ABSTRACT

ROBINSON, BRENT ROSS. Models for Prediction of Surface Vibrations from Pile Driving Records. (Under the direction of Dr. Mohammed A. Gabr.)

This study compares high strain dynamic testing measurements taken near the top of a driven pile to peak particle velocities on the ground surface and sound levels detected in the air some distance from the pile during driving. Based on a sample of installation records from 16 piles driven at the Marquette Interchange Project in Milwaukee, Wisconsin, a series of peak particle velocity plots versus distance, energy and scaled distance were created using traditional horizontal distance and rated hammer energy. These plots were modified using the seismic distance, the diesel hammer potential energy from the calculated stroke, and the energy transferred to the pile top. Incorporating these measurements tended to reduce some of the scatter in the data. More importantly, it was also discovered that components of peak particle velocity in the ground can be well correlated to the total pile resistance measured by dynamic testing. A plot of total resistance versus depth often independently yields the same shape curve as a plot of at least one component of peak particle velocity versus depth. A simple mathematical attenuation model is proposed as an initial step toward utilizing this relationship to predict at least one component of ground motions. Measured peak overpressure (noise) in the air correlated less directly to the quantities measured on the pile, but a conservative and simple mathematical model can still be proposed based on the dynamic testing-measured velocity near the pile top and idealized sound generation and attenuation theories.

Models for Prediction of Surface Vibrations from Pile Driving Records

by

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Biography

Brent Robinson was born in Battle Creek, Michigan in August, 1976. He received his BS in Civil Engineering, in May 1999, from Case Western Reserve University in Cleveland, Ohio. After graduation he joined GRL Engineers, Inc. as a research and field engineer. While with GRL, he performed high strain dynamic tests and other quality control tests on deep foundations and on construction sites around the U.S. and around the world. His work also included teaching nondestructive pile testing methods to engineers from other firms, in individual and classroom settings.

In August of 2004, he came to Raleigh to pursue a Master of Science Degree in Geotechnical Engineering. His research interests include but are not limited to foundation construction, design and analysis, and the application of nondestructive tests to foundations and other structures. Brent completed his Masters studies in the summer of 2006 and is expected to continue his work as a Ph.D. student at NCSU sponsored by an Eisenhower Fellowship.

Acknowledgments

This study would not have been possible without permission to use the Marquette Interchange data from the Wisconsin Department of Transportation and the Federal Highway Administration. In addition to the project's future benefits to the city of Milwaukee, they have also created a valuable data set for the future.

I would like to acknowledge my colleagues at GRL Engineers, Inc., particularly Patrick Hannigan, who organized the PDA testing, and who, along with Mark Rawlings, acquired and analyzed much of the PDA data included in this study. I would also like to thank Dr. Frank Rausche for taking a chance on a young engineer and guiding me through a five year adventure at his firm. The work of the Wagner Komurka Group and Milwaukee Transportation Partners is also gratefully acknowledged, as they collected driving and vibration records and helped facilitate the data transmission. Finally, the analyses in this thesis could not have been performed without the skill and dedication of the contractors and laborers who installed and assisted in the testing of each pile.

I wish to thank my advisor Dr. Mohammed Gabr for assisting me in the preparation of this thesis, and for allowing me to work with him on a number of other projects, both long and short term. I also wish to thank the other members of the Advisory Committee, Dr. Mervyn Kowalsky and Dr. Roy Borden, both of whom who have expanded my horizons in areas outside the niche of civil engineering to which I had grown accustomed. Finally, I have made many good friends while at North Carolina State. Our conversations and commiserations are a highlight of every day. Last, but certainly not least, I also thank my beautiful wife Angela for her encouragement, support and patience throughout my studies,.

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CHAPTER 1: INTRODUCTION

For millennia, impact driven piles have been used to support structures constructed on weak or unstable soils. Most piles over the centuries were made of timber, and driven to depth using human or animal power. The Roman empire was connected by roads paved by stones and bridges supported by piles. As the industrial revolution dawned, inventors and construction contractors turned their steam and diesel engines to the process of driving piles. No longer limited by the weights a group of people, horses or oxen could lift (or by the number of people the constructor could afford to hire), ram weights could be made larger and from cast iron or steel. The time between hammer blows could also be reduced, and the energy imparted to the pile could, at least in theory, be more carefully controlled.

Similarly, as concrete technology advanced and steel manufacturing developed, the piles themselves could be made to nearly any length, from materials that allowed higher loads to be placed over their cross sectional areas. As load bearing capacity increased, the size of the hammer required to install them generally increased, as well. As larger hammers were introduced, engineers attempted to make the most of them, designing piles with yet higher loads.

And so the cycle of pile design and installation technology continues to this day. Pile driving has, however, became something of a victim of its own success. By allowing more marginal sites to be developed, cities and other areas became more densely populated. As these populations grew, the number of people and existing structures located around new construction or reconstructed sites increased as well. In the middle 20th century, the installation techniques of pile driving began to come under scrutiny.

Pile driving is noisy. The act of impacting a pile top over a very short period of time with a relatively large impact force also creates vibrations: in the pile, in the air around it and in the surrounding soils. As the soil surrounding the pile vibrates, that vibration is transmitted into the surrounding area and into nearby structures. In many, if not most cases, the occupants of

these structures will be understandably alarmed and annoyed by the shaking of their building and the repeated noise from the nearby construction activities. In some cases, these vibrations will also cause the occupants to look closely at the structure itself, and take careful notice of any cracks or other damage to the existing structure.

Thus, the act of pile driving and the vibrations it causes is generally a two pronged problem: the annoyance created by the noise and vibration, and the possibility of damage to nearby structures due to the vibrations. For driven piles to continue to be a viable design alternative, the latter should be unquestionably avoided and the former should be minimized to reduce public outcry and resistance to a particular project. The challenge, then, is to minimize vibrations or to keep them within an acceptable level.

A topic to the impact of pile driving involves vibration in water due to pile installation. In the last decade or two, there has been increased concern regarding the effects of pile driving on fish behavior and habitat. Changes in fish behavior and even fish kills have been observed at sites, particularly in shallow waters where fish hatchlings are found. While related and a topic for concern, this aspect of the impact of vibrations from pile driving will not be addressed in this thesis.

Thus, there is some value in being able to predict prior to construction what vibrations in the air (sound), soil, or water will result from pile driving activity. If it can be shown that the probability of damage due to vibrations are minimized or that the noise due to a particular pile-hammer system is below regulated thresholds, then pile driving may be accepted in a place where another, possibly more expensive foundation system is being strongly considered.

1.1 PILE DRIVING: ANALYTICAL TECHNIQUES

The oldest question asked has always been how much a single pile can support. Axial static capacity for a group of piles was often traditionally estimated by one or more static load

tests, where a series of weights are placed on the pile top and the displacement is measured. Prediction methods were then developed, using soil mechanics theory and tests on soil samples to estimate the axial load carrying capacity of a single pile. Once these predictions and static load tests were complete, quality control on site for additional piles was and is often provided by counting and recording the number of blows required to move the pile a certain distance. In the last thirty years, high strain dynamic pile testing (HSDPT) has been used to combine both a record of driving and a capacity estimate on an actual pile at the time of driving. These measurements are obtained by installing strain transducers and accelerometers near the pile top and monitoring the transmission of compressive stress waves generated by the hammer impact.

As axial static capacity prediction developed, the question of whether a particular pile could be economically and successfully driven to a desired ultimate capacity with a particular driving system arose. Wave equation technology developed over the last fifty years as a pre-construction tool. An algorithm was developed to predict the stress in pile, energy transferred to pile, and set per blow for a given resistance and hammer type. Studies have been performed (Rausche et al., 2004) to check the ability of wave equation analyses to predict the quantities measured by HSDPT, showing that if the system is modeled correctly, these quantities can be predicted well.

Vibrations have traditionally been treated as a separate issue. What if we could predict vibrations reliably, over the length of a drive, using results from a preconstruction wave equation analysis? If HSDPT measured quantities can be used as a predictor of ground vibration, perhaps vibration prediction can be implemented in a wave equation analysis, and a more reliable predictor of vibration at a particular distance and pile toe depth can be developed with minimal changes to the existing, widely used wave equation model. This study, however, will only focus on the correlation of HSDPT quantities to ground vibration and noise due to pile driving. Further development of the wave equation model will be reserved for future studies.

1.2 PROBLEM STATEMENT

This research focuses on methods currently used to predict peak particle velocities (a measure of the magnitude of vibration) in soils and sound levels transmitted through the air near pile driving operations. First, a literature review will be conducted to determine the current state-of-practice in both pile driving vibration and sound prediction methods and to review the information obtainable from widely used techniques to monitor pile installations (high strain dynamic testing, HSDPT). Previous field and numerical studies will be reviewed, as well as the combination of the monitoring techniques with vibration records.

The results of this review will then be applied to a site in the downtown area of Milwaukee, Wisconsin, USA where pile driving was performed. Here, on a small subset of more than eighty full scale driven test piles, soil borings, traditional pile driving records, high strain dynamic test data, noise data and vibration data will be combined. This data set is somewhat unique, in that high strain dynamic test data are available for nearly every hammer blow, and vibration and noise maxima are available in 15 second increments (or every five to twelve blows) for the initial installations of many piles.

1.3 OBJECTIVES

The existing methods of noise and vibration prediction will then be compared to results from this field installation. At the same time, HSDPT data will be used to check the ability of other measured and calculated quantities to predict ground vibrations and noise levels. From these comparisons, mathematical models will be proposed. Finally, the study will conclude with a summary of the major results, final conclusions, and recommendations for future research or studies.

1.4 ORGANIZATION

This study is organized into six chapters. They are divided as follows:

Chapter 2 reviews existing ground vibration and noise prediction models as applied to pile driving. It also briefly reviews the quantities that can be calculated or measured from HSDPTs, which measure compressive stress wave propagation through the pile.

Chapter 3 summarizes the Milwaukee test pile program, focusing on the six static load test sites. It will summarize the pile types driven, the hammers used, the soil types encountered and the HSDPT and vibration data available.

Chapter 4 compares the ground vibration data to existing models, and the pile driving records to vibration data. A model will be proposed and other observations will be made.

Chapter 5 compares the noise data to existing models and analysis methods, and the pile driving records to collected noise data. An improved model will be proposed and other observations will be made.

Chapter 6 summarizes the major findings and concludes this portion of the study.

Chapter 7 suggests future directions for research.

CHAPTER 2: LITERATURE REVIEW AND BACKGROUND

The literature for noise and sound propagation due to pile driving extends back almost forty years. Much of the work has focused on the prediction of maximum velocities or sound levels accumulated over the entire driving event. Historically, this comes from vibration studies done for explosives in the mining and highway industries, where the events tend to be single, and not continuous or repetitious over long periods. The mining standards were extended to impact and vibratory driven piles by Wiss (1981).

While a number of papers have been published studying the vibrations in soil due installation of piles with vibratory hammers (see Borden and Shao, 1995; Morris, 1998, Viking, 2002), those will not be focused on here. Instead, only vibrations due to installation of piles using impact hammers will be discussed.

2.1 GROUND VIBRATIONS

Researchers and practitioners have approached the problem of vibrations due to pile driving in a few different ways. These range from conceptual models to empirical plots of vibration versus energy or distance to create an envelope of maximum expected values, to other theories and techniques. This section will briefly review this literature.

2.1.1 Conceptual Propagation Model

As piles are driven into the ground with an impact hammer, stress waves in the soil are generally considered to be generated from friction resistance along the side of the pile and from the compression and displacement of soils at the pile toe. The sliding along the pile's side generates shear waves, while the compression and downward displacement at the toe generates both shear and compressive waves (Woods, 1997). Wave propagation theory in layered elastic media shows that, at any interface at which the shear or compressive wave speed changes, both compressive and shear waves will be reflected into the original layer and

refracted into the adjoining layer as presented by Woods (1997). See Figure 1and Figure 2 for a conceptual sketch of this model.

Rayleigh and Love waves are generated once the shear and compression waves generated by the pile driving reach the surface. These waves propagate along the air-soil boundary, and tend to have higher amplitudes than the compressive and shear body waves. These surface waves tend to cause the most damage in earthquakes or other dynamic events, because of their higher amplitudes and thus larger distortion of structures. (Woods, 1997). Given full time histories of vibrations at a given site and knowing a distance from the source far enough to allow the waves to separate, these different waves can be identified in a particular record.

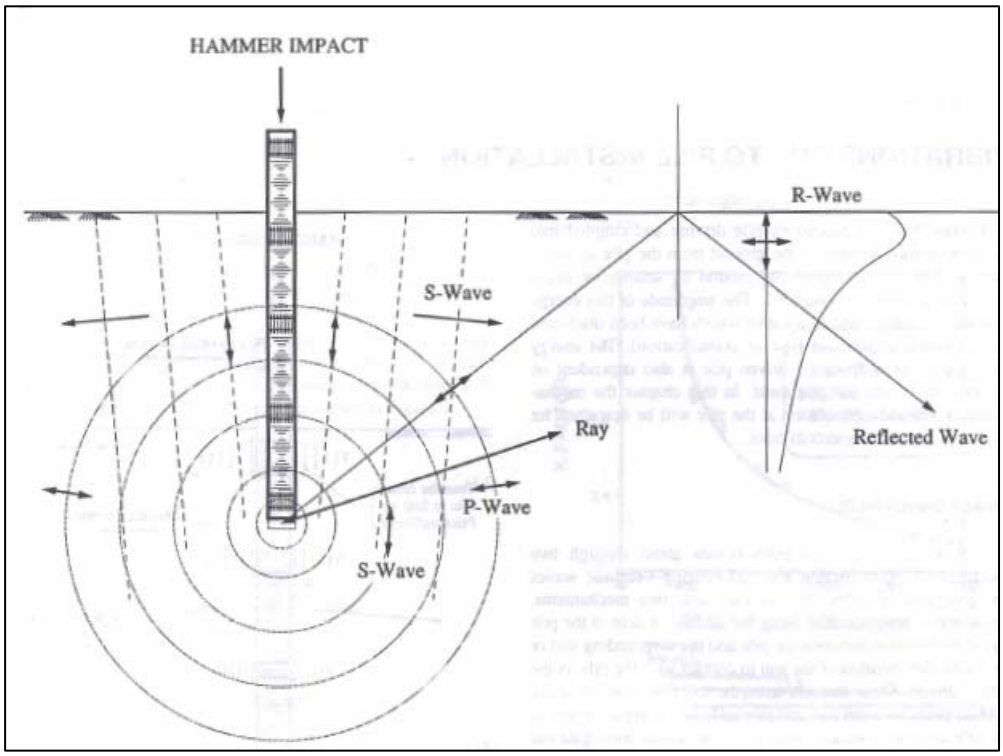


Figure 1. Conceptual Sketch of Waves Generated by Pile Driving (from Woods, 1997).

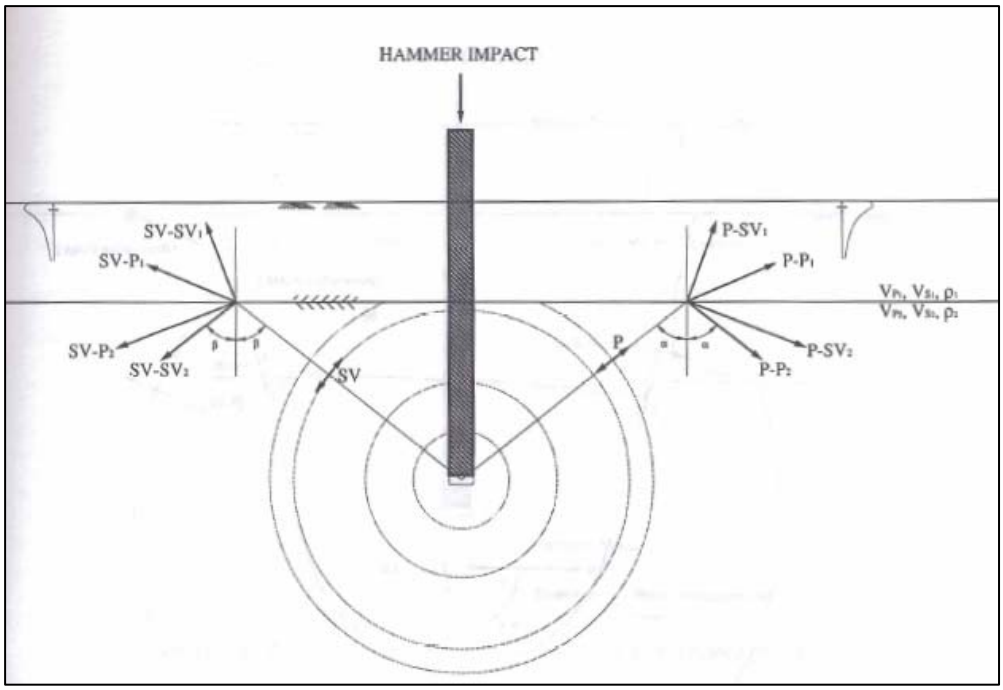


Figure 2. Transmission, Reflection and Refraction of a Compressive (P) and Shear Wave (SV) in a Layered Media (from Woods, 1997).

The model in Figure 1, however, is currently better suited to the conceptual understanding of the problem than careful numerical studies of actual pile driving records. In heavily layered soils, the reflection and refraction of multiple shear and compression waves becomes difficult to manage. Similarly, while one could calculate the expected arrival time of waves based on a soil's compressive and shear wave speeds, the amplitude of the resulting vibration would be largely unknown without a separate model for attenuation of those waves in the soil. Thus, the methods currently in common use are still highly empirical.

2.1.2 Vibration Thresholds

Vibration monitoring of pile driving is an offshoot of vibration monitoring of blasting. Portable seismographs using geophones and other devices were developed to monitor mine and rock blasting at remote sites. Thus, once pile driving vibrations started to become a concern, the same devices used to monitor a series of blasts were slightly modified to monitor a series of pile driving impacts. The only real difference was the number of events

collected, which can range in the tens or hundreds for a day of blasting and hundreds or thousands for a day of pile testing. Much of the guidance on pile driving vibration monitoring and thresholds are adopted directly from the blasting industry.

In his seminal study on pile driving vibrations, Wiss (1981) discusses a few of the common models of vibration attenuation, many of which are still used and shown in literature today. By examining the literature of structural damage due to blasting (for example, Edwards and Northwood, 1960 and Wiss, 1974), Wiss noted that peak particle velocity tended to correlate with structural damage and disturbance of the public. Wiss (1981) also noted that as the energy of the blast increased, the peak particle velocity increased and as the distance from source to monitoring area increased, peak particle velocity decreased. These relationships are empirically modeled in Equations 1 and 2.

$$PPV = CE^{a} \qquad \text{Equation 1}$$

In Equation 1, PPV = Peak particle Velocity (in/s), C and a are the intercept (in/s) and slope (log units) of a best fit line, and E is the impact energy (ft-lbs). For piles, this E is typically assumed to be the hammer's rated energy, or a value usually defined by the hammer manufacturer as the weight of the impact ram multiplied by the maximum achievable drop height

$$PPV = kD^{-n} \qquad \text{Equation 2}$$

In Equation 2, D is the distance from source to monitoring location (ft), k is the intercept at D=1 ft (in/s) and n is the slope (log units), or a pseudo-attenuation rate. Equation 2 is also known as a pseudo-attenuation model. In his closure to the paper (Wiss, 1982), the distance, D, was clarified to be the seismic or slope distance, which is the distance from the pile toe to the monitoring location. In spite of this clarification and because of the inherent difficult of knowing what penetration the pile is at from vibration monitoring results alone, researchers

and practitioners still tend to use either the horizontal distance or seismic distance, or in a few cases, show both results.

Wiss (1981) then observed the effects of distance and energy can be combined into a single equation, such as Equation 3. This is a so-called scaled distance relationship, that was again originally developed for blasting and introduced in Wiss (1967). The parameters K and N are similar to (but not the same as!) those in Equation 2. Wiss (1981) the value of N should be between 1 and 2, averaging around 1.5.

$$PPV = K(D/\sqrt{E})^N \qquad \text{Equation 3}$$

Equations 2 and 3 are meant to partially capture the effects of attenuation or damping of the wave front in an elastic media as the distance increases. A different attenuation model that considers geometric spreading of the wave in a half space with material damping was developed by Bornitz in 1931 and is shown in Equation 4.

$$A = A_o\left(\frac{D}{D_o}\right)^{-n} e^{-\alpha(D-D_o)} \qquad \text{Equation 4}$$

In Equation 4, A is the amplitude of PPV at a distance D of interest, A_o and D_o are known amplitude at a base distance, respectively, n is a function of the type of wave transmitted and α is the attenuation coefficient. The exponent n can be shown to be 1 for body waves (shear and compression) in the ground spreading spherically. On the surface, body waves have an n of 2, while the n for Rayleigh waves is ½.

In an often quoted study, Woods and Jedele (1985) developed recommendations for the attenuation coefficient, "α" based on vibration data collected and presented in the same paper. It should be noted that these sites included blasting, dynamic compaction, pile driving and other sources of vibrations. These recommendations follow in Table 1 for vibration

frequencies of 5 and 50 Hz; other frequencies can be calculated using a simple ratio as shown in Equation 5.

$$\alpha_2 = \alpha_1 \frac{f_2}{f_1} \qquad \text{Equation 5}$$

where α_1 is the known attenuation at a frequency f_1 (5 or 50 Hz) and α_2 is the unknown attenuation at frequency f_2.

Table 1. Classification of Earth Materials by Attenuation Coefficient (Woods and Jedele, 1985)

Soil Class	Attenuation Coefficient, α (1/ft)		Description of Material
	5 Hz	50 Hz	
I	0.003 – 0.01	0.03 – 0.10	*Weak or soft soils* (shovel penetrates easily); loessy soils, dry or partially saturated peat and muck, mud, loose beach or dune sand, recently plowed ground, soft spongy forest or jungle floor, organic soils, topsoil
II	0.001 – 0.003	0.01 – 0.03	*Competent Soils* (can dig with shovel): most sands, sandy clays, silty clays, gravel, silts, weathered rock
III	0.0001 – 0.001	0.001 – 0.01	*Hard soils* (cannot dig with shovel, must use pick to break up): dense compacted sand, dry consolidated clay, consolidated glacial till, some exposed rock
IV	<0.0001	<0.001	*Hard, competent rock* (difficult to break with hammer); bedrock, freshly exposed hard rock

The drawbacks of Equations 1 through 4 are that, for a particular site, calibration must be performed during the early stages of construction, or a set of values must be assumed and further vibration monitoring used to verify the assumptions. Because vibration monitoring involves recording a number of separate events at various times in the pile driving process, large variation in the magnitude of the measured vibration often occurs. Changes in hammer

energy, pile penetration and soils encountered will all affect the measured vibrations. In most cases, these vibrations will be harmless, so the methods laid out in Equations 1 through 4 are meant to predict upper bound, or maximum vibration magnitudes. These maxima are then compared to code requirements or other commonly used charts that correlate vibration levels to structural damage. Thus, the models outlined above are not meant to predict all vibration levels, just the most critical ones.

Results of these studies are generally plotted on log-log scale plots, with PPV the dependent variable and distance, energy or scaled distance the independent variable. Figure 3 through Figure 5 show the most common plots used in the vibration literature. It is these that will be used as a starting point for the analyses in this study. A sample plot of peak particle velocities (maxima only) versus distance is recreated in Figure 3 from the work of Woods and Jedele (1985). This data set was collected on a site where sheet piles are driven with a Linkbelt 440 diesel hammer, which had a reported rated energy of 13,200 ft-lbs. For the pseudo-attenuation model in Equation 3, n was 1.476; for the attenuation damping model in Equation 4, α was 0.0319 and n was 0.5.

Figure 4 shows maximum peak particle velocities versus energy as shown in Woods and Jedele (1985). Again, these are from a number of different types of vibration sources, not just pile driving. For reference, the range of hammer energies from the most recent hammer database for the GRLWEAP wave equation program is included along the bottom.

Figure 5 shows an example scaled distance plot, again from Woods and Jedele (1985). As can be seen, as the distance decreases or energy increases, scaled distance decreases. As scaled distance decreases, the peak particle velocity tends to increase. This tendency can also be shown mathematically in equation 3.

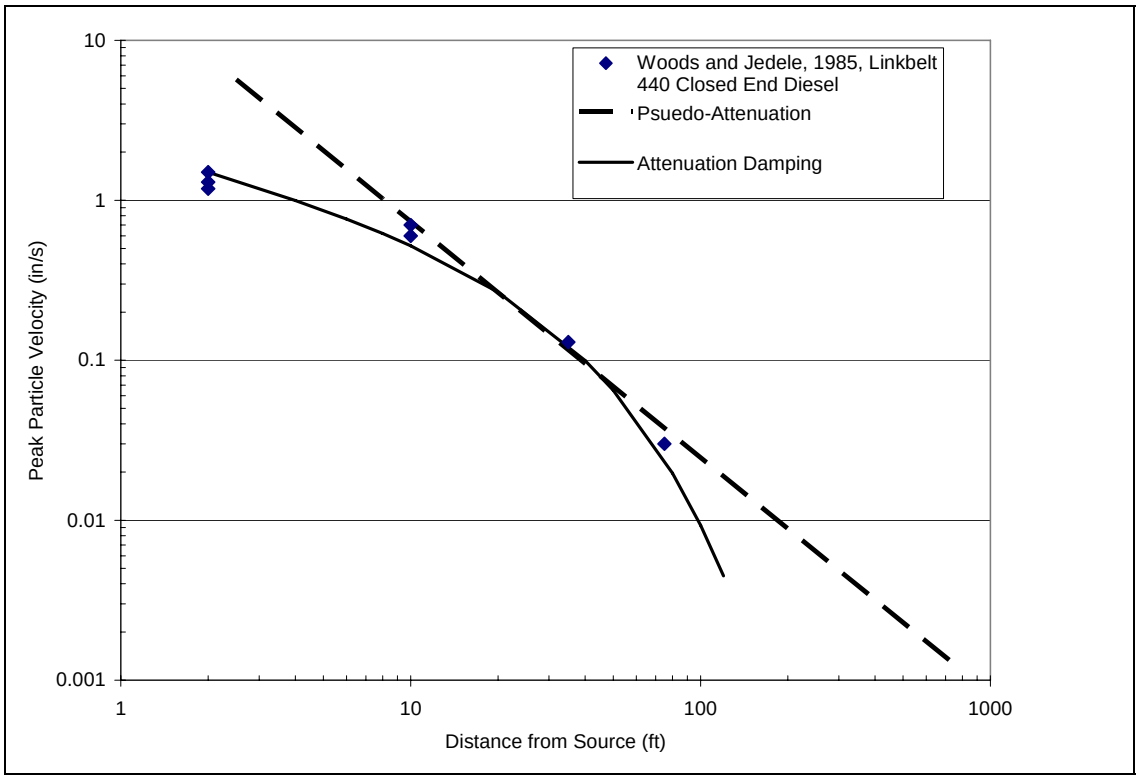


Figure 3. Sample Log PPV vs. log distance plot (Woods and Jedele, 1985).

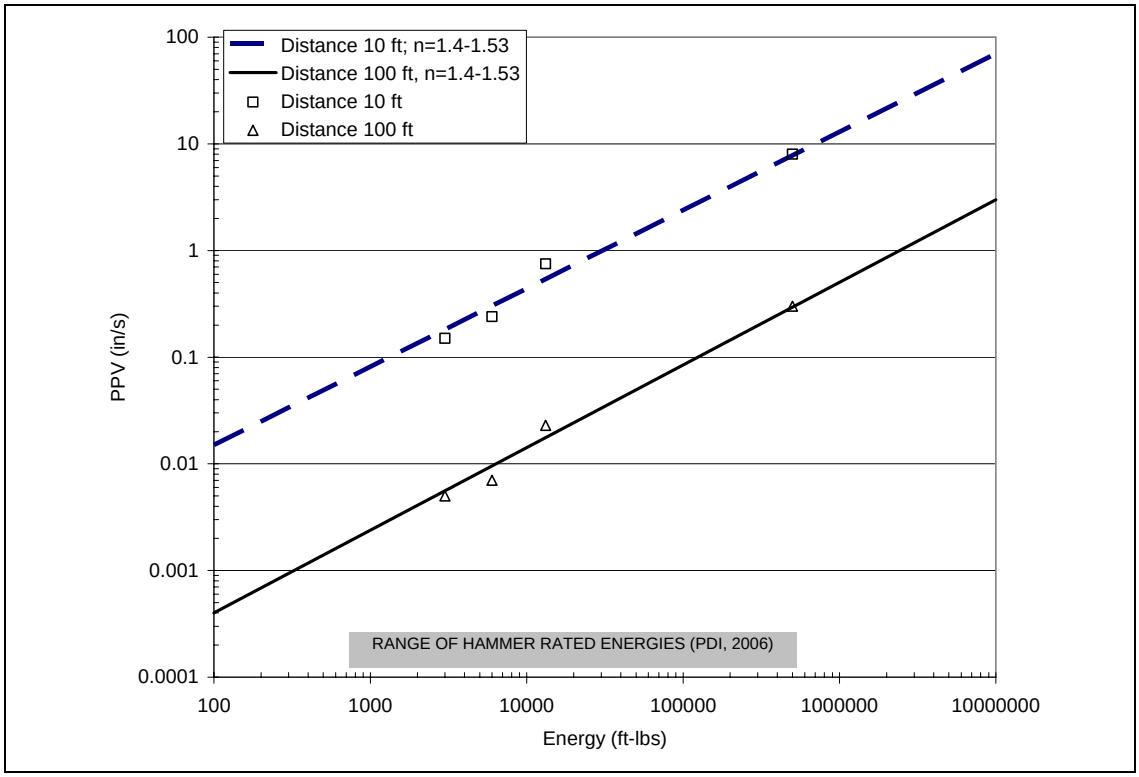


Figure 4. PPV vs. Energy Plot for many vibration sources (modified from Woods and Jedele, 1985).

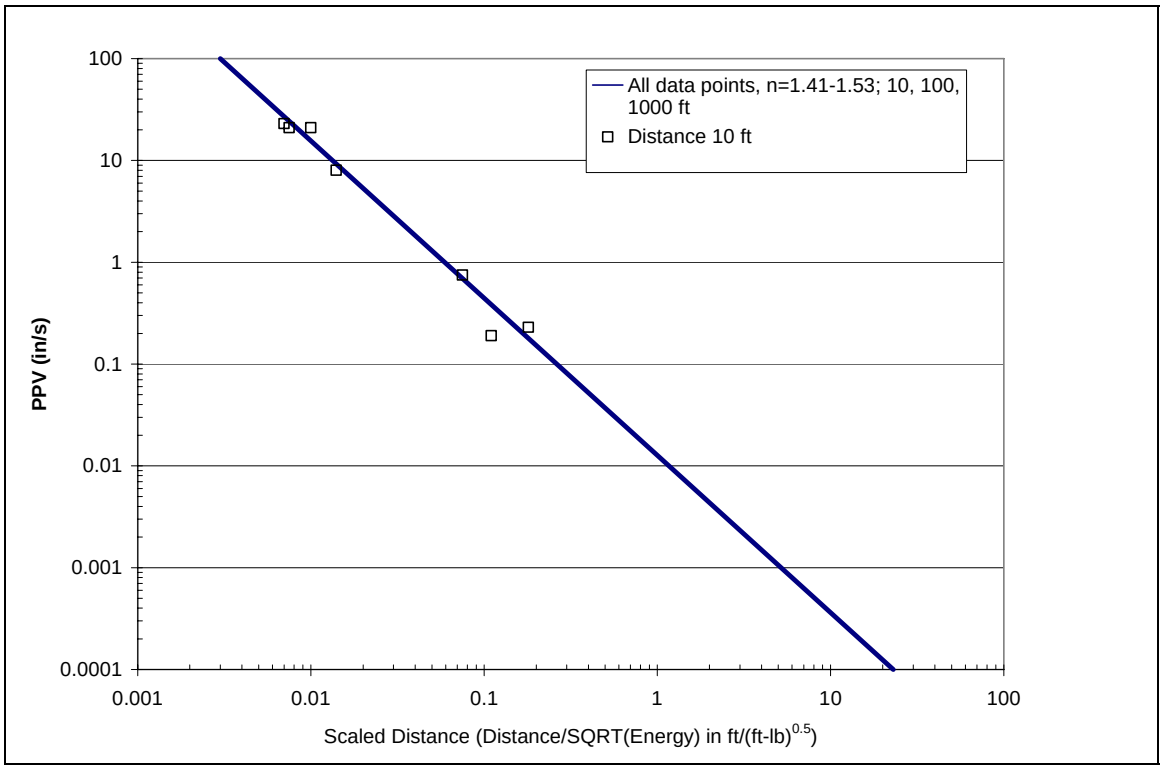


Figure 5. Scaled Distance Plot from Woods and Jedele (1985). N = 1.525

2.1.3 Other Analysis Methods

Outside of the log-log plots of velocities versus distance or energy, a few other researchers have proposed other ways to predict peak particle velocities in the ground due to impact pile driving. These include finite element studies, methods that use displacements generated by other programs, or the response spectra currently used in structural engineering for earthquakes.

Ramshaw et al. (1998) used ABAQUS (ABAQUS, Inc. 2006) to perform a finite and infinite element study. They modeled a 30 inch diameter, 70 foot long cast-in-place concrete pile that was dynamically load tested using a 4.8 kip drop hammer with a 1.2 m drop height. The pile was instrumented with a load cell or strain transducers to measure the force versus time. Vibrations were recorded 18 and 54 ft from the pile.

To predict the vibration records, Ramshaw et al. (1998) used a triangular impact force pulse of 5 seconds in duration. This input was placed into a finite element model that was assumed to have two layers with purely elastic properties. The model generated compressive, shear and Rayleigh waves, and produced an expected ground movement in the radial direction of motion. The authors reported the match between measured and predicted values was satisfactory, although the peak magnitude of the vibration at 54 feet from the pile was over predicted by a factor of 6 and the signal at 18 ft appeared to be overly damped. As more full time histories become available, this type of analysis may become more common.

Svinkin (1999) suggested a method of vibration prediction that uses "impulse-response functions" to predict vibrations versus time. Impulse-response functions are generated by an onsite, preconstruction test program where a mass is dropped on the surface and the response of the soil is measured. Once these functions are determined through reverse analyses, Svinkin (1999) suggests using the displacement versus time histories at various points along the pile from a wave equation program such as GRLWEAP (Pile Dynamics, Inc., 2006) to predict the dynamic force input into the soil. This dynamic force versus time function is then used in conjunction with the site specific impulse-response functions to estimate the horizontal and vertical vibration versus time histories at the site.

Massarsch (2005) has laid out the beginnings of a prediction model that considers the one dimensional compression wave travel and individual transfer of energy along the side of the pile and at the toe. Noting the limitations of the distance/energy attenuation methods described earlier, Massarsch (2005) develops equations to calculate conservative estimates of the stress at the pile toe and the maximum velocity in the pile. These are then used to predict maximum velocities at the pile toe and along the shaft that are transmitted into the surrounding soils.

To estimate the velocity transmitted into the soils, the stress at the base in the pile are reduced by an impedance defined by the mass density of the soil and a strain dependent shear

wave velocity. The shear velocities' strain dependence helps to model the plastic zone that occurs at the pile soil interface, and can reduce the shear wave velocity by up to 70% (Massarsch, 2005). To determine maximum vibrations on the surface in the far field, equation 4 is used.

The method of Massarsch (2005) shows promise, but needs to be refined, calibrated and verified prior to more widespread adoption. In U.S. practice, it is also unusual (but, with the growing requirement of shear wave velocity measurement for seismic site classification, becoming more common) to measure shear wave velocities on sites.

Finally, Dowding (1996) advocates a movement toward response spectra analysis as is used in earthquake engineering and structural dynamic analyses. In this case, for a particular input time history, the relative displacement response of a single degree of freedom system can be generated. The time history would be an acceleration or velocity versus time history for a particular pile driving vibration site. Given the response spectra, the engineer can proceed with structural design of the building or checks to see whether cracking or damage to an existing building. This method, however, requires measurement and recording of the most significant time histories, or at least an ability to accurately scale up a particular time history. This requires the ability of the monitoring equipment to automatically select and record the most critical time histories.

2.2 CODES AND FREQUENCY BASED LIMITS

The methods above arose from complaints or concerns about damage due to vibrations, and, as a means of limiting disputes and liability of contractors, owners and engineers. Not surprisingly, most cities and states now have codes that deal specifically with vibration and noise.

Today, vibration monitoring typically occurs for two reasons. First, there is an economic need to minimize the risk of lawsuits arising from claims of property damage, and second,

limitations on vibrations and noise levels are codified. These limitations are placed at the local, state and federal levels. For example, AASHTO (1990) recommends limiting peak particle velocities to between 0.5 and 1 inch/second to minimize the risk of damage for buildings in good repair. The State of Wisconsin (2006), based on a widely used recommendation by Siskind et al. (1980) to the Office of Surface Mining, uses a set of thresholds based on both the peak particle velocity and frequency. Similarly, as a part of its nuisance ordinances, the City of Milwaukee (2006), defines the acceptable limits of transient vibration (such as those due to pile driving), based on displacement amplitude levels. The limits are recreated in Table 2Figure 6.

Table 2. City of Milwaukee (2006) Nuisance Code Limits on Transient Vibrations.

Frequency (Hz)	Peak Displacement Amplitude(in)
2	0.1
5	0.01
10	0.005
20	0.0018
30	0.001
40	0.0008
50	0.0006
60	0.0005

Research has also been performed that determines at what peak particle velocities people start to notice, and at what velocities they start to become worried. These thresholds were presented by Reiher and Meister (1931) and were recreated in Richart et al. (1970). They determined that peak particle velocities of just below 0.01 in/s were barely noticeable, while velocities of 0.1 in/s or more often caused alarm.

These various nuisance levels were plotted together in Figure 6. Portions of this chart were adapted from Richart et al. (1970), who used tripartite paper to make the plots. This graph paper allows simultaneous plotting of acceleration, velocity and displacement against

frequency, taking advantage of the integral relationship between the three quantities. The dashed lines at an angle in Figure 6 are a displacement scale plotted logarithmically. The City of Milwaukee's data are plotted on the displacement scale, although peak particle velocities plotted on the same chart will also be subject to the same thresholds.

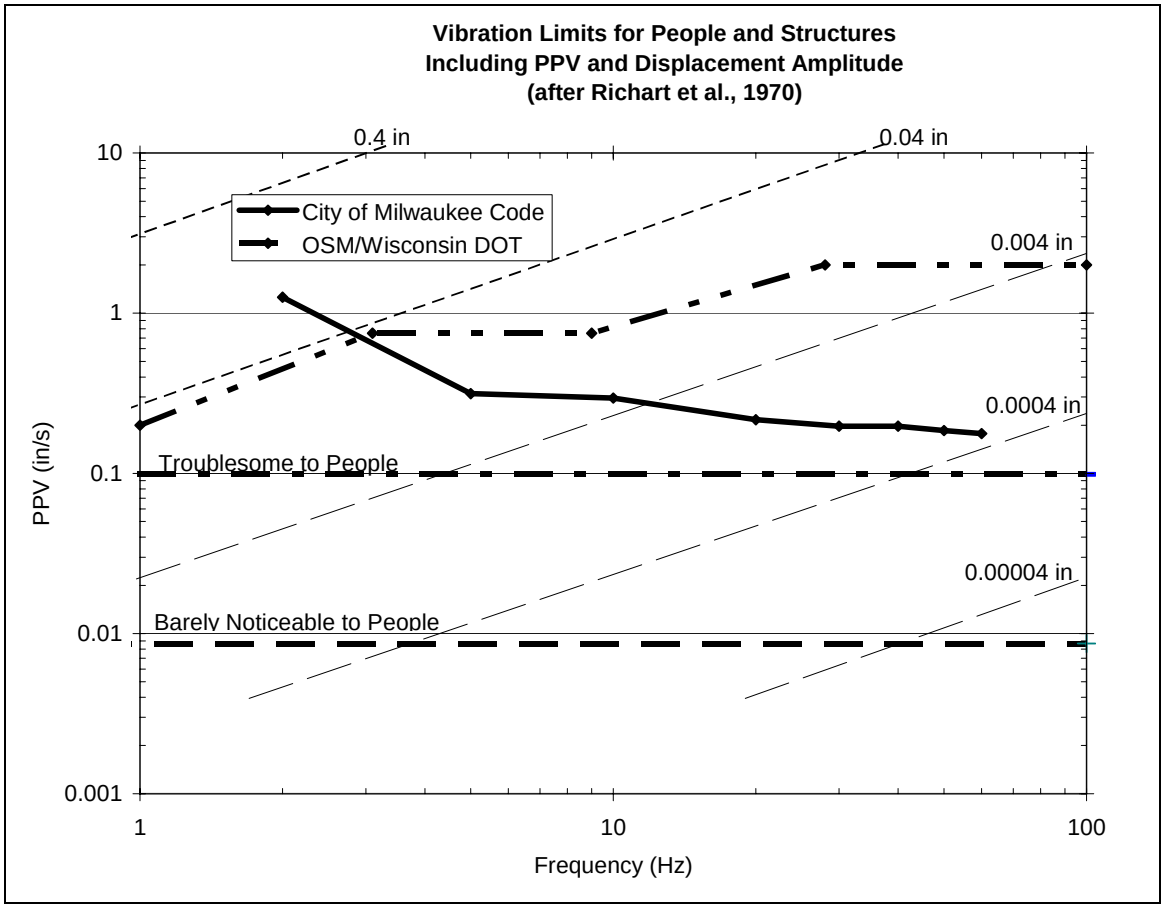


Figure 6. Typical threshold for people and buildings

Other regions and nations have different codes. In Sweden (as reported in Massarsch, 2004), for example, limit vibrations based on soil type beneath the existing structure. Additional factors are then used to increase or reduce the allowable velocities based on the type of structure (with bridges or defensive structures allowed higher vibrations than residential or historic buildings), the building's material, and the type of foundation on which the building sits. In Germany, the vibration standards are similar to those presented in Figure 6, but

limited to only 0.2 in/s up to 10 Hz and linearly increasing (on the log-log plot) to 1 in/s at 100 Hz (Dowding, 1996).

These codes are just a sampling, but include the codes in effect for the project used for this study, which will be described in Chapter 3. From this short review, the vibration standards generally serve two purposes: to limit the effects on the occupants of neighboring structures (nuisance ordinances) and to limit the likelihood of damage to the structures themselves.

2.3 CASE HISTORIES

Over the years, a number of reports have included the results of vibration studies due to impact vibrations. Many vibration studies occur in private practice every day, but these are not available for or included in this review. Instead, those available in literature are briefly surveyed.

Linehan et al (1992) investigated the response of a natural gas pipeline to construction activities. This included sheet pile driving with a vibratory hammer, H-Pile driving with an impact hammer, as well as demolition of a wall. The pile was an HP14x73 that was 58 ft long at final penetration and driven with a diesel hammer with a rated energy of between 23,000 and 30,000 ft-lbs. Vibrations were monitored on the soil surface and on the pipeline, where it was noted that those in the vertical or east-west direction tended to be maximum. It was concluded that the settlements observed during driving of the sheet piles and H-Piles were more detrimental to the structure than the vibrations themselves. Figure 7 shows this data along with that presented by Woods and Jedele (1985).

Singh and Knoebel (1993) discussed a vibration monitoring program for construction at a power plant. In this study, vibrations from step taper (pipe) piles and steel H-piles were driven with hammers rated at 24,450 and 19,500 ft-lbs, respectively through a sandy clay stratigraphy. These data points are included in Figure 7, as well. Data were monitored in

two different places: on the concrete foundations of existing structures and on free soil. In all cases, the free soil vibrations were higher than those measured on the concrete.

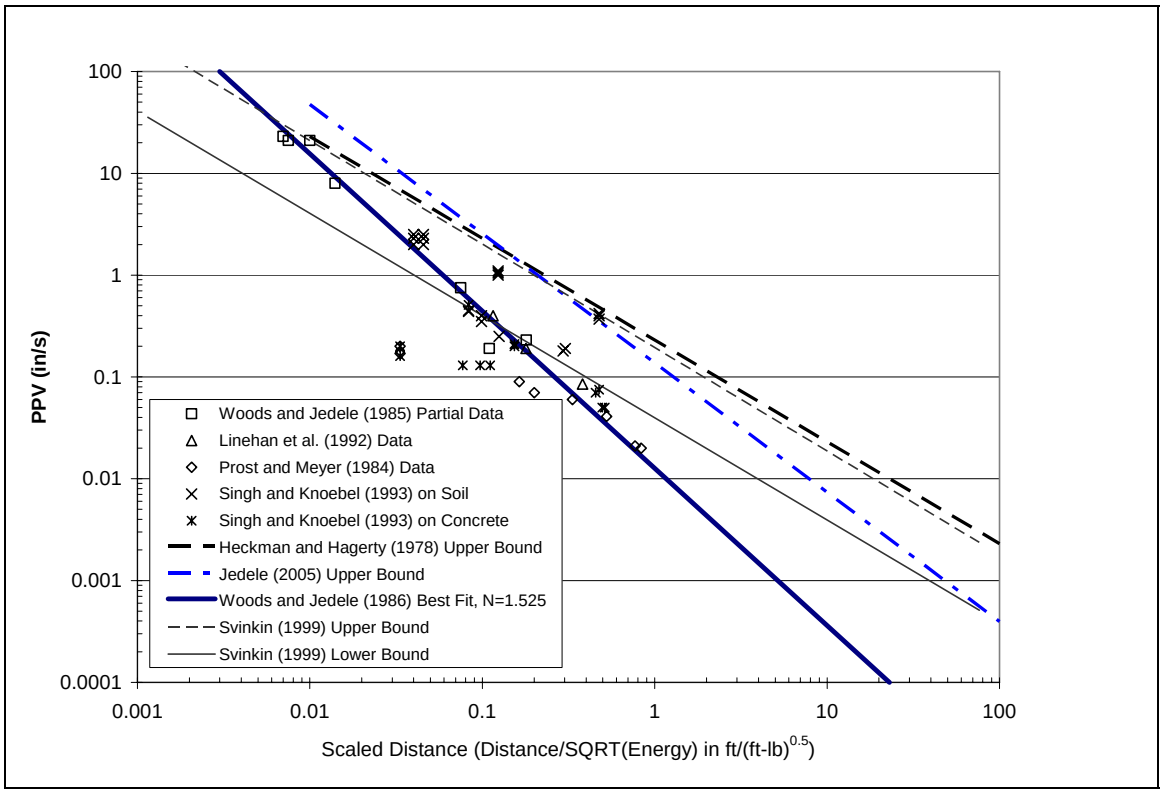


Figure 7. Scaled Distance Plots from Previous Studies.

In 2005, Jedele used the scaled distance relationship in equations 3 and 4 to extend the results of Woods and Jedele, 1985. To predict upper bound values, it was observed that the values of K= 0.137 and n = 1.27 fit the data best when D is in feet and E is in ft-lbs. This upper bound curve (but not the new data points) is included in Figure 7, along with an upper bound suggested by Heckman and Hagerty (1978), where K = 0.23 and n=1. Finally, Svinkin (1999) suggested a range of curves shown as upper and lower bound lines in Figure 7 based on the approximate velocity of the pile head at impact. The selection of scaled distance for this velocity is arbitrary set to be very small (0.001 ft/(ft-lb)$^{0.5}$).

Ashraf et al. (2002) drove 42 close ended steel pipe piles that were 14 inches in diameter through fine to medium sands. Vibration mitigation measures included preaugering the top

20 feet, as well as encasing the top 8 feet in a larger diameter steel shell filled with sand. The piles were driven with a Vulcan 01 hammer, which has a rated energy of 15,000 ft-lbs. Based on AASHTO (1990) guidelines, the peak particle velocities were limited to 0.5 to 1.0 in/s for buildings in good repair. Most of the data points fell under the Woods and Jedele (1985) curve shown in Figure 7, with peak particle velocities ranging from around 0.1 to 0.4 in/s at scaled distances ranging from 0.11 to 0.57 ft/(ft-lbs)$^{0.5}$.

Hope and Hiller (2000) performed an extensive study of vibrations due to impact pile driving. They compared a number of existing prediction models, where the parameters in equations 3 and 4 were determined. They then applied these results to a site where vibrations were carefully monitored during driving of an H-section driven by a Banut 700 piling rig, which has a hydraulic hammer with a ram weighing 11 kips. The rated energy of this hammer is nominally 29,000 ft-lbs according to the GRLWEAP hammer database (Pile Dynamics, Inc., 2006). Hope and Hiller (2000) recorded the peak particle velocities while also keeping careful track of the depth of penetration of the pile. The data showed wide scatter, particularly when the authors combined their data with that of Uromeihy (1990), and plotted versus slope distance, nominal hammer energy and scaled distance, as reproduced in Figure 8, Figure 9 and Figure 10. (Please note the PPV units are in mm/s, distances are in m, and energies are in kJ as presented in the original study.) They concluded that, while the predictions made by previous studies did give a reasonable upper bound prediction, that did not help to explain the wide range of vibration measurements observed as pile driving proceeded. They also noted (in line with the observations of many others) that vibrations tended to increase as the stiffness of the soil increased.

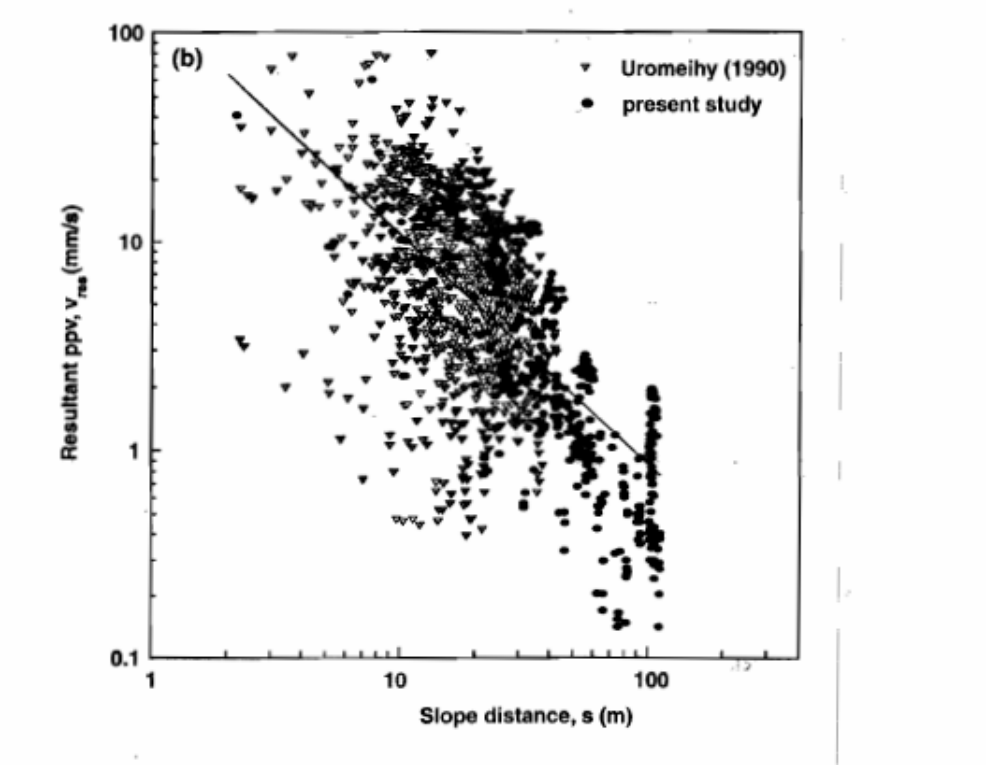


Figure 8. Seismic (or slope) distance plot for Peak Particle Velocities (from Hope and Hiller, 2000)

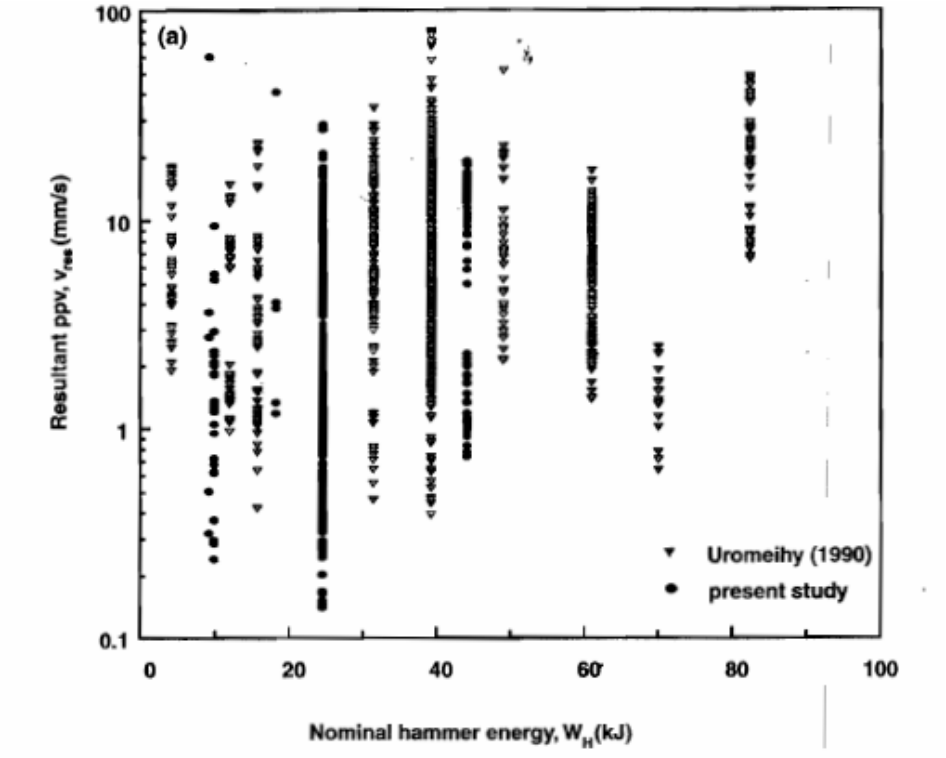


Figure 9. Rated Hammer Energy versus Peak Particle Velocities (Hope and Hiller, 2000).

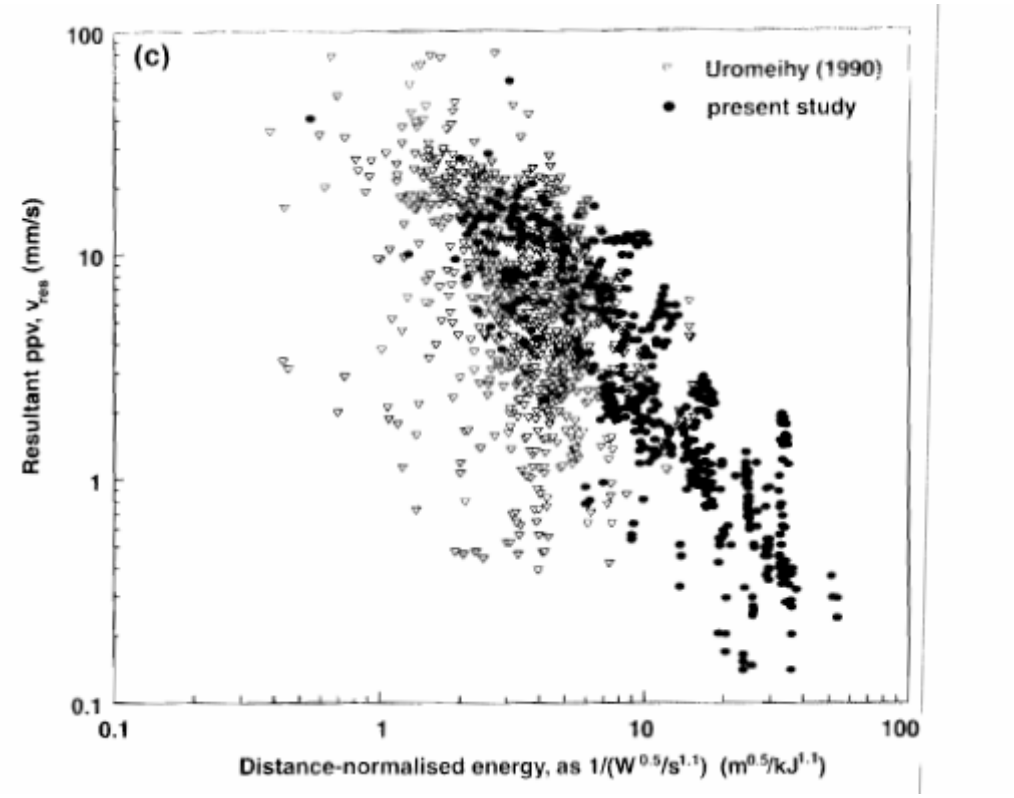


Figure 10. Scaled Distance Plot (Hope and Hiller, 2000).

These case histories show where the bulk of research has been focused over the past 30 or more years The state of practice is to generally use a distance or scaled distance approaches to conservatively measure the peak particle velocities expected at a site. The wide scatter in PPVs is generally ignored in the interest of the maximum values. While this does make some sense in the context of trying to limit damage by keeping vibrations below a certain level, it seems that an improvement to the method of vibration could be made if not only distance from the vibration source and hammer energy are considered. Ideally, the depth of installation to prevent high vibration levels or identification of soil strata that could result in significant vibrations would also be of interest. Perhaps we can improve the design phase by studying piles that have already been installed.

2.4 HIGH STRAIN DYNAMIC PILE TESTING

High strain dynamic pile testing (HSDPT) is performed during initial installation or during a restrike of a driven pile. Two to four strain transducers and two to four accelerometers are attached near the top of the pile to measure strain and acceleration records over a set period of time, usually on the order of 50 to 300 milliseconds. An example of an instrumented pile is shown in Figure 11 (the ruler is to collect pile set measurements for restrike purposes). The instrumentation is connected to a field computer on the ground that serves as the data acquisition and data processing system (Pile Dynamics, Inc., 2003).

Figure 11. HSDPT transducers on a pile to be tested during restrike.

The HSDPT testing equipment collects and records strain and acceleration records for every (or selected, if the operator so chooses) hammer blow. The equipment internally processes the data and then calculates quantities such as stresses in the pile, energy transferred to the gage location, estimates of axial pile capacity at the time of testing, and forces, velocities and displacements of the gage location. A few of the quantities used in this study will be described here.

In most cases, the quality of HSDPT data is monitored by the operator from the calculated force and velocity versus time curves. Figure 12 shows a sample force-velocity plot. From the strain and acceleration records measured by the gages, force and velocity are calculated from Equations 6 and 7.

$$F(t) = EA\varepsilon(t) \tag{6}$$

Where:

F(t) is the calculated force at the gage location as a function of time
E is the elastic modulus of the pile material at the gage location
A is the area of the pile at the gage location
ε(t) is the measured axial strain in the pile at the gage location

$$v(t) = \int a(t)dt \tag{7}$$

Where:

v(t) is the calculated velocity at the location of the accelerometer
a(t) is the measured acceleration at the location of the accelerometer
dt is the time between recorded data points

From one dimensional wave mechanics (see, for example Dowding, 1996), for a compressive stress wave traveling in an infinite elastic rod without significant resistance along the side,

the force and velocity will can be plotted proportionally using the pile's impedance, as shown in Equation 8.

$$F(t) = Zv(t) \tag{8}$$

Where:

Z is the pile impedance as shown in equation 9

$$Z = \frac{EA}{c} = \rho cA \tag{9}$$

c is the compressive wave speed of the pile material

ρ is the mass density of the pile material

For piles, which are by no means infinite, the force and velocity will only remain proportional until the traveling stress wave meets resisting forces. Practically, this usually means that proportionality will hold for HSDPT until the peak of the pulse created by impact. If there is any significant side friction, the velocity and force curves will begin to deviate and proportionality at the gage location will no longer hold. The record in Figure 12, for example, was taken during early, easy driving where the pile had not penetrated significantly into soils that generate significant shear resistance. As such, proportionality between the force and velocity is maintained until the wave reflects off the toe at a time of 2L/c, where L is the length from the gages to the pile toe. This point in the record is the amount of time required for the wave to travel from the gages down the pile, to reflect off the pile toe, and to return to the gage location. As is noted in Rausche et al. (1985) and Pile Dynamics, Inc. (2003), the time of maximum impact (T1) and the time 2L/c later (T2) where the toe reflection is seen are very useful in determining resistance, stresses elsewhere in the pile, and other quantities.

The PDA program (Pile Dynamics, Inc., 2003) can automatically calculate a number of different quantities. These include the forces at T1 and T2 (FT1 and FT2, respectively), the maximum force in the entire record (FMX), as well as the corresponding velocities (VT1,

VT2, VMX). By integrating the velocity *vs.* time curve, a maximum and final calculated displacement (DMX and DFN) can be determined. By integrating the product of force and velocity over time, as shown in Equation 10, a curve of energy versus time can be generated. Taking the maximum point on that energy curve gives EMX.

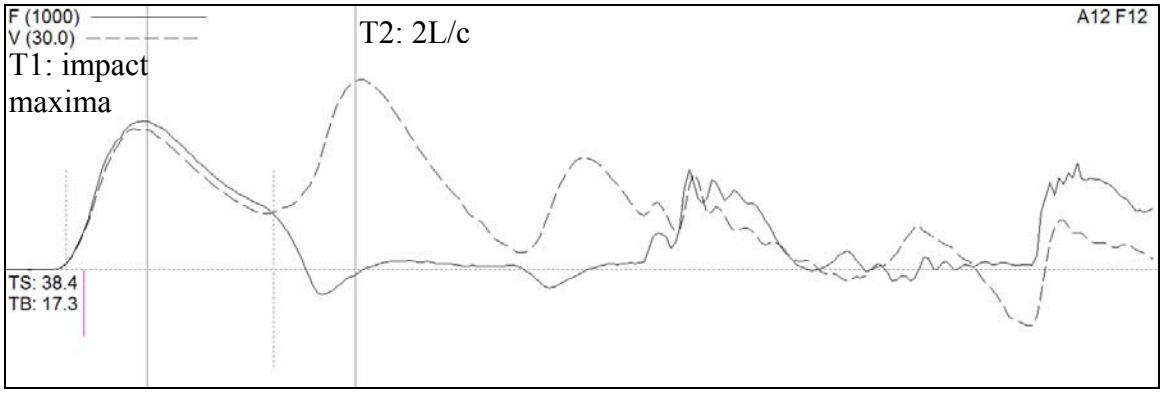


Figure 12. Typical early driving force-velocity (F-V) curve from a driven pipe pile.

$$EMX = Max\int_0^{t_{end}} F(t)v(t)dt \qquad (10)$$

A hammer's transfer or global efficiency is usually defined as the maximum energy transferred to the pile location (EMX) divided by the hammer's rated energy (which was discussed in Section 2.1.2). The transfer efficiency takes into account losses due to guide friction, losses in the cushion, losses due to friction and myriad other sources of energy loss. Alternatively, if other devices such a radar gun or proximity switches (but not a PDA) are used to measure the ram velocity prior to impact, a hammer efficiency can also be calculated. This hammer efficiency is built into hammer models in most wave equation programs.

Rausche (2000) summarized typical transfer efficiencies of various types of hammers based on the results of a large number of dynamic pile tests. Similarly, the GRLWEAP program (Pile Dynamics, Inc., 2006) includes hammer efficiencies based on ram velocity measurements and correlations to dynamic testing to determine hammer efficiencies. Table 3 summarizes these results.

Table 3. Measured transfer and hammer efficiencies for various hammer types.

Hammer Type	Transfer efficiency: Steel Piles		Transfer efficiency: Concrete Piles		Hammer Efficiency
	Average (%)	Range (%)	Average (%)	Range (%)	(%)
Single Acting Air/Steam	55	40-70	40	30-55	67
Single Acting Diesel	31	25-50	24	15-35	80
Hydraulic	Manufacturer and System Dependent				

For open end diesel hammers, where the behavior of the ram is dictated by gravity, the stroke of the ram (the ram's drop height) can be estimated using the Saximeter equation (as discussed in Rausche 2000) shown in equation 11.

$$STK = \frac{g}{8}T^2 - h_L \tag{11}$$

Where:

g is the acceleration due to gravity

T is the time between hammer impacts in seconds

h_L is an empirically correlated estimate of losses due to friction, gas compression, etc.

Multiplying the stroke, STK, by the ram's mass can give a more accurate measure of the potential energy of the ram prior to an impact. This can be important in single acting diesel hammers, where the stroke varies from blow to blow and is dependent on the resistance of the pile. As pile resistance increases, the stroke increases as well (see Rausche, 2000 for further discussion).

Finally, Rausche et al. (1985) derived the Case method estimate of static resistance by breaking up the total resistance experienced by a pile into static and dynamic components. The static component is what is of most interest to the typical practitioner. The total resistance, RTL, is derived in Rausche et al. (1985) using the pile impedance, the measured forces FT1 and FT2, and the measured velocities VT1 and VT2. The dynamic component of resistance, R_d, is modeled as being linearly proportional to the toe velocity, V_{toe}, using a Case factor, J as shown in Equation 12.

$$R_d = J_c * Z * V_{toe} = J_c(Z * VT1 + FT1 - RTL) \quad (12)$$

The PDA does not explicitly calculate toe velocity as a quantity for output. However, knowing equation 12 and outputting VT1, FT1 and RTL, this value can be manually calculated for any particular blow.

The PDA can calculate a number of other stresses, displacements, accelerations, and resistances for a given pile record. For this study, only those above are focused on. To review, there are three forces (FT1, FT2, FMX), four velocities (VT1, VT2, VMX, V_{toe}), the transferred energy (EMX), the hammer stroke (STK), and the maximum displacement (DMX). Other quantities could be investigated in future studies.

2.5 PILE DRIVING NOISE

With pile driving comes the sound of the hammer impacting the pile. The study of sound transmission is an enormous field, and the mitigation and hazards of loud continuous and transient sounds has been studied for decades. From worker protections in settings with loud industrial equipment to protection of homeowners through traffic noise barriers to controlling the noise from surrounding cubicles to the tuning of a new concert hall, the field of enhancing desired or mitigating unwanted or unsafe sounds is an enormous one. This study

does not look survey the entirety of the field of sound control and acoustics. Hopefully, a brief review will suffice.

One simple way to predict the attenuation of sound is to perform an analysis similar to those used for vibrations: plot versus distance. Similar to the vibration studies, this results in a log-log plot with considerable scatter, but will allow the engineer to plot upper bound thresholds and continue with design.

As shown in Figure 13, previous studies of noise from pile driving presented in Dowding (1996) show a relatively wide range of possible sound levels that tend to attenuate with distance. The data shown in Figure 13, from Linehan and Hannen (1984) are from a site in Phoenix where piles were driven through cemented sands and gravels to near refusal conditions. Dowding (1996) calls the Phoenix data outliers, attributing the high noise levels to the very hard driving and the low frequency air pressure transducers employed to measure sound.

Outdoor sound propagation modeling methods are summarized by Kurze and Anderson (2006). Propagation of sounds in an outdoor environment are affected by the height of the source (in this case, the pile driving hammer) and the receiver (the vibration monitoring equipment), as well as reflection and refraction of the waves off buildings, the ground, and in the air as wind or temperature changes. The sound attenuates naturally as the pressure disturbance expands outward (much like ground vibrations), but can also be attenuated by natural or manmade barriers or absorbed by the atmosphere. Clearly, there are plenty of variables to complicate the analysis!

The relation between the sound produced by the source, L_W, and the sound detected, L_p, at a distance, d, and angle from the source, Φ is shown in Equation 13 (Kurze and Anderson, 2006).

$$L_p(d,\phi) = L_W + D_I(\phi) + D_\Omega - A(d,\phi) \qquad \text{(in dB)} \qquad (13)$$

The correction factors in equation 13 are for the direction of the source, D_I, which for pile driving should be zero since the sound is in not focused in a particular direction (like a speaker or air horn, for example) if the hammer is in a free field. D_Ω can be estimated using equation 14. It accounts for situations where the source and receiver are at different heights, and the source itself is very close to the ground. Instead of radiating spherically, the sound waves from the source can only radiate over half a sphere. The correction factor A is a function that takes into account any other elements, such as walls or hills, in the path of the sound wave that can attenuate or amplify its intensity.

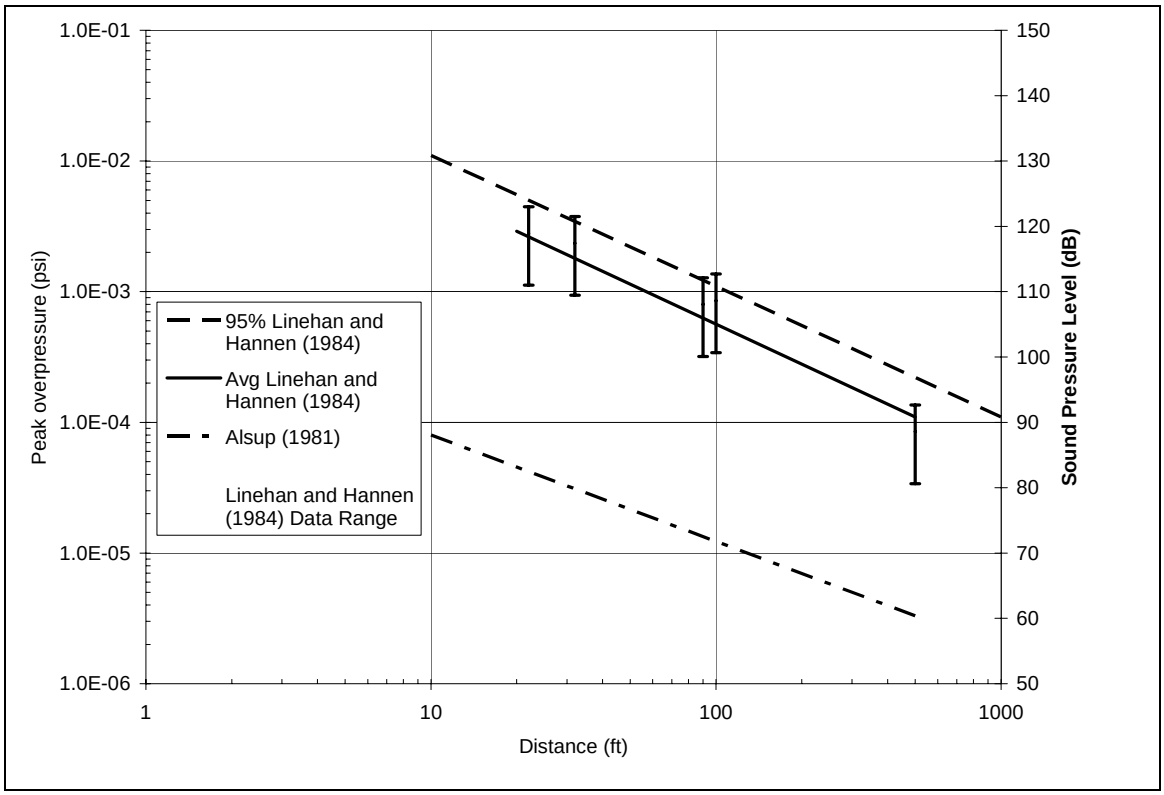


Figure 13. Pile Driving Noise versus distance plots from prior studies.

$$D_\Omega = 10\log\left[1+\frac{d^2+(h_s-h_R)^2}{d^2+(h_s+h_R)^2}\right] \qquad \text{(in dB)} \qquad (14)$$

In equation 14, d is the horizontal distance from source, S, to receiver, R, h_S is the height of the source and h_R is the height of the receiver. This factor will only be needed when the hammer is very close to the ground.

The transfer function, A, in equation 14 takes into account attenuation in free space over ground, as well as reflections from buildings, walls, and other barriers. For attenuation, the model can assume either straight line ray paths or account for refraction of the sound wave due to changes in atmosphere. This latter correction requires some knowledge of the temperature and wind gradient with altitude. Equation 15 shows the attenuation function, A, of spherically radiating sound waves, where d_{S-R} is the straight line (diagonal) distance from the source to the receiver and d_0 is a distance of 3.28 ft (1 m).

$$A = 10\log\frac{4\pi d_{S-R}{}^2}{d_0^2} \quad \text{(in dB)} \qquad (15)$$

Other attenuation factor formulations exist, but, since good data on ground surface, buildings and other built structures is not easily obtainable for this study, they will be assumed to be negligible. For a more detailed discussion, see Kurze and Anderson (2006).

To fully use Equation 13, the source intensity, L_w, must be estimated. To do so, the change in pressure due to the hammer impact on the pipe pile must also be estimated. The simplest analysis is to assume an infinitely long tube (Vér, 2006). As the hammer impacts the tube, a compression occurs at a particular velocity, $v_o(t)$, much like a piston at the end of the pipe. This compresses the air filling, for the current discussion, a rigid walled tube. The air has a density, ρ, and a wave speed, c. As shown in Equation 16, the pressure as a function of time can be determined.

$$p(t) = v_o(t)\rho c \qquad (16)$$

For a typical dynamic pipe pile test, the peak velocity during impact is around 10 ft/s. The mass density of air is 0.0022 slugs/ft^3 (0.07 lb/ft^3 specific weight) and the compressive wave speed in air is approximately 1128 ft/s. Given these parameters, the maximum sound pressure is 0.18 psi, or 156 dB (relative to a base overpressure of 2.9 x 10^{-9} psi for calculating decibel level).

Of course, this is a gross oversimplification, since the pile is not infinitely long, there is resistance along the side of the pile, reflections of sound can occur inside the pile itself, and other sound generators, such as the hammer, must be considered. It will, however, serve as a starting point for the study.

2.6 SUMMARY

This chapter has reviewed parts of the literature and state of practice pertaining to vibrations in surrounding soils due to impact pile driving and the codes that control them. A brief review of some measurements available from high strain dynamic testing of piles followed, as well as a very brief look at possible models of noise propagation through the air and noise generation at the hammer. The next chapter will review the details and data collected on a highway interchange project in Milwaukee, Wisconsin.

CHAPTER 3: THE MARQUETTE INTERCHANGE

3.1 GENERAL PROJECT INFORMATION

In 2003, the Wisconsin Department of Transportation and the Federal Highway Administration funded a pre-construction pile load test project in Milwaukee, Wisconsin. This project laid the groundwork for a major rebuilding effort of the interchange of Interstates 43, 94 and 794, which is called the Marquette Interchange. The original project was designed and built in the 1960s; this reconstruction aimed to improve the safety and increase the carrying capacity of these highways.

The load test program was primarily undertaken because the Milwaukee area is known for soils that show significant set-up, or increases in pile capacity after the pile is initially installed. This project attempted to quantify the amount of axial capacity increase measured on the piles, so that the size of the pile section and the length of embedment could be optimized during the subsequent design phase. It was hoped this would result in significant cost savings over a more traditional design in which longer term pile capacities were not initially measured.

A series of closed end pipe piles were installed at six static load test sites and 43 additional indicator pile sites where foundation elements would eventually be constructed. The total number of piles driven was 83. The piles were monitored using high strain dynamic testing during initial drive, where an initial capacity was estimated. Restrike dynamic load testing was then carried out with the pile driving hammer at approximately 2 hours and 1 day after initial testing. The piles were then filled with concrete, and at approximately 7 and 21 days further restrike dynamic load tests were carried out using a drop weight with a heavier ram. From these five sets of measurements, an overall curve of pile capacity increase versus time could be created, as well as estimates of how the change in capacity varies along the length of the pile.

Because the interchange is located in a heavily developed urban environment, the test pile program was also used to investigate the ground vibrations and noise levels generated by the pile driving operations. Vibrations and noise were measured at various distances from the pile driving operation, including near existing buildings and other structures. These measurements were to be used by Milwaukee Transportation Partners to determine attenuation curves with distance, using some of the techniques discussed in Chapter 2.

3.1.1 Soil

The city of Milwaukee is located approximately 90 miles north of Chicago, Illinois, on the shores of Lake Michigan in Wisconsin. The soils layers vary considerably over the site, but can generally be described as predominantly silty clays, with occasional layers of silty sands and sandy silts. The soil borings also indicate traces of fine to medium gravel in many of the layers. The borings terminate in dolomite bedrock, which is encountered at depths of 130 to 230 feet below the surface. It should also be noted that boulders were encountered in some of the borings.

3.1.2 Piles

All piles driven on the Milwaukee Interchange Project were steel, closed end pipe piles. The piles were manufactured from ASTM A252 Grade 3 steel, which has a minimum yield strength of 45 ksi. The pile diameters were 12.75, 14 and 16 inches. The pile wall thicknesses ranged from 3/8, 7/16 and 1/2 inches, respectively. Some 14 inch diameter piles were also driven with 1/2 inch thick walls. Most piles were driven in the range of 50 to 120 feet into the ground.

Most piles were driven with flat end plates that had a diameter ½ inch larger than the outer diameter of the pile. A few, however, were driven with conical tips to determine if any difference in developed end bearing could be discerned.

3.1.3 Hammers

The piles were driven using two different impact hammers: a Delmag D46-32 and a Junttan HHK-10A. A Delmag D46-32 is an open ended diesel hammer with a ram weight of 10.1 kips (HMC 2006). The hammer has four fuel settings, with a reported minimum energy of 52,260 ft-lbs and a maximum rated energy of 107,177 ft-lbs. This corresponds to rated strokes of between 5.15 ft and 10.57 ft. The hammer used on site is shown in Figure 14. Hammer cushion and helmet details were not available.

A Junttan HHK-10A is a double acting hydraulic hammer that is powered by an external power pack. The reported ram weight is 22 kips. The energy to raise the ram and push it down is provided by an external power pack, which allows the operator to vary the stroke between 0.16 and 3.94 feet. This implies maximum rated energies of up to 86,600 ft-lbs. The hammer used on site is shown in Figure 15. Hammer cushion and helmet details were not available.

Figure 14. Delmag D46-32 at Static Load Test Site E

Figure 15. Junttan HHK 10A driving a pile on a non static load test site

3.1.4 Pile Driving Records

Records of the pile installation were kept by personnel from the Wagner Komurka Geotechnical Group. These records included details such as the hammer used, the type of pile driven, the times for starts and stops, and the lengths of pile sections spliced to get to the final depth. These records also included the number of hammer impacts required to advance the pile one foot during early driving and 4 inches near the end of driving. Restrike blow counts were generally taken in ¼ inch increments.

3.1.5 Vibration Monitoring

To monitor the vibrations in the ground surrounding the pile driving operations, an Everlert VE seismograph was used on site by employees of Milwaukee Transportation Partners as shown in Figure 16. This device is manufactured by Vibra-Tech (Vibra-Tech, 2006) and is capable of measuring ground motions of up to 10 in/s in three directions: vertical, transverse (perpendicular to the pile-monitor line) and longitudinal (parallel to the pile-monitor line).

Changes in air overpressure (noise) are can also be recorded with the same device within a range of 88 to 142 dB.

The device can be set to record waveforms resulting from a particular triggering velocity or to continuously sample over a period of time. On this project, the former was used on selected restrikes, while the latter was used for monitoring vibrations during initial pile installation and to record background vibration levels as piles were spliced or during breaks. The data used in this report are from continuous samples only.

During continuous sampling, the device records the maximum detected air over pressure (in psi), sound intensity (in dB) and PPVs in the transverse, longitudinal and vertical directions over a 15 second (during driving) or 10 minute interval (during background readings). For each reading, the dominant frequency from a Fourier transform of the individual event waveforms are also calculated. The device also calculates the geometric PPVs during the reading and records the maximum value.

Figure 16. Vibra-tech Everlert VE monitoring device and ballast at Static Load Test Site F

3.1.6 High Strain Dynamic Testing Device

The system used for high strain dynamic testing of the piles during installation was a Pile Driving Analyzer®, Model PAK (PDA). This data acquisition and analysis system is

manufactured by Pile Dynamics, Inc. (Pile Dynamics, 2006) and data for this project were taken by employees of GRL Engineers, Inc., which at the time included the author.

For every hammer blow during initial pile installation, the PDA records strain and acceleration signals from two reusable strain transducers and two one-dimensional piezoelectric accelerometers attached near the pile tops. During restrike, two piezoelectric accelerometers, two piezoresistive accelerometers and four strain transducers were often used. These gauges are attached near the pile top and measured acceleration and strain are in the direction of the pile axis only. The strain and acceleration signals are converted to force and velocity signals and displayed on the PDA's LCD screen so that the engineer can monitor data quality, stresses, transfer of energy from the hammer to the pile and the change in estimated static resistance with as the pile is driven.

The PDA records the data from each hammer blow in 50 to 333 ms intervals and uses the Case Method (Rausche et al., 1985) to calculate the static resistance noted in Chapter 2, as well as other quantities. For each blow, various results can then be transferred to a text file that lists the measured maxima or values at a particular point in the record. Each individual blow is also given a time stamp, and the total number of blows can later be used in conjunction with the driving record to estimate the pile's penetration into the ground at each hammer blow.

3.1.7 Data Reduction

Given the soil borings (data points given at depths in feet), the driving records (data points given every foot of pile penetration), vibration records (in 15 second time intervals), and the PDA data (data recorded with time stamps and, using driving records, given estimated depths for every blow), the four separate data sources could be combined. This combination of data will form the basis for studying and modeling vibration and noise at the study site.

3.2 DATA FOR THIS STUDY

For this project, PDA data were taken on all piles during initial driving and restrike. The exception was on the first section of each pile, where blow counts were sometimes expected to be very low and damage to the testing equipment was to be avoided. Thus, not all piles had PDA data from the very beginning of driving. Vibration data were taken as the equipment was available, and, since two pile driving rigs were working simultaneously, some pile driving was not monitored for vibrations. Finally, not all of the electronic data were transmitted for this study, leaving some gaps in the overall record.

Of the 83 piles driven, 51 had vibration data recorded during initial drive. Combining these with the PDA data transmitted to the author, a total of 29 piles could be considered "complete" data sets. To further focus this study, it was decided to look only at the static load test sites, where more than one pile could be attached to a particular soil boring. It was hoped this could reduce some of the variability due to the wide ranging soil profiles across the site.

Thus, the static load test sites yielded 16 piles with complete data sets. The static load test sites were designated A through F. Data sets with both PDA records and vibrations are included in sites A (4 piles), B (6 piles), D (2 piles), and E (4 piles). Site C and F were not included in the study because site C lacked vibration data and the PDA data for Site F was not obtainable by the author. Table 4 summarizes the pile details, where pile names are given in the form SLT-A-14-1. This designation means that, in static load test (SLT) site A, a 14 inch diameter pipe pile was driven as the first pile. Also note that the total driven length in Table 2 is not the pile's final penetration, but the total length of the pile from the hammer's helmet to the pile toe at the end of driving. The final penetration of the piles in Table 6 ranged from 72 to 117 feet below grade.

Table 4. Summary of piles for this report.

Pile Designation	Soil Boring/ Hammer	Pile Diameter (in)	Wall Thickness (in)	Total Driven Length (ft)	Number of Pile Sections
SLT-A-14-1	P1222-01/ HHK-10A	14	7/16	120.6	2
SLT-A-14-2		14	1/2	120.6	2
SLT-A-16-4		16	1/2	120.6	2
SLT-A-16-5		16	1/2	121.8	2
SLT-B-12-1A	P1123-01/ D46-32	12.75	3/8	121.8	2
SLT-B-12-2		12.75	3/8	120.9	2
SLT-B-14-3		14	7/16	120.5	2
SLT-B-16-4		16	1/2	120.7	2
SLT-B-14-6		14	1/2	120.5	2
SLT-B-14-7		14	1/2	120.7	2
SLT-D-14-2	P27ER-13/ D46-32	14	1/2	150.7	3
SLT-D-12-6		12.75	3/8	120.7	2
SLT-E-12-1	P1121-02/ D46-32	12.75	3/8	120.7	2
SLT-E-16-2		16	1/2	142.9	3
SLT-E-14-3		14	7/16	120.6	2
SLT-E-12-4		12.75	3/8	120.8	2

3.2.1 Subsurface Characteristics

All soil borings for the static load test sites were drilled by Milwaukee Transportation Partners in 2002, and are included in Appendix A along with each pile's driving record. Figure 17 summarizes the uncorrected SPT N-value versus elevation above sea level. It should be noted that the surface elevation of nearby Lake Michigan at the time of the borings was approximately 578 ft (NOAA, 2006). Mud rotary drilling was used to obtain samples by Shelby tube or split spoon at approximately 2.5 foot intervals.

The soil boring closest to Static Load Test Site A is P1222-01. From the surface to approximately 11.5 feet, silty clay fill was encountered that also included some bricks. SPT blow counts were variable, but seemed to range from 6-17 blows per foot when no obstructions were encountered. From 11.5 feet to 68 feet, silty clay was encountered. SPT N-values generally increased with depth, with values ranging from 6 to 24 blows per foot. From 68.5 to 98.5 feet, layers of silty sand and sandy silt were reported. These layers had N-values ranging from 14 to 34 blows per foot. From 98.5 to 118.5 ft, silty clay was again encountered, which had SPT N-values of around 20 blows per foot, with a locally harder layer with coarse gravel over the last 5 feet (N-value was 66 blows per foot). From 118.5 136 feet, silty sands and clays were observed with blow counts of between 25 and 37 blows per foot. Below 136 feet, dolomite bedrock was encountered. The drillers reported seeing no water or cave-ins over the course of the boring.

Boring P1123-01 was drilled in the area of Static Load Test Site B. Approximately 8 feet of silty sand fill was again reported, with SPT N-values of around 20 blows per foot. Silty clay was encountered from 8 feet to 93.5 feet, with N-values that varied from 5 to 40 blows per foot. At 88.5 feet, a veer week layer was encountered where the weight of the hammer pushed the sampler. Between 13 and 16 feet and 78 to 82 feet, layers of Silty sand and sandy silt with clay were encountered. The upper layer had N-values of 12 blows per foot, while the deeper layer had an N-value of 35 blows per foot. More silty sand or clay layers were encountered between 93.5 and 106.5 feet, with N-values ranging from 4 to 63 blows per foot. A very high blow count layer of silty sand and gravel was observed from 106.5 to 123 feet, with N-Values in excess of 50/3” or 50/6” of penetration. This high resistance, however, could be due to the medium to coarse gravel’s diameter in comparison to the sampler diameter, however. From 123 feet to the bottom of the boring at 165 feet, a silty clay layer with variable (17 to 100 blows per foot) N-values were encountered.

In the vicinity of Static Load Test Site D, Boring P27ER-13 was drilled. The upper 11 feet consisted of fill, gravel and crushed coal, with blow counts in excess of 30 blows per foot. From 11 feet to 58.5 feet, organic silty clays with very low N-values (2 to 5 blows per foot)

were encountered. Within this layer, a 5 foot thick layer of sand was encountered at 23.5 feet with N-values of 8 blows per foot; another 5 foot thick layer of silty sand with an N-value of 7 was encountered at 48.5 feet.

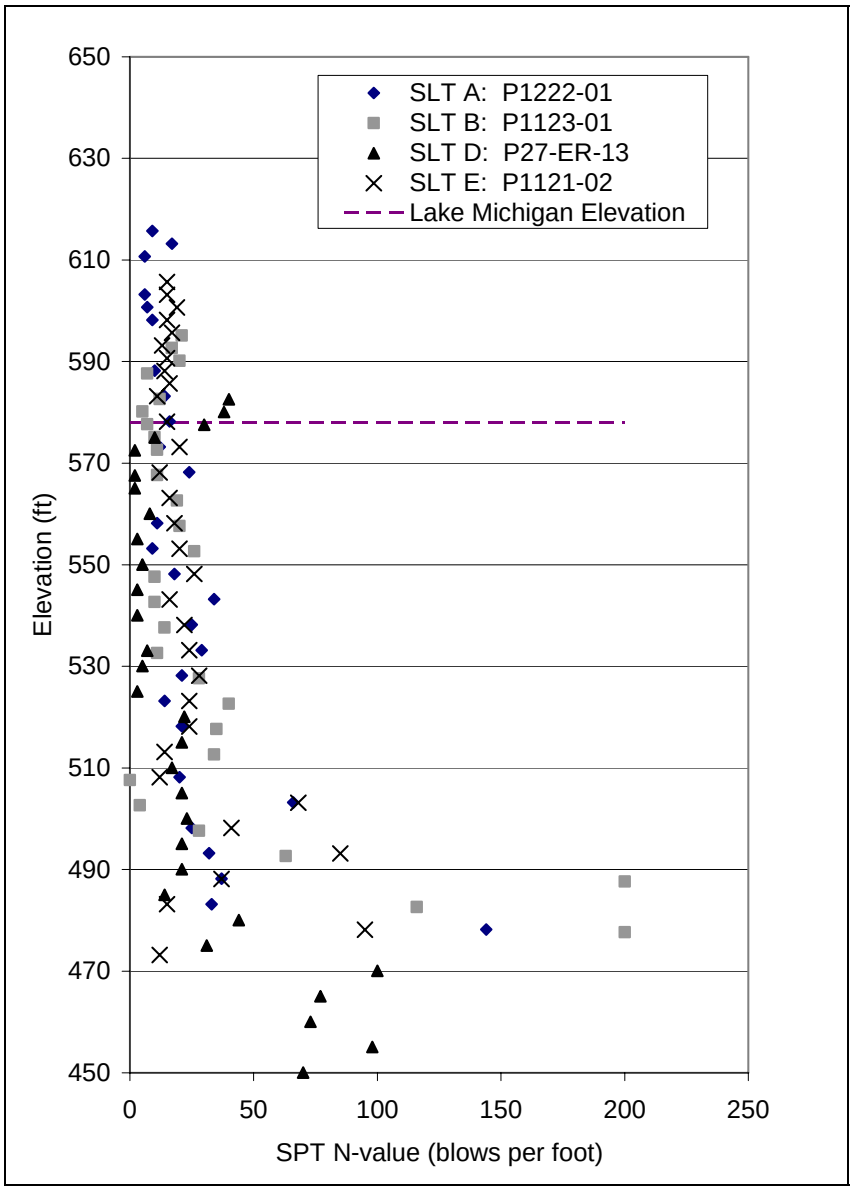


Figure 17. Summary of SPT N-Values for Four Static Load Test Sites

From 58.5 feet to 104 feet, silty sands, silty clay, clayey silt and sandy silts are encountered with N-values ranging from 14 to 23 blows per foot. Silty clay and silty sands described as very stiff or very dense with some medium gravel was observed from 103.5 to 188 feet. N-

values in these strata ranged from 30 blows per foot to 69 blows per 6 inches, with most N-values reported to be above 50 blows per foot. From 188.5 to 200 feet, silty clays with N-values of 34 and 38 blows per foot were encountered. The boring was terminated when fractured rock was encountered at 200 feet. Water was encountered 8.5 to 10 feet below the ground, or an elevation of 575 to 576.5 feet above sea level. This corresponds nicely to the level of Lake Michigan at the time of the boring.

Finally, boring P1121-02 was drilled in the vicinity of static load test site E. Fill materials were encountered to a depth of approximately 8 feet, with N-values ranging from 15 to 19 blows per foot. Silty clay was noted from 8 to 32 feet, with N-values between 11 and 17 blows per foot. Silty sands and clayey silts with N-values of 12 to 20 blows per foot were encountered from 32 to 51 feet, followed by another thick layer of silty clay from 51 to 84.5 feet. This layer had N-values ranging from 16 to 28 blows per foot.

A layer of silty sand with gravel was noted from 84.5 to 92 feet, with N-values of 24 blows per foot. Clayey silt layers with N-values of 12 to 14 blows per foot were observed from 92 to 101 feet, while high N-value (37 to 68 blows per foot) clayey gravel and sand were encountered from 101 to 122 feet. Sands were encountered from 122 to 140 feet. These sands had N-values ranging from 12 to 95 blows per foot. A dolomite boulder was encountered at 140 feet, after which the boring was continued. Because no piles in static load test site E was driven beyond a penetration of 131 feet, interested readers are directed to the appendix for the soils encountered in the remainder of the boring. No water was encountered during drilling.

3.2.2 Vibration Data

The details of the vibration monitoring program for the piles included in this study are summarized in Table 5. As can be seen, the device was placed on different surfaces at each static load test site, depending on what was available at each location. Horizontal distances for these piles ranged from 10 to 100 feet. While most the piles at the sites used in this study

had varying distances from pile to seismograph, static load test site E kept a constant 35 foot distance. Sample vibration and sound measurements versus time that resulted from tests on a particular pile are shown in Figure 18 and Figure 19, respectively.

Table 5. Vibration Monitoring Test Details

Pile Designation	Horizontal Distance from Pile (ft)	Sections Monitored	Surface Material
SLT-A-14-1	20	1, 2	Asphalt
SLT-A-14-2	60	1, 2, Background	Asphalt
SLT-A-16F-4	40	1, 2, Background	Not Reported
SLT-A-16P-5	80	2, Background	Not Reported
SLT-B-12-1A	58	2, Background	Fill soil
SLT-B-12-2	55	1, 2, Background	Fill soil
SLT-B-14-3	50	1, 2, Background	Fill soil
SLT-B-16F-4	45	2	Fill soil
SLT-B-14-6	64	1, 2, Background	Fill soil
SLT-B-14-7	25	1, 2	Fill soil
SLT-D-14-2	10	3	Crushed Stone
SLT-D-12-6	100	1, 2, Background	Crushed Stone
SLT-E-12-1	35	1, 2	Topsoil/Grass
SLT-E-16P-2	35	1, 2, Background	Topsoil/Grass
SLT-E-14-3	35	1, 2	Topsoil/Grass
SLT-E-12-4	35	1, 2, Background	Topsoil/Grass

It should be noted that the values shown in Figure 18 and Figure 19 are maxima, generally over a 15 second interval during driving and 10 minute intervals during background vibration and noise data collection. Thus, one or more hammer blows could have occurred (and usually did) during the interval. These data points can be matched up directly to the PDA

data through the time stamps, as will be illustrated in Section 3.2.4. Sound and noise data from all piles in the study are included in Appendix A.

From Figure 19, it is clear that some background data points were taken inadvertently. Based on the abrupt increase in sound level it is possible to determine when the hammer was started (in this case, at 30 minutes after the monitoring started). Indeed, the abrupt increase in sound level was a good indicator of where to begin the process of synchronizing the PDA records with the vibration records.

3.2.3 Driving Records and PDA Data

PDA data are recorded with a time stamp, and, based on the number of blows counted by the inspector for a given pile, are then correlated to depth using the driving record. However, human error sometimes creates small differences between total blows counted and total blows by recorded by the PDA. In this case, the blow counts are generally entered from the end of drive working toward beginning of drive, since the final blow counts are usually most important. For this project, however, it will be assumed that the entry of blow counts is sufficient for later correlation of vibrations to depth.

