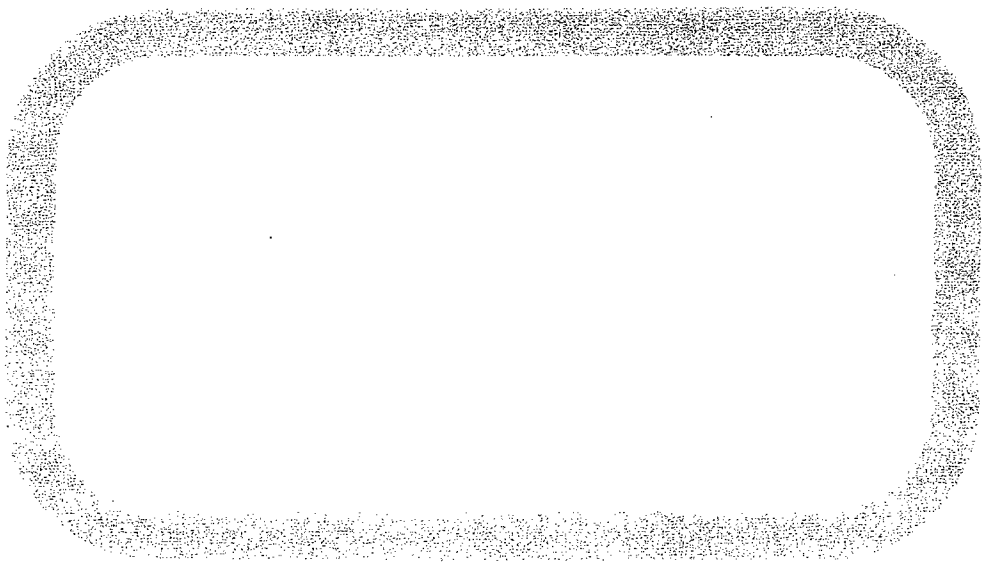
APPENDIX D

GEOTECHNICAL STUDY for REVISED DESIGN PROJECT



GSC GeoSoils Consultants Inc.

GEOTECHNICAL · GEOLOGIC · ENVIRONMENTAL

Review of Revised Tentative Tract Map and
Response to County of Los Angeles Department of Public Works
Geotechnical and Materials Engineering Division
Geologic and Soils Engineering Review Sheets
dated 11-10-05 and 11-15-05, respectively, Tentative Tract 47449,
San Dimas, County of Los Angeles, California

for

Vista Verde – San Dimas Avenue Property, LLC

February 22, 2006 W.O. 5831

MDN 8887

GeoSoils Consultants Inc.
GEOTECHNICAL · GEOLOGIC · ENVIRONMENTAL

February 22, 2006
W.O. 5831

VISTA VERDE-SAN DIMAS AVENUE PROPERTY LLC
10365 W. Jefferson Boulevard
Culver City, California 90232

Attention: Mr. Daniel Singh

Subject: **Review of Revised Tentative Tract Map and Response to County of Los Angeles Department of Public Works Geotechnical and Materials Engineering Division Geologic and Soils Engineering Review Sheets dated 11-10-05 and 11-15-05, respectively, Tentative Tract 47449, San Dimas, County of Los Angeles, California**

Dear Mr. Singh:

As requested, GeoSoils Consultants, Inc. (GSC) has reviewed the revised plan for Tentative Tract 47449. The purpose of this review is to provide geotechnical recommendations relative to the revised tract map, as requested in the County of Los Angeles Geologic and Soils Engineering Review Sheets dated November 10, 2005 and November 15, 2005, respectively.

The original tract map was previously approved by the Geotechnical and Materials Division (see attached approval letters). The previous studies were performed by Pacific Soils Engineering, Inc. and Southwestern Geotechnical, Inc. A change of consultant letter dated February 15, 2006 was prepared by this office and a copy is included herein (see Reference 5).

MDN 8887

6634 Valjean Avenue Van Nuys, California 91406 Phone: (818) 785-2158 Fax: (818) 785-1548

The revisions to the tentative tract map consist of reducing the number of proposed lots and modifications to site access. The originally approved tentative tract map included 100 lots for single family residential construction. The revised map has been reduced to include 70 lots. The originally proposed access road at the eastern part of the site has been replaced with a bridge. The purpose for the revision was to eliminate the grading required to create the roadway. A preliminary geologic and geotechnical engineering report, and response to County review sheet report, was prepared by this office for the subject bridge (see References 6 and 7). Lots 91 through 100 and "I" Street, which were originally proposed at the eastern part of the site, have been eliminated and this area is now to be span by the proposed bridge. Lots 44 through 51 and "C" Street have also been eliminated, along with the proposed fire access road at the western part of the site.

CONCLUSIONS AND RECOMMENDATIONS

The revisions to Tentative Tract 47449 are feasible from a geotechnical standpoint, provided the recommendations presented herein and within the referenced reports are adhered to. Additional recommendations should be provided at the 40-scale grading plan review stage. The following recommendations should be incorporated into the tentative tract map.

The recommendations within the referenced reports remain applicable, except where superseded below. As stated above, the GSC report dated December 13, 2005 provided recommendations for the proposed bridge (see Reference 6). The recommendations presented below address specific changes to the tentative tract map and include areas of newly proposed retaining walls.

Recommendations

A retaining wall is proposed along the south side of the access road, east of Lot 3. Based on review of previously excavated test pits in this area, the proposed retaining wall may be surcharged by a bedding plane conditions. Bedding exposed in test pit TP-6 dips to the north at 37 degrees. The retaining wall backcut should be laid back to the angle of the lowest bedding plane. If it is not feasible to lay the excavation back to the angle of bedding, then the recommendations within Table II below under *Retaining Walls* should be adhered to.

The originally proposed fill slope along the north side of the access road, north of current Lots 3 and 4, has been eliminated and a crib wall is now proposed in this area. The proposed wall will be approximately 20 feet high. In addition, the fill slope north of current Lots 51 and 52 has been eliminated and a 15 foot high retaining wall is now proposed. Retaining walls to approximately 16 feet in total height are proposed in the area of Lots 1 and 2. Retaining wall analyses are presented in Appendix A. All retaining walls should meet Code slope setback requirements. The setbacks along the east side of Lot 1 and the west side of Lot 2 should be measured from a 2:1 plane projected up from the toe of the subject slopes.

The following retaining wall recommendations should be adhered to.

RETAINING WALLS

Wall Criteria

Retaining and crib wall structures are proposed on the subject site. The wall foundations should have the minimum Code required setback of H/3 from the competent descending slope face.

All proposed retaining and crib walls should have a minimum embedment depth of 18 inches and a minimum width of 18 inches and should be designed in accordance to the recommendations presented herein. The equivalent fluid pressures recommended are based on the assumption of a uniform backfill and no build-up of hydrostatic pressure behind the wall. To prevent the build-up of soil pressures in excess of the recommended design pressures, overcompaction of the fill behind the wall should be avoided. This can be accomplished by placement of the backfill above a 45-degree plane projected upward from the base of the wall in lifts not exceeding eight inches in depth and compacting with hand-operated or small, self-propelled, vibrating plates. (Note: Backfill of free-draining material in this zone could also prevent the build-up of lateral soil pressures).

1. **Conventional (Yielding) Retaining Walls**

   All recommendations for active, lateral earth pressures contained herein assume that the retaining structures are in tight contact with the fill soil or bedrock that they are supposed to support. The earth support system must be sufficiently stiff to hold horizontal movements in the soil to less than one percent of the height of the vertical face, but should be free-standing to the point that they yield at the top at least 0.1 percent of the height of the wall.

2. **Earth Pressures on Conventional (Yielding) Walls**

   The earth pressures on walls up to 15± feet high, retaining granular materials, compacted fill, competent material or bedrock may be assumed equal to that exerted by an equivalent fluid having a density not less than that shown on the following table (substantiating calculations are presented in Plates EFP-1 through EFP-6 of Appendix A).

