5) All slopes should be planted or protected from erosion as soon as possible after construction.

6) All grading shall be performed under the supervision of the engineering geologist and geotechnical engineer. Final grading plans shall be reviewed by the engineering geologist and geotechnical engineer prior to construction.

7) Positive drainage should be established on the site. Water should not be allowed to flow towards nor pond adjacent to tops of slopes, nor to flow over the slope face. Water should not be allowed to pond adjacent to footings. It is the responsibility of the owner to maintain slopes and drainage facilities and improve deficiencies found during occupancy of the property.

8) The engineering geologist from this office shall review all temporary and permanent excavations (including foundation excavations). Should the observations reveal any unforeseen conditions, additional recommendations may be made at that time.

9) All work and materials shall comply with the latest applicable specifications of the City of Agoura Hills.

Limitations

The engineering geologist has prepared this report using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable engineering geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the professional advice provided under the terms of the agreement and included in this report.

Should the project be delayed beyond the period of one year after the date of this report, the site should be examined and the report reviewed to consider possible changed conditions.

This report is issued with the understanding that it is the responsibility of the owner, or his representative, to assure that the information and recommendations contained herein are called to the attention of the designers and builders for the project.

The subsurface conditions, excavations, characteristics, and geologic structure described herein and shown on the enclosed cross sections have been projected from individual test pits placed on the subject property. The subsurface conditions, excavation characteristics, and geologic structure shown should in no way be construed to reflect any variations which may occur between these test pits.

If conditions encountered during construction appear to differ from those disclosed, this office should be notified so as to consider the need for modifications. No responsibility for construction compliance with the design concepts, specifications, or recommendations is assumed unless on-site construction review is performed during the course of construction which pertains to the specific recommendations contained herein.

Thank you for this opportunity to be of service to you. Should you have any questions, please feel free to contact our office.

Respectfully submitted,

TERRY ANN MAYER
Engineering Geologist
CEG 1373

Terry A. Mayer
President
C.E.G. 1373

Enclosures:

Geologic Maps. . . . . .Plates 1.1 and 1.2
Test Pit Logs . . . . .Plate 2.1 - 2.7
Geologic Section . . . . Plate 3.1 - 3.2
References. . . . . Plate R
* in pocket

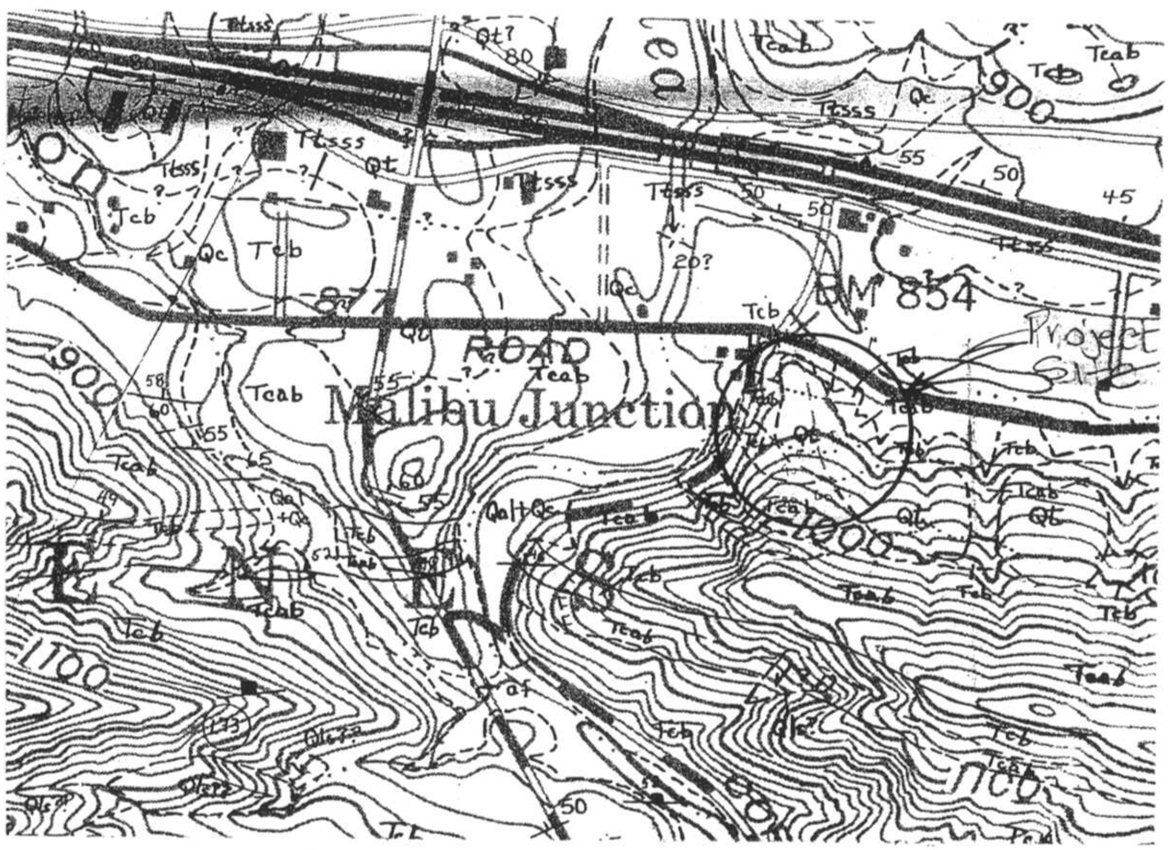
REFERENCES

Dibblee, T. W., 1990, Geologic Map of the Thousand Oaks Quadrangle, Dibblee Foundation Map #DF-49.

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

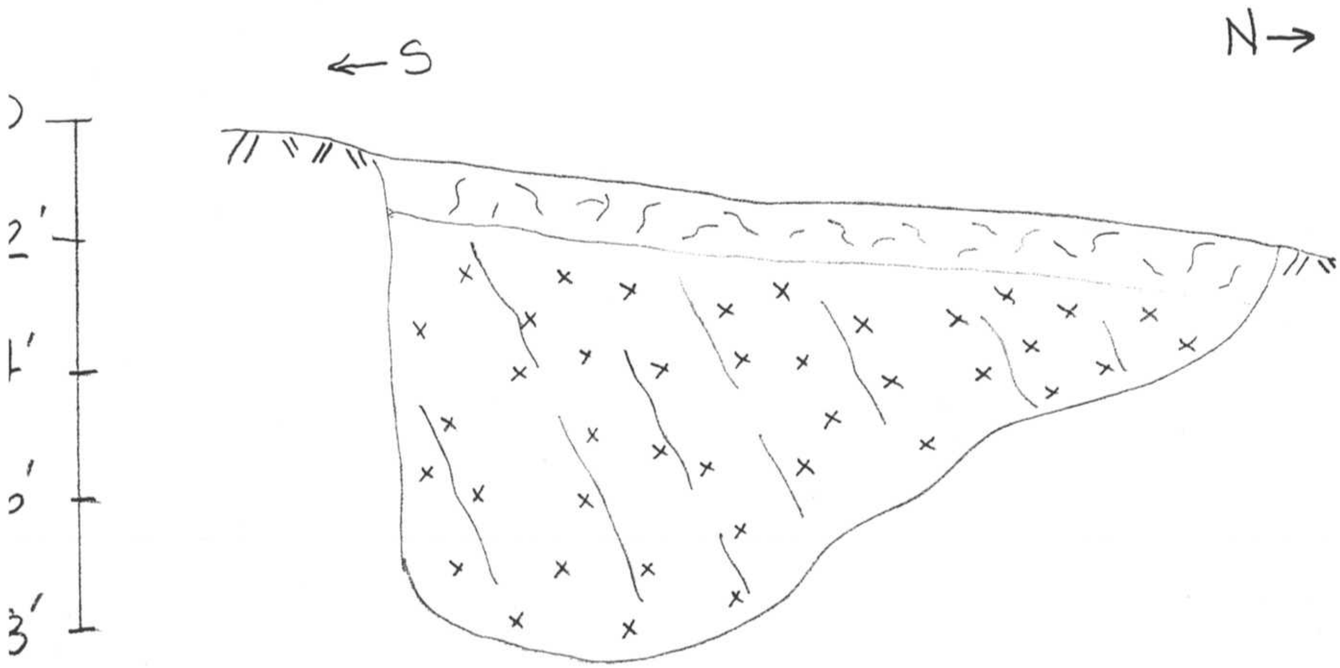
Regional Geologic Map

Weber, F. H., Jr. and Blackerby, B.A., 1984, Geologic Map of the S. ½ Thousand Oaks Quadrangle, Ventura and Los Angeles Counties, California, California Division of Mines and Geology.
Scale 1:9,600



Excavation Log: TP-1

Feet	Description
0 - 1 foot	Topsoil - Clayey Silt (ML) - dark brown, loose to medium dense, abundant volcanic rock fragments, dry to damp, moderate roots.
1 ft - 8 ft	Conejo Volcanics (Tcb) -weathered basalt, tan to rust-brown, damp, fractured, moderately developed flow structures, B N75°W, 61°N



Total Depth 8 feet. No Groundwater. No Seepage. No caving. Test Pit Backfilled.

The log of subsurface conditions hereon applies only at the specific location and the date indicated. It is not warranted to be representative of subsurface conditions at other times and locations

Terry A. Mayer
Consulting Geologist

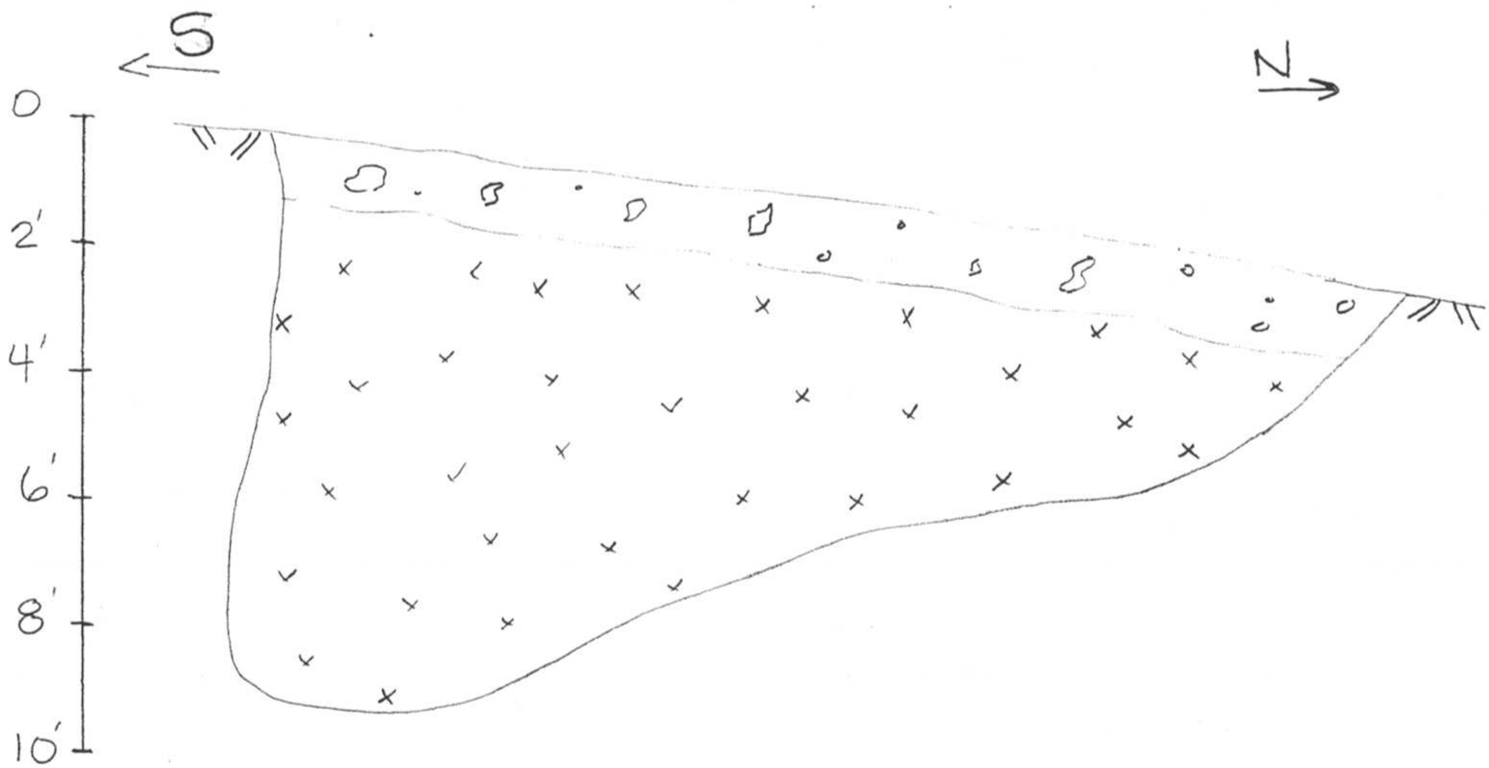
Date: August 23, 2004
Job Number # 040802

Date Excavated: June 18, 2004

Plate 2.1

Excavation Log: TP-2

Feet	Description
0 - 1 foot	Topsoil - Clayey Silt (ML) - light to chocolate brown, loose to medium dense, abundant volcanic rock fragments, dry to damp, moderate roots.
1 ft - 9 ft	Conejo Volcanics (Tcb) -weathered basalt, gray to rust-brown, upper 1 ½ moderately weathered, below relatively unweathered, dense, fractured, no observable structure, very difficult to excavate below 8 ½ ft, practical refusal at 9 feet



Total Depth 9 feet. No Groundwater. No Seepage. No caving. Test Pit Backfilled.

The log of subsurface conditions hereon applies only at the specific location and the date indicated. It is not warranted to be representative of subsurface conditions at other times and locations

Terry A. Mayer
Consulting Geologist

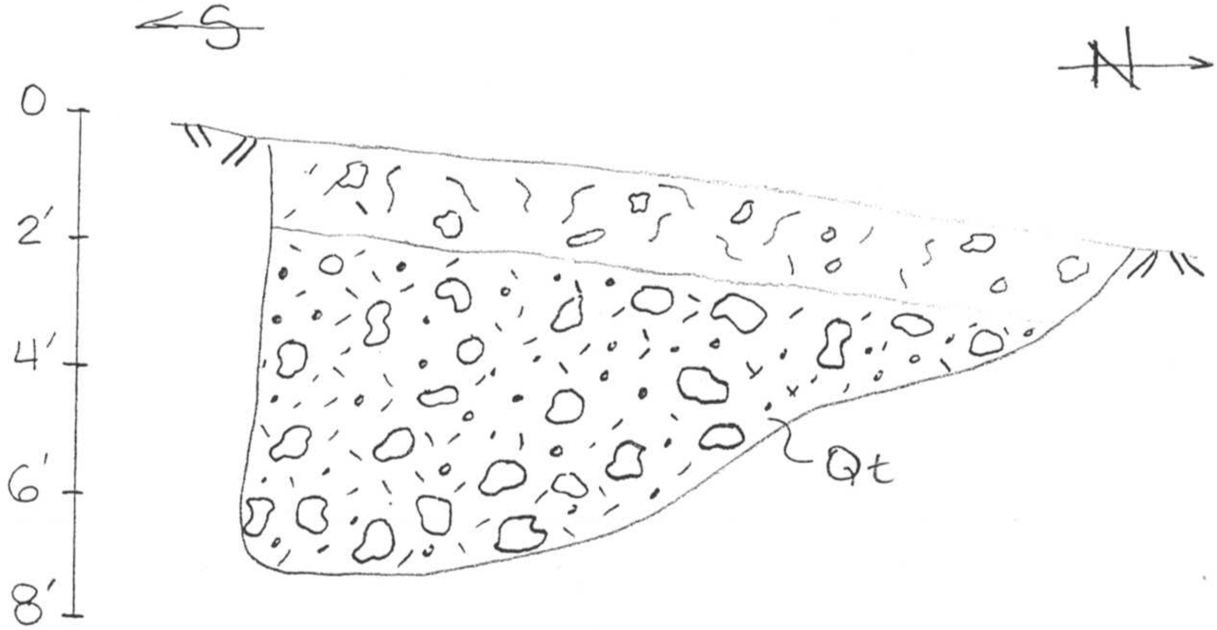
Date: August 23, 2004
Job Number # 040802

Date Excavated: June 18, 2004

Plate 2.2

Excavation Log: TP-3

Feet	Description
0 - 1 ½ foot	Topsoil - Clayey Silt (ML) - light to chocolate brown, loose to medium dense, abundant volcanic rock fragments, dry to damp, moderate roots.
11/2 ft - 7 ft	Terrace Deposits (Qt) -rounded to subangular volcanic boulders and gravels in a clayey silt matrix, damp, dense



Total Depth 7 feet. No Groundwater. No Seepage. No caving. Test Pit Backfilled.

The log of subsurface conditions hereon applies only at the specific location and the date indicated. It is not warranted to be representative of subsurface conditions at other times and locations

Terry A. Mayer
Consulting Geologist

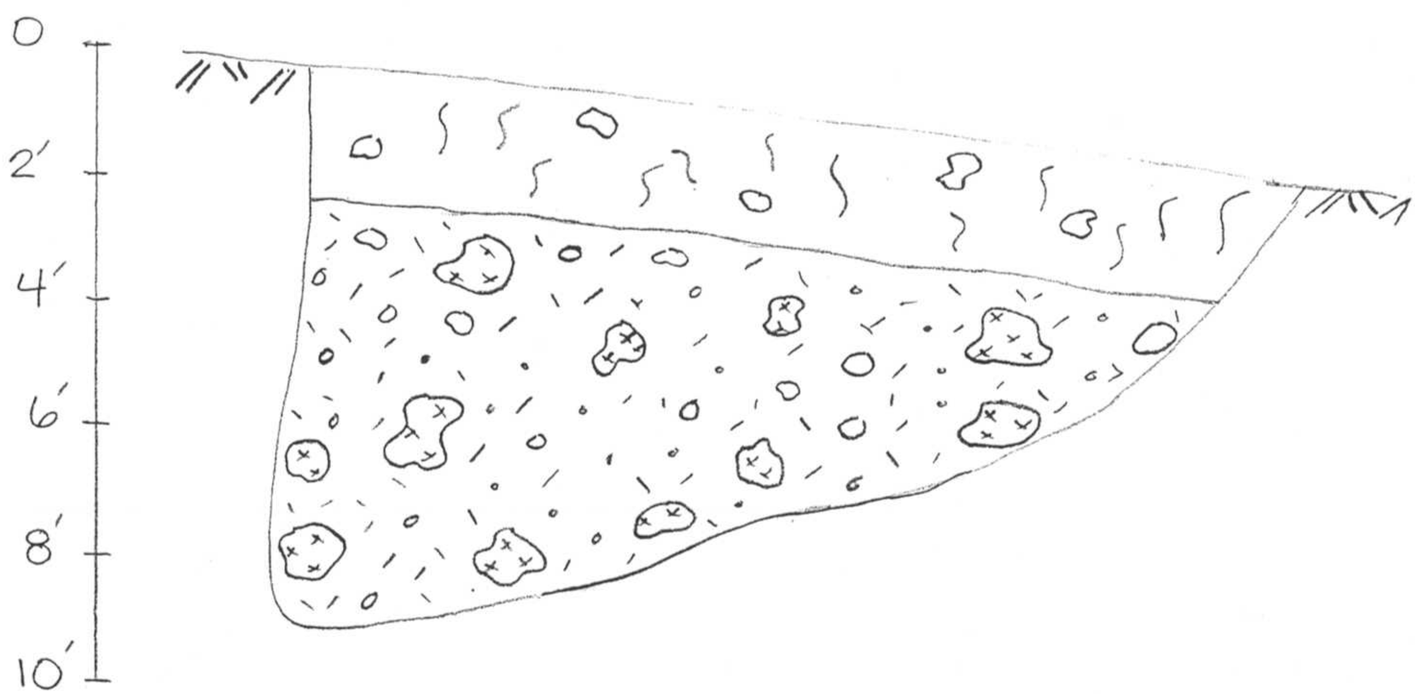
Date: August 23, 2004
Job Number # 040802

Date Excavated: June 18, 2004

Plate 2.3

Excavation Log: TP-4

Feet	Description
0 - 2 foot	Topsoil - Clayey Silt (ML) - light to chocolate brown, loose to medium dense, abundant volcanic rock fragments, dry to damp, moderate roots.
2 ft - 9 ft	Terrace Deposits (Qt) -rounded to subangular volcanic boulders and gravels in a dark brown clayey silt matrix, damp, dense



Total Depth 9 feet. No Groundwater. No Seepage. No caving. Test Pit Backfilled.

The log of subsurface conditions hereon applies only at the specific location and the date indicated. It is not warranted to be representative of subsurface conditions at other times and locations

Terry A. Mayer
Consulting Geologist

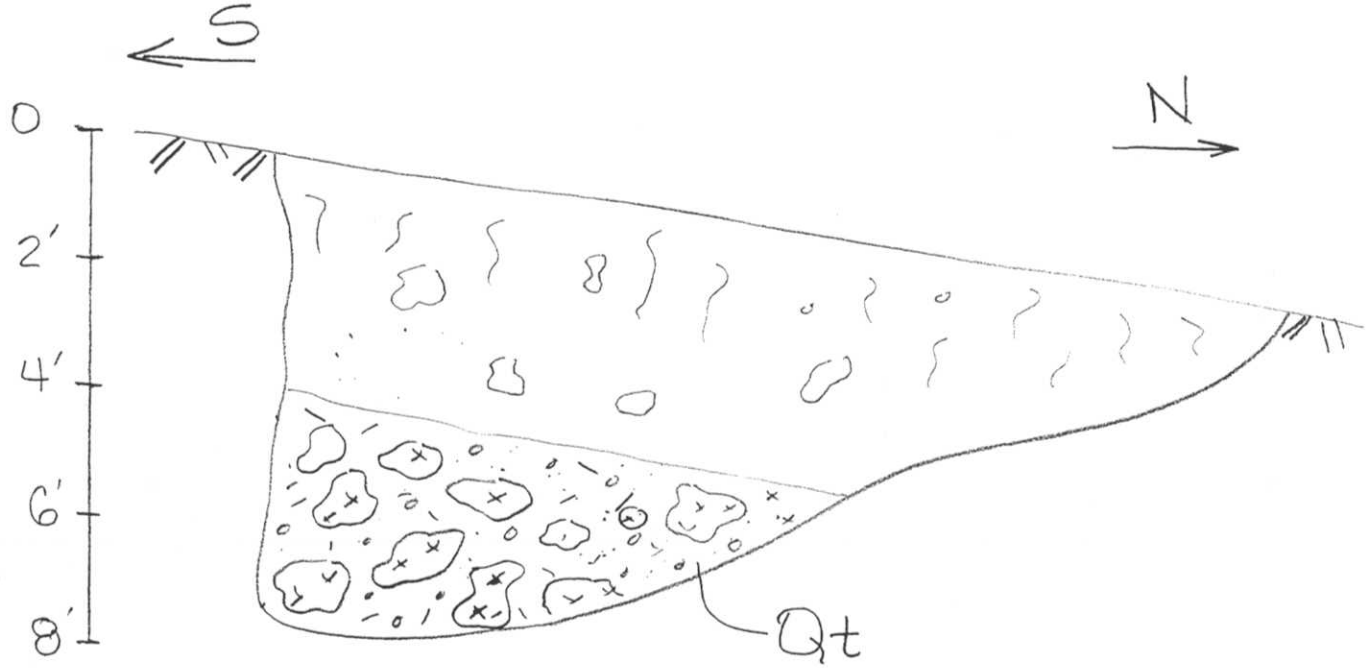
Date: August 23, 2004
Job Number # 040802

Date Excavated: June 18, 2004

Plate 2.4

Excavation Log: TP-5

Feet	Description
0 - 3 ½ foot	Topsoil - Clayey Silt (ML) - light to medium brown, loose to medium dense, abundant volcanic rock fragments, dry to damp, moderate roots.
3 1/2 ft - 7 1/2 ft	Terrace Deposits (Qt) -rounded to subangular volcanic cobbles and gravels in a silty sand, tan to light brown matrix, damp, dense



Total Depth 7 ½ feet. No Groundwater. No Seepage. No caving. Test Pit Backfilled.

The log of subsurface conditions hereon applies only at the specific location and the date indicated. It is not warranted to be representative of subsurface conditions at other times and locations

Terry A. Mayer
Consulting Geologist

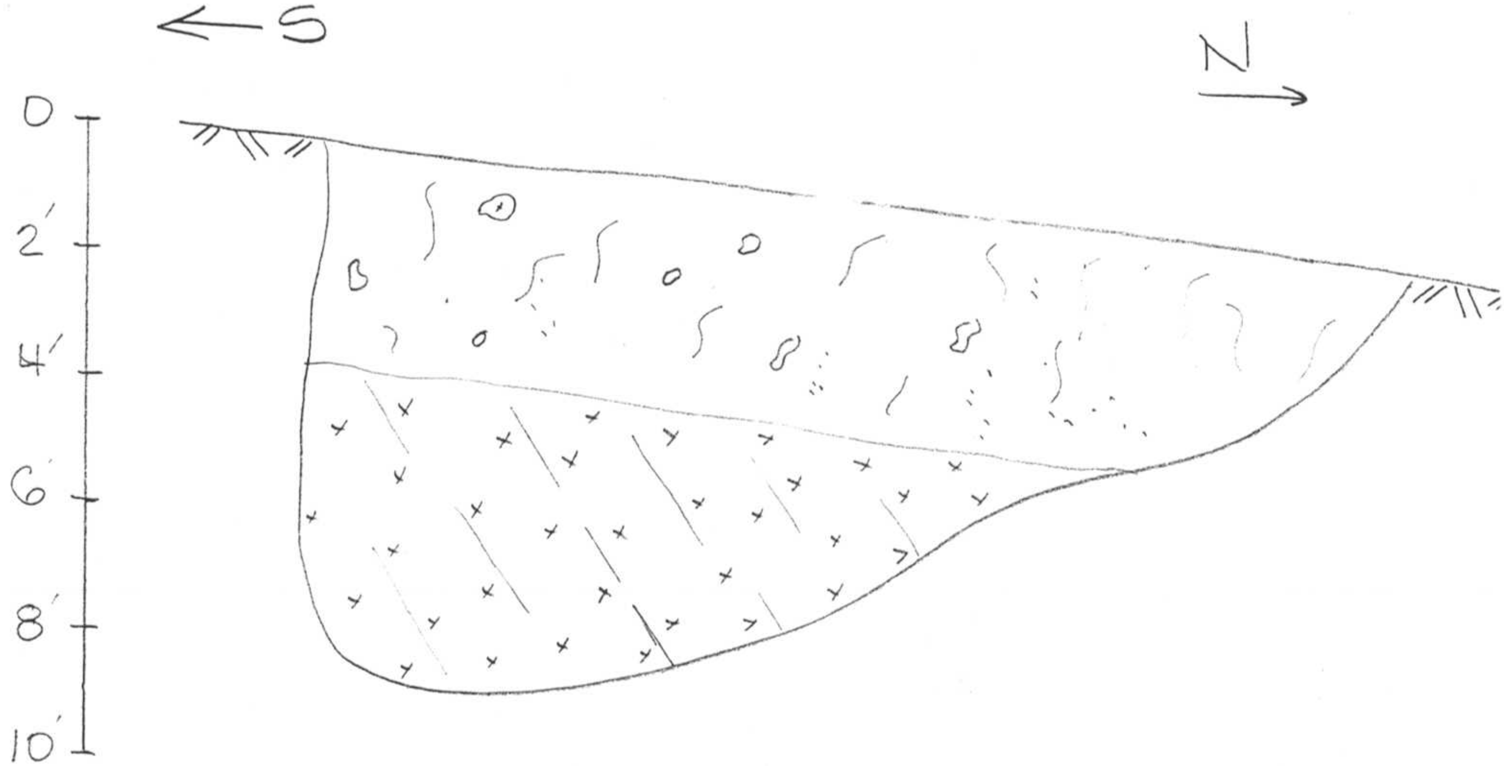
Date: August 23, 2004
Job Number # 040802

Date Excavated: June 18, 2004

Plate 2.5

Excavation Log: TP-6

Feet	Description
0 - 3 ½ foot	Topsoil - Clayey Silt (ML) - dark brown, loose to medium dense, abundant volcanic rock fragments, dry to damp.
3 ½ ft - 8 ½ ft	Conejo Volcanics (Tcb) -weathered basalt, gray to rust-brown, damp, fractured, moderately developed flow structures, B N87°W, 56°N



Total Depth 8 ½ feet. No Groundwater. No Seepage. No caving. Test Pit Backfilled.