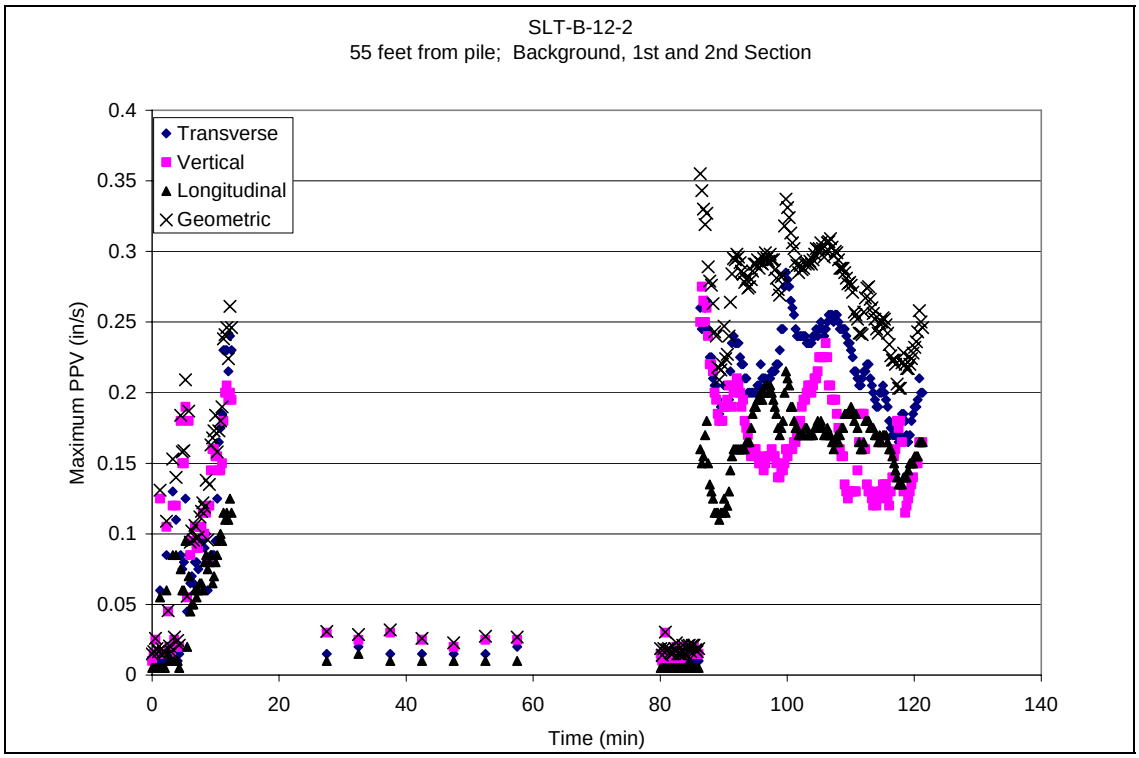


Figure 18. Results from Vibration Monitoring Program: Maximum PPV vs. time

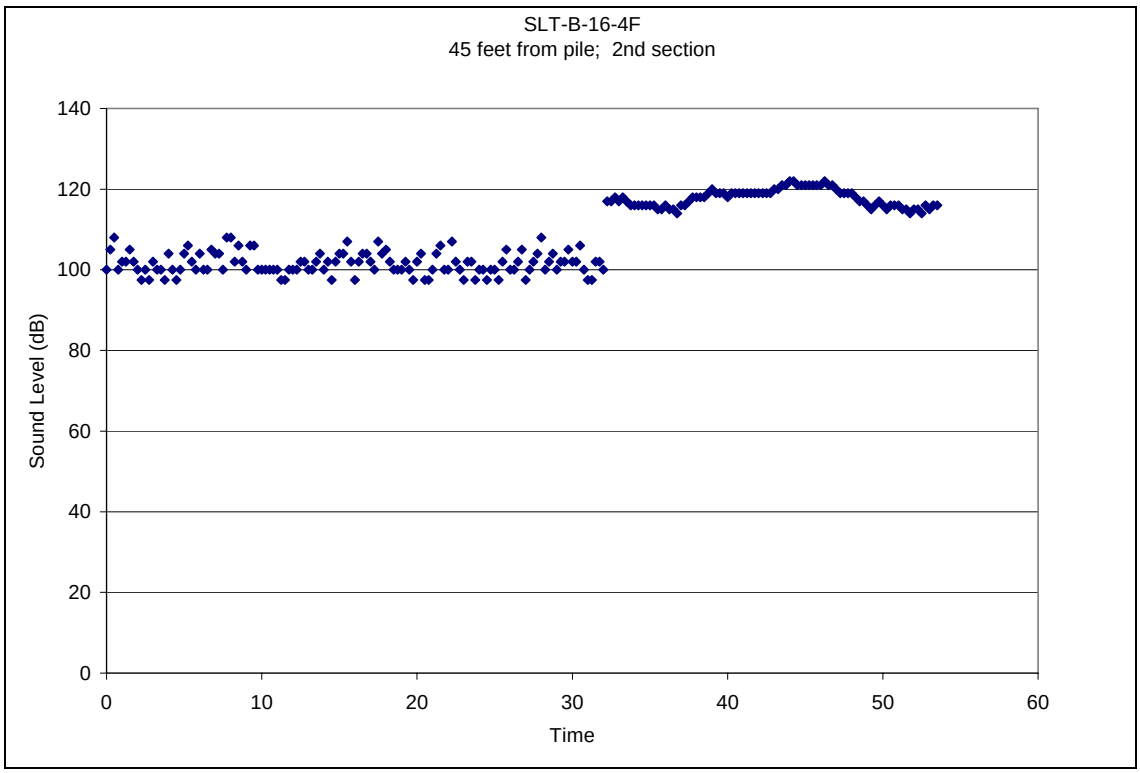


Figure 19. Results from vibration monitoring: Maximum Sound Level vs. time

A typical PDA record from near the end of driving is shown in Figure 20. These four plots show various quantities versus time, in milliseconds. The full time scale is 204.8 ms, as denoted by TS on the graph. The top graph shows force (F) and velocity (V) plotted proportionally by the pile's impedance (EA/c). In this case, the force is plotted to a maximum scale of 600 kips (to the top of screen) while the maximum velocity is 23.1 ft/s. The bottom graph shows energy transferred to the gage location (E) and displacement (D) versus time. Energy is in ft-kips and displacement is in inches. Along the left side are various parameters used in the data collection process, including project information, pile specifics, calculated quantities from the measurements, and other data quality and analysis parameters.

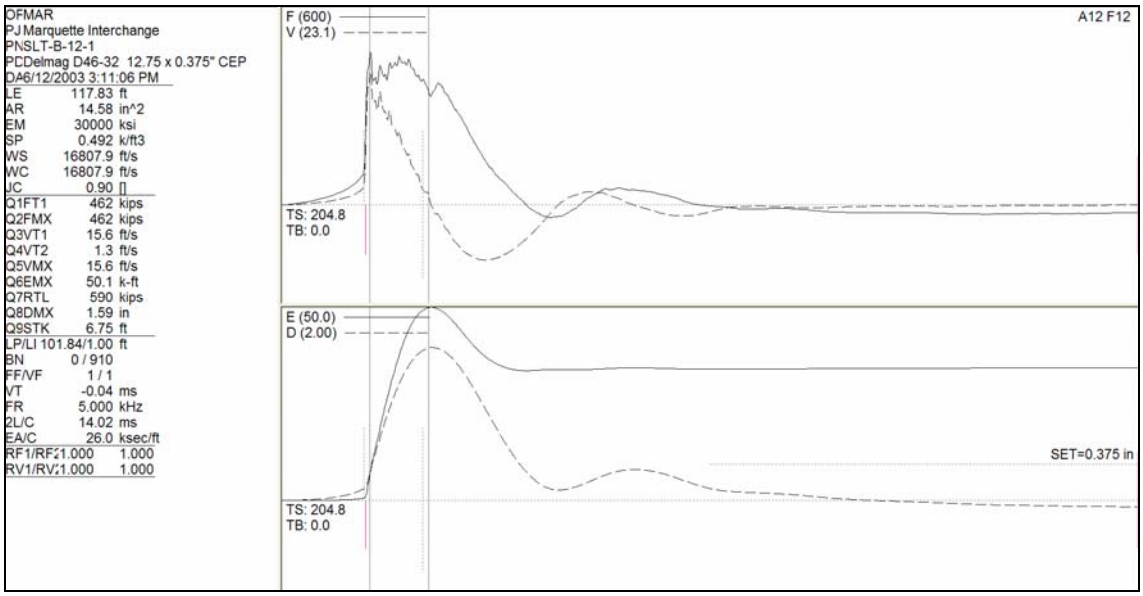


Figure 20. PDA screenshot of later blow from SLT-B-12-1. Force (F), Velocity (V), Energy (E) and Displacement (D)

The quantities displayed starting with Q1, Q2, etc. along the left side are a few of the many quantities calculated when using the Case method. FT1 is the force at the impact peak while FMX is the maximum force measured over the entire blow. VT1 is the velocity at impact and VT2 is the velocity that occurs at a time corresponding to the wave return (2L/c). VMX

is the maximum velocity measured over the blow. EMX is the maximum energy transferred to the pile top from the driving system, or the peak value of the energy curve shown in the bottom half of the screen. RTL is the total resistance as calculated by the case method, using a model that includes both static and dynamic resistance. This value should not be compared to static load test results. DMX is the maximum displacement measured, and STK is the diesel hammer stroke as calculated from the Saximeter equation (Equation 11) using hammer blows per minute.

The PDA can print the nine calculated quantities to a text file for every blow, as well as input penetration and time. The most common method of output is to plot PDA results versus blow number or penetration, which is determined based on the driving record. Figure 21 shows the maximum force, FMX, and total resistance, RTL versus approximate penetration depth. The driving record for this pile is also included for reference. Of interest in the maximum force versus depth data are the jumps at approximately 37, 46, 52, 55 and 62 feet penetration. At these depths, the hammer energy was increased by the contractor (at the PDA operator's and inspector's request) to make the driving go faster.

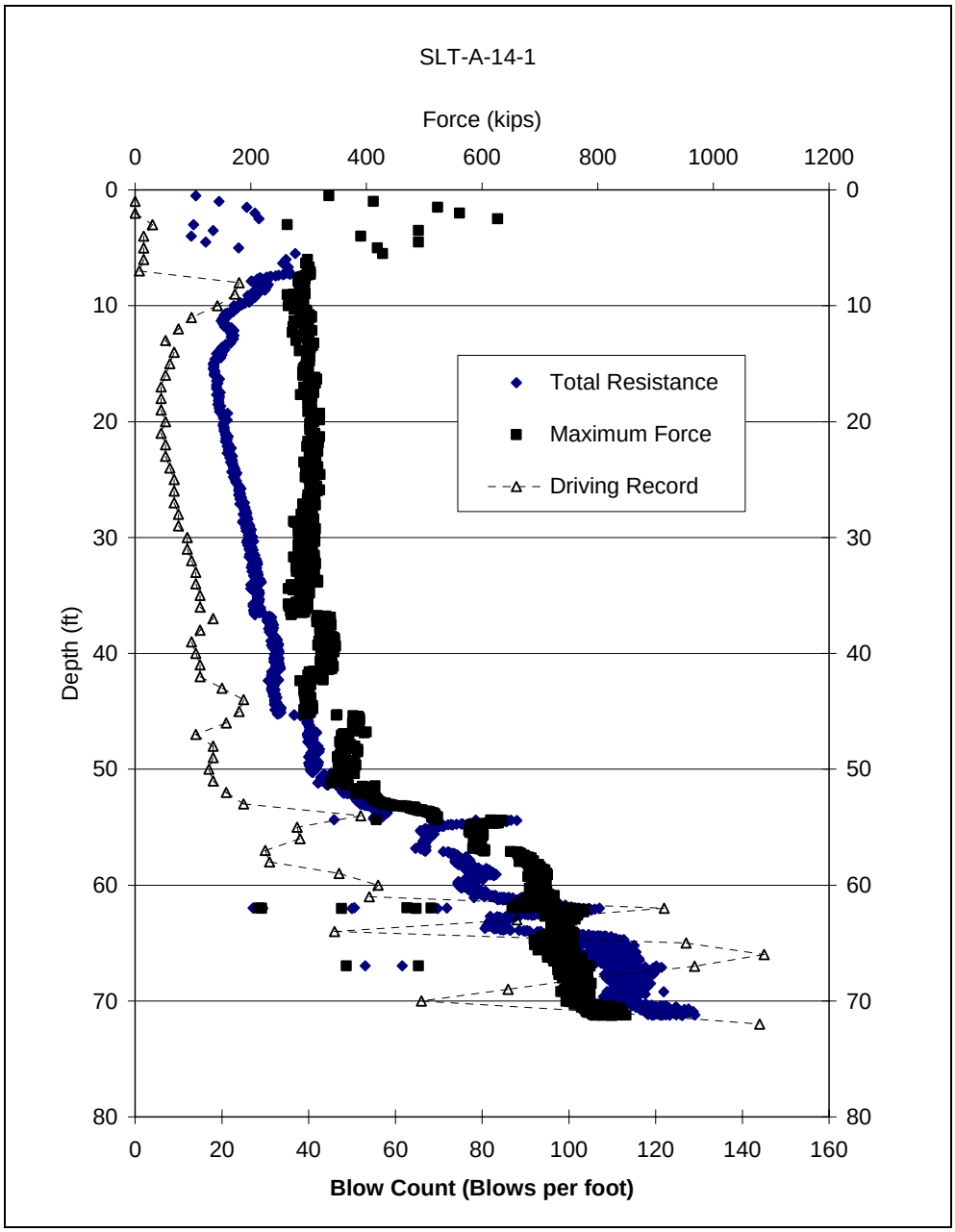


Figure 21. Selected PDA Data versus Depth of Pile Penetration

3.2.4 Coordinating vibration and PDA data

The vibration data and PDA data can also be compared. Any data from the PDA results, such as the peak velocity at impact, VT1, versus time and the vibrations versus time can be combined as in Figure 22 to show their trends compared to one another. Note the density of

data points in PDA compared to the data points from the vibration data. On average, the time between records recorded by the PDA is 1.6 seconds for this section of pile, or approximately 9 PDA records for every one vibration record.

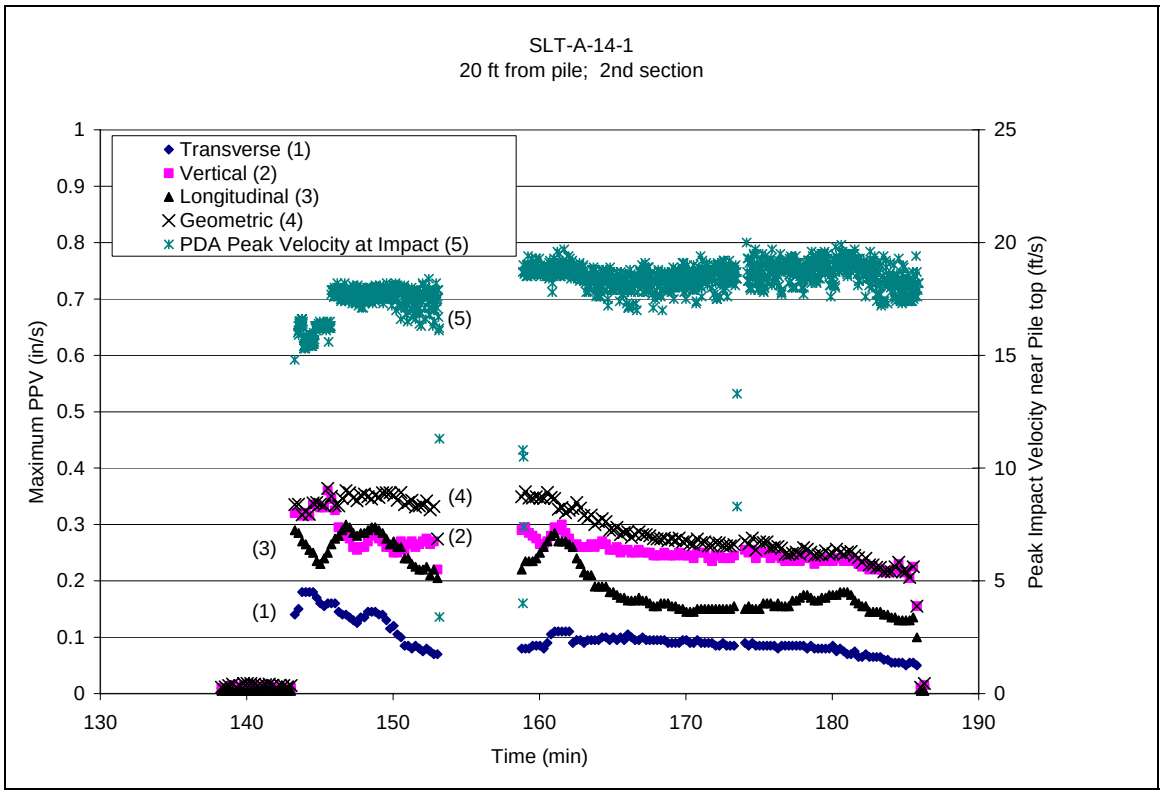


Figure 22. Selected PDA Result and Vibration Data plotted versus time.

In an attempt to synchronize the two data sets, an algorithm was created in Excel to aggregate the PDA data and record the minimum, maximum and average values of each of the nine quantities investigated over 15 second intervals. Starting with the first blow recorded in PDA, it then records maxima, minima and tracks the sum of data points until approximately 15 seconds of data is collected. These results are printed in conjunction with the vibration data. In the end, a one to one correlation of vibration or noise results and "filtered" PDA data (including depth of penetration and blow count) are shown as in Figure 23.

The above process is not without uncertainty. There is no way to know whether a particular blow in the PDA actually led to the vibration shown by the point it was compared to, or if it should have been included in the previous or next data point. Based, however, on the more relatively gradual changes in both vibration and PDA results, it has been assumed this will result in a minimal error. More importantly, once data points have been matched one to one, the vibration and noise results can be plotted versus depth, PDA results, or blow count.

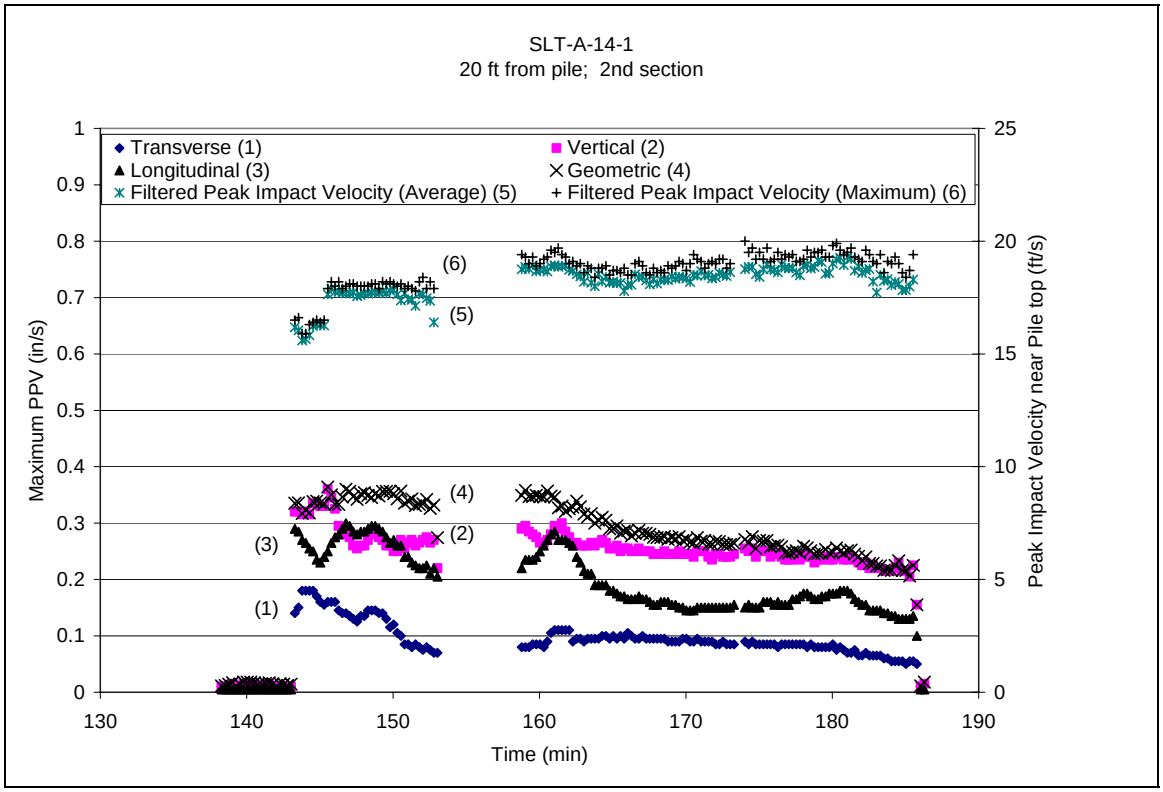


Figure 23. PDA and Vibration Data after filtering to match data points.

3.3 SUMMARY

This chapter has reviewed the specific site and piles investigated in this study. It discussed the hammers used, pile sizes driven, and the soil strata encountered. The equipment used to obtain the data was described, and examples of the initial results were shown. Finally, the logic used to allow a direct comparison of the results from pile driving and the results from vibration monitoring was discussed.

Studies to compare vibrations, noise and pile driving records follow. Chapter 4 shows the results of these studies, as well as the vibration data analyzed using some of the more traditional techniques described in Chapter 2.

CHAPTER 4: PREDICTION OF PEAK PARTICLE VELOCITY

The vibration data was initially analyzed using traditional distance, energy and scaled distance log-log plots, as well as plots versus the dominant frequency of the ground motion. Once those plots were created as a baseline, similar plots were created using PDA measured or correlated quantities that are similar to those typically used. For example, the correlation of driving record to PDA to vibration data allows the seismic distance, or diagonal distance from the pile toe to the monitoring device, to be calculated. The estimate of diesel hammer stroke, STK, allows a potential energy to be calculated that is a better estimate of the delivered energy than the rated energy. This, as well as the energy transferred to the pile top, EMX, could be used in the energy and scaled distance plots.

4.1 TRADITIONAL VIBRATION ANALYSIS FOR PILE DRIVING

4.1.1 Vibrations versus Frequency

To determine whether the vibrations from the piles studied exceeded limits put forth in the codes of the City of Milwaukee (2006), or in the Department of Commerce Code used by Wisconsin DOT (State of Wisconsin, 2006), the vibration data from the four static load test sites were plotted on the plot originally shown in Figure 4, as shown in Figure 24. The two piles at Static Load Test Site D, where vibrations were measured 10 feet from the pile location showed the highest magnitude of peak particle velocities in this study, at around 0.9 in/s. The bulk of the records in Figure 24 (and in the other piles studied) showed the peak particle velocities had dominant frequencies of between 10 and 30 Hz.

The results from Figure 24 and the figures for the other three static load test sites in Appendix B show most of the pile driving would be considered noticeable, if not troubling to people. All of the sites had peak particle velocities that would be considered in violation of the City of Milwaukee's nuisance code, but none of the piles studied in the four sites

exceeded the Wisconsin DOT's standard. Thus, for the piles in this study, the likelihood of structural damage due to the vibrations from pile driving appears to be minimal.

4.1.2 Vibrations versus Distance

The peak particle velocities were also plotted versus distance, similar to that shown in Figure 3. The longitudinal and vertical vibration data from the Milwaukee site were plotted in a similar manner, and the parameters from the attenuation damping and pseudo-attenuation damping models were fit to define maximum threshold values as shown in Figure 25. Peak particle velocities in the transverse direction were not plotted because they were, for the most part, of lower magnitude than the other two directions. Per Wiss (1982), the component with the highest magnitude was taken as the most critical. For the piles included in this study, the exponent, n, in the pseudo-attenuation model defined as Equation 2 would be 1.2, while the attenuation coefficient, α, in the attenuation damping model in Equation 4 was 0.012. Both values are lower than the exponents suggested by Woods and Jedele (1985) for the Linkbelt diesel hammer case shown in Figure 3, but are within the range of observed values.

When the same data is plotted versus seismic distance, Figure 26 results. Doing so tends to concentrate the data points into a much smaller area. While the range of peak particle velocities is approximately the same, the seismic distance plot shows that, compared to the horizontal distance plot, the vibrations are varying over a range of seismic distances of between 50 and 100 feet. When changed from horizontal to seismic distance plots, the exponents required in the pseudo-attenuation and attenuation damping models stay approximately the same. The only difference made to the curves is the approximately factor of two change applied to the proportionality constants k and A_o, respectively. In some ways, this increase in the proportionality constants makes sense if considered with the much higher velocities measured on the pile with the PDA. While these constants are still much lower than velocities measured anywhere on the pile (as will be discussed later), the PDA velocities could be considered to occur at a distance of approximately the pile radius, with reductions

due to energy dissipated by the plastic failure of the soil at the pile toe along the sides of the pile, as alluded to in Massarsch (2005).

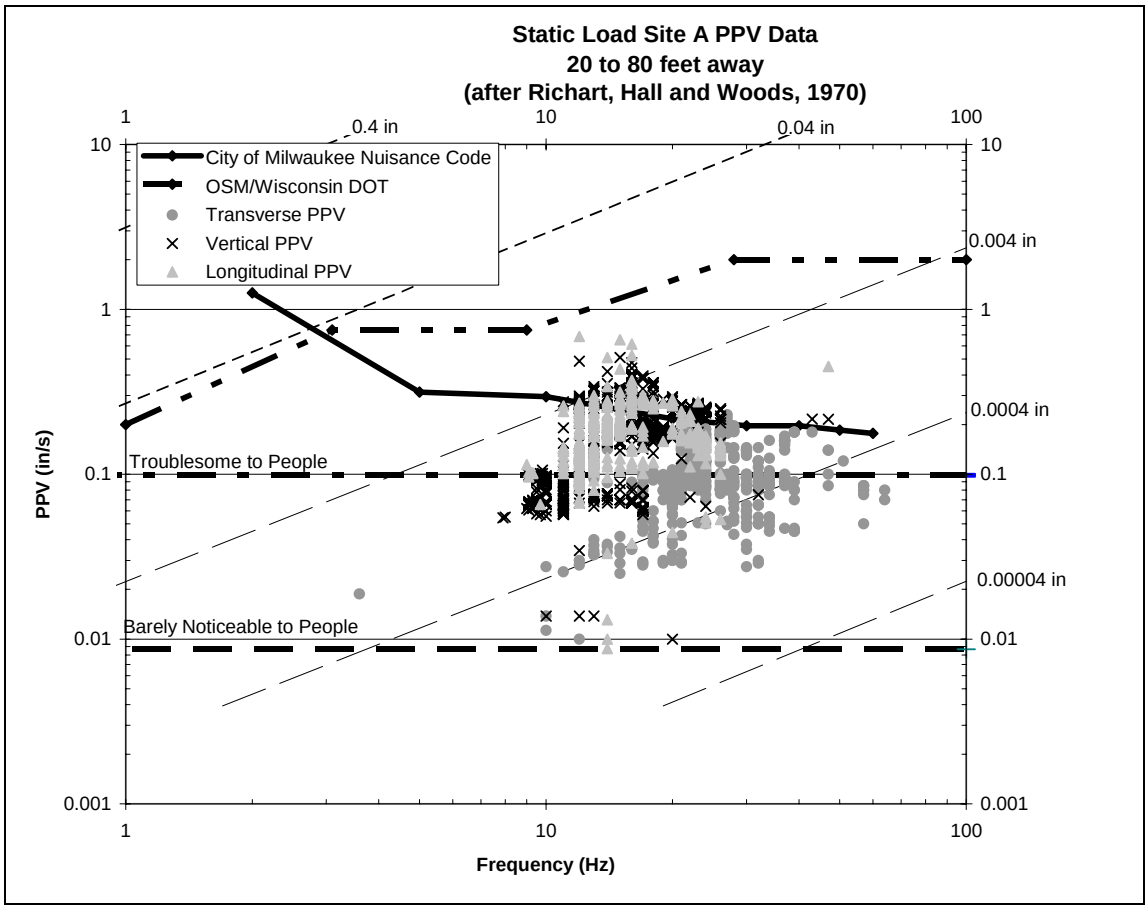


Figure 24. Vibration data compared to threshold levels.

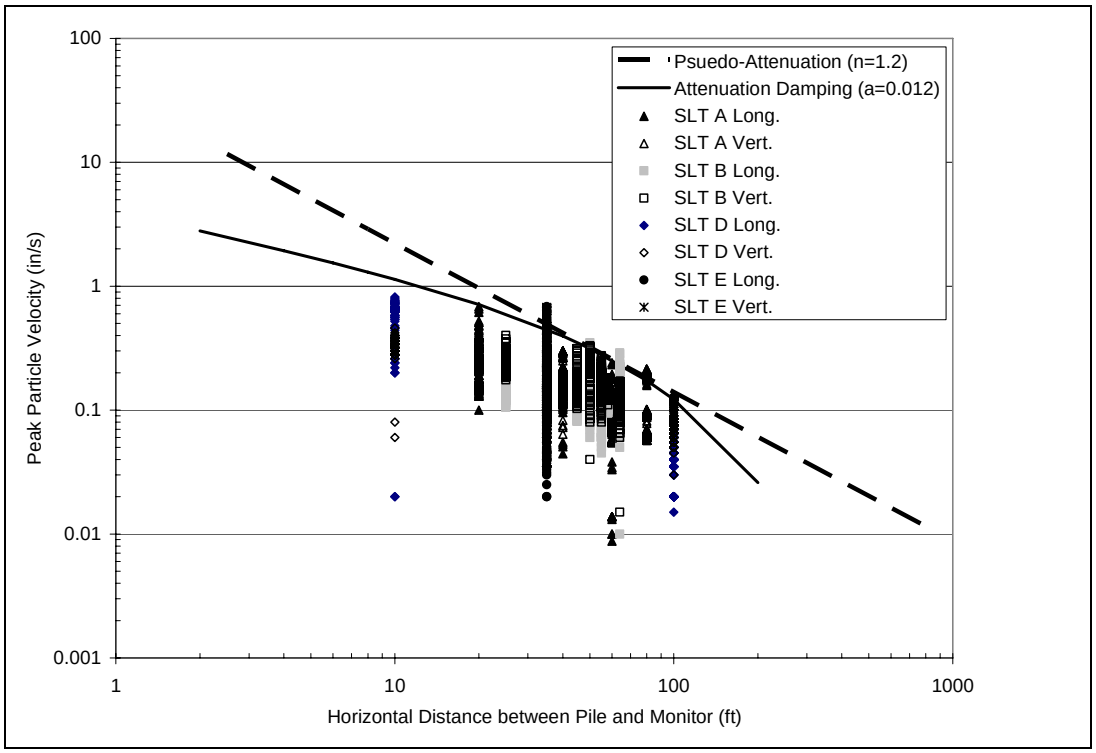


Figure 25. Vibration data plotted versus horizontal distance from source.

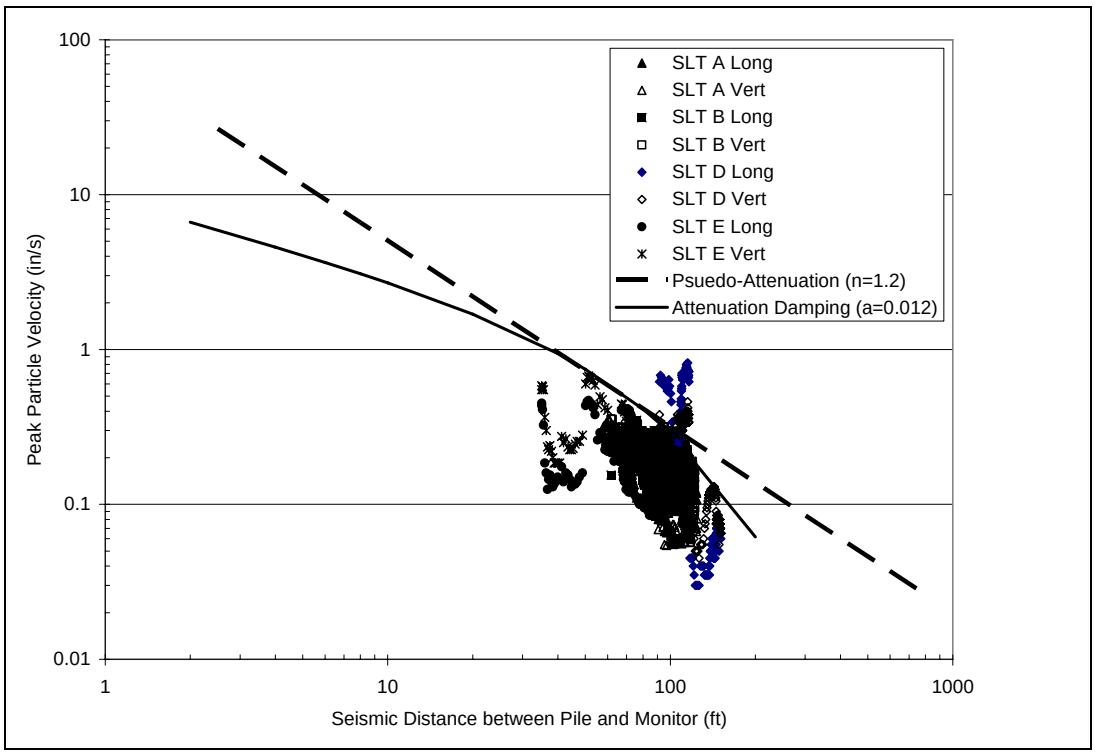


Figure 26. Vibration data plotted versus seismic distance (note: models modified from Figure 25)

Figure 26 includes one data set that appears to be an outlier. Half of the data from SLT site D has seismic distances of approximately 100 feet, with peak particle velocities approaching 1 in/s. This data comes from SLT-D-14-2, which was 10 feet from the pile. It would appear that, at very short distances, the horizontal distance matters more than the seismic distance. Unfortunately, there is not enough data in this study to confirm or disprove this.

To summarize, changing from horizontal to seismic distance in Figure 25 and Figure 26 appears to reduce some of the scatter observed in PPV data from the horizontal distance plot. One might, from Figure 26, be able to create a lower bound estimate of the PPV as well, particularly from seismic distances between 50 and 105 feet. The scatter between the two bounds may be better explained by energy differences, variability in the wave propagation characteristics of the soil, or superposition of waves at the monitoring location.

4.1.3 Vibrations versus Hammer Energy

In their study, Hope and Hiller (2000) could find no correlation between energy and peak particle velocities. Their plot was shown as Figure 9. Using the rated energy, a similar plot was created for the data used in this study as shown in Figure 27. Because only two hammers were used, there are only two rated energies shown. From the standpoint of vibration maxima, the higher rated energy did produce slightly higher maximum PPV. Comparing to Woods and Jedele's (1985) model used to predict PPV from energy at a horizontal distance of 10 feet, the PPV are all lower than predicted. This would be expected, since the horizontal distances involved are all 10 feet or greater.

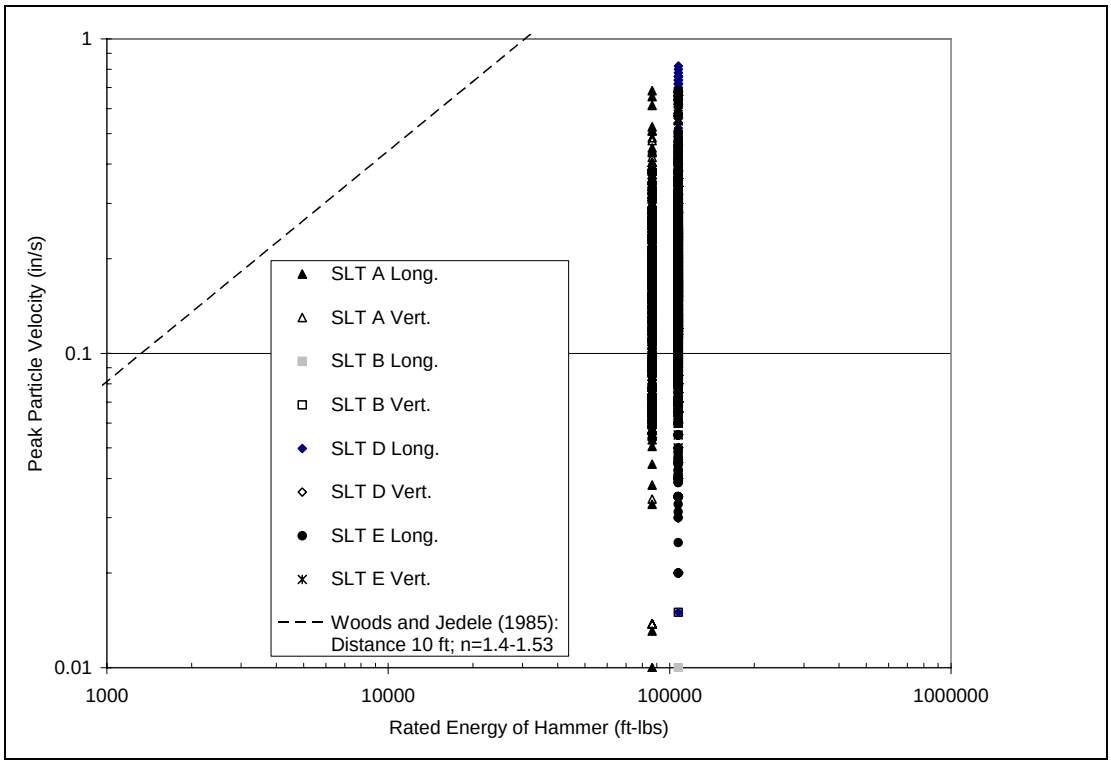


Figure 27. Vibration data plotted versus rated energy of the hammers.

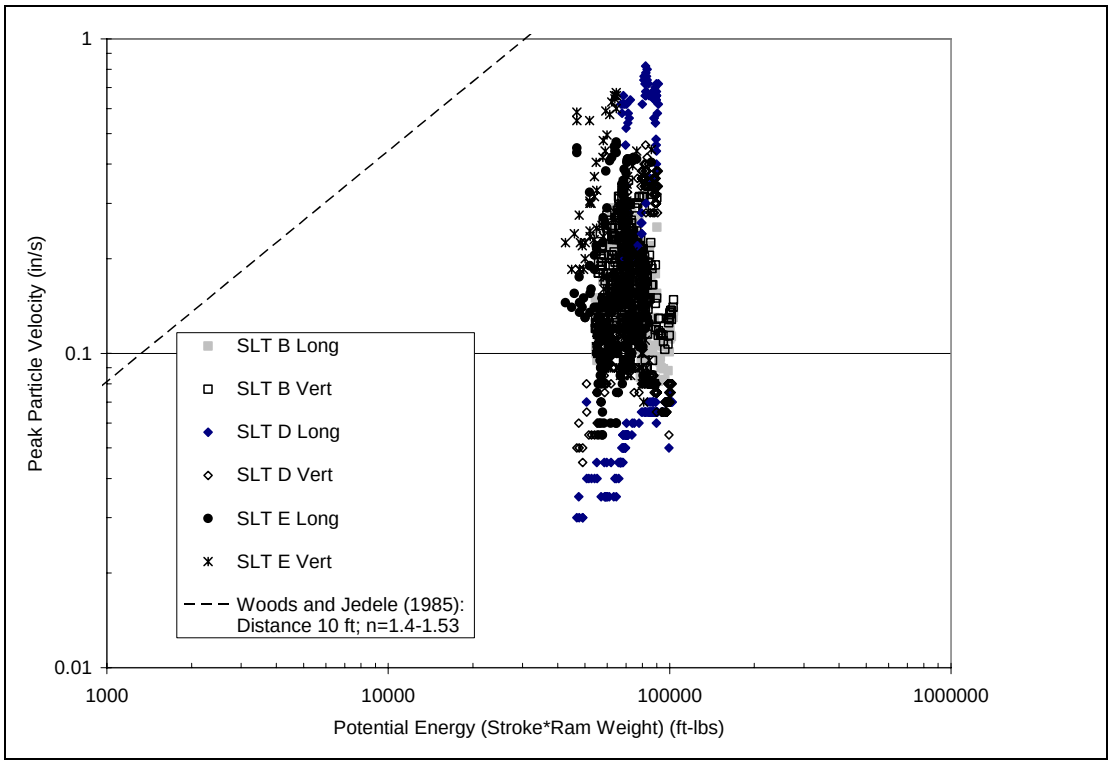


Figure 28. Vibration data plotted versus potential energy calculated from stroke. Diesel hammer sites only.

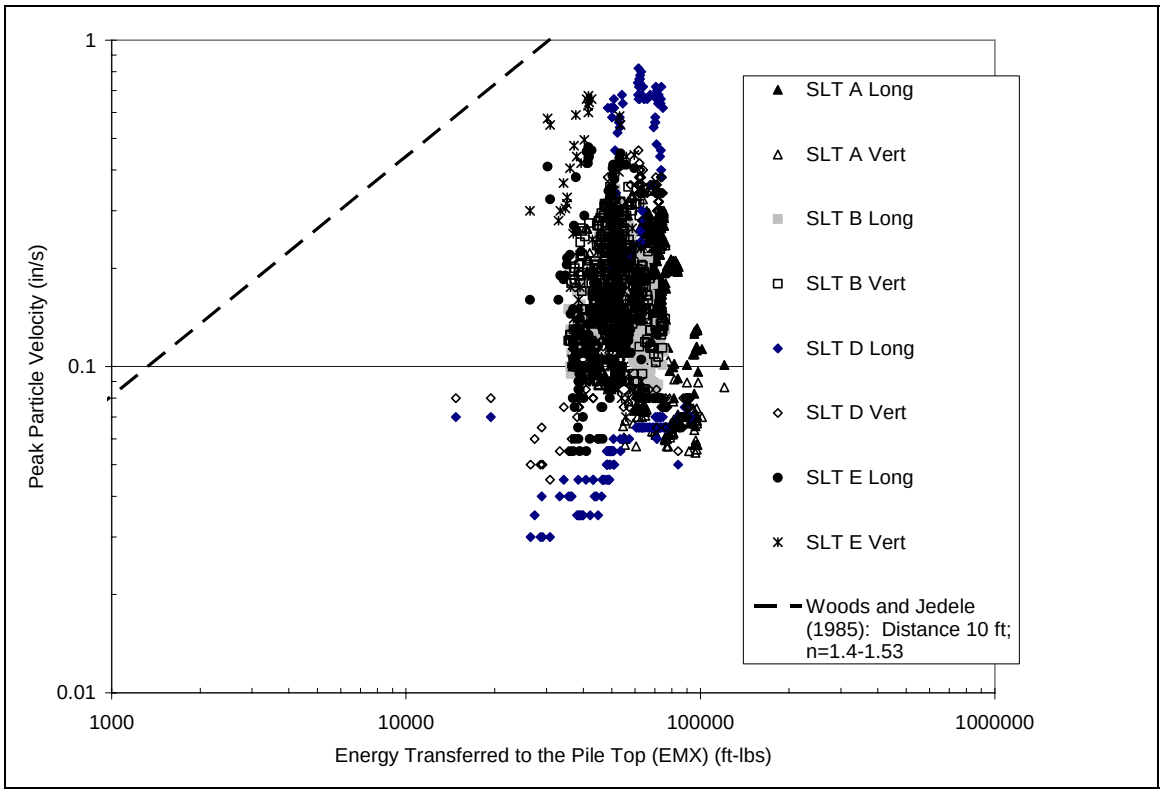


Figure 29. Vibration data plotted versus energy transferred to the PDA gages (EMX).

Plotting the peak particle velocities versus the potential energy (Figure 28) and energy transferred to the gage location (Figure 29) show similar trends. Figure 28, it should be noted, includes only the static load test sites installed with a diesel hammer, because the stroke calculation used by the PDA is not valid for the Junttan double acting hydraulic hammer used at Static Load Test Site A. Because the Junttan's energy level is controlled by the hammer operator, the rated energy is not valid for this plot, either. For both plots, the PPV varies widely over a small range of energy levels. Solely basing a prediction of ground movement based on the rated, actual potential or transferred energy would not be advised.

4.1.4 Scaled Distance Plots

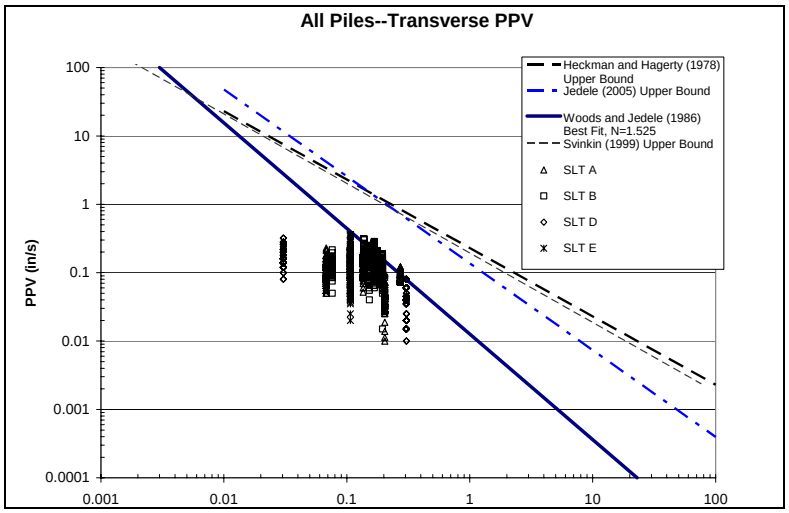
Scaled distance plots (normalized by distance and the square root of energy) were shown in Figure 7 and Figure 10. Figure 30 shows the technique applied to the Milwaukee data using the rated energy and the horizontal distance. In that case, the model parameters used by

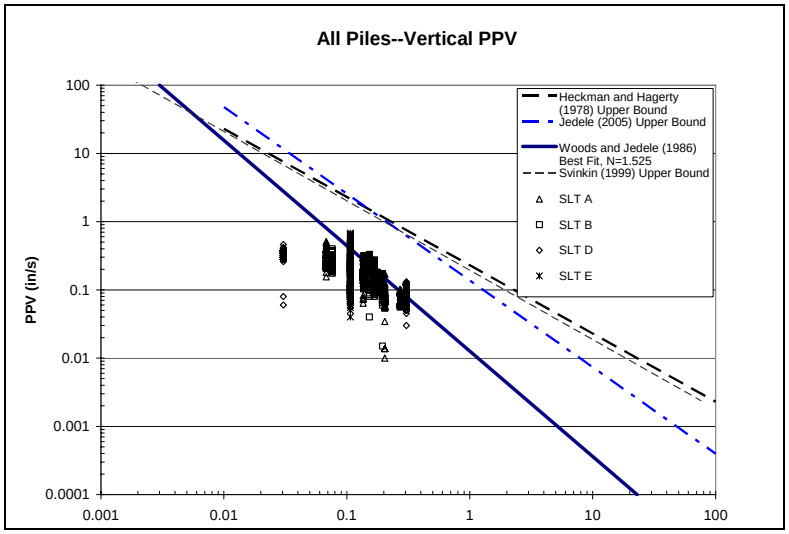
Woods and Jedele (1985) to predict maximum PPV is acceptable. The lowest scaled distances (in this case corresponding to the 10 foot horizontal distance in the SLT D site) tend to result in lower PPV than predicted by the curve, but the PPV maxima from the remaining piles fall near or below the line.

Figure 31 shows the results when the scaled distance is calculated using the potential energy from the calculated stroke (for the diesel hammer sites) and the seismic distance. Figure 32 shows the results when scaled distance is calculated using the seismic distance and the energy transferred to the PDA gage location on the pile. Because the potential and transferred energies are both lower than the rated energy, this increases the scaled distance, pushing the data points in the graph to the right. Similarly, the seismic distance for these records is larger than the horizontal distance, further increasing the scaled distance. The large variation in the scaled distance data in Figure 30 collapses to a much narrower range in Figure 31 and Figure 32.

In Figure 31, the vibration maxima in all three direction is bounded by either the Heckman and Hagarty (1978) upper bound or by the upper bound noted by Jedele (2005). This is a little surprising, since these curves were calibrated using rated energy and scaled distance. The quality of the upper bound predictors in Figure 32 is the same or slightly worse (due to a slightly larger scatter) than that shown in Figure 31.

If the scaled distance plots were a true predictive model of vibration, that is, the scatter of PPV was lower than Figure 30 through Figure 32 show for a particular seismic distance, the energy transferred to the pile should be the better predictor. The energy transferred to the pile differs from the potential energy due to losses in the driving system—compressing the hammer cushion, moving the helmet that attaches the hammer to the pile, etc. The energy transferred to the pile should be a better predictor of PPV, since it measures the energy that could be transferred (fully or partially) into the soil. Based on Figure 32, there appears to be more to the story.





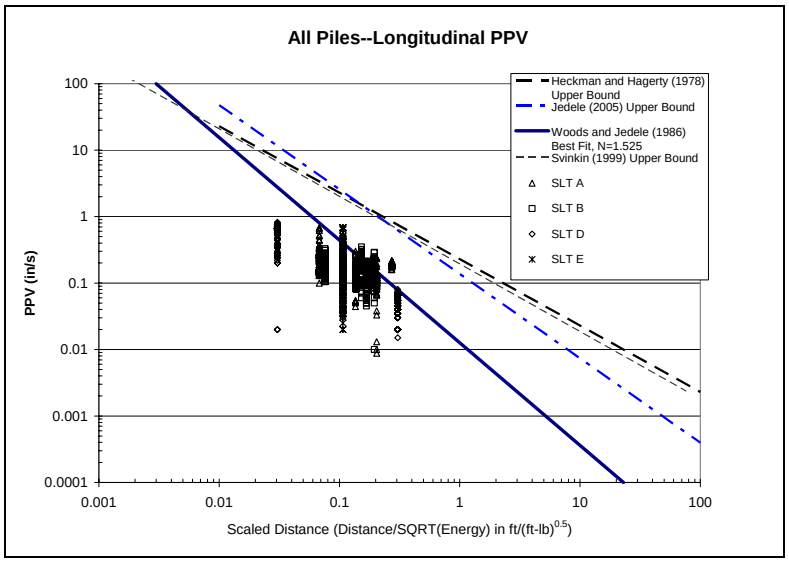


Figure 30. Scaled Distance Plots using Horizontal Distance and Rated Energy

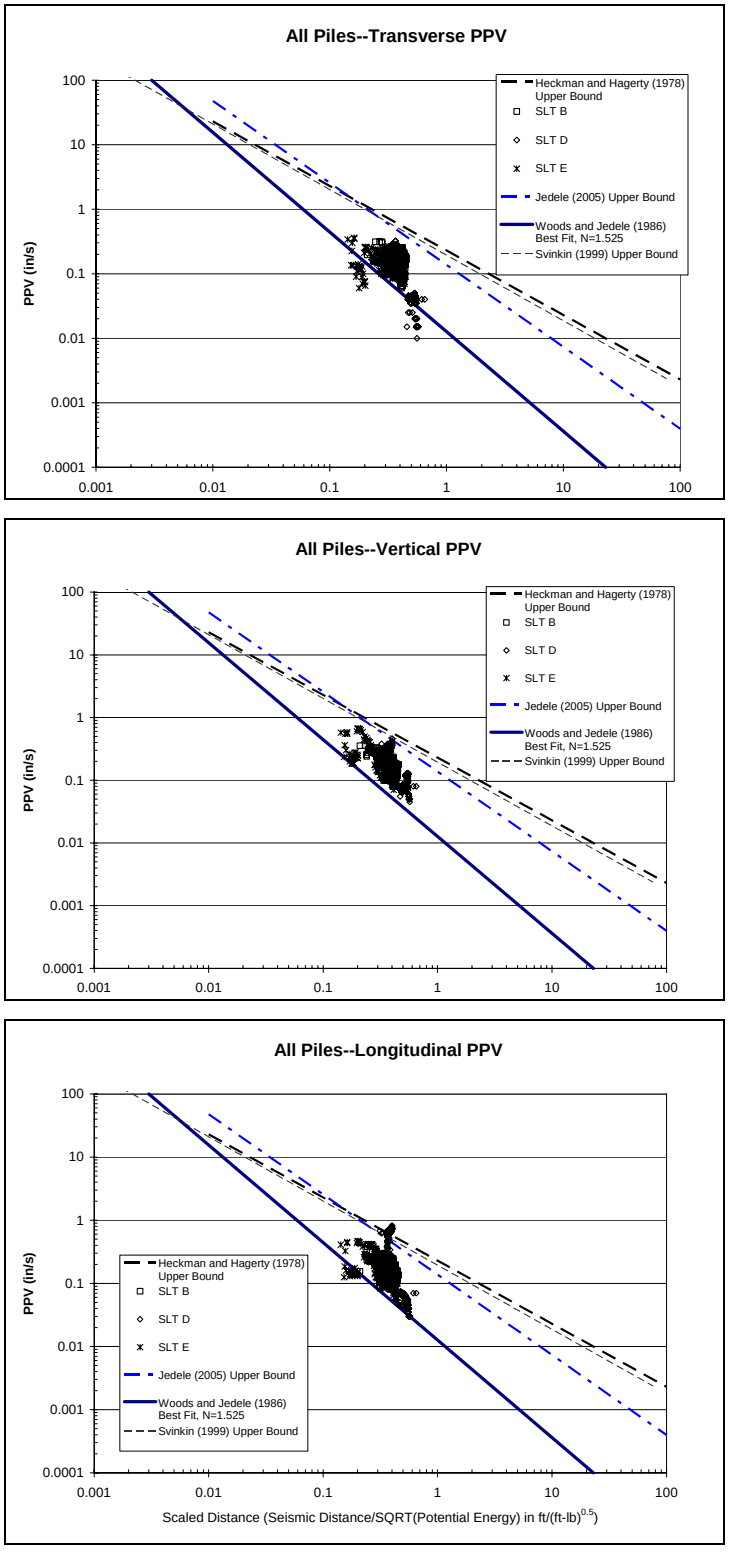


Figure 31. Scaled Distance Plots using Seismic Distance and Potential Energy from Stroke

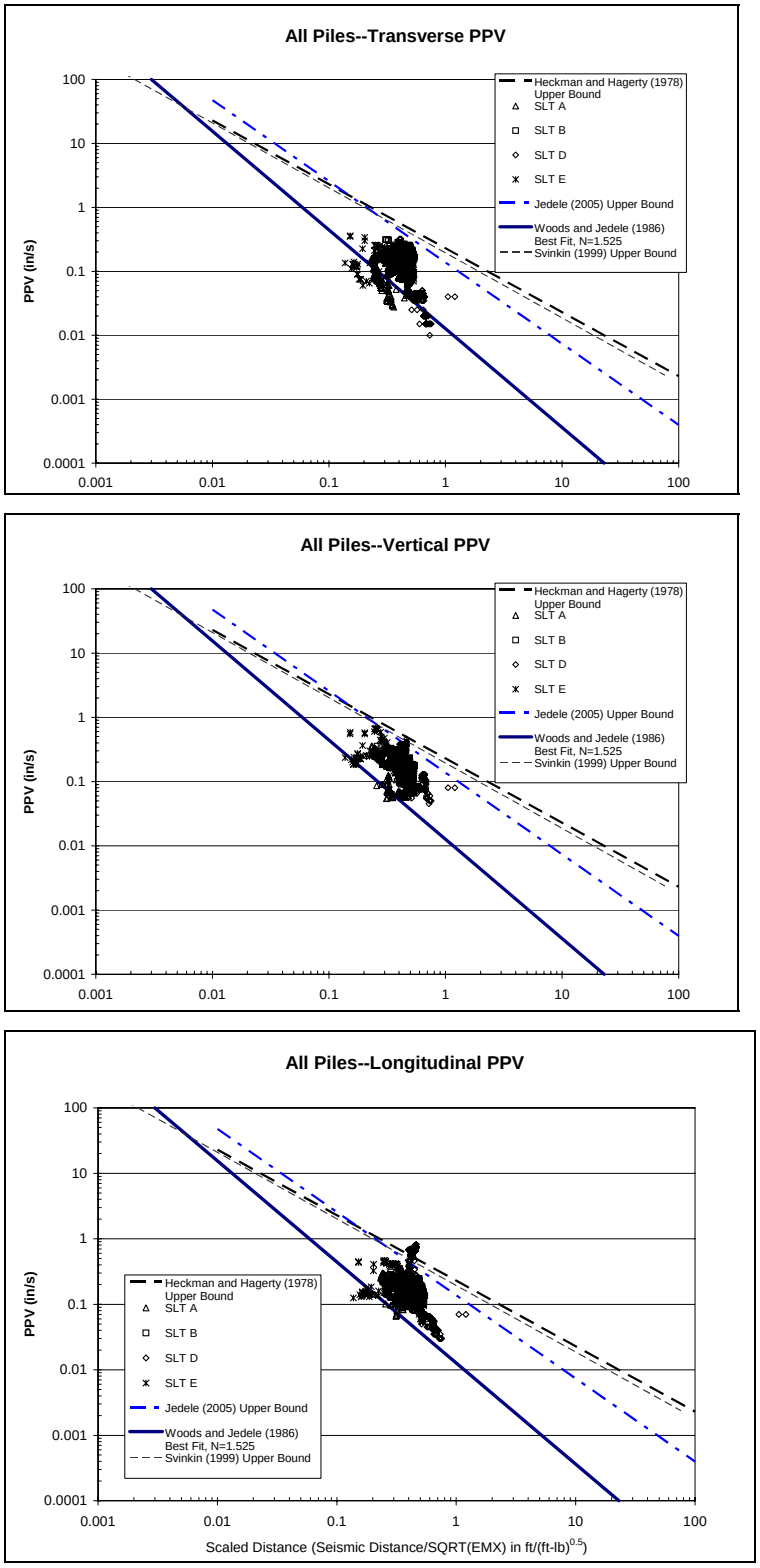


Figure 32. Scaled Distance Plots using Seismic Distance and Transferred Energy from Stroke

4.2 ANALYSIS WITH PDA VELOCITY DATA

The vibration data was next analyzed considering the velocities calculated or measured from the PDA data. To review, these included the peak velocity due to the impact (VT1); the velocity at a time 2L/c , or the time required for the compressive stress wave generated by the impact to travel from the gage location to the pile toe and back (VT2); the maximum measured velocity over the blow, regardless of timing (VMX), and the toe velocity (VTOE) which is calculated as in Equation 12. It was expected that the peak velocity due to impact or maximum velocity may be best correlated to the generation of shear waves along the side of the pile, while the toe velocity would be better suited to predict PPV generated from soil displacements at the pile toe.

As an initial step, the various PPVs were plotted versus time, with a secondary y-axis showing the velocity record of interest. Figure 33 compares the peak velocity due to impact with the peak particle velocities from SLT-A-14-1. The vibration monitor was located 20 feet from the pile while the second section was driven from 54 to 72 feet below the ground. With the exception of the first few data points, in the longitudinal direction and portions of the geometric PPV curve, no clearly defined similarities are noted. It would appear the PPVs are loosely, if at all correlated to the peak pile velocity at impact for this pile.

A more interesting and significant result arises from Figure 34, where the PPVs are compared to the calculated velocity at the pile toe. The distribution of the pile toe velocities with time almost perfectly tracks the maximum longitudinal PPV. This would appear to fit with the theory, where pile toe displacements generate compression and shear waves that are a significant source of the vibrations at the surface.

Conceptually and in a uniform elastic space, this compression wave should radiate spherically outward from toe, with both longitudinal and vertical components. Because of the deep penetration and shorter distance, this should be largely vertical. The shear wave

should be similar, generating again vertical and longitudinal components with larger longitudinal components. It is impossible to tell exactly what is happening from these records, as well as considering the soil is composed of a number of layers. Some superpositioning that amplifies the longitudinal component while tending to smooth out the vertical component appears to be occurring.

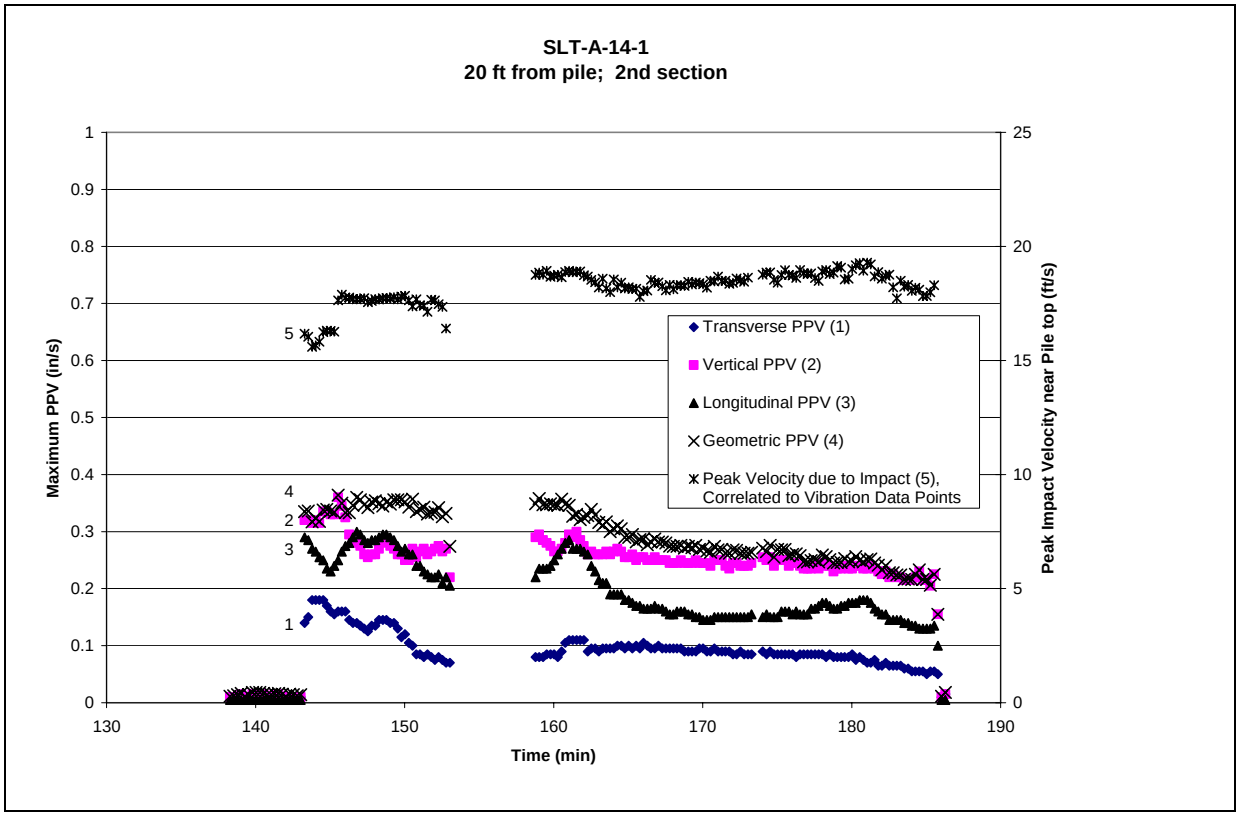


Figure 33. Vibration and velocity near the pile top due to impact (VT1) versus time.

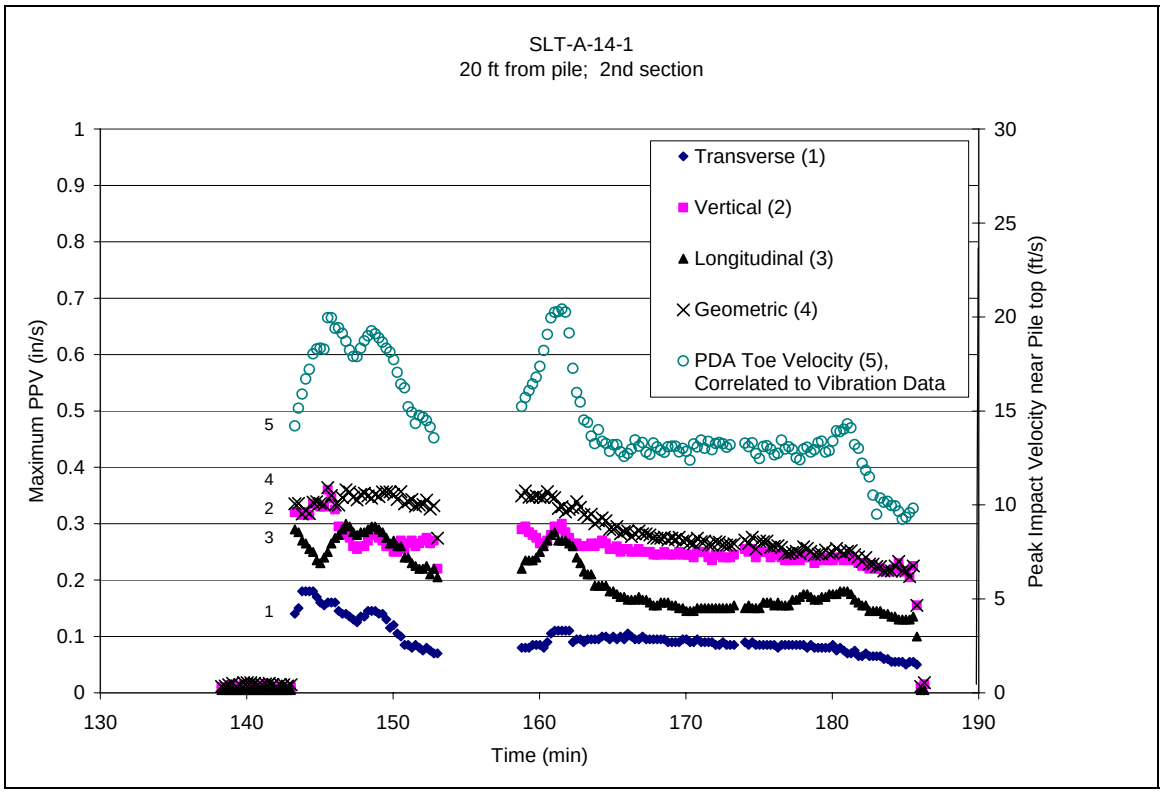


Figure 34. Vibration and calculated toe velocity versus time.

Part of the scatter in the longitudinal data in Figure 36 is due to the first few blows after the driving started. Longitudinal PPV dropped over the first several recorded time intervals while the vertical and transverse PPVs increased. This may be partially explained by the breakdown of soil resistance gained in the clay due to remolding and pore water pressure dissipation as the pile was spliced. Once the toe started to move significantly, the contribution from the pile toe became more dominant.

Figure 35 tends to show PPV increasing with decreasing peak velocity at impact. This is surprising at first glance, and likely actually due to the increase in penetration depth, which also shows relatively stronger correlation (0.72 to 0.78) between PPV and seismic distance for this pile.

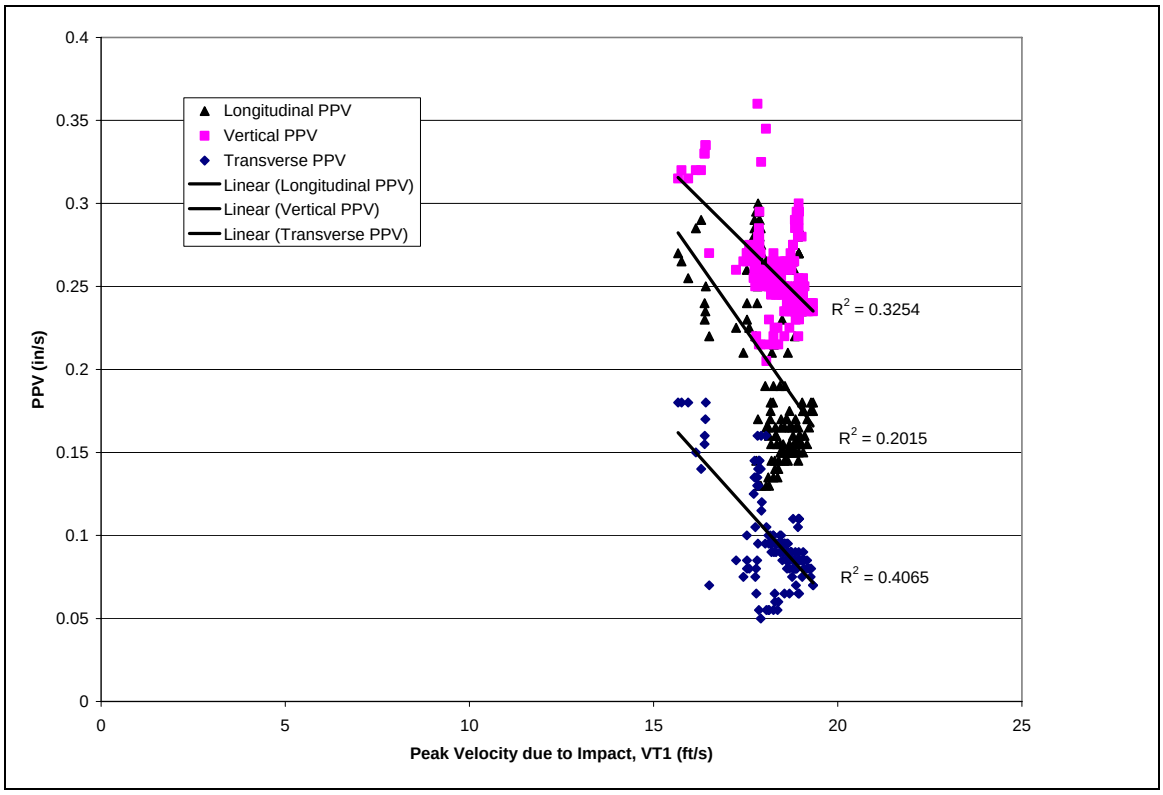


Figure 35. Peak Velocity due to Impact compared to PPV components.

The toe velocity correlation to longitudinal vibration looked very promising. The correlation was investigated for the other piles, with mixed results.

The four pile velocities investigated initially showed some promise, but are simply not reliable enough predictors of most of the PPV curves to create a viable model at this time. Some findings from this portion of the study are significant, however: the shape of certain components of the vibration record can be determined from PDA records. Similarly, portions of a particular PPV curve may diverge, particularly during the beginning of redriving as set-up is being broken down.

Table 6 shows SLT-A-14-1 has the best R^2value when comparing the toe velocity to the longitudinal PPV. Others are as low as 0.1 or lower, or no correlation at all. An example of a low R^2 value data set is shown in Figure 37. In this plot, pile toe and peak pile velocity do not track any of the PPV reliably with time. This pile is slightly further away (25 feet) from the vibration monitor, but the pile penetrations are the same. A direct correlation, in this case, is not possible, as evidenced in the Figure and by the very low R^2 value.

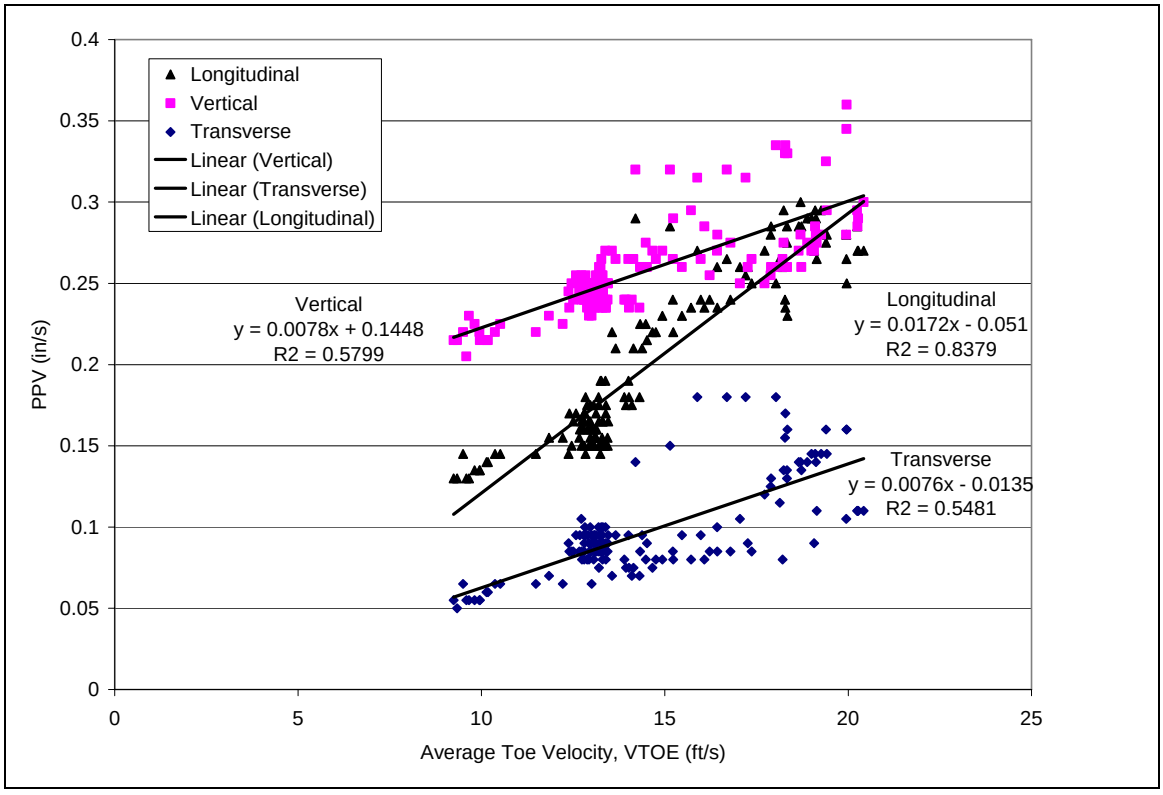


Figure 36. Toe velocity compared to PPV components.

The four pile velocities investigated initially showed some promise, but are simply not reliable enough predictors of most of the PPV curves to create a viable model at this time. Some findings from this portion of the study are significant, however: the shape of certain components of the vibration record can be determined from PDA records. Similarly, portions of a particular PPV curve may diverge, particularly during the beginning of redriving as set-up is being broken down.

Table 6. Longitudinal PPV correlated to toe velocity and peak velocity in pile.

Pile	R^2 (PPV/VT1)	R^2 (PPV/VToe)
SLT-A-14-1	0.205	0.838
SLT-A-14-2	0.215	0.531
SLT-A-16-4	0.317	0.224
SLT-A-16-5	0.239	0.036
SLT-B-12-1A	0.129	0.125
SLT-B-12-2	0.296	0.003
SLT-B-14-3	0.562	0.024
SLT-B-16-4	0.081	0.000
SLT-B-14-6	0.319	0.248
SLT-B-14-7	0.512	0.136
SLT-D-14-2	0.017	0.000
SLT-D-12-6	0.784	0.204
SLT-E-12-1	0.127	0.039
SLT-E-16-2	0.017	0.030
SLT-E-14-3	0.356	0.001
SLT-E-12-4	0.001	0.398

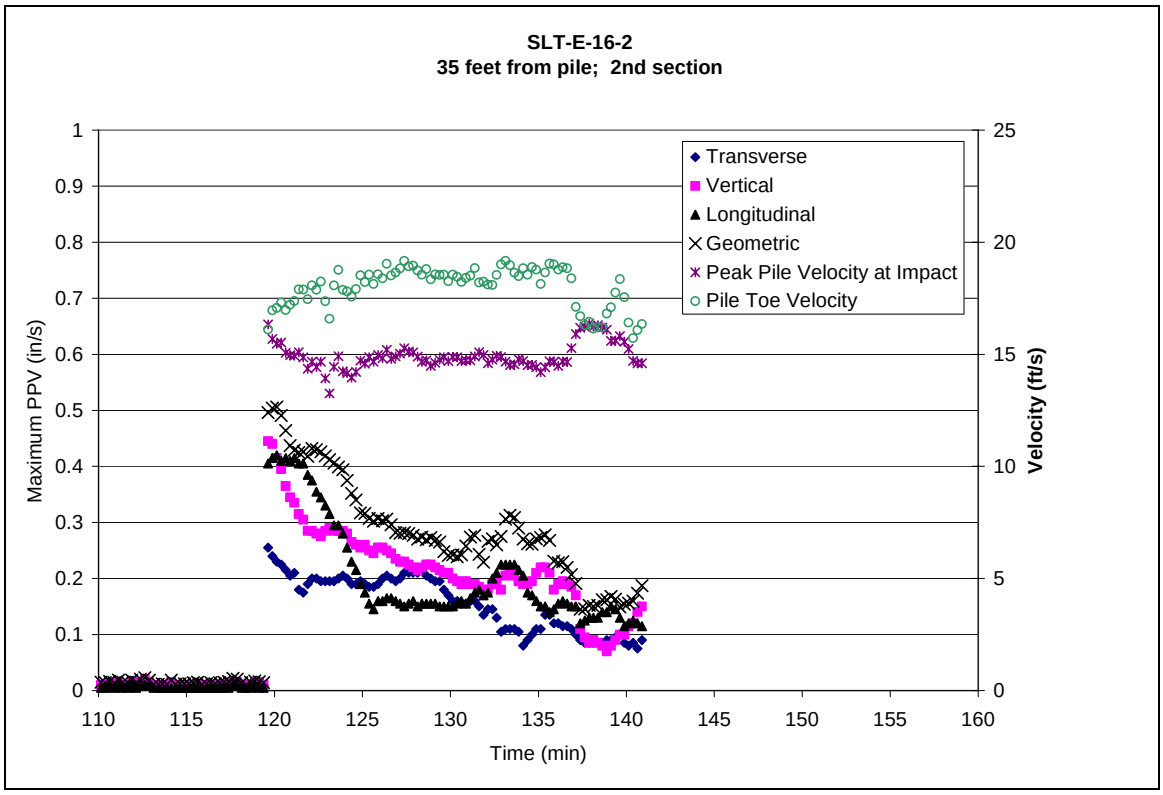


Figure 37. PPV and PDA velocities versus time. SLT-E-16-2.

4.3. ANALYSIS USING PDA TOTAL RESISTANCE.

The PDA calculates the total resistance (RTL) encountered by the pile for each blow. The Case Method further models this as the sum of static and dynamic resistance, where static resistance is the quantity of interest. In Figure 38, a striking similarity emerged when the RTL values for SLT-E-16-2 were compared to the PPV curves (previously shown in Figure 37).

The transverse, geometric and longitudinal curves had very little in common with the RTL curve versus time. The vertical PPV, however showed very similar trends. This curve was isolated from the others and compared directly to RTL (Figure 39). It was noted that, initially, the two curves followed each other's shape quite nicely. At a total time of 122.5 minutes, however, the trends reversed. As total resistance increased, vertical PPV decreased. Similarly, toward the end, as total resistance decreased, vertical PPV increased. Indeed, if

the total resistance curve was inverted (or mirrored, as in Figure 40), the two curves past 122.5 minutes track each other almost exactly.

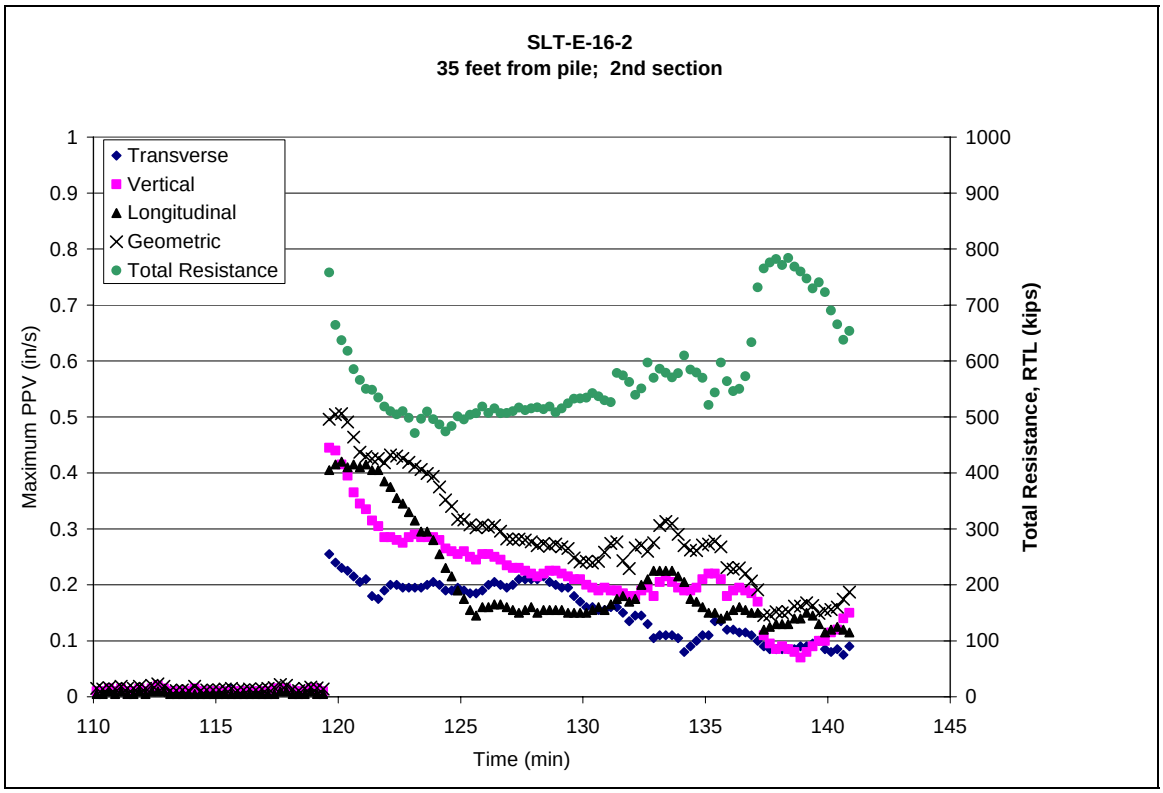


Figure 38. PPV and Total Resistance from PDA. SLT-E-16-2

Similar behavior can be observed in Figure 41 between longitudinal PPV and total resistance. Initially, the two curves follow one another, then at approximately 147 minutes after beginning of driving of the first section, the trend reverses: as RTL increases, PPV decreases. Otherwise, the shapes of the curves are exactly the same, only mirrored.

The other piles show similar trends. The PPV component that tracks the total resistance tends to change from pile to pile, with no obvious reason why one component is dominated by the resistance curves. The other components must be due to superpositioning of multiple wave forms, reflections or other phenomena.

But why does the switch from direct correlation to mirrored correlation occur shortly after the beginning of driving of the first section? As discussed earlier, it likely occurs in these cases due to the set-up experienced during splicing of the sections. As the set-up is broken down, more energy is transferred to the toe, and a faster moving pile toe would generate more dynamic resistance in the Case Method conceptual model. Thus, higher proportions of static resistance tends to result in a trend of increasing PPV, while higher proportions of dynamic resistance tend to decrease the PPV in the ground. This would explain the higher PPV observed when very hard driving or refusal occurs (Linehan and Hannen, 1984). In these hard driving cases, the pile toe velocity is very small, as is the dynamic resistance.

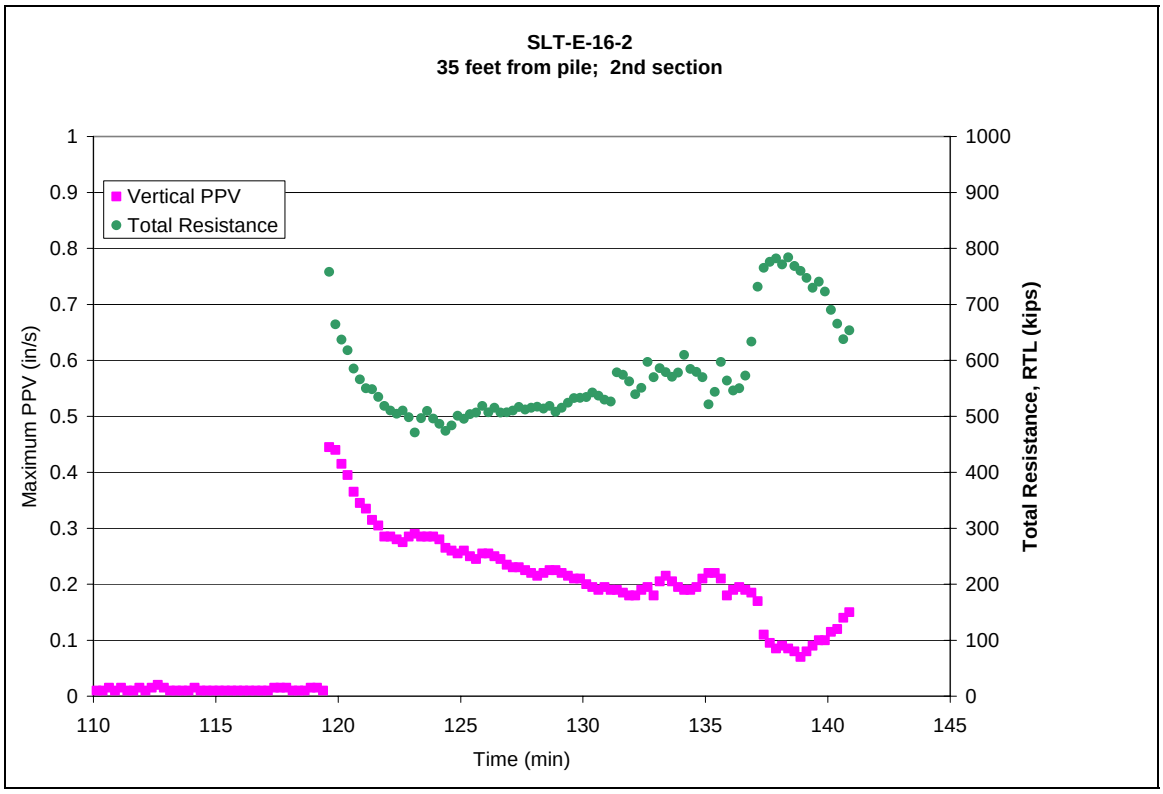


Figure 39. Vertical PPV and Total Resistance from PDA. SLT-E-16-2

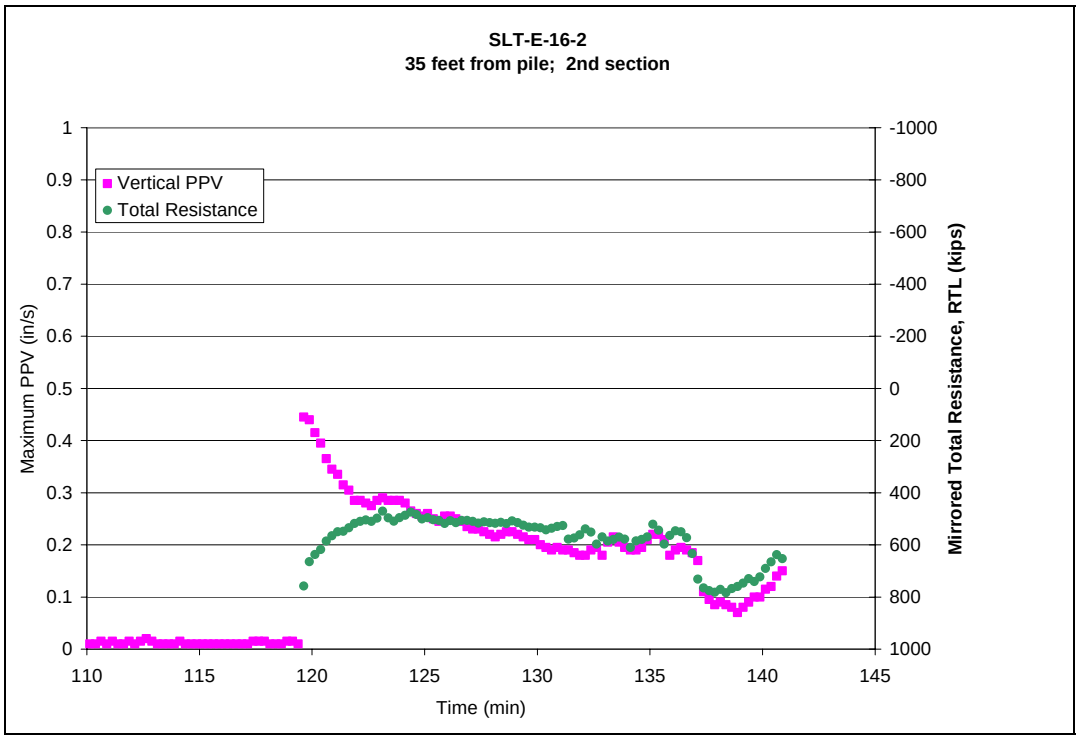


Figure 40. Vertical PPV and "Mirrored" Total Resistance from PDA. SLT-E-16-2

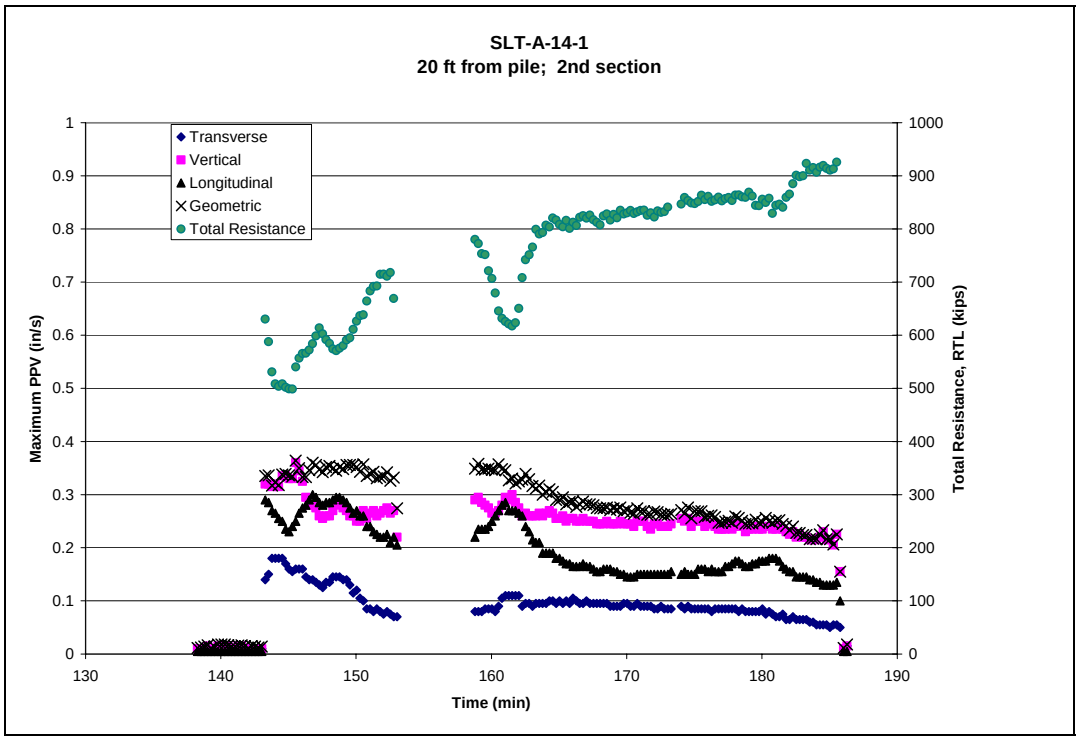


Figure 41. PPV and Total Resistance for SLT-A-14-1. Note the longitudinal velocity

4.3.1 Estimating PPV from RTL

To estimate ground motions from total resistance, a few features of the model are desirable. First, the parameters should be normalized such that choice of unit systems do not matter. As seen earlier in this section, this is a feature the scaled distance plots and normal distance plots do not have. Second, the model would ideally be relatively easy to use, as that is the allure of the current log-log plot methods.

To begin, the total resistance, RTL, is a force acting on the pile. Since a PPV is ultimately desired, adapting Equation 8 with the impedance, Z, of the pile section as defined in Equation 9, Equation 17 will result.

$$RTL = ZV_{RTL} \tag{17}$$

Given the impedance and the total resistance, a parameter with velocity units (in ft/s or m/s) will result. As an initial attempt at modeling, an attenuation model will be used as in Equation 18.

$$PPV = kV_{RTL}\left(\frac{D}{D_o}\right)^{-n} \qquad \text{Equation 18}$$

This is the same model (more or less) used in Equation 4, albeit without the exponential damping component (at least for the time being). In this case, k is a dimensionless constant, n is a dimensionless exponent and D_o is the distance at which the velocity is acting. For the purpose of this study, D_o is assumed to be the pile radius. For each value of PDA measured total resistance and its corresponding calculated equivalent velocity, D is the seismic distance.

As an initial model, n was set to 1. PPV (in/s) was divided by V_{RTL} and set as the dependent variable. The normalized distance was the independent variable. Figure 42 shows the PPV component for SLT E-16-2 with the best correlation to the total resistance. As expected from the earlier discussion, the vertical component matches best, with an R^2 of 0.867. The curve fitting parameters from the chart can then be substituted such that Equation 19 results.

