U.S. Department of the Interior
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Shear-Wave Velocity of the Ground Near Sixty California Strong Motion Recording Sites by the Spectral Analysis of Surface Waves (SASW) Method and Harmonic-Wave Sources

Robert Kayen, Eric Thompson, Diane Minasian and Brad Carkin
Coastal and Marine Geology Program
345 Middlefield Road
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INTRODUCTION

The seismic networks for California are coordinated through the Northern California Seismic Net (NCSN), the U.C. Berkeley Digital Seismic Net (BDSN), the southern California Seismic Network (SCSN), and the seismological laboratory of the University of Nevada, Reno (UNR). These networks are administered through collaborative efforts of the U.S. Geological Survey, California Institute of Technology (SCSN), U.C. San Diego and U.C. Berkeley, UNR, and the California Geological Survey (CSMIP). Many hundreds of these sites have little or no quantitative characterization for site amplification effects or natural site period of vibration. In this study, we investigate sixty strong motion recording (SMR) sites using an active-source approach that employs ultra-low frequency-controlled harmonic waves to measure the dispersive nature of surface waves in the ground. An inversion algorithm employing a non-linear least-squares best fit is used to invert shear-wave velocities for the upper 30 meters of the soil column.

The overall objective of this project is to visit unclassified California strong motion recording (SMR) sites and acquire spectral analysis of surface waves (SASW) data to characterize the site stiffness properties to a minimum depth of 30 meters. The principal products of this effort are the computation of shear-wave velocity logs, Vs-30 site values, and NEHRP site classification. This study was conducted at the request of the Pacific Earthquake Engineering Research (PEER) Center, Lifelines Program Task 1L10 to provide a quantitative basis for site classification of ground associated with recorded ground motions used in the Next Generation Attenuation (NGA) modeling project. Our preliminary findings were delivered in digital format on January 30, 2004 to PEER-NGA project participants through a password protected FTP site. An interim report with shear-wave velocity profiles was distributed to NGA members in digital form through the same web site on March 30, 2004. This was followed by an informal review process with several NGA participants that resulted in the computation of new shear-wave velocities using an inversion algorithm with reduced soil model layering, and clarification on the locations of several of the SASW test sites.

STUDY AREA

From December 13, 2003 to January 15, 2004 we investigated 60 SMR sites selected by staff of the California Geological Survey (CGS) and California Strong Motion Instrumentation Program (CSMIP) in northern and southern California. These sites are locations of prior recorded ground motions for which there are no measured quantitative

site stiffness properties. Fieldwork was clustered in spatial bins to optimize our field travel and to maximize the number of sites where data could be collected each day. Maps of the SMR sites investigated by the SASW team are presented in Figures 1-3. Figure 1 presents the statewide data collection effort. Of these sixty sites, 12 are located in the San Francisco Bay area and the remaining 48 are located in the Coast-Ranges, the Los Angeles region and the southern California desert. The second figure, Figure 2, shows the northern California test sites. Red sites were visited and tested: green sites were sites on the NGA project list where we attempted to test but were restricted by either site access issues or limited time (Figure 2). In southern California, we tested the majority of sites on the NGA project list (Figure 3). Again, red sites were tested, and green sites are on the NGA target list and were not tested.

The latitude and longitude locations of the SMR sites were given to the SASW team by CGS in NAD27 datum coordinates. We attempted to locate our profiles as close as practicable to each site using hand-held GPS units. In Table 1 we list the measured locations of the SASW site, the map estimated location of the SMR site, and the distance separating them. This table also presents the average 30 meter velocity (V_{s30}) and the NEHRP site classification. In most cases, we were able to locate the SASW array within 100 meters of the CGS coordinates. In one case, site 625SSF, we located on an asphalt parking lot constructed on fill, alluvium, and bay sediment adjacent to a rock outcrop at Sierra Point. The seismometer station is located on the rock site and its velocity structure bears no relation to the data collected at 625SSF. For this one case, we did not include the data for the SASW site in this report. Other sites had inaccurate GPS locations that we were able to correct, or note (i.e., 620AND, 633CSP; 647SAD; 649MWO; 658WDH).

FIELD METHODS

Spectral analysis of surface waves (SASW) testing is an inexpensive and efficient means for non-invasively estimating the stiffness properties of the ground. Various active and passive source surface wave methods have been developed to profile the subsurface from tens-of-meters to kilometers in depth. Prior to the development of non-invasive surface wave methods, shear-waves were measured in cased boreholes or during standard or cone penetration tests, both relatively costly methods, using a conventional travel-time approach. Static cone penetration tests often cannot sound to useful depths for site response characterization as the soil stiffness mobilizes to resists the maximum static shear the truck can deliver at shallow depths (<30m) for all but the softest sites. Surface wave test apparatus is highly portable, allowing for measurements in extremely remote locations, at soft sites where vehicles cannot drive, and in sub-aqueous environments (Stokoe and Nazarian, 1985).

Figure 1. State map showing the locations of SASW test sites included in this report.

We used a surface wave testing system to collect dispersion data for sixty sites employing a crew of 2 or 3 people. The test apparatus consists of 1-Hz Kinemetrics[1] seismometers, a low frequency spectrum analyzer, a computer-controlled continuous harmonic-wave source (shaker) and amplifier, cables and a small 4.5kW generator. The shaker-source is centered in the SASW seismometer line and receives an oscillatory-signal from a sine function generator. The output signal from the sine wave source is boosted by an amplifier to produce a continuous harmonic-wave that shakes the ground with surface waves of a specific frequency. The receivers measure the waves and a fast Fourier transform (FFT) is performed on each of the four receiver signals. The test steps through a suite of frequencies for which phase computations, respectively are made. In

near-real time, the linear spectra, cross power spectra, and coherence are computed. The ability to perform near real-time frequency domain calculations and monitor the progress and quality of the test allows us to adjust various aspects of the test to optimize the capture of the phase data while on-site in the field. These aspects include the source-wave generation, frequency step-size between each sine-wave burst, number of cycles-per-frequency, total frequency range of all the steps, and receiver spacing. This method of swept-sine surface wave testing will sweep through a broad range of low frequencies in order to capture the surface wave-dispersion characteristics of the ground. This approach is a slight modification of the Continuous Sine wave Source Spectral Analysis of Surface Waves (CSS-SASW) test presented by Kayen and others (2004a; 2004b).

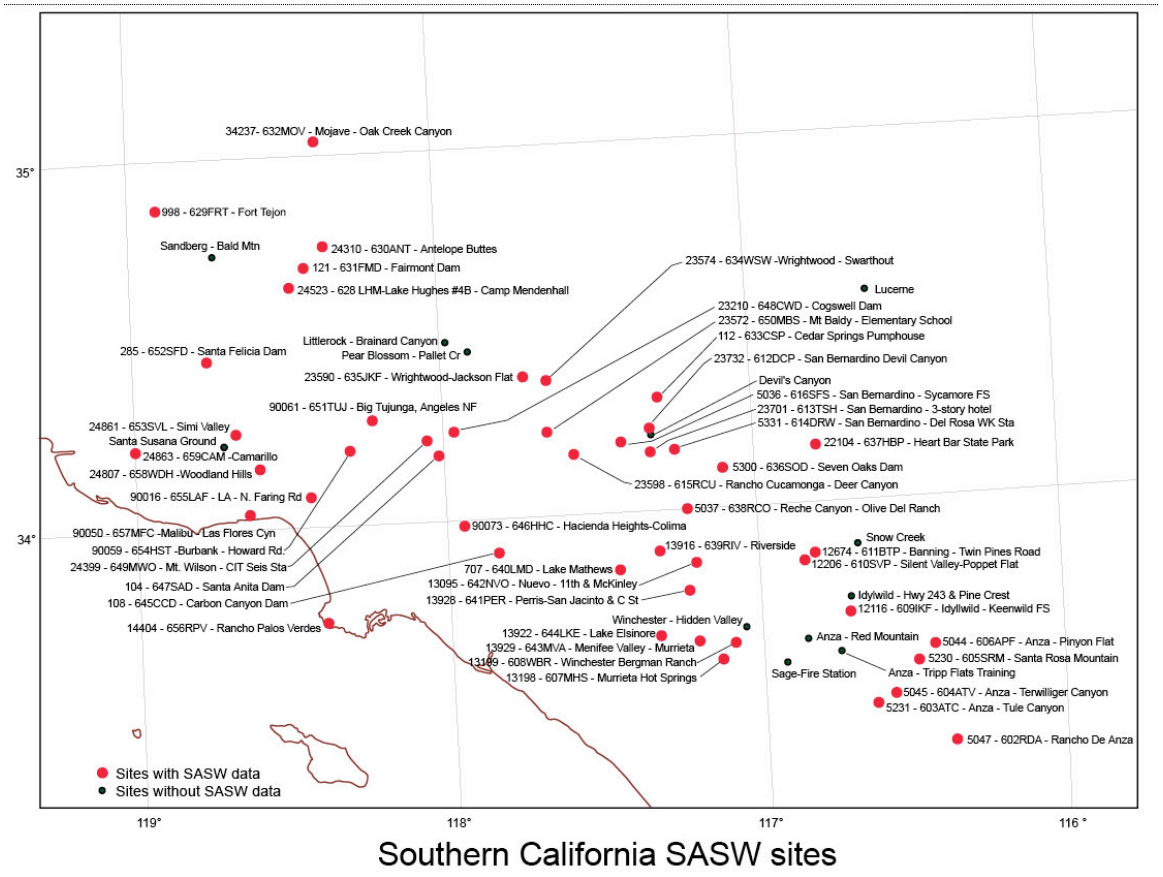

Figure 2. Southern California SASW test sites near SMR station. Red stations were tested; green stations were visited but site access was denied.

We adopted a common source-midpoint geometry in our array set up (Figure 4). To do this, we placed the harmonic-source at the centerline of the survey with the forward and reverse direction sensor-pairs equidistant from the source for each given array spacing. This configuration allowed us to merge the forward and reverse direction dispersion curves if they were similar. In order to build a merged dispersion profile for the site, several different receiver spacings were used to capture the high-, medium-, and low-frequency ranges of the surface wave dispersion. Spacing of the receivers stepped geometrically from 1 meter to 64 meters, i.e. 1, 2, 4, 8, 16, 32, and 64 meters. The two

seismometers were separated by a given distance, d, and the source was usually placed at a distance of 2d from the inner seismometer. When the array separation increased to a point where the d:2d spacing became impractical, either due to space limitations, cable limits, or the attenuation, the array spacing was changed to d:d. Prior investigations have shown that array spacing ratios between d:d and d:2d are a good compromise in minimizing near field effects and distant-wave attenuation (Sanchez-Salinero, et al., 1987).

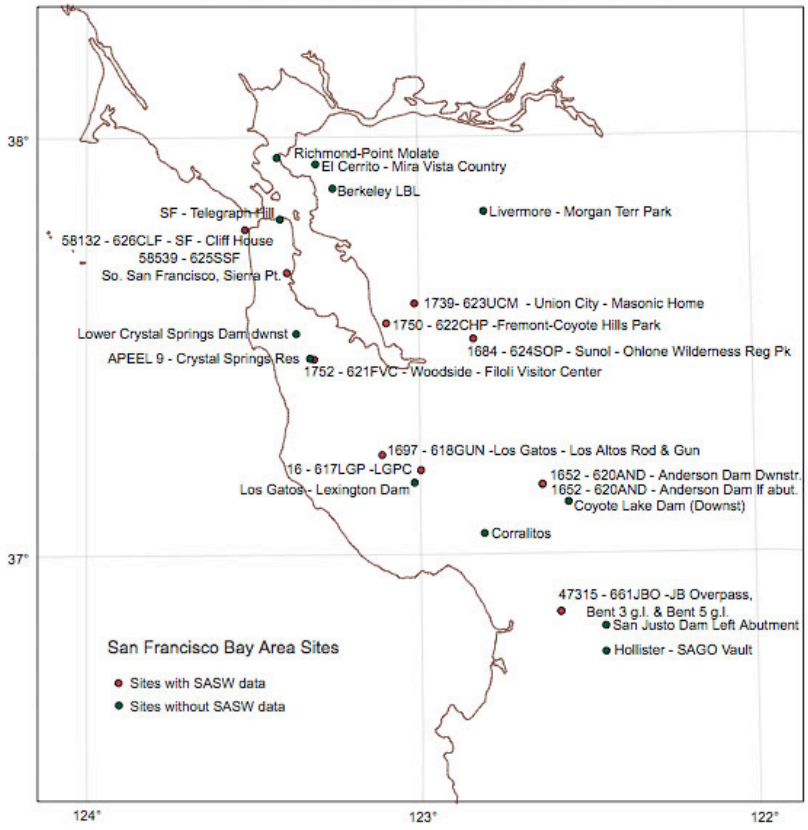

Figure 3. Northern California SASW test sites near SMR stations. Red stations were tested; green stations were visited but site access was denied.

In the field, we compute the Rayleigh wave wavelengths (λ) by relating the seismometer spacing (δ) and the phase angle (θ, in radians determined from the cross-power spectra) between the seismometers:

$$\lambda = 2\pi\delta/\theta \quad \text{.....(1)}$$

The Rayleigh wave surface wave velocity, V_r, is computed as the product of the frequency and its associated wavelength:

$$V_r = f\lambda \quad \text{.....(2)}$$

The grouped and average dispersion curves for the SMR sites are presented in the Appendix. We compute in the field reference velocity values for each seismometer set up for phase angles of π, 2π, and 4π. After completion of the field data collection, we will then compute a dispersion curve velocity profile for all calculated phase angles.

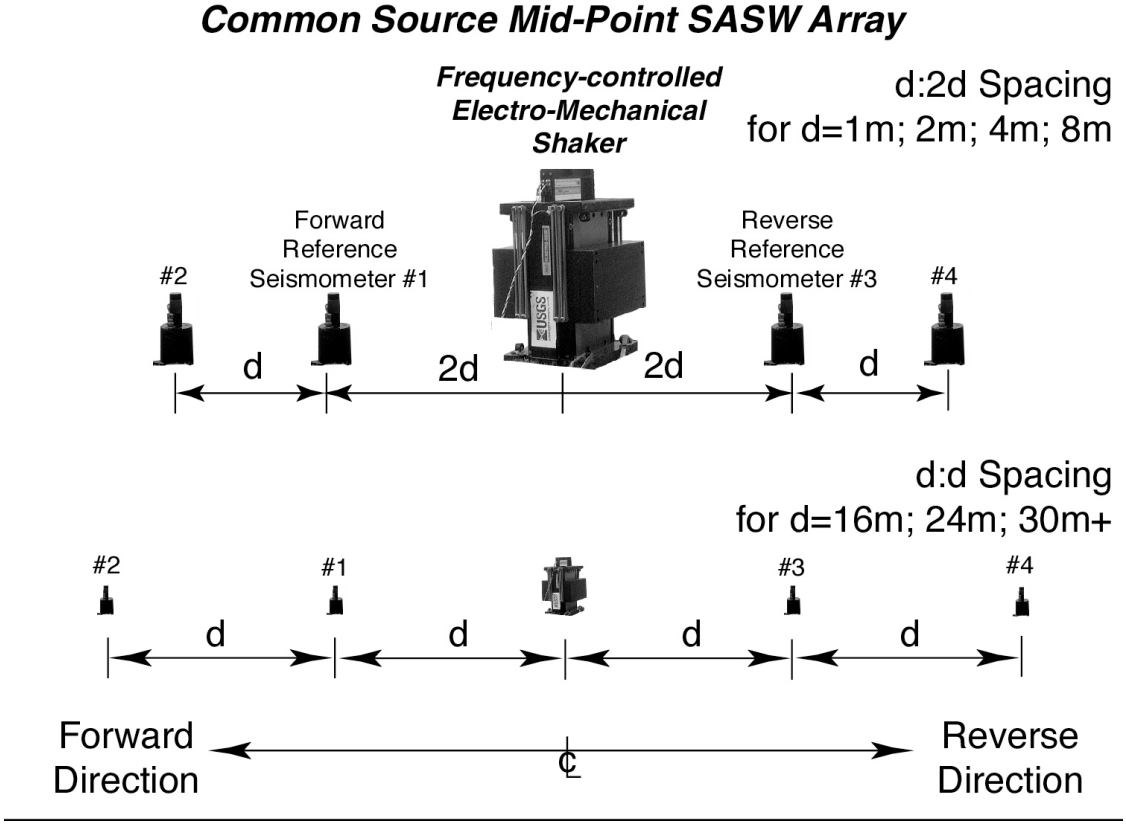

Figure 4. Configuration of the USGS surface wave testing system, composed of 1-Hz sensors and a 100 kg electro-mechanical shakers. Array separation changes from d:2d to d:d for large array separations when signal strength to the outermost receivers is weak.

INVERSION PROCEDURE

The inversion process is used to estimate the soil stiffness model whose computed *theoretical*-dispersion curve is a best-fit with the experimental dispersion data collected in the field. That is, we invert shear-wave velocity profiles using an inversion code that hunts for the best-fit shear-wave velocity profile whose theoretical dispersion curve is the closest match with the averaged field dispersion curve. The term "best-fit" refers to the minimum sum of the squares of residuals from the differences between the theoretical and experimental dispersion curves. The inversion algorithm, WaveEq of OYO Corp. (Hayashi and Kayen, 2003) uses an automated-numerical approach that employs a constrained least-squares fit of the theoretical and experimental dispersion curves. We also ran independent inversion algorithms, inverse.m (Lai and Rix, 1998) and WinSASW (Joh, 1998) to validate the profiles computed from WaveEQ.

The shear-wave velocity structure of the study sites is presented for the uppermost thirty meters of the ground in the Appendix figures A1-A13 for each of the sixty SMR sites. The inversion of a theoretical velocity profile was performed using the inversion code WaveEQ. Typically, a ten-layer model was used for the inversion, with layer thicknesses geometrically expanding with depth. The increased layer thicknesses with depth correspond with decreased dispersion information in the longer wavelength portion of the dispersion curve. The profiles generally increase in stiffness with depth, though low velocity layers are present in several of the profiles.

RESULTS

The testing program investigated sixty sites in California. These sites are listed in order of the SASW site number (602-661) in Table 1. Typically, these strong motion recording (SMR) sites are located in undeveloped rural areas; fire stations; small businesses; near Southern California Edison sub-station facilities; SBC Telephone network stations; and public park grounds. We attempted to locate within these facilities next to the SMR station, or tested immediately adjacent to the facility.

Table 1. SMR stations locations and their corresponding SASW and instrument site identifier. The computed 30-meter average shear-wave velocity and site codes are presented as V_{S30} and NEHRP. Positions refer to the position of the shaker sources during the SASW test.

The simplest way of characterizing the overall site condition is to use the average shear-wave velocity in the uppermost 30 meters of the subsurface (V_{s30}; ICC, 2002). Equation 3 is used to compute this average velocity based on the unit layer thickness (d_i) and the corresponding interval-velocity (V_{Si}).

$$V_{S30} = \frac{\sum_{i=1}^{n} d_i}{\sum_{i=1}^{n} \frac{d_i}{V_{Si}}} \tag{3}$$

In Table 1 and the Appendix, we report the computed V_{s30} values from the 8-10 layer models. The tested sites fall within an average velocity range of 235-to-902 m/s. The velocities fall within NEHRP categories “B”, "C", and "D". To better classify the stiffness of these units we have informally subdivided the categories with a + or - prefix to indicate whether the velocity falls within the upper or lower half of the 360 m/s range within each letter class (e.g. Class D-; D+, C-; C+ soils).

ACKNOWLEDGMENTS

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Appendix A.

Photographs, seismic wave velocity profiles, and data sets for sixty California strong motion recording stations.

TABLE1. SASW sites tested for the PEER NGA Project 1L10B sorted by sequentially-numbered SASW test identifier.

USGS ID	USGS -Lat	USGS-Long	Velocity	Vs30 (m/s)	Distance (m)*	Station number	Station name	lat	lon	NGA category	geologic unit
602RDA	33 20.908	116 24.05	D+	329	94	5047	Rancho De Anza	33.348	116.4	primary	Qal, coarse
603ATC	33 27.563	116 38.653	C-	471	48	5231	Anza - Tule Canyon	33.459	116.644	primary	Kgr
604ATV	33 28.751	116 35.550	C+	605	0	5045	Anza - Terwilliger Valley	33.48	116.59	primary	Kgr
605SRM	33 34.086	116 30.706	C+	744	164	5230	Santa Rosa Mountain	33.568	116.51	primary	Kgr
606APF	33 36.376	116 27.124	C+	577	119	5044	Anza - Pinyon Flat	33.607	116.453	primary	Kgr
607MHS	33 35.919	117 07.925	C-	443	39	13198	Murrieta Hot Springs	33.599	117.132	primary	J metamorphic
608WBR	33 38.408	117 05.807	C+	619	259	13199	Winchester Bergman Ran	33.64	117.094	primary	
609IKF	33 42.459	116 43.047	B-	902	57	5232	Idyllwild - Keenwild Fire Station	33.708	116.717	to add	Kgr
610SPV	33 51.069	116 51.221	C+	619	158	12206	Silent Valley - Poppet Flat	33.851	116.852	primary	Kgr
611BTP	33 52.144	116 49.509	C+	630	108	12674	Banning - Twin Pines Road	33.869	116.824	to add	Kgr
612DCP	34 13.419	117 19.851	B-	773	42	23732	San Bernardino - Devil Canyon Penstock	34.224	117.331	to add	Kgr
613TSH	34 09.727	117 19.971	D+	336	127	23701	San Bernardino - 3-story Motel	34.163	117.332	to add	
614DRW	34 09.939	117 15.051	C-	486	41	5331	San Bernardino - Del Rosa Wk Sta	34.166	117.251	to add	Kgr
615RCU	34 10.150	117 34.742	C-	432	18	23598	Rancho Cucamonga - Deer Can	34.169	117.579	primary	Kgr
616SFS	34 11.542	117 25.608	C-	376	72	5036	San Bernardino - Sycamore FS	34.193	117.427	to add	
617LGP	37 10.337	122 00.682	D+	345	132	16	LGPC	37.172	122.01	primary	Tss
618GUN	37 14.352	122 06.386	C-	522	45	1697	Los Gatos - Los Altos Rod & Gun	37.239	122.106	to add	Tss
619COY	37 07.453	121 33.169	C-	469	165	57504	Coyote Lake Dam (Downst)	37.124	121.551	primary	Tss
620AND	37 09.930	121 37.904	C-	383	336*	1652	Anderson Dam Left Abutment	37.166	121.628	primary	
621FVC	37 28.121	122 18.494	D-	240	78	1752	Woodside - Filoli Visitor Center	37.468	122.308	to add	KJf
622CHP	37 33.161	122 05.478	C+	588	38	1750	Fremont - Coyote Hills Park	37.553	122.091	to add	KJf
623UCM	37 36.023	122 00.415	C-	461	91	1739	Union City - Masonic Home	37.6	122.006	to add	Tss
624SOP	37 30.869	121 49.807	D+	346	59	1684	Sunol - Ohlone Wilderness Reg Pk	37.515	121.83	to add	Tss
626CLF	37 46.792	122 30.700	C-	393	241	58132	SF - Cliff House	37.778	122.513	primary	KJf
627PVC	35 58.386	120 28.036	C-	390	26	36177	Parkfield - Vineyard Cany 2E	35.973	120.467	primary	
628LHM	34 39.146	118 28.837	D+	294	428	24523	Lake Hughes #4B - Camp Mend	34.65	118.477	primary	pCg
629FRT	34 52.241	118 53.968	D+	314	92	998	Fort Tejon	34.87	118.9	primary	Kgr
630ANT	34 45.444	118 21.651	C-	483	68	24310	Antelope Buttes	34.758	118.361	primary	Kgr
631FMD	34 42.255	118 25.662	C-	486	157	24270 (121)	Fairmont Dam	34.704	118.426	primary	Kgr
632MOV	35 02.509	118 22.693	D+	320	112	34237	Mojave - Oak Creek Canyon	35.042	118.377	primary	
633CSP	34 18.468	117 18.912	C-	417	1.42km*	112	Cedar Springs Pumphouse	34.31	117.3	primary	Kgr
634WSW	34 22.132	117 39.642	C-	390	247	23574	Wrightwood - Swarthout	34.369	117.658	primary	
635JKF	34 22.863	117 44.182	C-	466	58	23590	Wrightwood - Jackson Flat	34.381	117.737	primary	schist
636SOD	34 06.638	117 05.948	C-	470	43	5300	Seven Oaks Dam Donwstream Surf.	34.111	117.099	to add	Kgr
637HBP	34 09.536	116 47.919	C-	453	229	22104	Heart Bar State Park	34.161	116.799	to add	Kgr
638RCO	34 00.257	117 13.424	C-	488	76	5037	Reche Canyon - Olive Dell Ranch	34.004	117.223	to add	QT
639RIV	33 53.615	117 19.289	C-	494	209	13916	Riverside - Van Buren & Trautwein	33.895	117.32	to add	Kgr
640LMD	33 51.222	117 27.008	C-	533	204	707	Lake Mathews Dike Toe	33.852	117.451	primary	Kgr
641PER	33 47.134	117 13.784	C-	518	161	13928	Perris - San Jacinto & C Street	33.787	117.23	to add	Qal, thin
642NVO	33 49.100	117 07.974	C-	369	?	13095	Nuevo - 11th & McKinley	33.818	117.132*	to add	Kgr
643MVA	33 38.894	117 12.291	C-	503	79	13929	Menifee Valley - Murrieta & Scott	33.649	117.205	to add	Qal, thin
644LKE	33 40.100	117 19.955	C+	616	91	13922	Lake Elsinore - Graham & Poe	33.669	117.332	to add	J metamorphic
645CCD	33 54.741	117 50.389	D-	235	171	108	Carbon Canyon Dam	33.912	117.838	primary	Qal, thin
646HHC	33 59.405	117 56.624	D+	337	69	90073	Hacienda Heights - Colima	33.99	117.943	primary	Qal, thin

647SAD	34 11.044	118 01.237	C-	774	263*	104	Santa Anita Dam	34.185	118.018	primary	Kgr
648CWD	34 14.686	117 57.911	C-	464	111	23210	Cogswell Dam - Right Abutment	34.245	117.964	to add	Kgr
649MWO	34 13.615	118 04.004	C-	390	913*	24399	Mt Wilson - CIT Seis Sta	34.224	118.057	primary	Kgr
650MBS	34 13.938	117 39.755	C-	438	163	23572	Mt Baldy - Elementary Sch	34.233	117.661	primary	
651TUJ	34 17.219	118 13.610	C-	415	202	90061	Big Tujunga, Angeles Nat F	34.286	118.225	primary	Kgr
652SFD	34 27.560	118 45.092	C-	389	154	24280 (285)	Santa Felita Dam (Outlet)	34.46	118.753	primary	Qal, coarse
653SVL	34 15.791	118 40.220	C-	391	179	24861	Simi Valley - Katherine Rd & Sylvan	34.262	118.669	to add	Qal, deep
654HST	34 12.239	118 18.110	C+	714	16	90059	Burbank - Howard Rd.	34.204	118.302	primary	Qal, deep
655LAF	34 05.358	118 26.084	D-	255	43	90016	LA - N Faring Rd	34.089	118.435	primary	Qoa
656RPV	33 44.724	118 23.886	C-	501	206	14404	Rancho Palos Verdes - Hawth	33.746	118.396	primary	
657MFC	34 02.720	118 38.344	C-	477	106	90050	Malibu - Las Flores Canyon	34.045	118.638	primary	J metamorphic
658WDH	34 10.009	118 35.833	D-	265	113*	24807	Woodland Hills - Canoga & Ventura	34.167	118.596	to add	Qal, thin, west
659CAM	34 13.431	118 59.688	D-	321	73	24863	Camarillo - Woodcreek & Santa Rosa	34.224	118.994	to add	Qal, thin
660SLO	35 17.079	120 39.641	C-	481	51	1083	San Luis Obispo	35.285	120.661	primary	KJf
661JBO	36 51.698	121 34.696	C-	372	46	47315	JB Overpass, Bent 3 g.l.	36.862	121.578	primary	

***NOTES**

"Distance" is the distance between the USGS and NGA waypoints
Station Numbers in parens were changed by Vladimir Graizer
Station # 13095 - we believe the Longitude to be 117.132, not 117.312

A few examples of NGA waypoint problems:
620AND - The waypoint is in the reservoir
633CSP - The waypoint is in a cow pasture
647SAD - The actual seismometer is at the dam station, not on the slope below
649MWO - The waypoint is on the slopes of the mountain, not at the Mt. Wilson CIT station
658WDH - The waypoint is down the street from the fire station instrument

SASW sites tested for the PEER NGA Project 1L10B sorted by USGS/CSMIP identifier.

USGS ID	USGS -Lat	USGS-Long	Velocity	Vs30 (m/s)	Distance (m)*	**Station #**	Station name	lat	lon	NGA category	geologic unit
617LGP	37 10.337	122 00.682	D+	345	132	**16**	LGPC	37.172	122.01	primary	Tss
647SAD	34 11.044	118 01.237	C-	774	263*	**104**	Santa Anita Dam	34.185	118.018	primary	Kgr
645CCD	33 54.741	117 50.389	D-	235	171	**108**	Carbon Canyon Dam	33.912	117.838	primary	Qal, thin
633CSP	34 18.468	117 18.912	C-	417	1.42km*	**112**	Cedar Springs Pumphouse	34.31	117.3	primary	Kgr
640LMD	33 51.222	117 27.008	C-	533	204	**707**	Lake Mathews Dike Toe	33.852	117.451	primary	Kgr
629FRT	34 52.241	118 53.968	D+	314	92	**998**	Fort Tejon	34.87	118.9	primary	Kgr
660SLO	35 17.079	120 39.641	C-	481	51	**1083**	San Luis Obispo	35.285	120.661	primary	KJf
620AND	37 09.930	121 37.904	C-	383	336*	**1652**	Anderson Dam Left Abutment	37.166	121.628	primary	
624SOP	37 30.869	121 49.807	D+	346	59	**1684**	Sunol - Ohlone Wilderness Reg Pk	37.515	121.83	to add	Tss
618GUN	37 14.352	122 06.386	C-	522	45	**1697**	Los Gatos - Los Altos Rod & Gun	37.239	122.106	to add	Tss
623UCM	37 36.023	122 00.415	C-	461	91	**1739**	Union City - Masonic Home	37.6	122.006	to add	Tss
622CHP	37 33.161	122 05.478	C+	588	38	**1750**	Fremont - Coyote Hills Park	37.553	122.091	to add	KJf
621FVC	37 28.121	122 18.494	D-	240	78	**1752**	Woodside - Filoli Visitor Center	37.468	122.308	to add	KJf
616SFS	34 11.542	117 25.608	C-	376	72	**5036**	San Bernardino - Sycamore FS	34.193	117.427	to add	
638RCO	34 00.257	117 13.424	C-	488	76	**5037**	Reche Canyon - Olive Dell Ranch	34.004	117.223	to add	QT
606APF	33 36.376	116 27.124	C+	577	119	**5044**	Anza - Pinyon Flat	33.607	116.453	primary	Kgr
604ATV	33 28.751	116 35.550	C+	605	0	**5045**	Anza - Terwilliger Valley	33.48	116.59	primary	Kgr
602RDA	33 20.908	116 24.05	D+	329	94	**5047**	Rancho De Anza	33.348	116.4	primary	Qal, coarse
605SRM	33 34.086	116 30.706	C+	744	164	**5230**	Santa Rosa Mountain	33.568	116.51	primary	Kgr
603ATC	33 27.563	116 38.653	C-	471	48	**5231**	Anza - Tule Canyon	33.459	116.644	primary	Kgr
609IKF	33 42.459	116 43.047	B-	902	57	**5232**	Idyllwild - Keenwild Fire Station	33.708	116.717	to add	Kgr
636SOD	34 06.638	117 05.948	C-	470	43	**5300**	Seven Oaks Dam Donwstream Surf.	34.111	117.099	to add	Kgr
614DRW	34 09.939	117 15.051	C-	486	41	**5331**	San Bernardino - Del Rosa Wk Sta	34.166	117.251	to add	Kgr
610SPV	33 51.069	116 51.221	C+	619	158	**12206**	Silent Valley - Poppet Flat	33.851	116.852	primary	Kgr
611BTP	33 52.144	116 49.509	C+	630	108	**12674**	Banning - Twin Pines Road	33.869	116.824	to add	Kgr
642NVO	33 49.100	117 07.974	C-	369	?	**13095**	Nuevo - 11th & McKinley	33.818	117.132*	to add	Kgr
607MHS	33 35.919	117 07.925	C-	443	39	**13198**	Murrieta Hot Springs	33.599	117.132	primary	J metamorphic
608WBR	33 38.408	117 05.807	C+	619	259	**13199**	Winchester Bergman Ran	33.64	117.094	primary	
639RIV	33 53.615	117 19.289	C-	494	209	**13916**	Riverside - Van Buren & Trautwein	33.895	117.32	to add	Kgr
644LKE	33 40.100	117 19.955	C+	616	91	**13922**	Lake Elsinore - Graham & Poe	33.669	117.332	to add	J metamorphic
641PER	33 47.134	117 13.784	C-	518	161	**13928**	Perris - San Jacinto & C Street	33.787	117.23	to add	Qal, thin
643MVA	33 38.894	117 12.291	C-	503	79	**13929**	Menifee Valley - Murrieta & Scott	33.649	117.205	to add	Qal, thin
656RPV	33 44.724	118 23.886	C-	501	206	**14404**	Rancho Palos Verdes - Hawth	33.746	118.396	primary	
637HBP	34 09.536	116 47.919	C-	453	229	**22104**	Heart Bar State Park	34.161	116.799	to add	Kgr
648CWD	34 14.686	117 57.911	C-	464	111	**23210**	Cogswell Dam - Right Abutment	34.245	117.964	to add	Kgr
650MBS	34 13.938	117 39.755	C-	438	163	**23572**	Mt Baldy - Elementary Sch	34.233	117.661	primary	
634WSW	34 22.132	117 39.642	C-	390	247	**23574**	Wrightwood - Swarthout	34.369	117.658	primary	
635JKF	34 22.863	117 44.182	C-	466	58	**23590**	Wrightwood - Jackson Flat	34.381	117.737	primary	schist
615RCU	34 10.150	117 34.742	C-	432	18	**23598**	Rancho Cucamonga - Deer Can	34.169	117.579	primary	Kgr
613TSH	34 09.727	117 19.971	D+	336	127	**23701**	San Bernardino - 3-story Motel	34.163	117.332	to add	
612DCP	34 13.419	117 19.851	B-	773	42	**23732**	San Bernardino - Devil Canyon Penstock	34.224	117.331	to add	Kgr
630ANT	34 45.444	118 21.651	C-	483	68	**24310**	Antelope Buttes	34.758	118.361	primary	Kgr
649MWO	34 13.615	118 04.004	C-	390	913*	**24399**	Mt Wilson - CIT Seis Sta	34.224	118.057	primary	Kgr
628LHM	34 39.146	118 28.837	D+	294	428	**24523**	Lake Hughes #4B - Camp Mend	34.65	118.477	primary	pCg
658WDH	34 10.009	118 35.833	D-	265	113*	**24807**	Woodland Hills - Canoga & Ventura	34.167	118.596	to add	Qal, thin, west

653SVL	34 15.791	118 40.220	C-	391	179	**24861**	Simi Valley - Katherine Rd & Sylvan	34.262	118.669	to add	Qal, deep
659CAM	34 13.431	118 59.688	D-	321	73	**24863**	Camarillo - Woodcreek & Santa Rosa	34.224	118.994	to add	Qal, thin
632MOV	35 02.509	118 22.693	D+	320	112	**34237**	Mojave - Oak Creek Canyon	35.042	118.377	primary	
627PVC	35 58.386	120 28.036	C-	390	26	**36177**	Parkfield - Vineyard Cany 2E	35.973	120.467	primary	
661JBO	36 51.698	121 34.696	C-	372	46	**47315**	JB Overpass, Bent 3 g.l.	36.862	121.578	primary	
619COY	37 07.453	121 33.169	C-	469	165	**57504**	Coyote Lake Dam (Downst)	37.124	121.551	primary	Tss
626CLF	37 46.792	122 30.700	C-	393	241	**58132**	SF - Cliff House	37.778	122.513	primary	KJf
655LAF	34 05.358	118 26.084	D-	255	43	**90016**	LA - N Faring Rd	34.089	118.435	primary	Qoa
657MFC	34 02.720	118 38.344	C-	477	106	**90050**	Malibu - Las Flores Canyon	34.045	118.638	primary	J metamorphic
654HST	34 12.239	118 18.110	C+	714	16	**90059**	Burbank - Howard Rd.	34.204	118.302	primary	Qal, deep
651TUJ	34 17.219	118 13.610	C-	415	202	**90061**	Big Tujunga, Angeles Nat F	34.286	118.225	primary	Kgr
646HHC	33 59.405	117 56.624	D+	337	69	**90073**	Hacienda Heights - Colima	33.99	117.943	primary	Qal, thin
631FMD	34 42.255	118 25.662	C-	486	157	**24270 (121)**	Fairmont Dam	34.704	118.426	primary	Kgr
631FMD	34 42.255	118 25.662	C-	486	157	**24270 (121)**	Fairmont Dam	34.704	118.426	primary	Kgr
652SFD	34 27.560	118 45.092	C-	389	154	**24280 (285)**	Santa Felita Dam (Outlet)	34.46	118.753	primary	Qal, coarse
652SFD	34 27.560	118 45.092	C-	380	154	**24280 (285)**	Santa Felita Dam (Outlet)	34.46	118.753	primary	Qal, coarse

Figure A1.—Site 602RDA (CSMIP site 5047), located at Rancho De Anza, San Diego County, California. Site location 33.348°N 116.4°W. The shaker is placed about 70 meters to the northwest of the NGA station. Photo A is facing the northeast showing the shaker source and the seismometer arrays. Photo B shows the source facing away from the NGA station, which is shown in photo C facing to the southeast. The reverse array is oriented toward the station shown in photo D, and the forward array is oriented away.

