5.0 RESULTS AND CONCLUSIONS

5.1 CSDRS Compatible Ground Motion Time Histories

One set of three-component statistically independent time histories of seismic motion is developed for use as the input motion in the earthquake response analysis of the US-APWR standard plant including the R/B, PCCV, CIS, and PS/Bs. The three individual directional time histories are developed to represent the ground motion for the three orthogonal earthquake components, two horizontal ("H1" and "H2") and vertical ("V"). The artificial time history plots for the ground accelerations, velocity, and displacements in three orthogonal directions ("H1," "H2," and "V") are shown in Figures 5.1-1, 5.1-2, and 5.1-3, respectively. The time history plots of the ground acceleration, velocity, and displacement are shown together to demonstrate their non-stationary process.

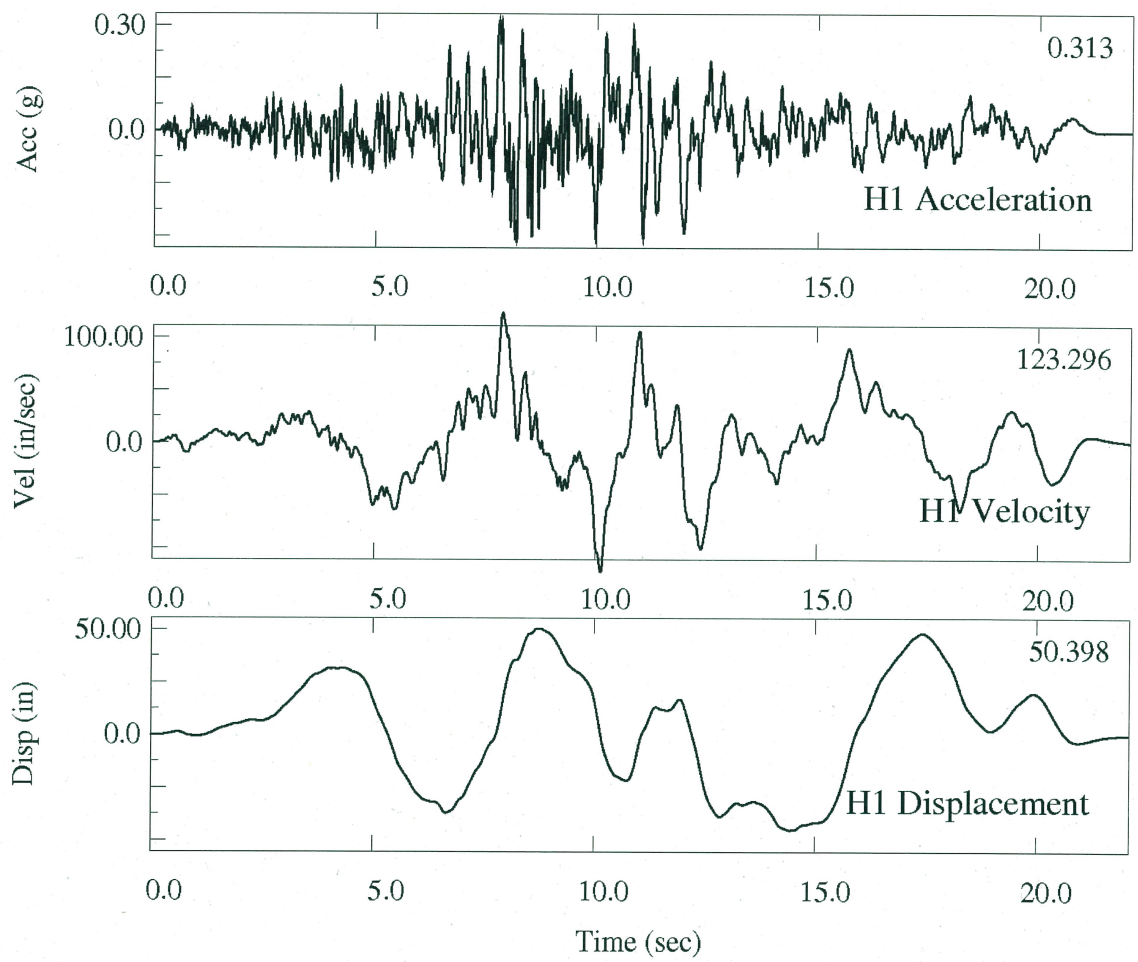


Figure 5.1-1 Acceleration, Velocity and Displacement Time History for Component H1 (090)

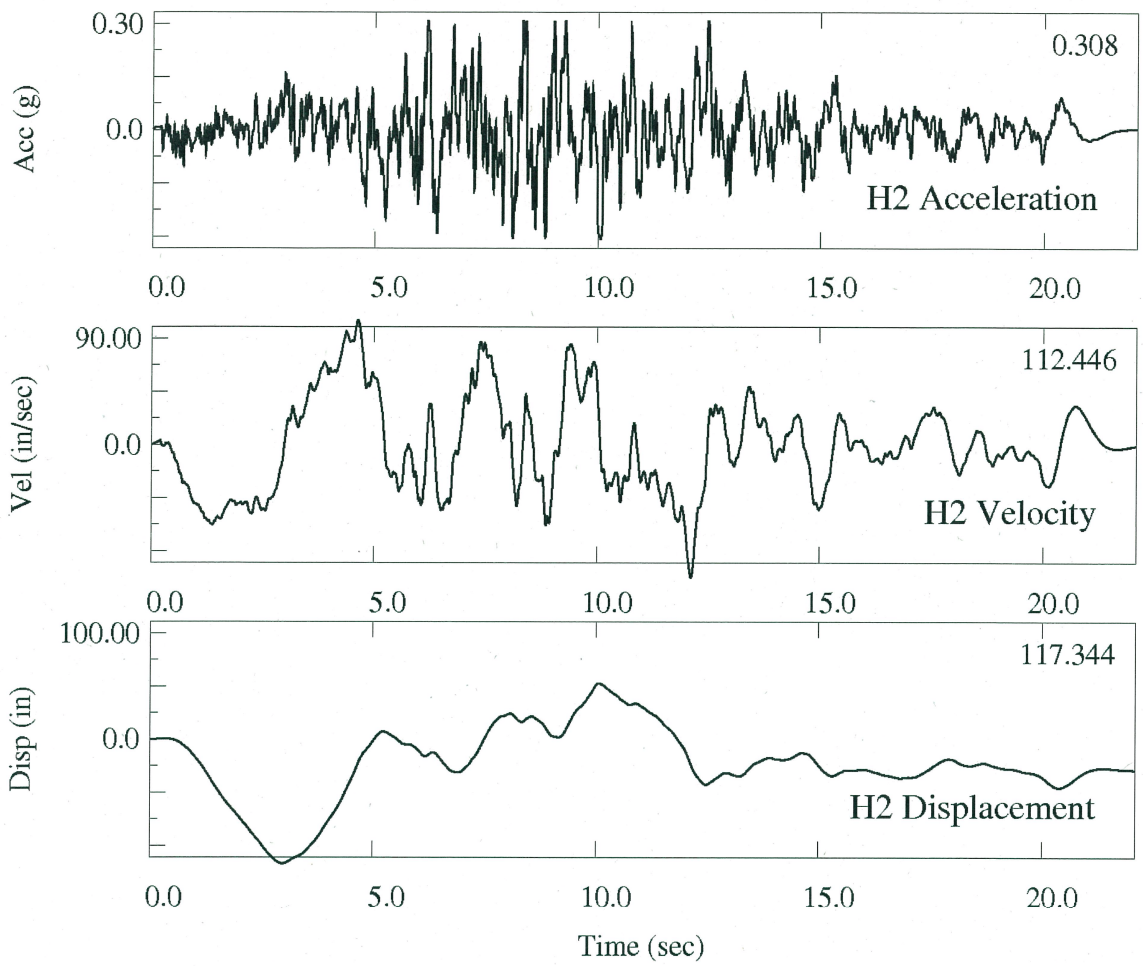


Figure 5.1-2 Acceleration, Velocity and Displacement Time History for Component H2 (180)

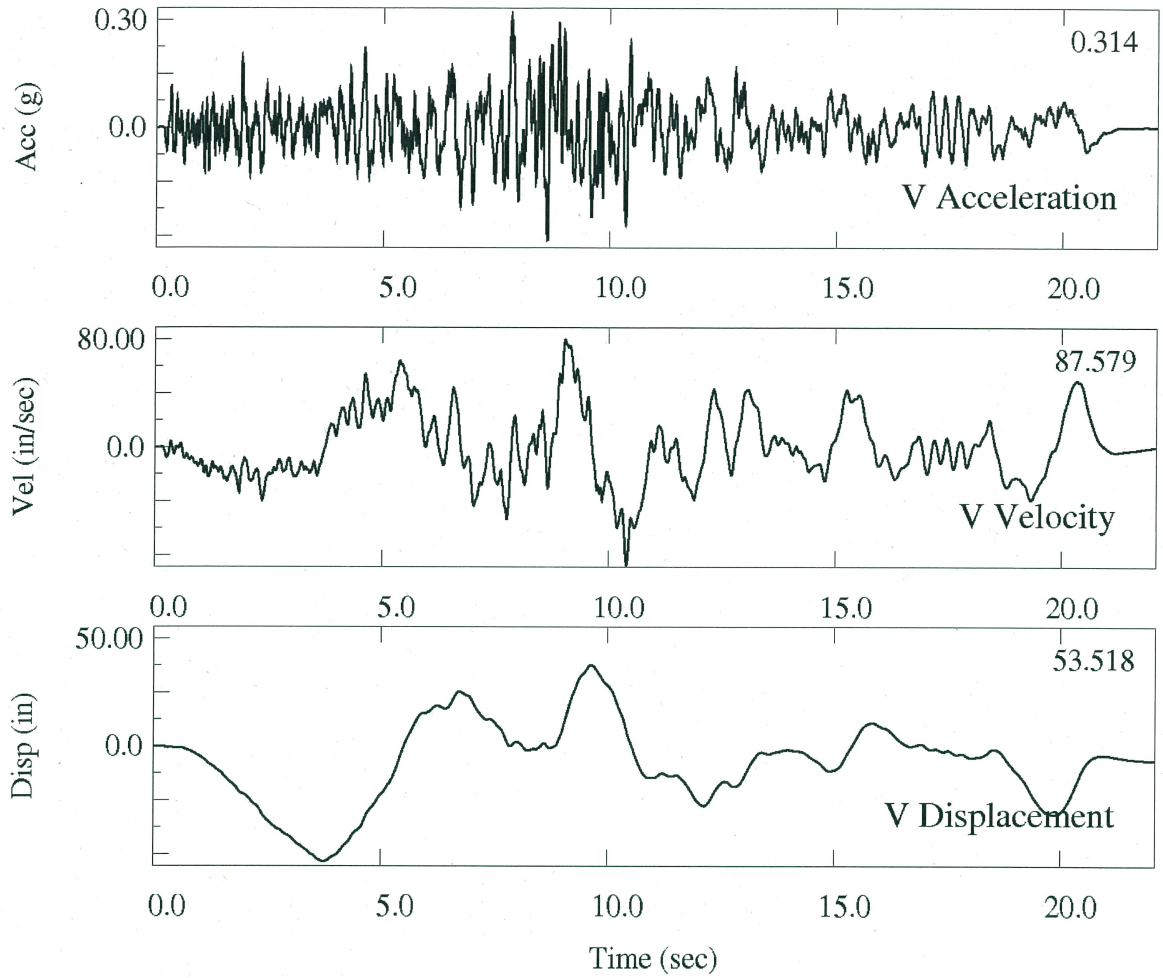
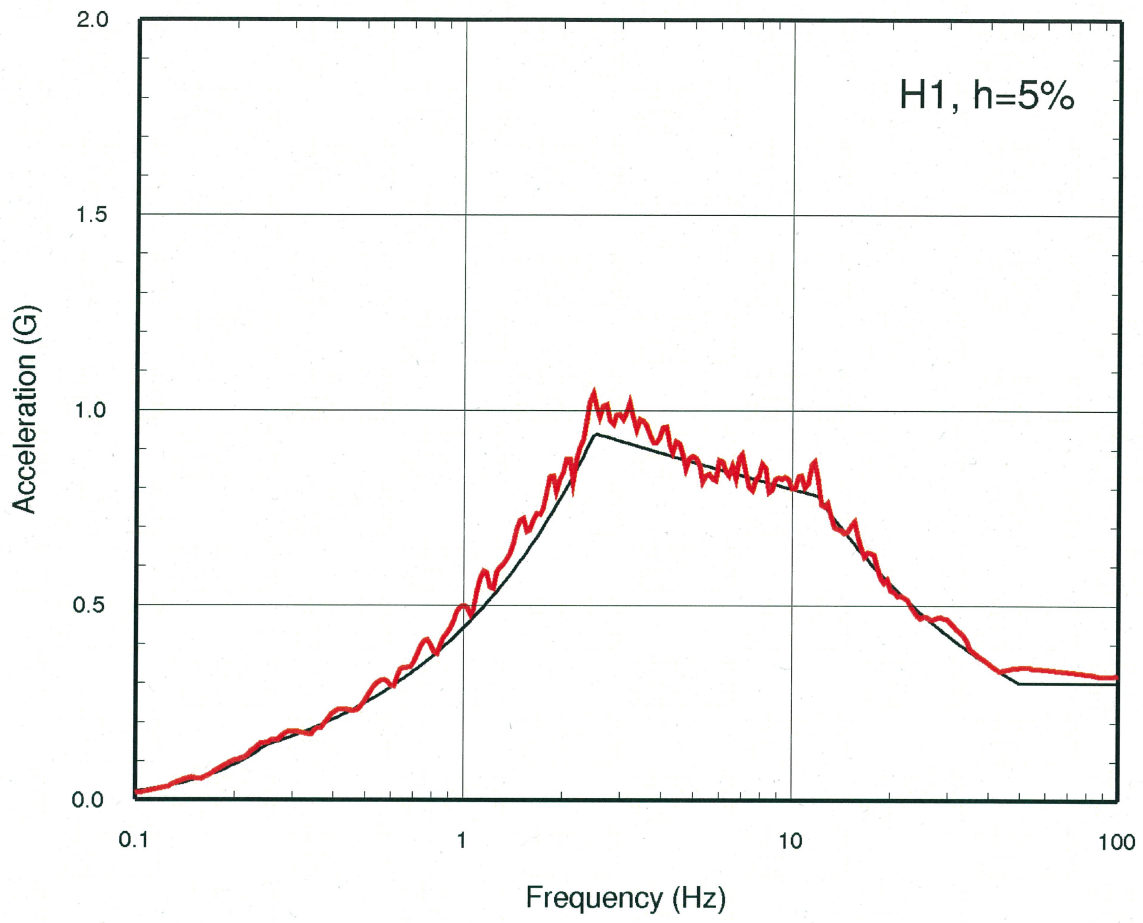


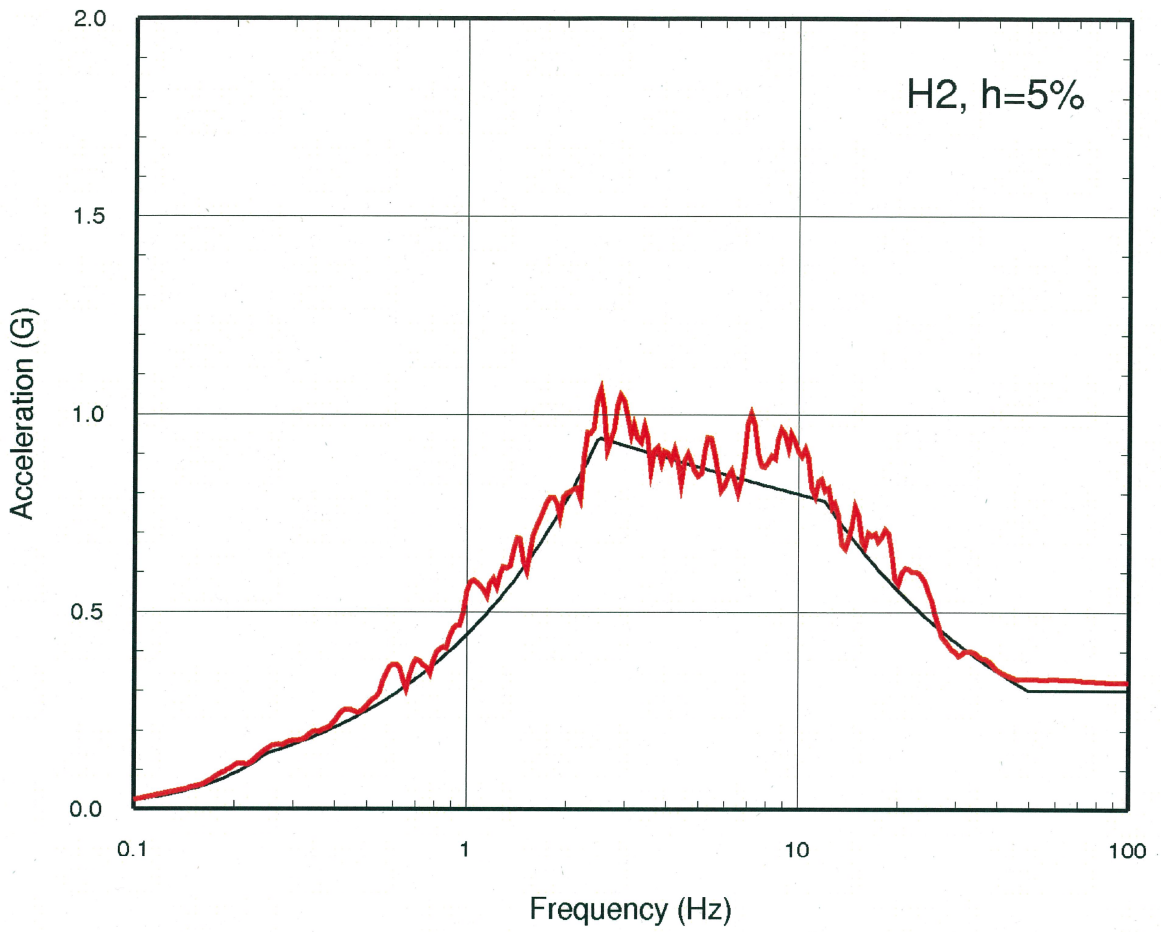
Figure 5.1-3 Acceleration, Velocity and Displacement Time History for Component V

Figures 5.1-4, 5.1-5 and 5.1-6 shows the ARS of the US-APWR artificial time histories for 5% damping for the three orthogonal directions H1, H2, and V, respectively. The plots of the CSDRS, which are based on the modified Regulatory Guide (RG) 1.60 (Reference 16) response spectra as described in Subsection 3.7.1.1 of the DCD, are also included in the figure to demonstrate that the ARS of the synthesized artificial time histories envelope those of the CSDRS for 5% damping values. The figures demonstrate that the artificial acceleration time histories do not have significant gaps in the Fourier amplitude spectra, and are also not biased high with respect to the target CSDRS.



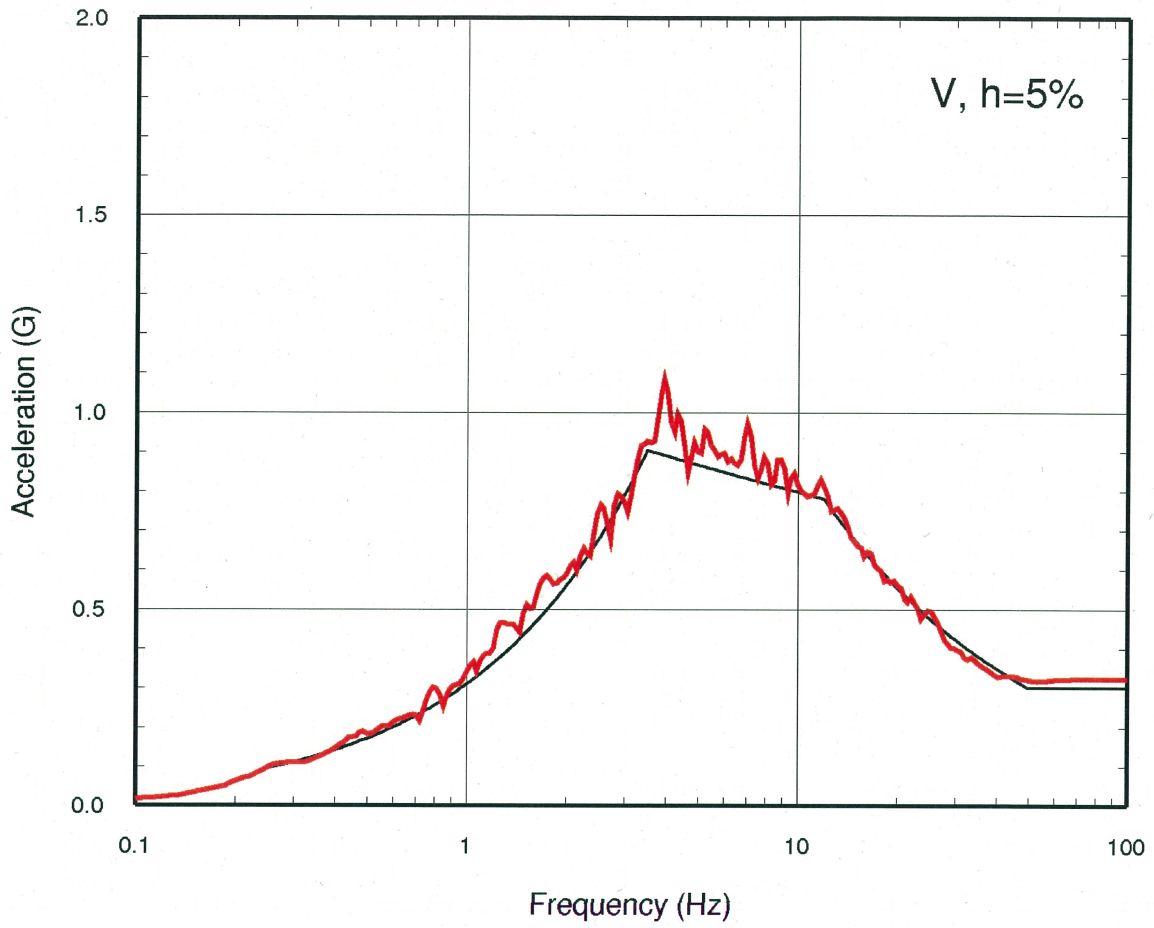
Note: Component H1 is shown by the jagged line, compared with the CSDRS, shown by the smooth line.

Figure 5.1-4 5% Damped Response Spectra Plots for Northridge, BAL Component H1 (90)



Note: Component H2 is shown by the jagged line, compared with the CSDRS, shown by the smooth line.

Figure 5.1-5 5% Damped Response Spectra Plots for Northridge, BAL Component H2 (180)



Note: Component V is shown by the jagged line, compared with the CSDRS, shown by the smooth line.

Figure 5.1-6 5% Damped Response Spectra Plots for Northridge, BAL Component V

The time histories meet all of the requirements and conditions set in Section II of NUREG-0800, SRP 3.7.1 (Reference 1) for the development of a single set of time histories Option 1, Approach 2, as demonstrated in the following, steps (a) through (d):

(a) The US-APWR artificial time histories have sufficiently small time increments (Δt =0.005 seconds) and a total duration of 22.005 seconds. The total duration of the artificial time histories is increased by zero packing (addition of values of zero acceleration at the end of the time history records) for the purpose of performing a discrete Fourier analysis). The time history data records have a Nyquist frequency of $N_f = 1/(2\Delta t)$ =100 Hz, and meet the SRP 3.7.1 (Reference 1) requirement of a total duration of at least 20 seconds. The time increment of 0.005 sec is lower than the maximum time increment of 0.01 sec permitted by SRP 3.7.1. The Nyquist frequency value of 100 Hz is considered to be above the range of frequencies important for the design of the US-APWR plant that assures that the seismic analysis will capture the responses of SSCs in the high frequency range. This is particularly important for site-specific subgrade conditions where seismic category I structures are founded on a hard rock subgrade.

(b) The 5% damped ARS of the US-APWR artificial time histories, shown in Figures 5.1-1, 5.1-2, and 5.1-3, are computed at 260 frequency points that are divided in three ranges: (a) 60 frequency points are uniformly spaced over the log frequency scale from 0.25 Hz to 1 Hz, (b) 100 frequency points are uniformly spaced over the log frequency scale from 1 Hz to 10 Hz, and (c) 100 frequency points are uniformly spaced over the log frequency scale from 10 Hz to 100 Hz. Each of the three ARS obtained from the three artificial ground motion time histories are compared with the target response spectra at each frequency computed in the frequency range of 0.25 Hz to 100 Hz.

(c) The 5% damped ARS computed for each of the three US-APWR artificial time histories does not fall more than 10% below the corresponding CSDRS target response spectra at any particular frequency. In addition, within a frequency window no larger than ±10% centered at any frequency data point, none of the three ARS (H1, H2, and V) falls below their corresponding target CSDRS. Consistent with SRP 3.7.1 (Reference 1), this has been confirmed by assuring that, for the spectra derived from the artificial time histories, no more than ten frequency points adjacent to any one particular frequency point fall below the CSDRS target response spectra for any particular frequency being considered. This prevents the response spectra resulting from the artificial time histories from falling below the respective target response spectra in large frequency windows. Table 5.1-1 demonstrates that these requirements are met by showing a summary of the frequency non-exceedances.

(d) In lieu of the power spectral density requirement of Approach 1 in SRP 3.7.1 (Reference 1), Approach 2 specifies that the computed 5% damped response spectra of each artificial ground motion time history does not exceed its target response spectra at any frequency by more than 30% (a factor of 1.3) in the frequency range of interest. For the US-APWR, the response spectra derived from the artificial time histories are checked to assure that they do not exceed the corresponding target spectra (CSDRS) by more than 30% at any frequency range measured as described in item (b) above. The results of this check are presented in Table 5.1-1.

Table 5.1-1 Comparison of 5% Damping ARS of Artificial Time History and CSDRS

Time History	Frequency Range		0.25 – 1 Hz	1 – 10 Hz	10 – 100 Hz	0.25 – 100 Hz
	No. Freq. Data Points		**60**	**100**	**100**	**260**
Horizontal H1	ARS/CSDRS ratio	Min.	0.963	0.924	0.912	0.948
		Max	1.264	1.279	1.226	1.279
	Max. No. of Data Point Non-Exceedances Within Any One Particular Frequency Window (1)		6	6	5	6
Horizontal H2	ARS/CSDRS ratio	Min.	0.931	0.954	0.948	0.931
		Max	1.163	1.185	1.151	1.185
	Max. No. of Data Point Non-Exceedances Within Any One Particular Frequency Window (1)		1	4	7	7
Vertical V	ARS/CSDRS ratio	Min.	0.920	0.928	0.952	0.920
		Max	1.186	1.235	1.093	1.235
	Max. No. of Data Point Non-Exceedances Within Any One Particular Frequency Window (1)		10	4	10	10

The time histories also meet the requirements set forth in Acceptance Criteria 1B, on page 3.7.1-9 of SRP 3.7.1 (Reference 1).

Cross Correlation between Components

The cross-correlation coefficients between the three components of the design time histories are as follows: $\rho_{12} = 0.0932$, $\rho_{23} = 0.0692$, and $\rho_{31} = 0.0809$ where 1, 2, and 3 are the three global directions corresponding to NS, EW, and vertical directions for the US-APWR standard plant. Since the absolute values of the cross-correlation coefficients of the US-APWR artificial time histories are less than 0.16, as demonstrated above, in accordance with NUREG/CR-6728 (Reference 6.10), the time histories are considered statistically independent of each other.

Duration of Motion

The set of three-component statistically independent time histories which were developed for design of the US-APWR seismic Category I buildings have values of strong duration of motion, listed in Table 5.1-2, that exceed 6 seconds, and a total duration of motion of 22.005 seconds. The strong motion duration is defined as the time required for the Arias Intensity to rise from 5% to 75% in accordance with SRP 3.7.1 (Reference 1). The uniformity of the growth of this Arias Intensity is shown in Figure 5.1-7 to be acceptable. The duration of motion of the US-APWR artificial time histories with respect to the time duration needed to achieve 5% and

75% Arias intensities is summarized in Table 5.1-2. The strong duration of motion meets the acceptance criterion of 6 seconds minimum for strong motion duration as given in SRP 3.7.1 (Reference 1) for design time histories. The total duration of motion meets the acceptance criterion of 20 seconds minimum as given in SRP 3.7.1 design time histories, Option 1, Approach 2 Part (a).

Table 5.1-2 Duration of Motion of US-APWR Artificial Time Histories with Respect to Arias Intensity

	Arias Intensity		Duration (seconds)
	Time for 5% (seconds)	Time for 75% (seconds)	
H1	4.73	11.79	7.06
H2	3.87	11.55	7.68
V	2.18	10.86	8.68

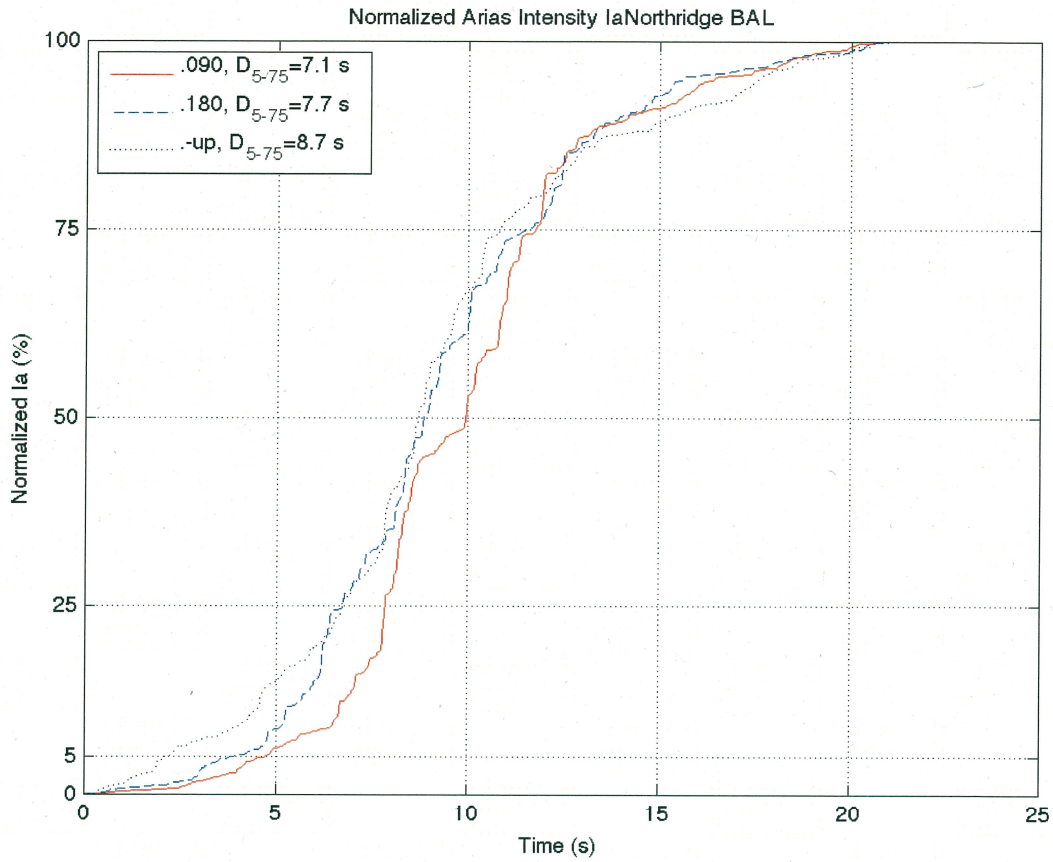


Figure 5.1-7 Normalized Arias Intensity of Time Histories Showing 5%-75% Duration

5.2 Development of Soil Profiles

Following the approach discussed in Section 4.2.2, strain compatible properties are developed for the $\overline{V_S}$ (30m) profile categories of 270 m/sec, 560 m/sec, 900 m/sec, and 2,032 m/sec. The selected shear- and compressional-wave profiles are shown in Figure 5.2-1 to their maximum depths with Poisson ratios shown in Figure 5.2-2. To accommodate realistic soil foundation conditions in developing the strain compatible properties, approximately 68 ft of soft soil is removed from the softest profile, $\overline{V_S}$ (30m) = 270 m/sec. The soil removal increased the original surficial shear-wave velocity of 520 ft/sec (Figure 4.2-1) to 1,247 ft/sec at a foundation level, although the profile name of 270 m/sec is retained. The remaining three profiles are assumed to reflect appropriate foundation conditions at the surface and are left unaltered. Due to their steep velocity gradients (Figure 5.2-1), the depth ranges for soft and firm rock profiles of 900 m/sec and 2,032 m/sec are restricted to 100 feet and 200 feet for soft rock (900 m/sec) and 100 ft for firm rock (2,032 m/sec). The final profile categories and depth bins are listed in Table 5.2-1.

Table 5.2-1 Final Profile Categories

Category (initial $\overline{V_S}$ [30m])	Depth to Hard Rock (ft)
270	100
	200
	500
560	100
	200
	500
900	100
	200
2,032	100

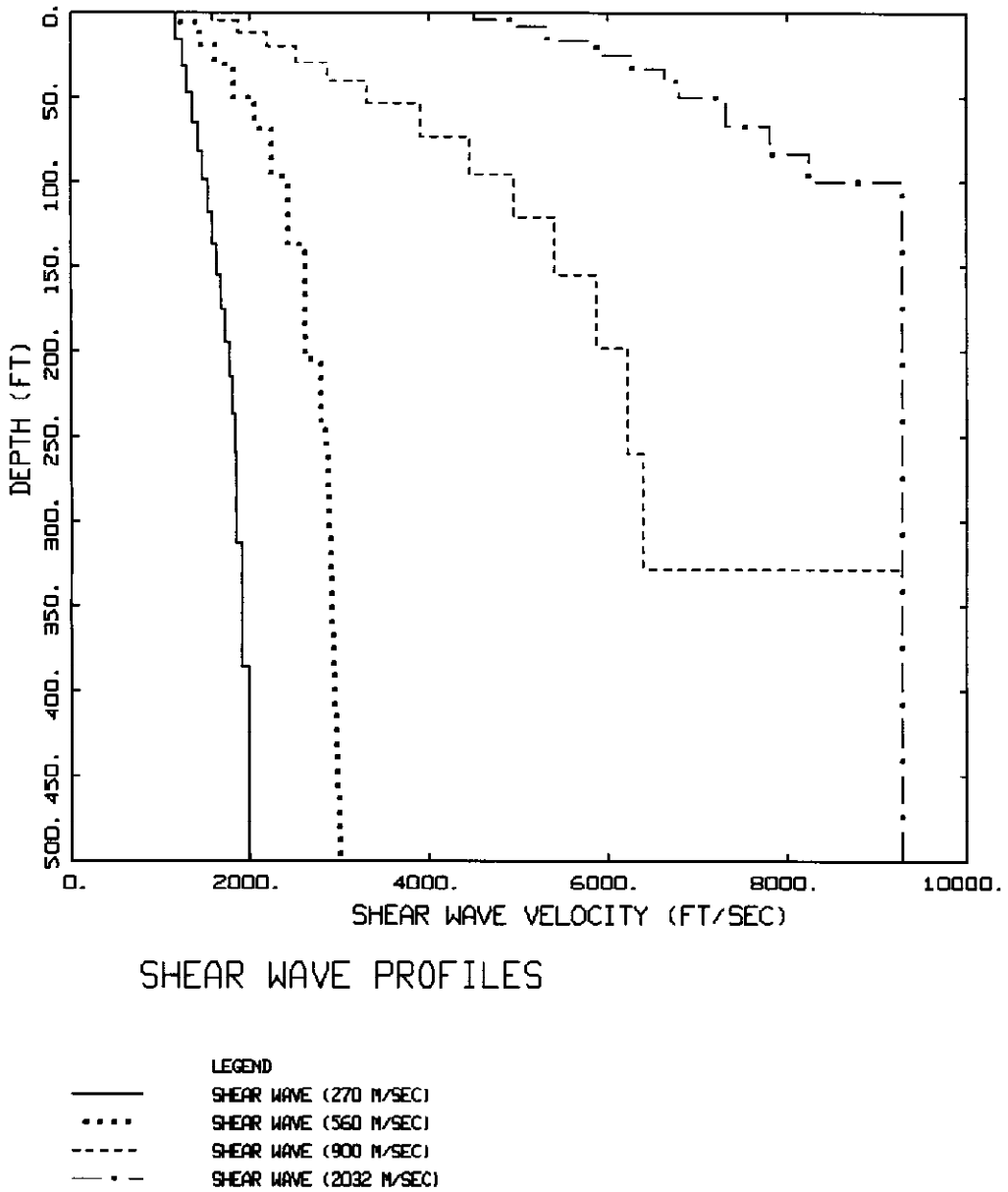


Figure 5.2-1 Final Foundation Level Base-Case Shear- And Compressional-Wave Velocity Profiles (Sheet 1 of 2)

Note: Since the water table was taken at the foundation level, the minimum compressional-wave velocity was set at 5,000 ft/sec.

