	29.71
27	87.83	31.06
28	89.25	32.47
29	90.61	33.94
30	91.90	35.46
31	93.14	37.03
32	94.31	38.66
33	95.41	40.33
34	96.44	42.04
35	97.40	43.79
36	97.50	44.00

Circle Center At X = 54.4 ; Y = 66.2 and Radius, 48.5

*** 1.911 ***

Individual data on the 37 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	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	1.4	124.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	1.9	471.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	2.0	811.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	2.0	1138.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	2.0	1449.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	2.0	1744.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	2.0	2018.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	2.0	2270.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	2.0	2499.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	2.0	2703.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	2.0	2880.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	2.0	3030.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	2.0	3152.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	1.9	3246.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	1.9	3310.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	1.9	3346.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	1.9	3353.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	1.8	3333.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	1.8	3286.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	1.8	3213.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	1.7	3116.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	1.7	2996.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	1.6	2855.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	1.6	2696.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	1.5	2520.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	1.5	2330.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	0.2	266.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	1.2	1815.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	1.4	1761.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	1.3	1449.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	1.2	1148.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33	1.2	863.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34	1.1	595.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35	1.0	348.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36	1.0	124.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37	0.1	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Failure Surface Specified By 36 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	38.47	20.00
2	40.40	19.47
3	42.34	19.01
4	44.31	18.62
5	46.28	18.32
6	48.27	18.09
7	50.27	17.94
8	52.26	17.87
9	54.26	17.88
10	56.26	17.97
11	58.26	18.13
12	60.24	18.37
13	62.22	18.69
14	64.18	19.09
15	66.12	19.56
16	68.04	20.11

17	69.94	20.74
18	71.82	21.44
19	73.66	22.21
20	75.47	23.05
21	77.25	23.97
22	79.00	24.95
23	80.70	26.00
24	82.36	27.12
25	83.97	28.30
26	85.54	29.54
27	87.05	30.84
28	88.52	32.20
29	89.93	33.62
30	91.28	35.10
31	92.58	36.62
32	93.81	38.19
33	94.98	39.82
34	96.09	41.48
35	97.13	43.19
36	97.58	44.00

Circle Center At X = 53.1 ; Y = 68.8 and Radius, 51.0

*** 1.914 ***

1

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	38.47	20.00
2	40.38	19.42
3	42.32	18.92
4	44.27	18.49
5	46.24	18.14
6	48.23	17.87
7	50.22	17.68
8	52.21	17.57
9	54.21	17.53
10	56.21	17.58
11	58.21	17.71
12	60.20	17.91
13	62.18	18.19
14	64.14	18.56
15	66.10	19.00
16	68.03	19.51
17	69.94	20.11
18	71.82	20.78
19	73.68	21.52
20	75.50	22.33
21	77.30	23.22
22	79.05	24.18
23	80.77	25.21
24	82.44	26.30
25	84.07	27.46
26	85.65	28.69
27	87.18	29.97
28	88.66	31.32
29	90.09	32.72
30	91.46	34.18
31	92.77	35.70
32	94.01	37.26
33	95.20	38.87
34	96.32	40.53
35	97.37	42.23

36	98.36	43.97
37	98.37	44.00

Circle Center At X = 54.0 ; Y = 67.9 and Radius, 50.4

*** 1.915 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	39.53	20.00
2	41.43	19.39
3	43.36	18.87
4	45.32	18.43
5	47.29	18.08
6	49.27	17.82
7	51.26	17.64
8	53.26	17.55
9	55.26	17.56
10	57.26	17.65
11	59.25	17.83
12	61.23	18.10
13	63.20	18.45
14	65.15	18.90
15	67.08	19.42
16	68.98	20.04
17	70.86	20.74
18	72.70	21.52
19	74.50	22.38
20	76.27	23.32
21	77.99	24.34
22	79.66	25.43
23	81.29	26.60
24	82.86	27.84
25	84.37	29.14
26	85.83	30.51
27	87.22	31.95
28	88.55	33.45
29	89.81	35.00
30	91.00	36.61
31	92.11	38.26
32	93.16	39.97
33	94.12	41.72
34	95.01	43.52
35	95.22	44.00

Circle Center At X = 54.2 ; Y = 62.6 and Radius, 45.0

*** 1.916 ***

1

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	38.47	20.00
2	40.38	19.41
3	42.31	18.89

4	44.27	18.46
5	46.24	18.11
6	48.22	17.85
7	50.21	17.67
8	52.21	17.58
9	54.21	17.57
10	56.21	17.65
11	58.20	17.81
12	60.19	18.05
13	62.16	18.38
14	64.12	18.80
15	66.05	19.29
16	67.97	19.87
17	69.86	20.53
18	71.72	21.27
19	73.54	22.08
20	75.33	22.98
21	77.08	23.94
22	78.79	24.99
23	80.45	26.10
24	82.06	27.28
25	83.62	28.53
26	85.13	29.85
27	86.58	31.23
28	87.97	32.67
29	89.29	34.16
30	90.56	35.71
31	91.75	37.32
32	92.88	38.97
33	93.93	40.67
34	94.91	42.41
35	95.72	44.00

Circle Center At X = 53.4 ; Y = 64.6 and Radius, 47.1

*** 1.916 ***

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	38.47	20.00
2	40.38	19.40
3	42.31	18.87
4	44.26	18.42
5	46.22	18.05
6	48.20	17.76
7	50.19	17.55
8	52.18	17.42
9	54.18	17.36
10	56.18	17.39
11	58.18	17.50
12	60.17	17.68
13	62.15	17.95
14	64.12	18.29
15	66.08	18.72
16	68.02	19.22
17	69.93	19.79
18	71.82	20.45
19	73.68	21.18
20	75.52	21.98
21	77.31	22.85
22	79.08	23.80
23	80.80	24.82
24	82.48	25.90

25	84.12	27.05
26	85.70	28.26
27	87.24	29.54
28	88.73	30.88
29	90.16	32.27
30	91.54	33.73
31	92.86	35.23
32	94.11	36.79
33	95.30	38.39
34	96.43	40.05
35	97.49	41.74
36	98.48	43.48
37	98.75	44.00

Circle Center At X = 54.5 ; Y = 67.4 and Radius, 50.1

*** 1.916 ***

1

Failure Surface Specified By 36 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	38.47	20.00
2	40.37	19.36
3	42.29	18.81
4	44.23	18.33
5	46.19	17.94
6	48.17	17.64
7	50.16	17.41
8	52.15	17.28
9	54.15	17.23
10	56.15	17.27
11	58.15	17.39
12	60.14	17.59
13	62.12	17.89
14	64.08	18.26
15	66.03	18.72
16	67.95	19.27
17	69.85	19.89
18	71.72	20.60
19	73.56	21.39
20	75.36	22.25
21	77.13	23.19
22	78.85	24.20
23	80.53	25.29
24	82.16	26.45
25	83.74	27.68
26	85.26	28.97
27	86.73	30.33
28	88.14	31.75
29	89.49	33.23
30	90.77	34.77
31	91.98	36.36
32	93.13	37.99
33	94.20	39.68
34	95.20	41.41
35	96.13	43.19
36	96.51	44.00

Circle Center At X = 54.3 ; Y = 63.9 and Radius, 46.6

*** 1.916 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	39.53	20.00
2	41.43	19.37
3	43.35	18.82
4	45.30	18.36
5	47.26	17.99
6	49.24	17.71
7	51.23	17.51
8	53.23	17.40
9	55.23	17.39
10	57.23	17.46
11	59.22	17.62
12	61.21	17.87
13	63.18	18.20
14	65.13	18.63
15	67.07	19.14
16	68.98	19.73
17	70.86	20.42
18	72.70	21.18
19	74.52	22.03
20	76.29	22.95
21	78.02	23.95
22	79.70	25.03
23	81.34	26.19
24	82.92	27.41
25	84.44	28.71
26	85.91	30.07
27	87.31	31.49
28	88.65	32.98
29	89.92	34.53
30	91.12	36.12
31	92.25	37.78
32	93.30	39.48
33	94.28	41.22
34	95.18	43.01
35	95.62	44.00

Circle Center At X = 54.6 ; Y = 62.3 and Radius, 44.9

*** 1.917 ***

1

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	38.47	20.00
2	40.41	19.50
3	42.36	19.07
4	44.33	18.72
5	46.31	18.45
6	48.30	18.26
7	50.30	18.14
8	52.30	18.11
9	54.30	18.15
10	56.29	18.28
11	58.28	18.48

12	60.26	18.76
13	62.23	19.12
14	64.18	19.55
15	66.12	20.07
16	68.03	20.66
17	69.91	21.32
18	71.77	22.06
19	73.60	22.87
20	75.40	23.75
21	77.16	24.70
22	78.87	25.72
23	80.55	26.81
24	82.19	27.97
25	83.77	29.19
26	85.31	30.46
27	86.79	31.80
28	88.23	33.20
29	89.60	34.65
30	90.92	36.16
31	92.17	37.72
32	93.37	39.32
33	94.50	40.97
34	95.56	42.66
35	96.33	44.00

Circle Center At X = 52.2 ; Y = 68.7 and Radius, 50.6

*** 1.917 ***

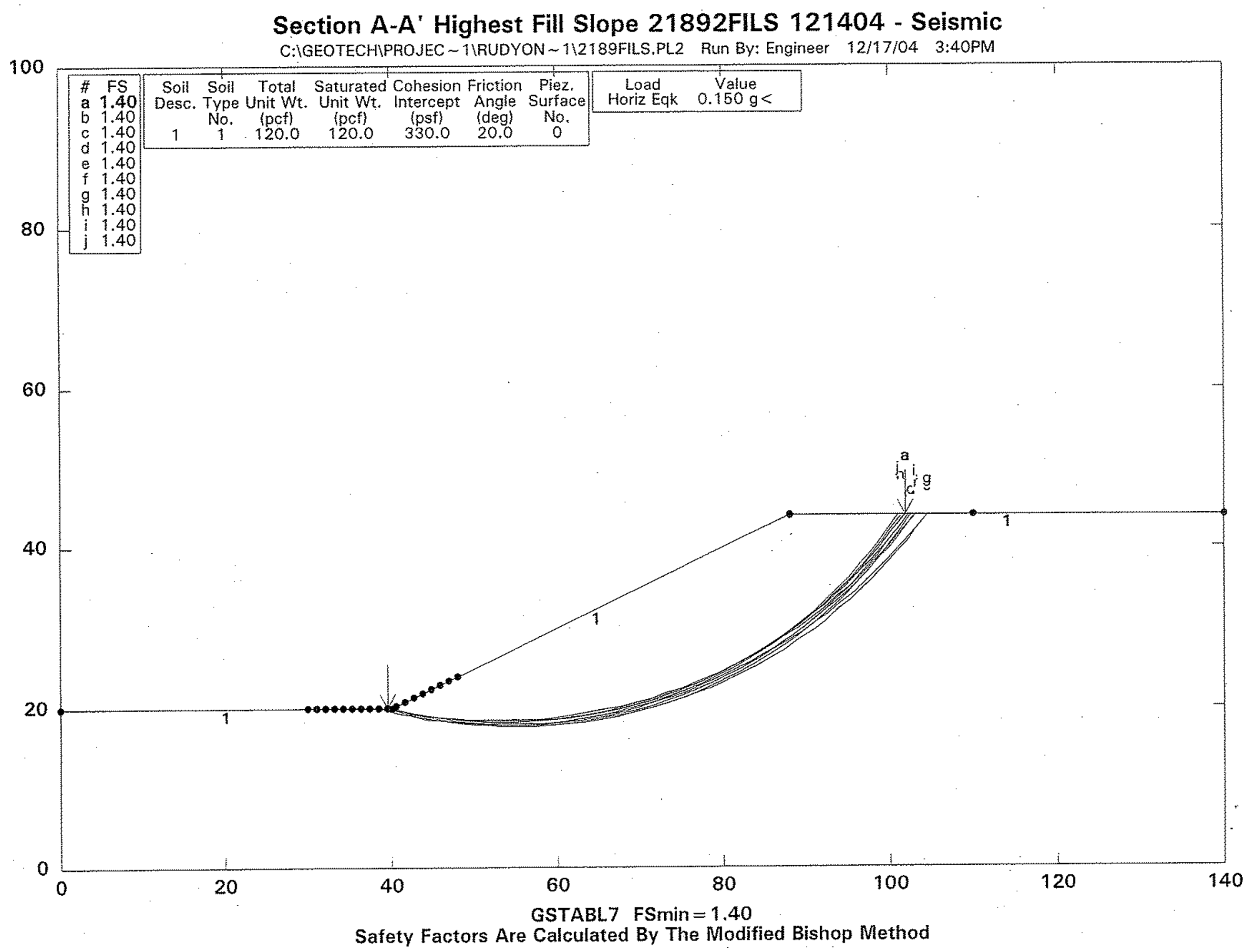
Failure Surface Specified By 36 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	38.47	20.00
2	40.41	19.53
3	42.37	19.13
4	44.35	18.81
5	46.33	18.56
6	48.32	18.38
7	50.32	18.29
8	52.32	18.26
9	54.32	18.32
10	56.32	18.45
11	58.31	18.65
12	60.29	18.93
13	62.26	19.28
14	64.21	19.71
15	66.15	20.21
16	68.06	20.79
17	69.95	21.44
18	71.82	22.16
19	73.66	22.94
20	75.46	23.80
21	77.24	24.73
22	78.97	25.72
23	80.67	26.78
24	82.33	27.90
25	83.94	29.08
26	85.51	30.32
27	87.03	31.62
28	88.50	32.98
29	89.91	34.39
30	91.27	35.86
31	92.58	37.37
32	93.83	38.94

33	95.01	40.55
34	96.14	42.20
35	97.20	43.90
36	97.26	44.00

Circle Center At X = 51.9 ; Y = 71.1 and Radius, 52.8

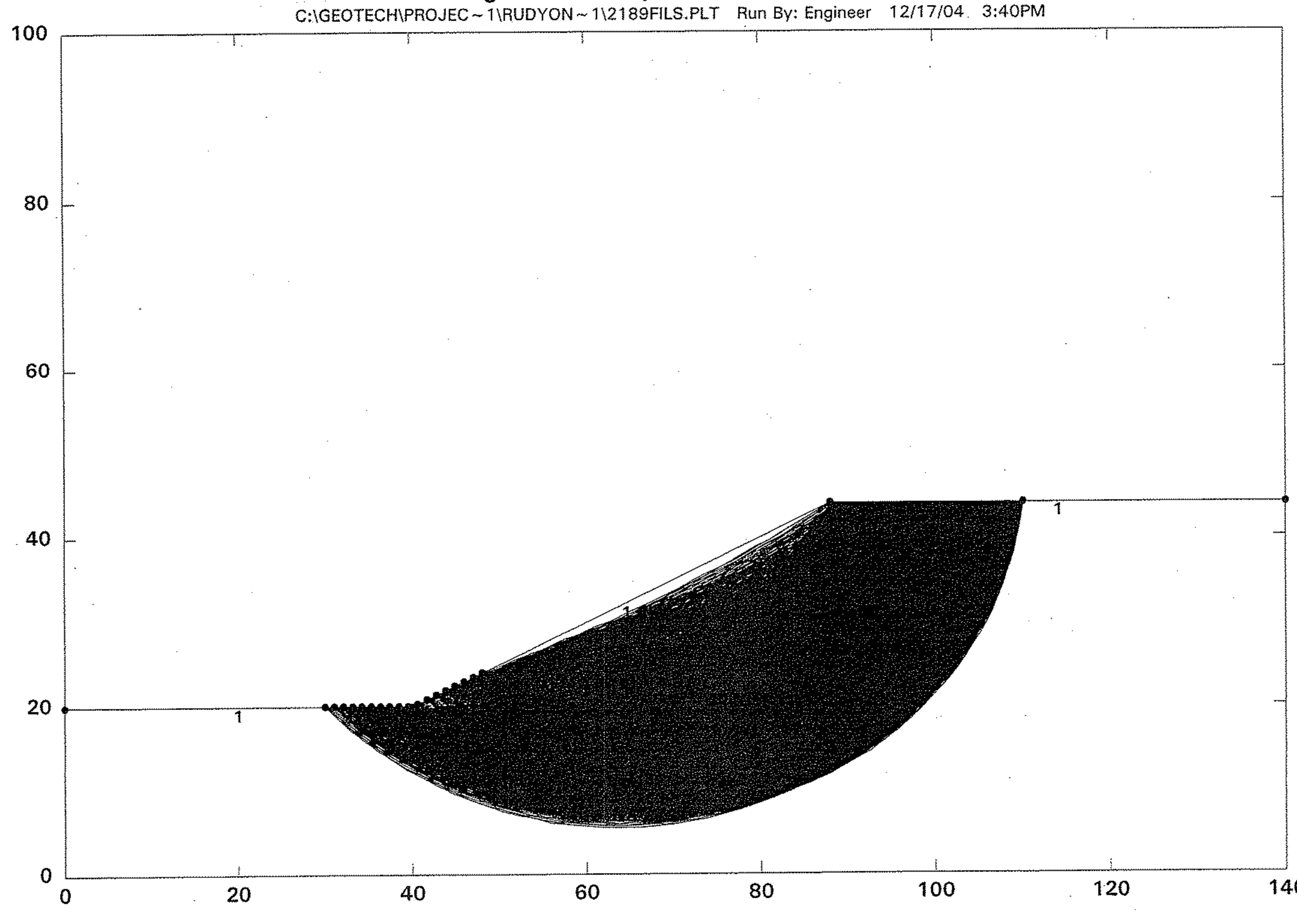
*** 1.918 ***



Work Order 2189-2-0-10
Cross-Section A-A', Pseudostatic – Highest Fill Slope
Figure C5.13

Section A-A' Highest Fill Slope 21892FILS 121404 - Seismic

C:\GEOTECH\PROJEC~1\RUDYON~1\2189FILS.PLT Run By: Engineer 12/17/04 3:40PM



Work Order 2189-2-0-10
Cross-Section A-A', Pseudostatic – Highest Fill Slope
Figure C5.14

```
                   ***  GSTABL7  ***

      ** GSTABL7 by Garry H. Gregory, P.E. **

** Version 1.0, January 1996; Version 1.16, May 2000 **

            --Slope Stability Analysis--
          Simplified Janbu, Modified Bishop
            or Spencer`s Method of Slices
     (Based on STABL6-1986, by Purdue University)

Run Date:                  12/17/04
Time of Run:               3:40PM
Run By:                    Engineer
Input Data Filename:       C:2189FILS.DTA
Output Filename:           C:2189FILS.OUT
Unit System:               English

Plotted Output Filename:   C:2189FILS.PLT


PROBLEM DESCRIPTION   Section A-A' Highest Fill Slope
                      21892FILS 121404 - Seismic


BOUNDARY COORDINATES

    3 Top   Boundaries
    3 Total Boundaries
```

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	20.00	40.00	20.00	1
2	40.00	20.00	88.00	44.00	1
3	88.00	44.00	140.00	44.00	1

1

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	330.0	20.0	0.00	0.0	0

```
A Horizontal Earthquake Loading Coefficient
Of0.150 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure =    0.0(psf)
```

1

A Critical Failure Surface Searching Method, Using A Random

Technique For Generating Circular Surfaces, Has Been Specified.

7200 Trial Surfaces Have Been Generated.

400 Surfaces Initiate From Each Of 18 Points Equally Spaced
Along The Ground Surface Between X = 30.00(ft)
and X = 48.00(ft)

Each Surface Terminates Between X = 88.00(ft)
and X = 110.00(ft)

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(ft)

2.00(ft) Line Segments Define Each Trial Failure Surface.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	39.53	20.00
2	41.48	19.54
3	43.44	19.15
4	45.41	18.83
5	47.40	18.58
6	49.39	18.39
7	51.38	18.28
8	53.38	18.23
9	55.38	18.25
10	57.38	18.35
11	59.38	18.51
12	61.36	18.74
13	63.34	19.03
14	65.31	19.40
15	67.26	19.83
16	69.19	20.34
17	71.11	20.90
18	73.01	21.54
19	74.88	22.24
20	76.73	23.00
21	78.55	23.83
22	80.34	24.72
23	82.10	25.67
24	83.83	26.68
25	85.52	27.75
26	87.17	28.88
27	88.78	30.07
28	90.35	31.30
29	91.87	32.60
30	93.35	33.94
31	94.79	35.34
32	96.17	36.78

33	97.50	38.27
34	98.78	39.81
35	100.01	41.39
36	101.18	43.01
37	101.84	44.00

Circle Center At X = 53.7 ; Y = 76.1 and Radius, 57.8

*** 1.402 ***

Individual data on the 38 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	3.1	0.0	0.0	0.0	0.0	0.5	0.0	0.0
2	1.5	115.8	0.0	0.0	0.0	0.0	17.4	0.0	0.0
3	2.0	442.8	0.0	0.0	0.0	0.0	66.4	0.0	0.0
4	2.0	763.0	0.0	0.0	0.0	0.0	114.4	0.0	0.0
5	2.0	1070.8	0.0	0.0	0.0	0.0	160.6	0.0	0.0
6	2.0	1364.8	0.0	0.0	0.0	0.0	204.7	0.0	0.0
7	2.0	1643.2	0.0	0.0	0.0	0.0	246.5	0.0	0.0
8	2.0	1904.6	0.0	0.0	0.0	0.0	285.7	0.0	0.0
9	2.0	2147.8	0.0	0.0	0.0	0.0	322.2	0.0	0.0
10	2.0	2371.6	0.0	0.0	0.0	0.0	355.7	0.0	0.0
11	2.0	2574.9	0.0	0.0	0.0	0.0	386.2	0.0	0.0
12	2.0	2756.8	0.0	0.0	0.0	0.0	413.5	0.0	0.0
13	2.0	2916.7	0.0	0.0	0.0	0.0	437.5	0.0	0.0
14	2.0	3053.9	0.0	0.0	0.0	0.0	458.1	0.0	0.0
15	2.0	3168.1	0.0	0.0	0.0	0.0	475.2	0.0	0.0
16	1.9	3259.0	0.0	0.0	0.0	0.0	488.8	0.0	0.0
17	1.9	3326.4	0.0	0.0	0.0	0.0	499.0	0.0	0.0
18	1.9	3370.6	0.0	0.0	0.0	0.0	505.6	0.0	0.0
19	1.9	3391.6	0.0	0.0	0.0	0.0	508.7	0.0	0.0
20	1.8	3389.9	0.0	0.0	0.0	0.0	508.5	0.0	0.0
21	1.8	3366.1	0.0	0.0	0.0	0.0	504.9	0.0	0.0
22	1.8	3320.7	0.0	0.0	0.0	0.0	498.1	0.0	0.0
23	1.8	3254.8	0.0	0.0	0.0	0.0	488.2	0.0	0.0
24	1.7	3169.2	0.0	0.0	0.0	0.0	475.4	0.0	0.0
25	1.7	3065.1	0.0	0.0	0.0	0.0	459.8	0.0	0.0
26	1.7	2943.7	0.0	0.0	0.0	0.0	441.6	0.0	0.0
27	0.8	1458.0	0.0	0.0	0.0	0.0	218.7	0.0	0.0
28	0.8	1330.3	0.0	0.0	0.0	0.0	199.5	0.0	0.0
29	1.6	2507.6	0.0	0.0	0.0	0.0	376.1	0.0	0.0
30	1.5	2205.7	0.0	0.0	0.0	0.0	330.9	0.0	0.0
31	1.5	1905.5	0.0	0.0	0.0	0.0	285.8	0.0	0.0
32	1.4	1608.8	0.0	0.0	0.0	0.0	241.3	0.0	0.0
33	1.4	1317.9	0.0	0.0	0.0	0.0	197.7	0.0	0.0
34	1.3	1034.8	0.0	0.0	0.0	0.0	155.2	0.0	0.0
35	1.3	761.6	0.0	0.0	0.0	0.0	114.2	0.0	0.0
36	1.2	500.2	0.0	0.0	0.0	0.0	75.0	0.0	0.0
37	1.2	252.7	0.0	0.0	0.0	0.0	37.9	0.0	0.0
38	0.7	39.3	0.0	0.0	0.0	0.0	5.9	0.0	0.0

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	39.53	20.00
2	41.46	19.48
3	43.41	19.03
4	45.37	18.65

5	47.35	18.34
6	49.33	18.10
7	51.33	17.93
8	53.33	17.84
9	55.33	17.81
10	57.32	17.86
11	59.32	17.98
12	61.31	18.18
13	63.29	18.44
14	65.27	18.77
15	67.22	19.18
16	69.17	19.66
17	71.09	20.20
18	72.99	20.82
19	74.87	21.50
20	76.73	22.25
21	78.55	23.06
22	80.35	23.94
23	82.11	24.89
24	83.84	25.90
25	85.53	26.97
26	87.18	28.10
27	88.79	29.28
28	90.36	30.53
29	91.88	31.83
30	93.35	33.18
31	94.77	34.59
32	96.14	36.05
33	97.46	37.55
34	98.72	39.10
35	99.93	40.70
36	101.07	42.34
37	102.15	44.00

Circle Center At X = 55.0 ; Y = 73.4 and Radius, 55.6

*** 1.402 ***

1

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	39.53	20.00
2	41.48	19.56
3	43.45	19.18
4	45.42	18.87
5	47.41	18.63
6	49.40	18.46
7	51.40	18.35
8	53.40	18.31
9	55.40	18.34
10	57.39	18.44
11	59.39	18.60
12	61.37	18.84
13	63.35	19.13
14	65.32	19.50
15	67.27	19.93
16	69.21	20.43
17	71.13	20.99
18	73.02	21.62
19	74.90	22.31
20	76.75	23.07
21	78.58	23.88
22	80.38	24.76

23	82.14	25.70
24	83.87	26.70
25	85.57	27.76
26	87.23	28.87
27	88.86	30.04
28	90.44	31.26
29	91.98	32.54
30	93.48	33.86
31	94.93	35.24
32	96.33	36.67
33	97.68	38.14
34	98.99	39.66
35	100.24	41.22
36	101.44	42.82
37	102.26	44.00

Circle Center At X = 53.5 ; Y = 77.4 and Radius, 59.1

*** 1.402 ***

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	39.53	20.00
2	41.45	19.46
3	43.40	18.98
4	45.36	18.58
5	47.33	18.25
6	49.31	17.99
7	51.30	17.80
8	53.30	17.68
9	55.30	17.64
10	57.30	17.67
11	59.30	17.77
12	61.29	17.95
13	63.27	18.20
14	65.25	18.51
15	67.21	18.90
16	69.16	19.36
17	71.08	19.90
18	72.99	20.50
19	74.88	21.17
20	76.74	21.90
21	78.57	22.71
22	80.37	23.58
23	82.13	24.51
24	83.87	25.51
25	85.56	26.57
26	87.22	27.70
27	88.83	28.88
28	90.40	30.12
29	91.93	31.41
30	93.40	32.76
31	94.83	34.16
32	96.20	35.61
33	97.53	37.12
34	98.79	38.66
35	100.00	40.26
36	101.15	41.89
37	102.24	43.57
38	102.50	44.00

Circle Center At X = 55.5 ; Y = 72.7 and Radius, 55.1

*** 1.403 ***

1

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	39.53	20.00
2	41.46	19.49
3	43.42	19.05
4	45.38	18.68
5	47.36	18.37
6	49.34	18.13
7	51.34	17.96
8	53.33	17.86
9	55.33	17.82
10	57.33	17.85
11	59.33	17.95
12	61.32	18.12
13	63.31	18.36
14	65.29	18.66
15	67.25	19.03
16	69.20	19.46
17	71.14	19.96
18	73.06	20.53
19	74.96	21.16
20	76.83	21.86
21	78.68	22.61
22	80.50	23.44
23	82.30	24.32
24	84.06	25.26
25	85.79	26.26
26	87.49	27.32
27	89.15	28.44
28	90.77	29.61
29	92.35	30.84
30	93.88	32.12
31	95.38	33.45
32	96.82	34.83
33	98.22	36.26
34	99.57	37.74
35	100.87	39.26
36	102.12	40.83
37	103.31	42.43
38	104.39	44.00

Circle Center At X = 55.4 ; Y = 76.8 and Radius, 58.9

*** 1.404 ***

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	39.53	20.00
2	41.49	19.59
3	43.46	19.25
4	45.44	18.96
5	47.43	18.75

6	49.42	18.60
7	51.42	18.51
8	53.42	18.49
9	55.42	18.53
10	57.41	18.63
11	59.41	18.81
12	61.39	19.04
13	63.37	19.34
14	65.34	19.71
15	67.29	20.14
16	69.23	20.63
17	71.15	21.18
18	73.05	21.80
19	74.94	22.47
20	76.79	23.21
21	78.63	24.01
22	80.44	24.87
23	82.21	25.78
24	83.96	26.75
25	85.68	27.78
26	87.36	28.87
27	89.00	30.00
28	90.61	31.19
29	92.18	32.44
30	93.71	33.73
31	95.19	35.07
32	96.63	36.46
33	98.02	37.89
34	99.37	39.37
35	100.67	40.89
36	101.92	42.45
37	103.07	44.00

Circle Center At X = 53.1 ; Y = 80.2 and Radius, 61.7

*** 1.404 ***

1

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	39.53	20.00
2	41.48	19.57
3	43.45	19.21
4	45.43	18.91
5	47.41	18.67
6	49.41	18.50
7	51.40	18.39
8	53.40	18.34
9	55.40	18.36
10	57.40	18.44
11	59.40	18.58
12	61.38	18.79
13	63.37	19.06
14	65.34	19.40
15	67.30	19.79
16	69.25	20.25
17	71.18	20.77
18	73.09	21.35
19	74.98	22.00
20	76.86	22.70
21	78.71	23.46
22	80.53	24.28
23	82.33	25.16

24	84.09	26.09
25	85.83	27.09
26	87.54	28.13
27	89.21	29.23
28	90.84	30.38
29	92.44	31.59
30	94.00	32.84
31	95.52	34.14
32	96.99	35.49
33	98.42	36.89
34	99.81	38.33
35	101.15	39.82
36	102.44	41.34
37	103.68	42.91
38	104.49	44.00

Circle Center At X = 53.9 ; Y = 81.1 and Radius, 62.8

*** 1.404 ***

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	38.47	20.00
2	40.40	19.49
3	42.35	19.04
4	44.32	18.67
5	46.30	18.37
6	48.28	18.13
7	50.28	17.97
8	52.27	17.88
9	54.27	17.86
10	56.27	17.91
11	58.27	18.03
12	60.26	18.22
13	62.24	18.48
14	64.21	18.81
15	66.17	19.22
16	68.12	19.69
17	70.04	20.23
18	71.95	20.84
19	73.83	21.51
20	75.69	22.26
21	77.52	23.07
22	79.32	23.94
23	81.08	24.87
24	82.82	25.87
25	84.51	26.93
26	86.17	28.05
27	87.79	29.23
28	89.36	30.46
29	90.89	31.75
30	92.37	33.09
31	93.81	34.49
32	95.19	35.93
33	96.52	37.42
34	97.80	38.96
35	99.02	40.55
36	100.19	42.17
37	101.29	43.84
38	101.39	44.00

Circle Center At X = 53.9 ; Y = 74.1 and Radius, 56.3

*** 1.405 ***

1

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	38.47	20.00
2	40.41	19.51
3	42.36	19.09
4	44.33	18.73
5	46.31	18.44
6	48.30	18.21
7	50.29	18.06
8	52.29	17.97
9	54.29	17.95
10	56.29	17.99
11	58.29	18.11
12	60.28	18.29
13	62.26	18.53
14	64.24	18.85
15	66.20	19.23
16	68.15	19.68
17	70.08	20.19
18	72.00	20.77
19	73.89	21.41
20	75.76	22.12
21	77.61	22.89
22	79.43	23.72
23	81.22	24.61
24	82.98	25.56
25	84.70	26.57
26	86.40	27.64
27	88.05	28.76
28	89.66	29.94
29	91.24	31.18
30	92.77	32.46
31	94.26	33.80
32	95.70	35.19
33	97.09	36.62
34	98.43	38.10
35	99.73	39.63
36	100.97	41.20
37	102.16	42.81
38	102.98	44.00

Circle Center At X = 53.9 ; Y = 77.1 and Radius, 59.2

*** 1.405 ***

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	38.47	20.00
2	40.40	19.47
3	42.35	19.01
4	44.31	18.63
5	46.28	18.31

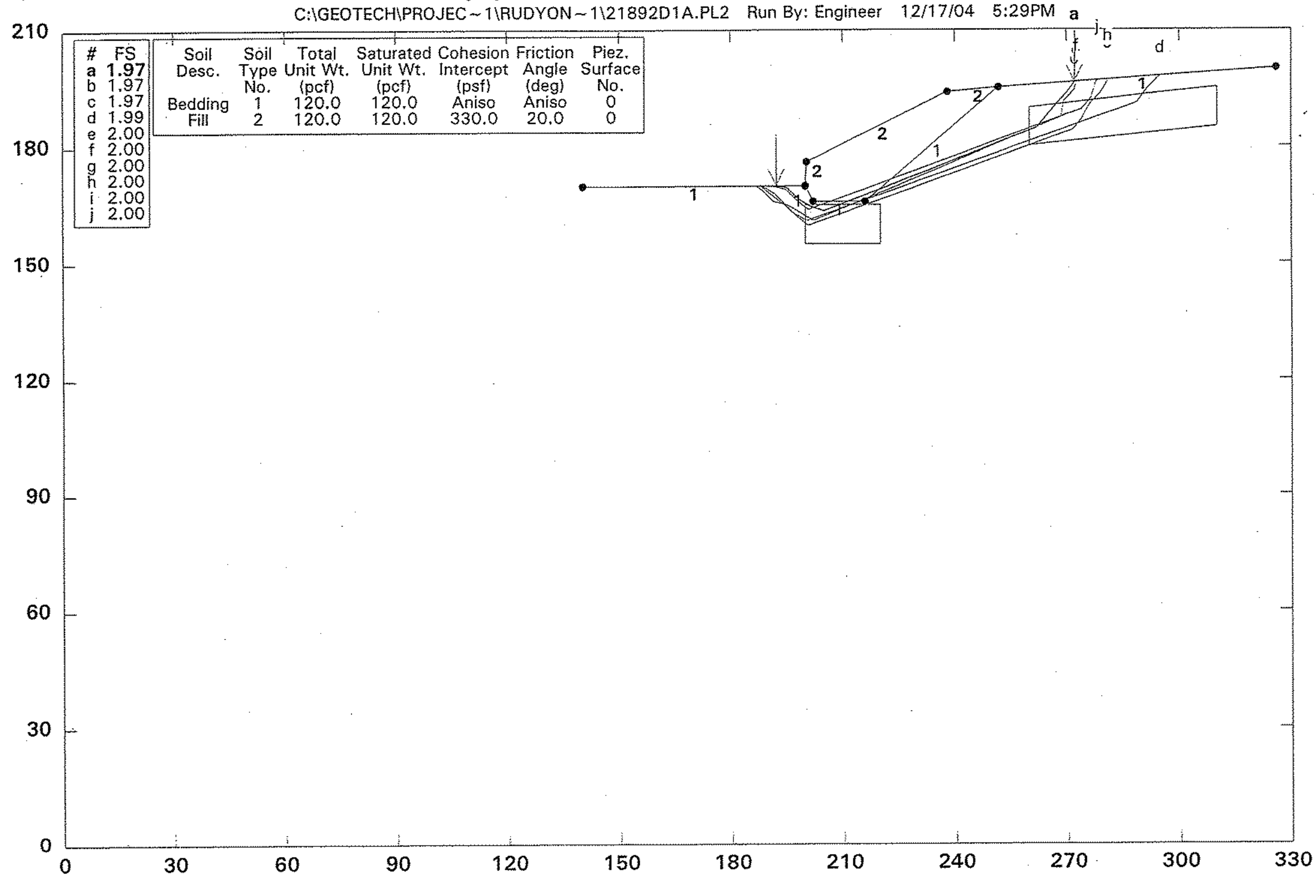
6	48.27	18.07
7	50.26	17.90
8	52.26	17.80
9	54.26	17.77
10	56.26	17.82
11	58.26	17.93
12	60.25	18.12
13	62.23	18.39
14	64.20	18.72
15	66.16	19.13
16	68.10	19.60
17	70.03	20.15
18	71.93	20.76
19	73.81	21.45
20	75.66	22.20
21	77.49	23.02
22	79.28	23.90
23	81.04	24.85
24	82.77	25.86
25	84.45	26.94
26	86.10	28.07
27	87.71	29.26
28	89.27	30.51
29	90.78	31.82
30	92.25	33.18
31	93.66	34.59
32	95.03	36.05
33	96.34	37.57
34	97.59	39.12
35	98.79	40.73
36	99.93	42.37
37	100.97	44.00

Circle Center At X = 54.0 ; Y = 72.9 and Radius, 55.2

*** 1.405 ***

Section D-D' Equip Stabilization Fill 21892D1a 121404 - Static

C:\GEOTECH\PROJEC~1\RUDYON~1\21892D1A.PL2 Run By: Engineer 12/17/04 5:29PM



GSTABL7 FSmin = 1.97

Safety Factors Are Calculated By The Simplified Janbu Method

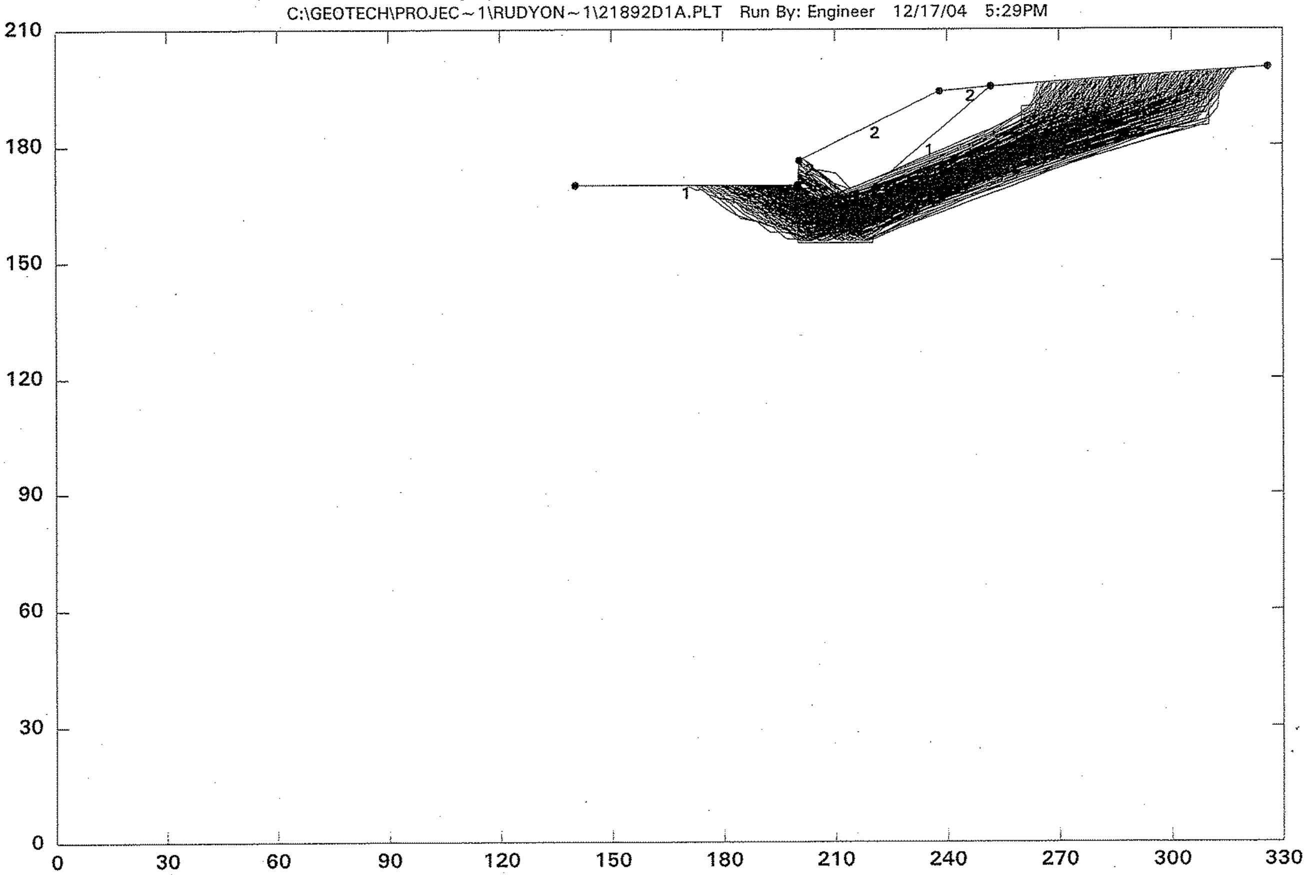
Work Order 2189-2-0-10

Cross-Section D-D', Static -- Highest Cut/Eq. Width Stab. Fill (under)