NGA-PEER Site Classification

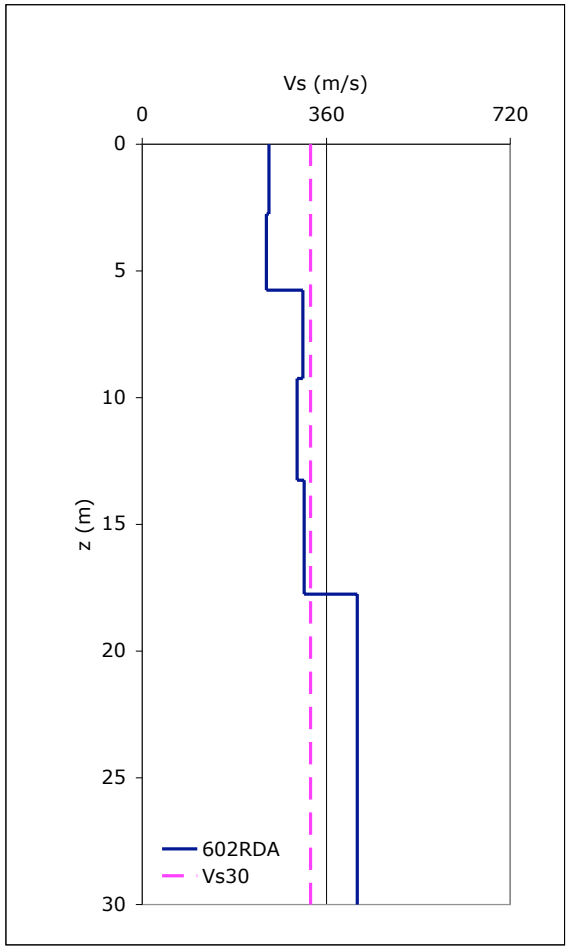
Site ID	**602RDA**
NEHRP CLASS:	**D**
Vs30	**329 (m/s)**
SUB-CLASS	**D+**

Location	Rancho De Anza
NGA Site ID	5047
State	CALIFORNIA

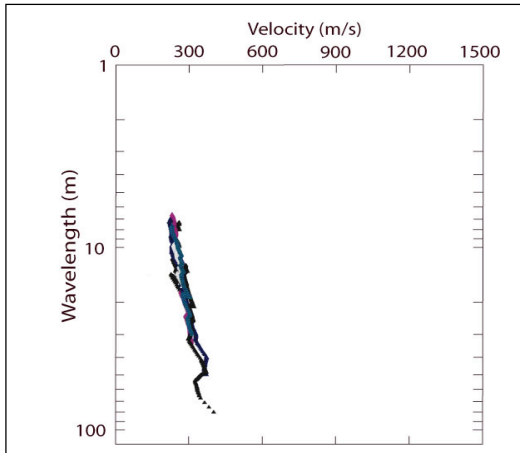
POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	33 20.908
GPS LONG (WEST	116 24.050

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	12/13/2003
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

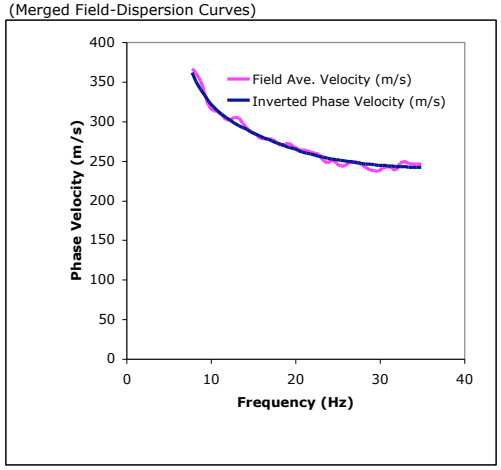
SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A2.—SASW site classification and location information for site 602RDA. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A3.—Site 603ATC (CSMIP site 5231), located at Anza - Tule Canyon, Riverside County, California. Site location 33.459°N 116.644°W. The shaker is placed on the dirt road about 7 meters to the northwest of the NGA station. Photo A shows the shaker and reverse array oriented to the west along the road. Photo B is taken from the road facing the shaker with the van and NGA station beyond. Photo C shows the forward array facing east along the road. The NGA station is shown in D and the shaker is located on the other side of the van.

NGA-PEER Site Classification

Site ID	**603ATC**
NEHRP CLASS:	**C**
Vs30	**471 (m/s)**
SUB-CLASS	**C-**

Location	Anza - Tule Canyon
NGA Site ID	5231
State	CALIFORNIA

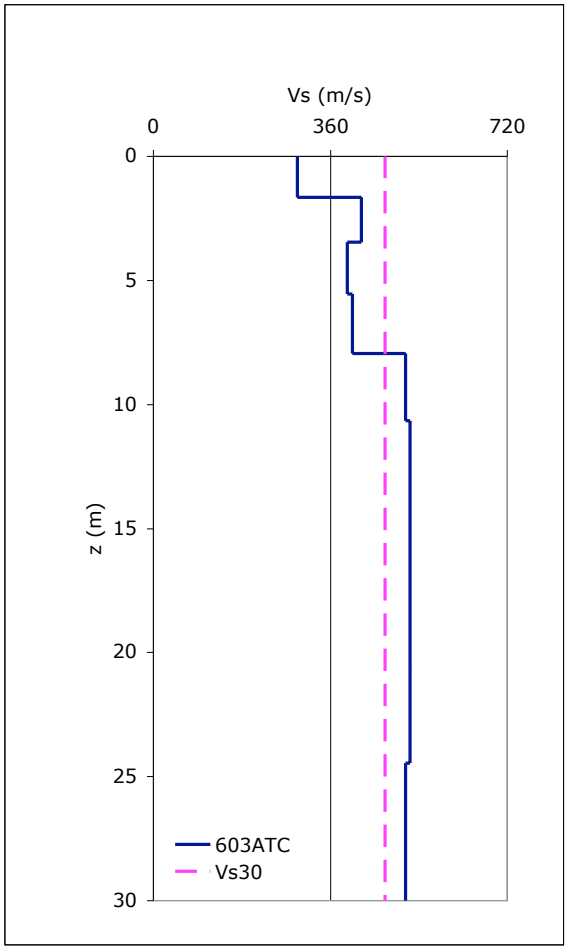
POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	33 27.563
GPS LONG (WEST	116 38.653

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	12/14/2003

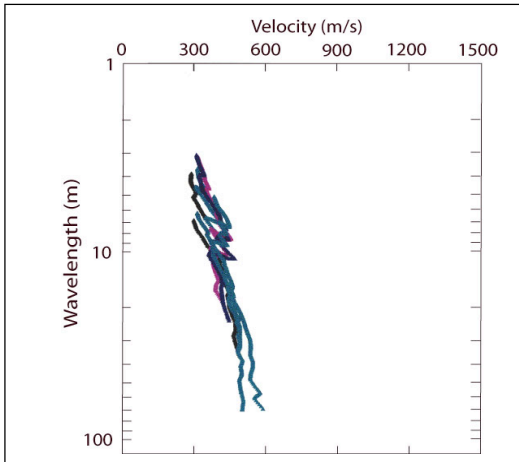
TEST METHOD CONTINUOUS HARMONIC WAVE-SASW

PROJECT NAME PEER 1LO2 NGA MODELS
SPONSORS PEER, Caltrans, CEC, PG&E

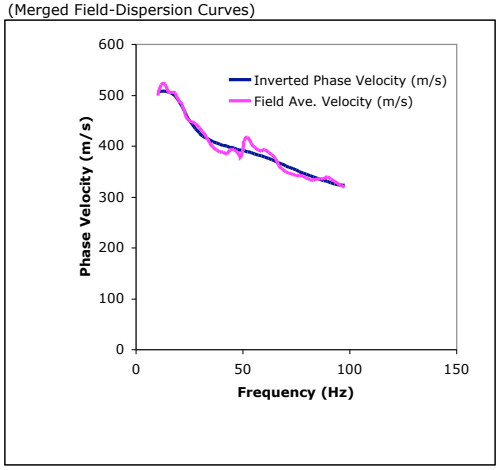
SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A4.—SASW site classification and location information for site 603ATC. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

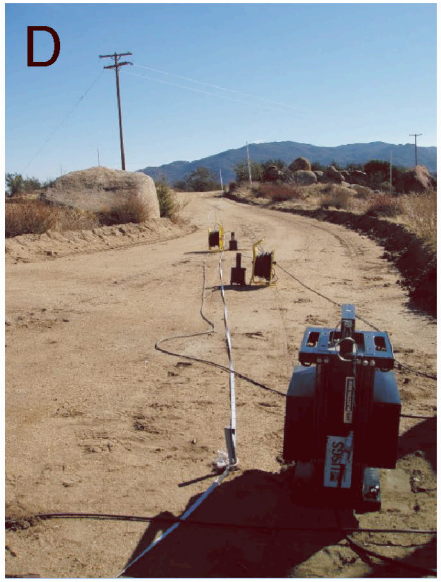


Figure A5.—Site 604ATV (CSMIP site 5045), located at Anza - Terwilliger Valley, Riverside County, California. Site location 33.48°N 116.59°W. The NGA station was not located. Photo A shows full array facing north. Photo B shows the reverse array oriented to the south of the source. Photo C is taken of the source facing to the west (toward the waypoint of the NGA station). Photo D shows the forward array facing to the north.

NGA-PEER Site Classification

Site ID	**604ATV**
NEHRP CLASS:	**C**
Vs30	**605 (m/s)**
SUB-CLASS	**C+**

Location	Anza - Terwilliger Valley
NGA Site ID	5045
State	CALIFORNIA

POSITION	**DEGREES**	**DECIMAL MINUTES**
GPS LAT (NORTH)	33	28.751
GPS LONG (WEST	116	35.550

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	12/14/2003
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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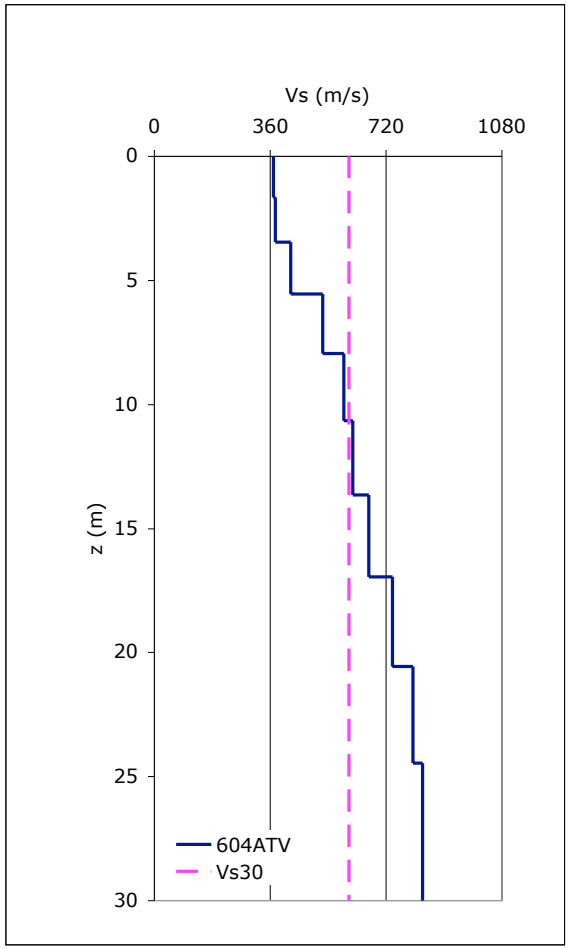
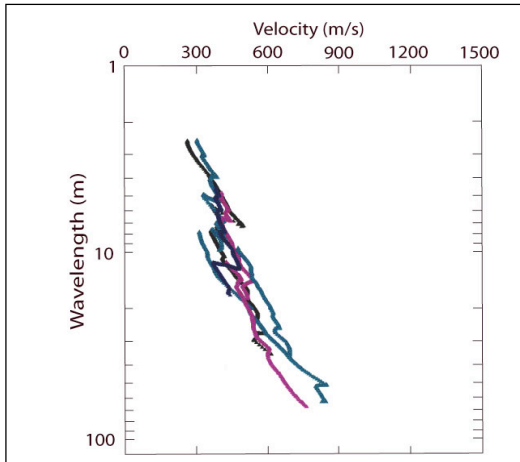
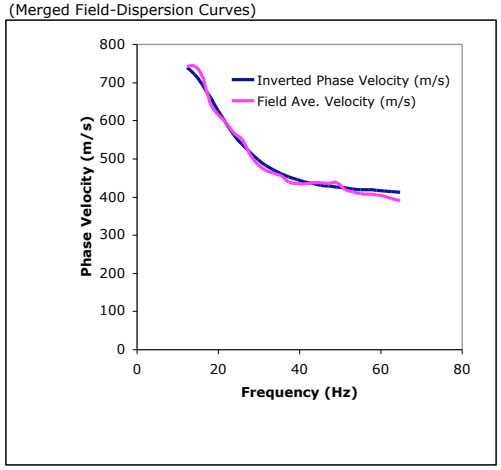


(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A6.—SASW site classification and location information for site 604ATV. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A7.—Site 605SRM (CSMIP site 5230), located at Santa Rosa Mountain, Riverside County, California. Site location 33.568°N 116.51°W. The NGA station is located in a turnout on the south side of Hwy 74 shown in photo A. Only a forward array was recorded due to limited space. Photo B shows the highway and turnout facing to the west. Photo C looks across the highway to the north at the National Forest Land sign as a landmark. Photo D is taken from the south, showing the source at the van and the seismometers oriented to the south of the source.

NGA-PEER Site Classification

Site ID	**605SRM**
NEHRP CLASS:	**C**
Vs30	**744 (m/s)**
SUB-CLASS	**B-**

Location	SANTA ROSA MOUNTAIN
NGA Site ID	5230
State	CALIFORNIA

POSITION	**DEGREES**	**DECIMAL MINUTES**
GPS LAT (NORTH)	33	34.086
GPS LONG (WEST	116	30.706

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	12/13/2003
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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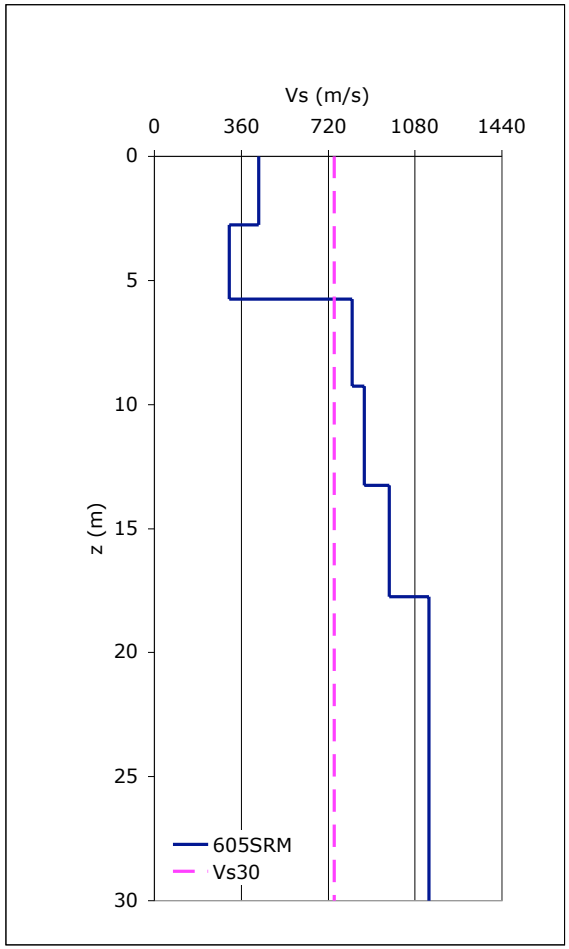
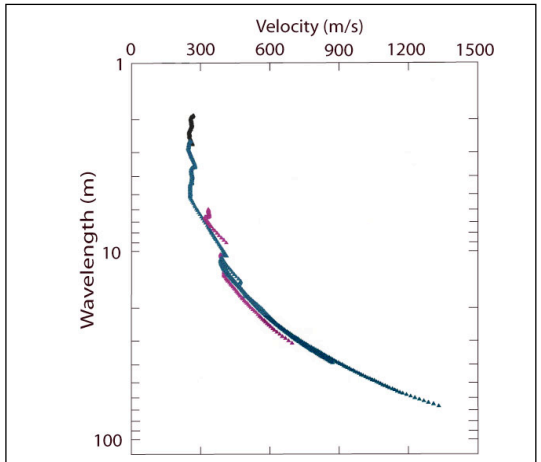
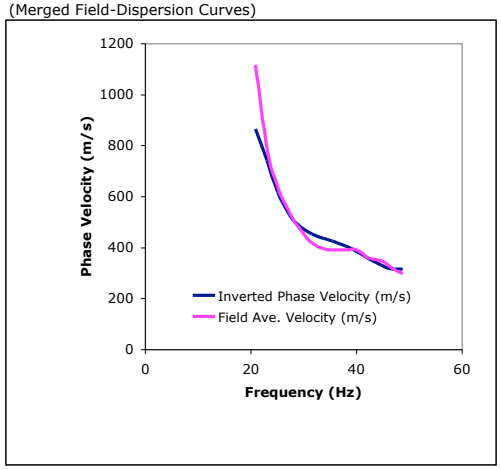
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A8.—SASW site classification and location information for site 605SRM. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A9.—Site 606APF (CSMIP site 5044), located at Anza - Pinyon Flat, Riverside County, California. Site location 33.607°N 116.453°W. The poor quality of the pictures is due to the low light conditions when we collected this data. Photo A is of the source which is located about 7 meters west of the NGA station shown in photo D. The reverse array extends to the south from the shaker shown in photo B. Photo C shows the full array facing south with the forward array extending north from the source and the reverse oriented to the south.

NGA-PEER Site Classification

Site ID **606APF**
NEHRP CLASS: **C**
Vs30 **577 (m/s)**
SUB-CLASS **C+**

Location Anza - Pinyon Flat
NGA Site ID 5044
State CALIFORNIA

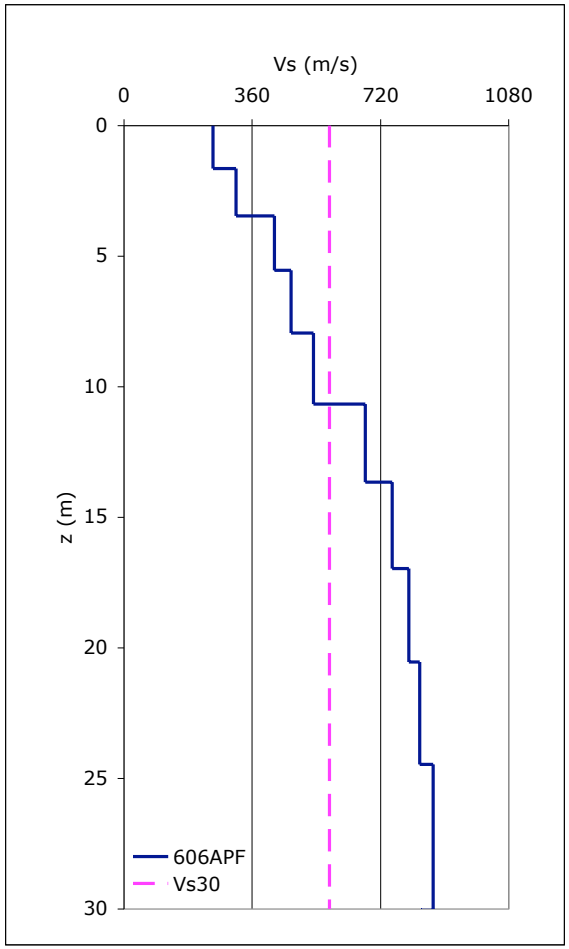
POSITION	**DEGREES**	**DECIMAL MINUTES**
GPS LAT (NORTH)	33	36.376
GPS LONG (WEST	116	27.124

Data Type SWEPT-SINE SASW
Investigators KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected 12/14/2003

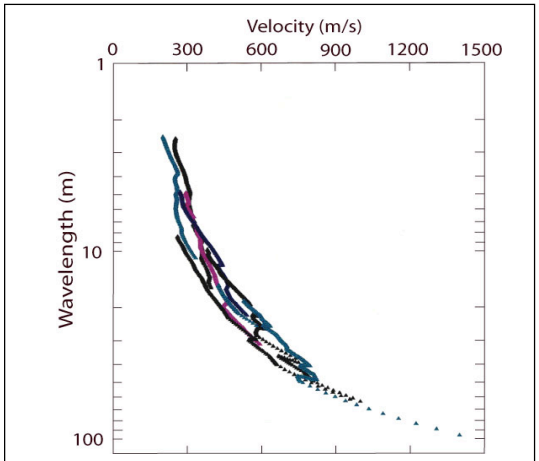
TEST METHOD CONTINUOUS HARMONIC WAVE-SASW

PROJECT NAME PEER 1LO2 NGA MODELS
SPONSORS PEER, Caltrans, CEC, PG&E

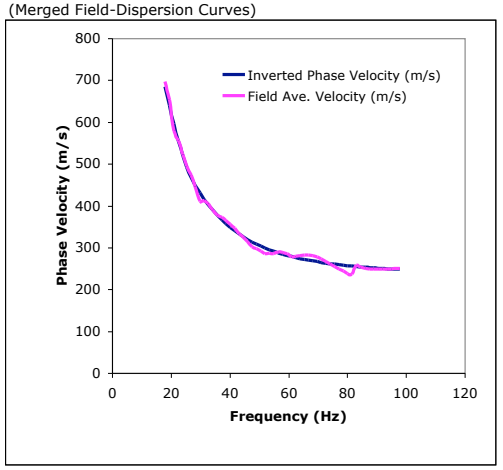
SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A10.—SASW site classification and location information for site 606APF. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A11.—Site 607MHS (CSMIP site 13198), located at Murrieta Hot Springs, Riverside County, California. Site location 33.599°N 117.132°W. The NGA station was never located. The extent of the array is shown in photo A, taken from the west of the array. The NGA waypoint plotted about 16 meters to the north of the location of the source, shown in photo B, facing the northeast, and C facing north. Photo D looks to the southwest along the road.

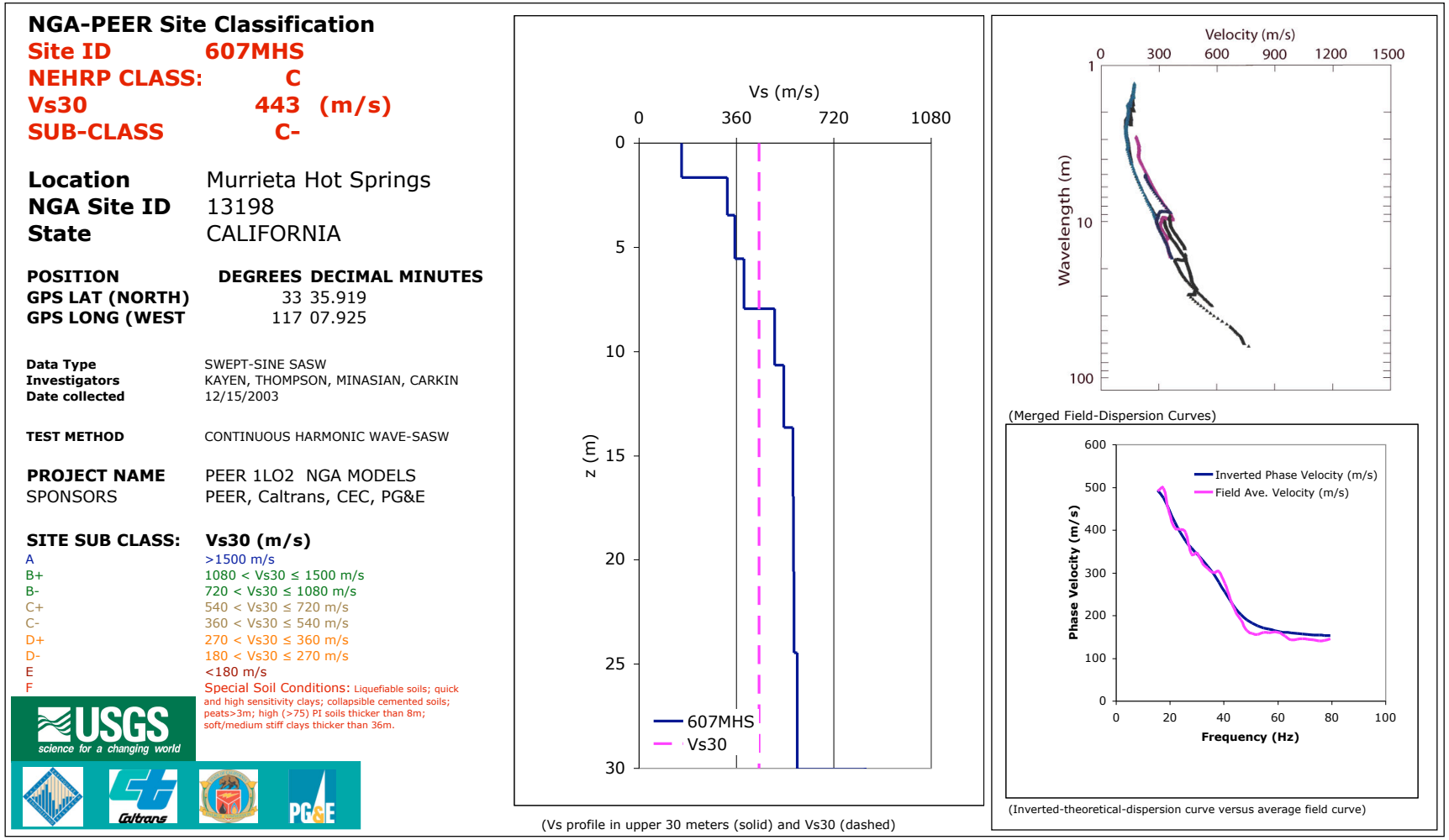


Figure A12.—SASW site classification and location information for site 607MHS. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A13.—Site 608WBR (CSMIP site 13199), located in Winchester at Bergman Ranch, Riverside County, California. Site location 33.64°N 117.094°W. The NGA station is located on Winchester Bergman Ranch shown in photo A. The source was located on the adjacent gravel road to the west of the ranch shown in photo B. Photo C is facing south and shows the full array (forward direction to the north and reverse to the south). Photo D shows the array facing north.

NGA-PEER Site Classification

Site ID **608WBR**
NEHRP CLASS: **C**
Vs30 **619 (m/s)**
SUB-CLASS **C+**

Location Winchester Bergman Ranch
NGA Site ID 13199
State CALIFORNIA

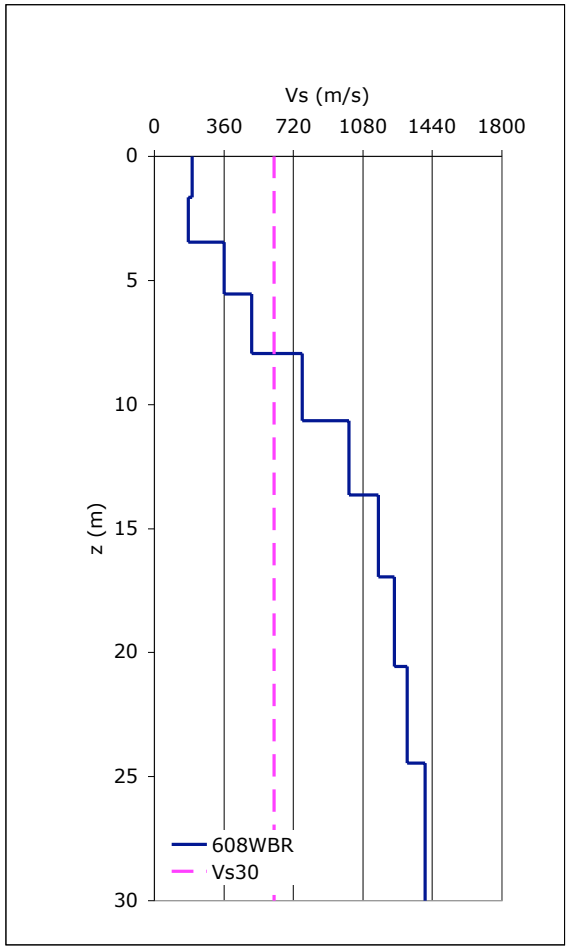
POSITION	**DEGREES**	**DECIMAL MINUTES**
GPS LAT (NORTH)	33	38.408
GPS LONG (WEST	117	05.807

Data Type SWEPT-SINE SASW
Investigators KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected 12/15/2003

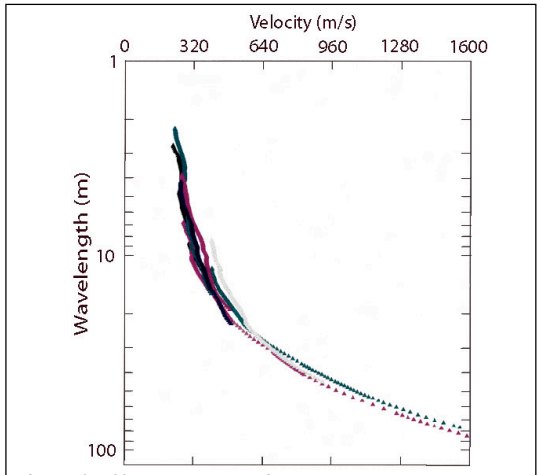
TEST METHOD CONTINUOUS HARMONIC WAVE-SASW

PROJECT NAME PEER 1LO2 NGA MODELS
SPONSORS PEER, Caltrans, CEC, PG&E

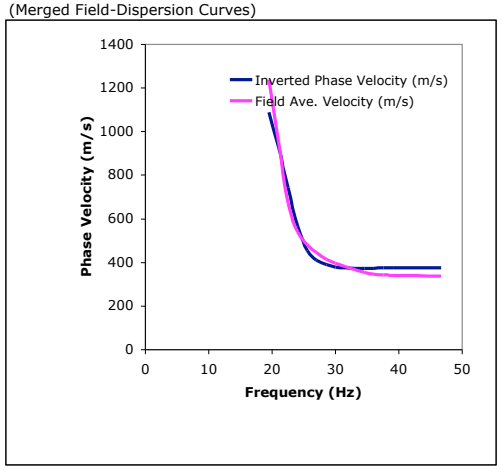
SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A14.—SASW site classification and location information for site 608WBR. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A15.—Site 609IKF (CSMIP site 5232), located in Idyllwild at Keenwild Fire Station, Riverside County, California. Site location 33.747° 116.715°W. The NGA station is located in a fire station, photos A and B. The source was located adjacent to the building shown in photo C and was approximately 10 meters from the NGA station shown in the garage in photo D.

NGA-PEER Site Classification

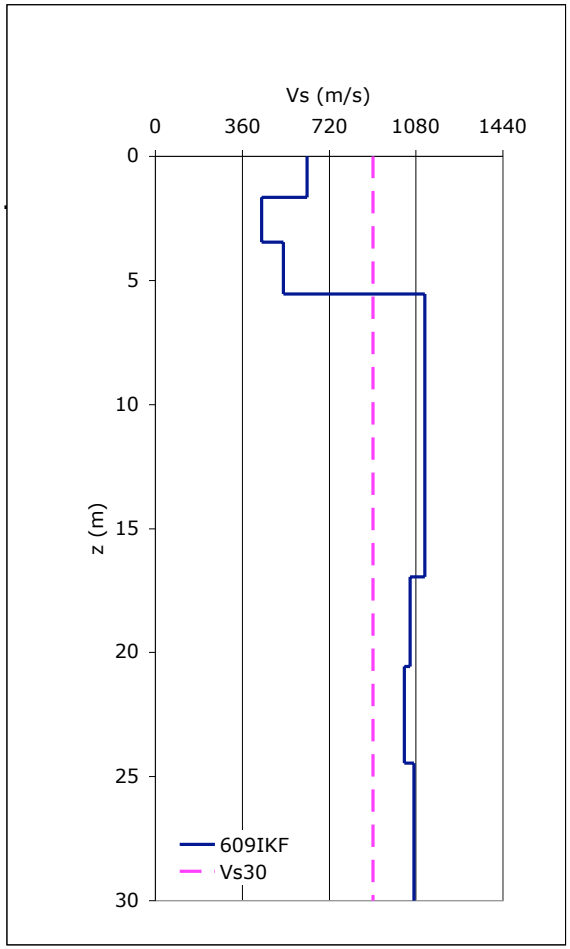
Site ID	**609IKF**
NEHRP CLASS:	**B**
Vs30	**902 (m/s)**
SUB-CLASS	**B-**

Location	Idyllwild - Keenwild Fire Sta.
NGA Site ID	5232
State	CALIFORNIA

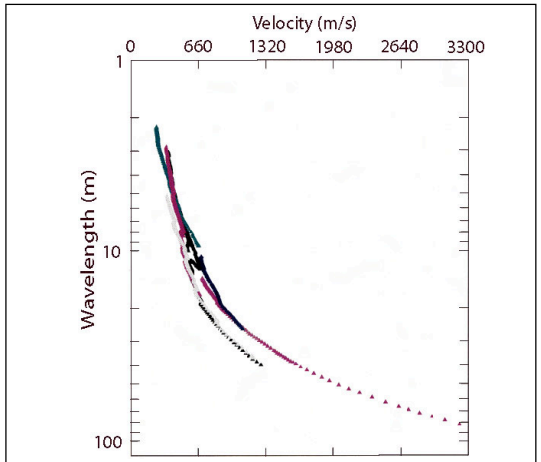
POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	33 42.459
GPS LONG (WEST	116 43.047

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	12/16/2003
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

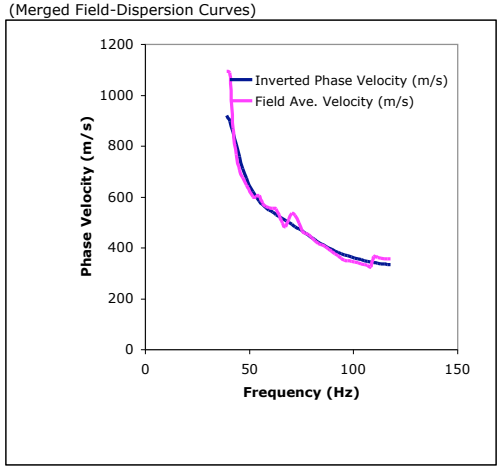
SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A16.—SASW site classification and location information for site 609IKF. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A17.—Site 610SPV (CSMIP site 12206), located in Silent Valley - Poppet Flat, Riverside County, California. Site location 33.851°N 116.852°W. Photo A faces south and shows the source and the reverse array coming toward the camera to the north, the forward array is oriented to the east, and the NGA station is located about 60 meters to the west of the source. Photo B faces northeast. Photo C is taken from the NGA station looking at the source, and photo D is looking at the NGA station from the source.

NGA-PEER Site Classification

Site ID	**610SPV**
NEHRP CLASS:	**C**
Vs30	**619 (m/s)**
SUB-CLASS	**C+**

Location	Silent Valley - Poppet Flat
NGA Site ID	12206
State	CALIFORNIA

POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	33 51.069
GPS LONG (WEST	116 51.221

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	12/16/2003
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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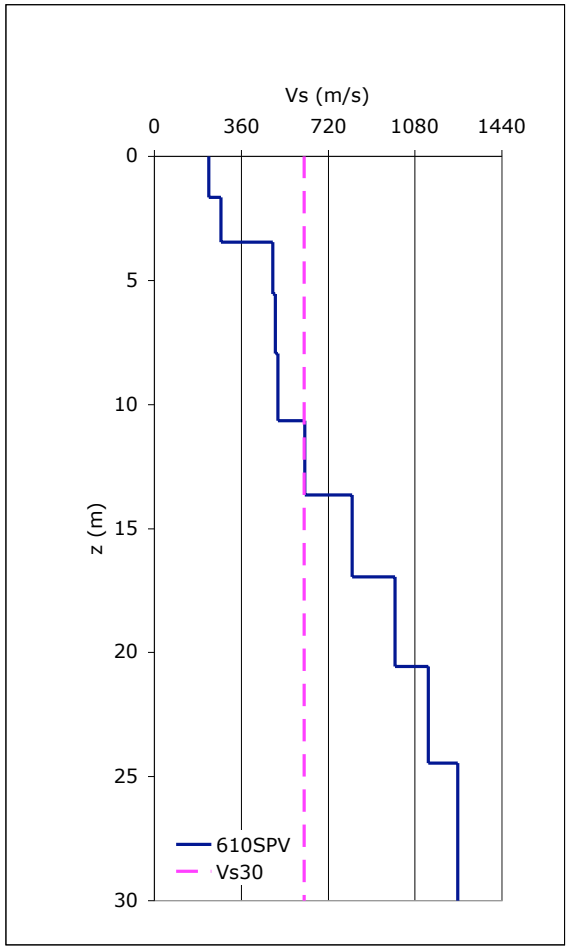
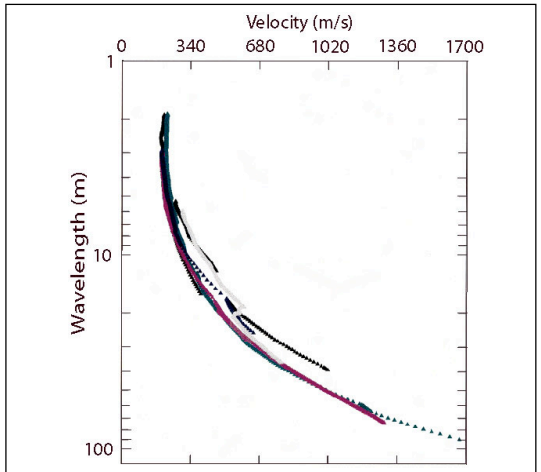
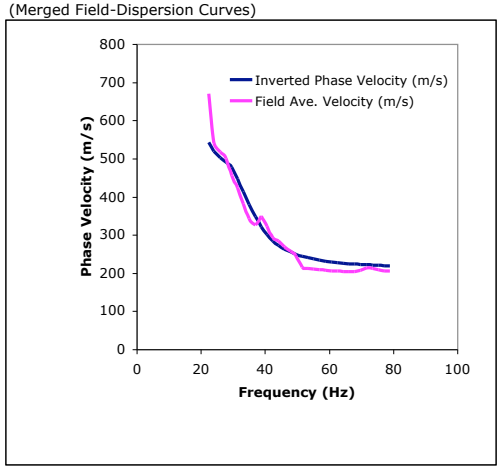
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A18.—SASW site classification and location information for site 610SPV. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A19.—Site 611BTP (CSMIP site 12674), located in Banning at Twin Pines Road, Riverside County, California. Site location 33.869°N 116.824°W. The pad on which the NGA station was located was found and is shown in photo A with the generator placed on it. The source was located about 10 meters southeast of the pad and is shown in photo B. This was a private residence and therewas only room for an array in one direction, to the northwest, shown in photo C. Photo D looks back at the source facing the southeast.