The log of subsurface conditions hereon applies only at the specific location and the date indicated. It is not warranted to be representative of subsurface conditions at other times and locations

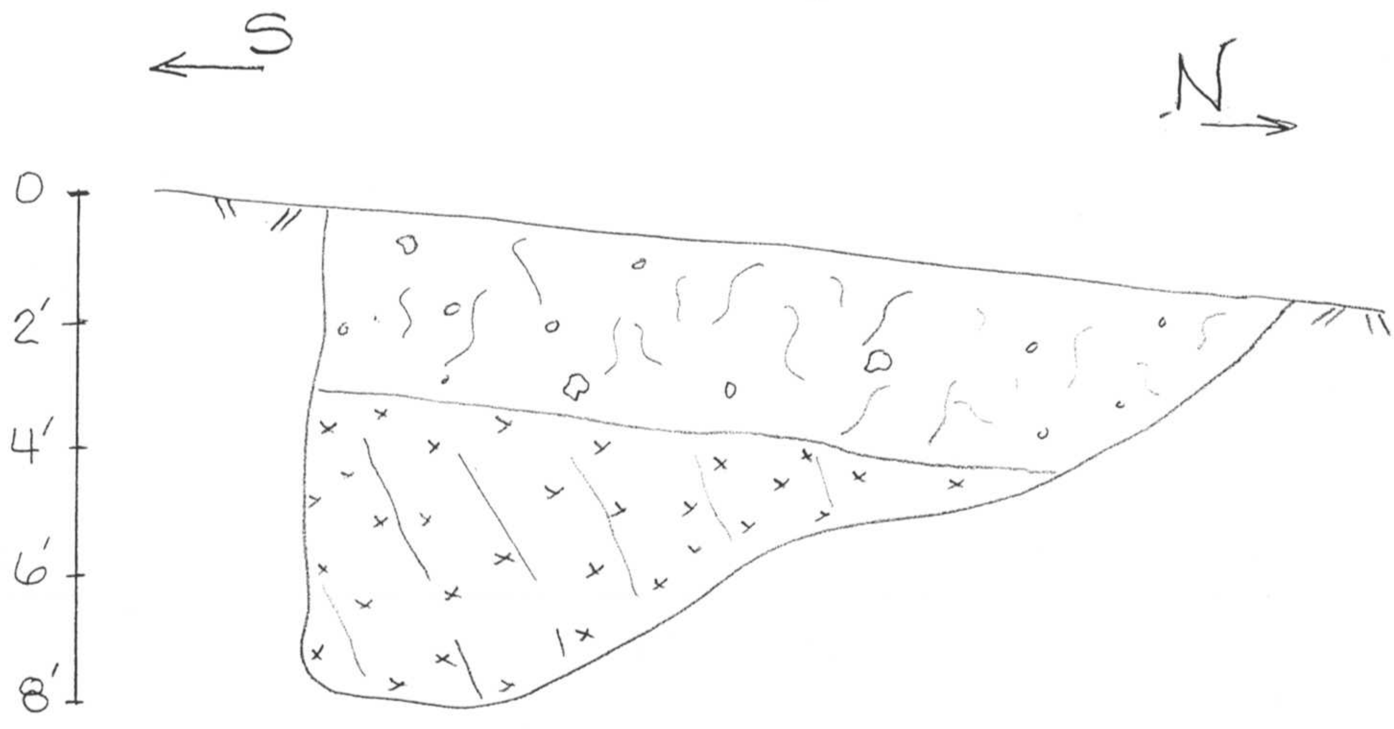
Terry A. Mayer
Consulting Geologist

Date: August 23, 2004
Job Number # 040802

Date Excavated: June 18, 2004

Excavation Log: TP-7

Feet	Description
0 - 3 foot	Topsoil - Clayey Silt (ML) - dark brown, loose to medium dense, abundant volcanic rock fragments, dry to damp.
3 ft - 8 ft	Conejo Volcanics (Tcb) -weathered basalt, gray to rust-brown, damp, fractured, moderately developed flow structures, B N82°W, 56°N



Total Depth 8 feet. No Groundwater. No Seepage. No caving. Test Pit Backfilled.

The log of subsurface conditions hereon applies only at the specific location and the date indicated. It is not warranted to be representative of subsurface conditions at other times and locations

Terry A. Mayer
Consulting Geologist

Date: August 23, 2004
Job Number # 040802

Date Excavated: June 18, 2004

SOIL ENGINEERING INVESTIGATION
FOR PROPOSED OFFICE, RETAIL, RESIDENTIAL BUILDINGS

AT

SOUTHEAST CORNER OF AGOURA ROAD AND CORNELL ROAD

AGOURA HILLS, CA

FOR

AGOURA AND CORNELL ROADS L.P.

HEATHCOTE GEOTECHNICAL

SOIL TESTING • FOUNDATIONS • INSPECTION

HEATHCOTE GEOTECHNICAL

SOIL TESTING • FOUNDATIONS • INSPECTION

P.O. BOX 6812, THOUSAND OAKS, CALIFORNIA 91359

1884 EASTMAN AVENUE, SUITE 105, VENTURA, CALIFORNIA 93003

Agoura and Cornell Roads L.P.
Attn: Doron Tal
5924 Melvin Avenue
Tarzana, California 91356

Job: 04182
Date: September 28, 2004

Ladies/Gentlemen:

We are pleased to present this soil engineering report in conjunction with an engineering geology report for you to aid in the design of your proposed project. The engineering geology report was prepared by Terry Mayer, Certified Engineering Geologist, and is presented in a separate report.

<u>The project is located at the southeast corner of Agoura Road and Cornell Road in Agoura Hills.</u>

The project involves erecting one and two story buildings. The structures will be built into the existing grade. Some substantial grading is expected. Basement walls are planned for some of the buildings. The basement walls may be up to 25 feet in height. The loads will be light to heavy. The floor will be slab-on-grade. The proposed building will be serviced by public sewers. Additionally, there will be some road widening and improvements made along Agoura Road and Cornell Road. Detailed calculations and geologic studies of the area are presented to facilitate the slope work.

Submittal of this report to appropriate governmental agencies is the responsibility of the owner or their representatives.

The project will be safe for intended use as long as the recommendations of the report are followed.

The report will follow and includes; a comprehensive task list, observations and findings, recommendations, basis of report, results of testing, plot plan, borings, and slope stability sections with calculations.

It has been our pleasure to serve you and if you have any questions or need additional service, please contact us.

Fred Heathcote
Civil Engineer
No. C48316

REGISTERED PROFESSIONAL ENGINEER
FRED ROY HEATHCOTE
No. C48316
Exp. 6-30-08
CIVIL
STATE OF CALIFORNIA

(805) 496-5566 (805) 646-9978 (805) 644-9978 FAX: (805) 644-9906

COMPREHENSIVE TASK LIST

GENERAL

This portion of the report specifies all the work that was performed and the procedures used.

This investigation did not address the possibility of any contaminants in the soil, although none were noted. Geologic hazards are presented in a separate report by Terry Mayer. Our report addresses geologic issues raised in the geology report with engineering strengths, calculations, recommendations, and factors of safety.
The following is the comprehensive task list.

SITE WORK

1. Reviewed site for engineering problems that can be associated with the soil.
2. Seven borings up to 9 feet in depth with undisturbed samples taken at frequent intervals. These borings were used for foundation and slope stability.
3. Logging of soils in the borings for engineering properties.
4. Obtained a bulk samples for laboratory testing.

TESTING

1. Moisture and density of the undisturbed samples
2. Maximum density and optimum moisture contents of soils on site for grading purposes
3. Expansion index tests
4. Shear testing for slope stability studies. We utilized ultimate shears and residual shears. Residual shears were sheared 5 times. The shears were examined at the end of testing. No piece larger than 1/8 inch was in the sheared zone. The latest version of the ASTM procedures were used. The strain rate was performed at a deformation rate of .05 inches per minute.
5. Consolidation testing for foundations using the latest versions of the ASTM.

Results of testing are presented following the basis of report and in the boring logs.

REPORT

1. Comprehensive task list
2. Findings and Observations
   a) site conditions
   b) soil conditions
   c) slope stability
   d) geologic hazards
3. Recommendations
   a) foundation: depths, bearing value, settlements, and lateral values
   b) slabs on grade
   c) basement/retaining walls

d) paving
e) construction procedures: earthwork, inspection

4. Basis of report
5. Results of testing
6. Plot plan
7. Boring logs
8. Slope stability

FINDINGS AND OBSERVATIONS

SITE CONDITIONS

The area of the proposed building is located on the top of a knoll. Generally, the existing side of the knoll slopes downward at incline of 2:1 at the steepest. See grading plan for details.

The hillside is composed of the volcanic bedrock. No gross instabilities were noted.

The site is mostly in a natural state with weeds and brush. There has been some weed abatement in the form of tilled earth. Some oak trees are present.

SOIL CONDITIONS

Seven borings were performed. No fill soils were encountered in the borings. Fill soils may be encountered in the construction phase.

Soils

Some minor surface soils are present on the sites. These soils are generally moderately firm and considered to have high expansion potential. These soils consist of silty clays with volcanic cobbles. Foundations will not rest on any of the soils.

Bedrock

Below the upper natural soils is found a volcanic bedrock. The bedrock formation is moderately dense and not very compressible. The expansion potential is considered medium.

The following shows the strength values used in analysis for the bedrock formation. These strengths are based on the conservative use of ultimate shear strength for the allowable strength for cross bedding. For along bedding strengths, we have used residual shear.

1. volcanic bedrock-ultimate	2. volcanic bedrock-residual
c=400 psf	c=200 psf
ϕ=36	ϕ=36
γ=120 pcf	γ=120 pcf

For the seismic case we have used the following ultimate value. This is conservative but yielded sufficient factors of safety.

1. Cross bedding	3. volcanic bedrock-residual
c=400 psf	c=200 psf
ϕ=36	ϕ=36
γ=120 pcf	γ=120 pcf

Water conditions
Water was not encountered.

SLOPE STABILITY
We used the value of the ultimate shear strength in the analysis of the total slope stability. Residual shear is used in the design of individual basement and retaining walls.

We are using circular failures to determine the factor of safety for gross stability.

Gross Stability
The overall gross stability of the slope was evaluated The physical testing and inspection did not reveal a slide plane underneath the proposed structures. No gross stability failures were noted.

Bishop's Simplified method was used with computer analysis. Generally, the lowest factors of safety for gross stability were almost surficial failures.

The gross factor of safety for the overall stability of the entire proposed cut slope to the north is 2.24.

For the seismic case, the factor of safety is 1.39.

Surficial Stability
Using the shear values obtained for residual shear yields sufficient factor of safety for the surficial stability. The factor of safety is 1.71. Some minor weathered areas of the bedrock may erode and should be maintained.

GEOLOGIC HAZARDS
This report is not a geology report, but certain things should be noted.

Liquefaction
No groundwater was observed in the borings. The site is not listed in an area of liquefaction. Bedrock is found at the surface. No liquefaction danger is present.

Debris flows
Due to the mild nature of the uphill slopes around the proposed building debris flows are not of concern. Proper setbacks of building shall be maintained as in accordance with C.B.C. code.

Flooding
No specific flooding is anticipated. The project is well above any flood plain issues. Surface waters need to be drained properly away from the proposed structures.

Faulting and Seismicity
Faults are addressed in the geology report.

The following are the seismic coefficients needed for the structural design.

Soil Profile	Sb	**Z**	0.4
Seismic Source	B	**Na**	1.00
Distance(km)	8.5	**Nv**	1.06
Seismic Zone	4	**Ca**	0.40
		Cv	0.42

RECOMMENDATIONS

FOUNDATIONS

The expansion potential of the bedrock indicates a foundation design for medium expansion soils is needed for the foundations. Foundations should have at least 2-#4 bar at top and bottom.

Supporting Soils

The proposed building may be supported on the bedrock.

Depth and Width

The footings must extend at least 24 inches below finished grade and at least 12 inches into the bedrock. Minimum width for the footings is 12 inches.

Proper depths of foundations will be needed to attain daylight distance from the bottoms of the foundations as prescribed in the U.B.C. and as per City of Agoura Hills code. The distance shall be 40 feet to daylight or H/2 whichever is less. We will need to review the depths of the foundations as exact locations are given. Piles may be needed to attain the depths needed.

Allowable Bearing Value

The proposed foundations may be designed to place a load of 6000 pounds per square foot on the bedrock.

Settlement

Load induced settlement of the structures should not exceed 1/2 inch. Differential settlement should be less than 1/4 inch.

Lateral Values

The coefficient of friction for the foundations shall be 0.4. The allowable passive pressure is equal to a fluid density of 400 pounds per cubic foot. Sliding resistance and passive pressure may be used to resist lateral forces without reduction.

SLABS ON GRADE

The slabs may be placed on the resulting compacted fill from proper grading. The slabs should be designed for soils of high expansion. Reinforcing should have a minimum of #4 bars at 18 inches on centers each way.

Due to the basement conditions, we recommend that you use a 6 inch layer of gravel beneath the slab as a capillary break. The gravel should be of 3/4 inch variety with less than 1% sand with very little amount of fines. The basement gravel shall have slotted pipes and be positively drained from beneath the slabs.

A visquene covering shall be used to serve as a water vapor barrier. A 2 inch layer of sand should be placed on top of the visquene.

BASEMENT/RETAINING WALLS

Lateral values

The retaining walls must be designed to resist a lateral pressure equal to a fluid density of 35 pounds per cubic foot assuming a level backfill behind the walls to accomodate active pressures. The equivalent fluid pressure for a 2:1 backfill must be at least 50 pcf.

If basement walls are used, the walls must be designed to resist a lateral pressure equal to a fluid density of 70 pounds per cubic foot assuming a level backfill behind the walls to accomodate at rest pressures. The equivalent fluid pressure for a 2:1 backfill must be at least 80 pcf.

Drainage

To provide proper drainage behind basement walls, a layer of gravel should be placed behind the wall to a depth of 24 inches below the proposed finished grade. The gravel should extend up to within 18 inches of the top ground surface, but no higher. All gravel shall be completely wrapped in burrito fashion so as to minimize soil entering the gravel. Compacted soils should be placed in the remainder to reduce surface water infiltration. A method of drainage should be provided in the form of a slotted pipe with Class 2 permeable material. Proper water proofing should be used on basement walls and be adequately protected from puncture.

ASPHALTIC PAVING

The asphaltic paving is designed using a R value of 14 for the type of soil. The Caltrans Method is used for designing the paving.

The following design will be satisfactory assuming a stable and compacted subgrade. The following sections will address this issue. The pavement sections are designed for traffic indices of 5 and 9. Both are presented. Other indices are presented at the end of the report.

Areas that are subject to purely auto traffic may use a Traffic Index of 5. Areas subject to heavy truck traffic must use a traffic index of at least 9.

TI=5
3" Asphaltic paving over
8" Base course

TI=9
6" Asphaltic paving over
18" Base course

Base course shall use class 2 aggregate base compacted to 95% of maximum compaction. Asphalt shall be similarly compacted. Proper drainage of paved areas will increase the life of the paving.

DRAINS AND GRADES

All grades shall drain away from the foundations. Downspouts should be drained away from the foundations.

CONSTRUCTION PROCEDURES

Slopes

All temporary slopes must maintain 3/4 to 1 horizontal to vertical. Vertical cuts over 4 feet are not allowed by OSHA.

Finished cut slopes shall not exceed 2:1 horizontal to vertical. Fill slopes shall not exceed 2:1 horizontal to vertical. Hillside should be planted for erosion control.

Generally, all buildings shall conform to setback requirements for slopes as specified in the C.B.C. This distance is H/2 or 15 feet whichever is less.

All appropriate drains and slope interceptor drains shall be installed as required by the City of Agoura Hills.

Excavations

To support slabs and any proposed fill soils the following must be excavated.

1) In the area of the proposed grading all organic material should be removed and taken off site.

2) Any fill soils

3) A keyway shall be placed at the bottom of all fill slopes a minimum depth of 3 feet and down to the bedrock. Keyway shall be a minimum of 10 feet wide.

4) All fill soils shall be benched into the hillside.

5) All upper soils shall be removed to the bedrock.

The following must be excavated in areas to be paved.

a) All organic material

b) All upper soils shall be removed to the bedrock.

Standard grading procedure

After excavation the following must be accomplished.

1) All bottoms of the excavations and areas to receive slabs shall be scarified and compacted to 90% compaction.

2) All fills and backfills should be placed in horizontal layers less than 8 inches in loose thickness.

3) The soils shall be compacted to a minimum of 90% of the maximum density rendered by the latest ASTM version.

4) The moisture content should not vary more than 2% from the optimum moisture content, although the grading process will be more easily accomplished with the soils being 1 to 2% wetter than optimum moisture content.

5) Any utility trenches will need to be properly backfilled as detailed in 2,3 and 4 above.

6) All on site soils may be used. Any import soils should be approved by our firm.

7) Slope face shall be compacted to at least 90% of maximum compaction.

Subdrains

Subdrains shall be placed in all fill slopes to minimize the affects of pore pressure on the finished slopes. One drain shall be placed for every 10 feet of fill slope height.

Inspection

This is an important step to obtain quality construction and to obtain correct design. The following will need inspection by our firm.

* Foundations
* All earthwork
* Subgrade preparation for slabs on grade

Inspection, by our firm, is needed to assure that the soil conditions are consistent with this report and design assumptions. Inspection by local government agencies may also be needed.

BASIS OF REPORT

RIGHT OF USE

This report is intended exclusively for the use of the Agoura and Cornell Roads L.L.P. and the project designers.

METHODS

This report has been developed based on our understanding of the project details, field review, boring excavations, laboratory testing, engineering analyses, and experience with similar soil conditions with similar use and loads.

DEGREE OF PERFORMANCE

The work was performed using the methods and degree of care used by other soil engineering firms operating in this vicinity, for similar projects, in this time period. This firm is responsible only for our own negligent errors and negligent omissions. Any error or omission that results in an unexpected cost that normally would have been present, is not the responsibility of our firm. Nothing else is warranted, implied or expressed, as to the details presented in this report.

VALIDITY OF REPORT

Changes

This report is valid for this specific project as described in the text of the report and on the plot plan. Any change in project size, loads, location, grade or use would require a review of this report.

Inspection

The recommendations given in this report are based on the assumption that all necessary inspection work will be performed during the construction phase of the project. The initial soil engineering investigation is only a part of the work needed to obtain correct engineering design. The soil conditions are only anticipated in the initial report. The inspection work verifies the conditions are as expected and allow our firm the ability to modify the recommendations in the event that the soil conditions are different.

The presence of inspection will provide the owner with the ability to obtain advice as to soil related construction procedures and answer related questions as to the implementation of the recommendations provided in this report.

If another firm is used to perform the construction inspection of the soil related aspects, our professional liability and responsibility would be drastically reduced to the point that we would no longer be the soils engineer of record.

RESULTS OF TESTING

EXPANSION INDEX TEST

Sample Location:	Boring 2@0-1'
Soil type:	Silty Clay
Confining Pressure:	144 psf
Initial Moisture Content: (% of dry wt.)	18.5
Final Moisture Content: (% of dry wt.)	34.5
Dry Density:	85 pcf
Expansion Index:	95

TEST METHOD:
UNIFORM BUILDING CODE STANDARD 18-2
EXPANSION INDEX TEST

COMPACTION TEST

Sample Location:	Boring 2@0-1'
Soil type:	Silty Clay
Maximum Dry Density:	109 pcf
Optimum Moisture Content: (% of dry wt.)	16

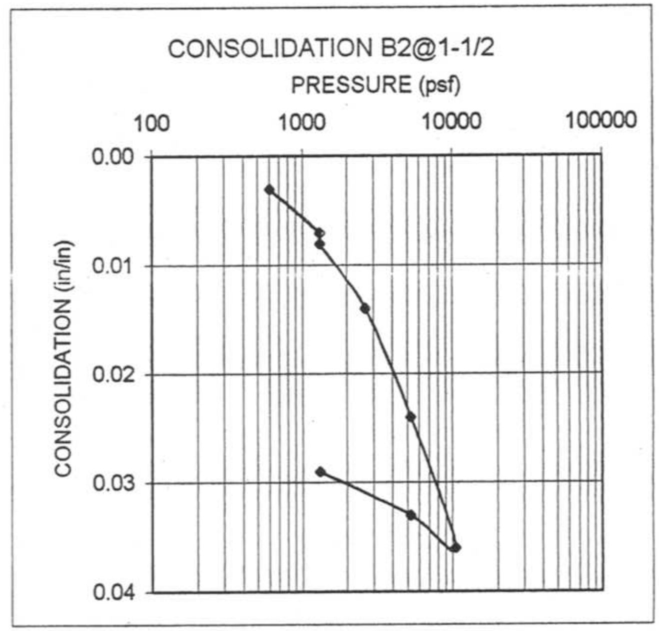
TEST METHOD:
LATEST ASTM VERSION
COMPACTION TEST

CONSOLIDATION

B2@1-1/2

Reading	Water?	Load (g)	Dial	Displacement (in.)	Pressure (psf)
1		0	0	0	0
2		590	3	0.003	600
3		1290	7	0.007	1313
4	yes	1290	8	0.008	1313
5	yes	2580	14	0.014	2625
6	yes	5160	24	0.024	5250
7	yes	10320	36	0.036	10501
8	yes	5160	33	0.033	5250
9	yes	1290	29	0.029	1313

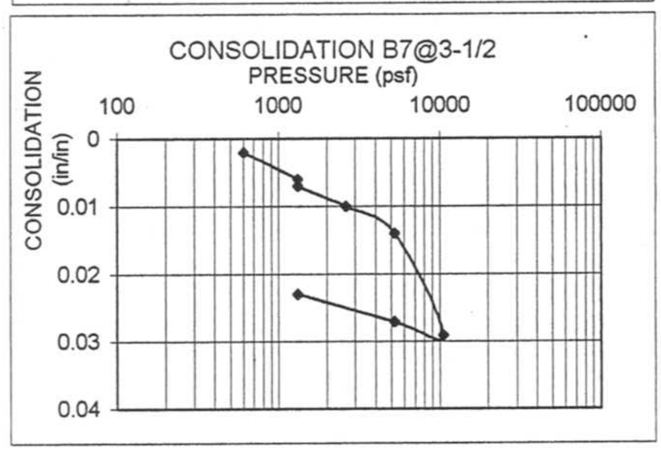
Pressure (psf	Consol (in/in)
600	0.00
1313	0.01
1313	0.01
2625	0.01
5250	0.02
10501	0.04
5250	0.03
1313	0.03



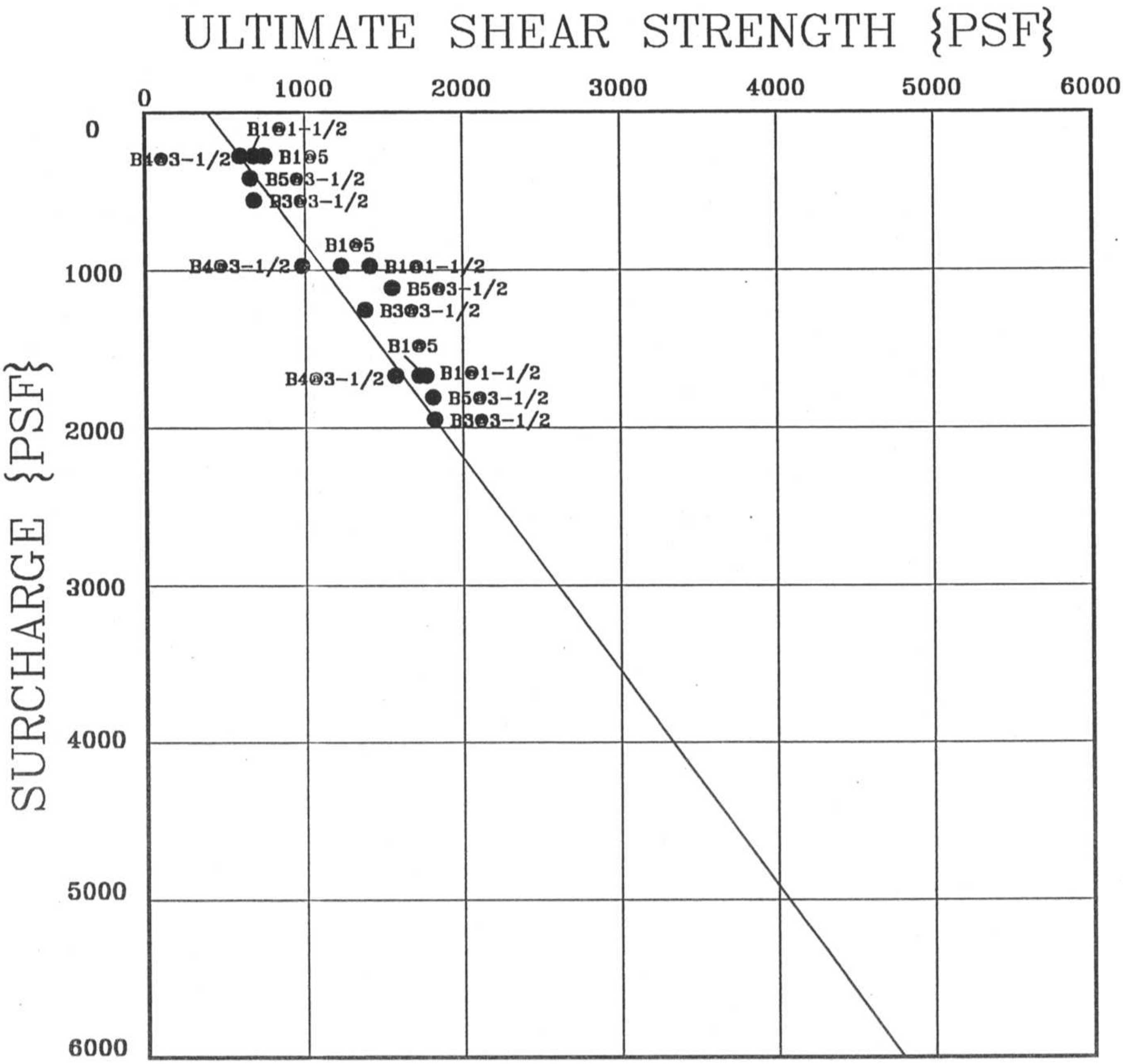
B7@3-1/2

Reading	Water?	Load (g)	Dial	Displacement (in.)	Pressure (psf)
1		0	0	0	0
2		590	2	0.002	600
3		1290	6	0.006	1313
4	yes	1290	7	0.007	1313
5	yes	2580	10	0.01	2625
6	yes	5160	14	0.014	5250
7	yes	10320	29	0.029	10501
8	yes	5160	27	0.027	5250
9	yes	1290	23	0.023	1313

