

FUGRO WEST, INC.



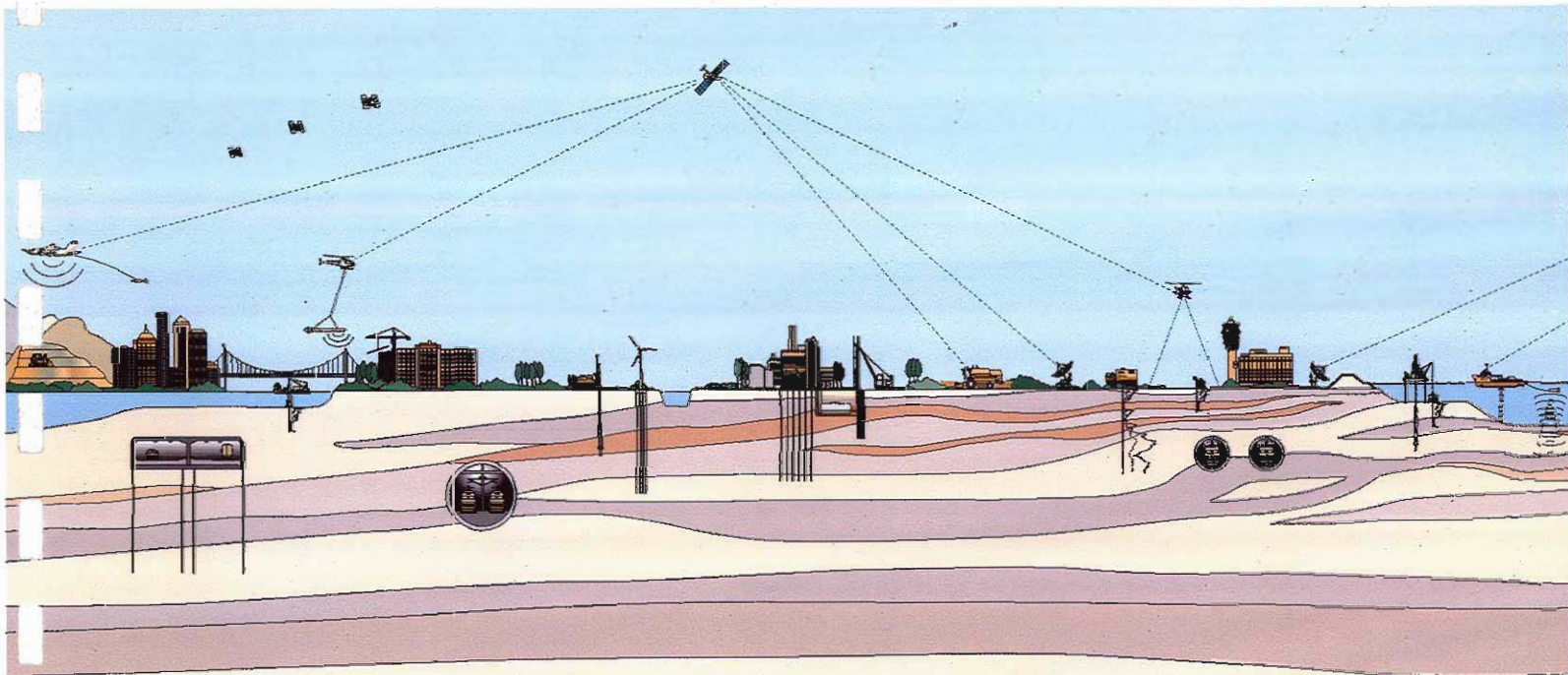
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**SUMMARY OF PAVEMENT CONDITION ASSESSMENT
COLLEGE OF MARIN
INDIAN VALLEY CAMPUS
NOVATO, CALIFORNIA**

Prepared for:
MARIN COMMUNITY COLLEGE DISTRICT

DECEMBER 2005

Project No. 1715.001





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December 14, 2005
Project No. 1715.001

Marin Community College District
c/o Swinerton Management
P.O. Box 144003
835 College Avenue, Building MS-3
Kentfield, California 94904-4003

Attention: Ms. Suzanne Brown

Subject: Summary of Pavement Condition Assessment
College of Marin, Indian Valley Campus, California

Dear Ms. Brown:

Fugro West, Inc., (Fugro) is pleased to present this letter summarizing the results of our field and laboratory assessment of select existing pavements at the Indian Valley Campus of the College of Marin in Novato, California.

PROJECT DESCRIPTION

In order to provide additional data to support the project assessment team in the evaluation of the existing condition and possible rehabilitation needs for the existing pavements at the Indian Valley Campus, Fugro performed shallow borings to evaluate the thicknesses of the existing pavement sections, and laboratory testing of recovered pavement subgrade materials at select locations throughout the campus. The scope of our work included drilling of shallow test borings at locations designated by the project team; measurement of the thickness of components of the existing pavement sections (e.g., asphalt concrete and baserock, if present); laboratory R-value testing of pavement subgrade samples recovered from select boring locations; and comparison of pavement sections encountered in our borings with pavement sections as determined from our engineering calculations that would be suitable for an 11- to 20-year design life.