TABLE I	
BACKFILL SLOPE	EQUIVALENT FLUID DENSITY (pcf)
Level	30
2:1	43
1½:1	55

Surcharge loads due to adverse (daylighted) bedding plane condition is presented below. Wall footing and cut excavation should be observed by a geologist from this office (substantiating calculations are presented in Plates EFP-8 to EFP-16 of Appendix A).

TABLE II With Daylighted Bedding Condition		
Backfill Slope (H:V)	Wall Height, H (feet)	Equivalent Fluid Density (pcf)
2:1 (cut slope)	7.5	43
	8.0	46.3
	9.0	55.3
	10.0	63.3
	11.0	70.1
	12.0	76.0
	13.0	81.3
	14.0	85.9
	15.0	90.1

Table III Walls Supported Compacted Fill with H>15 Feet			
Backfill Slope (H:V)	Wall Height, H (feet)	Equivalent Fluid Density (pcf)	Remarks
Level	20	35.7	see Plate EFP-7 of Appendix A

Retaining Wall Deflection

It should be noted that non-restrained retaining walls designed for active earth pressure will deflect ¼ to 1 percent of their height over time in response to loading. This deflection is normal and reduces the earth pressure on the wall. Improvements constructed immediately adjacent to or incorporated with non-restrained retaining walls should be designed to accommodate this movement. Curved or angled walls which have a convex, downslope plan pattern should be provided with vertical

construction joints at corners or 40 feet on center. A batter is recommended for exterior walls to avoid the visual impression that they are tilting. Decking which caps a retaining wall should be provided with a flexible joint to allow for the normal ¼ to 1 percent deflection of the retaining wall. Decking which does not cap a retaining wall should not be tied to the wall. The space between the wall and the deck will require periodic caulking to prevent moisture intrusions into the retaining wall backfill. Should wall deflection be undesirable, please contact our office for higher, at rest earth pressures which will reduce wall deflection significantly.

3. **Restrained (Non-Yielding) Walls**

Earth pressures will be greater on walls where yielding at the top of the wall is limited to less than one-thousandth the height of the wall either by stiffness (i.e., return walls, etc.) or structural network prior to backfilling. Utilizing the recommended backfill compaction of 90 percent. Proctor Density per ASTM D-1557-00, we recommend a 50 percent increase in the equivalent-fluid density from those recommended for conventional (yielding) walls be used for non-yielding walls.

4. **General**

a) Any anticipated, superimposed loading (i.e., upper retaining walls, other structures, traffic surcharge, etc.) within 45-degree (1:1) projection plane upward from the wall bottom, except retained earth, shall be considered as surcharge and provided for in the design.

b) A vertical component equal to one-third of the horizontal force so obtained may be assumed at the plane of application of force.

The depth of the retained earth shall be the vertical distance below the ground surface measured at the wall face for stem design or measured at the heel of the footing for overturning and sliding.

c) If water is allowed to saturate the backfill, the lateral pressure could exceed the active earth pressure recommended. Clayey or expansive soils should not be used for backfilling behind retaining walls.

d) The walls should be constructed with weepholes near the bottom on five-foot centers or perforated drain pipe in a gravel envelope at the bottom and behind the wall. A one-foot zone of clean, granular, free-draining material should be placed behind the wall to within three feet the surface (see Figure 1).

On-site soil may be used for the remainder of the backfill and should be compacted to 90 percent relative compaction as determined by ASTM Test Designation D-1557-00. All proposed subterranean walls and other walls where moisture migration through the walls is undesirable, should be waterproofed and backdrained.

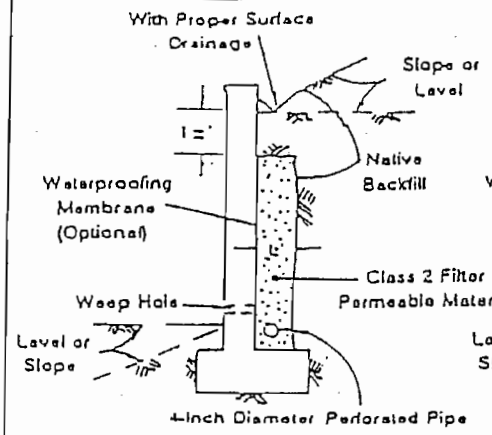
e) A concrete-lined swale is recommended to be placed behind retaining walls that can intercept surface runoff from upslope areas. This surface runoff shall be transferred to an approved channel via non-erosive drainage devices. The retaining walls should be provided with a minimum of 12 inches of freeboard for slough protection.

5. **Resisting Forces**

Active pressures and surcharge pressures for conventional retaining wall foundations are resisted by a combination of passive lateral earth pressure, base friction, and sub-grade bearing capacity. Passive pressure acts over the embedded front of the wall and varies with the fore-slope inclination, whereas base friction and bearing capacity act along the bottom of the footings. Assuming a level fore-slope at

SUBDRAIN OPTIONS FOR NATIVE MATERIAL BACKFILL

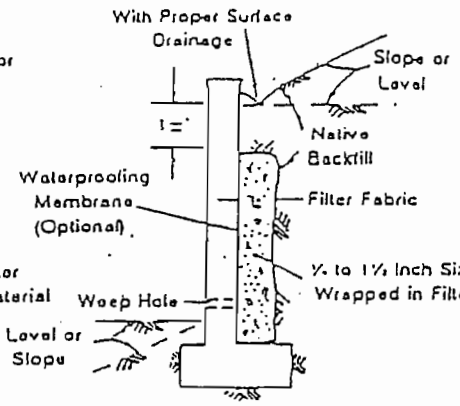
OPTION N2: Pipe Surrounded with Class 2 Material



Class 2 Filter Permeable Material Grading Per Caltrans Specifications

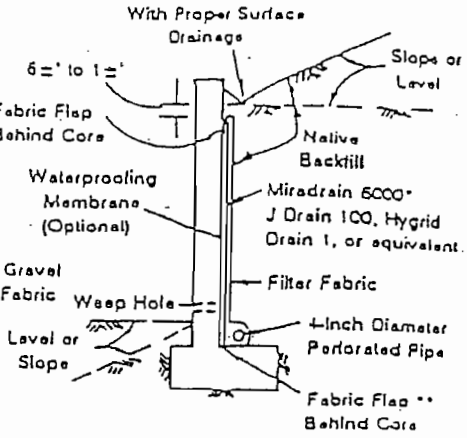
Sieve Size	Percent Passing
1"	100
3/4"	90-100
3/8"	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

OPTION N1: Gravel Wrapped in Filter Fabric



Proper Outlet Should be Provided for Gravel Subdrain (See Notes)

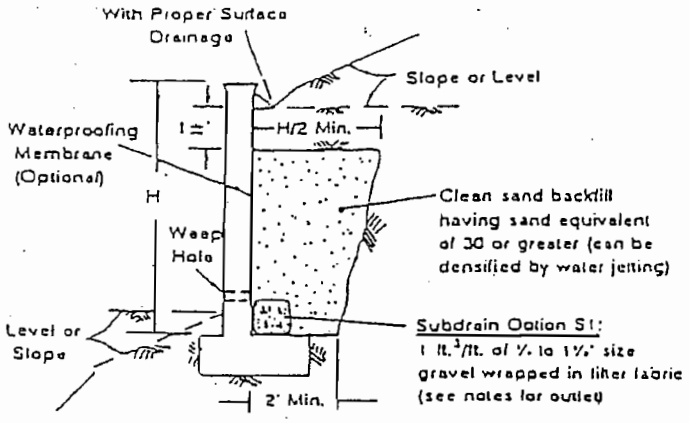
OPTION N3: Geotextile Drain

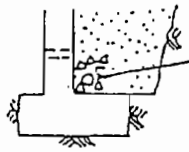


*Miradrain 6000 or J Drain 100 for non-waterproofed walls; Miradrain 6200 or J Drain 200 for completed waterproofed walls

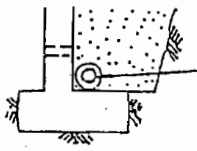
**Peel back the bottom fabric flap, place pipe next to core, wrap fabric around pipe and tuck behind core.

