SASW Measurements in Taiwan at 26 Strong-Motion Recording Stations: Summary Report of the Shear Wave Velocity Profiles

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1.0 Introduction

Spectral-Analysis-of-Surface-Waves (SASW) measurements were performed at 26 strong-motion recording (SMR) station in Taiwan during January of 2003 by personnel from the University of Texas at Austin. These specialized seismic measurements were conducted in the field by Kenneth H. Stokoe, II, Brent Rosenblad, and Farn-Yuh Menq. Field testing was performed from January 16 through January 23, 2003. Analysis of the SASW data was performed at the University of Texas at Austin by Yin-Chen Lin.

Assistance in the field during the SASW testing was provided by Prof. Sheng-Huoo (Tony) Ni and several of his graduate students from National Cheng Kung University (NCKU) in Tainan and from Prof. Ding-Shing Cheng from Chung Cheng Institute of Technology (CCIT) in Taoyuan.

The goal of the seismic investigations was to determine shear wave velocity profiles to a depth of about 100 ft (30 m) at each test site. The sites were selected because of their proximity to strong-motion recording (SMR) stations that recorded ground motion during the 1999 Chi-Chi Earthquake. In total, 26 shear wave velocity profiles were determined.

This report contains a discussion of the SASW test method. The testing and analysis procedures are described, and the shear wave velocity profiles are presented. All data determined at each site, including pictures of the sites, are included in the appendices of this report.

2.0 Overview of the SASW Test Method

The SASW test method is a nondestructive and nonintrusive seismic method. The method utilizes the dispersive nature of Rayleigh-type surface waves propagating through a layered material to determine the shear wave velocity profile into the material (Reference 1). In this context, dispersion arises when surface wave velocity varies with wavelength or frequency. Dispersion in surface wave velocity arises from changing stiffness properties of the soil and rock layers with depth. This phenomenon is illustrated in Figure 1 for a multi-layered solid. A high-frequency surface wave, which propagates with a short wavelength, only stresses material near the exposed surface and thus only samples the properties of the shallow, near-surface material (Figure 1b). A lower-frequency surface wave, which has a longer wavelength, stresses material to a greater depth and thus samples the properties of the shallower and deeper materials (Figure 1c). Spectral analysis is used to separate the waves by frequency and wavelength to determine the experimental ("field") dispersion curve for the site. An analytical procedure is then used to theoretically match the field dispersion curve with a one-dimensional layered system of varying layer stiffnesses and thicknesses (Reference 2). The one-dimensional shear wave velocity profile that generates a dispersion curve which matches the field dispersion curve is presented as the shear wave velocity profile at the site.

SASW testing involves generating surface waves at one point on the exposed material surface and measuring the motions perpendicular to the surface created by the passage of the surface waves at two or more locations. All measurement points are arranged on the exposed surface along a single radial path from the source. Successively longer spacings between the receivers and between the source and first receiver are typically used to measure progressively longer and longer wavelengths. This general testing configuration for one source/receiver set-up is illustrated in Figure 2. The distance between the source and first receiver (d) is kept equal to the distance between receivers (d) as shown in Figure 2. Testing is performed with several sets of source-receiver spacings (generally eight or more different spacings), and the totality of the eight or more sets of source-receiver spacings is called an SASW array.

Phase plots from surface wave propagation between the receivers are recorded for each receiver spacing. From each phase plot, the phase velocity of the surface wave can be calculated at each frequency from:

$$V_R = f \bullet \frac{360}{\phi} \bullet d \tag{1}$$

where V_R is the phase velocity in ft/sec or m/s, f is the frequency in Hertz (cycles per sec), ϕ is the phase angle in degrees (at frequency f), and d is the distance between the receivers in the same length units as used to represent V_R. From this calculation, a plot of phase velocity versus frequency, called an individual dispersion curve, is generated. This procedure is repeated for all source-receiver spacings used at the site and typically involves significant overlapping in the dispersion data between adjacent receiver sets. The individual dispersion curves from all receiver spacings are combined into a single composite dispersion curve called the experimental or field dispersion curve.

Once the composite dispersion curve is generated for the site, an iterative forward modeling procedure is used to create a theoretical dispersion curve to match this experimental curve (Reference 2). The stiffness profile that provides the best match to the experimental dispersion curve is presented as the shear wave velocity, V_S, profile at the site. Typical comparisons between V_S profiles measured by SASW testing and by independent crosshole seismic tests are presented in Figures 3 and 4 for work conducted in earlier studies (References 2, 3, and 4).

3.0 Summary of Field Procedures Used at Taiwan SMR Sites

3.1 Equipment and Testing Procedures:

A total of 26 SMR sites were evaluated in the Taiwan project. The approximate locations of these 26 SMR sites are shown on the map in Figure 5. An expanded map showing the locations is presented in Figure 6. The equipment and test procedures used at each SASW test location are described below.

The generalized arrangement of the SASW source and receivers used in field testing is illustrated in Figure 2. Vertical velocity transducers were used as receivers. The majority of the tests in Taiwan were conducted with Mark Products Model L-4C transducers which have a natural frequency of 1 Hz. The key points with regard to these receivers are that: (1) they have significant output over the measurement frequency range

(2 Hz to 300 Hz), (2) they are matched so that any differences in phase are negligible over the measurement frequency range, (3) they are coupled well to the soil, and (4) the coupling is similar for each receiver. These 1-Hz geophones have outputs in excess of 10 volts/(in./sec)(0.394 volts/(mm/sec)) and phase shifts between receivers of less than 3.6 degrees for frequencies from 2 Hz to 300 Hz, the range used in testing with these receivers.

Most of the field testing performed in Taiwan was located around elementary schools and close to classrooms. To obtain V_s profiles to a depth of about 100 ft (30 m), a large impact source (described below) was required. Noise from the large impact source could disturb the students. Therefore, an efficient arrangement of source and receivers was developed to minimize testing time around the schools. This arrangement, called the modified receivers-midpoint geometry, is illustrated in Figure 7. In this arrangement, three receivers were employed. The distance from the impact source to the first receiver equaled the distance between the first and second receivers, and the spacing between the impact source and the second receiver equaled the spacing between the second and third receivers. The major advantage of adopting this configuration was limiting the time the large source was required near the schools because two sets of data were obtained from each source location.

In the case of shorter test spacings, a smaller impact source (a sledge hammer) was used, and SASW testing was conducted in both the forward and reverse directions as illustrated in Figure 7. Due to limited space at the schools and in an attempt to minimize disturbance from noise, only forward-direction testing with the large impact source and longer receiver spacings was performed. Longer distances are defined as distances between the second and third receivers larger than 25 ft (7.6 m). This forward-direction testing arrangement is illustrated in Figure 8. By employing the modified receiver geometry and keeping the large impact source in one location, it was possible to collect twice as much data in the same amount of time compared with the conventional SASW testing arrangement (shown in Figure 2). As long as the dispersion curves from the different receiver spacings were consistent with each other and the dispersion curves overlapped as they did, the testing results were used with confidence.

Generally, receiver spacings of 3, 6, 12, 25, 50, 75, 100 ft (0.9, 1.8, 3.7, 7.6, 15.2, 22.9 and 30.5 m) were used. However, maximum distances between the second and third receivers varied, depending on the available space at the test site. The maximum spacing was 125 ft (38 m) at Si-Kon Elementary School (TGU-068) and Cheng - Jung Elementary School (TCU-128). The shortest distance between the first receiver and the second receiver was 3 ft (0.9 m) at most sites. This number and progression of receiver spacings resulted in extensive overlapping of individual dispersion curves used to develop the composite field curve which enhanced the test reliability

Two types of sources were used to generate energy over the required frequency ranges. At the shorter receiver spacings (typically equal to or less than 25 ft (7.6 m)), a sledge hammer was used to impact the ground. Use of the sledge hammer at one site is shown in Figure 9. At larger receiver spacings (typically larger than 25 ft (7.6 m)) a DynaSource was employed. A DynaSource is often used in surface refraction and surface reflection tests. A picture of the DynaSource is shown in Figure 10. The location of DynaSource was fixed at most sites. In this case, the locations of receivers were moved to the planned spots for different source/receiver spacings as illustrated in Figure 8.

The recording device used in these tests was an Agilent 35670A Dynamic Signal Analyzer, a four-channel analyzer. The dynamic signal analyzer was used to collect the time records and to perform calculations in the frequency domain so that the relative phase of the cross-power spectrum (discussed below) was reviewed at each receiver spacing during data collection. This process also allowed the operator to subjectively evaluate the data being collected in the field to assure consistency with expected Rayleigh wave propagation in a layered halfspace.

3.2 Spectral Calculations

The dynamic signal analyzer was used to measure time-domain records (x(t) and y(t)) from adjacent pairs of receivers at each receiver spacing. These time records were then transformed into the frequency domain (X (f) and Y (f)) and used to calculate the power spectra (G_{XX} and G_{YY}), the cross spectrum (G_{XY}) and the coherence function (γ^2). Expressions for these quantities are:

$$G_{XX} = X^*(f) \bullet X(f) \tag{2}$$

$$G_{YY} = Y^*(f) \bullet Y(f) \tag{3}$$

$$G_{XY} = X^*(f) \bullet Y(f) \tag{4}$$

$$\phi(f) = \arctan \bullet \frac{\mathrm{Im}(G_{XY})}{\mathrm{Re}(G_{XY})} \tag{5}$$

$$\gamma^2(f) = \frac{\left|G_{XY}(f)\right|^2}{G_{XX}(f) \bullet G_{YY}(f)} \tag{6}$$

where $G_{XY}(f) = \frac{1}{N}\sum_{i=1}^{N} X^{'}(f) \bullet Y_i(f)$ is the cross power spectrum from coherent signal averaging, (*) represents the complex conjugate of the quantity, Im signifies the imaginary part of the expression, Re signifies the real part of the expression, and $\phi(f)$ is the relative phase of the cross power spectrum.

The relative phase of the cross spectrum $\phi(f)$ is the key spectral quantity in SASW testing. The coherence function of averaged measurements is also an important indicator of the quality of the measurement over the monitored frequency range. Low values of coherence indicate a possible decrease in data quality. Typically, five time-domain records were averaged in the determination of the spectral functions. In some case, if the data in the low-frequency was not clear, additional impacts would be averaged. The relative phase of the cross spectrum, simply called the phase hereafter, represents the phase difference of the motion between the two receivers in the receiver set. One set of spectral functions was measured for each receiver spacing and testing direction. Most of the phase plots that were used in the interpretation of the data are presented in the 26 Appendices attached at the end of this report.

As an example, the wrapped phase spectrum and coherence function from one receiver spacing are shown in Figure 11. The data were collected with the 100-ft (30-m) receiver spacing recorded at Lin-Chong Elementary School (CHY-024) and are used in the example discussed below.

3.3 Data Reduction and Forward Modeling Procedures

The data collected in the field in the form of phase plots and coherence functions were transferred from the data disks recorded by the analyzer to a desktop computer. The data were then reduced and interpreted using the program WinSASW, developed by Sung Ho Joh at the University of Texas at Austin (Reference 2). For each receiver spacing, the phase plot and coherence function were loaded into WinSASW. A masking procedure was performed to manually eliminate portions of the data with poor signal quality or portions of the data likely contaminated by near-field body and surface waves. Figure 12 shows the masking applied to the phase plot collected at Site Lin-Chong elementary school site (CHY-024) shown in Figure 11. The masking of every phase plot used in the data analysis at each site is presented in Table 1 of each Appendix in this report. The program WinSASW uses the masking information to unwrap the phase plot and calculate the dispersion curve using the relationship presented in Equation 1. Figure 13 shows the individual dispersion curve created from the masked phase plot shown in Figure 12. This process was repeated for all receiver spacings, resulting in an experimental dispersion curve covering a wide range of wavelengths (typically 1 ft (0.3 m) to about 200 ft (61 m)). Figure 14 shows the composite experimental dispersion curve created at Lin-Chong elementary school site (CHY-024). It is worthwhile noting in Figure 14 that there is significant overlap in the individual dispersion curves.

The next step in the data reduction procedure was the creation of the theoretical dispersion curve. The program WinSASW was also used for this purpose. WinSASW uses an algorithm developed by Dr. Jose Roesset using a stiffness matrix approach to generate a theoretical dispersion curve for a given shear wave velocity profile (Reference 5). The theoretical dispersion curve can be generated using either the first-mode Rayleigh wave solution (termed 2D approach) or a complete solution which includes all modes and all body waves (termed 3D approach). For these analyses, the more accurate 3D approach was employed.

To begin the forward modeling process, an initial shear wave velocity profile was assumed based on the characteristics of the measured experimental dispersion curve. The theoretical dispersion curve was generated and compared to the experimental curve. The shear wave velocity profile features (shear wave velocities and layer thicknesses) were iteratively changed until an acceptable fit to the experimental curve was achieved. It is important to mention that the goodness of fit of the theoretical dispersion curve to the experimental dispersion curve is based on experience and judged “by eye”. Figure 15 shows the final fit to the composite experimental dispersion curve for site at Lin-Chong elementary school (CHY-024), and Figure 16 shows the final shear wave velocity profile.

The theoretical and experimental dispersion curves generated at each site are presented in each Appendix attached to this report. There is one Appendix for each one of the 26 test sites. For the theoretical analysis, several assumptions had to be made. First, the total unit weight and Poisson’s ratio of the material were assumed. Poisson’s ratio was assumed to be 0.25 for all materials. When no water table is present, the values of Poisson’s ratio have only a minor influence on the calculated dispersion curve. A total unit weight of 120 pcf (18.9 KN/m^3) was assumed for material with a shear wave velocity less than 2000 fps (610 m/s), a total unit weight of 125 pcf (19.7 KN/m^3) was assumed for material with velocities between 2000 fps (610 m/s) and 3000 fps (914 m/s), and a total unit weight of 130 pcf (20.4 KN/m^3) was assumed for materials with a shear wave velocity greater or equal to 3000 fps (914 m/s). Relative changes in total unit weight with depth affect the dispersion curve, but again the effect on the final shear wave velocity profile is minor. Therefore, precise knowledge of these values is not required. However, the values of Poisson’s ratio of the soil layers under the water table are calculated in the WinSASW program. The P-wave velocities of soil layers below the water table were assumed to be 5000 fps (1524 m/s), and, in the WinSASW program, the values of Poisson’s from the assumed P-wave and S-wave velocities were calculated.

Secondly, the theoretical dispersion curve can be generated using different assumptions of receiver locations. For these analyses, the theoretical dispersion curve was calculated assuming Source-to-Receiver-1 spacing of two wavelengths, and Source-to-Receiver 2 spacing of four wavelengths. These receiver locations represent far-field motions. Past studies have shown that the range in wavelengths collected in the SASW test do not differ significantly from the far-field motions (References 6, 7, and 8). However, in order to have more confidence in the SASW results, an array inversion method was used in this report to fit the experimental dispersion curve of the longest spacing at each site (Reference 2). Lastly, the final shear wave velocity profile is presented to a depth of approximately 0.5 times the maximum wavelength in the experimental dispersion curve. This cutoff depth is based on the fact that most of the particle motion occurs at depths less than one-half of the wavelength, as shown in Figure 1. Past experience has shown this to be an acceptable cut-off depth for many shear wave velocity profiles. All final shear wave velocity profiles are presented graphically and in tabular form in the Appendices of this report.

4.0 Summary of V_S Profiles from SASW Testing in Taiwan

A total of 26 shear wave velocity (V_S) profiles were generated for the Taiwan SASW test sites. The approximate locations of the SASW sites are superimposed on an expanded map of Taiwan in Figure 6. Each solid dot on the map represents an SASW test site. All 26 shear wave velocity profiles from these sites are presented in Figure 17.

Of the 26 V_s profiles, only 3 profiles extended to depths of 100 ft (30 m) or greater. For the remaining 23 sites, V_S profiles were not measured to a depth of 100 ft (30 m). In this case, extrapolation of the profile to 100 ft (30 m) was done so that the average shear wave velocity of the top 30 m ($V_{S,30}$) could be estimated. (The extrapolation at each of the 23 sites is shown in the appendices.) The value of $V_{S,30}$ was used to classify each site according to the Uniform Building Code (UBC-97) site classification system. The UBC-97 site categories are given in Table 1. Among the 26 sites, 22 sites classify as "Class C" and four sites classify as "Class D". Class C sites have $V_{S,30}$ in the range from

360 m/s (1200 fps) to 760 m/s (2500 fps) and Class D sites have $V_{S,30}$ in the range from 180 m/s (600 fps) to 360 m/s (1200 fps). The site classifications and $V_{S,30}$ values of all 26 SMR sites are presented in Table 2.

As seen in the comparison of all 26 shear wave velocity profiles in Figure 17, the four "Class D" sites are separated from the stiffer "Class C" sites, with a distinct gap in the V_S values between the two different site classifications. The median and 16^{th} and 85^{th} percentile boundaries of the 22 "Class C" sites and the four "Class D" sites are shown in Figures 18 and 19, respectively. The tabulated data are presented in Tables 3 and 4, respectively.

It is also interesting to see the statistical evaluation of the "Class C" profiles if only V_S values less than 2500 fps (760 m/s) are included ("filtered" profiles). These "filtered" V_S profiles are shown in Figure 20, with the statistical analysis shown by the gray lines. As expected, the median values decreased below about 40 ft (12 m) and the $\pm \sigma$ range also decreased below 40 ft (12 m) when compared with the "unfiltered" profiles (see Figure 18). The statistical results in Figure 20 are compared with V_S values predicted for dense sandy gravels (void ratios from 0.25 to 0.40 and uniformity coefficients of 10 to 50) in Figure 21. Clearly, the "filtered" Class C profiles (representing only dense soil and soft rock without any stiffer materials in the lower portion of the profiles) are generally stiffer than uncemented, reconstituted gravelly soils. Two likely contributors to the increased stiffness of the in situ material are: (1) cementation and (2) higher horizontal stresses in situ.

5.0 Benefits and Limitations of the SASW Method

The SASW method has several advantages over conventional seismic field methods in evaluating shear wave velocity profiles. First, the SASW method is both nondestructive and nonintrusive, and can therefore be performed without greatly affecting the surrounding environment. Secondly, because the SASW method does not require a borehole for the test to be performed, it can be done rather quickly (2 to 4 sites per 10-hour day, if minimal travel between sites) and an extensive amount of ground can be investigated. This coverage is a significant advantage over borehole methods which investigate localized areas in and around the borehole. The SASW method can be a useful tool to supplement the information from borehole methods in order to fill in V_S information between boreholes. Thirdly, the SASW method operates using wavelengths that are within the range of wavelengths excited by earthquakes (although they are considerably shorter than the longest wavelength excited by earthquakes). Therefore, for earthquake applications, the SASW method provides soil and rock stiffness over a range in wavelengths that is appropriate for earthquake analysis.

Although there are several advantages gained from using the SASW method, some limitations exist that should be understood by the user of this information. First, the theoretical model used to determine the shear wave velocity profile at a site is a one-dimensional layered model, meaning there is an assumption of no lateral variation in shear wave velocity and layer thickness across the extent of the receiver array (hence uniform horizontal layers). Therefore, the profile that is presented represents a 1-D layered model that fits the measured dispersion data. It should be noted that lateral variability can be observed qualitatively from mismatches in the individual experimental dispersion curves from adjacent receiver spacings. Secondly, successful implementation of the SASW method requires that multiple receiver spacings are used at one site. This poses some difficultly when creating a single theoretical dispersion curve to match the experimental dispersion curve. Because the actual receiver spacing is not used, the theoretical dispersion curve is calculated assuming that the receivers are located 2λ and 4λ (λ is wavelength) from the source. Past experience has shown that this assumption does not greatly affect the final shear wave velocity profile determined at the site. However, in order to have more confidence in the SASW results, array inversion method was used in this report to fit the experimental dispersion curve of longest testing spacing at each site (Reference 2). Lastly, as the wavelength, and hence depth of penetration, increases the surface wave propagates through a greater soil volume. Therefore, the resolution of the SASW method (ability to detect changes in velocity and layer thickness at depth) decreases as the wavelength increases. Therefore, the SASW resolution is best near the surface and lowest at the greatest depths in the profile.

6.0 Comparison of V_s Profiles from SASW and P-S Suspension Logging

During this project, some V_S data with the P-S suspension logger became available for 10 sites where SASW testing was also performed. These data are compared with the SASW V_s profiles, phase plots, and even dispersion curves in the Appendices. The 10 sites at which both types of seismic tests were performed are listed in Table 5. Two of these sites are "Class D" sites and 8 sites are Class "C" sites. The V_S profiles from the 10 P-S logger sites are plotted together in Figure 22. As with the 26 V_S profiles from SASW testing shown in Figure 17, there is a clear separation between the "Class C" and "Class D" V_S profiles.

It is interesting to compare the V_S profiles from both seismic testing methods. This comparison is more appropriately performed with the 8 Class C sites because there are too few Class D sites. The comparison is presented in Figure 23 in terms of profiles showing the median and the 16^{th} and 84^{th} percentiles boundaries. The profiles at each site have been adjusted for any differences in elevations at the test locations. In addition, the P-S logging profile often extended deeper than the SASW profile. However, only P-S logging profiles over the same depth intervals as the SASW profiles were used in this comparison. The following points should be considered and/or are evident in viewing the comparison in Figure 23. First, the top 10 ft (3 m) in each profile should not be considered, due mainly to potential differences in the near-surface soils between the SASW and P-S logger locations at each SMR site. Second, the V_S profiles from the P-S logger give values that are unrepresentatively high in the depth range of 10 to 30 ft (3 to 9 m). This overprediction may result, in part, from wave interactions with the casing. Below 30 ft (9 m), there is a good comparison in the V_S profiles measured by the two measurement methods, with the exception of the SASW profile in the 65- to 80-ft (20- to 24-m) depth range where the SASW-determined values seem to be too high for unknown reasons.

The $V_{S,30}$ values determined by the SASW and P-S suspension logging methods are compared in Table 5. As seen in the table, the P-S suspension logger generally gives somewhat higher $V_{S,30}$ values, most likely due to the slightly higher V_S values in the top

30 ft (9 m). However, the UBC-97 site classifications from both seismic methods are the same.

7.0 Summary and Conclusions

SASW seismic testing was performed at 26 SMR sites in Taiwan by personnel from the University of Texas in January, 2003. Pictures of the sites and results from the SASW tests are presented in the appendices of this report. As a result of these tests, V_s profiles were determined at the 26 SMR stations. The final V_s profiles are presented in Figure 17. The V_s profiles were used to classify each site according to the Uniform Building Code (UBC-97) site classification system. Among the 26 sites, 22 sites classify as “Class C” sites and four sites classify as “Class D” sites as listed in Table 2. Statistical evaluations of the V_S profiles of the “Class C” sites are presented in Figure 18 and Table 3 and Figure 19 and Table 4 for the “Class D” sites. Shear wave velocity profiles were also determined with the P-S suspension logger at 10 sites where SASW testing was conducted. Comparisons between the statistical evaluations of the V_S profiles determined by both seismic methods are presented in Figure 23 (for the 8 “Class C” sites). Although some differences existed in the V_s profiles determined by each seismic method, the site classifications were the same for both methods.

8.0 Acknowledgements

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Table 1 UBC-97 Site Categories

Soil Profile Type	Average Shear Wave Velocity of Top 30 m, $V_{s,30}$ (m/s) [Top100 ft, $V_{s,100}$ (ft/s)]	Description
S_A	$V_{s,30}$>1500 m/s [$V_{s,100}$>5000 ft/s]	Hard rock
S_B	760 m/s < $V_{s,30}$≤1500 m/s [2500 ft/s < $V_{s,100}$≤5000 ft/s]	Rock
S_C	360 m/s < $V_{s,30}$≤760 m/s [1200 ft/s < $V_{s,100}$≤2500 ft/s]	Very dense soil and soft rock
S_D	180 m/s ≤ $V_{s,30}$≤360 m/s [600 ft/s < $V_{s,100}$≤1200 ft/s]	Stiff Soil Profile
S_E	$V_{s,30}$< 180 m/s [$V_{s,100}$ < 600 ft/s]	Soft Soil Profile
S_F	-	Soils requiring site-specific evaluation.

Table 2 Average Shear Wave Velocity of Top 30 Meters ($V_{S,30}$) and Uniform Building Code (UBC-97) Site Classification of Taiwan SASW Test Sites at 26 SMR Stations

No.	Site Name	Station No. & Owner	$V_{s,30}$ (ft/s)	UBC-97 Site Classification
1	Lin - Chong Elementary School	CHY-024	1290 #	C
2	Ton - Lo Elementary School	TCU-039	1810 *	C
3	Cheou - Shio Elementary School	TCU-049	1490 ##	C
4	Wu - Fon Elementary School	TCU-065	800	D
5	Si - Kon Elementary School	TCU-068	1660 ++	C
6	Suan - Don Elementary School	TCU-071	1930 ++	C
7	Kuo- Sing Elementary School	TCU-072	1370	C
8	Nan - Kon Elementary School	TCU-074	1370 *	C
9	Chiou - Tun Elementary School	TCU-075	1480 ++	C
10	Nan - To Elementary School	TCU-076	1655 **	C
11	Shai - Li Elementary School	TCU-078	1540 +	C
12	Tor - Se Elementary School	TCU-079	1390 **	C
13	Fon - Ton High School	TCU-102	1770	C
14	Nai - Pu Elementary School	TCU-103	2060 **	C
15	Yuan - Lin Elementary School	TCU-110	700 ##	D
16	Sin - Hua Elementary School	TCU-113	780 +	D
17	Si - Hu Elementary School	TCU-115	750 **	D
18	Ten - Chong High School	TCU-116	1250 *	C
19	Ton - Ang Elementary School	TCU-120	1360 +	C
20	A - Sua Elementary School	TCU-122	1560 **	C
21	Cheng - Jung Elementary School	TCU-128	1720 ##	C
22	Sin - Jai Elementary School	TCU-129	2180 **	C
23	Kung - Chung Elementary School	TCU-052	1290 **	C
24	Sin - San Elementary School	TCU-054	1660 **	C
25	Tai - Chung Weather Station	TCU-082	1320 ##	C
26	Chi - Nan University	TCU-148	1370 *	C

* Based on extrapolating the V_S profile in the bottom 10 ft (4 sites).
** Based on extrapolating the V_S profile in the bottom 15 ft (8 sites).
\# Based on extrapolating the V_S profile in the bottom 20 ft (1 sites).
\## Based on extrapolating the V_S profile in the bottom 30 ft (4 sites).
\+ Based on extrapolating the V_S profile in the bottom 40 ft (3 sites).
\++ Based on extrapolating the V_S profile in the bottom 55 ft (3 sites).

Table 3 Statistical Evaluation of the Shear Wave Velocity Profiles from the 22 "Class C" Sites in Taiwan

Depth		Median V_s,		Mean V_s		16th Percentile Boundary*		84th Percentile Boundary*	
ft	m	fps	m/s	fps	m/s	fps	m/s	fps	m/s
0	0.0	490	149	561	171	261	80	848	259
1	0.3	500	152	528	161	361	110	694	211
2	0.6	625	191	640	195	462	141	816	249
3	0.9	675	206	681	208	513	156	849	259
4	1.2	700	213	726	221	487	148	963	293
5	1.5	775	236	819	250	590	180	1045	319
6	1.8	800	244	838	255	619	189	1055	321
7	2.1	850	259	865	264	647	197	1083	330
8	2.4	900	274	906	276	659	201	1152	351
9	2.7	900	274	950	290	714	217	1185	361
10	3.0	925	282	962	293	728	222	1196	364
15	4.6	1125	343	1121	342	862	263	1378	420
20	6.1	1250	381	1285	392	1020	311	1548	472
25	7.6	1400	427	1459	445	1180	360	1737	529
30	9.1	1525	465	1582	482	1292	394	1870	570
35	10.7	1625	495	1716	523	1329	405	2101	640
40	12.2	1750	533	1773	540	1400	427	2144	653
45	13.7	1800	549	1898	578	1452	443	2341	714
50	15.2	1800	549	1879	573	1501	457	2256	687
55	16.8	1800	549	1911	582	1536	468	2284	696
60	18.3	2000	610	1989	606	1568	478	2410	734
65	19.8	2000	610	2126	648	1666	508	2584	788
70	21.3	2100	640	2197	670	1751	534	2641	805
75	22.9	2500	762	2270	692	1837	560	2702	824
80	24.4	2500	762	2339	713	1868	569	2809	856
85	25.9	2500	762	2388	728	1933	589	2842	866
90	27.4	2300	701	2433	742	1836	560	3028	923
95	29.0	2400	732	2450	747	1945	593	2953	900
100	30.5	2650	808	2650	808	2036	621	3261	994
105	32.0	2650	808	2650	808	2036	621	3261	994
110	33.5	2650	808	2650	808	2036	621	3261	994
114	34.7	2650	808	2650	808	2036	621	3261	994

* Based on a log-normal distribution

Table 4 Statistical Evaluation of the Shear Wave Velocity Profiles from the Four "Class D" Sites in Taiwan

Depth		**Median V_s,**		**Mean V_s**		**16th Percentile Boundary***		**84th Percentile Boundary***	
ft	**m**	**fps**	**m/s**	**fps**	**m/s**	**fps**	**m/s**	**fps**	**m/s**
0	0.0	510	155	525	160	407	124	643	196
1	0.3	510	155	525	160	407	124	643	196
2	0.6	640	195	608	185	497	151	718	219
3	0.9	640	195	608	185	497	151	718	219
4	1.2	640	195	608	185	497	151	718	219
5	1.5	540	165	558	170	446	136	669	204
6	1.8	540	165	558	170	446	136	669	204
7	2.1	465	142	453	138	415	127	490	149
8	2.4	465	142	453	138	415	127	490	149
9	2.7	475	145	458	139	419	128	496	151
10	3.0	475	145	458	139	419	128	496	151
15	4.6	520	158	528	161	476	145	579	176
20	6.1	585	178	580	177	559	170	601	183
25	7.6	585	178	580	177	559	170	601	183
30	9.1	690	210	688	210	610	186	764	233
35	10.7	690	210	688	210	610	186	764	233
40	12.2	730	223	713	217	617	188	808	246
45	13.7	780	238	738	225	640	195	835	254
50	15.2	780	238	813	248	609	186	1014	309
55	16.8	780	238	813	248	609	186	1014	309
60	18.3	1000	305	1000	305	919	280	1081	329
65	19.8	1000	305	1000	305	919	280	1081	329
70	21.3	1000	305	967	295	909	277	1024	312

* Based on a log-normal distribution

Table 5 SMR Sites at Which Both SASW and P-S Suspension Logging were Performed

No.	Site Name	SMR Station No.	Max. Depth* (ft)	SASW Estimated $V_{s,30}$ (fps)	P-S Log $V_{s,30}$ (fps)	Site Class.△	GWT (NCREE) (ft)
1	Cheou - Shio Elementary School	TCU-049	74	1490	1600	C	7.5
2	Wu - Fon Elementary School	TCU-065	116	800	940	D	6.5
3	Kuo- Sing Elementary School	TCU-072	127	1370	1500	C	26
4	Chiou - Tun Elementary School	TCU-075	46	1480	1790	C	10
5	Nan - To Elementary School	TCU-076	87	1655	2020	C	25
6	Fon - Ton High School	TCU-102	114	1770	2340	C	15
7	Yuan - Lin Elementary School	TCU-110	70	700	650	D	10
8	Sin - San Elementary School	TCU-054	87	1660	1390	C	33
9	Tai - Chung Weather Station	TCU-082	78	1320	1580	C	9.8
10	Chi - Nan University	TCU-148	95	1370	1590	C	150

* Based on SASW tests
△ Based on SASW Profiles and UBC-97

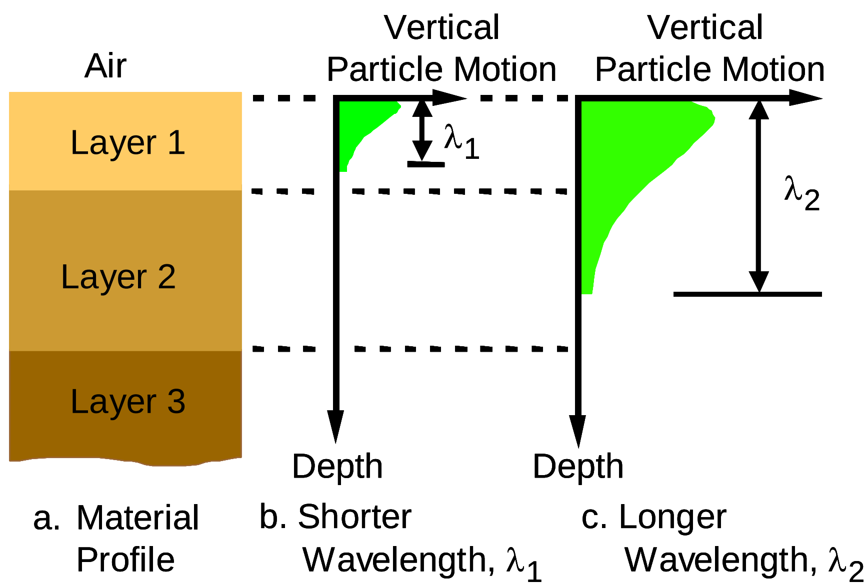


Figure 1 Illustration of Surface Waves with Different Wavelengths Sampling Different Materials in a Layered System which Results in Dispersion in Wave Velocities

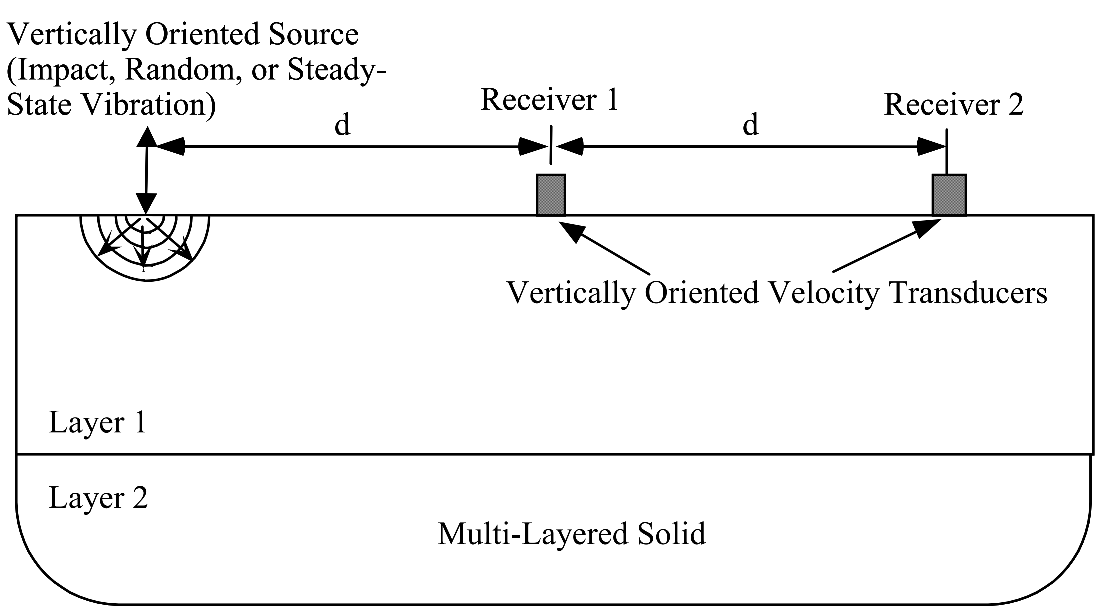


Figure 2 Schematic Diagram of the Generalized Equipment Arrangement Used in Spectral-Analysis-of-Surface-Waves (SASW) Testing

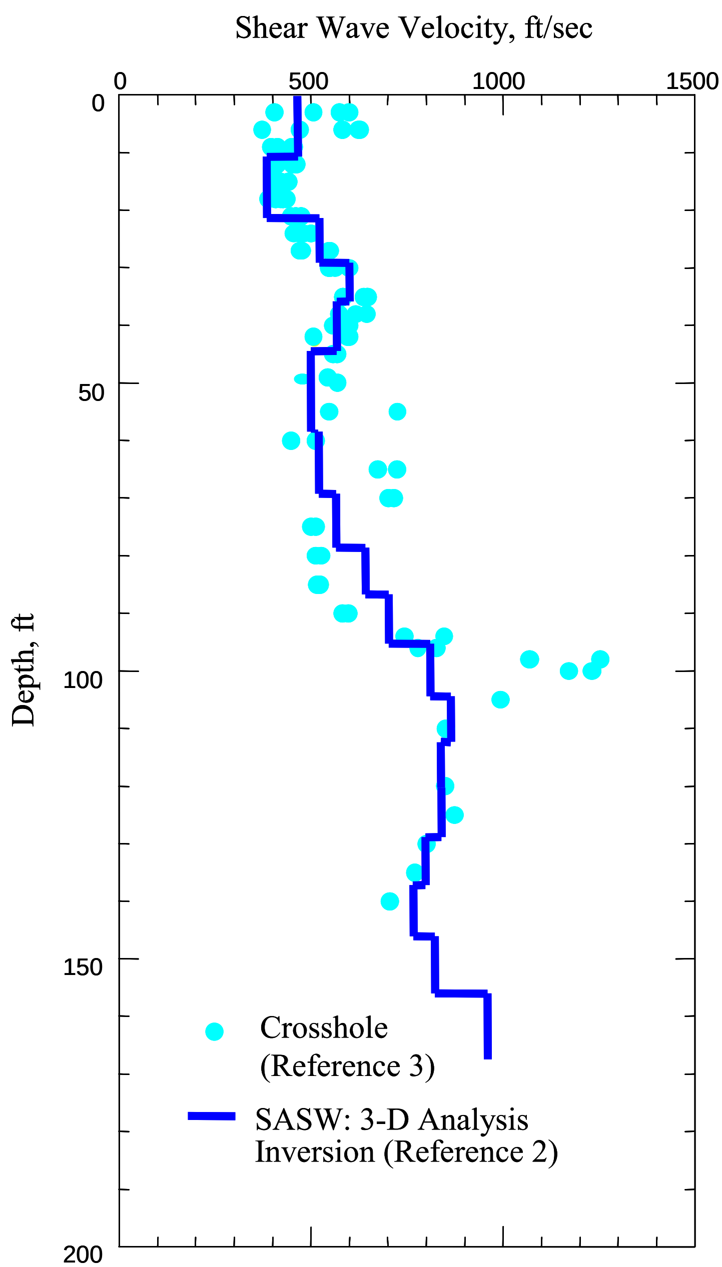


Figure 3 Comparison of Shear Wave Velocity Profiles from SASW and Crosshole Measurements Performed at the Treasure Island Site in California (References 2 and 3)

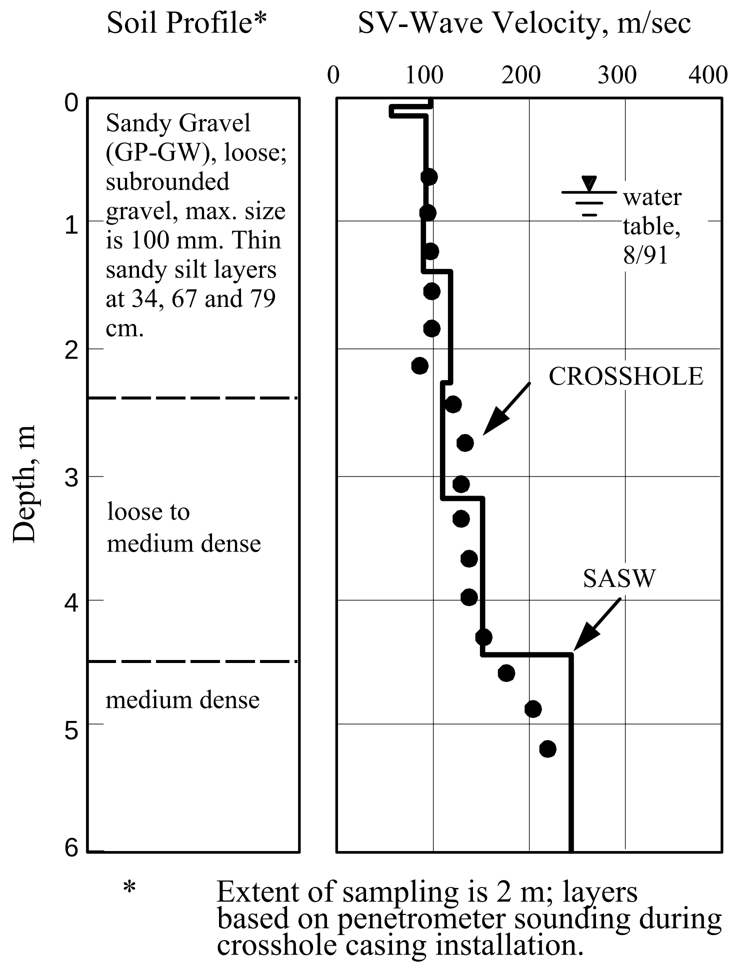


Figure 4 Comparison of Shear Wave Velocity Profiles from SASW and Crosshole Measurements Performed at Gravel Site in Idaho (Reference 4)

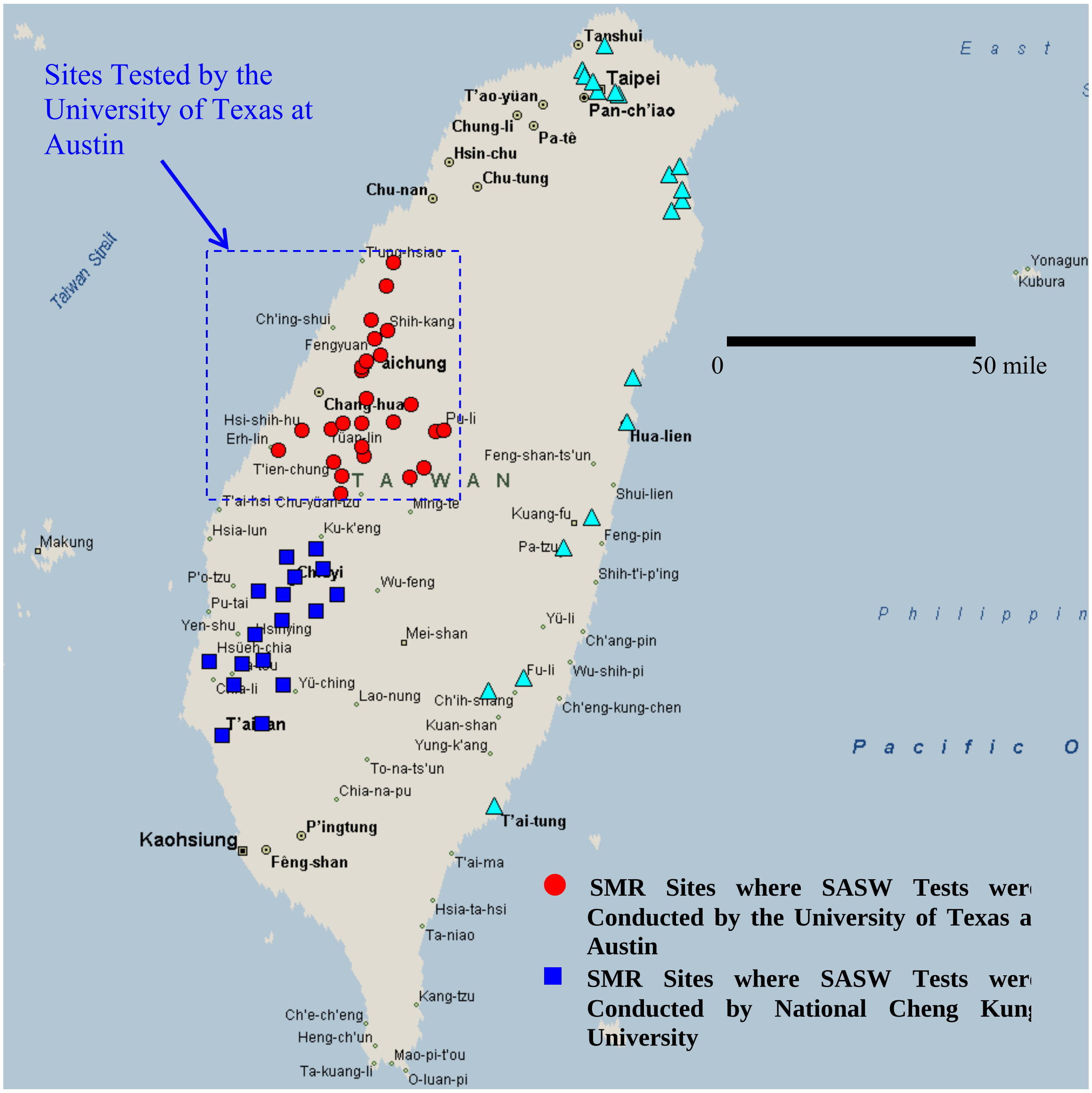


Figure 5 Approximate Locations of the 26 SASW Test Sites in Taiwan

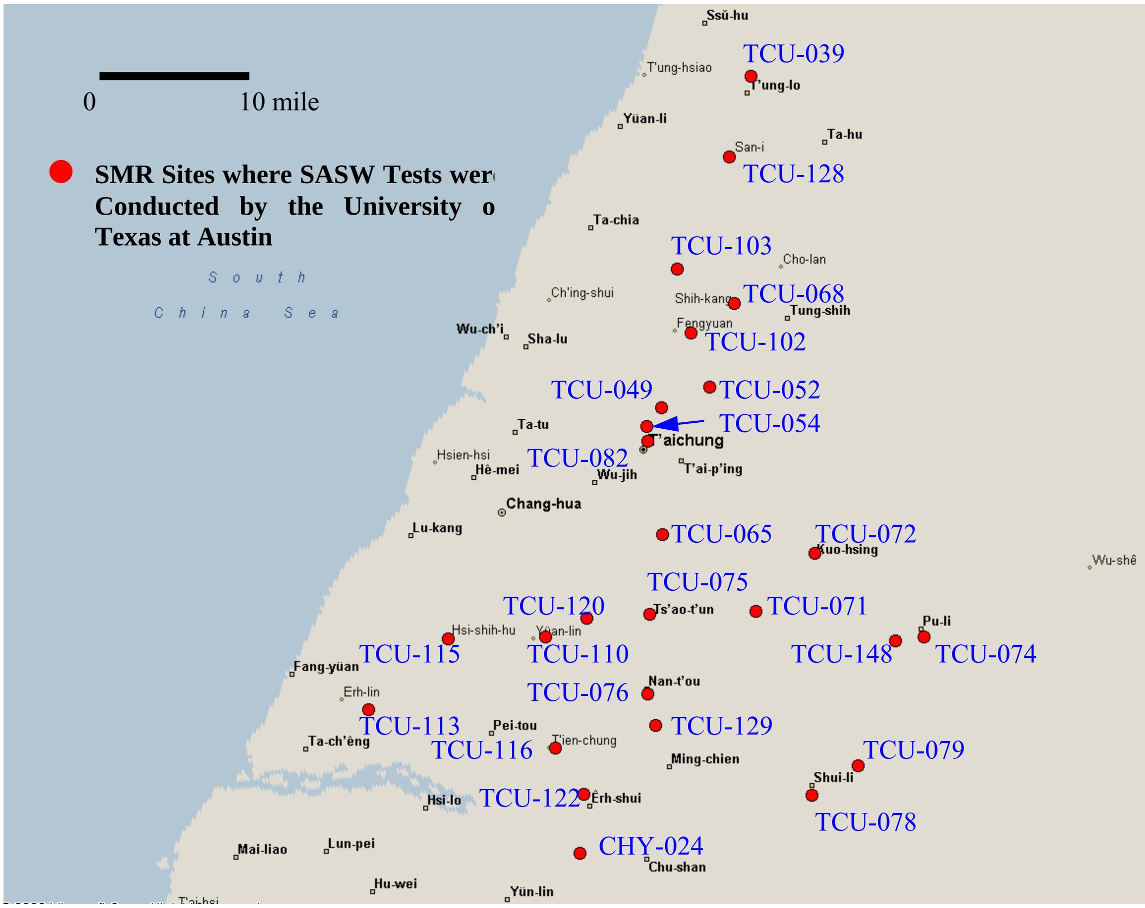


Figure 6 Expanded Map of Taiwan Showing the Approximate Locations of the 26 SASW Test Sites and the Numbers of the Associated SMR Stations

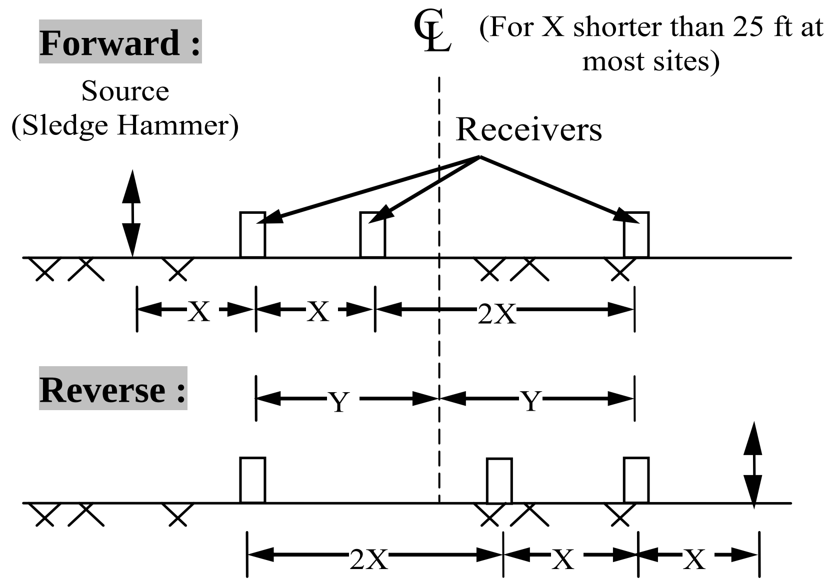


Figure 7 Modified Receivers-Midpoint Geometry Used with the Sledge-Hammer Source and Shorter Receiver Spacings in Taiwan

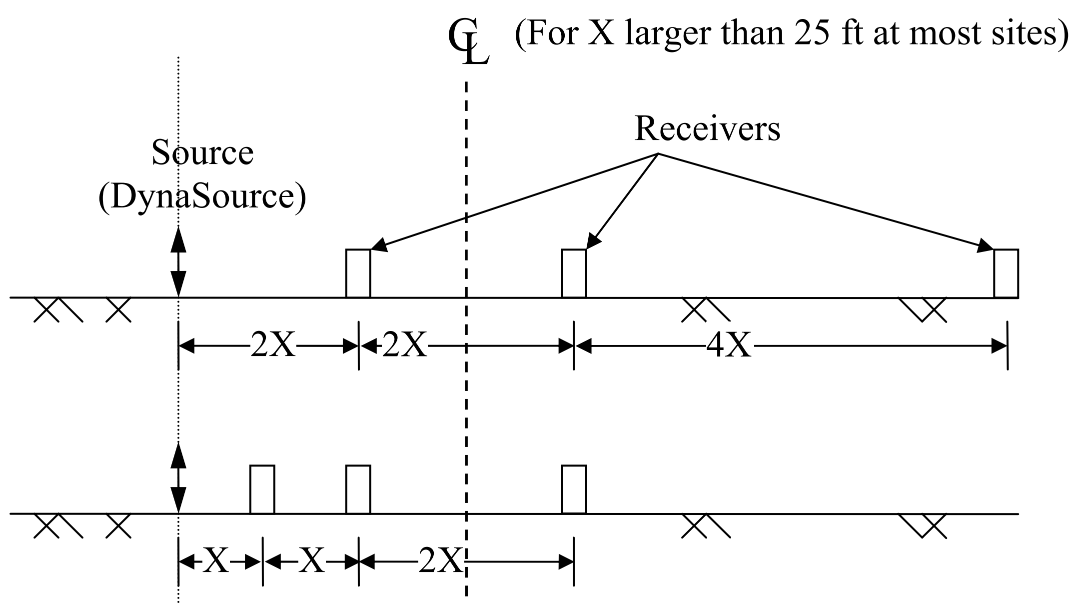
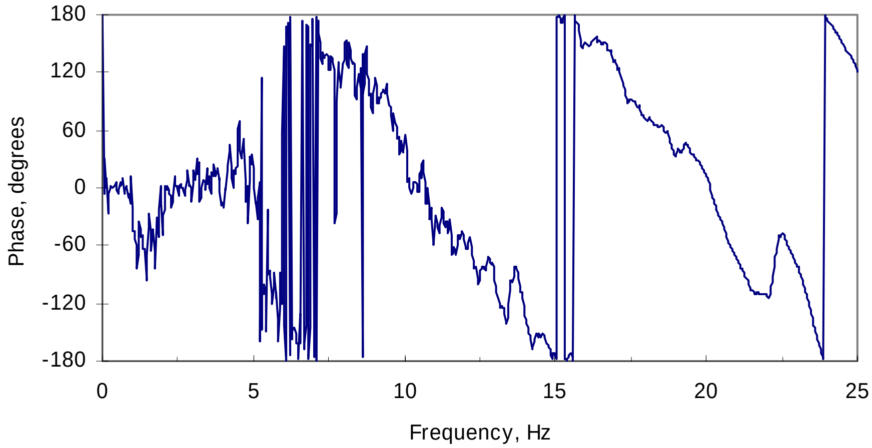


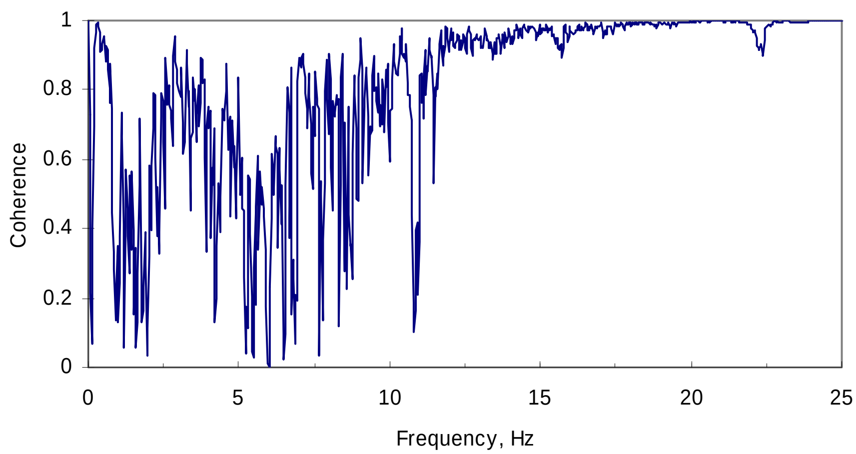
Figure 8 Modified Receivers-Midpoint Geometry Used with the Large DynaSource and Larger Receiver Spacings in Taiwan

Figure 9 Prof. Kenneth H. Stokoe, II Using the Sledge Hammer Source at Kuo-Sing Elementary School Site (TCU-072)

Figure 10 DynaSource Used as Impact Source at Kung-Chung Elementary School Site (TCU-52)

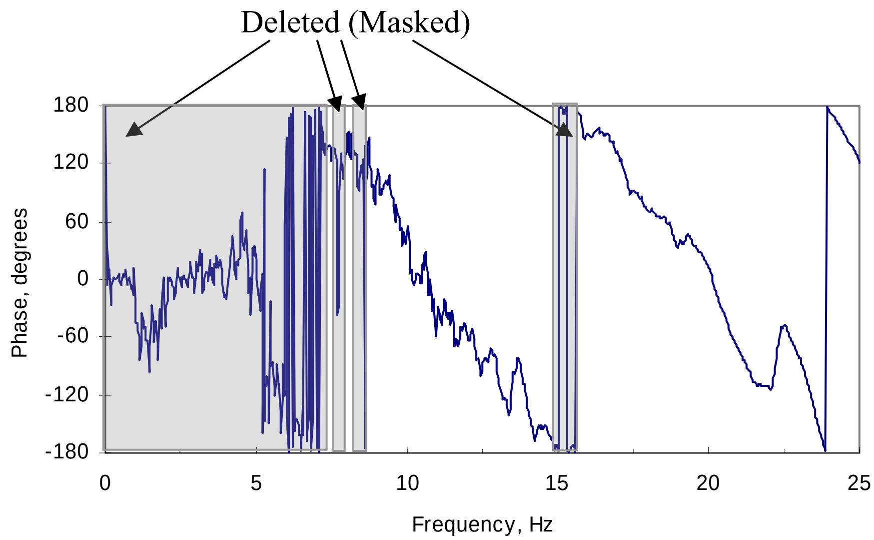


a. Cross Power Spectrum

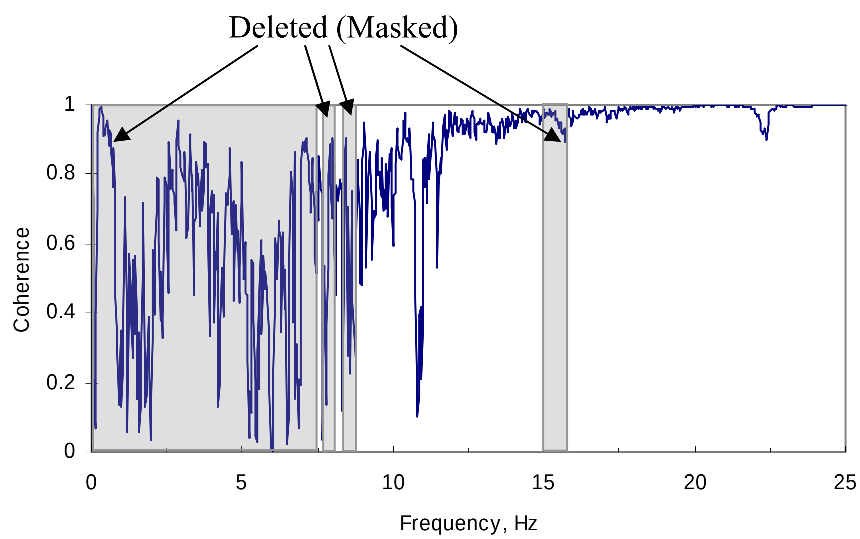


b. Coherence Function

Figure 11 Cross Power Spectrum and Coherence Function Measured at Lin-Chong Elementary School Site (CHY-024) with the 100-ft (30-m) Receiver Spacing



a. Cross Power Spectrum



b. Coherence Function

Figure 12 Cross Power Spectrum and Coherence Function Measured at Lin-Chong Elementary School Site (CHY-024) with the 100-ft (30-m) Receiver Spacing Shown with the Masking Applied to Near-Field and Low-Coherence Regions of the Phase Plot

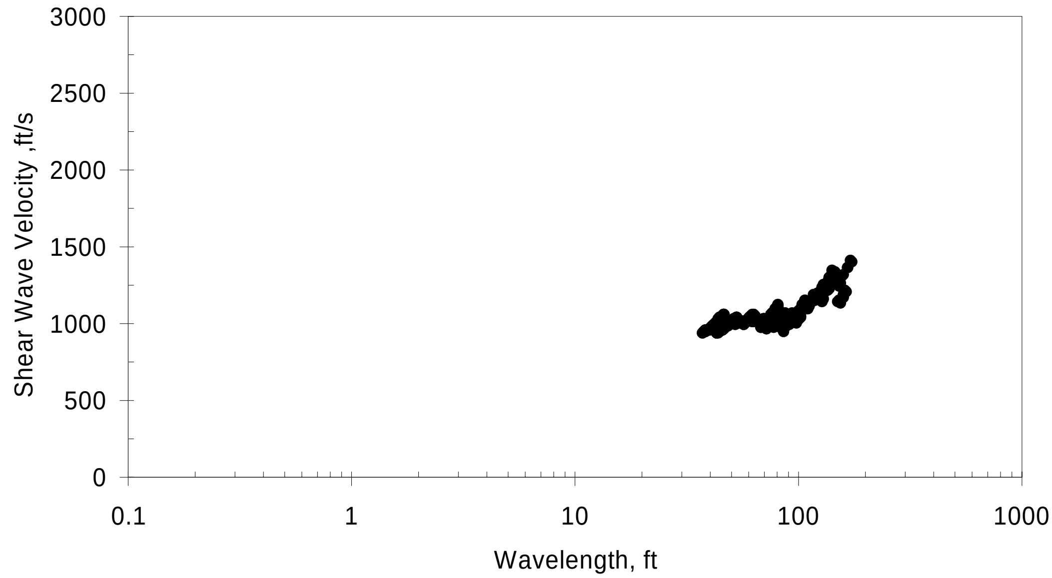


Figure 13 Individual Dispersion Curve Created from the 100-ft (30-m) Receiver Spacing at Lin-Chong Elementary School Site (CHY-024)

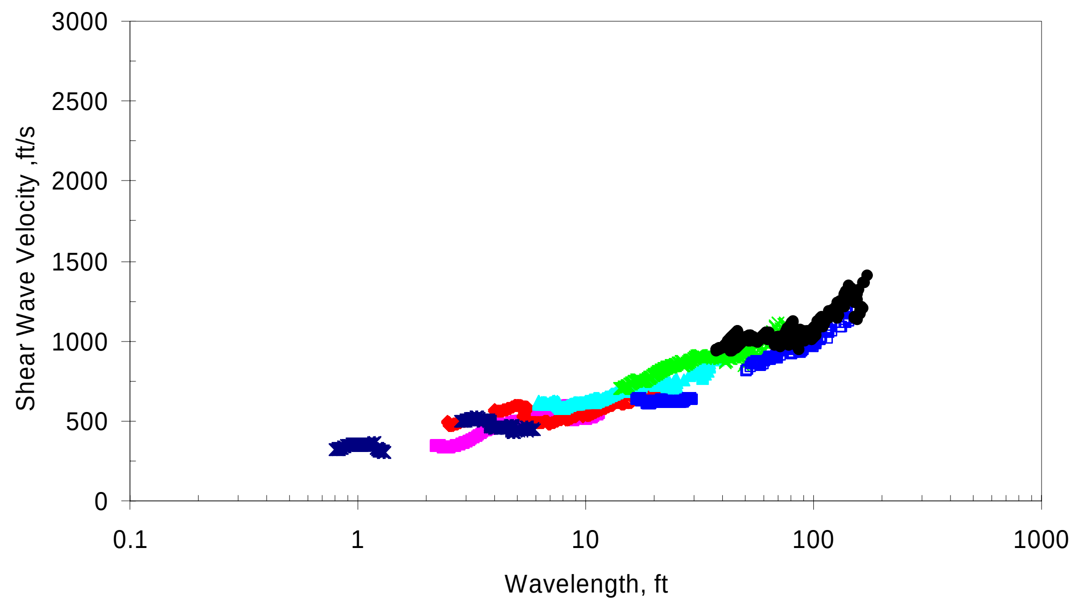


Figure 14 Composite Experimental Dispersion Curve Created from all Receiver Spacings at Lin-Chong Elementary School Site (CHY-024)

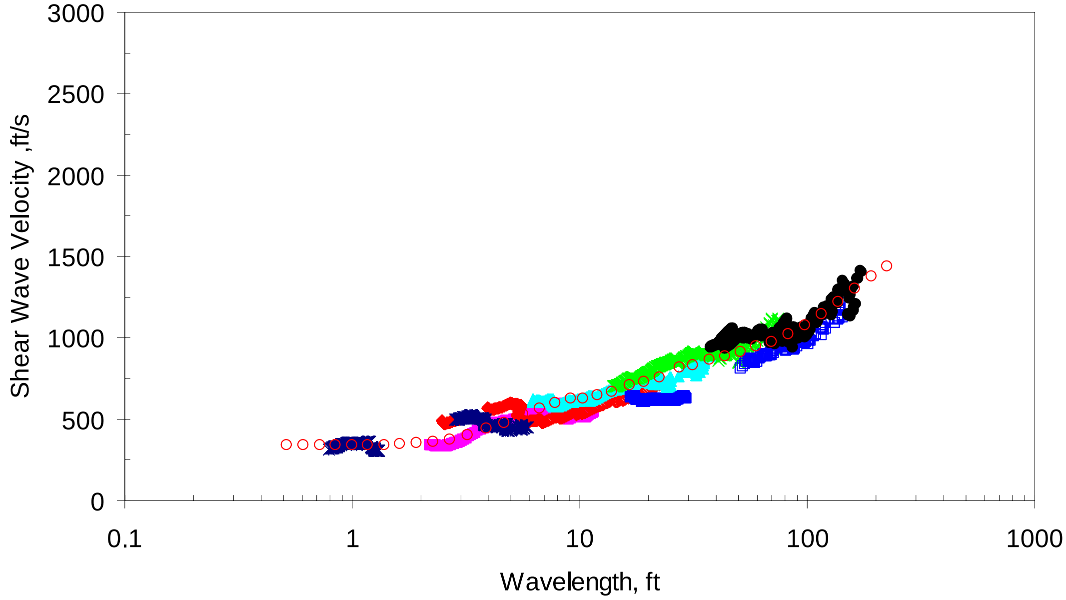


Figure 15 Theoretical Dispersion Curve Fit to the Experimental Dispersion Curve at Lin-Chong Elementary School Site (CHY-024)

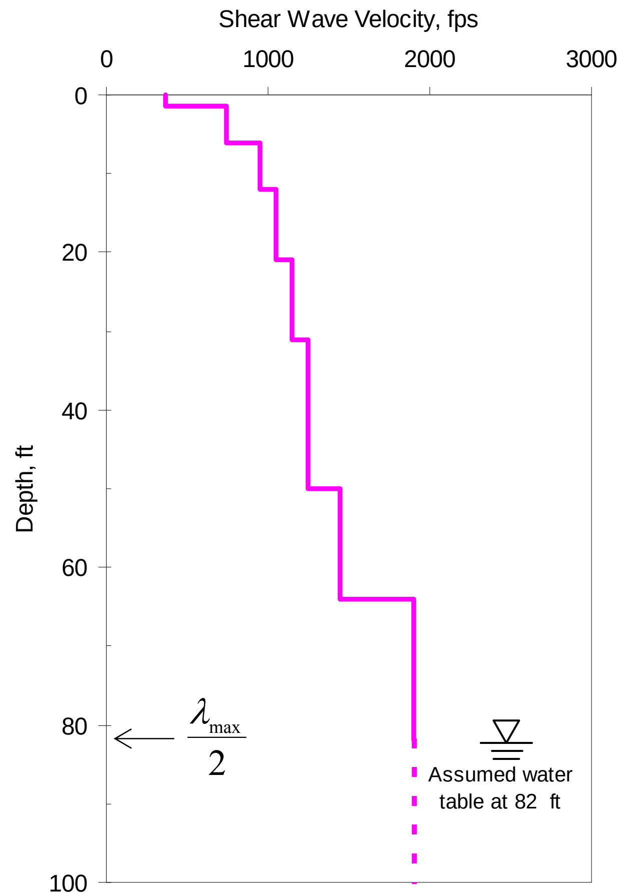


Figure 16 Final Shear Wave Velocity Profile Determined at Lin-Chong Elementary School Site (CHY-024)

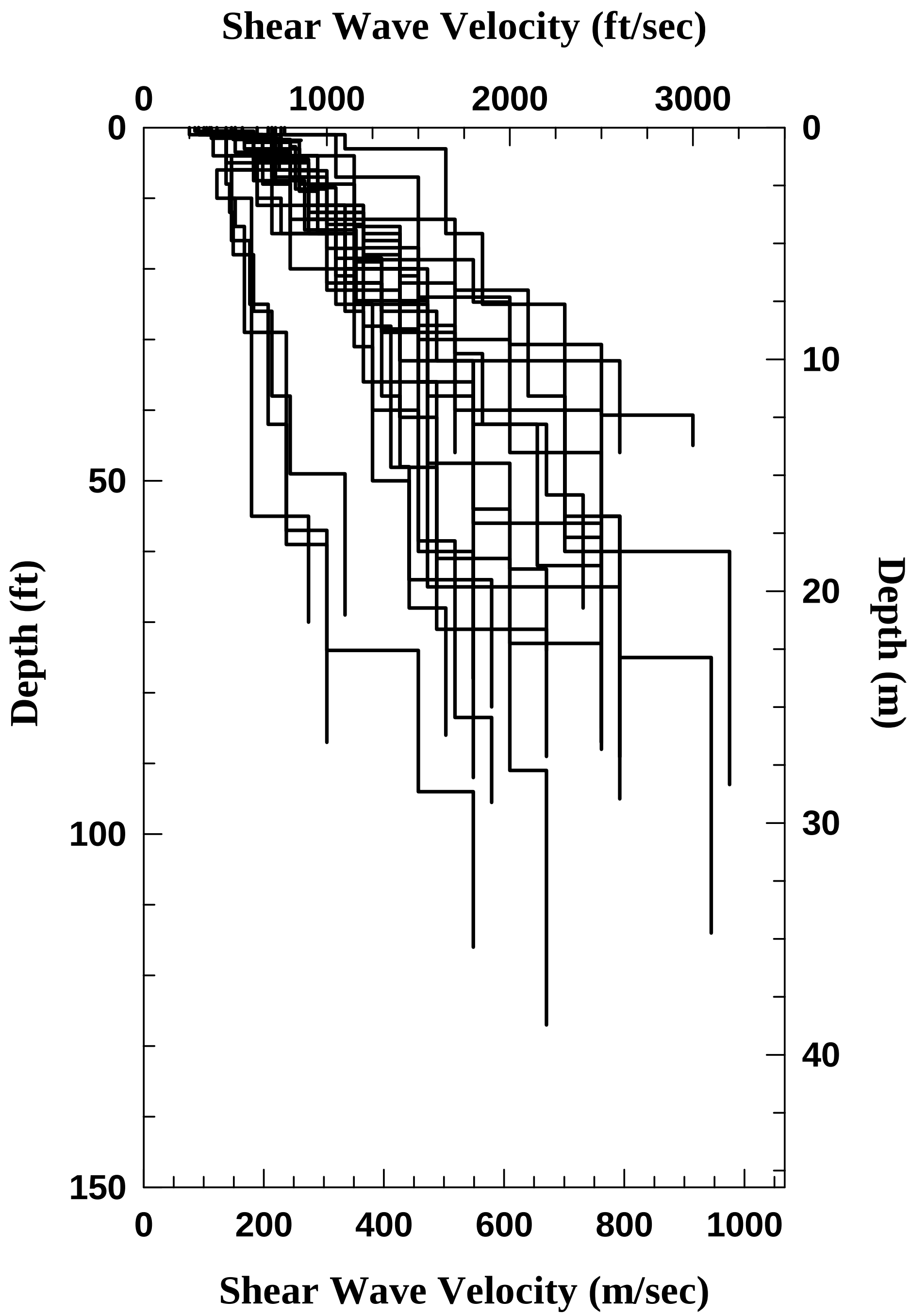


Figure 17 All 26 Shear Wave Velocity Profiles Measured by SASW Testing in Taiwan

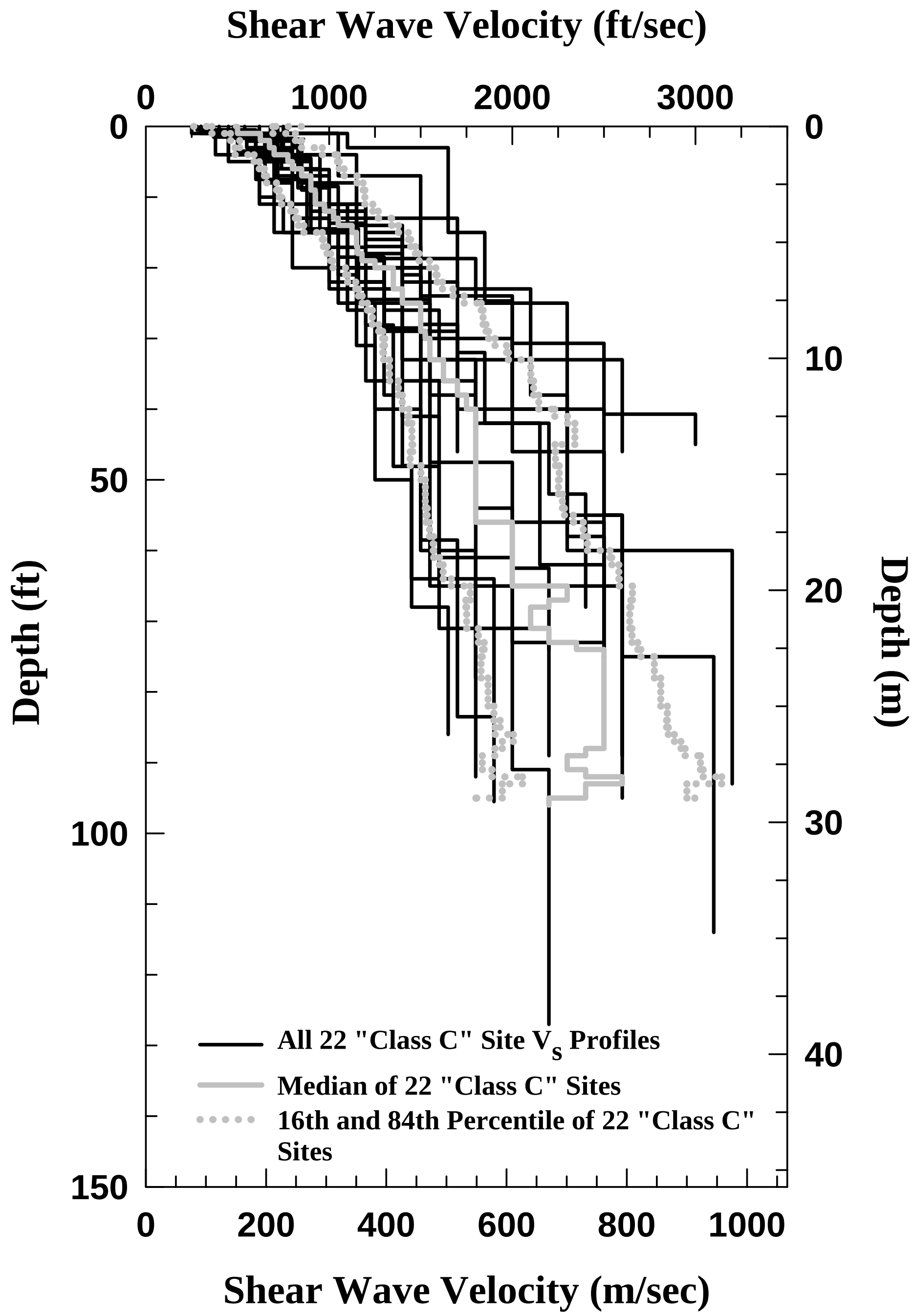


Figure 18 Shear Wave Velocity Profiles of 22 "Class C" Sites Evaluated by SASW Testing in Taiwan; Median and 16th and 85th Percentile Boundaries also Shown

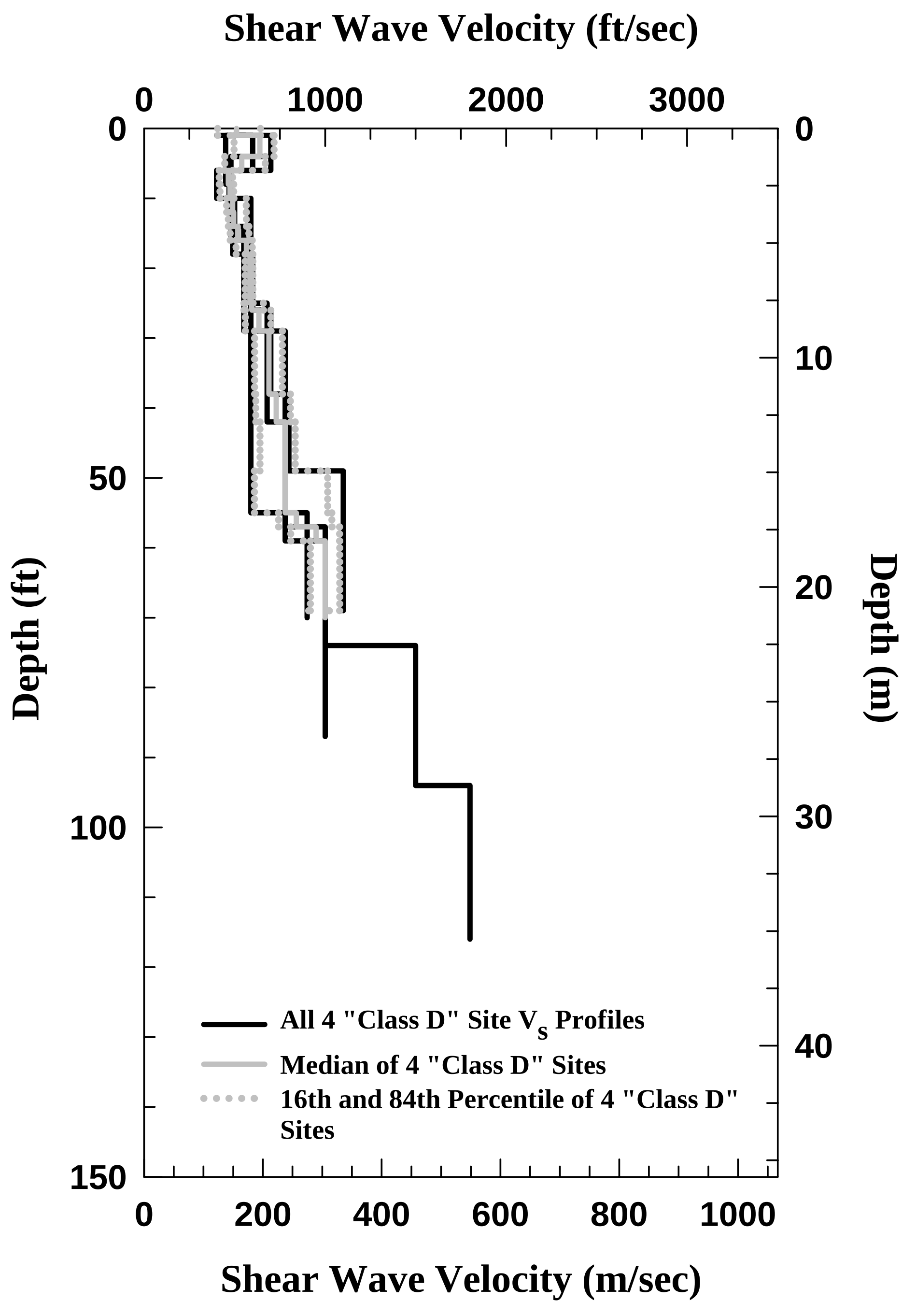


Figure 19 Shear Wave Velocity Profiles of Four "Class D" Sites Evaluated by SASW Testing in Taiwan; Median and 16^{th} and 85^{th} Percentile Boundaries also Shown

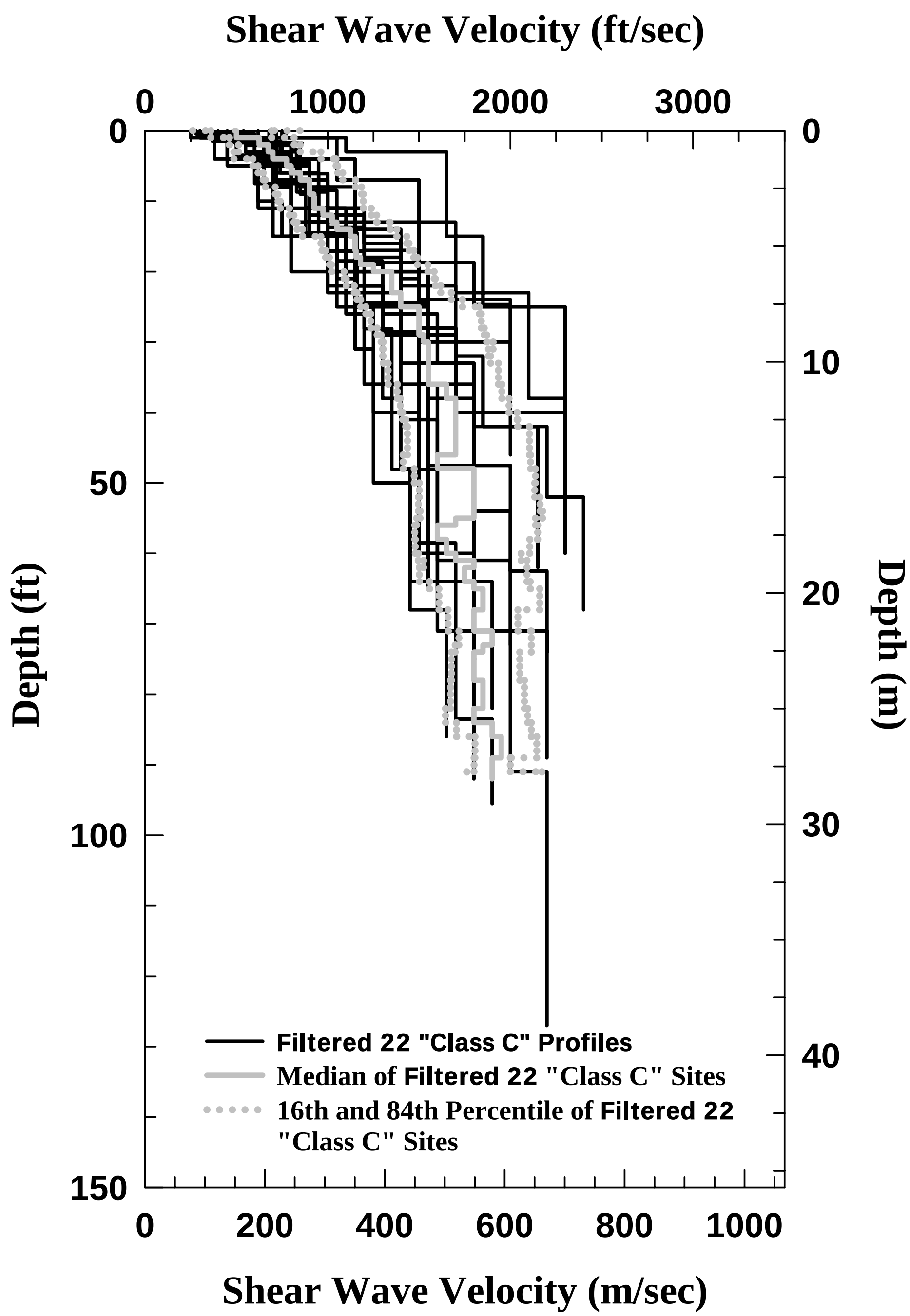


Figure 20 "Filtered" Shear Wave Velocity Profiles of 22 "Class C" Sites; V_s Values ≥ 2500 fps (760 m/s) Have Been Removed; Median and 16^{th} and 85^{th} Percentile Boundaries also Shown

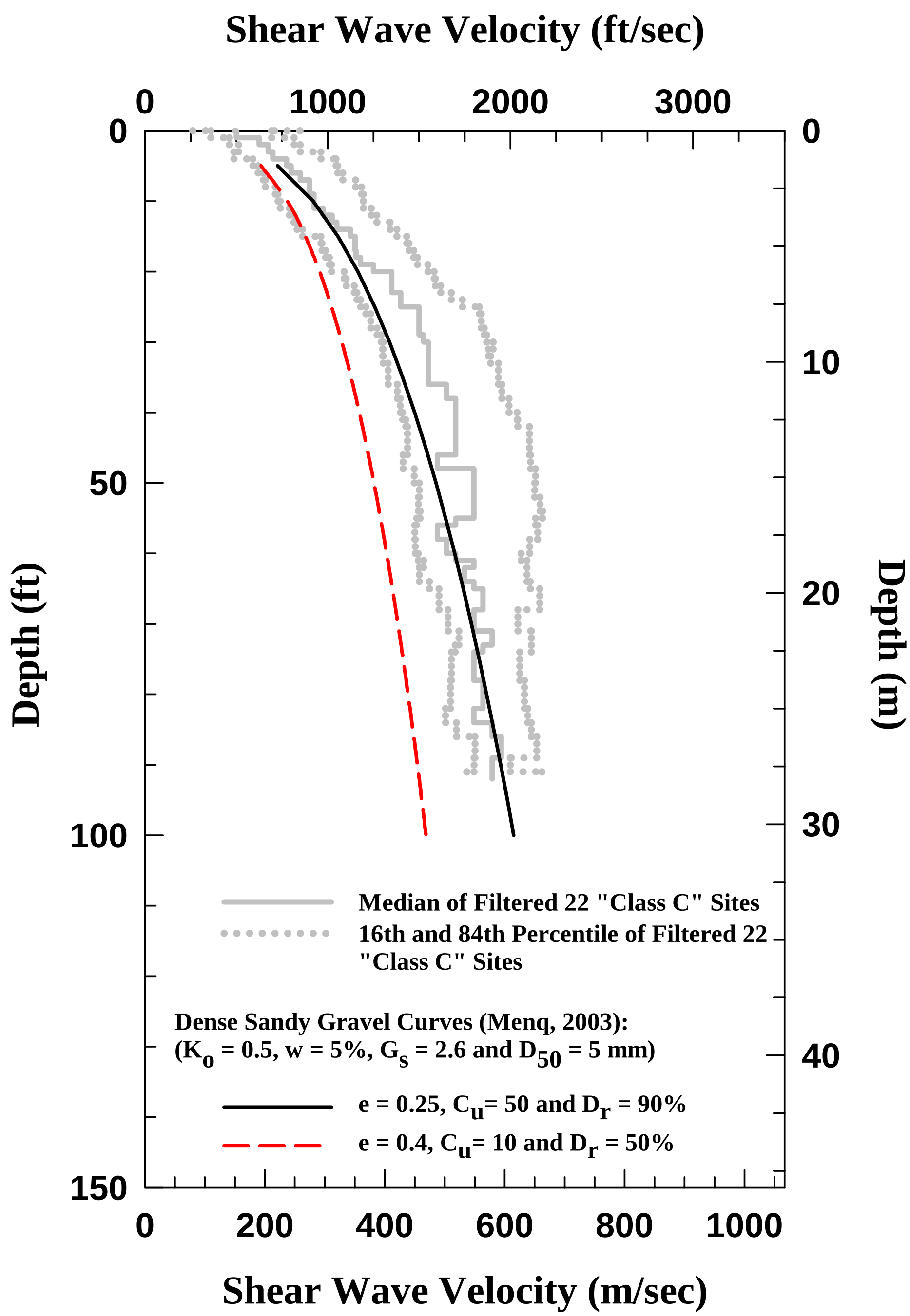


Figure 21 Comparison of V_s Profiles Estimated for Dense Sandy Gravels (Reference 9) and the 22 Filtered "Class C" Sites

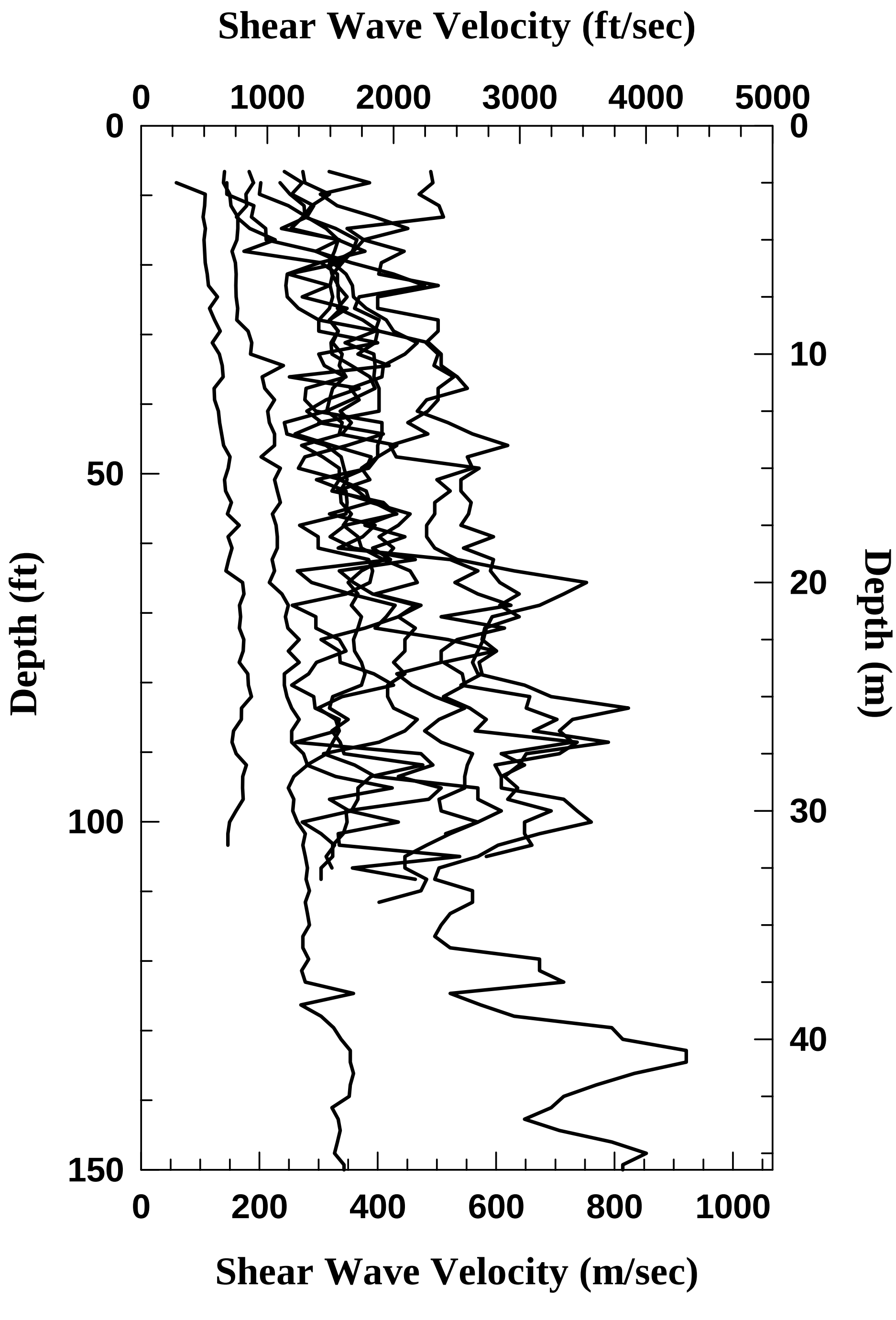


Figure 22 All 10 Available Shear Wave Velocity Profiles Measured by P-S Logging in Taiwan

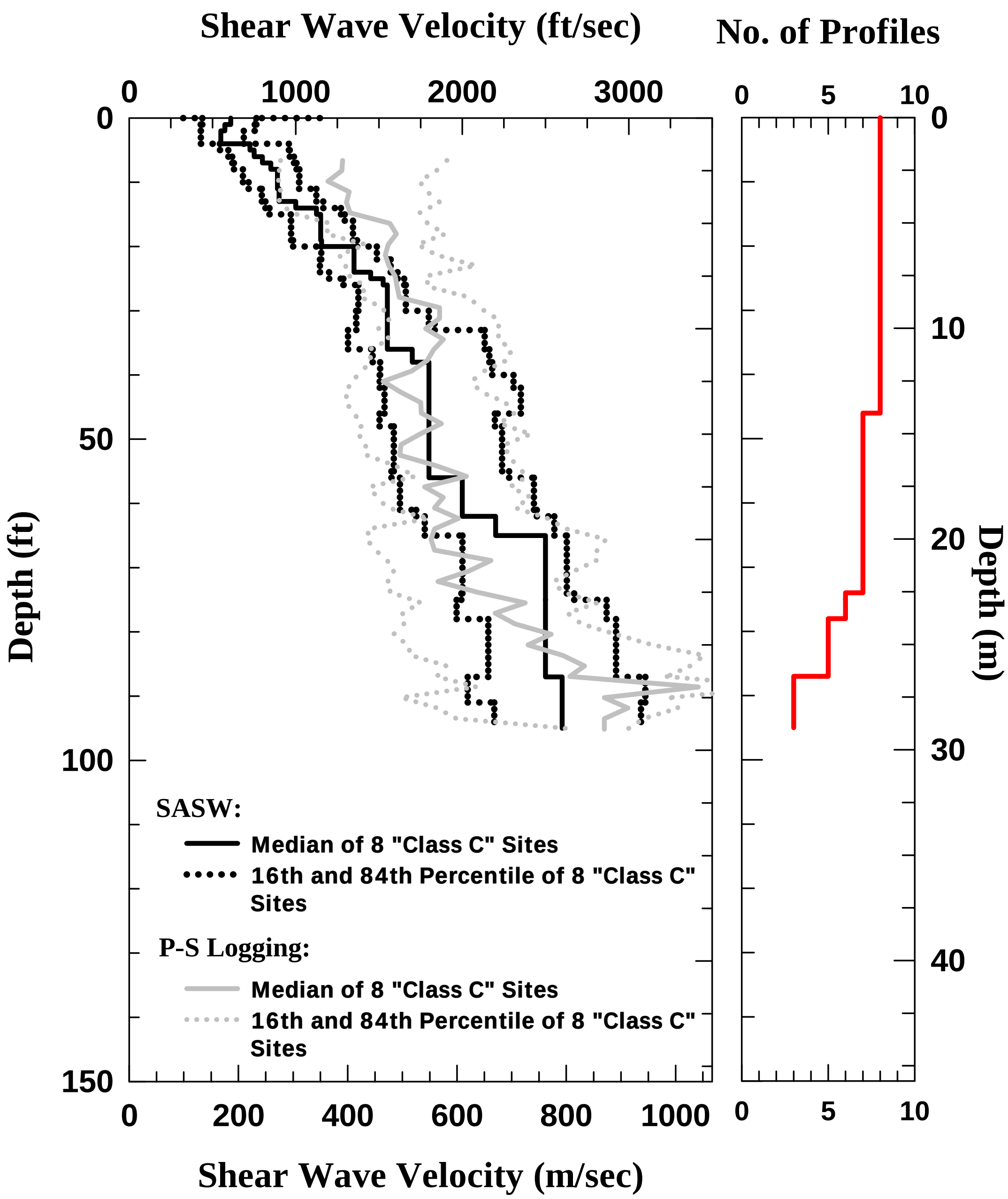


Figure 23 Comparison of Statistical Results of 8 Common Sites Tested by Both SASW and P-S Logging Methods