Figure C6.1

Section D-D' Equip Stabilization Fill 21892D1a   121404 - Static

C:\GEOTECH\PROJEC~1\RUDYON~1\21892D1A.PLT   Run By: Engineer   12/17/04   5:29PM



Work Order 2189-2-0-10
Cross-Section D-D', Static – Highest Cut/Eq. Width Stab. Fill (under)
Figure C6.2

```
                 ***  GSTABL7  ***

      ** GSTABL7 by Garry H. Gregory, P.E. **

** Version 1.0, January 1996; Version 1.16, May 2000 **

             --Slope Stability Analysis--
           Simplified Janbu, Modified Bishop
             or Spencer`s Method of Slices
     (Based on STABL6-1986, by Purdue University)

Run Date:                   12/17/04
Time of Run:                5:29PM
Run By:                     Engineer
Input Data Filename:        C:21892d1a.dta
Output Filename:            C:21892d1a.OUT
Unit System:                English

Plotted Output Filename:    C:21892d1a.PLT


PROBLEM DESCRIPTION   Section D-D'  Equip Stabilization Fill
                      21892D1a   121404 - Static
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BOUNDARY COORDINATES

5 Top Boundaries
8 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	140.00	170.00	200.00	170.00	1
2	200.00	170.00	200.50	176.00	2
3	200.50	176.00	238.00	194.00	2
4	238.00	194.00	252.00	195.00	2
5	252.00	195.00	326.00	200.00	1
6	200.00	170.00	202.00	166.00	1
7	202.00	166.00	216.00	166.00	1
8	216.00	166.00	252.00	195.00	1

1

ISOTROPIC SOIL PARAMETERS

2 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	29.0	0.00	0.0	0
2	120.0	120.0	330.0	20.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	18.0	500.0	29.0
2	22.0	300.0	16.0
3	90.0	500.0	29.0

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

750 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 4.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	200.00	160.00	220.00	160.00	10.00
2	260.00	185.00	310.00	190.00	10.00

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	192.41	170.00
2	195.02	169.41
3	198.10	166.86
4	201.33	164.51
5	205.16	163.33
6	262.02	184.51
7	264.64	187.53
8	267.18	190.62
9	270.01	193.45
10	272.15	196.36

*** 1.968 ***

Individual data on the 16 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot. (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	2.6	91.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	3.1	688.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	1.9	874.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.5	462.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.8	1135.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.7	976.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	3.2	5172.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	7.2	13146.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	6.8	13169.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	18.8	39389.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	14.0	27438.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	10.0	15274.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	2.6	3062.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	2.5	2088.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	2.8	1385.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	2.1	356.2	0.0	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	192.41	170.00
2	195.02	169.41
3	198.10	166.86
4	201.33	164.51
5	205.16	163.33
6	262.02	184.51
7	264.64	187.53
8	267.18	190.62
9	270.01	193.45
10	272.15	196.36

*** 1.968 ***

1

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	192.41	170.00
2	195.02	169.41
3	198.10	166.86
4	201.33	164.51
5	205.16	163.33
6	262.02	184.51
7	264.64	187.53
8	267.18	190.62
9	270.01	193.45
10	272.15	196.36

*** 1.968 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	188.09	170.00
2	190.88	168.07
3	193.86	165.40
4	197.00	162.92
5	200.56	161.09
6	289.00	191.25
7	291.56	194.32
8	294.38	197.17
9	294.92	197.90

*** 1.992 ***

1

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	186.88	170.00
2	188.47	168.66
3	191.39	165.92
4	195.25	164.86
5	198.82	163.06
6	202.22	160.94
7	268.54	187.57
8	269.41	191.48
9	272.16	194.38
10	272.78	196.40

*** 1.996 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	186.88	170.00
2	188.47	168.66
3	191.39	165.92
4	195.25	164.86
5	198.82	163.06
6	202.22	160.94
7	268.54	187.57
8	269.41	191.48
9	272.16	194.38
10	272.78	196.40

*** 1.996 ***

1

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	188.87	170.00
2	191.78	167.70
3	194.62	164.88
4	197.56	162.17
5	200.75	159.75
6	271.80	184.11
7	274.36	187.18
8	276.29	190.68
9	278.95	193.67
10	281.27	196.94
11	281.29	196.98

*** 2.001 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	188.87	170.00
2	191.78	167.70
3	194.62	164.88
4	197.56	162.17
5	200.75	159.75
6	271.80	184.11
7	274.36	187.18
8	276.29	190.68
9	278.95	193.67
10	281.27	196.94
11	281.29	196.98

*** 2.001 ***

1

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	191.26	170.00
2	194.62	169.06
3	197.57	166.36
4	200.71	163.87
5	274.05	189.55
6	276.73	192.51
7	277.96	196.32
8	278.16	196.77

*** 2.003 ***

Failure Surface Specified By 8 Coordinate Points

Point X-Surf Y-Surf

No.	(ft)	(ft)
1	191.26	170.00
2	194.62	169.06
3	197.57	166.36
4	200.71	163.87
5	274.05	189.55
6	276.73	192.51
7	277.96	196.32
8	278.16	196.77

*** 2.003 ***

Section D-D' Equip Stabilization Fill 2189D1as   121404 - Seismic

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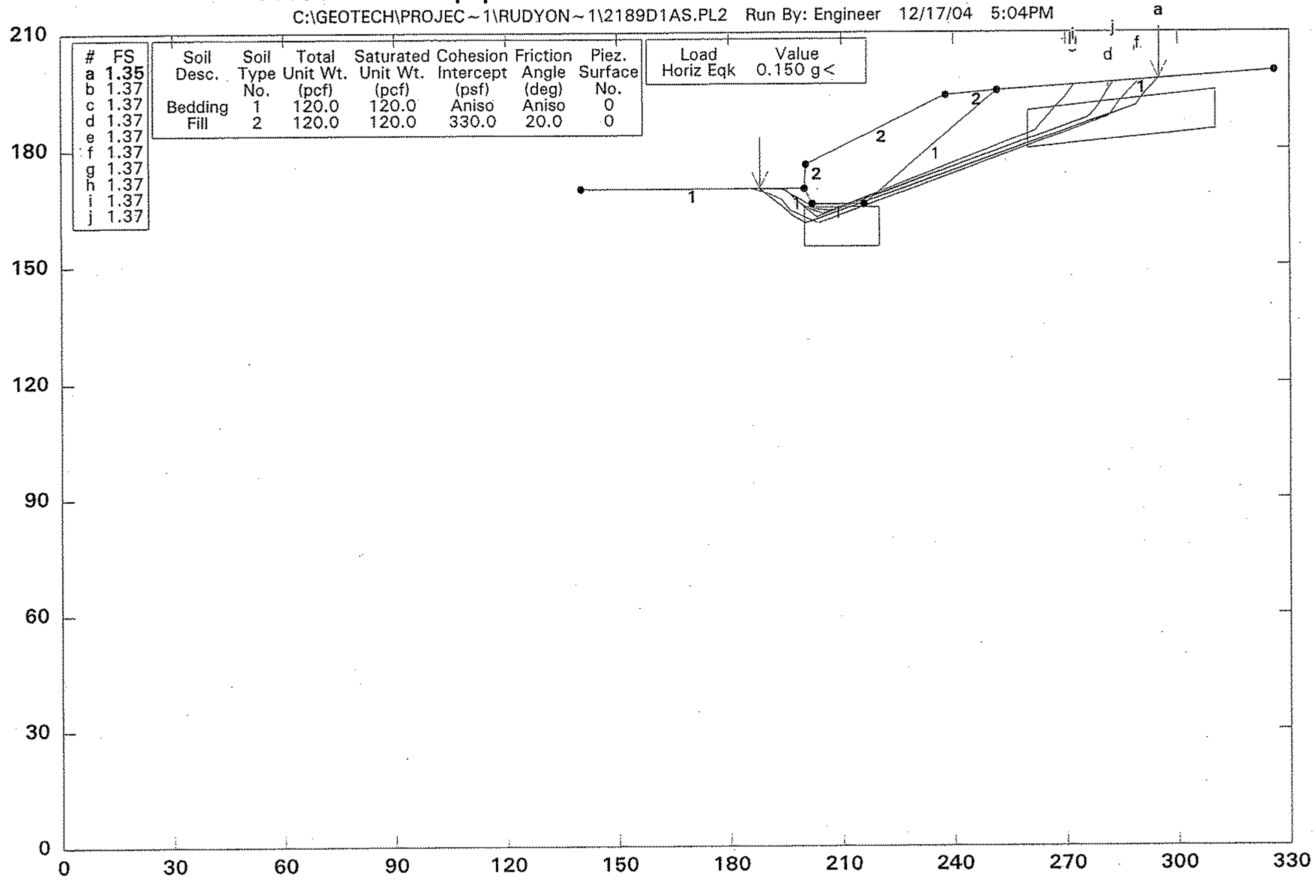


GSTABL7 FSmin = 1.35

Safety Factors Are Calculated By The Simplified Janbu Method

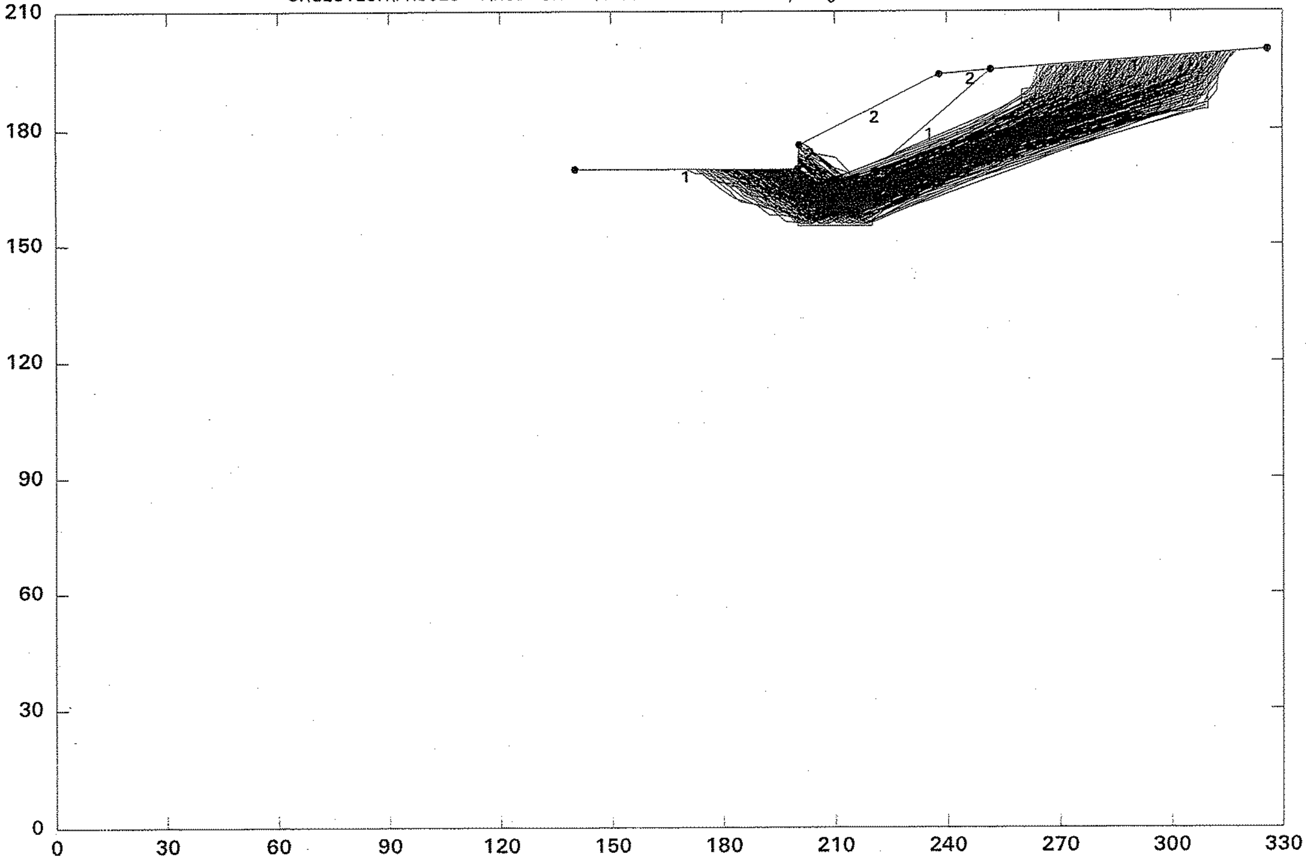
Cross-Section D-D', Pseudostatic – Highest Cut/Eq. Width Stab. Fill (under)

Work Order 2189-2-0-10

Figure C6.9

Section D-D' Equip Stabilization Fill 2189D1as   121404 - Seismic

C:\GEOTECH\PROJEC~1\RUDYON~1\2189D1AS.PLT   Run By: Engineer   12/17/04   5:04PM



Work Order 2189-2-0-10
Cross-Section D-D', Pseudostatic – Highest Cut/Eq. Width Stab. Fill (under)
Figure C6.10

*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Version 1.0, January 1996; Version 1.16, May 2000 **

--Slope Stability Analysis--
Simplified Janbu, Modified Bishop
or Spencer`s Method of Slices
(Based on STABL6-1986, by Purdue University)

Run Date: 12/17/04
Time of Run: 5:04PM
Run By: Engineer
Input Data Filename: C:2189d1as.dta
Output Filename: C:2189d1as.OUT
Unit System: English

Plotted Output Filename: C:2189d1as.PLT

PROBLEM DESCRIPTION Section D-D' Equip Stabilization Fill
2189D1as 121404 - Seismic

BOUNDARY COORDINATES

5 Top Boundaries
8 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	140.00	170.00	200.00	170.00	1
2	200.00	170.00	200.50	176.00	2
3	200.50	176.00	238.00	194.00	2
4	238.00	194.00	252.00	195.00	2
5	252.00	195.00	326.00	200.00	1
6	200.00	170.00	202.00	166.00	1
7	202.00	166.00	216.00	166.00	1
8	216.00	166.00	252.00	195.00	1

ISOTROPIC SOIL PARAMETERS

2 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	29.0	0.00	0.0	0
2	120.0	120.0	330.0	20.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	18.0	500.0	29.0
2	22.0	300.0	16.0
3	90.0	500.0	29.0

A Horizontal Earthquake Loading Coefficient
Of0.150 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0(psf)

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

750 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 4.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	200.00	160.00	220.00	160.00	10.00
2	260.00	185.00	310.00	190.00	10.00

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	188.09	170.00
2	190.88	168.07
3	193.86	165.40
4	197.00	162.92
5	200.56	161.09
6	289.00	191.25
7	291.56	194.32
8	294.38	197.17
9	294.92	197.90

*** 1.350 ***

Individual data on the 15 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	2.8	323.8	0.0	0.0	0.0	0.0	48.6	0.0	0.0
2	3.0	1168.6	0.0	0.0	0.0	0.0	175.3	0.0	0.0
3	3.1	2199.0	0.0	0.0	0.0	0.0	329.9	0.0	0.0
4	3.0	2827.6	0.0	0.0	0.0	0.0	424.1	0.0	0.0
5	0.5	705.1	0.0	0.0	0.0	0.0	105.8	0.0	0.0
6	0.1	99.1	0.0	0.0	0.0	0.0	14.9	0.0	0.0
7	1.4	2606.5	0.0	0.0	0.0	0.0	391.0	0.0	0.0
8	13.0	24924.5	0.0	0.0	0.0	0.0	3738.7	0.0	0.0
9	1.8	3722.0	0.0	0.0	0.0	0.0	558.3	0.0	0.0
10	21.2	47551.9	0.0	0.0	0.0	0.0	7132.8	0.0	0.0
11	14.0	30665.4	0.0	0.0	0.0	0.0	4599.8	0.0	0.0
12	37.0	50205.8	0.0	0.0	0.0	0.0	7530.9	0.0	0.0
13	2.6	1476.2	0.0	0.0	0.0	0.0	221.4	0.0	0.0
14	2.8	683.1	0.0	0.0	0.0	0.0	102.5	0.0	0.0
15	0.5	22.6	0.0	0.0	0.0	0.0	3.4	0.0	0.0

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	193.93	170.00
2	196.10	168.59
3	199.50	166.48
4	203.11	164.75
5	207.09	164.34
6	275.84	187.75
7	278.54	190.71
8	280.94	193.91
9	281.50	196.99

*** 1.365 ***

1

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	193.93	170.00
2	196.10	168.59
3	199.50	166.48
4	203.11	164.75
5	207.09	164.34
6	275.84	187.75
7	278.54	190.71
8	280.94	193.91
9	281.50	196.99

*** 1.365 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	193.93	170.00
2	196.10	168.59
3	199.50	166.48
4	203.11	164.75
5	207.09	164.34
6	275.84	187.75
7	278.54	190.71
8	280.94	193.91
9	281.50	196.99

*** 1.365 ***

1

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	186.07	170.00
2	186.30	169.83
3	190.15	168.74
4	193.78	167.06
5	196.61	164.23
6	200.16	162.39
7	203.94	161.09
8	281.65	188.13
9	283.97	191.39
10	286.39	194.57
11	289.20	197.42
12	289.23	197.52

*** 1.367 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	186.07	170.00
2	186.30	169.83
3	190.15	168.74
4	193.78	167.06
5	196.61	164.23
6	200.16	162.39
7	203.94	161.09
8	281.65	188.13
9	283.97	191.39
10	286.39	194.57
11	289.20	197.42
12	289.23	197.52

*** 1.367 ***

1

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	192.41	170.00
2	195.02	169.41
3	198.10	166.86
4	201.33	164.51
5	205.16	163.33
6	262.02	184.51
7	264.64	187.53
8	267.18	190.62
9	270.01	193.45
10	272.15	196.36

*** 1.373 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	192.41	170.00
2	195.02	169.41
3	198.10	166.86
4	201.33	164.51
5	205.16	163.33
6	262.02	184.51
7	264.64	187.53
8	267.18	190.62
9	270.01	193.45
10	272.15	196.36

*** 1.373 ***

1

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	192.41	170.00
2	195.02	169.41
3	198.10	166.86
4	201.33	164.51
5	205.16	163.33
6	262.02	184.51
7	264.64	187.53
8	267.18	190.62
9	270.01	193.45
10	272.15	196.36

*** 1.373 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	194.49	170.00
2	197.33	167.79
3	200.17	164.97
4	203.49	162.74
5	276.51	188.24
6	279.05	191.33
7	281.29	194.64
8	282.63	197.07

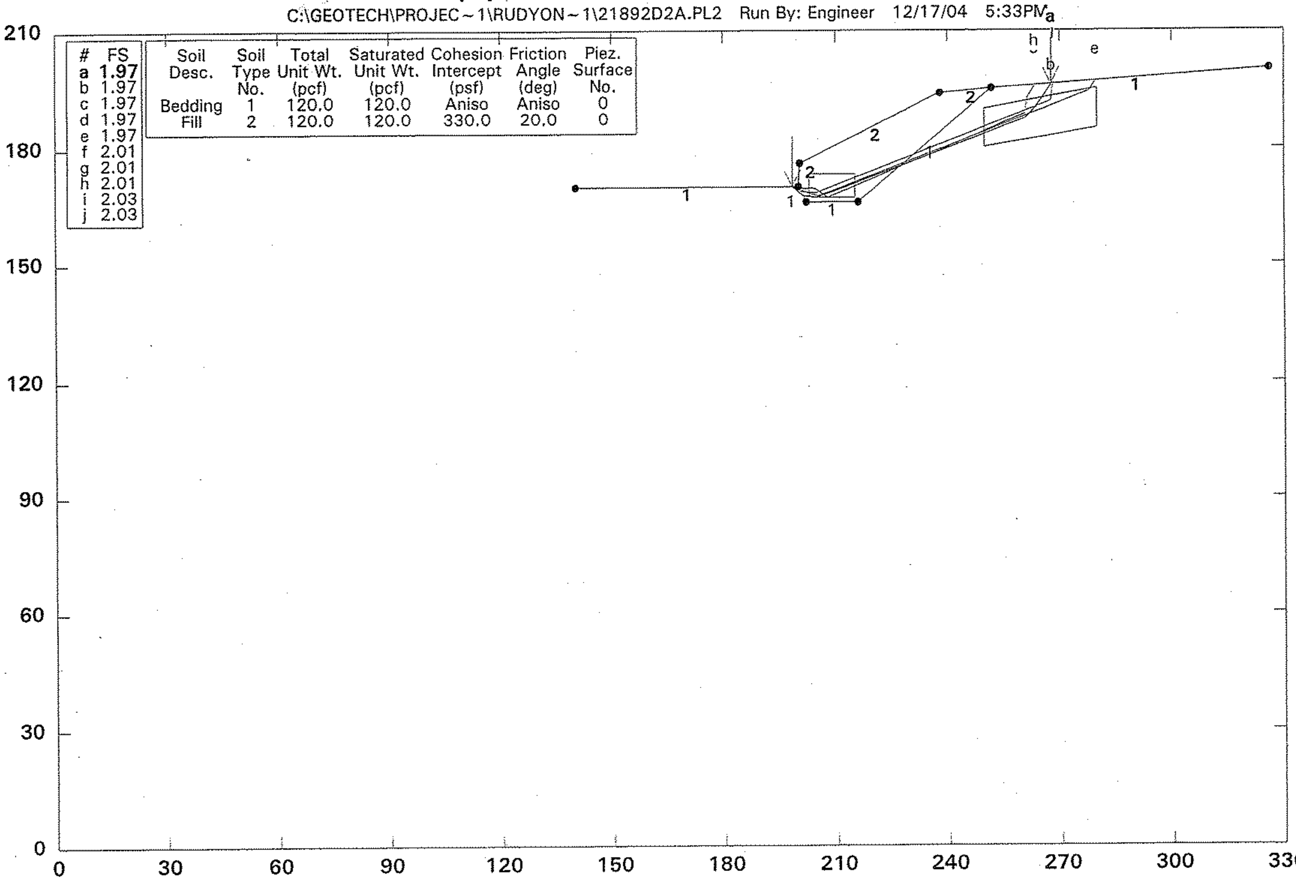
*** 1.373 ***

Section D-D' Equip Stabilization Fill 21892D2a   121404 - Static

C:\GEOTECH\PROJEC~1\RUDYON~1\21892D2A.PL2   Run By: Engineer   12/17/04   5:33PM

#	FS
a	**1.97**
b	1.97
c	1.97
d	1.97
e	1.97
f	2.01
g	2.01
h	2.01
i	2.03
j	2.03

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Bedding	1	120.0	120.0	Aniso	Aniso	0
Fill	2	120.0	120.0	330.0	20.0	0

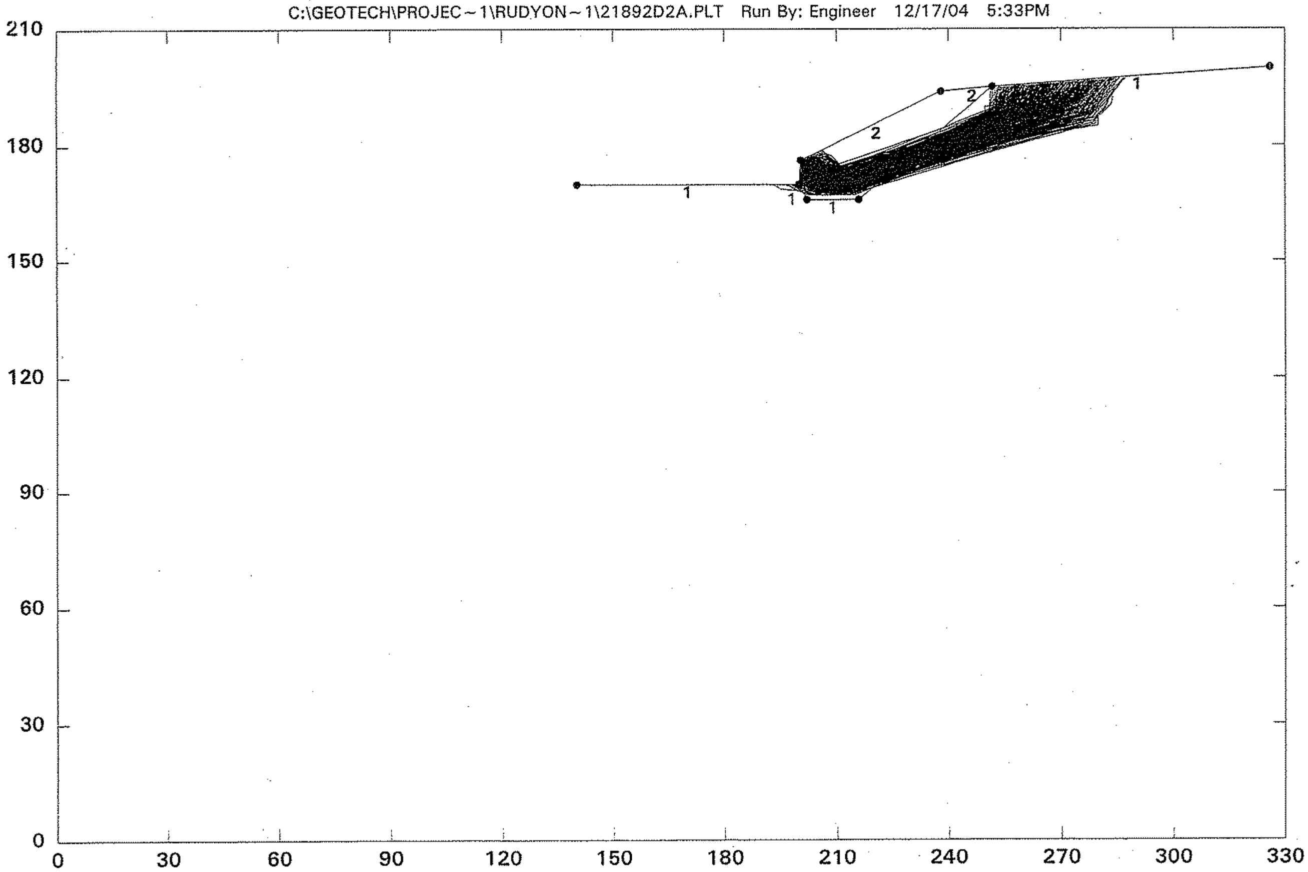


GSTABL7 FSmin = 1.97
Safety Factors Are Calculated By The Simplified Janbu Method

Cross-Section D-D', Static – Highest Cut/Eq. Width Stab. Fill (thru)
Work Order 2189-2-0-10
Figure C7.1

Section D-D' Equip Stabilization Fill 21892D2a 121404 - Static

C:\GEOTECH\PROJEC~1\RUDYON~1\21892D2A.PLT Run By: Engineer 12/17/04 5:33PM



Work Order 2189-2-0-10
Cross-Section D-D', Static – Highest Cut/Eq. Width Stab. Fill (thru)
Figure C7.2

*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Version 1.0, January 1996; Version 1.16, May 2000 **

--Slope Stability Analysis--
Simplified Janbu, Modified Bishop
or Spencer`s Method of Slices
(Based on STABL6-1986, by Purdue University)

Run Date:	12/17/04
Time of Run:	5:33PM
Run By:	Engineer
Input Data Filename:	C:21892d2a.dta
Output Filename:	C:21892d2a.OUT
Unit System:	English
Plotted Output Filename:	C:21892d2a.PLT

PROBLEM DESCRIPTION Section D-D' Equip Stabilization Fill
21892D2a 121404 - Static

BOUNDARY COORDINATES

5 Top Boundaries
8 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	140.00	170.00	200.00	170.00	1
2	200.00	170.00	200.50	176.00	2
3	200.50	176.00	238.00	194.00	2
4	238.00	194.00	252.00	195.00	2
5	252.00	195.00	326.00	200.00	1
6	200.00	170.00	202.00	166.00	1
7	202.00	166.00	216.00	166.00	1
8	216.00	166.00	252.00	195.00	1

1

ISOTROPIC SOIL PARAMETERS

2 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	29.0	0.00	0.0	0
2	120.0	120.0	330.0	20.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	18.0	500.0	29.0
2	22.0	300.0	16.0
3	90.0	500.0	29.0

1

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 4.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	203.00	170.00	215.00	170.00	6.00
2	250.00	185.00	280.00	190.00	10.00

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	198.51	170.00
2	201.16	167.49
3	205.14	167.14
4	260.79	187.30
5	263.45	190.29
6	265.92	193.44
7	267.85	196.07

*** 1.967 ***

Individual data on the 12 slices

			Water	Water	Tie	Tie	Earthquake		
			Force	Force	Force	Force	Force		Surcharge
Slice	Width	Weight	Top	Bot	Norm	Tan	Hor	Ver	Load

No.	(ft)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)
1	1.5	126.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.5	279.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.7	660.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.1	108.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	3.9	4653.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	22.3	33190.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	10.6	18147.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	14.0	21702.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	8.8	10116.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	2.7	2196.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	2.5	1184.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	1.9	289.6	0.0	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	198.51	170.00
2	201.16	167.49
3	205.14	167.14
4	260.79	187.30
5	263.45	190.29
6	265.92	193.44
7	267.85	196.07

*** 1.967 ***

1

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	200.00	169.99
2	201.47	168.52
3	205.30	167.39
4	277.78	194.28
5	279.43	196.85

*** 1.970 ***

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	200.00	169.99
2	201.47	168.52
3	205.30	167.39
4	277.78	194.28
5	279.43	196.85

*** 1.970 ***

1

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	200.00	169.99
2	201.47	168.52
3	205.30	167.39
4	277.78	194.28
5	279.43	196.85

*** 1.970 ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	199.79	170.00
2	200.68	169.65
3	204.67	169.44
4	208.01	167.24
5	260.71	188.47
6	261.31	192.42
7	263.19	195.76

*** 2.009 ***

1

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	199.79	170.00
2	200.68	169.65
3	204.67	169.44
4	208.01	167.24
5	260.71	188.47
6	261.31	192.42
7	263.19	195.76

*** 2.009 ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	199.79	170.00
2	200.68	169.65
3	204.67	169.44
4	208.01	167.24

5	260.71	188.47
6	261.31	192.42
7	263.19	195.76

*** 2.009 ***

1

Failure Surface Specified By 6 Coordinate Points

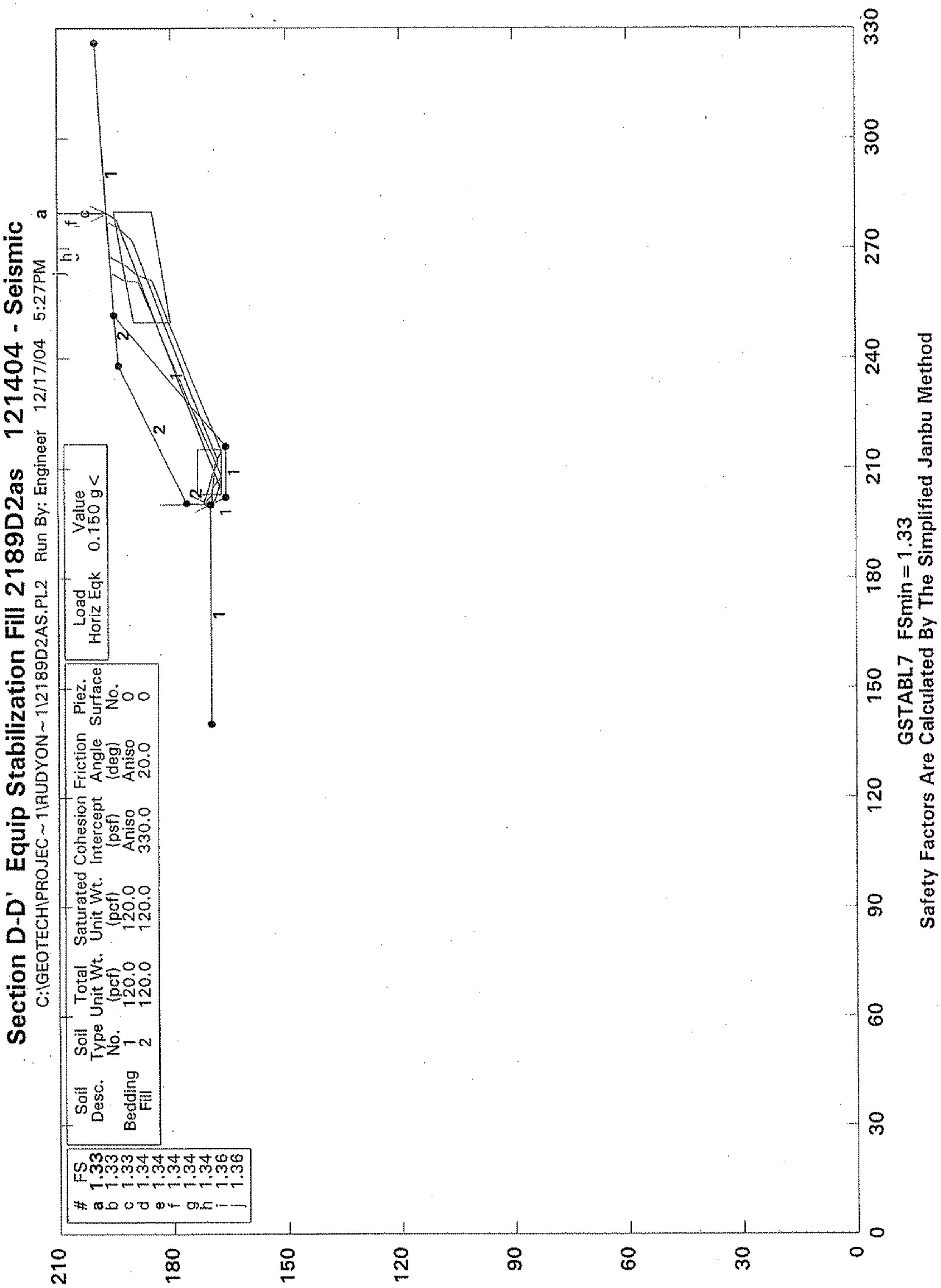
Point No.	X-Surf (ft)	Y-Surf (ft)
1	198.30	170.00
2	200.64	168.60
3	204.63	168.42
4	267.61	191.86
5	268.30	195.80
6	268.31	196.10

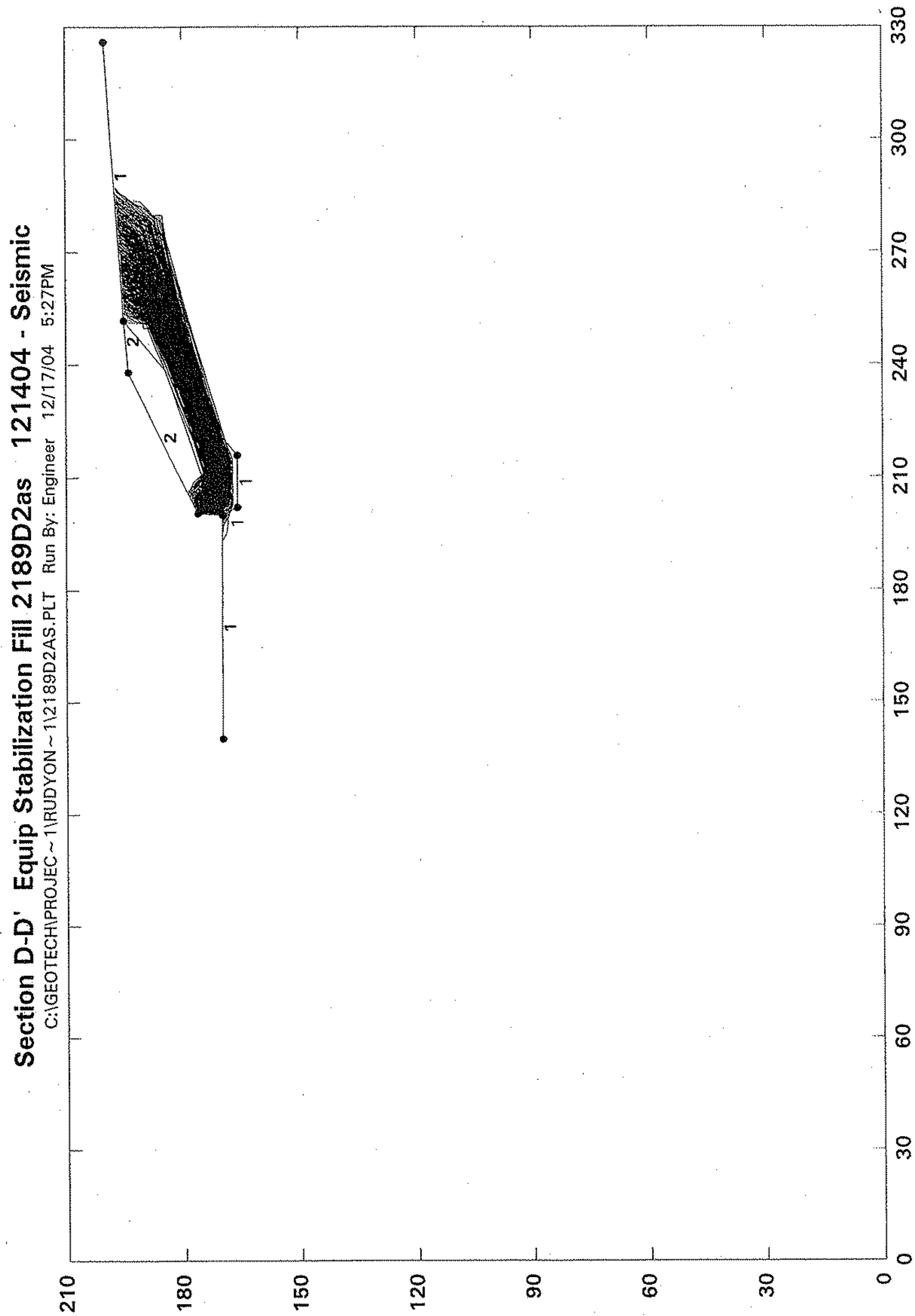
*** 2.034 ***

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	198.30	170.00
2	200.64	168.60
3	204.63	168.42
4	267.61	191.86
5	268.30	195.80
6	268.31	196.10

*** 2.034 ***


Section D-D' Equip Stabilization Fill 2189D2as 121404 - Seismic
C:\GEOTECH\PROJEC~1\RUDYON~1\2189D2AS.PL2 Run By: Engineer 12/17/04 5:27PM
FS
a 1.33
b 1.33
c 1.33
d 1.34
e 1.34
f 1.34
g 1.34
h 1.34
i 1.36
j 1.36
Soil Desc. | Soil Type No. | Total Unit Wt. (pcf) | Saturated Unit Wt. (pcf) | Cohesion Intercept (psf) | Friction Angle (deg) | Piez. Surface No.
Bedding | 1 | 120.0 | 120.0 | Aniso | Aniso | 0
Fill | 2 | 120.0 | 120.0 | 330.0 | 20.0 | 0
Load | Value
Horiz Eqk | 0.150 g<
GSTABL7 FSmin=1.33
Safety Factors Are Calculated By The Simplified Janbu Method
0
30
60
90
120
150
180
210
240
270
300
330


Section D-D' Equip Stabilization Fill 2189D2as 121404 - Seismic
C:\GEOTECH\PROJEC~1\RUDYON~1\2189D2AS.PLT Run By: Engineer 12/17/04 5:27PM
0
30
60
90
120
150
180
210
240
270
300
330
210
180
150
120
90
60
30
0
1
2
2
1
1
1

*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Version 1.0, January 1996; Version 1.16, May 2000 **

--Slope Stability Analysis--
Simplified Janbu, Modified Bishop
or Spencer`s Method of Slices
(Based on STABL6-1986, by Purdue University)

Run Date:	12/17/04
Time of Run:	5:27PM
Run By:	Engineer
Input Data Filename:	C:2189d2as.dta
Output Filename:	C:2189d2as.OUT
Unit System:	English
Plotted Output Filename:	C:2189d2as.PLT

PROBLEM DESCRIPTION Section D-D' Equip Stabilization Fill
2189D2as 121404 - Seismic

BOUNDARY COORDINATES

5 Top Boundaries
8 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	140.00	170.00	200.00	170.00	1
2	200.00	170.00	200.50	176.00	2
3	200.50	176.00	238.00	194.00	2
4	238.00	194.00	252.00	195.00	2
5	252.00	195.00	326.00	200.00	1
6	200.00	170.00	202.00	166.00	1
7	202.00	166.00	216.00	166.00	1
8	216.00	166.00	252.00	195.00	1

1

ISOTROPIC SOIL PARAMETERS

2 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	29.0	0.00	0.0	0
2	120.0	120.0	330.0	20.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	18.0	500.0	29.0
2	22.0	300.0	16.0
3	90.0	500.0	29.0

A Horizontal Earthquake Loading Coefficient
Of0.150 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0(psf)

1

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 4.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	203.00	170.00	215.00	170.00	6.00
2	250.00	185.00	280.00	190.00	10.00

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	200.00	169.99
2	201.47	168.52
3	205.30	167.39
4	277.78	194.28
5	279.43	196.85

*** 1.330 ***

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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.5	195.4	0.0	0.0	0.0	0.0	29.3	0.0	0.0
3	1.0	839.6	0.0	0.0	0.0	0.0	125.9	0.0	0.0
4	3.8	4339.9	0.0	0.0	0.0	0.0	651.0	0.0	0.0
5	23.0	33632.4	0.0	0.0	0.0	0.0	5044.9	0.0	0.0
6	9.7	16177.1	0.0	0.0	0.0	0.0	2426.6	0.0	0.0
7	14.0	20797.7	0.0	0.0	0.0	0.0	3119.6	0.0	0.0
8	25.8	19707.9	0.0	0.0	0.0	0.0	2956.2	0.0	0.0
9	1.7	243.6	0.0	0.0	0.0	0.0	36.5	0.0	0.0

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	200.00	169.99
2	201.47	168.52
3	205.30	167.39
4	277.78	194.28
5	279.43	196.85

*** 1.330 ***

1

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	200.00	169.99
2	201.47	168.52
3	205.30	167.39
4	277.78	194.28
5	279.43	196.85

*** 1.330 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	200.14	171.71
2	200.54	171.51
3	204.36	170.32
4	208.28	169.52
5	211.93	167.87
6	272.07	190.14
7	274.89	192.97
8	276.93	196.41

9	277.22	196.70

*** 1.343 ***

1

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	200.14	171.71
2	200.54	171.51
3	204.36	170.32
4	208.28	169.52
5	211.93	167.87
6	272.07	190.14
7	274.89	192.97
8	276.93	196.41
9	277.22	196.70

*** 1.343 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	200.14	171.71
2	200.54	171.51
3	204.36	170.32
4	208.28	169.52
5	211.93	167.87
6	272.07	190.14
7	274.89	192.97
8	276.93	196.41
9	277.22	196.70

*** 1.343 ***

1

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	200.12	171.47
2	202.95	169.47
3	206.92	168.98
4	210.90	168.65
5	214.59	167.10
6	261.27	185.15
7	262.67	188.90
8	265.38	191.84
9	267.20	195.40
10	267.74	196.06

*** 1.344 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	200.12	171.47
2	202.95	169.47
3	206.92	168.98
4	210.90	168.65
5	214.59	167.10
6	261.27	185.15
7	262.67	188.90
8	265.38	191.84
9	267.20	195.40
10	267.74	196.06

*** 1.344 ***

1

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	199.79	170.00
2	200.68	169.65
3	204.67	169.44
4	208.01	167.24
5	260.71	188.47
6	261.31	192.42
7	263.19	195.76

*** 1.356 ***

Failure Surface Specified By 7 Coordinate Points

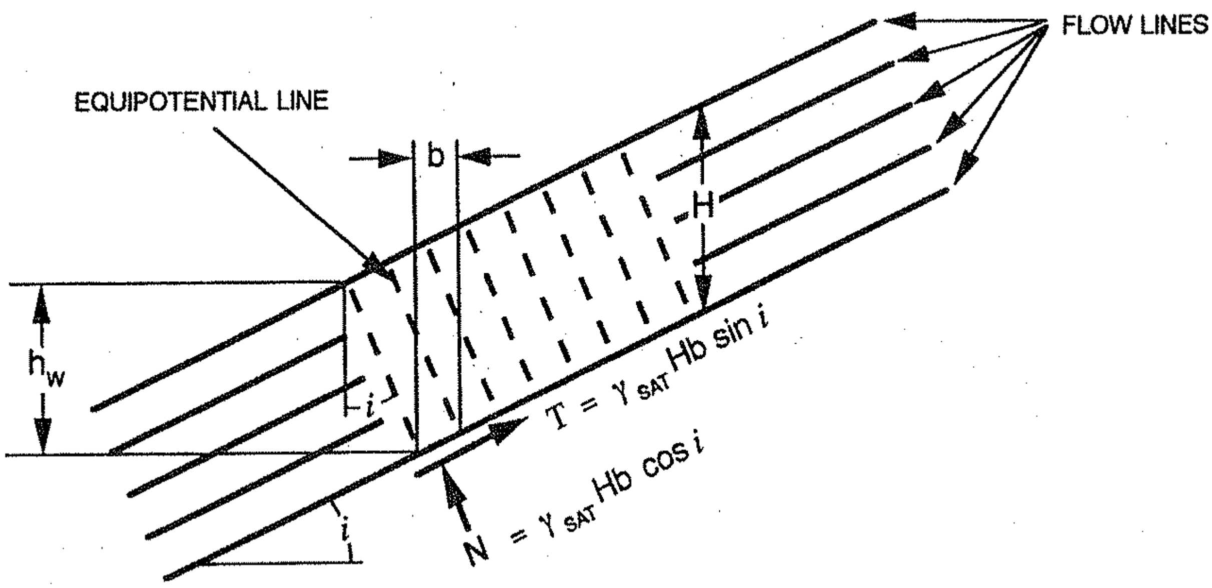
Point No.	X-Surf (ft)	Y-Surf (ft)
1	199.79	170.00
2	200.68	169.65
3	204.67	169.44
4	208.01	167.24
5	260.71	188.47
6	261.31	192.42
7	263.19	195.76

*** 1.356 ***

Gorian and Associates, Inc.
Applied Earth Sciences and Environmental Studies

Surficial Slope Stability

(Seepage Parallel to Slope)



$$T = \frac{T}{b/\cos i} \quad \frac{\gamma_{SAT} H \sin i \cos i}{b/\cos i} = \gamma_{SAT} H \sin i \cos i = \text{TANGENTIAL STRESS}$$

$$\sigma = \frac{N}{b/\cos i} - h_w \gamma_w = \gamma_{SAT} H \cos^2 i - h_w \gamma_w \quad \gamma' H \cos^2 = \text{NORMAL STRESS}$$

$$F.S. = \frac{C}{\gamma_{SAT} H \cos^2 i \tan i} + \frac{\gamma' \tan\phi}{\gamma_{SAT} \tan i}$$

$$F.S. = \frac{225}{192.18} + \frac{20.96}{60.09}$$

C	=	225	psf
ϕ	=	20	degrees
$\tan \phi$	=	0.36	
i	=	26.6	degrees
$\tan i$	=	0.50	
$\cos^2 i$	=	0.80	
H	=	4	feet
γ_{SAT}	=	120	pcf
γ'	=	57.6	pcf

FACTOR OF SAFETY = 1.52

Work Order: 2189-2-0-10
Date: 12/14/04

Reference: Soil Mech. and Found., Parcher, Measn, 1967

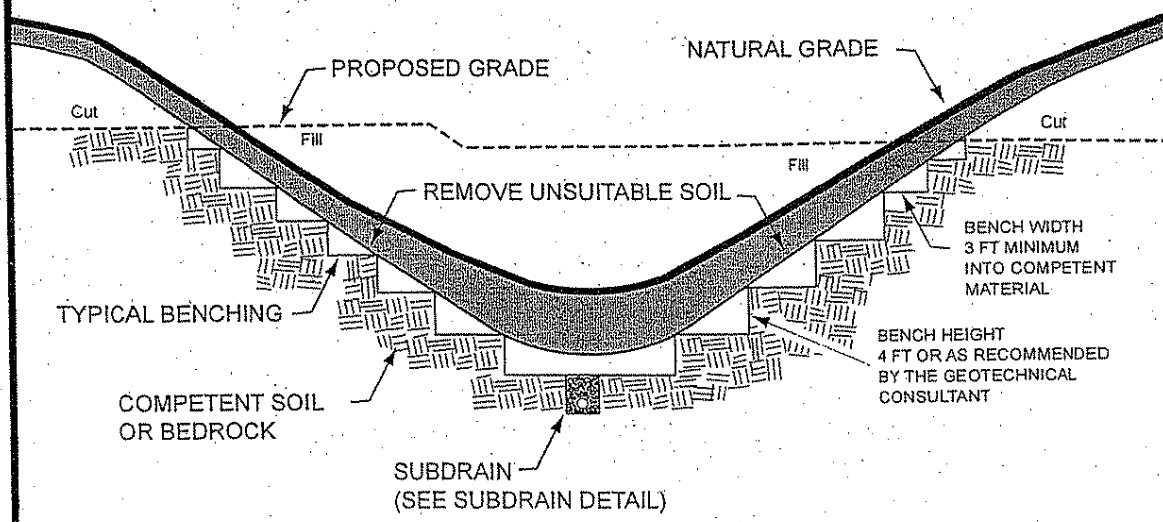
APPENDIX D

TYPICAL CONSTRUCTION DETAILS

CANYON CLEANOUT AND BENCHING

TYPICAL DETAIL

(GENERALIZED TRANSVERSE SECTION)

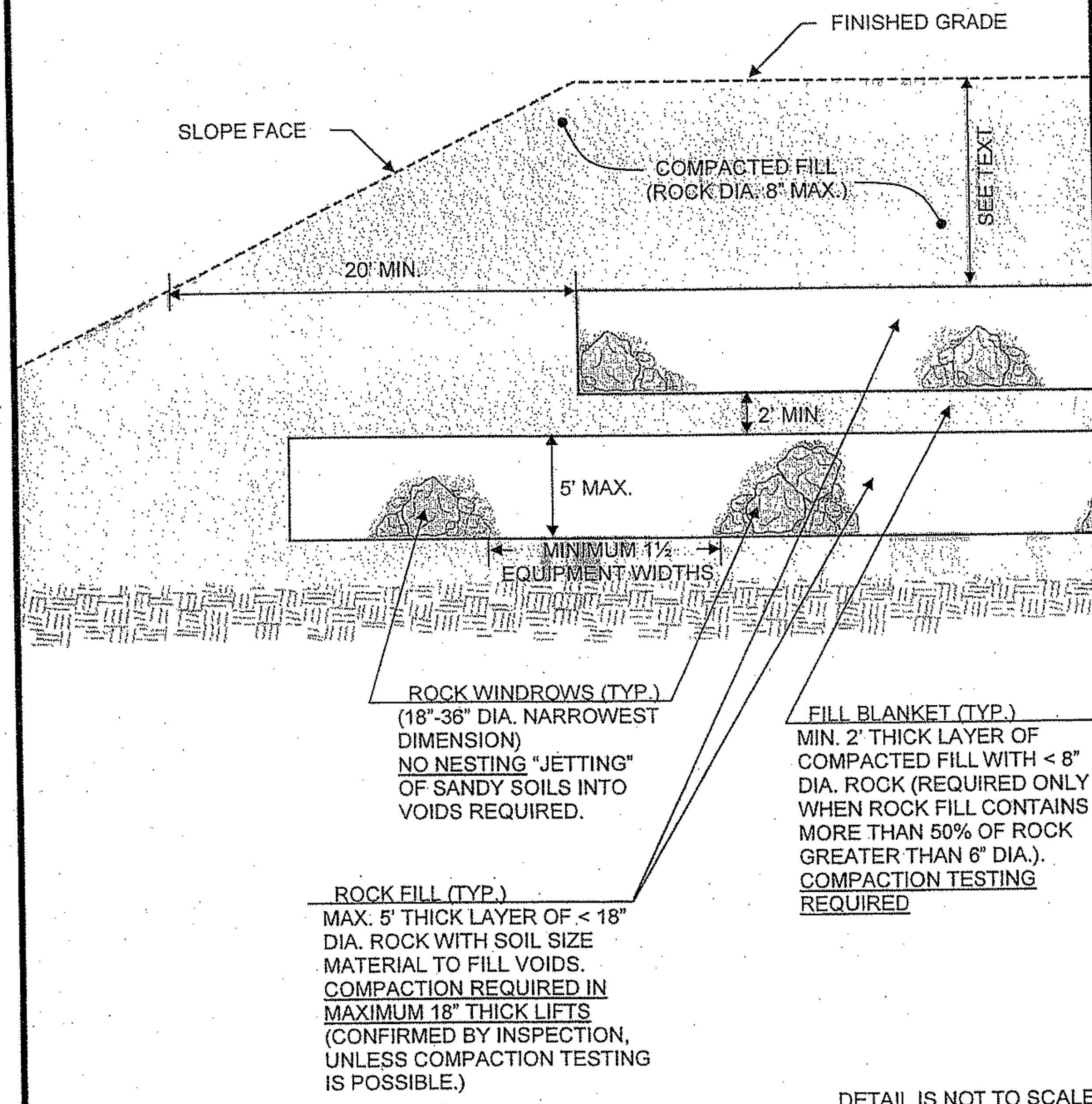


DETAIL IS NOT TO SCALE

Cyncln1.ai

GORIAN & ASSOCIATES, INC.

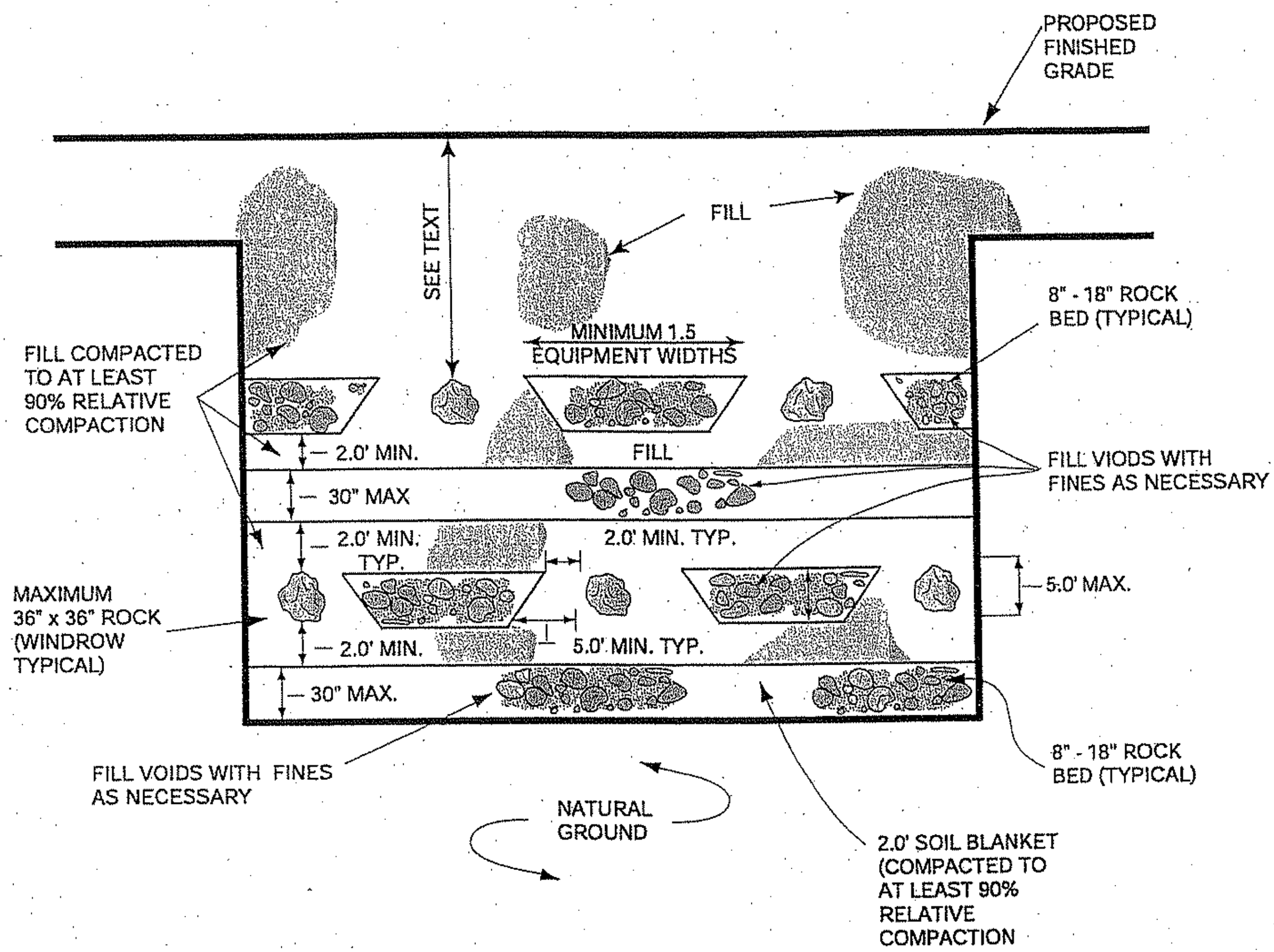
ROCK DISPOSAL
TYPICAL DETAIL



GORIAN & ASSOCIATES, INC.

ROCK DISPOSAL

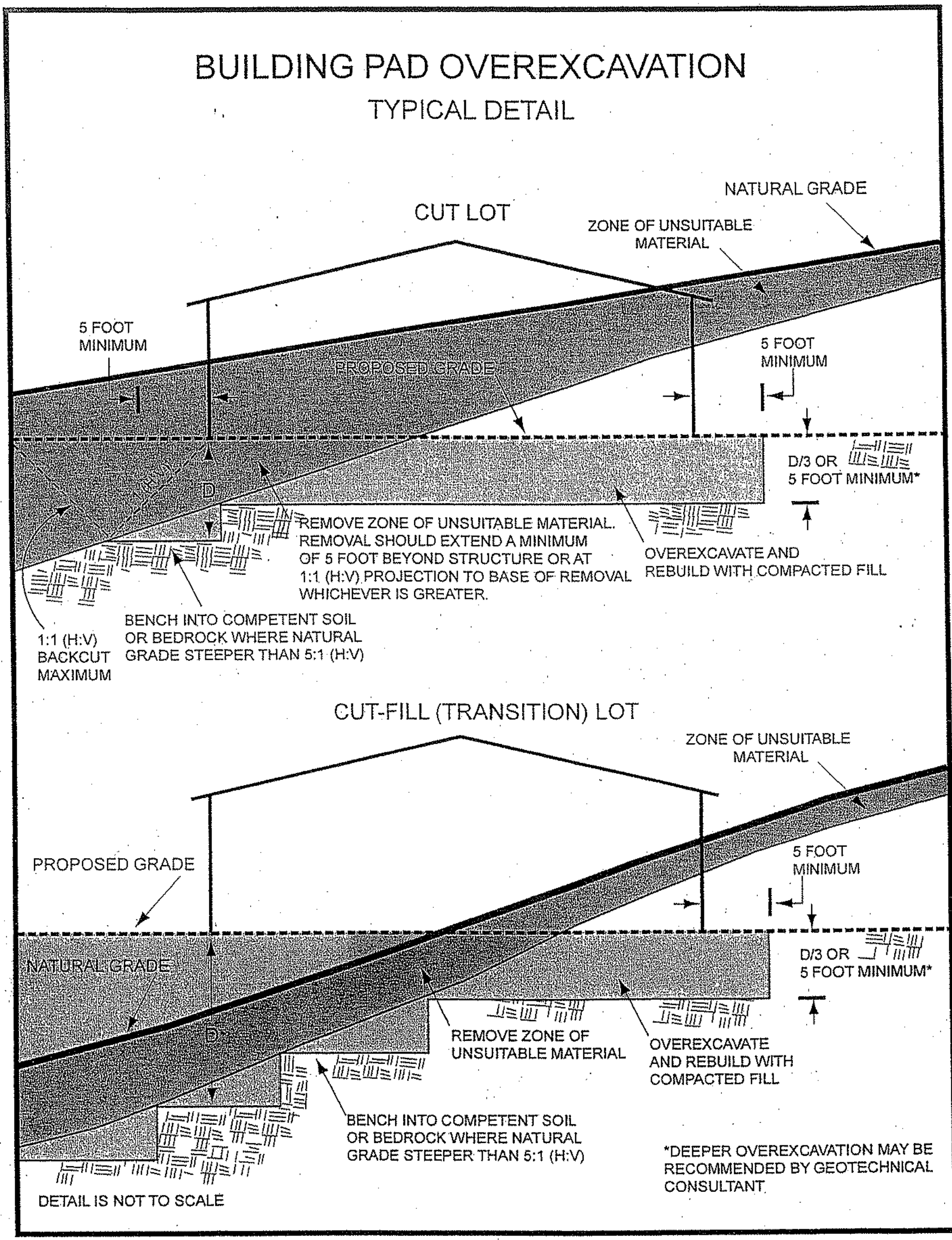
TYPICAL DETAIL



NOTE:
ROCK SHOULD BE KEPT 20 FEET
FROM THE SLOPE FACE

GORIAN & ASSOCIATES, INC.

RockDisposal.ai



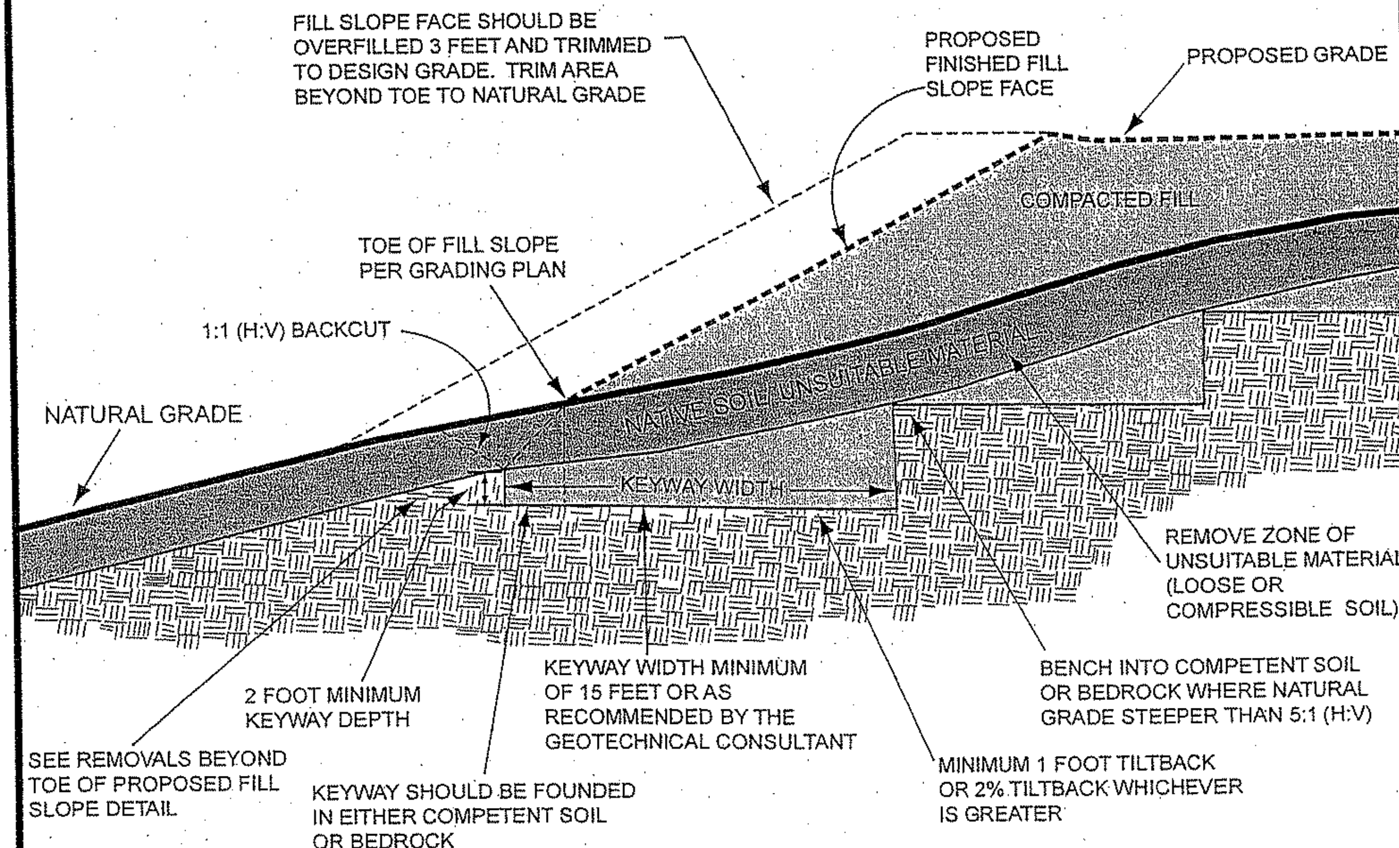
overex1.ai

GORIAN & ASSOCIATES, INC.

FILL SLOPE ABOVE NATURAL SLOPE

TYPICAL DETAIL

(PROFILE VIEW)



BACKDRAIN MAY BE RECOMMENDED. CHECK WITH GEOTECHNICAL CONSULTANT

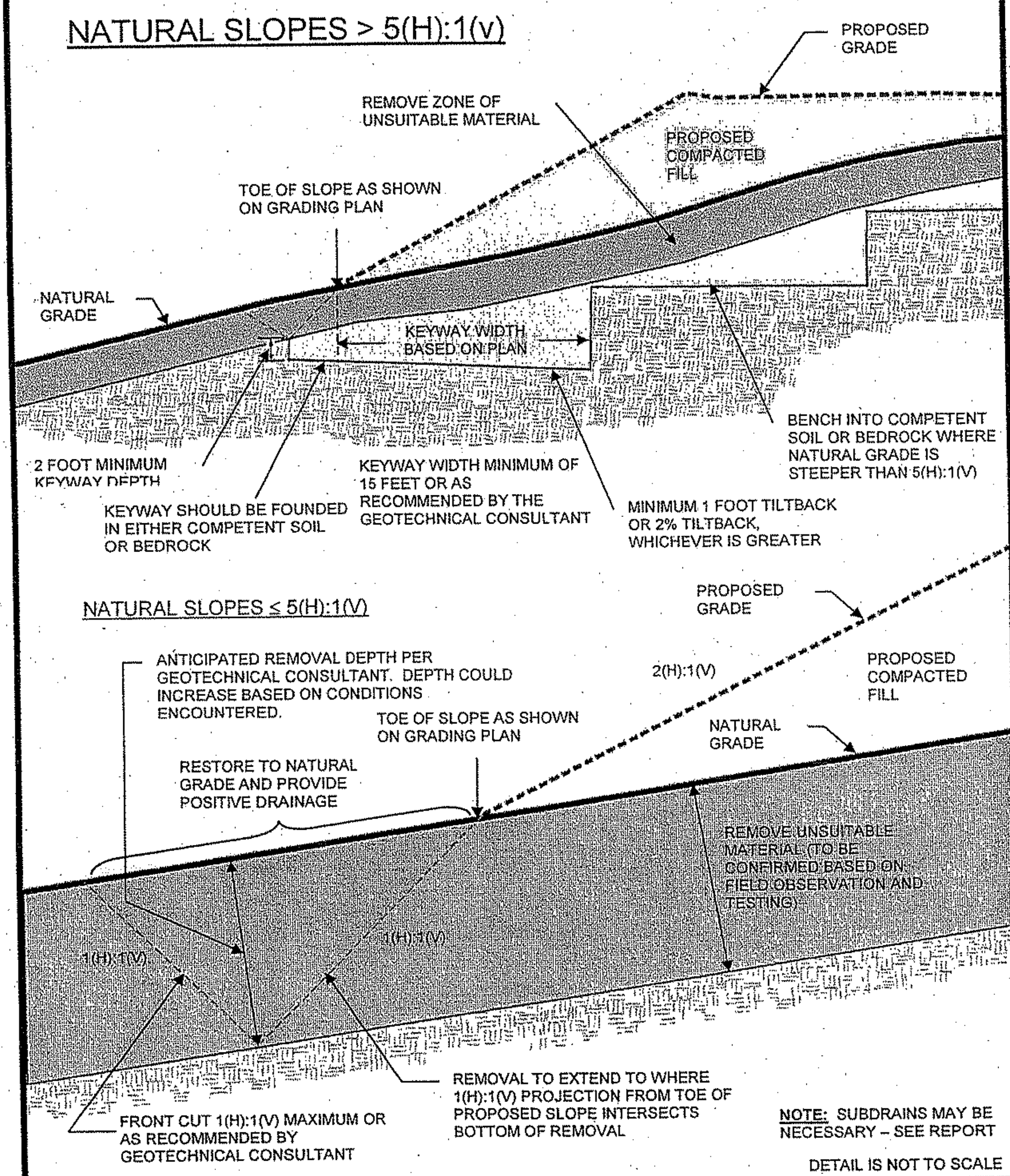
DETAIL IS NOT TO SCALE

GORIAN & ASSOCIATES, INC.

FilNatv1.ai

REMOVALS BEYOND TOE OF PROPOSED FILL SLOPES

TYPICAL DETAIL

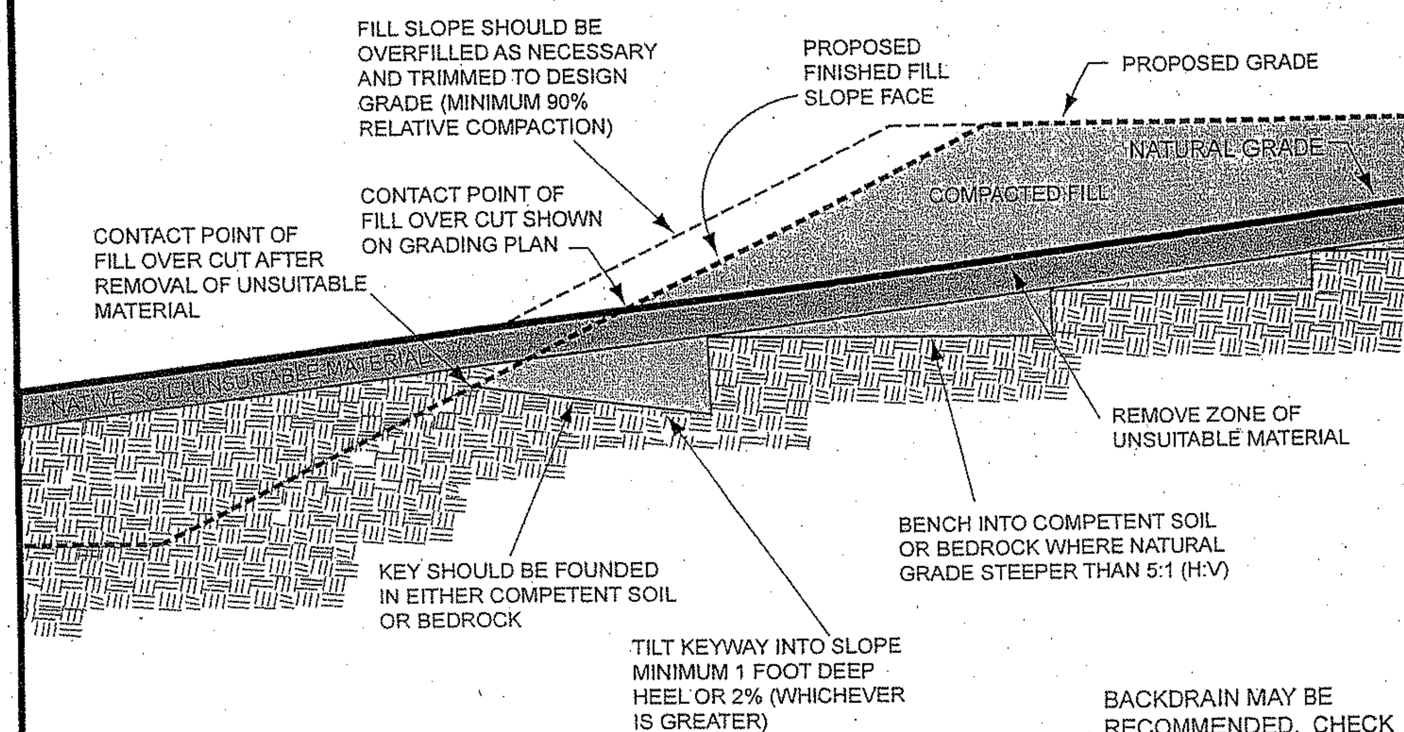


FillSlopeRemovals2.doc

GORIAN & ASSOCIATES, INC.

FILL SLOPE OVER CUT SLOPE AND BENCHING

TYPICAL DETAIL



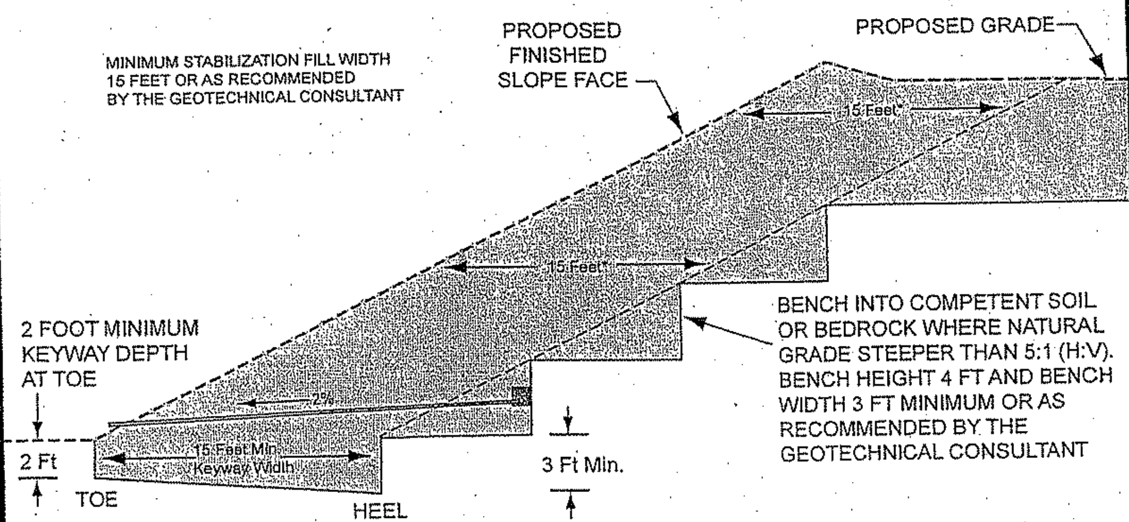
BACKDRAIN MAY BE RECOMMENDED. CHECK WITH GEOTECHNICAL CONSULTANT.

DETAIL IS NOT TO SCALE

GORIAN & ASSOCIATES, INC.

STABILIZATION FILL

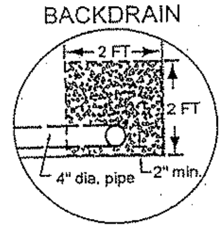
TYPICAL DETAIL



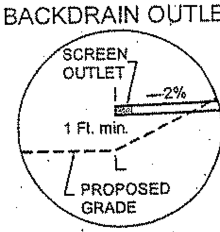
NOTES:

1. KEYWAY MINIMUM WIDTH 15 FEET OR AS RECOMMENDED BY THE GEOTECHNICAL CONSULTANT. KEYWAY SHOULD BE FOUNDED IN EITHER FIRM NATURAL SOIL OR BEDROCK.
2. TILT KEYWAY INTO SLOPE; HEEL MINIMUM 1 FOOT DEEPER THAN TOE OR 2% GRADE TOWARD HEEL (WHICHEVER IS GREATER).
3. TYPICAL BACKDRAIN 4 CUBIC FEET OF CLEAN 3/4 INCH GRAVEL PER LINEAL FOOT OF BACKDRAIN. GRAVEL SHOULD BE WRAPPED IN FILTER FABRIC.
4. PIPE SHOULD BE 4 INCH PVC, ABS, OR APPROVED SUBSTITUTE (PVC SCHEDULE 40, ABS - SDR 35).
5. BACKDRAIN PIPE SHOULD BE PERFORATED AND PERFORATIONS SHOULD BE PLACED FACING DOWN.
6. OUTLET PIPE SHOULD BE NON-PERFORATED AND CONNECTED TO THE PERFORATED PIPE BY "L" OR "T" JOINTS.