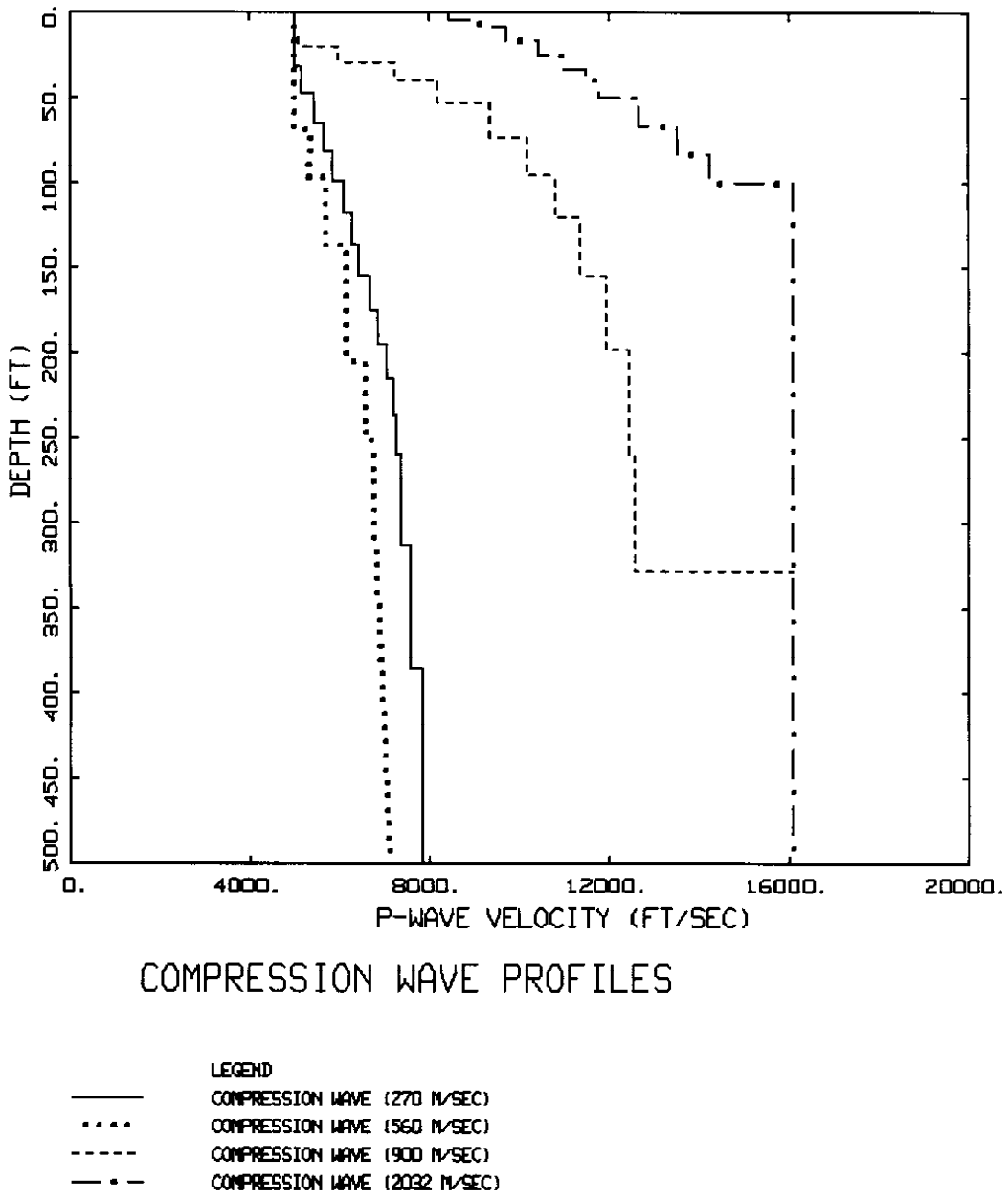


Figure 5.2-1 Final Foundation Level Base-Case Shear- And Compressional-Wave Velocity Profiles (Sheet 2 of 2)

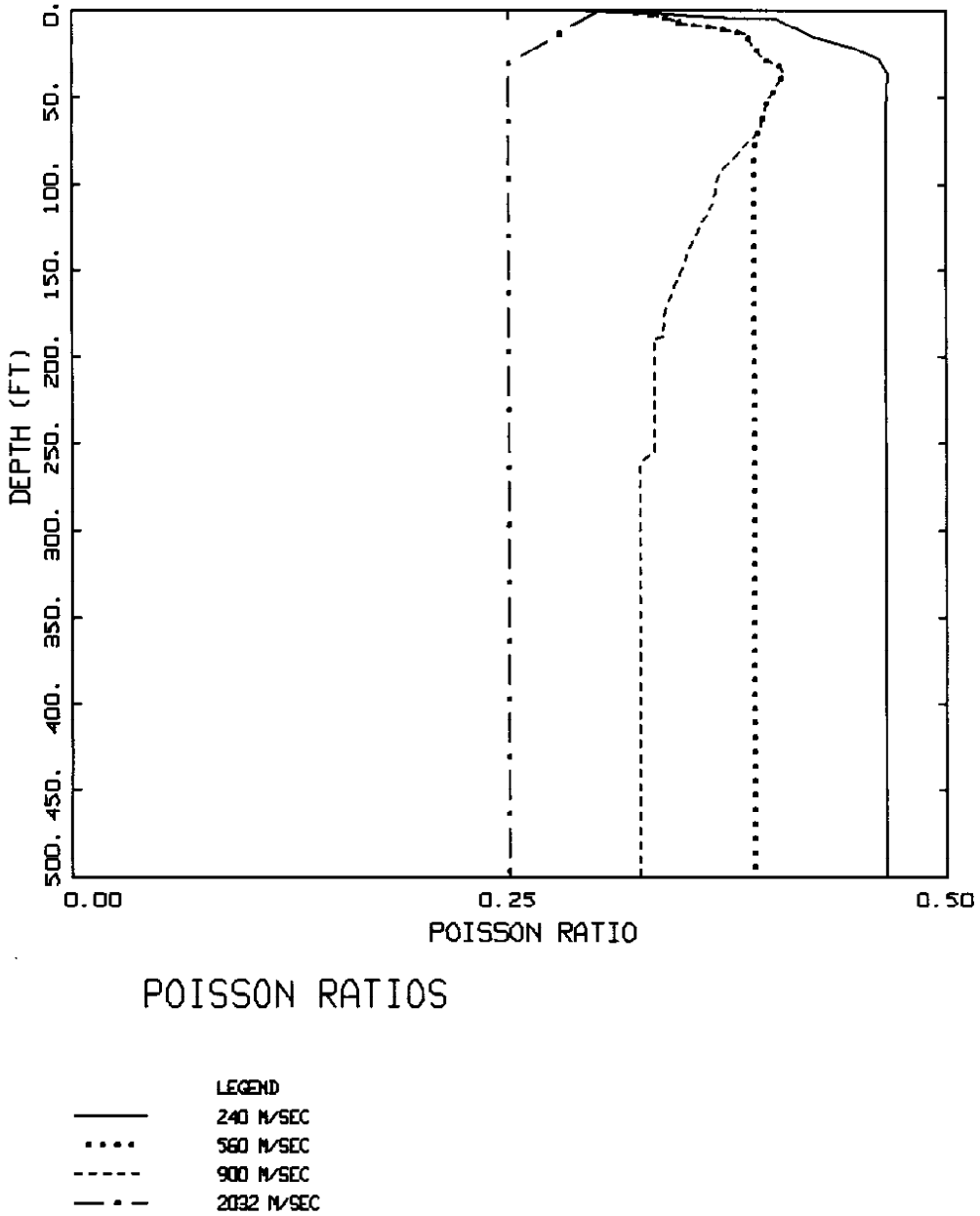


Figure 5.2-2 Poisson Ratios Computed for the Four Base-Case Profiles

5.2.1 Site Response Analyses

The site response analyses are conducted using the equivalent linear random vibration theory approach (Reference 8, Reference 10, and NUREG/CR-6729 [Reference 17]) with the point-source model used to generate both the horizontal and vertical motions (References 8, 10, and 11). Magnitude M7.5 is used as its spectral shape that is consistent with the CSDRS. Distances are adjusted such that the median spectrum computed for each profile approaches, but does not exceed, the horizontal and vertical CSDRS. The distances and median estimates of the horizontal and vertical peak accelerations are listed in Table 5.2-2 and the median spectrum computed for each profile is compared to the CSDRS spectrum in Figure 5.2-3 for horizontal components. Due to the shape of the US AWPR CSDRS, nearly all the profile spectra approach the design spectrum at high frequency (approximately 25 Hz to 50 Hz). This frequency range then becomes the effective control for non exceedence and associated distance adjustment for most of the profiles. The exceptions being reflected by the fundamental low-frequency resonance of the softest (270 m/sec) and deepest (200 feet and 500 feet) profiles. Figure 5.2-3 also suggests a simple manner to update the CSDRS to reflect the expected spectral shape for CENA strong ground motions.

For the vertical motions, Figure 5.2-4 compares the median spectra computed for the profiles with the vertical component CSDRS. In this case, the vertical motions are modeled assuming incident inclined P-SV wave using a linear analysis (References 8, 10, and 11). Linear analyses for vertical motions with incident inclined P-SV waves has been shown to be appropriate for loading levels up to about 0.5g (Reference 8) and consistent with empirical GMPEs from “Empirical Response Spectral Attenuation Relations for Shallow Crustal Earthquakes” (Reference 18). It is also consistent with spectral shapes for vertical motions being independent of loading level (Reference 11). For applications to sites with a water table at or very near the surface, linearity of the constrained modulus is also a realistic assumption as compressional waves control the high-frequencies in vertical motions (Refer to “Properties of Vertical Ground Motions”, Reference 19), where nonlinearity has its largest effort.

As Figure 5.2-4 shows, the vertical spectra fall significantly below the vertical CSDRS design spectrum which was based on the RG 1.60 (Reference 16) V/H ratio. This trend is consistent with vertical spectra recorded at both soil and rock sites in WNA and is a result of the large distances (Reference 10) (e.g. > 50 km, Table 5.2-2). Empirical (Refer to Reference 20) as well as simulated (References 10 and 11) V/H ratios decrease with increasing distance in both WNA and CENA and are less than one at distances exceeding 50 km.

Using the RG 1.60 (Reference 16) V/H ratio, which are conservatively independent of distance, elevates the vertical motions considerably as shown in Figure 5.2-5. With the conservative RG 1.60 V/H ratios, there are some minor exceedences near 1 to 2 Hz for the softest profile (270 m/sec) and largest depths to basement material (500 feet and 200 feet).

Table 5.2-2 Magnitudes, Distances, and Median Peak Accelerations

Profile	M	D(km)	PGA^*_H(g)	PGA^*_V(g)
270 – 100	7.5	70.0	0.235	0.093
270 – 200	7.5	58.0	0.259	0.127
270 – 300	7.5	60.0	0.200	0.114
560 -100	7.5	80.0	0.230	0.080
560 – 200	7.5	67.0	0.254	0.106
560 – 500	7.5	57.0	0.265	0.126
900 – 100	7.5	72.0	0.200	0.067
900 – 200	7.5	65.0	0.215	0.082
2032 - 100	7.5	58.0	0.172	0.067

$\Delta\sigma$ = 112 bars

$Q(f) = 670\ f^{0.33}$

κ = 0.006 sec, hard rock outcrop

* Median peak acceleration at profile surface

Table 5.2-3 (Sheet 1 of 2) Strain Compatible Properties for Profile 270, 100 ft (Median)

Layer	Thick(ft)	Mean Vs(ft/sec)	Mean Vp(ft/sec)	Mean Damps(%)	Mean Dampp(%)	Mean Den(cgs)	Mean Poisson	Depth To Top(ft)
1	7.917	.13069E+04	.53291E+04	.15065E+01	.11972E+01	.20000E+01	.46798E+00	.00000E+00
2	7.914	.13102E+04	.54995E+04	.21301E+01	.11972E+01	.20000E+01	.46983E+00	.79170E+01
3	7.917	.12160E+04	.51116E+04	.23392E+01	.10045E+01	.20000E+01	.46986E+00	.15831E+02
4	7.914	.11856E+04	.50679E+04	.26712E+01	.10045E+01	.20000E+01	.47085E+00	.23748E+02
5	8.580	.12569E+04	.53874E+04	.27489E+01	.10045E+01	.20000E+01	.47103E+00	.31662E+02
6	8.580	.12753E+04	.54943E+04	.28732E+01	.10045E+01	.20000E+01	.47131E+00	.40242E+02
7	8.580	.13074E+04	.56620E+04	.29265E+01	.10045E+01	.20000E+01	.47159E+00	.48822E+02
8	8.580	.13133E+04	.57039E+04	.30373E+01	.10045E+01	.20000E+01	.47179E+00	.57402E+02
9	8.580	.13036E+04	.56980E+04	.31986E+01	.10045E+01	.20000E+01	.47214E+00	.65982E+02
10	8.580	.13260E+04	.58049E+04	.32483E+01	.10045E+01	.20000E+01	.47222E+00	.74562E+02
11	9.377	.14014E+04	.61056E+04	.23414E+01	.79917E+00	.20000E+01	.47200E+00	.83142E+02
12	7.482	.14270E+04	.62013E+04	.23301E+01	.79917E+00	.20000E+01	.47190E+00	.92519E+02
13	3281.000	.93091E+04	.16123E+05	.50000E-03	.50000E-03	.25200E+01	.24996E+00	.10000E+03
-1 Sigma								
1	7.917	.99537E+03	.41022E+04	.10747E+01	.11713E+01	.20000E+01	.46691E+00	.00000E+00
2	7.914	.10102E+04	.43406E+04	.14715E+01	.11713E+01	.20000E+01	.46772E+00	.79170E+01
3	7.917	.92460E+03	.40173E+04	.16148E+01	.98294E+00	.20000E+01	.46703E+00	.15831E+02
4	7.914	.90495E+03	.40123E+04	.18417E+01	.98294E+00	.20000E+01	.46769E+00	.23748E+02
5	8.580	.99132E+03	.43892E+04	.20138E+01	.98294E+00	.20000E+01	.46804E+00	.31662E+02
6	8.580	.10212E+04	.45379E+04	.22212E+01	.98294E+00	.20000E+01	.46812E+00	.40242E+02
7	8.580	.10693E+04	.48396E+04	.22272E+01	.98294E+00	.20000E+01	.46820E+00	.48822E+02
8	8.580	.11194E+04	.50328E+04	.22323E+01	.98294E+00	.20000E+01	.46862E+00	.57402E+02
9	8.580	.10590E+04	.47853E+04	.23413E+01	.98294E+00	.20000E+01	.46884E+00	.65982E+02
10	8.580	.10629E+04	.48188E+04	.22978E+01	.98294E+00	.20000E+01	.46887E+00	.74562E+02
11	9.377	.11074E+04	.50026E+04	.16765E+01	.78362E+00	.20000E+01	.46889E+00	.83142E+02
12	7.482	.12042E+04	.53518E+04	.17145E+01	.78362E+00	.20000E+01	.46914E+00	.92519E+02
13	3281.000	.65275E+04	.11306E+05	.50000E-03	.50000E-03	.25200E+01	.24980E+00	.10000E+03

Table 5.2-3 (Sheet 2 of 2) Strain Compatible Properties for Profile 270, 100 ft (+1 Sigma)

Layer	Thick(ft)	Mean Vs(ft/sec)	Mean Vp(ft/sec)	Mean Damps(%)	Mean Dampp(%)	Mean Den(cgs)	Mean Poisson	Depth To Top(ft)
1	7.917	.17160E+04	.69229E+04	.21118E+01	.12237E+01	.20000E+01	.46906E+00	.00000E+00
2	7.914	.16992E+04	.69677E+04	.30836E+01	.12237E+01	.20000E+01	.47194E+00	.79170E+01
3	7.917	.15991E+04	.65040E+04	.33885E+01	.10265E+01	.20000E+01	.47270E+00	.15831E+02
4	7.914	.15533E+04	.64011E+04	.38744E+01	.10265E+01	.20000E+01	.47403E+00	.23748E+02
5	8.580	.15936E+04	.66128E+04	.37525E+01	.10265E+01	.20000E+01	.47404E+00	.31662E+02
6	8.580	.15926E+04	.66523E+04	.37167E+01	.10265E+01	.20000E+01	.47453E+00	.40242E+02
7	8.580	.15984E+04	.66241E+04	.38452E+01	.10265E+01	.20000E+01	.47501E+00	.48822E+02
8	8.580	.15407E+04	.64646E+04	.41326E+01	.10265E+01	.20000E+01	.47498E+00	.57402E+02
9	8.580	.16048E+04	.67846E+04	.43697E+01	.10265E+01	.20000E+01	.47547E+00	.65982E+02
10	8.580	.16543E+04	.69927E+04	.45920E+01	.10265E+01	.20000E+01	.47560E+00	.74562E+02
11	9.377	.17735E+04	.74518E+04	.32702E+01	.81502E+00	.20000E+01	.47514E+00	.83142E+02
12	7.482	.16910E+04	.71856E+04	.31667E+01	.81502E+00	.20000E+01	.47467E+00	.92519E+02
13	3281.000	.13276E+05	.22993E+05	.50000E-03	.50000E-03	.25200E+01	.25012E+00	.10000E+03

Table 5.2-4 (Sheet 1 of 3) Strain Compatible Properties for Profile 270, 200 ft (Median)

Layer	Thick(ft)	Mean Vs(ft/sec)	Mean Vp(ft/sec)	Mean Damps(%)	Mean Dampp(%)	Mean Den(cgs)	Mean Poisson	Depth To Top(ft)
1	7.917	.11986E+04	.49392E+04	.16840E+01	.11972E+01	.20000E+01	.46865E+00	.00000E+00
2	7.914	.11621E+04	.50015E+04	.25149E+01	.11972E+01	.20000E+01	.47123E+00	.79170E+01
3	7.917	.12767E+04	.53818E+04	.24105E+01	.10045E+01	.20000E+01	.46999E+00	.15831E+02
4	7.914	.13096E+04	.55796E+04	.26523E+01	.10045E+01	.20000E+01	.47060E+00	.23748E+02
5	8.580	.12378E+04	.53569E+04	.30310E+01	.10045E+01	.20000E+01	.47157E+00	.31662E+02
6	8.580	.12323E+04	.53907E+04	.32498E+01	.10045E+01	.20000E+01	.47216E+00	.40242E+02
7	8.580	.12716E+04	.55735E+04	.33322E+01	.10045E+01	.20000E+01	.47231E+00	.48822E+02
8	8.580	.12557E+04	.55378E+04	.35177E+01	.10045E+01	.20000E+01	.47273E+00	.57402E+02
9	8.580	.12848E+04	.56894E+04	.35725E+01	.10045E+01	.20000E+01	.47292E+00	.65982E+02
10	8.580	.13224E+04	.58615E+04	.35827E+01	.10045E+01	.20000E+01	.47301E+00	.74562E+02
11	9.377	.13320E+04	.59301E+04	.27032E+01	.79917E+00	.20000E+01	.47317E+00	.83142E+02
12	9.374	.13932E+04	.61917E+04	.26495E+01	.79917E+00	.20000E+01	.47306E+00	.92519E+02
13	9.377	.14414E+04	.63819E+04	.26370E+01	.79917E+00	.20000E+01	.47293E+00	.10189E+03
14	9.374	.14306E+04	.63623E+04	.27341E+01	.79917E+00	.20000E+01	.47316E+00	.11127E+03
15	9.377	.14183E+04	.63357E+04	.28299E+01	.79917E+00	.20000E+01	.47339E+00	.12064E+03
16	9.374	.14214E+04	.63542E+04	.28785E+01	.79917E+00	.20000E+01	.47343E+00	.13002E+03
17	10.000	.15112E+04	.66820E+04	.26821E+01	.79917E+00	.20000E+01	.47288E+00	.13939E+03
18	10.000	.15443E+04	.68356E+04	.26750E+01	.79917E+00	.20000E+01	.47292E+00	.14939E+03
19	10.000	.15394E+04	.68311E+04	.27355E+01	.79917E+00	.20000E+01	.47306E+00	.15939E+03
20	10.000	.15484E+04	.68868E+04	.27619E+01	.79917E+00	.20000E+01	.47317E+00	.16940E+03
21	10.000	.16733E+04	.73727E+04	.25874E+01	.79917E+00	.20000E+01	.47265E+00	.17940E+03
22	10.000	.16774E+04	.73851E+04	.26115E+01	.79917E+00	.20000E+01	.47264E+00	.18939E+03
23	.604	.16995E+04	.74837E+04	.25855E+01	.79917E+00	.20000E+01	.47264E+00	.19939E+03
24	3281.000	.88721E+04	.15368E+05	.50000E-03	.50000E-03	.25200E+01	.25005E+00	.20000E+03

Table 5.2-4 (Sheet 2 of 3) Strain Compatible Properties for Profile 270, 200 ft (-1 Sigma)

Layer	Thick(ft)	Mean Vs(ft/sec)	Mean Vp(ft/sec)	Mean Damps(%)	Mean Dampp(%)	Mean Den(cgs)	Mean Poisson	Depth To Top(ft)
1	7.917	.87245E+03	.36737E+04	.12192E+01	.11713E+01	.20000E+01	.46687E+00	.00000E+00
2	7.914	.83392E+03	.37651E+04	.16743E+01	.11713E+01	.20000E+01	.46782E+00	.79170E+01
3	7.917	.93995E+03	.40927E+04	.16403E+01	.98294E+00	.20000E+01	.46695E+00	.15831E+02
4	7.914	.92968E+03	.41214E+04	.16940E+01	.98294E+00	.20000E+01	.46720E+00	.23748E+02
5	8.580	.91675E+03	.40960E+04	.20258E+01	.98294E+00	.20000E+01	.46834E+00	.31662E+02
6	8.580	.91968E+03	.41669E+04	.21134E+01	.98294E+00	.20000E+01	.46875E+00	.40242E+02
7	8.580	.98361E+03	.44265E+04	.21806E+01	.98294E+00	.20000E+01	.46911E+00	.48822E+02
8	8.580	.10237E+04	.45531E+04	.23770E+01	.98294E+00	.20000E+01	.46996E+00	.57402E+02
9	8.580	.10638E+04	.47895E+04	.24955E+01	.98294E+00	.20000E+01	.46984E+00	.65982E+02
10	8.580	.11194E+04	.50320E+04	.25786E+01	.98294E+00	.20000E+01	.47006E+00	.74562E+02
11	9.377	.10717E+04	.50224E+04	.20845E+01	.78362E+00	.20000E+01	.46958E+00	.83142E+02
12	9.374	.11015E+04	.51741E+04	.20474E+01	.78362E+00	.20000E+01	.46934E+00	.92519E+02
13	9.377	.12005E+04	.55040E+04	.20167E+01	.78362E+00	.20000E+01	.46975E+00	.10189E+03
14	9.374	.11773E+04	.54329E+04	.21037E+01	.78362E+00	.20000E+01	.46989E+00	.11127E+03
15	9.377	.11660E+04	.54081E+04	.21832E+01	.78362E+00	.20000E+01	.47008E+00	.12064E+03
16	9.374	.11648E+04	.53783E+04	.20985E+01	.78362E+00	.20000E+01	.47008E+00	.13002E+03
17	10.000	.12584E+04	.56487E+04	.19200E+01	.78362E+00	.21000E+01	.46999E+00	.13939E+03
18	10.000	.12864E+04	.58390E+04	.19474E+01	.78362E+00	.21000E+01	.46984E+00	.14939E+03
19	10.000	.12691E+04	.57766E+04	.20539E+01	.78362E+00	.21000E+01	.46996E+00	.15939E+03
20	10.000	.12888E+04	.59280E+04	.20463E+01	.78362E+00	.21000E+01	.46990E+00	.16940E+03
21	10.000	.13884E+04	.63097E+04	.18582E+01	.78362E+00	.21000E+01	.46950E+00	.17940E+03
22	10.000	.13921E+04	.62309E+04	.18445E+01	.78362E+00	.21000E+01	.46979E+00	.18939E+03
23	.604	.13692E+04	.61704E+04	.18519E+01	.78362E+00	.21000E+01	.46968E+00	.19939E+03
24	3281.000	.69107E+04	.11971E+05	.50000E-03	.50000E-03	.25200E+01	.24986E+00	.20000E+03

Table 5.2-4 (Sheet 3 of 3) Strain Compatible Properties for Profile 270, 200 ft (+1 Sigma)

Layer	Thick(ft)	Mean Vs(ft/sec)	Mean Vp(ft/sec)	Mean Damps(%)	Mean Dampp(%)	Mean Den(cgs)	Mean Poisson	Depth To Top(ft)
1	7.917	.16467E+04	.66408E+04	.23259E+01	.12237E+01	.20000E+01	.47045E+00	.00000E+00
2	7.914	.16193E+04	.66439E+04	.37776E+01	.12237E+01	.20000E+01	.47466E+00	.79170E+01
3	7.917	.17340E+04	.70768E+04	.35425E+01	.10265E+01	.20000E+01	.47305E+00	.15831E+02
4	7.914	.18448E+04	.75537E+04	.41525E+01	.10265E+01	.20000E+01	.47402E+00	.23748E+02
5	8.580	.16714E+04	.70059E+04	.45351E+01	.10265E+01	.20000E+01	.47481E+00	.31662E+02
6	8.580	.16513E+04	.69740E+04	.49975E+01	.10265E+01	.20000E+01	.47561E+00	.40242E+02
7	8.580	.16439E+04	.70179E+04	.50920E+01	.10265E+01	.20000E+01	.47552E+00	.48822E+02
8	8.580	.15402E+04	.67354E+04	.52057E+01	.10265E+01	.20000E+01	.47552E+00	.57402E+02
9	8.580	.15518E+04	.67583E+04	.51142E+01	.10265E+01	.20000E+01	.47602E+00	.65982E+02
10	8.580	.15622E+04	.68278E+04	.49779E+01	.10265E+01	.20000E+01	.47597E+00	.74562E+02
11	9.377	.16555E+04	.70017E+04	.35056E+01	.81502E+00	.20000E+01	.47680E+00	.83142E+02
12	9.374	.17620E+04	.74095E+04	.34285E+01	.81502E+00	.20000E+01	.47680E+00	.92519E+02
13	9.377	.17307E+04	.73998E+04	.34482E+01	.81502E+00	.20000E+01	.47612E+00	.10189E+03
14	9.374	.17383E+04	.74507E+04	.35533E+01	.81502E+00	.20000E+01	.47645E+00	.11127E+03
15	9.377	.17253E+04	.74224E+04	.36682E+01	.81502E+00	.20000E+01	.47674E+00	.12064E+03
16	9.374	.17346E+04	.75071E+04	.39486E+01	.81502E+00	.20000E+01	.47680E+00	.13002E+03
17	10.000	.18148E+04	.79044E+04	.37468E+01	.81502E+00	.21000E+01	.47579E+00	.13939E+03
18	10.000	.18540E+04	.80023E+04	.36744E+01	.81502E+00	.21000E+01	.47602E+00	.14939E+03
19	10.000	.18673E+04	.80781E+04	.36434E+01	.81502E+00	.21000E+01	.47617E+00	.15939E+03
20	10.000	.18602E+04	.80007E+04	.37279E+01	.81502E+00	.21000E+01	.47645E+00	.16940E+03
21	10.000	.20165E+04	.86148E+04	.36028E+01	.81502E+00	.21000E+01	.47583E+00	.17940E+03
22	10.000	.20212E+04	.87532E+04	.36973E+01	.81502E+00	.21000E+01	.47552E+00	.18939E+03
23	.604	.21094E+04	.90766E+04	.36096E+01	.81502E+00	.21000E+01	.47562E+00	.19939E+03
24	3281.000	.11390E+05	.19729E+05	.50000E-03	.50000E-03	.25200E+01	.25023E+00	.20000E+03

Table 5.2-5 (Sheet 1 of 6) Strain Compatible Properties for Profile 270, 500 ft (Median)

Layer	Thick(ft)	Mean Vs(ft/sec)	Mean Vp(ft/sec)	Mean Damps(%)	Mean Dampp(%)	Mean Den(cgs)	Mean Poisson	Depth To Top(ft)
1	7.917	.12646E+04	.51738E+04	.15431E+01	.11972E+01	.20000E+01	.46819E+00	.00000E+00
2	7.914	.12951E+04	.54664E+04	.21683E+01	.11972E+01	.20000E+01	.47010E+00	.79170E+01
3	7.917	.12959E+04	.54042E+04	.22494E+01	.10045E+01	.20000E+01	.46939E+00	.15831E+02
4	7.914	.13476E+04	.56792E+04	.24315E+01	.10045E+01	.20000E+01	.47003E+00	.23748E+02
5	8.580	.13214E+04	.56416E+04	.26985E+01	.10045E+01	.20000E+01	.47080E+00	.31662E+02
6	8.580	.13104E+04	.56563E+04	.29131E+01	.10045E+01	.20000E+01	.47144E+00	.40242E+02
7	8.580	.13313E+04	.57682E+04	.30043E+01	.10045E+01	.20000E+01	.47167E+00	.48822E+02
8	8.580	.12657E+04	.55544E+04	.33341E+01	.10045E+01	.20000E+01	.47239E+00	.57402E+02
9	8.580	.13076E+04	.57635E+04	.33683E+01	.10045E+01	.20000E+01	.47260E+00	.65982E+02
10	8.580	.13026E+04	.57781E+04	.35039E+01	.10045E+01	.20000E+01	.47292E+00	.74562E+02
11	9.377	.13707E+04	.60231E+04	.25521E+01	.79917E+00	.20000E+01	.47253E+00	.83142E+02
12	9.374	.13930E+04	.61326E+04	.25885E+01	.79917E+00	.20000E+01	.47263E+00	.92519E+02
13	9.377	.14161E+04	.62406E+04	.26254E+01	.79917E+00	.20000E+01	.47269E+00	.10189E+03
14	9.374	.14012E+04	.62085E+04	.27127E+01	.79917E+00	.20000E+01	.47297E+00	.11127E+03
15	9.377	.14519E+04	.64302E+04	.26730E+01	.79917E+00	.20000E+01	.47292E+00	.12064E+03
16	9.374	.14258E+04	.63511E+04	.27806E+01	.79917E+00	.20000E+01	.47323E+00	.13002E+03
17	10.000	.14465E+04	.64245E+04	.27338E+01	.79917E+00	.21000E+01	.47307E+00	.13939E+03
18	10.000	.14972E+04	.66335E+04	.26820E+01	.79917E+00	.21000E+01	.47295E+00	.14939E+03
19	10.000	.15478E+04	.68498E+04	.26448E+01	.79917E+00	.21000E+01	.47290E+00	.15939E+03
20	10.000	.15138E+04	.67348E+04	.27612E+01	.79917E+00	.21000E+01	.47320E+00	.16940E+03
21	10.000	.14937E+04	.66749E+04	.28530E+01	.79917E+00	.21000E+01	.47343E+00	.17940E+03
22	10.000	.14841E+04	.66521E+04	.29255E+01	.79917E+00	.21000E+01	.47358E+00	.18939E+03
23	10.598	.16064E+04	.71280E+04	.27300E+01	.79917E+00	.21000E+01	.47304E+00	.19939E+03
24	10.598	.16527E+04	.70934E+04	.24002E+01	.70326E+00	.21000E+01	.47116E+00	.20999E+03
25	11.500	.16688E+04	.71702E+04	.24012E+01	.70326E+00	.21000E+01	.47121E+00	.22059E+03
26	11.500	.16746E+04	.72048E+04	.24313E+01	.70326E+00	.21000E+01	.47129E+00	.23209E+03
27	17.668	.16255E+04	.70280E+04	.25559E+01	.70326E+00	.21000E+01	.47158E+00	.24359E+03
28	17.668	.16368E+04	.70848E+04	.25962E+01	.70326E+00	.21000E+01	.47166E+00	.26126E+03
29	17.668	.16974E+04	.73317E+04	.25413E+01	.70326E+00	.21000E+01	.47154E+00	.27893E+03
30	18.249	.16983E+04	.73486E+04	.25840E+01	.70326E+00	.21000E+01	.47165E+00	.29660E+03
31	18.249	.17058E+04	.74023E+04	.26150E+01	.70326E+00	.21000E+01	.47176E+00	.31484E+03
32	18.249	.16898E+04	.73504E+04	.26830E+01	.70326E+00	.21000E+01	.47192E+00	.33309E+03
33	18.249	.17236E+04	.74880E+04	.26626E+01	.70326E+00	.21000E+01	.47185E+00	.35134E+03

Table 5.2-5 (Sheet 2 of 6) Strain Compatible Properties for Profile 270, 500 ft (Median)

Layer	Thick(ft)	Mean Vs(ft/sec)	Mean Vp(ft/sec)	Mean Damps(%)	Mean Dampp(%)	Mean Den(cgs)	Mean Poisson	Depth To Top(ft)
34	20.001	.18010E+04	.77915E+04	.25752E+01	.70326E+00	.21000E+01	.47160E+00	.36959E+03
35	20.001	.17996E+04	.77929E+04	.26102E+01	.70326E+00	.21000E+01	.47169E+00	.38959E+03
36	20.001	.18222E+04	.78911E+04	.26058E+01	.70326E+00	.21000E+01	.47168E+00	.40959E+03
37	20.001	.18752E+04	.81101E+04	.25594E+01	.70326E+00	.21000E+01	.47159E+00	.42959E+03
38	20.001	.19172E+04	.82756E+04	.25261E+01	.70326E+00	.21000E+01	.47149E+00	.44960E+03
39	20.001	.19348E+04	.83390E+04	.25340E+01	.70326E+00	.21000E+01	.47145E+00	.46960E+03
40	10.404	.19598E+04	.84447E+04	.25207E+01	.70326E+00	.21000E+01	.47142E+00	.48960E+03
41	3281.000	.86070E+04	.14908E+05	.50000E-03	.50000E-03	.25200E+01	.25001E+00	.50000E+03

Table 5.2-5 (Sheet 3 of 6) Strain Compatible Properties for Profile 270, 500 ft (-1 Sigma)

Layer	Thick(ft)	Mean Vs(ft/sec)	Mean Vp(ft/sec)	Mean Damps(%)	Mean Dampp(%)	Mean Den(cgs)	Mean Poisson	Depth To Top(ft)
1	7.917	.96381E+03	.40125E+04	.10747E+01	.11713E+01	.20000E+01	.46674E+00	.00000E+00
2	7.914	.98246E+03	.43216E+04	.14870E+01	.11713E+01	.20000E+01	.46724E+00	.79170E+01
3	7.917	.99202E+03	.42515E+04	.15170E+01	.98294E+00	.20000E+01	.46713E+00	.15831E+02
4	7.914	.10638E+04	.45989E+04	.17005E+01	.98294E+00	.20000E+01	.46740E+00	.23748E+02
5	8.580	.10722E+04	.47056E+04	.18380E+01	.98294E+00	.20000E+01	.46793E+00	.31662E+02
6	8.580	.10534E+04	.46912E+04	.19474E+01	.98294E+00	.20000E+01	.46834E+00	.40242E+02
7	8.580	.11495E+04	.51129E+04	.22035E+01	.98294E+00	.20000E+01	.46863E+00	.48822E+02
8	8.580	.10688E+04	.48108E+04	.24189E+01	.98294E+00	.20000E+01	.46916E+00	.57402E+02
9	8.580	.10855E+04	.49920E+04	.24312E+01	.98294E+00	.20000E+01	.46913E+00	.65982E+02
10	8.580	.10575E+04	.49328E+04	.25042E+01	.98294E+00	.20000E+01	.46921E+00	.74562E+02
11	9.377	.11371E+04	.51014E+04	.18484E+01	.78362E+00	.20000E+01	.46966E+00	.83142E+02
12	9.374	.11416E+04	.51326E+04	.19027E+01	.78362E+00	.20000E+01	.46973E+00	.92519E+02
13	9.377	.11958E+04	.53625E+04	.19725E+01	.78362E+00	.20000E+01	.46982E+00	.10189E+03
14	9.374	.11670E+04	.53003E+04	.20103E+01	.78362E+00	.20000E+01	.46990E+00	.11127E+03
15	9.377	.11952E+04	.54932E+04	.18659E+01	.78362E+00	.20000E+01	.46964E+00	.12064E+03
16	9.374	.11754E+04	.54548E+04	.19531E+01	.78362E+00	.20000E+01	.46981E+00	.13002E+03
17	10.000	.12099E+04	.55847E+04	.19474E+01	.78362E+00	.21000E+01	.46975E+00	.13939E+03
18	10.000	.12502E+04	.57317E+04	.19475E+01	.78362E+00	.21000E+01	.46971E+00	.14939E+03
19	10.000	.12826E+04	.58721E+04	.20077E+01	.78362E+00	.21000E+01	.46973E+00	.15939E+03
20	10.000	.12565E+04	.57777E+04	.20255E+01	.78362E+00	.21000E+01	.47000E+00	.16940E+03
21	10.000	.12550E+04	.58241E+04	.20706E+01	.78362E+00	.21000E+01	.47011E+00	.17940E+03
22	10.000	.12327E+04	.57292E+04	.21060E+01	.78362E+00	.21000E+01	.47019E+00	.18939E+03
23	10.598	.13207E+04	.60396E+04	.19050E+01	.78362E+00	.21000E+01	.46981E+00	.19939E+03
24	10.598	.13648E+04	.59695E+04	.16057E+01	.68591E+00	.21000E+01	.46858E+00	.20999E+03
25	11.500	.14014E+04	.61671E+04	.16835E+01	.68591E+00	.21000E+01	.46851E+00	.22059E+03
26	11.500	.14133E+04	.62314E+04	.17280E+01	.68591E+00	.21000E+01	.46856E+00	.23209E+03
27	17.668	.13679E+04	.60399E+04	.17811E+01	.68591E+00	.21000E+01	.46886E+00	.24359E+03
28	17.668	.14247E+04	.62582E+04	.18522E+01	.68591E+00	.21000E+01	.46907E+00	.26126E+03
29	17.668	.14773E+04	.64931E+04	.18807E+01	.68591E+00	.21000E+01	.46893E+00	.27893E+03
30	18.249	.14929E+04	.65774E+04	.19018E+01	.68591E+00	.21000E+01	.46902E+00	.29660E+03
31	18.249	.14988E+04	.67517E+04	.18955E+01	.68591E+00	.21000E+01	.46878E+00	.31484E+03
32	18.249	.15104E+04	.67856E+04	.19596E+01	.68591E+00	.21000E+01	.46903E+00	.33309E+03
33	18.249	.15390E+04	.68790E+04	.19669E+01	.68591E+00	.21000E+01	.46902E+00	.35134E+03

Table 5.2-5 (Sheet 4 of 6) Strain Compatible Properties for Profile 270, 500 ft (-1 Sigma)

Layer	Thick(ft)	Mean Vs(ft/sec)	Mean Vp(ft/sec)	Mean Damps(%)	Mean Dampp(%)	Mean Den(cgs)	Mean Poisson	Depth To Top(ft)
34	20.001	.15923E+04	.70636E+04	.18464E+01	.68591E+00	.21000E+01	.46884E+00	.36959E+03
35	20.001	.15944E+04	.70180E+04	.18863E+01	.68591E+00	.21000E+01	.46906E+00	.38959E+03
36	20.001	.16102E+04	.71020E+04	.18586E+01	.68591E+00	.21000E+01	.46903E+00	.40959E+03
37	20.001	.16427E+04	.73038E+04	.18323E+01	.68591E+00	.21000E+01	.46876E+00	.42959E+03
38	20.001	.16779E+04	.74092E+04	.18365E+01	.68591E+00	.21000E+01	.46880E+00	.44960E+03
39	20.001	.17208E+04	.74464E+04	.18617E+01	.68591E+00	.21000E+01	.46917E+00	.46960E+03
40	10.404	.17515E+04	.76043E+04	.18548E+01	.68591E+00	.21000E+01	.46906E+00	.48960E+03
41	3281.000	.65456E+04	.11337E+05	.50000E-03	.50000E-03	.25200E+01	.24983E+00	.50000E+03

Table 5.2-5 (Sheet 5 of 6) Strain Compatible Properties for Profile 270, 500 ft (+1 Sigma)

Layer	Thick(ft)	Mean Vs(ft/sec)	Mean Vp(ft/sec)	Mean Damps(%)	Mean Dampp(%)	Mean Den(cgs)	Mean Poisson	Depth To Top(ft)
1	7.917	.16592E+04	.66711E+04	.22155E+01	.12237E+01	.20000E+01	.46966E+00	.00000E+00
2	7.914	.17071E+04	.69145E+04	.31618E+01	.12237E+01	.20000E+01	.47297E+00	.79170E+01
3	7.917	.16929E+04	.68694E+04	.33355E+01	.10265E+01	.20000E+01	.47167E+00	.15831E+02
4	7.914	.17070E+04	.70135E+04	.34768E+01	.10265E+01	.20000E+01	.47267E+00	.23748E+02
5	8.580	.16285E+04	.67638E+04	.39620E+01	.10265E+01	.20000E+01	.47369E+00	.31662E+02
6	8.580	.16301E+04	.68199E+04	.43575E+01	.10265E+01	.20000E+01	.47456E+00	.40242E+02
7	8.580	.15418E+04	.65074E+04	.40961E+01	.10265E+01	.20000E+01	.47474E+00	.48822E+02
8	8.580	.14989E+04	.64128E+04	.45955E+01	.10265E+01	.20000E+01	.47565E+00	.57402E+02
9	8.580	.15752E+04	.66541E+04	.46667E+01	.10265E+01	.20000E+01	.47609E+00	.65982E+02
10	8.580	.16046E+04	.67684E+04	.49029E+01	.10265E+01	.20000E+01	.47665E+00	.74562E+02
11	9.377	.16523E+04	.71114E+04	.35237E+01	.81502E+00	.20000E+01	.47542E+00	.83142E+02
12	9.374	.16998E+04	.73273E+04	.35216E+01	.81502E+00	.20000E+01	.47555E+00	.92519E+02
13	9.377	.16770E+04	.72625E+04	.34943E+01	.81502E+00	.20000E+01	.47558E+00	.10189E+03
14	9.374	.16825E+04	.72723E+04	.36605E+01	.81502E+00	.20000E+01	.47607E+00	.11127E+03
15	9.377	.17636E+04	.75271E+04	.38291E+01	.81502E+00	.20000E+01	.47623E+00	.12064E+03
16	9.374	.17296E+04	.73947E+04	.39587E+01	.81502E+00	.20000E+01	.47666E+00	.13002E+03
17	10.000	.17295E+04	.73907E+04	.38379E+01	.81502E+00	.21000E+01	.47642E+00	.13939E+03
18	10.000	.17929E+04	.76772E+04	.36936E+01	.81502E+00	.21000E+01	.47622E+00	.14939E+03
19	10.000	.18678E+04	.79903E+04	.34839E+01	.81502E+00	.21000E+01	.47609E+00	.15939E+03
20	10.000	.18238E+04	.78504E+04	.37641E+01	.81502E+00	.21000E+01	.47641E+00	.16940E+03
21	10.000	.17778E+04	.76501E+04	.39311E+01	.81502E+00	.21000E+01	.47676E+00	.17940E+03
22	10.000	.17869E+04	.77236E+04	.40639E+01	.81502E+00	.21000E+01	.47699E+00	.18939E+03
23	10.598	.19539E+04	.84125E+04	.39122E+01	.81502E+00	.21000E+01	.47630E+00	.19939E+03
24	10.598	.20014E+04	.84288E+04	.35880E+01	.72106E+00	.21000E+01	.47375E+00	.20999E+03
25	11.500	.19873E+04	.83365E+04	.34249E+01	.72106E+00	.21000E+01	.47393E+00	.22059E+03
26	11.500	.19843E+04	.83303E+04	.34209E+01	.72106E+00	.21000E+01	.47404E+00	.23209E+03
27	17.668	.19317E+04	.81776E+04	.36677E+01	.72106E+00	.21000E+01	.47431E+00	.24359E+03
28	17.668	.18807E+04	.80205E+04	.36390E+01	.72106E+00	.21000E+01	.47427E+00	.26126E+03
29	17.668	.19504E+04	.82788E+04	.34339E+01	.72106E+00	.21000E+01	.47416E+00	.27893E+03
30	18.249	.19319E+04	.82102E+04	.35108E+01	.72106E+00	.21000E+01	.47429E+00	.29660E+03
31	18.249	.19413E+04	.81156E+04	.36077E+01	.72106E+00	.21000E+01	.47476E+00	.31484E+03
32	18.249	.18905E+04	.79622E+04	.36734E+01	.72106E+00	.21000E+01	.47483E+00	.33309E+03
33	18.249	.19304E+04	.81509E+04	.36043E+01	.72106E+00	.21000E+01	.47469E+00	.35134E+03

