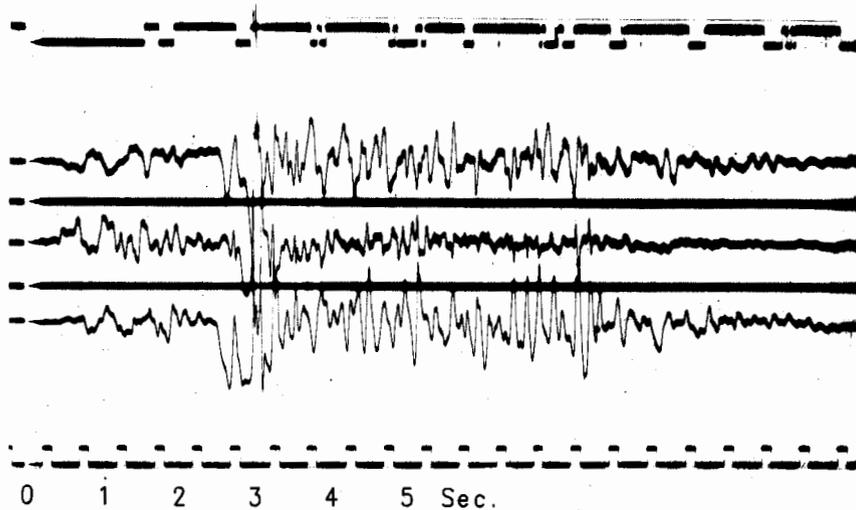


**CSMIP STRONG-MOTION RECORDS
FROM THE
PETROLIA, CALIFORNIA
EARTHQUAKES OF APRIL 25-26, 1992**



Cape Mendocino Record

**CALIFORNIA DEPARTMENT OF CONSERVATION
DIVISION OF MINES AND GEOLOGY
OFFICE OF STRONG MOTION STUDIES
REPORT OSMS 92-05**

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Report No. OSMS 92-05
California Strong Motion Instrumentation Program

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**CSMIP STRONG-MOTION RECORDS FROM THE
PETROLIA, CALIFORNIA EARTHQUAKES OF APRIL 25-26, 1992**

INTRODUCTION

Some of the highest accelerations ever recorded were obtained at stations of the California Strong Motion Instrumentation Program (CSMIP) during the M_s 6.9 April 25 earthquake near Petrolia. The Cape Mendocino station recorded a peak acceleration of near 2 g, the largest acceleration ever recorded in California. One of the highest accelerations ever recorded on a structure, 1.23 g, occurred on the deck of a freeway overpass near Rio Dell.

The accelerograms in this report were recorded during three earthquakes with magnitude over 6 that occurred in an 18-hour time span between 11:06 PDT on April 25 and 04:18 PDT on April 26. The largest event, the first, had a magnitude of 6.9 M_s . The epicenters of these three earthquakes were within about 25 km of each other.

The preliminary earthquake locations and magnitudes estimated by the USGS and UC Berkeley are:

Earthquake	Date	Time	N. Lat.	W. Long.	Depth	M_s	M_L
Mainshock	4/25/92	11:06:04 PDT	40.37	124.31	15 km	6.9	6.4
Aftershock No. 1	4/26/92	00:41:40 PDT	40.44	124.58	18 km	6.2	6.2
Aftershock No. 2	4/26/92	04:18:26 PDT	40.40	124.56	21 km	6.5	6.4

The April 25th event is the largest earthquake to occur in California since the 7.1 M_s Loma Prieta earthquake of 1989. It caused significant damage in Ferndale. The second large event, at 00:41 PDT on April 26, caused greater damage in Rio Dell, Fortuna, and Scotia, according to press reports. The USGS source mechanism indicates that the mainshock had pure thrust motion on a fault striking $N45^\circ W$ (approximately parallel to the San Andreas fault) and dipping 30° to the east. The epicenters of the first and second large aftershocks are northwest of the mainshock. The source mechanism of these events indicates strike-slip faulting on a fault striking northeast.

HIGHLIGHTS OF CSMIP STRONG-MOTION DATA

Strong-motion records were recovered from 14 CSMIP stations after the Petrolia earthquakes of April 25 and 26, 1992. The records contain data from a total of 84 strong-motion sensors. The stations include 10 ground-response stations and 4 extensively-instrumented structures. The 4 structures include 2 buildings, a freeway overpass and a dam. The epicentral distance of the stations triggered by the earthquakes ranges from 4 km for the closest (Cape Mendocino) to about 130 km for the farthest (Covelo). The maximum acceleration values and the station parameters are presented in the tables on pages 9 through 14 of this report. This report includes all CSMIP data from these earthquakes and supersedes the quick report distributed on April 28 (CSMIP, 1992).

Some highlights of particular interest from the stations for the mainshock include:

- Cape Mendocino. This station is underlain by hard sandstone and the instrument is enclosed in a standard lightweight fiberglass housing. Peak acceleration near 2 g was recorded at this station, approximately 4 km southwest of the epicenter. The traces on the record are of very high amplitude and interwoven as discussed below. The many small aftershocks recorded at this station following the mainshock caused the film supply to be exhausted before the first large aftershock occurred.
- Petrolia. A horizontal acceleration of 0.69 g was recorded at this station, approximately 5 km southeast of the epicenter. The instrument site is near the Petrolia General Store which was damaged by the mainshock and subsequently burned to the ground.
- Rio Dell overpass. This two-span skewed concrete bridge on Highway 101 recorded a transverse acceleration of 1.23 g at the deck level on the west end of the bridge. The corresponding peak acceleration at the east end was 0.69 g. No structural damage was reported. However, cracks were observed in the concrete curb on the west embankment. Before this event, 6 significant records had been obtained in earlier earthquakes. The largest previous acceleration at this bridge was 0.59 g, recorded during the 1982 Rio Dell earthquake.
- Fortuna - 1-story supermarket building. This structure with reinforced concrete-block shear walls and a plywood roof diaphragm was located 28 km northeast of the epicenter. Approximately 14% g horizontal acceleration was recorded on the ground floor and 46% g at the roof level in the out-of-plane direction of the wall. Larger motion was recorded at this building during the second event in this series, as discussed below. No structural damage was reported.
- Eureka - 5-story residential building. Reinforced concrete-block shear wall building located approximately 50 km northeast of the epicenter. Accelerations of 16% g horizontal on the ground floor and 34% g at the roof were recorded. Both this building and the Fortuna building have reference free-field sites located in adjoining parking lots, and their records are included in this report.

Some highlights of the records for the M_s 6.2 and 6.5 aftershocks include:

- Petrolia. Horizontal accelerations of 0.60 and 0.57 g were recorded at this station during the first and second large aftershocks. These are approximately the same levels as in the mainshock, although the epicentral distance increased to 25 km and the magnitudes are smaller.
- Rio Dell Overpass. A horizontal acceleration of 0.91 g was recorded on this structure at 42 km from the epicenter of the first large aftershock. The acceleration in the free-field was 0.55 g.
- Fortuna - 1-story supermarket building. During the first large aftershock, 18% g horizontal was recorded at the ground floor and 87% g at the roof level in the out-of-plane direction at the top of the wall. These are the largest accelerations ever recorded at this structure. In the

1989 Loma Prieta earthquake, similar large motions of roof diaphragms were recorded at other structures with stiff walls and flexible diaphragms.

THE CAPE MENDOCINO ACCELEROGRAM

The accelerogram recorded at the Cape Mendocino site contains some of the highest ground accelerations ever recorded. The record shown on page 17 is a direct reproduction of the accelerogram. An enlargement of the high amplitude section of the accelerogram is shown on page 18. Because of the importance of the record, this section considers aspects of the site and record in detail.

Cape Mendocino Site

The Cape Mendocino site was installed by CSMIP in 1978. A photograph of the site taken after the earthquake is shown in Figure 1. Although there are landslides in the area, the station was sited by a CSMIP geologist on hard, unweathered Franciscan sandstone, on a cut made when the road was built. The photo in Figure 2 shows the thin layer of surface material scraped away before the concrete pad was poured on the rock. Reconnaissance after the earthquake verified that the pad had not loosened from the rock.

Although the Cape Mendocino site is one of the best rock sites in the CSMIP network, it is, being in the Coast Ranges, in a region of substantial topographic relief. The site was installed along Mattole Road, the only road providing access to the Cape Mendocino area. The road was constructed part way up the flank of a large ridge as shown in Figure 3. This ridge is approximately 4 km long, 2 km wide, and 220 m (700 ft) high. Figure 4 is a

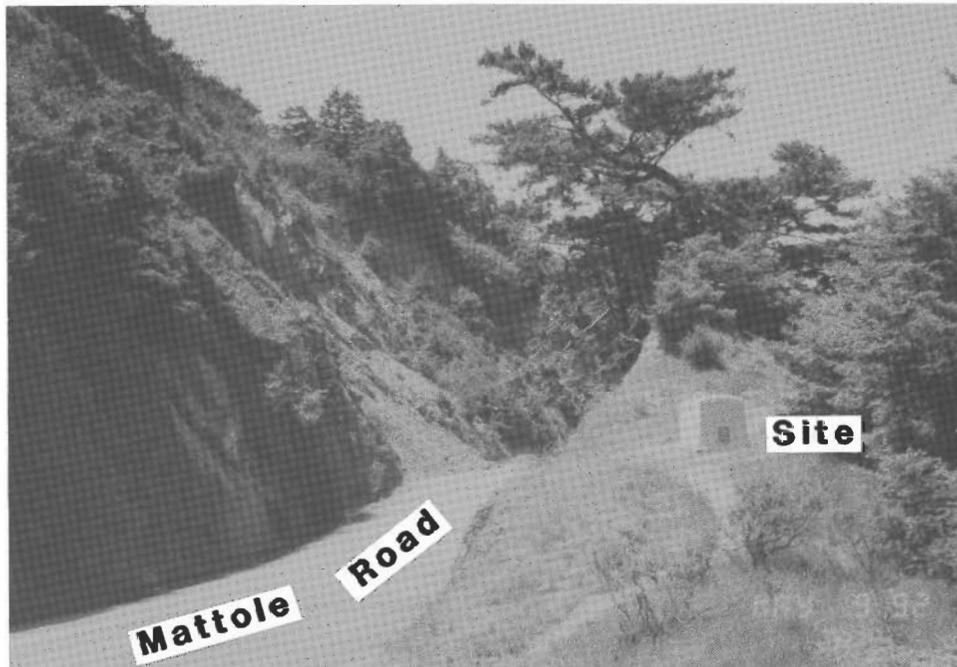


Figure 1. The CSMIP Cape Mendocino accelerograph site. The accelerograph is bolted to the concrete floor inside the 4-foot high fiberglass housing. The accelerograph was still securely bolted to the pad when the record was retrieved by CSMIP technicians after the earthquake.

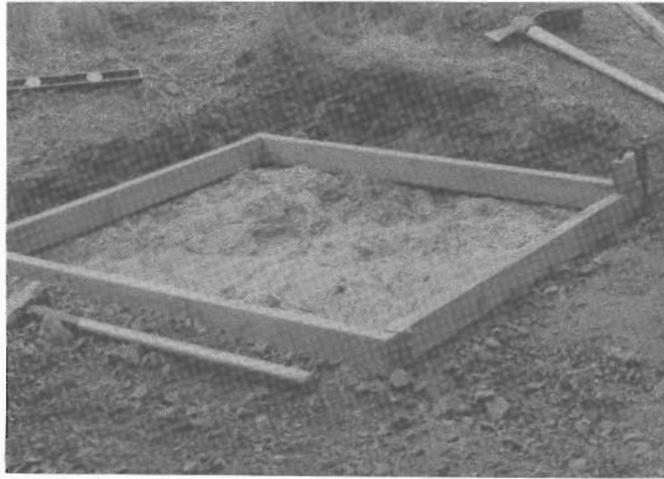


Figure 2. Photo of the excavation to rock at the Cape Mendocino site preparatory to pouring the pad on which the instrument and the housing in Figure 1 are mounted. The rough surface of the rock was cleaned to improve the bonding between the rock and the concrete pad. The installation was performed in 1978.

cross-section through the site and shows the location of the site on the flank of the ridge. As the section indicates, the relief continues downward to McNutt Gulch. In this region, McNutt Gulch follows the trend of easily eroded rock in an old (Tertiary) shear zone. The overall slope of the ridge flank is approximately 27° . The low knob near the station in Figure 1 is part of the hillside remaining after the road construction. Observations by CSMIP technicians during record recovery, and by a CSMIP geologist during a reconnaissance later, indicated rubble on the road from a rock slide along the hill approximately 50 m from the site, and also from the top of the knob west of the site. There was no evidence that large boulders had landed in the immediate vicinity of the site or that large cracks had formed in the rock in the vicinity of the station. In summary, there are no obvious sources near the site for the large accelerations in the record.

Cape Mendocino Record

The Cape Mendocino record shown on page 17 is a direct reproduction of the film accelerogram. To allow details of the record to be seen, a photographic enlargement (3x) is shown on page 18. Because of the unusual nature of the record, the instrument was tested in the field and brought back to the CSMIP laboratory for further testing. The instrument is an analog, optical, film-recording accelerograph (SMA-1, manufactured by Kinematics).

The high accelerations at about 3 seconds into the accelerogram occur on all three traces, East (90°), Vertical, and North (360°). The peak of the East (top) trace is the highest, rightmost peak visible in the enlargement on page 18. It has been scaled to yield a peak acceleration of 1.20 g. The post-earthquake laboratory tests indicate that the other two traces are influenced by limitations of the instrument itself.

Vertical trace. The results of the laboratory instrument tests indicate that the maximum excursion of the vertical (middle) trace in the upward direction is limited to 31 mm (1.85 g) by a mechanical stop on the motion of the

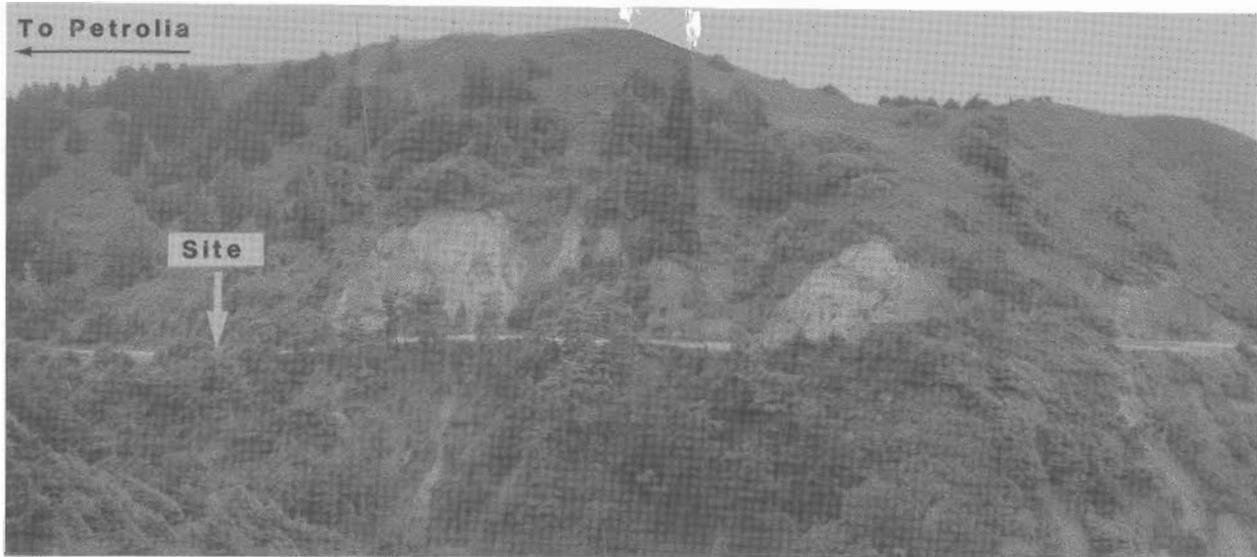


Figure 3. Photograph of vicinity of Cape Mendocino CSMIP site. The site is located at a cut along the road as indicated by the arrow. McNutt Gulch is at the base of the ridge, in the foreground.

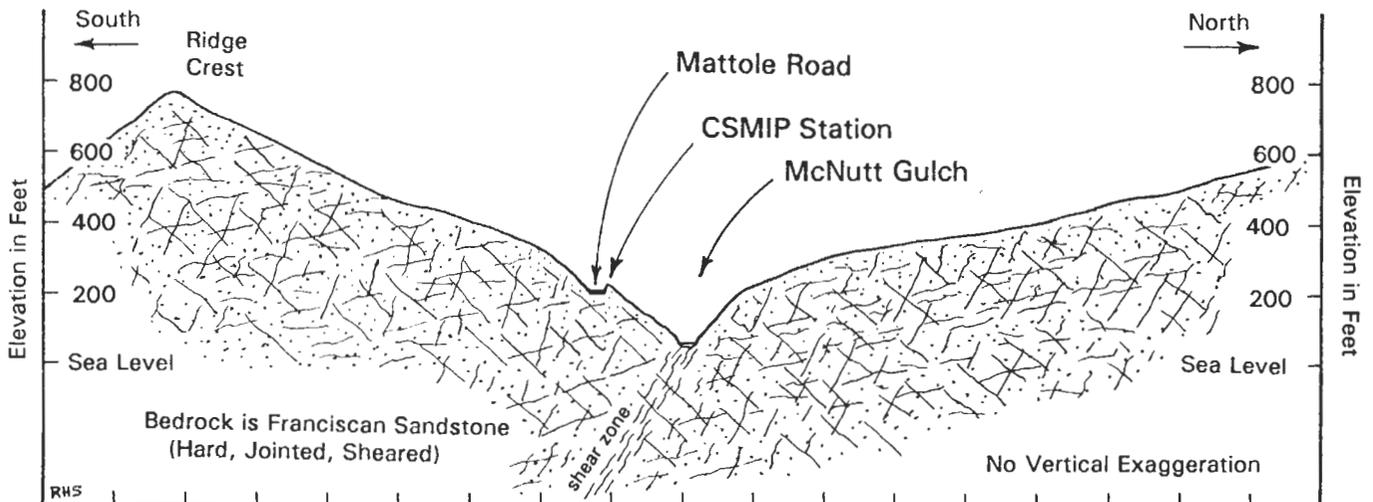


Figure 4. Approximately North-South cross-section through the Cape Mendocino CSMIP site showing the topographic setting of the station. McNutt Gulch follows the trend of easily eroded rock in an old (Tertiary) shear zone.

accelerometer mass. On the accelerogram enlargement on page 18, the peak vertical motion occurs as the first peak, a fraction of a second earlier than the East peak considered above. The peak reached by the vertical trace exceeds the maximum allowed by the physical limit on the mass (1.85 g). Close inspection of the original film and high quality photographic enlargements shows that the peak is a doublet, in contrast to the simple, single peak on the East trace. It is interpreted that the doubled peak arose from bouncing of the mass when it hit the mechanical stop.

Since the record maximum was limited by the accelerometer to 1.85 g, the actual peak acceleration exceeds this value and can only be estimated. The best estimate of the peak acceleration at this time from extrapolation is near 2.2 g. This estimate assumes that the sensitivity value determined at 1 g also applies at higher accelerations.

North trace. Laboratory tests indicate that the upward motion of the North (bottom) trace is limited by the optical path rather than by a physical stop on the mass. The optical beam in the instrument is reflected by a mirror on the mass itself and several additional mirrors along the path to the collimating lens where the image is placed on the film to form the acceleration trace. For some accelerometers, high-amplitude excursions (over 1 g) of the trace may be limited by the optical beam's path before the accelerometer mass encounters a mechanical stop. In that case, the light beam misses one of the internal mirrors and never reaches the film. This happens with the North trace of this accelerogram - the light beam misses a mirror when the trace has moved upward 31 mm, the equivalent of 1.80 g, and then the trace disappears from the film.

Since the trace excursion is limited at 1.80 g, the actual peak acceleration exceeds this value. The high frequency of this acceleration pulse makes extrapolation very uncertain. Preliminary processing of the record with different peak values indicates that the exact value of the peaks has negligible effects on the integrated velocity and displacement.

The above trace limits do not reflect negatively on the capabilities of this type of accelerograph. These accelerographs were designed, built and installed as 1 g instruments in the 1970's, when it was thought acceleration would only very rarely, if ever, exceed 1 g. In general, the ability of instruments of this type to register motion significantly in excess of 1 g is dependent on the care of maintenance technicians as well as details of manufacturing. Other instruments tested by CSMIP had more limited performance than the unit that was installed at Cape Mendocino, which has now been replaced with a digital 2g accelerograph.

ADDITIONAL STRONG-MOTION DATA

Several agencies in addition to CSMIP have strong-motion instruments in the Northwest California. The U.S. Geological Survey maintains instruments of its own and of other agencies in this area (USGS, 1992). Additional stations are maintained by Pacific Gas & Electric (Brady, 1992).

ORDER OF DATA PRESENTATION - HOW TO USE THIS REPORT

Several tables are included in this report to make cross-referencing stations and records convenient. The CSMIP stations that recorded this earthquake are shown on the map of the Petrolia area in Figure 5. Each station is identified by a three-digit code on the map. This code and the corresponding station name are cross-referenced in Table 1, which for convenience appears on the page opposite the station map.

Once the station name is known, Table 2, which lists the stations in alphabetical order, can be used to obtain station parameters such as coordinates and site geology. Table 2 also lists other stations in the region

that did not trigger during the Petrolia earthquakes. Finally, Tables 3 lists earthquake- and station-dependent information, such as epicentral distance, sensor orientations, and peak acceleration values. Tables 3A, 3B and 3C are arranged in increasing epicentral distance. The number of the page on which the accelerogram is reproduced in this report is listed in each table.

