

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

GEOLOGIC DESCRIPTION
OF
SELECTED STRONG-MOTION ACCELEROGRAPH SITES

PART III

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OPEN FILE REPORT
No. 79-1619

The report is preliminary and has not
been edited or reviewed for conformity with
Geological Survey standards and nomenclature.

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Preface

This report describes strong-motion accelerograph site geology for selected stations in the Western Hemisphere. The geologic and engineering data is presented on a two-page summary. This data is a summation of information on file with the Seismic Engineering Branch.

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Introduction

One task of the U.S. Geological Survey is the collection and dissemination of strong-motion data. The purpose of this report is to aid those who interpret this data.

The report includes local geological conditions, and when available, P and S wave data and density. These reports are not comprehensive, but are a summation of information in our files. More in-depth reports have been published on some accelerograph sites; (Duke and Leeds, 1962; Woodward-Lundgren Associates, 1963; and Shannon and Wilson and Agbabian Associates, 1976, for example).

Presently, geologic information on strong-motion accelerograph sites is dispersed in various reports; this series of open-file reports hopefully will serve as an "easy to use" compilation. More comprehensive reports are planned. A combined index of volumes I and II is included in this report. See Appendix A.

Geologic Site Descriptions

The first page of the geologic site description is a location map, a narrative on the local geology, and references, plus the following information from Open-File Report No. 77-374: the station name, number, and coordinates.

The second page graphically represents site geology, seismic velocity, and density. When 'undifferentiated' is used on the geologic log, the information is not based on actual coring; the rock sequence, thickness, and depth are unknown. Depths are not always shown on a linear scale. Lithologic symbols used in this report are shown in Figure 1.

The code on the bottom of the second page is a geologic summary for use in a computer data bank. The first three characters is a code describing the surface materials; this description is intended for those interested in general geology only. The symbols and their meanings are listed in Table 1.

Rock types are two-letter abbreviations. A third letter, when present, describes a physical characteristic, e.g., SH is shale and SHF is fractured, sheared or jointed shale. Abbreviations are not standardized to a particular nomenclature.

A number after the rock type is the rock's depth, that is, AL914:CS1067 means alluvium to 914 meters followed by a combination of sedimentary rocks from 914 to 1067 meters. The letter K after a number is a 1000 times multiplier, (4K equals 4000 meters). If a number is not given the depth is not known. Except for the colon after the three letter description, the colon is

translated as "overlying". A plus sign between two (or more) rock names means both (or all) rock types are present. (Note: the colon replaces the previously used semicolon.)

Example:

ALV: = alluvium at surface

AL84 = alluvium to 84m

:SSU = overlying unconsolidated sandstone to unknown depth

:SH+SC = overlying shale and schist to unknown depth

Erratum

Open-File Report 79-428, page 3, line 8: Bate, Paul C. should read Bateman,
Paul C.

Station No. 1001 Station APEEL Array #1, KGEI Radio Tower, Redwood City

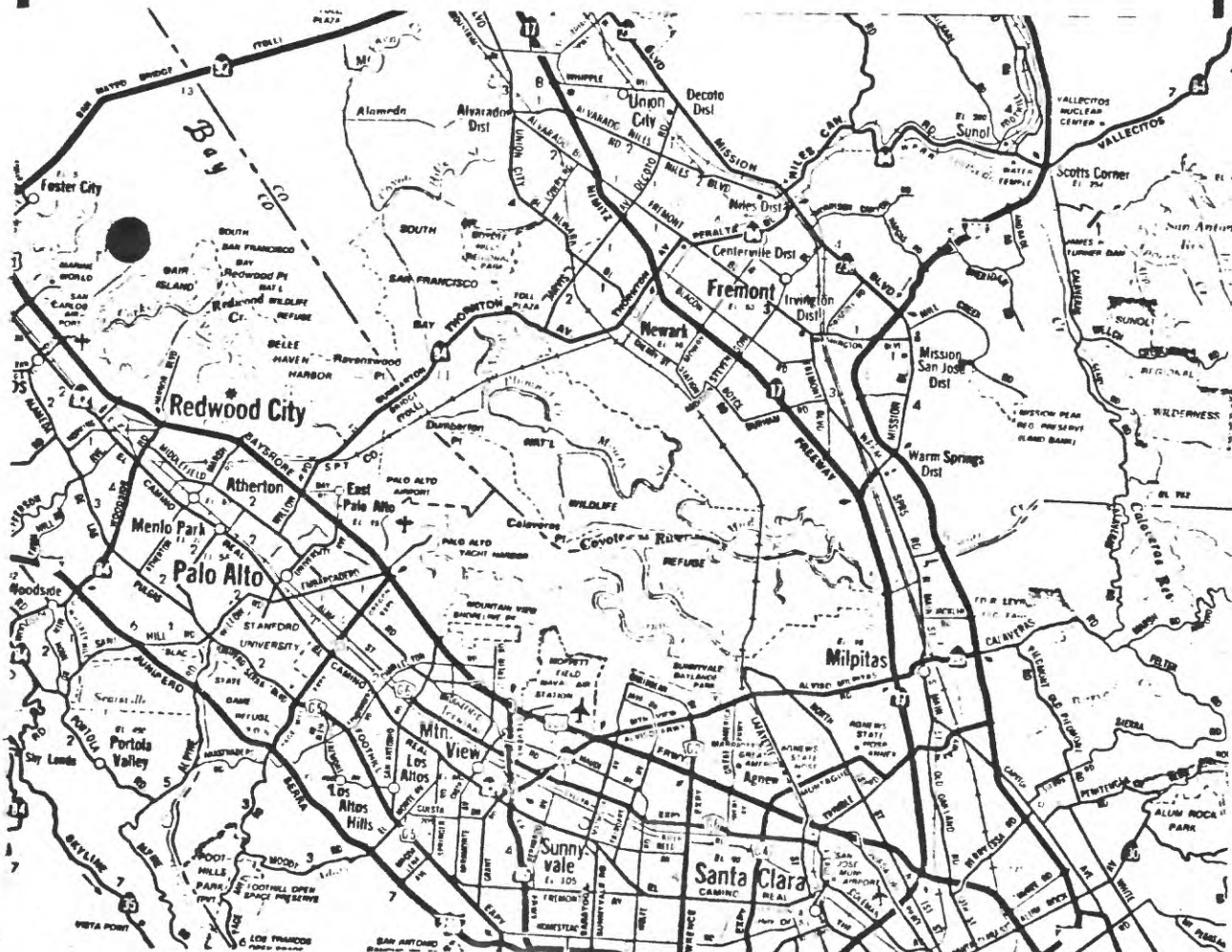
Coordinates 37.55 N, 122.23 W

This site is on about 200 m of alluvial material which covers a Franciscan bedrock. It is appx. 11 km east of the San Andreas fault and 19 km west of the Hayward fault.

References

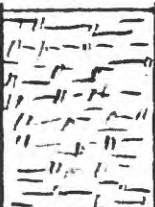

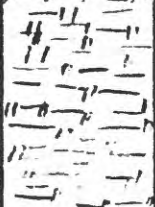


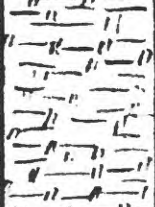


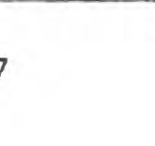
Morrill, B.J., 1972; The APEEL Array: A Site Study, NOAA Technical Report ERL 245-ESL 22

Gibbs, J.F., Fumal, T.E., Borchardt, R.D., and Roth, E.F., 1977; In-Situ Measurements of Seismic Velocities in the San Francisco Bay Region... Part III; Open File Report 77-850



GEOLOGIC SUMMARY OF STRONG-MOTION SITES

Date 9/79 Station No. 1001 Station APEEL Arrey #1, KGEI Radio Tower, Fedwood City

<u>Depth</u> meters	<u>P-Wave</u> m/sec	<u>S-Wave</u> m/sec	<u>Density</u> g/cm ³	<u>Log</u>	<u>Site Geology</u>
	355	86			
	388	72			
	403	74	1.52		
10	474	77			Silty clay
	514	81			
	566	85	1.59		
	572	88			
20	594	94			
	630	99			
	680	103			
	709	108			Coarse sand and gravel
	723	111			Silty clay
30	AVE.	VEL.	1.85		12/4/75

