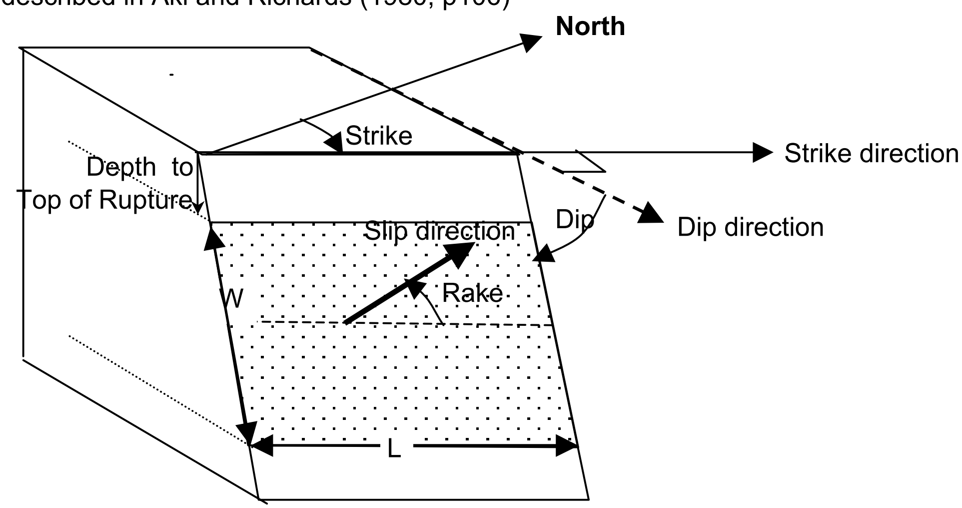
This documentation provides a basic definition of each column in the NGA flatfile and is intended only to make the columns more understandable to users. The extensive documentation prepared by PE&A, USGS, CGS, URS, SCEC, and other contributors will be included in the NGA data report. User should read the NGA data report for elaboration on definition and usage, and for credits to data contributors.

This document is prepared by Brian Chiou and reviewed by Bob Darragh and Maury Power. We did our best to provide a readable and accurate explanation of the flatfile, but errors are expected. We'll continue to update and improve this document. Your comments and feedback will be greatly appreciated.

April 26, 2005

NOTE: A blank cell typically means the parameter value is currently not available. For example, a blank HypD means the hypocentral distance is not available (because hypocenter depth is unknown).

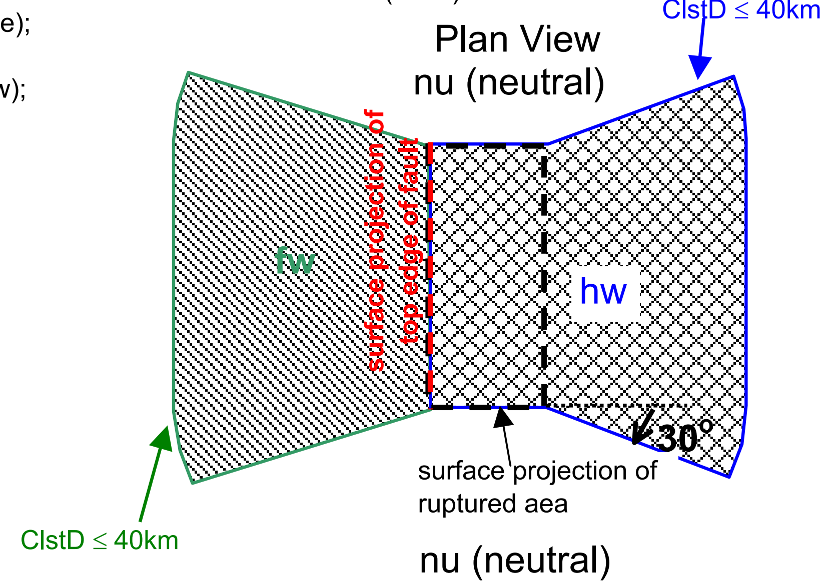
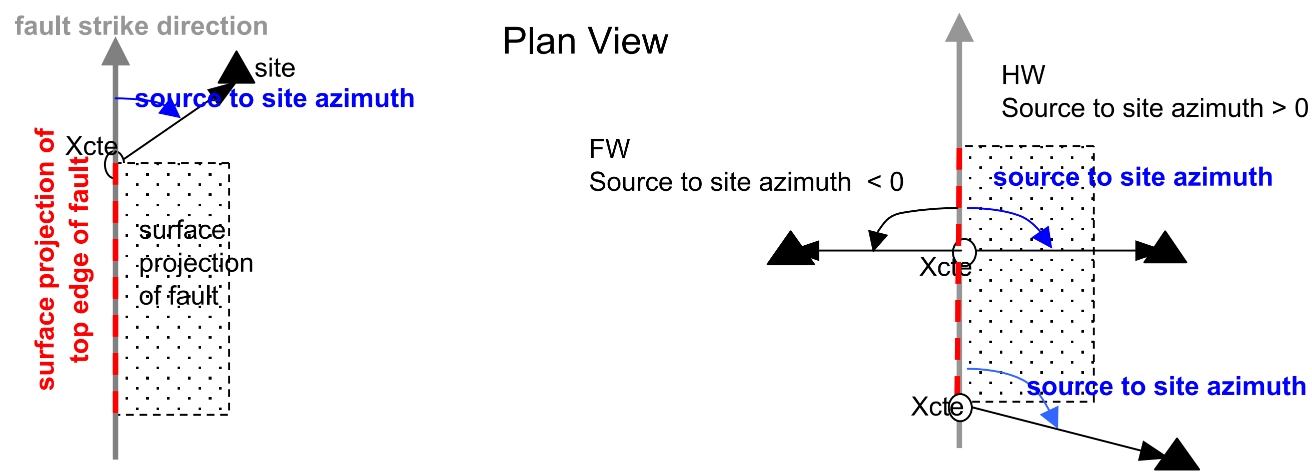
Column Name (units)	Description
Record Sequence Number	An arbitrary unique number assigned to each strong-motion record in the flatfile for identification purposes.
EQID	An arbitrary unique ID assigned to each earthquake for identification purpose. Records in the flatfile are grouped by EQID, except for the last 4 records, which were added in late 2004.
Earthquake Name	The common name of earthquake. The naming usually includes the name of the general area or country where earthquake occurred. In case of multiple earthquakes in the same general area/country (for example there are 8 earthquakes in the flatfile that are from Imperial Valley, CA), we used a number to distinguish between these events.
YEAR	Year of earthquake.
MODY	Month and Day (UTC) of earthquake.
HRMN	Origin time (UTC) of earthquake (Hour and Minute)
Station Name	The unique name of strong-motion station. When it is part of an array, a short phrase is sometimes added to indicate the location of the instrument (for example, "Rio Del Overpass E Ground" and "Rio Del Overpass W Ground").
Station Sequence Number	An arbitrary unique sequence number assigned to each strong-motion station for identification purpose.
Station ID No.	Station ID assigned by data provider (USGS, CGS/CSMIP, etc). When it is not available, Station ID is given a "99999".
Earthquake Magnitude	Moment magnitude of earthquake. When there are multiple reliable estimates of earthquake magnitude, the average value of the reliable estimates is used.

