UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

IN-SITU MEASUREMENTS OF SEISMIC VELOCITY AT 10 STRONG MOTION ACCELEROGRAPH STATIONS IN CENTRAL CALIFORNIA

by

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Open-File Report 82-407

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

CONTENTS

INTRODUCTION

The character of earthquake ground motion recorded by a strong motion accelerograph is strongly influenced by local geologic conditions. Consequently, a meaningful interpretation of the strong motion record can only be made when the nature of the geologic materials and their dynamic properties at the instrument location are known. Site properties are also an essential part of any method for predicting regional ground motion parameters.

This report presents geological and geophysical data from 10 strong motion stations in central California which have records from the Kern County (1952), Parkfield (1966) or Coyote Lake (1979) earthquakes. At each location seismic travel times are measured in drill holes, normally at 2.5 m intervals, to a depth of 20 to 60 m. Geologic logs are compiled from drill cuttings, undisturbed samples and penetrometer samples. The data provide a detailed comparison of geologic and seismic characteristics for use in interpreting strong motion records and predicting regional strong motion parameters.

SELECTION AND LOCATION OF SITES

Sites with records that are particularly useful for regional zonation were selected for this study. Sites for two of the earthquakes, Parkfield, 1966 (stations 5, 8, 12 and Temblor II) and Coyote Lake, 1979 (stations 1, 2, 3, 4 and 6) form linear arrays perpendicular to the fault giving records at increasing distances to the fault on a variety of geologic materials. The record from Taft is widely used in earthquake resistant design. Locations are shown on a regional map in figure 1. More detailed site maps are shown in figures 4-9.

DRILLING AND SAMPLING PROCEDURES

At each site selected, a hole 12 cm in diameter is drilled to a depth of 30 m using a truck-mounted drill and a rock bit with mud and water circulation. The boring is then cased with 7.6 cm diameter PVC plastic pipe and backfilled with drill cuttings and "pea" gravel. Casing insured accessibility of the hole and provided a secure clamping surface for the seismic probe.

Samples are taken in each of the holes at depths of approximately 3 m, 9 m, 20 m, 30 m, and at boundaries defined by continuously monitoring the drill cuttings and the drill reaction. The type and number of samples taken at each site is determined by the type of material, the number of significant lithologic boundaries, and variations in weathering.

In soils, standard penetration measurements are made and undisturbed samples are taken using a "Pitcher" core barrel and a "Shelby" thin tube liner. Pitcher barrel samples are also taken in soils with large amounts of hard rock fragments and in firm rock. Samples are obtained in hard rock using a core barrel with a diamond core bit.

RECORDING PROCEDURES

Compressional waves are generated at each site by the vertical impact of a sledge hammer on a steel plate. A signal produced by the opening of a switch attached to the hammer is recorded for determining origin time.

Shear waves are generated using the horizontal traction source introduced by Kobayashi (1959) and discussed by Warrick (1974). Briefly, the method consists of applying a horizontal impact to a large timber (244 x 30 x 18 cm). The timber is placed on a flattened soil surface and held firmly in place by the front wheels of a truck. A steel pipe extends through the timber and supports a 30 kg hammer to which is attached an impact switch. The specially constructed hammer rolls on bearings and moves a distance of 45 cm along the pipe before impacting the timber. The "horizontal traction" source generates a high proportion of S- and P-wave energy. The timber is struck twice, once in each direction. The two impacts reverse the polarity of the S-waves but not the polarity of the smaller amounts of P-wave energy. Comparison of the two signals provides an important tool for identifying the onset of the S-wave.

The timber is offset 2.0 m from the hole and a three-component geophone package (natural frequency 14 Hz) is placed within 9 cm of its center. The signals recorded from the surface geophones are used to monitor the input signals and determine the origin time for the generated S-waves. The arrangement of timber, steel plate, and surface geophone package is illustrated in figure 2.

The P-waves generated by a vertical impact on the steel plate and the S-waves generated by striking the timber in both directions are recorded separately. This procedure is repeated for each 2.5 m interval (closer spacing is sometimes used to obtain a velocity in thin layers) in the drill hole.

Two downhole geophones were used in this study. One has an inflatable diaphragm and a declinometer which under most circumstances permits orientation of the horizontal geophones from the surface. Proper orientation (parallel and perpendicular to the source) aids in identifying the onset of the S-wave. A second downhole geophone was used as a backup instrument in several holes in this study. This geophone has a spring clamping mechanism and cannot be oriented from the surface. Both instruments detect three components of motion.

The signals from the downhole and surface seismometers and the impact switches are recorded on photographic paper. The velocity unit-impulse response of the recording system is essentially flat from 2 Hz to above 100 Hz. A detailed description of the recording instrumentation is presented by Warrick and others (1961). The recording oscillograph is modified for this project by adding 500 Hz galvanometers and increasing the paper speed to 46 cm/sec.

REDUCTION OF GEOLOGIC DATA

Description of Samples

Portions of each of the samples are examined and described in the laboratory. The terms used for the descriptions are summarized on figure 3. The sample descriptions are presented in the left-hand columns of figures 10-19.

The soil samples are described using the field techniques of the Soil Conservation Service and those specified for the Unified Soil Classification System. Descriptions include soil texture, color, amount and size of coarse grains, plasticity, dry and wet consistency, and moisture condition. Texture refers to the relative proportions of clay, silt, and sand particles less than 2 mm in diameter. The dominant color of the soil and prominent mottles are determined from the Munsell soil color charts.

Descriptions of rock samples include rock name, weathering condition, color, grain size, hardness, and fracture spacing. Classifications of rock hardness and fracture spacing are those used by Ellen and others (1972) in describing hillside materials in San Mateo County, California. The weathering classification is modified from that used by Aetron-Blume-Atkinson (1965) in describing Tertiary sedimentary rocks in the foothills of the Santa Cruz Mountains, California.

Geologic Log

Geologic logs are compiled for each hole using the field log descriptions of the samples (figures 10-19). The field log is based on the reaction of the drill rig, a continuous record of drill cuttings, preliminary on-site inspection of samples, and inspection of nearby roadcuts and gullies.

Most information needed for describing relatively well-sorted soils and such properties of rock as lithology, color, and hardness are readily obtained from cuttings. Inspection of samples and nearby outcrops is also necessary to determine the nature of poorly sorted materials and to determine fracture spacing. Reaction of the drill rig is also useful in determining degree of fracturing as the rate of penetration in rock is highest for very closely fractured and crushed materials and drilling roughness generally is at a maximum in closely to moderately fractured rock. In-situ consistency of soil is determined largely from standard penetration measurements and rate of drill penetration.

Density Measurements

Values for density are required to calculate elastic moduli from measurements of seismic velocity. Densities were measured for the diamond core samples and most of the penetration samples by weighing a small piece of sample and obtaining its volume by the mercury displacement method. A different procedure was used for very friable materials such as grus or poorly-sorted materials which necessitated using a large sample. A section was cut from the Shelby tube containing the sample, its height and diameter measured and the sample extruded for weighing.

While the accuracy of the density measurements is generally sufficient for calculation of elastic moduli, a number of the samples used to obtain densities were not entirely representative of the material in-situ. Penetration samples were somewhat disturbed and many had dried out before measurements could be made. Densities of hard rock obtained using intact fragments may be higher than in-situ densities by approximately 0.1-0.2 gm/cc, depending on the amount and openness of fractures.

REDUCTION OF SEISMIC DATA

Identification of Shear Wave Onset

To aid in the identification of the shear wave arrivals, the signals recorded in the drill hole from impacting the timber in opposite directions and superimposed and drafted on a common time base (figs. 20-26). The S-wave group is easily identified when displayed in this manner, by a 180° phase inversion. The onset of the S-wave is chosen as the start of the first clearly inverted phase in the group. The interpretation proceeds from the bottom record, to the top using phase correlation at each recording depth. The onset of the S-wave arrival (arrows) and the first peak of the S-wave arrival (dots) are identified for each depth and are indicated on figures 20-26 for each site.

It was not possible at every site to control orientation of the downhole seismometer package because of high viscosity drilling mud left in the hole; hence, the relative amounts of S-wave energy recorded on the two horizontal seismometers vary with depth. The S-wave arrival is generally most easily identified on the horizontal seismogram with the largest amplitudes. Comparison of the signals recorded on the horizontal sensors with that recorded on the vertical sensor shows that the S-wave energy generated by the horizontal traction source is at least twice as large as the P-wave energy.

On many of the horizontal seismograms some P-wave energy prior to the onset of the S-wave is apparent. Some P-wave energy is generated by the horizontal traction source and some probably results from conversion of S to P at seismic boundaries. In some cases the polarity of this P-wave energy is reversed and careful consideration of the entire record section is required to identify the S-arrival. In general, the onset of the S-wave is easier to identify at sites underlain by the various types of soil than for sites underlain by the more consolidated rock units.

Travel Times and Average Velocities

To determine the travel time for the S-wave onset identified from the record sections (figures 20-26), the following times are measured with respect to a 100 Hz standard signal recorded on the records:

1) t_1 time of break in signal from impact switch

2) t_2 onset time of S-wave arrival on inline uphole geophone

3) t_3 onset time of identified S-wave arrival on downhole sensors

The time considered to be the origin time for the S-wave recorded on the downhole sensor is the onset time of the S-arrival on the uphole inline sensor. To reduce the uncertainties in determining this origin time, an average travel time from the source to the uphole geophone (t_A) is determined from the set of values, $t_2 - t_1$, measured at each depth. The travel time for the first S-arrival is given by

$$t_s = (t_3 - t_1) - t_A.$$

A corrected S-wave travel time (t_{s_c}), corresponding to the travel time for a vertical ray path, is computed from $t_{s_c} = t_s \cdot C$ where C corresponds to a timing correction (cosine of the angle of ray incidence) due to the distance the plank is offset from the center of the hole (usually 2.0 m). Average velocities from the surface are determined by dividing the corrected travel time by the corresponding depth. The travel time for the first S-peak is determined similarly. The origin corrections ($t_2 - t_1$), the travel times of the first S-arrival and the first S-arrival and the first S-peak (t_s), the corrected travel times for the first S-arrival and the first S-peak (t_{s_c}), and the average corresponding velocities computed at each site are presented in tables 1-10.

The travel times for the P-waves generated by a vertical impact on a steel plate are determined in the same way as for the S-waves, except that the origin time for the P-wave is given by the impact switch and no origin correction is necessary. The travel times, the corrected travel times, and the average velocities for the P-waves are also presented in tables 1-10.

Interval Velocities and Elastic Moduli

Calculation of interval velocities and elastic moduli requires determination of depth intervals over which the velocity is approximately constant within the uncertainty of the travel-time measurements. To determine these depth intervals, the travel time data (tables 1-10) are plotted as a function of depth (figs. 27-36) and the geologic logs (figs. 10-19) are simplified and displayed graphically on the travel time curves (figs. 27-36). Depth intervals for velocity determinations are selected on the basis of distinct changes in slope of the travel time plots and evidence for lithologic boundaries. For those geologic materials with S-velocities greater than 350 m/sec, the intervals are required to contain at least four travel time measurements to avoid determining a velocity from a travel time differential due in large part to measurement error.

Velocities are calculated for each of the selected intervals (tables 11-20) from the slope of the linear regression line which best fits the travel time data in a least squares sense (Borcherdt and Healy, 1968, eqs. 3.1-3.5). The equation of the linear-regression line which best fits, in a least-squares sense, a sample on n pairs of time-depth coordinates $(x_1,t_1),....(x_n,t_n)$ is

$$t(x) = a + b\,(x - \overline{x})$$

where $\overline{x} = \frac{1}{n} \sum_{i=1}^{n} x_i$, $a = \frac{1}{n} \sum_{i=1}^{n} t_i$,

the intercept is $\text{INCPT} = \frac{1}{n} \sum_{i=1}^{n} t_i - b\overline{x}$, and

the slope is $b = \sum_{i=1}^{n} w_i t_i$

with $w_i = (x_i - \overline{x})/D$ and $D = \sum_{k=1}^{n} (x_k - \overline{x})^2$

The desired velocity (VEL) is given by V = 1/b. Assuming the standard statistical model (Borcherdt and Healy, 1968), the 68.3 confidence level, uncertainty interval (UNC INT) for the velocity is estimated by

$$\frac{1}{b+S_b} , \frac{1}{b-S_b} ,$$

where $S_b = \frac{1}{(n-2)D} \sum_{i=1}^{n} (t_i - t(x_i))^2$

is the standard error of the regression coefficient.

For these depth intervals with measurements of density (ρ), the shear modulus (SHEAR MOD, M) and bulk modulus (BULK MOD, K) is calculated (tables 11-20) using the linear elastic equation:

$$M = \rho V_s^2$$

and

$$K = \rho V_p^2 - \frac{4}{3} M$$

Poisson's ratio (σ) is calculated (tables 11-20) using

$$\sigma = \frac{\left(\frac{V_p}{V_s}\right)^2 - 2}{2\left(\frac{V_p}{V_s}\right)^2 - 2}$$

ACKNOWLEDGMENTS

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FIGURES

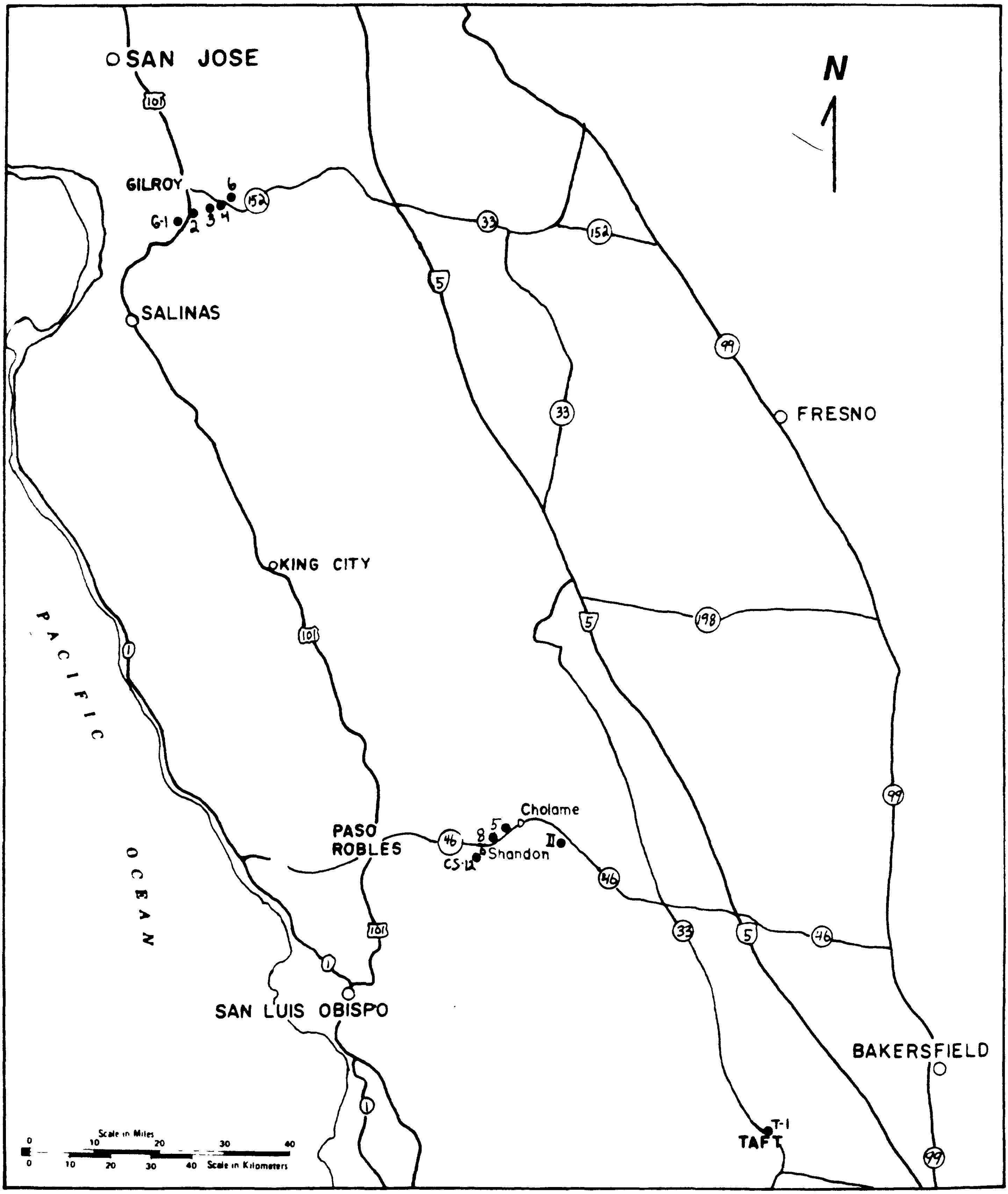


Figure 1. Generalized map of the central California coastal region showing the approximate locations of strong motion accelerograph stations. Detailed locations are shown in figures 4-9.

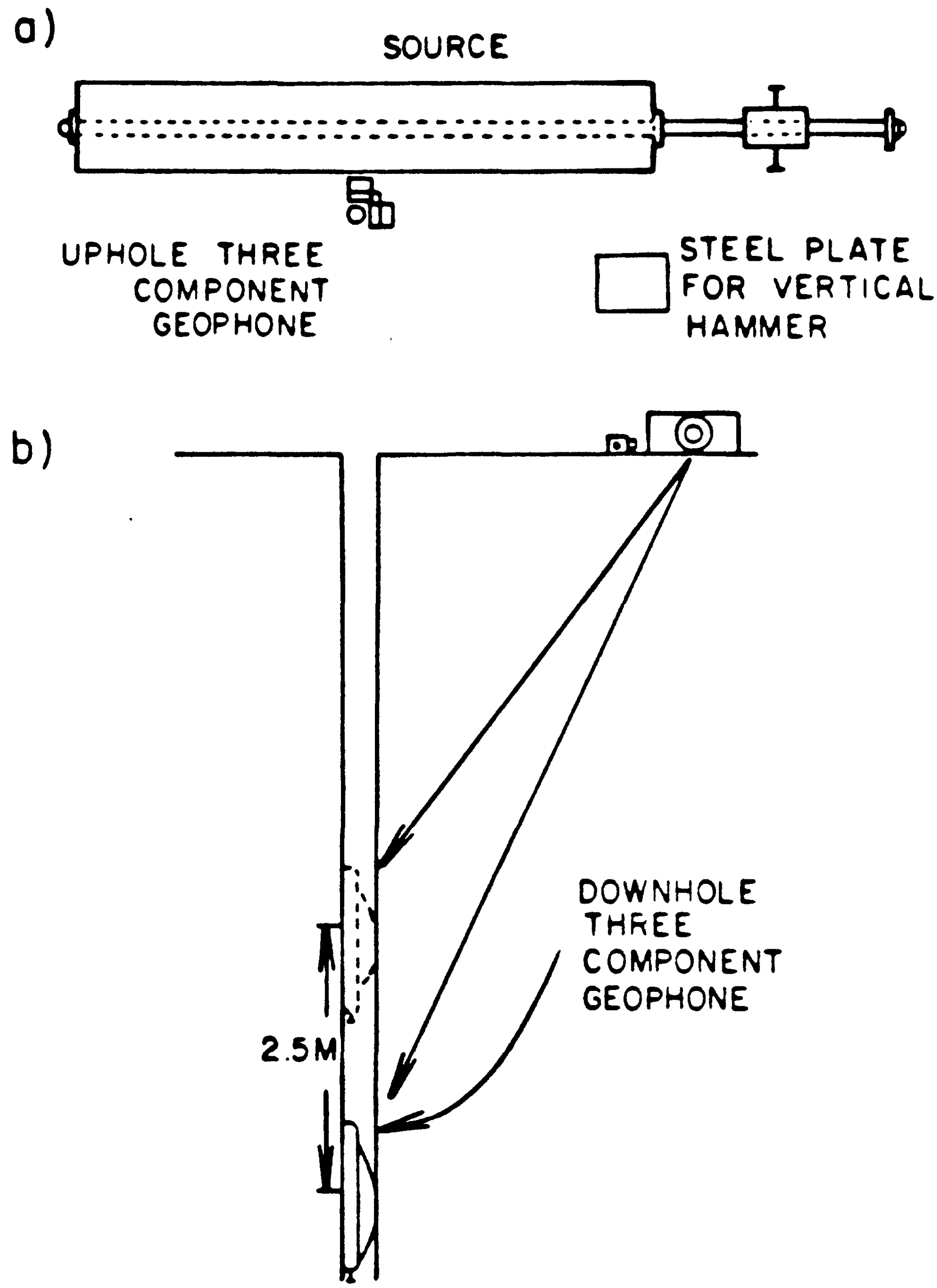


Figure 2. Details of field apparatus, (a) hammer and plank and (b) section showing three-component downhole geophone.

ALTITUDE: DATE:	LOCATION: Lat. Long. QUADRANGLE:	GEOLOGIC MAP UNIT: 1) Dibblee, 1966 2) Dibblee, 1974 3) Helley and Brabb, 1971

SAMPLE DESCRIPTION	Density (gm/cc)	Blows/Feet	Sampling	Graphic Log	Depth (meters)	DESCRIPTION

SAMPLING:

Standard penetration sample taken inside a 1 1/4" I.D. split-spoon driven 18" into the soil with a 140 lb. weight falling 30" at the top of the drill rod.