NGA-PEER Site Classification

Site ID	**611BTP**
NEHRP CLASS:	**C**
Vs30	**630 (m/s)**
SUB-CLASS	**C+**

Location	Banning - Twin Pines Road
NGA Site ID	12674
State	CALIFORNIA

POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	33 52.144
GPS LONG (WEST	116 49.509

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	12/16/2003
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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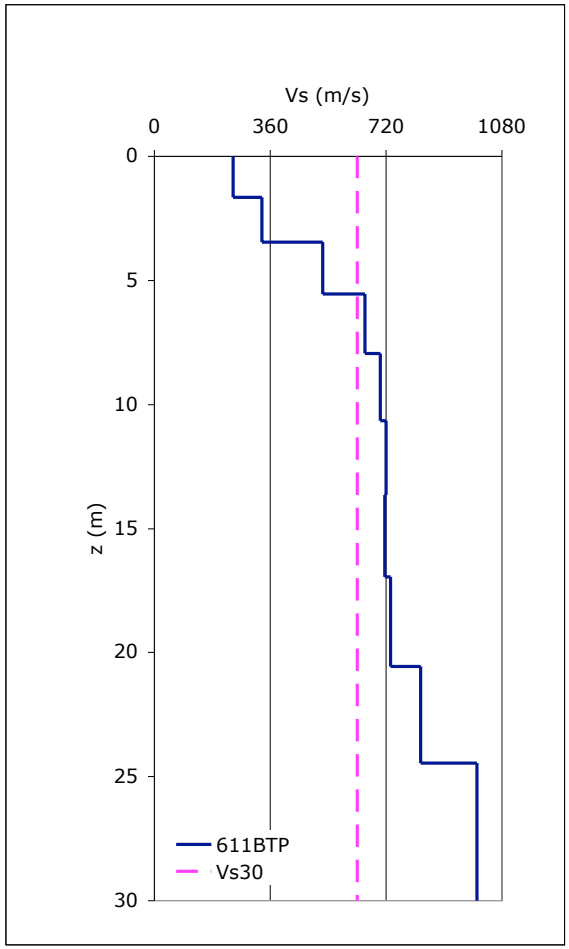
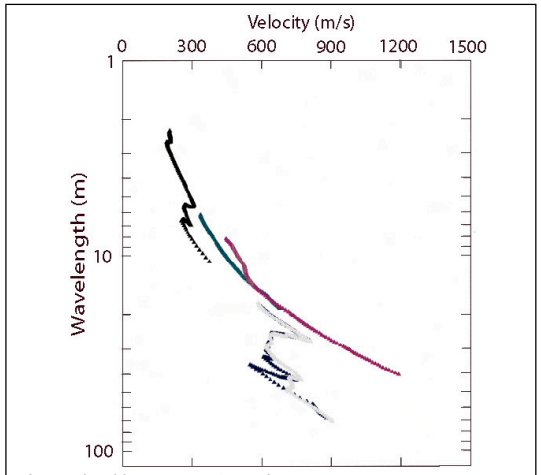
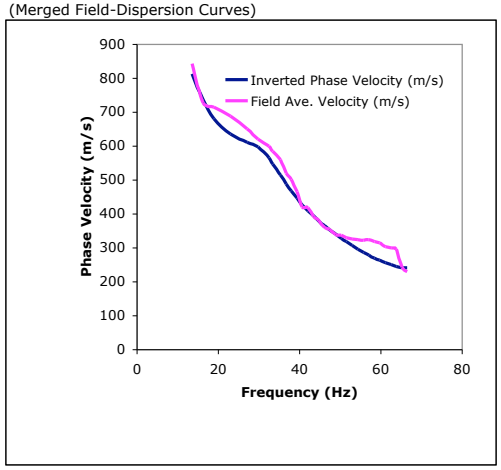
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A20.—SASW site classification and location information for site 611BTP. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

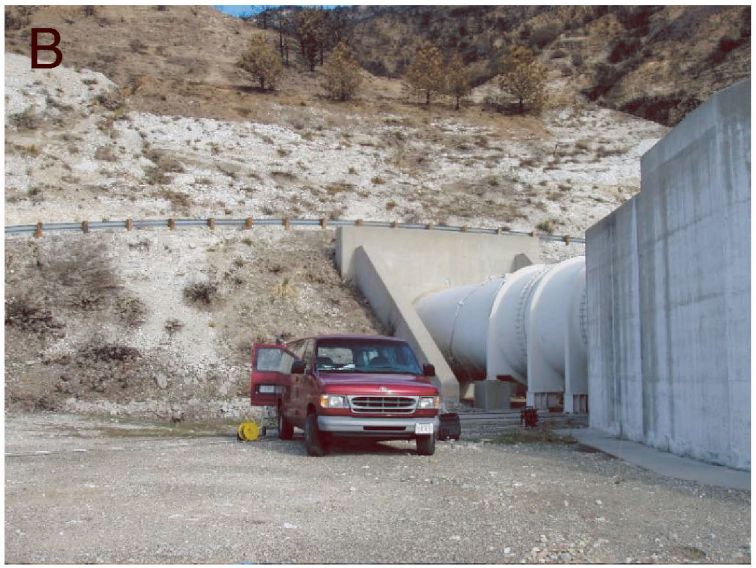


Figure A21.—Site 612DCP (CSMIP site 23732), located in San Bernardino - Devil Canyon Penstock, San Bernardino County, California. Site location 34.224°N 117.331°W. The NGA site was never located. Photo A looks south from where we tested, and photo B looks north. In photo B the forward array extends to the east, and the reverse to the west.

NGA-PEER Site Classification

Site ID	**612DCP**
NEHRP CLASS:	**B/C**
Vs30	**773 (m/s)**
SUB-CLASS	**B-**

Location	San Bern. - Devil Cyn Peak
NGA Site ID	23732
State	CALIFORNIA

POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	34 13.419
GPS LONG (WEST	117 19.851

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	12/17/2003
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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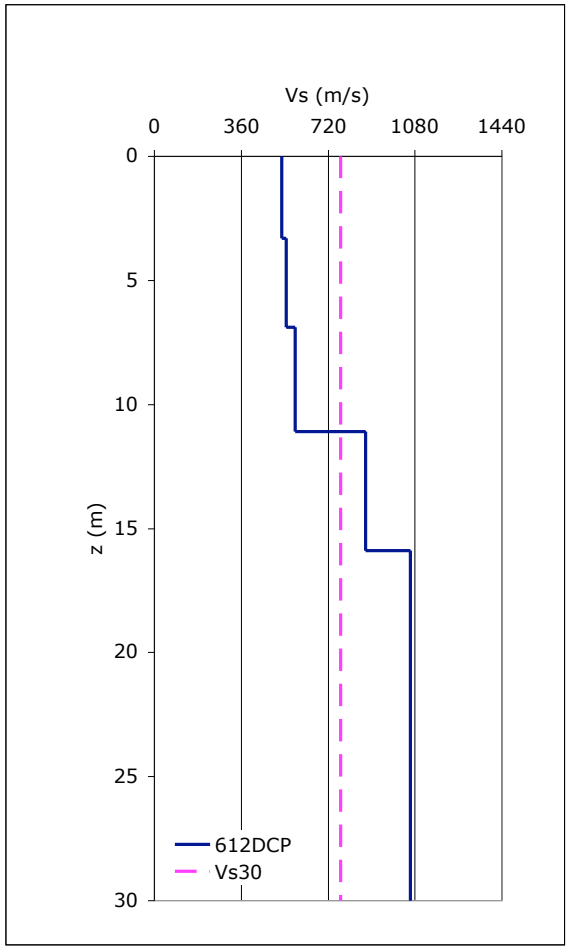
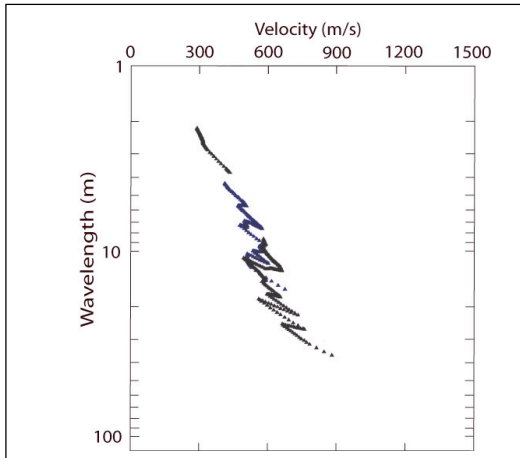
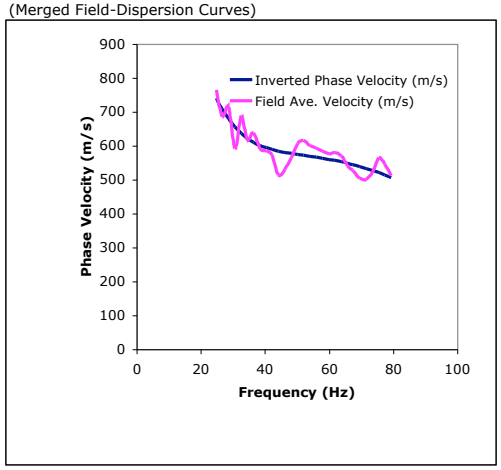
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A22.—SASW site classification and location information for site 612DCP. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A23.—Site 613TSH (CSMIP site 23701), located in San Bernardino - 3-story Motel, San Bernardino County, California. Site location 34.163°N 117.332°W. The NGA station could not be located. Photo A is looking at the source to the south at the reverse array and the forward array extends to the right of the picture. Photo B is facing to the northwest and is looking at a three story hotel. Photo C shows the address of the building we tested next to and the location of our source. Photo D is looking north at the source.

NGA-PEER Site Classification

Site ID	**613TSH**
NEHRP CLASS:	**D**
Vs30	**336 (m/s)**
SUB-CLASS	**D+**

Location	San Bern. - 3-Story Motel
NGA Site ID	23701
State	CALIFORNIA

POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	34 09.727
GPS LONG (WEST	117 19.971

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	12/17/2003

TEST METHOD CONTINUOUS HARMONIC WAVE-SASW

PROJECT NAME PEER 1LO2 NGA MODELS
SPONSORS PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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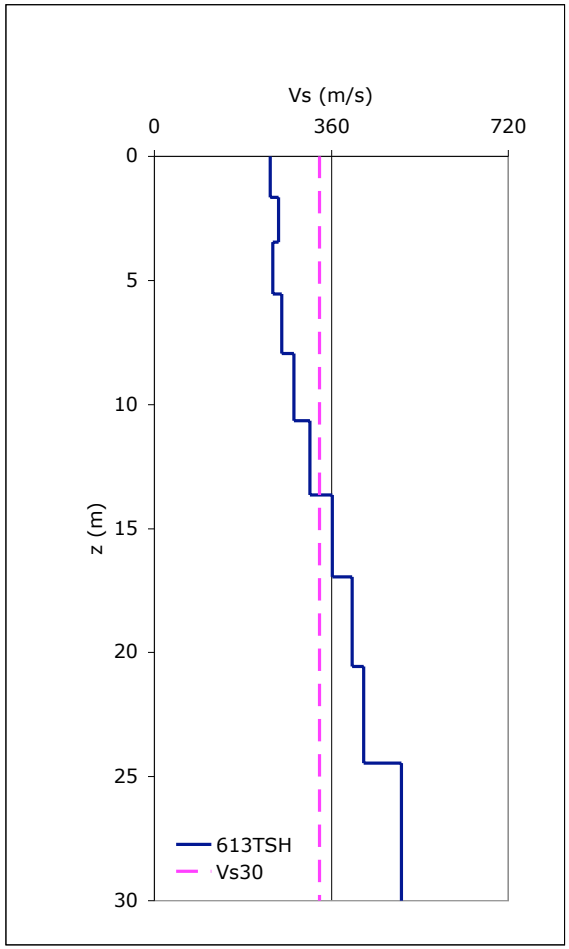
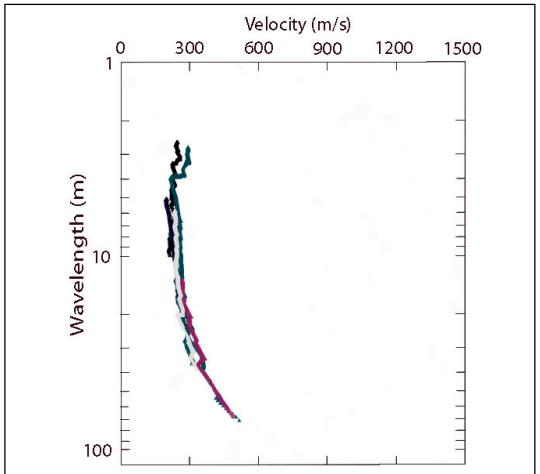
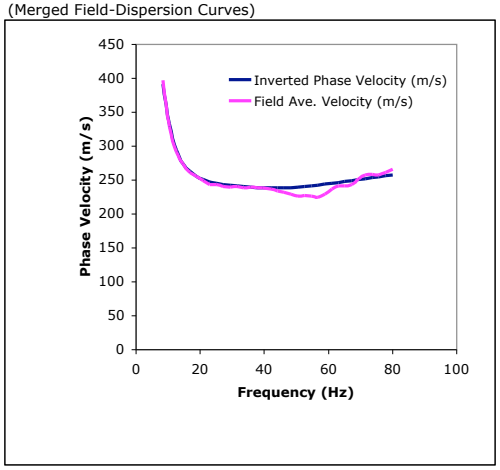
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A24.—SASW site classification and location information for site 613TSH. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

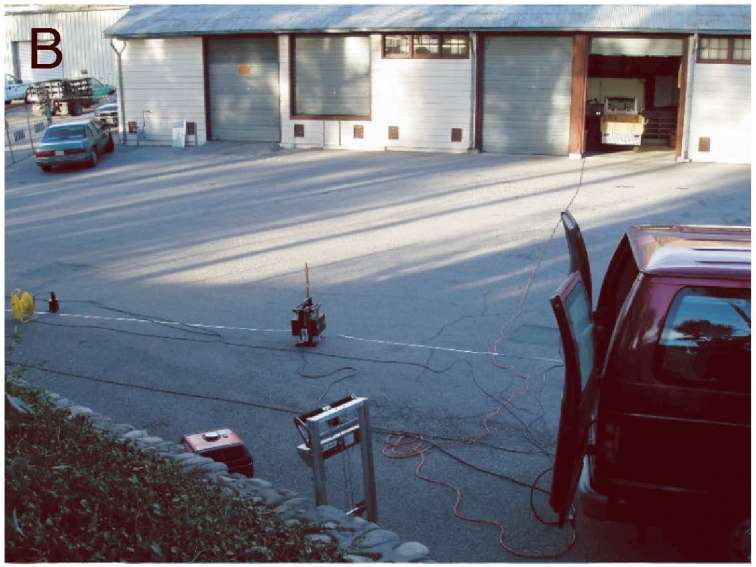


Figure A25.—Site 614DRW (CSMIP site 5331), located in San Bernardino - Del Rosa Week Station, San Bernardino County, California.Site location 34.166 °N 117.251°W. The NGA station is located in the fire station to the left in photo A which also shows the source and the forward array extending to the east. Photo B is looking directly north at the shaker and the fire station behind it. Photo C shows the source and the reverse direction extending to the west. The full array is shown in Photo D facing to the southeast.

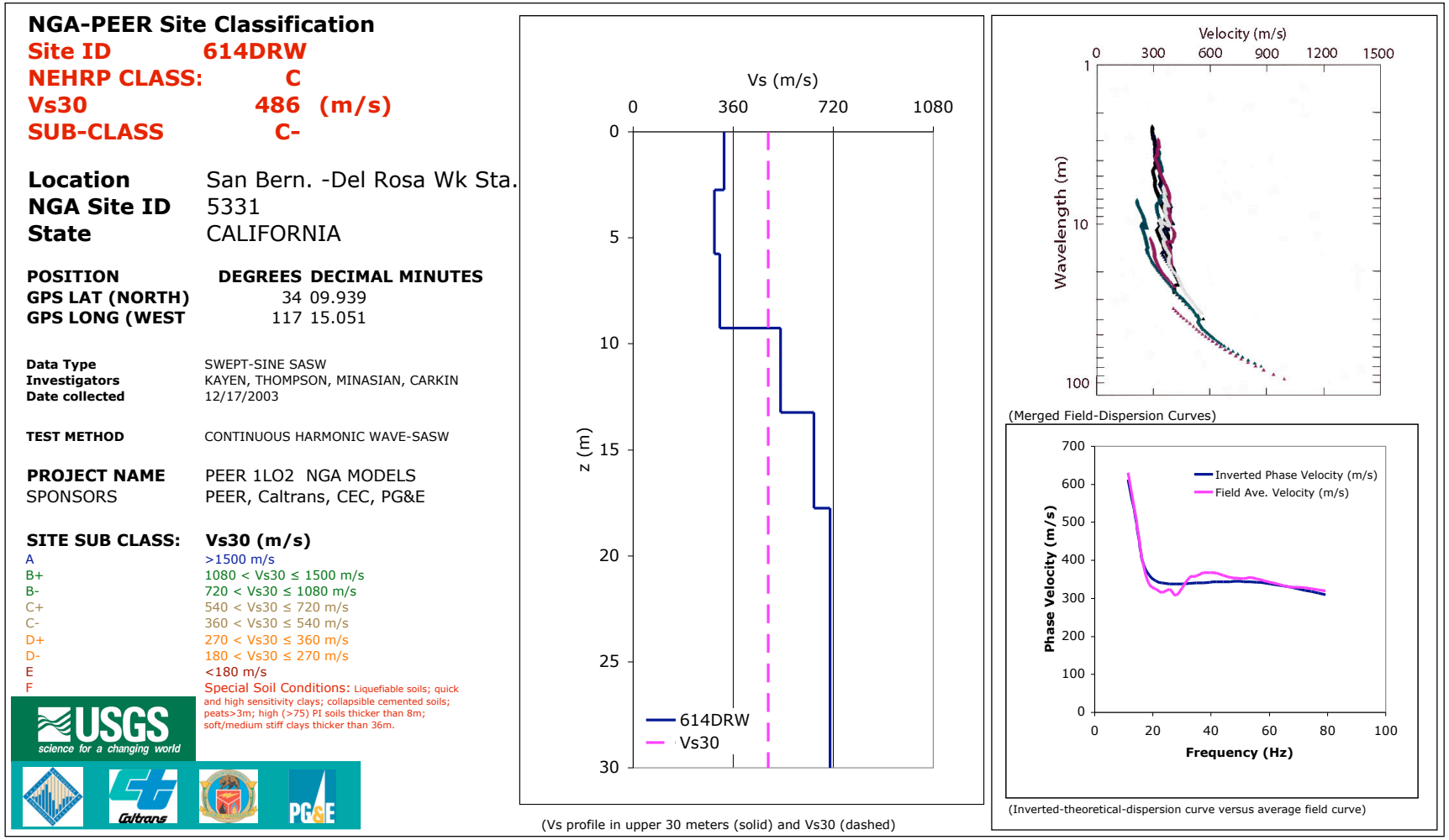
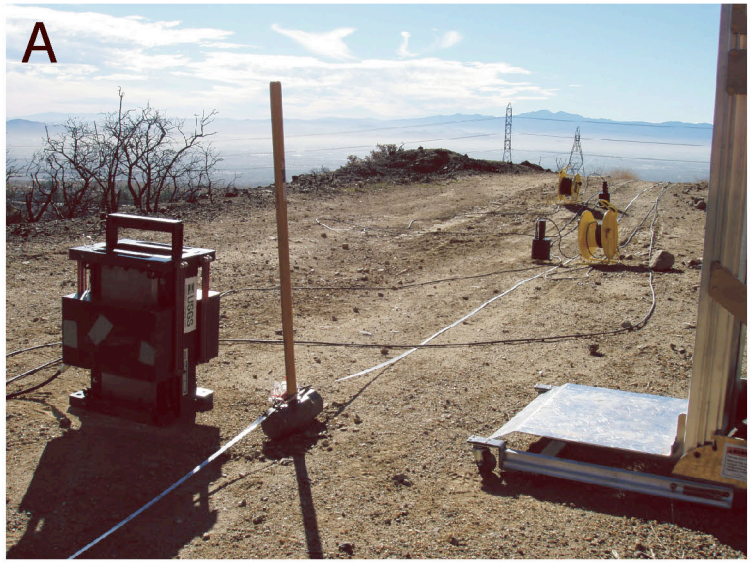


Figure A26.—SASW site classification and location information for site 614DRW. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.



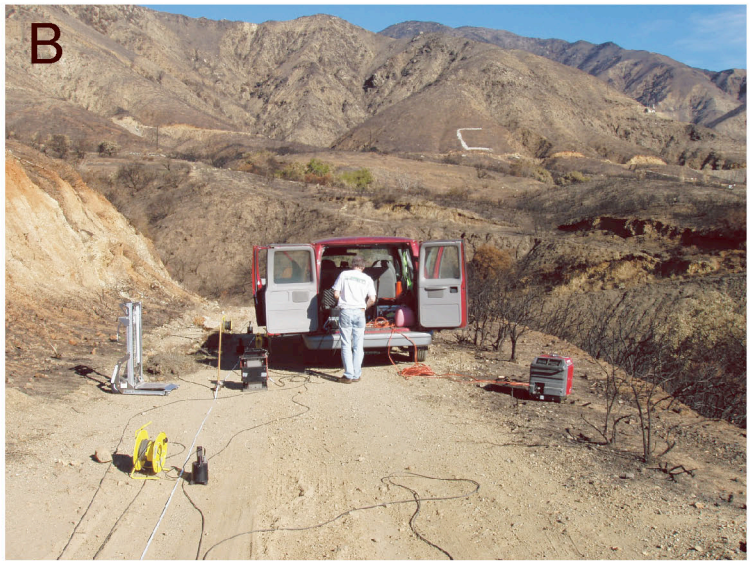


Figure A27.—Site 615RCU (CSMIP site 23598), located at Rancho Cucamonga - Deer Canyon, San Bernardino County, California. Site location 34.169°N 117.579°W. The NGA station could not be found. Photo A shows the source and the reverse array extending to the south. Photo B looks north along the road. Photo C faces the southwest, and photo D faces the east.

NGA-PEER Site Classification

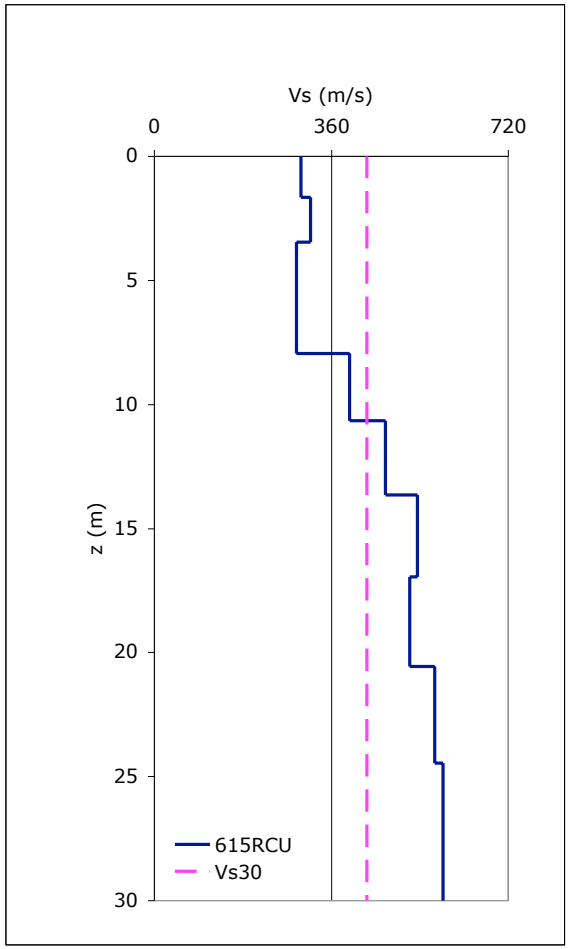
Site ID	**615RCU**
NEHRP CLASS:	**C**
Vs30	**432 (m/s)**
SUB-CLASS	**C-**

Location	R. Cucamonga - Deer Cyn.
NGA Site ID	23598
State	CALIFORNIA

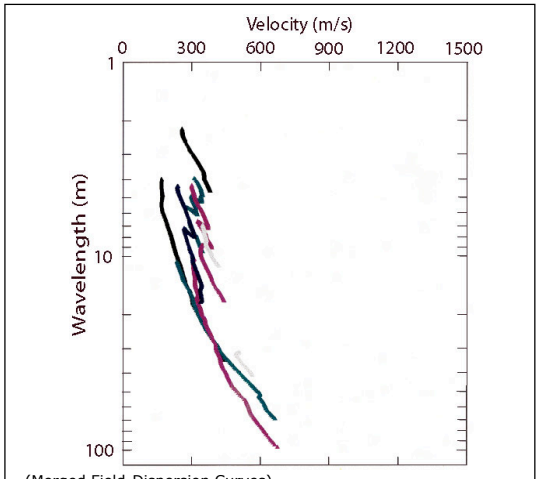
POSITION	**DEGREES**	**DECIMAL MINUTES**
GPS LAT (NORTH)	34	10.150
GPS LONG (WEST	117	34.742

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	12/18/2003
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

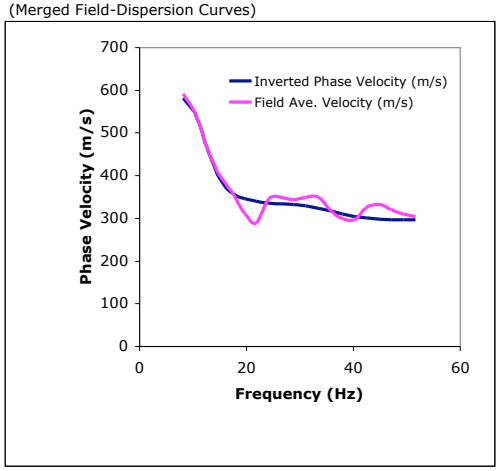
SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A28.—SASW site classification and location information for site 615RCU. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A29.—Site 616SFS (CSMIP site 5036), located in San Bernardino - Sycamore Fire Station, San Bernardino County, California. Site location 34.193°N 117.427°W. Photo A faces west along the reverse array which extends to the east from the source. The fire station is at the right side of the photo. The NGA station is located underneath the stairs in the fire station shown in photos B and C. Photo D faces east from the source looking along the reverse array.

NGA-PEER Site Classification

Site ID	**616SFS**
NEHRP CLASS:	**C/D**
Vs30	**376 (m/s)**
SUB-CLASS	**C-**

Location	San Bern. - Sycamore FS
NGA Site ID	5036
State	CALIFORNIA

POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	34 11.542
GPS LONG (WEST	117 25.608

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	12/18/2003
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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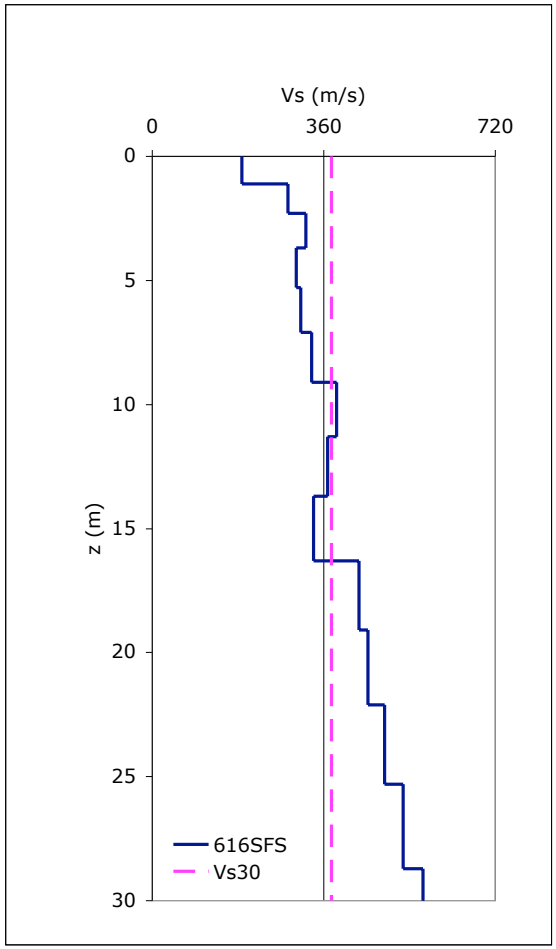
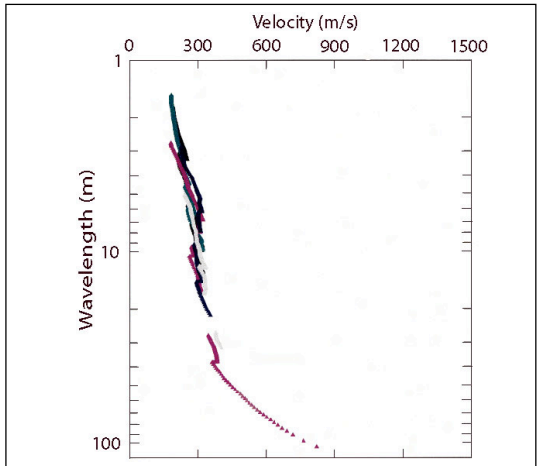
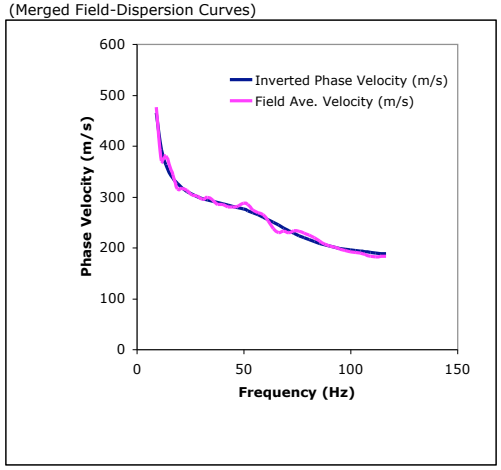
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A30.—SASW site classification and location information for site 616SFS. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A31.—Site 617LGP (CSMIP site 16), located in Los Gatos - Presentation Center, Santa Clara County, California. Site location 37.172°N 122.01°W. Photo A looks east over NGA station 16. Photo B looks north from the NGA station to the source which is located about 15 meters to the north of the station. There was only room for one array that extended to the north of the source. Photo C faces the source from the southwest. Photo D is looking toward the source along the array facing to the south.

NGA-PEER Site Classification

Site ID 617LGP
NEHRP CLASS: C/D
Vs30 345 (m/s)
SUB-CLASS D+

Location Los Gatos - LGPC
NGA Site ID 16
State CALIFORNIA

POSITION	DEGREES DECIMAL MINUTES
GPS LAT (NORTH)	37 10.337
GPS LONG (WEST	122 00.682

Data Type SWEPT-SINE SASW
Investigators KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected 12/27/2003

TEST METHOD CONTINUOUS HARMONIC WAVE-SASW

PROJECT NAME PEER 1LO2 NGA MODELS
SPONSORS PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	Vs30 (m/s)
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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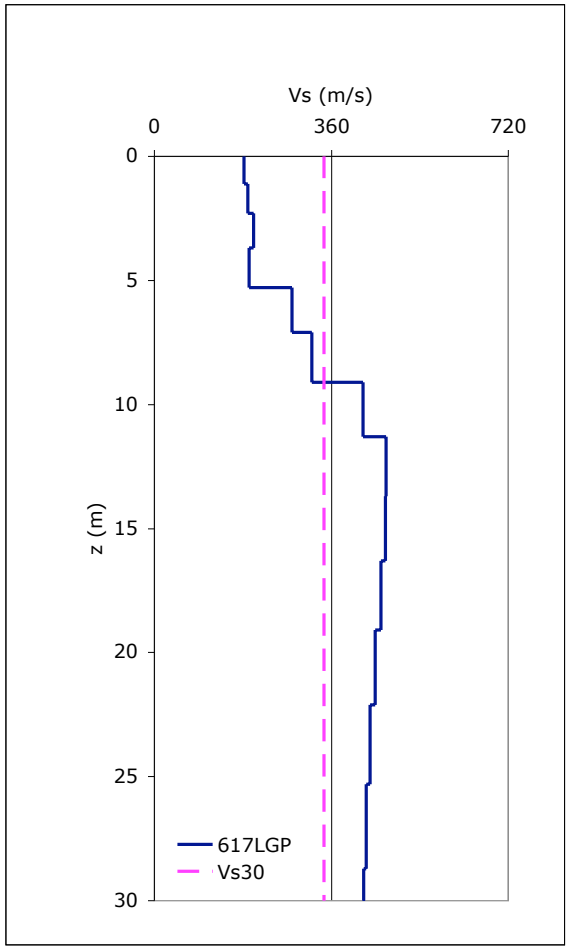
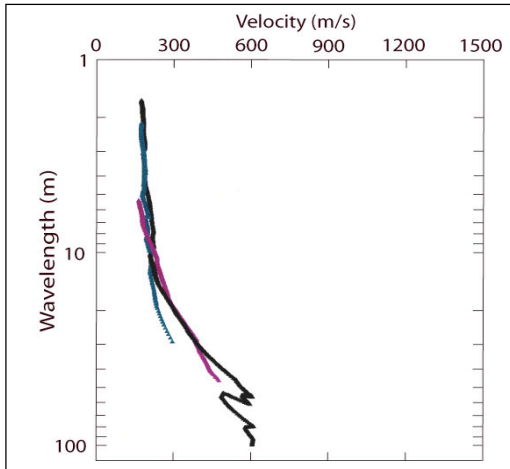
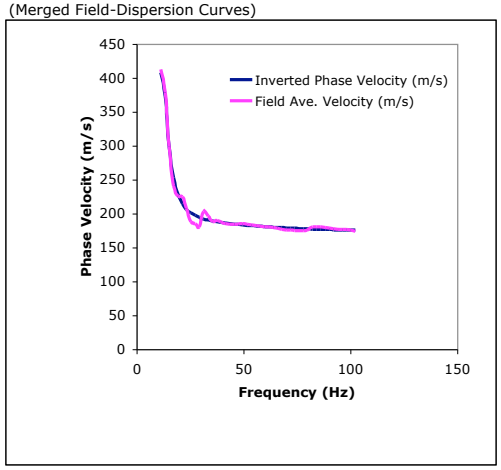


(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A32.—SASW site classification and location information for site 617LGP. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A33.—Site 618GUN (CSMIP site 1697), located in Los Gatos - Los Altos Rod & Gun, Santa Clara County, California. Site location 37.239°N 122.106°W. Photo A shows the source facing northeast. Photo B shows the source facing southwest. The NGA station is located about 15 meters to the south of the source in the men's room, photos C and D.