Magnitude Type	If the listed earthquake magnitude is NOT a moment magnitude, this column identifies the type of magnitude ML = local magnitude MS = surface-wave magnitude U = unknown magnitude type (blank) = unknown
Magnitude Uncertainty: Kagan Model	Magnitude uncertainty assigned using Kagan's model (Kagan, 2002).
Magnitude Uncertainty: Statistical	Magnitude uncertainty is taken as the standard deviation of the reliable magnitude estimates.
Magnitude Sample Size	Number of magnitude estimates used to compute the standard deviation.
Magnitude Uncertainty: Study Class	Magnitude uncertainty is assigned by PE&A based on the quality of special studies that yielded the magnitude estimates and is defined as: 0.3 --> Older events not well studied 0.2 --> Older events well studied or recent events not well studied 0.1 --> Recent events well studied
Mo (dyne.cm)	Seismic moment calculated from earthquake magnitude, treating it as a moment magnitude (Mw) regardless of magnitude type; Log10(Mo) = 3/2 * Mw + 16.05
Strike (deg)	Strike angle of the fault plane used to approximate the causative fault surface. 0^o <= Strike <= 360^o. Convention of fault strike, dip, and rake follows that described in Aki and Richards (1980, p106) 
Dip (deg)	Dip angle of the fault plane. 0^o <= Dip <= 90^o. (see note above)

Rake Angle (deg)	Rake is the angle measured on the fault plane counterclockwise from the reference strike direction to the average slip direction (see figure above). $-180^{o} <= \text{Rake} <= 180^{o}$
Mechanism Based on Rake Angle	Mechanism Class Rake Angles -- Strike - Slip 00 -180 < Rake < -150 -30 < Rake < 30 150 < Rake < 180 -- Normal 01 -120 < Rake < -60 -- Reverse 02 60 < Rake < 120 -- Reverse - Oblique 03 30 < Rake < 60 120 < Rake < 150 -- Normal - Oblique 04 -150 < Rake < -120 -60 < Rake < -30
P-plunge (deg)	This and the next 3 columns list the plunge and trend of the P- and T-axes. P- and T-axes are the maximum (P) and minimum (T) compressive principal stresses given by the fault plane solution. It is suggested that the plunge of the axes may be used to classify fault type, the advantage being that the classification may be more physically based than a simple classification based on rake angle (as the previous column), and furthermore the classification is not dependent on the choice of fault plane.
P-trend (deg)	(see note above)
T-plunge (deg)	(see note above)
T-trend (deg)	(see note above)
Hypocenter Latitude (deg)	See NGA data report for hypocenter references.
Hypocenter Longitude (deg)	See NGA data report for hypocenter references.
Hypocenter Depth (km)	See NGA data report for hypocenter references.
Coseismic Surface Rupture: 1=Yes; 0=No; 99=Unknown	Presence or absence of primary surface rupture.
Coseismic Surface Rupture (Including Inferred)	This column is mainly an effort to fill the 'Unknown' in the previous column with a value inferred from indirect evidence of surface rupture.