The accelerograph records section of this report has three main groupings corresponding to the three large earthquakes: mainshock, aftershock no. 1 and aftershock no. 2. Each section contains the records from ground-response stations, two records per page, followed by records from extensively-instrumented structures. The presentation of the building records includes a picture of the building, a brief description of the structural system, and a schematic of the sensor layout. This introductory page is followed by one page of records. Please note that, by convention, the orientation of sensors in a building is given by reference directions parallel to the principal dimensions of the building. The relationship of these directions to actual geographic directions is given as the Structure Reference Orientation on the sensor layout and the building record. Both buildings in this report have a ground-response station nearby to provide reference ground motion information, and a copy of the reference-station record is included with the building record for the mainshock. The presentation for lifeline structures follows the format used for building records including a schematic of the sensor layout.

ACKNOWLEDGEMENTS

The California Strong Motion Instrumentation Program extends its appreciation to the individuals and organizations which have permitted and cooperated in the installation of seismic strong-motion equipment on their property. CSMIP also extends its appreciation to the members of the Strong Motion Instrumentation Advisory Committee and its subcommittees.

The records presented in this report were made possible through the efforts of many CSMIP technicians, both present and past, who installed and maintained the stations over the years. Record recovery following this earthquake was performed by W. Stephan and D. Driver. A. Cramlet and R. Payne assisted in coordinating the record recovery. S. Rowley, N. Seibert and T. Ludwig assisted in the preparation of this report. The efforts of all those involved made the timely publication of these data possible.

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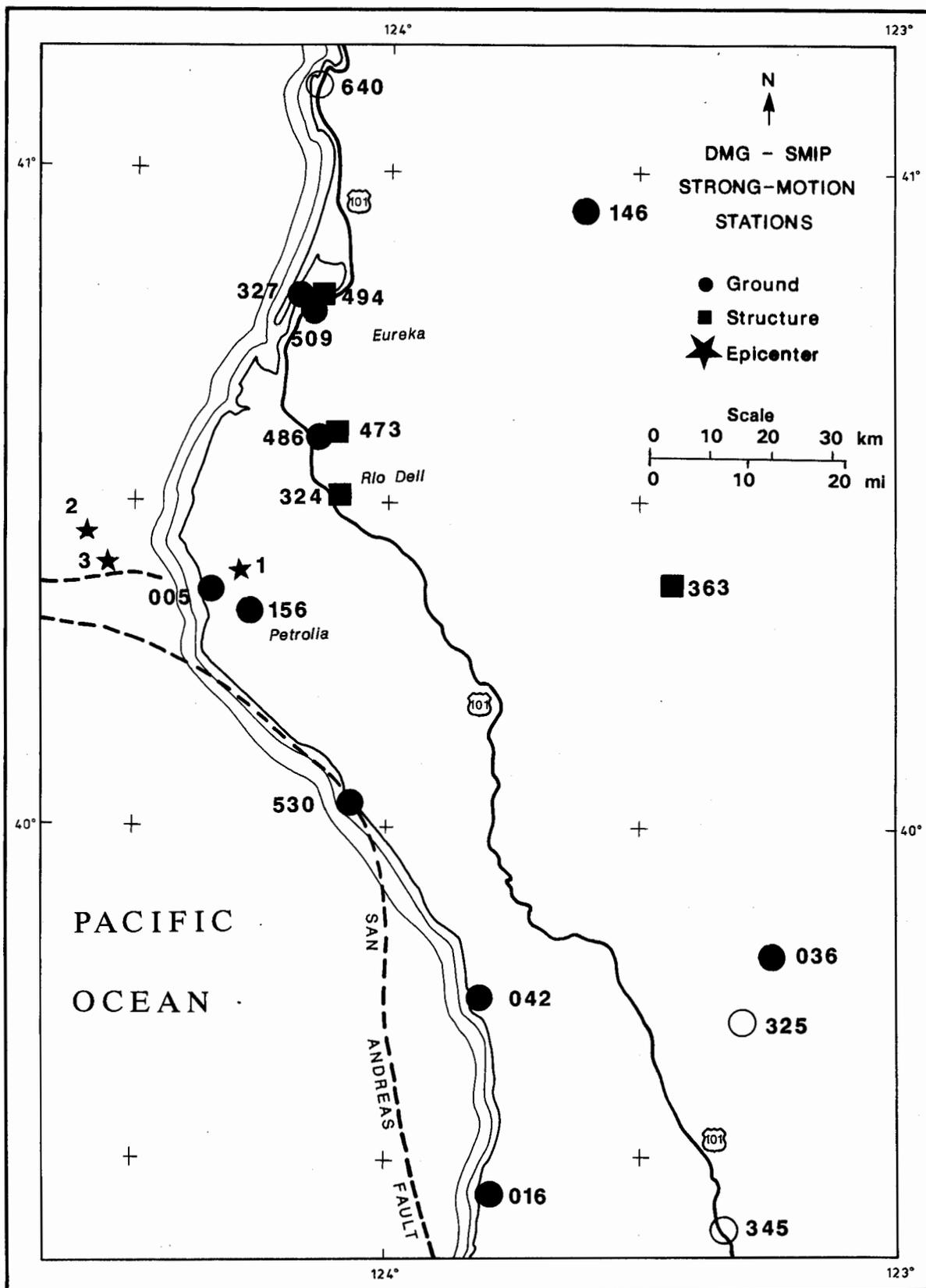


Figure 5. CSMIP stations that recorded the April 25-26, 1992 Petrolia earthquakes are shown as circles and squares. Open symbols identify stations which were not triggered during the earthquakes, but were operational. Stations are identified by a three digit code cross-referenced to station names in Table 1. Major faults are shown as dashed lines. Hypocentral information for the three earthquakes is presented in the text.

TABLE 1
Station-Code Reference Table

<u>Code</u>	<u>Station Name</u>	<u>Mainshock Record on Page</u>	<u>Aftershock No. 1 Record on Page</u>	<u>Aftershock No. 2 Record on Page</u>
005	Cape Mendocino	17, 18	*	*
016	Fort Bragg	nt	nt	58
036	Covelo	22	44	58
042	Rockport	21	43	57
146	Willow Creek	21	nt	nt
156	Petrolia	17	41	55
324	Rio Dell - Hwy 101/Painter St. Overpass	31	45	59
325	Dos Rios	nt	nt	nt
327	Eureka - 5th & H Federal Bldg.	20	42	56
345	Willits - Rutler Ranch	nt	nt	nt
363	Ruth Lake - Matthews Dam	36	nt	nt
473	Fortuna - 1-story Supermarket Bldg.	23	48	62
486	Fortuna - 701 S. Fortuna Blvd.	19, 26	41	55
494	Eureka - 5-story Residential Bldg.	27	50	64
509	Eureka - Myrtle & West Avenue	20, 30	42	56
530	Shelter Cove - Airport	19	43	57
640	Patrick's Point State Park	nt	nt	nt

nt - Instrument not triggered, though operational.

* - The instrument at this station recorded the many small aftershocks following the mainshock and was out of recording film at the time of the subsequent large aftershocks.

TABLE 2
CSMIP Strong-Motion Stations - Petrolia Area Earthquakes

<u>Station Name</u>	<u>N.Lat.</u>	<u>W.Long.</u>	<u>Station No.</u>	<u>Code</u>	<u>Site Geology</u>	<u>Mainshock Record on Page</u>	<u>Aftershock No. 1 Record on Page</u>	<u>Aftershock No. 2 Record on Page</u>
Cape Mendocino	40.348	124.352	89005	005	hard sandstone	17, 18	nr	nr
Covelo	39.806	123.247	79036	036	alluvium (~ 125m)	22	44	58
Crescent City	41.765	124.193	99017	017	alluvium	nt	nt	nt
Dos Rios	34.706	123.301	79325	325	sandstone/chert	nt	nt	nt
Eureka - 5th & H Federal Bldg.	40.802	124.163	89327	327	alluvium	20, 30	42	56
Eureka - Myrtle & West Avenue	40.801	124.148	89509	509	alluvium	20	42	56
Eureka - 5-story Residential Bldg.	40.802	124.146	89494	494	alluvium	27	50	64
Fort Bragg	39.452	123.803	79016	016	terrace deposits (~ 10m) over sandstone	nt	nt	58
Fortuna - 701 S. Fortuna Blvd.	40.584	124.145	89486	486	alluvium	19, 26	41	55
Fortuna - 1-story Supermarket Bldg.	40.584	124.144	89473	473	alluvium	23	48	62
Happy Camp	41.797	123.374	99144	144	alluvium	nt	nt	nt
Patrick's Point State Park	41.137	124.150	99640	640	sandstone	nt	nt	nt
Petrolia	40.324	124.286	89156	156	alluvium (~ 17m)	17	41	55
Rio Dell - Hwy 101/Painter St. Overpass	40.503	124.100	89324	324	alluvium (~ 15m)	31	45	59
Rockport	39.740	123.815	79042	042	alluvium (~ 8m) over sandstone	21	43	57
Ruth Lake - Matthews Dam	40.369	123.433	89363	363	hard sandstone	36	nt	nt
Shelter Cove - Airport	40.026	124.069	89530	530	thin terrace deposits over bedrock	19	43	57
Trinity Center	40.982	122.709	88048	048	alluvium	nt	nt	nt
Willits - Rutler Ranch	39.392	123.340	79345	345	alluvium	nt	nt	nt
Willow Creek	40.941	123.631	89146	146	alluvium	21	nt	nt

nt - Instrument not triggered, though operational
nr - No record; instrument out of media, see text

TABLE 3A - CSMIP Strong-Motion Data - Petrolia Mainshock

<u>Station Name</u>	<u>Station No.</u>	<u>Structure Type, Size*</u>	<u>Epicenter Dist.**</u>	<u>Trigger Time#</u>	<u>Max. Acceleration</u>			<u>Record on Pg.</u>
					<u>Comp.</u>	<u>Grnd. (g)</u>	<u>Struct. (g)</u>	
Cape Mendocino	89005	Instr. shltr. H	4	06:08.4	90 Up 360	1.20 >1.85 >1.80		17, 18
Petrolia	89156	Instr. shltr. H	5	06:07.7	90 Up 360	0.69 0.18 0.62		17
Rio Dell - Hwy 101/Painter St. Overpass	89324	2-span skew concrete bridge (20 sensors)	24	---	272 Up 2	0.39 0.20 0.55	0.70 0.68 1.23	31
Fortuna - 701 S. Fortuna Blvd.	89486	Instr. shltr. H	28	06:12.7	90 Up 360	0.12 0.06 0.12		19, 26
Fortuna - 1-story Supermarket Bldg.	89473	1-story reinforced masonry bldg. (12 sensors)	28	06:12±	270 Up 180	0.13 0.06 0.14	0.17 ----	23
Shelter Cove - Airport	89530	Instr. shltr. H	43	06:13.2	90 Up 360	0.18 0.08 0.24		19
Eureka - 5th & H Federal Bldg.	89327	3-story bldg.	50	---	80 Up 350	0.16 0.03 0.08		20
Eureka - Myrtle & West Avenue	89509	Instr. shltr. H	50	06:15.7	90 Up 360	0.17 0.04 0.16		20, 30
Eureka - 5-story Residential Bldg.	89494	5-story reinforced masonry bldg. (13 sensors)	50	06:16.2	90 Up 180	0.16 0.05 0.15	0.34 ----	27
Ruth Lake - Matthews Dam	89363	Earth dam (9 sensors)	75	06:30.5	146 Up 56	0.07 0.02 0.03	0.15 0.06 0.13	36
Rockport	79042	Instr. shltr. A	82	06:30.7	90 Up 360	0.03 0.02 0.03		21
Willow Creek**	89146	1-story bldg.	86	---	90 Up 360	0.05 0.02 0.04		21

TABLE 3A - CSMIP Strong-Motion Data - Petrolia Mainshock (continued)

<u>Station Name</u>	<u>Station No.</u>	<u>Structure Type, Size*</u>	<u>Epicenter Dist. **</u>	<u>Trigger Time#</u>	<u>Max. Acceleration</u>		<u>Record on Pg.</u>
					<u>Comp.</u>	<u>Grnd. (g)</u>	
Covelo	79036	Instr. shltr. F	110	06:30.3	90	0.03	22
					Up	0.02	
					360	0.02	

* - Instrument shelter types: Instr. shltr. A - small prefabricated metal building
Instr. shltr. F - small 1-story building
Instr. shltr. H - small fiberglass shelter

** - Distance (in km) relative to the presently estimated epicenter at 40.368N, 124.315W.

- Accelerograph trigger time, when known, in minutes and seconds after 18:00:00 GMT on 25 April 1992.
Seconds are given to tenths when possible.

- Only one earthquake was recorded at Willow Creek and this record has been associated with the mainshock. A late trigger combined with low signal amplitude and lack of absolute time all contribute to an equivocal event association. Also due to the late trigger the recorded peak acceleration may be less than the peak acceleration actually experienced at this station.

TABLE 3B - CSMIP Strong-Motion Data - Petrolia Aftershock No. 1

<u>Station Name</u>	<u>Station No.</u>	<u>Structure Type, Size*</u>	<u>Epicenter Dist. **</u>	<u>Trigger Time#</u>	<u>Max. Acceleration</u>			<u>Record on Pg.</u>
					<u>Comp.</u>	<u>Grnd. (g)</u>	<u>Struct. (g)</u>	
Petrolia	89156	Instr. shltr. H	28	41:46.5	90 Up 360	0.44 0.16 0.60		41
Fortuna - 701 S. Fortuna Blvd.	89486	Instr. shltr. H	41	41:48.9	90 Up 360	0.19 0.05 0.19		41
Fortuna - 1-story Supermarket Bldg.	89473	1-story reinforced masonry bldg. (12 sensors)	41	41:48±	270 Up 180	0.18 0.05 0.17	0.39 ---	48
Rio Dell - Hwy 101/Painter St. Overpass	89324	2-span skew concrete bridge (20 sensors)	42	---	272 Up 2	0.29 0.13 0.55	0.69 0.63 0.91	45
Eureka - 5th & H Federal Bldg.	89327	3-story bldg.	54	---	80 Up 350	0.05 0.03 0.06		42
Eureka - Myrtle & West Avenue	89509	Instr. shltr. H	55	41:54.3	90 Up 360	0.06 0.01 0.07		42
Eureka - 5-story Residential Bldg.	89494	5-story reinforced masonry bldg. (13 sensors)	55	41:55.4	90 Up 180	0.04 0.03 0.08	0.14 ---	50
Shelter Cove - Airport	89530	Instr. shltr. H	63	41:51.3	90 Up 360	0.33 0.09 0.31		43
Rockport	79042	Instr. shltr. A	102	42:11.1	90 Up 360	0.02 0.02 0.04		43
Covelo	79036	Instr. shltr. F	134	42:29.4	90 Up 360	0.03 0.02 0.03		44

* - Instrument shelter types: Instr. shltr. A - small prefabricated metal frame building
Instr. shltr. F - small 1-story building
Instr. shltr. H - small fiberglass shelter

** - Distance (in km) relative to the presently estimated epicenter at 40.438N, 124.585W.

- Accelerograph trigger time, when known, in minutes and seconds after 07:00:00 GMT on 26 April 1992. Seconds are given to tenths when possible.

TABLE 3C - CSMIP Strong-Motion Data - Petrolia Aftershock No. 2

Station Name	Station No.	Structure Type, Size*	Epicenter Dist. **	Trigger Time#	Max. Acceleration			Record on Pg.
					Comp.	Grnd. (g)	Struct. (g)	
Petrolia	89156	Instr. shltr. H	25	---	90 Up 360	0.57 0.16 0.34		55
Rio Dell - Hwy 101/Painter St. Overpass	89324	2-span skew concrete bridge (20 sensors)	41	---	272 Up 2	0.25 0.09 0.20	0.32 0.39 0.33	59
Fortuna - 701 S. Fortuna Blvd.	89486	Instr. shltr. H	41	18:35±	90 Up 360	0.18 0.07 0.15		55
Fortuna - 1-story Supermarket Bldg.	89473	1-story reinforced masonry bldg. (12 sensors)	41	18:35±	270 Up 180	0.19 0.07 0.14	0.20 ---- 0.28	62
Eureka - 5th & H Federal Bldg.	89327	3-story bldg.	56	---	80 Up 350	0.07 0.02 0.03		56
Eureka - Myrtle & West Avenue	89509	Instr. shltr. H	57	18:38.4	90 Up 360	0.06 0.03 0.06		56
Eureka - 5-story Residential Bldg.	89494	5-story reinforced masonry bldg. (13 sensors)	57	18:39.0	90 Up 180	0.05 0.03 0.04	0.17 ---- 0.13	64
Shelter Cove - Airport	89530	Instr. shltr. H	59	18:36.7	90 Up 360	0.52 0.38 0.30		57
Rockport	79042	Instr. shltr. A	97	18:42.1	90 Up 360	0.05 0.04 0.06		57
Fort Bragg	79016	1-story bldg.	123	18:45.4	180 Up 90	0.02 0.03 0.01		58
Covelo	79036	Instr. shltr. F	130	18:49.8	90 Up 360	0.01 0.01 0.02		58

* - Instrument shelter types: Instr. shltr. A - small prefabricated metal building
Instr. shltr. F - small 1-story building
Instr. shltr. H - small fiberglass shelter

** - Distance (in km) relative to the presently estimated epicenter at 40.395N, 124.562W.

- Accelerograph trigger time, when known, in minutes and seconds after 11:00:00 GMT on 26 April 1992.
Seconds are given to tenths when possible.

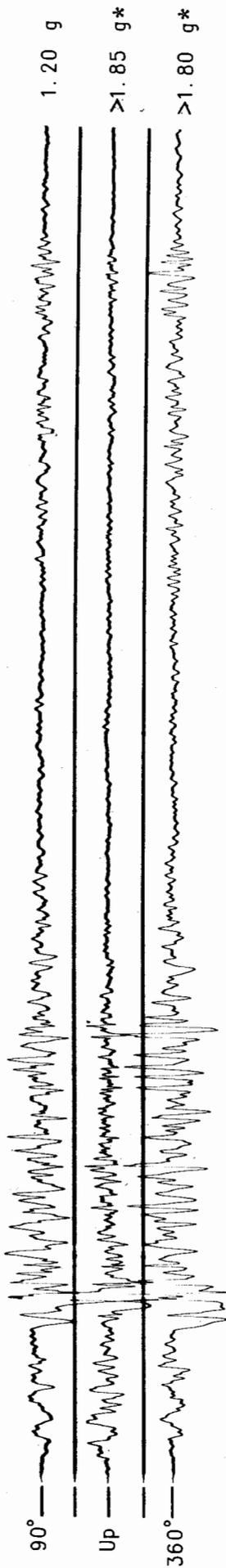
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Shelter Cove - Airport	19
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Eureka - Myrtle & West Avenue	20, 30
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Ruth Lake - Matthews Dam	36

Cape Mendocino
(CSMIP Station 89005)

Record 89005-S2596-92118.03

Max.
Accel.



Trigger Time: 18:06:08.4 GMT

0 1 2 3 4 5 10 15 20 Sec.

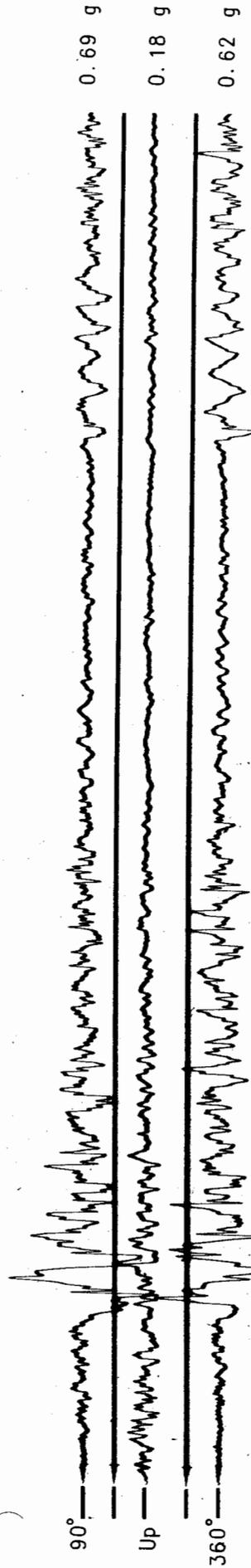
*Peak Values given for the Up and 360° component are minima. For further discussion see text.