Blow count for last 12" or, if penetration <12", for depth driven as noted. (14; 54/3")

Pitcher undisturbed sample taken inside a 3" I.D. Shelby thin tube mounted in a Pitcher core barrel. (P)

Sample taken inside a 3" I.D. Shelby tube mounted on end of drill rod and pushed into soil. (S)

Rock core taken inside a NX size core barrel with a diamond bit. (C)

Rock hardness: response to hand and geologic hammer: (Ellen et al., 1972)

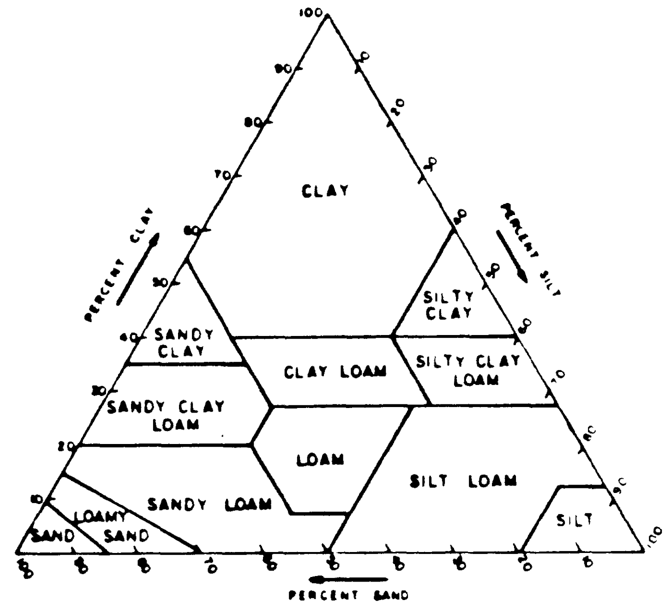
hard - hammer bounces off with solid sound
firm - hammer dents with thud, pick point dents or penetrates slightly
soft - pick point penetrates
friable material can be crumbled into individual grains by hand.

Fracture spacing. (Ellen et al., 1972)

cm	in	fracture spacing
0-1	0-1/2	v. close
1-5	1/2-2	close
5-30	2-12	moderate
30-100	12-36	wide
>100	>36	v. wide

Weathering: (Aetron-Blume-Atkinson, 1965)
Fresh: no visible signs of weathering
Slight: no visible decomposition of minerals, slight discoloration
Moderate: slight decomposition of minerals and disintegration of rock, deep and thorough discoloration
Decomposed: extensive decomposition of minerals and complete disintegration of rock but original structure is preserved.

Texture: the relative proportions of clay, silt, and sand below 2 mm. Proportions of larger particles are indicated by modifiers of textural class names. Determination is made in the field mainly by feeling the moist soil (Soil Survey Staff, 1951).



Color: Standard Munsell color names are given for the dominant color of the moist soil and for prominent mottles.

Plasticity: estimated from the strength of air dried sample and toughness of thread formed when soil is rolled at the plastic limit (Sowers and Sowers, 1970).

plasticity	dry strength	field test
non plastic	v. low	falls apart easily
slightly	slight	easily crushed
medium	medium	friable with difficulty
highly	high	cannot crush with fingers

Relative density of sand and consistency of clay is correlated with penetration resistance: (Terzaghi and Peck 1948)

blows/ft.	relative density	blows/ft.	consistency
0-4	v. loose	<2	v. soft
4-10	loose	2-4	soft
10-30	medium	4-8	medium
30-50	dense	8-15	stiff
>50	v. dense	15-30	v. stiff
		>30	hard

CL, MH, etc.: Unified Soil Classification Group Symbol (U. S. Army Corps of Engineers, 1960)

Figure 3

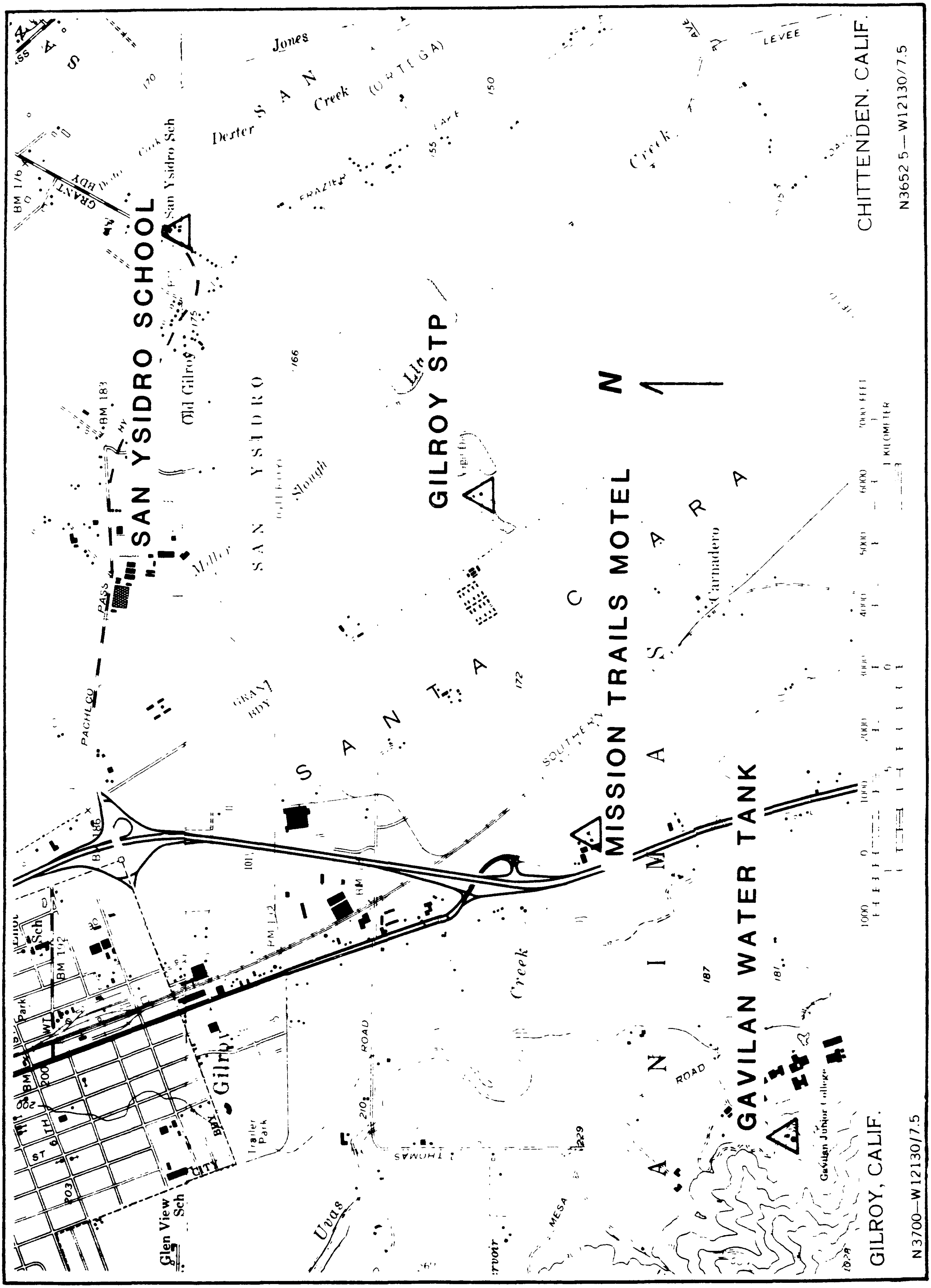

SAN YSIDRO SCHOOL
GILROY STP
MISSION TRAILS MOTEL
GAVILAN WATER TANK
N
CHITTENDEN, CALIF.
N3652.5—W12130/7.5
GILROY, CALIF.
N3700—W12130/7.5

Figure 4

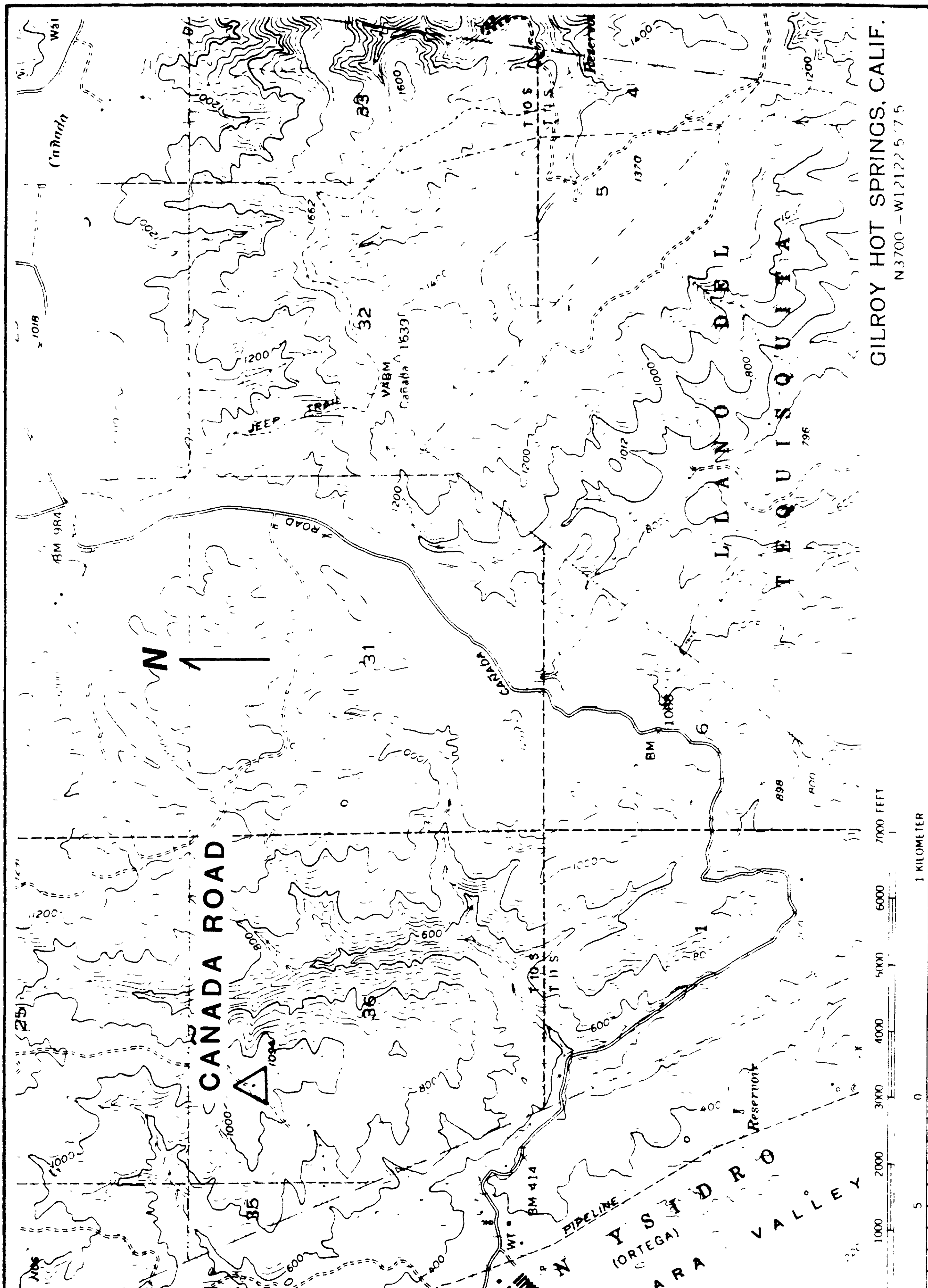

CANADA ROAD
N
GILROY HOT SPRINGS, CALIF.
SANTA CLARA VALLEY
PIPELINE
Reservoir
JEEP TRAIL
CANADA
ROAD
BM 414
BM 984
1 KILOMETER
7000 FEET

Figure 5

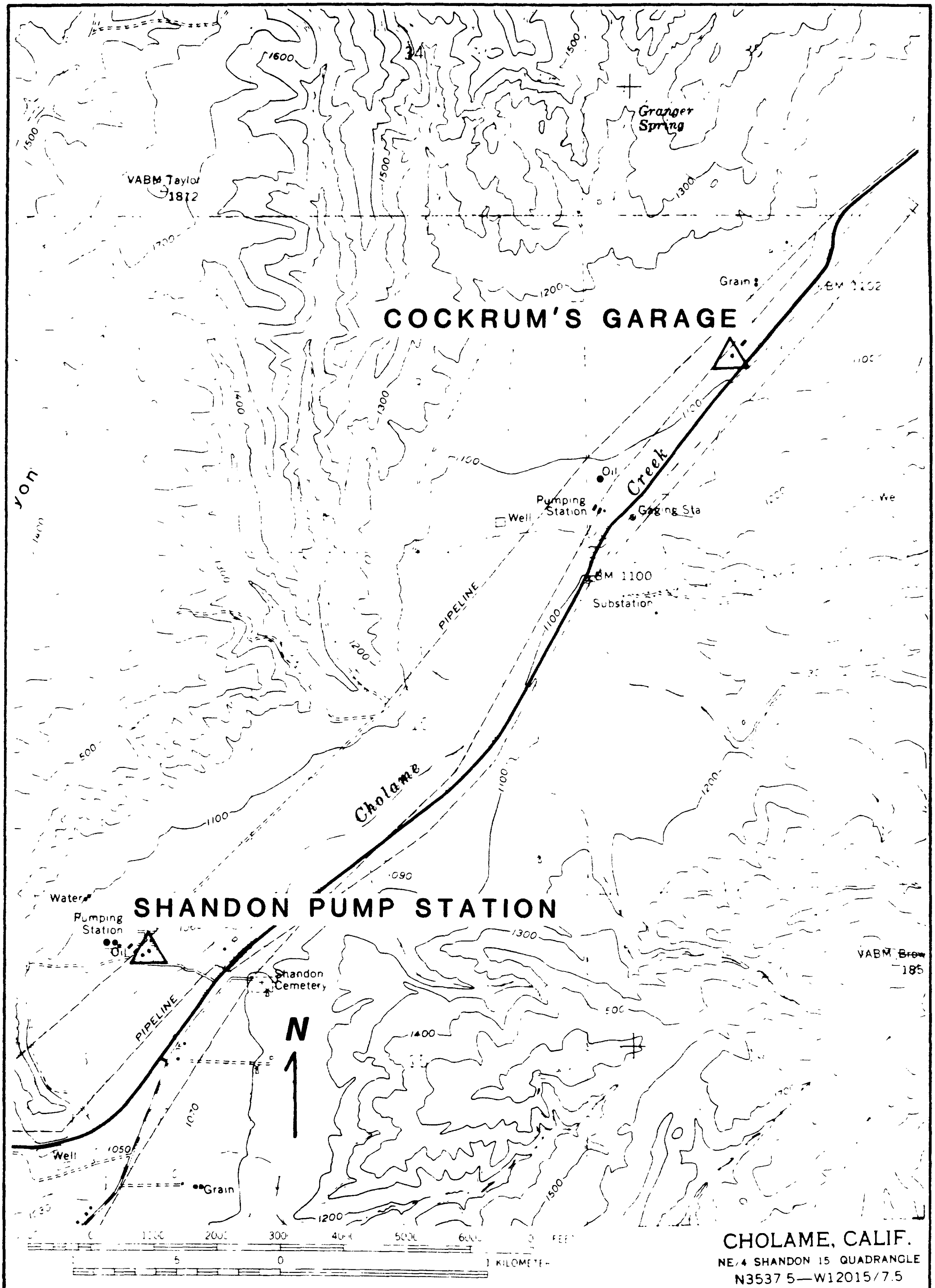

COCKRUM'S GARAGE
SHANDON PUMP STATION
Granger Spring
VABM Taylor
1812
Grain
BM 1102
Oil
Pumping Station
Well
Gaging Sta
BM 1100
Substation
PIPELINE
Cholame
Creek
Water
Pumping Station
Oil
Shandon Cemetery
N
Well
Grain
1600
1500
1300
1200
1100
1400
1090
1050
FEET
1 KILOMETER
CHOLAME, CALIF.
NE/4 SHANDON 15 QUADRANGLE
N3537 5—W12015/7.5

Figure 6

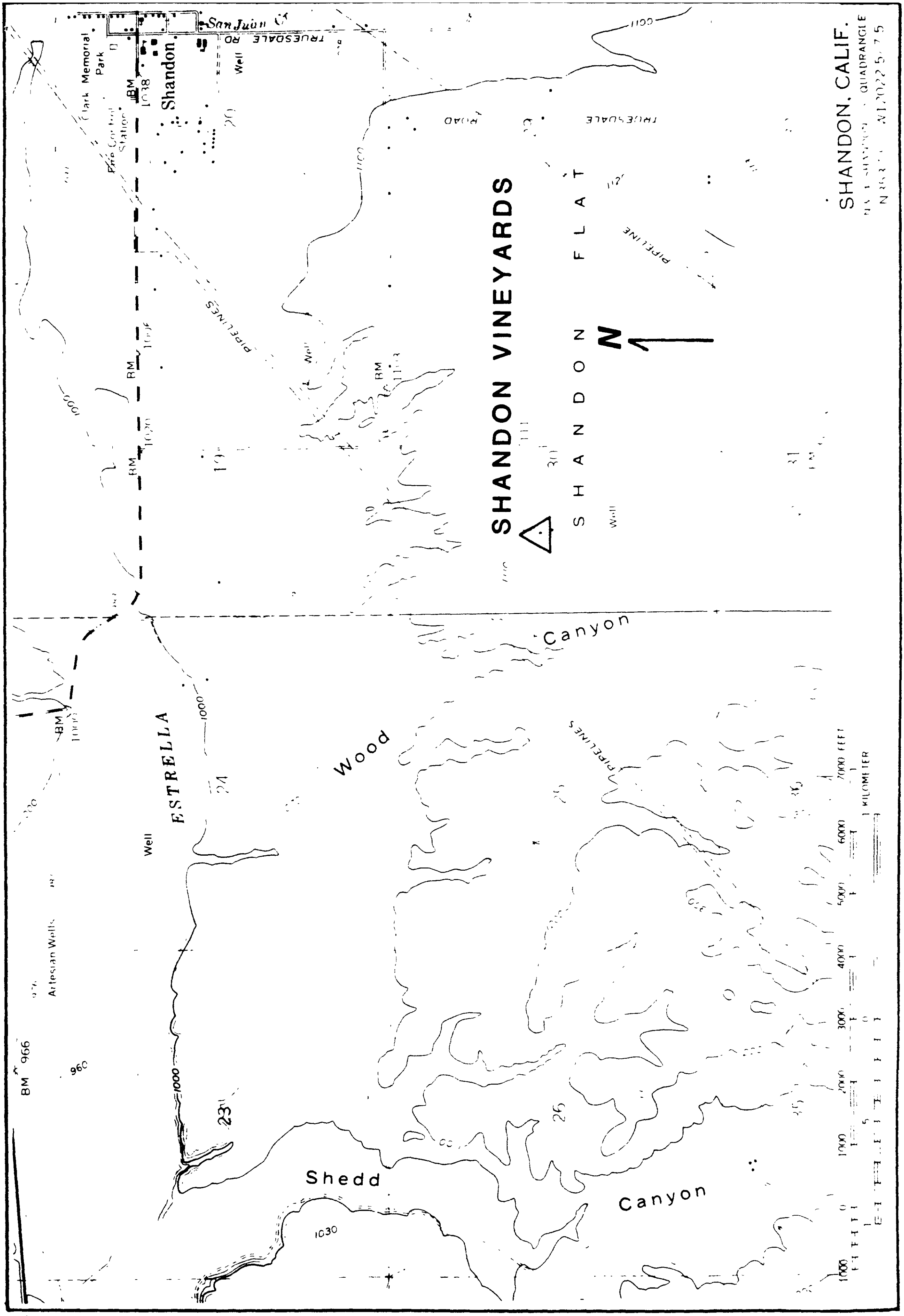

SHANDON VINEYARDS
SHANDON FLAT
N
Shandon
Clark Memorial Park
San Juan Cr
TRUESDALE RD
PIPELINES
ESTRELLA
Wood
Canyon
Shedd
Canyon
Artesian Wells
Well
SHANDON, CALIF.
1 KILOMETER