Basis for Inference of Surface Rupture	sfdoc = the reference documents the presence or absence of surface faulting sfdis = surface faulting discussed in references locdis = location of earthquake discussed in references M<6 = Magnitude < 6.0, likelihood of existence of surface rupture is small M>7 = Magnitude > 7.0, likelihood of existence of surface rupture is large
Finite Rupture Model: 1=Yes; 0=No	If 1, a geometric representation of the ruptured area was developed using observed surface rupture, published slip model(s), aftershock distribution (and time after mainshock), etc.
Depth to Top Of Fault Rupture Model	Depth to the top of the finite rupture model
Fault Rupture Length (km)	Total length ("L") of the finite rupture model
Fault Rupture Width (km)	Width ("W") of the finite rupture model (= A / L)
Fault Rupture Area (km^2)	Total area ("A") of the finite rupture model
Avg Fault Disp (cm)	The average amount of slip over the ruptured area. It's computed as Mo/(Mu*A*1.0E+10) where Mu=3.58e11.
Rise Time (s)	The time required for the completion of slip at a point on the fault plane. When there are multiple estimates of rise time, the average value is used.
Avg Slip Velocity (cm/s)	Avg. Slip Velocity = (Avg Fault Disp) / (Rise time)
Static Stress Drop (bars)	Static stress drop is calculated as 7/16*Mo/(A*1.0E+10/pi)^1.5/1.0E+06.
Preferred Rupture Velocity (km/s)	Rupture velocity (Vr) is the speed at which a rupture front moves along the fault during an earthquake. When there are multiple estimates of rupture velocity, the average value is used.
Average Vr/Vs	Ratio of rupture velocity (Vr) to shear-wave velocity (Vs or β) in the source region. When there are multiple estimates, the average value is used.
Percent of Moment Release in the Top 5 Km of Crust	This column is calculated from an appropriate slip model. See NGA data report for the slip model used for each earthquake.
Existence of Shallow Asperity: 0=No; 1=Yes	(see note below)

Depth to Top of Shallowest Asperity (km)	An asperity is defined by Somerville et al. (1999) as a rectangular region in which the slip exceeds, in a specified way, the slip averaged over the entire fault rupture. If the depth of the top of the shallowest asperity was less than 5 km, the earthquake is classified as a shallow asperity event, and the "Existence of Shallow Asperity" column has a value of 1. If the depth of the top of the shallowest asperity was greater than 5 km, the earthquake is classified as a deep asperity event, and the "Existence of Shallow Asperity" column has a value of 0.
Earthquake in Extensional Regime: 1=Yes; 0=No	Extensional regions are regions in which the lithosphere is expanding areally. Aside from obvious evidence of areal expansion, such as contemporary geodetic measurements and in situ stress measurement, extensional regimes usually present some or all of the following features: a mixture of normal faulting and strike slip earthquakes, recent volcanism, aligned volcanic features, lithospheric thinning, and high heat flow. (Text is excerpted from Spudich et al. (1997).)
Fault Name	Name of the causative fault. It is taken from the fault database of the National Seismic Hazard Maps (Frankel et al., 2002)
Slip Rate (mm/Yr)	Slip rate on the causative fault. It is taken from the fault database of the National Seismic Hazard Maps (Frankel et al., 2002).
EpiD (km)	Distance from the recording site to epicenter
HypD (km)	Distance from the recording site to hypocenter.
Joyner-Boore Dist. (km)	Shortest horizontal distance from the recording site to the vertical projection of the rupture
Campbell R Dist. (km)	Shortest distance from the recording site to the seismogenic portion of the ruptured area (Campbell, 1997). This distance measure assumes that rupture within the near-surface sediment or the shallow portion of fault gouge is non-seismogenic. The depth below which rupture is seismogenic was estimated using new guidelines from Campbell.
RmsD (km)	Root-mean-squared distance $= \left(\frac{1}{A} \int_{\Sigma} R^{-2} d\Sigma \right)^{-\frac{1}{2}}$
ClstD (km)	Closest distance from the recording site to the ruptured area

<table>
<tr>
<td>FW/HW Indicator</td>
<td>This column mimics the FW/HW indicator defined in Abrahamson and Somerville (1996).
hw: site is within the hanging wall region (blue line);
fw: site is within the footwall region (green line);
nu: site is in the neutral region (outside fw and hw);
na: not applicable as fault dip is greater than 70°

</td>
</tr>
<tr>
<td>Source to Site Azimuth (deg)</td>
<td>The (finite) source to site direction: It is the angle measured clockwise from the fault strike direction to the direction connecting the site and the site's closest point (Xcte) on the surface projection of top edge of fault (red dotted line). This column can be used an alternative to the FW/HW indicator given previously.