EXISTING DATA

Fugro reviewed the results of previous geotechnical investigations performed for the Marin College District, including the reports titled, "Report, Site and Foundation Investigation, Initial Facilities, Indian Valley Colleges, Novato, California," dated March 14, 1973; and "Report, Soil and Foundation Investigation, Proposed Physical Education Facilities, Phase III of Indian Valley Colleges, Novato, California," dated May 20, 1975; both prepared by Cooper Clark & Associates. These reports contained the results of R-value laboratory tests performed on various proposed pavement subgrade materials, as summarized below.





FIELD EXPLORATION

Between October 17 and 20, 2005, Fugro conducted seventeen exploratory borings as a part of our baseline geologic hazards study and pavement assessment. The exploratory borings, designated B-1 through B-18, were drilled with a truck-mounted drill rig. Boring B-3 was not performed due to the presence of numerous underground utilities in the selected location. Borings B-2, B-8, and B-13 were performed for the geologic hazards study, and were drilled to depths of 45, 45, and 29 feet, respectively, using hollow-stem augers. Borings B-2 and B-8 were converted into 2-inch-diameter open-standpipe piezometers.

All other borings were drilled specifically for the pavement assessment using solid flight augers, and extended to depths of about 4 to 5 feet below the existing ground surface. The general locations of the exploratory borings are summarized on Table 1. Specific boring locations are shown on the Site Plan included in the Fugro report titled, "Baseline Geologic Hazards Study, College of Marin Indian Valley Campus, Novato, California," dated December 2005. Our field geotechnical engineer measured pavement component thicknesses at each boring location, logged the subsurface soils, and recovered bulk samples of subgrade soils for laboratory testing. Copies of all Fugro exploratory boring logs are attached to this letter for convenience, and are also contained in the Baseline Geologic Hazards Study report.

LABORATORY TESTING

Eight R-value tests were performed at Fugro's soil mechanics laboratory in Oakland, California, on bulk subgrade samples recovered from the Indian Valley Campus parking lots and roadways, at depths extending from the bottom of the pavement materials up to about 5 feet.

The resistance R-value tests were performed in accordance with California Test Method 301-F, and the reported R-values represent resistance values corresponding with exudation pressures of 300 pounds per square inch.

SUMMARY OF FINDINGS

The pavement sections encountered in our exploratory borings generally consisted of asphalt concrete ranging in thickness from 2½ to 5 inches. No baserock material was encountered. Subgrade soils encountered below the asphalt concrete generally consisted of sandy clay and silt. A summary of the existing pavement sections encountered is presented below in Table 1.



Table 1. Summary of Existing Pavement Sections at Boring Locations

Boring Number	Location	Asphalt Concrete Thickness (in)	Aggregate Base/rock Thickness (in)
B-1	Parking Lot 1 (south side)	5	-
B-2	North of Bridge 6	3	-
B-4	Perimeter Road (near Building 15)	3	-
B-5	Perimeter Road	3	-
B-6	Perimeter Road	3	-
B-7	Perimeter Road	4	-
B-8	Perimeter Road (south of Bridge 2)	2½	-
B-9	Parking Lot 8 (north side)	3	-
B-10	Ignacio Boulevard (west end of Parking Lot 7)	3½	-
B-11	Parking Lot 7 (northeast corner)	3	-
B-12	Parking Lot 6 (south side)	3	-
B-13	Northeast of Bridge 4	2½	-
B-14	Parking Lot 5 (south side)	3	-
B-15	Ignacio Boulevard (north of dog bone)	3	-
B-16	Parking Lot 3 (near center)	3	-
B-17	Parking Lot 2 (northwest corner)	3	-
B-18	Ignacio Boulevard (at entrance to Parking Lots 1 and 2)	3	-

The results of the R-value tests from our geotechnical exploration as well as from previous investigations are summarized in Table 2 below.

Table 2. Results of R-Value Tests

Boring Number and Depth	Elevation (feet)	Location	Description of Material	R-Value (at 300 psi Exudation)
B-4 (0-5 ft)	214½-219½	Perimeter Road (near Building 15)	Light brown SAND with clay (SP-SC)	65
B-5 (0-5 ft)	216-221	Perimeter Road	Red brown clayey SAND (SC-CL)	48
B-10 (0-5 ft)	206-211	Ignacio Boulevard (west end of Parking Lot 7)	Brown clayey SAND (SC)	51
B-11 (0-5 ft)	198½-203½	Parking Lot 7 (northeast corner)	Brown sandy CLAY (CL)	37
B-14 (0-5 ft)	168-173	Parking Lot 5 (south side)	Dark brown sandy CLAY (CL)	26
B-15 (0-5 ft)	167½-172½	Ignacio Boulevard (north of dog bone)	Brown clayey SAND (SC-CL)	43
B-16 (0-5 ft)	159½-164½	Parking Lot 3 (near center)	Brown clayey SAND (SC-CL)	43
B-18 (0-5 ft)	154½-159½	Ignacio Boulevard (at entrance to Parking Lots 1 and 2)	Red brown clayey SAND (SC)	55