Appendices

Appendix 1

Site Location: Lin-Chong Elementary School (CHY-024)

Appendix

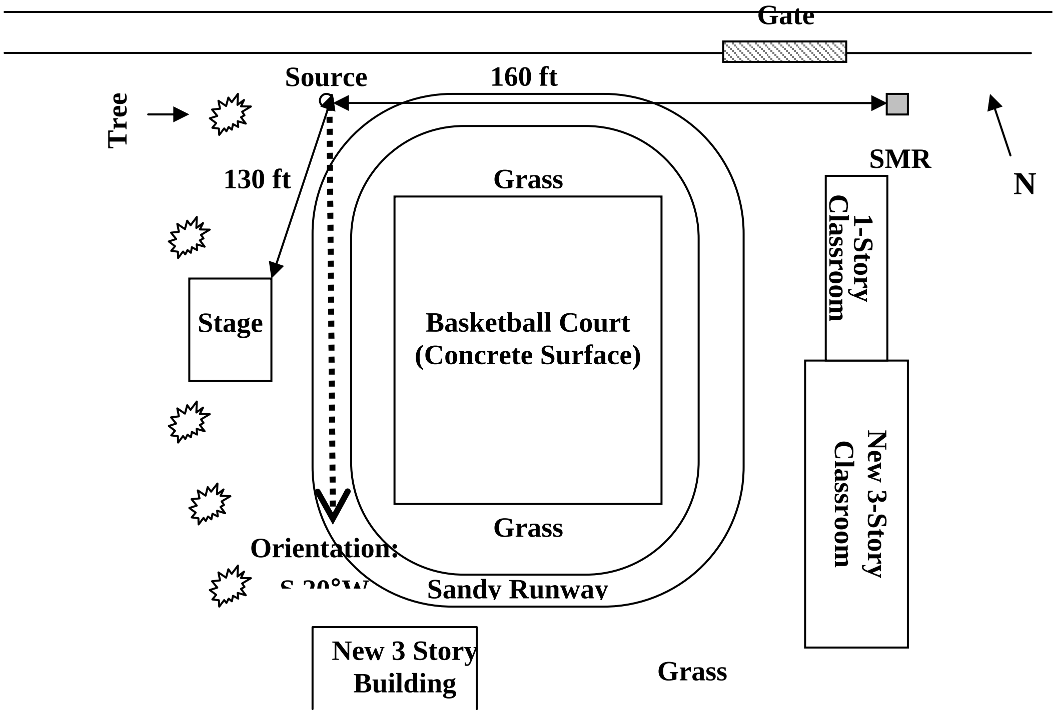


Figure 1.1 Site Map of Lin-Chong Elementary School

Figure 1.2 Picture Taken at Lin-Chong Elementary School (View # 1)

Figure 1.3 Picture Taken at Lin-Chong Elementary School (View # 2)

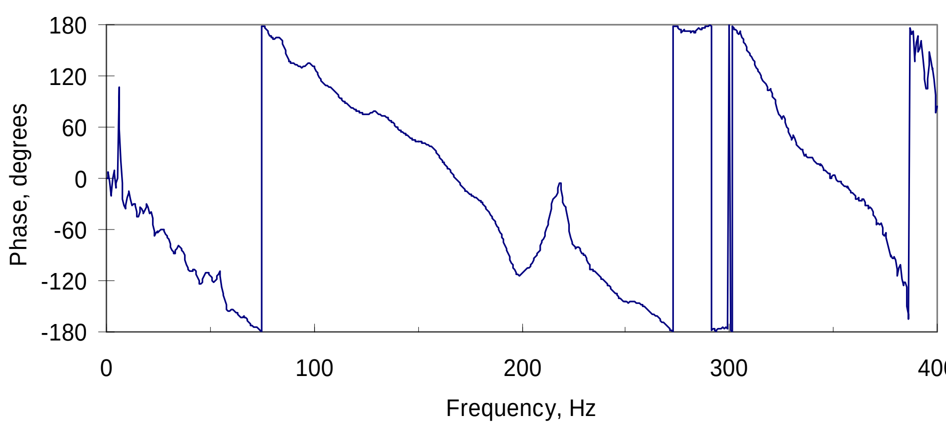


Figure 1.4 Phase Plots Measured by SASW Testing with 3-ft Receiver Spacing

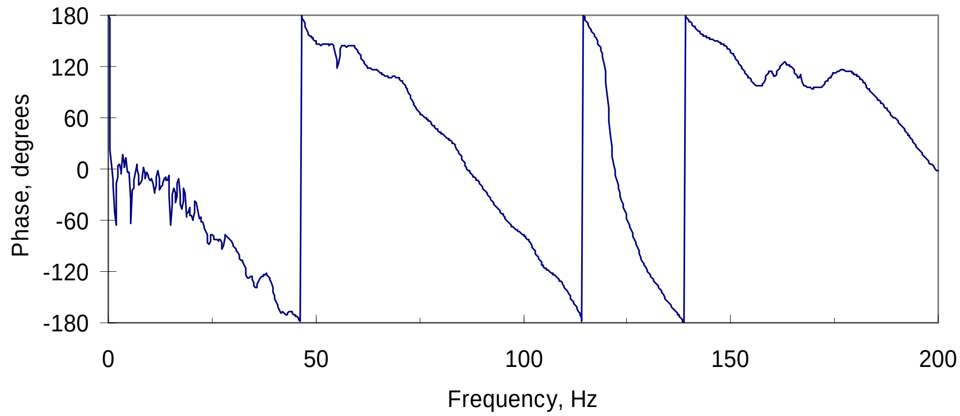


Figure 1.5 Phase Plots Measured by SASW Testing with 6-ft Receiver Spacing

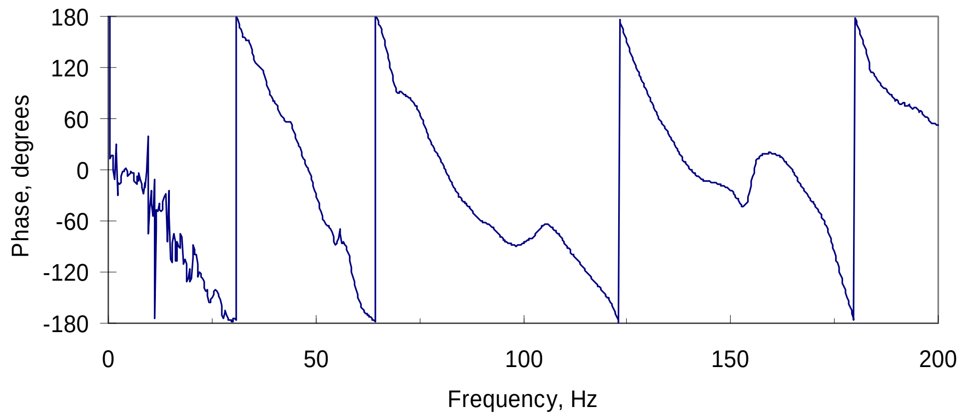


Figure 1.6 Phase Plots Measured by SASW Testing with 12-ft Receiver Spacing

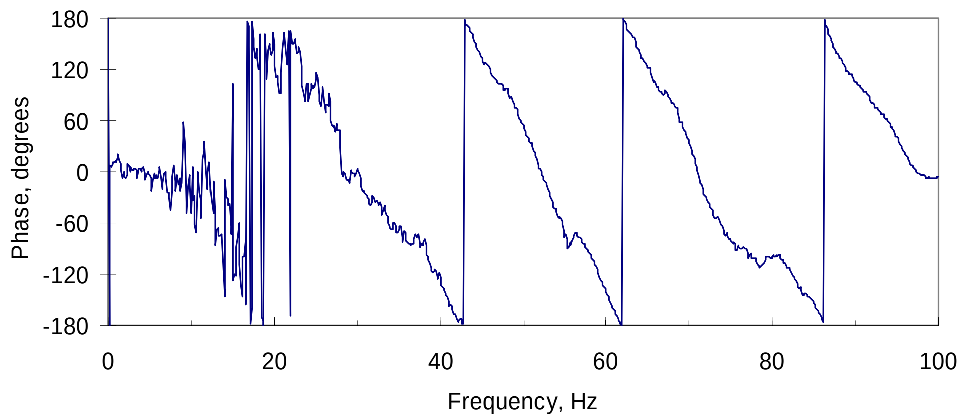


Figure 1.7 Phase Plots Measured by SASW Testing with 25-ft Receiver Spacing

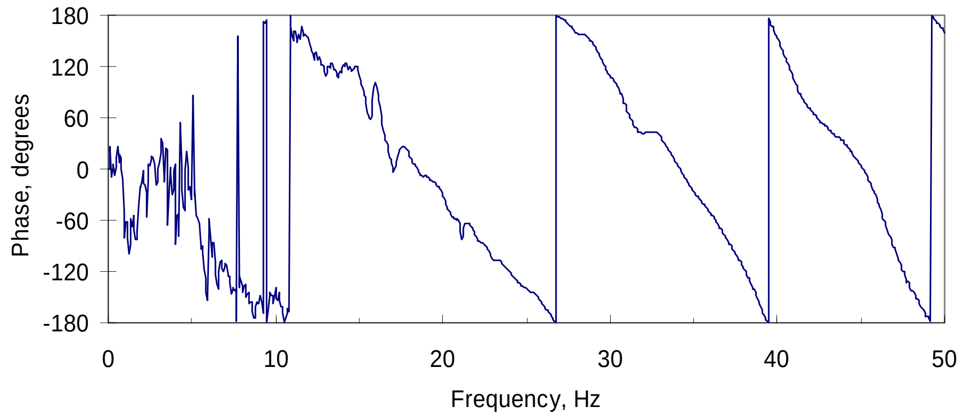


Figure 1.8 Phase Plots Measured by SASW Testing with 50-ft Receiver Spacing

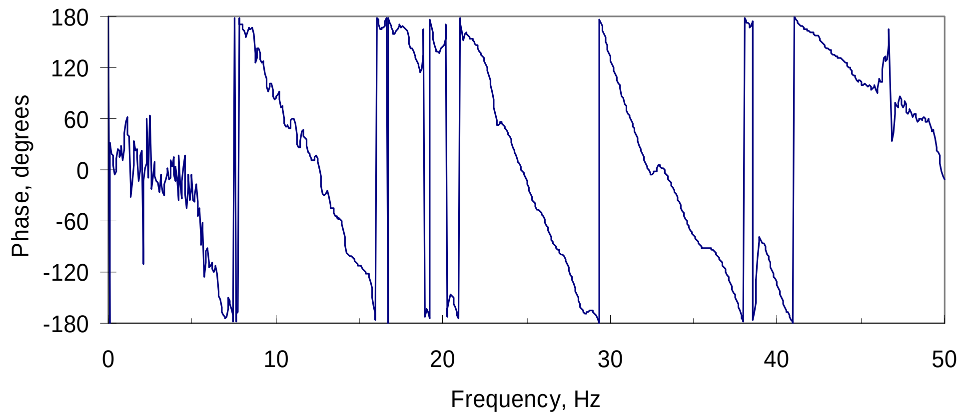


Figure 1.9 Phase Plots Measured by SASW Testing with 75-ft Receiver Spacing

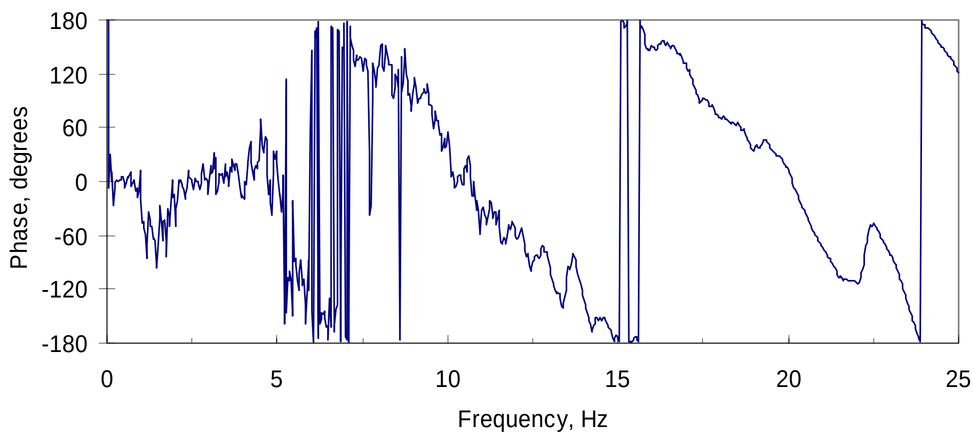


Figure 1.10 Phase Plots Measured by SASW Testing with 100-ft Receiver Spacing

Appendix

Table 1.1 Table of Masking Parameters Used on Data Collected at Lin-Chong Elementary School

Receiver Spacing	Masking Interval	Masking Start Frequency, Hz	Masking Stop Frequency, Hz	Number of Jumps
3 ft	1	0.0	75.0	1
	2	177.0	232.0	2
	3	271.0	304.5	3
6 ft	1	0.0	46.8	1
	2	156.0	200.0	-
12 ft	1	0.0	31.0	1
	2	144.3	166.3	4
25 ft	1	0.0	22.1	1
50 ft	1	0.0	11.6	1
75 ft	1	0.0	7.8	1
	2	16.0	21.4	3
	3	37.9	50.0	-
100 ft	1	0.0	7.2	1
	2	7.6	8.0	1
	3	8.3	8.8	1
	4	14.9	15.9	2

Performed by________________ Checked by________________
Yin-Cheng Lin Brent L. Rosenblad

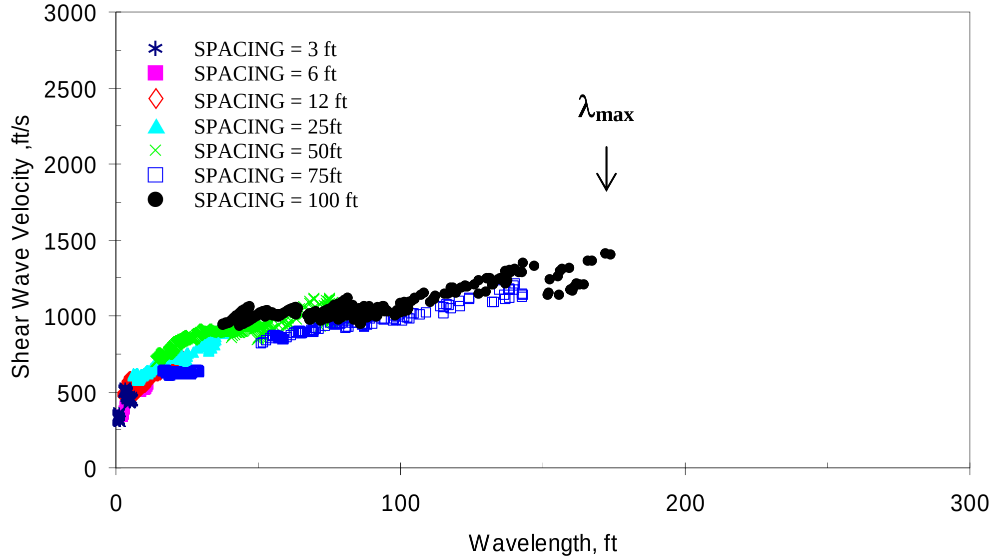


Figure 1.11 Experimental Dispersion Curve Measured at Lin-Chong Elementary School; Linear Wavelength Axis

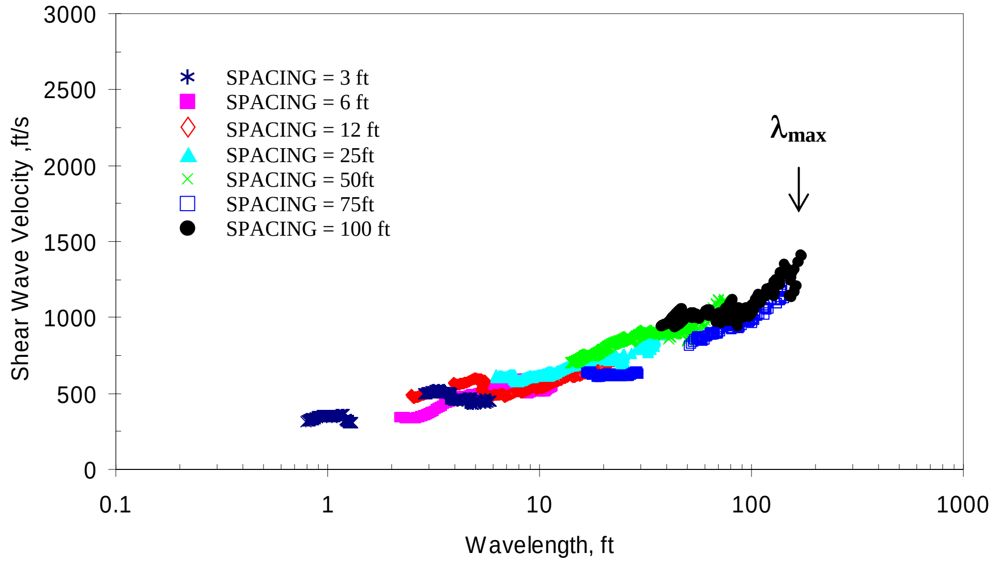


Figure 1.12 Experimental Dispersion Curve Measured at Lin-Chong Elementary School; Logarithmic Wavelength Axis

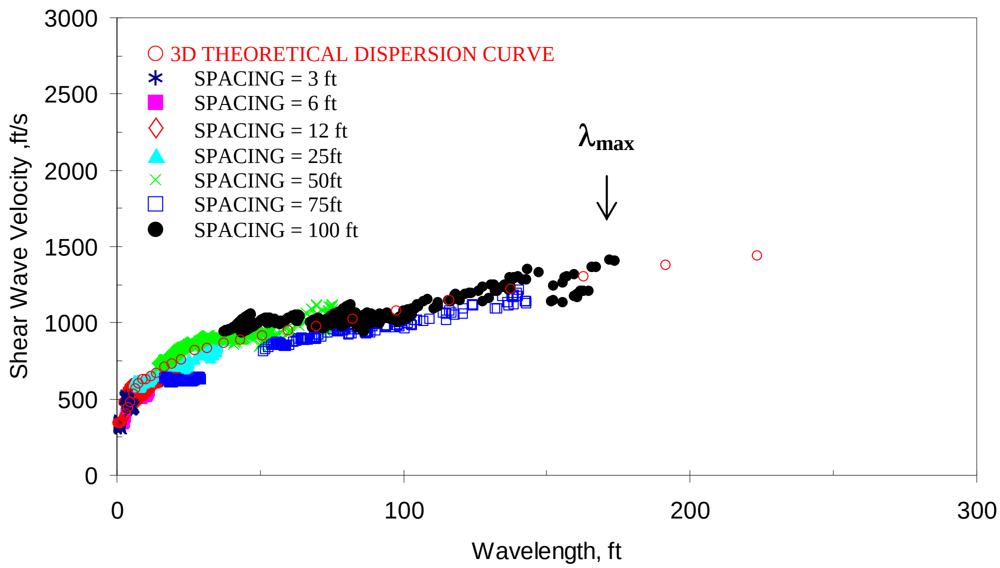


Figure 1.13 Experimental and Theoretical Dispersion Curves from Lin-Chong Elementary School; Linear Wavelength Axis

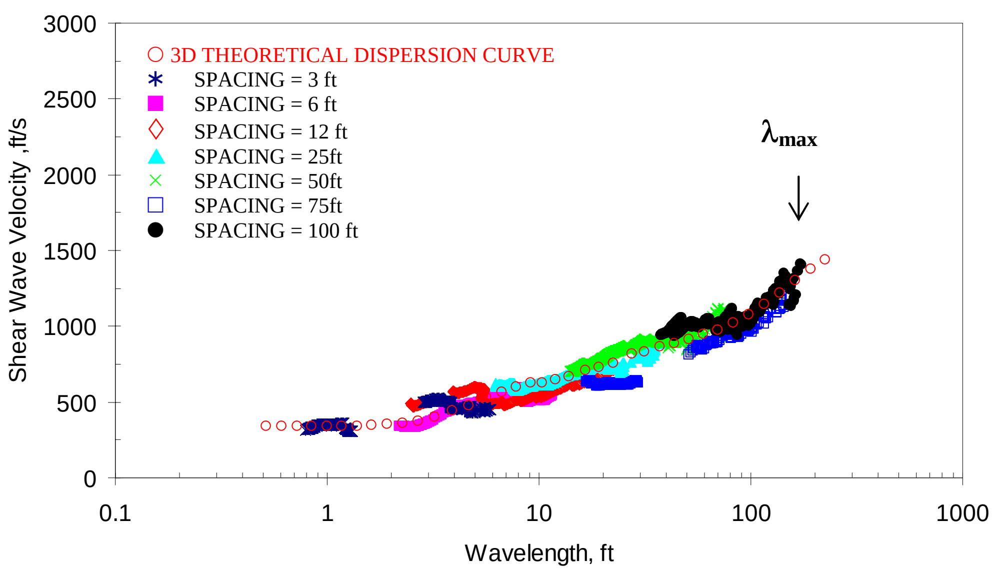


Figure 1.14 Experimental and Theoretical Dispersion Curves from Lin-Chong Elementary School; Logarithmic Wavelength Axis

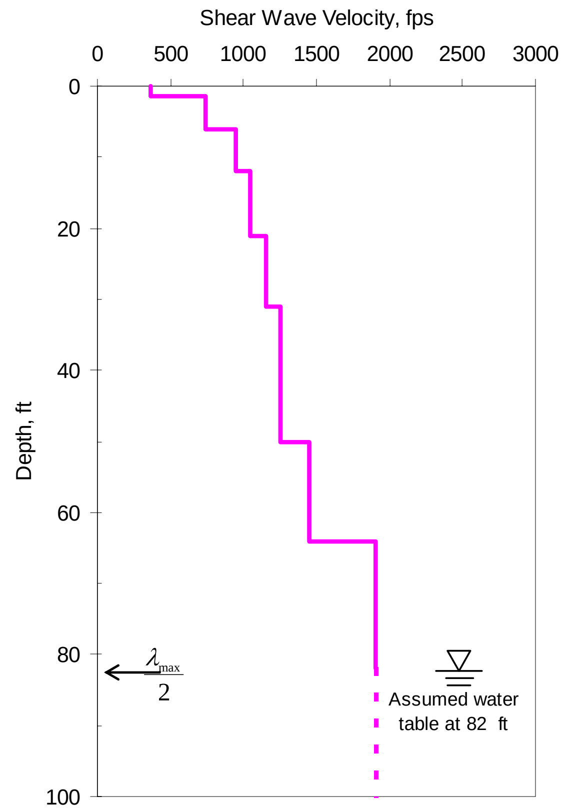


Figure 1.15 Shear Wave Velocity Profile Determined at Lin-Chong Elementary School

Table 1.2 Profile Parameters Used to Develop Theoretical Dispersion Curve at Lin-Chong Elementary School

Layer No.	Thickness, ft	Depth to the bottom, ft	P-Wave Velocity, ft/s	S-Wave Velocity, ft/s	Poisson's Ratio	Total Unit Weight, pcf
1	1.5	1.5	641	370	0.25	120
2	4.5	6	1282	740	0.25	120
3	6	12	1645	950	0.25	120
4	9	21	1819	1050	0.25	120
5	10	31	1992	1150	0.25	120
6	19	50	2165	1250	0.25	120
7	14	64	2512	1450	0.25	120
8	18	82	3291	1900	0.25	120

Performed by________________________ Checked by________________________

Yin-Cheng Lin Brent L. Rosenblad

Table 1.3 Uniform Building Code (UBC-97) Site Classification of Lin-Chong Elementary School

Average Shear Wave Velocity of Top 30 meters (100 ft), $V_{s,30}$ (ft/s) [m/s]	Site Classification
1290 [393]	C

Performed by________________________ Checked by________________________
Yin-Cheng Lin Brent L. Rosenblad

Table 1.4 UBC-97 Site Categories

Soil Profile Type	Average Shear Wave Velocity of Top 30 m, $V_{s,30}$ (m/s) [Top100 ft, $V_{s,100}$ (ft/s)]	Description
S_A	$V_{s,30}$ >1500 m/s [$V_{s,100}$ >5000 ft/s]	Hard rock
S_B	760 m/s < $V_{s,30}$ ≤1500 m/s [2500 ft/s < $V_{s,100}$ ≤5000 ft/s]	Rock
S_C	360 m/s < $V_{s,30}$ ≤760 m/s [1200 ft/s < $V_{s,100}$ ≤2500 ft/s]	Very dense soil and soft rock
S_D	180 m/s ≤ $V_{s,30}$ ≤360 m/s [600 ft/s < $V_{s,100}$ ≤1200 ft/s]	Stiff Soil Profile
S_E	$V_{s,30}$ < 180 m/s [$V_{s,100}$ < 600 ft/s]	Soft Soil Profile
S_F	-	Soils requiring site-specific evaluation.

Appendix 2

Site Location: Ton-Lo Elementary School (TCU-039)

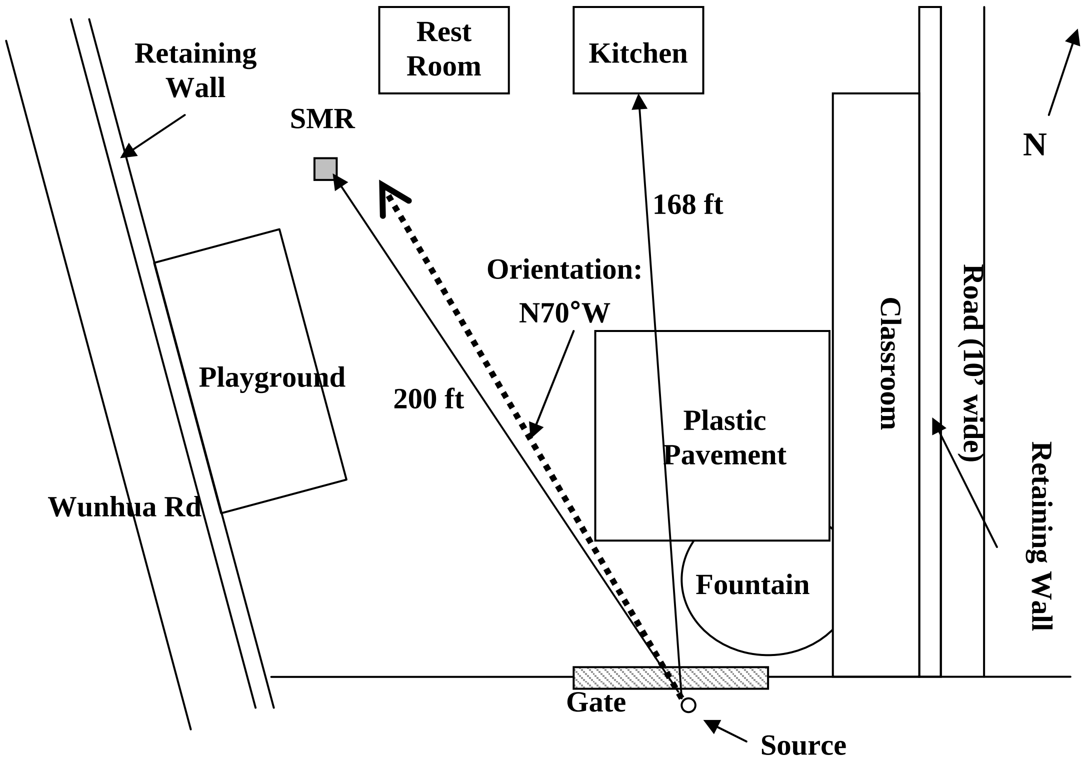


Figure 2.1 Site Map of Ton - Lo Elementary School

Figure 2.2 Picture Taken at Ton - Lo Elementary School (View # 1)

Figure 2.3 Picture Taken at Ton - Lo Elementary School (View # 2)

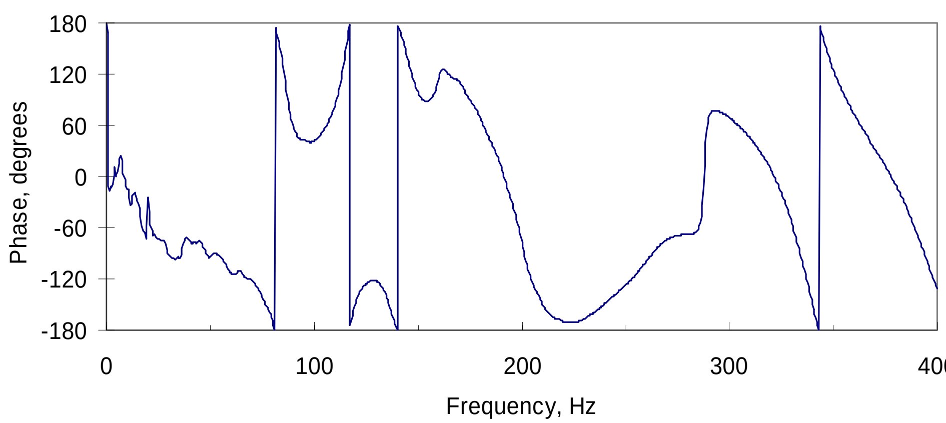


Figure 2.4 Phase Plots Measured by SASW Testing with 3-ft Receiver Spacing

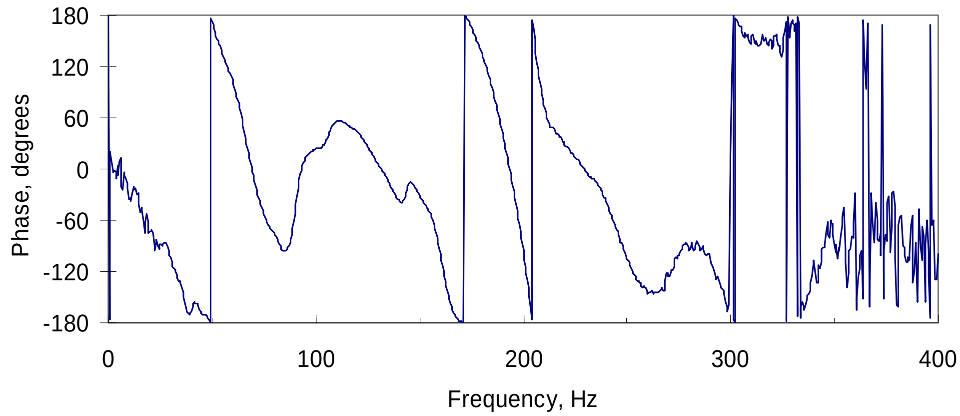


Figure 2.5 Phase Plots Measured by SASW Testing with 6-ft Receiver Spacing

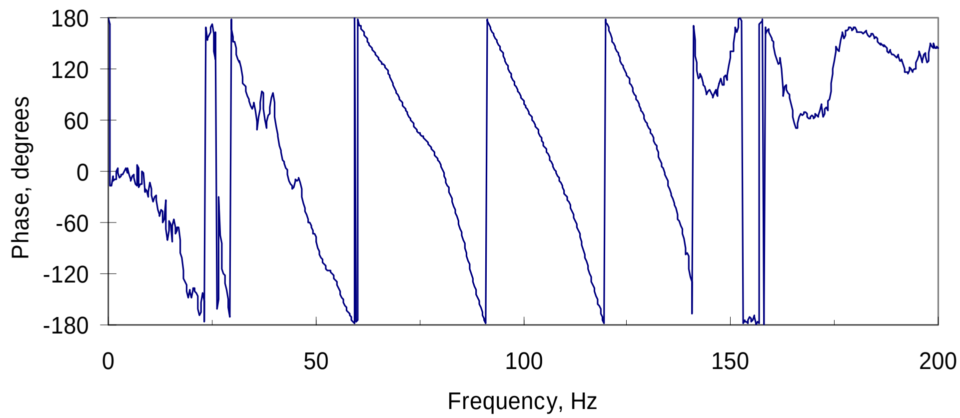


Figure 2.6 Phase Plots Measured by SASW Testing with 12-ft Receiver Spacing

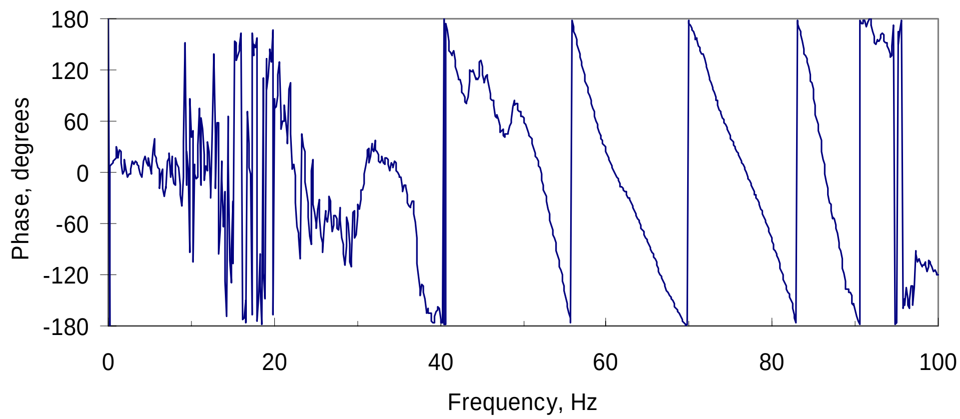


Figure 2.7 Phase Plots Measured by SASW Testing with 25-ft Receiver Spacing

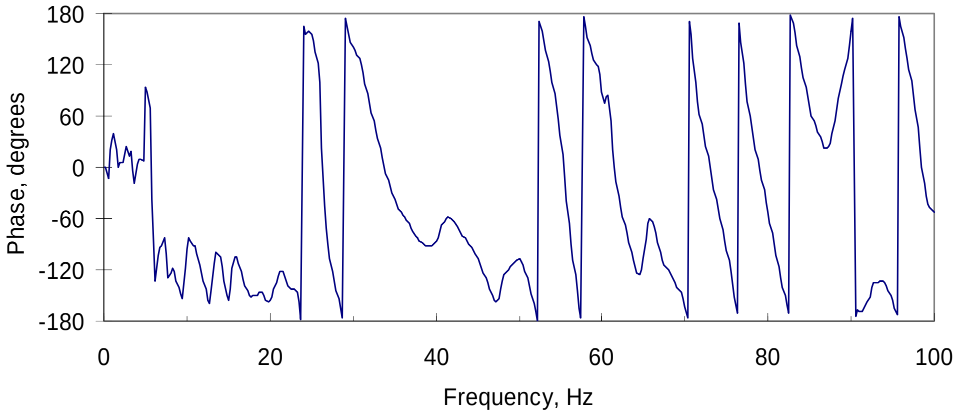


Figure 2.8 Phase Plots Measured by SASW Testing with 50-ft Receiver Spacing

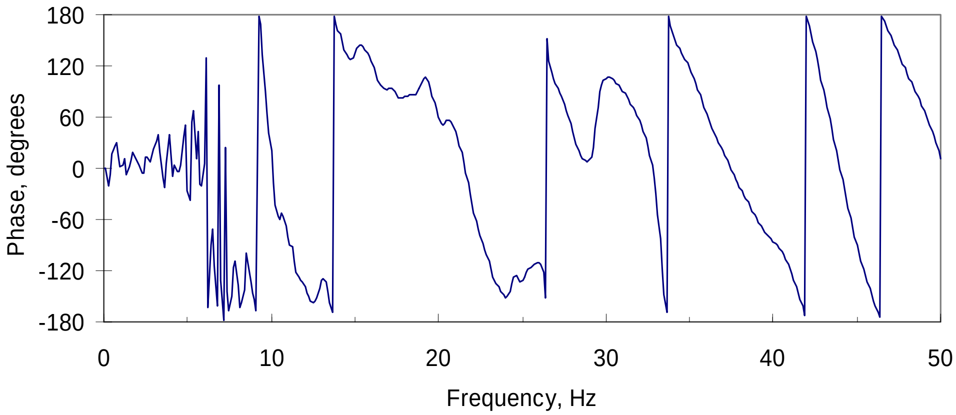


Figure 2.9 Phase Plots Measured by SASW Testing with 75-ft Receiver Spacing

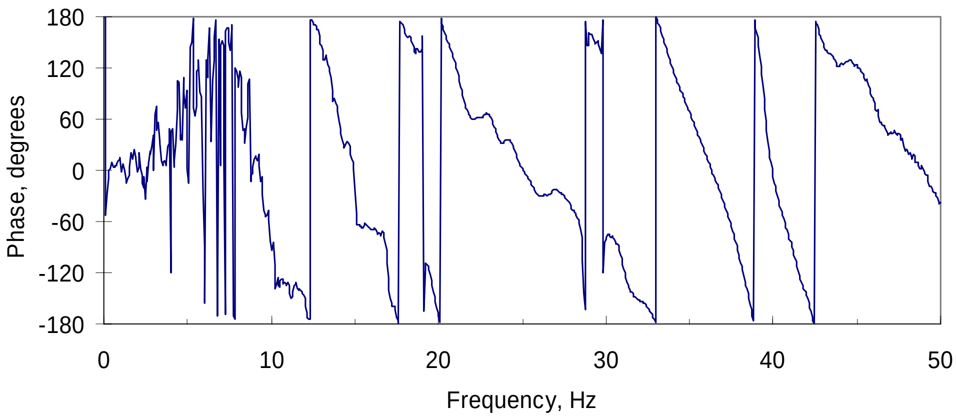


Figure 2.10 Phase Plots Measured by SASW Testing with 100-ft Receiver Spacing

Table 2.1 Table of Masking Parameters Used on Data Collected at Ton - Lo Elementary School

Receiver Spacing	Masking Interval	Masking Start Frequency, Hz	Masking Stop Frequency, Hz	Number of Jumps
3 ft	1	0.0	65.5	0
	2	92.0	130.5	1
	3	214.0	312.5	4
6 ft	1	0.0	29.5	0
	2	83.5	146.0	2
	3	254.5	400.0	-
12 ft	1	0.0	30.0	1
	2	59.3	60.3	2
	3	140.5	200.0	-
25 ft	1	0.0	41.1	2
50 ft	1	0.0	26.8	1
	2	37.8	52.5	4
	3	86.8	100.0	-
75 ft	1	0.0	13.9	1
	2	14.5	16.5	1
	3	18.0	26.9	2
	4	28.8	33.8	3
100 ft	1	0.0	12.4	1
	2	18.7	30.6	3

Performed by____________________ Checked by____________________

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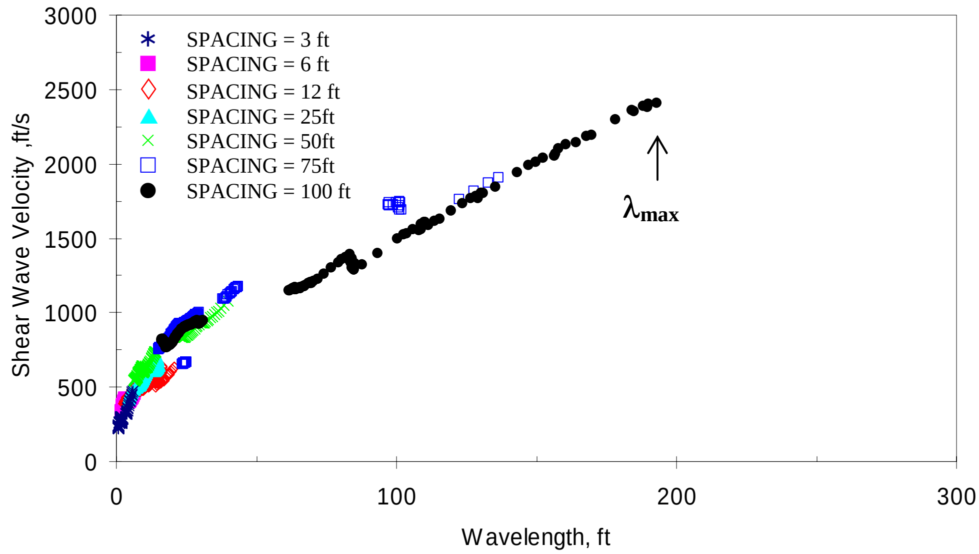

Figure 2.11 Experimental Dispersion Curve Measured at Ton - Lo Elementary School; Linear Wavelength Axis

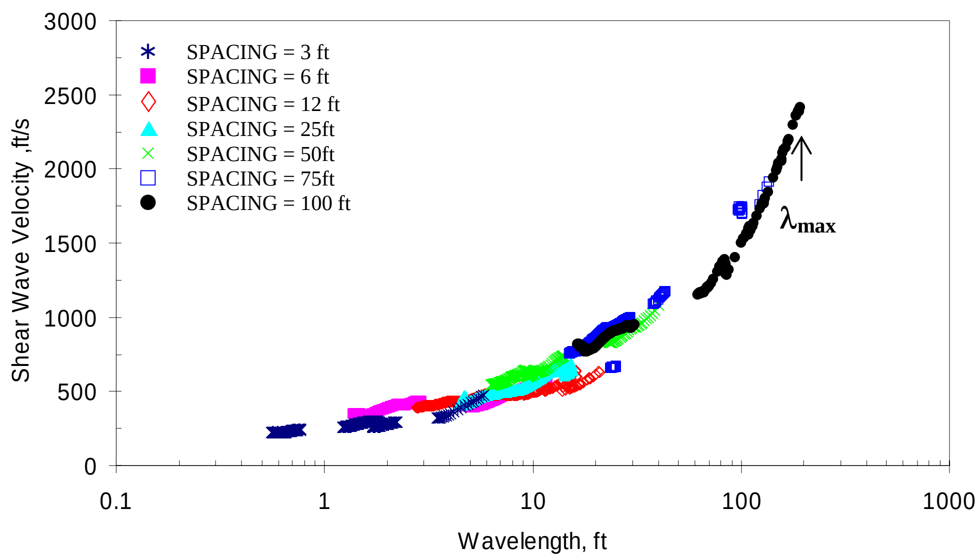

Figure 2.12 Experimental Dispersion Curve Measured at Ton - Lo Elementary School; Logarithmic Wavelength Axis

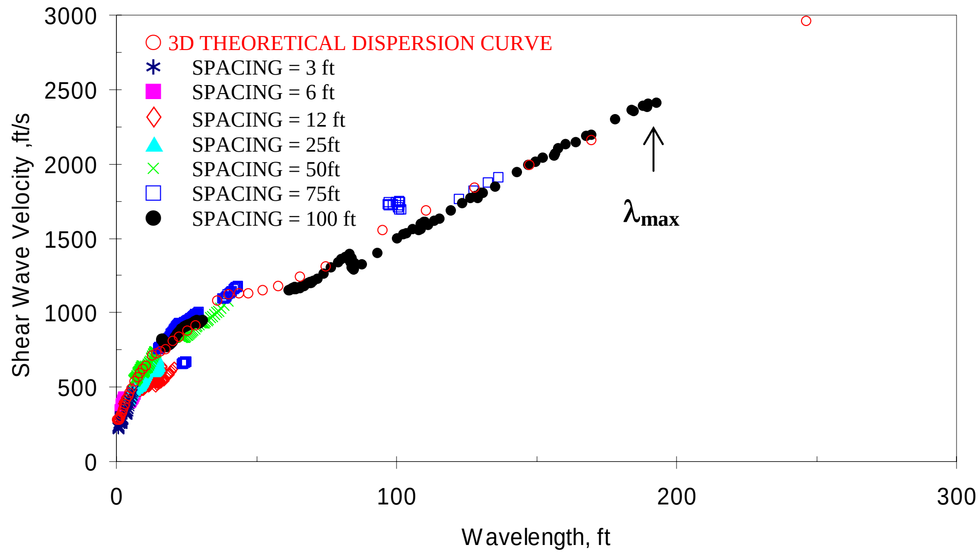

Figure 2.13 Experimental and Theoretical Dispersion Curves from Ton - Lo Elementary School; Linear Wavelength Axis

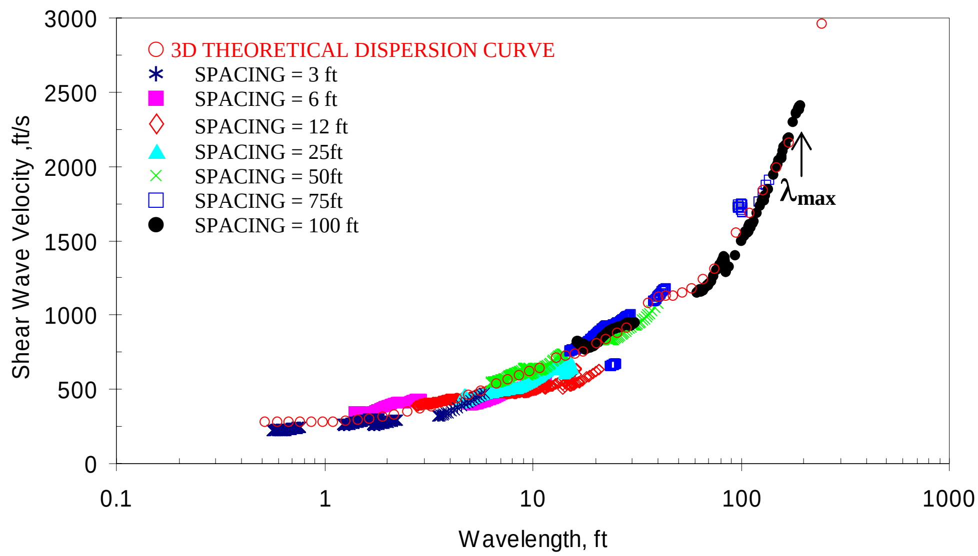

Figure 2.14 Experimental and Theoretical Dispersion Curves from Ton - Lo Elementary School; Logarithmic Wavelength Axis

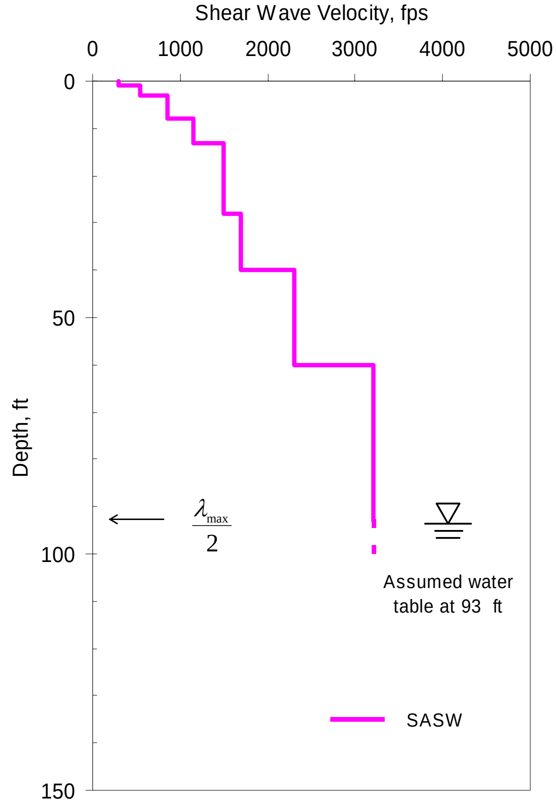

Figure 2.15 Shear Wave Velocity Profile Determined at Ton - Lo Elementary School

Table 2.2 Profile Parameters Used to Develop Theoretical Dispersion Curve at Ton - Lo Elementary School

Layer No.	Thickness, ft	Depth to the bottom, ft	P-Wave Velocity, ft/s	S-Wave Velocity, ft/s	Poisson's Ratio	Total Unit Weight, pcf
1	1.0	1	520	300	0.25	120
2	2.0	3	953	550	0.25	120
3	5.0	8	1472	850	0.25	120
4	5.0	13	1992	1150	0.25	120
5	15.0	28	2598	1500	0.25	120
6	12.0	40	2945	1700	0.25	120
7	20.0	60	3984	2300	0.25	125
8	33.0	93	5543	3200	0.25	130

Performed by____________________ Checked by____________________

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Table 2.3 Uniform Building Code (UBC-97) Site Classification of Ton - Lo Elementary School

Average Shear Wave Velocity of Top 30 meters (100 ft), $V_{s,30}$ (ft/s) [m/s]	Site Classification
1810 [552]	C

Performed by________________________ Checked by________________________
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Table 2.4 UBC-97 Site Categories

Soil Profile Type	Average Shear Wave Velocity of Top 30 m, $V_{s,30}$ (m/s) [Top100 ft, $V_{s,100}$ (ft/s)]	Description
S_A	$V_{s,30}$>1500 m/s [$V_{s,100}$>5000 ft/s]	Hard rock
S_B	760 m/s < $V_{s,30}$≤1500 m/s [2500 ft/s < $V_{s,100}$≤5000 ft/s]	Rock
S_C	360 m/s < $V_{s,30}$≤760 m/s [1200 ft/s < $V_{s,100}$≤2500 ft/s]	Very dense soil and soft rock
S_D	180 m/s ≤ $V_{s,30}$≤360 m/s [600 ft/s < $V_{s,100}$≤1200 ft/s]	Stiff Soil Profile
S_E	$V_{s,30}$< 180 m/s [$V_{s,100}$ < 600 ft/s]	Soft Soil Profile
S_F	-	Soils requiring site-specific evaluation.

Appendix 3

Site Location: Cheou-Shio Elementary School (TCU-049)

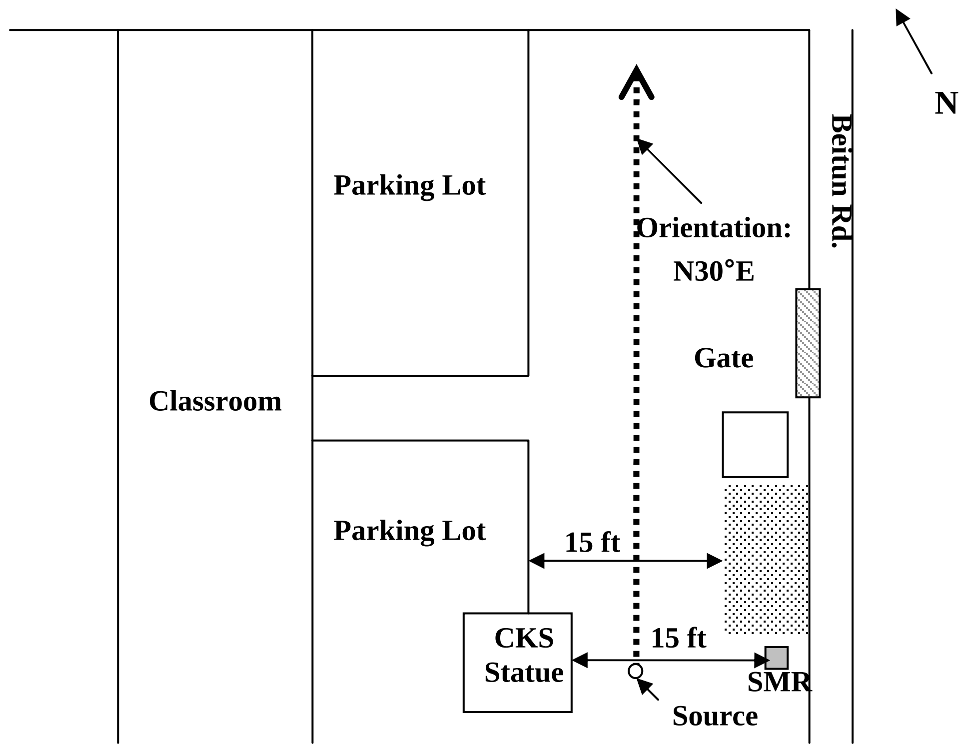

Figure 3.1 Site Map of Cheou-Shio Elementary School

Figure 3.2 Picture Taken at Cheou-Shio Elementary School (View # 1)

Figure 3.3 Picture Taken at Cheou-Shio Elementary School (View # 2)

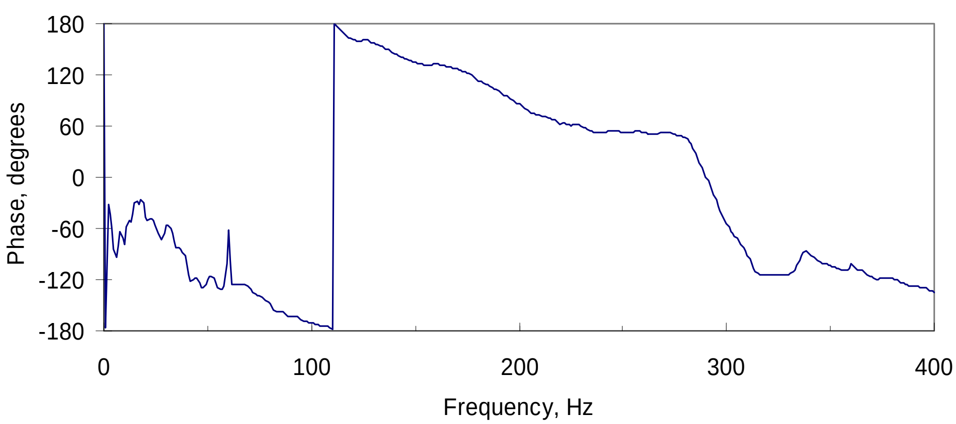

Figure 3.4 Phase Plots Measured by SASW Testing with 3-ft Receiver Spacing

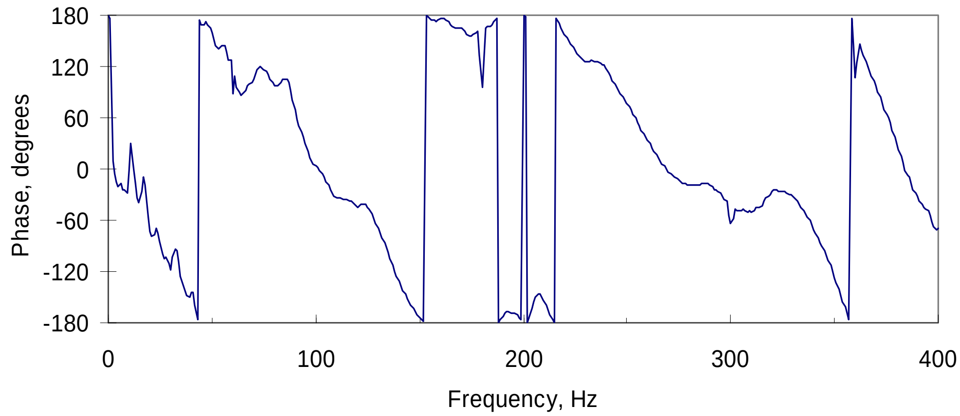

Figure 3.5 Phase Plots Measured by SASW Testing with 6-ft Receiver Spacing

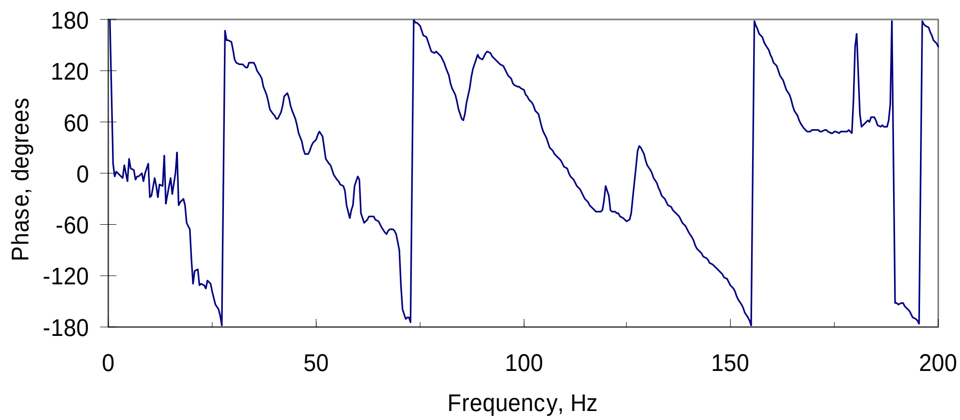

Figure 3.6 Phase Plots Measured by SASW Testing with 12-ft Receiver Spacing

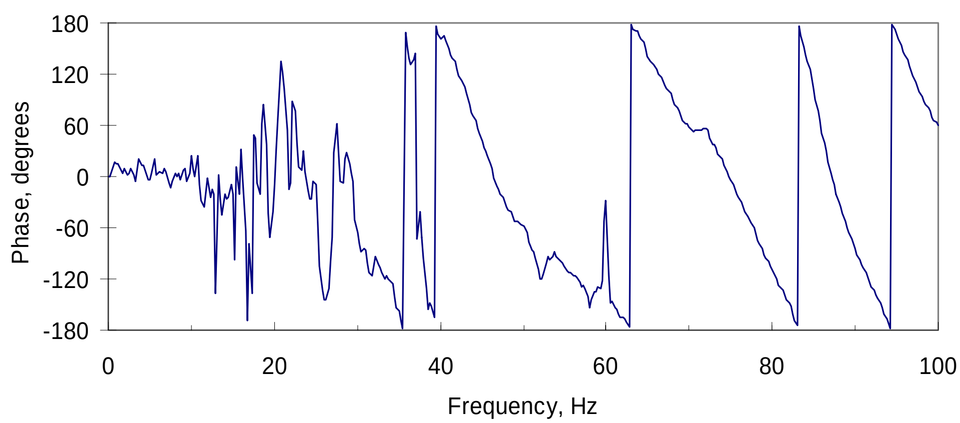

Figure 3.7 Phase Plots Measured by SASW Testing with 25-ft Receiver Spacing

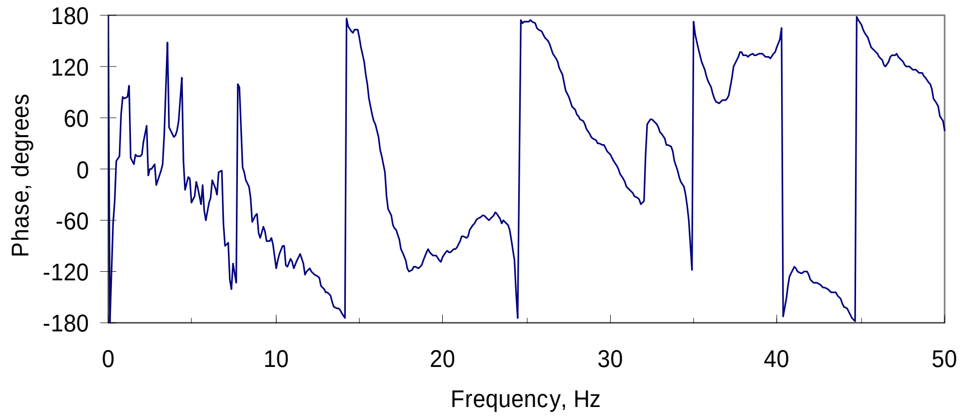

Figure 3.8 Phase Plots Measured by SASW Testing with 50-ft Receiver Spacing

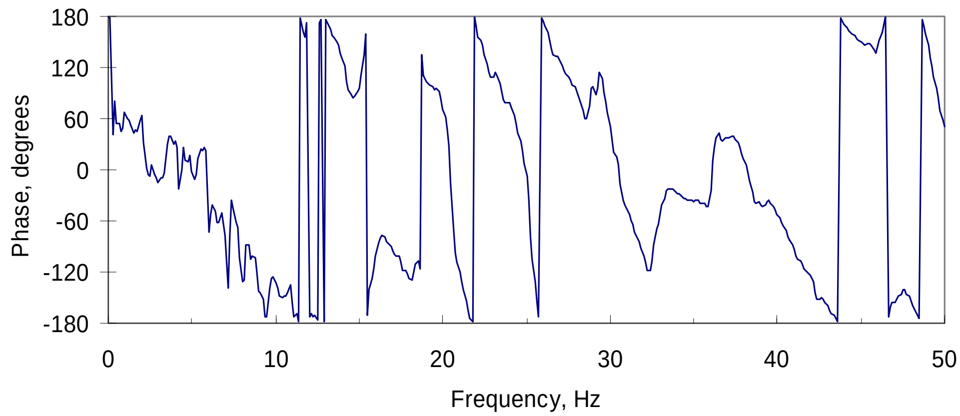

Figure 3.9 Phase Plots Measured by SASW Testing with 150-ft Receiver Spacing

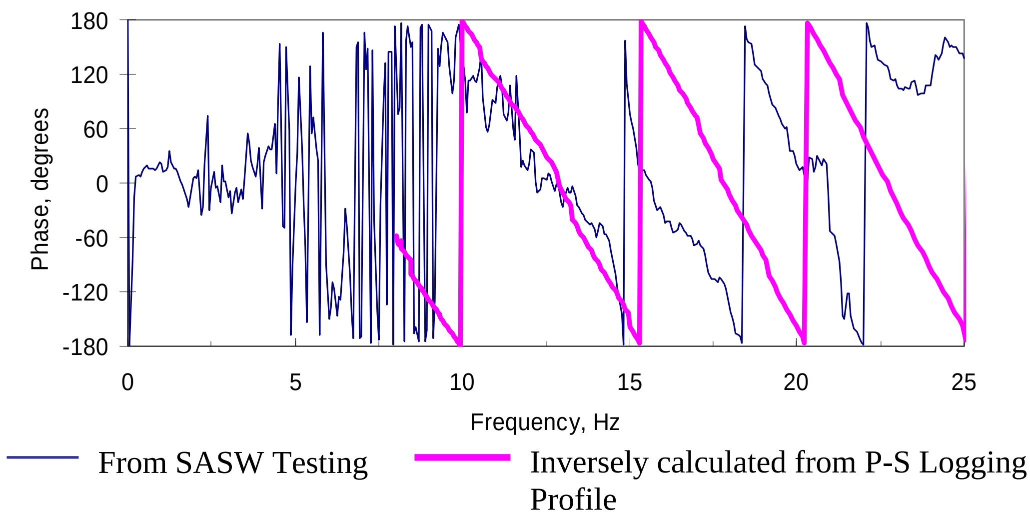

Figure 3.10 Phase Plots Measured by SASW Testing with 250-ft Receiver Spacing

Table 3.1 Table of Masking Parameters Used on Data Collected at Cheou-Shio Elementary School

Receiver Spacing	Masking Interval	Masking Start Frequency, Hz	Masking Stop Frequency, Hz	Number of Jumps
3 ft	1	0.0	71.0	0
	2	236.0	340.0	1
6 ft	1	0.0	44.0	1
	2	58.0	94.0	1
	3	126.0	217.0	2
	4	280.0	400.0	-
12 ft	1	0.0	28.0	1
	2	69.0	90.0	2
	3	105.0	136.5	2
	4	168.5	200.0	-
25 ft	1	0.0	39.5	2
	2	50.8	54.0	2
	3	57.3	60.8	2
50 ft	1	0.0	11.8	0
	2	15.5	24.8	2
	3	32.0	35.0	3
	4	36.5	41.0	3
150 ft	1	0.0	13.0	2
	2	14.6	16.4	2
	3	18.1	20.0	3
	4	28.5	50.0	-
250 ft	1	0.0	12.4	2
	2	19.9	21.1	4
	3	23.1	25.0	-

Performed by____________________ Checked by____________________

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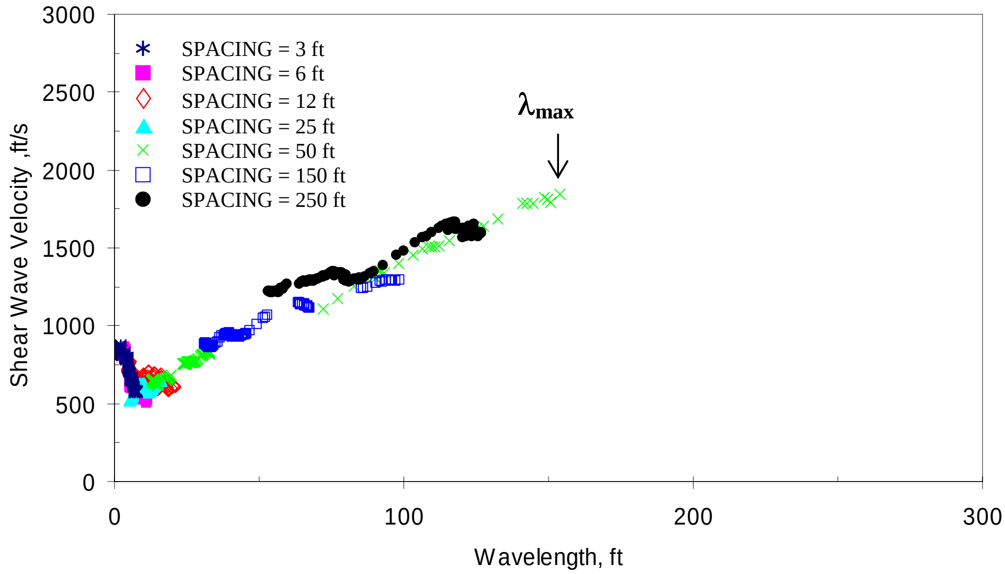


Figure 3.11 Experimental Dispersion Curve Measured at Cheou-Shio Elementary School; Linear Wavelength Axis

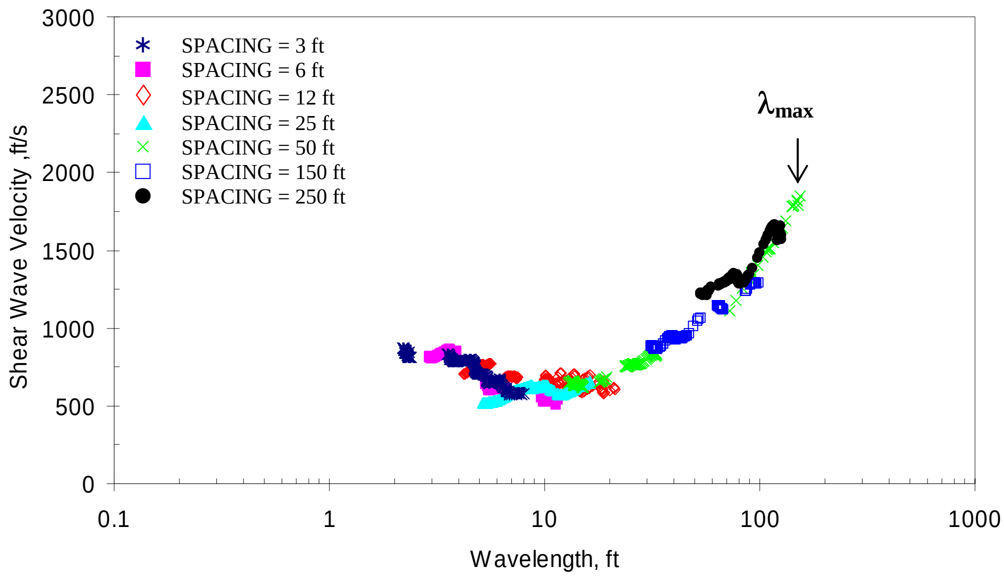


Figure 3.12 Experimental Dispersion Curve Measured at Cheou-Shio Elementary School; Logarithmic Wavelength Axis

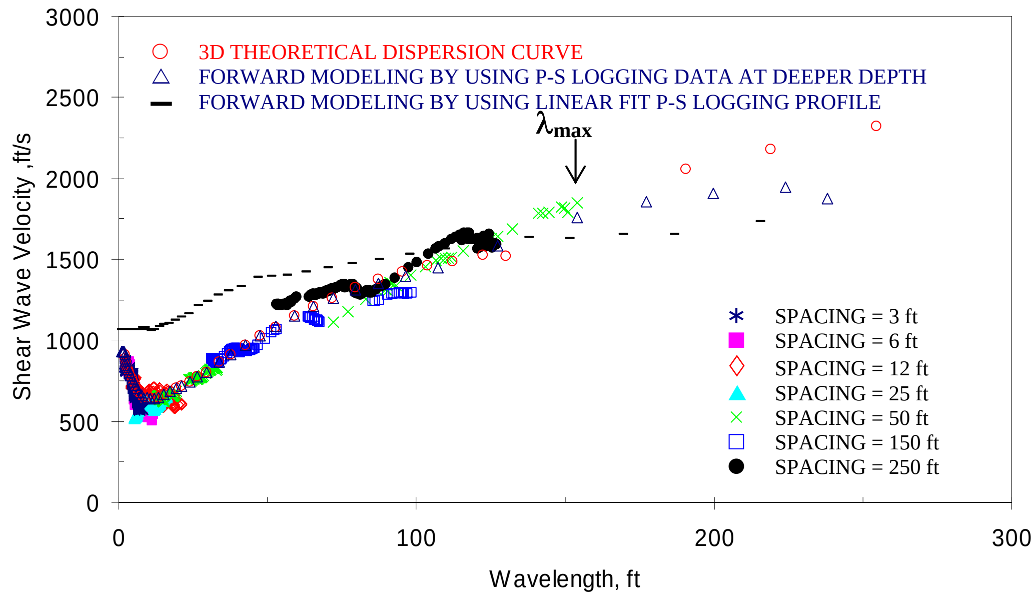


Figure 3.13 Experimental and Theoretical Dispersion Curves from Cheou-Shio Elementary School; Linear Wavelength Axis

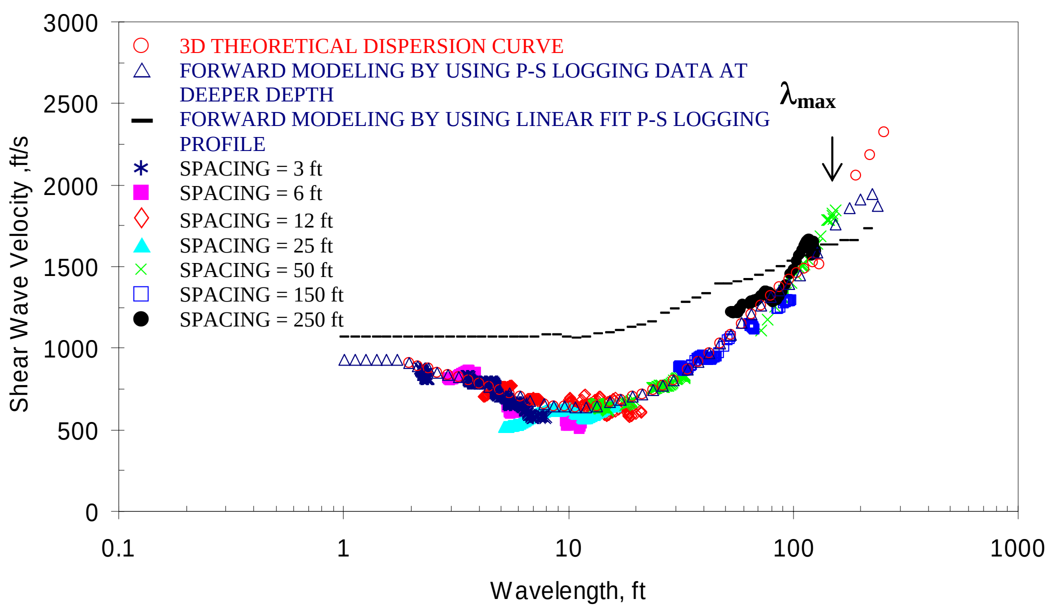
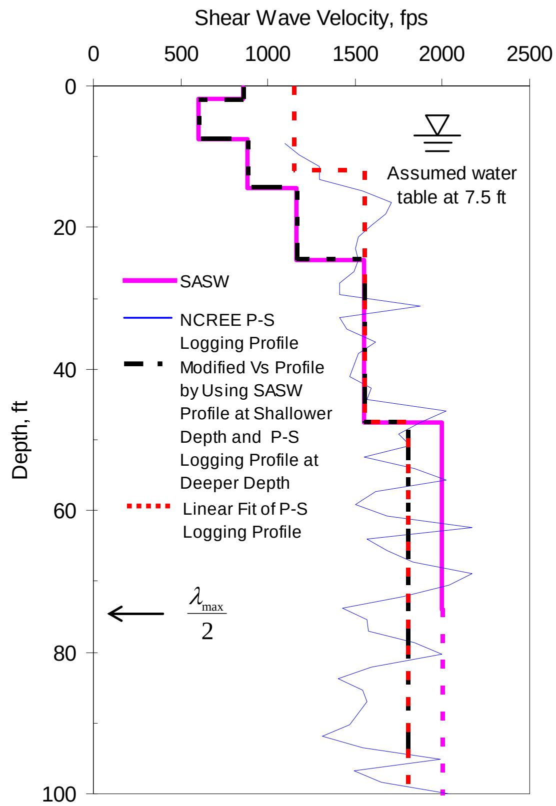


Figure 3.14 Experimental and Theoretical Dispersion Curves from Cheou-Shio Elementary School; Logarithmic Wavelength Axis



Note: Velocity in top 0.3 ft (asphalt pavement) not shown.

Figure 3.15 Shear Wave Velocity Profile Determined at Cheou-Shio Elementary School

Table 3.2 Profile Parameters Used to Develop Theoretical Dispersion Curve at Cheou-Shio Elementary School

Layer No.	Thickness, ft	Depth to the bottom, ft	P-Wave Velocity, ft/s	S-Wave Velocity, ft/s	Poisson's Ratio	Total Unit Weight, pcf
1	0.3	0.3	3464	2000	0.25	120
2	1.5	1.8	1490	860	0.25	120
3	5.7	7.5	1039	600	0.25	120
4	7.0	14.5	4800	880	0.48	120
5	10.0	24.5	5000	1160	0.47	120
6	23.0	47.5	5000	1550	0.45	120
7	15.0	62.5	5000	2000	0.40	120
8	11.5	74	5000	2200	0.38	125

Performed by____________________ Checked by____________________

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Table 3.3 Uniform Building Code (UBC-97) Site Classification of Cheou-Shio Elementary School

Average Shear Wave Velocity of Top 30 meters (100 ft), $V_{s,30}$ (ft/s) [m/s]	Site Classification
1490 [454]	C

Performed by________________________ Checked by________________________
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Table 3.4 UBC-97 Site Categories

Soil Profile Type	Average Shear Wave Velocity of Top 30 m, $V_{s,30}$ (m/s) [Top100 ft, $V_{s,100}$ (ft/s)]	Description
S_A	$V_{s,30}$>1500 m/s [$V_{s,100}$>5000 ft/s]	Hard rock
S_B	760 m/s < $V_{s,30}$≤1500 m/s [2500 ft/s < $V_{s,100}$≤5000 ft/s]	Rock
S_C	360 m/s < $V_{s,30}$≤760 m/s [1200 ft/s < $V_{s,100}$≤2500 ft/s]	Very dense soil and soft rock
S_D	180 m/s ≤ $V_{s,30}$≤360 m/s [600 ft/s < $V_{s,100}$≤1200 ft/s]	Stiff Soil Profile
S_E	$V_{s,30}$< 180 m/s [$V_{s,100}$ < 600 ft/s]	Soft Soil Profile
S_F	-	Soils requiring site-specific evaluation.

Appendix 4

Site Location: Wu-Fon Elementary School (TCU-065)

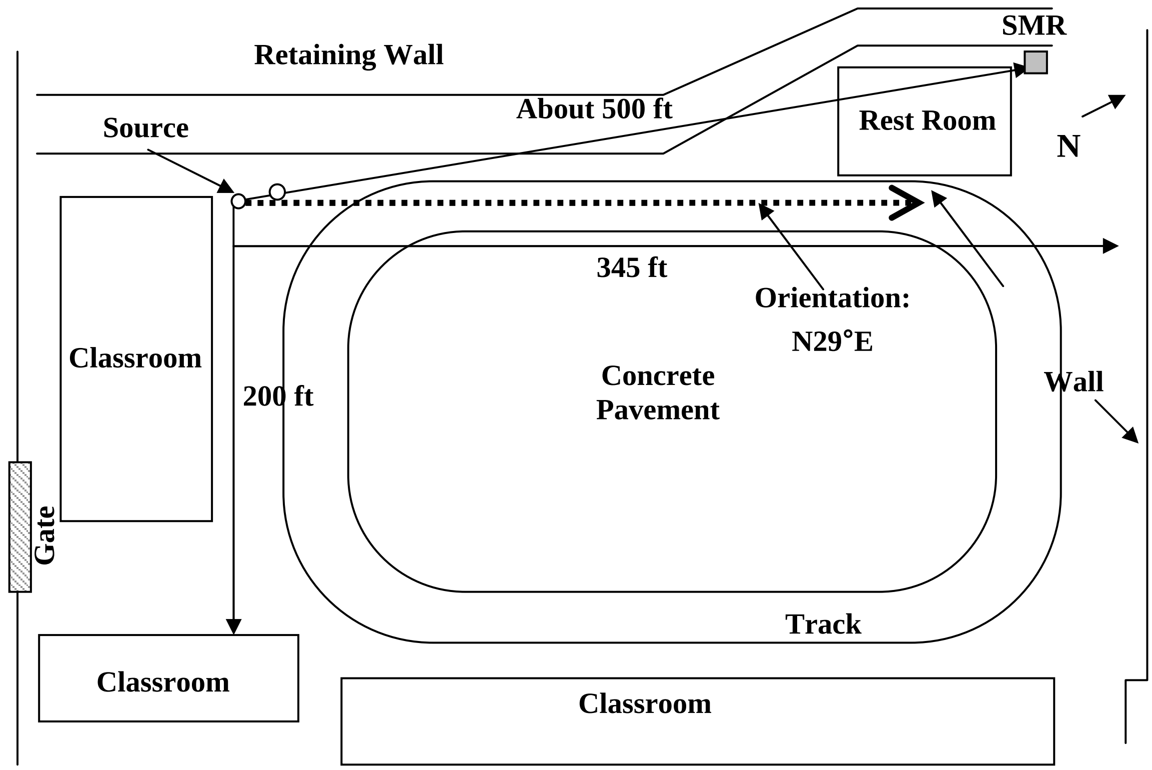


Figure 4.1 Site Map of Wu-Fon Elementary

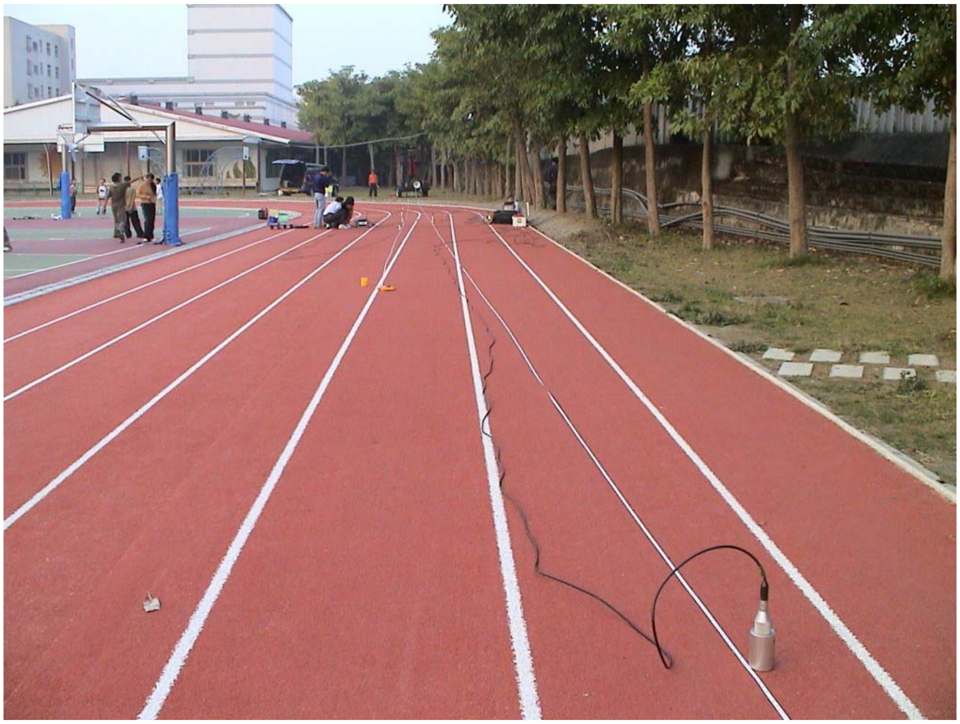


Figure 4.2 Picture Taken at Wu-Fon Elementary School (View # 1)

Figure 4.3 Picture Taken at Wu-Fon Elementary School (View # 2)

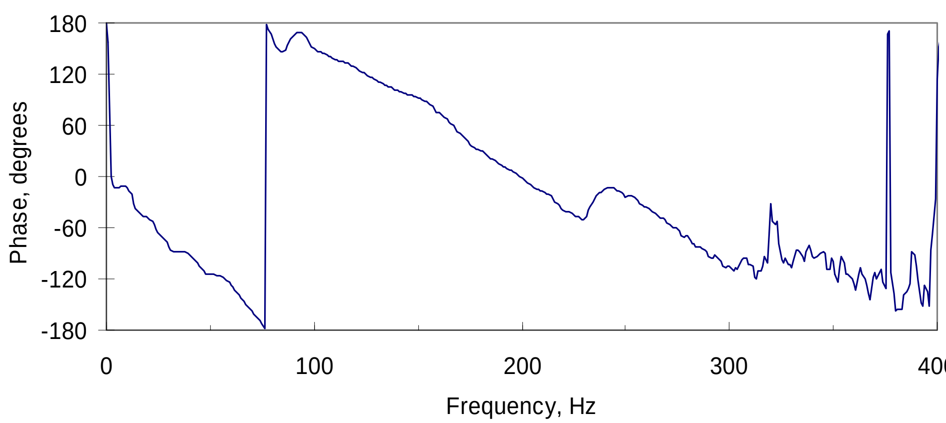


Figure 4.4 Phase Plots Measured by SASW Testing with 3-ft Receiver Spacing

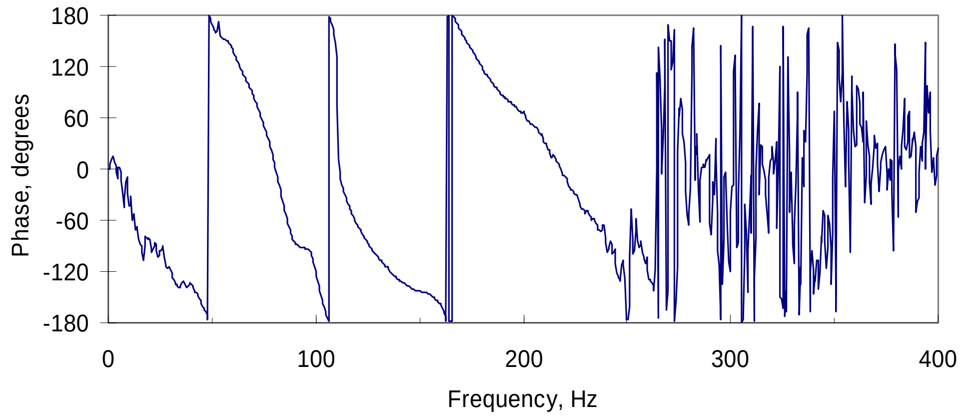


Figure 4.5 Phase Plots Measured by SASW Testing with 6-ft Receiver Spacing

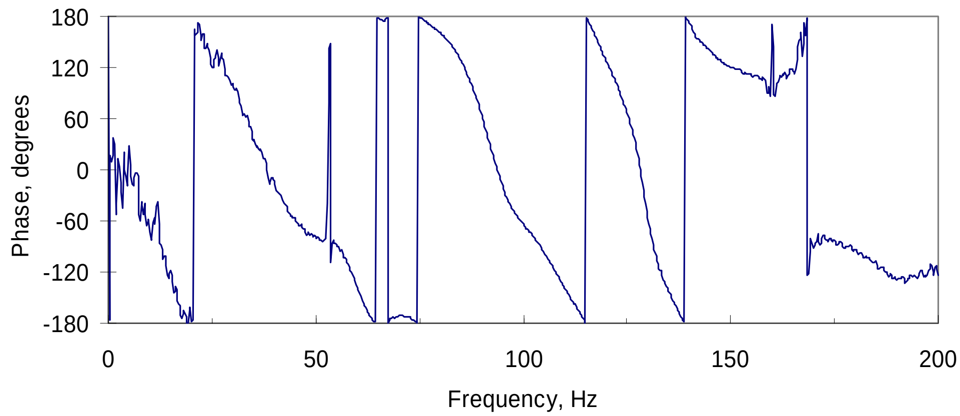


Figure 4.6 Phase Plots Measured by SASW Testing with 12-ft Receiver Spacing

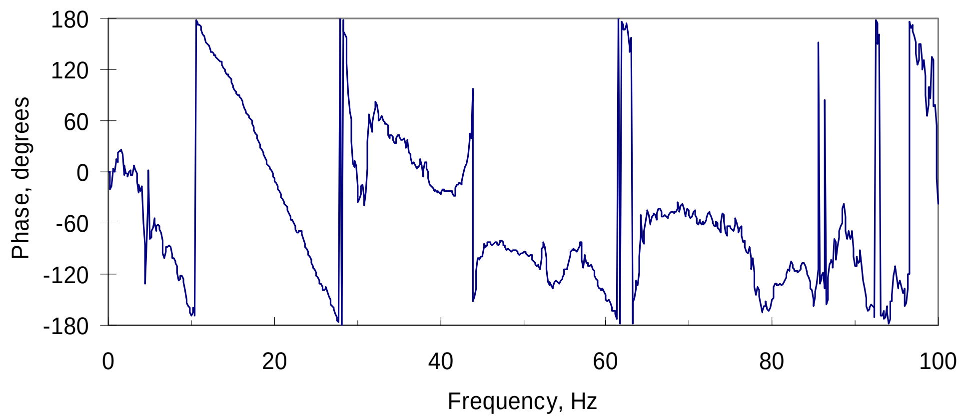


Figure 4.7 Phase Plots Measured by SASW Testing with 25-ft Receiver Spacing

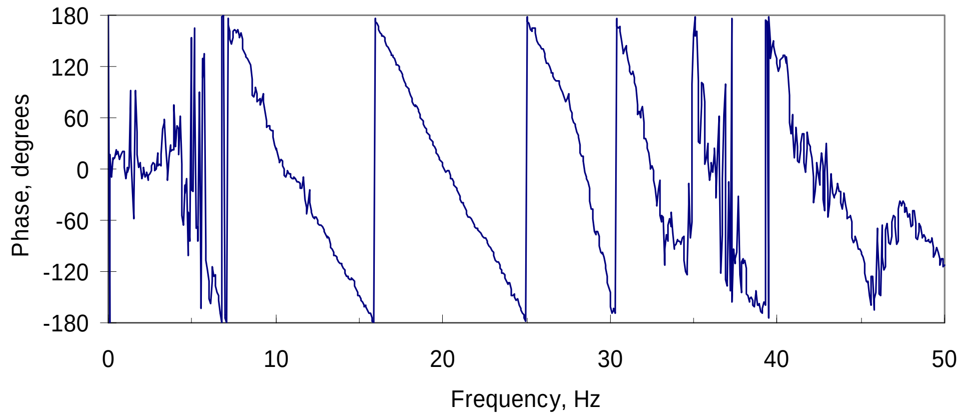


Figure 4.8 Phase Plots Measured by SASW Testing with 50-ft Receiver Spacing

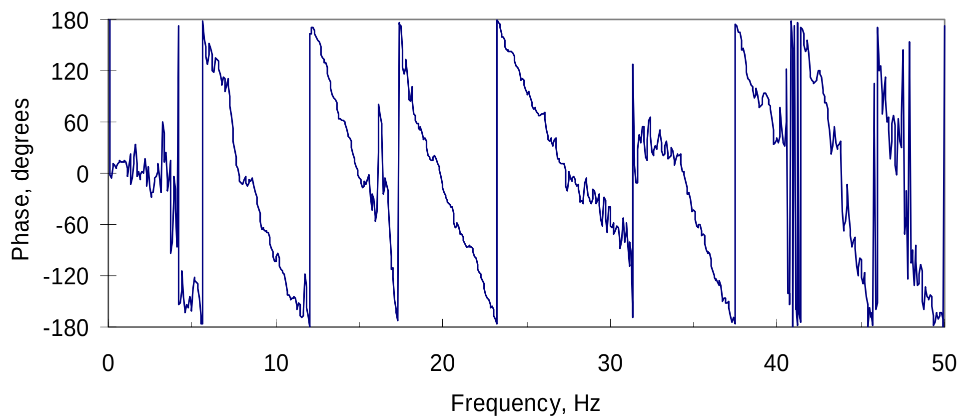


Figure 4.9 Phase Plots Measured by SASW Testing with 75-ft Receiver Spacing

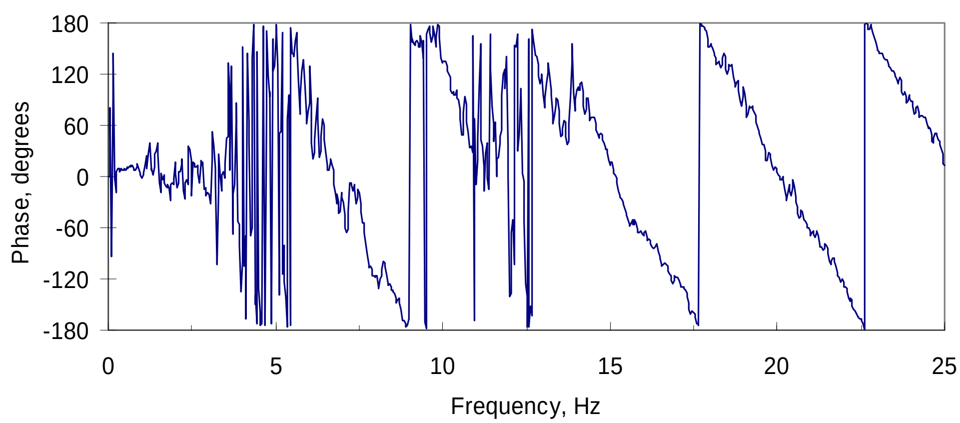
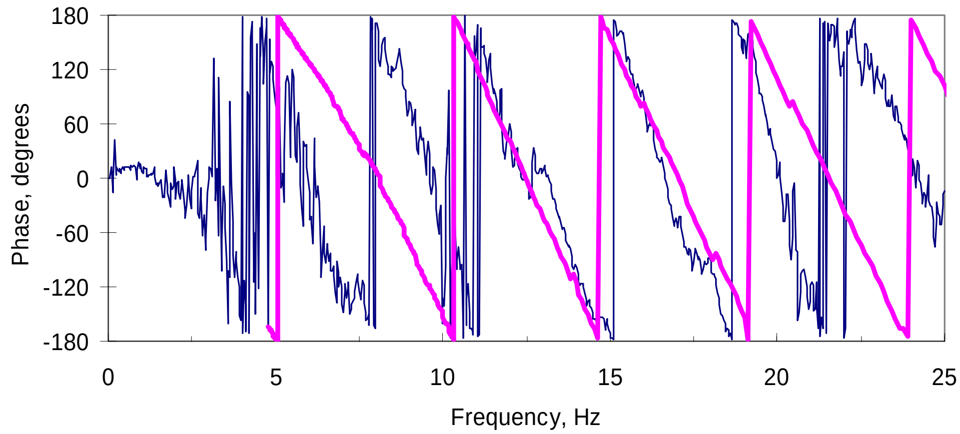


Figure 4.10 Phase Plots Measured by SASW Testing with 100-ft Receiver Spacing



From SASW Testing Inversely calculated from P-S Logging Profile

Figure 4.11 Phase Plots Measured by SASW Testing with 124-ft Receiver Spacing

Table 4.1 Table of Masking Parameters Used on Data Collected at Wu-Fon Elementary School

Receiver Spacing	Masking Interval	Masking Start Frequency, Hz	Masking Stop Frequency, Hz	Number of Jumps
3 ft	1	0.0	93.0	1
	2	226.0	400.0	-
6 ft	1	0.0	48.5	1
	2	77.5	137.5	1
	3	163.0	166.5	2
	4	247.0	400.0	-
12 ft	1	0.0	21.5	1
	2	50.5	56.3	1
	3	64.0	75.5	2
	4	115.8	200.0	-
25 ft	1	0.0	10.6	1
	2	27.8	32.6	2
	3	39.9	57.9	3
	4	61.1	100.0	-
50 ft	1	0.0	7.7	1
	2	30.1	50.0	-
75 ft	1	0.0	5.7	1
	2	16.0	17.4	3
	3	28.2	34.1	5
	4	39.6	50.0	-
100 ft	1	0.0	5.5	1
	2	8.9	14.1	3
124 ft	1	0.0	4.7	1
	2	5.0	6.2	1
	3	7.8	8.1	2
	4	9.9	11.2	3
	5	21.1	22.6	6

Performed by____________________ Checked by____________________

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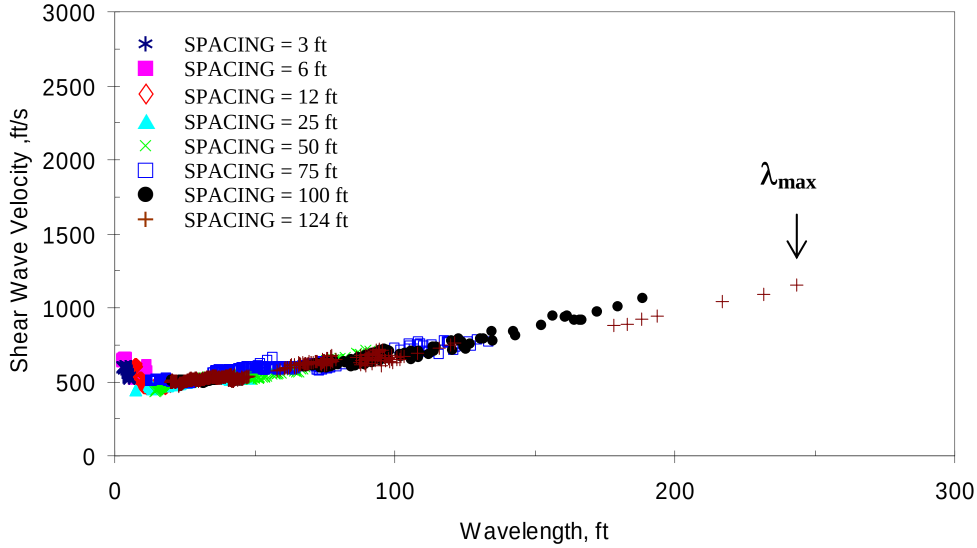

Figure 4.12 Experimental Dispersion Curve Measured at Wu-Fon Elementary School; Linear Wavelength Axis

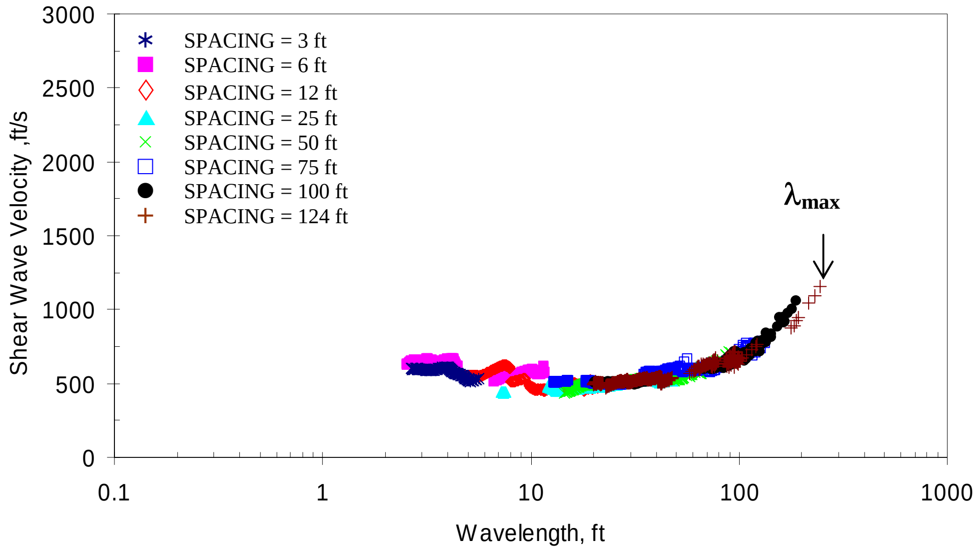

Figure 4.13 Experimental Dispersion Curve Measured at Wu-Fon Elementary School; Logarithmic Wavelength Axis

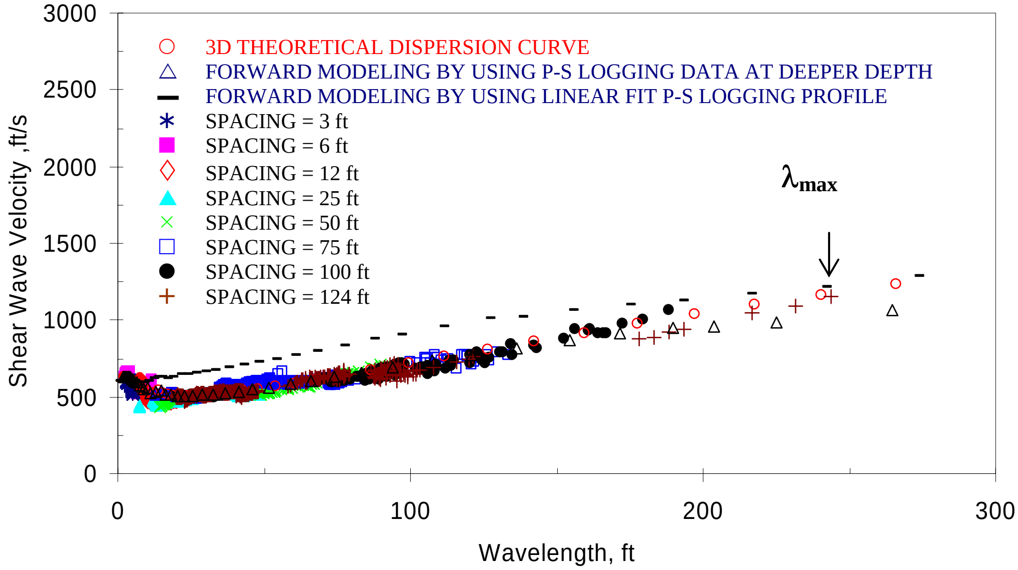

Figure 4.14 Experimental and Theoretical Dispersion Curves from Wu-Fon Elementary School; Linear Wavelength Axis

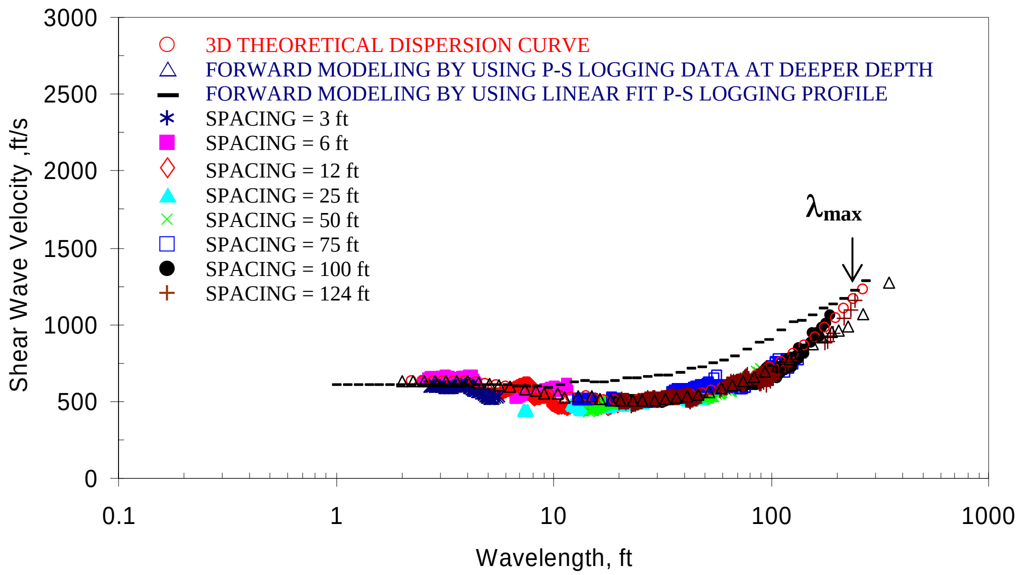

Figure 4.15 Experimental and Theoretical Dispersion Curves from Wu-Fon Elementary School; Logarithmic Wavelength Axis

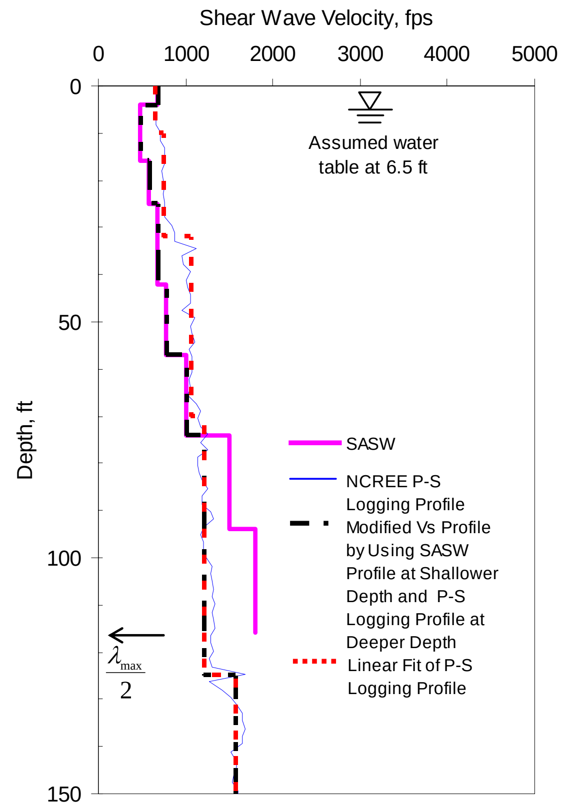

Figure 4.16 Shear Wave Velocity Profile Determined at Wu-Fon Elementary School

Table 4.2 Profile Parameters Used to Develop Theoretical Dispersion Curve at Wu-Fon Elementary School

Layer No.	Thickness, ft	Depth to the bottom, ft	P-Wave Velocity, ft/s	S-Wave Velocity, ft/s	Poisson's Ratio	Total Unit Weight, pcf
1	4.0	4	1178	680	0.25	120
2	2.5	6.5	831	480	0.25	120
3	9.5	16	4800	480	0.49	120
4	9.0	25	5000	580	0.49	120
5	17.0	42	5000	680	0.49	120
6	15.0	57	5000	780	0.49	120
7	17.0	74	5000	1000	0.48	120
8	20.0	94	5000	1500	0.45	120
9	28.0	122	5000	1800	0.43	120

Performed by________________________ Checked by________________________
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Table 4.3 Uniform Building Code (UBC-97) Site Classification of Wu-Fon Elementary School

Average Shear Wave Velocity of Top 30 meters (100 ft), $V_{s,30}$ (ft/s) [m/s]	Site Classification
800 [244]	D

Performed by________________________ Checked by________________________
Yin-Cheng Lin Brent L. Rosenblad

Table 4.4 UBC-97 Site Categories

Soil Profile Type	Average Shear Wave Velocity of Top 30 m, $V_{s,30}$ (m/s) [Top100 ft, $V_{s,100}$ (ft/s)]	Description
S_A	$V_{s,30}$>1500 m/s [$V_{s,100}$>5000 ft/s]	Hard rock
S_B	760 m/s < $V_{s,30}$≤1500 m/s [2500 ft/s < $V_{s,100}$≤5000 ft/s]	Rock
S_C	360 m/s < $V_{s,30}$≤760 m/s [1200 ft/s < $V_{s,100}$≤2500 ft/s]	Very dense soil and soft rock
S_D	180 m/s ≤ $V_{s,30}$≤360 m/s [600 ft/s < $V_{s,100}$≤1200 ft/s]	Stiff Soil Profile
S_E	$V_{s,30}$< 180 m/s [$V_{s,100}$ < 600 ft/s]	Soft Soil Profile
S_F	-	Soils requiring site-specific evaluation.