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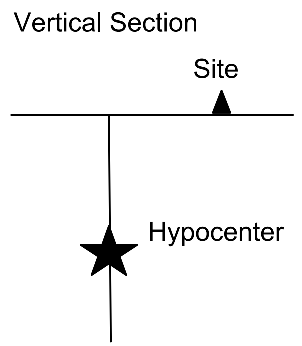
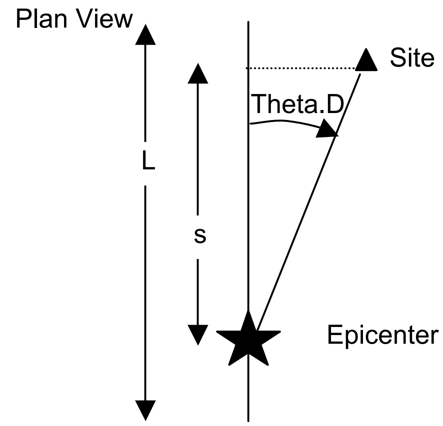
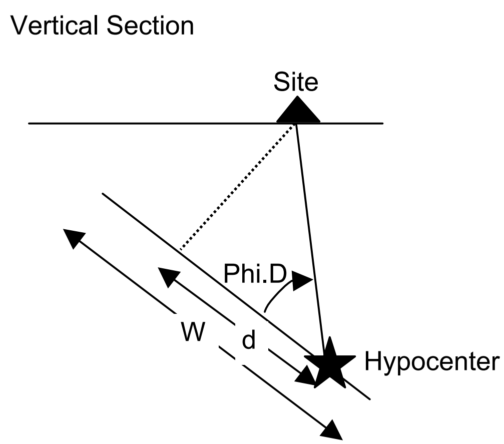
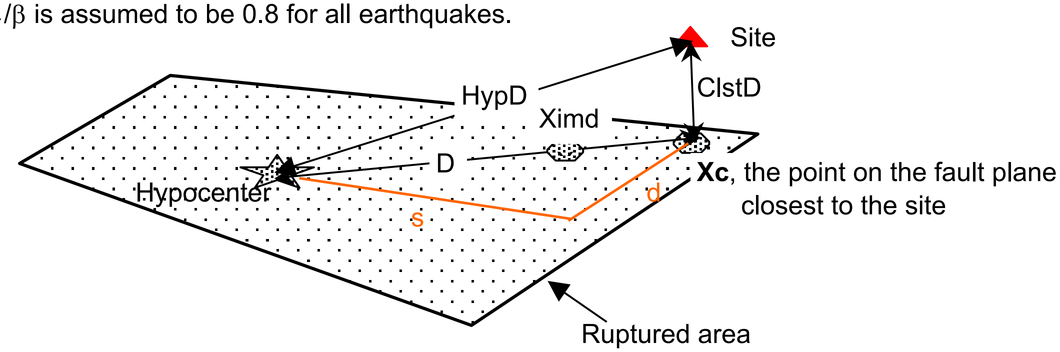
</table>

X	This and the following 3 columns list the values of directivity parameters defined in Somerville et al. (1997). X = s/L, where L is the fault length. Parameter X is the length ratio (fraction of fault along strike that ruptures toward site).  
Theta.D (deg)	(See note for X)
SSGA (Strike Slip)	$SSGA_{Strike\ Slip}$ = X Cos(Theta.D), calculated for sites within 50km (ClstD) of a strike-slip fault (mechanism = 0).
Y	Y = d/W, where W is the fault width. Parameter Y is the width ratio (fraction of fault up dip that ruptures toward site). 
Phi.D (deg)	(See note for Y)
SSGA (Dip Slip)	$SSGA_{Dip\ Slip}$ = Y Cos(Phi.D), calculated for sites within 50km (ClstD) on the footwall (FW) or hanging wall (HW) of a dip-slip fault (mechanism n.e. 0).
s (km)	s is the length of fault that ruptures toward site (See notes for X above and c.tilde.prime below).

<table>
<tr><td>d (km)</td><td>d is the width of fault that ruptures toward site (See notes for Y above and c.tilde.prime below).</td></tr>
<tr><td>c.tilde.prime</td><td>This and the next 2 columns are parameters of the isochrone-based directivity model defined in Spudich et al. (2004). Parameter c.tilde.prime, the approximate isochrone velocity ratio, has an angular behavior similar to Cos(Theta.D) and Cos(Phi.D). To calculate c.tilde.prime, V_r/β is assumed to be 0.8 for all earthquakes.



$$\tilde{c}' := \left(\frac{\beta}{V_r} + D^{-1}\left(ClstD - HypD\right)\right)^{-1}, \; D > 0$$