NGA-PEER Site Classification

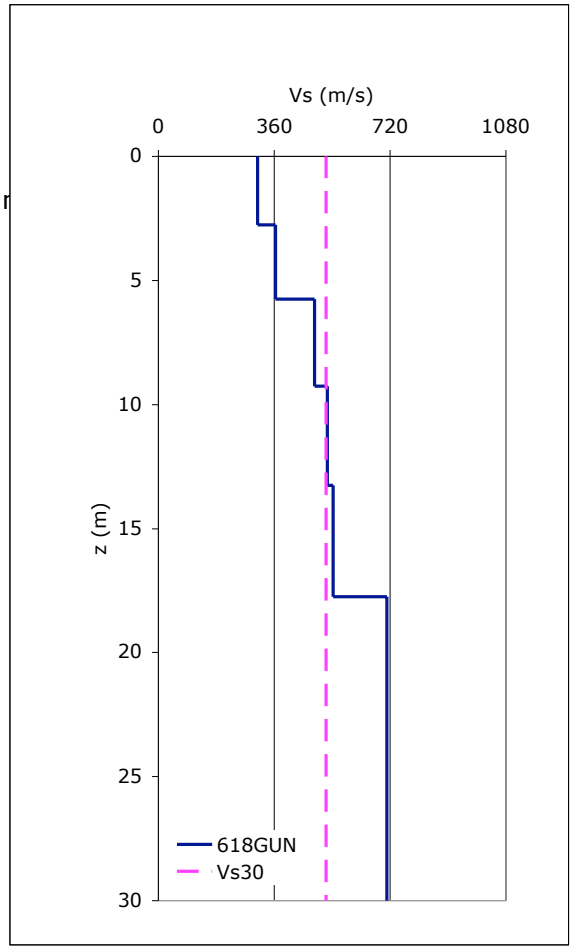
Site ID	**618GUN**
NEHRP CLASS:	**C**
Vs30	**522 (m/s)**
SUB-CLASS	**C-**

Location	Los Gatos - L.Altos Rod+Gur
NGA Site ID	1697
State	CALIFORNIA

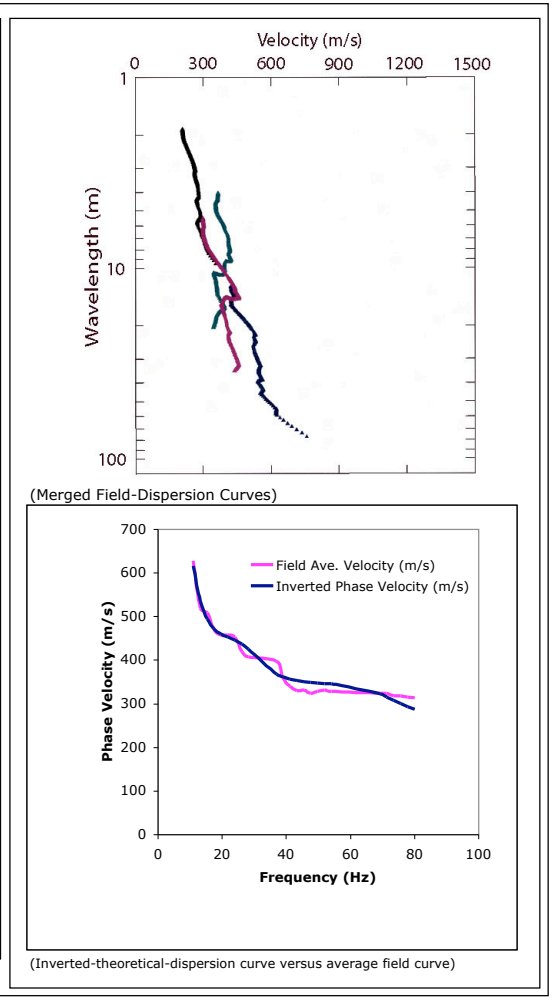
POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	37 14.352
GPS LONG (WEST	122 06.386

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	12/27/2003
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A34.—SASW site classification and location information for site 618GUN. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A35.—Site 619COY (CSMIP site 57504), located at Coyote Lake Dam (Downstream), Santa Clara County, California. Site location 37.124°N 121.551°W. Photo A shows the NGA station located about 100 meters northeast of the source in the middle of a field and one of the seismometers of the forward array that is oriented to the north of the source. Photo B looks southwest at the source from the field. Photo C shows the source facing northeast. Photo D looks to the east along the reverse array away from the source.

NGA-PEER Site Classification

Site ID	**619COY**
NEHRP CLASS:	**C**
Vs30	**469 (m/s)**
SUB-CLASS	**C-**

Location	Coyote Lake Dam
NGA Site ID	57504
State	CALIFORNIA

POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	37 07.453
GPS LONG (WEST	121 33.169

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	12/28/2003
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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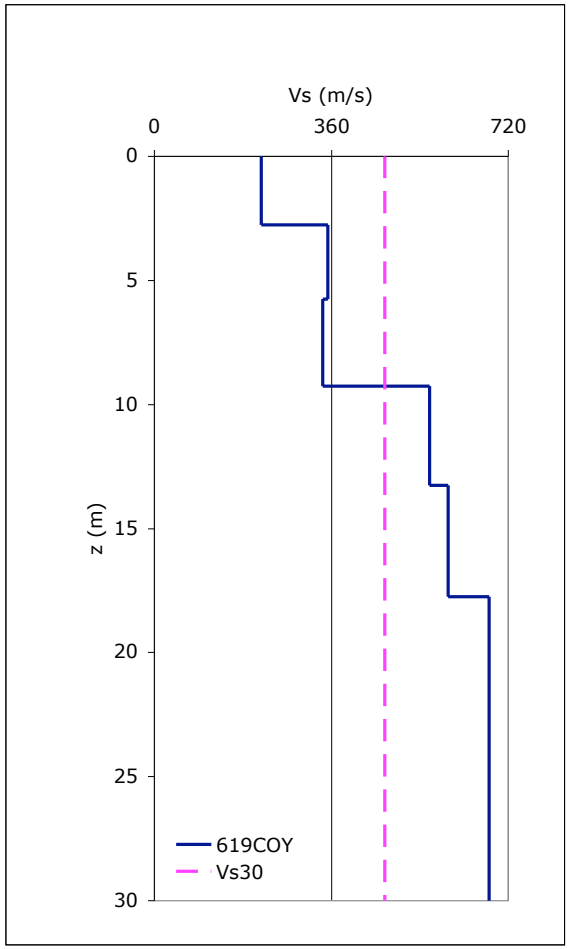
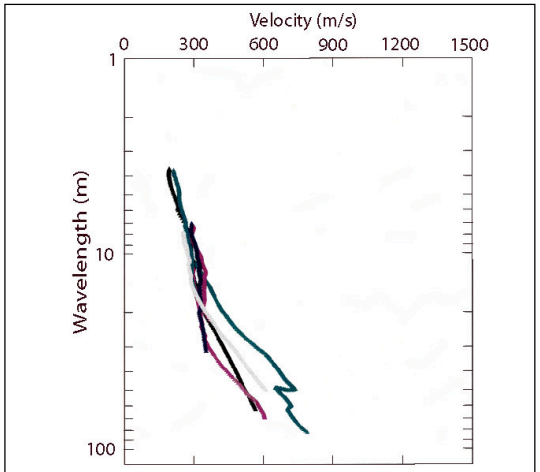
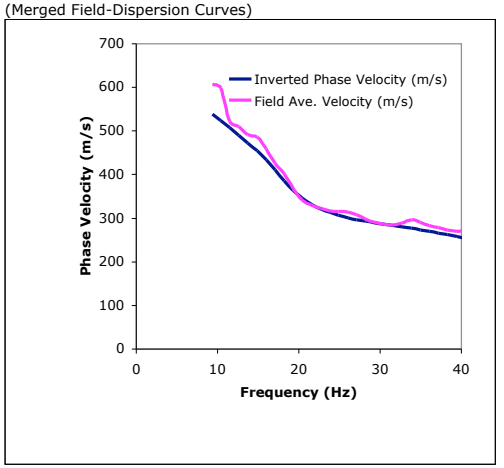
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A36.—SASW site classification and location information for site 619COY. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A37.—Site 620AND (CSMIP site 1652), located at Anderson Dam - Left Abutment, Santa Clara County, California. Site location 37.166° 121.628°W. We tested at the base of the damn in a parking lot. Photo A is taken at the entrance to the parking lot. Photo B shows the source looking northeast at the damn. Photo C shows the forward array extending west from the source, and photo D is taken at the base of the dam facing southwest.

NGA-PEER Site Classification

Site ID	**620AND**
NEHRP CLASS:	**C**
Vs30	**383 (m/s)**
SUB-CLASS	**C-**

Location	Anderson Dam (base)
NGA Site ID	1652
State	CALIFORNIA

POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	37 09.930
GPS LONG (WEST	121 37.904

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	12/28/2003
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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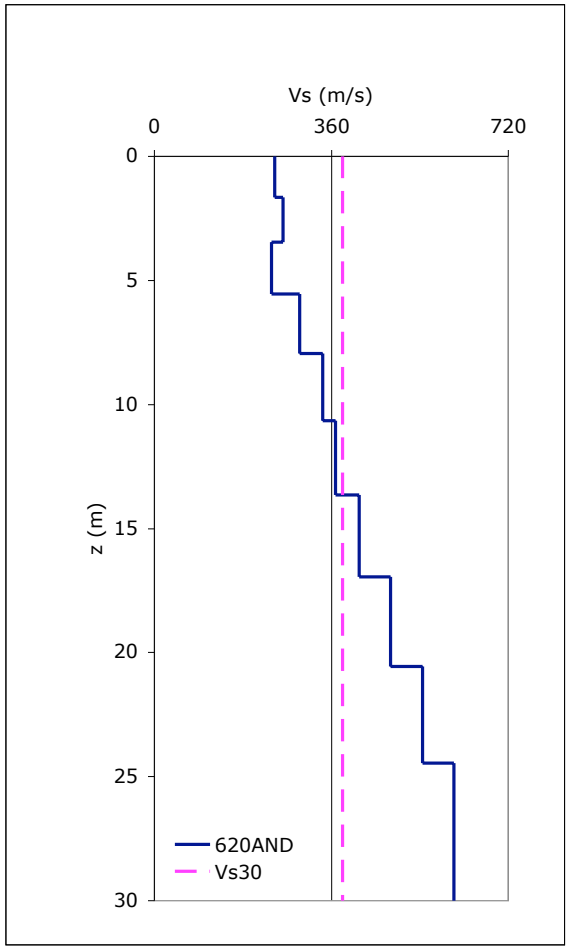
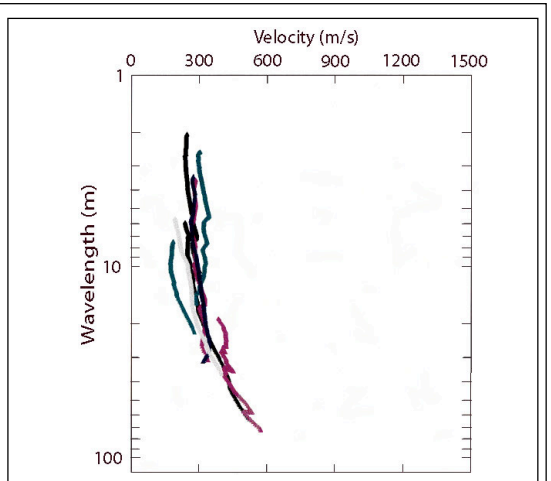
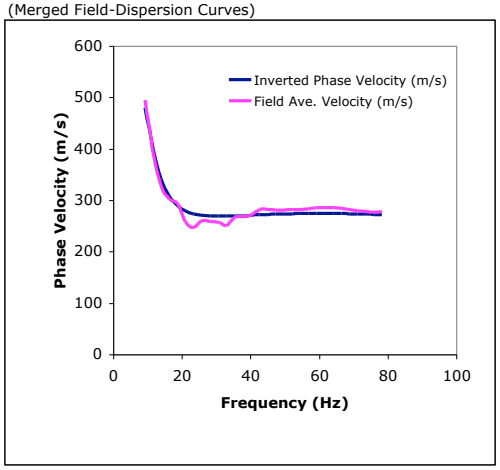
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A38.—SASW site classification and location information for site 620AND. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A39.—Site 621FVC (CSMIP site 1752), located at Filoli Visitor Center, Woodside, San Mateo County, California. Site location 37.468° 122.308°W. Photo A is of the source (covered with umbrellas) facing west toward the reverse array. Photo B faces north at the source, photo C faces southwest at the source, and photo D aces east toward the forward array.

NGA-PEER Site Classification

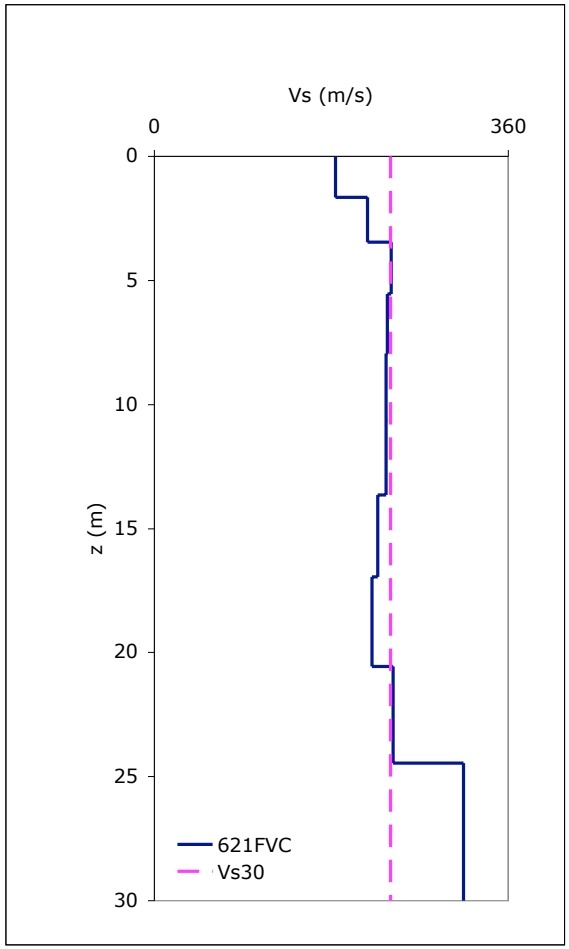
Site ID	**621FVC**
NEHRP CLASS:	**D**
Vs30	**240 (m/s)**
SUB-CLASS	**D-**

Location	Woodside -Filoli Visitor Ctr
NGA Site ID	1752
State	CALIFORNIA

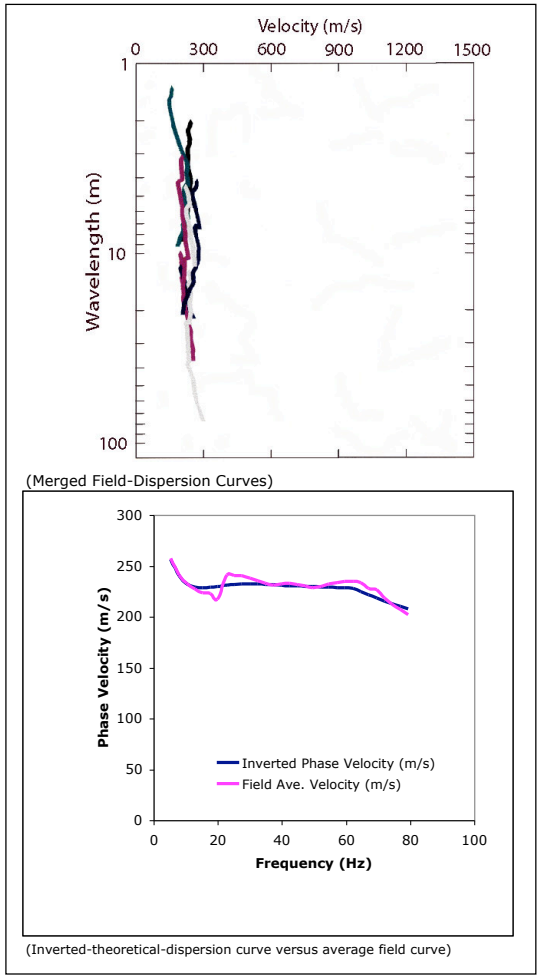
POSITION	**DEGREES**	**DECIMAL MINUTES**
GPS LAT (NORTH)	37	28.121
GPS LONG (WEST	122	18.494

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	12/29/2003
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)

(Inverted-theoretical-dispersion curve versus average field curve)

Figure A40.—SASW site classification and location information for site 621FVC. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A41.—Site 622CHP (CSMIP site 1750), located at Coyote Hills Park, Fremont, Alameda County, California. Site location 37.553° 122.091°W. Photo A looks southeast along the array — the forward is to the southeast and the reverse is to the northwest. Photo B faces the northwest. Photos C and D face the southeast.

NGA-PEER Site Classification

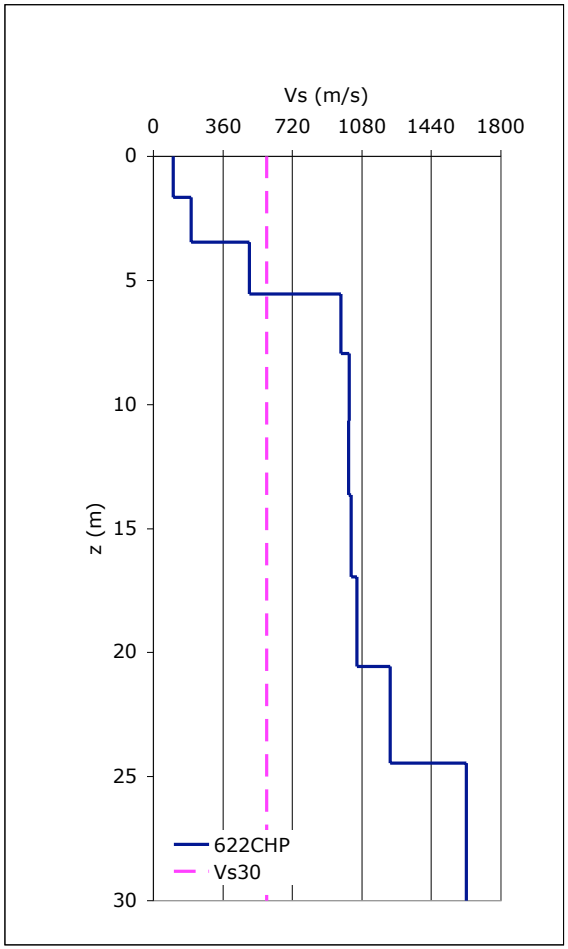
Site ID	**622CHP**
NEHRP CLASS:	**C**
Vs30	**588 (m/s)**
SUB-CLASS	**C-**

Location	Fremont - Coyote Hills Park
NGA Site ID	1750
State	CALIFORNIA

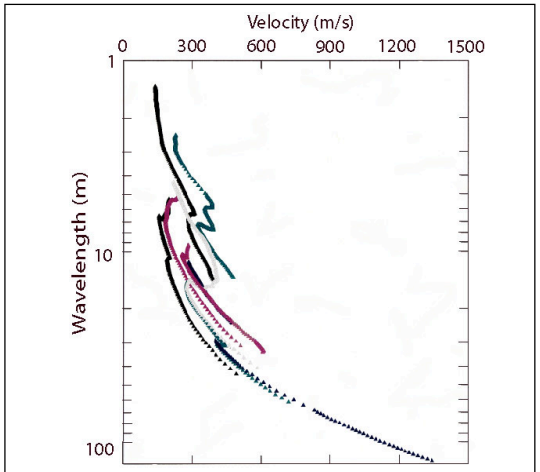
POSITION	**DEGREES**	**DECIMAL MINUTES**
GPS LAT (NORTH)	37	33.161
GPS LONG (WEST	122	05.478

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	12/30/2003
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

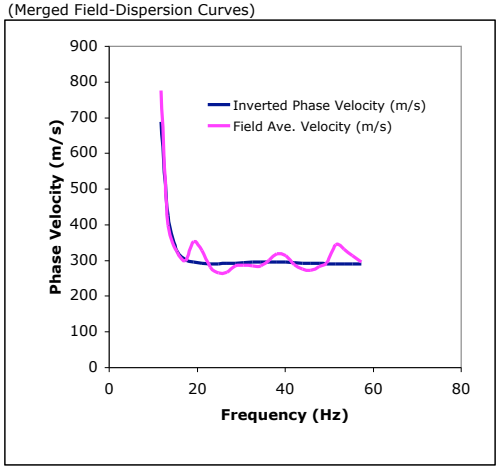
SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A42.—SASW site classification and location information for site 622CHP. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A43.—Site 623UCM (CSMIP site 1739), located at the Masonic Home, Union City, Alameda County, California. Site location 37.6°N 122.006°W. The full array is shown in photo A facing to the northwest. Photo B shows the reverse array extending to the south. Photo C shows the forward array extending to the north. Photo D is taken of the Masonic Home where the NGA station is located.

NGA-PEER Site Classification

Site ID	**623UCM**
NEHRP CLASS:	**C**
Vs30	**461 (m/s)**
SUB-CLASS	**C-**

Location	Union City - Masonic Home
NGA Site ID	1739
State	CALIFORNIA

POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	37 36.023
GPS LONG (WEST	122 00.415

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	12/30/2003
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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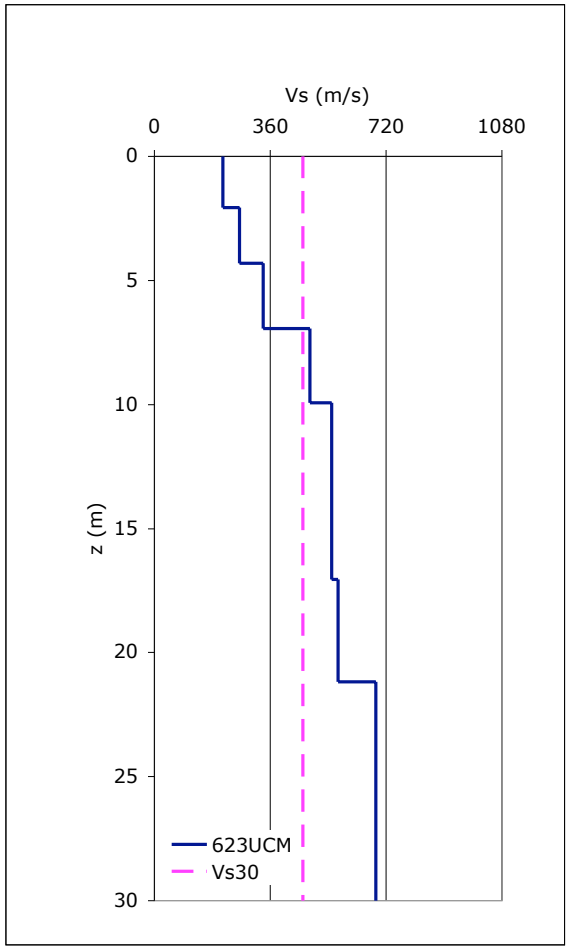
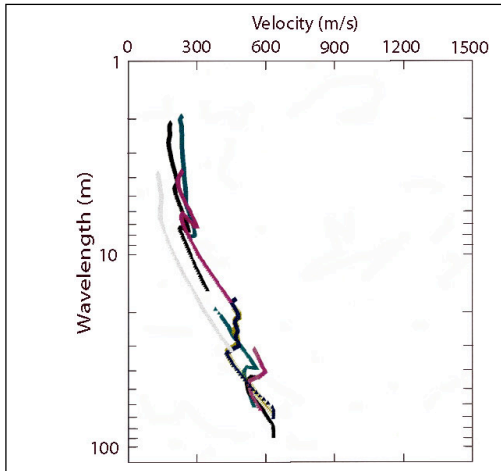
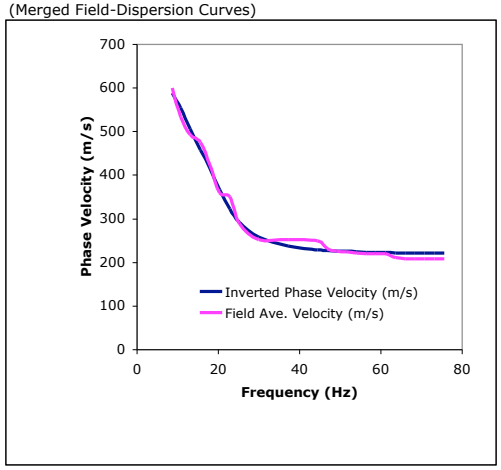
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A44.—SASW site classification and location information for site 623UCM. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

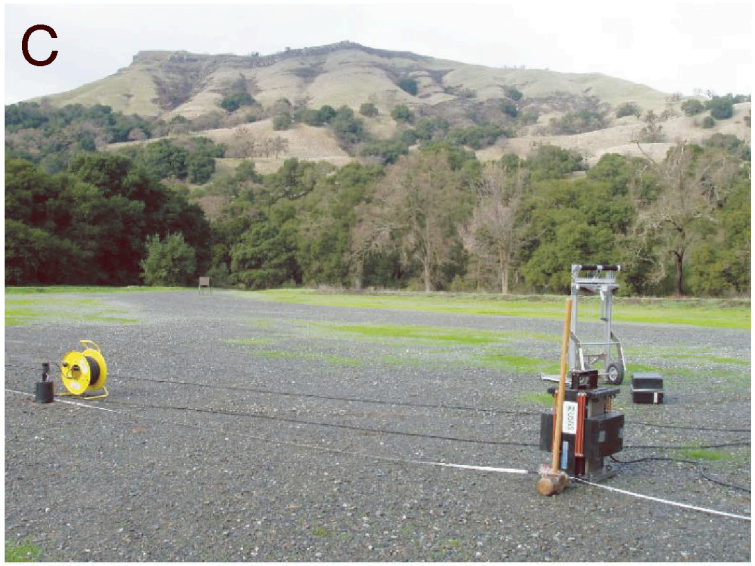


Figure A45.—Site 624SOP (CSMIP site 1684), located at Sunol - Ohlone Wilderness Regional Park, Alameda County, California. Site location 37.515°N 121.83°W. Photo A is taken at the source facing to the west showing the reverse array. Photo B is facing the east showing the full array. Photo C is looking north at the source. Photo D is of the garage where the NGA site was possibly located which is approximately 100 meters to the west of the source.

NGA-PEER Site Classification

Site ID	**624SOP**
NEHRP CLASS:	**D**
Vs30	**346 (m/s)**
SUB-CLASS	**D+**

Location	Sunol-Ohlone Wild. Reg. Pk
NGA Site ID	1684
State	CALIFORNIA

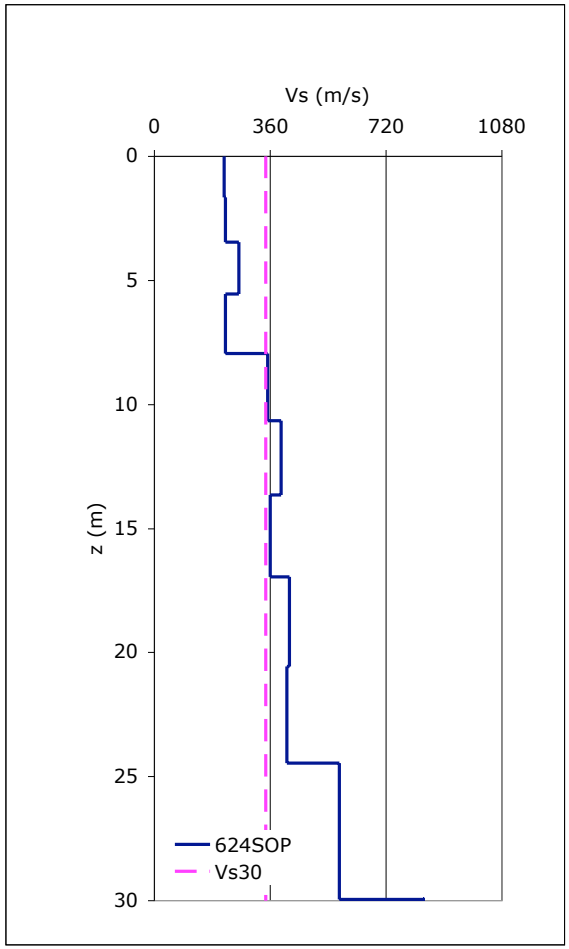
POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	37 30.869
GPS LONG (WEST	121 49.807

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	12/30/2003
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

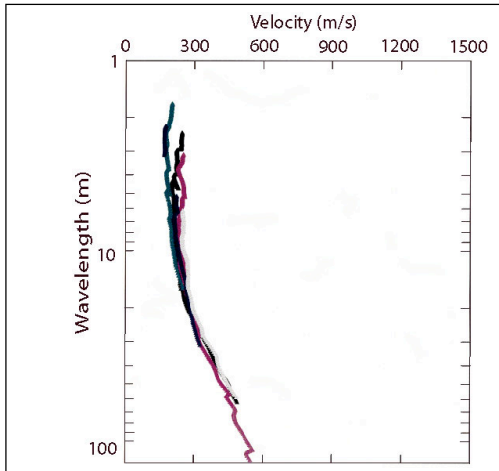
SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

USGS science for a changing world

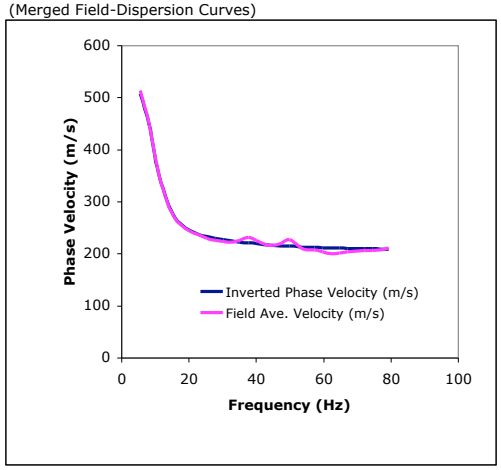
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A46.—SASW site classification and location information for site 624SOP. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A47.—Site 626CLF (CSMIP site 58132), located in San Francisco, California, at the Cliff House. Site location 37.778°N 122.513°W. We collected the data in the parking lot near the San Francisco Cliff House. The source was located about 200 meters northeast of the Cliff House (photo A) where the NGA station was located. Space only allowed for one array which was oriented to the southwest of the source, shown in photo B. Photo C shows the source facing south. Photo D faces northeast showing the array.

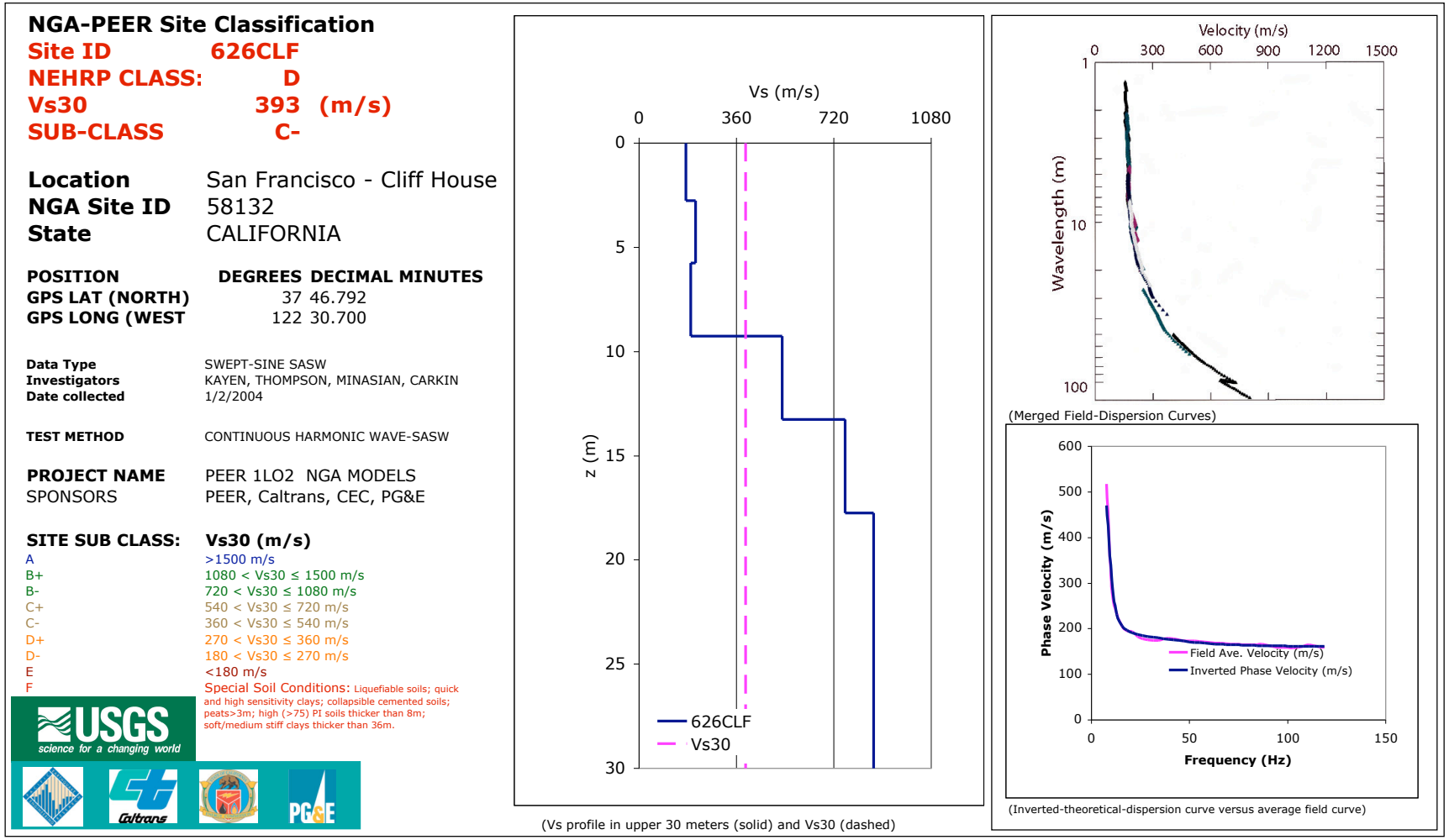


Figure A48—SASW site classification and location information for site 626CLF. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

D

Figure A49.—Site 627PVC (CSMIP site 36177), located in Parkfield - Vineyard Canyon, California. Site location 35.973°N 120.467°W. We placed the source along the road, shown in photo A, which is looking south. Photo B shows the location of the source with the NGA station in the background, about 30 meters west off the road. Photo C shows the source and road facing to the north. Photo D shows the array extending toward the NGA station from the source.

NGA-PEER Site Classification

Site ID	**627PVC**
NEHRP CLASS:	**C**
Vs30	**390 (m/s)**
SUB-CLASS	**C-**

Location	Parkfield - Vineyard Cyn. Rd
NGA Site ID	36177
State	CALIFORNIA

POSITION	**DEGREES**	**DECIMAL MINUTES**
GPS LAT (NORTH)	35	58.386
GPS LONG (WEST	120	28.036

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	1/5/2004
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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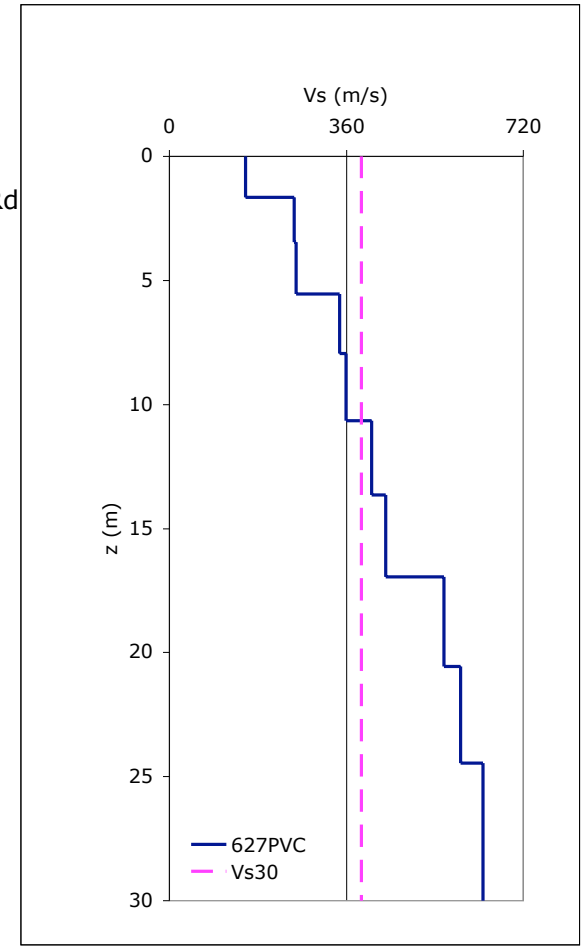
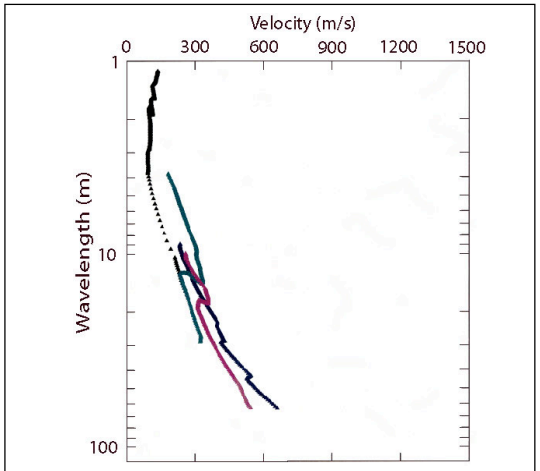
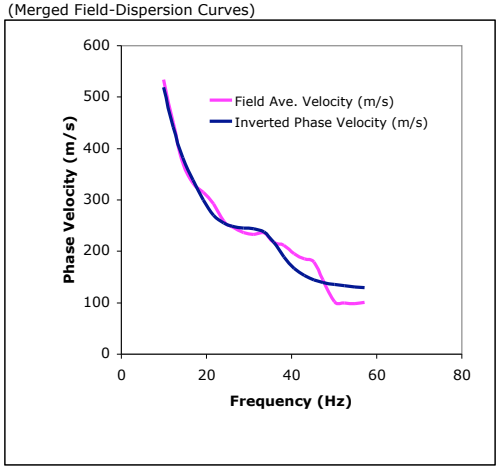
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A50—SASW site classification and location information for site 627PVC. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A51.—Site 628LHM (CSMIP site 24523), located at Lake Hughes #4B - Camp Mendenhall, Los Angeles County, California. Site location 34.65°N 118.477°W. Photo A shows the gated entrance to where we tested next to Camp Mendenhall. We think that the NGA station is located up in the hills (photo B, approximately 400 meters from the source) where we could not access. Photo C shows the source looking north along the forward array. Photo D shows the source facing east toward Camp Mendenhall.