Table 5.2-5 (Sheet 6 of 6) Strain Compatible Properties for Profile 270, 500 ft (+1 Sigma)

Layer	Thick(ft)	Mean Vs(ft/sec)	Mean Vp(ft/sec)	Mean Damps(%)	Mean Dampp(%)	Mean Den(cgs)	Mean Poisson	Depth To Top(ft)
34	20.001	.20371E+04	.85944E+04	.35916E+01	.72106E+00	.21000E+01	.47439E+00	.36959E+03
35	20.001	.20313E+04	.86532E+04	.36120E+01	.72106E+00	.21000E+01	.47432E+00	.38959E+03
36	20.001	.20621E+04	.87678E+04	.36533E+01	.72106E+00	.21000E+01	.47435E+00	.40959E+03
37	20.001	.21406E+04	.90055E+04	.35751E+01	.72106E+00	.21000E+01	.47443E+00	.42959E+03
38	20.001	.21906E+04	.92434E+04	.34747E+01	.72106E+00	.21000E+01	.47420E+00	.44960E+03
39	20.001	.21755E+04	.93386E+04	.34491E+01	.72106E+00	.21000E+01	.47374E+00	.46960E+03
40	10.404	.21930E+04	.93780E+04	.34257E+01	.72106E+00	.21000E+01	.47380E+00	.48960E+03
41	3281.000	.11318E+05	.19604E+05	.50000E-03	.50000E-03	.25200E+01	.25018E+00	.50000E+03

Table 5.2-6 (Sheet 1 of 2) Strain Compatible Properties for Profile 560, 100 ft (Median)

Layer	Thick(ft)	Mean Vs(ft/sec)	Mean Vp(ft/sec)	Mean Damps(%)	Mean Dampp(%)	Mean Den(cgs)	Mean Poisson	Depth To Top(ft)
1	6.001	.13805E+04	.58865E+04	.17267E+01	.14005E+01	.20000E+01	.47088E+00	.00000E+00
2	6.500	.15109E+04	.54338E+04	.21246E+01	.14006E+01	.20000E+01	.45801E+00	.60010E+01
3	6.500	.15622E+04	.57033E+04	.23794E+01	.14006E+01	.20000E+01	.45924E+00	.12501E+02
4	11.001	.17815E+04	.56853E+04	.17588E+01	.11950E+01	.20000E+01	.44538E+00	.19001E+02
5	10.000	.18449E+04	.52657E+04	.18291E+01	.11934E+01	.21000E+01	.42970E+00	.30002E+02
6	10.000	.19443E+04	.55498E+04	.18629E+01	.11934E+01	.21000E+01	.42972E+00	.40002E+02
7	18.000	.21394E+04	.53203E+04	.15699E+01	.10109E+01	.21000E+01	.40334E+00	.50002E+02
8	14.502	.23181E+04	.56560E+04	.16016E+01	.10113E+01	.21000E+01	.39881E+00	.68002E+02
9	14.499	.22802E+04	.55340E+04	.16541E+01	.10115E+01	.21000E+01	.39746E+00	.82504E+02
10	2.997	.23160E+04	.56190E+04	.16544E+01	.10115E+01	.21000E+01	.39739E+00	.97003E+02
11	3281.000	.79015E+04	.14896E+05	.50000E-03	.50000E-03	.25200E+01	.30423E+00	.10000E+03
-1 Sigma								
1	6.001	.10278E+04	.44407E+04	.12232E+01	.13690E+01	.20000E+01	.46987E+00	.00000E+00
2	6.500	.11610E+04	.42732E+04	.14402E+01	.13550E+01	.20000E+01	.45535E+00	.60010E+01
3	6.500	.11829E+04	.44722E+04	.14826E+01	.13550E+01	.20000E+01	.45552E+00	.12501E+02
4	11.001	.13826E+04	.45213E+04	.11772E+01	.11519E+01	.20000E+01	.44140E+00	.19001E+02
5	10.000	.14207E+04	.41695E+04	.12210E+01	.11394E+01	.21000E+01	.42377E+00	.30002E+02
6	10.000	.15861E+04	.46391E+04	.12525E+01	.11394E+01	.21000E+01	.42399E+00	.40002E+02
7	18.000	.18396E+04	.46073E+04	.11103E+01	.95466E+00	.21000E+01	.39803E+00	.50002E+02
8	14.502	.19725E+04	.48903E+04	.11167E+01	.95267E+00	.21000E+01	.39285E+00	.68002E+02
9	14.499	.19522E+04	.48019E+04	.11332E+01	.95189E+00	.21000E+01	.39096E+00	.82504E+02
10	2.997	.19902E+04	.48882E+04	.11254E+01	.95189E+00	.21000E+01	.39097E+00	.97003E+02
11	3281.000	.55014E+04	.10371E+05	.50000E-03	.50000E-03	.25200E+01	.30411E+00	.10000E+03
+1 Sigma								
1	6.001	.18541E+04	.78029E+04	.24375E+01	.14327E+01	.20000E+01	.47190E+00	.00000E+00
2	6.500	.19663E+04	.69097E+04	.31342E+01	.14479E+01	.20000E+01	.46068E+00	.60010E+01
3	6.500	.20633E+04	.72734E+04	.38188E+01	.14479E+01	.20000E+01	.46299E+00	.12501E+02
4	11.001	.22955E+04	.71490E+04	.26276E+01	.12397E+01	.20000E+01	.44939E+00	.19001E+02
5	10.000	.23956E+04	.66500E+04	.27400E+01	.12500E+01	.21000E+01	.43572E+00	.30002E+02
6	10.000	.23836E+04	.66393E+04	.27708E+01	.12500E+01	.21000E+01	.43553E+00	.40002E+02
7	18.000	.24881E+04	.61436E+04	.22196E+01	.10705E+01	.21000E+01	.40872E+00	.50002E+02
8	14.502	.27242E+04	.65415E+04	.22970E+01	.10736E+01	.21000E+01	.40486E+00	.68002E+02
9	14.499	.26633E+04	.63776E+04	.24144E+01	.10748E+01	.21000E+01	.40407E+00	.82504E+02

Table 5.2-6 (Sheet 2 of 2) Strain Compatible Properties for Profile 560, 100 ft (Median)

Layer	Thick(ft)	Mean Vs(ft/sec)	Mean Vp(ft/sec)	Mean Damps(%)	Mean Dampp(%)	Mean Den(cgs)	Mean Poisson	Depth To Top(ft)
10	2.997	.26951E+04	.64589E+04	.24321E+01	.10748E+01	.21000E+01	.40391E+00	.97003E+02
11	3281.000	.11349E+05	.21394E+05	.50000E-03	.50000E-03	.25200E+01	.30435E+00	.10000E+03

Table 5.2-7 (Sheet 1 of 2) Strain Compatible Properties for Profile 560, 200 ft (Median)

Layer	Thick(ft)	Mean Vs(ft/sec)	Mean Vp(ft/sec)	Mean Damps(%)	Mean Dampp(%)	Mean Den(cgs)	Mean Poisson	Depth To Top(ft)
1	6.001	.14341E+04	.61384E+04	.17714E+01	.14005E+01	.20000E+01	.47111E+00	.00000E+00
2	6.500	.14553E+04	.53149E+04	.24358E+01	.14006E+01	.20000E+01	.45930E+00	.60010E+01
3	6.500	.14491E+04	.54119E+04	.29364E+01	.14006E+01	.20000E+01	.46115E+00	.12501E+02
4	11.001	.15702E+04	.51063E+04	.23233E+01	.11950E+01	.20000E+01	.44758E+00	.19001E+02
5	10.000	.16722E+04	.48635E+04	.24079E+01	.11934E+01	.21000E+01	.43267E+00	.30002E+02
6	10.000	.18226E+04	.52878E+04	.24157E+01	.11934E+01	.21000E+01	.43245E+00	.40002E+02
7	18.000	.19296E+04	.48945E+04	.21329E+01	.10109E+01	.21000E+01	.40776E+00	.50002E+02
8	14.502	.21276E+04	.52809E+04	.21063E+01	.10113E+01	.21000E+01	.40280E+00	.68002E+02
9	14.499	.21381E+04	.52921E+04	.21883E+01	.10115E+01	.21000E+01	.40211E+00	.82504E+02
10	20.001	.23435E+04	.57764E+04	.21079E+01	.10115E+01	.21000E+01	.40111E+00	.97003E+02
11	20.001	.23733E+04	.58739E+04	.16400E+01	.79686E+00	.21000E+01	.40204E+00	.11700E+03
12	22.665	.24185E+04	.60044E+04	.16698E+01	.79686E+00	.21000E+01	.40272E+00	.13701E+03
13	22.665	.24239E+04	.60330E+04	.17130E+01	.79686E+00	.21000E+01	.40333E+00	.15967E+03
14	17.665	.25098E+04	.62439E+04	.17060E+01	.79686E+00	.21000E+01	.40318E+00	.18234E+03
15	3281.000	.87386E+04	.16474E+05	.50000E-03	.50000E-03	.25200E+01	.30421E+00	.20000E+03
-1 Sigma								
1	6.001	.10701E+04	.46574E+04	.12621E+01	.13690E+01	.20000E+01	.46994E+00	.00000E+00
2	6.500	.11052E+04	.41735E+04	.17171E+01	.13550E+01	.20000E+01	.45595E+00	.60010E+01
3	6.500	.11052E+04	.42860E+04	.21051E+01	.13550E+01	.20000E+01	.45739E+00	.12501E+02
4	11.001	.12155E+04	.40408E+04	.16530E+01	.11519E+01	.20000E+01	.44358E+00	.19001E+02
5	10.000	.13245E+04	.39431E+04	.17202E+01	.11394E+01	.21000E+01	.42730E+00	.30002E+02
6	10.000	.14794E+04	.43487E+04	.18128E+01	.11394E+01	.21000E+01	.42854E+00	.40002E+02
7	18.000	.16203E+04	.41618E+04	.16354E+01	.95466E+00	.21000E+01	.40226E+00	.50002E+02
8	14.502	.17627E+04	.44461E+04	.16362E+01	.95267E+00	.21000E+01	.39629E+00	.68002E+02
9	14.499	.17983E+04	.45326E+04	.17007E+01	.95189E+00	.21000E+01	.39508E+00	.82504E+02
10	20.001	.19425E+04	.48801E+04	.15441E+01	.95189E+00	.21000E+01	.39396E+00	.97003E+02
11	20.001	.18995E+04	.47982E+04	.12202E+01	.75355E+00	.21000E+01	.39463E+00	.11700E+03
12	22.665	.19138E+04	.48656E+04	.12188E+01	.75355E+00	.21000E+01	.39491E+00	.13701E+03
13	22.665	.20017E+04	.50811E+04	.12586E+01	.75355E+00	.21000E+01	.39560E+00	.15967E+03
14	17.665	.21000E+04	.53469E+04	.12832E+01	.75355E+00	.21000E+01	.39522E+00	.18234E+03
15	3281.000	.63640E+04	.11997E+05	.50000E-03	.50000E-03	.25200E+01	.30409E+00	.20000E+03

Table 5.2-7 (Sheet 2 of 2) Strain Compatible Properties for Profile 560, 200 ft (+1 Sigma)

Layer	Thick(ft)	Mean Vs(ft/sec)	Mean Vp(ft/sec)	Mean Damps(%)	Mean Dampp(%)	Mean Den(cgs)	Mean Poisson	Depth To Top(ft)
1	6.001	.19219E+04	.80904E+04	.24864E+01	.14327E+01	.20000E+01	.47228E+00	.00000E+00
2	6.500	.19162E+04	.67685E+04	.34553E+01	.14479E+01	.20000E+01	.46269E+00	.60010E+01
3	6.500	.18999E+04	.68336E+04	.40960E+01	.14479E+01	.20000E+01	.46493E+00	.12501E+02
4	11.001	.20285E+04	.64528E+04	.32654E+01	.12397E+01	.20000E+01	.45162E+00	.19001E+02
5	10.000	.21112E+04	.59988E+04	.33705E+01	.12500E+01	.21000E+01	.43812E+00	.30002E+02
6	10.000	.22455E+04	.64298E+04	.32191E+01	.12500E+01	.21000E+01	.43639E+00	.40002E+02
7	18.000	.22978E+04	.57563E+04	.27817E+01	.10705E+01	.21000E+01	.41334E+00	.50002E+02
8	14.502	.25680E+04	.62724E+04	.27115E+01	.10736E+01	.21000E+01	.40942E+00	.68002E+02
9	14.499	.25420E+04	.61789E+04	.28157E+01	.10748E+01	.21000E+01	.40926E+00	.82504E+02
10	20.001	.28272E+04	.68372E+04	.28776E+01	.10748E+01	.21000E+01	.40839E+00	.97003E+02
11	20.001	.29654E+04	.71908E+04	.22044E+01	.84266E+00	.21000E+01	.40960E+00	.11700E+03
12	22.665	.30562E+04	.74099E+04	.22878E+01	.84266E+00	.21000E+01	.41069E+00	.13701E+03
13	22.665	.29351E+04	.71633E+04	.23315E+01	.84266E+00	.21000E+01	.41121E+00	.15967E+03
14	17.665	.29996E+04	.72915E+04	.22680E+01	.84266E+00	.21000E+01	.41131E+00	.18234E+03
15	3281.000	.11999E+05	.22621E+05	.50000E-03	.50000E-03	.25200E+01	.30434E+00	.20000E+03

Table 5.2-8 (Sheet 1 of 6) Strain Compatible Properties for Profile 560, 500 ft (Median)

Layer	Thick(ft)	Mean Vs(ft/sec)	Mean Vp(ft/sec)	Mean Damps(%)	Mean Dampp(%)	Mean Den(cgs)	Mean Poisson	Depth To Top(ft)
1	6.001	.12690E+04	.54917E+04	.19753E+01	.14005E+01	.20000E+01	.47173E+00	.00000E+00
2	6.500	.13676E+04	.50717E+04	.26980E+01	.14006E+01	.20000E+01	.46048E+00	.60010E+01
3	6.500	.15127E+04	.56518E+04	.29456E+01	.14006E+01	.20000E+01	.46121E+00	.12501E+02
4	11.001	.16574E+04	.53855E+04	.23351E+01	.11950E+01	.20000E+01	.44755E+00	.19001E+02
5	10.000	.16933E+04	.49427E+04	.25109E+01	.11934E+01	.21000E+01	.43321E+00	.30002E+02
6	10.000	.17627E+04	.51814E+04	.26124E+01	.11934E+01	.21000E+01	.43417E+00	.40002E+02
7	18.000	.18980E+04	.48506E+04	.22888E+01	.10109E+01	.21000E+01	.40935E+00	.50002E+02
8	14.502	.20635E+04	.51688E+04	.22802E+01	.10113E+01	.21000E+01	.40487E+00	.68002E+02
9	14.499	.20835E+04	.51907E+04	.23649E+01	.10115E+01	.21000E+01	.40371E+00	.82504E+02
10	20.001	.22615E+04	.56217E+04	.23157E+01	.10115E+01	.21000E+01	.40317E+00	.97003E+02
11	20.001	.22571E+04	.56434E+04	.17999E+01	.79686E+00	.21000E+01	.40434E+00	.11700E+03
12	22.665	.24603E+04	.61308E+04	.17404E+01	.79686E+00	.21000E+01	.40354E+00	.13701E+03
13	22.665	.24976E+04	.62359E+04	.17807E+01	.79686E+00	.21000E+01	.40400E+00	.15967E+03
14	22.668	.24419E+04	.61328E+04	.18644E+01	.79686E+00	.21000E+01	.40527E+00	.18234E+03
15	20.998	.24624E+04	.61897E+04	.18907E+01	.79686E+00	.21000E+01	.40560E+00	.20500E+03
16	20.998	.25429E+04	.64039E+04	.18796E+01	.79686E+00	.21000E+01	.40590E+00	.22600E+03
17	12.501	.27088E+04	.66331E+04	.16126E+01	.70816E+00	.21000E+01	.39970E+00	.24700E+03
18	12.501	.26611E+04	.65302E+04	.16461E+01	.70816E+00	.21000E+01	.40019E+00	.25950E+03
19	12.501	.27219E+04	.66728E+04	.16361E+01	.70816E+00	.21000E+01	.39997E+00	.27200E+03
20	12.501	.27662E+04	.67840E+04	.16256E+01	.70816E+00	.21000E+01	.40001E+00	.28450E+03
21	12.501	.27833E+04	.68312E+04	.16357E+01	.70816E+00	.21000E+01	.40017E+00	.29700E+03
22	12.501	.28135E+04	.68962E+04	.16346E+01	.70816E+00	.21000E+01	.39993E+00	.30950E+03
23	12.501	.27676E+04	.67957E+04	.16669E+01	.70816E+00	.21000E+01	.40035E+00	.32201E+03
24	12.501	.27464E+04	.67551E+04	.16872E+01	.70816E+00	.21000E+01	.40071E+00	.33451E+03
25	12.501	.27365E+04	.67383E+04	.17041E+01	.70816E+00	.21000E+01	.40098E+00	.34701E+03
26	12.501	.27294E+04	.67233E+04	.17179E+01	.70816E+00	.21000E+01	.40107E+00	.35951E+03
27	12.501	.27890E+04	.68700E+04	.17037E+01	.70816E+00	.21000E+01	.40101E+00	.37201E+03
28	12.501	.28612E+04	.70381E+04	.16772E+01	.70816E+00	.21000E+01	.40070E+00	.38451E+03
29	12.501	.28998E+04	.71347E+04	.16684E+01	.70816E+00	.21000E+01	.40071E+00	.39701E+03
30	12.501	.29538E+04	.72614E+04	.16540E+01	.70816E+00	.21000E+01	.40051E+00	.40951E+03
31	12.501	.29030E+04	.71484E+04	.16841E+01	.70816E+00	.21000E+01	.40090E+00	.42201E+03
32	12.501	.28586E+04	.70474E+04	.17123E+01	.70816E+00	.21000E+01	.40119E+00	.43451E+03
33	12.501	.28883E+04	.71206E+04	.17145E+01	.70816E+00	.21000E+01	.40119E+00	.44702E+03

Table 5.2-8 (Sheet 2 of 6) Strain Compatible Properties for Profile 560, 500 ft (Median)

Layer	Thick(ft)	Mean Vs(ft/sec)	Mean Vp(ft/sec)	Mean Damps(%)	Mean Dampp(%)	Mean Den(cgs)	Mean Poisson	Depth To Top(ft)
34	12.501	.28893E+04	.71195E+04	.17281E+01	.70816E+00	.21000E+01	.40116E+00	.45952E+03
35	13.124	.28799E+04	.71033E+04	.17440E+01	.70816E+00	.21000E+01	.40137E+00	.47202E+03
36	13.124	.28697E+04	.70864E+04	.17505E+01	.70816E+00	.21000E+01	.40159E+00	.48514E+03
37	1.742	.28904E+04	.71353E+04	.17460E+01	.70816E+00	.21000E+01	.40152E+00	.49827E+03
38	3281.000	.86106E+04	.16234E+05	.50000E-03	.50000E-03	.25200E+01	.30426E+00	.50001E+03

Table 5.2-8 (Sheet 3 of 6) Strain Compatible Properties for Profile 560, 500 ft (-1 Sigma)

Layer	Thick(ft)	Mean Vs(ft/sec)	Mean Vp(ft/sec)	Mean Damps(%)	Mean Dampp(%)	Mean Den(cgs)	Mean Poisson	Depth To Top(ft)
1	6.001	.91691E+03	.40700E+04	.14164E+01	.13690E+01	.20000E+01	.47001E+00	.00000E+00
2	6.500	.97569E+03	.37981E+04	.18156E+01	.13550E+01	.20000E+01	.45610E+00	.60010E+01
3	6.500	.11375E+04	.44173E+04	.19967E+01	.13550E+01	.20000E+01	.45753E+00	.12501E+02
4	11.001	.12897E+04	.42542E+04	.16409E+01	.11519E+01	.20000E+01	.44408E+00	.19001E+02
5	10.000	.13282E+04	.39518E+04	.17504E+01	.11394E+01	.21000E+01	.42770E+00	.30002E+02
6	10.000	.13839E+04	.41792E+04	.18072E+01	.11394E+01	.21000E+01	.42796E+00	.40002E+02
7	18.000	.15858E+04	.40935E+04	.17090E+01	.95466E+00	.21000E+01	.40354E+00	.50002E+02
8	14.502	.17777E+04	.45154E+04	.16932E+01	.95267E+00	.21000E+01	.39821E+00	.68002E+02
9	14.499	.18013E+04	.45162E+04	.17478E+01	.95189E+00	.21000E+01	.39772E+00	.82504E+02
10	20.001	.19733E+04	.49503E+04	.16876E+01	.95189E+00	.21000E+01	.39690E+00	.97003E+02
11	20.001	.18704E+04	.47634E+04	.13442E+01	.75355E+00	.21000E+01	.39646E+00	.11700E+03
12	22.665	.20247E+04	.51570E+04	.12974E+01	.75355E+00	.21000E+01	.39550E+00	.13701E+03
13	22.665	.20875E+04	.53170E+04	.13276E+01	.75355E+00	.21000E+01	.39608E+00	.15967E+03
14	22.668	.20561E+04	.52662E+04	.13865E+01	.75355E+00	.21000E+01	.39694E+00	.18234E+03
15	20.998	.20966E+04	.53301E+04	.14127E+01	.75355E+00	.21000E+01	.39824E+00	.20500E+03
16	20.998	.21621E+04	.55735E+04	.13862E+01	.75355E+00	.21000E+01	.39760E+00	.22600E+03
17	12.501	.23727E+04	.58536E+04	.11563E+01	.66002E+00	.21000E+01	.39412E+00	.24700E+03
18	12.501	.23486E+04	.58073E+04	.11990E+01	.66002E+00	.21000E+01	.39445E+00	.25950E+03
19	12.501	.24074E+04	.59405E+04	.11946E+01	.66002E+00	.21000E+01	.39441E+00	.27200E+03
20	12.501	.24387E+04	.60487E+04	.11743E+01	.66002E+00	.21000E+01	.39388E+00	.28450E+03
21	12.501	.24231E+04	.60294E+04	.11808E+01	.66002E+00	.21000E+01	.39374E+00	.29700E+03
22	12.501	.24903E+04	.61429E+04	.11919E+01	.66002E+00	.21000E+01	.39433E+00	.30950E+03
23	12.501	.24627E+04	.60788E+04	.12240E+01	.66002E+00	.21000E+01	.39466E+00	.32201E+03
24	12.501	.24458E+04	.60618E+04	.12386E+01	.66002E+00	.21000E+01	.39468E+00	.33451E+03
25	12.501	.24446E+04	.60655E+04	.12531E+01	.66002E+00	.21000E+01	.39494E+00	.34701E+03
26	12.501	.24444E+04	.60567E+04	.12564E+01	.66002E+00	.21000E+01	.39504E+00	.35951E+03
27	12.501	.24408E+04	.60829E+04	.12206E+01	.66002E+00	.21000E+01	.39445E+00	.37201E+03
28	12.501	.25365E+04	.63120E+04	.12102E+01	.66002E+00	.21000E+01	.39424E+00	.38451E+03
29	12.501	.25387E+04	.63438E+04	.11949E+01	.66002E+00	.21000E+01	.39393E+00	.39701E+03
30	12.501	.26056E+04	.65078E+04	.11921E+01	.66002E+00	.21000E+01	.39372E+00	.40951E+03
31	12.501	.25569E+04	.63930E+04	.12044E+01	.66002E+00	.21000E+01	.39409E+00	.42201E+03
32	12.501	.25316E+04	.63214E+04	.12297E+01	.66002E+00	.21000E+01	.39451E+00	.43451E+03
33	12.501	.25425E+04	.63483E+04	.12326E+01	.66002E+00	.21000E+01	.39451E+00	.44702E+03

Table 5.2-8 (Sheet 4 of 6) Strain Compatible Properties for Profile 560, 500 ft (-1 Sigma)

Layer	Thick(ft)	Mean Vs(ft/sec)	Mean Vp(ft/sec)	Mean Damps(%)	Mean Dampp(%)	Mean Den(cgs)	Mean Poisson	Depth To Top(ft)
34	12.501	.25692E+04	.63681E+04	.12332E+01	.66002E+00	.21000E+01	.39530E+00	.45952E+03
35	13.124	.25556E+04	.63590E+04	.12392E+01	.66002E+00	.21000E+01	.39523E+00	.47202E+03
36	13.124	.25720E+04	.64215E+04	.12525E+01	.66002E+00	.21000E+01	.39501E+00	.48514E+03
37	1.742	.25827E+04	.64469E+04	.12521E+01	.66002E+00	.21000E+01	.39493E+00	.49827E+03
38	3281.000	.65670E+04	.12381E+05	.50000E-03	.50000E-03	.25200E+01	.30414E+00	.50001E+03

Table 5.2-8 (Sheet 5 of 6) Strain Compatible Properties for Profile 560, 500 ft (+1 Sigma)

Layer	Thick(ft)	Mean Vs(ft/sec)	Mean Vp(ft/sec)	Mean Damps(%)	Mean Dampp(%)	Mean Den(cgs)	Mean Poisson	Depth To Top(ft)
1	6.001	.17564E+04	.74098E+04	.27548E+01	.14327E+01	.20000E+01	.47346E+00	.00000E+00
2	6.500	.19170E+04	.67723E+04	.40092E+01	.14479E+01	.20000E+01	.46489E+00	.60010E+01
3	6.500	.20116E+04	.72314E+04	.43454E+01	.14479E+01	.20000E+01	.46491E+00	.12501E+02
4	11.001	.21299E+04	.68176E+04	.33230E+01	.12397E+01	.20000E+01	.45104E+00	.19001E+02
5	10.000	.21588E+04	.61821E+04	.36018E+01	.12500E+01	.21000E+01	.43879E+00	.30002E+02
6	10.000	.22452E+04	.64240E+04	.37764E+01	.12500E+01	.21000E+01	.44046E+00	.40002E+02
7	18.000	.22717E+04	.57478E+04	.30654E+01	.10705E+01	.21000E+01	.41524E+00	.50002E+02
8	14.502	.23952E+04	.59168E+04	.30706E+01	.10736E+01	.21000E+01	.41164E+00	.68002E+02
9	14.499	.24099E+04	.59659E+04	.31998E+01	.10748E+01	.21000E+01	.40979E+00	.82504E+02
10	20.001	.25918E+04	.63841E+04	.31774E+01	.10748E+01	.21000E+01	.40953E+00	.97003E+02
11	20.001	.27237E+04	.66861E+04	.24102E+01	.84266E+00	.21000E+01	.41238E+00	.11700E+03
12	22.665	.29896E+04	.72885E+04	.23346E+01	.84266E+00	.21000E+01	.41176E+00	.13701E+03
13	22.665	.29882E+04	.73136E+04	.23886E+01	.84266E+00	.21000E+01	.41207E+00	.15967E+03
14	22.668	.29001E+04	.71421E+04	.25069E+01	.84266E+00	.21000E+01	.41377E+00	.18234E+03
15	20.998	.28922E+04	.71881E+04	.25304E+01	.84266E+00	.21000E+01	.41310E+00	.20500E+03
16	20.998	.29908E+04	.73581E+04	.25487E+01	.84266E+00	.21000E+01	.41437E+00	.22600E+03
17	12.501	.30926E+04	.75164E+04	.22488E+01	.75981E+00	.21000E+01	.40536E+00	.24700E+03
18	12.501	.30153E+04	.73430E+04	.22600E+01	.75981E+00	.21000E+01	.40602E+00	.25950E+03
19	12.501	.30775E+04	.74954E+04	.22407E+01	.75981E+00	.21000E+01	.40561E+00	.27200E+03
20	12.501	.31377E+04	.76087E+04	.22503E+01	.75981E+00	.21000E+01	.40624E+00	.28450E+03
21	12.501	.31970E+04	.77396E+04	.22659E+01	.75981E+00	.21000E+01	.40670E+00	.29700E+03
22	12.501	.31786E+04	.77420E+04	.22417E+01	.75981E+00	.21000E+01	.40562E+00	.30950E+03
23	12.501	.31102E+04	.75972E+04	.22699E+01	.75981E+00	.21000E+01	.40612E+00	.32201E+03
24	12.501	.30839E+04	.75277E+04	.22982E+01	.75981E+00	.21000E+01	.40684E+00	.33451E+03
25	12.501	.30633E+04	.74857E+04	.23175E+01	.75981E+00	.21000E+01	.40711E+00	.34701E+03
26	12.501	.30477E+04	.74632E+04	.23488E+01	.75981E+00	.21000E+01	.40718E+00	.35951E+03
27	12.501	.31868E+04	.77588E+04	.23778E+01	.75981E+00	.21000E+01	.40767E+00	.37201E+03
28	12.501	.32273E+04	.78478E+04	.23246E+01	.75981E+00	.21000E+01	.40726E+00	.38451E+03
29	12.501	.33122E+04	.80242E+04	.23296E+01	.75981E+00	.21000E+01	.40761E+00	.39701E+03
30	12.501	.33484E+04	.81022E+04	.22948E+01	.75981E+00	.21000E+01	.40742E+00	.40951E+03
31	12.501	.32959E+04	.79930E+04	.23549E+01	.75981E+00	.21000E+01	.40783E+00	.42201E+03
32	12.501	.32278E+04	.78567E+04	.23842E+01	.75981E+00	.21000E+01	.40800E+00	.43451E+03
33	12.501	.32812E+04	.79869E+04	.23849E+01	.75981E+00	.21000E+01	.40798E+00	.44702E+03

Table 5.2-8 (Sheet 6 of 6) Strain Compatible Properties for Profile 560, 500 ft (+1 Sigma)

Layer	Thick(ft)	Mean Vs(ft/sec)	Mean Vp(ft/sec)	Mean Damps(%)	Mean Dampp(%)	Mean Den(cgs)	Mean Poisson	Depth To Top(ft)
34	12.501	.32494E+04	.79595E+04	.24218E+01	.75981E+00	.21000E+01	.40711E+00	.45952E+03
35	13.124	.32452E+04	.79348E+04	.24544E+01	.75981E+00	.21000E+01	.40761E+00	.47202E+03
36	13.124	.32019E+04	.78202E+04	.24465E+01	.75981E+00	.21000E+01	.40829E+00	.48514E+03
37	1.742	.32348E+04	.78973E+04	.24348E+01	.75981E+00	.21000E+01	.40822E+00	.49827E+03
38	3281.000	.11290E+05	.21285E+05	.50000E-03	.50000E-03	.25200E+01	.30438E+00	.50001E+03

Table 5.2-9 Strain Compatible Properties for Profile 900, 100 ft (Median)

Layer	Thick(ft)	Mean Vs(ft/sec)	Mean Vp(ft/sec)	Mean Damps(%)	Mean Dampp(%)	Mean Den(cgs)	Mean Poisson	Depth To Top(ft)
1	5.000	.19759E+04	.62284E+04	.35392E+01	.32618E+01	.20000E+01	.44404E+00	.00000E+00
2	6.998	.22224E+04	.60091E+04	.39036E+01	.32602E+01	.21000E+01	.42062E+00	.50000E+01
3	7.999	.22678E+04	.53479E+04	.41119E+01	.32577E+01	.21000E+01	.38981E+00	.11998E+02
4	9.000	.27389E+04	.66072E+04	.37298E+01	.31493E+01	.21000E+01	.39600E+00	.19997E+02
5	11.001	.30377E+04	.77486E+04	.37101E+01	.31598E+01	.21000E+01	.40887E+00	.28997E+02
6	12.999	.34027E+04	.84804E+04	.35983E+01	.31567E+01	.21500E+01	.40395E+00	.39998E+02
7	20.001	.40158E+04	.96892E+04	.35060E+01	.31189E+01	.21500E+01	.39626E+00	.52997E+02
8	23.000	.47306E+04	.10840E+05	.34603E+01	.31067E+01	.22400E+01	.38236E+00	.72998E+02
9	4.001	.49301E+04	.10793E+05	.34415E+01	.30944E+01	.22400E+01	.36815E+00	.95998E+02
10	3281.0	.89361E+04	.17520E+05	.10000E-05	.10000E-05	.25200E+01	.32419E+00	.99999E+02
-1 Sigma								
1	5.000	.14455E+04	.45772E+04	.27309E+01	.31528E+01	.20000E+01	.44307E+00	.00000E+00
2	6.998	.16631E+04	.45754E+04	.26029E+01	.31097E+01	.21000E+01	.41653E+00	.50000E+01
3	7.999	.16847E+04	.40848E+04	.25906E+01	.30566E+01	.21000E+01	.38101E+00	.11998E+02
4	9.000	.21549E+04	.52896E+04	.26371E+01	.29501E+01	.21000E+01	.39013E+00	.19997E+02
5	11.001	.23108E+04	.60363E+04	.27056E+01	.29805E+01	.21000E+01	.40265E+00	.28997E+02
6	12.999	.27709E+04	.69290E+04	.26535E+01	.29716E+01	.21500E+01	.40023E+00	.39998E+02
7	20.001	.33141E+04	.80263E+04	.27333E+01	.29043E+01	.21500E+01	.39397E+00	.52997E+02
8	23.000	.40444E+04	.92935E+04	.27312E+01	.28703E+01	.22400E+01	.38057E+00	.72998E+02
9	4.001	.41619E+04	.91355E+04	.27506E+01	.28366E+01	.22400E+01	.36610E+00	.95998E+02
10	3281.0	.63383E+04	.12427E+05	.99999E-06	.99999E-06	.25200E+01	.32410E+00	.99999E+02
+1 Sigma								
1	5.000	.27009E+04	.84754E+04	.45869E+01	.33745E+01	.20000E+01	.44501E+00	.00000E+00
2	6.998	.29699E+04	.78922E+04	.58543E+01	.34181E+01	.21000E+01	.42476E+00	.50000E+01
3	7.999	.30528E+04	.70016E+04	.65264E+01	.34720E+01	.21000E+01	.39880E+00	.11998E+02
4	9.000	.34812E+04	.82528E+04	.52754E+01	.33620E+01	.21000E+01	.40195E+00	.19997E+02
5	11.001	.39934E+04	.99465E+04	.50874E+01	.33499E+01	.21000E+01	.41519E+00	.28997E+02
6	12.999	.41784E+04	.10379E+05	.48795E+01	.33534E+01	.21500E+01	.40771E+00	.39998E+02
7	20.001	.48661E+04	.11697E+05	.44972E+01	.33494E+01	.21500E+01	.39856E+00	.52997E+02
8	23.000	.55331E+04	.12644E+05	.43839E+01	.33625E+01	.22400E+01	.38415E+00	.72998E+02
9	4.001	.58400E+04	.12752E+05	.43059E+01	.33757E+01	.22400E+01	.37021E+00	.95998E+02
10	3281.0	.12599E+05	.24700E+05	.10000E-05	.10000E-05	.25200E+01	.32428E+00	.99999E+02

Table 5.2-10 (Sheet 1 of 2) Strain Compatible Properties for Profile 900, 200 ft (Median)

Layer	Thick(ft)	Mean Vs(ft/sec)	Mean Vp(ft/sec)	Mean Damps(%)	Mean Dampp(%)	Mean Den(cgs)	Mean Poisson	Depth To Top(ft)
1	5.000	.19442E+04	.61418E+04	.37985E+01	.32618E+01	.20000E+01	.44430E+00	.00000E+00
2	6.998	.20426E+04	.55553E+04	.43178E+01	.32602E+01	.21000E+01	.42168E+00	.50000E+01
3	7.999	.23051E+04	.54548E+04	.44976E+01	.32577E+01	.21000E+01	.39085E+00	.11998E+02
4	9.000	.27398E+04	.66431E+04	.37017E+01	.31493E+01	.21000E+01	.39730E+00	.19997E+02
5	11.001	.27609E+04	.71078E+04	.38278E+01	.31598E+01	.21000E+01	.41088E+00	.28997E+02
6	12.999	.32366E+04	.81881E+04	.37513E+01	.31567E+01	.21500E+01	.40707E+00	.39998E+02
7	20.001	.40210E+04	.97553E+04	.36080E+01	.31189E+01	.21500E+01	.39757E+00	.52997E+02
8	23.000	.46531E+04	.10725E+05	.35859E+01	.31067E+01	.22400E+01	.38398E+00	.72998E+02
9	25.001	.47934E+04	.10559E+05	.35937E+01	.30944E+01	.22400E+01	.37013E+00	.95998E+02
10	34.001	.53296E+04	.11237E+05	.35554E+01	.31796E+01	.22400E+01	.35485E+00	.12100E+03
11	43.001	.58718E+04	.11956E+05	.34893E+01	.31770E+01	.22400E+01	.34102E+00	.15500E+03
12	1.998	.59183E+04	.11871E+05	.35175E+01	.31756E+01	.22400E+01	.33457E+00	.19800E+03
13	3281.000	.92641E+04	.18165E+05	.10000E-05	.10000E-05	.25200E+01	.32425E+00	.20000E+03
-1 Sigma								
1	5.000	.14247E+04	.45375E+04	.26730E+01	.31528E+01	.20000E+01	.44304E+00	.00000E+00
2	6.998	.15603E+04	.43292E+04	.27461E+01	.31097E+01	.21000E+01	.41737E+00	.50000E+01
3	7.999	.18261E+04	.44391E+04	.28096E+01	.30566E+01	.21000E+01	.38289E+00	.11998E+02
4	9.000	.21020E+04	.51680E+04	.25247E+01	.29501E+01	.21000E+01	.39173E+00	.19997E+02
5	11.001	.21557E+04	.56414E+04	.25792E+01	.29805E+01	.21000E+01	.40495E+00	.28997E+02
6	12.999	.24632E+04	.63655E+04	.26602E+01	.29716E+01	.21500E+01	.40045E+00	.39998E+02
7	20.001	.33443E+04	.82083E+04	.26943E+01	.29043E+01	.21500E+01	.39390E+00	.52997E+02
8	23.000	.37445E+04	.87038E+04	.26072E+01	.28703E+01	.22400E+01	.38058E+00	.72998E+02
9	25.001	.39467E+04	.87524E+04	.26881E+01	.28366E+01	.22400E+01	.36642E+00	.95998E+02
10	34.001	.45894E+04	.97232E+04	.26613E+01	.29227E+01	.22400E+01	.35212E+00	.12100E+03
11	43.001	.50114E+04	.10233E+05	.26798E+01	.29027E+01	.22400E+01	.33839E+00	.15500E+03
12	1.998	.51461E+04	.10370E+05	.26683E+01	.28930E+01	.22400E+01	.33118E+00	.19800E+03
13	3281.000	.71824E+04	.14082E+05	.99999E-06	.99999E-06	.25200E+01	.32413E+00	.20000E+03