ALV:AL210:SP

Station No. 1002/1194 Station APEEL Array: Sta. 2 and 2A Redwood City

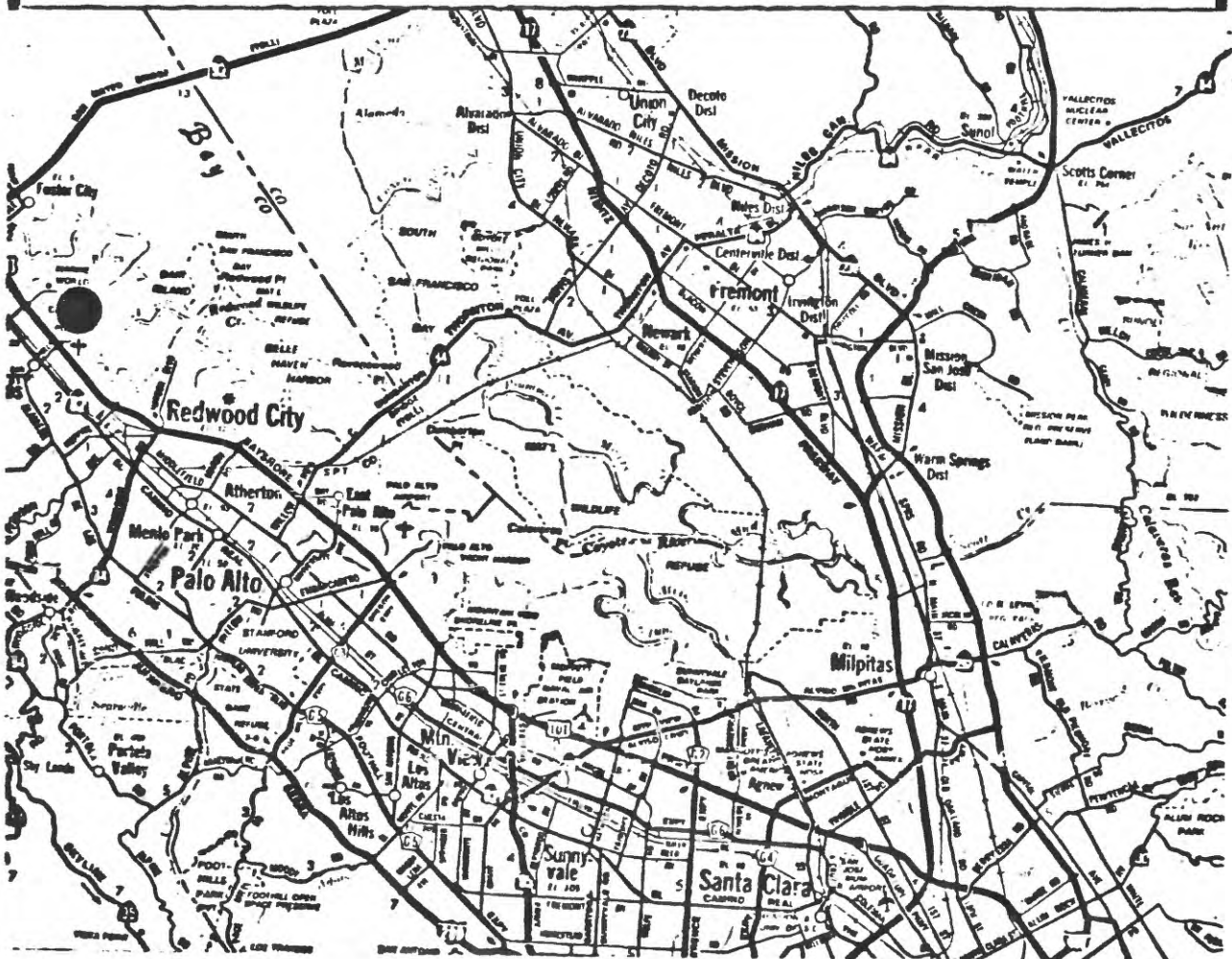
Coordinates 37.53 N 122.26/.25 W

This site, which is about 8 km east and 32 km west of the San Andreas and Hayward fault zones, respectively is on about 95m of alluvial material which overlies Franciscan sandstone.

References

Morrill, B.J., 1972; The APEEL Array: A Site Study, NOAA Technical Report ERL 245-ESL 22

Gibbs, J.F., Fumal, T.E., Borchardt, R.D., and Roth, E.F., 1977; In-Situ Measurements of Seismic Velocities in the San Francisco Bay Region... Part III; Open File Report 77-850

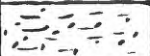
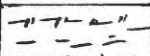
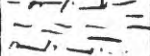
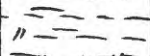
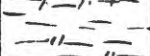

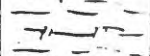
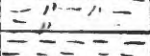




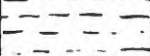
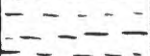


GEOLOGIC SUMMARY OF STRONG-MOTION SITES

Date 8/79

Station No 1002/1194

Station APEEL Array: Sta. 2 and 2A Redwood City

<u>Depth</u> meters	<u>P-Wave</u> m/sec	<u>S-Wave</u> m/sec	<u>Density</u> g/cm ³	<u>Log</u>	<u>Site Geology</u>
					Sandy clay
	488	177			
	583	84	1.43		Silty clay
	507	72			
10	451	73			
	456	83			
	513	91	1.99		Clay grading into silty clay
	566	98			
	612	104			
20	674	112			
	709	120			
	763	124			
	790	127			
30	804	130			
	AVE.	VEL.			12/12/75

ALV:AL95:SS

Station No. 1003 Station APEEL Array: Sta 6 Belmont

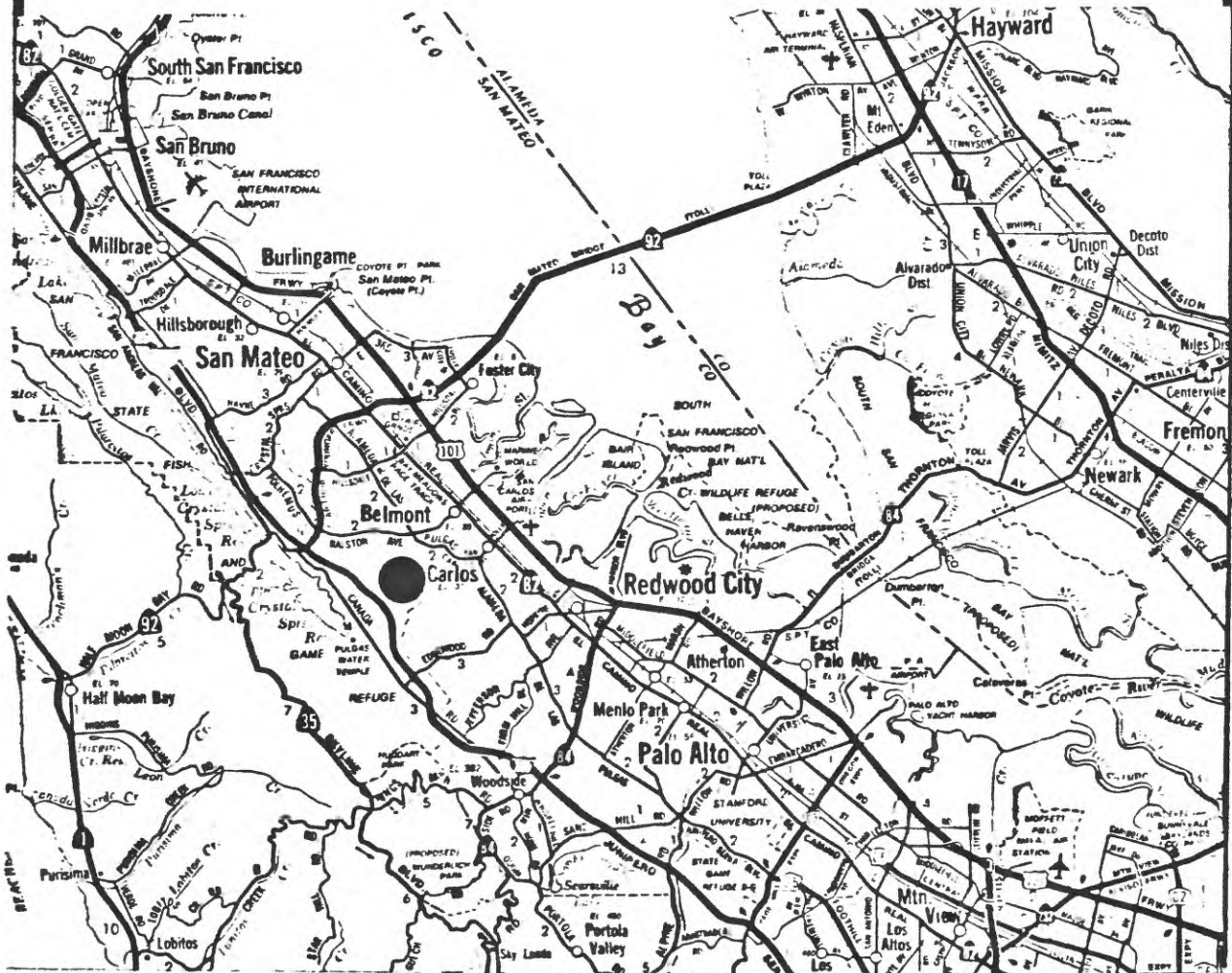
Coordinates 37.49 N, 122.30 W

APEEL 6, which is on Franciscan sandstone and shale, is appx. 2½ km. east of the San Andreas fault and 27 km. west of the Hayward fault.

References

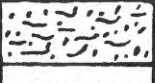
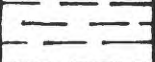
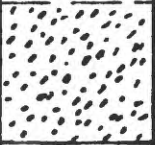
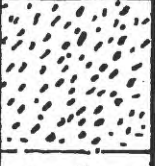
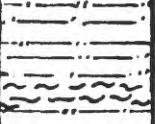
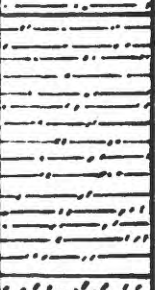






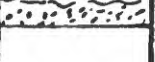

Morrill, B.J., 1972; The APEEL Array: A Site Study, NOAA Technical Report ERL 245-ESL 22

Gibbs, J.F., Fumal, T.E., and Borchardt, R.D., 1975; In-Situ Measurements of Seismic Velocities at Twelve Locations in the San Francisco Bay Region; Open-File Report 75-564



GEOLOGIC SUMMARY OF STRONG-MOTION SITES

Date 6/79 Station No. 1003 Station APEEL Array Sta 6 Belmont

<u>Depth</u> meters	<u>P-Wave</u> m/sec	<u>S-Wave</u> m/sec	<u>Density</u> g/cm ³	<u>Log</u>	<u>Site Geology</u>
					Sand and silt
	457	222	1.99		Deeply weathered shale and sandstone
	598	263			
	776	346	2.51		Moderately to slightly weathered sandstone and siltstone
-10	784	417			Clay gouge
	904	430			Siltstone- moderately fractured
	1080	481			
	1170	543			
-20	1340	584			Graywacke sandstone
	1410	603			
	1480	605			Clay gouge
	1530	607			Clay gouge
	1520	624			
-30	AVE.	VEL.	2.60		Clay gouge 11/8/74

ALV:ALL:SSW9:CSI+GOI31

Station No. 1161 Station APEEL Array: Sta 9 Crystal Springs Res.