Petrolia

(CSMIP Station 89156)

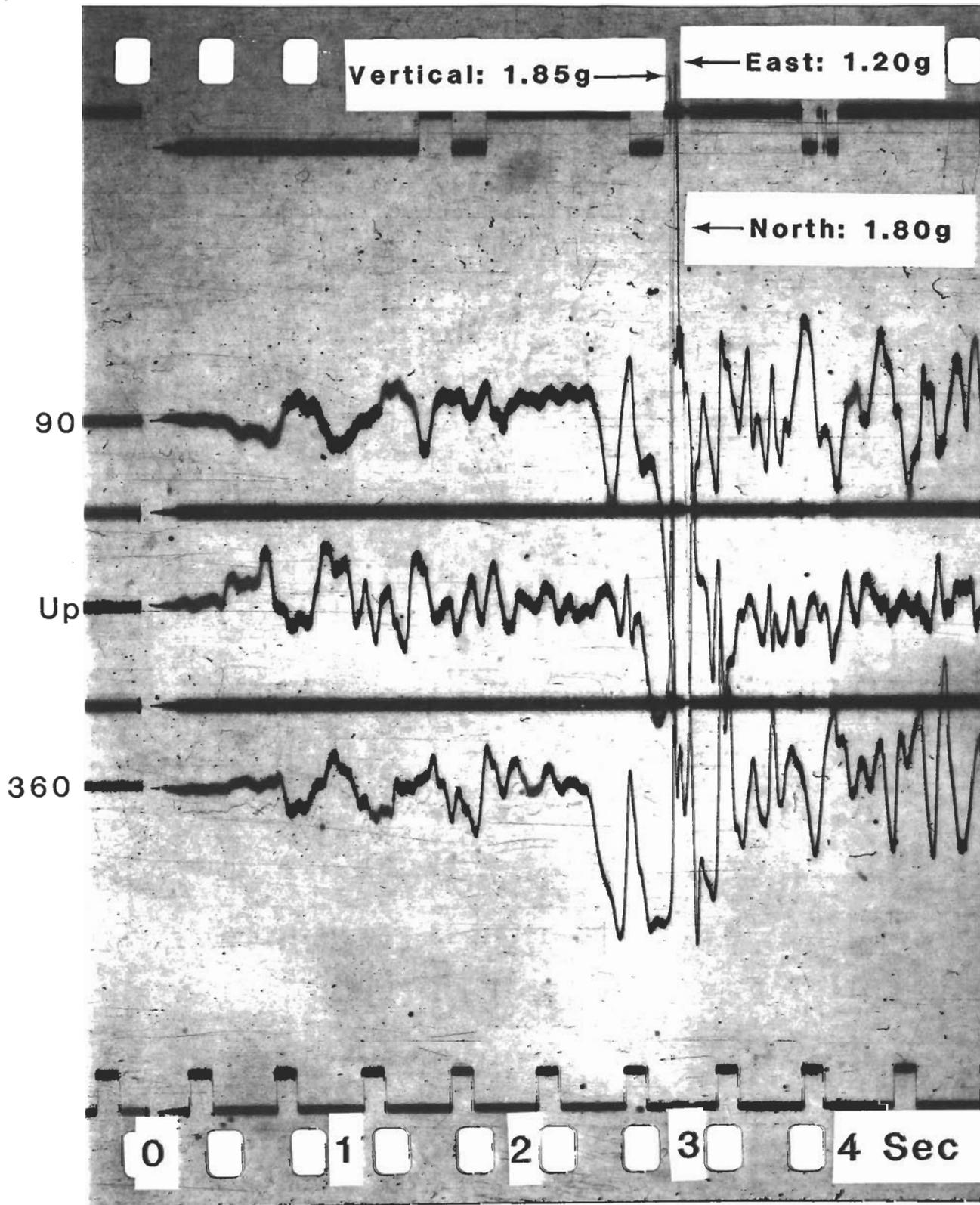
Record 89156-S2597-92118.03

Max.
Accel.



Trigger Time: 18:06:07.7 GMT

0 1 2 3 4 5 10 15 20 Sec.

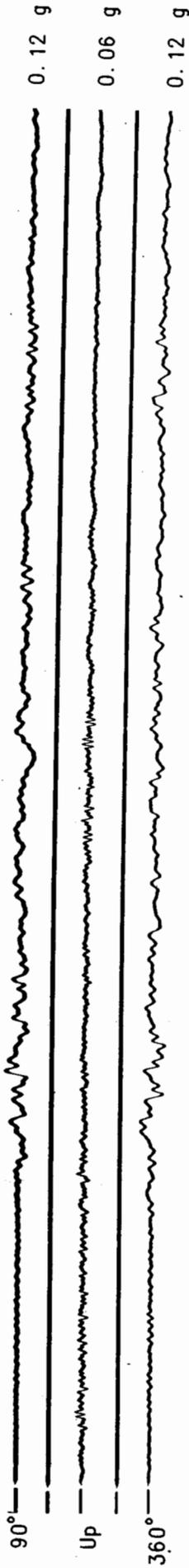


Photographic enlargement of the large amplitude portion of the Cape Mendocino record. For the vertical (middle) trace, the motion of the mass in the accelerometer was limited to 1.85 g by a physical stop in the instrument. Extrapolation of the signal traces yields an estimated peak acceleration of 2.2 g on this channel. For the North (bottom) trace, the excursion of the light beam was limited to 1.80 g by limitations on the optical path, as discussed in the text.

Fortuna - 701 S. Fortuna Blvd.
(CSMIP Station 89486)

Record 89486-S5086-92118.03

Max.
Accel.



Trigger Time: 18:06:12.7 GMT

0 1 2 3 4 5

10

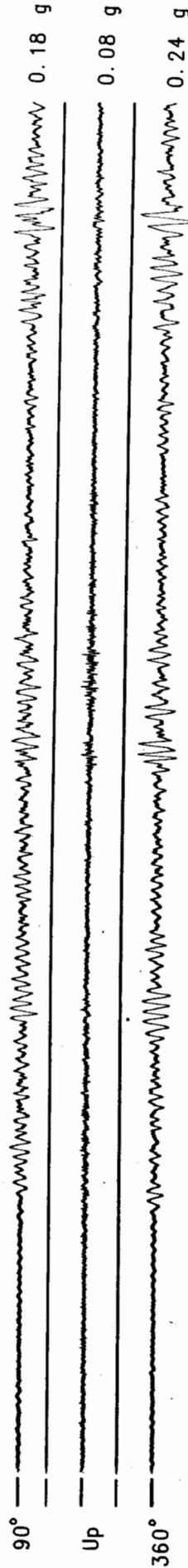
15

20 Sec.

Shelter Cove - Airport
(CSMIP Station 89530)

Record 89530-S1848-92120.03

Max.
Accel.



Trigger Time: 18:06:13.2 GMT

0 1 2 3 4 5

10

15

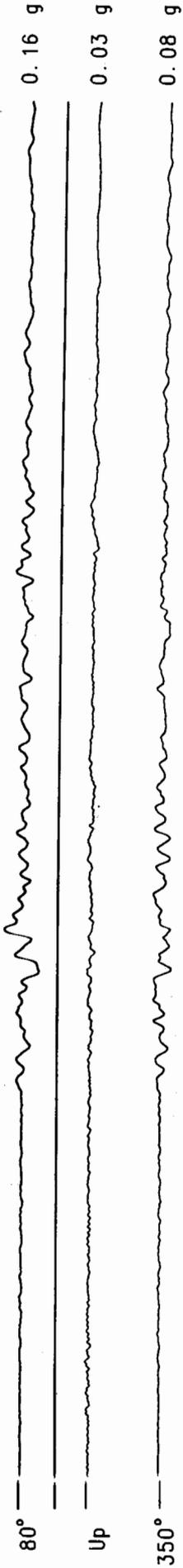
20 Sec.

Mainshock

Eureka - 5th & H Federal Bldg.
(CSMIP Station 89327)

Record 89327-R0437-92121.02

Max.
Accel.

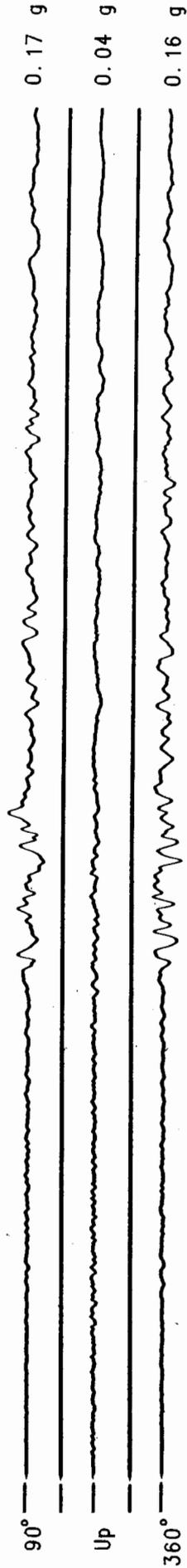
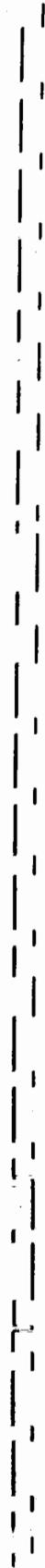


Mainshock

Eureka - Myrtle & West Avenue
(CSMIP Station 89509)

Record 89509-S5088-92118.03

Max.
Accel.



Trigger Time: 18:06:15.7 GMT

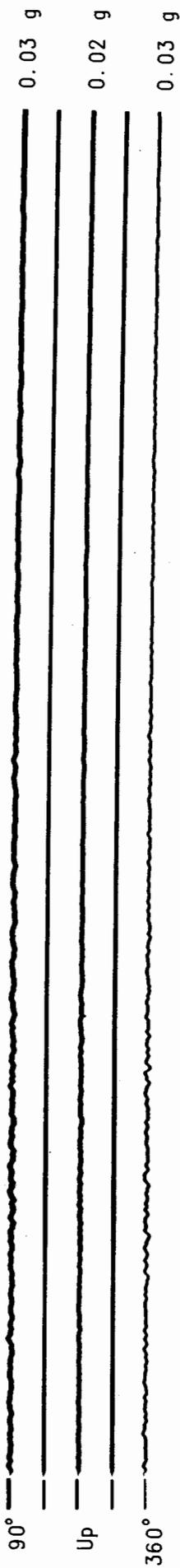


Rockport

(CSMIP Station 79042)

Record 79042-S2508-92120.02

Max.
Accel.



Trigger Time: 18:06:30.7 GMT

0 1 2 3 4 5 10 15 20 Sec.

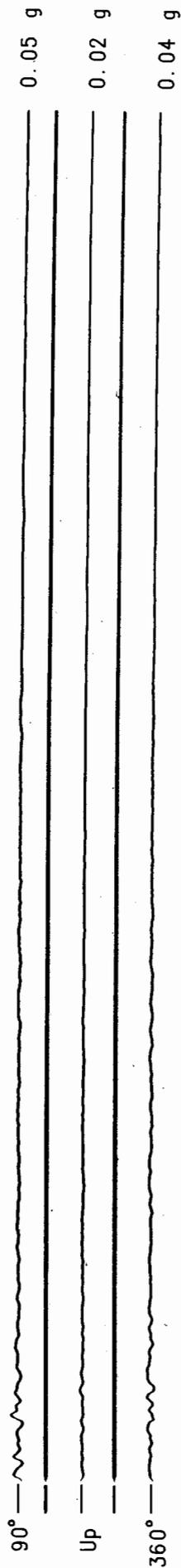
Mainshock

Willow Creek

(CSMIP Station 89146)

Record 89146-S1703-92121.02

Max.
Accel.

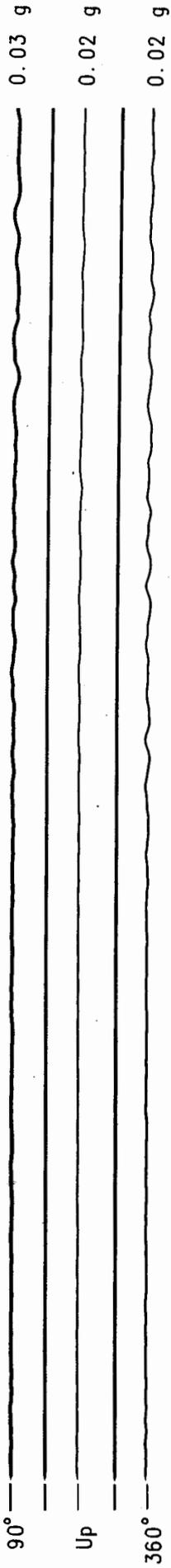


0 1 2 3 4 5 10 15 20 Sec.

Covelo
(CSMIP Station 79036)

Record 79036-S2562-92120.02

Max.
Accel.



Trigger Time: 18:06:30.3 GMT



Fortuna - 1-story Supermarket Building
(CSMIP Station No. 89473)



No. of Stories above/below ground: 1/0
Plan Shape: Rectangular
Base Dimensions: 222' x 202'
Typical Floor Dimensions: Same as base
Design Date: 1979
Construction Date: 1979

Vertical Load Carrying System:

Plywood roof sheetings on wood joists and glu-lam beams supported by steel pipe columns and concrete block walls.

Lateral Force Resisting System:

Plywood roof diaphragm and concrete block shear walls.

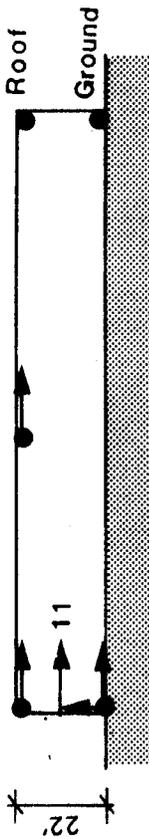
Foundation Type:

Spread footings.

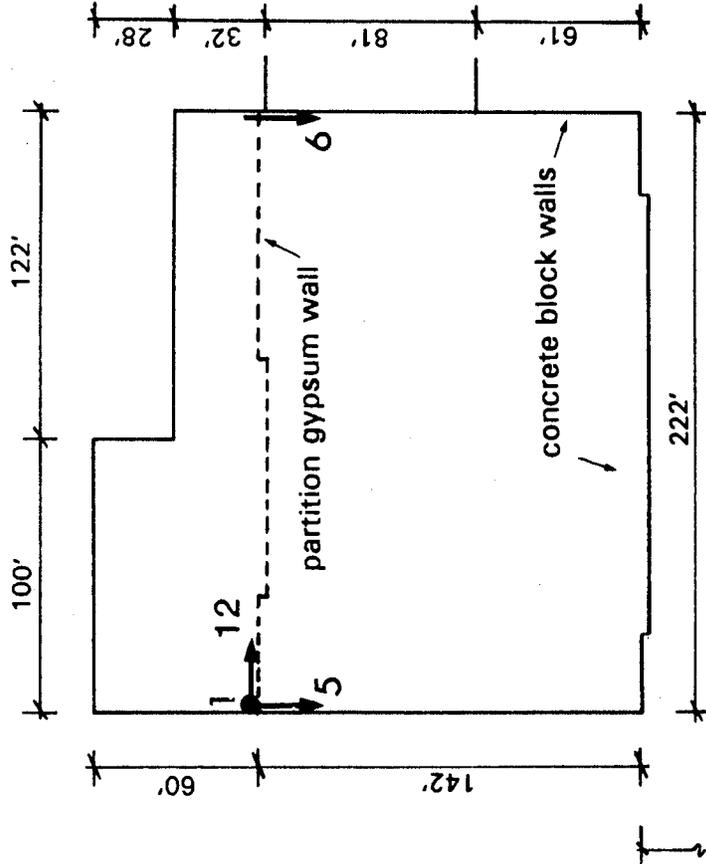
Fortuna - 1-story Supermarket Building

(CSMIP Station No. 89473)

SENSOR LOCATIONS

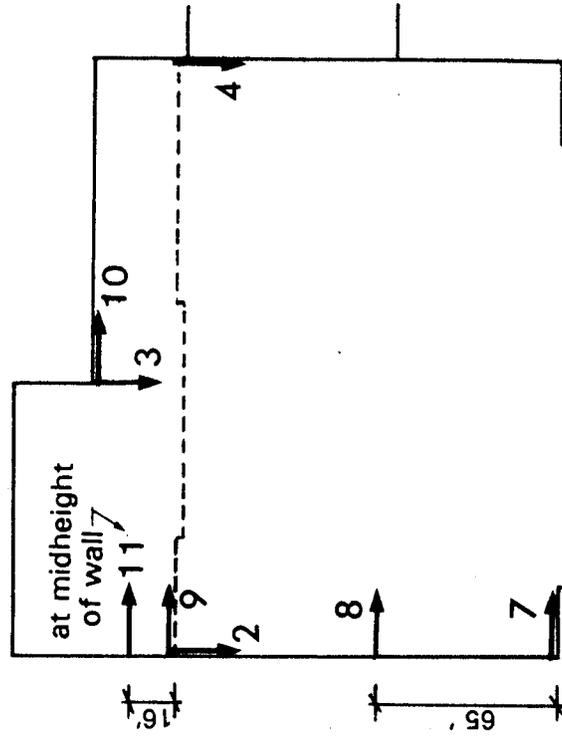


N/S Elevation



Ground Floor Plan

Sensor 3 Mounted on Glu-Lam Beam
Other Sensors Mounted on Walls.



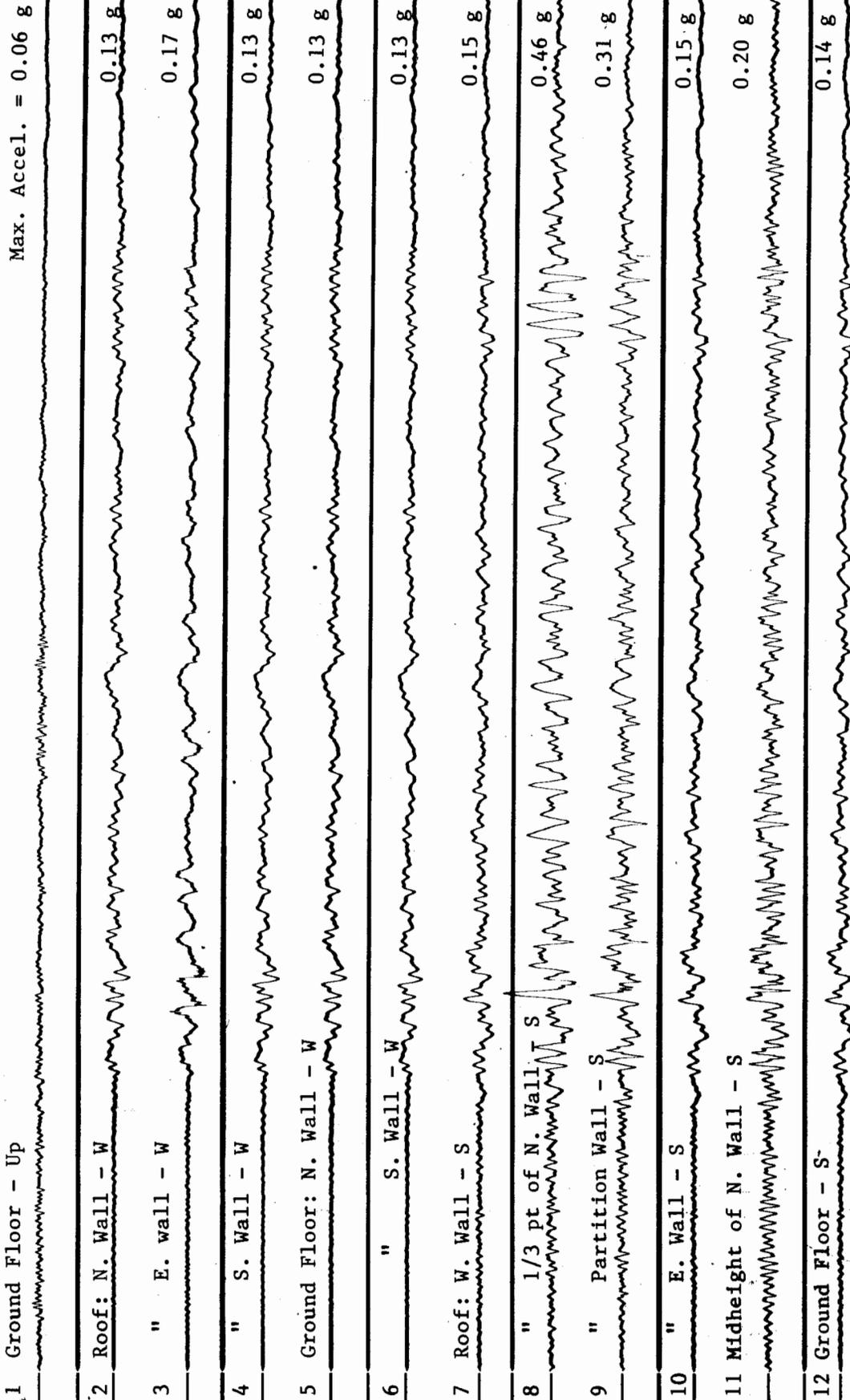
Roof Plan

Structure Reference
Orientation: N = 0°

Fortuna - 1-story Supermarket Bldg.
(CSMIP Station 89473)

Record 89473-C0220-92118.03

Mainshock

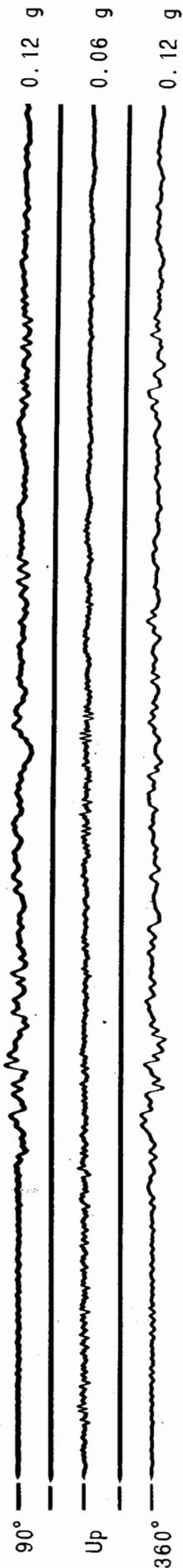


Trigger Time: 18:06:12± GMT Structure Reference Orientation: N=0°

0 1 2 3 4 5 10 15 20 Sec.

Fortuna - 701 S. Fortuna Blvd. (Reference Free Field for Fortuna - 1-story Supermarket Bldg.)
(CSMIP Station 89486) Record 89486-S5086-92118.03

Max.
Accel.