SUBDRAIN OPTIONS FOR CLEAN SAND BACKFILL





Subdrain Option S2:
4" diameter perforated pipe surrounded with 1 ft.³/ft. of Class 2 filter material per Caltrans specifications as above



Subdrain Option S3:
4" diameter perforated pipe wrapped in filter fabric

Notes:

- Pipe type should be ASTM D1527 Acrylonitrile Butadiene Styrene (ABS) SDR35 or ASTM D1785 Polyvinyl Chloride plastic (PVC), Schedule 40, Armco A2000 PVC, or approved equivalent. Pipe should be installed with perforations down.
- Filter fabric should be Mirafi 140N, 140NS, Supac 4NP, Amoco 4545, Trevira 1114, or approved equivalent.
- All drains should have a gradient of 1 percent minimum.
- Outlet portion for gravel subdrain should have a 4"-diameter pipe with the perforated portion inserted into the gravel approximately 2' minimum and the nonperforated portion extending approximately 1' outside the gravel. Proper sealing should be provided at the pipe insertion enabling water to run from the gravel portion into rather than outside the pipe.
- Waterproofing membrane may be required for a specific retaining wall such as a stucco or basement wall.
- Weephole should be 2" minimum diameter and provided at 25' maximum in length of wall. If exposure is permitted, weephole should be located at 3" above finished grade. If exposure is not permitted such as for a wall adjacent to a sidewalk/curb, a pipe under the sidewalk to discharge through the curb face or equivalent should be provided, or for a basement-type wall, a proper subdrain outlet system should be provided. Open vertical masonry joints (i.e., omit mortar from joints of first course above finished grade) at 32" maximum intervals may be substituted for weepholes. Screening such as with a filter fabric should be provided for weepholes/open joints to prevent earth materials from entering the holes/joints.

RETAINING WALL BACKFILL AND SUBDRAIN DETAIL

Figure No. 1

the wall location and that no hydrostatic pressure builds up behind the walls, we recommend the design values:

RETAINING WALL RESISTING FORCES		
Design Parameters	Allowable Value	Remarks
Bearing Capacity	1,500 psf	2000 pcf
Passive Pressure	250 psf	350 pcf
Maximum Passive Pressure	3000 psf	4000 pcf
Base Friction Coefficient	0.35	0.40

The recommended bearing capacities in the table above may be increased by 20 percent for each additional foot of depth deeper than the minimum recommended depth of 18 inches, plus 10 percent for each additional foot of width wider than the minimum recommended width of 18 inches to a maximum bearing of 4,000 psf.

6 Seismic EFP

Per County of Los Angeles policy, retaining and crib walls higher than 12 feet must be designed to withstand additional seismic loading during an earthquake. The following additional seismic loading should be considered in design of walls greater than 12 feet.

Wall Backfill	Seismic EFP (pcf)
Compacted Fill	18.0
Undisturbed Bedrock	19.5

The seismic (dynamic) lateral force acts at 0.6 H above the wall base (where H is the wall height).

7. Deep Foundation

Deep foundation recommendations presented in Reference 6 are valid and should be adhered to.

"111" STATEMENT

It is our opinion, provided that our recommendations and the recommendations included in the referenced reports are followed, that Tract 47449, will be safe from hazards of landslide, settlement, or slippage, and that the grading and building will not adversely affect the stability of property outside the subject development.

We appreciate this opportunity to be of continued service to you. If you have any questions regarding the content of this report or any other aspects of the project, please do not hesitate to contact us.

Very truly yours,

GEOSOILS CONSULTANTS, INC.

WILLIAM A. CIRIDON
GE 217

DIANCE R. PUTNAM
Staff Geologist

RUDY F. RUBERTI
CEG 1708

WAC.LRP.RFR.W:Review of Revised Tent. Tr. 47449

Encl: References
County of Los Angeles Geologic Review Sheet dated January 10, 2006
County of Los Angeles Soils Engineering Review Sheet dated November 15, 2005
County of Los Angeles Approval Letters dated June 6, 2000 and June 20, 2000
Change of Consultant Letter dated February 15, 2006
Plate 1, Geologic Map
Plate 2, Geologic Cross-Section
Appendix A, Determination of Equivalent Fluid Pressure (EFP) for Wall Design
Plates EFP 1 through EFP-16

cc: (3) Addressee
(2) County of Los Angeles
Attention: Bob Thomas

MDN 8887

REFERENCES

1. Pacific Soils Engineering, Inc. dated May 29, 1998, "Preliminary Geotechnical Report, Tentative Tract 47449, City of San Dimas, California".

2. Southwest Geotechnical, Inc. dated October 22, 1999, "Response to County of Los Angeles Department of Public Works Materials Engineering Division "Soils Engineering Review Sheet" and "Geologic Review", dated 7/6/99 and 7/1/99, respectively, for Tentative Tract 47449, San Dimas, California".

3. Southwest Geotechnical, Inc. dated March 24, 2000 "Response to County of Los Angeles Department of Public Works Materials Engineering Division "Soils Engineering Review Sheet" and "Geologic Review", dated 12/2/99, and 11/17/99, respectively, for Tentative Tract 47449, San Dimas, California".

4. Southwest Geotechnical, Inc. dated May 15, 2000, "Response to County of Los Angeles Department of Public Works, Land Development Division, Geologic Review Sheet dated 4-17-00, and Soils Engineering Review Sheet dated 5-11-00".

5. GeoSoils Consultants, Inc. dated February 15, 2006, "Change of Consultants, Tentative Tract 47449, San Dimas, California".

6. GeoSoils Consultants, Inc. dated December 13, 2005, "Preliminary Geologic and Geotechnical Engineering Study, Proposed Bridge, Vista Verde Ranch, Tract 47449, San Dimas, California".

7. GeoSoils Consultants, Inc. date February 15, 2006, "Response to County of Los Angeles Department of Public Works Geotechnical and Materials Engineering Division, Geologic and Soils Engineering Review Sheets dated January 4, 2006 and January 19, 2006, respectively, Regarding the GeoSoils Consultants, Inc. Report dated December 13, 2005, Vista Verde Ranch, Tract 47449, San Dimas, California".

Sheet 1 of 1

County of Los Angeles Department of Public Works
GEOTECHNICAL AND MATERIALS ENGINEERING DIVISION
GEOLOGIC REVIEW SHEET
900 So. Fremont Ave., Alhambra, CA 91803
TEL. (626) 458-4925

DISTRIBUTION
1 Geologist
__ Soils Engineer
1 GMED File
1 Subdivision

TENTATIVE TRACT	47449	**TENTATIVE MAP DATED**	10-06-05, 10th Revision
SUBDIVIDER	Vista Verde	**LOCATION**	San Dimas
ENGINEER	Paas Engineering		
GEOLOGIST	Southwest Geotechnical	**REPORT DATE**	5-15-00, 3-24-00, 10-22-99
SOILS ENGINEER	Southwest Geotechnical	**REPORT DATE**	

The Regional Planning Commission, developer, and engineer are advised that:

PRIOR TO RECOMMENDING APPROVAL OF THE TENTATIVE TRACT MAP:

[X] An update engineering geology report is required to evaluate the feasibility of the proposed revised subdivision. The report must address the reduction of lots and the revised access road and the proposed access bridge. The geology map must be based on the tentative map and show all the proposed grading and the existing and the proposed grades. The consultant must construct a series of cross-sections, which illustrate the geology of the subdivision and the proposed grading and mitigation.

[X] The Soils Engineering review dated 11-15-05 is attached.