Table 5.2-10 (Sheet 2 of 2) Strain Compatible Properties for Profile 900, 200 ft (+1 Sigma)

Layer	Thick(ft)	Mean Vs(ft/sec)	Mean Vp(ft/sec)	Mean Damps(%)	Mean Dampp(%)	Mean Den(cgs)	Mean Poisson	Depth To Top(ft)
1	5.000	.26531E+04	.83134E+04	.53977E+01	.33745E+01	.20000E+01	.44556E+00	.00000E+00
2	6.998	.26739E+04	.71287E+04	.67889E+01	.34181E+01	.21000E+01	.42604E+00	.50000E+01
3	7.999	.29097E+04	.67029E+04	.71996E+01	.34720E+01	.21000E+01	.39898E+00	.11998E+02
4	9.000	.35713E+04	.85394E+04	.54274E+01	.33620E+01	.21000E+01	.40295E+00	.19997E+02
5	11.001	.35360E+04	.89553E+04	.56807E+01	.33499E+01	.21000E+01	.41690E+00	.28997E+02
6	12.999	.42530E+04	.10533E+05	.52899E+01	.33534E+01	.21500E+01	.41379E+00	.39998E+02
7	20.001	.48346E+04	.11594E+05	.48316E+01	.33494E+01	.21500E+01	.40127E+00	.52997E+02
8	23.000	.57822E+04	.13215E+05	.49320E+01	.33625E+01	.22400E+01	.38740E+00	.72998E+02
9	25.001	.58218E+04	.12738E+05	.48043E+01	.33757E+01	.22400E+01	.37387E+00	.95998E+02
10	34.001	.61891E+04	.12987E+05	.47499E+01	.34590E+01	.22400E+01	.35761E+00	.12100E+03
11	43.001	.68800E+04	.13968E+05	.45434E+01	.34773E+01	.22400E+01	.34367E+00	.15500E+03
12	1.998	.68063E+04	.13590E+05	.46371E+01	.34858E+01	.22400E+01	.33800E+00	.19800E+03
13	3281.000	.11949E+05	.23433E+05	.10000E-05	.10000E-05	.25200E+01	.32437E+00	.20000E+03

Table 5.2-11 (Sheet 1 of 2) Strain Compatible Properties for Profile 2032, 100 ft (Median)

Layer	Thick(ft)	Mean Vs(ft/sec)	Mean Vp(ft/sec)	Mean Damps(%)	Mean Dampp(%)	Mean Den(cgs)	Mean Poisson	Depth To Top(ft)
1	4.167	.49064E+04	.91792E+04	.32250E+01	.31229E+01	.22400E+01	.30001E+00	.00000E+00
2	4.167	.51465E+04	.95494E+04	.32250E+01	.31208E+01	.22400E+01	.29533E+00	.41670E+01
3	8.334	.53930E+04	.98254E+04	.32250E+01	.31157E+01	.22400E+01	.28441E+00	.83340E+01
4	8.334	.56094E+04	.99644E+04	.32250E+01	.31082E+01	.22400E+01	.26803E+00	.16668E+02
5	8.334	.63151E+04	.11044E+05	.32250E+01	.31033E+01	.22400E+01	.25707E+00	.25002E+02
6	6.660	.65484E+04	.11343E+05	.32250E+01	.31002E+01	.22400E+01	.25003E+00	.33336E+02
7	10.007	.71260E+04	.12343E+05	.31580E+01	.31008E+01	.22400E+01	.25003E+00	.39996E+02
8	16.667	.73327E+04	.12701E+05	.31580E+01	.31008E+01	.22400E+01	.25004E+00	.50003E+02
9	16.667	.77463E+04	.13417E+05	.31580E+01	.31008E+01	.22400E+01	.24999E+00	.66670E+02
10	16.663	.81275E+04	.14077E+05	.31580E+01	.31008E+01	.22400E+01	.25001E+00	.83337E+02
11	3281.000	.85993E+04	.16794E+05	.10000E-05	.10000E-05	.25200E+01	.32231E+00	.10000E+03
-1 Sigma								
1	4.167	.36931E+04	.69093E+04	.32250E+01	.27247E+01	.22400E+01	.29993E+00	.00000E+00
2	4.167	.39987E+04	.74198E+04	.32250E+01	.27165E+01	.22400E+01	.29520E+00	.41670E+01
3	8.334	.41593E+04	.75775E+04	.32250E+01	.26973E+01	.22400E+01	.28432E+00	.83340E+01
4	8.334	.43808E+04	.77816E+04	.32250E+01	.26696E+01	.22400E+01	.26793E+00	.16668E+02
5	8.334	.50037E+04	.87506E+04	.32250E+01	.26516E+01	.22400E+01	.25690E+00	.25002E+02
6	6.660	.53247E+04	.92230E+04	.32250E+01	.26406E+01	.22400E+01	.24985E+00	.33336E+02
7	10.007	.60243E+04	.10435E+05	.31580E+01	.27293E+01	.22400E+01	.24983E+00	.39996E+02
8	16.667	.62740E+04	.10867E+05	.31580E+01	.27293E+01	.22400E+01	.24985E+00	.50003E+02
9	16.667	.65431E+04	.11333E+05	.31580E+01	.27293E+01	.22400E+01	.24978E+00	.66670E+02
10	16.663	.71188E+04	.12329E+05	.31580E+01	.27293E+01	.22400E+01	.24983E+00	.83337E+02
11	3281.000	.60295E+04	.11775E+05	.99999E-06	.99999E-06	.25200E+01	.32222E+00	.10000E+03
+1 Sigma								
1	4.167	.65181E+04	.12195E+05	.32250E+01	.35793E+01	.22400E+01	.30010E+00	.00000E+00
2	4.167	.66238E+04	.12290E+05	.32250E+01	.35853E+01	.22400E+01	.29545E+00	.41670E+01
3	8.334	.69927E+04	.12740E+05	.32250E+01	.35991E+01	.22400E+01	.28451E+00	.83340E+01
4	8.334	.71827E+04	.12760E+05	.32250E+01	.36188E+01	.22400E+01	.26814E+00	.16668E+02
5	8.334	.79703E+04	.13938E+05	.32250E+01	.36319E+01	.22400E+01	.25723E+00	.25002E+02
6	6.660	.80534E+04	.13949E+05	.32250E+01	.36399E+01	.22400E+01	.25020E+00	.33336E+02
7	10.007	.84293E+04	.14601E+05	.31580E+01	.35228E+01	.22400E+01	.25022E+00	.39996E+02

Table 5.2-11 (Sheet 2 of 2) Strain Compatible Properties for Profile 2032, 100 ft (Median)

Layer	Thick(ft)	Mean Vs(ft/sec)	Mean Vp(ft/sec)	Mean Damps(%)	Mean Dampp(%)	Mean Den(cgs)	Mean Poisson	Depth To Top(ft)
8	16.667	.85700E+04	.14845E+05	.31580E+01	.35228E+01	.22400E+01	.25023E+00	.50003E+02
9	16.667	.91706E+04	.15884E+05	.31580E+01	.35228E+01	.22400E+01	.25020E+00	.66670E+02
10	16.663	.92791E+04	.16073E+05	.31580E+01	.35228E+01	.22400E+01	.25018E+00	.83337E+02
11	3281.000	.12264E+05	.23952E+05	.10000E-05	.10000E-05	.25200E+01	.32241E+00	.10000E+03

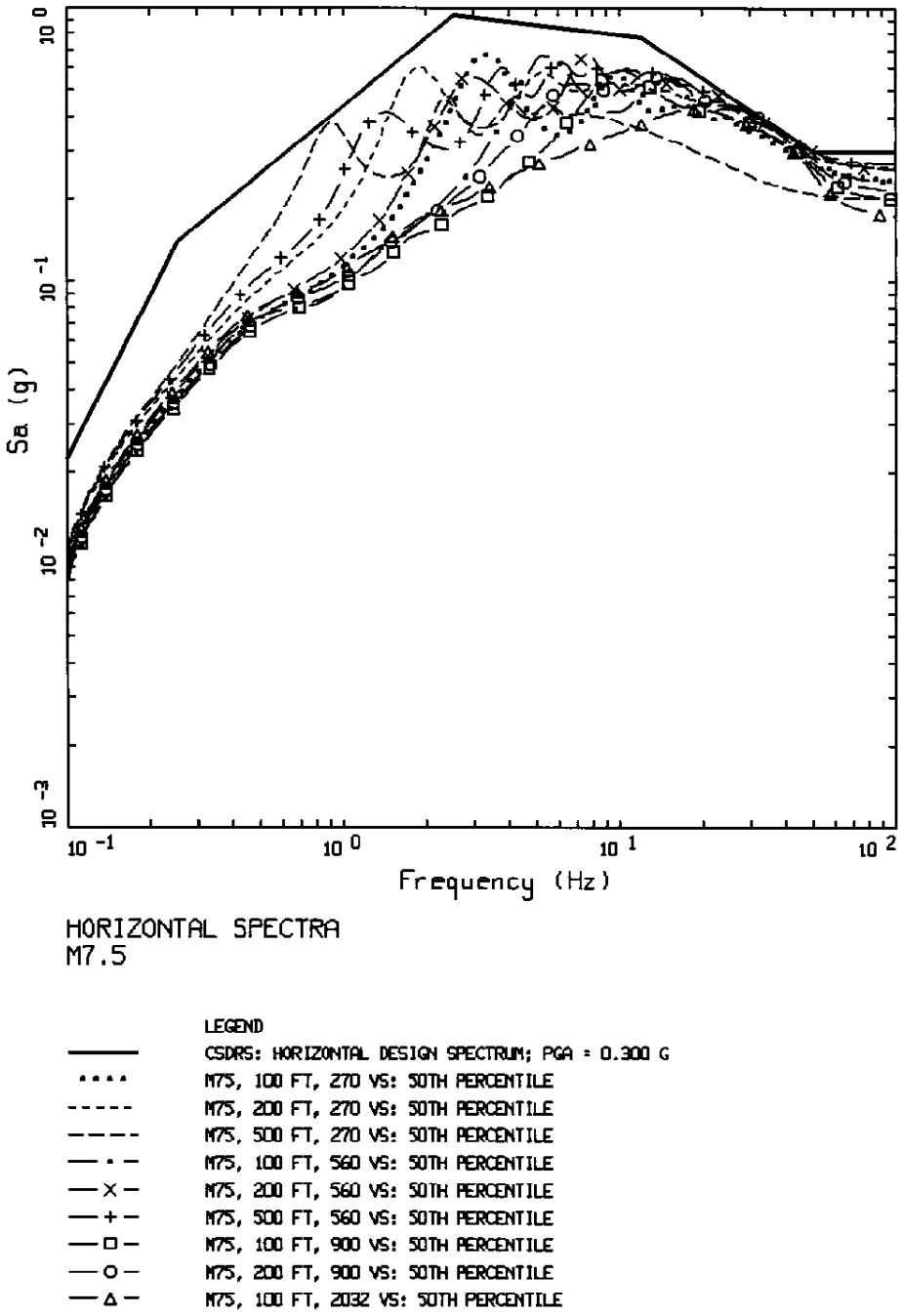


Figure 5.2-3 Median Spectra (5% damped) Compared to CSDRS Horizontal Components

Note: Magnitude is M 7.5 with median peak accelerations and distances listed in Table 5.2.2: Horizontal components

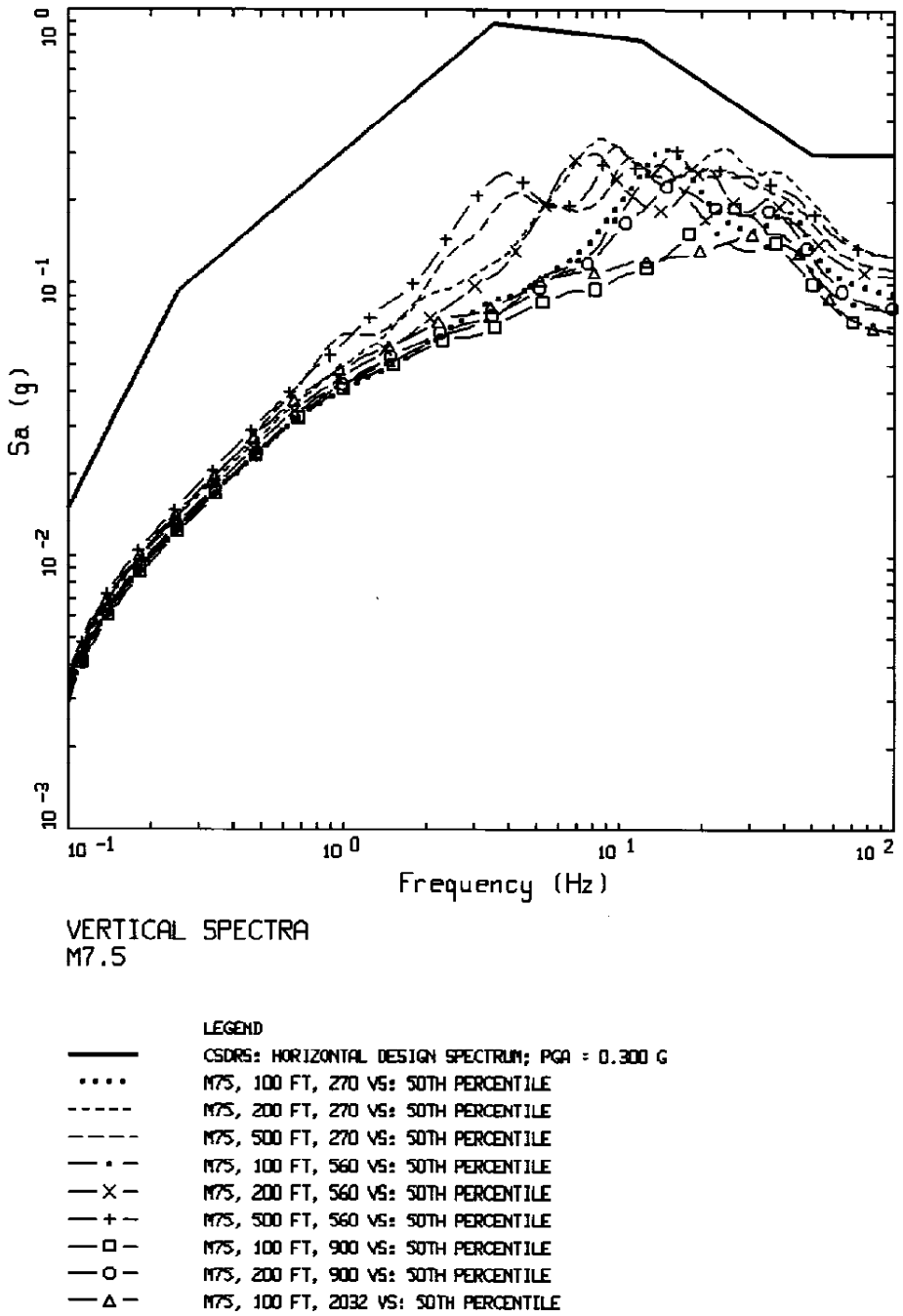


Figure 5.2-4 Median Spectra (5% damped) Compared to CSDRS Vertical Components

Note: Magnitude is M7.5 with median peak accelerations and distances listed in Table 5.2.2: Vertical components

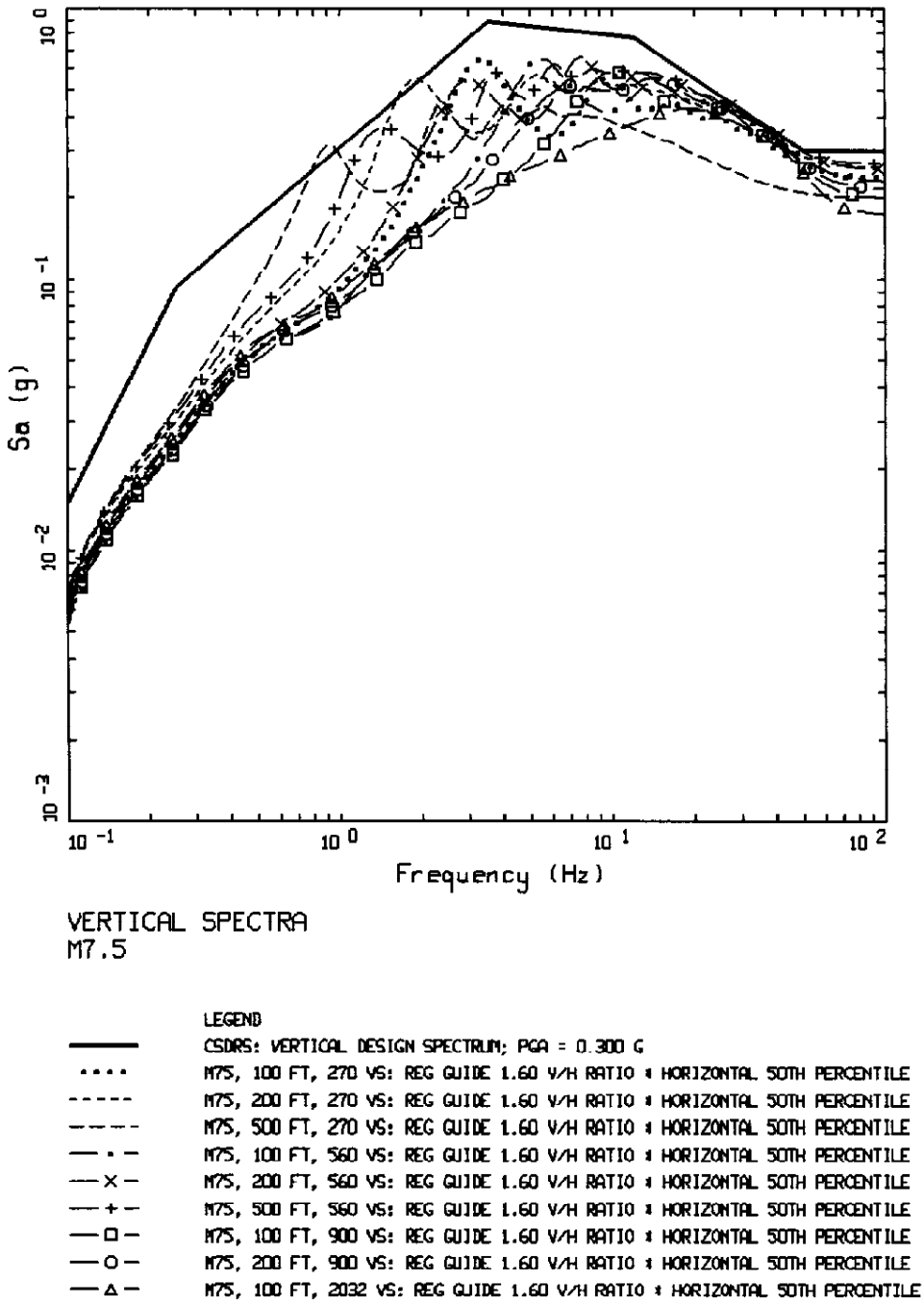


Figure 5.2-5 Median Spectra (5% damped) Compared to CSDRS Vertical Components Using RG 1.60 V/H Ratios

Note: Magnitude is M 7.5 with median peak accelerations and distances listed in Table 5.2.2: Vertical components using RG 1.60 V/H ratios

5.2.2 Strain Compatible Properties

For the nine combinations of profile categories and depths to basement material (Table 5.2-1) strain compatible properties are developed reflecting median (best estimate) and ± 1σ (upper and lower range) estimates over the thirty realizations of profiles and G/G_{max} and hysteretic damping curves (Section 4.2.2). The strain compatible properties are summarized in Tables 5.2-3 to 5.2-11, with Figures 5.2-6 to 5.2-13 showing the median and ±1σ estimates for the shear- and compressional-wave velocities and damping.

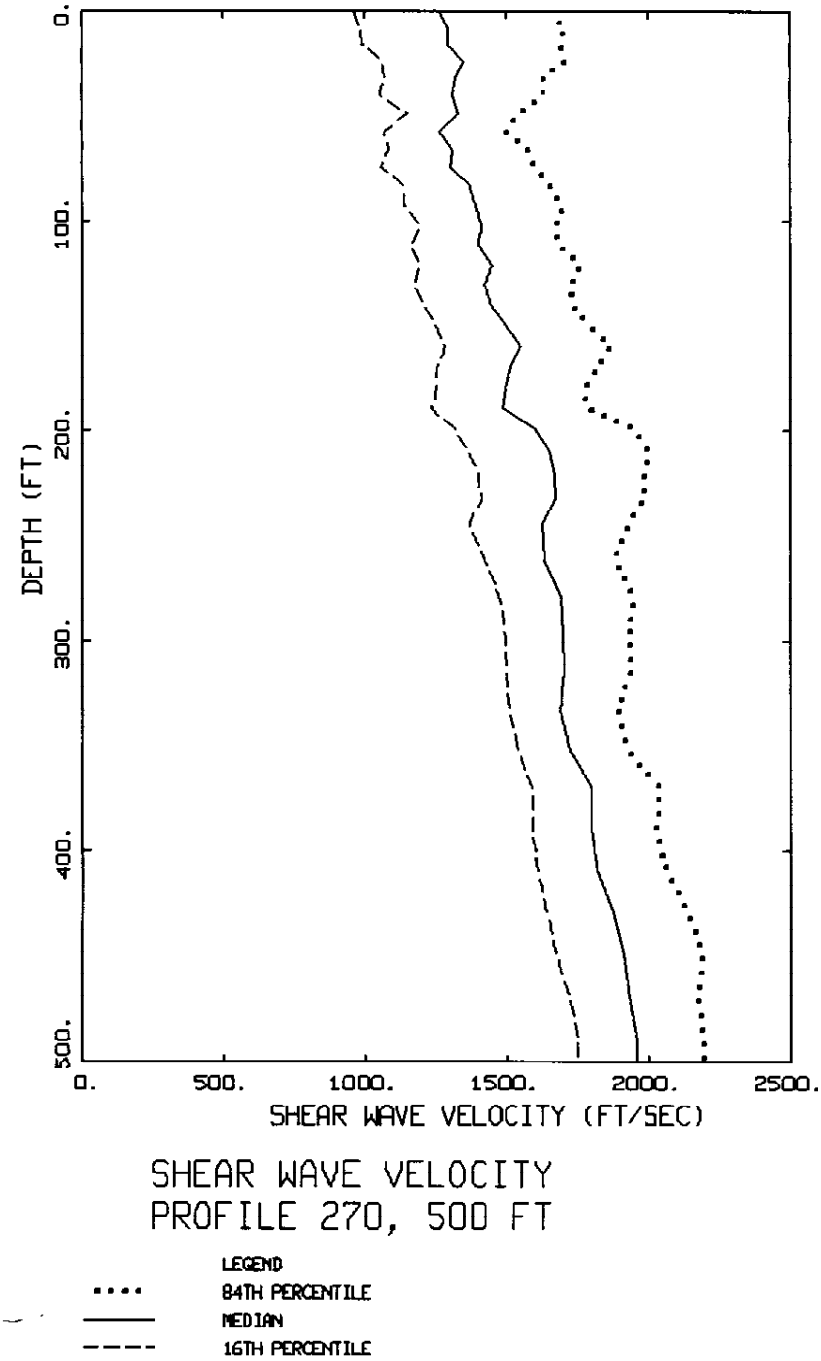


Figure 5.2-6 Strain Compatible Properties Computed for Profile 270 500 ft Depth to Basement (Sheet 1 of 4)

Note: Basement has shear- and compressional-wave velocities of 9,285 ft/sec and 16,082 ft/sec respectively (Table 4.2.1): shear-wave velocity, compressional-wave velocity, shear-wave damping, and compressional-wave damping.

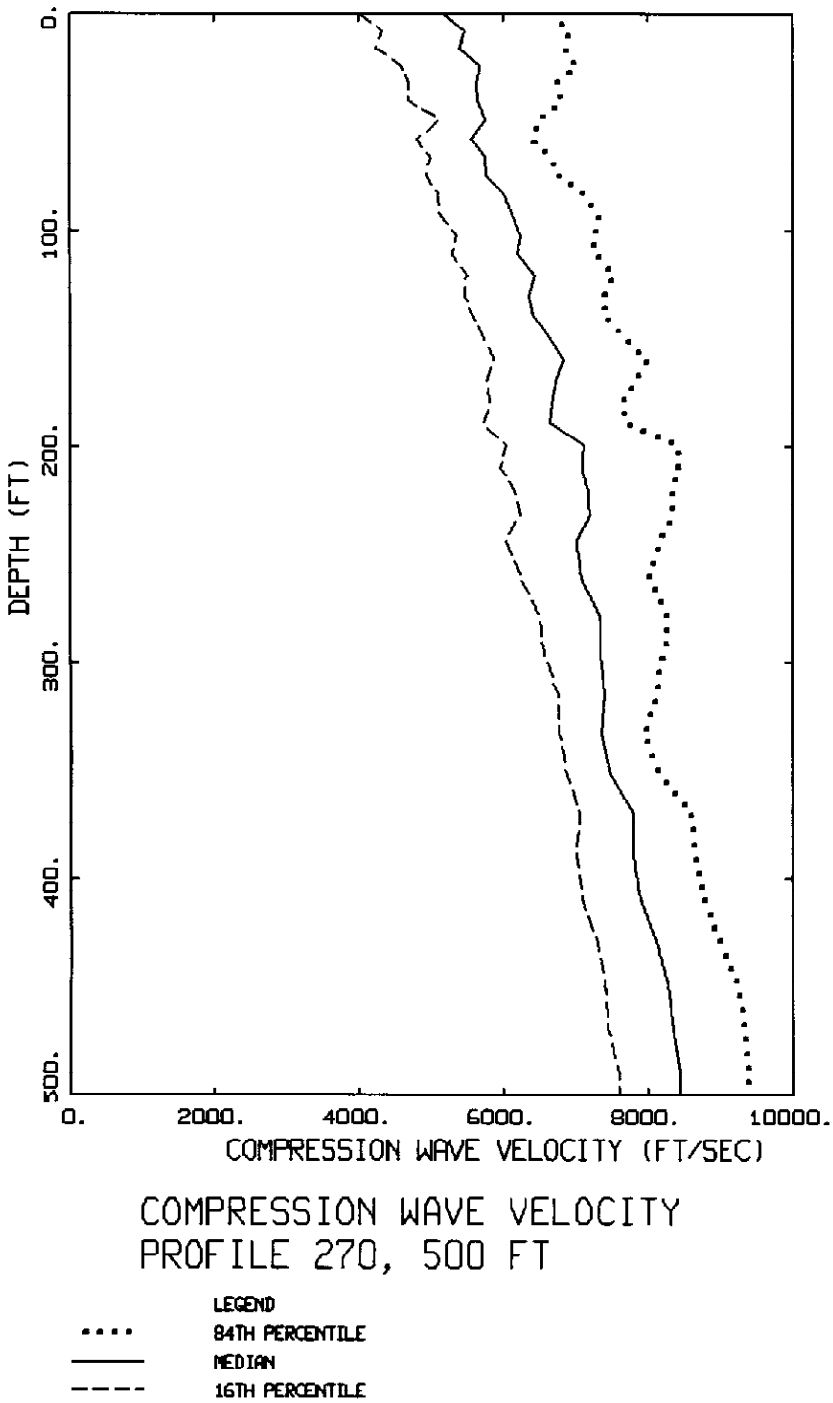


Figure 5.2-6 Strain Compatible Properties Computed for Profile 270 500 ft Depth to Basement (Sheet 2 of 4)

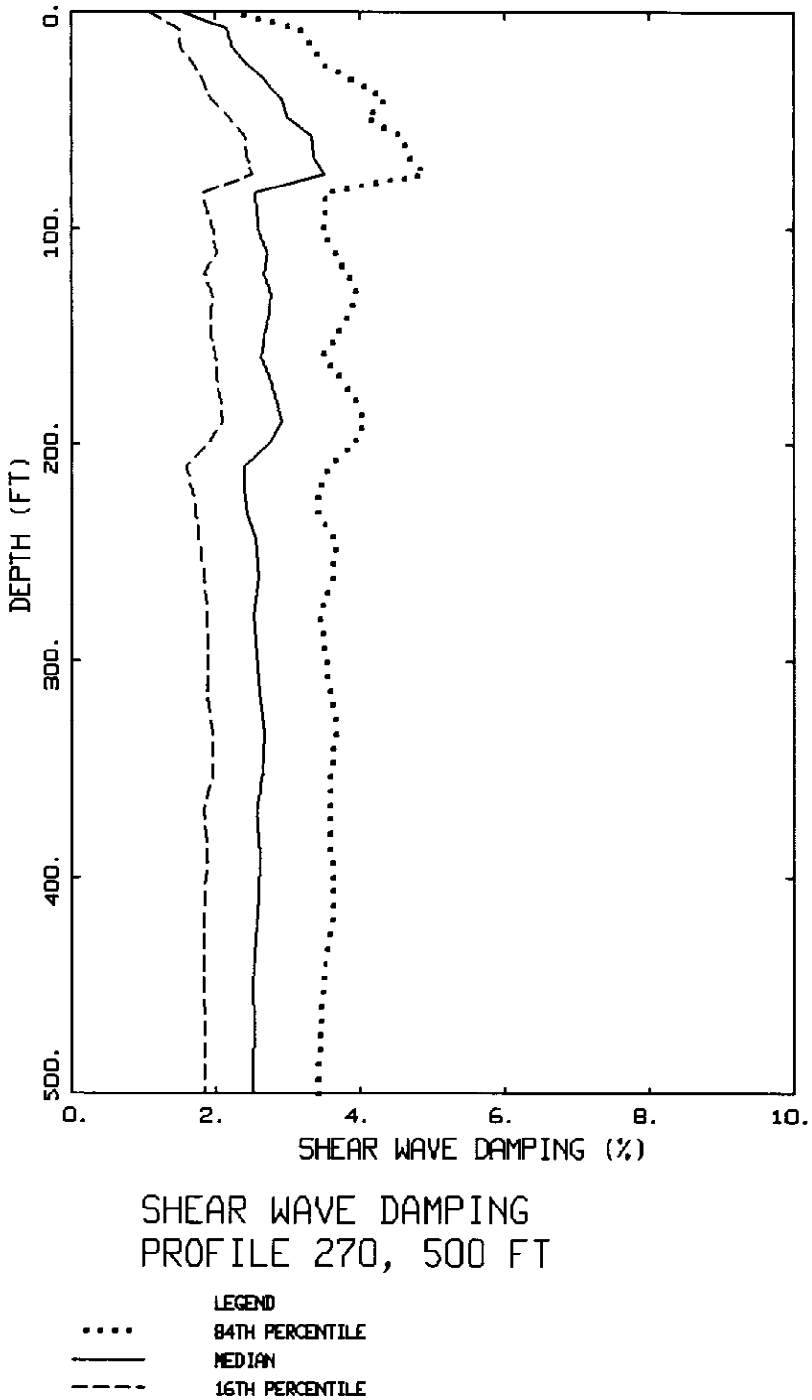


Figure 5.2-6 Strain Compatible Properties Computed for Profile 270 500 ft Depth to Basement (Sheet 3 of 4)

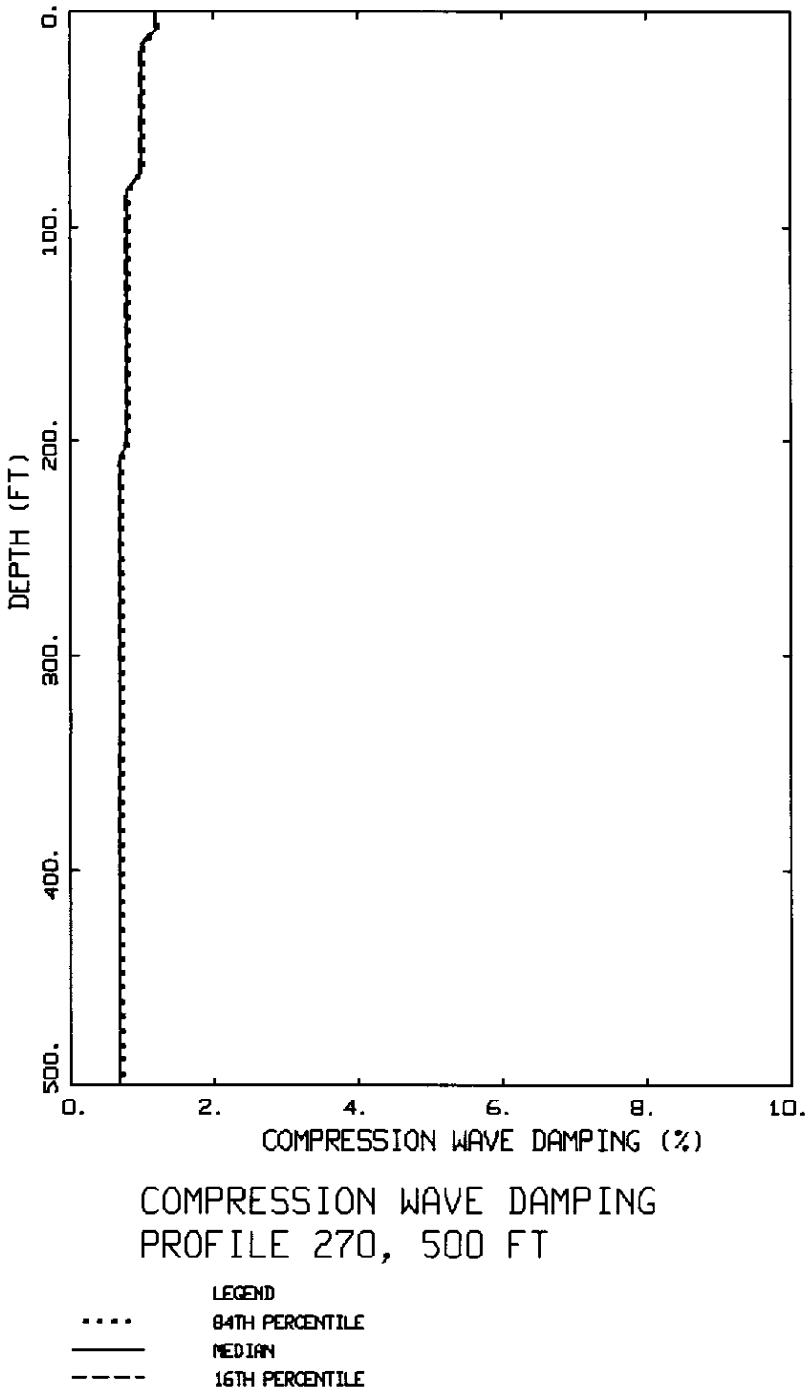


Figure 5.2-6 Strain Compatible Properties Computed for Profile 270 500 ft Depth to Basement (Sheet 4 of 4)

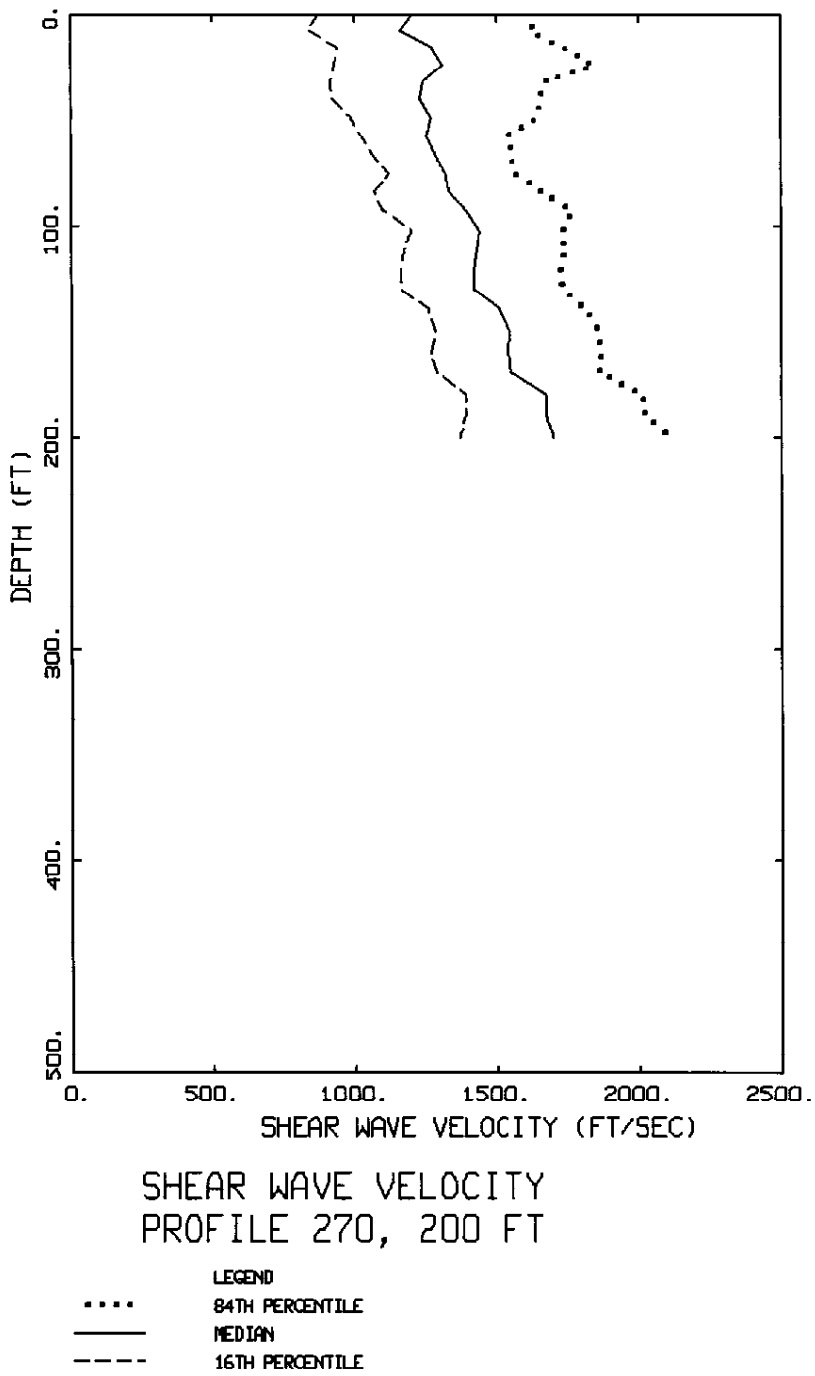


Figure 5.2-7 Strain Compatible Properties Computed for Profile 270 200 ft Depth to Basement (Sheet 1 of 4)

Note: Basement has shear- and compressional-wave velocities of 9,285 ft/sec and 16,082 ft/sec respectively (Table 4.2.1): shear-wave velocity, compressional-wave velocity, shear-wave damping, and compressional-wave damping.