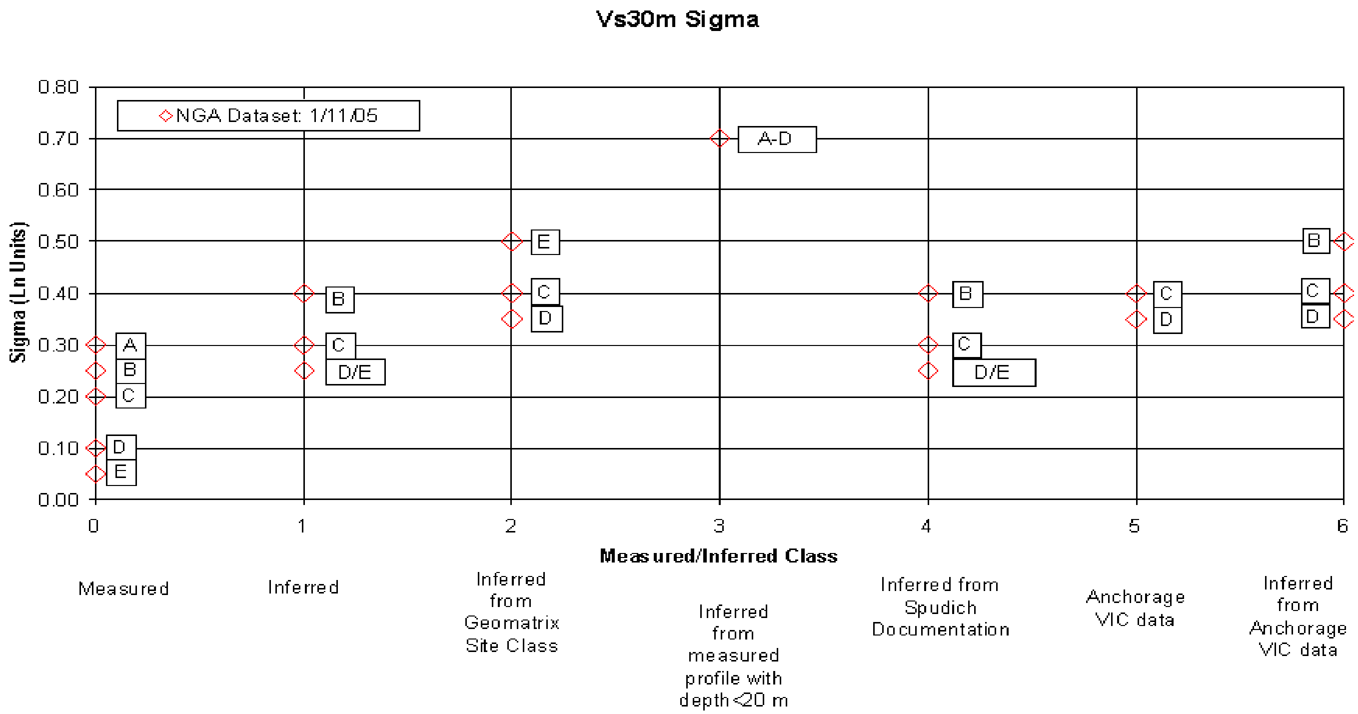
$$\tilde{c}' := \frac{\beta}{V_r}, \; D = 0$$</td></tr>
<tr><td>m5</td><td>The modification factor designed to modify c.tilde.prime for fault edge effects. See Spudich et al. (2004) for elaborated definition of m5.</td></tr>
<tr><td>D (km)</td><td>Distance between hypocenter and Xc, the point on the fault plane closest to the site</td></tr>
<tr><td>Rfn.Hyp</td><td>This and the next 5 columns provide the S-wave radiation coefficients used by Spudich et al. (2004) to approximate finite fault radiation pattern. Rfn.Hyp and Rfp.Hyp are coefficients of the hypocenter for strike-normal and strike-parallel components, respectively. A homogeneous crust is used to compute the coefficients.</td></tr>
<tr><td>Rfp.Hyp</td><td>(See note for Rfn.Hyp)</td></tr>
<tr><td>Rfn.Clst</td><td>The S-wave radiation coefficients of the point Xc (the point on the fault plane closest to the site). Rfn.Clst and Rfp.Clst are for strike-normal and strike-parallel components, respectively. A homogeneous crust is used to compute the coefficients.</td></tr>
<tr><td>Rfp.Clst</td><td>(See note for Rfn.Clst)</td></tr>
<tr><td>Rfn.Imd</td><td>The S-wave radiation coefficients of an intermediate point (Ximd) between hypocenter and Xc. Rfn.Imd and Rfp.Imd are for strike-normal and strike-parallel components, respectively. A homogeneous crust is used to compute the coefficients. See NGA data report for elaborated definition of the intermediate point.</td></tr>
<tr><td>Rfp.Imd</td><td>(See note for Rfn.Imd)</td></tr>
</table>

GMX's C1	First Letter of Geomatrix's Classification: Instrument Housing -- Structure Type and Instrument Location I = Free-field instrument or instrument shelter. Instrument is located at or within several feet of the ground surface, and not adjacent to any structure. A = One-story structure of lightweight construction. Instrument is located at the lowest level and within several feet of the ground surface. B = Two- to four-story structure of lightweight construction, or tall one-story warehouse-type building. Instrument is located at the lowest level and within several feet of the ground surface. C = One- to four-story structure of lightweight construction. Instrument is located at the lowest level in a basement and below the ground surface. D = Five or more story structure or heavy construction. Instrument is located at the lowest level and within several feet of the ground surface. E = Five or more story structure or heavy construction. Instrument is located at the lowest level in a basement and below the ground surface. F = Structure housing instrument is buried below the ground surface, e.g. tunnel or seismic vault. G = Structure of light or heavyweight construction, instrument not at lowest level of structure. H = Earth dam (station at toe of embankment or on abutment). J = Concrete Dam (none in database). K = Near a one-story structure of lightweight construction. Instrument is located outside on the ground surface, within approximately 3 m of the structure. L = Near a two- to four-story structure of lightweight construction. Instrument is located outside on the ground surface, within approximately 6 m of the structure. M = Near a two- to four-story structure of lightweight construction with basement. Instrument is located outside on the ground surface, within approximately 6 m of the structure. N = Near a five- to eight-story structure or heavy construction. Instrument is located outside on the ground surface, within approximately 10 m of the structure. O = Near a five- to eight-story structure or heavy construction with basement. Instrument is located outside on the ground surface, within approximately 10 m of the structure. (Structure Classifications K through O were added and applied to a number of Taiwan stations (~220 stations) for which station setting information was available. D. Wells reviewed available site plans for about 220 stations that detailed the distance of an instrument shelter from a building in addition to the height of the building, type of construction, and presence or absence of basement in the building. The information and judgment indicate that the great majority of the stations are likely to approximate free-field conditions.)