NOTE Provide a copy of this review with your resubmittal

Prepared by Robert O. Thomas Reviewed by _____ Date 11-10-05

s:\mepub\Geology Review\Forms\Form01.doc
10/03

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
GEOTECHNICAL AND MATERIALS ENGINEERING DIVISION

SOILS ENGINEERING REVIEW SHEET

Address: 900 S. Fremont Ave., Alhambra, CA 91803
Telephone: (626) 458-4925
Fax: (626) 458-4913

District Office 5
Job Number LX001129
Sheet 1 of 1

Tentative Tract Map 47449

DISTRIBUTION:
___ Grading/ Drainage
___ Geo/Soils Central File
___ District Engineer
___ Geologist
___ Soils Engineer
___ Engineer/Architect

Location	San Dimas
Developer/Owner	Vista Verde
Engineer/Architect	Pass Engineering
Soils Engineer	Southwest Geotechnical (9908183-VN)
Geologist	Same as above

Review of:

Revised Tentative Tract Map Dated By Regional Planning 10/6/05
Soils Engineering and Geologic Reports Dated 5/15/00, 3/24/00, and 10/22/99
Previous review sheet dated 8/17/05

ACTION:
Tentative Map feasibility is not recommended for approval.

REMARKS:
1. Submit an update soils report/letter, which addresses and evaluates current site conditions and the most recent, revised tentative map.

2. Provide additional subsurface data to address the revised access road alignment and the proposed bridge shown on the revised tentative map. Also, provide additional static, seismic and surficial slope stability analyses of cross-sections through the revised section of the proposed access road. Indicate the various shear strength parameters used in the analyses, in the appropriate segments of each failure plane. Show locations of the cross sections used in slope stability analyses on the geotechnical map. Recommend mitigation if factors of safety are below County minimum standards.

3. Show the following on the geotechnical map:
   a. Approximate limits and depth of removal and recompaction of unsuitable soils, landslide debris, etc.
   b. Location of keyways, buttress/stabilization fills, etc.
   c. Location of "Restricted Use Areas", if applicable.
   d. All recommended mitigation measures.

4. Requirements of the Geology Section are attached.

5. Include a copy of this review sheet with your response.

NOTE(S) TO THE PLAN CHECKER/BUILDING AND SAFETY ENGINEER:
ON-SITE SOILS ARE CORROSIVE TO FERROUS METAL AND EXHIBIT LOW TO HIGH EXPANSION POTENTIAL.

REGISTERED GEOTECHNICAL ENGINEER
GAN N. LEM
NO. 2328
EXP. 6/30/07
STATE OF CALIFORNIA

Prepared by Gan Lem Date 11/15/05

NOTICE: Public safety, relative to geotechnical subsurface exploration, shall be provided in accordance with current codes for excavations, inclusive of the Los Angeles County Code, Chapter 11.48, and the State of California, Title 8, Construction Safety Orders.
Gan:tract-47449

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION

SOILS ENGINEERING REVIEW SHEET

Address: 900 S. Fremont Ave.
Alhambra, CA 91803
Telephone: (626) 458-4925
Fax: (626) 458-4913 Calling hours - Monday through Thursday 8-9 a.m. & 3-4 p.m.

District Office 5.0
Sheet 1 of 1

Tentative Tract 47449
Location San Dimas
Developer/Owner Dentec Holdings
Engineer/Architect Gustafson
Soils Engineer Southwest Geotechnical, Inc. (# 9908183-VN)
Geologist Same as above

Review of:

Tentative Tract Dated By Regional Planning 5/25/00
Soils Engineering Report Dated 5/15/00 Geologic Report Dated 5/15/00
Previous review sheet dated 5/11/00

ACTION:

Tentative Map feasibility is recommended for approval.

REGISTERED PROFESSIONAL ENGINEER
STEVE ROBERT BURGER
Lic C 48565
Exp. 09/30/00
CIVIL
STATE OF CALIFORNIA

Prepared by _____ Date 6/20/00
Steve R. Burger

NOTICE: Public safety, relative to geotechnical subsurface exploration, shall be provided in accordance with current codes for excavations, inclusive of the Los Angeles County Code, Chapter 11.48, and the State of California, Title 8, Construction Safety Orders.
SteveB/tt47449e

iEWER CALLING HOURS
a.m. & 3-4 p.m. Mon.-Thurs.

LAND DEVELOPMENT DIVISION
GEOLOGIC REVIEW SHEET
900 S. Fremont Ave., Alhambra, CA 91803
TEL. (626) 458-4925

__ Geologist
__ Soils Engineer
1 LDMA/Proc. Center
1 Section File
1 Subdivision

ITATIVE TRACT 47449
3DIVIDER Dentec Holdings
GINEER Gustafson
)LOGIST Southwest Geotechnical
LS ENGINEER Same as above

TENTATIVE MAP DATED ~~4-20-00~~ 5-25-00
LOCATION San Dimas

REPORT DATE 5-15-00, 3-24-00, 10-22-99
REPORT DATE

TENTATIVE MAP FEASIBILITY IS RECOMMENDED FOR APPROVAL. PRIOR TO FILING THE FINAL LAND DIVISION MAP, THE FOLLOWING CONDITIONS MUST BE FULFILLED:

[X] The final map must be approved by the Geology and Soils Sections to assure that all geotechnical (geology and soils) factors have been properly evaluated.

[X] A grading plan must be geotechnically approved by the Geology and Soils Sections. This grading plan must be based on a detailed engineering geology report and/or soils engineering report and show all recommendations submitted by them. It must also agree with the tentative map and conditions as approved by the Planning Commission. If the subdivision is to be recorded prior to the completion and acceptance of grading and completion of soils work, corrective grading will be required.

[X] All geologic hazards associated with this proposed development must be eliminated,

or

delineate restricted use areas, approved by the consultant geologist and/or soils engineer, to the satisfaction of the Geology and Soils Sections, and dedicate to the County the right to prohibit the erection of buildings or other structures within the restricted use areas.

[X] The Soils Engineering review dated 6-20-00 is attached.

TENTATIVE MAP IS APPROVED FOR FEASIBILITY. THE FOLLOWING INFORMATION IS APPLICABLE TO THIS DIVISION OF LAND:

[ ] This project may not qualify for a waiver of final map under section 21.48.140 of the Los Angeles County Title 21 Subdivision Code.

[X] The subdivider is advised that approval of this division of land is contingent upon the installation and use of a sewer system.

[X] A geology and/or soils engineering report may be required prior to approval of building or grading plans.

[X] Geotechnical Recordation Map verification deposit estimate 6 hours.

[ ] Groundwater is less than 10 feet from the ground surface on lots

epared by Robert O. Thomas Reviewed by Date 6-6-00

"Manual for Preparation of Geotechnical Reports" prepared by County of Los Angeles, Department of Public Works is available on the internet at the following address: p://dpw.co.la.ca.us/med/manual.pdf

:pubs\adminlgeo review forms\Form_2
'99

If you should have any questions regarding this letter, please do not hesitate to contact us.

Very truly yours,

GEOSOILS CONSULTANTS, INC.

WILLIAM A. CIRIDON
GE 217

RUDY F. RUBERTI
CEG 1708

Encl: References

cc: (2) Addressee
(2) County of Los Angeles

GeoSoils Consultants Inc.
GEOTECHNICAL · GEOLOGIC · ENVIRONMENTAL

February 15, 2006
W.O. 5831

VISTA VERDE-SAN DIMAS AVENUE PROPERTY, LLC.
10365 West Jefferson Boulevard
Culver City, California 90232

Attention: Mr. Daniel Singh:

Subject: Change of Consultants, Tentative Tract 47449, San Dimas, California

Dear Mr. Singh:

As requested, GeoSoils Consultants, Inc. (GSC) has reviewed the referenced reports by Southwest Geotechnical, Inc. for the subject property. We agree with the findings, conclusions, and recommendations within presented in the reports. Revisions to the Tentative Tract Map have been made since the original plan was approved. These revisions many consist of eliminating lots at the eastern portion of the tract and construction of a bridge as primary access. Separate reports are being prepared by this office to address these changes to the Tentative Tract Map and will be submitted to the County for review.

"111" STATEMENT

It is our opinion, provided that our recommendations and the recommendations included in the referenced reports are followed, that Tract 47449, will be safe from hazards of landslide, settlement, or slippage, and that the grading and building will not aversely affect the stability of property outside the subject development.

6634 Valjean Avenue Van Nuys, California 91406 Phone: (818) 785-2158 Fax: (818) 785-1548

REFERENCES

1. Pacific Soils Engineering, Inc. dated May 29, 1998, "Preliminary Geotechnical Report, Tentative Tract 47449, City of San Dimas, California".