Boring Number and Depth	Elevation (feet)	Location	Description of Material	R-Value (at 300 psi Exudation)
		1 and 2)		
P-1 ¹ (1-2 ft)	139-140	Ignacio Boulevard (east of campus)	Grayish brown sandy CLAY (CL-ML)	24
P-2 ¹ (1-2 ft)	147½-148½	Parking Lot 1 (southeast corner)	Grayish brown sandy CLAY (CL)	13
P-2 ¹ (1-2 ft)	147½-148½	Parking Lot 1 (southeast corner)	Grayish brown sandy CLAY with 4% lime	75
P-3 ¹ (3-4 ft)	153-154	Ignacio Boulevard (at entrance to Parking Lots 1 and 2)	Yellowish brown clayey SAND (SC)	24
P-4 ¹ (1-2 ft)	155-156	Parking Lot 2	Grayish brown sandy CLAY (CL)	12
P-6 ¹ (2-3 ft)	173-174	West of Building 11	Grayish brown sandy CLAY with gravel (CL)	9
P-8 ¹ (7-8 ft)	201-202	Ignacio Boulevard (next to Parking Lot 7)	Brown highly decomposed SANDSTONE	18
P-9 ¹ (1-2 ft)	198-199	Parking Lot 8	Brown clayey SAND (SC)	14
P-10 ¹ (3-4 ft)	224½-225½	Tennis Courts (west end)	Yellowish brown sandy CLAY (CL)	9
P-11 ¹ (2.5-3.5 ft)	214½-215½	Tennis Courts (middle)	Brown sandy CLAY (CL)	11
P-11 ¹ (2.5-3.5 ft)	214½-215½	Tennis Courts (middle)	Brown sandy CLAY with 4% lime	67
P-12 ¹ (1.5-2.5 ft)	207½-208½	Tennis Courts (east end)	Brown sandy CLAY (CL-ML)	17
P-14 ¹ (8-9 ft)	213-214	West of Building 17	Yellowish brown highly decomposed SANDSTONE	67
P-15 ¹ (2-3 ft)	224½-225½	Perimeter Road	Brown sandy CLAY (CL-ML)	12
P-16 ¹ (2.5-3.5 ft)	230½-231½	Perimeter Road	Brown sandy CLAY (CL)	14
P-17 ¹ (3-4 ft)	220-221	Perimeter Road	Grayish brown sandy CLAY (CL)	12
P-18 ¹ (2.5-3.5 ft)	212½-213½	Perimeter Road	Yellowish brown clayey SAND (SC)	31
P-20 ¹ (3-4 ft)	179-180	Perimeter Road (near Building 1)	Brown silty CLAY with gravel (CL-ML)	48
P-21 ¹ (1-2 ft)	216½-217½	Hard Courts (west of Building 22)	Brown silty GRAVEL (GM)	53
P-23 ¹ (2-3 ft)	206-207	Hard Courts (west of Building 22)	Brown sandy CLAY (CL)	12
P-23 ¹ (2-3 ft)	206-207	Hard Courts (west of Building 22)	Brown sandy CLAY with 4% lime	66
R-1 ²	-	West of Men's Locker Room	Dark Brown Sandy CLAY (CL)	77

¹ Cooper Clark & Associates (1972)

² Cooper Clark & Associates (1975)

PRELIMINARY EVALUATION

Using the computer program PAVE, Version 1.0, we calculated Caltrans full depth asphalt concrete design sections, assuming an 11- to 20-year design life. These sections were



compared to pavement sections encountered in the borings for which R-Value tests were performed. For borings on access roads and Ignacio Boulevard, a design traffic index (TI) of 6.5 was assumed. For parking lot pavements, a TI of 4.5 was assumed, which is judged to be typical for pavements receiving only automobile traffic. The following table compares the calculated full-depth asphalt sections with those encountered in each boring.

Table 3. Comparison: Calculated Versus Existing Asphalt Concrete Pavement Sections

Boring Number	Location	Assumed Traffic Index	Existing Asphalt Concrete Thickness (in)	Design Minimum Full-Depth Asphalt Concrete Thickness (in) for 11-20-Year Life
B-4	Perimeter Road (near Building 15)	6.5	3	5.0
B-5	Perimeter Road	6.5	3	6.5
B-10	Ignacio Boulevard (west end of Parking Lot 7)	6.5	3.5	6.5
B-11	Parking Lot 7 (northeast corner)	4.5	3	5.5
B-14	Parking Lot 5 (south side)	4.5	3	6.0
B-15	Ignacio Boulevard (north of dog bone)	6.5	3	7.5
B-16	Parking Lot 3 (near center)	4.5	3	5.0
B-18	Ignacio Boulevard (at entrance to Parking Lots 1 and 2)	6.5	3	6.0

The comparison shows that all of the existing pavement sections at the evaluated boring locations were thinner than the design full-depth asphalt concrete thickness calculated to be required to support the assumed traffic indexes for an 11- to 20-year design life.