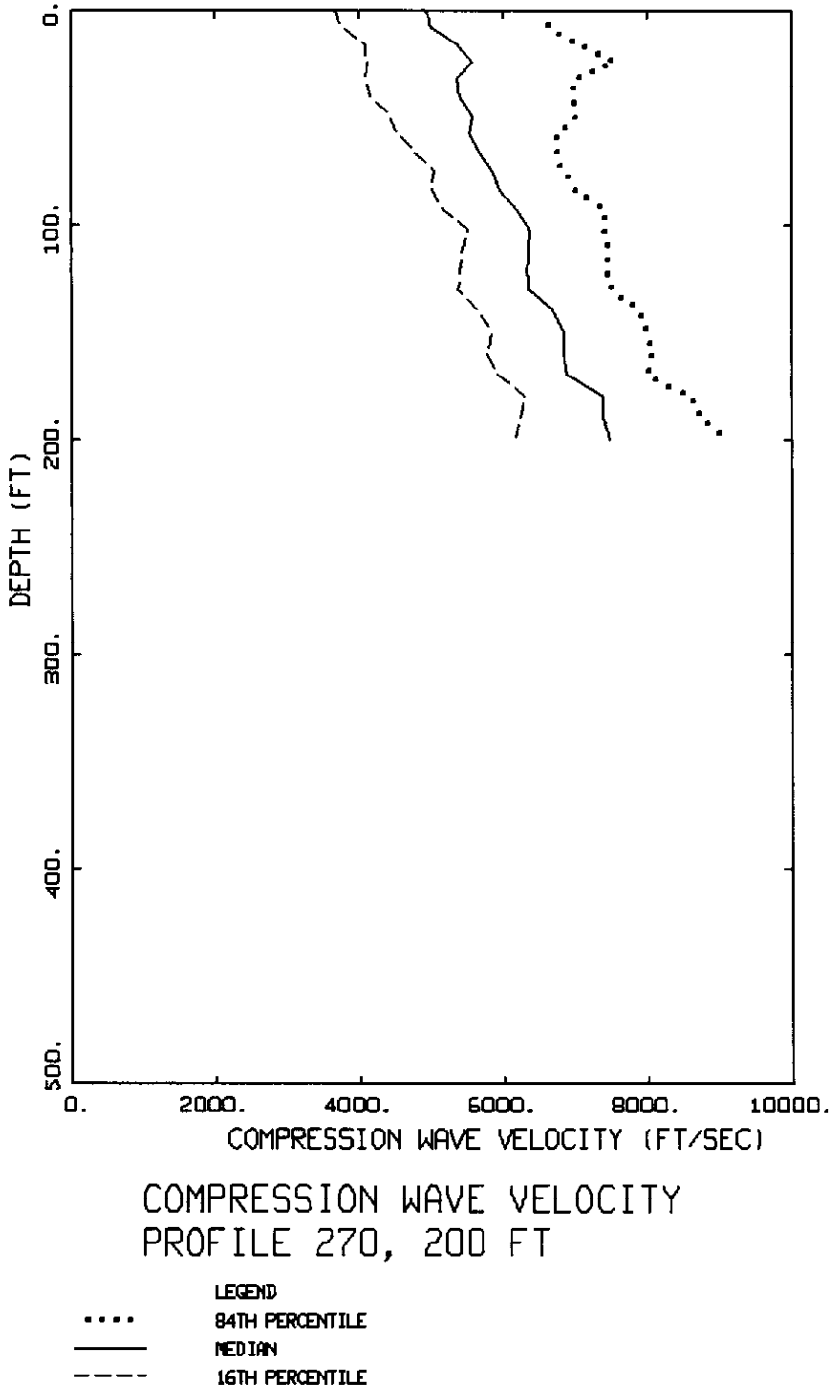


Figure 5.2-7 Strain Compatible Properties Computed for Profile 270 200 ft Depth to Basement (Sheet 2 of 4)

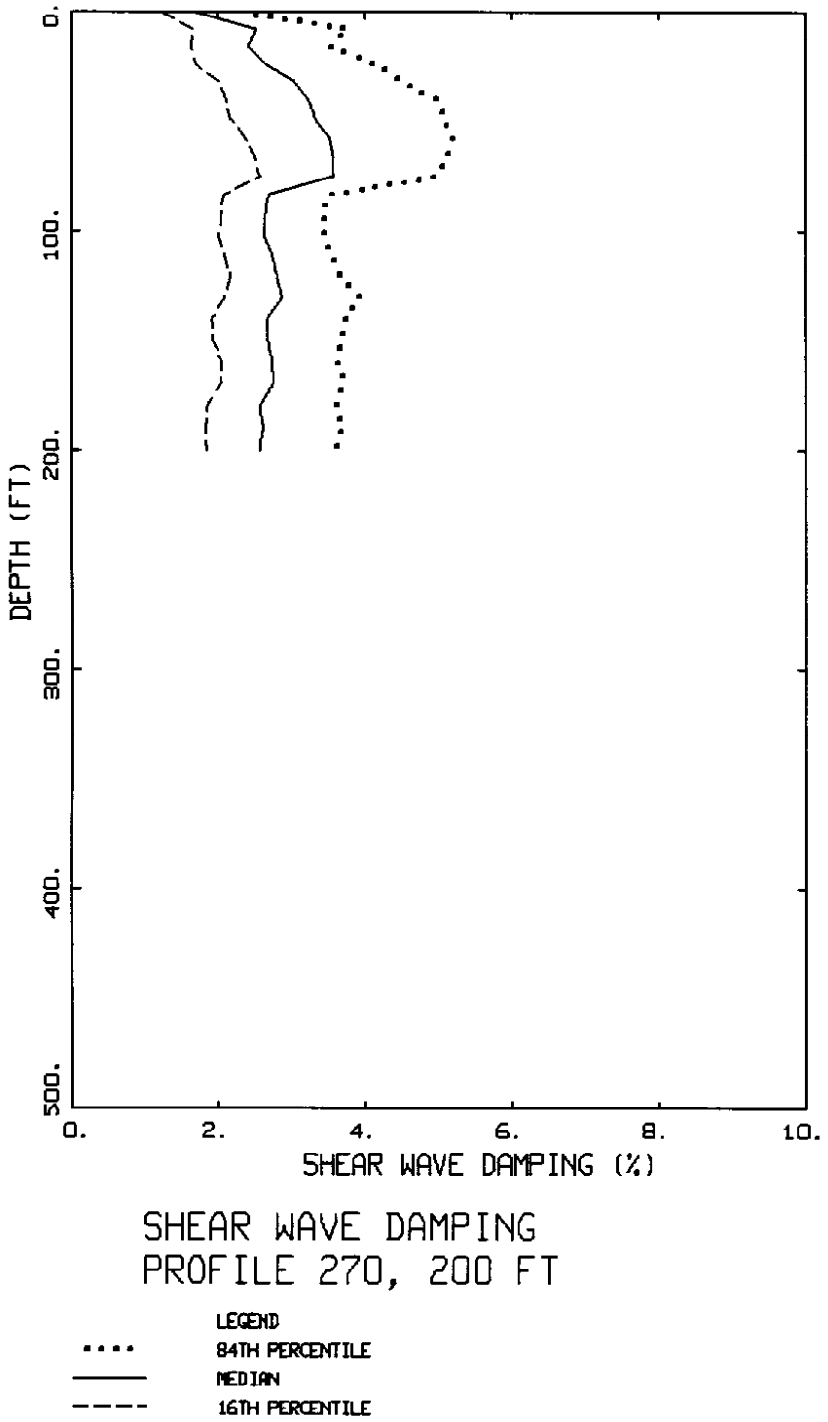


Figure 5.2-7 Strain Compatible Properties Computed for Profile 270 200 ft Depth to Basement (Sheet 3 of 4)

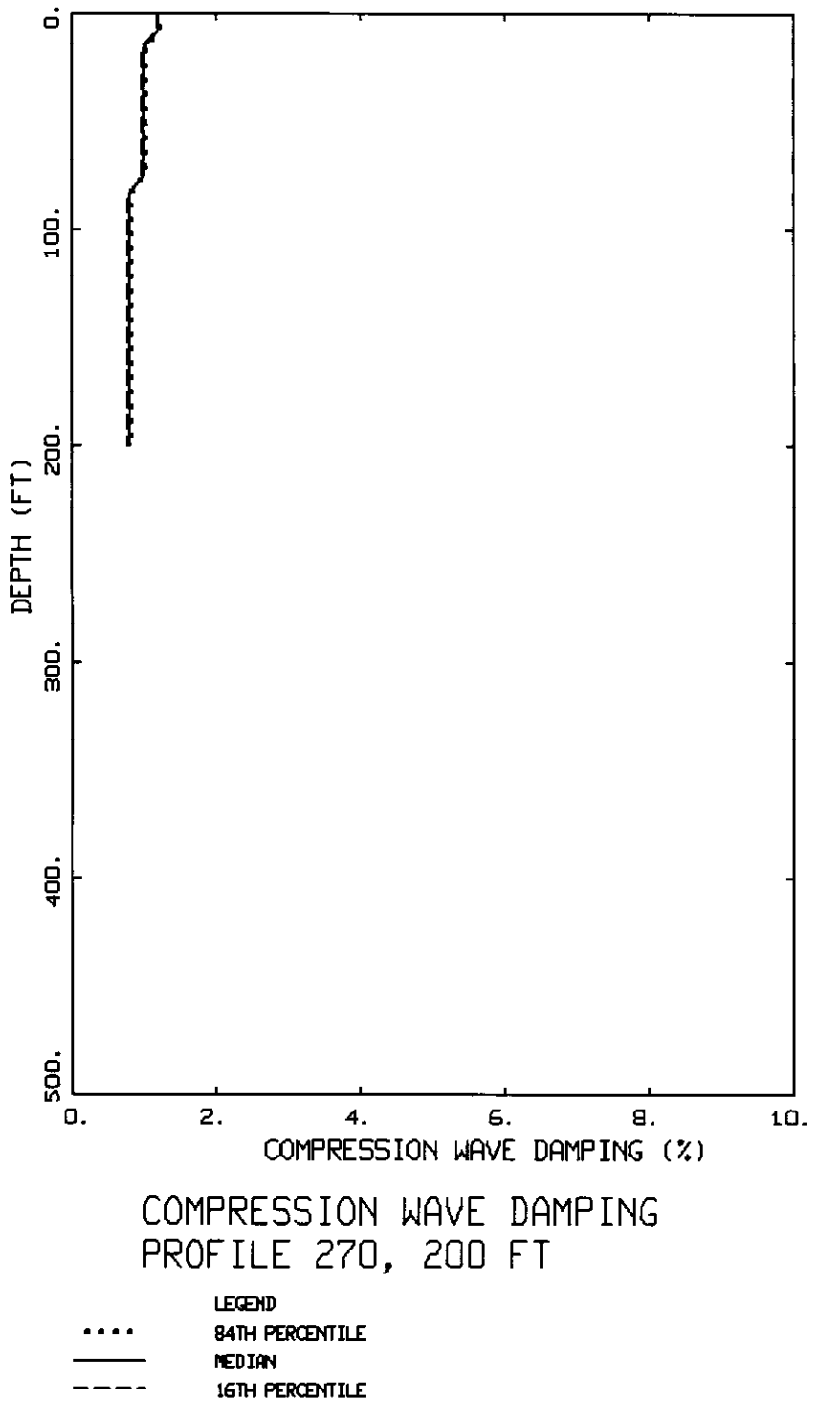


Figure 5.2-7 Strain Compatible Properties Computed for Profile 270 200 ft Depth to Basement (Sheet 4 of 4)

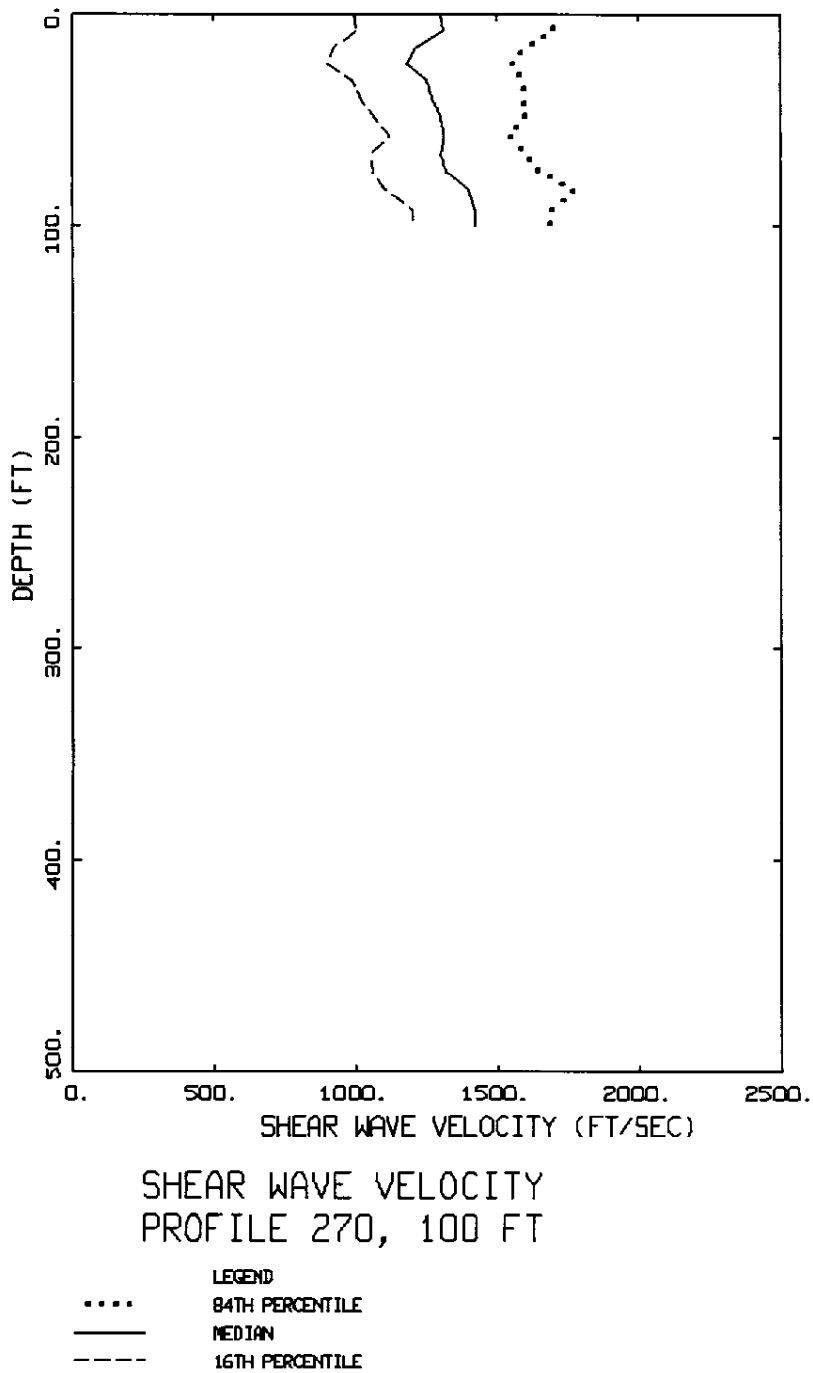


Figure 5.2-8 Strain Compatible Properties Computed for Profile 270 100 ft Depth to Basement (Sheet 1 of 4)

Note: Basement has shear- and compressional-wave velocities of 9,285 ft/sec and 16,082 ft/sec respectively (Table 4.2.1): shear-wave velocity, compressional-wave velocity, shear-wave damping, and compressional-wave damping.

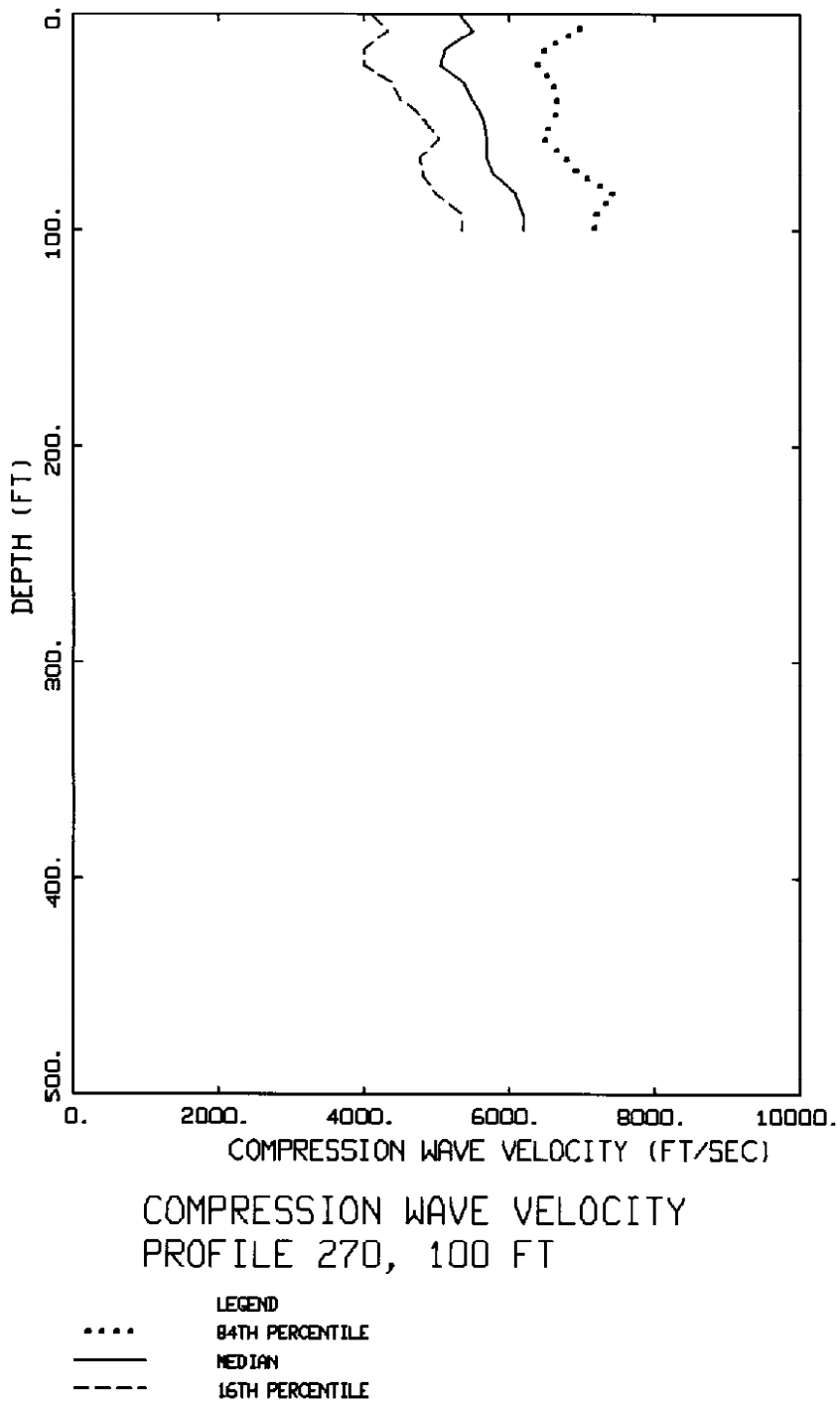


Figure 5.2-8 Strain Compatible Properties Computed for Profile 270 100 ft Depth to Basement (Sheet 2 of 4)

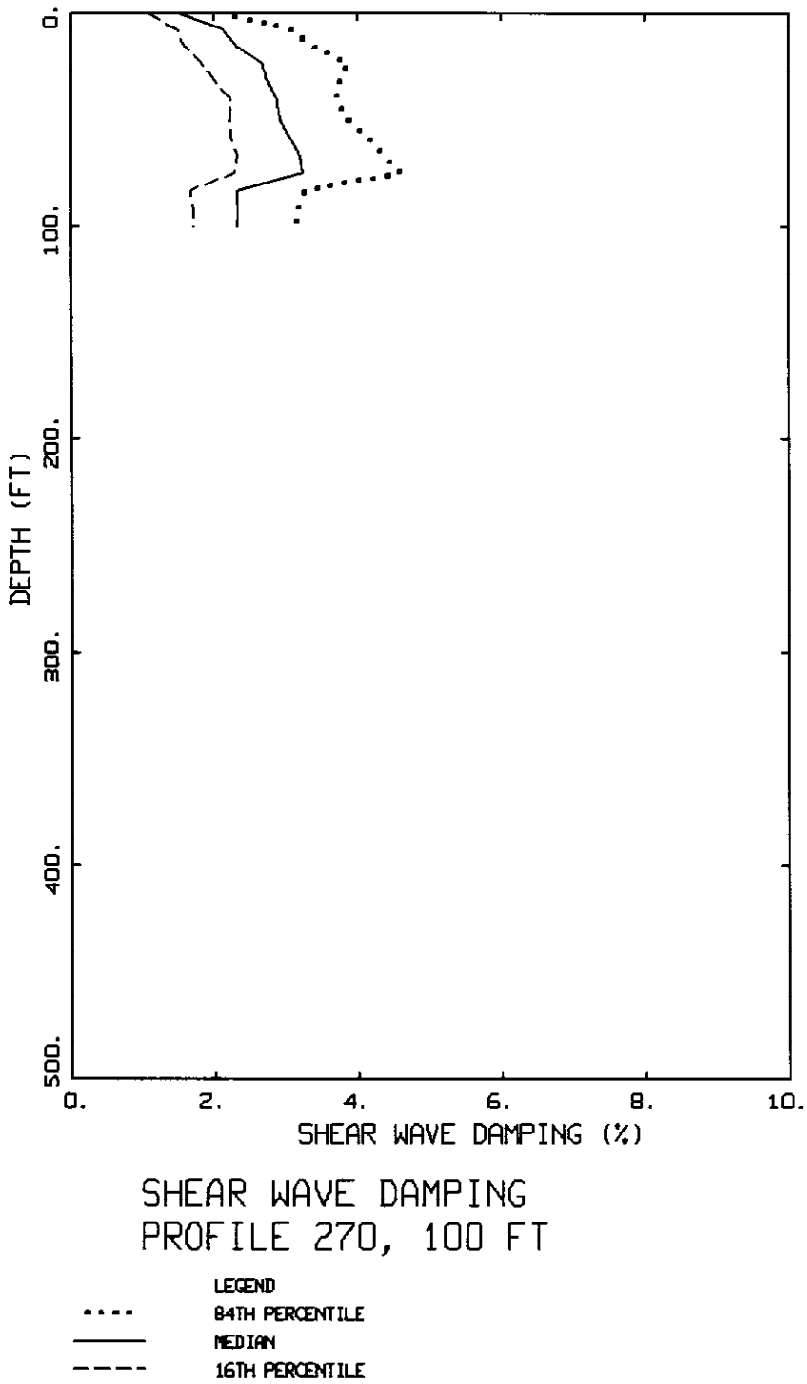


Figure 5.2-8 Strain Compatible Properties Computed for Profile 270 100 ft Depth to Basement (Sheet 3 of 4)

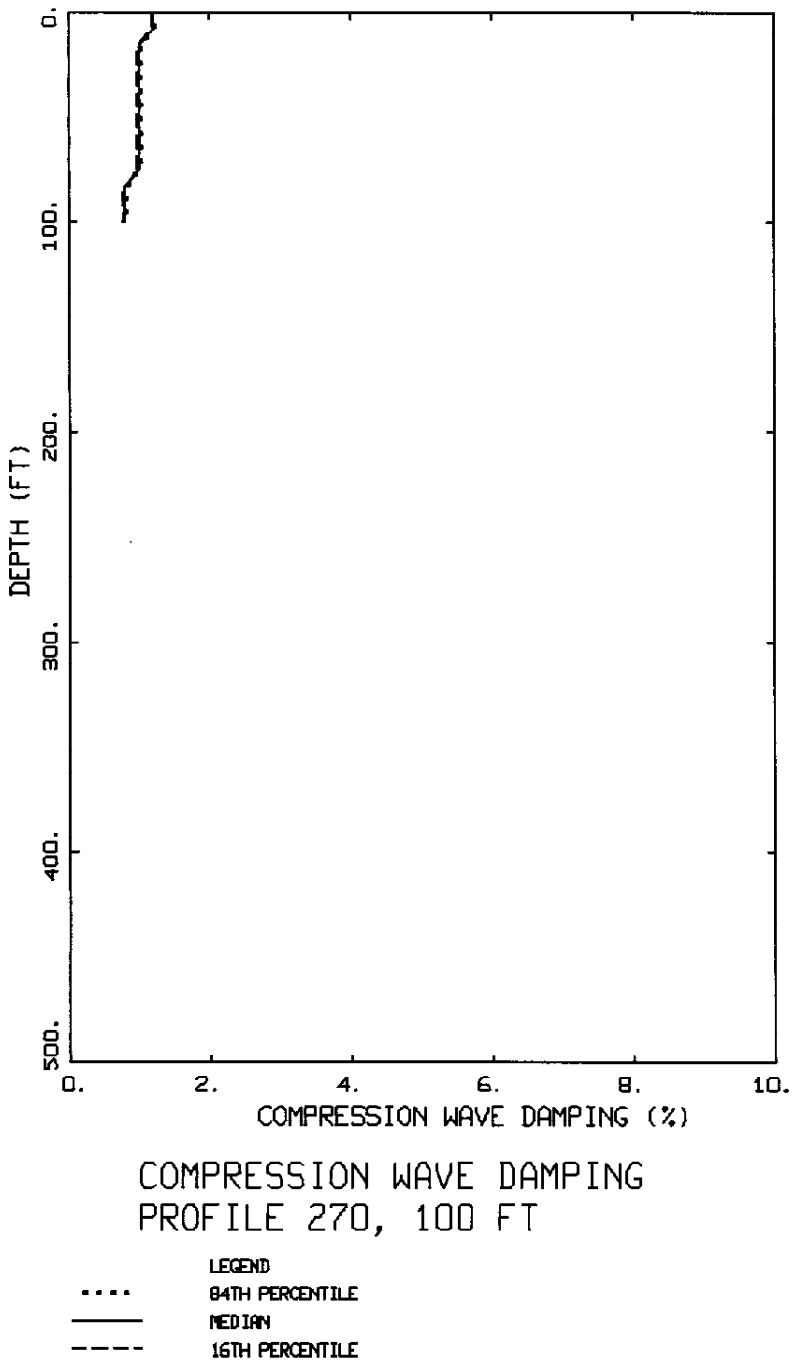


Figure 5.2-8 Strain Compatible Properties Computed for Profile 270 100 ft Depth to Basement (Sheet 4 of 4)

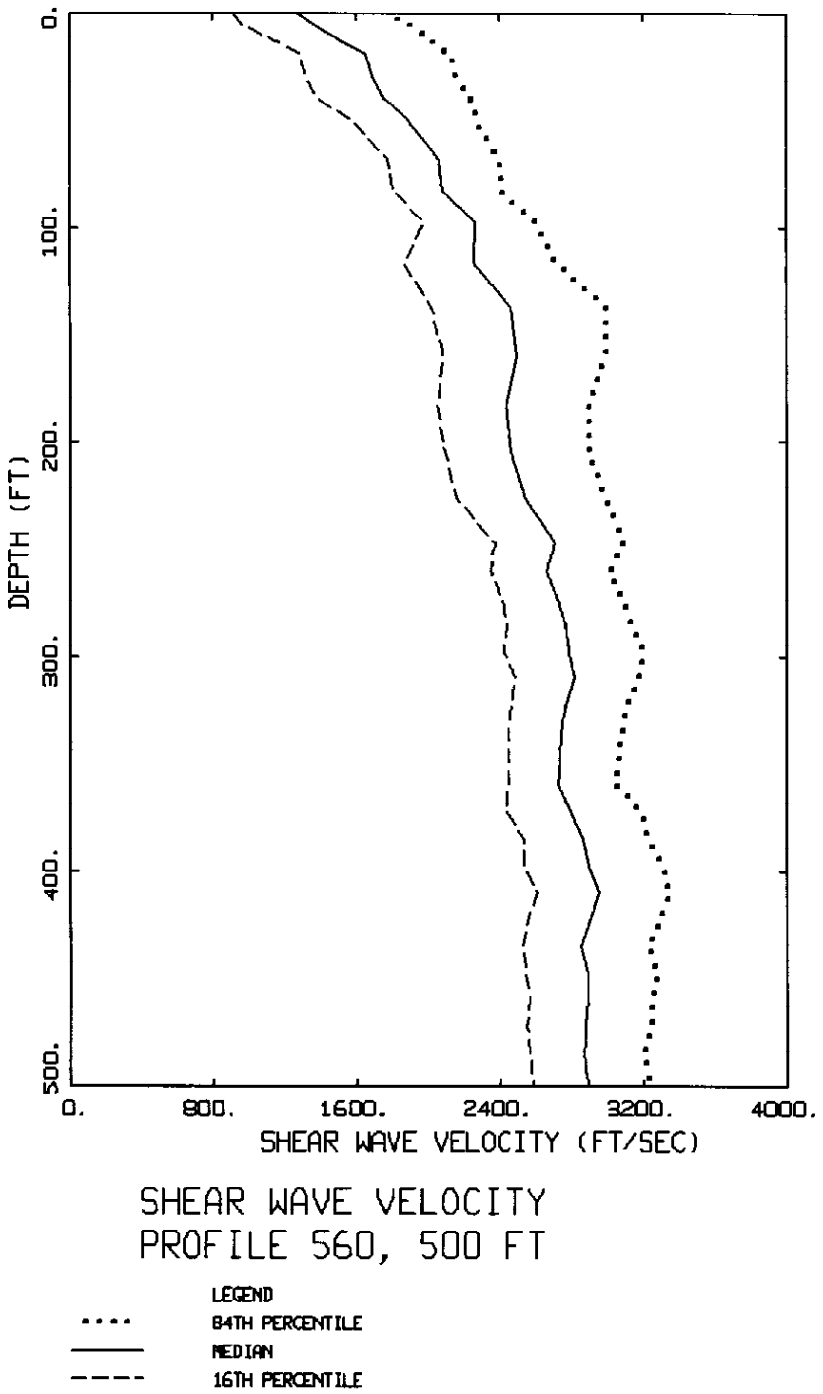


Figure 5.2-9 Strain Compatible Properties Computed for Profile 560 500 ft Depth to Basement (Sheet 1 of 4)

Note: Basement has shear- and compressional-wave velocities of 9,285 ft/sec and 16,082 ft/sec respectively (Table 4.2.1): shear-wave velocity, compressional-wave velocity, shear-wave damping, and compressional-wave damping.

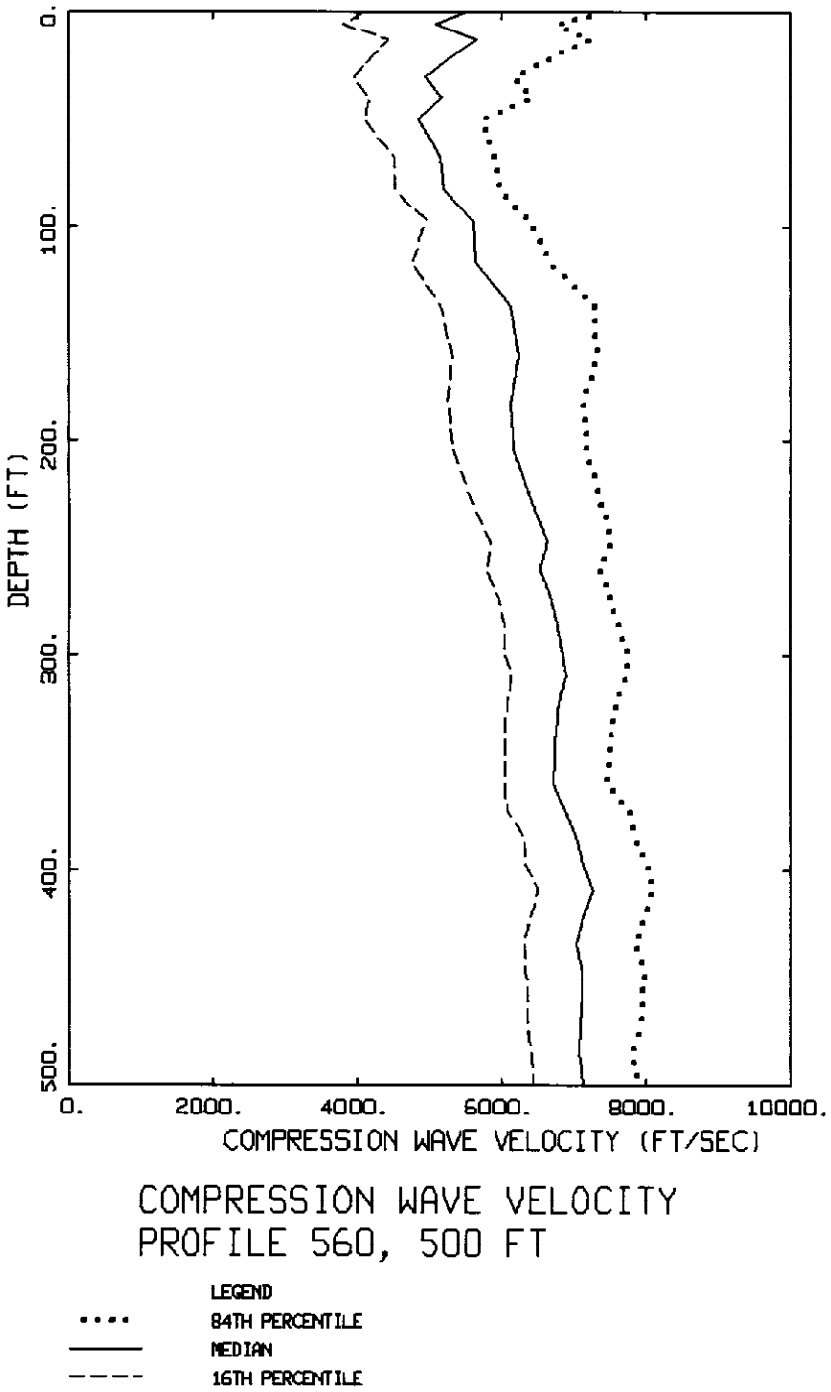


Figure 5.2-9 Strain Compatible Properties Computed for Profile 560 500 ft Depth to Basement (Sheet 2 of 4)

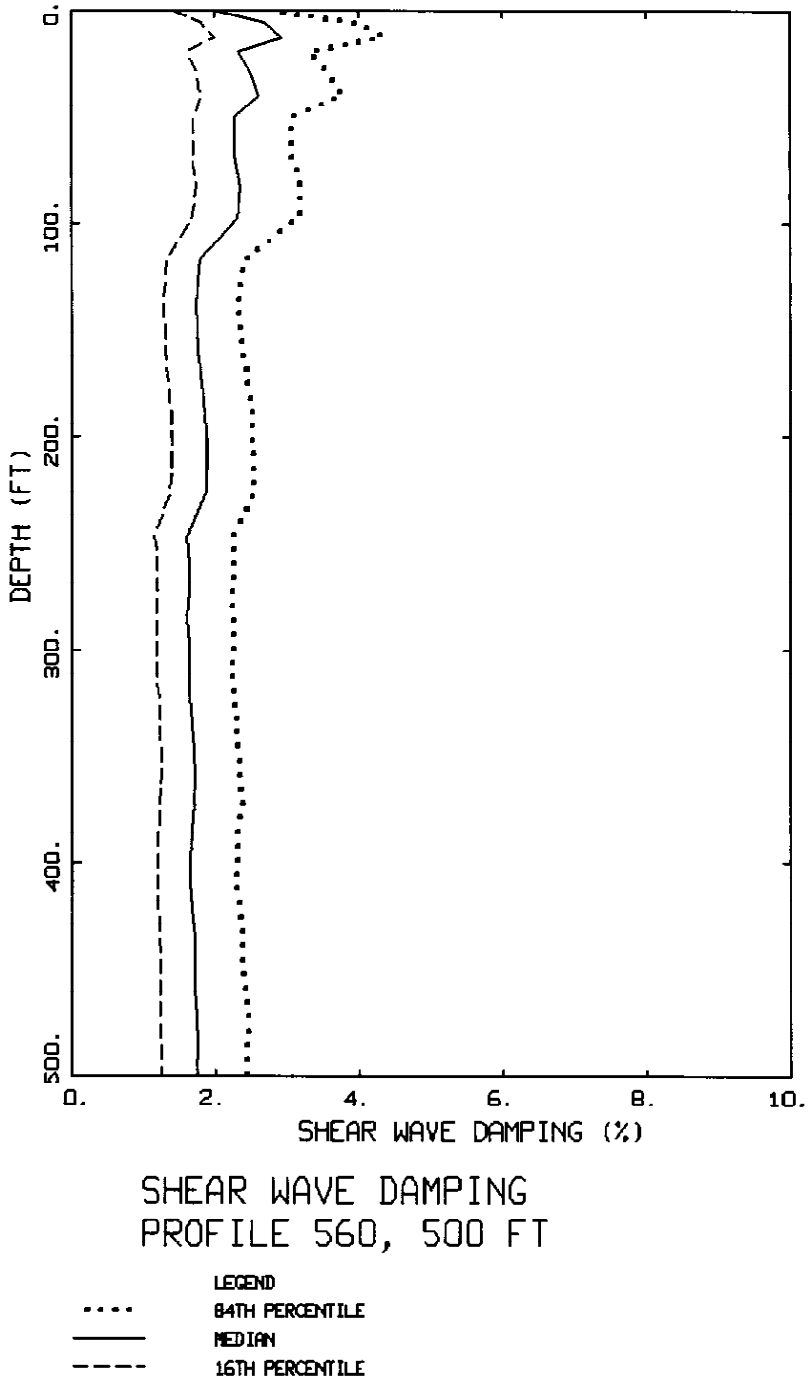


Figure 5.2-9 Strain Compatible Properties Computed for Profile 560 500 ft Depth to Basement (Sheet 3 of 4)

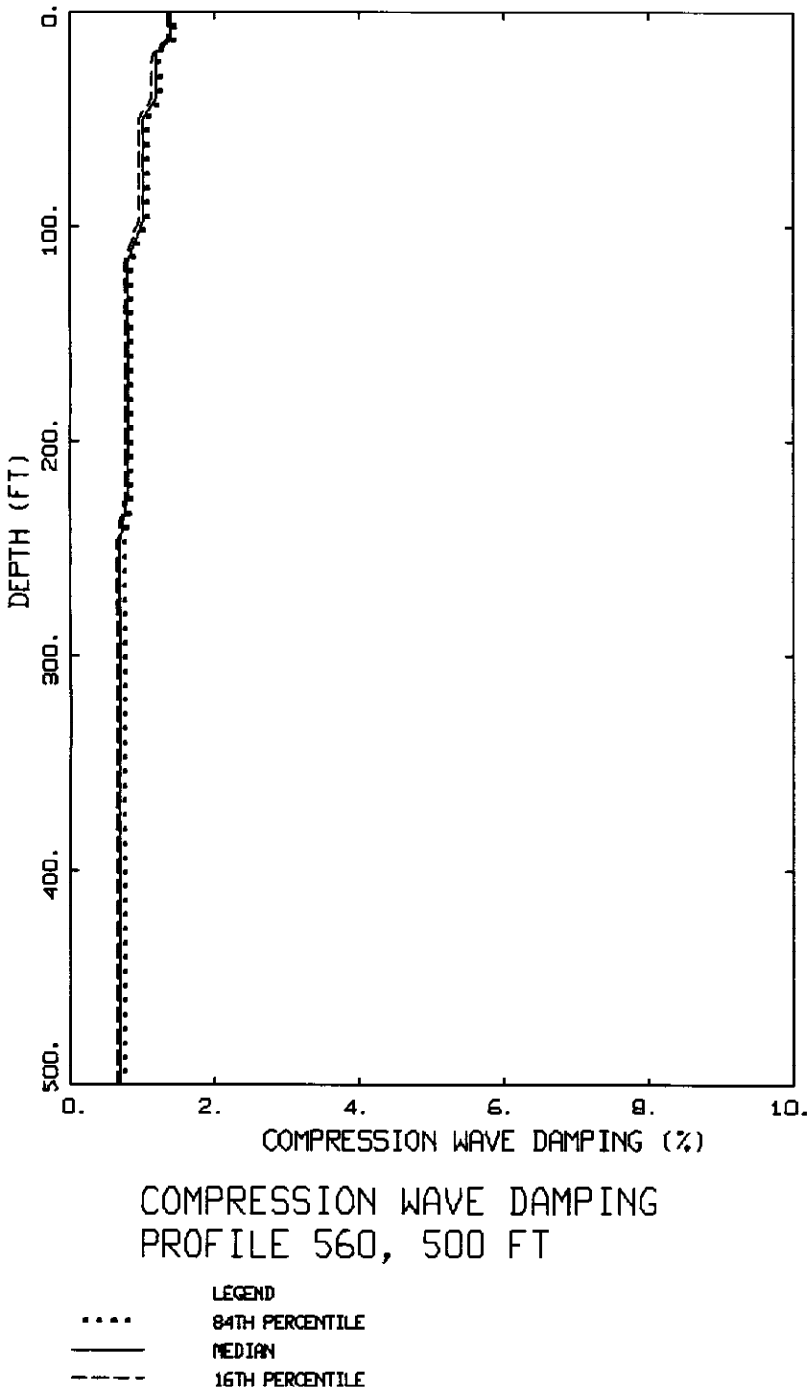


Figure 5.2-9 Strain Compatible Properties Computed for Profile 560 500 ft Depth to Basement (Sheet 4 of 4)

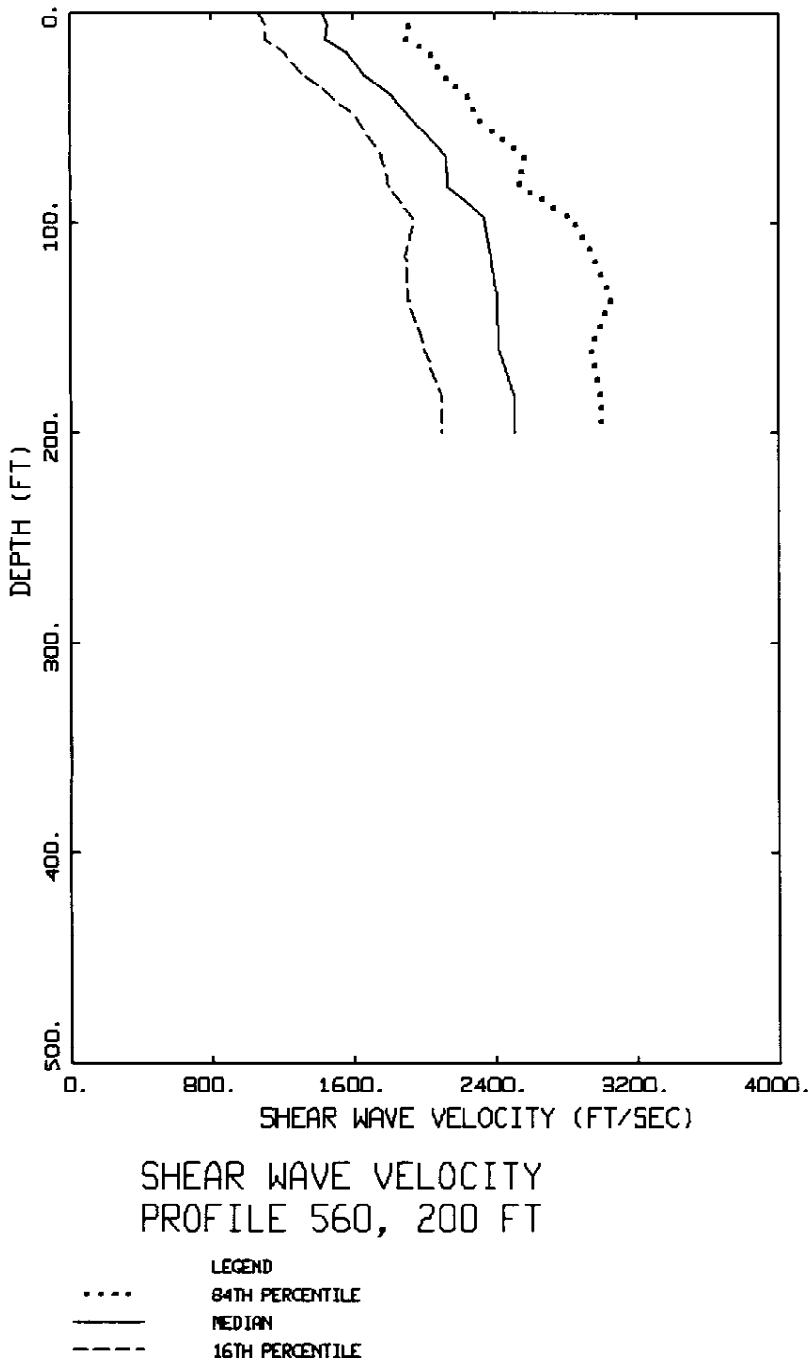


Figure 5.2-10 Strain Compatible Properties Computed for Profile 560 200 ft Depth to Basement (Sheet 1 of 4)

Note: Basement has shear- and compressional-wave velocities of 9,285 ft/sec and 16,082 ft/sec respectively (Table 4.2.1): shear-wave velocity, compressional-wave velocity, shear-wave damping, and compressional-wave damping.