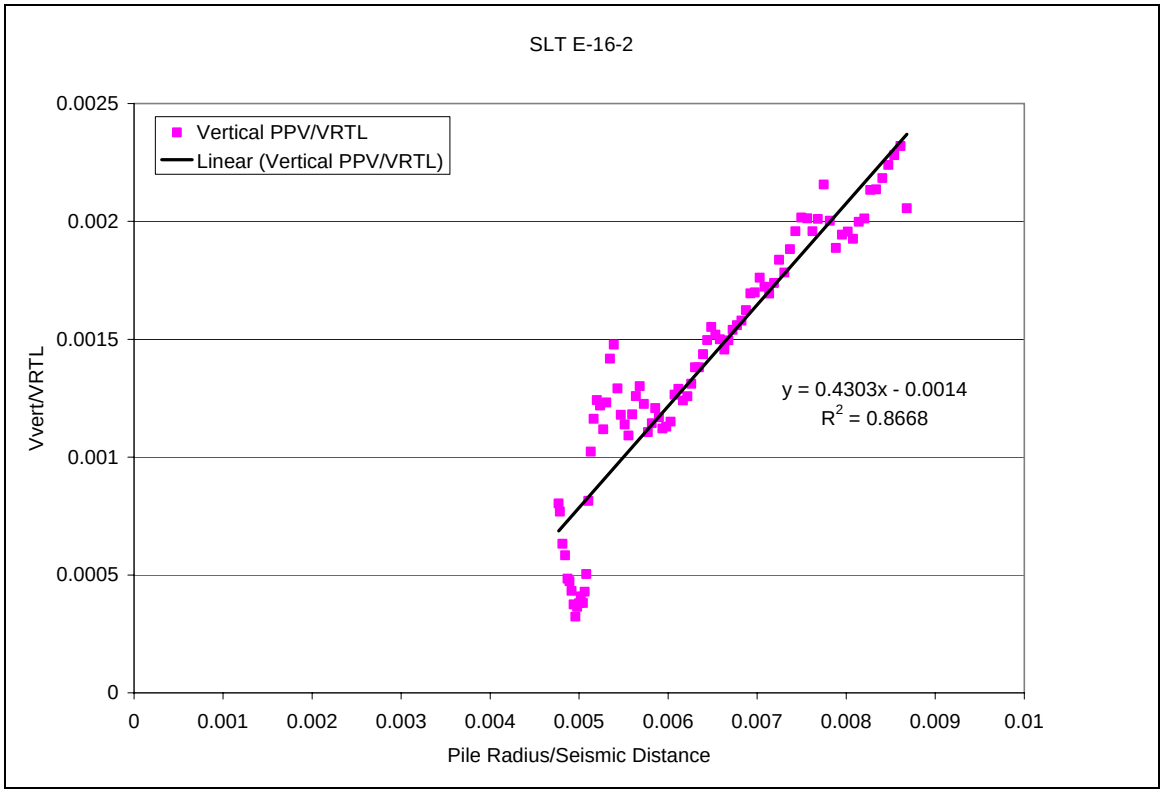


Figure 42. Correlation of Normalized distance to normalized velocity.

$$PPV = V_{RTL}\left(m\frac{D_o}{D} + b\right) = mV_{RTL}\frac{D_o}{D} + bV_{RTL} \qquad (19)$$

Where m and b are the slope and intercept of the best fit line as shown in Figure 42, respectively. Looking at the above model the intercept of the equation would correspond to a peak particle velocity at an infinite seismic distance, D. This should clearly be at or near

zero, not negative as the model for SLT E-16-2 would imply. Thus, some form of damping or an exponential model will need to be added in the future.

When the model above is used to predict the peak particle velocities for the same piles, Figure 43 results. The two curves track each other quite well, until 100 feet where the mirroring effect noted in Figure 40 comes into full effect. In this case, the velocity calculated from total resistance must be somehow flipped along the general "axis" of the curve itself. That aspect of calibration of the model is beyond the scope of this study.

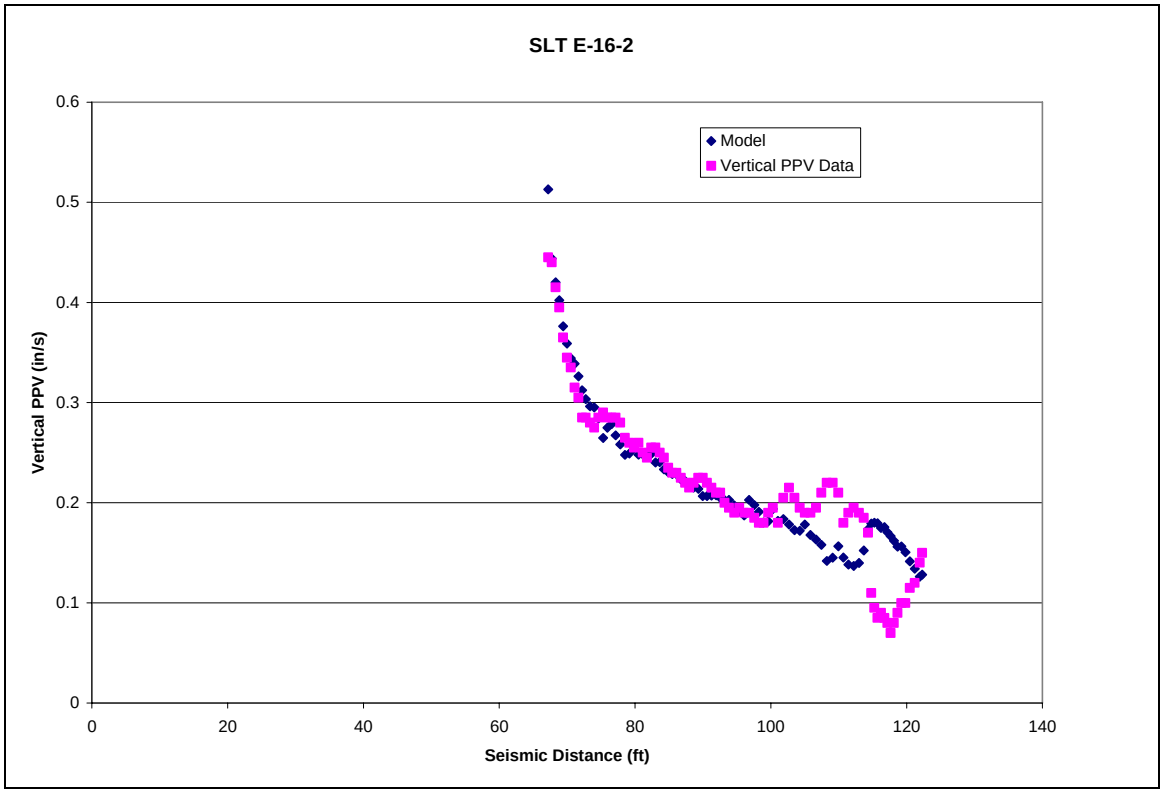


Figure 43. Model results versus measured PPV data in PPV-seismic distance space.

The same process was used to determine model slopes, intercepts and R^2 values for the other piles in the study. Most of the piles had at least one R^2 value in excess of 0.6, with the exception of the piles in SLT D (either the monitoring system was 100 ft away or, for the shorter distance, the pile penetration was in excess of 100 feet) and SLT E-14-3, where the first section of the pile was monitored, and the erratic nature of the hammer impacts due to

low soil resistance made correlation between PDA and vibration data spotty at best. Table 7 summarizes the quality of fit while Table 8 summarizes the slope and intercept from each of the piles, as well as the average and range of the values calculated.

Table 7. R^2 values when PPV/V_{RTL} is plotted versus normalized distance

Pile	R^2		
	Transverse PPV	Vertical PPV	Longitudinal PPV
SLT-A-14-1	0.810	0.870	0.812
SLT-A-14-2	0.730	0.780	0.403
SLT-A-16-4	0.340	0.804	0.925
SLT-A-16-5	0.864	0.800	0.846
SLT-B-12-1A	0.250	0.544	0.768
SLT-B-12-2	0.823	0.738	0.637
SLT-B-14-3	0.775	0.863	0.730
SLT-B-16-4	0.492	0.883	0.802
SLT-B-14-6	0.631	0.846	0.870
SLT-B-14-7	0.761	0.742	0.744
SLT-D-14-2	0.204	0.189	0.025
SLT-D-12-6	0.128	0.581	0.429
SLT-E-12-1	0.501	0.607	0.757
SLT-E-16-2	0.723	0.867	0.763
SLT-E-14-3	0.346	0.204	0.193
SLT-E-12-4	0.849	0.810	0.904

There is, unfortunately, some variation in the slopes observed. Because the PPV is directly proportional to the slope, significant differences in the predictive model can occur if the average, upper or lower bounds are used in lieu of curve fitting the model to data from the field. Figure 44 shows the range of possible predictions if the highest and lowest slopes from all the piles studied are used for SLT E-16-2. In that case, the average under predicts the PPV while the upper bound significantly over predicts the PPV. A brief study was conducted to check what factors may contribute to the change in slope.

Table 8. Simple model parameters

Pile	Best Fit Slope, m			Best Fit Intercept, b		
	Transverse PPV	Vertical PPV	Longitudinal PPV	Transverse PPV	Vertical PPV	Longitudinal PPV
SLT-A-14-1	0.314	0.493	0.557	-2.34E-03	-3.31E-03	-4.06E-03
SLT-A-14-2	0.139	0.176			-5.70E-04	
SLT-A-16F-4		0.302	0.365		-1.68E-03	-2.29E-03
SLT-A-16P-5	0.374	0.395	0.512	-1.81E-03	-1.99E-03	-2.13E-03
SLT-B-12-1A			0.177			-3.27E-04
SLT-B-12-2	0.309	0.379	0.137	-6.99E-04		
SLT-B-14-3	0.395	0.370	0.415	-1.45E-03	-1.02E-03	
SLT-B-16F-4		0.515	0.283		-2.41E-03	-1.18E-03
SLT-B-14-6	0.364	0.480	0.640		-1.90E-03	-2.46E-03
SLT-B-14-7	0.152	0.263	0.309	-4.34E-04		
SLT-D-14-2						
SLT-D-12-6						
SLT-E-12-1		0.180	0.221			-6.66E-04
SLT-E-16P-2	0.279	0.430	0.459		-1.37E-03	-1.64E-03
SLT-E-14-3						
SLT-E-12-4	0.212	0.141	0.151	-4.84E-04	-2.59E-04	-4.00E-04
Minimum	0.139	0.141	0.137	-2.34E-03	-3.31E-03	-4.06E-03
Maximum	0.395	0.515	0.640	-4.34E-04	-2.59E-04	-3.27E-04
Average	0.282	0.344	0.352	-1.20E-03	-1.61E-03	-1.68E-03

* - Not shown. R^2 is less than 0.6. Shaded lines have very low R^2 values and are excluded from slope maxima, average and minima in Table 8.

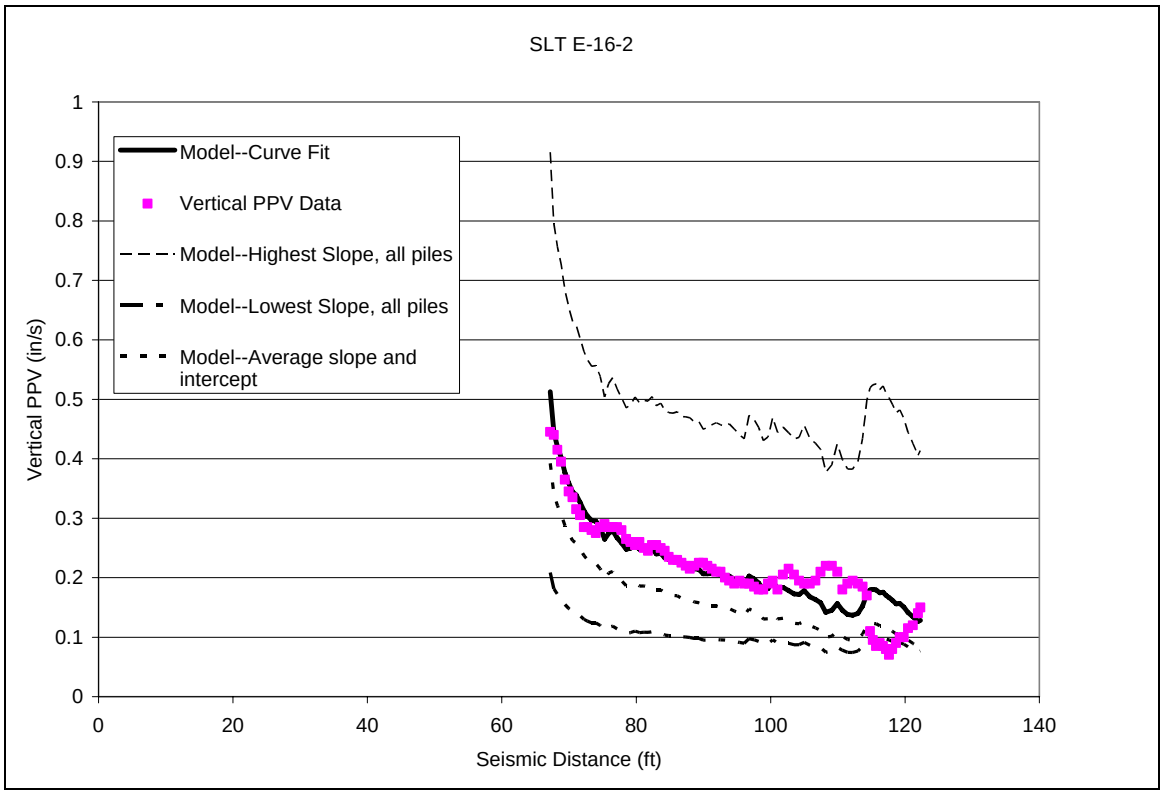


Figure 44. Range of possible model results using statistics from Table 8.

First, the values were plotted against the horizontal distance from the pile to the monitoring device as shown in Figure 45. From this plot, and the scatter contained in it, there is not clear trend for a particular PPV component. Horizontal distance does not seem to affect the slope in this model.

Figure 46 shows the correlation between pile impedance, Z, and the slope values from Table 8. There is a very rough trend of increasing slope constant with increasing impedance. Hope and Hiller's (2000) observed that, for a purely end bearing pile, the vibration or energy transmitted to the soil may be a function of the soil and pile impedance at the interface. Zoeppritz (1919) derived a ratio of energy intensities, T, of the transmitted wave at an acoustic interface as shown in Equation 20.

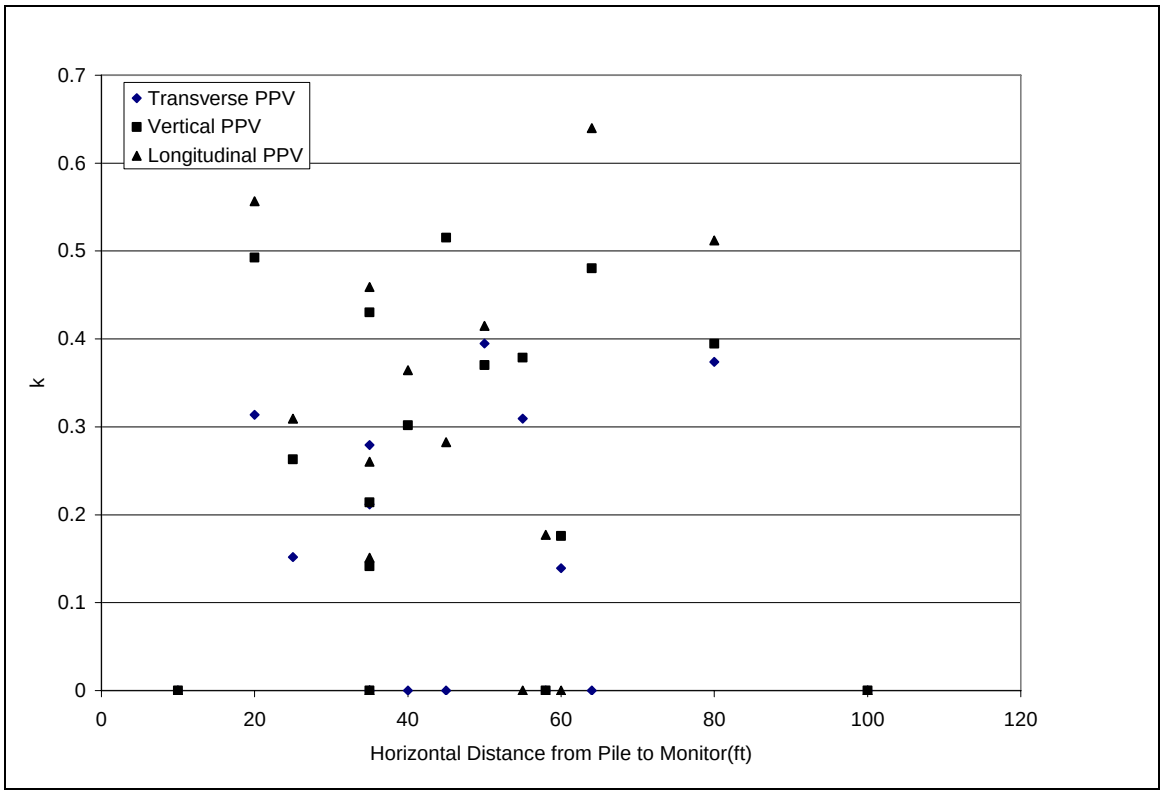


Figure 45. Slope of model, k, versus Horizontal Distance for all piles with R^2 greater than 0.6.

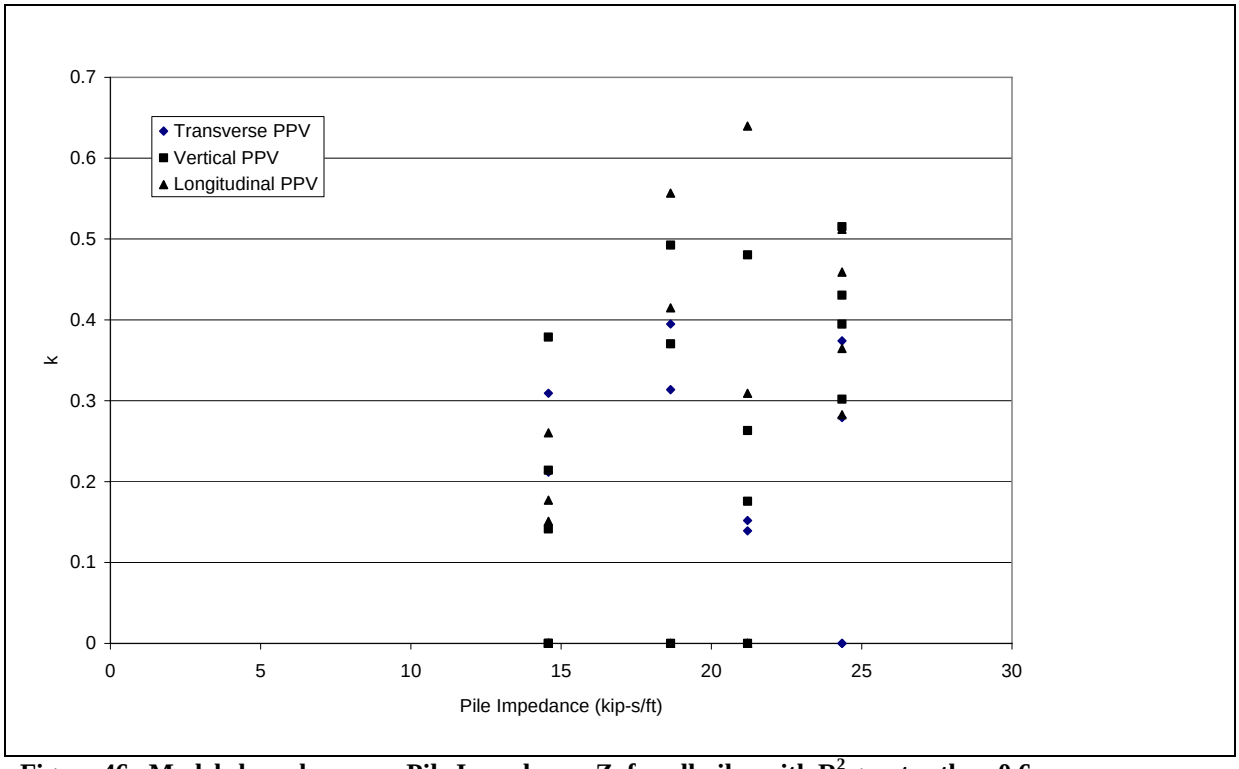


Figure 46. Model slope, k, versus Pile Impedance, Z, for all piles with R^2 greater than 0.6.

$$T = \frac{4 Z_{pile} Z_{soil}}{(Z_{pile} + Z_{soil})^2} \tag{20}$$

In equation 20, the acoustic impedance, Z, is defined slightly differently than that used in the bounded pile. In this case, the acoustic impedance is the product of compressive wave speed and mass density of the material. Assuming typical values of density and wave speed for steel (492 lbs/ft^3 and 16,800 ft/s, respectively) and a range of density and wave speeds for moist clays of 100 to 140 lb/ft^3 and 4,000 to 4,800 ft/s (Das, 1993), respectively, the ratio of transmitted energy should be between 0.17 and 0.28, which, (perhaps coincidentally) correspond to the lower values calculated for this slope. Thus, the transfer of energy and vibrations across the soil-pile interface may also be contributing to the variability.

4.4 SUMMARY

This chapter has investigated the prediction of peak particle velocity from PDA records. Traditional analyses have shown that using the seismic distance instead of horizontal distance tends to decrease the scatter observed in plots of PPV versus distance. Use of seismic distance also requires higher constants of proportionality (more or less, velocities at 1 unit of distance), which might make sense if velocities measured on the pile are involved. Using potential energy from ram stroke in conjunction with the seismic distance to calculate a scaled distance also reduces the amount of scatter in the PPV scaled distance plots. To a lesser extent, using the maximum energy transferred to the pile reduced scatter compared to using rated energy, as well. Finally, as a sole predictor of maximum PPV, energy (rated, potential or transferred) was not adequate for this data set.

The vibration data was correlated to PDA measured velocity data near the pile top and the calculated pile toe velocity. Toe velocity showed potential to have good correlation with certain components of peak particle velocity, but, upon further investigation, was not consistent enough to be used reliably.

Finally, the total resistance calculated by PDA was shown to be a good predictor of trends in the PPV data. A simple attenuation model was proposed that considers the measured total resistance, normalizes it to velocity using the pile's impedance, then multiplies by the seismic distance normalized by the pile diameter. A correlation study was performed to derive the model parameter, a few shortcomings were noted leaving the possibility for future calibration and research, as will be discussed in Chapter 6.

CHAPTER 5: PREDICTION OF SOUND LEVELS

Once the vibration levels were initially investigated, the noise data was examined. The measured data ranged from 126 to 102 dB while driving. All decibel levels in this chapter are relative to an overpressure of 2.9×10^{-9} psi, which is a standard baseline for decibel calculation. Dominant frequency content of the records was uniformly greater than 100 Hz (the range of the equipment), although a few records for the piles driven with the diesel hammer showed scattered frequency levels of between 8 and 100 Hz.

The vibration monitoring system used to record these sound pressures is A and C-weighted, which, as discussed in Dowding (1996), is good for studying the sound levels for human hearing and peak levels, but will not give a full picture for determining whether the overpressures pose a risk to structures. For the latter case, a system that more fully recreates the very lowest frequencies (below normal human hearing) is required.

5.1 TRADITIONAL NOISE ANALYSIS FOR PILE DRIVING

In Dowding (1996), a horizontal distance plot similar to those used in vibration analysis in Chapter 4 was created. Peak overpressure (or sound intensity) is plotted versus horizontal distance in a log-log plot. The plots were divided by pile driving hammer. As a comparison, the seismic distance was also plotted.

5.1.1 Noise versus distance

Figure 47 for the Junttan HHK-10A and Figure 48 for the Delmag D46-32 show the measured data compared to the upper bounds and typical levels reported in Dowding (1996). This chart was discussed in Section 2.5 and originally presented in Figure 13. Dowding (1996) described the sound levels measured by Linehan and Hannen (1984) as unusually high outliers, citing very hard driving in cemented soils.

Based on the results of this monitoring, it appears the Linehan and Hannen (1984) upper bounds fit both hammers' data sets relatively well, with the exception of SLT-A-16-4, for which much higher values sound values than would be expected for its horizontal distance were measured. It is unclear why this particular pile had such high noise levels, since the background levels prior to and after driving are typical, between 95 and 105 dB.

After the horizontal distance plots, the diagonal hammer-microphone distance was investigated. Similar to the seismic distance, this is the straight line distance from the source to the receiver. In seismic distance, the source was considered to be the pile toe, while for the hammer-microphone distance the source is, of course, the hammer. In both cases, the receiver is the vibration monitor. Plotting overpressure versus the hammer-microphone distance assumes that the actual straight line distance the sound wave must travel is a better predictor of attenuation than the horizontal distance.

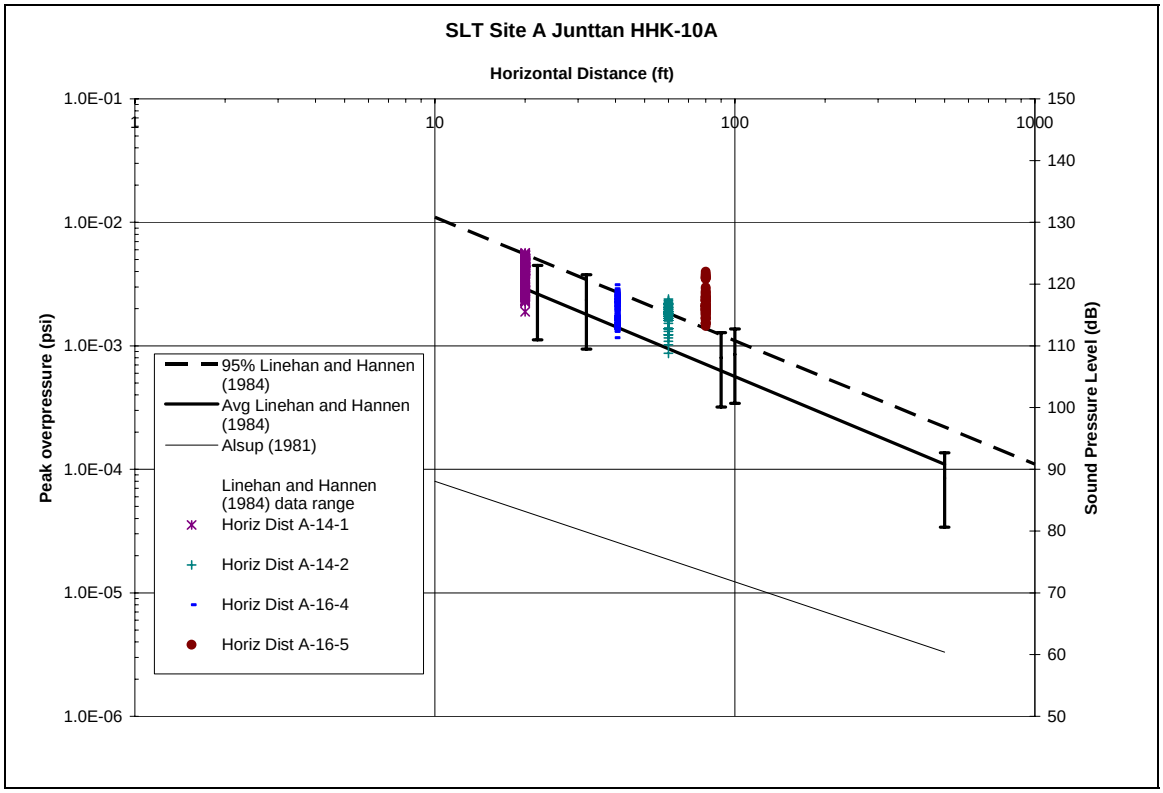


Figure 47. Horizontal distance plot, piles driven with Junttan HHK-10A hydraulic hammer.

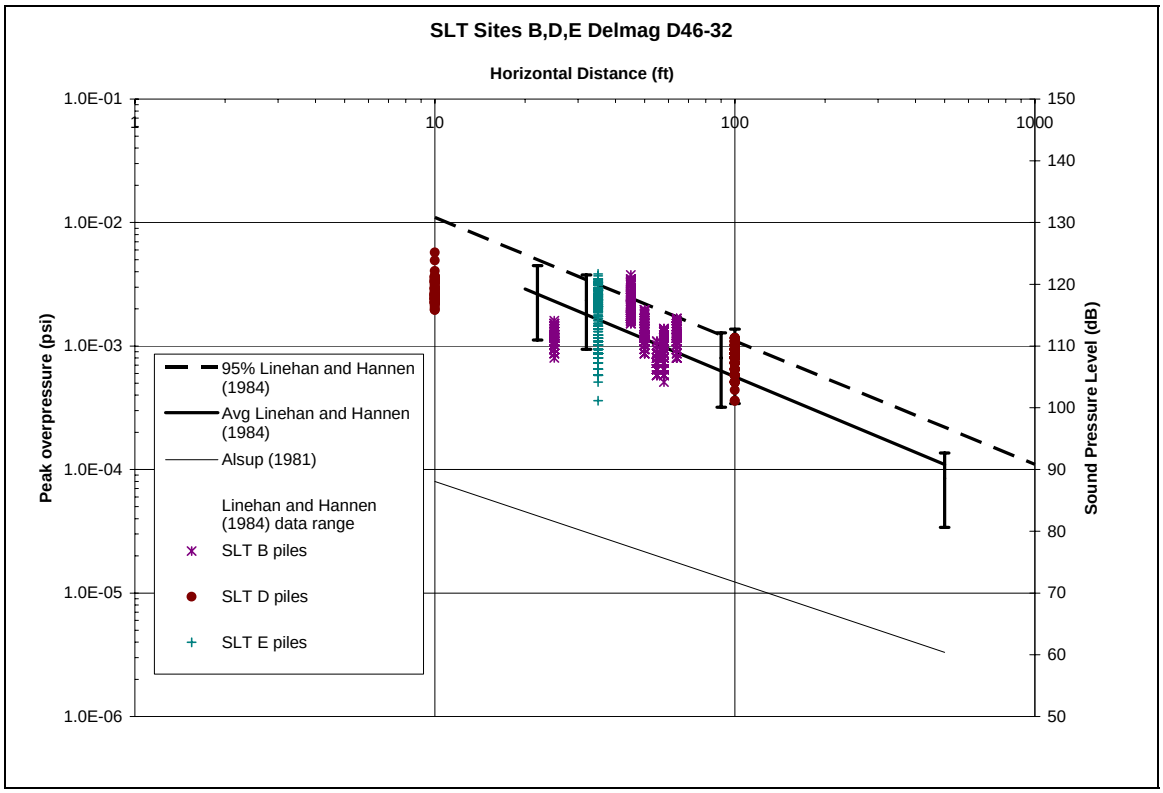


Figure 48. Horizontal distance plot, piles driven with Delmag D46-32 diesel hammer.

Figure 49 and Figure 50 show noise data plotted versus diagonal distance for the Junttan and Delmag, respectively. An upper bound threshold plot was created for Figure 50, but the odd distribution and relatively small number of the data points in Figure 49 makes one hesitate to make further recommendations for the Junttan hammer..

5.1.2 Scaled Distance

Adopting an analysis technique from the vibration portion of this study, the peak air overpressures were plotted on a scaled distance plot. This analysis focused on seismic distance plotted using the hammer-microphone distance and either the potential or transferred energy. Figure 51 shows the potential energy scaled distance plot for the piles driven Delmag D46-32. As in the vibration study, the potential energy was calculated using the PDA estimated stroke for diesel hammers multiplied by the Delmag's ram weight. The Junttan data was not analyzed in this manner, because the stroke calculation is invalid for

hydraulic hammers and that particular hammer has energy levels that can be adjusted by the hammer operator.

Figure 51 includes significant scatter, but there appears to be a rather clear upper bound, as estimated by the upper bound threshold line on the plot. The outliers at a scaled distance of 0.1 ft/(ft-lbs)$^{0.5}$ are at site SLT B, where the smaller scaled distance values are resulting in lower than expected peak overpressures.

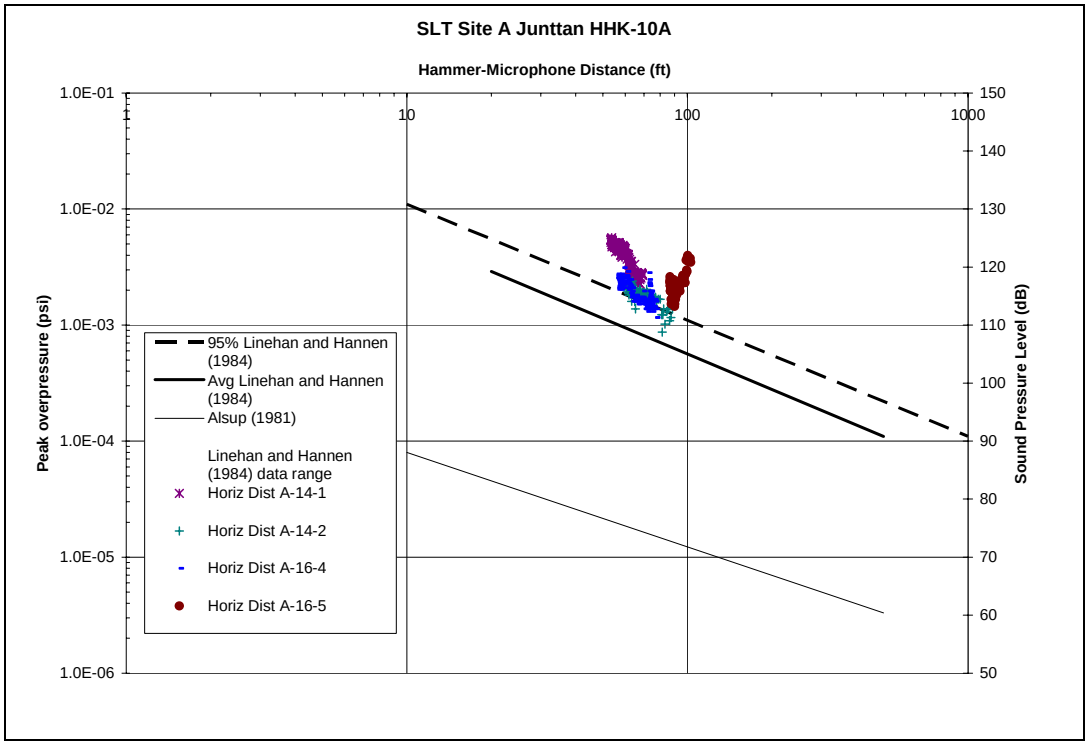


Figure 49. Junttan HHK 10-A Noise levels compared to diagonal distance from hammer to microphone.

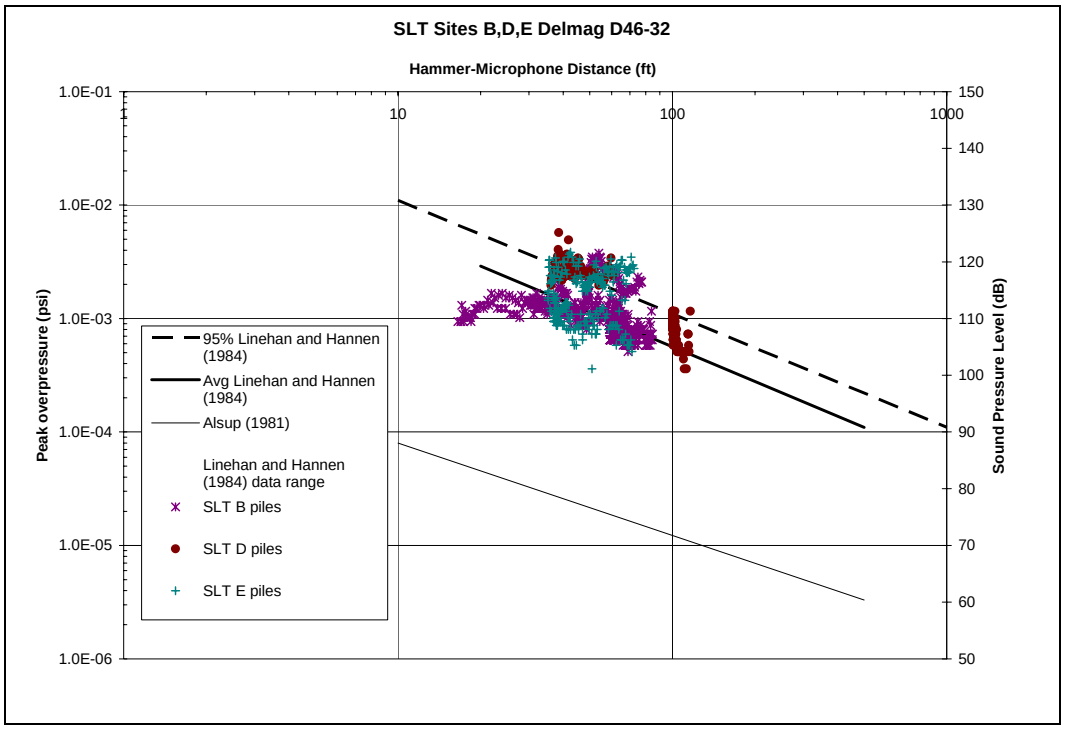


Figure 50. Delmag D46-32 Noise levels compared to diagonal distance from hammer to microphone.

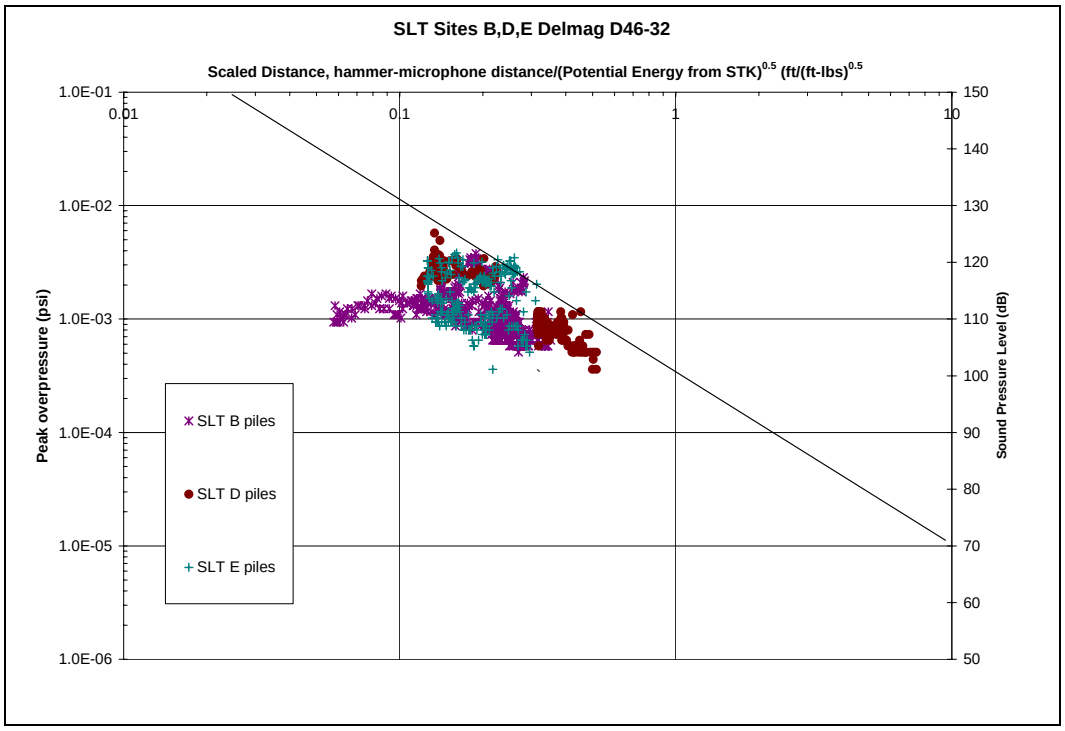


Figure 51. Delmag D46-32 Noise levels compared to potential energy scaled distance .

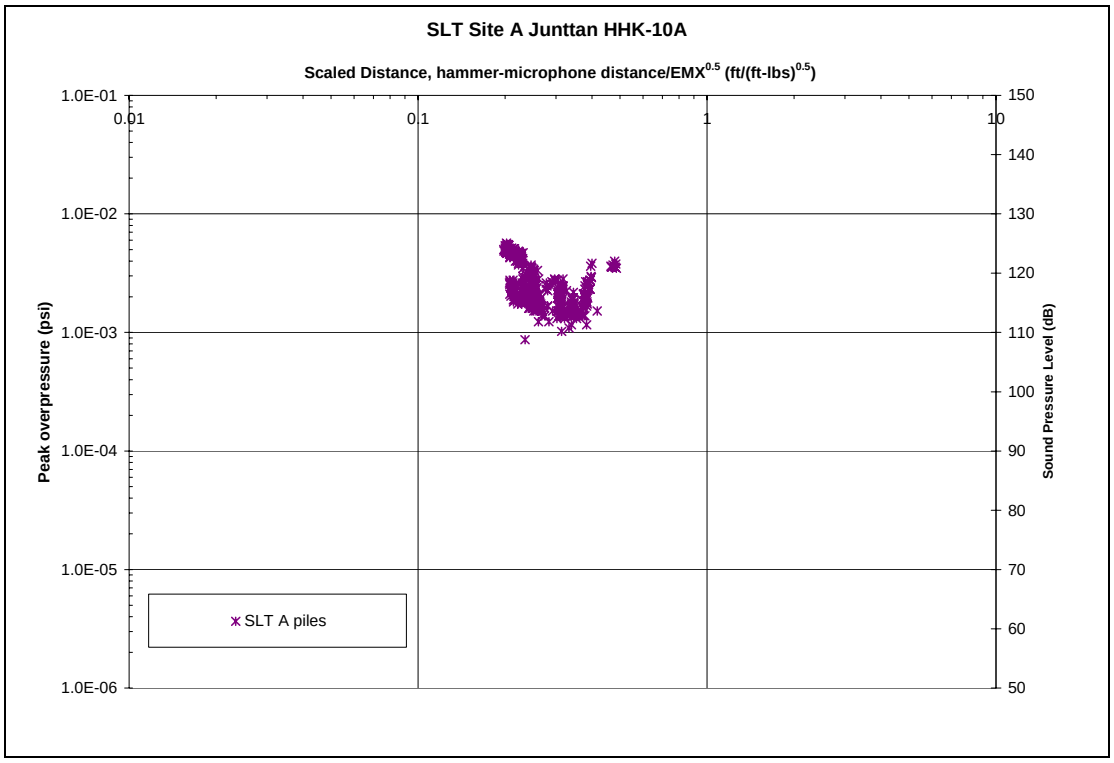


Figure 52. Junttan HHK-10A noise levels compared to transferred energy scaled distance.

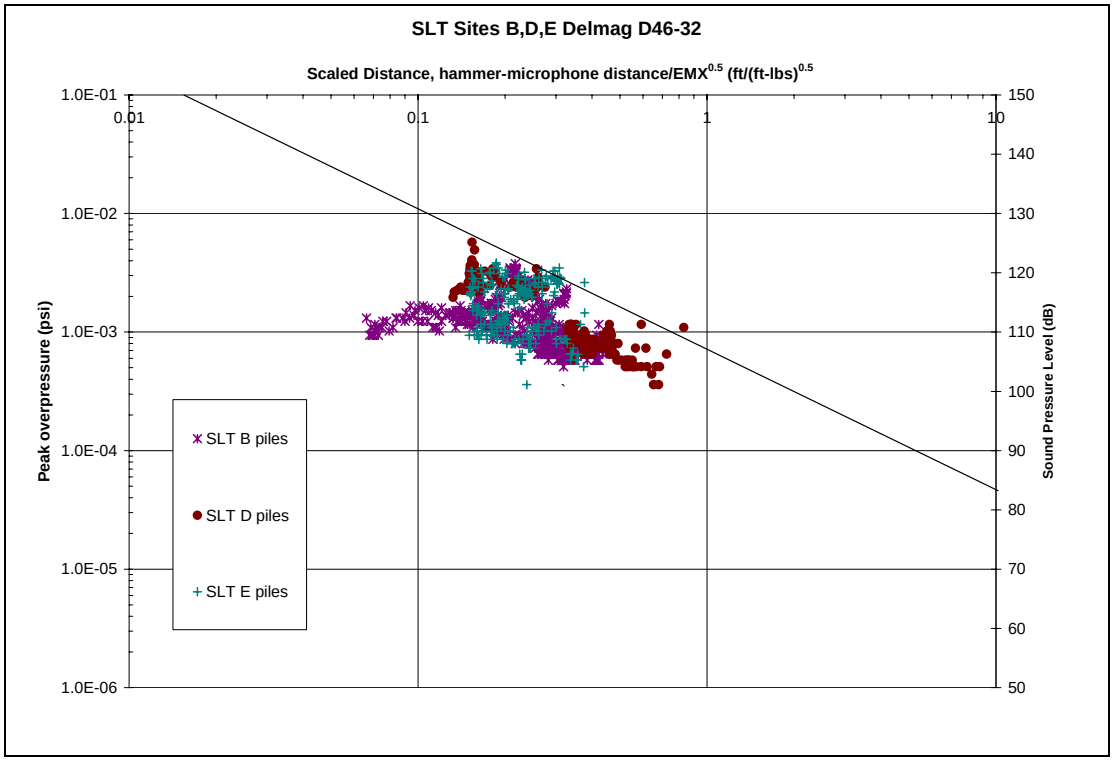


Figure 53. Delmag D46-32 noise levels compared to transferred energy scaled distance.

Figure 52 and Figure 53 show the transferred energy scaled distance plots. As in the vibration scaled distance plots, the transferred and potential energy plots for the diesel hammer are similar to one another. The biggest difference is the lower transferred energy tends to push the data points to the right of the graph, creating a bit more apparent scatter in the data than in the potential energy plot.

An upper bound threshold was not drawn in Figure 52, since there simply was not a wide enough range of data points to determine where that line should be drawn. That could be expanded with other piles at other indicator pile locations in future studies.

5.2 COMPARING PDA DATA TO NOISE LEVELS

The PDA data was investigated for correlations to the noise. Like the vibration data in Chapter 4, it was hypothesized that the general shape and trends of the peak overpressure versus time curve would be mirrored in some way in the PDA data. While that was seen in Section 4.2 and 4.3 for toe velocity and total resistance compared to certain components of vibration, it is less clear in the noise data.

Initially, the PDA velocities (VT1, VMX, VT2 and VTOE) versus hammer-microphone distance (as the pile penetration increases, the hammer-microphone distance decreases) were plotted in conjunction with the noise levels. An example is shown in Figure 54 One immediately apparent result is the sheer amount of scatter in the noise data. To better see the trend, a moving average line was also added as filtered data to the figure. With the exception of the jump in noise level at both changes of hammer energy (shown by the abrupt, discontinuous increases in the plot of velocity), there is very little similarity between the two curves. The other velocity measurement showed similar results with a similar lack of correlation.

A host of other parameters were looked at, including transferred energy, stroke (for the diesel hammers), and total resistance. For pile SLT-A-14-1, total resistance (RTL) again showed

some promise. Figure 55 shows the change in total resistance with hammer-microphone distance, as well as the moving average of sound level with hammer-microphone distance. The two separate measurements track each other fairly well, although there are places where the sound level shows more variation than the total resistance and vice versa.

The correlation of total resistance to noise level makes some sense. In Dowding's discussion of Linehan and Hannen (1984)'s noise data, the data are considered unusual because it was taken during very hard driving events in cemented soils. Thus, with higher resistance came higher noise levels. Of course, for diesel hammers, higher resistance means higher hammer strokes, higher impact velocities and higher energies transferred to the pile. So, the interrelationship between various parameters may be hard to untangle.

Overpressure and total resistance were plotted against one another as shown in Figure 56. The results follow a fairly strong linear trend, with an R^2 value of 0.825. This appeared to be quite promising, so the correlation coefficients of all other piles were generated and are summarized in Table 9. As seen in Table 9, the nearly linear R^2 value for pile SLT-A-14-1 is very much an anomaly compared to the other data points.

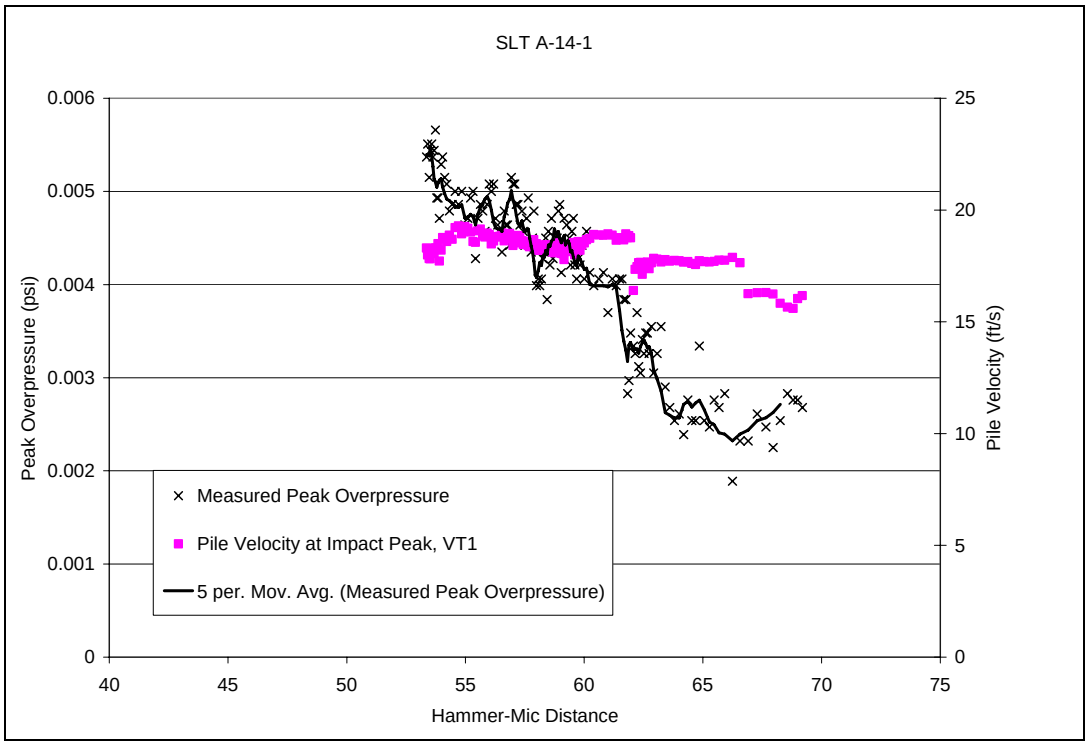


Figure 54. Correlation of peak overpressure to pile velocity at impact peak.

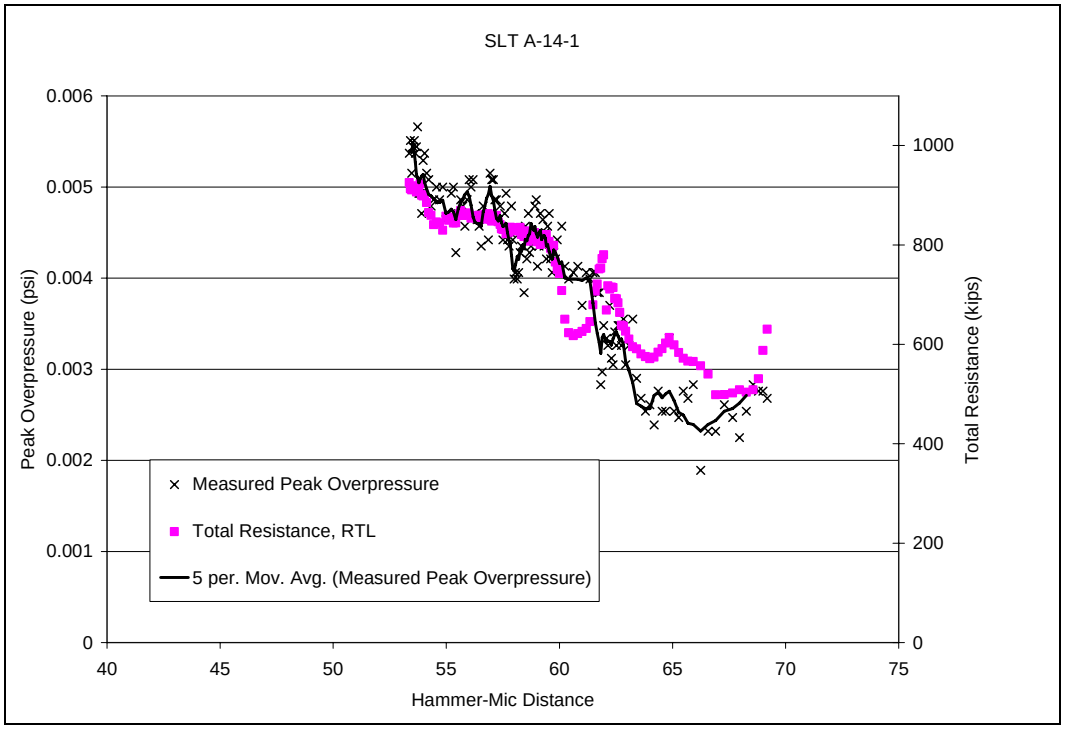


Figure 55. Correlation of peak overpressure to total resistance.

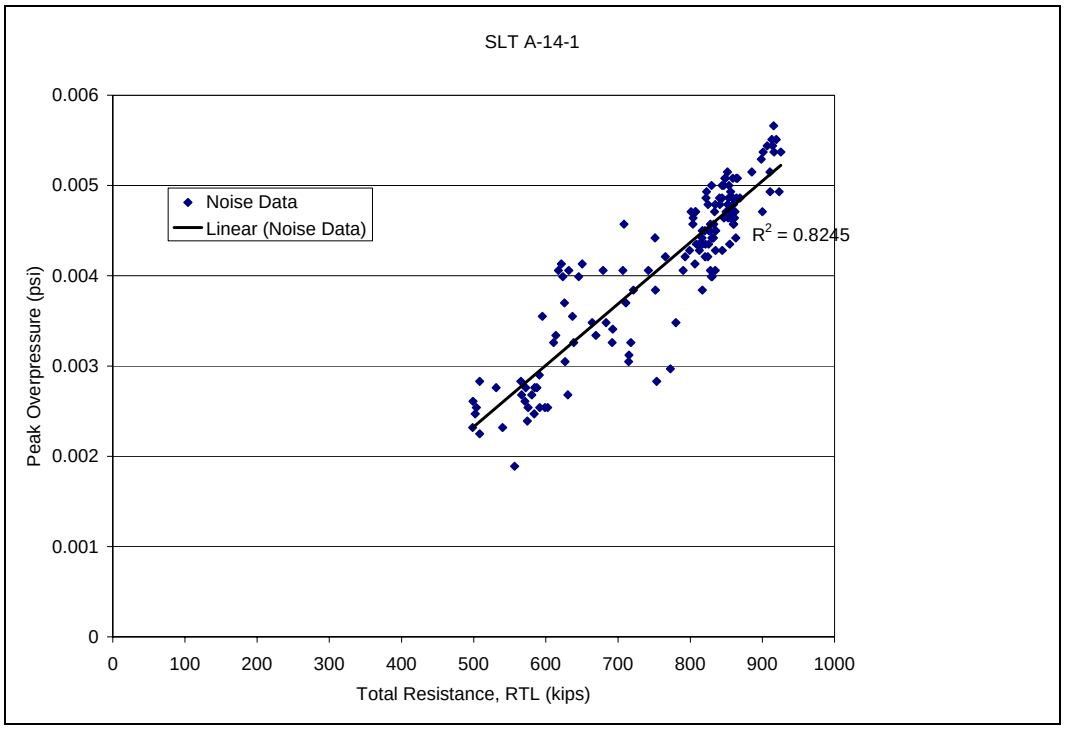


Figure 56. Correlation of total resistance to peak overpressure.

Table 9. R^2 values for correlation of total resistance to peak overpressure, all piles.

Pile	Horizontal Distance (ft)	R^2
SLT-A-14-1	20	0.825
SLT-A-14-2	60	0.433
SLT-A-16F-4	40	0.544
SLT-A-16P-5	80	0.217
SLT-B-12-1A	58	0.374
SLT-B-12-2	55	0.067
SLT-B-14-3	50	0.069
SLT-B-16F-4	45	0.029
SLT-B-14-6	64	0.002
SLT-B-14-7	25	0.010
SLT-D-14-2	10	0.008
SLT-D-12-6	100	0.425
SLT-E-12-1	35	0.378
SLT-E-16P-2	35	0.001
SLT-E-14-3	35	0.358
SLT-E-12-4	35	0.034

To check the lack of a strong trend shown in Table 9, other piles were investigated. Resistance and peak overpressure for SLT B-12-2 was plotted versus hammer-microphone distance. This is shown in Figure 57. As can be seen in the figure, there is tremendous scatter over a relatively small band of peak overpressures for this pile. The noise data acquisition system's limitations are also somewhat apparent in this figure, based on the distinct "rows" of noise data points that are equally spaced in 0.0007 psi intervals. That may be part of the problem, but, again the large amount of scatter in this data make the prediction strictly from PDA data more difficult.

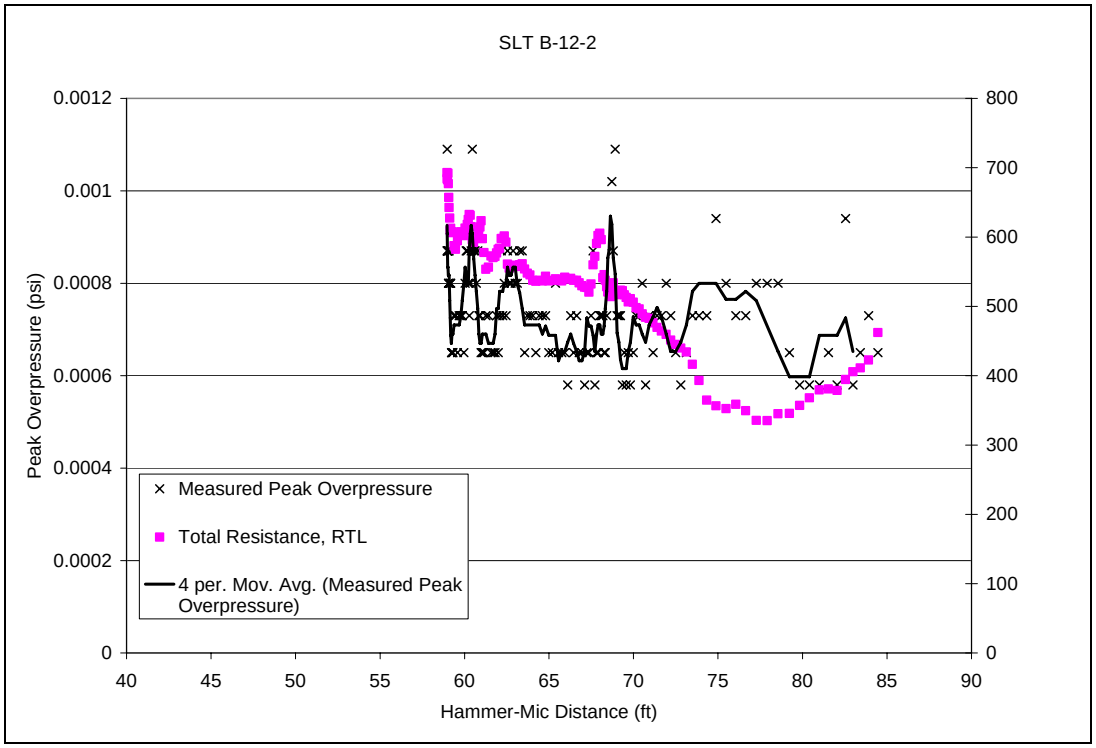


Figure 57. Correlation of peak overpressure to total resistance., SLT B-12-2.

5.3 MATHEMATICAL MODEL

Since there were no obvious relationships between single or combined PDA data and the noise level, a separate mathematical model was considered. Given models for propagation of sound in the outdoors (Kurze and Anderson, 2006) and sound generation due to compression of air in a rigid walled, infinite pile (Vér, 2006), a model that relates the velocity at the pile top and the attenuation of the sound wave with distance could be created.

From Section 2.5, using Equations 13, 14, 15 and 16, the model used can be condensed and modified to:

$$L_p(d) = 20\log\left(\frac{v_{PDA}(t)\rho_{air}c_{air}}{2.9x10^{-9}\,psi}\right) - 10\log\frac{4\pi d_{hammer-mic}^2}{d_0^2} \quad \text{(in dB)} \tag{21}$$

To recap, the variables in equation 21 are the calculated peak overpressure at a distance from the source, $L_p(d)$, a PDA measured velocity versus time, $v_{PDA}(t)$, the mass density and wave speed of the air compressed inside the pipe pile, ρ and c, the diagonal distance from the hammer to the microphone, $d_{hammer\text{-}mic}$, and a reference distance, d_0 that is typically set at 3.281 ft (1 m).

The two terms above account for, from left to right, the sound generated by the compression of the air in an (assumed rigid and infinite) pipe, and the attenuation of energy assuming spherical expansion of the wave form in free space. A third term, D_Ω, can be added in if the hammer (or source) gets very close to the ground surface compared to the receiver, and the sound propagation media change from a free space (no boundaries) to a half space (bounded by the ground). For all of these piles, the hammer was higher than the receiver.

The PDA velocity in Equation 21 was selected to be either the maximum velocity measured over the entire PDA record, VMX, or the velocity at the impact peak, VT1. These are velocity levels at the pile top, very close to the hammer itself. For SLT A-14-1, the results of the mathematical model using VT1 and VMX, as well as the measured data are shown in Figure 58. For the most part, the model predicts conservatively the decibel level measured on this particular pile. The figure also shows that the maximum velocity was at the peak due to impact for these blows.

To determine the typical amount of overprediction for each pile, the average, standard deviation, maximum and minimum difference between the predicted and the measured decibel levels for each data point was computed. These results are shown in Table 10.

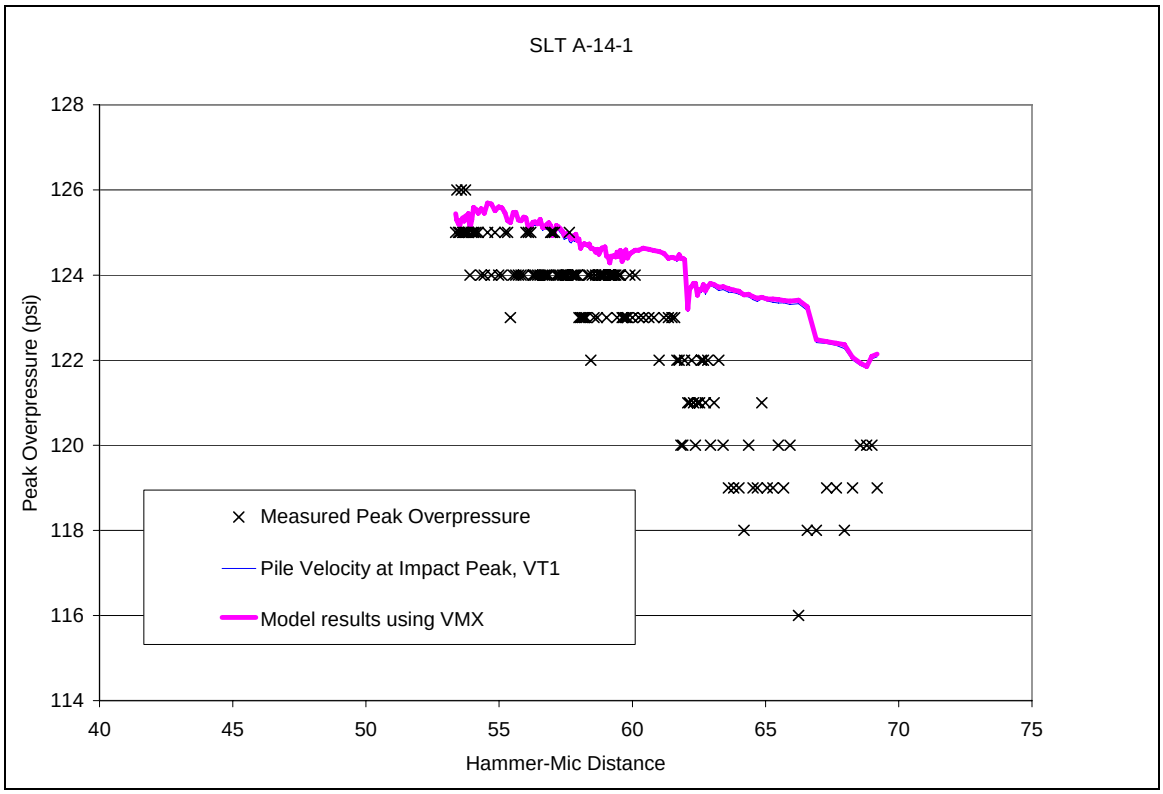


Figure 58. Measured versus calculated noise levels from model.

Table 10 shows that, on average, the results of the proposed model are conservative, with predicted noise levels exceeding the measured noise levels by 2 to 14 dB. While a few piles (SLT A-14-1, SLT A-16-4 and SLT B-12-1A) have minimum differences that are negative (an under prediction by the model), the model for the most part predicts conservative to very conservative results. Indeed, with differences as great as 10 dB, the model would appear to need significant refinement if noise levels are to be accurately predicted for any hammer blow.

To better predict the actual shape and magnitude of the curve, a few things could be investigated. First, the sound generator model may need to be expanded beyond the rigid walled, infinite pile. The hammers create sounds of their own outside of striking the pile,

from exhausting spent diesel fumes to impacting the drive system to the ram sliding along its guides. All of which could be the trigger for a particular noise and frequency level. Similarly, taking better environmental attenuation factors (meteorological data, surrounding buildings, the ground surface, and other structures) could help better estimate the amplification or reduction of the noise level with distance.

Table 10. Typical average difference in predicted versus measured noise levels.

Pile	Average Difference (Predicted - Measured decibel level) (dB)	Maximum Difference (Predicted - Measured decibel level) (dB)	Minimum Difference (Predicted - Measured decibel level) (dB)	Standard Deviation Predicted - Measured decibel level) (dB)
SLT-A-14-1	2	7	-1	1.4
SLT-A-14-2	7	13	4	1.6
SLT-A-16F-4	6	9	1	1.4
SLT-A-16P-5	2	7	-5	3.0
SLT-B-12-1A	11	16	6	2.1
SLT-B-12-2	14	16	8	1.7
SLT-B-14-3	10	14	6	2.0
SLT-B-16F-4	6	13	3	2.8
SLT-B-14-6	8	13	5	1.9
SLT-B-14-7	13	17	8	2.4
SLT-D-14-2	7	12	2	2.1
SLT-D-12-6	13	14	1	1.7
SLT-E-12-1	14	17	11	1.5
SLT-E-16P-2	6	13	0	3.0
SLT-E-14-3	8	19	-1	5.0
SLT-E-12-4	13	17	8	2.5

5.4 SUMMARY

Noise data collected on the site was considered using horizontal distance, hammer to microphone diagonal distance, and scaled distance plots. The results showed that the scaled distance plots did tend to reduce some of the scatter observed in the horizontal and hammer to microphone distance plots. Upper bound thresholds were suggested for the diesel hammer sites when scaled distance is used to predict or correlate transferred or potential energy to noise levels.

PDA data was compared to the noise data, and, initially, it appeared total resistance would be an excellent predictor of noise level. Unfortunately, the scatter and likely other factors in most of the other piles led this method being abandoned.

Finally, a very simple mathematical model was proposed that used sound generation in an rigid walled, infinite tube and attenuation of sound wave fronts with distance to predict the sound levels using PDA measured velocities near the pile top. The resulting model was almost uniformly conservative, over predicting the noise level by 2 to 13 dB on average.

There are clearly many more details that could be investigated in this problem. The environmental factors affecting attenuation or amplification and the sound levels generated by a system more complex than a piston in a tube should all be considered for future research in this model.

CHAPTER 6: SUMMARY AND CONCLUSIONS

Piles and other deep foundation elements have allowed owners, engineers and contractors to build larger structures on increasingly marginal ground. Difficult site conditions have traditionally been overcome through transferring loads to more competent layers mostly using pile foundations.

The act of pile driving and the vibrations it causes is a two pronged problem: the annoyance created by the noise and vibration, and the possibility of damage to nearby structures. The latter should be unquestionably avoided and the former should be minimized to reduce public resistance to a particular project. The challenge, then, is to minimize vibrations or to keep them within an acceptable level. Work in this study utilized a subset of closed end pipe piles from four of the six static load test sites at the Marquette Interchange reconstruction site in Milwaukee, Wisconsin. One static load test site was excluded because it lacked vibration data; the other was excluded because it lacked PDA data. The piles used in this study were driven to depths of 72 to 117 feet, with vibration monitoring at horizontal distances from 10 to 100 feet.

This study illustrated the applicability of existing models to both vibration and sound data collected on the ground near impact driven pile installations. The piles also had strain and acceleration data taken near the top of the pile during driving. In essence, vibrations in the pile due to hammer impact were compared to the vibrations generated in the ground and in the air due to the driving of the pile into the ground.

Vibration data were collected as the maximum vibration level recorded every 15 seconds. PDA data was collected for every blow, or every one to two seconds. One challenge for this work was correlating the PDA data to the vibration data, such that the data points could be compared one to one. Existing models for vibration estimation were reviewed, as well as a few municipal and regional codes and other commonly used damage and annoyance criteria.

The most commonly used methods to predict vibrations prior to construction are through distance, energy or scaled distance plots. These independent variables are plotted versus peak particle velocity. For a given hammer energy and distance from the pile to the point where vibrations are critical, a maximum expected vibration level can be estimated using the correlations of others (see, for example, Woods and Jedele, 1985 or Dowding, 1996). This is largely the status quo, although a few researchers have proposed other methods of analysis.

The data analyses were focused on the various velocities and energies that can be output or computed from the dynamic testing data, as well as the total resistance experienced by the pile. Propagation of sound through the air was also briefly investigated by calculating the sound generated by compressing air in an idealized rigid pipe. A model that accounted for attenuation of sound generated by a point source in the outdoors was used to predict the reduction in noise level with distance from the hammer. For both vibrations and noise levels, case histories from the literature were briefly summarized and reviewed. Based on the findings and analyses of data, the following conclusions can be advanced:

i. Comparing PPV to horizontal distance, seismic distance (the diagonal distance from the pile toe to the monitoring point), hammer energy and scaled distance (a distance divided by the square root of energy) indicated that using seismic distance tended to reduce some of the scatter. When changing to seismic distance, the pseudo-attenuation and attenuation damping models used to predict the maximum PPV and originally calibrated to horizontal distance had to be adjusted slightly. In the case of the piles used in this study, that meant adjusting the proportionality constant, k and A_o, but not the exponent, n or damping coefficient, α.

ii. Plotting PPV versus energy showed enormous scatter. This was the case regardless of whether the rated hammer energy, the potential energy calculated from the estimated diesel hammer stroke and ram weight, or the energy transferred to the location of the PDA gages as measured by the PDA were used.

This approach does not appear to be a viable predictor of PPV, a finding that supports the similar observations of Hope and Hiller (2000).

iii. For the data set used in this study, using seismic distance and potential energy from the estimated stroke for the diesel hammer or, to a lesser extent the transferred energy, reduced the scatter compared to the using horizontal distance and the nominal rated energy of the hammer. Using the measured quantities, however, did require a different model for predicting peak vibrations to be used. The reader should be wary of using scaled distance from measured results with vibration upper bound models calibrated with rated energy and horizontal distance.

iv. When the attenuation-damping model was considered by comparing PPV to PDA measured velocities, the measured peak pile top velocity after impact (VT1) and the maximum measured velocity over the entire record did not correlate well to PPV. The shape of the PDA toe velocity versus time curve, however, did compare well with one component of PPV in multiple piles. In some ways, this appeared to confirm the conceptual model assumption that the movement of the pile toe is a significant generator of stress waves. For pile SLT-A-14-1, toe velocity and longitudinal PPV correlated to each other almost linearly, with an R^2 value of 0.84. Unfortunately, for the other piles, the results were not consistent enough to merit recommendation for a predictive model based on toe velocity alone.

v. Comparing total resistance (RTL) to one component of PPV in many records, showed that the two curves are basically mirror images of each other. This finding indicated that the shape of at least one component of the maximum PPV curve could be independently reproduced from measurements on the pile.

vi. A predictive model based on an attenuation model was proposed as follows:

$$PPV = k \frac{RTL}{Z} \left(\frac{D}{D_o} \right)^{-n}$$

For the data set used in this study, satisfactory results were obtained with an exponent, n, of 1. That way, PPV divided by the equivalent velocity from the total resistance, RTL, and the pile impedance, Z, could be correlated to the seismic distance, D, normalized by a base distance, D_o, which in this case was assumed to be the pile radius. When k is computed based on a curve fit, the measured and predicted data follow similar trends, although the effects of the "mirroring" that is especially pronounced at the end of drive is not fully captured with this model. The poorest correlations to total resistance occurred where velocity monitoring occurred at a horizontal distance of 100 ft from the pile, where the pile was closest to the monitor (10 ft) but driven very deep, and a pile where only the first section had PDA data. In the last case, correlating blows in the PDA to the vibration data was very difficult because the hammer was running erratically during initial start-up.

vii. The measured sound level data ranged from 102 to 126 dB while driving, relative to an overpressure of 2.9×10^{-9} psi, which is a standard baseline for decibel calculation. The dominant frequency content of the records was uniformly greater than 100 Hz. A plot of both hammer types were created using log-log horizontal distance, hammer to microphone distance, and scaled distance were analyzed. The horizontal distance showed considerable spread, but was perhaps easier to than the hammer to microphone distance. A scaled distance plot using potential energy from the diesel hammer stroke and the hammer-microphone distance indicated that a relatively clear upper bound threshold could be generated, at least over the range of scaled distances included in the study data set.

viii. Using the PDA quantities to compare to the noise data indicated that the velocities at the pile top and toe did not appear to correlate directly with the level of sound detected at the vibration monitoring location. However, in one pile, total

resistance again appeared to be well correlated to noise. Unfortunately studies of the other piles did not verify the correlation seen for the one pile. For most piles, there is a large amount of scatter and variability from data point to data point. As such, an attempt to predict maximum values was made.

ix. Using basic theories of sound attenuation in a free space and sound levels generated by a piston moving in a rigid walled, infinitely long pipe, a mathematical model was proposed. To generate the sound level at the source (the hammer), the model used PDA measured peak velocities at impact and maximum velocity over the course of the record. When the model results are compared to noise data measured on a particular pile, the model tends to over predict noise levels. On average, the model over predicts measured values by between 2 and 14 dB, with standard deviations of between 1.4 and 5 dB.

In summary, this study has looked in depth at the current state of practice of vibration and noise monitoring for pile driving and started the initial work required to correlate vibration results to results measured on a pile with accelerometers and strain transducers.

It is hoped that, with some of the similarities observed in this study between the two separate measurements, further work will more clearly define, calibrate, and improve the relationship between vibrations occurring in the pile and vibrations occurring in the soil. There are still a number of unanswered questions, many of which must be addressed to create a viable model that can be used from the first impact to the last restrike of a pile. Hopefully, as we better understand how waves propagate through nonuniformly layered media, how pore pressure changes under dynamic events like pile driving, and how stress waves are transmitted through soil undergoing failure, still more questions will be answered in the ground vibration problem. In addition, the environmental factors affecting attenuation or amplification and the sound levels generated by a system more complex than a piston in a tube should all be considered for future research.

CHAPTER 7: FUTURE RESEARCH

As noted in Chapter 2, there is still a wide gulf between the conceptual underpinnings of wave propagation in the soil due to pile driving and the prediction and analysis of cases in the field. While there is thought to be a general understanding of the mechanisms for stress wave generation in the soil, the current analysis methods are based on a different theoretical underpinning—that of an explosion or impact at a single point. A pile is quite different, in that it has stress wave sources all along its length (which can be hundreds of feet in the extreme) and at its toe. There are complex questions of dynamic soil-pile interaction, superposition and three dimensional transmission of stress waves through soils that are non-uniform and undergoing both elastic and plastic changes. Progress on this problem (and other vibration transmission problems through soil) will require data from theoretical, numerical, laboratory and, probably the most important and most difficult to study but the most common data collected, field studies. Following are a few ideas for future directions of research

7.1 PEAK PARTICLE VELOCITIES IN THE SOIL

- **Expand the scope of the study and analyze remaining data.** This study has looked at a very limited number of pipe piles with penetrations of between 50 to 120 feet and diameters of 12.75 to 16 inches. Shallower and deeper penetrations, different pile types and sizes, more vibration distances different soil types and strata should all be considered for future study. The data set includes 83 piles with PDA files, more than 50 of which also have corresponding vibration data. Some restrikes have full wave forms. More piles are being driven at the Marquette Interchange with vibration monitoring and occasional PDA tests as of this writing.
- **Look more carefully at short seismic distances, short horizontal distances, and shallow pile penetrations.** The general consensus of previous studies is that the closer the pile is to the monitoring site, the higher the peak particle velocities in the soil. By looking at shallower seismic distances, something distinctly lacking in the data analyzed in this study, the results from PDA testing can be better correlated.

- **Investigate whether the scaled distance plot method can be more tightly bounded using PDA records or other parameters.** Plotting using seismic distance and potential or transferred energy made for a much tighter distribution compared to the traditional method. This, however, will require new calibration of the scaled distance model parameters.
- **Develop a unified prediction algorithm that can predict all three components of ground motion.** The method proposed in this study was (moderately) successful in predicting at least one component in some cases. This needs to be generalized and expanded through more correlation and theoretical study.
- **Improve the proposed model.** This initial attempt at a mathematical model is clearly in need of further calibration to more piles, and would likely benefit from a more robust model than the simple attenuation model proposed in Chapter 4. Adding damping, better exploring the benefits of changing the exponent on normalized distance or creating a superimposed model (for example, attenuation-damping with a total resistance type model added or superimposed onto it to better account for variations in the soil).
- **Consider carefully studying the effects of soil impedance on the transmission of vibrations from piles.** To do this effectively, a series of crosshole seismic or seismic cone penetration tests would have to be performed on the site before and perhaps after the pile driving. Indeed, the crosshole access tubes may also be an ideal spot to measure stress wave transmissions in the ground. This could also be considered as a laboratory study, if the proper scale and equipment could be mustered.
- **Attempt to model this or another site numerically.** This suggestion may require an additional set of soil testing to be performed, unless correlations for a number of parameters to N-value and shear strength gives an acceptable result.
- **Pursue basic research in the propagation of stress waves through soils in plastic failure.** A key question in the pile problem is: how much vibration is transferred from the pile, through the failed zone, and into the free field? A related question (which some researchers have studied in full-scale field studies) involves changes in

pore pressure due to pile driving and prediction of settlement due to vibrations from pile driving.

7.2 NOISE

The field of acoustics and sound propagation is well-established and enormous. This study has only scratched the surface, and there are a number of things even within the area of this study that could be done.

- **Look for or develop better models of noise generation for impact hammers on piles.** Part of the over prediction noted in the suggested model may be due to the over prediction of noise levels generated by the hammer.
- **Improve the reflection models by better characterizing the buildings and ground materials around the pile driving site.** This can only improve the current, very simple attenuation model used in this study. Obtaining this data may be possible for the existing data and would be much easier for future studies.
- **Include weather data (wind, humidity, temperature) in the collected data.** There are existing models that will take winds, temperature, and humidity into account, if the data is available.

7.3 WAVE EQUATION PROGRAMS FOR PILE DRIVING

This study has as a larger goal the possible prediction of vibration and noise levels prior to arrival on site. This may be achievable using existing wave equation programs as applied to the pile driving problem. A number of studies (for example, Rausche et al., 2004) have correlated wave equation results to dynamic testing results. If the work in this thesis is calibrated and expanded, strong correlations between vibration and/or noise results and dynamic testing results may also arise. Research that should be concurrent, or more likely, further down the road should include implementing models generated by comparisons of pile driving data to vibrations in a wave equation program and using data from sites like the one in Milwaukee to calibrate the new wave-equation-to-vibration models.

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APPENDIX

DRIVING RECORDS

PILE DRIVING RECORD

WKG

PROJECT: Marquette Interchange Replacement | WKG PROJECT NO.: 02032
DESIGNER: HNTB | CONTRACTOR: Marquette Constructors
PILE LOCATION: SLT-A-14-1 (NW PILE)

Ft.	Blows		Ft.	Blows		Ft.	Blows
1	WOH		46	21	(3)	91	
2			47	14		92	
3	V16;2	(V)	48	18		93	
4	2		49	18		94	
5	2		50	17		95	
6	2		51	18		96	
7	1		52	21	(4)	97	
8	24	(1)	53	25		98	
9	23		54	52		99	
10	19		55	31|3",28	SPLICE (5)	100	
11	13		56	38		101	
12	10		57	30		102	
13	7		58	31		103	
14	9		59	47		104	
15	8		60	15-15-14-12	3-INCH INCREMENTS	105	
16	7		61	13-12-14-15		106	
17	6		62	25-33-33-31	STOP* (6)	107	
18	6		63	34-25-17-12		108	
19	6		64	11-11-10-14		109	
20	7		65	22-29-35-41		110	
21	6		66	36-38-34-37	(7)	111	
22	7		67	30-37-31-31		112	
23	7		68	29-28-26-22		113	
24	8		69	23-23-21-19		114	
25	9		70	20-17-14-15		115	
26	9		71	17-22-32-39		116	
27	9		72	36/3"		117	
28	10		73	RESTRIKE @ 5:15pm		118	
29	10		74	**#1= 3-1/8", 20-1/8"		119	
30	12		75	#2= 3-1/8", 2 1/8", 1-1/8",		120	
31	12		76	2-1/8", 2-1/8", 1-1/8", 1-1/8"		121	
32	13		77			122	
33	14		78	RESTRIKE @ 4:00pm		123	
34	14		79	6/18/03 (8;5) 6-1/4"		124	
35	15		80			125	
36	15		81			126	
37	18		82			127	
38	15		83			128	
39	13		84			129	
40	14		85			130	
41	15		86			131	
42	15		87			132	
43	20		88			133	
44	25		89			134	
45	24		90			135	

GENERAL INFORMATION

Hammer: Junttan HHK-10A
Weight: 22.0 kips
Energy: variable
Pile: 14.0" O.D., 0.438 Wall Pipe Pile
Steel Grade: ASTM A252 Gr 3 (45 ksi)
Allowable Load: ----- Tons
Date Driven: 6-17-03
Pile No. in Cap: 3
Req'd Resist.: Variable

======= BOTTOM SECTION ======
Length: 60'4" (GAGES)
Wall Thickness: 0.438
Driving Time: Start: 11:38 Finish: 11:51

======= 2nd SECTION ======
Length: 60'3"
Total Length: 126'7"
Wall Thickness: 0.438
Driving Time: Start: 14:03 Finish: 14:45

======= 3rd SECTION ======
Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

======= 4th SECTION ======
Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

Cut-Off Elev.: —
Length Cut Off: 39'2 1/2"
Calc. Pile Length: 81'-4 1/2"
Toe Elev.: 546.03'
Ground Elevation: 617.40'
Meas. Length: 81'2"
Collapse: NONE
Sweep: Depth NONE *** Dir: —
Plum Dev.: 1" IN 10 FEET N
Allowable: -----
Align Dev.: -----
Allowable: -----
Boot Plate: 1" PLATE, 14.5" Φ
Remarks:

Technician: Charles J. Winter
Chk.: Date:

Remarks: Circled numbers refer to stroke setting (V) indicates manual (continuously variable stroke and cadence) 1 welder on Splice, Splice took longer also due to wrong Pile thickness on site
* STOP TO ADJUST GEL GAGES (APPROX 3 min) ** #1 = ONE PUMP ON, #2 = TWO (BOTH) PUMPS ON
*** = PARTIAL SWEEP TO SE, STAGES ~70', APPROX 1/8 OF BOOT PLATE VISIBLE.

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PILE DRIVING RECORD

WKG

PROJECT: Marquette Interchange Replacement — WKG PROJECT NO.: 02032
DESIGNER: HNTB — CONTRACTOR: Marquette Constructors
PILE LOCATION: SLT-A-14-2

DRIVING RESISTANCE

Ft.	Blows		Ft.	Blows		Ft.	Blows	
1	4		46	10		91	7	
2	WOH		47	11		92	5	
3		(4)	48	11		93	6	
4			49	9	ACTUAL (3)	94	5	
5	3		50	9		95	7	(5)
6	3		51	9		96	10	
7	1		52	8	(4) ACTUAL	97	5/4" 11	STOP @ 9:55 10.37
8	5	(1)	53	8		98	6-6-6-5	3-INCH INCREMENTS
9	14		54	7		99	5-5-5-6	
10	17		55	1/4" 4	(5)	100	6-6-5-5	
11	11		56	6		101	5-5-5-4	
12	7		57	7		102	5-4-4-5	
13	6		58	7		103	5-4-5-5	
14	4		59	12		104	13	
15	4		60	12		105	12	
16	3		61	10		106	13	
17	5		62	7	(6)	107	18	
18	4		63	4		108	24	
19	6		64	7		109	19	
20	10		65	4		~~110~~		
21	6		66	6		~~111~~	Restrike @ 3:38PM	
22	5		67	5		~~112~~ (6.5)	3-1/2", 2-1/2, 2-1/2,	
23	5		68	4		~~113~~	1-1/2, 2-1/4	
24	6		69	4		~~114~~ (7)	2-1/2", 1-1/2", 1-1/2",	
25	5		70	5		~~115~~	1-1/2, 1-1/2", 1-1/2", 1-1/4"	
26	6		71	5		~~116~~		
27	6		72	6	(7)	~~117~~	Restrike @ 8:25AM	
28	6		73	9		~~118~~ (7)	2-1/4", 2-1/4"	
29	8		74	4	(8)	~~119~~	2-1/4", 2-1/4", 2-1/4"	
30	8		75	4		~~120~~		
31	9		76	3		~~121~~		
32	10		77	4		~~122~~		
33	10		78	3		~~123~~		
34	10		79	3		~~124~~		
35	10		80	4		~~125~~		
36	11		81	7		~~126~~		
37	11		82	9		~~127~~		
38	10		83	9		~~128~~		
39	9	ACTUAL (2)	84	7		~~129~~		
40	8		85	7		~~130~~		
41	9		86	5		~~131~~		
42	9		87	6		~~132~~		
43	10		88	7		~~133~~		
44	11		89	8		~~134~~		
45	10		90	9		~~135~~		

GENERAL INFORMATION

Hammer: Juntan HHK-10A
Weight: 22.0 kips
Energy: VARIABLE
Pile: 14 x 0.500" Wall Pipe Pile
Steel Grade: A252 GRADE 3
Allowable Load: ----- Tons
Date Driven: 06-18-03
Pile No. in Cap: ~~THIRD~~ FOURTH
Req'd Resist.: Variable

====== BOTTOM SECTION ======
Length: 60'-4"
Wall Thickness: 0.500" GAGES
Driving Time: Start: 08:35 Finish: 08:40

====== 2nd SECTION ======
Length: 60'3" HT. BD1061-6 GAGES
Total Length: 120'7"
Wall Thickness: 0.500"
Driving Time: Start: 9:44 Finish: 10:13

====== 3rd SECTION ======
Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

====== 4th SECTION ======
Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

Cut-Off Elev.: —
Length Cut Off: —
Calc. Pile Length: —
Toe Elev.: 507.99'
Ground Elevation: 617.81'
Meas. Length: 118'8" OK
Collapse: NONE
Sweep: Depth: — Dir: NONE
Plum Dev.: 1 5/8" E
Allowable: -----
Align Dev.: -----
Allowable: -----
Boot Plate: 1" FLAT, 14.5" ϕ
Remarks:

Technician: VAN E. KEMMERER/Charles J. Winter
Chk.: Date:

Remarks: * STOP TO Change gages to top of Pile

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PILE DRIVING RECORD

WKG

PROJECT: Marquette Interchange Replacement
DESIGNER: HNTB
PILE LOCATION: SLT-A-16F-4 (SW PILE)

WKG PROJECT NO.: 02032
CONTRACTOR: Marquette Constructors

Ft.	Blows		Ft.	Blows		Ft.	Blows
1	2	(V)	46	9		91	
2	2		47	10		92	
3	4		48	10		93	
4	2		49	13		94	
5	2		50	12		95	
6	2		51	11		96	
7	5		52	12		97	
8	6		53	15		98	
9	10	(3)	54	16		99	
10	9		55	6/3" 23	SPLICE	100	
11	8		56	32		101	
12	7		57	44		102	
13	7		58	80		103	
	8		59	20-22-26-28	3-INCH DRIVE EQUIPMENT	104	
15	14		60	28-28-30-30		105	
16	16		61	30-40-41-44	(5)	106	
17	17		62	44-39-31-31		107	
18	18		63	24-23-21-20		108	
19	15		64	15-12-12-12	(6)	109	
20	11		65	10-10-9-9		110	
21	5		66	9-8-7-9		111	
22	8	(4)	67	6-7-8-7		112	
23	6		68	8-7-7-7		113	
24	6		69	6-6-6-5		114	
25	7		70	4-5-4-5		115	
26	8		71	5-5-5-6		116	
27	8		72	6-9-9-12		117	
28	5		73	11-14-14-16		118	
29	6		74	13-15-13-15		119	
30	6		75	13-12-12-10		120	
31	6		76	9-9-8-8		121	
32	6		77	8-7-10-13		122	
33	6		78	14-15-17-20		123	
34	7		79	20-27-26-28		124	
35	6		80	24-24-24-21		125	
36	8		81	19-20-20-24		126	
37	7		82	27-3 1/4"		127	
38	8		83	RESTRIKE @ 3:40 PM	(9)	128	
39	8		84	2-1/4, 3-1/4, 3-1/4		129	
40	8		85	2-1/8"		130	
41	8		86	RESTRIKE @ 2:15PM		131	
42	8		87	6/18 (W)	(6.5)	132	
43	9		88	2-1/8", 2-1/8", 7-1/8",		133	
44	8		89	4-1/8"		134	
45	9		90			135	

GENERAL INFORMATION

Hammer: Juntan HHK-10A
Weight: 22.0 kips
Energy: variable
Pile: 16.0" O.D., 0.50 Wall Pipe Pile
Steel Grade: ASTM A252 Gr 3 (45 ksi)
Allowable Load: ----- Tons
Date Driven: 6-17-03
Pile No. in Cap: 2
Req'd Resist.: Variable

BOTTOM SECTION
Length: 60'4" HT N2D477-1 (GAGES)
Wall Thickness: 0.50
Driving Time: Start: 7:58 Finish: 8:01

2nd SECTION
Length: 60'3" (GAGES)
Total Length: 120'7"
Wall Thickness: 0.50
Driving Time: Start: 9:17 Finish: 9:56

3rd SECTION
Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

4th SECTION
Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

Cut-Off Elev.: —
Length Cut Off: —
Calc. Pile Length: —
Toe Elev.: 534.53'
Ground Elevation: 615.98'
Meas Length: 92'8"
Collapse: NONE
Sweep: Depth: 74 Dir: SE
Plum Dev.: 2 1/8" IN 10 FEET, SW
Allowable: -----
Align Dev.: -----
Allowable: -----
Boot Plate: 1" FLAT, 16.5" Ø
Remarks:

Technician: Charles J. Winter
Chk.: Date:

Remarks: Circled numbers refer to stroke setting, (V) indicates manual (continuously variable stroke and cadence) TWO WELDERS ON SPLICE
HEAD ROLL ON BOTTOM SECTION, CUT OFF 1 FOOT BEFORE ADDING SECTION 2
SWEEP STARTS at 6.5', 60's = OF LIGHT @ 78'

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PILE DRIVING RECORD

WKG

PROJECT: Marquette Interchange Replacement
WKG PROJECT NO.: 02032
DESIGNER: HNTB
CONTRACTOR: Marquette Constructors
PILE LOCATION: SLT-A-16P-5 (SE PILE)

DRIVING RESISTANCE

Ft.	Blows		Ft.	Blows		Ft.	Blows	
1	1	(V)	46	11 •		91	RESTRIKE @ 3:57pm (1)	
2	WOH		47	11		92	6/17/03 2-1/2"/12-1/8"	
3	1		48	11		93		
4	6		49	12		94		
5	4		50	11		95		
6	2		51	11		96		
7	4		52	7/7" 5	STOPPED 59 SHORT @ 2:59	97		
8	4		53	14		98		
9	15	(3)	54	13		99		
10	13		55	14		100		
11	11		56	8/6", 7	STOP FOR SPLICE	101		
12	8		57	20		102		
13	?		58	19		103		
14	13		59	19		104		
15	11		60	31		105		
16	14		61	24	(5)	106		
17	15		62	21		107		
18	16		63	22•		108		
19	10		64	6-6-5-6	3-INCH INCREMENTS	109		
20	11		65	5-5-5-5	•	110		
21	6	(4) •	66	5-5-4-4		111		
22	6		67	4-4-4-3		112		
23	5		68	3-3-3-4		113		
24	5		69	3-3-3-4		114		
25	5		70	3-3-4-3		115		
26	5		71	4-3-3-4		116		
27	6		72	4-3-4-4		117		
28	5		73	3-4-3-3		118		
29	5		74	3-3-4-3		119		
30	6		75	3-3-3-2		120		
31	6		76	3-3-2-3		121		
32	7		77	3-3-3-3		122		
33	6		78	4-3-5-6		123		
34	7		79	8-12-17-24		124		
35	7		80	25-20-21-19	(6)	125		
36	7		81	16-13-13-11	(7)	126		
37	9		82	8-8-7-7		127		
38	8		83	10-11-16-16		128		
39	8		84	14-21-8-8		129		
40	8		85	7-6-6-8		130		
41	9		86	7-8-12-12		131		
42	9		87	14-16-20-26		132		
43	10		88	31 (3 inches)		133		
44	10		89	RESTRIKE @ 5:10PM		134		
45	10		90	1/1/2", 7-7/8"	(6)	135		

GENERAL INFORMATION

Hammer: Juntan HHK-10A
Weight: 22.0 kips
Energy: variable
Pile: 16.0 O.D. ϕ 0.5" Wall Pipe Pile
Steel Grade: ASTM A252 Gr 3 (45 ksi)
Allowable Load: ----- Tons
Date Driven: 6-16-03
Pile No. in Cap: 1
Req'd Resist.: Variable

BOTTOM SECTION
Length: 61'6" (VERTICAL) HTS20199-63 GAGES
Wall Thickness: 0.5
Driving Time: Start: 12:47 Finish: 1:06

2nd SECTION
Length: 60'3" HTS20199-61 GAGES
Total Length: 121'9"
Wall Thickness: 0.5
Driving Time: Start: 2:18 Finish: 2:41

3rd SECTION
Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

4th SECTION
Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

Cut-Off Elev.: —
Length Cut Off: —
Calc. Pile Length: —
Toe Elev.: 529.21'
Ground Elevation: 616.60'
Meas. Length: 87' 2"
Collapse: NONE
Sweep: Depth: NONE* Dir:
Plum Dev.: 3 1/2" IN 10 FEET SE
Allowable: -----
Align Dev.: -----
Allowable: -----
Boot Plate: CONICAL TIP, 16.0" ϕ 15" VERT. HT.
Remarks:

Technician: Charles J. Winter
Chk.: Date:

Remarks: Circled numbers refer to stroke setting, (V) indicates Manual (continuously variable stroke and cadence). TWO WELDERS ON SPLICE

* SLIGHT SWEEP TO ESE, STARTS ~65', 1/3 TO 1/2 OF BOOT PLATE VISIBLE

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PILE DRIVING RECORD

WKG

PROJECT: Marquette Interchange Replacement — WKG PROJECT NO.: 02032
DESIGNER: HNTB — CONTRACTOR: Marquette Constructors
PILE LOCATION: SBT-B-12-1A

Ft.	Blows		Ft.	Blows		Ft.	Blows
1	WOH		46	6		91	5 6 5 6
2	↓		47	6		92	6 6 6 6
3	NEW		48	6		93	8 8 8 7
4	FILL		49	6		94	9 10 12 12
5			50	6		95	10 10 9 9
6			51	6		96	8 8 8 7
7			52	6		97	6 6 6 5
8	↓		53	5		98	5 5 6 5
9	1		54	5	STOP TO SPLICE	99	5 5 4 5
10	5		55	6		100	3 4 5 5
11	1		56	4/9"	4/3"	101	4 4 5 5
12	1		57	13		102	5 5 7 8
13	5		58	14		103	6 6 7 9
14	1		59	17		104	9 14
15	1		60	16		105	
16	1		61	16		106	1-DAY RESTRIKE
17	5		62	21 ?		107	06-13-03
18	1		63	13		108	07:20
19	1		64	12		109	2-1/8"
20	1		65	12		110	1-1/8"
21	1		66	11		111	1-1/8"
22	1		67	12		112	1-1/8"
23	2		68	12		113	GAGE MALFUNCTIONED
24	1		69	13		114	07:32
25	1		70	12		115	5-1/8"
26	1		71	10		116	
27	1		72	11		117	2½"-HR RESTRIKE
28	1		73	14		118	17:46
29	1		74	19		119	1-1/8"
30	1		75	18		120	1-1/4"
31	2		76	16		121	1-1/8"
32	2		77	16		122	1-1/8"
33	2		78	17		123	1-1/8"
34	2		79	24		124	1-1/8"
35	2		80	25		125	1-1/8"
36	1		81	34		126	
37	2		82	32		127	
38	2		83	26		128	
39	1		84	23		129	
40	3		85	22		130	
41	3		86	21		131	
42	6		87	21		132	
43	6		88	20		133	
44	6		89	21		134	
45	5		90	21		135	

GENERAL INFORMATION

Hammer: DELMAG D46-32
Weight: 10.1 K
Energy: VARIABLE
Pile: 12 3/4" Φ 0.375" Wall Pipe Pile
Steel Grade: ASTM 252 3 PHY
Allowable Load: ----- Tons
Date Driven: 6-12-03
Pile No. in Cap: 1 (NW COR)
Req'd Resist.: Variable

====== BOTTOM SECTION ======
Length: 60'-5" FUEL SET 2
Wall Thickness: 0.375"
Driving Time: Start: 1:37 Finish: 1:47

====== 2nd SECTION ======
Length: 60'-5" FUEL SET 1
Total Length: 120'-10"
Wall Thickness: 0.375
Driving Time: Start: 2:55 Finish: 3:15

====== 3rd SECTION ======
Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

====== 4th SECTION ======
Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

Cut-Off Elev.: —
Length Cut Off: —
Calc. Pile Length: —
Toe Elev.: 492.00
Ground Elevation: 596.01
Meas. Length: REACTION-FRAME HEIGHT: 113'-4"
Collapse: NO
Sweep: Depth: 88' Dir: ENE
Plum Dev.: 3/8" IN 10' NW
Allowable: -----
Align Dev.: -----
Allowable: -----
Boot Plate: 1" THICK, FLAT, 13¼" DIAM.
Remarks: SWEEP DAILY SLIGHT, COULD SEE GLOW OF LIGHT AT BOTTOM
Technician: ALAN B. WAGNER
Chk.: Date:

Remarks:

PILE DRIVING RECORD

WKG

PROJECT: Marquette Interchange Replacement — WKG PROJECT NO.: 02032
DESIGNER: HNTB — CONTRACTOR: Marquette Constructors
PILE LOCATION: SLT-B-12-2

DRIVING RESISTANCE

Ft.	Blows		Ft.	Blows		Ft.	Blows	
1	1		46	9		91	27	
2			47	8		92	31	
3	2		48	9		93	31	
4	1		49	10		94	36	
5	1		50	11		95	43	
6	1		51	10		96	11-12-10-11	3-INCH INCREMENTS
7	1		52	10		97	11-10-9-8	
8			53	10		98	7-6-6-6	
9	2		54	10		99	7-8-10-12	
10			55	9		100	11-13-12-10	
11	1		56	9	SPLICE	101	11-10-11-11	
12			57	16		102	13-13-13-12	
13	2		58	18		103	10-10-9-8	
14	2		59	21		104	7-8-7-6	
15	2		60	17		105	6-6-6-6	
16			61	17		106	8-10-12-15	
17	2		62	15		107	17-17-21-22	
18			63	15		108	24/3"	
19	1		64	14		109		
20	2		65	13		110	1-DAY RESTRIKE	FUEL #1
21	1		66	13		111	06-12-03	
22	2		67	13		112	07:25	
23	1		68	13		113	1-1/8"	
24	1		69	14		114	LAST TAKE	
25	2		70	14		115		
26	1		71	13		116		
27	1		72	16		117		
28	2		73	19		118		
29	2		74	23		119		
30	2		75	25		120		
31	2		76	26		121		
32	2		77	28		122		
33	3		78	34		123		
34	4		79	38		124		
35	6		80	56		125		
36	7		81	58		126		
37	6		82	82		127		
38	7		83	59		128		
39	6		84	47		129		
40	7		85	36		130		
41	7		86	32		131		
42	7		87	31		132		
43	7		88	28		133		
44	8		89	27		134		
45	8		90	26		135		

GENERAL INFORMATION

Hammer: DELMAG D46-32
Weight: 10.1 K
Energy: VARIABLE
Pile: 12 3/4 X 0.375" Wall Pipe Pile
Steel Grade: A252-GRADE 3
Allowable Load: ----- Tons
Date Driven: 06-11-03
Pile No. in Cap: THIRD
Req'd Resist.: Variable

====== BOTTOM SECTION ======
Length: 60'-6" FUEL SETTING #1
Wall Thickness: 0.375" GAGES
Driving Time: Start: 10:56 Finish: 11:08

====== 2nd SECTION ======
Length: 60'-5" FUEL SETTING #1
Total Length: 120'-11" GAGES
Wall Thickness: 0.375"
Driving Time: Start: 12:21 Finish: 12:58

====== 3rd SECTION ======
Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

====== 4th SECTION ======
Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

Cut-Off Elev.: —
Length Cut Off: —
Calc. Pile Length: —
Toe Elev.: 489.23
Ground Elevation: 596.47
Meas. Length: 116'-1½" (REACTION-FRAME HEIGHT)
Collapse: NONE
Sweep: Depth: 100' Dir: SE
Plum Dev.: 1" in 10 FEET SE
Allowable: -----
Align Dev.: -----
Allowable: -----
Boot Plate: 1" THICK, FLAT, 13¼" DIAM.
Remarks: SWEEP ONLY SLIGHT; CAN DIRECTLY SEE LIGHT @ BOTTOM
Technician: VAN E. KOMURKA
Chk.: Date:

Remarks:

H:/Templates/Piles/Pile Driving Record Template - Marquette.xls

PILE DRIVING RECORD

PROJECT: Marquette Interchange Replacement
DESIGNER: HNTB
PILE LOCATION: SLT-B-14 -35 (CTR)

WKG PROJECT NO.: 02032
CONTRACTOR: Marquette Constructors

DRIVING RESISTANCE

Ft.	Blows	Ft.	Blows	Ft.	Blows
1	1	46	7	91	16
2	1	47	8	92	17
3	2	48	8	93	17
4	6	49	8	94	17
5	3	50	8	95	15
6	1	51	7	96	13
7	1	52	8	97	14
8	1	53	8	98	15
9	1	54	8	99	15
10	1	55	7	100	13
11	1	56	7	101	15
12	1	57	14	102	17
13	1	58	18	103	16
14	1	59	14	104	16/6"
15	4	60	14	105	
16	5	61	13	106	
17	5	62	12	107	
18	4	63	13	108	
19	4	64	14	109	
20	3	65	11	110	
21	2	66	11	111	
22	1	67	12	112	
23	2	68	10	113	
24	2	69	11	114	
25	4	70	10	115	
26	5	71	12	116	
27	5	72	13	117	
28	5	73	15	118	
29	5	74	19	119	
30	5	75	17	120	
31	5	76	17	121	
32	4	77	19	122	
33	5	78	22	123	
34	6	79	20	124	
35	6	80	34	125	
36	5	81	33	126	
37	7	82	35	127	
38	6	83	38	128	
39	6	84	18	129	
40	7	85	16	130	
41	6	86	16	131	
42	7	87	15	132	
43	7	88	16	133	
44	1	89	18	134	
45	6	90	16	135	

STOP

GENERAL INFORMATION

Hammer: DELMAG D46-32
Weight: 10,1K
Energy: VARIABLE
Pile: 14" x 0.438" Wall Pipe Pile
Steel Grade: A252 - 3E
Allowable Load: ----- Tons
Date Driven: 6-12-03
Pile No. in Cap: 3
Req'd Resist.: Variable

BOTTOM SECTION
Length: 60' - 3 3/4" FUEL SET # 2
Wall Thickness: 0.438" GAGES
Driving Time: Start: 8:18 Finish: 8:28

2nd SECTION
Length: 60'-2 3/4" FUEL SET # 2
Total Length: 120' - 6 1/2" GAUGES
Wall Thickness: 0.438"
Driving Time: Start: 9:44 Finish: 10:02

3rd SECTION
Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

4th SECTION
Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

Cut-Off Elev.: —
Length Cut Off: —
Calc. Pile Length: —
Toe Elev.: 492.36
Ground Elevation: 595.85
Meas. Length: 105'-2 1/2"
Collapse: NONE
Sweep: Depth: 48' Dir: SE
Plum Dev.: 1 1/2" IN 10' ESE
Allowable: -----
Align Dev.: -----
Allowable: -----
Boot Plate: FLAT, 1" THICK, 19 1/2" DIAM.
Remarks:

Technician: ALAN. B. WAGNER
Chk.: Date:

Remarks: LOST DIRECT SIGHT OF LIGHT @ 66'.