7. BACKDRAIN SHOULD EXTEND LENGTH OF STABILIZATION FILL, SHOULD BE SLOPED TOWARD OUTLETS, AND OUTLETS PROVIDED EVERY 100 FEET OR AS SPECIFIED BY THE GEOTECHNICAL CONSULTANT.

BACKDRAIN



BACKDRAIN OUTLET



DETAIL IS NOT TO SCALE

GORIAN & ASSOCIATES, INC.

stabfil.ai

GORIAN & ASSOCIATES, INC.

Applied Earth Sciences
Geotechnical
Engineers
and Geologists

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805 375-9262
818 889-2137
FAX 805 375-9263

January 13, 2005

Amir Rudyan
8245 Remmet Avenue
Canoga Park, California 91304

Work Order: 2189-2-0-11
Log Number: 23609

Subject: **SUPPLEMENTAL GEOTECHNICAL INVESTIGATION, SLOPE STABILITY EVALUATION OF RAISED BUILDING PAD, PROPOSED RESIDENTIAL DEVELOPMENT, APN 2072-001-004, 23604 DRY CANYON-COLD CREEK ROAD, CITY OF CALABASAS, CALIFORNIA.**

Reference: Gorian and Associates, Inc., December 17, 2004, Feasibility Level Geologic and Geotechnical Engineering Site Investigation, Proposed Residential Development, APN 2072-001-004, 23604 Dry Canyon-Cold Creek Road, City of Calabasas, California. Work Order 2189-2-0-10, Log Number 23412.

The following report presents a supplemental evaluation of slope stability for the subject project. The purpose of the supplemental evaluation was to consider the possible impact of raising the subject building pad from elevation 1270 to elevation 1275. The pad elevation revision was a solution to a request by the City of Calabasas Planning Department, that the quantity of grading be reduced. Accordingly we have prepared the attached revised Geotechnical Map, Plate 1 and revised Geotechnical Cross-sections; Plates 2 through 4 to reflect the new proposed building pad. No change was made to the Geotechnical Cross-sections other than that for the new proposed grading.

As discussed in the referenced report, natural and manufactured slopes within the proposed development contend with potential slope instability due to existing conditions and/or adverse geologic structure. The reader is referred to Appendix C of the referenced report for a detailed discussion of the methods, techniques and material strengths used in our Stability Analyses. Previously presented calculations for Section A-A' and Section E-E' have been revised to reflect the higher building pad. The height of the highest cut slope (shown on Section D-D') was reduced, however, the anticipated adverse geologic structure requires that a stabilization fill be recommended. In each case evaluated herein, the minimum factor of safety was greater than 1.5 and 1.1 for static and pseudostatic conditions, respectively. Therefore the higher building pad does not appear to present a problem from a geotechnical standpoint. Geotechnical recommendations presented in the referenced report remain applicable and should be followed. A brief description of the analyses and associated factors of safety are presented in the following sections of this report.

Section A-A' – Natural Slope

Section A-A' bisects the northern portion of subject parcel from the proposed building pad to Dry Canyon Cold Creek Road. This section was drawn to show the geologic structure relative to a synclinal structure within the Calabasas Formation. Our stability analysis modeled the synclinal structure with several zones of anisotropic material strengths to account for weaker along bedding plane strengths at several different bedding plane inclinations throughout the syncline.

Slope stability analyses were performed on potential slip surfaces that were generated from three exit search box scenarios through the lower portions of the cross-section. The first scenario used several search boxes to model potential failure planes through the syncline structure. The second scenario positioned an exit search box further downslope near the vicinity of the toe of slope. The third and last scenario positioned an exit search box at the toe and beyond. This third scenario considered the influence of the flatter bedding planes depicted at the toe. Each of the analyses completed indicates minimum factors of safety in excess of 1.5 and 1.1 for static and pseudostatic conditions, respectively. The results of our analyses are summarized below.

Section	Conditions	Static FS	Seismic FS	Figure No.
A-A'	Exit pathways through syncline	2.22	1.40	Rev.C1
	Exit pathways through syncline or toe	1.74	1.10	Rev.C2
	Exit pathways through toe or beyond	1.87	1.18	Rev.C3

Section E-E – Steep Natural Slope'

Section E-E' is through the natural slope that descends from the south side of the proposed building pad. The geologic structure is tightly folded within the upper portion of the section and transitions to a near dip-slope inclination. Our analyses conservatively ignored the folded portion in the upper portion of the section and considered potential failure paths inclined same as the lower portion of the section with bedding plane strength up to the building pad. Each of the analyses completed indicates minimum factors of safety in excess of 1.5 and 1.1 for static and pseudostatic conditions, respectively. The results of our analyses are summarized below.

Section	Conditions	Static FS	Seismic FS	Figure No.
E-E'	Exit pathways through toe or beyond	1.60	1.12	Rev.C4

Section D-D' – Highest Cut Slope

Section D-D' is through the proposed 2(h):1(v) cut slope along the west side of building pad. The overall height of the cut slope has been favorably reduced, however, the geologic structure behind this proposed cut slope is anticipated to be adverse, and therefore requires an equipment width stabilization fill. Additional information is contained in the text of the referenced report and as shown on the *Typical Stabilization Fill Detail* within the referenced report. As previously pointed out a sewerline and waterline have been installed near the top of the recommended stabilization fill. These pipelines will need to be carefully evaluated and if needed rerouted during the construction of the recommended stabilization fill.

We appreciate the opportunity to be of service to you on this project. Please do not hesitate to call if you have any questions or comments regarding items presented in this report.

Respectfully submitted,

GORIAN AND ASSOCIATES, INC.

By: Eric A. Boone, PE 55348
Senior Project Engineer
Exp. 12/31/06

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By: William F. Cavan, Jr. CEG 1161
Principal Engineering Geologist
Exp. 9/30/05

REGISTERED GEOLOGIST
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CERTIFIED
ENGINEERING
GEOLOGIST
EXP. 9/30/05
STATE OF CALIFORNIA

Attachments:

Appendix Rev.C – Slope Stability Analysis
Plate 1 – Geotechnical Map (in pocket)
Plate 2, 3, and 4 – Geotechnical Cross Sections A-A' through F-F' (in pocket)

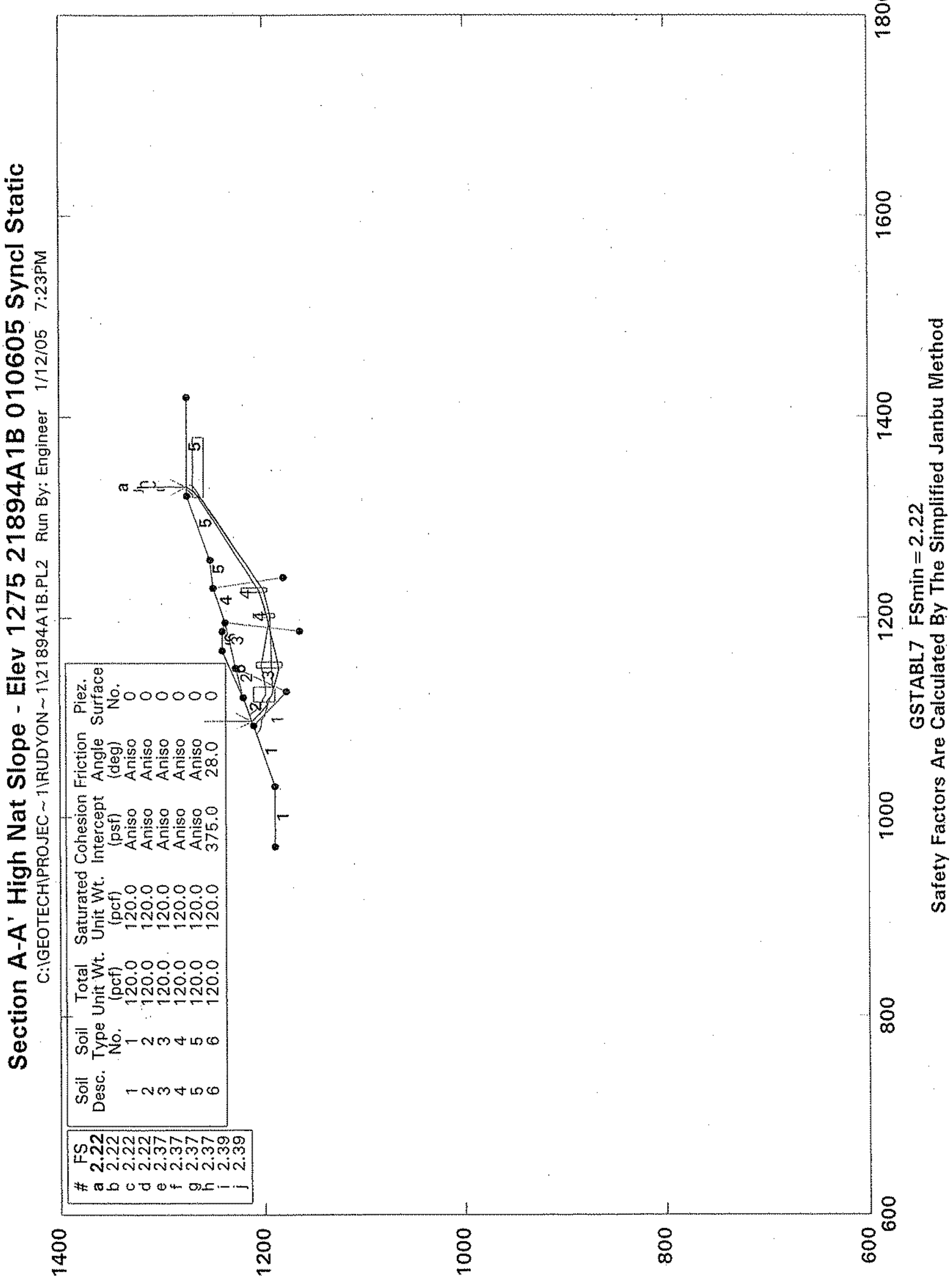
Distribution: Addressee (6)

APPENDIX Rev.C

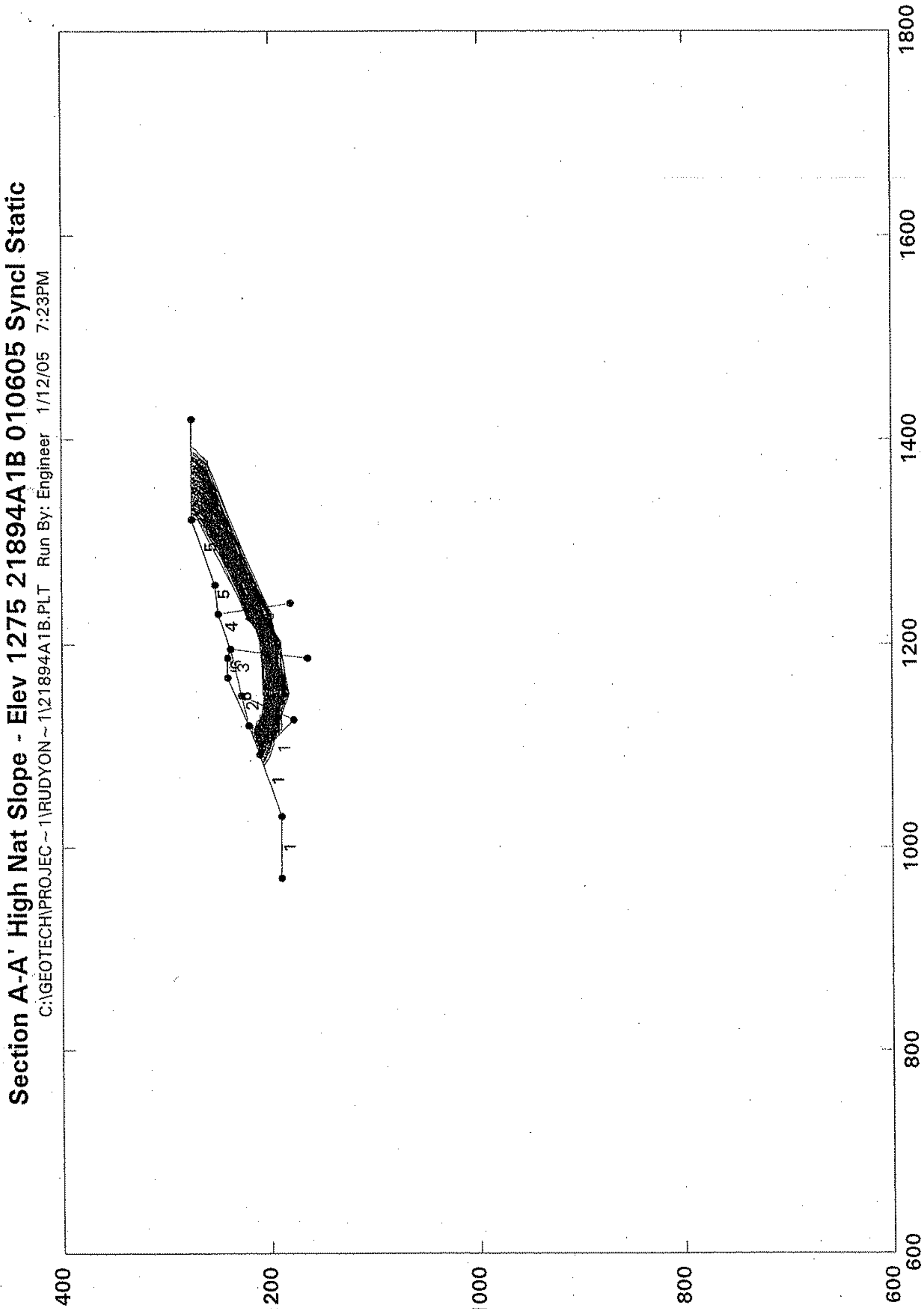
SLOPE STABILITY ANALYSIS

Section A-A'	**Through Synclinal Structure**	**Figure Rev.C1.1 to Rev.C1.19**
	Through Syncline / Toe	**Figure Rev.C2.1 to Rev.C2.19**
	Through Toe	**Figure Rev.C3.1 to Rev.C3.20**
Section E-E'	**Steep Natural Slope**	**Figure Rev.C4.1 to Rev.C4.15**

Work Order 2189-2-0-10
Cross-Section A-A', Static – Thru Synclinal Structure
Figure Rev.C1.1



Work Order 2189-2-0-10
Cross-Section A-A', Static – Thru Synclinal Structure
Figure Rev.C1.2



*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Version 1.0, January 1996; Version 1.16, May 2000 **

--Slope Stability Analysis--
Simplified Janbu, Modified Bishop
or Spencer`s Method of Slices
(Based on STABL6-1986, by Purdue University)

Run Date:	1/12/05
Time of Run:	7:23PM
Run By:	Engineer
Input Data Filename:	C:21894a1b.dta
Output Filename:	C:21894a1b.OUT
Unit System:	English
Plotted Output Filename:	C:21894a1b.PLT

PROBLEM DESCRIPTION Section A-A' High Nat Slope - Elev 1275
21894A1B 010605 Syncl Static

BOUNDARY COORDINATES

10 Top Boundaries
16 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	370.00	589.00	430.00	589.00	1
2	430.00	589.00	492.00	610.00	1
3	492.00	610.00	520.00	620.00	2
4	520.00	620.00	568.00	642.00	6
5	568.00	642.00	586.00	642.00	6
6	586.00	642.00	595.00	639.00	6
7	595.00	639.00	630.00	650.00	4
8	630.00	650.00	658.00	653.00	5
9	658.00	653.00	721.00	675.00	5
10	721.00	675.00	820.00	675.00	5
11	520.00	620.00	550.00	628.00	2
12	550.00	628.00	595.00	639.00	3
13	492.00	610.00	526.00	577.00	1
14	526.00	577.00	550.00	628.00	3
15	586.00	565.00	595.00	639.00	4
16	630.00	650.00	640.00	580.00	4

1

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	13.0	0.00	0.0	0
2	120.0	120.0	300.0	13.0	0.00	0.0	0

3	120.0	120.0	300.0	13.0	0.00	0.0	0
4	120.0	120.0	300.0	13.0	0.00	0.0	0
5	120.0	120.0	300.0	13.0	0.00	0.0	0
6	120.0	120.0	375.0	28.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
5 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-4.0	560.0	29.0
2	0.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-45.0	560.0	29.0
2	-41.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 4

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-21.0	560.0	29.0
2	-17.0	300.0	13.0
3	0.0	560.0	29.0
4	90.0	560.0	29.0

Soil Type 4 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	12.0	560.0	29.0
2	16.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 5 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	31.0	560.0	29.0
2	35.0	300.0	13.0
3	90.0	560.0	29.0

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

850 Trial Surfaces Have Been Generated.

5 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 5.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	515.00	600.00	530.00	600.00	20.00
2	550.00	595.00	555.00	595.00	25.00
3	600.00	600.00	605.00	600.00	20.00
4	625.00	610.00	630.00	610.00	25.00
5	720.00	665.00	780.00	665.00	10.00

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	496.00	611.43
2	497.91	610.11
3	501.47	606.60
4	505.10	603.15
5	508.87	599.87
6	512.52	596.45
7	517.52	596.43
8	521.07	592.91
9	550.15	585.59
10	602.08	597.58
11	626.41	603.88
12	725.90	668.47
13	728.72	672.59
14	730.77	675.00

*** 2.225 ***

Individual data on the 24 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	1.9	230.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	3.6	1878.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	3.6	3981.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	3.8	6268.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	3.6	8104.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	5.0	13069.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	2.5	7248.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	1.1	3456.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	11.1	41978.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	17.8	89418.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.1	852.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	17.9	107674.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	18.0	108460.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	3.6	20422.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	5.4	28822.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	7.1	36824.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	24.3	129411.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	3.6	19111.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	5.7	29014.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	22.3	92617.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	63.0	144872.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	4.9	4776.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	2.8	1515.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	2.0	295.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	496.00	611.43
2	497.91	610.11
3	501.47	606.60
4	505.10	603.15
5	508.87	599.87
6	512.52	596.45
7	517.52	596.43
8	521.07	592.91
9	550.15	585.59
10	602.08	597.58
11	626.41	603.88
12	725.90	668.47
13	728.72	672.59
14	730.77	675.00

*** 2.225 ***

1

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	496.00	611.43
2	497.91	610.11

3	501.47	606.60
4	505.10	603.15
5	508.87	599.87
6	512.52	596.45
7	517.52	596.43
8	521.07	592.91
9	550.15	585.59
10	602.08	597.58
11	626.41	603.88
12	725.90	668.47
13	728.72	672.59
14	730.77	675.00

*** 2.225 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	496.00	611.43
2	497.91	610.11
3	501.47	606.60
4	505.10	603.15
5	508.87	599.87
6	512.52	596.45
7	517.52	596.43
8	521.07	592.91
9	550.15	585.59
10	602.08	597.58
11	626.41	603.88
12	725.90	668.47
13	728.72	672.59
14	730.77	675.00

*** 2.225 ***

1

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	501.37	613.35
2	502.98	612.73
3	506.61	609.28
4	510.28	605.89
5	513.94	602.49
6	518.78	601.22
7	523.30	599.09
8	528.11	597.72
9	552.43	603.42
10	600.71	594.42
11	629.05	600.82
12	732.49	669.15
13	733.36	674.08
14	733.61	675.00

*** 2.371 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	501.37	613.35
2	502.98	612.73
3	506.61	609.28
4	510.28	605.89
5	513.94	602.49
6	518.78	601.22
7	523.30	599.09
8	528.11	597.72
9	552.43	603.42
10	600.71	594.42
11	629.05	600.82
12	732.49	669.15
13	733.36	674.08
14	733.61	675.00

*** 2.371 ***

1

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	501.37	613.35
2	502.98	612.73
3	506.61	609.28
4	510.28	605.89
5	513.94	602.49
6	518.78	601.22
7	523.30	599.09
8	528.11	597.72
9	552.43	603.42
10	600.71	594.42
11	629.05	600.82
12	732.49	669.15
13	733.36	674.08
14	733.61	675.00

*** 2.371 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	501.37	613.35
2	502.98	612.73
3	506.61	609.28
4	510.28	605.89
5	513.94	602.49
6	518.78	601.22
7	523.30	599.09

8	528.11	597.72
9	552.43	603.42
10	600.71	594.42
11	629.05	600.82
12	732.49	669.15
13	733.36	674.08
14	733.61	675.00

*** 2.371 ***

1

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	482.63	606.82
2	482.79	606.69
3	487.34	604.62
4	492.02	602.87
5	497.01	602.55
6	500.79	599.27
7	505.78	598.94
8	510.59	597.58
9	514.92	595.08
10	519.71	593.66
11	523.81	590.79
12	551.05	593.25
13	603.21	594.13
14	627.37	599.73
15	723.25	665.46
16	723.63	670.44
17	727.14	674.00
18	727.94	675.00

*** 2.391 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	482.63	606.82
2	482.79	606.69
3	487.34	604.62
4	492.02	602.87
5	497.01	602.55
6	500.79	599.27
7	505.78	598.94
8	510.59	597.58
9	514.92	595.08
10	519.71	593.66
11	523.81	590.79
12	551.05	593.25
13	603.21	594.13
14	627.37	599.73
15	723.25	665.46
16	723.63	670.44
17	727.14	674.00
18	727.94	675.00

*** 2.391 ***

Work Order 2189-2-0-10
Cross-Section A-A', Seismic – Thru Synclinal Structure
Figure Rev:C1.10

Section A-A' High Nat Slope - Elev 1275 21894ABS 010605 Syncl Seismic

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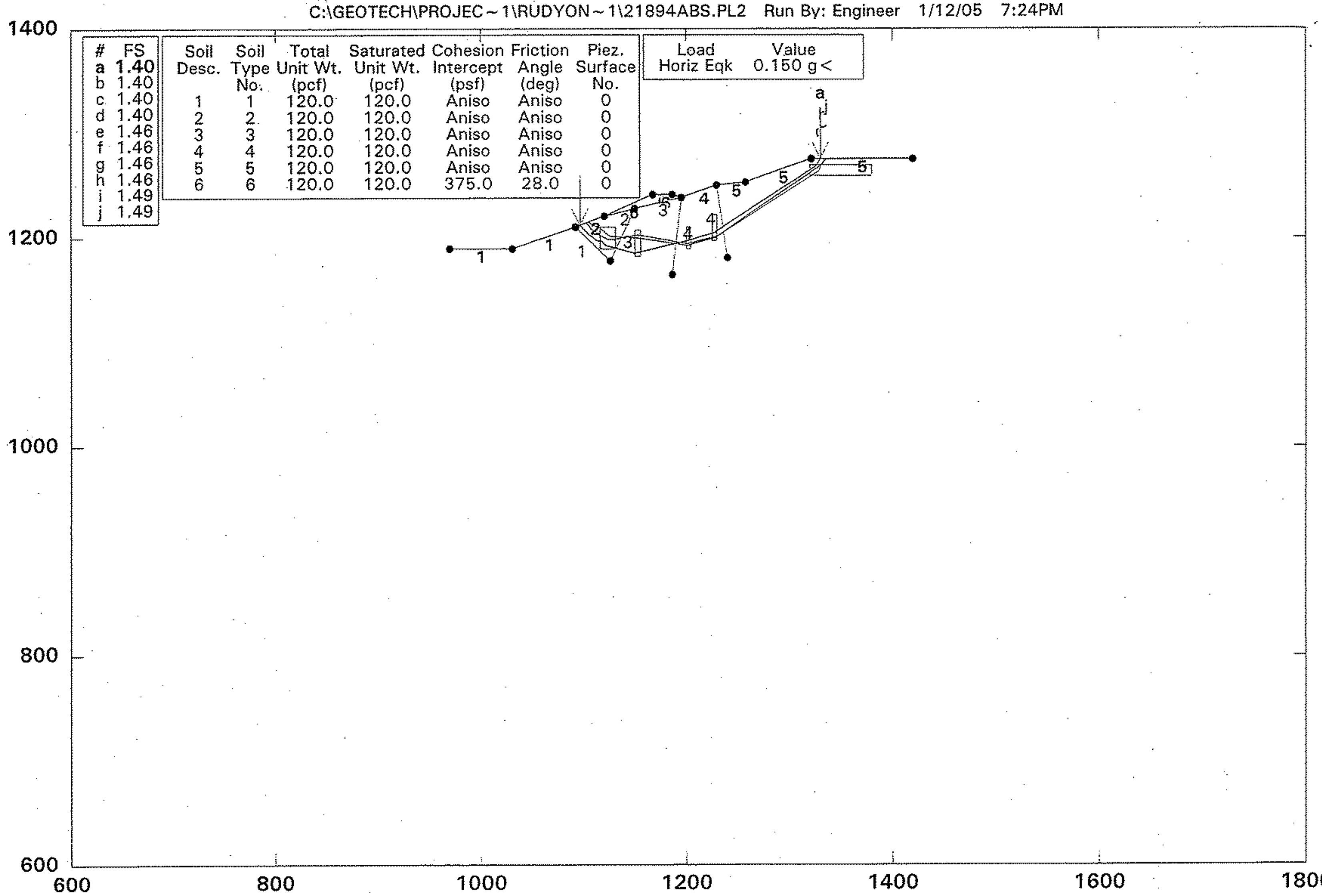
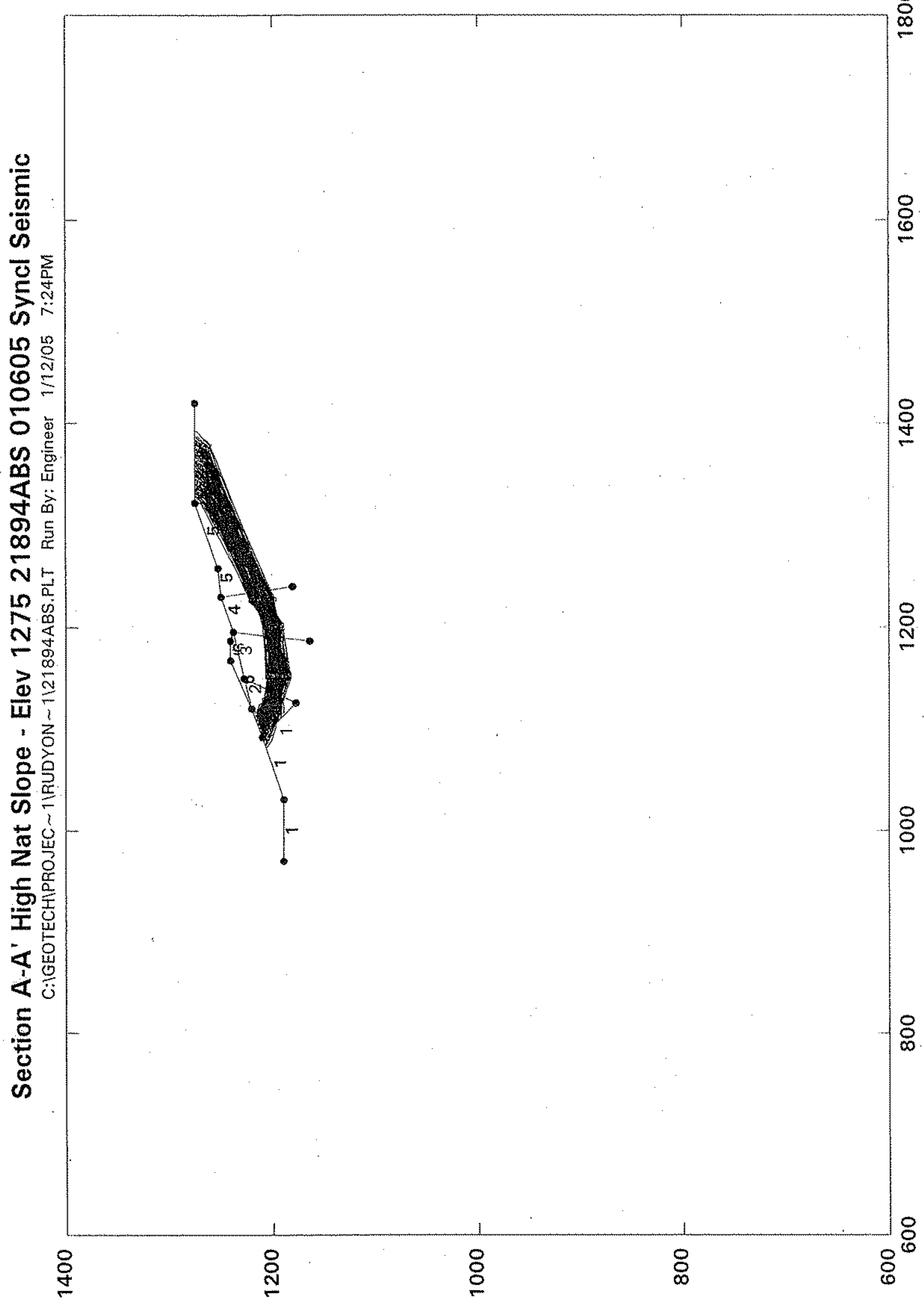


GSTABL7 FSmin = 1.40

Safety Factors Are Calculated By The Simplified Janbu Method

Work Order 2189-2-0-10
Cross-Section A-A', Seismic – Thru Synclinal Structure
Figure Rev.C1.11



*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Version 1.0, January 1996; Version 1.16, May 2000 **

--Slope Stability Analysis--
Simplified Janbu, Modified Bishop
or Spencer`s Method of Slices
(Based on STABL6-1986, by Purdue University)

Run Date:	1/12/05
Time of Run:	7:24PM
Run By:	Engineer
Input Data Filename:	C:21894abs.dta
Output Filename:	C:21894abs.OUT
Unit System:	English
Plotted Output Filename:	C:21894abs.PLT

PROBLEM DESCRIPTION Section A-A' High Nat Slope - Elev 1275
21894ABS 010605 Syncl Seismic

BOUNDARY COORDINATES

10 Top Boundaries
16 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	370.00	589.00	430.00	589.00	1
2	430.00	589.00	492.00	610.00	1
3	492.00	610.00	520.00	620.00	2
4	520.00	620.00	568.00	642.00	6
5	568.00	642.00	586.00	642.00	6
6	586.00	642.00	595.00	639.00	6
7	595.00	639.00	630.00	650.00	4
8	630.00	650.00	658.00	653.00	5
9	658.00	653.00	721.00	675.00	5
10	721.00	675.00	820.00	675.00	5
11	520.00	620.00	550.00	628.00	2
12	550.00	628.00	595.00	639.00	3
13	492.00	610.00	526.00	577.00	1
14	526.00	577.00	550.00	628.00	3
15	586.00	565.00	595.00	639.00	4
16	630.00	650.00	640.00	580.00	4

1

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	13.0	0.00	0.0	0
2	120.0	120.0	300.0	13.0	0.00	0.0	0

3	120.0	120.0	300.0	13.0	0.00	0.0	0
4	120.0	120.0	300.0	13.0	0.00	0.0	0
5	120.0	120.0	300.0	13.0	0.00	0.0	0
6	120.0	120.0	375.0	28.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
5 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-4.0	560.0	29.0
2	0.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-45.0	560.0	29.0
2	-41.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 4

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-21.0	560.0	29.0
2	-17.0	300.0	13.0
3	0.0	560.0	29.0
4	90.0	560.0	29.0

Soil Type 4 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	12.0	560.0	29.0
2	16.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 5 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	31.0	560.0	29.0
2	35.0	300.0	13.0
3	90.0	560.0	29.0

A Horizontal Earthquake Loading Coefficient
Of0.150 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0(psf)

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

850 Trial Surfaces Have Been Generated.

5 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 5.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	515.00	600.00	530.00	600.00	20.00
2	550.00	595.00	555.00	595.00	25.00
3	600.00	600.00	605.00	600.00	20.00
4	625.00	610.00	630.00	610.00	25.00
5	720.00	665.00	780.00	665.00	10.00

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	496.00	611.43
2	497.91	610.11
3	501.47	606.60
4	505.10	603.15
5	508.87	599.87
6	512.52	596.45
7	517.52	596.43
8	521.07	592.91
9	550.15	585.59

10	602.08	597.58
11	626.41	603.88
12	725.90	668.47
13	728.72	672.59
14	730.77	675.00

*** 1.397 ***

Individual data on the 24 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	1.9	230.1	0.0	0.0	0.0	0.0	34.5	0.0	0.0
2	3.6	1878.8	0.0	0.0	0.0	0.0	281.8	0.0	0.0
3	3.6	3981.1	0.0	0.0	0.0	0.0	597.2	0.0	0.0
4	3.8	6268.6	0.0	0.0	0.0	0.0	940.3	0.0	0.0
5	3.6	8104.7	0.0	0.0	0.0	0.0	1215.7	0.0	0.0
6	5.0	13069.1	0.0	0.0	0.0	0.0	1960.4	0.0	0.0
7	2.5	7248.3	0.0	0.0	0.0	0.0	1087.2	0.0	0.0
8	1.1	3456.4	0.0	0.0	0.0	0.0	518.5	0.0	0.0
9	11.1	41978.1	0.0	0.0	0.0	0.0	6296.7	0.0	0.0
10	17.8	89418.1	0.0	0.0	0.0	0.0	13412.7	0.0	0.0
11	0.1	852.2	0.0	0.0	0.0	0.0	127.8	0.0	0.0
12	17.9	107674.8	0.0	0.0	0.0	0.0	16151.2	0.0	0.0
13	18.0	108460.8	0.0	0.0	0.0	0.0	16269.1	0.0	0.0
14	3.6	20422.1	0.0	0.0	0.0	0.0	3063.3	0.0	0.0
15	5.4	28822.0	0.0	0.0	0.0	0.0	4323.3	0.0	0.0
16	7.1	36824.8	0.0	0.0	0.0	0.0	5523.7	0.0	0.0
17	24.3	129411.4	0.0	0.0	0.0	0.0	19411.7	0.0	0.0
18	3.6	19111.8	0.0	0.0	0.0	0.0	2866.8	0.0	0.0
19	5.7	29014.3	0.0	0.0	0.0	0.0	4352.1	0.0	0.0
20	22.3	92617.1	0.0	0.0	0.0	0.0	13892.6	0.0	0.0
21	63.0	144872.5	0.0	0.0	0.0	0.0	21730.9	0.0	0.0
22	4.9	4776.7	0.0	0.0	0.0	0.0	716.5	0.0	0.0
23	2.8	1515.7	0.0	0.0	0.0	0.0	227.4	0.0	0.0
24	2.0	295.3	0.0	0.0	0.0	0.0	44.3	0.0	0.0

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	496.00	611.43
2	497.91	610.11
3	501.47	606.60
4	505.10	603.15
5	508.87	599.87
6	512.52	596.45
7	517.52	596.43
8	521.07	592.91
9	550.15	585.59
10	602.08	597.58
11	626.41	603.88
12	725.90	668.47
13	728.72	672.59
14	730.77	675.00

*** 1.397 ***

1

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	496.00	611.43
2	497.91	610.11
3	501.47	606.60
4	505.10	603.15
5	508.87	599.87
6	512.52	596.45
7	517.52	596.43
8	521.07	592.91
9	550.15	585.59
10	602.08	597.58
11	626.41	603.88
12	725.90	668.47
13	728.72	672.59
14	730.77	675.00

*** 1.397 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	496.00	611.43
2	497.91	610.11
3	501.47	606.60
4	505.10	603.15
5	508.87	599.87
6	512.52	596.45
7	517.52	596.43
8	521.07	592.91
9	550.15	585.59
10	602.08	597.58
11	626.41	603.88
12	725.90	668.47
13	728.72	672.59
14	730.77	675.00

*** 1.397 ***

1

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	501.37	613.35
2	502.98	612.73
3	506.61	609.28
4	510.28	605.89
5	513.94	602.49
6	518.78	601.22
7	523.30	599.09
8	528.11	597.72

9	552.43	603.42
10	600.71	594.42
11	629.05	600.82
12	732.49	669.15
13	733.36	674.08
14	733.61	675.00

*** 1.460 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	501.37	613.35
2	502.98	612.73
3	506.61	609.28
4	510.28	605.89
5	513.94	602.49
6	518.78	601.22
7	523.30	599.09
8	528.11	597.72
9	552.43	603.42
10	600.71	594.42
11	629.05	600.82
12	732.49	669.15
13	733.36	674.08
14	733.61	675.00

*** 1.460 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	501.37	613.35
2	502.98	612.73
3	506.61	609.28
4	510.28	605.89
5	513.94	602.49
6	518.78	601.22
7	523.30	599.09
8	528.11	597.72
9	552.43	603.42
10	600.71	594.42
11	629.05	600.82
12	732.49	669.15
13	733.36	674.08
14	733.61	675.00

*** 1.460 ***

Failure Surface Specified By 14 Coordinate Points

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

1	501.37	613.35
2	502.98	612.73
3	506.61	609.28
4	510.28	605.89
5	513.94	602.49
6	518.78	601.22
7	523.30	599.09
8	528.11	597.72
9	552.43	603.42
10	600.71	594.42
11	629.05	600.82
12	732.49	669.15
13	733.36	674.08
14	733.61	675.00

*** 1.460 ***

Failure Surface Specified By 14 Coordinate Points

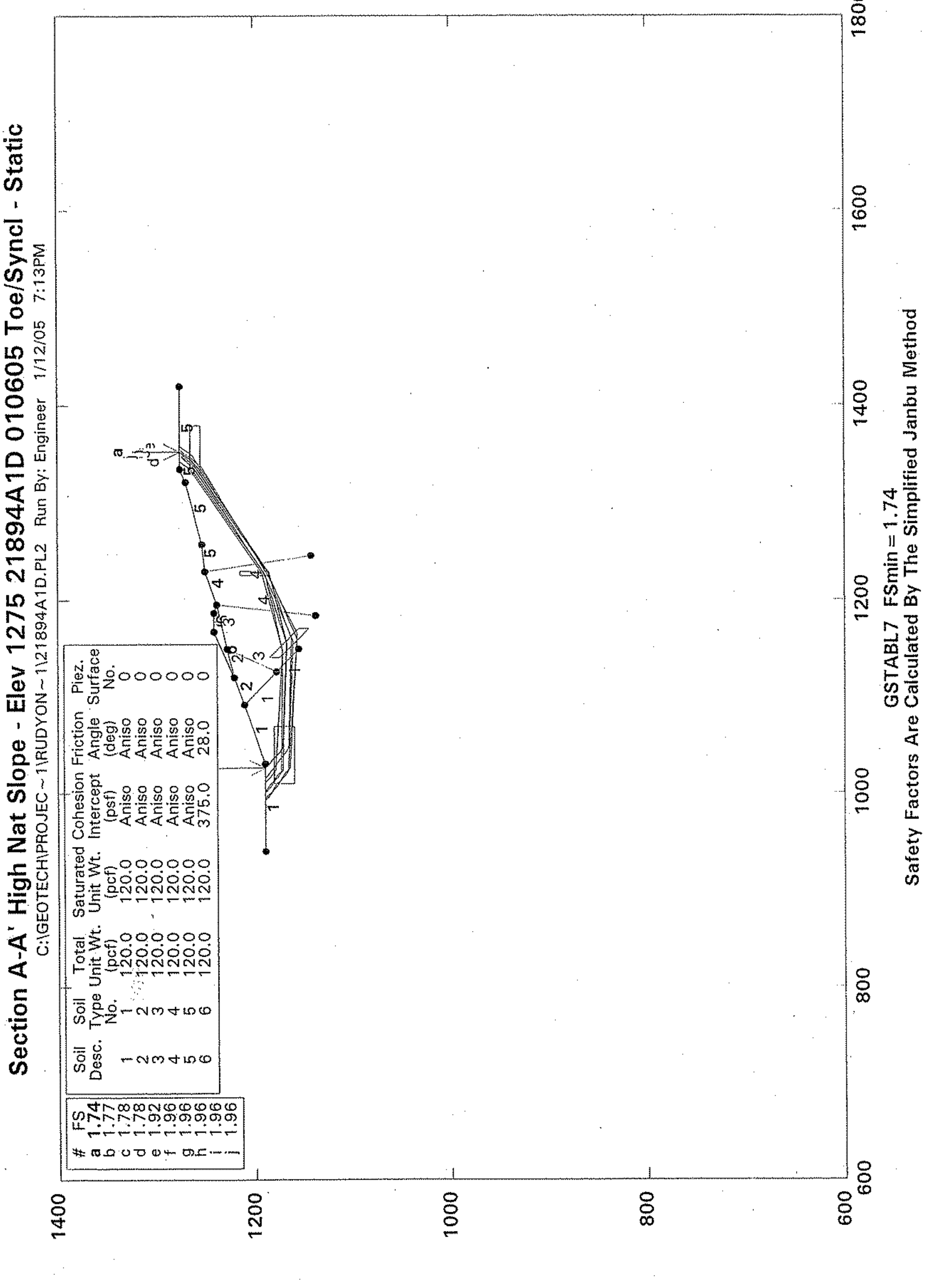
Point No.	X-Surf (ft)	Y-Surf (ft)
1	504.26	614.38
2	504.65	614.17
3	508.72	611.27
4	513.63	610.35
5	517.66	607.39
6	521.78	604.56
7	525.93	601.77
8	551.67	599.69
9	600.85	593.15
10	628.52	599.82
11	729.39	663.36
12	730.95	668.11
13	733.65	672.32
14	735.87	675.00

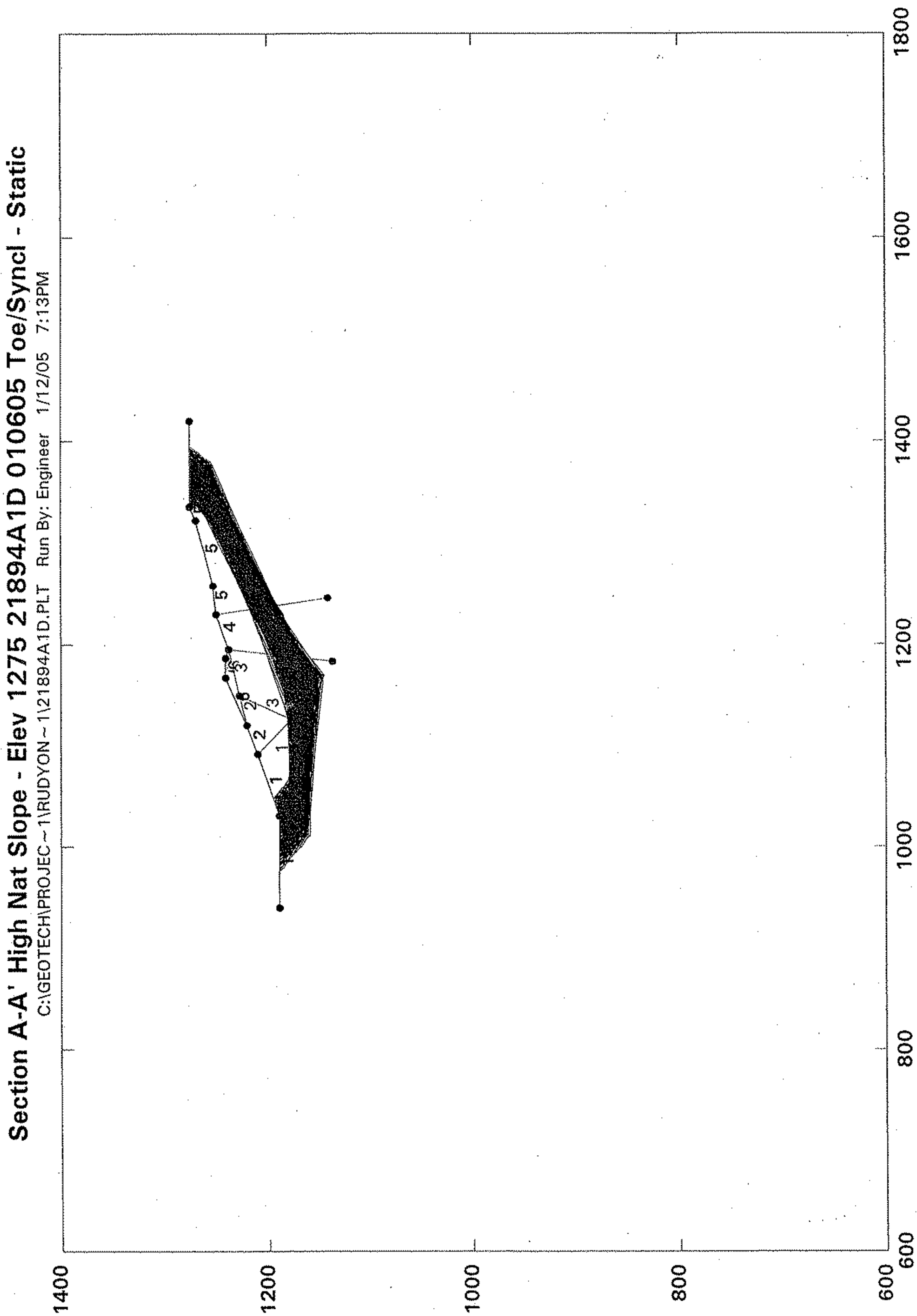
*** 1.489 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	504.26	614.38
2	504.65	614.17
3	508.72	611.27
4	513.63	610.35
5	517.66	607.39
6	521.78	604.56
7	525.93	601.77
8	551.67	599.69
9	600.85	593.15
10	628.52	599.82
11	729.39	663.36
12	730.95	668.11
13	733.65	672.32
14	735.87	675.00

*** 1.489 ***


Section A-A' High Nat Slope - Elev 1275 21894A1D 010605 Toe/Syncl - Static
C:\GEOTECH\PROJEC~1\RUDYON~1\21894A1D.PL2 Run By: Engineer 1/12/05 7:13PM
FS
a 1.74
b 1.77
c 1.78
d 1.78
e 1.92
f 1.96
g 1.96
h 1.96
i 1.96
j 1.96
Soil Desc. | Soil Type No. | Total Unit Wt. (pcf) | Saturated Unit Wt. (pcf) | Cohesion Intercept (psf) | Friction Angle (deg) | Piez. Surface No.
1 1 120.0 120.0 Aniso Aniso 0
2 2 120.0 120.0 Aniso Aniso 0
3 3 120.0 120.0 Aniso Aniso 0
4 4 120.0 120.0 Aniso Aniso 0
5 5 120.0 120.0 Aniso Aniso 0
6 6 120.0 120.0 375.0 28.0 0
1400
1200
1000
800
600
600
800
1000
1200
1400
1600
1800
GSTABL7 FSmin = 1.74
Safety Factors Are Calculated By The Simplified Janbu Method


Section A-A' High Nat Slope - Elev 1275 21894A1D 010605 Toe/Syncl - Static
C:\GEOTECH\PROJEC~1\RUDYON~1\21894A1D.PLT Run By: Engineer 1/12/05 7:13PM
1400
1200
1000
800
600
600
800
1000
1200
1400
1600
1800
1
2
3
4
5