GMX's C2	Second Letter of Geomatrix's Classification: Mapped Local Geology Sedimentary and Metasedimentary Geologic Materials H = Holocene (Recent) Quaternary (< 11,000y bp). Q = Pleistocene Quaternary (< 1.8my bp). P = Pliocene Tertiary (< 5my bp). M = Miocene Tertiary (< 24my bp). O = Oligocene Tertiary (< 34my bp). E = Eocene Tertiary (< 55my bp). L = Paleocene Tertiary (< 65my bp). K = Cretaceous (< 144my bp). F = Franciscan Formation (Cretaceous/Late Jurassic). J = Jurassic (< 206my bp). T = Triassic (<248my bp). Z = Permian or older (> 248my bp). Igneous or meta-igneous: V = Volcanic (extrusive). N = Intrusive. G = Granitic.
GMX's C3	Third Letter of Geomatrix's Classification: Geotechnical Subsurface Characteristics A = Rock. Instrument on rock (Vs > 600 m/sec) or < 5m of soil over rock. B = Shallow (stiff) soil. Instrument on/in soil profile up to 20m thick overlying rock. C = Deep narrow soil. Instrument on/in soil profile at least 20m thick overlying rock, in a narrow canyon or valley no more than several km wide. D = Deep broad soil. Instrument on/in soil profile at least 20m thick overlying rock, in a broad valley. E = Soft deep soil. Instrument on/in deep soil profile with average Vs < 150 m/sec.

Campbell's GEOCODE	Site Classification defined by Campbell and Bozorgnia (2003), with suggested Vs30 from Wills and Silva (1998) and extended NEHRP site classes as defined by Wills et al., (2000) A= Firm Soil: Holocene; recent alluvium, alluvial fans, undifferentiated Quaternary deposits., Vs30 = 298±92 m/sec; NEHRP D B= Very Firm Soil: Pleistocene; older alluvium or terrace deposits. Vs30 = 368±80 m/sec; NEHRP CD C= Soft Rock: Sedimentary rock, soft volcanic deposits of Tertiary age, “softer” Franciscan, low grade metamorphic rocks such as mélange, serpentine, schist. Vs30 = 421±109 m/sec; NEHRP CD D= Firm Rock: Older sedimentary rock and hard volcanic deposits, high grade metamorphic rock, crystalline rock, “harder” Franciscan Vs30 = 830±339 m/sec; NEHRP BC E= Shallow Soils (≤ 10 m deep) F= Extremely soft or loose Holocene age soils such as beach sand or recent floodplain, lake, swamp estuarine, and delta deposits.
Bray and Rodriguez-Marek SGS	Site Classification defined by Bray and Rodriguez-Marek (1997; personal communication, 2003) Site Description and Comments A HARD ROCK — Hard, strong, intact rock; Vs ≥ 1500 m/s B ROCK — Most “unweathered” California rock cases (Vs ≥ 760 m/s or < 6 m of weathered rock or soil). C WEATHERED SOFT ROCK/ SHALLOW STIFF SOIL — Weathered rock zone > 6 m and < 60 m (Vs > 360 m/s increasing to > 700 m/s); Soil depth < 60 m D DEEP STIFF SOIL — Soil depth > 60 m and < 3 m of soft soils E SOFT CLAY — Thickness of soft clay > 3 m F SPECIAL — Potentially Liquefiable Sand or peat: Holocene loose sand with high water table (z_w ≤ 6 m) or organic peat. U Unknown Conditions — Unknown Conditions
Depth	An assessment of 'soil depth' used in Bray and Rodriguez-Marek SGS. S = alluvium is shallower than 60 m D = alluvium is greater than 60 m
Preferred NEHRP Based on Vs30	The preferred NEHRP site class was determined based on the preferred Vs 30 values. The following Vs 30 table was used: A = > 1500 m/s B = 760 m/s- 1500 m/s C = 360 m/s – 760 m/s D = 180 m/s – 360 m/s E = < 180 m/s

Preferred Vs30 (m/s)	Vs30 ASSIGNMENT HIERARCHY The following hierarchy was used to assign a Vs30 to each recording station 1) Measured Velocity Vs30 (Interpreted from the PE&A Profile Data Set) Only profiles greater than or equal to 20m are considered, in general. 2) Vs30 inferred for California sites from USGS Northridge assignments by Borcherdt and Fumal CGS assignments by Wills 3) Vs30 inferred for non-California sites from Regional Generic Vs profiles Correlation mapping between NEHRP and Geomatrix classification Campbell classification Spudich classification
Alternate Vs30 for CWB stations (m/sec)	Alternate inference of Vs30 for Taiwan CWB sites only. Vs30 is inferred from both Geomatrix site class and the station elevation. Station elevation was used to model the within category variation of Vs30 as observed in the measured Vs30s at 126 CWB sites. This type of inference was applied only to CWB sites, as dependence on elevation is not established for other regions.
Measured/Inferred Class	This column identifies the source of the preferred Vs30: 0 = Measured Vs 1 = Inferred Vs from Borcherdt and Fumal and from CGS assignments 2 = Inferred from Geomatrix Site Class 3 = Inferred from Vs profile less that 20 m in depth 4 = Inferred from Spudich and others (1997; 1999; Spudich, personal communications, 2003) 5 = Anchorage Alaska maps of Vs30 from measured VIC data 6 = Inferred from Anchorage Alaska maps of Vs30 from VIC data (Martirosyan et al., 2002)