H:\Templates\Files\Pile Driving Record Template - Marquette.xls

PILE DRIVING RECORD

WKG

PROJECT: Marquette Interchange Replacement — WKG PROJECT NO.: 02032
DESIGNER: HNTB — CONTRACTOR: Marquette Constructors
PILE LOCATION: SLT-B-16F-4

DRIVING RESISTANCE

Ft.	Blows		Ft.	Blows		Ft.	Blows	
1	WOH		46	6		91	15	
2	1		47	6		92	15	
3	1		48	6		93	12	
4	1		49	5		94	11	
5	2		50	6		95	12	
6	1		51	5		96	12	
7	1		52	5		97	13	
8	1		53	5		98	12	
9	1		54	6		99	11	
10	1		55	6		100	11	
11	1		56	5	SPLICE	101	11	
12	2		57	14		102	15	
13	2		58	15		103	23	
14	3		59	15		104	7-7-7-6	3-INCH INCREMENTS
15	3		60	13		105	6-6-5-6	
16	4		61	13		106	6-6-7-7	
17	3		62	11		107	8-11-13-14	
18	5		63	11		108	16-15-15-15	
19	5		64	11		109	19-23/6" TOTAL	
20	4		65	10		110		
21	4		66	9		111	3-HOUR RESTRIKE	FUEL #4
22	3		67	9		112	13:21	
23	3		68	10		113	4/1/2"	
24	4		69	11		114	3/1/4"	
25	4		70	13		115	4/1/4"	
26	4		71	15		116	4/1/4"	
27	4		72	14		117		
28	4		73	16		118	1-DAY RESTRIKE	
29	4		74	19		119	3-1/8"	FUEL #4
30	4		75	18		120	3-1/8"	06-12-03
31	5		76	22		121	4-1/8"	
32	4		77	22		122		
33	5		78	31		123		
34	4		79	20		124		
35	5		80	16		125		
36	4		81	14		126		
37	6		82	13		127		
38	4		83	13		128		
39	5		84	13		129		
40	6		85	13		130		
41	5		86	13		131		
42	6		87	13		132		
43	5		88	13		133		
44	6		89	13		134		
45	7		90	13		135		

GENERAL INFORMATION

Hammer: DELMAG D46-32
Weight: 10.1 K
Energy: VARIABLE
Pile: 16 x 0.500" Wall Pipe Pile
Steel Grade: A252 GRADE 3
Allowable Load: ----- Tons
Date Driven: 06-11-03
Pile No. in Cap: SECOND
Req'd Resist.: Variable

====== BOTTOM SECTION ======
Length: 60'-5" FUEL SETTING # 3
Wall Thickness: 0.500" GAGES
Driving Time: Start: 07:42 Finish: 07:48

====== 2nd SECTION ======
Length: 60'-3 1/2" FUEL SETTING # 3
Total Length: 120'-8 1/2" GAGES
Wall Thickness: 0.500"
Driving Time: Start: 09:23 Finish: 09:49

====== 3rd SECTION ======
Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

====== 4th SECTION ======
Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

Cut-Off Elev.: —
Length Cut Off: —
Calc. Pile Length: —
Toe Elev.: 486.27
Ground Elevation: 596.15
Meas. Length: 119'-1"
Collapse: NONE
Sweep: Depth: NONE Dir: —
Plum Dev.: 1/2" IN 10' SOUTH
Allowable: -----
Align Dev.: -----
Allowable: -----
Boot Plate: 1" THICK, FLAT, 16 1/2" DIAM.
Remarks:

Technician: VAN E. KOMUREK
Chk.: Date:

Remarks:

H:\Templates\Piles\Pile Driving Record Template - Marquette.xls

PILE DRIVING RECORD.

PROJECT: Marquette Interchange Replacement — WKG PROJECT NO.: 02032
DESIGNER: HNTB — CONTRACTOR: Marquette Constructors
PILE LOCATION: SLT-B-14 -66 (COMPANION PILE)

Ft.	Blows		Ft.	Blows		Ft.	Blows	
1	1		46	7		91	4 5 3 4	
2	1		47	7		92	4 4 4 4	
3	2		48	7		93	4 4 4 4	
4	1		49	8		94	4 4 4 4	
5	1		50	8		95	4 4 4 4	
6	1		51	9		96	4 4 4 3	
7	5		52	8		97	4 4 3 4	
8	3		53	8		98	4 4 3 4	
9	1		54	7		99	4 5 4 4	
10	1		55	8 STOP TO SPLICE		100	4 5 4 4	
11	1		56	7		101	4 5 4 4	
12	1		57	2/6" 6/6"		102	8 7 9 8	
13	5		58	12		103	10 10 9 9	
14	5		59	13		104	7 7 6 6	
15	5		60	13		105	6	
16	4		61	15		106		
17	4		62	12		107	1-DAY RESTRIKE	
18	4		63	12		108	04-13-03	
19	5		64	12		109	07:45	
20	6		65	12		110	2 - 1/8"	
21	2		66	11		111	2 - 1/8"	
22	2		67	12		112	2 - 1/8"	
23	2		68	11		113		
24	2		69	12		114	2½" RESTRIKE	
25	2		70	11		115	15:50	FUEL #2
26	1		71	11		116	2 - 1/8"	
27	4		72	14		117	2 - 1/8"	
28	1		73	21		118	2 - 1/8"	
29	4		74	19		119	2 - 1/4"	
30	2		75	18		120	2 - 3/8"	
31	4		76	16		121		
32	5		77	20		122		
33	4		78	17		123		
34	5		79	17		124		
35	4		80	17		125		
36	5		81	21		126		
37	5		82	21		127		
38	5		83	21		128		
39	5		84	18		129		
40	6		85	19		130		
41	5		86	18		131		
42	6		87	18		132		
43	6		88	17		133		
44	6		89	17		134		
45	7		90	15		135		

GENERAL INFORMATION

Hammer: DELMAG D 46-32
Weight: 10.1K
Energy: VARIABLE
Pile: 14" ϕ 0.500" Wall Pipe Pile
Steel Grade: A252 - 3E
Allowable Load: ----- Tons
Date Driven: 6-12-03
Pile No. in Cap: 6
Req'd Resist.: Variable

====== BOTTOM SECTION ======
Length: 60' - 4" FUEL SET 2
Wall Thickness: 0.500" GAGES
Driving Time: Start: 10:28 Finish: 10:36

====== 2nd SECTION ======
Length: 60' - 1½" FUEL SET 2
Total Length: 120' - 5½"
Wall Thickness: 0.50 GAGES
Driving Time: Start: 11:52 Finish: 12:11

====== 3rd SECTION ======
Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

====== 4th SECTION ======
Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

Cut-Off Elev.: —
Length Cut Off: —
Calc. Pile Length: —
Toe Elev.: 492.24
Ground Elevation: 596.62
Meas. Length: 107'-11"
Collapse: NONE
Sweep: Depth: 88' Dir: —
Plum Dev.: ⅛" IN 3' NW
Allowable: -----
Align Dev.: -----
Allowable: -----
Boot Plate: 1" THICK, FLAT, 14½" DIAM.
Remarks: SWEEP ONLY SLIGHT, COULD SEE GLOW OF LIGHT AT BOTTOM
Technician: ALAN B. WAGNER
Chk.: Date:

Remarks:

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PILE DRIVING RECORD

WKG

PROJECT: Marquette Interchange Replacement — WKG PROJECT NO.: 02032

DESIGNER: HNTB — CONTRACTOR: Marquette Constructors

PILE LOCATION: SLT-B-14-7C

Ft.	Blows		Ft.	Blows		Ft.	Blows
1	WOH		46	4		91	4-5-5-6
2			47	9		92	5-5-5-5
3	↓1		48	8		93	4-4-5-4
4	↓		49	8		94	5-5-5-4
5	↓3		50	8		95	5-4-4-4
6	↓		51	9		96	4-3-4-3
7			52	8		97	3-3-3-3
8			53	8		98	3-3-3-3
9	2		54	8		99	3-3-3-3
10			55	8		100	3-3-3-3
11	↓		56	8		101	
12			57	1/2" 18	SAME	102	NEX-DAY RESTRIKE
13	1		58	22		103	06-24-03
14	↓		59	18		104	FUEL SETTING #3
15	3		60	15		105	07:00
16	↓4		61	15		106	1-⅛"
17	↓		62	15		107	1-⅛"
18	1		63	13		108	1-⅛"
19	4		64	12		109	1-⅛"
20	3		65	14		110	1-⅛"
21	5		66	12		111	1-⅛"
22	5		67	11		112	1-⅛"
23	↓6		68	11		113	1-⅛"
24	↓		69	11		114	1-⅛"
25	↓8		70	11		115	
26	↓		71	11		116	
27	4		72	12		117	
28	5		73	15		118	
29	4		74	16		119	
30	5		75	16		120	
31	5		76	17		121	
32	5		77	18		122	
33	5		78	23		123	
34	5		79	25		124	
35	6		80	34		125	
36	5		81	10-10-10-7		126	
37	7		82	7-8-5-6		127	
38	6		83	6-6-5-5		128	
39	7		84	6-5-5-4		129	
40	6		85	5-5-4-5		130	
41	8		86	4-5-4-4		131	
42	7		87	4-4-4-4		132	
43	8		88	4-4-4-4		133	
44	8		89	4-3-4-4		134	
45	8		90	4-3-4-4		135	

GENERAL INFORMATION

Hammer: DELMAG D46-32
Weight: 10.1K
Energy: VARIABLE
Pile: 14 x 0.500" Wall Pipe Pile
Steel Grade: A252 GRADE 3 (45 Ksi)
Allowable Load: ----- Tons
Date Driven: 6-23-03 (M)
Pile No. in Cap: SEVENTH
Req'd Resist.: Variable

====== BOTTOM SECTION ======

Length: 60' 4" FUEL SETTING #2
Wall Thickness: 0.500" GABAS
Driving Time: Start: 3:32 Finish: 3:40

====== 2nd SECTION ======

Length: 60' 4" FUEL SETTING #2
Total Length: 120' 8"
Wall Thickness: 0.500" GABAS
Driving Time: Start: 5:03 Finish: 5:20

====== 3rd SECTION ======

Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

====== 4th SECTION ======

Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

Cut-Off Elev.: —
Length Cut Off: 16'-4"
Calc. Pile Length: 114'-4"
Toe Elev.: 495.78
Ground Elevation: 595.76
Meas. Length: 104'-2½"
Collapse: NONE
Sweep: Depth: NONE Dir: —
Plum Dev.: 2" IN 10' NORTH
Allowable: -----
Align Dev.: -----
Allowable: -----
Boot Plate: 1" THICK, FLAT, 14.5" O.D.
Remarks:

Technician: CHARLES J. WINTER
Chk.: Date:

Remarks:

H:\Templates\Piles\Pile Driving Record Template - Marquette.xls

PILE DRIVING RECORD

PROJECT: Marquette Interchange Replacement
DESIGNER: HNTB
PILE LOCATION: SLT-D-14-2
WKG PROJECT NO.: 02032
CONTRACTOR: Marquette Constructors

DRIVING RESISTANCE

Ft.	Blows		Ft.	Blows		Ft.	Blows	
1	7		46	4		91	15	
2	8		47	4		92	15	
3	9		48	3		93	14	
4	9		49	4		94	15	
5	11		50	5		95	16	
6	10		51	5		96	14	
7	9		52	4		97	16	
8	5		53	4		98	19	
9	4		54	4		99	18	
10	3		55	4		100	15	
11	1		56	3		101	15	
12	1		57	3/9"-2	SPLICE	102	13	
13	1		58	5		103	14	
14	1		59	5		104	13	
15	1		60	4		105	15	
16	4		61	4		106	29	
17	2		62	4		107	8-8-9-8	
18			63	4		108	7-12-12-12	
19	4		64	8		109	13-14-18-21	
20	2		65	12		110	20-25-24-21	
21			66	14		111	23-28-23-24	
22			67	10		112	21-19-20-16	
23	1		68	7		113	16-16-12-12	
24	1		69	7		114	12-10-12-11	
25	1		70	5		115	10-12-12-10	
26	1		71	6		116	15-15-14-18	
27	1		72	6		117		
28	1		73	6		118	2½-HOUR RETRIEVE	
29	1		74	6		119	FUEL SETTING #3	
30	1		75	6		120	15:49	
31	1		76	6		121	3-¼"	
32	1		77	6		122	2-¼"	
33	1		78	7		123	3-¼"	
34	1		79	6		124		
35	1		80	7		125		
36	1		81	7		126		
37	1		82	7		127		
38	1		83	8		128		
39	1		84	9		129		
40	2		85	8		130		
41	3		86	9/11"-4	SPLICE	131		
42	2		87	11		132		
43	4		88	15		133		
44	8		89	15		134		
45	3		90	15		135		

GENERAL INFORMATION

Hammer: DELMAG D46-32
Weight: 10.1 K
Energy: VARIABLE
Pile: 14x0.500" Wall Pipe Pile
Steel Grade: A252-3
Allowable Load: ----- Tons
Date Driven: 05-30-03
Pile No. in Cap: FOURTH
Req'd Resist.: Variable

BOTTOM SECTION
Length: 60'-3" FUEL SETTING #2
Wall Thickness: 0.500" NO GAGES
Driving Time: Start: 10:37 Finish: 10:45

2nd SECTION
Length: 30'-2" FUEL SETTING #2
Total Length: 90'-5" GAGES
Wall Thickness: 0.500" HT-801061-6
Driving Time: Start: 12:00 Finish: 12:05

3rd SECTION
Length: 60'-3" FUEL SETTING #2
Total Length: 150'-8" GAGES
Wall Thickness: 0.500" HT. 801060-5
Driving Time: Start: 12:54:30 Finish: 13:11:55

4th SECTION
Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

Cut-Off Elev.: —
Length Cut Off: —
Calc. Pile Length: —
Toe Elev.: 469.02
Ground Elevation: 585.49
Meas. Length: 120'-7½"
Collapse: No
Sweep: Depth: Dir: SE
Plum Dev.: 5/8" IN 10' NNW
Allowable: -----
Align Dev.: -----
Allowable: -----
Boot Plate: FLAT, 14.5" O.D., 1 INCH THICK
Remarks: AFTER MEASURING LENGTH, 5'-0¾" ADDED ON
Technician: VAN E. KOMUNKA / CJW
Chk.: Date:

Remarks: LOST DIRECT LINE OF SIGHT TO FLASHLIGHT 19'-4" FROM TOE.

H:\Templates\Plan\Pile Driving Record Template - Marquette.xls

PILE DRIVING RECORD

WKG²

PROJECT:	Marquette Interchange Replacement	WKG PROJECT NO.:	02032
DESIGNER:	HNTB	CONTRACTOR:	Marquette Constructors
PILE LOCATION:	SLT-D-12-6C (15 FEET CENTER-TO-CENTER EAST OF STATIC LOAD TEST PILE)		

DRIVING RESISTANCE

Ft.	Blows		Ft.	Blows		Ft.	Blows	
1	6		46	1		91	15	
2	4		47	1		92	15	
3	8		48	1		93	17	
4	9		49	2		94	22	
5	10		50	2		95	26	
6	12		51	3		96	33	
7	9		52	2		97	36	
8	7		53	2		98	38	
9	2		54	2		99	50	
10	1		55	2		100	43	
11	1		56	1/6" - 2	SPLICE	101	10-10-8-8	3-INCH INCREMENTS
12	↑		57	5		102	7-7-7-7	
13	2		58	5		103	7-6-7-7	
14	↓		59	3		104	6-7-7-8	
15	1		60	2		105	8-9-10-9	
16	1		61	2		106	10-14-26-22	
17	↑		62	2		107	17-21-22-28	
18	2		63	5		108	[illegible]	[illegible]
19	↓		64	10		109	57-60-50-53	[illegible]
20	1		65	18		110	56-57-59-56	[illegible]
21	1		66	17		111	46-51-51-54	FUEL #2 11:39
22	1		67	11		112	58-56-54-42	
23	1		68	8		113	38-28-19-16	
24	1		69	7		114		
25	1		70	7		115	2½-HR RESTRIKE	14:27
26	1		71	6		116	3	1/4-INCH
27	1		72	6		117	2	INCREMENTS
28	↑		73	6		118	3	
29	2		74	6		119	3	
30	↓		75	6		120	2	
31	1		76	6		121	3	
32	1		77	6		122	3	
33	↑		78	6		123		
34	2		79	6		124		
35	↓		80	6		125		
36	1		81	7		126		
37	1		82	7		127		
38	1		83	8		128		
39	1		84	8		129		
40	1		85	8		130		
41	2		86	10		131		
42	1		87	10		132		
43	1		88	11		133		
44	1		89	12		134		
45	1		90	13		135		

GENERAL INFORMATION

Hammer: DELMAG D46-32
Weight: 10.1 Kips
Energy: VARIABLE
Pile: 12 3/4 x 0.375 Wall Pipe Pile
Steel Grade: A252-3
Allowable Load: ----- Tons
Date Driven: 06-02-03
Pile No. in Cap: SIXTH
Req'd Resist.: Variable

====== BOTTOM SECTION ======
Length: 60'-4" FUEL SETTING #1
Wall Thickness: 0.375" NO GAGES
Driving Time: Start: 09:28 Finish: 09:37

====== 2nd SECTION ======
Length: 60'-4" FUEL SETTING #1+2
Total Length: 120'-8" GAGES
Wall Thickness: 0.375"
Driving Time: Start: 10:45 Finish: 11:52

====== 3rd SECTION ====== (crossed out)
Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

====== 4th SECTION ====== (crossed out)
Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

Cut-Off Elev.: —
Length Cut Off: —
Calc. Pile Length: —
Toe Elev.: 474.02
Ground Elevation: 585.48
Meas. Length: —
Collapse: —
Sweep: Depth: — Dir: —
Plum Dev.: —
Allowable: -----
Align Dev.: -----
Allowable: -----
Boot Plate: FLAT, 1"-THICK, 13 3/4-INCH Ø
Remarks: CONCRETED BEFORE INSPECTED
Technician: VAN E. KOMUREKA
Chk.: Date:

Remarks: AT FOOT 109: STOPPED FIRST TIME TO ADJUST GAGE; SECOND TIME TO REPLACE GAGE; 11:21 THIRD TIME TO CHECK CONNECTIONS. AT END OF FOOT 110: REPLACED GAGE

H:/Templates/Piles/Pile Driving Record Template - Marquette.xls

PILE DRIVING RECORD

WKG

PROJECT: Marquette Interchange Replacement
DESIGNER: HNTB
PILE LOCATION: SCT-E-12-1 (NW)

WKG PROJECT NO.: 02032
CONTRACTOR: Marquette Constructors

Ft.	Blows		Ft.	Blows		Ft.	Blows	
1	3	F.S.=1	46	9		91	12	
2	2		47	8		92	11	
3	4		48	8		93	11	
4	3		49	7		94	12	
5	2		50	8		95	11	
6	1		51	7		96	10	
7	4		52	7		97	10	
8	3		53	7		98	12	
9	3		54	7		99	12	
10	2		55	7		100	12	
11	1		56	7	SPLICE	101	3-4-4-5	
12	2		57	20		102	4-3-4-5	
13	1		58	14		103	3-4-3-3	
14	1		59	14		104	2-3-3-3	
15	1		60	14		105	2-3-3-3	
16	1		61	13		106	11	
17	2		62	14		107	17	
18	2		63	13		108	5-7-9-12	
19	2		64	12		109	9-12-16-18	
20	2		65	12		110	12/2"	
21	1		66	13		111		
22	1		67	13		112	Restrike @ 2:08 pm	
23	2		68	13		113	7/7/03 F.S.=2	
24	2		69	13		114	1-1/4", 1-1/4", 2-1/4", 3-1/4"	
25	2		70	14		115	3-1/4", 2-1/8" (1 3/8")	
26	2		71	13		116	total travel	
27	2		72	16		117		
28	2		73	15		118		
29	3		74	14		119		
30	3		75	14		120		
31	4		76	15		121		
32	4		77	16		122		
33	3		78	15		123		
34	3		79	16		124		
35	9		80	15		125		
36	13		81	19		126		
37	15		82	22		127		
38	18		83	17		128		
39	16		84	16		129		
40	14		85	15		130		
41	11		86	13		131		
42	9		87	14		132		
43	9		88	13		133		
44	8		89	12		134		
45	7		90	11		135		

GENERAL INFORMATION

Hammer: DELMAG D46-32
Weight: 10.1 K
Energy: VARIABLE
Pile: 12-75X0.375" Wall Pipe Pile
Steel Grade: ASTM A252 Gr 3 (45Ksi)
Allowable Load: ----- Tons
Date Driven: 7-7-03
Pile No. in Cap: 1
Req'd Resist.: Variable

BOTTOM SECTION
Length: 60'4" HT83804-1B
Wall Thickness: 0.375 GAGES
Driving Time: Start: 9:39 Finish: 9:54

2nd SECTION
Length: 60' 4" HT73457.11
Total Length: 120'8" - GAGES
Wall Thickness: 0.375
Driving Time: Start: 11:15 Finish: 11:35

3rd SECTION
Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

4th SECTION
Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

Cut-Off Elev.:
Length Cut Off:
Calc. Pile Length:
Toe Elev.: 499.73
Ground Elevation: 608.70
Meas. Length:
Collapse:
Sweep: Depth: Dir:
Plum Dev.:
Allowable: -----
Align Dev.: -----
Allowable: -----
Boot Plate:
Remarks:

Technician: Charles J. Winter
Chk.: Date:

Remarks:

H:\Templates\Piles\Pile Driving Record Template - Marquette.xls

PILE DRIVING RECORD

PROJECT: Marquette Interchange Replacement
DESIGNER: HNTB
PILE LOCATION: SLT-E-16P-2
WKG PROJECT NO.: 02032
CONTRACTOR: Marquette Constructors

DRIVING RESISTANCE

Ft.	Blows		Ft.	Blows		Ft.	Blows	
1	WOH		46	9		91	14	
2	1		47	10		92	15	
3	3		48	8		93	15	
4	1		49	8		94	15	
5	3	HAMMER RUNNING	50	7		95	14	
6	4		51	7		96	13	
7	4		52	6		97	13	
8	5		53	7		98	13	
9	5		54	8		99	14	
10	3+1		55	8		100	13	
11	4		56	8		101	13	
12	5		57	8	SPLICE	102	14	
13	6		58	17		103	12	
14	4		59	17		104	13	
15	4		60	18		105	14	
16	5		61	17		106	14	
17	3		62	17		107	13	
18	4		63	18		108	14	
19	3		64	18		109	17	
20	5		65	16		110	23	
21	5		66	16		111	19	
22	4		67	15		112	22	
23	5		68	17		113	21	
24	5		69	16		114	18	
25	5		70	15		115	17	
26	5		71	15		116	15	
27	6		72	15		117	13	
28	5		73	16		118	5/3"	SPLICE
29	5		74	17		119	07-08-03 DRIVING AT SPLICE	07:23
30	5		75	16		120	FUEL SETTING #2	
31	5		76	16		121	1-1/16"	
32	6		77	17		122	2-1/8"	ALL TRIP STROKES
33	6		78	16		123	2-1/8"	
34	8		79	17		124	1-5/8"	
35	11		80	16		125	1-1/8"	HAMMER RUNNING
36	13		81	17		126	1-1/4"	
37	15		82	15		127	1-1/4"	
38	14		83	16		128	1-1/8"	
39	13		84	16		129	1-1/4"	
40	11		85	16		130	1-1/8"	
41	11		86	16		131	1-1/4"	
42	9		87	16		132	1-1/8"	
43	8		88	14		133	1-1/4"	
44	9		89	14		134	1-1/8"	
45	9		90	15		135	1-1/8"	

GENERAL INFORMATION

Hammer: DELMAG D46-32
Weight: 10.1 K
Energy: VARIABLE
Pile: 16 X 0.500" Wall Pipe Pile
Steel Grade: A252 GRADE 3
Allowable Load: ----- Tons
Date Driven: 07-08-03
Pile No. in Cap: THIRD
Req'd Resist.: Variable

====== BOTTOM SECTION ======
Length: 61'-6" (STRAIGHT TO POINT)
Wall Thickness: 0.500" FUEL SETTING #2; 49 BLOWS
Driving Time: Start: 07:25 Finish: 07:35

====== 2nd SECTION ======
Length: 60'-3" HT520199-63 GAGED
Total Length: 121'-9"
Wall Thickness: 0.500"
Driving Time: Start: 9:10 Finish: 9:37

====== 3rd SECTION ======
Length: 21'-2"
Total Length: 142'-11"
Wall Thickness: 0.500"
Driving Time: Start: Finish:

~~====== 4th SECTION ======~~
~~Length:~~
~~Total Length:~~
~~Wall Thickness:~~
~~Driving Time: Start: Finish:~~

Cut-Off Elev.:
Length Cut Off:
Calc. Pile Length:
Toe Elev.: 490.98
Ground Elevation: 608.71
Meas. Length:
Collapse:
Sweep: Depth: Dir:
Plum Dev.:
Allowable: -----
Align Dev.: -----
Allowable: -----
Boot Plate: Conical tip
Remarks: RESTRIKE 9:17 AM 7/10/03 (R)
(3) 4-1/4", 7-1/4", 3-1/4", 4-1/8"
Technician: VAN E. KOMUSKA
Chk.: Date:

Remarks:
1-3/8"
1-1/4"
1-1/8
LOST TRACK OF SETS TOTAL SET = 4"

H:\Templates\Piles\Pile Driving Record Template - Marquette.xls

PILE DRIVING RECORD

WKG

PROJECT: Marquette Interchange Replacement
WKG PROJECT NO.: 02032
DESIGNER: HNTB
CONTRACTOR: Marquette Constructors
PILE LOCATION: SLT-E-14-35

DRIVING RESISTANCE

Ft.	Blows		Ft.	Blows		Ft.	Blows
1	1		46	8		91	12
2	1		47	9		92	12
3	2		48	8		93	12
4	2		49	7		94	12
5	8	DRIVEN BUNTED	50	6		95	15
6	7		51	7		96	13
7	7		52	7		97	14
8	7		53	6		98	12
9	7		54	6		99	12
10	7		55	7		100	15
11	5	DRIVEN STOPS	56	7	SPLICE	101	14
12	2		57	10		102	17
13	2		58	12		103	18
14	1		59	11		104	20
15	2		60	10		105	28
16	2		61	12		106	9-9-11
17	2		62	11		107	
18	2		63	11		108	
19	1		64	10		109	
20	2		65	10		110	
21	1		66	11		111	
22	2		67	11		112	
23	2		68	10		113	
24	2		69	11		114	
25	2		70	10		115	
26	2		71	11		116	
27	2		72	12		117	
28	2		73	11		118	
29	2		74	12		119	
30	2		75	11		120	
31	3		76	12		121	
32	2		77	13		122	
33	4		78	12		123	
34	5	HAMMER RUNNING	79	12		124	
35	6		80	12		125	
36	8		81	13		126	
37	14		82	16		127	
38	16		83	14		128	
39	15		84	13		129	
40	13		85	12		130	
41	11		86	14		131	
42	9		87	13		132	
43	8		88	12		133	
44	9		89	12		134	
45	9		90	12		135	

GENERAL INFORMATION

Hammer: DELMAG D46-32
Weight: 10.1 K
Energy: VARIABLE
Pile: 14 x 0.458 Wall Pipe Pile
Steel Grade: A252 GRADE 3
Allowable Load: ----- Tons
Date Driven: 07-09-03
Pile No. in Cap: FIFTH
Req'd Resist.: Variable

====== BOTTOM SECTION ======
Length: 60'-4" FUEL SETTING #1
Wall Thickness: 0.438" GAGES
Driving Time: Start: 13:22 Finish: 13:34

====== 2nd SECTION ======
Length: 60'-3" FUEL SETTING # 2
Total Length: 120'-7" GAGES
Wall Thickness: 0.438"
Driving Time: Start: 15:10 Finish: 15:25

====== 3rd SECTION ======
Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

====== 4th SECTION ======
Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

Cut-Off Elev.:
Length Cut Off:
Calc. Pile Length:
Toe Elev.: 502.47
Ground Elevation: 608.20
Meas. Length:
Collapse:
Sweep: Depth: Dir:
Plum Dev.:
Allowable: -----
Align Dev.: -----
Allowable: -----
Boot Plate: FLAT, 1" THICK, 14½" DIAM.
Remarks:

Technician: VAN E. KOMUNKA
Chk.: Date:

Remarks:

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PILE DRIVING RECORD

WKG

PROJECT: Marquette Interchange Replacement
DESIGNER: HNTB
WKG PROJECT NO.: 02032
CONTRACTOR: Marquette Constructors
LE LOCATION: SCT. E-12-4 (SW)

Ft.	Blows		Ft.	Blows		Ft.	Blows	
1	1	F.S.=1	46	9		91	9	
2	1		47	8		92	11	
3	↓		48	7		93	9	
4	2		49	7		94	10	
5	↓		50	7		95	11	
6	1		51	7		96	10	
7	↓		52	6		97	9	
8	2		53	7		98	10	
9	2		54	7		99	10	
10	3		55	6		100	9	
11	2		56	7	SPLICE	101	10	
12	2		57	17		102	11	
13	↓		58	16		103	11	
14	2		59	16		104	17	
15	2		60	15		105	21	
16	1		61	16		106	31	
17	2		62	13		107	12-12-16 (9 inches total)	
18	2		63	13		108		
19	2		64	12		109	Restrike @ 4:21 PM	
20	2		65	11		110	7/7/03 (M)	
21	1		66	12		111	2-1/4", 2-1/8", 2-1/4", 1-7/8"	
22	2		67	11		112	2-1/4", 1-1/8", 2-3/8"	
23	2		68	11		113	TOTAL THICKNESS = 17/8"	
24	1		69	12		114		
25	1		70	11		115		
26	1		71	12		116		
27	2		72	12		117		
28	2		73	11		118		
29	2		74	12		119		
30	2		75	12		120		
31	2		76	13		121		
32	2		77	13		122		
33	3		78	12		123		
34	3		79	12		124		
35	2		80	12		125		
36	2		81	13		126		
37	3		82	15		127		
38	9	↓	83	13		128		
39	12		84	13		129		
40	12		85	12		130		
41	12		86	12		131		
42	10		87	10		132		
43	8		88	11		133		
44	9		89	10		134		
45	9		90	11		135		

GENERAL INFORMATION

Hammer: DELMAG D46-32
Weight: 10.1 K
Energy: VARIABLE
Pile: 12.75 x 0.375 Wall Pipe Pile
Steel Grade: A252 Gr 3
Allowable Load: ----- Tons
Date Driven: 7-7-03 (M)
Pile No. in Cap: 2
Req'd Resist.: Variable

BOTTOM SECTION

Length: 60'5" HT83814-14 GAGES
Wall Thickness: 0.375
Driving Time: Start: 12:17 Finish: 12:28

2nd SECTION

Length: 60'4" HT83814-13 GAGES
Total Length: 120'9"
Wall Thickness: 0.375
Driving Time: Start: 1:35 Finish: 1:52

3rd SECTION

Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

4th SECTION

Length:
Total Length:
Wall Thickness:
Driving Time: Start: Finish:

Cut-Off Elev.:
Length Cut Off:
Calc. Pile Length:
Toe Elev.: 501.57
Ground Elevation: 608.32
Meas. Length:
Collapse:
Sweep: Depth: Dir:
Plum Dev.:
Allowable: -----
Align Dev.: -----
Allowable: -----
Boot Plate: 1" FLAT, 13.25" ϕ
Remarks:

Technician: Charles J. Winter
Chk.: Date:

Remarks:

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SOIL BORINGS

Milwaukee Transportation Partners

LOG OF TEST BORING

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Marquette Interchange		P1222-01

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
SES – Kevin Hargis	11 / 11 / 02 (mm dd yy)	11 / 15 / 02 (mm dd yy)	Mud Rotary

WI Unique Well No.	DNR Well ID No.	Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
			____ Feet MSL	618.19 Feet MSL	4"

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☐
State Plane 298658 N, 601211 E S/C/N | Lat__° __' ____"
____1/4 of ____1/4 of Section ____, T ____ N, R ____E/W | Long__° __' ____"

Local Grid Location ☐ N ☐ E ____Feet ☐ S ____Feet ☐ W

Facility ID	County	County Code	Civil Town/City/or Village
	Milwaukee	41	Milwaukee, WI

Sample Number and Type	Length Recovered (in.)	Blow Counts	Depth in Feet (below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength Lab Qu tsf bold	% Moisture Content	Liquid Limit	Plasticity Index	P 200 (% silt / clay)	Moist / Dry Weight (pcf)
				1" Bituminous Pavement										
1-2.5 SS-1	8	9	2	SILTY CLAY FILL – stiff, brown, moist, mix of sand, silt and clay	HF-CL-ML			0.0		13.5	21	8		
3.5-5 SS-2	5	17	4					0.0						
6-7.5 SS-3	NR	6	6	Rock in end of spoon				0.0						
8.5-10 SS-4	4	60/<1"	8	Yellow brick noted Silt seam 1" noted				0.0		16.9				
11-12.5 ST-5	11	ST	10	11.5'					.94	18.9				137.6/ 115.7
13.5-15 SS-6	14	6	12	SILTY CLAY – soft to medium stiff, gray, moist to wet, trace fine gravel, saturated silt seams, top 2" silty sand with shells	CL-ML			0.0	1.0	24.5	18	5		
16-17.5 SS-7	NR	7	14	Trace medium gravel				0.0						
18.5-20 SS-8	16	9	16					0.0	2.5					
			18											
			20											
			22											
23.5-25 ST-9	3	ST	24	Continued on page 2						19.1	27	13		

Facility/Project Name: **Marquette Interchange**
Boring Number **P1222-01**

Sample Number and Type	Length Recovered (in.)	Blow Counts	Depth in Feet (below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength Lab Qu is bold	% Moisture Content	Liquid Limit	Plasticity Index	P 200 (% silt / clay)	Moist / Dry Weight (pcf)
			26	SILTY CLAY - continued from page 1	CL-ML									
			28											
28.5-30 SS-10	2	10		Trace medium gravel, pushed rock in spoon				0.0		14.0				
			30											
			32											
33.5-35 SS-11	1	14	34	Trace medium, coars gravel				0.0						
			36											
			38	Trace fine gravel										
38.5-40 SS-12	6	16						0.0	.75	18.6				
			40											
			42											
43.5-45 SS-13	8	12	44	Trace shells, trace fine grained gravel				0.0						
			46											
			48											
48.5-50 SS-14	5	24						0.0		25.2				
			50											
			52											
53.5-55 ST-15	11	ST	54							12.2	24	11	85.0 (45.6/ 39.4)	149.0/ 132.8
			56											
			58	Continued on page 3										

Facility/Project Name: **Marquette Interchange**
Boring Number **P1222-01**

Sample Number and Type	Length Recovered (in.)	Blow Counts	Depth in Feet (below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength Lab Qu is bold	Soil Properties: % Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200 (% silt / clay)	Moist / Dry Weight (pcf)
			58	SILTY CLAY – continued from page 2	CL-ML									
58.5-60 SS-16	10	11	60					0.0						
			62											
63.5-65 SS-17	13	9	64	Increased fine sand noted				0.0	2.5	14.6				
			66											
			68											
68.5-70 SS-18	8	18	70	68.5' SILTY SAND – medium dense, gray, saturated, fine grained, some silt, trace clay	SM			0.0		16.6				
			72											
73.5-75 SS-19	10	34	74	73.5' SANDY SILT – dense, gray, wet, fine grained sand, trace clay noted	ML			0.0	1.0					
			76											
			78											
78.5-80 SS-20	12	25	80					0.0		17.4				
			82											
83.5-85 SS-21	10	29	84					0.0						
			86											
			88											
8.5-90 SS-22	12	21	90	2" silty clay in 88.5-90' spoon tip				0.0		20.7			43.4 (26.9/ 16.5)	
			92	Continued on page 4										

Facility/Project Name: **Marquette Interchange**
Boring Number **P1222-01**

Sample Number and Type	Length Recovered (in.)	Blow Counts	Depth in Feet (below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength Lab Qu is bold	Soil Properties: % Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200 (% silt / clay)	Moist / Dry Weight (pcf)
			92	SANDY SILT – continued from page 3	ML									
				92.0' SILTY SAND – medium dense, gray, saturated, fine grained, trace clay	SM									
93.5-95 SS-23	14	14	94					0.0						
			96											
			98											
98.5-100 SS-24	14	21	100	98.5' SILTY CLAY – very stiff, gray, moist, trace fine sand	CL-ML			0.0	4.5+	16.6				
			102											
103.5-105 ST-25	NR	ST	104											
			106											
			108											
108.5-110 SS-26	6	20	110	Wet @ 108.5-110', trace fine gravel noted				0.0						
			112	shelby tube attempted from 113.5-115'; snapped off in hole Abandoned hole. Moved 5' and blind drilled to 113.5' continued sampling										
113.5-115 SS-27	5	66	114	113.5' SILTY CLAY – hard, brown, moist to wet, trace coarse gravel	CL			0.0						
			116											
			118	118.5' SANDY SILT with Sand Seams mixed with silty clay – medium dense, gray, wet, coarse gravel, fine to medium grained sand	SM			0.0	1.5					
118.5-120 SS-28	10	25	120											
			122	123.5' CLAYEY SILT – dense, gray, moist, fine to medium, trace clay seam noted	CL-ML			0.0		20.5				
123.5-125 SS-29	8	32	124	Continued on page 5										
			126											

Facility/Project Name: **Marquette Interchange**
Boring Number **P1222-01**

Sample Number and Type	Length Recovered (in.)	Blow Counts	Depth in Feet (below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength Lab Qu is bold	Soil Properties: % Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200 (% silt / clay)	Moist / Dry Weight (pcf)
			128	CLAYEY SILT – continued from page 4	CL-ML									
128.5-130 SS-30	10	37	130	128.5' SILTY SAND – dense, gray, moist to wet, fine grained with some clay, trace fine to coarse gravel at 128.5 to 130'	SM			0.0	4.5+					
133.5-135 SS-31	10	33	134					0.0		18.8				
			136	136.0' Dolomite										
138.5-140 SS-32	10	60/5"	138	Tricore of Bedrock				0.0						
			140											
			142											
			144	143.8' Rock Core										164.4
			146											
			148											
			150											
			152											
			154	End of Boring @ 153.8' No Water Encountered NO Cave-in depth										

SLT B

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LOG OF TEST BORING

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Marquette Interchange		**P1123-01**

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
STS – Bill Zakowski	**10 / 28 / 02** (mm dd yy)	**11 / 01 / 02** (mm dd yy)	**Mud Rotary**

WI Unique Well No.	DNR Well ID No.	Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
			____ Feet MSL	596.15 Feet MSL	0-10'=6" and 10'-EOB 4"

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☐
State Plane 298442 N, 602279 E S/C/N | Lat ___° ___' ____"
____ 1/4 of ____ 1/4 of Section ____, T ____ N, R ____ E/W | Long ___° ___' ____"

Local Grid Location
☐ N ☐ E
____ Feet ☐ S ____ Feet ☐ W

Facility ID	County	County Code	Civil Town/City/or Village
	Milwaukee	**41**	**Milwaukee, WI**

Sample Number and Type	Length Recovered (in.)	Blow Counts	Depth in Feet (below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength Lab Qu is bold	% Moisture Content	Liquid Limit	Plasticity Index	P 200 (% silt / clay)	Moist/Dry Weight (pcf)
				2" TOPSOIL over brown SILTY SAND	OL									
1-2.5 SS-1	16	21	2	0.2' SILTY SAND FILL – medium dense, brown, dry to moist, fine to coarse grained, trace medium to coarse gravel, trace asphalt	HF-SM			0.0						
3.5-5 SS-2	13	17	4					0.0		4.0				
6-7.5 SS-3	14	20	6	trace pulverized concrete, trace brick fragments, trace fine to medium gravel				0.0						
8.5-10 SS-4	16	7	8 10	8.0' SILTY CLAY – soft, brown to gray, moist to damp	CL			0.0	<0.5	19.4				
11-13 ST-5	20	ST	12	ORGANIC CLAY – soft, black, moist 11.0' Loss on Ignition = 12.9%; Gs=2.435; e_o=3.779; Pc=2500 psf; Cc=1.45; Cs=NA	OL					127.7				75.1/ 33.0
				SILTY CLAY – soft, gray, moist 12.0'	CL					53.2				84.3/ 55.0
13.5-15 SS-6	18	12	14 16	13.0' SILTY SAND – medium dense, gray to brown, moist, little to some brown clayey silt, trace wood fibers, trace sea shell fragments	SM			0.0	<0.5					
16-17.5 SS-7	10	5	18	16.0' SILTY CLAY – soft to stiff, brown to grayish brown, moist, trace fine to coarse sand, trace fine to coarse sand and gravel	CL			0.0	1.7					
18.5-20 SS-8	18	7	20					0.0	2.2	18.7	26	12		
21-22.5 SS-9	18	10	22					0.0	3.75					
23.5-25 SS-10	18	11	24					0.0	1.5					
				Continued on page 2										

Facility/Project Name: **Marquette Interchange**
Boring Number **P1123-01**

Sample Number and Type	Length Recovered (in.)	Blow Counts	Depth in Feet (below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength Lab Qu is bold	Soil Properties: % Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200 (% silt / clay)	Moist / Dry Weight (pcf)
				SILTY CLAY continued from page 1	CL									
25-27 ST-11	20	ST	26							17.2				136.2/ 116.2
			28											
28.5-30 SS-12	18	11						0.0	3.75	16.8				
			30											
			32											
33.5-35 SS-13	18	19	34					0.0	3.25					
			36											
			38											
38.5-40 SS-14	18	20						0.0	2.25	11.8				
			40											
			42											
43.5-45 SS-15	13	26	44					0.0	3.5					
			46											
			48											
48.5-50 SS-16	18	10		Some wet silt, grayish brown				0.0	<0.5 ML, 2.7 CL	20.7				
			50											
			52											
53.5-55 SS-17	18	10	54					0.0	4.5	24.3				
			56											
			58											
58.5-60 SS-18	18	14						0.0	2.25					
			60											
				Continued on page 3										

Facility/Project Name: **Marquette Interchange**
Boring Number **P1121-01**

Sample Number and Type	Length Recovered (in.)	Blow Counts	Depth in Feet (below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength Lab Qu is bolded	Soil Properties: % Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200 (% silt / clay)	Moist / Dry Weight (pcf)
			62	SILTY CLAY from page 2	CL									
63.5-65 SS-19	18	11	64					0.0	3.25					
			66											
			68											
68.5-70 SS-20	18	28						0.0	4.5+					
			70											
			72											
73.5-75 SS-21	18	40	74					0.0	3.75	11.5				
75-75.5 SS-22	6	ST	76						4.5+	11.3	17	5		
			78											
78.5-80 SS-23	18	35		78.0' SANDY SILT with CLAY – dense, gray, wet, trace clay	ML			0.0		13.7				
			80											
			82	82.0' SILTY CLAY –hard, gray, moist to damp	CL									
83.5-85 SS-24	18	34	84					0.0	4.5+	19.7				
			86											
			88	Trace coarse sand, trace fine gravel noted										
88.5-90 SS-25	14	WOH	90					0.0	<0.1					
			92											
93.5-95 SS-26	16	4	94	93.5' SILTY SAND with CLAY – loose, gray, wet, trace to some clay	SM			0.0						
			96	Continued on page 4										

Facility/Project Name: **Marquette Interchange**
Boring Number **P1121-01**

Sample Number and Type	Length Recovered (in.)	Blow Counts	Depth in Feet (below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	FID/PID	Soil Properties: Compressive Strength Lab Qu in ksf/tsf	% Moisture Content	Liquid Limit	Plasticity Index	P 200 (% silt / clay)	Moist / Dry Weight (pcf)
			98	SILTY SAND with CLAY continued from page 3	SM									
				98.0'										
98.5-100 SS-27	16	28	100	SILTY SAND – medium dense, gray, wet, medium to coarse gravel, trace to some clay	SM			0.0						
			102											
			104	103.5'										
103.5-105 SS-28	18	63		SILTY CLAY – hard, gray, moist, trace medium gravel	CL			0.0						
			106											
				106.5'										
			108	SILTY SAND and GRAVEL – very dense, brown to gray, wet	SM-GW									
108.5-110 SS-29	2	50/3"	110					0.0		15.2				
			112											
113.5-115 SS-30	5	50/6"	114					0.0						
			116											
			118											
118.5-120 SS-31	2	50/3"	120	Gravel layer noted – dense, medium to coarse, some rock chips				0.0						
			122											
			124	123.0'										
123.5-125 SS-32	7	50/6"		SILTY CLAY – hard, gray, moist	CL			0.0						
			126	Trace to little sand, medium to coarse grained, trace fractured stone noted										
			128											
128.5-130 SS-33	18	46	130	Some sand, dense, gray, wet, fine to medium grained				0.0		10.1				
				Continued on page 5										

Facility/Project Name: **Marquette Interchange**
Boring Number **P1121-01**

Sample Number and Type	Length Recovered (in.)	Blow Counts	Depth in Feet (below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength Lab Qu is bolded	% Moisture Content	Liquid Limit	Plasticity Index	F 200 (% silt / clay)	Moist / Dry Weight (pcf)
			132	SILTY CLAY continued from page 4	CL									
133.5-135 SS-34	NR	72	134											
			136											
			138											
138.5-140 SS-35	17	38						0.0	2.75					
			140											
			142											
143.5-145 SS-36	18	19	144	Some silty sand noted from 143.5-145				0.0						
			146											
			148											
148.5-150 SS-37	18	17						0.0	2.75	19.3				
150-152 ST-38	20	ST	150	Gs=2.675; e_o=0.408; Pc=16900 psf; Cc=0.053; Cs=0.003					3.5 **2.19**	15.4	22	10		138.2/ 119.8
			152											
153.5-155 SS-39	18	20	154	Trace fine sand				0.0	2.5					
			156											
			158											
158.5-160 SS-40	18	25		Trace fine sand, trace fine gravel				0.0	3.0	13.5	19	8		
			160											
			162											
163.5-165 SS-41	18	38	164	Trace medium to coarse sand				0.0	3.75					
			166	Continued on page 6										

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LOG OF TEST BORING

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Marquette Interchange		P27ER-13

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
STS – Bill Zakowski	11 / 01 / 02 (mm dd yy)	11 / 08 / 02 (mm dd yy)	Mud Rotary

WI Unique Well No.	DNR Well ID No.	Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
			Feet MSL	585.06 Feet MSL	0'-10'=6", 10'-200'=4"

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☐
State Plane 296072 N, 602531 E S/C/N | Lat __° __' __"
__ 1/4 of __ 1/4 of Section __, T __ N, R __ E/W | Long __° __' __"

Local Grid Location ☐ N ☐ E __ Feet ☐ S __ Feet ☐ W

Facility ID	County	County Code	Civil Town/City/or Village
	Milwaukee	41	Milwaukee, WI

Sample Number and Type	Length Recovered (in.)	Blow Counts	Depth in Feet (below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength Lab Qu lb/sqft	Soil Properties: % Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200 (% silt / clay)	Moist / Dry Weight (pcf)
				CLAYEY SAND and GRAVEL FILL – black, coal dust	HF									
				1.0'										
1-2.5 SS-1	18	40	2	SILTY CLAY FILL with gravel – hard, moist, brown	HF-CL			0.0		5.8				
				3.0'										
3.5-5 SS-2	13	38	4	GRAVEL – dense, moist, brown, trace to little pulverized concrete, trace sand, trace asphalt, trace clay, fine to coarse grained Crushed limestone, dry to very moist	GW			0.0		6.0				
			6											
6-7.5 SS-3	18	30		6.0'				0.0		11.3			17.0 (15.2/ 1.8)	
			8	CRUSHED COAL – dense, black, damp to wet, fine grained, trace to little brown clayey silt, trace medium gravel, trace sand	HF									
8.5-10 SS-3	12	10						0.0						
			10											
				11.0'										
11-12.5 SS-4	12	2	12	ORGANIC CLAYEY SILT – soft, dark brown to black, damp, trace peat, trace shell fragments Loss On Ignition = 7.8%	OL			0.0	0.7	50.3				
			14											
13.5-15 ST	NR	--												
			16											
16-17.5 SS-6	NR	2												
			18											
18.5-20 SS-7	12	2		trace plant fibers Loss On Ignition = 5.0%				0.0	0.5	51.0	48	12		
			20											
20-22 ST-8	21	ST		Loss On Ignition = 4.9%					2.25	27.8 27.8				119.6/ 93.6 119.2/ 93.3
			22											
				SAND – loose, dark brown, wet, medium to coarse grained, trace silt 23.5'	SW									
			24											
23.5-25 SS-9	14	8		Continued on page 2				0.0		18.0				
			26											

Facility/Project Name: **Marquette Interchange**
Boring Number **P27ER-13**

Sample Number and Type	Length Recovered (in.)	Blow Counts	Depth in Feet (below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength Lab Qu lb/sqft	Soil Properties: % Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P-200 (% silt / clay)	Moist / Dry Weight (pcf)
			26 28	SAND continued from page 1	SW									
28.5-30 SS-10	18	3	30	28.5' ORGANIC SILTY CLAY – soft, greenish brown to dark brown, moist to wet, trace shell fragments Loss On Ignition = 12.0%	CL-OL			0.0	1.25	86.0	83	25		
			32											
33.5-35 SS-11	18	5	34					0.0	1.75					
			36 38											
38.5-40 SS-12	14	3	40					0.0	<0.5	60.7				
			42											
43.5-45 SS-13	18	3	44					0.0	1.2	46.0				
			46 48											
48.5-50 ST-14	16	ST	50							24.9				
50-52 SS-15	18	7	52	48.5' SILTY SAND – loose, gray, wet, fine to medium grained, trace fine gravel, trace clay	SM			0.0						
53.5-55 SS-16	18	5	54	53.5' ORGANIC SILTY CLAY – soft, greenish brown to black, wet, trace shell fragments Loss On Ignition = 4.6%	OL			0.0	1.2	29.2				
			56 58											
58.5-60 SS-17	18	3	60	58.5' SILTY SAND – loose, grayish brown, wet	SM			0.0		25.4			56.9 (47.9/9.0)	
				Continued on page 3										

Facility/Project Name: **Marquette Interchange**
Boring Number **P27ER-13**

Sample Number and Type	Length Recovered (in.)	Blow Counts	Depth in Feet (below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength Lab Qu in ksf	Soil Properties: % Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200 (% silt / clay)	Moist./ Dry Weight (pcf)
			62	SILTY SAND continued from page 2	SM									
63.5-65 SS-18	13	22	64					0.0						
			66											
			68	67.0' CLAYEY SILT – medium dense, gray, wet, little to some silty clay, some fine sand	ML-CL									
68.5-70 SS-19	18	21	70					0.0	2.5					
			72											
73.5-75 SS-20	18	17	74	73.5' SILTY CLAY – stiff to very stiff, gray, moist, trace gravel, saturated silt and sand seams	CL			0.0	3.5	12.4	20	8		
			76											
			78											
78.5-80 SS-21	14	21	80	Trace fine sand, trace medium gravel				0.0	4.25					
			82											
83.5-85 SS-22	18	23	84					0.0	1.0	15.0				
			86											
			88											
88.5-90 SS-23	18	21	90					0.0	4.0					
90-92 ST	10	ST		6" gravel seam					2.0	15.8				139.3/ 120.5
			92											
			94	93.5'										
93.5-95 SS-24	12	21		SANDY SILT with CLAY – medium dense, grayish brown, wet, trace to some clay	ML-SM			0.0						
			96											

Continued on page 4

Facility/Project Name: **Marquette Interchange**
Boring Number **P271R-20**

Sample Number and Type	Length Recovered (in.)	Blow Counts	Depth in Feet (below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength Lab Qu is bold	Soil Properties: % Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200 (% silt / clay)	Moist / Dry Weight (pcf)
			98	SANDY SILT with CLAY continued from page 3	ML-SM									
98.5-100 SS-26	18	14	100					0.0		14.2				
			102											
103.5-105 SS-27	18	44	104	103.5' SILTY CLAY – very stiff to hard, grayish brown, wet, some medium gravel, trace sand, medium grained seams	CL			0.0	1.7					
			106											
			108											
108.5-110 SS-28	14	31	110	sand seams from 108.5' to 115.0' – dense, grayish brown, wet, little medium gravel				0.0						
			112											
113.5-115 SS-29	10	50/6"	114	Little to some medium gravel				0.0		10.7				
			116											
			118											
118.5-120 SS-30	18	77	120					0.0	4.5+					
			122											
123.5-125 SS-31	18	73	124					0.0	4.5+	21.0				
			126											
			128											
128.5-130 SS-32	18	98	130	128.5' SILTY SAND with CLAY – very dense, gray, wet, trace medium to coarse sand, trace to little fine to coarse gravel	SM-SC			0.0						
				Continued on page 5										

Facility/Project Name: **Marquette Interchange**
Boring Number **P27ER-13**

Sample: Number and Type	Sample: Length Recovered (in.)	Blow Counts	Depth in Feet (below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength Lab Qu is bold	Soil Properties: % Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200 (% wt / dep)	Moist / Dry Weight (pcf)
			132	SILTY SAND with CLAY continued from page 4	SM-SC									
133.5-135 SS-33	18	70	134	fine to medium sand, trace to little clay from 133.5' to 133.9'				0.0	4.5+	13.5				
			136											
138.5-140 SS-34	18	85	138					0.0	4.5+					
				trace to little clay from 139.5' to 140.0'										
			140	140.0'										
			142	SILTY CLAY – hard, grayish brown, dry to moist, trace fine to coarse sand, trace medium gravel	CL									
143.5-145 SS-35	18	87	144					0.0	4.5+	16.7				
			146											
148.5-150 SS-36	18	84	148					0.0	4.5+					
			150											
			152											
153.5-155 SS-37	18	65	154					0.0						
				sand lense, dense, grayish brown, wet, medium grained, trace clay										
			156											
			158											
158.5-160 SS-38	18	30	160					0.0	4.5+	25.0				
			162											
			164											
163.5-165 SS-39	18	37						0.0	4.5+					
			166	Continued on page 6										

Facility/Project Name: **Marquette Interchange**
Boring Number **P27ER-13**

Sample Number and Type	Length Recovered (in.)	Blow Counts	Depth in Feet (below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength Lab Qu in ksf	Soil Properties: % Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200 (% silt / clay)	Moist / Dry Weight (pcf)
			166	SILTY CLAY continued from page 5	CL									
			168											
168.5-170 SS-40	18	36	170					0.0	3.25					
170-171.5 ST-41	6	ST		170.0' SILTY SAND – very dense, grayish brown, moist, fine to coarse grained, trace medium gravel, round to subround, clay layers noted	SM					31.1				
			172											
173.5-175 SS-42	18	69	174					0.0	4.5+	8.0	14	5		
			176											
			178											
178.5-180 SS-43	12	69/6"	180					0.0	4.5+					
			182											
183.5-185 SS-44	11	50/9"	184	Trace fractured rock, trace medium to coarse gravel, trace clay				0.0	4.5+					
			186											
			188											
188.5-190 SS-45	18	38	190	188.5' SILTY CLAY – hard, grayish brown, moist	CL			0.0	4.5+	25.0				
			192											
193.5-195 SS-46	18	34	194					0.0	4.5					
			196											
			198											
198.5-200 SS-47	18	69	200	Trace fractured rock				0.0	4.5+					
				End of Boring @ 200 feet below ground surface Water encountered @ 8.5 to 10 feet below grade Borehole abandoned with 110 gallons of sand – bentonite slurry and 2 bags of holeplug										

SLT E

Milwaukee Transportation Partners

LOG OF TEST BORING

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Marquette Interchange		**P1121-02**

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
SES – Steve Hunger	10 / 02 / 02 (mm dd yy)	10 / 10 / 02 (mm dd yy)	**Mud Rotary**

WI Unique Well No.	DNR Well ID No.	Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
			____ Feet MSL	608.17 Feet MSL	8"

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☐
State Plane 298271 N, 602928 E S/C/N | Lat__° __' ____"
____ 1/4 of ____ 1/4 of Section ____, T ____ N, R ____ E/W | Long__° __' ____"

Local Grid Location ☐ N ☐ E ____ Feet ☐ S ____ Feet ☐ W

Facility ID	County	County Code	Civil Town/City/or Village
	Milwaukee	**41**	**Milwaukee, WI**

Sample Number and Type	Length Recovered (in.)	Blow Counts	Depth in Feet (below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength Lab Qu is bold	% Moisture Content	Liquid Limit	Plasticity Index	P 200 (% silt / clay)	Moist / Dry Weight (pcf)
				13" TOPSOIL	OL									
1-2.5 SS-1	8	15	2	1.1' SILTY CLAY with SAND FILL – medium stiff to stiff, brown and black, moist, fine to medium grained, gravel	HF-CL			0.0		8.2				
3.5-5 SS-2	10	15	4	3.0' SILTY SAND FILL – medium dense, reddish brown to brown, moist, trace to some fine to medium gravel	HF-SM			0.0		6.1				
6-7.5 SS-3	12	19	6					0.0						
8.5-10 SS-4	18	15	8	8.0' SILTY CLAY – stiff to very stiff, grayish-brown, moist, trace fine sand, silt seams	CL			0.0		14.4				
11-12.5 SS-5	18	17	10					0.0	2.7					
13.5-15 SS-6	18	13	12					0.0	2.5	14.8	26	13		
16-17.5 SS-7	18	15	14	With occasional silt seams				0.0	3.2					
17.5-18.5 ST	15	ST	16	Black organic clay noted; Gs=2.72; e_o=0.478; Pc=2720psf Cc=0.056; Cs=0.001					.51	18.3				136.6/ 112.1
18.5-20 SS-8	18	14	18					0.0	2.6					
21-22.5 SS-9	18	16	20	Saturated sand and silt seams noted 21' to 30'				0.0	4.0					
23.5-25 SS-10	18	11	22					0.0	3.25	14.6				
			24	Continued on page 2										
			26											

Facility/Project Name: **Marquette Interchange**
Boring Number **P1121-02**

Sample Number and Type	Length Recovered (in.)	Blow Counts	Depth in Feet (below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	FID/PID	Soil Properties: Compressive Strength Lab Qu in ksf	Soil Properties: % Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200 (% silt / clay)	Moist / Dry Weight (pcf)
			26	SILTY CLAY continued from page 1	CL									
27.5-28.5 ST	12	ST	28							15.4				141.2/ 122.4
28.5-30 SS-11	14	15	30					0.0	2.5					
			32											
				32.0' SILTY SAND – medium dense, gray, wet, fine grained	SM									
33.5-35 SS-12	12	20	34					0.0		20.1			36.3	
			36											
			38											
				38.0' CLAYEY SILT with SAND – medium dense, gray, moist to wet, some very fine sand, trace clay	ML									
38.5-40 SS-13	18	12	40					0.0		17.2			69.5 (59.9/ 9.6)	
			42											
				42.0' SILTY SAND – medium dense, grayish brown, saturated, very fine grained	SM									
43.5-45 SS-14	12	16	44					0.0						
			46											
			48											
				48.0' CLAYEY SILT – medium dense, grayish brown, moist to wet, trace very fine sand	ML									
48.5-50 SS-15	16	18	50					0.0	2.5	16.2				
			52											
				51.0' SILTY CLAY – very stiff, grayish brown, moist, trace fine sand	CL									
53.5-55 SS-16	18	20	54					0.0	2.75	14.8				
			56											
			58											
58.5-60 SS-17	18	26	60					0.0	3.1					
				Continued on Page 3										

Facility/Project Name: **Marquette Interchange**
Boring Number **P1121-02**

Sample Number and Type	Length Recovered (in.)	Blow Counts	Depth in Feet (below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength Lab Qu is bold	% Moisture Content	Liquid Limit	Plasticity Index	P 200 (% silt / clay)	Moist / Dry Weight (pcf)
			60	SILTY CLAY continued from page 2	CL									
			62											
63.5-65 SS-18	12	16	64	With some silt layers				0.0	2.5					
			66											
67.5-68.5 ST	12	ST	68	Gs=2.647; e_o=0.422; Pc=8000 psf; Cc=0.066; Cs=0.004					**1.68**	17.1				137.8/ 117.7
68.5-70 SS-19	16	22						0.0	3.5	16.8	24	11		
			70											
			72											
73.5-75 SS-20	18	24	74					0.0	3.1					
			76											
			78											
78.5-80 SS-21	16	28						0.0	4.0					
			80											
			82											
83.5-85 SS-22	14	24	84					0.0		16.6				
				84.5' CLAYEY SILT – medium dense, gray, wet, trace gravel	CL-ML									
			86	86.0' SILTY SAND with GRAVEL SEAMS – medium dense, gray, moist to wet, medium grained	SM									
			88											
88.5-90 SS-23	10	24						0.0						
			90											
			92											
				92.0' CLAYEY SILT – medium dense, grayish brown, moist to wet, some clay layers	ML									
			94											
				Continued on Page 4										

Facility/Project Name: **Marquette Interchange**
Boring Number **P1121-02**

Sample Number and Type	Length Recovered (in.)	Blow Counts	Depth in Feet (below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength Lab Qu is bold	% Moisture Content	Liquid Limit	Plasticity Index	P 200 (% silt / clay)	Moist / Dry Weight (pcf)
			94	CLAYEY SILT continued from page 3	ML									
93.5-95 SS-24	14	14						0.0		16.6			61.2 (51.6/ 9.6)	
			96											
			98											
98.5-100 SS-25	12	12		With higher clay content				0.0						
			100											
			102	101.0' CLAYEY GRAVEL with SAND – dense, gray, wet, fine to medium grained, trace to some silt, - till	GC-SC									
103.5-105 SS-26	5	68	104					0.0	4.5+					
			106	106.0' SAND – dense to very dense, gray, wet, fine to medium grained, trace to some silt	SP									
			108											
108.5-110 SS-27	14	41	110					0.0		19.3				
			112											
113.5-115 SS-28	12	85	114					0.0						
			116											
			118											
118.5-120 SS-29	6	37	120					0.0						
			122	122.0' SILTY SAND – medium dense to dense, grayish-brown, wet, fine to medium grained, trace to some clay	SM									
123.5-125 SS-30	8	15	124					0.0		14.3			45.1	
			126											
				Continued on Page 5										

Facility/Project Name: **Marquette Interchange**
Boring Number **P1121-02**

Sample Number and Type	Length Recovered (in.)	Blow Counts	Depth in Feet (below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength Lab Qu is bolded	% Moisture Content	Liquid Limit	Plasticity Index	P 200 (% silt / clay)	Moist / Dry Weight (pcf)
			126	SILTY SAND continued from page 5	SM									
			128											
128.5-130 SS-31	14	95	130					0.0						
			132											
133.5-135 SS-32	12	12	134	More gravel				0.0						
			136											
			138											
138.5-140 SS-33	1	60/1"	140	Drilled through dolomite boulder 140' to 140.9'				0.0						
			142	141.0' CLAYEY SILT with SAND – dense, brownish gray, wet, fine grained sand	ML									
143.5-145 SS-34	10	25	144					0.0		13.7				
			146											
			148	148.0'										
148.5-150 SS-35	12	72	150	SAND – very dense, gray, moist, fine to medium grained, trace silt	SP			0.0		16.2				
			152											
153.5-155 SS-36	14	99	154	wet				0.0		14.4				
			156											
			158											
158.5-160 SS-37	12	92	160					0.0						
				Continued on Page 6										

Facility/Project Name: **Marquette Interchange**
Boring Number **P1121-02**

Sample Number and Type	Length Recovered (in.)	Blow Counts	Depth in Feet (below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength Lab Qu is bold	Soil Properties: % Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200 (% silt / clay)	Moist / Dry Weight (pcf)
			160	SAND continued from page 5	SP									
			162											
				163.0'										
163.5-165 SS-38	12	76	164	SILTY CLAY – hard, gray, moist	CL			0.0	4.5+					
			166											
167.5-165.5 ST	12	ST	168	Gs=2.653; e_o=0.678; Pc=18300 psf; Cc=0.098; Cs=0.012						23.5				123.6/ 100.1
				168.5'										
168.5-170 SS-39	12	52/4"	170	GRAVELLY SAND with SILT – very dense, gray, moist to wet	SW			0.0						
			172											
				172.5'										
173.5-175 SS-40	10	58/6"	174	SILTY SAND – very dense, gray, moist, fine grained, some gravel, some clay lenses	SM			0.0						
				174.5'										
			176	SILTY CLAY – hard, brownish gray, moist, trace silt	CL									
			178											
178.5-180 SS-41	12	64	180					0.0	4.5+	22.4				
			182											
183.5-185 SS-42	16	55	184	Trace medium sand				0.0	4.5+					
			186											
			188											
188.5-190 SS-43	18	44	190					0.0	4.5+					
			192											
				Continued on page 7										

Facility/Project Name: **Marquette Interchange**
Boring Number **P1121-02**

Sample Number and Type	Length Recovered	Blow Counts	Depth in Feet (below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength Lab Qu in ksf	Soil Properties: % Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200 (% silt / clay)	Moist / Dry Weight (pcf)
			192	SILTY CLAY continued from page 6	CL									
193.5-195 SS-44	18	65	194					0.0	4.5+	20.0	42	23		
			196											
			198											
198.5-200 SS-45	16	103	200					0.0	4.5+					
			202											
202.5-203.5 ST	5	ST		Gs=2.693; e_o=0.441; Pc=23000 psf; Cc=0.030; Cs=0.006						18.7				126.0/ 114.6
203.5-205 SS-46	18	84	204					0.0	4.5+					
			206											
			208	207.0' SANDY CLAY with GRAVEL – hard, gray, moist, medium grained sand	CL									
208.5-210 SS-47	1	100/5"	210											
			212											
213.5-215 SS-48	2	100/5"	214	With angular rock fragments										
			216	216.0' Dolomite rock core 216' to 226'										166.2
			218											
			220											
			224											
			226	End of Boring @ 226 feet below grade No water encountered No Cave-in depth										

REDUCED DATA

PPV = Peak Particle Velocity
LP = Pile Penetration
VTOE = Estimated Pile Toe Velocity
FT1 = Force at first force peak after impact
FMX = Maximum force in record
VT1 = Velocity at first velocity peak after impact
VT2 = Velocity at time 2L/c after impact
VMX = Maximum velocity in record
EMX = Maximum energy transferred to the pile top
RTL = Total resistance calculated in pile
DMX = Maximum displacement near pile top
STK = Calculated hammer stroke height for diesel hammers only.

SLT-A-16-4: Second Section

Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
1:44:10 AM	104.167	0.388	0.0931	18	0.265	18	0.171	17	0.269	0.00116	112	100	0.094	77.22	40	
1:44:25 AM	104.417	0.388	0.0975	20	0.264	18	0.196	16	0.271	0.00138	114	100	0.094	76.80	40	
1:44:40 AM	104.667	0.389	0.0969	20	0.223	16	0.195	16	0.24	0.0016	115	100	0.095	76.42	40	
1:44:55 AM	104.917	0.389	0.0956	20	0.214	16	0.193	17	0.231	0.00167	115	100	0.094	76.05	40	
1:45:10 AM	105.167	0.389	0.0938	21	0.211	16	0.19	16	0.232	0.00138	114	100	0.093	75.76	40	
1:45:25 AM	105.417	0.389	0.0894	22	0.208	17	0.188	16	0.236	0.00145	114	100	0.096	75.49	40	
1:45:40 AM	105.667	0.389	0.0938	21	0.211	17	0.193	16	0.248	0.00138	114	100	0.098	75.22	40	
1:45:55 AM	105.917	0.389	0.0906	21	0.214	18	0.191	15	0.25	0.00145	114	100	0.097	75.03	40	
1:46:10 AM	106.167	0.390	0.0919	21	0.216	17	0.181	14	0.251	0.0016	115	100	0.095	74.88	40	
1:46:25 AM	106.417	0.390	0.0925	20	0.203	18	0.176	14	0.24	0.00145	114	100	0.095	74.73	40	
1:46:40 AM	106.667	0.390	0.0931	22	0.199	18	0.178	14	0.237	0.00131	113	100	0.095	74.58	40	
1:46:55 AM	106.917	0.390	0.101	21	0.193	18	0.176	14	0.23	0.00138	114	100	0.094	74.43	40	
1:47:10 AM	107.167	0.390	0.101	21	0.192	17	0.177	14	0.229	0.00152	114	100	0.097	74.28	40	
1:47:25 AM	107.417	0.390	0.111	21	0.2	17	0.183	15	0.236	0.00145	114	100	0.099	74.14	40	
1:47:40 AM	107.667	0.391	0.115	21	0.201	17	0.181	14	0.239	0.0016	115	100	0.098	74.00	40	
1:47:55 AM	107.917	0.391	0.113	22	0.198	17	0.179	14	0.234	0.00138	114	100	0.098	73.87	40	
1:48:10 AM	108.167	0.391	0.115	22	0.189	17	0.177	14	0.225	0.00196	117	100	0.096	73.76	40	
1:48:25 AM	108.417	0.391	0.116	22	0.186	17	0.173	14	0.222	0.00196	117	100	0.096	73.66	40	
1:48:40 AM	108.667	0.391	0.115	22	0.182	17	0.174	14	0.22	0.00174	116	100	0.095	73.55	40	
1:48:55 AM	108.917	0.391	0.122	23	0.184	17	0.176	14	0.222	0.00189	116	100	0.095	73.45	40	
1:49:10 AM	109.167	0.392	0.124	23	0.183	17	0.175	14	0.219	0.00174	116	100	0.096	73.35	40	
1:49:25 AM	109.417	0.392	0.123	23	0.182	17	0.174	14	0.22	0.00167	115	100	0.096	73.25	40	
1:49:40 AM	109.667	0.392	0.123	23	0.183	17	0.178	14	0.22	0.00174	116	100	0.094	73.14	40	
1:49:55 AM	109.917	0.392	0.124	23	0.183	17	0.178	14	0.22	0.0016	115	100	0.093	73.04	40	
1:50:10 AM	110.167	0.392	0.115	23	0.183	17	0.174	14	0.215	0.00181	116	100	0.093	72.95	40	
1:50:25 AM	110.417	0.393	0.118	22	0.181	16	0.168	14	0.213	0.00174	116	100	0.092	72.85	40	
1:50:40 AM	110.667	0.393	0.113	23	0.178	17	0.169	14	0.212	0.00218	118	100	0.093	72.76	40	
1:50:55 AM	110.917	0.393	0.116	23	0.181	17	0.173	14	0.213	0.00196	117	100	0.093	72.66	40	
1:51:10 AM	111.167	0.393	0.119	23	0.181	17	0.171	14	0.215	0.00225	118	100	0.098	72.57	40	
1:51:25 AM	111.417	0.393	0.134	22	0.199	17	0.19	14	0.231	0.00247	119	100	0.100	72.49	40	
1:51:40 AM	111.667	0.393	0.141	22	0.196	17	0.191	14	0.232	0.00232	118	100	0.100	72.41	40	
1:51:55 AM	111.917	0.394	0.144	23	0.199	17	0.196	14	0.242	0.00283	120	100	0.100	72.34	40	
1:52:10 AM	112.167	0.394	0.146	23	0.196	16	0.199	14	0.246	0.00138	114	100	0.100	72.28	40	
1:52:25 AM	112.417	0.394	0.15	23	0.194	16	0.199	14	0.245	0.00145	114	100	0.100	72.22	40	
1:52:40 AM	112.667	0.394	0.151	23	0.194	17	0.199	15	0.244	0.00138	114	100	0.100	72.16	40	
1:52:55 AM	112.917	0.394	0.158	24	0.194	17	0.198	15	0.25	0.00152	114	100	0.099	72.10	40	
1:53:10 AM	113.167	0.394	0.16	23	0.195	16	0.199	15	0.249	0.00145	114	100	0.099	72.04	40	
1:53:25 AM	113.417	0.395	0.159	24	0.194	16	0.196	15	0.251	0.00138	114	100	0.098	71.98	40	
1:53:40 AM	113.667	0.395	0.163	24	0.189	16	0.195	15	0.247	0.00152	114	100	0.098	71.93	40	
1:53:55 AM	113.917	0.395	0.164	26	0.19	17	0.195	15	0.248	0.00138	114	100	0.098	71.88	40	
1:54:10 AM	114.167	0.395	0.165	24	0.19	17	0.194	15	0.245	0.00145	114	100	0.097	71.83	40	
1:54:25 AM	114.417	0.395	0.166	24	0.187	17	0.195	15	0.243	0.00138	114	85	0.097	71.78	40	
1:54:40 AM	114.667	0.395	0.169	26	0.184	17	0.195	15	0.242	0.00131	113	100	0.097	71.72	40	
1:54:55 AM	114.917	0.396	0.171	26	0.186	17	0.195	15	0.243	0.00145	114	100	0.096	71.67	40	
1:55:10 AM	115.167	0.396	0.174	26	0.181	17	0.195	15	0.242	0.00152	114	100	0.097	71.61	40	

SLT-A-16-4:

Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
1:44:10 AM	67.65	15.75	54.55	14.52	589.93	591.80	13.25	7.49	13.25	40.71	535.07	1.28	3.86	1.05	0.03
1:44:25 AM	68.04	30.64	55.04	15.31	585.07	587.50	13.25	8.27	13.25	41.33	495.64	1.34	4.25	1.06	0.03
1:44:40 AM	68.40	45.78	55.48	15.73	587.71	590.36	13.33	8.66	13.33	42.07	483.57	1.37	4.40	1.08	0.03
1:44:55 AM	68.75	60.78	55.92	15.75	585.79	586.50	13.24	8.65	13.24	41.49	476.64	1.35	4.33	1.07	0.03
1:45:10 AM	69.03	75.66	56.26	15.64	586.57	586.71	13.26	8.50	13.26	41.51	483.00	1.35	4.24	1.06	0.02
1:45:25 AM	69.29	90.61	56.58	16.00	601.36	603.21	13.69	8.59	13.69	44.07	501.07	1.39	4.29	1.07	0.02
1:45:40 AM	69.55	105.64	56.90	16.26	616.71	618.14	14.09	8.60	14.09	46.44	522.07	1.42	4.34	1.07	0.02
1:45:55 AM	69.73	120.53	57.12	15.89	612.79	614.21	13.97	8.19	13.97	45.65	529.29	1.41	4.25	1.06	0.01
1:46:10 AM	69.88	136.23	57.30	15.60	610.13	616.13	13.87	7.88	13.87	44.42	534.73	1.35	4.12	1.05	0.01
1:46:25 AM	70.03	151.01	57.48	15.37	608.29	621.36	13.83	7.62	13.83	44.39	541.21	1.35	4.18	1.06	0.01
1:46:40 AM	70.17	165.75	57.66	15.34	609.43	625.93	13.85	7.56	13.85	44.53	544.86	1.35	4.16	1.05	0.01
1:46:55 AM	70.32	181.51	57.84	15.19	604.93	627.00	13.71	7.47	13.71	43.78	540.93	1.33	4.14	1.05	0.01
1:47:10 AM	70.47	195.78	58.01	15.67	627.00	643.08	14.22	7.67	14.22	47.03	563.77	1.38	4.55	1.10	0.01
1:47:25 AM	70.60	211.40	58.18	15.77	635.64	649.57	14.44	7.64	14.44	48.61	578.14	1.41	4.71	1.12	0.01
1:47:40 AM	70.74	225.87	58.34	15.61	635.08	647.92	14.35	7.49	14.35	47.96	580.00	1.40	4.69	1.11	0.01
1:47:55 AM	70.86	241.53	58.49	15.58	634.64	651.36	14.46	7.44	14.46	48.63	586.07	1.41	4.74	1.12	0.01
1:48:10 AM	70.97	255.95	58.62	15.19	620.62	643.77	14.18	7.21	14.18	46.87	576.62	1.38	4.65	1.11	0.01
1:48:25 AM	71.08	271.41	58.75	14.85	613.57	641.21	14.06	6.93	14.06	46.16	579.00	1.36	4.61	1.10	0.01
1:48:40 AM	71.18	285.75	58.87	14.79	611.38	640.54	13.98	6.87	13.98	45.49	575.85	1.34	4.60	1.10	0.01
1:48:55 AM	71.28	301.24	59.00	14.78	610.86	645.36	14.06	6.85	14.06	46.20	579.71	1.36	4.63	1.11	0.01
1:49:10 AM	71.38	315.62	59.12	15.00	615.46	650.77	14.22	6.99	14.22	46.84	581.38	1.36	4.63	1.11	0.01
1:49:25 AM	71.48	331.11	59.24	15.10	617.36	650.21	14.15	7.11	14.15	46.86	576.21	1.37	4.63	1.11	0.01
1:49:40 AM	71.58	346.50	59.36	14.88	606.71	638.00	13.88	7.01	13.88	45.09	563.21	1.34	4.57	1.10	0.01
1:49:55 AM	71.68	360.78	59.48	14.69	595.38	634.77	13.75	7.00	13.75	44.62	554.62	1.33	4.56	1.10	0.01
1:50:10 AM	71.78	376.10	59.60	14.67	593.79	632.07	13.73	6.99	13.73	44.31	553.07	1.33	4.52	1.09	0.01
1:50:25 AM	71.87	391.40	59.71	14.64	591.86	630.86	13.69	6.96	13.69	44.07	550.21	1.32	4.51	1.09	0.01
1:50:40 AM	71.97	405.66	59.83	14.73	594.00	634.38	13.75	7.04	13.75	44.54	551.62	1.33	4.54	1.10	0.01
1:50:55 AM	72.06	421.03	59.94	14.62	599.00	635.29	13.74	6.88	13.74	44.48	560.79	1.32	4.55	1.10	0.01
1:51:10 AM	72.15	435.59	60.05	15.31	638.42	666.92	14.53	7.05	14.53	49.51	604.33	1.39	5.65	1.21	0.01
1:51:25 AM	72.23	450.82	60.15	15.62	657.50	685.75	14.93	7.08	14.93	52.11	627.58	1.42	6.18	1.27	0.01
1:51:40 AM	72.31	466.05	60.24	15.21	657.58	689.33	14.93	6.68	14.93	52.03	645.33	1.41	6.19	1.27	0.01
1:51:55 AM	72.38	481.29	60.32	14.99	658.92	691.25	14.94	6.43	14.94	52.03	656.92	1.40	6.19	1.27	0.01
1:52:10 AM	72.44	496.52	60.40	14.87	662.83	693.83	14.99	6.24	14.99	52.42	668.00	1.41	6.19	1.27	0.01
1:52:25 AM	72.50	511.74	60.47	14.66	663.50	694.00	14.98	6.04	14.98	52.35	677.58	1.40	6.18	1.27	0.01
1:52:40 AM	72.56	525.71	60.54	14.22	661.00	697.27	14.95	5.65	14.95	52.45	692.73	1.40	6.19	1.27	0.01
1:52:55 AM	72.62	540.91	60.61	13.81	657.25	693.00	14.83	5.32	14.83	51.48	701.17	1.38	6.16	1.27	0.01
1:53:10 AM	72.68	556.12	60.69	13.61	658.25	692.92	14.80	5.12	14.80	51.28	710.17	1.37	6.17	1.27	0.01
1:53:25 AM	72.74	571.29	60.76	13.46	657.42	691.25	14.80	4.98	14.80	50.77	715.67	1.36	6.13	1.26	0.01
1:53:40 AM	72.79	586.45	60.82	13.45	650.83	685.33	14.68	5.04	14.68	50.38	704.25	1.36	6.12	1.26	0.01
1:53:55 AM	72.84	601.61	60.88	13.42	652.17	684.67	14.68	5.01	14.68	50.54	707.00	1.36	6.13	1.26	0.00
1:54:10 AM	72.90	616.75	60.94	13.30	647.83	680.25	14.68	4.89	14.68	50.21	707.92	1.35	6.10	1.26	0.01
1:54:25 AM	72.95	630.64	61.00	13.25	648.64	680.82	14.68	4.85	14.68	50.32	711.00	1.35	6.12	1.26	0.01
1:54:40 AM	73.00	645.77	61.07	13.22	647.17	679.83	14.68	4.83	14.68	49.86	710.50	1.34	6.10	1.26	0.01
1:54:55 AM	73.06	660.86	61.13	13.10	646.92	678.67	14.70	4.60	14.70	48.95	716.50	1.32	6.06	1.26	0.00
1:55:10 AM	73.11	675.96	61.20	13.14	648.42	679.58	14.67	4.79	14.67	50.43	714.58	1.36	6.07	1.26	0.01

SLT-A-16-4: Second Section

Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
1:55:25 AM	115.417	0.396	0.173	26	0.181	17	0.194	15	0.239	0.00145	114	100	0.097	71.55	40	
1:55:40 AM	115.667	0.396	0.174	26	0.181	17	0.193	16	0.236	0.00167	115	100	0.097	71.49	40	
1:55:55 AM	115.917	0.396	0.178	24	0.181	17	0.195	15	0.236	0.00138	114	100	0.097	71.42	40	
1:56:10 AM	116.167	0.396	0.186	24	0.187	17	0.196	15	0.24	0.00145	114	100	0.097	71.35	40	
1:56:25 AM	116.417	0.397	0.186	26	0.182	17	0.194	15	0.236	0.0016	115	100	0.098	71.27	40	
1:56:40 AM	116.667	0.397	0.188	24	0.183	17	0.201	15	0.241	0.0016	115	100	0.097	71.19	40	
1:56:55 AM	116.917	0.397	0.178	26	0.177	17	0.193	15	0.231	0.00138	114	100	0.097	71.12	40	
1:57:10 AM	117.167	0.397	0.185	26	0.179	17	0.193	15	0.235	0.00138	114	100	0.099	71.04	40	
1:57:25 AM	117.417	0.397	0.182	26	0.18	17	0.197	15	0.238	0.00145	114	100	0.098	70.96	40	
1:57:40 AM	117.667	0.398	0.177	26	0.179	17	0.195	15	0.234	0.00138	114	100	0.098	70.86	40	
1:57:55 AM	117.917	0.398	0.184	26	0.181	17	0.199	15	0.239	0.0016	115	100	0.097	70.76	40	
1:58:10 AM	118.167	0.398	0.174	26	0.173	17	0.198	15	0.236	0.00152	114	100	0.098	70.65	40	
1:58:25 AM	118.417	0.398	0.174	24	0.176	18	0.2	15	0.235	0.00152	114	100	0.098	70.55	40	
1:58:40 AM	118.667	0.398	0.173	24	0.175	18	0.193	14	0.233	0.00167	115	100	0.098	70.44	40	
1:58:55 AM	118.917	0.398	0.172	24	0.174	18	0.193	14	0.231	0.00167	115	100	0.097	70.32	40	
1:59:10 AM	119.167	0.399	0.171	26	0.171	18	0.194	15	0.23	0.00138	114	100	0.097	70.23	40	
1:59:25 AM	119.417	0.399	0.173	26	0.173	19	0.192	14	0.23	0.00152	114	100	0.102	70.13	40	
1:59:40 AM	119.667	0.399	0.19	27	0.185	18	0.216	14	0.25	0.00152	114	100	0.110	70.00	40	
1:59:55 AM	119.917	0.399	0.197	27	0.193	18	0.222	14	0.257	0.00152	114	100	0.110	69.84	40	
2:00:10 AM	120.167	0.399	0.198	26	0.185	18	0.216	14	0.254	0.00152	114	100	0.110	69.67	40	
2:00:25 AM	120.417	0.399	0.198	27	0.183	18	0.214	14	0.254	0.00167	115	100	0.109	69.50	40	
2:00:40 AM	120.667	0.400	0.201	27	0.184	18	0.216	14	0.255	0.00196	117	100	0.109	69.32	40	
2:00:55 AM	120.917	0.400	0.2	27	0.184	18	0.21	14	0.255	0.0016	115	100	0.109	69.11	40	
2:01:10 AM	121.167	0.400	0.201	27	0.189	18	0.217	14	0.259	0.00174	116	100	0.110	68.91	40	
2:01:25 AM	121.417	0.400	0.198	27	0.186	18	0.211	13	0.254	0.0016	115	100	0.109	68.69	40	
2:01:40 AM	121.667	0.400	0.197	28	0.186	18	0.209	13	0.251	0.00167	115	100	0.109	68.46	40	
2:01:55 AM	121.917	0.400	0.199	27	0.188	18	0.21	13	0.249	0.00174	116	100	0.108	68.23	40	
2:02:10 AM	122.167	0.401	0.192	28	0.186	18	0.208	13	0.248	0.00167	115	100	0.108	67.96	40	
2:02:25 AM	122.417	0.401	0.185	28	0.184	18	0.206	13	0.244	0.00167	115	100	0.108	67.69	40	
2:02:40 AM	122.667	0.401	0.181	28	0.184	18	0.198	13	0.236	0.0016	115	100	0.106	67.38	40	
2:02:55 AM	122.917	0.401	0.177	27	0.186	18	0.193	13	0.233	0.00167	115	100	0.107	67.12	40	
2:03:10 AM	123.167	0.401	0.181	28	0.186	18	0.179	13	0.228	0.00152	114	100	0.106	66.84	40	
2:03:25 AM	123.417	0.402	0.183	26	0.189	18	0.179	13	0.228	0.00174	116	100	0.104	66.58	40	
2:03:40 AM	123.667	0.402	0.182	26	0.189	18	0.175	13	0.227	0.00152	114	100	0.106	66.29	40	
2:03:55 AM	123.917	0.402	0.173	26	0.191	18	0.176	12	0.224	0.0016	115	100	0.106	66.00	40	
2:04:10 AM	124.167	0.402	0.164	26	0.189	17	0.176	12	0.222	0.00174	116	100	0.106	65.67	40	
2:04:25 AM	124.417	0.402	0.159	23	0.188	18	0.181	12	0.223	0.00181	116	100	0.105	65.30	40	
2:04:40 AM	124.667	0.402	0.146	23	0.186	17	0.194	14	0.218	0.0016	115	100	0.105	64.88	40	
2:04:55 AM	124.917	0.403	0.133	22	0.188	16	0.191	14	0.217	0.00167	115	100	0.103	64.48	40	
2:05:10 AM	125.167	0.403	0.133	23	0.19	17	0.191	13	0.216	0.0016	115	100	0.104	64.09	40	
2:05:25 AM	125.417	0.403	0.136	22	0.186	17	0.189	12	0.213	0.00174	116	100	0.101	63.73	40	
2:05:40 AM	125.667	0.403	0.144	22	0.186	18	0.176	12	0.21	0.0016	115	100	0.101	63.44	40	
2:05:55 AM	125.917	0.403	0.151	23	0.186	18	0.158	19	0.215	0.0021	117	100	0.100	63.21	40	
2:06:10 AM	126.167	0.403	0.154	22	0.186	19	0.151	12	0.218	0.00196	117	100	0.100	63.03	40	
2:06:25 AM	126.417	0.404	0.159	22	0.186	19	0.143	12	0.216	0.00181	116	100	0.099	62.87	40	