NGA-PEER Site Classification

Site ID	**628LHM**
NEHRP CLASS:	**D**
Vs30	**294 (m/s)**
SUB-CLASS	**D+**

Location	Lk Hughes-Camp Mendenhall
NGA Site ID	24523
State	CALIFORNIA

POSITION	**DEGREES**	**DECIMAL MINUTES**
GPS LAT (NORTH)	34	39.146
GPS LONG (WEST	118	28.837

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	1/6/2004
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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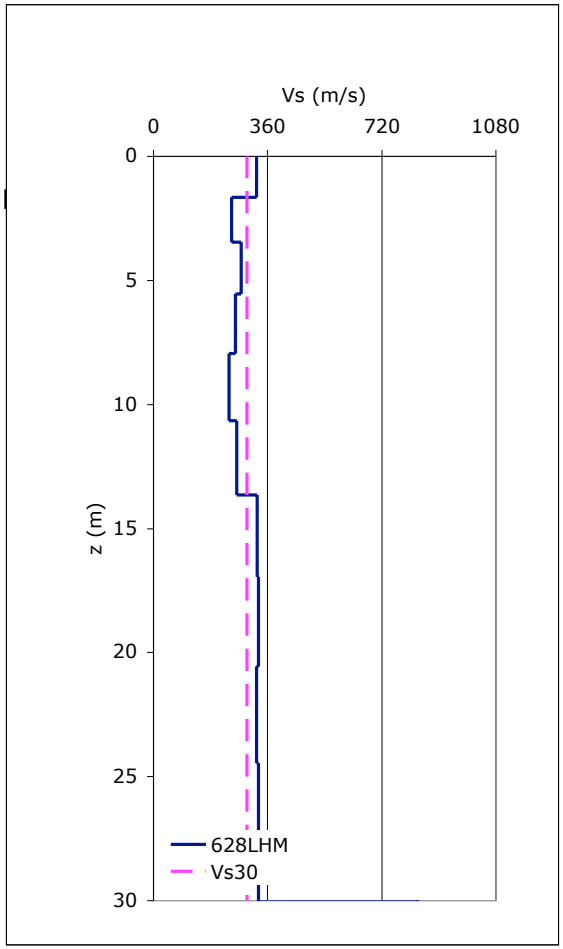
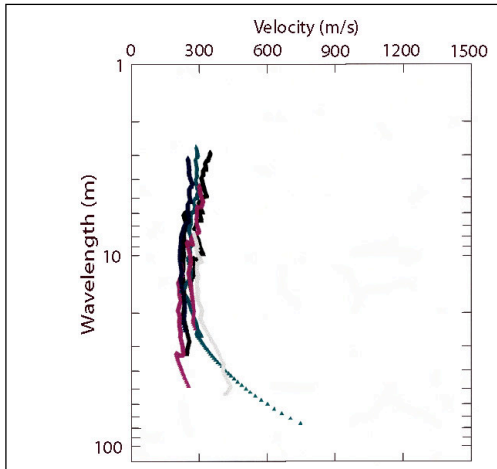
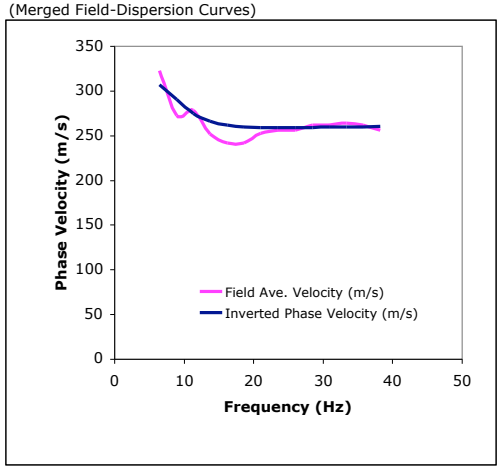
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A52—SASW site classification and location information for site 628LHM. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A53.—Site 629FRT (CSMIP site 998), located at Fort Tejon State Historic Park, Kern County, California. Site location 34.87°N 118.9°W. Photo A is looking east at the reverse array which is extending south from the source. Photo B faces southwest. Photo C shows the source and array extending to the south. Photo D shows the building we tested next to, and was taken facing north.

NGA-PEER Site Classification

Site ID	**629FRT**
NEHRP CLASS:	**D**
Vs30	**314 (m/s)**
SUB-CLASS	**D+**

Location	Fort Tejon
NGA Site ID	998
State	CALIFORNIA

POSITION	**DEGREES**	**DECIMAL MINUTES**
GPS LAT (NORTH)	34	52.241
GPS LONG (WEST	118	53.968

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	1/6/2004
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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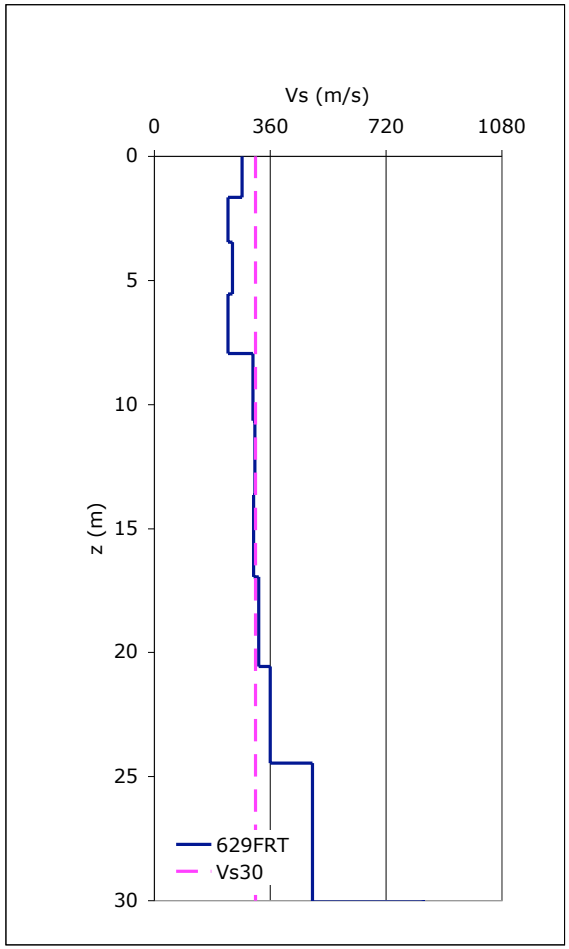
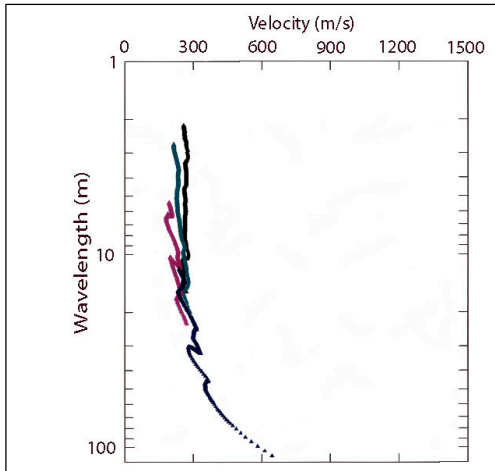
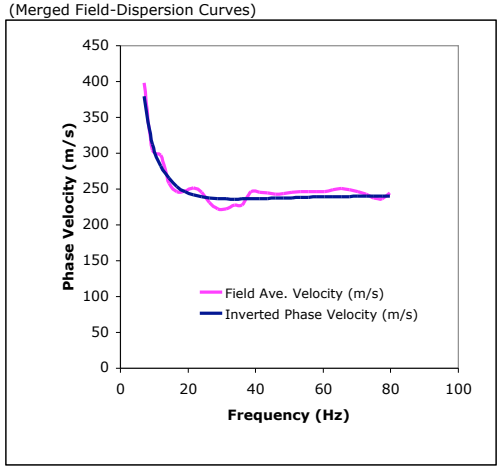
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A54—SASW site classification and location information for site 629FRT. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A55.—Site 630ANT (CSMIP site 24310), located at Antelope Buttes, Los Angeles County, California. Site location 34.758°N 118.361°W. Photo A looks east from the source to the forward array. The entire array is shown in photo B, facing to the west. Photo C faces south. The NGA station is located about 30 meters to the northwest of the source and can be seen in photos B and D.

NGA-PEER Site Classification

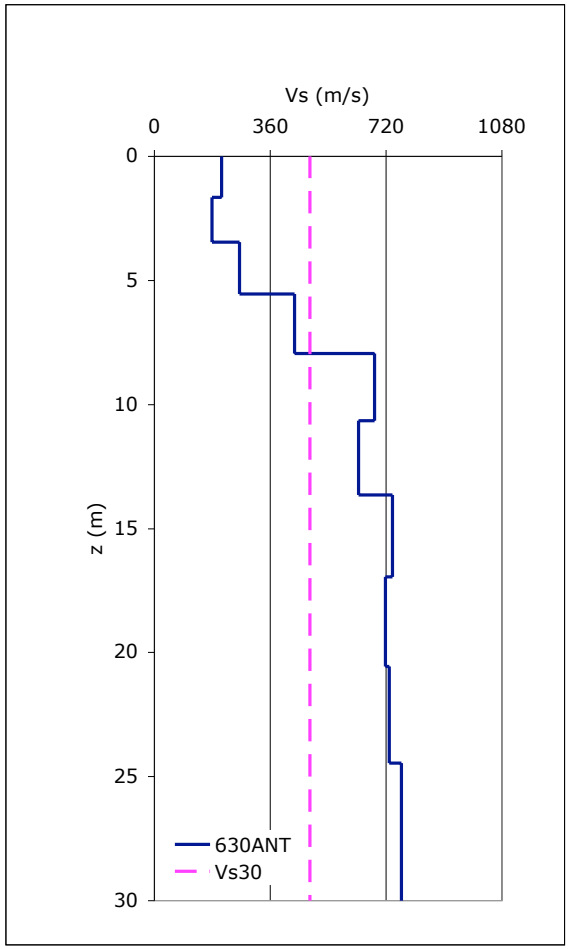
Site ID	**630ANT**
NEHRP CLASS:	**C**
Vs30	**483 (m/s)**
SUB-CLASS	**C-**

Location	Antelope Buttes
NGA Site ID	24310
State	CALIFORNIA

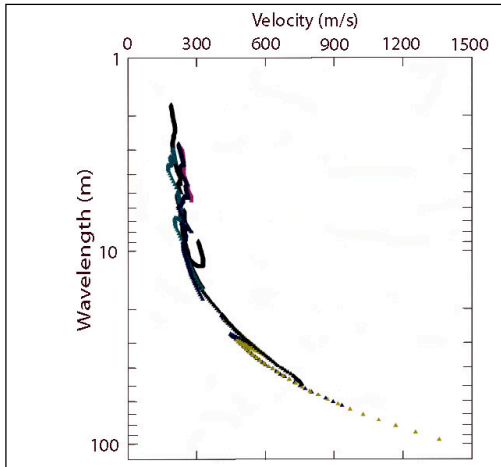
POSITION	**DEGREES**	**DECIMAL MINUTES**
GPS LAT (NORTH)	34	45.444
GPS LONG (WEST	118	21.651

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	1/6/2004
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

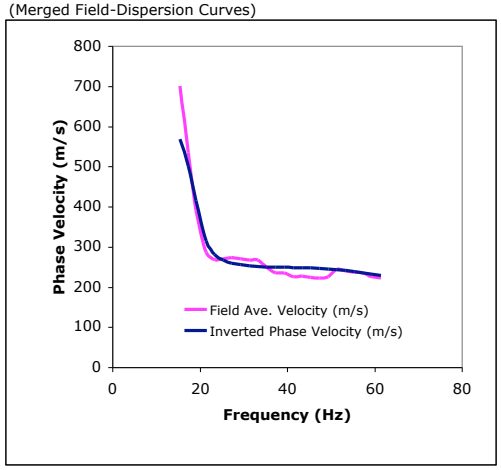
SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A56.—SASW site classification and location information for site 630ANT. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A57.—Site 631FMD (CSMIP site 121), located at Fairmont Dam, Los Angeles County, California. Site location 34.704°N 118.426°W. Photo A is looking south along the road we tested. Photo B shows the source and is facing northeast. Photo C shows the entire array looking toward the south. Photo D looks north along the road.

NGA-PEER Site Classification

Site ID	**631FMD**
NEHRP CLASS:	**C**
Vs30	**486 (m/s)**
SUB-CLASS	**C-**

Location	Fairmont Dam
NGA Site ID	24270
State	CALIFORNIA

POSITION	**DEGREES**	**DECIMAL MINUTES**
GPS LAT (NORTH)	34	42.255
GPS LONG (WEST	118	25.662

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	1/6/2004
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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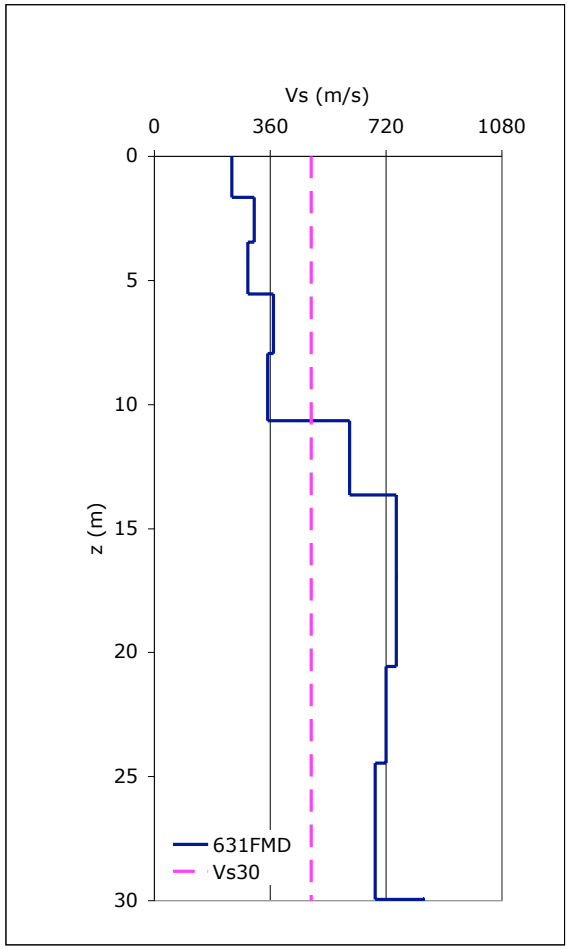
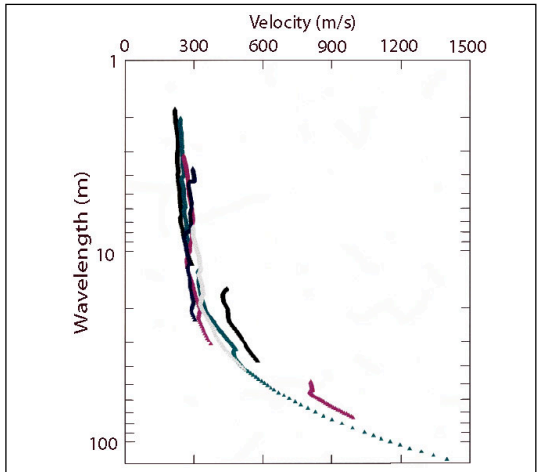
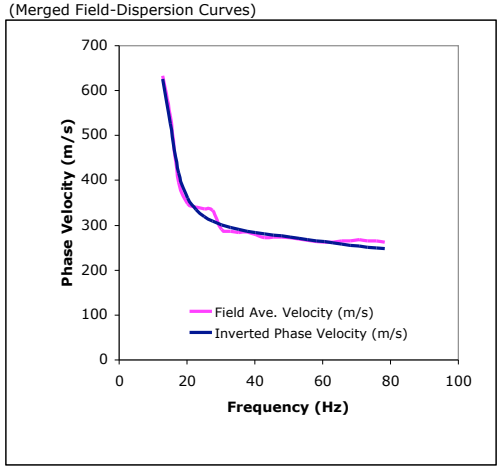
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A58.—SASW site classification and location information for site 631FMD. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A59.—Site 632MOV (CSMIP site 34237), located at Mojave - Oak Creek Canyon, Kern County, California. Site location 35.042°N 118.377°W. Photo A shows the building where we think the NGA instrument is located. Photo B looks to the north from the source along the forward array. Photo C shows the location of the source relative to the building. Photo D is looking south at the source and building.

NGA-PEER Site Classification

Site ID	**632MOV**
NEHRP CLASS:	**D**
Vs30	**320 (m/s)**
SUB-CLASS	**D+**

Location	Mojave - Oak Creek Cyn
NGA Site ID	34237
State	CALIFORNIA

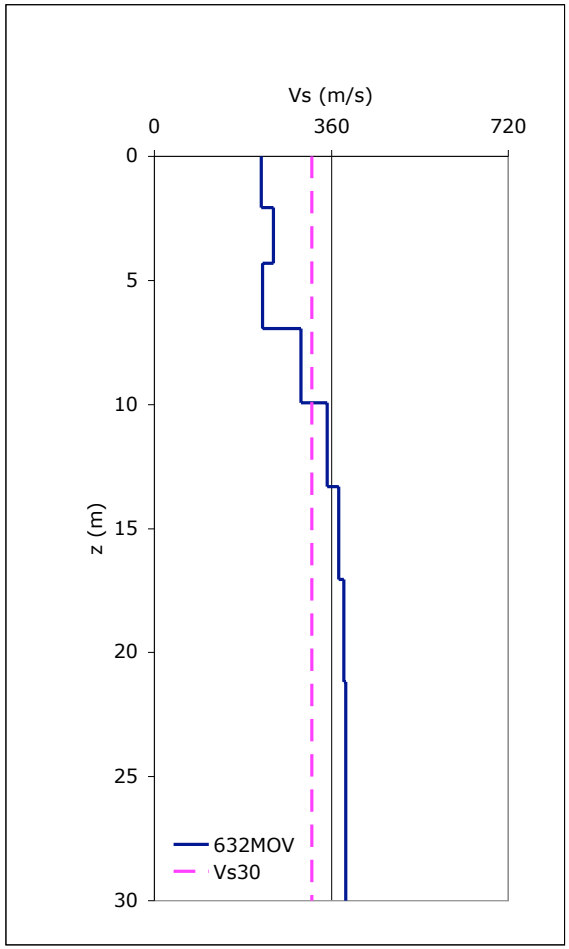
POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	35 02.509
GPS LONG (WEST	118 22.693

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	1/7/2004
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

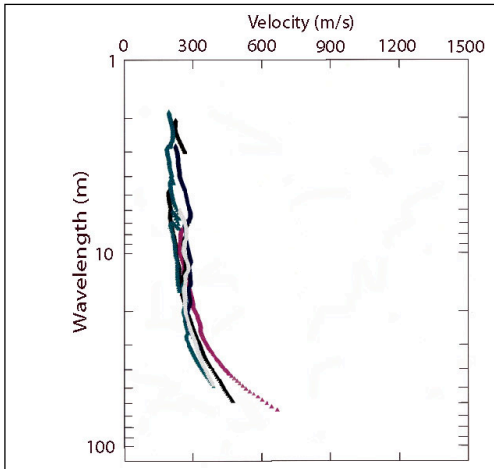
SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

USGS science for a changing world

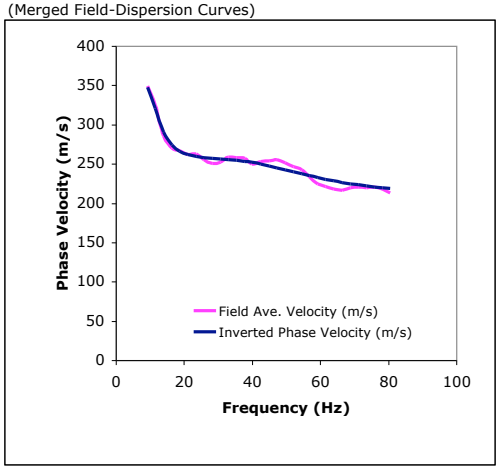
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A60.—SASW site classification and location information for site 632MOV. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A61.—Site 633CSP (CSMIP site 112), located at Cedar Springs Pumphouse, San Bernardino County, California. Site location 34.31°N 117.3°W. The waypoint for the NGA station is located in the middle of an empty field, so we tested at the nearest site possible. We tested at a Department of Water Resources maintenance yard, about 1 mile west of the waypoint. Photo A is looking north toward the entrance to the yard. Photo B shows the full array looking to the east. Photo C shows the building we tested next to. Photo D faces the southeast.

NGA-PEER Site Classification

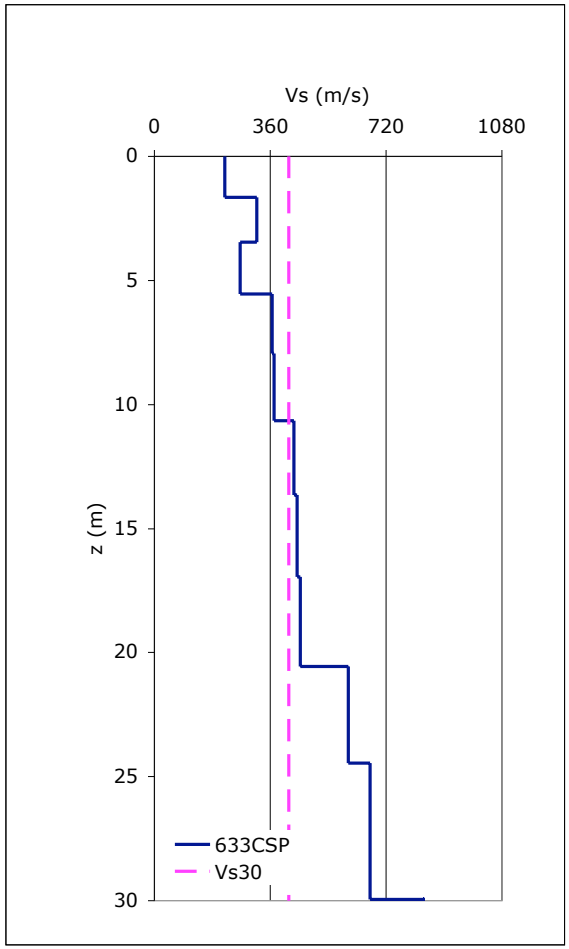
Site ID	**633CSP**
NEHRP CLASS:	**C**
Vs30	**417 (m/s)**
SUB-CLASS	**C-**

Location	Cedar Springs Pumphouse
NGA Site ID	112
State	CALIFORNIA

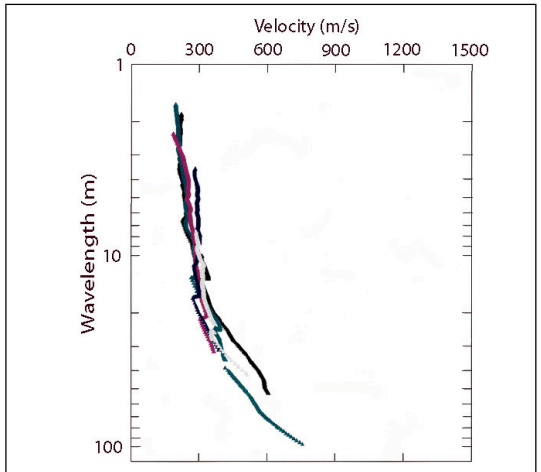
POSITION	**DEGREES**	**DECIMAL MINUTES**
GPS LAT (NORTH)	34	18.468
GPS LONG (WEST	117	18.912

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	1/7/2004
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

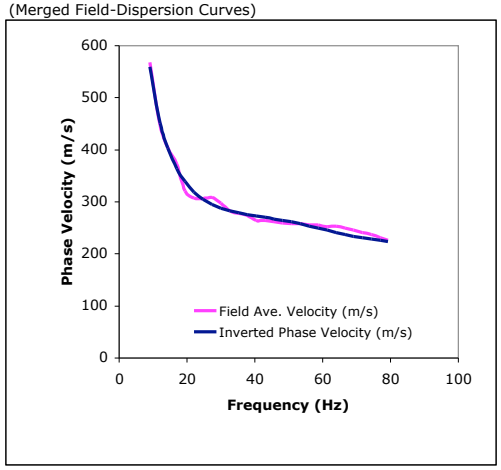
SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A62.—SASW site classification and location information for site 633CSP. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A63.—Site 634WSW (CSMIP site 23574), located at Wrightwood - Swarthout, Los Angeles County, California. Site location 34.369°N 117.658°W. Photo A shows the turn off the main road to where we tested. Photo B faces east at the source toward the forward array. Photo C faces north toward the source along reverse array. Photo C faces south toward the reverse array.

NGA-PEER Site Classification

Site ID 634WSW
NEHRP CLASS: C
Vs30 390 (m/s)
SUB-CLASS C-

Location	Wrightwood - Swarthout
NGA Site ID	23574
State	CALIFORNIA

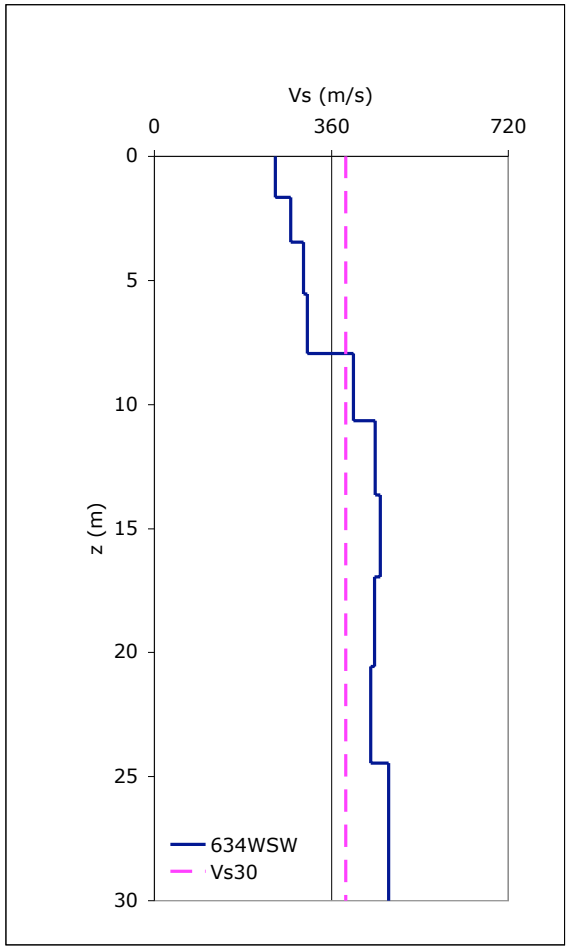
POSITION	**DEGREES**	**DECIMAL MINUTES**
GPS LAT (NORTH)	34	22.132
GPS LONG (WEST	117	39.642

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	1/8/2004
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

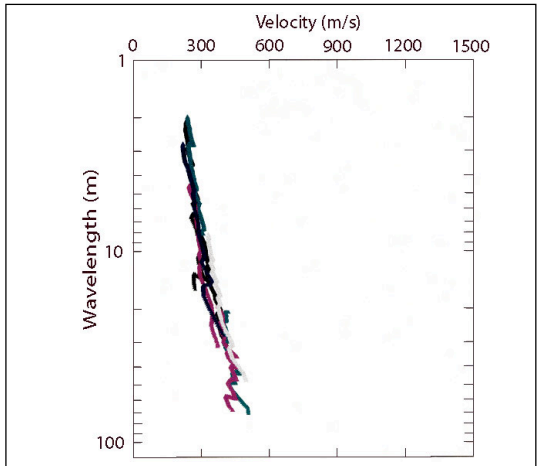
SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

USGS science for a changing world

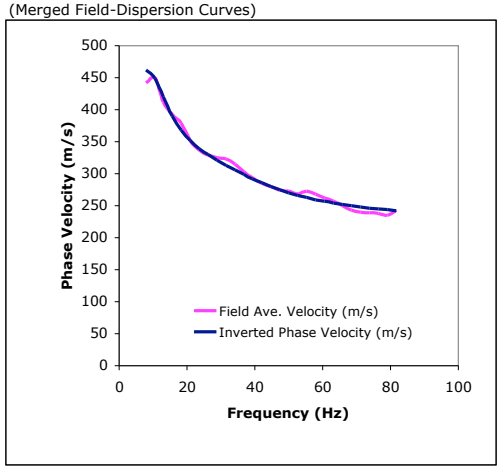
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A64.—SASW site classification and location information for site 634WSW. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A65.—Site 635JKF (CSMIP site 23590), located at Wrightwood - Jackson Flat Campground, Los Angeles County, California. Site location 34.381°N 117.737°W. Photo A shows the NGA station — photo B shows it facing toward the source (east) which is located about 100 meters away (at the red van that can be seen in the background). Photo C looks south along the reverse array,and D looks north along the forward array.

NGA-PEER Site Classification

Site ID	**635JKF**
NEHRP CLASS:	**C**
Vs30	**466 (m/s)**
SUB-CLASS	**C-**

Location	Wrightwood - Jackson Flat
NGA Site ID	23590
State	CALIFORNIA

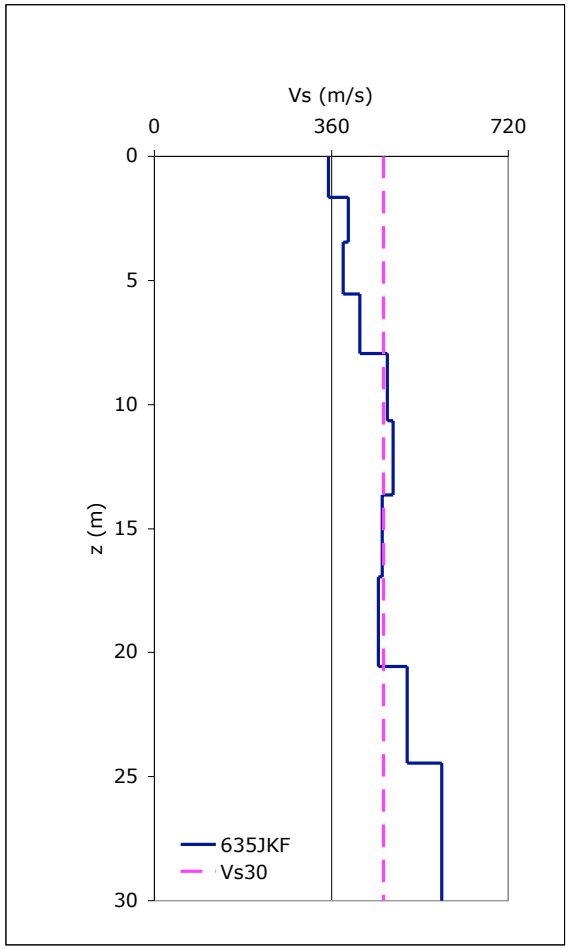
POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	34 22.863
GPS LONG (WEST	117 44.182

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	1/8/2004
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

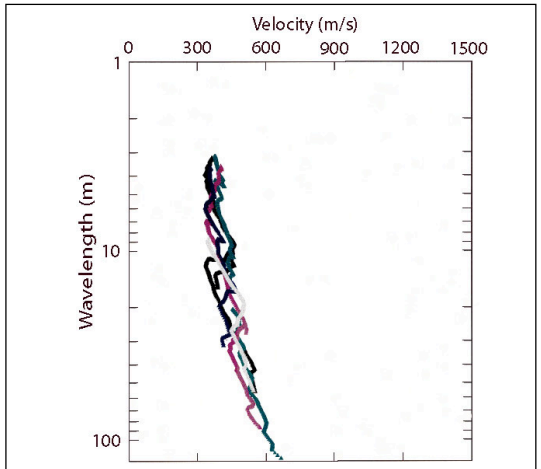
SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

USGS science for a changing world

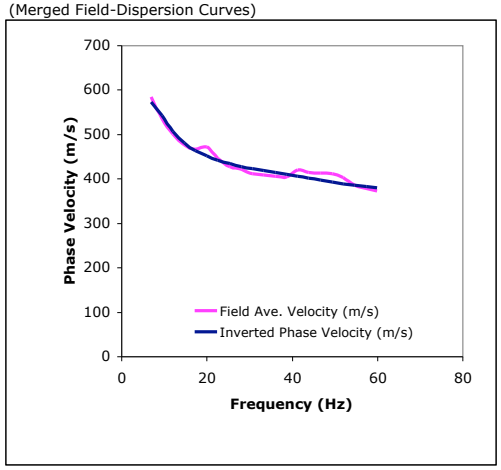
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A66.—SASW site classification and location information for site 635JKF. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A67.—Site 636SOD (CSMIP site 5300), located at Seven Oaks Dam, Downstream Surf., San Bernardino County, California. Site location 34.111°N 117.099°W. Photo A is looking north along the road, and photo B looks south. Photo C is looking toward the east, and photo D looks north toward the dam.

NGA-PEER Site Classification

Site ID	**636SOD**
NEHRP CLASS:	**C**
Vs30	**470 (m/s)**
SUB-CLASS	**C-**

Location	Seven Oaks Dam
NGA Site ID	5300
State	CALIFORNIA

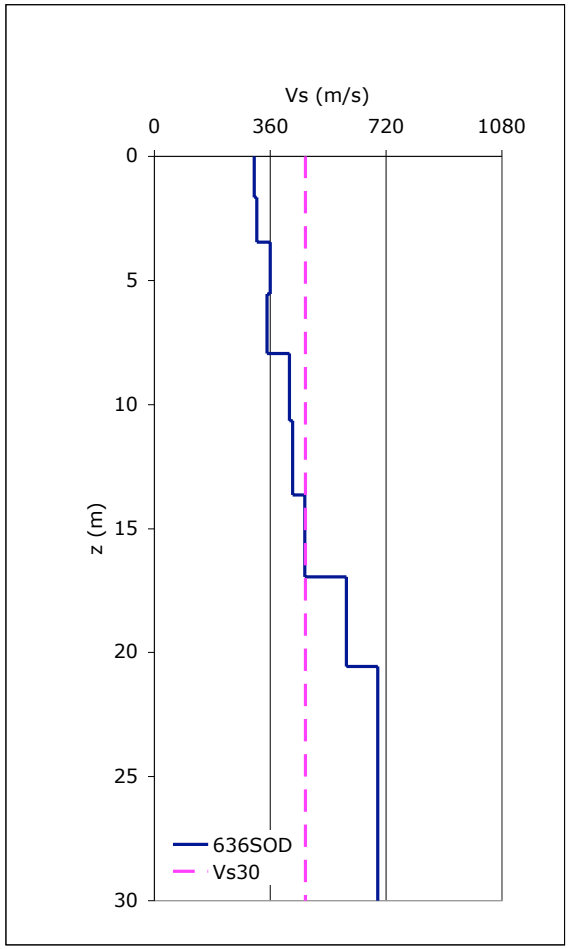
POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	34 06.638
GPS LONG (WEST	117 05.948

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	1/8/2004
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

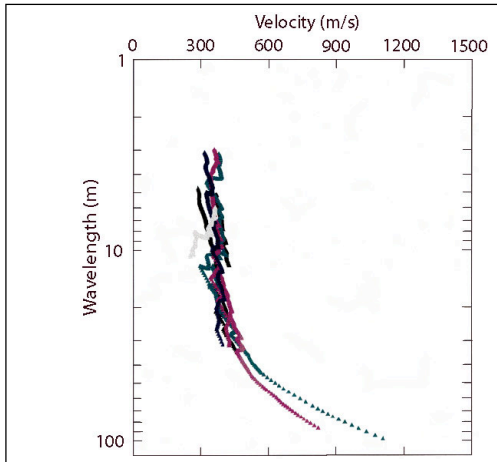
SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

USGS science for a changing world

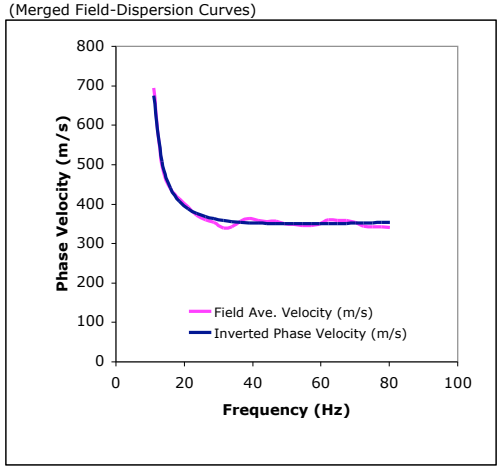
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A68.—SASW site classification and location information for site 636SOD. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A69.—Site 637HBP (CSMIP site 22104), located at Heart Bar State Park, (Correctional Facility), San Bernardino County, California. Site location 34.161°N 116.799°W. Photo A is looking to the south along the array. Photo B shows the source and is looking north along the forward array. Photo C looks south along the reverse array. Photo D looks to the west.