Trigger Time: 18:06:12.7 GMT



Eureka - 5-story Residential Building
(CSMIP Station No. 89494)



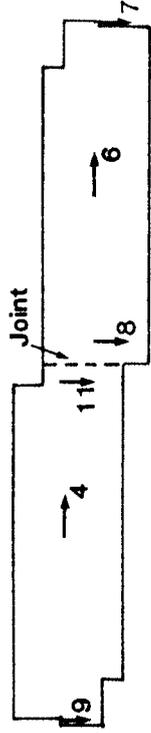
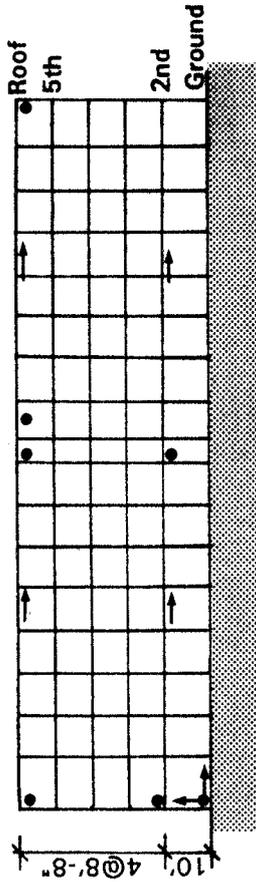
No. of Stories above/below ground: 5/0
Plan Shape: 2 adjoining rectangular bldgs.
Base Dimensions: 55' x 180' each bldg.
Typical Floor Dimensions: Same as base
Design Date: 1979
Construction Date: 1979+

Vertical Load Carrying System:

Concrete slabs on metal decks supported by reinforced concrete block walls.
Lateral Force Resisting System:
Multiple reinforced concrete block shear walls.
Foundation Type:
Continuous spread footings.

Eureka - 5-story Residential Bldg. (CSMIP Station No. 89494)

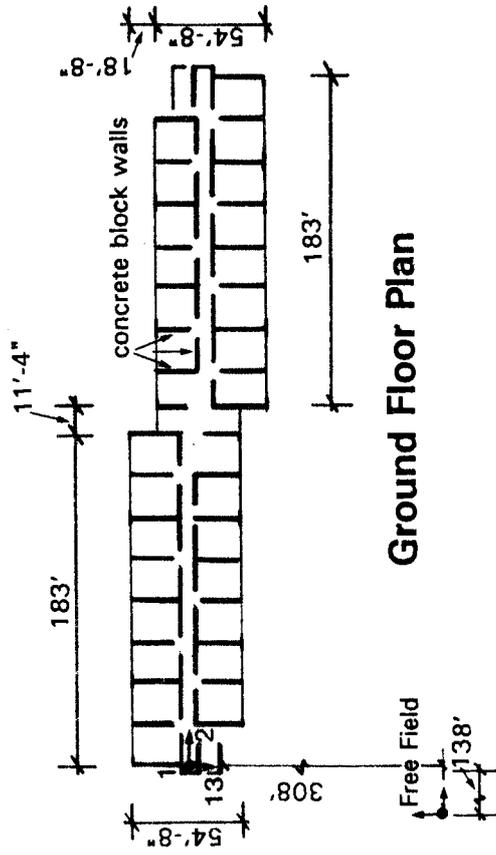
SENSOR LOCATIONS



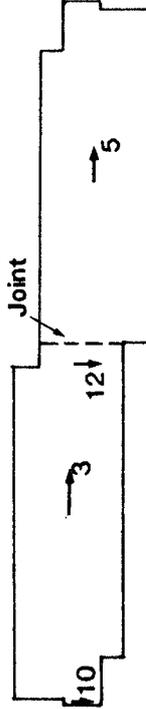
Roof Plan



Structure Reference
Orientation: N = 0°



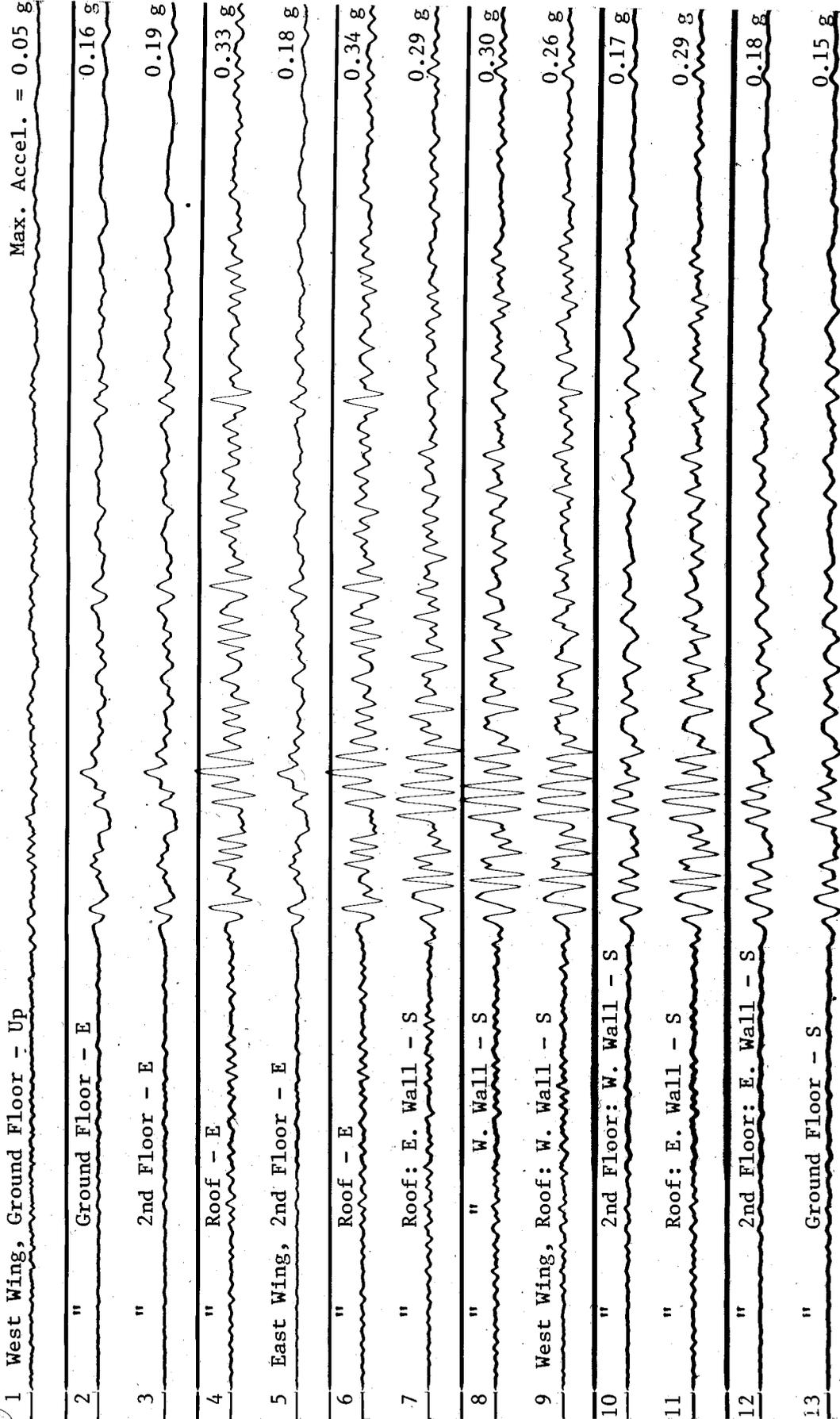
2nd Floor Plan



Eureka - 5-story Residential Bldg.
(CSMIP Station 89494)

Record 89494-C0249-92118.03

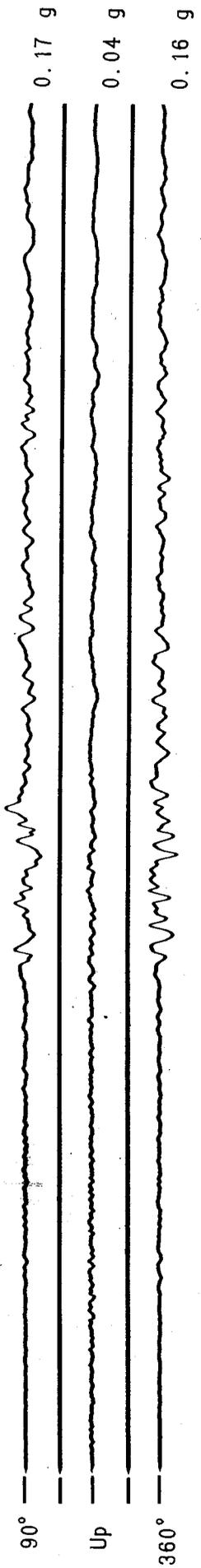
Mainshock



Trigger Time: 18:06:16.2 GMT Structure Reference Orientation N=0°

Eureka - Myrtle & West Avenue (Reference Free Field for Eureka - 5-story Residential Bldg.)
 (CSMIP Station 89509) Record 89509-S5088-92118.03

Max.
Accel.



Trigger Time: 18:06:15.7 GMT



Rio Dell - Hwy 101/Painter Street Overpass
(CSMIP Station No. 89324)



Number of Spans: 2
Length: 265'
Width: 52'
Plan Shape: Skew
Design Date: 1973
Construction Date: 1976

Superstructure Type:

Continuous cast-in-place, prestressed, post-tensioned concrete box girder.

Substructure Type:

One two-column reinforced concrete bent; abutments built on top of fill material.

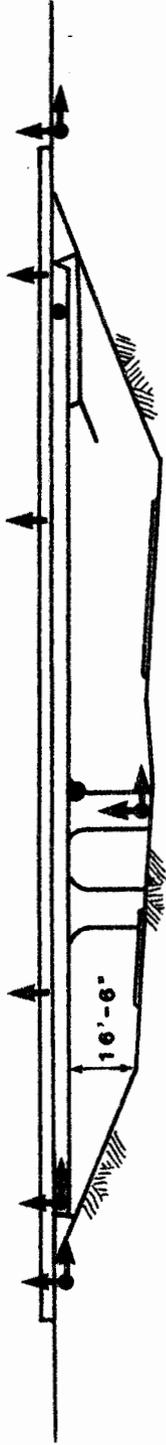
Foundation Type:

Driven concrete friction piles.

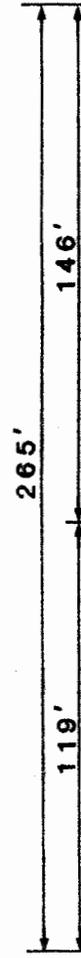
Rio Dell - Hwy 101/Painter Street Overpass

(CSMIP Station No. 89324)

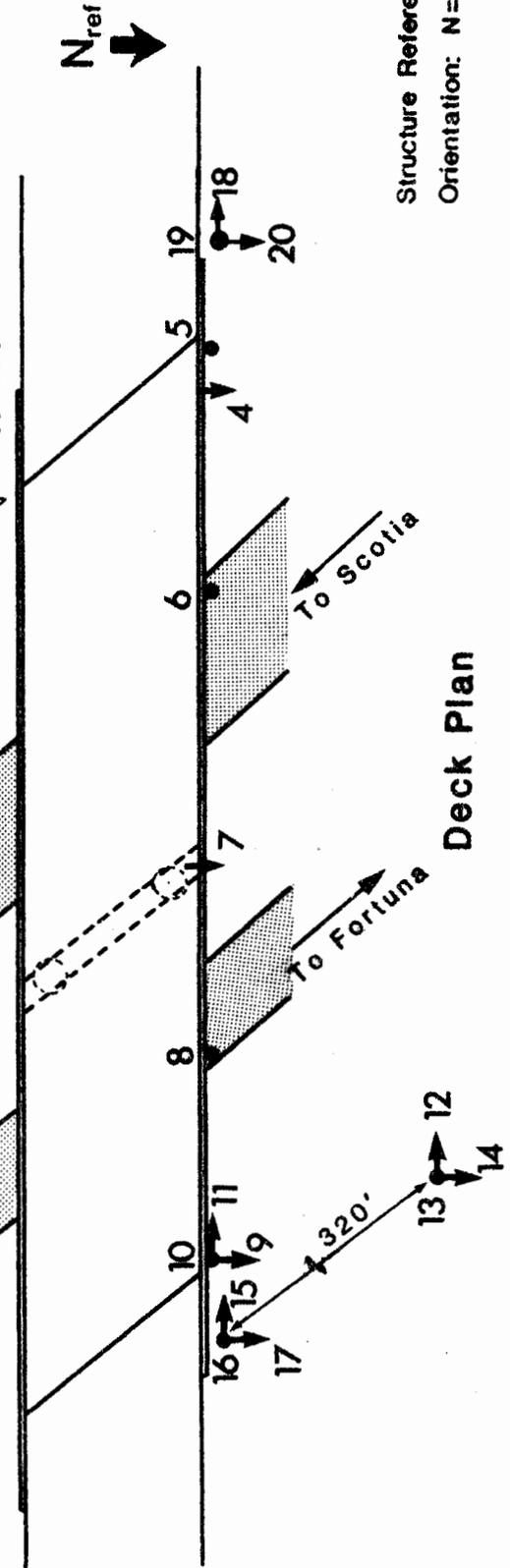
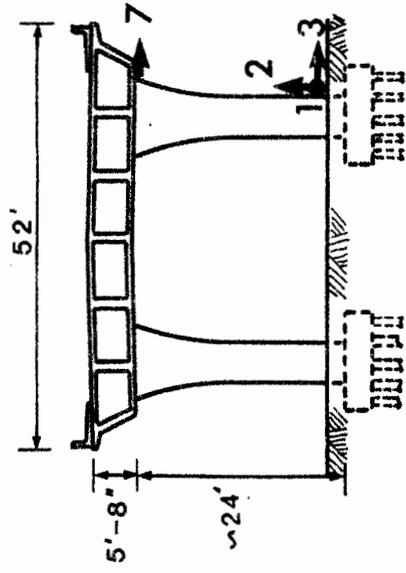
SENSOR LOCATIONS



E/W Elevation



S/N Elevation



Structure Reference
Orientation: N=2°

Rio Dell - Hwy 101/Painter St. Overpass (Sensors 1-8)
(CSMIP Station 89324)

Record 89324-C0161-92118.04

Max. Accel. =

Base of Center Bent - W 0.34 g

" - Up 0.27 g

" - N 0.48 g

Deck, Near West Abutment - N 1.23 g

" - Up 0.18 g

Deck, Center of West Span - Up 0.68 g

Underside of Girder at Center Bent - N 0.92 g

Deck, Center of East Span - Up 0.64 g

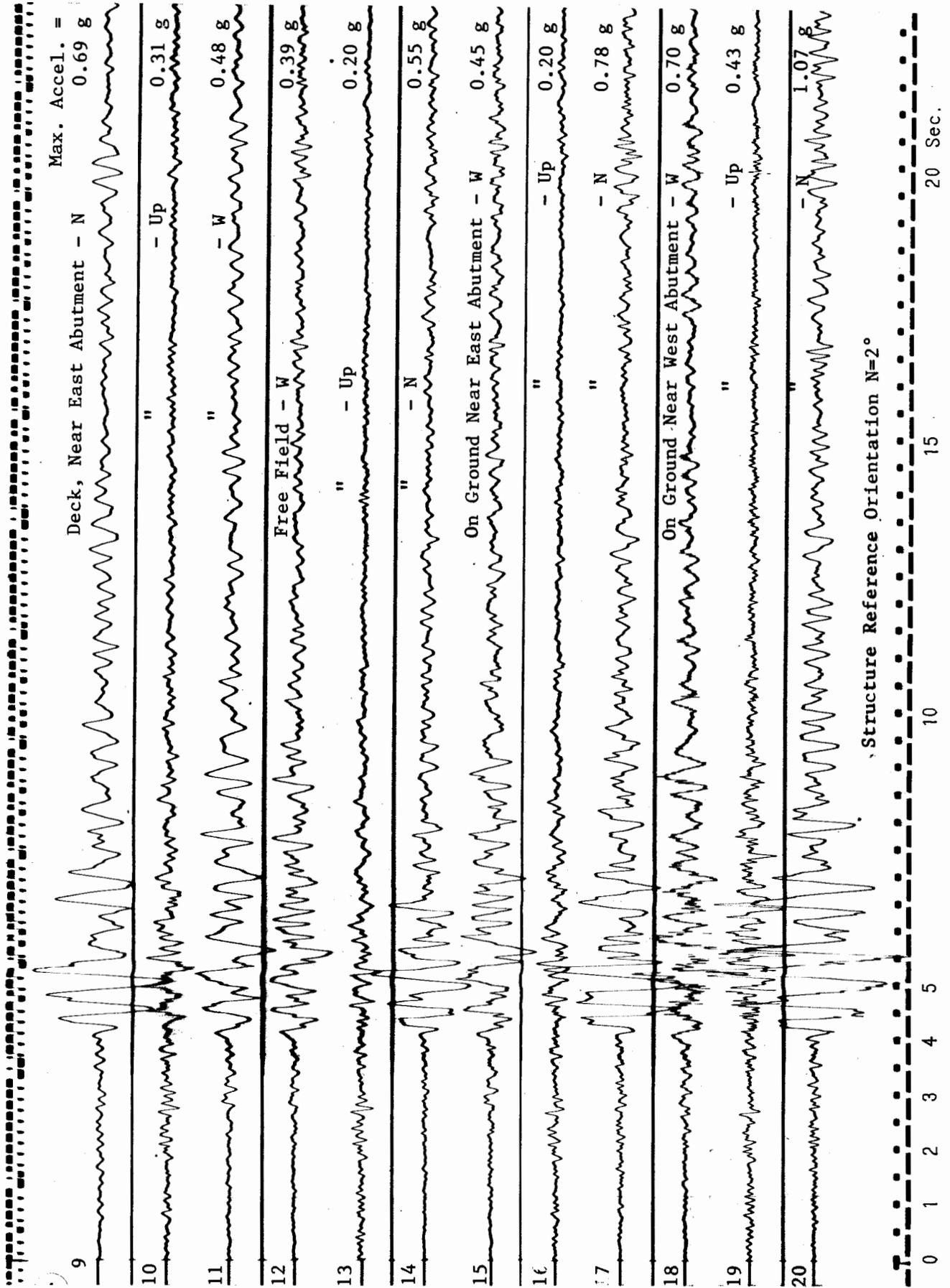
Structure Reference Orientation: N=2°



20 Sec.

Rio Dell - Hwy 101/Painter St. Overpass (Sensors 9-20)
 (CSMIP Station 89324)

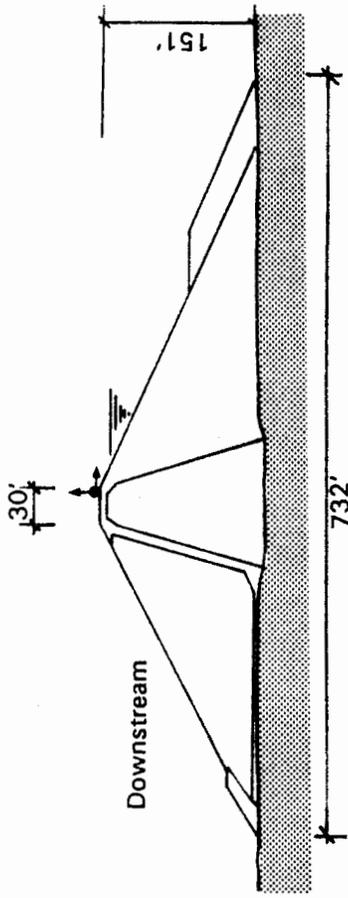
Record 89324-C0138-92118.04



Mainshock

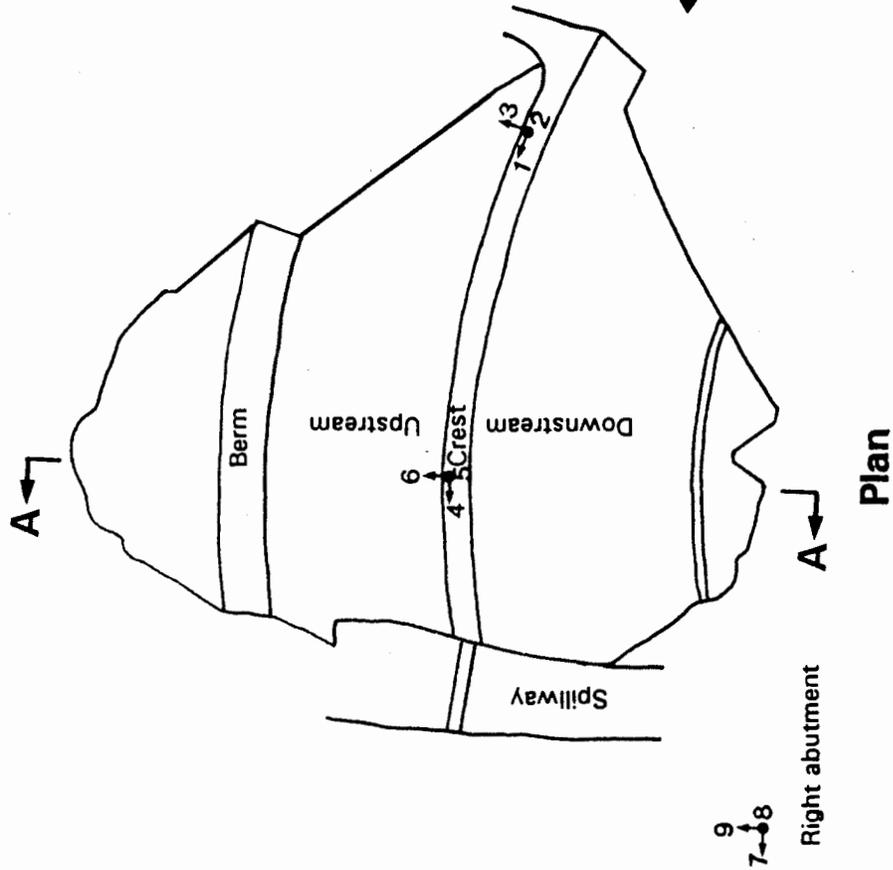
Ruth Lake - Matthews Dam (CSMIP Station No. 89363)

SENSOR LOCATIONS



Section A-A

Earth Dam
Year completed: 1962



9
7-8

Right abutment

Plan

Structure Reference
Orientation: N = 56°

Ruth Lake - Matthews Dam
(CSMIP Station 89363)

Record 89363-C0158-92119.02

1 Left Crest - N+12° Max Accel. = 0.10 g

2 " - Up 0.05 g

3 " - E+12° 0.15 g

4 Center Crest - N 0.13 g

5 " - Up 0.06 g

6 " - E 0.13 g

7 Right Abutment - N 0.03 g

8 " - Up 0.02 g

9 " - E 0.07 g

Trigger Time: 18:06:30.5 GMT Structure Deflection Orientation N=56°

0 1 2 3 4 5 10 15 20 Sec.