Appendix 5

Site Location: Si-Kon Elementary School (TCU-068)

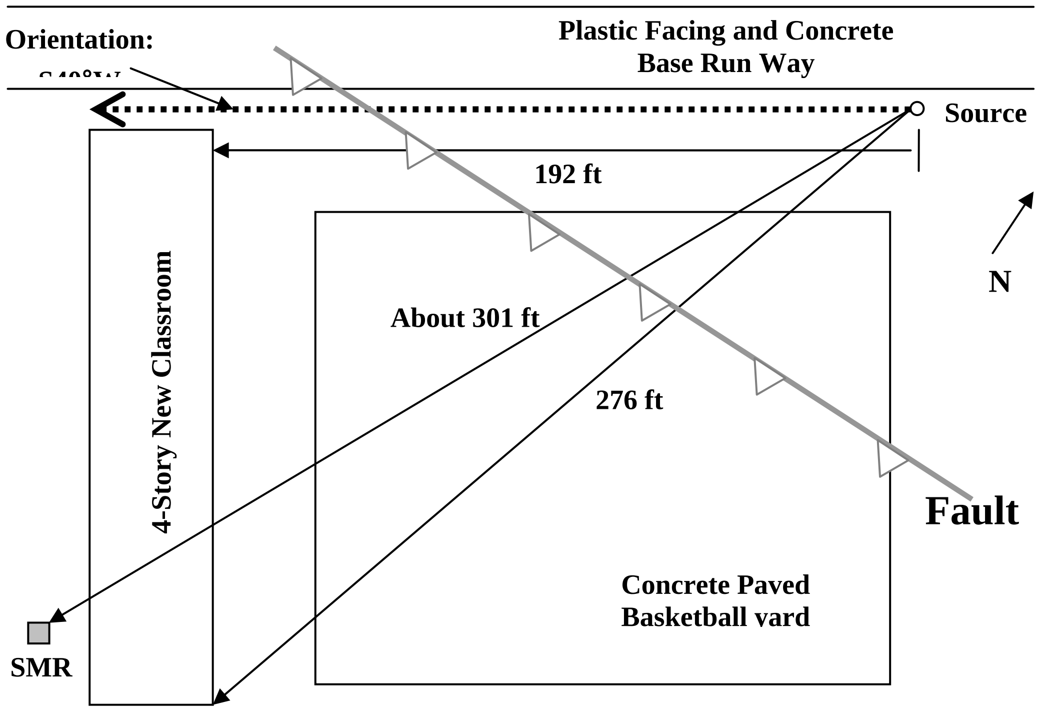

Figure 5.1 Site Map of Si-Kon Elementary School

Figure 5.2 Picture Taken at Si-Kon Elementary School (View # 1)

Figure 5.3 Picture Taken at Si-Kon Elementary School (View # 2)

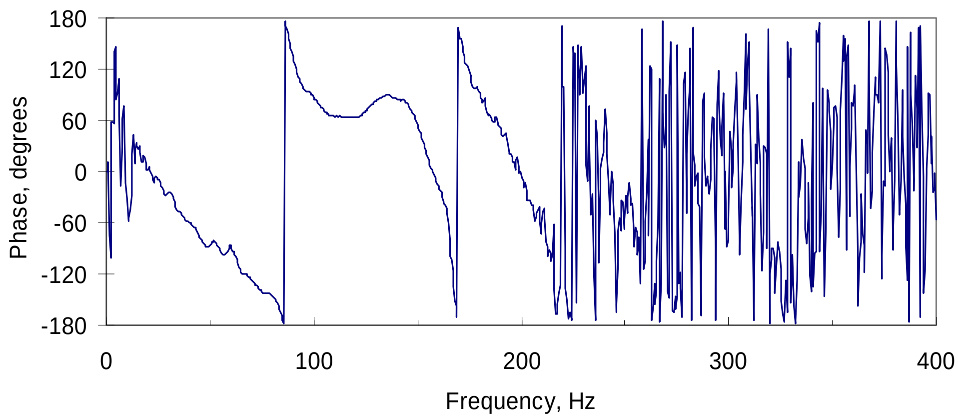

Figure 5.4 Phase Plots Measured by SASW Testing with 3-ft Receiver Spacing

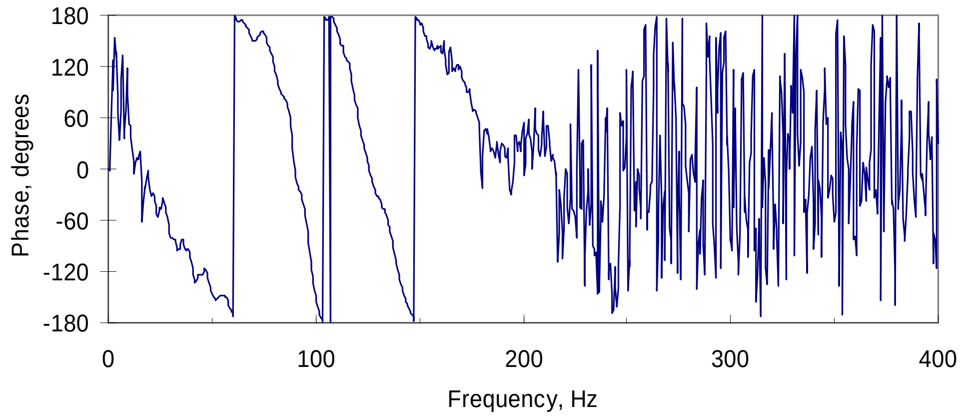

Figure 5.5 Phase Plots Measured by SASW Testing with 6-ft Receiver Spacing

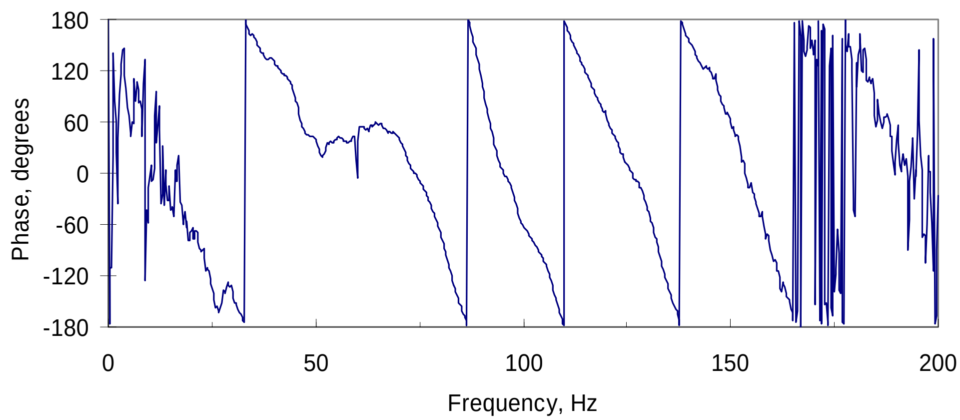

Figure 5.6 Phase Plots Measured by SASW Testing with 12-ft Receiver Spacing

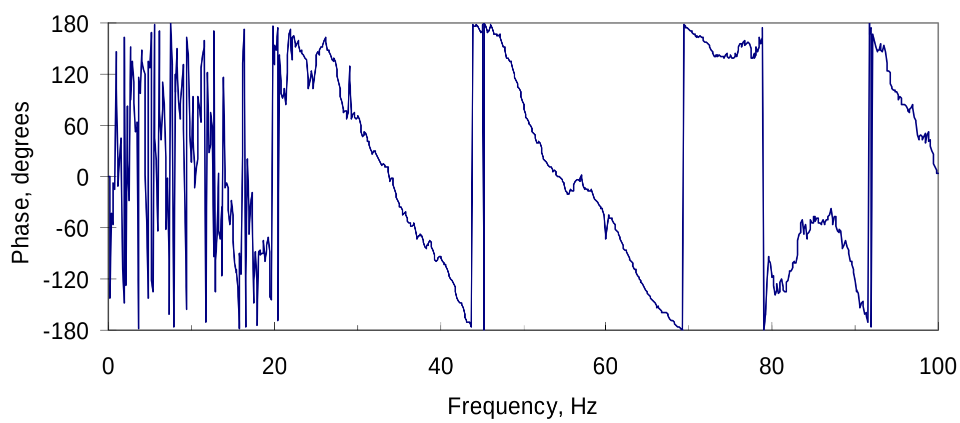

Figure 5.7 Phase Plots Measured by SASW Testing with 25-ft Receiver Spacing

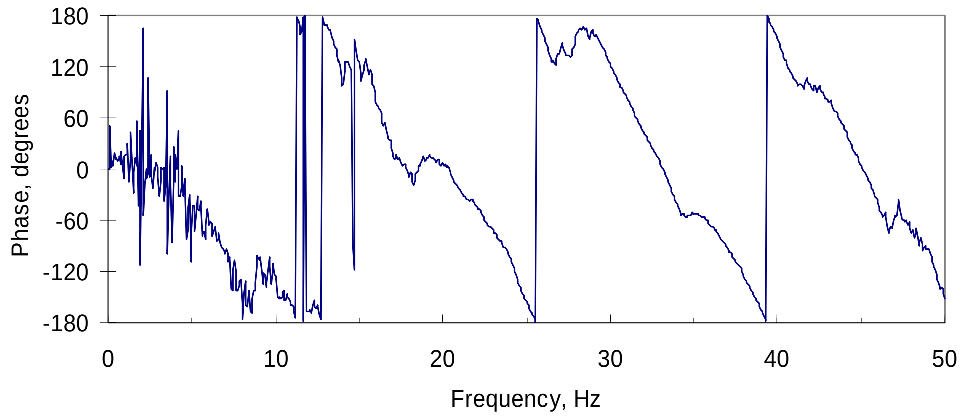

Figure 5.8 Phase Plots Measured by SASW Testing with 50-ft Receiver Spacing

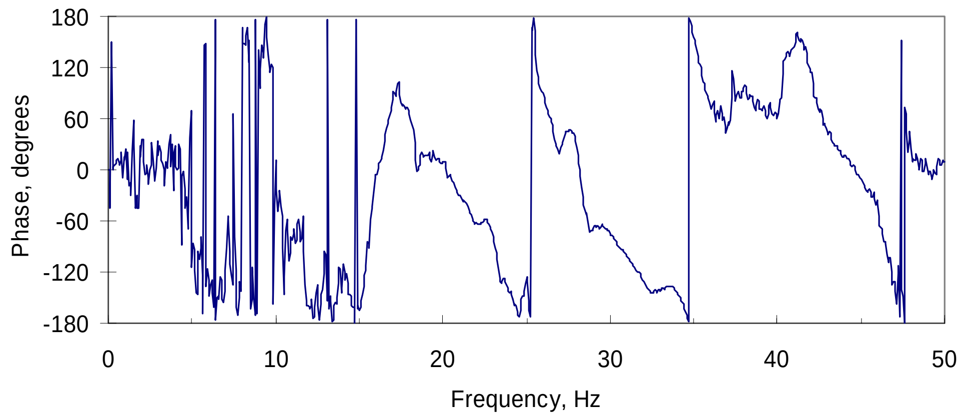

Figure 5.9 Phase Plots Measured by SASW Testing with 100-ft Receiver Spacing

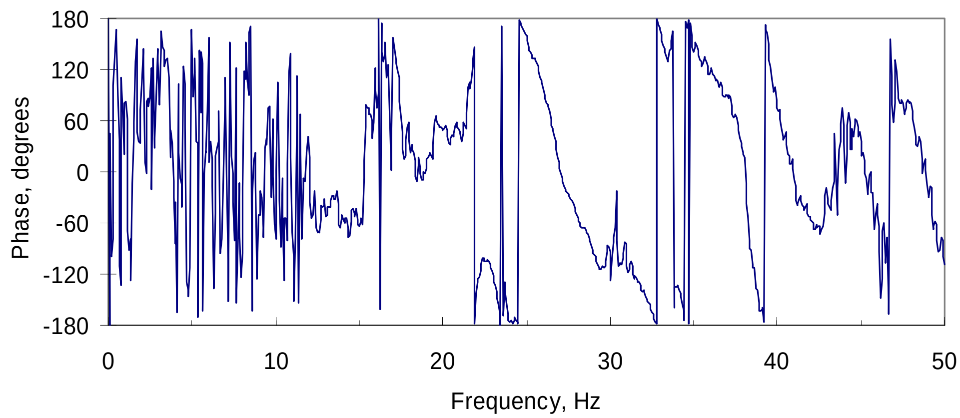

Figure 5.10 Phase Plots Measured by SASW Testing with 125-ft Receiver Spacing

Table 5.1 Table of Masking Parameters Used on Data Collected at Si-Kon Elementary School

Receiver Spacing	Masking Interval	Masking Start Frequency, Hz	Masking Stop Frequency, Hz	Number of Jumps
3 ft	1	0.0	86.0	1
	2	109.0	169.5	2
	3	214.5	400.0	-
6 ft	1	0.0	61.5	1
	2	69.5	81.5	1
	3	103.5	108.5	2
	4	155.5	400.0	-
12 ft	1	0.0	33.3	1
	2	51.5	70.5	2
	3	165.0	200.0	-
25 ft	1	0.0	22.4	1
	2	23.9	29.9	1
	3	43.8	46.0	2
	4	73.0	87.1	3
	5	91.5	92.3	4
50 ft	1	0.0	13.0	1
	2	13.8	19.1	1
	3	25.4	28.9	2
100 ft	1	0.0	17.4	2
	2	37.0	50.0	-
125 ft	1	0.0	24.6	3
	2	29.4	50.0	-

Performed by____________________ Checked by____________________

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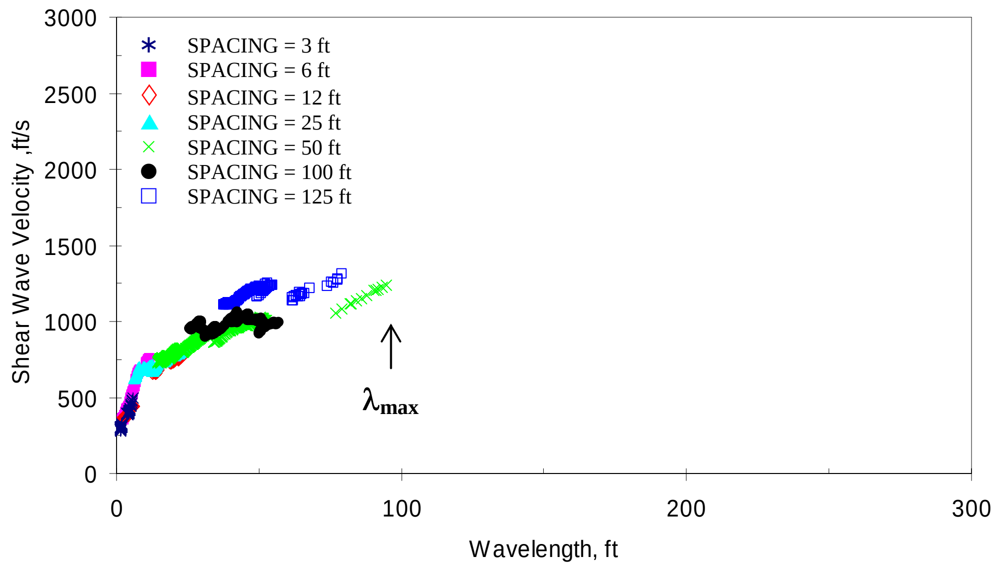

Figure 5.11 Experimental Dispersion Curve Measured at Si-Kon Elementary School; Linear Wavelength Axis

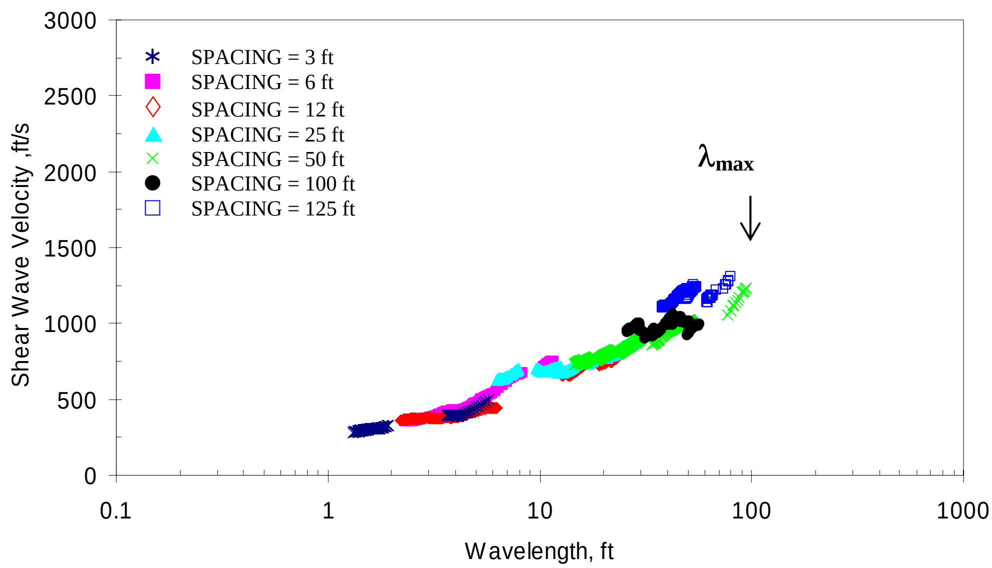

Figure 5.12 Experimental Dispersion Curve Measured at Si-Kon Elementary School; Logarithmic Wavelength Axis

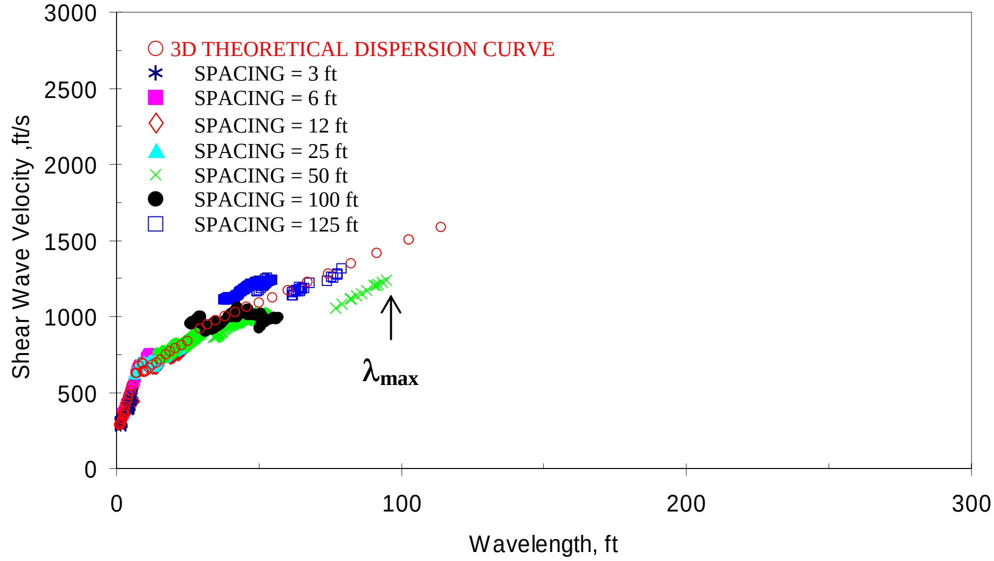

Figure 5.13 Experimental and Theoretical Dispersion Curves from Si-Kon Elementary School; Linear Wavelength Axis

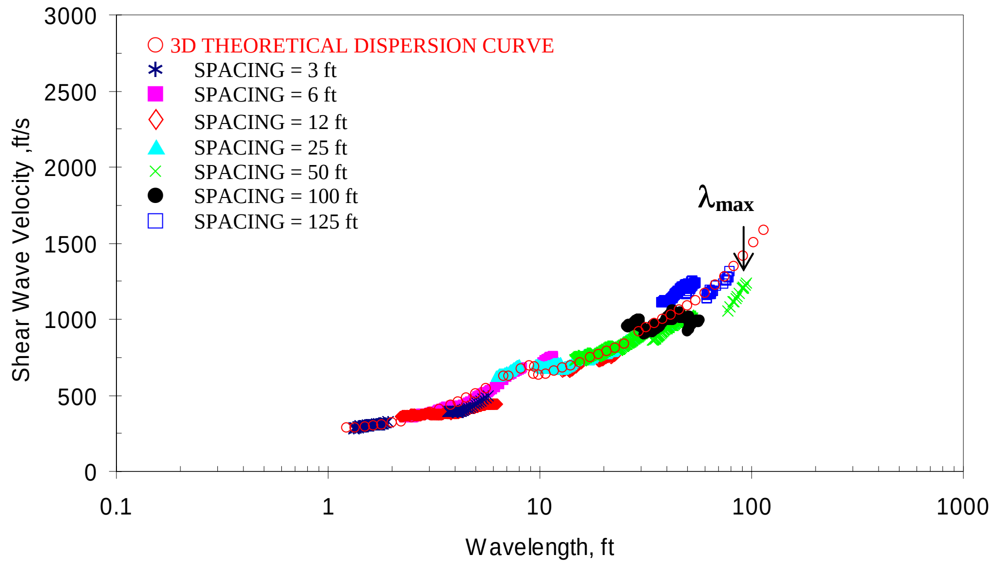

Figure 5.14 Experimental and Theoretical Dispersion Curves from Si-Kon Elementary School; Logarithmic Wavelength Axis

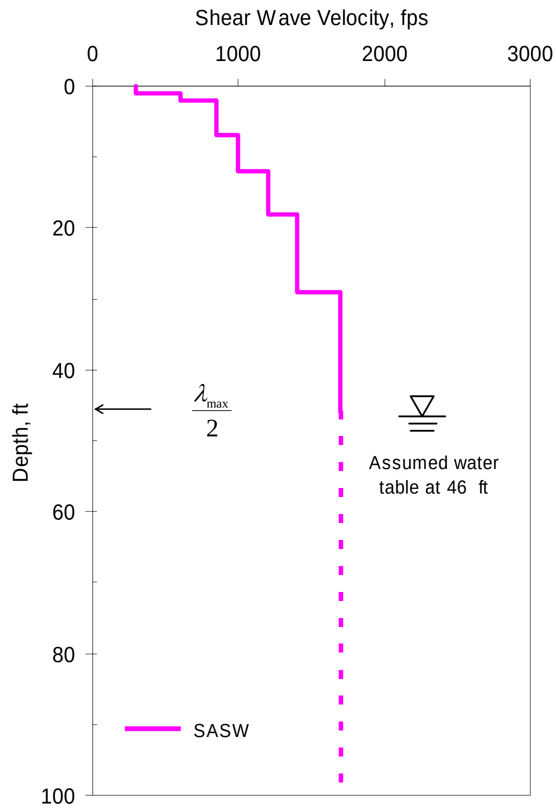

Figure 5.15 Shear Wave Velocity Profile Determined at Si-Kon Elementary School

Table 5.2 Profile Parameters Used to Develop Theoretical Dispersion Curve at Si-Kon Elementary School

Layer No.	Thickness, ft	Depth to the bottom, ft	P-Wave Velocity, ft/s	S-Wave Velocity, ft/s	Poisson's Ratio	Total Unit Weight, pcf
1	1.0	1	520	300	0.25	120
2	1.0	2	1039	600	0.25	120
3	5.0	7	1472	850	0.25	120
4	5.0	12	1732	1000	0.25	120
5	6.0	18	2079	1200	0.25	120
6	11.0	29	2425	1400	0.25	120
7	17.0	46	2945	1700	0.25	120

Performed by________________________ Checked by________________________
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Table 5.3 Uniform Building Code (UBC-97) Site Classification of Si-Kon Elementary School

Average Shear Wave Velocity of Top 30 meters (100 ft), $V_{s,30}$ (ft/s) [m/s]	Site Classification
1660 [506]	C

Performed by________________ Checked by________________
Yin-Cheng Lin Brent L. Rosenblad

Table 5.4 UBC-97 Site Categories

Soil Profile Type	Average Shear Wave Velocity of Top 30 m, $V_{s,30}$ (m/s) [Top100 ft, $V_{s,100}$ (ft/s)]	Description
S_A	$V_{s,30}$>1500 m/s [$V_{s,100}$>5000 ft/s]	Hard rock
S_B	760 m/s < $V_{s,30}$≤1500 m/s [2500 ft/s < $V_{s,100}$≤5000 ft/s]	Rock
S_C	360 m/s < $V_{s,30}$≤760 m/s [1200 ft/s < $V_{s,100}$≤2500 ft/s]	Very dense soil and soft rock
S_D	180 m/s ≤ $V_{s,30}$≤360 m/s [600 ft/s < $V_{s,100}$≤1200 ft/s]	Stiff Soil Profile
S_E	$V_{s,30}$< 180 m/s [$V_{s,100}$ < 600 ft/s]	Soft Soil Profile
S_F	-	Soils requiring site-specific evaluation.

Appendix 6

Site Location: Suan-Don Elementary School (TCU-071)

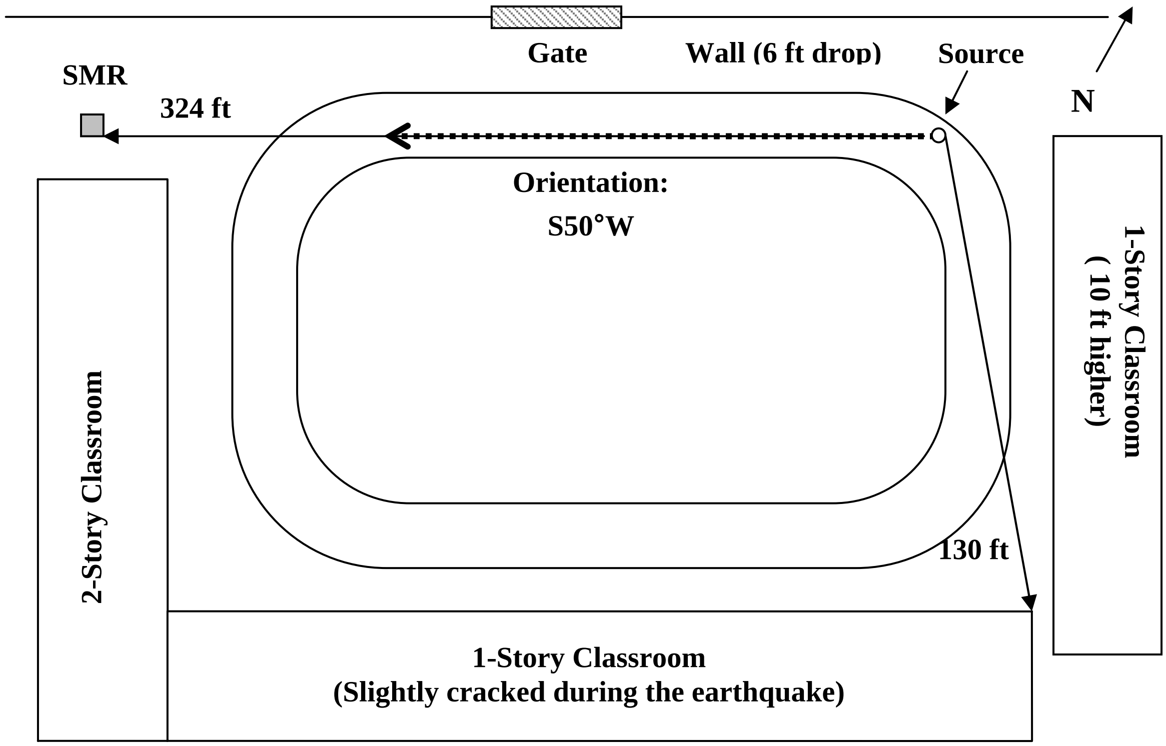

Figure 6.1 Site Map of Suan-Don Elementary School

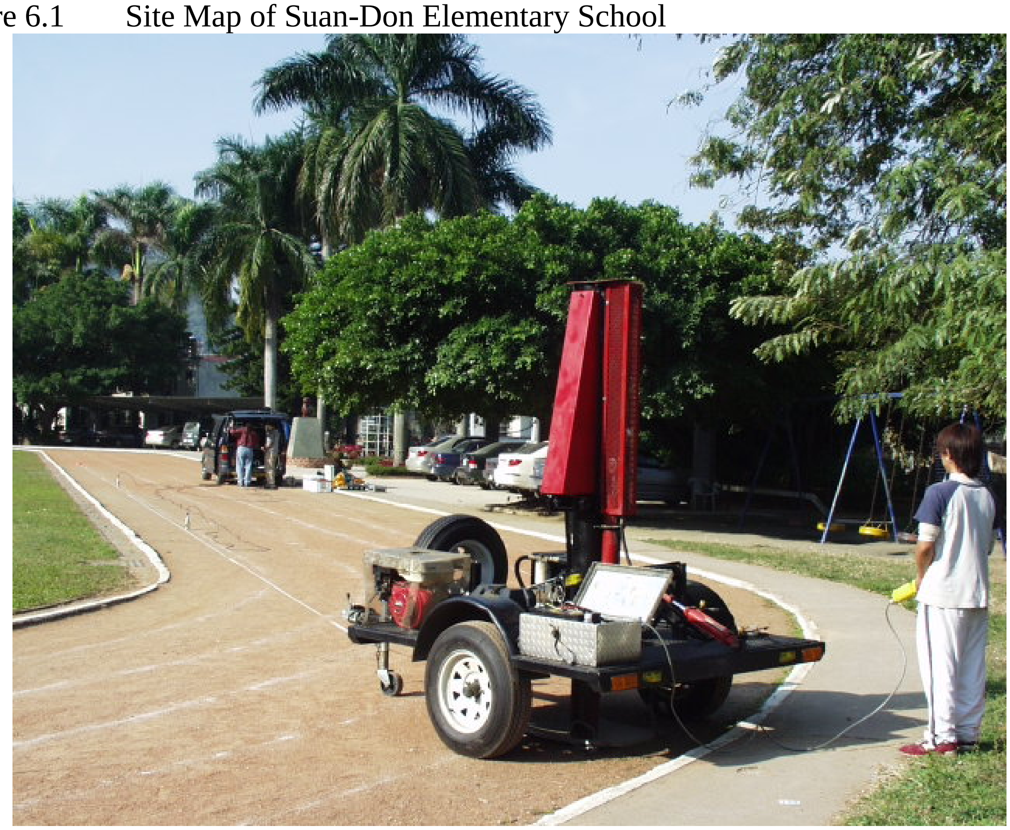

Figure 6.2 Picture Taken at Suan-Don Elementary School (View # 1)

Figure 6.3 Picture Taken at Suan-Don Elementary School (View # 2)

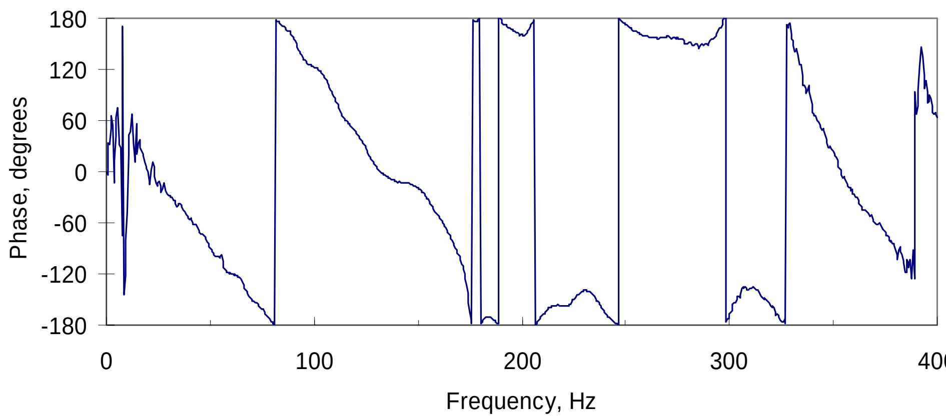

Figure 6.4 Phase Plots Measured by SASW Testing with 3-ft Receiver Spacing

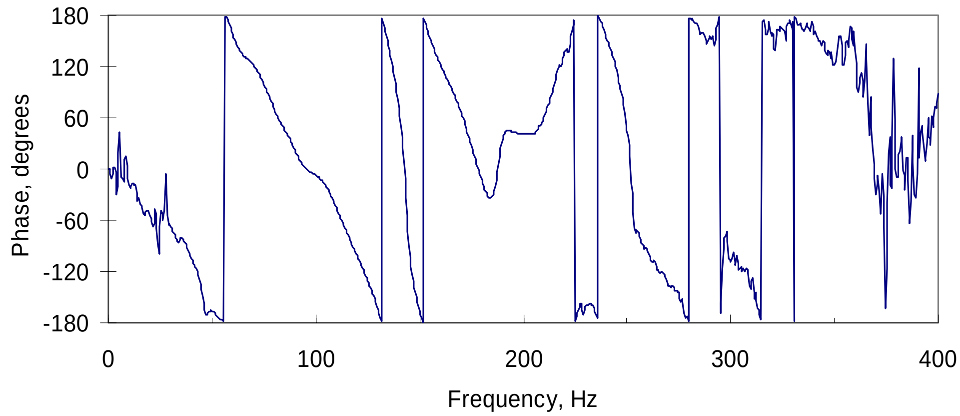

Figure 6.5 Phase Plots Measured by SASW Testing with 6-ft Receiver Spacing

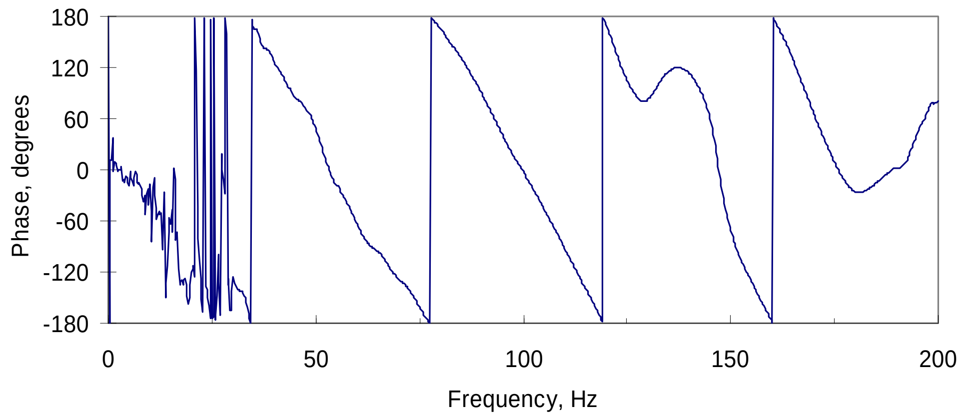

Figure 6.6 Phase Plots Measured by SASW Testing with 12-ft Receiver Spacing

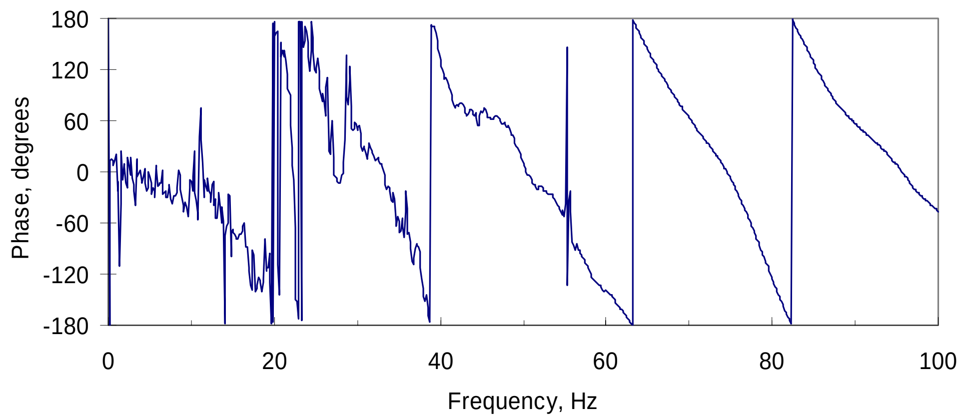

Figure 6.7 Phase Plots Measured by SASW Testing with 25-ft Receiver Spacing

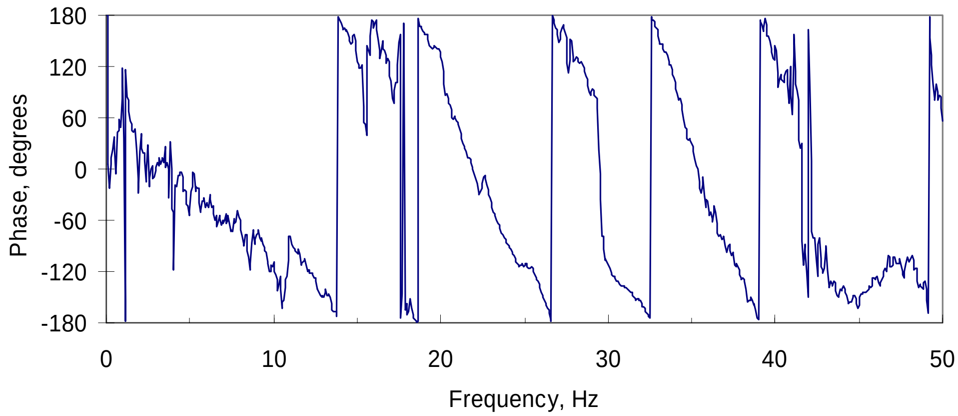

Figure 6.8 Phase Plots Measured by SASW Testing with 50-ft Receiver Spacing

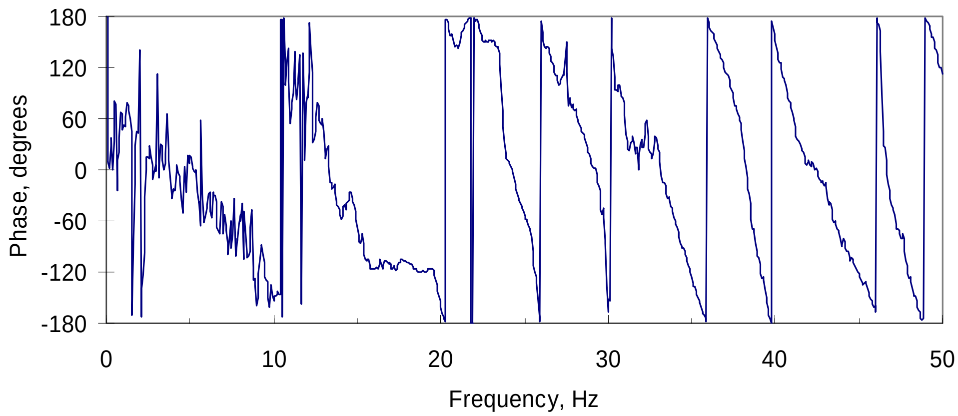

Figure 6.9 Phase Plots Measured by SASW Testing with 75-ft Receiver Spacing

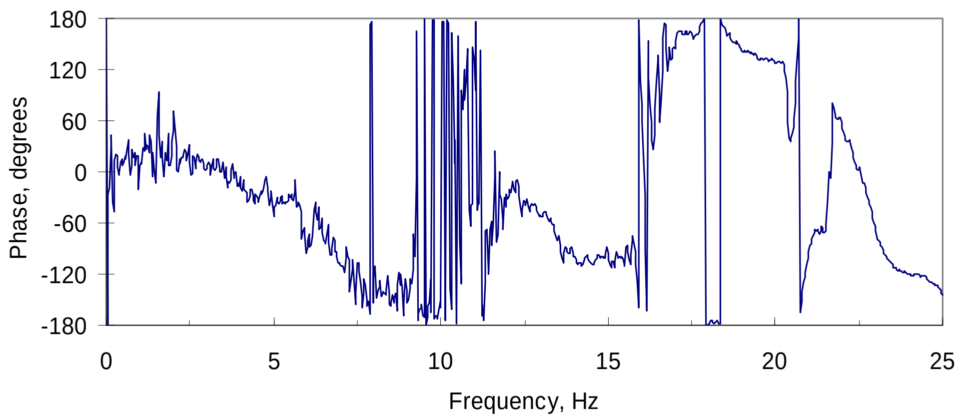

Figure 6.10 Phase Plots Measured by SASW Testing with 100-ft Receiver Spacing

Table 6.1 Table of Masking Parameters Used on Data Collected at Suan-Don Elementary School

Receiver Spacing	Masking Interval	Masking Start Frequency, Hz	Masking Stop Frequency, Hz	Number of Jumps
3 ft	1	0.0	81.5	1
	2	175.5	328.5	4
	3	383.5	400.0	4
6 ft	1	0.0	56.0	1
	2	185.0	400.0	-
12 ft	1	0.0	34.8	1
	2	128.0	151.0	3
	3	180.0	200.0	-
25 ft	1	0.0	29.9	1
	2	54.8	56.5	2
50 ft	1	0.0	18.8	1
	2	40.1	50.0	-
75 ft	1	0.0	19.6	1
	2	21.0	23.9	2
	3	27.3	33.3	3
100 ft	1	0.0	12.2	1
	2	14.3	25.0	-

Performed by______________________ Checked by______________________
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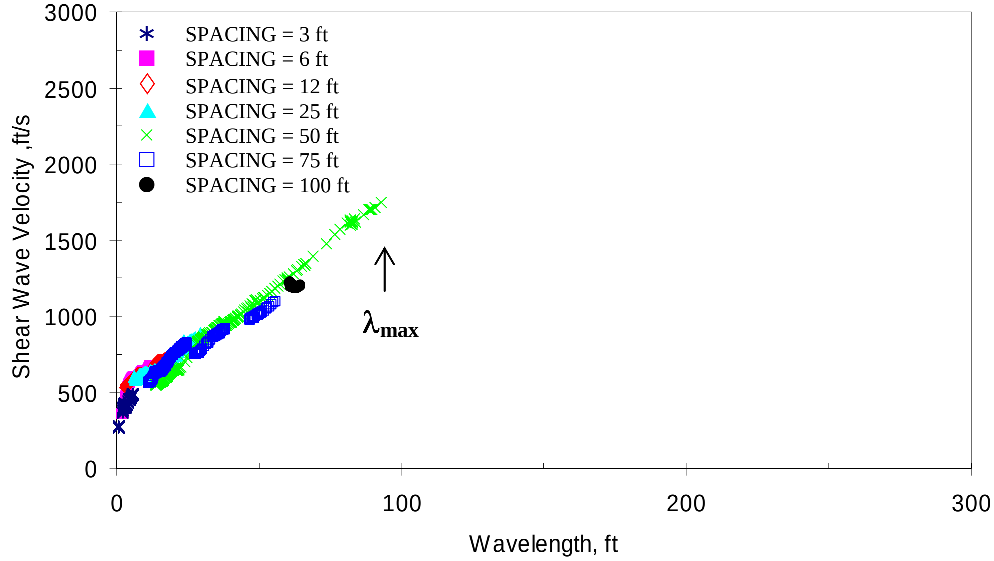

Figure 6.11 Experimental Dispersion Curve Measured at Suan-Don Elementary School; Linear Wavelength Axis

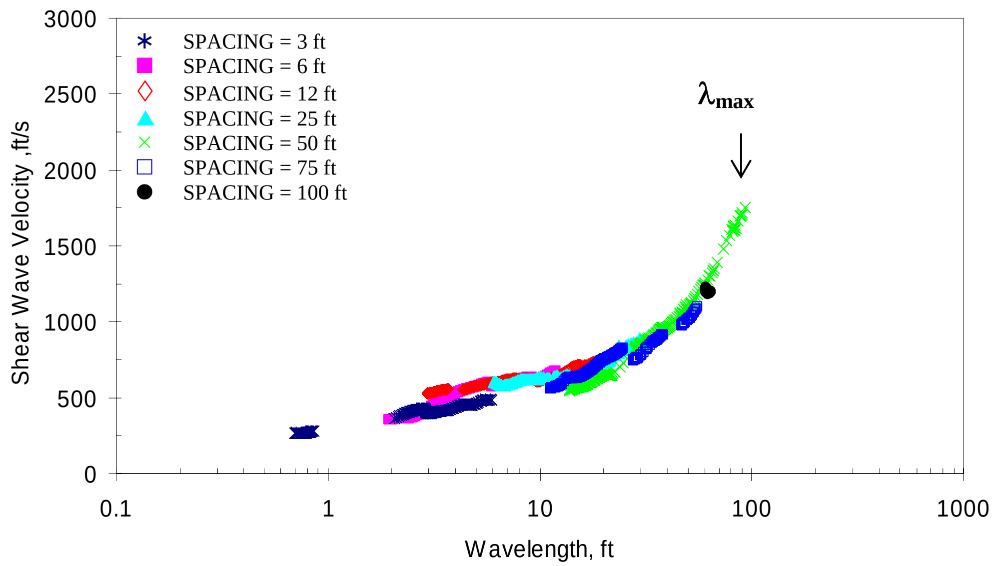

Figure 6.12 Experimental Dispersion Curve Measured at Suan-Don Elementary School; Logarithmic Wavelength Axis

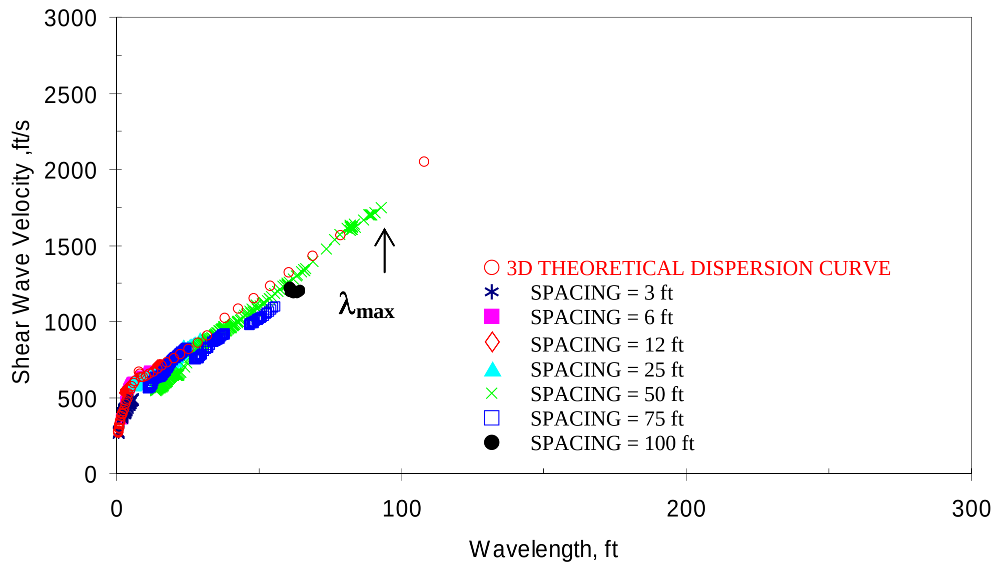

Figure 6.13 Experimental and Theoretical Dispersion Curves from Suan-Don Elementary School; Linear Wavelength Axis

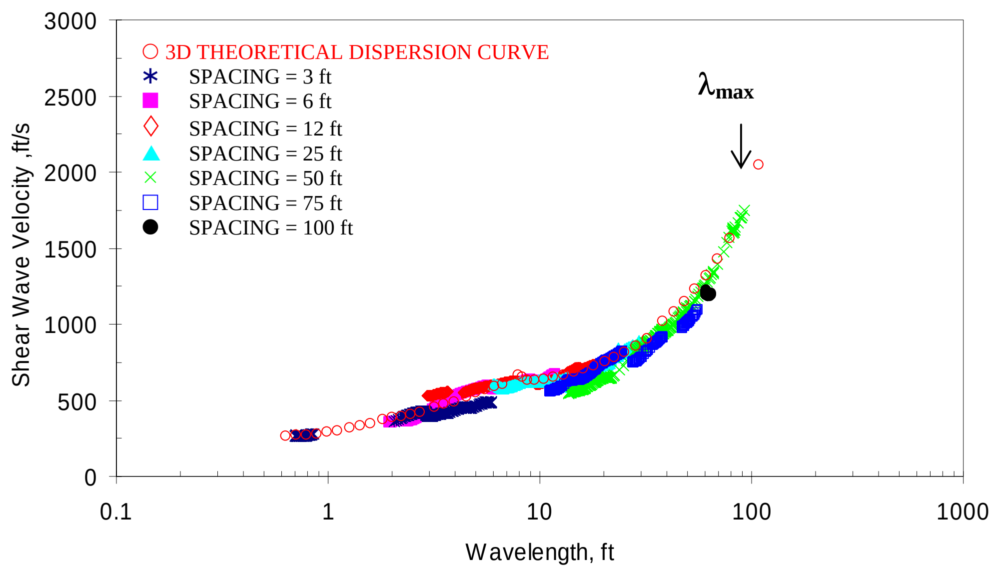

Figure 6.14 Experimental and Theoretical Dispersion Curves from Suan-Don Elementary School; Logarithmic Wavelength Axis

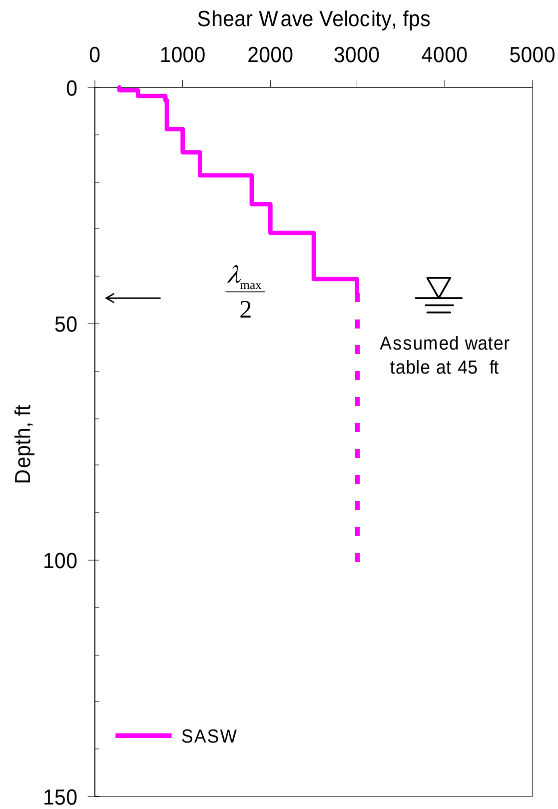

Figure 6.15 Shear Wave Velocity Profile Determined at Suan-Don Elementary School

Table 6.2 Profile Parameters Used to Develop Theoretical Dispersion Curve at Suan-Don Elementary School

Layer No.	Thickness, ft	Depth to the bottom, ft	P-Wave Velocity, ft/s	S-Wave Velocity, ft/s	Poisson's Ratio	Total Unit Weight, pcf
1	0.5	0.5	485	280	0.25	120
2	1.2	1.7	849	490	0.25	120
3	1.0	2.7	1386	800	0.25	120
4	6.0	8.7	1438	830	0.25	120
5	5.0	13.7	1732	1000	0.25	120
6	5.0	18.7	2079	1200	0.25	120
7	6.0	24.7	3118	1800	0.25	120
8	6.0	30.7	3464	2000	0.25	120
9	10.0	40.7	4330	2500	0.25	125
10	4.0	44.7	5200	3000	0.25	130

Performed by____________________ Checked by____________________

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Table 6.3 Uniform Building Code (UBC-97) Site Classification of Suan-Don Elementary School

Average Shear Wave Velocity of Top 30 meters (100 ft), $V_{s,30}$ (ft/s) [m/s]	Site Classification
1930 [588]	C

Performed by______________________ Checked by______________________

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Table 6.4 UBC-97 Site Categories

Soil Profile Type	Average Shear Wave Velocity of Top 30 m, $V_{s,30}$ (m/s) [Top100 ft, $V_{s,100}$ (ft/s)]	Description
S_A	$V_{s,30}$>1500 m/s [$V_{s,100}$>5000 ft/s]	Hard rock
S_B	760 m/s < $V_{s,30}$≤1500 m/s [2500 ft/s < $V_{s,100}$≤5000 ft/s]	Rock
S_C	360 m/s < $V_{s,30}$≤760 m/s [1200 ft/s < $V_{s,100}$≤2500 ft/s]	Very dense soil and soft rock
S_D	180 m/s ≤ $V_{s,30}$≤360 m/s [600 ft/s < $V_{s,100}$≤1200 ft/s]	Stiff Soil Profile
S_E	$V_{s,30}$< 180 m/s [$V_{s,100}$ < 600 ft/s]	Soft Soil Profile
S_F	-	Soils requiring site-specific evaluation.

Appendix 7

Site Location: Kuo-Sing Elementary School (TCU-072)

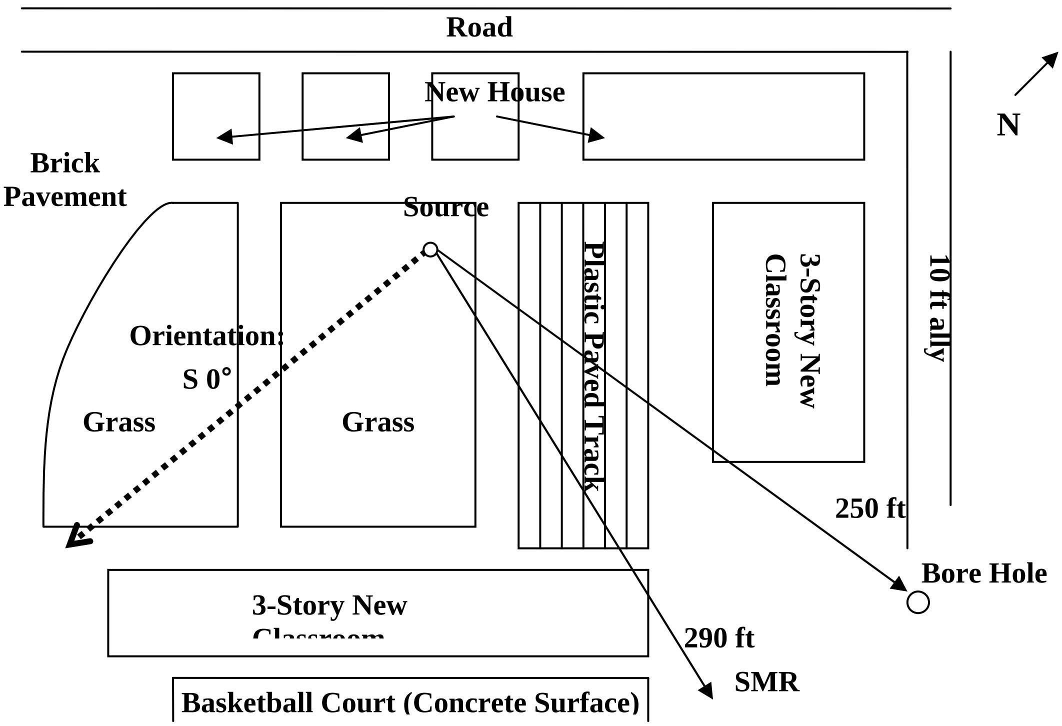


Figure 7.1 Site Map of Kuo-Sing Elementary School

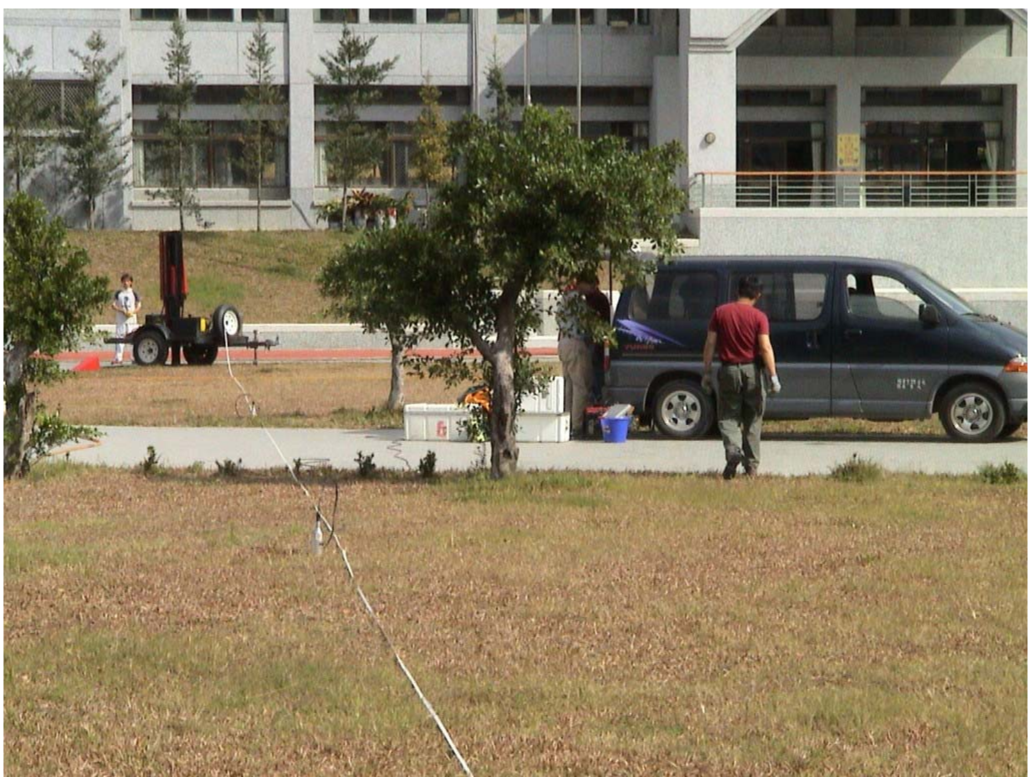


Figure 7.2 Picture Taken at Kuo-Sing Elementary School (View # 1)

Figure 7.3 Picture Taken at Kuo-Sing Elementary School (View # 2)

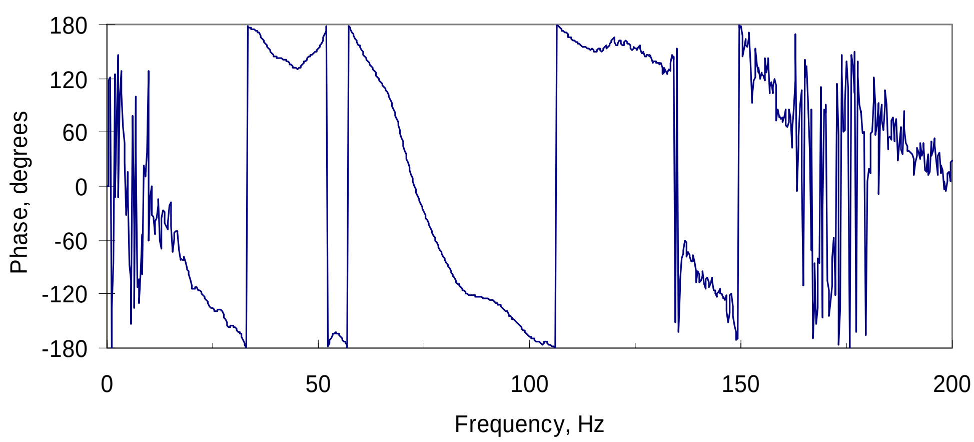


Figure 7.4 Phase Plots Measured by SASW Testing with 10-ft Receiver Spacing

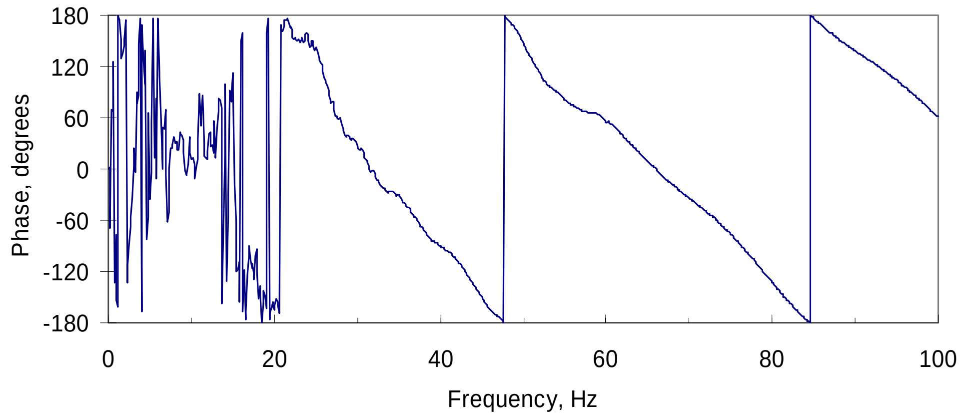


Figure 7.5 Phase Plots Measured by SASW Testing with 20-ft Receiver Spacing

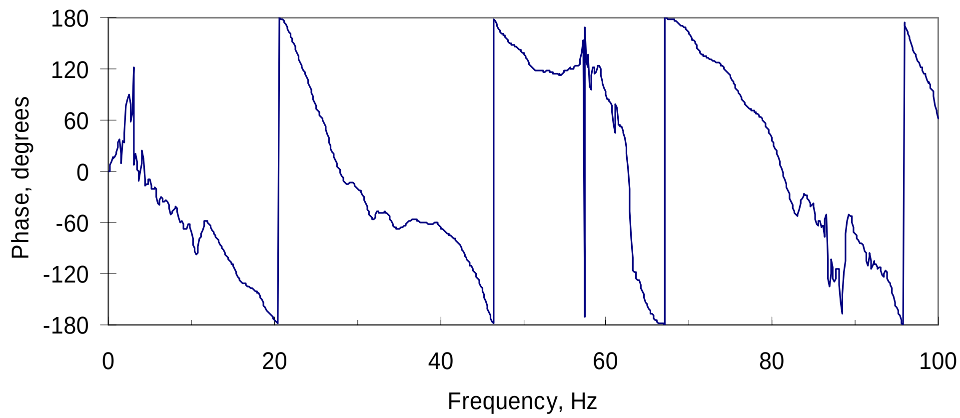


Figure 7.6 Phase Plots Measured by SASW Testing with 25-ft Receiver Spacing

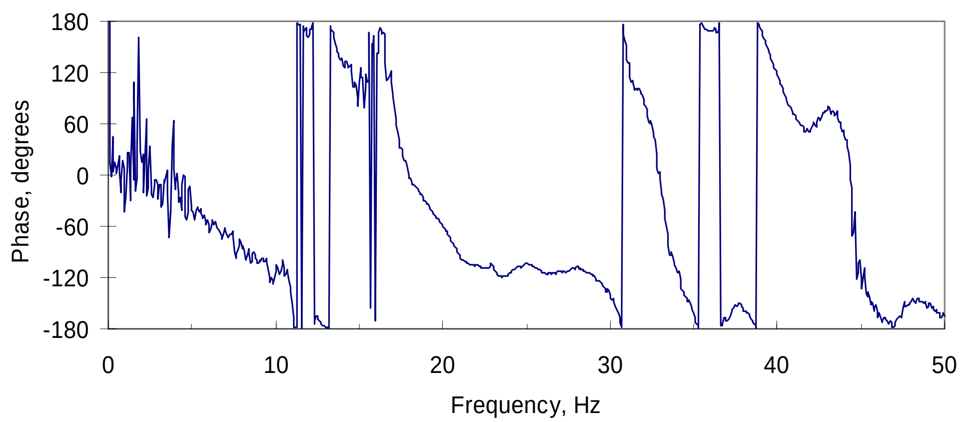


Figure 7.7 Phase Plots Measured by SASW Testing with 50-ft Receiver Spacing

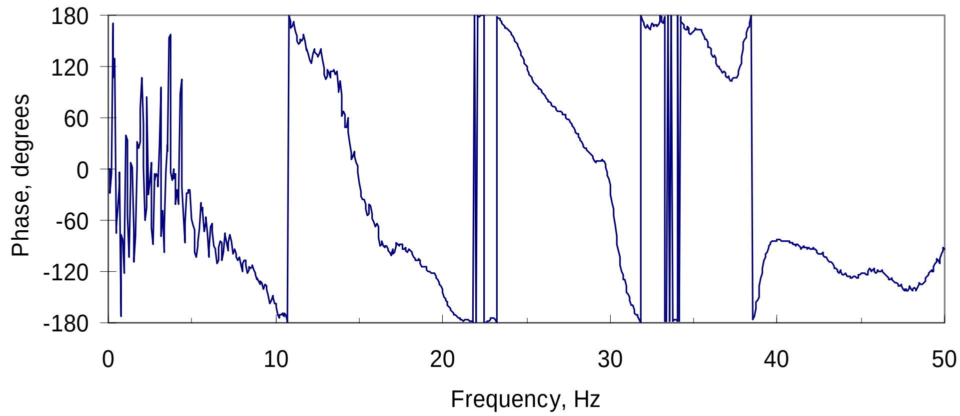
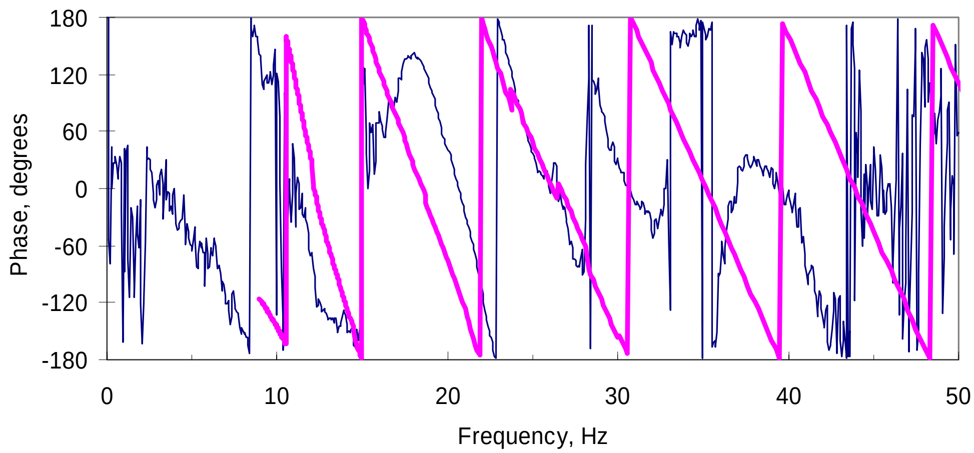


Figure 7.8 Phase Plots Measured by SASW Testing with 65-ft Receiver Spacing



From SASW Testing — Inversely calculated from P-S Logging Profile

Figure 7.9 Phase Plots Measured by SASW Testing with 90-ft Receiver Spacing

Table 7.1 Table of Masking Parameters Used on Data Collected at Kuo-Sing Elementary School

Receiver Spacing	Masking Interval	Masking Start Frequency, Hz	Masking Stop Frequency, Hz	Number of Jumps
10 ft	1	0.0	33.3	1
	2	44.5	90.3	1
	3	106.3	200.0	-
20 ft	1	0.0	21.6	1
25 ft	1	0.0	21.0	1
	2	51.4	64.3	2
	3	82.8	100.0	-
50 ft	1	0.0	13.5	1
	2	14.6	17.4	1
	3	21.6	28.5	2
	4	32.6	37.9	3
	5	41.9	50.0	-
65 ft	1	0.0	11.1	1
	2	20.4	23.4	2
	3	31.7	50.0	-
90 ft	1	0.0	7.4	0
	2	9.1	11.7	1
	3	13.6	17.9	2
	4	27.6	28.8	4
	5	31.4	50.0	-

Performed by________________________ Checked by________________________
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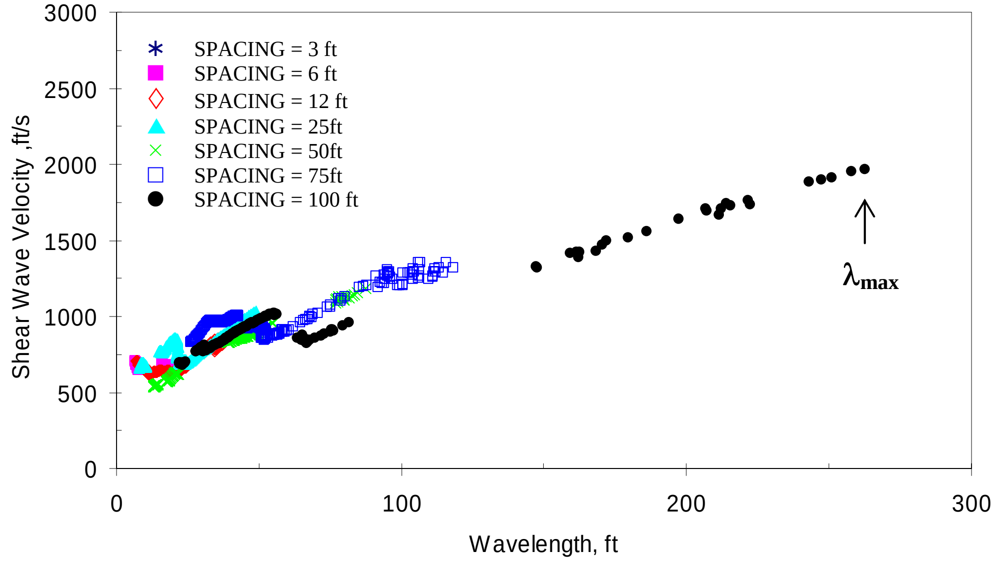

Figure 7.10 Experimental Dispersion Curve Measured at Kuo-Sing Elementary School; Linear Wavelength Axis

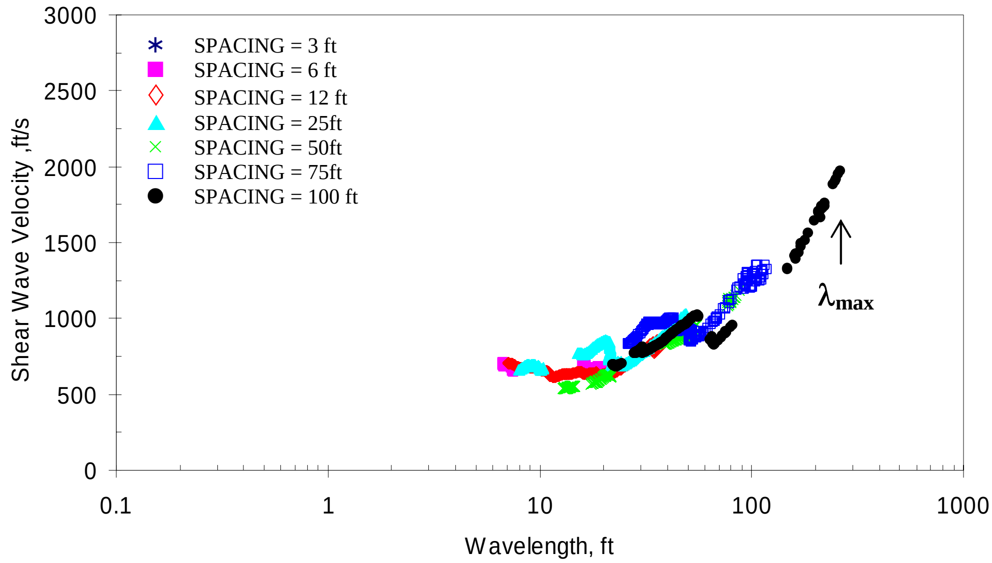

Figure 7.11 Experimental Dispersion Curve Measured at Kuo-Sing Elementary School; Logarithmic Wavelength Axis

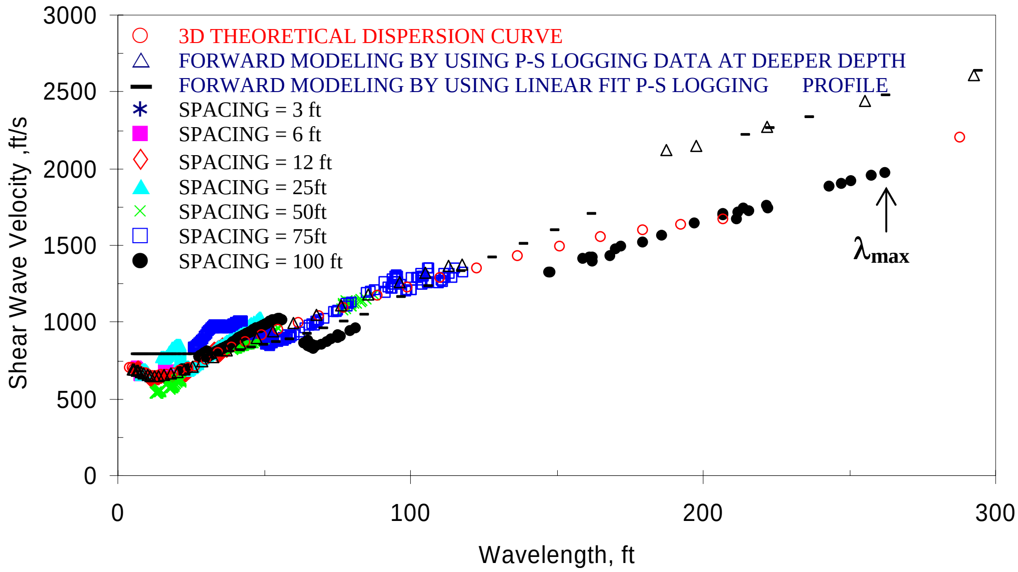

Figure 7.12 Experimental and Theoretical Dispersion Curves from Kuo-Sing Elementary School; Linear Wavelength Axis

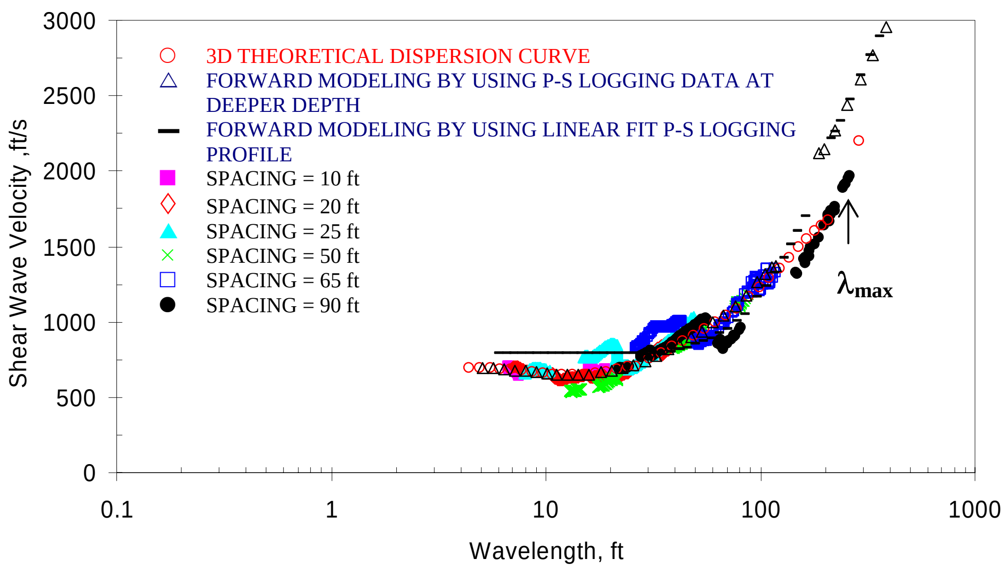

Figure 7.13 Experimental and Theoretical Dispersion Curves from Kuo-Sing Elementary School; Logarithmic Wavelength Axis

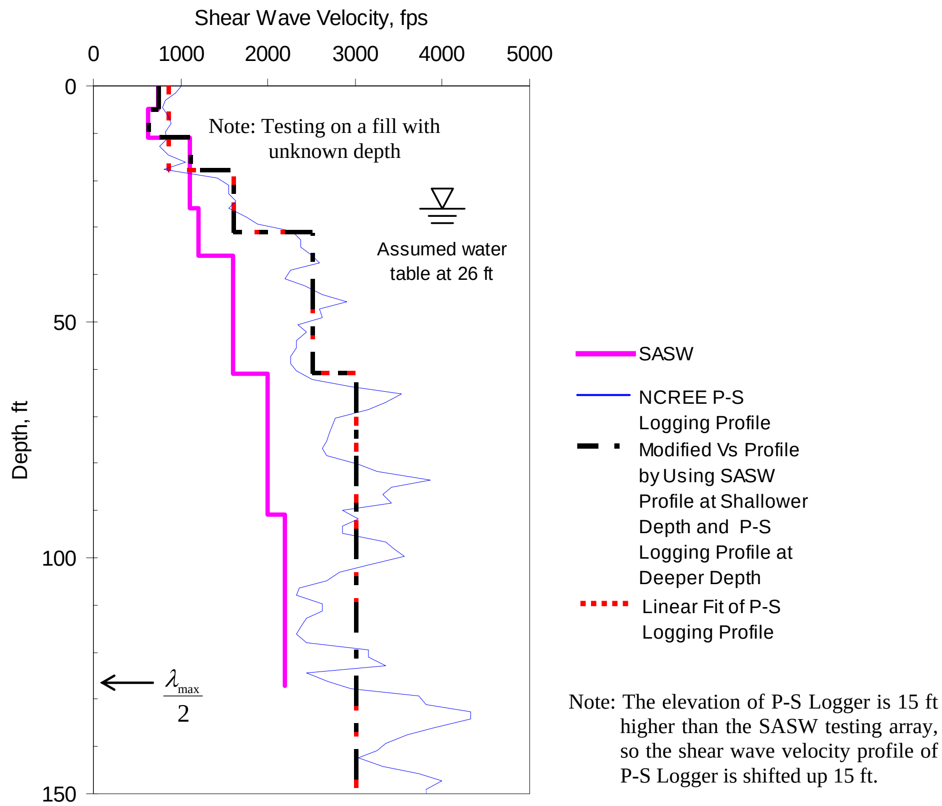

Figure 7.14 Shear Wave Velocity Profile Determined at Kuo-Sing Elementary School

Table 7.2 Profile Parameters Used to Develop Theoretical Dispersion Curve at Kuo-Sing Elementary School

Layer No.	Thickness, ft	Depth to the bottom, ft	P-Wave Velocity, ft/s	S-Wave Velocity, ft/s	Poisson's Ratio	Total Unit Weight, pcf
1	5	5	1299	750	0.25	120
2	6	11	1074	620	0.25	120
3	15	26	1905	1100	0.25	120
4	10	36	4800	1200	0.47	120
5	25	61	5000	1600	0.44	120
6	30	91	5000	2000	0.40	120
7	36	127	5000	2200	0.38	125

Performed by______________________ Checked by______________________

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Table 7.3 Uniform Building Code (UBC-97) Site Classification of Kuo-Sing Elementary School

Average Shear Wave Velocity of Top 30 meters (100 ft), $V_{s,30}$ (ft/s) [m/s]	Site Classification
1370 [417]	C

Performed by________________________ Checked by________________________
Yin-Cheng Lin Brent L. Rosenblad

Table 7.4 UBC-97 Site Categories

Soil Profile Type	Average Shear Wave Velocity of Top 30 m, $V_{s,30}$ (m/s) [Top100 ft, $V_{s,100}$ (ft/s)]	Description
S_A	$V_{s,30}$>1500 m/s [$V_{s,100}$>5000 ft/s]	Hard rock
S_B	760 m/s < $V_{s,30}$≤1500 m/s [2500 ft/s < $V_{s,100}$≤5000 ft/s]	Rock
S_C	360 m/s < $V_{s,30}$≤760 m/s [1200 ft/s < $V_{s,100}$≤2500 ft/s]	Very dense soil and soft rock
S_D	180 m/s ≤ $V_{s,30}$≤360 m/s [600 ft/s < $V_{s,100}$≤1200 ft/s]	Stiff Soil Profile
S_E	$V_{s,30}$< 180 m/s [$V_{s,100}$ < 600 ft/s]	Soft Soil Profile
S_F	-	Soils requiring site-specific evaluation.