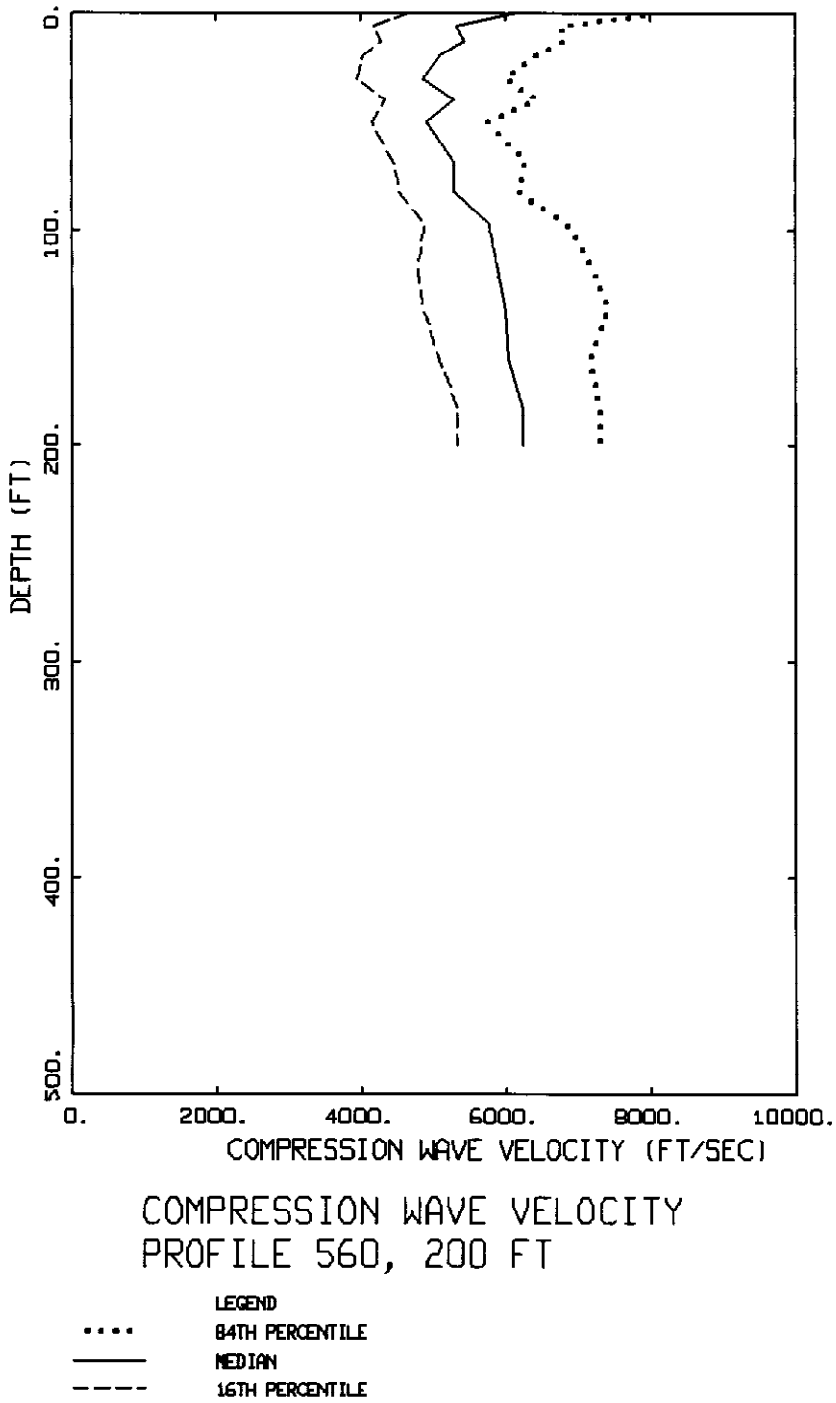


Figure 5.2-10 Strain Compatible Properties Computed for Profile 560 200 ft Depth to Basement (Sheet 2 of 4)

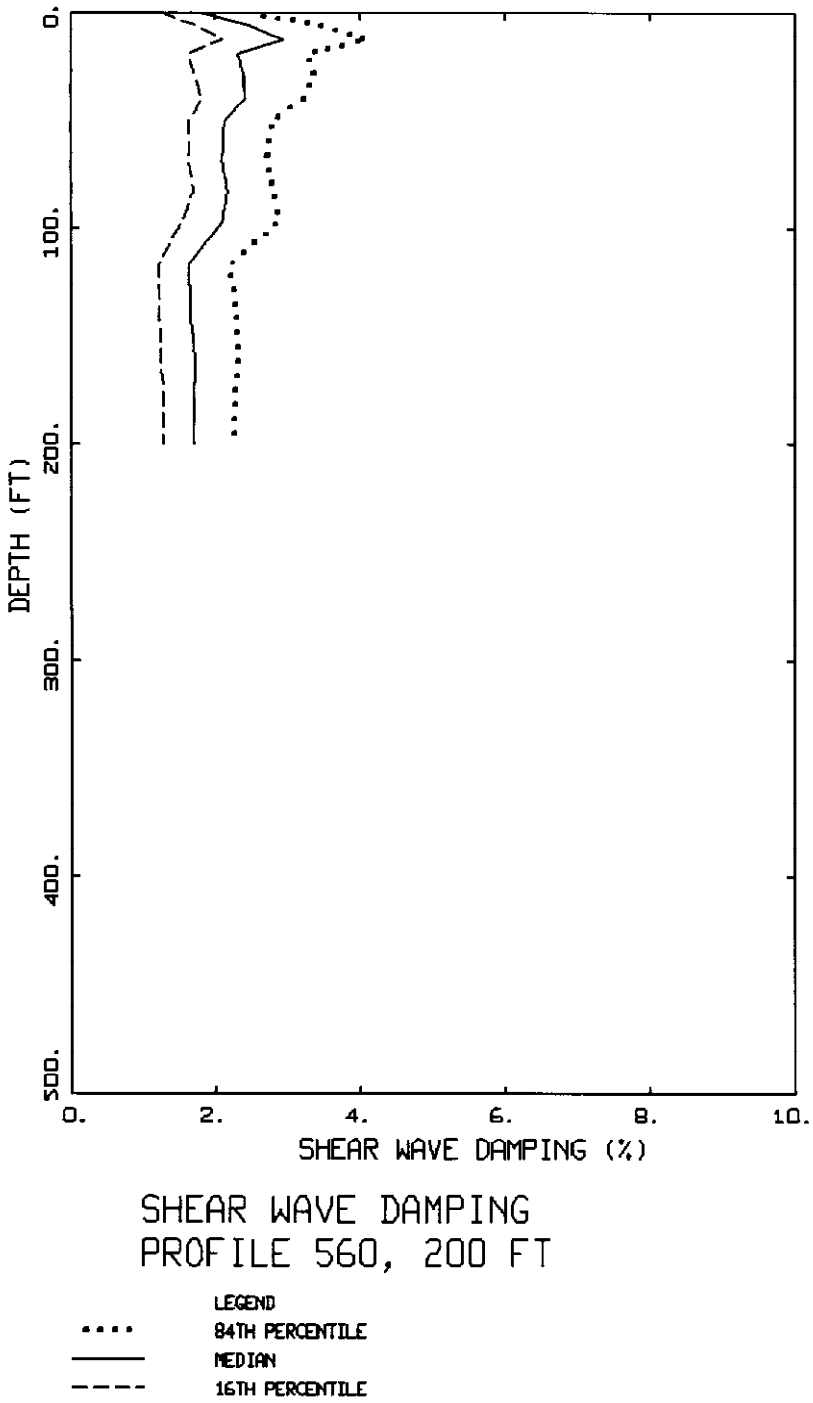


Figure 5.2-10 Strain Compatible Properties Computed for Profile 560 200 ft Depth to Basement (Sheet 3 of 4)

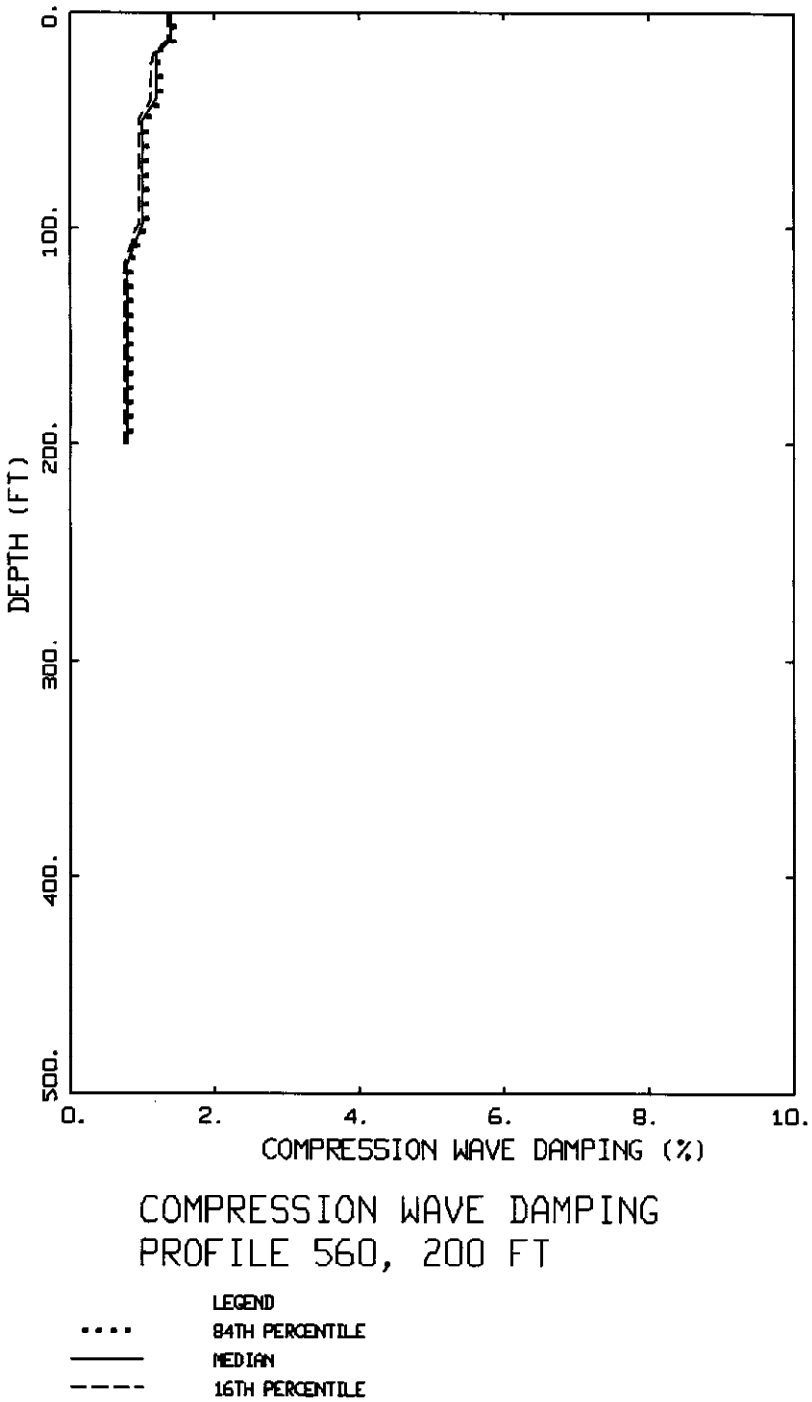


Figure 5.2-10 Strain Compatible Properties Computed for Profile 560 200 ft Depth to Basement (Sheet 4 of 4)

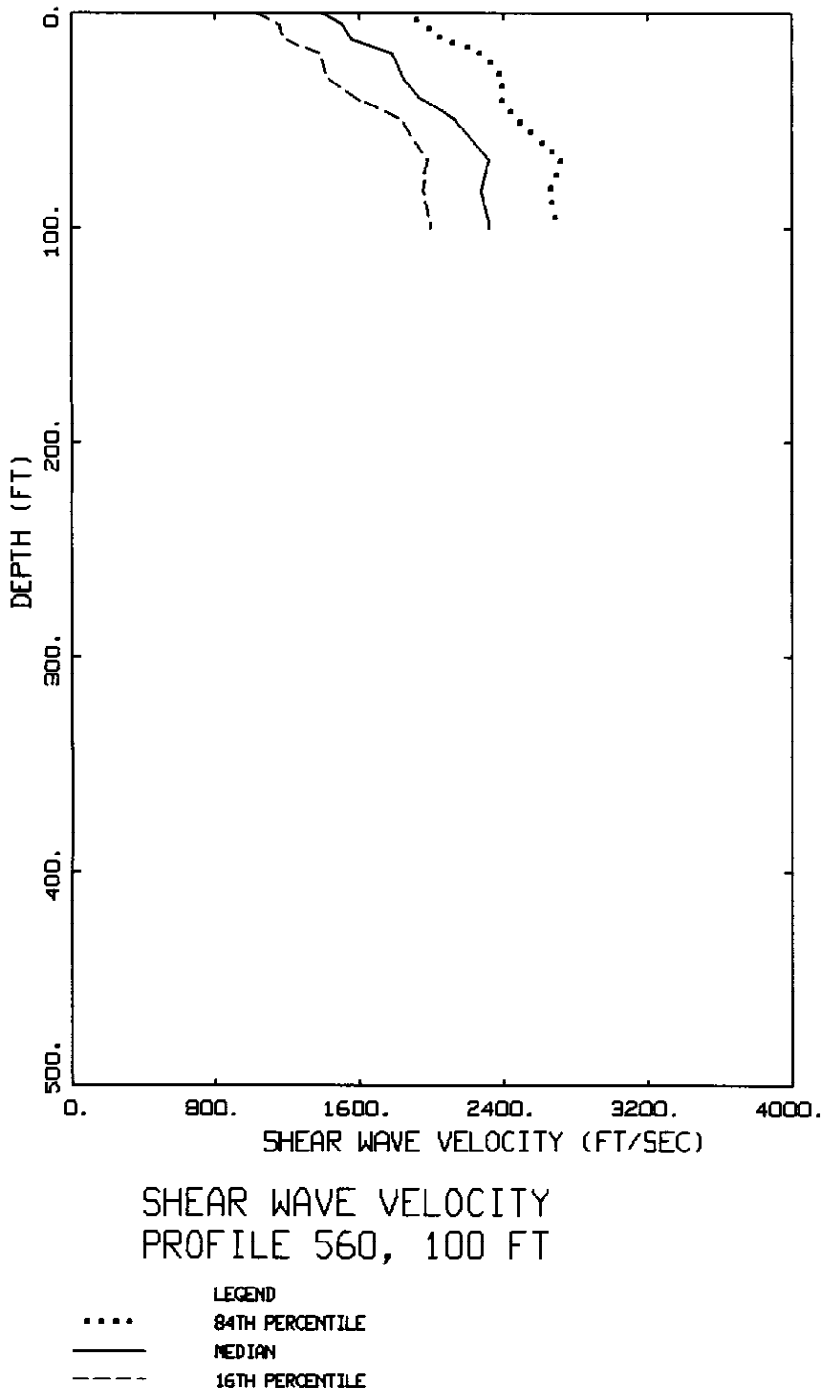


Figure 5.2-11 Strain Compatible Properties Computed for Profile 560 100 ft Depth to Basement (Sheet 1 of 4)

Note: Basement has shear- and compressional-wave velocities of 9,285 ft/sec and 16,082 ft/sec respectively (Table 4.2.1): shear-wave velocity, compressional-wave velocity, shear-wave damping, and compressional-wave damping.

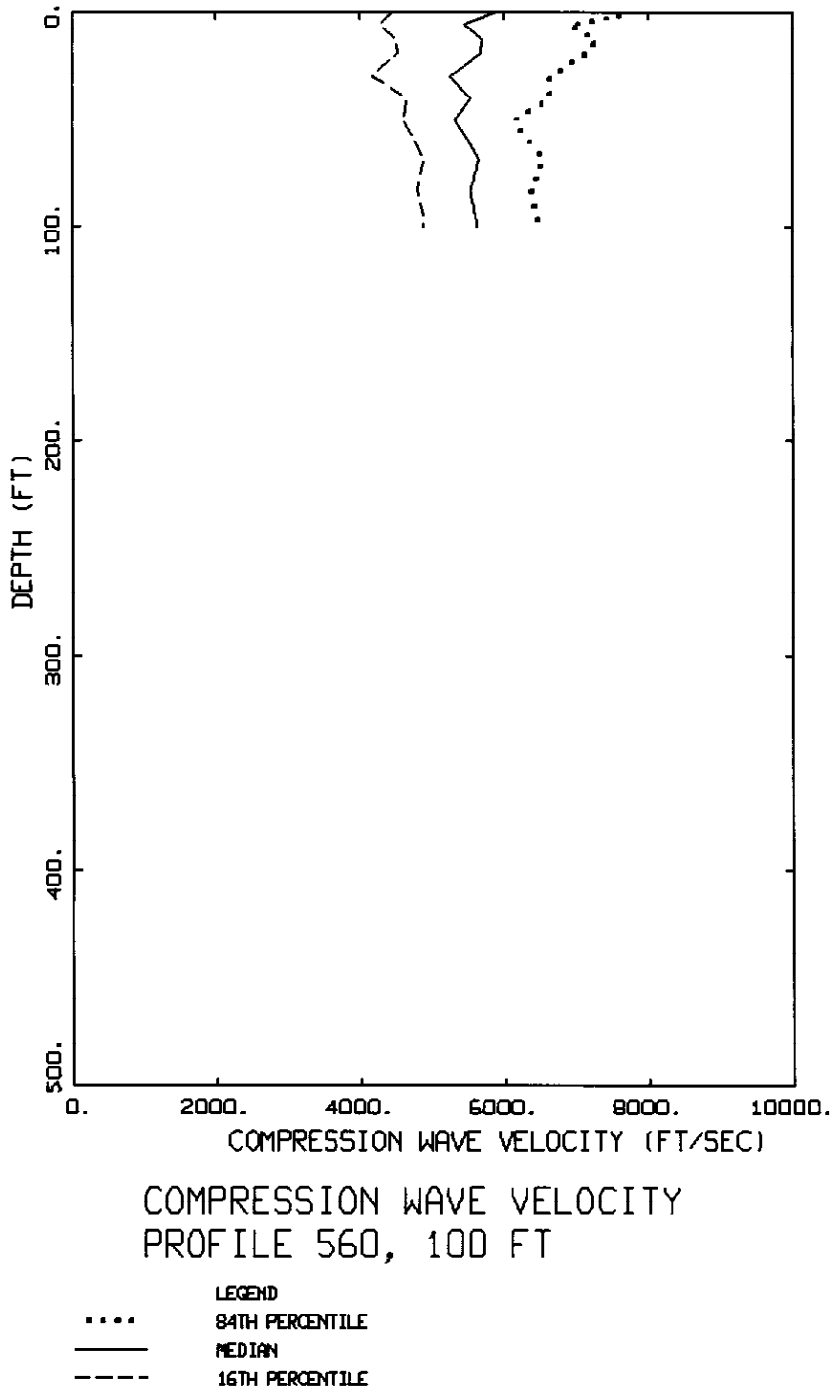


Figure 5.2-11 Strain Compatible Properties Computed for Profile 560 100 ft Depth to Basement (Sheet 2 of 4)

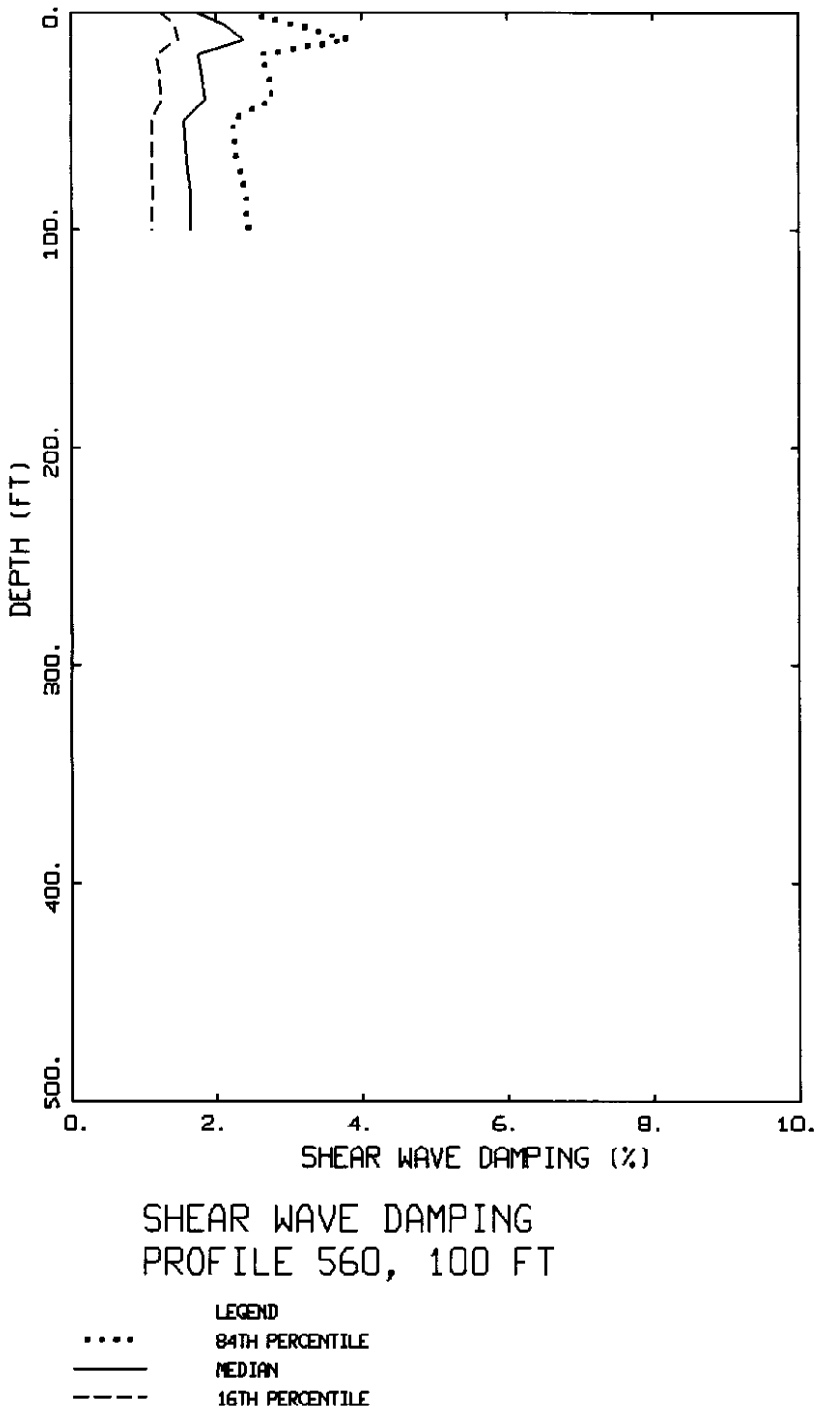


Figure 5.2-11 Strain Compatible Properties Computed for Profile 560 100 ft Depth to Basement (Sheet 3 of 4)

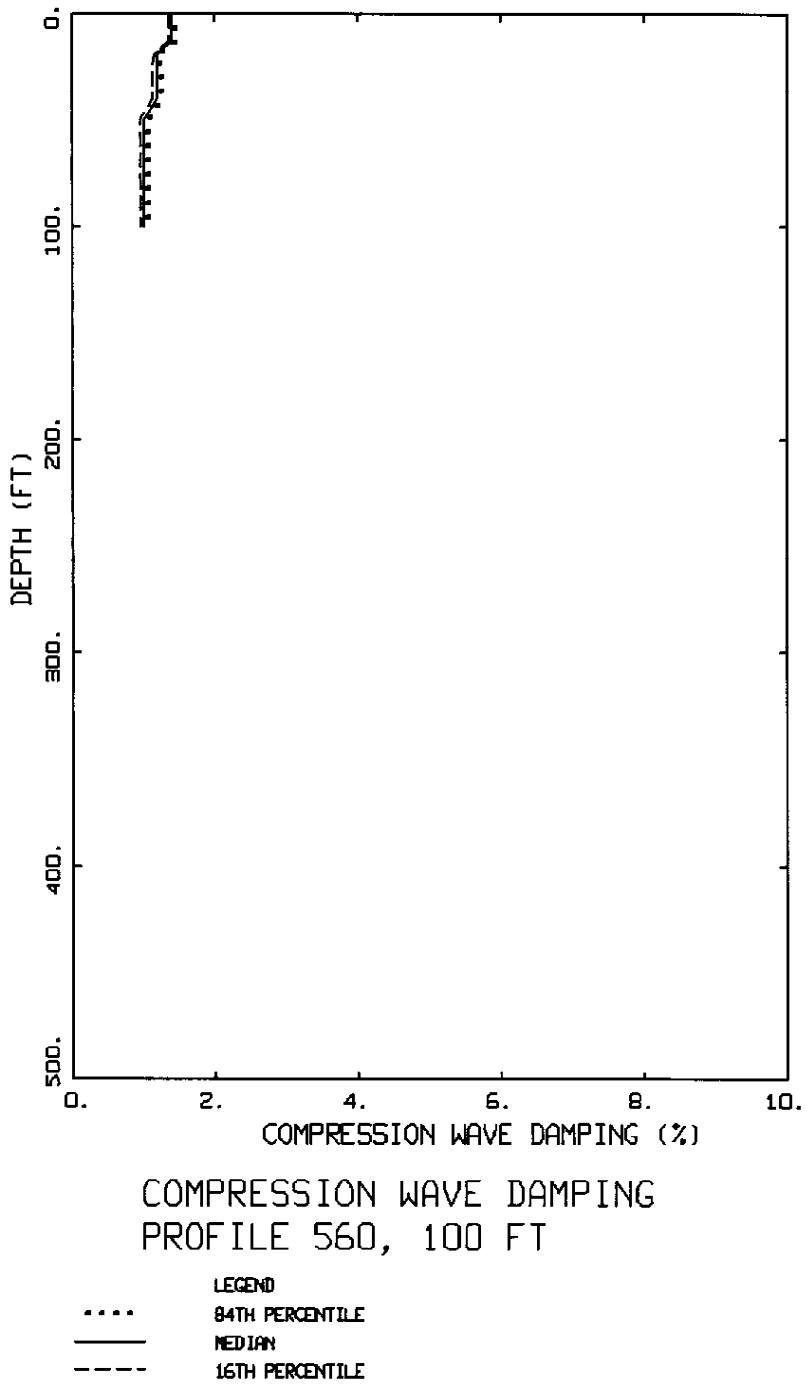


Figure 5.2-11 Strain Compatible Properties Computed for Profile 560 100 ft Depth to Basement (Sheet 4 of 4)

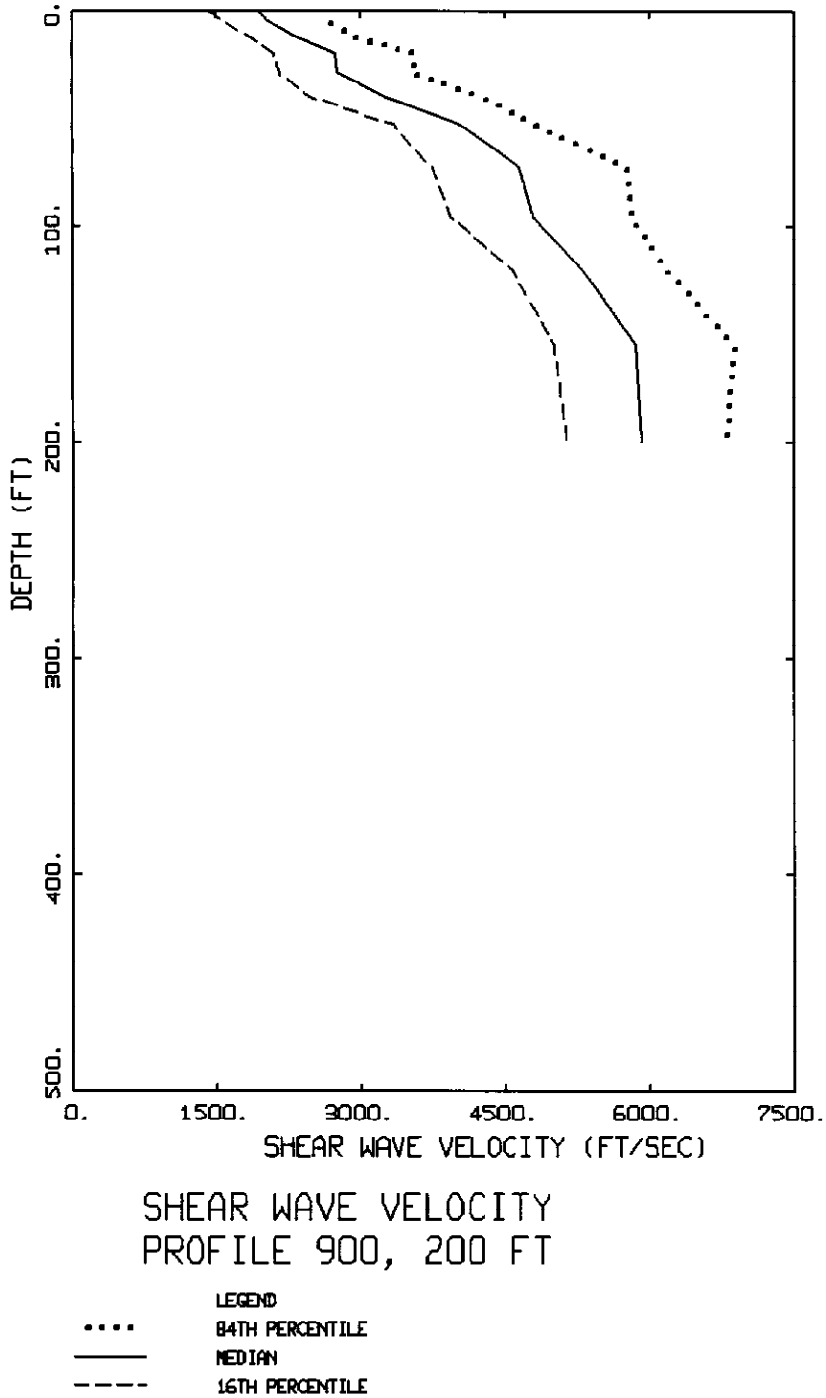


Figure 5.2-12 Strain Compatible Properties Computed for Profile 900 200 ft Depth to Basement (Sheet 1 of 4)

Note: Basement has shear- and compressional-wave velocities of 9,285 ft/sec and 16,082 ft/sec respectively (Table 4.2.1): shear-wave velocity, compressional-wave velocity, shear-wave damping, and compressional-wave damping.