SLT-A-16-4:

Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
1:55:25 AM	73.17	691.08	61.27	13.26	652.33	683.50	14.72	4.83	14.72	50.78	715.75	1.36	6.09	1.26	0.01
1:55:40 AM	73.24	706.21	61.35	13.37	654.17	685.42	14.75	4.90	14.75	50.63	714.00	1.36	6.10	1.26	0.01
1:55:55 AM	73.31	721.35	61.43	13.50	654.58	686.33	14.78	5.03	14.78	50.99	710.00	1.36	6.10	1.26	0.01
1:56:10 AM	73.37	736.46	61.51	13.59	655.58	687.17	14.78	5.09	14.78	50.95	707.25	1.37	6.09	1.26	0.01
1:56:25 AM	73.45	751.60	61.61	13.85	657.50	691.17	14.85	5.30	14.85	51.53	701.08	1.38	6.11	1.26	0.01
1:56:40 AM	73.54	766.74	61.71	13.90	650.58	687.33	14.69	5.48	14.69	50.46	685.08	1.36	6.11	1.26	0.01
1:56:55 AM	73.61	780.59	61.80	14.20	654.64	692.82	14.78	5.70	14.78	51.12	679.91	1.37	6.08	1.26	0.01
1:57:10 AM	73.69	795.81	61.89	14.71	665.92	703.25	15.05	6.03	15.05	52.70	680.58	1.40	6.18	1.27	0.01
1:57:25 AM	73.77	811.05	61.99	14.83	658.00	699.58	14.95	6.24	14.95	51.81	663.25	1.39	6.19	1.27	0.01
1:57:40 AM	73.88	826.29	62.11	15.19	666.67	705.42	15.07	6.53	15.07	52.89	661.17	1.41	6.19	1.27	0.01
1:57:55 AM	73.98	841.49	62.24	15.22	661.92	698.50	14.94	6.63	14.94	51.71	649.67	1.39	6.16	1.27	0.01
1:58:10 AM	74.09	856.77	62.36	15.47	665.67	695.58	15.03	6.85	15.03	53.02	646.58	1.42	6.22	1.27	0.01
1:58:25 AM	74.20	870.75	62.49	15.47	666.55	689.73	15.02	6.87	15.02	52.87	646.73	1.42	6.21	1.27	0.01
1:58:40 AM	74.31	885.95	62.63	15.37	661.33	683.00	14.91	6.88	14.91	52.55	641.33	1.41	6.15	1.27	0.01
1:58:55 AM	74.43	901.10	62.76	15.43	657.92	683.75	14.93	6.90	14.93	52.34	636.50	1.41	6.12	1.26	0.01
1:59:10 AM	74.52	916.27	62.88	15.33	659.75	682.17	14.94	6.75	14.94	52.19	643.08	1.40	6.13	1.26	0.01
1:59:25 AM	74.62	931.10	63.00	16.27	697.09	713.09	15.77	7.15	15.77	57.72	675.64	1.48	7.06	1.35	0.01
1:59:40 AM	74.76	945.93	63.16	17.86	752.20	764.10	17.22	7.84	17.22	67.41	724.20	1.62	8.56	1.48	0.02
1:59:55 AM	74.92	960.78	63.34	17.45	750.10	768.40	17.34	7.31	17.34	67.43	745.40	1.61	8.58	1.48	0.02
2:00:10 AM	75.09	975.65	63.55	17.38	749.80	765.50	17.32	7.33	17.32	67.77	747.20	1.62	8.60	1.49	0.02
2:00:25 AM	75.27	990.55	63.76	17.11	759.80	766.00	17.37	7.01	17.37	66.79	770.90	1.58	8.64	1.49	0.02
2:00:40 AM	75.46	1006.93	63.98	17.28	754.73	761.36	17.28	7.34	17.28	67.75	754.64	1.62	8.62	1.49	0.02
2:00:55 AM	75.67	1021.85	64.24	17.81	757.70	765.80	17.37	7.76	17.37	68.20	738.50	1.63	8.66	1.49	0.03
2:01:10 AM	75.89	1036.81	64.49	18.19	764.60	770.40	17.44	8.12	17.44	69.20	732.20	1.65	8.72	1.50	0.03
2:01:25 AM	76.12	1051.79	64.76	18.01	761.00	767.50	17.46	8.03	17.46	69.32	737.20	1.65	8.73	1.50	0.03
2:01:40 AM	76.36	1066.76	65.04	18.14	764.70	767.10	17.45	8.09	17.45	68.88	734.80	1.64	8.72	1.50	0.03
2:01:55 AM	76.60	1081.75	65.33	18.42	760.50	763.50	17.47	8.37	17.47	69.06	719.30	1.65	8.74	1.50	0.03
2:02:10 AM	76.88	1096.75	65.66	18.67	764.90	767.40	17.43	8.59	17.43	68.35	710.80	1.64	8.75	1.50	0.03
2:02:25 AM	77.17	1111.77	66.00	18.77	763.60	768.50	17.41	8.76	17.41	68.85	704.30	1.65	8.78	1.50	0.04
2:02:40 AM	77.50	1126.76	66.37	18.41	769.20	772.10	17.40	8.27	17.40	67.98	725.40	1.63	8.74	1.50	0.04
2:02:55 AM	77.78	1141.72	66.71	17.61	767.00	767.80	17.47	7.65	17.47	69.13	760.80	1.64	8.71	1.50	0.03
2:03:10 AM	78.07	1156.68	67.04	17.91	768.40	768.50	17.42	7.86	17.42	68.39	747.30	1.62	8.71	1.50	0.03
2:03:25 AM	78.36	1171.63	67.38	17.87	767.90	769.70	17.36	7.76	17.36	66.75	745.80	1.59	8.70	1.49	0.04
2:03:40 AM	78.66	1186.62	67.73	18.23	770.70	772.50	17.52	8.21	17.52	69.61	740.00	1.65	8.74	1.50	0.03
2:03:55 AM	78.98	1201.63	68.11	18.61	774.70	774.70	17.46	8.56	17.46	69.54	724.80	1.66	8.77	1.50	0.04
2:04:10 AM	79.34	1216.68	68.52	19.21	777.10	777.10	17.53	9.22	17.53	70.62	703.90	1.69	8.82	1.51	0.04
2:04:25 AM	79.75	1231.86	68.99	19.52	767.10	768.00	17.45	9.76	17.45	70.20	677.30	1.69	8.97	1.52	0.05
2:04:40 AM	80.20	1245.54	69.51	19.92	774.33	775.89	17.47	10.12	17.47	71.22	667.89	1.71	9.00	1.52	0.06
2:04:55 AM	80.64	1260.66	70.03	19.41	772.70	776.20	17.52	9.50	17.52	69.48	690.70	1.65	8.90	1.51	0.05
2:05:10 AM	81.08	1275.70	70.53	18.63	773.40	774.60	17.46	8.81	17.46	70.43	722.50	1.65	8.81	1.50	0.05
2:05:25 AM	81.47	1290.64	70.98	17.01	770.10	770.10	17.40	7.14	17.40	67.44	787.20	1.56	8.68	1.49	0.04
2:05:40 AM	81.81	1306.99	71.36	16.30	768.55	773.09	17.51	6.44	17.51	68.18	820.91	1.56	8.59	1.49	0.03
2:05:55 AM	82.06	1321.83	71.65	16.03	767.50	770.70	17.46	6.16	17.46	67.42	829.70	1.54	8.57	1.48	0.03
2:06:10 AM	82.27	1336.63	71.89	15.94	769.00	773.90	17.50	6.01	17.50	67.26	836.80	1.53	8.52	1.48	0.02
2:06:25 AM	82.45	1351.44	72.10	15.77	765.70	771.00	17.41	5.90	17.41	66.50	836.90	1.52	8.52	1.48	0.02

SLT-A-16-4: Second Section

Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
2:06:40 AM	126.667	0.404	0.162	22	0.184	20	0.133	12	0.217	0.00174	116	100	0.097	62.70	40	
2:06:55 AM	126.917	0.404	0.162	22	0.182	19	0.128	13	0.217	0.00189	116	100	0.096	62.57	40	
2:07:10 AM	127.167	0.404	0.164	23	0.183	19	0.126	12	0.22	0.00189	116	100	0.096	62.43	40	
2:07:25 AM	127.417	0.404	0.163	22	0.183	19	0.121	12	0.22	0.00218	118	100	0.097	62.29	40	
2:07:40 AM	127.667	0.404	0.171	23	0.186	20	0.122	13	0.222	0.00247	119	100	0.097	62.16	40	
2:07:55 AM	127.917	0.405	0.17	23	0.187	19	0.123	13	0.225	0.0021	117	100	0.096	62.02	40	
2:08:10 AM	128.167	0.405	0.168	23	0.188	19	0.124	12	0.228	0.00218	118	100	0.096	61.89	40	
2:08:25 AM	128.417	0.405	0.166	23	0.186	19	0.121	12	0.227	0.0021	117	100	0.098	61.76	40	
2:08:40 AM	128.667	0.405	0.168	22	0.189	19	0.127	13	0.228	0.00225	118	100	0.096	61.61	40	
2:08:55 AM	128.917	0.405	0.166	22	0.192	19	0.128	13	0.227	0.00203	117	100	0.095	61.48	40	
2:09:10 AM	129.167	0.406	0.163	22	0.188	19	0.119	13	0.224	0.00203	117	100	0.094	61.33	40	
2:09:25 AM	129.417	0.406	0.163	22	0.187	19	0.119	12	0.223	0.00232	118	100	0.095	61.18	40	
2:09:40 AM	129.667	0.406	0.159	22	0.189	19	0.124	13	0.224	0.00247	119	100	0.095	61.03	40	
2:09:55 AM	129.917	0.406	0.158	23	0.186	19	0.122	13	0.221	0.0021	117	100	0.097	60.86	40	
2:10:10 AM	130.167	0.406	0.155	22	0.192	18	0.129	12	0.224	0.0029	120	100	0.096	60.67	40	
2:10:25 AM	130.417	0.406	0.15	22	0.193	18	0.131	13	0.223	0.00261	119	100	0.096	60.46	40	
2:10:40 AM	130.667	0.407	0.149	21	0.191	19	0.131	12	0.222	0.00268	119	100	0.095	60.25	40	
2:10:55 AM	130.917	0.407	0.144	21	0.192	19	0.134	12	0.221	0.00239	118	100	0.096	60.01	40	
2:11:10 AM	131.167	0.407	0.14	22	0.194	19	0.135	12	0.222	0.00225	118	100	0.096	59.78	40	
2:11:25 AM	131.417	0.407	0.139	21	0.194	19	0.13	12	0.223	0.00239	118	100	0.095	59.54	40	
2:11:40 AM	131.667	0.407	0.142	21	0.19	18	0.124	12	0.222	0.00239	118	100	0.094	59.34	40	
2:11:55 AM	131.917	0.407	0.154	22	0.188	19	0.121	12	0.228	0.00254	119	100	0.093	59.19	40	
2:12:10 AM	132.167	0.408	0.158	22	0.184	19	0.114	13	0.228	0.00225	118	100	0.091	59.06	40	
2:12:25 AM	132.417	0.408	0.16	22	0.178	19	0.114	13	0.226	0.00312	121	100	0.091	58.93	40	
2:12:40 AM	132.667	0.408	0.152	22	0.178	19	0.115	13	0.229	0.00225	118	100	0.091	58.80	40	
2:12:55 AM	132.917	0.408	0.154	22	0.179	19	0.113	12	0.231	0.0021	117	100	0.090	58.69	40	
2:13:10 AM	133.167	0.408	0.156	22	0.183	19	0.113	12	0.236	0.00225	118	100	0.090	58.59	40	
2:13:25 AM	133.417	0.408	0.156	22	0.176	19	0.121	12	0.235	0.00254	119	100	0.091	58.50	40	
2:13:40 AM	133.667	0.409	0.159	22	0.176	19	0.119	12	0.236	0.00239	118	100	0.091	58.40	40	
2:13:55 AM	133.917	0.409	0.173	22	0.173	19	0.123	12	0.24	0.0021	117	100	0.090	58.30	40	
2:14:10 AM	134.167	0.409	0.174	23	0.173	19	0.134	12	0.25	0.00261	119	100	0.094	58.22	40	
2:14:25 AM	134.417	0.409	0.178	23	0.175	18	0.143	12	0.257	0.00232	118	100	0.098	58.16	40	
2:14:40 AM	134.667	0.409	0.189	22	0.181	19	0.148	12	0.268	0.00232	118	100	0.098	58.10	40	
2:14:55 AM	134.917	0.410	0.186	22	0.18	19	0.149	12	0.271	0.00239	118	100	0.097	58.04	40	
2:15:10 AM	135.167	0.410	0.187	23	0.179	19	0.152	12	0.268	0.00261	119	100	0.098	57.98	40	
2:15:25 AM	135.417	0.410	0.186	22	0.18	18	0.148	12	0.267	0.00254	119	100	0.096	57.91	40	
2:15:40 AM	135.667	0.410	0.184	22	0.179	19	0.151	12	0.269	0.00239	118	100	0.096	57.85	40	
2:15:55 AM	135.917	0.410	0.184	22	0.175	18	0.144	12	0.264	0.00225	118	100	0.096	57.79	40	
2:16:10 AM	136.167	0.410	0.184	22	0.176	19	0.147	12	0.263	0.00276	120	100	0.097	57.74	40	
2:16:25 AM	136.417	0.411	0.182	22	0.174	19	0.145	12	0.266	0.00232	118	100	0.095	57.67	40	
2:16:40 AM	136.667	0.411	0.183	22	0.173	18	0.149	12	0.269	0.00203	117	100	0.096	57.60	40	
2:16:55 AM	136.917	0.411	0.181	23	0.174	19	0.149	12	0.267	0.00225	118	100	0.097	57.54	40	
2:17:10 AM	137.167	0.411	0.182	22	0.176	18	0.143	12	0.266	0.00218	118	100	0.095	57.47	40	
2:17:25 AM	137.417	0.411	0.179	23	0.178	20	0.144	12	0.266	0.00247	119	100	0.094	57.40	40	
2:17:40 AM	137.667	0.411	0.181	22	0.174	18	0.143	12	0.264	0.00225	118	100	0.095	57.34	40	

SLT-A-16-4:

Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
2:06:40 AM	82.64	1366.20	72.31	15.50	756.10	761.70	17.23	5.71	17.23	64.86	831.30	1.50	8.47	1.48	0.02
2:06:55 AM	82.79	1380.90	72.49	15.27	751.60	754.60	17.09	5.53	17.09	63.74	830.70	1.48	8.40	1.47	0.02
2:07:10 AM	82.95	1395.63	72.67	15.11	750.60	754.90	17.11	5.37	17.11	63.88	837.30	1.48	8.44	1.47	0.02
2:07:25 AM	83.10	1411.86	72.84	15.10	759.91	766.00	17.32	5.25	17.32	65.26	856.09	1.49	8.46	1.48	0.02
2:07:40 AM	83.25	1426.60	73.01	14.87	760.30	771.80	17.38	5.07	17.38	65.76	869.50	1.49	8.45	1.47	0.02
2:07:55 AM	83.42	1441.36	73.20	14.72	756.10	763.00	17.25	5.00	17.25	64.77	866.00	1.48	8.46	1.48	0.02
2:08:10 AM	83.57	1456.06	73.38	14.55	754.70	761.10	17.19	4.91	17.19	64.46	869.30	1.47	8.41	1.47	0.02
2:08:25 AM	83.72	1470.84	73.55	14.84	770.00	774.40	17.55	5.04	17.55	66.94	887.80	1.50	8.49	1.48	0.02
2:08:40 AM	83.89	1485.56	73.74	14.75	760.90	769.90	17.35	5.04	17.35	65.52	873.70	1.48	8.42	1.47	0.02
2:08:55 AM	84.05	1501.73	73.92	14.51	754.55	760.36	17.14	4.89	17.14	63.83	868.55	1.46	8.39	1.47	0.02
2:09:10 AM	84.21	1516.37	74.11	14.26	746.00	752.20	16.96	4.84	16.96	62.63	863.40	1.44	8.33	1.46	0.02
2:09:25 AM	84.38	1531.02	74.30	14.47	753.30	757.50	17.06	5.06	17.06	63.81	865.80	1.46	8.34	1.47	0.02
2:09:40 AM	84.57	1545.69	74.51	14.63	751.60	760.50	17.14	5.24	17.14	64.17	860.70	1.46	8.36	1.47	0.02
2:09:55 AM	84.77	1561.93	74.73	15.50	771.64	778.00	17.56	5.81	17.56	67.16	861.36	1.51	8.47	1.48	0.02
2:10:10 AM	84.99	1576.69	74.99	15.78	765.80	772.30	17.47	6.16	17.47	66.53	839.30	1.50	8.47	1.48	0.03
2:10:25 AM	85.23	1591.49	75.26	16.21	772.40	780.80	17.58	6.50	17.58	67.54	832.10	1.52	8.51	1.48	0.03
2:10:40 AM	85.48	1606.31	75.55	16.11	769.20	778.60	17.63	6.38	17.63	66.18	835.40	1.49	8.55	1.48	0.03
2:10:55 AM	85.76	1621.14	75.86	16.24	774.20	780.30	17.64	6.55	17.64	68.08	835.10	1.52	8.55	1.48	0.03
2:11:10 AM	86.04	1635.97	76.17	16.17	779.10	784.40	17.76	6.43	17.76	68.48	848.00	1.52	8.55	1.48	0.03
2:11:25 AM	86.33	1650.76	76.50	15.59	773.00	779.90	17.61	5.96	17.61	67.06	860.60	1.49	8.51	1.48	0.03
2:11:40 AM	86.56	1666.95	76.76	14.80	768.27	775.64	17.50	5.23	17.50	65.65	885.73	1.46	8.42	1.47	0.02
2:11:55 AM	86.74	1681.61	76.97	14.64	777.90	780.50	17.54	4.91	17.54	65.54	904.10	1.46	8.35	1.47	0.02
2:12:10 AM	86.90	1696.22	77.15	14.18	753.00	762.00	17.18	4.84	17.18	62.92	883.40	1.42	8.30	1.46	0.02
2:12:25 AM	87.06	1710.84	77.33	14.21	760.40	761.90	17.25	4.83	17.25	63.31	892.30	1.42	8.30	1.46	0.02
2:12:40 AM	87.21	1726.90	77.50	14.14	764.82	767.64	17.33	4.59	17.33	62.83	903.45	1.40	8.29	1.46	0.02
2:12:55 AM	87.35	1741.52	77.66	13.70	756.60	759.40	17.15	4.36	17.15	62.24	906.40	1.39	8.30	1.46	0.02
2:13:10 AM	87.48	1756.09	77.79	13.62	757.80	764.00	17.17	4.24	17.17	62.61	911.90	1.40	8.24	1.46	0.01
2:13:25 AM	87.59	1770.66	77.92	13.44	760.50	768.60	17.24	4.07	17.24	63.49	925.80	1.41	8.25	1.46	0.01
2:13:40 AM	87.70	1786.73	78.05	12.94	764.82	780.00	17.35	3.49	17.35	63.64	956.36	1.40	8.29	1.46	0.01
2:13:55 AM	87.82	1801.29	78.18	11.86	755.50	788.80	17.13	2.63	17.13	62.54	984.60	1.38	8.23	1.46	0.01
2:14:10 AM	87.92	1816.91	78.29	12.43	785.90	816.80	17.95	2.64	17.95	68.08	1025.90	1.45	9.57	1.56	0.01
2:14:25 AM	88.00	1831.89	78.38	13.46	827.67	842.67	18.96	2.93	18.96	73.71	1066.56	1.51	10.86	1.67	0.01
2:14:40 AM	88.07	1846.85	78.46	13.38	826.33	840.22	18.90	2.99	18.90	74.50	1066.22	1.53	10.82	1.66	0.01
2:14:55 AM	88.15	1861.82	78.55	13.12	823.89	841.89	18.90	2.73	18.90	73.38	1074.89	1.50	10.83	1.66	0.01
2:15:10 AM	88.22	1876.82	78.63	13.39	832.67	844.56	19.04	2.88	19.04	74.17	1078.44	1.52	10.88	1.67	0.01
2:15:25 AM	88.30	1891.76	78.72	13.04	823.56	839.89	18.86	2.59	18.86	71.66	1076.11	1.48	10.79	1.66	0.01
2:15:40 AM	88.37	1906.72	78.80	13.10	825.67	842.11	18.84	2.71	18.84	72.52	1075.22	1.49	10.83	1.66	0.01
2:15:55 AM	88.45	1921.70	78.88	13.24	830.44	845.11	18.94	2.70	18.94	72.13	1078.22	1.48	10.85	1.66	0.01
2:16:10 AM	88.52	1936.69	78.96	13.39	834.67	845.67	18.99	2.87	18.99	73.49	1077.89	1.50	10.87	1.67	0.01
2:16:25 AM	88.59	1951.62	79.05	13.13	823.22	840.78	18.78	2.64	18.78	70.71	1068.78	1.46	10.78	1.66	0.01
2:16:40 AM	88.68	1966.56	79.15	13.24	819.89	842.44	18.82	2.83	18.82	72.06	1062.67	1.48	10.79	1.66	0.01
2:16:55 AM	88.76	1981.59	79.24	13.55	836.44	847.56	19.09	2.94	19.09	74.40	1077.11	1.51	10.93	1.67	0.01
2:17:10 AM	88.84	1996.45	79.33	13.03	813.22	835.89	18.66	2.72	18.66	70.94	1057.56	1.47	10.69	1.65	0.01
2:17:25 AM	88.93	2011.41	79.43	13.10	822.44	841.67	18.88	2.46	18.88	69.26	1073.33	1.42	10.82	1.66	0.01
2:17:40 AM	89.01	2026.33	79.52	13.21	812.89	837.78	18.76	2.91	18.76	71.87	1053.89	1.48	10.76	1.66	0.01

SLT-A-16-4: Second Section

Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
2:17:55 AM	137.917	0.412	0.178	22	0.177	18	0.144	12	0.264	0.00239	118	100	0.096	57.27		40
2:18:10 AM	138.167	0.412	0.176	23	0.173	19	0.139	12	0.261	0.00261	119	100	0.098	57.20		40
2:18:25 AM	138.417	0.412	0.176	22	0.173	19	0.137	12	0.26	0.00254	119	100	0.096	57.13		40
2:18:40 AM	138.667	0.412	0.174	22	0.176	19	0.138	12	0.261	0.00239	118	100	0.096	57.05		40
2:18:55 AM	138.917	0.412	0.175	21	0.172	19	0.131	12	0.257	0.00225	118	100	0.095	56.97		40
2:19:10 AM	139.167	0.412	0.173	22	0.175	19	0.129	12	0.26	0.00232	118	100	0.095	56.89		40
2:19:25 AM	139.417	0.413	0.173	21	0.179	18	0.13	12	0.262	0.00239	118	100	0.095	56.81		40
2:19:40 AM	139.667	0.413	0.173	21	0.178	19	0.129	11	0.259	0.00218	118	100	0.095	56.73		40
2:19:55 AM	139.917	0.413	0.173	22	0.172	18	0.129	12	0.254	0.00254	119	100	0.094	56.65		40
2:20:10 AM	140.167	0.413	0.173	22	0.169	20	0.129	12	0.252	0.00203	117	100	0.095	56.57		40
2:20:25 AM	140.417	0.413	0.176	22	0.166	19	0.133	12	0.253	0.0021	117	100	0.096	56.49		40
2:20:40 AM	140.667	0.414	0.176	22	0.166	19	0.137	11	0.255	0.00247	119	100	0.094	56.42		40
2:20:55 AM	140.917	0.414	0.171	22	0.165	19	0.139	11	0.255	0.00254	119	100	0.094	56.35		40
2:21:10 AM	141.167	0.414	0.176	22	0.168	19	0.143	11	0.259	0.00276	120	100	0.095	56.28		40
2:21:25 AM	141.417	0.414	0.178	23	0.164	20	0.145	11	0.261	0.00261	119	100	0.094	56.22		40
2:21:40 AM	141.667	0.414	0.178	22	0.169	19	0.145	11	0.265	0.00268	119	100	0.094	56.16		40
2:21:55 AM	141.917	0.414	0.176	22	0.165	18	0.143	11	0.261	0.00254	119	100	0.094	56.12		40
2:22:10 AM	142.167	0.415	0.178	22	0.164	19	0.141	11	0.264	0.00392	123	100				40

SLT-A-16-4:

Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
2:17:55 AM	89.10	2041.27	79.61	13.53	827.56	840.22	18.90	3.07	18.90	73.84	1060.78	1.51	10.80	1.66	0.01
2:18:10 AM	89.18	2056.26	79.71	13.76	830.78	842.56	19.03	3.36	19.03	76.37	1060.11	1.55	10.86	1.66	0.01
2:18:25 AM	89.27	2071.24	79.81	13.63	829.33	845.78	19.02	3.17	19.02	73.57	1063.78	1.49	10.86	1.66	0.01
2:18:40 AM	89.37	2086.21	79.92	13.65	832.44	845.56	18.98	3.24	18.98	73.86	1063.89	1.50	10.84	1.66	0.01
2:18:55 AM	89.47	2101.16	80.03	13.40	834.44	846.22	18.92	2.98	18.92	72.14	1074.44	1.47	10.80	1.66	0.01
2:19:10 AM	89.57	2116.07	80.14	13.25	824.56	843.44	18.81	3.06	18.81	72.80	1066.11	1.49	10.75	1.66	0.01
2:19:25 AM	89.68	2131.03	80.26	13.40	830.89	851.33	19.08	2.98	19.08	72.68	1077.67	1.47	10.83	1.66	0.01
2:19:40 AM	89.78	2145.89	80.38	13.32	816.11	846.89	18.81	3.20	18.81	72.49	1054.89	1.48	10.68	1.65	0.01
2:19:55 AM	89.88	2160.77	80.49	13.09	820.56	847.11	18.74	2.98	18.74	71.48	1066.44	1.46	10.70	1.65	0.01
2:20:10 AM	89.98	2175.73	80.60	13.09	826.56	858.89	18.97	2.86	18.97	72.93	1082.11	1.47	10.81	1.66	0.01
2:20:25 AM	90.08	2190.72	80.71	12.98	832.33	865.78	19.08	2.68	19.08	74.02	1097.44	1.49	10.87	1.67	0.01
2:20:40 AM	90.17	2205.57	80.81	12.42	823.22	863.33	18.81	2.27	18.81	71.88	1101.00	1.46	10.66	1.65	0.01
2:20:55 AM	90.26	2222.07	80.91	12.22	828.80	867.50	18.76	2.09	18.76	71.84	1112.90	1.46	10.66	1.65	0.01
2:21:10 AM	90.35	2236.97	81.01	12.17	839.78	876.22	18.91	1.96	18.91	73.30	1132.89	1.47	10.73	1.66	0.01
2:21:25 AM	90.42	2251.86	81.09	12.02	836.67	876.78	18.84	1.82	18.84	72.50	1133.33	1.46	10.72	1.65	0.01
2:21:40 AM	90.50	2266.76	81.18	12.04	837.11	880.56	18.94	1.83	18.94	72.74	1137.11	1.46	10.72	1.65	0.01
2:21:55 AM	90.54	2271.70	81.23	12.04	832.00	876.67	18.83	1.97	18.83	72.97	1127.33	1.47	10.63	1.65	0.01
2:22:10 AM															

SLT-A-16-5: Second Section

Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
12:15:13 AM	107.217	0.599	0.0856	20	0.101	12	0.193	14	0.199	0.00348	122	100	0.069	102.80	80	
12:15:28 AM	107.467	0.599	0.0919	20	0.0881	10	0.191	14	0.196	0.00377	122	100	0.068	102.39	80	
12:15:43 AM	107.717	0.599	0.0931	20	0.0875	9.8	0.188	14	0.194	0.00355	122	100	0.068	101.97	80	
12:15:58 AM	107.967	0.599	0.0956	20	0.0925	9.8	0.191	14	0.193	0.0037	122	100	0.069	101.55	80	
12:16:13 AM	108.217	0.599	0.101	21	0.0931	12	0.179	14	0.184	0.00363	122	100	0.069	101.13	80	
12:16:28 AM	108.467	0.599	0.102	20	0.0963	10	0.188	14	0.194	0.00355	122	100	0.069	100.83	80	
12:16:43 AM	108.717	0.600	0.101	23	0.0963	9.7	0.199	15	0.202	0.00355	122	100	0.068	100.58	80	
12:16:58 AM	108.967	0.600	0.105	24	0.095	9.7	0.196	15	0.196	0.00399	123	100	0.066	100.29	80	
12:17:13 AM	109.217	0.600	0.119	24	0.101	9.7	0.213	15	0.218	0.00384	122	100	0.079	99.97	80	
12:17:28 AM	109.467	0.600	0.12	24	0.101	9.5	0.213	15	0.218	0.0029	120	100	0.079	99.65	80	
12:17:43 AM	109.717	0.600	0.12	24	0.0994	9.5	0.207	14	0.212	0.00297	120	100	0.078	99.34	80	
12:17:58 AM	109.967	0.601	0.119	24	0.0969	9.5	0.21	15	0.213	0.00363	122	100	0.078	99.04	80	
12:18:13 AM	110.217	0.601	0.118	24	0.0981	9.3	0.211	15	0.214	0.00276	120	100	0.078	98.73	80	
12:18:28 AM	110.467	0.601	0.12	24	0.0988	9.5	0.214	14	0.217	0.00276	120	100	0.078	98.43	80	
12:18:43 AM	110.717	0.601	0.121	24	0.0988	9.5	0.213	15	0.215	0.00232	118	100	0.077	98.16	80	
12:18:58 AM	110.967	0.601	0.119	26	0.0988	9.1	0.211	15	0.214	0.00232	118	100	0.077	97.84	80	
12:19:13 AM	111.217	0.601	0.118	26	0.0963	9.5	0.209	14	0.212	0.00254	119	100	0.077	97.51	80	
12:19:28 AM	111.467	0.602	0.114	24	0.095	9.5	0.206	14	0.209	0.00232	118	100	0.077	97.16	80	
12:19:43 AM	111.717	0.602	0.106	24	0.0913	9.5	0.201	14	0.204	0.00268	119	100	0.076	96.80	80	
12:19:58 AM	111.967	0.602	0.101	26	0.0956	9.8	0.199	14	0.202	0.00268	119	100	0.077	96.38	80	
12:20:13 AM	112.217	0.602	0.103	24	0.0969	9.8	0.191	14	0.194	0.00254	119	100	0.075	95.93	80	
12:20:28 AM	112.467	0.602	0.0969	24	0.095	10	0.184	14	0.187	0.00247	119	100	0.074	95.46	80	
12:20:43 AM	112.717	0.602	0.0944	26	0.0969	10	0.199	14	0.201	0.00247	119	100	0.075	95.00	80	
12:20:58 AM	112.967	0.603	0.095	27	0.0969	9.7	0.207	14	0.208	0.00232	118	100	0.074	94.56	80	
12:21:13 AM	113.217	0.603	0.095	27	0.0969	9.8	0.211	15	0.212	0.00196	117	100	0.074	94.17	80	
12:21:28 AM	113.467	0.603	0.0906	26	0.0938	9.8	0.215	14	0.216	0.0021	117	100	0.073	93.80	80	
12:21:43 AM	113.717	0.603	0.0888	27	0.0931	9.8	0.201	15	0.201	0.0021	117	100	0.073	93.38	80	
12:21:58 AM	113.967	0.603	0.0881	26	0.0938	10	0.192	14	0.193	0.0021	117	100	0.072	92.94	80	
12:22:13 AM	114.217	0.603	0.0863	24	0.0906	9.8	0.184	15	0.185	0.00196	117	100	0.070	92.49	80	
12:22:28 AM	114.467	0.604	0.0831	24	0.0913	9.8	0.178	14	0.181	0.00203	117	100	0.070	92.02	80	
12:22:43 AM	114.717	0.604	0.0775	21	0.09	12	0.158	12	0.164	0.00181	116	100	0.070	91.58	80	
12:22:58 AM	114.967	0.604	0.0806	23	0.0919	10	0.162	14	0.163	0.0021	117	100	0.069	91.18	80	
12:23:13 AM	115.217	0.604	0.0844	24	0.0913	9.8	0.172	15	0.172	0.00189	116	100	0.070	90.87	80	
12:23:28 AM	115.467	0.604	0.0838	17	0.0819	9.5	0.185	15	0.185	0.00167	115	100	0.069	90.63	80	
12:23:43 AM	115.717	0.605	0.0825	21	0.0781	9.5	0.189	16	0.19	0.00196	117	100	0.067	90.49	80	
12:23:58 AM	115.967	0.605	0.0781	20	0.0681	9.1	0.184	15	0.186	0.00181	116	100	0.066	90.40	80	
12:24:13 AM	116.217	0.605	0.0769	20	0.0656	9.1	0.182	15	0.185	0.00196	117	100	0.066	90.33	80	
12:24:28 AM	116.467	0.605	0.0725	20	0.0606	9.1	0.178	13	0.182	0.00174	116	100	0.066	90.27	80	
12:24:43 AM	116.717	0.605	0.0744	20	0.06	10	0.179	13	0.185	0.00189	116	100	0.066	90.21	80	
12:24:58 AM	116.967	0.605	0.0738	20	0.0575	9.5	0.18	15	0.185	0.00167	115	100	0.066	90.16	80	
12:25:13 AM	117.217	0.606	0.0738	20	0.0569	9.7	0.182	15	0.187	0.00152	114	100	0.069	90.10	80	
12:25:28 AM	117.467	0.606	0.0744	20	0.0631	9.7	0.196	15	0.2	0.0016	115	100	0.074	90.04	80	
12:25:43 AM	117.717	0.606	0.0775	20	0.0631	9.3	0.2	13	0.205	0.00152	114	100	0.073	89.98	80	
12:25:58 AM	117.967	0.606	0.075	20	0.0619	9.3	0.194	16	0.199	0.00145	114	100	0.074	89.93	80	
12:26:13 AM	118.217	0.606	0.0738	20	0.0619	9.8	0.194	15	0.199	0.00152	114	100	0.074	89.87	80	

SLT-A-16-5: S

Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
12:15:13 AM	97.73	15.18	56.14	14.63	554.54	565.69	14.14	6.02	14.14	44.84	533.08	1.45	5.19	1.17	0.06
12:15:28 AM	98.11	30.19	56.80	14.96	546.77	569.46	14.18	6.19	14.18	44.97	513.23	1.46	5.07	1.15	0.05
12:15:43 AM	98.51	45.17	57.47	14.82	540.15	560.77	14.22	6.14	14.22	45.02	513.92	1.46	5.04	1.15	0.05
12:15:58 AM	98.91	60.31	58.16	14.84	545.31	567.08	14.28	6.18	14.28	46.13	521.00	1.48	5.16	1.17	0.05
12:16:13 AM	99.30	75.55	58.83	14.80	551.00	571.62	14.36	6.15	14.36	47.33	531.92	1.51	5.23	1.17	0.05
12:16:28 AM	99.59	90.40	59.32	14.22	544.62	572.85	14.23	5.79	14.23	46.79	545.23	1.47	4.95	1.14	0.03
12:16:43 AM	99.85	104.89	59.74	13.71	539.69	574.92	14.15	5.36	14.15	46.04	558.77	1.41	4.70	1.11	0.03
12:16:58 AM	100.13	119.22	60.21	13.10	524.54	562.54	13.88	4.98	13.89	43.92	558.46	1.37	4.60	1.10	0.04
12:17:13 AM	100.45	136.58	60.75	16.04	621.85	665.85	16.23	5.88	16.23	62.52	630.23	1.71	6.87	1.33	0.04
12:17:28 AM	100.78	151.26	61.29	16.14	604.27	660.73	16.31	6.30	16.31	62.70	611.64	1.72	6.87	1.33	0.05
12:17:43 AM	101.10	165.94	61.81	16.22	602.91	658.73	16.31	6.55	16.31	62.79	606.64	1.74	6.87	1.34	0.05
12:17:58 AM	101.41	180.59	62.32	15.92	595.55	663.27	16.15	6.39	16.17	62.66	605.64	1.72	6.83	1.33	0.05
12:18:13 AM	101.73	196.50	62.84	15.70	593.50	665.67	16.08	6.21	16.10	62.68	609.92	1.71	6.78	1.33	0.05
12:18:28 AM	102.04	211.08	63.35	15.32	586.82	666.45	16.11	5.79	16.11	62.81	621.18	1.72	6.76	1.32	0.04
12:18:43 AM	102.34	225.66	63.83	15.23	586.73	664.18	16.06	5.68	16.06	62.36	623.09	1.71	6.77	1.33	0.04
12:18:58 AM	102.68	241.58	64.38	15.54	584.00	659.83	15.98	6.10	15.98	61.81	603.08	1.72	6.79	1.33	0.05
12:19:13 AM	103.05	256.22	64.96	15.90	598.18	669.09	16.04	6.09	16.04	62.95	604.27	1.73	6.82	1.33	0.05
12:19:28 AM	103.43	270.94	65.56	15.90	578.27	664.82	15.95	6.37	15.96	62.78	580.45	1.73	6.91	1.34	0.06
12:19:43 AM	103.84	285.75	66.20	15.96	587.27	663.18	15.92	6.56	15.93	62.68	585.55	1.72	7.00	1.35	0.06
12:19:58 AM	104.31	300.91	66.94	16.67	606.09	678.73	16.29	6.52	16.32	64.37	589.45	1.76	7.35	1.38	0.07
12:20:13 AM	104.85	316.21	67.77	16.31	587.45	665.82	15.95	6.61	15.99	61.95	571.45	1.72	7.48	1.39	0.08
12:20:28 AM	105.39	331.53	68.62	16.15	584.91	660.18	15.79	6.68	15.79	60.71	569.45	1.70	7.50	1.39	0.08
12:20:43 AM	105.95	346.74	69.46	16.52	606.73	678.00	16.22	6.15	16.25	63.05	593.82	1.70	7.40	1.38	0.08
12:20:58 AM	106.49	361.86	70.28	16.50	624.82	679.00	16.33	5.99	16.33	62.77	617.27	1.70	7.30	1.37	0.07
12:21:13 AM	106.98	375.62	71.03	16.38	616.00	673.60	16.24	6.00	16.24	61.91	610.10	1.68	7.32	1.38	0.07
12:21:28 AM	107.45	390.55	71.73	16.27	613.36	669.18	16.13	5.99	16.13	61.75	607.18	1.69	7.12	1.36	0.07
12:21:43 AM	107.99	405.72	72.54	16.59	618.36	676.27	16.27	6.11	16.27	62.79	604.55	1.71	7.35	1.38	0.08
12:21:58 AM	108.56	421.03	73.38	16.55	613.64	667.18	15.87	6.13	15.87	60.77	584.18	1.68	7.50	1.39	0.08
12:22:13 AM	109.16	436.58	74.28	16.30	580.73	650.91	15.55	6.22	15.55	58.79	548.27	1.67	7.74	1.41	0.09
12:22:28 AM	109.81	451.29	75.23	16.02	551.90	648.60	15.35	6.72	15.36	58.83	522.70	1.69	8.42	1.47	0.09
12:22:43 AM	110.43	466.13	76.12	16.41	559.70	650.00	15.45	6.85	15.46	59.00	517.80	1.70	8.56	1.48	0.09
12:22:58 AM	111.01	481.80	76.96	16.32	568.64	655.18	15.51	6.63	15.53	59.47	533.45	1.68	7.87	1.42	0.07
12:23:13 AM	111.46	496.70	77.61	16.04	569.91	664.73	15.79	6.53	15.85	60.85	559.00	1.66	7.08	1.35	0.06
12:23:28 AM	111.82	511.16	78.12	15.23	586.27	656.18	15.57	5.81	15.60	60.32	601.00	1.62	6.66	1.31	0.03
12:23:43 AM	112.02	526.68	78.41	14.02	552.75	642.33	15.30	5.33	15.31	57.09	608.33	1.57	6.44	1.29	0.02
12:23:58 AM	112.15	540.78	78.60	13.02	545.82	637.45	15.08	4.74	15.08	55.39	635.36	1.54	6.31	1.28	0.02
12:24:13 AM	112.26	556.12	78.76	12.44	539.58	632.75	15.14	4.38	15.14	54.60	656.92	1.53	6.28	1.28	0.01
12:24:28 AM	112.36	571.45	78.89	12.03	538.33	636.33	15.12	4.17	15.13	54.89	672.58	1.53	6.27	1.28	0.01
12:24:43 AM	112.44	586.76	79.02	11.32	555.67	641.75	15.09	3.67	15.18	55.62	719.75	1.53	6.26	1.28	0.01
12:24:58 AM	112.52	600.81	79.13	11.16	581.36	641.82	15.15	3.40	15.18	55.39	754.55	1.52	6.26	1.28	0.01
12:25:13 AM	112.60	615.67	79.24	11.87	621.82	670.36	15.84	3.55	15.84	60.45	794.00	1.59	7.09	1.35	0.01
12:25:28 AM	112.70	631.88	79.38	13.28	700.00	733.73	16.88	3.94	16.88	69.85	856.73	1.70	8.43	1.47	0.01
12:25:43 AM	112.79	646.46	79.51	13.16	724.10	733.40	16.69	3.75	16.69	68.49	877.60	1.67	8.26	1.46	0.01
12:25:58 AM	112.87	661.12	79.63	13.46	737.70	741.90	16.96	3.85	16.96	70.32	889.70	1.70	8.35	1.47	0.01
12:26:13 AM	112.96	675.78	79.75	13.61	742.30	747.40	16.95	3.89	16.95	70.76	887.50	1.71	8.36	1.47	0.01

SLT-A-16-5: Second Section

Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
12:26:28 AM	118.467	0.606	0.0756	20	0.065	9.1	0.193	15	0.198	0.00181	116	100	0.074	89.81		80
12:26:43 AM	118.717	0.607	0.0744	20	0.0619	9	0.194	16	0.199	0.00167	115	100	0.074	89.75		80
12:26:58 AM	118.967	0.607	0.0831	20	0.0669	9.1	0.213	13	0.218	0.00167	115	100	0.079	89.68		80
12:27:13 AM	119.217	0.607	0.0806	20	0.0663	9.5	0.211	13	0.216	0.00174	116	100	0.080	89.61		80
12:27:28 AM	119.467	0.607	0.0825	20	0.0675	9.1	0.211	13	0.214	0.00189	116	100	0.079	89.53		80
12:27:43 AM	119.717	0.607	0.0813	20	0.0669	11	0.209	13	0.214	0.00239	118	100	0.079	89.45		80
12:27:58 AM	119.967	0.607	0.0831	20	0.0669	9.3	0.208	12	0.211	0.00247	119	100	0.080	89.36		80
12:28:13 AM	120.217	0.608	0.0806	20	0.0694	9.3	0.206	14	0.209	0.00203	117	100	0.080	89.25		80
12:28:28 AM	120.467	0.608	0.0806	20	0.0694	9.3	0.202	13	0.205	0.00203	117	100	0.080	89.13		80
12:28:43 AM	120.717	0.608	0.0788	21	0.0706	9.5	0.195	14	0.197	0.00232	118	100	0.080	89.00		80
12:28:58 AM	120.967	0.608	0.08	19	0.0694	9.5	0.197	14	0.198	0.00203	117	100	0.080	88.87		80
12:29:13 AM	121.217	0.608	0.0781	20	0.0681	9.5	0.201	15	0.203	0.00181	116	100	0.079	88.77		80
12:29:28 AM	121.467	0.609	0.0794	19	0.0675	9.5	0.205	13	0.208	0.0021	117	100	0.078	88.68		80
12:29:43 AM	121.717	0.609	0.0794	17	0.0656	11	0.206	15	0.21	0.0021	117	100	0.078	88.61		80
12:29:58 AM	121.967	0.609	0.0781	20	0.0656	10	0.208	13	0.212	0.0021	117	100	0.078	88.54		80
12:30:13 AM	122.217	0.609	0.0813	24	0.065	9.7	0.204	13	0.21	0.00203	117	100	0.078	88.48		80
12:30:28 AM	122.467	0.609	0.08	26	0.0644	11	0.203	13	0.209	0.00196	117	100	0.077	88.42		80
12:30:43 AM	122.717	0.609	0.08	26	0.0631	11	0.203	13	0.209	0.00189	116	100	0.078	88.35		80
12:30:58 AM	122.967	0.610	0.0819	26	0.0663	11	0.206	13	0.211	0.0021	117	100	0.078	88.27		80
12:31:13 AM	123.217	0.610	0.0831	26	0.0656	10	0.204	15	0.208	0.00247	119	100	0.079	88.17		80
12:31:28 AM	123.467	0.610	0.0813	26	0.0663	10	0.203	15	0.206	0.00218	118	100	0.079	88.05		80
12:31:43 AM	123.717	0.610	0.0819	27	0.0669	16	0.203	15	0.205	0.0021	117	100	0.079	87.93		80
12:31:58 AM	123.967	0.610	0.0806	26	0.0669	16	0.196	15	0.198	0.00196	117	100	0.078	87.77		80
12:32:13 AM	124.217	0.610	0.0806	27	0.0669	16	0.198	15	0.2	0.00152	114	100	0.078	87.64		80
12:32:28 AM	124.467	0.611	0.0819	27	0.0694	16	0.199	15	0.202	0.00167	115	100	0.078	87.52		80
12:32:43 AM	124.717	0.611	0.0813	26	0.0681	16	0.204	15	0.207	0.0021	117	100	0.077	87.41		80
12:32:58 AM	124.967	0.611	0.0838	27	0.0644	11	0.205	15	0.209	0.00218	118	100	0.076	87.33		80
12:33:13 AM	125.217	0.611	0.085	27	0.0644	11	0.207	15	0.212	0.0021	117	100	0.076	87.25		80
12:33:28 AM	125.467	0.611	0.0844	27	0.0619	11	0.205	15	0.211	0.0021	117	100	0.076	87.18		80
12:33:43 AM	125.717	0.611	0.0838	28	0.0619	11	0.206	15	0.212	0.00218	118	100	0.076	87.11		80
12:33:58 AM	125.967	0.612	0.0844	27	0.0625	11	0.206	15	0.212	0.00196	117	100	0.076	87.05		80
12:34:13 AM	126.217	0.612	0.0844	27	0.0606	11	0.207	14	0.214	0.00196	117	100	0.075	87.00		80
12:34:28 AM	126.467	0.612	0.0869	26	0.06	11	0.203	15	0.208	0.00218	118	100	0.074	86.95		80
12:34:43 AM	126.717	0.612	0.0856	28	0.0569	11	0.198	15	0.204	0.00218	118	100	0.075	86.91		80
12:34:58 AM	126.967	0.612	0.0888	28	0.0569	17	0.199	15	0.206	0.00247	119	100	0.074	86.87		80
12:35:13 AM	127.217	0.613	0.0931	27	0.0594	17	0.195	15	0.202	0.00232	118	100	0.074	86.84		80
12:35:28 AM	127.467	0.613	0.0913	28	0.0606	17	0.195	15	0.202	0.00239	118	100	0.074	86.81		80
12:35:43 AM	127.717	0.613	0.0938	30	0.0613	17	0.198	15	0.205	0.00239	118	100	0.074	86.78		80
12:35:58 AM	127.967	0.613	0.095	30	0.06	17	0.193	15	0.2	0.00232	118	100	0.074	86.75		80
12:36:13 AM	128.217	0.613	0.0963	30	0.0625	17	0.196	15	0.203	0.00261	119	100	0.075	86.72		80
12:36:28 AM	128.467	0.613	0.0975	30	0.0631	17	0.203	15	0.21	0.00239	118	100				

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
12:26:28 AM	113.05	691.91	79.88	13.62	719.55	746.36	16.85	3.93	16.85	70.51	859.64	1.70	8.35	1.47	0.01
12:26:43 AM	113.15	706.56	80.03	13.64	706.70	747.50	16.82	3.93	16.82	70.71	845.00	1.71	8.34	1.47	0.01
12:26:58 AM	113.26	721.03	80.17	14.64	723.56	788.67	17.88	4.27	17.88	79.50	864.22	1.81	10.12	1.61	0.02
12:27:13 AM	113.37	735.86	80.33	14.96	729.22	801.00	18.19	4.41	18.19	82.23	869.67	1.85	10.63	1.65	0.02
12:27:28 AM	113.49	750.64	80.50	14.94	720.22	795.89	18.09	4.44	18.09	80.98	856.89	1.83	10.56	1.64	0.02
12:27:43 AM	113.62	767.08	80.68	15.18	730.50	794.10	18.08	4.56	18.08	81.12	856.70	1.84	10.58	1.64	0.02
12:27:58 AM	113.77	781.94	80.89	15.70	726.67	799.78	18.14	4.77	18.14	82.00	833.00	1.86	10.67	1.65	0.02
12:28:13 AM	113.94	796.96	81.13	16.41	719.67	803.56	18.33	5.19	18.33	83.47	803.33	1.88	10.91	1.67	0.03
12:28:28 AM	114.14	812.08	81.41	17.06	726.33	809.78	18.48	5.46	18.48	84.41	788.00	1.90	11.05	1.68	0.03
12:28:43 AM	114.34	825.51	81.70	17.21	713.25	804.88	18.43	5.70	18.43	83.83	766.13	1.89	11.05	1.68	0.03
12:28:58 AM	114.55	840.60	81.99	16.75	714.78	806.89	18.43	5.32	18.44	83.54	787.78	1.87	11.02	1.68	0.03
12:29:13 AM	114.72	855.56	82.22	15.86	691.67	804.00	18.19	5.04	18.28	82.19	793.00	1.84	10.81	1.66	0.02
12:29:28 AM	114.88	872.05	82.44	15.18	700.60	797.60	18.18	4.53	18.18	80.59	831.10	1.81	10.64	1.65	0.02
12:29:43 AM	115.00	886.89	82.61	14.47	692.67	797.56	18.12	4.30	18.12	80.82	851.33	1.81	10.64	1.65	0.02
12:29:58 AM	115.10	901.71	82.75	14.10	683.11	793.11	18.06	4.19	18.08	80.01	855.11	1.80	10.62	1.65	0.02
12:30:13 AM	115.20	916.49	82.89	14.02	680.00	794.11	18.01	4.17	18.01	80.09	853.44	1.79	10.56	1.64	0.02
12:30:28 AM	115.30	931.26	83.04	13.97	700.89	794.56	17.98	4.11	18.00	79.73	875.00	1.79	10.54	1.64	0.02
12:30:43 AM	115.42	946.05	83.20	14.32	695.56	796.33	18.07	4.34	18.07	80.04	858.44	1.80	10.58	1.64	0.02
12:30:58 AM	115.56	960.93	83.39	14.62	709.00	802.67	18.30	4.51	18.30	81.79	869.11	1.82	10.70	1.65	0.02
12:31:13 AM	115.73	975.90	83.63	14.83	707.11	804.67	18.44	4.69	18.48	82.66	864.00	1.83	10.83	1.66	0.03
12:31:28 AM	115.93	990.93	83.91	15.40	743.89	812.22	18.61	4.77	18.61	83.74	883.22	1.85	10.93	1.67	0.03
12:31:43 AM	116.16	1006.01	84.22	15.43	726.22	810.33	18.63	4.82	18.63	83.54	865.22	1.84	11.00	1.68	0.04
12:31:58 AM	116.42	1021.12	84.58	15.71	742.11	803.89	18.68	4.77	18.68	83.27	871.00	1.84	11.04	1.68	0.04
12:32:13 AM	116.66	1036.22	84.91	15.53	744.44	806.67	18.69	4.63	18.69	83.39	881.78	1.83	11.04	1.68	0.03
12:32:28 AM	116.88	1051.28	85.21	15.35	735.11	802.11	18.63	4.63	18.63	82.76	877.78	1.82	10.97	1.67	0.03
12:32:43 AM	117.08	1066.25	85.49	15.04	739.89	800.22	18.54	4.46	18.54	81.79	892.33	1.80	10.84	1.66	0.03
12:32:58 AM	117.23	1081.11	85.69	14.29	717.67	784.33	18.30	4.23	18.30	79.67	891.78	1.78	10.67	1.65	0.02
12:33:13 AM	117.37	1095.92	85.88	14.11	732.22	789.67	18.30	3.99	18.30	79.87	914.11	1.77	10.61	1.65	0.02
12:33:28 AM	117.50	1110.65	86.05	13.84	706.89	782.11	18.21	4.02	18.21	78.72	896.89	1.75	10.48	1.64	0.02
12:33:43 AM	117.62	1127.12	86.22	14.15	752.10	792.70	18.46	3.81	18.46	80.39	939.20	1.77	10.61	1.65	0.02
12:33:58 AM	117.73	1141.95	86.38	14.20	771.00	796.78	18.58	3.63	18.58	80.97	961.11	1.77	10.63	1.65	0.02
12:34:13 AM	117.83	1156.66	86.51	13.60	745.00	781.00	18.32	3.46	18.32	78.91	950.11	1.75	10.45	1.63	0.01
12:34:28 AM	117.92	1171.24	86.63	12.93	742.89	771.22	18.10	3.12	18.10	76.97	967.78	1.72	10.27	1.62	0.01
12:34:43 AM	118.00	1185.83	86.74	12.58	751.78	777.89	18.17	2.94	18.17	77.60	994.67	1.72	10.27	1.62	0.01
12:34:58 AM	118.07	1201.99	86.84	12.05	750.60	775.80	18.01	2.76	18.01	76.79	1009.70	1.70	10.22	1.62	0.01
12:35:13 AM	118.13	1216.51	86.92	11.62	725.11	770.00	17.93	2.67	17.93	75.87	999.56	1.69	10.17	1.61	0.01
12:35:28 AM	118.20	1231.03	87.01	11.33	722.44	771.22	18.02	2.58	18.02	76.37	1013.33	1.70	10.17	1.61	0.01
12:35:43 AM	118.25	1245.57	87.08	11.13	718.67	775.22	17.99	2.53	17.99	76.22	1016.78	1.68	10.21	1.62	0.01
12:35:58 AM	118.31	1261.64	87.16	10.94	715.10	772.80	17.93	2.45	17.93	75.66	1019.00	1.68	10.10	1.61	0.01
12:36:13 AM	118.36	1276.22	87.23	11.23	753.33	786.78	18.18	2.47	18.18	78.01	1055.33	1.70	10.25	1.62	0.01
12:36:28 AM															

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
2:23:17 AM	143.283	0.586	0.14	37	0.32	15	0.29	32	0.335	0.00268	119	100	0.130	69.19		20
2:23:32 AM	143.533	0.586	0.15	37	0.32	13	0.285	32	0.336	0.00276	120	100	0.126	68.99		20
2:23:47 AM	143.783	0.586	0.18	39	0.315	15	0.27	30	0.317	0.00276	120	100	0.123	68.80		20
2:24:02 AM	144.033	0.587	0.18	39	0.32	15	0.265	28	0.323	0.00283	120	100	0.125	68.56		20
2:24:17 AM	144.283	0.587	0.18	43	0.315	14	0.255	27	0.318	0.00254	119	100	0.126	68.26		20
2:24:32 AM	144.533	0.587	0.18	39	0.335	15	0.25	27	0.338	0.00225	118	100	0.129	67.96		20
2:24:47 AM	144.783	0.587	0.17	37	0.335	16	0.235	21	0.339	0.00247	119	100	0.129	67.65		20
2:25:02 AM	145.033	0.587	0.16	37	0.33	15	0.23	20	0.336	0.00261	119	100	0.128	67.29		20
2:25:17 AM	145.283	0.587	0.155	37	0.33	16	0.24	23	0.334	0.00232	118	100	0.127	66.91		20
2:25:32 AM	145.533	0.588	0.16	37	0.36	16	0.25	24	0.364	0.00232	118	100	0.136	66.57		20
2:25:47 AM	145.783	0.588	0.16	34	0.345	16	0.265	24	0.35	0.00189	116	100	0.135	66.24		20
2:26:02 AM	146.033	0.588	0.16	37	0.325	16	0.275	28	0.333	0.00283	120	100	0.130	65.92		20
2:26:17 AM	146.283	0.588	0.145	32	0.295	16	0.28	28	0.333	0.00268	119	73	0.133	65.68		20
2:26:32 AM	146.533	0.588	0.14	30	0.28	16	0.29	32	0.346	0.00276	120	100	0.132	65.48		20
2:26:47 AM	146.783	0.589	0.14	30	0.28	17	0.3	32	0.36	0.00247	119	100	0.131	65.28		20
2:27:02 AM	147.033	0.589	0.135	23	0.275	16	0.295	34	0.356	0.00254	119	100	0.130	65.06		20
2:27:17 AM	147.283	0.589	0.13	23	0.26	16	0.285	34	0.347	0.00334	121	100	0.130	64.86		20
2:27:32 AM	147.533	0.589	0.125	23	0.255	14	0.28	34	0.342	0.00254	119	100	0.129	64.69		20
2:27:47 AM	147.783	0.589	0.135	26	0.26	15	0.285	37	0.352	0.00254	119	100	0.129	64.54		20
2:28:02 AM	148.033	0.589	0.135	26	0.26	16	0.285	34	0.354	0.00276	120	100	0.129	64.37		20
2:28:17 AM	148.283	0.590	0.145	28	0.27	16	0.29	37	0.349	0.00239	118	100	0.129	64.19		20
2:28:32 AM	148.533	0.590	0.145	27	0.28	17	0.295	32	0.345	0.00261	119	100	0.129	64.00		20
2:28:47 AM	148.783	0.590	0.145	30	0.285	17	0.295	32	0.352	0.00254	119	100	0.129	63.80		20
2:29:02 AM	149.033	0.590	0.14	30	0.275	16	0.29	32	0.348	0.00268	119	100	0.129	63.60		20
2:29:17 AM	149.283	0.590	0.14	24	0.27	16	0.285	34	0.356	0.0029	120	100	0.128	63.41		20
2:29:32 AM	149.533	0.590	0.13	23	0.26	15	0.275	37	0.356	0.00355	122	100	0.127	63.24		20
2:29:47 AM	149.783	0.591	0.115	22	0.26	14	0.265	37	0.356	0.00326	121	100	0.128	63.07		20
2:30:02 AM	150.033	0.591	0.12	22	0.25	12	0.27	37	0.352	0.00305	120	100	0.127	62.93		20
2:30:17 AM	150.283	0.591	0.105	22	0.25	12	0.26	37	0.343	0.00355	122	100	0.126	62.83		20
2:30:32 AM	150.533	0.591	0.1	21	0.27	12	0.26	37	0.357	0.00326	121	100	0.124	62.74		20
2:30:47 AM	150.783	0.591	0.085	57	0.255	12	0.24	39	0.335	0.00348	122	100	0.126	62.66		20
2:31:02 AM	151.033	0.591	0.085	57	0.265	13	0.24	39	0.339	0.00348	122	100	0.124	62.59		20
2:31:17 AM	151.283	0.592	0.08	57	0.27	12	0.23	39	0.343	0.00326	121	100	0.124	62.52		20
2:31:32 AM	151.533	0.592	0.085	57	0.26	12	0.225	39	0.331	0.00341	121	100	0.122	62.45		20
2:31:47 AM	151.783	0.592	0.08	64	0.265	12	0.22	43	0.333	0.00305	120	100	0.125	62.37		20
2:32:02 AM	152.033	0.592	0.075	57	0.27	12	0.22	43	0.334	0.00312	121	100	0.124	62.30		20
2:32:17 AM	152.283	0.592	0.08	57	0.275	12	0.225	39	0.342	0.0037	122	100	0.123	62.22		20
2:32:32 AM	152.533	0.593	0.075	20	0.265	12	0.21	43	0.326	0.00326	121	100	0.121	62.15		20
2:32:47 AM	152.783	0.593	0.07	64	0.27	12	0.22	43	0.332	0.00334	121	100	0.116	62.08		20
2:33:02 AM	153.033	0.593	0.07	21	0.22	12	0.205	37	0.274	0.00261	119	100				
2:38:47 AM	158.783	0.597	0.08	39	0.29	12	0.22	39	0.349	0.00348	122	100	0.130	61.96		20
2:39:02 AM	159.033	0.597	0.08	20	0.295	12	0.235	43	0.358	0.00297	120	100	0.130	61.89		20
2:39:17 AM	159.283	0.597	0.08	21	0.285	12	0.235	39	0.347	0.00283	120	100	0.130	61.83		20
2:39:32 AM	159.533	0.597	0.085	20	0.28	12	0.235	43	0.347	0.00384	122	100	0.131	61.76		20
2:39:47 AM	159.783	0.598	0.085	20	0.275	11	0.24	43	0.349	0.00384	122	100	0.130	61.67		20

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
2:23:17 AM	58.02	15.15788	54.46583	14.19853	564.5833	626.0833	16.175	5.683333	16.29167	56.78333	630.4167	1.66	5.614167	1.263157	0.0175
2:23:32 AM	58.21	30.35901	54.66917	15.1435	557.8333	609.1667	16.04167	6.475	16.15	53.66667	587.75	1.619167	6.159167	1.266761	0.016667
2:23:47 AM	58.40	45.53093	54.87333	15.88771	540.5833	587	15.6	7.525	15.66667	51.44167	531	1.625833	6.134167	1.264327	0.0175
2:24:02 AM	58.64	60.75592	55.11917	16.6916	542.8333	584.9167	15.65833	8.383333	15.75833	53.30833	508.4167	1.696667	6.179167	1.268749	0.024167
2:24:17 AM	58.93	76.02577	55.43417	17.20352	549.75	587.4167	15.825	8.858333	15.94167	55.125	503.8333	1.745833	6.2175	1.272487	0.026667
2:24:32 AM	59.23	91.40566	55.75	18.03049	568	597.75	16.24167	9.483333	16.41667	58.53333	508.4167	1.806667	6.311667	1.281658	0.025833
2:24:47 AM	59.53	105.5147	56.07	18.29056	568.1818	591.0909	16.30909	9.718182	16.40909	58.71818	502.1818	1.823636	6.321818	1.282642	0.030909
2:25:02 AM	59.89	120.8936	56.45	18.34151	567	589.4167	16.3	9.833333	16.39167	58.60833	499	1.823333	6.310833	1.281577	0.033333
2:25:17 AM	60.27	136.2405	56.85	18.27733	565.9167	598.25	16.25833	9.833333	16.38333	58.4	498.6667	1.814167	6.283333	1.278903	0.033333
2:25:32 AM	60.60	150.7717	57.209	19.95772	617.3	655.9	17.64	10.59	17.82	67.66	540.1	1.919	8.213	1.45312	0.032
2:25:47 AM	60.93	166.9532	57.54909	19.95335	625.7273	674.9091	17.88182	10.32727	18.05455	67.63636	556.7273	1.884545	8.41	1.471044	0.032727
2:26:02 AM	61.24	181.6441	57.886	19.39522	620.3	679	17.75	9.71	17.92	63.76	565.5	1.785	8.387	1.469096	0.031
2:26:17 AM	61.48	196.3283	58.138	19.41723	621.5	685.8	17.76	9.9	17.88	66.82	566.3	1.855	8.379	1.468419	0.021
2:26:32 AM	61.68	211.0024	58.352	19.12005	619.4	691.5	17.7	9.64	17.87	66.52	572.1	1.844	8.367	1.467405	0.022
2:26:47 AM	61.88	225.6425	58.564	18.70376	617.8	694.3	17.68	9.22	17.84	65.7	583.7	1.823	8.327	1.464015	0.021
2:27:02 AM	62.10	241.746	58.78636	18.2395	617	697.3636	17.69091	8.718182	17.78182	65.61818	598.7273	1.817273	8.326364	1.463956	0.020909
2:27:17 AM	62.30	256.3835	59.004	17.89512	619.2	701	17.73	8.36	17.81	66	613.7	1.819	8.324	1.463749	0.019
2:27:32 AM	62.46	270.9733	59.175	17.88724	613.5	696.3	17.56	8.45	17.72	64.72	602.6	1.796	8.268	1.458982	0.017
2:27:47 AM	62.62	285.559	59.342	18.33053	615.5	696.3	17.61	8.9	17.74	65.25	591.5	1.808	8.263	1.458571	0.017
2:28:02 AM	62.79	301.5954	59.51909	18.72531	619	696.7273	17.69091	9.245455	17.81818	65.91818	584.5455	1.830909	8.254545	1.457854	0.017273
2:28:17 AM	62.97	316.1496	59.706	18.99999	618.6	695.4	17.67	9.54	17.74	65.8	574.3	1.834	8.226	1.45542	0.018
2:28:32 AM	63.16	330.7345	59.907	19.26114	621.9	698	17.73	9.78	17.86	66.55	570.9	1.852	8.262	1.458485	0.021
2:28:47 AM	63.36	346.7786	60.11545	19.09919	620.3636	694.4545	17.74545	9.654545	17.86364	66.7	575.2727	1.863636	8.262727	1.458551	0.019091
2:29:02 AM	63.55	361.3515	60.323	18.88387	619.6	695.2	17.71	9.49	17.88	66.72	580.5	1.856	8.248	1.457296	0.021
2:29:17 AM	63.74	375.9322	60.526	18.65365	620	700.2	17.78	9.2	17.91	66.55	590.9	1.843	8.257	1.458064	0.019
2:29:32 AM	63.91	390.5412	60.705	18.33148	616.9	702.8	17.68	8.96	17.85	66.21	595.2	1.827	8.291	1.460903	0.017
2:29:47 AM	64.08	406.9203	60.88364	18.13297	621.9091	710.6364	17.8	8.672727	17.92727	67.01818	610.8182	1.84	8.624545	1.48901	0.017273
2:30:02 AM	64.23	421.8334	61.034	17.72291	622.6	712.7	17.84	8.17	17.94	66.87	626.5	1.825	8.652	1.491313	0.011
2:30:17 AM	64.32	436.7233	61.135	17.04856	617.1	707.8	17.64	7.61	17.76	65.51	636.8	1.787	8.625	1.488991	0.01
2:30:32 AM	64.42	451.5298	61.234	16.4243	607.1	699.3	17.37	7.22	17.53	63.97	638.6	1.752	8.525	1.480648	0.009
2:30:47 AM	64.49	466.3889	61.315	16.22092	615.6	705.2	17.68	6.81	17.81	65.84	664.2	1.783	8.587	1.48591	0.008
2:31:02 AM	64.57	481.1216	61.39	15.21937	610.1	698.7	17.42	5.92	17.54	63.67	683.4	1.725	8.437	1.473265	0.007
2:31:17 AM	64.64	495.8483	61.465	14.93517	609.7	698	17.4	5.65	17.54	63.83	691.8	1.724	8.43	1.472674	0.008
2:31:32 AM	64.71	510.5114	61.543	14.32892	599.3	688.5	17.13	5.24	17.24	61.98	692.6	1.693	8.355	1.466306	0.008
2:31:47 AM	64.79	526.8084	61.62091	14.75421	617.6364	704.5455	17.66364	5.272727	17.78182	65.37273	714.5455	1.745455	8.535455	1.481552	0.007273
2:32:02 AM	64.86	541.6471	61.7	14.66479	615.9	703	17.64	5.23	17.76	65.16	715	1.744	8.563	1.483867	0.007
2:32:17 AM	64.93	556.4516	61.778	14.47978	611.3	698.7	17.47	5.12	17.6	64	710.9	1.723	8.523	1.480451	0.008
2:32:32 AM	65.01	571.2084	61.859	14.14362	610.8	696.8	17.35	4.6	17.44	62.16	717.6	1.664	8.466	1.475678	0.009
2:32:47 AM	65.08	581.8871	61.93125	13.55914	574.625	663.75	16.4	4.6125	16.5125	57.45	669.25	1.62625	7.2225	1.334832	0.0075
2:33:02 AM															
2:38:47 AM	65.20	16.74481	62.05909	15.2283	662.7273	750.7273	18.75455	4.809091	18.83636	72.05455	780.1818	1.807273	9.655455	1.522255	0.008182
2:39:02 AM	65.27	31.57333	62.13222	15.71323	667.6667	756.4444	18.85556	5.155556	18.88889	72.31111	772.3333	1.812222	10.62667	1.647614	0.006667
2:39:17 AM	65.34	46.40122	62.19889	16.07801	663.8889	757.2222	18.76667	5.6	18.84444	71.98889	753.4444	1.818889	10.62556	1.647543	0.007778
2:39:32 AM	65.40	61.2846	62.27111	16.43148	668.3333	762.8889	18.93333	5.911111	19.02222	73.34444	751.6667	1.846667	10.70778	1.653709	0.008889
2:39:47 AM	65.49	76.10118	62.36	16.78861	658.7778	754.3333	18.66667	6.466667	18.78889	72.05556	721.3333	1.844444	10.60889	1.646287	0.01

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM Dist (ft)	Hammer-M Dist (ft)	Horiz	
2:40:02 AM	160.033	0.598	0.085	20	0.265	12	0.25	43	0.347	0.00406	123	100	0.130	61.59		20
2:40:17 AM	160.283	0.598	0.08	21	0.265	11	0.26	43	0.346	0.00406	123	100	0.130	61.49		20
2:40:32 AM	160.533	0.598	0.09	23	0.27	18	0.27	39	0.357	0.00399	123	100	0.129	61.35		20
2:40:47 AM	160.783	0.598	0.105	23	0.28	20	0.28	39	0.348	0.00406	123	100	0.131	61.19		20
2:41:02 AM	161.033	0.598	0.11	23	0.295	20	0.285	37	0.346	0.0037	122	100	0.131	61.00		20
2:41:17 AM	161.283	0.599	0.11	24	0.29	20	0.27	34	0.327	0.00413	123	100	0.131	60.81		20
2:41:32 AM	161.533	0.599	0.11	23	0.3	18	0.27	32	0.33	0.00406	123	100	0.130	60.62		20
2:41:47 AM	161.783	0.599	0.11	23	0.285	19	0.27	34	0.321	0.00399	123	100	0.130	60.41		20
2:42:02 AM	162.033	0.599	0.11	23	0.275	20	0.265	34	0.325	0.00413	123	100	0.128	60.24		20
2:42:17 AM	162.283	0.599	0.09	24	0.26	20	0.26	37	0.328	0.00457	124	100	0.127	60.11		20
2:42:32 AM	162.533	0.599	0.095	21	0.265	21	0.24	39	0.339	0.00406	123	100	0.126	60.01		20
2:42:47 AM	162.783	0.600	0.095	21	0.26	22	0.23	43	0.329	0.00442	124	100	0.125	59.91		20
2:43:02 AM	163.033	0.600	0.09	37	0.26	21	0.215	43	0.316	0.00421	123	100	0.123	59.82		20
2:43:17 AM	163.283	0.600	0.095	34	0.26	22	0.21	47	0.311	0.00428	123	100	0.125	59.75		20
2:43:32 AM	163.533	0.600	0.095	37	0.265	21	0.21	43	0.317	0.00406	123	100	0.122	59.68		20
2:43:47 AM	163.783	0.600	0.095	37	0.26	23	0.19	47	0.3	0.00421	123	100	0.121	59.61		20
2:44:02 AM	164.033	0.600	0.095	34	0.265	23	0.19	47	0.305	0.00471	124	100	0.125	59.55		20
2:44:17 AM	164.283	0.601	0.1	32	0.27	23	0.19	43	0.31	0.00457	124	100	0.122	59.48		20
2:44:32 AM	164.533	0.601	0.1	34	0.265	23	0.19	47	0.305	0.00421	123	100	0.123	59.42		20
2:44:47 AM	164.783	0.601	0.095	37	0.255	23	0.18	47	0.29	0.0045	124	100	0.122	59.37		20
2:45:02 AM	165.033	0.601	0.1	34	0.255	23	0.18	47	0.29	0.00435	124	100	0.122	59.32		20
2:45:17 AM	165.283	0.601	0.095	34	0.26	23	0.175	51	0.295	0.00464	124	100	0.121	59.27		20
2:45:32 AM	165.533	0.602	0.1	34	0.25	24	0.17	47	0.282	0.00442	124	100	0.121	59.21		20
2:45:47 AM	165.783	0.602	0.095	34	0.255	24	0.17	47	0.286	0.00471	124	100	0.119	59.16		20
2:46:02 AM	166.033	0.602	0.105	34	0.255	23	0.165	47	0.287	0.00435	124	100	0.120	59.10		20
2:46:17 AM	166.283	0.602	0.1	37	0.25	24	0.165	47	0.277	0.00413	123	100	0.121	59.03		20
2:46:32 AM	166.533	0.602	0.095	34	0.25	23	0.165	47	0.282	0.00486	124	100	0.123	58.97		20
2:46:47 AM	166.783	0.602	0.095	34	0.255	23	0.17	47	0.287	0.00479	124	100	0.122	58.92		20
2:47:02 AM	167.033	0.603	0.1	34	0.25	24	0.165	47	0.282	0.0045	124	100	0.122	58.86		20
2:47:17 AM	167.283	0.603	0.095	34	0.25	24	0.165	47	0.282	0.0045	124	100	0.121	58.80		20
2:47:32 AM	167.533	0.603	0.095	37	0.25	24	0.16	51	0.28	0.00435	124	100	0.120	58.75		20
2:47:47 AM	167.783	0.603	0.095	37	0.245	24	0.155	47	0.275	0.00428	123	100	0.122	58.68		20
2:48:02 AM	168.033	0.603	0.095	37	0.245	24	0.155	47	0.274	0.00471	124	100	0.120	58.62		20
2:48:17 AM	168.283	0.603	0.095	37	0.245	24	0.16	47	0.274	0.00421	123	100	0.121	58.56		20
2:48:32 AM	168.533	0.604	0.095	34	0.25	24	0.16	47	0.276	0.00457	124	100	0.121	58.50		20
2:48:47 AM	168.783	0.604	0.09	34	0.245	24	0.16	47	0.271	0.00384	122	100	0.121	58.44		20
2:49:02 AM	169.033	0.604	0.09	37	0.245	23	0.155	43	0.274	0.0045	124	100	0.122	58.38		20
2:49:17 AM	169.283	0.604	0.09	34	0.245	24	0.155	47	0.272	0.00435	124	100	0.121	58.32		20
2:49:32 AM	169.533	0.604	0.09	34	0.25	24	0.15	47	0.276	0.00428	123	100	0.121	58.27		20
2:49:47 AM	169.783	0.604	0.095	34	0.245	24	0.15	47	0.269	0.00406	123	100	0.121	58.20		20
2:50:02 AM	170.033	0.605	0.095	34	0.245	26	0.145	26	0.271	0.00399	123	100	0.121	58.13		20
2:50:17 AM	170.283	0.605	0.09	34	0.245	24	0.145	26	0.266	0.00406	123	100	0.119	58.06		20
2:50:32 AM	170.533	0.605	0.09	37	0.24	24	0.145	26	0.264	0.00399	123	100	0.122	58.00		20
2:50:47 AM	170.783	0.605	0.095	32	0.25	24	0.15	26	0.274	0.00442	124	100	0.121	57.94		20
2:51:02 AM	171.033	0.605	0.09	37	0.25	23	0.15	26	0.268	0.00479	124	100	0.123	57.88		20

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
2:40:02 AM	65.57	90.92304	62.45	17.36788	661.6667	756.6667	18.72222	7	18.81111	72.61111	706.7778	1.858889	10.61667	1.646873	0.01
2:40:17 AM	65.68	105.7108	62.55778	18.21182	661.2222	751.4444	18.75556	7.8	18.82222	72.53333	679.3333	1.875556	10.56667	1.64308	0.014444
2:40:32 AM	65.81	122.1233	62.7	19.07031	659.5	743.2	18.65	8.76	18.72	72.34	645.5	1.886	10.543	1.641256	0.015
2:40:47 AM	65.98	136.9291	62.87556	19.94524	667.3333	742.1111	18.87778	9.477778	18.92222	74.25556	631.7778	1.931111	10.59333	1.645082	0.021111
2:41:02 AM	66.16	151.7688	63.06889	20.24431	669.5556	737.3333	18.93333	9.811111	18.95556	75.17778	625.8889	1.951111	10.64333	1.648858	0.022222
2:41:17 AM	66.36	166.6067	63.27222	20.27438	668.2222	730.1111	18.86667	9.933333	18.94444	75.08889	621.3333	1.958889	10.64111	1.648662	0.022222
2:41:32 AM	66.56	181.4435	63.47889	20.42002	668.3333	731.5556	18.88889	10.06667	18.94444	75.05556	617.3333	1.957778	10.63889	1.648527	0.024444
2:41:47 AM	66.76	196.2621	63.69889	20.25434	668.5556	734.7778	18.9	9.911111	18.94444	75.14444	623.4444	1.952222	10.61222	1.646518	0.023333
2:42:02 AM	66.93	211.0727	63.87556	19.14364	664.1111	734.6667	18.73333	8.877778	18.78889	73.58889	650.4444	1.903333	10.6	1.645612	0.017778
2:42:17 AM	67.07	225.8347	64.02	17.2634	661	740.1111	18.67778	7.033333	18.74444	72.5	708.1111	1.851111	10.52889	1.640226	0.013333
2:42:32 AM	67.17	240.5916	64.12556	15.98144	657.1111	741.3333	18.53333	5.811111	18.62222	71.42222	742.1111	1.814444	10.52111	1.639652	0.011111
2:42:47 AM	67.27	256.9353	64.232	15.46981	652.5	740.4	18.43	5.36	18.49	70.44	751.1	1.796	10.452	1.634373	0.011
2:43:02 AM	67.36	271.5908	64.31778	14.51393	642.8889	731.1111	18.2	4.6	18.26667	69.08889	765.6667	1.771111	10.37333	1.62839	0.007778
2:43:17 AM	67.43	286.3309	64.39667	14.38244	658.8889	746	18.58889	4.155556	18.64444	71.27778	799	1.785556	10.49667	1.637794	0.008889
2:43:32 AM	67.51	300.9933	64.47444	13.66222	640.5556	727.8889	18.15556	3.722222	18.21111	67.68889	790.2222	1.733333	10.38333	1.629151	0.008889
2:43:47 AM	67.57	315.6128	64.54222	13.24648	634.6667	723.3333	18	3.466667	18.03333	67.35556	793	1.727778	10.32111	1.624392	0.006667
2:44:02 AM	67.64	332.0009	64.611	14.00463	655.6	741.7	18.55	3.83	18.57	71.08	807	1.773	10.51	1.638807	0.007
2:44:17 AM	67.70	346.6367	64.67889	13.37753	642.6667	727.7778	18.21111	3.422222	18.25556	68.7	803.6667	1.746667	10.34556	1.626205	0.007778
2:44:32 AM	67.76	361.3372	64.74222	13.2673	649.2222	737.4444	18.41111	3.2	18.43333	69.68889	820.5556	1.753333	10.43889	1.633384	0.006667
2:44:47 AM	67.81	375.9844	64.79778	12.84162	639.7778	727.3333	18.15556	2.944444	18.17778	68.07778	816.7778	1.731111	10.36111	1.627473	0.005556
2:45:02 AM	67.87	390.6543	64.85444	13.19406	641.5556	729	18.21111	3.3	18.24444	68.88889	808.6667	1.75	10.39444	1.629985	0.006667
2:45:17 AM	67.92	406.9378	64.911	13.21035	639.8	727.9	18.14	3.33	18.18	67.79	804	1.721	10.373	1.628354	0.006
2:45:32 AM	67.98	421.5741	64.97	12.8205	638.8889	725.5556	18.14444	2.966667	18.16667	68.06667	816.2222	1.733333	10.34556	1.626249	0.005556
2:45:47 AM	68.03	436.1178	65.02778	12.57836	627.4444	715.4444	17.78889	2.977778	17.83333	65.71111	801	1.695556	10.21222	1.61597	0.007778
2:46:02 AM	68.09	450.6935	65.09	12.72383	635.2222	722.3333	18.04444	2.933333	18.06667	67.18889	812.4444	1.715556	10.25778	1.61952	0.006667
2:46:17 AM	68.16	466.9077	65.157	12.96622	636.4	724.3	18.07	3.2	18.12	67.68	806.4	1.726	10.283	1.621417	0.007
2:46:32 AM	68.22	481.6189	65.22222	13.45624	652.6667	738.8889	18.53333	3.366667	18.55556	70.26667	821.7778	1.754444	10.45444	1.63458	0.006667
2:46:47 AM	68.28	496.2841	65.28333	13.12275	649	734.1111	18.4	3.077778	18.46667	69.15556	824.7778	1.736667	10.38778	1.629466	0.006667
2:47:02 AM	68.34	510.9753	65.34333	13.3151	650.1111	736.2222	18.42222	3.333333	18.46667	69.95556	820.2222	1.752222	10.42556	1.63236	0.006667
2:47:17 AM	68.39	525.6453	65.40111	12.79818	644.1111	730.7778	18.25556	2.933333	18.31111	68.78889	825.8889	1.735556	10.39444	1.629998	0.006667
2:47:32 AM	68.45	541.907	65.463	12.682	637.3	726.9	18.08	2.95	18.13	67.76	817.1	1.723	10.345	1.626175	0.006
2:47:47 AM	68.51	556.6286	65.52889	13.29072	645.4444	734	18.31111	3.422222	18.34444	69.33333	812.6667	1.742222	10.47	1.635729	0.007778
2:48:02 AM	68.58	571.2782	65.59667	13.07515	639.3333	729.6667	18.12222	3.322222	18.18889	68.1	807.4444	1.724444	10.36556	1.627735	0.007778
2:48:17 AM	68.64	585.9687	65.66111	12.90156	645	733.3333	18.28889	3.022222	18.31111	68.76667	824.4444	1.728889	10.42444	1.632277	0.006667
2:48:32 AM	68.70	600.8522	65.72889	12.79592	644.5556	735.4444	18.3	2.944444	18.33333	68.95556	827.8889	1.731111	10.70889	1.653718	0.007778
2:48:47 AM	68.76	615.9337	65.79	13.08616	644.1111	736	18.26667	3.266667	18.32222	68.87778	816.6667	1.727778	11.00333	1.675725	0.006667
2:49:02 AM	68.82	631.0464	65.85	13.12717	650.3333	742.5556	18.44444	3.233333	18.52222	70.34444	827.4444	1.748889	11.05	1.679194	0.006667
2:49:17 AM	68.88	646.1571	65.91333	13.11947	647.3333	742.2222	18.33333	3.3	18.44444	69.72222	821	1.735556	11.04667	1.678963	0.006667
2:49:32 AM	68.94	661.2811	65.97333	12.80806	648	740.7778	18.42222	2.877778	18.44444	69.16667	835	1.728889	11.06778	1.680441	0.006667
2:49:47 AM	69.01	676.4072	66.04333	13.0049	648.5556	744.6667	18.38889	3.177778	18.47778	69.91111	827.8889	1.74	11.07	1.680682	0.008889
2:50:02 AM	69.08	691.4571	66.11667	12.84036	646.8889	743.4444	18.34444	3.044444	18.4	69.42222	830.2222	1.727778	10.95556	1.672207	0.007778
2:50:17 AM	69.15	706.4425	66.19222	12.37791	641.1111	738.2222	18.18889	2.711111	18.2	68	834.6667	1.707778	10.86	1.665052	0.008889
2:50:32 AM	69.21	721.726	66.26222	13.24277	654.1111	751.8889	18.5	3.377778	18.64444	71.26667	829.2222	1.754444	11.30889	1.698164	0.006667
2:50:47 AM	69.27	737.0752	66.32333	13.07934	652.5556	749.5556	18.46667	3.211111	18.54444	70.46667	832	1.738889	11.40778	1.705467	0.006667
2:51:02 AM	69.33	750.8094	66.3825	13.44737	660.625	757.875	18.675	3.45	18.85	72.475	834.75	1.765	11.56375	1.716779	0.0075

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
2:51:17 AM	171.283	0.606	0.09	34	0.25	24	0.15	26	0.269	0.0045	124	100	0.122	57.83	20	
2:51:32 AM	171.533	0.606	0.09	32	0.24	24	0.15	27	0.262	0.00435	124	100	0.122	57.77	20	
2:51:47 AM	171.783	0.606	0.09	34	0.235	24	0.15	24	0.262	0.00442	124	100	0.121	57.70	20	
2:52:02 AM	172.033	0.606	0.085	34	0.245	26	0.15	26	0.268	0.00493	125	100	0.121	57.64	20	
2:52:17 AM	172.283	0.606	0.085	34	0.245	24	0.15	26	0.267	0.00471	124	100	0.122	57.58	20	
2:52:32 AM	172.533	0.606	0.09	34	0.24	24	0.15	26	0.262	0.00442	124	100	0.121	57.51	20	
2:52:47 AM	172.783	0.607	0.085	34	0.24	24	0.15	26	0.262	0.00457	124	100	0.121	57.44	20	
2:53:02 AM	173.033	0.607	0.085	32	0.24	24	0.15	26	0.262	0.00479	124	100	0.122	57.38	20	
2:53:17 AM	173.283	0.607	0.085	34	0.245	24	0.155	39	0.264	0.00457	124	100			20	
2:54:02 AM	174.033	0.607	0.09	32	0.255	24	0.15	26	0.271	0.00464	124	100	0.122	57.29	20	
2:54:17 AM	174.283	0.608	0.085	37	0.25	26	0.155	26	0.265	0.00486	124	100	0.122	57.21	20	
2:54:32 AM	174.533	0.608	0.09	32	0.255	23	0.15	26	0.276	0.00486	124	100	0.122	57.15	20	
2:54:47 AM	174.783	0.608	0.085	32	0.24	24	0.15	26	0.255	0.00508	125	100	0.120	57.08	20	
2:55:02 AM	175.033	0.608	0.085	34	0.25	24	0.15	26	0.269	0.00508	125	100	0.119	57.00	20	
2:55:17 AM	175.283	0.608	0.085	34	0.25	23	0.16	27	0.268	0.00515	125	100	0.122	56.93	20	
2:55:32 AM	175.533	0.608	0.085	34	0.25	24	0.16	27	0.269	0.00442	124	100	0.122	56.86	20	
2:55:47 AM	175.783	0.609	0.085	34	0.24	23	0.16	26	0.258	0.00464	124	100	0.120	56.78	20	
2:56:02 AM	176.033	0.609	0.085	34	0.245	23	0.155	26	0.26	0.00464	124	100	0.121	56.71	20	
2:56:17 AM	176.283	0.609	0.08	32	0.245	23	0.16	26	0.261	0.00479	124	100	0.119	56.63	20	
2:56:32 AM	176.533	0.609	0.085	30	0.24	24	0.155	27	0.258	0.00435	124	100	0.122	56.54	20	
2:56:47 AM	176.783	0.609	0.085	32	0.235	23	0.155	26	0.247	0.00457	124	100	0.120	56.45	20	
2:57:02 AM	177.033	0.610	0.085	34	0.235	23	0.155	26	0.247	0.00464	124	100	0.120	56.36	20	
2:57:17 AM	177.283	0.610	0.085	32	0.235	23	0.165	27	0.249	0.00471	124	100	0.121	56.27	20	
2:57:32 AM	177.533	0.610	0.085	32	0.24	23	0.165	26	0.251	0.00508	125	100	0.120	56.18	20	
2:57:47 AM	177.783	0.610	0.085	30	0.235	23	0.17	26	0.247	0.005	125	100	0.120	56.09	20	
2:58:02 AM	178.033	0.610	0.085	20	0.245	22	0.175	27	0.259	0.00508	125	100	0.121	56.01	20	
2:58:17 AM	178.283	0.610	0.08	32	0.24	23	0.175	26	0.256	0.00486	124	100	0.120	55.92	20	
2:58:32 AM	178.533	0.611	0.085	20	0.24	22	0.17	26	0.251	0.00457	124	100	0.119	55.82	20	
2:58:47 AM	178.783	0.611	0.08	20	0.23	22	0.165	26	0.245	0.00479	124	100	0.119	55.73	20	
2:59:02 AM	179.033	0.611	0.08	20	0.235	22	0.165	26	0.246	0.00486	124	100	0.120	55.63	20	
2:59:17 AM	179.283	0.611	0.08	20	0.235	22	0.17	26	0.246	0.00471	124	100	0.120	55.53	20	
2:59:32 AM	179.533	0.611	0.08	27	0.24	21	0.17	26	0.253	0.00428	123	100	0.117	55.42	20	
2:59:47 AM	179.783	0.611	0.08	21	0.235	22	0.175	26	0.247	0.005	125	100	0.118	55.32	20	
3:00:02 AM	180.033	0.612	0.085	24	0.235	21	0.175	26	0.248	0.00493	125	100	0.118	55.22	20	
3:00:17 AM	180.283	0.612	0.075	24	0.24	20	0.175	26	0.256	0.00471	124	100	0.120	55.11	20	
3:00:32 AM	180.533	0.612	0.08	21	0.24	20	0.18	26	0.25	0.00464	124	100	0.118	54.98	20	
3:00:47 AM	180.783	0.612	0.075	20	0.235	20	0.18	26	0.247	0.005	125	100	0.118	54.84	20	
3:01:02 AM	181.033	0.612	0.07	20	0.235	20	0.18	26	0.251	0.00486	124	100	0.120	54.70	20	
3:01:17 AM	181.283	0.612	0.07	21	0.24	21	0.175	26	0.252	0.005	125	100	0.119933	54.56422	20	
0.126064815	181.5333	0.61265	0.075	34	0.235	21	0.165	24	0.245	0.00486	124	100	0.116737	54.44174	20	
0.126238426	181.7833	0.612824	0.065	20	0.23	21	0.16	26	0.241	0.00479	124	100	0.117028	54.32344	20	
0.126412037	182.0333	0.612998	0.065	20	0.225	23	0.155	26	0.233	0.00508	125	100	0.116075	54.21705	20	
0.126585648	182.2833	0.613171	0.07	19	0.23	22	0.155	26	0.24	0.00515	125	100	0.116798	54.12682	20	
0.126759259	182.5333	0.613345	0.065	32	0.22	23	0.145	26	0.228	0.00537	125	100	0.116578	54.04049	20	
0.12693287	182.7833	0.613519	0.065	30	0.225	23	0.145	26	0.228	0.00529	125	100	0.113693	53.97237	20	