Our evaluation of the existing pavements did not include a detailed physical survey of the condition of the existing pavements, and did not take into account the actual age of the pavements, nor the degree of traffic loading to which the pavements have actually been subjected in the past. An evaluation of remaining useful life of the existing pavements for possible overlay design would require the use of in situ deflection testing using a *Dynaflect* or a falling weight deflectometer device.



If you have any questions or comments, please do not hesitate to contact us.

Sincerely,
FUGRO WEST, INC.

Jon C. Hagen, P.E.
Project Engineer



Corey T. Dare, P.E., G.E.
Principal Engineer

JCH/CTD:rp

Attachments: Logs of Exploratory Borings B-1, B-2, B-4 through B-18

Copies Submitted: (2) Addressee

LOGS OF EXPLORATORY BORINGS



MAJOR DIVISIONS			GROUP NAMES		GENERAL NOTES
COARSE-GRAINED SOILS More than 50% retained on the No. 200 sieve	GRAVELS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	Clean gravels less than 5% fines	GW		
			GP		Poorly Graded Gravel
		Gravels with more than 12% fines	GM		Silty Gravel
			GC		Clayey Gravel
	SANDS MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	Clean sand less than 5% fines	SW		Well-Graded Sand
			SP		Poorly Graded Sand
		Sands with more than 12% fines	SM		Silty Sand
			SC		Clayey Sand
FINE-GRAINED SOILS 50% or more passes the No. 200 sieve	SILTS AND CLAYS Liquid Limit Less than 50%	ML		Silt	
		CL		Lean Clay	
		OL		Organic Silt	
	SILTS AND CLAYS Liquid Limit Greater than 50%	MH		Elastic Silt	
		CH		Fat Clay	
		OH		Organic Clay	
HIGHLY ORGANIC SOILS		PT		Peat or Highly Organic Soils	
FILL		FILL		Debris or Mixed Fill	
AC		AC		Asphalt Concrete Pavement with Aggregate Base	

SAMPLER TYPE

1 SPT 2 MC 3 CA 4 SH 5 BB 6 HA 7 LS 8 PS 9 VS 10 NR 11 RC

Samplers and sampler dimensions (unless otherwise noted in report text) are as follows:

1 SPT Sampler, driven 1 3/8" ID, 2" OD	6 Hand Auger Sample
2 MOD CA Liner Sampler 2 3/8" ID, 3" OD	7 Lexan Sample
3 CA Liner Sampler 1 7/8" ID, 2.5" OD	8 Pitcher Sample
4 Thin-walled Tube, pushed 2 7/8" ID, 3" OD	9 Vibracore Sample
5 Bulk Bag Sample (from cuttings)	10 No Sample Recovered
	11 Rock Core

SOIL STRUCTURE

Fissured: Containing shrinkage or relief cracks, often filled with fine sand or silt, usually more or less vertical.

Pocket: Inclusion of material of different texture that is smaller than the diameter of the sample.

Parting: Inclusion less than 1/8 inch thick extending through the sample.

Seam: Inclusion 1/8 inch to 3 inches thick extending through the sample.

Layer: Inclusion greater than 3 inches thick extending through the sample.

Laminated: Soil sample composed of alternating partings or seams of different soil types.

Interlayered: Soil sample composed of alternating layers of different soil type.

Intermixed: Soil sample composed of pockets of different soil type, and layered or laminated structure is not evident.

CONSISTENCY

Clays	Blows/Foot SPT	Undrained Shear Strength (ksf)
Very Soft	0 - 2	0 - 0.25
Soft	3 - 4	0.25 - 0.5
Firm	5 - 8	0.5 - 1
Stiff	9 - 16	1 - 2
Very Stiff	17 - 32	2 - 4
Hard	Over 32	Over 4

RELATIVE DENSITY

Sands and Gravels	Blows/Foot SPT
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	Over 50

INCREASING VISUAL MOISTURE CONTENT

Dry
Moist
Wet

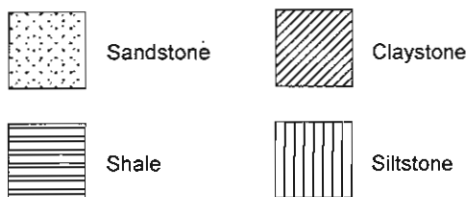
Information on each boring log is a compilation of subsurface conditions and soil or rock classifications obtained from the field as well as from laboratory testing of samples. Strata have been interpreted by commonly accepted procedures. The stratum lines on the logs may be transitional and approximate in nature. Water level measurements refer only to those observed at the time and places indicated, and can vary with time, geologic condition, or construction activity.