2. Southwest Geotechnical, Inc. dated October 22, 1999, "Response to County of Los Angeles Department of Public Works Materials Engineering Division "Soils Engineering Review Sheet" and "Geologic Review", dated 7/6/99 and 7/1/99, respectively, for Tentative Tract 47449, San Dimas, California".

3. Southwest Geotechnical, Inc. dated March 24, 2000 "Response to County of Los Angeles Department of Public Works Materials Engineering Division "Soils Engineering Review Sheet" and "Geologic Review", dated 12/2/99, and 11/17/99, respectively, for Tentative Tract 47449, San Dimas, California".

4. Southwest Geotechnical, Inc. dated May 15, 2000, "Response to County of Los Angeles Department of Public Works, Land Development Division, Geologic Review Sheet dated 4-17-00, and Soils Engineering Review Sheet dated 5-11-00".

February 22, 2006
W.O. 5831

APPENDIX A

DETERMINATION OF EQUIVALENT FLUID PRESSURE (EFP)

FOR WALL DESIGN

GEOSOILS CONSULTANTS, INC.

Geotechnical Geologic Environmental

Retaining Wall Analysis

WO 5831 VISTA VERDE

Calculate the design minimum Equivalent Fluid Pressure (EFP) for proposed Retaining Wall supporting Bedrock up to 15 feet high, with a 3-foot high, 1 degree backslope. Assume the backfill is saturated with no excess hydrostatic pressure.

Bedrock Properties (Saturated)		
Cohesion (C)	Saturated Density (Ws)	Angle of Internal Friction (ϕ)
600 psf	130 pcf	40 °

Retaining Wall Properties		
Retained Height	Backslope Angle	Surcharge
15 feet	1°	0 pounds

FOR FACTOR OF SAFETY (Fs) = 1.5

$$Cd = C / Fs = 400 \text{ psf} \qquad \phi d = \text{ARCTAN} \frac{\text{TAN}(\phi)}{Fs} = 29.22\ °$$

6 TRIALS WERE ANALYZED USING ASSUMED RANKINE FAILURE ANGLE OF 65 DEGREES AND UPSLOPE DISTANCES TO THE TENSION CRACK FROM 2 TO 40 FEET AT 1 FOOT INTERVALS.

THE UPSLOPE DISTANCE TO THE TENSION CRACK WHICH RESULTS IN THE HIGHEST HORIZONTAL THRUST IS 2 FEET.

DESIGN THE RETAINING WALL AS FOLLOWS:

Rankine Angle:	Area of Failure Wedge:	Tension Crack Depth:	Maximum Horizontal Thrust:	Equivalent Fluid Pressure:
65 degrees	26 sq. ft.	11 feet	376 lbs	3.4 pcf

CONCLUSIONS:

THE CALCULATION INDICATES THAT THE PROPOSED RETAINING WALL UP TO 15 FEET HIGH SUPPORTING BEDROCK MAY BE DESIGNED FOR A MINIMUM EFP OF 30 PCF.

GEOSOILS CONSULTANTS, INC.

Geotechnical Geologic Environmental

Retaining Wall Analysis

WO 5831 VISTA VERDE

Calculate the design minimum Equivalent Fluid Pressure (EFP) for proposed Retaining Wall supporting Bedrock up to 15 feet high, with a 30-foot high, 26.57 degree backslope. Assume the backfill is saturated with no excess hydrostatic pressure.

Bedrock Properties (Saturated)		
Cohesion (C)	Saturated Density (Ws)	Angle of Internal Friction (ϕ)
600 psf	130 pcf	40 °

Retaining Wall Properties		
Retained Height	Backslope Angle	Surcharge
15 feet	26.57°	0 pounds

FOR FACTOR OF SAFETY (Fs) = 1.5

$Cd = C / Fs = 400$ psf

$\phi d = ARCTAN \frac{TAN(\phi)}{Fs} = 29.22$ °

9 TRIALS WERE ANALYZED USING ASSUMED RANKINE FAILURE ANGLE OF 65 DEGREES AND UPSLOPE DISTANCES TO THE TENSION CRACK FROM 2 TO 40 FEET AT 1 FOOT INTERVALS.

THE UPSLOPE DISTANCE TO THE TENSION CRACK WHICH RESULTS IN THE HIGHEST HORIZONTAL THRUST IS 3 FEET.

DESIGN THE RETAINING WALL AS FOLLOWS:

Rankine Angle:	Area of Failure Wedge:	Tension Crack Depth:	Maximum Horizontal Thrust:	Equivalent Fluid Pressure:
65 degrees	35 sq. ft.	11 feet	485 lbs	4.4 pcf

CONCLUSIONS:

THE CALCULATION INDICATES THAT THE PROPOSED RETAINING WALL UP TO 15 FEET HIGH SUPPORTING BEDROCK MAY BE DESIGNED FOR A MINIMUM EFP OF 43 PCF.

GEOSOILS CONSULTANTS, INC.

Geotechnical Geologic Environmental

Retaining Wall Analysis

WO 5831 VISTA VERDE

Calculate the design minimumEquivalent Fluid Pressure (EFP) for proposed Retaining Wall supporting Bedrock up to 15 feet high, with a 30-foot high, 33.69 degree backslope. Assume the backfill is saturated with no excess hydrostatic pressure.

Bedrock Properties (Saturated)		
Cohesion (C)	Saturated Density (Ws)	Angle of Internal Friction (ϕ)
600 psf	130 pcf	40 °

Retaining Wall Properties		
Retained Height	Backslope Angle	Surcharge
15 feet	33.69°	0 pounds

FOR FACTOR OF SAFETY (Fs) = 1.5

$$Cd = C / Fs = 400 \text{ psf} \qquad \phi d = \text{ARCTAN}\frac{\text{TAN}(\phi)}{Fs} = 29.22\ °$$

11 TRIALS WERE ANALYZED USING ASSUMED RANKINE FAILURE ANGLE OF 65 DEGREES AND UPSLOPE DISTANCES TO THE TENSION CRACK FROM 2 TO 40 FEET AT 1 FOOT INTERVALS.

THE UPSLOPE DISTANCE TO THE TENSION CRACK WHICH RESULTS IN THE HIGHEST HORIZONTAL THRUST IS 3 FEET.

DESIGN THE RETAINING WALL AS FOLLOWS:

Rankine Angle:	Area of Failure Wedge:	Tension Crack Depth:	Maximum Horizontal Thrust:	Equivalent Fluid Pressure:
65 degrees	33 sq. ft.	11 feet	535 lbs	4.8 pcf

CONCLUSIONS:

THE CALCULATION INDICATES THAT THE PROPOSED RETAINING WALL UP TO 15 FEET HIGH SUPPORTING BEDROCK MAY BE DESIGNED FOR A MINIMUM EFP OF 55 PCF.

GEOSOILS CONSULTANTS, INC.

Geotechnical Geologic Environmental

Retaining Wall Analysis

WO 5831 VISTA VERDE

Calculate the design minimum Equivalent Fluid Pressure (EFP) for proposed Retaining Wall supporting Compacted Fill up to 15 feet high, with a 3-foot high, 1 degree backslope. Assume the backfill is saturated with no excess hydrostatic pressure.

Compacted Fill Properties (Saturated)		
Cohesion (C)	Saturated Density (Ws)	Angle of Internal Friction (ϕ)
250 psf	120 pcf	30 °

Retaining Wall Properties		
Retained Height	Backslope Angle	Surcharge
15 feet	1°	0 pounds

FOR FACTOR OF SAFETY (Fs) = 1.5

$$Cd = C / Fs = 166.67 \text{ psf} \qquad \phi d = \text{ARCTAN}\frac{\text{TAN}(\phi)}{Fs} = 21.05\ °$$

7 TRIALS WERE ANALYZED USING ASSUMED RANKINE FAILURE ANGLE OF 60 DEGREES AND UPSLOPE DISTANCES TO THE TENSION CRACK FROM 2 TO 40 FEET AT 1 FOOT INTERVALS.