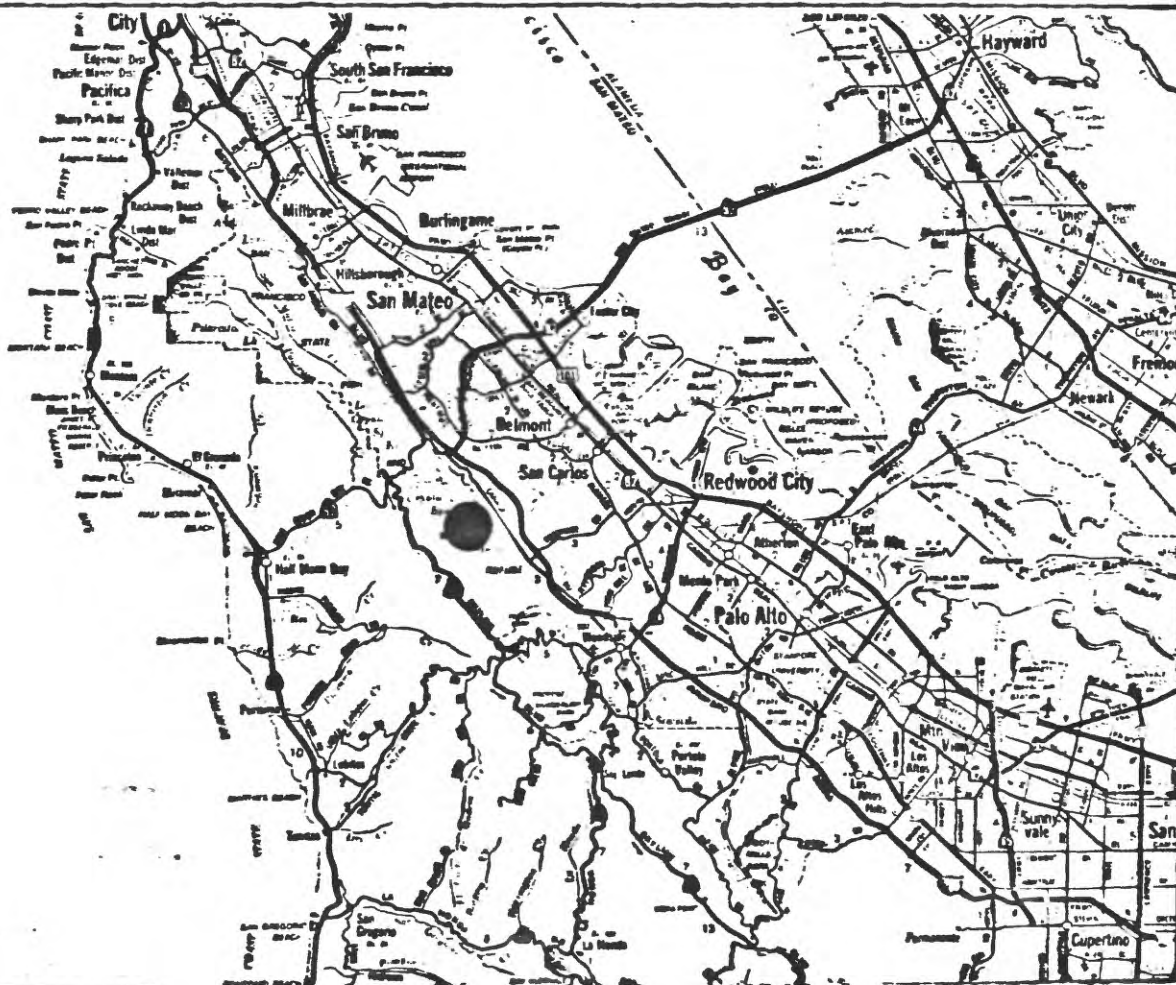
Coordinates 37.48 N, 122.32 W

This site is on the Pleistocene Santa Clara Formation which is mostly Butano sandstone clasts. The accelerograph is appx. 1/3 km and 30 km west of the San Andreas and Hayward faults, respectively.

References

Morrill, B.J., 1972; The APEEL Array: A Site Study, NOAA Technial Report ERL 245-ESL 22

Gibbs, J.F., Fumal, T.E., and Borchardt, R.D., 1975; In-Situ Measurements of Seismic Velocities at Twelve Locations in the San Francisco Bay Region; Open-File Report 75-564



GEOLOGIC SUMMARY OF STRONG-MOTION SITES

Date 6/79 Station No. 1161 Station APEEL Arrey: Sta 9 Crystal Springs

<u>Depth</u> meters	<u>P-Wave</u> m/sec	<u>S-Wave</u> m/sec	<u>Density</u> g/cm ³	<u>Log</u>	<u>Site Geology</u>
	246	203	1.97		Sand
	414	272		Clayey sand grading into gravelly sand	
	554	313	2.13		
10	679	331			
	744	364		Gravel	
	840	380			
	927	402	2.32		Silty sand
20	1000	404			
	1030	428		Gravel	
	1090	434			
	1170	449	2.32		
30	AVE.	VEL.			
				11/6/74	

ALV:AL30:AL

Station No. 1107 Station APEEL Array: Sta 10 12585 Skyline Blvd.

Coordinates 37.64 N, 122.34 W

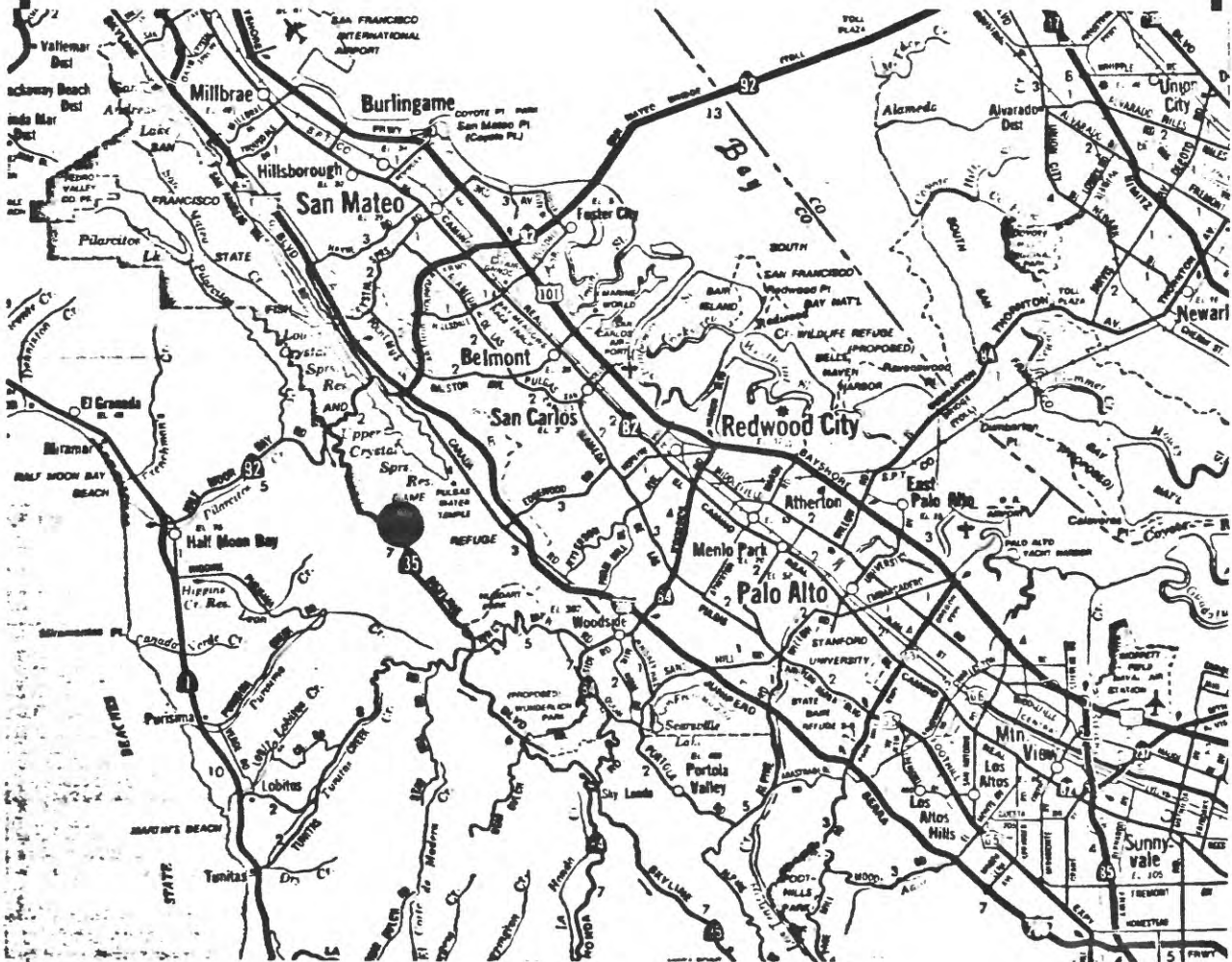
LOCATION MAP

This station is on Eocene Butano sandstone appx. 3 km and 33 km west of the San Andreas and Hayward fault zones, respectively.