WEATHERING *	
FRESH	Rock fresh, crystals bright, few joints may show slight staining. Rock rings under hammer blows if crystalline.
VERY SLIGHT	Rock generally fresh, joints stained, some joints may show thin clay coatings, crystals in broken face show bright. Rings under hammer blows if crystalline.
SLIGHT	Rock generally fresh, joints stained, and discoloration extends into rock up to 1 inch. Joints may contain clay. In granitoid rocks, some occasional feldspar crystals are dull and discolored. Crystalline rock rings under hammer blows.
MODERATE	Significant portions of rock show discoloration and weathering effects. In granitoid rocks, most feldspars are dull and discolored; some show clayey. Rock has dull sound under hammer blows and shows significant loss of strength as compared with fresh rock.
MODERATELY SEVERE	All rock except quartz discolored or stained. In granitoid rocks, all feldspars dull and discolored and majority show kaolinization. Rock shows severe loss of strength and can be excavated with geologist's pick. Rock goes "clunk" when struck.
SEVERE	All rock except quartz discolored or stained. Rock "fabric" clear and evident, but reduced in strength to strong soil. In some granitoid rocks, all feldspar kaolinized to some extent. Some fragments of strong rock usually remain.
VERY SEVERE	All rock except quartz discolored or stained. Rock "fabric" discernible, but rock mass effectively reduced to "soil" with only fragments of strong rock remaining.
COMPLETE	Rock reduced to "soil." Rock "fabric" not discernible or discernible only in small scattered locations. Quartz may be present as dikes or stringers.

* After GSA, Engineering Geology Division, Data Sheet 1, 1980.

STRENGTH	
VERY STRONG	Resists breakage from hammer blows; but will yield dust and small chips.
STRONG	Withstands a few hammer blows; but will yield large fragments.
MODERATELY STRONG	Withstands a few firm hammer blows.
WEAK	Crumbles with light hammer blows.
FRIABLE	Can be broken down with hand and finger pressure.

ROCK QUALITY DESIGNATION	
RQD	ROCK MASS QUALITY
90-100	Excellent
75-90	Good
50-75	Fair
25-50	Poor
0-25	Very Poor



Rock Quality Designation (RQD) is the ratio of the total length of core segments longer than 4 in. to the total length of the core run, expressed as a percentage. Mechanical breaks are ignored in the calculation of total length of segments greater than 4 in. long. RQD will always be equal to, or less than, % Recovery.

Percent Recovery is the ratio of the total length of core recovered to the total length of the core run, expressed as a percentage.

DISCONTINUITY SPACING		
JOINTS	BEDDING, CLEAVAGE, FOLIATION	SPACING
VERY CLOSE	VERY THIN	Less than 2 inches
CLOSE	THIN	2 inches to 1 foot
MODERATELY CLOSE	MEDIUM	1 foot to 3 feet
WIDE	THICK	3 feet to 10 feet
VERY WIDE	VERY THICK	Greater than 10 feet

HARDNESS	
VERY HARD	Cannot be scratched with a knife; metal powder left on sample.
HARD	Scratched with knife with difficulty; trace of metal powder left on samples; scratch faintly visible.
MODERATELY HARD	Readily scratched with knife, scratch leaves heavy trace of dust and is readily visible.
LOW HARDNESS	Gouged or grooved to 1/16 inch by firm pressure on knife; scratches with penny.
SOFT	Gouged or grooved readily with knife; small thin pieces can be broken by finger pressure.
VERY SOFT	Carves with knife; scratched by fingernail.

ROUGHNESS OF DISCONTINUITY SURFACES	
SMOOTH	Appears smooth and is essentially smooth to the touch. May be slickensided.
SLIGHTLY ROUGH	Asperities on surfaces are visible and distinct.
MEDIUM ROUGH	Asperities are clearly visible and surface feels abrasive.
ROUGH	Large angular asperities can be seen. Some ridge and high side angle steps are evident.
VERY ROUGH	Near vertical steps and ridges occur on surfaces.

ROCK MASS PHYSICAL DESCRIPTION





DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	LOCATION: South side of Parking Lot 1 SURFACE EL: 153.5 ft +/- 0.5 (rel. MSL datum)	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u , ksf	OTHER TESTS
					MATERIAL DESCRIPTION							
0					Asphalt Concrete (5 inches)							
1		B1			Lean CLAY with sand (CL): very stiff, brown, moist, fine-grained sand							
2				(33)								
3				21		108	21				4.0 P	
4					Sandy Lean CLAY (CL): very stiff, yellowish brown, moist, fine-grained sand			64				
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
 DEPTH TO WATER: Not Encountered
 BACKFILL: Portland Cement, Concrete Cap
 COMPLETION DATE: October 21, 2005

NOTES: 1. Terms and symbols defined on Plate A-1.
 2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
 HAMMER TYPE: Rope and Cathead, 140 lb
 RIG TYPE: DR 5K
 DRILLED BY: Clear Heart Drilling, Pablo/Ryan
 LOGGED BY: L AI Atik

LOG OF BORING NO. B-1
 College of Marin, Indian Valley Campus
 Novato, California



DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, pcf	LOCATION: North approach to Bridge 6 SURFACE EL: 157.0 ft +/- 0.5 (rel. MSL datum)	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u , ksf	OTHER TESTS
					MATERIAL DESCRIPTION							
					Asphalt Concrete (3 inches)							
					Sandy SILT (ML): very stiff, brown, dry, fine- to medium-grained sand, with trace gravel (weak sandstone fragments)							
		1		(34)								
		2										
		3		17							>4.5 P	
5												
		4		(27)	Sandy Lean CLAY (CL): very stiff, yellowish brown, damp to moist, fine to coarse-grained sand, with silt and weak sandstone fragments	112	12					
10		5										
					Silty CLAY with sand (CL): stiff, reddish brown and gray, wet, fine-grained sand							
		6		10				64				
15					- grades gray at 15 feet							
		7		(45)	Silty GRAVEL with sand (GM): dense, yellowish and reddish brown, wet, fine and coarse, subangular to subrounded gravel (weak fine-grained sandstone fragments), fine-grained sand							
20		8										
					Sandy Lean CLAY (CL): stiff, brown, wet, fine-grained sand							
		9		18								

Continued

BORING DEPTH: 45.0 ft
 DEPTH TO WATER: 12.0 ft
 BACKFILL: Established as a Piezometer
 COMPLETION DATE: October 18, 2005
 NOTES: 1. Terms and symbols defined on Plate A-1.
 2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
 HAMMER TYPE: Automatic Trip, 140 lb
 RIG TYPE: CME 75
 DRILLED BY: Clear Heart Drilling, Rick
 LOGGED BY: J Hagen

LOG OF BORING NO. B-2
 College of Marin, Indian Valley Campus
 Novato, California



DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	LOCATION: North approach to Bridge 6 SURFACE EL: 157.0 ft +/- 0.5 (rel. MSL datum)	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u , ksf	OTHER TESTS
					MATERIAL DESCRIPTION							
30		10	X	23	Silty CLAY (CL): very stiff, dark gray, moist to wet, trace fine-grained sand, zones of gravel (weak sandstone fragments)							
35		11	X	17	Clayey GRAVEL (GC): medium dense, yellowish and reddish brown, wet, fine, (weak sandstone fragments in a gray clay binder)							
40		12 13	X	(19)	Gravelly Lean CLAY (CL): stiff, brown and gray, wet, gravel (fine and coarse, subrounded to subangular, weak sandstone fragments)							
45		14	X	50/6"	SILTSTONE: soft, brown, wet, weak							

BORING DEPTH: 45.0 ft
 DEPTH TO WATER: 12.0 ft
 BACKFILL: Established as a Piezometer
 COMPLETION DATE: October 18, 2005
 NOTES: 1. Terms and symbols defined on Plate A-1.
 2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
 HAMMER TYPE: Automatic Trip, 140 lb
 RIG TYPE: CME 75
 DRILLED BY: Clear Heart Drilling, Rick
 LOGGED BY: J Hagen

8-in. dia. Solid Stem Auger
 and Cathead, 140 lb
 Clear Heart Drilling, Pablo/Ryan

INDEX	UNDRAINED SHEAR STRENGTH, S_u , ksf	OTHER TESTS
		R-Value

LOG OF BORING NO. B-2
 College of Marin, Indian Valley Campus
 Novato, California



DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW/COUNT/ PRESSURE, psi	LOCATION: South approach to Bridge 2 SURFACE EL: 205.5 ft +/- 0.5 (rel. MSL datum)	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S _u , ksf	OTHER TESTS
					MATERIAL DESCRIPTION							
					wet, fine-grained sand						1.2 P	
30		9 10		(46)	Clayey SAND with gravel (SC): dense, dark gray, wet, fine- to coarse-grained, subangular gravel, fine and coarse (sandstone fragments)			17				MA
35		11		34	Lean CLAY with sand (CL): hard, brown with gray mottling, wet, fine-grained sand			57				
40		12 13		(82)	- grades gravelly (fine, angular, sandstone fragments)						4.2 P	
45		14		50/5"	SHALE: moderately hard, grayish brown, wet							

BORING DEPTH: 45.0 ft
 DEPTH TO WATER: 23.0 ft
 BACKFILL: Established as a Piezometer
 COMPLETION DATE: October 19, 2005
 NOTES: 1. Terms and symbols defined on Plate A-1.
 2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
 HAMMER TYPE: Automatic Trip, 140 lb
 RIG TYPE: DR 10K
 DRILLED BY: Clear Heart Drilling, Pablo/Ryan
 LOGGED BY: J Hagen

LOG OF BORING NO. B-8
 College of Marin, Indian Valley Campus
 Novato, California



DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	LOCATION: North side of Parking Lot 8 SURFACE EL: 206.0 ft +/- 0.5 (rel. MSL datum)	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u , ksf	OTHER TESTS
					MATERIAL DESCRIPTION							
0					Asphalt Concrete (3 inches)							
1		B9			Lean CLAY with sand (CL): firm, dark brown, moist, fine- to medium-grained sand, trace of silt							
2				(9)								
3		1				103	19					
4		2						60			3.0 P	
5		3		8	- grades firm to stiff below 3.5 feet							
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
 DEPTH TO WATER: Not Encountered
 BACKFILL: Portland Cement, Concrete Cap
 COMPLETION DATE: October 19, 2005

NOTES: 1. Terms and symbols defined on Plate A-1.
 2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 4-in. dia. Solid Stem Auger
 HAMMER TYPE: Automatic Trip, 140 lb
 RIG TYPE: DR 10K
 DRILLED BY: Clear Heart Drilling, Pablo/Ryan
 LOGGED BY: L Al Atik