Figure 7

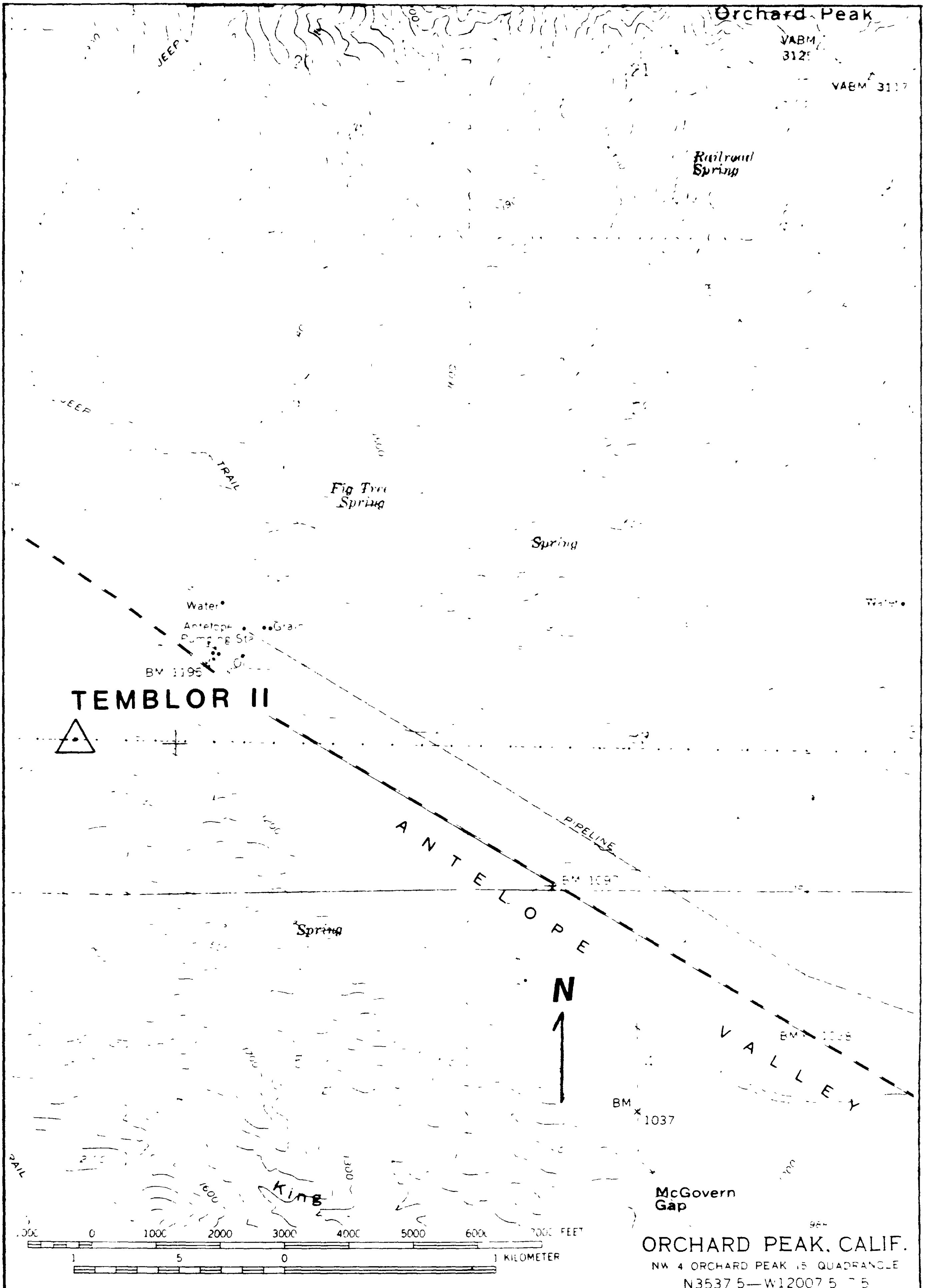

Orchard Peak
VABM 3125
VABM 3117
JEEP
Railroad Spring
JEEP
TRAIL
Fig Tree Spring
Spring
Water
Antelope Pumping Sta
Grain
BM 1195
TEMBLOR II
PIPELINE
ANTELOPE
BM 1097
Spring
N
VALLEY
BM 1037
King
McGovern Gap
ORCHARD PEAK, CALIF.
1 KILOMETER
FEET

Figure 8

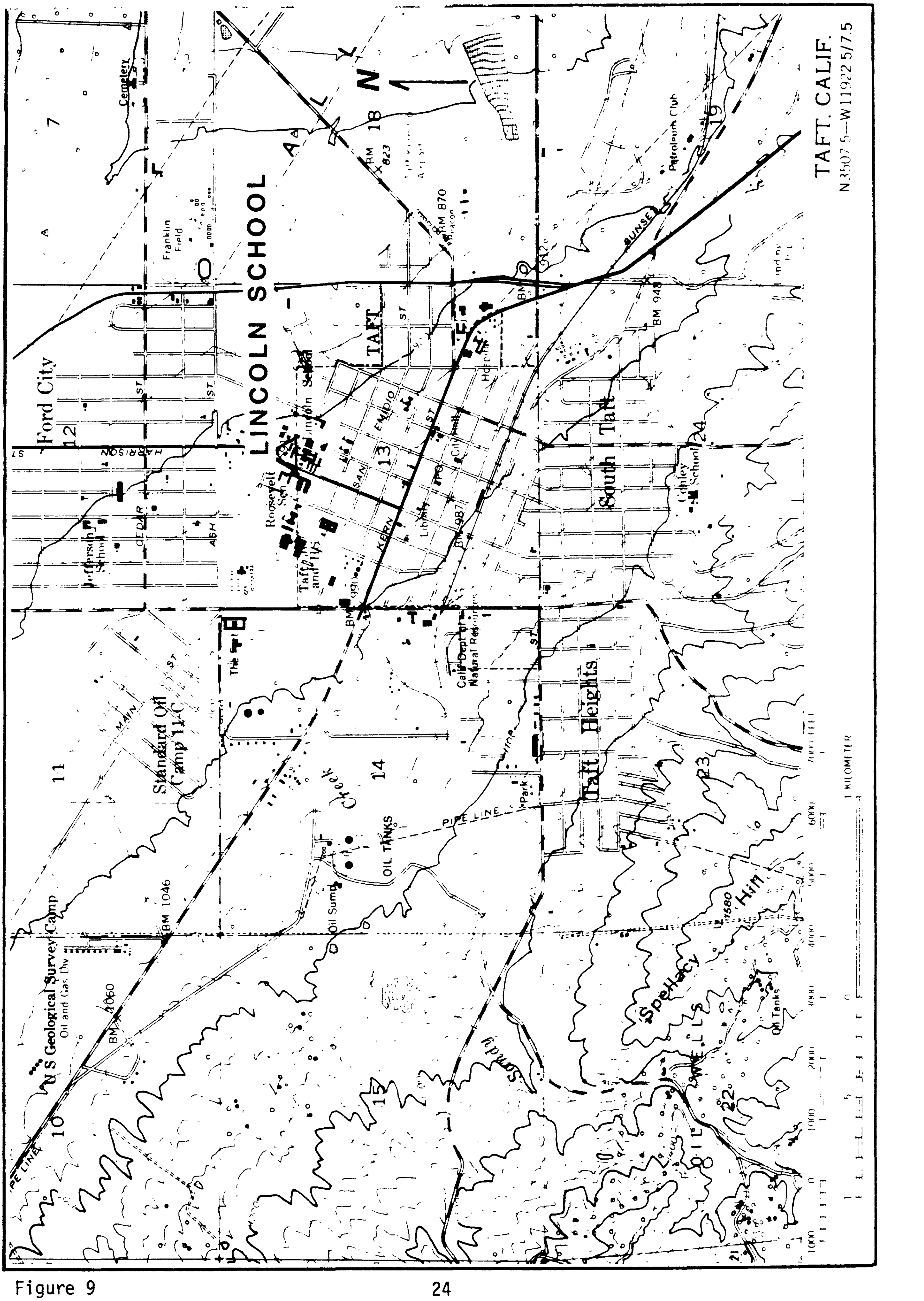
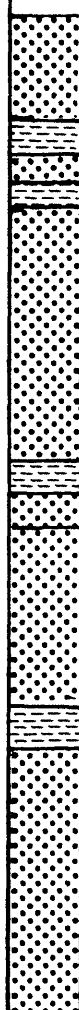

LINCOLN SCHOOL
TAFT, CALIF.
N3507.5—W11922.5/7.5
Ford City
TAFT
South Taft
Taft Heights
Standard Oil Camp 11-C
US Geological Survey Camp
Oil and Gas Div
Spellacy Hill
OIL TANKS
PIPE LINE
Sandy
Creek
Roosevelt Sch
Jefferson School
Conley School
Petroleum Club
Franklin Field
Calif Dept of Natural Resources
SUNSET
KERN
SAN EMIDIO ST
CEDAR
ASH
HARRISON ST
MAIN ST
Oil Sump
Oil Tanks
WELLS
Park
Library
BM 1046
BM 1060
BM 870
BM 823
BM 948
BM 987
1 KILOMETER

Figure 9

ALTITUDE: 400' **DATE:** 9/19/79	**LOCATION:** **Lat.** 36°58'25" **Long.** 121°34'20" **QUADRANGLE:** CHITTENDEN, CALIF.	**HOLE No.** G-1 **SITE:** GAVILAN WATER TANK **GEOLOGIC MAP UNIT:** fs Franciscan sandstone[3]

SAMPLE DESCRIPTION	Density (gm/cc)	Blows/Foot	Sampling	Graphic Log	Depth (meters)	DESCRIPTION
					0	SANDSTONE, yellowish brown, moderately weathered, mostly v. close to close fracture spacing, fine to medium grained, hard. Contains thin beds of SHALE, moderately to deeply weathered, v. close fracture spacing, and stringers of quartz.
					5	
					10	SANDSTONE, dk. olive, fine to medium grained, hard, close to moderate fracture spacing.
					15	SHALE, black, slight to moderately weathered.
					20	
					25	
					30	



COMMENTS: Drilling rates: 10.3 m-18 m: 15 min/ft. 18-20.3 m: 20 min/ft.	**LOGGED BY:** T. Fumal

Figure 10

ALTITUDE: 185'

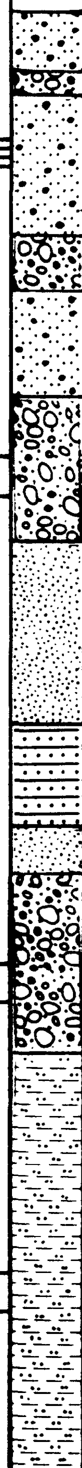
DATE: 9/17/79

LOCATION:
Lat. 36°58'53"
Long. 121°33'14"
QUADRANGLE: CHITTENDEN, CALIF.

HOLE No. G-2
SITE: MISSION TRAILS MOTEL
GEOLOGIC MAP UNIT: Qyf Young alluvial fan deposits[3]

SAMPLE DESCRIPTION	Density (gm/cc)	Blows/Foot	Sampling	Depth (meters)	DESCRIPTION
SANDY LOAM, dk. brown, mostly fine to medium sand, medium dense, slightly plastic, moist. (SM)		21		0–8	SANDY LOAM, dk. brown, mostly fine to medium grained sand, medium to dense, with lenses of coarse Sandy Loam and GRAVEL to 4 mm (SM-GM).
SANDY GRAVEL, poorly sorted, 75% gravel to 50 mm, rounded to sub rounded, v. dk. brown to black, wet. (GM)	2.22		P	8–11	SANDY GRAVEL, to 50 mm, with lenses of coarse sand. (GM)
				11–15	SAND, yellowish brown, poorly sorted to coarse size. (SM)
				15–17	SANDY CLAY, yellowish brown. (CL)
GRAVELLY SAND, v. dk. greyish brown, poorly sorted, 40% medium pebble gravel to 20 mm, rounded to sub rounded, wet. (SW)	2.25		P	17–21	SAND, fine to medium, yellowish brown, v. dense grading to: GRAVELLY SAND, poorly sorted, yellowish brown. (SW)
SILTY CLAY, dk. greenish grey, highly plastic, medium to coarse blocky structure, v. stiff, wet. (CH)	1.97		P	21–30	SILTY CLAY, dk. grey, v. stiff, moist. (CH)

Graphic Log:

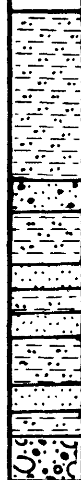


CONTINUED ON NEXT FIGURE

COMMENTS:
Figure 11

LOGGED BY: T. Fumal

ALTITUDE: DATE:	LOCATION: Lat. Long. QUADRANGLE:	HOLE No. GILROY #2 SITE: MISSION TRAILS MOTEL GEOLOGIC MAP UNIT:

SAMPLE DESCRIPTION	Density (gm/cc)	Blows/Feet	Sampling	Graphic Log	Depth (meters)	DESCRIPTION
					30	with lenses of v. fine SANDY LOAM. (ML)
					35	
						GRAVEL, well-sorted, little or no fines (GP)
					40	
					45	
					50	

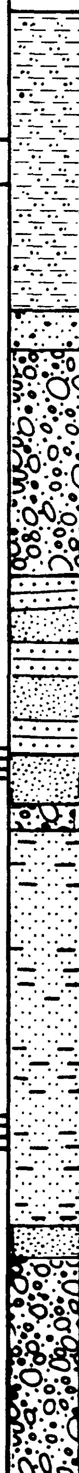
COMMENTS: Lost circulation suddenly at 39.4 m. Were unable to regain it and so stopped drilling.

Figure 11 continued

LOGGED BY:

ALTITUDE: 165'	LOCATION: Lat. 36°59'10" Long. 121°32'11"	HOLE No. G-3
DATE: 9/20/79	QUADRANGLE: CHITTENDEN, CALIF.	SITE: SEWAGE TREATMENT PLANT GEOLOGIC MAP UNIT: Qb Interfluvial basin deposits[3]

SAMPLE DESCRIPTION	Density (gm/cc)	Blows/Foot	Sampling	Depth (meters)	DESCRIPTION
				0	SILTY CLAY and CLAY LOAM, v. dk. greyish brown stiff (CL-CH) mottled yellowish brown and v. dk. greyish brown greyish brown dk. yellowish brown sand to medium size, v. stiff
CLAY LOAM, mottled, dk. grey, dk. greyish brown and dk. yellowish brown, high plasticity, medium to coarse blocky structure, v. stiff (CH).	2.12		S	5	
					SANDY LOAM grading to: SANDY GRAVEL, mostly dk. greenish grey to olive fine to medium grained sandstone, to 50 mm. (GP)
				10	
					SANDY CLAY LOAM and SILT LOAM, yellowish brown, stiff (CL-ML) dk. grey yellowish brown to strong brown
COARSE SANDY LOAM, brown, poorly sorted, medium plasticity, some rounded gravel to 20 mm. (SC)		50/6"		15	SANDY LOAM, brown, poorly sorted (SM-SC) grading to: SANDY GRAVEL, to 15 mm.
					SILTY CLAY LOAM and SILT LOAM, dk. yellowish brown to greyish brown (CL-ML) dk. grey
				20	
SILTY CLAY LOAM, grey, medium plasticity, v. stiff (CL)		28			
				25	FINE SAND, yellowish brown to strong brown grading to: GRAVELLY SAND (SP) v. dense
				30	CONTINUED ON NEXT FIGURE



COMMENTS:

Figure 12

LOGGED BY: T. Fumal

ALTITUDE:

DATE:

LOCATION:
Lat.
Long.
QUADRANGLE:

HOLE No. GILROY #3
SITE: SEWAGE TREATMENT PLANT
GEOLOGIC MAP UNIT:

SAMPLE DESCRIPTION	Density (gm/cc)	Blows/Foot	Sampling	Graphic Log	Depth (meters)	DESCRIPTION
					30	GRAVELLY SAND, v. dense
						FINE SANDY CLAY LOAM, grey (SC) olive, firmer
LOAMY SAND, lt olive brown, poorly sorted, 10-20% v. fine gravel to 10 mm. (SM) grading to: GRAVELLY SAND, 20% coarse pebble gravel to 25 mm, rounded to subrounded. (SW)	2.10		P		35	GRAVELLY SAND, olive, brown, poorly sorted (SW)
						mostly <30 mm
					40	
					45	SANDY CLAY and SANDY LOAM, yellowish brown, v. stiff (CL-SM)
					50	
					55	
					60	

COMMENTS: Rapid loss of fluid at 36.4 m but were able to keep circulation and continued drilling.

LOGGED BY:

Figure 12 continued

ALTITUDE: 172'

DATE: 9/25/79

LOCATION:
Lat. 37°00'01"
Long. 121°31'16"

QUADRANGLE: GILROY, CALIF.

HOLE No. G-4

SITE: SAN YSIDRO SCHOOL

GEOLOGIC MAP UNIT: Qyf Young alluvial fan deposits

SAMPLE DESCRIPTION	Density (gm/cc)	Blows/Foot	Sampling
CLAY, black, organic, highly plastic, weakly developed medium to fine blocky structure, soft, wet. (OH) SILTY CLAY, olive grey to grey with common mottles of dk. yellowish brown, medium plasticity, some fine pebbles. (CL)		4	
GRAVELLY SAND, dk. greyish brown 40% gravel to 30 mm, poorly sorted. (SW)	1.89		S
SILTY CLAY, dk. grey, medium plasticity, fine to medium blocky structure (CL)	1.81		P
SILTY CLAY LOAM, yellowish brown, medium plasticity, v. stiff, moist (CL)		29	

Depth (meters)	DESCRIPTION
0	SANDY CLAY LOAM, dk. brown (SC)
	GRAVELLY V. COARSE SAND (SP)
	SANDY CLAY, brown, grading to: SILTY CLAY, bluish grey, soft (CH-OH)
5	black
	lt. greenish grey
	greyish brown
10	GRAVELLY SAND, dk. greyish brown, poorly sorted. (SP)
	SANDY LOAM, dk. grey
	SILTY CLAY, dk. grey
	V. FINE SANDY CLAY, yellowish brown
	GRAVELLY V. COARSE SAND (SP)
15	SILTY CLAY, pale brown, v. stiff. (CL)
	SILTY CLAY LOAM and SILT LOAM, greyish brown (ML).
	F. SANDY CLAY and SILT LOAM, grey (ML)
20	SILTY CLAY, grey (CL)
	CLAY, greyish brown to brown grading to: SILTY CLAY, yellowish brown (CL)
	SANDY CLAY, yellowish brown, some v. coarse sand (CL).
25	SANDY GRAVEL (GP).
	V. FINE SANDY CLAY and SILTY CLAY LOAM, yellowish brown to strong brown, v. stiff (CL)
30	

COMMENTS:
Figure 13

LOGGED BY: T. Fumal

ALTITUDE: 1090'

DATE: 9/26/79

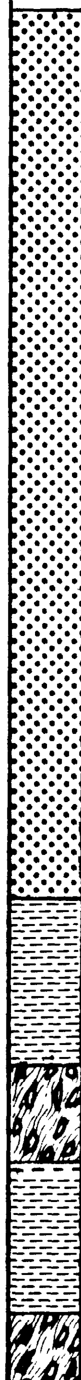
LOCATION:
Lat. 37°01'36"
Long. 121°29'07"

QUADRANGLE:
GILROY HOT SPRINGS, CALIF.

HOLE No. G-6

SITE: CAÑADA ROAD

GEOLOGIC MAP UNIT: Kts
Hard shale and sandstone[3]

SAMPLE DESCRIPTION	Density (gm/cc)	Blows/Foot	Sampling	Graphic Log	Depth (meters)	DESCRIPTION
					0	SANDSTONE, deeply to moderately weathered, v. close to close fracture spacing, hard sandstone is dk. olive brown. Texture is Gravelly clayey sand with lenses of strong brown silty sand and yellowish red clay.
					5	
					10	
					15	
						SHALE, black, slightly weathered to fresh close to moderate fracture spacing, hard. Contains zones that are sheared with texture of gravelly sandy clay.
					20	
						sheared rock
					25	
						sheared rock
					30	

COMMENTS: Rapid loss of fluid to 10 m.

LOGGED BY: T. Fumal

Figure 14

ALTITUDE: 1110'	**LOCATION:** **Lat.** 35°41'47" **Long.** 120°19'40"	**HOLE No.** CS-5
DATE: 8/20/79	**QUADRANGLE:** CHOLAME, CALIF.	**SITE:** COCKRUM'S GARAGE
		GEOLOGIC MAP UNIT: Qa Holocene alluvium[2]

SAMPLE DESCRIPTION	Density (gm/cc)	Blows/Foot	Sampling	Graphic Log	Depth (meters)	DESCRIPTION
					0	SANDY LOAM, dk. brown, poorly sorted, some gravel to 10 mm, most is medium sand or finer, loose. (SM)
SANDY LOAM, greyish brown, poorly sorted up to v. coarse size, most is finer than medium sand, loose. (SM)		7				
					5	
CLAY, brown, medium plasticity stiff, moist. (CL)		9				CLAY, brown, medium plasticity, stiff, moist. (CL).
					10	
						GRAVELLY SAND, poorly sorted, gravel to 10 mm. (SW)
					15	MUDSTONE, v. dk. grey to black, texture is silty clay, firm, close to v. close fracture spacing.
					20	
MUDSTONE, v. dk. grey to black, texture is silty clay, firm, close to v. close fracture spacing.	2.07		P			
					25	
						Interbedded SILTSTONE, olive grey, frim, close to moderate fracture spacing and MUDSTONE, dk. grey firm, close to v. close fracture spacing.
SILTSTONE, olive grey, texture is silty clay loam, firm, close to moderate fracture spacing. Some interbedded MUDSTONE.	2.20		P			
					30	CONTINUED ON FOLLOWING PAGE

COMMENTS: Figure 15	**LOGGED BY:** T. Fumal

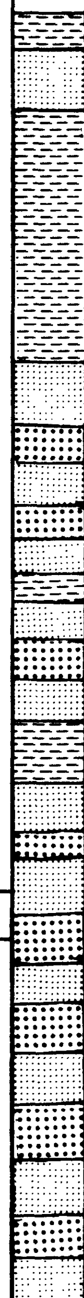
ALTITUDE:

DATE:

LOCATION:
Lat.
Long.
QUADRANGLE:

HOLE No.
SITE: COCKRUM'S GARAGE
GEOLOGIC MAP UNIT:

SAMPLE DESCRIPTION	Density (gm/cc)	Blows/Foot	Sampling	Graphic Log	Depth (meters)	DESCRIPTION
					30	
						MUDSTONE, dk. grey, firm.
					35	
						Interbedded SILTSTONE, olive grey, firm, moderate to close fracture and SANDSTONE, lt. grey, v. fine to fine, soft to firm, moderate and wider fracture.
					40	
						MUDSTONE, dk. grey, firm
						Interbedded SILTSTONE and SANDSTONE
					45	MUDSTONE, dk. grey, firm.
						Interbedded SILTSTONE and SANDSTONE.
SILTSTONE, olive grey, firm, moderate to close fracture spacing, bedding inclined 60-80°. SANDSTONE, lt. grey, v. fine to fine grained, soft to firm, moderate to wide fracture spacing.	2.25		P			
					50	
					55	
					60	



COMMENTS:
Figure 15 continued

LOGGED BY:

ALTITUDE: 1056'

DATE: 9/10/79

LOCATION:
Lat. 35°40'15"
Long. 120°21'30"

QUADRANGLE: CHOLAME, CALIF.