References


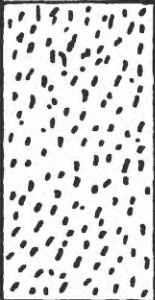
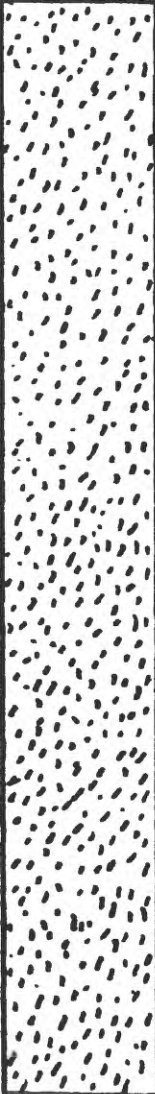
Morrill, B.J., 1972; The APEEL Array: A Site Study, NOAA Technical Report ERL 245-ESL 22

Gibbs, J.F., Fumal, T.E., and Borchardt, R.D., 1975; In-Situ Measurements of Seismic Velocities at Twelve Locations in the San Francisco Bay Region; Open-File Report 75-564



GEOLOGIC SUMMARY OF STRONG-MOTION SITES

Date 6/79 Station No. 1107 Station APEEL Array: Sta 10 12585 Skyline Blvd

<u>Depth</u> meters	<u>P-Wave</u> m/sec	<u>S-Wave</u> m/sec	<u>Density</u> g/cm ³	<u>Log</u>	<u>Site Geology</u>
					Sand
	228	212			Sandstone- highly weathered
	384	297			
	517	309	2.26		Sandstone- with small amounts of hard siltstone
10	637	317			
	744	341			
	796	328			
	838	325			
20	913	346			
	982	363			
	1040	379			
	1110	392			
30	AVE.	VEL.			11/5/74

ALV:ALL:SSW7:SS30:SS

Station No. 1180 Station APEEL Array: 1E Hayward

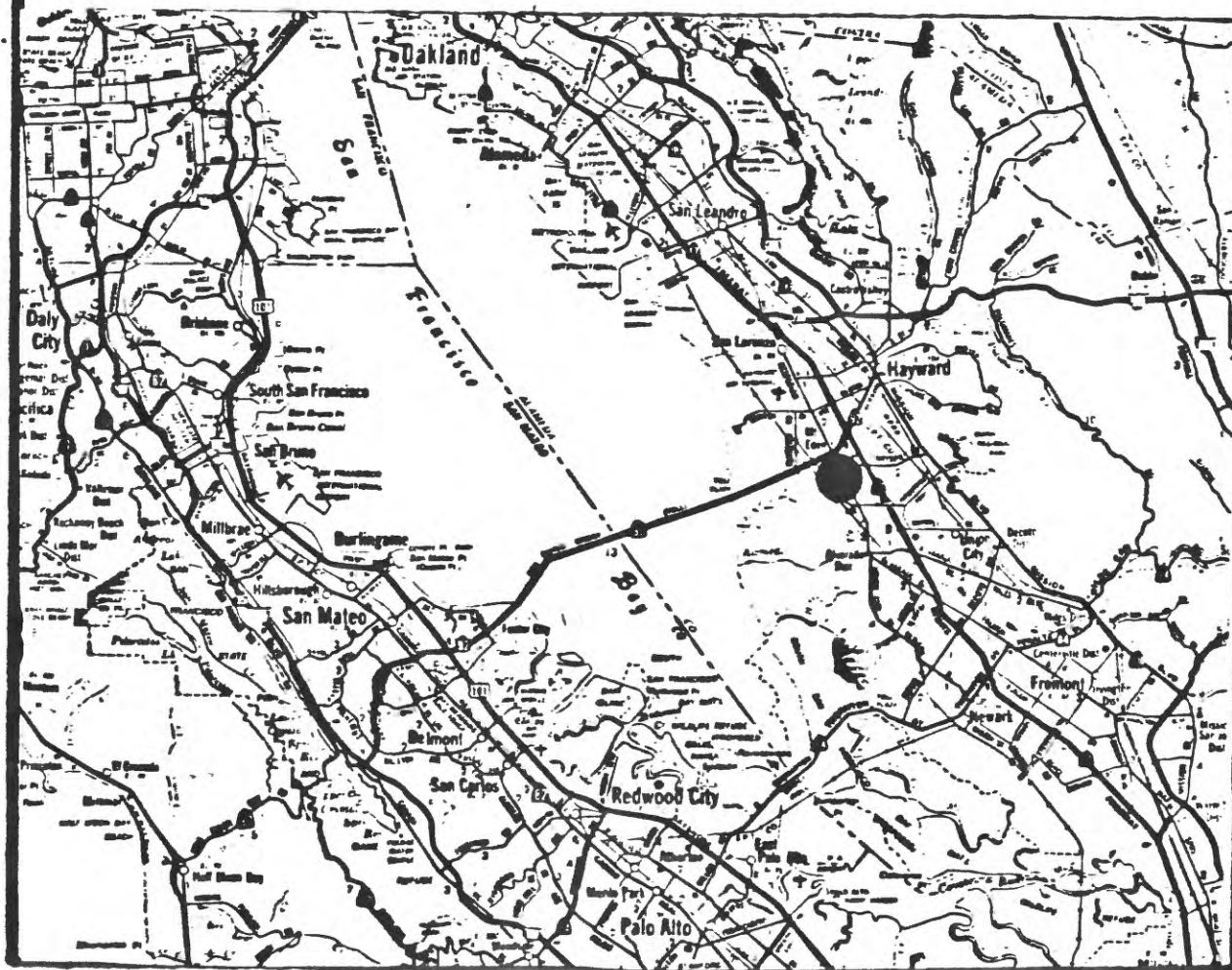
Coordinates 37.63 N, 122.12 W

This site is on a minimum of 100 m of alluvium and is appx. 6 km west of the Hayward and 24 km east of the San Andreas fault zones.

References







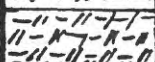
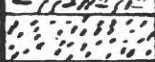
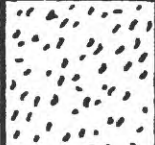



Morrill, B. J., 1972; The APEEL Array: A Site Study, NOAA Technical Report ERL 245-ESL 22

Gibbs, J.F., Funel, T.E., and Borchardt, R.D., 1976; In- Situ Measurements of Seismic Velocities in the San Francisco Bay Region...Part II; Open File Report 76-731



GEOLOGIC SUMMARY OF STRONG-MOTION SITES

Date 8/79 Station No. 1180 Station APEEL Array: 1E Hayward

<u>Depth</u> <u>meters</u>	<u>P-Wave</u> <u>m/sec</u>	<u>S-Wave</u> <u>m/sec</u>	<u>Density</u> <u>g/cm³</u>	<u>LOG</u>	<u>Site Geology</u>
					Clay grading into fine sand.
	314	128			Clay grading into sandy clay
	406	144	1.94		
	486	162			
	589	171			
10	679	178			Sand with fine gravel and shell fragments
	760	187			Silty clay
	762	193	2.13		Sand, very fine to coarse
	AVE.	VEL.			Sand
20					
					Clay with thin lenses of sand
30					
					5/1/75

ALV:AL30:AL

Station No. 1121 Station APEEL Array: Sta 2E Hayward

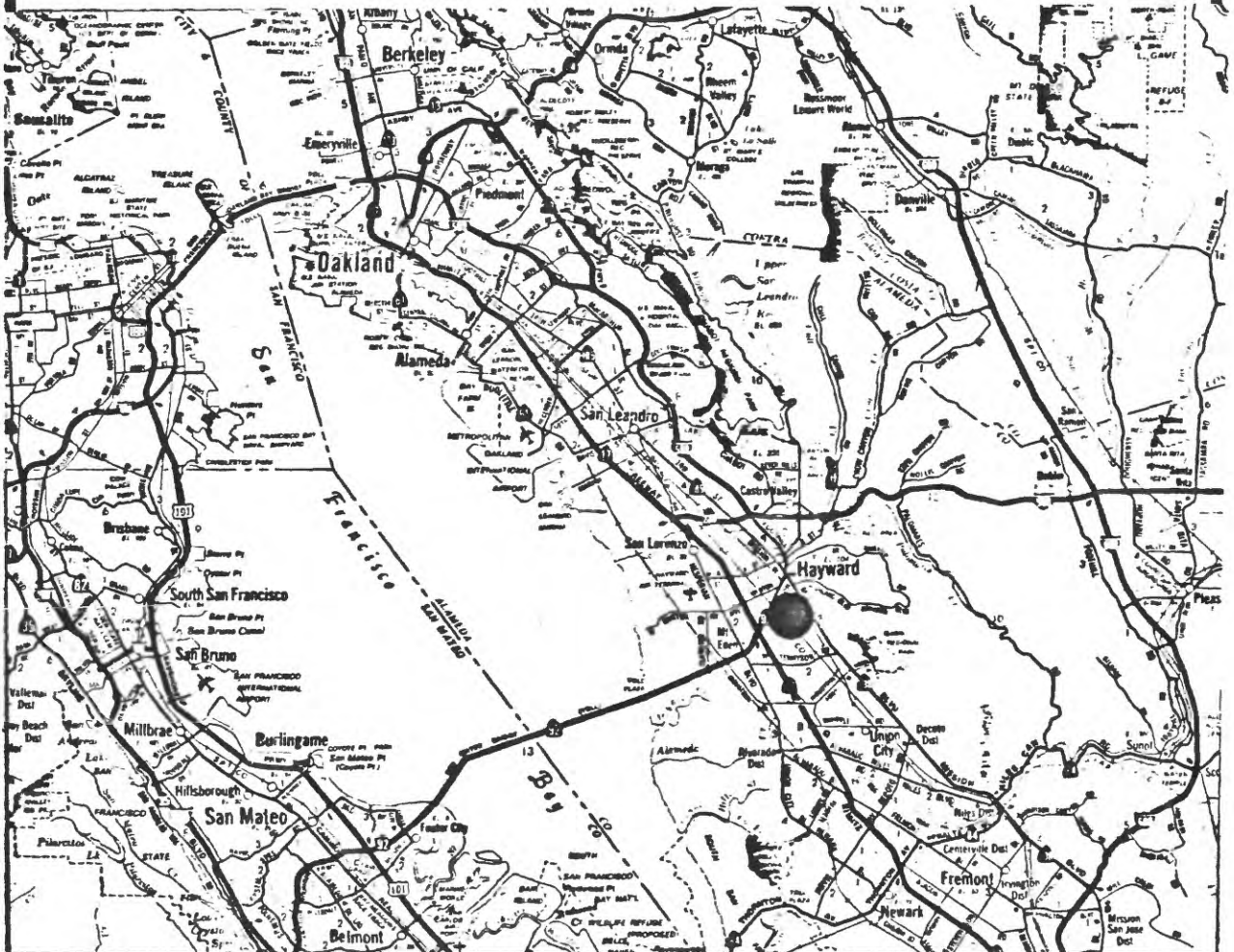
Coordinates 37.66 N, 122.08 W

This station is on Quaternary stream alluvium and slope wash and is appx. 29 km east of the San Andreas fault and 1 km west of the Hayward fault.