THE UPSLOPE DISTANCE TO THE TENSION CRACK WHICH RESULTS IN THE HIGHEST HORIZONTAL THRUST IS 6 FEET.

DESIGN THE RETAINING WALL AS FOLLOWS:

Rankine Angle:	Area of Failure Wedge:	Tension Crack Depth:	Maximum Horizontal Thrust:	Equivalent Fluid Pressure:
60 degrees	60 sq. ft.	5 feet	3336 lbs	29.7 pcf

CONCLUSIONS:

THE CALCULATION INDICATES THAT THE PROPOSED RETAINING WALL UP TO 15 FEET HIGH SUPPORTING COMPACTED FILL MAY BE DESIGNED FOR A MINIMUM EFP OF 30 PCF.

GEOSOILS CONSULTANTS, INC.

Geotechnical Geologic Environmental

Retaining Wall Analysis

WO 5831 VISTA VERDE

Calculate the design minimum Equivalent Fluid Pressure (EFP) for proposed Retaining Wall supporting Compacted Fill up to 15 feet high, with a 30-foot high, 26.57 degree backslope. Assume the backfill is saturated with no excess hydrostatic pressure.

Compacted Fill Properties (Saturated)		
Cohesion (C)	Saturated Density (Ws)	Angle of Internal Friction (ϕ)
250 psf	120 pcf	30 °

Retaining Wall Properties		
Retained Height	Backslope Angle	Surcharge
15 feet	26.57°	0 pounds

FOR FACTOR OF SAFETY (Fs) = 1.5

$Cd = C / Fs = 166.67$ psf $\qquad \phi d = \text{ARCTAN}\dfrac{\text{TAN}(\phi)}{Fs} = 21.05\ °$

12 TRIALS WERE ANALYZED USING ASSUMED RANKINE FAILURE ANGLE OF 60 DEGREES AND UPSLOPE DISTANCES TO THE TENSION CRACK FROM 2 TO 40 FEET AT 1 FOOT INTERVALS.

THE UPSLOPE DISTANCE TO THE TENSION CRACK WHICH RESULTS IN THE HIGHEST HORIZONTAL THRUST IS 10 FEET.

DESIGN THE RETAINING WALL AS FOLLOWS:

Rankine Angle:	Area of Failure Wedge:	Tension Crack Depth:	Maximum Horizontal Thrust:	Equivalent Fluid Pressure:
60 degrees	85 sq. ft.	4 feet	4656 lbs	41.4 pcf

CONCLUSIONS:

THE CALCULATION INDICATES THAT THE PROPOSED RETAINING WALL UP TO 15 FEET HIGH SUPPORTING COMPACTED FILL MAY BE DESIGNED FOR A MINIMUM EFP OF 43 PCF.

GEOSOILS CONSULTANTS, INC.

Geotechnical Geologic Environmental

Retaining Wall Analysis

WO 5831 VISTA VERDE

Calculate the design minimumEquivalent Fluid Pressure (EFP) for proposed Retaining Wall supporting Compacted Fill up to 15 feet high, with a 30-foot high, 33.69 degree backslope. Assume the backfill is saturated with no excess hydrostatic pressure.

Compacted Fill Properties (Saturated)		
Cohesion (C)	Saturated Density (Ws)	Angle of Internal Friction (ϕ)
250 psf	120 pcf	30 °

Retaining Wall Properties		
Retained Height	Backslope Angle	Surcharge
15 feet	33.69°	0 pounds

FOR FACTOR OF SAFETY (Fs) = 1.5

$Cd = C / Fs = 166.67$ psf $\qquad \phi d = \text{ARCTAN}\frac{\text{TAN}(\phi)}{Fs} = 21.05\ °$

15 TRIALS WERE ANALYZED USING ASSUMED RANKINE FAILURE ANGLE OF 60 DEGREES AND UPSLOPE DISTANCES TO THE TENSION CRACK FROM 2 TO 40 FEET AT 1 FOOT INTERVALS.

THE UPSLOPE DISTANCE TO THE TENSION CRACK WHICH RESULTS IN THE HIGHEST HORIZONTAL THRUST IS 12 FEET.

DESIGN THE RETAINING WALL AS FOLLOWS:

Rankine Angle:	Area of Failure Wedge:	Tension Crack Depth:	Maximum Horizontal Thrust:	Equivalent Fluid Pressure:
60 degrees	97 sq. ft.	4 feet	5383 lbs	47.9 pcf

CONCLUSIONS:

THE CALCULATION INDICATES THAT THE PROPOSED RETAINING WALL UP TO 15 FEET HIGH SUPPORTING COMPACTED FILL MAY BE DESIGNED FOR A MINIMUM EFP OF 55 PCF.

GEOSOILS CONSULTANTS, INC.

Geotechnical Geologic Environmental

Retaining Wall Analysis

WO 5831 VISTA VERDE

Calculate the design minimumEquivalent Fluid Pressure (EFP) for proposed Retaining Wall supporting Compacted Fill up to 20 feet high, with a 3-foot high, 1 degree backslope. Assume the backfill is saturated with no excess hydrostatic pressure.

Compacted Fill Properties (Saturated)		
Cohesion (C)	Saturated Density (Ws)	Angle of Internal Friction (ϕ)
250 psf	120 pcf	30 °

Retaining Wall Properties		
Retained Height	Backslope Angle	Surcharge
20 feet	1°	0 pounds

FOR FACTOR OF SAFETY (Fs) = 1.5

$Cd = C / Fs = 166.67$ psf $\qquad \phi d = \text{ARCTAN}\frac{\text{TAN}(\phi)}{Fs} = 21.05°$

10 TRIALS WERE ANALYZED USING ASSUMED RANKINE FAILURE ANGLE OF 60 DEGREES AND UPSLOPE DISTANCES TO THE TENSION CRACK FROM 2 TO 40 FEET AT 1 FOOT INTERVALS.

THE UPSLOPE DISTANCE TO THE TENSION CRACK WHICH RESULTS IN THE HIGHEST HORIZONTAL THRUST IS 9 FEET.

DESIGN THE RETAINING WALL AS FOLLOWS:

Rankine Angle:	Area of Failure Wedge:	Tension Crack Depth:	Maximum Horizontal Thrust:	Equivalent Fluid Pressure:
60 degrees	111 sq. ft.	5 feet	7124 lbs	35.7 pcf

CONCLUSIONS:

THE CALCULATION INDICATES THAT THE PROPOSED RETAINING WALL UP TO 20 FEET HIGH SUPPORTING COMPACTED FILL MAY BE DESIGNED FOR A MINIMUM EFP OF 35.7 PCF.

GEOSOILS CONSULTANTS, INC.

Geotechnical Geologic Environmental

Retaining Wall Analysis

WO 5831 VISTA VERDE

Calculate the design minimumEquivalent Fluid Pressure (EFP) for proposed Retaining Wall supporting Bedding Plane up to 7.5 feet high, with a 25-foot high, 26.57 degree backslope. Assume the backfill is saturated with no excess hydrostatic pressure.

Bedding Plane Properties (Saturated)		
Cohesion (C)	Saturated Density (Ws)	Angle of Internal Friction (ϕ)
200 psf	130 pcf	10 °

Retaining Wall Properties		
Retained Height	Backslope Angle	Surcharge
7.5 feet	26.57°	0 pounds

FOR FACTOR OF SAFETY (Fs) = 1

$$Cd = C / Fs = 200 \text{ psf} \qquad \phi d = \text{ARCTAN}\frac{\text{TAN}(\phi)}{Fs} = 10\ °$$

11 TRIALS WERE ANALYZED USING ASSUMED RANKINE FAILURE ANGLE OF 50 DEGREES AND UPSLOPE DISTANCES TO THE TENSION CRACK FROM 2 TO 40 FEET AT 1 FOOT INTERVALS.

THE UPSLOPE DISTANCE TO THE TENSION CRACK WHICH RESULTS IN THE HIGHEST HORIZONTAL THRUST IS 6 FEET.