LOG OF BORING NO. B-9
 College of Marin, Indian Valley Campus
 Novato, California



DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	LOCATION: Ignacio Blvd. at west entrance of Parking Lot 7 SURFACE EL: 211.0 ft +/- 0.5 (rel. MSL datum)	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u , ksf	OTHER TESTS
0					MATERIAL DESCRIPTION							
0.5					Asphalt Concrete (3.5 inches)							
1.0		B10			Sandy SILT (ML): firm, orangish brown, moist, fine-grained sand							R-Value
2.0				(ref/5")	SHALE: moderately hard, gray, moist							
3.0												
4.0				ref/5"								
5.0												
6.0												
7.0												
8.0												
9.0												

BORING DEPTH: 5.0 ft
 DEPTH TO WATER: Not Encountered
 BACKFILL: Portland Cement, Concrete Cap
 COMPLETION DATE: October 20, 2005

NOTES: 1. Terms and symbols defined on Plate A-1.
 2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
 HAMMER TYPE: Rope and Cathead, 140 lb
 RIG TYPE: DR 5K
 DRILLED BY: Clear Heart Drilling, Pablo/Ryan
 LOGGED BY: L Al Atik

LOG OF BORING NO. B-10
 College of Marin, Indian Valley Campus
 Novato, California



DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	LOCATION: Northeast side of Parking Lot 7 SURFACE EL: 203.5 ft +/- 0.5 (rel. MSL datum)	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u , ksf	OTHER TESTS
1		B11			Asphalt Concrete (3 inches)							R-Value
2				(16)	Sandy Lean CLAY (CL): stiff, reddish brown, moist, fine- to medium-grained sand							
3				10	- grades brown below 3.5 feet	110	18				1.3 P	
4												
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
 DEPTH TO WATER: Not Encountered
 BACKFILL: Portland Cement, Concrete Cap
 COMPLETION DATE: October 20, 2005

NOTES: 1. Terms and symbols defined on Plate A-1.
 2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
 HAMMER TYPE: Rope and Cathead, 140 lb
 RIG TYPE: DR 5K
 DRILLED BY: Clear Heart Drilling, Pablo/Ryan
 LOGGED BY: L AI Atik

LOG OF BORING NO. B-11
 College of Marin, Indian Valley Campus
 Novato, California



DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW/COUNT/ PRESSURE, psi	LOCATION: South side of Parking Lot 6 SURFACE EL: 183.0 ft +/- 0.5 (rel. MSL datum)	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u , ksf	OTHER TESTS
					MATERIAL DESCRIPTION							
0					Asphalt Concrete (3 inches)							
1		B12			Well-graded SAND with silt and gravel (SW-SM): medium dense, reddish brown, moist, fine to medium-grained, some gravel (coarse, subangular claystone fragments)							
2				(28)				9				MA
3		1										
4				48	Clayey GRAVEL (GC-GW): dense, reddish brown, moist, fine and coarse, angular (claystone fragments)							
5		2										
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
 DEPTH TO WATER: Not Encountered
 BACKFILL: Portland Cement, Concrete Cap
 COMPLETION DATE: October 20, 2005
 NOTES: 1. Terms and symbols defined on Plate A-1.
 2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
 HAMMER TYPE: Rope and Cathead, 140 lb
 RIG TYPE: DR 5K
 DRILLED BY: Clear Heart Drilling, Pablo/Ryan
 LOGGED BY: L AI Atik

LOG OF BORING NO. B-12
 College of Marin, Indian Valley Campus
 Novato, California



DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	LOCATION: East of the north approach to Bridge 4 SURFACE EL: 176.0 ft +/- 0.5 (rel. MSL datum)	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u , ksf	OTHER TESTS
MATERIAL DESCRIPTION												
	[Pattern]											
		10	⊗	ref/3.5"	- grades gray, moderately hard at 28.5 feet							
30												
35												
40												
45												

BORING DEPTH: 29.0 ft
 DEPTH TO WATER: Not Encountered
 BACKFILL: Portland Cement, Concrete Cap
 COMPLETION DATE: October 18, 2005

NOTES: 1. Terms and symbols defined on Plate A-1.
 2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
 HAMMER TYPE: Automatic Trip, 140 lb
 RIG TYPE: CME 75
 DRILLED BY: Clear Heart Drilling, Rick
 LOGGED BY: J Hagen

LOG OF BORING NO. B-13
 College of Marin, Indian Valley Campus
 Novato, California



DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	LOCATION: South side of Parking Lot 5 SURFACE EL: 173.0 ft +/- 0.5 (rel. MSL datum)	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u , ksf	OTHER TESTS
0					MATERIAL DESCRIPTION							
0 - 0.3					Asphalt Concrete (3 inches)							
0.3 - 1.0		B14			Sandy Lean CLAY (CL): very stiff to hard, orangish brown, moist, fine- to medium-grained sand, with coarse gravel (claystone fragments)							R-Value
1.0 - 2.0				(49)								
2.0 - 3.0				1								
3.0 - 4.0				2							>4.5 P	
4.0 - 5.0				3								
5.0 - 6.0				30								
6.0 - 7.0												
7.0 - 8.0												
8.0 - 9.0												