```
                    ***  GSTABL7  ***

        ** GSTABL7 by Garry H. Gregory, P.E. **

   ** Version 1.0, January 1996; Version 1.16, May 2000 **


              --Slope Stability Analysis--
           Simplified Janbu, Modified Bishop
              or Spencer`s Method of Slices
      (Based on STABL6-1986, by Purdue University)


   Run Date:                  12/29/04
   Time of Run:               2:04PM
   Run By:                    Engineer
   Input Data Filename:       C:21893A1D.DTA
   Output Filename:           C:21893A1D.OUT
   Unit System:               English

   Plotted Output Filename:   C:21893A1D.PLT



   PROBLEM DESCRIPTION   Section A-A' Highest Natural Slope
                         21893A1D 122804 Toe/Syncl - Static



   BOUNDARY COORDINATES

      11 Top   Boundaries
      18 Total Boundaries
```

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	340.00	589.00	430.00	589.00	1
2	430.00	589.00	492.00	610.00	1
3	492.00	610.00	520.00	620.00	2
4	520.00	620.00	568.00	642.00	6
5	568.00	642.00	586.00	642.00	6
6	586.00	642.00	595.00	639.00	6
7	595.00	639.00	630.00	650.00	4
8	630.00	650.00	658.00	653.00	5
9	658.00	653.00	721.00	670.00	5
10	721.00	670.00	745.00	680.00	5
11	745.00	680.00	820.00	680.00	5
12	520.00	620.00	550.00	628.00	2
13	550.00	628.00	595.00	639.00	3
14	492.00	610.00	526.00	577.00	1
15	526.00	577.00	550.00	628.00	3
16	583.00	538.00	595.00	639.00	4
17	630.00	650.00	646.00	542.00	4
18	526.00	577.00	550.00	555.00	1

1

```
  ISOTROPIC SOIL PARAMETERS


   6 Type(s) of Soil
```

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.

1	120.0	120.0	300.0	13.0	0.00	0.0	0
2	120.0	120.0	300.0	13.0	0.00	0.0	0
3	120.0	120.0	300.0	13.0	0.00	0.0	0
4	120.0	120.0	300.0	13.0	0.00	0.0	0
5	120.0	120.0	300.0	13.0	0.00	0.0	0
6	120.0	120.0	375.0	28.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
5 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-4.0	560.0	29.0
2	0.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-45.0	560.0	29.0
2	-41.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 4

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-21.0	560.0	29.0
2	-17.0	300.0	13.0
3	0.0	560.0	29.0
4	90.0	560.0	29.0

Soil Type 4 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	12.0	560.0	29.0
2	16.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 5 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	31.0	560.0	29.0
2	35.0	300.0	13.0
3	90.0	560.0	29.0

A Horizontal Earthquake Loading Coefficient
Of0.150 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0(psf)

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

The Active And Passive Portions Of The Sliding Surfaces Are Generated According To The Rankine Theory.

750 Trial Surfaces Have Been Generated.

4 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 5.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	410.00	570.00	470.00	570.00	20.00
2	540.00	580.00	570.00	550.00	10.00
3	625.00	600.00	630.00	600.00	30.00
4	730.00	660.00	780.00	660.00	10.00

**** ERROR - BK12 ****

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	425.60	589.00

2	427.18	587.74
3	431.10	584.63
4	435.01	581.51
5	438.92	578.40
6	442.84	575.29
7	446.75	572.18
8	555.20	566.96
9	628.47	585.19
10	737.11	655.74
11	740.23	659.65
12	743.34	663.57
13	746.45	667.48
14	749.56	671.39
15	752.68	675.31
16	755.79	679.22
17	756.41	680.00

*** 1.097 ***

Individual data on the 31 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	1.6	119.9	0.0	0.0	0.0	0.0	18.0	0.0	0.0
2	2.8	804.5	0.0	0.0	0.0	0.0	120.7	0.0	0.0
3	1.1	542.7	0.0	0.0	0.0	0.0	81.4	0.0	0.0
4	3.9	3270.0	0.0	0.0	0.0	0.0	490.5	0.0	0.0
5	3.9	5353.9	0.0	0.0	0.0	0.0	803.1	0.0	0.0
6	3.9	7437.8	0.0	0.0	0.0	0.0	1115.7	0.0	0.0
7	3.9	9521.7	0.0	0.0	0.0	0.0	1428.3	0.0	0.0
8	45.3	169679.3	0.0	0.0	0.0	0.0	25451.9	0.0	0.0
9	28.0	153460.2	0.0	0.0	0.0	0.0	23019.0	0.0	0.0
10	6.0	38062.9	0.0	0.0	0.0	0.0	5709.4	0.0	0.0
11	9.9	67877.5	0.0	0.0	0.0	0.0	10181.6	0.0	0.0
12	14.1	106251.3	0.0	0.0	0.0	0.0	15937.7	0.0	0.0
13	5.2	42307.8	0.0	0.0	0.0	0.0	6346.2	0.0	0.0
14	12.8	108340.2	0.0	0.0	0.0	0.0	16251.0	0.0	0.0
15	18.0	150367.0	0.0	0.0	0.0	0.0	22555.1	0.0	0.0
16	1.4	11191.4	0.0	0.0	0.0	0.0	1678.7	0.0	0.0
17	7.6	58745.3	0.0	0.0	0.0	0.0	8811.8	0.0	0.0
18	33.5	253952.8	0.0	0.0	0.0	0.0	38092.9	0.0	0.0
19	1.5	11781.4	0.0	0.0	0.0	0.0	1767.2	0.0	0.0
20	8.6	63626.7	0.0	0.0	0.0	0.0	9544.0	0.0	0.0
21	19.4	125289.4	0.0	0.0	0.0	0.0	18793.4	0.0	0.0
22	63.0	277285.5	0.0	0.0	0.0	0.0	41592.8	0.0	0.0
23	16.1	44178.6	0.0	0.0	0.0	0.0	6626.8	0.0	0.0
24	3.1	7344.8	0.0	0.0	0.0	0.0	1101.7	0.0	0.0
25	3.1	6367.6	0.0	0.0	0.0	0.0	955.1	0.0	0.0
26	1.7	2998.6	0.0	0.0	0.0	0.0	449.8	0.0	0.0
27	1.5	2339.2	0.0	0.0	0.0	0.0	350.9	0.0	0.0
28	3.1	3945.3	0.0	0.0	0.0	0.0	591.8	0.0	0.0
29	3.1	2483.7	0.0	0.0	0.0	0.0	372.6	0.0	0.0
30	3.1	1022.2	0.0	0.0	0.0	0.0	153.3	0.0	0.0
31	0.6	29.1	0.0	0.0	0.0	0.0	4.4	0.0	0.0

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	411.83	589.00
2	412.16	588.74

3	416.07	585.63
4	419.98	582.52
5	423.90	579.40
6	547.99	571.06
7	626.09	589.47
8	732.91	662.95
9	736.03	666.86
10	739.14	670.77
11	742.25	674.69
12	745.36	678.60
13	746.48	680.00

*** 1.113 ***

1

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	400.68	589.00
2	401.87	588.05
3	405.78	584.94
4	409.70	581.83
5	413.61	578.71
6	417.52	575.60
7	421.44	572.49
8	546.29	572.27
9	627.61	593.16
10	734.77	664.65
11	737.88	668.56
12	740.99	672.47
13	744.11	676.39
14	746.98	680.00

*** 1.127 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	400.68	589.00
2	401.87	588.05
3	405.78	584.94
4	409.70	581.83
5	413.61	578.71
6	417.52	575.60
7	421.44	572.49
8	546.29	572.27
9	627.61	593.16
10	734.77	664.65
11	737.88	668.56
12	740.99	672.47
13	744.11	676.39
14	746.98	680.00

*** 1.127 ***

1

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	394.12	589.00
2	394.23	588.91
3	398.15	585.80
4	402.06	582.69
5	405.97	579.58
6	409.89	576.46
7	413.80	573.35
8	417.71	570.24
9	421.63	567.13
10	425.54	564.01
11	559.12	556.92
12	628.42	587.01
13	748.34	661.82
14	751.46	665.73
15	754.57	669.64
16	757.68	673.55
17	760.79	677.47
18	762.81	680.00

*** 1.197 ***

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	395.06	589.00
2	397.56	587.01
3	401.47	583.90
4	405.39	580.79
5	409.30	577.67
6	413.21	574.56
7	417.13	571.45
8	421.04	568.34
9	424.95	565.22
10	565.86	556.26
11	627.59	587.88
12	739.26	655.08
13	742.37	658.99
14	745.49	662.90
15	748.60	666.82
16	751.71	670.73
17	754.82	674.64
18	757.94	678.56
19	759.09	680.00

*** 1.217 ***

1

Failure Surface Specified By 16 Coordinate Points

Point	X-Surf	Y-Surf

No.	(ft)	(ft)
1	402.52	589.00
2	403.86	587.93
3	407.78	584.82
4	411.69	581.71
5	415.60	578.60
6	419.52	575.48
7	423.43	572.37
8	553.38	566.53
9	625.43	590.17
10	735.65	657.56
11	738.76	661.47
12	741.87	665.38
13	744.99	669.30
14	748.10	673.21
15	751.21	677.12
16	753.50	680.00

*** 1.225 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	393.22	589.00
2	395.57	587.13
3	399.48	584.02
4	403.39	580.90
5	407.31	577.79
6	411.22	574.68
7	415.13	571.57
8	419.05	568.45
9	422.96	565.34
10	558.77	562.00
11	629.77	590.87
12	738.38	662.17
13	741.50	666.08
14	744.61	669.99
15	747.72	673.91
16	750.83	677.82
17	752.57	680.00

*** 1.234 ***

1

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	416.29	589.00
2	418.89	586.93
3	422.80	583.82
4	426.72	580.71
5	430.63	577.60
6	434.54	574.48
7	438.45	571.37
8	442.37	568.26
9	446.28	565.15

10	560.59	562.43
11	627.80	585.89
12	739.85	660.35
13	742.96	664.26
14	746.07	668.18
15	749.19	672.09
16	752.30	676.00
17	755.41	679.92
18	755.48	680.00

*** 1.239 ***

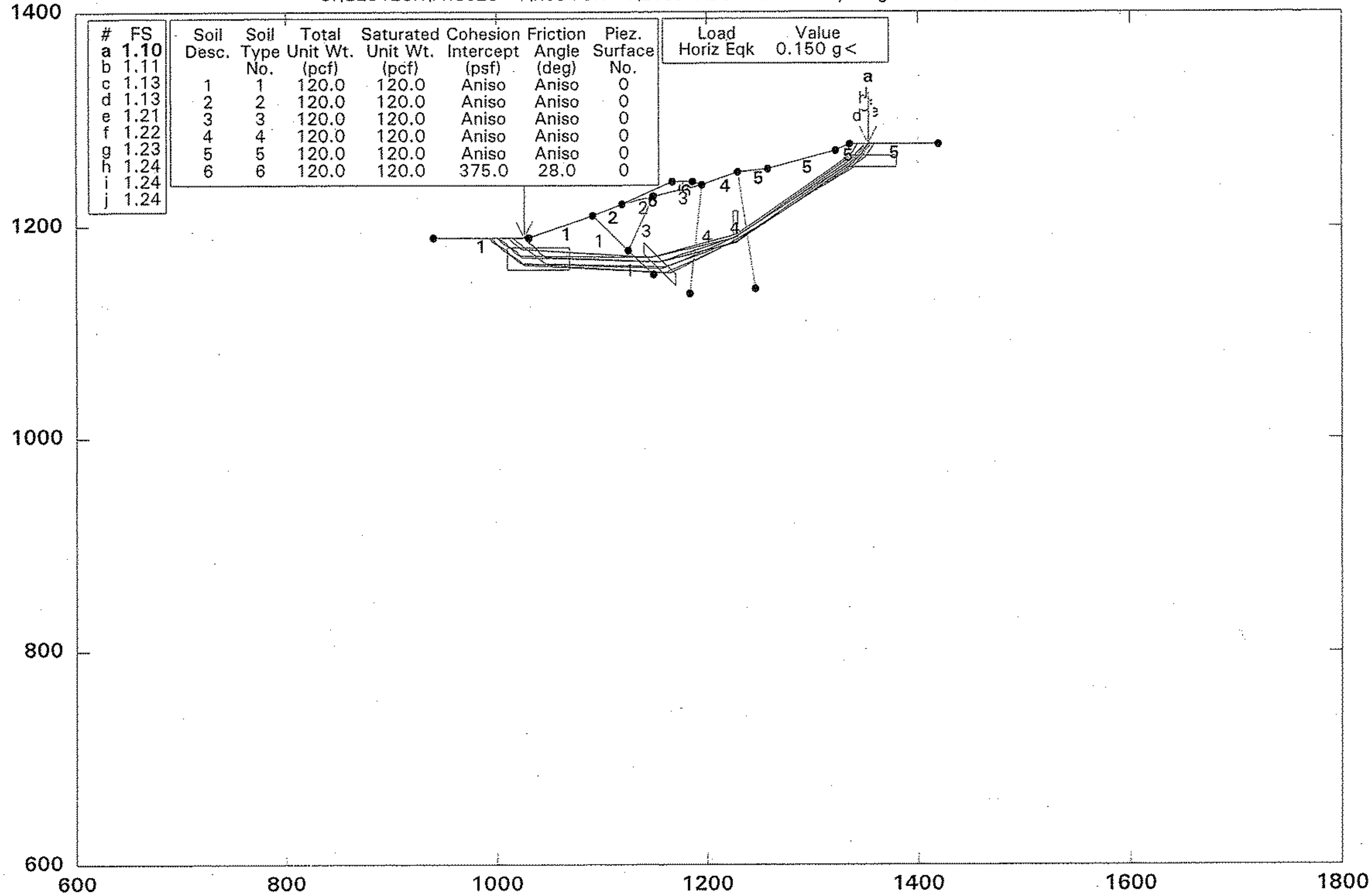
Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	416.29	589.00
2	418.89	586.93
3	422.80	583.82
4	426.72	580.71
5	430.63	577.60
6	434.54	574.48
7	438.45	571.37
8	442.37	568.26
9	446.28	565.15
10	560.59	562.43
11	627.80	585.89
12	739.85	660.35
13	742.96	664.26
14	746.07	668.18
15	749.19	672.09
16	752.30	676.00
17	755.41	679.92
18	755.48	680.00

*** 1.239 ***

Section A-A' High Nat Slope - Elev 1275 21894ADS 010605 Toe/Syncl - Seismic

C:\GEOTECH\PROJEC~1\RUDYON~1\21894ADS.PL2 Run By: Engineer 1/12/05 7:11PM



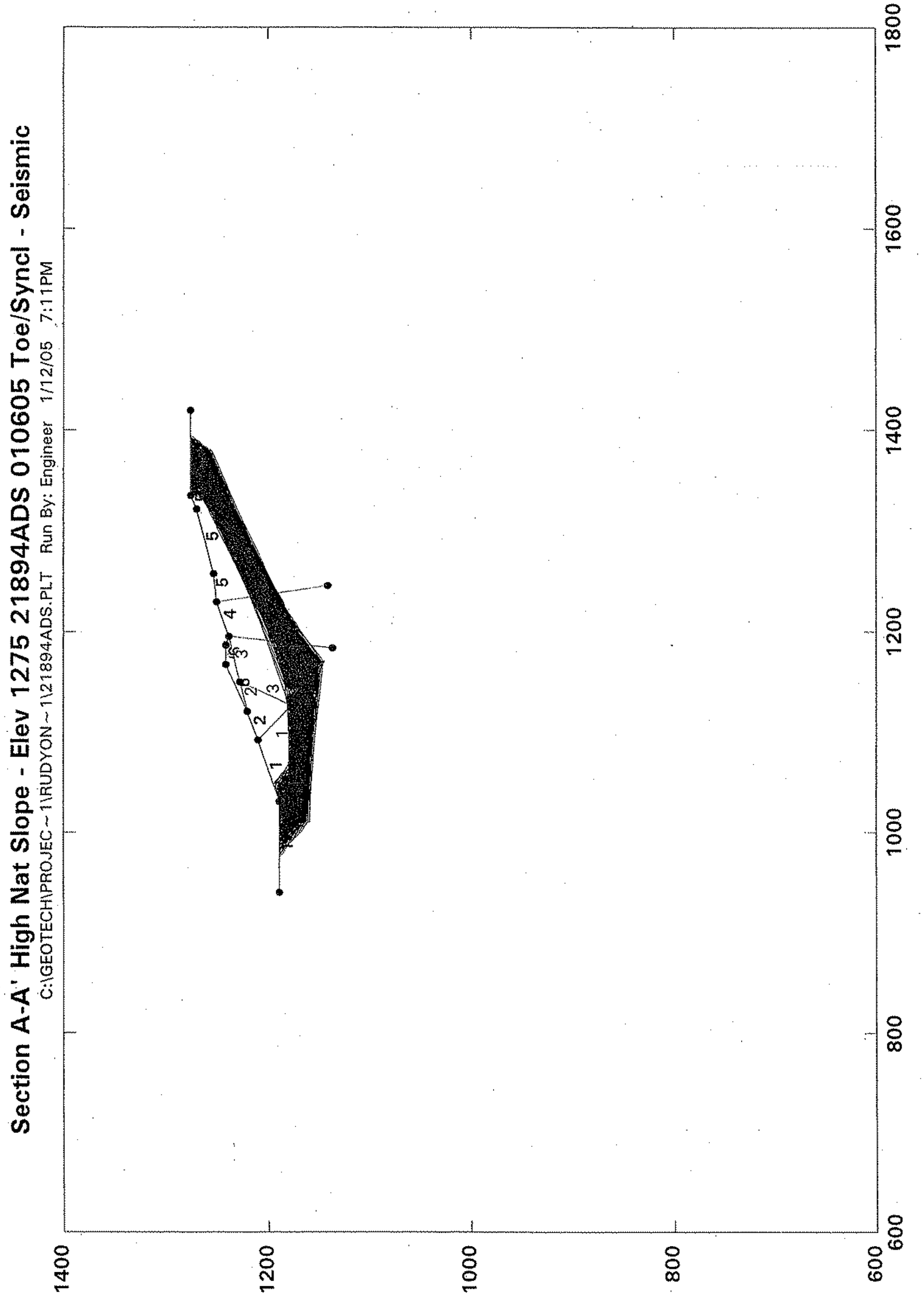
#	FS
a	1.10
b	1.11
c	1.13
d	1.13
e	1.21
f	1.22
g	1.23
h	1.24
i	1.24
j	1.24

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
1	1	120.0	120.0	Aniso	Aniso	0
2	2	120.0	120.0	Aniso	Aniso	0
3	3	120.0	120.0	Aniso	Aniso	0
4	4	120.0	120.0	Aniso	Aniso	0
5	5	120.0	120.0	Aniso	Aniso	0
6	6	120.0	120.0	375.0	28.0	0

Load	Value
Horiz Eqk	0.150 g<

GSTABL7 FSmin = 1.10
Safety Factors Are Calculated By The Simplified Janbu Method

Work Order 2189-2-0-10
Cross-Section A-A', Seismic – Synclinal/Toe Structure
Figure Rev.C2.12



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                    ***  GSTABL7  ***

         ** GSTABL7 by Garry H. Gregory, P.E. **

  ** Version 1.0, January 1996; Version 1.16, May 2000 **

                --Slope Stability Analysis--
              Simplified Janbu, Modified Bishop
                or Spencer`s Method of Slices
        (Based on STABL6-1986, by Purdue University)

Run Date:                 1/12/05
Time of Run:              7:11PM
Run By:                   Engineer
Input Data Filename:      C:21894ads.dta
Output Filename:          C:21894ads.OUT
Unit System:              English

Plotted Output Filename:  C:21894ads.PLT


PROBLEM DESCRIPTION   Section A-A' High Nat Slope - Elev 1275
                      21894ADS 010605 Toe/Syncl - Seismic


BOUNDARY COORDINATES

   11 Top   Boundaries
   18 Total Boundaries
```