HOLE No. CS-8

SITE: SHANDON PUMP STATION

GEOLOGIC MAP UNIT: Qa Holocene alluvium[a]

SAMPLE DESCRIPTION	Density (gm/cc)	Blows/Foot	Sampling	Depth (meters)	DESCRIPTION
				0	CLAY, dk. greyish brown, high plasticity, common stringers of white carbonate (CH).
CLAY LOAM, olive, sand is v. fine to fine, medium plasticity, stiff, moist (CL)		15			CLAY LOAM, olive to dk. grey, sand is v. fine to fine, medium plasticity, stiff, moist (CL).
				5	
CLAY LOAM, dk. grey, sand is very fine to fine, medium plasticity, stiff, moist (CL)		14		10	
					SILTY CLAY, dk. grey (CL)
				15	GRAVELLY SAND, greyish brown, mostly v. coarse grained, some gravel to 20 mm, subrounded to subangular (SP)
					SILTY CLAY, greyish brown (CL)
LOAMY SAND, lt. yellowish brown, poorly sorted, some gravel to 15 mm subangular to subrounded, v. dense (SM)		30/4"		20	LOAMY SAND, lt. yellowish brown, poorly to moderately well-sorted, mostly medium to v. coarse grained, some gravel to 20 mm., v. dense (SM)
LOAMY SAND, lt. yellowish brown, moderately well-sorted grading from v. fine to fine at top to medium to coarse at bottom (SM)	2.13		P	25	
				30	

COMMENTS:
Figure 16

LOGGED BY: T. Fumal

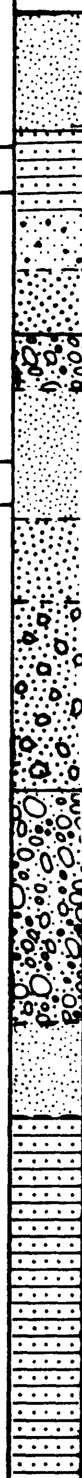
ALTITUDE: 1119'	**LOCATION:** **Lat.** 35°38'55" **Long.** 120°24'10"
DATE: 9/11/79	**QUADRANGLE:** SHANDON, CALIF.

HOLE No. CS-12

SITE: SHANDON VALLEY VINEYARDS

GEOLOGIC MAP UNIT: Qoa3 Older alluvium, youngest terrace?

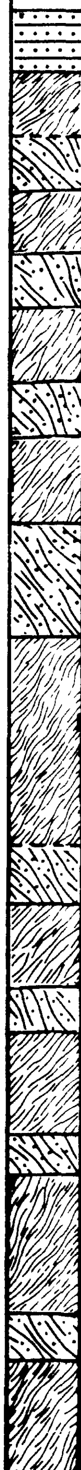
SAMPLE DESCRIPTION	Density (gm/cc)	Blows/Foot	Sampling	Depth (meters)	DESCRIPTION
				0	LOAMY SAND, brown, moderately well-sorted, mostly fine to medium sand, dry, loose, quick (SM)
FINE SANDY CLAY LOAM, lt. yellowish brown, medium plasticity, slightly moist.	2.07		P	5	FINE SANDY CLAY LOAM, lt. yellowish brown, medium plasticity, slightly moist. (SC) grading to COARSE SANDY LOAM (SM) grading to SAND, mostly coarse to v. coarse (SP) grading to SANDY GRAVEL, yellowish brown, substantial is 5-10 mm, subrounded (GP)
SAND, lt. brownish grey, moderately well-sorted, grades from fine-medium to coarse v. coarse, some gravel to 15 mm.	2.09		P	10	SAND, lt. brownish grey, fine to medium grading to GRAVELLY SAND (SP)
				15	
					SANDY GRAVEL, hard, cemented (SP) grading to GRAVELLY SAND, v. dense.
				20	SAND, v. dense (SP)
					SANDY CLAY LOAM, yellowish brown, v. dense (SC)
				25	
				30	



COMMENTS:
Figure 17

LOGGED BY: T. Fumal

ALTITUDE: 1430' **DATE:** 9/13/79	**LOCATION:** **Lat.** 35°42'29" **Long.** 120°10'17" **QUADRANGLE:** ORCHARD PEAK, CALIF.	**HOLE No.** CS-11 **SITE:** TEMBLOR II **GEOLOGIC MAP UNIT:** sp SERPENTINE[a]

SAMPLE DESCRIPTION	Density (gm/cc)	Blows/Foot	Sampling	Graphic Log	Depth (meters)	DESCRIPTION
					0	SANDY CLAY LOAM, dk. brown, poorly sorted, some fine gravel, low plasticity (SC)
						SERPENTINE, dk. green and black to dk. reddish brown, hard, close to v. close fracture spacing. Substantial proportion of grey SANDY CLAY GOUGE below 2.5 m.
					5	
					10	
						SANDY CLAY, lt. grey and strong brown, with some rock fragments (Gouge)
						SERPENTINE, dk. green and black, hard, close to v. close fracture spacing.
					15	
						abundant lt. grey SANDY CLAY GOUGE
					20	
					25	
					30	

COMMENTS:
Figure 18

LOGGED BY: T. Fumal

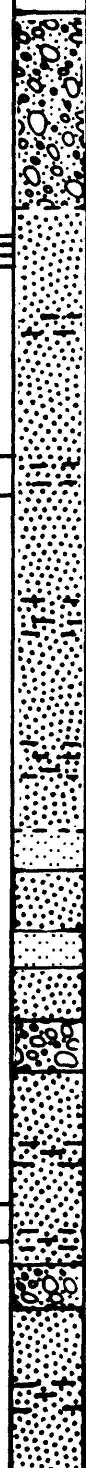
ALTITUDE: 915'

DATE: 8/16/79

LOCATION:
Lat. 35°08'56"
Long. 119°27'22"
QUADRANGLE: TAFT, CALIF.

HOLE No. T-1
SITE: LINCOLN SCHOOL
GEOLOGIC MAP UNIT: Qf Holocene alluvial fan deposits'

SAMPLE DESCRIPTION	Density (gm/cc)	Blows/Foot	Sampling	Depth (meters)	DESCRIPTION
				0	GRAVELLY SAND, lt. yellowish brown, moderately well-sorted, most is v. coarse sand and fine gravel to 5 mm, gravel is flat angular shale fragments (GP).
					grading finer to:
SAND, lt. yellowish brown, poorly sorted, 10-15% angular shale gravel to 30 mm, dense (SP)		40		5	SAND, lt. yellowish brown to brownish yellow, moderately well-sorted, most is medium to v. coarse, up to 10-15% subrounded to subangular quartz and feldspar gravel. Occasional clods of sandy clay loam-weathered shale fragments (SP)
SAND, brownish yellow, moderately well-sorted, most is medium to v. coarse, some fine gravel of quartz, feldspar, subrounded to subangular. Occasional clods of reddish brown sandy loam (weathered shale fragments) (SP)	1.90		P	10	
				15	Lenses of SILT LOAM
				20	SANDY GRAVEL
SAND, brownish yellow, moderately well-sorted, most is medium to v. coarse, subangular to subrounded, occasional clods of greyish brown to reddish brown sandy clay loam (weathered shale) More cemented than at 9 m (SP)	2.62		P	25	SANDY GRAVEL
				30	



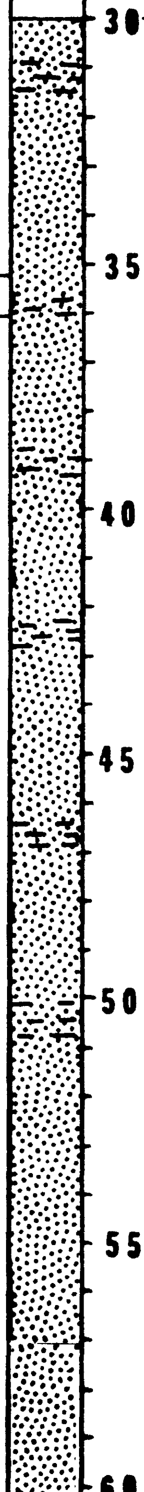
CONTINUED ON FOLLOWING PAGE

COMMENTS:
Figure 19

LOGGED BY: T. Fumal

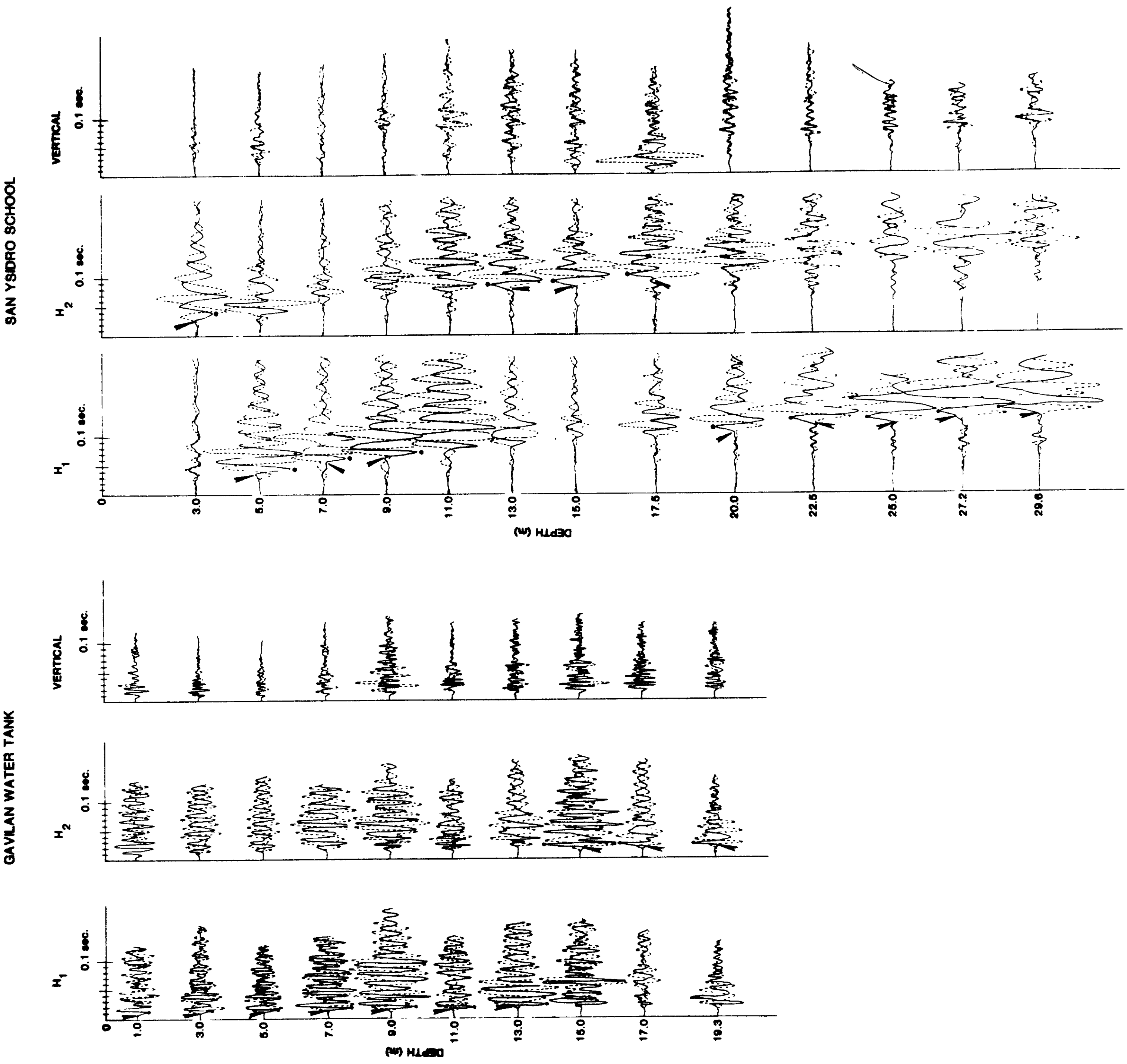
ALTITUDE:	LOCATION: Lat. Long.	HOLE No.
DATE:	QUADRANGLE:	SITE: LINCOLN SCHOOL GEOLOGIC MAP UNIT:

SAMPLE DESCRIPTION	Density (gm/cc)	Blows/ Foot	Sampling	Graphic Log	Depth (meters)	DESCRIPTION
SAND, lt. yellowish brown, poorly sorted, most is medium to v. coarse, 10-15% shale gravel to 20 mm, angular to subrounded. Occasional clods of sandy clay loam (weathered shale) (SM-SC)	1.85		P		30–60	



COMMENTS:
Figure 19 continued

LOGGED BY: T. Fumal



SAN YSIDRO SCHOOL
VERTICAL
H_2
H_1
0.1 sec.
DEPTH (m)
0
3.0
5.0
7.0
9.0
11.0
13.0
15.0
17.5
20.0
22.5
25.0
27.2
29.6
GAVILAN WATER TANK
1.0
17.0
19.3

Figure 20

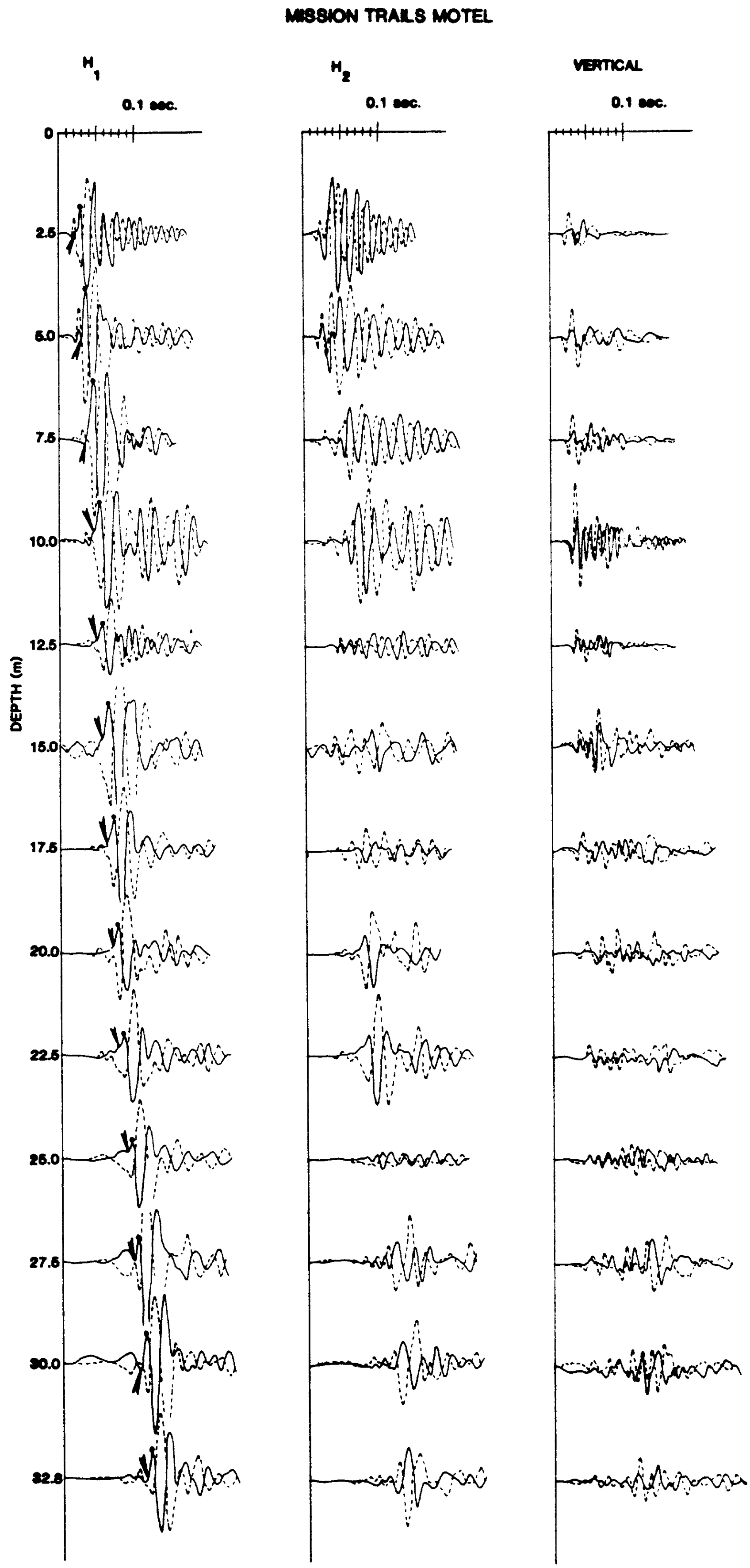

MISSION TRAILS MOTEL
H1
H2
VERTICAL
0.1 sec.
0.1 sec.
0.1 sec.
DEPTH (m)
0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
22.5
25.0
27.5
30.0
32.5

Figure 21

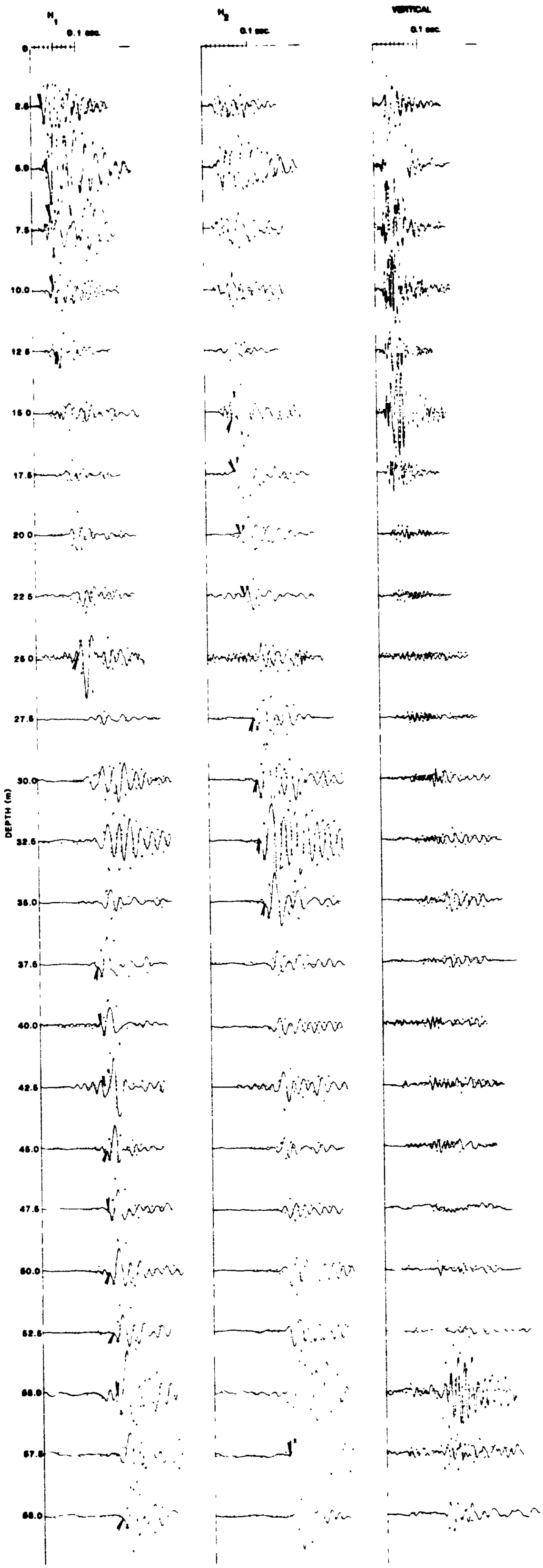

H1
0.1 sec.
H2
0.1 sec.
VERTICAL
0.1 sec.
DEPTH (m)
0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
22.5
25.0
27.5
30.0
32.5
35.0
37.5
40.0
42.5
45.0
47.5
50.0
52.5
55.0
57.5
60.0