DESIGN THE RETAINING WALL AS FOLLOWS:

Rankine Angle:	Area of Failure Wedge:	Tension Crack Depth:	Maximum Horizontal Thrust:	Equivalent Fluid Pressure:
50 degrees	31 sq. ft.	4 feet	1158 lbs	41.2 pcf

CONCLUSIONS:

THE CALCULATION INDICATES THAT THE PROPOSED RETAINING WALL UP TO 7.5 FEET HIGH SUPPORTING BEDDING PLANE MAY BE DESIGNED FOR A MINIMUM EFP OF 43 PCF.

GEOSOILS CONSULTANTS, INC.

Geotechhical Geologic Environmental

Retaining Wall Analysis

WO 5831 VISTA VERDE

Calculate the design minimumEquivalent Fluid Pressure (EFP) for proposed Retaining Wall supporting Bedding Plane up to 8 feet high, with a 25-foot high, 26.57 degree backslope. Assume the backfill is saturated with no excess hydrostatic pressure.

Bedding Plane Properties (Saturated)		
Cohesion (C)	Saturated Density (Ws)	Angle of Internal Friction (ϕ)
200 psf	130 pcf	10 °

Retaining Wall Properties		
Retained Height	Backslope Angle	Surcharge
8 feet	26.57°	0 pounds

FOR FACTOR OF SAFETY (Fs) = 1

$$Cd = C / Fs = 200 \text{ psf} \qquad \phi d = \text{ARCTAN}\frac{\text{TAN}(\phi)}{Fs} = 10\ °$$

11 TRIALS WERE ANALYZED USING ASSUMED RANKINE FAILURE ANGLE OF 50 DEGREES AND UPSLOPE DISTANCES TO THE TENSION CRACK FROM 2 TO 40 FEET AT 1 FOOT INTERVALS.

THE UPSLOPE DISTANCE TO THE TENSION CRACK WHICH RESULTS IN THE HIGHEST HORIZONTAL THRUST IS 7 FEET.

DESIGN THE RETAINING WALL AS FOLLOWS:

Rankine Angle:	Area of Failure Wedge:	Tension Crack Depth:	Maximum Horizontal Thrust:	Equivalent Fluid Pressure:
50 degrees	37 sq. ft.	4 feet	1481 lbs	46.3 pcf

CONCLUSIONS:

THE CALCULATION INDICATES THAT THE PROPOSED RETAINING WALL UP TO 8 FEET HIGH SUPPORTING BEDDING PLANE MAY BE DESIGNED FOR A MINIMUM EFP OF 46.3 PCF.

GEOSOILS CONSULTANTS, INC.

Geotechnical Geologic Environmental

Retaining Wall Analysis

WO 5831 VISTA VERDE

Calculate the design minimum Equivalent Fluid Pressure (EFP) for proposed Retaining Wall supporting Bedding Plane up to 9 feet high, with a 25-foot high, 26.57 degree backslope. Assume the backfill is saturated with no excess hydrostatic pressure.

Bedding Plane Properties (Saturated)		
Cohesion (C)	Saturated Density (Ws)	Angle of Internal Friction (ϕ)
200 psf	130 pcf	10 °

Retaining Wall Properties		
Retained Height	Backslope Angle	Surcharge
9 feet	26.57°	0 pounds

FOR FACTOR OF SAFETY (Fs) = 1

$$Cd = C / Fs = 200 \text{ psf} \qquad \phi d = \text{ARCTAN}\frac{\text{TAN}(\phi)}{Fs} = 10\ °$$

13 TRIALS WERE ANALYZED USING ASSUMED RANKINE FAILURE ANGLE OF 50 DEGREES AND UPSLOPE DISTANCES TO THE TENSION CRACK FROM 2 TO 40 FEET AT 1 FOOT INTERVALS.

THE UPSLOPE DISTANCE TO THE TENSION CRACK WHICH RESULTS IN THE HIGHEST HORIZONTAL THRUST IS 9 FEET.

DESIGN THE RETAINING WALL AS FOLLOWS:

Rankine Angle:	Area of Failure Wedge:	Tension Crack Depth:	Maximum Horizontal Thrust:	Equivalent Fluid Pressure:
50 degrees	51 sq. ft.	3 feet	2239 lbs	55.3 pcf

CONCLUSIONS:

THE CALCULATION INDICATES THAT THE PROPOSED RETAINING WALL UP TO 9 FEET HIGH SUPPORTING BEDDING PLANE MAY BE DESIGNED FOR A MINIMUM EFP OF 55.3 PCF.

GEOSOILS CONSULTANTS, INC.

Geotechnical Geologic Environmental

Retaining Wall Analysis

WO 5831 VISTA VERDE

Calculate the design minimum Equivalent Fluid Pressure (EFP) for proposed Retaining Wall supporting Bedding Plane up to 10 feet high, with a 25-foot high, 26.57 degree backslope. Assume the backfill is saturated with no excess hydrostatic pressure.

Bedding Plane Properties (Saturated)		
Cohesion (C)	Saturated Density (Ws)	Angle of Internal Friction (ϕ)
200 psf	130 pcf	10 °

Retaining Wall Properties		
Retained Height	Backslope Angle	Surcharge
10 feet	26.57°	0 pounds

FOR FACTOR OF SAFETY (Fs) = 1

$$Cd = C / Fs = 200 \text{ psf} \qquad \phi d = \text{ARCTAN}\frac{\text{TAN}(\phi)}{Fs} = 10\ °$$

15 TRIALS WERE ANALYZED USING ASSUMED RANKINE FAILURE ANGLE OF 50 DEGREES AND UPSLOPE DISTANCES TO THE TENSION CRACK FROM 2 TO 40 FEET AT 1 FOOT INTERVALS.

THE UPSLOPE DISTANCE TO THE TENSION CRACK WHICH RESULTS IN THE HIGHEST HORIZONTAL THRUST IS 10 FEET.

DESIGN THE RETAINING WALL AS FOLLOWS:

Rankine Angle:	Area of Failure Wedge:	Tension Crack Depth:	Maximum Horizontal Thrust:	Equivalent Fluid Pressure:
50 degrees	62 sq. ft.	4 feet	3162 lbs	63.3 pcf

CONCLUSIONS:

THE CALCULATION INDICATES THAT THE PROPOSED RETAINING WALL UP TO 10 FEET HIGH SUPPORTING BEDDING PLANE MAY BE DESIGNED FOR A MINIMUM EFP OF 63.3 PCF.

GEOSOILS CONSULTANTS, INC.

Geotechnical Geologic Environmental

Retaining Wall Analysis

WO 5831 VISTA VERDE

Calculate the design minimum Equivalent Fluid Pressure (EFP) for proposed Retaining Wall supporting Bedding Plane up to 11 feet high, with a 25-foot high, 26.57 degree backslope. Assume the backfill is saturated with no excess hydrostatic pressure.

Bedding Plane Properties (Saturated)		
Cohesion (C)	Saturated Density (Ws)	Angle of Internal Friction (ϕ)
200 psf	130 pcf	10 °

Retaining Wall Properties		
Retained Height	Backslope Angle	Surcharge
11 feet	26.57°	0 pounds

FOR FACTOR OF SAFETY (Fs) = 1

$$Cd = C / Fs = 200 \text{ psf} \qquad \phi d = \text{ARCTAN} \frac{\text{TAN}(\phi)}{Fs} = 10\ °$$

16 TRIALS WERE ANALYZED USING ASSUMED RANKINE FAILURE ANGLE OF 50 DEGREES AND UPSLOPE DISTANCES TO THE TENSION CRACK FROM 2 TO 40 FEET AT 1 FOOT INTERVALS.

THE UPSLOPE DISTANCE TO THE TENSION CRACK WHICH RESULTS IN THE HIGHEST HORIZONTAL THRUST IS 12 FEET.

DESIGN THE RETAINING WALL AS FOLLOWS:

Rankine Angle:	Area of Failure Wedge:	Tension Crack Depth:	Maximum Horizontal Thrust:	Equivalent Fluid Pressure:
50 degrees	79 sq. ft.	4 feet	4240 lbs	70.1 pcf

CONCLUSIONS:

THE CALCULATION INDICATES THAT THE PROPOSED RETAINING WALL UP TO 11 FEET HIGH SUPPORTING BEDDING PLANE MAY BE DESIGNED FOR A MINIMUM EFP OF 70.1 PCF.