References

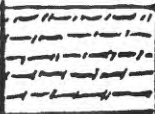



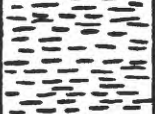



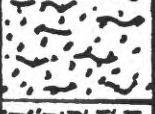




Morrill, B.J., 1972; The APEEL Array: A Site Study, NOAA Technical Report ERL 245-ESL 22

Gibbs, J.F., Fumal, T.E., and Borchardt, R.D., 1976; In-Situ Measurements of Seismic Velocities in the San Francisco Bay Region...Part II; Open File Report 76-731



GEOLOGIC SUMMARY OF STRONG-MOTION SITES

Date 7/79 Station No. 1121 Station APEEL Array: Sta 2E Hayward

<u>Depth</u> <u>meters</u>	<u>P-Wave</u> <u>m/sec</u>	<u>S-Wave</u> <u>m/sec</u>	<u>Density</u> <u>g/cm³</u>	<u>Log</u>	<u>Site Geology</u>
					Silty clay
	320	213			Clayey sand
	384	224			Clayey sand
	456	228			Clayey sand
10	536	231			Clay
	575	263			Clayey sand
	630	265			Sand
	677	266			Clayey sand
20	689	273			Clayey sand
	728	268			Silty clay
	759	269			Silty clay
	813	271			Silty clay
30	841 AVE.	277 VEL.			Sand

ALV:AL30:AL

Station No. 1219 Station APEEL Array: 3E Hayward (C219)

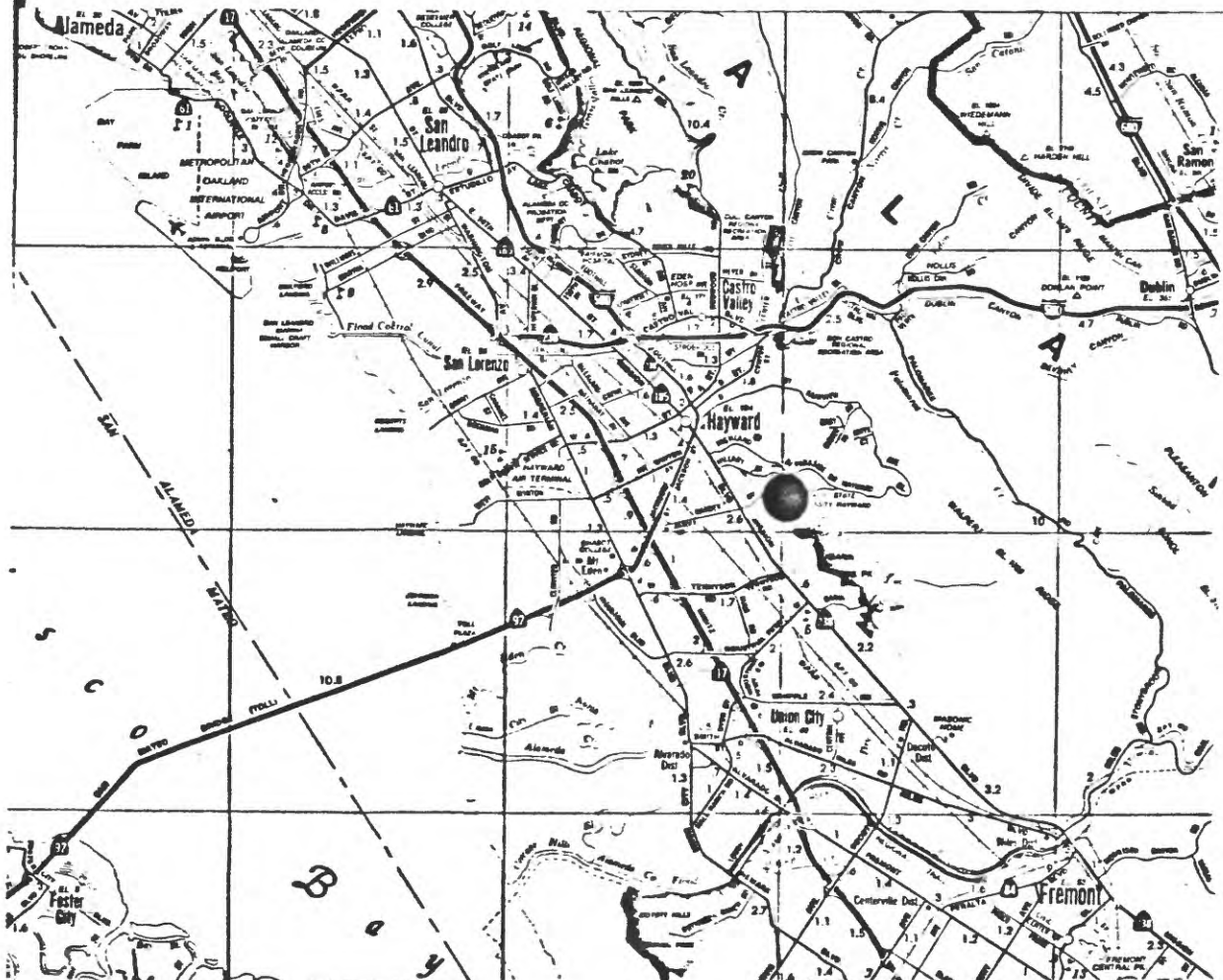
Coordinates 37.66 N, 122.06 W

This site, which is on Franciscan greenstone, is about 1/3 km from the Hayward fault and about 30 km east of the San Andreas fault.

References

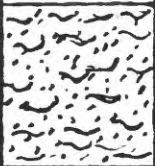
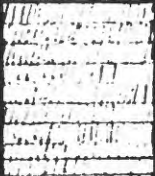
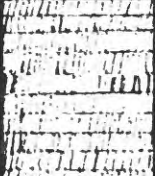
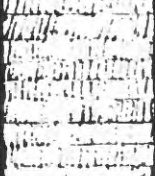

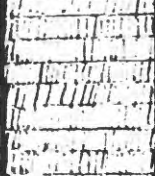



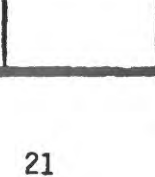
Morrill, B. J., 1972; The APEEL Array: A Site Study, NOAA Technical Report ERL 245-ESL 22

Gibbs, J.F., Fumal, T.E., and Borchardt, R.D., 1976; In-Situ Measurements of Seismic Velocities in the San Francisco Bay Region...Part II; Open File Report 76-731



GEOLOGIC SUMMARY OF STRONG-MOTION SITES

Date 7/79 Station No. 1219 Station APEEL Array: Sta 3E Hayward (C219)

<u>Depth</u> <u>meters</u>	<u>P-Wave</u> <u>m/sec</u>	<u>S-Wave</u> <u>m/sec</u>	<u>Density</u> <u>g/cm³</u>	<u>Log</u>	<u>Site Geology</u>
	177	320	1.87		Sandy clay
	256	414			Deeply weathered greenstone grading into moderately weathered greenstone.
	250	517	1.98		
10	299	599			
	361	666			
	378	756			
	400	765			
20	446	837			
	470	868			
	493	917			
30	AVE.	VEL.	2.37		3/27/75

ALV:AL3:GSW30

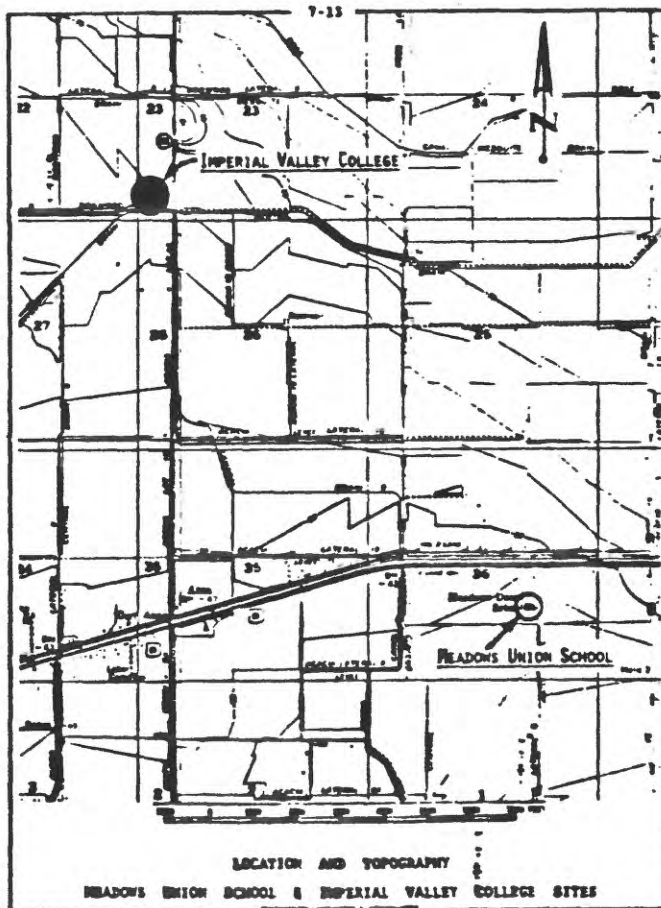
Station No. 5028 Station El Centro: Sta 7 Imperial Valley College

Coordinates 32.83 N, 115.50 W

The Imperial Valley College accelerograph on deep alluvial deposits of the Imperial Valley in southern California is located within appx. 8 km of the Superstition Mountain, Superstition Hill, and Imperial Valley faults.


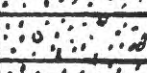



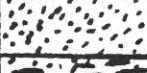


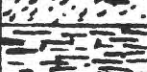




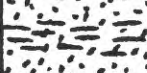
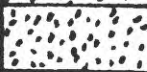

REFERENCE

Hansen, W.R., Weiss, R.B., Idress, I.M., Cluff, L.S.; 1973, Geotechnical Data Compilation for Selected Strong Motion Seismograph Sites in California, Woodward-Lundgren & Associates



GEOLOGIC SUMMARY OF STRONG-MOTION SITES

Date 4/79 Station No. 5028 Station El Centro: Sta. 7, Imperial Valley Col.