Appendix 8

Site Location: Nan-Kon Elementary School (TCU-074)

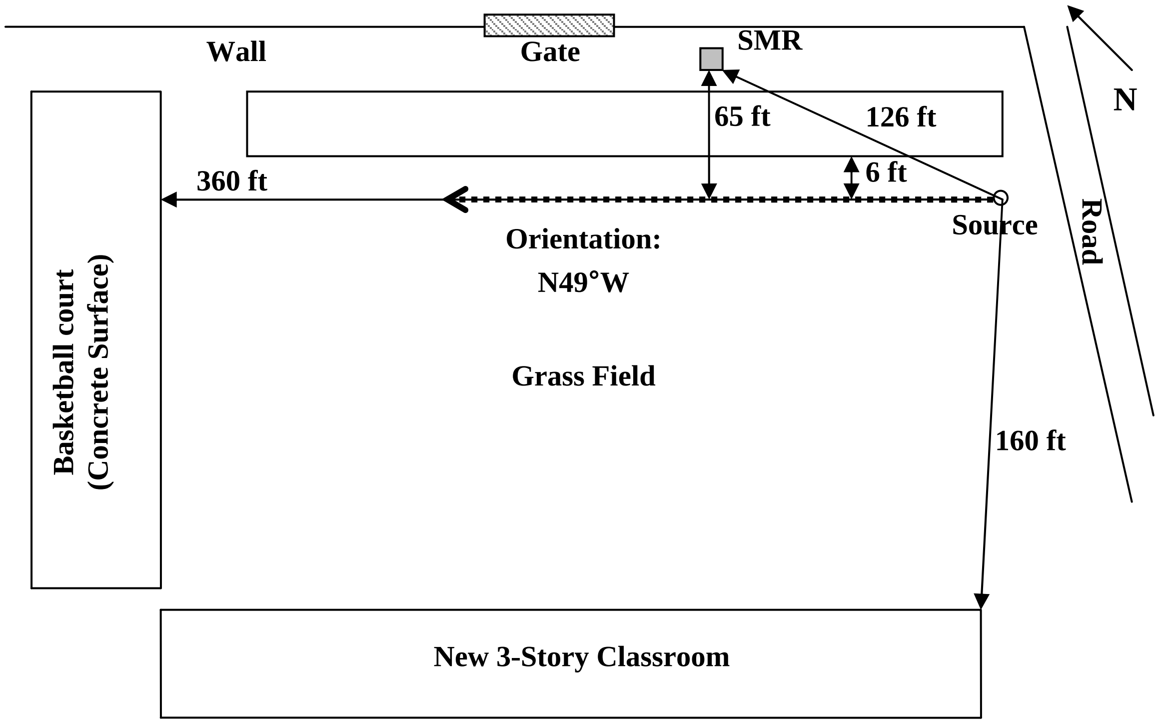

Figure 8.1 Site Map of Nan-Kon Elementary School

Figure 8.2 Picture Taken at Nan-Kon Elementary School (View # 1)

Figure 8.3 Picture Taken at Nan-Kon Elementary School (View # 2)

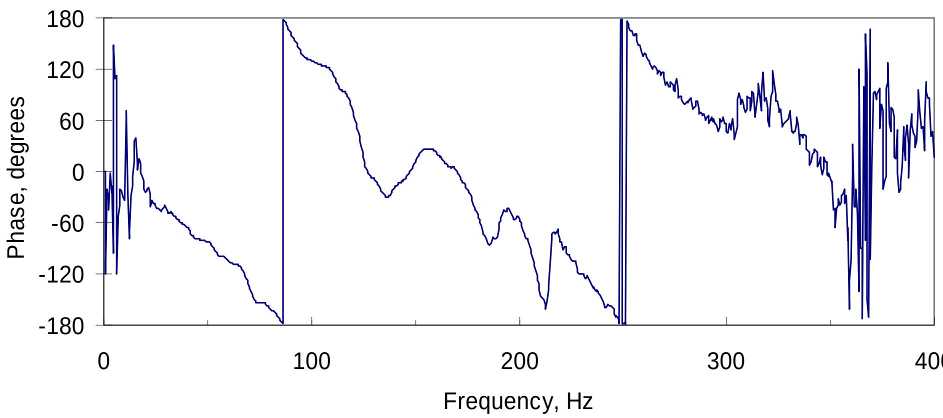

Figure 8.4 Phase Plots Measured by SASW Testing with 3-ft Receiver Spacing

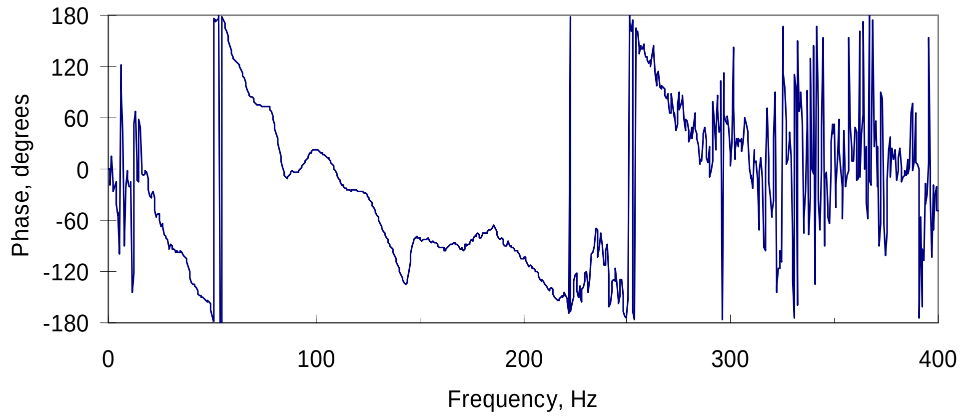

Figure 8.5 Phase Plots Measured by SASW Testing with 6-ft Receiver Spacing

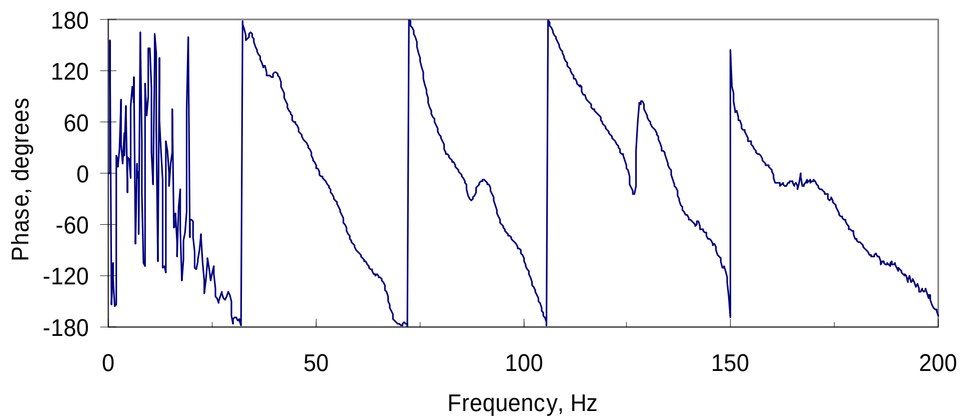

Figure 8.6 Phase Plots Measured by SASW Testing with 12-ft Receiver Spacing

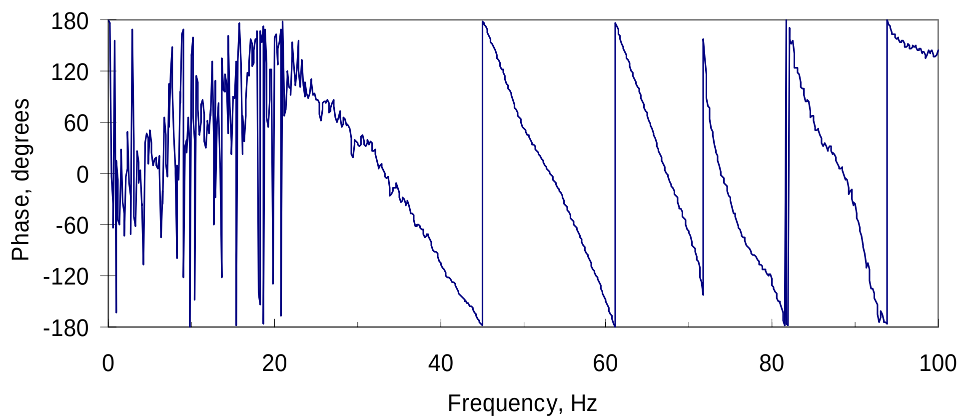

Figure 8.7 Phase Plots Measured by SASW Testing with 25-ft Receiver Spacing

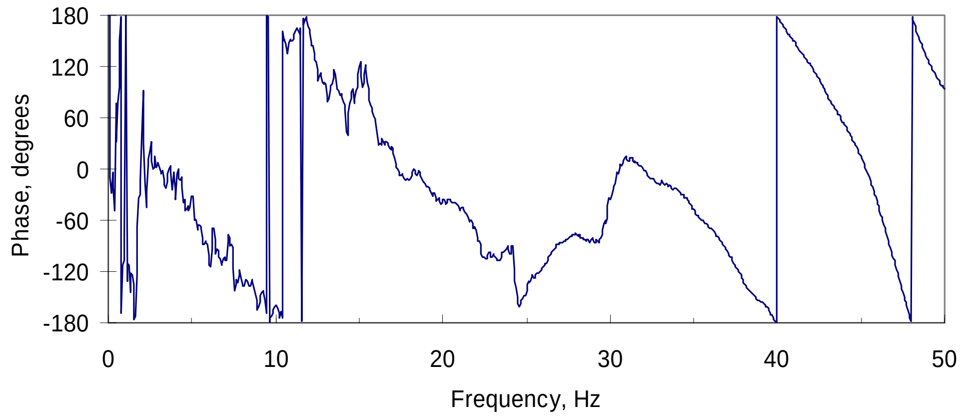

Figure 8.8 Phase Plots Measured by SASW Testing with 50-ft Receiver Spacing

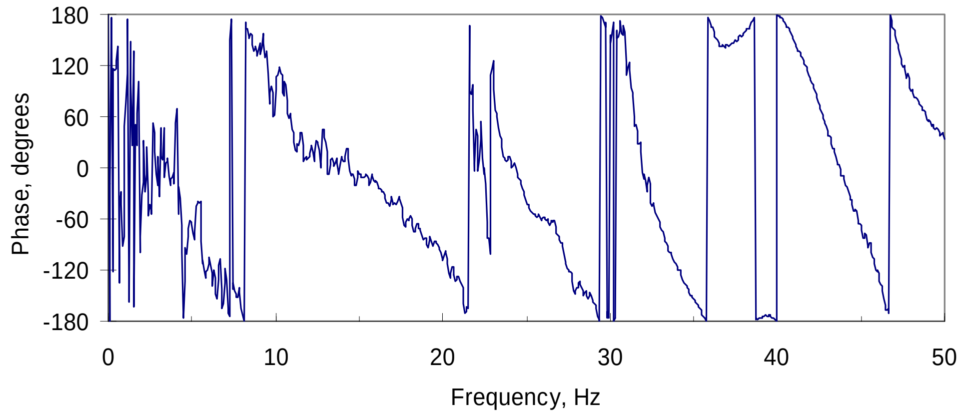

Figure 8.9 Phase Plots Measured by SASW Testing with 75-ft Receiver Spacing

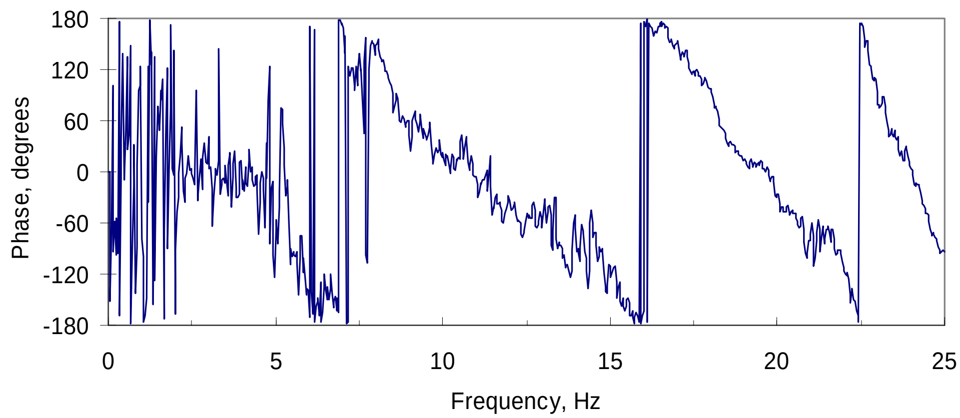

Figure 8.10 Phase Plots Measured by SASW Testing with 100-ft Receiver Spacing

Table 8.1 Table of Masking Parameters Used on Data Collected at Nan-Kon Elementary School

Receiver Spacing	Masking Interval	Masking Start Frequency, Hz	Masking Stop Frequency, Hz	Number of Jumps
3 ft	1	0.0	86.5	1
	2	117.0	155.5	1
	3	174.5	195.0	1
	4	203.5	222.5	1
	5	247.0	253.0	2
	6	299.0	400.0	-
6 ft	1	0.0	55.0	1
	2	86.5	187.5	2
	3	216.0	254.5	4
	4	286.0	400.0	-
12 ft	1	0.0	32.5	1
	2	126.8	200.0	-
25 ft	1	0.0	23.9	1
	2	94.0	100.0	-
50 ft	1	0.0	11.8	1
	2	14.2	16.5	1
	3	22.6	34.8	2
75 ft	1	0.0	8.2	1
	2	9.0	12.6	1
	3	20.5	23.1	2
	4	29.3	30.8	3
	5	35.8	40.1	5
100 ft	1	0.0	6.9	1
	2	7.1	7.9	1
	3	10.3	11.6	1
	4	12.3	13.6	1
	5	13.8	15.3	1
	6	15.8	16.2	2

Performed by____________________ Checked by____________________
Yin-Cheng Lin Brent L. Rosenblad

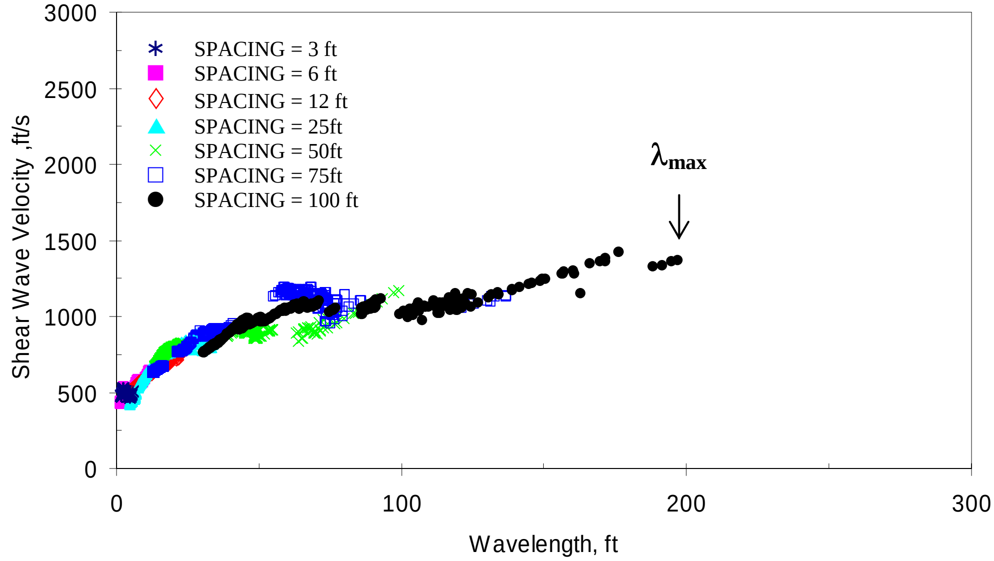

Figure 8.11 Experimental Dispersion Curve Measured at Nan-Kon Elementary School; Linear Wavelength Axis

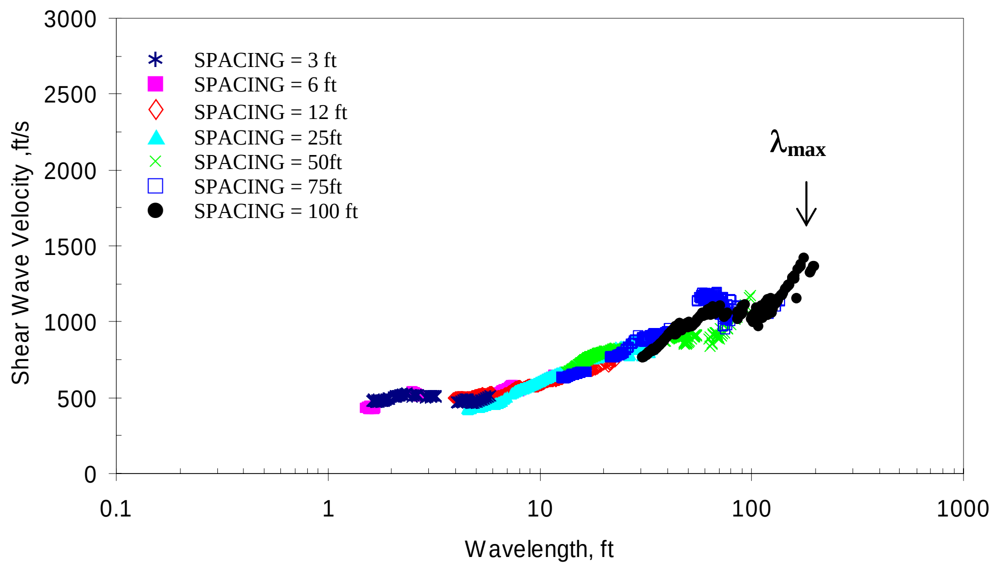

Figure 8.12 Experimental Dispersion Curve Measured at Nan-Kon Elementary School; Logarithmic Wavelength Axis

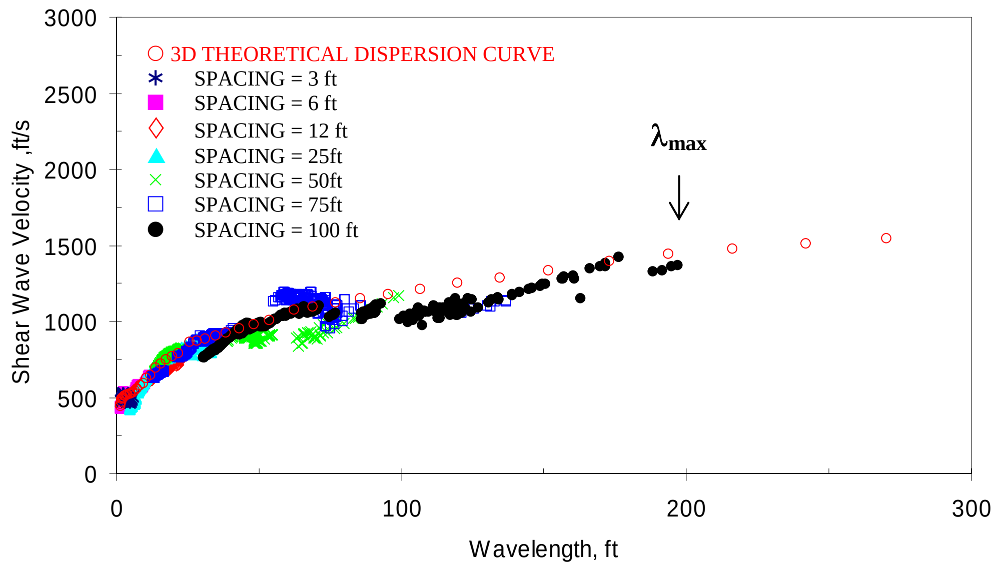

Figure 8.13 Experimental and Theoretical Dispersion Curves from Nan-Kon Elementary School; Linear Wavelength Axis

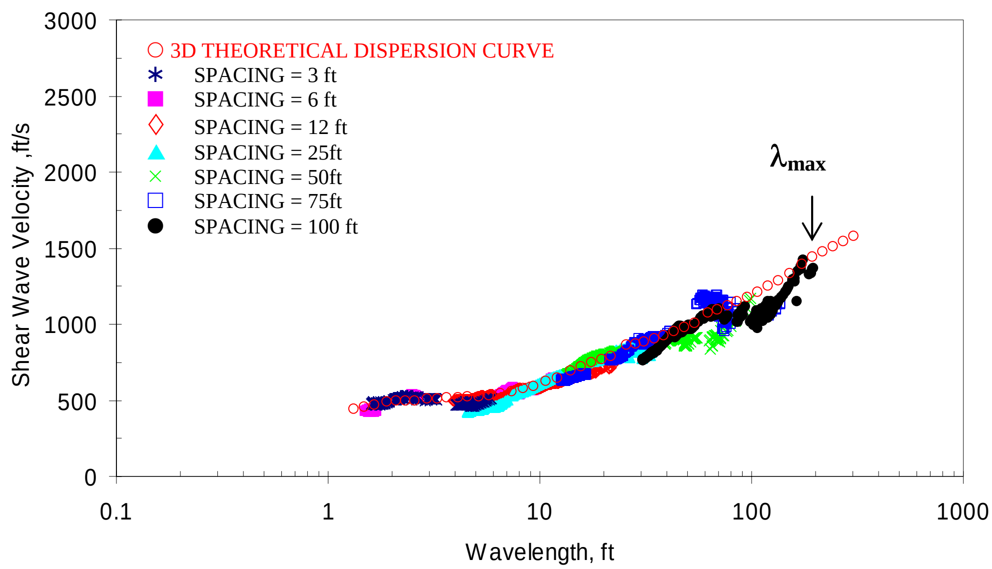

Figure 8.14 Experimental and Theoretical Dispersion Curves from Nan-Kon Elementary School; Logarithmic Wavelength Axis

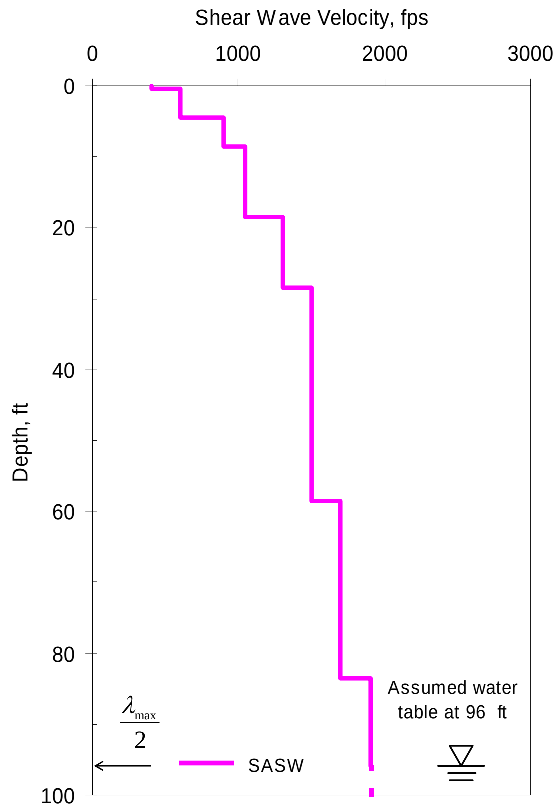

Figure 8.15 Shear Wave Velocity Profile Determined at Nan-Kon Elementary School

Table 8.2 Profile Parameters Used to Develop Theoretical Dispersion Curve at Nan-Kon Elementary School

Layer No.	Thickness, ft	Depth to the bottom, ft	P-Wave Velocity, ft/s	S-Wave Velocity, ft/s	Poisson's Ratio	Total Unit Weight, pcf
1	0.5	0.5	693	400	0.25	120
2	4.0	4.5	1039	600	0.25	120
3	4.0	8.5	1559	900	0.25	120
4	10.0	18.5	1819	1050	0.25	120
5	10.0	28.5	2252	1300	0.25	120
6	30.0	58.5	2598	1500	0.25	120
7	25.0	83.5	2945	1700	0.25	120
8	12.0	95.5	3291	1900	0.25	120

Performed by____________________ Checked by____________________

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Table 8.3 Uniform Building Code (UBC-97) Site Classification of Nan-Kon Elementary School

Average Shear Wave Velocity of Top 30 meters (100 ft), $V_{s,30}$ (ft/s) [m/s]	Site Classification
1370 [418]	C

Performed by________________________ Checked by________________________
Yin-Cheng Lin Brent L. Rosenblad

Table 8.4 UBC-97 Site Categories

Soil Profile Type	Average Shear Wave Velocity of Top 30 m, $V_{s,30}$ (m/s) [Top100 ft, $V_{s,100}$ (ft/s)]	Description
S_A	$V_{s,30}$>1500 m/s [$V_{s,100}$>5000 ft/s]	Hard rock
S_B	760 m/s < $V_{s,30}$≤1500 m/s [2500 ft/s < $V_{s,100}$≤5000 ft/s]	Rock
S_C	360 m/s < $V_{s,30}$≤760 m/s [1200 ft/s < $V_{s,100}$≤2500 ft/s]	Very dense soil and soft rock
S_D	180 m/s ≤ $V_{s,30}$≤360 m/s [600 ft/s < $V_{s,100}$≤1200 ft/s]	Stiff Soil Profile
S_E	$V_{s,30}$< 180 m/s [$V_{s,100}$ < 600 ft/s]	Soft Soil Profile
S_F	-	Soils requiring site-specific evaluation.

Appendix 9

Site Location: Chiou-Tun Elementary School (TCU-075)

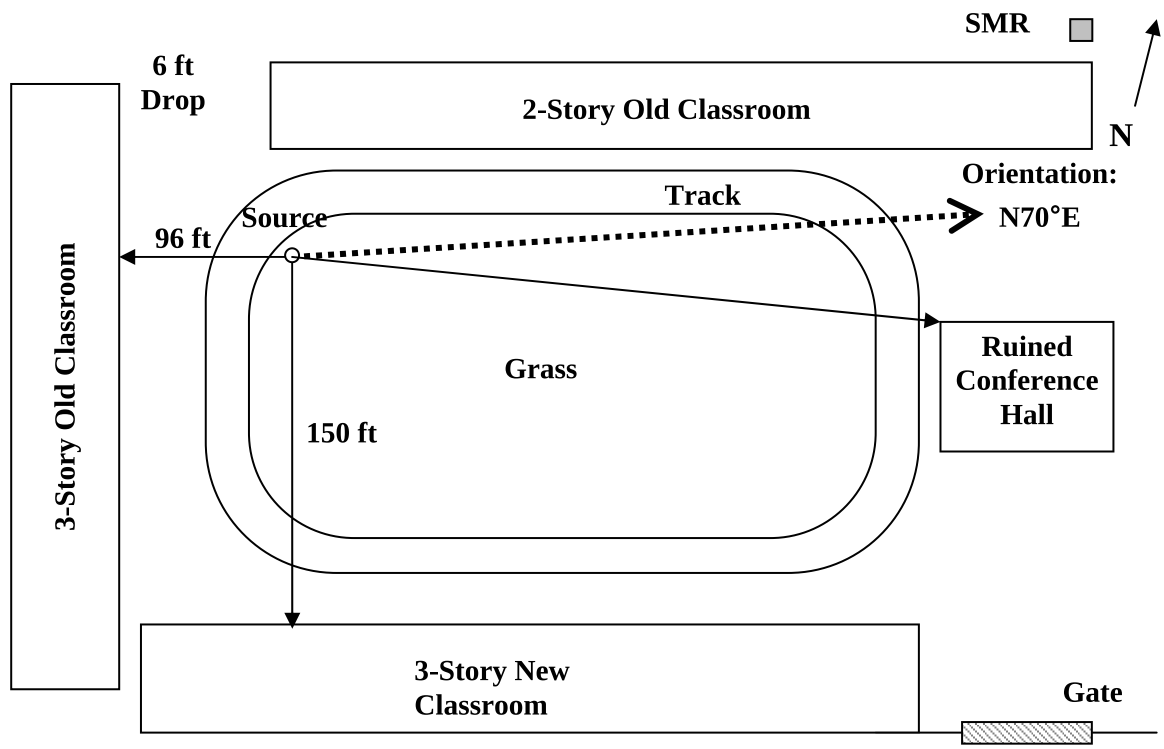

Figure 9.1 Site Map of Chiou-Tun Elementary School

Figure 9.2 Picture Taken at Chiou-Tun Elementary School (View # 1)

Figure 9.3 Picture Taken at Chiou-Tun Elementary School (View # 2)

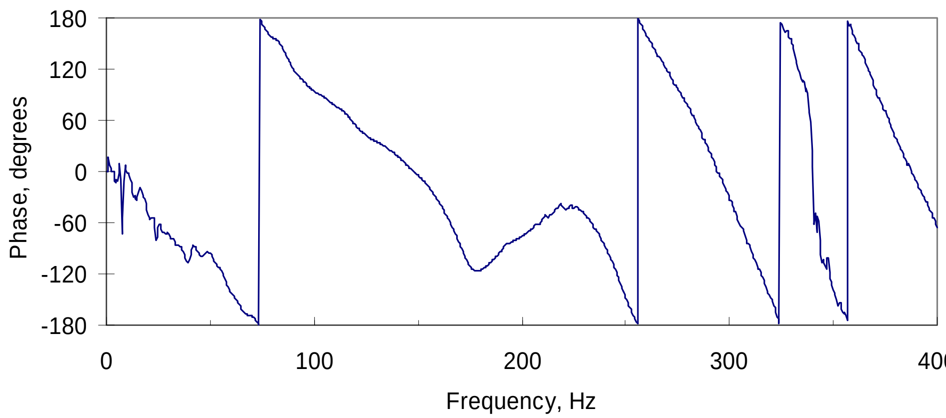

Figure 9.4 Phase Plots Measured by SASW Testing with 3-ft Receiver Spacing

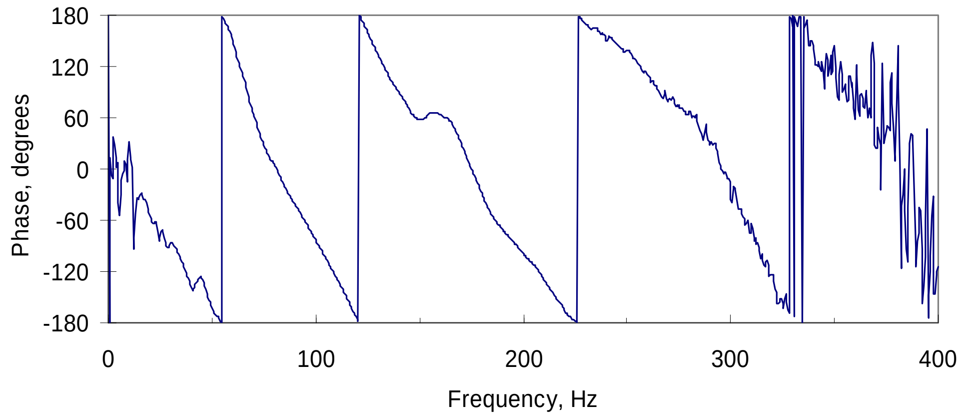

Figure 9.5 Phase Plots Measured by SASW Testing with 6-ft Receiver Spacing

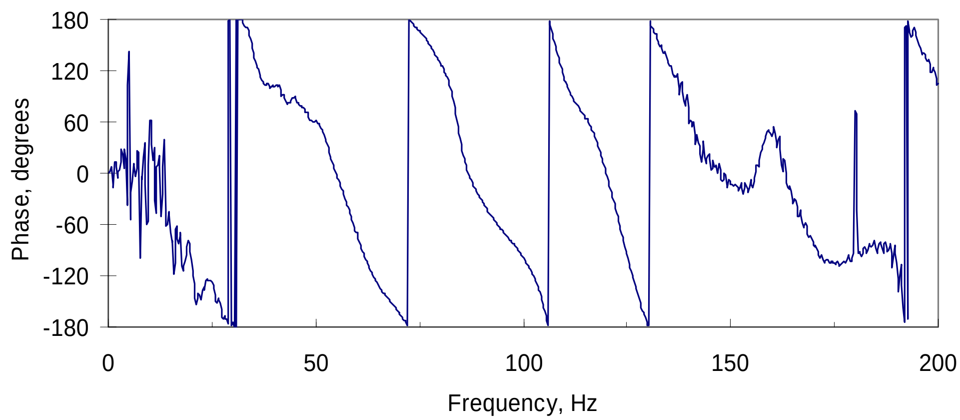

Figure 9.6 Phase Plots Measured by SASW Testing with 12-ft Receiver Spacing

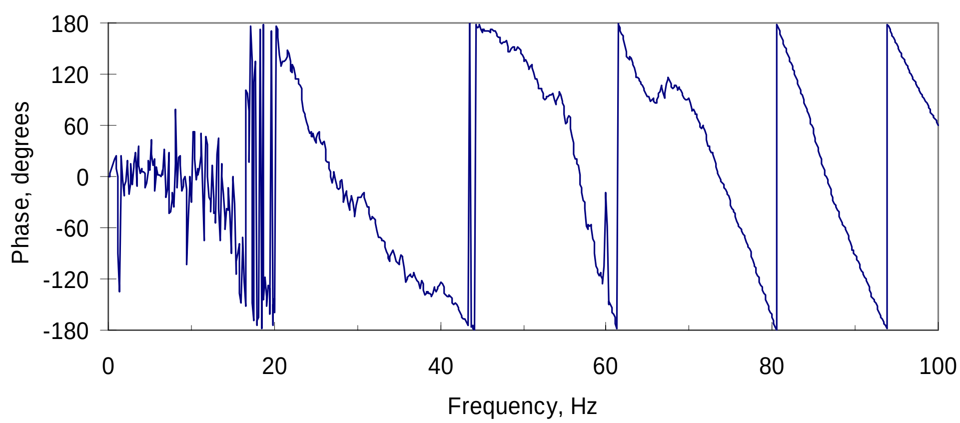

Figure 9.7 Phase Plots Measured by SASW Testing with 25-ft Receiver Spacing

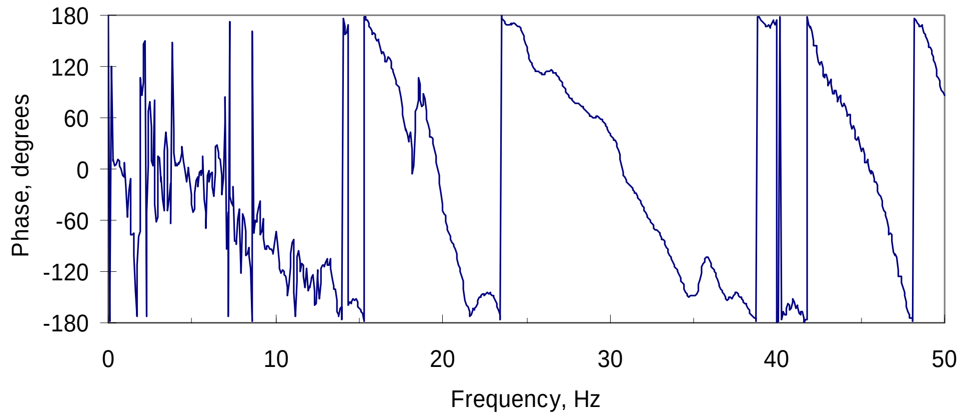

Figure 9.8 Phase Plots Measured by SASW Testing with 50-ft Receiver Spacing

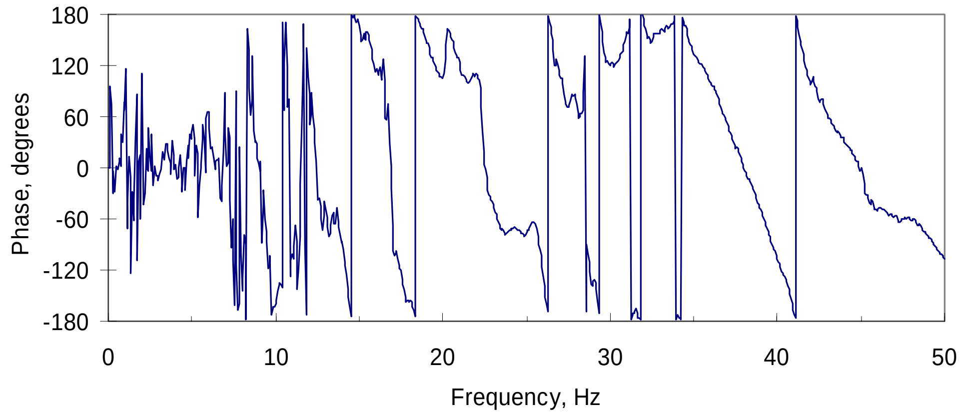

Figure 9.9 Phase Plots Measured by SASW Testing with 75-ft Receiver Spacing

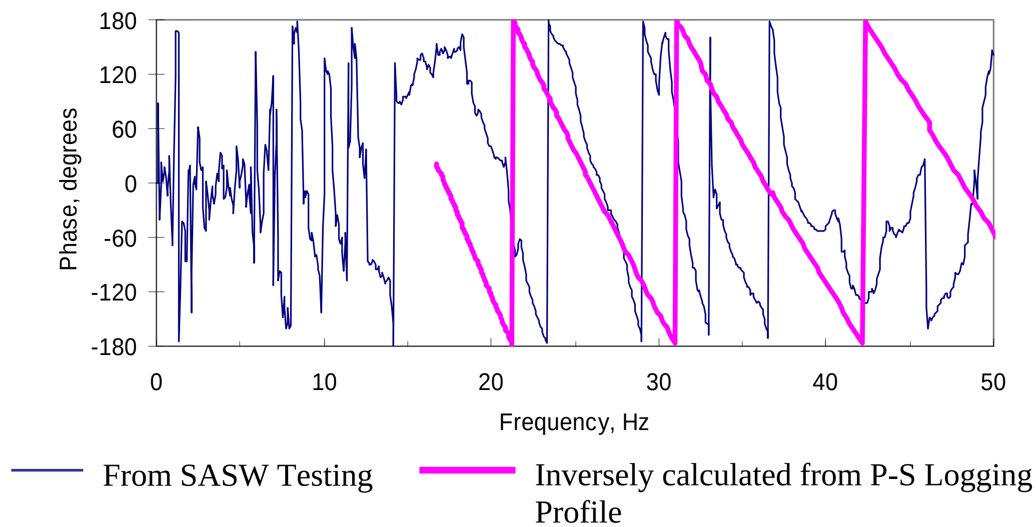

Figure 9.10 Phase Plots Measured by SASW Testing with 100-ft Receiver Spacing

Table 9.1 Table of Masking Parameters Used on Data Collected at Chiou-Tun Elementary School

Receiver Spacing	Masking Interval	Masking Start Frequency, Hz	Masking Stop Frequency, Hz	Number of Jumps
3 ft	1	0.0	74.0	1
	2	168.5	231.0	2
6 ft	1	0.0	55.0	1
	2	323.0	400.0	-
12 ft	1	0.0	31.5	1
	2	149.3	200.0	-
25 ft	1	0.0	21.8	1
	2	43.1	44.4	2
	3	59.5	60.5	2
50 ft	1	0.0	15.5	1
	2	17.3	19.4	1
	3	34.8	50.0	-
75 ft	1	0.0	20.3	2
	2	28.3	34.3	4
100 ft	1	0.0	18.3	2
	2	29.9	50.0	-

Performed by________________ Checked by________________
Yin-Cheng Lin Brent L. Rosenblad

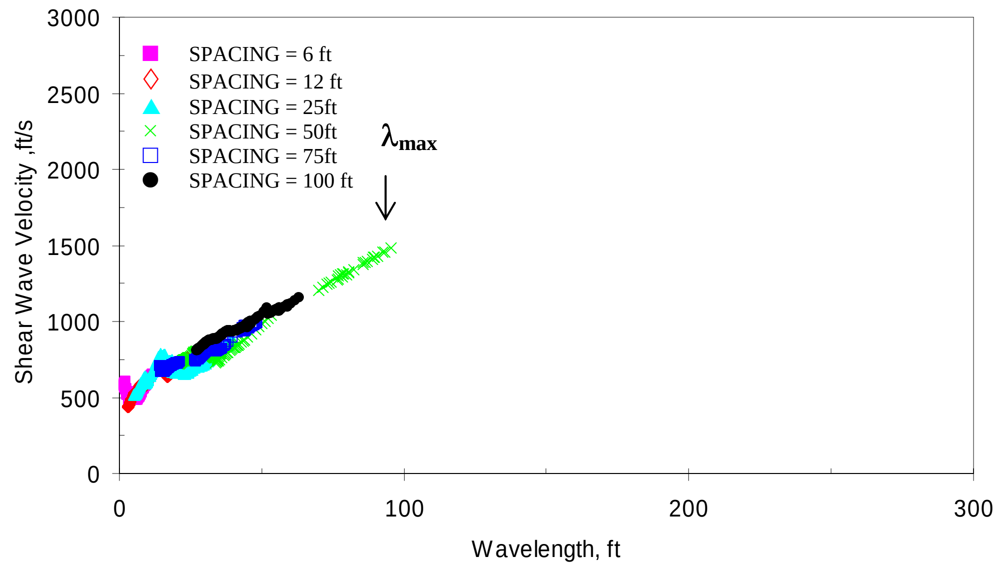

Figure 9.11 Experimental Dispersion Curve Measured at Chiou-Tun Elementary School; Linear Wavelength Axis

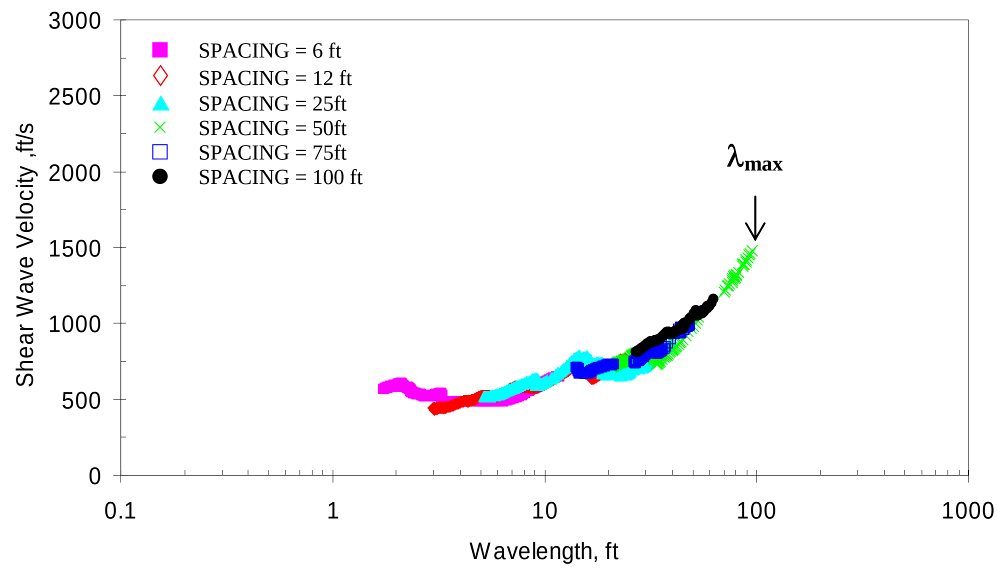

Figure 9.12 Experimental Dispersion Curve Measured at Chiou-Tun Elementary School; Logarithmic Wavelength Axis

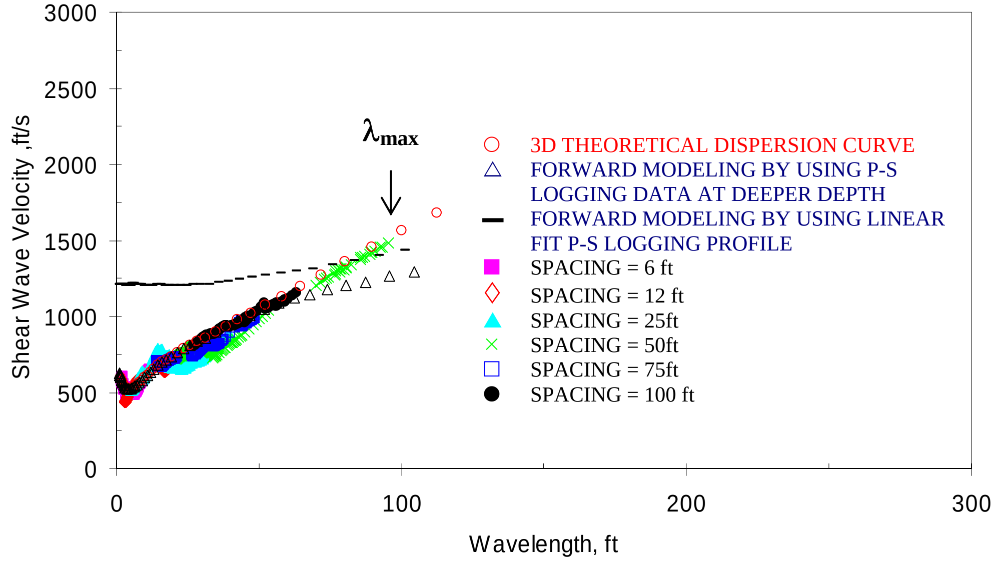

Figure 9.13 Experimental and Theoretical Dispersion Curves from Chiou-Tun Elementary School; Linear Wavelength Axis

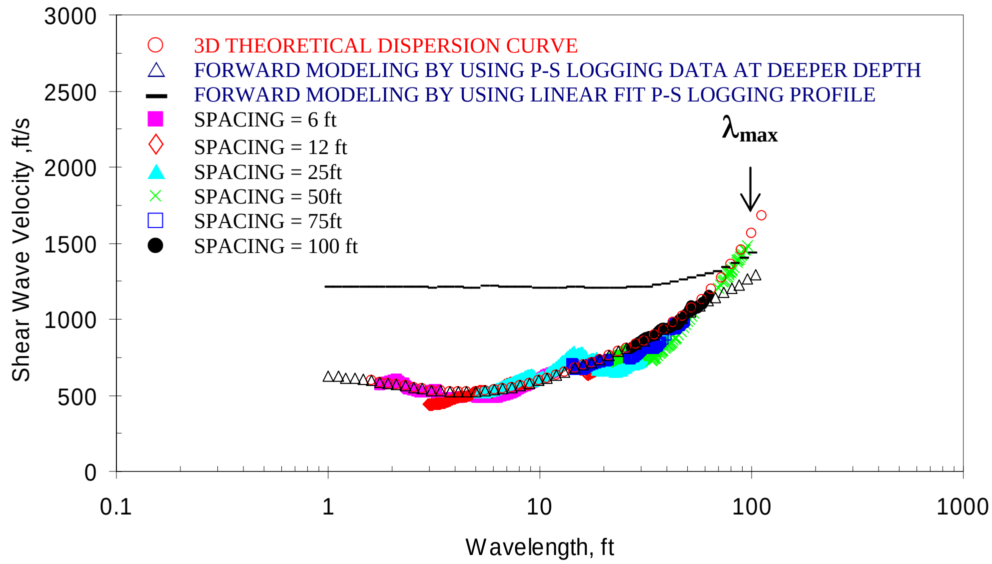

Figure 9.14 Experimental and Theoretical Dispersion Curves from Chiou-Tun Elementary School; Logarithmic Wavelength Axis

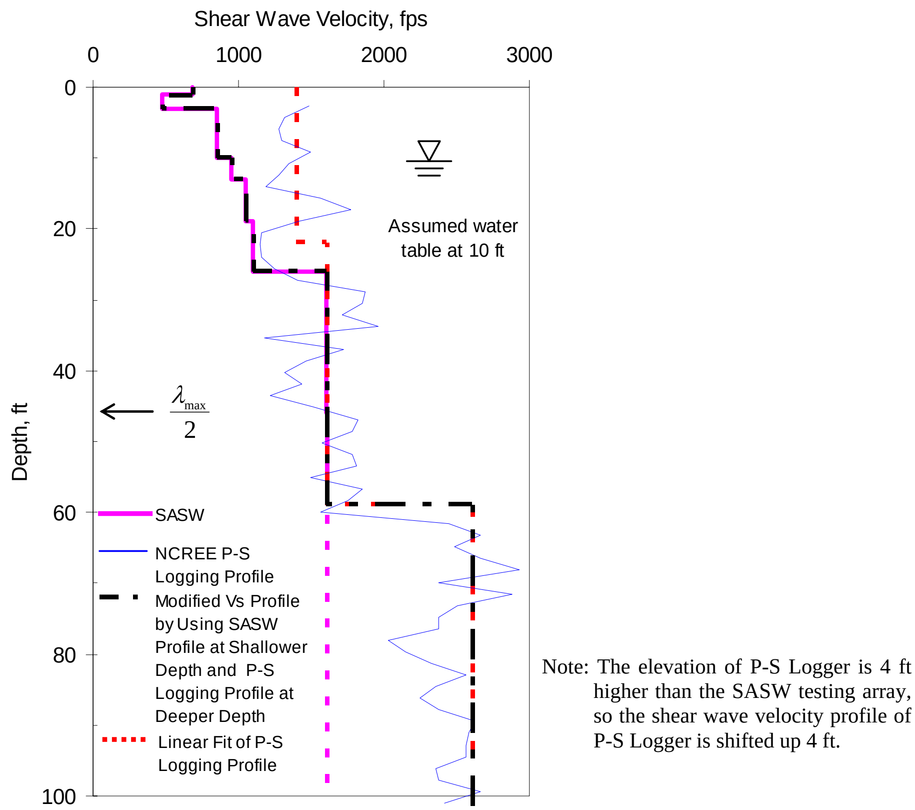

Figure 9.15 Shear Wave Velocity Profile Determined at Chiou-Tun Elementary School

Table 9.2 Profile Parameters Used to Develop Theoretical Dispersion Curve at Chiou-Tun Elementary School

Layer No.	Thickness, ft	Depth to the bottom, ft	P-Wave Velocity, ft/s	S-Wave Velocity, ft/s	Poisson's Ratio	Total Unit Weight, pcf
1	1.0	1	1178	680	0.25	120
2	2.0	3	831	480	0.25	120
3	7.0	10	1472	850	0.25	120
4	3.0	13	4800	950	0.48	120
5	6.0	19	5000	1050	0.48	120
6	7.0	26	5000	1100	0.47	120
7	20.0	46	5000	1600	0.44	120

Performed by____________________ Checked by____________________
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Table 9.3 Uniform Building Code (UBC-97) Site Classification of Chiou-Tun Elementary School

Average Shear Wave Velocity of Top 30 meters (100 ft), $V_{s,30}$ (ft/s) [m/s]	Site Classification
1480 [451]	C

Performed by________________________ Checked by________________________
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Table 9.4 UBC-97 Site Categories

Soil Profile Type	Average Shear Wave Velocity of Top 30 m, $V_{s,30}$ (m/s) [Top100 ft, $V_{s,100}$ (ft/s)]	Description
S_A	$V_{s,30}$>1500 m/s [$V_{s,100}$>5000 ft/s]	Hard rock
S_B	760 m/s < $V_{s,30}$≤1500 m/s [2500 ft/s < $V_{s,100}$≤5000 ft/s]	Rock
S_C	360 m/s < $V_{s,30}$≤760 m/s [1200 ft/s < $V_{s,100}$≤2500 ft/s]	Very dense soil and soft rock
S_D	180 m/s ≤ $V_{s,30}$≤360 m/s [600 ft/s < $V_{s,100}$≤1200 ft/s]	Stiff Soil Profile
S_E	$V_{s,30}$< 180 m/s [$V_{s,100}$ < 600 ft/s]	Soft Soil Profile
S_F	-	Soils requiring site-specific evaluation.

Appendix 10

Site Location: Nan-To Elementary School (TCU-076)

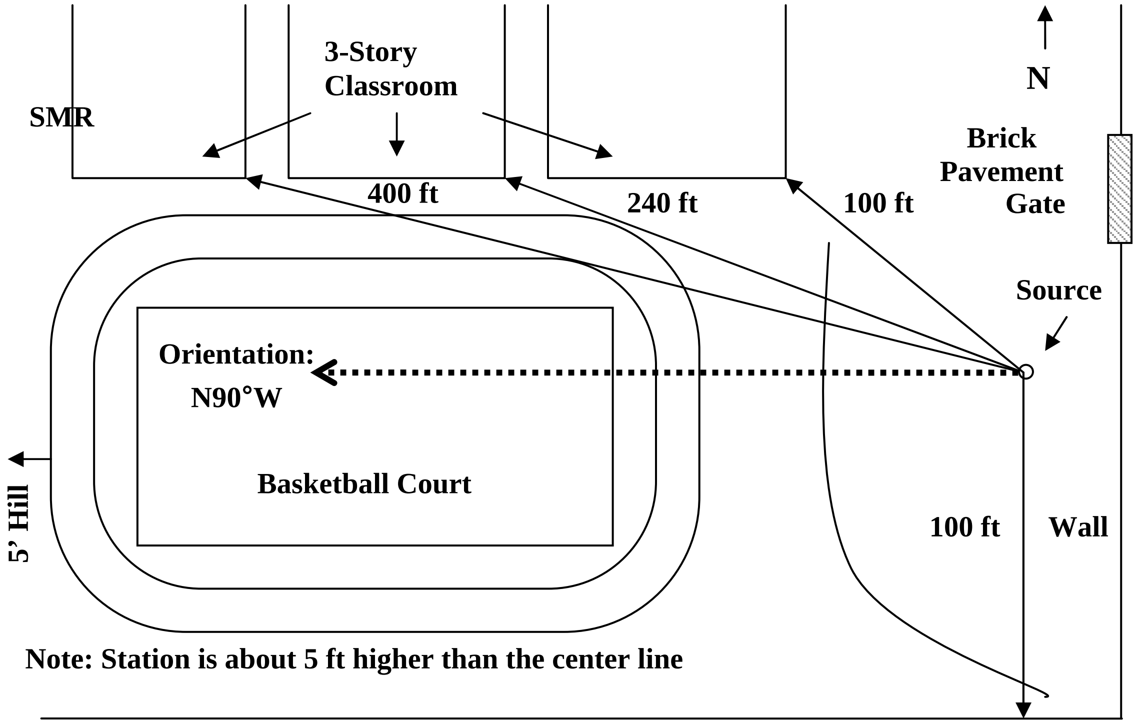


Figure 10.1 Site Map of Nan-To Elementary School

Figure 10.2 Picture Taken at Nan-To Elementary School (View # 1)

Figure 10.3 Picture Taken at Nan-To Elementary School (View # 2)

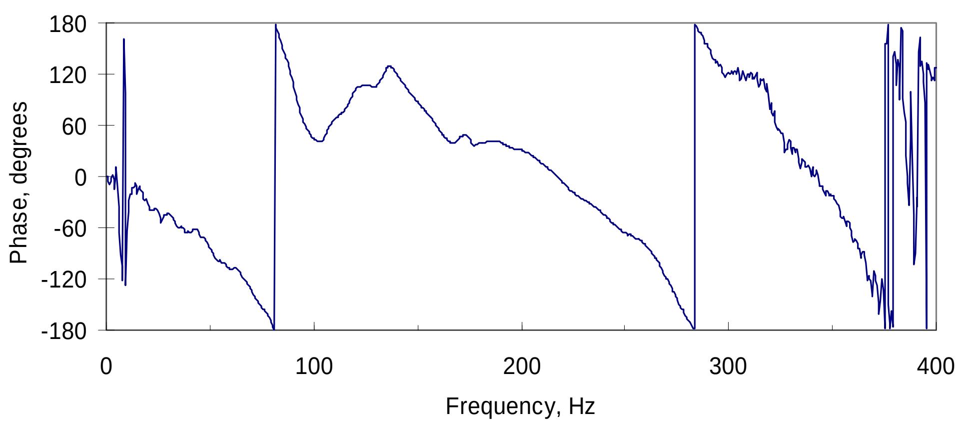


Figure 10.4 Phase Plots Measured by SASW Testing with 3-ft Receiver Spacing

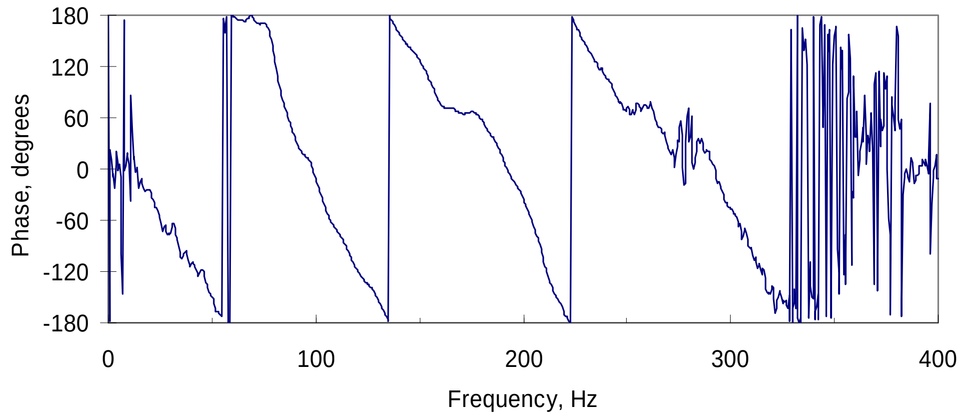


Figure 10.5 Phase Plots Measured by SASW Testing with 6-ft Receiver Spacing

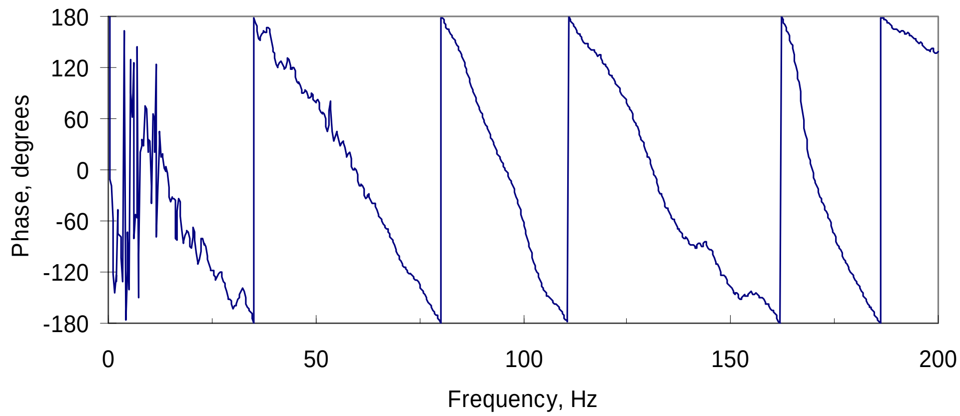


Figure 10.6 Phase Plots Measured by SASW Testing with 12-ft Receiver Spacing

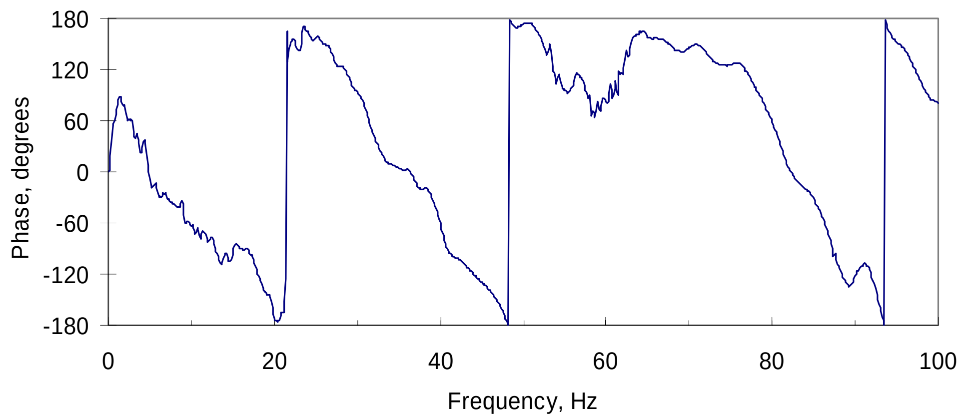


Figure 10.7 Phase Plots Measured by SASW Testing with 25-ft Receiver Spacing

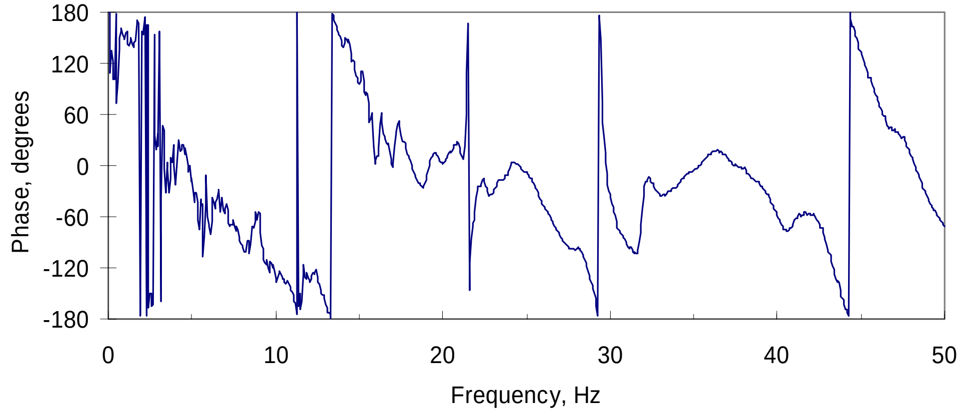


Figure 10.8 Phase Plots Measured by SASW Testing with 50-ft Receiver Spacing

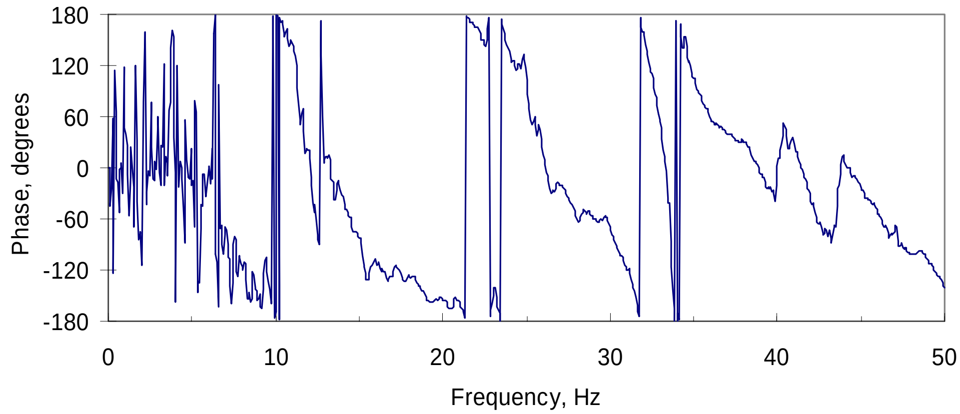


Figure 10.9 Phase Plots Measured by SASW Testing with 75-ft Receiver Spacing

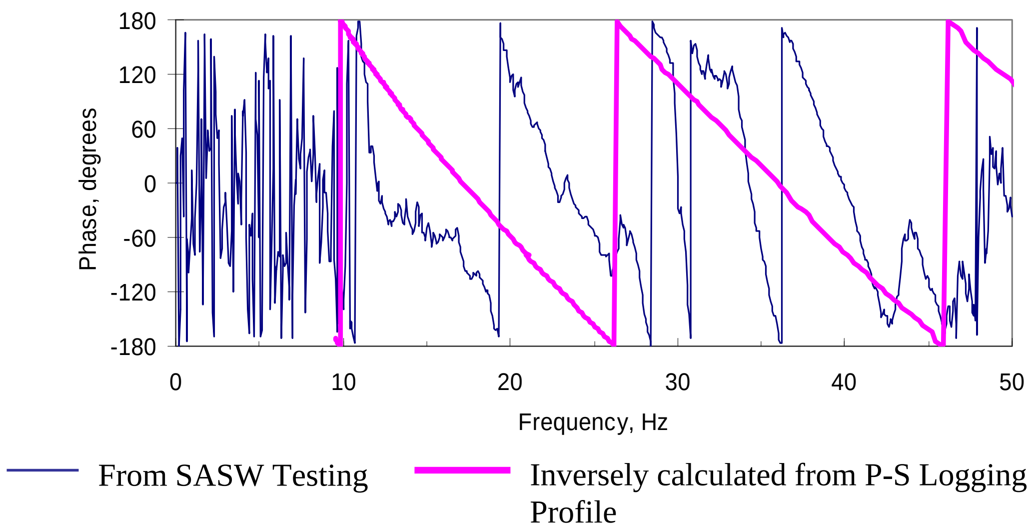


Figure 10.10 Phase Plots Measured by SASW Testing with 100-ft Receiver Spacing

Table 10.1 Table of Masking Parameters Used on Data Collected at Nan-To Elementary School

Receiver Spacing	Masking Interval	Masking Start Frequency, Hz	Masking Stop Frequency, Hz	Number of Jumps
3 ft	1	0.0	136.5	1
	2	367.5	400.0	-
6 ft	1	0.0	77.5	1
	2	252.0	294.5	3
	3	317.0	400.0	-
12 ft	1	0.0	35.8	1
25 ft	1	0.0	23.5	1
	2	55.5	76.4	3
50 ft	1	0.0	13.4	1
	2	15.0	24.3	1
	3	29.1	42.1	2
75 ft	1	0.0	10.4	1
	2	11.1	13.1	1
	3	22.2	23.8	2
	4	24.4	25.0	2
	5	31.8	34.4	3
	6	39.8	50.0	-
100 ft	1	0.0	10.9	1
	2	26.0	36.5	4
	3	42.8	50.0	-

Performed by________________________ Checked by________________________
Yin-Cheng Lin Brent L. Rosenblad

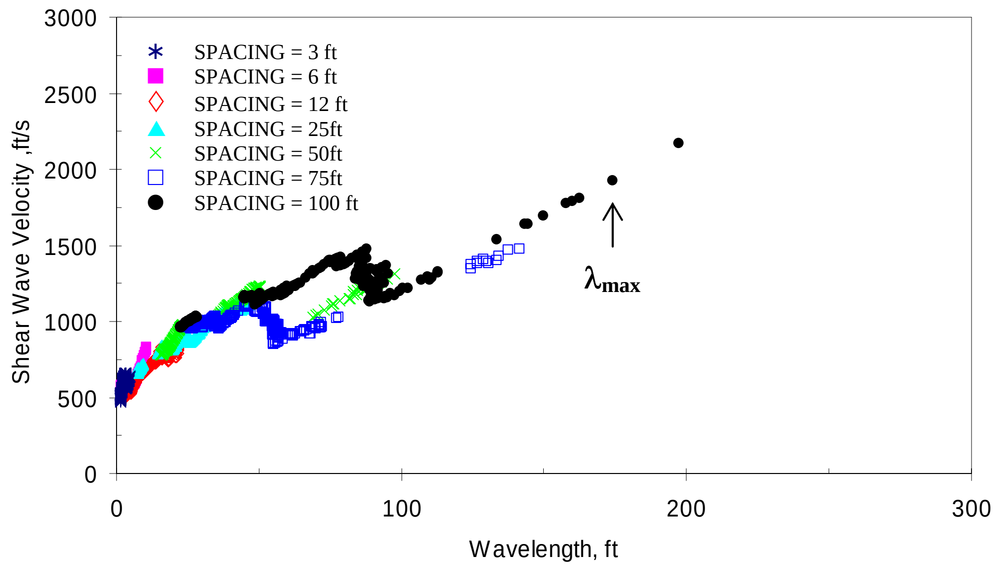


Figure 10.11 Experimental Dispersion Curve Measured at Nan-To Elementary School; Linear Wavelength Axis

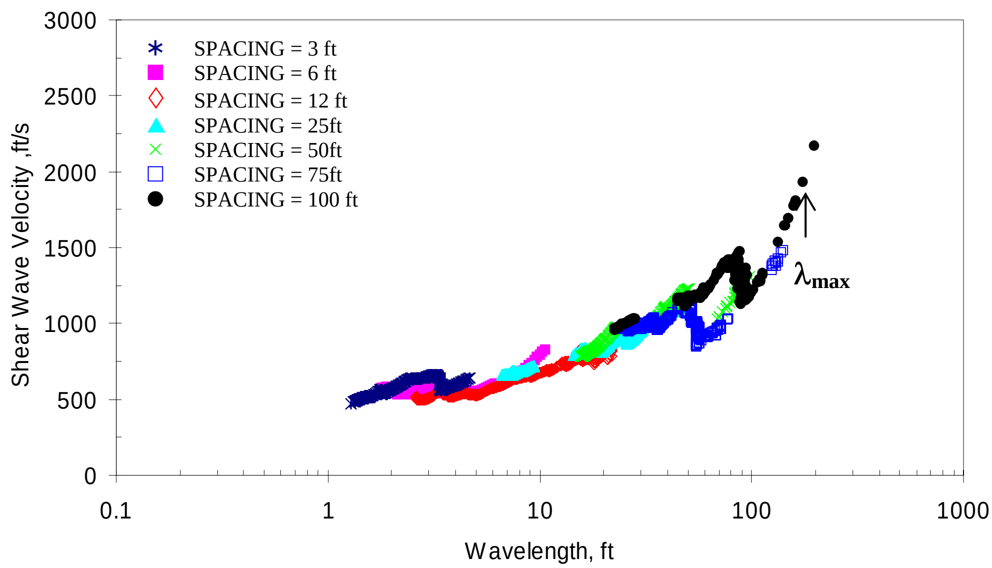


Figure 10.12 Experimental Dispersion Curve Measured at Nan-To Elementary School; Logarithmic Wavelength Axis

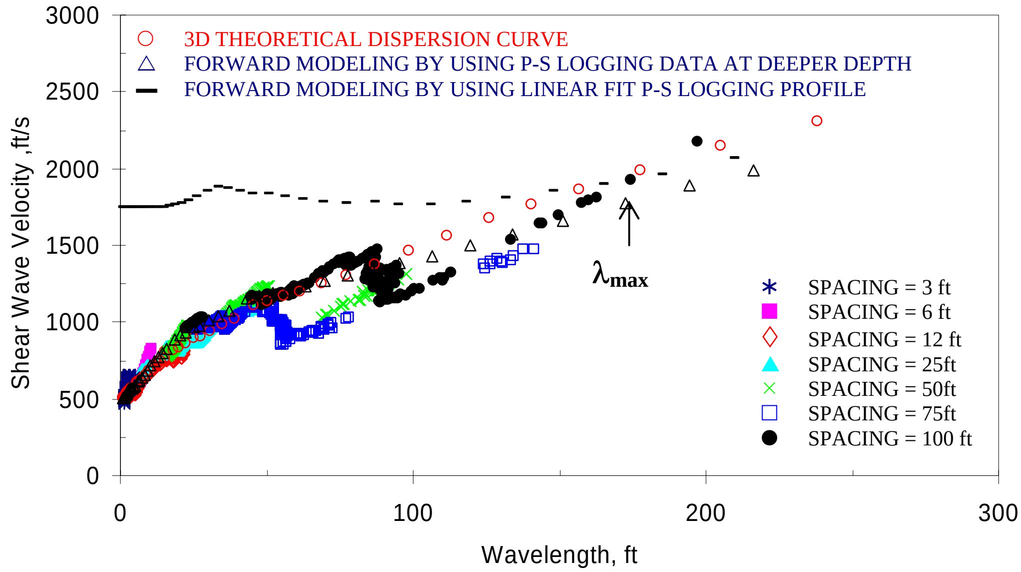


Figure 10.13 Experimental and Theoretical Dispersion Curves from Nan-To Elementary School; Linear Wavelength Axis

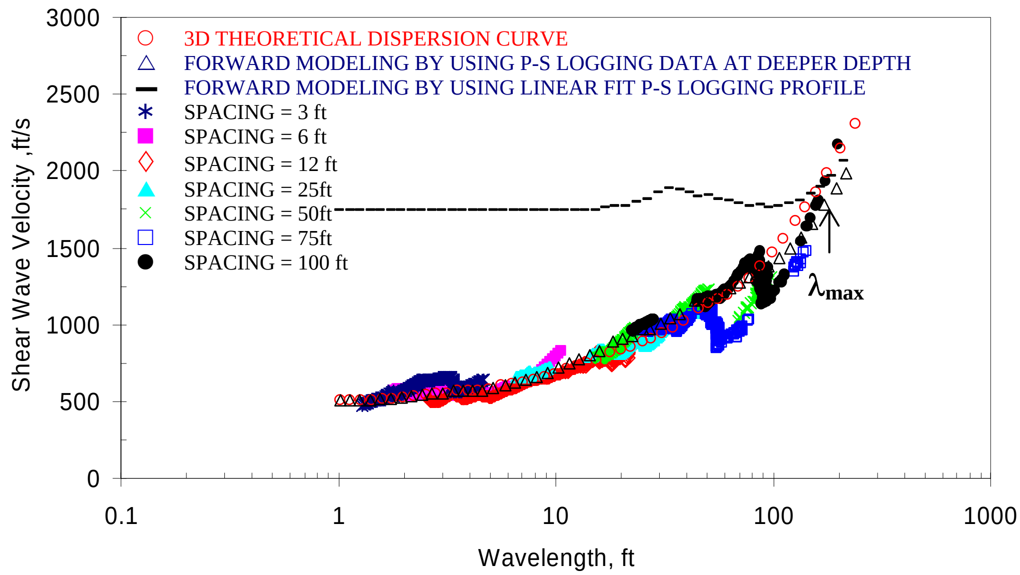
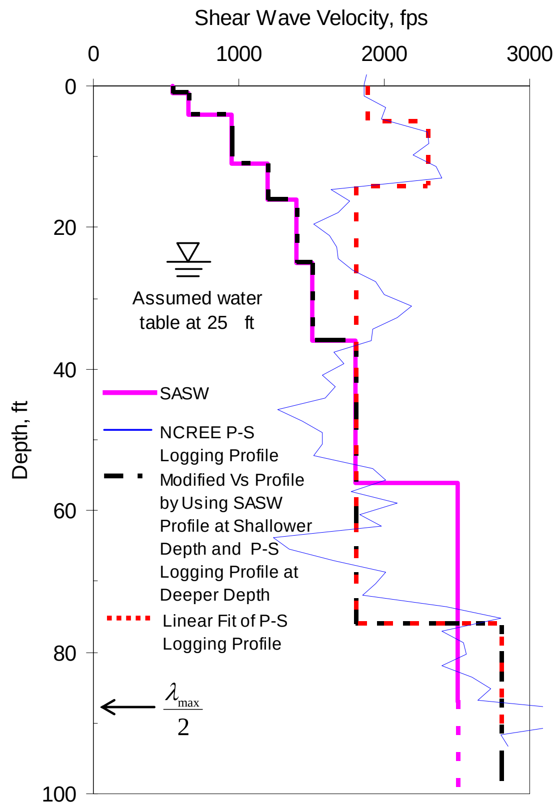


Figure 10.14 Experimental and Theoretical Dispersion Curves from Nan-To Elementary School; Logarithmic Wavelength Axis

Appendix



Note: The elevation of P-S Logger is 10 ft higher than the SASW testing array, so the shear wave velocity profile of P-S Logger is shifted up 10 ft.

Figure 10.15 Shear Wave Velocity Profile Determined at Nan-To Elementary School

Table 10.2 Profile Parameters Used to Develop Theoretical Dispersion Curve at Nan-To Elementary School

Layer No.	Thickness, ft	Depth to the bottom, ft	P-Wave Velocity, ft/s	S-Wave Velocity, ft/s	Poisson's Ratio	Total Unit Weight, pcf
1	1	1	935	540	0.25	120
2	3	4	1126	650	0.25	120
3	7	11	1819	950	0.25	120
4	5	16	2252	1200	0.25	120
5	9	25	2598	1400	0.25	120
6	11	36	5000	1500	0.45	120
7	20	56	5000	1800	0.43	120
8	31	87	5000	2500	0.33	130

Performed by______________________ Checked by______________________
Yin-Cheng Lin Brent L. Rosenblad

Table 10.3 Uniform Building Code (UBC-97) Site Classification of Nan-To Elementary School

Average Shear Wave Velocity of Top 30 meters (100 ft), $V_{s,30}$ (ft/s) [m/s]	Site Classification
1655 [504]	C

Performed by________________________ Checked by________________________
Yin-Cheng Lin Brent L. Rosenblad

Table 10.4 UBC-97 Site Categories

Soil Profile Type	Average Shear Wave Velocity of Top 30 m, $V_{s,30}$ (m/s) [Top100 ft, $V_{s,100}$ (ft/s)]	Description
S_A	$V_{s,30}$>1500 m/s [$V_{s,100}$>5000 ft/s]	Hard rock
S_B	760 m/s < $V_{s,30}$≤1500 m/s [2500 ft/s < $V_{s,100}$≤5000 ft/s]	Rock
S_C	360 m/s < $V_{s,30}$≤760 m/s [1200 ft/s < $V_{s,100}$≤2500 ft/s]	Very dense soil and soft rock
S_D	180 m/s ≤ $V_{s,30}$≤360 m/s [600 ft/s < $V_{s,100}$≤1200 ft/s]	Stiff Soil Profile
S_E	$V_{s,30}$< 180 m/s [$V_{s,100}$ < 600 ft/s]	Soft Soil Profile
S_F	-	Soils requiring site-specific evaluation.

Appendix 11

Site Location: Shai-Li Elementary School (TCU-078)

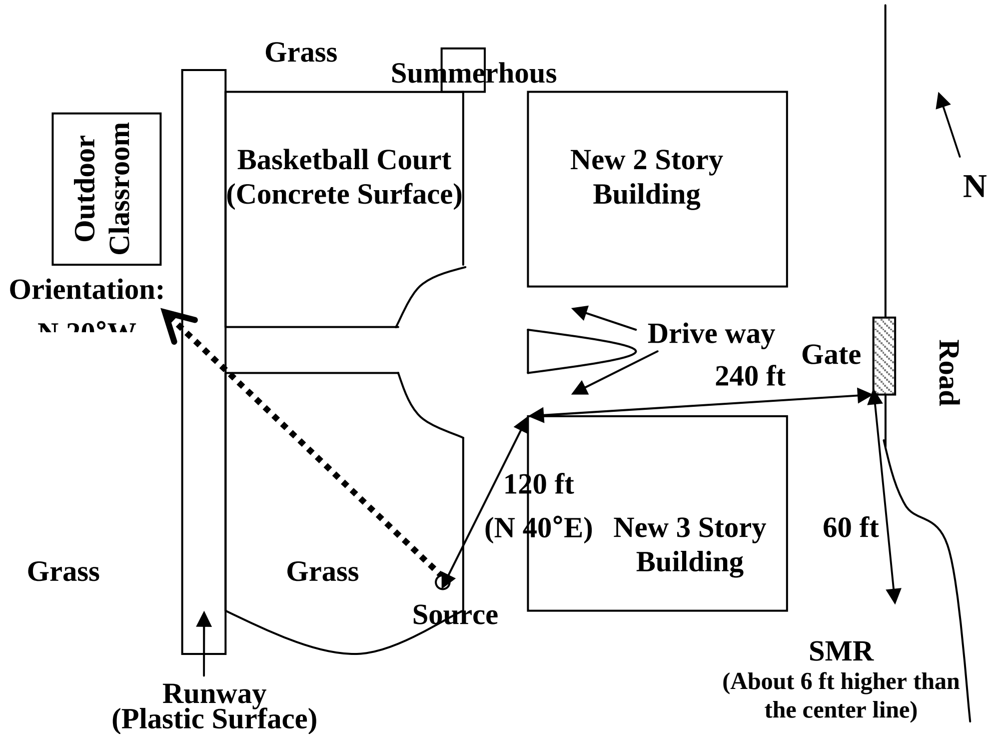


Figure 11.1 Site Map of Shai-Li Elementary School

Figure 11.2 Picture Taken at Shai-Li Elementary School (View # 1)

Figure 11.3 Picture Taken at Shai-Li Elementary School (View # 2)

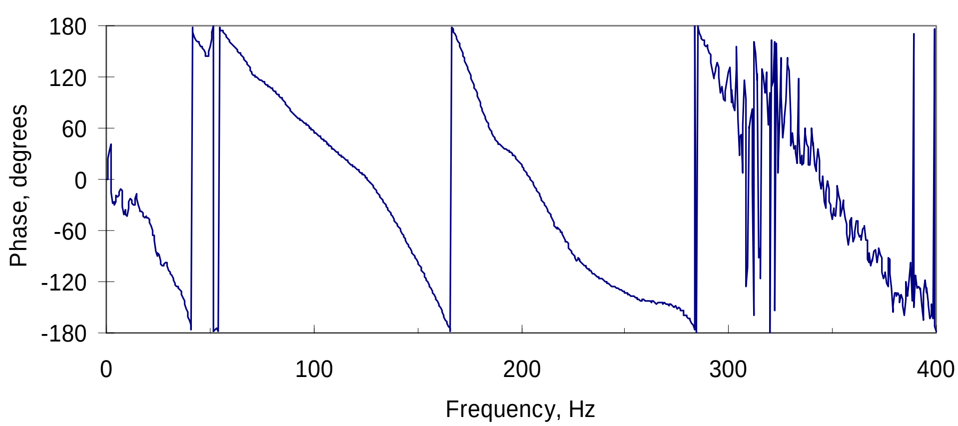


Figure 11.4 Phase Plots Measured by SASW Testing with 6-ft Receiver Spacing

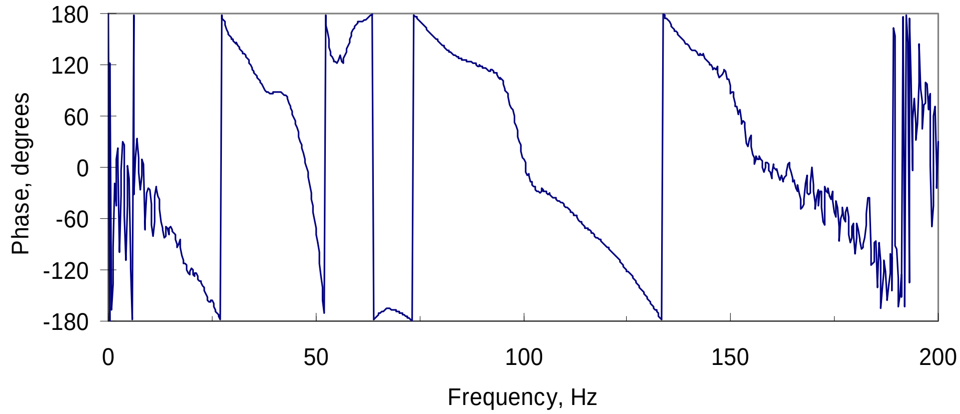


Figure 11.5 Phase Plots Measured by SASW Testing with 12-ft Receiver Spacing

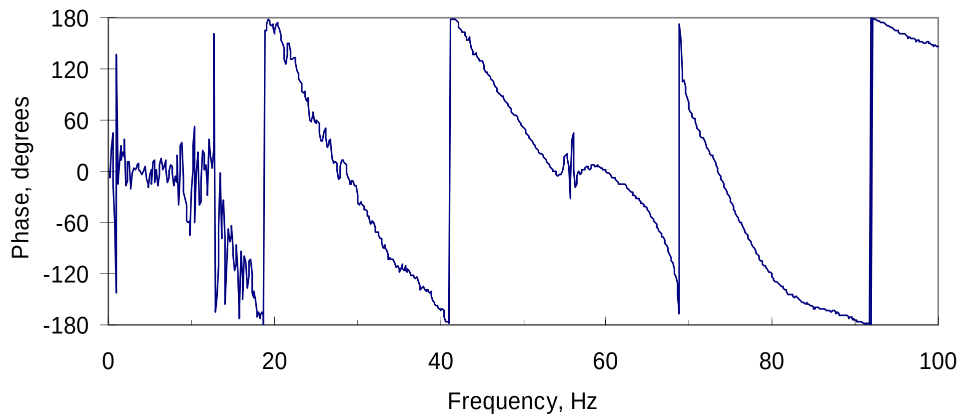


Figure 11.6 Phase Plots Measured by SASW Testing with 25-ft Receiver Spacing

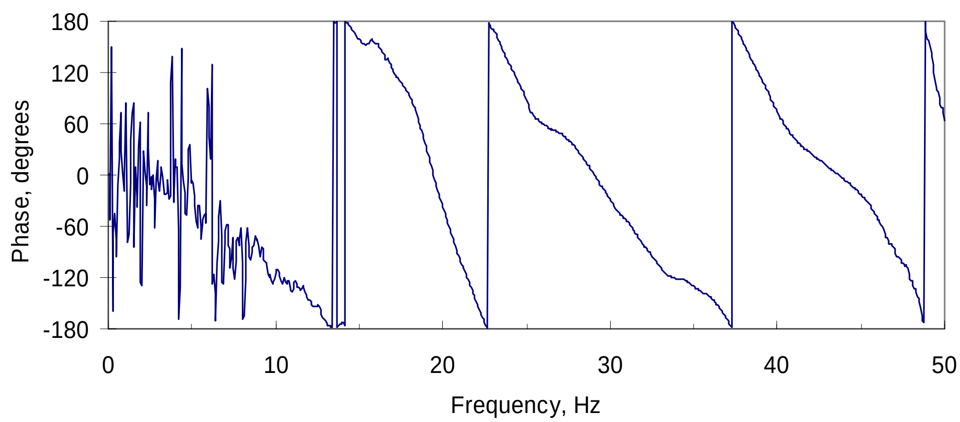


Figure 11.7 Phase Plots Measured by SASW Testing with 50-ft Receiver Spacing

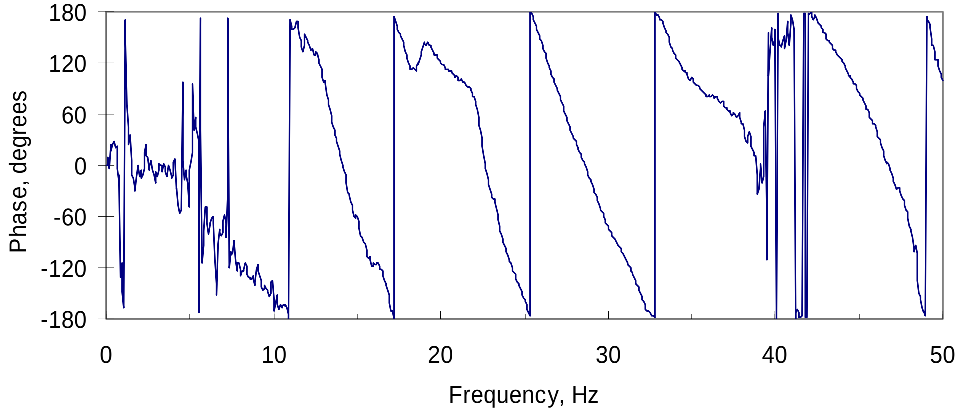


Figure 11.8 Phase Plots Measured by SASW Testing with 75-ft Receiver Spacing

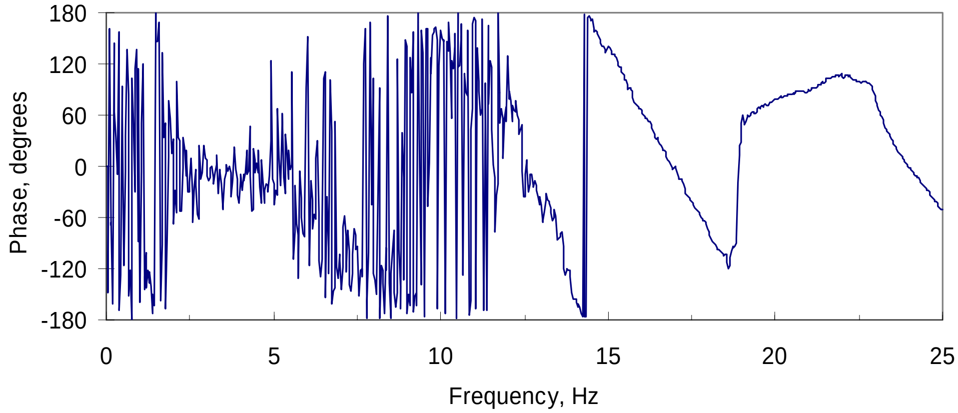


Figure 11.9 Phase Plots Measured by SASW Testing with 100-ft Receiver Spacing

Table 11.1 Table of Masking Parameters Used on Data Collected at Shai-Li Elementary School

Receiver Spacing	Masking Interval	Masking Start Frequency, Hz	Masking Stop Frequency, Hz	Number of Jumps
6 ft	1	0.0	54.5	1
	2	298.5	400.0	-
12 ft	1	0.0	27.5	1
	2	39.5	74.5	2
	3	149.3	200.0	-
25 ft	1	0.0	19.1	1
	2	54.0	100.0	-
50 ft	1	0.0	14.2	1
75 ft	1	0.0	11.1	1
	2	36.5	42.0	6
105 ft	1	0.0	12.0	1
	2	14.3	14.5	2
	3	18.6	25.0	-

Performed by____________________ Checked by____________________

Yin-Cheng Lin Brent L. Rosenblad

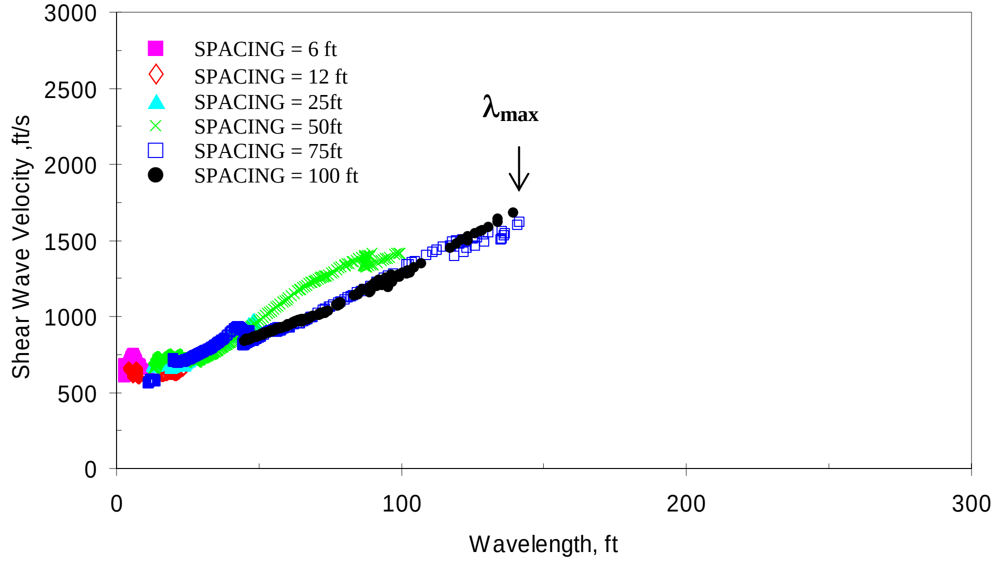


Figure 11.10 Experimental Dispersion Curve Measured at Shai-Li Elementary School; Linear Wavelength Axis

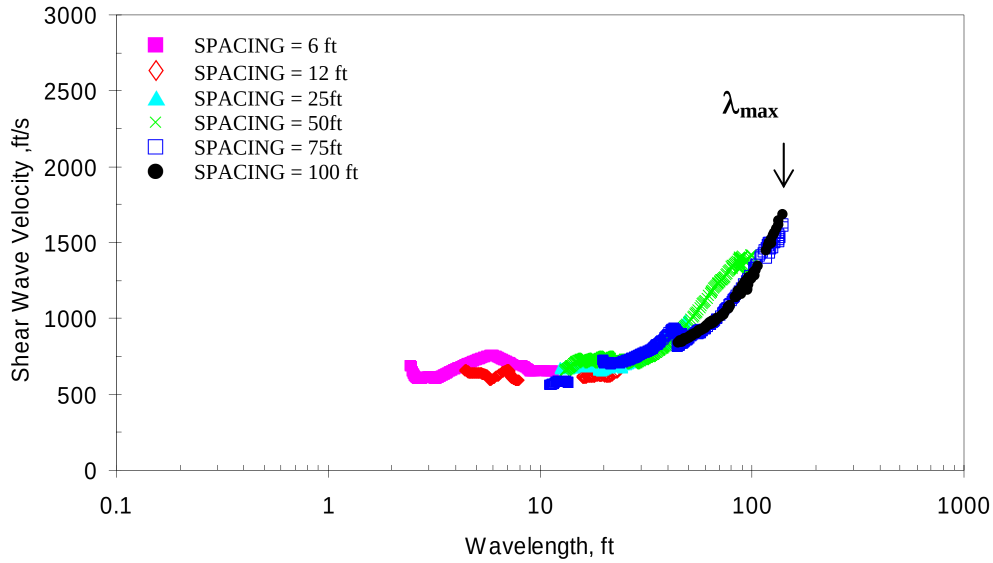


Figure 11.11 Experimental Dispersion Curve Measured at Shai-Li Elementary School; Logarithmic Wavelength Axis

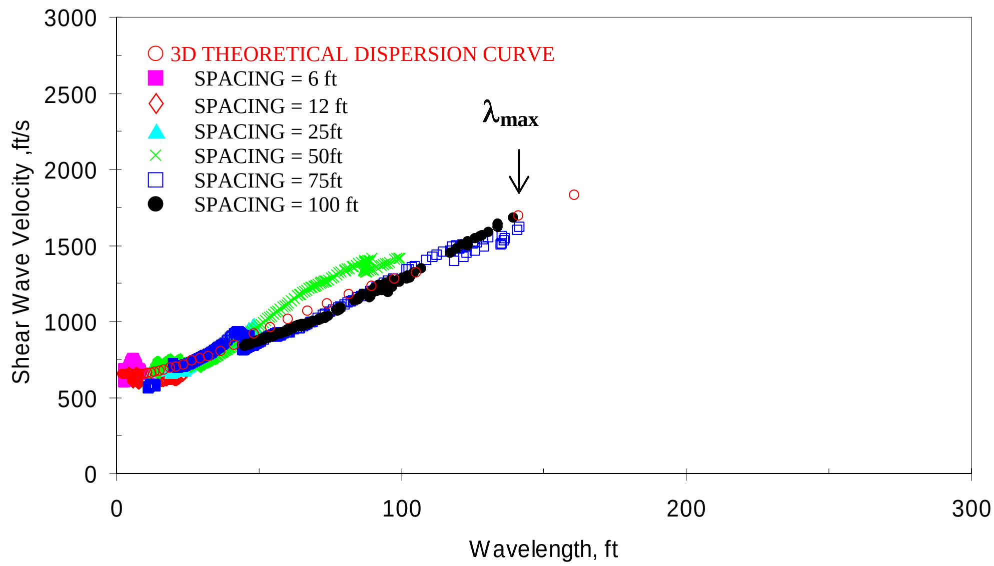


Figure 11.12 Experimental and Theoretical Dispersion Curves from Shai-Li Elementary School; Linear Wavelength Axis

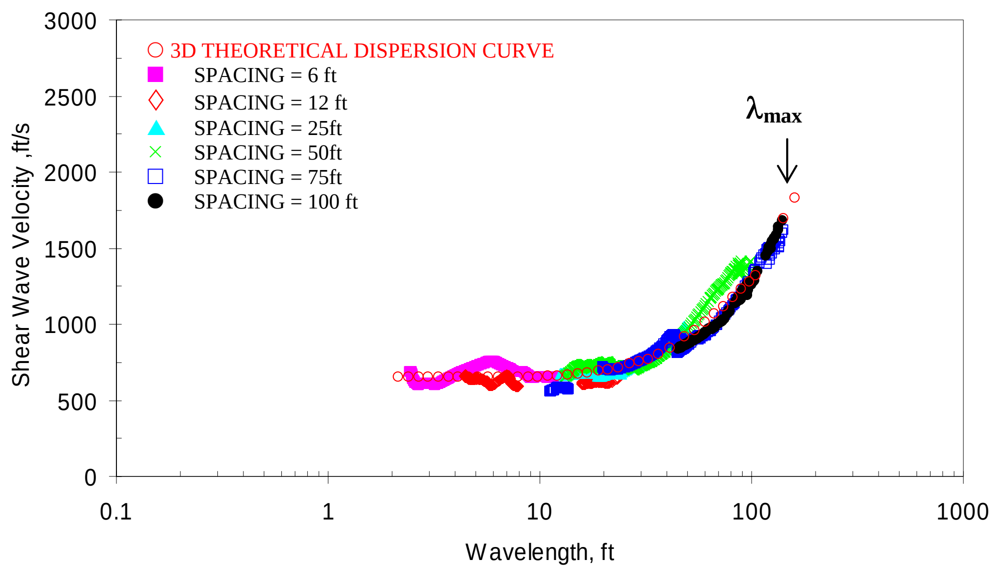


Figure 11.13 Experimental and Theoretical Dispersion Curves from Shai-Li Elementary School; Logarithmic Wavelength Axis

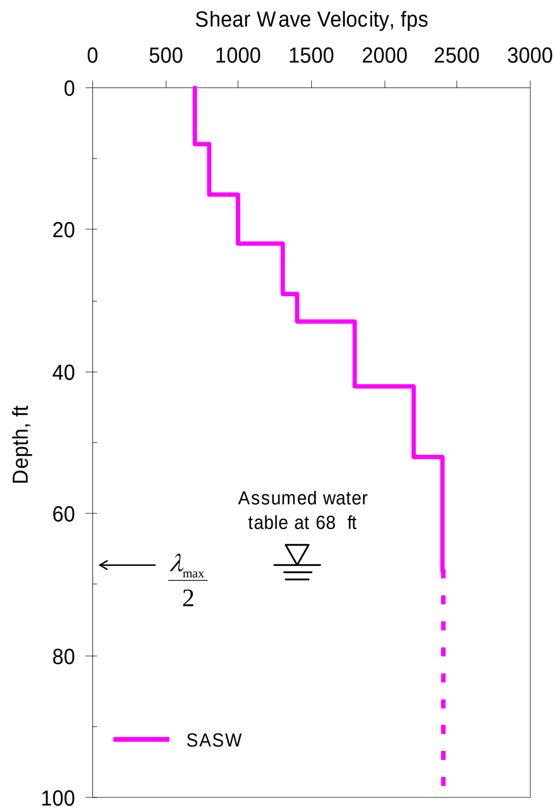


Figure 11.14 Shear Wave Velocity Profile Determined at Shai-Li Elementary School

Table 11.2 Profile Parameters Used to Develop Theoretical Dispersion Curve at Shai-Li Elementary School

Layer No.	Thickness, ft	Depth to the bottom, ft	P-Wave Velocity, ft/s	S-Wave Velocity, ft/s	Poisson's Ratio	Total Unit Weight, pcf
1	8.0	8	1212	700	0.25	120
2	7.0	15	1386	800	0.25	120
3	7.0	22	1732	1000	0.25	120
4	7.0	29	2252	1300	0.25	120
5	4.0	33	5000	1400	0.46	120
6	9.0	42	5000	1800	0.43	120
7	10.0	52	5100	2200	0.39	125
8	16.0	68	5200	2400	0.36	125

Performed by____________________ Checked by____________________
Yin-Cheng Lin Brent L. Rosenblad

Table 11.3 Uniform Building Code (UBC-97) Site Classification of Shai-Li Elementary School

Average Shear Wave Velocity of Top 30 meters (100 ft), $V_{s,30}$ (ft/s) [m/s]	Site Classification
1540 [469]	C

Performed by________________________ Checked by________________________
Yin-Cheng Lin Brent L. Rosenblad

Table 11.4 UBC-97 Site Categories

Soil Profile Type	Average Shear Wave Velocity of Top 30 m, $V_{s,30}$ (m/s) [Top100 ft, $V_{s,100}$ (ft/s)]	Description
S_A	$V_{s,30}$>1500 m/s [$V_{s,100}$>5000 ft/s]	Hard rock
S_B	760 m/s < $V_{s,30}$≤1500 m/s [2500 ft/s < $V_{s,100}$≤5000 ft/s]	Rock
S_C	360 m/s < $V_{s,30}$≤760 m/s [1200 ft/s < $V_{s,100}$≤2500 ft/s]	Very dense soil and soft rock
S_D	180 m/s ≤ $V_{s,30}$≤360 m/s [600 ft/s < $V_{s,100}$≤1200 ft/s]	Stiff Soil Profile
S_E	$V_{s,30}$< 180 m/s [$V_{s,100}$ < 600 ft/s]	Soft Soil Profile
S_F	-	Soils requiring site-specific evaluation.