Pressure (psf	Consol (in/in)
600	0.002
1313	0.006
1313	0.007
2625	0.01
5250	0.014
10501	0.029
5250	0.027
1313	0.023



DIRECT SHEAR TESTS

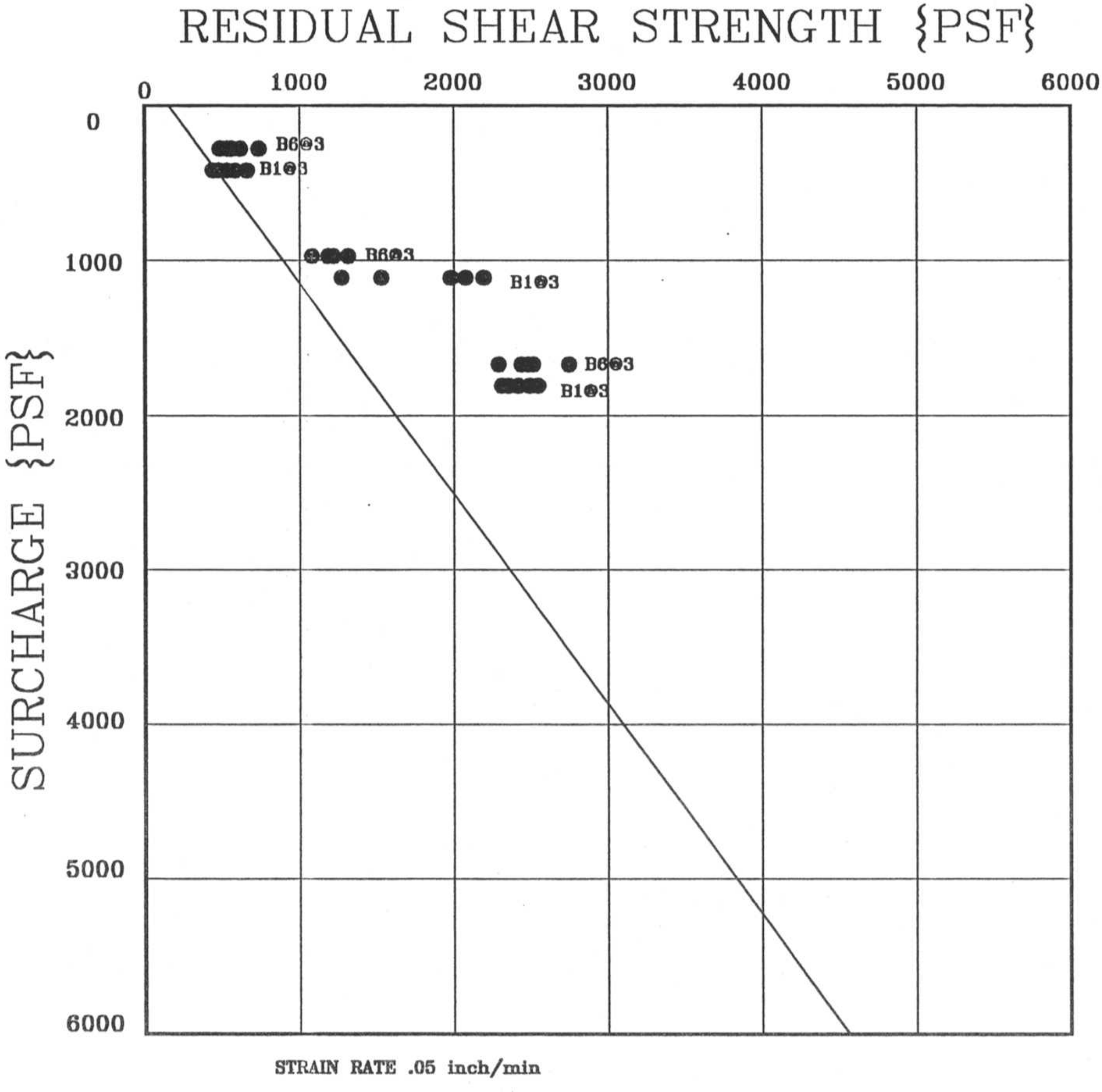


STRAIN RATE .05 inch/min

● ANALYZED NEAR SATURATION

BEDROCK AND SOIL

DIRECT SHEAR TESTS



ANALYZED NEAR SATURATION

BEDROCK AND SOIL

BORING 1

JOB: 04162

FIELD ENGINEER: FRED HEATHCOTE

DATES DRILLED: JUNE 18, 2004

DRILLING EQUIPMENT: BACKHOE

	MOISTURE CONTENT (% of dry weight)	DRY DENSITY (lbs. per cubic foot)	DRIVE ENERGY (kip-feet)	ELEVATION (feet)	DEPTH (feet)	SAMPLE LOCATION		
							CL	SILTY CLAY–dark brown,loose,some gravel,cobble
	12.8	105						VOLCANICS– brown,damp,firm
	11.2	106						
	10.6	108			5			

WATER NOT ENCOUNTERED

BORING 2

JOB: 04162

FIELD ENGINEER: FRED HEATHCOTE

DATES DRILLED: JUNE 18, 2004

DRILLING EQUIPMENT: BACKHOE

	MOISTURE CONTENT (% of dry weight)	DRY DENSITY (lbs. per cubic foot)	DRIVE ENERGY (kip-feet)	ELEVATION (feet)	DEPTH (feet)	SAMPLE LOCATION		
							CL	SILTY CLAY–dark brown,loose,some gravel,cobble
	17.6	99						VOLCANICS– brown,damp,firm
	13.8	104						
					5			

WATER NOT ENCOUNTERED

BORING 3

JOB: 04182

FIELD ENGINEER: FRED HEATHCOTE

DATES DRILLED: JUNE 16, 2004

DRILLING EQUIPMENT: BACKHOE

	MOISTURE CONTENT (% of dry weight)	DRY DENSITY (lbs. per cubic foot)	DRIVE ENERGY (kip-feet)	ELEVATION (feet)	DEPTH (feet)	SAMPLE LOCATION		
							CL	SILTY CLAY–dark brown,loose,some gravel,cobble
	13.3	103					GP	SANDY GRAVEL–brown,damp,some boulders and cobbles
	14.1	102						
					5			

WATER NOT ENCOUNTERED

BORING 4

JOB: 04182

FIELD ENGINEER: FRED HEATHCOTE

DATES DRILLED: JUNE 16, 2004

DRILLING EQUIPMENT: BACKHOE

	MOISTURE CONTENT (% of dry weight)	DRY DENSITY (lbs. per cubic foot)	DRIVE ENERGY (kip-feet)	ELEVATION (feet)	DEPTH (feet)	SAMPLE LOCATION		
							CL	SILTY CLAY–dark brown,loose,some gravel,cobble
	16.1	100					GP	SANDY GRAVEL–brown,damp,some boulders and cobbles
	9.6	111						
					5			

WATER NOT ENCOUNTERED

BORING 5

JOB: 04182
FIELD ENGINEER: FRED HEATHCOTE
DATES DRILLED: JUNE 18, 2004
DRILLING EQUIPMENT: BACKHOE

MOISTURE CONTENT (% of dry weight)	DRY DENSITY (lbs. per cubic foot)	DRIVE ENERGY (kip-feet)	ELEVATION (feet)	DEPTH (feet)	USCS	DESCRIPTION
					CL	SILTY CLAY–dark brown,loose,some gravel,cobble
13.3	96	6				
11.9	107	6			GP	SANDY GRAVEL–brown,damp,some boulders and cobbles
				5		

WATER NOT ENCOUNTERED

BORING 6

JOB: 04182
FIELD ENGINEER: FRED HEATHCOTE
DATES DRILLED: JUNE 18, 2004
DRILLING EQUIPMENT: BACKHOE

MOISTURE CONTENT (% of dry weight)	DRY DENSITY (lbs. per cubic foot)	DRIVE ENERGY (kip-feet)	ELEVATION (feet)	DEPTH (feet)	USCS	DESCRIPTION
					CL	SILTY CLAY–dark brown,loose,some gravel,cobble
15.8	92	6				
13.4	108	6				VOLCANICS– brown,damp,firm
				5		

WATER NOT ENCOUNTERED

BORING 7

JOB: 04162

FIELD ENGINEER: FRED HEATHCOTE

DATES DRILLED: JUNE 18, 2004

DRILLING EQUIPMENT: BACKHOE

	MOISTURE CONTENT (% of dry weight)	DRY DENSITY (lbs. per cubic foot)	DRIVE ENERGY (kip-feet)	ELEVATION (feet)	DEPTH (feet)	SAMPLE LOCATION			
	17.4	96						CL	SILTY CLAY–dark brown,loose,some gravel,cobble
	14.3	107			5				VOLCANICS– brown,damp,firm

WATER NOT ENCOUNTERED

Slope stability based on wedges using vector method							
SECTION	**1**	**2**	**3**	**4**	**5**	**6**	**7**
SLOPE ANGLE(deg)	55			0	0	0	0
COHESION(ksf)	200			0	0	0	0
PHI(deg)	36			0	0	0	0
UNIT WEIGHT(kcf)	120			0	0	0	0
LENGTH(ft)	31			0	0	0	0
AREA(sq ft)	219			0	0	0	0
DESIRED F.S.	1.5			0	0	0	1.5
WALL HEIGHT(ft)	25			25	25	25	25
friction angle(rad)	0.62832	0	0	0	0	0	0
friction angle(mobilized-ra	0.45106	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0
cohesion(Mobilized)	133.3333	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0
slope angle(rad)	0.959933	0	0	0	0	0	0
Weight(kp)	26280	0	0	0	0	0	0
tan(alpha-frictionmob)	0.55788	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0
Force(active)	10401.43	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0
Summation	10401.43	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Equivalent fluid pressure	33.28458	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

RANKINE PRESSURES	
ACTIVE PRESSURE	
Soil Friction Angle=	36
Cohesion =	200
Unit Weight=	120
Soil Inclination Angle=	0
Ka=	0.259616
Pressure at 0'	-203.81
Pressure at 10'	107.7292
Pressure at 20'	419.2687
Pressure at 30'	730.8081
Pressure at 114'	3347.739
COS(B7)=	1
COS(B4)=	0.809017
PASSIVE PRESSURE	
TAN(45+PHI/2)	1.962611
Kp=	3.85184
Pressure at 0'	785.0442
Pressure at 5'	3096.148
Pressure at 10'	5407.252
AT REST PRESSURE	
(1-SIN(friction angle))	0.412215
Pressure at 10'	494.6577

RANKINE PRESSURES	
ACTIVE PRESSURE	
Soil Friction Angle=	36
Cohesion =	200
Unit Weight=	120
Soil Inclination Angle=	27
Ka=	0.364807
Pressure at 0'	-241.597
Pressure at 10'	196.171
Pressure at 20'	633.9389
Pressure at 30'	1071.707
Pressure at 114'	4748.957
COS(B7)=	0.891007
COS(B4)=	0.809017
PASSIVE PRESSURE	
TAN(45+PHI/2)	1.962611
Kp=	3.85184
Pressure at 0'	785.0442
Pressure at 5'	3096.148
Pressure at 10'	5407.252
AT REST PRESSURE	
(1-SIN(friction angle))	0.412215
Pressure at 10'	494.6577

caltrans method

agoura cornell

For Traffic Indices up to 10 using normal aggregate base

R-value(soil)	**14**		
		gravel eq.(a.c.)	0.35
traffic index	**5**	gravel eq.(a.c.)+f.s.=.2	0.55
min. thickness(a.c.)	**2.6**	gravel factor(a.c.)	2.5
Thickness used(a.c.)	**3**	Gravel eq.(a.c. for thickness used)	0.63
Thickness used(a.b.)	**8.2**	gravel eq.(total)	1.376
		Gravel eq.(a.b.)	0.75

		gravel eq.(a.c.)	0.42
traffic index	**6**	gravel eq.(a.c.)+f.s.=.2	0.62
min. thickness(a.c.)	**3.2**	gravel factor(a.c.)	2.32
Thickness used(a.c.)	**4**	Gravel eq.(a.c. for thickness used)	0.77
Thickness used(a.b.)	**9.6**	gravel eq.(total)	1.6512
		Gravel eq.(a.b.)	0.88

		gravel eq.(a.c.)	0.49
traffic index	**7**	gravel eq.(a.c.)+f.s.=.2	0.69
min. thickness(a.c.)	**3.9**	gravel factor(a.c.)	2.14
Thickness used(a.c.)	**4**	Gravel eq.(a.c. for thickness used)	0.71
Thickness used(a.b.)	**13.2**	gravel eq.(total)	1.9264
		Gravel eq.(a.b.)	1.21

caltrans method

agoura cornell

For Traffic Indices up to 10 using normal aggregate base

R-value(soil)	**14**		
		gravel eq.(a.c.)	0.56
traffic index	**8**	gravel eq.(a.c.)+f.s.=.2	0.76
min. thickness(a.c.)	**4.6**	gravel factor(a.c.)	2.01
Thickness used(a.c.)	**5**	Gravel eq.(a.c. for thickness used)	0.84
Thickness used(a.b.)	**14.9**	gravel eq.(total)	2.2016
		Gravel eq.(a.b.)	1.36
		gravel eq.(a.c.)	0.63
traffic index	**9**	gravel eq.(a.c.)+f.s.=.2	0.83
min. thickness(a.c.)	**5.3**	gravel factor(a.c.)	1.89
Thickness used(a.c.)	**6**	Gravel eq.(a.c. for thickness used)	0.95
Thickness used(a.b.)	**16.7**	gravel eq.(total)	2.4768
		Gravel eq.(a.b.)	1.53
		gravel eq.(a.c.)	0.70
traffic index	**10**	gravel eq.(a.c.)+f.s.=.2	0.90
min. thickness(a.c.)	**6.1**	gravel factor(a.c.)	1.79
Thickness used(a.c.)	**7**	Gravel eq.(a.c. for thickness used)	1.04
Thickness used(a.b.)	**18.6**	gravel eq.(total)	2.752
		Gravel eq.(a.b.)	1.71

PROGRAM TERZAGHI - VERSION 2.1
BEARING CAPACITY -- TERZAGHI EQUATION
GENERAL SHEAR

Client: agoura cornell
Job No: 04182 By: fh Date: 10-01-04

Footing Type: CONTINUOUS

SOIL PROPERTIES

UNIT WEIGHT..... 120.0 P.C.F.
COHESION........ 400.0 P.S.F.
FRICTION ANGLE.. 36.0 DEGREES

BEARING CAPACITY FACTORS

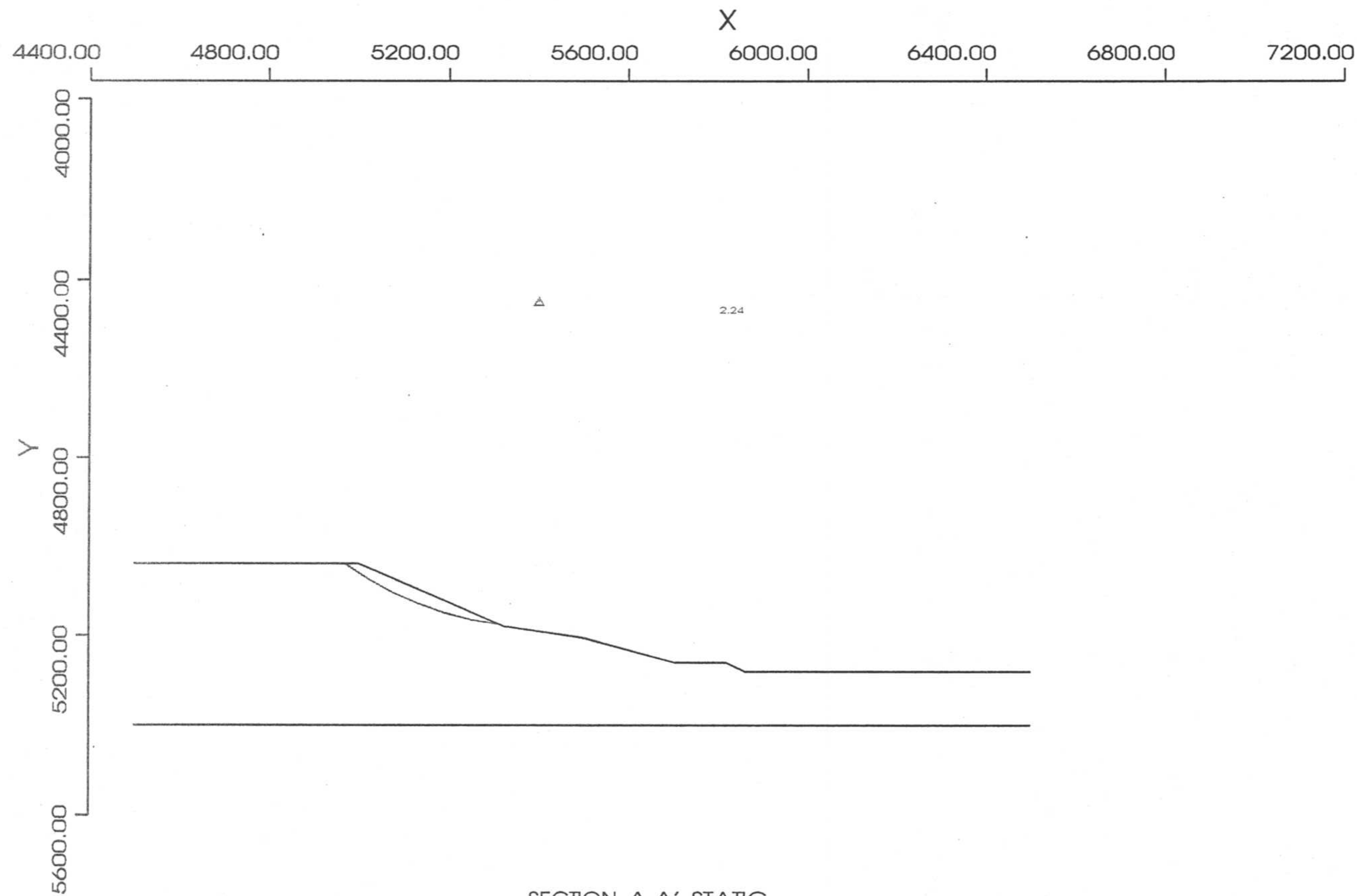
Nc........ 63.5
Nq........ 47.2
Ngamma.... 51.7
Kpg....... 93.8

ULTIMATE BEARING CAPACITY= 1.0 *COHESION *Nc +(UNIT WT)* DEPTH * Nq
+ .5 * (UNIT WT) * WIDTH * Ngamma

ULTIMATE BEARING CAPACITY= 25411. + 5659. * DEPTH + 3102. * WIDTH

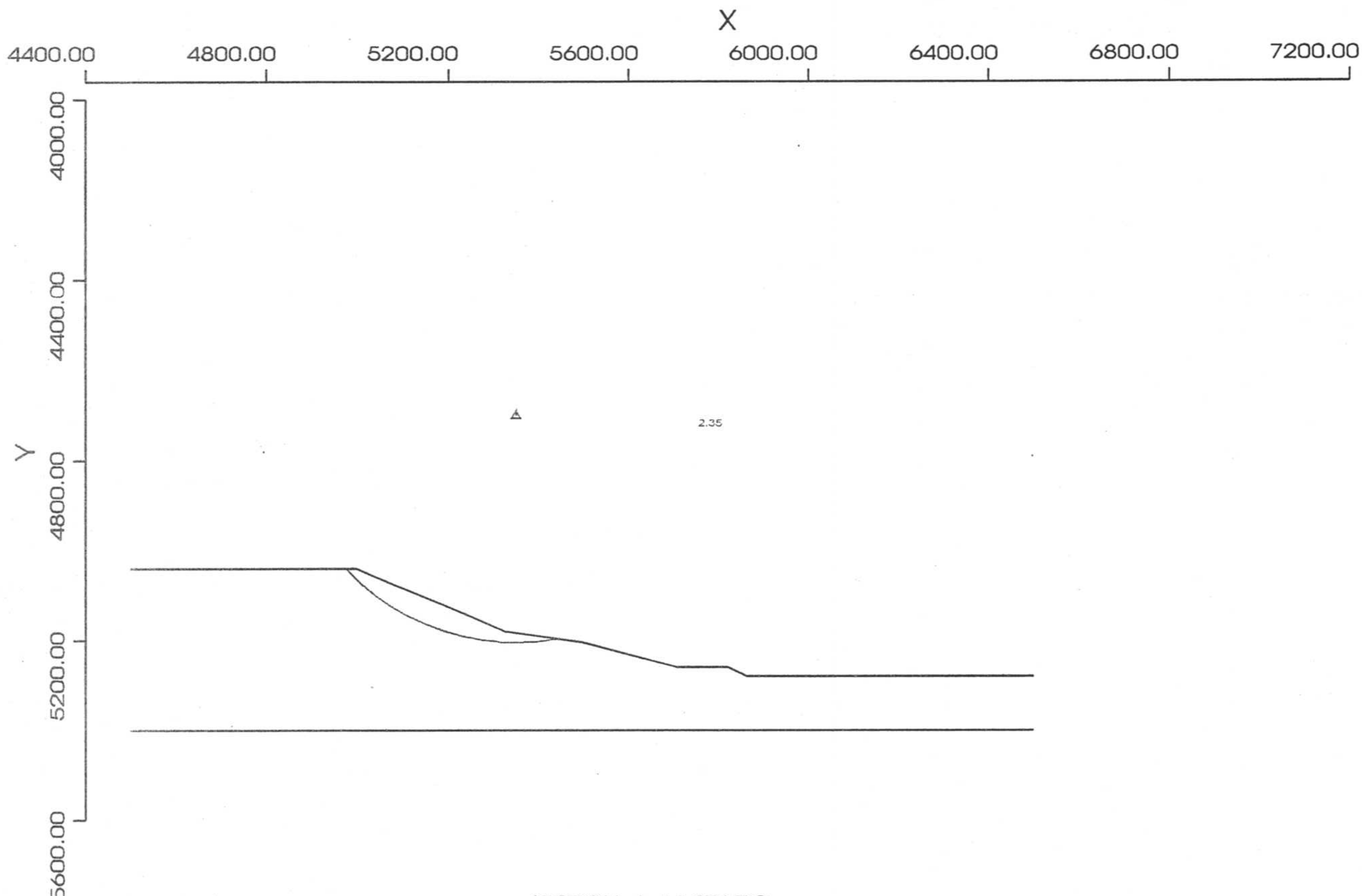
ALLOWABLE BEARING CAPACITY IN P.S.F.
FACTOR OF SAFETY = 3.0

DEPTH IN FEET	FOOTING WIDTH 1 FOOT	2 FEET	4 FEET	6 FEET	10 FEET
.0	9504.	10538.	12606.	14674.	18810.
2.0	13277.	14311.	16379.	18447.	22583.
4.0	17049.	18083.	20151.	22219.	26355.
6.0	20822.	21856.	23924.	25992.	30128.