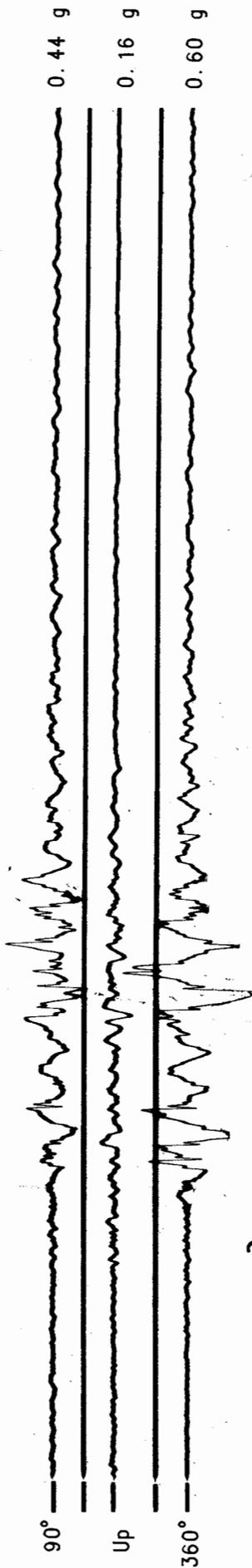
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Petrolia
(CSMIP Station 89156)

Record 89156-S2597-92118.09

Max.
Accel.



Trigger Time: 07:41:46.5 GMT

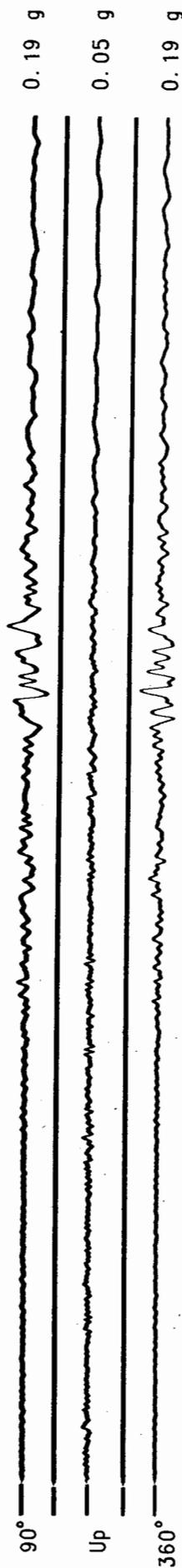
0 1 2 3 4 5

15 20 Sec.

Fortuna - 701 S. Fortuna Blvd.
(CSMIP Station 89486)

Record 89486-S5086-92118.04

Max.
Accel.



Trigger Time: 07:41:48.9 GMT

0 1 2 3 4 5

15 20 Sec.

Eureka - 5th & H Federal Bldg.
(CSMIP Station 89327)

Record 89327-R0437-92121.03

Max.
Accel.



80° ————— 0.05 g

Up ————— 0.03 g

350° ————— 0.06 g



20 Sec.

10

15

5

4

3

2

Eureka - Myrtle & West Avenue
(CSMIP Station 89509)

Record 89509-S5088-92118.04

Max.
Accel.



90° ————— 0.06 g

Up ————— 0.01 g

360° ————— 0.07 g

Trigger Time: 07:41:54.3 GMT



20 Sec.

10

15

5

4

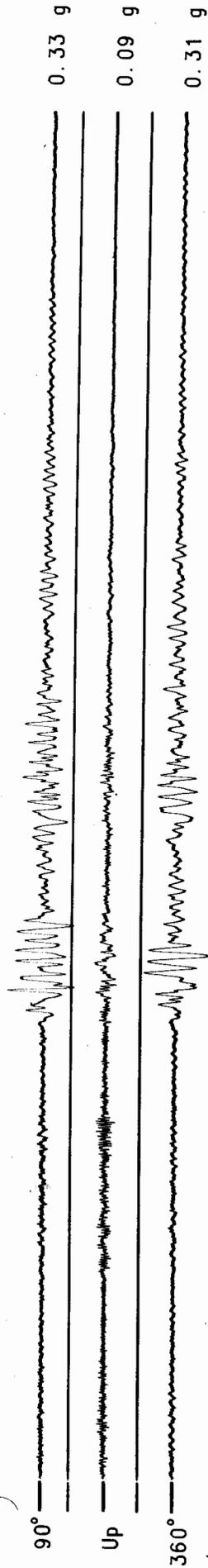
3

2

Shelter Cove - Airport
(CSMIP Station 89530)

Record 89530-S1848-92120.05

Max.
Accel.



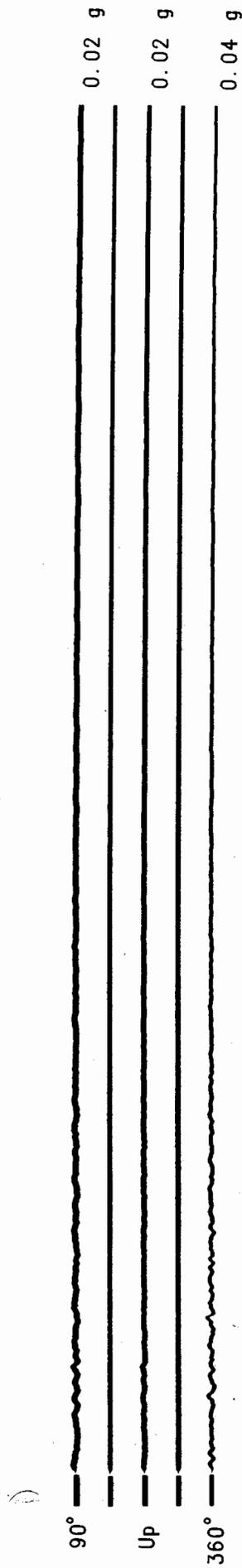
Trigger Time: 07:41:51.3 GMT

Aftershock No. 1

Rockport
(CSMIP Station 79042)

Record 79042-S2506-92120.03

Max.
Accel.



Trigger Time: 07:42:11.1 GMT

Covelo
(CSMIP Station 79036)

Record 79036-S2562-92120.03

Max.
Accel.

0.03 g

0.02 g

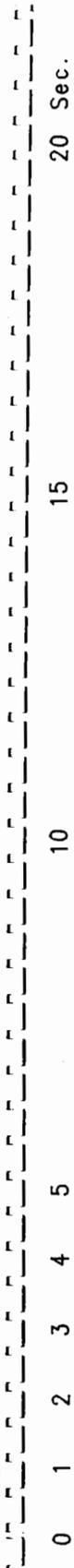
0.03 g

90°

Up

360°

Trigger Time: 07:42:29.4 GMT

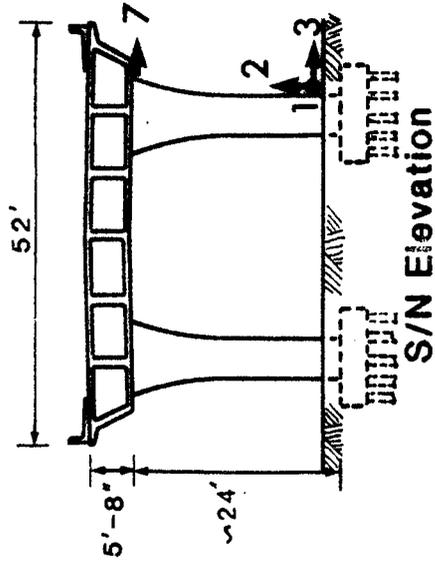
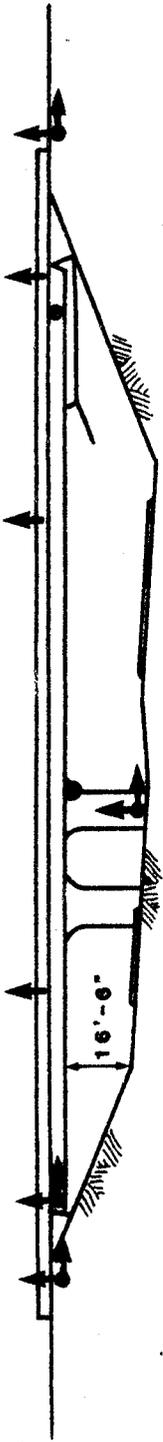


20 Sec.

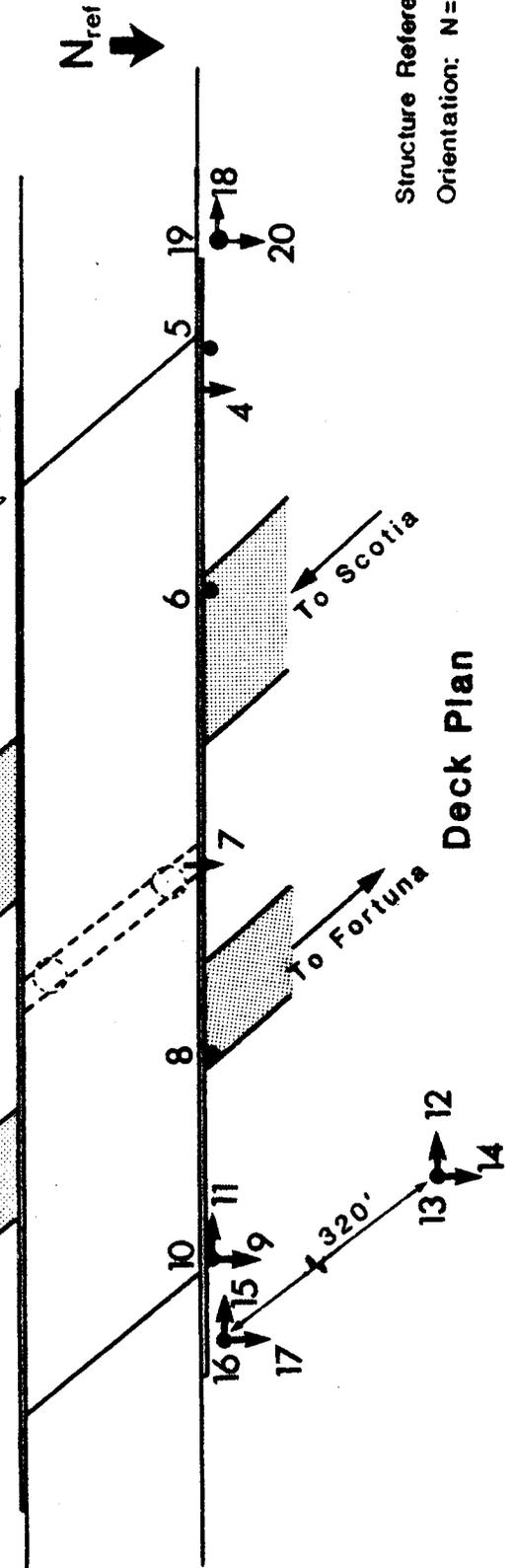
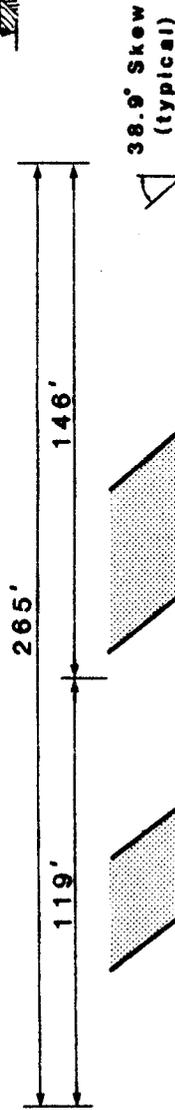
Rio Dell - Hwy 101/Painter Street Overpass

(CSMIP Station No. 89324)

SENSOR LOCATIONS



E/W Elevation



Structure Reference
Orientation: N=2°

Rio Dell - Hwy 101/Painter St. Overpass (Sensors 1-8)
(CSMIP Station 89324)

Record 89324-C0161-92118.07

Max Accel. =

Base of Center Bent - W 0.26 g

" - Up 0.09 g

" - N 0.39 g

Deck, Near West Abutment - N 0.80 g

" - Up 0.11 g

Deck, Center of West Span - Up 0.53 g

Underside of Girder at Center Bent - N 0.63 g

Deck, Center of East Span - Up 0.45 g

Structure Reference Orientation: N=2°

20 Sec.

15

10

5

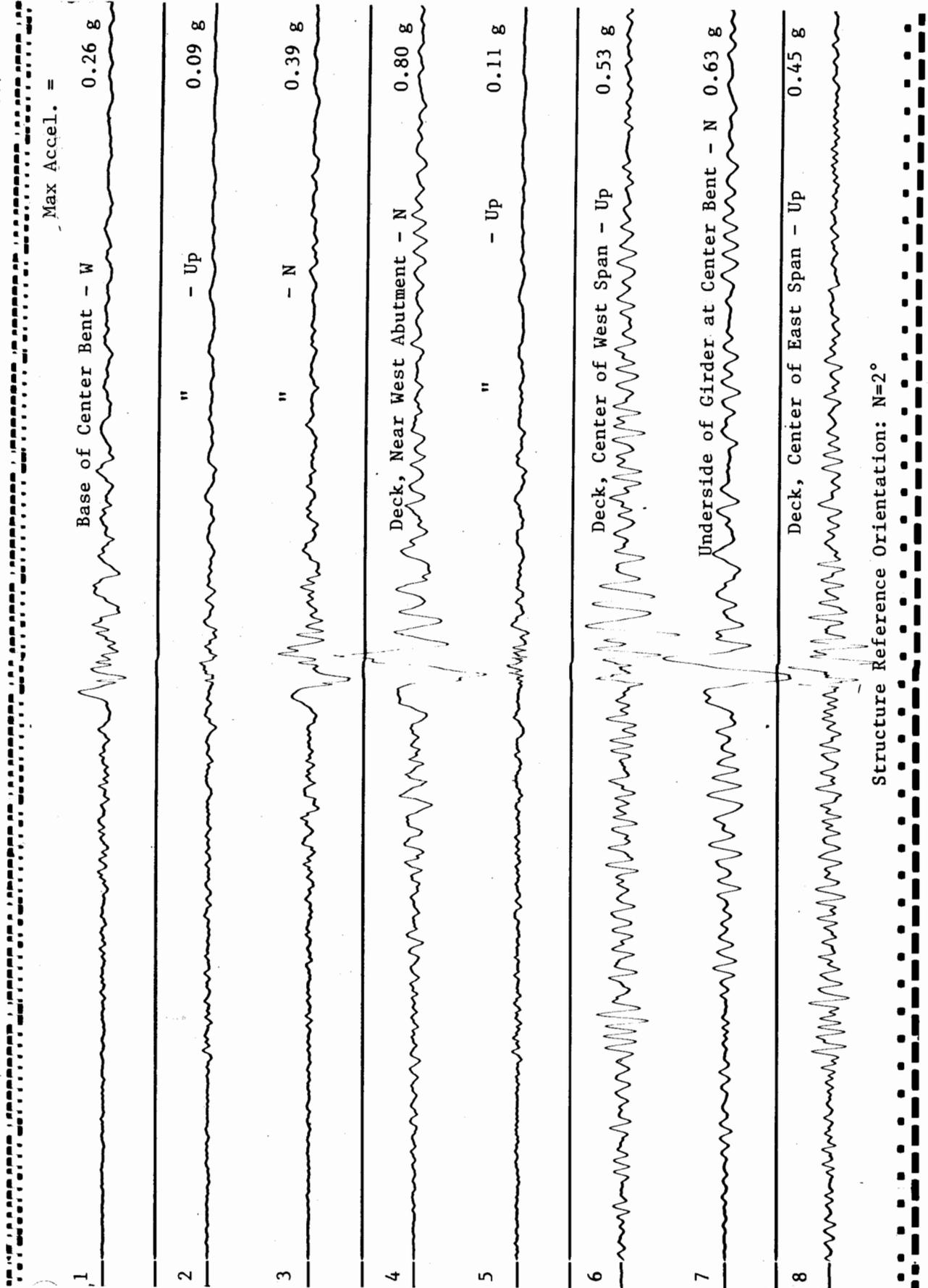
4

3

2

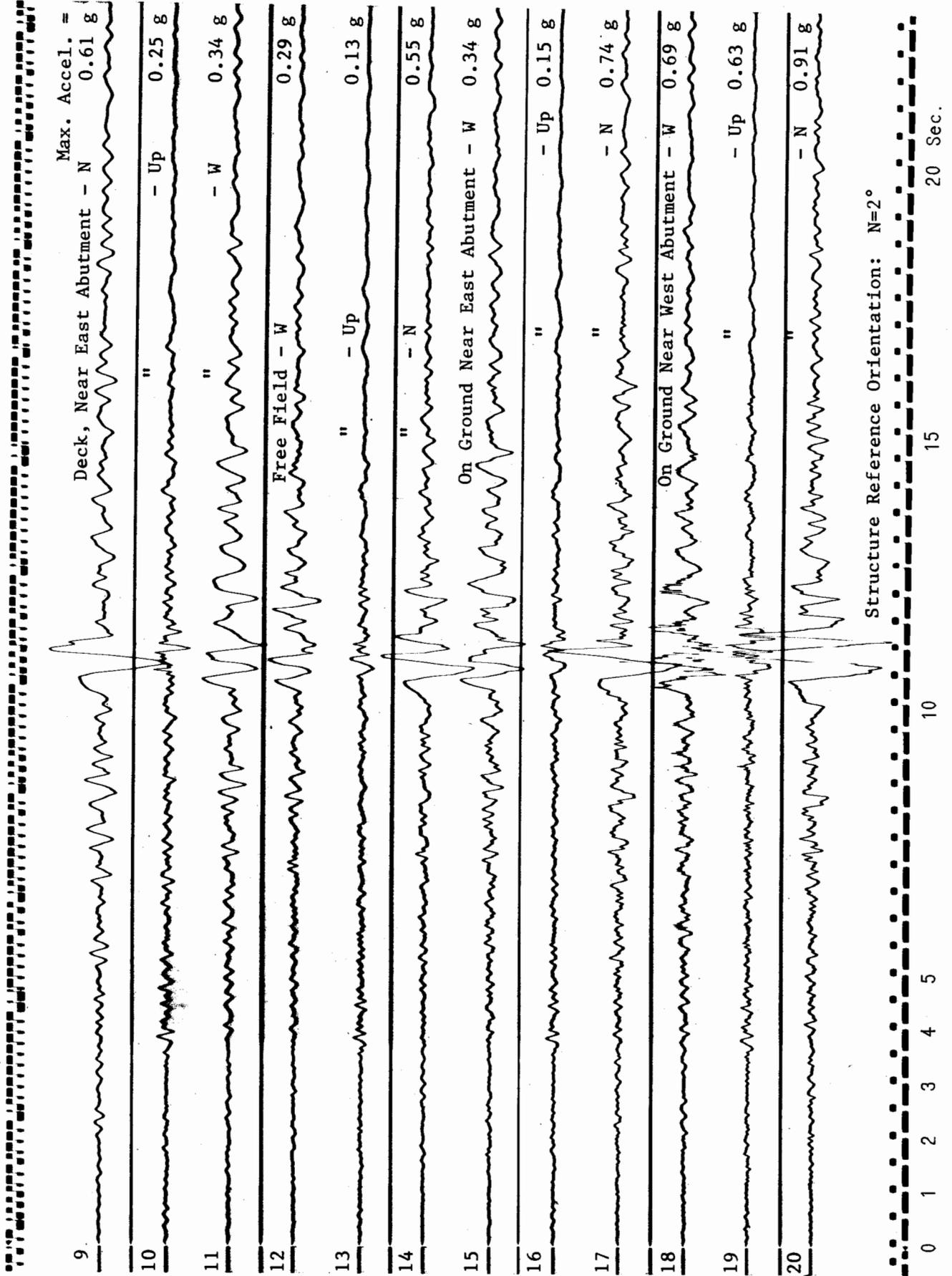
1

0



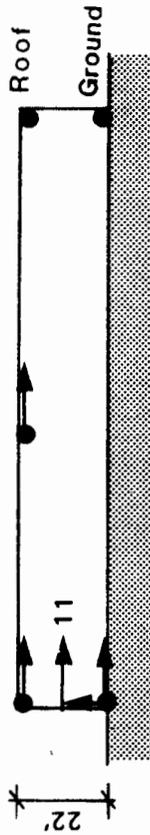
Rio Dell - Hwy 101/Painter St. Overpass (Sensors 9-20)
 (CSMIP Station 89324)