NGA-PEER Site Classification

Site ID	**637HBP**
NEHRP CLASS:	**C**
Vs30	**453 (m/s)**
SUB-CLASS	**C-**

Location	Heart Bar State Park
NGA Site ID	22104
State	CALIFORNIA

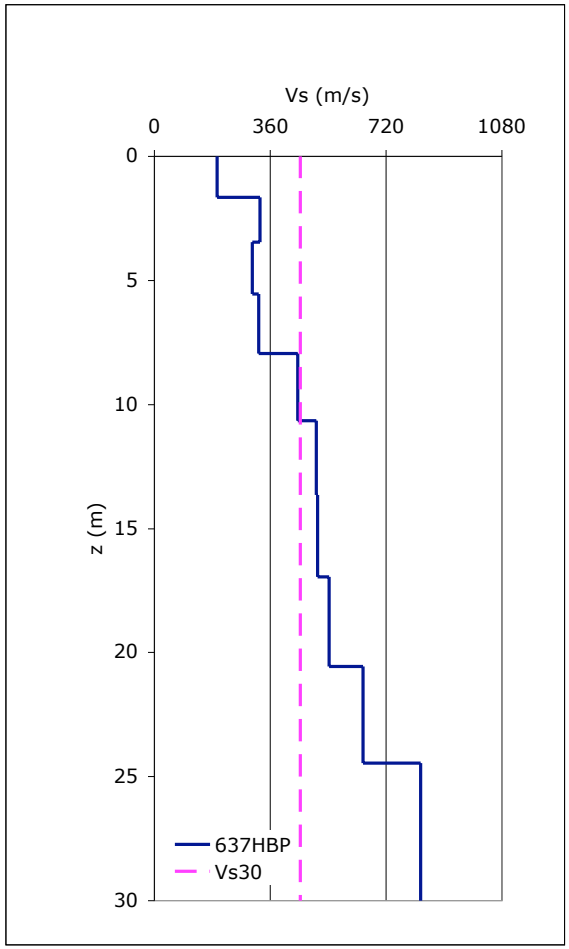
POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	34 09.536
GPS LONG (WEST	117 47.919

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	1/8/2004
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

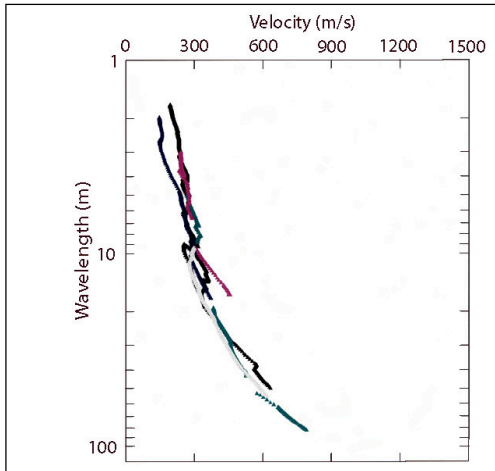
SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

USGS science for a changing world

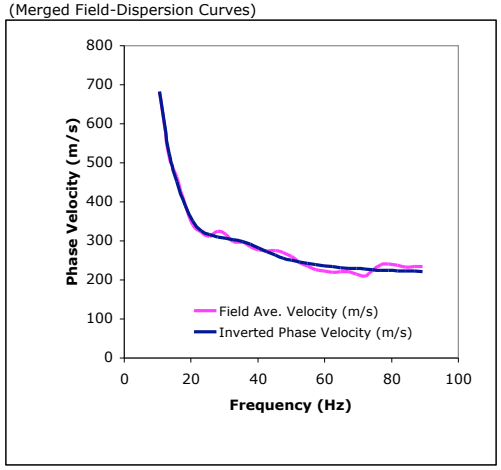
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A70.—SASW site classification and location information for site 637HBP. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A71.—Site 638RCO (CSMIP site 5037), located at Reche Canyon - Olive Dell Ranch, Redlands, San Bernardino County, California. Site location 34.004°N 117.223°W. Photo A is facing west and shows the full array. Photo B is looking south along the reverse array, and photos C and D are looking back north.

NGA-PEER Site Classification

Site ID	**638RCO**
NEHRP CLASS:	**C**
Vs30	**488 (m/s)**
SUB-CLASS	**C-**

Location	Reche Cyn - Olive Dell Ranch
NGA Site ID	5037
State	CALIFORNIA

POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	34 00.257
GPS LONG (WEST	117 13.424

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	1/9/2004
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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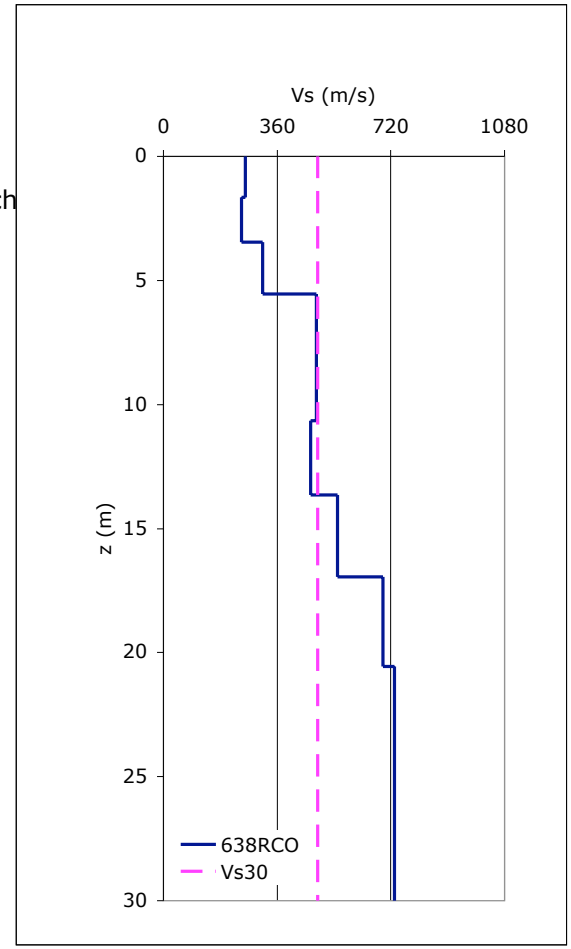
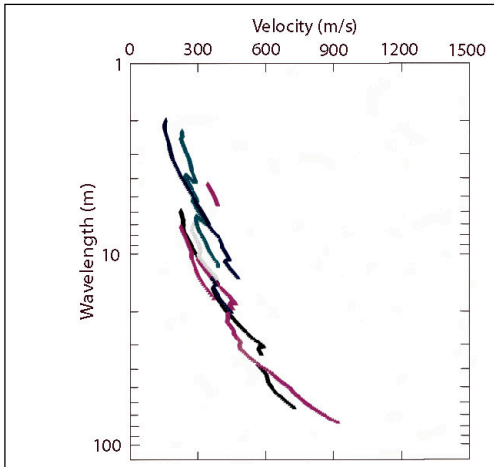
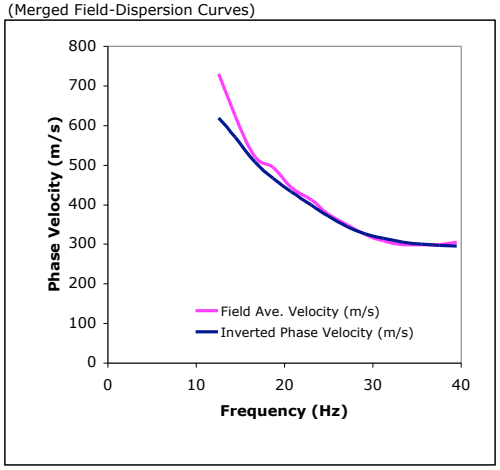
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)

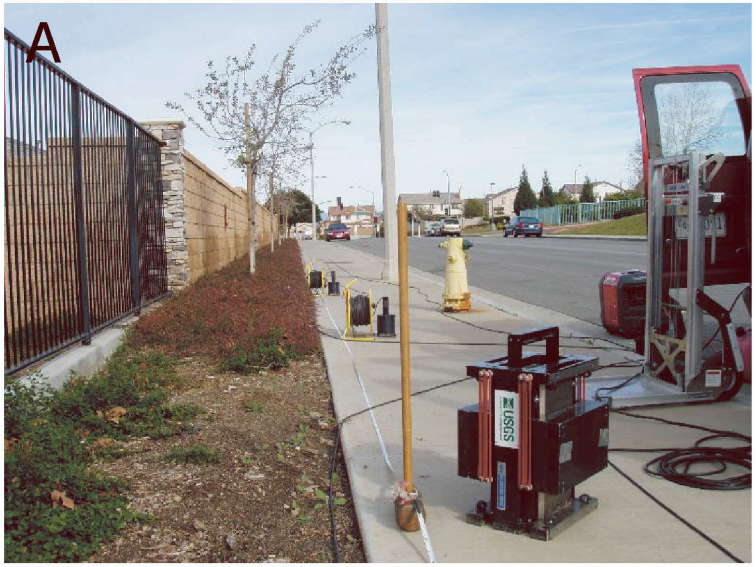


(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A72.—SASW site classification and location information for site 638RCO. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.



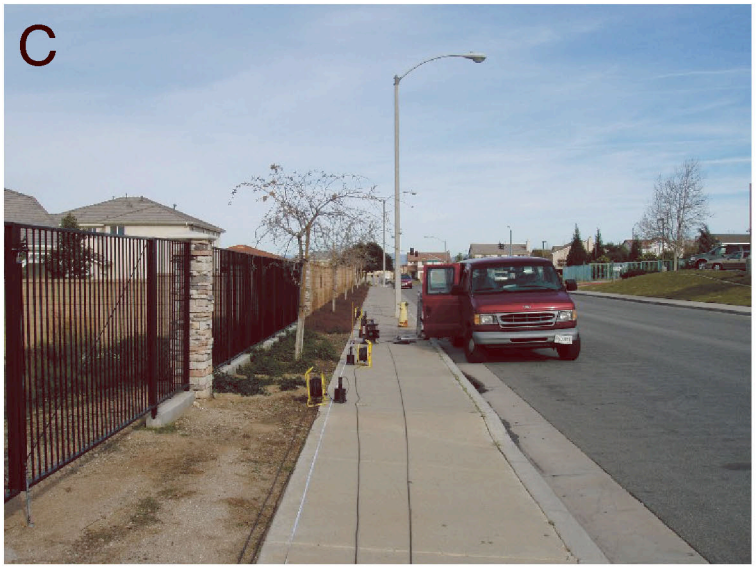


Figure A73.—Site 639RIV (CSMIP site 13916), located in Riverside - Van Buren & Trautwein, Riverside County, California. Site location 33.895°N 117.32°W. Photo A shows the source and the forward array extending to the north along the sidewalk. Photo B shows the elementary school across the street. Photo C shows the full array facing to the north. Photo D is facing to the west.

NGA-PEER Site Classification

Site ID	**639RIV**
NEHRP CLASS:	**C**
Vs30	**494 (m/s)**
SUB-CLASS	**C-**

Location	Riverside
NGA Site ID	13916
State	CALIFORNIA

POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	33 53.615
GPS LONG (WEST	117 19.289

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	1/9/2004
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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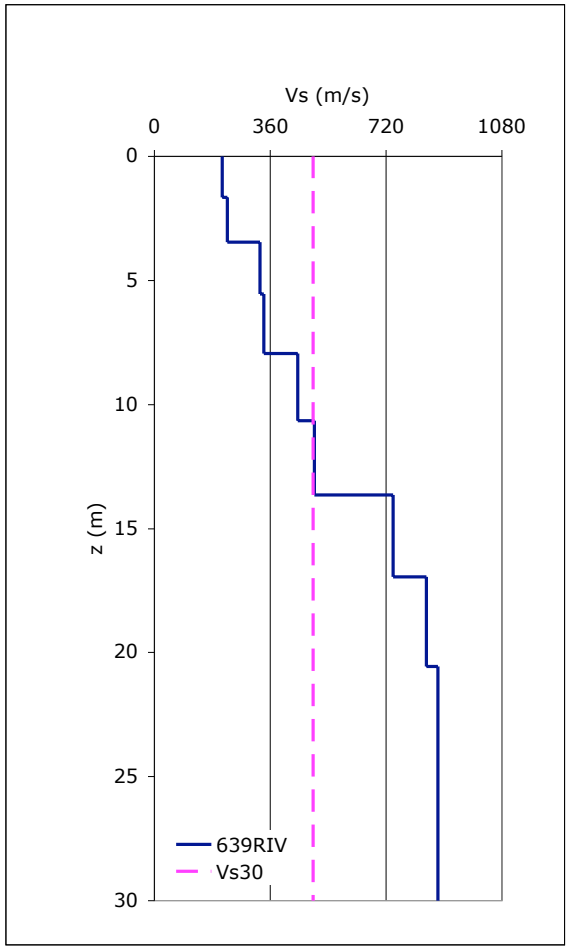
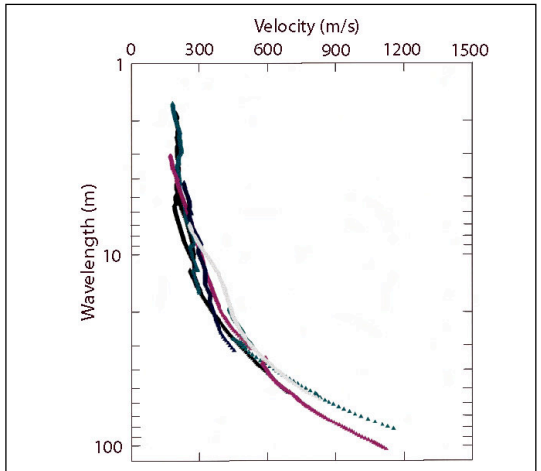
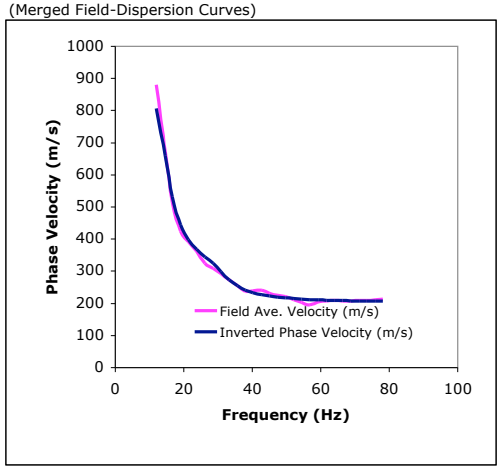


(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A74.—SASW site classification and location information for site 639RIV. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A75.—Site 640LMD (CSMIP site 707), located at Lake Mathews Dike Toe, Riverside County, California. Site location 33.852°N 117.451°W. The waypoint plotted in the lake, so we tested as close to it as possible at the base of the dam. Photo A looks away from the dam at the source to the north. Photos B and C show the reverse array to the west along the dam,and photo D shows the forward array to the east.

NGA-PEER Site Classification

Site ID	**640LMD**	
NEHRP CLASS:	**C**	
Vs30	**533**	**(m/s)**
SUB-CLASS	**C+**	

Location	Lake Mathews Dike Toe
NGA Site ID	707
State	CALIFORNIA

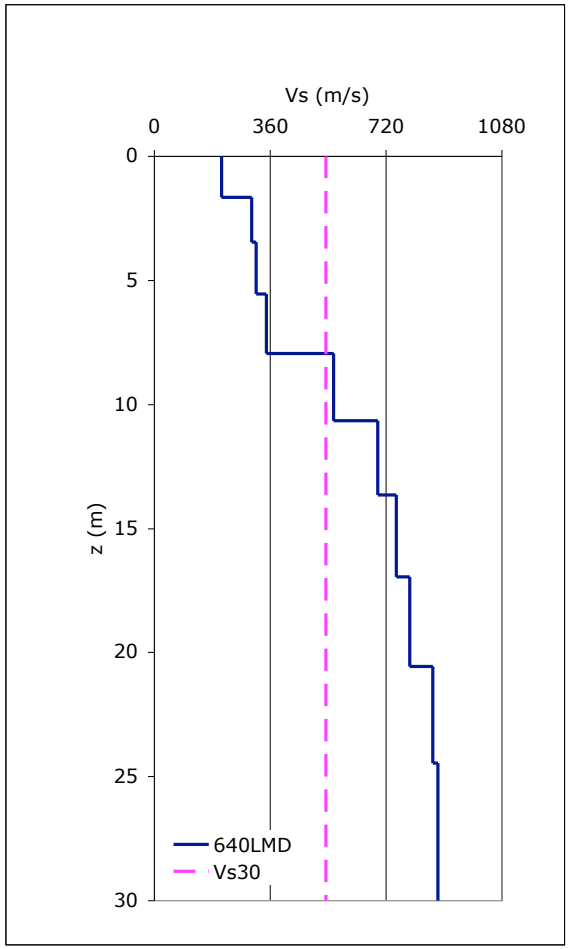
POSITION	**DEGREES**	**DECIMAL MINUTES**
GPS LAT (NORTH)	33	51.222
GPS LONG (WEST	117	27.008

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	1/9/2004
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

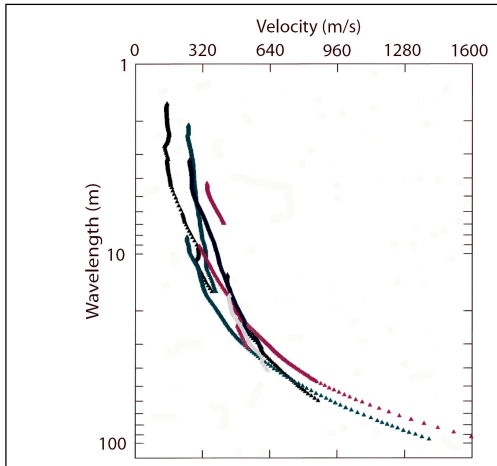
SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

USGS science for a changing world

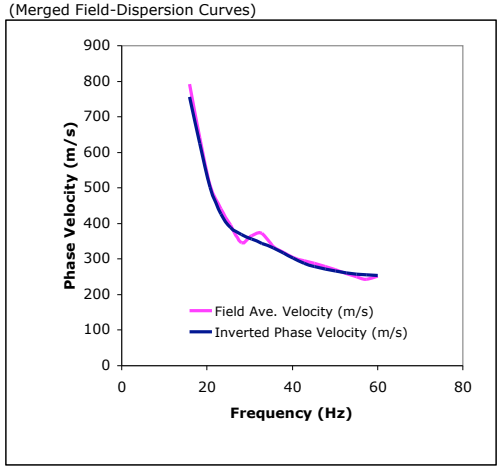
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A76.—SASW site classification and location information for site 640LMD. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A77.—Site 641PER (CSMIP site 13928), located in Perris - San Jacinto & C Street, Riverside County, California. Site location 33.787°N 117.23°W. Photo A faces south looking at the shaker and the reverse array. Photo B looks to the southeast. Photo C looks north along the forward array, and photo D looks to the northwest.

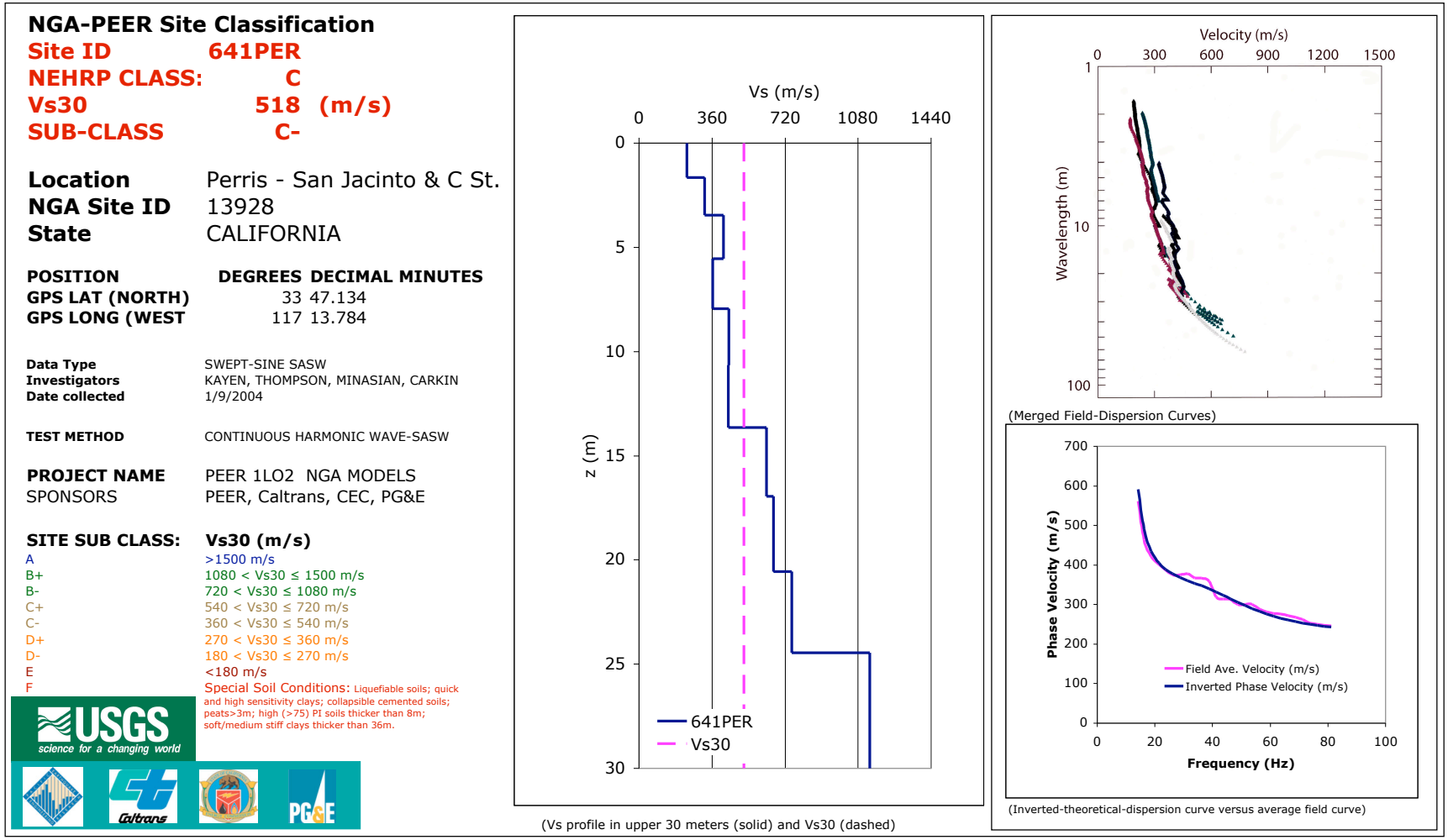


Figure A78.—SASW site classification and location information for site 641PER. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A79.—Site 642NVO (CSMIP site 13095), located in Nuevo - 11th & McKinley, Riverside County, California. Site location 33.818°N 117.312°W. Photo A shows the intersection of 11th St. and Lakeview Ave. from the location where we tested. Photo B looks south along Lakeview Ave. Photo C looks to the northeast from the shaker. Photo D shows the full array look to the west.

NGA-PEER Site Classification

Site ID	**642NVO**
NEHRP CLASS:	**C**
Vs30	**369 (m/s)**
SUB-CLASS	**C-**

Location	Nuevo - 11th & McKinley
NGA Site ID	13095
State	CALIFORNIA

POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	33 49.100
GPS LONG (WEST	117 07.974

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	1/9/2004
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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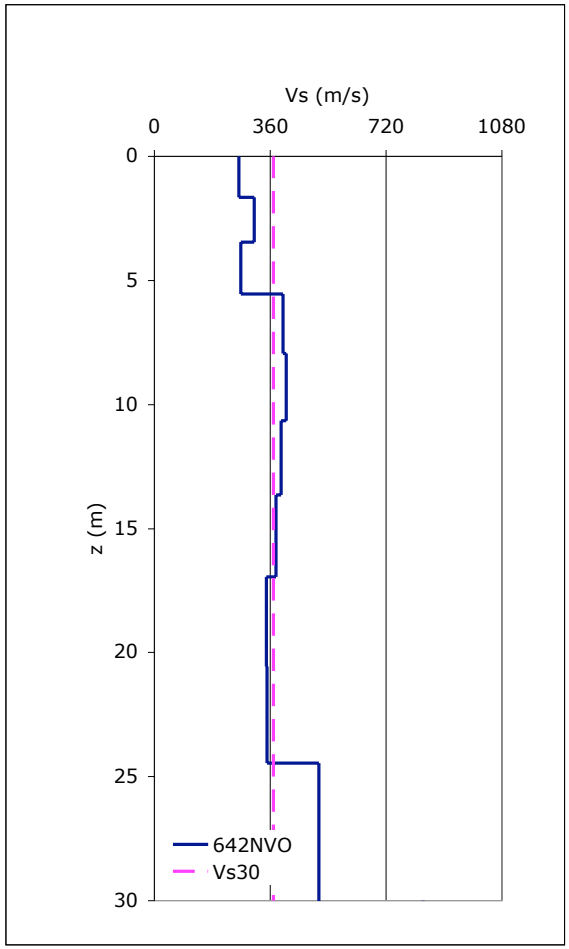
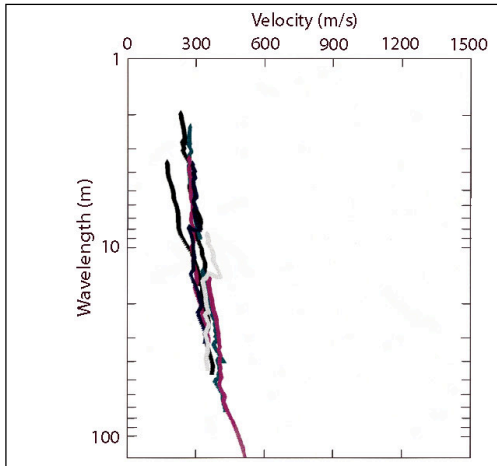
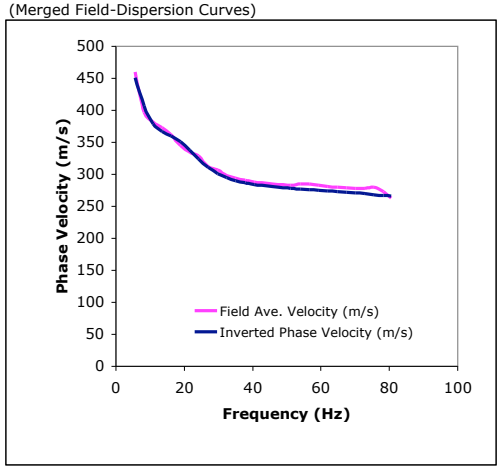
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A80.—SASW site classification and location information for site 642NVO. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A81.—Site 643MVA (CSMIP site 13929), located in Menifee Valley - Murrieta & Scott, Riverside County, California. Site location 33.649°N 117.205°W. Photo A shows the full array facing to the north and photo B looks to the northwest. Photo C shows the shaker and reverse array looking to the south. Photo D shows the shaker facing to the west.

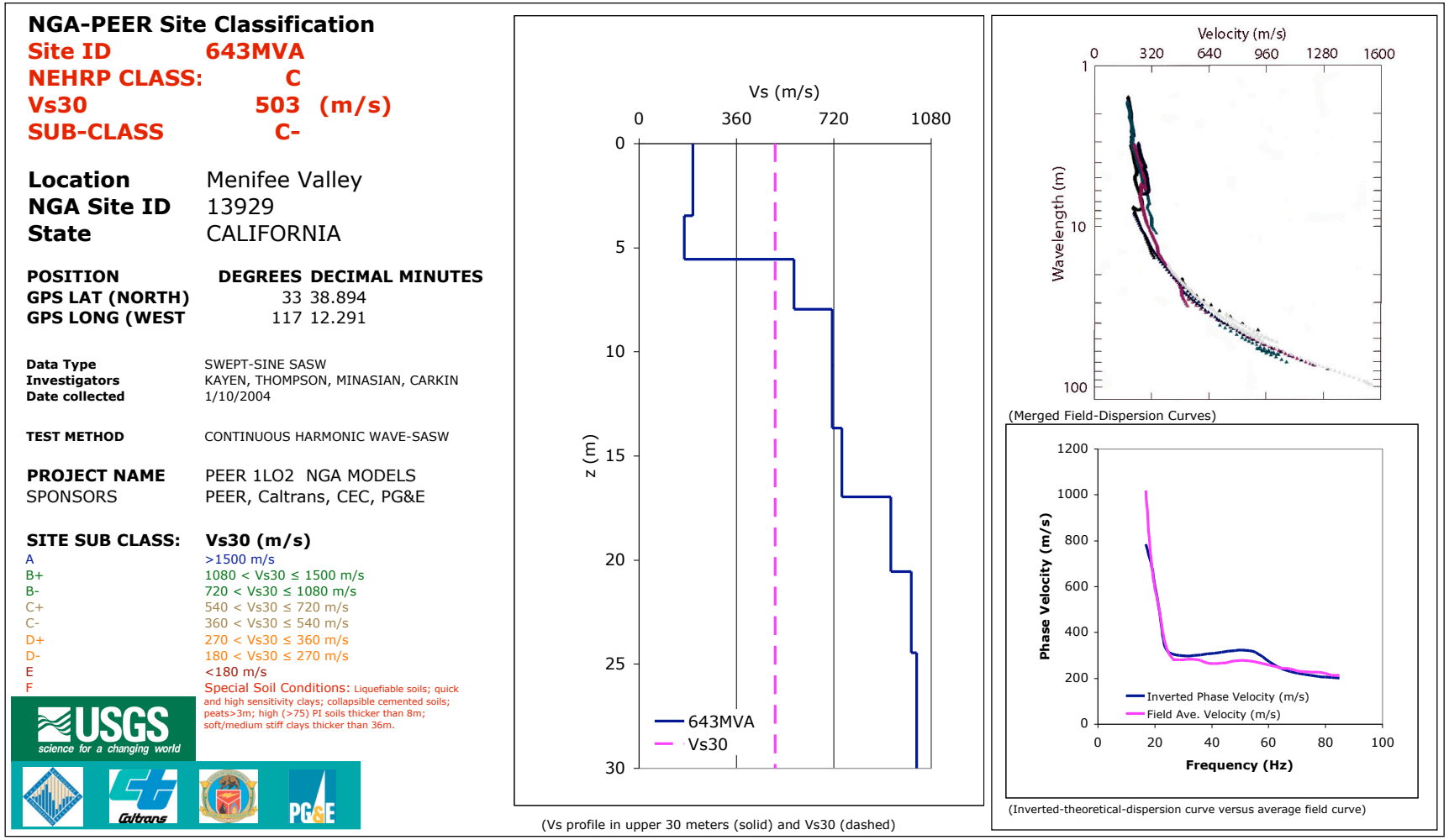


Figure A82.—SASW site classification and location information for site 643MVA. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A83.—Site 644LKE (CSMIP site 13922), located in Lake Elsinore - Graham & Poe, Riverside County, California. Site location 33.669°N 117.332°W. Photo A shows the shaker, array and Lake Elsinore facing to the southwest. Photo B shows the side of the Fire Station where the NGA station was likely located, and the location of the adjacent parking lot where we tested which was a few meters higher in elevation than the Fire Station. Photo C shows the Fire Station to the north of the array. Photo D faces to the west showing the entrance to the parking lot.

NGA-PEER Site Classification

Site ID	**644LKE**
NEHRP CLASS:	**C**
Vs30	**616 (m/s)**
SUB-CLASS	**C+**

Location	Lake Elsinore
NGA Site ID	13922
State	CALIFORNIA

POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	33 40.100
GPS LONG (WEST	117 19.955

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	1/10/2004
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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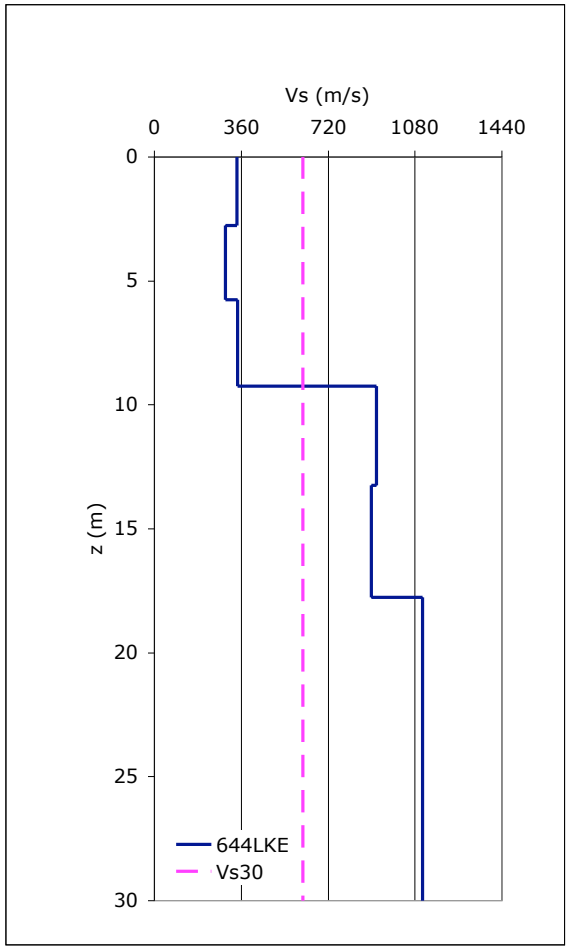
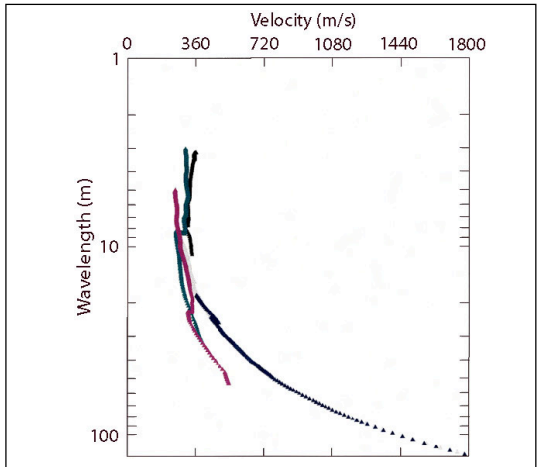
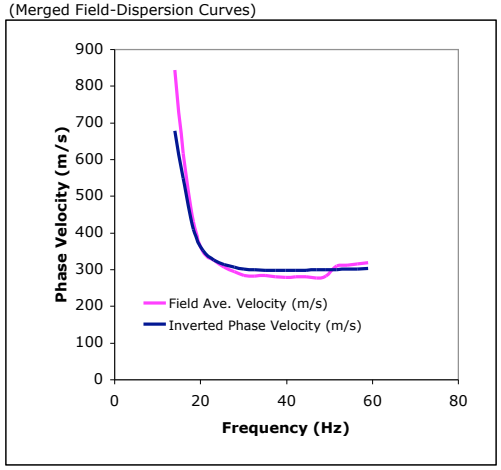
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A84.—SASW site classification and location information for site 644LKE. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A85.—Site 645CCD (CSMIP site 108), located at Carbon Canyon Dam, Yorba Linda, Orange County, California. Site location 33.912°N 117.838°W. Photo A looks northeast at the dam and showing the location of the shaker, and photo B looks down on the shaker to the south from the dam. Photo C shows the shaker looking east along the forward array, and photo D looks to the southwest showing the reverse array.

NGA-PEER Site Classification

Site ID	**645CCD**
NEHRP CLASS:	**D**
Vs30	**235 (m/s)**
SUB-CLASS	**D-**

Location	Carbon Canyon Dam
NGA Site ID	108
State	CALIFORNIA

POSITION	**DEGREES**	**DECIMAL MINUTES**
GPS LAT (NORTH)	33	54.741
GPS LONG (WEST	117	50.389

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	1/10/2004
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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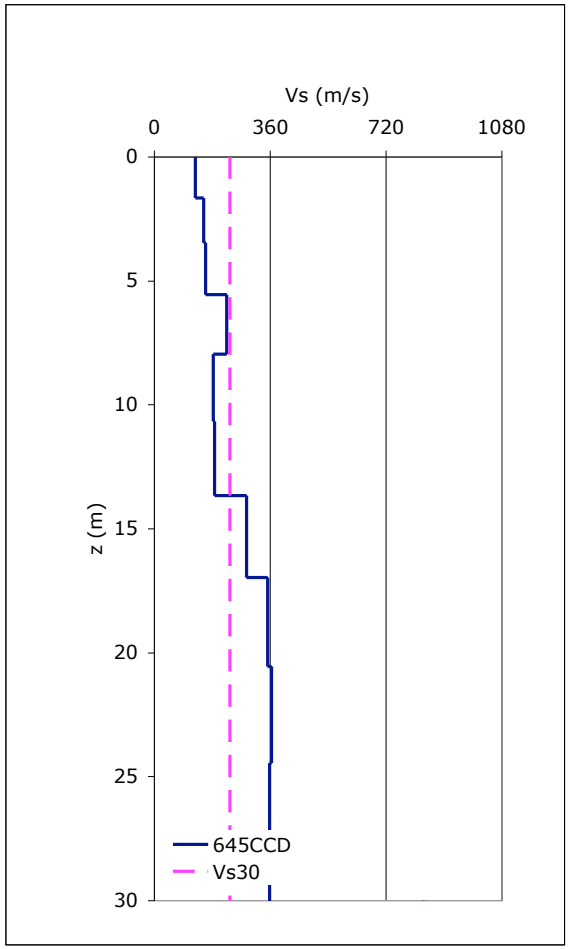
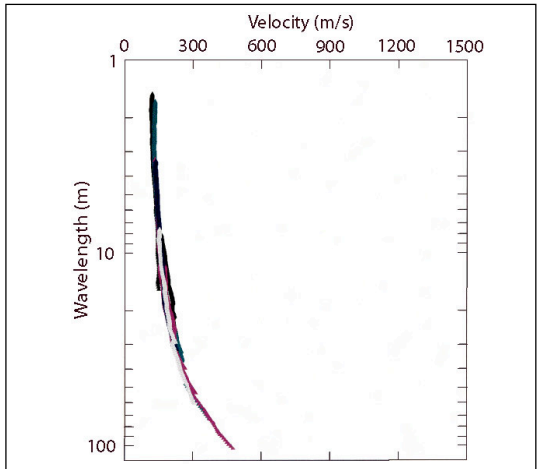
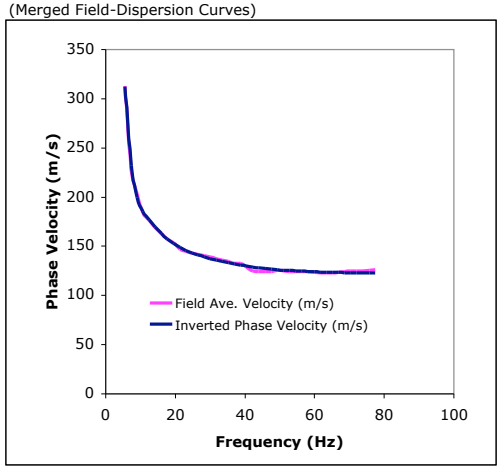
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A86.—SASW site classification and location information for site 645CCD. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A87.—Site 646HHC (CSMIP site 90073), located in Hacienda Heights - Colima, Los Angeles County, California. Site location 33.99°N 117.943°W. Photo A shows the parking lot where we tested, and looks at if from the street to the north. Photo B is located at the shaker, looking back toward the street to the south. Photo C looks to the west and shows the church we tested next to. Photo D shows the shaker and the forward array extending to the north.