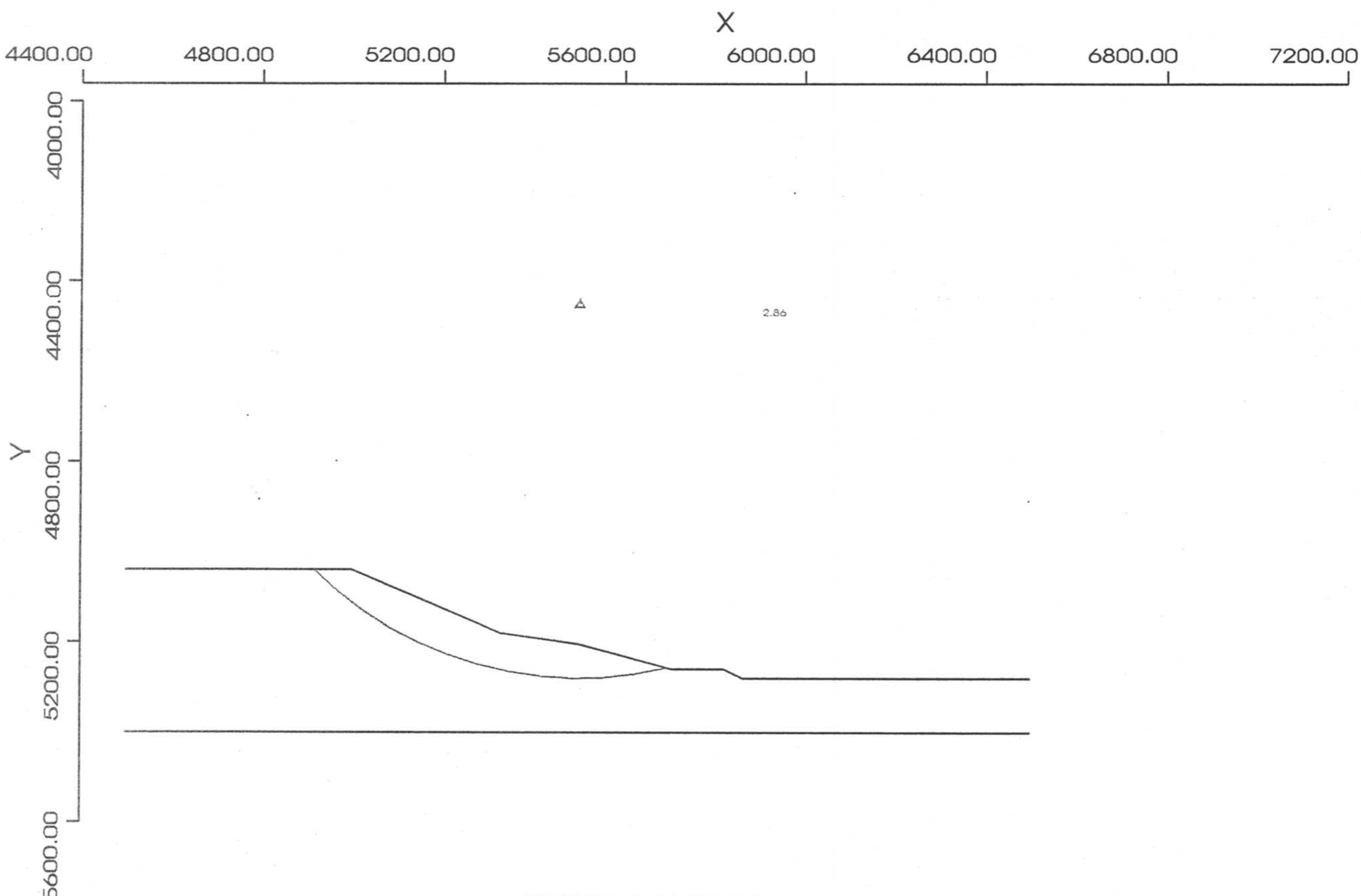


SECTION A-A′ STATIC
RESULTS

33



SECTION A-A′ STATIC
RESULTS



SECTION A-A′ STATIC
RESULTS

```
**************************************************************************
****
  SECTION A-A' STATIC

**************************************************************************
****
******************************************
  ANALYSIS BY BISHOP'S SIMPLIFIED METHOD
******************************************
**************
  INPUT DATA
**************
 CONTROL DATA,
      AUTOMATIC SEARCH FOR CRITICAL CIRCLE
      NUMBER OF DEPTH LIMITING TANGENTS                   3
      NUMBER OF VERTICAL SECTIONS                         8
      NUMBER OF SOIL LAYER BOUNDARIES                     2
      NUMBER OF POINTS DEFINING COHESION PROFILE          0
      NUMBER OF CURVES DEFINING COHESION ANISOTROPY       0
      NUMBER OF BOUNDARY LINE LOADS                       0
      NUMBER OF BOUNDARY PRESSURE LOADS                   0

      SEISMIC COEFFICIENT                        =        .000
      ATMOSPHERIC PRESSURE                       =        .000
      UNIT WEIGHT OF WATER                       =      62.400
      UNIT WEIGHT OF WATER IN TENSION CRACK =           62.400

 SEARCH STARTS AT CENTER (5300.0,4500.0),WITH FINAL GRID OF 50.0

 ALL CIRCLES TANGENT TO DEPTH,5180.0,5205.0,5280.0,

 GEOMETRY

     SECTIONS     4500.00  5000.00  5325.00  5500.00  5705.00  582
0.00
5865.00  6500.00

     T. CRACKS    5040.00  5040.00  5180.00  5205.00  5260.00  526
0.00
5280.00  5280.00
     W IN CRACK   5040.00  5040.00  5180.00  5205.00  5260.00  526
0.00
5280.00  5280.00
     BOUNDARY 1   5040.00  5040.00  5180.00  5205.00  5260.00  526
0.00
5280.00  5280.00
     BOUNDARY 2   5400.00  5400.00  5400.00  5400.00  5400.00  540
0.00
5400.00  5400.00

 SOIL PROPERTIES
```

LAYER	DENSITY	COHESION	FRICTION ANGLE	DELTA PHI
1	120.00	400.00	36.00	.00

****
RESULTS
****

****
DEPTH LIMITING TANGENT NO. 1 AT Y = 5180.00
****

NUMBER	TANGENT	RADIUS	(X) CENTER	(Y) CENTER	F.S.
1	5180.0	680.0	5300.0	4500.0	2.500
2	5180.0	680.0	5200.0	4500.0	3.210
3	5180.0	780.0	5300.0	4400.0	2.668
4	5180.0	680.0	5400.0	4500.0	2.253
5	5180.0	580.0	5300.0	4600.0	2.340
6	5180.0	780.0	5400.0	4400.0	2.265
7	5180.0	680.0	5500.0	4500.0	CIRCLE OUTSIDE SLOPE
8	5180.0	580.0	5400.0	4600.0	2.469
9	5180.0	680.0	5350.0	4500.0	2.279
10	5180.0	730.0	5400.0	4450.0	2.240
11	5180.0	680.0	5450.0	4500.0	3.812
12	5180.0	630.0	5400.0	4550.0	2.340
13	5180.0	730.0	5350.0	4450.0	2.343
14	5180.0	780.0	5400.0	4400.0	2.265
15	5180.0	730.0	5450.0	4450.0	2.972
16	5180.0	780.0	5350.0	4400.0	2.414
17	5180.0	780.0	5450.0	4400.0	2.619
18	5180.0	680.0	5450.0	4500.0	3.812
19	5180.0	680.0	5350.0	4500.0	2.279

F.S. MINIMUM= 2.240 FOR THE CIRCLE OF CENTER (5400.0,4450.0)

****
DEPTH LIMITING TANGENT NO. 2 AT Y = 5205.00
****

NUMBER	TANGENT	RADIUS	(X) CENTER	(Y) CENTER	F.S.
1	5205.0	755.0	5400.0	4450.0	2.434
2	5205.0	705.0	5250.0	4500.0	2.968
3	5205.0	805.0	5350.0	4400.0	2.630
4	5205.0	705.0	5450.0	4500.0	2.558
5	5205.0	605.0	5350.0	4600.0	2.392
6	5205.0	605.0	5300.0	4600.0	2.544
7	5205.0	655.0	5350.0	4550.0	2.442
8	5205.0	605.0	5400.0	4600.0	2.410

30	5280.0	780.0	5550.0	4500.0	2.973
31	5280.0	830.0	5450.0	4450.0	2.928
32	5280.0	880.0	5500.0	4400.0	2.871
33	5280.0	830.0	5550.0	4450.0	2.907
34	5280.0	880.0	5450.0	4400.0	2.956
35	5280.0	880.0	5550.0	4400.0	2.873
36	5280.0	780.0	5550.0	4500.0	2.973
37	5280.0	780.0	5450.0	4500.0	2.907

F.S. MINIMUM= 2.865 FOR THE CIRCLE OF CENTER (5500.0,4450.0)

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************************************************************************
****
  SECTION A-A' Seismic


************************************************************************
****
******************************************
  ANALYSIS BY BISHOP'S SIMPLIFIED METHOD
******************************************
**************
  INPUT DATA
**************

 CONTROL DATA,
      AUTOMATIC SEARCH FOR CRITICAL CIRCLE
      NUMBER OF DEPTH LIMITING TANGENTS                   3
      NUMBER OF VERTICAL SECTIONS                         8
      NUMBER OF SOIL LAYER BOUNDARIES                     2
      NUMBER OF POINTS DEFINING COHESION PROFILE          0
      NUMBER OF CURVES DEFINING COHESION ANISOTROPY       0
      NUMBER OF BOUNDARY LINE LOADS                       0
      NUMBER OF BOUNDARY PRESSURE LOADS                   0

      SEISMIC COEFFICIENT                      =        .200
      ATMOSPHERIC PRESSURE                     =        .000
      UNIT WEIGHT OF WATER                     =      62.400
      UNIT WEIGHT OF WATER IN TENSION CRACK =         62.400