Appendix 12

Site Location: Tor-Se Elementary School (TCU-079)

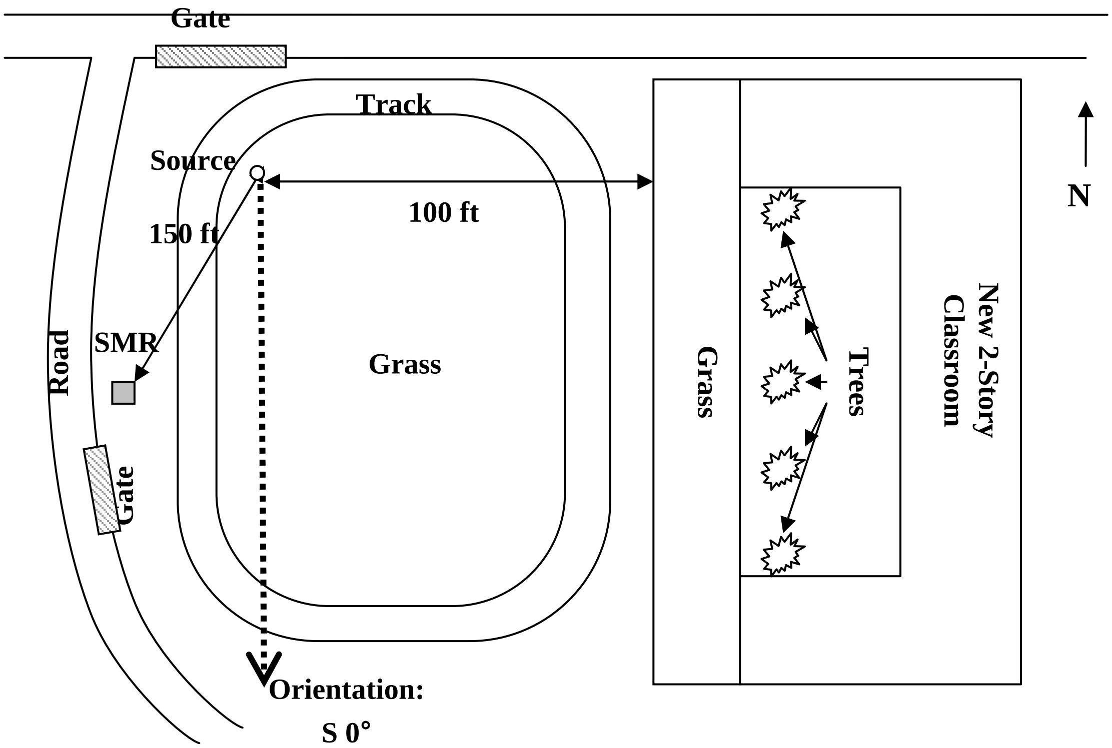


Figure 12.1 Site Map of Tor-Se Elementary School

Figure 12.2 Picture Taken at Tor-Se Elementary School (View # 1)

Figure 12.3 Picture Taken at Tor-Se Elementary School (View # 2)

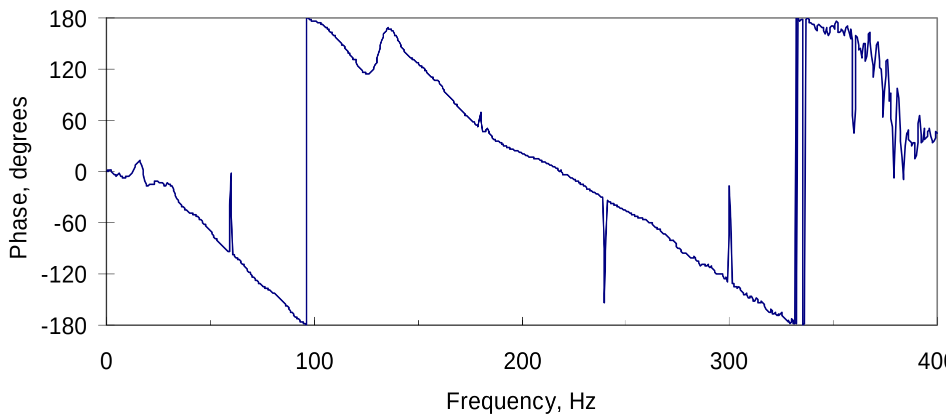


Figure 12.4 Phase Plots Measured by SASW Testing with 3-ft Receiver Spacing

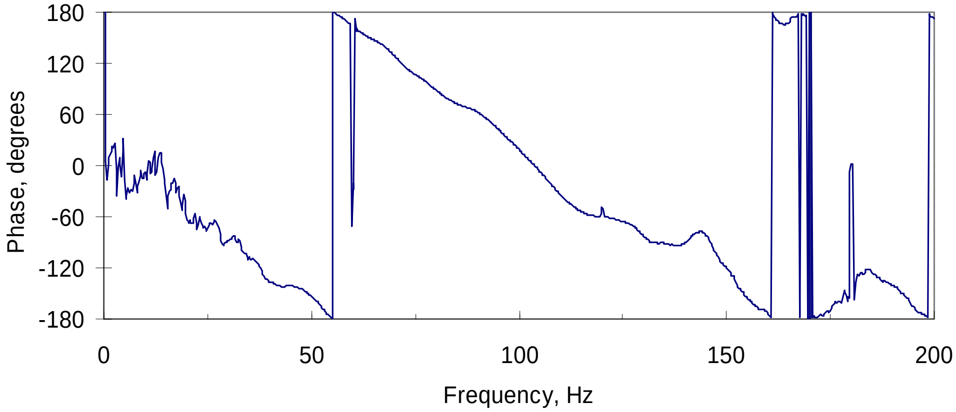


Figure 12.5 Phase Plots Measured by SASW Testing with 6-ft Receiver Spacing

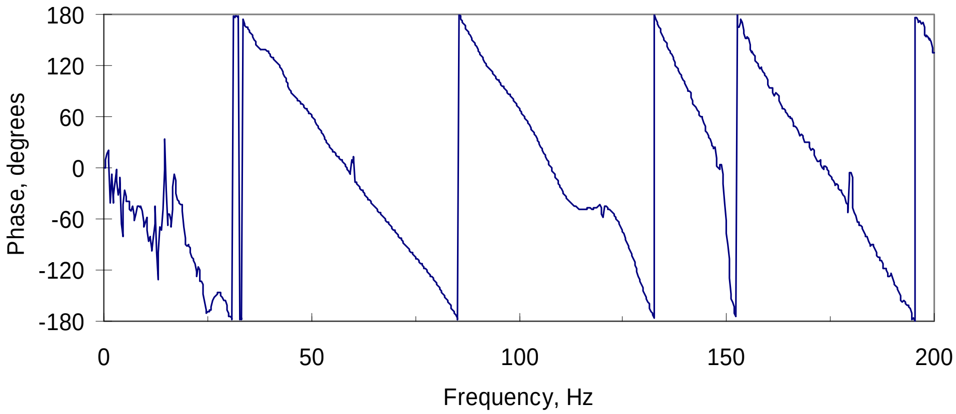


Figure 12.6 Phase Plots Measured by SASW Testing with 12-ft Receiver Spacing

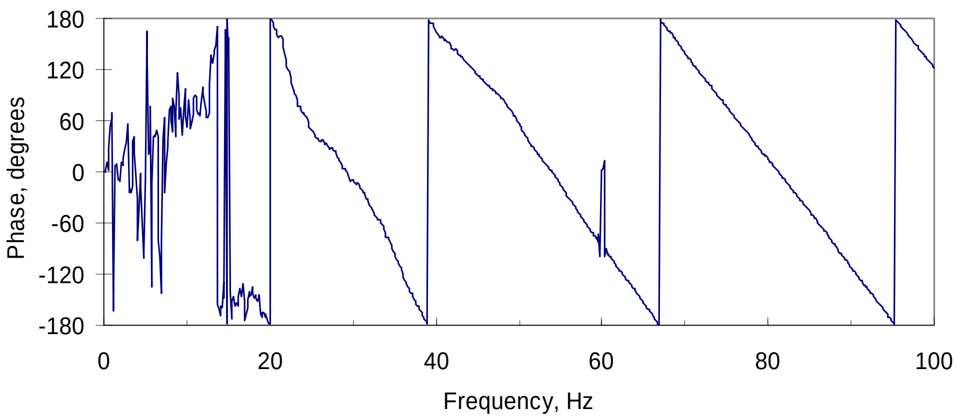


Figure 12.7 Phase Plots Measured by SASW Testing with 25-ft Receiver Spacing

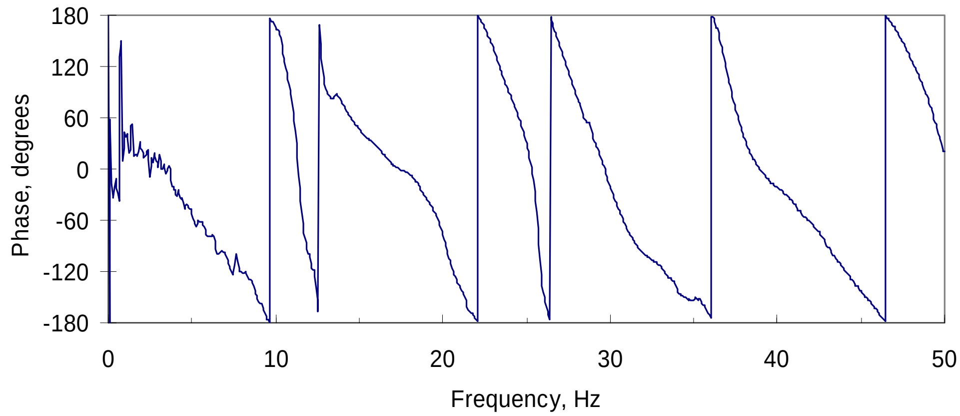


Figure 12.8 Phase Plots Measured by SASW Testing with 50-ft Receiver Spacing

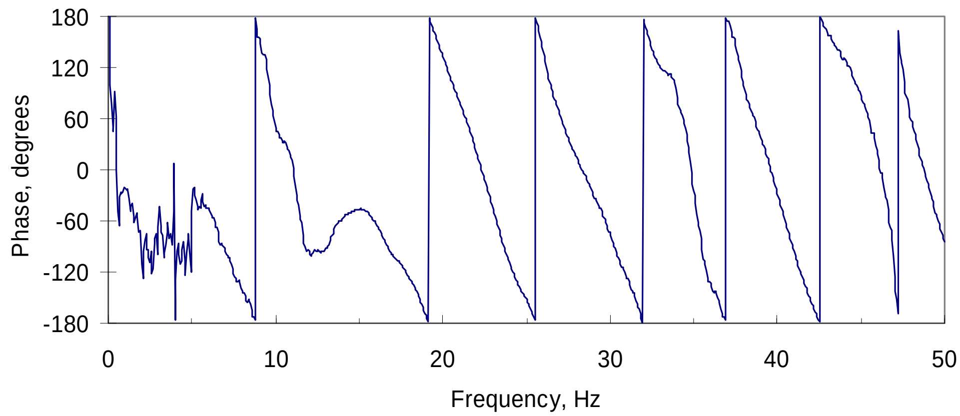


Figure 12.9 Phase Plots Measured by SASW Testing with 75-ft Receiver Spacing

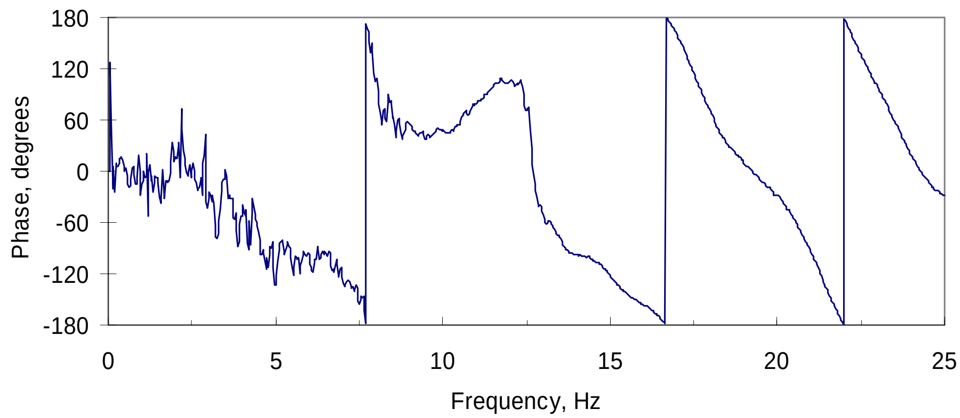


Figure 12.10 Phase Plots Measured by SASW Testing with 100-ft Receiver Spacing

Table 12.1 Table of Masking Parameters Used on Data Collected at Tor-Se Elementary School

Receiver Spacing	Masking Interval	Masking Start Frequency, Hz	Masking Stop Frequency, Hz	Number of Jumps
3 ft	1	0.0	97.0	1
	2	109.0	159.0	1
	3	179.0	185.5	1
	4	238.5	242.0	1
	5	299.0	301.0	1
	6	330.0	400.0	-
6 ft	1	0.0	55.5	1
	2	59.3	61.0	1
	3	160.0	200.0	-
12 ft	1	0.0	34.0	1
	2	59.5	60.5	1
25 ft	1	0.0	20.1	1
	2	59.5	60.6	2
50 ft	1	0.0	13.3	1
75 ft	1	0.0	8.9	1
	2	10.8	15.4	1
100 ft	1	0.0	7.7	1
	2	9.5	13.1	1

Performed by________________________ Checked by________________________

Yin-Cheng Lin Brent L. Rosenblad

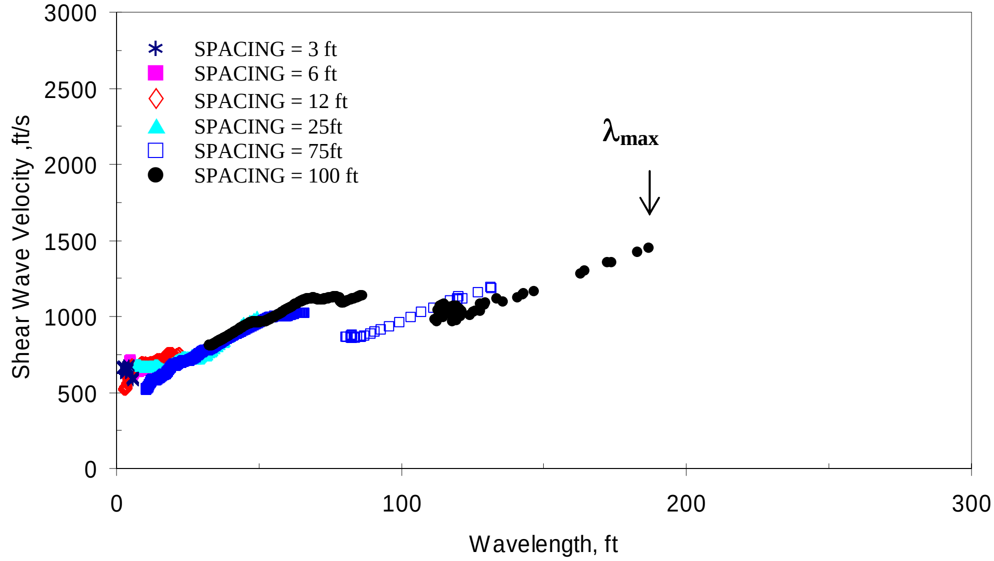


Figure 12.11 Experimental Dispersion Curve Measured at Tor-Se Elementary School; Linear Wavelength Axis

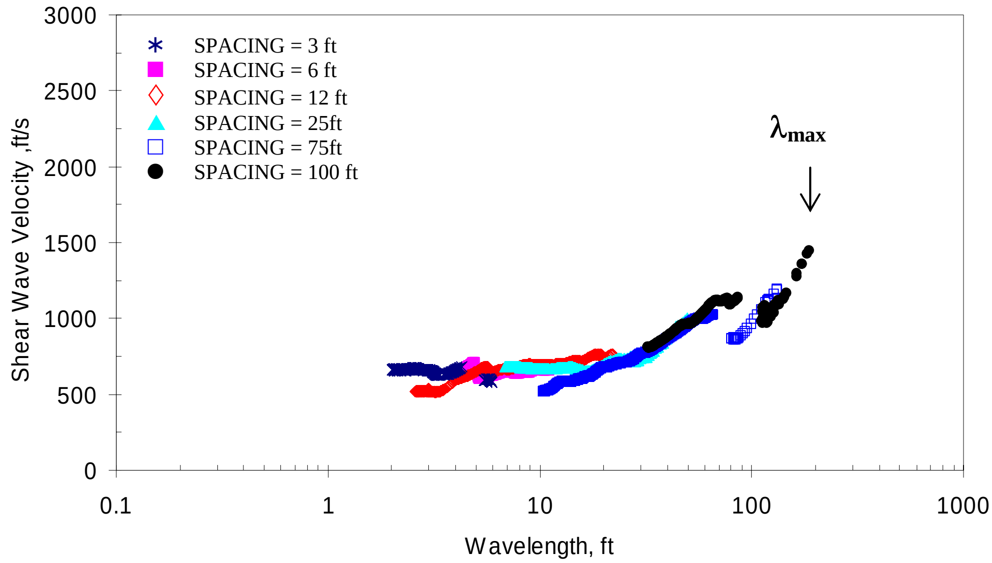


Figure 12.12 Experimental Dispersion Curve Measured at Tor-Se Elementary School; Logarithmic Wavelength Axis

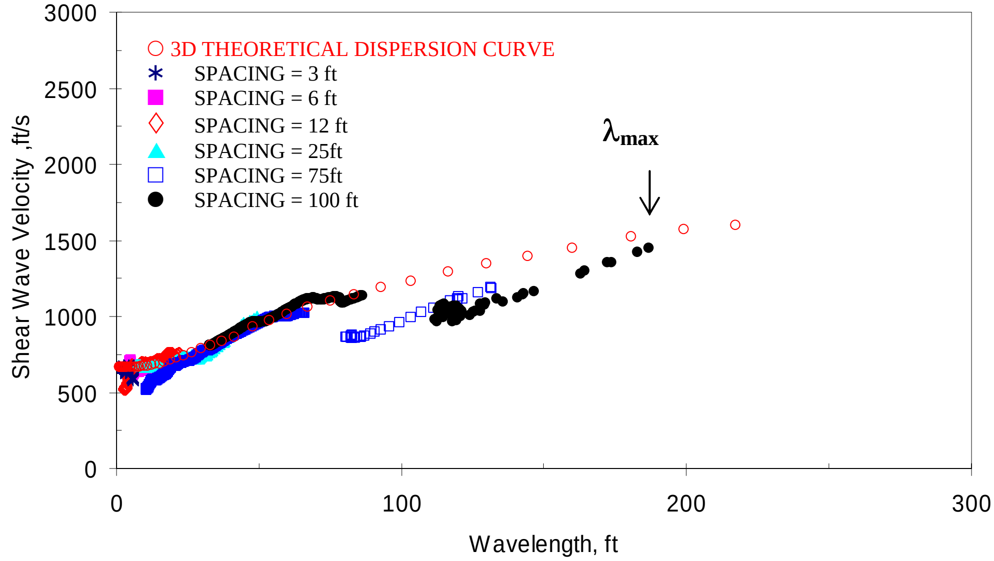


Figure 12.13 Experimental and Theoretical Dispersion Curves from Tor-Se Elementary School; Linear Wavelength Axis

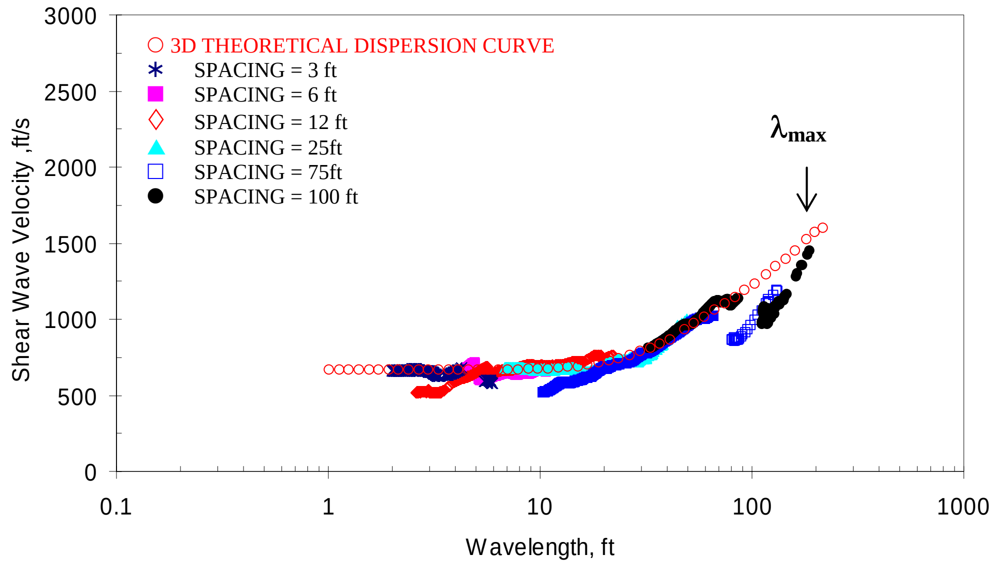


Figure 12.14 Experimental and Theoretical Dispersion Curves from Tor-Se Elementary School; Logarithmic Wavelength Axis

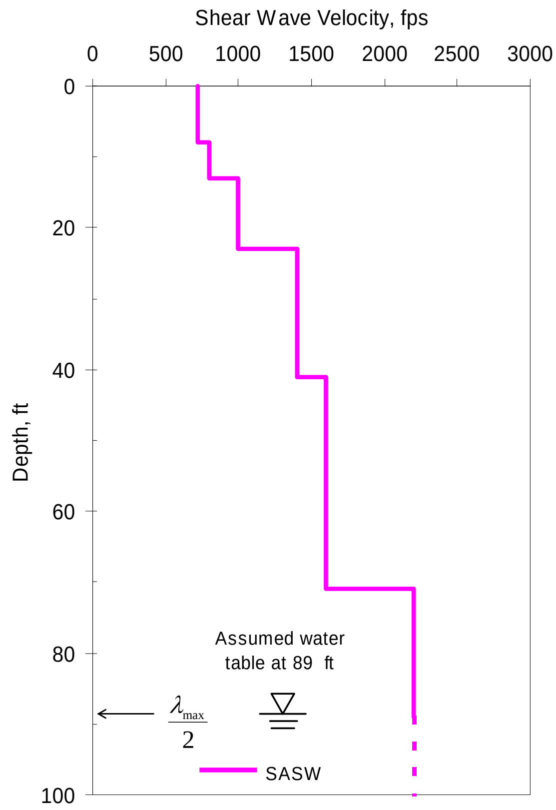


Figure 12.15 Shear Wave Velocity Profile Determined at Tor-Se Elementary School

Table 12.2 Profile Parameters Used to Develop Theoretical Dispersion Curve at Tor-Se Elementary School

Layer No.	Thickness, ft	Depth to the bottom, ft	P-Wave Velocity, ft/s	S-Wave Velocity, ft/s	Poisson's Ratio	Total Unit Weight, pcf
1	8.0	8	1247	720	0.25	120
2	5.0	13	1386	800	0.25	120
3	10.0	23	1732	1000	0.25	120
4	18.0	41	2425	1400	0.25	120
5	30.0	71	2771	1600	0.25	120
6	18.0	89	4368	2200	0.33	125

Performed by____________________ Checked by____________________

Yin-Cheng Lin Brent L. Rosenblad

Table 12.3 Uniform Building Code (UBC-97) Site Classification of Tor-Se Elementary School

Average Shear Wave Velocity of Top 30 meters (100 ft), $V_{s,30}$ (ft/s) [m/s]	Site Classification
1390 [424]	C

Performed by________________________ Checked by________________________
Yin-Cheng Lin Brent L. Rosenblad

Table 12.4 UBC-97 Site Categories

Soil Profile Type	Average Shear Wave Velocity of Top 30 m, $V_{s,30}$ (m/s) [Top100 ft, $V_{s,100}$ (ft/s)]	Description
S_A	$V_{s,30}$>1500 m/s [$V_{s,100}$>5000 ft/s]	Hard rock
S_B	760 m/s < $V_{s,30}$≤1500 m/s [2500 ft/s < $V_{s,100}$≤5000 ft/s]	Rock
S_C	360 m/s < $V_{s,30}$≤760 m/s [1200 ft/s < $V_{s,100}$≤2500 ft/s]	Very dense soil and soft rock
S_D	180 m/s ≤ $V_{s,30}$≤360 m/s [600 ft/s < $V_{s,100}$≤1200 ft/s]	Stiff Soil Profile
S_E	$V_{s,30}$< 180 m/s [$V_{s,100}$ < 600 ft/s]	Soft Soil Profile
S_F	-	Soils requiring site-specific evaluation.

Appendix 13

Site Location: Fon-Ton High School (TCU-102)

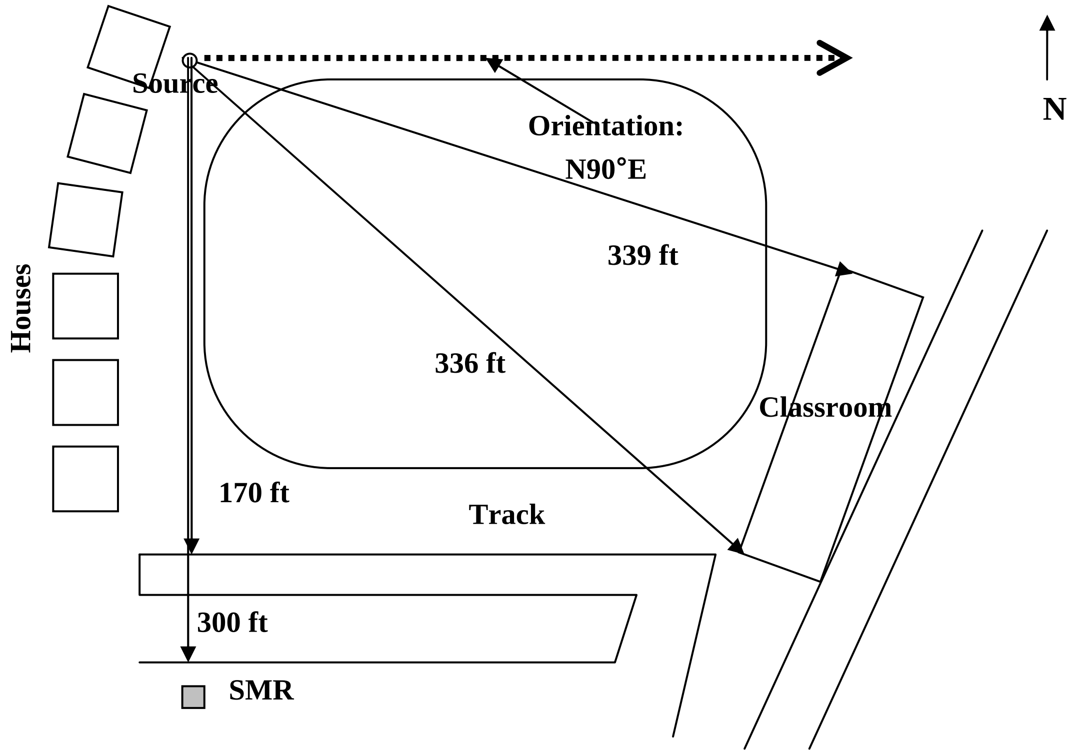


Figure 13.1 Site Map of Fon-Ton High School

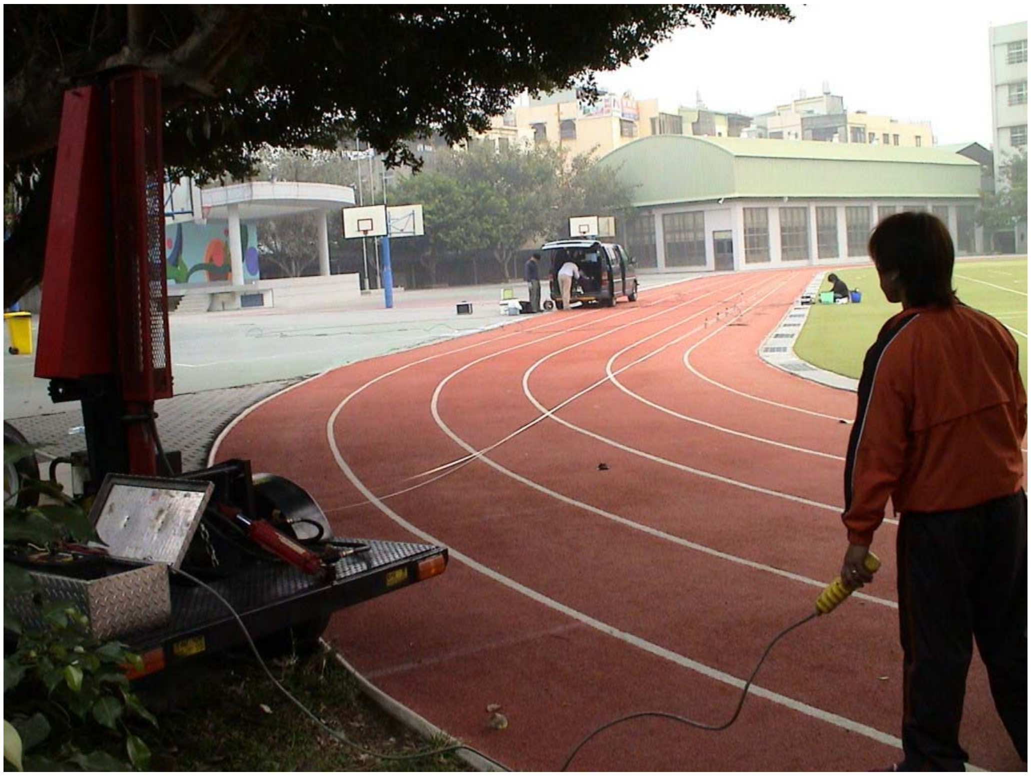


Figure 13.2 Picture Taken at Fon-Ton High School (View # 1)

Figure 13.3 Picture Taken at Fon-Ton High School (View # 2)

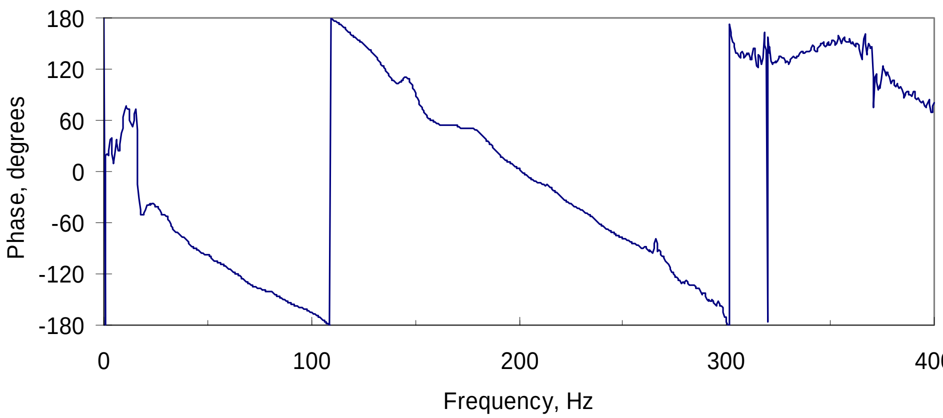


Figure 13.4 Phase Plots Measured by SASW Testing with 3-ft Receiver Spacing

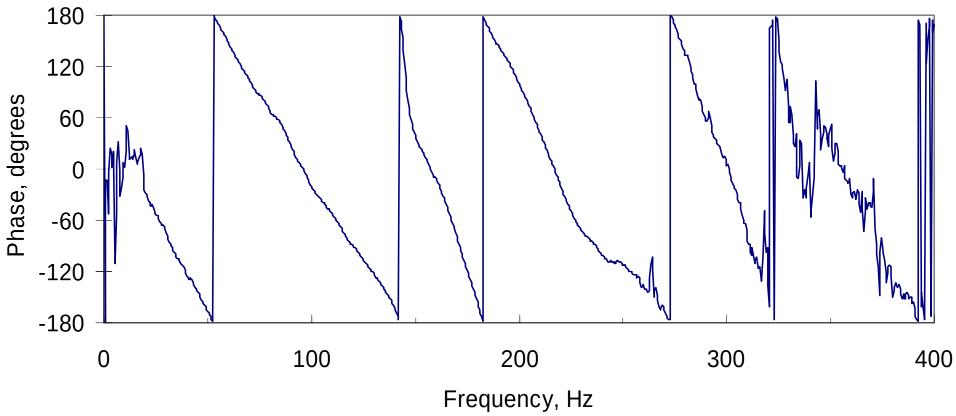


Figure 13.5 Phase Plots Measured by SASW Testing with 6-ft Receiver Spacing

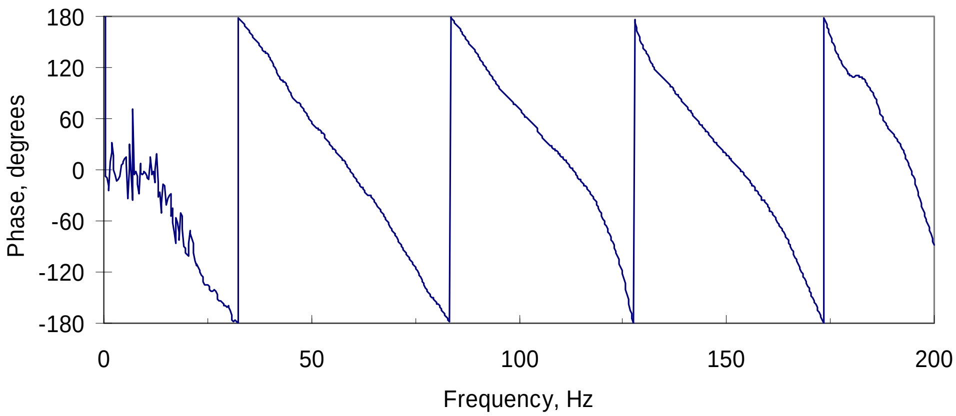


Figure 13.6 Phase Plots Measured by SASW Testing with 12-ft Receiver Spacing

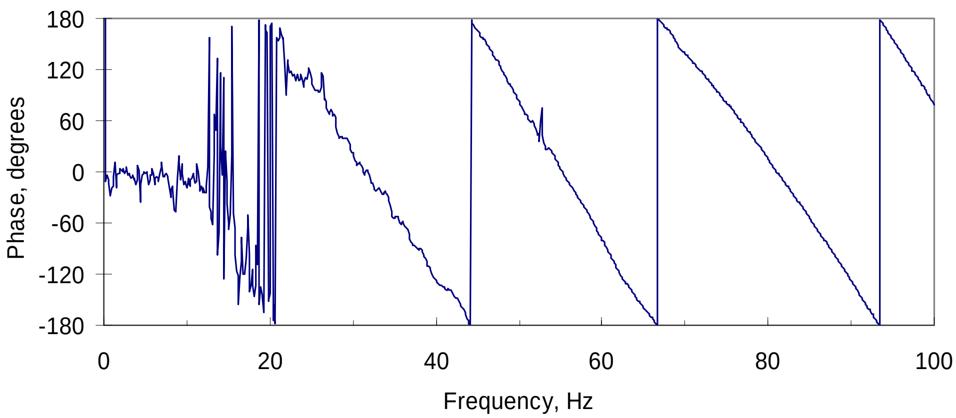


Figure 13.7 Phase Plots Measured by SASW Testing with 25-ft Receiver Spacing

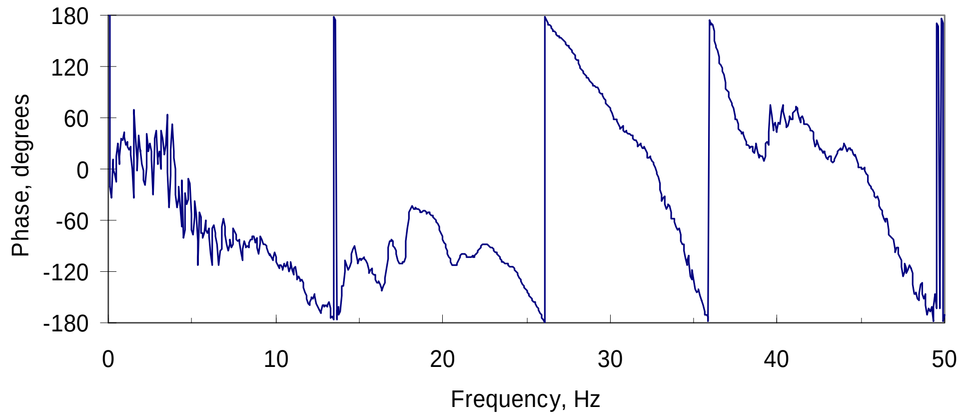


Figure 13.8 Phase Plots Measured by SASW Testing with 50-ft Receiver Spacing

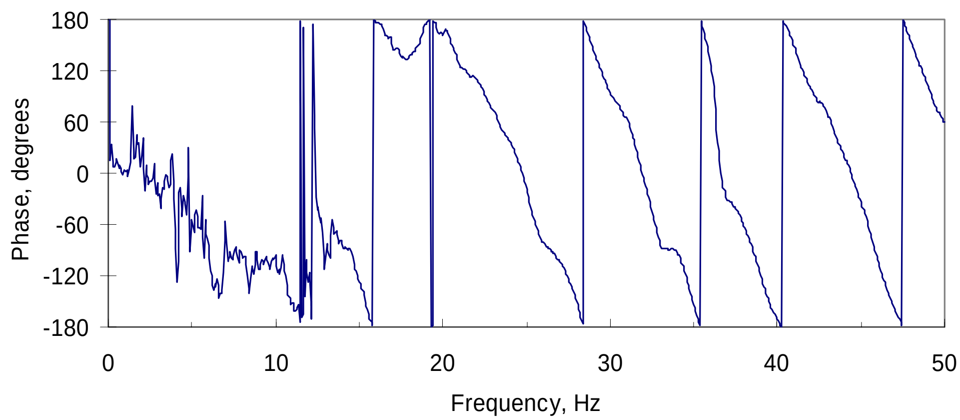


Figure 13.9 Phase Plots Measured by SASW Testing with 75-ft Receiver Spacing

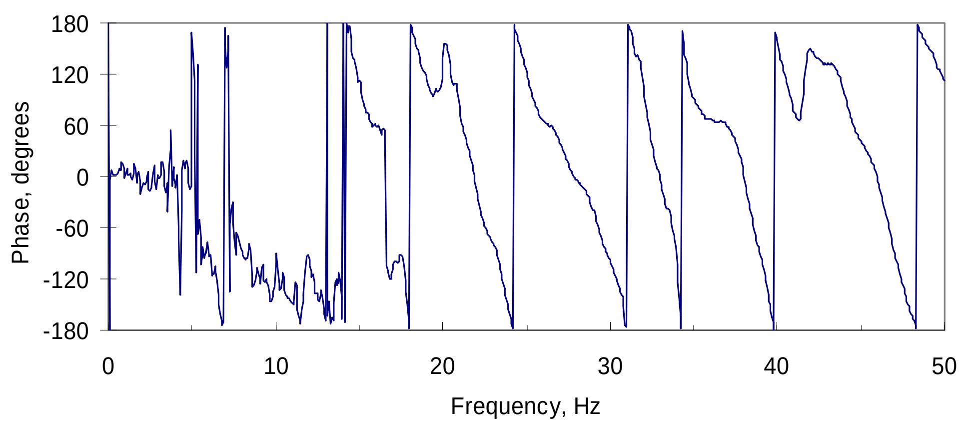


Figure 13.10 Phase Plots Measured by SASW Testing with 100-ft Receiver Spacing

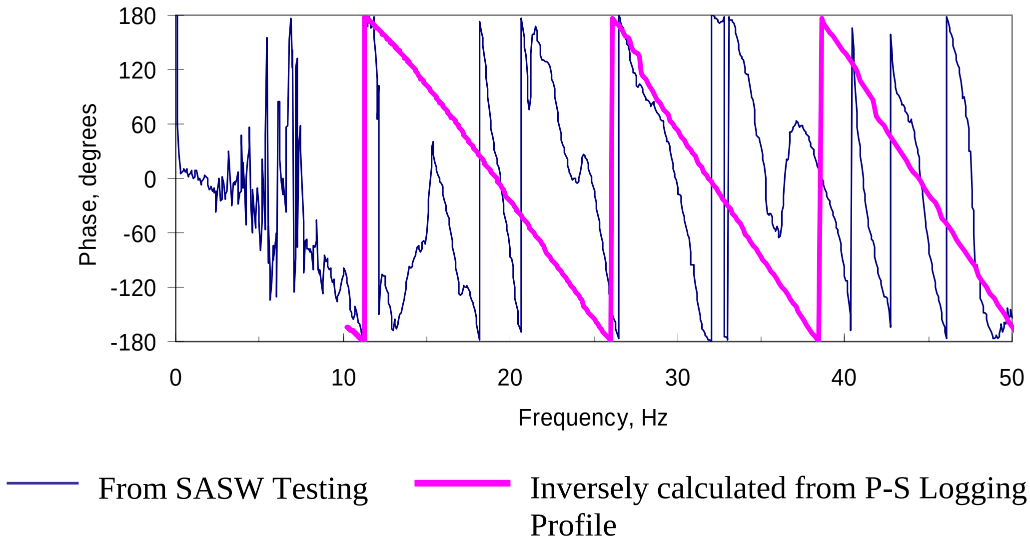


Figure 13.10 Phase Plots Measured by SASW Testing with 119-ft Receiver Spacing

Table 13.1 Table of Masking Parameters Used on Data Collected at Fon-Ton High School

Receiver Spacing	Masking Interval	Masking Start Frequency, Hz	Masking Stop Frequency, Hz	Number of Jumps
3 ft	1	0.0	111.5	1
	2	301.0	400.0	-
6 ft	1	0.0	54.0	1
	2	121.5	184.5	2
	3	315.0	400.0	-
12 ft	1	0.0	32.5	1
25 ft	1	0.0	22.1	1
50 ft	1	0.0	22.5	1
	2	49.1	50.0	-
75 ft	1	0.0	19.6	2
100 ft	1	0.0	14.6	1
	2	15.8	20.2	2
119 ft	1	0.0	11.4	1
	2	11.8	15.4	1
	3	31.7	50.0	-

Performed by______________________ Checked by______________________
Yin-Cheng Lin Brent L. Rosenblad

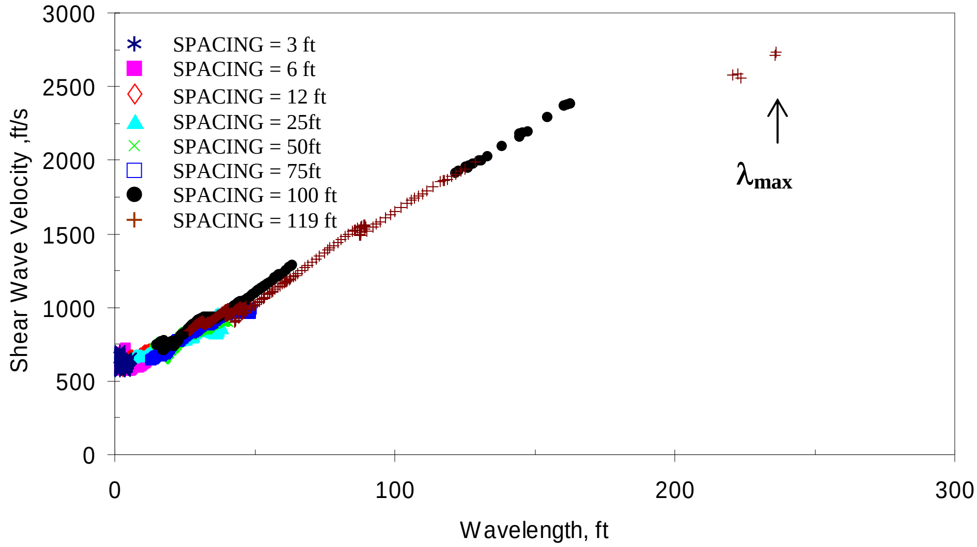


Figure 13.11 Experimental Dispersion Curve Measured at Fon-Ton High School; Linear Wavelength Axis

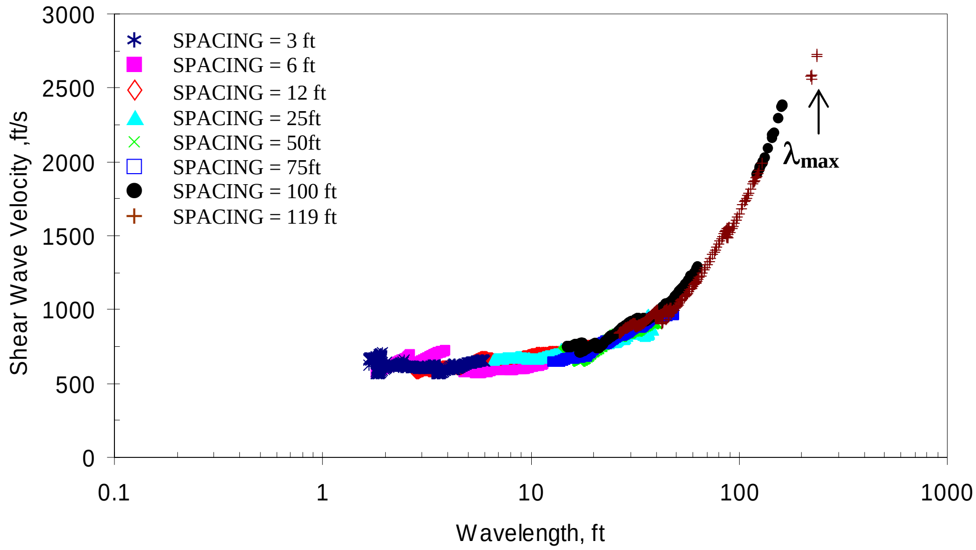


Figure 13.12 Experimental Dispersion Curve Measured at Fon-Ton High School; Logarithmic Wavelength Axis

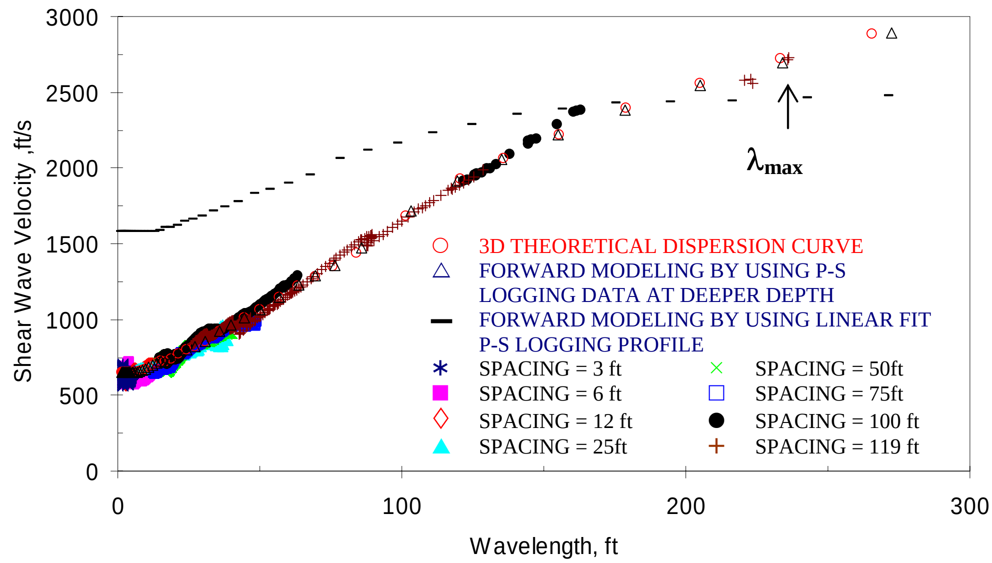


Figure 13.13 Experimental and Theoretical Dispersion Curves from Fon-Ton High School; Linear Wavelength Axis

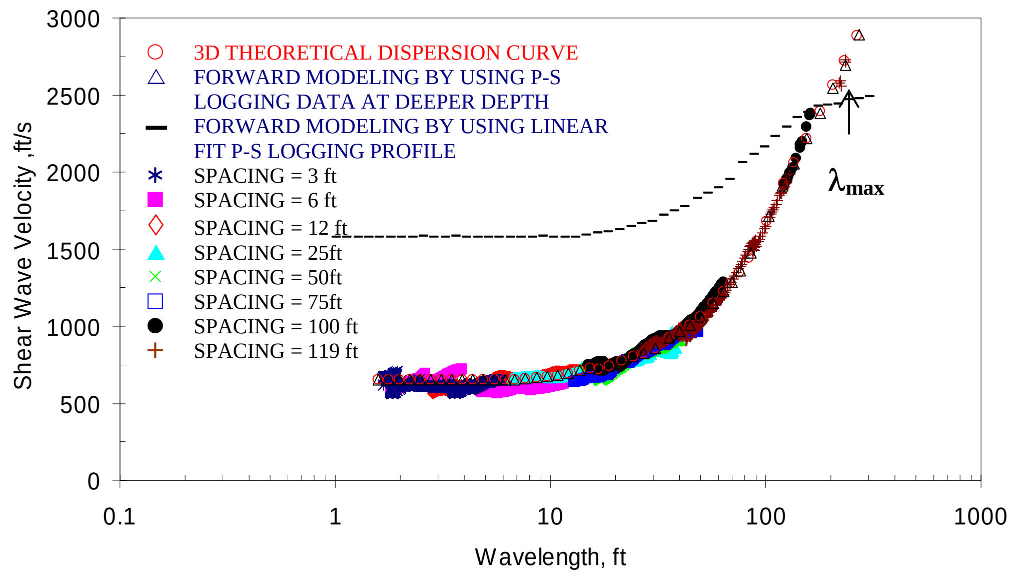


Figure 13.14 Experimental and Theoretical Dispersion Curves from Fon-Ton High School; Logarithmic Wavelength Axis

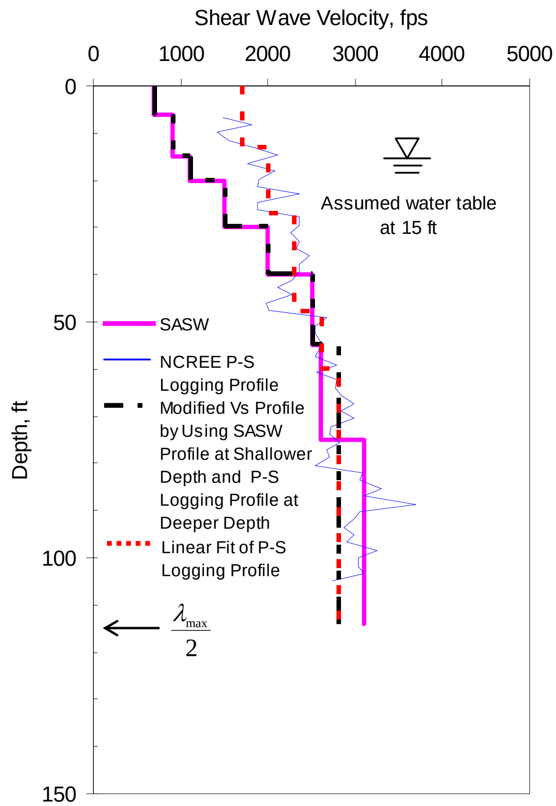


Figure 13.15 Shear Wave Velocity Profile Determined at Fon-Ton High School

Table 13.2 Profile Parameters Used to Develop Theoretical Dispersion Curve at Fon-Ton High School

Layer No.	Thickness, ft	Depth to the bottom, ft	P-Wave Velocity, ft/s	S-Wave Velocity, ft/s	Poisson's Ratio	Total Unit Weight, pcf
1	6.0	6	1212	700	0.25	120
2	9.0	15	1559	900	0.25	120
3	5.0	20	4800	1100	0.47	120
4	10.0	30	5000	1500	0.45	120
5	10.0	40	5000	2000	0.40	120
6	15.0	55	5000	2500	0.33	125
7	20.0	75	5000	2600	0.31	125
8	39.0	114	5000	3100	0.19	130

Performed by________________________ Checked by________________________
Yin-Cheng Lin Brent L. Rosenblad

Table 13.3 Uniform Building Code (UBC-97) Site Classification of Fon-Ton High School

Average Shear Wave Velocity of Top 30 meters (100 ft), $V_{s,30}$ (ft/s) [m/s]	Site Classification
1770 [539]	C

Performed by________________________ Checked by________________________
Yin-Cheng Lin Brent L. Rosenblad

Table 13.4 UBC-97 Site Categories

Soil Profile Type	Average Shear Wave Velocity of Top 30 m, $V_{s,30}$ (m/s) [Top100 ft, $V_{s,100}$ (ft/s)]	Description
S_A	$V_{s,30}$ >1500 m/s [$V_{s,100}$ >5000 ft/s]	Hard rock
S_B	760 m/s < $V_{s,30}$ ≤1500 m/s [2500 ft/s < $V_{s,100}$ ≤5000 ft/s]	Rock
S_C	360 m/s < $V_{s,30}$ ≤760 m/s [1200 ft/s < $V_{s,100}$ ≤2500 ft/s]	Very dense soil and soft rock
S_D	180 m/s ≤ $V_{s,30}$ ≤360 m/s [600 ft/s < $V_{s,100}$ ≤1200 ft/s]	Stiff Soil Profile
S_E	$V_{s,30}$ < 180 m/s [$V_{s,100}$ < 600 ft/s]	Soft Soil Profile
S_F	-	Soils requiring site-specific evaluation.

Appendix 14

Site Location: Nai-Pu Elementary School (TCU-103)

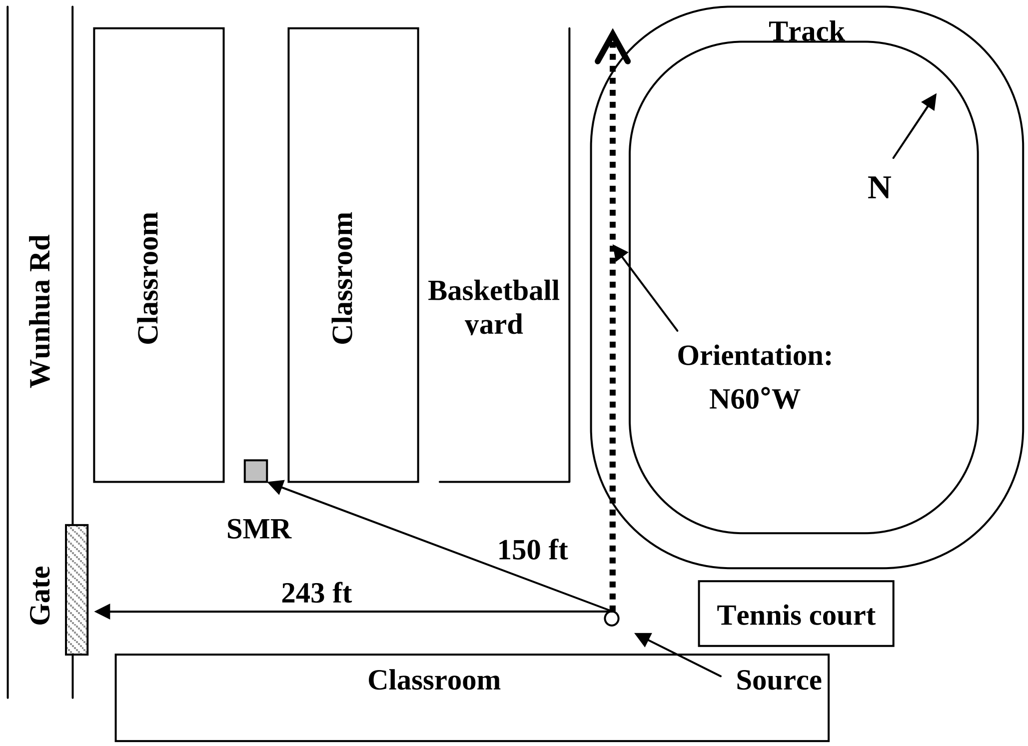


Figure 14.1 Site Map of Nai-Pu Elementary School

Figure 14.2 Picture Taken at Nai-Pu Elementary School (View # 1)

Figure 14.3 Picture Taken at Nai-Pu Elementary School (View # 2)

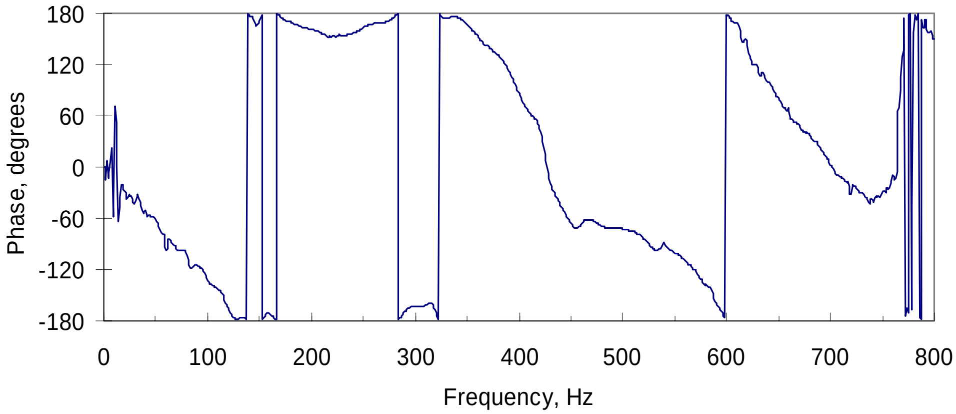


Figure 14.4 Phase Plots Measured by SASW Testing with 3-ft Receiver Spacing

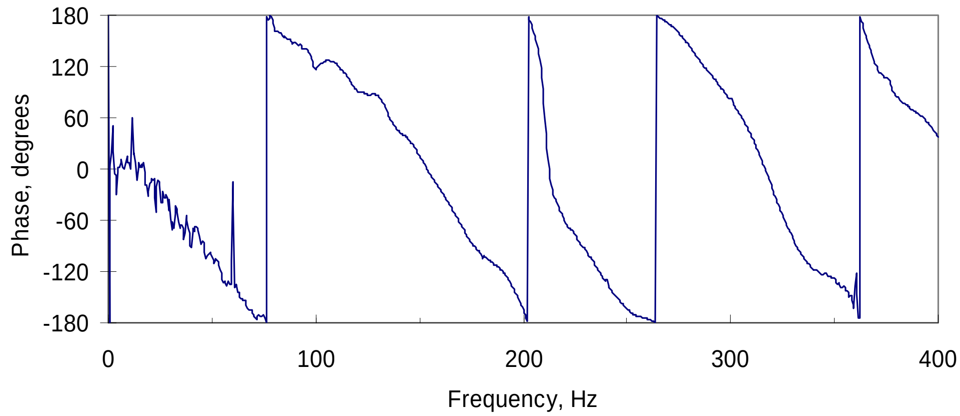


Figure 14.5 Phase Plots Measured by SASW Testing with 6-ft Receiver Spacing

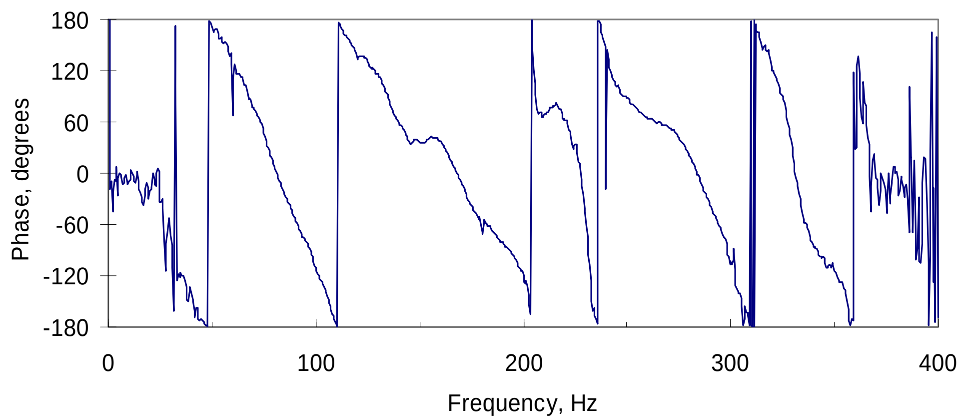


Figure 14.6 Phase Plots Measured by SASW Testing with 12-ft Receiver Spacing

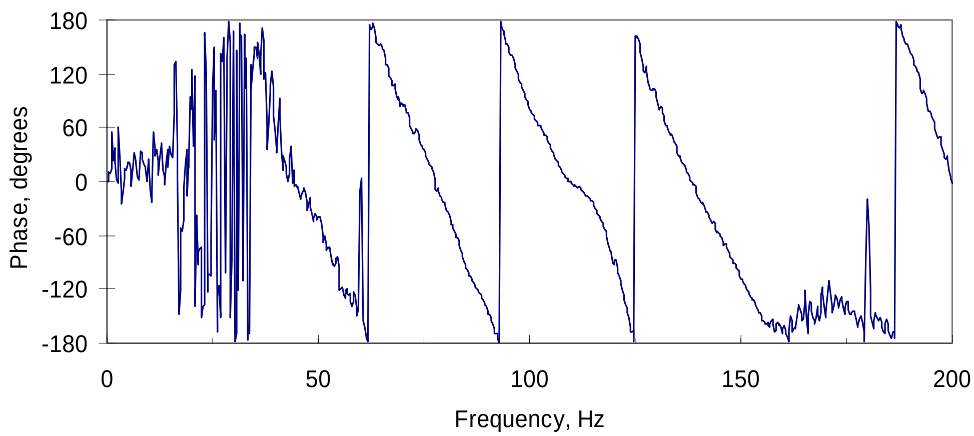


Figure 14.7 Phase Plots Measured by SASW Testing with 25-ft Receiver Spacing

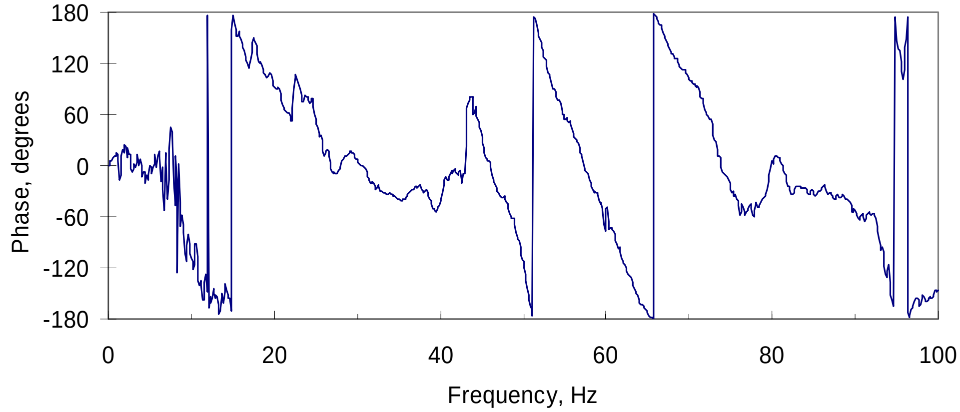


Figure 14.8 Phase Plots Measured by SASW Testing with 50-ft Receiver Spacing

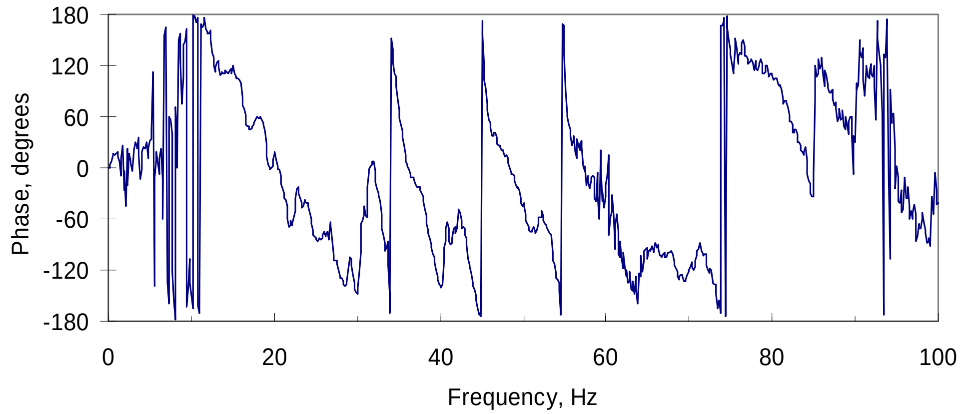


Figure 14.9 Phase Plots Measured by SASW Testing with 75-ft Receiver Spacing

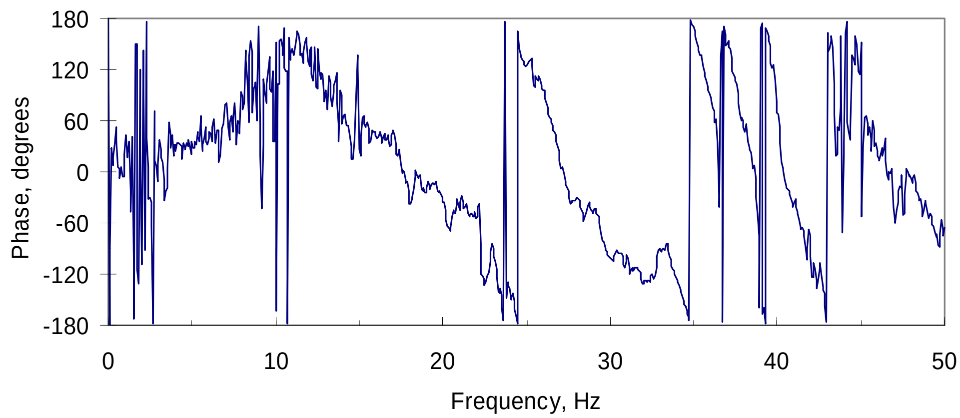


Figure 14.10 Phase Plots Measured by SASW Testing with 100-ft Receiver Spacing

Table 14.1 Table of Masking Parameters Used on Data Collected at Nai-Pu Elementary School

Receiver Spacing	Masking Interval	Masking Start Frequency, Hz	Masking Stop Frequency, Hz	Number of Jumps
3 ft	1	0.0	323.0	2
	2	729.0	800.0	-
6 ft	1	0.0	77.5	1
12 ft	1	0.0	48.5	1
	2	359.0	400.0	-
25 ft	1	0.0	35.3	1
	2	59.3	61.8	1
	3	157.5	187.5	6
50 ft	1	0.0	15.1	1
	2	27.6	43.8	2
	3	76.9	100.0	-
75 ft	1	0.0	11.4	1
	2	29.6	34.8	2
	3	37.8	43.3	2
	4	63.0	100.0	-
100 ft	1	0.0	11.4	1
	2	14.1	15.8	1
	3	19.9	23.9	1
	4	36.2	40.8	3
	5	43.0	50.0	-

Performed by________________________ Checked by________________________
Yin-Cheng Lin Brent L. Rosenblad

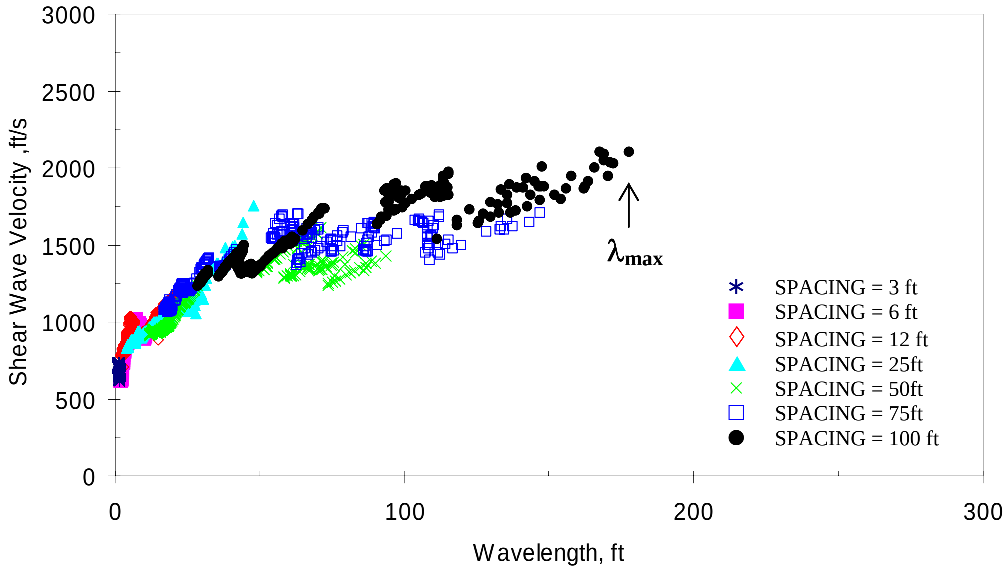


Figure 14.11 Experimental Dispersion Curve Measured at Nai-Pu Elementary School; Linear Wavelength Axis

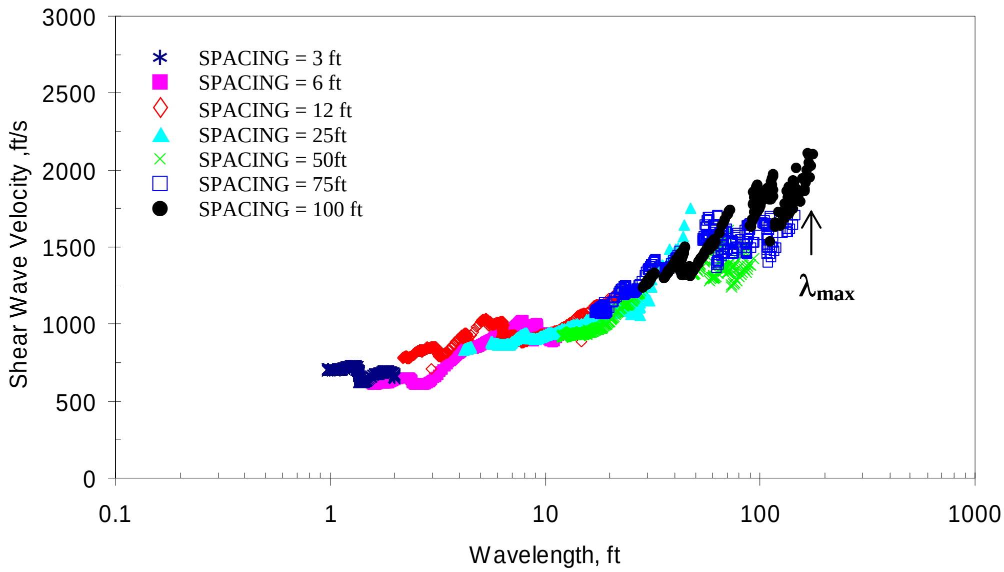


Figure 14.12 Experimental Dispersion Curve Measured at Nai-Pu Elementary School; Logarithmic Wavelength Axis

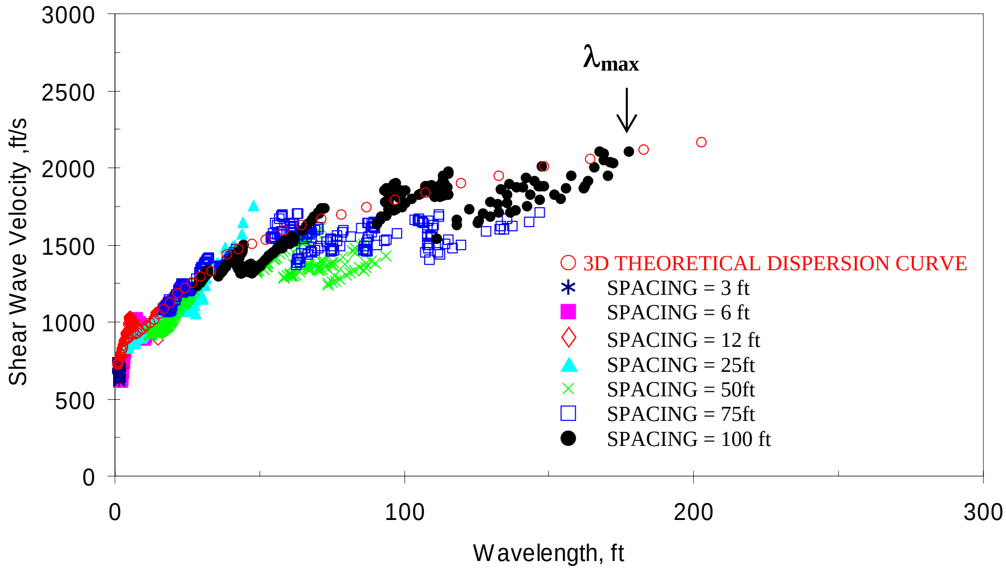


Figure 14.13 Experimental and Theoretical Dispersion Curves from Nai-Pu Elementary School; Linear Wavelength Axis

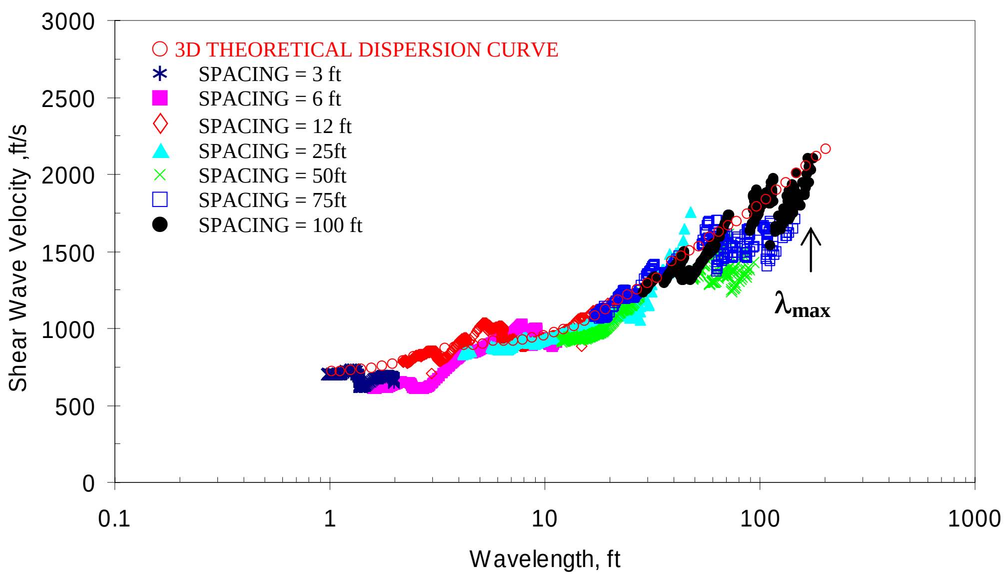


Figure 14.14 Experimental and Theoretical Dispersion Curves from Nai-Pu Elementary School; Logarithmic Wavelength Axis

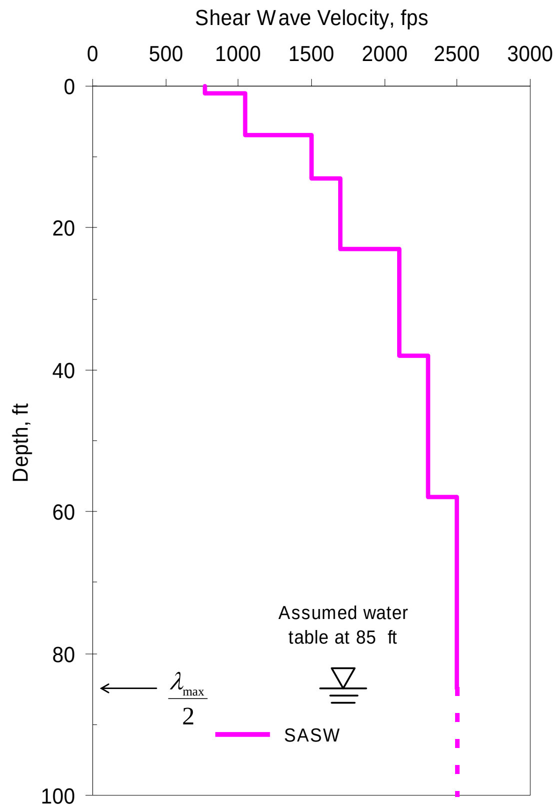


Figure 14.15 Shear Wave Velocity Profile Determined at Nai-Pu Elementary School

Table 14.2 Profile Parameters Used to Develop Theoretical Dispersion Curve at Nai-Pu Elementary School

Layer No.	Thickness, ft	Depth to the bottom, ft	P-Wave Velocity, ft/s	S-Wave Velocity, ft/s	Poisson's Ratio	Total Unit Weight, pcf
1	1.0	1	1334	770	0.25	120
2	6.0	7	1819	1050	0.25	120
3	6.0	13	2598	1500	0.25	120
4	10.0	23	2945	1700	0.25	120
5	15.0	38	3637	2100	0.25	125
6	20.0	58	3984	2300	0.25	125
7	27.0	85	4330	2500	0.25	125

Performed by____________________ Checked by____________________
Yin-Cheng Lin Brent L. Rosenblad

Table 14.3 Uniform Building Code (UBC-97) Site Classification of Nai-Pu Elementary School

Average Shear Wave Velocity of Top 30 meters (100 ft), $V_{s,30}$ (ft/s) [m/s]	Site Classification
2060 [628]	C

Performed by________________________ Checked by________________________
Yin-Cheng Lin Brent L. Rosenblad

Table 14.4 UBC-97 Site Categories

Soil Profile Type	Average Shear Wave Velocity of Top 30 m, $V_{s,30}$ (m/s) [Top100 ft, $V_{s,100}$ (ft/s)]	Description
S_A	$V_{s,30}$>1500 m/s [$V_{s,100}$>5000 ft/s]	Hard rock
S_B	760 m/s < $V_{s,30}$≤1500 m/s [2500 ft/s < $V_{s,100}$≤5000 ft/s]	Rock
S_C	360 m/s < $V_{s,30}$≤760 m/s [1200 ft/s < $V_{s,100}$≤2500 ft/s]	Very dense soil and soft rock
S_D	180 m/s ≤ $V_{s,30}$≤360 m/s [600 ft/s < $V_{s,100}$≤1200 ft/s]	Stiff Soil Profile
S_E	$V_{s,30}$< 180 m/s [$V_{s,100}$ < 600 ft/s]	Soft Soil Profile
S_F	-	Soils requiring site-specific evaluation.

Appendix 15

Site Location: Yuan-Lin Elementary School (TCU-110)

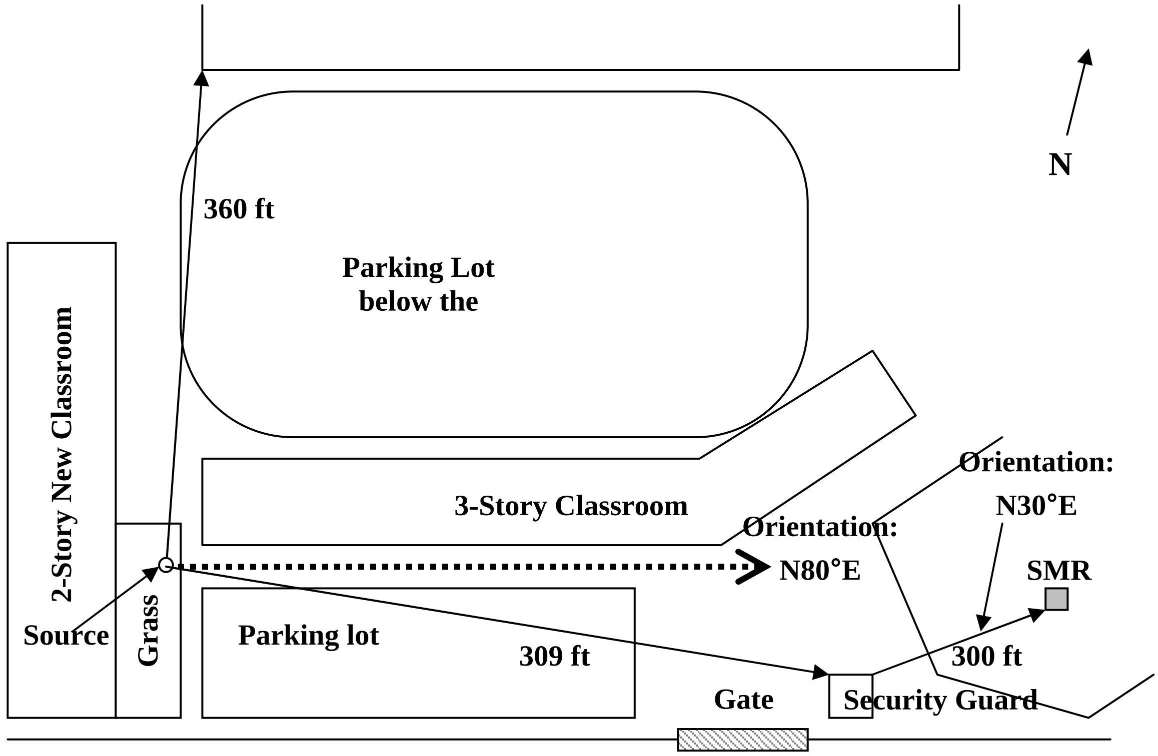


Figure 15.1 Site Map of Yuan-Lin Elementary School

Figure 15.2 Picture Taken at Yuan-Lin Elementary School (View # 1)

Figure 15.3 Picture Taken at Yuan-Lin Elementary School (View # 2)

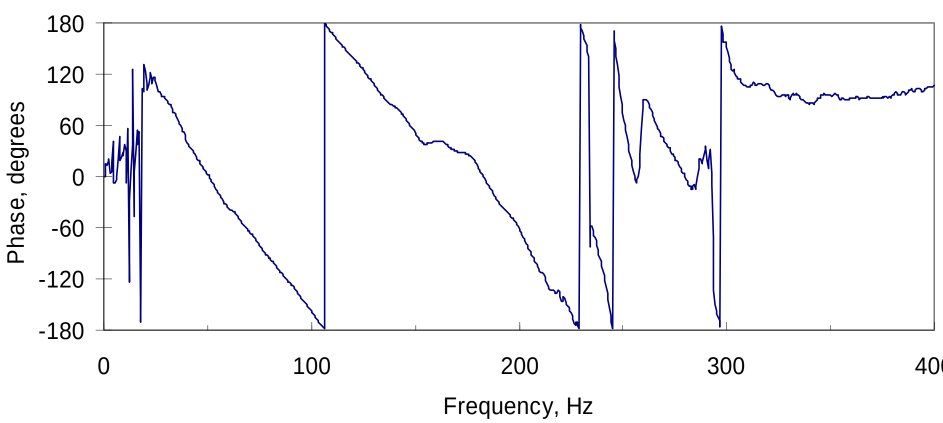


Figure 15.4 Phase Plots Measured by SASW Testing with 3-ft Receiver Spacing

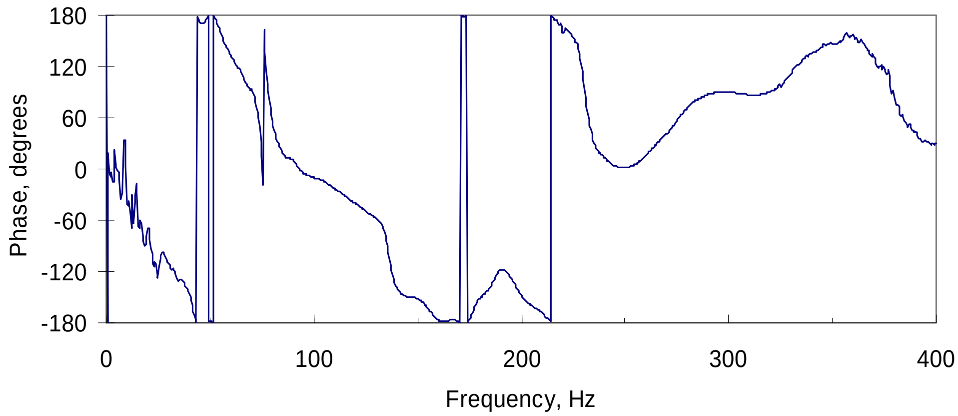


Figure 15.5 Phase Plots Measured by SASW Testing with 6-ft Receiver Spacing

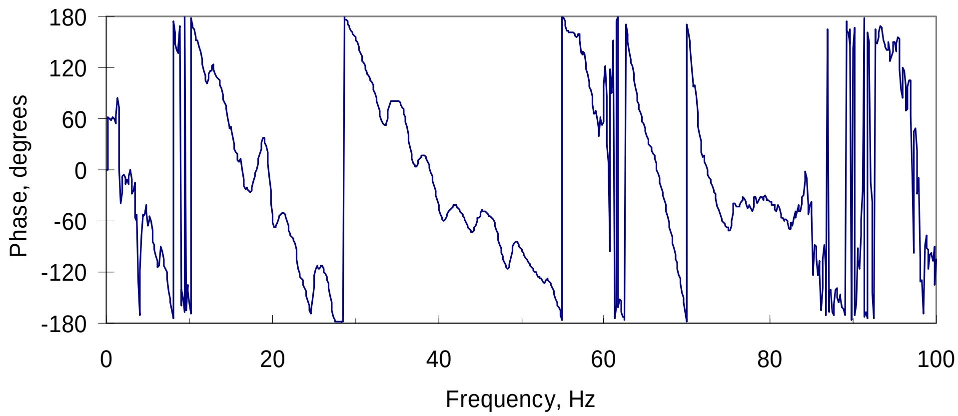


Figure 15.6 Phase Plots Measured by SASW Testing with 25-ft Receiver Spacing

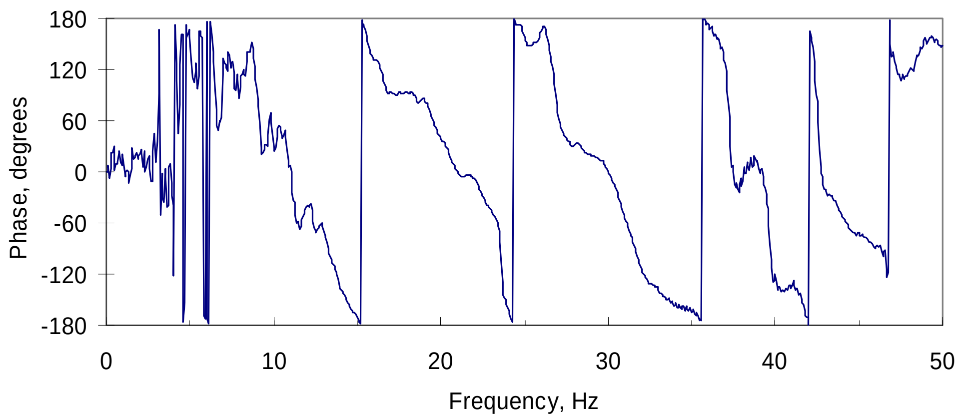


Figure 15.7 Phase Plots Measured by SASW Testing with 50-ft Receiver Spacing

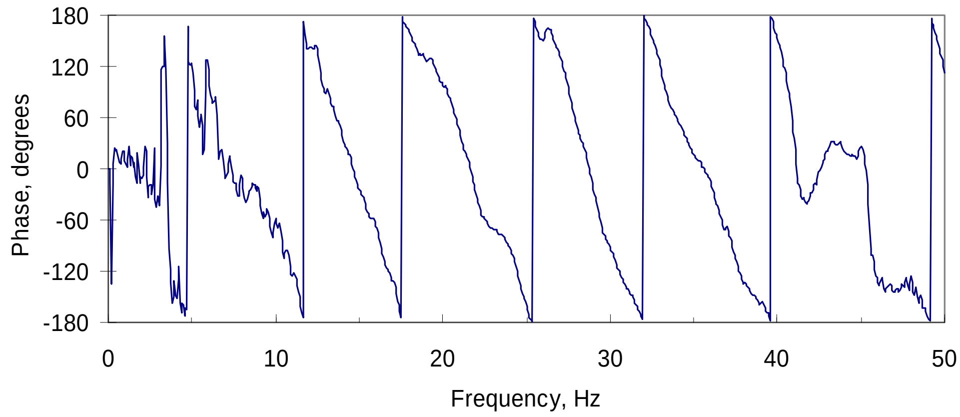


Figure 15.8 Phase Plots Measured by SASW Testing with 75-ft Receiver Spacing

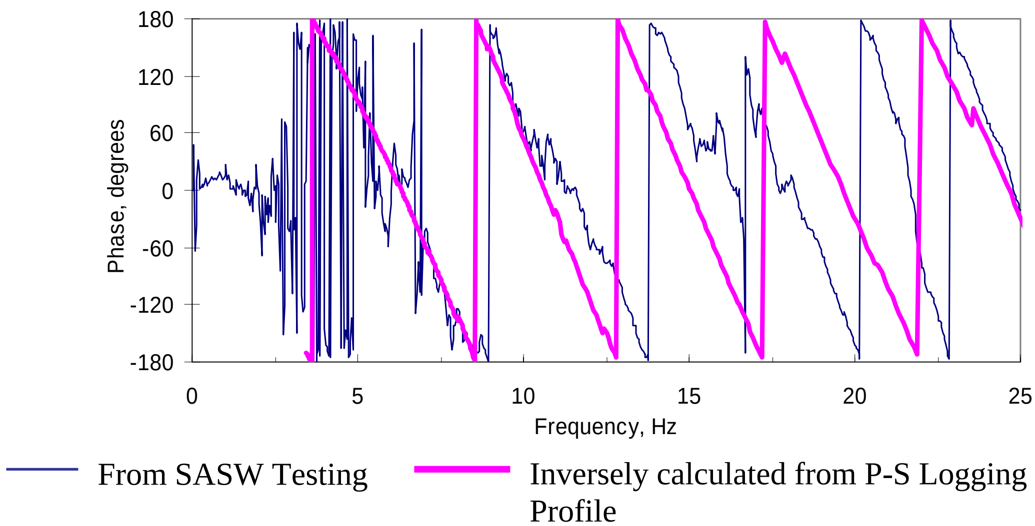


Figure 15.9 Phase Plots Measured by SASW Testing with 100-ft Receiver Spacing

Table 15.1 Table of Masking Parameters Used on Data Collected at Yuan-Lin Elementary School

Receiver Spacing	Masking Interval	Masking Start Frequency, Hz	Masking Stop Frequency, Hz	Number of Jumps
3 ft	1	0.0	109.0	1
	2	229.5	400.0	-
6 ft	1	0.0	52.0	1
	2	69.5	82.5	1
	3	169.5	400.0	-
25 ft	1	0.0	10.4	1
	2	54.9	100.0	-
50 ft	1	0.0	7.1	1
	2	7.9	10.1	1
	3	35.4	50.0	-
75 ft	1	0.0	8.6	1
	2	39.6	50.0	-
100 ft	1	0.0	4.3	1
	2	4.3	5.0	1
	3	5.2	6.1	1
	4	6.6	7.2	1
	5	15.2	25.0	-

Performed by______________________ Checked by______________________
Yin-Cheng Lin Brent L. Rosenblad

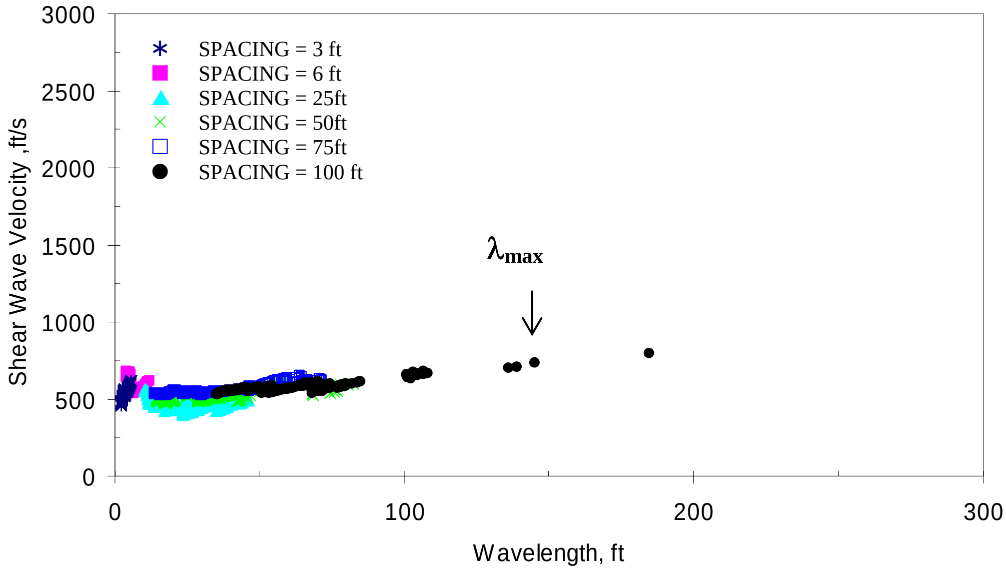


Figure 15.10 Experimental Dispersion Curve Measured at Yuan-Lin Elementary School; Linear Wavelength Axis

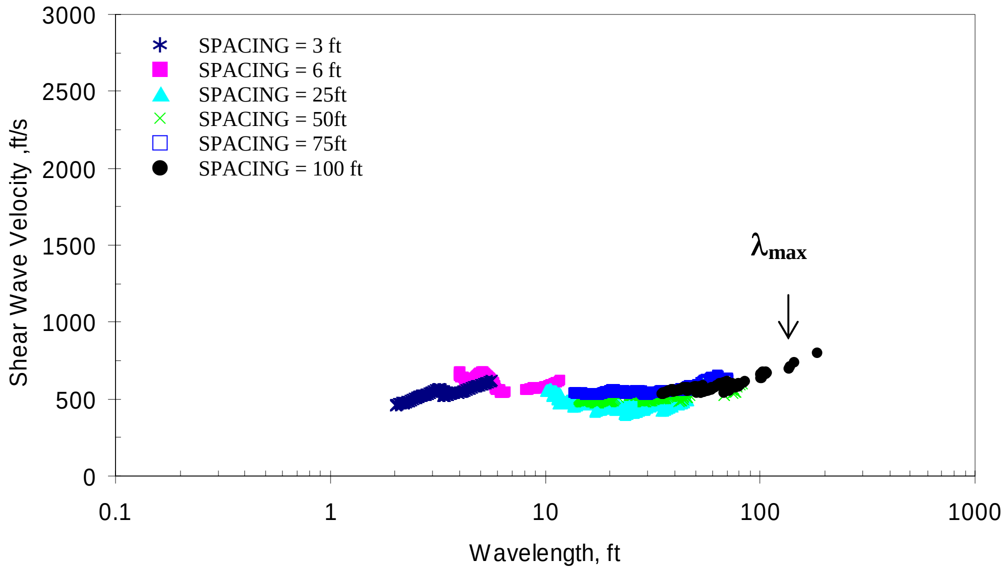


Figure 15.11 Experimental Dispersion Curve Measured at Yuan-Lin Elementary School; Logarithmic Wavelength Axis

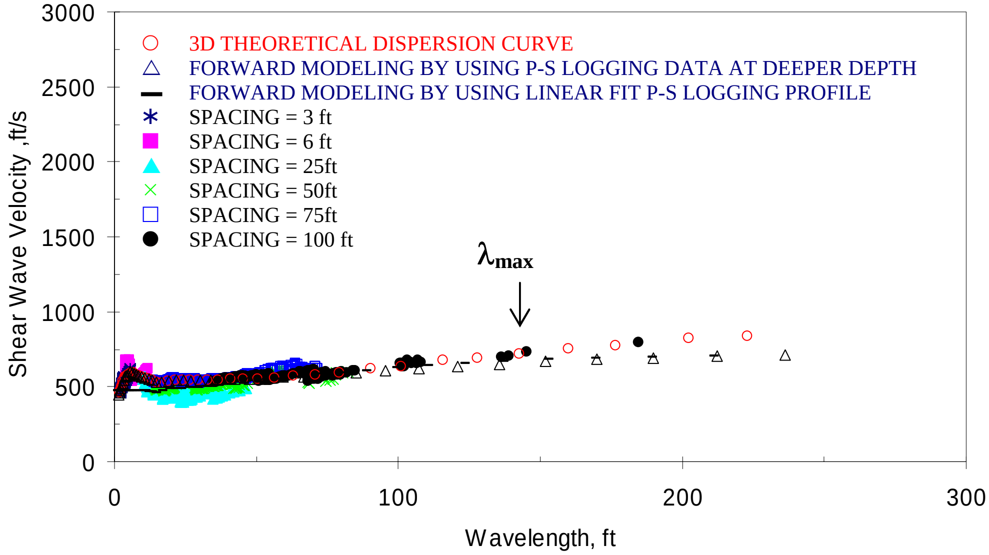


Figure 15.12 Experimental and Theoretical Dispersion Curves from Yuan-Lin Elementary School; Linear Wavelength Axis

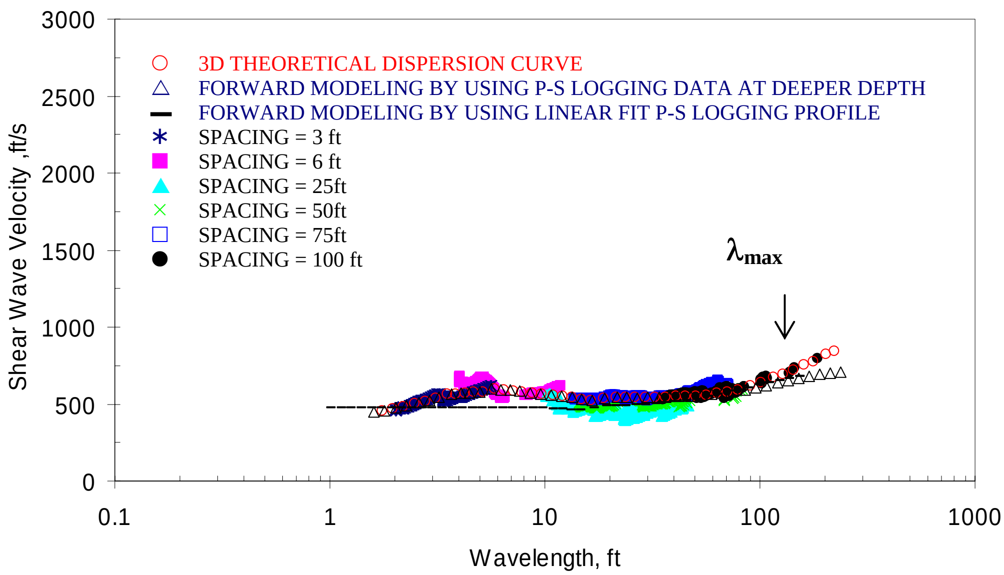
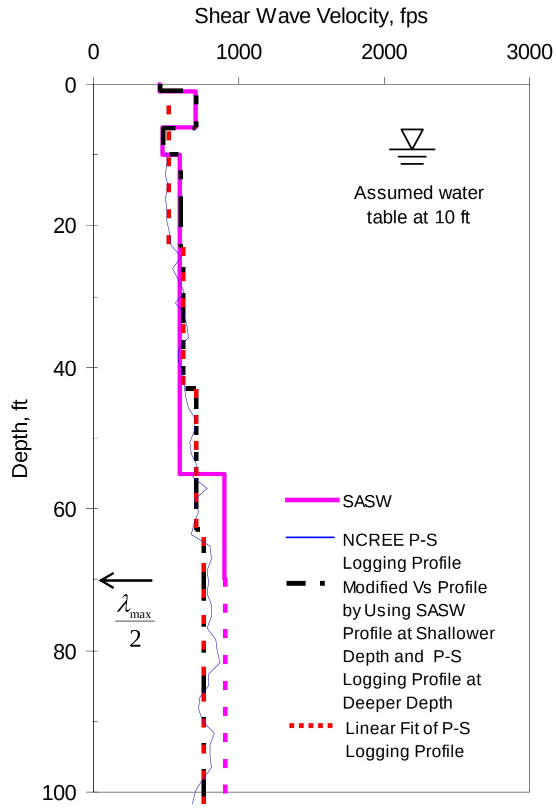


Figure 15.13 Experimental and Theoretical Dispersion Curves from Yuan-Lin Elementary School; Logarithmic Wavelength Axis



Note: The elevation of P-S Logger is 3 ft lower than the SASW testing array, so the shear wave velocity profile of P-S Logger is shifted Down 3 ft.