NGA-PEER Site Classification

Site ID	**646HHC**
NEHRP CLASS:	**D**
Vs30	**337 (m/s)**
SUB-CLASS	**D+**

Location	Hacienda Heights - Colima
NGA Site ID	90073
State	CALIFORNIA

POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	33 59.405
GPS LONG (WEST	117 56.624

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	1/10/2004
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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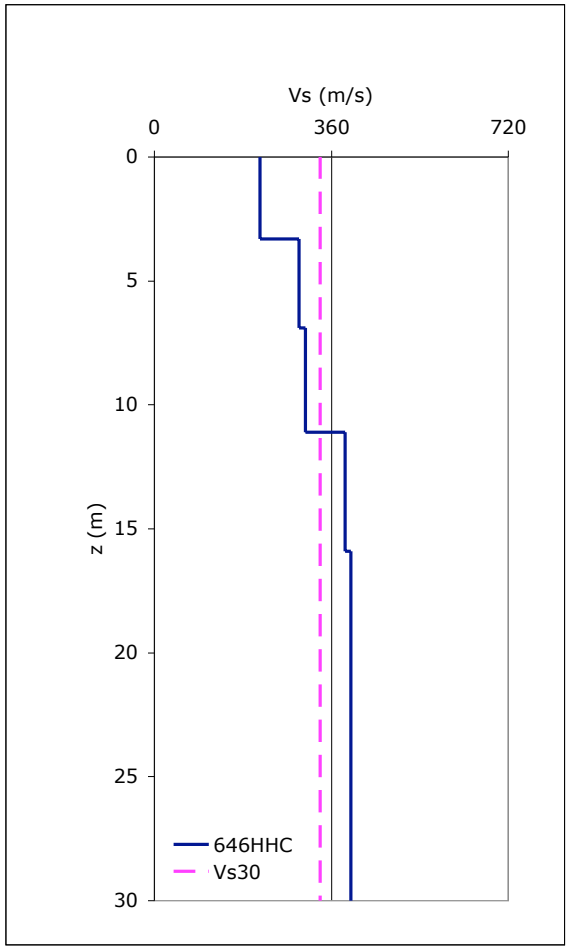
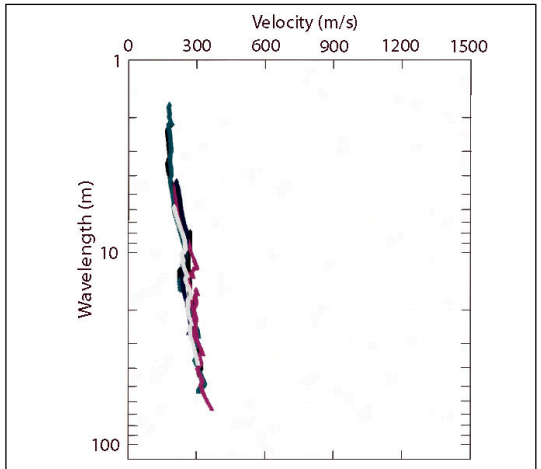
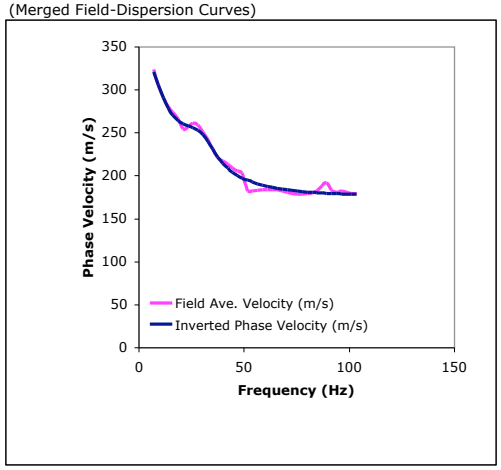
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A88.—SASW site classification and location information for site 646HHC. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

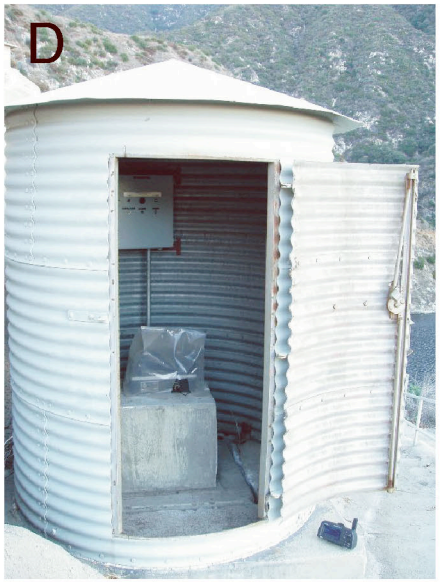


Figure A89.—Site 647SAD (CSMIP site 104), located at Santa Anita Dam, Los Angeles County, California. Site location 34.185°N 118.018°W. Photo A shows the location of the array facing to the east. The NGA station is located to the right (southeast) from the house in the photo. Photo B looks to the northeast. Photo C shows the NGA station located on the west side of the dam (photo facing the northeast). Photo D is a close of up of the instrument.

NGA-PEER Site Classification

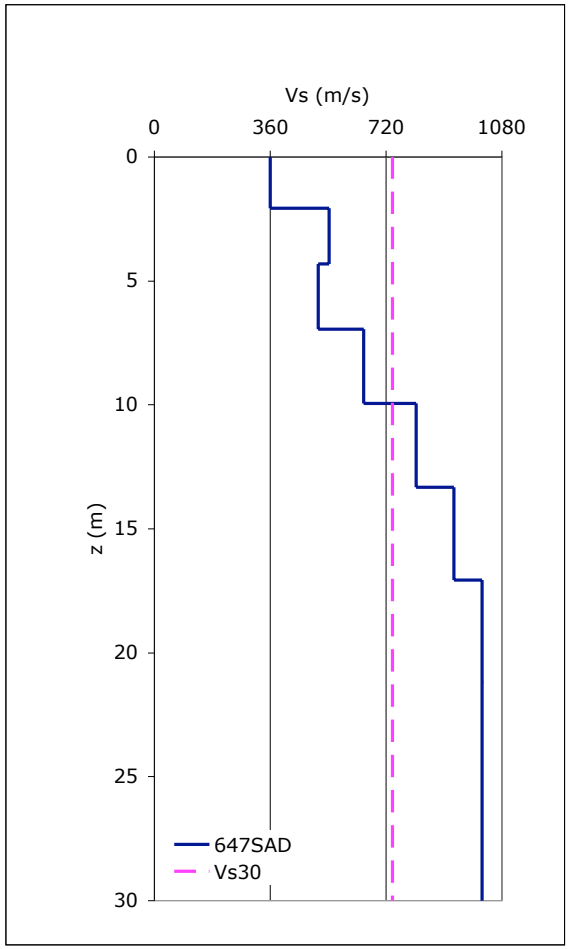
Site ID	**647SAD**
NEHRP CLASS:	**C**
Vs30	**740 (m/s)**
SUB-CLASS	**B-**

Location	Santa Anita Dam
NGA Site ID	104
State	CALIFORNIA

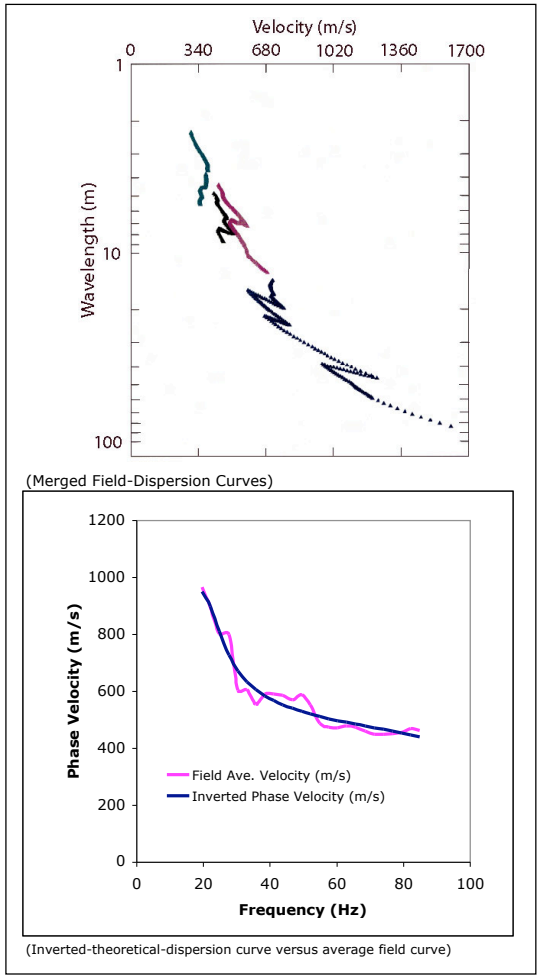
POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	34 11.044
GPS LONG (WEST	118 01.237

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	1/11/2004
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A90.—SASW site classification and location information for site 647SAD. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A91.—Site 648CWD (CSMIP site 23210), located Cogswell Dam - Right Abutment, Los Angeles County, California. Site location 34.245°N 117.964°W. The location of the NGA instrument could not be found, but the closest to the waypoint we could get was on the dam. The waypoint plotted at the base of the dam, where there was no access. Photo A looks to the east from the dam, and photo B looks to the south. Photo C looks upstream of the dam to the west, and photo D looks to the south.

NGA-PEER Site Classification

Site ID 648CWD
NEHRP CLASS: C
Vs30 464 (m/s)
SUB-CLASS C-

Location Cogswell Dam
NGA Site ID 23210
State CALIFORNIA

POSITION	DEGREES	DECIMAL MINUTES
GPS LAT (NORTH)	34	14.686
GPS LONG (WEST	117	57.911

Data Type SWEPT-SINE SASW
Investigators KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected 1/11/2004

TEST METHOD CONTINUOUS HARMONIC WAVE-SASW

PROJECT NAME PEER 1LO2 NGA MODELS
SPONSORS PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	Vs30 (m/s)
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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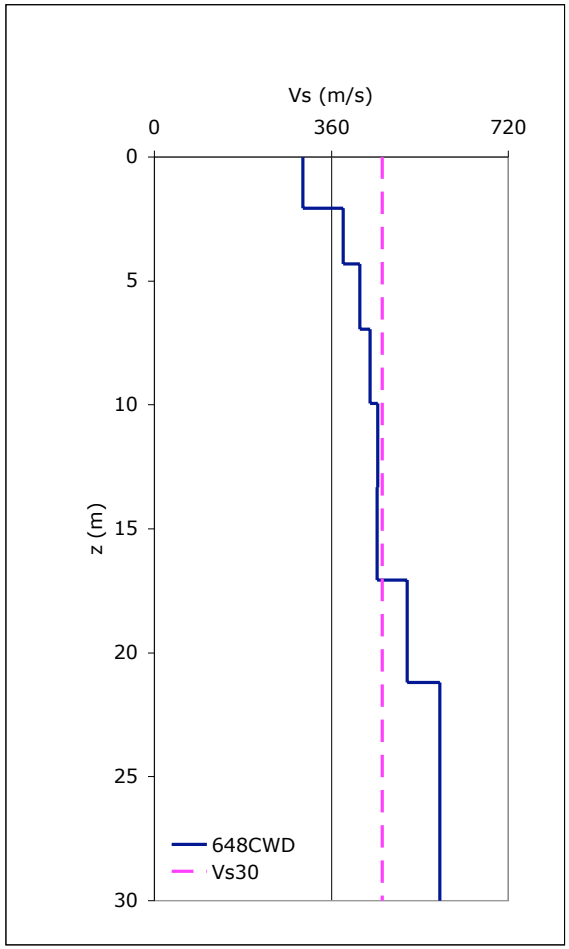
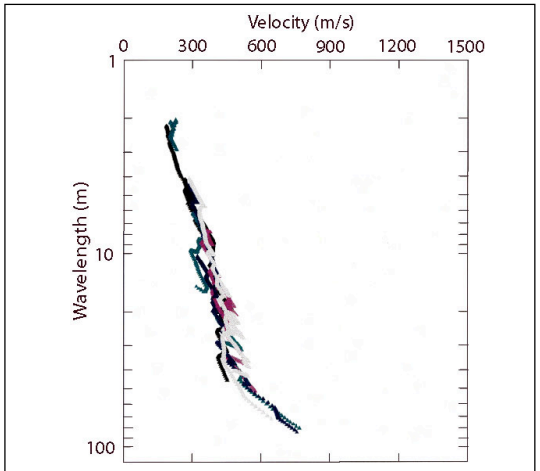
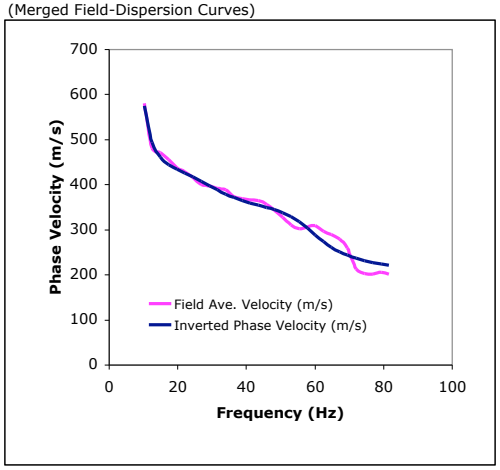


(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A92.—SASW site classification and location information for site 648CWD. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

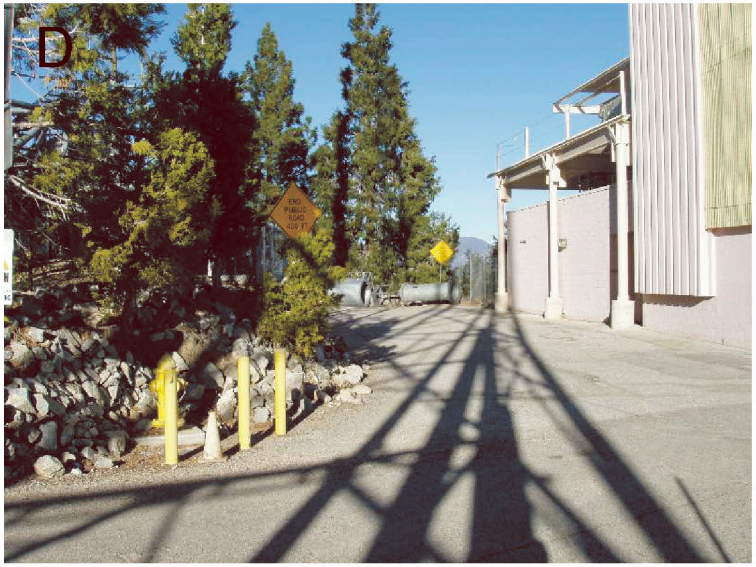


Figure A93.—Site 649MWO (CSMIP site 24399), located at Mount Wilson - CIT Seismic Station, Los Angeles County, California. Site location 34.224°N 118.057°W. We could not get access any closer to the NGA station than the Radio Towers. Photo A shows the full array facing the southeast, and photo B faces the northwest. Photo C shows the road we turned onto to test (facing the northeast, the array is to the left in the photo). Photo D looks to the southeast along the road we drove in on.

NGA-PEER Site Classification

Site ID 649MWO
NEHRP CLASS: C
Vs30 390 (m/s)
SUB-CLASS C-

Location	Mount Wilson - CIT Seis Sta.
NGA Site ID	24399
State	CALIFORNIA

POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	34 13.615
GPS LONG (WEST	118 04.004

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	1/11/2004
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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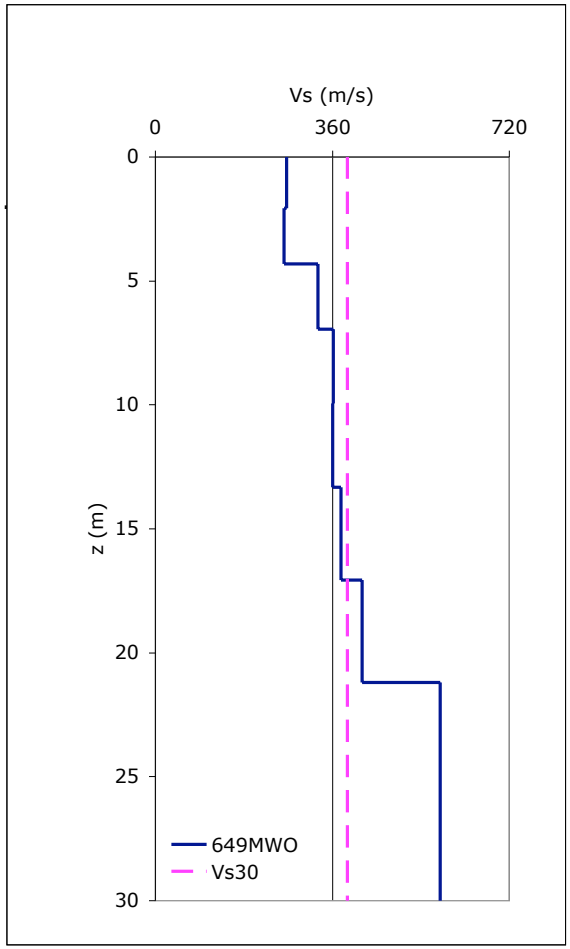
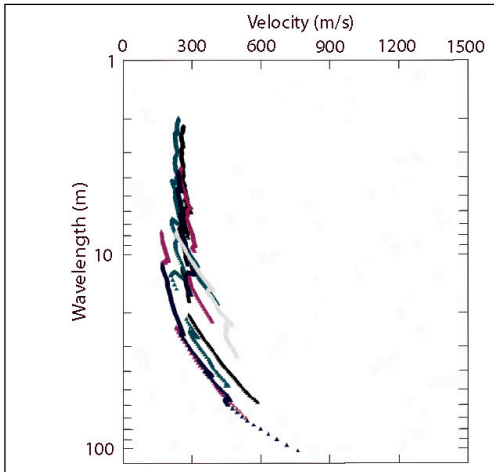
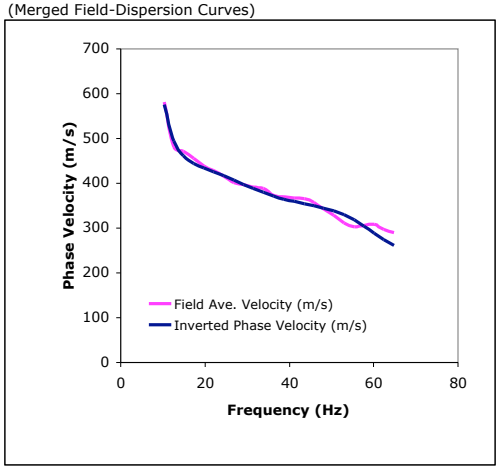


(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A94.—SASW site classification and location information for site 649MWO. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

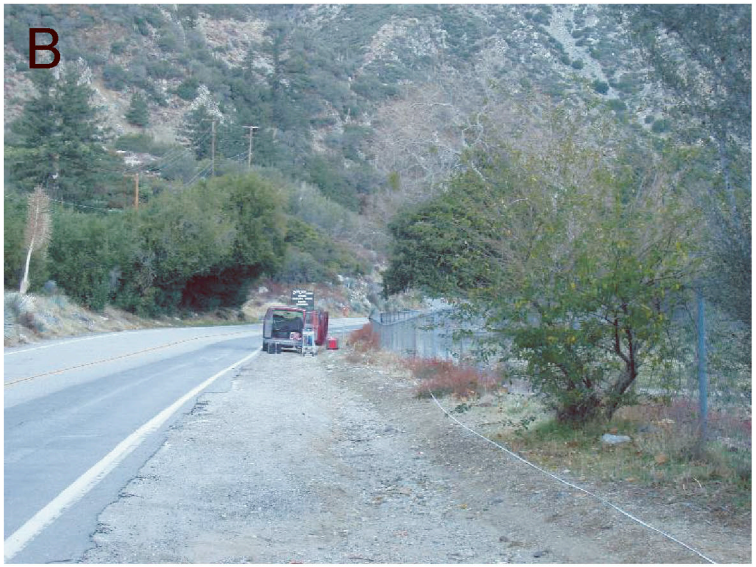


Figure A95.—Site 650MBS (CSMIP site 23572), located at Mount Baldy - Elementary School, Los Angeles County, California. Site location 34.233°N 117.661°W. Photo A faces the southeast and shows the full array and the Elementary School where the NGA station is located can be seen in the background. Photo B looks north along the array. Photo C shows the parking lot of the Elementary School. Photo D shows the NGA station at the end of the reverse array.

NGA-PEER Site Classification

Site ID	**650MBS**
NEHRP CLASS:	**C**
Vs30	**438 (m/s)**
SUB-CLASS	**C-**

Location	Mt. Baldy - Elementary Sch.
NGA Site ID	23572
State	CALIFORNIA

POSITION	**DEGREES**	**DECIMAL MINUTES**
GPS LAT (NORTH)	34	13.938
GPS LONG (WEST	117	39.755

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	1/12/2004
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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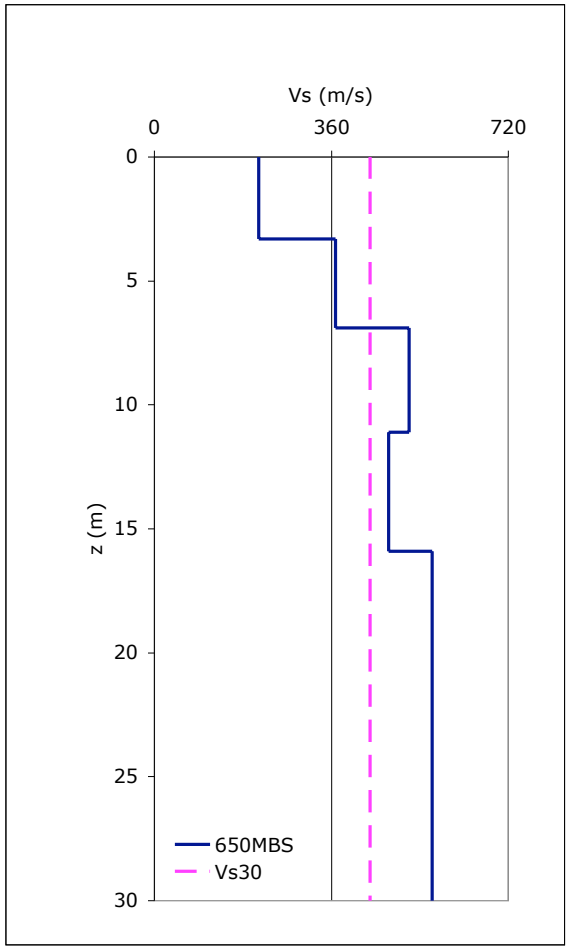
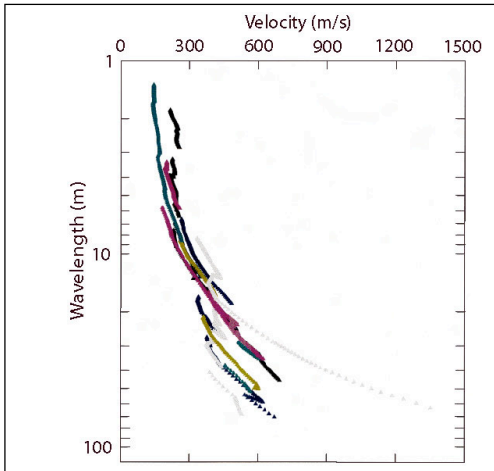
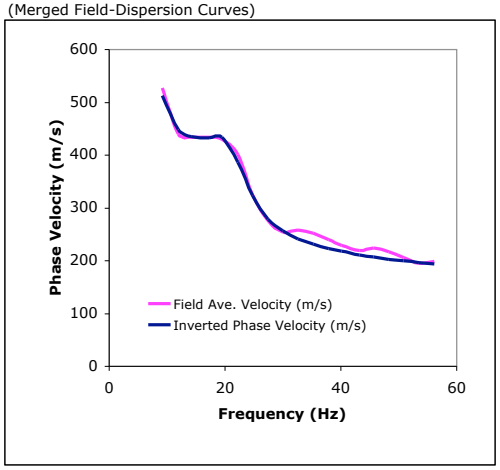
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A96.—SASW site classification and location information for site 650MBS. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A97.—Site 651TUJ (CSMIP site 90061), located at Big Tujunga, Angeles National Forest, Los Angeles County, California. Site location 34.286°N 118.225°W. Photo A shows the Fire Station facing to the east and the reverse array can be seen stretching across the parking lot. Photo B shows the full array and faces to the west. Photo C looks to the south, and photo D shows the array with the station in the background facing the east.

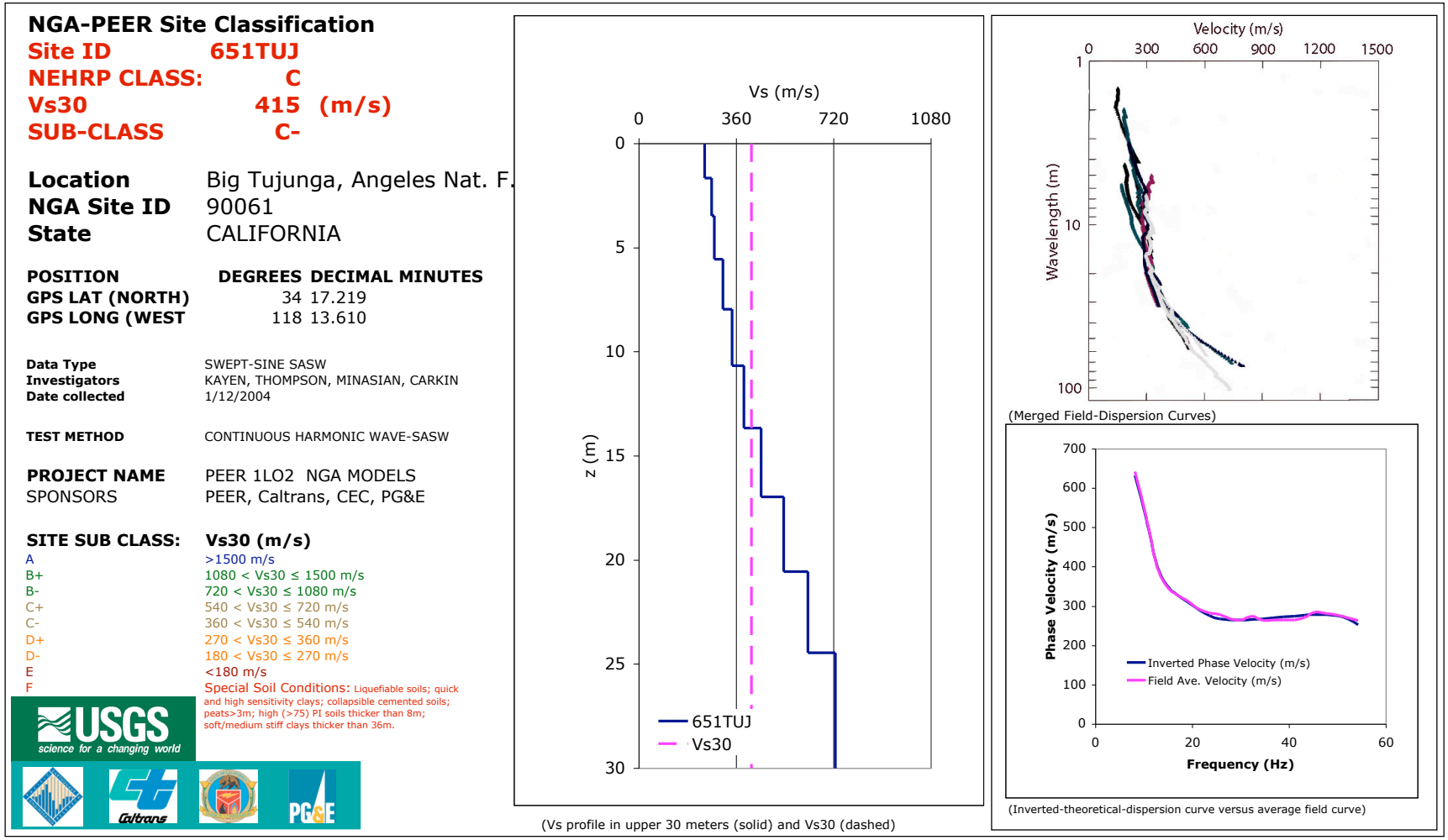


Figure A98.—SASW site classification and location information for site 651TUJ. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A99.—Site 652SFD (CSMIP site 24280), located at Santa Felita Dam (Outlet), in Piru, Ventura County, California. Site location 34.46°N 118.753°W. Photo A shows the dam as we approached it from the south, and photo B looks back on the road to the south from where we tested. Photo C faces the west from the testing location at the base of the dam, and photo D looks to the northeast and shows the array at the base of the dam.

NGA-PEER Site Classification

Site ID	**652SFD**
NEHRP CLASS:	**C**
Vs30	**389 (m/s)**
SUB-CLASS	**C-**

Location	Santa Felicia Dam (Outlet)
NGA Site ID	24280
State	CALIFORNIA

POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	34 27.560
GPS LONG (WEST	118 45.092

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	1/12/2004
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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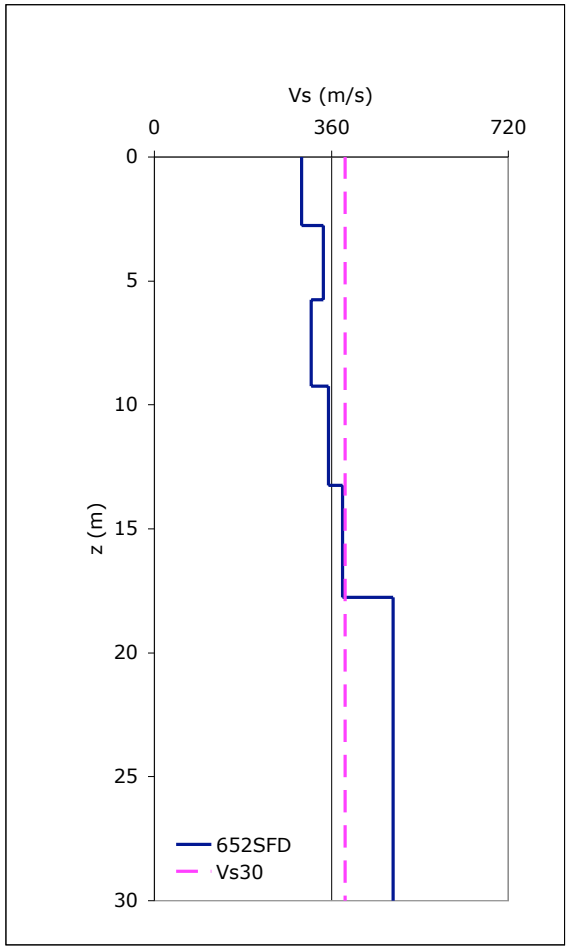
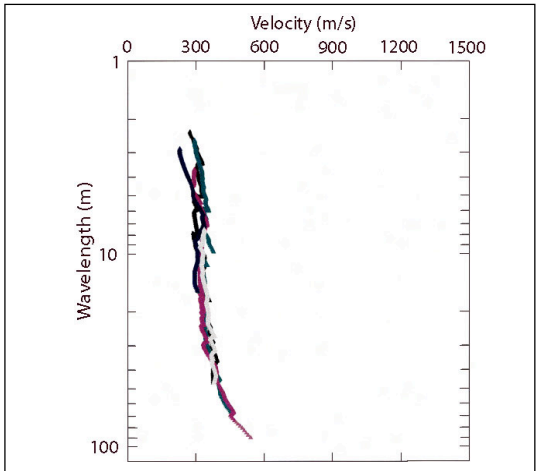
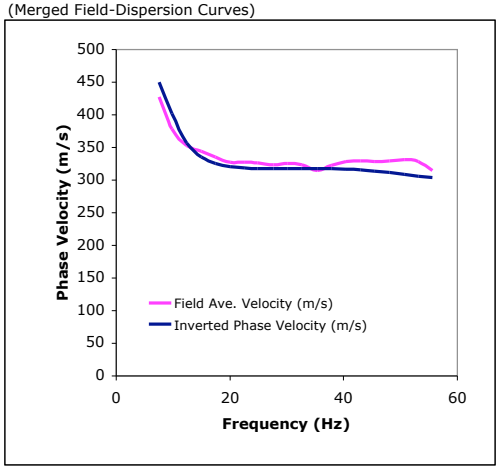
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A100.—SASW site classification and location information for site 652SFD. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

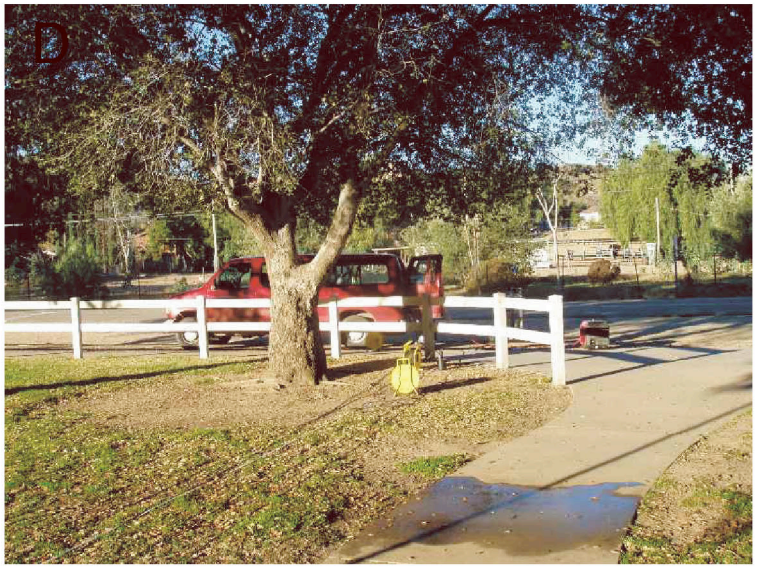


Figure A101.—Site 653SVL (CSMIP site 24861), located in Simi Valley - Katherine Road & Sylvan, Ventura County, California. Site location 34.262°N 118.669°W. Photo A shows the name of the park we tested next to. Photo B shows the road along which we tested facing to the north. Photo C shows the nearby Fire Station at the intersection of Katherine Road and Sylvan Road, just to the south of where we tested. Photo D faces west.