<u>Depth</u> <u>meters</u>	<u>P-Wave</u> <u>m/sec</u>	<u>S-Wave</u> <u>m/sec</u>	<u>Density</u> <u>g/cm³</u>	<u>Log</u>	<u>Site Geology</u>
					Sand with clay stringers
					Sand with clay stringers & fine gravel
—20					Sand
					Sand and clay
—40					Sand with clay stringers
					Sand and clay
—60					Sand and clay
					Clay and sand
—80					Clay and sand
					Sand and clay
—100					Sand and clay
					Sand with clay stringers
—120					Sand and clay
					Sand with clay stringers
—140					Sand and clay
					Clay with stringers of sand
—160					Bottom of core 4/25/58
					Well located appx. 6.4 km northwest of site

ALV:ALD

Station No. 1024 Station Foster City, Andover School, 841 Gull St.

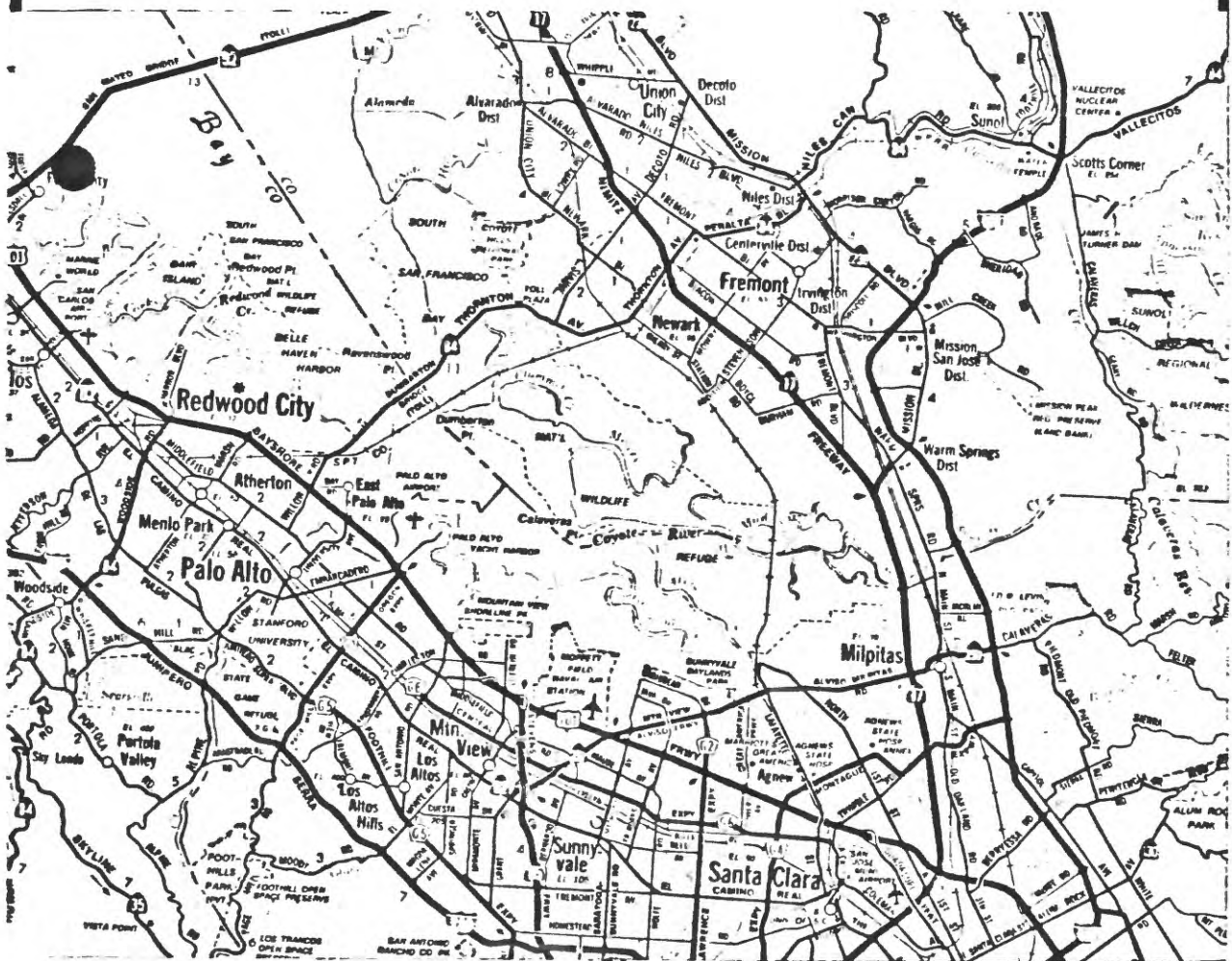
Coordinates 37.57 N, 122.25 W

This site is on appx. 84 m of alluvial material which covers a Franciscan basement. The site is about 8.2 km east of the San Andreas fault.

References





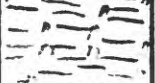
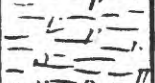
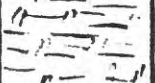

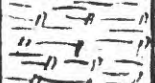
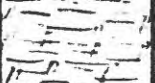

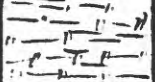


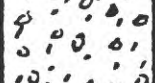
Gibbs, J.F., Fumal, T.E., Borchardt, R.D., and Roth, E.F., 1977; In-Situ Measurements of Seismic Velocities in the San Francisco Bay Region... Part III; Open File Report 77-850

Hansen, W.R., Weiss, R.B., Idriss, I.M., Cluff, L.S.; 1973; Geotechnical Data Compilation for Selected Strong Motion Seismograph Sites in California, Woodward-Lundgren & Associates



GEOLOGIC SUMMARY OF STRONG-MOTION SITES

Date 9/79 Station No. 1024 Station Foster City, Audobon Sch., 841 Gull St.

<u>Depth</u> meters	<u>P-Wave</u> m/sec	<u>S-Wave</u> m/sec	<u>Density</u> g/cm ³	<u>Log</u>	<u>Site Geology</u>
					Sand
	433	145			
	454	120			
	559	121	1.55		
	610	112			
10	652	109			
	714	107			Silty clay
	764	105			
	807	105	1.53		
20	842	106			
	868	109			
	892	113			
	908	118			Coarse sand and gravel
	953	124			
30	AVE.	VEL.			12/11/75

ALV:AL30:AL

Station No. 118E Station Fremont 3909 Stevenson

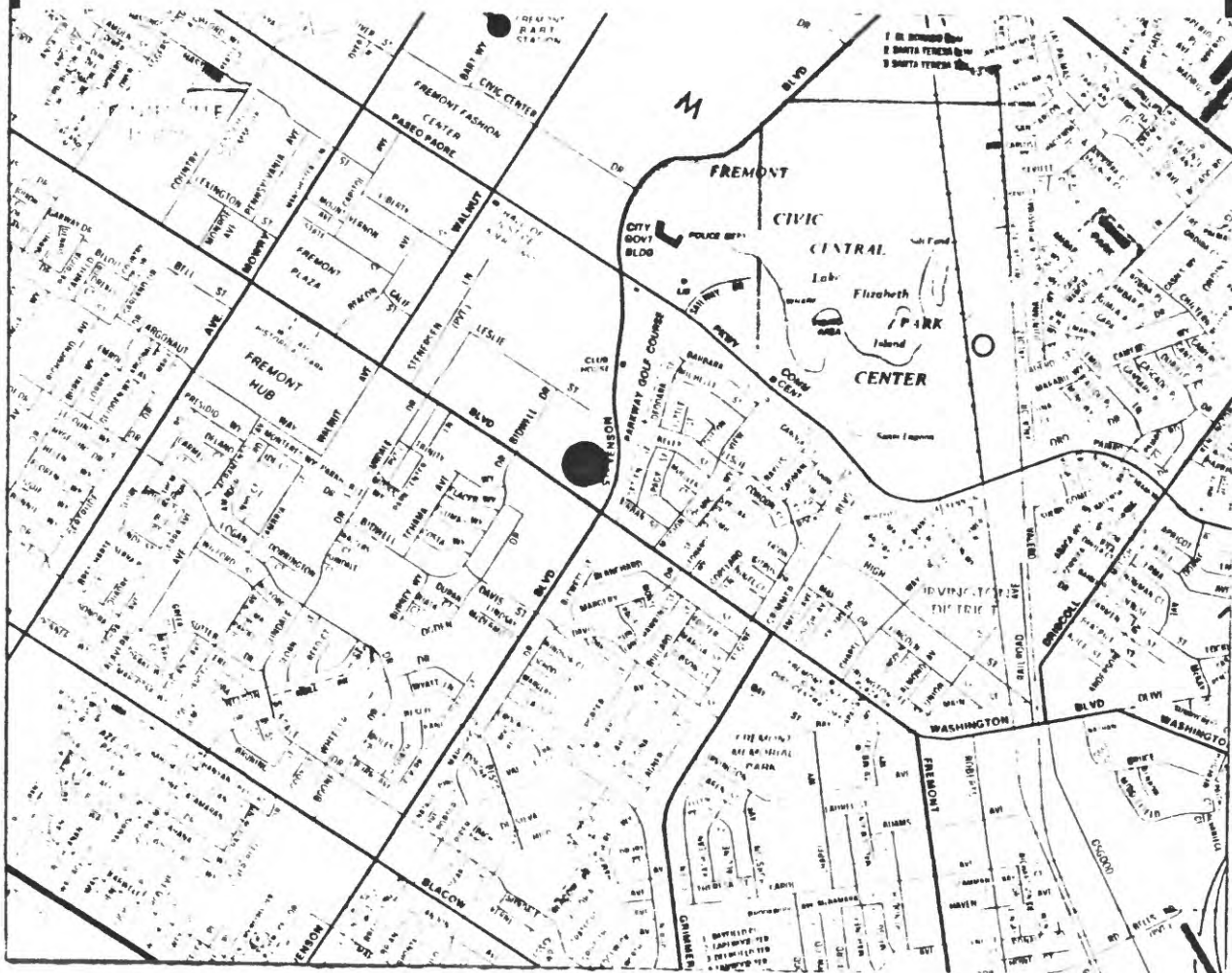
Coordinates 37.54 N, 121.97 W

This site is located on alluvial fill of the Santa Clara Valley and is about 2 km west of the Hayward Fault zone.