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
2:51:17 AM	69.38	766.1733	66.44	13.00372	653	753.1111	18.47778	3.211111	18.63333	71.17778	835.3333	1.75	11.43	1.707094	0.006667
2:51:32 AM	69.44	781.5733	66.50111	13.37954	655	756	18.5	3.555556	18.72222	71.54444	825.5556	1.75	11.48556	1.711115	0.006667
2:51:47 AM	69.51	796.9321	66.57222	12.93487	649.4444	750.1111	18.35556	3.188889	18.54444	70.2	830	1.731111	11.42333	1.706533	0.007778
2:52:02 AM	69.58	810.6151	66.64125	13.26244	651.375	753.875	18.4	3.475	18.6375	71.05	822.5	1.745	11.475	1.710375	0.00875
2:52:17 AM	69.64	825.9895	66.71	13.31942	657.6667	757	18.6	3.433333	18.77778	72.08889	833.5556	1.757778	11.44667	1.708269	0.007778
2:52:32 AM	69.71	841.375	66.78222	13.24721	655.8889	755.5556	18.51111	3.433333	18.73333	71.58889	831.2222	1.748889	11.46333	1.709497	0.007778
2:52:47 AM	69.78	856.6909	66.85444	13.06156	653	753.4444	18.45556	3.333333	18.64444	71.12222	832.6667	1.744444	11.35667	1.701767	0.008889
2:53:02 AM	69.84	868.6639	66.92	13.20312	660.2857	758	18.62857	3.3	18.84286	72.02857	841	1.747143	11.47571	1.710421	0.007143
2:53:17 AM															
2:54:02 AM	69.93	15.88335	67.013	13.28094	664.2	758.7	18.76	3.34	18.94	72.93	846.7	1.758	10.629	1.588335	0.008
2:54:17 AM	70.01	31.59175	67.09444	13.09128	667.2222	761.2222	18.85556	3.1	19.02222	73.25556	859.2222	1.764444	11.96222	1.745378	0.008889
2:54:32 AM	70.08	45.52987	67.16875	13.30463	668.25	761.75	18.8625	3.3	19.0625	73.6875	853.375	1.76875	11.91875	1.742266	0.00875
2:54:47 AM	70.15	61.11904	67.24222	12.72903	655.4444	752.2222	18.53333	3.011111	18.66667	71.18889	848.7778	1.738889	11.77667	1.732129	0.008889
2:55:02 AM	70.23	76.66943	67.32111	12.4567	649.5556	746.5556	18.41111	2.822222	18.5	70	847.8889	1.721111	11.71778	1.727822	0.008889
2:55:17 AM	70.30	90.577	67.3975	13.10582	663.5	759.375	18.75	3.2375	18.975	73.05	851.5	1.75625	11.865	1.738446	0.00875
2:55:32 AM	70.38	106.239	67.47333	13.14125	669.4444	761.8889	18.95556	3.166667	19.1	74.01111	863.1111	1.772222	11.89	1.740224	0.008889
2:55:47 AM	70.46	121.9127	67.56	12.97794	662.6667	758.5556	18.75556	3.022222	18.96667	71.03333	855.1111	1.714444	11.90778	1.741517	0.01
2:56:02 AM	70.53	135.8431	67.63875	12.66801	659.5	762.5	18.725	3.1125	18.8125	72.5375	861.25	1.75	11.905	1.741309	0.00875
2:56:17 AM	70.61	151.4753	67.72	12.73786	655.8889	756.7778	18.62222	3.1	18.78889	71.16667	851.8889	1.725556	11.84444	1.736906	0.01
2:56:32 AM	70.71	167.1667	67.81778	13.43924	670.4444	761.8889	18.96667	3.466667	19.16667	74.03333	854.5556	1.764444	11.93556	1.743486	0.011111
2:56:47 AM	70.80	181.0684	67.915	12.96691	664.5	758.5	18.825	3.2	18.9125	72.7125	859.625	1.75125	11.855	1.737722	0.01125
2:57:02 AM	70.89	196.7363	68.01	13.088	662.6667	759.3333	18.78889	3.355556	18.97778	72.61111	852.5556	1.744444	11.89889	1.740873	0.011111
2:57:17 AM	70.98	210.6387	68.105	12.9469	661.625	766.125	18.8125	3.4625	18.9375	73.575	857	1.76375	11.85625	1.737798	0.01125
2:57:32 AM	71.07	226.3044	68.19556	12.50325	655.5556	768.4444	18.61111	3.344444	18.68889	72.55556	859	1.747778	11.89556	1.740637	0.011111
2:57:47 AM	71.16	241.923	68.29333	12.39771	650.6667	768.8889	18.48889	3.377778	18.6	72.5	853.5556	1.751111	11.82222	1.735399	0.011111
2:58:02 AM	71.25	255.855	68.385	12.9706	666.25	766.5	18.9	3.425	19.0625	74.0125	863.75	1.76625	11.9075	1.741497	0.01
2:58:17 AM	71.34	271.4733	68.47889	13.05895	667.3333	766.6667	18.96667	3.388889	19.07778	72.72222	864.1111	1.737778	11.82222	1.735367	0.011111
2:58:32 AM	71.44	287.0744	68.58444	12.80112	660.8889	762.7778	18.78889	3.4	18.85556	72.73333	860.3333	1.747778	11.79556	1.733458	0.012222
2:58:47 AM	71.54	300.9682	68.68375	12.93186	662.25	766.125	18.85	3.525	18.8625	72.925	859.375	1.74875	11.84125	1.736728	0.0125
2:59:02 AM	71.64	316.6688	68.79	13.30345	674.4444	770.2222	19.14444	3.5	19.22222	73.43333	869	1.742222	11.95	1.744506	0.012222
2:59:17 AM	71.75	330.5992	68.90125	13.38954	672.625	765.625	19.075	3.7	19.175	74.0625	862	1.76125	11.905	1.741306	0.01375
2:59:32 AM	71.85	346.136	69.01222	12.79795	652.5556	757	18.55556	3.644444	18.62222	70.93333	844.3333	1.72	11.69556	1.726308	0.012222
2:59:47 AM	71.96	361.6789	69.12556	12.88132	653.8889	761.8889	18.58889	3.822222	18.68889	71.83333	844	1.734444	11.70556	1.726988	0.012222
3:00:02 AM	72.06	375.5333	69.2325	13.39459	668.75	762.75	19.0125	3.8625	19.0625	72.3375	855.875	1.73	11.7725	1.731803	0.01375
3:00:17 AM	72.18	391.1203	69.35222	13.94056	675.3333	764.2222	19.17778	4.355556	19.26667	74.72222	849.7778	1.771111	11.77333	1.731885	0.014444
3:00:32 AM	72.31	406.6982	69.48889	13.89602	678.8889	763.4444	19.26667	4.266667	19.27778	73.36667	857.7778	1.74	11.75889	1.730881	0.015556
3:00:47 AM	72.45	420.5135	69.635	14.02511	665.875	757.625	18.9375	4.7875	19.0375	73.65	829.5	1.7575	11.70375	1.726913	0.01875
3:01:02 AM	72.59	436.1537	69.78222	14.30853	678.3333	766.6667	19.28889	4.866667	19.33333	76.1	844.2222	1.793333	11.85556	1.737798	0.016667
3:01:17 AM	72.737	451.7817	69.93333	14.10066	676.1111	769.4444	19.21111	4.788889	19.33333	76.1	846.3333	1.793333	11.83667	1.736444	0.016667
0.126064815	72.8636	465.5945	70.065	13.20469	658	763	18.6875	4.25	18.7625	72.35	840.625	1.73375	11.7	1.726603	0.015
0.126238426	72.98594	481.1386	70.19222	13.00676	664	772.4444	18.87778	3.888889	18.95556	72.95556	859.5556	1.732222	11.70667	1.727118	0.014444
0.126412037	73.09601	496.6974	70.30667	12.21416	653	780.6667	18.58889	3.322222	18.68889	71.98889	865.3333	1.72	11.73	1.728756	0.011111
0.126585648	73.1894	510.5574	70.40375	11.84116	656.375	793.5	18.7125	2.8625	18.8625	73.075	885.25	1.72875	11.7825	1.732499	0.01125
0.126759259	73.27878	526.1663	70.49667	11.4846	658.4444	799.8889	18.76667	2.322222	18.93333	72.97778	901	1.722222	11.80778	1.734329	0.01
0.12693287	73.34933	541.7264	70.57	10.51207	641.8889	795.3333	18.21111	1.844444	18.28889	69.54444	898.3333	1.67	11.73222	1.728901	0.007778

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
0.127106481	183.0333	0.613692	0.065	32	0.22	24	0.145	27	0.224	0.00471	124	100	0.111509	53.90633		20
0.127280093	183.2833	0.613866	0.065	32	0.22	24	0.145	26	0.224	0.00493	125	100	0.115053	53.84468		20
0.127453704	183.5333	0.614039	0.06	30	0.215	26	0.14	27	0.216	0.00493	125	100	0.113804	53.78769		20
0.127627315	183.7833	0.614213	0.06	30	0.215	26	0.14	27	0.217	0.00566	126	100	0.114231	53.73406		20
0.127800926	184.0333	0.614387	0.055	32	0.215	24	0.135	27	0.216	0.00544	125	100	0.112069	53.6834		20
0.127974537	184.2833	0.61456	0.055	34	0.22	24	0.135	26	0.225	0.00537	125	100	0.112868	53.63198		20
0.128148148	184.5333	0.614734	0.055	28	0.23	23	0.13	27	0.233	0.00551	126	100	0.112876	53.57941		20
0.128321759	184.7833	0.614907	0.055	30	0.215	26	0.13	27	0.216	0.00544	125	100	0.111357	53.52452		20
0.12849537	185.0333	0.615081	0.05	32	0.215	24	0.13	28	0.216	0.00515	125	100	0.11089	53.47016		20
0.128668981	185.2833	0.615255	0.055	34	0.205	26	0.13	43	0.206	0.00551	126	100	0.111523	53.41246		20
0.128842593	185.5333	0.615428	0.055	34	0.225	26	0.135	43	0.225	0.00537	125	100	0.113319	53.36301		20
0.129016204	185.7833	0.615602	0.05	57	0.155	26	0.1	47	0.155	0.00384	122	100				20

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
0.127106481	73.41775	557.1777	70.64111	9.49946	626.1111	790.3333	17.72222	1.277778	17.78889	67.02222	900	1.636667	11.56444	1.716808	0.007778
0.127280093	73.48163	571.0662	70.7075	10.36772	652.25	812.5	18.5	1.525	18.55	71.475	923.125	1.6875	11.8325	1.736064	0.0075
0.127453704	73.54071	586.6123	70.76889	10.13733	641	809.1111	18.23333	1.566667	18.3	70.04444	910.6667	1.675556	11.71	1.727348	0.006667
0.127627315	73.59631	602.1585	70.82667	10.17842	644.6667	810.5556	18.31111	1.522222	18.38889	70.67778	915.5556	1.682222	11.71	1.727354	0.006667
0.127800926	73.64884	615.9389	70.88125	9.959002	637	800.5	18.05	1.3625	18.1125	68.125	906.5	1.6425	11.64375	1.722544	0.00625
0.127974537	73.70218	631.4756	70.93667	9.946112	641.5556	809.5556	18.18889	1.366667	18.25556	69.2	916.1111	1.653333	11.69556	1.726301	0.006667
0.128148148	73.75672	647.0025	70.99333	9.657074	638	810.6667	18.1	1.244444	18.13333	69.31111	919.2222	1.66	11.68111	1.725217	0.006667
0.128321759	73.81367	660.7962	71.0525	9.238635	627.875	806	17.825	1.0875	17.8625	67.5625	913.875	1.63375	11.66625	1.724204	0.0075
0.12849537	73.87009	676.2762	71.11111	9.333699	627.3333	803.5556	17.83333	1.055556	17.91111	67.1	910.4444	1.627778	11.60778	1.720004	0.006667
0.128668981	73.92999	691.8201	71.17333	9.585993	633	810.2222	17.98889	1.111111	18.06667	67.97778	912.8889	1.638889	11.70667	1.727096	0.006667
0.128842593	73.98134	702.1974	71.22667	9.813709	642.8333	820.3333	18.3	1.2	18.36667	70.28333	925.5	1.668333	11.74167	1.729552	0.006667
0.129016204															

SLT-A-14-2

Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
1:14:55 AM	74.917	0.407	0.0519	27	0.106	9.8	0.107	12	0.148	0.00152	114	100	0.084	89.42		60
1:15:10 AM	75.167	0.407	0.0594	30	0.101	9.8	0.106	11	0.148	0.00138	114	100	0.099	88.43		60
1:15:25 AM	75.417	0.407	0.0913	24	0.125	12	0.124	12	0.179	0.00116	112	100	0.098	87.35		60
1:15:40 AM	75.667	0.407	0.0981	26	0.121	13	0.123	12	0.174	0.00109	111	57	0.098	86.48		60
1:15:55 AM	75.917	0.408	0.0981	27	0.118	13	0.12	11	0.175	0.00138	114	100	0.096	85.79		60
1:16:10 AM	76.167	0.408	0.0944	30	0.111	12	0.119	11	0.171	0.00138	114	85	0.096	85.06		60
1:16:25 AM	76.417	0.408	0.0863	30	0.104	11	0.114	9	0.158	0.00131	113	100	0.103	84.29		60
1:16:40 AM	76.667	0.408	0.0725	28	0.0894	10	0.103	9.1	0.138	0.00102	111	85	0.096	83.14		60
1:16:55 AM	76.917	0.408	0.0669	28	0.0894	11	0.101	9.3	0.138	0.00138	114	100	0.108	82.21		60
1:17:10 AM	77.167	0.409	0.0725	28	0.0894	11	0.0963	9.1	0.137	0.00123	113	100	0.112	81.70		60
1:17:25 AM	77.417	0.409	0.0713	28	0.0863	11	0.101	11	0.137	0.00087	110	100	0.123	81.41		60
1:17:40 AM	77.667	0.409	0.0619	28	0.0913	12	0.102	9.3	0.14	0.00123	113	100	0.101	80.99		60
1:17:55 AM	77.917	0.409	0.0519	18	0.0688	11	0.08	13	0.107	0.00167	115	100	0.099	79.94		60
1:18:10 AM	78.167	0.409	0.06	18	0.08	11	0.0969	12	0.12	0.00167	115	100	0.096	78.75		60
1:18:25 AM	78.417	0.409	0.045	17	0.0781	10	0.0994	12	0.117	0.0016	115	100	0.096	77.71		60
1:18:40 AM	78.667	0.410	0.0481	17	0.0713	11	0.0919	12	0.107	0.00174	116	100	0.097	76.93		60
1:18:55 AM	78.917	0.410	0.0375	30	0.055	8	0.0669	12	0.0811	0.00167	115	100	0.100	75.96		60
1:19:10 AM	79.167	0.410	0.035	30	0.0544	7.9	0.0656	9.7	0.0806	0.00181	116	100	0.101	74.69		60
1:19:25 AM	79.417	0.410	0.0338	14	0.0669	14	0.0706	12	0.0792	0.00181	116	100	0.100	73.59		60
1:19:40 AM	79.667	0.410	0.0375	14	0.07	14	0.113	11	0.12	0.00181	116	100	0.101	72.78		60
1:19:55 AM	79.917	0.410	0.05	24	0.0694	11	0.128	12	0.136	0.00189	116	100	0.097	72.15		60
1:20:10 AM	80.167	0.411	0.0506	21	0.0681	10	0.131	12	0.14	0.00203	117	100	0.097	71.61		60
1:20:25 AM	80.417	0.411	0.0419	15	0.0744	11	0.115	13	0.122	0.00174	116	100	0.097	71.10		60
1:20:40 AM	80.667	0.411	0.0344	13	0.0744	11	0.109	13	0.113	0.00181	116	100	0.094	70.52		60
1:20:55 AM	80.917	0.411	0.0331	13	0.0713	12	0.109	13	0.112	0.00189	116	57	0.094	69.92		60
1:21:10 AM	81.167	0.411	0.0356	15	0.0669	12	0.109	13	0.114	0.00189	116	100	0.093	69.24		60
1:21:25 AM	81.417	0.411	0.04	13	0.0594	11	0.129	12	0.137	0.00174	116	100	0.093	68.64		60
1:21:40 AM	81.667	0.412	0.0369	13	0.0575	11	0.129	12	0.137	0.00196	117	100	0.092	68.12		60
1:21:55 AM	81.917	0.412	0.03	32	0.0575	11	0.126	12	0.133	0.00203	117	100	0.091	67.63		60
1:22:10 AM	82.167	0.412	0.0288	32	0.0575	11	0.114	13	0.116	0.00189	116	100	0.090	67.10		60
1:22:25 AM	82.417	0.412	0.03	19	0.0556	10	0.112	13	0.113	0.00189	116	100	0.090	66.52		60
1:22:40 AM	82.667	0.412	0.0275	30	0.0638	13	0.0825	12	0.0888	0.00181	116	100	0.088	65.96		60
1:24:25 AM	84.417	0.414	0.0419	18	0.0731	13	0.126	14	0.131	0.00138	114	100	0.069	65.30		60
1:24:40 AM	84.667	0.414	0.0381	18	0.0706	13	0.121	13	0.123	0.0016	115	100	0.071	64.91		60
1:38:40 AM	98.667	0.423	0.0738	17	0.0875	15	0.177	13	0.187	0.0021	117	100	0.068	64.63		60
1:38:55 AM	98.917	0.424	0.0625	20	0.0744	14	0.151	13	0.155	0.00189	116	100	0.068	64.40		60
1:39:10 AM	99.167	0.424	0.0519	18	0.0756	13	0.142	13	0.146	0.0021	117	100	0.068	64.22		60
1:39:25 AM	99.417	0.424	0.0506	23	0.0744	13	0.139	13	0.143	0.00203	117	100	0.070	64.03		60
1:39:40 AM	99.667	0.424	0.0494	27	0.0744	13	0.148	13	0.152	0.00218	118	100	0.069	63.84		60
1:39:55 AM	99.917	0.424	0.0525	17	0.0763	14	0.143	12	0.148	0.00239	118	100	0.067	63.67		60
1:40:10 AM	100.167	0.425	0.0506	30	0.0738	14	0.14	13	0.144	0.00225	118	100	0.068	63.50		60
1:40:25 AM	100.417	0.425	0.05	32	0.0731	13	0.134	13	0.139	0.0016	115	100	0.069	63.31		60
1:40:40 AM	100.667	0.425	0.05	32	0.0756	13	0.132	13	0.137	0.00196	117	100	0.069	63.12		60
1:40:55 AM	100.917	0.425	0.0475	30	0.075	13	0.13	13	0.135	0.00232	118	100	0.068	62.93		60
1:41:10 AM	101.167	0.425	0.055	30	0.075	13	0.132	12	0.138	0.00189	116	100	0.067	62.75		60

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
1:14:55 AM	80.99	16.00723	54.4	16.80117	510.2	512	12.78	10.26	12.78	46.06	358	1.784	3.52	3.201445	0.2
1:15:10 AM	81.89	30.84435	55.736	22.08263	645.8	647.4	16.36	13.25	16.36	65.17	429.2	2.318	8.562	1.483712	0.163
1:15:25 AM	82.91	45.53268	57.214	22.68044	656	658.6	16.58	13.77	16.58	66.16	425.1	2.271	8.386	1.468833	0.143
1:15:40 AM	83.74	60.5616	58.41636	20.94522	661.7273	662.5455	16.89091	11.87273	16.89091	67.46364	508.2727	2.038182	7.219091	1.366265	0.088182
1:15:55 AM	84.41	76.51704	59.375	19.63564	652.4167	654	16.725	10.65	16.725	65.625	542.25	1.9375	6.815833	1.32962	0.083333
1:16:10 AM	85.14	91.39952	60.40182	20.18869	657.0909	659.1818	16.63636	11.22727	16.63636	66.83636	522.6364	2.02	7.069091	1.352953	0.097273
1:16:25 AM	85.92	105.6775	61.5	22.54343	695.75	697.125	17.55	13.15	17.55	77.6875	506.75	2.365	7.3775	1.784749	0.1375
1:16:40 AM	87.11	128.959	63.15	22.63868	663.5	664.4	16.85	13.54	16.85	70.09	444.4	2.348	7.62	2.328147	0.186
1:16:55 AM	88.09	137.1097	64.5	25.78064	740.4	742.2	18.7	15.74	18.7	90.04	472.4	2.902	10.904	1.63014	0.228
1:17:10 AM	88.64	151.8007	65.25	26.07112	768.5	772.5	19.4	15.7	19.4	98.2	516	2.965	5.605	7.345522	0.165
1:17:25 AM	88.95	171.8007	65.67	28.97694	847	856	21.5	17.5	21.5	120.5	564	3.37	13.9	20	0.16
1:17:40 AM	89.42	181.9388	66.305	23.71876	705	709.5	17.86667	14.08333	17.86667	81.53333	483.5	2.586667	11.19167	1.689682	0.188333
1:17:55 AM	90.59	196.1136	67.875	24.97826	707.125	709.75	18	15.25	18	81.175	443	2.86625	12.345	1.771854	0.24375
1:18:10 AM	91.97	210.8302	69.7	24.64552	690	693.875	17.4625	15.225	17.5	78.5625	418.125	2.985	13.32625	1.839575	0.20625
1:18:25 AM	93.20	225.9976	71.32222	23.46632	703	704.7778	17.78889	13.84444	17.8	80.86667	488.1111	2.54	11.13222	1.685266	0.177778
1:18:40 AM	94.15	241.4504	72.55556	24.09655	718.5556	720.8889	18.16667	14.21111	18.16667	83.76667	494.1111	2.578889	11.58444	1.716972	0.111111
1:18:55 AM	95.37	257.5674	74.125	27.2073	745.375	750.125	18.875	16.8625	18.875	91.4875	430	3.31	16.065	2.014626	0.25
1:19:10 AM	97.00	272.5714	76.21429	28.74203	762.7143	768.5714	19.25714	18.24286	19.25714	96.17143	403.7143	3.615714	15.45714	2.143423	0.285714
1:19:25 AM	98.47	285.6587	78.08333	28.89464	769.8333	772.8333	19.38333	18.43333	19.38333	97.35	409.8333	3.69	9.143333	2.181221	0.291667
1:19:40 AM	99.60	300.912	79.5	28.52739	782	787.8	19.74	17.82	19.74	101.14	449.4	3.298	10.316	3.050654	0.25
1:19:55 AM	100.51	315.8982	80.63875	24.92511	776.75	782	19.575	14.2625	19.575	95.5	574.25	2.45375	13.83625	1.873278	0.13875
1:20:10 AM	101.29	330.5791	81.61125	24.75615	794.125	794.5	19.875	13.8625	19.875	97.4625	609.375	2.3475	13.255	1.835118	0.11125
1:20:25 AM	102.06	347.1129	82.55556	24.54729	787.1111	789.1111	19.68889	13.74444	19.68889	97.03333	603.2222	2.414444	13.28444	1.837088	0.111111
1:20:40 AM	102.94	362.2059	83.6425	25.87844	764.875	770.75	19.1875	15.4	19.1875	94.3875	511.625	2.57375	14.0275	1.886621	0.1425
1:20:55 AM	103.89	377.4192	84.8075	25.6496	772.125	777.875	19.2625	15.075	19.2625	95.4625	530.375	2.62	14.2575	1.901666	0.1575
1:21:10 AM	104.99	390.9227	86.15286	25.63819	774.5714	778.2857	19.21429	15	19.21429	94.97143	531.4286	2.622857	14.67857	1.929066	0.181429
1:21:25 AM	105.97	405.9541	87.35375	24.09716	779.5	785.125	19.325	13.525	19.325	96.3375	598.875	2.45625	13.91375	1.878926	0.14875
1:21:40 AM	106.87	420.6066	88.44	23.13396	792.5	793.5	19.5375	12.2625	19.5375	97.7	656.375	2.3375	13.2025	1.831565	0.1275
1:21:55 AM	107.75	437.1003	89.50222	22.86532	779.8889	780.8889	19.06667	12.3	19.06667	95.23333	636.1111	2.355556	13.21889	1.83264	0.124444
1:22:10 AM	108.71	452.3242	90.65	23.72991	786	788.625	19.1625	13.225	19.1625	96.575	613.125	2.50875	14.2775	1.902976	0.15
1:22:25 AM	109.81	465.8963	91.97143	24.16677	786.1429	791.4286	19.07143	13.62857	19.07143	97.12857	593.2857	2.614286	14.83143	1.938882	0.185714
1:22:40 AM	110.94	482.153	93.3125	24.5941	773.25	779.25	18.6	14.2625	18.6	95.2	546.375	2.83875	16.32625	2.032087	0.1875
1:24:25 AM	112.31	15.77773	94.94182	15.16165	629	634.4545	14.81818	7.581818	14.81818	59.47273	616	1.867273	7.985455	1.434339	0.123636
1:24:40 AM	113.14	27.90392	95.9225	17.13362	650.625	655	15.2875	9.225	15.2875	64.975	580.75	1.77	8.94875	1.515774	0.08625
1:38:40 AM	113.79	16.68731	96.68692	9.516079	590.8462	653.7692	15.58462	3.4	15.58462	59.83846	820.5385	1.828462	6.332308	1.283639	0.061538
1:38:55 AM	114.32	30.9524	97.30364	10.30398	579.0909	626.9091	15.34545	3.954545	15.34545	59.86364	769.9091	1.52	6.469091	1.296826	0.043636
1:39:10 AM	114.74	46.6041	97.80583	11.0081	582.25	633.75	15.39167	4.225	15.39167	60.46667	748.1667	1.535833	6.5475	1.304309	0.044167
1:39:25 AM	115.19	61.04056	98.33364	11.64034	602.3636	647.7273	15.83636	4.445455	15.83636	64.20909	761.1818	1.59	6.632727	1.312405	0.047273
1:39:40 AM	115.66	76.6971	98.88	11.30053	605.3333	644.5833	15.825	4.083333	15.825	63.19167	776.5833	1.5875	6.551667	1.304712	0.0475
1:39:55 AM	116.11	91.05481	99.40909	11.53846	608.3636	650.7273	15.72727	3.863636	15.73636	61.01818	766.9091	1.640909	6.557273	1.305246	0.045455
1:40:10 AM	116.54	105.5026	99.91273	12.18574	605.3636	650.7273	15.79091	4.272727	15.8	63.18182	741.8182	1.649091	6.643636	1.313437	0.047273
1:40:25 AM	117.05	121.3522	100.5	12.77078	609.4167	638.5	15.83333	4.658333	15.83333	64.96667	725.3333	1.6225	6.721667	1.320798	0.0525
1:40:40 AM	117.57	135.9887	101.1127	13.32881	611	636	15.96364	4.809091	15.96364	64.89091	710.7273	1.629091	6.826364	1.330591	0.054545
1:40:55 AM	118.10	150.5608	101.7218	13.07148	604.1818	636.8182	15.92727	4.7	15.92727	64.11818	712.2727	1.621818	6.763636	1.324734	0.055455
1:41:10 AM	118.63	166.384	102.3425	12.77343	595.3333	645.5833	15.94167	4.525	15.94167	63.36667	715.25	1.615	6.698333	1.318601	0.0525

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
1:41:25 AM	101.417	0.425	0.0513	34	0.0725	13	0.129	12	0.135	0.00218	118	100	0.068	62.57		60
1:41:40 AM	101.667	0.426	0.0488	34	0.0738	13	0.127	13	0.132	0.00218	118	100	0.068	62.34		60
1:41:55 AM	101.917	0.426	0.0469	18	0.0738	13	0.122	13	0.128	0.00189	116	100	0.065	62.11		60
1:42:10 AM	102.167	0.426	0.0431	28	0.0738	13	0.115	12	0.121	0.00181	116	100	0.065	61.89		60
1:42:25 AM	102.417	0.426	0.0425	18	0.0725	13	0.114	13	0.122	0.00189	116	100	0.066	61.71		60
1:42:40 AM	102.667	0.426	0.045	39	0.0738	14	0.118	13	0.124	0.00218	118	100	0.064	61.57		60
1:42:55 AM	102.917	0.426	0.045	39	0.07	15	0.121	13	0.126	0.00218	118	100	0.063	61.46		60
1:43:10 AM	103.167	0.427	0.0469	39	0.0669	15	0.121	13	0.125	0.00203	117	100	0.062	61.35		60
1:43:25 AM	103.417	0.427	0.0469	37	0.07	15	0.118	13	0.122	0.00218	118	100	0.064	61.24		60
1:43:40 AM	103.667	0.427	0.045	34	0.0806	15	0.107	13	0.118	0.00196	117	100	0.065	61.16		60

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
1:41:25 AM	119.17	181.0717	102.9691	13.8198	603.3636	646.1818	16.07273	4.936364	16.07273	64.98182	688.6364	1.659091	6.876364	1.335246	0.061818
1:41:40 AM	119.87	196.0993	103.7709	14.88931	602.5455	649	16.01818	5.454545	16.01818	65.67273	645.2727	1.704545	7.212727	1.366147	0.078182
1:41:55 AM	120.64	211.3928	104.6664	14.46981	583.3636	620.9091	15.32727	5.336364	15.32727	60.99091	615.8182	1.640909	7.480909	1.390319	0.082727
1:42:10 AM	121.40	226.7035	105.5382	14.57307	591.7273	640.7273	15.45455	5.418182	15.45455	61.78182	625.0909	1.650909	7.499091	1.391879	0.076364
1:42:25 AM	122.05	241.4201	106.2782	14.09758	611.0909	665.6364	15.91818	5.118182	16.00909	64.31818	680	1.758182	6.904545	1.337879	0.058182
1:42:40 AM	122.57	255.7891	106.8809	13.10949	604.1818	657.0909	15.42727	4.6	15.75455	60.59091	691.9091	1.609091	6.568182	1.306265	0.051818
1:42:55 AM	123.02	271.4275	107.3967	13.14199	607	662.4167	15.5	4.508333	15.83333	60.99167	696.25	1.609167	6.535833	1.303202	0.041667
1:43:10 AM	123.44	285.7899	107.8791	13.10859	600.9091	665.8182	15.65455	4.272727	15.72727	59.10909	697.2727	1.998182	6.561818	1.305676	0.043636
1:43:25 AM	123.94	301.7029	108.4475	14.28128	614.0833	671.9167	15.90833	5.058333	16.01667	63.29167	675.6667	1.714167	6.778333	1.326078	0.0525
1:43:40 AM	124.31	307.1393	108.8675	15.49702	619.5	683	16.25	5.675	16.25	65.7	648	1.7275	7.135	1.359103	0.0525

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
9:11:46	591.77	13:02:10	0.26	20	0.38	13	0.62	37	0.668	0.00239	118	100	0.076	60.47	10	
9:12:01	592.02	13:02:25	0.16	20	0.32	13	0.68	39	0.709	0.00341	121	43	0.080	59.74	10	
9:12:16	592.27	13:02:40	0.14	21	0.32	14	0.66	37	0.703	0.00268	119	100	0.077	58.98	10	
9:12:31	592.52	13:02:55	0.16	22	0.28	14	0.62	39	0.675	0.0029	120	100	0.075	58.20	10	
9:12:46	592.77	13:03:10	0.16	22	0.3	13	0.62	43	0.69	0.00239	118	100	0.074	57.45	10	
9:13:01	593.02	13:03:25	0.16	26	0.3	14	0.58	43	0.645	0.00225	118	100	0.074	56.74	10	
9:13:16	593.27	13:03:40	0.14	24	0.3	14	0.62	43	0.666	0.0021	117	100	0.074	55.96	10	
9:13:31	593.52	13:03:55	0.14	32	0.28	14	0.62	43	0.666	0.00203	117	100	0.074	55.21	10	
9:13:46	593.77	13:04:10	0.14	43	0.26	20	0.54	43	0.576	0.00225	118	73	0.075	54.52	10	
9:14:01	594.02	13:04:25	0.14	43	0.28	18	0.56	39	0.609	0.00196	117	100	0.074	53.95	10	
9:14:16	594.27	13:04:40	0.14	30	0.3	14	0.64	39	0.684	0.00232	118	100	0.075	53.37	10	
9:14:31	594.52	13:04:55	0.14	20	0.3	17	0.58	39	0.644	0.00239	118	100	0.073	52.76	10	
9:14:46	594.77	13:05:10	0.14	26	0.3	17	0.52	39	0.601	0.00268	119	100	0.072	52.04	10	
9:15:01	595.02	13:05:25	0.14	27	0.3	15	0.46	47	0.529	0.00276	120	100	0.071	51.28	10	
9:15:16	595.27	13:05:40	0.14	28	0.28	15	0.34	43	0.417	0.00261	119	100	0.071	50.54	10	
9:15:31	595.52	13:05:55	0.14	30	0.3	15	0.28	43	0.356	0.00239	118	100	0.070	49.69	10	
9:15:46	595.77	13:06:10	0.14	32	0.28	14	0.2	26	0.308	0.00254	119	100	0.069	48.87	10	
9:16:01	596.02	13:06:25	0.16	64	0.32	14	0.28	28	0.368	0.00261	119	100	0.068	48.06	10	
9:16:16	596.27	13:06:40	0.14	32	0.3	15	0.2	37	0.317	0.00239	118	73	0.068	47.27	10	
9:16:31	596.52	13:06:55	0.12	39	0.36	26	0.22	21	0.376	0.00261	119	64	0.072	46.67	10	
9:16:46	596.77	13:07:10	0.12	64	0.38	16	0.24	22	0.393	0.0029	120	57	0.075	46.31	10	
9:17:01	597.02	13:07:25	0.12	43	0.36	16	0.24	24	0.374	0.0029	120	51	0.075	45.94	10	
9:17:16	597.27	13:07:40	0.14	43	0.36	16	0.26	30	0.374	0.00334	121	51	0.074	45.61	10	
9:17:31	597.52	13:07:55	0.14	64	0.34	100	0.26	30	0.368	0.00341	121	51	0.074	45.29	10	
9:17:46	597.77	13:08:10	0.22	43	0.36	16	0.28	23	0.371	0.00297	120	57	0.074	45.00	10	
9:18:01	598.02	13:08:25	0.24	39	0.28	15	0.3	30	0.331	0.00247	119	100	0.074	44.66	10	
9:18:16	598.27	13:08:40	0.14	26	0.28	16	0.36	28	0.369	0.00326	121	15	0.077	44.41	10	
9:18:31	598.52	13:08:55	0.16	26	0.28	16	0.36	28	0.369	0.00247	119	37	0.078	44.21	10	
9:18:46	598.77	13:09:10	0.16	26	0.28	17	0.34	27	0.377	0.00225	118	73	0.079	44.01	10	
9:19:01	599.02	13:09:25	0.16	26	0.28	17	0.38	26	0.393	0.00232	118	100	0.079	43.81	10	
9:19:16	599.27	13:09:40	0.16	24	0.3	17	0.38	26	0.409	0.00261	119	73	0.079	43.62	10	
9:19:31	599.52	13:09:55	0.18	26	0.3	17	0.4	26	0.418	0.00261	119	51	0.079	43.45	10	
9:19:46	599.77	13:10:10	0.32	18	0.38	34	0.46	26	0.5	0.00326	121	100	0.079	43.29	10	
9:20:01	600.02	13:10:25	0.28	30	0.34	17	0.44	26	0.462	0.00261	119	100	0.078	43.16	10	
9:20:16	600.27	13:10:40	0.28	17	0.36	39	0.48	27	0.52	0.0029	120	64	0.077	43.04	10	
9:20:31	600.52	13:10:55	0.32	18	0.36	23	0.54	27	0.586	0.00261	119	73	0.076	42.92	10	
9:20:46	600.77	13:11:10	0.28	20	0.36	17	0.56	26	0.594	0.00254	119	100	0.076	42.79	10	
9:21:01	601.02	13:11:25	0.26	19	0.36	17	0.56	26	0.6	0.00247	119	73	0.076	42.67	10	
9:21:16	601.27	13:11:40	0.26	16	0.34	16	0.58	24	0.625	0.00268	119	73	0.076	42.57	10	
9:21:31	601.52	13:11:55	0.28	17	0.34	20	0.68	23	0.738	0.00268	119	100	0.077	42.47	10	
9:21:46	601.77	13:12:10	0.26	19	0.34	20	0.7	23	0.753	0.00254	119	100	0.077	42.37	10	
9:22:01	602.02	13:12:25	0.24	19	0.32	19	0.68	22	0.728	0.00239	118	100	0.077	42.27	10	
9:22:16	602.27	13:12:40	0.22	19	0.32	17	0.66	22	0.7	0.00247	119	100	0.077	42.17	10	
9:22:31	602.52	13:12:55	0.22	19	0.3	17	0.66	21	0.7	0.00239	118	100	0.077	42.06	10	
9:22:46	602.77	13:13:10	0.22	17	0.3	19	0.66	21	0.695	0.00334	121	100	0.077	41.94	10	

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
9:11:46	91.61	106.095	91.06636	15.29092	597.2727	601	13.47273	2.072727	13.59091	48.41818	528.4545	1.495455	7.066364	1.351963	0.066364
9:12:01	92.34	121.1483	91.80091	16.94092	639.2727	644.0909	14.7	2.236364	14.79091	54.12727	554.4545	1.582727	7.256364	1.368478	0.067273
9:12:16	93.11	135.5656	92.57182	17.22584	642.4545	642.4545	14.92727	2.045455	14.92727	50.78182	555.4545	1.503636	6.614545	1.310665	0.071818
9:12:31	93.90	151.2166	93.36667	16.90908	635.6667	635.6667	14.725	2.016667	14.725	49.925	553	1.5025	6.5475	1.304254	0.066667
9:12:46	94.65	165.5837	94.12364	16.83849	635.1818	635.1818	14.72727	1.990909	14.72727	49.63636	555.2727	1.498182	6.566364	1.306101	0.064545
9:13:01	95.37	181.3008	94.84833	16.84066	636	636	14.76667	1.966667	14.76667	50.05	557.5	1.504167	6.605	1.309759	0.064167
9:13:16	96.16	195.7917	95.64364	17.0222	642.6364	642.6364	14.91818	1.954545	14.91818	50.69091	563	1.511818	6.685455	1.31735	0.071818
9:13:31	96.92	211.6292	96.4075	16.77111	644.5833	644.5833	14.98333	1.641667	14.98333	50.85833	576.9167	1.493333	6.711667	1.31979	0.0625
9:13:46	97.61	226.3763	97.10091	17.02207	666.0909	666.0909	15.55455	1.381818	15.55455	53.17273	610.5455	1.512727	6.934545	1.340649	0.056364
9:14:01	98.19	241.1086	97.68364	16.68393	666.5455	666.5455	15.54545	1.118182	15.54545	52.87273	623.4545	1.501818	6.92	1.339302	0.052727
9:14:16	98.79	255.9259	98.27818	16.84085	677.5455	677.5455	15.82727	0.963636	15.82727	54.41818	639.1818	1.52	7.003636	1.347028	0.055455
9:14:31	99.40	270.6723	98.89455	17.07026	670.6364	670.6364	15.63636	1.290909	15.63636	53.2	616.3636	1.504545	6.933636	1.340574	0.058182
9:14:46	100.13	286.65	99.63333	17.15444	659.75	659.75	15.36667	1.516667	15.36667	52.29167	592.0833	1.5025	6.835833	1.331477	0.066667
9:15:01	100.90	301.2125	100.4	17.069	649.5455	649.5455	15.10909	1.636364	15.10909	51.26364	575.3636	1.490909	6.754545	1.323869	0.066364
9:15:16	101.65	315.8237	101.1591	17.29903	653.7273	653.7273	15.24545	1.7	15.24545	51.7	576	1.492727	6.801818	1.328291	0.073636
9:15:31	102.52	331.7546	102.0292	17.20557	655	655	15.24167	1.666667	15.24167	51.71667	580.6667	1.493333	6.794167	1.327572	0.074167
9:15:46	103.34	346.3098	102.86	17.20195	650.0909	650.0909	15.13636	1.781818	15.13636	50.9	571.9091	1.496364	6.747273	1.323199	0.072727
9:16:01	104.17	360.8046	103.6918	17.16404	648.6364	648.6364	15.12727	1.763636	15.12727	50.87273	571.5455	1.514545	6.689091	1.31771	0.076364
9:16:16	104.98	376.7992	104.5	16.82859	659.5833	659.5833	15.36667	1.183333	15.36667	51.46667	604.25	1.474167	6.851667	1.332887	0.066667
9:16:31	105.59	390.6082	105.117	16.71457	700.2	700.2	16.49	0.21	16.49	57.89	691.7	1.563	7.376	1.380895	0.041
9:16:46	105.96	406.1265	105.4827	16.6788	726.7273	726.7273	17.2	-0.23636	17.2	62.42727	746.4545	1.64	7.710909	1.410759	0.034545
9:17:01	106.33	421.6782	105.8618	16.82495	727.4545	727.4545	17.29091	-0.08182	17.29091	62.8	745.0909	1.656364	7.745455	1.41379	0.033636
9:17:16	106.67	435.8025	106.203	16.88804	725.9	725.9	17.25	-0.04	17.25	62.35	739.6	1.649	7.73	1.412427	0.031
9:17:31	106.99	451.3385	106.5264	16.89806	721.9091	721.9091	17.14545	0.072727	17.14545	62.36364	731.2727	1.657273	7.729091	1.412361	0.03
9:17:46	107.30	465.5235	106.829	16.7833	726.6	726.6	17.28	-0.02	17.28	63.31	745.4	1.668	7.799	1.418507	0.03
9:18:01	107.64	481.2034	107.17	15.66607	724.2727	724.2727	17.22727	-0.56364	17.22727	63.31818	783.3636	1.662727	7.879091	1.425441	0.030909
9:18:16	107.89	495.8086	107.428	16.23851	762.4	762.4	18.08	-0.7	18.08	68.31	832.1	1.73	8.286	1.460516	0.021
9:18:31	108.10	510.5846	107.636	16.08803	779.4	779.4	18.45	-1	18.45	70.73	868.8	1.755	8.488	1.477601	0.021
9:18:46	108.31	525.532	107.844	15.85829	794.6	794.6	18.82	-1.4	18.82	72.53	906.7	1.764	8.693	1.494747	0.021
9:19:01	108.51	540.5746	108.049	15.97485	806.2	806.2	19.14	-1.5	19.14	73.54	926	1.772	8.808	1.504261	0.019
9:19:16	108.70	555.6422	108.238	16.05428	809	809	19.23	-1.49	19.23	73.94	929.2	1.778	8.838	1.506752	0.019
9:19:31	108.88	570.6566	108.42	15.95184	802.3	802.3	19.08	-1.33	19.08	73.54	920.7	1.776	8.774	1.501448	0.018
9:19:46	109.04	585.6139	108.577	15.63729	788.8	788.8	18.85	-1.29	18.85	73.37	910.4	1.775	8.705	1.495728	0.014
9:20:01	109.17	600.6045	108.714	15.53332	782.8	782.8	18.82	-1.14	18.82	72.89	907.2	1.776	8.745	1.499055	0.013
9:20:16	109.30	615.5135	108.84	15.439	776.1	776.1	18.62	-1.11	18.62	70.88	896.5	1.757	8.647	1.490898	0.012
9:20:31	109.42	631.8291	108.9645	15.08153	761.7273	761.7273	18.3	-1.11818	18.3	69.35455	883.5455	1.734545	8.555455	1.483241	0.012727
9:20:46	109.55	646.7241	109.095	14.86329	741.1	741.1	18.29	-0.93	18.29	70.19	870.8	1.75	8.63	1.489495	0.012
9:21:01	109.67	661.6183	109.218	15.12107	748.4	748.4	18.31	-0.83	18.31	70.07	869.1	1.75	8.629	1.489421	0.012
9:21:16	109.78	676.5261	109.325	15.38053	757.3	757.3	18.44	-0.79	18.44	70.21	873.1	1.754	8.646	1.490788	0.01
9:21:31	109.88	691.4428	109.425	15.62718	766	766.3	18.47	-0.69	18.47	70.97	873.6	1.764	8.656	1.491664	0.01
9:21:46	109.98	706.3611	109.525	15.82326	762.1	762.1	18.46	-0.51	18.46	71.27	861.9	1.768	8.658	1.491831	0.01
9:22:01	110.09	721.3699	109.631	16.24726	770.6	770.6	18.67	-0.42	18.67	72.12	862.3	1.78	8.767	1.500877	0.011
9:22:16	110.19	736.3395	109.736	16.19544	759.4	764.3	18.28	-0.13	18.46	72.03	838.3	1.778	8.72	1.496968	0.011
9:22:31	110.31	751.3116	109.851	16.20586	747.9	765.5	18.05	0.31	18.48	71.96	817.7	1.779	8.723	1.497203	0.011
9:22:46	110.42	766.2366	109.97	16.47251	752.1	760.2	18.1	0.24	18.34	71.8	813.7	1.777	8.666	1.492502	0.012

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
9:23:01	603.02	13:13:25	0.22	20	0.3	19	0.66	20	0.703	0.00493	125	6.2	0.076	41.83		10
9:23:16	603.27	13:13:40	0.22	21	0.32	19	0.66	21	0.703	0.00283	120	100	0.077	41.73		10
9:23:31	603.52	13:13:55	0.2	22	0.34	18	0.64	21	0.681	0.00297	120	100	0.077	41.63		10
9:23:46	603.77	13:14:10	0.2	22	0.34	20	0.64	21	0.678	0.00334	121	100	0.077	41.54		10
9:24:01	604.02	13:14:25	0.2	17	0.32	20	0.64	20	0.681	0.00363	122	100	0.076	41.46		10
9:24:16	604.27	13:14:40	0.2	24	0.34	20	0.64	21	0.672	0.00363	122	100	0.076	41.36		10
9:24:31	604.52	13:14:55	0.2	20	0.34	19	0.64	21	0.678	0.0037	122	100	0.077	41.25		10
9:24:46	604.77	13:15:10	0.2	24	0.34	20	0.66	21	0.691	0.00334	121	100	0.077	41.15		10
9:25:01	605.02	13:15:25	0.18	17	0.34	19	0.66	21	0.695	0.00355	122	100	0.077	41.04		10
9:25:16	605.27	13:15:40	0.18	24	0.34	19	0.66	21	0.695	0.00363	122	100	0.077	40.94		10
9:25:31	605.52	13:15:55	0.18	20	0.34	19	0.66	21	0.695	0.00341	121	100	0.076	40.83		10
9:25:46	605.77	13:16:10	0.16	18	0.34	20	0.66	22	0.685	0.00326	121	100	0.076	40.71		10
9:26:01	606.02	13:16:25	0.16	18	0.34	20	0.66	21	0.681	0.00297	120	100	0.076	40.59		10
9:26:16	606.27	13:16:40	0.16	17	0.34	20	0.66	22	0.681	0.00247	119	100	0.075	40.46		10
9:26:31	606.52	13:16:55	0.16	18	0.34	20	0.66	22	0.678	0.00232	118	100	0.076	40.34		10
9:26:46	606.77	13:17:10	0.16	18	0.36	20	0.68	22	0.698	0.00247	119	100	0.075	40.21		10
9:27:01	607.02	13:17:25	0.14	18	0.36	20	0.68	22	0.698	0.00276	120	100	0.074717	40.0521		10
9:27:16	607.27	13:17:40	0.14	17	0.34	22	0.66	23	0.678	0.00247	119	100	0.071319	39.88786		10
9:27:31	607.52	13:17:55	0.14	17	0.34	21	0.68	23	0.698	0.00254	119	100	0.070526	39.73686		10
9:27:46	607.77	13:18:10	0.14	17	0.34	21	0.66	23	0.676	0.00218	118	100	0.069621	39.57868		10
9:28:01	608.02	13:18:25	0.14	17	0.36	21	0.68	24	0.69	0.00225	118	100	0.069304	39.39725		10
9:28:16	608.27	13:18:40	0.12	17	0.36	21	0.66	24	0.707	0.00261	119	100	0.069556	39.18564		10
9:28:31	608.52	13:18:55	0.1	24	0.34	23	0.74	34	0.782	0.0037	122	100	0.069403	38.97472		10
9:28:46	608.77	13:19:10	0.1	43	0.4	24	0.76	37	0.803	0.00348	122	100	0.069365	38.77882		10
9:29:01	609.02	13:19:25	0.12	64	0.38	24	0.8	37	0.844	0.00573	126	57	0.069617	38.55541		10
9:29:16	609.27	13:19:40	0.14	100	0.4	23	0.78	37	0.837	0.00406	123	100	0.06922	38.35386		10
9:29:31	609.52	13:19:55	0.14	28	0.38	23	0.76	37	0.809	0.00355	122	100	0.068958	38.14897		10
9:29:46	609.77	13:20:10	0.14	100	0.36	23	0.76	37	0.792	0.00326	121	100	0.068811	37.9396		10
9:30:01	610.02	13:20:25	0.12	23	0.38	24	0.72	37	0.752	0.00297	120	100	0.06851	37.72234		10
9:30:16	610.27	13:20:40	0.12	34	0.36	24	0.74	37	0.771	0.00312	121	100	0.068119	37.52691		10
9:30:31	610.52	13:20:55	0.16	100	0.46	26	0.82	37	0.888	0.00312	121	100	0.068174	37.33155		10
9:30:46	610.77	13:21:10	0.16	27	0.42	20	0.74	37	0.8	0.00261	119	100	0.068257	37.11071		10
9:31:01	611.02	13:21:25	0.16	30	0.4	23	0.72	37	0.775	0.00225	118	100	0.069133	36.94702		10
9:31:16	611.27	13:21:40	0.14	27	0.34	22	0.66	34	0.719	0.00225	118	100	0.069396	36.78882		10
9:31:31	611.52	13:21:55	0.16	26	0.34	22	0.66	37	0.723	0.00225	118	51	0.070062	36.63041		10
9:31:46	611.77	13:22:10	0.16	27	0.36	22	0.68	34	0.749	0.00239	118	100	0.070802	36.47267		10
9:32:01	612.02	13:22:25	0.14	51	0.38	22	0.72	23	0.741	0.00225	118	85	0.072261	36.32171		10
9:32:16	612.27	13:22:40	0.16	51	0.38	21	0.72	23	0.737	0.00218	118	100	0.073758	36.19483		10
9:32:31	612.52	13:22:55	0.14	27	0.34	23	0.62	26	0.628	0.00196	117	100	0.074189	36.1218		10

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
9:23:01	110.54	781.0837	110.082	16.38293	738.4	751.1	17.77	0.53	18.11	71.07	790.9	1.771	8.573	1.484716	0.011
9:23:16	110.64	796.061	110.19	16.74183	749.6	764.6	18.01	0.59	18.43	72.32	797.6	1.782	8.729	1.49772	0.011
9:23:31	110.74	811.0399	110.29	16.77319	741	765.3	17.83	0.96	18.48	72.7	781	1.786	8.731	1.497897	0.009
9:23:46	110.83	826.0122	110.38	17.24739	749.7	767.7	18.04	0.94	18.48	72.72	779.7	1.79	8.723	1.497232	0.009
9:24:01	110.92	840.9331	110.469	17.6431	755.1	760.8	18.19	0.61	18.28	71.83	775.8	1.783	8.661	1.492085	0.009
9:24:16	111.02	855.878	110.571	18.07881	767.1	767.1	18.38	0.63	18.38	72.08	778.5	1.791	8.69	1.494491	0.011
9:24:31	111.13	870.8951	110.679	18.42242	777.9	777.9	18.61	0.66	18.61	73.2	785	1.805	8.777	1.501712	0.011
9:24:46	111.24	885.9346	110.785	18.63923	783.4	783.4	18.7	0.72	18.7	73.39	785.7	1.803	8.804	1.503946	0.01
9:25:01	111.34	900.926	110.892	18.56244	780.5	780.6	18.61	0.76	18.61	72.87	782.3	1.793	8.746	1.499144	0.011
9:25:16	111.45	915.9191	110.997	18.68642	783	783	18.66	0.84	18.66	72.9	782	1.802	8.748	1.499311	0.011
9:25:31	111.56	930.9321	111.113	18.81173	783.4	783.4	18.64	0.98	18.64	72.83	776.9	1.805	8.772	1.501295	0.012
9:25:46	111.68	945.882	111.233	18.62778	776.6	776.7	18.39	0.98	18.39	71.36	767.6	1.785	8.696	1.494996	0.012
9:26:01	111.81	960.8246	111.362	18.61307	775.9	775.9	18.37	0.99	18.37	71.72	766.7	1.788	8.687	1.494251	0.013
9:26:16	111.94	975.7428	111.493	18.53116	776.5	776.5	18.37	0.9	18.37	71.07	770.4	1.775	8.658	1.491827	0.013
9:26:31	112.07	990.7136	111.62	18.49378	781.6	781.6	18.47	0.74	18.47	71.68	780.7	1.779	8.721	1.497074	0.013
9:26:46	112.20	1005.632	111.749	18.35622	777.6	777.6	18.38	0.74	18.38	71.04	778.5	1.772	8.658	1.491838	0.014
9:27:01	112.3622	1021.946	111.9164	18.30225	772.1818	772.1818	18.21818	0.845455	18.21818	70.48182	769	1.761818	8.553636	1.483115	0.016364
9:27:16	112.5312	1036.424	112.086	17.34017	740	740	17.43	0.69	17.43	64.41	743.4	1.675	8.138	1.447809	0.016
9:27:31	112.6866	1050.803	112.242	17.03281	731.3	731.3	17.12	0.64	17.12	63.16	734.6	1.655	8.022	1.43786	0.015
9:27:46	112.8494	1066.529	112.4055	16.66581	725.0909	725.1818	16.96364	0.372727	16.96364	61.72727	736.3636	1.630909	7.927273	1.429637	0.015455
9:28:01	113.0362	1080.796	112.593	16.43199	722.7	722.7	16.86	0.34	16.86	61.37	738.9	1.619	7.894	1.426728	0.021
9:28:16	113.2542	1096.569	112.8118	16.42939	725.9091	725.9091	16.98182	0.290909	16.98182	62.05455	746.8182	1.628182	7.975455	1.433859	0.020909
9:28:31	113.4715	1110.869	113.03	16.27213	721.9	722	16.93	0.27	16.93	62.02	746.8	1.633	7.931	1.430012	0.02
9:28:46	113.6734	1126.618	113.2327	16.14786	721.3636	721.3636	16.99091	0.209091	16.99091	62.17273	753.2727	1.634545	7.950909	1.431742	0.02
9:29:01	113.9038	1141.003	113.464	16.02055	723.4	723.4	17.08	0.11	17.08	62.88	763.5	1.642	8.029	1.438489	0.022
9:29:16	114.1117	1156.831	113.6727	15.81966	718.1818	718.1818	17.01818	0	17.01818	62.39091	763.5455	1.627273	8.033636	1.438896	0.019091
9:29:31	114.3232	1171.23	113.885	15.85166	720.8	720.8	17.03	0.02	17.03	62.15	765.4	1.629	8.046	1.439963	0.021
9:29:46	114.5394	1185.618	114.102	15.8858	721	721	17.08	-0.04	17.08	62.12	766.2	1.624	8.032	1.438759	0.022
9:30:01	114.7638	1201.422	114.3273	15.73833	717.8182	717.8182	17.05455	-0.08182	17.05455	61.81818	767.6364	1.616364	8.008182	1.436704	0.02
9:30:16	114.9657	1215.743	114.53	15.50217	710.7	710.7	16.95	-0.21	16.95	61.33	765.5	1.603	7.956	1.432185	0.02
9:30:31	115.1677	1231.555	114.7327	15.4014	710.8182	710.8182	16.98182	-0.26364	16.98182	61.64545	770.6364	1.607273	8.016364	1.4374	0.02
9:30:46	115.3961	1245.981	114.962	15.32779	712.2	713.6	16.95	-0.35	16.95	62.04	773.6	1.613	8.077	1.44263	0.021
9:31:01	115.5655	1260.504	115.132	15.61799	723.7	724	17.19	-0.26	17.19	63.83	783.2	1.644	8.19	1.452314	0.015
9:31:16	115.7292	1276.531	115.2964	15.7091	738.3636	738.3636	17.4	-0.39091	17.4	64.5	802.3636	1.651818	8.244545	1.456957	0.015455
9:31:31	115.8932	1291.212	115.461	15.7764	752.6	752.6	17.75	-0.55	17.75	65.93	827.3	1.67	8.376	1.468114	0.016
9:31:46	116.0566	1305.986	115.625	15.70447	758.7	758.7	17.9	-0.64	17.9	67.52	841.8	1.687	8.486	1.477413	0.017
9:32:01	116.213	1320.948	115.782	15.95916	777.8	777.8	18.3	-0.74	18.3	70.52	866.4	1.719	8.711	1.496187	0.014
9:32:16	116.3446	1336.073	115.914	16.13271	792	792	18.64	-0.84	18.64	73.64	886.9	1.751	8.908	1.512508	0.013
9:32:31	116.4203	1337.595	115.99	16.40513	807	807	19.1	-1.1	19.1	74.6	909	1.76	9.02	1.521686	0.02

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
1:20:14	80.23	10:50:48	0.015	100	0.075	9.3	0.045	22	0.0791	0.00116	112	100	0.053	116.15	100	
1:20:29	80.48	10:51:03	0.025	47	0.08	14	0.045	20	0.0862	0.00051	105	100	0.055	115.02	100	
1:20:44	80.73	10:51:18	0.04	47	0.08	16	0.045	20	0.0862	0.00058	106	100	0.055	114.62	100	
1:20:59	80.98	10:51:33	0.035	47	0.085	16	0.045	21	0.0908	0.00073	108	100	0.054	114.29	100	
1:21:14	81.23	10:51:48	0.025	47	0.075	14	0.045	28	0.0832	0.00073	108	100	0.049	113.91	100	
1:21:29	81.48	10:52:03	0.02	43	0.065	13	0.04	23	0.0675	0.00051	105	100	0.045	113.33	100	
1:21:44	81.73	10:52:18	0.015	100	0.06	13	0.035	17	0.0626	0.00036	102	100	0.043	112.53	100	
1:21:59	81.98	10:52:33	0.015	100	0.05	13	0.03	17	0.0532	0.00051	105	100	0.042	111.63	100	
1:22:14	82.23	10:52:48	0.01	100	0.05	14	0.03	16	0.052	0.00036	102	100	0.043	110.68	100	
1:22:29	82.48	10:53:03	0.015	100	0.05	15	0.03	37	0.0512	0.00044	104	100	0.043	109.77	100	
1:22:44	82.73	10:53:18	0.015	100	0.045	15	0.03	37	0.0485	0.00051	105	100	0.044	108.89	100	
1:22:59	82.98	10:53:33	0.015	100	0.055	15	0.04	34	0.0568	0.00051	105	100	0.045	108.06	100	
1:23:14	83.23	10:53:48	0.015	100	0.055	12	0.04	37	0.0568	0.00051	105	100	0.046	107.35	100	
1:23:29	83.48	10:54:03	0.02	51	0.055	13	0.04	34	0.0561	0.00051	105	73	0.046	106.75	100	
1:23:44	83.73	10:54:18	0.02	51	0.06	14	0.04	37	0.0634	0.00051	105	100	0.046	106.20	100	
1:23:59	83.98	10:54:33	0.02	57	0.07	14	0.035	43	0.0718	0.00051	105	100	0.047	105.75	100	
1:24:14	84.23	10:54:48	0.02	57	0.075	15	0.035	47	0.0766	0.00058	106	100	0.047	105.35	100	
1:24:29	84.48	10:55:03	0.015	100	0.08	15	0.035	34	0.0808	0.00058	106	100	0.047	105.00	100	
1:24:44	84.73	10:55:18	0.015	100	0.09	19	0.035	34	0.0903	0.00051	105	100	0.046	104.69	100	
1:24:59	84.98	10:55:33	0.015	100	0.095	19	0.035	57	0.0951	0.00051	105	100	0.046	104.42	100	
1:25:14	85.23	10:55:48	0.015	100	0.1	19	0.035	51	0.1	0.00058	106	100	0.047	104.19	100	
1:25:29	85.48	10:56:03	0.02	85	0.105	20	0.035	51	0.105	0.00051	105	100	0.046	103.97	100	
1:25:44	85.73	10:56:18	0.02	100	0.11	19	0.035	51	0.111	0.00058	106	100	0.048	103.78	100	
1:25:59	85.98	10:56:33	0.02	85	0.115	19	0.04	26	0.117	0.0008	109	100	0.049	103.62	100	
1:26:14	86.23	10:56:48	0.02	64	0.115	20	0.04	22	0.118	0.00058	106	100	0.048	103.49	100	
1:26:29	86.48	10:57:03	0.02	64	0.115	20	0.035	23	0.119	0.00058	106	100	0.049	103.37	100	
1:26:44	86.73	10:57:18	0.035	57	0.12	20	0.04	21	0.125	0.00065	107	100	0.049	103.26	100	
1:26:59	86.98	10:57:33	0.035	51	0.12	20	0.045	21	0.126	0.00065	107	100	0.049	103.16	100	
1:27:14	87.23	10:57:48	0.04	51	0.115	20	0.045	21	0.124	0.00065	107	100	0.049	103.08	100	
1:27:29	87.48	10:58:03	0.04	51	0.12	20	0.05	20	0.13	0.00065	107	100	0.050	102.99	100	
1:27:44	87.73	10:58:18	0.045	51	0.12	20	0.05	21	0.128	0.00073	108	100	0.050	102.92	100	
1:27:59	87.98	10:58:33	0.045	51	0.12	20	0.05	20	0.13	0.0008	109	100	0.050	102.84	100	
1:28:14	88.23	10:58:48	0.045	51	0.125	20	0.05	21	0.135	0.0008	109	100	0.050	102.77	100	
1:28:29	88.48	10:59:03	0.045	51	0.12	20	0.05	20	0.13	0.0008	109	100	0.050	102.70	100	
1:28:44	88.73	10:59:18	0.045	51	0.12	20	0.05	20	0.13	0.0008	109	100	0.050	102.63	100	
1:28:59	88.98	10:59:33	0.045	51	0.12	20	0.055	20	0.13	0.0008	109	100	0.050	102.56	100	
1:29:14	89.23	10:59:48	0.045	47	0.115	20	0.055	20	0.128	0.0008	109	100	0.051	102.50	100	
1:29:29	89.48	11:00:03	0.045	51	0.115	20	0.06	20	0.13	0.0008	109	100	0.051	102.45	100	
1:29:44	89.73	11:00:18	0.045	47	0.115	20	0.055	20	0.128	0.00094	110	100	0.050	102.40	100	
1:29:59	89.98	11:00:33	0.045	51	0.115	20	0.055	20	0.128	0.00065	107	100	0.050	102.35	100	
1:30:14	90.23	11:00:48	0.05	47	0.12	20	0.055	20	0.132	0.00102	111	100	0.050	102.31	100	
1:30:29	90.48	11:01:03	0.045	47	0.12	20	0.055	20	0.13	0.00087	110	100	0.049	102.25	100	
1:30:44	90.73	11:01:18	0.045	51	0.12	20	0.055	20	0.132	0.00116	112	100	0.050	102.19	100	
1:30:59	90.98	11:01:33	0.05	51	0.125	20	0.055	20	0.137	0.00087	110	100	0.050	102.14	100	
1:31:14	91.23	11:01:48	0.045	47	0.125	20	0.055	20	0.135	0.0008	109	85	0.050	102.09	100	

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
1:20:14	117.40	15.02524	61.50769	12.52274	322.4615	331.3077	9.992308	5.038462	10.33846	38.45385	256.6154	2.263846	4.610769	1.155787	0.340769
1:20:29	118.60	31.03354	63.76615	12.73	384.4615	391.4615	12.52308	4.046154	12.90769	43.17692	379.0769	1.753077	5.803846	1.231408	0.086154
1:20:44	119.04	45.95517	64.58333	12.21333	392.6667	399.5833	12.825	3.716667	13.2	43.25	408.5833	1.736667	5.924167	1.243469	0.055833
1:20:59	119.41	60.58139	65.265	12.07321	376.9167	384.8333	12.23333	3.941667	12.64167	40.85833	381.0833	1.725833	5.68	1.218852	0.058333
1:21:14	119.84	75.74045	66.05077	11.15394	331.8462	341.6923	10.55385	4.092308	10.97692	34.33846	316.2308	1.702308	5.173846	1.166082	0.073846
1:21:29	120.53	90.26188	67.27846	10.90733	288.7692	294.0769	9.053846	4.553846	9.276923	28.9	240.5385	1.835385	4.723077	1.117033	0.111538
1:21:44	121.49	104.5734	69	10.8531	274.5385	279.8462	8.538462	4.592308	8.753846	27.33846	214.3077	1.884615	4.578462	1.100887	0.143077
1:21:59	122.64	118.6997	71	10.81899	263	264.9231	8.046154	4.553846	8.176923	26.50769	190.8462	1.96	4.453077	1.08664	0.164615
1:22:14	123.91	132.9994	73.16692	11.6235	282.1538	286.2308	8.584615	4.830769	8.784615	28.64615	203.0769	2.01	4.570769	1.099978	0.166923
1:22:29	125.20	147.3426	75.33308	11.57032	284.6154	289.6154	8.623077	4.961538	8.846154	29.07692	207.9231	1.995385	4.6	1.103319	0.166154
1:22:44	126.52	161.8734	77.5	11.40558	289.2308	295.6923	8.869231	5.007692	9.153846	30.84615	223.2308	2.021538	4.729231	1.117752	0.166923
1:22:59	127.84	176.7035	79.64846	9.163698	284.5385	304.3846	8.915385	5.153846	9.576923	33.26154	278.0769	1.99	4.938462	1.140783	0.159231
1:23:14	129.05	191.8156	81.56385	9.792115	297.6154	324.6923	9.561538	5.238462	10.23077	35.67692	291.6154	1.951538	5.139231	1.162462	0.139231
1:23:29	130.12	207.1092	83.25231	10.25642	307.6923	339.5385	9.792308	5.061538	10.73846	36.22308	295.6154	1.862308	5.270769	1.176435	0.124615
1:23:44	131.15	222.5511	84.84769	9.194697	305.2308	345.8462	9.930769	4.7	10.98462	36.53846	324.3846	1.748462	5.373077	1.187836	0.115385
1:23:59	132.02	238.1395	86.2	9.253632	316.3077	356.3846	10.41538	4.569231	11.37692	38.1	346.5385	1.708462	5.487692	1.199113	0.1
1:24:14	132.85	253.8673	87.45385	9.135072	323.3846	366.6154	10.74615	4.346154	11.72308	38.8	365.3077	1.658462	5.591538	1.209825	0.092308
1:24:29	133.59	269.6561	88.58308	8.749029	325.4615	372.8462	10.77692	4.192308	11.88462	38.89231	378.2308	1.623077	5.637692	1.214526	0.083077
1:24:44	134.28	285.5011	89.61462	8.506152	329.8462	378.5385	10.91538	3.915385	12.06154	38.73077	392.5385	1.578462	5.68	1.218847	0.076154
1:24:59	134.89	301.402	90.53308	8.18934	335.7692	385.4615	11.01538	3.761538	12.26923	39.22308	409.3077	1.571538	5.722308	1.223147	0.066154
1:25:14	135.45	316.1733	91.36667	7.818102	342.4167	396.5833	11.075	3.658333	12.41667	39.86667	427.1667	1.57	5.799167	1.230939	0.066667
1:25:29	135.98	331.001	92.14333	7.674096	345.1667	400.3333	11.2	3.533333	12.53333	39.875	436.9167	1.554167	5.845833	1.235641	0.061667
1:25:44	136.46	346.0501	92.84667	7.962114	358.5833	417.25	11.725	3.558333	13.05	42.20833	456.5	1.588333	6.030833	1.25409	0.055833
1:25:59	136.86	361.2921	93.43167	7.986807	368	431.3333	12.15	3.458333	13.4	44.33333	476.3333	1.6175	6.194167	1.270168	0.045
1:26:14	137.22	376.5266	93.96833	7.792696	366.6667	435.5833	12.1	3.275	13.46667	43.70833	478.75	1.596667	6.1875	1.269542	0.0425
1:26:29	137.53	390.5732	94.42364	7.751272	367.5455	443.1818	12.20909	3.245455	13.69091	44.93636	483.5455	1.616364	6.263636	1.276967	0.039091
1:26:44	137.84	405.9992	94.8625	7.576377	370.8333	450.75	12.3	3.233333	13.975	46.15	493.75	1.631667	6.351667	1.285495	0.036667
1:26:59	138.11	421.4904	95.255	7.323452	372.8333	452.8333	12.38333	3.05	14.11667	46.54167	504.5	1.630833	6.408333	1.290938	0.03
1:27:14	138.35	435.707	95.60818	7.579827	370.4545	450.0909	12.73636	2.954545	14.09091	46.7	504.6364	1.628182	6.423636	1.292416	0.030909
1:27:29	138.59	451.3579	95.95333	7.302552	372.5	459.5833	12.66667	2.916667	14.425	48.075	512.0833	1.649167	6.5475	1.304245	0.029167
1:27:44	138.81	465.7461	96.27818	7.506613	371.3636	459.1818	12.91818	2.845455	14.51818	48.20909	512.1818	1.645455	6.587273	1.308018	0.028182
1:27:59	139.04	481.3972	96.59667	7.391706	366.8333	453	12.81667	2.866667	14.375	48.15833	508	1.6425	6.5475	1.304253	0.0275
1:28:14	139.26	495.7953	96.91636	7.828888	376.9091	450.6364	13.11818	2.981818	14.43636	49.18182	514.5455	1.659091	6.596364	1.308923	0.027273
1:28:29	139.47	511.443	97.22417	7.606959	384.75	445.5	12.875	2.916667	14.18333	48.26667	521.8333	1.6375	6.544167	1.303973	0.026667
1:28:44	139.68	525.8838	97.52636	7.105975	378.0909	453.9091	12.59091	2.9	14.35455	48.37273	520.8182	1.630909	6.637273	1.3128	0.026364
1:28:59	139.89	541.6461	97.82833	6.874628	376.25	458.0833	12.575	2.725	14.43333	48.05	524.5833	1.623333	6.645	1.313525	0.025833
1:29:14	140.08	556.2659	98.1	6.279081	369	466.8182	12.21818	2.836364	14.76364	50.28182	523.5455	1.661818	6.810909	1.329073	0.020909
1:29:29	140.24	570.8853	98.32	7.521718	397.5455	466	13.43636	2.772727	14.84545	50.62727	551.4545	1.670909	6.81	1.329038	0.02
1:29:44	140.40	586.744	98.55	6.686337	377.6667	459.8333	12.59167	2.8	14.525	49.525	531.3333	1.655	6.73	1.321555	0.02
1:29:59	140.56	601.3024	98.78	6.740614	379.0909	462.9091	12.67273	2.754545	14.58182	49.4	533.4545	1.649091	6.750909	1.323495	0.02
1:30:14	140.72	615.9071	99.00455	6.598128	372.6364	472.3636	12.73636	2.709091	14.56364	48.91818	532.3636	1.638182	6.795455	1.327699	0.021818
1:30:29	140.90	631.6906	99.26833	6.724182	382.0833	467.9167	12.65833	2.508333	14.6	48.45833	536.5	1.6225	6.664167	1.315291	0.023333
1:30:44	141.09	646.1784	99.53455	7.344069	393.5455	464.0909	13.22727	2.481818	14.68182	49.46364	546.6364	1.639091	6.682727	1.317077	0.022727
1:30:59	141.27	660.7389	99.79	8.619197	421	469.9091	14.02727	2.190909	14.98182	50.70909	561.7273	1.66	6.752727	1.323679	0.023636
1:31:14	141.47	676.5507	100.065	9.122178	436.4167	467	14.19167	1.816667	14.925	49.825	568.3333	1.638333	6.689167	1.317649	0.024167

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
1:31:29	91.48	11:02:03	0.045	51	0.125	20	0.055	20	0.135	0.0008	109	51	0.050	102.03		100
1:31:44	91.73	11:02:18	0.045	51	0.125	20	0.055	20	0.137	0.00073	108	100	0.049	101.97		100
1:31:59	91.98	11:02:33	0.045	47	0.13	20	0.05	20	0.138	0.00065	107	100	0.049	101.89		100
1:32:14	92.23	11:02:48	0.045	47	0.13	20	0.045	24	0.138	0.00087	110	100	0.049	101.82		100
1:32:29	92.48	11:03:03	0.04	51	0.13	20	0.045	24	0.138	0.00087	110	100	0.049	101.74		100
1:32:44	92.73	11:03:18	0.04	47	0.13	20	0.045	23	0.136	0.0008	109	100	0.048	101.66		100
1:32:59	92.98	11:03:33	0.04	47	0.125	20	0.045	20	0.131	0.00094	110	100	0.048	101.59		100
1:33:14	93.23	11:03:48	0.04	51	0.125	20	0.045	23	0.133	0.00087	110	100	0.049	101.51		100
1:33:29	93.48	11:04:03	0.035	47	0.125	20	0.045	20	0.133	0.00087	110	100	0.048	101.44		100
1:33:44	93.73	11:04:18	0.035	51	0.12	20	0.05	20	0.13	0.00102	111	100	0.049	101.38		100
1:33:59	93.98	11:04:33	0.04	47	0.12	20	0.055	20	0.128	0.00087	110	100	0.049	101.32		100
1:34:14	94.23	11:04:48	0.035	47	0.115	21	0.05	20	0.125	0.00094	110	100	0.049	101.27		100
1:34:29	94.48	11:05:03	0.04	47	0.11	20	0.055	20	0.121	0.00073	108	100	0.048	101.22		100
1:34:44	94.73	11:05:18	0.035	47	0.105	20	0.055	19	0.117	0.00094	110	100	0.050	101.18		100
1:34:59	94.98	11:05:33	0.035	43	0.09	20	0.06	20	0.106	0.0008	109	100	0.050	101.14		100
1:35:14	95.23	11:05:48	0.035	43	0.075	20	0.06	19	0.0942	0.00073	108	100	0.051	101.12		100
1:35:29	95.48	11:06:03	0.04	47	0.075	20	0.06	19	0.0942	0.0008	109	100	0.052022	101.1082		100
1:35:44	95.73	11:06:18	0.04	47	0.08	19	0.065	18	0.101	0.00073	108	100	0.053449	101.0915		100
1:35:59	95.98	11:06:33	0.04	47	0.08	19	0.065	19	0.104	0.0008	109	100	0.056322	101.0742		100
1:36:14	96.23	11:06:48	0.04	47	0.085	19	0.065	18	0.104	0.00087	110	100	0.057755	101.057		100
1:36:29	96.48	11:07:03	0.04	47	0.08	19	0.065	19	0.104	0.00087	110	100	0.058552	101.0376		100
1:36:44	96.73	11:07:18	0.04	47	0.08	19	0.065	18	0.101	0.0008	109	100	0.058613	101.0184		100
1:36:59	96.98	11:07:33	0.04	43	0.08	19	0.07	19	0.104	0.0008	109	100	0.058491	101.0018		100
1:37:14	97.23	11:07:48	0.04	47	0.08	19	0.07	19	0.101	0.00087	110	100	0.058548	100.9851		100
1:37:29	97.48	11:08:03	0.04	43	0.08	19	0.07	19	0.101	0.00087	110	100	0.058318	100.9687		100
1:37:44	97.73	11:08:18	0.04	47	0.08	19	0.07	19	0.101	0.00087	110	100	0.057344	100.9523		100
1:37:59	97.98	11:08:33	0.04	43	0.08	19	0.07	19	0.104	0.00073	108	73	0.057832	100.9368		100
1:38:14	98.23	11:08:48	0.04	47	0.08	19	0.07	18	0.1	0.00109	111	100	0.026241	100.9233		100
1:38:29	98.48	11:09:03	0.04	51	0.08	19	0.07	19	0.103	0.00065	107	100	0.030052	100.9005		100
0.079328704	114.2333	0.475556	0.04	51	0.08	19	0.065	19	0.1	0.00065	107	73	0.054739	100.786		100
0.079502315	114.4833	0.475729	0.04	51	0.085	19	0.065	18	0.103	0.0008	109	100	0.052903	100.7788		100
0.079675926	114.7333	0.475903	0.045	51	0.085	18	0.065	19	0.101	0.0008	109	30	0.055567	100.7704		100
0.079849537	114.9833	0.476076	0.045	47	0.085	19	0.065	18	0.103	0.00087	110	100	0.054277	100.765		100
0.080023148	115.2333	0.47625	0.045	43	0.085	19	0.065	18	0.104	0.0008	109	100	0.053874	100.7589		100
0.080196759	115.4833	0.476424	0.04	51	0.08	18	0.065	18	0.101	0.0008	109	100	0.053991	100.7518		100
0.08037037	115.7333	0.476597	0.04	51	0.08	18	0.065	19	0.101	0.00065	107	100	0.054025	100.7477		100
0.080543981	115.9833	0.476771	0.04	51	0.085	18	0.065	19	0.101	0.0008	109	100	0.053255	100.7423		100
0.080717593	116.2333	0.476944	0.04	51	0.08	19	0.065	19	0.101	0.00087	110	100	0.053185	100.7377		100
0.080891204	116.4833	0.477118	0.04	57	0.08	19	0.065	19	0.0982	0.0008	109	100	0.054321	100.7314		100
0.081064815	116.7333	0.477292	0.04	57	0.08	18	0.065	18	0.101	0.0008	109	100	0.053737	100.7258		100
0.081238426	116.9833	0.477465	0.04	51	0.08	18	0.065	19	0.0991	0.00073	108	100	0.053408	100.7195		100
0.081412037	117.2333	0.477639	0.04	51	0.08	19	0.065	19	0.101	0.0008	109	100	0.055029	100.7124		100
0.081585648	117.4833	0.477813	0.04	57	0.08	18	0.065	19	0.0982	0.00073	108	100	0.05613	100.7064		100
0.081759259	117.7333	0.477986	0.04	57	0.08	19	0.065	19	0.0991	0.00065	107	100	0.057345	100.7006		100
0.08193287	117.9833	0.47816	0.04	51	0.08	18	0.065	18	0.101	0.0008	109	100	0.057215	100.6915		100

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
1:31:29	141.67	691.0134	100.3527	8.361759	415.7273	468.1818	13.65455	2.063636	14.84545	49.66364	553.4545	1.639091	6.658182	1.314794	0.025455
1:31:44	141.90	706.7201	100.6717	8.456235	414.25	466.5	13.625	2.025	14.73333	48.725	548.75	1.6175	6.595833	1.308891	0.03
1:31:59	142.16	721.1172	101.0409	8.188355	412.6364	472.4545	13.50909	2.027273	14.63636	49.29091	551.0909	1.620909	6.595455	1.308823	0.033636
1:32:14	142.45	736.7982	101.4467	7.999385	409.25	471.75	13.40833	1.991667	14.65833	49.075	550	1.619167	6.573333	1.306749	0.035833
1:32:29	142.74	751.1163	101.8573	9.268329	431.8182	466.9091	14.05455	1.745455	14.59091	48.18182	556.3636	1.597273	6.52	1.30165	0.036364
1:32:44	143.04	766.6179	102.2783	8.957747	422.0833	461.75	13.63333	1.758333	14.38333	46.43333	543.75	1.561667	6.4175	1.291799	0.038333
1:32:59	143.35	780.8694	102.7145	9.249882	425.3636	466.6364	13.71818	1.9	14.46364	47.34545	541.6364	1.575455	6.456364	1.295594	0.035455
1:33:14	143.66	796.5219	103.145	9.686326	433.8333	473.3333	14.04167	2.016667	14.76667	48.90833	547.1667	1.600833	6.548333	1.304372	0.039167
1:33:29	143.97	810.883	103.5709	9.516298	433.0909	472.5455	13.96364	1.890909	14.76364	48.60909	548.8182	1.591818	6.560909	1.305558	0.035455
1:33:44	144.24	826.704	103.9533	9.894729	442.8333	477.9167	14.33333	1.966667	15.11667	50.65	558.3333	1.6275	6.696667	1.318416	0.031667
1:33:59	144.50	841.2254	104.3136	9.908824	449.9091	476.4545	14.61818	1.645455	15.1	50.35455	572.4545	1.616364	6.714545	1.32012	0.030909
1:34:14	144.73	855.7514	104.6245	9.213486	444.4545	482.7273	14.48182	1.590909	15.15455	50.93636	581.5455	1.62	6.719091	1.320547	0.025455
1:34:29	144.95	871.5127	104.93	9.261436	439.3333	470.8333	14.51667	1.275	15.05	48.98333	576.0833	1.586667	6.644167	1.313446	0.0275
1:34:44	145.16	886.2927	105.2191	9.260337	465.5455	488.7273	15.36364	0.872727	15.84545	53.51818	624.3636	1.665455	6.967273	1.343637	0.021818
1:34:59	145.31	901.1976	105.4282	8.245541	461.3636	487.9091	15.05455	0.563636	16.00909	53.4	638.5455	1.658182	7.090909	1.354989	0.017273
1:35:14	145.41	916.1824	105.57	8.497945	469.3636	493.4545	15.25455	0.681818	16.21818	54.82727	645.1818	1.684545	7.17	1.362253	0.01
1:35:29	145.4866	931.3616	105.6709	8.748997	476.4545	505.6364	15.50909	0.818182	16.63636	57.28182	652.3636	1.721818	7.365455	1.37993	0.009091
1:35:44	145.5691	946.7218	105.7845	9.030177	486.3636	515.0909	15.86364	1	17.01818	60.53636	664.1818	1.776364	7.551818	1.396384	0.010909
1:35:59	145.6552	961.0588	105.903	9.500464	501.7	537.4	16.51	1.34	17.89	67.3	684.1	1.882	7.975	1.433691	0.011
1:36:14	145.7418	975.6059	106.022	9.927531	518.4	551	17.11	1.39	18.41	70.85	705.3	1.934	8.218	1.454717	0.013
1:36:29	145.8402	991.7142	106.1573	10.06283	527.9091	558.6364	17.47273	1.345455	18.66364	72.91818	720.7273	1.964545	8.331818	1.464387	0.012727
1:36:44	145.9383	1006.399	106.292	10.21481	536.5	560.5	17.82	1.3	18.78	73.17	734.4	1.964	8.38	1.468464	0.013
1:36:59	146.0243	1021.07	106.41	10.32101	541.6	558.7	17.98	1.22	18.74	72.95	740.9	1.962	8.365	1.467161	0.011
1:37:14	146.111	1035.764	106.529	9.934063	530.5	560.6	17.57	1.34	18.75	73.18	729.2	1.963	8.391	1.469367	0.012
1:37:29	146.1973	1051.878	106.6473	10.17703	538.8182	558	17.84545	1.218182	18.69091	72.69091	738.3636	1.954545	8.338182	1.464888	0.010909
1:37:44	146.2844	1066.336	106.7667	10.10639	537.3333	546.6667	17.76667	1.133333	18.23333	70.36667	736.6667	1.92	8.153333	4.819441	0.033333
1:37:59	146.3671	1089.782	106.88	10.55646	550	566	18.3	1.05	18.45	71.65	751.5	1.94	8.27	11.72274	0.075
1:38:14	146.4402	1095.882	106.98	3.839007	276.6667	283.3333	7.566667	-1.13333	7.866667	14.76667	373.6667	0.736667	4.643333	2.033451	0.013333
1:38:29	146.5644	1290.882	107.15	4.81904	316	328	9.2	-0.8	9.7	19.4	430	0.91	5.01	195	0.16
0.079328704	147.2143	15.8368	108.0373	9.305538	500.6364	536.2727	16.78182	0.754545	18.00909	64.93636	695.1818	1.846364	8.05	1.439709	0.004545
0.079502315	147.2571	35.76495	108.0956	8.965066	487.8889	522.1111	16.26667	0.611111	17.27778	60.68889	677.8889	1.781111	7.752222	2.21424	0.008889
0.079675926	147.3065	45.90048	108.1629	9.417292	505.7143	549.2857	16.97143	0.828571	18.24286	67	702.2857	1.878571	8.147143	1.447932	0.005714
0.079849537	147.3391	61.65197	108.2073	9.393781	506.1818	532.0909	17.02727	0.581818	17.83636	63.95455	704.8182	1.833636	7.953636	1.431954	0.004545
0.080023148	147.3756	78.50652	108.257	9.394063	506.4	532.1	17.03	0.53	17.64	63.04	705.1	1.822	7.909	1.685454	0.005
0.080196759	147.4182	93.50652	108.315	9.360178	504	543.5	16.95	0.6	17.6	63.35	701.5	1.825	7.925	7.5	0.025
0.08037037	147.443	106.5027	108.3488	9.447731	506.875	535.375	17.1	0.5625	17.6375	63.45	706	1.82875	7.95375	1.62452	0.005
0.080543981	147.4758	120.5958	108.3933	9.160109	496.6667	526	16.66667	0.6	17.35	61.68333	692	1.805	7.756667	2.348854	0.006667
0.080717593	147.5036	138.9304	108.4311	9.112128	492.7778	524.6667	16.47778	0.577778	17.37778	61.54444	684.4444	1.8	7.78	2.037176	0.005556
0.080891204	147.542	151.8287	108.4833	9.457538	504.6667	573.4444	16.95556	0.622222	17.8	64.23333	699.7778	1.836667	7.97	1.433152	0.004444
0.081064815	147.5763	166.0835	108.53	9.333194	501.7	528.8	16.85	0.6	17.55	62.89	697.3	1.823	7.883	1.425479	0.005
0.081238426	147.6151	181.7189	108.5827	9.34333	501.2727	527.5455	16.85455	0.581818	17.49091	62.15455	696.7273	1.813636	7.832727	1.421399	0.005455
0.081412037	147.659	195.8103	108.6425	9.4062	501.375	544.25	16.8375	0.7875	18.0375	66.025	694.75	1.87375	8.09125	1.76142	0.00625
0.081585648	147.696	211.855	108.6927	9.856742	518.8182	550	17.51818	0.854545	18.44545	68.72727	718.1818	1.915455	8.264545	1.458608	0.005455
0.081759259	147.7323	226.6104	108.742	10.03642	523.9	561.4	17.73	0.99	18.92	71.77	724.1	1.963	8.464	1.475548	0.004
0.08193287	147.7897	243.6104	108.82	9.829393	517	560	17.4	1.1	18.9	71.5	714	1.96	8.43	17	0.06

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
0.082106481	118.2333	0.478333	0.04	57	0.08	19	0.065	23	0.102	0.0008	109	100	0.056282	100.6893		100
0.082280093	118.4833	0.478507	0.04	57	0.08	19	0.065	22	0.0991	0.00094	110	100	0.056718	100.6839		100
0.082453704	118.7333	0.478681	0.04	51	0.08	18	0.065	22	0.101	0.0008	109	100	0.057856	100.6773		100
0.085231481	122.7333	0.481458	0.045	51	0.08	18	0.07	22	0.0991	0.00094	110	100	0.057056	100.6315		100
0.085405093	122.9833	0.481632	0.045	51	0.08	19	0.07	22	0.0976	0.00087	110	100	0.058215	100.6252		100
0.085578704	123.2333	0.481806	0.04	51	0.075	20	0.065	23	0.0972	0.00087	110	100	0.057867	100.6219		100
0.085752315	123.4833	0.481979	0.04	51	0.075	20	0.065	23	0.0972	0.00094	110	100	0.058912	100.6169		100
0.085925926	123.7333	0.482153	0.04	51	0.075	20	0.065	23	0.0972	0.00094	110	100	0.059199	100.6122		100
0.086099537	123.9833	0.482326	0.045	51	0.075	20	0.065	23	0.0972	0.00094	110	100	0.058981	100.6069		100
0.086273148	124.2333	0.4825	0.04	51	0.075	19	0.065	23	0.0972	0.00087	110	24	0.058337	100.6021		100
0.086446759	124.4833	0.482674	0.04	51	0.08	18	0.065	22	0.0972	0.0008	109	100	0.058813	100.5972		100
0.08662037	124.7333	0.482847	0.04	51	0.075	20	0.065	22	0.0972	0.0008	109	39	0.058625	100.5922		100
0.086793981	124.9833	0.483021	0.04	51	0.075	20	0.065	23	0.0972	0.0008	109	100	0.058778	100.5871		100
0.086967593	125.2333	0.483194	0.04	51	0.075	20	0.065	23	0.0951	0.00073	108	100	0.058397	100.5811		100
0.090613426	130.4833	0.48684	0.025	57	0.055	18	0.05	19	0.0718	0.00058	106	100	0.061644	100.5576		100
0.090787037	130.7333	0.487014	0.045	47	0.08	20	0.07	19	0.102	0.00073	108	100	0.063531	100.5519		100
0.090960648	130.9833	0.487188	0.045	51	0.08	20	0.07	23	0.103	0.00087	110	51	0.062856	100.5462		100
0.091134259	131.2333	0.487361	0.045	47	0.08	19	0.07	23	0.104	0.00094	110	28	0.063918	100.541		100
0.09130787	131.4833	0.487535	0.045	47	0.08	19	0.07	23	0.104	0.00094	110	100	0.063723	100.5357		100
0.091481481	131.7333	0.487708	0.045	47	0.08	20	0.07	23	0.103	0.00087	110	51	0.064461	100.5309		100
0.091655093	131.9833	0.487882	0.045	51	0.08	19	0.07	23	0.104	0.00087	110	51	0.063636	100.526		100
0.091828704	132.2333	0.488056	0.045	47	0.08	19	0.07	23	0.104	0.00102	111	100	0.063919	100.5211		100
0.092002315	132.4833	0.488229	0.045	47	0.08	20	0.07	22	0.103	0.00087	110	47	0.06416	100.5163		100
0.092175926	132.7333	0.488403	0.045	47	0.08	19	0.07	23	0.101	0.00087	110	43	0.064392	100.5116		100
0.092349537	132.9833	0.488576	0.04	51	0.08	19	0.07	23	0.103	0.0008	109	100	0.06431	100.5071		100
0.092523148	133.2333	0.48875	0.045	47	0.08	19	0.07	22	0.103	0.0008	109	51	0.063962	100.5025		100
0.092696759	133.4833	0.488924	0.045	47	0.08	18	0.07	23	0.104	0.00094	110	30	0.06376	100.4978		100
0.09287037	133.7333	0.489097	0.04	47	0.08	19	0.07	23	0.104	0.00109	111	100	0.063536	100.493		100
0.093043981	133.9833	0.489271	0.04	47	0.08	19	0.07	23	0.101	0.0008	109	34	0.064039	100.4884		100
0.093217593	134.2333	0.489444	0.04	47	0.08	18	0.07	22	0.103	0.00094	110	100	0.06421	100.4839		100
0.093391204	134.4833	0.489618	0.04	51	0.08	19	0.07	23	0.0997	0.00109	111	73	0.064214	100.4796		100
0.093564815	134.7333	0.489792	0.04	47	0.08	19	0.07	19	0.0997	0.00087	110	37	0.06438	100.4754		100
0.093738426	134.9833	0.489965	0.04	51	0.08	18	0.07	18	0.103	0.0008	109	30	0.063115	100.4713		100
0.093912037	135.2333	0.490139	0.04	47	0.075	19	0.07	23	0.0997	0.00094	110	51	0.064218	100.467		100
0.094085648	135.4833	0.490313	0.04	51	0.075	18	0.07	22	0.0997	0.00087	110	100	0.063841	100.4628		100
0.094259259	135.7333	0.490486	0.04	47	0.08	18	0.07	18	0.1	0.00087	110	73	0.063984	100.4587		100
0.09443287	135.9833	0.49066	0.04	51	0.075	19	0.07	18	0.0991	0.00102	111	100	0.063631	100.4549		100
0.094606481	136.2333	0.490833	0.04	51	0.075	20	0.07	18	0.0997	0.00102	111	100	0.063388	100.451		100
0.094780093	136.4833	0.491007	0.04	57	0.075	18	0.07	19	0.0997	0.00094	110	9.1	0.063804	100.447		100
0.094953704	136.7333	0.491181	0.04	47	0.075	18	0.07	18	0.0991	0.0008	109	100	0.063595	100.4432		100
0.095127315	136.9833	0.491354	0.04	47	0.075	18	0.07	19	0.0991	0.00087	110	100	0.063646	100.4394		100
0.095300926	137.2333	0.491528	0.04	51	0.075	18	0.07	18	0.0991	0.00109	111	32	0.063832	100.4355		100
0.095474537	137.4833	0.491701	0.04	51	0.075	16	0.07	19	0.0995	0.00102	111	20	0.063693	100.4316		100
0.095648148	137.7333	0.491875	0.04	47	0.075	24	0.07	18	0.0991	0.00102	111	100	0.063626	100.4279		100
0.095821759	137.9833	0.492049	0.04	51	0.07	19	0.07	19	0.0991	0.00109	111	100	0.063195	100.424		100

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
0.082106481	147.8032	256.4938	108.8383	9.87168	515.1667	560.8333	17.41667	0.9	18.53333	69.2	711.5	1.921667	8.32	2.147218	0.006667
0.082280093	147.8376	271.1403	108.885	10.10101	524.4	554.6	17.76	0.91	18.66	70.31	723.7	1.941	8.335	1.464654	0.005
0.082453704	147.8795	319.4653	108.942	10.33563	531.3	561.9	18.01	1.05	19.05	73.2	731	1.986	8.528	4.832496	0.015
0.085231481	148.1758	24.74134	109.3438	10.18791	522.5	572.375	17.6	0.95	18.8	71.475	715.375	1.9625	8.385	3.092667	0.02125
0.085405093	148.2173	30.72087	109.4	10.31576	523	565.75	17.675	1.025	19.375	74.45	714.5	2.01	8.695	1.494883	0.005
0.085578704	148.2394	46.15571	109.43	10.41387	529.5714	576.4286	17.81429	1.014286	19.25714	73.58571	722.1429	1.995714	8.612857	2.204978	0.005714
0.085752315	148.2726	61.153	109.475	10.88311	546	600.5	18.3	1.1	19.625	76.3	739	2.0375	8.7675	3.749323	0.01
0.085925926	148.3044	79.17425	109.518	10.88592	546.2	587.6	17.98	1.18	19.72	77.08	730.8	2.042	8.854	3.604249	0.012
0.086099537	148.34	91.24604	109.5663	10.84065	541.75	599	18.075	1.225	19.675	76.55	730	2.035	8.865	1.508974	0.00375
0.086273148	148.3723	106.2054	109.61	10.73691	537.4	605.6	18.1	1.06	19.45	74.92	729	2.013	8.708	1.495939	0.005
0.086446759	148.4056	121.2056	109.655	10.8798	543.8	605.8	18.02	1.17	19.56	76.18	729.6	2.031	8.757	1.500013	0.005
0.08662037	148.4396	136.2226	109.701	10.93609	546.9	615.8	18.23	1.09	19.61	75.73	736.7	2.022	8.777	1.501701	0.004
0.086793981	148.4743	151.2809	109.748	11.04385	550.5	584.7	18.43	1.08	19.68	76.16	742.7	2.03	8.827	1.505832	0.005
0.086967593	148.5157	204.7852	109.804	10.85621	542.3	572.5	18.3	1.09	19.52	75.22	736	2.024	8.762	5.350433	0.016
0.090613426	148.6792	15.5161	110.025	11.1103	566.3	609.4	18.85	1.37	20.32	84	767.7	2.123	8.557	1.55161	0.005
0.090787037	148.7192	31.19975	110.079	11.61493	582.7	625.3	19.37	1.44	21.35	89.27	784.5	2.192	9.601	1.568365	0.005
0.090960648	148.7599	46.7829	110.134	11.43873	577.4	622.1	19.14	1.36	21.15	87.43	777.8	2.161	9.48	1.558315	0.006
0.091134259	148.7972	60.9586	110.1844	11.66801	584.3333	628.5556	19.42222	1.544444	21.46667	90.45556	786.1111	2.203333	9.685556	1.575078	0.005556
0.09130787	148.8347	76.70253	110.235	11.67336	583.5	628.3	19.39	1.52	21.4	89.95	784.3	2.198	9.677	1.574393	0.005
0.091481481	148.8696	90.93803	110.2822	11.91842	592.5556	635.4444	19.65556	1.577778	21.74444	92.08889	793.8889	2.225556	9.77	1.581722	0.004444
0.091655093	148.905	106.6961	110.33	11.77795	585.4	632.6	19.46	1.56	21.53	89.79	785.3	2.195	9.695	1.575806	0.005
0.091828704	148.9404	120.9062	110.3778	11.85084	586.8889	634.4444	19.51111	1.633333	21.54444	90.63333	786.2222	2.207778	9.734444	1.5789	0.005556
0.092002315	148.9754	136.7391	110.425	11.90022	586.8	636.4	19.54	1.69	21.62	91.36	785.6	2.219	9.79	1.58329	0.005
0.092175926	149.0104	151.0028	110.4722	11.95166	586.8889	639.1111	19.57778	1.744444	21.67778	92.06667	785.3333	2.231111	9.81	1.584857	0.004444
0.092349537	149.0429	166.8576	110.516	12.07634	589.4	638.6	19.67	1.8	21.72	91.87	787	2.227	9.818	1.585483	0.005
0.092523148	149.0772	181.0631	110.5622	12.04128	585.4444	635.7778	19.52222	1.788889	21.58889	90.92222	780.1111	2.216667	9.727778	1.578382	0.004444
0.092696759	149.1126	196.8353	110.61	12.00547	584.4	635.7	19.48	1.8	21.56	90.39	778.9	2.207	9.713	1.577219	0.005
0.09287037	149.1481	211.0377	110.6578	12.04895	586.2222	633.8889	19.5	1.7	21.55556	89.8	780.1111	2.197778	9.723333	1.578045	0.005556
0.093043981	149.1831	226.8948	110.705	12.22543	590.2	638.2	19.65	1.71	21.68	91.27	783.4	2.221	9.821	1.585711	0.005
0.093217593	149.2165	241.1914	110.75	12.172	586.2222	640.3333	19.58889	1.777778	21.64444	91.8	779.2222	2.227778	9.856667	1.588512	0.004444
0.093391204	149.2492	257.0635	110.794	12.32844	592	640.2	19.68	1.75	21.73	91.85	783.3	2.229	9.84	1.587209	0.004
0.093564815	149.2817	271.3779	110.8378	12.31208	590.3333	642.7778	19.62222	1.8	21.75556	92.36667	780.5556	2.235556	9.882222	1.590497	0.005556
0.093738426	149.313	285.5384	110.88	12.00951	579.8889	635.3333	19.31111	1.7	21.15556	88.81111	769.8889	2.186667	9.67	1.573381	0.004444
0.093912037	149.3457	301.4323	110.924	12.32224	588.7	641.2	19.62	1.86	21.66	91.98	778.6	2.233	9.868	1.589397	0.004
0.094085648	149.3782	315.6922	110.9678	12.51727	594.7778	639	19.9	1.788889	21.51111	90.94444	786.8889	2.22	9.804444	1.584423	0.005556
0.094259259	149.4103	331.587	111.011	12.28679	584.9	642.6	19.5	1.93	21.58	91.39	772.6	2.223	9.869	1.58948	0.004
0.09443287	149.4401	345.8169	111.0511	12.35478	588.5556	640.2222	19.62222	1.811111	21.44444	90.42222	777.6667	2.21	9.762222	1.581105	0.004444
0.094606481	149.4705	361.6385	111.092	12.25443	583.6	637.4	19.41	1.83	21.47	89.77	769.8	2.202	9.776	1.582161	0.004
0.094780093	149.5021	375.9241	111.1344	12.28977	584.8889	641.7778	19.48889	1.877778	21.57778	90.98889	772.2222	2.222222	9.841111	1.587291	0.004444
0.094953704	149.5322	391.7727	111.175	12.22753	581.3	639	19.41	1.81	21.46	90.43	768.2	2.21	9.81	1.58486	0.004
0.095127315	149.5624	406.0623	111.2156	12.28977	583.5556	640.6667	19.48889	1.811111	21.54444	90.61111	770.8889	2.213333	9.846667	1.587734	0.004444
0.095300926	149.5932	421.972	111.257	12.35447	585.9	641.9	19.56	1.78	21.69	91.18	773.4	2.221	9.888	1.590963	0.005
0.095474537	149.6243	436.2693	111.2989	12.37608	587.5556	640.2222	19.56667	1.722222	21.71111	90.82222	774.6667	2.216667	9.857778	1.588599	0.004444
0.095648148	149.6541	450.5738	111.3389	12.4804	590.8889	638.3333	19.72222	1.677778	21.6	90.66667	779.3333	2.214444	9.867778	1.589382	0.004444
0.095821759	149.6862	466.3783	111.382	12.1736	578.4	634.2	19.26	1.74	21.38	89.48	762.8	2.201	9.754	1.580454	0.004