Record 89324-C0138-92118.07



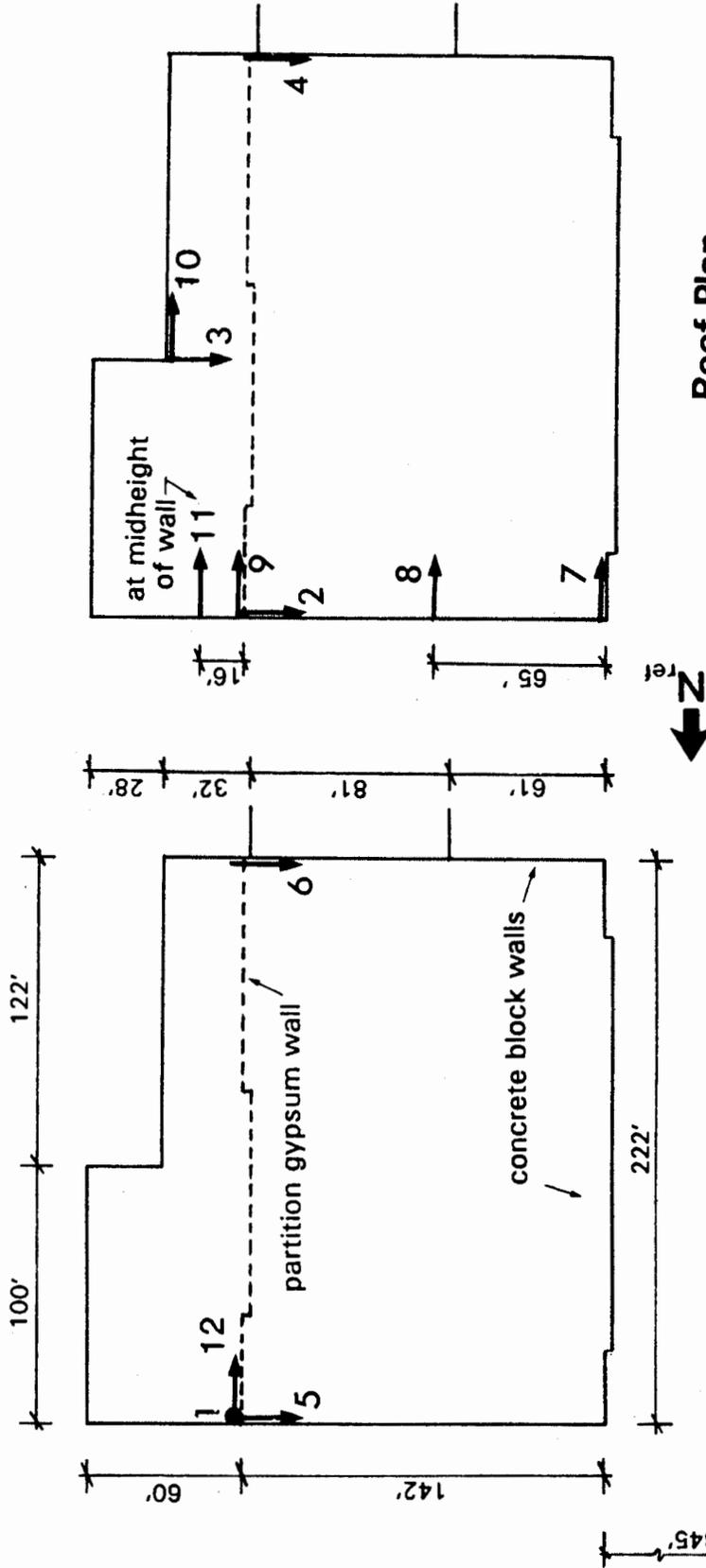
Fortuna - 1-story Supermarket Building (CSMIP Station No. 89473)

SENSOR LOCATIONS



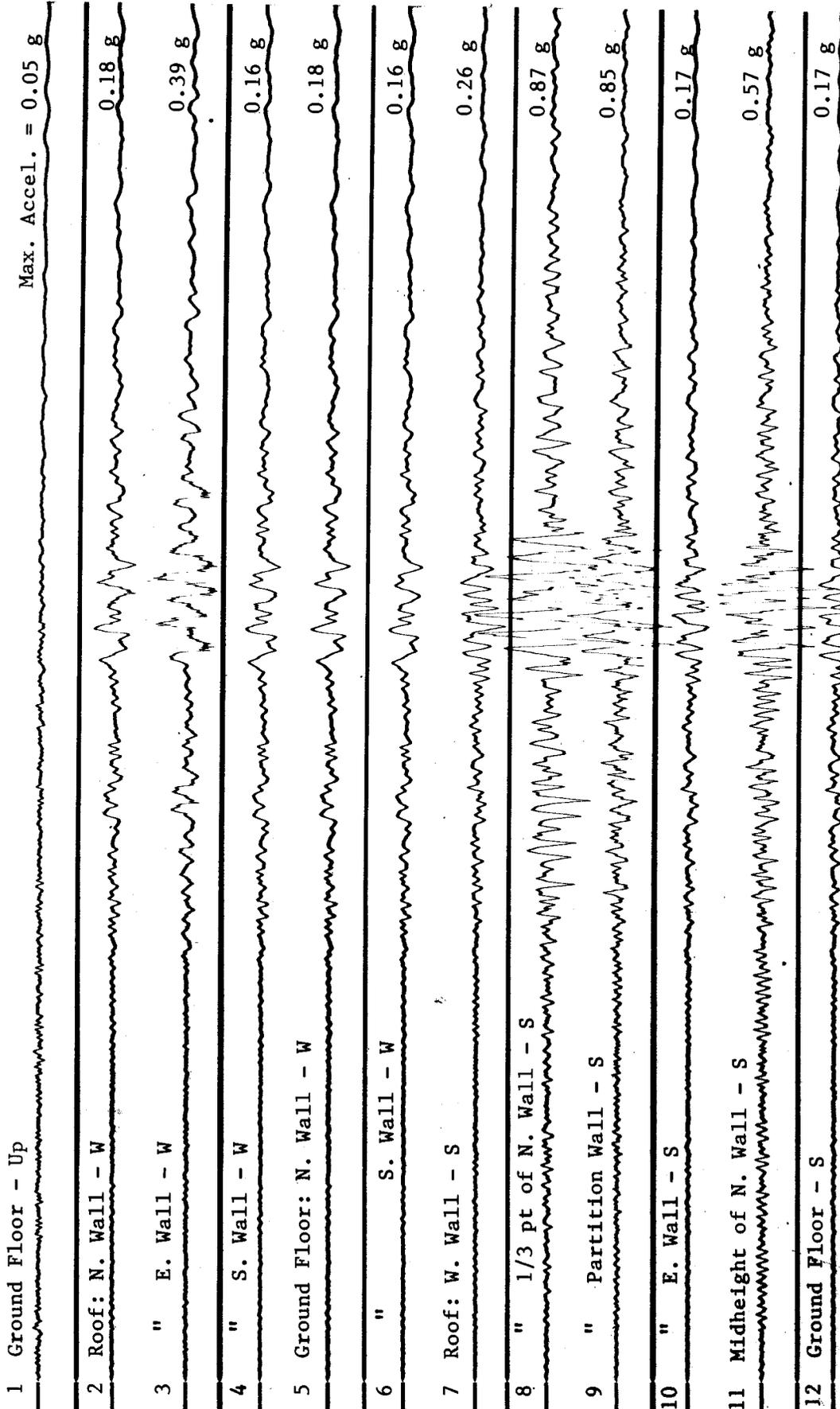
N/S Elevation

Sensor 3 Mounted on Glu-Lam Beam
Other Sensors Mounted on Walls.



Fortuna - 1-story Supermarket Bldg.
(CSMIP Station 89473)

Reference freefield record for this building is shown on pg. 41.
Record 89473-C0220-92118.04



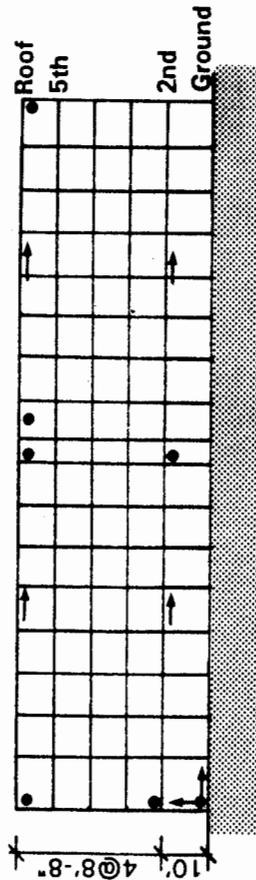
Trigger Time: 07:41:48± GMT

Structure Reference Orientation: N=0°

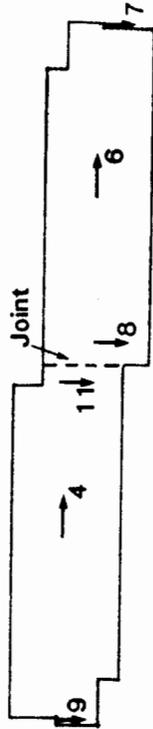
0 1 2 3 4 5 10 15 20 Sec.

Eureka - 5-story Residential Bldg.
 (CSMIP Station No. 89494)

SENSOR LOCATIONS

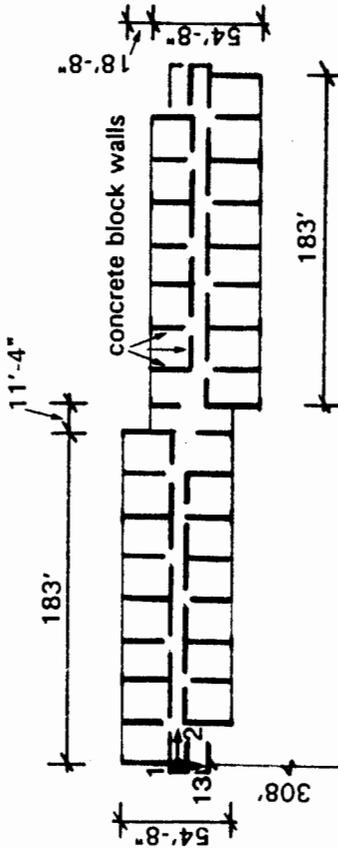


W/E Elevation

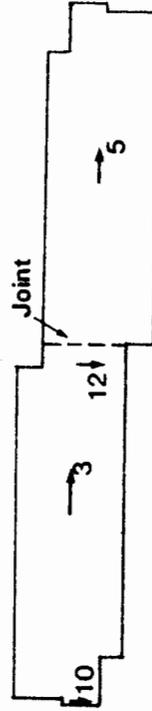


Roof Plan

Structure Reference
 N_{ref} Orientation: $N = 0^\circ$



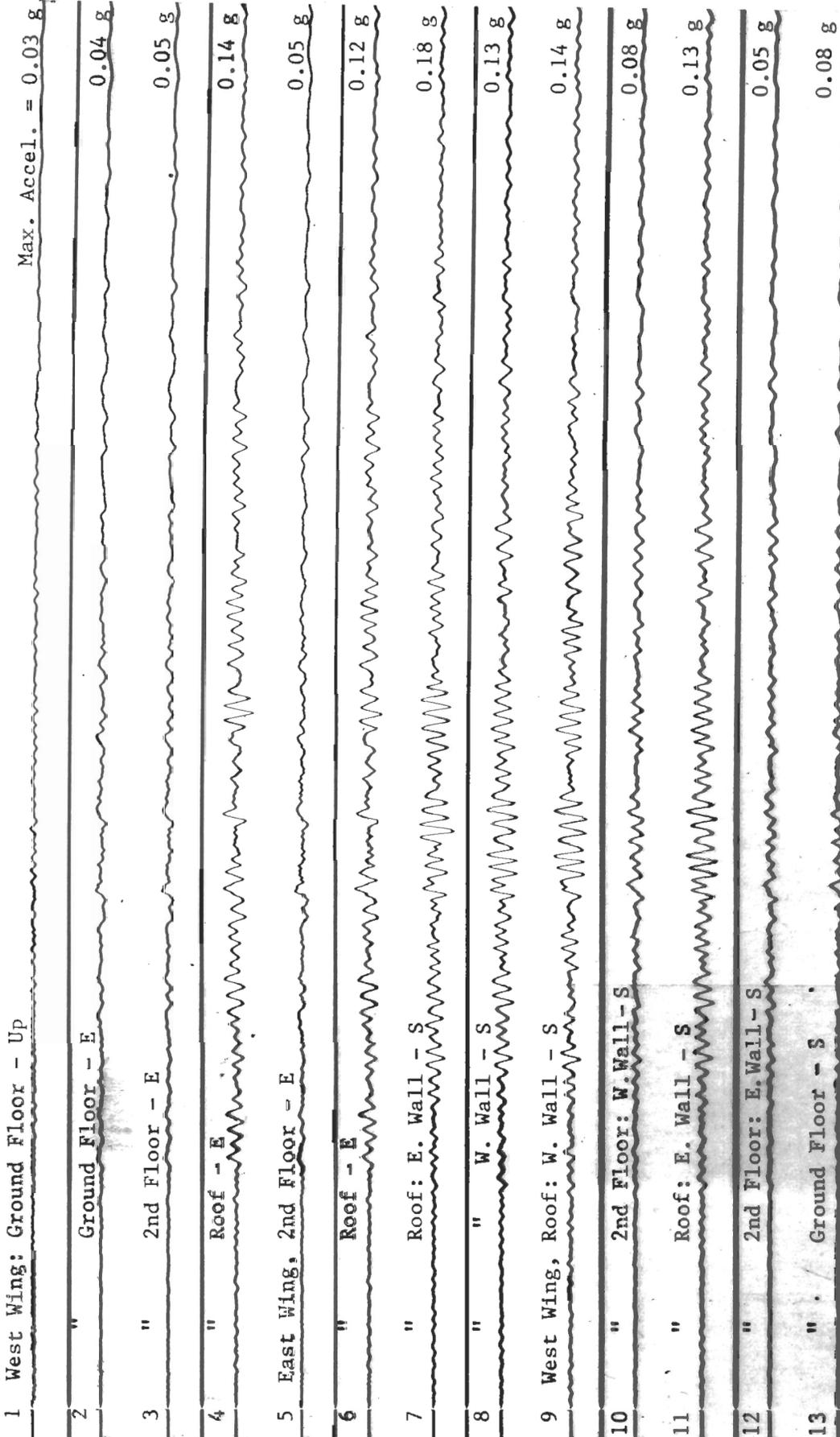
Ground Floor Plan



2nd Floor Plan

Eureka - 5-story Residential Bldg.
(CSMIP Station 89494)

Reference freefield record for this building is shown
on p. 42 (Myrtle & West station). Record 89494-C0249-92118.05



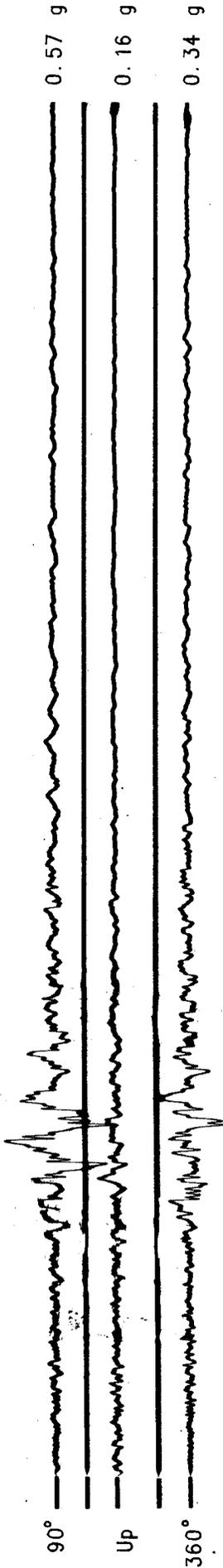
INDEX TO PETROLIA AFTERSHOCK NO. 2 RECORDS

<u>Ground-Response Stations:</u>	<u>Page</u>
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Fortuna - 701 S. Fortuna Blvd.	55
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Eureka - Myrtle & West Avenue	56
Shelter Cove - Airport	57
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Fort Bragg	58
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 <u>Lifeline Structure:</u>	
Rio Dell - Hwy 101/Painter St. Overpass	59
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Fortuna - 1-story Supermarket Bldg.	62
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Petrolia
(CSMIP Station 89156)

Record 89156-S2597-92118.10

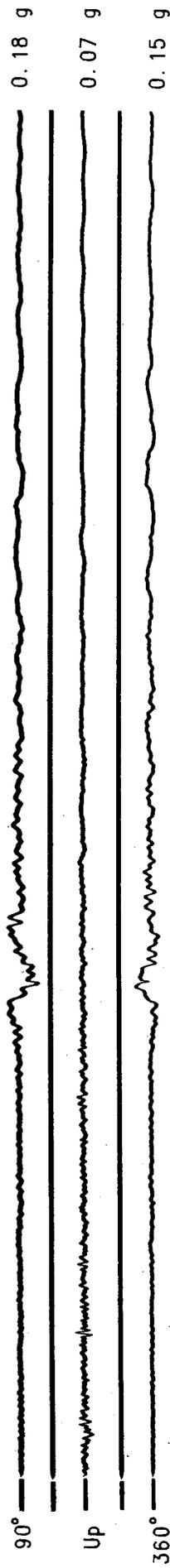
Max.
Accel.



Fortuna - 701 S. Fortuna Blvd.
(CSMIP Station 89486)

Record 89486-S5086-92118.05

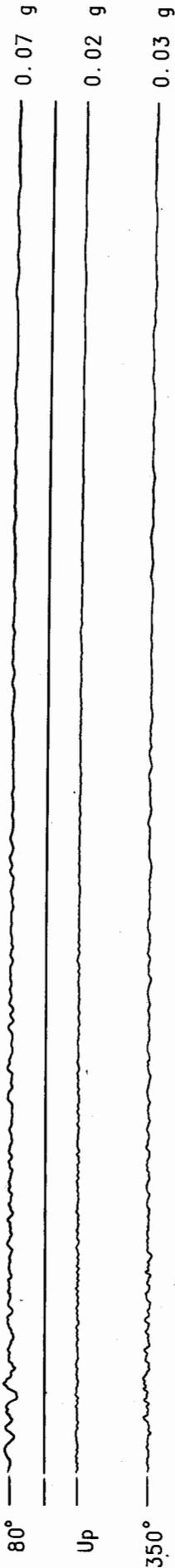
Max.
Accel.



Trigger Time: 11:18:35± GMT

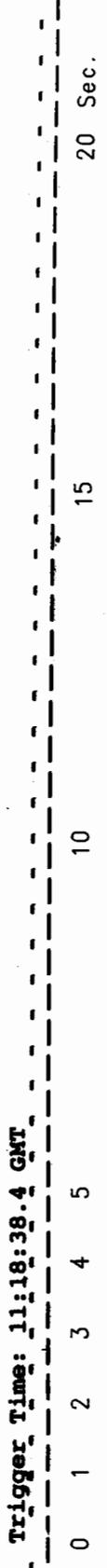
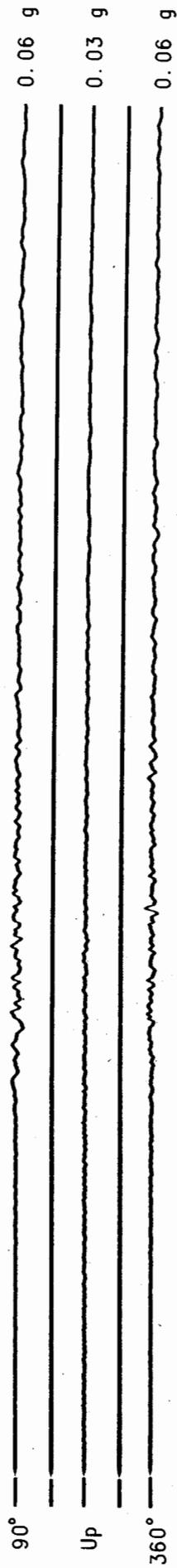
Eureka - 5th & H Federal Bldg.
(CSMIP Station 89327)

Record 89327-R0437-92121.04



Eureka - Myrtle & West Avenue
(CSMIP Station 89509)

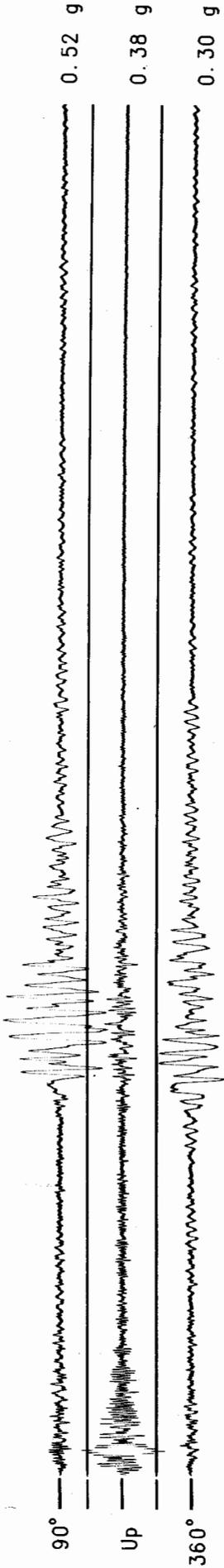
Record 89509-S5088-92118.05



Shelter Cove - Airport
(CSMIP Station 89530)

Record 89530-S1848-92120.06

Max.
Accel.