 SEARCH STARTS AT CENTER (5300.0,4500.0),WITH FINAL GRID OF 50.0

 ALL CIRCLES TANGENT TO DEPTH,5180.0,5205.0,5280.0,

 GEOMETRY

     SECTIONS     4500.00  5000.00  5325.00  5500.00  5705.00  582
0.00
5865.00  6500.00

     T. CRACKS    5040.00  5040.00  5180.00  5205.00  5260.00  526
0.00
5280.00  5280.00
     W IN CRACK   5040.00  5040.00  5180.00  5205.00  5260.00  526
0.00
5280.00  5280.00
     BOUNDARY 1   5040.00  5040.00  5180.00  5205.00  5260.00  526
0.00
5280.00  5280.00
     BOUNDARY 2   5400.00  5400.00  5400.00  5400.00  5400.00  540
0.00
5400.00  5400.00
```

GORIAN & ASSOCIATES, INC.

Applied Earth Sciences
Geotechnical
Engineers
and Geologists

766 Lakefield Road, Suite A
Westlake Village
California 91361
805 497-9363
818 889-2137
FAX 805 373-6938

August 28, 2001

EF Moore & Company
428 Bryant Circle, Suite 225
Ojai, California 93023

Work Order: 1770-1-0-10
Log Number: 21285

Attention: Mr. Ted Moore, President

Subject: **SHALLOW SEISMIC REFRACTION TRAVERSE SURVEYS FOR EVALUATION OF THE ROCK HARDNESS, PROPOSED MULTI-USE DEVELOPMENT, SOUTHEAST CORNER OF KANAN AND AGOURA ROADS, AGOURA HILLS, CALIFORNIA.**

Mr. Moore:

Herein is a summary of the shallow seismic refraction traverse surveys performed to evaluate the hardness of the rock on the subject site. The traverses were located in suspected areas of hard rock that may need to be excavated to achieve conceptual design grades for building areas as shown on a *Preliminary Site Plan* – Scheme 'C', prepared by Architects Leidenfrost/Horowitz & Associates (dated 30 July 2001).

Six shallow seismic refraction traverse surveys were performed to provide data for the evaluation of rock hardness and rippability. Both forward and reverse profiles were performed. The locations of our traverses are shown on the attached map.

The excavation characteristics of rock material are a function of lithology, seismic velocity, geologic structure, ripping equipment capacity, and equipment operation. Shallow seismic refraction survey traverses can provide data to compute compressional wave velocities (p-wave) traveling through the underlying earth materials. These velocities can be roughly correlated with the rippability of these materials by conventional grading equipment. These correlations are not precise but rather, are intended to represent a generalized means of indicating relative excavation characteristics.

The results of our (two-direction) shallow seismic refraction traverse surveys are presented in Table 1. Comments regarding rock rippability reflect usage of Caterpillar D9R bulldozer or equivalent, and are based on local experience and on rippability curves published by Caterpillar, Inc. (1995).

TABLE I

TRAVERSE NUMBER	LAYER	DEPTH (ft)	VELOCITY (ft/sec)	RIPPABILITY COMMENTS(1)
ST-1_{G1}	1	0-2	1471	Easy Ripping
	2	2-7	4082	Moderate Ripping
	3	>7	6087	Probable Blasting
ST-1_{G2}	1	0-2	2326	Easy Ripping
	2	2-10½	4167	Moderate Ripping
	3	>10½	7613	Blasting
ST-1_{AVE}	1	0-2	1899	Easy Ripping
	2	2-9	4125	Moderate Ripping
	3	>9	6850	Probable Blasting
ST-2_{G1}	1	0-3½	1220	Easy Ripping
	2	3½ -14	2778	Easy Ripping
	3	>14	11,864	Blasting
ST-2_{G2}	1	0-3	1667	Easy Ripping
	2	3–13	3175	Moderate Ripping
	3	>13	8642	Blasting
ST-2_{AVE}	1	0-3	1444	Easy Ripping
	2	3-14	2977	Moderate Ripping
	3	>14	10,253	Blasting
ST-3_{G1}	1	0-12	1426	Easy Ripping
	2	12-29	6977	Probable Blasting
	3	>29	17,391	Blasting
ST-3_{G2}	1	0-9½	1470	Easy Ripping
	2	9½-20	6667	Probable Blasting
	3	>20	7500*	Assume Blasting
ST-3_{AVE}	1	0-10½	1448	Easy Ripping
	2	10½-30	6822	Probable Blasting
	3	>30	12,446	Blasting
ST-4_{G1}	1	0-9	1666	Easy Ripping
	2	9-24	4778	Medium to Heavy Ripping
	3	>24	8511	Blasting
ST-4_{G2}	1	0-7	1875	Easy Ripping
	2	7-28	3297	Medium Ripping
	3	>28	11,429	Blasting
ST-4_{AVE}	1	0-6	2708	Easy Ripping
	2	6-25	4038	Moderate Ripping
	3	>25	9970	Blasting
ST-5_{G1}	1	0-5½	1408	Easy Ripping
	2	5½-27	2645	Easy Ripping
	3	>27	6122	Difficult Ripping
ST-5_{G2}	1	0-4½	1333	Easy Ripping
	2	4½-17	2020	Easy Ripping
	3	>17	4959	Heavy Ripping
ST-5_{AVE}	1	0-5	1370	Easy Ripping
	2	5-22	2333	Easy Ripping
	3	>22	5541	Heavy Ripping
ST-6_{G1}	1	0-2	1923	Easy Ripping
	2	2-24	10,106	Blasting
ST-6_{G2}	1	0-25	6757	Probable Blasting
	2	>25	14,285	Blasting
ST-6_{AVE}	1	0-15	4340	Moderate Ripping
	2	>15	12,195	Blasting Indicated

*7500 ft/sec assumed velocity used to back-calculate minimum depth of rippable material.

The seismic traverses indicate that the surficial soil will be easily processed at depths ranging from 2 to 6 feet in all the areas explored except for the hilltop vicinity of ST-6. Below that, the volcanic bedrock is weathered and has an average velocity of approximately 4200 feet/second. The weathered rocks appear to be rippable, but the excavations may be difficult as the geophysical data and previous outcrop mapping suggests that the weathered bedrock is not uniform, but rather has local areas of very hard rock. Furthermore, the data indicates that the bedrock is very hard at depths below 9 to 14 feet in the areas of ST-1 through ST-3 and is very hard near surface (<2 feet) at the hilltop location of ST-6. Excavations below these depths in those areas will be very difficult or impractical to complete with conventional grading equipment and blasting would be necessary. The data from ST-4 and ST-5 indicates that the bedrock in those areas is weathered and rippable to depths of at least 22 to 25 feet.

Excavations in the volcanic bedrock can be expected to produce rock too large for placement in engineered compacted fill and special handling should be anticipated. The special handling may include on- or off-site rock disposal. It should also be noted that although bedrock may be rippable from a mass grading production standpoint, conventional equipment used for trench excavations for utility line construction typically have a lower velocity limit (approximately 4000 ft/sec). Overexcavation of utility corridors during the rough grading operations may be considered to facilitate utility line construction.

As a matter of completeness, we quote on the following page from the Caterpillar Performance Handbook, edition 26, pg.1-73:

"*Use of Seismic Velocity Charts*

The charts of ripper performance estimated by seismic wave velocities have been developed from field tests conducted in a variety of materials. Considering the extreme variations among materials and even among rocks of a specific classification, the charts must be recognized as being at best only one indicator of rippability.

Accordingly, consider the following precautions when evaluating the feasibility of ripping a given formation:

-- *Tooth penetration is often the key to ripping success, regardless of seismic velocity. This is particularly true in homogeneous materials such as mudstone and claystone and the fine-grained caliches. It is also true in tightly cemented formations such as conglomerate, some glacial tills and caliches containing rock fragments.*

-- *Low seismic velocities of sedimentaries can indicate probable rippability. However, if the fractures and bedding joints do not allow tooth penetration, the material may not be ripped effectively.*

-- *Pre-blasting or "popping" may induce sufficient fracturing to permit tooth entry, particularly in the caliches, conglomerates and some other rock; but the economics should be checked carefully when considering popping in the higher grades of sandstones, limestones and granites.*

Ripping is still more art than science, and much will depend on the skill and experience of the tractor operator. Ripping for scraper loading may call for different techniques than if the same material is to be dozed away. If cross-ripping is called for, it, too, requires a change in approach.

The number of shanks used, length and depth of shank and tooth angle, direction, throttle position--all must be adjusted according to field conditions encountered. Ripping success may well depend on the operator finding the proper combination for those conditions."

Respectfully submitted,

GORIAN AND ASSOCIATES, INC.

by: William F. Cavan, Jr., EG 1161
Principal Engineering Geologist

Attachments: Geotechnical Map

Distribution: Addressee (4)

GORIAN & ASSOCIATES, INC
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GORIAN AND ASSOCIATES, Inc.
Soil and Foundation Engineers
Applied Earth Sciences

April 5, 1990

Work Order: 1770-1-10
Log Number: 14256

Subject: Feasibility Level Geotechnical Site Investigation, Vesting Tentative Parcel Map No. 21730, City of Agoura Hills, California.

Gentlemen:

We are pleased to present the results of our feasibility level geotechnical site investigation of Vesting Tentative Parcel Map No. 21730, City of Agoura Hills. We understand that the subject property is proposed to be split into 4 parcels and subsequently each parcel will be sold separately. No development plans are presently being considered. A topographic map showing the property and proposed parcel split has been prepared by HMK Engineering Inc. (W.O. 89-247, 1"=60', 11/2/89), which serves as the base for the attached Geotechnical Map (Plate 1).

Geologic and geotechnical engineering concerns developed from our feasibility study include: 1) hard rock conditions, 2) potential

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rock fall hazard, 3) fill soils derived from hard rock expected to have low cohesion, 4) expansive topsoil, 5) extensive areas with thick cover of non-engineered fills, and 6) flood protection for lowland areas.

SCOPE OF SERVICES

Our investigation was performed in accordance with generally accepted geotechnical engineering practices in the area and was conducted under the direction of a State licensed geotechnical engineer and certified engineering geologist. Our investigation included the following:

1) **Archival Review**
Pertinent geologic and geotechnical literature in our files was reviewed.

2) **Geologic Mapping**
Reconnaissance geologic mapping of the subject site was performed.

3) **Exploratory Trenches**
Thirteen trenches were excavated by backhoe to depths ranging from 2½ to 11 feet to explore subsurface conditions. Each trench was logged by an engineering geologist (trench logs are attached). After logging, each trench was backfilled and partially compacted by wheel-rolling with the backhoe. Although compacted to a degree, the backfill may settle and it is the responsibility of the owner or representatives to periodically check the trench locations and fill depressions as necessary.

4) **Analyses**
Information gained from the above tasks was evaluated with respect to potential commercial and residential development of the property. The seismic setting of the site was reviewed and ground shaking site parameters were projected.

7) **Report Preparation**
The results of our investigation are presented in the following report.

SITE LOCATION AND DESCRIPTION

The 18½ acre subject property is located south of US 101 (Ventura Freeway) in the Malibu Junction area of the City of Agoura Hills, western Los Angeles County. Situated within Rancho Las Virgenes, the irregularly shaped property is bound on the north by Agoura Road, on the west by Kanan Road, on the south by Sideway Road (Cornell Way) and partially on the east by Cornell Road. Physiographically, the property is situated near the confluence of Lindero Canyon Creek and Medea Creek in the vicinity of Ladyface within the west-central Santa Monica Mountains.

For descriptive purposes, the property can be divided into an upland area dominated by a low hill and a lowland area consisting of the Medea Creek flood plain. The low hill is a hogback with a relatively gentle north slope [>4(h):1(v)] and steeper south slope [<4(h):1(v)]. The hogback is the result of a north dipping resistant unit. The east slope of this hill is relatively gentle, but the western slope has been attenuated by a steep cut for Kanan Road. The south area of this hill has been substantially altered by grading. Medea Creek meanders in the vicinity of the property and its relatively level flood plain on-site represents a point bar.

The property is currently occupied by a modular building housing the Chamber of Commerce. An asphalt parking area and brick porch are associated with this structure that is located in the northwestern part of the property. An asphalt paved parking lot and concrete foundations remain from the Charter Pacific Bank which previously occupied the southeastern corner of Kanan and Agoura Roads. A wood platform (deck) is present in the eastern part of the site; its purpose is uncertain. The site was used previously as a parking area for the Renaissance Fair, as well as a staging area and fill disposal area for the construction of Kanan Road. Illicit dumping has occurred locally within the property, particularly adjacent to Cornell Road. Trash and debris are scattered across the site.

An area along the eastern part of the site apparently has been encroached. The area of encroachment is bound by a chain-link fence. This area was not investigated as a part of this study, but could be observed to be used as a nursery and stock yard at about natural grade.

Natural or naturalized vegetation cover most of the site. Annual forbs and grasses, punctuated by valley oaks are typical in gently sloping to relatively level areas of the site. Characteristic coastal sage scrub plants are sparsely present on steeper slopes. Riparian vegetation is present along Medea Creek. Ornamental vegetation is present adjacent to structures in the northwestern part of the site and in previously graded areas in the southern part of the property.

GEOLOGIC SETTING

Bedrock underlying the parcel consists of volcanic and volcaniclastic rocks of Miocene age. Surficial deposits mantle bedrock over much of the site and include older alluvium, colluvium, alluvium, topsoil and artificial fill. Interpreted areal distribution and spatial relationships of shallow bedrock units and surficial deposits, exclusive of topsoil, are depicted on the attached Geotechnical Map (Plate 1) and Structural Cross Sections (Plate 2). Abbreviations used on the Geotechnical Map and Structural Cross Sections are cited below along with the description of units.

Bedrock

Bedrock underlying the site is assignable to the Conejo Volcanics (Tcv), a wide spread formation in the region. Within the property, the Conejo Volcanics consist of intercalated units of agglomerate (Tcva) and basalt (Tcvb). The agglomerate units (Tcva) are well exposed, particularly on the Kanan Road cut. Overall color of this unit is grey to tan, but orange-brown to reddish varnish is common on natural exposures. This unit consist chiefly of very thick units of agglomerate with thin to very thick interbeds of volcaniclastic sandstone. The agglomerate is indurated and poorly to moderately sorted. Clasts are matrix to self-supported, subangular to subrounded, gravel to boulder-size and are heterolithic (although andesite is most common).

Units of basalt consist predominantly of brown, reddish brown to dark grey, moderately indurated, vesicular basalt. This unit is only exposed in road cuts and is generally fractured and highly weathered near the surface.

Surficial Deposits

Bedrock is mantled over much of the site by surficial deposits which include Older Alluvium (Qoa), Colluvium (Qc), Alluvium (Qal), topsoil (not shown on map) and artificial fill (af).

Older Alluvium (Qoa)

Remnant deposits of well consolidated alluvial soils are present in the northwestern portion of the site. This unit is exposed along Kanan Road and was encountered in exploratory trench 6 and 7. It consists of tan to brown very sandy clay, clayey gravel and sand with gravel. Clasts include shale, quartzite and various volcanic types. Stratification is crude, but a subhorizontal attitude is suggested. This deposit was referred as a terrace deposit by Weber (1984).

Colluvium (Qc)

Unconsolidated slope wash is interpreted to be present in local areas of the site along the toe of slopes, particularly where drainage is concentrated. The colluvium can be expected to be sandy clay with gravel.

Alluvium (Qal)

Unconsolidated alluvial sediments are present in the bed and flood plain of Medea Creek. Predominant sediments noted in the active stream channel include silt, sand and gravel. The flood plain of Medea Creek is underlain by very sandy clay (that appears to represent an immature soil), silt and sand. Soils in the flood plain area are porous to very porous.

Topsoil

Topsoil is present over much of the site, but is generally less than two or three feet thick where underlain by bedrock. Topsoil mantling volcanic rocks typically is composed of sandy silty clay with scattered gravel. These soils are anticipated to be highly expansive.

Artificial Fill (af)

Excavated soils have been placed on-site apparently associated with the construction of Kanan Road, Cornell Road and local on-site grading. The fill encountered in trenches 10, 11, 12, and 13, located in the south part of the property, consisted of much rock with little soil. The fill did not appear properly placed and included over-sized rock (>12" maximum dimension) and occasional unsuitable rock (>36" maximum dimension).

GROUNDWATER

Flowing water was present in Medea Creek at the time of the field investigation. Groundwater was not encountered in the subsurface exploratory trenches, however the water table can be expected to be near the elevation of Medea Creek. Evidence of seeps or springs above Medea Creek was not observed during our field investigation.

FAULTING AND SEISMICITY

Active or potentially active faults identified by the State Geologist (Hart, 1988) are not present in the vicinity of the subject property. Two faults are exposed on the Kanan Road cut, and additional concealed faults are likely to be present within the property, however they all are considered inactive. We regard the possibility of ground rupture within the subject site due to fault rupture within the next 50 to 100 years to be extremely remote.

The property is situated in the Transverse Ranges Geomorphic Province, which is a seismically active area. This site, like any other in the area, can be expected to experience strong ground motion from earthquakes generated on regional faults. Table 1 presents a list of active and potentially active faults in the region and their projected on-site groundshaking capabilities. While many of these faults are listed for completeness, the constraining events are those considered most probable, of greatest projected magnitude and occurring closest to the site.

The most likely source of intense ground motion on-site is a seismic event on the southern segment of the San Andreas fault zone, located about 42 miles to the northeast. An earthquake with a magnitude of 8.1+ is considered imminent and is projected to produce maximum credible rock acceleration (mcra) on-site of .17 the acceleration of gravity (g). Maximum repeatable ground accelerations (mrga) on-site generated by such an event are expected to range from .10 to .15 g.

TABLE 1

List of major active and potentially active (*) faults in the region of the site. Abbreviations: approximate distance (d in miles) of fault from site, predicted magnitude (m) fault is capable of generating[1], maximum credible rock accelerations (mcra)[2], maximum repeatable ground accelerations (mrga)[3].

Fault	d	m	mcra	mrga
Malibu Coast	7	6.6	.40g	.20-.25g
Simi-Santa Rosa*	10	6.6	.31g	.15-.20g
Santa Susana	15	6.6	.23g	.10-.15g
Oak Ridge*	17	6.7	.21g	.10-.15g
San Cayetano	18	6.7	.20g	.10-.15g
San Fernando	20	6.4	.15g	.05-.10g
San Gabriel*	23	6.7	.15g	.05-.10g
Newport-Inglewood	23	6.7	.15g	.05-.10g
San Andreas (south segment)	41	8.1	.17g	.10-.15g

1) after Evernden and Thomson, 1985
2) from Greensfelder, 1974; after Schnabel and Seed, 1973
3) modified from Ploessel and Slosson, 1974

Less likely, but potentially more severe groundshaking may be generated on the Malibu Coast fault, located about 7 miles south of the parcel.

This fault is predicted to be capable of generating a 6.6 magnitude earthquake and produce on-site mcra of .40 and mrga ranging from .20 to .25 g.

ROCKFALL

Large boulders have or are locally eroding from the agglomerates of the Conejo Volcanics (Tcva). Where perched on slopes at the surface, these boulders may become dislodged and roll down slope.

ROCK HARDNESS

In general, the Conejo Volcanics is one of the most stable formations in western Los Angeles County. The indurated nature of these rocks, however, often presents problems in excavation. Based on surface exposure, we anticipate that the shallow cuts in the agglomerate and deep cuts in the basalt will be difficult to excavate with conventional grading equipment. Blasting may be necessary to perform excavations greater than several feet deep. In addition, excavations in these hard rocks may result in the production of large rock unsuitable for use in engineered fill.

CONCLUSIONS AND RECOMMENDATIONS

1. General

From a feasibility standpoint, the subject property is considered geotechnically suitable for the development of either commercial or residential use, provided that potential geologic hazards are mitigated or avoided, and that specific geotechnical investigations will be conducted prior to finalizing development plans. Although specific grading and foundation recommendations are beyond the scope of this investigation, geotechnical concerns developed as a result of this investigation are presented below.

2. **Slope Stability**

Cut slopes constructed at 1½(h):1(v) or shallower gradient in the Conejo Volcanics are not anticipated to encounter adverse bedding conditions. North or northwest facing slopes constructed at inclinations steeper than 1½(h):1(v) may expose adverse bedding and require stabilization or buttressing. Slope stabilization may be required if any combination of intersecting joints, beds or faults plunge adversely to the slope face. Cut slopes steeper than a 2(h):1(v) inclination that expose loose or very fractured rock subject to ravelling may require stabilization. Fill slopes should be designed at 2(h):1(v), or less steep.

3. **Rockfall Hazard**

Evidence for rockfall or rock ravel is locally present. This hazard could be mitigated by simply removing loose cobbles and boulders from slopes.

4. **Hard Rock**

Due to the terrain of the property, development here is anticipated to require grading to construct building pads. Excavations may encounter hard rock at the surface or at depth. The agglomerate units of the Conejo Volcanics exposed on-site are resistant and very indurated. The basalt units of this formation within the property are apparently susceptible to chemical degradation and are poorly exposed. These units, however, may be very indurated at depth below the zone of weathering. Whether indurated at the surface or at depth, excavation with conventional grading equipment may be slow and difficult. Blasting may be necessary to perform excavations at production rates in certain areas from the surface down or in other areas to complete deep cuts. At the proper stage of design, shallow seismic refraction survey traverses can be performed to evaluate rock "rippability" in specific areas.

5. **Groundwater**

Groundwater is not expected to be a concern in the upland portions of the site. In the lowland portion of the property, groundwater can be expected to be encountered at or near the elevation of Medea Creek.

6. **Engineered Fill**

Excavations in hard rock or in rocky surficial deposits can be expected to produce "oversized" rock (i.e., rock greater than 12 inches in maximum dimension). Rock greater than 36 inches in maximum dimension is unsuitable to be placed in any engineered fill. Oversize rock less than 36 inches in maximum dimension may be placed within suitable rock disposal areas. Specific rock disposal areas can be evaluated when development plans become available.

If blasting is necessary to perform excavations, a program should be designed to minimize the size of rock fragments generated. This could produce more suitable fill soils and reduce the production of oversize rock.

Fill soils placed within 10 feet of finished slope faces should have enough clay to develop at least 250 pounds per square foot cohesive shear strength. This is a minimum strength requirement based on standard practice to provide for surficial slope stability. Soils generated from excavations within the Conejo Volcanics are expected to be marginal with respect to this standard.

7. **Artificial Fill**

Non-engineered artificial fill has been placed on-site. Fills in the northwest corner and south part of the site are thick and extensive. Other fills on-site are superficial and of little concern. Non-engineered artificial fill must be removed in areas to receive engineered fill or in areas where structural support is required.

8. **Flood Protection**

Development in the area of the flood plain will require protecting the area from erosion and inundation. Protection measures should be designed by a civil engineer and integrated into the development plans.

9. **Alluvial Soils**

The alluvium encountered in trench 8 and 9 is porous to very porous suggesting that removals will be necessary to develop this area.

10. **Recommended Design Level Geotechnical Investigation**

Discussions and preliminary recommendations presented in this report are based on a field reconnaissance, a review of available reference literature and limited subsurface exploration program. We recommend that a detailed geotechnical investigation be performed to provide design level recommendations for site development and foundation support when specific development plans are available.

The detailed study should include drilling borings, performing shallow seismic refraction survey traverses, a program of laboratory testing and engineering analyses.

- 0 -

If you have any questions concerning the discussions and preliminary recommendations contained in this report, please do not hesitate to contact us.

Respectfully submitted,

Gorian and Associates, Inc.

James P. Quinn RG 4610	William F. Cavan, Jr. EG 1161	Rudy M. Pacal GE 660
REGISTERED GEOLOGIST JAMES PATRICK QUINN No. R.G. 4610 Exp. 3-3-91 STATE OF CALIFORNIA	REGISTERED GEOLOGIST WILLIAM F. CAVAN, JR. No. EG 1161 CERTIFIED ENGINEERING GEOLOGIST EXP. 6/30/90 STATE OF CALIFORNIA	REGISTERED PROFESSIONAL ENGINEER RUDY M. PACAL No. 660 Exp. 9-30-93 TECHNICAL STATE OF CALIFORNIA

JQ/WFC/RMP/jq/bh

List of Attachments:

References
Figures 1-7 Backhoe Trench Logs
Plate 1. Geotechnical Map (in pocket)
Plate 2. Structural Cross Sections (in pocket)

Distribution: Addressee (2)
HMK Engineering Inc. (5)

Creekside

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TRANSMITTAL

TO: City of Agoura Hills
30101 Agoura Court, Suite 102
Agoura Hills, CA 91301

DATE: November 27, 1996

Attn: Dave Anderson
Elroy Kiepke
Mike Kamino

SUBJECT: Creekside Center

WE ARE SENDING YOU THE FOLLOWING ITEMS: HEREIN (X)
SEPARATELY ( )

NO. COPIES	DESCRIPTION
1	Geotechnical Engineering, Design Civil Engineering and Planning Concerns Pertaining to Grading Plan and Responses to Geological and Geotechnical Review Sheets, Creekside Center, City of Agoura Hills
1	Engineering Geology Review of Grading Plan Review and Responses to Geological and Geotechnical Review Sheets, Creekside Center, City of Agoura Hills

COPIES TO: Bing Yen and Associates
Steve Bailey, Building and Safety

BY: Cindy Granieri

TITLE: Secretary

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November 26, 1996
S&A #921026

TO: City of Agoura Hills
30101 Agoura Court, Suite 102
Agoura Hills, California 91301

Attention: Dave Anderson
Elroy Kiepke
Mike Kamino

Send this one out, but not the other.

SUBJECT: Engineering Geology Review of Grading Plan Review and Responses to Geological and Geotechnical Review Sheets, Creekside Center, City of Agoura Hills

This office has received the following documents from the City which pertain to the subject site:

- "Grading Plan Review and Responses to Geological and Geotechnical Review Sheets, Creekside Center, City of Agoura Hills, California," prepared by Pacific Soils Engineering, Inc., dated October 16, 1996, Volumes I and II

- "Preliminary Grading/Drainage Plan, Creekside Center, Agoura Hills," prepared by Westland Civil, Inc., updated November 14, 1996, scale 1" = 40'

- Cross Sections A-A' through H-H', prepared by Westland Civil, Inc., updated November 12, 1996, scale 1" = 10'

- "Stage Grading and Drainage Plan for Creekside Center - Agoura Hills, California," prepared by Westland Civil, Inc., dated November 1, 1996, 5 sheets

At the request of the City, this office has completed a review of the above-referenced documents. Comments contained herein are based upon review of all pertinent documents submitted by the Consultant(s) to date. The comments in this document pertain only to specific engineering geology concerns. In addition to this review document, please refer to the Addendum letter dated November 26, 1996, for additional concerns which pertain specifically to geotechnical engineering, civil engineering and planning issues which this office feels should be considered by the City's geotechnical engineer and the City engineer. This office remains of the opinion that additional data should be provided and specific concerns should be addressed prior to issuance and/or approval of a grading permit.

1. The bedrock outcrops and the bedrock units exposed during subsurface exploration at the Creekside development are divided by the Consultant into two facies of the Conejo Volcanics. The first unit (Tcvab) is described as "*matrix supported breccias and conglomerates which consist of weakly stratified silty (tuffaceous?) sandstone....*", while the other unit (Tcvb) "*consists of extrusive basaltic flows and pillow structures with minor reworked lenses of volcanic and sedimentary material.*" Based on these two bedrock descriptions, this office compared the data contained in the test pit logs and the boring logs with the contacts shown on the geologic map. The review revealed that in several instances, data presented in the various logs do not match what is shown on the geologic map. For example, the bedrock in Test Pit T-103 is defined by the Consultant as Tcvab but is actually in an area shown to be Tcvb on the geologic map. Additionally, the materials described in Test Pits T-218, T-219, T-220, T-221 and in Boring B-204 appear to be predominantly consistent with the description for Tcvb materials; however, Tcvab is shown on the map in this area. An accurate geologic map is important because it is not likely that the design civil engineer will review each individual boring log to determine the type of materials which will be exposed; rather, the design will likely be based predominantly on the general unit classifications. Accurate representation of the units is important to assure that a wall design is chosen based on the type of materials which will likely be exposed in the backcut. In addition, boring B-206 shows no surficial materials in the log, but is located in an area designated as colluvium. These apparent discrepancies should be clarified prior to approval and/or issuance a grading permit.

   Differentiation between Tcvab and Tcvb materials is important because the material descriptions appear to indicate that in general Tcvb materials are more highly weathered and fractured and are generally weathered to greater depths than the Tcvab materials. The weathered basalt (Tcvb) is described as "*friable and falls apart along random partings...The basalt facies weathers more deeply and more thoroughly than the breccia as evidenced by PSE core holes and seismic lines.*" As described above, the southern portion of the proposed retaining wall in the area of Test Pits T-218, T-219, T-220, T-221 and in Boring B-204 are in Tcvb materials. In addition, the northernmost section (410 feet) of the proposed retaining wall will be in an area underlain by Tcvb materials. Review of test pit logs and boring logs in this area indicate friable, highly fractured, weathered material which locally breaks into ½"-2" shards. The poor quality of the material is further substantiated through review of cross sections (BP-BP', GP-GP', IP-IP') and seismic data (S-101, S-206) which indicate a zone of low-velocity materials. The presence of the highly fractured Tcvb material is significant because both of these sections are in an area where only "Gabion" walls are to be utilized with no other engineered structure. These items must be addressed prior to approval and/or issuance of a grading permit.

2. Based on the recorded RQD's, seismic data and upon field observations, it appears that at least the upper 15 feet to 27 feet of material which will be exposed in the wall backcut is highly weathered and or fractured/jointed. As requested, the Consultant has provided additional joint/fracture data; however, the joint attitudes are not drawn on the cross-sections and most are not plotted on the test pit diagrams. While most of the joint/fracture attitudes appear to dip into slope, some of the joint sets likely cross-cut one another and in turn lessen the strength of the bedrock. All joint/fracture data should be plotted on the cross-sections and on the test pits logs to accurately reflect the orientation and approximate spacing of the features.