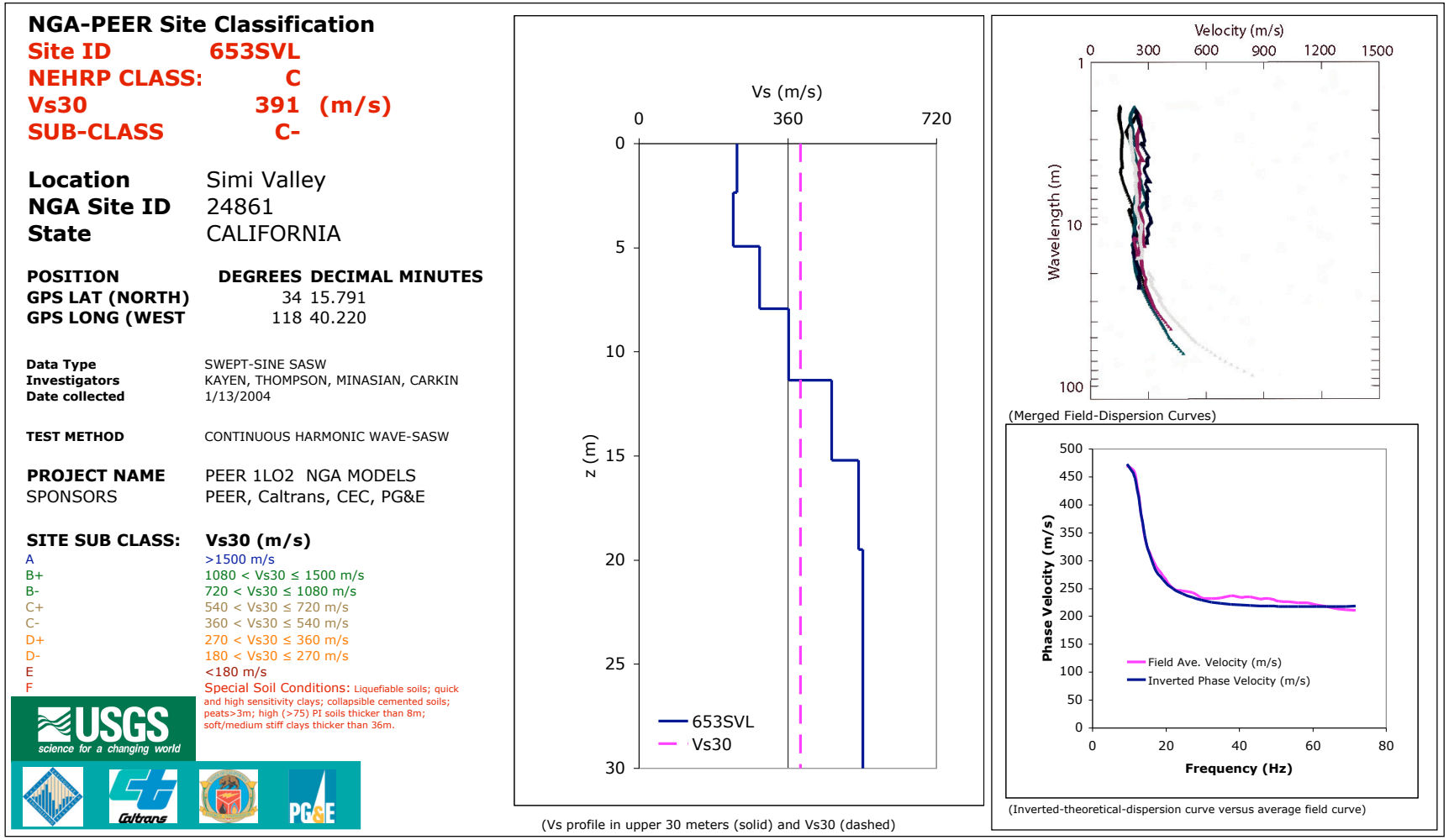


Figure A102.—SASW site classification and location information for site 653SVL. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A103.—Site 654HST (CSMIP site 90059), located in Burbank - Harvard Street, Los Angeles County, California. Site location 34.204°N 118.302°W. Photo A shows the name of the business in who's parking lot we tested. Photo B shows the parking lot facing to the west, and photo C looks to the southwest from the parking lot. Photo D shows the array looking to the north.

NGA-PEER Site Classification

Site ID	**654HST**
NEHRP CLASS:	**B**
Vs30	**714 (m/s)**
SUB-CLASS	**C+**

Location	Burbank - Harvard St.
NGA Site ID	90059
State	CALIFORNIA

POSITION	**DEGREES**	**DECIMAL MINUTES**
GPS LAT (NORTH)	34	12.239
GPS LONG (WEST	118	18.110

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	1/13/2004

TEST METHOD CONTINUOUS HARMONIC WAVE-SASW

PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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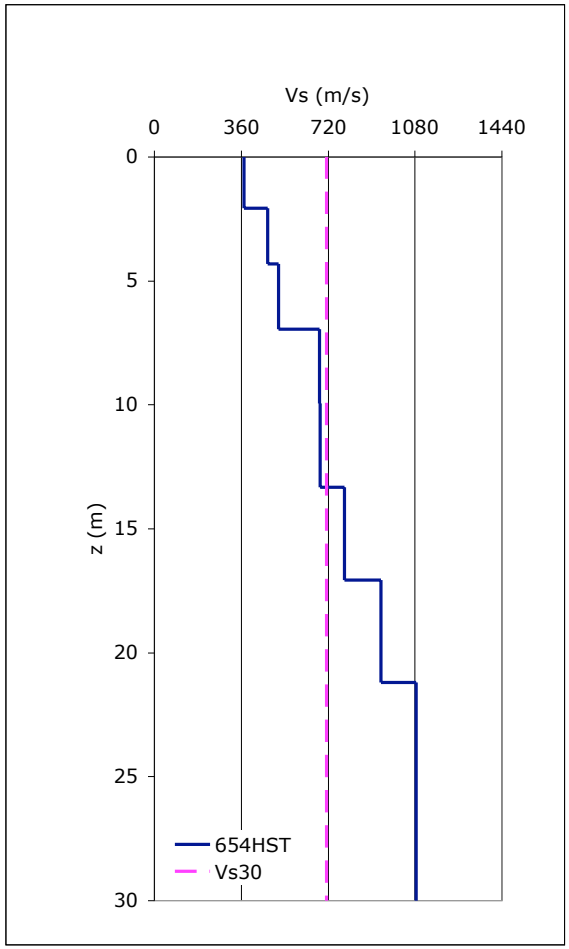
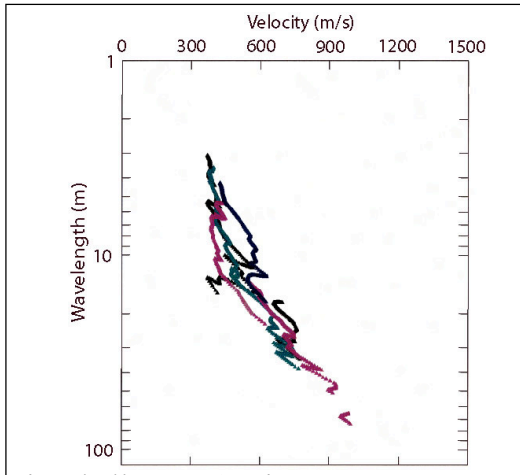
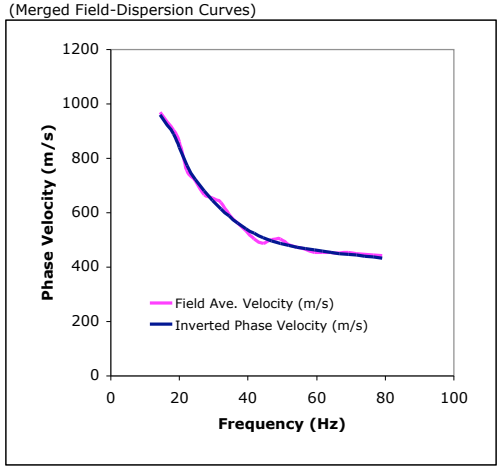
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A104.—SASW site classification and location information for site 654HST. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A105.—Site 655LAF (CSMIP site 90016), located at Harvard Westlake School - N. Faring Road, Los Angeles, California. Site location 34.089°N 118.435°W. Photo A looks to the southeast at the school from the location of the array source. Photo B looks at the field where we tested, facing the northeast. Photo C looks to the north where the forward array was located, and photo D faces the east where the reverse array was located.

NGA-PEER Site Classification

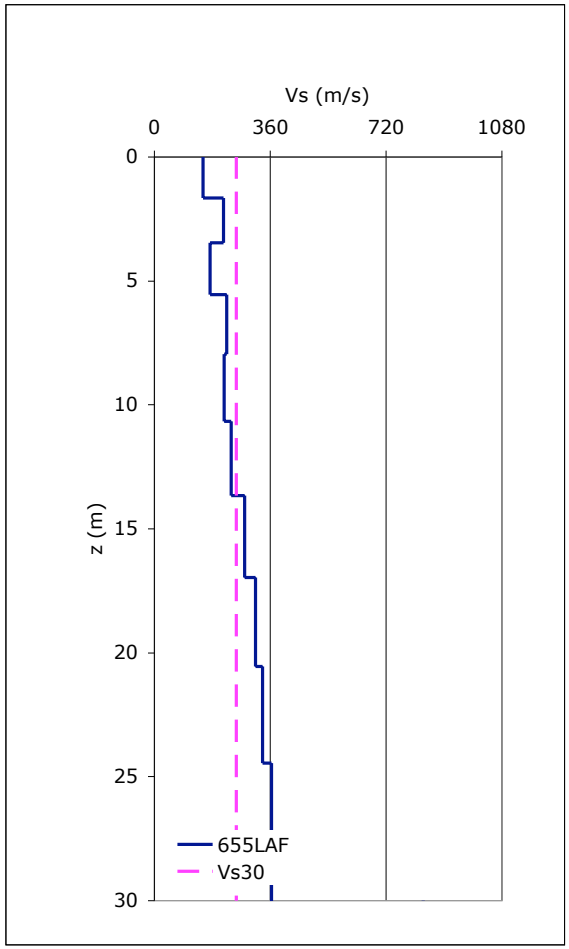
Site ID	**655LAF**
NEHRP CLASS:	**D**
Vs30	**255 (m/s)**
SUB-CLASS	**D-**

Location	Los Angeles, N. Faring
NGA Site ID	90016
State	CALIFORNIA

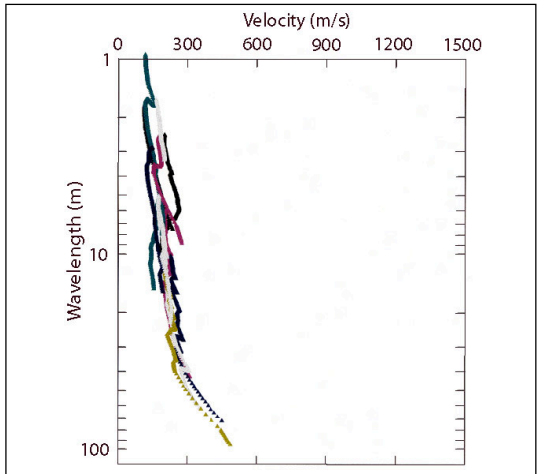
POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	34 05.358
GPS LONG (WEST	118 26.084

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	1/13/2004
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

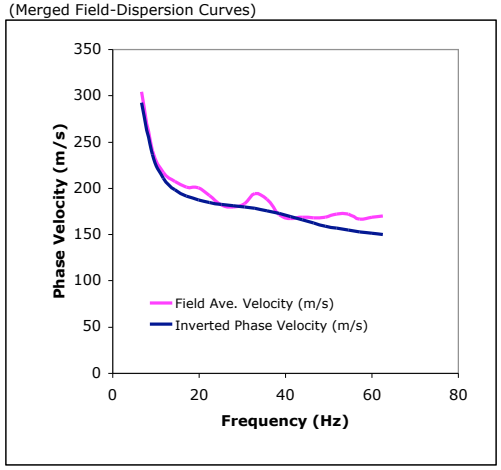
SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A106.—SASW site classification and location information for site 655LAF. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A107.—Site 656RPV (CSMIP site 14404), located at the Salvation Army College, Rancho Palos Verdes - Hawthorne St., Los Angeles County, California. Site location 33.746°N 118.396°W. Photo A shows the array looking to the southeast, photo C faces the south, photo C to the northwest, and photo D to the north.

NGA-PEER Site Classification

Site ID	**656RPV**
NEHRP CLASS:	**C**
Vs30	**501 (m/s)**
SUB-CLASS	**C-**

Location	Ranch Palos Verdes
NGA Site ID	14404
State	CALIFORNIA

POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	33 44.724
GPS LONG (WEST	118 23.886

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	1/13/2004
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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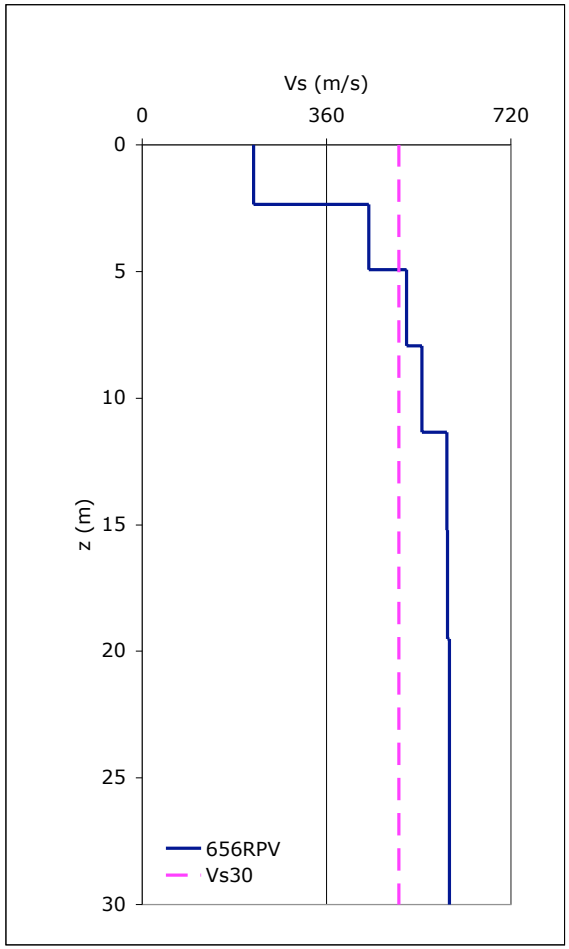
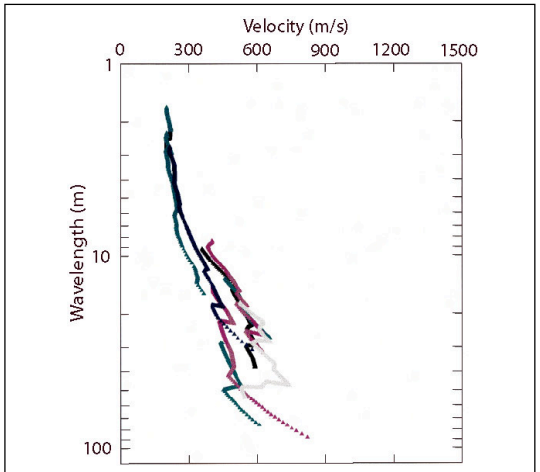
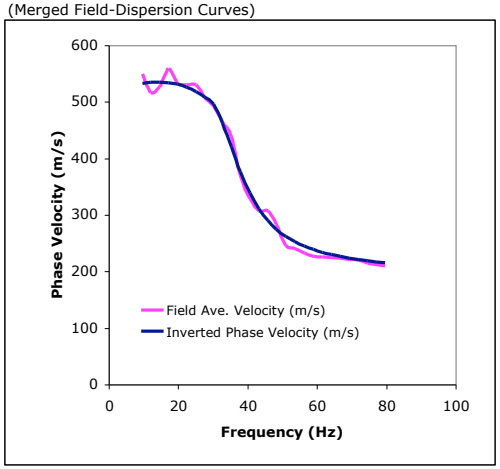
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A108.—SASW site classification and location information for site 656RPV. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A109.—Site 657MFC (CSMIP site 90050), located in Malibu - Las Flores Canyon, Los Angeles County, California. Site location 34.045°N 118.638°W. Photo A shows the entrance to the maintenance station where we tested on the west side of the road. Photo B shows the school across the street where the NGA station may have been located. Photo C shows the array facing to the north, and photo D shows the array facing to the south.

NGA-PEER Site Classification

Site ID	**657MFC**
NEHRP CLASS:	**C**
Vs30	**477 (m/s)**
SUB-CLASS	**C-**

Location	Malibu - Las Flores Canyon
NGA Site ID	90050
State	CALIFORNIA

POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	34 02.720
GPS LONG (WEST	118 38.344

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	1/14/2004
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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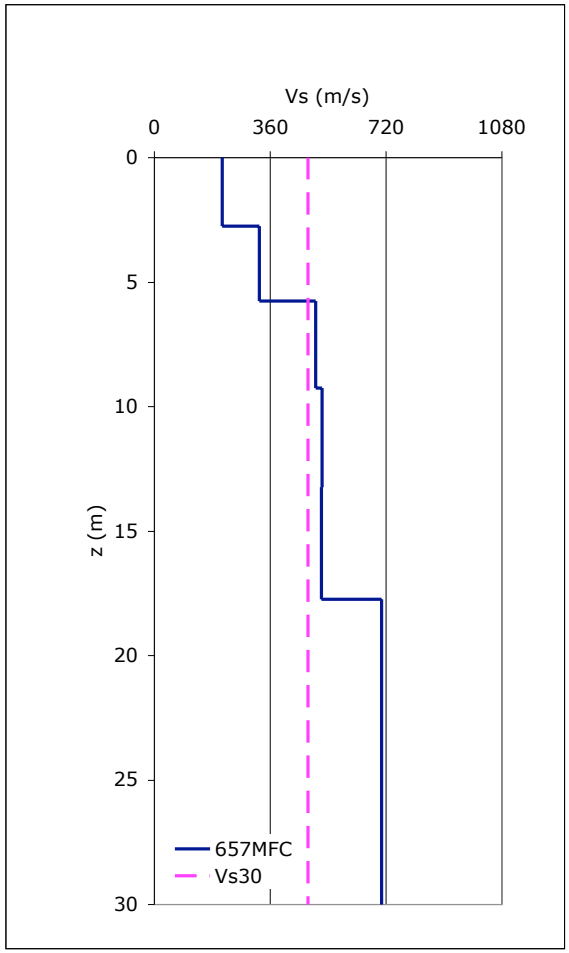
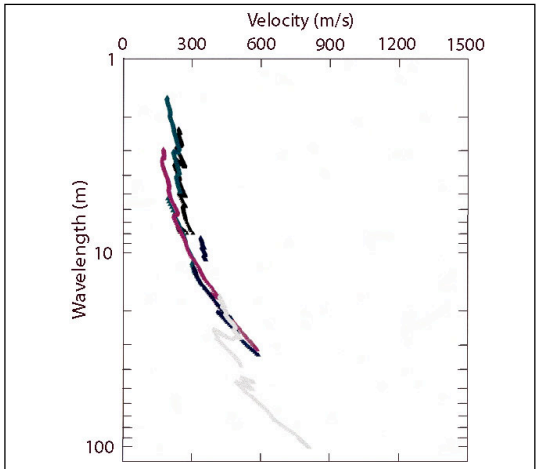
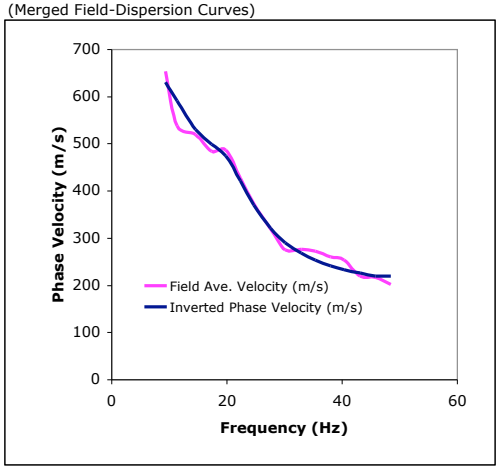


(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field

Figure A110.—SASW site classification and location information for site 657MFC. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

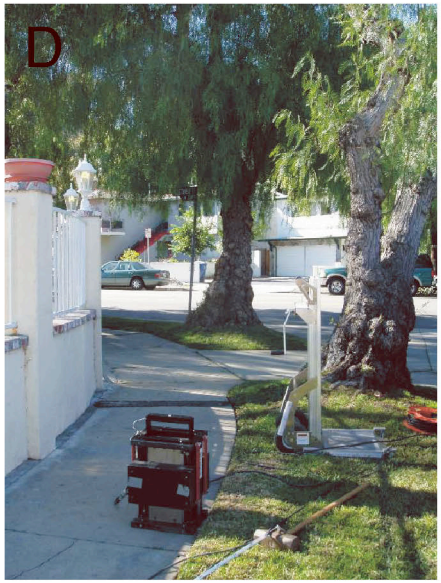


Figure A111.—Site 658WDH (CSMIP site 24807), located Woodland Hills - Canoga & Ventura Blvd., Los Angeles County, California. Site location 34.167°N 118.596°W. Photo A shows the location of the Fire Station to the north of the shaker at the intersection of Canoga and Costanso St, one block off of Ventura Blvd. Photos B and C show the array extending to the east of the shaker. Photo D looks back to the west.

NGA-PEER Site Classification

Site ID 658WDH
NEHRP CLASS: D
Vs30 265 (m/s)
SUB-CLASS D-

Location Woodland Hills
NGA Site ID 24807
State CALIFORNIA

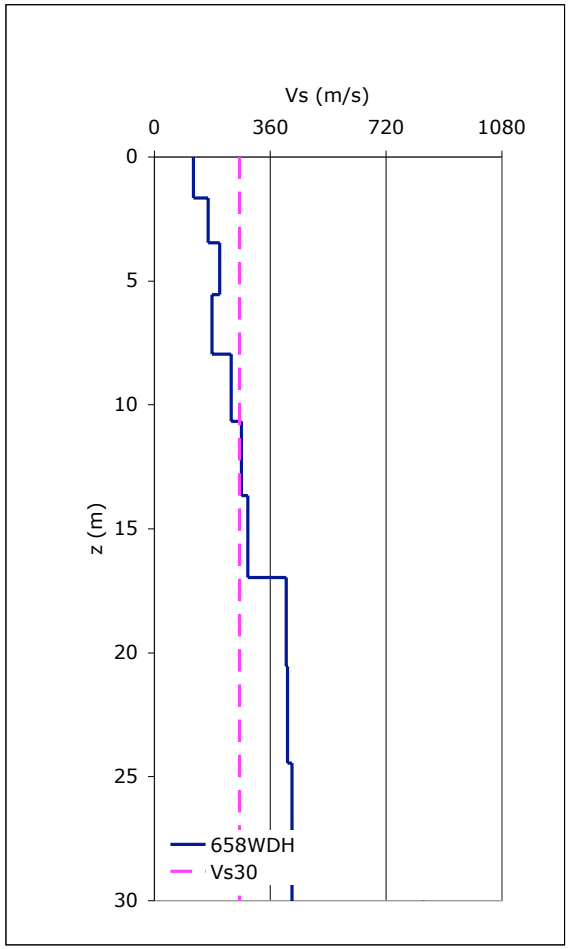
POSITION	DEGREES	DECIMAL MINUTES
GPS LAT (NORTH)	34	10.009
GPS LONG (WEST	118	35.833

Data Type SWEPT-SINE SASW
Investigators KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected 1/14/2004

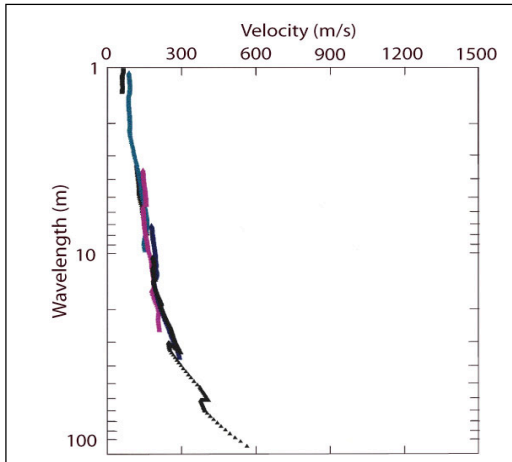
TEST METHOD CONTINUOUS HARMONIC WAVE-SASW

PROJECT NAME PEER 1LO2 NGA MODELS
SPONSORS PEER, Caltrans, CEC, PG&E

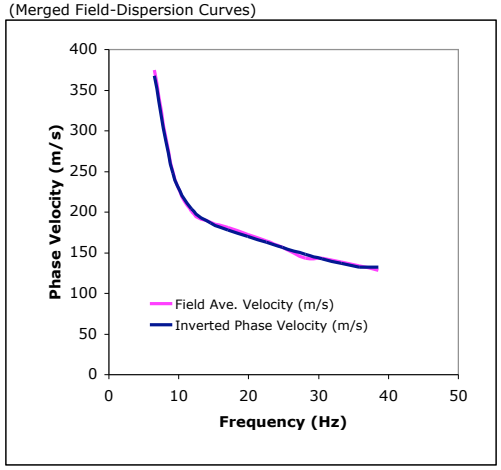
SITE SUB CLASS:	Vs30 (m/s)
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A112.—SASW site classification and location information for site 658WDH. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A113.—Site 659CAM (CSMIP site 24863), located in Camarillo - Woodcreek & Santa Rosa, Ventura County, California. Site location 34.224°N 118.994°W. Photo A shows the Fire Station we tested at. Photo B shows the array looking to the east. Photo C shows the intersection where we tested. Photo D shows the Fire Station and the location of the array facing to the west.

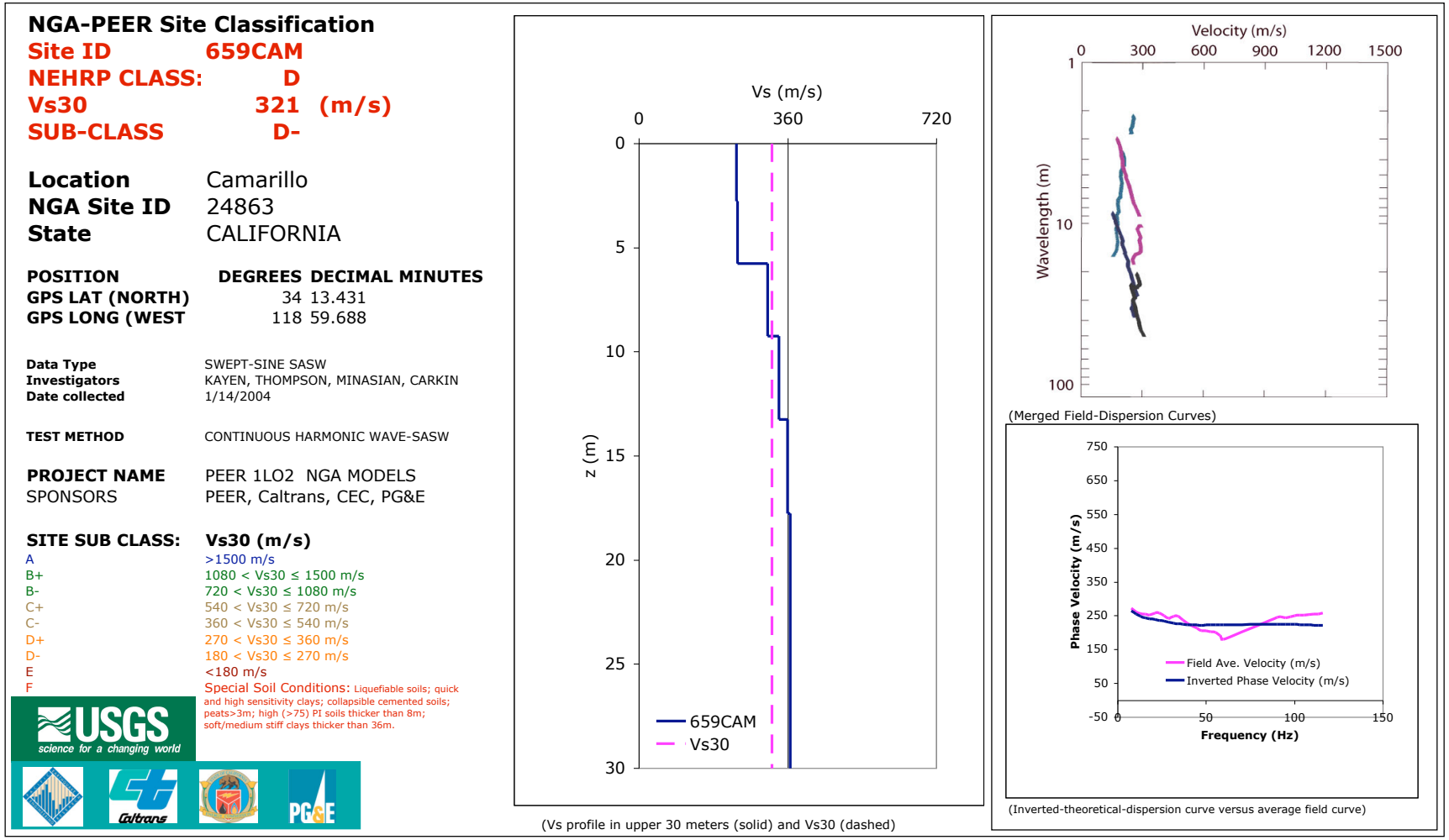


Figure A114.—SASW site classification and location information for site 659CAM. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A115.—Site 660SLO (CSMIP site 1083), located San Luis Obispo, San Luis Obispo County, California. Site location 35.285°N 120.661°W. Photo A shows the building we tested next to. Photo B shows the intersection at which the building was located. Photo C shows the forward array facing toward the shaker to the north. Photo D shows the reverse array looking toward the shaker to the west.

NGA-PEER Site Classification

Site ID	**660SLO**
NEHRP CLASS:	**C**
Vs30	**481 (m/s)**
SUB-CLASS	**C-**

Location	San Luis Obispo
NGA Site ID	1083
State	CALIFORNIA

POSITION	**DEGREES DECIMAL MINUTES**
GPS LAT (NORTH)	35 17.079
GPS LONG (WEST	120 39.641

Data Type	SWEPT-SINE SASW
Investigators	KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected	1/15/2004
TEST METHOD	CONTINUOUS HARMONIC WAVE-SASW
PROJECT NAME	PEER 1LO2 NGA MODELS
SPONSORS	PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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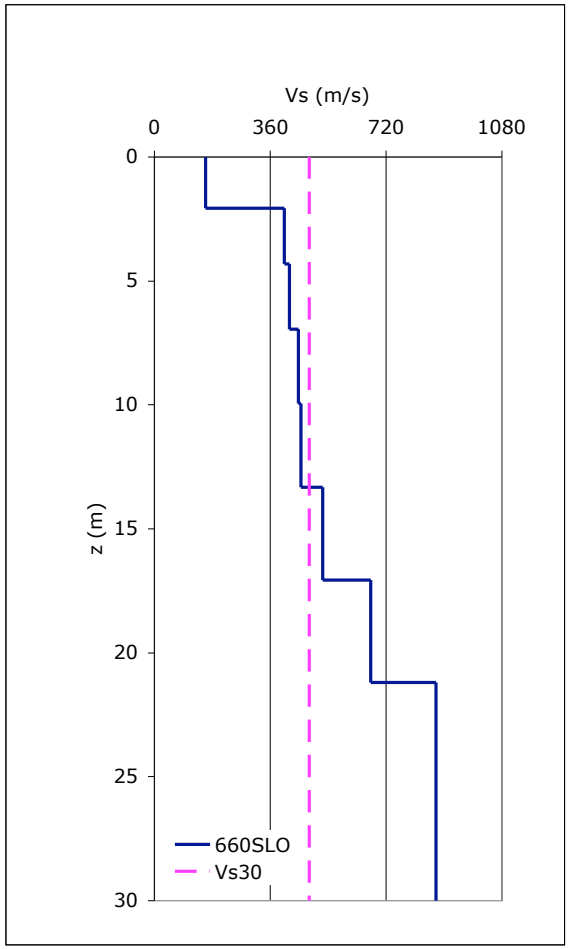
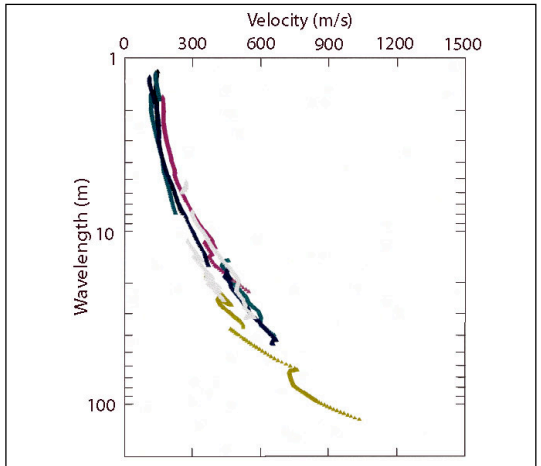
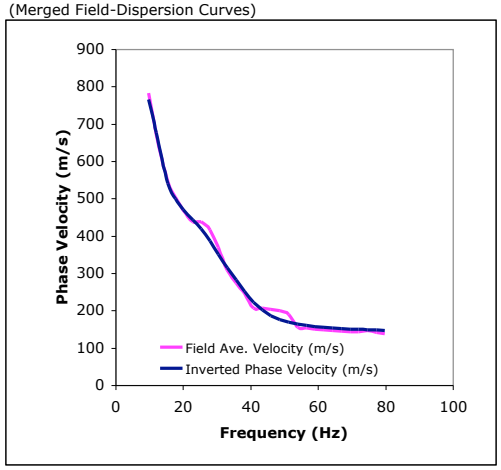
Caltrans PG&E



(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A116.—SASW site classification and location information for site 660SLO. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.

Figure A117.—Site 661JBO (CSMIP site 47315), located at JB Overpass, Bent 3 g.l., Highway 101 at 156, San Benito County, California. Site location 36.862°N 121.578°W. Photo A shows the array looking to the east. Photo B faces the southwest, photo C faces to the northeast and photo D faces to the southwest.

NGA-PEER Site Classification

Site ID **661JBO**
NEHRP CLASS: **D**
Vs30 **372 (m/s)**
SUB-CLASS **C-**

Location JB Overpass
NGA Site ID 47315
State CALIFORNIA

POSITION	**DEGREES**	**DECIMAL MINUTES**
GPS LAT (NORTH)	36	51.698
GPS LONG (WEST	121	34.696

Data Type SWEPT-SINE SASW
Investigators KAYEN, THOMPSON, MINASIAN, CARKIN
Date collected 1/15/2003

TEST METHOD CONTINUOUS HARMONIC WAVE-SASW

PROJECT NAME PEER 1LO2 NGA MODELS
SPONSORS PEER, Caltrans, CEC, PG&E

SITE SUB CLASS:	**Vs30 (m/s)**
A	>1500 m/s
B+	1080 < Vs30 ≤ 1500 m/s
B-	720 < Vs30 ≤ 1080 m/s
C+	540 < Vs30 ≤ 720 m/s
C-	360 < Vs30 ≤ 540 m/s
D+	270 < Vs30 ≤ 360 m/s
D-	180 < Vs30 ≤ 270 m/s
E	<180 m/s
F	Special Soil Conditions: Liquefiable soils; quick and high sensitivity clays; collapsible cemented soils; peats>3m; high (>75) PI soils thicker than 8m; soft/medium stiff clays thicker than 36m.

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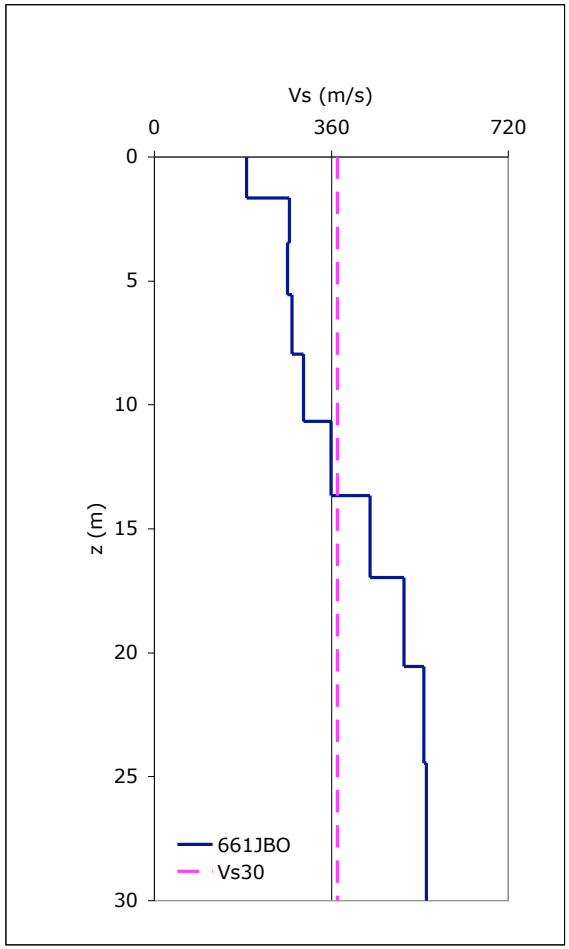
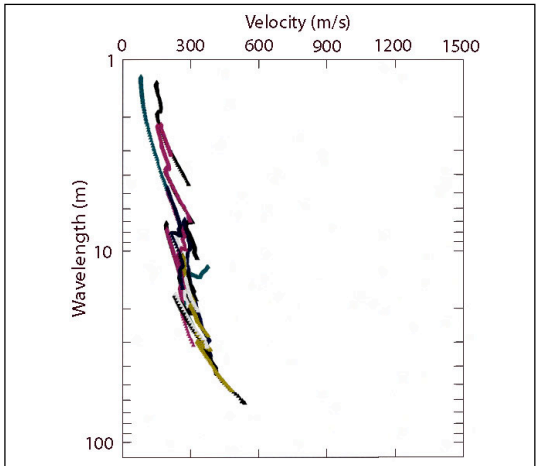
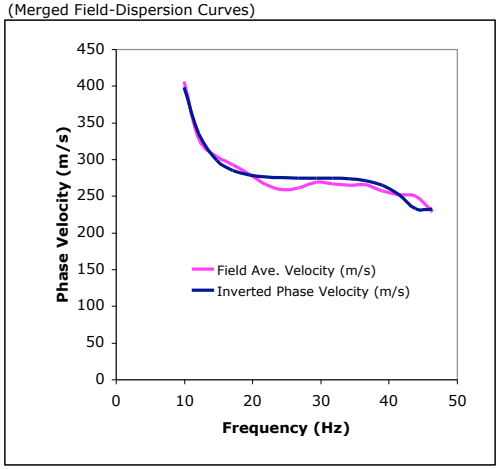


(Vs profile in upper 30 meters (solid) and Vs30 (dashed)



(Merged Field-Dispersion Curves)



(Inverted-theoretical-dispersion curve versus average field curve)

Figure A118.—SASW site classification and location information for site 661JBO. The layered inversion model of shear wave velocity in the upper 30 meters is presented in the middle plot. The site dispersion curves are presented in the upper-right plot, and the comparison between the average site dispersion curve and theoretical dispersion curve is presented in the lower-left.