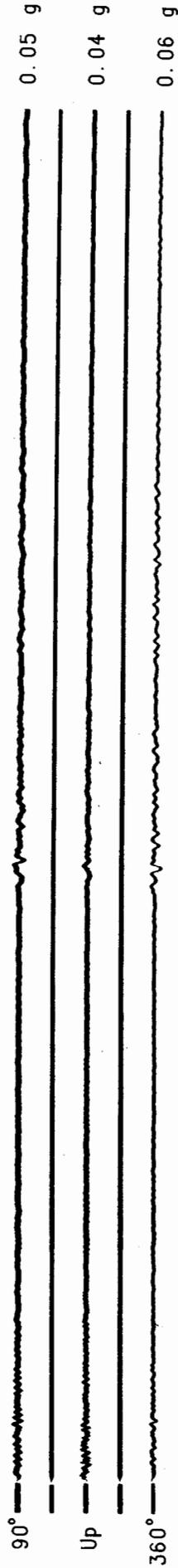
Trigger Time: 11:18:36.7 GMT

0 1 2 3 4 5 10 15 20 Sec.

Rockport
(CSMIP Station 79042)

Record 79042-S2506-92120.04

Max.
Accel.



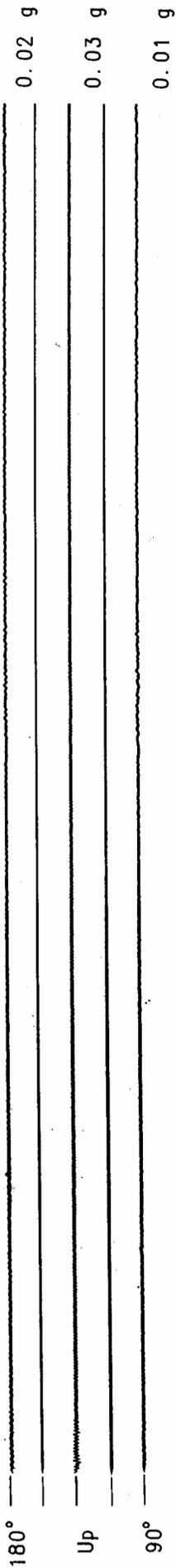
Trigger Time: 11:18:42.1 GMT

0 1 2 3 4 5 10 15 20 Sec.

Fort Bragg
(CSMIP Station 79016)

Record 79016-S4828-92122.02

Max.
Accel.



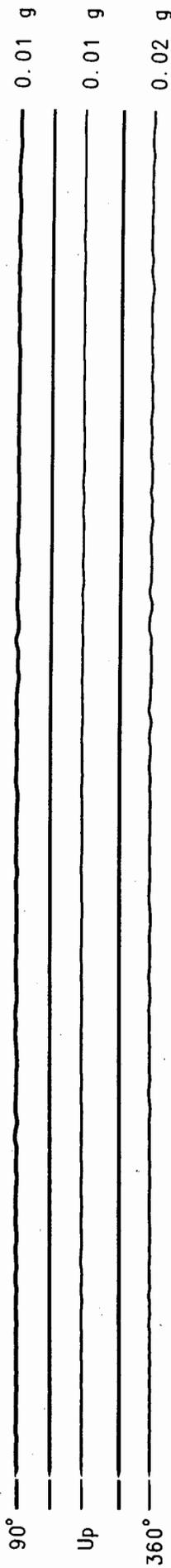
Trigger Time: 11:18:45.4 GMT

0 1 2 3 4 5 10 15 20 Sec.

Covelo
(CSMIP Station 79036)

Record 79036-S2562-92120.04

Max.
Accel.



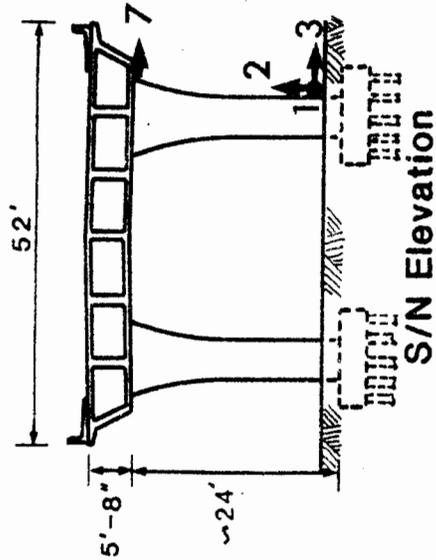
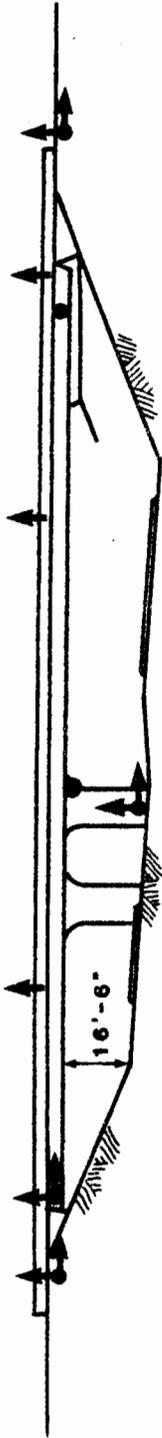
Trigger Time: 11:18:49.8 GMT

0 1 2 3 4 5 10 15 20 Sec.

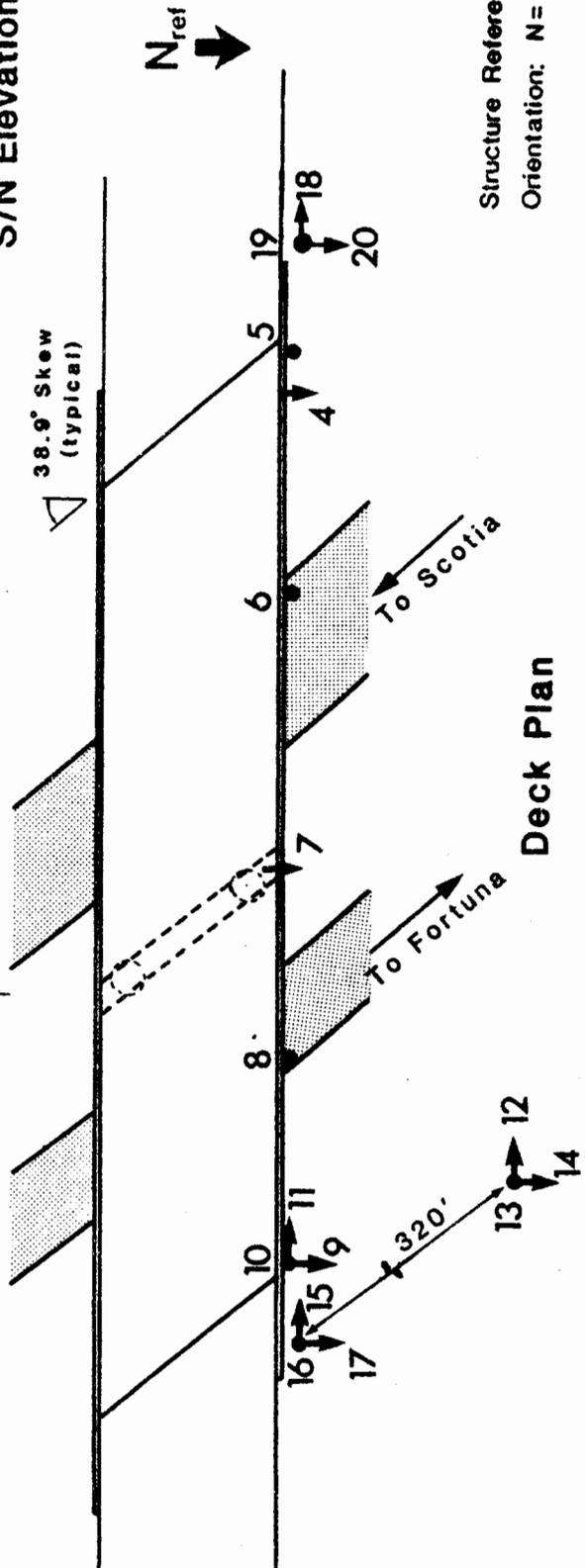
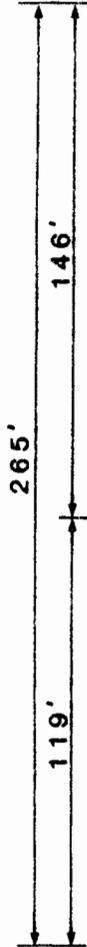
Rio Dell - Hwy 101/Painter Street Overpass

(CSMIP Station No. 89324)

SENSOR LOCATIONS



E/W Elevation



Structure Reference
Orientation: N = 20°

Deck Plan

Rio Dell - Hwy 101/Painter St. Overpass (Sensors 1-8)
(CSMIP Station 89324)

Record 89324-C0161-92118.08



Max. Accel. =



Structure Reference Orientation: N=2°



20 Sec.

10

15

5

4

3

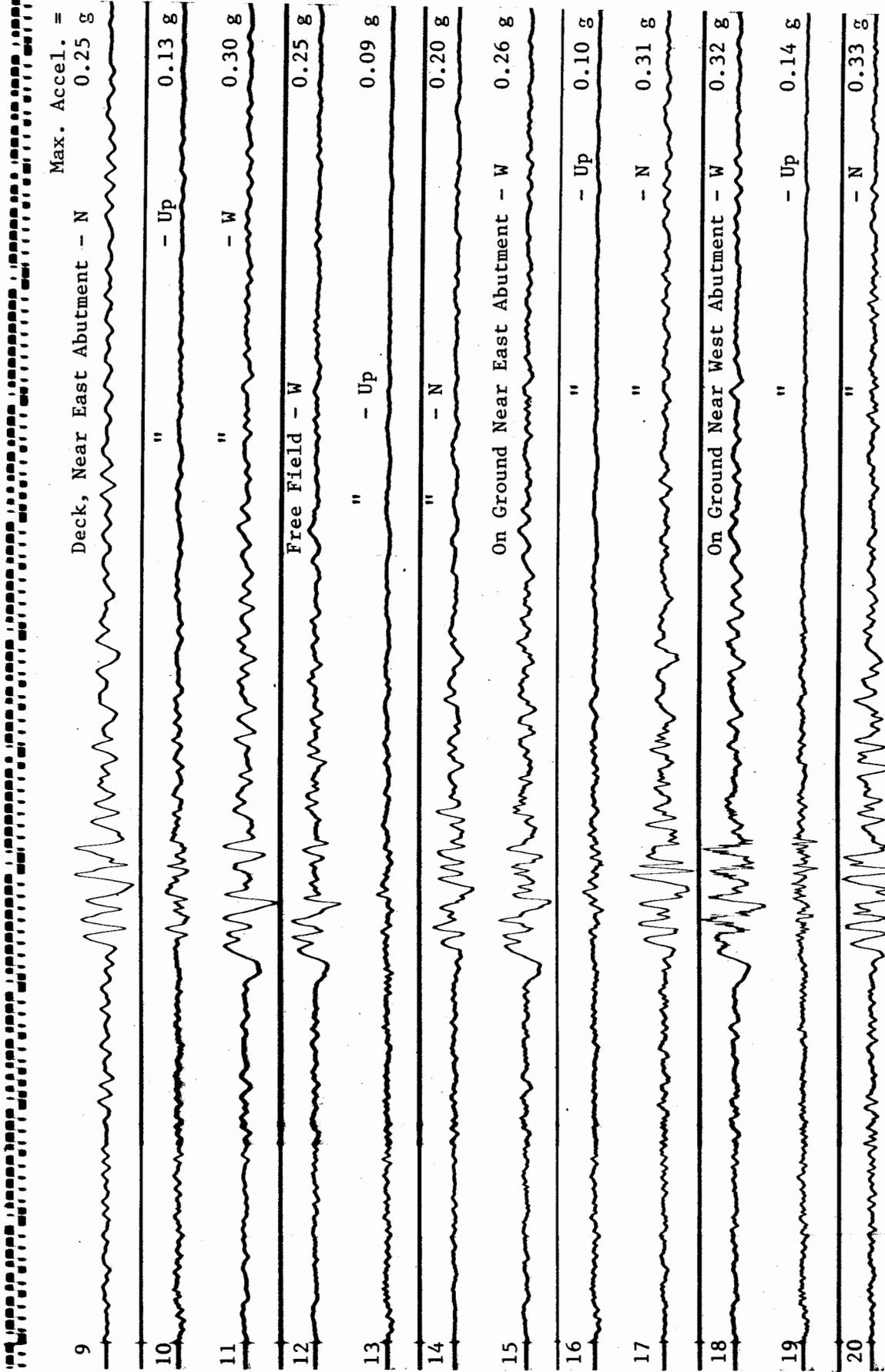
2

1

0

Rio Dell - Hwy 101/Painter St. Overpass (Sensors 9-20)
(CSMIP Station 89324)

Record 89324-C0138-92118.08

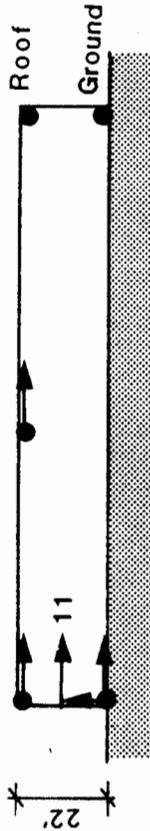


Structure Reference Orientation: N=2°

20 Sec.

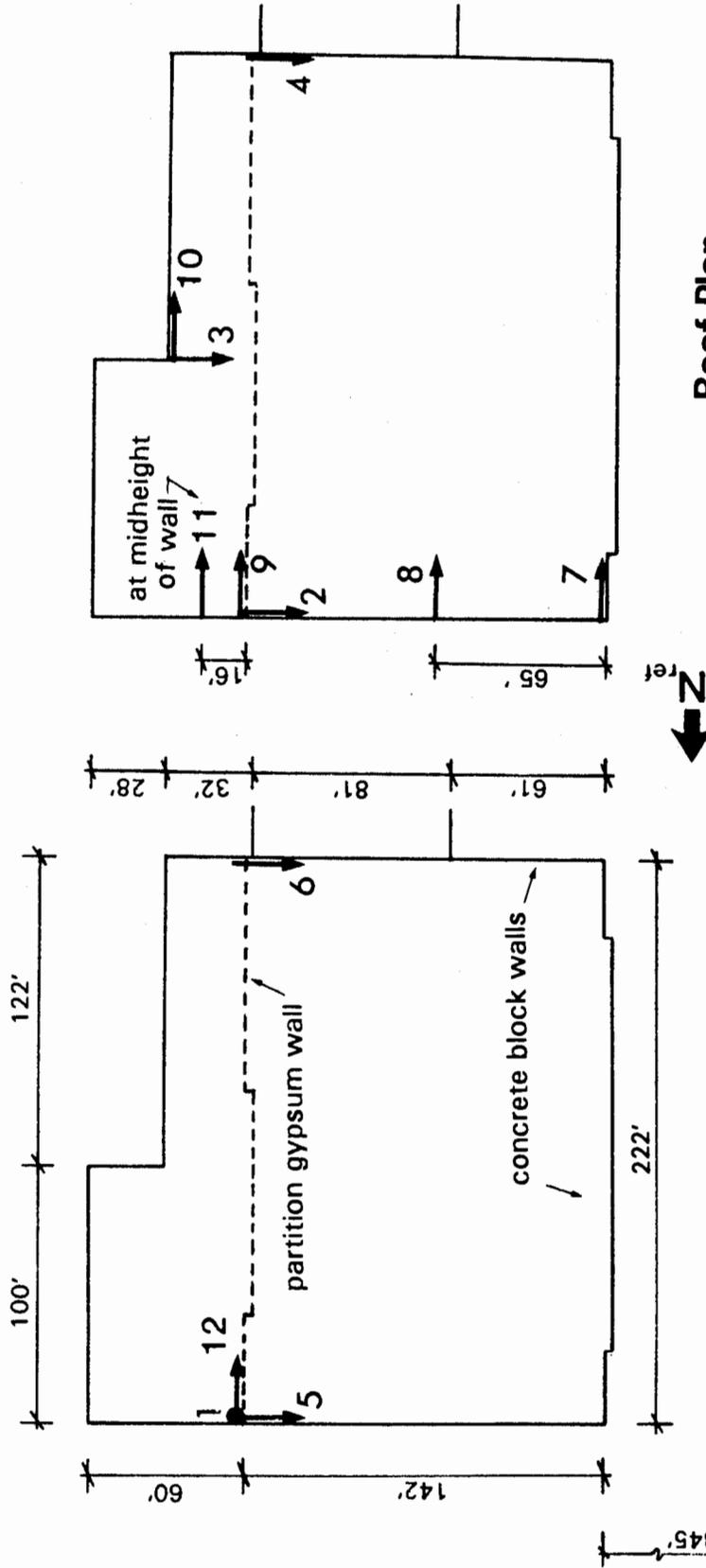
Fortuna - 1-story Supermarket Building (CSMIP Station No. 89473)

SENSOR LOCATIONS



N/S Elevation

Sensor 3 Mounted on Glu-Lam Beam
Other Sensors Mounted on Walls.

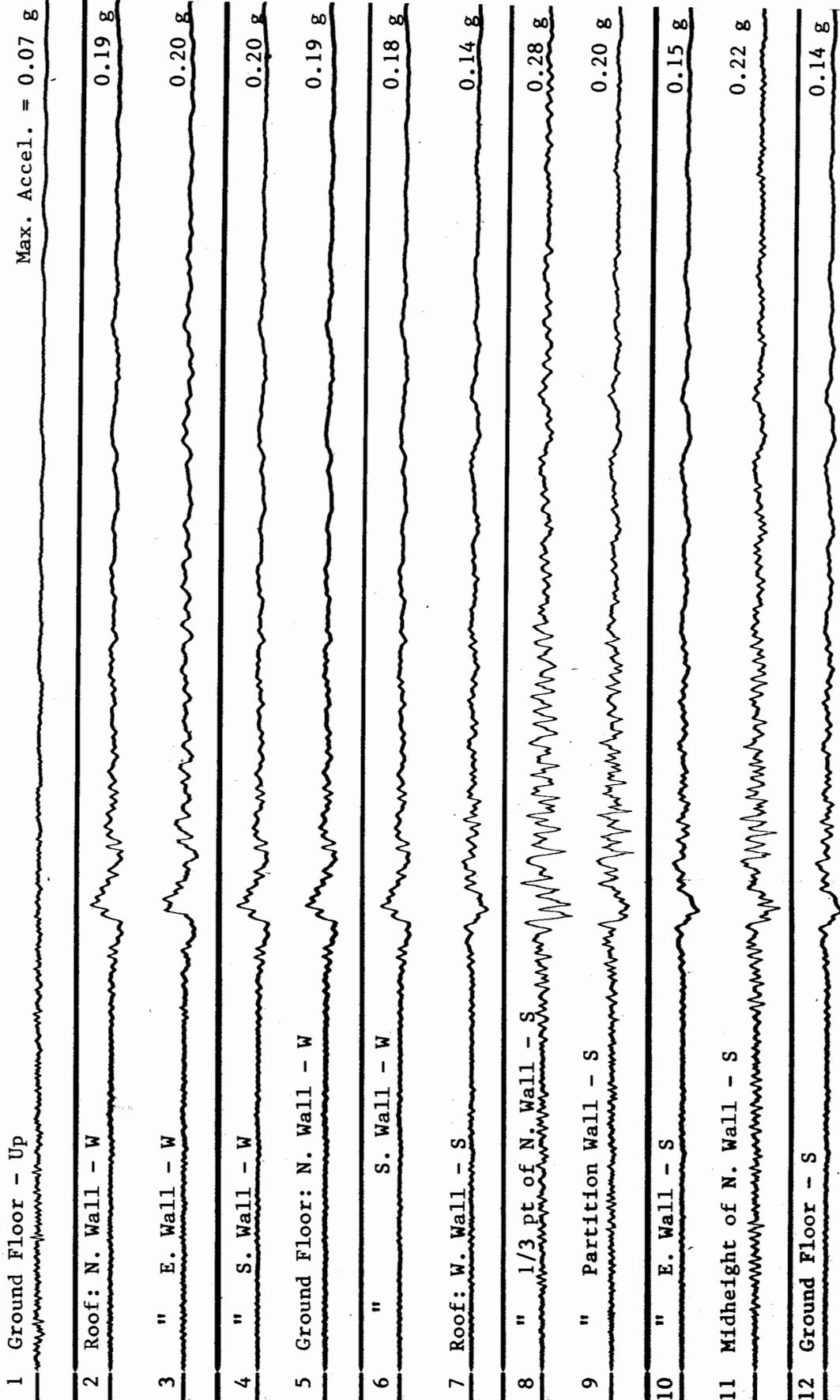


Roof Plan

Ground Floor Plan

Structure Reference
Orientation: N = 0°

Fortuna - 1-story Supermarket Bldg. Reference freefield record for this building is shown on pg. 55.
(CSMIP Station 89473) Record 89473-C0220-92118.05

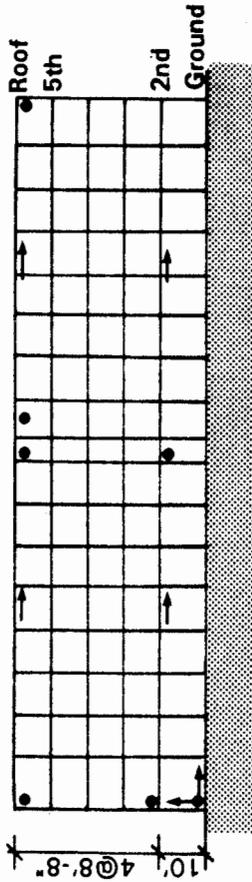


Trigger Time: 11:18:35± GMT Structure Reference Orientation: N=0°

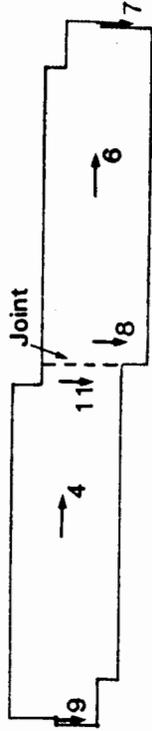
0 1 2 3 4 5 10 15 20 Sec.