3. Much of the basalt described in the borings and test pits is described as "*broken into ½" to 2" pieces along joints*" to depths as great as 26 feet in Boring B-204. The boring was only drilled to 26 feet, so the highly jointed material may extend even deeper. Due to the highly fractured/jointed nature of the site bedrock materials, the effects of groundshaking must also be considered in the site evaluation and subsequent design. Review of a Caltrans seismic hazard map (Mualchin, 1995) depicts maximum credible peak ground acceleration values of .5g for the area. How will such accelerations affect the highly broken material? Did the Consultant(s) consider the possible duration of ground shaking? This office is of the opinion that it may not be feasible to support a 26 foot ± backcut with a "Gabion" wall with no other engineered structure as is proposed in this area.

4. The Consultant states "*The feet and toes of north-facing slopes seemingly support deeper weather rinds most likely owing to slope orientation that facilitates moisture retention rather than "immediate" evaporation of transient moisture; and to long-term, pre-Holocene exposure of the lower slopes...*" In addition, the Consultant states that "*basaltic flows...have...many fractures, and pronounced joint sets. The joints and fractures are filled with clays, silts, and carbonates within the upper weathered zone and serpentinite, talc, and carbonates in the non-weathered zones.*" Based on the above-referenced comments, it seems reasonable that groundwater will likely be present in the areas behind, as well as below the proposed retaining wall. Observations by

this office of projects and other areas of distress within the City of Agoura Hills indicate that joint/fractures often allow migration of groundwater. The secondary porosity of highly fractured/jointed materials should also be considered. The retaining wall and accompanying subdrain design should consider the potentially adverse effects of groundwater. Will water have an adverse effect on the "*matrix supported*" materials which comprise much of the site bedrock? Does the matrix weaken when exposed to water? These issues should be addressed prior to approval and/or issuance of a grading permit.

5. The Consultant states "*All natural soils, alluvium/colluvium, and/or non-engineered onsite fill are not considered suitable for the support of proposed engineered fill and/or improvements. As such, these materials shall be removed from areas planned to receive fill or where exposed in cut surfaces at final grade.*" This office concurs with the Consultant's recommendations; however, review of the current grading plan indicates that large areas of alluvium/colluvium are to be left in place. For example, the proposed removals shown on the grading plan in the south-southwestern portion of the subject property adjacent to the proposed retaining wall, approximate the contact between alluvium and colluvium shown on the geologic map. The proposed removal line suggests that fill will be placed on top of the colluvium. As a result, the back portion of the proposed theater will be founded on over 30 feet of fill and an unknown thickness of colluvium. The actual thickness of the colluvium in this area is not know because no subsurface data are provided. The grading plan indicates that surficial materials will also remain beneath the proposed Building "K" as well beneath portions of the R.C.B. culvert and adjacent sewer line. The grading plans should reflect the recommendations of the project engineering geologist, geotechnical engineer and design civil engineer. As currently presented, this is not the case. In addition, representatives of this office met with the Consultant on August 28, 1996 to discuss specific project concerns. During the meeting this office requested that a series of seismic profiles be generated across the Creek to accurately define the channel configuration and the approximate thickness of alluvial materials within the channel. While a significant amount of seismic data has been provided, to date no profiles have been provided across the creek and borings and test pit data only provide localized thicknesses of alluvial materials. This office is of the opinion that anticipated removals should be determined prior to approval and/or issuance of a grading permit. Proposed removal depths should be clearly shown on the grading plan.

The Consultant also states in the current report that "*All potentially liquefiable materials onsite will be removed and replaced with* *compacted fill.*" Does the Consultant consider the material (noted in Item #3 above) which breaks into ½"-2" shards to be material which could be liquefiable? If these materials will be adversely affected by groundshaking or groundwater activity, they should be considered a surficial material and removed. Once again, as noted above, proposed removals are not clearly shown; therefore, it is unclear whether all liquefiable materials will actually be removed.

6. Review of Boring Log B-103 and Test Pit logs T-210, T-212 indicate slicked materials. The logs do not indicate the orientation of the slicks nor do they discuss the origin of the features. Boring Log B-3 describes slickensided fractures and joint sets from 25 feet to as deep as 46.6 feet, which is the bottom of the boring; therefore the slicked material may extend to greater depths. Test Pit T-212 shows approximately 11 ½ feet of clay along a steeply north dipping contact with slicked bedrock. The orientation of the steeply dipping contact is also not provided. Does the material reflect a possible small landslide, or were the slickensides caused by previous tectonic activity? Seismic line S-3 is located immediately upslope from Boring B-3. The profile indicates an approximately 45 foot thick zone (thickens from northwest to southeast) of moderately low velocity material (4484 ft/sec) above an undulatory surface marking the boundary with a very high velocity material (12899 ft/sec.). The southeastern end of the contact is at an elevation of approximately 845 feet and could continue even further to the southeast. Is there any significance to this distinct contact? Does it in any way tie in to the slicked materials below? Further east, Test Pit T-210 describes slickensides within a moderately weathered basalt, which is also proximal to Test Pit T-14 which states that the material from 3.5 feet to 8.0 feet is "*near fault*". The Consultant acknowledges in the current report that several small faults were noted during the site investigation but that they could not be traced beyond the various test pits. The faults should be plotted on the geologic map. These items should be addressed prior to approval and/or issuance of a grading permit.

7. This office is of the opinion that if "Gabion" walls are to be utilized, a detailed case history of the long-term effectiveness of similar walls used for similar purposes at other locations should be provided prior to approval and/or issuance of a grading permit. Representatives of this office have observed failures of "Gabion" walls used as retaining walls, including examples within the Los Angeles area. For example, a "Gabion" retaining wall above Beverley Hills around Coldwater Canyon and Mulholland Drive failed in the late 1970's during a torrential rainstorm. In addition, sand was washed from below a "Gabion" seawall constructed at Portuguese Bend. Utilization of a

"Gabion" retaining wall as the sole means of support for a large slope comprised of the highly weathered, and jointed/fractured bedrock described in the geology report does not seem to be feasible.

This office is of the understanding that a primary reason for utilization of the "Gabion" wall design is to promote plant growth. What type of material will be placed within the "Gabion" boxes? If the "Gabion" baskets are to be filled with large rock, as is specified by the manufacturer, it is unclear how plants will grow. What method of irrigation will be utilized? If the baskets are to be filled with fine grained materials, the fill will eventually winnow out of the cells, and the boxes could settle, which would in turn reduce the overall stability of the structure. Failure or distress can occur when flowing water winnows out fine grained materials or when plastic filler materials become saturated. In addition, the Consultant states "*The onsite earth materials are considered to be corrosive toward ferrous metals.*" Although the mesh baskets will be galvanized how will the corrosive groundwater effect the "Gabion" wall? The galvanized boxes can be easily damaged during construction, thus increasing the potential risk of corrosion. If a section of the wall or even one of the mesh boxes is damaged, how will it be repaired?

Review of typical "Gabion" design diagrams indicate that the walls should be supported by a foundation. The design schematics shown on the current grading plan do not show foundations below the proposed "Gabion" walls. Will the walls be supported by a foundation or will the base of the wall be placed directly on fill or bedrock?

8. Additional detail should be provided for the proposed retaining walls along the west side of the subject property. The current grading plan and accompanying cross-sections indicate that three different wall/slope configurations will be utilized. As currently depicted, the boundaries of each of the wall types/designs are not clearly discernible. This is particularly important for the design shown on schematic Cross-Section C-C' (Grading Plan) as these areas are to be supported by a "Gabion" wall with no other engineered structure. As described in Items 1 and 2 above, concerns about the quality and integrity of the bedrock materials in the area of the proposed retaining wall remain. Additional data should be provided or the wall should be designed with these concerns in mind. This office is of the opinion that the quality of the materials described in the areas where no tie-backs are proposed is of no better quality than the quality of materials where tie-backs will be utilized. What criteria were used to determine that tie-backs were not needed in these areas?

9. Section 7006(g) of the City of Agoura Hills Municipal Codes states that "*No blasting plan shall be employed or used in any grading work unless such devices have been specifically approved by the City council and the fire marshal.*" Based on the referenced City code as well review of the seismic data, this office concurs with the Consultant that "*A blasting plan should be prepared by the Contractor...*" The blasting plan should clearly depict all areas where blasting will be likely. The cross-sections contained in the current report present seismic velocities in the area of the proposed retaining wall along the western boundary of the subject property; however, it is unclear whether the retaining walls depicted on the cross-sections reflect the currently proposed varied wall designs. Accurate cross-sections should show total depths of proposed cutting or excavation for walls and foundations and should clearly indicate where blasting will be required. Review of the seismic data and the cross-sections indicates that blasting could be required for much of the base of the retaining wall. No cross-sections are provided across the creek. The blasting plan should contain a map and an adequate number of accompanying cross-sections which clearly define the areas where blasting will be required as well as areas where blasting may be required. For example, a number of the velocities are only slightly less than the 7000 feet/sec. range which the Consultant defines as "*unrippable.*" In addition, inconsistencies in seismic velocities were noted at the intersection of Seismic lines S-106 and S-206 (D-E). The two profiles indicate significantly different velocities at the same depths. If S-206 is correct, "*extremely hard ripping*" material will be encountered within 10 feet of the surface. The base of the proposed retaining wall would be within this zone so blasting could be required in this area. In addition, the elevations of particular zones on the seismic profiles were compared with the elevations as depicted on the cross-sections to determine their accuracy. Although the observed discrepancies are minor, it should be noted that blasting could be necessary along many sections of the proposed retaining wall depending on removal depths. Further detail is also requested in the area of proposed Building "I" where no seismic data were recorded. It appears as though several resistant knobs exist in this area. The grading plan indicates that as many as nine feet will be cut in this area. What subsurface information does the Consultant have with regard to the rippabililty of the material in this area? Will blasting be required? This office is of the opinion that said plan should be submitted to the City for review prior to approval and/or issuance of grading permit.

The items listed above pertain to the current grading plans. Said items should be considered and addressed by the City, the property owner/applicant, and all the applicant's Consultant(s) prior to approval and/or issuance of a grading or building permit. Items 1-6 contained in this document refer only to specific geologic concerns; please refer to the Addendum letter dated November 26, 1996 for concerns which pertain to geotechnical engineering, civil engineering and City ordinance issues.

This review was conducted solely as part of the City's planning and building and safety permitting process. The comments are advisory in nature only.

Mitchell G. McGinnis
Senior Staff Engineering Geologist

Thomas L. Slosson
Supervising Engineering Geologist
R.G. #4204, C.E.G. #1327

MGM:TLS/mm:
cy:Bing Yen and Associates
Steve Bailey, Building and Safety

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Van Nuys, California 91411
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ADDENDUM

November 26, 1996
S&A #921026

TO: City of Agoura Hills
30101 Agoura Court, Suite 102
Agoura Hills, California 91301

Attention: Dave Anderson
Elroy Kiepke
Mike Kamino

SUBJECT: Geotechnical Engineering, Design Civil Engineering and Planning Concerns Pertaining to Grading Plan and Responses to Geological and Geotechnical Review Sheets, Creekside Center, City of Agoura Hills

This office has received the following documents from the City which pertain to the subject site:

- "Grading Plan Review and Responses to Geological and Geotechnical Review Sheets, Creekside Center, City of Agoura Hills, California," prepared by Pacific Soils Engineering, Inc., dated October 16, 1996, Volumes I and II

- "Preliminary Grading/Drainage Plan, Creekside Center, Agoura Hills," prepared by Westland Civil, Inc., updated November 14, 1996, scale 1" = 40'

- Cross Sections A-A' through H-H', prepared by Westland Civil, Inc., updated November 12, 1996, scale 1" = 10'

- "Stage Grading and Drainage Plan for Creekside Center - Agoura Hills, California," prepared by Westland Civil, Inc., dated November 1, 1996, 5 sheets

This document provides an overview of geotechnical and planning issues which should be considered by the City's geotechnical engineer and the City engineer prior to approval and/or issuance of a grading permit. It should be understood by all that the term "Consultant(s)," as used herein, applies to the project engineering geologist, geotechnical engineer, design civil engineer, and any other professional affiliated with the proposed development. The following items should be considered in addition to those presented in the engineering geology review submitted by this office: (Please refer to Slosson and Associates review letter dated November 26, 1996 for concerns which pertain specifically to the geology at the Creekside Terrace site).

1. It is the understanding of this office that fill removed from a slope repair at Calle Montecillo/Via Amistosa was stockpiled at the Creekside site. The materials removed for the slope repair were not suitable for use as fill and were therefore not incorporated into the completed slope repair. The poor quality fill removed from the slope repair should not be utilized in the proposed Creekside development.

2. The proposed retaining wall cross-sections submitted with the most recent grading plan indicate that subdrains will be placed behind the "Gabion" walls along the western edge of the subject property; however, this office is of the opinion that the proposed subdrainage design should be modified slightly. For example, the subdrain shown on Cross-Sections A-A' and B-B' is depicted at the front of the "Gabion" wall within the gravel backfill. This office is of the opinion that a subdrain should be placed along the fill/bedrock contact at the back of the cut, to assure that the backfill material is properly drained.

   Cross-Sections A-A' and C-C' show a retaining wall (4'-6' max.) at the toe of slope, east of an approximately 50-foot-wide parking lot which is immediately adjacent to a planter at the foot of the "Gabion" walls. No subdrains are shown on either of the cross-sections in these areas. A storm drain is shown on the grading plan for a portion of the retaining wall located immediately behind the proposed theater, but it appears to end approximately 40 feet from the corner of the structure, where the retaining wall is still 3-4 feet high. This office is of the opinion that backdrainage should be provided behind these retaining walls at the toe of slope.

   No subdrains are shown behind the two-tiered "Gabion" wall or the R.C. Box Wing retaining wall at the toe of slope as depicted on cross-section H-H' in the area of the concrete outlet. Subdrainage should be designed behind all of the walls in these areas.

3. Cross-section B-B' indicates that the proposed retaining wall will have a maximum height of 30 feet with a 4-foot (max.) wall at the toe of slope behind the proposed theater. Any fill slope which is to be constructed over 25 feet in height will require a variance from the City of Agoura Hills. In addition, a separate permit is required for any proposed retaining wall greater than 2 ft in height.

4. Review of the updated grading plan indicates that the design of the descending slope along the southern border of the property has been slightly modified. A cross-section should be provided from the parking lot at the top of slope to the toe of slope. Said cross-section should depict the proposed "Gabion" wall, subdrain, and the detail of the flood control access road. The flood control access roads shown on the northwest and south sides of the subject property should be designed with a berm or splash walls along the edges to prevent water from flowing over the slope face or from undermining the adjacent ascending slope.

5. Cross-section H-H' indicates a proposed 1½ foot thick layer of rip-rap rock between the R.C. Box Wing Wall and the toe of the lower-most cell of the lower tier of the "Gabion" wall depicted in Cross-Section H-H'. Will there be any potential for erosion and distress/collapse of the "Gabion" wall above the section of rip rap? Is 1½ feet of rip-rap sufficient for the expected (25 ft/sec) flow out of the R.C. Box? How will the zone of rip-rap be tied into the "Gabion" wall and the R.C. Box retaining wall to prevent water from getting behind or below either of the walls?

6. Cross-section G-G' depicts the foundation of the proposed overhanging building at the east side of the subject property with an approximately 10 foot setback. Review of the grading plan indicates that the setback should actually be approximately 18 ft from the center of the foundation to be in compliance with the City of Agoura Hills Building regulations. In addition, what material will the structure be founded in and has the material been sufficiently analyzed?

7. The Consultant states in the current report that "*The debris catchment devices should be designed to allow periodic clean out and maintenance.*" This office concurs with these recommendations; however, the current grading plan does not show a catchment design which will allow access for cleanout behind the proposed retaining walls. Impact walls or fences cannot be easily maintained unless an access road is provided along the top of the entire length of the proposed retaining wall. Said devices become ineffective if they become filled with debris.

8. The Consultant states that oversized rocks which have been properly flooded with granular fill can be utilized on site. This office suggests that this practice be limited to areas that will underlie the parking lots and not the proposed retaining walls or buildings.

9. Review of literature on "Gabion" walls indicates that large rocks with a high specific gravity and which are typically slightly larger than the mesh are recommended. The material which is utilized should also be hard and

friable materials should be excluded. Will the rocks which will be used to fill the mesh cages be imported? This office is of the opinion that on-site materials do not meet the criteria as described herein; therefore, the amount, type and source of imported materials should be discussed. In addition, if onsite materials are not utilized, the amount of proposed off-site export should also be considered. The amounts of imports and exports could have an impact on planning and should therefore be determined. Based on observation of past failures (e.g. Item #7 of the engineering geology review), this office remains of the opinion that "Gabion" walls are best suited for temporary or other short lifespan purposes, and not as a permanent retaining wall.

The items listed above pertain to the current grading plans. Said items should be considered and addressed by the City, the property owner/applicant, and all the applicant's Consultant(s) prior to issuance of a grading or building permit. Items 1-11 contained in this document refer only to specific geotechnical engineering, civil engineering and City ordinance issues; please refer to Slosson and Associates review letter dated November 26, 1996 for specific geologic concerns.

This review was conducted solely as part of the City's planning and building and safety permitting process. The comments are advisory in nature only.

Mitchell G. McGinnis
Senior Staff Engineering Geologist

Thomas L. Slosson
Supervising Engineering Geologist
R.G. #4204, C.E.G. #1327

MGM:TLS/mm:
cy:Bing Yen and Associates
Steve Bailey, Building and Safety

CITY OF AGOURA HILLS
DEPARTMENT OF PLANNING & COMMUNITY DEVELOPMENT
FAX TRANSMITTAL

TO:	JoAnn Lee-Kim Excell Architects	**FAX (714) 223-0909** Phone (714) 223-0900

FROM: Mike Kamino
City of Agoura Hills
Department of Planning & Community Development
30101 Agoura Court, Suite 102
Agoura Hills, CA 91301
818/597-7321 (direct)
818/597-7352 (fax)

DATE: November 26, 1996

SUBJECT: Creekside

ATTACHED: Comments from City's Geotechnical Consultant

No. of PAGES: 4
(incl. cover)

REMARKS:

Please forward the attached to Pacific Soils so that they can respond to the comments.

As I indicated on the phone, if you are proposing blasting, we need to get a blasting impact study from you as part of the Specific Plan Amendment request.

BING YEN & ASSOCIATES, INC.
Geotechnical & Environmental Consultants. Established 1979

November 26, 1996

BYA Project No.:G961259

City of Agoura Hills
30101 Agoura Court
Agoura Hills, CA 90274

Attention: Mr. Mike Kamino

SUBJECT: Geotechnical Engineering Review, Proposed Commercial Development, Creekside Center, Southwest corner of Kanan Road and Agoura Road, Agoura Hills, California.

REFERENCES:

1. Pacific Soils Engineering, Inc., "Addendum to Grading Plan Review, Creekside Center, City of Agoura Hills, California" W.O. 101568-GP, Dated November 14, 1996.

2. Pacific Soils Engineering, Inc., "Grading Plan Review and Responses to Geological and Geotechnical Review Sheets, Creekside Center, City of Agoura Hills, California" W.O. 101568-GP Dated October, 16, 1996.

3. Pacific Soils Engineering, Inc., "Geotechnical Feasibility Review of Creekside Center Preliminary Grading/Drainage Plan Including Responses to City Technical Reviews SW Corner of Kanan Road and Agoura Road, City of Agoura Hills, California" W.O. 101568-P, Dated January 24, 1996.

4. Pacific Soils Engineering, Inc., "Soils Engineering and Engineering Geology Feasibility Study, Agoura Canyon Ranch Center, Agoura, County of Los Angeles, California", dated September 16, 1992.

5. Pacific Soils Engineering, Inc., "Preliminary Soils Engineering and Engineering Geologic Investigation, Agoura Canyon Ranch, Agoura Hills Area, County of Los Angeles, California" dated September 16, 1988.

6. Review Sheets by Bing Yen and Associates dated April 10, 1996, July 24, 1996 and October 9, 1992.

17701 Mitchell North, Irvine, California 92614-6029 Phone (714) 757-1941 Fax (714) 757-1943 e-mail: bya@earthlink.net

Dear Mr. Kamino:

At the City's request, the above referenced report has been reviewed from a geotechnical engineering perspective. The following items should be completed prior to planning/grading plan check approval:

1. Details should be provided for the proposed debris flow mitigation devices at the western boundary of the site. Debris fences should be design for impact loads and debris volumes as recommended by the geotechnical consultant.

2. A test blast/vibration study should be performed to evaluate the variation in vibratory ground motion intensity with respect to distance from the blast site. It must be shown that the blasting can be done safely with respect to existing improvements. The study should include a plan for monitoring of the blasting vibrations for the proposed excavations for the box culvert and cut at the western site boundary.

3. A dewatering plan should be developed by the geotechnical consultant for the removals within the creek bed alluvium. Effects from the dewatering on adjacent roadways, structures and slopes should be evaluated. Temporary stability calculations should be presented for excavation side slopes.

4. Slope stability analysis must be provided for the 30 to 35 foot high fill slope/retaining wall system at the southern boundary of the site.

5. Foundation recommendations must be provided for the proposed restaurant building at the southeast corner of the site. Footings must meet code required setback distances from descending slopes.

6. Calculations used to develop design parameters for the proposed soldier pile/gabbion retaining wall system should be submitted for review. Recommendations for the tieback system shown on the plans must also be submitted including: Tieback length, grouted length, free length, test loads, and design load. Rock hardness should also be addressed relative to the feasibility of placing the soldier piles and tiebacks to the design lengths.

7. Details for retaining wall backdrainage, in accordance with the consultant's recommendations should also be shown on the final retaining wall plans.

8. Shear strength testing at low normal loads should be performed to confirm the shear strength used in the stability calculations for all fill slopes.

9. The geotechnical consultant indicates that on-site soils are highly corrosive to buried metal. Details for the gabbion walls (or other alternative retaining structures), including corrosion resistance, gabbion fill material, and backdrainage must be submitted to the City for evaluation. Estimates for long-term design life of the retaining structures must be indicated.

10. Additional shear strength testing, rock mass strength correlations, etc. should be performed to justify the strength used for the weathered volcanic bedrock.

11. The location of all proposed stabilization fills, buttress fills, keyways, alluvial removals, and subdrains, should be shown on the final grading plan. The Project Engineering Geologist and Project Geotechnical Engineer should review, approve, and sign the final grading plan prior to approval.

This review has been conducted solely as a part of the City's planning and permit process. If you have any questions, please feel free to contact our office.

Sincerely,

BING YEN AND ASSOCIATES, INC.

Matthew Rogers

Matthew G. Rogers, P.E.
Project Reviewer

Reviewed By:

Gregory P. Silver, P.E., G.E.
Associate
Manager, Municipal Services

SLOSSON AND ASSOCIATES
Consulting Geologists

15500 Erwin Street, Suite 1123
Van Nuys, CA 91411
(818) 376-6540 • (818) 785-0835
FAX (818) 376-6543

TRANSMITTAL

TO: City of Agoura Hills
30101 Agoura Court, Suite 102
Agoura Hills, CA 91301

DATE: August 12, 1996

Attn: Dave Anderson
Elroy Kiepke
Doug Hooper

SUBJECT: Creekside Center

WE ARE SENDING YOU THE FOLLOWING ITEMS: HEREIN (X)
SEPARATELY ( )

NO. COPIES	DESCRIPTION
1	Engineering Geology Review of Geotechnical Feasibility Review of Creekside Center Preliminary Grading/Drainage Plan Including Responses to City Technical Reviews SW Corner of Kanan Road and Agoura Road

COPIES TO: Bing Yen & Associates
Steve Bailey, Building & Safety

BY: Cindy Granieri

TITLE: Secretary

SLOSSON AND ASSOCIATES
CONSULTING GEOLOGISTS
15500 Erwin Street, Suite 1123
Van Nuys, California 91411
(818) 376-6540 • (818) 785-0835
FAX (818) 376-6543

August 12, 1996
S&A #921026

TO: City of Agoura Hills
30101 Agoura Court, Suite 102
Agoura Hills, California 91301

Attention: Dave Anderson
Elroy Kiepke
Doug Hooper

SUBJECT: Engineering Geology Review of Geotechnical Feasibility Review of Creekside Center Preliminary Grading/Drainage Plan Including Responses to City Technical Reviews SW Corner of Kanan Road and Agoura Road.

This office has received the following documents from the City which pertain to the subject site:

- "Preliminary Grading/Drainage Plan for Creekside Center, Agoura Hills, California," prepared by Westland Civil, Inc., dated June 4, 1996, scale 1" = 40'.

- "Cross-sections A-A' through H-H' for Creekside Center, Agoura Hills, California," prepared by Westland Civil, Inc., dated June 4, 1996, scale 1" = 10'.

- "Agoura Road Preliminary Road Design and Traffic Lane Configuration for Creekside Center, Agoura Hills, California," prepared by Westland Civil, Inc., dated June 4, 1996, scale 1" = 60', 2 sheets.

- "Site Plan for Creekside Center, Agoura Hills, California," prepared by Westland Civil, Inc., scale 1" = 40'.

At the request of the City, this office has completed a review of the above-referenced documents. Based upon review of all pertinent documents submitted by the Consultant(s) to date, this office remains of the opinion that additional data should be provided prior to issuance of a grading permit. It should be understood by all that the term "Consultant(s)," as used herein, applies to the project engineering geologist, geotechnical engineer, design civil engineer, and any other professional affiliated with the proposed development. Comments contained in a previous review submitted by this office on March 27, 1996 remain valid and should be addressed in addition to concerns expressed herein. The following is a list of those concerns which pertain to the current grading plan and cross-sections; all issues should be addressed by the Consultant(s) prior to issuance of a grading permit:

1. The most significant differences between the current grading plan and previous plans pertain to proposed retaining walls. Retaining walls are proposed along the toe of the ascending slopes which border the south, southeastern and southwestern margins of the subject property. The Consultant(s) has provided a grading plan and cross-sections which depict proposed retaining wall locations, but only generalized depiction of retaining wall design. This office is of the opinion that retaining wall design schematics showing locations and specifications for all proposed walls should be submitted for review prior to issuance of a grading permit. The following items which pertain to the proposed retaining walls should be considered prior to issuance of a grading permit:

    a. The grading plan and cross-sections indicate that the proposed retaining walls will be "Gabion" type and will have a maximum height of 25 feet. This office has serious concerns regarding utilization of 25-foot high "Gabion" retaining walls to support the adjacent ascending slopes. If any erosion is possible in areas adjacent to the proposed "Gabions", they should not be utilized as retaining walls. This office questions the effectiveness of utilizing "Gabion" structures as retaining walls. Schematics which show the actual dimensions and design specifications for the "Gabion" retaining walls should be provided by the design civil engineer. The actual structural design of the wall and accompanying foundation is unclear and should be clarified. Will the "Gabion" wall be stair-stepped or will just one row be utilized as indicated on the cross-sections? What is the life expectancy of the proposed retaining wall design? Case histories detailing projects where similar walls were utilized to retain high slopes in a geologic environment similar to that of the subject property should be submitted for review prior to issuance of a grading permit.