Reference









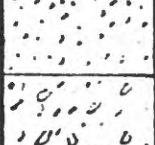
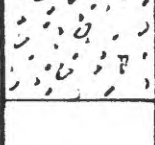


Gibbs, J.F., Fumal, T.E., and Borchardt, R.D., 1976; In-Situ Measurements of Seismic Velocities in the San Francisco Bay Region...Part II; Open File Report 76-731

California Division of Mines and Geology; 1966; Geologic Map of California, San Jose Sheet



GEOLOGIC SUMMARY OF STRONG-MOTION SITES

Date 8/79 Station No. 1188 Station Fremont 3909 Stevenson

<u>Depth</u> <u>meters</u>	<u>P-Wave</u> <u>m/sec</u>	<u>S-Wave</u> <u>m/sec</u>	<u>Density</u> <u>g/cm³</u>	<u>Log</u>	<u>Site Geology</u>
	288	228	1.70		Sand
	426	215			
	492	228			
10	571	231	1.72		Coarse sand and gravel
	636	230			
	660	248			
	706	270			Coarse sand and gravel
20	694	283			
	514	273			
	545	302			Sand
	587	306			Coarse sand and gravel
	604	311			4/1/75
30	AVE.	VEL.			

ALV: AL30:AL

Station No. 1028 Station Hollister City Hall 339 Fifth St.

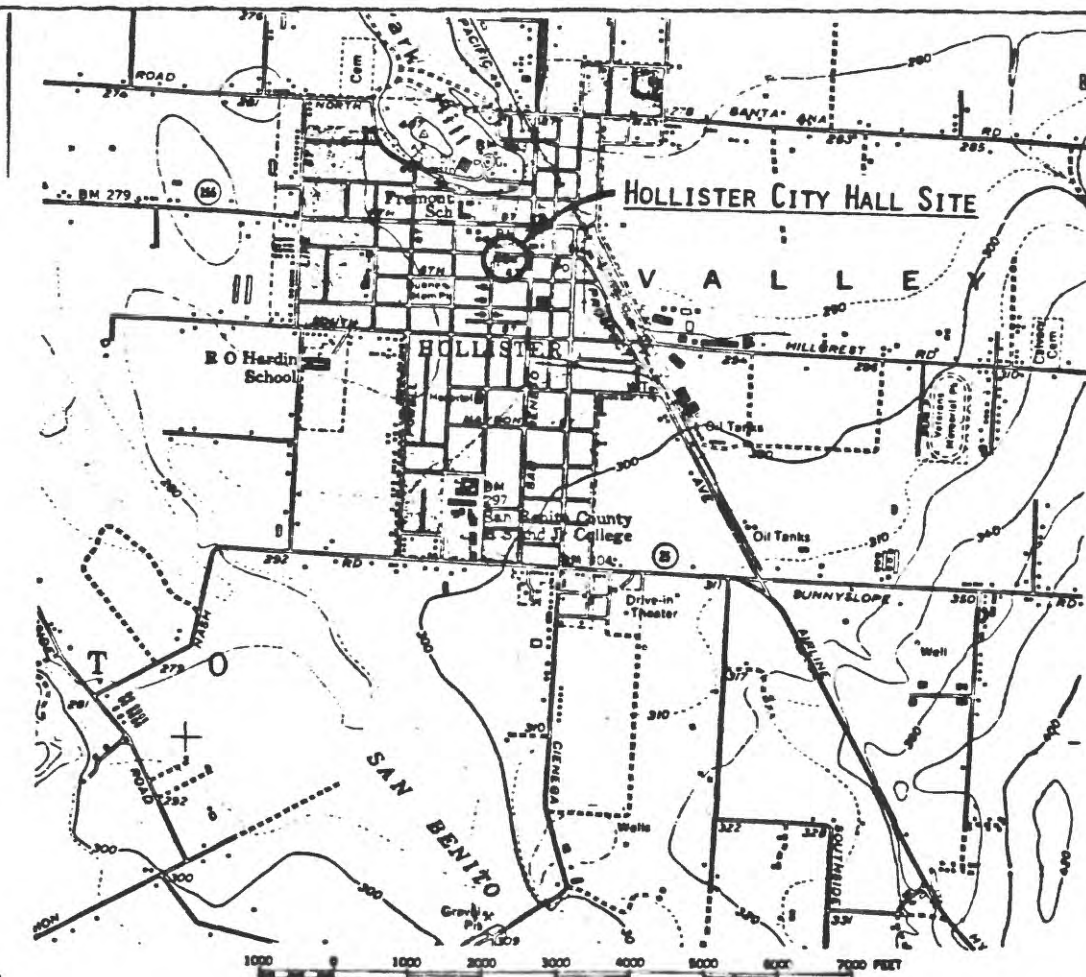
Coordinates 36.85 N, 121.40 W

This site is on Quaternary river deposits in the southern end of the Santa Clara Valley. The San Andreas fault is appx. 8 km. southwest and the Calaveras fault a few blocks from the accelerograph.

REFERENCES


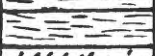


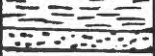

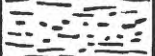
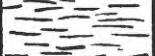
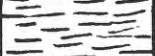
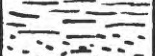
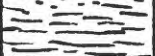

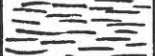
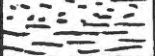

Taliaferro, N.L., 1949; Geologic Map of the Hollister Quad., California CDMG Bulletin 143

Hansen, W.R., Weiss, R.B., Idress, I.M., Cluff, L.S.; 1973, Geotechnical Data Compilation for Selected Strong-Motion Seismograph Sites in California, Woodward-Lundgren & Associates



GEOLOGIC SUMMARY OF STRONG-MOTION SITES

Date 4/79 Station No. 1028 Station Hollister City Hall 339 Fifth St.

<u>Depth</u> <u>meters</u>	<u>P-Wave</u> <u>m/sec</u>	<u>S-Wave</u>	<u>Density</u> <u>g/cm³</u>	<u>Log</u>	<u>Site Geology</u>
5			1.44		Silty clay
			1.43		Silty clay
			1.28		Sand layers
			1.49		Silty clay
			1.54		Silty sand
			1.43		Silty clay with occasional layers of silty sand
			1.39		
			1.28		
			1.28		
	10			1.43	
			1.44		
			1.41		
15			1.47		
			1.35		
			1.38		
			(Dry)		Bottom of core 2/20/62 Located about 250 m west of the site.

ALV:AL

Station No. 1191/1212 Station Palo Alto Square Nos. 1 and 2

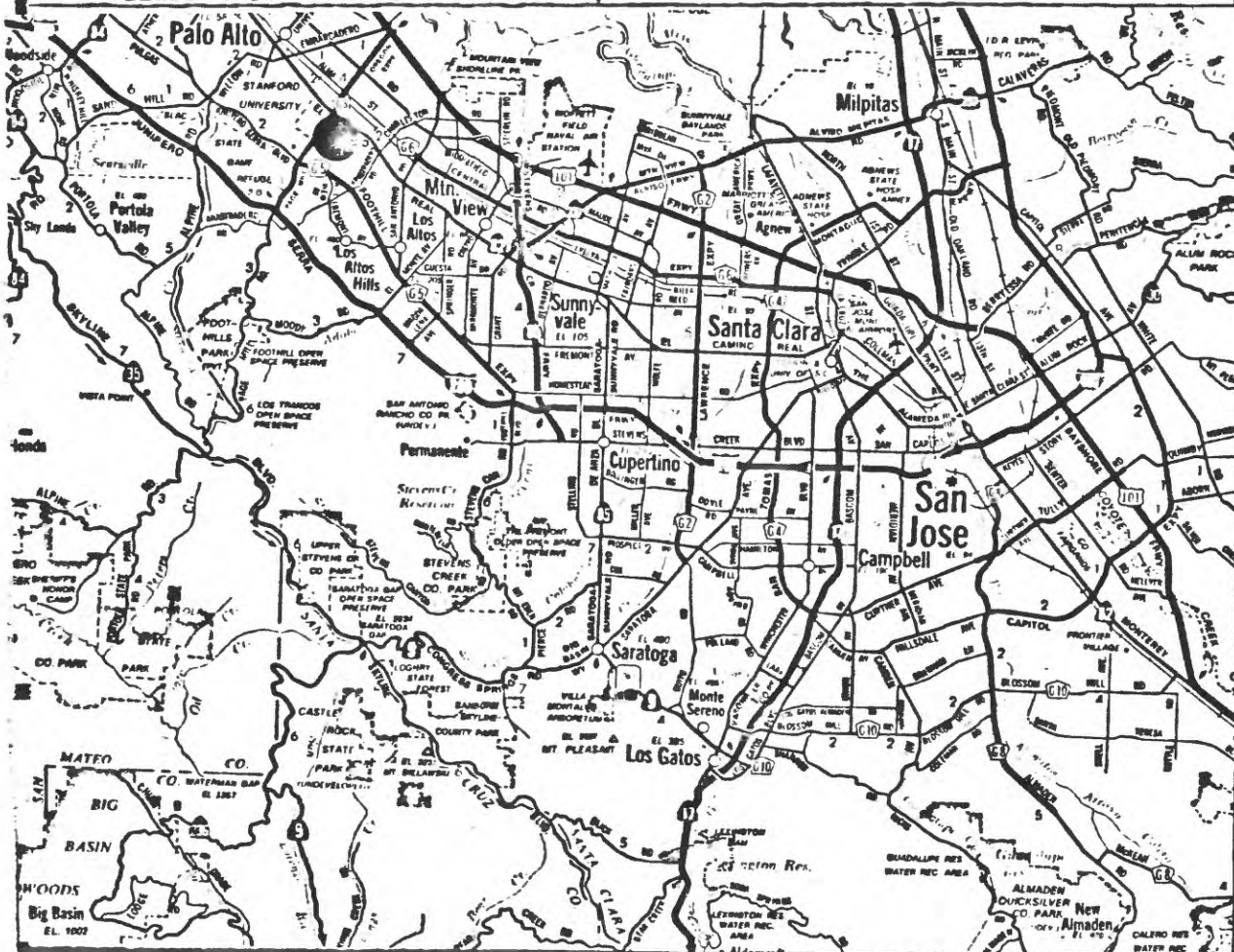
Coordinates 37.42 N, 122.14 W

Palo Alto Squares I and II are on approximately 600 meters of alluvial deposits which cover the Merced formation; sandstone, conglomeritic sandstone and silty sandstone.