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	340.00	589.00	430.00	589.00	1
2	430.00	589.00	492.00	610.00	1
3	492.00	610.00	520.00	620.00	2
4	520.00	620.00	568.00	642.00	6
5	568.00	642.00	586.00	642.00	6
6	586.00	642.00	595.00	639.00	6
7	595.00	639.00	630.00	650.00	4
8	630.00	650.00	658.00	653.00	5
9	658.00	653.00	721.00	670.00	5
10	721.00	670.00	735.00	675.00	5
11	735.00	675.00	820.00	675.00	5
12	520.00	620.00	550.00	628.00	2
13	550.00	628.00	595.00	639.00	3
14	492.00	610.00	526.00	577.00	1
15	526.00	577.00	550.00	628.00	3
16	583.00	538.00	595.00	639.00	4
17	630.00	650.00	646.00	542.00	4
18	526.00	577.00	550.00	555.00	1

1

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.

1	120.0	120.0	300.0	13.0	0.00	0.0	0
2	120.0	120.0	300.0	13.0	0.00	0.0	0
3	120.0	120.0	300.0	13.0	0.00	0.0	0
4	120.0	120.0	300.0	13.0	0.00	0.0	0
5	120.0	120.0	300.0	13.0	0.00	0.0	0
6	120.0	120.0	375.0	28.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
5 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-4.0	560.0	29.0
2	0.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-45.0	560.0	29.0
2	-41.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 4

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-21.0	560.0	29.0
2	-17.0	300.0	13.0
3	0.0	560.0	29.0
4	90.0	560.0	29.0

Soil Type 4 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	12.0	560.0	29.0
2	16.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 5 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	31.0	560.0	29.0
2	35.0	300.0	13.0
3	90.0	560.0	29.0

A Horizontal Earthquake Loading Coefficient
Of0.150 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0(psf)

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

The Active And Passive Portions Of The Sliding Surfaces Are Generated According To The Rankine Theory.

750 Trial Surfaces Have Been Generated.

4 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 5.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	410.00	570.00	470.00	570.00	20.00
2	540.00	580.00	570.00	550.00	10.00
3	625.00	600.00	630.00	600.00	30.00
4	730.00	660.00	780.00	660.00	10.00

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	425.60	589.00
2	427.18	587.74
3	431.10	584.63
4	435.01	581.51

5	438.92	578.40
6	442.84	575.29
7	446.75	572.18
8	555.20	566.96
9	628.47	585.19
10	737.11	655.74
11	740.23	659.65
12	743.34	663.57
13	746.45	667.48
14	749.56	671.39
15	752.43	675.00

*** 1.102 ***

Individual data on the 29 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	1.6	119.9	0.0	0.0	0.0	0.0	18.0	0.0	0.0
2	2.8	804.5	0.0	0.0	0.0	0.0	120.7	0.0	0.0
3	1.1	542.7	0.0	0.0	0.0	0.0	81.4	0.0	0.0
4	3.9	3270.0	0.0	0.0	0.0	0.0	490.5	0.0	0.0
5	3.9	5353.9	0.0	0.0	0.0	0.0	803.1	0.0	0.0
6	3.9	7437.8	0.0	0.0	0.0	0.0	1115.7	0.0	0.0
7	3.9	9521.7	0.0	0.0	0.0	0.0	1428.3	0.0	0.0
8	45.3	169679.3	0.0	0.0	0.0	0.0	25451.9	0.0	0.0
9	28.0	153460.2	0.0	0.0	0.0	0.0	23019.0	0.0	0.0
10	6.0	38062.9	0.0	0.0	0.0	0.0	5709.4	0.0	0.0
11	9.9	67877.5	0.0	0.0	0.0	0.0	10181.6	0.0	0.0
12	14.1	106251.3	0.0	0.0	0.0	0.0	15937.7	0.0	0.0
13	5.2	42307.8	0.0	0.0	0.0	0.0	6346.2	0.0	0.0
14	12.8	108340.2	0.0	0.0	0.0	0.0	16251.0	0.0	0.0
15	18.0	150367.0	0.0	0.0	0.0	0.0	22555.1	0.0	0.0
16	1.4	11191.4	0.0	0.0	0.0	0.0	1678.7	0.0	0.0
17	7.6	58745.3	0.0	0.0	0.0	0.0	8811.8	0.0	0.0
18	33.5	253952.8	0.0	0.0	0.0	0.0	38092.9	0.0	0.0
19	1.5	11781.4	0.0	0.0	0.0	0.0	1767.2	0.0	0.0
20	8.6	63626.7	0.0	0.0	0.0	0.0	9544.0	0.0	0.0
21	19.4	125289.4	0.0	0.0	0.0	0.0	18793.4	0.0	0.0
22	63.0	277285.5	0.0	0.0	0.0	0.0	41592.8	0.0	0.0
23	14.0	38096.9	0.0	0.0	0.0	0.0	5714.5	0.0	0.0
24	2.1	5058.7	0.0	0.0	0.0	0.0	758.8	0.0	0.0
25	3.1	6462.4	0.0	0.0	0.0	0.0	969.4	0.0	0.0
26	3.1	5000.8	0.0	0.0	0.0	0.0	750.1	0.0	0.0
27	3.1	3539.3	0.0	0.0	0.0	0.0	530.9	0.0	0.0
28	3.1	2077.8	0.0	0.0	0.0	0.0	311.7	0.0	0.0
29	2.9	620.7	0.0	0.0	0.0	0.0	93.1	0.0	0.0

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	411.83	589.00
2	412.16	588.74
3	416.07	585.63
4	419.98	582.52
5	423.90	579.40
6	547.99	571.06
7	626.09	589.47
8	732.91	662.95
9	736.03	666.86

10	739.14	670.77
11	742.25	674.69
12	742.50	675.00

*** 1.111 ***

1

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	400.68	589.00
2	401.87	588.05
3	405.78	584.94
4	409.70	581.83
5	413.61	578.71
6	417.52	575.60
7	421.44	572.49
8	546.29	572.27
9	627.61	593.16
10	734.77	664.65
11	737.88	668.56
12	740.99	672.47
13	743.00	675.00

*** 1.125 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	400.68	589.00
2	401.87	588.05
3	405.78	584.94
4	409.70	581.83
5	413.61	578.71
6	417.52	575.60
7	421.44	572.49
8	546.29	572.27
9	627.61	593.16
10	734.77	664.65
11	737.88	668.56
12	740.99	672.47
13	743.00	675.00

*** 1.125 ***

1

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	394.12	589.00

2	394.23	588.91
3	398.15	585.80
4	402.06	582.69
5	405.97	579.58
6	409.89	576.46
7	413.80	573.35
8	417.71	570.24
9	421.63	567.13
10	425.54	564.01
11	559.12	556.92
12	628.42	587.01
13	748.34	661.82
14	751.46	665.73
15	754.57	669.64
16	757.68	673.55
17	758.83	675.00

*** 1.205 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	395.06	589.00
2	397.56	587.01
3	401.47	583.90
4	405.39	580.79
5	409.30	577.67
6	413.21	574.56
7	417.13	571.45
8	421.04	568.34
9	424.95	565.22
10	565.86	556.26
11	627.59	587.88
12	739.26	655.08
13	742.37	658.99
14	745.49	662.90
15	748.60	666.82
16	751.71	670.73
17	754.82	674.64
18	755.11	675.00

*** 1.223 ***

1

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	402.52	589.00
2	403.86	587.93
3	407.78	584.82
4	411.69	581.71
5	415.60	578.60
6	419.52	575.48
7	423.43	572.37
8	553.38	566.53
9	625.43	590.17
10	735.65	657.56

11	738.76	661.47
12	741.87	665.38
13	744.99	669.30
14	748.10	673.21
15	749.52	675.00

*** 1.229 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	393.22	589.00
2	395.57	587.13
3	399.48	584.02
4	403.39	580.90
5	407.31	577.79
6	411.22	574.68
7	415.13	571.57
8	419.05	568.45
9	422.96	565.34
10	558.77	562.00
11	629.77	590.87
12	738.38	662.17
13	741.50	666.08
14	744.61	669.99
15	747.72	673.91
16	748.59	675.00

*** 1.238 ***

1

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	416.29	589.00
2	418.89	586.93
3	422.80	583.82
4	426.72	580.71
5	430.63	577.60
6	434.54	574.48
7	438.45	571.37
8	442.37	568.26
9	446.28	565.15
10	560.59	562.43
11	627.80	585.89
12	739.85	660.35
13	742.96	664.26
14	746.07	668.18
15	749.19	672.09
16	751.50	675.00

*** 1.244 ***

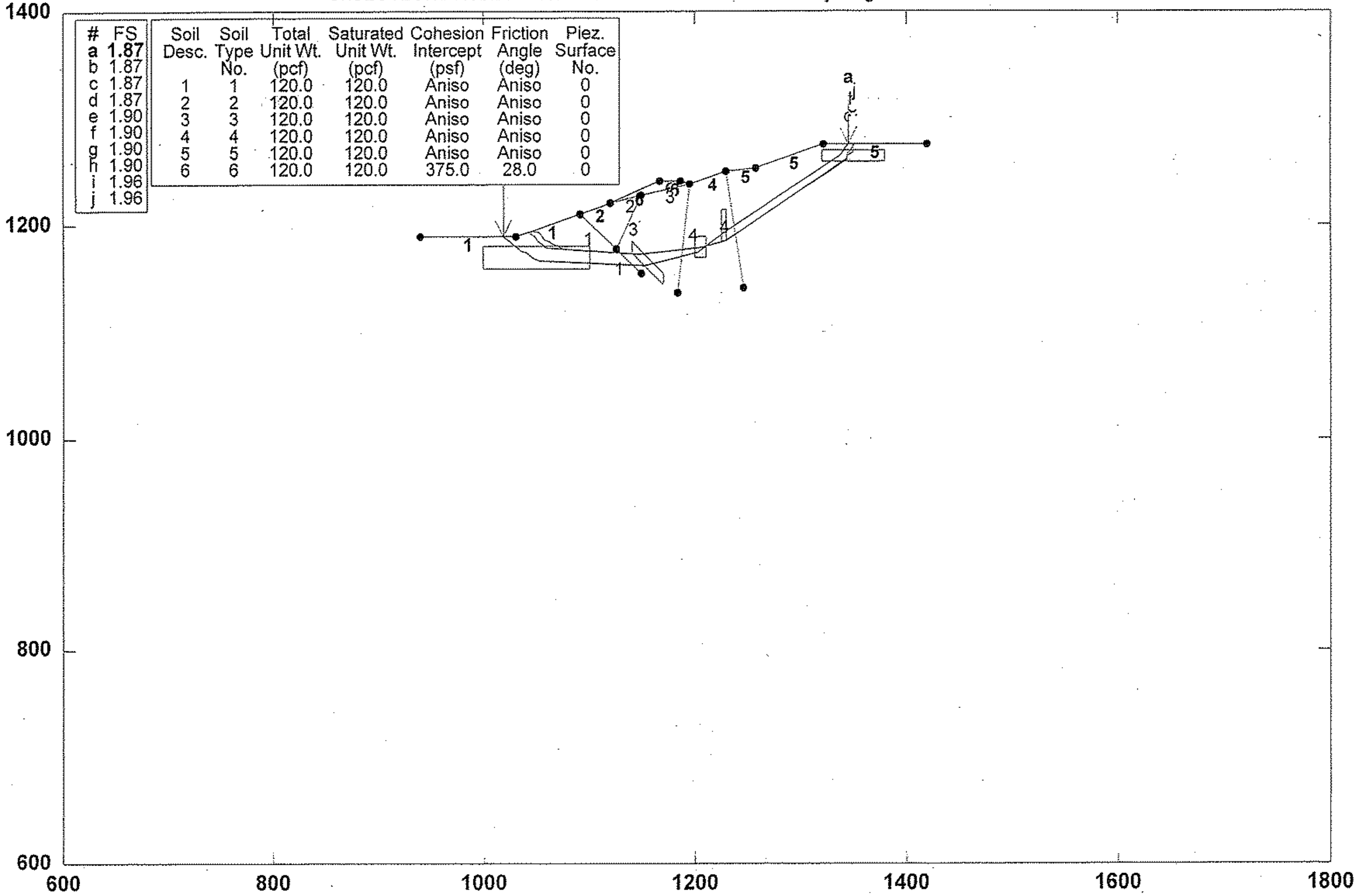
Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	416.29	589.00
2	418.89	586.93
3	422.80	583.82
4	426.72	580.71
5	430.63	577.60
6	434.54	574.48
7	438.45	571.37
8	442.37	568.26
9	446.28	565.15
10	560.59	562.43
11	627.80	585.89
12	739.85	660.35
13	742.96	664.26
14	746.07	668.18
15	749.19	672.09
16	751.50	675.00

*** 1.244 ***

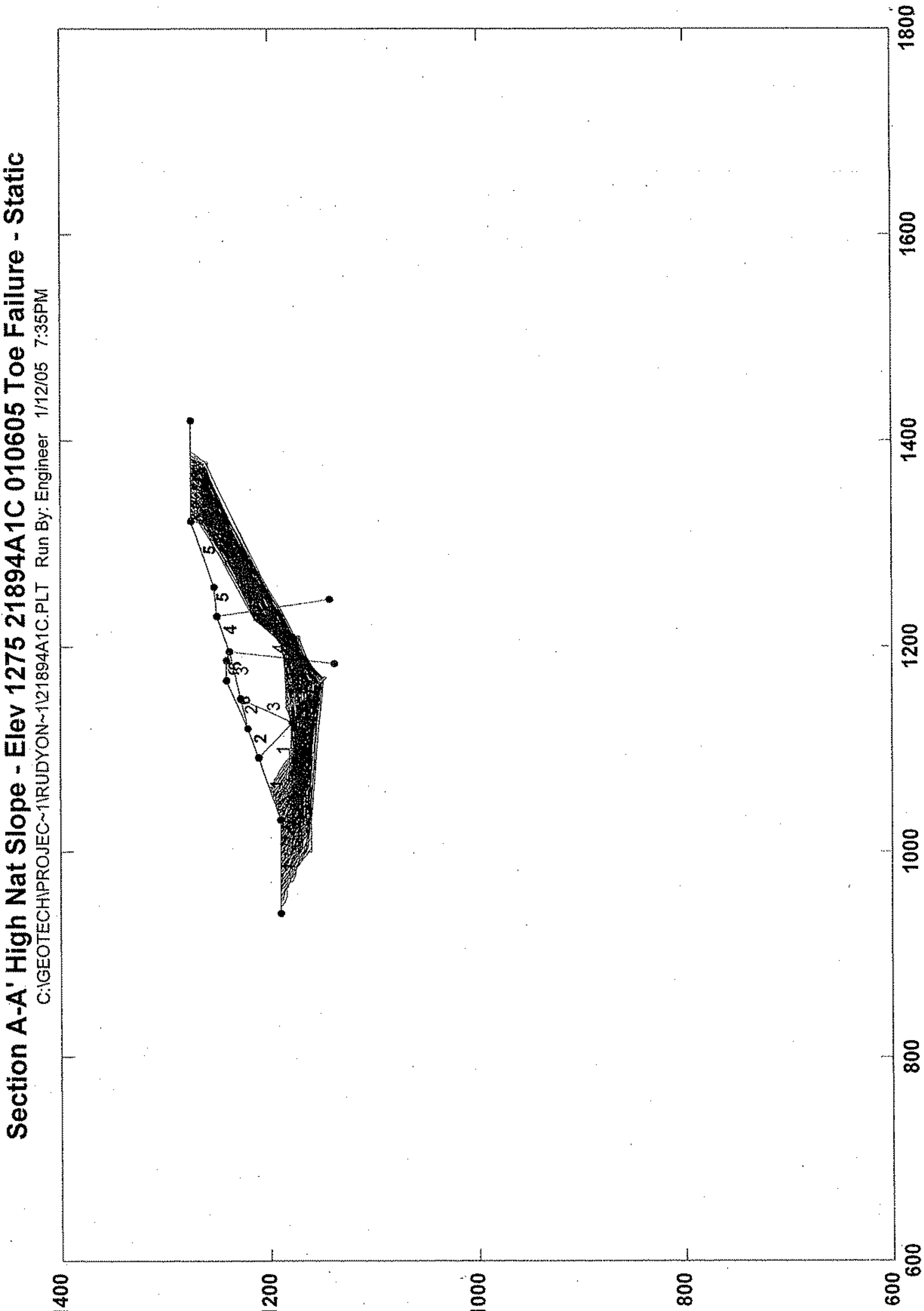
Section A-A' High Nat Slope - Elev 1275 21894A1C 010605 Toe Failure - Static

C:\GEOTECH\PROJEC~1\RUDYON~1\21894A1C.PL2 Run By: Engineer 1/12/05 7:35PM



GSTABL7 FSmin=1.87
Safety Factors Are Calculated By The Simplified Janbu Method

Work Order 2189-2-0-10
Cross-Section A-A', Static – ThruToe
Figure Rev.C3.2



*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Version 1.0, January 1996; Version 1.16, May 2000 **

--Slope Stability Analysis--
Simplified Janbu, Modified Bishop
or Spencer`s Method of Slices
(Based on STABL6-1986, by Purdue University)

Run Date:	1/12/05
Time of Run:	7:35PM
Run By:	Engineer
Input Data Filename:	C:21894a1c.dta
Output Filename:	C:21894a1c.OUT
Unit System:	English
Plotted Output Filename:	C:21894a1c.PLT

PROBLEM DESCRIPTION Section A-A' High Nat Slope - Elev 1275
21894A1C 010605 Toe Failure - Static

BOUNDARY COORDINATES

10 Top Boundaries
17 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	340.00	589.00	430.00	589.00	1
2	430.00	589.00	492.00	610.00	1
3	492.00	610.00	520.00	620.00	2
4	520.00	620.00	568.00	642.00	6
5	568.00	642.00	586.00	642.00	6
6	586.00	642.00	595.00	639.00	6
7	595.00	639.00	630.00	650.00	4
8	630.00	650.00	658.00	653.00	5
9	658.00	653.00	721.00	675.00	5
10	721.00	675.00	820.00	675.00	5
11	520.00	620.00	550.00	628.00	2
12	550.00	628.00	595.00	639.00	3
13	492.00	610.00	526.00	577.00	1
14	526.00	577.00	550.00	628.00	3
15	583.00	538.00	595.00	639.00	4
16	630.00	650.00	646.00	542.00	4
17	526.00	577.00	550.00	555.00	1

1

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	13.0	0.00	0.0	0

2	120.0	120.0	300.0	13.0	0.00	0.0	0
3	120.0	120.0	300.0	13.0	0.00	0.0	0
4	120.0	120.0	300.0	13.0	0.00	0.0	0
5	120.0	120.0	300.0	13.0	0.00	0.0	0
6	120.0	120.0	375.0	28.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
5 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-4.0	560.0	29.0
2	0.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-45.0	560.0	29.0
2	-41.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 4

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-21.0	560.0	29.0
2	-17.0	300.0	13.0
3	0.0	560.0	29.0
4	90.0	560.0	29.0

Soil Type 4 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	12.0	560.0	29.0
2	16.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 5 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	31.0	560.0	29.0
2	35.0	300.0	13.0
3	90.0	560.0	29.0

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

850 Trial Surfaces Have Been Generated.

5 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 5.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	400.00	570.00	500.00	570.00	20.00
2	540.00	580.00	570.00	550.00	10.00
3	600.00	580.00	610.00	580.00	20.00
4	625.00	600.00	630.00	600.00	30.00
5	720.00	665.00	780.00	665.00	10.00

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	419.01	589.00
2	420.39	588.31
3	424.04	584.88
4	427.76	581.54
5	431.94	578.80
6	435.76	575.58
7	440.74	575.15
8	444.66	572.04
9	448.26	568.57
10	452.85	566.59
11	553.15	563.25
12	602.66	575.16
13	629.90	593.38
14	738.00	665.46
15	741.50	669.03
16	743.53	673.60
17	744.93	675.00

*** 1.870 ***

Individual data on the 30 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	1.4	57.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	3.6	1052.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	3.7	2581.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	2.2	2207.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	1.9	2301.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	3.8	6018.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	5.0	9822.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	3.9	9258.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	3.6	10485.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	4.6	15637.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	39.1	175849.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	28.0	168602.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	6.0	41126.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	14.5	108483.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	9.5	77261.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	3.1	26859.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	14.9	131122.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	18.0	157699.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	1.0	8188.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	8.0	65532.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	7.7	60615.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	27.2	200779.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	0.1	673.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	7.6	49799.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	20.4	113902.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	63.0	233443.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	17.0	31016.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	3.5	3261.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	2.0	898.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	1.4	117.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	419.01	589.00
2	420.39	588.31
3	424.04	584.88
4	427.76	581.54
5	431.94	578.80
6	435.76	575.58
7	440.74	575.15
8	444.66	572.04
9	448.26	568.57
10	452.85	566.59
11	553.15	563.25
12	602.66	575.16
13	629.90	593.38
14	738.00	665.46
15	741.50	669.03
16	743.53	673.60
17	744.93	675.00

*** 1.870 ***

1

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	419.01	589.00
2	420.39	588.31
3	424.04	584.88
4	427.76	581.54
5	431.94	578.80
6	435.76	575.58
7	440.74	575.15
8	444.66	572.04
9	448.26	568.57
10	452.85	566.59
11	553.15	563.25
12	602.66	575.16
13	629.90	593.38
14	738.00	665.46
15	741.50	669.03
16	743.53	673.60
17	744.93	675.00

*** 1.870 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	419.01	589.00
2	420.39	588.31
3	424.04	584.88
4	427.76	581.54
5	431.94	578.80
6	435.76	575.58
7	440.74	575.15
8	444.66	572.04
9	448.26	568.57
10	452.85	566.59
11	553.15	563.25
12	602.66	575.16
13	629.90	593.38
14	738.00	665.46
15	741.50	669.03
16	743.53	673.60
17	744.93	675.00

*** 1.870 ***

1

Failure Surface Specified By 13 Coordinate Points

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

1	443.42	593.55
2	444.61	592.41
3	448.16	588.88
4	451.69	585.35
5	455.83	582.54
6	459.37	579.01
7	549.42	572.93
8	604.99	578.75
9	629.96	585.81
10	743.32	662.22
11	744.22	667.14
12	747.72	670.71
13	749.64	675.00

*** 1.905 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	443.42	593.55
2	444.61	592.41
3	448.16	588.88
4	451.69	585.35
5	455.83	582.54
6	459.37	579.01
7	549.42	572.93
8	604.99	578.75
9	629.96	585.81
10	743.32	662.22
11	744.22	667.14
12	747.72	670.71
13	749.64	675.00

*** 1.905 ***

1

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	443.42	593.55
2	444.61	592.41
3	448.16	588.88
4	451.69	585.35
5	455.83	582.54
6	459.37	579.01
7	549.42	572.93
8	604.99	578.75
9	629.96	585.81
10	743.32	662.22
11	744.22	667.14
12	747.72	670.71
13	749.64	675.00

*** 1.905 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	443.42	593.55
2	444.61	592.41
3	448.16	588.88
4	451.69	585.35
5	455.83	582.54
6	459.37	579.01
7	549.42	572.93
8	604.99	578.75
9	629.96	585.81
10	743.32	662.22
11	744.22	667.14
12	747.72	670.71
13	749.64	675.00

*** 1.905 ***

1

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	446.33	594.53
2	450.94	594.30
3	454.50	590.78
4	458.03	587.25
5	462.29	584.62
6	466.59	582.07
7	471.21	580.16
8	475.29	577.27
9	544.58	572.76
10	607.05	579.20
11	628.77	585.31
12	743.49	661.04
13	746.16	665.26
14	749.57	668.92
15	750.52	673.83
16	751.47	675.00

*** 1.958 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	446.33	594.53
2	450.94	594.30
3	454.50	590.78
4	458.03	587.25
5	462.29	584.62
6	466.59	582.07

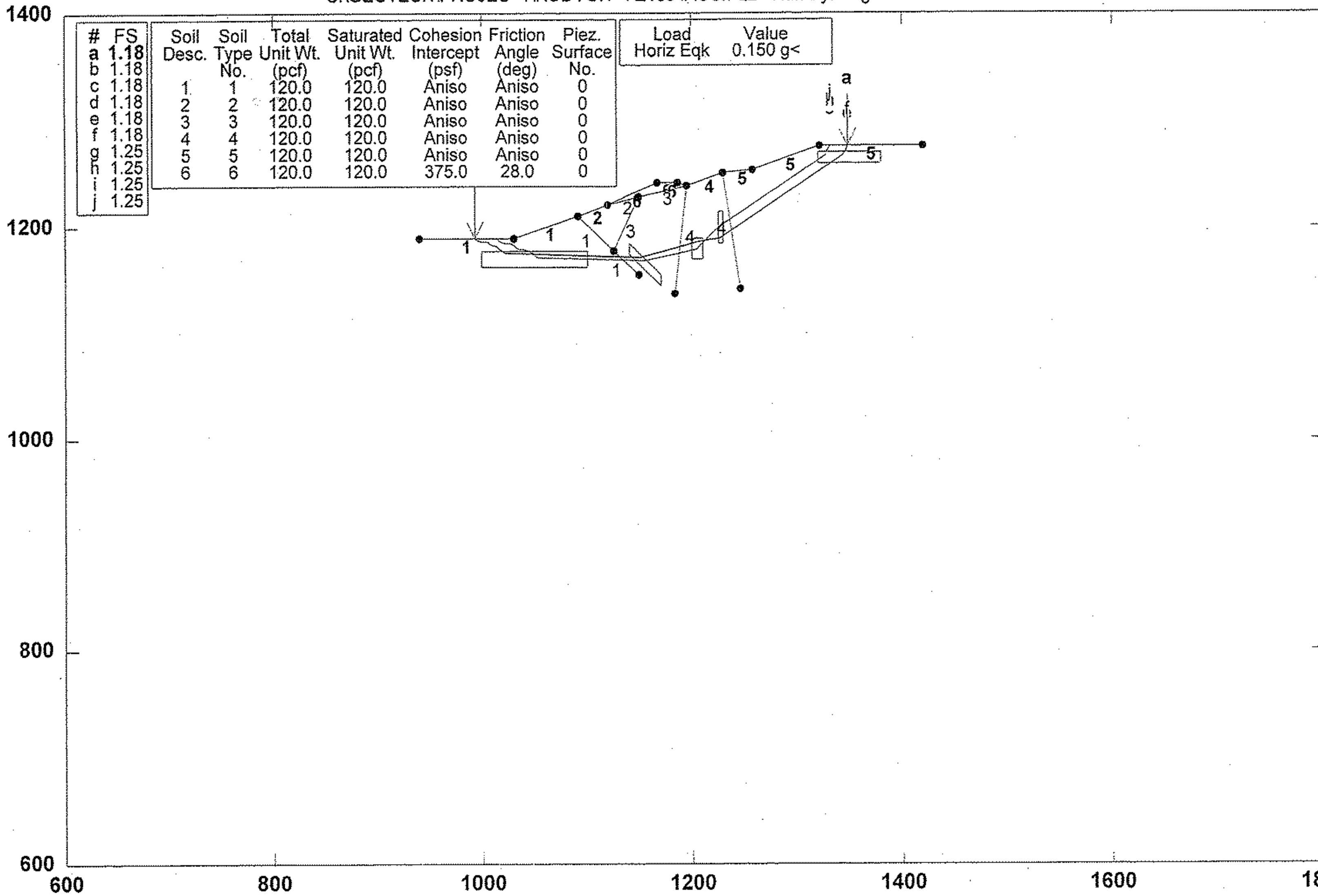
7	471.21	580.16
8	475.29	577.27
9	544.58	572.76
10	607.05	579.20
11	628.77	585.31
12	743.49	661.04
13	746.16	665.26
14	749.57	668.92
15	750.52	673.83
16	751.47	675.00

*** 1.958 ***

Work Order 2189-2-0-10
Cross-Section A-A', Seismic – Thru Toe
Figure Rev.C3.11

Section A-A' High Nat Slope - Elev 1275 21894ACS 010605 Toe Failure - Seismic

C:\GEOTECH\PROJEC~1\RUDYON~1\21894ACS.PL2 Run By: Engineer 1/12/05 7:38PM

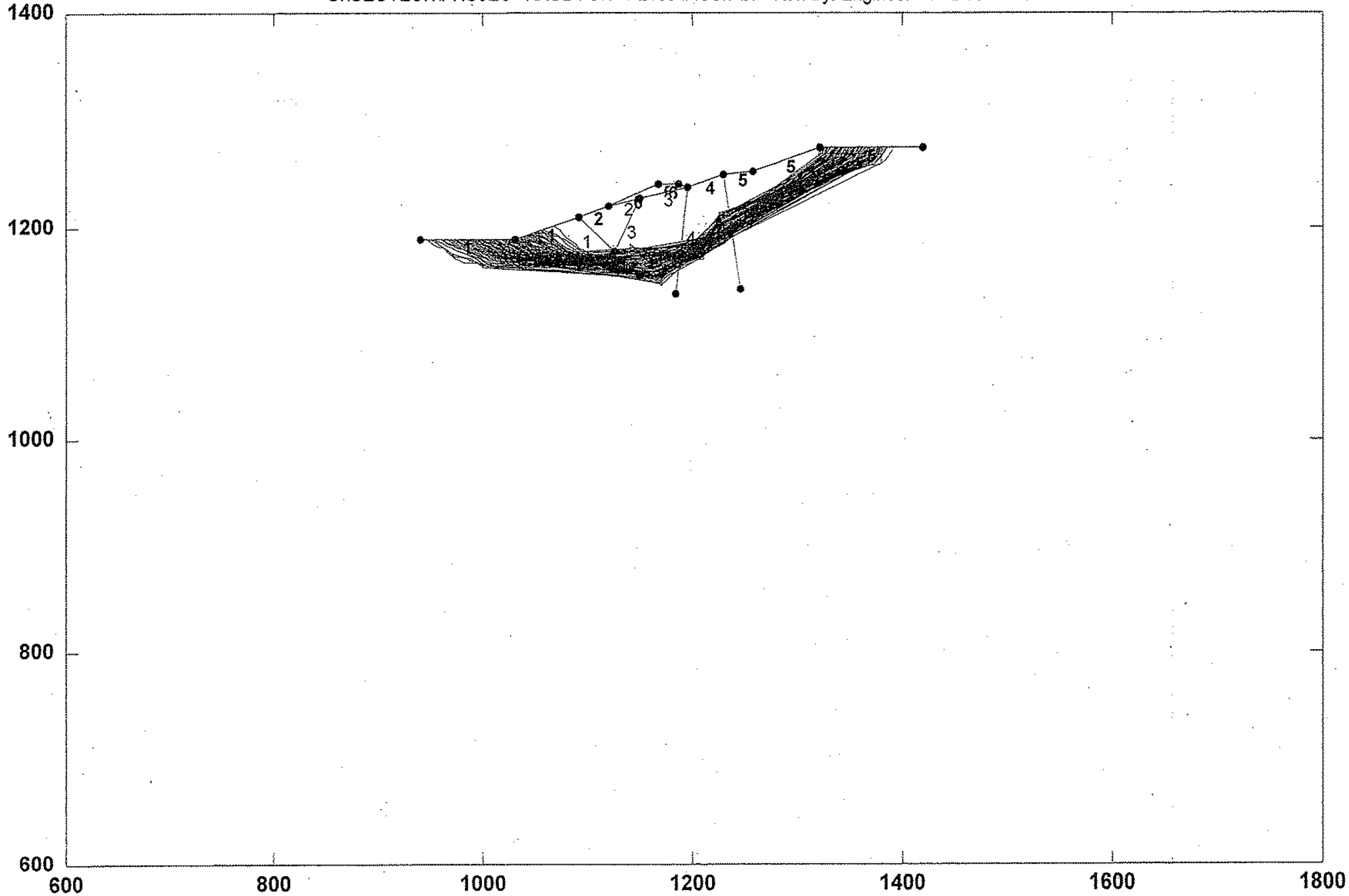


GSTABL7 FSmin=1.18
Safety Factors Are Calculated By The Simplified Janbu Method

Work Order 2189-2-0-10
Cross-Section A-A', Seismic – Thru Toe
Figure Rev.C3.12

Section A-A' High Nat Slope - Elev 1275 21894ACS 010605 Toe Failure - Seismic

C:\GEOTECH\PROJEC~1\RUDYON~1\21894ACS.PLT Run By: Engineer 1/12/05 7:38PM



*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Version 1.0, January 1996; Version 1.16, May 2000 **

--Slope Stability Analysis--
Simplified Janbu, Modified Bishop
or Spencer`s Method of Slices
(Based on STABL6-1986, by Purdue University)

Run Date:	1/12/05
Time of Run:	7:38PM
Run By:	Engineer
Input Data Filename:	C:21894acs.dta
Output Filename:	C:21894acs.OUT
Unit System:	English
Plotted Output Filename:	C:21894acs.PLT

PROBLEM DESCRIPTION Section A-A' High Nat Slope - Elev 1275
21894ACS 010605 Toe Failure - Seismic

BOUNDARY COORDINATES

10 Top Boundaries
17 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	340.00	589.00	430.00	589.00	1
2	430.00	589.00	492.00	610.00	1
3	492.00	610.00	520.00	620.00	2
4	520.00	620.00	568.00	642.00	6
5	568.00	642.00	586.00	642.00	6
6	586.00	642.00	595.00	639.00	6
7	595.00	639.00	630.00	650.00	4
8	630.00	650.00	658.00	653.00	5
9	658.00	653.00	721.00	675.00	5
10	721.00	675.00	820.00	675.00	5
11	520.00	620.00	550.00	628.00	2
12	550.00	628.00	595.00	639.00	3
13	492.00	610.00	526.00	577.00	1
14	526.00	577.00	550.00	628.00	3
15	583.00	538.00	595.00	639.00	4
16	630.00	650.00	646.00	542.00	4
17	526.00	577.00	550.00	555.00	1

1

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	13.0	0.00	0.0	0

2	120.0	120.0	300.0	13.0	0.00	0.0	0
3	120.0	120.0	300.0	13.0	0.00	0.0	0
4	120.0	120.0	300.0	13.0	0.00	0.0	0
5	120.0	120.0	300.0	13.0	0.00	0.0	0
6	120.0	120.0	375.0	28.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
5 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-4.0	560.0	29.0
2	0.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-45.0	560.0	29.0
2	-41.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 4

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-21.0	560.0	29.0
2	-17.0	300.0	13.0
3	0.0	560.0	29.0
4	90.0	560.0	29.0

Soil Type 4 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	12.0	560.0	29.0
2	16.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 5 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	31.0	560.0	29.0
2	35.0	300.0	13.0
3	90.0	560.0	29.0

A Horizontal Earthquake Loading Coefficient
Of0.150 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0(psf)

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

850 Trial Surfaces Have Been Generated.

5 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 5.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	400.00	570.00	500.00	570.00	15.00
2	540.00	580.00	570.00	550.00	10.00
3	600.00	580.00	610.00	580.00	20.00
4	625.00	600.00	630.00	600.00	30.00
5	720.00	665.00	780.00	665.00	10.00