Eureka - 5-story Residential Bldg. (CSMIP Station No. 89494)

SENSOR LOCATIONS

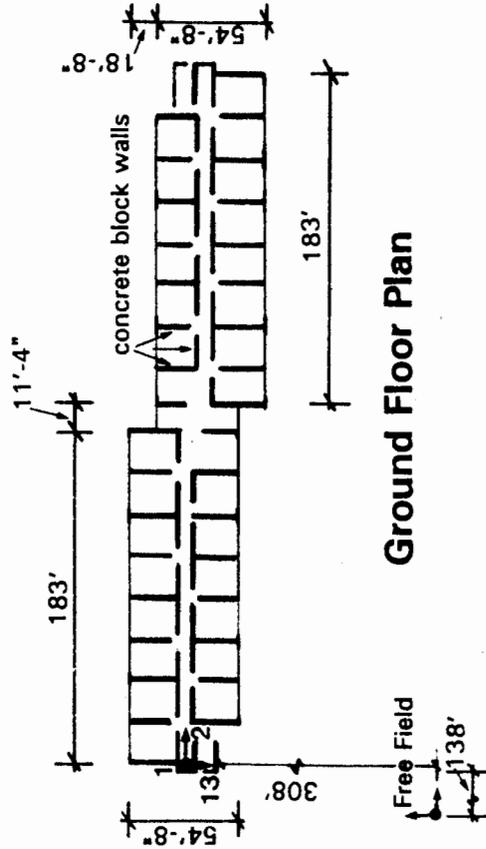


W/E Elevation

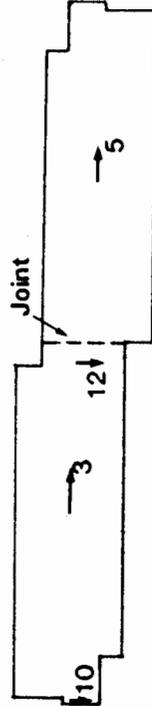


Roof Plan


 N_{ref} Structure Reference
 Orientation: $N = 0^\circ$

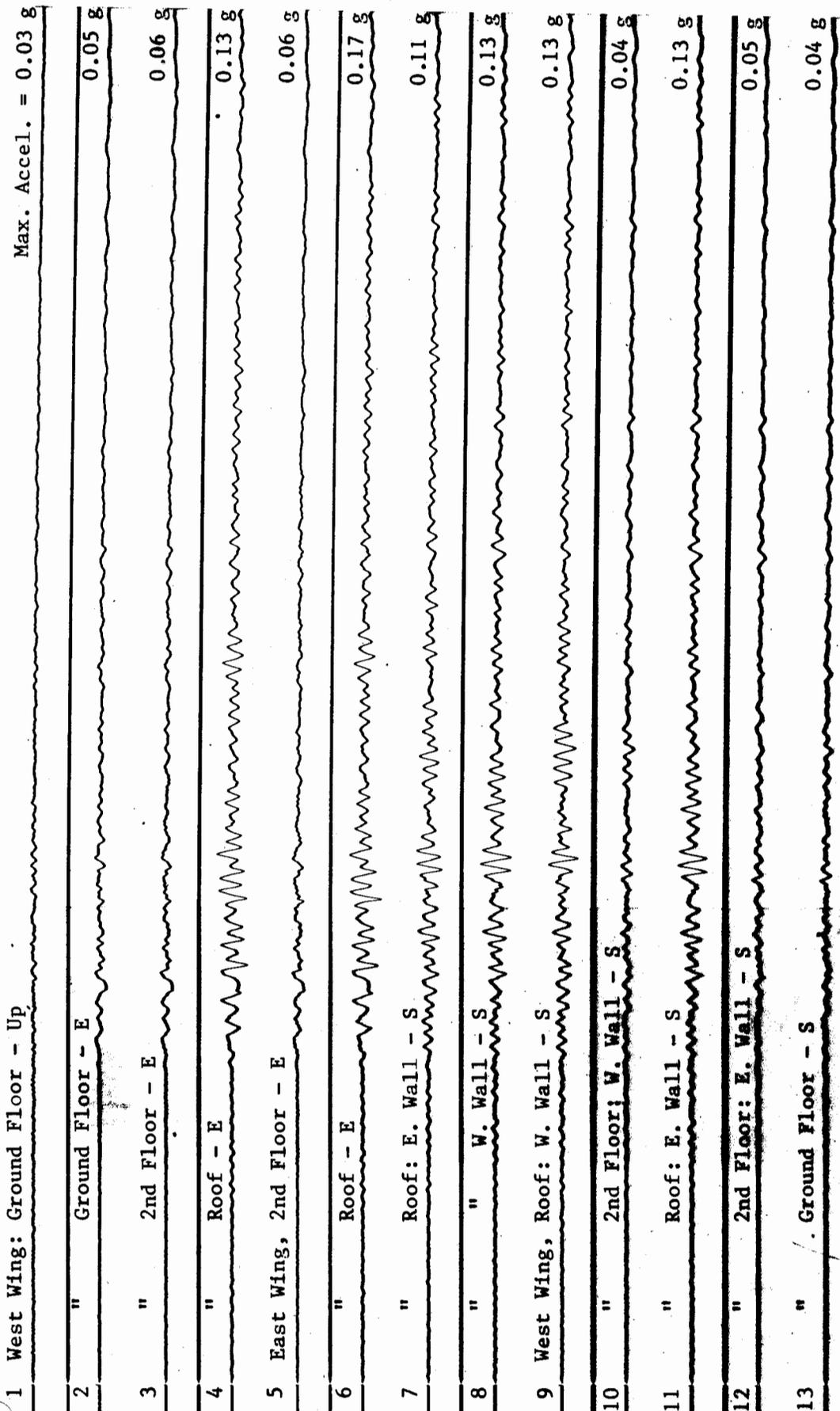


Ground Floor Plan



2nd Floor Plan

Eureka - 5-story Residential Bldg. Reference freefield record for this building is shown
(CSMIP Station 89494) on p. 56 (Myrtle & West station). Record 89494-C0249-92118.06



Trigger Time: 11:18:39.0 GMT Structure Reference Orientation N=0°



20 Sec.

LIST OF CSMIP REPORTS AND DATA TAPES

California Department of Conservation
 Division of Mines and Geology
 Office of Strong Motion Studies
 California Strong Motion Instrumentation Program (CSMIP)

AVAILABLE REPORTS:

<u>Title</u>	<u>Number</u>
I. Earthquake Data Reports:	
Quick Report on CSMIP Strong-Motion Records from the Petrolia, California Earthquakes of April 25-26, 1992	OSMS 92-04
Quick Report on CSMIP Strong-Motion Records from the April 22, 1992 Desert Hot Springs, California Earthquake	OSMS 92-03
Summary of CSMIP Strong-Motion Records for the August 17, 1991 Earthquake near Petrolia, California	OSMS 91-09
CSMIP Strong-Motion Records from the Sierra Madre, California Earthquake of 28 June 1991	OSMS 91-03
Quick Report on CSMIP Strong-Motion Records for the February 28, 1990 Earthquake near Upland, California	OSMS 90-02
CSMIP Strong-Motion Records from the Santa Cruz Mountains (Loma Prieta), California Earthquake of 17 October 1989	OSMS 89-06
CSMIP Strong-Motion Records from the Superstition Hills, Imperial County, California Earthquakes of 23 and 24 November 1987	OSMS 87-06
CSMIP Strong-Motion Records from the Whittier, California Earthquake of 1 October 1987	OSMS 87-05
CSMIP Strong-Motion Records from the Chalfant Valley, California Earthquakes of July and August 1986	OSMS 86-06
CSMIP Strong-Motion Records from the Palm Springs, California Earthquake of 8 July 1986	OSMS 86-05
Selected Accelerograms from the Redlands, California Earthquake of October 2, 1985	OSMS 85-02
CSMIP Strong-Motion Records from the Bishop, California Earthquake of 23 November 1984	OSMS 84-12
CDMG Strong-Motion Records from the Morgan Hill, California Earthquake of 24 April 1984	OSMS 84-7

<u>Title</u>	<u>Number</u>
Preliminary Summary of CDMG Strong-Motion Records from the 2 May 1983 Coalinga, California Earthquake	OSMS 83-5.2
Strong-Motion Records from the Mammoth Lakes, California Earthquake of 6 January 1983	OSMS 83-1.1
Strong-Motion Records Recovered from the Mammoth Lakes, California Earthquake of 30 September 1981	OSMS 81-10.1
Strong-Motion Records Recovered from the Westmorland, California Earthquake of 25 April 1981	OSMS 81-5.1
Strong-Motion Records Recovered from the Trinidad-Offshore, California Earthquake of 8 November 1980	OSMS 80-11.1
Strong-Motion Records from the Livermore Earthquakes of 24 and 26 January 1980	PR 28
Strong-Motion Records from the Mammoth Lakes Earthquakes of May 1980	PR 27
Compilation of Strong-Motion Records and Preliminary Data from the Imperial Valley Earthquake of 15 October 1979	PR 26
Compilation of Strong-Motion Records from the Coyote Lake Earthquake of 6 August 1979	PR 25
Compilation of Strong-Motion Records Recovered from the Bishop, California Earthquake of 4 October 1978	OSMS 78-7.1
Compilation of Strong-Motion Records Recovered from the Santa Barbara Earthquake of 13 August 1978	PR 22
Catalog of Strong Motion Accelerograph Records Recovered by Office of Strong Motion Studies before January 1, 1982	SR 154
Catalog of Strong Motion Accelerograph Records Recovered by Office of Strong Motion Studies During 1982	SR 154A

II. Processed Data Reports:

Plots of the Accompany Tape: BERKELEY86 (Building Response Data Set)	OSMS 92-02
Plots of the Accompany Tape: SIERRAMADRE91 - INTERIM-1 (Ground, Building, and Lifeline Structure Response Data Set)	OSMS 92-01
Plots of the Accompany Tape: PALMSPRINGS86-IB, and B (Building Response Data Set)	OSMS 91-16
Plots of the Accompany Tape: LIVERMORE80 (Ground and Building Response Data Set)	OSMS 91-15

<u>Title</u>	<u>Number</u>
Plots of the Accompany Tape: LEXINGTON88-89 (Lifeline Structure Response Data Set)	OSMS 91-14
Plots of the Accompany Tape: ALUMROCK88 (Building Response Data Set)	OSMS 91-13
Plots of the Accompany Tape: WHEELERRIDGE88 (Lifeline Structure Response Data Set)	OSMS 91-12
Plots of the Accompany Tape: CHALFANT86 (Ground and Lifeline Structure Response Data Set)	OSMS 91-11
Plots of the Accompany Tape: WHITTIER87 - CALTECH (Ground Response Data Set)	OSMS 91-10
Plots of the Accompany Tapes: LOMAPRIETA89-IL, and L (Lifeline Structure Response Data Set)	OSMS 91-08
Plots of the Accompany Tapes: LOMAPRIETA89-IB1, IB2, IB3, IIB1, IIB2, and IIIB (Building Response Data Set)	OSMS 91-07
Plots of the Accompany Tapes: LOMAPRIETA89-IG, and G (Ground Response Data Set)	OSMS 91-06
Processed Strong-Motion Data from the Base-Isolated San Bernardino County Law & Justice Center for the Upland earthquake of February 28, 1990	OSMS 90-03
Processed Strong-Motion Data from the Whittier, California Earthquake of 1 October 1987; Part I Ground-Response Records	OSMS 89-03
The Cerro Prieto, Baja California Earthquake of February 6, 1987 and Processed Strong-Motion Data	OSMS 87-04
Processed Strong Motion Data from the Palm Springs Earthquake of 8 July 1986; Part I Ground-Response Records	OSMS 87-01
Processed Strong Motion Data from the San Salvador Earthquake of October 10, 1986	OSMS 86-07
Processed Data from the Strong-Motion Record Obtained at a Base-Isolated Building in Rancho Cucamonga, California during the Redlands Earthquake of 2 October 1985	OSMS 86-01
Processed Data from Strong-Motion Records of the Morgan Hill Earthquake of 24 April 1984: Part I Ground-Response Records	OSMS 85-04
Processed Data from Strong-Motion Records of the Morgan Hill Earthquake of 24 April 1984: Part II Structural-Response Records	OSMS 85-05

<u>Title</u>	<u>Number</u>
Processed Data from the Strong-Motion Records of the Imperial Valley Earthquake of 15 October 1979.	SP 65
Processed Data from the San Juan Bautista 101/156 Separation Bridge and the San Juan Bautista Freefield Records from the Coyote Lake Earthquake 6 August 1979	SP 64
Processed Data from the Gilroy Array and Coyote Creek Records, Coyote Lake, California, Earthquake 6 August 1979	PR 24
Processed Data from the Strong-Motion Records of the Santa Barbara Earthquake of 13 August 1978. (in three volumes)	SR 144
III. Other Reports:	
Standard Tape Format of CSMIP Strong-Motion Data Tapes	OSMS 85-03

AVAILABLE STRONG-MOTION DATA TAPES:

<u>Tape Name</u>	<u>Description</u>
PUGETSOUND65	Puget Sound, Washington Earthquake of 29 April 1965; Vol. 1, 2 and 3 data from two buildings.
SANTBARB78	Santa Barbara earthquake of 13 August 1978.
IMPERIAL79	Imperial Valley earthquake of 15 October 1979, County Services Bldg. and other CSMIP stations.
COYOTE79A	Coyote Lake earthquake of 6 August 1979, Gilroy Array stations.
COYOTE79B	Coyote Lake earthquake of 6 August 1979, San Juan Bautista overpass and nearest free-field station.
COYOTE79C	Coyote Lake earthquake of 6 August 1979, Halls Valley station.
LIVERMORE80	Livermore earthquakes of 24 and 27 January 1980; data from 5 ground-response and 2 buildings for the earthquake on the 24th and data from 6 ground-response and 2 buildings for the earthquake of the 27th.
MAMMOTH80A	Mammoth Lakes earthquakes of 25 May 1980 at 09:34 and 09:49 PDT.
MAMMOTH80B	Mammoth Lakes earthquakes of 25 May 1980 at 12:45 and 13:36 PDT.
MAMMOTH80C	Mammoth Lakes earthquakes of 26 May 1980 at 11:58 PDT and 27 May 1980 at 07:51 PDT.
WESTMOR81	Westmoreland earthquake of 26 April 1981.
COALINGA83	Coalinga earthquake of 2 May 1983, 16:43 PDT; Vol. 2 and 3 data for 47 records.
COALINGA83-IA	Coalinga earthquake of 2 May 1983, Vol. 1 data for first 22 records.
COALINGA83-IB	Coalinga earthquake of 2 May 1983, Vol. 1 data for remaining 25 records.
COALINGA83AS	Vol. 2 and 3 data for eight aftershocks of the Coalinga 2 May 1983 earthquake. The aftershocks occurred between 8 May and 11 September 1983, and were of magnitude (ML) 4.3 - 6.0.
COALINGA83AS-I	Vol. 1 data for the Coalinga aftershock records included on the tape COALINGA83AS.
RIODEL8083	Processed data from the Highway 101 Overpass at Rio Dell for the earthquakes of: 8 Nov 1980 (6.9ML Trinidad-Offshore); 16 Dec 1982 (4.4ML Rio Dell) and 24 Aug 1983 (5.5ML Cape Mendocino Offshore).
MAMMOTH83	Mammoth Lakes earthquakes of 7 Jan 1983 at 01:38 and 03:24 GMT.

<u>Tape Name</u>	<u>Description</u>
MORGANHILL84-IG	Morgan Hill earthquake of 24 April 1984; Vol. 1 data from 19 ground-response stations.
MORGANHILL84-G	Morgan Hill earthquake of 24 April 1984; Vol. 2 and 3 data from 19 ground-response stations.
MORGANHILL84-IS	Morgan Hill earthquake of 24 April 1984; Vol. 1 data from 7 buildings and one bridge.
MORGANHILL84-S	Morgan Hill earthquake of 24 April 1984; Vol. 2 and 3 data from 7 buildings and one bridge.
REDLANDS85	Redlands earthquake of 2 October 1985; data from the Law & Justice Building at Rancho Cucamonga.
BERKELEY86	Berkeley Hills earthquake of 29 March 1986; data from a 2-story Hospital in Berkeley.
HOLLISTER86	Hollister earthquake of 26 January 1986; data from 2 ground-response stations and Hollister - 1-story Warehouse.
MTLEWIS86	Mt. Lewis earthquake of 31 March 1986; data from 1 ground-response station and 3 buildings.
SANSALVADOR86	San Salvador earthquake of October 10, 1986; data from 9 stations.
PALMSPRINGS86-IG	Palm Springs earthquake of 8 July 1986; Vol. 1 data from 18 ground-response stations.
PALMSPRINGS86-G	Palm Springs earthquake of 8 July 1986; Vol. 2 and 3 data from 18 ground-response stations.
PALMSPRINGS86-IB	Palm Springs earthquake of 8 July 1986; Vol. 1 data from 5 buildings.
PALMSPRINGS86-B	Palm Springs earthquake of 8 July 1986; Vol. 2 and 3 data from 5 buildings.
CHALFANT86	Chalfant earthquake sequence of July 1986 at 9 stations including Lake Crowley - Long Valley Dam.
CERROPRIETO87	Cerro Prieto, Baja California earthquake of February 6, 1987; data from 1 ground-response station.
WHITTIER87-IG	Whittier earthquake of 1 October 1987; Vol. 1 data 36 from 36 ground-response stations.
WHITTIER87-G	Whittier earthquake of 1 October 1987; Vol. 2 and 3 data from 36 ground-response stations.
WHITTIER87-IB1	Whittier earthquake of 1 October 1987; Vol. 1 data from first 10 of the 18 buildings.
WHITTIER87-IB2	Whittier earthquake of 1 October 1987; Vol. 1 data from last 8 of the 18 buildings.
WHITTIER87-IIB	Whittier earthquake of 1 October 1987; Vol. 2 data from all 18 buildings.
WHITTIER87-IIIB	Whittier earthquake of 1 October 1987; Vol. 3 data from all 18 buildings.

<u>Tape Name</u>	<u>Description</u>
WHITTIER87-L	Whittier earthquake of 1 October 1987; Vol. 1, 2 and 3 data from 3 lifeline structures (1 bridge and 2 dams).
WHITTIER87-CALTECH	Whittier earthquake of 1 October 1987; Vol. 1, 2 and 3 data from 10 Caltech Stations.
WHEELERRIDGE88	Wheeler Ridge area earthquake of 10 June 1988; data from California Department of Water Resources station at Edmonston Pumping Plant (basement).
ALUMROCK88	Alum Rock earthquake of 12 June 1988; data from Milpitas - 2-story Industrial Building.
LEXINGTON88-89	Lake Elsmar earthquakes of 27 June 1988 and 8 August 1989; data from Lexington Dam.
UPLAND90-INTERIM	Upland earthquake of 28 February 1990; Vol. 1, 2 and 3 data from the base-isolated San Bernardino County Law & Justice Center.
LOMAPRIETA89-IG	Loma Prieta earthquake of 17 October 1989; Vol. 1 data from 44 ground-response stations.
LOMAPRIETA89-G	Loma Prieta earthquake of 17 October 1989; Vol. 2 and 3 data from 44 ground-response stations.
LOMAPRIETA89-IB1	Loma Prieta earthquake of 17 October 1989; Vol. 1 data from first 10 of 30 buildings.
LOMAPRIETA89-IB2	Loma Prieta earthquake of 17 October 1989; Vol. 1 data from middle 10 of 30 buildings.
LOMAPRIETA89-IB3	Loma Prieta earthquake of 17 October 1989; Vol. 1 data from last 10 of 30 buildings.
LOMAPRIETA89-IIB1	Loma Prieta earthquake of 17 October 1989; Vol. 2 data from first 15 of 30 buildings.
LOMAPRIETA89-IIB2	Loma Prieta earthquake of 17 October 1989; Vol. 2 data from last 15 of 30 buildings.
LOMAPRIETA89-IIIB	Loma Prieta earthquake of 17 October 1989; Vol. 3 data from all 30 buildings.
LOMAPRIETA89-IL	Loma Prieta earthquake of 17 October 1989; Vol. 1 data from all 7 lifeline structures.
LOMAPRIETA89-L	Loma Prieta earthquake of 17 October 1989; Vol. 2 and 3 data from all 7 lifeline structures.
SIERRAMADRE91-INT1	Sierra Madre earthquake of 28 June 1991; Vol. 1, 2 and 3 data from the 7 ground-response stations, 3 buildings and 1 lifeline structure.

Footnotes:

Each tape contains Vol. 1 data (uncorrected acceleration), Vol. 2 data (corrected acceleration, velocity and displacement) and Vol. 3 data (response and Fourier amplitude spectra) unless otherwise specified. The magnetic tapes are provided at cost. Included with each tape is a copy of either the processed data report (if available) or the plots of the data.

The Vol. 2 and 3 data are also available on floppy disks for use in personal computers. Requests for the reports, data tapes, data disks and/or for additional information should be addressed to:

Data Reduction Manager
Office of Strong Motion Studies
Division of Mines and Geology
California Department of Conservation
801 K Street, MS 13-35
Sacramento, CA 95814-3531

Phone: (916) 322-3105