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
0.09599537	138.2333	0.492222	0.04	47	0.07	18	0.075	18	0.0994	0.00116	112	100	0.062799	100.4201		100
0.096168981	138.4833	0.492396	0.04	64	0.07	19	0.07	18	0.096	0.00087	110	100	0.063044	100.4162		100
0.096342593	138.7333	0.492569	0.04	51	0.07	19	0.07	19	0.096	0.00094	110	100	0.062985	100.4124		100
0.096516204	138.9833	0.492743	0.04	47	0.07	23	0.07	19	0.0991	0.00102	111	100	0.062667	100.4084		100
0.096689815	139.2333	0.492917	0.04	51	0.07	16	0.07	18	0.096	0.00087	110	37	0.062737	100.4044		100
0.096863426	139.4833	0.49309	0.04	47	0.07	24	0.07	19	0.0991	0.00116	112	100	0.063532	100.4005		100
0.097037037	139.7333	0.493264	0.04	51	0.07	24	0.07	19	0.096	0.00116	112	100	0.062722	100.3966		100
0.097210648	139.9833	0.493438	0.04	47	0.07	24	0.07	18	0.0957	0.00116	112	100	0.062148	100.3926		100
0.097384259	140.2333	0.493611	0.04	51	0.07	18	0.07	18	0.0957	0.00094	110	100	0.062669	100.3879		100
0.09755787	140.4833	0.493785	0.04	43	0.07	16	0.07	18	0.096	0.00109	111	100	0.061829	100.383		100
0.097731481	140.7333	0.493958	0.04	51	0.065	18	0.07	18	0.0955	0.00102	111	51	0.062169	100.3782		100
0.097905093	140.9833	0.494132	0.04	47	0.07	23	0.07	19	0.0955	0.00094	110	26	0.06193	100.3732		100
0.098078704	141.2333	0.494306	0.04	51	0.07	18	0.07	18	0.0957	0.00109	111	100	0.06148	100.3683		100
0.098252315	141.4833	0.494479	0.04	51	0.065	18	0.07	18	0.0955	0.0008	109	51	0.061423	100.3626		100
0.098425926	141.7333	0.494653	0.04	47	0.07	24	0.07	18	0.0923	0.00102	111	100	0.061354	100.3575		100
0.098599537	141.9833	0.494826	0.04	51	0.065	18	0.07	18	0.0923	0.00094	110	100	0.061353	100.3522		100
0.098773148	142.2333	0.495	0.04	47	0.065	18	0.07	18	0.0923	0.00087	110	100	0.061562	100.3464		100
0.098946759	142.4833	0.495174	0.04	51	0.065	18	0.07	18	0.0923	0.00109	111	100	0.061007	100.3396		100
0.09912037	142.7333	0.495347	0.04	51	0.065	18	0.065	19	0.0886	0.00087	110	39	0.06031	100.3322		100
0.099293981	142.9833	0.495521	0.04	51	0.065	18	0.065	18	0.0886	0.00087	110	100	0.060417	100.3243		100
0.099467593	143.2333	0.495694	0.035	51	0.065	18	0.065	18	0.0886	0.00116	112	100	0.059844	100.3144		100
0.099641204	143.4833	0.495868	0.035	57	0.065	17	0.065	19	0.089	0.00087	110	64	0.057952	100.3034		100
0.099814815	143.7333	0.496042	0.035	51	0.065	18	0.06	18	0.085	0.00102	111	17	0.055921	100.2932		100
0.099988426	143.9833	0.496215	0.035	51	0.065	18	0.06	23	0.0815	0.00116	112	100				100

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
0.09599537	149.7178	480.5783	111.4244	12.01534	574.8889	633.3333	19.13333	1.711111	21.28889	88.4	760.1111	2.185556	9.72	1.577778	0.004444
0.096168981	149.7494	496.3775	111.467	12.13592	578.6	632.4	19.23	1.69	21.39	89.13	763.2	2.194	9.747	1.579916	0.005
0.096342593	149.7806	510.5916	111.5089	12.54027	592.8889	630.6667	19.83333	1.555556	21.3	89	782.6667	2.195556	9.74	1.579349	0.004444
0.096516204	149.8135	526.3526	111.553	11.96976	572	628.4	19.06	1.74	21.21	88.14	756.5	2.185	9.699	1.5761	0.004
0.096689815	149.8468	540.5195	111.5978	12.11098	575.2222	628.1111	19.12222	1.777778	21.31111	88.37778	757.6667	2.188889	9.673333	1.574096	0.005556
0.096863426	149.879	556.3728	111.641	12.33584	580.2	632.5	19.33	1.83	21.52	90.67	762.2	2.216	9.816	1.585327	0.004
0.097037037	149.9122	570.5633	111.6856	12.34348	580.8889	627	19.38889	1.722222	21.31111	88.41111	764.2222	2.187778	9.706667	1.576724	0.004444
0.097210648	149.9453	586.2416	111.73	12.17968	576.1	621.8	19.17	1.72	21.1	86.84	758	2.165	9.595	1.567834	0.005
0.097384259	149.9848	602.0076	111.783	12.24265	575.8	625.8	19.11	1.82	21.28	88.35	754.5	2.187	9.705	1.576596	0.006
0.09755787	150.0273	616.0731	111.84	12.01681	567.5556	618.4444	18.84444	1.833333	20.96667	86.04444	745.2222	2.155556	9.531111	1.562832	0.005556
0.097731481	150.0683	631.7411	111.895	12.38658	580.1	620.7	19.35	1.76	21.05	87.04	761.3	2.169	9.581	1.566805	0.006
0.097905093	150.111	645.8202	111.9522	12.23306	573	619	19.07778	1.855556	20.96667	86.42222	751.1111	2.162222	9.55	1.564341	0.006667
0.098078704	150.1541	661.3863	112.01	12.46422	583.2	614.4	19.37	1.74	20.86	85.22	762.9	2.144	9.453	1.55661	0.006
0.098252315	150.204	676.9764	112.077	12.56811	585.7	614.8	19.52	1.74	20.8	85.12	766.6	2.145	9.483	1.559007	0.007
0.098425926	150.2486	690.9574	112.1367	12.14064	568	611.1111	18.84444	1.988889	20.68889	84.97778	742.4444	2.142222	9.413333	1.553455	0.005556
0.098599537	150.2958	706.5603	112.2	12.19257	571	614.7	18.96	1.94	20.83	85.03	747.1	2.142	9.499	1.560285	0.007
0.098773148	150.3473	720.6331	112.2689	12.2877	573.2222	616.3333	19.05556	2.011111	20.88889	85.66667	749.3333	2.153333	9.541111	1.563642	0.007778
0.098946759	150.4093	736.1897	112.352	12.31096	572.8	610.4	18.99	2	20.61	84.2	746.6	2.132	9.441	1.555658	0.009
0.09912037	150.4766	751.6306	112.442	12.11707	565.1	601.4	18.75	2.01	20.25	82.36	737.7	2.107	9.297	1.544097	0.009
0.099293981	150.5498	765.5437	112.54	12.17484	569.7778	606.8889	18.9	1.977778	20.48889	82.73333	744.7778	2.111111	9.318889	1.545891	0.012222
0.099467593	150.6425	780.9195	112.664	11.87174	560.6	605.3	18.57	2	20.44	81.27	734.9	2.085	9.216	1.53759	0.013
0.099641204	150.748	796.0167	112.805	11.25005	538.4	585.8	17.76	1.89	19.63	76.32	707.8	2.01	8.877	1.509711	0.015
0.099814815	150.8469	806.3697	112.9371	11.35146	539.1429	565	17.71429	1.6	18.85714	71.15714	704.7143	1.932857	8.508571	1.47901	0.015714
0.099988426															

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
1:38:12	102.10	11:20:45	0.085	18	0.175	18	0.18	13	0.248	0.0008	109	20	0.080	62.32		35
1:38:27	102.35	11:21:00	0.085	21	0.16	17	0.17	17	0.228	0.00073	108	28	0.081	61.57		35
1:38:42	102.60	11:21:15	0.09	21	0.145	17	0.165	17	0.214	0.00073	108	100	0.080	60.81		35
1:38:57	102.85	11:21:30	0.09	22	0.145	17	0.155	17	0.207	0.00087	110	17	0.079	60.15		35
1:39:12	103.10	11:21:45	0.095	22	0.145	17	0.15	12	0.208	0.00087	110	100	0.078	59.51		35
1:39:27	103.35	11:22:00	0.095	22	0.14	17	0.14	15	0.196	0.00073	108	43	0.077	58.82		35
1:39:42	103.60	11:22:15	0.095	21	0.13	17	0.135	15	0.181	0.00102	111	14	0.078	58.10		35
1:39:57	103.85	11:22:30	0.1	22	0.13	18	0.125	15	0.168	0.0008	109	100	0.077	57.43		35
1:40:12	104.10	11:22:45	0.095	21	0.12	17	0.125	15	0.153	0.00087	110	22	0.076	56.78		35
1:40:27	104.35	11:23:00	0.09	18	0.12	17	0.12	23	0.136	0.00094	110	85	0.075	56.16		35
1:40:42	104.60	11:23:15	0.09	18	0.11	17	0.12	26	0.137	0.00094	110	100	0.074	55.55		35
1:40:57	104.85	11:23:30	0.095	18	0.105	17	0.12	26	0.133	0.00065	107	100	0.077	54.92		35
1:41:12	105.10	11:23:45	0.095	18	0.1	16	0.12	24	0.137	0.00087	110	100	0.074	54.31		35
1:41:27	105.35	11:24:00	0.09	18	0.095	16	0.115	23	0.129	0.00087	110	100	0.073	53.72		35
1:41:42	105.60	11:24:15	0.095	18	0.09	20	0.11	26	0.124	0.00087	110	100	0.075	53.22		35
1:41:57	105.85	11:24:30	0.09	17	0.095	15	0.11	22	0.123	0.0008	109	100	0.078	52.77		35
1:42:12	106.10	11:24:45	0.095	17	0.09	21	0.11	22	0.118	0.0008	109	100	0.077	52.37		35
1:42:27	106.35	11:25:00	0.09	16	0.1	22	0.11	20	0.131	0.00109	111	100	0.076	51.92		35
1:42:42	106.60	11:25:15	0.09	17	0.095	22	0.105	20	0.128	0.00094	110	100	0.074	51.42		35
1:42:57	106.85	11:25:30	0.095	17	0.095	21	0.105	21	0.119	0.00102	111	100	0.073	50.87		35
1:43:12	107.10	11:25:45	0.09	17	0.105	23	0.135	32	0.147	0.00116	112	100	0.070	50.31		35
1:43:27	107.35	11:26:00	0.09	26	0.105	30	0.145	32	0.156	0.00123	113	100	0.070	49.67		35
1:43:42	107.60	11:26:15	0.09	17	0.105	24	0.14	32	0.155	0.00123	113	100	0.069	49.01		35
1:43:57	107.85	11:26:30	0.08	16	0.11	23	0.12	22	0.138	0.00123	113	100	0.068	48.40		35
1:44:12	108.10	11:26:45	0.085	16	0.11	23	0.105	20	0.127	0.00123	113	100	0.067	47.75		35
1:44:27	108.35	11:27:00	0.09	16	0.115	22	0.11	20	0.127	0.00123	113	100	0.068	47.07		35
1:44:42	108.60	11:27:15	0.105	17	0.12	21	0.105	19	0.127	0.00109	111	100	0.066	46.34		35
1:44:57	108.85	11:27:30	0.1	20	0.105	21	0.105	18	0.121	0.00109	111	100	0.066	45.64		35
1:45:12	109.10	11:27:45	0.095	20	0.11	21	0.105	18	0.122	0.00109	111	100	0.066	44.95		35
1:45:27	109.35	11:28:00	0.095	20	0.11	22	0.105	22	0.123	0.00116	112	100	0.066	44.30		35
1:45:42	109.60	11:28:15	0.1	22	0.11	21	0.105	23	0.12	0.00116	112	100	0.063	43.67		35
1:45:57	109.85	11:28:30	0.1	21	0.105	20	0.105	27	0.122	0.00116	112	100	0.062	42.95		35
1:46:12	110.10	11:28:45	0.1	21	0.1	20	0.105	26	0.128	0.00102	111	100	0.063	42.26		35
1:46:27	110.35	11:29:00	0.105	22	0.095	20	0.1	26	0.12	0.00094	110	100	0.064	41.69		35
1:46:42	110.60	11:29:15	0.105	22	0.095	20	0.1	27	0.124	0.00109	111	85	0.064	41.16		35
1:46:57	110.85	11:29:30	0.105	21	0.1	20	0.095	27	0.121	0.00102	111	100	0.064	40.66		35
1:47:12	111.10	11:29:45	0.105	21	0.09	20	0.095	27	0.129	0.00094	110	85	0.062	40.29		35
1:47:27	111.35	11:30:00	0.105	22	0.085	18	0.1	27	0.128	0.00094	110	100	0.061	39.93		35
1:47:42	111.60	11:30:15	0.1	20	0.09	19	0.1	28	0.123	0.00102	111	100	0.061	39.55		35
1:47:57	111.85	11:30:30	0.1	21	0.09	20	0.1	28	0.121	0.00094	110	100	0.060	39.12		35
1:48:12	112.10	11:30:45	0.095	21	0.095	15	0.1	28	0.119	0.00102	111	100	0.059	38.64		35
1:48:27	112.35	11:31:00	0.1	21	0.1	16	0.1	27	0.122	0.00116	112	100	0.061	38.19		35
1:48:42	112.60	11:31:15	0.07	16	0.11	17	0.1	20	0.125	0.00152	114	100	0.059	37.84		35
1:48:57	112.85	11:31:30	0.085	18	0.095	22	0.095	20	0.12	0.00138	114	100	0.059	37.59		35
1:49:12	113.10	11:31:45	0.09	18	0.1	23	0.09	27	0.117	0.00145	114	100	0.062	37.42		35

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
1:38:12	77.49	226.4233	69.13846	11.37514	345.5385	381.6923	11.36923	4.661538	12.15385	38.30769	345.3846	1.603846	5.466154	1.196892	0.073077
1:38:27	78.30	240.8622	70.045	11.27128	340.5	385.75	11.425	4.783333	12.31667	39.9	344.5	1.6575	5.5275	1.203235	0.074167
1:38:42	79.14	256.5995	70.97769	11.0035	341.2308	391.3077	11.65385	4.738462	12.5	40.45385	358.1538	1.643846	5.599231	1.210567	0.070769
1:38:57	79.86	271.1687	71.78333	10.89109	341.9167	392.25	11.73333	4.641667	12.60833	40.3	363.8333	1.629167	5.633333	1.214101	0.0625
1:39:12	80.57	285.6736	72.56667	11.27018	353.8333	390.8333	11.64167	4.466667	12.475	39.29167	363.5	1.5975	5.580833	1.208736	0.066667
1:39:27	81.34	301.3684	73.42846	11.07852	353.6154	388.0769	11.56923	4.369231	12.37692	38.97692	366.3846	1.58	5.566923	1.207291	0.071538
1:39:42	82.15	315.9582	74.32083	10.24168	338.8333	395.5	11.79167	4.375	12.65833	40.675	379.1667	1.624167	5.65	1.215818	0.070833
1:39:57	82.91	330.5376	75.165	10.79185	354	394.25	11.775	4.291667	12.65833	40.23333	379.5833	1.598333	5.641667	1.214952	0.068333
1:40:12	83.67	346.336	75.99385	10.16819	343.3077	396.6154	11.76154	4.2	12.63077	40.21538	384.7692	1.589231	5.644615	1.215264	0.065385
1:40:27	84.38	360.9299	76.78333	10.38644	346	398.1667	11.80833	4.133333	12.71667	40.16667	383	1.5825	5.653333	1.216159	0.0625
1:40:42	85.10	375.5238	77.56667	10.3423	347.25	397.25	11.86667	4.025	12.68333	40.1	386.9167	1.574167	5.653333	1.216155	0.066667
1:40:57	85.84	391.6606	78.37615	10.38215	358.9231	414.5385	12.39231	4.153846	13.36923	43.55385	411.2308	1.627692	5.902308	1.241292	0.063077
1:41:12	86.56	406.3661	79.16917	10.48393	355.9167	403.5	11.96667	3.975	12.95	40.94167	394.5	1.578333	5.745	1.225462	0.065
1:41:27	87.27	421.0089	79.94917	11.03854	360.5	402.3333	11.9	4.083333	12.825	40.53333	382.9167	1.575833	5.693333	1.220227	0.060833
1:41:42	87.88	435.9978	80.605	10.62922	374.0833	419.6667	12.60833	3.875	13.525	43.525	425.5833	1.599167	5.981667	1.249078	0.0525
1:41:57	88.43	451.3502	81.20417	10.00839	387.0833	435	13.15	3.616667	14.28333	47.15	468.8333	1.655833	6.289167	1.279367	0.046667
1:42:12	88.93	466.6859	81.75	9.978914	386.5	435.4167	13.13333	3.575	14.29167	47.15	468.5833	1.655833	6.274167	1.277976	0.045833
1:42:27	89.48	480.6251	82.35364	10.01711	383.2727	429.4545	12.92727	3.627273	14.00909	46.13636	459	1.643636	6.163636	1.267196	0.059091
1:42:42	90.11	495.6637	83.03583	10.13221	381.25	421.6667	12.63333	3.608333	13.70833	44.075	446.3333	1.6075	6.021667	1.253223	0.060833
1:42:57	90.80	510.7143	83.78333	9.821611	382.5833	425.75	12.675	3.408333	13.75833	43.78333	456.8333	1.585833	6.031667	1.254212	0.0625
1:43:12	91.52	525.5149	84.56667	9.890994	369.6667	413.5	12.15833	3.4	13.16667	41.45	428.6667	1.553333	5.823333	1.233382	0.066667
1:43:27	92.35	541.5113	85.46154	10.39203	367	413.8462	12.19231	3.6	13.08462	41.66923	413.8462	1.568462	5.794615	1.230497	0.076154
1:43:42	93.21	556.2699	86.3925	10.43341	367.3333	412.8333	12.06667	3.575	13.05833	40.90833	409.8333	1.540833	5.788333	1.229883	0.0725
1:43:57	94.03	571.0676	87.27083	9.675121	368.75	415.25	12.125	3.208333	13.125	41.04167	432.5	1.529167	5.820833	1.233137	0.075
1:44:12	94.90	585.7693	88.21167	10.04323	369.3333	412	11.91667	3.45	12.89167	40.64167	418.0833	1.544167	5.741667	1.225146	0.081667
1:44:27	95.85	600.54	89.23083	10.50714	375.8333	417.4167	12.15	3.575	13.1	42.2	418.5833	1.581667	5.798333	1.230887	0.088333
1:44:42	96.88	616.4309	90.33154	11.25058	386.9231	412.4615	12.3	3.346154	12.93846	40.28462	414.2308	1.531538	5.714615	1.22238	0.084615
1:44:57	97.88	631.1965	91.41	10.308	379.3333	420.3333	12.21667	3.266667	13.2	41.75	429	1.5475	5.794167	1.230466	0.09
1:45:12	98.90	646.0627	92.5	10.42092	384.1667	426.6667	12.44167	3.308333	13.4	43.05	436.75	1.5675	5.8775	1.238849	0.090833
1:45:27	99.88	660.9946	93.54167	10.53311	389.25	429.1667	12.56667	3.266667	13.49167	43.3	442.1667	1.5475	5.9325	1.244325	0.083333
1:45:42	100.86	675.6803	94.59167	11.12012	382.8333	416.6667	12.18333	3.233333	12.875	40.725	410.5	1.538333	5.728333	1.223806	0.091667
1:45:57	101.99	691.5329	95.8	11.58386	380.2308	415.1538	12.09231	3.4	12.76154	40.39231	393.4615	1.553077	5.685385	1.219435	0.1
1:46:12	103.14	706.401	97.02083	10.5995	374.3333	433.75	12.3	3.283333	13.3	42.85833	418.5833	1.545833	5.879167	1.239008	0.091667
1:46:27	104.10	721.369	98.04167	10.35311	382.5	440.5833	12.55	3.083333	13.54167	43.74167	439.6667	1.525	5.9625	1.247329	0.083333
1:46:42	105.04	736.5014	99.04167	9.871026	386.6667	450.8333	12.79167	2.966667	13.90833	45.70833	462.6667	1.548333	6.100833	1.261038	0.083333
1:46:57	105.95	751.7406	100.0058	9.956392	391.8333	456.9167	13.00833	2.741667	14.15833	45.93333	471.25	1.5325	6.191667	1.269936	0.073333
1:47:12	106.66	765.7501	100.7509	8.829407	390.9091	456.6364	13.06364	1.809091	13.93636	44.05455	501.0909	1.453636	6.229091	1.273589	0.061818
1:47:27	107.34	780.9247	101.47	9.099924	388	452.0833	12.85	2.075	13.7	43.16667	485.5833	1.441667	6.136667	1.264549	0.0625
1:47:42	108.10	796.1063	102.2733	9.19858	385.75	455	12.875	2.183333	13.69167	43.63333	481.4167	1.450833	6.1425	1.265136	0.073333
1:47:57	109.01	811.1101	103.2342	9.813243	384.6667	446.5	12.625	2.758333	13.35833	43.3	457.8333	1.4825	5.9925	1.250316	0.086667
1:48:12	110.03	826.0702	104.3183	9.494822	380.5	445.3333	12.50833	2.891667	13.06667	42.63333	458.9167	1.469167	5.955833	1.246676	0.090833
1:48:27	111.07	841.3178	105.4092	9.921889	395.25	461	13.10833	2.825	13.58333	45.34167	478.1667	1.480833	6.199167	1.27063	0.090833
1:48:42	111.94	856.6476	106.3242	9.29111	397.4167	464.0833	13.23333	2.091667	13.66667	44.14167	500	1.425833	6.269167	1.277485	0.061667
1:48:57	112.57	870.8483	106.9873	8.986359	403	472.1818	13.59091	1.472727	13.87273	44.6	522.8182	1.421818	6.409091	1.29097	0.054545
1:49:12	113.03	886.7294	107.4725	8.830894	413	488.9167	14.35833	1.15	14.88333	48.85833	556.8333	1.515833	6.75	1.323429	0.0325

SLT-E-12-1

Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
1:49:27	113.35	11:32:00	0.1	20	0.09	16	0.09	27	0.117	0.00138	114	100	0.063	37.31		35
1:49:42	113.60	11:32:15	0.095	20	0.085	16	0.085	27	0.116	0.00145	114	100	0.062	37.22		35
1:49:57	113.85	11:32:30	0.095	20	0.09	17	0.09	27	0.109	0.00138	114	100	0.065	37.12		35
1:50:12	114.10	11:32:45	0.085	19	0.1	17	0.09	27	0.111	0.0016	115	100	0.064	37.05		35
1:50:27	114.35	11:33:00	0.075	17	0.125	27	0.11	22	0.144	0.00152	114	100	0.064	36.99		35
1:50:42	114.60	11:33:15	0.075	19	0.155	28	0.13	23	0.171	0.00167	115	73	0.063	36.94		35
1:50:57	114.85	11:33:30	0.08	20	0.15	30	0.13	23	0.169	0.00152	114	100	0.063	36.89		35
1:51:12	115.10	11:33:45	0.08	20	0.145	28	0.135	28	0.163	0.00152	114	100	0.064	36.84		35

SLT-E-12-1

Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
1:49:27	113.33	901.4405	107.7873	9.242263	417.7273	490.9091	14.63636	1.5	15.3	51.10909	558.0909	1.570909	6.899091	1.337368	0.023636
1:49:42	113.58	916.431	108.0483	9.138949	420.0833	479.6667	14.33333	1.308333	14.90833	49.76667	555.25	1.535	6.3525	1.249213	0.024167
1:49:57	113.85	931.332	108.3327	9.345794	424	493	14.78182	1.518182	15.74545	54.3	565.4545	1.630909	7.086364	1.354637	0.022727
1:50:12	114.05	946.1772	108.5464	10.31758	475	489.7273	15.46364	0.672727	15.71818	53.54545	608.9091	1.62	7.030909	1.349558	0.017273
1:50:27	114.21	961.0314	108.7173	10.81315	490.3636	490.3636	15.67273	0.690909	15.67273	53.66364	616.8182	1.620909	7.04	1.350386	0.014545
1:50:42	114.36	975.7634	108.8755	10.58234	484.8182	485.0909	15.4	0.581818	15.4	51.77273	610.1818	1.587273	6.92	1.339271	0.013636
1:50:57	114.52	990.5359	109.0455	10.56142	488.5455	488.5455	15.44545	0.490909	15.44545	52.31818	615.6364	1.593636	6.960909	1.342951	0.019091
1:51:12	114.67	995.9371	109.2	8.98537	416.5	496	14.5	1.075	15.75	53.175	560	1.6025	7.04	1.350304	0.02

SLT-E-16-2

Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
1:59:38	119.63	9:14:27	0.255	28	0.445	21	0.405	18	0.496	0.00276	120	100	0.115	72.46	35	
1:59:53	119.88	9:14:42	0.24	27	0.44	21	0.415	17	0.504	0.00297	120	100	0.110	71.89	35	
2:00:08	120.13	9:14:57	0.23	27	0.415	21	0.42	17	0.506	0.0029	120	100	0.107	71.33	35	
2:00:23	120.38	9:15:12	0.225	27	0.395	20	0.41	16	0.491	0.00348	122	100	0.106	70.78	35	
2:00:38	120.63	9:15:27	0.215	28	0.365	20	0.415	17	0.464	0.00283	120	100	0.102	70.22	35	
2:00:53	120.88	9:15:42	0.205	28	0.345	20	0.41	17	0.437	0.00254	119	100	0.102	69.65	35	
2:01:08	121.13	9:15:57	0.21	30	0.335	17	0.415	17	0.429	0.00261	119	100	0.101	69.09	35	
2:01:23	121.38	9:16:12	0.18	21	0.315	20	0.405	17	0.425	0.00254	119	100	0.101	68.53	35	
2:01:38	121.63	9:16:27	0.175	22	0.305	20	0.405	17	0.426	0.00254	119	100	0.099	67.98	35	
2:01:53	121.88	9:16:42	0.19	22	0.285	20	0.385	17	0.418	0.00268	119	100	0.098	67.43	35	
2:02:08	122.13	9:16:57	0.2	23	0.285	20	0.375	17	0.432	0.00283	120	100	0.098	66.91	35	
2:02:23	122.38	9:17:12	0.2	23	0.28	20	0.355	17	0.43	0.00218	118	100	0.096	66.32	35	
2:02:38	122.63	9:17:27	0.195	22	0.275	20	0.345	17	0.426	0.00326	121	100	0.094	65.71	35	
2:02:53	122.88	9:17:42	0.195	23	0.285	13	0.33	17	0.419	0.00326	121	100	0.094	65.10	35	
2:03:08	123.13	9:17:57	0.195	23	0.29	13	0.315	17	0.412	0.0029	120	100	0.092	64.46	35	
2:03:23	123.38	9:18:12	0.195	23	0.285	13	0.295	17	0.406	0.00283	120	100	0.092	63.86	35	
2:03:38	123.63	9:18:27	0.2	22	0.285	13	0.295	16	0.399	0.00254	119	100	0.093	63.29	35	
2:03:53	123.88	9:18:42	0.205	23	0.285	13	0.28	16	0.394	0.00297	120	100	0.093	62.72	35	
2:04:08	124.13	9:18:57	0.2	23	0.28	12	0.255	16	0.375	0.00283	120	100	0.092	62.10	35	
2:04:23	124.38	9:19:12	0.19	23	0.265	13	0.23	16	0.352	0.00239	118	100	0.092	61.47	35	
2:04:38	124.63	9:19:27	0.19	24	0.26	13	0.215	16	0.34	0.0021	117	100	0.090	60.87	35	
2:04:53	124.88	9:19:42	0.195	23	0.255	13	0.19	16	0.317	0.00261	119	100	0.089	60.24	35	
2:05:08	125.13	9:19:57	0.19	23	0.26	13	0.175	16	0.316	0.00334	121	100	0.088	59.65	35	
2:05:23	125.38	9:20:12	0.185	23	0.25	13	0.155	15	0.307	0.0029	120	100	0.088	59.08	35	
2:05:38	125.63	9:20:27	0.185	24	0.245	13	0.145	23	0.302	0.00239	118	100	0.087	58.53	35	
2:05:53	125.88	9:20:42	0.19	24	0.255	13	0.16	14	0.307	0.00254	119	100	0.088	57.99	35	
2:06:08	126.13	9:20:57	0.2	24	0.255	14	0.16	14	0.303	0.00283	120	100	0.087	57.44	35	
2:06:23	126.38	9:21:12	0.205	24	0.25	13	0.165	15	0.306	0.00196	117	100	0.087	56.88	35	
2:06:38	126.63	9:21:27	0.2	24	0.245	13	0.165	14	0.296	0.00196	117	100	0.085	56.34	35	
2:06:53	126.88	9:21:42	0.195	24	0.235	13	0.16	14	0.282	0.00225	118	100	0.085	55.82	35	
2:07:08	127.13	9:21:57	0.2	26	0.23	13	0.155	13	0.281	0.0021	117	100	0.084	55.29	35	
2:07:23	127.38	9:22:12	0.21	24	0.23	13	0.15	26	0.282	0.00203	117	100	0.085	54.77	35	
2:07:38	127.63	9:22:27	0.21	24	0.225	13	0.155	26	0.28	0.00218	118	100	0.084	54.23	35	
2:07:53	127.88	9:22:42	0.21	24	0.22	13	0.16	26	0.277	0.00232	118	100	0.083	53.71	35	
2:08:08	128.13	9:22:57	0.21	26	0.215	13	0.15	27	0.27	0.0021	117	100	0.082	53.22	35	
2:08:23	128.38	9:23:12	0.215	26	0.22	14	0.155	27	0.274	0.00319	121	100	0.081	52.68	35	
2:08:38	128.63	9:23:27	0.205	26	0.225	13	0.155	28	0.269	0.00232	118	100	0.080	52.11	35	
2:08:53	128.88	9:23:42	0.2	26	0.225	13	0.155	28	0.273	0.00239	118	100	0.079	51.61	35	
2:09:08	129.13	9:23:57	0.195	26	0.22	13	0.155	28	0.268	0.00225	118	100	0.079	51.10	35	
2:09:23	129.38	9:24:12	0.195	26	0.215	13	0.15	30	0.265	0.0021	117	100	0.078	50.58	35	
2:09:38	129.63	9:24:27	0.18	26	0.21	13	0.15	30	0.248	0.00189	116	100	0.078	50.07	35	
2:09:53	129.88	9:24:42	0.17	26	0.21	13	0.15	30	0.241	0.00203	117	100	0.077	49.58	35	
2:10:08	130.13	9:24:57	0.16	27	0.2	13	0.15	23	0.242	0.00174	116	100	0.077	49.09	35	
2:10:23	130.38	9:25:12	0.16	27	0.195	13	0.155	23	0.239	0.00181	116	85	0.076	48.60	35	
2:10:38	130.63	9:25:27	0.155	26	0.19	13	0.16	24	0.242	0.00189	116	85	0.075	48.04	35	

SLT-E-16-2

Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
1:59:38	67.19	15.58842	57.35364	16.10834	748.1818	792.4545	16.33636	0.836364	16.49091	59.59091	758.0909	1.442727	7.014545	1.417129	0.059091
1:59:53	67.74	30.81686	58	16.95862	719.4545	818.6364	15.69091	2.218182	16.30909	56.01818	664.3636	1.413636	7.414545	1.384404	0.058182
2:00:08	68.30	45.75966	58.64636	17.07515	706.7273	817.2727	15.47273	2.518182	15.79091	53.14545	637.0909	1.39	7.128182	1.358436	0.059091
2:00:23	68.84	60.63319	59.27818	17.3117	695.3636	805.2727	15.52727	2.827273	15.65455	52.81818	617.8182	1.406364	7.059091	1.352139	0.056364
2:00:38	69.39	76.66644	59.92	16.97277	668.1667	768.5	15.06667	2.95	15.06667	50.53333	585.3333	1.3975	6.885833	1.336105	0.056667
2:00:53	69.97	91.35605	60.58727	17.21456	663.6364	770.5455	14.96364	3.463636	14.96364	50.95455	565.8182	1.429091	6.878182	1.335419	0.058182
2:01:08	70.53	106.0335	61.23545	17.37838	655.7273	776.7273	14.94545	3.845455	14.94545	51.02727	550	1.445455	6.866364	1.334317	0.059091
2:01:23	71.09	120.7093	61.88091	17.89411	670.1818	805.8182	15.09091	4.245455	15.09091	51.37273	548.3636	1.468182	6.864545	1.33416	0.058182
2:01:38	71.66	136.6204	62.5275	17.88432	666.0833	783.8333	14.85833	4.483333	14.98333	50.34167	534.5833	1.484167	6.776667	1.325927	0.055
2:01:53	72.21	151.1661	63.16636	17.45898	653.2727	774	14.35455	4.781818	14.98182	50.25455	518.3636	1.522727	6.738182	1.322335	0.055455
2:02:08	72.75	165.6437	63.77818	18.07422	657.9091	716.0909	14.67273	5.118182	14.93636	51.00909	510.0909	1.606364	6.672727	1.316143	0.056364
2:02:23	73.36	181.373	64.47	17.87928	654.3333	751.4167	14.43333	5.1	14.8	49.95833	504.5833	1.59	6.615833	1.310778	0.0625
2:02:38	73.99	195.7494	65.18909	18.24994	665.7273	751.7273	14.67273	5.090909	14.67273	48.72727	510.2727	1.574545	6.575455	1.306948	0.062727
2:02:53	74.63	211.4542	65.91083	17.36327	647.75	735.8333	13.925	5.125	14.675	49.21667	498.3333	1.601667	6.594167	1.308729	0.064167
2:03:08	75.30	225.842	66.66636	16.58909	615.9091	727.9091	13.25455	4.954545	14.66364	48.41818	471	1.585455	6.586364	1.307979	0.066364
2:03:23	75.93	241.5836	67.38333	18.07745	654.5	724.6667	14.44167	5.291667	14.675	49.1	496.5	1.610833	6.626667	1.311804	0.059167
2:03:38	76.54	256.0934	68.06545	18.76944	677	721.3636	14.91818	5.554545	14.91818	50.7	509.6364	1.667273	6.703636	1.319075	0.060909
2:03:53	77.15	270.6371	68.75182	17.87706	653.6364	731.5455	14.24545	5.390909	14.95455	50.97273	495.8182	1.680909	6.736364	1.322154	0.062727
2:04:08	77.82	286.4553	69.5	17.80563	644.9167	714.9167	14.15833	5.458333	14.91667	50.75	486.4167	1.703333	6.694167	1.318179	0.066667
2:04:23	78.50	301.0451	70.26636	17.57223	630.8182	725.9091	13.96364	5.5	15.06364	52.25455	474	1.755455	6.780909	1.326344	0.066364
2:04:38	79.16	315.5578	71	17.91254	644.2727	720.4545	14.21818	5.518182	14.90909	51.14545	483.7273	1.733636	6.706364	1.319343	0.066364
2:04:53	79.85	331.3667	71.76583	18.52887	666.4167	752.75	14.71667	5.483333	14.71667	50.34167	500.75	1.696667	6.685833	1.317408	0.066667
2:05:08	80.51	345.85	72.50091	18.22179	653.8182	754.5455	14.58182	5.318182	14.58182	49.74545	495.6364	1.649091	6.678182	1.316664	0.061818
2:05:23	81.14	361.7718	73.20583	18.55297	663.5	729.3333	14.875	5.4	14.875	51	503.6667	1.665833	6.785833	1.326811	0.06
2:05:38	81.76	376.3603	73.88455	18.14116	657.4545	744.3636	14.67273	5.1	14.79091	50.90909	506.7273	1.655455	6.78	1.326235	0.06
2:05:53	82.37	391.0527	74.56364	18.56668	674.6364	779.5455	14.97273	5.136364	14.97273	51.95455	518.4545	1.668182	6.880909	1.335673	0.062727
2:06:08	82.99	405.7051	75.25091	18.38984	661.9091	742.0909	14.82727	5.181818	14.82727	51.94545	507.0909	1.702727	6.841818	1.332034	0.061818
2:06:23	83.64	421.7043	75.96583	19.03905	682.25	717.9167	15.2	5.508333	15.2	53	515.4167	1.785833	6.855	1.333267	0.060833
2:06:38	84.26	436.2817	76.64636	18.51946	668.1818	715.6364	14.8	5.309091	14.91818	51.37273	506.5455	1.744545	6.769091	1.325218	0.059091
2:06:53	84.87	450.9257	77.31364	18.65366	669.7273	723.9091	14.90909	5.345455	15.01818	51.95455	507	1.750909	6.833636	1.331273	0.062727
2:07:08	85.49	465.5408	77.99636	18.82905	674.9091	718.9091	15.03636	5.409091	15.03636	51.9	510.0909	1.749091	6.805455	1.328645	0.06
2:07:23	86.11	481.6144	78.67583	19.17158	685.9167	728.9167	15.275	5.608333	15.275	53.625	516.5833	1.791667	6.921667	1.339462	0.059167
2:07:38	86.75	496.3347	79.37636	18.91786	676.6364	741.8182	15.12727	5.545455	15.12727	53.25455	511.9091	1.775455	6.908182	1.33821	0.062727
2:07:53	87.37	511.0356	80.05636	18.96027	683.9091	724.0909	15.08182	5.472727	15.08182	52.5	515.3636	1.755455	6.889091	1.336444	0.06
2:08:08	87.97	525.7279	80.70545	18.74289	684.0909	742.0909	14.9	5.281818	14.9	51.96364	517.0909	1.707273	6.880909	1.335662	0.059091
2:08:23	88.64	541.7346	81.43333	18.55558	682.75	724.4167	14.66667	5.166667	14.66667	50.91667	513.75	1.665833	6.861667	1.333893	0.066667
2:08:38	89.33	556.4678	82.18727	18.80518	695.4545	717.9091	14.73636	5.190909	14.73636	51.56364	518.6364	1.697273	6.920909	1.339388	0.063636
2:08:53	89.96	571.0942	82.87636	18.34144	675.6364	720.9091	14.48182	5.118182	14.48182	50.7	507.9091	1.709091	6.816364	1.329672	0.062727
2:09:08	90.60	585.7484	83.56364	18.56148	686.4545	709	14.61818	5.081818	14.61818	51.29091	515.0909	1.721818	6.843636	1.332199	0.062727
2:09:23	91.26	601.744	84.2825	18.53986	688.6667	708.8333	14.75833	4.833333	14.75833	51.23333	524.3333	1.68	6.851667	1.332962	0.0625
2:09:38	91.92	616.4447	85.00091	18.55245	692.3636	714	14.87273	4.654545	14.87273	51.57273	532.4545	1.636364	6.889091	1.336431	0.061818
2:09:53	92.56	631.1028	85.68909	18.25839	687.3636	708	14.7	4.418182	14.7	50.36364	532.7273	1.6	6.847273	1.332551	0.062727
2:10:08	93.20	645.7944	86.37636	18.54898	693.8182	715.2727	14.88182	4.590909	14.88182	52	534.4545	1.665455	6.88	1.335604	0.062727
2:10:23	93.85	660.5118	87.08	18.46668	698.9091	709.3636	14.87273	4.372727	14.87273	51.44545	542.7273	1.621818	6.905455	1.337946	0.067273
2:10:38	94.60	676.4931	87.8925	18.23224	690.25	707.8333	14.7	4.208333	14.7	50.44167	536.75	1.6	6.839167	1.331769	0.071667

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
2:10:53	130.88	9:25:42	0.155	26	0.195	13	0.155	30	0.258	0.00189	116	100	0.075	47.48		35
2:11:08	131.13	9:25:57	0.16	26	0.19	13	0.165	28	0.274	0.00174	116	100	0.075	46.98		35
2:11:23	131.38	9:26:12	0.16	26	0.19	16	0.175	24	0.277	0.00225	118	100	0.074	46.46		35
2:11:38	131.63	9:26:27	0.15	27	0.185	13	0.18	23	0.243	0.00334	121	100	0.074	45.93		35
2:11:53	131.88	9:26:42	0.135	26	0.18	13	0.17	22	0.229	0.0029	120	100	0.073	45.45		35
2:12:08	132.13	9:26:57	0.145	27	0.18	13	0.175	23	0.266	0.0021	117	100	0.072	44.99		35
2:12:23	132.38	9:27:12	0.145	26	0.19	13	0.2	22	0.271	0.0029	120	100	0.072	44.53		35
2:12:38	132.63	9:27:27	0.13	26	0.195	13	0.21	21	0.26	0.00232	118	100	0.072	44.08		35
2:12:53	132.88	9:27:42	0.105	26	0.18	13	0.225	20	0.275	0.00312	121	100	0.071	43.61		35
2:13:08	133.13	9:27:57	0.11	27	0.205	20	0.225	20	0.306	0.00348	122	100	0.071	43.10		35
2:13:23	133.38	9:28:12	0.11	27	0.215	19	0.225	18	0.313	0.00384	122	100	0.070	42.59		35
2:13:38	133.63	9:28:27	0.11	28	0.205	19	0.225	13	0.309	0.0037	122	100	0.069	42.11		35
2:13:53	133.88	9:28:42	0.105	27	0.195	19	0.215	13	0.29	0.00348	122	100	0.069	41.66		35
2:14:08	134.13	9:28:57	0.08	32	0.19	17	0.205	17	0.27	0.00247	119	100	0.068	41.23		35
2:14:23	134.38	9:29:12	0.09	28	0.19	17	0.175	15	0.262	0.00268	119	100	0.068	40.77		35
2:14:38	134.63	9:29:27	0.1	28	0.195	19	0.17	14	0.261	0.00312	121	100	0.067	40.33		35
2:14:53	134.88	9:29:42	0.11	30	0.21	18	0.16	13	0.271	0.00319	121	100	0.06655	39.93398		35
2:15:08	135.13	9:29:57	0.11	28	0.22	17	0.15	13	0.273	0.00254	119	100	0.065249	39.53426		35
2:15:23	135.38	9:30:12	0.135	27	0.22	17	0.15	27	0.278	0.00232	118	100	0.065333	39.11071		35
2:15:38	135.63	9:30:27	0.135	27	0.21	17	0.14	27	0.268	0.00218	118	100	0.065544	38.73161		35
2:15:53	135.88	9:30:42	0.12	27	0.18	17	0.145	24	0.231	0.00283	120	100	0.065238	38.40104		35
2:16:08	136.13	9:30:57	0.12	28	0.19	19	0.155	24	0.228	0.00261	119	100	0.064381	38.08388		35
2:16:23	136.38	9:31:12	0.115	27	0.195	20	0.16	24	0.23	0.00312	121	100	0.064054	37.76508		35
2:16:38	136.63	9:31:27	0.115	28	0.19	12	0.155	24	0.22	0.00341	121	100	0.063689	37.46739		35
2:16:53	136.88	9:31:42	0.11	28	0.185	20	0.15	23	0.207	0.00239	118	100	0.06407	37.20786		35
2:17:08	137.13	9:31:57	0.1	27	0.17	20	0.15	23	0.191	0.00268	119	100	0.064905	36.99381		35
2:17:23	137.38	9:32:12	0.09	17	0.11	16	0.12	28	0.145	0.00232	118	100	0.065753	36.83308		35
2:17:38	137.63	9:32:27	0.085	19	0.095	13	0.125	28	0.146	0.00218	118	100	0.065615	36.69278		35
2:17:53	137.88	9:32:42	0.085	17	0.085	13	0.13	27	0.152	0.0021	117	39	0.065732	36.54395		35
0.095925926	138.1333	0.397882	0.085	17	0.09	23	0.13	19	0.15	0.00218	118	100	0.065238	36.38958		35
0.096099537	138.3833	0.398056	0.085	17	0.085	20	0.13	19	0.152	0.00239	118	100	0.064937	36.25566		35
0.096273148	138.6333	0.398229	0.085	18	0.08	24	0.14	26	0.162	0.0021	117	100	0.064343	36.1341		35
0.096446759	138.8833	0.398403	0.09	17	0.07	23	0.14	27	0.162	0.00203	117	100	0.063523	36.015		35
0.09662037	139.1333	0.398576	0.09	17	0.08	17	0.15	28	0.168	0.00239	118	100	0.062236	35.90042		35
0.096793981	139.3833	0.39875	0.095	16	0.09	14	0.145	28	0.163	0.00283	120	100	0.061805	35.77599		35
0.096967593	139.6333	0.398924	0.1	16	0.1	13	0.13	28	0.149	0.00326	121	100	0.06202	35.65904		35
0.097141204	139.8833	0.399097	0.085	16	0.1	13	0.115	30	0.154	0.00326	121	100	0.061022	35.54712		35
0.097314815	140.1333	0.399271	0.08	16	0.115	14	0.12	20	0.156	0.00283	120	100	0.059604	35.4346		35
0.097488426	140.3833	0.399444	0.085	17	0.12	14	0.125	20	0.16	0.00174	116	100	0.059394	35.32576		35
0.097662037	140.6333	0.399618	0.075	17	0.14	17	0.12	21	0.174	0.00167	115	100	0.059067	35.22783		35
0.097835648	140.8833	0.399792	0.09	28	0.15	17	0.115	21	0.187	0.00152	114	39	0.058825	35.18722		35

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
2:10:53	95.37	691.0863	88.71455	18.4119	689.4545	708.3636	14.73636	4.418182	14.73636	51.48182	529.7273	1.703636	6.784545	1.326663	0.070909
2:11:08	96.07	705.7004	89.46636	18.50813	690.1818	710.0909	14.73636	4.581818	14.73636	52.47273	526.2727	1.743636	6.804545	1.328547	0.066364
2:11:23	96.80	721.8429	90.25083	18.84519	749.5833	824.6667	14.90833	4.316667	14.90833	51.70833	578.5	1.515833	6.984167	1.345214	0.07
2:11:38	97.56	736.7687	91.06273	18.20371	709.3636	774.1818	15.09091	3.863636	15.09091	52.55455	574.0909	1.494545	7.110909	1.356886	0.069091
2:11:53	98.25	751.5601	91.8	18.23824	704.0909	724.7273	14.97273	3.809091	14.97273	51.88182	562.1818	1.574545	6.978182	1.344678	0.066364
2:12:08	98.93	766.1899	92.53364	18.11446	691.9091	714.8182	14.6	4.090909	14.6	50.92727	539.1818	1.64	6.82	1.32998	0.067273
2:12:23	99.62	780.9507	93.26636	18.094	695.6364	727.9091	14.76364	3.963636	14.76364	51.59091	550.9091	1.574545	6.948182	1.341889	0.066364
2:12:38	100.31	795.7345	94.00636	18.54496	754.0909	819.9091	14.93636	3.790909	14.93636	51.64545	597.2727	1.520909	6.970909	1.343981	0.069091
2:12:53	101.04	810.5084	94.78727	19.00712	749.0909	844.7273	14.88182	4.481818	14.88182	51.88182	569.8182	1.595455	6.960909	1.343086	0.071818
2:13:08	101.86	826.543	95.65417	19.16988	781.1667	824.9167	14.675	4.5	14.675	51.89167	585.8333	1.6625	6.886667	1.336213	0.0775
2:13:23	102.69	841.2102	96.53818	18.97819	772.7273	831.6364	14.51818	4.518182	14.51818	52.18182	578.9091	1.71	6.856364	1.333385	0.076364
2:13:38	103.48	855.9241	97.38455	18.64638	748.3636	773.6364	14.55455	4.272727	14.55455	51.21818	570.5455	1.613636	6.901818	1.337624	0.077273
2:13:53	104.26	870.7774	98.21273	18.48664	739.2727	767.8182	14.78182	4.045455	14.78182	51.86364	578.2727	1.521818	7.039091	1.350299	0.072727
2:14:08	105.01	885.6151	99.00727	18.84204	789.7273	793.7273	14.7	3.963636	14.7	51.71818	609.7273	1.51	7.023636	1.348882	0.073636
2:14:23	105.84	901.7302	99.885	18.55132	759.9167	804.1667	14.51667	4.041667	14.51667	51.325	584.5833	1.546667	6.959167	1.342929	0.0775
2:14:38	106.67	916.4578	100.7673	18.89315	768.8182	815.1818	14.52727	4.227273	14.52727	51.48182	579.0909	1.591818	6.915455	1.338869	0.075455
2:14:53	107.4329	931.1531	101.5718	18.7736	759	798.9091	14.41818	4.227273	14.41818	51.11818	569.7273	1.582727	6.883636	1.335938	0.071818
2:15:08	108.2317	945.77	102.4164	18.13566	692	758.4545	14.20909	4.481818	14.20909	49.87273	521.3636	1.623636	6.807273	1.328804	0.081818
2:15:23	109.1117	961.8116	103.3458	18.65525	727.5	769.5	14.425	4.533333	14.425	50.81667	543.6667	1.606667	6.893333	1.336805	0.078333
2:15:38	109.9331	976.6532	104.2127	19.04632	786.5455	828.4545	14.69091	4.290909	14.69091	51.91818	597.2727	1.525455	7.028182	1.349233	0.072727
2:15:53	110.6797	991.4813	105	19.01414	753.3636	822.0909	14.65455	4.7	14.65455	52.13636	563.9091	1.575455	7.014545	1.348012	0.071818
2:16:08	111.4269	1006.23	105.7873	18.77657	732.6364	799.8182	14.48182	4.772727	14.48182	51.46364	546	1.583636	6.936364	1.340755	0.071818
2:16:23	112.2134	1021.071	106.6155	18.88452	732.6364	788.4545	14.68182	4.6	14.68182	51.66364	550	1.540909	7.027273	1.349207	0.077273
2:16:38	112.9859	1035.902	107.4282	18.84051	754.4545	791	14.65455	4.254545	14.65455	51.78182	572.5455	1.518182	7.017273	1.348277	0.071818
2:16:53	113.6949	1051.071	108.1736	18.3939	769.0909	799.1818	15.27273	3.163636	15.27273	53.06364	633.4545	1.346364	7.355455	1.378974	0.061818
2:17:08	114.3092	1066.605	108.8191	17.11332	784.2727	824.4545	15.9	1.372727	15.9	55.04545	731.5455	1.25	7.728182	1.412234	0.056364
2:17:23	114.7909	1080.864	109.325	16.70006	787.8	829.4	16.18	1.05	16.18	56.97	765.2	1.268	7.885	1.425896	0.043
2:17:38	115.2278	1096.599	109.7836	16.29566	778.2727	820.0909	16.24545	0.754545	16.24545	57.16364	776.0909	1.262727	7.938182	1.430432	0.043636
2:17:53	115.7103	1110.945	110.29	16.44744	785.7	825.9	16.36	0.8	16.36	57.85	781.9	1.278	7.985	1.434587	0.053
0.095925926	116.2347	1126.694	110.84	16.1485	767.3636	823.3636	16.23636	0.790909	16.23636	57.5	771.1818	1.275455	7.951818	1.431717	0.050909
0.096099537	116.7125	1141.024	111.341	16.20795	780	818.8	16.3	0.83	16.3	57.44	784	1.268	7.967	1.433073	0.046
0.096273148	117.1679	1156.742	111.8182	16.20418	768.5455	816.4545	16.2	0.927273	16.2	56.83636	768.3636	1.251818	7.918182	1.428891	0.045455
0.096446759	117.6373	1170.95	112.31	16.82256	791.2	822.2	16.1	1.24	16.1	55.84	759.8	1.239	7.826	1.420774	0.047
0.09662037	118.1148	1186.434	112.81	17.09364	812.1818	823.8182	15.6	1.563636	15.84545	54.03636	747.2727	1.220909	7.676364	1.407614	0.049091
0.096793981	118.668	1201.847	113.3891	17.75405	822.4545	850.1818	15.61818	1.909091	15.70909	53.79091	729.6364	1.239091	7.605455	1.401246	0.055455
0.096967593	119.2289	1215.874	113.976	18.35045	850.9	897	15.81	2.19	15.81	54.68	740.5	1.274	7.62	1.402627	0.057
0.097141204	119.8134	1231.243	114.5873	17.55098	809.1818	822.3636	15.56364	1.754545	15.56364	53.45455	722.8182	1.245455	7.559091	1.39722	0.058182
0.097314815	120.4639	1246.525	115.2673	16.41831	741.5455	779.9091	15.23636	1.418182	15.46364	51.55455	690.1818	1.206364	7.469091	1.389217	0.065455
0.097488426	121.1782	1261.747	116.0136	15.72577	709.5455	781.1818	14.70909	1.727273	15.30909	51.8	665.3636	1.25	7.409091	1.383842	0.070909
0.097662037	121.9313	1275.529	116.8	16.08423	702.3	771.6	14.6	2.1	15.25	51.87	637.8	1.303	7.347	1.378266	0.072
0.097835648	122.2906	1278.294	117.175	16.34886	729.5	784	14.6	2.2	15.3	51.75	653.5	1.31	7.39	1.382219	0.05

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
0:00:45	0.75	13:25:16	0.36	19	0.585	20	0.435	17	0.697	0.00203	117	100	0.152	123.66		35
0:01:00	1.00	13:25:31	0.35	17	0.55	16	0.45	17	0.641	0.00145	114	64	0.152	122.94		35
0:01:15	1.25	13:25:46	0.34	17	0.575	16	0.41	18	0.666	0.00145	114	73	0.203	121.16		35
0:01:30	1.50	13:26:01	0.3	15	0.55	16	0.325	16	0.646	0.00116	112	18	0.203	119.42		35
0:01:45	1.75	13:26:16	0.225	24	0.365	17	0.185	15	0.401	0.00058	106	32	0.194	117.64		35
0:02:00	2.00	13:26:31	0.135	22	0.3	20	0.16	17	0.328	0.00261	119	100	0.224	116.11		35
0:02:15	2.25	13:26:46	0.135	28	0.235	21	0.125	20	0.254	0.0016	115	100	0.138	114.81		35
0:02:30	2.50	13:27:01	0.12	30	0.225	20	0.145	17	0.244	0.00174	116	100	0.175	113.86		35
0:02:45	2.75	13:27:16	0.14	28	0.24	20	0.155	16	0.274	0.00261	119	100	0.164	112.67		35
0:03:00	3.00	13:27:31	0.11	19	0.22	19	0.14	19	0.246	0.00283	120	100	0.156	111.49		35
0:03:15	3.25	13:27:46	0.13	21	0.2	23	0.13	16	0.229	0.00276	120	100	0.160	110.54		35
0:03:30	3.50	13:28:01	0.125	22	0.185	19	0.135	16	0.206	0.00189	116	100	0.162	109.59		35
0:03:45	3.75	13:28:16	0.115	23	0.185	19	0.14	16	0.196	0.00247	119	100	0.174	108.64		35
0:04:00	4.00	13:28:31	0.13	23	0.185	18	0.15	16	0.194	0.00247	119	100	0.163	107.22		35
0:04:15	4.25	13:28:46	0.12	23	0.185	20	0.145	16	0.21	0.00283	120	100	0.170	106.04		35
0:04:30	4.50	13:29:01	0.13	23	0.275	17	0.175	14	0.28	0.00297	120	100	0.177	104.86		35
0:04:45	4.75	13:29:16	0.06	27	0.25	23	0.14	27	0.267	0.00036	102	47	0.195	103.69		35
0:05:00	5.00	13:29:31	0.09	20	0.265	24	0.16	19	0.27	0.00232	118	100	0.176	102.28		35
0:05:15	5.25	13:29:46	0.09	26	0.235	22	0.155	20	0.242	0.0021	117	100	0.176	101.10		35
0:05:30	5.50	13:30:01	0.075	21	0.225	22	0.145	23	0.229	0.00174	116	85	0.188	100.16		35
0:05:45	5.75	13:30:16	0.075	26	0.225	22	0.13	23	0.229	0.00196	117	100	0.187	99.23		35
0:06:00	6.00	13:30:31	0.075	23	0.23	22	0.14	26	0.236	0.0021	117	100	0.181	98.29		35
0:06:15	6.25	13:30:46	0.065	32	0.245	23	0.135	26	0.252	0.00239	118	100	0.222	97.18		35
0:06:45	6.75	13:31:16	0.07	27	0.255	26	0.14	34	0.265	0.00312	121	100	0.209	96.14		35
0:07:00	7.00	13:31:31	0.075	24	0.255	20	0.15	22	0.261	0.00203	117	100	0.248	94.91		35
0:07:15	7.25	13:31:46	0.1	24	0.28	18	0.16	12	0.283	0.00218	118	100	0.269	93.29		35
0:07:30	7.50	13:32:01	0.21	19	0.6	23	0.435	19	0.618	0.00102	111	85	0.246	91.63		35
0:07:45	7.75	13:32:16	0.255	22	0.66	20	0.46	19	0.747	0.00131	113	85	0.246	90.74		35
0:08:00	8.00	13:32:31	0.26	21	0.675	20	0.47	19	0.761	0.00138	114	85	0.252	90.02		35
0:08:15	8.25	13:32:46	0.255	21	0.66	21	0.455	19	0.75	0.00138	114	85	0.257	89.31		35
0:08:30	8.50	13:33:01	0.24	21	0.645	24	0.44	19	0.722	0.00138	114	85	0.257	88.54		35
0:08:45	8.75	13:33:16	0.23	20	0.63	24	0.42	18	0.685	0.00131	113	85	0.262	87.70		35
0:09:00	9.00	13:33:31	0.205	19	0.59	26	0.38	18	0.598	0.00123	113	8	0.279	86.64		35
0:09:15	9.25	13:33:46	0.15	17	0.44	26	0.26	16	0.442	0.00116	112	15	0.284	85.31		35
0:09:30	9.50	13:34:01	0.185	18	0.495	26	0.29	16	0.496	0.00123	113	73	0.281	84.01		35
0:09:45	9.75	13:34:16	0.18	18	0.475	26	0.27	16	0.478	0.00123	113	28	0.298	82.69		35
0:10:00	10.00	13:34:31	0.155	14	0.42	26	0.225	14	0.421	0.00116	112	20	0.296	81.42		35
0:10:15	10.25	13:34:46	0.145	13	0.405	27	0.22	17	0.406	0.00109	111	27	0.316	79.94		35
0:10:30	10.50	13:35:01	0.115	10	0.33	26	0.215	17	0.333	0.00116	112	28	0.328	78.16		35
0:10:45	10.75	13:35:16	0.1	10	0.3	27	0.19	17	0.305	0.00123	113	26	0.346	76.41		35
0:11:00	11.00	13:35:31	0.105	12	0.315	27	0.205	15	0.317	0.00174	116	100	0.347	74.61		35
0:11:15	11.25	13:35:46	0.095	12	0.305	27	0.19	17	0.307	0.00145	114	100	0.353	73.66		35

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
0:00:45	35.06	1.106727	2	21.07665	395	395	12.1	15.7	16.6	53.1	96	9.94	4.63		
0:01:00	35.11	2.213454	2.75	19.93637	407.5	409	11.35	14	14.85	53.5	121.5	6.765	4.63	1.106727	0.5
0:01:15	35.30	14.3647	4.606154	14.31755	373.9231	375.3846	9.315385	7.876923	9.461538	30.23846	207.3077	2.053077	4.629231	1.104977	0.186923
0:01:30	35.59	29.18882	6.428462	14.95579	403.1538	403.1538	10.25385	7.946154	10.25385	30.86154	246.5385	1.889231	4.934615	1.140317	0.143077
0:01:45	35.97	44.38046	8.285385	15.78045	424.5385	424.5385	11.02308	8.346154	11.02308	34.25385	266.0769	1.900769	5.196923	1.168588	0.142308
0:02:00	36.37	54.35382	9.895556	13.39451	337.7778	337.7778	8.811111	7.933333	8.811111	26.36667	185.1111	1.955556	4.648889	1.108151	0.162222
0:02:15	36.76	1.499022	11.25	22.05171	473	473	13	14.9	16.75	71.35	171.5	6.34	2.875	0.749511	0.35
0:02:30	37.08	2.119416	12.25	16.98514	356.5	358	10.05	11.25	12.25	44.85	125.5	4.49	4.22	1.059708	0.5
0:02:45	37.51	2.156287	13.5	18.94585	390.5	390.5	11.05	12.55	13.55	52.5	127.5	5.17	4.38	1.078143	0.75
0:03:00	37.98	2.189761	14.75	19.97621	406	411	11.6	13.75	14.55	59.45	127	5.475	4.53	1.09488	0.5
0:03:15	38.38	2.202876	15.75	19.85104	418	418	11.7	13.35	14.1	57.75	146.5	5.15	4.59	1.101438	0.5
0:03:30	38.80	2.178714	16.75	18.92069	393.5	393.5	11.25	12.95	13.85	57.15	138	5.595	4.48	1.089357	0.5
0:03:45	39.24	2.144899	17.75	17.36516	361.5	362.5	10.4	11.95	12.8	51.15	129.5	5.13	4.33	1.07245	0.5
0:04:00	39.94	2.196337	19.25	19.06075	404	404	11.3	13.2	13.95	60.1	145.5	5.76	4.56	1.098169	0.75
0:04:15	40.56	2.178714	20.5	18.35049	387.5	388	10.95	12.55	13	56.65	141	5.19	4.48	1.089357	0.75
0:04:30	41.21	2.176491	21.75	18.17543	390.5	392	10.85	12.4	12.9	54.3	146.5	4.92	4.47	1.088246	0.5
0:04:45	41.88	3.283882	23	16.25118	373.3333	374.6667	10.16667	10.36667	11.13333	45.9	170.6667	3.53	4.543333	1.094627	0.5
0:05:00	42.72	3.375063	24.5	17.5581	416.3333	416.3333	11.13333	11.36667	12.5	58.7	202.3333	4.17	4.846667	1.125021	0.5
0:05:15	43.45	2.225472	25.75	19.12046	426	426	11.75	12.55	13.45	60.7	180.5	4.965	4.695	1.112736	0.5
0:05:30	44.05	2.182039	26.75	18.01009	401.5	401.5	11.15	11.85	12.7	55.15	173	4.77	4.495	1.09102	0.5
0:05:45	44.67	2.202876	27.75	18.66031	413.5	413.5	11.5	12.3	12.9	57.2	175	4.855	4.59	1.101438	0.5
0:06:00	45.29	2.243449	28.75	19.71561	433.5	433.5	12.15	13.05	14.1	62.8	181.5	5.06	4.78	1.121724	0.5
0:06:15	46.06	3.23368	29.94333	14.39731	335.3333	335.6667	9.033333	9.433333	9.933333	42.93333	156.6667	3.48	4.393333	1.077893	0.443333
0:06:45	46.79	3.310868	31.05667	15.65419	371	371	10	10.26667	11.3	50.03333	182.6667	3.67	4.643333	1.103623	0.39
0:07:00	47.68	4.314746	32.375	13.01581	326.5	326.75	8.55	8.4	9.05	37	177.75	2.7375	4.4125	1.078687	0.3125
0:07:15	48.88	14.42557	34.12538	13.23703	339.7692	341.7692	8.946154	8.353846	9.161538	32.96923	196.8462	2.237692	4.67	1.109659	0.183077
0:07:30	50.15	30.61949	35.91462	17.53018	501.3846	501.8462	13.13077	8.930769	13.13077	41.66154	354.8462	1.623846	5.950769	1.245686	0.1
0:07:45	50.85	46.00017	36.88583	17.47734	547.9167	548.6667	14.325	8.008333	14.325	42.68333	442.9167	1.421667	6.3125	1.281723	0.068333
0:08:00	51.41	61.33226	37.6575	17.18471	546.25	546.25	14.2	7.883333	14.2	41.625	446.8333	1.390833	6.270833	1.277674	0.0625
0:08:15	51.98	76.56103	38.43333	17.30997	537.5833	537.5833	13.975	7.933333	13.975	41.05833	426.5	1.413333	6.1825	1.269064	0.066667
0:08:30	52.60	91.73972	39.27167	17.33008	533.5833	533.5833	13.85	8.1	13.85	41.84167	417.6667	1.460833	6.14	1.264891	0.074167
0:08:45	53.29	105.5558	40.18909	17.79669	527	527	13.67273	8.490909	13.67273	41.51818	389.6364	1.515455	6.05	1.256008	0.086364
0:09:00	54.17	121.2719	41.34308	16.79335	480	480	12.26923	8.576923	12.26923	37.74615	329.3077	1.613077	5.583846	1.20893	0.104615
0:09:15	55.29	135.7033	42.80167	16.74111	462.8333	462.8333	11.875	8.808333	11.875	37.98333	300.75	1.661667	5.523333	1.202617	0.12
0:09:30	56.40	151.6878	44.22308	17.59425	505	505	12.89231	8.730769	12.89231	40.36154	348.3846	1.603846	5.785385	1.229574	0.111538
0:09:45	57.55	166.0947	45.68167	16.67015	470.25	470.25	11.96667	8.675	11.96667	37.225	313.5833	1.6575	5.5025	1.200582	0.12
0:10:00	58.67	180.6692	47.08167	17.31769	492.5833	492.5833	12.56667	8.658333	12.56667	39.34167	334.3333	1.675833	5.6375	1.21454	0.118333
0:10:15	60.00	195.9327	48.73462	16.05979	440.9231	440.9231	11.16154	8.7	11.16154	36.07692	277.7692	1.855385	5.249231	1.174115	0.147692
0:10:30	61.62	211.1296	50.71231	16.01219	432.5385	434	10.98462	8.623077	10.98462	35.28462	265.0769	1.865385	5.201538	1.168991	0.146154
0:10:45	63.24	226.0901	52.67231	15.32908	408.6923	409.1538	10.33846	8.392308	10.33846	33.43846	242.4615	1.923077	5.030769	1.150807	0.161538
0:11:00	64.95	241.2313	54.71231	15.83521	431.6923	431.6923	10.87692	8.592308	10.87692	35.13077	266.5385	1.902308	5.160769	1.164707	0.146154
0:11:15	65.86	243.5575	55.785	15.95378	430	430	10.85	8.55	10.85	34.75	260	1.92	5.145	1.163097	0.145

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
1:26:22	86.37	13:40:27	0.155	17	0.175	17	0.145	18	0.185	0.00051	105	100	0.088	71.24		35
1:26:37	86.62	13:40:42	0.18	18	0.175	15	0.14	18	0.191	0.00065	107	100	0.091	70.56		35
1:26:52	86.87	13:40:57	0.185	18	0.16	16	0.125	17	0.196	0.00058	106	100	0.089	69.85		35
1:27:07	87.12	13:41:12	0.195	18	0.145	15	0.125	23	0.21	0.00058	106	100	0.088	69.15		35
1:27:22	87.37	13:41:27	0.205	18	0.14	18	0.12	22	0.219	0.00058	106	100	0.086	68.34		35
1:27:37	87.62	13:41:42	0.19	18	0.135	19	0.125	18	0.213	0.00073	108	100	0.086	67.51		35
1:27:52	87.87	13:41:57	0.175	18	0.135	19	0.13	18	0.2	0.00065	107	100	0.084	66.62		35
1:28:07	88.12	13:42:12	0.175	18	0.12	19	0.13	18	0.197	0.00065	107	100	0.083	65.68		35
1:28:22	88.37	13:42:27	0.17	18	0.12	14	0.115	20	0.186	0.00065	107	100	0.081	64.78		35
1:28:37	88.62	13:42:42	0.165	18	0.11	19	0.11	19	0.178	0.0008	109	100	0.081	63.79		35
1:28:52	88.87	13:42:57	0.16	18	0.11	20	0.105	16	0.177	0.00087	110	100	0.079	62.88		35
1:29:07	89.12	13:43:12	0.16	18	0.11	20	0.1	16	0.179	0.00087	110	100	0.078	61.98		35
1:29:22	89.37	13:43:27	0.16	18	0.105	20	0.1	15	0.177	0.00087	110	100	0.077	61.06		35
1:29:37	89.62	13:43:42	0.165	18	0.1	20	0.1	16	0.181	0.00087	110	100	0.076	60.21		35
1:29:52	89.87	13:43:57	0.17	19	0.1	20	0.095	15	0.179	0.00087	110	100	0.078	59.31		35
1:30:07	90.12	13:44:12	0.16	18	0.1	20	0.1	16	0.172	0.0008	109	100	0.075	58.46		35
1:30:22	90.37	13:44:27	0.15	18	0.1	20	0.1	16	0.171	0.00109	111	85	0.073	57.64		35
1:30:37	90.62	13:44:42	0.155	19	0.1	20	0.09	16	0.167	0.00102	111	100	0.074	56.86		35
1:30:52	90.87	13:44:57	0.155	20	0.1	20	0.085	28	0.165	0.00123	113	100	0.074	56.10		35
1:31:07	91.12	13:45:12	0.155	20	0.1	21	0.085	27	0.167	0.00123	113	100	0.073	55.31		35
1:31:22	91.37	13:45:27	0.155	20	0.1	21	0.09	23	0.173	0.00116	112	100	0.072	54.51		35
1:31:37	91.62	13:45:42	0.15	20	0.1	21	0.095	26	0.167	0.00102	111	100	0.071	53.72		35
1:31:52	91.87	13:45:57	0.145	20	0.1	21	0.1	24	0.156	0.00116	112	100	0.073	52.99		35
1:32:07	92.12	13:46:12	0.14	20	0.1	21	0.1	24	0.149	0.00109	111	100	0.071	52.35		35
1:32:22	92.37	13:46:27	0.14	20	0.1	22	0.1	24	0.151	0.00094	110	100	0.070	51.70		35
1:32:37	92.62	13:46:42	0.14	20	0.1	23	0.095	24	0.149	0.00102	111	100	0.069	50.99		35
1:32:52	92.87	13:46:57	0.15	21	0.1	23	0.095	23	0.165	0.00109	111	100	0.068	50.26		35
1:33:07	93.12	13:47:12	0.15	20	0.1	21	0.09	23	0.163	0.00109	111	100	0.067	49.55		35
1:33:22	93.37	13:47:27	0.145	20	0.095	14	0.08	23	0.166	0.00094	110	100	0.068	48.73		35
1:33:37	93.62	13:47:42	0.145	21	0.1	14	0.08	24	0.161	0.00087	110	100	0.066	47.92		35
1:33:52	93.87	13:47:57	0.135	21	0.105	13	0.08	16	0.158	0.00073	108	100	0.063	47.10		35
1:34:07	94.12	13:48:12	0.135	21	0.115	14	0.075	26	0.156	0.00109	111	17	0.063	46.30		35
1:34:22	94.37	13:48:27	0.13	21	0.115	14	0.07	32	0.152	0.0008	109	17	0.064	45.49		35
1:34:37	94.62	13:48:42	0.125	21	0.11	14	0.065	28	0.139	0.00058	106	85	0.062	44.68		35
1:34:52	94.87	13:48:57	0.115	21	0.115	15	0.06	34	0.128	0.00058	106	32	0.061	43.92		35
1:35:07	95.12	13:49:12	0.11	20	0.11	15	0.055	37	0.117	0.00065	107	100	0.060	43.21		35
1:35:22	95.37	13:49:27	0.115	21	0.105	15	0.06	32	0.125	0.0008	109	16	0.060	42.46		35
1:35:37	95.62	13:49:42	0.11	21	0.1	15	0.055	34	0.121	0.0008	109	20	0.060	41.74		35
1:35:52	95.87	13:49:57	0.11	21	0.09	15	0.055	34	0.121	0.0008	109	100	0.061	41.06		35
1:36:07	96.12	13:50:12	0.115	20	0.09	15	0.06	32	0.121	0.00087	110	100	0.061	40.39		35
1:36:22	96.37	13:50:27	0.115	20	0.09	22	0.06	32	0.118	0.00087	110	100	0.062	39.83		35
1:36:37	96.62	13:50:42	0.115	21	0.105	26	0.06	32	0.121	0.00094	110	100	0.063	39.33		35
1:36:52	96.87	13:50:57	0.09	22	0.1	26	0.06	34	0.113	0.00094	110	28	0.061	38.97		35
1:37:07	97.12	13:51:12	0.09	22	0.09	26	0.075	28	0.122	0.00102	111	100	0.062	38.69		35
1:37:22	97.37	13:51:27	0.095	23	0.09	26	0.075	28	0.122	0.00094	110	100	0.062	38.46		35

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
1:26:22	68.30	61.01799	58.655	11.28737	374.1667	377.75	12.28333	3.416667	12.36667	36.25	400.0833	1.555	5.476667	1.197832	0.0625
1:26:37	68.97	75.54629	59.43333	12.15231	380.25	385.25	12.61667	3.933333	12.7	38.98333	392.3333	1.649167	5.600833	1.210692	0.066667
1:26:52	69.68	91.28485	60.25	12.49762	378.7692	378.7692	12.47692	4.230769	12.47692	38.51538	378.2308	1.655385	5.6	1.210658	0.063846
1:27:07	70.38	105.7996	61.05667	12.71384	378.1667	379.5	12.4	4.333333	12.4	38.6	370	1.665833	5.589167	1.209566	0.069167
1:27:22	71.20	121.3484	62	11.55041	351.0769	369.6154	11.69231	4.869231	12.00769	37.08462	354.7692	1.648462	5.458462	1.196059	0.076923
1:27:37	72.04	135.7521	62.97	11.1478	343.1667	373.6667	11.58333	5.125	12.13333	38.31667	354.5	1.6875	5.499167	1.200306	0.08
1:27:52	72.96	151.3124	64.01154	10.52966	333.7692	367.1538	11.33077	5.215385	11.81538	37.99231	354.6154	1.680769	5.466923	1.196951	0.086923
1:28:07	73.93	165.5769	65.11917	10.5749	330.5	360.5833	11.225	5.25	11.625	37.3	347.4167	1.675833	5.3875	1.188702	0.085833
1:28:22	74.87	181.0165	66.18769	10.67273	326.6923	361.9231	11.32308	5.284615	11.66154	37.12308	343.6154	1.688462	5.377692	1.187668	0.088462
1:28:37	75.91	196.4674	67.36385	10.81351	328	366.3846	11.40769	5.415385	11.77692	37.88462	343.4615	1.713846	5.386154	1.188524	0.090769
1:28:52	76.89	210.6855	68.45833	10.73447	327	364.1667	11.33333	5.308333	11.78333	36.96667	342.5833	1.688333	5.350833	1.184842	0.084167
1:29:07	77.86	226.0696	69.54462	10.78624	327.9231	360	11.31538	5.338462	11.65385	36.93846	341.6923	1.704615	5.336923	1.183398	0.089231
1:29:22	78.86	241.4851	70.66692	10.53367	324.6154	361.3077	11.16923	5.176923	11.62308	36.60769	341.1538	1.670769	5.36	1.185805	0.083846
1:29:37	79.80	255.7505	71.71	10.44611	326.3333	362.3333	11.16667	5.033333	11.75833	37.14167	345.0833	1.674167	5.388333	1.188782	0.084167
1:29:52	80.79	271.3391	72.81231	10.71663	326.6923	372.8462	11.5	5.261538	12.09231	39.21538	347.0769	1.736923	5.487692	1.199123	0.088462
1:30:07	81.75	285.6265	73.875	10.22583	322.8333	367.0833	11.225	4.966667	11.95833	37.76667	348.8333	1.698333	5.405833	1.190619	0.083333
1:30:22	82.68	301.0662	74.90923	10.03818	321.6923	367.4615	11.12308	4.815385	11.86923	36.73077	349.9231	1.646154	5.377692	1.187671	0.080769
1:30:37	83.57	315.5154	75.885	10.4426	330.3333	377.1667	11.56667	4.941667	12.13333	38.55	359.5833	1.658333	5.535833	1.204094	0.0775
1:30:52	84.45	331.137	76.85077	10.07814	327.8462	375.4615	11.53846	4.723077	12.06923	38.53077	365.8462	1.657692	5.512308	1.201661	0.078462
1:31:07	85.38	345.5664	77.875	10.24085	329.0833	374.5833	11.56667	4.85	12.06667	38.925	363.5833	1.6825	5.52	1.202456	0.083333
1:31:22	86.33	361.1788	78.91692	10.35548	331.6923	373.1538	11.6	4.884615	12	39.05385	364.0769	1.695385	5.505385	1.200952	0.083846
1:31:37	87.28	375.5857	79.95	10.29922	337.1667	373.5833	11.66667	4.641667	11.96667	38.80833	372.75	1.648333	5.501667	1.200574	0.08
1:31:52	88.16	391.6039	80.91154	10.5353	351.7692	395.2308	12.41538	4.392308	12.79231	41.7	400.6923	1.638462	5.811538	1.232166	0.073077
1:32:07	88.94	406.2101	81.76917	10.18235	345	383.75	12.075	4.35	12.36667	40.01667	394.25	1.625833	5.663333	1.217182	0.068333
1:32:22	89.76	420.7303	82.65417	10.09633	339.5833	379.0833	11.84167	4.375	12.15833	39	385	1.605833	5.593333	1.210023	0.0775
1:32:37	90.65	436.5585	83.61538	10.26889	342.0769	385.3077	11.99231	4.246154	12.36154	39.58462	386.9231	1.596154	5.666923	1.217549	0.076923
1:32:52	91.58	451.0756	84.625	10.07966	341.0833	383.75	11.825	4.15	12.19167	39.31667	386.5	1.609167	5.590833	1.20976	0.083333
1:33:07	92.50	465.5967	85.62667	10.16409	342.75	388	11.69167	4.058333	12.28333	38.975	382.5	1.588333	5.594167	1.210092	0.085
1:33:22	93.58	481.3328	86.79231	11.24651	365.7692	389.4615	11.66923	4.361538	12.37692	40.08462	376.7692	1.649231	5.597692	1.210467	0.096923
1:33:37	94.67	495.7582	87.96667	10.76915	349.75	384.25	11.44167	4.258333	12.2	38.65833	367.25	1.6425	5.516667	1.202116	0.095
1:33:52	95.80	511.2627	89.17462	9.901058	336	375.4615	11.16923	3.923077	11.86923	36.86923	369	1.586923	5.425385	1.192658	0.094615
1:34:07	96.93	525.5658	90.39417	10.6531	347.8333	376	11.3	3.933333	11.79167	37.40833	364.6667	1.635833	5.418333	1.191922	0.105833
1:34:22	98.10	541.2514	91.64077	11.37009	368.3077	391.6154	11.69231	4.153846	12.37692	39.91538	376.6923	1.636923	5.56	1.206587	0.093846
1:34:37	99.30	555.6692	92.93083	10.16451	341.4167	384	11.41667	3.9	12.08333	38.41667	374	1.633333	5.510833	1.201484	0.106667
1:34:52	100.47	571.1998	94.17462	9.881702	339.4615	379.3846	11.35385	3.761538	11.81538	37.44615	377.7692	1.582308	5.444615	1.19466	0.094615
1:35:07	101.57	585.5006	95.3525	9.963302	340.1667	379.75	11.30833	3.666667	11.85833	36.94167	375.1667	1.564167	5.416667	1.191733	0.0975
1:35:22	102.80	601.094	96.66154	10.02897	341.7692	386.9231	11.41538	3.684615	12.07692	38.51538	377.8462	1.610769	5.491538	1.199498	0.107692
1:35:37	104.02	615.5203	97.95	9.859138	343.1667	392.3333	11.59167	3.491667	12.21667	38.91667	388.25	1.590833	5.5175	1.202186	0.1
1:35:52	105.22	631.327	99.23077	10.2168	349.1538	403.3077	11.90769	3.607692	12.65385	41.00769	393.1538	1.62	5.650769	1.215905	0.106923
1:36:07	106.47	646.0127	100.5492	10.63004	356.1667	409.25	12.05833	3.725	12.925	42.10833	393.3333	1.619167	5.728333	1.223807	0.1
1:36:22	107.54	660.9806	101.6817	10.45821	366.9167	424.6667	12.61667	3.4	13.58333	45.08333	423.0833	1.6075	5.9625	1.247321	0.090833
1:36:37	108.55	676.2007	102.7575	9.8962	381.8333	435.4167	13.025	2.816667	14.08333	46.55	463.25	1.586667	6.175833	1.268346	0.083333
1:36:52	109.31	691.4221	103.5583	9.461286	384.75	429.9167	13	2.25	14.01667	45.09167	476.8333	1.548333	6.176667	1.268443	0.058333
1:37:07	109.93	706.7657	104.2142	9.99503	406.3333	432.8333	13.25833	2.175	14.25833	46.04167	491.25	1.57	6.280833	1.278634	0.05
1:37:22	110.45	720.8705	104.7609	10.24319	412	434	13.39091	2.145455	14.37273	46.47273	493.9091	1.58	6.318182	1.282259	0.047273

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
1:37:37	97.62	13:51:42	0.1	23	0.085	26	0.08	28	0.127	0.00094	110	43	0.063	38.27	35	
1:37:52	97.87	13:51:57	0.105	21	0.085	18	0.085	27	0.129	0.00087	110	34	0.063	38.13	35	
1:38:07	98.12	13:52:12	0.12	20	0.085	24	0.09	24	0.135	0.00094	110	100	0.062	37.98	35	
1:38:22	98.37	13:52:27	0.12	20	0.085	27	0.095	23	0.136	0.00094	110	100	0.065	37.88	35	
1:38:37	98.62	13:52:42	0.125	21	0.09	26	0.1	24	0.141	0.00087	110	34	0.066	37.79	35	
1:38:52	98.87	13:52:57	0.13	21	0.09	18	0.11	21	0.149	0.00094	110	24	0.068	37.72	35	
1:39:07	99.12	13:53:12	0.125	21	0.09	18	0.105	21	0.146	0.00094	110	43	0.071	37.69	35	

SLT-E-14-3

Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
1:37:37	110.88	736.473	105.2092	10.04218	400.4167	442.1667	13.725	2.366667	14.78333	49.20833	496.25	1.6425	6.505	1.300208	0.0325
1:37:52	111.23	750.7513	105.5809	10.11415	401.6364	439.8182	13.66364	2.390909	14.73636	48.55455	494	1.641818	6.481818	1.298026	0.031818
1:38:07	111.57	766.3641	105.9417	10.07224	405.4167	442.75	13.675	2.316667	14.79167	48.48333	499.1667	1.6425	6.514167	1.301063	0.028333
1:38:22	111.83	780.9808	106.2091	10.62257	418.2727	459.5455	14.2	2.990909	15.4	52.48182	511.3636	1.712727	6.808182	1.328792	0.020909
1:38:37	112.04	795.7348	106.4373	10.76464	428.2727	465.2727	14.48182	2.990909	15.68182	54.29091	525	1.743636	6.942727	1.341276	0.02
1:38:52	112.22	810.7555	106.6255	11.28707	442.5455	478.7273	15.06364	3.081818	16.24545	58.01818	540.8182	1.802727	7.209091	1.365521	0.015455
1:39:07	112.32	813.5313	106.725	11.74548	459	492.5	15.55	3.4	16.7	62.95	558	1.885	7.455	1.387871	0.015

SLT-B-12-1A

Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
2:01:45	121.75	14:55:49	0.195	24	0.17	30	0.165	24	0.266	0.00073	108	100	0.082	84.62		58
2:02:00	122.00	14:56:04	0.195	27	0.17	28	0.175	27	0.275	0.00116	112	100	0.077	83.90		58
2:02:15	122.25	14:56:19	0.175	26	0.145	24	0.17	27	0.258	0.00087	110	100	0.075	83.27		58
2:02:30	122.50	14:56:34	0.145	21	0.12	24	0.15	26	0.224	0.00073	108	100	0.075	82.74		58
2:02:45	122.75	14:56:49	0.15	20	0.12	23	0.15	26	0.224	0.00065	107	100	0.072	82.19		58
2:03:00	123.00	14:57:04	0.11	18	0.12	18	0.13	27	0.197	0.00073	108	100	0.072	81.64		58
2:03:15	123.25	14:57:19	0.105	17	0.12	23	0.125	22	0.185	0.00073	108	100	0.072	81.05		58
2:03:30	123.50	14:57:34	0.1	16	0.125	23	0.12	22	0.178	0.00058	106	100	0.071	80.42		58
2:03:45	123.75	14:57:49	0.11	22	0.125	22	0.11	22	0.165	0.00065	107	100	0.073	79.75		58
2:04:00	124.00	14:58:04	0.105	20	0.13	17	0.105	18	0.168	0.00065	107	100	0.070	79.02		58
2:04:15	124.25	14:58:19	0.095	16	0.13	17	0.095	18	0.162	0.0008	109	100	0.071	78.30		58
2:04:30	124.50	14:58:34	0.09	16	0.12	17	0.1	16	0.157	0.0008	109	100	0.068	77.56		58
2:04:45	124.75	14:58:49	0.085	15	0.125	17	0.095	26	0.147	0.00087	110	100	0.068	76.85		58
2:05:00	125.00	14:59:04	0.125	21	0.12	22	0.095	26	0.176	0.0008	109	100	0.068	76.19		58
2:05:15	125.25	14:59:19	0.135	22	0.13	20	0.1	26	0.188	0.00065	107	100	0.069	75.55		58
2:05:30	125.50	14:59:34	0.135	22	0.125	21	0.1	26	0.191	0.00058	106	100	0.067	74.83		58
2:05:45	125.75	14:59:49	0.1	20	0.13	20	0.12	27	0.171	0.00087	110	100	0.067	74.10		58
2:06:00	126.00	15:00:04	0.14	22	0.14	21	0.11	27	0.197	0.00065	107	100	0.069	73.50		58
2:06:15	126.25	15:00:19	0.175	23	0.14	22	0.13	27	0.226	0.0008	109	100	0.070	73.06		58
2:06:30	126.50	15:00:34	0.19	24	0.145	23	0.14	27	0.234	0.00058	106	100	0.070	72.68		58
2:06:45	126.75	15:00:49	0.185	24	0.15	23	0.135	28	0.231	0.00073	108	100	0.068	72.27		58
2:07:00	127.00	15:01:04	0.16	26	0.15	27	0.125	27	0.213	0.00073	108	100	0.067	71.82		58
2:07:15	127.25	15:01:19	0.15	23	0.15	26	0.12	27	0.207	0.00065	107	100	0.066	71.38		58
2:07:30	127.50	15:01:34	0.145	23	0.15	27	0.115	27	0.199	0.0008	109	26	0.065	70.93		58
2:07:45	127.75	15:01:49	0.15	24	0.15	26	0.11	27	0.197	0.00073	108	100	0.065	70.51		58
2:08:00	128.00	15:02:04	0.18	26	0.15	28	0.125	28	0.217	0.00073	108	100	0.068	70.18		58
2:08:15	128.25	15:02:19	0.205	26	0.15	27	0.14	28	0.235	0.00065	107	100	0.069	69.90		58
2:08:30	128.50	15:02:34	0.19	27	0.14	24	0.13	28	0.219	0.00058	106	100	0.067	69.63		58
2:08:45	128.75	15:02:49	0.185	27	0.14	26	0.125	27	0.215	0.00058	106	47	0.069	69.37		58
2:09:00	129.00	15:03:04	0.2	27	0.14	26	0.13	28	0.22	0.00065	107	100	0.069	69.14		58
2:09:15	129.25	15:03:19	0.2	27	0.14	24	0.13	28	0.223	0.00051	105	100	0.069	68.96		58
2:09:30	129.50	15:03:34	0.205	27	0.13	23	0.13	21	0.225	0.00058	106	100	0.069	68.78		58
2:09:45	129.75	15:03:49	0.21	27	0.125	24	0.135	21	0.224	0.00058	106	100	0.069	68.58		58
2:10:00	130.00	15:04:04	0.21	27	0.13	23	0.135	21	0.226	0.00058	106	73	0.068	68.39		58
2:10:15	130.25	15:04:19	0.195	27	0.135	24	0.13	21	0.215	0.00058	106	100	0.067	68.20		58
2:10:30	130.50	15:04:34	0.185	27	0.15	27	0.12	20	0.207	0.00058	106	100	0.065	67.96		58
2:10:45	130.75	15:04:49	0.17	27	0.155	28	0.115	27	0.196	0.00065	107	100	0.066	67.72		58
2:11:00	131.00	15:05:04	0.165	26	0.16	26	0.11	27	0.191	0.00094	110	100	0.065	67.47		58
2:11:15	131.25	15:05:19	0.165	27	0.16	28	0.11	18	0.196	0.00094	110	100	0.065	67.20		58
2:11:30	131.50	15:05:34	0.17	27	0.165	30	0.115	27	0.206	0.00065	107	100	0.065	66.93		58
2:11:45	131.75	15:05:49	0.175	27	0.165	34	0.115	27	0.207	0.00087	110	100	0.064	66.66		58
2:12:00	132.00	15:06:04	0.175	27	0.165	30	0.12	27	0.214	0.00094	110	100	0.064	66.38		58
2:12:15	132.25	15:06:19	0.175	28	0.165	30	0.12	26	0.212	0.00109	111	100	0.063	66.10		58
2:12:30	132.50	15:06:34	0.175	28	0.165	30	0.115	27	0.211	0.00102	111	100	0.064	65.83		58
2:12:45	132.75	15:06:49	0.165	28	0.18	28	0.12	27	0.211	0.00109	111	100	0.062	65.56		58