<table>
<tr>
<td>Sigma of Vs30 (in natural log Units)</td>
<td>Uncertainty of Vs30. Sigma (standard deviation) values are estimated based on the source of the preferred Vs30 value and site category.

</td>
</tr>
<tr>
<td>NEHRP Classification from CGS's Site Condition Map</td>
<td>Extended NEHRP – UBC Site Classification for CA (Wills et al.,2000; Wills, personal communication (2003))

B: Plutonic and metamorphic rocks, most volcanic rocks, coarse sedimentary rocks of Cretaceous age and older.
BC: Franciscan Complex rocks of the Transverse Ranges which tend to be more sheared, Cretaceous siltstones, or mudstone.
C: Franciscan mélange and serpentine, sedimentary rocks of Oligocene to Cretaceous age, or coarse-grained sedimentary rocks of younger age.
CD: Sedimentary rocks of Miocene and younger age, unless formation is notably coarse grained, Plio-Pleistocene alluvial units, older (Pleistocene) alluvium, some areas of coarse younger alluvium.
D: Younger (Holocene) alluvium
DE: Fill over bay mud in the San Francisco Bay Area, fine-grained alluvial and estuarine deposits elsewhere along the coast.
E: Bay mud and similar intertidal mud.</td>
</tr>
</table>

Geological Unit	Currently this column is populated only for CA sites with information from CGS. For non-CA sites, this column is blank.
Geology	A short description of geology from various sources.
Owner	Owner of strong-motion instrument/record. It is not necessarily the most recent owner.
Station Latitude	From data provider, when available.
Station Longitude	From data provider, when available.
STORIES	Number of stories above ground.
INSTLOC	Location of instrument in structure.
Depth to Basement Rock	Campbell-Bozorgnia definition of sediment depth (text is excerpted from an e-mail written by Ken Campbell to Maury Power, dated 5/19/03). The general criteria used to estimate sediment depth can be described by the following: 1. Set D = 0 for a site categorized as Firm Rock (Hard Rock of Campbell, 1997). Firm Rock has a Vs,30 of around 817 + 365 m/s for those sites for which a measured value of Vs,30 is available. These sites are located primarily in California. This Vs,30 corresponds approximately to NEHRP site class BC and stiffer according to the classification proposed by CGS (Wills et al., 2000). Geologically, Firm Rock can be defined as pre-Tertiary sedimentary rock and “hard” volcanic deposits, high-grade metamorphic rock, crystalline rock, and the “harder” units of the Franciscan Complex generally described as sandstone, greywacke, shale, chert, and greenstone. 2. Where the depth to Firm Rock is known, set D to that depth (e.g. in the LA Basin where a map showing the depth to basement complex (crystalline rock) is available or in the San Francisco Bay Area where depth to Franciscan or crystalline rock is available). 3. Where the depth to Firm Rock is not known but where basin depth can be inferred from gravity and/or density data, set D to that depth. 4. Where no other information is available, but a local or regional velocity model is available, set D to the depth corresponding to seismic basement (defined as Vp approximately equal to 5.0 km/s or greater and/or Vs approximately equal to 2.9 km/s or greater). 5. Where multiple types of information are available, judgment must be applied to determine the best estimate of D, roughly using the order of items 1-4 above as the priority assigned to each type of data.
Site Visited	Site visited by geologist or engineer. This is a sparsely populated column; currently only sites in S. Cal are populated.