BORING DEPTH: 5.0 ft
 DEPTH TO WATER: Not Encountered
 BACKFILL: Portland Cement, Concrete Cap
 COMPLETION DATE: October 20, 2005
 NOTES: 1. Terms and symbols defined on Plate A-1.
 2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
 HAMMER TYPE: Rope and Cathead, 140 lb
 RIG TYPE: DR 5K
 DRILLED BY: Clear Heart Drilling, Pablo/Ryan
 LOGGED BY: L AI Atik

LOG OF BORING NO. B-14
 College of Marin, Indian Valley Campus
 Novato, California



DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	LOCATION: Ignacio Blvd. at dogbone SURFACE EL: 171.5 ft +/- 0.5 (rel. MSL datum)	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u , ksf	OTHER TESTS
0					MATERIAL DESCRIPTION							
0						Asphalt Concrete (3 inches)						
1		B15			Lean CLAY with sand (CL): firm, reddish brown, moist, fine to medium-grained sand							R-Value
2				(9)								
3				6							2.0 P	
4												
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
 DEPTH TO WATER: Not Encountered
 BACKFILL: Portland Cement, Concrete Cap
 COMPLETION DATE: October 20, 2005

NOTES: 1. Terms and symbols defined on Plate A-1.
 2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
 HAMMER TYPE: Rope and Cathead, 140 lb
 RIG TYPE: DR 5K
 DRILLED BY: Clear Heart Drilling, Pablo/Ryan
 LOGGED BY: L Al Atik

LOG OF BORING NO. B-15
 College of Marin, Indian Valley Campus
 Novato, California



DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW/COUNT/ PRESSURE, psi	LOCATION: Middle of Parking Lot 3 SURFACE EL: 165.0 ft +/- 0.5 (rel. MSL datum)	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u , ksf	OTHER TESTS
					MATERIAL DESCRIPTION							
0					Asphalt Concrete (3 inches)							
1		B16			Lean CLAY with sand (CL): very stiff, brown to reddish brown, moist, fine-grained sand							R-Value
2				(27)								
3				19	- grades orangish brown below 3.5 feet	105	16					
4												
5											>4.5 P	
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
 DEPTH TO WATER: Not Encountered
 BACKFILL: Portland Cement
 COMPLETION DATE: October 20, 2005

NOTES: 1. Terms and symbols defined on Plate A-1.
 2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
 HAMMER TYPE: Rope and Cathead, 140 lb
 RIG TYPE: DR 5K
 DRILLED BY: Clear Heart Drilling, Pablo/Ryan
 LOGGED BY: L Al Atik

LOG OF BORING NO. B-16
 College of Marin, Indian Valley Campus
 Novato, California



DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW/COUNT/ PRESSURE, psi	LOCATION: North side of Parking Lot 2 SURFACE EL: 159.5 ft +/- 0.5 (rel. MSL datum)	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u , ksf	OTHER TESTS
0					Asphalt Concrete (3 inches)							
1		B17			Lean CLAY with sand (CL): stiff, orangish brown, moist, fine-grained sand							
2				(20)								
3				1								
4				2								
5				3	Clayey SAND (SC): medium dense, reddish brown, moist, fine- to medium-grained, trace of gravel			24			>4.5 P	
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
 DEPTH TO WATER: Not Encountered
 BACKFILL: Portland Cement, Concrete Cap
 COMPLETION DATE: October 20, 2005

NOTES: 1. Terms and symbols defined on Plate A-1.
 2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
 HAMMER TYPE: Rope and Cathead, 140 lb
 RIG TYPE: DR 5K
 DRILLED BY: Clear Heart Drilling, Pablo/Ryan
 LOGGED BY: L Al Atik

LOG OF BORING NO. B-17
 College of Marin, Indian Valley Campus
 Novato, California



DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW/COUNT/ PRESSURE, psi	LOCATION: Ignacio Blvd. near northeast corner of Parking Lot 2 SURFACE EL: 159.5 ft +/- 0.5 (rel. MSL datum)	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u , ksf	OTHER TESTS
					MATERIAL DESCRIPTION							
0					Asphalt Concrete (3 inches)							
1		B18			Clayey SAND (SC): medium dense, reddish brown, moist, fine-grained							R-Value (0-5)
2				(25)								
3		1		2		114	13					
4		2		16								
5		3										
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
 DEPTH TO WATER: Not Encountered
 BACKFILL: Portland Cement, Concrete Cap
 COMPLETION DATE: October 20, 2005
 NOTES: 1. Terms and symbols defined on Plate A-1.
 2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
 HAMMER TYPE: Rope and Cathead, 140 lb
 RIG TYPE: DR 5K
 DRILLED BY: Clear Heart Drilling, Pablo/Ryan
 LOGGED BY: L AI Atik

LOG OF BORING NO. B-18
 College of Marin, Indian Valley Campus
 Novato, California