Figure 22

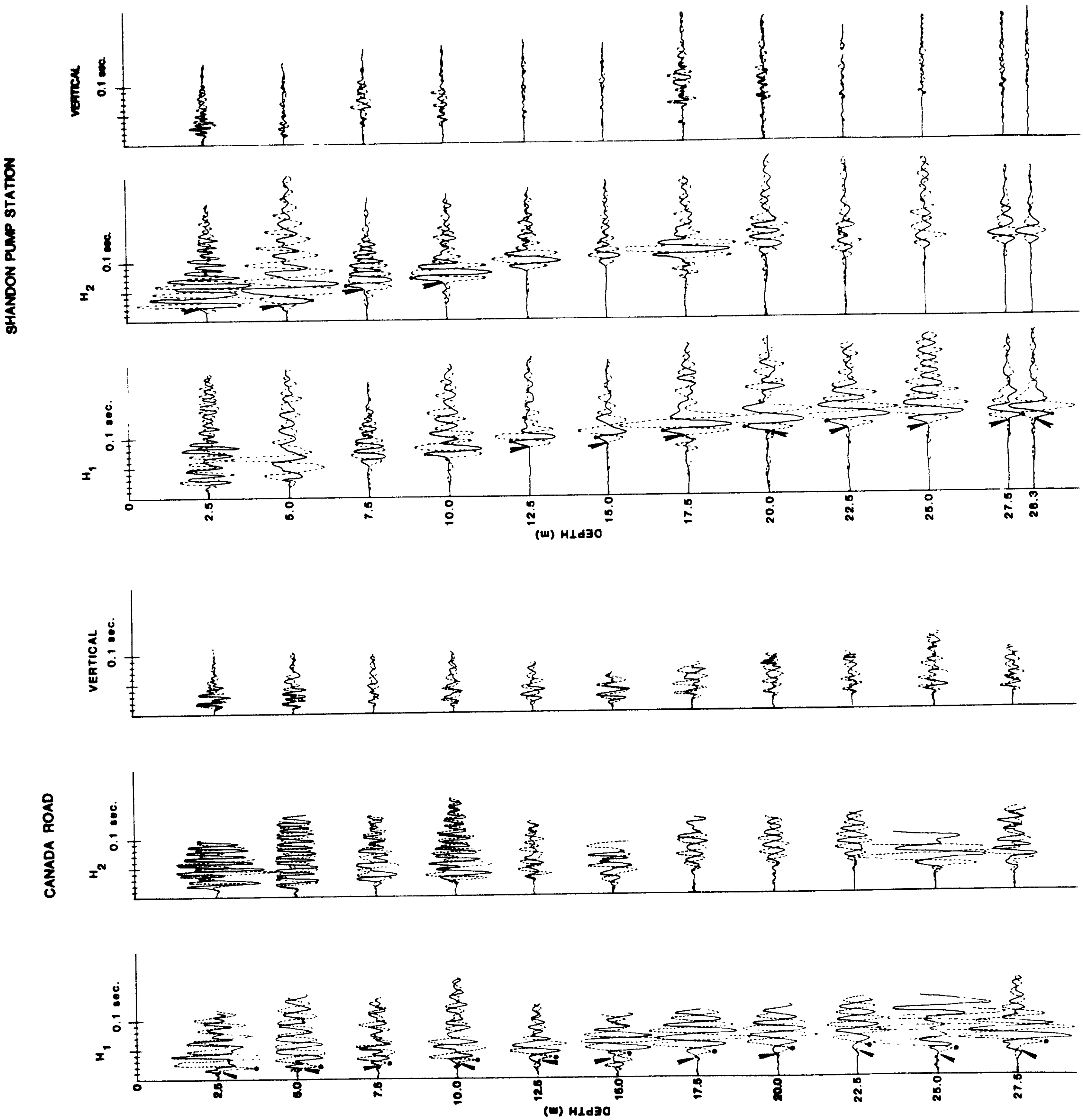
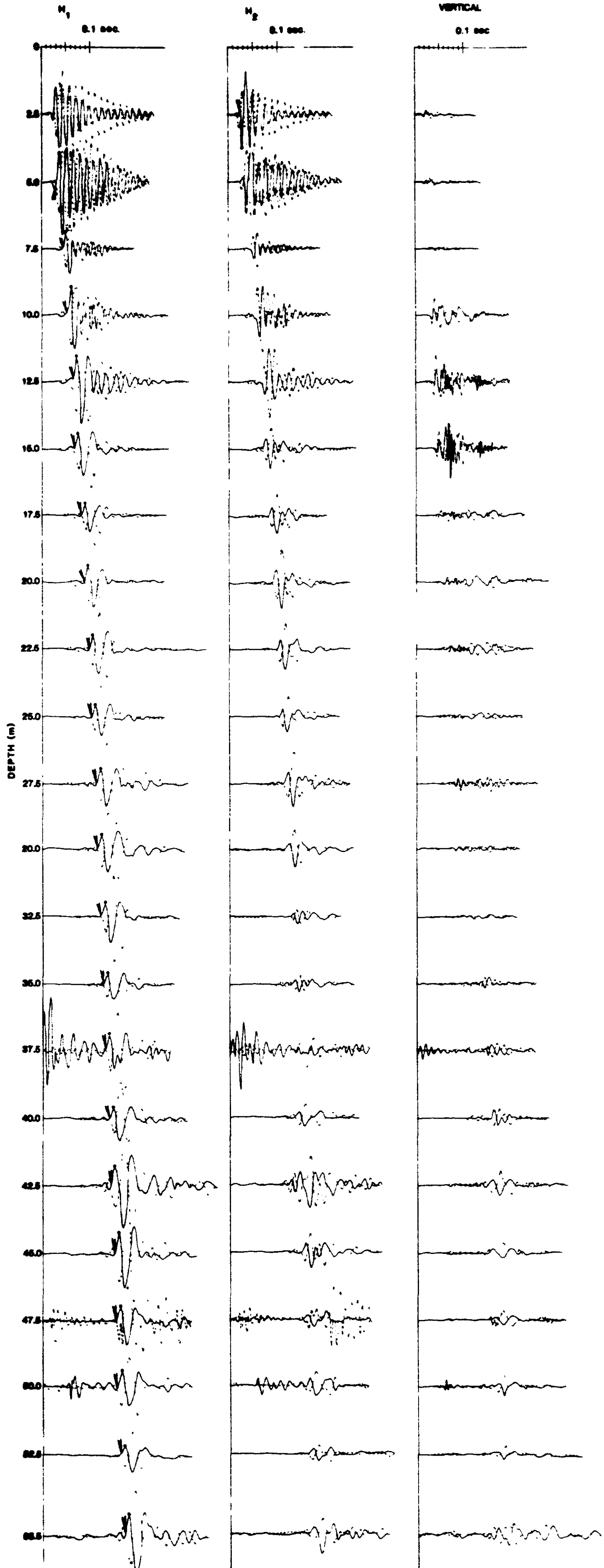

SHANDON PUMP STATION
CANADA ROAD
VERTICAL
H_2
H_1
0.1 sec.
0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
22.5
25.0
27.5
28.3
DEPTH (m)

Figure 23



H1
0.1 sec.
H2
0.1 sec.
VERTICAL
0.1 sec
DEPTH (m)
0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
22.5
25.0
27.5
30.0
32.5
35.0
37.5
40.0
42.5
45.0
47.5
50.0
52.5
55.5