References

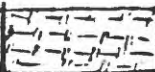


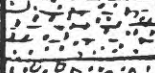
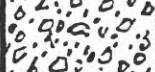
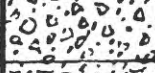
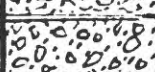
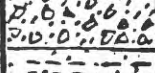
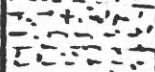


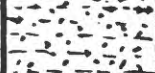
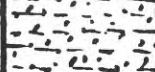


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Woodward-Lundgren & Assc., 1973; Geologic, Seismologic, and Earthquake Engineering Investigations and Evaluations; Veterans Administration Hospitals, Martinez, Palo Alto, Fresno, Sepulveda, and Long Beach, California: Contract V1001P-247



GEOLOGIC SUMMARY OF STRONG-MOTION SITES

Date 7/79 Station No. 1191 & 1212 Station Palo Alto Square Nos. 1 and 2

<u>Depth</u> meters	<u>P-Wave</u> m/sec	<u>S-Wave</u> m/sec	<u>Density</u> g/cm ³	<u>Log</u>	<u>Site Geology</u>
					Silty clay
	296	214	2.03		Sandy clay
	417	284			Sandy gravel
	486	299			Sandy clay
10	567	309	1.82		Sandy gravel
	633	294			Sandy clay
	688	309			Sandy clay
	705	293			Sandy clay
20	773	287			Sandy clay
	836	289			Silty sand
					Silty clay
	865	288			Silty clay
					Sandy clay
	919	296			Sandy clay
30	963	295			Sandy clay
					4/18/75

ALV:AL600:SS

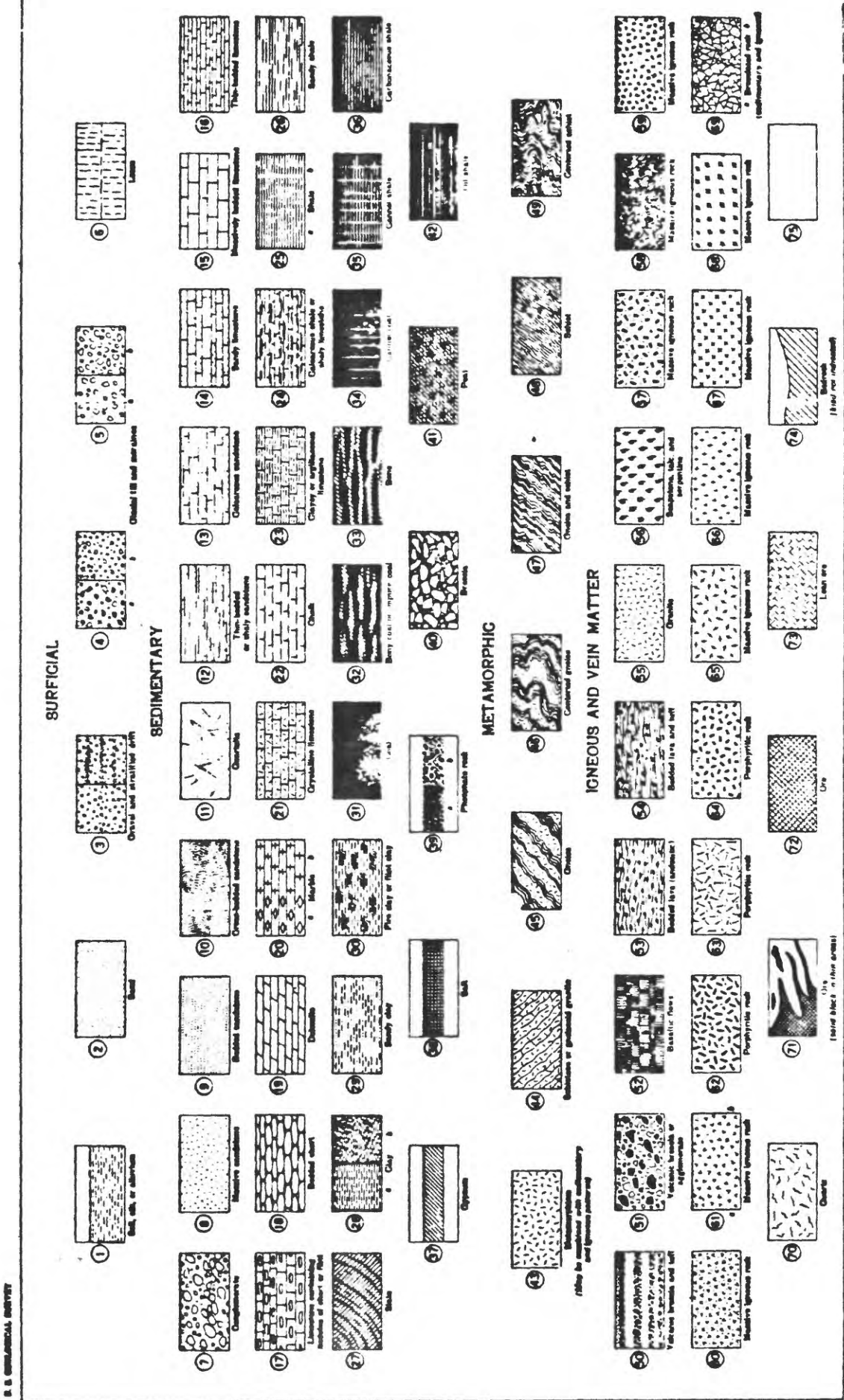
TABLE 1

ALPHABETIZED GEOLOGIC CODE

<u>ROCK TYPES</u>	<u>CLASS CODE</u>
AC Coarse Alluvium	ALV Alluvium
AF Artificial Fill	IGN Igneous Rock
AG Agglomerate	MET Metamorphic Rock
AL Alluvium	MIX Mixture of Rock Types
AM Amphibolite	SED Sedimentary Rock
AN Andesite	
BA Basalt	
BR Breccia	
CG Conglomerate	
CH Chert	
CI Combination Igneous	
CM Combination Metamorphics	
CR Combination Rock Types	
CS Combination Sedimentary	
CY Claystone	
DI Diorite	
DK Dikes or Sills	
DO Dolomite	
FR Franciscan Rocks	
GB Gabbro	
GD Granodiorite	
GN Gneiss	
GO Gouge	
GR Granite	
GS Greenstone	
HF Hornsfel	
LF Lava Flows	
LS Limestone	
MR Marble	
MS Mudstone	
MZ Monzonite	
OB Obsidian	
PH Phyllite	
PU Pumice	
QM Quartz Monzonite	
QZ Quartzite	
RY Rhyolite	
SC Schist	
SH Shale	
SI Siltstone	
SL Slate	
SP Serpentine	
SS Sandstone	
SY Syenite	
TF Tuff	
VA Volcanic Ash	

<u>EXPLANATORY SYMBOLS</u>
C Cemented
D Deep
F Fractured, Sheared, or Jointed
I Interbedded
K x1000 (multiplier)
L Layered or Stratified
M Massive
P Permafrost
S Semiconsolidated
U Unconsolidated
V Veneer
W Weathered or Friable
X Crystalline Basement
; Overlying
+ And
. Decimal

Figure 1



LITHOLOGIC SYMBOLS USED IN STRUCTURE AND COLUMNAR SECTIONS TO REPRESENT DIFFERENT KINDS OF ROCK

Appendix A

COMBINED INDEX OF VOLUMES I AND II

<u>Station No</u>	<u>State</u>	<u>Instrument Site</u>	<u>Part</u>	<u>Page</u>
2305	Arizona	Phoenix V.A. Hospital	I	3
1002	California	APEEL Array: Station 2	I	5
1008	"	Bishop	II	3
1120	"	Buena Vista Pumping Plant	II	5
1013-16	"	Cholame-Shandon Stations	II	7
1023	"	Ferndale, Old City Hall	I	7
1229	"	Fresno V.A. Hospital	II	12
638	"	Los Angeles V. A. Hospital, Brentwood	I	9
1222	"	Menlo Park, 1330 University Drive	II	14
1215	"	Mt. Diablo Summit Building	II	16
1046	"	Newville Flood Farm	II	18
1140	"	Oroville Dam	I	11
1051	"	Oroville, Seismograph Station	I	13
1054	"	Pine Flat Dam	II	20
639	"	San Diego V.A. Hospital	II	22
1117	"	San Francisco, Golden Gate Park	I	15
1228	"	San Francisco, Randall Sr. Museum	I	17
1225	"	San Francisco, V.A. Hospital	I	19
1098	"	Terminus Dam	II	24
2201	Montana	Butte, Metallurgy Building	I	21
2208	Nevada	Reno, V.A. Hospital	I	23
2605	New York	Albany, V.A. Hospital	I	25
2206	Utah	Flaming Gorge, Seismograph Station	I	27
2203	"	Logan, Administration Bldg. Station, USU	I	29
2210	"	Salt Lake City, V.A. Hospital	I	31

<u>Station No</u>	<u>State</u>	<u>Instrument Site</u>	<u>Part</u>	<u>Page</u>
2130	Washington	American Lake V.A. Hospital	II	26
2101	"	Olympia, Highway Test Laboratory	I	33
2102	"	Seattle Federal Building	II	29
2106	"	Seattle, Pier 20	I	35
2124	"	Walla Walla, V.A. Hospital	II	31