Figure 15.14 Shear Wave Velocity Profile Determined at Yuan-Lin Elementary School

Table 15.2 Profile Parameters Used to Develop Theoretical Dispersion Curve at Yuan-Lin Elementary School

Layer No.	Thickness, ft	Depth to the bottom, ft	P-Wave Velocity, ft/s	S-Wave Velocity, ft/s	Poisson's Ratio	Total Unit Weight, pcf
1	1.0	1	797	460	0.25	120
2	5.0	6	1212	700	0.25	120
3	4.0	10	831	480	0.25	120
4	45.0	55	4800	590	0.49	120
5	15.0	70	5000	900	0.48	120

Performed by________________ Checked by________________

Yin-Cheng Lin Brent L. Rosenblad

Table 15.3 Uniform Building Code (UBC-97) Site Classification of Yuan-Lin Elementary School

Average Shear Wave Velocity of Top 30 meters (100 ft), $V_{s,30}$ (ft/s) [m/s]	Site Classification
700 [213]	D

Performed by________________________ Checked by_______________________
Yin-Cheng Lin Brent L. Rosenblad

Table 15.4 UBC-97 Site Categories

Soil Profile Type	Average Shear Wave Velocity of Top 30 m, $V_{s,30}$ (m/s) [Top100 ft, $V_{s,100}$ (ft/s)]	Description
S_A	$V_{s,30}$>1500 m/s [$V_{s,100}$>5000 ft/s]	Hard rock
S_B	760 m/s < $V_{s,30}$≤1500 m/s [2500 ft/s < $V_{s,100}$≤5000 ft/s]	Rock
S_C	360 m/s < $V_{s,30}$≤760 m/s [1200 ft/s < $V_{s,100}$≤2500 ft/s]	Very dense soil and soft rock
S_D	180 m/s ≤ $V_{s,30}$≤360 m/s [600 ft/s < $V_{s,100}$≤1200 ft/s]	Stiff Soil Profile
S_E	$V_{s,30}$< 180 m/s [$V_{s,100}$ < 600 ft/s]	Soft Soil Profile
S_F	-	Soils requiring site-specific evaluation.

Appendix 16

Site Location: Sin-Hua Elementary School (TCU-113)

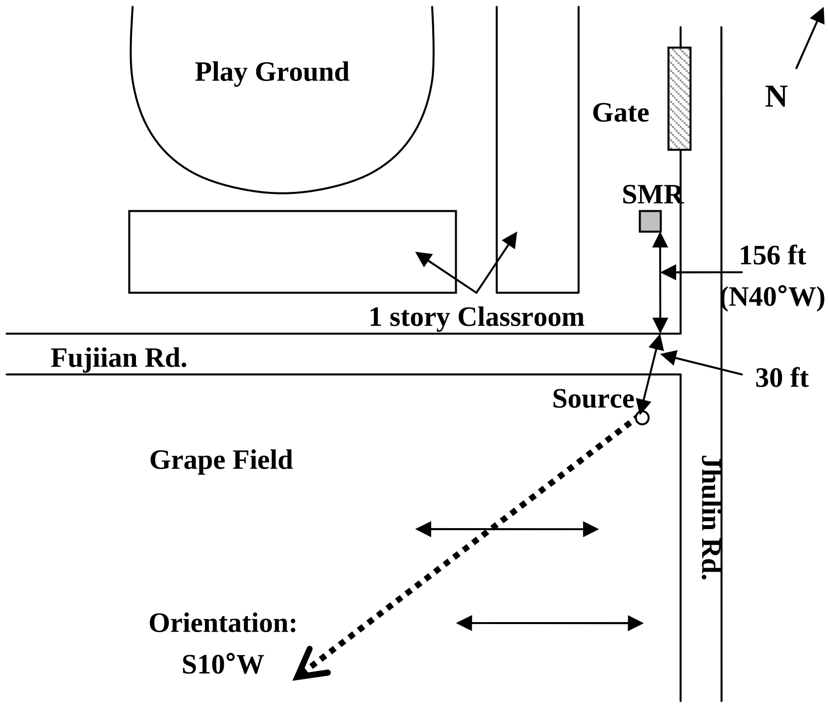


Figure 16.1 Site Map of Sin-Hua Elementary School

Figure 16.2 Picture Taken at Sin-Hua Elementary School (View # 1)

Figure 16.3 Picture Taken at Sin-Hua Elementary School (View # 2)

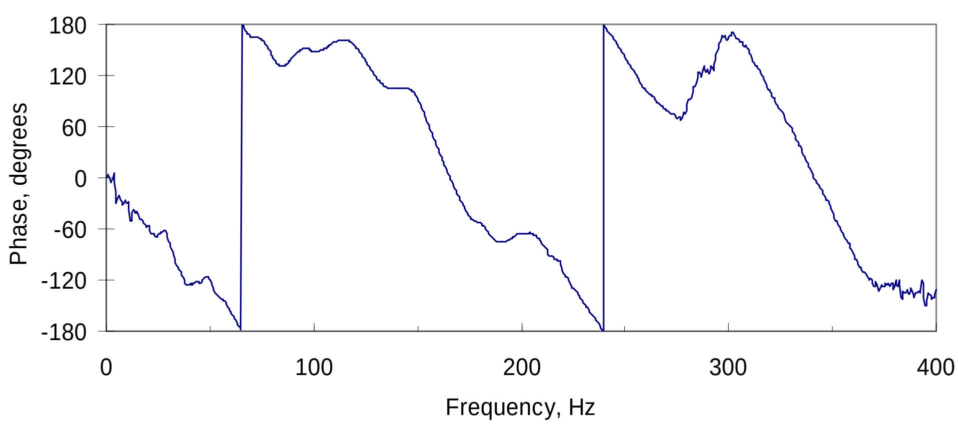


Figure 16.4 Phase Plots Measured by SASW Testing with 3-ft Receiver Spacing

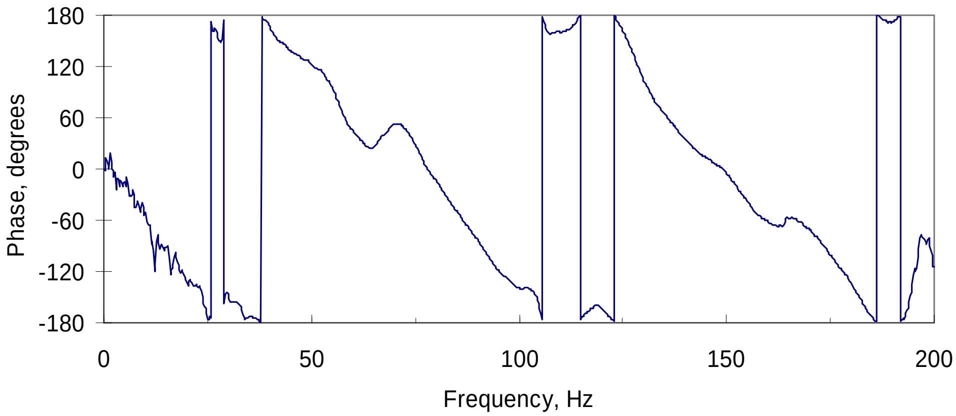


Figure 16.5 Phase Plots Measured by SASW Testing with 6-ft Receiver Spacing

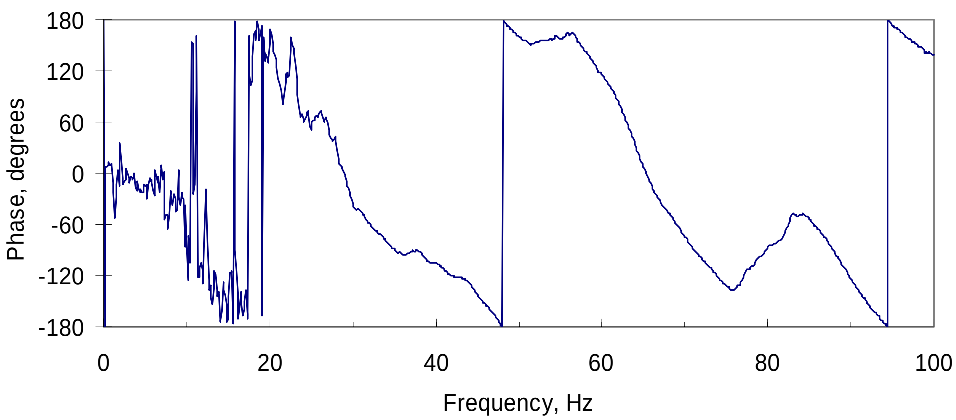


Figure 16.6 Phase Plots Measured by SASW Testing with 12-ft Receiver Spacing

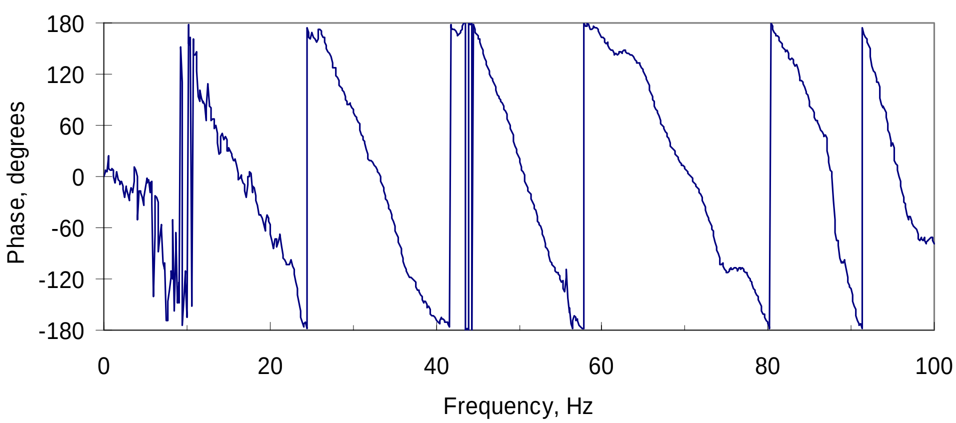


Figure 16.7 Phase Plots Measured by SASW Testing with 25-ft Receiver Spacing

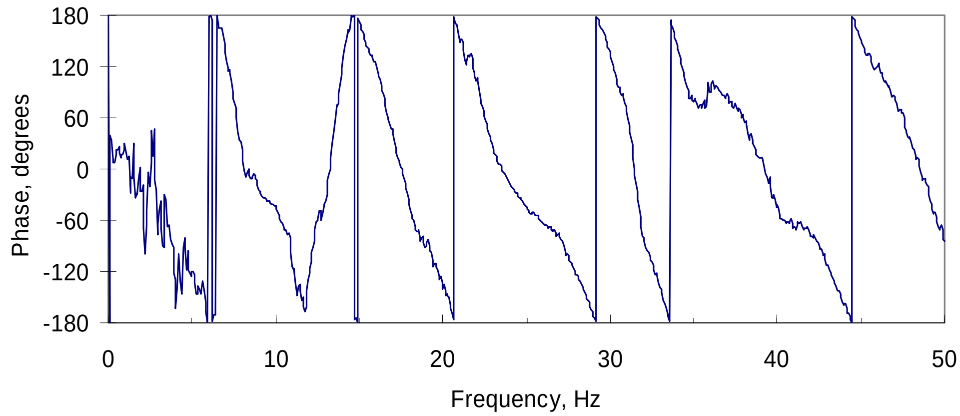


Figure 16.8 Phase Plots Measured by SASW Testing with 50-ft Receiver Spacing

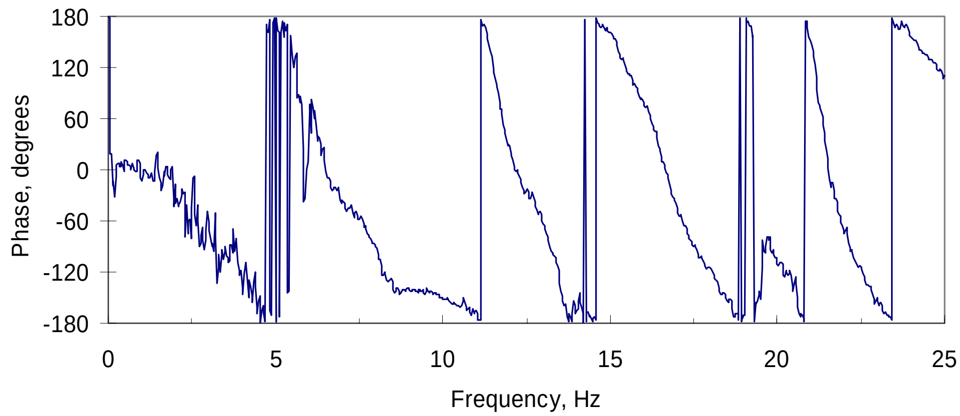


Figure 16.9 Phase Plots Measured by SASW Testing with 75-ft Receiver Spacing

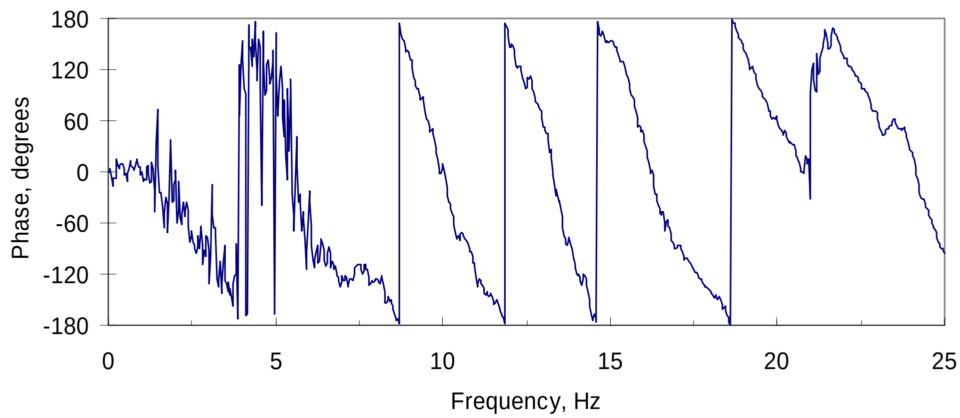


Figure 16.10 Phase Plots Measured by SASW Testing with 100-ft Receiver Spacing

Table 16.1 Table of Masking Parameters Used on Data Collected at Sin-Hua Elementary School

Receiver Spacing	Masking Interval	Masking Start Frequency, Hz	Masking Stop Frequency, Hz	Number of Jumps
3 ft	1	0.0	66.0	1
	2	85.0	205.0	1
	3	274.0	369.0	2
6 ft	1	0.0	38.3	1
	2	104.8	123.0	2
	3	185.5	200.0	-
12 ft	1	0.0	26.3	1
25 ft	1	0.0	10.1	1
	2	10.4	11.0	1
	3	41.6	44.5	3
	4	54.9	100.0	-
50 ft	1	0.0	6.6	1
	2	10.7	15.0	2
75 ft	1	0.0	5.2	1
	2	5.3	6.3	1
	3	13.4	14.6	3
	4	18.8	23.4	5
100 ft	1	0.0	7.5	1
	2	20.8	25.0	-

Performed by________________________ Checked by_______________________
Yin-Cheng Lin Brent L. Rosenblad

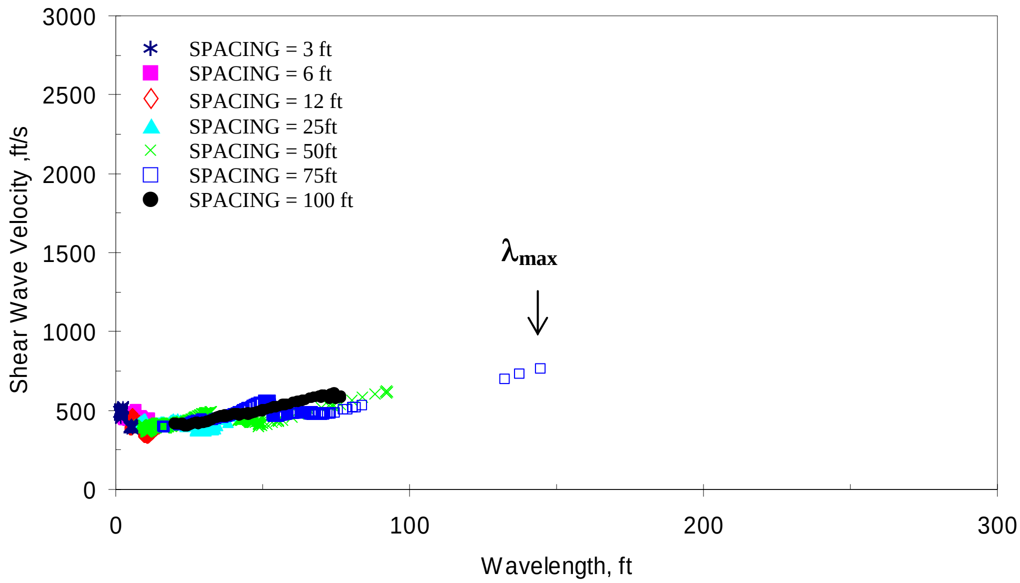


Figure 16.11 Experimental Dispersion Curve Measured at Sin-Hua Elementary School; Linear Wavelength Axis

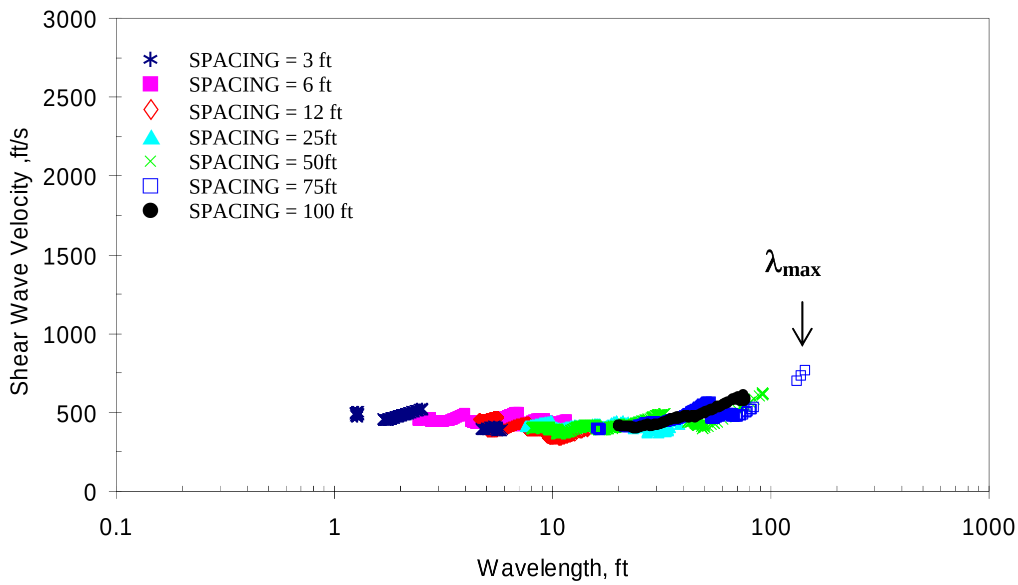


Figure 16.12 Experimental Dispersion Curve Measured at Sin-Hua Elementary School; Logarithmic Wavelength Axis

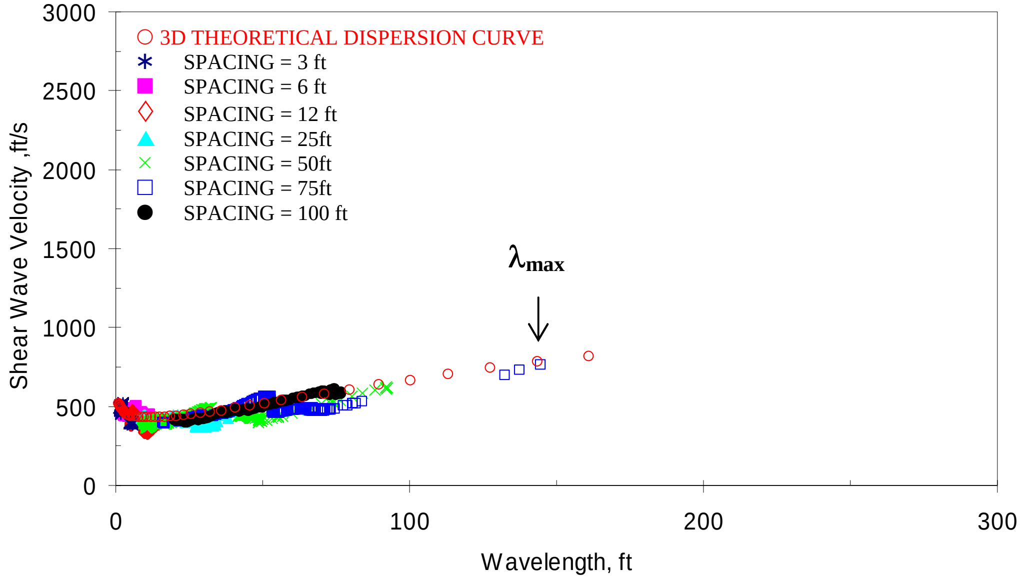


Figure 16.13 Experimental and Theoretical Dispersion Curves from Sin-Hua Elementary School; Linear Wavelength Axis

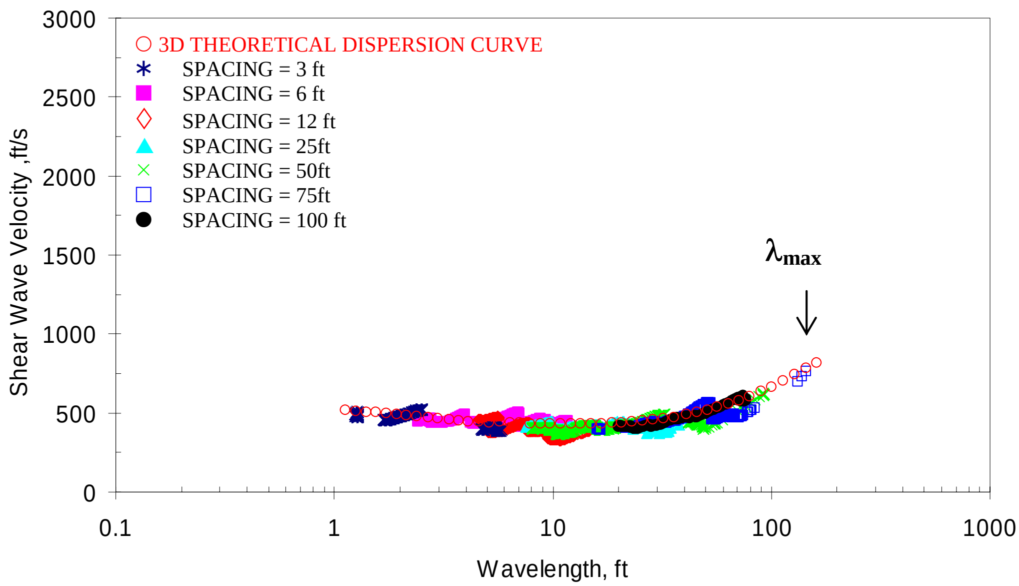


Figure 16.14 Experimental and Theoretical Dispersion Curves from Sin-Hua Elementary School; Logarithmic Wavelength Axis

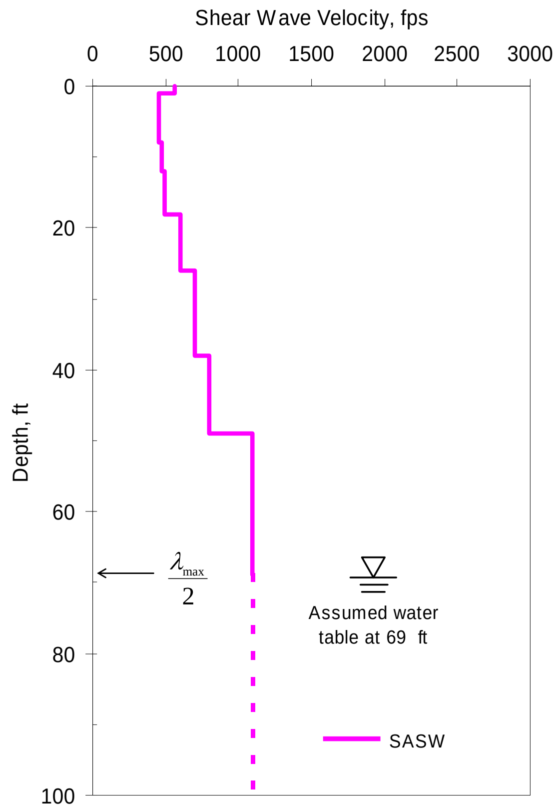


Figure 16.15 Shear Wave Velocity Profile Determined at Sin-Hua Elementary School

Table 16.2 Profile Parameters Used to Develop Theoretical Dispersion Curve at Sin-Hua Elementary School

Layer No.	Thickness, ft	Depth to the bottom, ft	P-Wave Velocity, ft/s	S-Wave Velocity, ft/s	Poisson's Ratio	Total Unit Weight, pcf
1	1.0	1	970	560	0.25	120
2	7.0	8	779	450	0.25	120
3	4.0	12	814	470	0.25	120
4	6.0	18	849	490	0.25	120
5	8.0	26	1039	600	0.25	120
6	12.0	38	1212	700	0.25	120
7	11.0	49	1386	800	0.25	120
8	20.0	69	1905	1100	0.25	120

Performed by________________________ Checked by________________________
Yin-Cheng Lin Brent L. Rosenblad

Table 16.3 Uniform Building Code (UBC-97) Site Classification of Sin-Hua Elementary School

Average Shear Wave Velocity of Top 30 meters (100 ft), $V_{s,30}$ (ft/s) [m/s]	Site Classification
780 [238]	D

Performed by________________________ Checked by________________________
Yin-Cheng Lin Brent L. Rosenblad

Table 16.4 UBC-97 Site Categories

Soil Profile Type	Average Shear Wave Velocity of Top 30 m, $V_{s,30}$ (m/s) [Top100 ft, $V_{s,100}$ (ft/s)]	Description
S_A	$V_{s,30}$ >1500 m/s [$V_{s,100}$ >5000 ft/s]	Hard rock
S_B	760 m/s < $V_{s,30}$ ≤1500 m/s [2500 ft/s < $V_{s,100}$ ≤5000 ft/s]	Rock
S_C	360 m/s < $V_{s,30}$ ≤760 m/s [1200 ft/s < $V_{s,100}$ ≤2500 ft/s]	Very dense soil and soft rock
S_D	180 m/s ≤ $V_{s,30}$ ≤360 m/s [600 ft/s < $V_{s,100}$ ≤1200 ft/s]	Stiff Soil Profile
S_E	$V_{s,30}$ < 180 m/s [$V_{s,100}$ < 600 ft/s]	Soft Soil Profile
S_F	-	Soils requiring site-specific evaluation.

Appendix 17

Site Location: Si-Hu Elementary School (TCU-115)

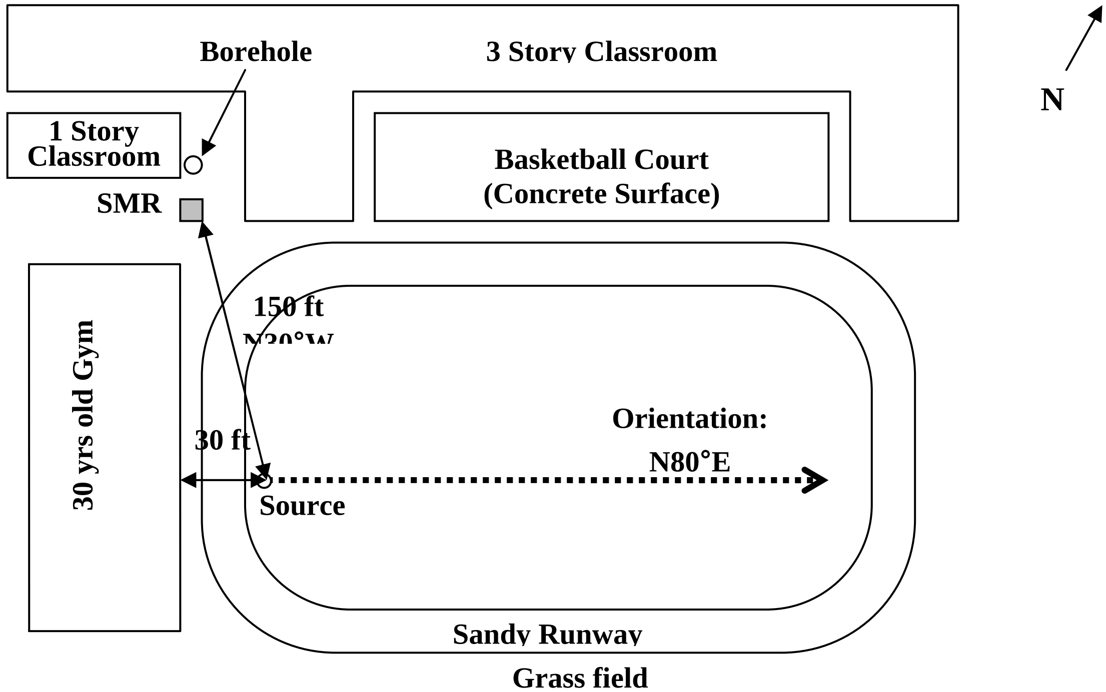


Figure 17.1 Site Map of Si-Hu Elementary School

Figure 17.2 Picture Taken at Si-Hu Elementary School (View # 1)

Figure 17.3 Picture Taken at Si-Hu Elementary School (View # 2)

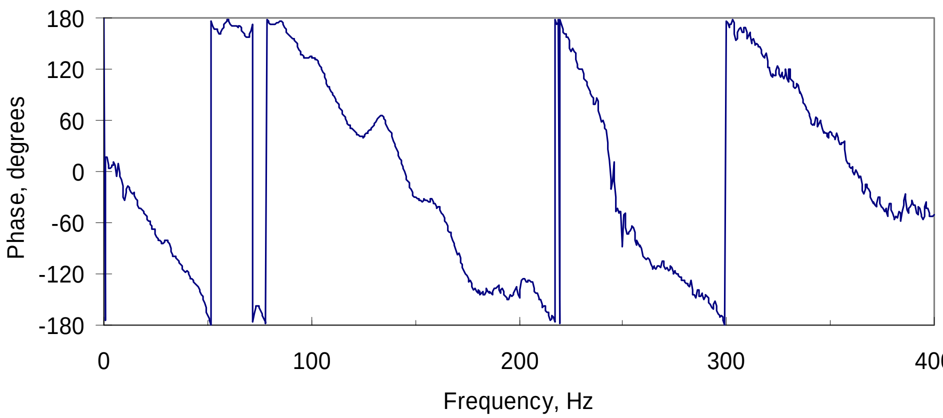


Figure 17.4 Phase Plots Measured by SASW Testing with 3-ft Receiver Spacing

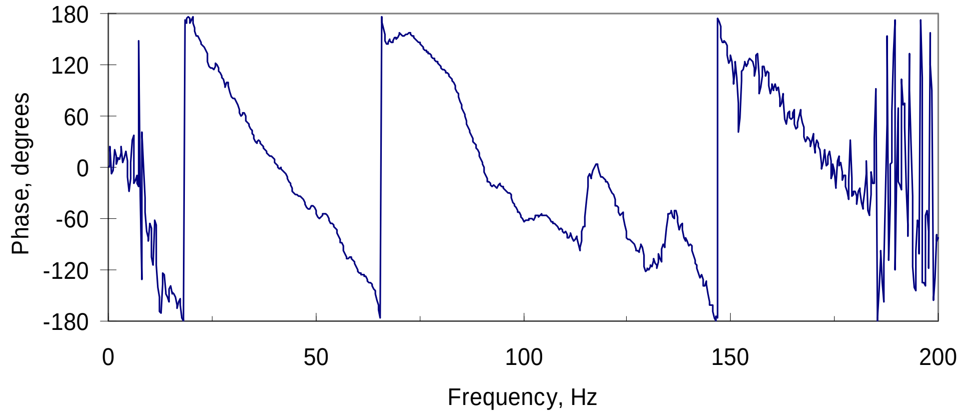


Figure 17.5 Phase Plots Measured by SASW Testing with 12-ft Receiver Spacing

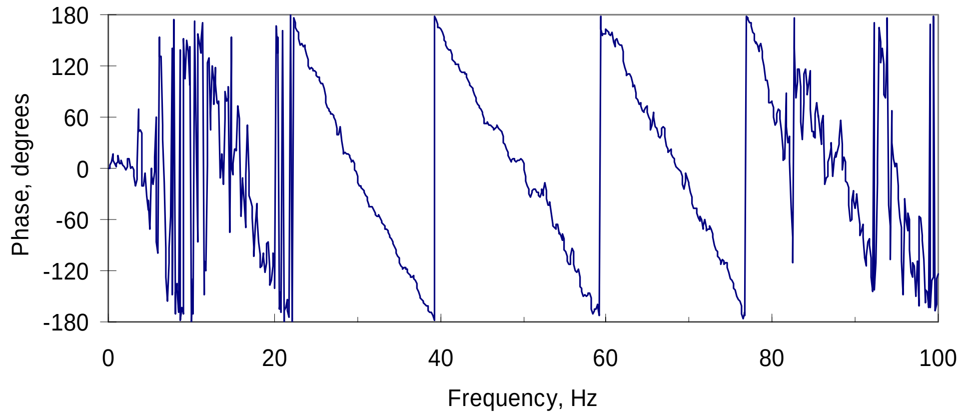


Figure 17.6 Phase Plots Measured by SASW Testing with 25-ft Receiver Spacing

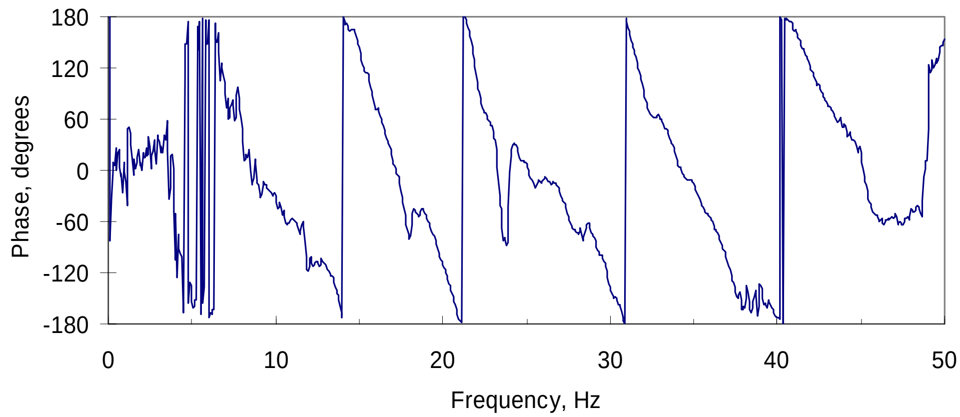


Figure 17.7 Phase Plots Measured by SASW Testing with 50-ft Receiver Spacing

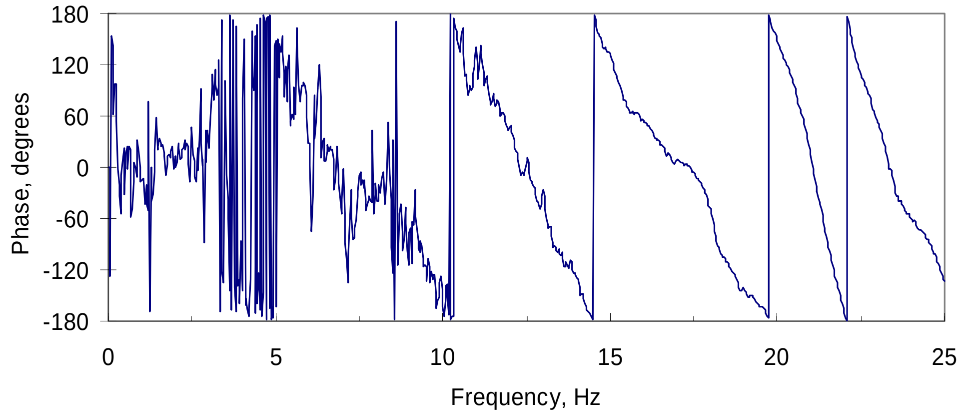


Figure 17.8 Phase Plots Measured by SASW Testing with 75-ft Receiver Spacing

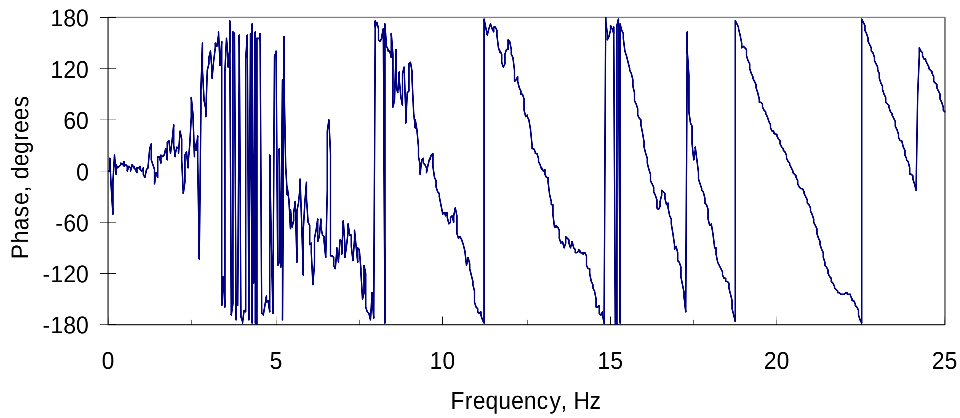


Figure 17.9 Phase Plots Measured by SASW Testing with 100-ft Receiver Spacing

Table 17.1 Table of Masking Parameters Used on Data Collected at Si-Hu Elementary School

Receiver Spacing	Masking Interval	Masking Start Frequency, Hz	Masking Stop Frequency, Hz	Number of Jumps
3 ft	1	0.0	11.5	0
	2	51.5	80.5	1
	3	215.5	220.0	2
12 ft	1	0.0	19.0	1
	2	90.8	137.0	3
	3	181.8	200.0	-
25 ft	1	0.0	9.9	1
	2	45.5	100.0	-
50 ft	1	0.0	6.4	1
	2	22.9	24.3	3
	3	37.8	40.6	5
	4	43.8	50.0	-
75 ft	1	0.0	5.2	1
	2	5.4	5.8	1
	3	5.9	6.6	1
	4	6.7	7.5	1
	5	7.7	9.3	1
	6	9.8	11.3	2
100 ft	1	0.0	4.5	1
	2	4.6	5.0	1
	3	5.0	7.2	1
	4	8.1	9.2	2
	5	14.8	15.4	4

Performed by________________________ Checked by________________________

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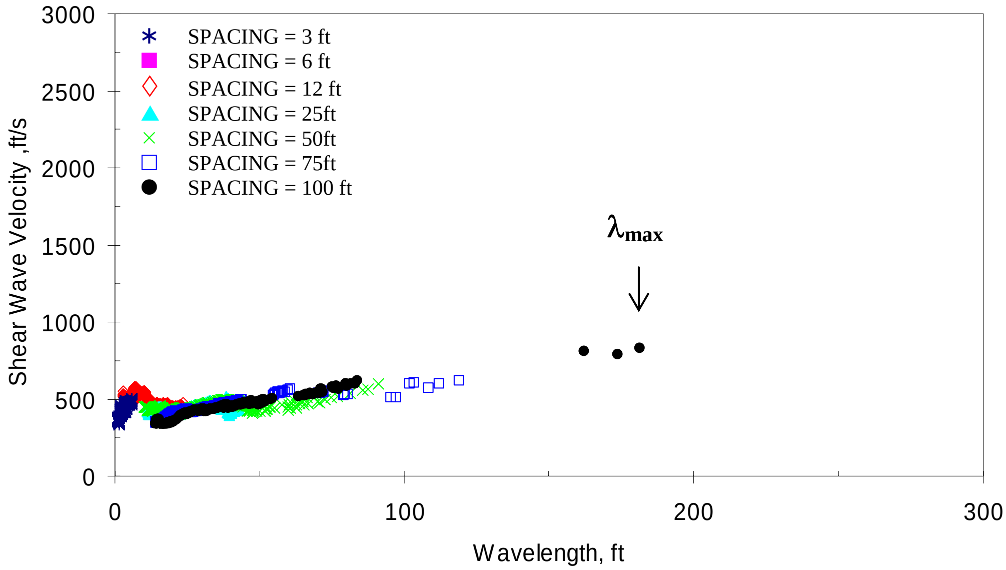

Figure 17.10 Experimental Dispersion Curve Measured at Si-Hu Elementary School; Linear Wavelength Axis

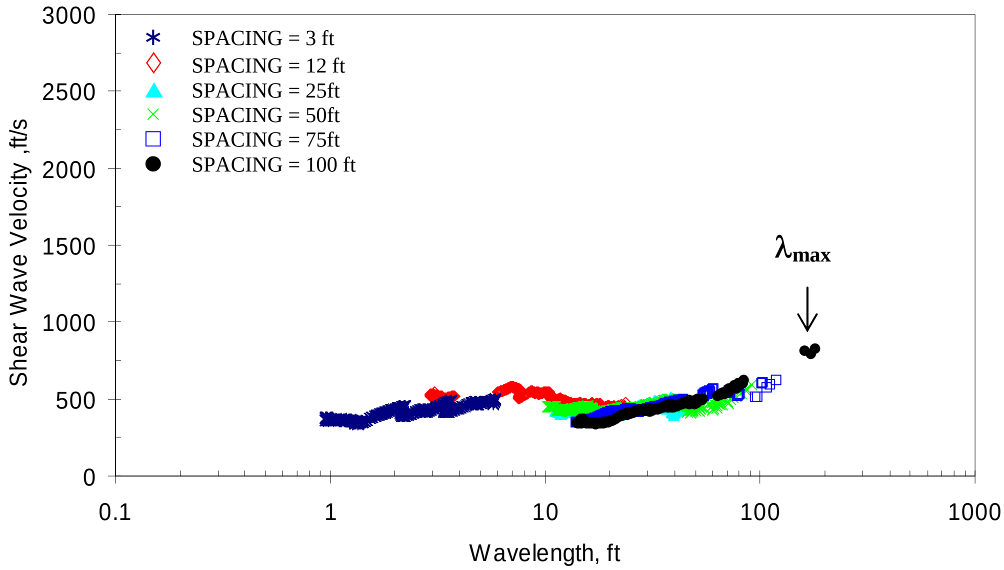

Figure 17.11 Experimental Dispersion Curve Measured at Si-Hu Elementary School; Logarithmic Wavelength Axis

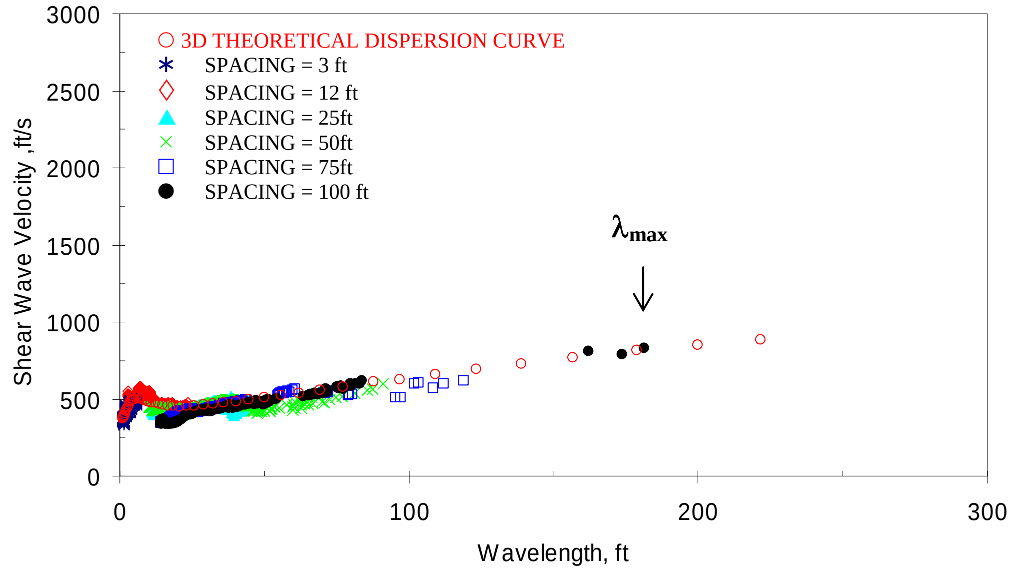

Figure 17.12 Experimental and Theoretical Dispersion Curves from Si-Hu Elementary School; Linear Wavelength Axis

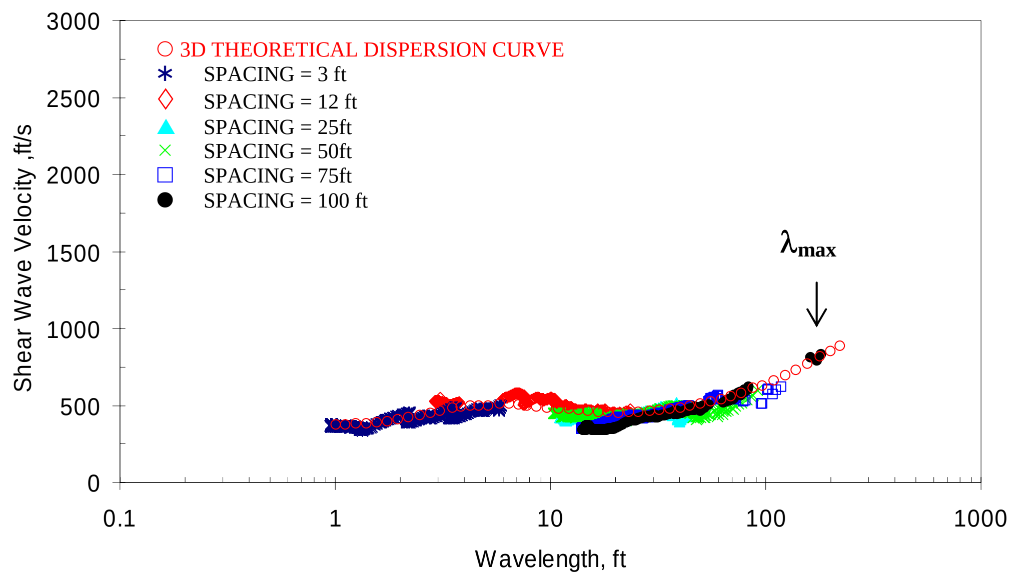

Figure 17.13 Experimental and Theoretical Dispersion Curves from Si-Hu Elementary School; Logarithmic Wavelength Axis

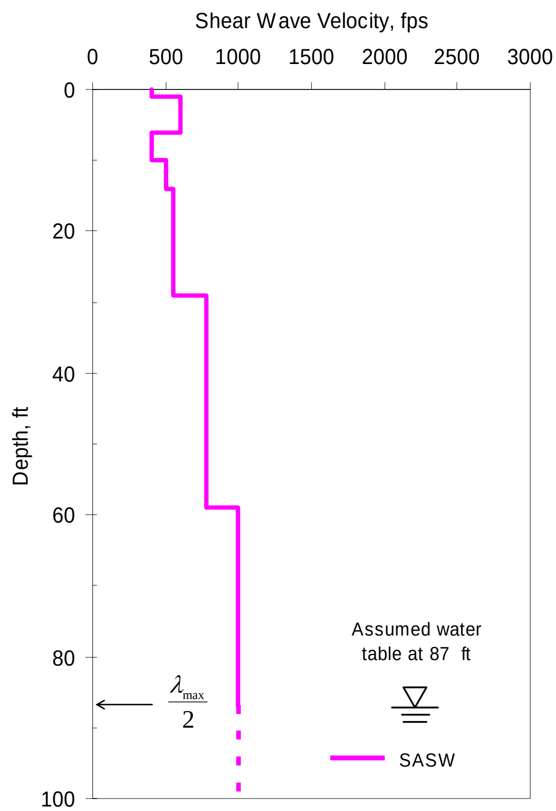

Figure 17.14 Shear Wave Velocity Profile Determined at Si-Hu Elementary School

Table 17.2 Profile Parameters Used to Develop Theoretical Dispersion Curve at Si-Hu Elementary School

Layer No.	Thickness, ft	Depth to the bottom, ft	P-Wave Velocity, ft/s	S-Wave Velocity, ft/s	Poisson's Ratio	Total Unit Weight, pcf
1	1.0	1	693	400	0.25	120
2	5.0	6	1039	600	0.25	120
3	4.0	10	693	400	0.25	120
4	4.0	14	866	500	0.25	120
5	15.0	29	953	550	0.25	120
6	30.0	59	1351	780	0.25	120
7	28.0	87	1732	1000	0.25	120

Performed by________________________ Checked by________________________

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Table 17.3 Uniform Building Code (UBC-97) Site Classification of Si-Hu Elementary School

Average Shear Wave Velocity of Top 30 meters (100 ft), $V_{s,30}$ (ft/s) [m/s]	Site Classification
750 [229]	D

Performed by________________________ Checked by________________________
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Table 17.4 UBC-97 Site Categories

Soil Profile Type	Average Shear Wave Velocity of Top 30 m, $V_{s,30}$ (m/s) [Top100 ft, $V_{s,100}$ (ft/s)]	Description
S_A	$V_{s,30}$>1500 m/s [$V_{s,100}$>5000 ft/s]	Hard rock
S_B	760 m/s < $V_{s,30}$≤1500 m/s [2500 ft/s < $V_{s,100}$≤5000 ft/s]	Rock
S_C	360 m/s < $V_{s,30}$≤760 m/s [1200 ft/s < $V_{s,100}$≤2500 ft/s]	Very dense soil and soft rock
S_D	180 m/s ≤ $V_{s,30}$≤360 m/s [600 ft/s < $V_{s,100}$≤1200 ft/s]	Stiff Soil Profile
S_E	$V_{s,30}$< 180 m/s [$V_{s,100}$ < 600 ft/s]	Soft Soil Profile
S_F	-	Soils requiring site-specific evaluation.

Appendix 18

Site Location: Ten-Chong High School (TCU-116)

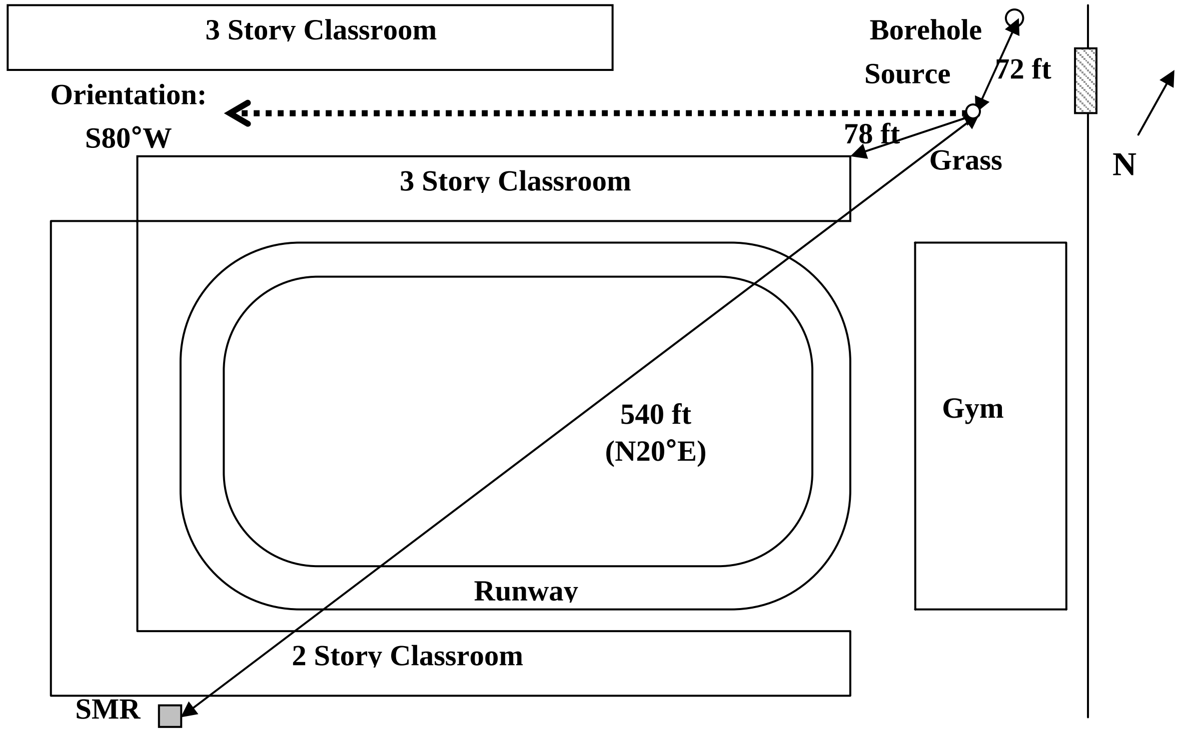

Figure 18.1 Site Map of Ten-Chong High School

Figure 18.2 Picture Taken at Ten-Chong High School (View # 1)

Figure 18.3 Picture Taken at Ten-Chong High School (View # 2)

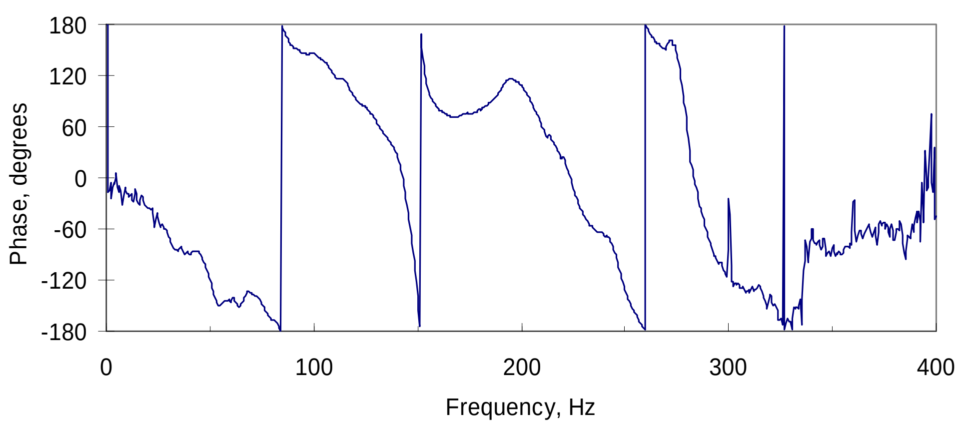

Figure 18.4 Phase Plots Measured by SASW Testing with 3-ft Receiver Spacing

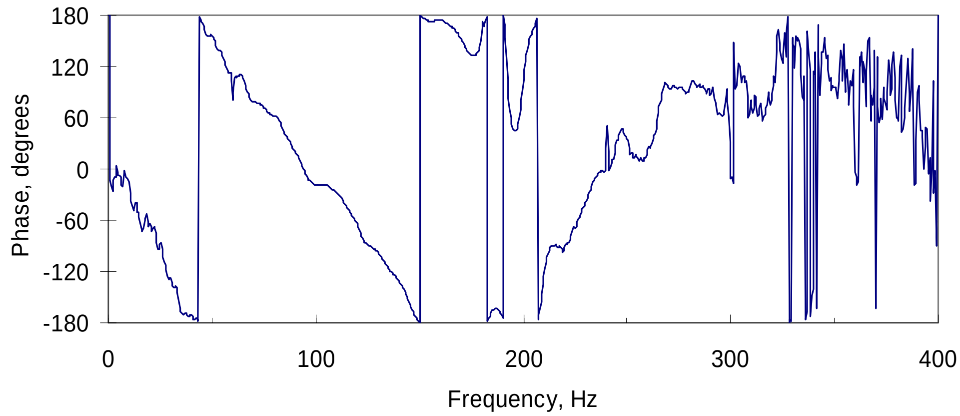

Figure 18.5 Phase Plots Measured by SASW Testing with 6-ft Receiver Spacing

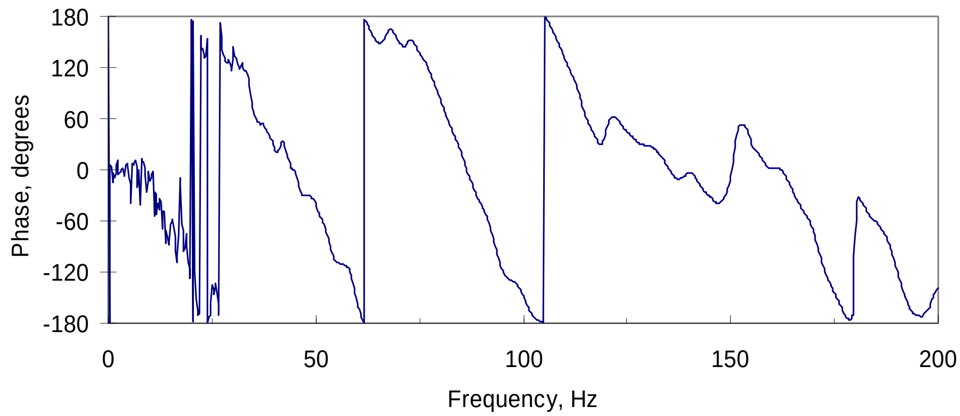

Figure 18.6 Phase Plots Measured by SASW Testing with 12-ft Receiver Spacing

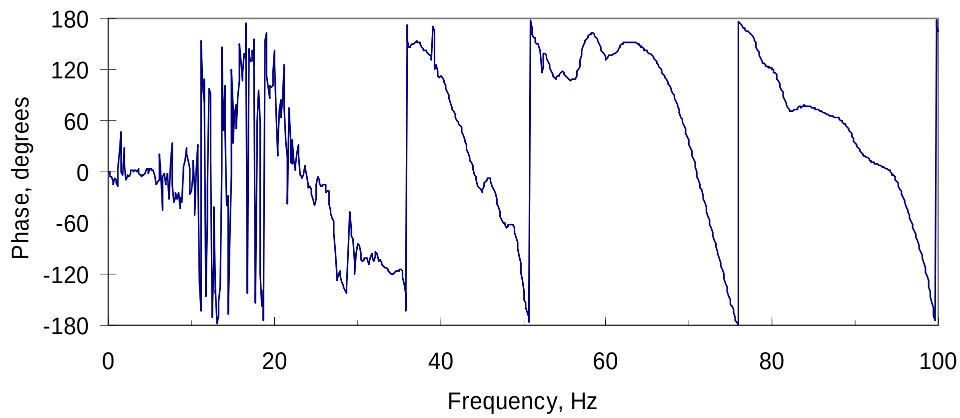

Figure 18.7 Phase Plots Measured by SASW Testing with 25-ft Receiver Spacing

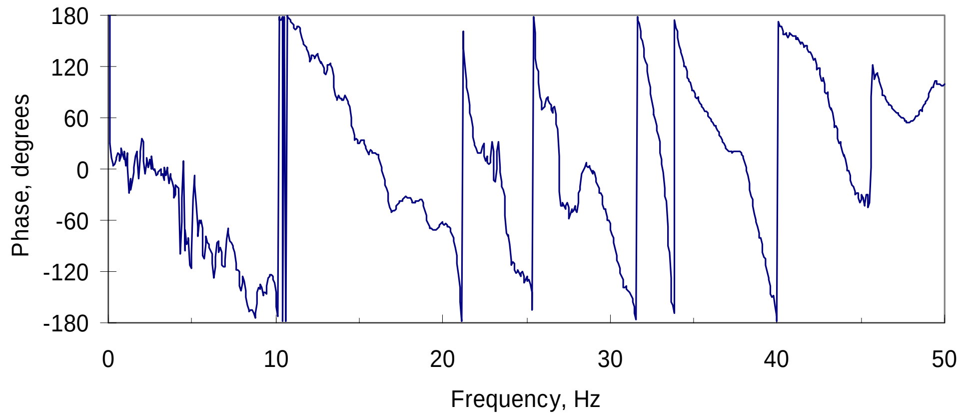

Figure 18.8 Phase Plots Measured by SASW Testing with 50-ft Receiver Spacing

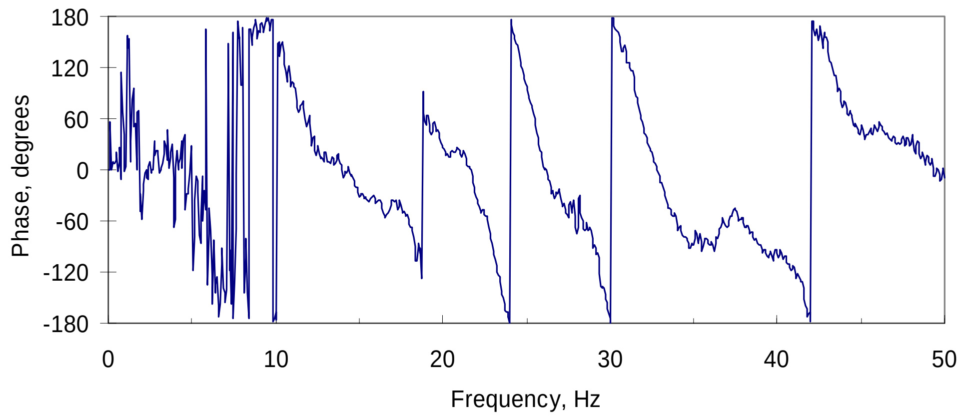

Figure 18.9 Phase Plots Measured by SASW Testing with 65-ft Receiver Spacing

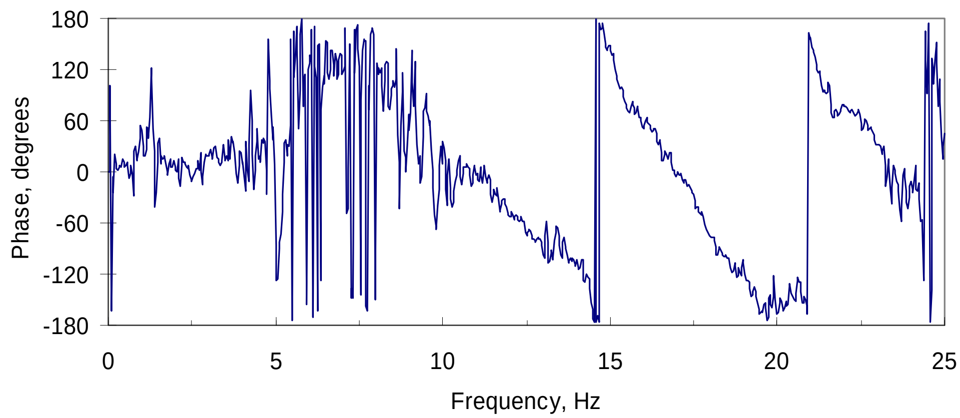

Figure 18.10 Phase Plots Measured by SASW Testing with 105-ft Receiver Spacing

Appendix

Table 18.1 Table of Masking Parameters Used on Data Collected at Ten-Chong High School

Receiver Spacing	Masking Interval	Masking Start Frequency, Hz	Masking Stop Frequency, Hz	Number of Jumps
3 ft	1	0.0	85.0	1
	2	137.5	197.5	2
	3	259.5	400.0	-
6 ft	1	0.0	44.0	1
	2	149.5	400.0	-
12 ft	1	0.0	27.5	1
	2	118.3	200.0	-
25 ft	1	0.0	19.0	1
	2	20.3	22.4	1
	3	26.6	29.4	1
50 ft	1	0.0	10.8	1
	2	26.6	28.8	3
	3	31.7	50.0	5
65 ft	1	0.0	8.8	1
	2	9.3	10.4	1
	3	16.4	21.2	2
	4	34.8	42.1	6
	5	45.1	50.0	-
105 ft	1	0.0	7.6	1
	2	7.7	8.0	1
	3	8.6	10.5	1
	4	14.0	14.8	2
	5	19.6	21.0	3
	6	23.1	25.0	-

Performed by________________ Checked by________________

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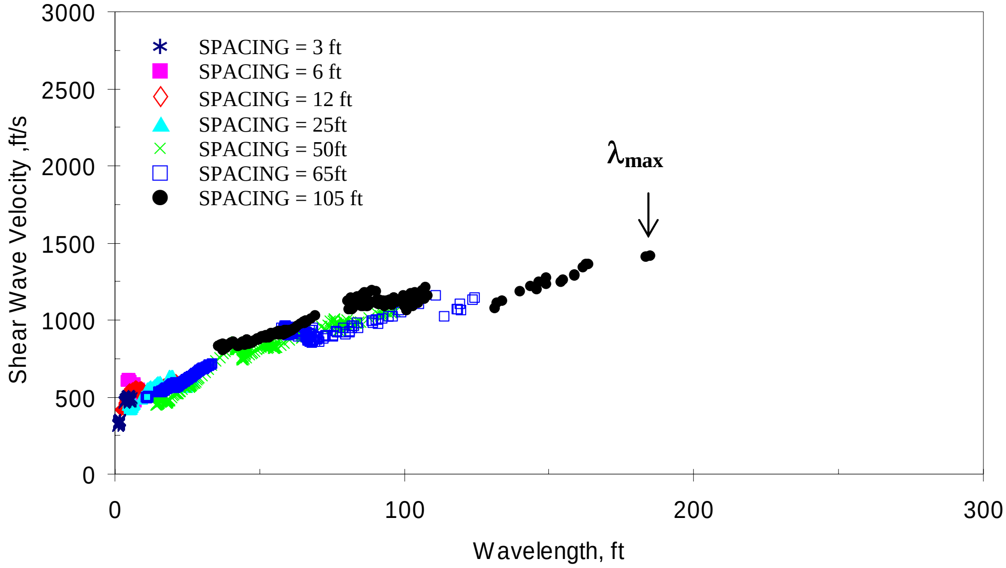

Figure 18.11 Experimental Dispersion Curve Measured at Ten-Chong High School; Linear Wavelength Axis

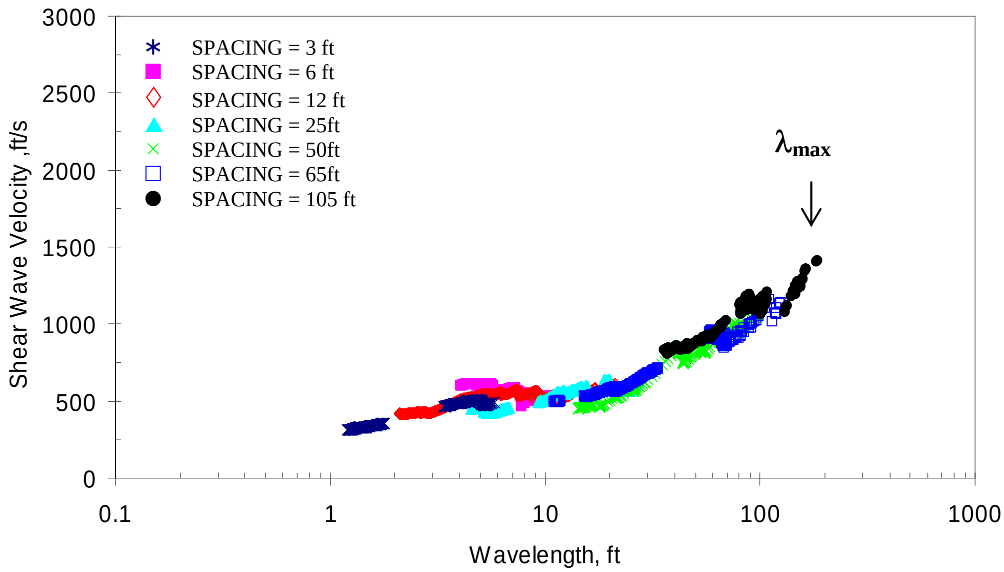

Figure 18.12 Experimental Dispersion Curve Measured at Ten-Chong High School; Logarithmic Wavelength Axis

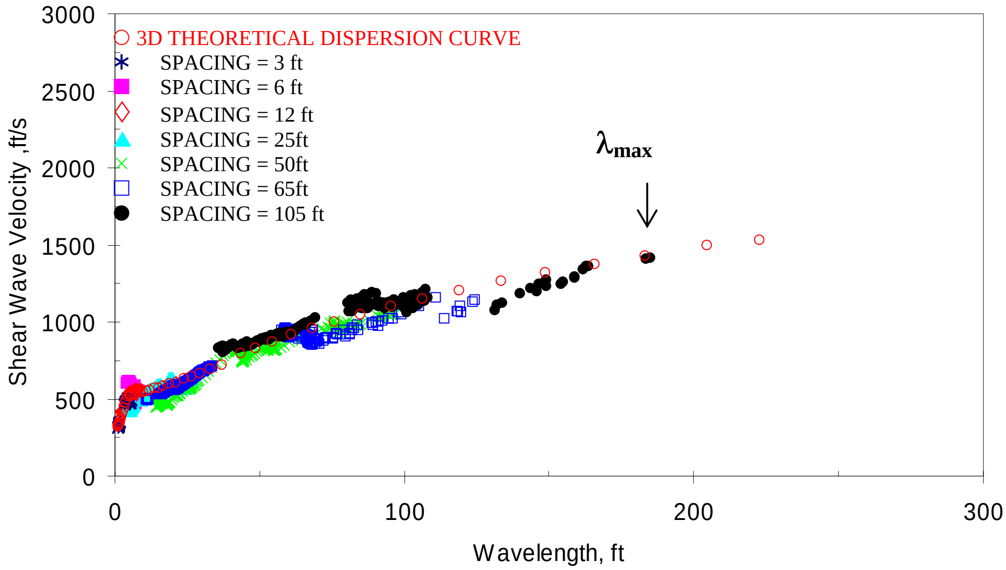

Figure 18.13 Experimental and Theoretical Dispersion Curves from Ten-Chong High School; Linear Wavelength Axis

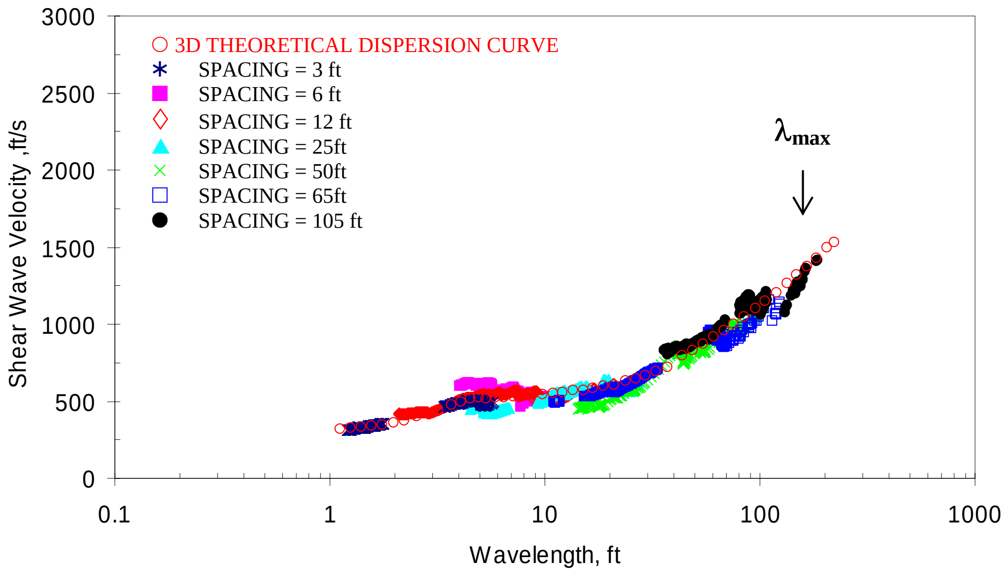

Figure 18.14 Experimental and Theoretical Dispersion Curves from Ten-Chong High School; Logarithmic Wavelength Axis

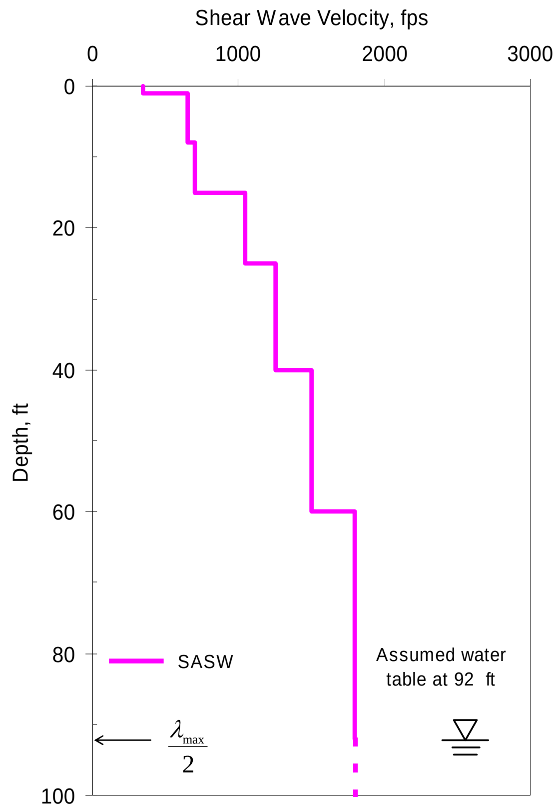

Figure 18.15 Shear Wave Velocity Profile Determined at Ten-Chong High School

Table 18.2 Profile Parameters Used to Develop Theoretical Dispersion Curve at Ten-Chong High School

Layer No.	Thickness, ft	Depth to the bottom, ft	P-Wave Velocity, ft/s	S-Wave Velocity, ft/s	Poisson's Ratio	Total Unit Weight, pcf
1	1.0	1	598	345	0.25	120
2	7.0	8	1126	650	0.25	120
3	7.0	15	1212	700	0.25	120
4	10.0	25	1819	1050	0.25	120
5	15.0	40	2165	1250	0.25	120
6	20.0	60	2598	1500	0.25	120
7	32.0	92	3118	1800	0.25	120

Performed by____________________ Checked by____________________

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Table 18.3 Uniform Building Code (UBC-97) Site Classification of Ten-Chong High School

Average Shear Wave Velocity of Top 30 meters (100 ft), $V_{s,30}$ (ft/s) [m/s]	Site Classification
1250 [381]	C

Performed by________________________ Checked by________________________
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Table 18.4 UBC-97 Site Categories

Soil Profile Type	Average Shear Wave Velocity of Top 30 m, $V_{s,30}$ (m/s) [Top100 ft, $V_{s,100}$ (ft/s)]	Description
S_A	$V_{s,30}$>1500 m/s [$V_{s,100}$>5000 ft/s]	Hard rock
S_B	760 m/s < $V_{s,30}$≤1500 m/s [2500 ft/s < $V_{s,100}$≤5000 ft/s]	Rock
S_C	360 m/s < $V_{s,30}$≤760 m/s [1200 ft/s < $V_{s,100}$≤2500 ft/s]	Very dense soil and soft rock
S_D	180 m/s ≤ $V_{s,30}$≤360 m/s [600 ft/s < $V_{s,100}$≤1200 ft/s]	Stiff Soil Profile
S_E	$V_{s,30}$< 180 m/s [$V_{s,100}$ < 600 ft/s]	Soft Soil Profile
S_F	-	Soils requiring site-specific evaluation.