    b. The maximum wall height is said to be 25 feet; however, construction of the retaining wall and backfill would create fill slopes that are greater than 25 feet in height. Any fill slope which will be greater than 25 feet in height will require a variance from the City. The grading plan should clearly show cut and fill boundaries to accurately depict proposed as-built site conditions.

    c. As noted in the March 27, 1996 review, this office is of the opinion that additional subsurface information should be provided to substantiate that the slopes are stable and will not be adversely affected by the proposed development. The current cross-sections do not include any subsurface geologic data and in most cases do not extend to the top of slope. All cross-sections should extend from the toe of slope to the top of slope and should include all subsurface geologic data as well as all proposed and existing structures. An updated geologic and geotechnical engineering report which pertains to the current grading plan and wall designs should be prepared and submitted for review. This point is even more important if 25-foot retaining walls are to be utilized. Planes of weakness and potential groundwater flow paths must clearly be defined and depicted on cross-sections if such large retaining walls are to even be considered. Subsurface data should include bedding/joints/fractures/fault orientations.

d. The project design civil engineer should provide detailed schematics which clearly indicate design and location of all proposed surface and subsurface drainage devices. No subdrains or backdrains are shown on the cross-sections or grading plans in the planters or areas behind the proposed retaining walls. In addition, no subdrainage is shown along the fill/bedrock contacts. Are the proposed retaining walls designed without backdrainage? This office is of the opinion that due to the height and the number of swales crossed by the proposed retaining walls, an extensive and effective backdrainage system should be included in any design which is to utilize retaining walls. This office is also of the opinion that canyon subdrains should be designed in all of the areas where swales will be filled. The January 24, 1996 report prepared by Pacific Soils Engineering, Inc., contains general canyon subdrain detail; however, it is unclear whether the designs pertain to the current grading plan. All proposed designs should be shown on or attached to the grading plan and the specific location of a structure should be clearly noted on the grading plan and cross-sections. As noted earlier, this office is of the opinion that additional subsurface data should be provided to better define potentially adverse slope and groundwater conditions. The locations and number of surface and subsurface drains should be based, in part, on site-specific geologic and geotechnical data provided by the project geologist and geotechnical engineer. These items are deferred to the City's geotechnical engineer and the City engineer for consideration.

2. This office is of the opinion that additional subsurface data should be provided not only in the area of the proposed retaining walls, but also in those areas where buildings are to extend out over a descending slope (Cross-section G-G'). Detailed foundation specifications should be provided prior to issuance of a grading

permit. These specifications should be based upon site-specific geologic and geotechnical data obtained during subsurface investigations. A cross-section which includes all subsurface geologic data should be provided in the area of Cross-section G-G' and should be extended from the top of slope to the toe of slope.

As noted above, this office is of the opinion that detailed surface and subsurface drainage design parameters should be submitted and subsequently reviewed prior to issuance of a grading permit. Drainage is of particular importance around the proposed structure intersected by Cross-section G-G'. It is imperative that all runoff from the roof and any adjacent hardscape be collected and directed offsite and not allowed to flow over the descending slope face or allowed to pond on any of the flat areas. In addition, Cross-section G-G' indicates that a proposed 2:1 slope will intersect a flat, finished grade immediately adjacent to the proposed building. Will this area adjacent to the building be paved? How will water be directed away from the building and removed from the area? No berms or area drains are depicted in areas adjacent to the proposed structure and no surface or subsurface drainage devices are indicated for adjacent retaining walls. These items are deferred to the City's geotechnical engineer and the City engineer for evaluation.

3. Clarification is requested regarding the existing and proposed configuration of the ascending slopes behind the subject property and, in particular, the slope behind the proposed theater building. Review of published topographic maps indicates that the ascending slopes behind the subject property extend above the 1000-foot elevation indicated on the current site map. As noted above, cross-sections should extend from the toe of slope to the top of slope to assure accurate depiction of all slopes which could have an impact on the subject property. The setback for the proposed theater building is approximately 63 feet, which is greater than the 40-foot setback required by the City; however, due to the high slopes, this office is of the opinion that additional items pertaining to slope stability should be addressed. For example, potentially adverse conditions such as rockfalls, landslides and debris flows should also be considered in the retaining wall design. How will the effects of these potential hazards be reduced by the proposed retaining walls? Are catchment devices to be constructed along the entire length of the ascending slopes to prevent material from reaching the subject property? If yes, how will said devices be cleaned/maintained? This item is deferred to the City's geotechnical engineer and the City engineer for consideration.

4. Additional detail is requested in the area along Cross-section H-H'. A two-tiered "Gabion" wall is depicted with the lower wall having a maximum height of 25 feet and the upper wall with a maximum height of six feet resulting in a 35-foot± high fill slope. The proposed foundation designs are not defined and should be clarified by the design civil engineer. Does the design consist of one row of "Gabions" stacked on top of one another or will the wall be stair-stepped? If the proposed design is for a single row, the structure will likely fail more easily.

The base of the lower-most proposed retaining wall is located 14 vertical feet above Lindero Canyon Creek, near the outlet channel for the redirected portion of the creek which flows beneath the subject property. It is unclear whether a concrete channel is proposed in this area to prevent undercutting of the slope below the retaining walls. Cross-section H-H' extends to the opposite side of the channel, but the creek is not shown on the cross-section. The slope configuration in this area should be clarified. These items are deferred to the City's geotechnical engineer and City engineer for evaluation.

5. The plans provided indicate that a portion of Kanan and Agoura Roads will be widened or altered, presumably to accommodate an increase in vehicular traffic. Will there be any changes to the slopes adjacent to the road improvements? Detailed schematics of all proposed grading in these areas should be provided prior to issuance of a grading permit. If the slopes are to be altered in any manner, the Consultant(s) should be required to provide subsurface geologic data to substantiate that grading will not cause adverse conditions in the areas adjacent to Agoura Road and Kanan Road. The plans show proposed curb and gutter systems along portions of the road improvement; however, has a potential increase in runoff/erosion been considered? How will runoff from the improvements affect adjacent properties? Will the existing storm drains be sufficient to prevent flooding even during times of heavy rain/flow? The potentially adverse effects on existing drainage systems due to possible substantial flow increases should certainly be considered prior to finalization of design. These items are deferred to the City geotechnical engineer and the City's engineer for consideration and should be addressed prior to issuance of a grading permit.

6. Detailed design schematics and specifications for all proposed drainage inlets and debris basins should be submitted for review prior to issuance of a grading permit.

7. Per City of Agoura Hills building regulations, runoff should not be allowed to flow over slope faces or be diverted toward the toe of slope. For example, a berm may be necessary adjacent to the flood control access road depicted along the southern property boundary and the runoff directed to approved drainage devices. A splash wall should also be designed along the immediate western edge of the access road to keep runoff from eroding the toe of the adjacent ascending slope. As currently shown, the access road has a 10% grade to the northeast and it appears as though runoff will flow on to adjacent descending slopes. The water from this area should be directed to an approved drainage device. A cross-section which depicts this slope area should be provided. This item is deferred to the City's geotechnical engineer and the City engineer for consideration.

This office wishes to emphasize the importance of obtaining detailed geologic structural data to assure that an accurate geotechnical engineering assessment can be completed. The geotechnical engineering analysis should include all data to determine whether the proposed "Gabion" walls are practical and will be stable.

The items listed above pertain to the current grading plans, said items should be considered and addressed by the City, the property owner/applicant, and all the applicant's Consultant(s) prior to issuance of a grading or building permit. In addition, items contained in the March 27, 1996 review submitted by this office should also be addressed prior to issuance of a grading permit.

This review was conducted solely as part of the City's planning and building and safety permitting process. The comments are advisory in nature only.

Mitchell G. McGinnis
Senior Staff Engineering Geologist

Thomas L. Slosson
Supervising Engineering Geologist
R.G. #4204, C.E.G. #1327

MGM:TLS/mm:
Attachment
cy:Bing Yen and Associates
Steve Bailey, Building and Safety

ATTACHMENT 1

Additional Documents Reviewed for the Subject Property

- "Geotechnical Feasibility Review of Creekside Center Preliminary Grading/Drainage Plan Including Responses to City Geotechnical Reviews SW Corner of Kanan Road and Agoura Road, City of Agoura Hills," prepared by Pacific Soils Engineering, Inc., dated January 24, 1996.

- "Untitled preliminary plan, prepared by Valcon Engineering, Inc., dated April 23, 1992, scale 1"=200'.

- "Summary Site Development Plan & Notes, Creekside Terrace, Agoura Hills, California," prepared by Behr Browers Partnership., dated April 3, 1992, scale 1"=80'.

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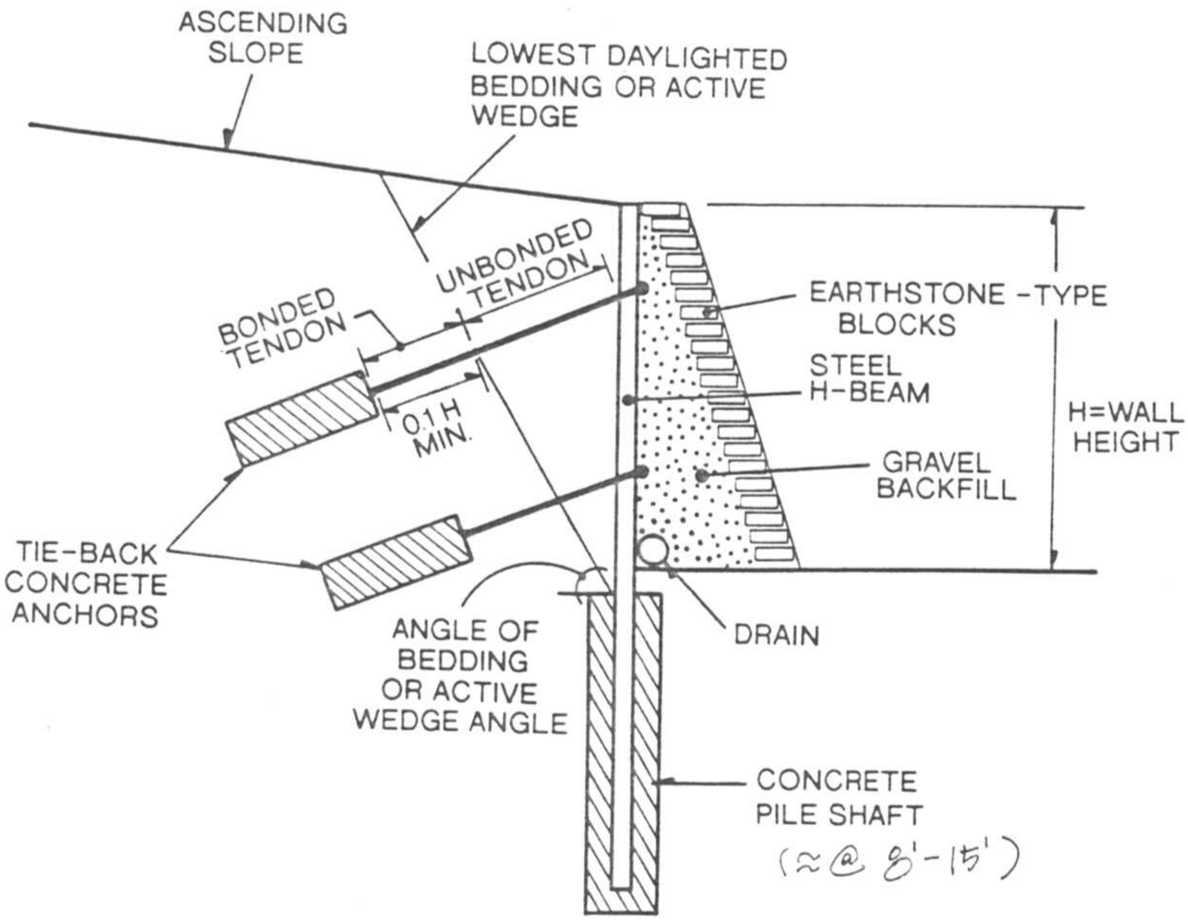
- "Soils Engineering and Engineering Geology Feasibility Study, Agoura Canyon Ranch Center, Agoura, County of Los Angeles, California," prepared by Pacific Soils Engineering Inc., dated September 16, 1988.



TIEBACK WALL DETAIL

NOT TO SCALE

PACIFIC SOILS ENGINEERING, INC.
10653 PROGRESS WAY CYPRESS, CALIFORNIA (714) 220-0770

W.O. 101568-P **DATE**

City of Agoura Hills

"Gateway to the Santa Monica Mountains"

July 16, 1996

Mr. Thomas Slosson
Slosson & Associates
15500 Erwin Street, Suite 1123
Van Nuys, CA 91411

RE: GEOLOGICAL REVIEW FOR CREEKSIDE CENTER

Dear Mr. Slosson:

Enclosed are the latest plans for the Creekside Center project, submitted as part of their formal application on June 27, 1996. Please let me know whether or not an update to the previous soils and geology report is necessary or whether your most recent comment letter of March 27, 1996 is still valid.

If you should have any questions, please give me a call at (818) 597-7321.

Sincerely,

Mike Kamino

Mike Kamino
Senior Planner

City of Agoura Hills

"Gateway to the Santa Monica Mountains"

July 16, 1996

Mr. Greg Silver
Bing Yen & Associates
17701 Mitchell North
Irvine, CA 92714

RE: GEOTECHNICAL ENGINEERING REVIEW FOR CREEKSIDE CENTER

Dear Mr. Silver:

Enclosed are the latest plans for the Creekside Center project, submitted as part of their formal application on June 27, 1996. Please let me know whether or not an update to the previous soils and geology report is necessary or whether your most recent comment letter of April 10, 1996 is still valid.

If you should have any questions, please give me a call at (818) 597-7321.

Sincerely,

Mike Kamino

Mike Kamino
Senior Planner

BING YEN & ASSOCIATES, INC.
Geotechnical & Environmental Consultants, Established 1979

April 10, 1996

BYA Project No.:G961259

City of Agoura Hills
30101 Agoura Court
Agoura Hills, CA 90274

Attention: Mr. Elroy Kiepke

SUBJECT: Geotechnical Engineering Review, Proposed Commercial Development, Creekside Center, Southwest corner of Kanan Road and Agoura Road, Agoura Hills, California.

REFERENCES:

1. Pacific Soils Engineering, Inc., "Geotechnical Feasibility Review of Creekside Center Preliminary Grading/Drainage Plan Including Responses to City Technical Reviews SW Corner of Kanan Road and Agoura Road, City of Agoura Hills, California" W.O. 101568-P, Dated January 24, 1996.

2. Pacific Soils Engineering, Inc., "Soils Engineering and Engineering Geology Feasibility Study, Agoura Canyon Ranch Center, Agoura, County of Los Angeles, California", dated September 16, 1992.

3. Pacific Soils Engineering, Inc., "Preliminary Soils Engineering and Engineering Geologic Investigation, Agoura Canyon Ranch, Agoura Hills Area, County of Los Angeles, California" dated September 16, 1988.

4. Review Sheets by Bing Yen and Associates dated October 9, 1992.

Dear Mr. Kiepke:

At the City's request, the above referenced report has been reviewed from a geotechnical engineering perspective. It is our understanding that the project is in the feasibility stage and was reviewed under that assumption. Based on our review, we recommend that the following items be addressed before the City considers feasibility/tentative approval of the project. Additional items are also listed to be noted by the City and addressed by the Project Geotechnical consultant when final grading plans are developed.

Items to be Addressed Prior to Feasibility/Tentative Approval:

1. An evaluation of the debris flow potential should be performed for the subject site. The evaluation should include the natural slopes above the proposed pad area as well as the manufactured slopes proposed for the site.

2. Mitigation measures for the proposed 1½ to 1 slopes should be recommended by the consultant prior to consideration of a variance of the City's slope gradient requirement. Mitigation measures should include detailed surface drainage and subdrainage recommendations and consider surficial failures and possible debris flow/rockfall from the oversteepened slopes.

Items to be Addressed prior to Grading Plan Check Approval:

1. A dewatering plan should be developed by the geotechnical consultant for the removals within the creek bed alluvium. Effects from the dewatering on adjacent roadways, structures and slopes should be evaluated. Temporary stability calculations should be presented for excavation side slopes.

2. The stability analysis of all cut and fill slopes (as shown on the final grading plan) steeper than 4:1 should be presented prior to consideration of a variance to the City's slope height limit. Stability calculations should include the effect on slope stability of the proposed mid-slope and toe of slope retaining walls.

3. Detailed foundation recommendations should be presented by the geotechnical consultant upon review of final grading plans. Foundations for structures encroaching on slopes should meet code required setback distances.

4. Detailed recommendations should be provided by the geotechnical consultants for all of the proposed retaining walls. The recommendations should provide for adequate backdrainage of the walls.

5. The location of all proposed stabilization fills, buttress fills, keyways, alluvial removals, and subdrains, should be shown on the final grading plan. The Project Engineering Geologist and Project Geotechnical Engineer should review, approve, and sign the final grading plan prior to approval.

This review has been conducted solely as a part of the City's planning and permit process. If you have any questions, please feel free to contact our office.

Sincerely,

BING YEN AND ASSOCIATES, INC.

Matthew G. Rogers

Matthew G. Rogers, P.E.
Project Reviewer

Reviewed By:

Gregory P. Silver, P.E., G.E.
Associate
Manager, Municipal Services

Westland Civil, Inc.

100 N. RANCHO RD., STE. 5
THOUSAND OAKS, CA 91362

PH. (805) 495-1330
FAX (805) 446-9125

Dave Anderson FYI

CONFERENCE REPORT

Client: Creekside Ltd. Conf. Date: 5/14/96

Project: Creekside Center, Agoura Hills ID.#: Moran.MannTHR/02

Conference Location: Los Angeles Co. Dept. of Public Works

Attending: Don Waite - Westland Civil, Inc.
Elroy Kiepke - City of Agoura Hills
Phil Doudar - L.A. Co. Dept. Public Works
Rob Kumumotta - L.A. Co. Dept. Public Works

ITEMS DISCUSSED AT MEETING:

Reinforced Concrete Box Design in Lindero Cyn. Creek

A) L.A. Co. will consider the reinforced concrete box extension as a Miscellaneous Transfer Drain (M.T.D).
B) L.A. Co. will plan check design. Design will be performed per County design STD's.
C) Lindero Cyn Creek is in Flood Zone "A" as shown on flood insurance rate maps.
D) City of Agoura Hills will need to obtain Lomar letter approval from FEMA prior to construction of R.C. Box culvert.
E) Maintenance considerations:

1) Vehicular access to R.C. Box outlet will be required. Design criteria: min. 12' wide road @ max. 12% grade. A 40' X 40' turnaround near outlet will be required.
2) Drainage from most westerly tributary will need to be conveyed by a pipe to R.C. Box Culvert. It is not known whether a debris basin will be required or the pipe should be designed to carry debris flow. Size of drainage shed & debris potential will be the determining factor.
3) Middle tributary drainage area: the inlet and drainage system will be privately maintained.
4) Most westerly drainage area and existing culvert under Agoura Road, Elroy (City of Agoura Hills) questioned who is responsible for maintenance of inlet and pipe. Rob (L.A. County) thought it was a County maintained inlet & pipe culvert. Inlet & pipe may need to be upgraded to current standards.

F) Hydrology of Lindero Creek: Phil Doudar suggested Westland Civil to contact Hydrology Section to determine design drainage flows for sizing of R.C. Concrete Box Culverts.

G) Construction schedule: Don (Westland Civil) stated that the project schedule is to have a graded pad ready for the Mann Theater building in spring of 1997. It is unlikely that construction will be allowed in existing channel during rainy season. This will restrict the design & construction time of the R.C. Box in order to meet Mann Theater construction schedule. Westland Civil will review the design schedule with Architect to determine feasibility of the present project schedule.

THESE CONFERENCE NOTES ARE CONSIDERED TO BE SUBSTANTIALLY CORRECT. IF READER DETERMINES THAT THE NOTES ARE IN NEED OF CLARIFICATION, PLEASE NOTIFY WESTLAND CIVIL IN WRITING.

Don Grant

Preparer

5/21/96

Date

cc: JoAnne - Excell Architects
Dave Rhodes - Excell Architects
Glen Lukos - Lukos & Assoc.
Vance Moran
All Attendees

SLOSSON AND ASSOCIATES
CONSULTING GEOLOGISTS

15500 Erwin Street, Suite 1123
Van Nuys, California 91411
(818) 376-6540 • (818) 785-0835
FAX (818) 376-6543

March 27, 1996
S&A #921026

TO: City of Agoura Hills
30101 Agoura Court, Suite 102
Agoura Hills, California 91301

Attention: Dave Anderson
Elroy Kiepke
Doug Hooper

SUBJECT: Engineering Geology Review of Geotechnical Feasibility Review of Creekside Center Preliminary Grading/Drainage Plan Including Responses to City Technical Reviews SW Corner of Kanan Road and Agoura Road.

This office has received the following documents from the City which pertain to the subject site:

- "Geotechnical Feasibility Review of Creekside Center Preliminary Grading/Drainage Plan Including Responses to City Technical Reviews SW Corner of Kanan Road and Agoura Road, Agoura Hills, California," by Pacific Soils Engineering, Inc., dated January 24, 1996.

(See Attachment 1 for additional documents reviewed)

At the request of the City, this office has completed a review of the above-referenced document. Based upon review of all pertinent documents submitted by the Consultant(s), this office remains of the opinion that certain items must still be clarified prior to issuance of a grading permit. While the Consultant(s) has provided many of the items detailed in the September 16, 1992 review letter submitted by this office, further clarification or additional data should be submitted. It should be understood by all, that the term "Consultant(s)," as used herein, applies to the project engineering geologist, geotechnical engineer, design civil engineer, and any other professional affiliated with the proposed development. The following is a list of concerns which should be addressed by the Consultant(s) prior to issuance of a grading permit:

1. Section I of the September 16, 1992 review prepared by this office contains comments pertaining to compliance with City of Agoura Hills building codes. The Consultant(s) states in Item #8 of the current

report that "*PSE acknowledges the application of the City of Agoura Building Code, rather than that of Los Angeles County.*" Although portions of the development have been redesigned to comply with City building codes and variances have been requested for others, further consideration must be given to items which are not in accordance with codes. This office is of the opinion that the Consultant(s) should be required to adhere to all building regulations of the City of Agoura Hills. The following is a list of items which currently do not conform to City of Agoura Hills Municipal Codes and will require a code variance:

a. The current grading plan includes approximately seven slopes which are to be constructed at 1.5:1 which, as acknowledged by the Consultant(s), will require a variance from the City of Agoura Hills. The Consultant(s) states that "*Some (south site margin) cut slopes are planned at 1.5:1 and would, according to City Code require permission for Code variance. Their maximum heights are about 25 ft.*" Review of the proposed cut slope descriptions shows that the heights of the proposed slopes actually range from approximately 10 feet to 40 feet. The Consultant(s) also states, with regard to the cut slope southeast of Trenches T-104 and T-105, that "*This northerly facing 1½:1 cut slopes will approach a total height of about 40 feet....*" The proposed slope heights must be clearly defined prior to issuance of grading permits. A variance will also be required for the proposed 30-foot ± fill slope located at the south end of the property. Additionally, areas designated as cut slopes on the grading plan are drawn as stabilization fills on the cross-sections and thus should be considered fill slopes. Therefore, a variance would be required for all 1.5:1 cut and fill slopes as well as for stabilization fill slopes which will be constructed over 25 feet in height. This item is deferred to the City's geotechnical engineer and the City engineer and planning staff for consideration.

b. A retaining wall (eight foot maximum) is depicted northeast of the access road along the southwestern property boundary. A variance from the City if Agoura Hills will be required for construction of any retaining wall greater than six feet in height. Additionally, the Consultant(s) is reminded that according to City of Agoura Hills Building Codes, separate building permits are required for all proposed retaining walls to be constructed over two feet in height. This item is deferred to the City's geotechnical engineer and the City engineer for consideration.

c. The Consultant(s) states that *"The current development plan has been revised so that the parking lot access roads, not buildings, are at the base of slope. Adequate structural setbacks are now provided."* Review of the current grading plan indicates that the setback along the southwest wall of the large building northeast of the access road along the southwestern property boundary is only five feet. The elevation difference between the center line in the road above and the finished floor elevation is 15 feet; therefore, the required setback is actually 7.5 feet and therefore, is not in compliance with City building codes. It is unclear whether an impact wall is proposed along the top of the eight-foot retaining wall to reduce adverse conditions adjacent to the proposed downslope property where the five-foot setback is shown. This office wishes to point out that if the City does not approve a code variance for the 1.5:1 slopes, the top and toe of slope and the setback for the upper slope will also not be in compliance and the setback of the building will have to be reevaluated. This item is deferred to the City's geotechnical engineer and the City engineer and planning staff for consideration.

d. City of Agoura Hills Municipal Building Code states that "*Graded building sites (building pads) shall have a minimum slope of two (2) percent towards a public street or engineered drainage structure approved to receive storm waters.*" The grading plan indicates 1% drainage in numerous locations within the subject property A drainage design which adheres to the City code should be provided and reviewed prior to issuance of a grading permit. Maps and cross-sections should include the locations of all proposed surface drains and subdrains. This item is deferred to the City's geotechnical engineer and the City engineer for consideration.

2. The Consultant(s) has provided geologic cross-sections as requested; however, the sections are not oriented perpendicular to slope and thus do not accurately depict the site topography. The current cross-sections depict approximately 2:1 slopes rather than 1.5:1 slopes as proposed. Cross-sections oriented perpendicular to slope which depict proposed slope configurations and surface structures should be prepared for all slopes and in all areas where retaining walls are to be utilized. The cross-sections should include all proposed retaining walls, drainage devices (surface and subsurface), and structures to insure that all proposed conditions can be evaluated. The Consultant(s) states that Cross-Section D-D' depicts the proposed configuration of the 40-foot high slope noted above in Item 1a, but the cross-section is not oriented

perpendicular to the slope; therefore, the topography is not adequately reflected. Cross-section D-D' should be redrawn perpendicular to slope with all surface and subsurface features included. Based upon review of the maps and cross-sections, this office has concerns regarding the limited geologic data in the areas of the proposed cut and fill slopes. This is most notable in the area of the 40-foot high slope noted above, where there does not appear to be any geologic data for the uppermost portion of the slope. This office is of the opinion that additional data should be collected in these areas to adequately define slope conditions.

3. Have sufficient geologic data been collected in proposed cut and fill areas to accurately complete the slope stability analyses? This item is deferred to the City's geotechnical engineer and the City engineer for consideration.

4. The Consultant(s) states in numerous locations and indicates on Cross-sections A-A', B-B' C-C' and D-D' that stabilization fills will be required for many of the slopes. The Consultant(s) also states that "*The stabilization fill slope may be constructed at 1.5:1 ratio if reinforcements such as geofabrics or soil cement are used, otherwise, the slopes should be constructed at 2:1.*" Based on the number of slopes that appear to require "*stabilization fill*", it seems apparent that some of the site materials are not of sufficient strength to justify a variance for 1.5:1 slopes. This office is of the opinion that if the site materials will only remain stable at 1.5:1 with additional additives or with the use of geofabric or soil cement, construction of the proposed 1.5:1 slopes does not seem viable. This office is of the opinion that data supporting the long-term effectiveness of such stabilization methods may be insufficient and utilization of said methods on the large, oversteepened slopes proposed within the subject property, should be seriously questioned. The Consultant(s) should also be required to provide detailed drainage schematics for proposed stability fills. This item is deferred to the City's geotechnical engineer and the City engineer for consideration.

5. Item #2, Part II submitted by this office in the September 16, 1992 review, stated that "*The flood hazard zone established by FEMA (1986) for Madea Creek should be identified on the site development plan.*" In response, the Consultant(s) states that "*Such should be under the purview of the project hydrologist and civil engineer.*" This office concurs that evaluation of the effects of the flood hazard falls within the responsibilities of the project hydrologist and civil engineer; however, the boundaries of said flood hazard zone should be clearly and accurately depicted on the grading plan. In addition, based upon specific knowledge of site conditions and site materials, the engineering

geologist of record should be required to provide an assessment of potentially adverse site conditions which could develop should proper drainage not be established or should flooding occur. Per the Consultant(s), all alluvial material is to be removed to reduce the risk of liquefaction. Will alluvial materials be utilized as fill materials? What are the potentially adverse effects of any future rise in groundwater on fill materials? This item is deferred to the City's geotechnical engineer and the City engineer for consideration.

6. The seismic velocities shown on the cross-sections vary greatly over relatively short horizontal and vertical distances. What explanation does the Consultant(s) have for these differences and how do the given velocities reflect the stability of a particular material? Do these variations in seismic velocity indicate distinct differences in the site geology over relatively short horizontal and vertical distances? What impact will geologic variations have on the stability of the proposed and natural slopes?

7. Is there a potential for mud/debris flows from natural slopes to adversely impact the subject property? Has mud/debris flow potential been sufficiently analyzed? This item is deferred to the City's geotechnical engineer and the City engineer for consideration.

8. The Consultant(s) states in the current report that "*It should be noted that References 2 and 3 pertain to both the commercial and residential development portions of an overall parcel. This report is concerned exclusively with a section of the commercial portion of the currently proposed project.*"

   It should be documented that the current report (January 24, 1996) and any permits issued for the project are valid only for the commercial section of the project depicted in the current report and not the residential section previously defined. Any development beyond the confines of this review must also be reviewed and subsequently approved.

9. The Consultant states that "*The subject site is on the flank of the Repetto Hills which presumably owe their existence to late Quaternary growth of the Elysian Park Anticline....*" This statement is likely a typographical error, as the subject property is not within the Repetto Hills, and should be clarified.

The items listed above need to be considered and addressed by the City, the property owner/applicant, and all the applicant's Consultant(s) prior to issuance of a grading or building permit.

This review was conducted solely as part of the City's planning and building and safety permitting process. The comments are advisory in nature only.

Mitchell G. McGinnis
Senior Staff Engineering Geologist

Thomas L. Slosson
Supervising Engineering Geologist
R.G. #4204, C.E.G. #1327

MGM:TLS/mm:
Attachment
cy:Bing Yen and Associates
Steve Bailey, Building and Safety

ATTACHMENT 1

Additional Documents Reviewed for the Subject Property

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Appendix D

Water Quality and Runoff Calculations

SIMPLIFIED RATIONAL APPROACH *

Zone A North (Medea Creek Drainage)

Redevelopment with Downtown Business