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	393.51	589.00
2	395.19	587.32
3	400.17	586.94
4	405.15	586.43
5	408.89	583.11
6	413.84	582.39
7	417.58	579.07
8	421.14	575.56

9	550.72	572.44
10	607.49	586.69
11	627.41	589.40
12	743.81	667.20
13	747.16	670.92
14	748.57	675.00

*** 1.181 ***

Individual data on the 27 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	1.7	168.6	0.0	0.0	0.0	0.0	25.3	0.0	0.0
2	5.0	1118.1	0.0	0.0	0.0	0.0	167.7	0.0	0.0
3	5.0	1383.5	0.0	0.0	0.0	0.0	207.5	0.0	0.0
4	3.7	1900.5	0.0	0.0	0.0	0.0	285.1	0.0	0.0
5	4.9	3709.1	0.0	0.0	0.0	0.0	556.4	0.0	0.0
6	3.7	3708.0	0.0	0.0	0.0	0.0	556.2	0.0	0.0
7	3.6	4987.4	0.0	0.0	0.0	0.0	748.1	0.0	0.0
8	8.9	14406.9	0.0	0.0	0.0	0.0	2161.0	0.0	0.0
9	62.0	185255.7	0.0	0.0	0.0	0.0	27788.4	0.0	0.0
10	28.0	139392.0	0.0	0.0	0.0	0.0	20908.8	0.0	0.0
11	6.0	34755.0	0.0	0.0	0.0	0.0	5213.3	0.0	0.0
12	4.4	27098.2	0.0	0.0	0.0	0.0	4064.7	0.0	0.0
13	19.6	132764.1	0.0	0.0	0.0	0.0	19914.6	0.0	0.0
14	0.7	5317.2	0.0	0.0	0.0	0.0	797.6	0.0	0.0
15	17.3	131532.9	0.0	0.0	0.0	0.0	19729.9	0.0	0.0
16	18.0	136004.6	0.0	0.0	0.0	0.0	20400.7	0.0	0.0
17	2.2	15926.9	0.0	0.0	0.0	0.0	2389.0	0.0	0.0
18	6.8	46793.8	0.0	0.0	0.0	0.0	7019.1	0.0	0.0
19	12.5	83722.0	0.0	0.0	0.0	0.0	12558.3	0.0	0.0
20	19.9	138612.7	0.0	0.0	0.0	0.0	20791.9	0.0	0.0
21	2.6	18460.4	0.0	0.0	0.0	0.0	2769.1	0.0	0.0
22	7.9	53934.7	0.0	0.0	0.0	0.0	8090.2	0.0	0.0
23	20.1	117457.5	0.0	0.0	0.0	0.0	17618.6	0.0	0.0
24	63.0	250225.2	0.0	0.0	0.0	0.0	37533.8	0.0	0.0
25	22.8	42217.4	0.0	0.0	0.0	0.0	6332.6	0.0	0.0
26	3.3	2385.0	0.0	0.0	0.0	0.0	357.7	0.0	0.0
27	1.4	344.7	0.0	0.0	0.0	0.0	51.7	0.0	0.0

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	393.51	589.00
2	395.19	587.32
3	400.17	586.94
4	405.15	586.43
5	408.89	583.11
6	413.84	582.39
7	417.58	579.07
8	421.14	575.56
9	550.72	572.44
10	607.49	586.69
11	627.41	589.40
12	743.81	667.20
13	747.16	670.92
14	748.57	675.00

*** 1.181 ***

1

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	393.51	589.00
2	395.19	587.32
3	400.17	586.94
4	405.15	586.43
5	408.89	583.11
6	413.84	582.39
7	417.58	579.07
8	421.14	575.56
9	550.72	572.44
10	607.49	586.69
11	627.41	589.40
12	743.81	667.20
13	747.16	670.92
14	748.57	675.00

*** 1.181 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	393.51	589.00
2	395.19	587.32
3	400.17	586.94
4	405.15	586.43
5	408.89	583.11
6	413.84	582.39
7	417.58	579.07
8	421.14	575.56
9	550.72	572.44
10	607.49	586.69
11	627.41	589.40
12	743.81	667.20
13	747.16	670.92
14	748.57	675.00

*** 1.181 ***

1

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	393.51	589.00
2	395.19	587.32
3	400.17	586.94
4	405.15	586.43

5	408.89	583.11
6	413.84	582.39
7	417.58	579.07
8	421.14	575.56
9	550.72	572.44
10	607.49	586.69
11	627.41	589.40
12	743.81	667.20
13	747.16	670.92
14	748.57	675.00

*** 1.181 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	393.51	589.00
2	395.19	587.32
3	400.17	586.94
4	405.15	586.43
5	408.89	583.11
6	413.84	582.39
7	417.58	579.07
8	421.14	575.56
9	550.72	572.44
10	607.49	586.69
11	627.41	589.40
12	743.81	667.20
13	747.16	670.92
14	748.57	675.00

*** 1.181 ***

1

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	414.24	589.00
2	417.76	586.73
3	422.67	585.74
4	427.52	584.53
5	431.93	582.18
6	435.48	578.66
7	440.48	578.53
8	445.33	577.30
9	449.78	575.01
10	453.60	571.79
11	458.59	571.48
12	554.81	568.40
13	603.66	579.22
14	625.24	599.64
15	727.85	666.20
16	729.05	671.06
17	732.17	674.97
18	732.19	675.00

*** 1.254 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	414.24	589.00
2	417.76	586.73
3	422.67	585.74
4	427.52	584.53
5	431.93	582.18
6	435.48	578.66
7	440.48	578.53
8	445.33	577.30
9	449.78	575.01
10	453.60	571.79
11	458.59	571.48
12	554.81	568.40
13	603.66	579.22
14	625.24	599.64
15	727.85	666.20
16	729.05	671.06
17	732.17	674.97
18	732.19	675.00

*** 1.254 ***

1

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	414.24	589.00
2	417.76	586.73
3	422.67	585.74
4	427.52	584.53
5	431.93	582.18
6	435.48	578.66
7	440.48	578.53
8	445.33	577.30
9	449.78	575.01
10	453.60	571.79
11	458.59	571.48
12	554.81	568.40
13	603.66	579.22
14	625.24	599.64
15	727.85	666.20
16	729.05	671.06
17	732.17	674.97
18	732.19	675.00

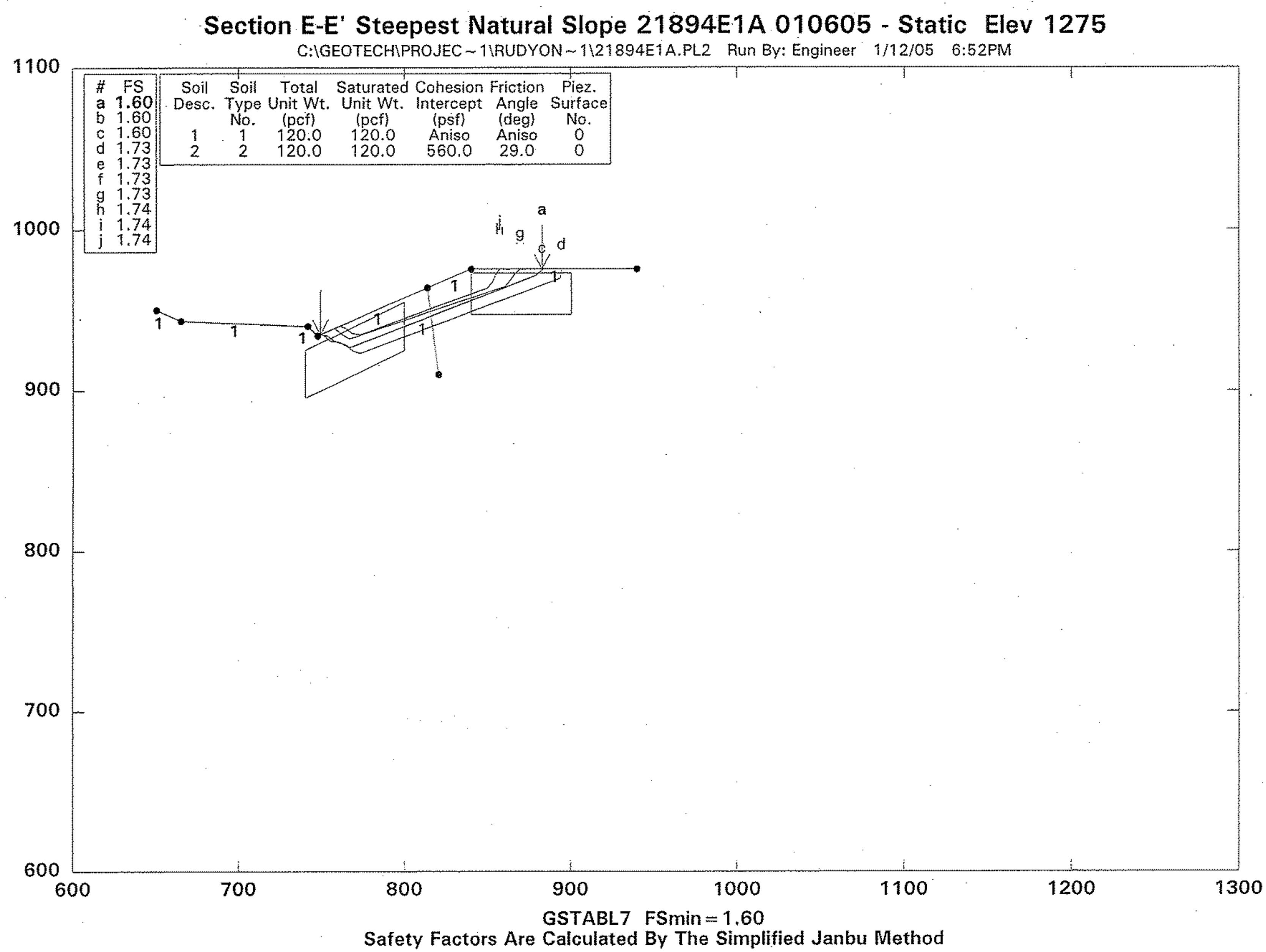
*** 1.254 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	414.24	589.00
2	417.76	586.73
3	422.67	585.74
4	427.52	584.53
5	431.93	582.18
6	435.48	578.66
7	440.48	578.53
8	445.33	577.30
9	449.78	575.01
10	453.60	571.79
11	458.59	571.48
12	554.81	568.40
13	603.66	579.22
14	625.24	599.64
15	727.85	666.20
16	729.05	671.06
17	732.17	674.97
18	732.19	675.00

*** 1.254 ***

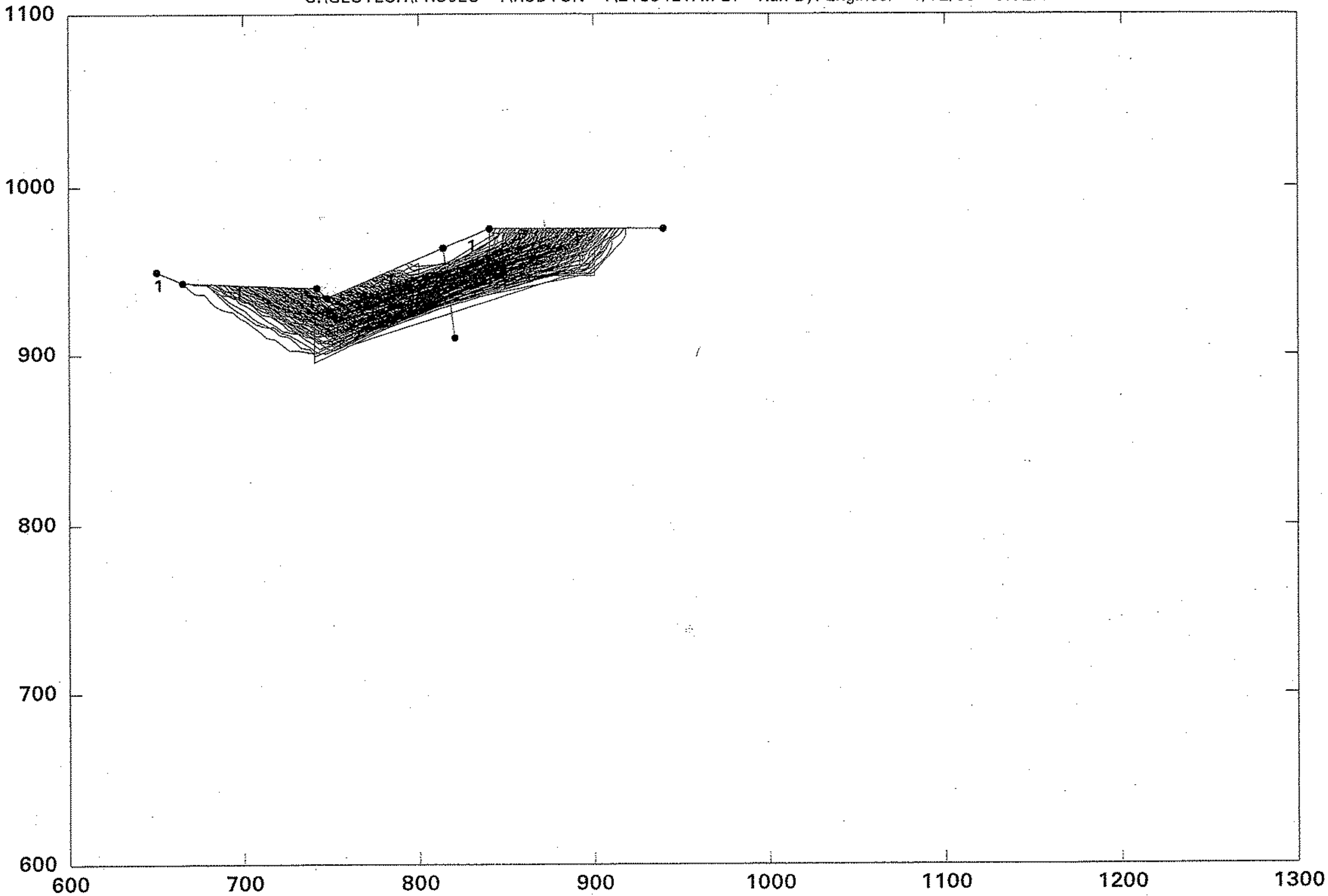
Work Order 2189-2-0-10
Cross-Section E-E', Static
Figure Rev.C4.1



Work Order 2189-2-0-10
Cross-Section E-E', Static
Figure Rev.C4.2

Section E-E' Steepest Natural Slope 21894E1A 010605 - Static Elev 1275

C:\GEOTECH\PROJEC~1\RUDYON~1\21894E1A.PLT Run By: Engineer 1/12/05 6:52PM



*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Version 1.0, January 1996; Version 1.16, May 2000 **

--Slope Stability Analysis--
Simplified Janbu, Modified Bishop
or Spencer`s Method of Slices
(Based on STABL6-1986, by Purdue University)

Run Date: 1/12/05
Time of Run: 6:52PM
Run By: Engineer
Input Data Filename: C:21894E1A.DTA
Output Filename: C:21894E1A.OUT
Unit System: English

Plotted Output Filename: C:21894E1A.PLT

PROBLEM DESCRIPTION Section E-E' Steepest Natural Slope
21894E1A 010605 - Static Elev 1275

BOUNDARY COORDINATES

6 Top Boundaries
7 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	50.00	350.00	65.00	343.00	1
2	65.00	343.00	142.00	340.00	1
3	142.00	340.00	148.00	334.00	1
4	148.00	334.00	214.00	364.00	1
5	214.00	364.00	240.00	375.00	1
6	240.00	375.00	340.00	375.00	1
7	214.00	364.00	220.00	310.00	1

1

ISOTROPIC SOIL PARAMETERS

2 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	600.0	13.0	0.00	0.0	0
2	120.0	120.0	560.0	29.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	18.0	560.0	29.0
2	24.0	300.0	13.0
3	90.0	560.0	29.0

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

750 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 5.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	140.00	310.00	200.00	340.00	30.00
2	240.00	360.00	300.00	360.00	25.00

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	149.26	334.57
2	153.62	333.82
3	157.55	330.73
4	162.29	329.13
5	166.58	326.57
6	279.21	371.36
7	282.71	374.93
8	282.73	375.00

*** 1.601 ***

Individual data on the 10 slices

Slice	Width	Weight	Water Force Top	Water Force Bot	Tie Force Norm	Tie Force Tan	Earthquake Force Hor	Earthquake Force Ver	Surcharge Load

No.	(ft)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)
1	4.4	714.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	3.9	2442.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	4.7	5393.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	4.3	7025.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	47.4	98001.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	2.0	4409.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	24.0	54561.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	39.2	53798.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	3.5	779.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	149.26	334.57
2	153.62	333.82
3	157.55	330.73
4	162.29	329.13
5	166.58	326.57
6	279.21	371.36
7	282.71	374.93
8	282.73	375.00

*** 1.601 ***

1

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	149.26	334.57
2	153.62	333.82
3	157.55	330.73
4	162.29	329.13
5	166.58	326.57
6	279.21	371.36
7	282.71	374.93
8	282.73	375.00

*** 1.601 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	150.52	335.15
2	151.64	334.23
3	155.19	330.71
4	160.13	329.94
5	164.96	328.65
6	168.59	325.21
7	173.12	323.08
8	293.95	369.54
9	294.66	374.49

10	294.90	375.00

*** 1.732 ***

1

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	157.81	338.46
2	158.54	338.39
3	162.49	335.32
4	166.42	332.24
5	260.42	364.29
6	263.35	368.34
7	266.87	371.89
8	269.97	375.00

*** 1.734 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	157.81	338.46
2	158.54	338.39
3	162.49	335.32
4	166.42	332.24
5	260.42	364.29
6	263.35	368.34
7	266.87	371.89
8	269.97	375.00

*** 1.734 ***

1

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	157.81	338.46
2	158.54	338.39
3	162.49	335.32
4	166.42	332.24
5	260.42	364.29
6	263.35	368.34
7	266.87	371.89
8	269.97	375.00

*** 1.734 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	161.82	340.28
2	164.22	338.68
3	168.49	336.07
4	173.39	335.11
5	250.05	363.58
6	252.93	367.67
7	255.05	372.19
8	257.80	375.00

*** 1.742 ***

1

Failure Surface Specified By 8 Coordinate Points

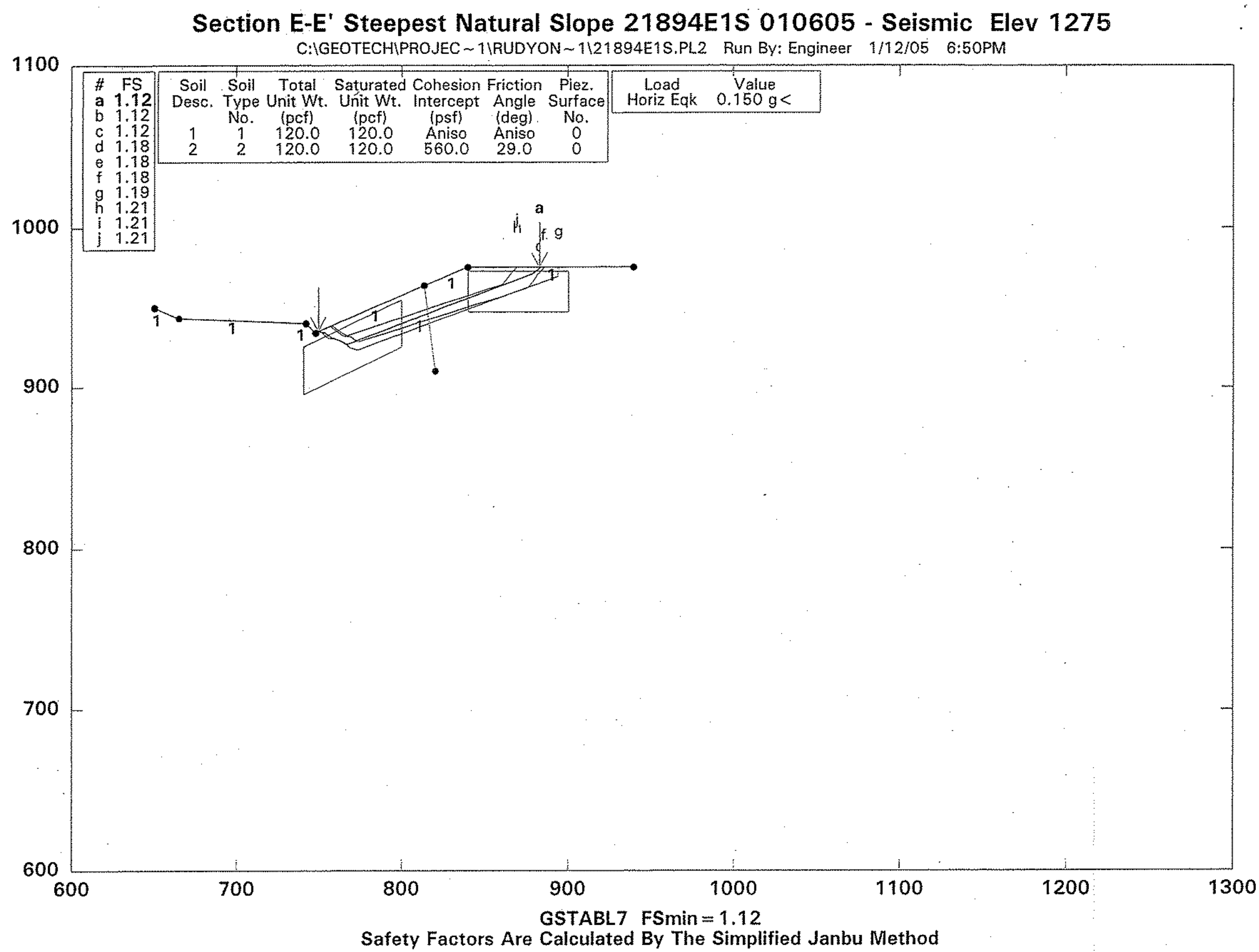
Point No.	X-Surf (ft)	Y-Surf (ft)
1	161.82	340.28
2	164.22	338.68
3	168.49	336.07
4	173.39	335.11
5	250.05	363.58
6	252.93	367.67
7	255.05	372.19
8	257.80	375.00

*** 1.742 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	161.82	340.28
2	164.22	338.68
3	168.49	336.07
4	173.39	335.11
5	250.05	363.58
6	252.93	367.67
7	255.05	372.19
8	257.80	375.00

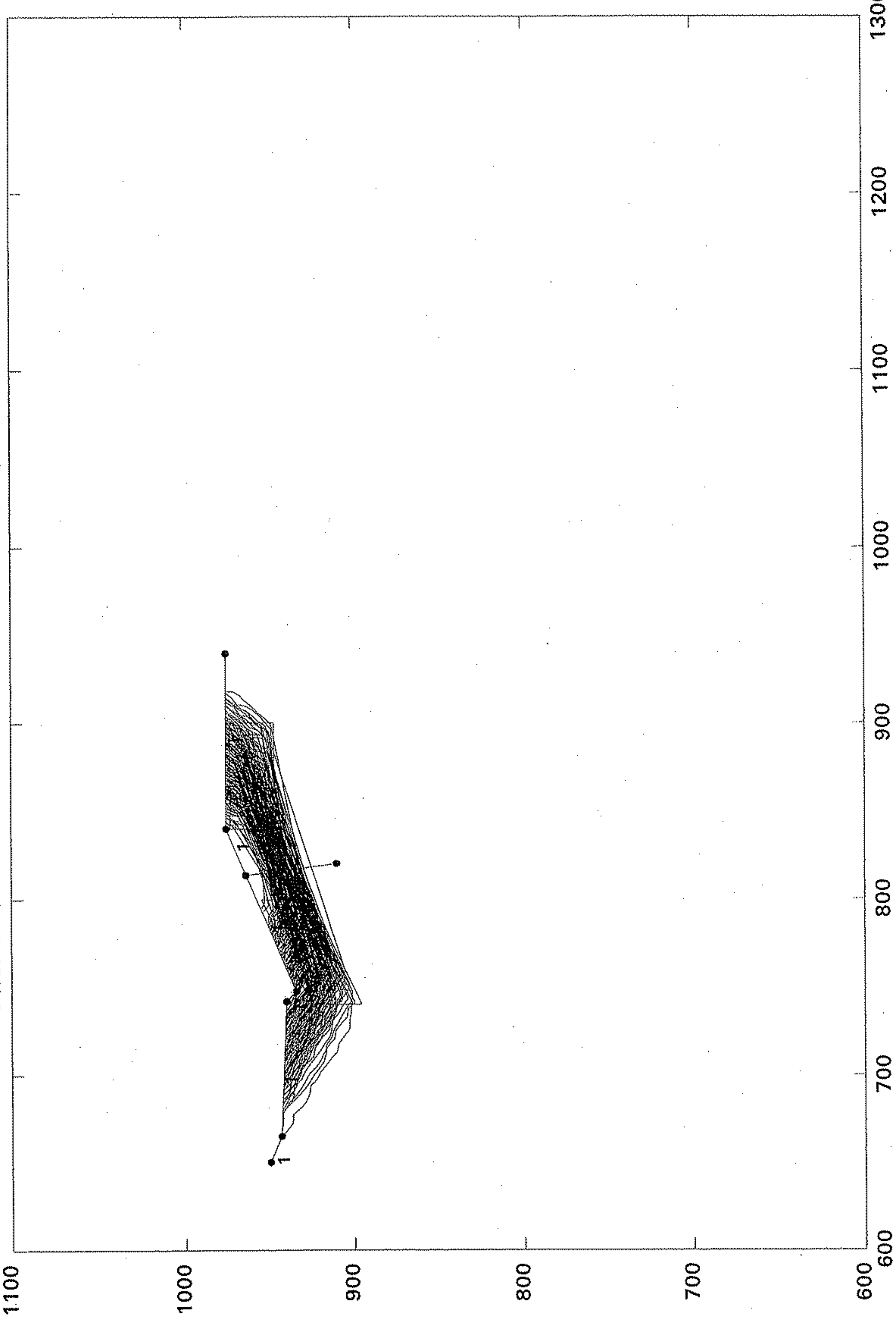
Work Order 2189-2-0-10
Cross-Section E-E', Seismic
Figure Rev.C4.8



Work Order 2189-2-0-10
Cross-Section E-E', Seismic
Figure Rev.C4.9

Section E-E' Steepest Natural Slope 21894E1S 010605 - Seismic Elev 1275

C:\GEOTECH\PROJEC~1\RUDYON~1\21894E1S.PLT Run By: Engineer 1/12/05 6:50PM



*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Version 1.0, January 1996; Version 1.16, May 2000 **

--Slope Stability Analysis--
Simplified Janbu, Modified Bishop
or Spencer`s Method of Slices
(Based on STABL6-1986, by Purdue University)

Run Date:	1/12/05
Time of Run:	6:50PM
Run By:	Engineer
Input Data Filename:	C:21894e1s.dta
Output Filename:	C:21894e1s.OUT
Unit System:	English

Plotted Output Filename: C:21894e1s.PLT

PROBLEM DESCRIPTION Section E-E' Steepest Natural Slope
21894E1S 010605 - Seismic Elev 1275

BOUNDARY COORDINATES

6 Top Boundaries
7 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	50.00	350.00	65.00	343.00	1
2	65.00	343.00	142.00	340.00	1
3	142.00	340.00	148.00	334.00	1
4	148.00	334.00	214.00	364.00	1
5	214.00	364.00	240.00	375.00	1
6	240.00	375.00	340.00	375.00	1
7	214.00	364.00	220.00	310.00	1

1

ISOTROPIC SOIL PARAMETERS

2 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	600.0	13.0	0.00	0.0	0
2	120.0	120.0	560.0	29.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	18.0	560.0	29.0
2	24.0	300.0	13.0
3	90.0	560.0	29.0

A Horizontal Earthquake Loading Coefficient
Of0.150 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0(psf)

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

750 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 5.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	140.00	310.00	200.00	340.00	30.00
2	240.00	360.00	300.00	360.00	25.00

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	149.26	334.57
2	153.62	333.82
3	157.55	330.73
4	162.29	329.13
5	166.58	326.57
6	279.21	371.36
7	282.71	374.93
8	282.73	375.00

*** 1.121 ***

Individual data on the 10 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	4.4	714.7	0.0	0.0	0.0	0.0	107.2	0.0	0.0
2	3.9	2442.4	0.0	0.0	0.0	0.0	366.4	0.0	0.0
3	4.7	5393.5	0.0	0.0	0.0	0.0	809.0	0.0	0.0
4	4.3	7025.5	0.0	0.0	0.0	0.0	1053.8	0.0	0.0
5	47.4	98001.9	0.0	0.0	0.0	0.0	14700.3	0.0	0.0
6	2.0	4409.8	0.0	0.0	0.0	0.0	661.5	0.0	0.0
7	24.0	54561.2	0.0	0.0	0.0	0.0	8184.2	0.0	0.0
8	39.2	53798.6	0.0	0.0	0.0	0.0	8069.8	0.0	0.0
9	3.5	779.6	0.0	0.0	0.0	0.0	116.9	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	149.26	334.57
2	153.62	333.82
3	157.55	330.73
4	162.29	329.13
5	166.58	326.57
6	279.21	371.36
7	282.71	374.93
8	282.73	375.00

*** 1.121 ***

1

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	149.26	334.57
2	153.62	333.82
3	157.55	330.73
4	162.29	329.13
5	166.58	326.57
6	279.21	371.36
7	282.71	374.93
8	282.73	375.00

*** 1.121 ***

Failure Surface Specified By 10 Coordinate Points

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

1	157.06	338.12
2	160.09	335.96
3	163.97	332.82
4	168.81	331.55
5	172.96	328.75
6	275.15	362.47
7	278.68	366.01
8	281.50	370.14
9	284.99	373.73
10	285.65	375.00

*** 1.179 ***

1

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	157.06	338.12
2	160.09	335.96
3	163.97	332.82
4	168.81	331.55
5	172.96	328.75
6	275.15	362.47
7	278.68	366.01
8	281.50	370.14
9	284.99	373.73
10	285.65	375.00

*** 1.179 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	157.06	338.12
2	160.09	335.96
3	163.97	332.82
4	168.81	331.55
5	172.96	328.75
6	275.15	362.47
7	278.68	366.01
8	281.50	370.14
9	284.99	373.73
10	285.65	375.00

*** 1.179 ***

1

Failure Surface Specified By 10 Coordinate Points

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

1	150.52	335.15
2	151.64	334.23
3	155.19	330.71
4	160.13	329.94
5	164.96	328.65
6	168.59	325.21
7	173.12	323.08
8	293.95	369.54
9	294.66	374.49
10	294.90	375.00

*** 1.190 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	157.81	338.46
2	158.54	338.39
3	162.49	335.32
4	166.42	332.24
5	260.42	364.29
6	263.35	368.34
7	266.87	371.89
8	269.97	375.00

*** 1.205 ***

1

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	157.81	338.46
2	158.54	338.39
3	162.49	335.32
4	166.42	332.24
5	260.42	364.29
6	263.35	368.34
7	266.87	371.89
8	269.97	375.00

*** 1.205 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	157.81	338.46
2	158.54	338.39
3	162.49	335.32
4	166.42	332.24

5	260.42	364.29
6	263.35	368.34
7	266.87	371.89
8	269.97	375.00

*** 1.205 ***

GORIAN & ASSOCIATES, INC.

Applied Earth Sciences
Geotechnical
Engineers
and Geologists

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Thousand Oaks
California 91320-2122
805 375-9262
818 889-2137
805 375-9263 fax

April 14, 2006

Amir Rudyan
8245 Remmet Avenue
Canoga Park, California 91304

Work Order: 2189-2-0-100

Subject: **Geotechnical Evaluation of Revised Grading Plans, Proposed Residential Development, APN 2072-001-004, 23604 Dry Canyon-Cold Creek Road, City of Calabasas, California.**

References: Gorian and Associates, Inc., December 17, 2004, Feasibility Level Geologic and Geotechnical Engineering Site Investigation, Proposed Residential Development, APN 2072-001-004, 23604 Dry Canyon-Cold Creek Road, City of Calabasas, California. Work Order 2189-2-0-10, Log Number 23412.

Gorian and Associates, Inc., January 13, 2005, Supplemental Geotechnical Investigation, Slope Stability Evaluation of Raised Building Pad, Proposed Residential Development, APN 2072-001-004, 23604 Dry Canyon-Cold Creek Road, City of Calabasas, California. Work Order: 2189-2-0-11, Log Number: 23609.

The revised grading plans for the residence at 23604 Dry Canyon-Cold Creek Road within Calabasas have been submitted to this office for review. Prepared by Diamond West Engineering, Inc. (no date), and serving as the base map for our attached Revised Geotechnical Map, Plate 1, the revised plan shows the currently proposed house footprint as well as the addition of a pool area. The proposed house now has a tuck under garage which has resulted in a change in the driveway to the house as well as the creation of the previously mentioned pool area. The remaining portion of the plan remains as shown in the referenced report of January 13, 2005 except for minor grade changes. However, some exterior walls are proposed near the tops of slopes and the slope at the rear of the house was slightly reconfigured, being steepened to a 1-1/2(H):1(v) slope.

The changes to the proposed grading were evaluated from a geotechnical engineering and geologic standpoint and are acceptable providing development is per the recommendations presented in the referenced reports and/or as specified herein. The minor changes to the pad grades based on the latest plan from Diamond West Engineering are reflected on the attached Revised Geotechnical Cross Sections. The most significant change, the garage and pool area, is reflected in Cross Section A-A'. Since this is the most significant change, the cross section has been reevaluated for slope stability. The calculations are similar to the prior calculations presented in the referenced report of January 13, 2005. The revised slope still maintains factors of safety that exceed the required minimums. The calculations are attached for reference.

An additional change is that the cut slope at the rear of the residence is now planned at a 1-1/2(h):1(v) gradient. However, as previously stated in the referenced report of December 7, 2004 this slope should be overcut and replaced as a stabilization fill. Since, this slope is steeper than originally planned at a 2(h):1(v) gradient, it will require geogrid reinforcement. Preliminary design of the slope would consist of geogrid layers spaced every two foot vertically for the entire slope. The geogrid should extend a minimum of ten feet into the slope from the slope face. This is a preliminary recommendation that should be reevaluated when the locations of the existing subterranean utilities (water and sewer) at the top of the proposed cut are accurately known.

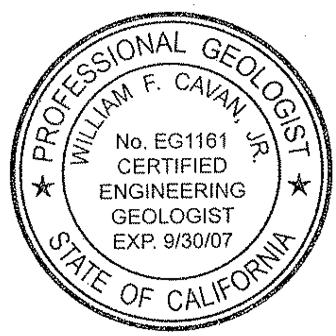
We appreciate the opportunity to be of service to you on this project. Please do not hesitate to call if you have any questions or comments regarding items presented in this report.

Respectfully,

Gorian and Associates, Inc.

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

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



Attachments: Appendix – Slope Stability Analysis
Plate 1 – Revised Geotechnical Map (in pocket)
Plates 2, 3, and 4 – Revised Geotechnical Cross Sections A-A' through F-F' (in pocket)

Distribution: Addressee (6)

APPENDIX

SLOPE STABILITY ANALYSIS

Rudyan / Cross-Section A-A'/ Syncline- Static

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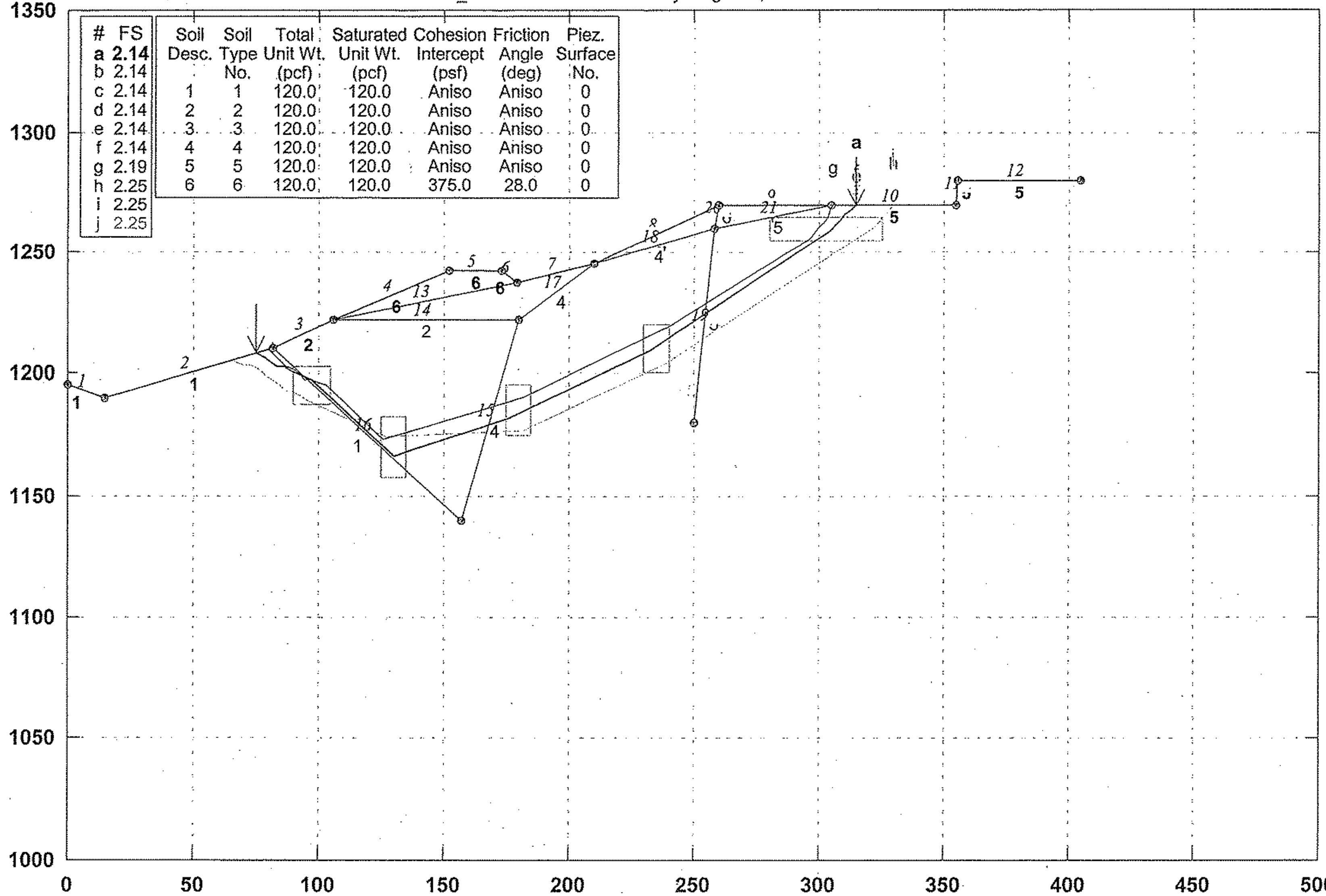


#	FS
a	2.14
b	2.14
c	2.14
d	2.14
e	2.14
f	2.14
g	2.19
h	2.25
i	2.25
j	2.25

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
1	1	120.0	120.0	Aniso	Aniso	0
2	2	120.0	120.0	Aniso	Aniso	0
3	3	120.0	120.0	Aniso	Aniso	0
4	4	120.0	120.0	Aniso	Aniso	0
5	5	120.0	120.0	Aniso	Aniso	0
6	6	120.0	120.0	375.0	28.0	0

GSTABL7 FSmin=2.14

Safety Factors Are Calculated By The Simplified Janbu Method

STED

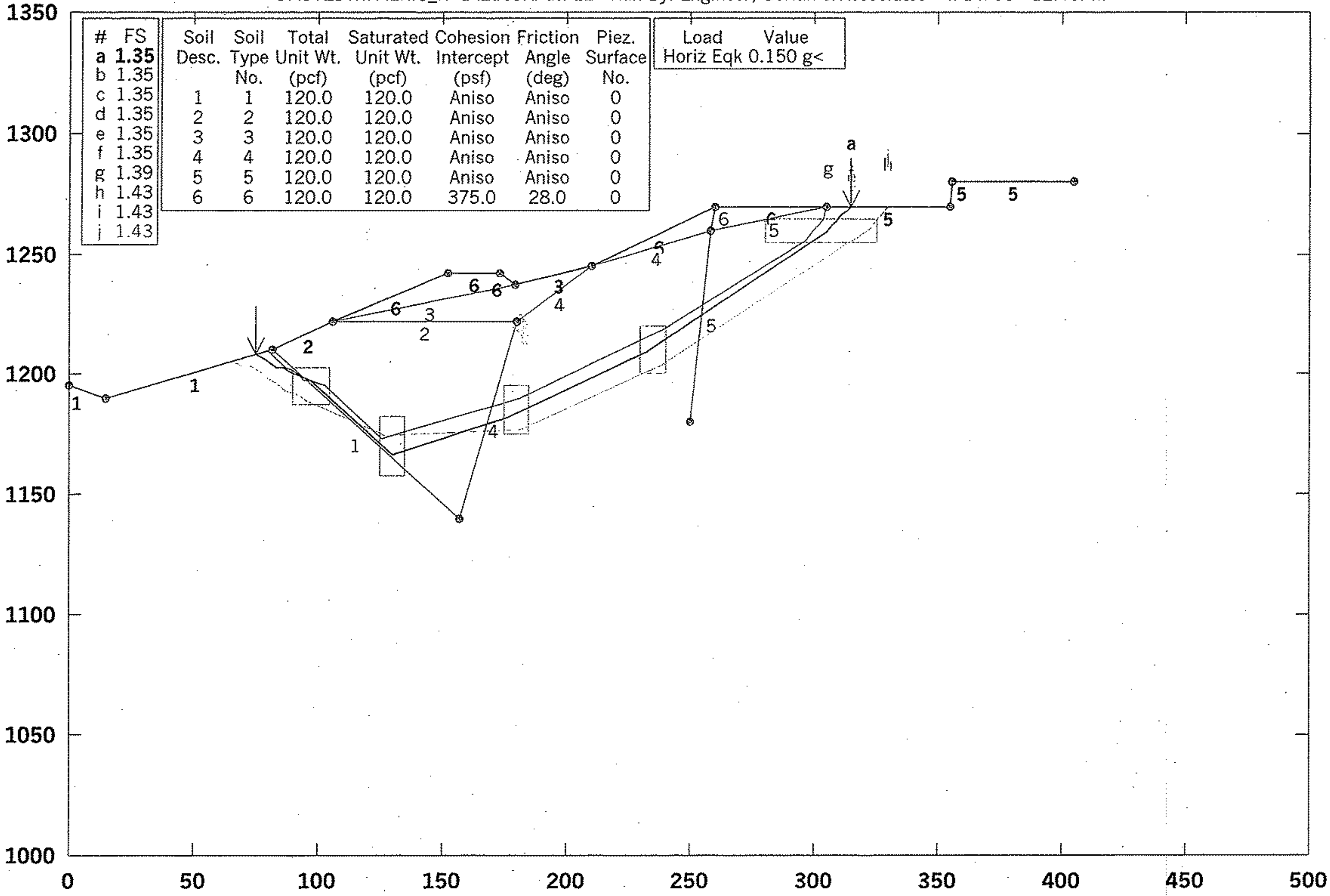
Rudyan / Cross-Section A-A'/ Syncline- Pseudo-Static

C:\STEDWIN\ERIC_R~1\2189AP1.PL2 Run By: Engineer, Gorian & Associates 4/14/06 12:40PM

#	FS
a	**1.35**
b	1.35
c	1.35
d	1.35
e	1.35
f	1.35
g	1.39
h	1.43
i	1.43
j	1.43

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
1	1	120.0	120.0	Aniso	Aniso	0
2	2	120.0	120.0	Aniso	Aniso	0
3	3	120.0	120.0	Aniso	Aniso	0
4	4	120.0	120.0	Aniso	Aniso	0
5	5	120.0	120.0	Aniso	Aniso	0
6	6	120.0	120.0	375.0	28.0	0