Appendix 19

Site Location: Ton-Ang Elementary School (TCU-120)

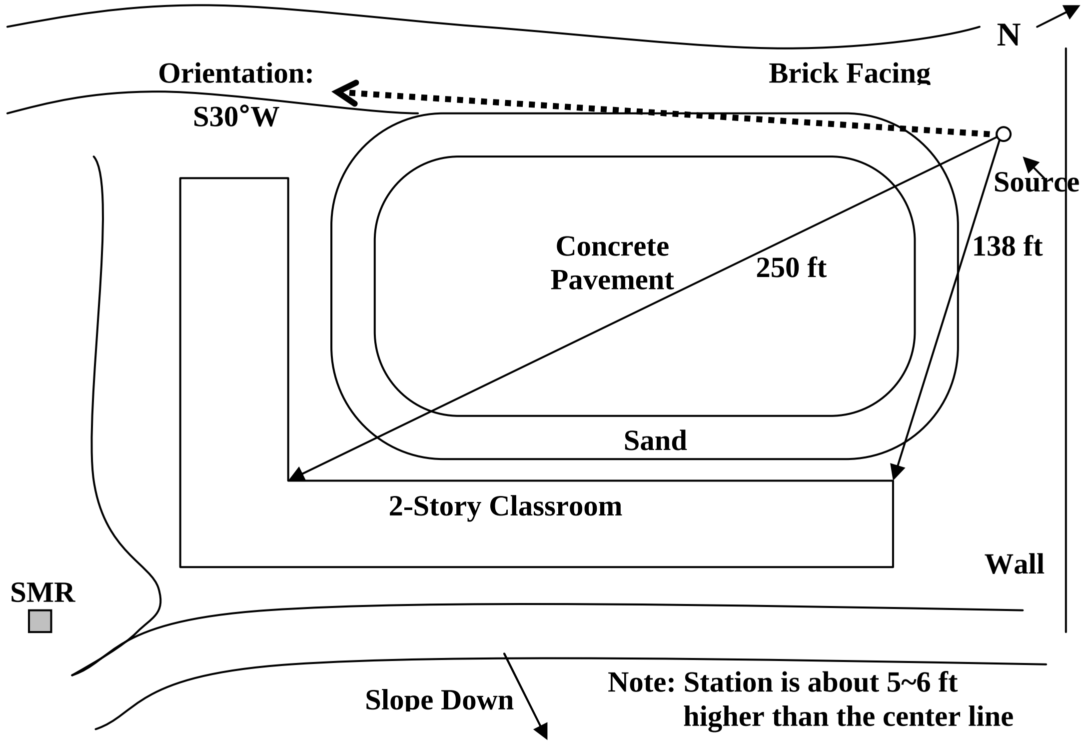

Figure 19.1 Site Map of Ton-Ang Elementary School

Figure 19.2 Picture Taken at Ton-Ang Elementary School (View # 1)

Figure 19.3 Picture Taken at Ton-Ang Elementary School (View # 2)

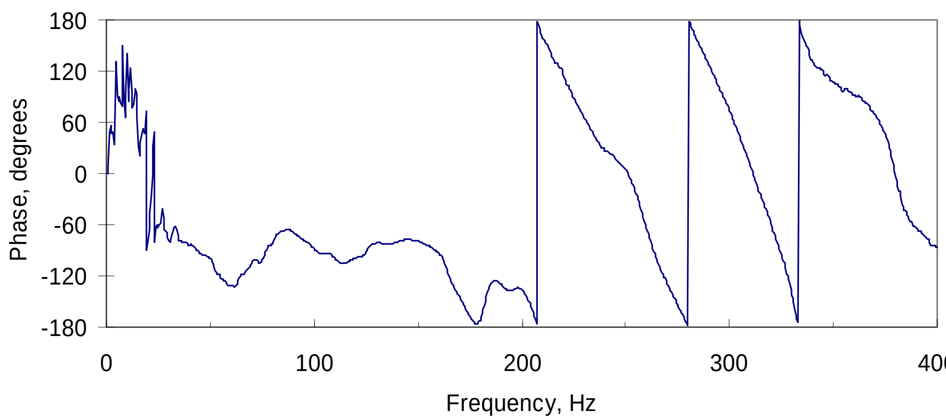

Figure 19.4 Phase Plots Measured by SASW Testing with 3-ft Receiver Spacing

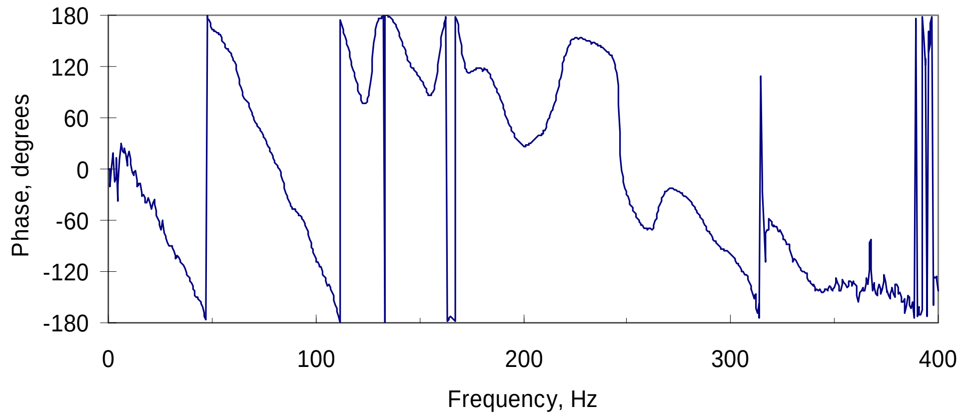

Figure 19.5 Phase Plots Measured by SASW Testing with 6-ft Receiver Spacing

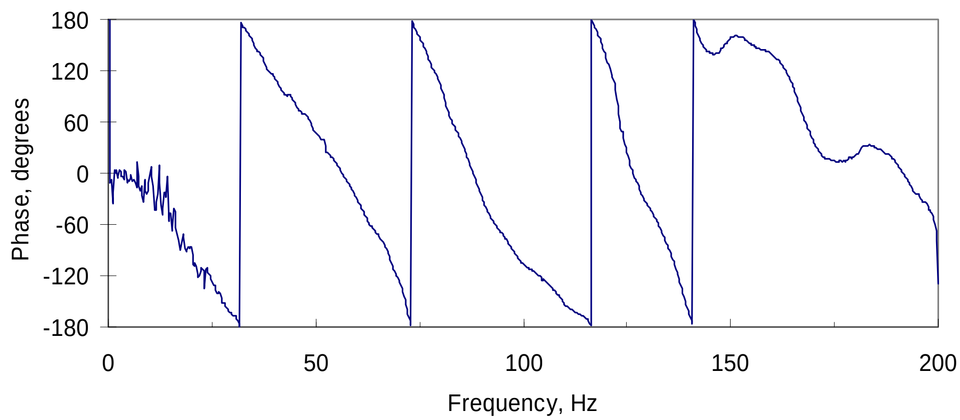

Figure 19.6 Phase Plots Measured by SASW Testing with 12-ft Receiver Spacing

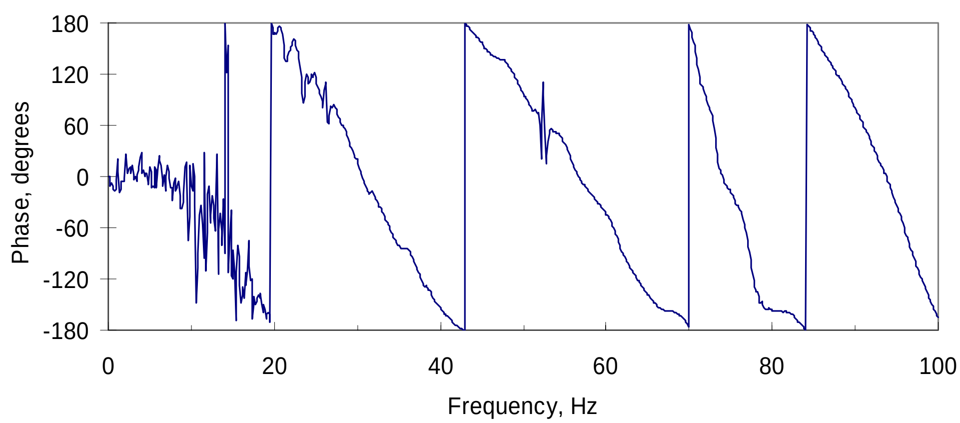

Figure 19.7 Phase Plots Measured by SASW Testing with 25-ft Receiver Spacing

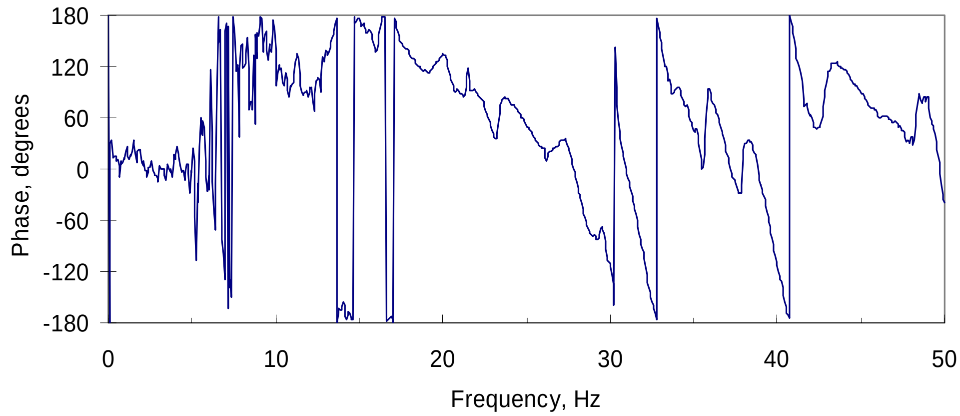

Figure 19.8 Phase Plots Measured by SASW Testing with 75-ft Receiver Spacing

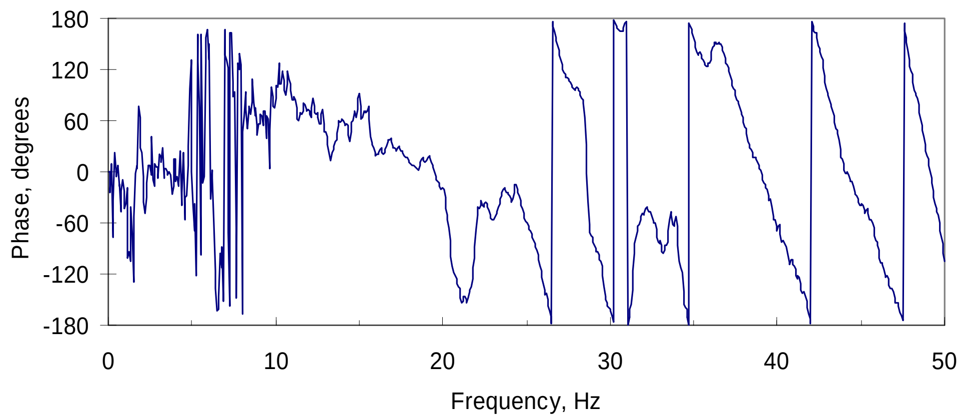

Figure 19.9 Phase Plots Measured by SASW Testing with 100-ft Receiver Spacing

Table 19.1 Table of Masking Parameters Used on Data Collected at Ton-Ang Elementary School

Receiver Spacing	Masking Interval	Masking Start Frequency, Hz	Masking Stop Frequency, Hz	Number of Jumps
3 ft	1	0.0	208.0	2
6 ft	1	0.0	47.5	1
	2	122.5	400.0	-
12 ft	1	0.0	32.0	1
	2	141.3	200.0	-
25 ft	1	0.0	22.3	1
	2	23.1	25.1	1
	3	25.9	28.6	1
	4	50.4	53.5	2
	5	69.0	100.0	-
75 ft	1	0.0	9.3	1
	2	9.7	10.2	1
	3	10.9	11.6	1
	4	12.3	17.4	2
100 ft	1	0.0	19.1	2
	2	21.3	24.4	3
	3	30.3	34.8	5

Performed by____________________ Checked by____________________

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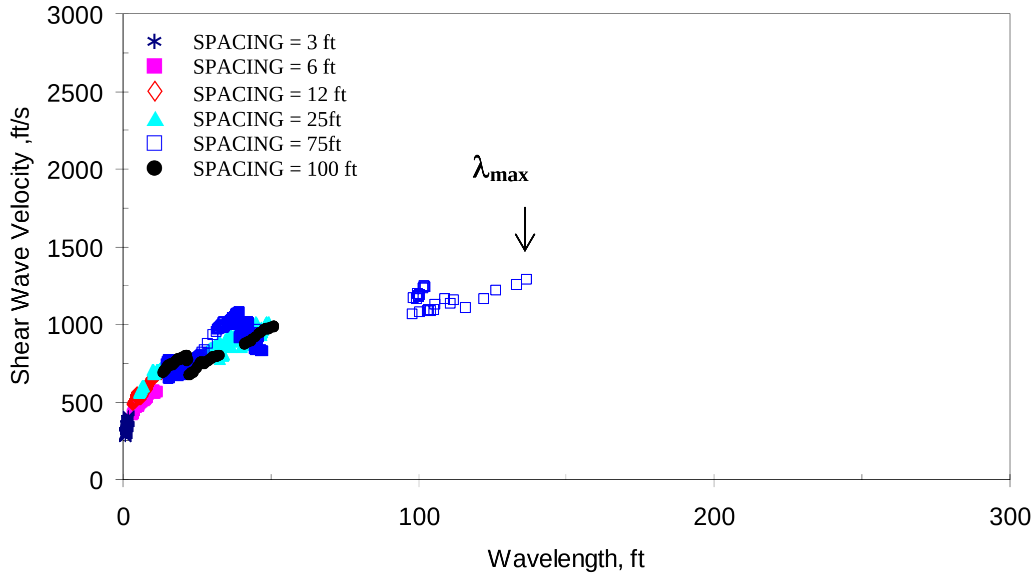

Figure 19.10 Experimental Dispersion Curve Measured at Ton-Ang Elementary School; Linear Wavelength Axis

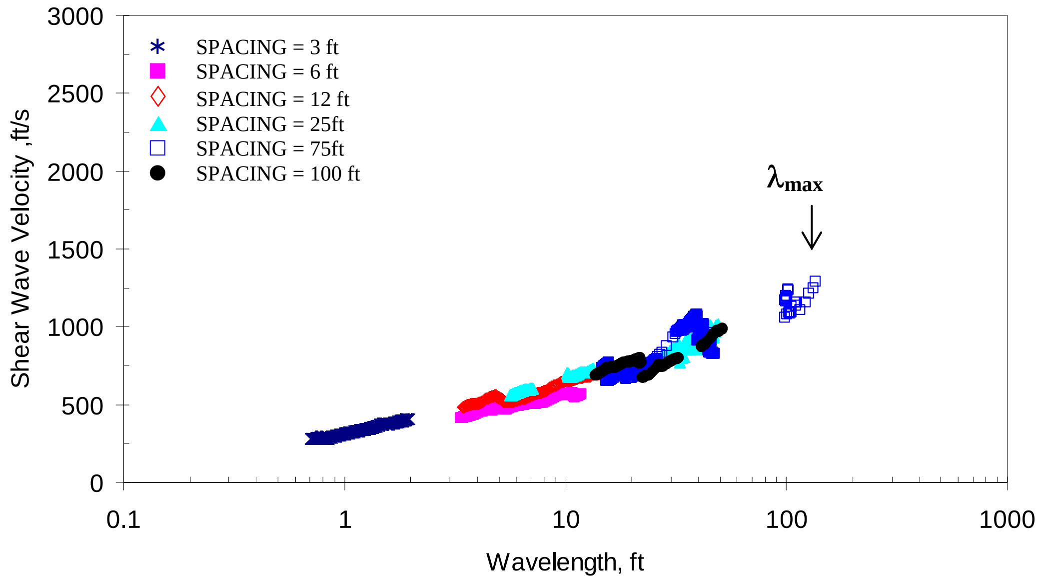

Figure 19.11 Experimental Dispersion Curve Measured at Ton-Ang Elementary School; Logarithmic Wavelength Axis

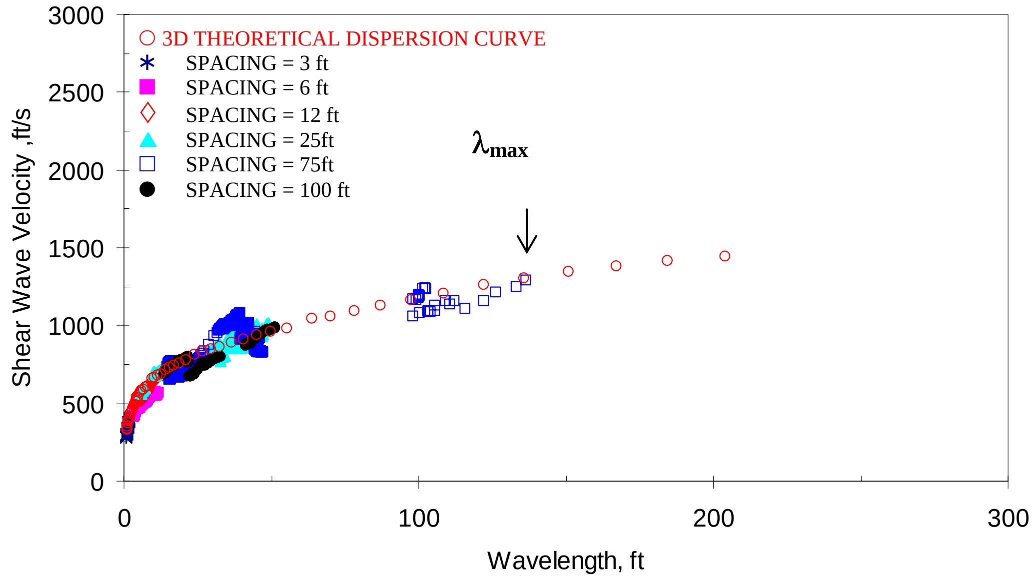

Figure 19.12 Experimental and Theoretical Dispersion Curves from Ton-Ang Elementary School; Linear Wavelength Axis

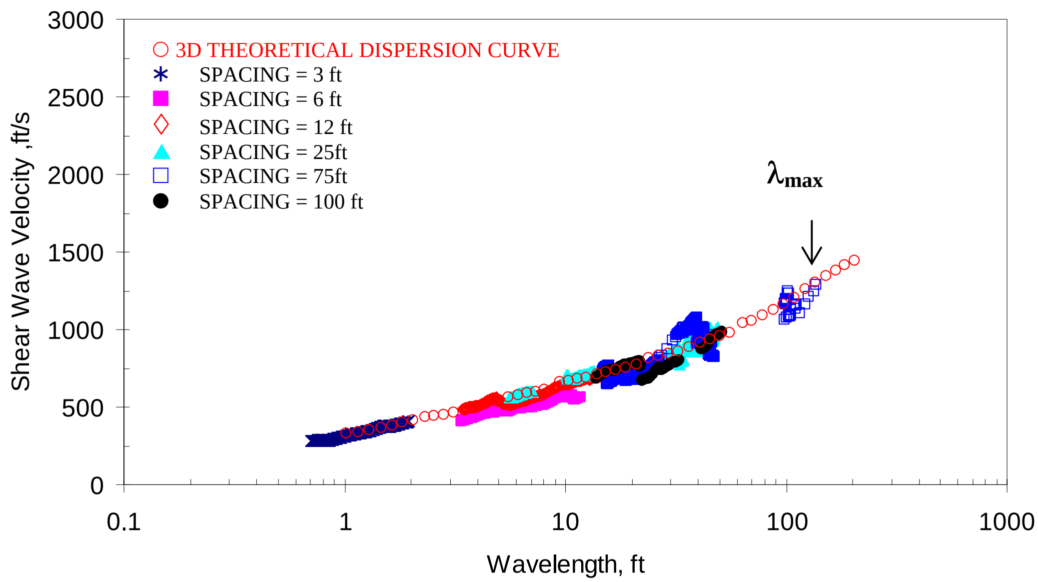

Figure 19.13 Experimental and Theoretical Dispersion Curves from Ton-Ang Elementary School; Logarithmic Wavelength Axis

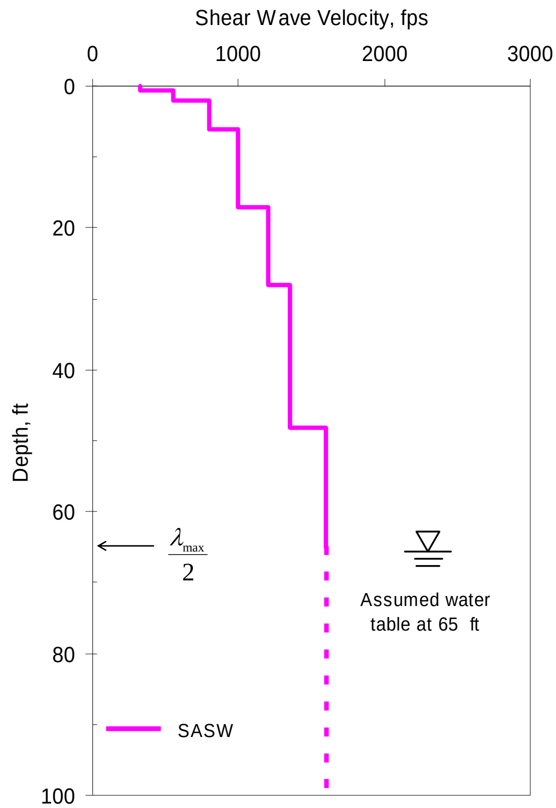

Figure 19.14 Shear Wave Velocity Profile Determined at Ton-Ang Elementary School

Table 19.2 Profile Parameters Used to Develop Theoretical Dispersion Curve at Ton-Ang Elementary School

Layer No.	Thickness, ft	Depth to the bottom, ft	P-Wave Velocity, ft/s	S-Wave Velocity, ft/s	Poisson's Ratio	Total Unit Weight, pcf
1	0.6	0.6	572	330	0.25	120
2	1.5	2.1	953	550	0.25	120
3	4.0	6.1	1386	800	0.25	120
4	11.0	17.1	1732	1000	0.25	120
5	11.0	28.1	2079	1200	0.25	120
6	20.0	48.1	2338	1350	0.25	120
7	17.0	65.1	2771	1600	0.25	120

Performed by____________________ Checked by____________________
Yin-Cheng Lin Brent L. Rosenblad

Table 19.3 Uniform Building Code (UBC-97) Site Classification of Ton-Ang Elementary School

Average Shear Wave Velocity of Top 30 meters (100 ft), $V_{s,30}$ (ft/s) [m/s]	Site Classification
1360 [415]	C

Performed by________________________ Checked by________________________
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Table 19.4 UBC-97 Site Categories

Soil Profile Type	Average Shear Wave Velocity of Top 30 m, $V_{s,30}$ (m/s) [Top100 ft, $V_{s,100}$ (ft/s)]	Description
S_A	$V_{s,30}$>1500 m/s [$V_{s,100}$>5000 ft/s]	Hard rock
S_B	760 m/s < $V_{s,30}$ ≤1500 m/s [2500 ft/s < $V_{s,100}$ ≤5000 ft/s]	Rock
S_C	360 m/s < $V_{s,30}$ ≤760 m/s [1200 ft/s < $V_{s,100}$ ≤2500 ft/s]	Very dense soil and soft rock
S_D	180 m/s ≤ $V_{s,30}$ ≤360 m/s [600 ft/s < $V_{s,100}$ ≤1200 ft/s]	Stiff Soil Profile
S_E	$V_{s,30}$ < 180 m/s [$V_{s,100}$ < 600 ft/s]	Soft Soil Profile
S_F	-	Soils requiring site-specific evaluation.

Appendix 20

Site Location: A-Sua Elementary School (TCU-122)

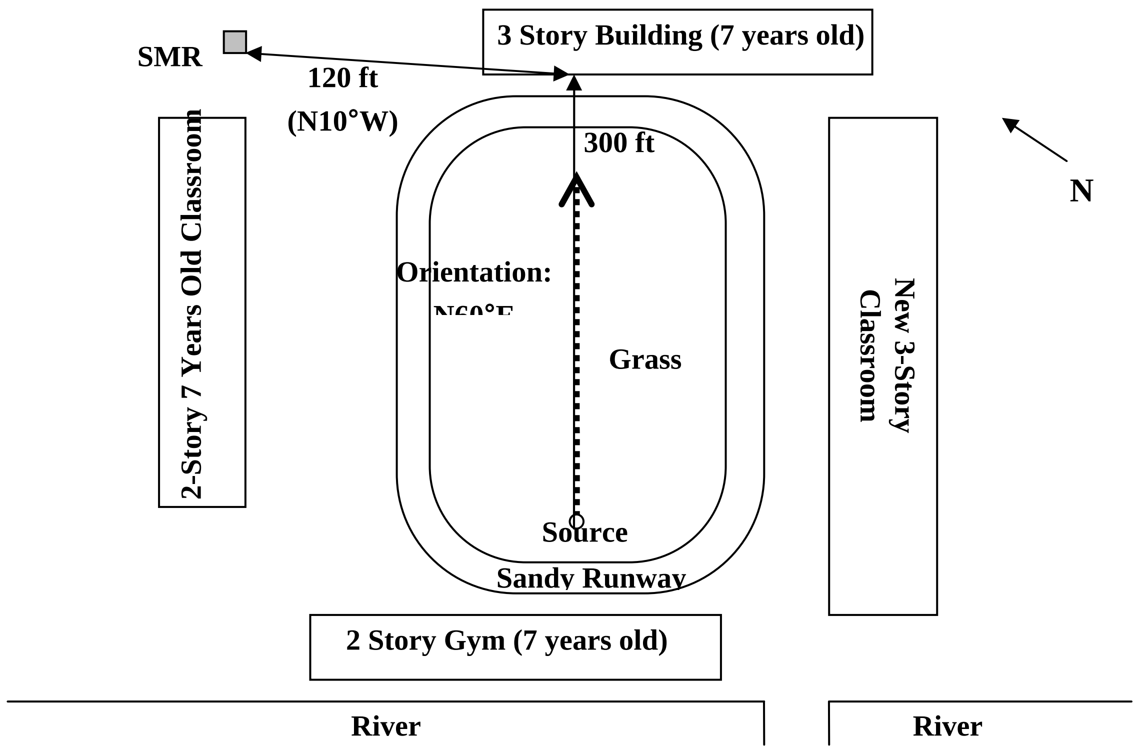

Figure 20.1 Site Map of A-Sua Elementary School

Figure 20.2 Picture Taken at A-Sua Elementary School (View # 1)

Figure 20.3 Picture Taken at A-Sua Elementary School (View # 2)

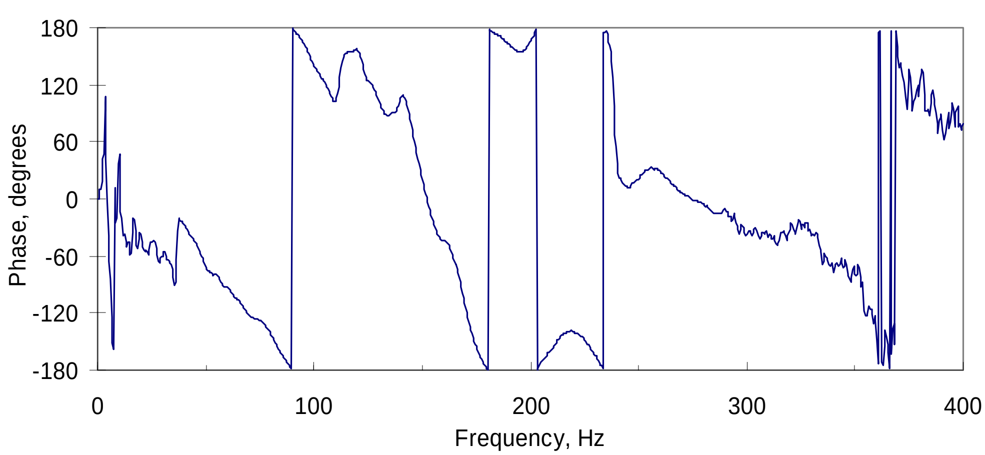

Figure 20.4 Phase Plots Measured by SASW Testing with 3-ft Receiver Spacing

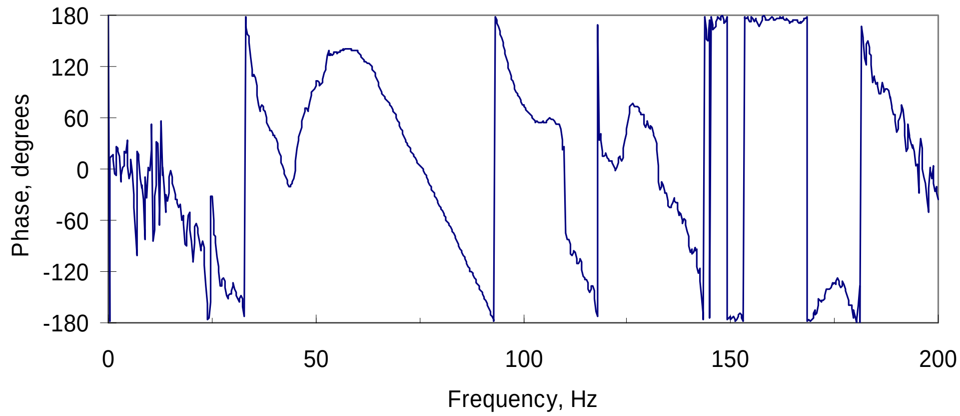

Figure 20.5 Phase Plots Measured by SASW Testing with 12-ft Receiver Spacing

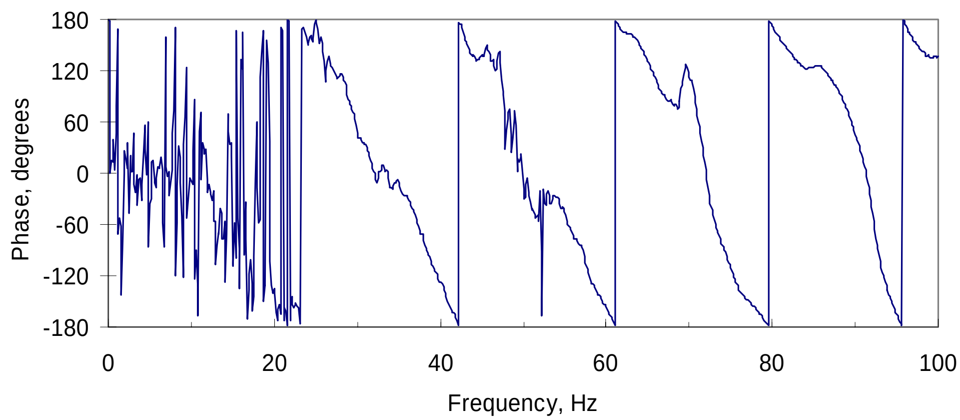

Figure 20.6 Phase Plots Measured by SASW Testing with 25-ft Receiver Spacing

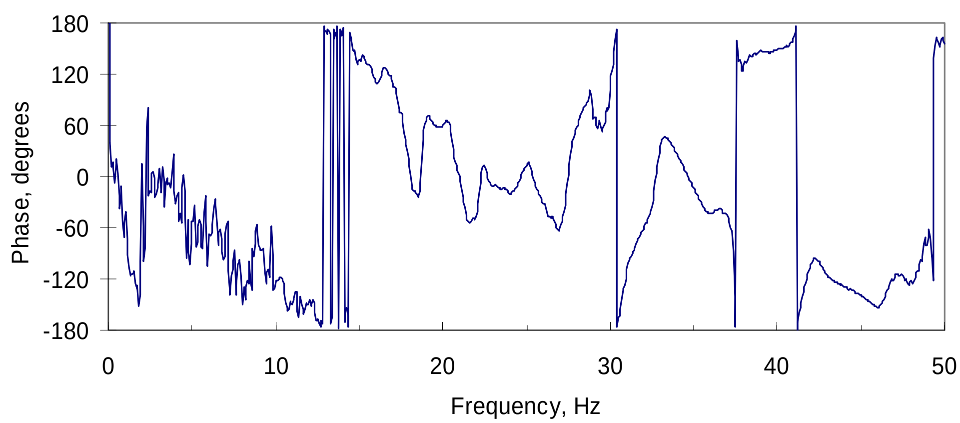

Figure 20.7 Phase Plots Measured by SASW Testing with 50-ft Receiver Spacing

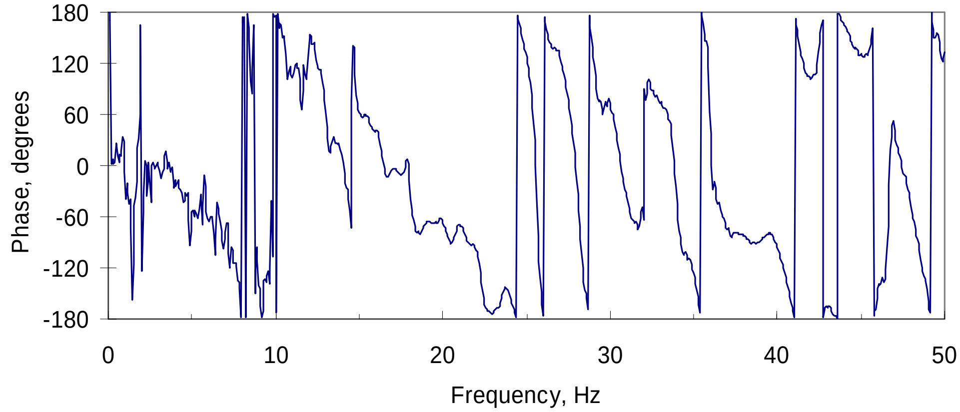

Figure 20.8 Phase Plots Measured by SASW Testing with 75-ft Receiver Spacing

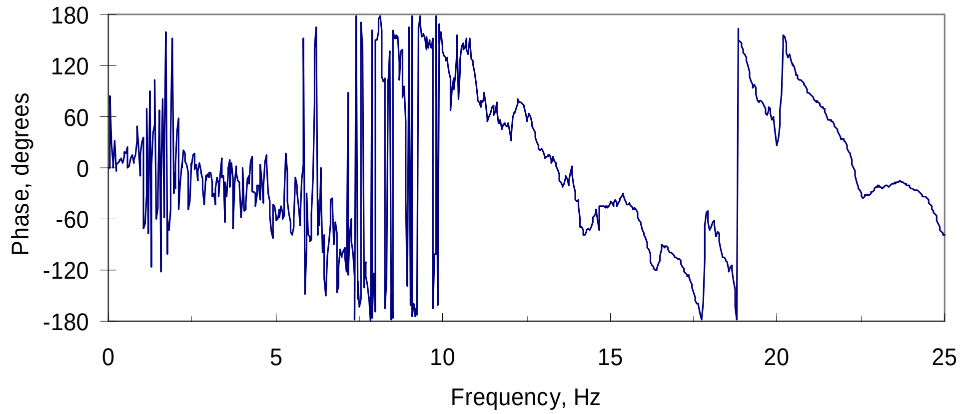

Figure 20.9 Phase Plots Measured by SASW Testing with 100-ft Receiver Spacing

Table 20.1 Table of Masking Parameters Used on Data Collected at A-Sua Elementary School

Receiver Spacing	Masking Interval	Masking Start Frequency, Hz	Masking Stop Frequency, Hz	Number of Jumps
3 ft	1	0.0	90.5	1
	2	110.5	144.0	2
	3	180.5	400.0	-
12 ft	1	0.0	33.3	1
	2	43.8	61.0	2
	3	102.3	111.5	3
	4	117.8	200.0	-
25 ft	1	0.0	23.4	1
	2	23.9	26.6	1
	3	44.5	54.1	2
	4	66.3	72.3	3
50 ft	1	0.0	14.5	1
	2	17.1	19.1	1
	3	20.6	22.8	1
	4	24.0	26.1	1
	5	26.9	50.0	-
75 ft	1	0.0	10.3	1
	2	10.4	15.1	1
	3	24.4	28.0	2
	4	31.8	50.0	-
100 ft	1	0.0	9.3	1
	2	9.7	11.3	1
	3	17.8	20.2	2

Performed by________________________ Checked by________________________
Yin-Cheng Lin Brent L. Rosenblad

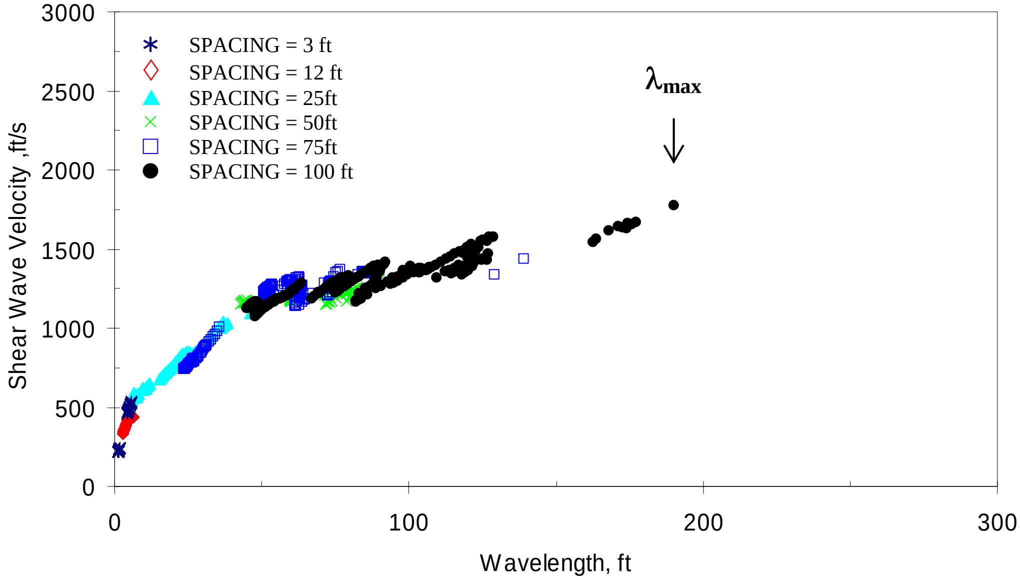

Figure 20.10 Experimental Dispersion Curve Measured at A-Sua Elementary School; Linear Wavelength Axis

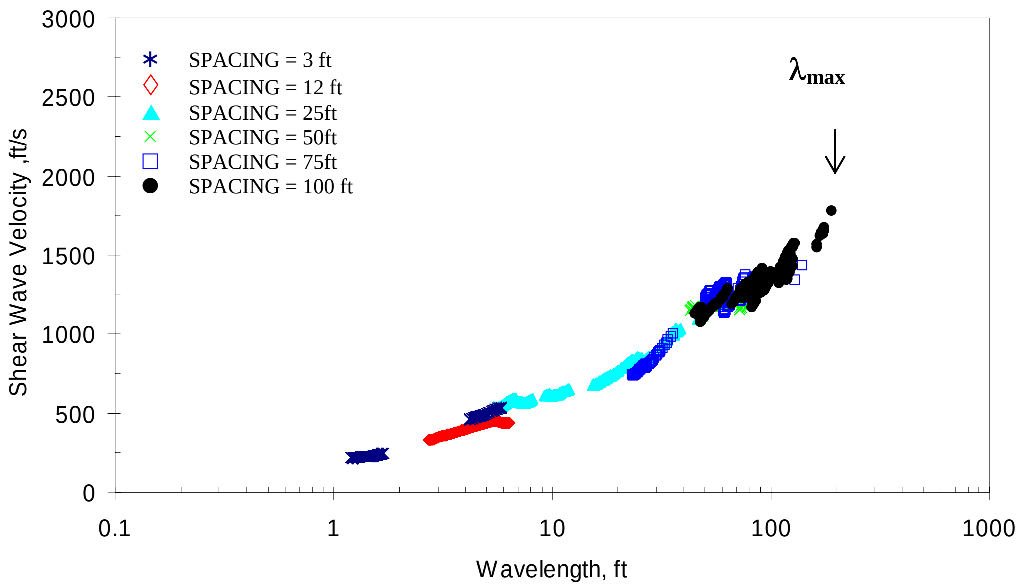

Figure 20.11 Experimental Dispersion Curve Measured at A-Sua Elementary School; Logarithmic Wavelength Axis

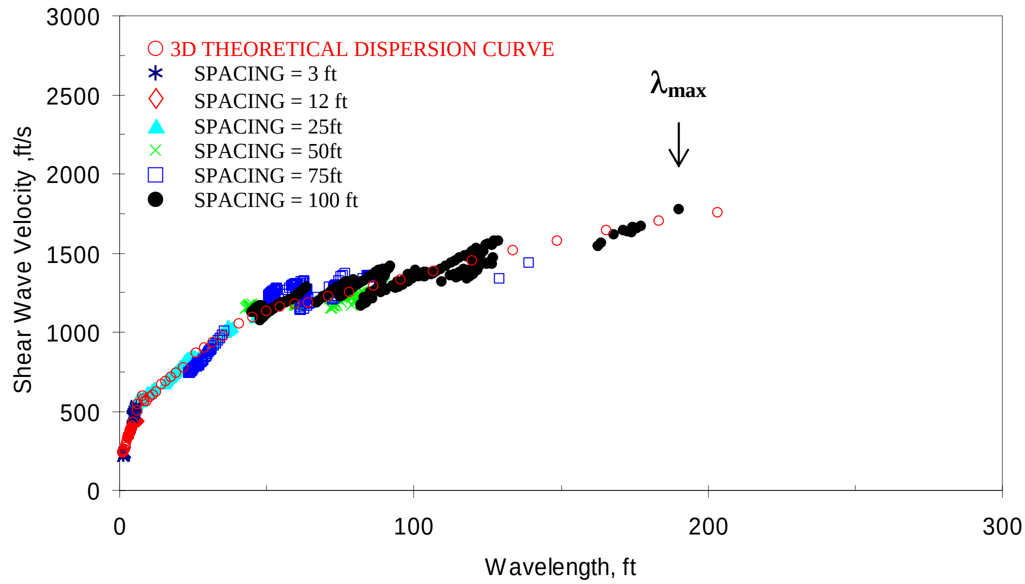

Figure 20.12 Experimental and Theoretical Dispersion Curves from A-Sua Elementary School; Linear Wavelength Axis

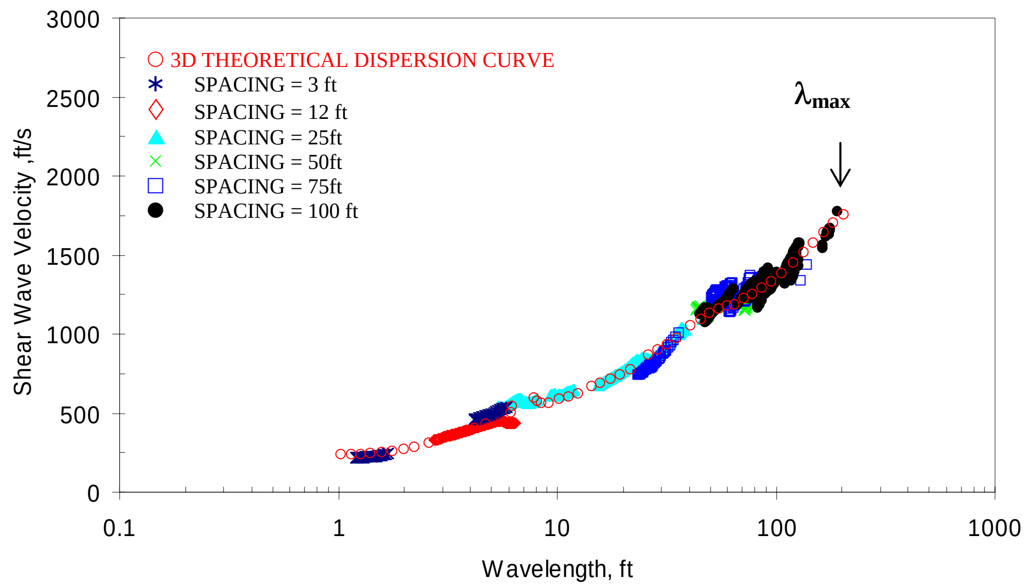

Figure 20.13 Experimental and Theoretical Dispersion Curves from A-Sua Elementary School; Logarithmic Wavelength Axis

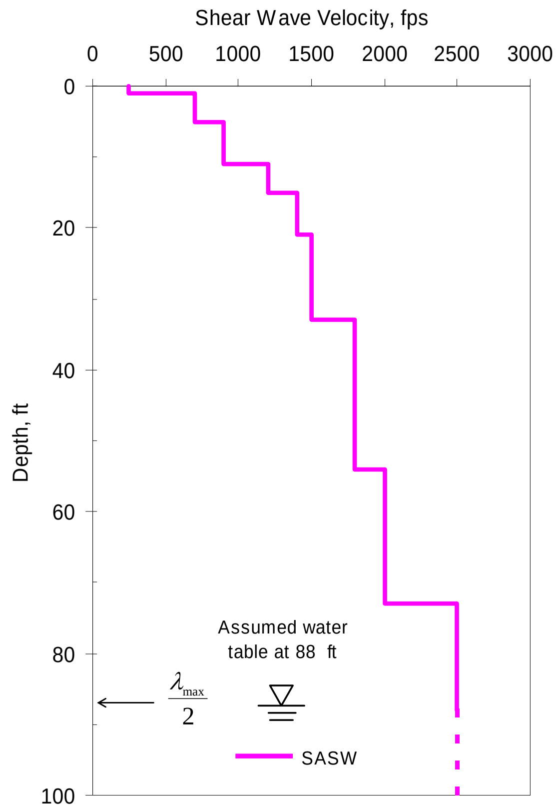

Figure 20.14 Shear Wave Velocity Profile Determined at A-Sua Elementary School

Table 20.2 Profile Parameters Used to Develop Theoretical Dispersion Curve at A-Sua Elementary School

Layer No.	Thickness, ft	Depth to the bottom, ft	P-Wave Velocity, ft/s	S-Wave Velocity, ft/s	Poisson's Ratio	Total Unit Weight, pcf
1	1.0	1	433	250	0.25	120
2	4.0	5	1212	700	0.25	120
3	6.0	11	1559	900	0.25	120
4	4.0	15	2079	1200	0.25	120
5	6.0	21	2425	1400	0.25	120
6	12.0	33	2598	1500	0.25	120
7	21.0	54	3118	1800	0.25	120
8	19.0	73	3464	2000	0.25	120
9	15.0	88	5000	2500	0.33	125

Performed by____________________ Checked by____________________
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Table 20.3 Uniform Building Code (UBC-97) Site Classification of A-Sua Elementary School

Average Shear Wave Velocity of Top 30 meters (100 ft), $V_{s,30}$ (ft/s) [m/s]	Site Classification
1560 [475]	C

Performed by________________________ Checked by________________________
Yin-Cheng Lin Brent L. Rosenblad

Table 20.4 UBC-97 Site Categories

Soil Profile Type	Average Shear Wave Velocity of Top 30 m, $V_{s,30}$ (m/s) [Top100 ft, $V_{s,100}$ (ft/s)]	Description
S_A	$V_{s,30}$ >1500 m/s [$V_{s,100}$ >5000 ft/s]	Hard rock
S_B	760 m/s < $V_{s,30}$ ≤1500 m/s [2500 ft/s < $V_{s,100}$ ≤5000 ft/s]	Rock
S_C	360 m/s < $V_{s,30}$ ≤760 m/s [1200 ft/s < $V_{s,100}$ ≤2500 ft/s]	Very dense soil and soft rock
S_D	180 m/s ≤ $V_{s,30}$ ≤360 m/s [600 ft/s < $V_{s,100}$ ≤1200 ft/s]	Stiff Soil Profile
S_E	$V_{s,30}$ < 180 m/s [$V_{s,100}$ < 600 ft/s]	Soft Soil Profile
S_F	-	Soils requiring site-specific evaluation.

Appendix 21

Site Location: Cheng-Jung Elementary School (TCU-128)

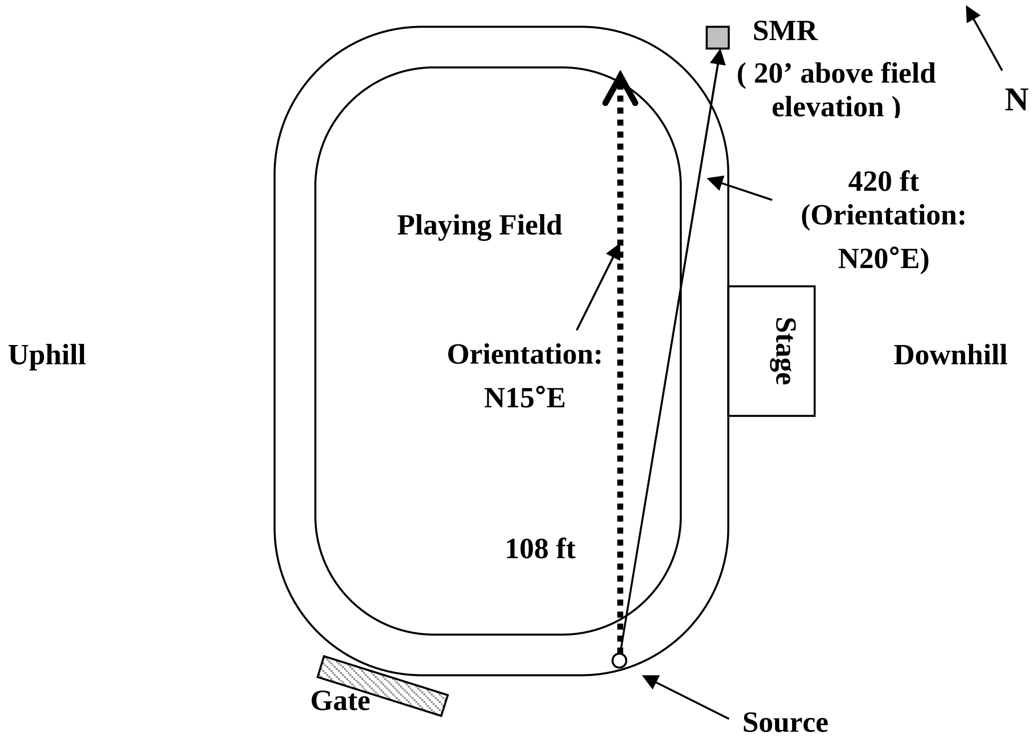

Figure 21.1 Site Map of Cheng-Jung Elementary School

Figure 21.2 Picture Taken at Cheng-Jung Elementary School (View # 1)

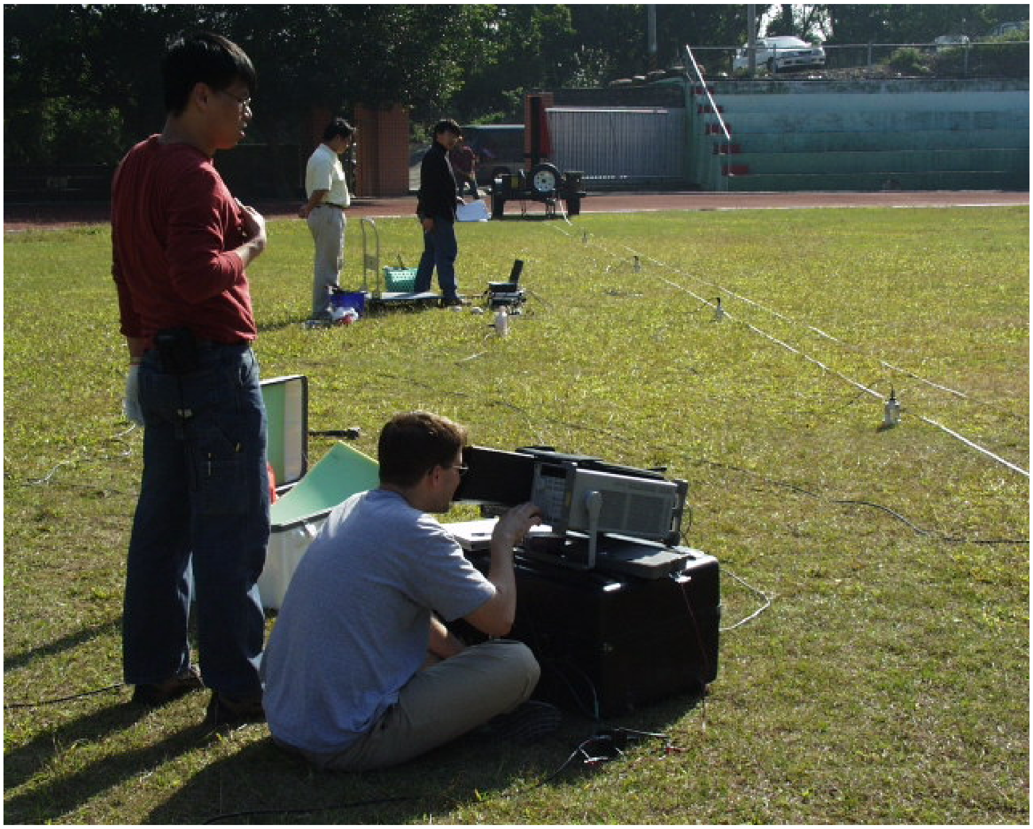

Figure 21.3 Picture Taken at Cheng-Jung Elementary School (View # 2)

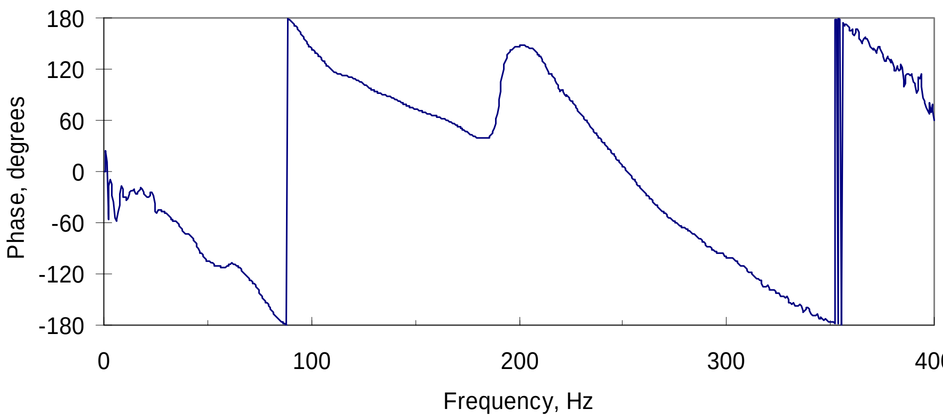

Figure 21.4 Phase Plots Measured by SASW Testing with 3-ft Receiver Spacing

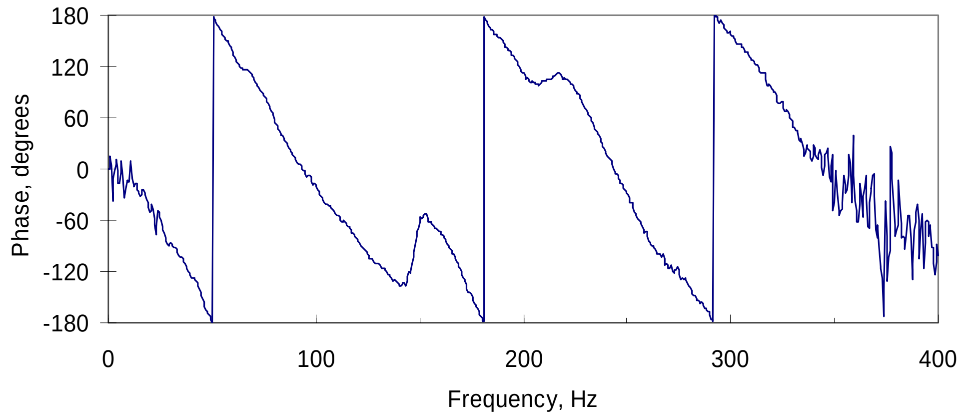

Figure 21.5 Phase Plots Measured by SASW Testing with 6-ft Receiver Spacing

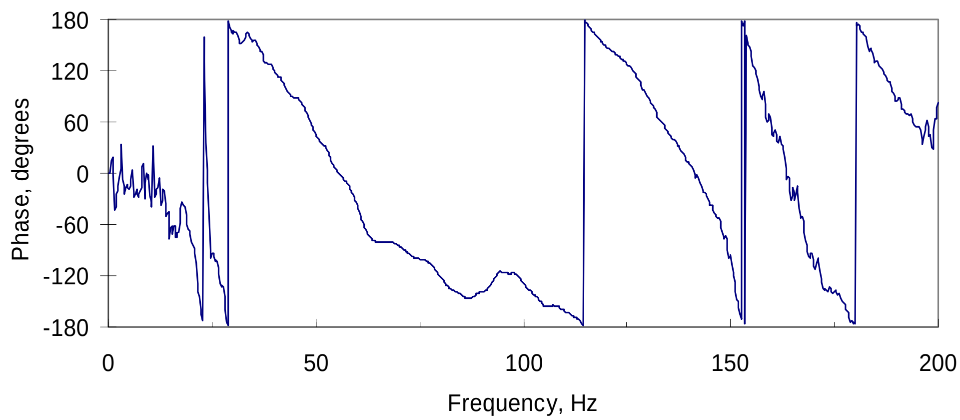

Figure 21.6 Phase Plots Measured by SASW Testing with 12-ft Receiver Spacing

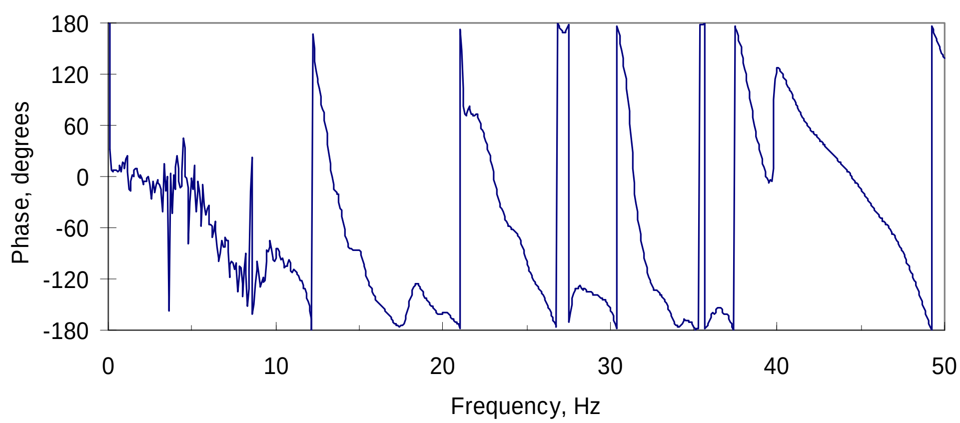

Figure 21.7 Phase Plots Measured by SASW Testing with 25-ft Receiver Spacing

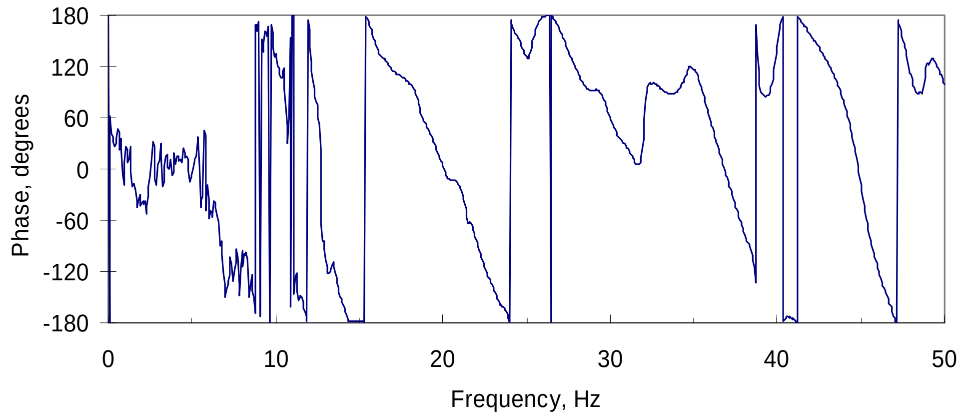

Figure 21.8 Phase Plots Measured by SASW Testing with 50-ft Receiver Spacing

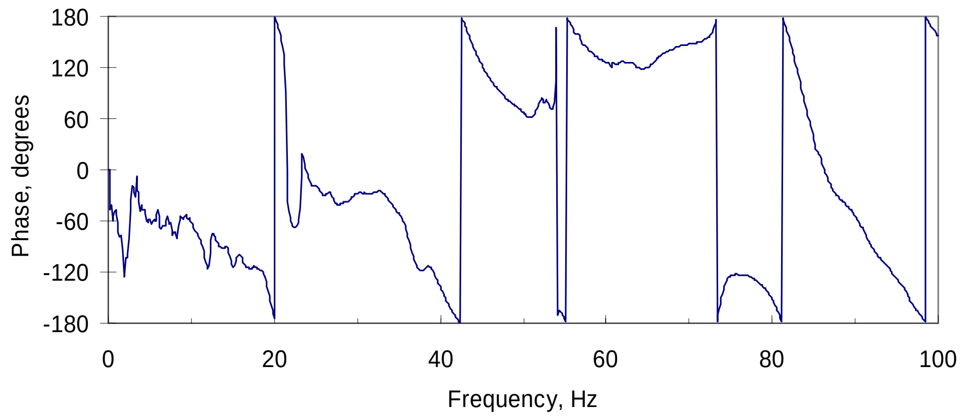

Figure 21.9 Phase Plots Measured by SASW Testing with 75-ft Receiver Spacing

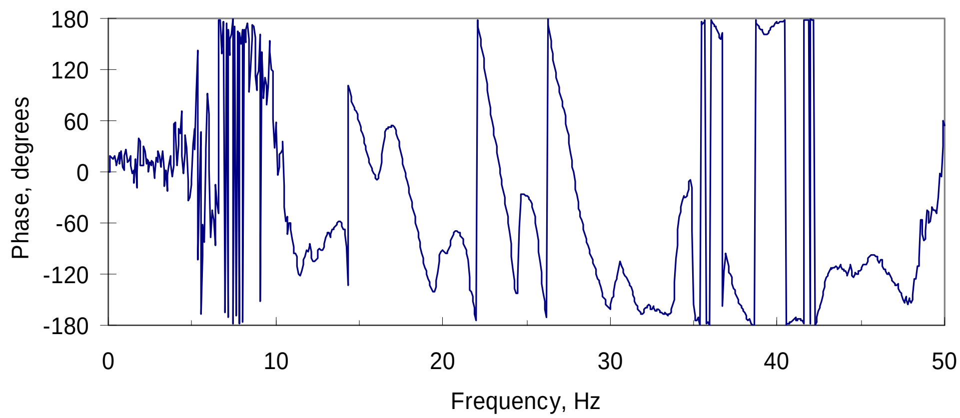

Figure 21.10 Phase Plots Measured by SASW Testing with 125-ft Receiver Spacing

Table 21.1 Table of Masking Parameters Used on Data Collected at Cheng-Jung Elementary School

Receiver Spacing	Masking Interval	Masking Start Frequency, Hz	Masking Stop Frequency, Hz	Number of Jumps
3 ft	1	0.0	89.0	1
	2	110.5	214.5	2
	3	351.5	357.5	3
6 ft	1	0.0	50.5	1
	2	117.5	223.0	3
	3	332.5	400.0	-
12 ft	1	0.0	29.0	1
	2	30.8	33.5	1
	3	63.3	114.8	3
	4	152.0	154.0	4
	5	195.3	200.0	-
25 ft	1	0.0	20.1	1
	2	20.8	33.3	1
	3	47.4	81.3	4
50 ft	1	0.0	12.3	1
75 ft	1	0.0	15.4	1
	2	24.9	50.0	-
125 ft	1	0.0	16.9	1
	2	29.8	50.0	-

Performed by______________________ Checked by______________________

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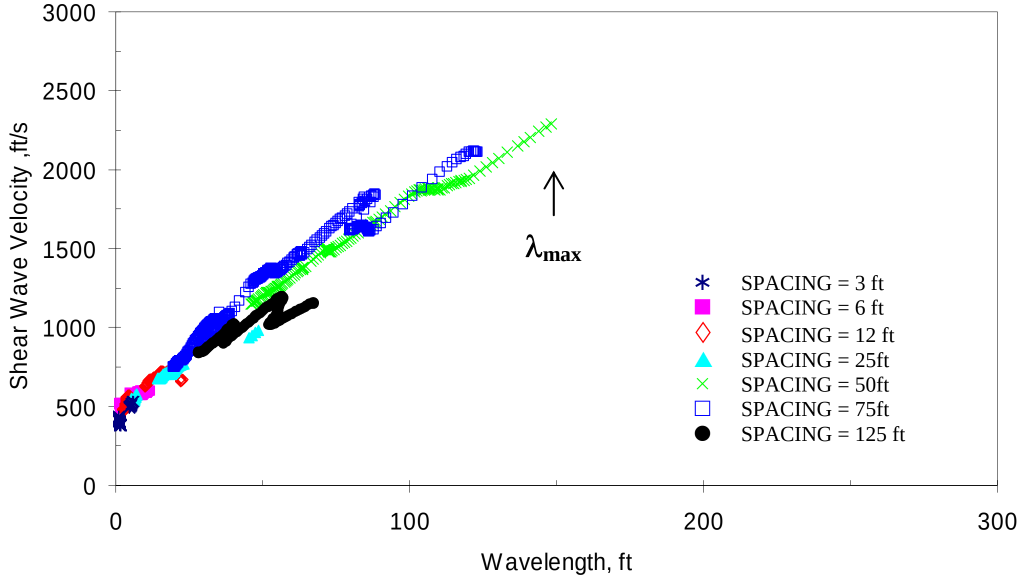

Figure 21.11 Experimental Dispersion Curve Measured at Cheng-Jung Elementary School; Linear Wavelength Axis

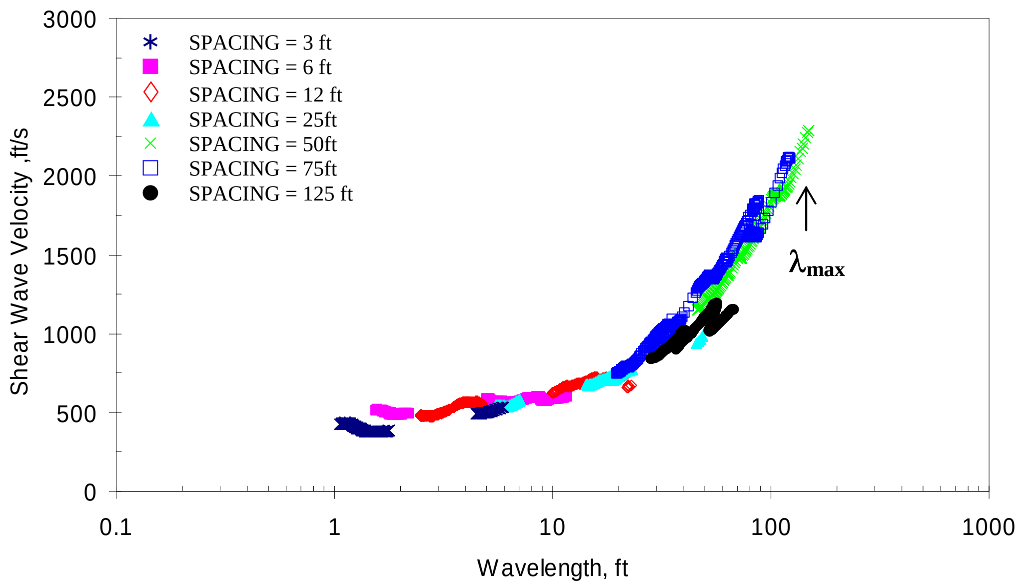

Figure 21.12 Experimental Dispersion Curve Measured at Cheng-Jung Elementary School; Logarithmic Wavelength Axis

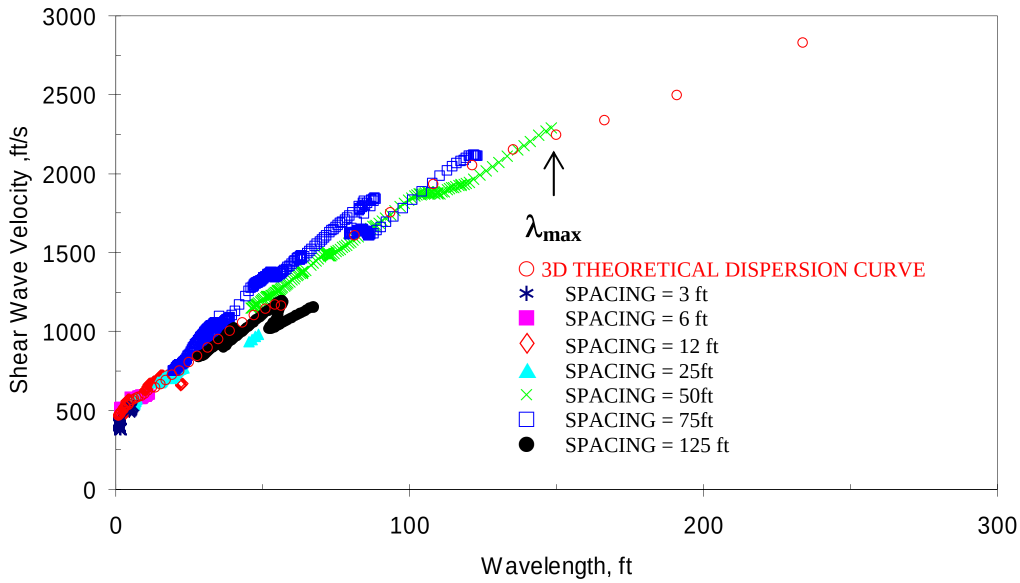

Figure 21.13 Experimental and Theoretical Dispersion Curves from Cheng-Jung Elementary School; Linear Wavelength Axis

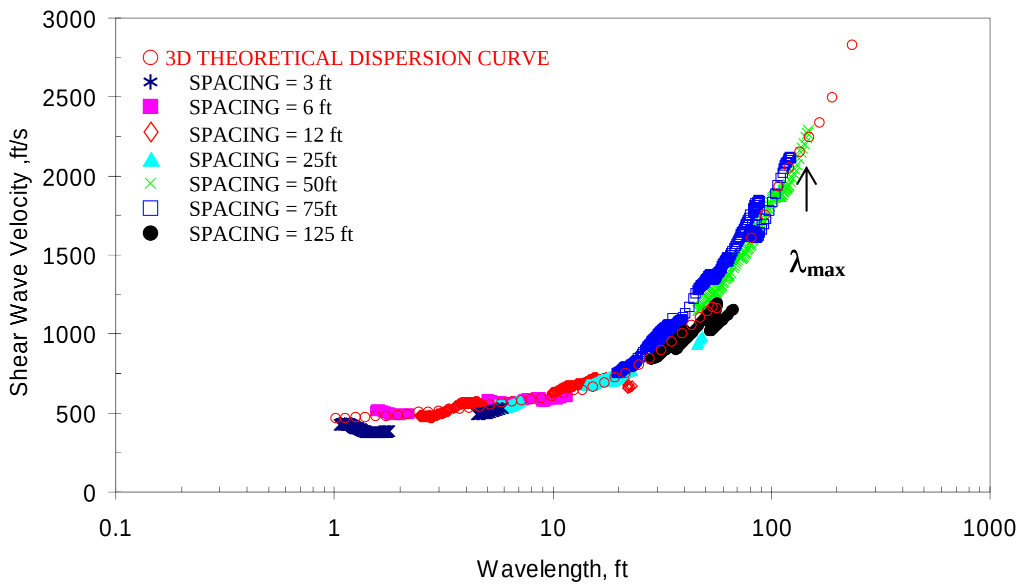

Figure 21.14 Experimental and Theoretical Dispersion Curves from Cheng-Jung Elementary School; Logarithmic Wavelength Axis

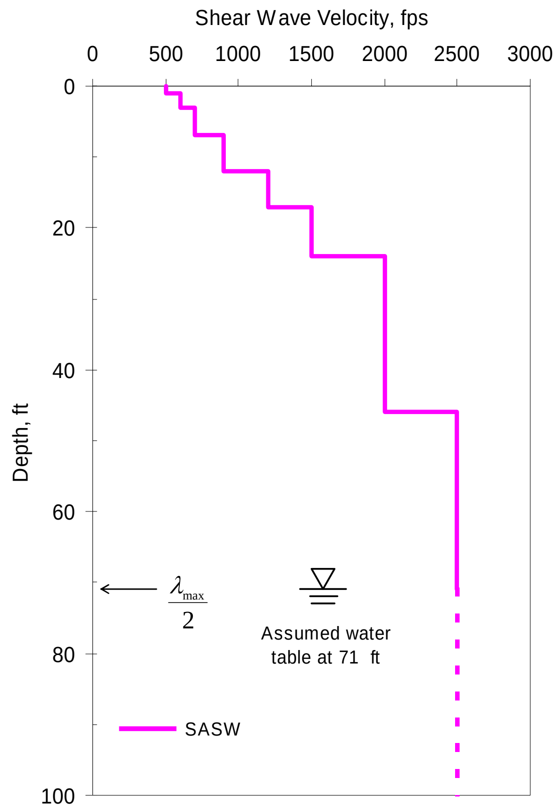

Figure 21.15 Shear Wave Velocity Profile Determined at Cheng-Jung Elementary School

Table 21.2 Profile Parameters Used to Develop Theoretical Dispersion Curve at Cheng-Jung Elementary School

Layer No.	Thickness, ft	Depth to the bottom, ft	P-Wave Velocity, ft/s	S-Wave Velocity, ft/s	Poisson's Ratio	Total Unit Weight, pcf
1	1.0	1	866	500	0.25	120
2	2.0	3	1039	600	0.25	120
3	4.0	7	1212	700	0.25	120
4	5.0	12	1559	900	0.25	120
5	5.0	17	5000	1200	0.47	120
6	7.0	24	5000	1500	0.45	120
7	22.0	46	5000	2000	0.40	120
8	21.0	67	5000	2500	0.33	125

Performed by________________________ Checked by_______________________
Yin-Cheng Lin Brent L. Rosenblad

Table 21.3 Uniform Building Code (UBC-97) Site Classification of Cheng-Jung Elementary School

Average Shear Wave Velocity of Top 30 meters (100 ft), $V_{s,30}$ (ft/s) [m/s]	Site Classification
1720 [524]	C

Performed by________________________ Checked by________________________
Yin-Cheng Lin Brent L. Rosenblad

Table 21.4 UBC-97 Site Categories

Soil Profile Type	Average Shear Wave Velocity of Top 30 m, $V_{s,30}$ (m/s) [Top100 ft, $V_{s,100}$ (ft/s)]	Description
S_A	$V_{s,30}$>1500 m/s [$V_{s,100}$>5000 ft/s]	Hard rock
S_B	760 m/s < $V_{s,30}$≤1500 m/s [2500 ft/s < $V_{s,100}$≤5000 ft/s]	Rock
S_C	360 m/s < $V_{s,30}$≤760 m/s [1200 ft/s < $V_{s,100}$≤2500 ft/s]	Very dense soil and soft rock
S_D	180 m/s ≤ $V_{s,30}$≤360 m/s [600 ft/s < $V_{s,100}$≤1200 ft/s]	Stiff Soil Profile
S_E	$V_{s,30}$< 180 m/s [$V_{s,100}$ < 600 ft/s]	Soft Soil Profile
S_F	-	Soils requiring site-specific evaluation.

Appendix 22

Site Location: Sin-Jai Elementary School (TCU-129)

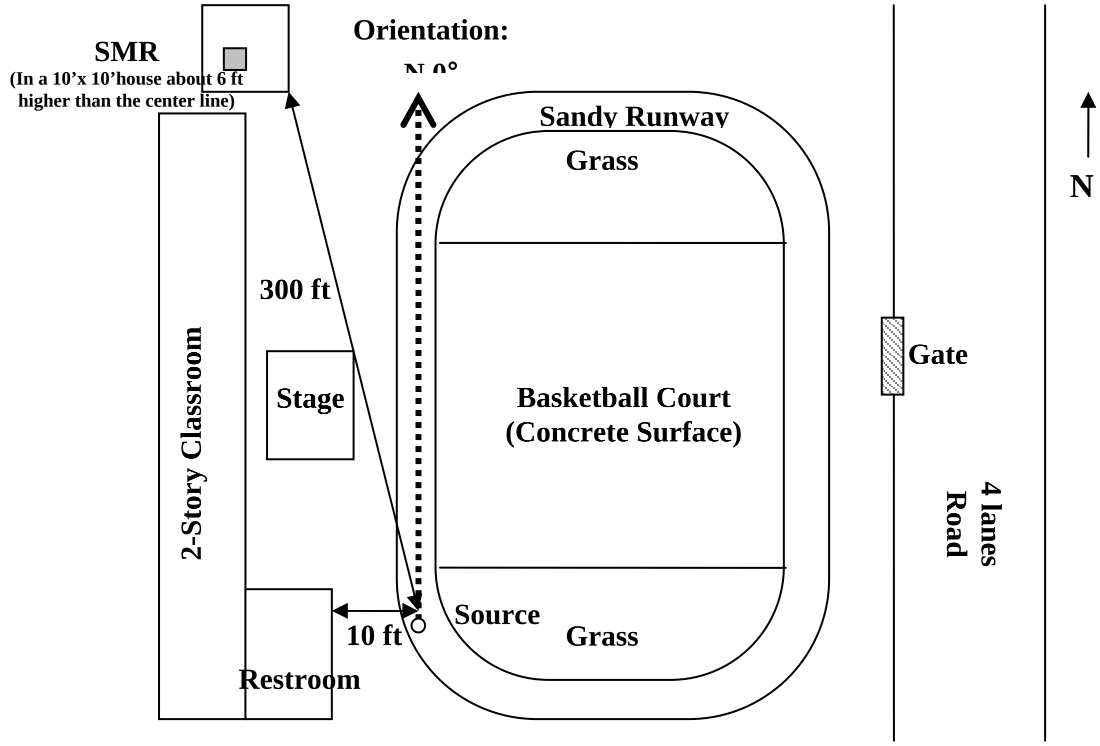

Figure 22.1 Site Map of Sin-Jai Elementary School

Figure 22.2 Picture Taken at Sin-Jai Elementary School (View # 1)

Figure 22.3 Picture Taken at Sin-Jai Elementary School (View # 2)

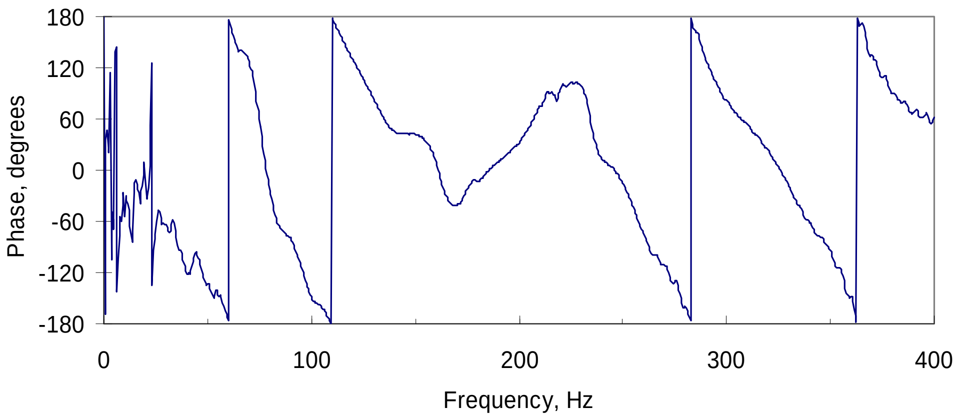

Figure 22.4 Phase Plots Measured by SASW Testing with 6-ft Receiver Spacing

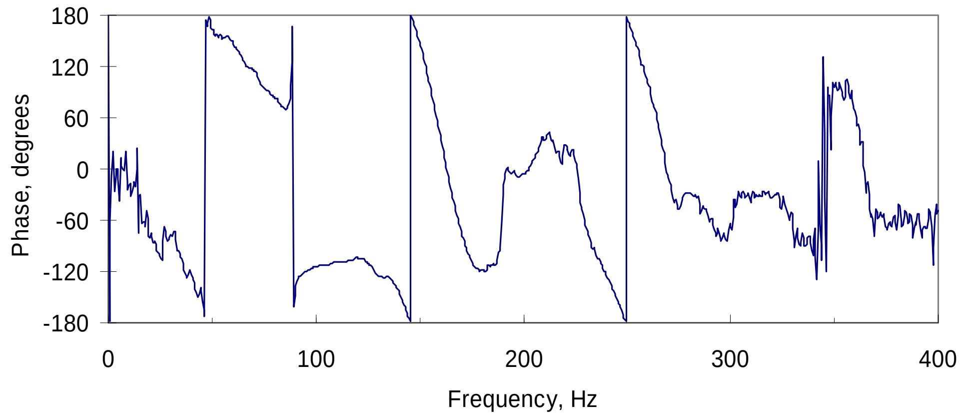

Figure 22.5 Phase Plots Measured by SASW Testing with 12-ft Receiver Spacing

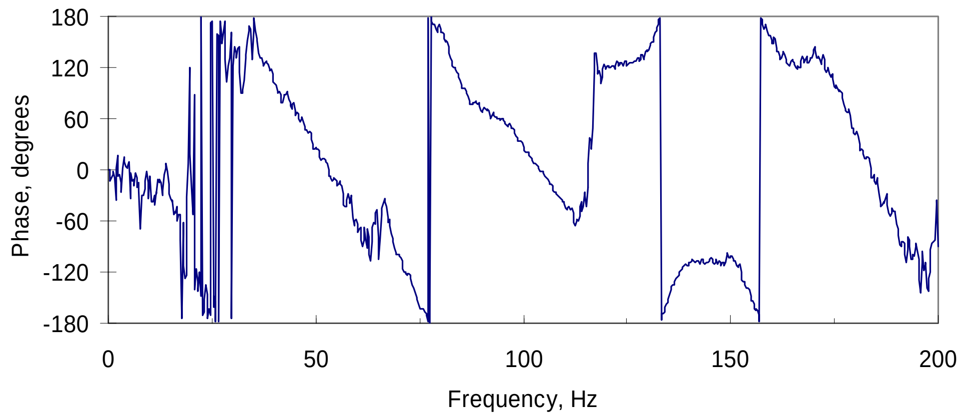

Figure 22.6 Phase Plots Measured by SASW Testing with 25-ft Receiver Spacing

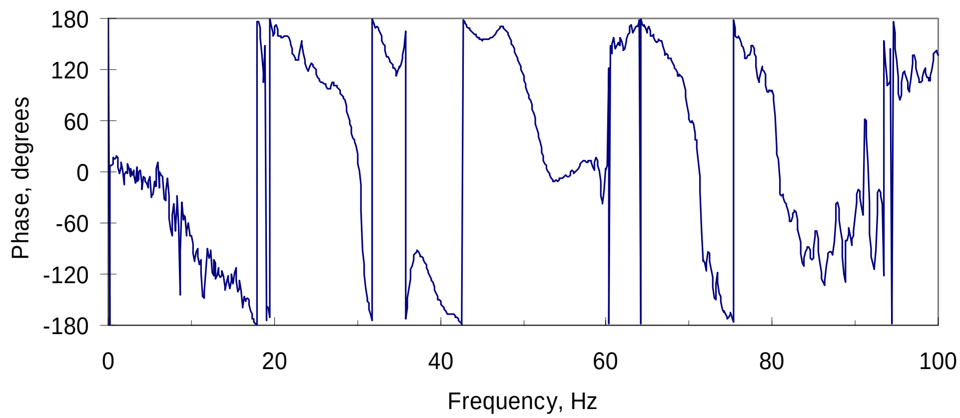

Figure 22.7 Phase Plots Measured by SASW Testing with 50-ft Receiver Spacing

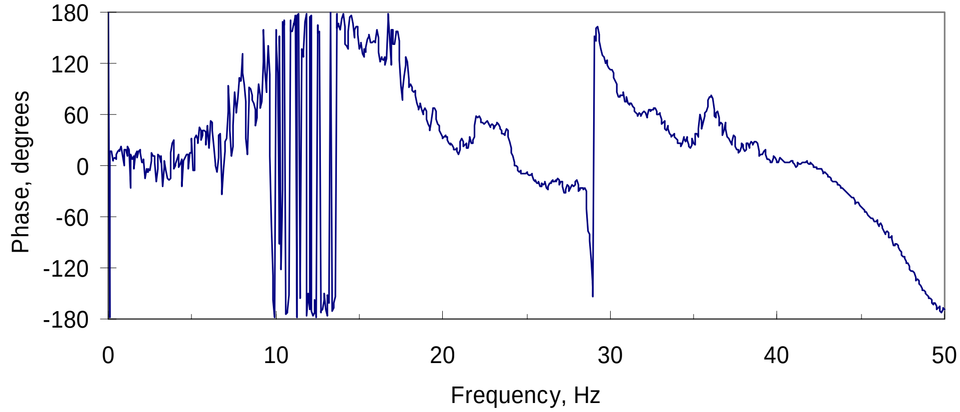

Figure 22.8 Phase Plots Measured by SASW Testing with 75-ft Receiver Spacing

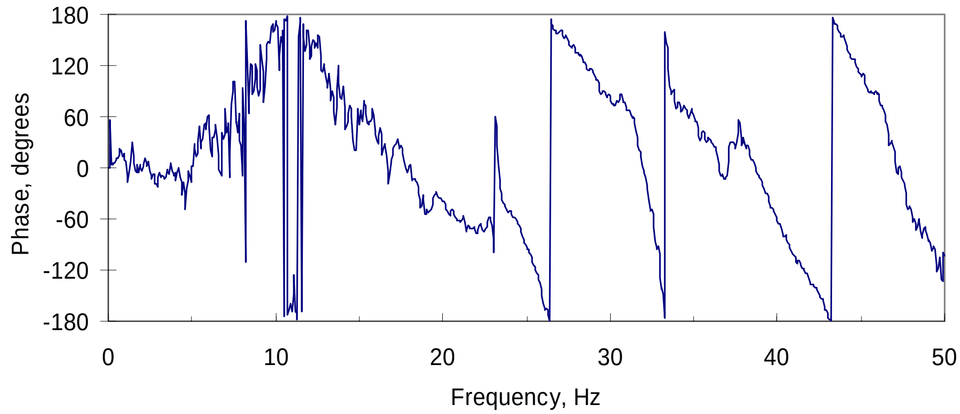

Figure 22.9 Phase Plots Measured by SASW Testing with 100-ft Receiver Spacing

Table 22.1 Table of Masking Parameters Used on Data Collected at Sin-Jai Elementary School

Receiver Spacing	Masking Interval	Masking Start Frequency, Hz	Masking Stop Frequency, Hz	Number of Jumps
6 ft	1	0.0	110.0	1
	2	143.0	230.0	2
12 ft	1	0.0	47.5	1
	2	83.0	126.0	1
	3	178.0	400.0	-
25 ft	1	0.0	36.5	1
	2	58.0	69.5	1
	3	112.5	150.8	3
	4	165.0	200.0	-
50 ft	1	0.0	17.5	1
	2	21.0	24.3	1
	3	29.5	36.0	2
	4	71.3	100.0	-
75 ft	1	0.0	13.8	1
	2	16.3	18.0	1
	3	21.0	29.3	2
	4	34.5	42.8	3
100 ft	1	0.0	11.4	1
	2	11.5	11.6	1
	3	13.5	14.9	1
	4	16.5	17.3	1
	5	21.1	26.4	2

Performed by______________________ Checked by______________________
Yin-Cheng Lin Brent L. Rosenblad

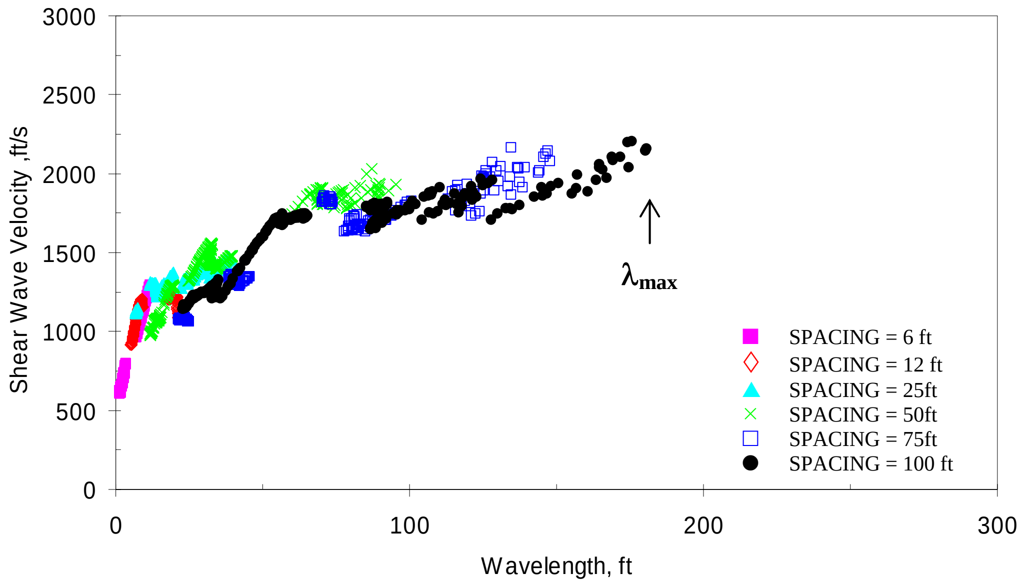

Figure 22.10 Experimental Dispersion Curve Measured at Sin-Jai Elementary School; Linear Wavelength Axis

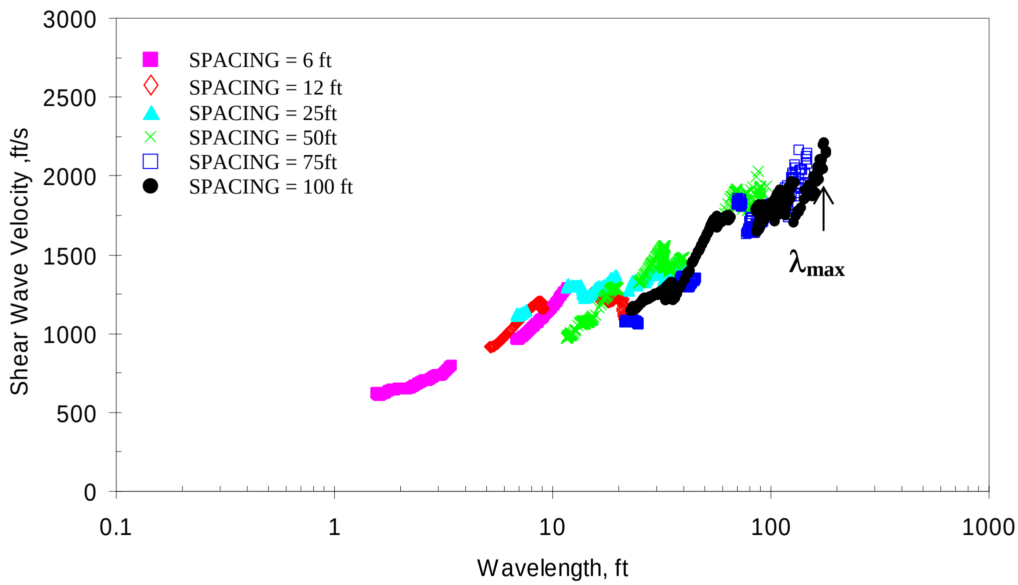

Figure 22.11 Experimental Dispersion Curve Measured at Sin-Jai Elementary School; Logarithmic Wavelength Axis

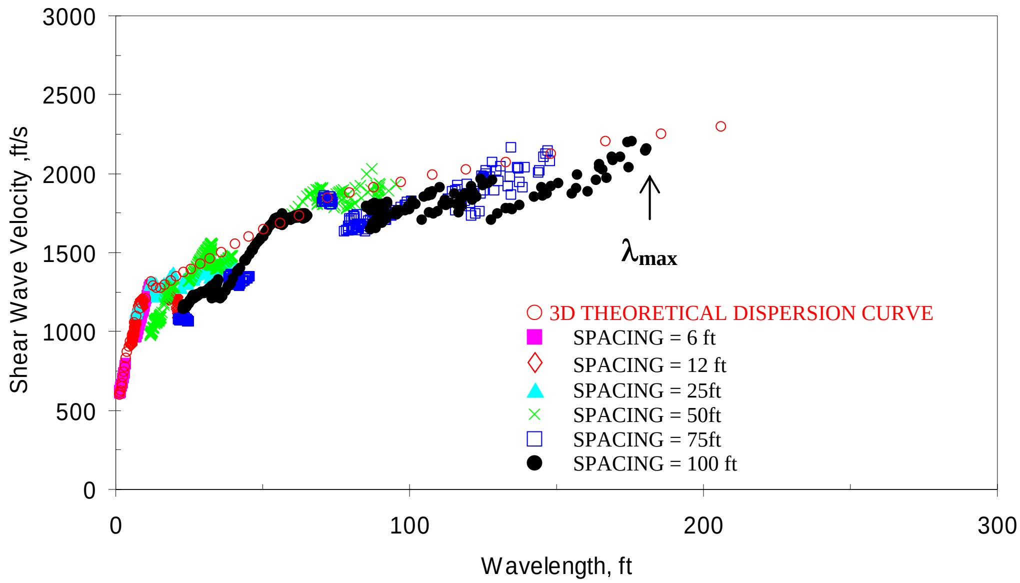

Figure 22.12 Experimental and Theoretical Dispersion Curves from Sin-Jai Elementary School; Linear Wavelength Axis

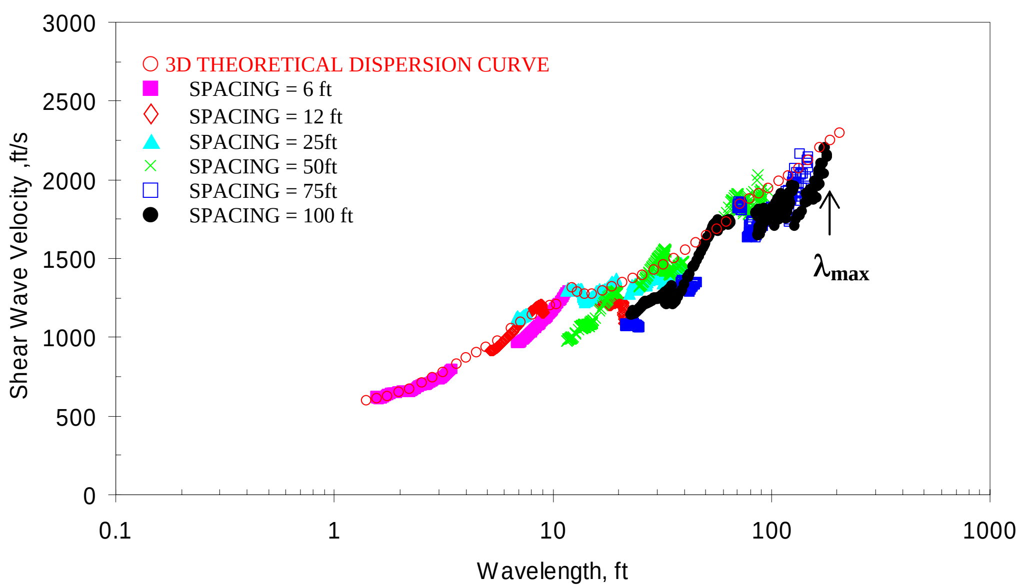

Figure 22.13 Experimental and Theoretical Dispersion Curves from Sin-Jai Elementary School; Logarithmic Wavelength Axis

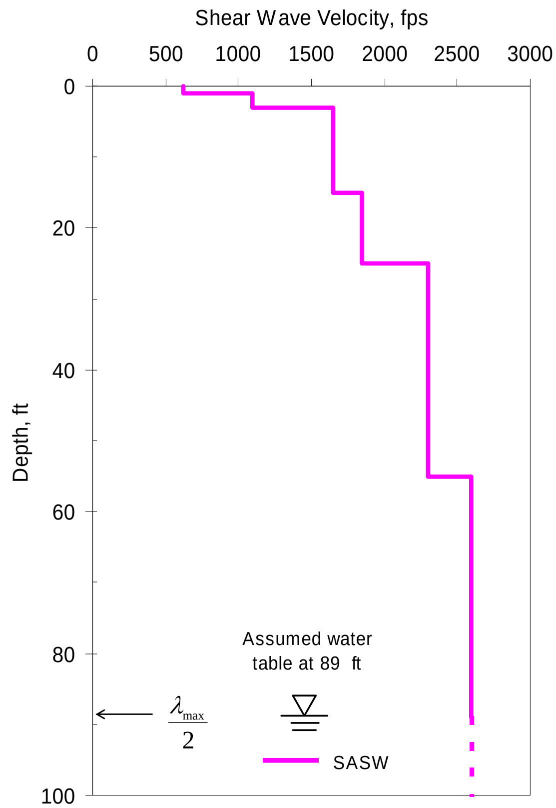

Figure 22.14 Shear Wave Velocity Profile Determined at Sin-Jai Elementary School

Table 22.2 Profile Parameters Used to Develop Theoretical Dispersion Curve at Sin-Jai Elementary School

Layer No.	Thickness, ft	Depth to the bottom, ft	P-Wave Velocity, ft/s	S-Wave Velocity, ft/s	Poisson's Ratio	Total Unit Weight, pcf
1	1.0	1	1074	620	0.25	120
2	2.0	3	1905	1100	0.25	120
3	12.0	15	2858	1650	0.25	120
4	10.0	25	3204	1850	0.25	120
5	30.0	55	3984	2300	0.25	125
6	34.0	89	4503	2600	0.25	125

Performed by____________________ Checked by____________________
Yin-Cheng Lin Brent L. Rosenblad

Table 22.3 Uniform Building Code (UBC-97) Site Classification of Sin-Jai Elementary School

Average Shear Wave Velocity of Top 30 meters (100 ft), $V_{s,30}$ (ft/s) [m/s]	Site Classification
2180 [664]	C

Performed by________________________ Checked by________________________
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Table 22.4 UBC-97 Site Categories

Soil Profile Type	Average Shear Wave Velocity of Top 30 m, $V_{s,30}$ (m/s) [Top100 ft, $V_{s,100}$ (ft/s)]	Description
S_A	$V_{s,30}$>1500 m/s [$V_{s,100}$>5000 ft/s]	Hard rock
S_B	760 m/s < $V_{s,30}$≤1500 m/s [2500 ft/s < $V_{s,100}$≤5000 ft/s]	Rock
S_C	360 m/s < $V_{s,30}$≤760 m/s [1200 ft/s < $V_{s,100}$≤2500 ft/s]	Very dense soil and soft rock
S_D	180 m/s ≤ $V_{s,30}$≤360 m/s [600 ft/s < $V_{s,100}$≤1200 ft/s]	Stiff Soil Profile
S_E	$V_{s,30}$< 180 m/s [$V_{s,100}$ < 600 ft/s]	Soft Soil Profile
S_F	-	Soils requiring site-specific evaluation.