Figure 24

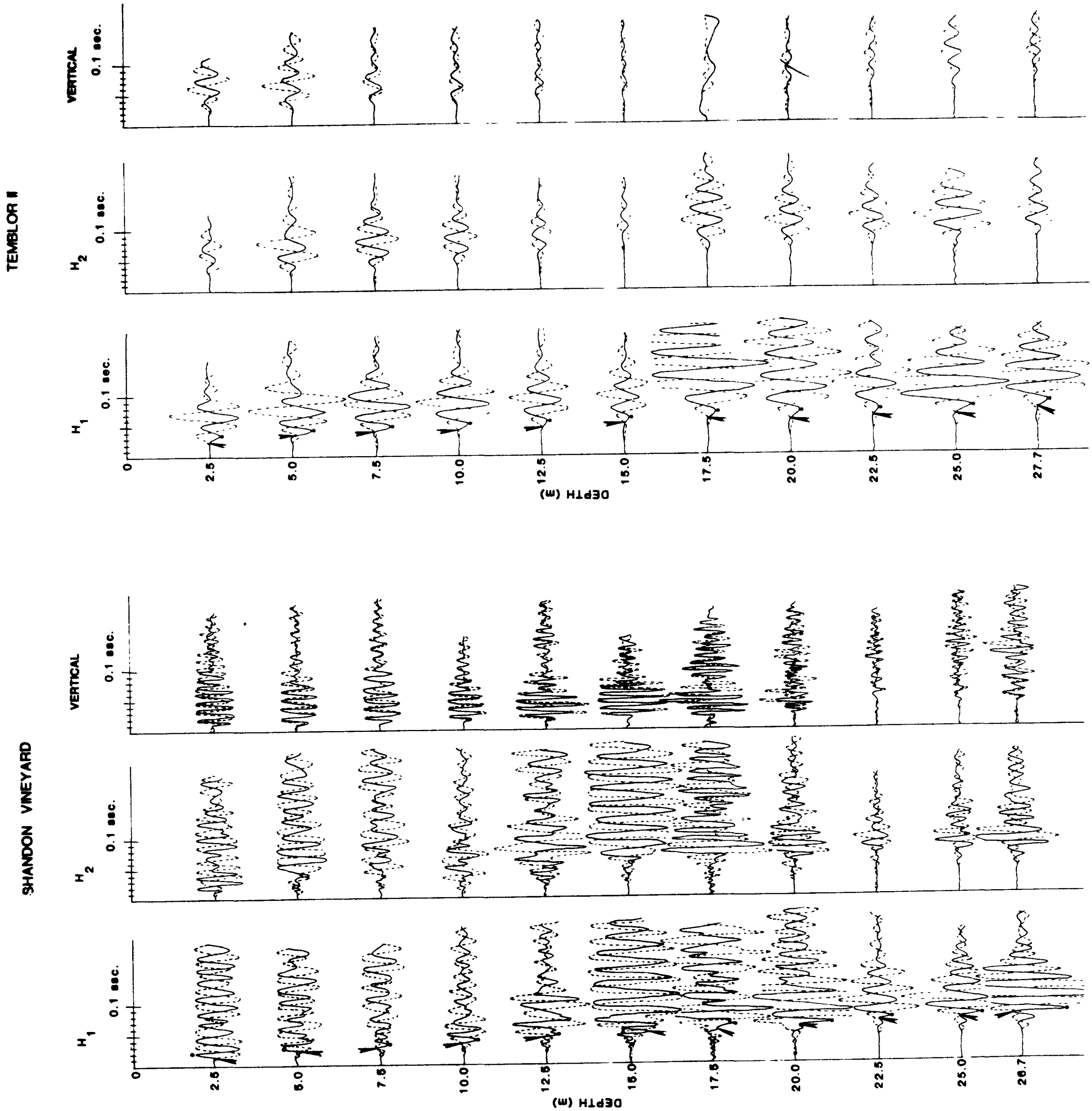


Figure 25

X6 page 45

LINCOLN SCHOOL - TAFT

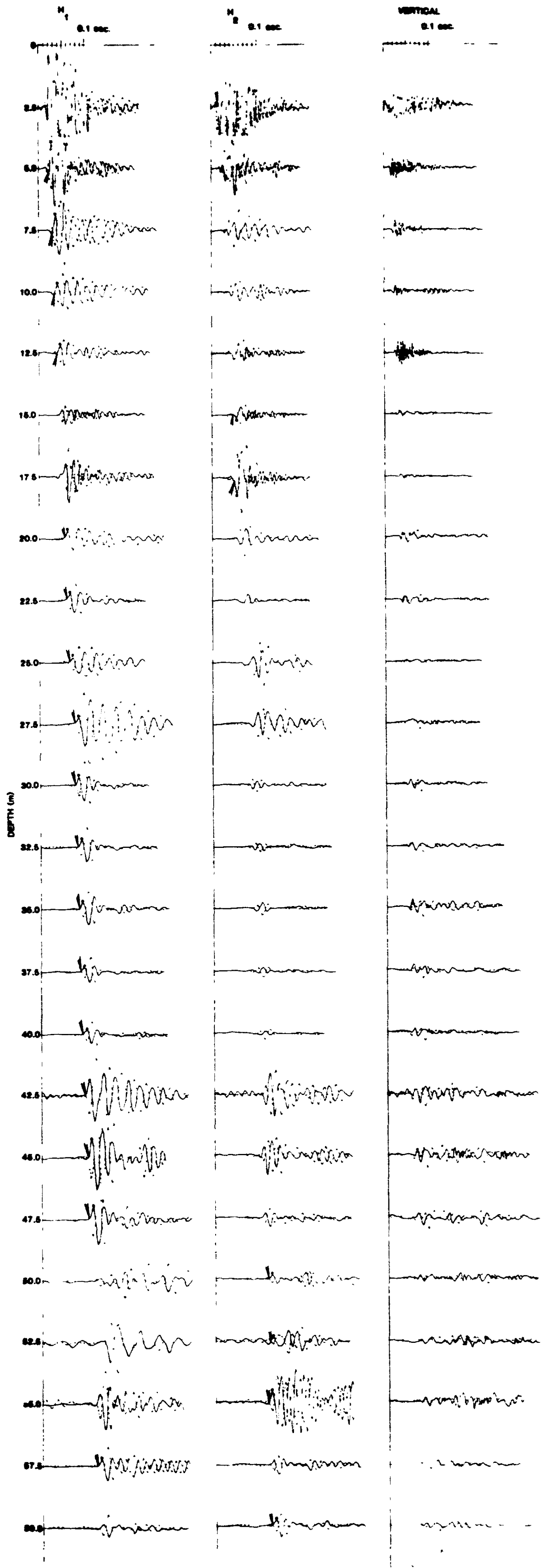


Figure 26

GAVILAN WATER TANK SITE G-1

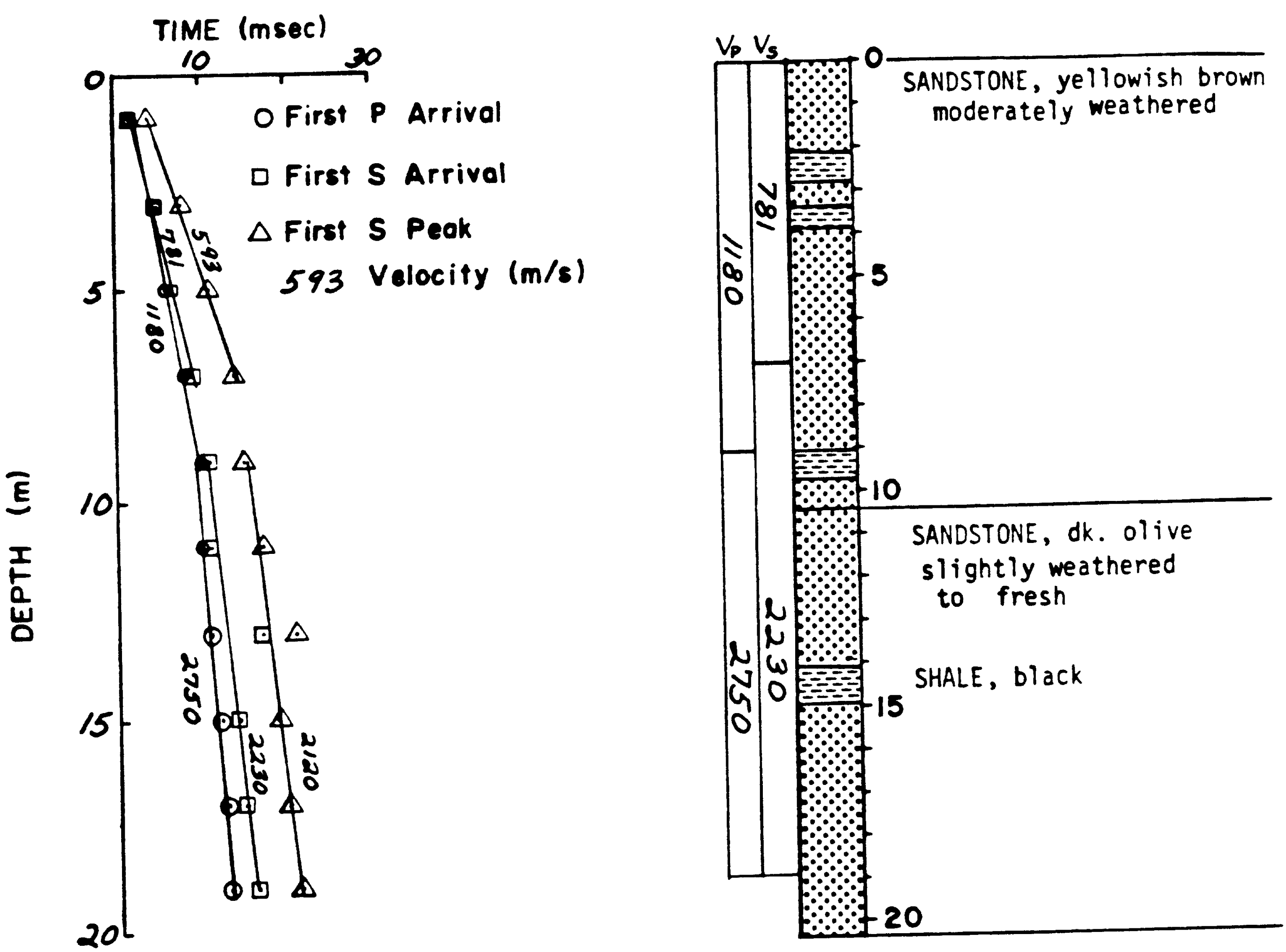


Figure 27

MISSION TRAILS MOTEL SITE G-2

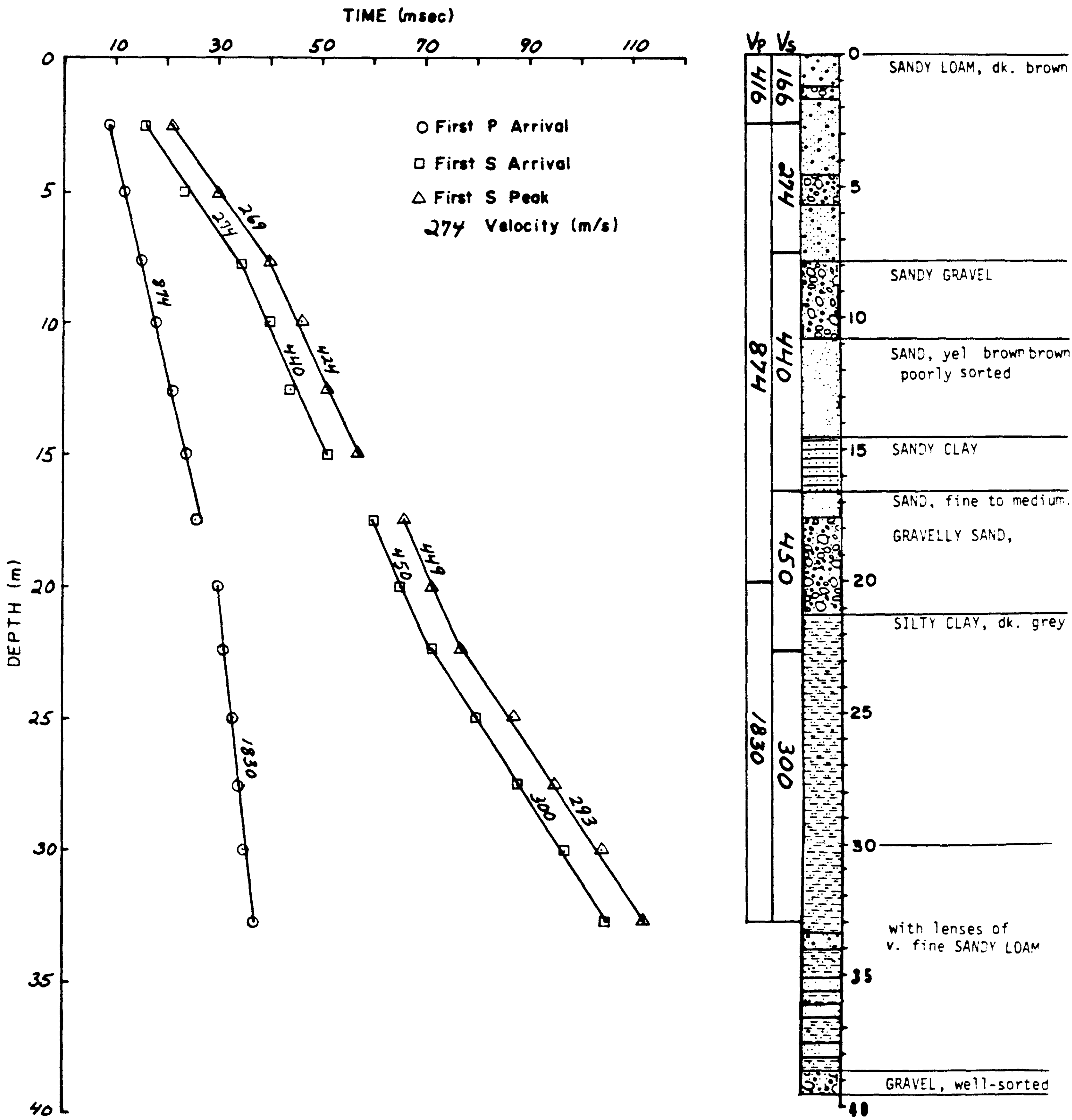


Figure 28

GILROY SEWAGE TREATMENT PLANT SITE G-3

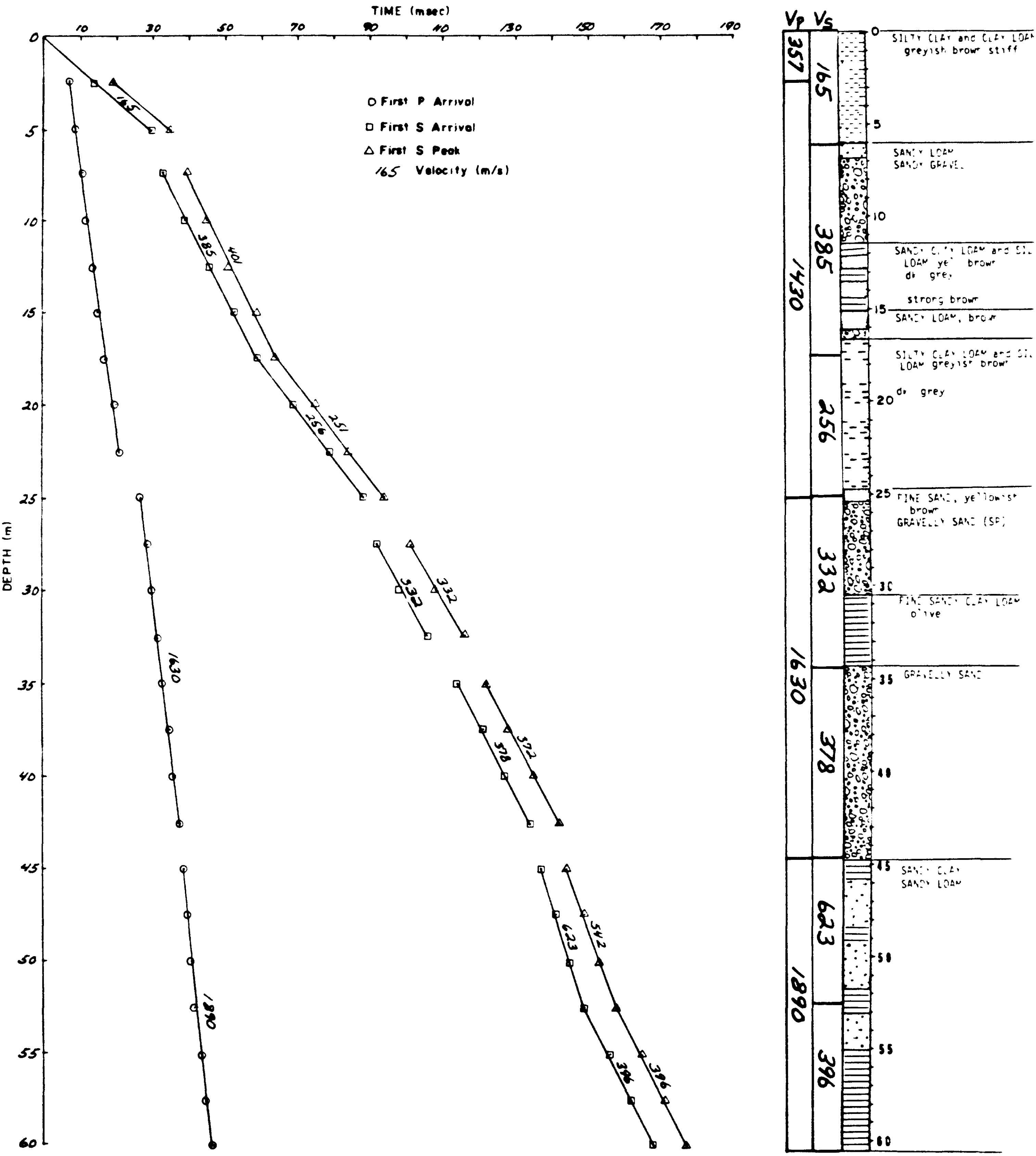


Figure 29

SAN YSIDRO SCHOOL SITE G-4

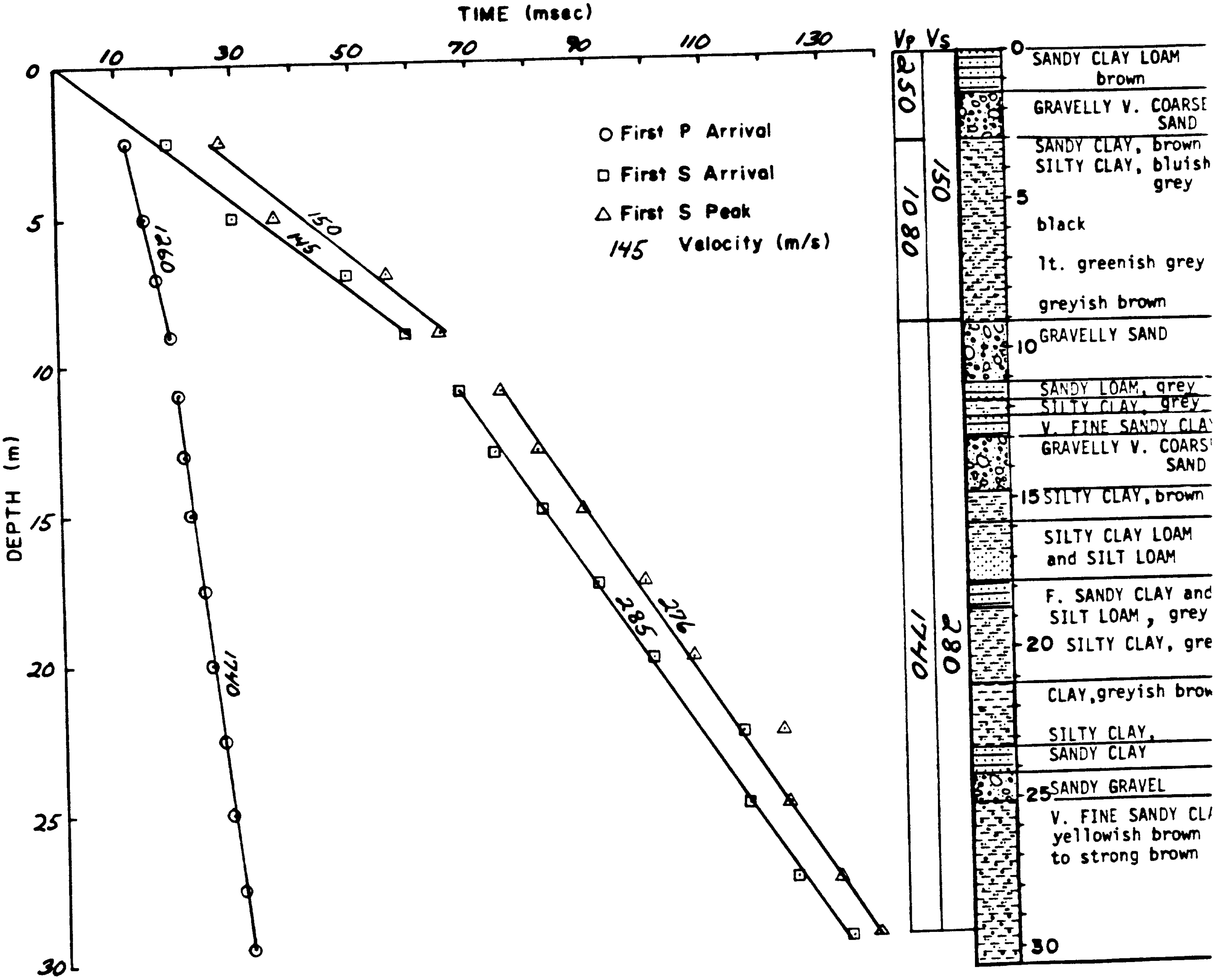


Figure 30

CAÑADA ROAD SITE G-6

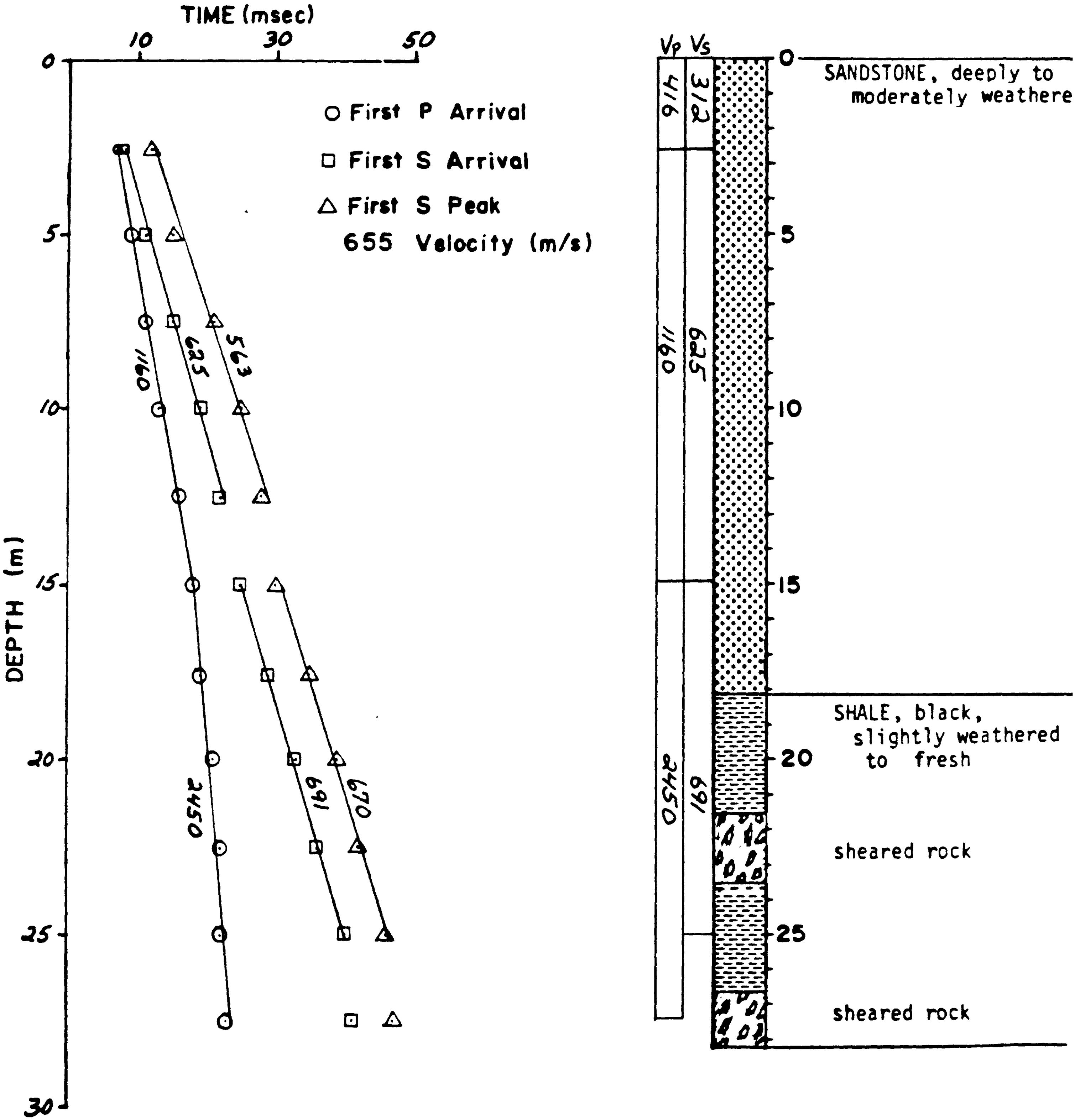


Figure 31

COCKRUM'S GARAGE SITE CS-5

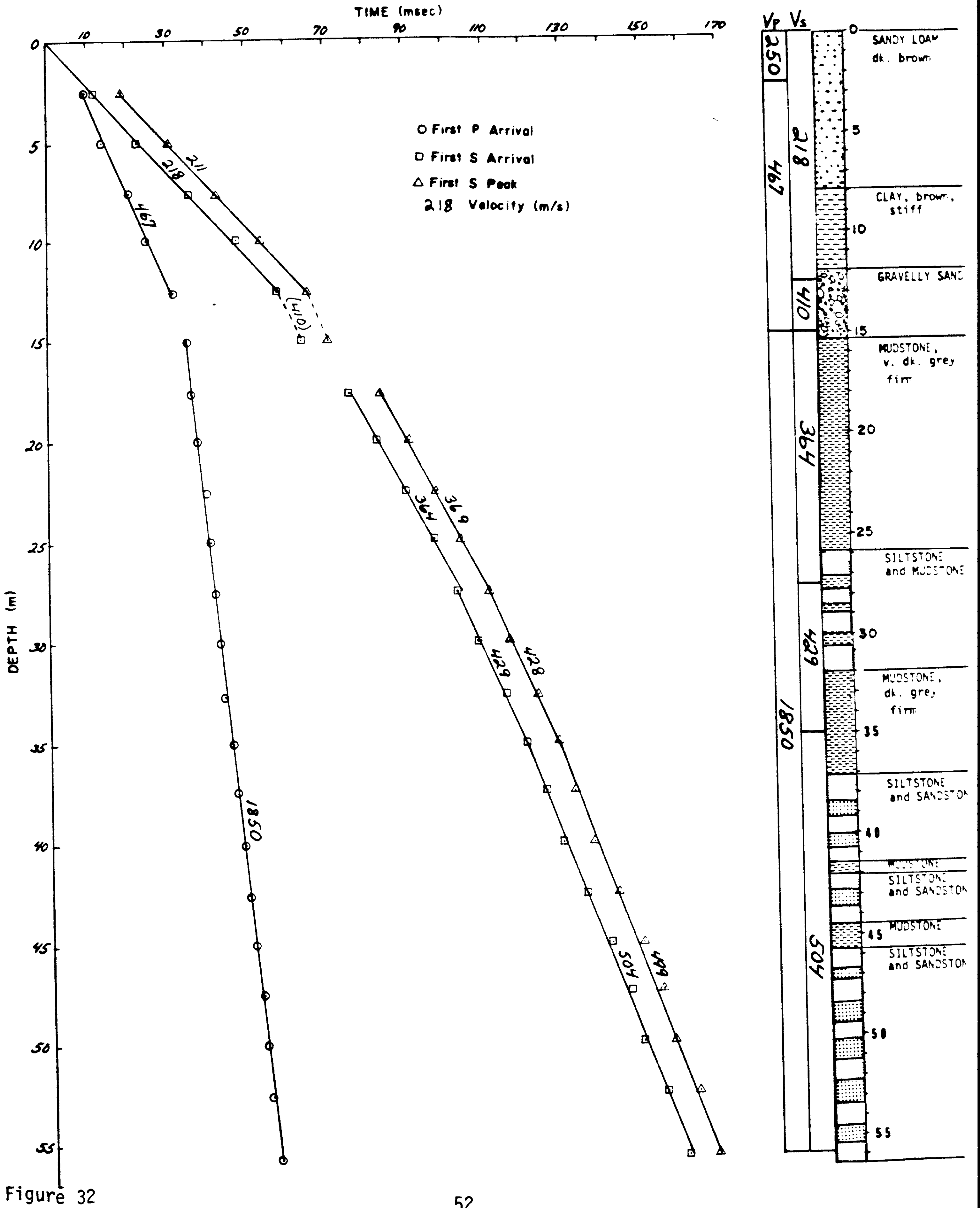


Figure 32

SHANDON PUMP STATION SITE CS-8

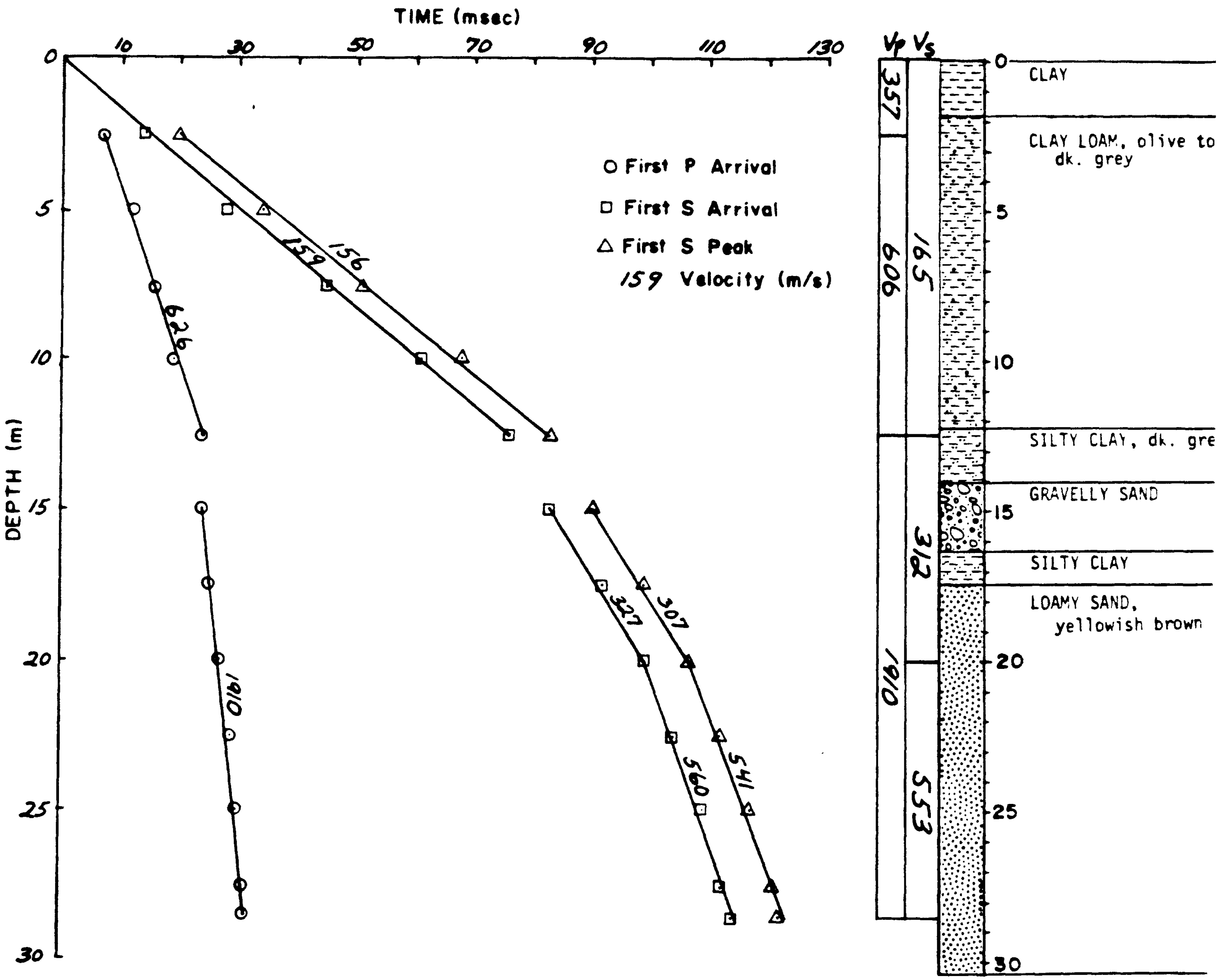


Figure 33

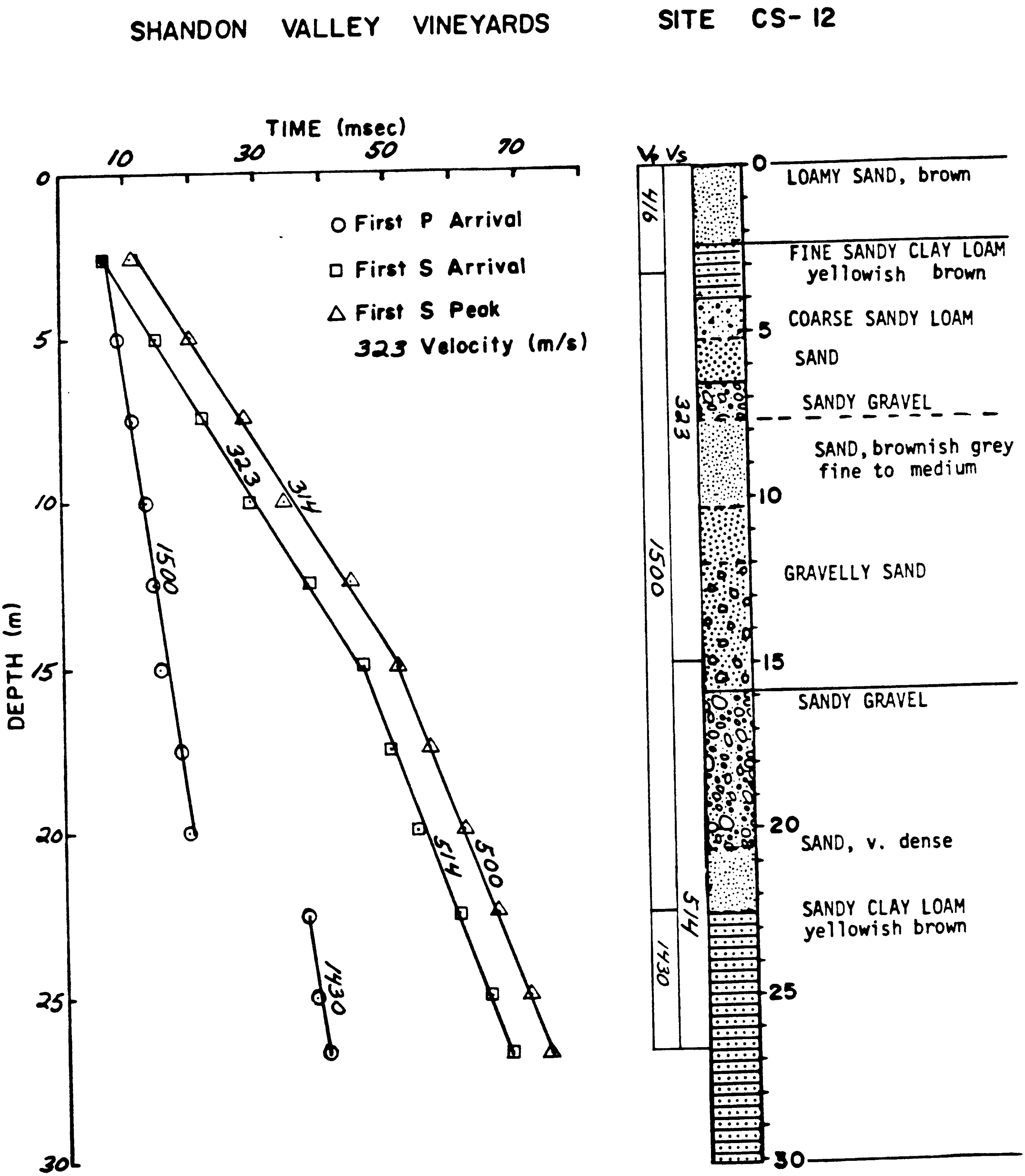

SHANDON VALLEY VINEYARDS
SITE CS- 12
TIME (msec)
10
30
50
70
0
5
10
15
20
25
30
DEPTH (m)
O First P Arrival
□ First S Arrival
△ First S Peak
323 Velocity (m/s)
1500
323
314
514
500
1430
Vp
Vs
416
323
1500
514
1430
LOAMY SAND, brown
FINE SANDY CLAY LOAM yellowish brown
COARSE SANDY LOAM
SAND
SANDY GRAVEL
SAND, brownish grey fine to medium
GRAVELLY SAND
SANDY GRAVEL
SAND, v. dense
SANDY CLAY LOAM yellowish brown