Q=cIA

where: *Q = peak flow in cfs*
c = runoff coefficent
I = storm peak intensity
A = acreage of watershed (or site)

Runoff Coeficients (c-Factor)

Land Use	low c	high c
Apartment	0.5	0.7
Downtown Business	0.7	0.95
Heavy Industry	0.6	0.9
Light Industry	0.5	0.8
Multi-family, attached	0.6	0.75
Multi-family, detached	0.4	0.6
Neighborhood Business	0.5	0.7
Playgrounds	0.2	0.4
Suburban Residential	0.25	0.4
Urban Single-family	0.3	0.5
Vacant, park, cemetery	0.1	0.25
Z - Undeveloped Coefficient from next page	0.26	0.38

Project Details

Existing Land Use:	Neighborhood Business	
Proposed Land Use:	Downtown Business	
Rainfall Intensity, in/hr	2-year	2.2
	25-year	3.8
	50-year	4.5
	100-Year	5

Get Intensity from NOAA maps:
http://www.wrcc.dri.edu/pcpnfreq.html
Remember: Isoleths are in tenths (20=2.0 inches)
Acreage: 5.7 acres

LOW	***2-Year***		***25-Year***		***50-Year***		***100-Year***	
	Existing	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***
c =	0.50	0.70	0.58	0.81	0.60	0.84	0.63	0.88
I =	2.20	2.20	3.80	3.80	4.50	4.50	5.00	5.00
A =	5.70	5.70	5.70	5.70	5.70	5.70	5.70	5.70
Q =	6	9	12	17	15	22	18	25

HIGH	***2-Year***		***25-Year***		***50-Year***		***100-Year***	
	Existing	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***
c =	0.70	0.95	0.81	1.09	0.84	1.14	0.88	1.19
I =	2.20	2.20	3.80	3.80	4.50	4.50	5.00	5.00
A =	5.70	5.70	5.70	5.70	5.70	5.70	5.70	5.70
Q =	9	12	17	24	22	29	25	34

SUMMARY	***Existing***		***Post-Project***		***Increase, cfs***		***Percentage Increase***	
	Low	***High***	***Low***	***High***	***Low***	***High***	***Low***	***High***
2-Year	6	9	9	12	3	3	140%	136%
25-Year	12	17	17	24	5	6	140%	136%
50-Year	15	22	22	29	6	8	140%	136%
100-Year	18	25	25	34	7	9	140%	136%

**Note: Only for rough estimate within small urban areas (<40 acres)*

SIMPLIFIED RATIONAL APPROACH *

Zone A South (Medea Creek)

Full Buildout with Neighborhood Business (Pre-Project Drainage)

Q=cIA

where: *Q = peak flow in cfs*
c = runoff coefficent
I = storm peak intensity
A = acreage of watershed (or site)

Project Details

Existing Land Use:	Vacant, park, cemetery	
Proposed Land Use:	Neighborhood Business	
Rainfall Intensity, in/hr	2-year	2.2
	25-year	3.8
	50-year	4.5
	100-Year	5

Get Intensity from NOAA maps:
http://www.wrcc.dri.edu/pcpnfreq.html
Remember: Isoleths are in tenths (20=2.0 inches)
Acreage: 7.7 acres

Runoff Coeficients (c-Factor)

Land Use	low c	high c
Apartment	0.5	0.7
Downtown Business	0.7	0.95
Heavy Industry	0.6	0.9
Light Industry	0.5	0.8
Multi-family, attached	0.6	0.75
Multi-family, detached	0.4	0.6
Neighborhood Business	0.5	0.7
Playgrounds	0.2	0.4
Suburban Residential	0.25	0.4
Urban Single-family	0.3	0.5
Vacant, park, cemetery	0.1	0.25
Z - Undeveloped Coefficient from next page	0.26	0.38

LOW	***2-Year***		***25-Year***		***50-Year***		***100-Year***	
	Existing	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***
c =	0.10	0.50	0.12	0.58	0.12	0.60	0.13	0.63
I =	2.20	2.20	3.80	3.80	4.50	4.50	5.00	5.00
A =	7.70	7.70	7.70	7.70	7.70	7.70	7.70	7.70
Q =	2	8	3	17	4	21	5	24

HIGH	***2-Year***		***25-Year***		***50-Year***		***100-Year***	
	Existing	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***
c =	0.25	0.70	0.29	0.81	0.30	0.84	0.31	0.88
I =	2.20	2.20	3.80	3.80	4.50	4.50	5.00	5.00
A =	7.70	7.70	7.70	7.70	7.70	7.70	7.70	7.70
Q =	4	12	8	24	10	29	12	34

SUMMARY	***Existing***		***Post-Project***		***Increase, cfs***		***Percentage Increase***	
	Low	***High***	***Low***	***High***	***Low***	***High***	***Low***	***High***
2-Year	2	4	8	12	7	8	500%	280%
25-Year	3	8	17	24	13	15	500%	280%
50-Year	4	10	21	29	17	19	500%	280%
100-Year	5	12	24	34	19	22	500%	280%

**Note: Only for rough estimate within small urban areas (<40 acres)*

SIMPLIFIED RATIONAL APPROACH *
Zone A South (Medea Creek)
Full Buildout with Neighborhood Business (Post-Project Drainage)

Q=cIA

where: *Q = peak flow in cfs*
c = runoff coefficent
I = storm peak intensity
A = acreage of watershed (or site)

Runoff Coeficients (c-Factor)

Land Use	low c	high c
Apartment	0.5	0.7
Downtown Business	0.7	0.95
Heavy Industry	0.6	0.9
Light Industry	0.5	0.8
Multi-family, attached	0.6	0.75
Multi-family, detached	0.4	0.6
Neighborhood Business	0.5	0.7
Playgrounds	0.2	0.4
Suburban Residential	0.25	0.4
Urban Single-family	0.3	0.5
Vacant, park, cemetery	0.1	0.25
Z - Undeveloped Coefficient from next page	0.26	0.38

Project Details

Existing Land Use:	Vacant, park, cemetery	
Proposed Land Use:	Neighborhood Business	
Rainfall Intensity, in/hr	2-year	2.2
	25-year	3.8
	50-year	4.5
	100-Year	5

Get Intensity from NOAA maps:
http://www.wrcc.dri.edu/pcpnfreq.html
Remember: Isoleths are in tenths (20=2.0 inches)
Acreage: 13.7 acres

LOW	***2-Year***		***25-Year***		***50-Year***		***100-Year***	
	Existing	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***
c =	0.10	0.50	0.12	0.58	0.12	0.60	0.13	0.63
I =	2.20	2.20	3.80	3.80	4.50	4.50	5.00	5.00
A =	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70
Q =	3	15	6	30	7	37	9	43

HIGH	***2-Year***		***25-Year***		***50-Year***		***100-Year***	
	Existing	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***
c =	0.25	0.70	0.29	0.81	0.30	0.84	0.31	0.88
I =	2.20	2.20	3.80	3.80	4.50	4.50	5.00	5.00
A =	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70
Q =	8	21	15	42	18	52	21	60

SUMMARY	***Existing***		***Post-Project***		***Increase, cfs***		***Percentage Increase***	
	Low	***High***	***Low***	***High***	***Low***	***High***	***Low***	***High***
2-Year	3	8	15	21	12	14	500%	280%
25-Year	6	15	30	42	24	27	500%	280%
50-Year	7	18	37	52	30	33	500%	280%
100-Year	9	21	43	60	34	39	500%	280%

**Note: Only for rough estimate within small urban areas (<40 acres)*

SIMPLIFIED RATIONAL APPROACH *
Zone B (Lindero Canyon Creek)
Full Buildout with Neighborhood Business (Pre-Project Drainage)

Q=cIA

where: *Q = peak flow in cfs*
c = runoff coefficent
I = storm peak intensity
A = acreage of watershed (or site)

Runoff Coeficients (c-Factor)

Land Use	low c	high c
Apartment	0.5	0.7
Downtown Business	0.7	0.95
Heavy Industry	0.6	0.9
Light Industry	0.5	0.8
Multi-family, attached	0.6	0.75
Multi-family, detached	0.4	0.6
Neighborhood Business	0.5	0.7
Playgrounds	0.2	0.4
Suburban Residential	0.25	0.4
Urban Single-family	0.3	0.5
Vacant, park, cemetery	0.1	0.25
Z - Undeveloped Coefficient from next page	0.26	0.38

Project Details

Existing Land Use:	Vacant, park, cemetery	
Proposed Land Use:	Neighborhood Business	
Rainfall Intensity, in/hr	2-year	2.2
	25-year	3.8
	50-year	4.5
	100-Year	5

Get Intensity from NOAA maps:
http://www.wrcc.dri.edu/pcpnfreq.html
Remember: Isoleths are in tenths (20=2.0 inches)
Acreage: 22.1 acres

LOW	***2-Year***		***25-Year***		***50-Year***		***100-Year***	
	Existing	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***
c =	0.10	0.50	0.12	0.58	0.12	0.60	0.13	0.63
I =	2.20	2.20	3.80	3.80	4.50	4.50	5.00	5.00
A =	22.10	22.10	22.10	22.10	22.10	22.10	22.10	22.10
Q =	5	24	10	48	12	60	14	69

HIGH	***2-Year***		***25-Year***		***50-Year***		***100-Year***	
	Existing	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***
c =	0.25	0.70	0.29	0.81	0.30	0.84	0.31	0.88
I =	2.20	2.20	3.80	3.80	4.50	4.50	5.00	5.00
A =	22.10	22.10	22.10	22.10	22.10	22.10	22.10	22.10
Q =	12	34	24	68	30	84	35	97

SUMMARY	***Existing***		***Post-Project***		***Increase, cfs***		***Percentage Increase***	
	Low	***High***	***Low***	***High***	***Low***	***High***	***Low***	***High***
2-Year	5	12	24	34	19	22	500%	280%
25-Year	10	24	48	68	39	43	500%	280%
50-Year	12	30	60	84	48	54	500%	280%
100-Year	14	35	69	97	55	62	500%	280%

**Note: Only for rough estimate within small urban areas (<40 acres)*

SIMPLIFIED RATIONAL APPROACH *

Zone B (Lindero Canyon Creek)

Full Buildout with Neighborhood Business (Post-Project Drainage)

Q=cIA

where: *Q = peak flow in cfs*
c = runoff coefficent
I = storm peak intensity
A = acreage of watershed (or site)

Project Details

Existing Land Use:	Vacant, park, cemetery	
Proposed Land Use:	Neighborhood Business	
Rainfall Intensity, in/hr	2-year	2.2
	25-year	3.8
	50-year	4.5
	100-Year	5

Get Intensity from NOAA maps:
http://www.wrcc.dri.edu/pcpnfreq.html
Remember: Isoleths are in tenths (20=2.0 inches)
Acreage: 16.1 acres

Runoff Coeficients (c-Factor)

Land Use	low c	high c
Apartment	0.5	0.7
Downtown Business	0.7	0.95
Heavy Industry	0.6	0.9
Light Industry	0.5	0.8
Multi-family, attached	0.6	0.75
Multi-family, detached	0.4	0.6
Neighborhood Business	0.5	0.7
Playgrounds	0.2	0.4
Suburban Residential	0.25	0.4
Urban Single-family	0.3	0.5
Vacant, park, cemetery	0.1	0.25
Z - Undeveloped Coefficient from next page	0.26	0.38

LOW	***2-Year***		***25-Year***		***50-Year***		***100-Year***	
	Existing	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***
c =	0.10	0.50	0.12	0.58	0.12	0.60	0.13	0.63
I =	2.20	2.20	3.80	3.80	4.50	4.50	5.00	5.00
A =	16.10	16.10	16.10	16.10	16.10	16.10	16.10	16.10
Q =	4	18	7	35	9	43	10	50

HIGH	***2-Year***		***25-Year***		***50-Year***		***100-Year***	
	Existing	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***
c =	0.25	0.70	0.29	0.81	0.30	0.84	0.31	0.88
I =	2.20	2.20	3.80	3.80	4.50	4.50	5.00	5.00
A =	16.10	16.10	16.10	16.10	16.10	16.10	16.10	16.10
Q =	9	25	18	49	22	61	25	70

SUMMARY	***Existing***		***Post-Project***		***Increase, cfs***		***Percentage Increase***	
	Low	***High***	***Low***	***High***	***Low***	***High***	***Low***	***High***
2-Year	4	9	18	25	14	16	500%	280%
25-Year	7	18	35	49	28	32	500%	280%
50-Year	9	22	43	61	35	39	500%	280%
100-Year	10	25	50	70	40	45	500%	280%

**Note: Only for rough estimate within small urban areas (<40 acres)*

SIMPLIFIED RATIONAL APPROACH *

Zone C (Medea Creek Drainage)

Redevelopment with Downtown Business

Q=cIA

where: *Q = peak flow in cfs*
c = runoff coefficent
I = storm peak intensity
A = acreage of watershed (or site)

Runoff Coeficients (c-Factor)

Land Use	low c	high c
Apartment	0.5	0.7
Downtown Business	0.7	0.95
Heavy Industry	0.6	0.9
Light Industry	0.5	0.8
Multi-family, attached	0.6	0.75
Multi-family, detached	0.4	0.6
Neighborhood Business	0.5	0.7
Playgrounds	0.2	0.4
Suburban Residential	0.25	0.4
Urban Single-family	0.3	0.5
Vacant, park, cemetery	0.1	0.25
Z - Undeveloped Coefficient from next page	0.26	0.38

Project Details

Existing Land Use:	Neighborhood Business	
Proposed Land Use:	Downtown Business	
Rainfall Intensity, in/hr	2-year	2.2
	25-year	3.8
	50-year	4.5
	100-Year	5

Get Intensity from NOAA maps:
http://www.wrcc.dri.edu/pcpnfreq.html
Remember: Isoleths are in tenths (20=2.0 inches)
Acreage: 3.1 acres

LOW	***2-Year***		***25-Year***		***50-Year***		***100-Year***	
	Existing	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***
c =	0.50	0.70	0.58	0.81	0.60	0.84	0.63	0.88
I =	2.20	2.20	3.80	3.80	4.50	4.50	5.00	5.00
A =	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10
Q =	3	5	7	9	8	12	10	14

HIGH	***2-Year***		***25-Year***		***50-Year***		***100-Year***	
	Existing	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***
c =	0.70	0.95	0.81	1.09	0.84	1.14	0.88	1.19
I =	2.20	2.20	3.80	3.80	4.50	4.50	5.00	5.00
A =	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10
Q =	5	6	9	13	12	16	14	18

SUMMARY	***Existing***		***Post-Project***		***Increase, cfs***		***Percentage Increase***	
	Low	***High***	***Low***	***High***	***Low***	***High***	***Low***	***High***
2-Year	3	5	5	6	1	2	140%	136%
25-Year	7	9	9	13	3	3	140%	136%
50-Year	8	12	12	16	3	4	140%	136%
100-Year	10	14	14	18	4	5	140%	136%

**Note: Only for rough estimate within small urban areas (<40 acres)*

SIMPLIFIED RATIONAL APPROACH *

Zone D East (Cheseboro Creek Drainage)

Redevelopment with Downtown Business

Q=cIA

where: *Q = peak flow in cfs*
c = runoff coefficent
I = storm peak intensity
A = acreage of watershed (or site)

Project Details

Existing Land Use:	Neighborhood Business	
Proposed Land Use:	Downtown Business	
Rainfall Intensity, in/hr	2-year	2.2
	25-year	3.8
	50-year	4.5
	100-Year	5

Get Intensity from NOAA maps:
http://www.wrcc.dri.edu/pcpnfreq.html
Remember: Isoleths are in tenths (20=2.0 inches)
Acreage: 25.25 acres

Runoff Coeficients (c-Factor)

Land Use	low c	high c
Apartment	0.5	0.7
Downtown Business	0.7	0.95
Heavy Industry	0.6	0.9
Light Industry	0.5	0.8
Multi-family, attached	0.6	0.75
Multi-family, detached	0.4	0.6
Neighborhood Business	0.5	0.7
Playgrounds	0.2	0.4
Suburban Residential	0.25	0.4
Urban Single-family	0.3	0.5
Vacant, park, cemetery	0.1	0.25
Z - Undeveloped Coefficient from next page	0.26	0.38

LOW	***2-Year***		***25-Year***		***50-Year***		***100-Year***	
	Existing	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***
c =	0.50	0.70	0.58	0.81	0.60	0.84	0.63	0.88
I =	2.20	2.20	3.80	3.80	4.50	4.50	5.00	5.00
A =	25.25	25.25	25.25	25.25	25.25	25.25	25.25	25.25
Q =	28	39	55	77	68	95	79	110

HIGH	***2-Year***		***25-Year***		***50-Year***		***100-Year***	
	Existing	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***
c =	0.70	0.95	0.81	1.09	0.84	1.14	0.88	1.19
I =	2.20	2.20	3.80	3.80	4.50	4.50	5.00	5.00
A =	25.25	25.25	25.25	25.25	25.25	25.25	25.25	25.25
Q =	39	53	77	105	95	130	110	150

SUMMARY	***Existing***		***Post-Project***		***Increase, cfs***		***Percentage Increase***	
	Low	***High***	***Low***	***High***	***Low***	***High***	***Low***	***High***
2-Year	28	39	39	53	11	14	140%	136%
25-Year	55	77	77	105	22	28	140%	136%
50-Year	68	95	95	130	27	34	140%	136%
100-Year	79	110	110	150	32	39	140%	136%

**Note: Only for rough estimate within small urban areas (<40 acres)*

SIMPLIFIED RATIONAL APPROACH *
Zone D West (Lindero Canyon Creek Drainage)
Redevelopment with Downtown Business

Q=cIA

where: *Q = peak flow in cfs*
c = runoff coefficent
I = storm peak intensity
A = acreage of watershed (or site)

Runoff Coeficients (c-Factor)

Land Use	low c	high c
Apartment	0.5	0.7
Downtown Business	0.7	0.95
Heavy Industry	0.6	0.9
Light Industry	0.5	0.8
Multi-family, attached	0.6	0.75
Multi-family, detached	0.4	0.6
Neighborhood Business	0.5	0.7
Playgrounds	0.2	0.4
Suburban Residential	0.25	0.4
Urban Single-family	0.3	0.5
Vacant, park, cemetery	0.1	0.25
Z - Undeveloped Coefficient from next page	0.26	0.38

Project Details

Existing Land Use:	Neighborhood Business	
Proposed Land Use:	Downtown Business	
Rainfall Intensity, in/hr	2-year	2.2
	25-year	3.8
	50-year	4.5
	100-Year	5

Get Intensity from NOAA maps:
http://www.wrcc.dri.edu/pcpnfreq.html
Remember: Isoleths are in tenths (20=2.0 inches)
Acreage: 4.8 acres

LOW	***2-Year***		***25-Year***		***50-Year***		***100-Year***	
	Existing	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***
c =	0.50	0.70	0.58	0.81	0.60	0.84	0.63	0.88
I =	2.20	2.20	3.80	3.80	4.50	4.50	5.00	5.00
A =	4.80	4.80	4.80	4.80	4.80	4.80	4.80	4.80
Q =	5	7	10	15	13	18	15	21

HIGH	***2-Year***		***25-Year***		***50-Year***		***100-Year***	
	Existing	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***
c =	0.70	0.95	0.81	1.09	0.84	1.14	0.88	1.19
I =	2.20	2.20	3.80	3.80	4.50	4.50	5.00	5.00
A =	4.80	4.80	4.80	4.80	4.80	4.80	4.80	4.80
Q =	7	10	15	20	18	25	21	29

SUMMARY	***Existing***		***Post-Project***		***Increase, cfs***		***Percentage Increase***	
	Low	***High***	***Low***	***High***	***Low***	***High***	***Low***	***High***
2-Year	5	7	7	10	2	3	140%	136%
25-Year	10	15	15	20	4	5	140%	136%
50-Year	13	18	18	25	5	6	140%	136%
100-Year	15	21	21	29	6	8	140%	136%

**Note: Only for rough estimate within small urban areas (<40 acres)*

SIMPLIFIED RATIONAL APPROACH *
Zone E (Cheseboro Creek)
Full Buildout with Neighborhood Business

Q=cIA

where: *Q = peak flow in cfs*
c = runoff coefficent
I = storm peak intensity
A = acreage of watershed (or site)

Project Details

Existing Land Use:	Vacant, park, cemetery	
Proposed Land Use:	Neighborhood Business	
Rainfall Intensity, in/hr	2-year	2.2
	25-year	3.8
	50-year	4.5
	100-Year	5

Get Intensity from NOAA maps:
http://www.wrcc.dri.edu/pcpnfreq.html
Remember: Isoleths are in tenths (20=2.0 inches)
Acreage: 7.4 acres

Runoff Coeficients (c-Factor)

Land Use	low c	high c
Apartment	0.5	0.7
Downtown Business	0.7	0.95
Heavy Industry	0.6	0.9
Light Industry	0.5	0.8
Multi-family, attached	0.6	0.75
Multi-family, detached	0.4	0.6
Neighborhood Business	0.5	0.7
Playgrounds	0.2	0.4
Suburban Residential	0.25	0.4
Urban Single-family	0.3	0.5
Vacant, park, cemetery	0.1	0.25
Z - Undeveloped Coefficient from next page	0.26	0.38

LOW	*2-Year*		*25-Year*		*50-Year*		*100-Year*	
	Existing	*Post-Project*	*Existing*	*Post-Project*	*Existing*	*Post-Project*	*Existing*	*Post-Project*
c =	0.10	0.50	0.12	0.58	0.12	0.60	0.13	0.63
I =	2.20	2.20	3.80	3.80	4.50	4.50	5.00	5.00
A =	7.40	7.40	7.40	7.40	7.40	7.40	7.40	7.40
Q =	2	8	3	16	4	20	5	23

HIGH	*2-Year*		*25-Year*		*50-Year*		*100-Year*	
	Existing	*Post-Project*	*Existing*	*Post-Project*	*Existing*	*Post-Project*	*Existing*	*Post-Project*
c =	0.25	0.70	0.29	0.81	0.30	0.84	0.31	0.88
I =	2.20	2.20	3.80	3.80	4.50	4.50	5.00	5.00
A =	7.40	7.40	7.40	7.40	7.40	7.40	7.40	7.40
Q =	4	11	8	23	10	28	12	32

SUMMARY	*Existing*		*Post-Project*		*Increase, cfs*		*Percentage Increase*	
	Low	*High*	*Low*	*High*	*Low*	*High*	*Low*	*High*
2-Year	2	4	8	11	7	7	500%	280%
25-Year	3	8	16	23	13	15	500%	280%
50-Year	4	10	20	28	16	18	500%	280%
100-Year	5	12	23	32	19	21	500%	280%

**Note: Only for rough estimate within small urban areas (<40 acres)*

SIMPLIFIED RATIONAL APPROACH *
Zone F (Lindero Canyon Creek)
Full Buildout with Neighborhood Business

Q=cIA

where: *Q = peak flow in cfs*
c = runoff coefficent
I = storm peak intensity
A = acreage of watershed (or site)

Project Details

Existing Land Use:	Vacant, park, cemetery	
Proposed Land Use:	Neighborhood Business	
Rainfall Intensity, in/hr	2-year	2.2
	25-year	3.8
	50-year	4.5
	100-Year	5

Get Intensity from NOAA maps:
http://www.wrcc.dri.edu/pcpnfreq.html
Remember: Isoleths are in tenths (20=2.0 inches)
Acreage: 7.2 acres

Runoff Coeficients (c-Factor)

Land Use	low c	high c
Apartment	0.5	0.7
Downtown Business	0.7	0.95
Heavy Industry	0.6	0.9
Light Industry	0.5	0.8
Multi-family, attached	0.6	0.75
Multi-family, detached	0.4	0.6
Neighborhood Business	0.5	0.7
Playgrounds	0.2	0.4
Suburban Residential	0.25	0.4
Urban Single-family	0.3	0.5
Vacant, park, cemetery	0.1	0.25
Z - Undeveloped Coefficient from next page	0.26	0.38

LOW	***2-Year***		***25-Year***		***50-Year***		***100-Year***	
	Existing	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***
c =	0.10	0.50	0.12	0.58	0.12	0.60	0.13	0.63
I =	2.20	2.20	3.80	3.80	4.50	4.50	5.00	5.00
A =	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20
Q =	2	8	3	16	4	19	5	23

HIGH	***2-Year***		***25-Year***		***50-Year***		***100-Year***	
	Existing	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***	***Existing***	***Post-Project***
c =	0.25	0.70	0.29	0.81	0.30	0.84	0.31	0.88
I =	2.20	2.20	3.80	3.80	4.50	4.50	5.00	5.00
A =	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20
Q =	4	11	8	22	10	27	11	32

SUMMARY	***Existing***		***Post-Project***		***Increase, cfs***		***Percentage Increase***	
	Low	***High***	***Low***	***High***	***Low***	***High***	***Low***	***High***
2-Year	2	4	8	11	6	7	500%	280%
25-Year	3	8	16	22	13	14	500%	280%
50-Year	4	10	19	27	16	17	500%	280%
100-Year	5	11	23	32	18	20	500%	280%

**Note: Only for rough estimate within small urban areas (<40 acres)*

Appendix E

Noise Calculations

ROADWAY TRAFFIC NOISE

Project:	Agoura Village Specific Plan	Project No.	04-57370
Date:	24-Oct-05		

Roadway: U.S. Highway 101 East of Kanan Road

PROJECT DATA and ASSUMPTIONS

Vehicle Reference Energy Mean Emission Levels (FHWA 1977, TNM®, or CALVENO): TNM

Distance to Receptor:	187.5 feet
Site Condition (Hard or Soft):	Soft
Upgrade longer than 1 mile:	0 %
Existing Total Traffic Volume (ADT):	181,000 vehicles
Ambient Growth Factor:	0.0%
Future Year :	2010
Total Project Volume (ADT):	4,800 vehicles
Total Cumulative Growth Volume (ADT):	37,600 vehicles

Source of Traffic Data: AVSP Traffic Study

Daily Vehicle Mix

	Existing	*Project*	*Future*
Automobile	95.3%	96.5%	95.7%
Medium Truck	2.0%	3.0%	2.0%
Heavy Truck	2.7%	0.5%	2.3%

Source: 2003 Caltrans truck traffic

Percentage of Daily Traffic

	Existing and Future		
	Day (7 am-7 pm)	*Evening (7-10 pm)*	*Night (10 pm - 7 am)*
Automobile	77.5%	12.9%	9.6%
Medium Truck	84.8%	4.9%	10.3%
Heavy Truck	86.5%	2.7%	10.8%

Source: Default Assumption

	Project		
	Day (7 am-7 pm)	*Evening (7-10 pm)*	*Night (10 pm - 7 am)*
Automobile	77.5%	12.9%	9.6%
Medium Truck	84.8%	4.9%	10.3%
Heavy Truck	86.5%	2.7%	10.8%

Source: Default Assumption

Average Speed

	Existing		
	Day (7 am-7 pm)	*Evening (7-10 pm)*	*Night (10 pm - 7 am)*
Automobile	65	65	65
Medium Truck	65	65	65
Heavy Truck	65	65	65

Source: Assumed average speed

	Future		
	Day (7 am-7 pm)	*Evening (7-10 pm)*	*Night (10 pm - 7 am)*
Automobile	65	65	65
Medium Truck	65	65	65
Heavy Truck	65	65	65

Source: Assumed average speed

ROADWAY TRAFFIC NOISE

Project: Agoura Village Specific Plan — Project No. 04-57370
Date: 24-Oct-05

Roadway: U.S. Highway 101 East of Kanan Road

Vehicle Noise Emission Levels*: TNM

RESULTS

DAY-NIGHT AVERAGE LEVEL (Ldn)

	Ldn at Site 187.5 feet from road centerline	Distance to dBA Contour Line from roadway centerline, feet: 75	70	65	60	55
Existing	77.3 dBA	268	577	1243	2678	5770
Existing + Project	77.4 dBA	272	586	1262	2720	5859
Future with Ambient Growth	77.3 dBA	268	577	1243	2678	5770
Future with Ambient Growth and Project	77.4 dBA	272	586	1262	2720	5859
Future with Ambient Growth and Cumulative Projects	78.1 dBA	303	653	1406	3029	6525
Future with Ambient, Cumulative, and Project Growth	78.2 dBA	307	661	1424	3068	6609

Change in Noise Levels	
Due to Project	0.1 dBA
Due to Ambient Growth	0.0 dBA
Due to Ambient and Cumulative	0.8 dBA
Due to All Future Growth	0.9 dBA

COMMUNITY NOISE EXPOSURE LEVEL (CNEL)

	CNEL at Site 187.5 feet from road centerline	Distance to dBA Contour Line from roadway centerline, feet: 75	70	65	60	55
Existing	77.8 dBA	289	623	1341	2890	6225
Existing + Project	77.9 dBA	293	632	1362	2935	6323
Future with Ambient Growth	77.8 dBA	289	623	1341	2890	6225
Future with Ambient Growth and Project	77.9 dBA	293	632	1362	2935	6323
Future with Ambient Growth and Cumulative Projects	78.6 dBA	327	704	1517	3269	7042
Future with Ambient, Cumulative, and Project Growth	78.7 dBA	331	713	1537	3311	7134

Change in Noise Levels	
Due to Project	0.1 dBA
Due to Ambient Growth	0.0 dBA
Due to Ambient and Cumulative	0.8 dBA
Due to All Future Growth	0.9 dBA

*NOTES: Based on algorithms from the Federal Highway Administration "Traffic Noise Model ®", FHWA-PD-96-010, January, 1998.

#N/A = Not Applicable

ROADWAY TRAFFIC NOISE

Project:	Agoura Village Specific Plan	Project No.	04-57370
Date:	24-Oct-05		

Roadway: U.S. Highway 101 West of Kanan Road

PROJECT DATA and ASSUMPTIONS

Vehicle Reference Energy Mean Emission Levels (FHWA 1977, TNM®, or CALVENO):	TNM
Distance to Receptor:	187.5 feet
Site Condition (Hard or Soft):	Soft
Upgrade longer than 1 mile:	0 %
Existing Total Traffic Volume (ADT):	175,000 vehicles
Ambient Growth Factor:	0.0%
Future Year :	2010
Total Project Volume (ADT):	5,900 vehicles
Total Cumulative Growth Volume (ADT):	45,300 vehicles

Source of Traffic Data: AVSP Traffic Study, cumulative growth based on AVSP traffic model and cumulative development scenario for

Daily Vehicle Mix

	Existing	*Project*	*Future*
Automobile	95.3%	96.5%	95.8%
Medium Truck	2.0%	3.0%	2.0%
Heavy Truck	2.7%	0.5%	2.2%

Source: 2003 Caltrans Truck Traffic

Percentage of Daily Traffic

		Existing and Future	
	Day (7 am-7 pm)	*Evening (7-10 pm)*	*Night (10 pm - 7 am)*
Automobile	77.5%	12.9%	9.6%
Medium Truck	84.8%	4.9%	10.3%
Heavy Truck	86.5%	2.7%	10.8%

Source: Default Assumption

		Project	
	Day (7 am-7 pm)	*Evening (7-10 pm)*	*Night (10 pm - 7 am)*
Automobile	77.5%	12.9%	9.6%
Medium Truck	84.8%	4.9%	10.3%
Heavy Truck	86.5%	2.7%	10.8%

Source: Default Assumption

Average Speed

		Existing	
	Day (7 am-7 pm)	*Evening (7-10 pm)*	*Night (10 pm - 7 am)*
Automobile	65	65	65
Medium Truck	65	65	65
Heavy Truck	65	65	65

Source: Assumed average speed

		Future	
	Day (7 am-7 pm)	*Evening (7-10 pm)*	*Night (10 pm - 7 am)*
Automobile	65	65	65
Medium Truck	65	65	65
Heavy Truck	65	65	65

Source: Assumed average speed

ROADWAY TRAFFIC NOISE

Project: Agoura Village Specific Plan   Project No. 04-57370
Date: 24-Oct-05

Roadway: U.S. Highway 101 West of Kanan Road

Vehicle Noise Emission Levels*: TNM

RESULTS

DAY-NIGHT AVERAGE LEVEL (Ldn)	Ldn at Site 187.5 feet from road centerline	Distance to dBA Contour Line from roadway centerline, feet 75	70	65	60	55
Existing	77.2 dBA	262	564	1216	2619	5642
Existing + Project	77.3 dBA	267	575	1239	2670	5753
Future with Ambient Growth	77.2 dBA	262	564	1216	2619	5642
Future with Ambient Growth and Project	77.3 dBA	267	575	1239	2670	5753
Future with Ambient Growth and Cumulative Projects	78.1 dBA	304	655	1411	3041	6551
Future with Ambient, Cumulative, and Project Growth	78.3 dBA	309	665	1434	3088	6654

Change in Noise Levels	
Due to Project	0.1 dBA
Due to Ambient Growth	0.0 dBA
Due to Ambient and Cumulative	1.0 dBA
Due to All Future Growth	1.1 dBA

COMMUNITY NOISE EXPOSURE LEVEL (CNEL)	CNEL at Site 187.5 feet from road centerline	Distance to dBA Contour Line from roadway centerline, feet 75	70	65	60	55
Existing	77.7 dBA	283	609	1311	2825	6087
Existing + Project	77.8 dBA	288	621	1337	2881	6208
Future with Ambient Growth	77.7 dBA	283	609	1311	2825	6087
Future with Ambient Growth and Project	77.8 dBA	288	621	1337	2881	6208
Future with Ambient Growth and Cumulative Projects	78.6 dBA	328	707	1523	3282	7070
Future with Ambient, Cumulative, and Project Growth	78.7 dBA	333	718	1548	3334	7183

Change in Noise Levels	
Due to Project	0.1 dBA
Due to Ambient Growth	0.0 dBA
Due to Ambient and Cumulative	1.0 dBA
Due to All Future Growth	1.1 dBA

*NOTES: Based on algorithms from the Federal Highway Administration "Traffic Noise Model ®", FHWA-PD-96-010, January, 1998.

#N/A = Not Applicable

ROADWAY TRAFFIC NOISE

Project:	Agoura Village Specific Plan	Project No.	04-57370
Date:	24-Oct-05		

Roadway: Kanan Road North of Agoura Road

PROJECT DATA and ASSUMPTIONS

Vehicle Reference Energy Mean Emission Levels (FHWA 1977, TNM®, or CALVENO):	TNM
Distance to Receptor:	75 feet
Site Condition (Hard or Soft):	Soft
Upgrade longer than 1 mile:	0 %
Existing Total Traffic Volume (ADT):	20,000 vehicles
Ambient Growth Factor:	0.0%
Future Year :	2010
Total Project Volume (ADT):	9,900 vehicles
Total Cumulative Growth Volume (ADT):	7,000 vehicles
Source of Traffic Data:	AVSP Traffic Study

Daily Vehicle Mix

	Existing	*Project*	*Future*
Automobile	96.0%	99.0%	97.1%
Medium Truck	2.0%	0.5%	1.6%
Heavy Truck	2.0%	0.5%	1.4%

Source: Assumed given land use and road characteristics

Percentage of Daily Traffic

	Existing and Future		
	Day (7 am-7 pm)	*Evening (7-10 pm)*	*Night (10 pm - 7 am)*
Automobile	77.5%	12.9%	9.6%
Medium Truck	84.8%	4.9%	10.3%
Heavy Truck	86.5%	2.7%	10.8%

Source: Default Assumption

	Project		
	Day (7 am-7 pm)	*Evening (7-10 pm)*	*Night (10 pm - 7 am)*
Automobile	77.5%	12.9%	9.6%
Medium Truck	84.8%	4.9%	10.3%
Heavy Truck	86.5%	2.7%	10.8%

Source: Default Assumption

Average Speed

	Existing		
	Day (7 am-7 pm)	*Evening (7-10 pm)*	*Night (10 pm - 7 am)*
Automobile	35	35	35
Medium Truck	35	35	35
Heavy Truck	35	35	35

Source: Assumed average speed

	Future		
	Day (7 am-7 pm)	*Evening (7-10 pm)*	*Night (10 pm - 7 am)*
Automobile	35	35	35
Medium Truck	35	35	35
Heavy Truck	35	35	35

Source: Assumed average speed

ROADWAY TRAFFIC NOISE

Project: Agoura Village Specific Plan   Project No. 04-57370
Date: 24-Oct-05

Roadway: Kanan Road North of Agoura Road

Vehicle Noise Emission Levels*: TNM

RESULTS

DAY-NIGHT AVERAGE LEVEL (Ldn)	Ldn at Site 75 feet from road centerline	Distance to dBA Contour Line from roadway centerline, feet 75	70	65	60	55
Existing	66.0 dBA	#N/A	30	88	189	407
Existing + Project	67.4 dBA	#N/A	50	108	233	502
Future with Ambient Growth	66.0 dBA	#N/A	30	88	189	407
Future with Ambient Growth and Project	67.4 dBA	#N/A	50	108	233	502
Future with Ambient Growth and Cumulative Projects	67.2 dBA	#N/A	39	105	227	489
Future with Ambient, Cumulative, and Project Growth	68.3 dBA	16	58	124	268	577

Change in Noise Levels	
Due to Project	1.4 dBA
Due to Ambient Growth	0.0 dBA
Due to Ambient and Cumulative	1.2 dBA
Due to All Future Growth	2.3 dBA

COMMUNITY NOISE EXPOSURE LEVEL (CNEL)	CNEL at Site 75 feet from road centerline	Distance to dBA Contour Line from roadway centerline, feet 75	70	65	60	55
Existing	66.5 dBA	#N/A	33	94	202	436
Existing + Project	67.9 dBA	15	54	116	251	540
Future with Ambient Growth	66.5 dBA	#N/A	33	94	202	436
Future with Ambient Growth and Project	67.9 dBA	15	54	116	251	540
Future with Ambient Growth and Cumulative Projects	67.7 dBA	#N/A	52	113	243	524
Future with Ambient, Cumulative, and Project Growth	68.8 dBA	18	62	134	288	620

Change in Noise Levels	
Due to Project	1.4 dBA
Due to Ambient Growth	0.0 dBA
Due to Ambient and Cumulative	1.2 dBA
Due to All Future Growth	2.3 dBA

*NOTES: Based on algorithms from the Federal Highway Administration "Traffic Noise Model ®", FHWA-PD-96-010, January, 1998.

#N/A = Not Applicable

ROADWAY TRAFFIC NOISE

Project:	Agoura Village Specific Plan	Project No.	04-57370
Date:	24-Oct-05		

Roadway: U.S. Highway 101 West of Kanan Road

PROJECT DATA and ASSUMPTIONS

Vehicle Reference Energy Mean Emission Levels (FHWA 1977, TNM®, or CALVENO): TNM

Distance to Receptor:	187.5 feet
Site Condition (Hard or Soft):	Soft
Upgrade longer than 1 mile:	0 %
Existing Total Traffic Volume (ADT):	175,000 vehicles
Ambient Growth Factor:	0.0%
Future Year :	2010
Total Project Volume (ADT):	5,900 vehicles
Total Cumulative Growth Volume (ADT):	45,300 vehicles

Source of Traffic Data: AVSP Traffic Study, cumulative growth based on AVSP traffic model and cumulative development scenario for

Daily Vehicle Mix

	Existing	*Project*	*Future*
Automobile	95.3%	96.5%	95.8%
Medium Truck	2.0%	3.0%	2.0%
Heavy Truck	2.7%	0.5%	2.2%

Source: 2003 Caltrans Truck Traffic

Percentage of Daily Traffic

	Existing and Future		
	Day (7 am-7 pm)	*Evening (7-10 pm)*	*Night (10 pm - 7 am)*
Automobile	77.5%	12.9%	9.6%
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Heavy Truck	86.5%	2.7%	10.8%

Source: Default Assumption

	Project		
	Day (7 am-7 pm)	*Evening (7-10 pm)*	*Night (10 pm - 7 am)*
Automobile	77.5%	12.9%	9.6%
Medium Truck	84.8%	4.9%	10.3%
Heavy Truck	86.5%	2.7%	10.8%

Source: Default Assumption

Average Speed

	Existing		
	Day (7 am-7 pm)	*Evening (7-10 pm)*	*Night (10 pm - 7 am)*
Automobile	65	65	65
Medium Truck	65	65	65
Heavy Truck	65	65	65

Source: Assumed average speed

	Future		
	Day (7 am-7 pm)	*Evening (7-10 pm)*	*Night (10 pm - 7 am)*
Automobile	65	65	65
Medium Truck	65	65	65
Heavy Truck	65	65	65

Source: Assumed average speed

ROADWAY TRAFFIC NOISE

Project: Agoura Village Specific Plan Project No. 04-57370
Date: 24-Oct-05

Roadway: U.S. Highway 101 West of Kanan Road

Vehicle Noise Emission Levels*: TNM

RESULTS

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Future with Ambient, Cumulative, and Project Growth	78.3 dBA	309	665	1434	3088	6654

Change in Noise Levels	
Due to Project	0.1 dBA
Due to Ambient Growth	0.0 dBA
Due to Ambient and Cumulative	1.0 dBA
Due to All Future Growth	1.1 dBA

COMMUNITY NOISE EXPOSURE LEVEL (CNEL)

	CNEL at Site 187.5 feet from road centerline	Distance to dBA Contour Line from roadway centerline, feet 75	70	65	60	55
Existing	77.7 dBA	283	609	1311	2825	6087
Existing + Project	77.8 dBA	288	621	1337	2881	6208
Future with Ambient Growth	77.7 dBA	283	609	1311	2825	6087
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Future with Ambient Growth and Cumulative Projects	78.6 dBA	328	707	1523	3282	7070
Future with Ambient, Cumulative, and Project Growth	78.7 dBA	333	718	1548	3334	7183

Change in Noise Levels	
Due to Project	0.1 dBA
Due to Ambient Growth	0.0 dBA
Due to Ambient and Cumulative	1.0 dBA
Due to All Future Growth	1.1 dBA

*NOTES: Based on algorithms from the Federal Highway Administration "Traffic Noise Model ®", FHWA-PD-96-010, January, 1998.

#N/A = Not Applicable

TO DETERMINE NOISE CONTOURS FOR A GIVEN NOISE LEVEL					
ATTENUATION RATE:	4.5	dBA/DOUBLING OF DISTANCE			
(Choice: 3, 4.5, or 6)			Note: Within 0-10 feet from		
NOISE LEVEL:	78.7	dBA	the source, there is		
REFERENCE DISTANCE:	187.5	FEET	virtually no attenuation.		
NOISE CONTOUR	DISTANCE FROM SOURCE		SPECIFIC DISTANCE	NOISE LEVEL	
75	331	feet	50	87.3	
70	713	feet	100	82.8	
65	1536	feet	150	80.2	
60	3309	feet	200	78.3	
55	7129	feet	400	73.8	
50	15358	feet	500	72.3	
75	331	feet			
74	386	feet			
73	450	feet			
72	524	feet			
71	611	feet			
70	713	feet			
69	831	feet			
68	969	feet			
67	1130	feet			
66	1317	feet			
65	1536	feet			
64	1791	feet			
63	2088	feet			
62	2434	feet			
61	2838	feet			
60	3309	feet			

CNEL Contour Basis for Both Segments of U.S. 101 (East + West Sides of Kanan Road)

BUILDING SHIELDING - Note: if first row of buildings is greater than 90%, calculate buildings as a sound barrier.								
Percent of first row occupied by buildings:	40	%		3	0	40	65	66
Number of additional rows:	1				0	3	3	5
Attenuation to subtract from Ldn or CNEL:	-4.5	dB						
TREE SHIELDING - Must be at least 100 feet wide, and dense enough that the roadway is not visible. If this adjustment is used, distance propagation as a hard site must be used also.								
Width of forest belt:	0	feet						
Attenuation to subtract from Ldn or CNEL:	0	dB						

Background for Table 4.9-6