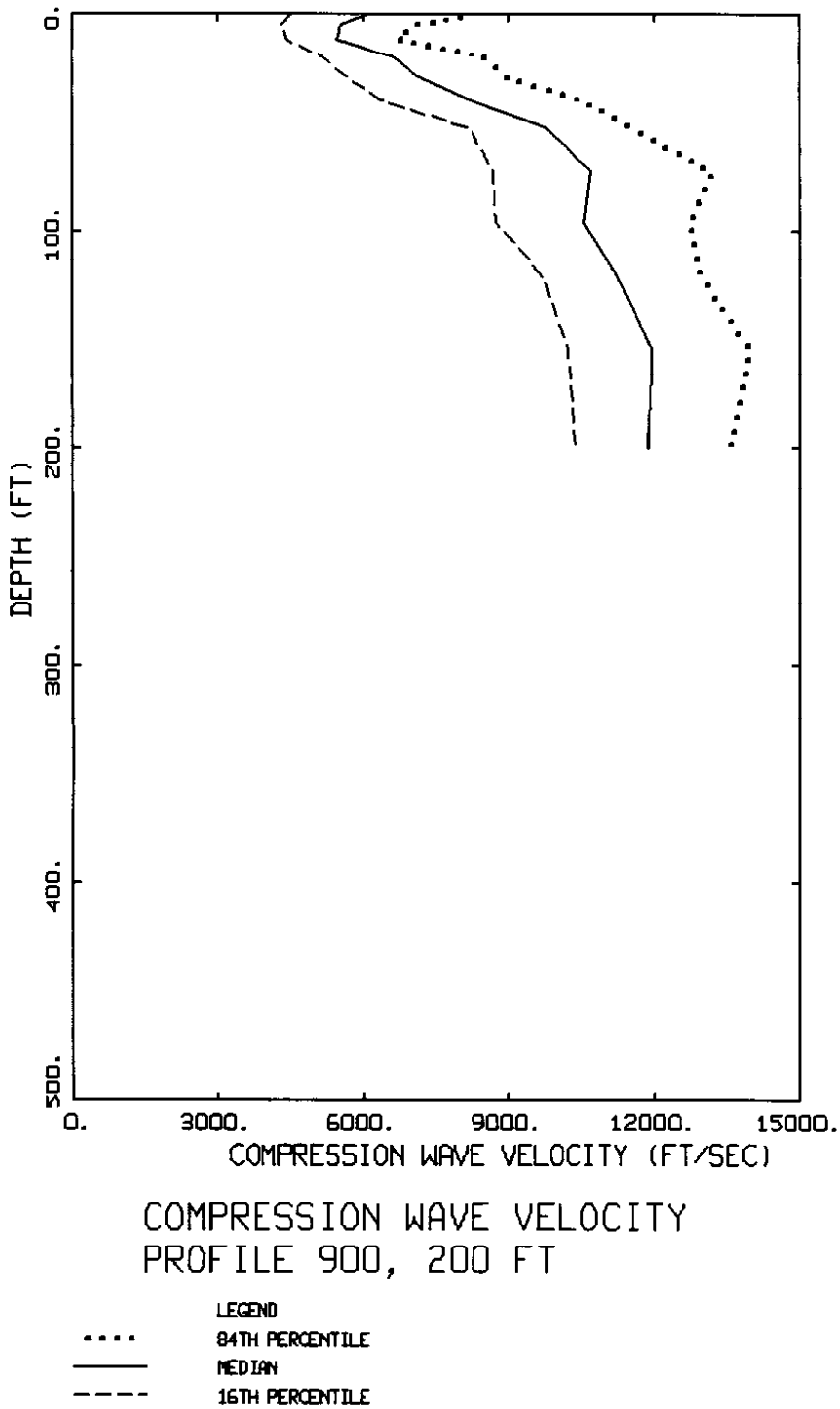


Figure 5.2-12 Strain Compatible Properties Computed for Profile 900 200 ft Depth to Basement (Sheet 2 of 4)

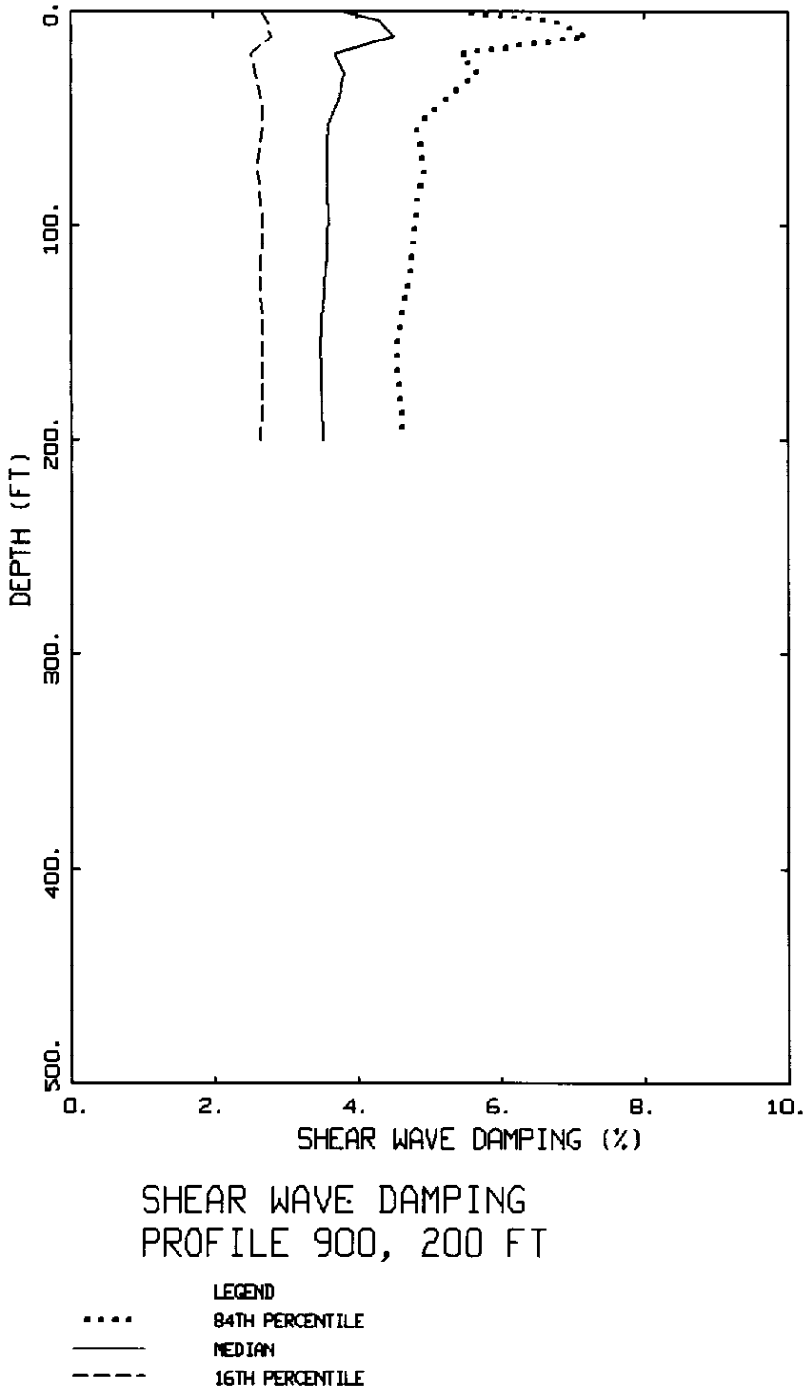


Figure 5.2-12 Strain Compatible Properties Computed for Profile 900 200 ft Depth to Basement (Sheet 3 of 4)

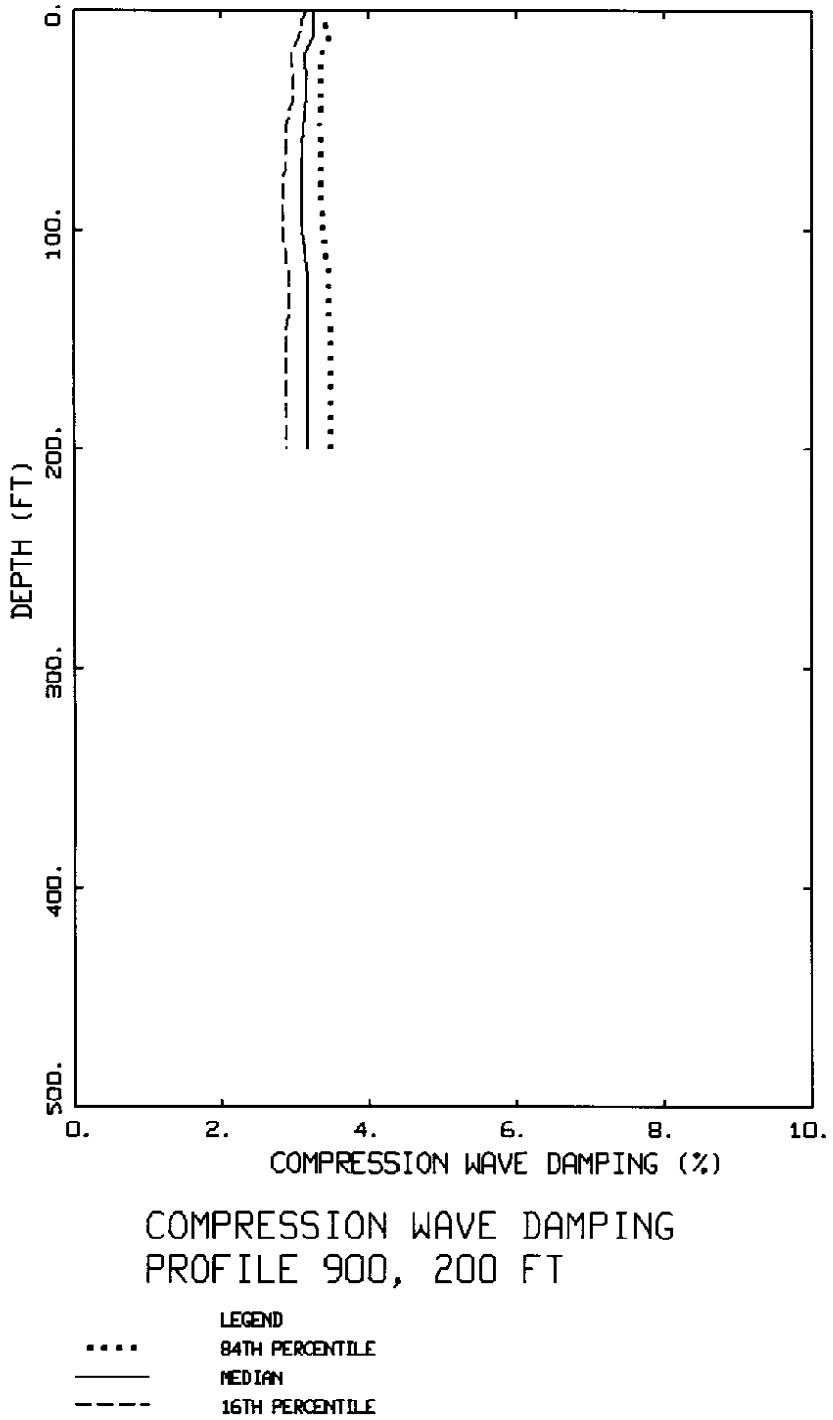


Figure 5.2-12 Strain Compatible Properties Computed for Profile 900 200 ft Depth to Basement (Sheet 4 of 4)

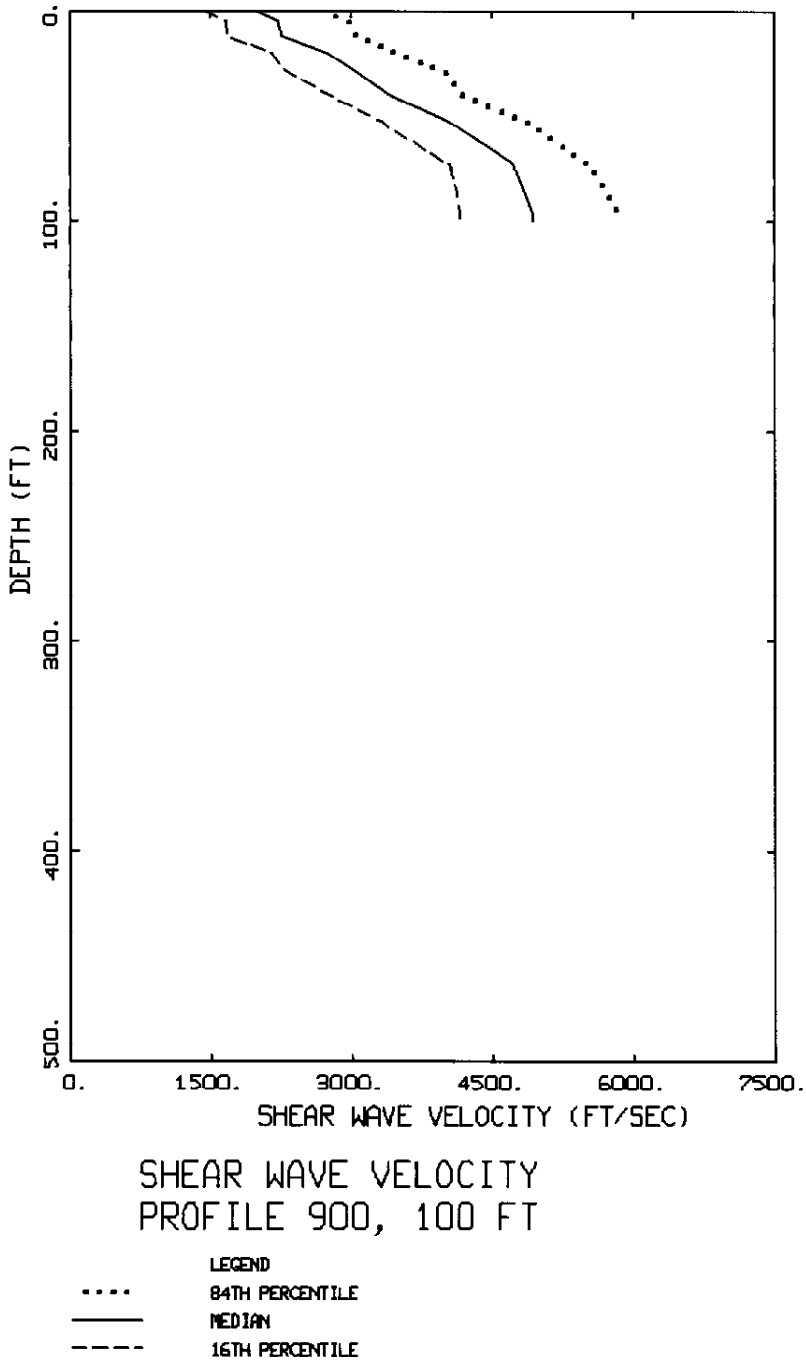


Figure 5.2-13 Strain Compatible Properties Computed for Profile 900 100 ft Depth to Basement (Sheet 1 of 4)

Note: Basement has shear- and compressional-wave velocities of 9,285 ft/sec and 16,082 ft/sec respectively (Table 4.2.1): shear-wave velocity, compressional-wave velocity, shear-wave damping, and compressional-wave damping.

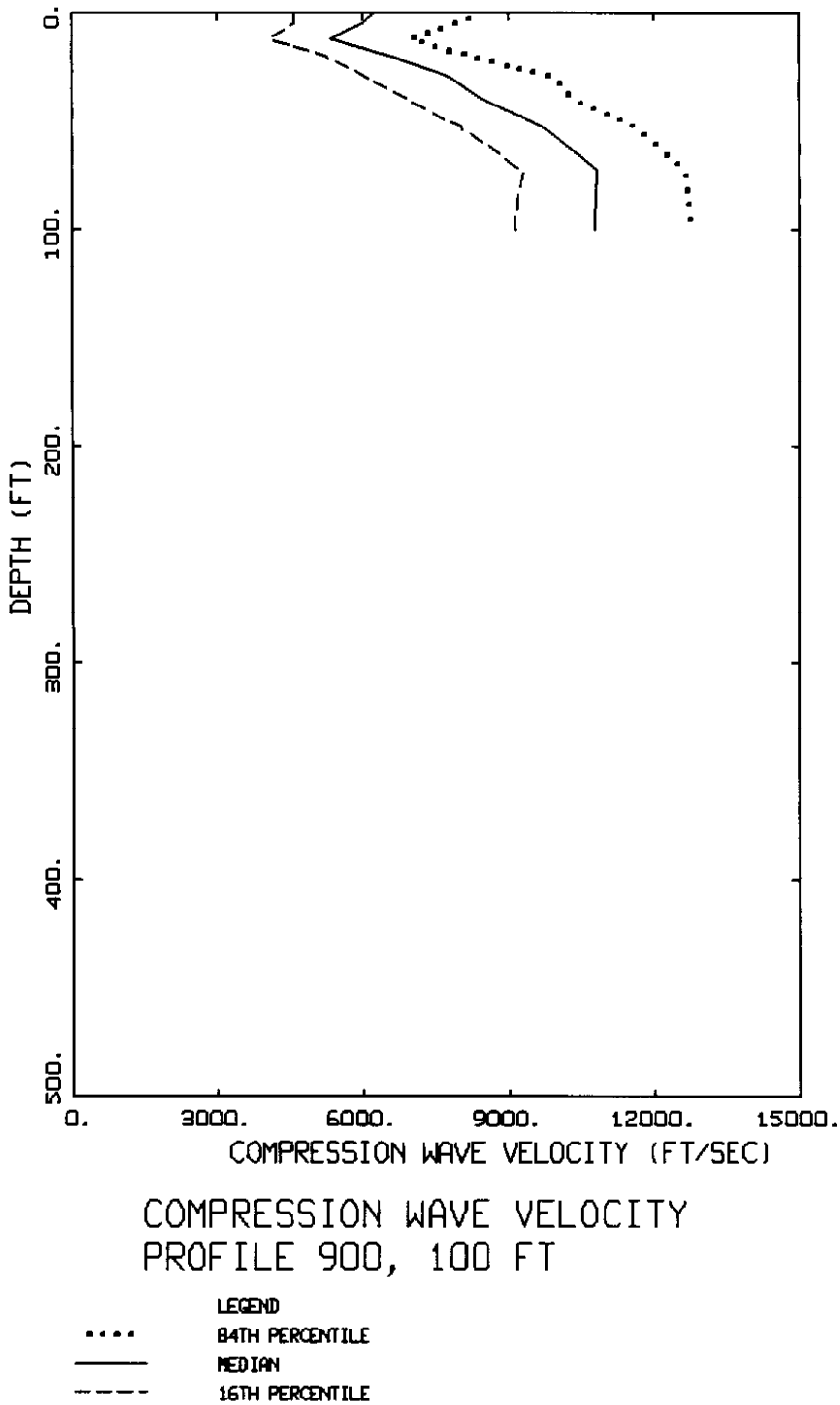


Figure 5.2-13 Strain Compatible Properties Computed for Profile 900 100 ft Depth to Basement (Sheet 2 of 4)

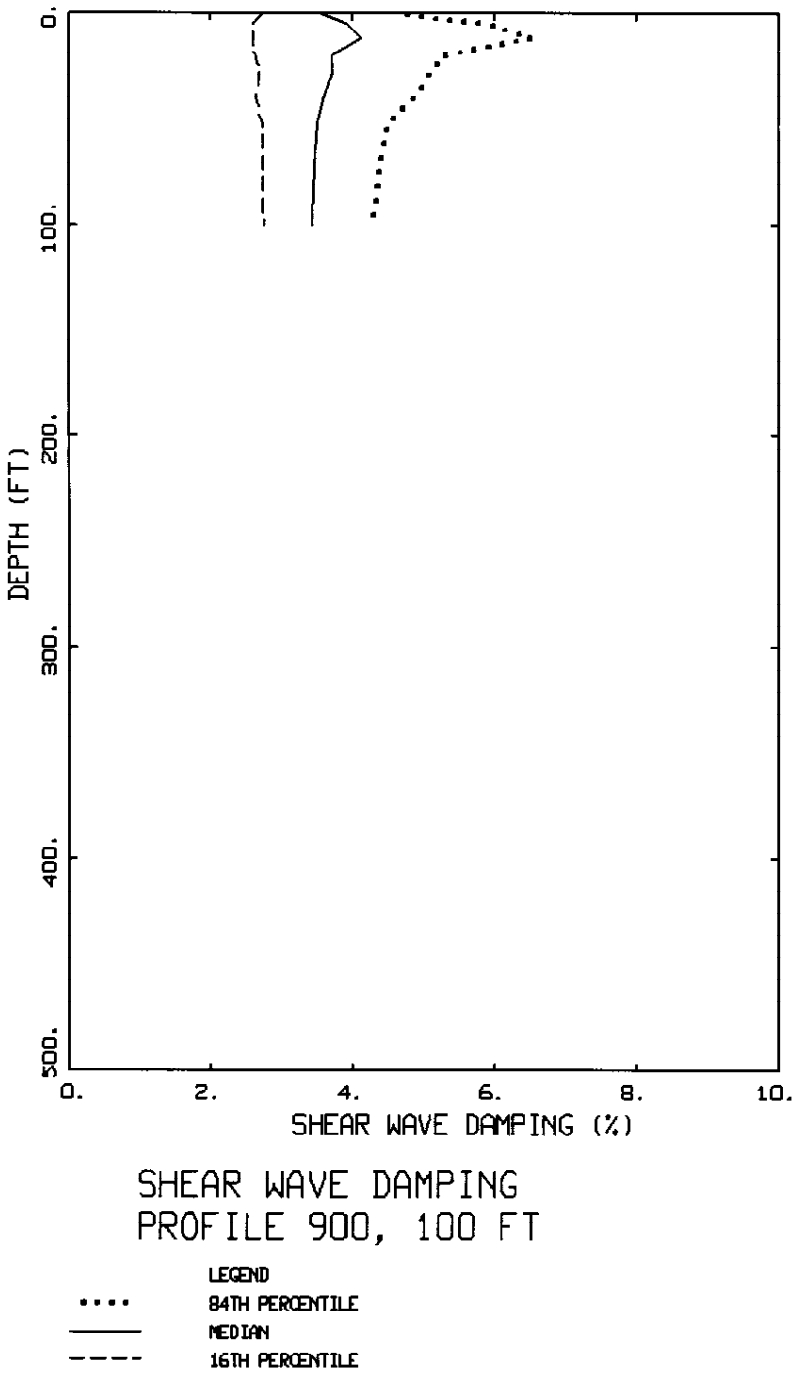


Figure 5.2-13 Strain Compatible Properties Computed for Profile 900 100 ft Depth to Basement (Sheet 3 of 4)

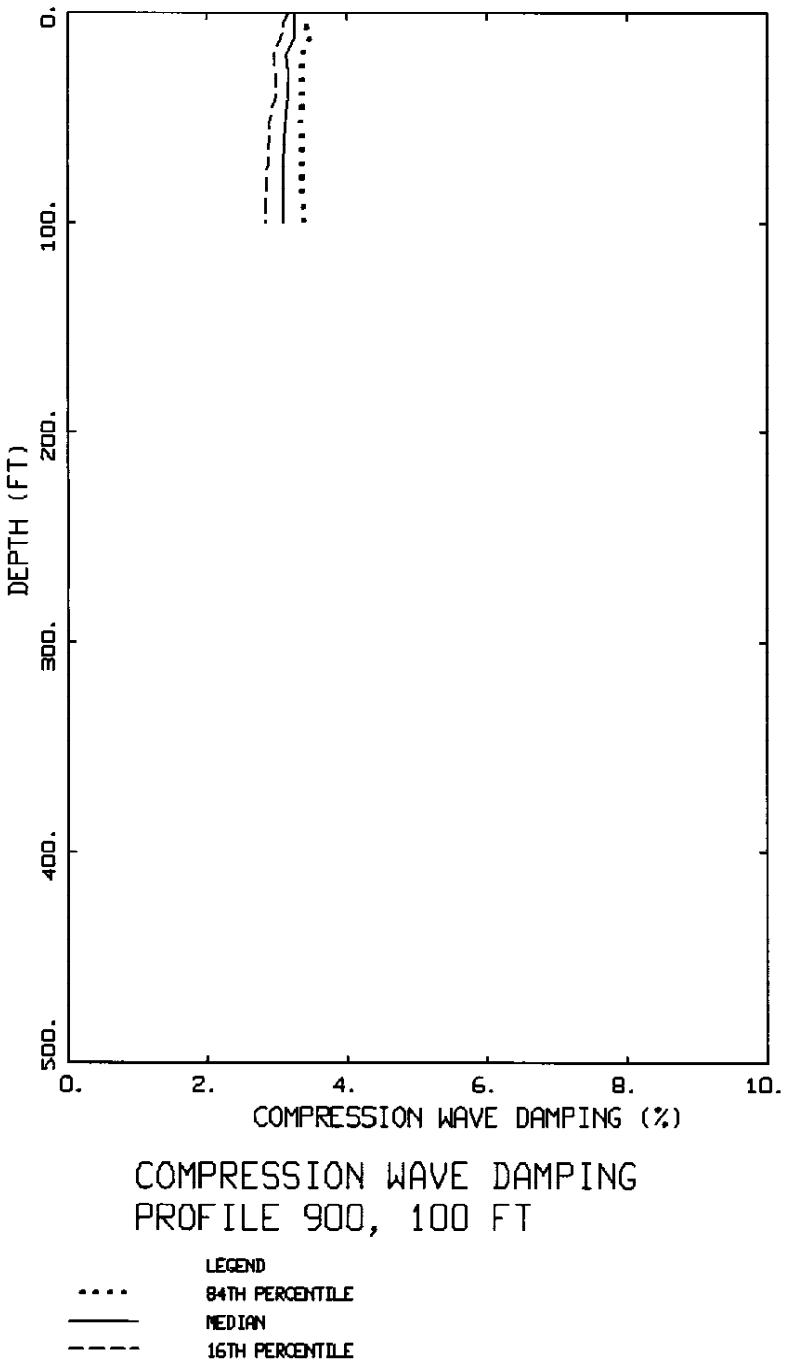


Figure 5.2-13 Strain Compatible Properties Computed for Profile 900 100 ft Depth to Basement (Sheet 4 of 4)

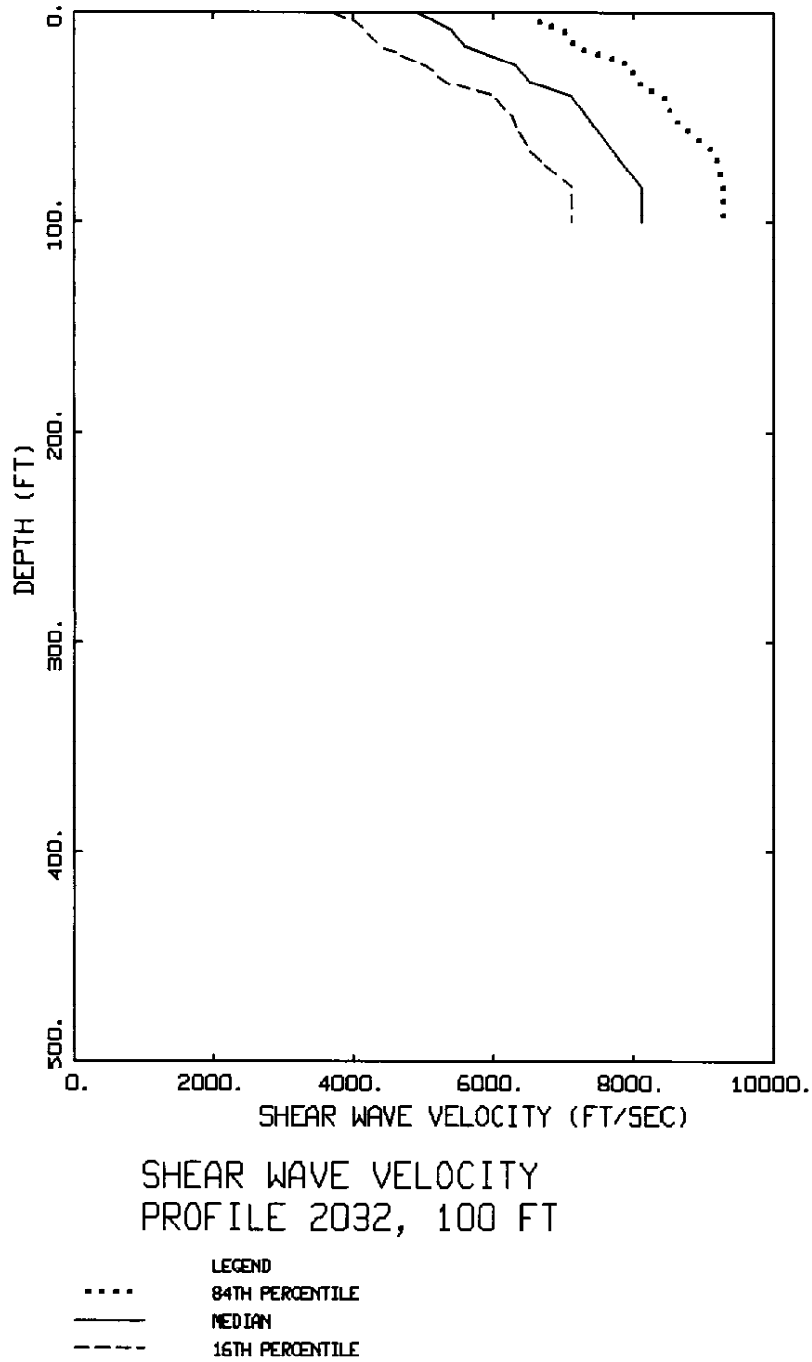


Figure 5.2-14 Strain Compatible Properties Computed for Profile 2032 100 ft Depth to Basement (Sheet 1 of 4)

Note: Basement has shear- and compressional-wave velocities of 9,285 ft/sec and 16,082 ft/sec respectively (Table 4.2.1): shear-wave velocity, compressional-wave velocity, shear-wave damping, and compressional-wave damping.

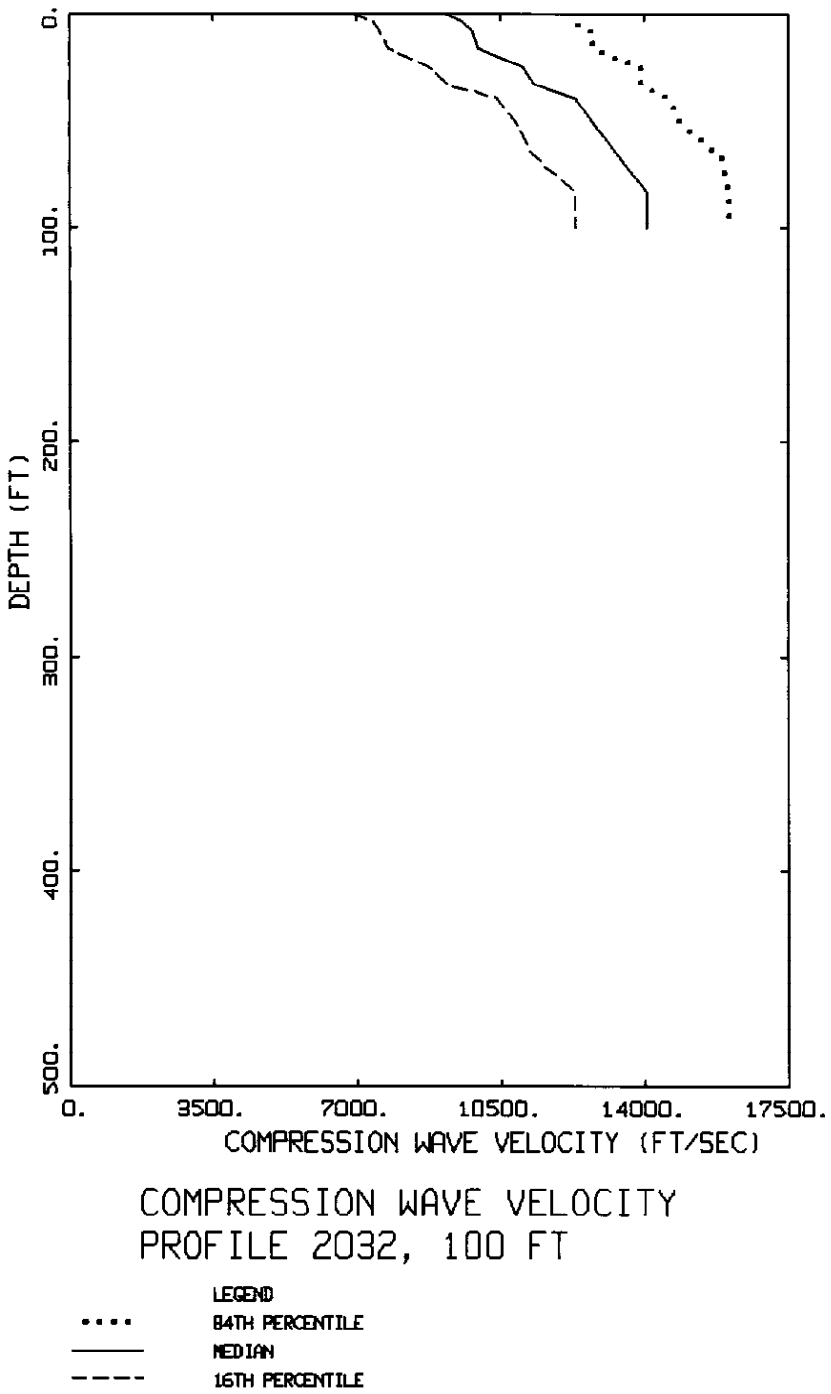


Figure 5.2-14 Strain Compatible Properties Computed for Profile 2032 100 ft Depth to Basement (Sheet 2 of 4)

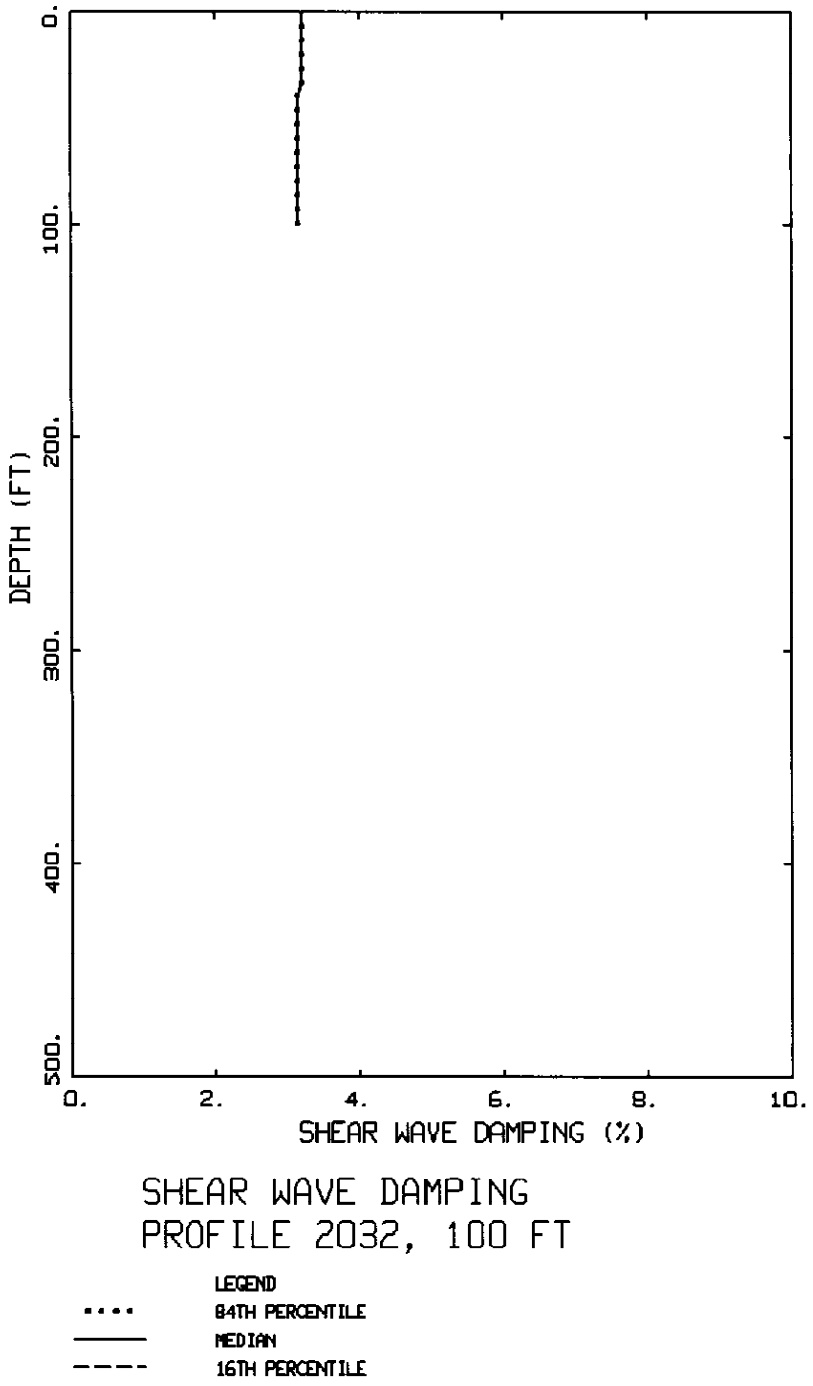


Figure 5.2-14 Strain Compatible Properties Computed for Profile 2032 100 ft Depth to Basement (Sheet 3 of 4)

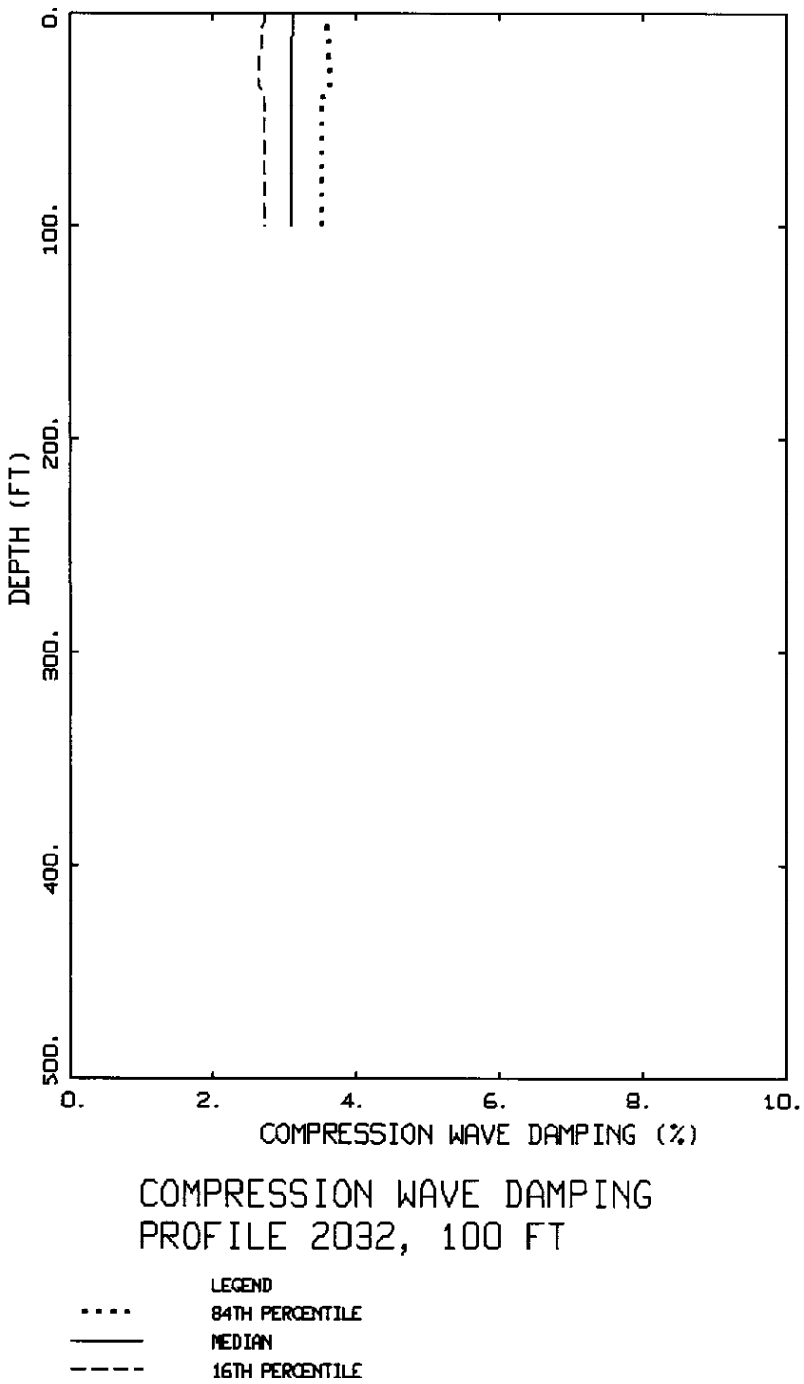


Figure 5.2-14 Strain Compatible Properties Computed for Profile 2032 100 ft Depth to Basement (Sheet 4 of 4)

5.3 Enhanced ACS SASSI Lumped-Mass-Stick Model of R/B Complex

5.3.1 R/B Complex Lumped-Mass-Stick Model

The US-APWR RB complex consists of the R/B and FH/A, PCCV, CIS supported on a common reinforced concrete basemat. The lumped mass stick model of the R/B complex represents the dynamic characteristics (stiffness and mass inertia properties) of the R/B complex's structures.

Figure 5.3.1-1 presents the enhanced lumped mass stick model of the R/B complex.

5.3.1.1 SDOF Elements

The lumped mass stick model of the R/B complex is refined by including SDOF mass/spring elements to account for the flexibility of the slabs and walls within the R/B. A FE model identifies those slabs and walls that have a fundamental frequency less than 40 Hz along with their location, frequency, and effective mass, as shown in Tables 5.3.1-1 through 5.3.1-3. An equivalent spring constant is computed for each SDOF. The SDOF's location, mass, and equivalent spring constant are then added with rigid links to the lumped mass stick model.

Table 5.3.1-1 lists the 105 slabs that have frequencies below 40 Hz and their associated lumped mass node. Overall, the slab SDOF elements account for 27,731 kips, or 7% of the building's mass.