Load	Value
Horiz Eqk	0.150 g<



GSTABL7 FSmin=1.35

Safety Factors Are Calculated By The Simplified Janbu Method

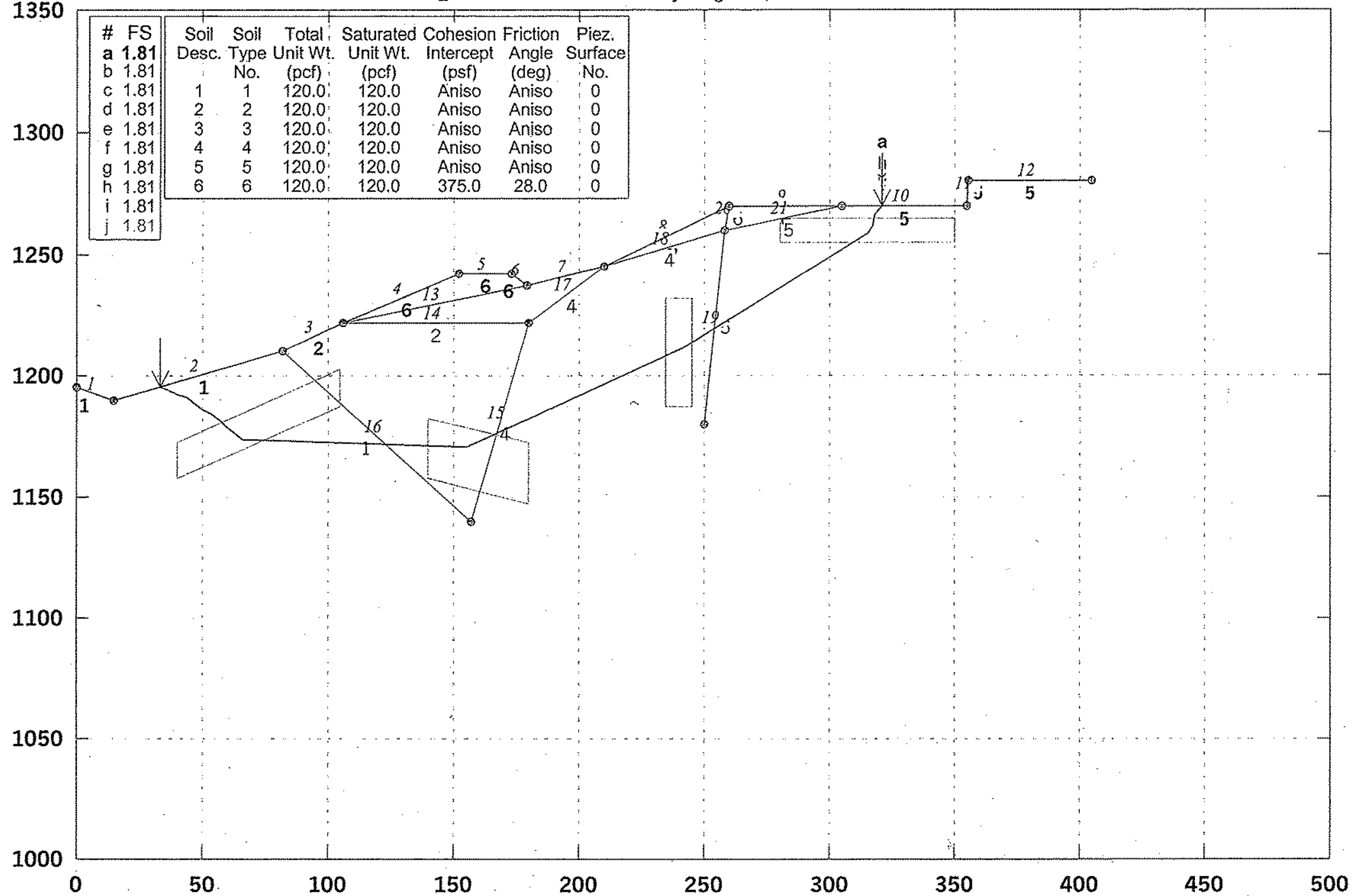
STED

Rudyan / Cross-Section A-A'/ Syncline/Toe-Static

C:\STEDWIN\ERIC_R~1\2189AS2.PL2 Run By: Engineer, Gorian & Associates 4/14/06 12:11PM

#	FS
a	**1.81**
b	1.81
c	1.81
d	1.81
e	1.81
f	1.81
g	1.81
h	1.81
i	1.81
j	1.81

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
1	1	120.0	120.0	Aniso	Aniso	0
2	2	120.0	120.0	Aniso	Aniso	0
3	3	120.0	120.0	Aniso	Aniso	0
4	4	120.0	120.0	Aniso	Aniso	0
5	5	120.0	120.0	Aniso	Aniso	0
6	6	120.0	120.0	375.0	28.0	0

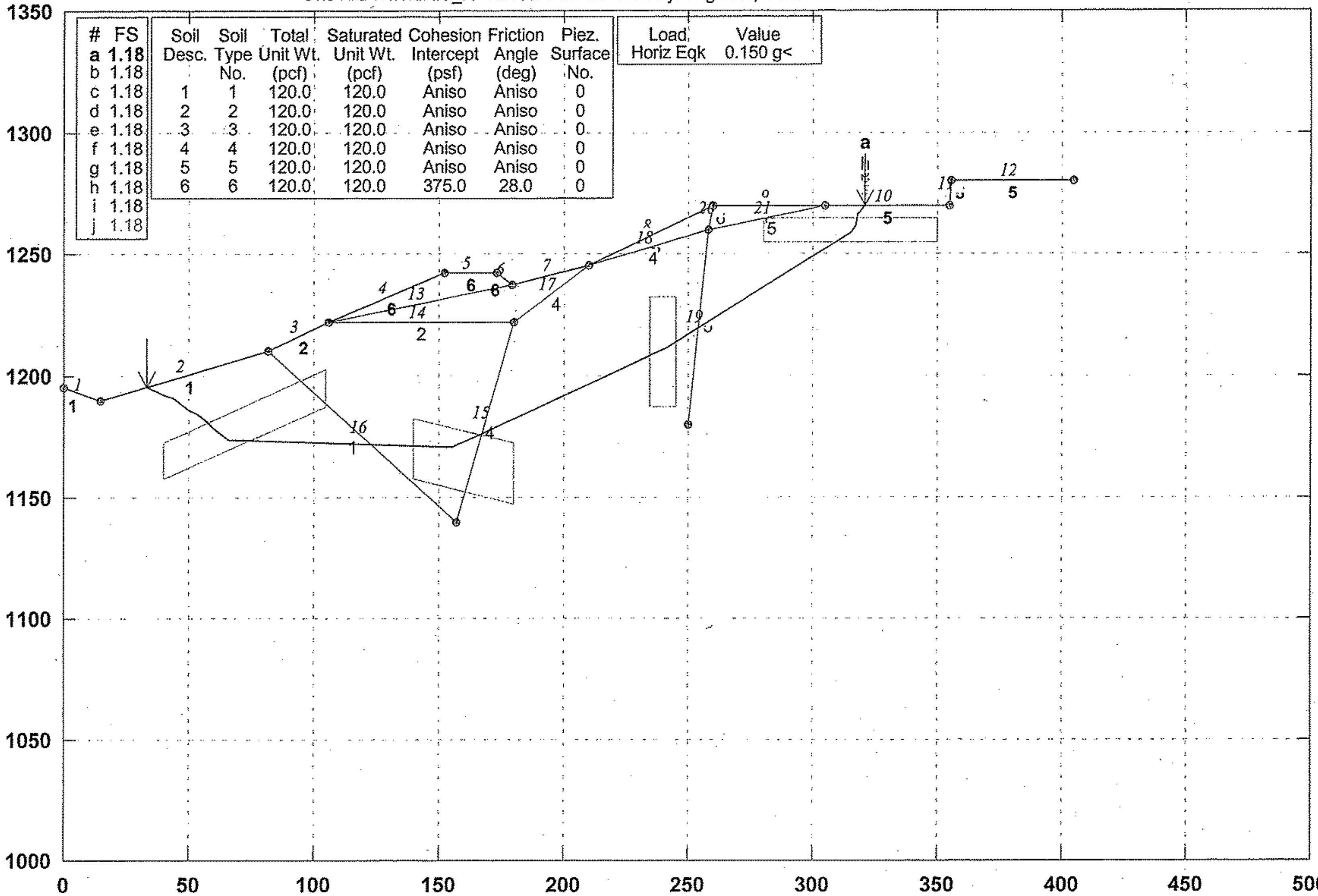


GSTABL7 FSmin=1.81
Safety Factors Are Calculated By The Simplified Janbu Method

STED

Rudyan / Cross-Section A-A'/ Syncline/Toe-Pseudo-Static

C:\STEDWIN\ERIC_R~1\2189AP2.PL2 Run By: Engineer, Gorian & Associates 4/14/06 12:17PM

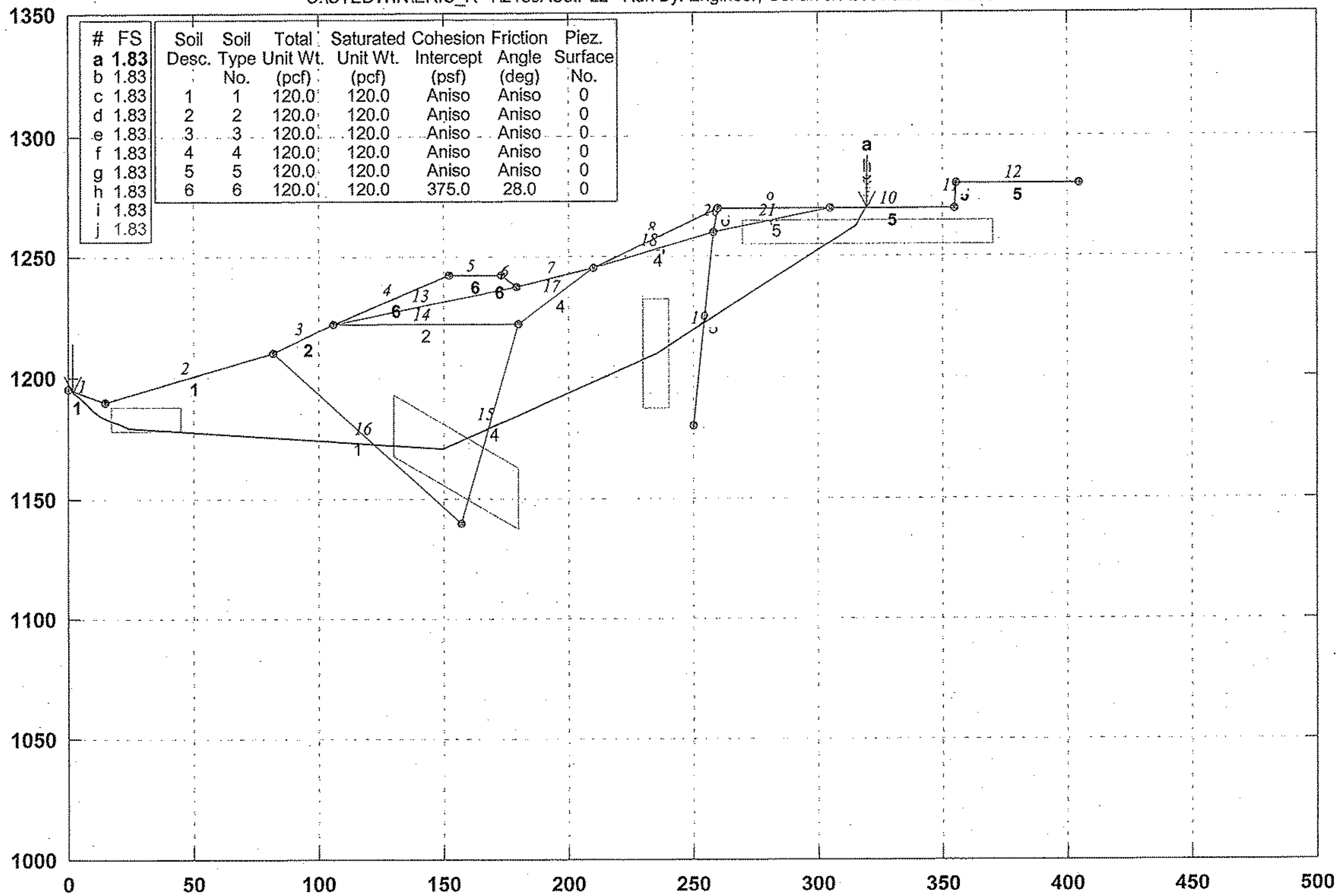


GSTABL7 FSmin=1.18
Safety Factors Are Calculated By The Simplified Janbu Method

STED

Rudyan / Cross-Section A-A'/ Toe - Static

C:\STEDWIN\ERIC_R~1\2189AS3.PL2 Run By: Engineer, Gorian & Associates 4/14/06 12:18PM



#	FS
a	**1.83**
b	1.83
c	1.83
d	1.83
e	1.83
f	1.83
g	1.83
h	1.83
i	1.83
j	1.83

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
1	1	120.0	120.0	Aniso	Aniso	0
2	2	120.0	120.0	Aniso	Aniso	0
3	3	120.0	120.0	Aniso	Aniso	0
4	4	120.0	120.0	Aniso	Aniso	0
5	5	120.0	120.0	Aniso	Aniso	0
6	6	120.0	120.0	375.0	28.0	0

GSTABL7 FSmin=1.83

STED

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

Rudyan / Cross-Section A-A'/ Toe - Pseudo-Static

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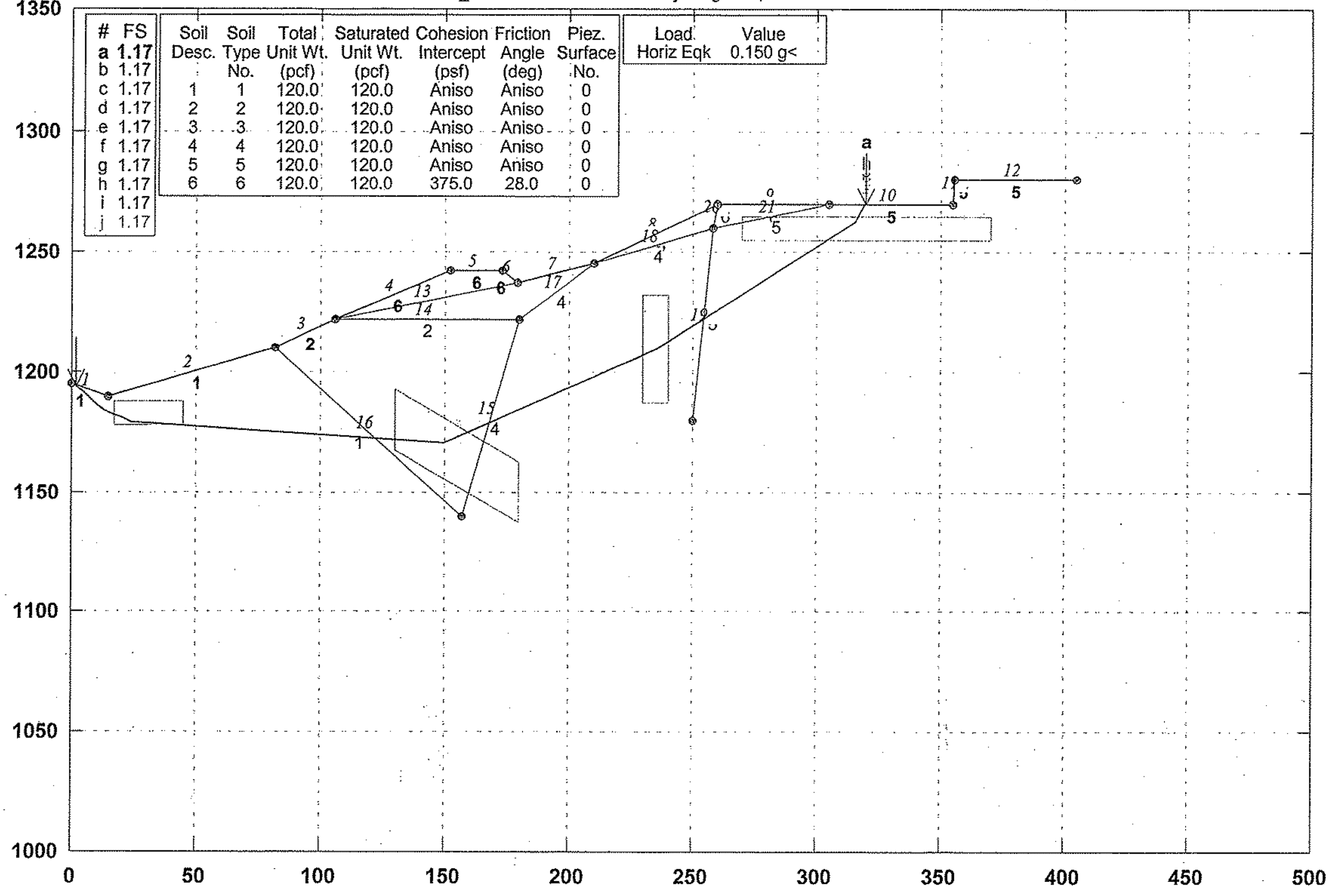

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

STED

*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Version 1.0, January 1996; Version 1.16, May 2000 **

--Slope Stability Analysis--
Simplified Janbu, Modified Bishop
or Spencer`s Method of Slices
(Based on STABL6-1986, by Purdue University)

Run Date: 4/14/06
Time of Run: 12:16PM
Run By: Engineer, Gorian & Associates
Input Data Filename: C:2189AS1.
Output Filename: C:2189AS1.OUT
Unit System: English

Plotted Output Filename: C:2189AS1.PLT

PROBLEM DESCRIPTION Rudyan / Cross-Section A-A'/ Syncline-
Static

BOUNDARY COORDINATES

12 Top Boundaries
21 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	195.00	15.00	190.00	1
2	15.00	190.00	82.00	210.00	1
3	82.00	210.00	106.00	222.00	2
4	106.00	222.00	152.00	242.00	6
5	152.00	242.00	173.00	242.00	6
6	173.00	242.00	179.00	237.00	6
7	179.00	237.00	210.00	245.00	3
8	210.00	245.00	260.00	270.00	6
9	260.00	270.00	305.00	270.00	6
10	305.00	270.00	355.00	270.00	5
11	355.00	270.00	355.50	280.00	5
12	355.50	280.00	405.00	280.00	5
13	106.00	222.00	179.00	237.00	3
14	106.00	222.00	180.00	222.00	2
15	157.00	140.00	180.00	222.00	4
16	82.00	210.00	157.00	140.00	1
17	180.00	222.00	210.00	245.00	4
18	210.00	245.00	258.00	260.00	4
19	250.00	180.00	258.00	260.00	5
20	258.00	260.00	260.00	270.00	6
21	258.00	260.00	305.00	270.00	5

1

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Total Saturated Cohesion Friction Pore Pressure Piez.

Type No.	Unit Wt. (pcf)	Unit Wt. (pcf)	Intercept (psf)	Angle (deg)	Pressure Param.	Constant (psf)	Surface No.
1	120.0	120.0	300.0	13.0	0.00	0.0	0
2	120.0	120.0	300.0	13.0	0.00	0.0	0
3	120.0	120.0	300.0	13.0	0.00	0.0	0
4	120.0	120.0	300.0	13.0	0.00	0.0	0
5	120.0	120.0	300.0	13.0	0.00	0.0	0
6	120.0	120.0	375.0	28.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
5 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-4.0	560.0	29.0
2	0.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-45.0	560.0	29.0
2	-41.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-18.0	560.0	29.0
2	-14.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 4 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	23.0	560.0	29.0
2	27.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 5 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	31.0	560.0	29.0
2	35.0	300.0	13.0
3	90.0	560.0	29.0

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

1000 Trial Surfaces Have Been Generated.

5 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	90.00	195.00	105.00	195.00	15.00
2	125.00	170.00	135.00	170.00	25.00
3	175.00	185.00	185.00	185.00	20.00
4	230.00	210.00	240.00	210.00	20.00
5	280.00	260.00	325.00	260.00	10.00

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	75.17	207.96
2	75.82	207.77
3	78.48	206.39
4	80.99	204.75
5	83.37	202.92
6	86.35	202.59
7	88.92	201.05
8	91.51	199.54
9	94.32	198.48
10	97.12	197.40
11	99.43	195.49
12	130.05	166.21
13	175.97	181.64
14	232.47	209.06
15	304.69	259.29

16	306.65	261.57
17	308.77	263.69
18	310.73	265.96
19	312.84	268.09
20	314.63	270.00

*** 2.145 ***

Individual data on the 32 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	0.6	14.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	2.7	470.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	2.5	1130.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	1.0	663.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	1.4	1133.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	3.0	3103.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	2.6	3392.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	2.6	4297.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	2.8	5541.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	93.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	2.8	6263.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	2.3	6020.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	6.6	22075.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	24.1	142937.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	21.9	177326.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	15.9	125600.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	5.1	37905.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	3.0	21220.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	3.0	20344.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	1.0	6452.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	30.0	180899.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	22.5	126730.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	22.0	118705.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	3.6	18203.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	2.0	10077.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	44.7	140802.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	0.3	386.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	1.6	1858.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	2.1	1877.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	2.0	1218.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	2.1	752.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	1.8	204.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	75.17	207.96
2	75.82	207.77
3	78.48	206.39
4	80.99	204.75
5	83.37	202.92
6	86.35	202.59
7	88.92	201.05
8	91.51	199.54
9	94.32	198.48
10	97.12	197.40
11	99.43	195.49
12	130.05	166.21

13	175.97	181.64
14	232.47	209.06
15	304.69	259.29
16	306.65	261.57
17	308.77	263.69
18	310.73	265.96
19	312.84	268.09
20	314.63	270.00

*** 2.145 ***

1

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	75.17	207.96
2	75.82	207.77
3	78.48	206.39
4	80.99	204.75
5	83.37	202.92
6	86.35	202.59
7	88.92	201.05
8	91.51	199.54
9	94.32	198.48
10	97.12	197.40
11	99.43	195.49
12	130.05	166.21
13	175.97	181.64
14	232.47	209.06
15	304.69	259.29
16	306.65	261.57
17	308.77	263.69
18	310.73	265.96
19	312.84	268.09
20	314.63	270.00

*** 2.145 ***

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	75.17	207.96
2	75.82	207.77
3	78.48	206.39
4	80.99	204.75
5	83.37	202.92
6	86.35	202.59
7	88.92	201.05
8	91.51	199.54
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11	99.43	195.49
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15	304.69	259.29
16	306.65	261.57

17	308.77	263.69
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19	312.84	268.09
20	314.63	270.00

*** 2.145 ***

1

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	75.17	207.96
2	75.82	207.77
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4	80.99	204.75
5	83.37	202.92
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19	312.84	268.09
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*** 2.145 ***

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Point No.	X-Surf (ft)	Y-Surf (ft)
1	75.17	207.96
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15	304.69	259.29
16	306.65	261.57
17	308.77	263.69
18	310.73	265.96
19	312.84	268.09
20	314.63	270.00

*** 2.145 ***

1

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	79.20	209.17
2	80.69	208.68
3	82.88	206.62
4	85.00	204.50
5	87.13	202.38
6	89.96	201.39
7	92.20	199.40
8	94.43	197.40
9	97.42	197.06
10	100.21	195.98
11	103.07	195.07
12	125.54	172.98
13	180.93	189.60
14	239.56	218.61
15	296.27	255.65
16	298.03	258.08
17	300.06	260.28
18	302.05	262.53
19	303.68	265.05
20	304.10	268.02
21	305.43	270.00

*** 2.191 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	65.66	205.12
2	66.69	204.36
3	69.51	203.33
4	72.49	202.99
5	75.39	202.23
6	77.51	200.11
7	79.71	198.07
8	82.31	196.56
9	84.77	194.84
10	87.03	192.88
11	89.97	192.28
12	92.58	190.80
13	94.98	188.99
14	127.14	174.48
15	181.71	176.97
16	239.20	204.03
17	321.91	260.82
18	323.95	263.02
19	325.81	265.37
20	327.87	267.55
21	329.77	269.88
22	329.86	270.00

*** 2.247 ***

1

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	65.66	205.12
2	66.69	204.36
3	69.51	203.33
4	72.49	202.99
5	75.39	202.23
6	77.51	200.11
7	79.71	198.07
8	82.31	196.56
9	84.77	194.84
10	87.03	192.88
11	89.97	192.28
12	92.58	190.80
13	94.98	188.99
14	127.14	174.48
15	181.71	176.97
16	239.20	204.03
17	321.91	260.82
18	323.95	263.02
19	325.81	265.37
20	327.87	267.55
21	329.77	269.88
22	329.86	270.00

*** 2.247 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	65.66	205.12
2	66.69	204.36
3	69.51	203.33
4	72.49	202.99
5	75.39	202.23
6	77.51	200.11
7	79.71	198.07
8	82.31	196.56
9	84.77	194.84
10	87.03	192.88
11	89.97	192.28
12	92.58	190.80
13	94.98	188.99
14	127.14	174.48
15	181.71	176.97
16	239.20	204.03
17	321.91	260.82
18	323.95	263.02
19	325.81	265.37
20	327.87	267.55
21	329.77	269.88
22	329.86	270.00

*** 2.247 ***

*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Version 1.0, January 1996; Version 1.16, May 2000 **

--Slope Stability Analysis--
Simplified Janbu, Modified Bishop
or Spencer˜s Method of Slices
(Based on STABL6-1986, by Purdue University)

Run Date:	4/14/06
Time of Run:	12:34PM
Run By:	Engineer, Gorian & Associates
Input Data Filename:	C:2189ap1.
Output Filename:	C:2189ap1.OUT
Unit System:	English
Plotted Output Filename:	C:2189ap1.PLT

PROBLEM DESCRIPTION Rudyan / Cross-Section A-A'/ Syncline-
Pseudo-Static

BOUNDARY COORDINATES

12 Top Boundaries
21 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	195.00	15.00	190.00	1
2	15.00	190.00	82.00	210.00	1
3	82.00	210.00	106.00	222.00	2
4	106.00	222.00	152.00	242.00	6
5	152.00	242.00	173.00	242.00	6
6	173.00	242.00	179.00	237.00	6
7	179.00	237.00	210.00	245.00	3
8	210.00	245.00	260.00	270.00	6
9	260.00	270.00	305.00	270.00	6
10	305.00	270.00	355.00	270.00	5
11	355.00	270.00	355.50	280.00	5
12	355.50	280.00	405.00	280.00	5
13	106.00	222.00	179.00	237.00	3
14	106.00	222.00	180.00	222.00	2
15	157.00	140.00	180.00	222.00	4
16	82.00	210.00	157.00	140.00	1
17	180.00	222.00	210.00	245.00	4
18	210.00	245.00	258.00	260.00	4
19	250.00	180.00	258.00	260.00	5
20	258.00	260.00	260.00	270.00	6
21	258.00	260.00	305.00	270.00	5

1

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Total Saturated Cohesion Friction Pore Pressure Piez.

Type No.	Unit Wt. (pcf)	Unit Wt. (pcf)	Intercept (psf)	Angle (deg)	Pressure Param.	Constant (psf)	Surface No.
1	120.0	120.0	300.0	13.0	0.00	0.0	0
2	120.0	120.0	300.0	13.0	0.00	0.0	0
3	120.0	120.0	300.0	13.0	0.00	0.0	0
4	120.0	120.0	300.0	13.0	0.00	0.0	0
5	120.0	120.0	300.0	13.0	0.00	0.0	0
6	120.0	120.0	375.0	28.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
5 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-4.0	560.0	29.0
2	0.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-45.0	560.0	29.0
2	-41.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-18.0	560.0	29.0
2	-14.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 4 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	23.0	560.0	29.0
2	27.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 5 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	31.0	560.0	29.0
2	35.0	300.0	13.0
3	90.0	560.0	29.0

A Horizontal Earthquake Loading Coefficient
Of0.150 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0(psf)

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

1000 Trial Surfaces Have Been Generated.

5 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	90.00	195.00	105.00	195.00	15.00
2	125.00	170.00	135.00	170.00	25.00
3	175.00	185.00	185.00	185.00	20.00
4	230.00	210.00	240.00	210.00	20.00
5	280.00	260.00	325.00	260.00	10.00

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	75.17	207.96
2	75.82	207.77
3	78.48	206.39
4	80.99	204.75
5	83.37	202.92

6	86.35	202.59
7	88.92	201.05
8	91.51	199.54
9	94.32	198.48
10	97.12	197.40
11	99.43	195.49
12	130.05	166.21
13	175.97	181.64
14	232.47	209.06
15	304.69	259.29
16	306.65	261.57
17	308.77	263.69
18	310.73	265.96
19	312.84	268.09
20	314.63	270.00

*** 1.351 ***

Individual data on the 32 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	0.6	14.9	0.0	0.0	0.0	0.0	2.2	0.0	0.0
2	2.7	470.1	0.0	0.0	0.0	0.0	70.5	0.0	0.0
3	2.5	1130.8	0.0	0.0	0.0	0.0	169.6	0.0	0.0
4	1.0	663.1	0.0	0.0	0.0	0.0	99.5	0.0	0.0
5	1.4	1133.5	0.0	0.0	0.0	0.0	170.0	0.0	0.0
6	3.0	3103.4	0.0	0.0	0.0	0.0	465.5	0.0	0.0
7	2.6	3392.7	0.0	0.0	0.0	0.0	508.9	0.0	0.0
8	2.6	4297.1	0.0	0.0	0.0	0.0	644.6	0.0	0.0
9	2.8	5541.8	0.0	0.0	0.0	0.0	831.3	0.0	0.0
10	0.0	93.7	0.0	0.0	0.0	0.0	14.1	0.0	0.0
11	2.8	6263.2	0.0	0.0	0.0	0.0	939.5	0.0	0.0
12	2.3	6020.1	0.0	0.0	0.0	0.0	903.0	0.0	0.0
13	6.6	22075.4	0.0	0.0	0.0	0.0	3311.3	0.0	0.0
14	24.1	142937.3	0.0	0.0	0.0	0.0	21440.6	0.0	0.0
15	21.9	177326.0	0.0	0.0	0.0	0.0	26598.9	0.0	0.0
16	15.9	125600.3	0.0	0.0	0.0	0.0	18840.0	0.0	0.0
17	5.1	37905.1	0.0	0.0	0.0	0.0	5685.8	0.0	0.0
18	3.0	21220.7	0.0	0.0	0.0	0.0	3183.1	0.0	0.0
19	3.0	20344.9	0.0	0.0	0.0	0.0	3051.7	0.0	0.0
20	1.0	6452.4	0.0	0.0	0.0	0.0	967.9	0.0	0.0
21	30.0	180899.8	0.0	0.0	0.0	0.0	27135.0	0.0	0.0
22	22.5	126730.0	0.0	0.0	0.0	0.0	19009.5	0.0	0.0
23	22.0	118705.6	0.0	0.0	0.0	0.0	17805.8	0.0	0.0
24	3.6	18203.9	0.0	0.0	0.0	0.0	2730.6	0.0	0.0
25	2.0	10077.5	0.0	0.0	0.0	0.0	1511.6	0.0	0.0
26	44.7	140802.1	0.0	0.0	0.0	0.0	21120.3	0.0	0.0
27	0.3	386.1	0.0	0.0	0.0	0.0	57.9	0.0	0.0
28	1.6	1858.2	0.0	0.0	0.0	0.0	278.7	0.0	0.0
29	2.1	1877.0	0.0	0.0	0.0	0.0	281.6	0.0	0.0
30	2.0	1218.2	0.0	0.0	0.0	0.0	182.7	0.0	0.0
31	2.1	752.6	0.0	0.0	0.0	0.0	112.9	0.0	0.0
32	1.8	204.9	0.0	0.0	0.0	0.0	30.7	0.0	0.0

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	75.17	207.96

2	75.82	207.77
3	78.48	206.39
4	80.99	204.75
5	83.37	202.92
6	86.35	202.59
7	88.92	201.05
8	91.51	199.54
9	94.32	198.48
10	97.12	197.40
11	99.43	195.49
12	130.05	166.21
13	175.97	181.64
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4	80.99	204.75
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18	310.73	265.96
19	312.84	268.09
20	314.63	270.00

*** 1.351 ***

1

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	79.20	209.17
2	80.69	208.68
3	82.88	206.62
4	85.00	204.50
5	87.13	202.38
6	89.96	201.39
7	92.20	199.40
8	94.43	197.40
9	97.42	197.06
10	100.21	195.98
11	103.07	195.07
12	125.54	172.98
13	180.93	189.60
14	239.56	218.61
15	296.27	255.65
16	298.03	258.08
17	300.06	260.28
18	302.05	262.53
19	303.68	265.05
20	304.10	268.02
21	305.43	270.00

*** 1.392 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	65.66	205.12
2	66.69	204.36
3	69.51	203.33
4	72.49	202.99
5	75.39	202.23
6	77.51	200.11
7	79.71	198.07
8	82.31	196.56
9	84.77	194.84
10	87.03	192.88
11	89.97	192.28

12	92.58	190.80
13	94.98	188.99
14	127.14	174.48
15	181.71	176.97
16	239.20	204.03
17	321.91	260.82
18	323.95	263.02
19	325.81	265.37
20	327.87	267.55
21	329.77	269.88
22	329.86	270.00

*** 1.434 ***

1

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	65.66	205.12
2	66.69	204.36
3	69.51	203.33
4	72.49	202.99
5	75.39	202.23
6	77.51	200.11
7	79.71	198.07
8	82.31	196.56
9	84.77	194.84
10	87.03	192.88
11	89.97	192.28
12	92.58	190.80
13	94.98	188.99
14	127.14	174.48
15	181.71	176.97
16	239.20	204.03
17	321.91	260.82
18	323.95	263.02
19	325.81	265.37
20	327.87	267.55
21	329.77	269.88
22	329.86	270.00

*** 1.434 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	65.66	205.12
2	66.69	204.36
3	69.51	203.33
4	72.49	202.99
5	75.39	202.23
6	77.51	200.11
7	79.71	198.07
8	82.31	196.56
9	84.77	194.84
10	87.03	192.88
11	89.97	192.28

12	92.58	190.80
13	94.98	188.99
14	127.14	174.48
15	181.71	176.97
16	239.20	204.03
17	321.91	260.82
18	323.95	263.02
19	325.81	265.37
20	327.87	267.55
21	329.77	269.88
22	329.86	270.00

*** 1.434 ***

*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Version 1.0, January 1996; Version 1.16, May 2000 **

--Slope Stability Analysis--
Simplified Janbu, Modified Bishop
or Spencer`s Method of Slices
(Based on STABL6-1986, by Purdue University)

Run Date:	4/14/06
Time of Run:	12:11PM
Run By:	Engineer, Gorian & Associates
Input Data Filename:	C:2189AS2.
Output Filename:	C:2189AS2.OUT
Unit System:	English

Plotted Output Filename: C:2189AS2.PLT

PROBLEM DESCRIPTION Rudyan / Cross-Section A-A'/ Syncline/To
e-Static

BOUNDARY COORDINATES

12 Top Boundaries
21 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	195.00	15.00	190.00	1
2	15.00	190.00	82.00	210.00	1
3	82.00	210.00	106.00	222.00	2
4	106.00	222.00	152.00	242.00	6
5	152.00	242.00	173.00	242.00	6
6	173.00	242.00	179.00	237.00	6
7	179.00	237.00	210.00	245.00	3
8	210.00	245.00	260.00	270.00	6
9	260.00	270.00	305.00	270.00	6
10	305.00	270.00	355.00	270.00	5
11	355.00	270.00	355.50	280.00	5
12	355.50	280.00	405.00	280.00	5
13	106.00	222.00	179.00	237.00	3
14	106.00	222.00	180.00	222.00	2
15	157.00	140.00	180.00	222.00	4
16	82.00	210.00	157.00	140.00	1
17	180.00	222.00	210.00	245.00	4
18	210.00	245.00	258.00	260.00	4
19	250.00	180.00	258.00	260.00	5
20	258.00	260.00	260.00	270.00	6
21	258.00	260.00	305.00	270.00	5

1

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Total Saturated Cohesion Friction Pore Pressure Piez.

Type No.	Unit Wt. (pcf)	Unit Wt. (pcf)	Intercept (psf)	Angle (deg)	Pressure Param.	Constant (psf)	Surface No.
1	120.0	120.0	300.0	13.0	0.00	0.0	0
2	120.0	120.0	300.0	13.0	0.00	0.0	0
3	120.0	120.0	300.0	13.0	0.00	0.0	0
4	120.0	120.0	300.0	13.0	0.00	0.0	0
5	120.0	120.0	300.0	13.0	0.00	0.0	0
6	120.0	120.0	375.0	28.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
5 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-4.0	560.0	29.0
2	0.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-45.0	560.0	29.0
2	-41.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-18.0	560.0	29.0
2	-14.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 4 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	23.0	560.0	29.0
2	27.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 5 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	31.0	560.0	29.0
2	35.0	300.0	13.0
3	90.0	560.0	29.0

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

2000 Trial Surfaces Have Been Generated.

4 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 4.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	40.00	165.00	105.00	195.00	15.00
2	140.00	170.00	180.00	160.00	25.00
3	235.00	210.00	245.00	210.00	45.00
4	280.00	260.00	350.00	260.00	10.00

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	33.52	195.53
2	36.41	193.84
3	40.15	192.43
4	43.89	190.99
5	46.97	188.44
6	50.17	186.05
7	53.59	183.96
8	56.83	181.63
9	59.79	178.94
10	62.85	176.36
11	65.70	173.56
12	154.94	170.41
13	241.29	211.46
14	315.37	258.48
15	317.43	261.91
16	317.87	265.89

17	320.31	269.06
18	320.93	270.00

*** 1.808 ***

Individual data on the 30 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	2.9	442.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	3.7	1712.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	3.7	2846.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	3.1	3464.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	3.2	4914.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	3.4	6552.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	3.2	7480.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	3.0	8044.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	3.1	9621.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	2.8	10171.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	16.3	67073.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	24.0	125114.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	17.2	111414.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	28.8	223522.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	2.9	25230.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	12.2	100719.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	5.8	45139.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	6.0	42537.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	1.0	6605.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	30.0	186033.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	31.3	183228.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	12.7	73433.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	4.1	22945.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	2.0	11231.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	45.0	174864.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	10.4	18430.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	2.1	2426.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	0.4	321.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	2.4	740.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	0.6	34.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	33.52	195.53
2	36.41	193.84
3	40.15	192.43
4	43.89	190.99
5	46.97	188.44
6	50.17	186.05
7	53.59	183.96
8	56.83	181.63
9	59.79	178.94
10	62.85	176.36
11	65.70	173.56
12	154.94	170.41
13	241.29	211.46
14	315.37	258.48
15	317.43	261.91
16	317.87	265.89
17	320.31	269.06

18	320.93	270.00

*** 1.808 ***

1

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	33.52	195.53
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3	40.15	192.43
4	43.89	190.99
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9	59.79	178.94
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11	65.70	173.56
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*** 1.808 ***

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3	40.15	192.43
4	43.89	190.99
5	46.97	188.44
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16	317.87	265.89
17	320.31	269.06
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*** 1.808 ***

1

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Point No.	X-Surf (ft)	Y-Surf (ft)
1	33.52	195.53
2	36.41	193.84
3	40.15	192.43
4	43.89	190.99
5	46.97	188.44
6	50.17	186.05
7	53.59	183.96
8	56.83	181.63

9	59.79	178.94
10	62.85	176.36
11	65.70	173.56
12	154.94	170.41
13	241.29	211.46
14	315.37	258.48
15	317.43	261.91
16	317.87	265.89
17	320.31	269.06
18	320.93	270.00

*** 1.808 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	33.52	195.53
2	36.41	193.84
3	40.15	192.43
4	43.89	190.99
5	46.97	188.44
6	50.17	186.05
7	53.59	183.96
8	56.83	181.63
9	59.79	178.94
10	62.85	176.36
11	65.70	173.56
12	154.94	170.41
13	241.29	211.46
14	315.37	258.48
15	317.43	261.91
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17	320.31	269.06
18	320.93	270.00

*** 1.808 ***

*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Version 1.0, January 1996; Version 1.16, May 2000 **

--Slope Stability Analysis--
Simplified Janbu, Modified Bishop
or Spencer`s Method of Slices
(Based on STABL6-1986, by Purdue University)

Run Date:	4/14/06
Time of Run:	12:17PM
Run By:	Engineer, Gorian & Associates
Input Data Filename:	C:2189ap2.
Output Filename:	C:2189ap2.OUT
Unit System:	English

Plotted Output Filename: C:2189ap2.PLT

PROBLEM DESCRIPTION Rudyan / Cross-Section A-A'/ Syncline/To
e-Pseudo-Static

BOUNDARY COORDINATES

12 Top Boundaries
21 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	195.00	15.00	190.00	1
2	15.00	190.00	82.00	210.00	1
3	82.00	210.00	106.00	222.00	2
4	106.00	222.00	152.00	242.00	6
5	152.00	242.00	173.00	242.00	6
6	173.00	242.00	179.00	237.00	6
7	179.00	237.00	210.00	245.00	3
8	210.00	245.00	260.00	270.00	6
9	260.00	270.00	305.00	270.00	6
10	305.00	270.00	355.00	270.00	5
11	355.00	270.00	355.50	280.00	5
12	355.50	280.00	405.00	280.00	5
13	106.00	222.00	179.00	237.00	3
14	106.00	222.00	180.00	222.00	2
15	157.00	140.00	180.00	222.00	4
16	82.00	210.00	157.00	140.00	1
17	180.00	222.00	210.00	245.00	4
18	210.00	245.00	258.00	260.00	4
19	250.00	180.00	258.00	260.00	5
20	258.00	260.00	260.00	270.00	6
21	258.00	260.00	305.00	270.00	5

1

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Total Saturated Cohesion Friction Pore Pressure Piez.