Figure 34

TEMBLOR II SITE CS-II

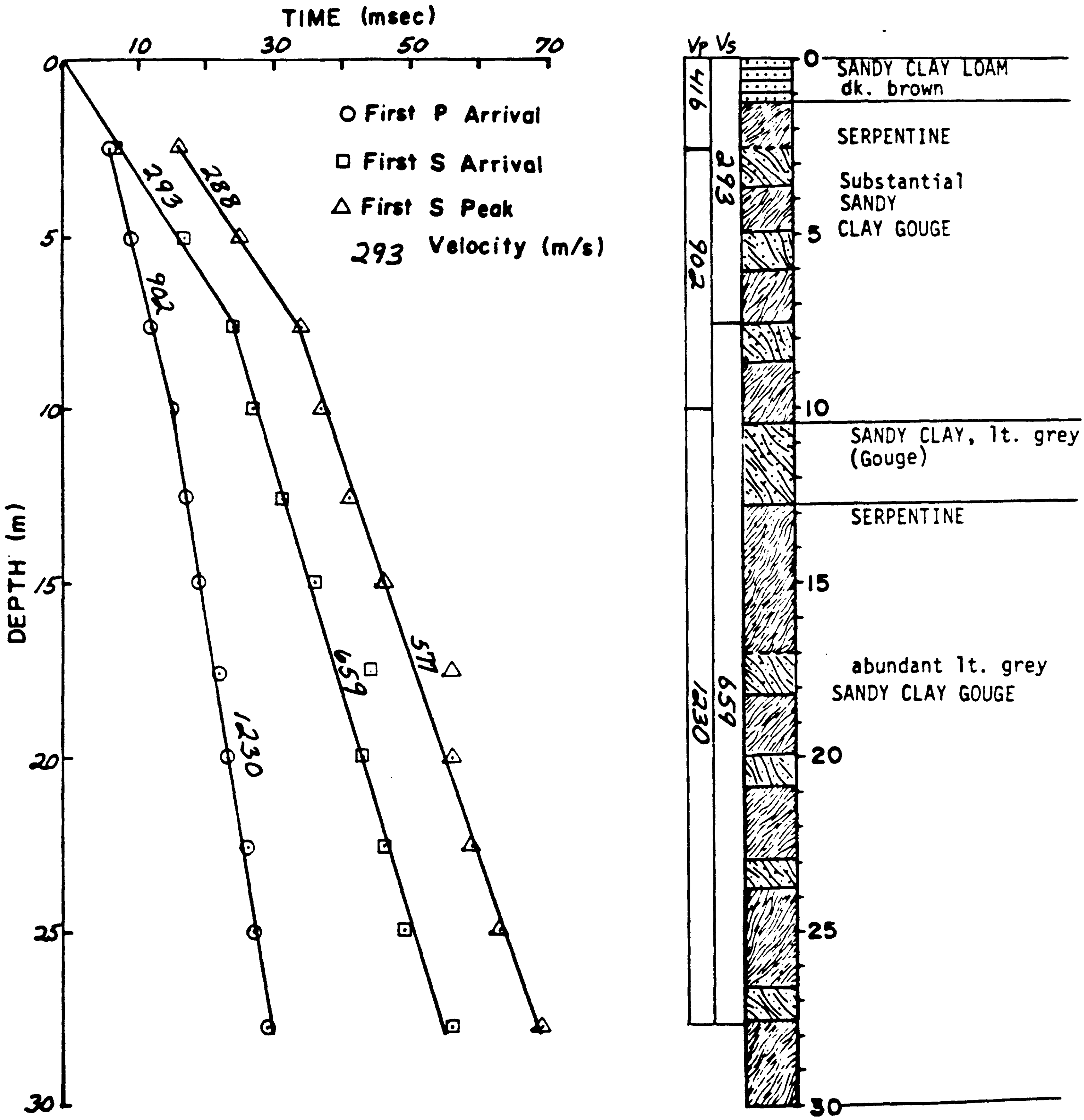


Figure 35

LINCOLN SCHOOL - TAFT SITE T-1

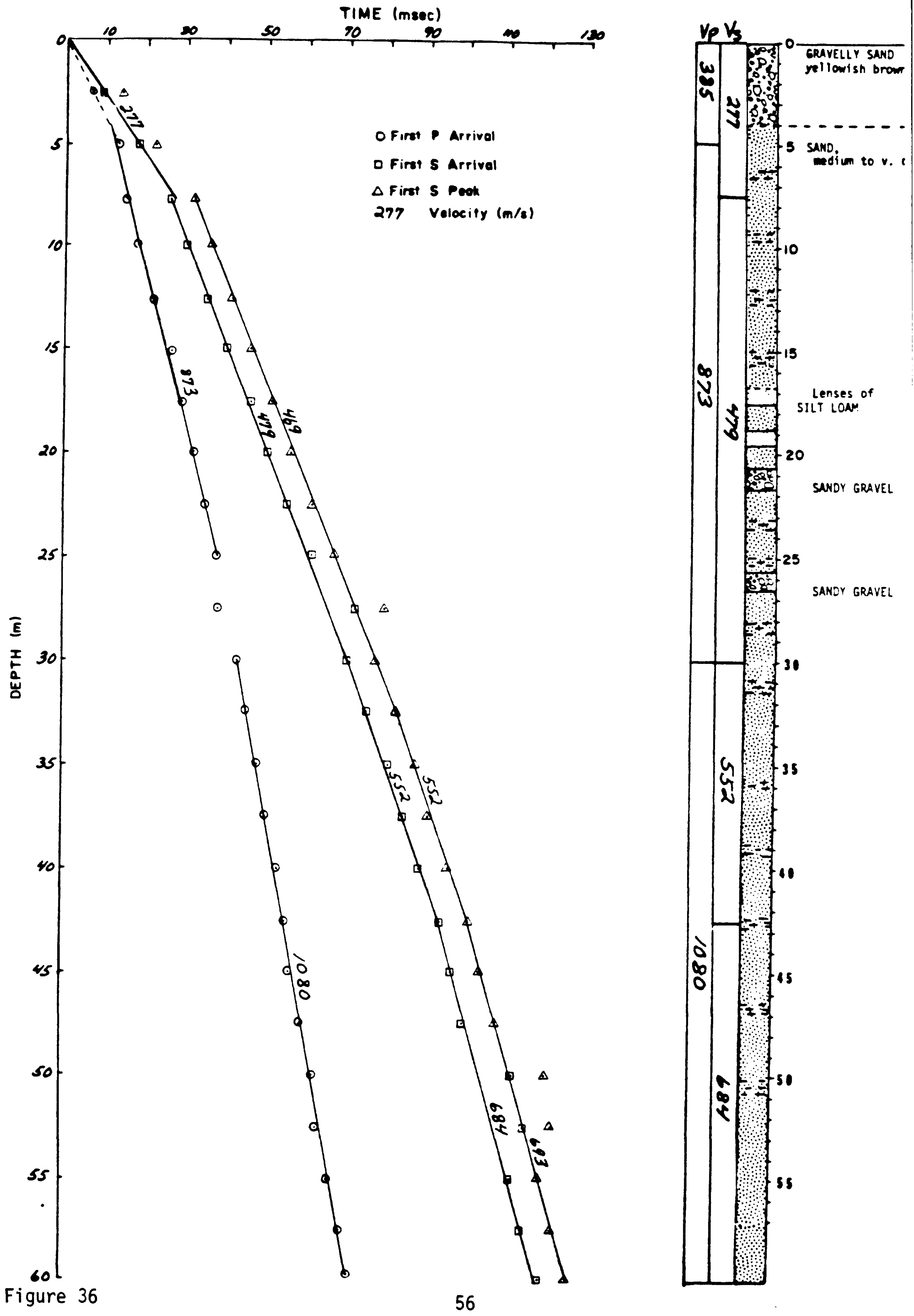


Figure 36

TABLE 1

TRAVEL-TIMES AND AVERAGE VELOCITIES

SITE NO.G-1 GAVILAN WATER TANK DATE LOGGED 10-29-79
PLANK DIST= 2.0 PLATE DIST= 2.0 AVE ORIGIN CORR= 0.003

DEPTH (M)	ORIGIN CORR (S)	FIRST S ARRIVAL (S)	CORR S TIME (S)	AVE VEL S WAVE (M/S)
1.0	0.003	0.004	0.002	588
3.0	0.003	0.006	0.005	621
5.0	0.003	0.008	0.007	690
7.0	0.004	0.010	0.009	742
9.0	0.003	0.011	0.011	853
11.0	0.003	0.012	0.012	947
13.0	0.003	0.017	0.017	782
15.0	0.003	0.014	0.014	1100
17.0	0.004	0.015	0.015	1160
19.3	0.003	0.016	0.016	1230

DEPTH (M)	FIRST S PEAK (S)	CORR S PEAK (S)	P TIME (S)	CORR P TIME (S)	AVE VEL P WAVE (M/S)
1.0	0.009	0.004	0.005	0.002	447
3.0	0.010	0.008	0.007	0.006	515
5.0	0.012	0.011	0.007	0.006	769
7.0	0.015	0.014	0.008	0.008	910
9.0	0.016	0.015	0.010	0.010	921
11.0	0.017	0.017	0.010	0.010	1120
13.0	0.021	0.021	0.011	0.011	1200
15.0	0.019	0.019	0.012	0.012	1260
17.0	0.020	0.020	0.013	0.013	1320
19.3	0.021	0.021	0.013	0.013	1490

TABLE 2

TRAVEL-TIMES AND AVERAGE VELOCITIES

SITE NO.G-2 MISSION TRAILS MOTEL DATE LOGGED 11-1-79
PLANK DIST= 2.0 PLATE DIST= 2.0 AVE ORIGIN CORR= 0.005

DEPTH (M)	ORIGIN CORR (S)	FIRST S ARRIVAL (S)	CORR S TIME (S)	AVE VEL S WAVE (M/S)
2.5	0.006	0.020	0.016	160
5.0	0.005	0.025	0.023	215
7.5	0.005	0.035	0.034	221
10.0	0.005	0.041	0.040	248
12.5	0.005	0.046	0.045	278
15.0	0.005	0.051	0.051	296
17.5	0.005	0.060	0.060	293
20.0	0.005	0.065	0.065	309
22.5	0.004	0.071	0.071	318
25.0	0.005	0.080	0.080	313
27.5	0.005	0.088	0.088	313
30.0	0.006	0.097	0.097	309
32.8	0.004	0.105	0.105	312

DEPTH (M)	FIRST S PEAK (S)	CORR S PEAK (S)	P TIME (S)	CORR P TIME (S)	AVE VEL P WAVE (M/S)
2.5	0.027	0.021	0.012	0.009	266
5.0	0.032	0.030	0.013	0.012	414
7.5	0.041	0.040	0.016	0.015	485
10.0	0.047	0.046	0.018	0.018	566
12.5	0.052	0.051	0.021	0.021	602
15.0	0.058	0.057	0.024	0.024	630
17.5	0.066	0.066	0.026	0.026	677
20.0	0.071	0.071	0.030	0.030	669
22.5	0.077	0.077	0.031	0.031	728
25.0	0.087	0.087	0.033	0.033	759
27.5	0.095	0.095	0.034	0.034	810
30.0	0.104	0.104	0.035	0.035	859
32.8	0.112	0.112	0.037	0.037	888

TABLE 3

TRAVEL-TIMES AND AVERAGE VELOCITIES

SITE NO. G-3 GILROY STP DATE LOGGED 10-30-79
PLANK DIST= 2.0 PLATE DIST= 2.0 AVE ORIGIN CORR= 0.005

DEPTH (M)	ORIGIN CORR (S)	FIRST S ARRIVAL (S)	CORR S TIME (S)	AVE VEL S WAVE (M/S)
2.5	0.005	0.018	0.014	179
5.0	0.005	0.032	0.030	168
7.5	0.005	0.034	0.033	229
10.0	0.005	0.040	0.039	255
12.5	0.005	0.047	0.046	270
15.0	0.005	0.053	0.052	286
17.5	0.005	0.059	0.058	299
20.0	0.005	0.069	0.069	291
22.5	0.005	0.079	0.079	286
25.0	0.005	0.088	0.088	285
27.5	0.005	0.091	0.091	302
30.0	0.006	0.098	0.098	307
32.5	0.005	0.106	0.106	307
35.0	0.004	0.114	0.114	307
37.5	0.005	0.121	0.121	310
40.0	0.005	0.127	0.127	315
42.5	0.005	0.134	0.134	317
45.0	0.006	0.137	0.137	329
47.5	0.006	0.141	0.141	337
50.0	0.005	0.145	0.145	345
52.5	0.005	0.149	0.149	352
55.0	0.005	0.156	0.156	353
57.5	0.005	0.162	0.162	355
60.0	0.006	0.168	0.168	357

DEPTH (M)	FIRST S PEAK (S)	CORR S PEAK (S)	P TIME (S)	CORR P TIME (S)	AVE VEL P WAVE (M/S)
2.5	0.024	0.019	0.009	0.007	355
5.0	0.038	0.035	0.010	0.009	538
7.5	0.041	0.039	0.011	0.011	705
10.0	0.046	0.045	0.012	0.012	849
12.5	0.052	0.051	0.014	0.014	904
15.0	0.060	0.059	0.015	0.015	1010
17.5	0.064	0.063	0.017	0.017	1040
20.0	0.075	0.075	0.020	0.020	1000
22.5	0.084	0.084	0.021	0.021	1080
25.0	0.094	0.094	0.027	0.027	928
27.5	0.101	0.101	0.029	0.029	950
30.0	0.108	0.108	0.030	0.030	1000
32.5	0.116	0.116	0.032	0.032	1020
35.0	0.122	0.122	0.033	0.033	1060
37.5	0.128	0.128	0.035	0.035	1070
40.0	0.135	0.135	0.036	0.036	1110
42.5	0.142	0.142	0.038	0.038	1120
45.0	0.144	0.144	0.039	0.039	1150
47.5	0.149	0.149	0.040	0.040	1190
50.0	0.153	0.153	0.041	0.041	1220
52.5	0.158	0.158	0.042	0.042	1250
55.0	0.165	0.165	0.044	0.044	1250
57.5	0.171	0.171	0.045	0.045	1280
60.0	0.177	0.177	0.047	0.047	1280

TABLE 4

TRAVEL-TIMES AND AVERAGE VELOCITIES

SITE NO.G-4 SAN YSIDRO SCHOOL DATE LOGGED 10-22-79
PLANK DIST= 2.0 PLATE DIST= 2.0 AVE ORIGIN CORR= 0.004

DEPTH (M)	ORIGIN CORR (S)	FIRST S ARRIVAL (S)	CORR S TIME (S)	AVE VEL S WAVE (M/S)
3.0	0.004	0.023	0.019	157
5.0	0.004	0.032	0.030	168
7.0	0.004	0.051	0.049	142
9.0	0.004	0.060	0.058	153
11.0	0.004	0.069	0.068	162
13.0	0.004	0.075	0.074	175
15.0	0.004	0.083	0.082	182
17.5	0.005	0.092	0.091	191
20.0	0.004	0.100	0.099	201
22.5	0.004	0.115	0.114	196
25.0	0.004	0.116	0.116	216
27.2	0.004	0.124	0.124	220
29.6	0.004	0.133	0.133	223

DEPTH (M)	FIRST S PEAK (S)	CORR S PEAK (S)	P TIME (S)	CORR P TIME (S)	AVE VEL P WAVE (M/S)
3.0	0.034	0.028	0.017	0.014	212
5.0	0.040	0.037	0.016	0.015	336
7.0	0.058	0.056	0.018	0.017	404
9.0	0.068	0.066	0.020	0.020	460
11.0	0.076	0.075	0.021	0.021	532
13.0	0.082	0.081	0.021	0.021	626
15.0	0.090	0.089	0.022	0.022	687
17.5	0.100	0.099	0.024	0.024	733
20.0	0.107	0.106	0.025	0.025	803
22.5	0.122	0.121	0.027	0.027	836
25.0	0.123	0.123	0.028	0.028	895
27.2	0.131	0.131	0.030	0.030	909
29.6	0.144	0.144	0.031	0.031	957

TABLE 5

TRAVEL-TIMES AND AVERAGE VELOCITIES

SITE NO. G-6 CAÑADA ROAD DATE LOGGED 10-23-79
PLANK DIST= 2.0 PLATE DIST= 2.0 AVE ORIGIN CORR= 0.007

DEPTH (M)	ORIGIN CORR (S)	FIRST S ARRIVAL (S)	CORR S TIME (S)	AVE VEL S WAVE (M/S)
2.5	0.009	0.010	0.008	329
5.0	0.008	0.012	0.011	459
7.5	0.009	0.016	0.015	493
10.0	0.009	0.020	0.020	516
12.5	0.007	0.023	0.023	556
15.0	0.007	0.025	0.025	611
17.5	0.006	0.029	0.029	613
20.0	0.006	0.033	0.033	614
22.5	0.007	0.036	0.036	632
25.0	0.006	0.040	0.040	631
27.5	0.006	0.041	0.041	677

DEPTH (M)	FIRST S PEAK (S)	CORR S PEAK (S)	P TIME (S)	CORR P TIME (S)	AVE VEL P WAVE (M/S)
2.5	0.015	0.012	0.008	0.006	416
5.0	0.016	0.015	0.010	0.009	538
7.5	0.022	0.021	0.011	0.011	705
10.0	0.026	0.025	0.013	0.013	784
12.5	0.029	0.028	0.016	0.016	791
15.0	0.031	0.030	0.018	0.018	840
17.5	0.035	0.035	0.019	0.019	927
20.0	0.039	0.039	0.021	0.021	957
22.5	0.042	0.042	0.022	0.022	1030
25.0	0.046	0.046	0.022	0.022	1140
27.5	0.047	0.047	0.023	0.023	1200

TABLE 6

TRAVEL-TIMES AND AVERAGE VELOCITIES

SITE NO. CS-5 COCHRUM'S GARAGE — DATE LOGGED 4-30-80

PLANK DIST= 2.0 PLATE DIST= 2.0 AVE ORIGIN CORR= 0.003

DEPTH (M)	ORIGIN CORR (S)	FIRST S ARRIVAL (S)	CORR S TIME (S)	AVE VEL S WAVE (M/S)
2.5	0.003	0.016	0.012	202
5.0	0.003	0.025	0.023	216
7.5	0.003	0.037	0.036	210
10.0	0.003	0.049	0.048	208
12.5	0.004	0.058	0.057	218
15.0	0.004	0.064	0.063	237
17.5	0.004	0.076	0.075	232
20.0	0.004	0.083	0.082	242
22.5	0.003	0.090	0.089	251
25.0	0.003	0.097	0.097	259
27.5	0.003	0.103	0.103	268
30.0	0.003	0.108	0.108	278
32.5	0.003	0.115	0.115	283
35.0	0.003	0.120	0.120	292
37.5	0.003	0.125	0.125	300
40.0	0.004	0.129	0.129	310
42.5	0.003	0.135	0.135	315
45.0	0.003	0.141	0.141	319
47.5	0.003	0.146	0.146	326
50.0	0.003	0.149	0.149	336
52.5	0.003	0.155	0.155	339
55.5	0.002	0.160	0.160	347

DEPTH (M)	FIRST S PEAK (S)	CORR S PEAK (S)	P TIME (S)	CORR P TIME (S)	AVE VEL P WAVE (M/S)
2.5	0.024	0.019	0.013	0.010	246
5.0	0.031	0.029	0.015	0.014	359
7.5	0.044	0.042	0.022	0.021	352
10.0	0.055	0.054	0.025	0.025	407
12.5	0.066	0.065	0.032	0.032	395
15.0	0.071	0.070	0.035	0.035	432
17.5	0.084	0.083	0.036	0.036	489
20.0	0.091	0.090	0.038	0.038	528
22.5	0.098	0.097	0.040	0.040	564
25.0	0.104	0.103	0.041	0.041	611
27.5	0.111	0.111	0.042	0.042	656
30.0	0.116	0.116	0.043	0.043	699
32.5	0.123	0.123	0.044	0.044	740
35.0	0.128	0.128	0.046	0.046	762
37.5	0.132	0.132	0.047	0.047	799
40.0	0.137	0.137	0.049	0.049	817
42.5	0.143	0.143	0.050	0.050	850
45.0	0.149	0.149	0.051	0.051	883
47.5	0.154	0.154	0.053	0.053	897
50.0	0.157	0.157	0.054	0.054	926
52.5	0.163	0.163	0.055	0.055	955
55.5	0.168	0.168	0.057	0.057	974

TABLE 7

TRAVEL-TIMES AND AVERAGE VELOCITIES

SITE NO. CS-8 SHANDON PUMP STATION   DATE LOGGED 4-29-80
PLANK DIST= 2.0 PLATE DIST= 2.0   AVE ORIGIN CORR= 0.003

DEPTH (M)	ORIGIN CORR (S)	FIRST S ARRIVAL (S)	CORR S TIME (S)	AVE VEL S WAVE (M/S)
2.5	0.003	0.018	0.014	180
5.0	0.003	0.030	0.028	181
7.5	0.004	0.047	0.045	166
10.0	0.004	0.062	0.061	165
12.5	0.003	0.077	0.076	164
15.0	0.003	0.084	0.083	180
17.5	0.003	0.093	0.092	189
20.0	0.004	0.099	0.098	203
22.5	0.004	0.104	0.103	217
25.0	0.002	0.109	0.108	230
27.5	0.003	0.112	0.111	246
28.3	0.003	0.114	0.113	249

DEPTH (M)	FIRST S PEAK (S)	CORR S PEAK (S)	P TIME (S)	CORR P TIME (S)	AVE VEL P WAVE (M/S)
2.5	0.025	0.019	0.009	0.007	355
5.0	0.037	0.034	0.013	0.012	414
7.5	0.054	0.052	0.016	0.015	485
10.0	0.069	0.067	0.019	0.019	536
12.5	0.084	0.083	0.024	0.024	527
15.0	0.091	0.090	0.024	0.024	630
17.5	0.100	0.099	0.025	0.025	704
20.0	0.107	0.106	0.027	0.027	744
22.5	0.112	0.111	0.029	0.029	778
25.0	0.117	0.116	0.030	0.030	835
27.5	0.121	0.120	0.031	0.031	889
28.3	0.122	0.121	0.031	0.031	915