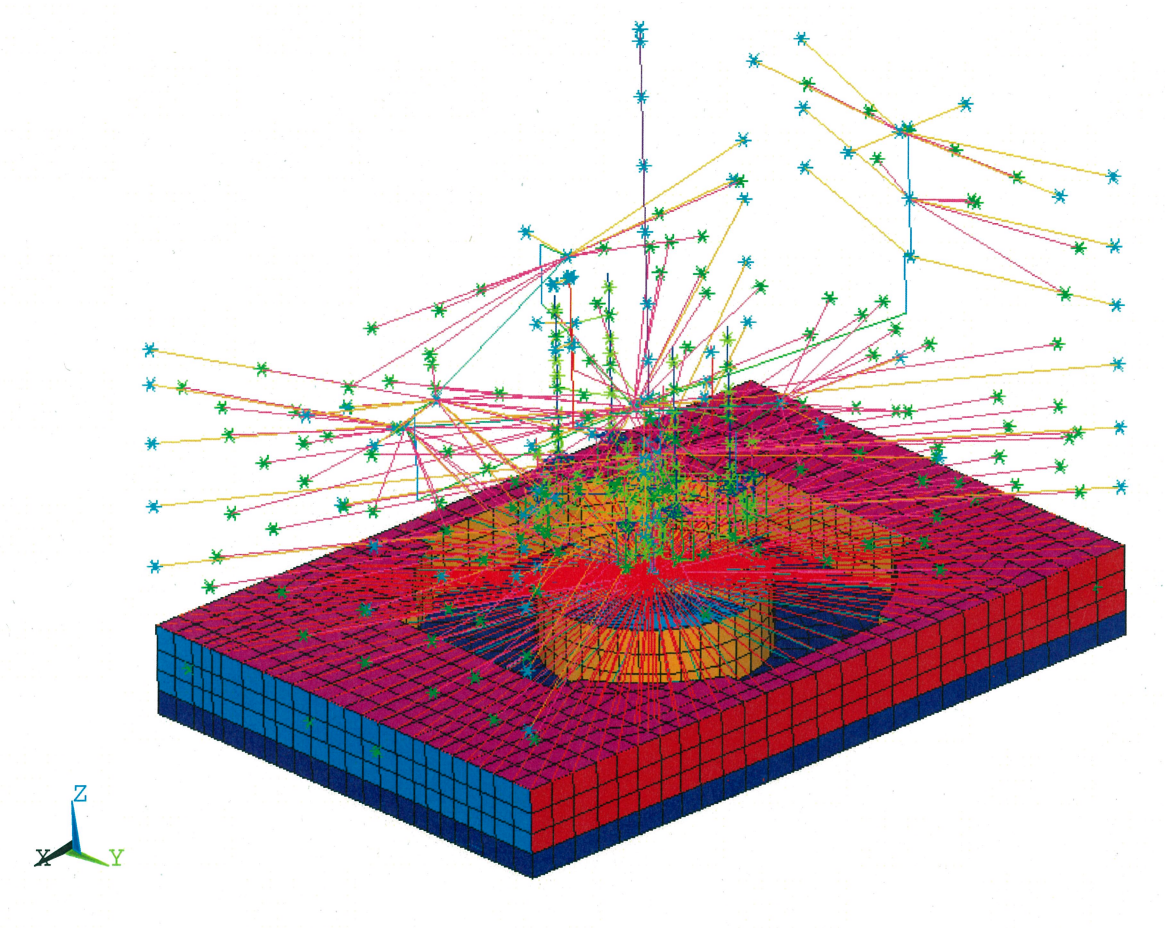


Figure 5.3.1-1 Enhanced Lumped-Mass-Stick Model of the R/B Complex

Table 5.3.1-1 Slab SDOF Properties (Cracked Concrete)
(Sheet 1 of 4)

Floor Mass ID	Slab ID#	x (ft)	y (ft)	z (ft)	Frequency (Hz)	Weight (Kips)	Spring Constant (kip/ft)
FH08	115_10	-120.48	80.75	154.50	9.6	393	4.461E+04
	115_10	-120.48	-39.42	154.50	9.7	537	6.211E+04
	115_10	-120.48	-4.13	154.50	10.7	504	7.054E+04
	115_10	-120.48	45.25	154.50	11.4	379	6.048E+04
	115_10	-120.48	18.46	153.88	12.1	355	6.343E+04
	Full Floor Weight: 6250 kips			Total SDOF Weight:		2167 kips	35% of Total
RE05	115_30	94.67	70.50	122.33	13.3	224	4.818E+04
	115_30a	79.00	88.33	122.33	14.5	131	3.399E+04
	115_30b	82.35	54.42	122.33	14.5	131	3.399E+04
	115_30c	111.33	70.50	122.33	14.5	131	3.399E+04
	115_31	143.50	65.92	115.50	21.9	350	2.061E+05
	115_32	143.50	99.00	115.50	21.9	175	1.030E+05
	115_33a	94.67	19.42	115.50	17.8	678	2.620E+05
	115_33b	94.67	-19.42	115.50	17.8	678	2.620E+05
	115_33c	143.50	14.00	115.50	14.6	145	3.787E+04
	115_33d	143.50	-14.00	115.50	14.6	145	3.787E+04
	115_40	143.50	-62.71	115.50	21.8	497	2.891E+05
	Full Floor Weight: 19200 kips			Total SDOF Weight:		3286 kips	17% of Total
RE41	101_10a	-120.79	-80.17	101.00	13.4	140	3.076E+04
	101_10b	-79.00	-80.17	101.00	17.3	105	3.837E+04
	101_11	-43.17	-72.38	101.00	28.4	85	8.420E+04
	101_12b	-77.08	-53.75	101.00	39.9	74	1.452E+05
	101_40	39.00	-76.83	101.00	32.6	78	1.015E+05
	101_41a	68.33	-83.25	101.00	23.1	140	9.175E+04
	101_41b	68.33	-50.17	101.00	30.0	185	2.048E+05
	101_43a	110.50	-50.17	101.00	35.4	131	2.020E+05
	Full Floor Weight: 9450 kips			Total SDOF Weight:		939 kips	10% of Total

Table 5.3.1-1 Slab SDOF Properties (Cracked Concrete)
(Sheet 2 of 4)

Floor Mass ID	Slab ID#	x (ft)	y (ft)	z (ft)	Frequency (Hz)	Weight (Kips)	Spring Constant (kip/ft)
RE42	101_21	-57.79	40.54	112.00	10.0	308	3.748E+04
	101_22	-70.08	57.63	112.00	27.0	58	5.216E+04
	101_23	-56.58	79.63	112.00	12.8	291	5.818E+04
	101_23	-56.58	79.63	112.00	27.0	58	5.216E+04
	101_24a	-56.58	99.08	112.00	29.1	23	2.439E+04
	Full Floor Weight: 7590 kips			Total SDOF Weight:		739 kips	10% of Total
RE04	101_30	42.50	73.75	101.00	34.2	123	1.765E+05
	101_30	42.50	73.75	101.00	38.2	79	1.413E+05
	101_33a	110.50	81.58	101.00	30.3	136	1.523E+05
	Full Floor Weight: 16600 kips			Total SDOF Weight:		337 kips	2% of Total
RE03	86_14	-74.83	-81.08	88.42	29.1	123	1.276E+05
	86_16	-77.08	-54.67	85.25	33.4	131	1.795E+05
	86_17b	-82.21	-26.71	86.92	18.7	33	1.421E+04
	76_10a	-43.17	-76.83	76.50	31.8	139	1.722E+05
	76_10b	-78.83	-80.42	76.50	29.3	171	1.804E+05
	76_10c	-78.83	-54.00	76.50	34.9	207	3.092E+05
	76_11a	-100.42	-98.58	76.50	37.4	148	2.538E+05
	76_13	-81.83	1.67	76.50	27.9	64	6.119E+04
	76_20a	-58.33	76.71	76.50	37.6	337	5.830E+05
	76_21g	-142.63	76.71	76.50	27.0	209	1.858E+05
	76_30a	52.00	65.83	76.50	33.0	245	3.271E+05
	76_30a	52.00	65.83	76.50	37.4	148	2.538E+05
	76_30a	52.00	65.83	76.50	38.1	199	3.549E+05
	76_31b	87.67	19.42	76.50	39.8	229	4.449E+05
	76_33a	110.50	62.75	76.50	33.7	311	4.331E+05
	76_33b	143.50	62.75	76.50	17.8	1,622	6.287E+05
	76_40a	52.00	-65.50	76.50	31.7	161	1.979E+05
	76_41c	87.67	-19.42	76.50	39.8	244	4.744E+05
	76_43a	110.50	-62.71	76.50	28.8	320	3.260E+05
	76_43b	143.50	-62.71	76.50	18.0	1,570	6.202E+05
	Full Floor Weight: 67700 kips			Total SDOF Weight:		6611 kips	10% of Total

Table 5.3.1-1 Slab SDOF Properties (Cracked Concrete)
(Sheet 3 of 4)

Floor Mass ID	Slab ID#	x (ft)	y (ft)	z (ft)	Frequency (Hz)	Weight (Kips)	Spring Constant (kip/ft)
RE02	50_10b	-78.83	-65.75	50.17	37.8	589	1.031E+06
	50_20b	-78.83	75.88	50.17	29.1	208	2.165E+05
	50_21b	-132.42	98.58	50.17	22.3	74	4.520E+04
	50_21c	-142.88	75.88	50.17	22.3	74	4.520E+04
	50_21d	-116.88	75.88	50.17	22.3	74	4.520E+04
	50_21e	-132.42	52.88	50.17	22.3	74	4.520E+04
	50_22a	-87.46	20.83	50.17	32.0	175	2.202E+05
	50_30a	42.50	77.00	50.17	35.8	164	2.576E+05
	50_30b	71.83	82.67	50.17	34.8	128	1.897E+05
	50_32c	110.50	56.00	50.17	22.4	102	6.293E+04
	50_33d	143.50	59.88	50.17	26.4	167	1.429E+05
	50_34	127.00	19.42	50.17	22.4	920	5.664E+05
	50_40b	71.83	-81.08	50.17	34.0	106	1.501E+05
	50_42e	110.50	-54.42	50.17	22.4	102	6.293E+04
	50_43d	143.50	-58.29	50.17	26.3	161	1.369E+05
	50_44	127.00	-19.42	50.17	22.4	920	5.664E+05
	35_26	0.00	100.08	40.67	39.5	68	1.302E+05
	Full Floor Weight: 72400 kips			Total SDOF Weight:		4105 kips	6% of Total
RE01	25_20a	-121.50	29.73	25.25	27.4	307	2.830E+05
	25_20b	-132.42	52.88	25.25	21.8	85	4.947E+04
	25_20c	-104.92	59.67	25.25	39.1	314	5.891E+05
	25_20d	-142.88	75.88	25.25	21.8	85	4.947E+04
	25_20e	-119.71	75.88	25.25	21.8	85	4.947E+04
	25_20f	-132.42	98.58	25.25	21.8	85	4.947E+04
	25_22e	-78.83	75.88	25.25	36.9	143	2.388E+05
	25_23	-43.17	75.88	25.25	32.3	228	2.927E+05
	25_30b	42.50	77.00	25.25	33.0	210	2.814E+05
	25_33b	116.50	56.00	25.25	35.3	221	3.365E+05
	25_33d	143.50	56.00	25.25	21.0	485	2.613E+05
	25_34b	133.00	19.42	25.25	17.9	594	2.324E+05
	25_42d	139.50	-95.79	25.25	34.6	112	1.645E+05

Table 5.3.1-1 Slab SDOF Properties (Cracked Concrete)
(Sheet 4 of 4)

Floor Mass ID	Slab ID#	x (ft)	y (ft)	z (ft)	Frequency (Hz)	Weight (Kips)	Spring Constant (kip/ft)
	25_43d	143.50	-54.42	25.25	20.9	196	1.056E+05
	25_44b	133.00	-19.42	25.25	17.9	594	2.324E+05
	13_17	-127.04	-54.25	14.33	32.0	52	6.470E+04
	13_31	149.42	95.79	14.08	25.5	49	3.926E+04
	13_42	143.50	-95.79	14.08	21.3	72	4.025E+04
	Full Floor Weight: 68600 kips			Total SDOF Weight:		3918 kips	6% of Total
RE00	3_32a	133.00	54.42	3.58	27.4	1,593	1.461E+06
	3_32b	133.00	19.42	3.58	20.2	554	2.785E+05
	3_32c	133.00	-19.42	3.58	20.2	554	2.785E+05
	3_32d	133.00	-54.42	3.58	27.1	343	3.088E+05
	3_10a	-78.83	-75.88	3.58	30.4	314	3.547E+05
	3_20a	-78.83	76.88	3.58	29.3	315	3.323E+05
	3_15c	-127.92	-41.25	3.58	36.5	247	4.033E+05
	3_15d	-127.92	-23.29	3.58	36.5	247	4.033E+05
	3_15	-131.54	39.04	3.58	38.0	327	5.773E+05
	n8_10a	-84.33	-70.83	-8.58	38.1	148	2.627E+05
	n8_11c	-100.42	-95.79	-8.58	33.2	76	1.027E+05
	n8_13	-127.04	-74.04	-8.58	29.4	121	1.281E+05
	n8_14b	-127.04	-40.42	-8.58	30.5	140	1.601E+05
	n8_16	-127.04	7.25	-8.58	33.9	111	1.568E+05
	n8_21c	-104.92	67.50	-8.58	30.0	113	1.249E+05
	n8_22a	-84.33	64.58	-8.58	39.2	129	2.424E+05
	n8_30a	84.67	64.58	-8.58	38.8	149	2.748E+05
	n8_40a	84.67	-70.83	-8.58	38.8	151	2.788E+05
	Full Floor Weight: 117000 kips			Total SDOF Weight:		5630 kips	5% of Total
Full Model Weight: 393990 kips				Total SDOF Weight:		27731 kips	7% of Total

Tables 5.3.1-2 and 5.3.1-3 list the 37 walls that have frequencies below 40 Hz (18 in the X direction and 19 in the Y), and their associated lumped mass properties. Overall, the wall SDOF elements account for 19,740 kips, or 5% of the reactor building's mass.

Table 5.3.1-2 Wall SDOF-X Properties

Floor Mass ID	Slab ID#	x (ft)	y (ft)	z (ft)	Frequency (Hz)	Weight (Kips)	Spring Constant (kip/ft)
RE04	W_N_1	-152.17	21.06	114.31	9.10	720	7.285E+04
	W_N_1	-152.17	-35.69	114.31	10.90	680	9.957E+04
	W_N_1	-152.17	79.81	114.31	11.20	625	9.584E+04
	W_N_1	-152.17	18.46	114.31	12.60	191	3.745E+04
	W_S_3	161.67	-19.42	88.58	24.90	335	2.549E+05
	W_S_4	161.67	19.42	88.58	24.90	335	2.549E+05
	W_S_5	161.67	-61.88	94.29	12.80	984	1.980E+05
	W_S_6	161.67	61.88	94.29	13.00	1,004	2.078E+05
	W_P1n	127.00	61.88	92.63	26.10	714	5.971E+05
	W_P2n	127.00	-61.88	92.63	31.90	923	1.150E+06
RE03	W_S_9	161.67	-61.88	61.63	38.30	150	2.691E+05
	W_S_10	161.67	61.88	61.63	38.50	82	1.480E+05
RE02	W_N_3	-147.25	76.71	36.04	37.40	164	2.820E+05
	W_N_2	-147.25	-41.04	49.17	33.10	2,181	2.938E+06
RE00	W_S_21	161.67	-19.42	-11.38	37.20	192	3.251E+05
	W_S_22	161.67	19.42	-11.38	37.20	192	3.251E+05
	W_S_25	161.67	-88.33	-11.38	36.60	305	4.999E+05
	W_S_26	161.67	18.33	-11.38	36.60	305	4.999E+05
Full Model Weight: 393990 kips				Total SDOF Weight:		10082 kips	3% of Total

Table 5.3.1-3 Wall SDOF-Y Properties

Floor Mass ID	Slab ID#	x (ft)	y (ft)	z (ft)	Frequency (Hz)	Weight (Kips)	Spring Constant (kip/ft)
FH07	W_E_1	-120.48	106.67	114.31	7.20	1,208	7.776E+04
RE42	W_E_2	-37.83	106.67	92.54	15.70	224	6.735E+04
	W_E_3	18.50	106.67	87.04	31.40	192	2.328E+05
RE41	W_W_2	-9.50	-106.67	83.96	23.00	140	9.079E+04
RE04	W_E_7	144.33	106.67	94.29	25.60	319	2.555E+05
	W_W_1	145.08	-106.67	94.29	34.60	314	4.596E+05
	W_P1e	144.33	84.92	92.63	15.40	965	2.794E+05
	W_P1w	144.33	38.83	92.63	15.40	965	2.794E+05
	W_P2e	144.33	-38.83	92.63	15.10	958	2.690E+05
	W_P2w	144.33	-84.92	92.63	15.10	958	2.690E+05
RE03	W_E_4	-44.40	106.67	61.63	31.40	192	2.328E+05
	W_E_4	-44.40	106.67	61.63	36.30	195	3.153E+05
	W_E_5	41.92	106.67	61.63	31.40	192	2.328E+05
	W_W_5	38.96	-106.67	61.63	28.80	195	1.986E+05
	W_W_6	-47.83	-106.67	61.63	28.80	195	1.986E+05
RE02	W_W_8	-65.17	-106.67	36.04	37.20	413	7.000E+05
	W_E_6	-44.40	106.67	36.04	36.30	195	3.153E+05
	W_P3e	-128.08	-13.92	47.53	22.70	1,584	9.990E+05
RE00	W_E_8	-131.54	106.67	-11.38	38.60	254	4.631E+05
	Full Model Weight: 393990 kips			Total SDOF Weight:		9658 kips	2% of Total

5.3.1.2 Lumped Mass Stick Model Properties

The lumped mass stick model for the R/B Complex contains concentrated masses that reflect the inertial properties and stick elements that reflect the stiffness properties of the R/B, PCCV, and CIS structures. The R/B, PCCV, and CIS concentrated mass properties are found in Tables 5.3.1-4 thru 5.3.1-6. The R/B concentrated masses in Table 5.3.1-6 also consider the SDOF elements in the R/B complex model. The stick element properties are found in Tables 5.3.1-7 thru 5.3.1-9.

Table 5.3.1-4 PCCV Model - Lumped Mass Inertia

Node	Description	Location			Lumped Mass & Inertia			
		X (ft)	Y (ft)	Z (ft)	Weight ($x10^3$ kip)	Jyy ($x10^6$ kip-ft^2)	Jxx ($x10^6$ kip-ft^2)	Jzz ($x10^6$ kip-ft^2)
CV11	Top of dome	0.00	0.00	230.17	0.887	0.0520	0.0520	0.101
CV10	7ft under dome top	0.00	0.00	225.00	4.1	2.88	2.88	5.63
CV09	El. At dome angle 40 deg.	0.00	0.00	201.67	7.81	14.5	14.5	28.2
CV08	El. At dome angle 15 deg.	0.00	0.00	173.08	8.49	23.4	23.4	45.8
CV07	Top of polar crane rail	0.00	0.00	145.58	11.9	35.6	35.6	70.1
CV06	Roof of MS/FW room	0.00	0.00	115.50	9.06	27.2	27.2	53.4
CV05	MS penetration	0.00	0.00	92.17	7.53	22.4	22.4	44.4
CV04	Operation floor level	0.00	0.00	76.42	4.64	13.8	13.8	27.4
CV03	FW penetration	0.00	0.00	68.25	4.43	13.1	13.1	26.1
CV02	R/B 3rd floor level	0.00	0.00	50.17	7.27	21.7	21.7	42.8
CV01	R/B 2nd floor level	0.00	0.00	25.25	8.23	24.7	24.7	48.5

subtotal:74.36 $\times 10^3$ kip

Table 5.3.1-5 CIS Model - Lumped Mass Inertia

Node	Description	Location			Lumped Mass & Inertia			
		X (ft)	Y (ft)	Z (ft)	Weight ($x10^3$ kip)	Jyy ($x10^6$ kip-1ft^2)	Jxx ($x10^6$ kip-ft^2)	Jzz ($x10^6$ kip-ft^2)
IC09	Upper level of P/R room	39.38	-0.03	139.50	0.716	0.0306	0.0553	0.0792
IC08	Change in P/R room wall thickness	39.64	0.02	112.33	2.08	0.163	0.235	0.230
IC18	P/R support	39.64	0.02	110.75	0.342	0.0133	0.0251	0.038
IC07	P/R room operation floor	36.25	0.12	76.42	1.07	0.0518	0.0889	0.118
IC71		8.11	-43.98	112.00	0.817	0.192	0.0622	0.253
IC72		7.29	44.03	112.00	1.04	0.243	0.0792	0.322
IC61	Top of SG wall	3.94	-37.73	96.58	2.16	0.510	0.168	0.671
IC62	Top of SG wall	3.88	37.65	96.58	2.2	0.518	0.171	0.681
IC05	Operation floor level	3.36	0.74	76.42	15.1	13.0	13.0	25.8
IC15	SG support level	3.36	0.74	59.17	0.22	0.178	0.178	0.355
IC04	R/B 3rd floor level	1.92	-0.61	50.17	14.9	12.1	12.1	24.0
IC14	SG support level	1.92	-0.61	45.67	0.353	0.284	0.284	0.568
IC03	Reactor vessel support	-2.28	0.13	35.88	8.84	5.97	5.97	11.9
IC02	R/B 2nd floor level	-2.02	0.23	25.25	17.4	23.0	23.0	45.8
IC01	Pressure header room	1.22	0.05	16.00	18.5	24.4	24.4	48.6

subtotal:85.70 $\times 10^3$ kip

Table 5.3.1-6 Mass of Stick Model for Buildings R/B and Basemat

(Sheet 1 of 2)

Node	Description	Location			Lumped Mass & Inertia			
		X (ft)	Y (ft)	Z (ft)	Weight ($x10^3$ kip)	Jyy ($x10^6$ kip-ft^2)	Jxx ($x10^6$ kip-ft^2)	Jzz ($x10^6$ kip-ft^2)
FH08	FH/A roof	-120.1	18.37	154.5	4.1	2.1	12.7	18.6
FH07	Top of FH/A crane rail	-120.1	18.37	125.67	4.5	1.2	11.8	9.1
FH06	Center building roof	-120.7	14.13	101	4.7	1.6	12.4	14.0
RE41	R/B 5th floor west roof	-28.58	-92.73	101	8.4	37.4	1.1	46.5
RE42	R/B 5th floor east roof	33.592	86.54	101	6.9	18.0	0.7	21.5
RE05	MS/FW room roof	127.8	6.84	115.5	15.9	7.3	64.6	82.0
RE04	R/B 5th floor level (MS/FW room)	124.98	4.28	101	16.3	6.5	60.2	53.9
RE03	R/B 4th floor operation floor	-5.733	-1.01	76.42	61.1	457.5	230.7	796.2
RE02	R/B 3rd floor	-5.342	-4.09	50.17	68.4	524.0	265.3	825.1
RE01	R/B 2nd floor	-0.033	-2.09	25.25	64.7	485.7	248.0	806.2

Table 5.3.1-6 Mass of Stick Model for Buildings R/B and Basemat

(Sheet 2 of 2)

Node	Location			Lumped Mass Inertia			
	X (ft)	Y (ft)	Z (ft)	Weight ($x10^3$ kip)	Jyy ($x10^6$ kip-ft^2)	Jxx ($x10^6$ kip-ft^2)	Jzz ($x10^6$ kip-ft^2)
CV00	0.00	0.00	1.92	3.94	11.7	11.7	23.2
RE00	1.24	-0.25	3.58	117	931	447	1375
IC00	1.22	0.05	1.92	21.8	28.9	28.9	57.5
BS01	2.43	0.75	-26.08	187	1500	722	2201
BB01	0.00	0.00	-36.25	-	-	-	-

subtotal:329.7 ×106lb

Total Weight:766.76 ×106lb

Table 5.3.1-7 PCCV Model – Stick Elements

Symbol	Height (ft)	Bottom Elevation (ft)	Eccentricity		Cross Sectional Properties						Shear Center (ft)	
			X (ft)	Y (ft)	Az (ft^2)	Ax (ft^2)	Ay (ft^2)	Iyy (ft^4)	Ixx (ft^4)	Izz (ft^4)	x_s NS	y_s EW
CV11	5.17	225.00	0.00	0.00	10.21	881.9	881.9	3.45E+05	3.45E+05	6.90E+05	0	0
CV10	23.33	201.67	0.00	0.00	116.7	881.9	881.9	2.02E+06	2.02E+06	4.04E+06	0	0
CV09	28.58	173.08	0.00	0.00	565.3	881.9	881.9	4.15E+06	4.15E+06	8.29E+06	0	0
CV08	27.50	145.58	0.00	0.00	2271	1000	1000	5.84E+06	5.84E+06	1.17E+07	0	0
CV07	30.08	115.50	0.00	0.00	2090	1042	1042	6.173E+06	6.173E+06	1.230E+07	0	0
CV06	23.33	92.17	0.00	0.00	2090	1042	1042	6.173E+06	6.173E+06	1.230E+07	0	0
CV05	15.75	76.42	0.00	0.00	2090	1042	1042	6.173E+06	6.173E+06	1.230E+07	0	0
CV04	8.17	68.25	0.00	0.00	2090	1042	1042	6.173E+06	6.173E+06	1.230E+07	0	0
CV03	18.08	50.17	0.00	0.00	2090	1042	1042	6.173E+06	6.173E+06	1.230E+07	0	0
CV02	24.92	25.25	0.00	0.00	2090	1042	1042	6.173E+06	6.173E+06	1.230E+07	0	0
CV01	23.33	1.92	0.00	0.00	2090	1042	1042	6.173E+06	6.173E+06	1.230E+07	0	0

Table 5.3.1-8 CIS Model – Elements

Symbol	Height (ft)	Bottom Elevation (ft)	Eccentricity		Cross Sectional Properties						Shear Center (ft)	
			X (ft)	Y (ft)	Az (ft^2)	Ax (ft^2)	Ay (ft^2)	Iyy (ft^4)	Ixx (ft^4)	Izz (ft^4)	x_s NS	y_s EW
IC09	27.17	112.33	-39.29	0.00	285.4	82.6	143.1	2.069E+04	3.193E+04	3.347E+04	41.86	0.00
IC08	1.58	110.75	-39.24	0.00	379.2	97.2	152.1	2.532E+04	4.104E+04	3.627E+04	41.75	0.00
IC18	34.33	76.42	-39.24	0.00	379.2	97.2	152.1	2.532E+04	4.104E+04	3.627E+04	41.75	0.00
IC71			3.31	-40.33	370.8	133.3	118.8	2.397E+04	1.206E+04	1.268E+04	4.00	-39.44
IC72			3.31	40.33	370.8	133.3	118.8	2.397E+04	1.206E+04	1.268E+04	4.00	39.44
IC61	20.17	76.42	3.30	-39.79	770.8	361.1	191.7	5.401E+04	2.725E+04	1.673E+05	3.33	-36.52
IC62	20.17	76.42	3.30	39.79	770.8	361.1	191.7	5.401E+04	2.725E+04	1.673E+05	3.33	36.52
IC05	17.25	59.17	-0.61	-0.04	3035	1521	993.1	1.664E+06	1.307E+06	3.525E+06	-1.30	-0.23
IC15	9.00	50.17	-0.61	-0.04	3035	1521	993.1	1.664E+06	1.307E+06	3.525E+06	-1.30	-0.23
IC04	4.50	45.67	0.04	-0.43	2931	1465	1076	1.707E+06	1.379E+06	3.472E+06	-1.48	-0.24
IC14	10.06	35.60	0.04	-0.43	2931	1465	1076	1.707E+06	1.379E+06	3.472E+06	-1.48	-0.24
IC03	10.35	25.25	0.65	-0.39	3833	1833	1729	1.987E+06	1.239E+06	3.115E+06	-1.59	-0.07
IC02	9.25	16.00	-2.38	-0.18	7917	5257	5021	3.390E+06	1.770E+06	8.247E+06	-1.28	0.00
IC01	14.08	1.92	-3.68	-0.08	10347	8542	8333	3.530E+06	3.516E+06	8.825E+06	-0.87	0.00

Table 5.3.1-9 R/B-FH/A Model – Stick Elements

Symbol	Height (ft)	Bottom Elevation (ft)	Eccentricity		Cross Sectional Properties					
			X (ft)	Y (ft)	Az (ft^2)	Ax (ft^2)	Ay (ft^2)	Iyy (10^3 ft^4)	Ixx (10^3 ft^4)	Izz (10^6 ft^4)
FH08	28.83	125.67	-120.08	18.37	1,330	423	706	141	1,830	2.4
FH07	24.67	101.00	-120.08	18.37	1,330	423	706	141	1,830	3.7
FH06	24.58	76.42	-120.73	14.13	1,331	423	658	141	1,506	3.7
RE41	24.58	76.42	-28.58	-92.73	1,375	826	333	2,826	38	2.9
RE42	24.58	76.42	33.59	86.54	1,063	567	370	757	46	0.5
RE05	14.50	101.00	127.80	6.84	2,667	1,417	1,111	878	2,874	9.0
RE04	24.58	76.42	124.98	4.28	3,063	1,479	1,507	892	3,014	10.0
RE03	26.25	50.17	-5.73	-1.01	9,514	4,875	5,132	21,412	14,853	103.7
RE02	24.92	25.25	-5.34	-4.09	10,417	5,521	5,410	23,148	13,503	109.5
RE01	21.67	3.58	-0.03	-2.09	10,833	5,619	5,757	22,184	14,130	113.8

5.3.1.3 Lumped-Mass-Stick Models of Major Equipment and Piping

Lumped mass stick models consisting of ACS SASSI 3-D beam and linear spring elements used to represent the stiffness of the major equipment and piping. The stiffness and the mass inertia properties of these lumped-mass models are identical to those described in Technical Report MUAP-08005, “Dynamic Analysis of the Coupled RCL-R/B-PCCV-CIS Lumped Mass Stick Model” (Reference 3).

5.3.2 Reactor Building Basemat Model

The ANSYS program (Reference 12) is used to develop the 3-D FE model of the R/B building basement. The model is developed with reference to the Cartesian coordinate system with origin located at the center of the PCCV foundation, at a point 2'-7" below the ground elevation and Z-axis oriented upward. The overall footprint of the PCCV, CIS and R/B common foundation is 309 feet in the NS direction and 210 feet in the EW direction, resulting in an area of 64,890 square feet. The SASSI model of the basement is simplified by neglecting the pits in the basemat.

The positive X and Y axes of the Cartesian coordinate system are oriented northward and westward, respectively. Table 5.3.2-1 present the model main vertical coordinates, and Tables 5.3.2-3 and 5.3.2-4 present the model main horizontal coordinates. The radii coordinates of the PCCV foundation are presented in Table 5.3.2-5. The coordinates of the external basement walls are set at the outer wall surface in order to accurately model the overall dimensions of the basement. The coordinates of interior basement walls are set at the wall centerline. The ANSYS input files also use a cylindrical coordinate system to create the central portion of the Basemat foundation under the PCCV. Table 5.3.2-4 lists the major radial coordinates used in the development of the R/B basement. Table 5.3.2-5 presents the groups of finite elements used to model different structural members of the basement.

The resulting model of the basement is shown in Figure 5.3.2-1 through Figure 5.3.2-5 These figures are generally arranged in order of ascending elevation. The model is comprised of solid brick type elements, plate elements, and rigid beam elements.

The material properties of the components of the model are based on the concrete properties given in Table 5.3.2-1 below.

Table 5.3.2-1 Input Material Properties

Structural Component	Concrete Compressive Strength (psi)	Young's Modulus ($x10^5$ ksf)	Poisson's Ratio	Damping	
				OBE	SSE
PCCV	7,000	6.86	0.17	3%	5%
R/B, HF/B and Basement	4,000	5.191	0.17	4%	7%
CIS	4,000	5.191	0.17	4%	5%

SASSI 3-D shell elements are used to model the basement shear walls, and the R/B slabs at ground floor elevation. The elastic modulus material property assigned to the shell elements of the shear walls is adjusted to accurately model the wall's shear stiffness, and account for the reduction of wall stiffness at the openings as described in Section 4.5.2. Table 5.3.2-7 presents the properties of the Shell elements modeling the walls with openings.

At the basemat solid elements located at the tendon gallery floors, Young's modulus and the density are reduced to account for the reduced thickness of the concrete at these locations. The 3-D beam elements are used to connect the shell elements at the top of the shear walls of the 3-D SASSI finite element model of the R/B basement to the lumped-mass stick model representing the above ground portion of the R/B and FH/A.

The basemat solid elements are shown in Figure 5.3.2-1.

The material properties assigned to the FE are adjusted to accurately model the actual bending stiffness and mass inertia of the basemat. Figure 5.3.2-2 shows the part of the FE model that represents the upper part of the thick portion of the Basemat under the PCCV. Flexible shell elements are used to account for additional bending stiffness of the thick central part of the basemat. The thickness and material properties assigned to these elements are presented in this figure.

Figure 5.3.2-3 shows the FE model components located below the PCCV and CIS. The rigid shell and beam elements connect the basemat with the rest of the model at ground elevation. Figure 5.3.2-5 shows the FE model shell elements of the floor slabs and the basemat at ground elevation. The thicknesses of the shells and the input material properties are also presented in the figure.

Figure 5.3.2-4 presents the shell elements used to model the shear walls of the R/B and FH/A basement. The material properties assigned to the shell FE are adjusted to model accurately the shear stiffness and mass inertia of the walls. The plate and beam elements shown in Figure 5.3.2-3 fit inside the center area of the shear wall element to complete the portion of the basement model that is located below the floor slabs at the ground elevation.

Figure 5.3.2-5 shows the FE model shell elements of the floor slabs and the basemat at ground elevation. The thicknesses of the shells and the input material properties are also presented in the figure.

Table 5.3.2-2 Basement Model Z-Coordinates (Down to Up)

Z (ft)	Elevation (ft)	Description
-37.420	782.00	Basemat Bottom
-24.083	795.34	Bottom of Basemat under Reactor
2.583	822.00	Ground Elevation

Table 5.3.2-3 Basement Model X-Coordinates (South to North)

X (ft)	Column Line	Description
-161.67	LR	South Exterior Wall
-139.33	K1R	R/B South Basement Wall
-127.00	KR	R/B South Basement Wall
-106.00	J1R	E-W Interior Wall R/B South Basement
-94.00	JR	Reactor Basemat South End
-73.92	H0.5R	R/B South Basement Wall
-39.08	GR - G2R	Reactor Basement South Edge
0.00	FR	Reactor E-W Centerline
39.08	D1R - ER	Reactor Basement North Edge
76.42	C0.5R	R/B North Interior Wall
94.00	CR	North Interior Wall
106.8	BR	Reactor Basemat North End
117.9	A1R	Basement Exterior Wall under F/HB Surface Mat
115.83	A2R	R/B North Interior Wall
147.25	AR	Basement North Exterior Wall

Table 5.3.2-4 Basement Model Y-Coordinates (East to West)

Y (ft)	Column Line	Description
-116.42	12R	Basement East External Wall (Short)
-106.67	11R	Basement East External Wall
-92.167	10R	Reactor Basemat East End
-85.667	9bR	R/B Basement N-S Interior Wall
-70.00	9R	R/B Basement N-S Interior Wall
-66.25	8bR	R/B Basement N-S Interior Wall
-48.75	8aR & 8R	Reactor Basement East Edge
-43.917	8R	N-S External Wall under F/HB Surface Mat
-38.833	7R	R/B Basement N-S Interior Wall
-8.5	6aR	R/B Basement N-S Interior Wall
-21.70	6bR	R/B Basement N-S Interior Wall
-31.70	7a1R	R/B Basement N-S Interior Wall
0.00	6R	Reactor N-S Centerline
17.833	5aR	Tendon Gallery Access Exterior Wall
39.333	4bR	Tendon Gallery Access West Wall
38.83	5R	R/B Basement N-S Interior Wall
59.58	4aR	Reactor Basement West Edge
61.50	4R	F/HB N-S Interior Wall
70.000	3R	R/B Basement N-S Interior Wall
86.583	2aR	F/HB and R/B N-S Interior Wall
92.167	2R	Reactor Basemat West End
106.67	1R	Basement West External Wall

Table 5.3.2-5 Basement Model Radial Coordinates

R (ft)	Description
0.00	Reactor Center
46.00	Reactor Pit Radius
71.83	Tendon Gallery Inner Radius
80.42	Tendon Gallery Outer Radius
93.50	Reactor Foundation Radius

Table 5.3.2-6 Finite Element Properties of R/B Basement Model

Structural Member	Element Type	Mass	Stiffness
Upper Portion of Reactor Mat	Shell	Weightless	Concrete fc=4000psi
FH/A Surface Basemat	Shell	Weightless	Concrete fc=4000psi
NS Exterior Walls	Shell	Concrete	Concrete fc=4000psi (adjusted)
EW Exterior Walls	Shell	Concrete	Concrete fc=4000psi (adjusted)
NS Basement Inner Shear Walls	Shell	Weightless	Concrete fc=4000psi (adjusted)
EW Basement Inner Shear Walls	Shell	Weightless	Concrete fc=4000psi (adjusted)
Connecting Shells	Shell	Weightless	Rigid
Ground Floor Slabs	Shell	Weightless	Concrete fc=4000psi
Basemat	Solid	Concrete	Concrete fc=4000psi (adjusted)
Fill Concrete	Solid	Concrete	Concrete fc=3000psi
Rigid Rim at top of Reactor Mat	Beam	Weightless	Rigid
PCCV stick Rigid Connection	Beam	Weightless	Rigid
CIS stick Rigid Connection	Beam	Weightless	Rigid
R/B-FH/A stick Rigid Connection	Beam	Weightless	Rigid
BS01 Lumped Mass Rigid Connection	Beam	Weightless	Rigid

Table 5.3.2-7 Adjusted Material Properties of Basement Shear Walls with Openings (Sheet 1 of 3)

Wall Location	Wall Dimensions (ft)			Openings Dimensions (ft)		Stiffness Ratios		Adjusted
	Thick.	Width	Height	Width	Height	Outplane	Inplane	E ($x10^5$ ksf)
CL-11R segment A1R-CR (-26'-4")	3.33	21.833	15.92	9.0	8.33	.593	.468	2.428
CL-1R segment CR-JR CL-11R segment CR-JR	3.33	188.00	15.92	8.0	8.33	.958	.879	4.562
CL-1R segment JR-KR CL-11R segment JR-KR	3.33	33.0	27.25	9.0	9.0	.758	.676	3.508
CL-2R segment H1R-GR (-26'-4") CL-10R segment H1R-GR (-26'-4")	2.67	40	15.52	3,6.6	6.83,10	.764	.677	3.514
CL-2R segment C1R-ER (-26'-4") CL-10R segment C1R-ER (-26'-4")	2.67	40	15.52	3,6.6	6.83,10	.764	.677	3.514
CL-2R segment H1R-JR (-26'-4") CL-10R segment H1R-JR (-26'-4")	3.33	19	16.5	9	16	.520	.106	0.550
CL-2R segment C1R-CR (-26'-4") CL-10R segment C1R-CR (-26'-4")	3.33	19	16.5	9	16	.520	.106	0.550
CL-2R segment C1R-ER (-8'-7") CL-10R segment C1R-ER (-8'-7")	3.33	40	8.83	3.0	6.83	.925	.888	4.609

Table 5.3.2-7 Adjusted Material Properties of Basement Shear Walls with Openings (Sheet 2 of 3)

Wall Location	Wall Dimensions (ft)			Openings Dimensions (ft)		Stiffness Ratios		Adjusted
	Thick.	Width	Height	Width	Height	Outplane	Inplane	E ($x10^5$ ksf)
CL-2R segment GR-H1R (-8'-7") CL-10R segment GR-H1R (-8'-7")	3.33	40	8.83	3.0	6.83	.925	.888	4.609
CL-CR segments 1R-2R & 10R-11R (-26'-4")	3.33	12.83	15.92	6.67	8.5	.488	.393	2.040
CL-CR segments 1R-2R & 10R-11R (-8'-7")	3.33	12.83	8.83	3	6.83	.763	.545	2.829
CL-J1R segments 2aR-3R & 9bR-9R	2.67	16.58	25.92	3	6.83	.866	.798	4.142
CL-J1R segments 3R-5R & 7R-9R	1.67	31.17	25.92	6.67	8.5	.816	.741	3.846
CL-J1R segments 5R-6R & 6R-7R	1.67	38.83	25.92	6.67	8.5	.853	.794	4.121
CL-K1R segments 1R-2aR & 11R-9bR	2.00	35	25.92	3	6.83	.939	.898	4.66
CL-BR segment YCMwest-YTGeast (-26'-4")	4.0	64.9	15.92	7,7	8.5,8.5	.789	.772	4.007
CL-BR segment 4R-YTGwest (-8'-7")	4.0	77.1	8.83	3,3	6.83,6.83	.922	.874	4.536
CL-A1R segment 2aR-4R (-8'-7" & above, no foundation @ EL -26'-4")	3.17	21.1	9.5	3.0	6.83	.857	.761	3.950
CL-A1R segment 8aR-11R (-26'-4")	2.67	40.58	17.75	6.0	8.5	.858	.827	4.292

Table 5.3.2-7 Adjusted Material Properties of Basement Shear Walls with Openings (Sheet 3 of 3)

Wall Location	Wall Dimensions (ft)			Openings Dimensions (ft)		Stiffness Ratios		Adjusted
	Thick.	Width	Height	Width	Height	Outplane	Inplane	E ($x10^5$ ksf)
CL-4R segment AR-CR (-26'-4")	4.0	54.99	15.92	3,7	6.83,8.5	.823	.733	3.804
CL-4R segment AR-CR (-8'-7")	4.0	54.99	9.5	5	6.83	.908	.870	4.515
CL-YCMwest segment AR-CR (-26'-4")	4.0	54.99	14.58	7	8.5	.874	.850	4.412
CL- YCMwest segment AR-CR (-8'-7")	4.0	45.17	8.83	3.33	8.83	.924	.787	4.085
CL-YTGwest segment AR-CR (-8'-7")	5.92	54.99	8.83	9.83	6.83	.822	.787	4.085
CL-8R segment AR-CR (-26'-4")	4.0	53.25	15.92	3,5	6.83,8.5	.854	.776	4.027
CL-8R segment AR-CR (-8'-7")	4.0	55	8.83	5	8.83	.907	.769	3.991
CL-9bR segment AR-A1R (-26'-4")	2.67	33.18	26.58	6.0	8.5	.848	.774	4.017