NGA Type	Categories for Vs30 estimation as defined in Borcherdt (personal communication, 2003; 1994, 2002) and Borcherdt and Fumal (2002) 1. Measured value at the station <300 m (a) USGS OFR, ROSRINE, Agbabian; (b) NUREG; (c) SASW; (d) Data gaps in VS30 record 2. Estimate based on velocities measured at nearby sites (< 1500 m distance) in same geologic unit; site visited by geologist 3. Estimate based on velocities measured at site in same geologic unit and judged to have similar materials; site visited by geologist 4. Estimate based on average velocity for the geologic unit; site visited by geologist 5. Estimate based on average velocity for the geologic unit where geologic unit is defined based on large-scale geologic/physical properties map (1:24,000 to 1:100,000 scale) 6. Estimate based on average velocity for the geologic unit where geologic unit is defined based on small-scale geologic map (1:250,000 to 1:750,000 scale) This is a sparsely populated column; currently only sites in S. Cal are populated.
Age	Geological age of surface material.
Grain Size	Grain size of surface material: Aggregate, Coarse, or Fine.
Depositional History	
Z1 (m)	Depth to Vs=1.0 km/sec. This column is populated with stations within the 3-D velocity models of S. Cal (3D SCEC Community Velocity Model; Magistrale et al., 2000), N. Cal (Boatwright et al. 2004), and the Eel River basin (Graves, 1994), with the addition of information from the PE&A Profile Data Base of depths to 1 km/sec, 1.5 km/sec and 2.5 km/sec when these velocities were measured at the site.
Z1.5 (m)	Depth to Vs = 1.5 km/sec (see note for Z1)
Z2.5 (m)	Depth to Vs = 2.5 km/sec (see note for Z1)
Depth to Franciscan Rock (km)	This column is populated only for stations in the Bay Area.
Basin	Name of the sedimentary basin. This column and the next 6 columns contain basin parameters defined and used in Joyner (2000) and Somerville et al. (2002). These columns are sparsely populated.
h (m)	Depth to basement.
hnorm (m)	= h / Rsbe.
Rsbe (m)	Closest distance from the station to the basin edge.
Rcebe (m)	Perpendicular distance from the station to the basin edge.
Rebe (m)	Distance from the epicenter to the basin edge along a line between the epicenter and the station.
Rsbe1 (m)	Distance from the station to the basin edge along a line between the epicenter and the station.
File Name (Horizontal 1)	Directory name and file name of time history data files. Note that file name is made up of station abbreviation and instrument orientation. If the orientation is XXX then that component did not record the event.
File Name (Horizontal 2)	(Same as above)

File Name (Vertical)	(Same as above)
Type of Recording	A - Analog D - Digital A large portion of this column is still not populated. More effort is needed to fill the missing information.
Instrument Model	A large portion of this column is still not populated. More effort is needed to fill the missing information.
PEA Processing Flag	PEA: Acceleration time history record was processed using PE&A's standard processing procedure starting with the Volume 1 (uncorrected) time history ; #: Acceleration time history record is directly from the Volume 2 (corrected) accelerogram as received from the data provider (pass-through records), except for the ChiChi aftershocks records. In the case of ChiChi aftershocks, equivalents to the Volume 2 records were created by NGA project.
Type of Filter	This column lists the type of filter used by PE&A or data providers (mainly USGS and CSMIP) to remove noise at long and short periods. O - Ormsby A - Acausal Butterworth C - Causal Butterworth
npass	Number of passes of filter.
nroll	This column lists the 'nroll' parameter of the Butterworth filter. -99 when not applicable (Ormsby filter).
HP-H1 (Hz)	Corner frequency of the high-pass filter of component H1. 1. When this component is unavailable, corner frequency is -99. 2. If filter was not applied, corner frequency is blank. 3. The definition of corner frequency varies with the filter type. In the case of a Butterworth filter, the corner frequency is the frequency at which the filter response is at -3db of the maximum response. In the case of an Ormsby filter, the corner frequency is the beginning point of the transition frequency band.
HP-H2 (Hz)	Corner frequency of the high-pass filter of component H2. (see note for HP-H1)
LP-H1 (Hz)	Corner frequency of the low-pass filter of component H1. (see note for HP-H1)
LP-H2 (Hz)	Corner frequency of the low-pass filter of component H2. (see note for HP-H1)
Factor	This column ("Factor") gives the ratio of the lowest usable frequency ("LUF") to the corner frequency ("HP") of the high-pass filter. The recommended lowest usable frequency is the frequency above which spectra from high-pass filtered data are relatively unaffected by the filter. For convenience, "LUF" is evaluated in terms of "Factor". "Factor" is determined according to the filter type and order of the filter. 1. When a Butterworth filter is used, "LUF" is taken as the frequency at which filter response is -0.5db down from the maximum response (or 94% of the maximum). "Factor" is then determined from the number of passes ("npass") and "nroll" of the Butterworth filter. 2. For Ormsby filter, "Factor" is 1. 3. When filter is not applied (blank "HP"), empirical relationship is used to determine "LUF" and the value for "Factor" becomes irrelevant.

Lowest Usable Freq - H1 (Hz)	This column ("LUF") is the product of "HP-H1" and "Factor", except when "HP-H1" is -99 or blank. When "HP-H1" is -99, "LUF" is again -99. When "HP-H1" is blank, "LUF" is determined from an empirical relationship between "LUF" and earthquake magnitude and type of recording.
Lowest Usable Freq - H2 (Hz)	(see note above)
Lowest Usable Freq - Ave. Component (Hz)	This column is the recommended lowest usable frequency for the average horizontal component. It is taken as the larger of the two previous columns. If any of the two previous columns is -99 (i.e. one or both of the two horizontal components did not record the event), this column is left blank.
PGA (g)	This and the next 107 columns list the peak acceleration (PGA), peak velocity (PGV), peak displacement (PGD), and pseudo spectral accelerations (5%-damped) at 105 periods. Period is given in the column heading. 1. Listed ground-motion value is the geometric average of the two orthogonal horizontal components orientated randomly. It is computed as the 50th percentile value of the geometric mean over the non-redundant 90 degrees range of rotation (Dave Boore, 2005). 2. Pseudo spectral acceleration is in units of g. 3. Ground-motion data for the CEOR records of the Kobe earthquake were left out of the flatfile. Interested users may acquire the ground-motion data directly from CEOR.
PGV (cm/sec)	
PGD (cm)	
T0.010S	
……..	
T10.000S	