Type No.	Unit Wt. (pcf)	Unit Wt. (pcf)	Intercept (psf)	Angle (deg)	Pressure Param.	Constant (psf)	Surface No.
1	120.0	120.0	300.0	13.0	0.00	0.0	0
2	120.0	120.0	300.0	13.0	0.00	0.0	0
3	120.0	120.0	300.0	13.0	0.00	0.0	0
4	120.0	120.0	300.0	13.0	0.00	0.0	0
5	120.0	120.0	300.0	13.0	0.00	0.0	0
6	120.0	120.0	375.0	28.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
5 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-4.0	560.0	29.0
2	0.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-45.0	560.0	29.0
2	-41.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-18.0	560.0	29.0
2	-14.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 4 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	23.0	560.0	29.0
2	27.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 5 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	31.0	560.0	29.0
2	35.0	300.0	13.0
3	90.0	560.0	29.0

A Horizontal Earthquake Loading Coefficient
Of0.150 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0(psf)

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

2000 Trial Surfaces Have Been Generated.

4 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 4.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	40.00	165.00	105.00	195.00	15.00
2	140.00	170.00	180.00	160.00	25.00
3	235.00	210.00	245.00	210.00	45.00
4	280.00	260.00	350.00	260.00	10.00

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	33.52	195.53
2	36.41	193.84
3	40.15	192.43
4	43.89	190.99
5	46.97	188.44
6	50.17	186.05

7	53.59	183.96
8	56.83	181.63
9	59.79	178.94
10	62.85	176.36
11	65.70	173.56
12	154.94	170.41
13	241.29	211.46
14	315.37	258.48
15	317.43	261.91
16	317.87	265.89
17	320.31	269.06
18	320.93	270.00

*** 1.178 ***

Individual data on the 30 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	2.9	442.1	0.0	0.0	0.0	0.0	66.3	0.0	0.0
2	3.7	1712.7	0.0	0.0	0.0	0.0	256.9	0.0	0.0
3	3.7	2846.1	0.0	0.0	0.0	0.0	426.9	0.0	0.0
4	3.1	3464.7	0.0	0.0	0.0	0.0	519.7	0.0	0.0
5	3.2	4914.6	0.0	0.0	0.0	0.0	737.2	0.0	0.0
6	3.4	6552.3	0.0	0.0	0.0	0.0	982.8	0.0	0.0
7	3.2	7480.1	0.0	0.0	0.0	0.0	1122.0	0.0	0.0
8	3.0	8044.9	0.0	0.0	0.0	0.0	1206.7	0.0	0.0
9	3.1	9621.0	0.0	0.0	0.0	0.0	1443.2	0.0	0.0
10	2.8	10171.5	0.0	0.0	0.0	0.0	1525.7	0.0	0.0
11	16.3	67073.3	0.0	0.0	0.0	0.0	10061.0	0.0	0.0
12	24.0	125114.3	0.0	0.0	0.0	0.0	18767.2	0.0	0.0
13	17.2	111414.7	0.0	0.0	0.0	0.0	16712.2	0.0	0.0
14	28.8	223522.6	0.0	0.0	0.0	0.0	33528.4	0.0	0.0
15	2.9	25230.5	0.0	0.0	0.0	0.0	3784.6	0.0	0.0
16	12.2	100719.1	0.0	0.0	0.0	0.0	15107.9	0.0	0.0
17	5.8	45139.4	0.0	0.0	0.0	0.0	6770.9	0.0	0.0
18	6.0	42537.3	0.0	0.0	0.0	0.0	6380.6	0.0	0.0
19	1.0	6605.4	0.0	0.0	0.0	0.0	990.8	0.0	0.0
20	30.0	186033.8	0.0	0.0	0.0	0.0	27905.1	0.0	0.0
21	31.3	183228.6	0.0	0.0	0.0	0.0	27484.3	0.0	0.0
22	12.7	73433.2	0.0	0.0	0.0	0.0	11015.0	0.0	0.0
23	4.1	22945.2	0.0	0.0	0.0	0.0	3441.8	0.0	0.0
24	2.0	11231.8	0.0	0.0	0.0	0.0	1684.8	0.0	0.0
25	45.0	174864.2	0.0	0.0	0.0	0.0	26229.6	0.0	0.0
26	10.4	18430.7	0.0	0.0	0.0	0.0	2764.6	0.0	0.0
27	2.1	2426.0	0.0	0.0	0.0	0.0	363.9	0.0	0.0
28	0.4	321.1	0.0	0.0	0.0	0.0	48.2	0.0	0.0
29	2.4	740.1	0.0	0.0	0.0	0.0	111.0	0.0	0.0
30	0.6	34.9	0.0	0.0	0.0	0.0	5.2	0.0	0.0

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	33.52	195.53
2	36.41	193.84
3	40.15	192.43
4	43.89	190.99
5	46.97	188.44
6	50.17	186.05

7	53.59	183.96
8	56.83	181.63
9	59.79	178.94
10	62.85	176.36
11	65.70	173.56
12	154.94	170.41
13	241.29	211.46
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*** 1.178 ***

*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Version 1.0, January 1996; Version 1.16, May 2000 **

--Slope Stability Analysis--
Simplified Janbu, Modified Bishop
or Spencer`s Method of Slices
(Based on STABL6-1986, by Purdue University)

Run Date:	4/14/06
Time of Run:	12:18PM
Run By:	Engineer, Gorian & Associates
Input Data Filename:	C:2189as3.
Output Filename:	C:2189as3.OUT
Unit System:	English

Plotted Output Filename: C:2189as3.PLT

PROBLEM DESCRIPTION Rudyan / Cross-Section A-A'/ Toe - Static

BOUNDARY COORDINATES

12 Top Boundaries
21 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	195.00	15.00	190.00	1
2	15.00	190.00	82.00	210.00	1
3	82.00	210.00	106.00	222.00	2
4	106.00	222.00	152.00	242.00	6
5	152.00	242.00	173.00	242.00	6
6	173.00	242.00	179.00	237.00	6
7	179.00	237.00	210.00	245.00	3
8	210.00	245.00	260.00	270.00	6
9	260.00	270.00	305.00	270.00	6
10	305.00	270.00	355.00	270.00	5
11	355.00	270.00	355.50	280.00	5
12	355.50	280.00	405.00	280.00	5
13	106.00	222.00	179.00	237.00	3
14	106.00	222.00	180.00	222.00	2
15	157.00	140.00	180.00	222.00	4
16	82.00	210.00	157.00	140.00	1
17	180.00	222.00	210.00	245.00	4
18	210.00	245.00	258.00	260.00	4
19	250.00	180.00	258.00	260.00	5
20	258.00	260.00	260.00	270.00	6
21	258.00	260.00	305.00	270.00	5

1

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Total Saturated Cohesion Friction Pore Pressure Piez.

Type No.	Unit Wt. (pcf)	Unit Wt. (pcf)	Intercept (psf)	Angle (deg)	Pressure Param.	Constant (psf)	Surface No.
1	120.0	120.0	300.0	13.0	0.00	0.0	0
2	120.0	120.0	300.0	13.0	0.00	0.0	0
3	120.0	120.0	300.0	13.0	0.00	0.0	0
4	120.0	120.0	300.0	13.0	0.00	0.0	0
5	120.0	120.0	300.0	13.0	0.00	0.0	0
6	120.0	120.0	375.0	28.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
5 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-4.0	560.0	29.0
2	0.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-45.0	560.0	29.0
2	-41.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-18.0	560.0	29.0
2	-14.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 4 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	23.0	560.0	29.0
2	27.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 5 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	31.0	560.0	29.0
2	35.0	300.0	13.0
3	90.0	560.0	29.0

Janbus Empirical Coef is being used for the case of c & phi both > 0

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

1750 Trial Surfaces Have Been Generated.

4 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 4.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	17.00	183.00	45.00	183.00	10.00
2	130.00	180.00	180.00	150.00	25.00
3	230.00	210.00	240.00	210.00	45.00
4	270.00	260.00	370.00	260.00	10.00

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	2.00	194.33
2	4.11	192.30
3	6.97	189.50
4	9.87	186.75
5	12.73	183.95
6	16.51	182.63
7	20.17	181.03
8	23.78	179.30
9	149.99	170.56
10	235.22	209.66
11	315.36	262.69
12	317.37	266.15
13	319.19	269.71

14	319.48	270.00

*** 1.825 ***

Individual data on the 27 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	2.1	168.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	2.9	774.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	2.9	1415.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	2.9	2016.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	2.3	1857.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	1.5	1326.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	3.7	4030.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	3.6	5156.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	58.2	167853.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	24.0	119698.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	16.2	101972.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	27.8	212024.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	2.0	16997.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	15.9	127381.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	5.1	38187.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	6.0	41046.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	1.0	6364.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	30.0	179723.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	25.2	143578.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	19.0	105827.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	3.8	20202.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	2.0	10585.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	45.0	156887.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	10.4	13339.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	2.0	1348.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	1.8	453.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	0.3	5.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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12	317.37	266.15
13	319.19	269.71
14	319.48	270.00

*** 1.825 ***

1

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	2.00	194.33
2	4.11	192.30
3	6.97	189.50
4	9.87	186.75
5	12.73	183.95
6	16.51	182.63
7	20.17	181.03
8	23.78	179.30
9	149.99	170.56
10	235.22	209.66
11	315.36	262.69
12	317.37	266.15
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14	319.48	270.00

*** 1.825 ***

*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Version 1.0, January 1996; Version 1.16, May 2000 **

--Slope Stability Analysis--
Simplified Janbu, Modified Bishop
or Spencer`s Method of Slices
(Based on STABL6-1986, by Purdue University)

Run Date: 4/14/06
Time of Run: 12:18PM
Run By: Engineer, Gorian & Associates
Input Data Filename: C:2189ap3.
Output Filename: C:2189ap3.OUT
Unit System: English

Plotted Output Filename: C:2189ap3.PLT

PROBLEM DESCRIPTION Rudyan / Cross-Section A-A'/ Toe - Pseudo-Static

BOUNDARY COORDINATES

12 Top Boundaries
21 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	195.00	15.00	190.00	1
2	15.00	190.00	82.00	210.00	1
3	82.00	210.00	106.00	222.00	2
4	106.00	222.00	152.00	242.00	6
5	152.00	242.00	173.00	242.00	6
6	173.00	242.00	179.00	237.00	6
7	179.00	237.00	210.00	245.00	3
8	210.00	245.00	260.00	270.00	6
9	260.00	270.00	305.00	270.00	6
10	305.00	270.00	355.00	270.00	5
11	355.00	270.00	355.50	280.00	5
12	355.50	280.00	405.00	280.00	5
13	106.00	222.00	179.00	237.00	3
14	106.00	222.00	180.00	222.00	2
15	157.00	140.00	180.00	222.00	4
16	82.00	210.00	157.00	140.00	1
17	180.00	222.00	210.00	245.00	4
18	210.00	245.00	258.00	260.00	4
19	250.00	180.00	258.00	260.00	5
20	258.00	260.00	260.00	270.00	6
21	258.00	260.00	305.00	270.00	5

i

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Total Saturated Cohesion Friction Pore Pressure Piez.

Type No.	Unit Wt. (pcf)	Unit Wt. (pcf)	Intercept (psf)	Angle (deg)	Pressure Param.	Constant (psf)	Surface No.
1	120.0	120.0	300.0	13.0	0.00	0.0	0
2	120.0	120.0	300.0	13.0	0.00	0.0	0
3	120.0	120.0	300.0	13.0	0.00	0.0	0
4	120.0	120.0	300.0	13.0	0.00	0.0	0
5	120.0	120.0	300.0	13.0	0.00	0.0	0
6	120.0	120.0	375.0	28.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
5 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-4.0	560.0	29.0
2	0.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-45.0	560.0	29.0
2	-41.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-18.0	560.0	29.0
2	-14.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 4 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	23.0	560.0	29.0
2	27.0	300.0	13.0
3	90.0	560.0	29.0

Soil Type 5 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	31.0	560.0	29.0
2	35.0	300.0	13.0
3	90.0	560.0	29.0

A Horizontal Earthquake Loading Coefficient
Of0.150 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0(psf)

Janbus Empirical Coef is being used for the case of c & phi both > 0

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

1750 Trial Surfaces Have Been Generated.

4 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 4.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	17.00	183.00	45.00	183.00	10.00
2	130.00	180.00	180.00	150.00	25.00
3	230.00	210.00	240.00	210.00	45.00
4	270.00	260.00	370.00	260.00	10.00

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	2.00	194.33
2	4.11	192.30
3	6.97	189.50
4	9.87	186.75

5	12.73	183.95
6	16.51	182.63
7	20.17	181.03
8	23.78	179.30
9	149.99	170.56
10	235.22	209.66
11	315.36	262.69
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13	319.19	269.71
14	319.48	270.00

*** 1.172 ***

Individual data on the 27 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	2.1	168.9	0.0	0.0	0.0	0.0	25.3	0.0	0.0
2	2.9	774.1	0.0	0.0	0.0	0.0	116.1	0.0	0.0
3	2.9	1415.4	0.0	0.0	0.0	0.0	212.3	0.0	0.0
4	2.9	2016.4	0.0	0.0	0.0	0.0	302.5	0.0	0.0
5	2.3	1857.9	0.0	0.0	0.0	0.0	278.7	0.0	0.0
6	1.5	1326.4	0.0	0.0	0.0	0.0	199.0	0.0	0.0
7	3.7	4030.7	0.0	0.0	0.0	0.0	604.6	0.0	0.0
8	3.6	5156.8	0.0	0.0	0.0	0.0	773.5	0.0	0.0
9	58.2	167853.5	0.0	0.0	0.0	0.0	25178.0	0.0	0.0
10	24.0	119698.6	0.0	0.0	0.0	0.0	17954.8	0.0	0.0
11	16.2	101972.0	0.0	0.0	0.0	0.0	15295.8	0.0	0.0
12	27.8	212024.1	0.0	0.0	0.0	0.0	31803.6	0.0	0.0
13	2.0	16997.3	0.0	0.0	0.0	0.0	2549.6	0.0	0.0
14	15.9	127381.4	0.0	0.0	0.0	0.0	19107.2	0.0	0.0
15	5.1	38187.6	0.0	0.0	0.0	0.0	5728.1	0.0	0.0
16	6.0	41046.8	0.0	0.0	0.0	0.0	6157.0	0.0	0.0
17	1.0	6364.0	0.0	0.0	0.0	0.0	954.6	0.0	0.0
18	30.0	179723.5	0.0	0.0	0.0	0.0	26958.5	0.0	0.0
19	25.2	143578.5	0.0	0.0	0.0	0.0	21536.8	0.0	0.0
20	19.0	105827.6	0.0	0.0	0.0	0.0	15874.1	0.0	0.0
21	3.8	20202.2	0.0	0.0	0.0	0.0	3030.3	0.0	0.0
22	2.0	10585.7	0.0	0.0	0.0	0.0	1587.9	0.0	0.0
23	45.0	156887.7	0.0	0.0	0.0	0.0	23533.1	0.0	0.0
24	10.4	13339.1	0.0	0.0	0.0	0.0	2000.9	0.0	0.0
25	2.0	1348.9	0.0	0.0	0.0	0.0	202.3	0.0	0.0
26	1.8	453.1	0.0	0.0	0.0	0.0	68.0	0.0	0.0
27	0.3	5.1	0.0	0.0	0.0	0.0	0.8	0.0	0.0

Failure Surface Specified By 14 Coordinate Points

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*** 1.172 ***

Appendix E

Hydrology Report

HYDROLOGY

FOR

PROPOSED SINGLE FAMILY RESIDENCE GRADING

A.P.N. # 2072-001-004

LOCATED AT
23604 DRY CANYON COLD CREEK RD.
CALABASAS CA

August 27, 2007

PREPARED BY:

REGISTERED PROFESSIONAL ENGINEER
DANNY P. HOLMES
No. 24769
Exp: 12/31/07
CIVIL
STATE OF CALIFORNIA

HOLMES ENTERPRISES, INC

STRUCTURAL and CIVIL ENGINEERING
200 Wicks Road Moorpark, CA 93021

PRE-DEVELOPED

RUN-OFF FROM OFF-SITE **AREA = A1**

DATA:

Drainage Area, A	=	**0.08** ac	**see Attachment "A"**
Impervious Surface, Ai	=	**0.00** ac	

CALCULATION:

Time of Concentration, tc	=	**5.00** min	
Rainfall Intensity, I	=	**5.6** in/hr	**see Attachment "B-3"**
Runoff Coefficient, C_u	=	**0.81**	**see Attachment "D-85"**
Design Flow, $Q_{pre} = C_u*I*A$	=	**0.36** cfs	(To V-Ditch behind Retaining Wall)

PRE-DEVELOPED

RUN-OFF FROM PROPERTY **AREA = A2**

DATA:

Drainage Area, A	=	**0.62** ac	**see Attachment "A"**
Impervious Surface, Ai	=	**0.00** ac	

CALCULATION:

Percent Impervious(Ai/A)	=	**0.0** %	
Time of Concentration, tc	=	**5.00** min	
Rainfall Intensity, I	=	**5.6** in/hr	**see Attachment "B-3"**
Runoff Coefficient, C_u	=	**0.81**	**see Attachment "D-85"**
Design Flow, $Q_{post} = C_U*I*A$	=	**2.78** cfs	(To Cold Creek Road)

HOLMES ENTERPRISES, INC.
Structural and Civil Engineering
200 Wicks Road Moorpark CA 93021 (805) 532-1571

Project *HADDAD* **Location** *23604 DRY CANYON COLD CREEK RD.* **Date** *JULY 17, 2006*

POST-DEVELOPED

RUN-OFF FROM PROPERTY **AREA = A2**

DATA:

Drainage Area, A	=	**0.63** ac	**see Attachment "A"**
Impervious Surface, Ai	=	**0.24** ac	

CALCULATION:

Percent Impervious(Ai/A)	=	**37.8** %	
Proportion Impervious	=	**0.42 Single Family**	
Time of Concentration, tc	=	**5.00** min	
Rainfall Intensity, I	=	**5.6** in/hr	**see Attachment "B-3"**
Runoff Coefficient, C_u	=	**0.81**	**see Attachment "D-85"**
Developed Runoff Coefficient, C_D $C_D = (0.9*Imp)+(1.0-Imp)*C_u$	=	**0.85**	**>** C_u, therefore use $C_D = C_u$
Design Flow, $Q_{post} = C_d*I*A$	=	**2.96** cfs	(To Cold Creek Road)

Concrete V-Ditch Design

Channel Calculator

Given Input Data:
Shape .... Trapezoidal
Solving for .... Flowrate
Slope .... 0.0010 ft/ft
Manning's n 0.0130
Depth .... 0.5000 ft
Height .... 1.0000 ft
Bottom width .... 0.0000 ft
Left slope .... 0.5000 ft/ft (V/H)
Right slope .... 0.5000 ft/ft (V/H)

Computed Results:
Flowrate .... 0.6658 cfs **> 0.36 cfs ...ok**
Velocity .... 1.3317 fps
Full Flowrate .... 4.2278 cfs
Flow area 0.5000 ft2
Flow perimeter .... 2.2361 ft
Hydraulic radius .... 0.2236 ft
Top width .... 2.0000 ft
Area 2.0000 ft2
Perimeter .... 4.4721 ft
Percent full .... 50.0000 %

Critical Information
Critical depth .... 0.3695 ft
Critical slope .... 0.0050 ft/ft
Critical velocity .... 2.4381 fps
Critical area 0.2731 ft2
Critical perimeter .... 1.6526 ft
Critical hydraulic radius .... 0.1653 ft
Critical top width .... 1.4781 ft
Specific energy .... 0.5276 ft
Minimum energy .... 0.5543 ft
Froude number 0.4695
Flow condition .... Subcritical

STORMWATER TREATMENT CONTROL MEASURE

DATA:

Total Site Area	=	**56324.0** sq.ft		**1.29** Ac
Post-development Impervious Surface	=	**0.0** sq.ft		**0.00** Ac
Pre-development Impervious Surface	=	**10382.0** sq.ft		**0.24** Ac
Total Impervious Surface	=	**10382.0** sq.ft		**0.24** Ac
Soil Type	=	**066**		
DPA	=	**7**		
Zone	=	**L**		
Runoff Coefficient Group	=	**A**	*Table M-1*	

HOLMES ENTERPRISES, INC.
Structural and Civil Engineering
200 Wicks Road Moorpark CA 93021 (805) 532-1571

Project *HADDAD* **Location** *23604 DRY CANYON COLD CREEK RD.* **Date** *JULY 17, 2006*

SIZING OF GRASSY SWALE FILTER

POST-DEVELOPED CONDITION

DATA:

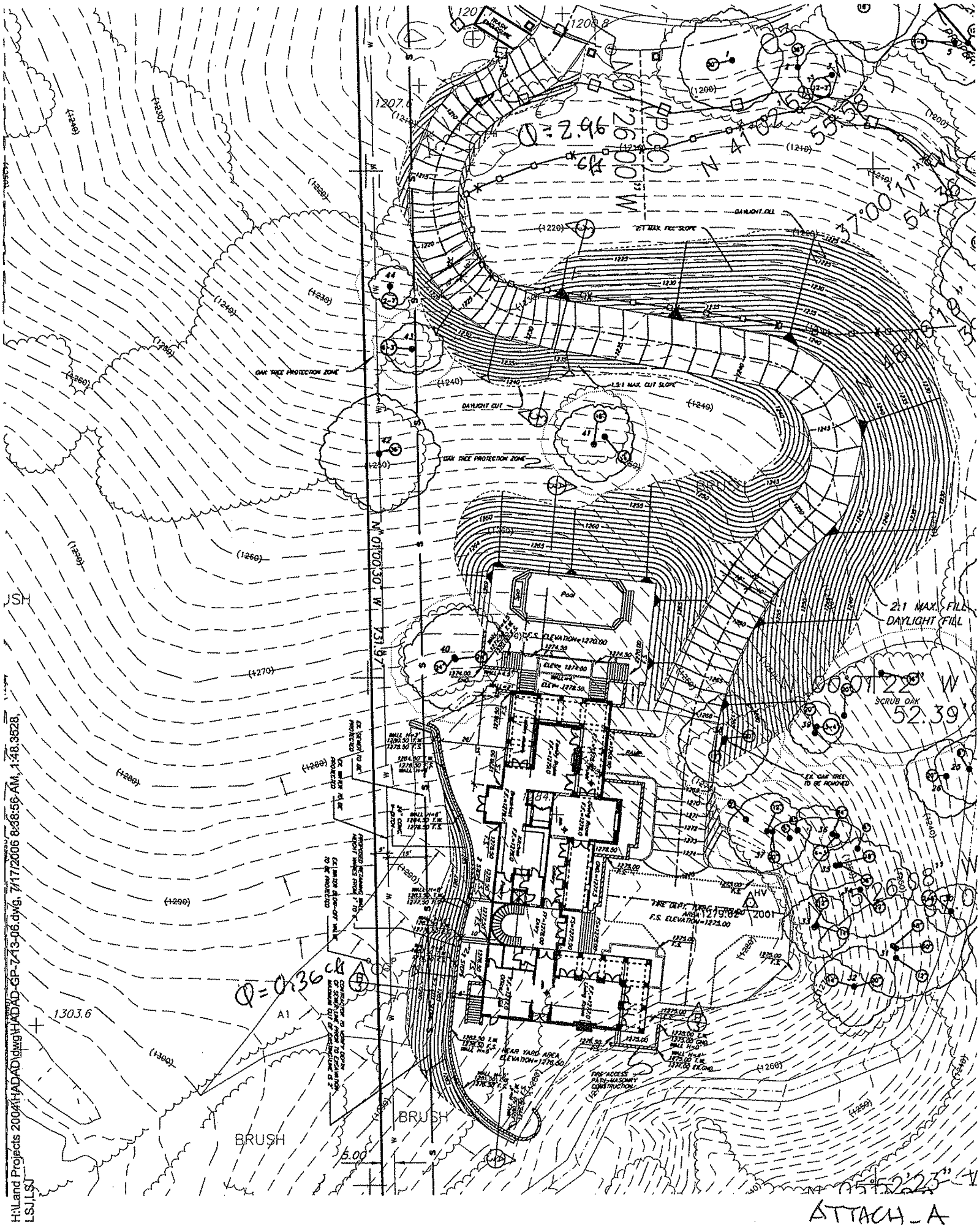
Drainage Area, At	=	**56324.0**	sq.ft
Impervious Surface, Ai	=	**10382.0**	sq.ft

CALCULATION:

Percent Impervious(Ai/At)		=	**18.4**	%
Design Flow, $Q_{p = 0.1}$*Q_{post}		=	**0.30**	cfs
Swale Geometry				
	Bottom Width, b	=	**1.0**	ft
	Top Width, w	=	**6.0**	ft
	Side Slope, s	=	**4:1**	ft
Design Flow Area, A		=	**1.5**	ft^2
Design Flow Velocity, V =Q_p /A		=	**0.2**	ft/sec
Depth of Flow at Qd_{es}	d	=	**5.0**	in
Design Length, L_{swale} = 7 min * V x 60sec		=	**85.4**	ft
Vegetation		=	Tall Fescue	

PROVIDE:

Size:	Width	=	**6.0**	ft
	Length	=	**140.0**	ft
	Depth	=	**0.5**	ft
	Slope	=	**0.5**	%



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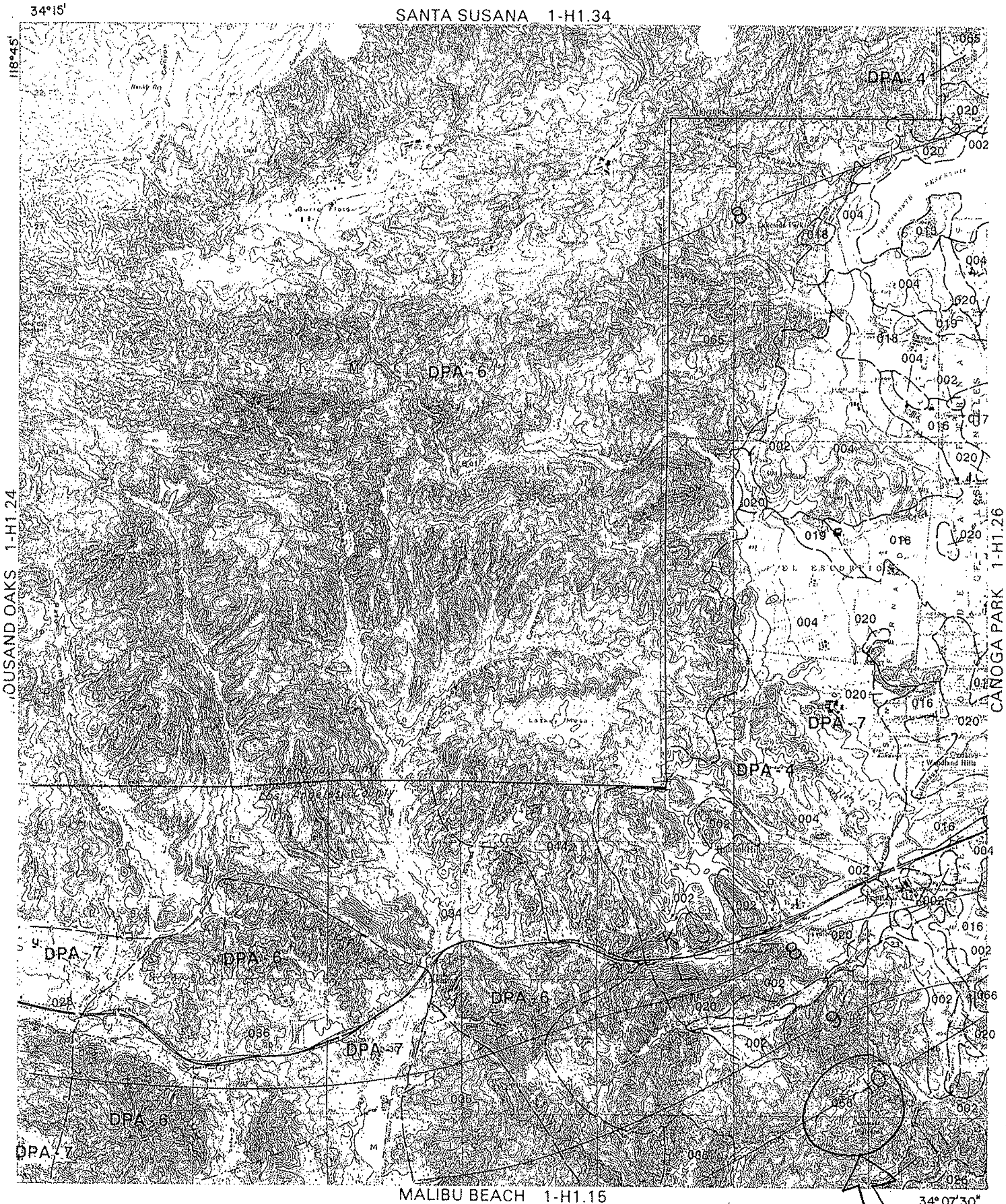
ATTACH_A



LEGEND

- — — — SOIL CLASSIFICATION AREA
- ········· DEBRIS POTENTIAL AREA
- —·—·—· RAINFALL ZONE
- —12— 50-YEAR ISOHYET (MAX 24-HOUR AMOUNT)

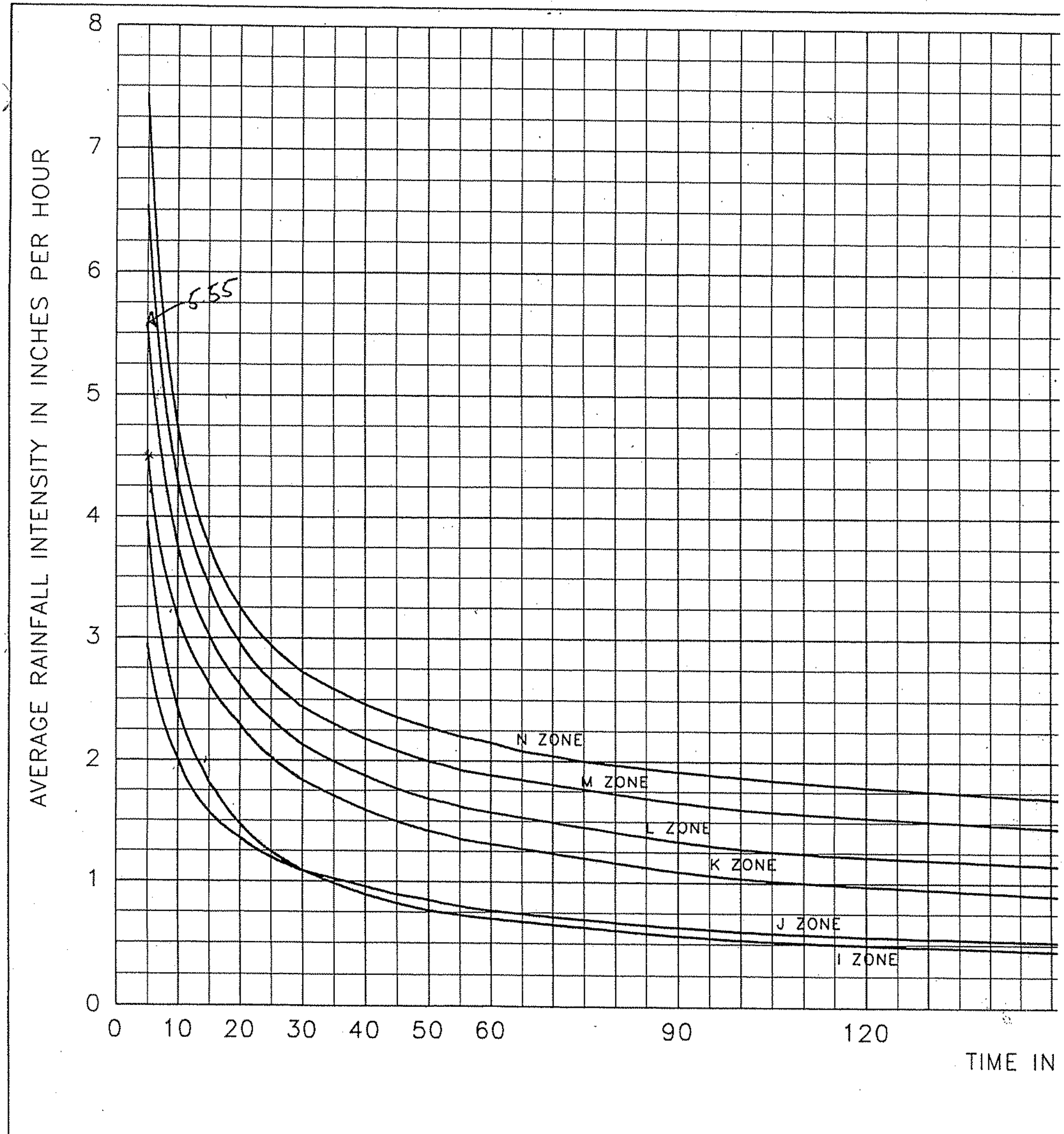
LACDPW

N

0 FEET 5000

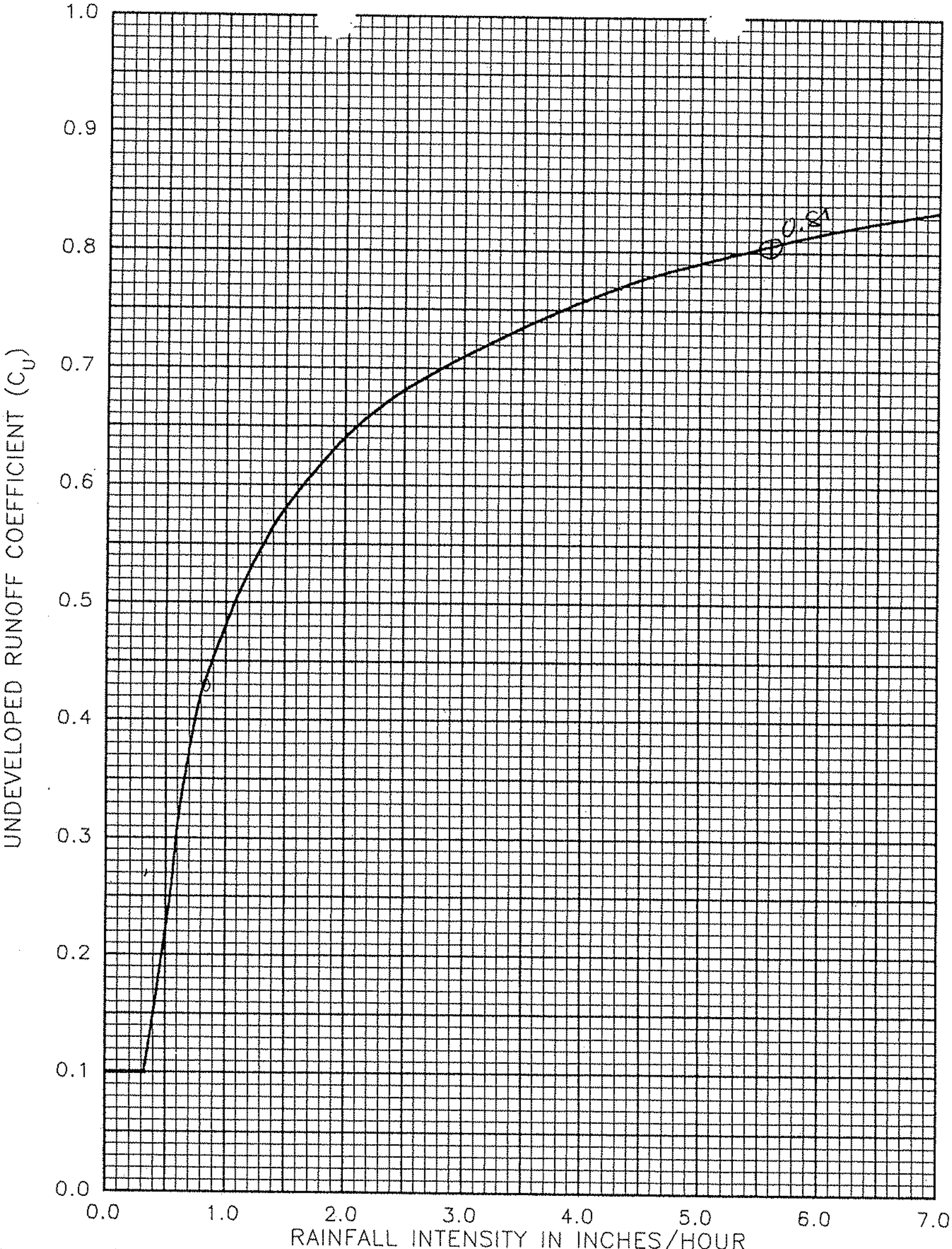
CALABASAS 1967

hydrologic map



AVE. RAINFALL INTENCITY

B-3.



Equation:

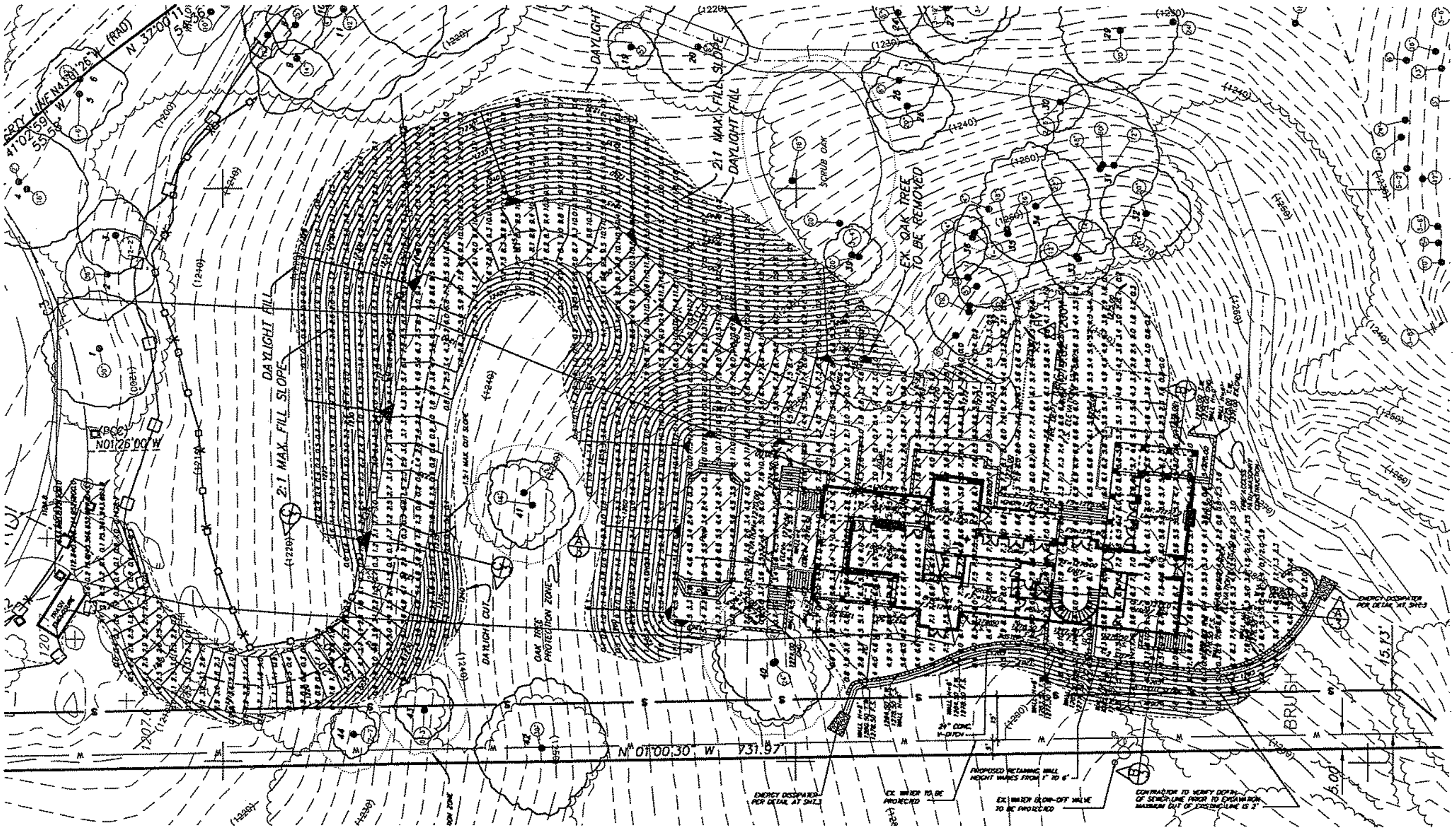
$$C_D = (0.9 * IMP) + (1.0 - IMP)\, C_U$$

Where:
C_D = Developed runoff coefficient.
IMP = Proportion impervious.
C_U = Undeveloped runoff coefficient.

Los Angeles County
Department of Public Works

RUNOFF COEFFICIENT CURVE
SOIL TYPE NO. 066

NS066.SPG



Site Volume Table: Unadjusted

Site	Stratum	Surf1	Surf2	Cut cu.yds	Fill cu.yds	Net cu.yds	Method
STUDY2A							
	fg 2a	eg 6-26-06	study2a				
				16969	4697	12272 (C)	Composite
				11051	4566	6485 (C)	Grid

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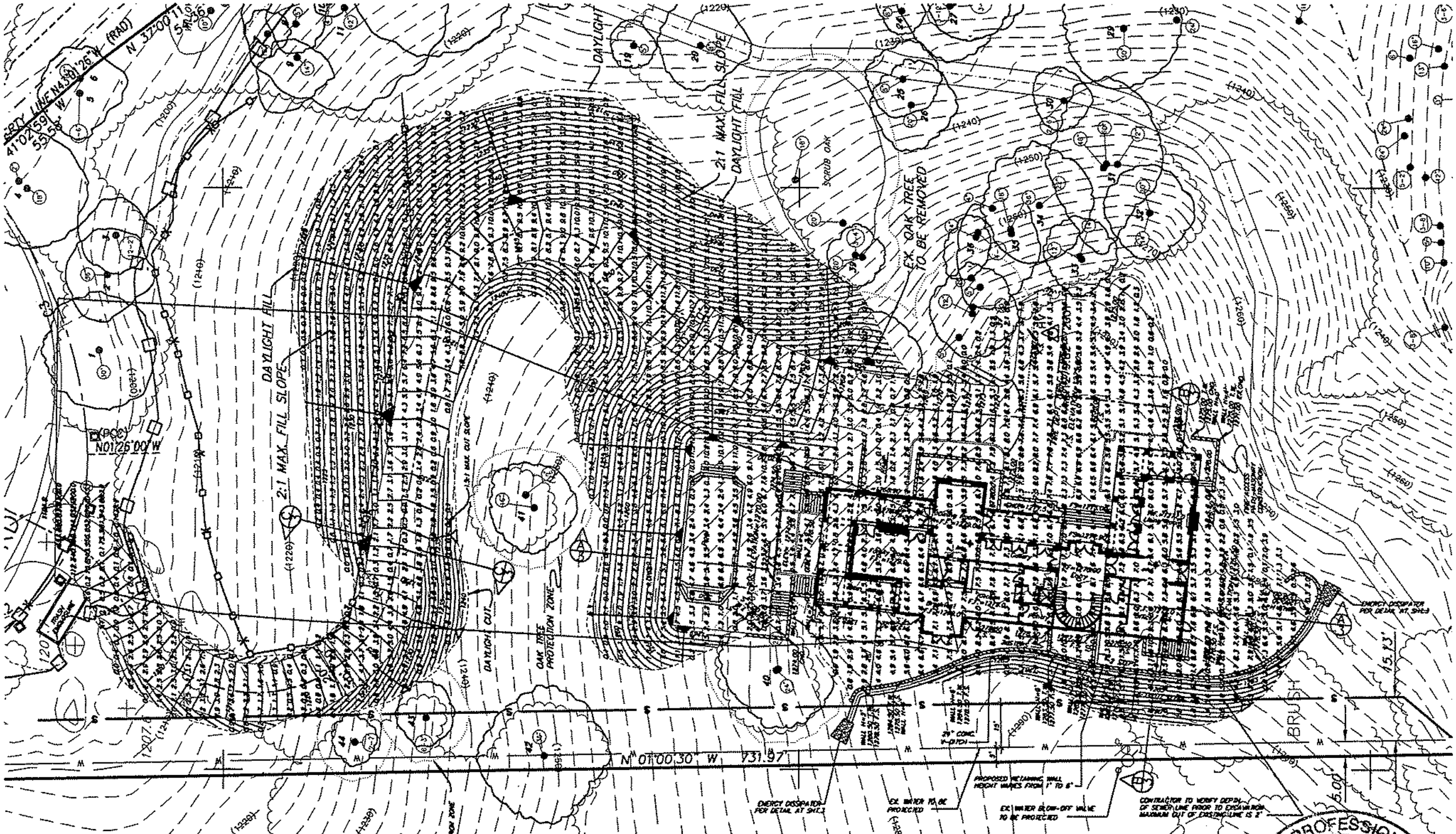

Site Volume Table: Unadjusted

Site	Stratum	Surf1	Surf2	Cut cu.yds	Fill cu.yds	Net cu.yds	Method
STUDY2A	fg 2a	eg 6-26-06	study2a	16969	4697	12272 (C)	Composite
				11051	4566	6485 (C)	Grid

REGISTERED PROFESSIONAL ENGINEER
DANNY P. HOLMES
No. 24769
Exp: 12/31/07
CIVIL
STATE OF CALIFORNIA

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LSJ,LSJ