TABLE 8

TRAVEL-TIMES AND AVERAGE VELOCITIES

SITE NO. CS-12 SHANDON VALLEY VINEYARDS DATE LOGGED 4-29-80
PLANK DIST= 2.0 PLATE DIST= 2.0 AVE ORIGIN CORR= 0.004

DEPTH (M)	ORIGIN CORR (S)	FIRST S ARRIVAL (S)	CORR S TIME (S)	AVE VEL S WAVE (M/S)
2.5	0.003	0.009	0.007	341
5.0	0.003	0.016	0.015	329
7.5	0.004	0.026	0.025	294
10.0	0.004	0.029	0.029	347
12.5	0.004	0.040	0.040	313
15.0	0.003	0.046	0.046	326
17.5	0.004	0.050	0.050	349
20.0	0.004	0.054	0.054	369
22.5	0.004	0.060	0.060	374
25.0	0.004	0.065	0.065	383
26.7	0.003	0.068	0.068	391

DEPTH (M)	FIRST S PEAK (S)	CORR S PEAK (S)	P TIME (S)	CORR P TIME (S)	AVE VEL P WAVE (M/S)
2.5	0.014	0.011	0.008	0.006	416
5.0	0.022	0.021	0.010	0.009	538
7.5	0.027	0.026	0.011	0.011	705
10.0	0.034	0.034	0.013	0.013	784
12.5	0.045	0.045	0.014	0.014	904
15.0	0.051	0.051	0.015	0.015	1010
17.5	0.056	0.056	0.018	0.018	978
20.0	0.061	0.061	0.019	0.019	1060
22.5	0.066	0.066	0.037	0.037	610
25.0	0.071	0.071	0.038	0.038	659
26.7	0.074	0.074	0.040	0.040	669

TABLE 9

TRAVEL-TIMES AND AVERAGE VELOCITIES

SITE NO. CS-II TEMBLOR II DATE LOGGED 10-20-80
PLANK DIST= 2.0 PLATE DIST= 2.0 AVE ORIGIN CORR= 0.014

DEPTH (M)	ORIGIN CORR (S)	FIRST S ARRIVAL (S)	CORR S TIME (S)	AVE VEL S WAVE (M/S)
2.5	0.014	0.009	0.007	370
5.0	0.015	0.018	0.016	305
7.5	0.015	0.025	0.024	315
10.0	0.014	0.028	0.027	369
12.5	0.015	0.031	0.030	413
15.0	0.014	0.036	0.035	424
17.5	0.014	0.044	0.043	403
20.0	0.014	0.043	0.042	471
22.5	0.014	0.046	0.045	494
25.0	0.015	0.049	0.048	515
27.7	0.014	0.056	0.055	499

DEPTH (M)	FIRST S PEAK (S)	CORR S PEAK (S)	P TIME (S)	CORR P TIME (S)	AVE VEL P WAVE (M/S)
2.5	0.021	0.016	0.008	0.006	400
5.0	0.028	0.026	0.010	0.009	538
7.5	0.035	0.033	0.012	0.012	646
10.0	0.038	0.037	0.015	0.015	679
12.5	0.042	0.041	0.017	0.017	744
15.0	0.046	0.045	0.019	0.019	796
17.5	0.056	0.055	0.022	0.022	800
20.0	0.056	0.055	0.023	0.023	873
22.5	0.059	0.058	0.026	0.026	868
25.0	0.063	0.062	0.027	0.027	928
27.7	0.069	0.068	0.029	0.029	957

TABLE 10

TRAVEL-TIMES AND AVERAGE VELOCITIES

SITE NO. T-1 LINCOLN SCHOOL DATE LOGGED 5-1-80
PLANK DIST= 2.0 PLATE DIST= 2.0 AVE ORIGIN CORR= 0.004

DEPTH (M)	ORIGIN CORR (S)	FIRST S ARRIVAL (S)	CORR S TIME (S)	AVE VEL S WAVE (M/S)
2.5	0.004	0.012	0.009	264
5.0	0.004	0.019	0.018	281
7.5	0.004	0.027	0.026	286
10.0	0.004	0.031	0.031	327
12.5	0.004	0.036	0.036	350
15.0	0.004	0.040	0.040	377
17.5	0.004	0.046	0.046	381
20.0	0.002	0.050	0.050	400
22.5	0.004	0.055	0.055	409
25.0	0.005	0.061	0.061	410
27.5	0.003	0.072	0.072	382
30.0	0.004	0.070	0.070	428
32.5	0.004	0.075	0.075	433
35.0	0.004	0.080	0.080	437
37.5	0.004	0.084	0.084	446
40.0	0.004	0.088	0.088	454
42.5	0.004	0.093	0.093	456
45.0	0.004	0.096	0.096	468
47.5	0.004	0.099	0.099	479
50.0	0.003	0.111	0.111	450
52.5	0.004	0.114	0.114	460
55.0	0.004	0.111	0.111	495
57.5	0.005	0.114	0.114	504
59.8	0.003	0.118	0.118	506

DEPTH (M)	FIRST S PEAK (S)	CORR S PEAK (S)	P TIME (S)	CORR P TIME (S)	AVE VEL P WAVE (M/S)
2.5	0.018	0.014	0.009	0.007	385
5.0	0.024	0.022	0.014	0.013	384
7.5	0.033	0.032	0.016	0.015	485
10.0	0.037	0.036	0.018	0.018	566
12.5	0.042	0.042	0.021	0.021	602
15.0	0.046	0.046	0.027	0.027	560
17.5	0.051	0.051	0.029	0.029	607
20.0	0.056	0.056	0.032	0.032	628
22.5	0.061	0.061	0.035	0.035	645
25.0	0.067	0.067	0.038	0.038	659
27.5	0.079	0.079	0.038	0.038	725
30.0	0.077	0.077	0.043	0.043	699
32.5	0.082	0.082	0.045	0.045	723
35.0	0.087	0.087	0.048	0.048	730
37.5	0.091	0.091	0.050	0.050	751
40.0	0.095	0.095	0.053	0.053	755
42.5	0.100	0.100	0.055	0.055	773
45.0	0.103	0.103	0.056	0.056	804
47.5	0.107	0.107	0.059	0.059	805
50.0	0.119	0.119	0.062	0.062	807
52.5	0.121	0.121	0.063	0.063	833
55.0	0.118	0.118	0.066	0.066	833
57.5	0.121	0.121	0.069	0.069	833
59.8	0.125	0.125	0.071	0.071	842

TABLE 12

INTERVAL VELOCITIES AND ELASTIC MODULI

SITE NO. G-2 MISSION TRAILS MOTEL

		FIRST S ARRIVAL			FIRST S PEAK		
DEPTH INT (M)	NO MEAS	INCPT (S)	VEL (M/S)	UNC INT (M/S)	INCPT (S)	VEL (M/S)	UNC INT (M/S)
2.5- 7.5	3	0.006	274	(250, 303)	0.012	269	(259, 280)
7.5-15.0	4	0.018	442	(427, 467)	0.022	424	(413, 436)
17.5-22.5	3	0.021	450	(428, 474)	0.026	449	(427, 473)
22.5-32.8	5	-.004	300	(294, 307)	0.001	293	(284, 303)

		FIRST P ARRIVAL		
DEPTH INT (M)	NO MEAS	INCPT (S)	VEL (M/S)	UNC INT (M/S)
2.5-20.0	8	0.006	874	(855, 893)
2.5-20.0	8	0.006	874	(855, 893)
20.0-32.8	6	0.019	1830	(1740,1930)
20.0-32.8	6	0.019	1830	(1740,1930)

S VEL (M/S)	DEPTH INT (M)	P VEL (M/S)	DEPTH INT (M)	DENSITY DEPTH (M)	DENSITY (G/CC)	SHEAR MOD (BARS)	BULK MOD (BARS)	POISSONS RATIO
274	2.5- 7.5	874	2.5-20.0					0.445
459	7.5-15.0	874	2.5-20.0	9.5	2.22	4680	10700	0.309
450	17.5-22.5	1830	20.0-32.8	19.5	2.25	4560	69400	0.468
300	22.5-32.8	1830	20.0-32.8	25.9	1.97	1780	63700	0.486

TABLE 11

INTERVAL VELOCITIES AND ELASTIC MODULI

SITE NO.G-1 GAVILAN WATER TANK

DEPTH INT (M)	NO MEAS	FIRST S ARRIVAL INCPT (S)	FIRST S ARRIVAL VEL (M/S)	FIRST S ARRIVAL UNC INT (M/S)	FIRST S PEAK INCPT (S)	FIRST S PEAK VEL (M/S)	FIRST S PEAK UNC INT (M/S)
1.0- 7.0	4	0.001	781	(737, 831)	0.003	593	(560, 631)
9.0-19.3	6	0.008	2230	(1520,4220)	0.012	2120	(1580,3210)

DEPTH INT (M)	NO MEAS	FIRST P ARRIVAL INCPT (S)	FIRST P ARRIVAL VEL (M/S)	FIRST P ARRIVAL UNC INT (M/S)
1.0- 9.0	5	0.002	1180	(1020,1400)
9.0-19.3	6	0.006	2750	(2440,3150)

S VEL (M/S)	DEPTH INT (M)	P VEL (M/S)	DEPTH INT (M)	DENSITY DEPTH (M)	DENSITY (G/CC)	SHEAR MOD (BARS)	BULK MOD (BARS)	POISSONS RATIO
781	1.0- 7.0	1180	1.0- 9.0					0.111
2230	9.0-19.3	2750	9.0-19.3					-.454

TABLE 13

INTERVAL VELOCITIES AND ELASTIC MODULI

SITE NO. 3 GILROY STP

DEPTH INT (M)	NO MEAS	FIRST S ARRIVAL INCPT (S)	FIRST S ARRIVAL VEL (M/S)	FIRST S ARRIVAL UNC INT (M/S)	FIRST S PEAK INCPT (S)	FIRST S PEAK VEL (M/S)	FIRST S PEAK UNC INT (M/S)
7.5-17.5	5	0.013	385	(378, 392)	0.071	401	(381, 422)
17.5-25.0	4	-.009	256	(252, 261)	-.006	251	(245, 258)
27.5-32.5	3	0.014	332	(320, 345)	0.018	332	(320, 345)
35.0-42.5	4	0.021	378	(370, 386)	0.027	372	(363, 382)
45.0-52.5	4	0.065	623	(623, 623)	0.061	542	(526, 559)
52.5-60.0	4	0.017	396	(385, 407)	0.026	396	(385, 407)

DEPTH INT (M)	NO MEAS	FIRST P ARRIVAL INCPT (S)	FIRST P ARRIVAL VEL (M/S)	FIRST P ARRIVAL UNC INT (M/S)
2.5-45.0	18	0.004	1240	(1210,1280)
2.5-22.5	9	0.005	1460	(1400,1520)
25.0-42.5	8	0.012	1630	(1590,1680)
25.0-42.5	8	0.012	1630	(1590,1680)
45.0-60.0	7	0.015	1890	(1790,2000)
45.0-60.0	7	0.015	1890	(1790,2000)

S VEL (M/S)	DEPTH INT (M)	P VEL (M/S)	DEPTH INT (M)	DENSITY DEPTH (M)	DENSITY (G/CC)	SHEAR MOD (BARS)	BULK MOD (BARS)	POISSONS RATIO
385	7.5-17.5	1240	2.5-45.0					0.447
256	17.5-25.0	1460	2.5-22.5					0.484
356	27.5-32.5	1630	25.0-42.5					0.475
378	35.0-42.5	1630	25.0-42.5	35.4	2.10	3000	52100	0.472
623	45.0-52.5	1890	45.0-60.0					0.439
396	52.5-60.0	1890	45.0-60.0					0.477

TABLE 14

INTERVAL VELOCITIES AND ELASTIC MODULI

SITE NO. G-4 SAN YSIDRO SCHOOL

DEPTH INT (M)	NO MEAS	FIRST S ARRIVAL INCPT (S)	FIRST S ARRIVAL VEL (M/S)	FIRST S ARRIVAL UNC INT (M/S)	FIRST S PEAK INCPT (S)	FIRST S PEAK VEL (M/S)	FIRST S PEAK UNC INT (M/S)
3.0- 9.0	4	-.002	145	(132, 160)	0.007	150	(137, 166)
11.0-29.6	9	0.030	285	(274, 296)	0.035	276	(266, 287)

DEPTH INT (M)	NO MEAS	FIRST P ARRIVAL INCPT (S)	FIRST P ARRIVAL VEL (M/S)	FIRST P ARRIVAL UNC INT (M/S)
3.0- 7.0	3	0.011	1260	(959,1850)
9.0-29.6	10	0.014	1740	(1680,1810)

S VEL (M/S)	DEPTH INT (M)	P VEL (M/S)	DEPTH INT (M)	DENSITY DEPTH (M)	DENSITY (G/CC)	SHEAR MOD (BARS)	BULK MOD (BARS)	POISSONS RATIO
145	3.0- 9.0	1260	3.0- 7.0					0.493
285	11.0-29.6	1740	9.0-29.6	19.5	1.81	1470	53000	0.486

TABLE 15

INTERVAL VELOCITIES AND ELASTIC MODULI

SITE NO. 6 CAÑADA ROAD

	FIRST S ARRIVAL				FIRST S PEAK		
DEPTH INT (M)	NO MEAS	INCPT (S)	VEL (M/S)	UNC INT (M/S)	INCPT (S)	VEL (M/S)	UNC INT (M/S)
2.5-12.5	5	0.004	625	(604, 673)	0.007	563	(527, 605)
15.0-25.0	5	0.002	691	(646, 709)	0.008	670	(652, 688)

	FIRST P ARRIVAL			
DEPTH INT (M)	NO MEAS	INCPT (S)	VEL (M/S)	UNC INT (M/S)
2.5-15.0	6	0.005	1160	(1100,1220)
15.0-27.5	6	0.012	2450	(2160,2840)

S VEL (M/S)	DEPTH INT (M)	P VEL (M/S)	DEPTH INT (M)	DENSITY DEPTH (M)	DENSITY (G/CC)	SHEAR MOD (BARS)	BULK MOD (BARS)	POISSONS RATIO
655	2.5-12.5	1160	2.5-15.0					0.263
671	15.0-25.0	2450	15.0-27.5					0.460

TABLE 16

INTERVAL VELOCITIES AND ELASTIC MODULI

SITE NO. CS-5 COCHRUM'S GARAGE

DEPTH INT (M)	NO MEAS	FIRST S ARRIVAL INCPT (S)	FIRST S ARRIVAL VEL (M/S)	FIRST S ARRIVAL UNC INT (M/S)	FIRST S PEAK INCPT (S)	FIRST S PEAK VEL (M/S)	FIRST S PEAK UNC INT (M/S)
2.5-12.5	5	0.001	218	(212, 225)	0.006	211	(206, 217)
17.5-27.5	5	0.028	364	(358, 371)	0.036	369	(364, 375)
27.5-35.0	4	0.038	429	(409, 451)	0.046	428	(409, 450)
35.0-55.5	9	0.050	504	(493, 514)	0.057	499	(488, 510)

DEPTH INT (M)	NO MEAS	FIRST P ARRIVAL INCPT (S)	FIRST P ARRIVAL VEL (M/S)	FIRST P ARRIVAL UNC INT (M/S)
2.5-12.5	5	0.004	467	(437, 501)
2.5-12.5	5	0.004	467	(437, 501)
15.0-55.5	17	0.027	1850	(1820,1870)
15.0-55.5	17	0.027	1850	(1820,1870)

S VEL (M/S)	DEPTH INT (M)	P VEL (M/S)	DEPTH INT (M)	DENSITY DEPTH (M)	DENSITY (G/CC)	SHEAR MOD (BARS)	BULK MOD (BARS)	POISSONS RATIO
218	2.5-12.5	467	2.5-12.5					0.360
364	17.5-27.5	467	2.5-12.5	20.1	2.07	2750	851	-.278
429	27.5-35.0	1850	15.0-55.5	28.1	2.20	4050	69600	0.471
504	35.0-55.5	1850	15.0-55.5	47.6	2.23	5670	68500	0.460

TABLE 17

INTERVAL VELOCITIES AND ELASTIC MODULI

SITE NO. CS-8 SHANDON PUMP STATION

DEPTH INT (M)	NO MEAS	FIRST S ARRIVAL INCPT (S)	FIRST S ARRIVAL VEL (M/S)	FIRST S ARRIVAL UNC INT (M/S)	FIRST S PEAK INCPT (S)	FIRST S PEAK VEL (M/S)	FIRST S PEAK UNC INT (M/S)
2.5-12.5	5	-.002	159	(156, 162)	0.003	156	(153, 158)
15.0-20.0	3	0.038	327	(294, 370)	0.041	307	(286, 331)
20.0-28.3	5	0.063	560	(532, 591)	0.070	541	(522, 562)

DEPTH INT (M)	NO MEAS	FIRST P ARRIVAL INCPT (S)	FIRST P ARRIVAL VEL (M/S)	FIRST P ARRIVAL UNC INT (M/S)
2.5-12.5	5	0.003	626	(595, 660)
12.5-28.3	8	0.016	1910	(1780,2060)
12.5-28.3	8	0.016	1910	(1780,2060)

S VEL (M/S)	DEPTH INT (M)	P VEL (M/S)	DEPTH INT (M)	DENSITY DEPTH (M)	DENSITY (G/CC)	SHEAR MOD (BARS)	BULK MOD (BARS)	POISSONS RATIO
159	2.5-12.5	626	2.5-12.5					0.465
327	15.0-20.0	1910	12.5-28.3					0.485
560	20.0-28.3	1910	12.5-28.3	24.5	2.13	6690	68500	0.453

TABLE 18

INTERVAL VELOCITIES AND ELASTIC MODULI

SITE NO. CS-12 SHANDON VALLEY VINEYARDS

DEPTH INT (M)	NO MEAS	FIRST S ARRIVAL INCPT (S)	FIRST S ARRIVAL VEL (M/S)	FIRST S ARRIVAL UNC INT (M/S)	FIRST S PEAK INCPT (S)	FIRST S PEAK VEL (M/S)	FIRST S PEAK UNC INT (M/S)
2.5-15.0	6	0.000	323	(307, 341)	0.004	314	(302, 328)
15.0-26.7	6	0.016	514	(498, 530)	0.021	500	(496, 504)

DEPTH INT (M)	NO MEAS	FIRST P ARRIVAL INCPT (S)	FIRST P ARRIVAL VEL (M/S)	FIRST P ARRIVAL UNC INT (M/S)
2.5-20.0	8	0.006	1500	(1440,1570)
22.5-26.7	3	0.021	1430	(1100,2050)

S VEL (M/S)	DEPTH INT (M)	P VEL (M/S)	DEPTH INT (M)	DENSITY DEPTH (M)	DENSITY (G/CC)	SHEAR MOD (BARS)	BULK MOD (BARS)	POISSONS RATIO
323	2.5-15.0	1500	2.5-20.0	2.7	2.07	2170	43700	0.476
323	2.5-15.0	1500	2.5-20.0	9.2	0.09	94	1900	0.476
514	15.0-26.7	1430	22.5-26.7					0.426

TABLE 19

INTERVAL VELOCITIES AND ELASTIC MODULI

SITE NO. CS-II TEMBLOR II

		FIRST S ARRIVAL			FIRST S PEAK		
DEPTH INT (M)	NO MEAS	INCPT (S)	VEL (M/S)	UNC INT (M/S)	INCPT (S)	VEL (M/S)	UNC INT (M/S)
2.5- 7.5	3	-.001	293	(272, 316)	0.008	288	(272, 305)
7.5-27.7	9	0.013	659	(619, 706)	0.020	577	(545, 612)

		FIRST P ARRIVAL		
DEPTH INT (M)	NO MEAS	INCPT (S)	VEL (M/S)	UNC INT (M/S)
2.5-10.0	4	0.004	902	(868, 939)
10.0-27.7	8	0.007	1230	(1180,1280)

S VEL (M/S)	DEPTH INT (M)	P VEL (M/S)	DEPTH INT (M)	DENSITY DEPTH (M)	DENSITY (G/CC)	SHEAR MOD (BARS)	BULK MOD (BARS)	POISSONS RATIO
293	2.5- 7.5	902	2.5-10.0					0.441
659	7.5-27.7	1230	10.0-27.7					0.296

TABLE 20

INTERVAL VELOCITIES AND ELASTIC MODULI

SITE NO. 7-1 LINCOLN SCHOOL

		First S Arrival			First S Peak		
DEPTH INT (M)	NO MEAS	INCPT (S)	VEL (M/S)	UNC INT (M/S)	INCPT (S)	VEL (M/S)	UNC INT (M/S)
7.5-30.0	10	0.009	479	(459, 502)	0.015	469	(447, 493)
30.0-42.5	6	0.016	552	(540, 565)	0.023	552	(540, 564)
42.5-59.8	8	0.032	684	(592, 811)	0.040	693	(595, 831)

		First P Arrival		
DEPTH INT (M)	NO MEAS	INCPT (S)	VEL (M/S)	UNC INT (M/S)
2.5-12.5	5	0.006	863	(803, 933)
15.0-25.0	5	0.009	883	(850, 920)
30.0-59.8	13	0.015	1080	(1060,1090)

S VEL (M/S)	DEPTH INT (M)	P VEL (M/S)	DEPTH INT (M)	DENSITY DEPTH (M)	DENSITY (G/CC)	SHEAR MOD (BARS)	BULK MOD (BARS)	POISSONS RATIO
479	7.5-30.0	863	2.5-12.5	9.2	1.90	4380	8340	0.277
479	7.5-30.0	863	2.5-12.5	24.4	2.02	4650	8870	0.277
552	30.0-42.5	883	15.0-25.0	35.1	1.85	5650	6930	0.179
684	42.5-59.8	1080	30.0-59.8					0.160