Appendix 23

Site Location: Kung-Chung Elementary School (TCU-052)

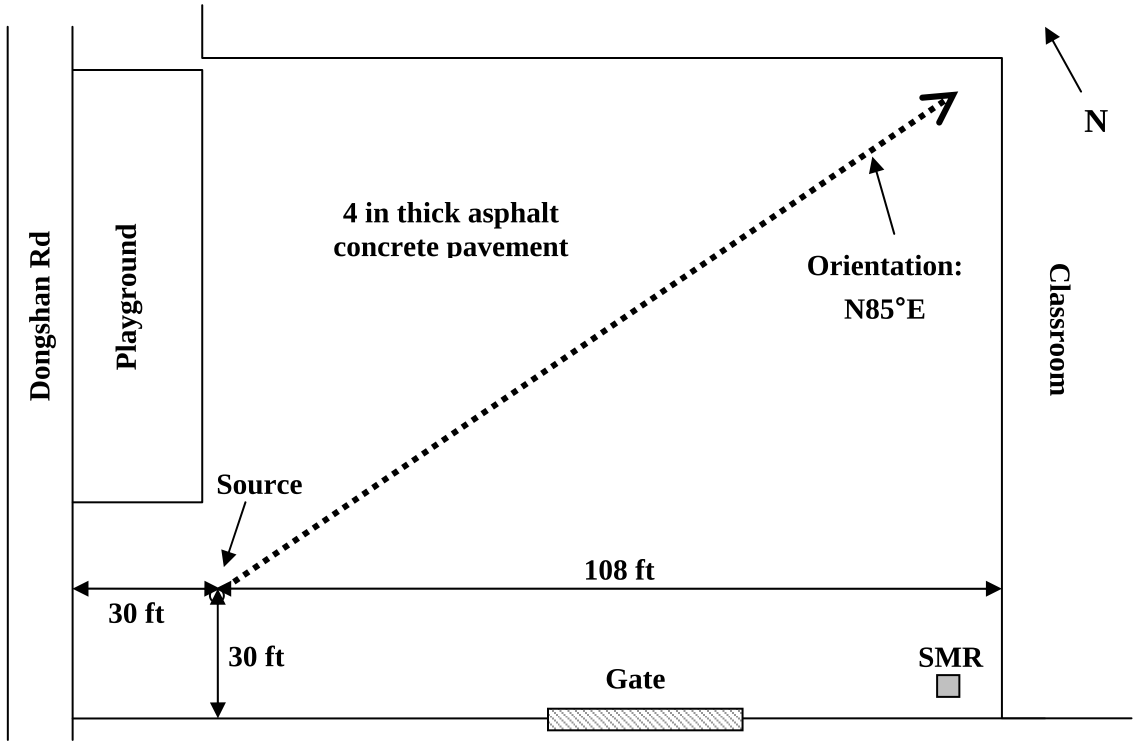

Figure 23.1 Site Map of Kung-Chung Elementary School

Figure 23.2 Picture Taken at Kung-Chung Elementary School (View # 1)

Figure 23.3 Picture Taken at Kung-Chung Elementary School (View # 2)

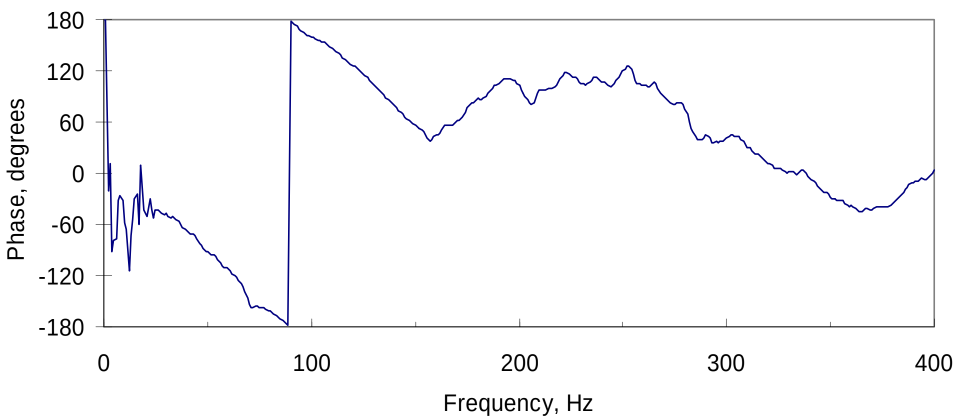

Figure 23.4 Phase Plots Measured by SASW Testing with 3-ft Receiver Spacing

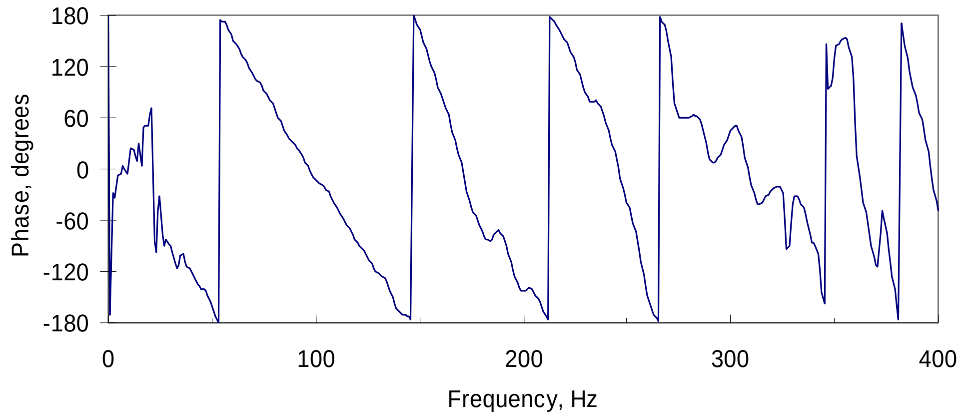

Figure 23.5 Phase Plots Measured by SASW Testing with 6-ft Receiver Spacing

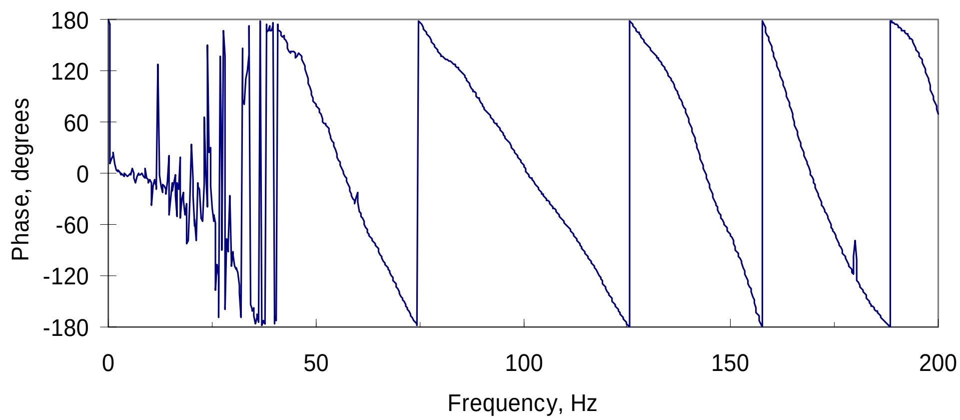

Figure 23.6 Phase Plots Measured by SASW Testing with 12-ft Receiver Spacing

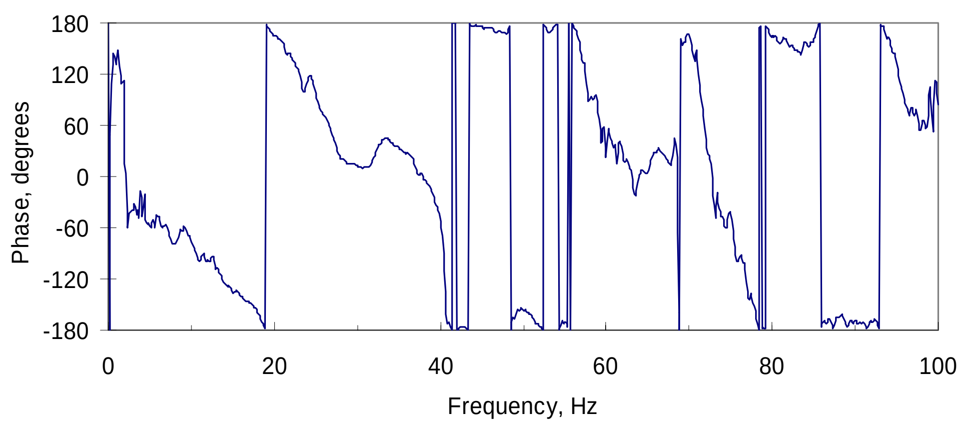

Figure 23.7 Phase Plots Measured by SASW Testing with 25-ft Receiver Spacing (Using dyna- source)

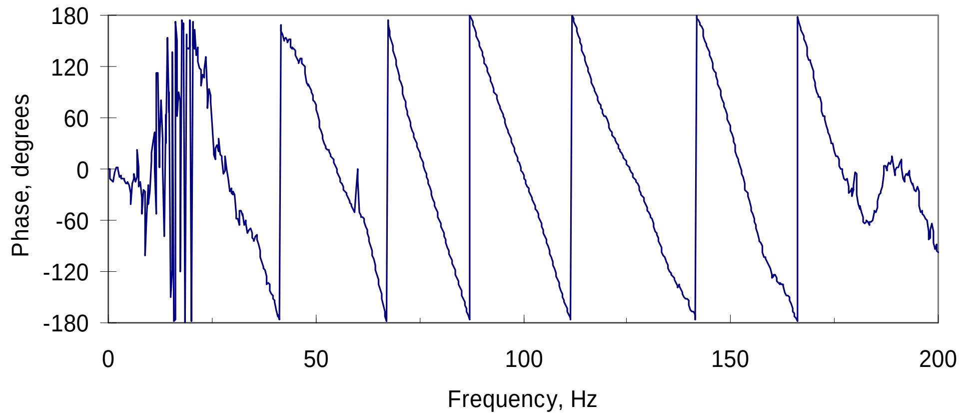

Figure 23.8 Phase Plots Measured by SASW Testing with 25-ft Receiver Spacing (Using sledge hammer)

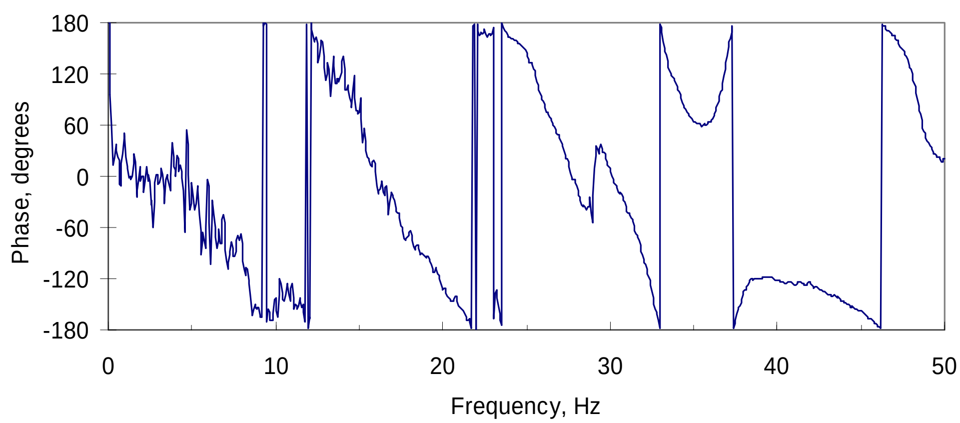

Figure 23.9 Phase Plots Measured by SASW Testing with 50-ft Receiver Spacing

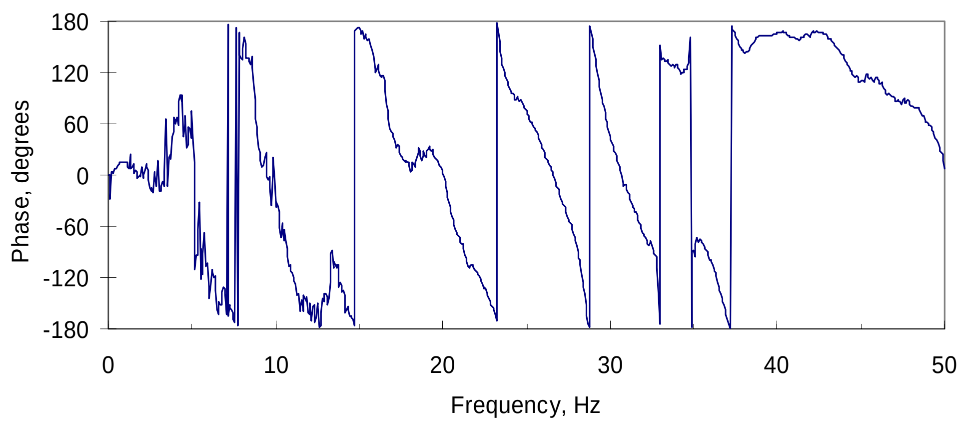

Figure 23.10 Phase Plots Measured by SASW Testing with 100-ft Receiver Spacing

Table 23.1 Table of Masking Parameters Used on Data Collected at Kung-Chung Elementary School

Receiver Spacing	Masking Interval	Masking Start Frequency, Hz	Masking Stop Frequency, Hz	Number of Jumps
3 ft	1	0.0	90.0	1
	2	161.0	400.0	-
6 ft	1	0.0	36.0	0
	2	266.0	400.0	-
12 ft	1	0.0	46.5	1
	2	179.3	180.8	4
25 ft (Using dyna-source)	1	0.0	13.5	0
	2	30.4	100.0	-
25 ft (Using sledge hammer)	1	0.0	20.3	1
	2	179.0	200.0	-
50 ft	1	0.0	12.2	1
	2	21.6	22.1	2
	3	22.9	23.9	2
	4	27.4	30.4	2
	5	35.4	50.0	-
100 ft	1	0.0	7.8	1
	2	8.6	13.4	1
	3	16.4	19.3	2
	4	32.9	50.0	-

Performed by______________________ Checked by______________________

Yin-Cheng Lin   Brent L. Rosenblad

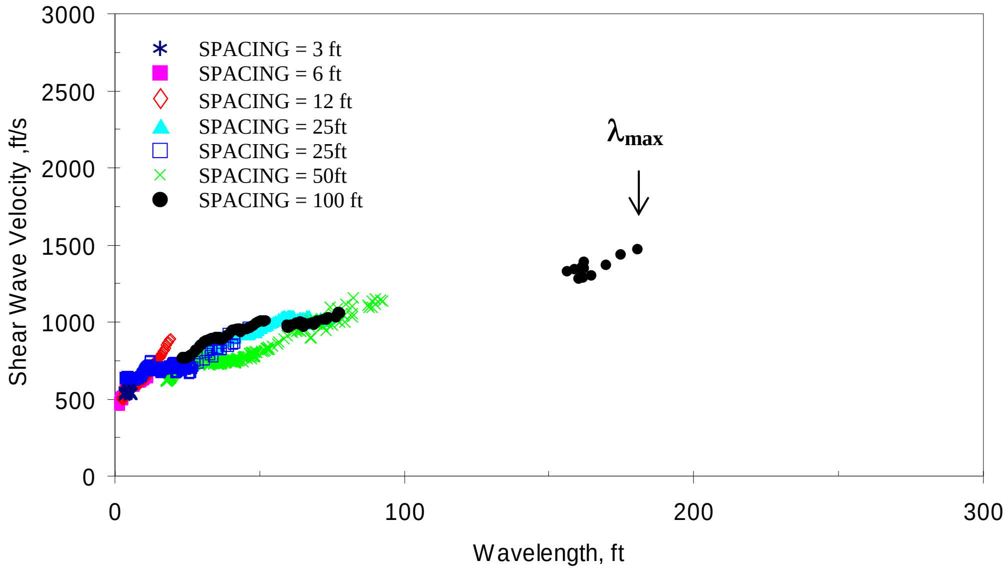

Figure 23.11 Experimental Dispersion Curve Measured at Kung-Chung Elementary School; Linear Wavelength Axis

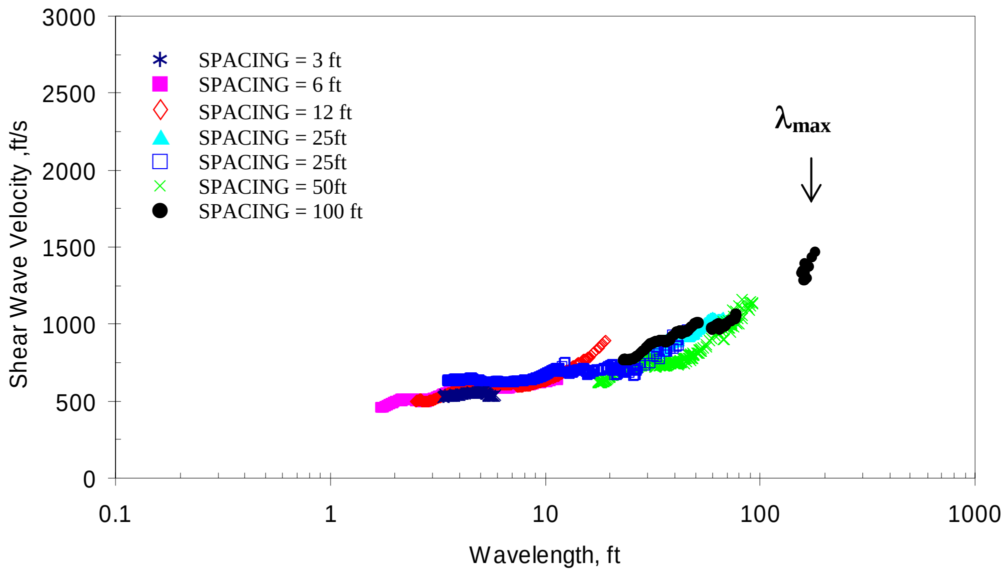

Figure 23.12 Experimental Dispersion Curve Measured at Kung-Chung Elementary School; Logarithmic Wavelength Axis

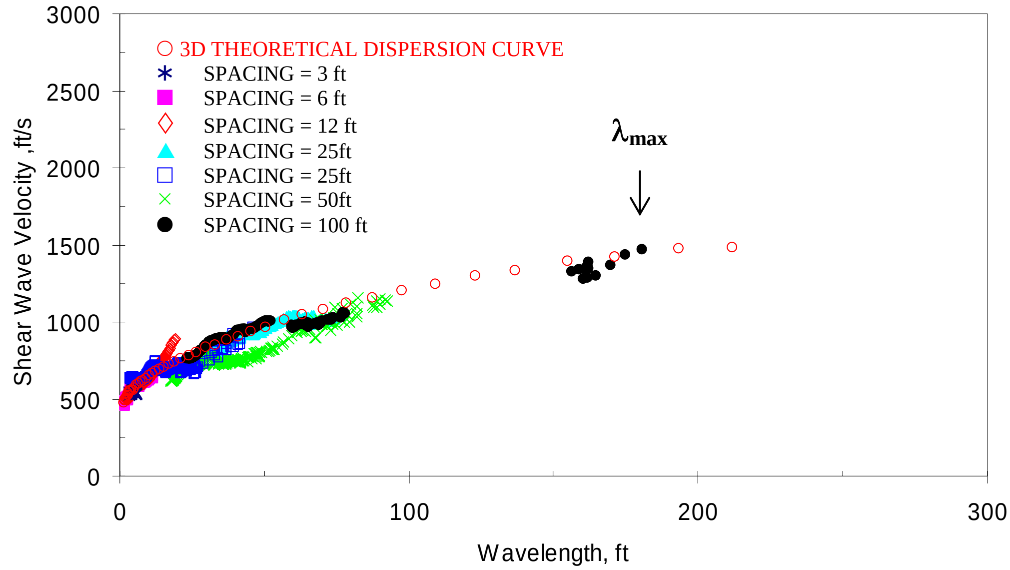

Figure 23.13 Experimental and Theoretical Dispersion Curves from Kung-Chung Elementary School; Linear Wavelength Axis

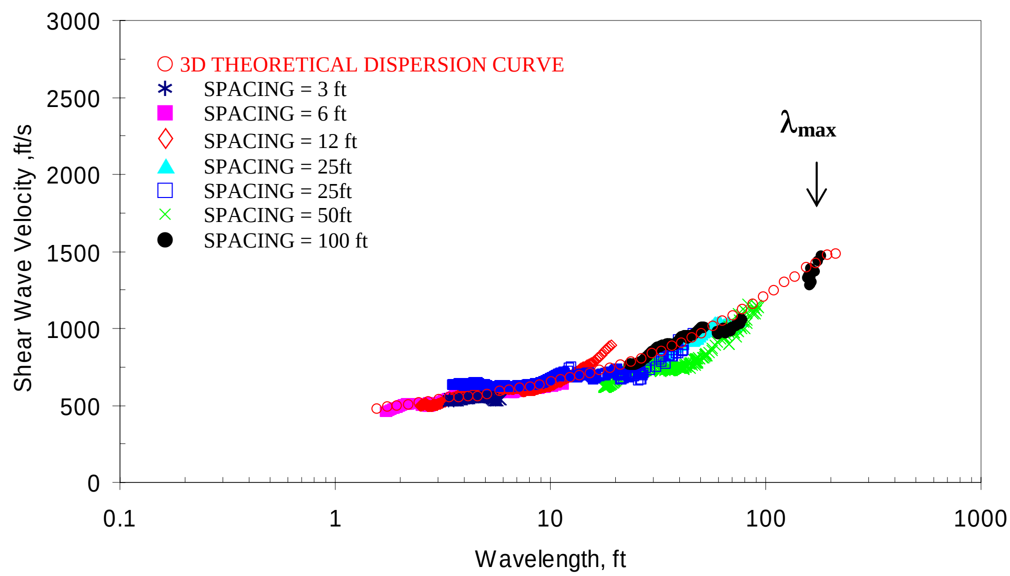

Figure 23.14 Experimental and Theoretical Dispersion Curves from Kung-Chung Elementary School; Logarithmic Wavelength Axis

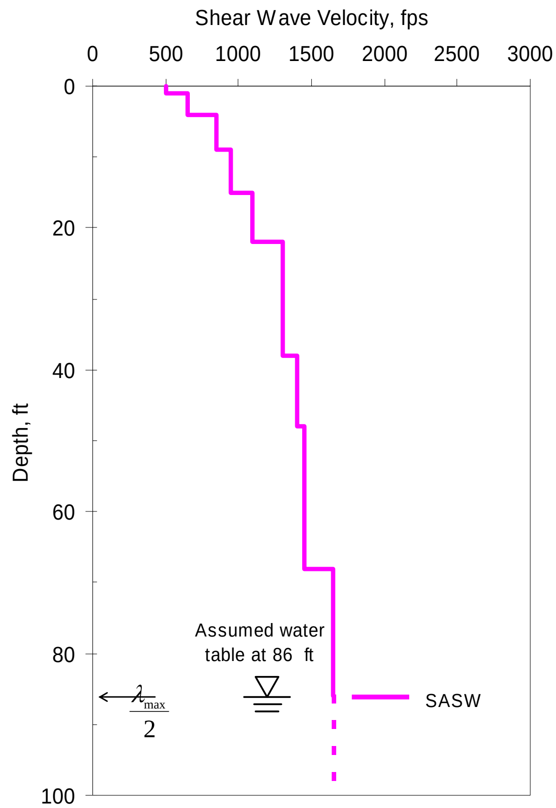

Figure 23.15 Shear Wave Velocity Profile Determined at Kung-Chung Elementary School

Table 23.2 Profile Parameters Used to Develop Theoretical Dispersion Curve at Kung-Chung Elementary School

Layer No.	Thickness, ft	Depth to the bottom, ft	P-Wave Velocity, ft/s	S-Wave Velocity, ft/s	Poisson's Ratio	Total Unit Weight, pcf
1	1	1	866	500	0.25	120
2	3	4	1126	650	0.25	120
3	5	9	1472	850	0.25	120
4	6	15	1646	950	0.25	120
5	7	22	5000	1100	0.47	120
6	16	38	5000	1300	0.46	120
7	10	48	5000	1400	0.46	120
8	20	68	5000	1450	0.45	120
9	18	86	5000	1650	0.44	120

Performed by________________________Checked by________________________

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Table 23.3 Uniform Building Code (UBC-97) Site Classification of Kung-Chung Elementary School

Average Shear Wave Velocity of Top 30 meters (100 ft), $V_{s,30}$ (ft/s) [m/s]	Site Classification
1290 [393]	C

Performed by______________________Checked by_____________________
Yin-Cheng Lin Brent L. Rosenblad

Table 23.4 UBC-97 Site Categories

Soil Profile Type	Average Shear Wave Velocity of Top 30 m, $V_{s,30}$ (m/s) [Top100 ft, $V_{s,100}$ (ft/s)]	Description
S_A	$V_{s,30}$>1500 m/s [$V_{s,100}$>5000 ft/s]	Hard rock
S_B	760 m/s < $V_{s,30}$≤1500 m/s [2500 ft/s < $V_{s,100}$≤5000 ft/s]	Rock
S_C	360 m/s < $V_{s,30}$≤760 m/s [1200 ft/s < $V_{s,100}$≤2500 ft/s]	Very dense soil and soft rock
S_D	180 m/s ≤ $V_{s,30}$≤360 m/s [600 ft/s < $V_{s,100}$≤1200 ft/s]	Stiff Soil Profile
S_E	$V_{s,30}$< 180 m/s [$V_{s,100}$ < 600 ft/s]	Soft Soil Profile
S_F	-	Soils requiring site-specific evaluation.

Appendix 24

Site Location: Sin-San Elementary School (TCU-054)

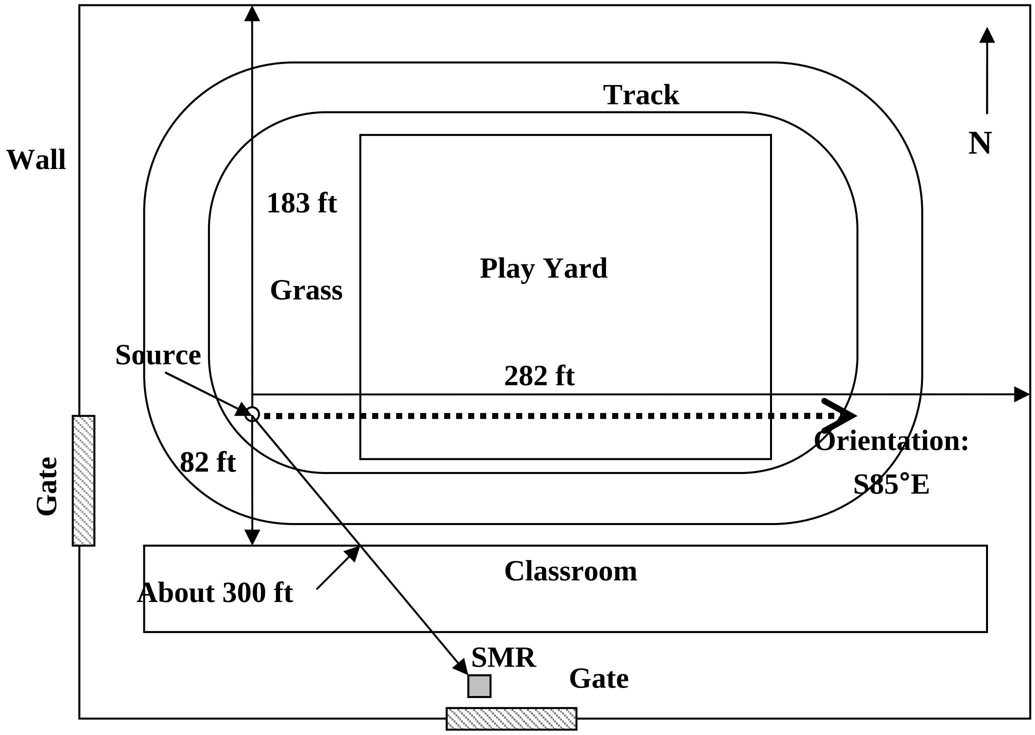

Figure 24.1 Site Map of Sin-San Elementary School

Figure 24.2 Picture Taken at Sin-San Elementary School (View # 1)

Figure 24.3 Picture Taken at Sin-San Elementary School (View # 2)

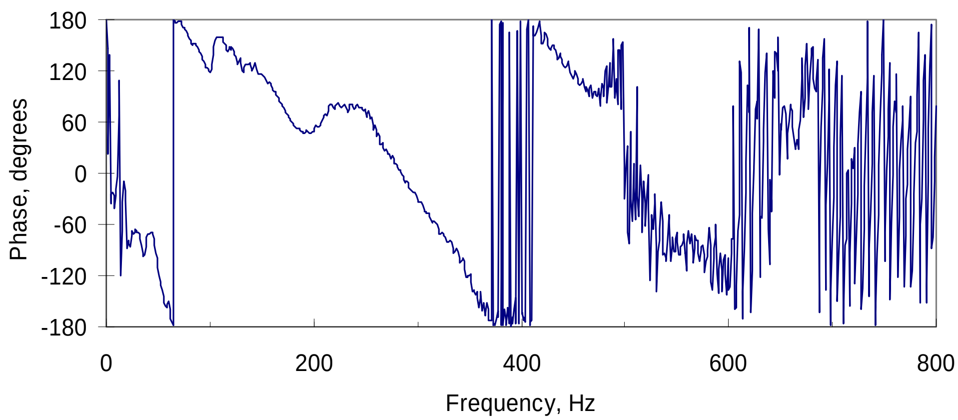

Figure 24.4 Phase Plots Measured by SASW Testing with 3-ft Receiver Spacing

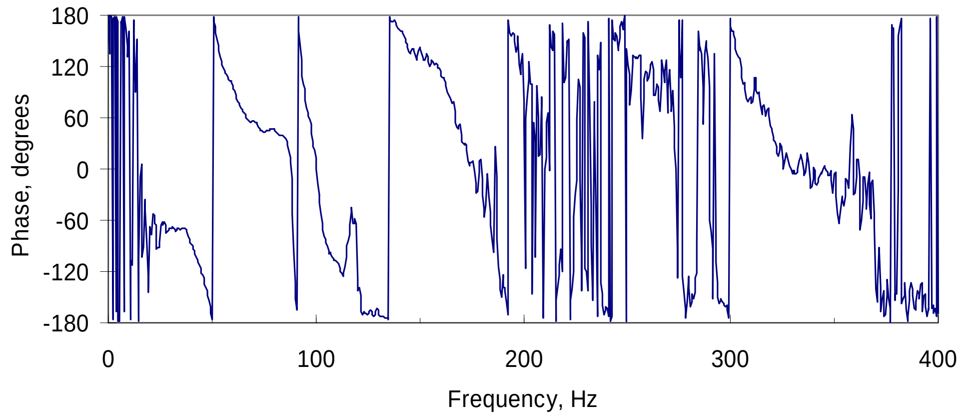

Figure 24.5 Phase Plots Measured by SASW Testing with 6-ft Receiver Spacing

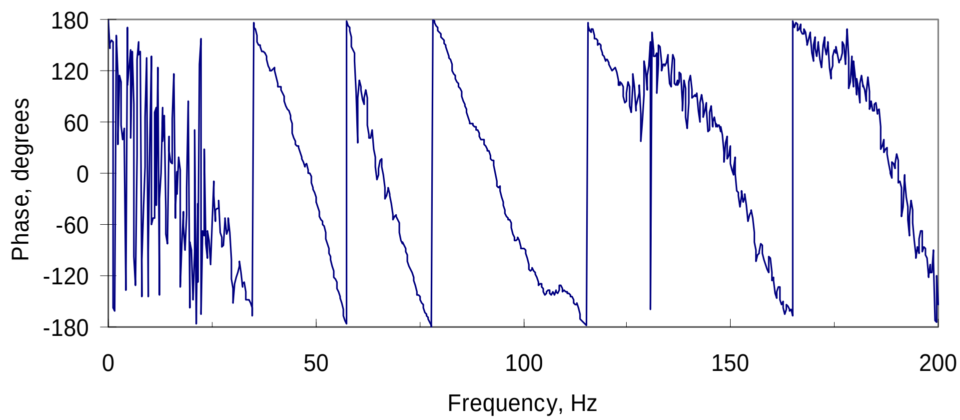

Figure 24.6 Phase Plots Measured by SASW Testing with 12-ft Receiver Spacing

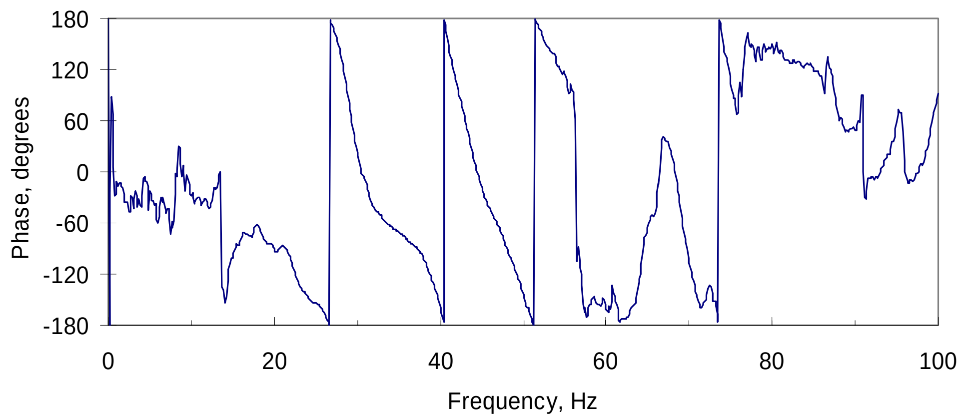

Figure 24.7 Phase Plots Measured by SASW Testing with 25-ft Receiver Spacing

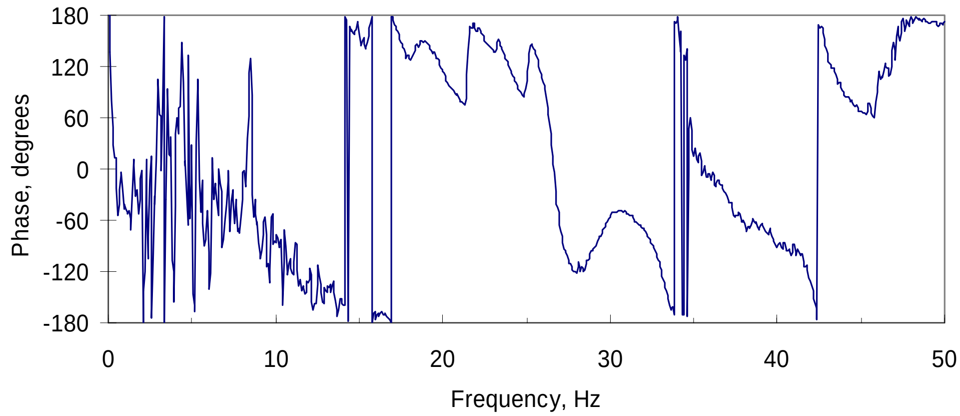

Figure 24.8 Phase Plots Measured by SASW Testing with 50-ft Receiver Spacing

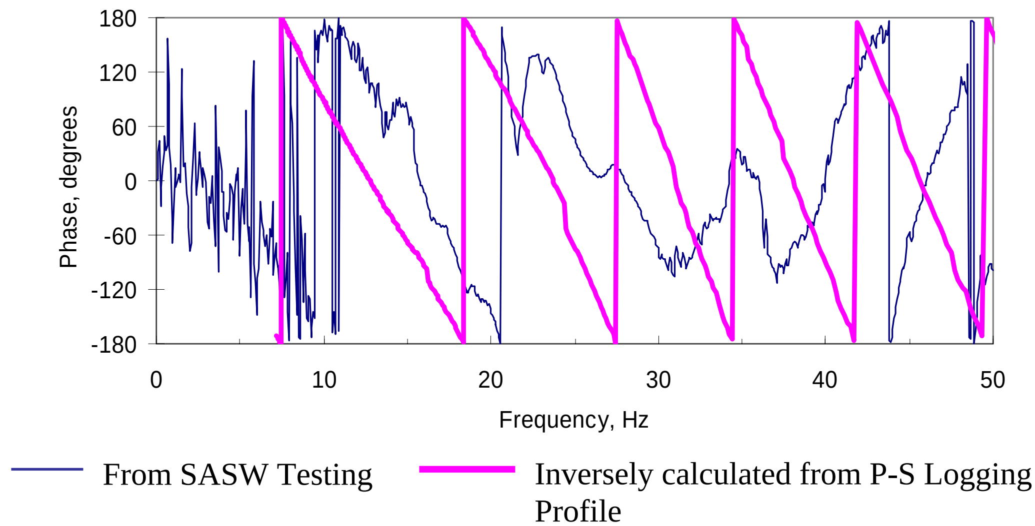

Figure 24.9 Phase Plots Measured by SASW Testing with 100-ft Receiver Spacing

Table 24.1 Table of Masking Parameters Used on Data Collected at Sin-San Elementary School

Receiver Spacing	Masking Interval	Masking Start Frequency, Hz	Masking Stop Frequency, Hz	Number of Jumps
3 ft	1	0.0	68.0	1
	2	98.0	253.0	2
	3	366.0	800.0	-
6 ft	1	0.0	37.5	0
	2	67.5	135.5	3
	3	174.5	400.0	-
12 ft	1	0.0	35.0	1
	2	124.8	200.0	-
25 ft	1	0.0	27.0	1
	2	51.4	100.0	-
50 ft	1	0.0	16.9	1
	2	21.2	31.1	1
	3	33.6	35.6	2
	4	45.6	50.0	2
100 ft	1	0.0	11.2	1
	2	20.6	23.4	2
	3	30.4	50.0	-

Performed by______________________ Checked by______________________
Yin-Cheng Lin Brent L. Rosenblad

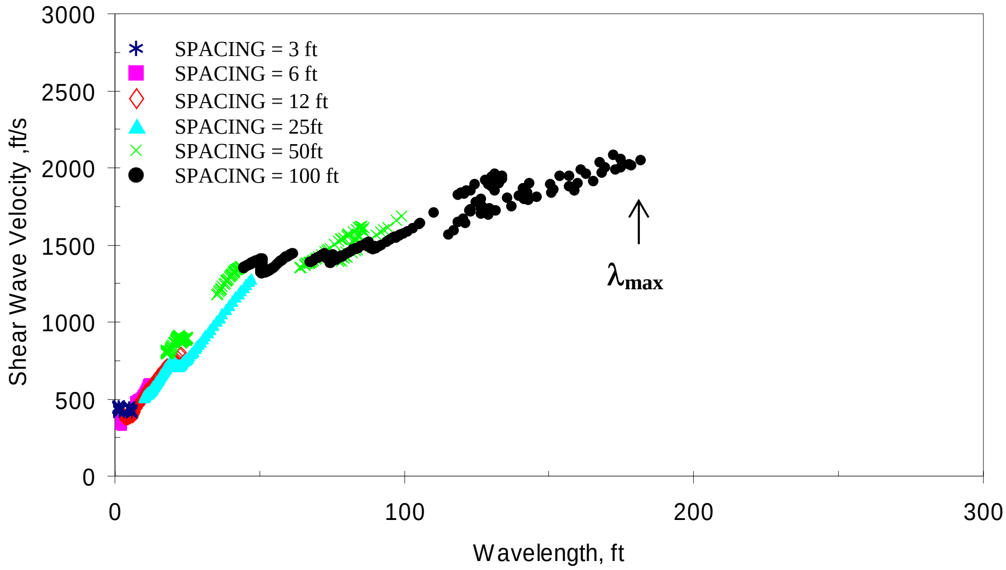

Figure 24.10 Experimental Dispersion Curve Measured at Sin-San Elementary School; Linear Wavelength Axis

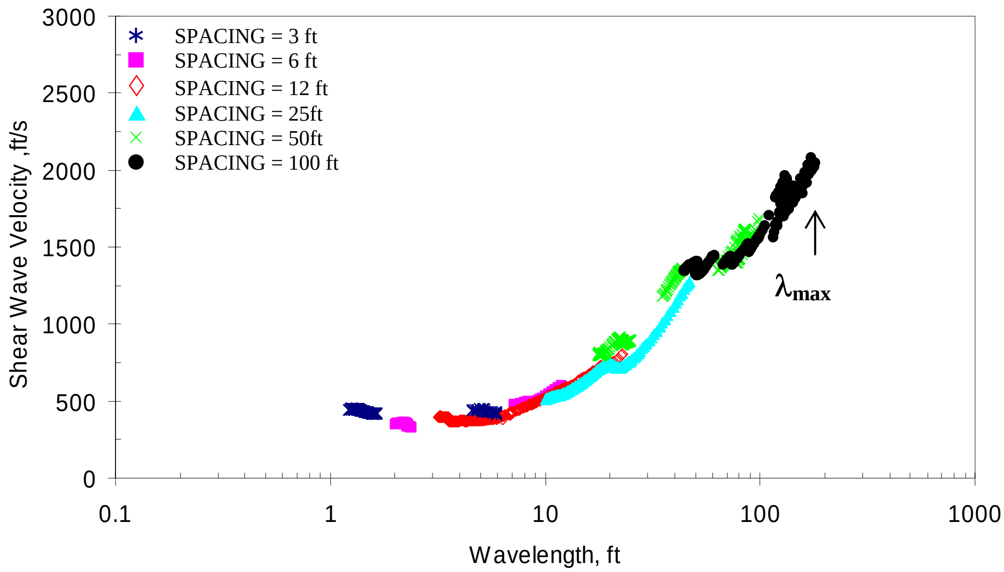

Figure 24.11 Experimental Dispersion Curve Measured at Sin-San Elementary School; Logarithmic Wavelength Axis

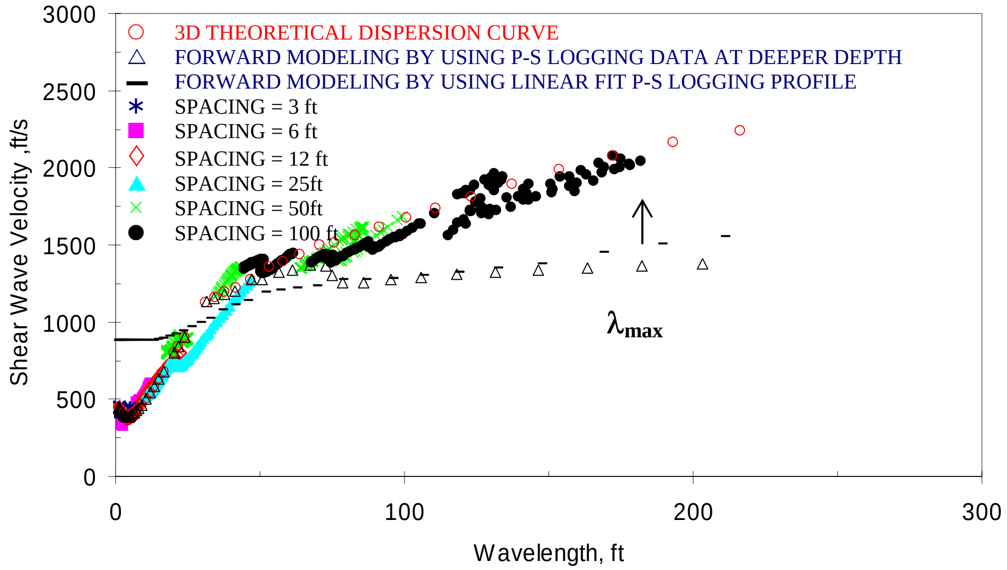

Figure 24.12 Experimental and Theoretical Dispersion Curves from Sin-San Elementary School; Linear Wavelength Axis

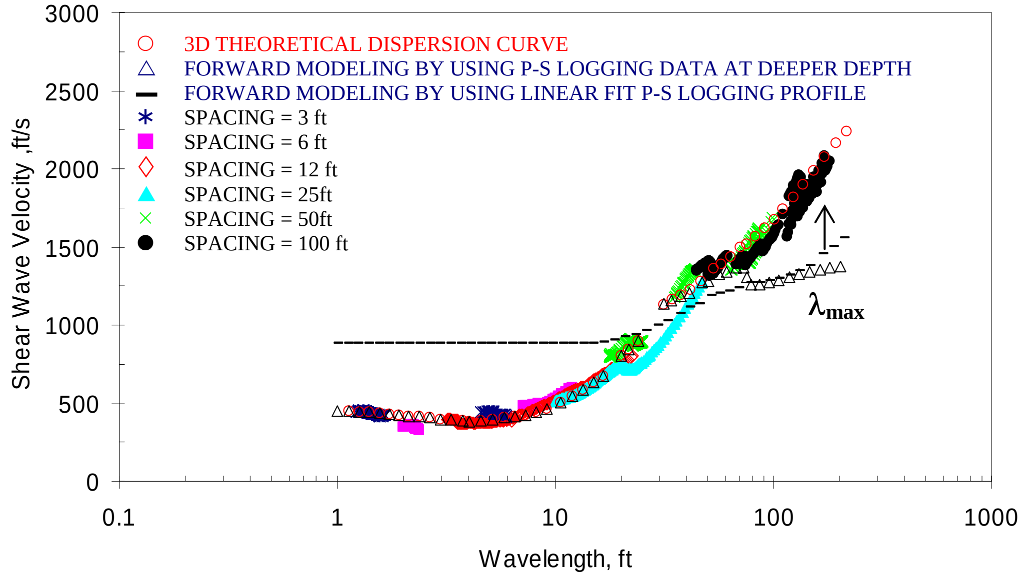

Figure 24.13 Experimental and Theoretical Dispersion Curves from Sin-San Elementary School; Logarithmic Wavelength Axis

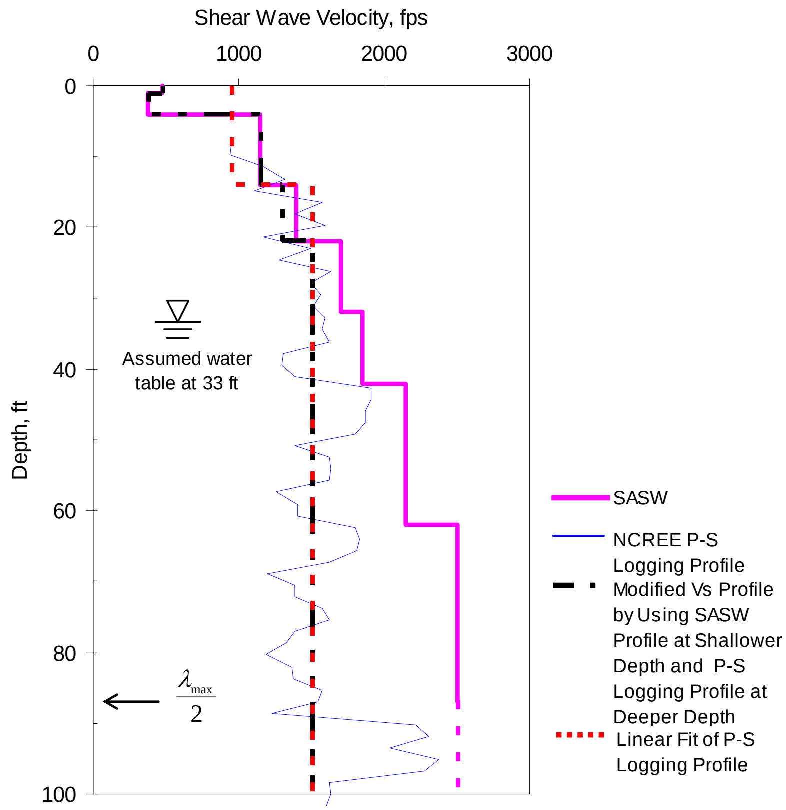

Figure 24.14 Shear Wave Velocity Profile Determined at Sin-San Elementary School

Table 24.2 Profile Parameters Used to Develop Theoretical Dispersion Curve at Sin-San Elementary School

Layer No.	Thickness, ft	Depth to the bottom, ft	P-Wave Velocity, ft/s	S-Wave Velocity, ft/s	Poisson's Ratio	Total Unit Weight, pcf
1	1	1	831	480	0.25	120
2	3	4	658	380	0.25	120
3	10	14	1992	1150	0.25	120
4	8	22	2425	1400	0.25	120
5	10	32	2945	1700	0.25	120
6	10	42	5000	1850	0.42	120
7	20	62	5000	2150	0.39	120
8	25	87	5000	2500	0.33	130

Performed by____________________ Checked by____________________

Yin-Cheng Lin Brent L. Rosenblad

Table 24.3 Uniform Building Code (UBC-97) Site Classification of Sin-San Elementary School

Average Shear Wave Velocity of Top 30 meters (100 ft), $V_{s,30}$ (ft/s) [m/s]	Site Classification
1660 [510]	C

Performed by________________________ Checked by________________________
Yin-Cheng Lin Brent L. Rosenblad

Table 24.4 UBC-97 Site Categories

Soil Profile Type	Average Shear Wave Velocity of Top 30 m, $V_{s,30}$ (m/s) [Top100 ft, $V_{s,100}$ (ft/s)]	Description
S_A	$V_{s,30}$ >1500 m/s [$V_{s,100}$ >5000 ft/s]	Hard rock
S_B	760 m/s < $V_{s,30}$ ≤1500 m/s [2500 ft/s < $V_{s,100}$ ≤5000 ft/s]	Rock
S_C	360 m/s < $V_{s,30}$ ≤760 m/s [1200 ft/s < $V_{s,100}$ ≤2500 ft/s]	Very dense soil and soft rock
S_D	180 m/s ≤ $V_{s,30}$ ≤360 m/s [600 ft/s < $V_{s,100}$ ≤1200 ft/s]	Stiff Soil Profile
S_E	$V_{s,30}$ < 180 m/s [$V_{s,100}$ < 600 ft/s]	Soft Soil Profile
S_F	-	Soils requiring site-specific evaluation.

Appendix 25

Site Location: Tai-Chung Weather Station (TCU-082)

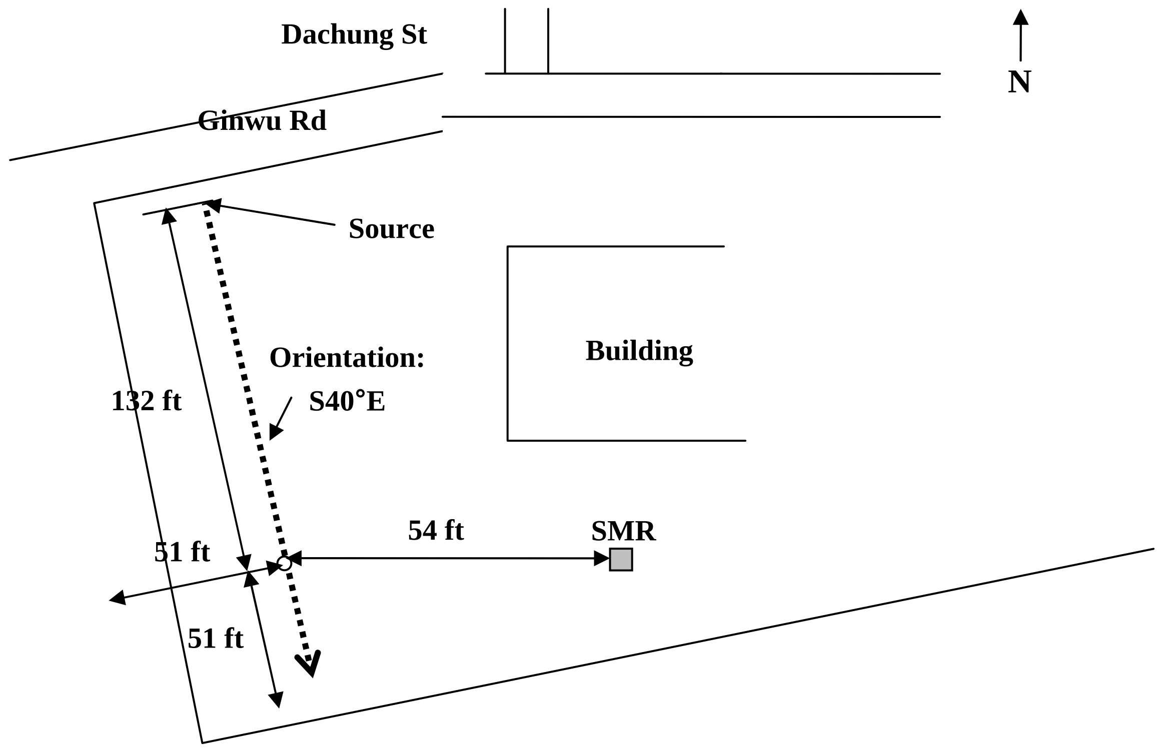

Figure 25.1 Site Map of Tai-Chung Weather Station

Figure 25.2 Picture Taken at Tai-Chung Weather Station (View # 1)

Figure 25.3 Picture Taken at Tai-Chung Weather Station (View # 2)

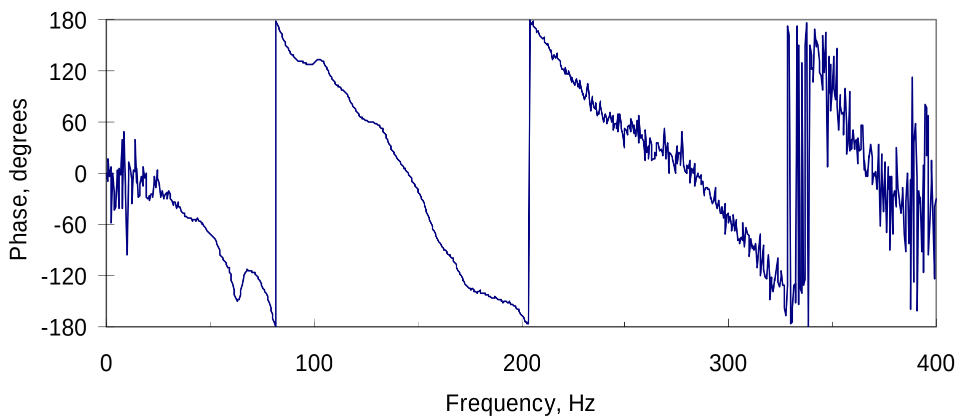

Figure 25.4 Phase Plots Measured by SASW Testing with 3-ft Receiver Spacing

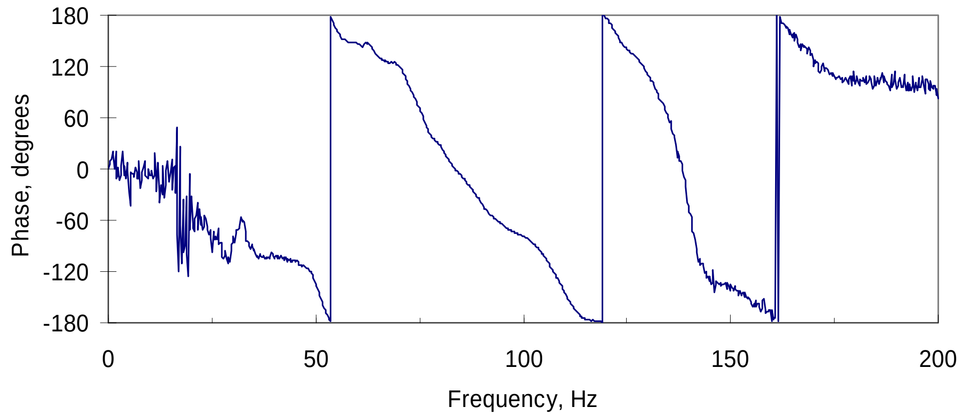

Figure 25.5 Phase Plots Measured by SASW Testing with 6-ft Receiver Spacing

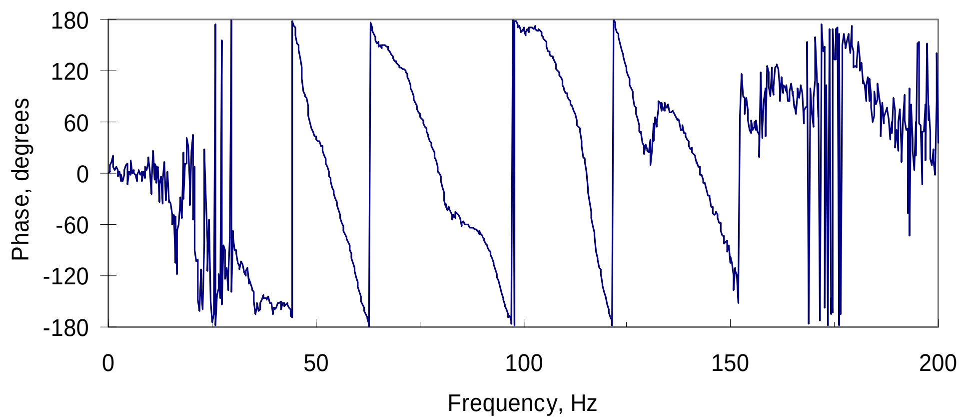

Figure 25.6 Phase Plots Measured by SASW Testing with 12-ft Receiver Spacing

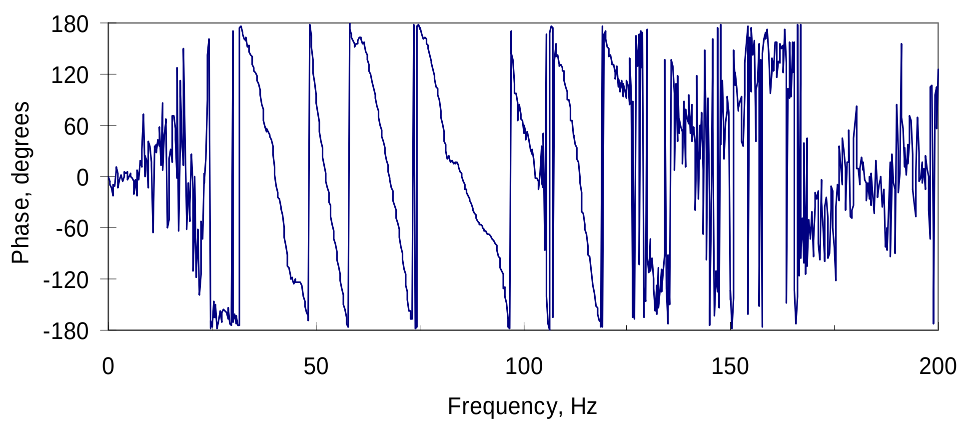

Figure 25.7 Phase Plots Measured by SASW Testing with 25-ft Receiver Spacing

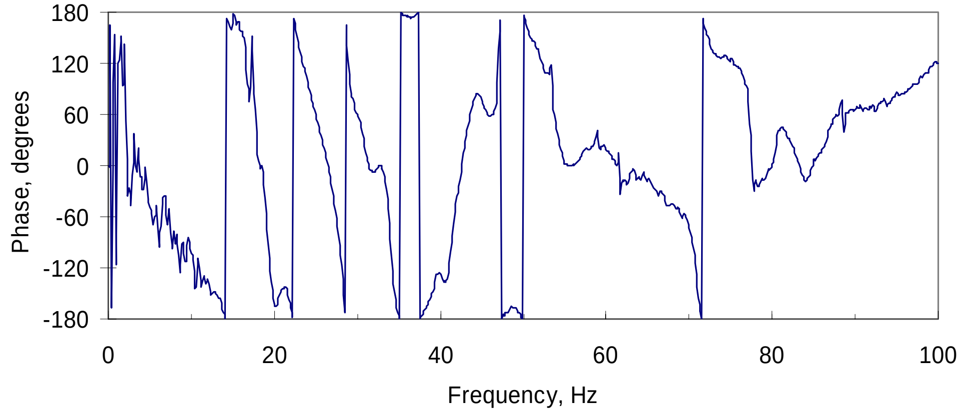

Figure 25.8 Phase Plots Measured by SASW Testing with 50-ft Receiver Spacing

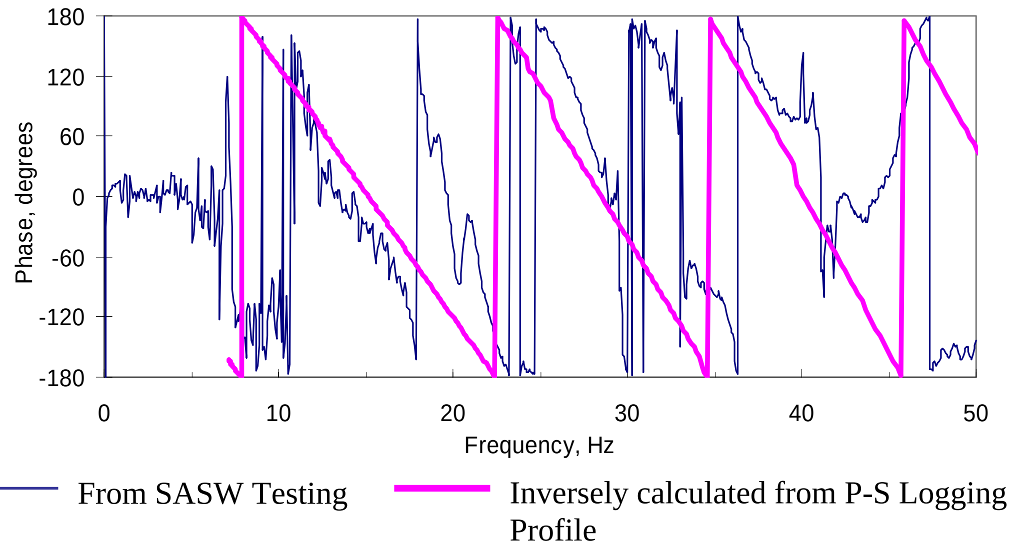

Figure 25.9 Phase Plots Measured by SASW Testing with 95-ft Receiver Spacing

Table 25.1 Table of Masking Parameters Used on Data Collected at Tai-Chung Weather Station

Receiver Spacing	Masking Interval	Masking Start Frequency, Hz	Masking Stop Frequency, Hz	Number of Jumps
3 ft	1	0.0	83.0	1
	2	318.5	400.0	-
6 ft	1	0.0	53.8	1
	2	136.8	200.0	-
12 ft	1	0.0	50.3	1
	2	129.3	200.0	-
25 ft	1	0.0	32.0	2
	2	73.0	75.0	5
	3	102.3	200.0	-
50 ft	1	0.0	15.0	1
	2	34.5	100.0	-
95 ft	1	0.0	11.0	1
	2	23.2	25.1	3
	3	29.1	50.0	3

Performed by____________________ Checked by____________________

Yin-Cheng Lin Brent L. Rosenblad

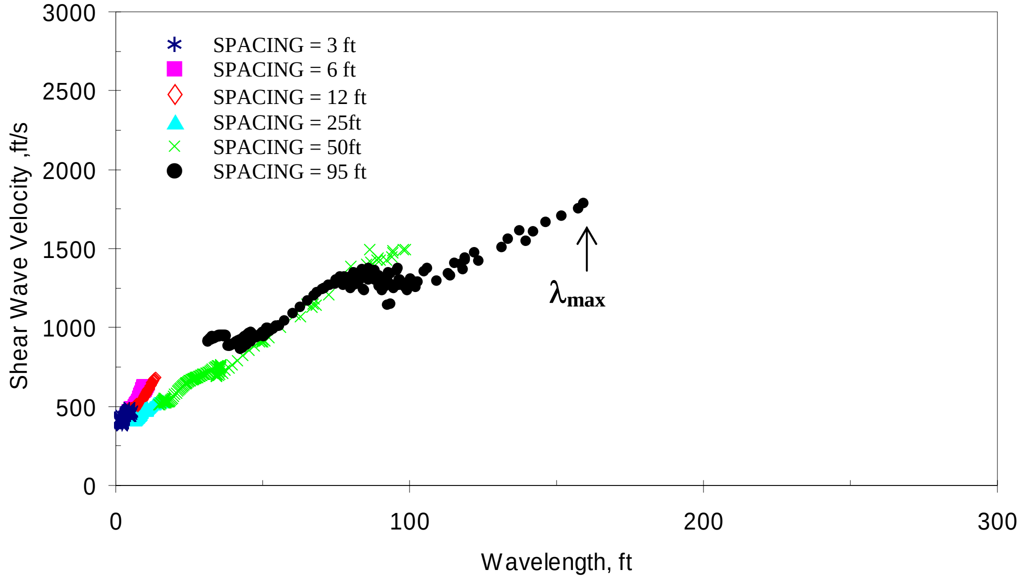

Figure 25.10 Experimental Dispersion Curve Measured at Tai-Chung Weather Station; Linear Wavelength Axis

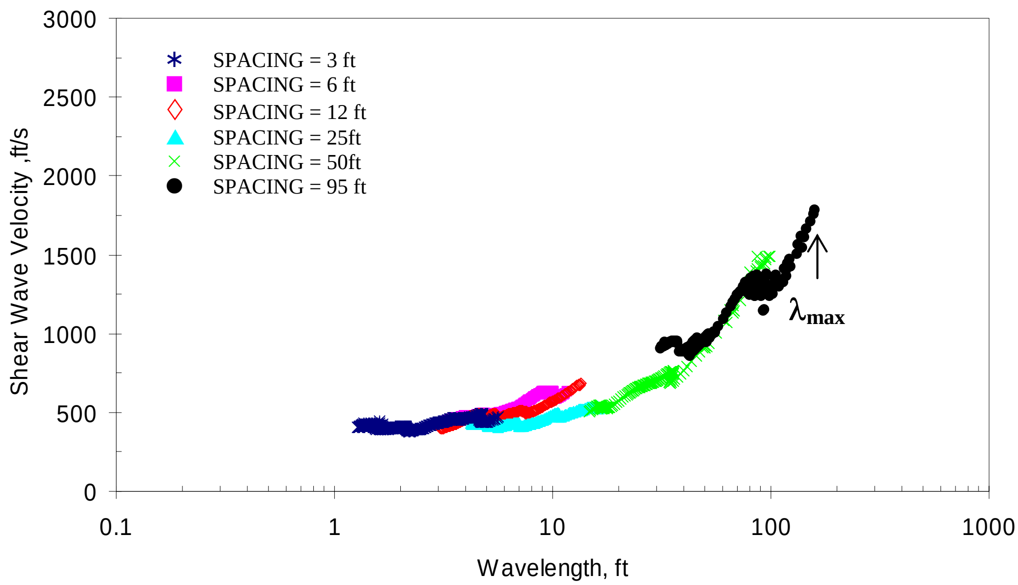

Figure 25.11 Experimental Dispersion Curve Measured at Tai-Chung Weather Station; Logarithmic Wavelength Axis

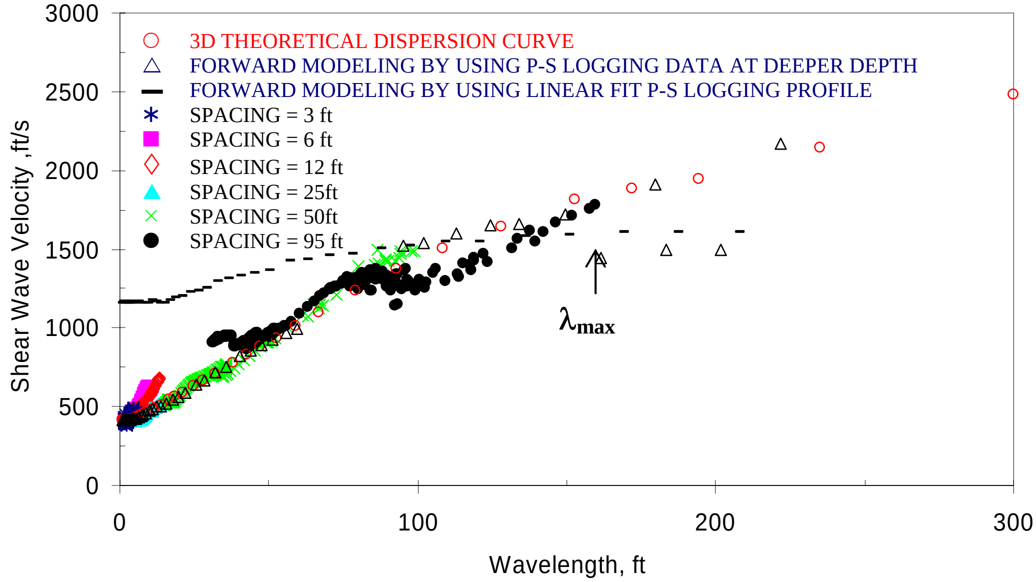

Figure 25.12 Experimental and Theoretical Dispersion Curves from Tai-Chung Weather Station; Linear Wavelength Axis

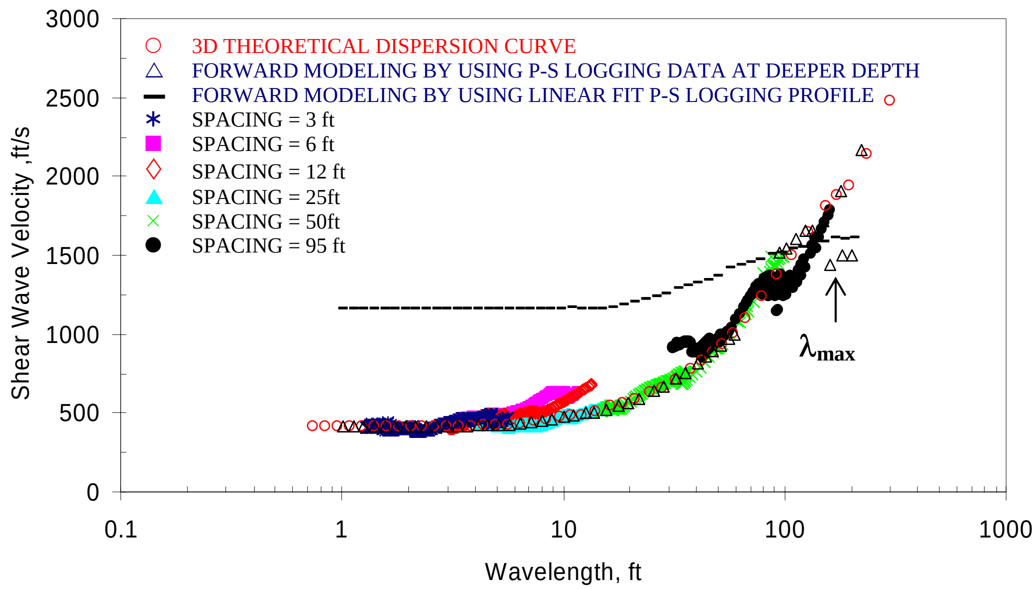

Figure 25.13 Experimental and Theoretical Dispersion Curves from Tai-Chung Weather Station; Logarithmic Wavelength Axis

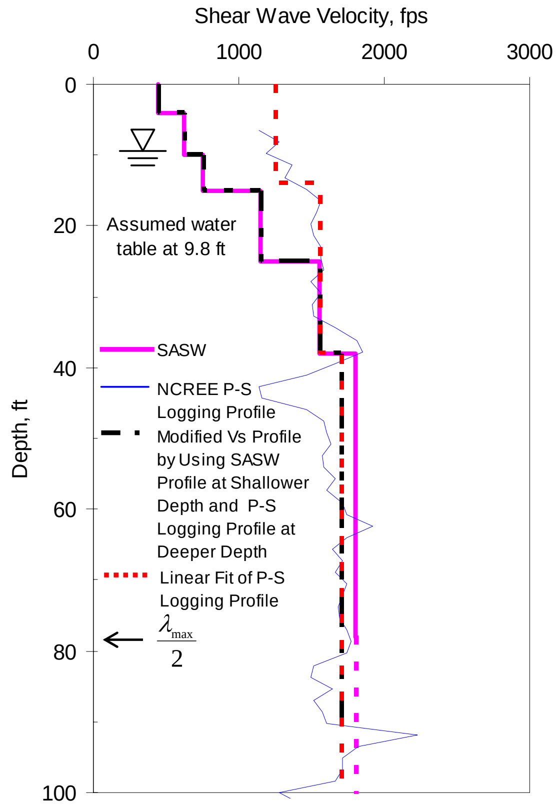

Figure 25.14 Shear Wave Velocity Profile Determined at Tai-Chung Weather Station

Table 25.2 Profile Parameters Used to Develop Theoretical Dispersion Curve at Tai-Chung Weather Station

Layer No.	Thickness, ft	Depth to the bottom, ft	P-Wave Velocity, ft/s	S-Wave Velocity, ft/s	Poisson's Ratio	Total Unit Weight, pcf
1	4	4	779	450	0.25	120
2	6	10	1074	620	0.25	120
3	5	15	5000	750	0.49	120
4	10	25	5000	1150	0.47	120
5	13	38	5000	1550	0.45	120
6	40	78	5000	1800	0.43	120

Performed by________________________ Checked by________________________
Yin-Cheng Lin Brent L. Rosenblad

Table 25.3 Uniform Building Code (UBC-97) Site Classification of Tai-Chung Weather Station

Average Shear Wave Velocity of Top 30 meters (100 ft), $V_{s,30}$ (ft/s) [m/s]	Site Classification
1320 [403]	C

Performed by________________________ Checked by________________________
Yin-Cheng Lin Brent L. Rosenblad

Table 25.4 UBC-97 Site Categories

Soil Profile Type	Average Shear Wave Velocity of Top 30 m, $V_{s,30}$ (m/s) [Top100 ft, $V_{s,100}$ (ft/s)]	Description
S_A	$V_{s,30}$>1500 m/s [$V_{s,100}$>5000 ft/s]	Hard rock
S_B	760 m/s < $V_{s,30}$≤1500 m/s [2500 ft/s < $V_{s,100}$≤5000 ft/s]	Rock
S_C	360 m/s < $V_{s,30}$≤760 m/s [1200 ft/s < $V_{s,100}$≤2500 ft/s]	Very dense soil and soft rock
S_D	180 m/s ≤ $V_{s,30}$≤360 m/s [600 ft/s < $V_{s,100}$≤1200 ft/s]	Stiff Soil Profile
S_E	$V_{s,30}$< 180 m/s [$V_{s,100}$ < 600 ft/s]	Soft Soil Profile
S_F	-	Soils requiring site-specific evaluation.

Appendix 26

Site Location: Chi-Nan University
(TCU-148)

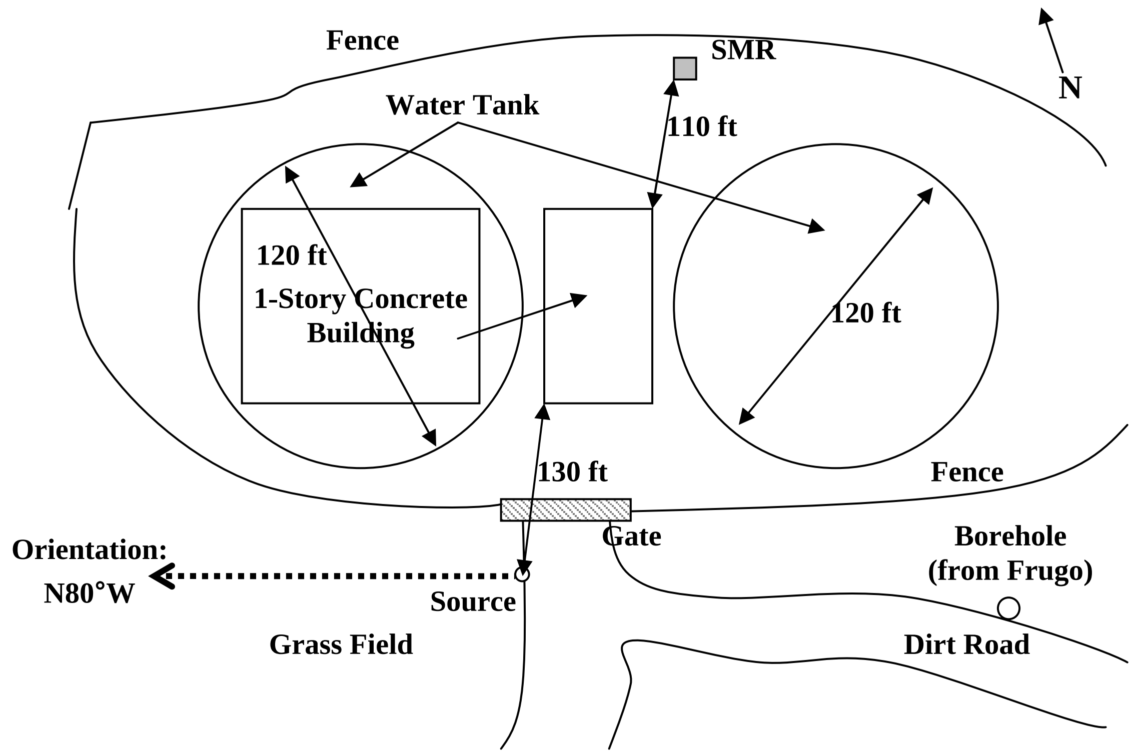

Figure 26.1 Site Map of Chi-Nan University

Figure 26.2 Picture Taken at Chi-Nan University (View # 1)

Figure 26.3 Picture Taken at Chi-Nan University (View # 2)

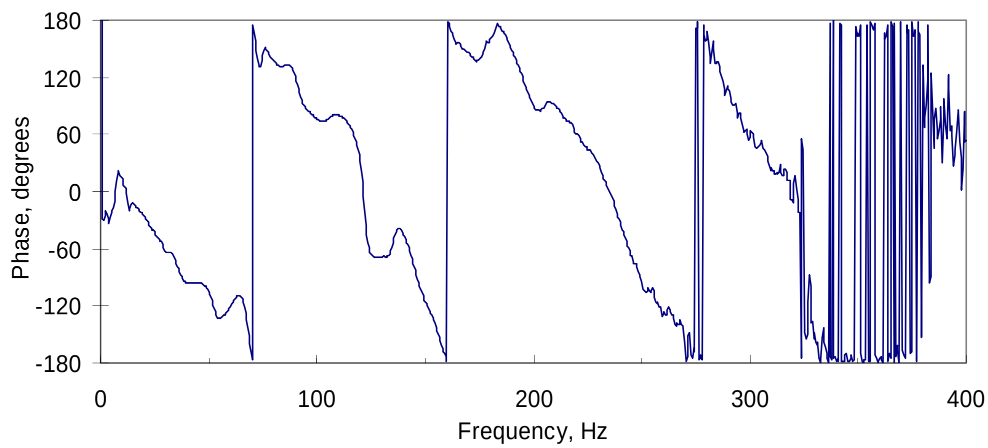

Figure 26.4 Phase Plots Measured by SASW Testing with 3-ft Receiver Spacing

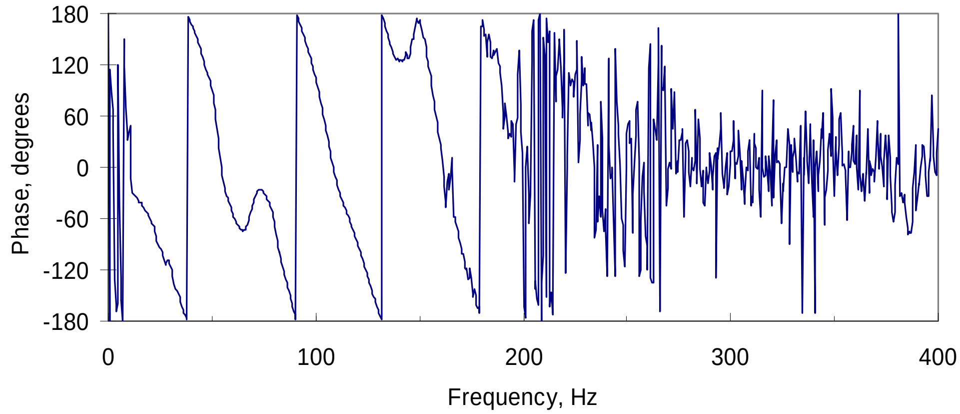

Figure 26.5 Phase Plots Measured by SASW Testing with 6-ft Receiver Spacing

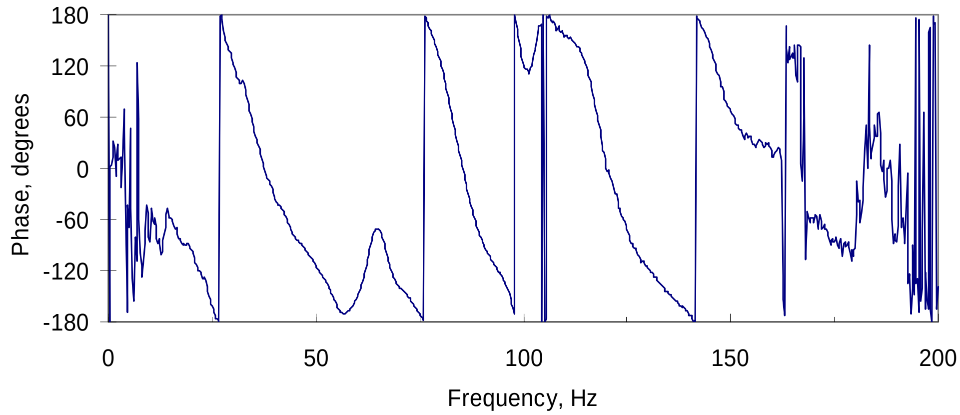

Figure 26.6 Phase Plots Measured by SASW Testing with 12-ft Receiver Spacing

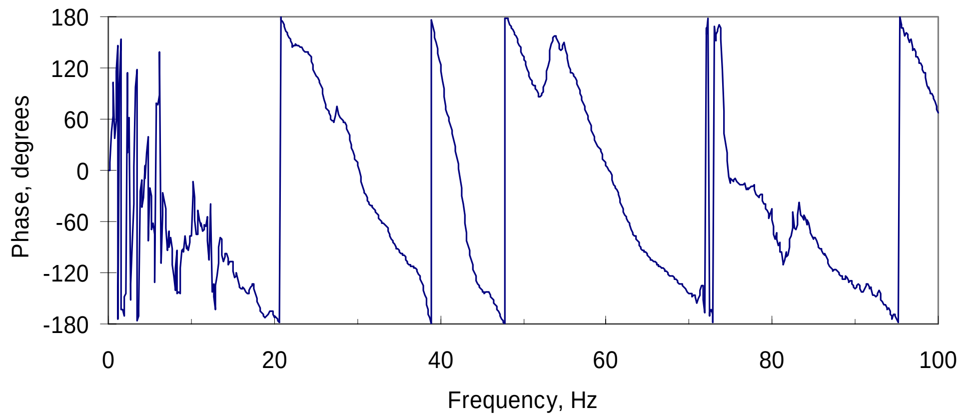

Figure 26.7 Phase Plots Measured by SASW Testing with 25-ft Receiver Spacing

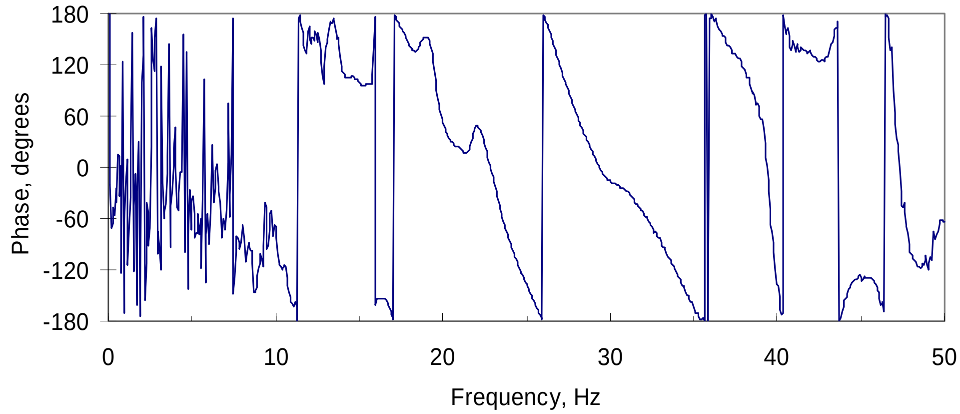

Figure 26.8 Phase Plots Measured by SASW Testing with 50-ft Receiver Spacing

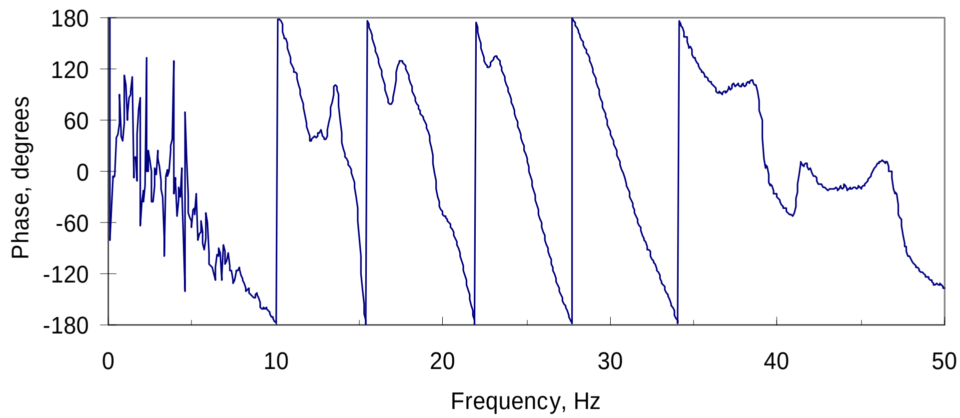

Figure 26.9 Phase Plots Measured by SASW Testing with 75-ft Receiver Spacing

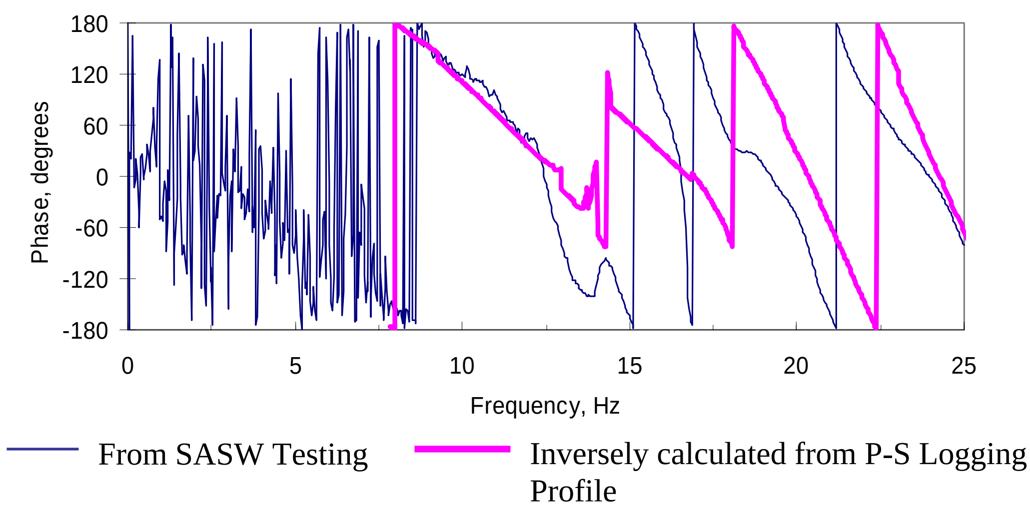

Figure 26.10 Phase Plots Measured by SASW Testing with 100-ft Receiver Spacing

Table 26.1 Table of Masking Parameters Used on Data Collected at Chi-Nan University

Receiver Spacing	Masking Interval	Masking Start Frequency, Hz	Masking Stop Frequency, Hz	Number of Jumps
3 ft	1	0.0	72.5	1
	2	257.0	279.5	3
	3	319.5	400.0	-
6 ft	1	0.0	40.0	1
	2	190.5	400.0	-
12 ft	1	0.0	27.5	1
	2	57.0	76.5	3
	3	97.8	106.0	4
	4	154.3	200.0	-
25 ft	1	0.0	20.9	1
	2	38.9	53.9	3
	3	70.5	100.0	-
50 ft	1	0.0	11.4	1
	2	11.6	11.9	1
	3	12.6	16.5	1
	4	35.5	36.1	4
	5	39.0	50.0	-
75 ft	1	0.0	10.2	1
	2	36.4	50.0	-
100 ft	1	0.0	8.7	1

Performed by________________________ Checked by________________________
Yin-Cheng Lin Brent L. Rosenblad

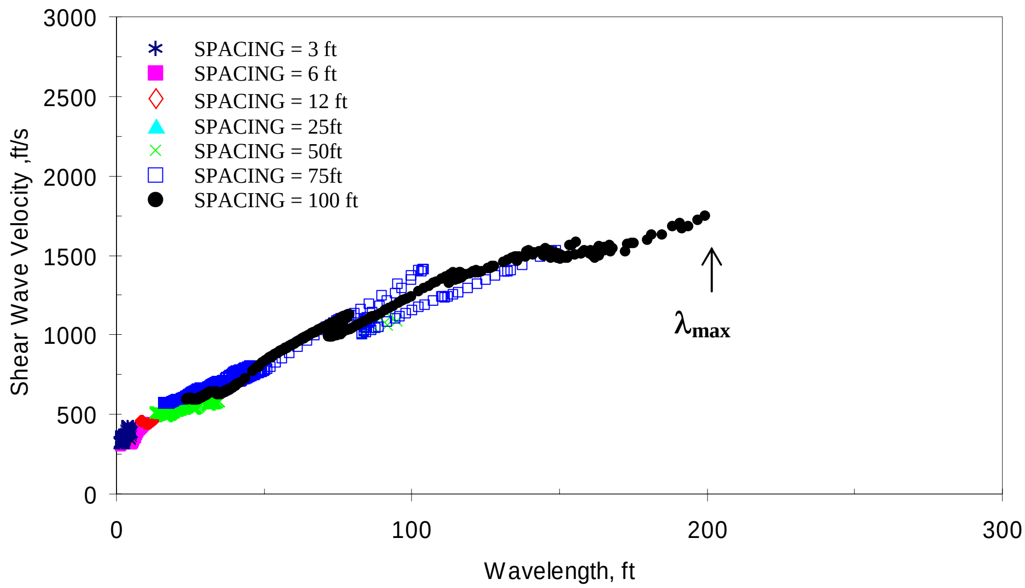

Figure 26.11 Experimental Dispersion Curve Measured at Chi-Nan University; Linear Wavelength Axis

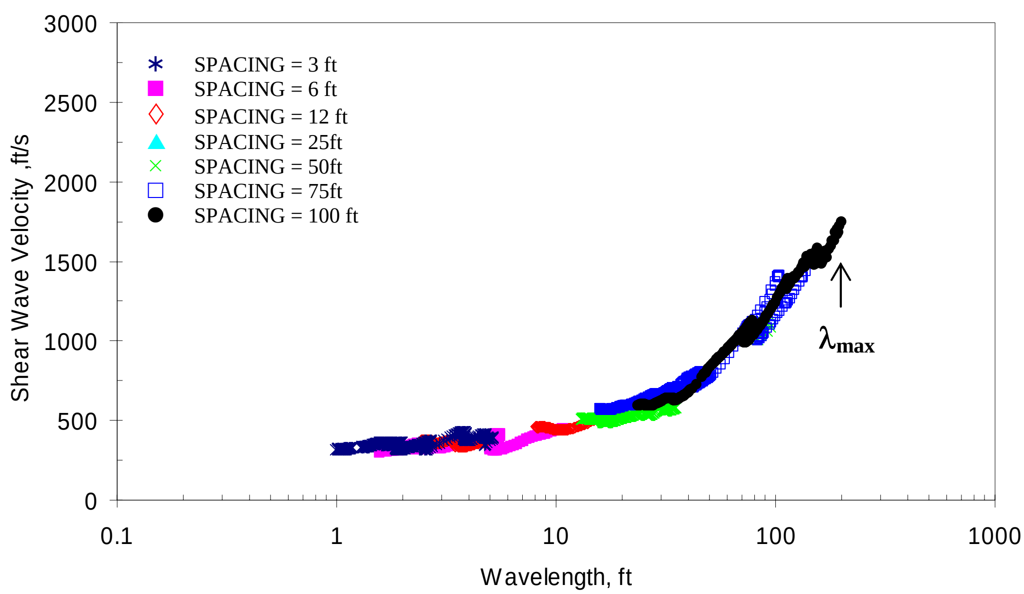

Figure 26.12 Experimental Dispersion Curve Measured at Chi-Nan University; Logarithmic Wavelength Axis

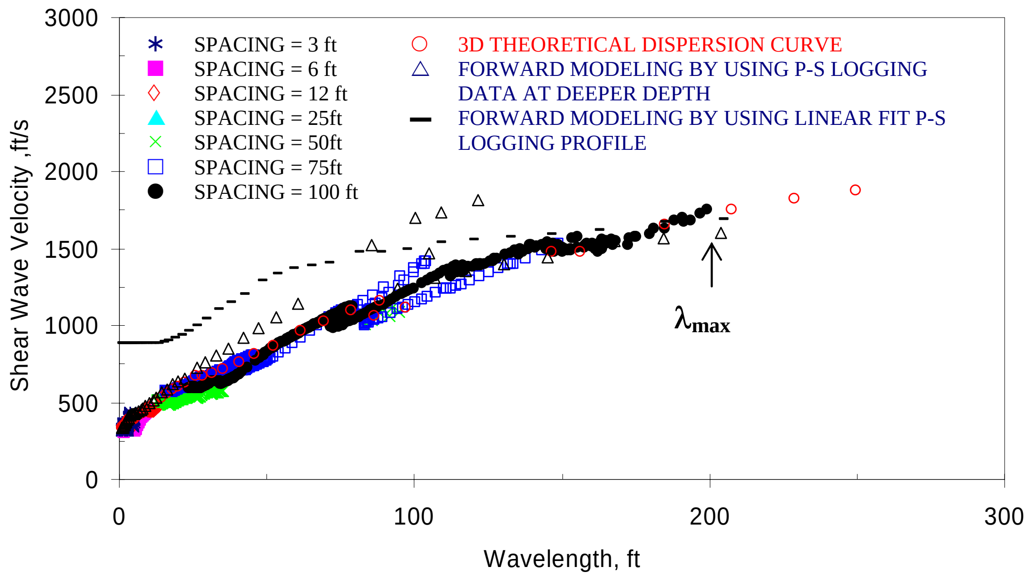

Figure 26.13 Experimental and Theoretical Dispersion Curves from Chi-Nan University; Linear Wavelength Axis

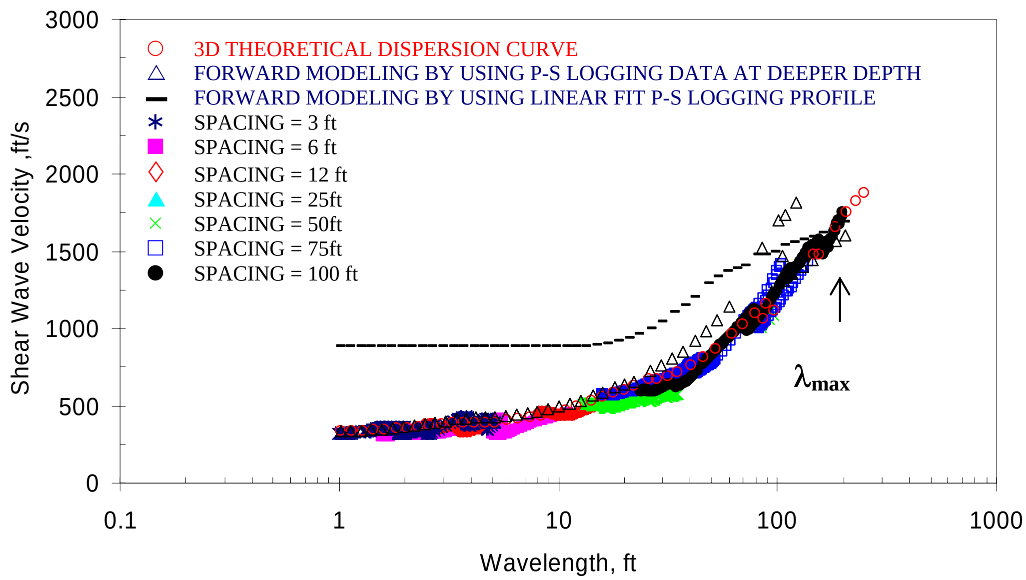

Figure 26.14 Experimental and Theoretical Dispersion Curves from Chi-Nan University; Logarithmic Wavelength Axis

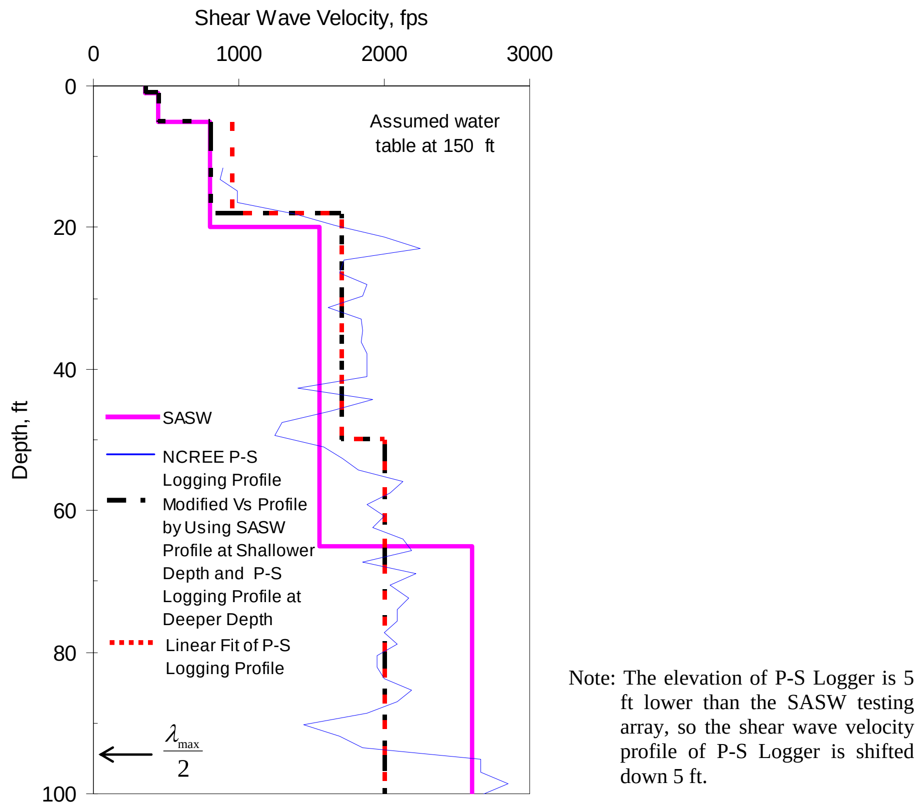

Figure 26.15 Shear Wave Velocity Profile Determined at Chi-Nan University

Table 26.2 Profile Parameters Used to Develop Theoretical Dispersion Curve at Chi-Nan University

Layer No.	Thickness, ft	Depth to the bottom, ft	P-Wave Velocity, ft/s	S-Wave Velocity, ft/s	Poisson's Ratio	Total Unit Weight, pcf
1	1	1	624	360	0.25	120
2	4	5	779	450	0.25	120
3	15	20	1386	800	0.25	120
4	45	65	2685	1550	0.25	120
5	30	95	4503	2600	0.25	125

Performed by________________________ Checked by________________________
Yin-Cheng Lin Brent L. Rosenblad

Table 26.3 Uniform Building Code (UBC-97) Site Classification of Chi-Nan University

Average Shear Wave Velocity of Top 30 meters (100 ft), $V_{s,30}$ (ft/s) [m/s]	Site Classification
1370 [418]	C

Performed by________________________ Checked by________________________
Yin-Cheng Lin Brent L. Rosenblad

Table 26.4 UBC-97 Site Categories

Soil Profile Type	Average Shear Wave Velocity of Top 30 m, $V_{s,30}$ (m/s) [Top100 ft, $V_{s,100}$ (ft/s)]	Description
S_A	$V_{s,30}$>1500 m/s [$V_{s,100}$>5000 ft/s]	Hard rock
S_B	760 m/s < $V_{s,30}$≤1500 m/s [2500 ft/s < $V_{s,100}$≤5000 ft/s]	Rock
S_C	360 m/s < $V_{s,30}$≤760 m/s [1200 ft/s < $V_{s,100}$≤2500 ft/s]	Very dense soil and soft rock
S_D	180 m/s ≤ $V_{s,30}$≤360 m/s [600 ft/s < $V_{s,100}$≤1200 ft/s]	Stiff Soil Profile
S_E	$V_{s,30}$< 180 m/s [$V_{s,100}$ < 600 ft/s]	Soft Soil Profile
S_F	-	Soils requiring site-specific evaluation.