GEOSOILS CONSULTANTS, INC.

Geotechnical Geologic Environmental

Retaining Wall Analysis

WO 5831 VISTA VERDE

Calculate the design minimumEquivalent Fluid Pressure (EFP) for proposed Retaining Wall supporting Bedding Plane up to 12 feet high, with a 25-foot high, 26.57 degree backslope. Assume the backfill is saturated with no excess hydrostatic pressure.

Bedding Plane Properties (Saturated)		
Cohesion (C)	Saturated Density (Ws)	Angle of Internal Friction (ϕ)
200 psf	130 pcf	10 °

Retaining Wall Properties		
Retained Height	Backslope Angle	Surcharge
12 feet	26.57°	0 pounds

FOR FACTOR OF SAFETY (Fs) = 1

$$Cd = C / Fs = 200 \text{ psf} \qquad \phi d = \text{ARCTAN}\frac{\text{TAN}(\phi)}{Fs} = 10\ °$$

18 TRIALS WERE ANALYZED USING ASSUMED RANKINE FAILURE ANGLE OF 50 DEGREES AND UPSLOPE DISTANCES TO THE TENSION CRACK FROM 2 TO 40 FEET AT 1 FOOT INTERVALS.

THE UPSLOPE DISTANCE TO THE TENSION CRACK WHICH RESULTS IN THE HIGHEST HORIZONTAL THRUST IS 13 FEET.

DESIGN THE RETAINING WALL AS FOLLOWS:

Rankine Angle:	Area of Failure Wedge:	Tension Crack Depth:	Maximum Horizontal Thrust:	Equivalent Fluid Pressure:
50 degrees	93 sq. ft.	4 feet	5470 lbs	76 pcf

CONCLUSIONS:

THE CALCULATION INDICATES THAT THE PROPOSED RETAINING WALL UP TO 12 FEET HIGH SUPPORTING BEDDING PLANE MAY BE DESIGNED FOR A MINIMUM EFP OF 76 PCF.

GEOSOILS CONSULTANTS, INC.

Geotechnical Geologic Environmental

Retaining Wall Analysis

WO 5831 VISTA VERDE

Calculate the design minimumEquivalent Fluid Pressure (EFP) for proposed Retaining Wall supporting Bedding Plane up to 13 feet high, with a 30-foot high, 26.57 degree backslope. Assume the backfill is saturated with no excess hydrostatic pressure.

Bedding Plane Properties (Saturated)		
Cohesion (C)	Saturated Density (Ws)	Angle of Internal Friction (ϕ)
200 psf	130 pcf	10 °

Retaining Wall Properties		
Retained Height	Backslope Angle	Surcharge
13 feet	26.57°	0 pounds

FOR FACTOR OF SAFETY (Fs) = 1

$$Cd = C / Fs = 200 \text{ psf} \qquad \phi d = \text{ARCTAN}\frac{\text{TAN}(\phi)}{Fs} = 10°$$

20 TRIALS WERE ANALYZED USING ASSUMED RANKINE FAILURE ANGLE OF 50 DEGREES AND UPSLOPE DISTANCES TO THE TENSION CRACK FROM 2 TO 40 FEET AT 1 FOOT INTERVALS.

THE UPSLOPE DISTANCE TO THE TENSION CRACK WHICH RESULTS IN THE HIGHEST HORIZONTAL THRUST IS 15 FEET.

DESIGN THE RETAINING WALL AS FOLLOWS:

Rankine Angle:	Area of Failure Wedge:	Tension Crack Depth:	Maximum Horizontal Thrust:	Equivalent Fluid Pressure:
50 degrees	113 sq. ft.	4 feet	6869 lbs	81.3 pcf

CONCLUSIONS:

THE CALCULATION INDICATES THAT THE PROPOSED RETAINING WALL UP TO 13 FEET HIGH SUPPORTING BEDDING PLANE MAY BE DESIGNED FOR A MINIMUM EFP OF 81.3 PCF.

GEOSOILS CONSULTANTS, INC.

Geotechnical Geologic Environmental

Retaining Wall Analysis

WO 5831 VISTA VERDE

Calculate the design minimumEquivalent Fluid Pressure (EFP) for proposed Retaining Wall supporting Bedding Plane up to 14 feet high, with a 30-foot high, 26.57 degree backslope. Assume the backfill is saturated with no excess hydrostatic pressure.

Bedding Plane Properties (Saturated)		
Cohesion (C)	Saturated Density (Ws)	Angle of Internal Friction (ϕ)
200 psf	130 pcf	10 °

Retaining Wall Properties		
Retained Height	Backslope Angle	Surcharge
14 feet	26.57°	0 pounds

FOR FACTOR OF SAFETY (Fs) = 1

$$Cd = C / Fs = 200 \text{ psf} \qquad \phi d = \text{ARCTAN}\frac{\text{TAN}(\phi)}{Fs} = 10\ °$$

21 TRIALS WERE ANALYZED USING ASSUMED RANKINE FAILURE ANGLE OF 50 DEGREES AND UPSLOPE DISTANCES TO THE TENSION CRACK FROM 2 TO 40 FEET AT 1 FOOT INTERVALS.

THE UPSLOPE DISTANCE TO THE TENSION CRACK WHICH RESULTS IN THE HIGHEST HORIZONTAL THRUST IS 17 FEET.

DESIGN THE RETAINING WALL AS FOLLOWS:

Rankine Angle:	Area of Failure Wedge:	Tension Crack Depth:	Maximum Horizontal Thrust:	Equivalent Fluid Pressure:
50 degrees	133 sq. ft.	3 feet	8418 lbs	85.9 pcf

CONCLUSIONS:

THE CALCULATION INDICATES THAT THE PROPOSED RETAINING WALL UP TO 14 FEET HIGH SUPPORTING BEDDING PLANE MAY BE DESIGNED FOR A MINIMUM EFP OF 85.9 PCF.

GEOSOILS CONSULTANTS, INC.

Geotechhical Geologic Environmental

Retaining Wall Analysis

WO 5831 VISTA VERDE

Calculate the design minimumEquivalent Fluid Pressure (EFP) for proposed Retaining Wall supporting Bedding Plane up to 15 feet high, with a 30-foot high, 26.57 degree backslope. Assume the backfill is saturated with no excess hydrostatic pressure.

Bedding Plane Properties (Saturated)		
Cohesion (C)	Saturated Density (Ws)	Angle of Internal Friction (ϕ)
200 psf	130 pcf	10 °

Retaining Wall Properties		
Retained Height	Backslope Angle	Surcharge
15 feet	26.57°	0 pounds

FOR FACTOR OF SAFETY (Fs) = 1

$$Cd = C / Fs = 200 \text{ psf} \qquad \phi d = \text{ARCTAN}\frac{\text{TAN}(\phi)}{Fs} = 10\ °$$

23 TRIALS WERE ANALYZED USING ASSUMED RANKINE FAILURE ANGLE OF 50 DEGREES AND UPSLOPE DISTANCES TO THE TENSION CRACK FROM 2 TO 40 FEET AT 1 FOOT INTERVALS.

THE UPSLOPE DISTANCE TO THE TENSION CRACK WHICH RESULTS IN THE HIGHEST HORIZONTAL THRUST IS 18 FEET.

DESIGN THE RETAINING WALL AS FOLLOWS:

Rankine Angle:	Area of Failure Wedge:	Tension Crack Depth:	Maximum Horizontal Thrust:	Equivalent Fluid Pressure:
50 degrees	152 sq. ft.	4 feet	10126 lbs	90.1 pcf

CONCLUSIONS:

THE CALCULATION INDICATES THAT THE PROPOSED RETAINING WALL UP TO 15 FEET HIGH SUPPORTING BEDDING PLANE MAY BE DESIGNED FOR A MINIMUM EFP OF 90.1 PCF.