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
2:01:45	80.77	15.99316	56.20769	12.68614	392.9231	393.4615	13.1	4.023077	13.1	44	403.6923	1.81	5.296923	1.230243	0.092308
2:02:00	81.47	31.6618	57.21154	12.79269	374.5385	374.5385	12.53846	4.1	12.53846	39.6	367.9231	1.755385	5.547692	1.205281	0.073077
2:02:15	82.08	46.00499	58.07833	12.95334	374.6667	374.6667	12.34167	3.925	12.34167	38.1	358.75	1.711667	5.450833	1.195266	0.064167
2:02:30	82.61	61.53631	58.82538	13.2123	371.6154	371.6154	12.34615	3.923077	12.34615	38.02308	349.0769	1.72	5.445385	1.194717	0.06
2:02:45	83.16	75.64074	59.595	12.69603	356.8333	356.8333	11.78333	3.916667	11.78333	35.6	333.0833	1.691667	5.260833	1.175369	0.0625
2:03:00	83.72	91.02319	60.37615	12.92107	364.0769	364.0769	11.93077	3.730769	11.93077	36.18462	338.3077	1.665385	5.336154	1.183266	0.062308
2:03:15	84.33	106.4447	61.21846	13.12866	367.6923	367.6923	12.02308	3.784615	12.02308	36.96154	338.9231	1.681538	5.364615	1.186272	0.068462
2:03:30	84.99	120.5935	62.12	13.06755	362	362	11.825	3.833333	11.825	36.10833	329.6667	1.681667	5.295833	1.179067	0.075
2:03:45	85.70	136.1007	63.09077	13.83355	371.5385	371.5385	12.20769	4.169231	12.20769	38.66923	329.2308	1.776154	5.427692	1.192858	0.08
2:04:00	86.50	151.4512	64.16692	13.37446	362	362	11.84615	4.061538	11.84615	37.1	322.2308	1.755385	5.312308	1.180807	0.083846
2:04:15	87.29	165.7612	65.23083	13.45275	371.3333	371.3333	12.13333	3.95	12.13333	38.475	337	1.7275	5.424167	1.192503	0.088333
2:04:30	88.11	181.0777	66.33154	13.23476	357.3846	357.3846	11.63846	4.053846	11.63846	36.13077	315.8462	1.714615	5.287692	1.178193	0.084615
2:04:45	88.93	196.4343	67.41692	13.43003	363.7692	363.7692	11.83077	4.030769	11.83077	36.26154	322.1538	1.683846	5.316923	1.181272	0.083846
2:05:00	89.70	210.7256	68.42333	13.49954	369.8333	369.8333	12.18333	3.9	12.18333	36.89167	335.5833	1.668333	5.409167	1.190943	0.0775
2:05:15	90.46	226.3339	69.41692	13.49796	375.6923	375.6923	12.46923	4.046154	12.46923	38.98462	348.9231	1.724615	5.502308	1.200638	0.082308
2:05:30	91.33	240.6025	70.54917	13.42454	366.8333	366.8333	12.10833	4.183333	12.10833	37.85833	332.5833	1.748333	5.390833	1.189048	0.0975
2:05:45	92.24	256.1026	71.71769	13.51957	368.7692	368.7692	12.15385	4.207692	12.15385	38.54615	333.2308	1.753077	5.422308	1.192318	0.086154
2:06:00	92.98	270.7432	72.6775	13.97923	393.0833	393.0833	12.9	3.808333	12.9	40.575	365	1.6825	5.691667	1.220052	0.07
2:06:15	93.55	285.6412	73.395	13.47249	405.5833	405.5833	13.53333	3.4	13.53333	42.53333	407.1667	1.6775	5.904167	1.241502	0.0525
2:06:30	94.05	300.6032	74.03167	13.29009	409.25	409.25	13.7	3.475	13.7	43.30833	419.9167	1.696667	5.9575	1.246832	0.054167
2:06:45	94.59	316.5705	74.72231	13.12133	397.3846	397.4615	13.15385	3.607692	13.15385	40.84615	398.2308	1.657692	5.772308	1.228256	0.056154
2:07:00	95.18	331.2247	75.47	13.18054	391.5	391.5	12.90833	3.816667	12.90833	40.49167	384.4167	1.673333	5.7025	1.221177	0.0625
2:07:15	95.78	345.8197	76.22	13.27782	391.1667	391.1667	12.81667	3.875	12.81667	39.9	379.1667	1.6675	5.654167	1.216254	0.0625
2:07:30	96.40	361.5639	76.99538	13.115	387.9231	388.0769	12.65385	3.938462	12.65385	39.52308	375.9231	1.659231	5.603846	1.211093	0.060769
2:07:45	96.99	376.1781	77.73333	13.18495	393.5833	393.5833	12.81667	3.725	12.81667	39.7	384	1.63	5.67	1.217849	0.0575
2:08:00	97.45	391.2095	78.31333	13.95627	414.5	414.5	13.78333	3.916667	13.78333	43.85	410	1.694167	6.015833	1.252614	0.041667
2:08:15	97.85	406.2865	78.81333	14.20809	414.4167	414.4167	13.91667	4.275	13.91667	44.96667	406.8333	1.7675	6.054167	1.256418	0.041667
2:08:30	98.25	421.2803	79.3	13.96966	411.4167	411.4167	13.71667	4.166667	13.71667	43.875	404.8333	1.7375	5.984167	1.249485	0.04
2:08:45	98.63	436.4756	79.78	14.34983	424.5833	424.5833	14.14167	4.183333	14.14167	46.19167	419.1667	1.765833	6.154167	1.266273	0.04
2:09:00	98.97	451.7295	80.19167	14.35317	426.4167	426.4167	14.30833	4.308333	14.30833	46.61667	425.25	1.785833	6.204167	1.271156	0.029167
2:09:15	99.24	465.7505	80.53	14.34684	426.2727	426.2727	14.33636	4.345455	14.33636	46.89091	426	1.790909	6.24	1.274642	0.03
2:09:30	99.52	481.0836	80.86667	14.38974	430	430.1667	14.38333	4.408333	14.38333	47.625	429.8333	1.799167	6.271667	1.27776	0.029167
2:09:45	99.82	496.4623	81.235	14.22652	434.8333	434.9167	14.50833	4.158333	14.50833	47.7	442.1667	1.778333	6.310833	1.281554	0.031667
2:10:00	100.11	510.5177	81.59455	13.78727	433.1818	433.2727	14.45455	3.972727	14.45455	46.80909	450.5455	1.748182	6.271818	1.277767	0.030909
2:10:15	100.41	525.6994	81.96	13.25452	424.25	424.25	14.05833	3.75	14.05833	45.21667	445.1667	1.7025	6.1425	1.265136	0.033333
2:10:30	100.77	540.7102	82.40417	13.16516	416.75	416.75	13.65833	3.575	13.65833	43.11667	429.5833	1.651667	5.998333	1.250903	0.039167
2:10:45	101.15	555.7705	82.86583	13.56877	420	420	13.78333	3.691667	13.78333	44.06667	425.5833	1.681667	6.04	1.255027	0.039167
2:11:00	101.56	570.7654	83.36917	13.53216	418.4167	418.5	13.66667	3.466667	13.66667	43.50833	421.9167	1.655833	5.985	1.249576	0.043333
2:11:15	101.99	585.8101	83.89333	13.49577	424.1667	424.1667	13.8	3.366667	13.8	44.15833	432.0833	1.65	6.026667	1.253724	0.044167
2:11:30	102.43	600.9031	84.43167	13.24019	425	425	13.775	3.191667	13.775	44.60833	438.9167	1.6375	6.0675	1.257749	0.045
2:11:45	102.89	615.9089	84.98	12.94925	419.25	419.25	13.58333	2.958333	13.58333	43.1	435.75	1.595833	5.994167	1.250482	0.046667
2:12:00	103.36	630.9178	85.5475	12.87952	420.3333	420.4167	13.68333	2.925	13.68333	43.5	441.25	1.600833	5.996667	1.250738	0.0475
2:12:15	103.83	645.9246	86.11917	12.70782	421	421	13.63333	2.766667	13.63333	43.09167	445.0833	1.57	5.995	1.250573	0.0475
2:12:30	104.30	661.0738	86.69	12.9437	427.5	427.9167	13.85	2.841667	13.85	44.55833	451.0833	1.59	6.115	1.262429	0.0475
2:12:45	104.79	676.1025	87.275	12.76736	420.4167	420.6667	13.6	2.766667	13.6	42.6	442.0833	1.545	6.013333	1.252389	0.05

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
2:13:00	133.00	15:07:04	0.16	28	0.17	32	0.115	27	0.208	0.00102	111	100	0.062	65.28		58
2:13:15	133.25	15:07:19	0.165	27	0.17	32	0.12	28	0.208	0.00102	111	100	0.062	65.02		58
2:13:30	133.50	15:07:34	0.165	27	0.175	32	0.12	26	0.214	0.00116	112	100	0.063	64.76		58
2:13:45	133.75	15:07:49	0.17	27	0.175	30	0.125	27	0.215	0.00102	111	100	0.064	64.51		58
2:14:00	134.00	15:08:04	0.18	27	0.18	30	0.13	27	0.221	0.00102	111	100	0.064	64.27		58
2:14:15	134.25	15:08:19	0.19	27	0.18	30	0.125	26	0.222	0.00109	111	100	0.064	64.04		58
2:14:30	134.50	15:08:34	0.19	27	0.18	30	0.135	27	0.225	0.00131	113	100	0.064	63.83		58
2:14:45	134.75	15:08:49	0.19	27	0.18	30	0.14	27	0.224	0.00123	113	100	0.065	63.63		58
2:15:00	135.00	15:09:04	0.19	27	0.175	30	0.145	26	0.222	0.00116	112	100	0.065	63.45		58
2:15:15	135.25	15:09:19	0.19	26	0.16	30	0.135	26	0.206	0.00131	113	100	0.065	63.30		58
2:15:30	135.50	15:09:34	0.185	27	0.165	28	0.135	26	0.202	0.00131	113	100	0.065	63.16		58
2:15:45	135.75	15:09:49	0.18	26	0.16	28	0.135	26	0.199	0.00131	113	100	0.065	63.02		58
2:16:00	136.00	15:10:04	0.175	26	0.15	30	0.135	26	0.189	0.00131	113	100	0.065	62.91		58
2:16:15	136.25	15:10:19	0.165	27	0.15	28	0.13	26	0.184	0.00123	113	100	0.065	62.81		58
2:16:30	136.50	15:10:34	0.165	26	0.15	28	0.14	24	0.184	0.00138	114	100	0.066	62.72		58
2:16:45	136.75	15:10:49	0.16	26	0.15	27	0.14	26	0.187	0.00138	114	100	0.065	62.62		58
2:17:00	137.00	15:11:04	0.16	26	0.16	30	0.14	26	0.198	0.00123	113	100	0.064896	62.50978		58
2:17:15	137.25	15:11:19	0.16	26	0.155	30	0.14	26	0.197	0.00123	113	100	0.064391	62.3929		58
2:17:30	137.50	15:11:34	0.16	27	0.16	30	0.145	24	0.204	0.00138	114	100	0.064198	62.27434		58
2:17:45	137.75	15:11:49	0.165	27	0.165	30	0.15	26	0.213	0.00131	113	100	0.064251	62.14407		58
2:18:00	138.00	15:12:04	0.165	27	0.17	30	0.15	26	0.224	0.00116	112	100	0.063112	62.00939		58
2:18:15	138.25	15:12:19	0.155	28	0.17	30	0.145	26	0.223	0.00116	112	100	0.062942	61.848		58
2:18:30	138.50	15:12:34	0.155	18	0.16	30	0.145	26	0.219	0.00116	112	100	0.062355	61.67602		58
2:18:45	138.75	15:12:49	0.155	18	0.16	30	0.135	27	0.219	0.00109	111	100	0.06106	61.48688		58
2:19:00	139.00	15:13:04	0.155	19	0.155	30	0.135	26	0.216	0.00109	111	100	0.059991	61.31214		58
2:19:15	139.25	15:13:19	0.155	20	0.155	30	0.12	26	0.217	0.00102	111	100	0.058986	61.12236		58
2:19:30	139.50	15:13:34	0.17	26	0.155	28	0.125	24	0.22	0.00094	110	100	0.059755	60.90003		58
2:19:45	139.75	15:13:49	0.175	28	0.15	28	0.13	20	0.224	0.00094	110	100	0.059722	60.70605		58
2:20:00	140.00	15:14:04	0.17	28	0.155	28	0.135	20	0.223	0.00087	110	100	0.059684	60.51512		58
2:20:15 AM	140.25	0.634942	0.175	28	0.15	30	0.145	20	0.227	0.0008	109	100	0.060562	60.35083		58
2:20:30 AM	140.5	0.635116	0.17	28	0.15	30	0.15	21	0.223	0.0008	109	100	0.06022	60.21724		58
2:20:45 AM	140.75	0.635289	0.155	30	0.14	28	0.135	23	0.206	0.0008	109	100	0.060832	60.11225		58
2:21:00 AM	141	0.635463	0.155	28	0.135	28	0.13	22	0.202	0.0008	109	85	0.06	59.9936		58
2:21:15 AM	141.25	0.635637	0.145	32	0.13	28	0.125	21	0.192	0.00109	111	73	0.060125	59.90076		58
2:21:30 AM	141.5	0.63581	0.14	30	0.12	28	0.115	21	0.184	0.00087	110	100	0.060793	59.82261		58
2:21:45 AM	141.75	0.635984	0.135	30	0.12	27	0.115	23	0.178	0.00087	110	100	0.060371	59.76761		58
2:22:00 AM	142	0.636157	0.12	34	0.11	27	0.115	23	0.17	0.0008	109	73				

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
2:13:00	105.29	691.1856	87.87417	12.69443	424	424.3333	13.7	2.591667	13.7	43.06667	450.1667	1.545833	6.059167	1.256927	0.049167
2:13:15	105.77	706.2743	88.4525	12.44925	425.5833	426.5	13.85833	2.475	13.85833	43.30833	462.25	1.5375	6.064167	1.257398	0.0475
2:13:30	106.25	721.4117	89.02417	12.47573	429.4167	430.1667	14.125	2.483333	14.125	44.3	472.3333	1.5625	6.105	1.261447	0.048333
2:13:45	106.73	736.7001	89.595	12.64516	437.5	438	14.525	2.525	14.525	46.24167	486.4167	1.59	6.233333	1.274029	0.0475
2:14:00	107.19	750.7672	90.14545	12.52267	440.6364	441.1818	14.54545	2.427273	14.54545	46.84545	493.2727	1.591818	6.282727	1.278827	0.047273
2:14:15	107.63	766.2131	90.67083	12.18483	447.3333	447.4167	14.75	2.058333	14.75	47.525	514.0833	1.599167	6.369167	1.287165	0.045
2:14:30	108.07	781.7403	91.18833	12.03318	449.3333	450	14.925	2.15	14.925	48.525	524.5833	1.618333	6.439167	1.293931	0.041667
2:14:45	108.48	796.028	91.66727	12.37297	454.9091	455.2727	15.18182	2.145455	15.18182	49.20909	528	1.630909	6.490909	1.298881	0.041818
2:15:00	108.85	811.7442	92.1075	12.33067	456.6667	461.1667	15.28333	2.191667	15.45	50.73333	533.5	1.666667	6.604167	1.309683	0.033333
2:15:15	109.15	826.1578	92.46909	12.55464	450.1818	455.6364	15.18182	2.736364	15.35455	51.07273	518.5455	1.692727	6.610909	1.310326	0.031818
2:15:30	109.45	840.5827	92.82455	12.94051	454.5455	455.6364	15.4	2.636364	15.4	50.78182	518.5455	1.685455	6.621818	1.311354	0.033636
2:15:45	109.76	856.3434	93.17917	11.48473	436.6667	456.25	14.7	2.466667	15.50833	50.50833	520.3333	1.676667	6.643333	1.313396	0.0275
2:16:00	110.00	870.8449	93.47	11.16254	440.7273	458.2727	14.87273	2.218182	15.6	50.87273	537.2727	1.68	6.695455	1.318312	0.022727
2:16:15	110.21	886.7784	93.71917	10.90148	441.1667	462.4167	14.975	2.208333	15.81667	52.08333	547.1667	1.706667	6.796667	1.327791	0.020833
2:16:30	110.42	901.411	93.96182	10.76423	436.4545	463.8182	14.82727	2.309091	15.9	52.36364	542.1818	1.712727	6.822727	1.330244	0.022727
2:16:45	110.64	915.9507	94.22455	11.4459	449.2727	459.4545	15.32727	2.218182	15.70909	51.37273	550.2727	1.690909	6.732727	1.321792	0.024545
2:17:00	110.8944	931.8017	94.5175	11.33271	447.6667	461.1667	15.19167	2.241667	15.7	51.79167	548.0833	1.6925	6.723333	1.320917	0.026667
2:17:15	111.1632	946.3068	94.83273	11.18226	445.2727	459.8182	15.06364	2.190909	15.62727	51.23636	546.2727	1.678182	6.699091	1.318644	0.027273
2:17:30	111.4394	960.8026	95.15636	11.22486	444.5455	459.6364	15.03636	2.181818	15.56364	51.18182	543.7273	1.675455	6.69	1.317798	0.030909
2:17:45	111.7472	976.5859	95.51667	11.13005	440.9167	459.0833	14.88333	2.275	15.525	51.55	538.5833	1.675833	6.663333	1.315277	0.031667
2:18:00	112.0704	990.9501	95.89455	10.21445	422.9091	454.5455	14.12727	2.136364	15.31818	50.02727	524.7273	1.638182	6.563636	1.305834	0.035455
2:18:15	112.4646	1006.646	96.355	10.2783	427.0833	456.0833	14.23333	2.033333	15.35833	50.10833	530	1.628333	6.585833	1.307956	0.041667
2:18:30	112.8937	1021.021	96.85545	11.09548	448.4545	458.3636	14.9	1.845455	15.23636	49.55455	547.4545	1.609091	6.574545	1.30688	0.047273
2:18:45	113.3769	1036.628	97.41833	10.76683	447.75	452.25	14.80833	1.55	14.95833	47.925	552.9167	1.565	6.508333	1.300568	0.0475
2:19:00	113.8349	1050.793	97.95091	10.16569	434	444.4545	14.30909	1.5	14.64545	46.63636	541.8182	1.525455	6.374545	1.287716	0.048182
2:19:15	114.3458	1066.193	98.54417	10.71346	439.9167	442.5	14.55	1.441667	14.55	45.49167	539.75	1.493333	6.329167	1.283344	0.054167
2:19:30	114.964	1081.746	99.26083	9.820453	434	451	14.35833	1.175	14.95	47.19167	552.0833	1.5225	6.461667	1.296098	0.0625
2:19:45	115.5226	1095.998	99.90727	10.29879	443.0909	454	14.71818	1.172727	15.04545	47.6	558.0909	1.52	6.456364	1.295598	0.053636
2:20:00	116.0919	1111.574	100.565	10.87469	454.1667	456.5	15.10833	1.158333	15.10833	48.00833	564.3333	1.528333	6.481667	1.297977	0.055
2:20:15 AM	116.599	1126.039	101.15	10.75349	463.3636	464.9091	15.35455	1.081818	15.35455	49.86364	583.0909	1.562727	6.660909	1.315028	0.05
2:20:30 AM	117.0243	1140.553	101.64	10.43704	459.9091	460.3636	15.43636	1.054545	15.43636	49.66364	590	1.572727	6.707273	1.319423	0.037273
2:20:45 AM	117.3675	1156.485	102.035	10.97572	465.3333	465.5	15.68333	1.35	15.68333	50.975	587.8333	1.605	6.795833	1.327747	0.036667
2:21:00 AM	117.7657	1170.987	102.4927	11.30345	458.3636	458.8182	15.43636	1.663636	15.43636	49.92727	565.9091	1.593636	6.695455	1.318321	0.039091
2:21:15 AM	118.0855	1185.538	102.86	11.43211	459.1818	459.4545	15.55455	1.763636	15.55455	50.40909	566.4545	1.610909	6.743636	1.322839	0.029091
2:21:30 AM	118.3607	1201.536	103.1758	10.96295	462.5833	463.3333	15.725	1.591667	15.725	51.775	586.5	1.641667	6.854167	1.333184	0.025
2:21:45 AM	118.5579	1214.89	103.402	10.63723	459.8	461.5	15.61	1.54	15.61	51.23	589.2	1.63	6.877	1.335313	0.018
2:22:00 AM															

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
1:26:19	86.32	12:24:11	0.26	21	0.25	22	0.16	18	0.355	0.00065	107	27	0.084	84.46		58
1:26:34	86.57	12:24:26	0.245	23	0.275	26	0.15	18	0.343	0.00073	108	32	0.079	83.91		58
1:26:49	86.82	12:24:41	0.25	23	0.265	26	0.155	18	0.33	0.00065	107	100	0.077	83.43		58
1:27:04	87.07	12:24:56	0.26	22	0.25	24	0.17	18	0.319	0.00058	106	100	0.077	82.99		58
1:27:19	87.32	12:25:11	0.265	22	0.26	23	0.18	18	0.327	0.00094	110	100	0.076	82.54		58
1:27:34	87.57	12:25:26	0.245	23	0.24	24	0.15	18	0.289	0.00058	106	100	0.075	82.05		58
1:27:49	87.82	12:25:41	0.225	22	0.22	23	0.135	18	0.279	0.00065	107	100	0.075	81.53		58
1:28:04	88.07	12:25:56	0.225	22	0.22	23	0.13	18	0.276	0.00058	106	100	0.074	80.99		58
1:28:19	88.32	12:26:11	0.21	23	0.215	22	0.125	18	0.263	0.00058	106	100	0.072	80.41		58
1:28:34	88.57	12:26:26	0.205	21	0.2	22	0.115	18	0.243	0.00058	106	100	0.071	79.83		58
1:28:49	88.82	12:26:41	0.205	21	0.195	21	0.115	18	0.24	0.00065	107	100	0.071	79.22		58
1:29:04	89.07	12:26:56	0.195	22	0.185	21	0.115	19	0.218	0.0008	109	100	0.070	78.56		58
1:29:19	89.32	12:27:11	0.185	22	0.18	21	0.11	20	0.209	0.0008	109	100	0.069	77.91		58
1:29:34	89.57	12:27:26	0.19	22	0.18	21	0.115	20	0.216	0.0008	109	100	0.069	77.27		58
1:29:49	89.82	12:27:41	0.19	21	0.18	21	0.115	19	0.22	0.00073	108	100	0.070	76.64		58
1:30:04	90.07	12:27:56	0.205	22	0.19	22	0.125	17	0.247	0.00073	108	100	0.070	76.05		58
1:30:19	90.32	12:28:11	0.19	22	0.19	21	0.115	19	0.224	0.0008	109	100	0.069	75.47		58
1:30:34	90.57	12:28:26	0.19	22	0.195	22	0.12	17	0.227	0.00094	110	13	0.068	74.89		58
1:30:49	90.82	12:28:41	0.195	23	0.205	22	0.13	16	0.24	0.00073	108	100	0.068	74.33		58
1:31:04	91.07	12:28:56	0.215	23	0.205	22	0.145	16	0.264	0.00073	108	100	0.069	73.88		58
1:31:19	91.32	12:29:11	0.235	23	0.19	21	0.155	16	0.284	0.00073	108	100	0.071	73.48		58
1:31:34	91.57	12:29:26	0.24	23	0.2	27	0.16	16	0.295	0.00065	107	32	0.071	73.13		58
1:31:49	91.82	12:29:41	0.235	23	0.205	28	0.16	27	0.294	0.00058	106	100	0.071	72.80		58
1:32:04	92.07	12:29:56	0.235	23	0.21	30	0.16	28	0.298	0.00065	107	28	0.070	72.49		58
1:32:19	92.32	12:30:11	0.235	23	0.205	28	0.16	30	0.296	0.00073	108	85	0.070	72.21		58
1:32:34	92.57	12:30:26	0.225	23	0.2	28	0.16	28	0.292	0.0008	109	100	0.071	71.93		58
1:32:49	92.82	12:30:41	0.22	23	0.19	27	0.16	28	0.286	0.00073	108	100	0.071	71.66		58
1:33:04	93.07	12:30:56	0.22	23	0.195	26	0.16	28	0.284	0.00073	108	100	0.071	71.40		58
1:33:19	93.32	12:31:11	0.21	23	0.18	28	0.16	30	0.278	0.00065	107	100	0.071	71.16		58
1:33:34	93.57	12:31:26	0.21	23	0.175	27	0.165	27	0.28	0.00073	108	47	0.071	70.93		58
1:33:49	93.82	12:31:41	0.2	24	0.17	27	0.165	30	0.274	0.00058	106	100	0.071	70.72		58
1:34:04	94.07	12:31:56	0.2	23	0.16	24	0.165	30	0.275	0.0008	109	11	0.071	70.52		58
1:34:19	94.32	12:32:11	0.2	24	0.155	24	0.175	28	0.28	0.00073	108	34	0.072	70.33		58
1:34:34	94.57	12:32:26	0.2	24	0.16	24	0.185	30	0.286	0.00073	108	57	0.070	70.16		58
1:34:49	94.82	12:32:41	0.2	24	0.16	23	0.19	32	0.291	0.00065	107	100	0.071	69.98		58
1:35:04	95.07	12:32:56	0.2	26	0.16	23	0.19	30	0.291	0.00058	106	39	0.071	69.82		58
1:35:19	95.32	12:33:11	0.205	24	0.155	24	0.195	28	0.294	0.00065	107	47	0.071	69.69		58
1:35:34	95.57	12:33:26	0.205	24	0.15	23	0.195	30	0.288	0.00058	106	100	0.072	69.58		58
1:35:49	95.82	12:33:41	0.22	24	0.15	24	0.2	30	0.292	0.00065	107	100	0.072	69.46		58
1:36:04	96.07	12:33:56	0.21	24	0.15	24	0.195	28	0.291	0.00058	106	100	0.073	69.35		58
1:36:19	96.32	12:34:11	0.21	24	0.145	24	0.2	28	0.295	0.00073	108	100	0.073	69.24		58
1:36:34	96.57	12:34:26	0.21	26	0.15	24	0.205	28	0.299	0.00073	108	100	0.072	69.13		58
1:36:49	96.82	12:34:41	0.205	24	0.155	26	0.205	28	0.295	0.00073	108	100	0.071	69.03		58
1:37:04	97.07	12:34:56	0.21	24	0.155	26	0.2	28	0.293	0.00109	111	100	0.071	68.91		58
1:37:19	97.32	12:35:11	0.21	24	0.155	26	0.205	28	0.298	0.00087	110	100	0.072	68.81		58

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
1:26:19	80.93	16.40928	56.43615	11.61832	407.4615	410.6923	13.72308	3.646154	13.72308	46.61538	462.2308	1.773077	5.574615	1.262253	0.062308
1:26:34	81.46	31.1059	57.1925	11.79595	389.1667	389.3333	13.08333	3.658333	13.08333	41.80833	422.6667	1.7025	5.7375	1.224718	0.0575
1:26:49	81.92	45.65903	57.8575	11.46895	380	380.4167	12.66667	3.433333	12.66667	39.3	411.1667	1.6325	5.621667	1.212762	0.053333
1:27:04	82.36	61.53609	58.47615	12.07702	384.0769	384.2308	12.90769	3.707692	12.90769	40.53077	405.6923	1.676923	5.704615	1.221312	0.047692
1:27:19	82.80	76.06631	59.0975	11.92494	376.5833	376.5833	12.61667	3.725	12.61667	39.61667	394.5833	1.675	5.601667	1.210852	0.054167
1:27:34	83.30	90.51127	59.79417	12.08871	371	371.0833	12.38333	3.791667	12.38333	39.1	378.6667	1.6825	5.5325	1.203747	0.059167
1:27:49	83.83	106.2275	60.52923	12.32915	376	376	12.51538	3.861538	12.51538	39.68462	380.8462	1.681538	5.583077	1.208943	0.058462
1:28:04	84.39	120.69	61.30083	12.47569	378	378.0833	12.53333	3.883333	12.53333	39.075	379.5	1.655833	5.546667	1.205202	0.065833
1:28:19	85.00	136.2582	62.13308	12.4685	372.3846	372.5385	12.3	3.707692	12.3	37.05385	368	1.614615	5.473077	1.197559	0.066154
1:28:34	85.61	150.6221	62.9725	12.71177	369.75	369.75	12.225	3.933333	12.225	37.43333	357.0833	1.6475	5.4675	1.196986	0.069167
1:28:49	86.27	166.0961	63.86154	12.64856	362.7692	362.7692	11.99231	3.9	11.99231	37.17692	345.6923	1.677692	5.403077	1.190315	0.073077
1:29:04	87.00	181.5911	64.84615	12.7272	363.9231	364	12	3.930769	12	37.4	345	1.666154	5.418462	1.19192	0.076923
1:29:19	87.72	195.7881	65.8075	12.63646	357.75	357.75	11.775	3.908333	11.775	36.4	335.3333	1.655833	5.334167	1.18308	0.076667
1:29:34	88.44	211.2554	66.76923	12.96366	361.6923	361.8462	11.96154	4.038462	11.96154	37.43077	335.6154	1.689231	5.398462	1.189795	0.076923
1:29:49	89.17	225.6883	67.72917	13.21401	372.3333	372.3333	12.33333	4.125	12.33333	39.15833	349.4167	1.691667	5.524167	1.202742	0.075833
1:30:04	89.87	241.4056	68.64308	13.06815	374.0769	374.2308	12.47692	4.076923	12.47692	39.34615	358.6923	1.692308	5.583846	1.209021	0.071538
1:30:19	90.55	255.8369	69.53583	13.10192	372.3333	372.3333	12.33333	3.933333	12.33333	38.63333	352.3333	1.675	5.521667	1.202611	0.071667
1:30:34	91.26	271.4916	70.46154	13.0568	375.2308	375.2308	12.33846	3.846154	12.33846	38.56154	356.5385	1.643077	5.537692	1.20421	0.076154
1:30:49	91.95	286.0433	71.345	13.13667	380.6667	380.6667	12.525	3.675	12.525	38.81667	364.75	1.62	5.619167	1.21264	0.064167
1:31:04	92.51	300.8355	72.07167	13.25757	396.8333	396.8333	13.11667	3.616667	13.11667	41.21667	393.1667	1.631667	5.816667	1.232682	0.056667
1:31:19	93.01	315.8285	72.71	13.23809	408.0833	408.0833	13.55833	3.383333	13.55833	43.2	416.4167	1.651667	5.983333	1.249414	0.0525
1:31:34	93.47	330.9491	73.29583	13.1916	416.1667	416.1667	13.88333	3.375	13.88333	44.54167	434.1667	1.6675	6.090833	1.260054	0.045833
1:31:49	93.89	345.9778	73.83917	12.87776	413.8333	413.8333	13.88333	3.45	13.88333	43.90833	440	1.658333	6.013333	1.252393	0.044167
1:32:04	94.29	361.0167	74.34	12.79264	414.6667	414.75	13.95833	3.316667	13.95833	43.98333	445	1.658333	6.0225	1.253242	0.04
1:32:19	94.67	376.081	74.82	12.72291	416.5833	416.75	14.05833	3.325	14.05833	43.55833	451.3333	1.648333	6.043333	1.255358	0.04
1:32:34	95.04	391.2513	75.28833	12.87556	422.0833	422.1667	14.31667	3.466667	14.31667	45.10833	459.5833	1.681667	6.133333	1.264189	0.038333
1:32:49	95.40	406.4594	75.75	12.86409	424.6667	424.6667	14.39167	3.566667	14.39167	45.85833	464.4167	1.7075	6.165	1.267344	0.038333
1:33:04	95.76	421.6859	76.19667	12.80972	426.25	426.25	14.475	3.525	14.475	45.81667	469.5833	1.708333	6.180833	1.268873	0.035833
1:33:19	96.09	435.7265	76.60727	12.83998	428.9091	428.9091	14.66364	3.636364	14.66364	46.82727	476.3636	1.736364	6.258182	1.276423	0.036364
1:33:34	96.41	451.0546	77.0075	12.80487	430.6667	430.6667	14.8	3.641667	14.8	47.39167	482.5833	1.750833	6.2675	1.277336	0.0325
1:33:49	96.69	466.3447	77.36667	12.60756	428.5	428.5	14.75	3.6	14.75	46.475	484.25	1.7375	6.235	1.274177	0.029167
1:34:04	96.98	481.7069	77.72083	12.71272	432.1667	432.1667	14.9	3.716667	14.9	47.80833	489.0833	1.771667	6.296667	1.280181	0.029167
1:34:19	97.24	495.8486	78.05091	12.73198	436.7273	436.7273	15.02727	3.709091	15.02727	48.43636	496.4545	1.783636	6.352727	1.285611	0.027273
1:34:34	97.49	511.1826	78.355	12.22905	431.9167	431.9167	14.775	3.533333	14.775	46.95	498.1667	1.746667	6.2725	1.277833	0.026667
1:34:49	97.74	526.5823	78.67167	12.25932	435.3333	435.3333	14.975	3.533333	14.975	47.94167	506	1.765833	6.329167	1.283307	0.026667
1:35:04	97.98	540.7636	78.96545	12.3939	439.7273	439.7273	15.13636	3.618182	15.13636	48.90909	511.0909	1.779091	6.39	1.28921	0.022727
1:35:19	98.16	556.1914	79.18833	12.41758	437.75	437.75	15.05	3.65	15.05	48.23333	506.25	1.774167	6.353333	1.285652	0.018333
1:35:34	98.33	571.7444	79.40167	12.75405	446.6667	446.6667	15.3	3.825	15.3	49.65	512.9167	1.798333	6.461667	1.296084	0.0175
1:35:49	98.50	586.0444	79.60818	12.75254	448.3636	448.3636	15.37273	3.772727	15.37273	49.93636	516.5455	1.798182	6.502727	1.300003	0.018182
1:36:04	98.66	601.7625	79.8125	13.02464	453.8333	453.8333	15.66667	3.966667	15.66667	51.81667	522.5833	1.844167	6.605833	1.309842	0.0175
1:36:19	98.83	616.1673	80.01636	13.05603	455	455	15.67273	4.027273	15.67273	52	523.0909	1.850909	6.602727	1.309527	0.017273
1:36:34	98.98	630.5026	80.20727	12.7463	450.1818	450.1818	15.43636	3.827273	15.43636	50.37273	520.1818	1.810909	6.536364	1.303206	0.017273
1:36:49	99.14	646.0965	80.405	12.49076	445.1667	445.1667	15.24167	3.716667	15.24167	49.44167	516.75	1.789167	6.4975	1.299492	0.0175
1:37:04	99.31	661.6945	80.6125	12.44468	445.75	445.75	15.29167	3.725	15.29167	50.06667	519.8333	1.7975	6.500833	1.299836	0.0175
1:37:19	99.47	676.1183	80.81	12.66407	455	455	15.7	3.7	15.7	51.90909	534	1.820909	6.620909	1.311254	0.017273

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
1:37:34	97.57	12:35:26	0.215	24	0.16	24	0.2	28	0.294	0.00102	111	100	0.072	68.71		58
1:37:49	97.82	12:35:41	0.215	24	0.155	27	0.195	30	0.294	0.0008	109	100	0.072	68.63		58
1:38:04	98.07	12:35:56	0.215	24	0.155	27	0.19	28	0.287	0.0008	109	100	0.072	68.56		58
1:38:19	98.32	12:36:11	0.22	26	0.15	27	0.185	28	0.281	0.0008	109	100	0.072	68.48		58
1:38:34	98.57	12:36:26	0.22	24	0.14	27	0.175	28	0.273	0.00073	108	100	0.073	68.41		58
1:38:49	98.82	12:36:41	0.23	24	0.14	27	0.17	30	0.269	0.00065	107	100	0.074	68.34		58
1:39:04	99.07	12:36:56	0.245	24	0.145	26	0.175	22	0.282	0.00065	107	100	0.074	68.26		58
1:39:19	99.32	12:37:11	0.245	23	0.145	26	0.18	23	0.283	0.00073	108	47	0.073	68.19		58
1:39:34	99.57	12:37:26	0.275	22	0.15	27	0.2	23	0.318	0.00073	108	28	0.080	68.09		58
1:39:49	99.82	12:37:41	0.285	23	0.16	27	0.215	23	0.337	0.00073	108	28	0.081	68.00		58
1:40:04	100.07	12:37:56	0.28	22	0.155	27	0.21	23	0.331	0.00065	107	32	0.080	67.91		58
1:40:19	100.32	12:38:11	0.275	22	0.16	26	0.205	22	0.324	0.00065	107	100	0.077	67.81		58
1:40:34	100.57	12:38:26	0.265	23	0.16	27	0.19	23	0.313	0.00058	106	100	0.075	67.72		58
1:40:49	100.82	12:38:41	0.26	23	0.16	27	0.19	21	0.306	0.00087	110	73	0.073	67.61		58
1:41:04	101.07	12:38:56	0.255	23	0.165	27	0.18	21	0.302	0.00073	108	100	0.069	67.49		58
1:41:19	101.32	12:39:11	0.245	23	0.165	28	0.175	20	0.293	0.00065	107	34	0.067	67.37		58
1:41:34	101.57	12:39:26	0.24	23	0.17	27	0.175	28	0.29	0.00065	107	39	0.068086	67.24244		58
1:41:49	101.82	12:39:41	0.24	24	0.175	30	0.17	30	0.285	0.00058	106	100	0.06809	67.10822		58
1:42:04	102.07	12:39:56	0.24	23	0.18	30	0.17	28	0.29	0.00065	107	100	0.068036	66.94994		58
1:42:19	102.32	12:40:11	0.24	23	0.19	30	0.17	30	0.287	0.00065	107	100	0.067638	66.79105		58
1:42:34	102.57	12:40:26	0.24	24	0.195	30	0.17	30	0.288	0.00073	108	100	0.067245	66.62989		58
1:42:49	102.82	12:40:41	0.24	23	0.195	30	0.175	30	0.291	0.00065	107	100	0.066579	66.45524		58
1:43:04	103.07	12:40:56	0.235	23	0.2	30	0.175	30	0.292	0.00073	108	100	0.066974	66.28022		58
1:43:19	103.32	12:41:11	0.235	23	0.205	30	0.17	30	0.291	0.00058	106	100	0.066107	66.10557		58
1:43:34	103.57	12:41:26	0.235	23	0.205	30	0.17	30	0.293	0.00065	107	34	0.065849	65.92871		58
1:43:49	103.82	12:41:41	0.235	23	0.2	30	0.17	30	0.291	0.00065	107	100	0.064975	65.75256		58
1:44:04	104.07	12:41:56	0.24	23	0.205	30	0.17	26	0.294	0.00065	107	100	0.065423	65.5678		58
1:44:19	104.32	12:42:11	0.24	23	0.21	30	0.175	26	0.298	0.0008	109	100	0.065528	65.3772		58
1:44:34	104.57	12:42:26	0.245	23	0.21	30	0.175	24	0.302	0.00065	107	100	0.065323	65.18732		58
1:44:49 AM	104.8167	0.529641	0.24	23	0.215	32	0.18	24	0.301	0.00065	107	100	0.065192	64.99422		58
1:45:04 AM	105.0667	0.529815	0.245	23	0.225	32	0.175	26	0.302	0.00073	108	100	0.065564	64.80253		58
1:45:19 AM	105.3167	0.529988	0.25	23	0.225	32	0.18	26	0.306	0.00073	108	100	0.064816	64.60848		58
1:45:34 AM	105.5667	0.530162	0.245	23	0.225	32	0.175	26	0.302	0.00073	108	100	0.064411	64.41485		58
1:45:49 AM	105.8167	0.530336	0.24	23	0.225	30	0.17	26	0.296	0.00065	107	100	0.064062	64.22742		58
1:46:04 AM	106.0667	0.530509	0.245	23	0.235	32	0.17	24	0.3	0.00073	108	100	0.064162	64.04579		58
1:46:19 AM	106.3167	0.530683	0.25	24	0.225	32	0.175	26	0.306	0.00073	108	100	0.064485	63.87215		58
1:46:34 AM	106.5667	0.530856	0.255	24	0.205	30	0.17	26	0.307	0.00073	108	100	0.063904	63.717		58
0.074178241	106.8167	0.53103	0.255	23	0.205	32	0.17	24	0.309	0.00065	107	100	0.064238	63.56372		58
0.074351852	107.0667	0.531204	0.255	24	0.195	32	0.165	24	0.303	0.00087	110	100	0.065197	63.41348		58
0.074525463	107.3167	0.531377	0.25	24	0.195	32	0.16	26	0.297	0.00087	110	57	0.06487	63.27025		58
0.074699074	107.5667	0.531551	0.255	24	0.195	32	0.165	21	0.3	0.0008	109	100	0.064771	63.12395		58
0.074872685	107.8167	0.531725	0.255	24	0.185	30	0.17	20	0.299	0.0008	109	100	0.064565	62.99346		58
0.075046296	108.0667	0.531898	0.25	24	0.175	30	0.165	21	0.294	0.00087	110	100	0.064663	62.8749		58
0.075219907	108.3167	0.532072	0.245	24	0.16	30	0.17	21	0.288	0.0008	109	100	0.064288	62.75255		58
0.075393519	108.5667	0.532245	0.245	24	0.155	28	0.175	21	0.288	0.0008	109	100	0.063967	62.64261		58

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
1:37:34	99.62	690.5191	80.99273	12.01388	442.2727	454.2727	15.24545	3.618182	15.69091	51.55455	526.3636	1.816364	6.599091	1.309163	0.014545
1:37:49	99.74	706.2003	81.14083	10.86518	420.5	452.5	14.45833	3.508333	15.6	51.35833	514	1.813333	6.573333	1.306767	0.0125
1:38:04	99.85	720.612	81.28	11.35885	429.7273	452.7273	14.84545	3.536364	15.65455	51.78182	520.4545	1.819091	6.609091	1.310152	0.011818
1:38:19	99.97	736.385	81.42083	11.32792	429.75	455.9167	14.825	3.508333	15.74167	51.81667	520.75	1.818333	6.654167	1.31442	0.0125
1:38:34	100.08	750.9411	81.56091	12.39488	448.2727	459.7273	15.47273	3.654545	15.85455	52.84545	528.3636	1.836364	6.748182	1.32328	0.011818
1:38:49	100.19	765.6166	81.69545	12.46283	453.6364	464.7273	15.69091	3.7	16.09091	54.3	537.6364	1.863636	6.864545	1.334131	0.012727
1:39:04	100.30	781.7262	81.835	12.95515	465	465.0833	16.05833	3.608333	16.05833	55.23333	545.75	1.8775	6.954167	1.342471	0.011667
1:39:19	100.42	796.4102	81.97818	12.64942	461.1818	461.3636	15.72727	3.363636	15.72727	53.34545	541.2727	1.828182	6.872727	1.334909	0.013636
1:39:34	100.56	811.9173	82.15273	14.31952	510.8182	510.8182	17.6	3.909091	17.6	64.70909	596.1818	2.01	7.704545	1.409738	0.017273
1:39:49	100.71	826.1136	82.331	14.65201	519	519	17.98	3.93	17.98	66.41	605.6	2.042	7.812	1.419625	0.017
1:40:04	100.85	841.5628	82.50818	14.23226	512.2727	512.2727	17.69091	3.745455	17.69091	64.29091	602.2727	2.001818	7.64	1.404479	0.016364
1:40:19	101.01	856.7805	82.69455	13.63301	499	499.3636	17.15455	3.5	17.15455	61.14545	590.6364	1.947273	7.403636	1.383423	0.017273
1:40:34	101.16	871.7712	82.88182	13.04623	482.4545	482.4545	16.49091	3.390909	16.49091	57.6	572.0909	1.884545	7.175455	1.362795	0.017273
1:40:49	101.33	886.6134	83.08545	12.72238	472.6364	472.6364	16.07273	3.227273	16.07273	55.05455	559.8182	1.829091	7.028182	1.349291	0.02
1:41:04	101.52	901.118	83.31909	11.93346	448.3636	448.7273	15.15455	2.918182	15.15455	49.38182	532.1818	1.719091	6.701818	1.318593	0.021818
1:41:19	101.72	916.7058	83.56417	11.60391	438.5	438.75	14.75833	2.716667	14.75833	46.49167	520.5833	1.6575	6.494167	1.298984	0.020833
1:41:34	101.9199	931.0737	83.80727	11.85787	445.1818	445.3636	15.00909	2.718182	15.00909	48.15455	527.1818	1.684545	6.57	1.306171	0.020909
1:41:49	102.1388	946.6899	84.07333	11.71679	443.5833	443.75	14.94167	2.708333	14.94167	48.36667	527.5	1.684167	6.5175	1.301354	0.025833
1:42:04	102.3988	961.0414	84.38909	11.7412	444.4545	445	15.01818	2.581818	15.01818	48.53636	529.7273	1.680909	6.551818	1.304683	0.028182
1:42:19	102.6621	976.6729	84.70833	11.47661	443.5833	443.5833	14.94167	2.5	14.94167	48.21667	533.75	1.6675	6.53	1.302621	0.0275
1:42:34	102.9314	991.0031	85.03455	11.42745	445	445.0909	14.99091	2.263636	14.99091	47.90909	537.7273	1.646364	6.531818	1.302752	0.03
1:42:49	103.2259	1006.58	85.39083	11.1377	441.1667	441.1667	14.83333	2.075	14.83333	47.23333	537.3333	1.624167	6.4825	1.298047	0.030833
1:43:04	103.524	1020.913	85.75091	11.19612	443.2727	443.5455	14.92727	2.063636	14.92727	48.07273	540.3636	1.638182	6.534545	1.303005	0.031818
1:43:19	103.8244	1036.508	86.11333	10.98074	439.9167	440.5	14.79167	1.891667	14.79167	47.10833	539.0833	1.615	6.499167	1.299628	0.031667
1:43:34	104.1317	1050.829	86.48364	10.89067	440.4545	441.0909	14.8	1.8	14.8	47.01818	542.1818	1.603636	6.523636	1.301928	0.032727
1:43:49	104.4411	1066.382	86.85583	10.82692	436.75	438.1667	14.66667	1.708333	14.66667	46.05	536.6667	1.5825	6.461667	1.296044	0.0325
1:44:04	104.7691	1080.693	87.25	10.99544	439.8182	441.2727	14.75455	1.845455	14.75455	46.98182	537.6364	1.6	6.513636	1.30102	0.035455
1:44:19	105.1115	1096.364	87.66083	11.20437	443.5	444.1667	14.9	1.833333	14.9	47.44167	539.6667	1.605833	6.565	1.305907	0.035833
1:44:34	105.4567	1110.732	88.07455	11.3016	443.7273	444.3636	14.9	1.827273	14.9	47.45455	537.3636	1.604545	6.567273	1.306149	0.036364
1:44:49 AM	105.8123	1126.373	88.5	11.20622	442.4167	443.5833	14.825	1.85	14.825	47.58333	536.5833	1.6025	6.538333	1.303402	0.036667
1:45:04 AM	106.17	1140.758	88.92727	11.25765	446.4545	446.6364	14.98182	1.927273	14.98182	48.45455	543.3636	1.618182	6.583636	1.307746	0.038182
1:45:19 AM	106.5369	1156.38	89.365	11.17355	442.0833	443.1667	14.80833	1.808333	14.80833	47.68333	536.6667	1.604167	6.521667	1.301813	0.038333
1:45:34 AM	106.9081	1170.703	89.80727	11.17298	442.7273	443.6364	14.82727	1.881818	14.82727	47.41818	537.8182	1.598182	6.525455	1.302168	0.038182
1:45:49 AM	107.2726	1186.298	90.24083	11.12868	441.3333	442.1667	14.76667	1.883333	14.76667	47.225	536	1.594167	6.498333	1.299588	0.036667
1:46:04 AM	107.6308	1200.64	90.66636	11.21351	443.0909	443.0909	14.83636	1.763636	14.83636	47.69091	537.3636	1.604545	6.542727	1.3038	0.037273
1:46:19 AM	107.9781	1216.354	91.07833	11.16601	445.9167	445.9167	14.98333	1.841667	14.98333	48.48333	545.25	1.625	6.6025	1.309512	0.034167
1:46:34 AM	108.2925	1230.754	91.45091	10.83203	443	443	14.86364	1.581818	14.86364	47.89091	547.9091	1.610909	6.597273	1.309011	0.031818
0.074178241	108.6072	1246.517	91.82333	10.7772	445.25	445.25	14.95	1.591667	14.95	48.675	553.8333	1.626667	6.645833	1.313605	0.0325
0.074351852	108.9197	1261.052	92.19273	10.93151	451	451.0909	15.17273	1.727273	15.17273	50.42727	561.3636	1.66	6.728182	1.321392	0.031818
0.074525463	109.2215	1275.592	92.54909	10.96784	450.9091	450.9091	15.16364	1.854545	15.16364	50.2	560.0909	1.658182	6.732727	1.321825	0.032727
0.074699074	109.5338	1291.467	92.9175	11.06432	450.8333	450.8333	15.16667	1.875	15.16667	50.33333	557.5833	1.66	6.744167	1.322905	0.030833
0.074872685	109.816	1306.027	93.25	11.07824	450.8182	450.8182	15.17273	1.790909	15.17273	50.27273	557.3636	1.661818	6.751818	1.323611	0.028182
0.075046296	110.0755	1320.617	93.55545	11.12302	451.9091	452	15.24545	1.836364	15.24545	50.66364	559.1818	1.668182	6.780909	1.326351	0.027273
0.075219907	110.3465	1336.546	93.87417	11.10471	451.5833	451.5833	15.21667	1.891667	15.21667	50.325	558.5833	1.664167	6.7925	1.327417	0.0275
0.075393519	110.5929	1351.163	94.16364	11.11945	450.1818	450.1818	15.15455	1.863636	15.15455	50.04545	555.1818	1.66	6.808182	1.32886	0.023636

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
0.07556713	108.8167	0.532419	0.245	24	0.155	28	0.175	21	0.288	0.00087	110	100	0.06369	62.54655		58
0.075740741	109.0667	0.532593	0.245	23	0.135	32	0.185	21	0.285	0.00073	108	100	0.066303	62.45172		58
0.075914352	109.3167	0.532766	0.24	23	0.13	26	0.185	21	0.281	0.0008	109	100	0.066731	62.35712		58
0.076087963	109.5667	0.53294	0.235	23	0.125	21	0.185	21	0.277	0.00073	108	100	0.0663	62.26541		58
0.076261574	109.8167	0.533113	0.235	23	0.13	23	0.185	21	0.278	0.00087	110	21	0.06592	62.17982		58
0.076435185	110.0667	0.533287	0.23	23	0.13	26	0.19	21	0.276	0.00073	108	100	0.064542	62.08723		58
0.076608796	110.3167	0.533461	0.225	23	0.13	26	0.185	22	0.271	0.00065	107	85	0.063485	61.99215		58
0.076782407	110.5667	0.533634	0.215	23	0.13	26	0.18	22	0.257	0.00073	108	100	0.062567	61.90009		58
0.076956019	110.8167	0.533808	0.215	24	0.13	27	0.185	22	0.255	0.00065	107	26	0.061113	61.80534		58
0.07712963	111.0667	0.533981	0.21	24	0.145	32	0.175	22	0.252	0.00065	107	100	0.061198	61.6949		58
0.077303241	111.3167	0.534155	0.205	23	0.165	32	0.165	22	0.242	0.00065	107	100	0.061725	61.5658		58
0.077476852	111.5667	0.534329	0.205	24	0.185	30	0.16	22	0.242	0.00073	108	100	0.060635	61.41843		58
0.077650463	111.8167	0.534502	0.21	24	0.185	32	0.16	22	0.241	0.00073	108	100	0.061079	61.26826		58
0.077824074	112.0667	0.534676	0.215	24	0.185	34	0.165	21	0.257	0.00065	107	28	0.061674	61.14753		58
0.077997685	112.3167	0.53485	0.215	24	0.16	32	0.18	22	0.267	0.00065	107	26	0.062666	61.05972		58
0.078171296	112.5667	0.535023	0.22	24	0.135	28	0.18	22	0.274	0.00065	107	28	0.064713	60.98541		58
0.078344907	112.8167	0.535197	0.22	24	0.13	28	0.18	22	0.275	0.00073	108	64	0.063397	60.91111		58
0.078518519	113.0667	0.53537	0.21	23	0.13	30	0.175	21	0.266	0.00073	108	100	0.063163	60.84509		58
0.07869213	113.3167	0.535544	0.205	24	0.125	28	0.175	22	0.26	0.00087	110	100	0.062177	60.77707		58
0.078865741	113.5667	0.535718	0.2	24	0.12	28	0.175	22	0.256	0.0008	109	100	0.062729	60.70068		58
0.079039352	113.8167	0.535891	0.195	23	0.125	26	0.17	22	0.252	0.00087	110	100	0.062689	60.62529		58
0.079212963	114.0667	0.536065	0.19	24	0.12	27	0.17	22	0.245	0.00087	110	100	0.061763	60.54445		58
0.079386574	114.3167	0.536238	0.19	24	0.125	28	0.165	23	0.242	0.00109	111	13	0.062419	60.46903		58
0.079560185	114.5667	0.536412	0.2	24	0.13	28	0.17	22	0.249	0.00087	110	100	0.063228	60.39956		58
0.079733796	114.8167	0.536586	0.2	24	0.13	28	0.165	22	0.25	0.0008	109	100	0.064399	60.34199		58
0.079907407	115.0667	0.536759	0.205	24	0.135	30	0.17	22	0.253	0.00073	108	100	0.064379	60.28642		58
0.080081019	115.3167	0.536933	0.2	26	0.135	28	0.17	21	0.252	0.0008	109	47	0.063415	60.22899		58
0.08025463	115.5667	0.537106	0.195	26	0.135	28	0.17	21	0.248	0.00087	110	100	0.062179	60.17103		58
0.080428241	115.8167	0.53728	0.19	26	0.125	30	0.165	22	0.242	0.00087	110	100	0.061426	60.10711		58
0.080601852	116.0667	0.537454	0.18	26	0.12	28	0.16	22	0.234	0.0008	109	100	0.061625	60.03283		58
0.080775463	116.3167	0.537627	0.175	23	0.13	30	0.16	22	0.226	0.00065	107	21	0.059891	59.95635		58
0.080949074	116.5667	0.537801	0.17	23	0.14	32	0.155	22	0.223	0.00073	108	100	0.059836	59.87246		58
0.081122685	116.8167	0.537975	0.17	24	0.155	32	0.15	21	0.223	0.00073	108	100	0.060047	59.78195		58
0.081296296	117.0667	0.538148	0.17	26	0.16	34	0.145	22	0.22	0.00073	108	100	0.059617	59.69164		58
0.081469907	117.3167	0.538322	0.17	26	0.18	34	0.14	21	0.206	0.00065	107	100	0.059096	59.58267		58
0.081643519	117.5667	0.538495	0.165	24	0.175	32	0.135	21	0.203	0.00073	108	100	0.058182	59.47485		58
0.08181713	117.8167	0.538669	0.17	24	0.18	32	0.135	21	0.203	0.00073	108	100	0.058882	59.38233		58
0.081990741	118.0667	0.538843	0.185	27	0.165	32	0.135	21	0.221	0.00065	107	100	0.059829	59.31437		58
0.082164352	118.3167	0.539016	0.185	27	0.13	32	0.14	22	0.228	0.00065	107	100	0.059625	59.26156		58
0.082337963	118.5667	0.53919	0.18	27	0.115	30	0.14	22	0.22	0.00065	107	37	0.059397	59.22101		58
0.082511574	118.8167	0.539363	0.17	26	0.12	30	0.14	22	0.217	0.0008	109	100	0.060129	59.18564		58
0.082685185	119.0667	0.539537	0.165	27	0.125	28	0.145	22	0.217	0.0008	109	100	0.059876	59.15327		58
0.082858796	119.3167	0.539711	0.17	27	0.13	28	0.15	21	0.22	0.0008	109	100	0.061687	59.12186		58
0.083032407	119.5667	0.539884	0.18	27	0.135	28	0.15	22	0.224	0.00087	110	100	0.06323	59.09301		58
0.083206019	119.8167	0.540058	0.185	26	0.14	28	0.15	21	0.228	0.0008	109	100	0.064696	59.06907		58

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
0.07556713	110.8105	1365.82	94.41909	11.16077	453.8182	453.8182	15.27273	1.845455	15.27273	49.80909	560.8182	1.654545	6.847273	1.332447	0.022727
0.075740741	111.0275	1380.797	94.67364	11.65619	475.9091	475.9091	16.14545	1.8	16.14545	54.19091	592.7273	1.732727	7.162727	1.361572	0.023636
0.075914352	111.2461	1395.784	94.93	11.6808	480.8182	480.8182	16.32727	1.809091	16.32727	55.10909	601.7273	1.750909	7.172727	1.362427	0.023636
0.076087963	111.4603	1410.733	95.18091	11.45634	476.2727	476.2727	16.12727	1.790909	16.12727	54.60909	597.8182	1.742727	7.136364	1.358999	0.021818
0.076261574	111.6622	1425.714	95.41727	11.32982	474.5455	474.5455	16.06364	1.7	16.06364	54.18182	597.7273	1.730909	7.168182	1.361917	0.020909
0.076435185	111.8829	1440.566	95.67545	11.05067	464.9091	464.9091	15.62727	1.654545	15.62727	52.14545	584	1.692727	7.038182	1.350161	0.025455
0.076608796	112.1121	1456.613	95.94333	11.02689	463.4167	463.4167	15.6	1.466667	15.6	50.65833	582.4167	1.663333	6.899167	1.337241	0.0225
0.076782407	112.3365	1471.206	96.20545	10.59831	455.3636	455.6364	15.27273	1.363636	15.27273	49.4	577	1.633636	6.785455	1.326633	0.023636
0.076956019	112.5702	1485.756	96.47818	10.30323	449.3636	449.9091	15.00909	1.154545	15.00909	47.32727	571.8182	1.589091	6.744545	1.322719	0.025455
0.07712963	112.8461	1501.573	96.8	10.13922	446.5833	446.5833	14.89167	1.141667	14.89167	47.69167	570.25	1.59	6.694167	1.318117	0.03
0.077303241	113.1738	1516.105	97.18182	10.40879	451.2727	451.4545	15.07273	1.127273	15.07273	48.8	572.6364	1.596364	6.725455	1.321132	0.037273
0.077476852	113.555	1530.537	97.62545	10.52035	445.1818	446.1818	14.8	1.272727	14.8	47.40909	556.5455	1.567273	6.628182	1.311953	0.040909
0.077650463	113.9517	1546.358	98.08667	10.87069	448	449.9167	14.925	1.35	14.925	48.44167	553.5	1.585833	6.6975	1.318452	0.0375
0.077824074	114.2771	1561.008	98.46455	10.56544	456.0909	456.2727	15.23636	1.045455	15.23636	49.67273	577.6364	1.608182	6.839091	1.331768	0.029091
0.077997685	114.5177	1575.83	98.74364	10.56228	465.3636	465.4545	15.64545	0.981818	15.64545	51.5	597.6364	1.647273	7.009091	1.347441	0.022727
0.078171296	114.7239	1590.934	98.98273	10.86044	483.0909	483.2727	16.25455	1.054545	16.25455	55.11818	623.4545	1.708182	7.290909	1.373161	0.021818
0.078344907	114.9326	1605.916	99.22455	10.73588	477.0909	477.0909	16.01818	1.072727	16.01818	53.09091	614.5455	1.675455	7.167273	1.361936	0.021818
0.078518519	115.1203	1620.861	99.44182	10.7337	474.6364	474.6364	15.91818	1.145455	15.91818	52.87273	609.5455	1.673636	7.131818	1.35865	0.019091
0.07869213	115.3159	1635.713	99.66818	10.5553	467.0909	467.0909	15.64545	1.109091	15.64545	51.40909	599.5455	1.647273	7.039091	1.350182	0.021818
0.078865741	115.5383	1650.609	99.92545	10.68599	468.5455	468.5455	15.68182	1.127273	15.68182	52.52727	598.5455	1.666364	7.081818	1.354151	0.024545
0.079039352	115.7609	1665.547	100.1827	10.84538	471.7273	471.7273	15.78182	1.154545	15.78182	52.66364	600.1818	1.664545	7.123636	1.358056	0.022727
0.079212963	116.0031	1681.739	100.4625	10.65858	464.9167	464.9167	15.55833	1.091667	15.55833	51.33333	592.4167	1.638333	7.028333	1.349292	0.024167
0.079386574	116.2325	1696.641	100.7273	10.75308	467.1818	467.1818	15.7	1.136364	15.7	52.63636	595.9091	1.660909	7.087273	1.354719	0.022727
0.079560185	116.4468	1711.691	100.9745	10.82397	478.1818	478.1818	16.08182	1.036364	16.08182	54.20909	615	1.687273	7.235455	1.368196	0.021818
0.079733796	116.6267	1725.514	101.182	10.97996	488.9	488.9	16.46	1.03	16.46	56.41	631.5	1.722	7.392	1.382295	0.019
0.079907407	116.8025	1740.703	101.3845	10.95564	489.3636	489.4545	16.45455	0.954545	16.45455	56.54545	632.4545	1.719091	7.376364	1.380822	0.019091
0.080081019	116.9864	1755.786	101.5964	10.71086	483	483.4545	16.18182	0.927273	16.18182	55.03636	625.3636	1.692727	7.269091	1.371174	0.019091
0.08025463	117.1744	1770.728	101.8127	10.49125	476.7273	477	15.92727	0.836364	15.92727	53.08182	618.1818	1.656364	7.129091	1.358413	0.020909
0.080428241	117.3845	1785.554	102.0545	10.18002	468.7273	468.7273	15.56364	0.836364	15.56364	51.99091	608.8182	1.635455	7.012727	1.347786	0.023636
0.080601852	117.6328	1801.756	102.34	10.16739	470.0833	470.0833	15.65	0.658333	15.65	52.55	612.75	1.634167	7.0375	1.350155	0.025
0.080775463	117.8931	1816.425	102.6391	9.83182	460.0909	460.0909	15.28182	0.581818	15.28182	49.85455	601.9091	1.584545	6.858182	1.333566	0.027273
0.080949074	118.1845	1831.102	102.9736	9.745156	459.3636	459.3636	15.25455	0.509091	15.25455	50.00909	602.7273	1.583636	6.865455	1.334237	0.032727
0.081122685	118.5062	1845.833	103.3427	9.788583	462	462.0909	15.38182	0.472727	15.38182	50.63636	607.5455	1.586364	6.919091	1.339221	0.032727
0.081296296	118.8353	1860.538	103.72	9.796922	461	462.4545	15.32727	0.436364	15.32727	50.19091	604.9091	1.570909	6.893636	1.336837	0.038182
0.081469907	119.2443	1876.51	104.1883	10.00947	459	461.5	15.21667	0.566667	15.21667	49.65833	594.5	1.5575	6.830833	1.331003	0.041667
0.081643519	119.663	1891.065	104.6673	10.02164	452.8182	456.6364	15	0.6	15	48.47273	582.3636	1.537273	6.747273	1.323173	0.041818
0.08181713	120.0345	1905.702	105.0918	10.38031	459.8182	460.7273	15.28182	0.681818	15.28182	49.95455	587.3636	1.566364	6.826364	1.330594	0.033636
0.081990741	120.3154	1921.843	105.4125	10.53189	471.4167	471.5	15.71667	0.608333	15.71667	51.81667	606.3333	1.604167	6.9825	1.345082	0.024167
0.082164352	120.5387	1936.673	105.6673	10.53441	472.1818	472.3636	15.73636	0.636364	15.73636	51.65455	607.5455	1.605455	7.016364	1.348209	0.020909
0.082337963	120.7132	1951.493	105.8664	10.66161	473.5455	473.6364	15.77273	0.672727	15.77273	51.40909	606.5455	1.607273	7.008182	1.34729	0.016364
0.082511574	120.8679	1966.44	106.0427	10.94831	480	480.0909	16.04545	0.781818	16.04545	52.81818	612.6364	1.634545	7.133636	1.358791	0.015455
0.082685185	121.0115	1981.358	106.2064	10.84898	477.3636	477.3636	15.91818	0.818182	15.91818	52.5	609.2727	1.633636	7.105455	1.356236	0.014545
0.082858796	121.1528	1996.517	106.3673	11.33858	492.8182	492.9091	16.50909	0.9	16.50909	55.85455	627.3636	1.69	7.346364	1.378064	0.014545
0.083032407	121.2843	2010.511	106.517	11.70979	505.3	505.3	16.99	0.97	16.99	58.81	642.7	1.741	7.584	1.399353	0.013
0.083206019	121.3947	2026.04	106.6427	11.90244	515.5455	516.1818	17.34545	1.009091	17.34545	61.68182	657.1818	1.787273	7.725455	1.411752	0.011818

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
0.08337963	120.0667	0.540231	0.19	27	0.15	27	0.155	21	0.232	0.0008	109	100	0.066291	59.04459		58
0.083553241	120.3167	0.540405	0.19	27	0.15	28	0.155	22	0.236	0.00087	110	100	0.067291	59.02237		58
0.083726852	120.5667	0.540579	0.195	26	0.15	30	0.155	21	0.243	0.00087	110	100	0.066505	59.00171		58
0.083900463	120.8167	0.540752	0.21	26	0.165	30	0.165	21	0.258	0.00109	111	22	0.066653	58.98153		58
0.084074074	121.0667	0.540926	0.2	27	0.165	28	0.165	21	0.25	0.00087	110	100	0.066699	58.96426		58
0.084247685	121.3167	0.5411	0.2	27	0.165	28	0.165	21	0.246	0.00087	110	85				

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
0.08337963	121.5089	2041.796	106.7727	12.41792	532.5455	532.5455	17.97273	1.127273	17.97273	64.88182	677.0909	1.837273	7.96	1.432406	0.011818
0.083553241	121.6137	2056.27	106.892	12.75244	544.1	544.5	18.44	1.1	18.44	66.97	692.1	1.869	8.133	1.447324	0.011
0.083726852	121.7122	2070.667	107.004	12.60306	539.1	544.2	18.11	1.02	18.11	65.52	682.4	1.835	8.074	1.439719	0.011
0.083900463	121.8094	2086.541	107.1145	12.41311	536.6364	543.7273	18.07273	1.118182	18.31818	65.91818	683.9091	1.856364	8.084545	1.443147	0.010909
0.084074074	121.8933	2096.628	107.21	12.57513	543.2857	543.4286	18.32857	1.014286	18.32857	66.1	693	1.858571	8.057143	1.440889	0.01
0.084247685															

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
1:25:37	85.62	9:44:52	0.225	43	0.32	13	0.32	26	0.403	0.00109	111	100	0.097	81.22	50	
1:25:52	85.87	9:45:07	0.25	43	0.325	15	0.35	27	0.427	0.00094	110	100	0.094	80.59	50	
1:26:07	86.12	9:45:22	0.225	24	0.33	14	0.32	32	0.411	0.00094	110	28	0.093	80.04	50	
1:26:22	86.37	9:45:37	0.235	24	0.29	17	0.27	24	0.356	0.00094	110	51	0.089	79.35	50	
1:26:37	86.62	9:45:52	0.235	26	0.235	23	0.275	26	0.361	0.00087	110	34	0.088	78.66	50	
1:26:52	86.87	9:46:07	0.23	26	0.24	24	0.29	27	0.372	0.00094	110	100	0.086	77.91	50	
1:27:07	87.12	9:46:22	0.215	26	0.23	26	0.285	27	0.365	0.00109	111	100	0.086	77.06	50	
1:27:22	87.37	9:46:37	0.21	32	0.23	23	0.28	27	0.36	0.00123	113	100	0.085	76.30	50	
1:27:37	87.62	9:46:52	0.21	34	0.23	22	0.28	27	0.361	0.00116	112	100	0.085	75.58	50	
1:27:52	87.87	9:47:07	0.23	34	0.23	22	0.28	27	0.365	0.00102	111	100	0.082	74.74	50	
1:28:07	88.12	9:47:22	0.235	34	0.235	23	0.275	27	0.361	0.00094	110	100	0.080	73.87	50	
1:28:22	88.37	9:47:37	0.235	34	0.235	23	0.275	27	0.361	0.00102	111	100	0.080	73.02	50	
1:28:37	88.62	9:47:52	0.235	34	0.24	24	0.275	27	0.367	0.00123	113	100	0.080	72.10	50	
1:28:52	88.87	9:48:07	0.245	32	0.25	23	0.275	26	0.37	0.00131	113	100	0.079	71.20	50	
1:29:07	89.12	9:48:22	0.25	32	0.25	23	0.285	27	0.377	0.00138	114	100	0.078	70.40	50	
1:29:22	89.37	9:48:37	0.235	32	0.25	24	0.3	26	0.39	0.00145	114	100	0.079	69.72	50	
1:29:37	89.62	9:48:52	0.24	23	0.265	24	0.29	26	0.388	0.00131	113	100	0.081	69.14	50	
1:29:52	89.87	9:49:07	0.245	24	0.265	24	0.28	27	0.387	0.00131	113	100	0.081	68.66	50	
1:30:07	90.12	9:49:22	0.235	24	0.26	26	0.28	27	0.379	0.00138	114	100	0.080	68.23	50	
1:30:22	90.37	9:49:37	0.2	23	0.275	20	0.275	27	0.375	0.00087	110	100	0.081	67.75	50	
1:30:37	90.62	9:49:52	0.18	23	0.275	19	0.275	28	0.362	0.00094	110	100	0.080	67.27	50	
1:30:52	90.87	9:50:07	0.205	23	0.26	19	0.28	28	0.366	0.00102	111	100	0.079	66.82	50	
1:31:07	91.12	9:50:22	0.2	23	0.25	19	0.275	28	0.359	0.00116	112	100	0.080	66.42	50	
1:31:22	91.37	9:50:37	0.19	22	0.25	18	0.27	27	0.349	0.00116	112	100	0.080	66.04	50	
1:31:37	91.62	9:50:52	0.175	22	0.26	19	0.25	28	0.331	0.00087	110	100	0.080	65.68	50	
1:31:52	91.87	9:51:07	0.135	43	0.265	19	0.225	30	0.291	0.00116	112	100	0.080	65.32	50	
1:32:07	92.12	9:51:22	0.165	21	0.27	19	0.225	28	0.297	0.0016	115	100	0.079	64.97	50	
1:32:22	92.37	9:51:37	0.165	21	0.245	18	0.23	28	0.305	0.00167	115	100	0.079	64.75	50	
1:32:37	92.62	9:51:52	0.16	22	0.245	18	0.22	30	0.297	0.00167	115	100	0.080	64.53	50	
1:32:52	92.87	9:52:07	0.19	32	0.29	20	0.21	30	0.324	0.0016	115	100	0.084	64.32	50	
1:33:07	93.12	9:52:22	0.245	30	0.315	20	0.175	30	0.355	0.00167	115	100	0.083	64.12	50	
1:33:22	93.37	9:52:37	0.235	32	0.315	21	0.18	27	0.359	0.00174	116	100	0.082	63.91	50	
1:33:37	93.62	9:52:52	0.23	32	0.315	21	0.18	26	0.355	0.00196	117	100	0.081	63.70	50	
1:33:52	93.87	9:53:07	0.205	34	0.3	21	0.18	32	0.338	0.00181	116	100	0.080	63.51	50	
1:34:07	94.12	9:53:22	0.19	34	0.29	20	0.195	32	0.316	0.00196	117	100	0.078	63.32	50	
1:34:22	94.37	9:53:37	0.16	37	0.26	18	0.225	32	0.281	0.00189	116	100	0.077	63.13	50	
1:34:37	94.62	9:53:52	0.155	24	0.23	18	0.235	30	0.301	0.00181	116	100	0.076	62.94	50	
1:34:52	94.87	9:54:07	0.155	26	0.225	28	0.235	28	0.301	0.00152	114	100	0.075	62.75	50	
1:35:07	95.12	9:54:22	0.175	27	0.235	28	0.24	28	0.322	0.00138	114	100	0.075	62.56	50	
1:35:22	95.37	9:54:37	0.19	30	0.24	28	0.25	28	0.326	0.00131	113	100	0.074	62.25	50	
1:35:37	95.62	9:54:52	0.19	28	0.24	28	0.25	28	0.329	0.00123	113	100	0.073	61.86	50	
1:35:52	95.87	9:55:07	0.195	28	0.24	28	0.245	28	0.329	0.00138	114	100	0.073	61.44	50	
1:36:07	96.12	9:55:22	0.195	27	0.24	30	0.245	27	0.33	0.00138	114	100	0.073	61.01	50	
1:36:22	96.37	9:55:37	0.195	28	0.235	28	0.25	27	0.33	0.00145	114	100	0.072	60.57	50	
1:36:37	96.62	9:55:52	0.18	28	0.23	30	0.245	27	0.326	0.00138	114	100	0.073	60.11	50	

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
1:25:37	75.45	16.0798	56.5	16.72768	555.5833	556	15.36667	3.975	15.36667	53.55833	510.25	1.750833	6.231667	1.339984	0.075833
1:25:52	76.04	30.51781	57.29455	17.76817	549	549	15.33636	4.672727	15.33636	51.5	468	1.756364	6.634545	1.312546	0.060909
1:26:07	76.57	46.20921	57.9925	17.48427	540.5833	541.1667	15.1	4.616667	15.1	50.63333	461.1667	1.761667	6.5825	1.307617	0.065833
1:26:22	77.25	61.51846	58.885	16.74514	515.75	515.75	14.30833	4.5	14.30833	46.875	434.5833	1.735	6.251667	1.275771	0.0775
1:26:37	77.93	75.54266	59.77091	16.95835	517.0909	518.2727	14.27273	4.390909	14.27273	47.21818	427.6364	1.752727	6.242727	1.274927	0.078182
1:26:52	78.68	91.00036	60.75308	16.92902	511.4615	512	14.1	4.530769	14.1	45.86923	417.2308	1.75	5.672308	1.189054	0.084615
1:27:07	79.54	106.1672	61.8575	16.9172	505.4167	505.9167	13.95	4.783333	13.95	46.675	406.5833	1.818333	6.13	1.263903	0.088333
1:27:22	80.33	121.4282	62.87	17.10881	511.9167	512.4167	14.21667	4.691667	14.21667	47.05	415.5833	1.770833	6.210833	1.271753	0.081667
1:27:37	81.07	135.7829	63.81917	17.22119	518.3333	518.9167	14.49167	4.616667	14.49167	48.04167	427.4167	1.785	5.7725	1.196223	0.0825
1:27:52	81.97	150.9479	64.95	16.64619	506.75	507.5	13.91667	4.475	13.91667	45.45833	415.8333	1.755833	6.128333	1.263748	0.1
1:28:07	82.90	166.0092	66.12833	16.55206	503.4167	503.4167	13.775	4.525	13.775	44.46667	410.9167	1.7525	6.040833	1.255112	0.095
1:28:22	83.83	181.1208	67.28833	16.82474	500.5833	503.6667	13.8	4.508333	13.8	45.225	399.8333	1.8025	6.083333	1.259302	0.104167
1:28:37	84.85	196.2788	68.55083	17.05318	500.1667	502.8333	13.88333	4.533333	13.88333	46.04167	394.5833	1.819167	6.1225	1.263162	0.101667
1:28:52	85.87	211.4113	69.81583	16.91562	500.5	501.8333	13.83333	4.558333	13.83333	46.14167	397.8333	1.821667	6.100833	1.261044	0.104167
1:29:07	86.79	226.5587	70.94583	16.91137	505.25	508.5833	13.94167	4.333333	13.94167	45.89167	406.3333	1.7625	6.113333	1.262284	0.088333
1:29:22	87.58	240.733	71.90545	17.24099	531.7273	533.2727	14.67273	4.190909	14.67273	48.41818	446.1818	1.687273	6.383636	1.288571	0.079091
1:29:37	88.27	256.5074	72.74667	17.47165	552.1667	553.0833	15.25	3.966667	15.25	50.85	478.1667	1.66	6.655833	1.314533	0.068333
1:29:52	88.85	271.1373	73.44455	17.72975	562.6364	567.7273	15.60909	3.572727	15.60909	52.21818	492	1.644545	6.82	1.329987	0.055455
1:30:07	89.37	285.7279	74.06909	17.57962	564.6364	567.7273	15.63636	3.645455	15.63636	51.24545	499.9091	1.627273	6.781818	1.326419	0.06
1:30:22	89.96	301.781	74.7825	17.83811	573.0833	575.6667	15.89167	3.825	15.89167	53.13333	508.25	1.668333	6.903333	1.337766	0.0625
1:30:37	90.56	316.3773	75.50091	17.75524	564.9091	567.9091	15.59091	3.909091	15.59091	52.12727	492.8182	1.661818	6.787273	1.326931	0.061818
1:30:52	91.11	330.9708	76.16545	18.13277	564.3636	566.5455	15.62727	4.172727	15.62727	52.13636	480.9091	1.675455	6.784545	1.326681	0.057273
1:31:07	91.62	345.6149	76.77727	18.43471	568.2727	571	15.75455	4.345455	15.75455	53.11818	479	1.712727	6.833636	1.33128	0.055455
1:31:22	92.11	361.7282	77.3575	18.84043	578.6667	579.6667	16.00833	4.683333	16.00833	54.35	484.3333	1.731667	6.9575	1.342775	0.0475
1:31:37	92.57	376.5475	77.90727	19.084	581.0909	581.0909	16.13636	4.972727	16.13636	55.25455	482.9091	1.771818	7.005455	1.347209	0.049091
1:31:52	93.05	391.3128	78.47364	18.62289	572.9091	572.9091	15.94545	4.836364	15.94545	55.07273	483.7273	1.780909	6.952727	1.342302	0.052727
1:32:07	93.50	406.022	79.00909	18.05805	567.8182	567.8182	15.78182	4.463636	15.78182	54.20909	492	1.746364	6.897273	1.337198	0.04
1:32:22	93.80	420.8375	79.36091	18.00792	573.2727	573.2727	15.90909	4.345455	15.90909	55.34545	503.3636	1.749091	7.001818	1.346866	0.030909
1:32:37	94.09	435.9318	79.7	18.32044	586.5455	586.5455	16.5	4.118182	16.5	57.16364	525.9091	1.748182	7.28	1.372212	0.03
1:32:52	94.37	451.563	80.03273	18.5753	619.2727	619.2727	17.55455	3.590909	17.55455	62.12727	585.2727	1.783636	7.828182	1.421014	0.030909
1:33:07	94.65	465.8344	80.36	17.94921	624.9	624.9	17.67	3.04	17.67	62.07	615.6	1.775	7.898	1.427138	0.031
1:33:22	94.92	481.3508	80.68727	17.52376	609.5455	609.5455	17.35455	3.009091	17.35455	60.70909	603.9091	1.762727	7.709091	1.410582	0.030909
1:33:37	95.21	496.7691	81.03	17.61405	601.5455	601.5455	17.05455	3.354545	17.05455	59.97273	582.9091	1.753636	7.608182	1.40167	0.030909
1:33:52	95.48	510.6683	81.337	17.65563	592	592	16.8	3.54	16.8	58.62	563.5	1.732	7.476	1.389916	0.029
1:34:07	95.74	525.7352	81.64818	17.00143	577.5455	577.5455	16.3	3.154545	16.3	56.11818	554.1818	1.667273	7.251818	1.369722	0.029091
1:34:22	96.01	540.7041	81.96727	16.97795	574.7273	574.7273	16.06364	3.063636	16.06364	54.45455	544.2727	1.623636	7.153636	1.360809	0.029091
1:34:37	96.27	555.6574	82.27091	17.10807	573.6364	573.6364	16.02727	2.990909	16.02727	53.83636	537.6364	1.609091	7.138182	1.359384	0.027273
1:34:52	96.54	571.8499	82.58083	16.61476	569.6667	569.6667	15.81667	2.758333	15.81667	52.80833	543.0833	1.585	7.029167	1.34938	0.026667
1:35:07	96.81	586.6323	82.89455	16.57705	566.1818	566.1818	15.65455	2.763636	15.65455	52.11818	535.4545	1.577273	6.969091	1.343851	0.03
1:35:22	97.25	601.3582	83.41273	16.51983	562.0909	562.0909	15.51818	2.7	15.51818	51.2	528.7273	1.553636	6.913636	1.33872	0.059091
1:35:37	97.82	616.1055	84.07273	16.63629	560.5455	560.5455	15.50909	2.845455	15.50909	51.6	523	1.561818	6.934545	1.340662	0.062727
1:35:52	98.44	630.8517	84.8	16.86188	562.7273	562.7273	15.55455	2.909091	15.55455	51.90909	519.1818	1.573636	6.933636	1.340568	0.066364
1:36:07	99.08	645.583	85.53364	16.83278	562.5455	562.5455	15.53636	2.854545	15.53636	51.72727	519.3636	1.564545	6.919091	1.339206	0.067273
1:36:22	99.76	661.7462	86.32083	16.82499	566.6667	566.6667	15.71667	2.791667	15.71667	51.78333	529.75	1.546667	7.0025	1.346935	0.07
1:36:37	100.46	676.7487	87.13182	16.71227	575.8182	575.8182	16.10909	2.618182	16.10909	53.73636	555.7273	1.554545	7.187273	1.363864	0.069091

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
1:36:52	96.87	9:56:07	0.16	28	0.23	28	0.23	28	0.313	0.00152	114	100	0.073	59.71		50
1:37:07	97.12	9:56:22	0.14	28	0.23	28	0.22	27	0.306	0.00167	115	100	0.071	59.35		50
1:37:22	97.37	9:56:37	0.145	28	0.23	30	0.22	27	0.307	0.00152	114	100	0.071	58.99		50
1:37:37	97.62	9:56:52	0.16	30	0.23	28	0.235	28	0.321	0.00138	114	100	0.070	58.60		50
1:37:52	97.87	9:57:07	0.155	28	0.23	28	0.235	28	0.322	0.00145	114	100	0.071	58.22		50
1:38:07	98.12	9:57:22	0.145	28	0.225	30	0.24	27	0.322	0.00138	114	100	0.071	57.86		50
1:38:22	98.37	9:57:37	0.135	28	0.225	30	0.225	27	0.313	0.00123	113	100	0.071	57.52		50
1:38:37	98.62	9:57:52	0.12	30	0.215	28	0.21	26	0.296	0.00102	111	100	0.070	57.20		50
1:38:52	98.87	9:58:07	0.135	30	0.21	28	0.225	28	0.307	0.00109	111	100	0.070	56.88		50
1:39:07	99.12	9:58:22	0.15	30	0.215	28	0.23	28	0.31	0.00109	111	100	0.068	56.55		50
1:39:22	99.37	9:58:37	0.16	32	0.21	30	0.24	30	0.318	0.00109	111	100	0.067	56.19		50
1:39:37	99.62	9:58:52	0.16	32	0.21	28	0.24	28	0.314	0.00123	113	100	0.067	55.77		50
1:39:52	99.87	9:59:07	0.155	32	0.205	30	0.235	28	0.309	0.00123	113	100	0.067	55.38		50
1:40:07	100.12	9:59:22	0.15	32	0.195	28	0.25	26	0.302	0.00123	113	100	0.067	55.04		50
1:40:22	100.37	9:59:37	0.145	43	0.2	23	0.24	30	0.29	0.00138	114	100	0.066	54.71		50
1:40:37	100.62	9:59:52	0.15	47	0.205	23	0.245	28	0.293	0.00131	113	100	0.065	54.39		50
1:40:52	100.87	10:00:07	0.155	43	0.185	24	0.245	30	0.293	0.00123	113	100	0.064411	54.04555		50
1:41:07	101.12	10:00:22	0.155	43	0.18	23	0.235	30	0.287	0.00131	113	100	0.066218	53.75967		50
1:41:22	101.37	10:00:37	0.16	43	0.2	23	0.235	30	0.287	0.00109	111	100	0.065136	53.50998		50
1:41:37	101.62	10:00:52	0.15	47	0.2	23	0.22	32	0.269	0.00102	111	100	0.064434	53.26904		50
1:41:52	101.87	10:01:07	0.155	43	0.185	23	0.225	32	0.267	0.00109	111	100	0.065306	53.03894		50
1:42:07	102.12	10:01:22	0.15	47	0.205	24	0.22	32	0.262	0.00109	111	100	0.069317	52.89688		50
1:42:22	102.37	10:01:37	0.125	28	0.225	26	0.175	34	0.252	0.00131	113	57	0.070907	52.83517		50
1:42:37	102.62	10:01:52	0.135	30	0.22	24	0.16	24	0.232	0.00138	114	100				

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
1:36:52	101.09	691.7404	87.86273	16.39203	576.7273	576.7273	16.1	2.527273	16.1	53.94545	567	1.554545	7.176364	1.362876	0.064545
1:37:07	101.67	706.6268	88.52909	16.22663	570.7273	570.7273	15.86364	2.509091	15.86364	52.43636	558.6364	1.527273	7.071818	1.353309	0.058182
1:37:22	102.26	721.4876	89.20182	16.39677	570.9091	570.9091	15.84545	2.6	15.84545	52.27273	552.5455	1.53	7.046364	1.350981	0.064545
1:37:37	102.90	736.3529	89.93364	16.25936	571.2727	571.2727	15.89091	2.445455	15.89091	52.18182	559	1.517273	7.050909	1.351391	0.067273
1:37:52	103.54	751.3636	90.66636	16.20724	584.6364	584.6364	16.24545	2.181818	16.24545	53.30909	585.9091	1.511818	7.195455	1.364614	0.066364
1:38:07	104.16	766.5156	91.37636	15.95864	593.9091	593.9091	16.57273	1.809091	16.57273	54.7	614.3636	1.52	7.337273	1.377456	0.062727
1:38:22	104.77	781.7808	92.06364	15.67097	602.7273	602.7273	16.80909	1.536364	16.80909	55.70909	640.6364	1.528182	7.451818	1.38774	0.062727
1:38:37	105.34	795.5849	92.72	15.94847	601.8	601.8	16.66	1.7	16.66	55.04	625.5	1.509	7.37	1.380411	0.062
1:38:52	105.92	810.7343	93.37636	16.20062	602.6364	602.6364	16.59091	1.836364	16.59091	54.64545	615.6364	1.499091	7.334545	1.377223	0.062727
1:39:07	106.54	825.7204	94.08	16.14537	593.0909	593.0909	16.25455	2.027273	16.25455	52.89091	596.7273	1.471818	7.170909	1.362369	0.067273
1:39:22	107.23	840.5895	94.86364	16.29478	583.0909	583.0909	15.97273	2.327273	15.97273	51.97273	572.3636	1.48	7.054545	1.351735	0.074545
1:39:37	108.05	856.8151	95.78833	16.31363	579.75	579.75	15.90833	2.408333	15.90833	52.55	566.25	1.501667	7.059167	1.352139	0.081667
1:39:52	108.85	871.7693	96.69182	16.51303	583.9091	583.9091	16.10909	2.409091	16.10909	52.9	570.4545	1.483636	7.139091	1.359469	0.076364
1:40:07	109.57	886.76	97.5	16.04993	584.7273	584.7273	16.14545	2.181818	16.14545	53.1	587.9091	1.473636	7.175455	1.36279	0.071818
1:40:22	110.27	901.7726	98.28545	15.26022	587	587	16.19091	1.590909	16.19091	52.70909	618	1.450909	7.197273	1.364781	0.070909
1:40:37	110.99	916.7333	99.09455	15.5487	585.6364	585.6364	16.07273	1.836364	16.07273	52.49091	603.0909	1.459091	7.145455	1.360064	0.078182
1:40:52	111.7888	931.6942	99.98364	15.57142	585.3636	585.3636	16.10909	1.745455	16.10909	51.84545	603.2727	1.433636	7.146364	1.36008	0.078182
1:41:07	112.4738	945.5665	100.749	15.11882	603.9	603.9	16.71	1.27	16.71	55.47	656.9	1.48	7.446	1.387238	0.07
1:41:22	113.0924	960.7453	101.4391	15.18992	599	599	16.52727	1.281818	16.52727	54.26364	643.5455	1.458182	7.364545	1.379888	0.062727
1:41:37	113.7093	975.8838	102.1264	15.74306	598.7273	598.7273	16.51818	1.545455	16.51818	53.68182	624.5455	1.443636	7.323636	1.376229	0.062727
1:41:52	114.3187	991.1835	102.8045	15.67551	606.7273	606.7273	16.82727	1.309091	16.82727	55.73636	645.0909	1.475455	7.487273	1.390879	0.056364
1:42:07	114.706	1005.67	103.235	16.24365	639.8	639.8	18.06	1.17	18.06	63.22	700.3	1.607	8.148	1.44866	0.032
1:42:22	114.877	1008.616	103.425	16.43851	652	652	18.45	1.2	18.45	66.35	719	1.665	8.43	1.472725	0.03
1:42:37															

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
0:32:15	32.25	9:25:09	0.313	24	0.313	20	0.252	34	0.509	0.0021	117	100	0.103	77.28	48	
0:32:30	32.50	9:25:24	0.313	27	0.313	18	0.269	34	0.517	0.0021	117	100	0.101	76.68	48	
0:32:45	32.75	9:25:39	0.313	26	0.301	16	0.243	34	0.497	0.00218	118	100	0.098	76.11	48	
0:33:00	33.00	9:25:54	0.301	24	0.298	13	0.213	32	0.449	0.00203	117	100	0.098	75.52	48	
0:33:15	33.25	9:26:09	0.25	21	0.298	13	0.193	28	0.39	0.00232	118	100	0.095	74.87	48	
0:33:30	33.50	9:26:24	0.227	20	0.298	14	0.183	30	0.352	0.0021	117	100	0.094	74.22	48	
0:33:45	33.75	9:26:39	0.203	20	0.298	14	0.178	28	0.327	0.00174	116	100	0.093	73.51	48	
0:34:00	34.00	9:26:54	0.181	20	0.298	13	0.164	30	0.307	0.00189	116	100	0.091	72.73	48	
0:34:15	34.25	9:27:09	0.157	18	0.298	13	0.143	28	0.302	0.00181	116	100	0.091	71.98	48	
0:34:30	34.50	9:27:24	0.151	18	0.288	13	0.138	24	0.29	0.00181	116	100	0.089	71.17	48	
0:34:45	34.75	9:27:39	0.149	18	0.273	12	0.133	22	0.274	0.00181	116	100	0.089	70.28	48	
0:35:00	35.00	9:27:54	0.145	18	0.256	11	0.116	20	0.26	0.00181	116	100	0.087	69.36	48	
0:35:15	35.25	9:28:09	0.133	14	0.248	12	0.121	22	0.251	0.00174	116	100	0.087	68.53	48	
0:35:30	35.50	9:28:24	0.155	17	0.226	12	0.134	30	0.245	0.00167	115	100	0.088	67.84	48	
0:35:45	35.75	9:28:39	0.161	17	0.2	13	0.142	34	0.25	0.00167	115	100	0.089	67.24	48	
0:36:00	36.00	9:28:54	0.157	17	0.206	13	0.139	37	0.249	0.00174	116	100	0.089	66.71	48	
0:36:15	36.25	9:29:09	0.154	17	0.199	11	0.128	37	0.233	0.00167	115	100	0.091	66.19	48	
0:36:30	36.50	9:29:24	0.151	16	0.194	11	0.113	37	0.223	0.0016	115	100	0.091	65.67	48	
0:36:45	36.75	9:29:39	0.149	16	0.194	12	0.103	34	0.219	0.00152	114	100	0.091	65.22	48	
0:37:00	37.00	9:29:54	0.134	16	0.186	12	0.0888	17	0.219	0.00189	116	100	0.089	64.83	48	
0:37:15	37.25	9:30:09	0.123	20	0.182	13	0.0925	19	0.222	0.00181	116	100	0.089	64.44	48	
0:37:30	37.50	9:30:24	0.123	15	0.176	12	0.0838	14	0.21	0.00196	117	100	0.089	64.06	48	
0:37:45	37.75	9:30:39	0.122	16	0.169	12	0.0894	14	0.214	0.00225	118	100	0.089	63.69	48	
0:38:00	38.00	9:30:54	0.15	21	0.185	13	0.124	39	0.24	0.00239	118	100	0.090	63.38	48	
0:38:15	38.25	9:31:09	0.144	22	0.183	13	0.125	43	0.24	0.00218	118	100	0.089	63.07	48	
0:38:30	38.50	9:31:24	0.121	20	0.178	13	0.11	19	0.228	0.00218	118	100	0.089	62.76	48	
0:38:45	38.75	9:31:39	0.131	21	0.176	13	0.123	39	0.222	0.00247	119	100	0.089	62.47	48	
0:39:00	39.00	9:31:54	0.166	24	0.186	14	0.166	34	0.225	0.00276	120	100	0.090	62.25	48	
0:39:15	39.25	9:32:09	0.173	26	0.191	12	0.179	32	0.227	0.00268	119	100	0.091	62.04	48	
0:39:30	39.50	9:32:24	0.174	24	0.19	12	0.179	32	0.228	0.00268	119	100	0.090	61.82	48	
0:39:45	39.75	9:32:39	0.164	23	0.195	15	0.169	34	0.219	0.00261	119	100	0.087	61.50	48	
0:40:00	40.00	9:32:54	0.152	23	0.203	13	0.143	39	0.208	0.00232	118	100	0.086	61.16	48	
0:40:15	40.25	9:33:09	0.136	15	0.198	13	0.0988	15	0.199	0.00247	119	100	0.085	60.76	48	
0:40:30	40.50	9:33:24	0.132	16	0.191	12	0.0956	17	0.193	0.00254	119	100	0.083	60.32	48	
0:40:45	40.75	9:33:39	0.129	16	0.188	13	0.0956	17	0.191	0.00261	119	100	0.082	59.86	48	
0:41:00	41.00	9:33:54	0.128	16	0.18	12	0.0913	17	0.184	0.00261	119	100	0.082	59.36	48	
0:41:15	41.25	9:34:09	0.119	16	0.169	12	0.0925	17	0.172	0.00254	119	100	0.081	58.89	48	
0:41:30	41.50	9:34:24	0.111	16	0.164	12	0.0919	18	0.172	0.00254	119	100	0.081	58.42	48	
0:41:45	41.75	9:34:39	0.107	16	0.161	11	0.0963	19	0.17	0.00261	119	100	0.081	57.97	48	
0:42:00	42.00	9:34:54	0.106	26	0.151	11	0.0981	19	0.17	0.00247	119	100	0.080	57.52	48	
0:42:15	42.25	9:35:09	0.104	27	0.154	15	0.108	19	0.174	0.00247	119	100	0.080	57.08	48	
0:42:30	42.50	9:35:24	0.108	17	0.149	11	0.117	30	0.173	0.00247	119	100	0.080	56.64	48	
0:42:45	42.75	9:35:39	0.116	16	0.157	15	0.127	30	0.175	0.00254	119	100	0.079	56.22	48	
0:43:00	43.00	9:35:54	0.12	17	0.152	15	0.12	30	0.172	0.00276	120	100	0.077	55.80	48	
0:43:15	43.25	9:36:09	0.124	16	0.147	15	0.103	30	0.175	0.0029	120	100	0.078	55.40	48	

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
0:32:15	74.08	15.55387	56.42818	20.61763	771.2727	771.2727	16.74545	5.527273	16.74545	58.47273	603	1.620909	6.946364	1.413989	0.071818
0:32:30	74.67	30.73162	57.19909	21.33718	766.0909	766.0909	16.71818	6.081818	16.71818	57.42727	565.3636	1.680909	7.364545	1.379795	0.067273
0:32:45	75.24	45.5526	57.93364	20.53026	733.8182	733.8182	15.93636	6.027273	15.93636	54.44545	534.1818	1.766364	7.007273	1.347362	0.067273
0:33:00	75.83	61.71488	58.70083	21.04369	735.3333	735.3333	15.90833	6.4	15.90833	54.74167	512.1667	1.810833	7.001667	1.346857	0.0675
0:33:15	76.48	76.34366	59.53818	20.8778	722.0909	722.0909	15.54545	6.418182	15.54545	52.55455	490.3636	1.764545	6.819091	1.329889	0.076364
0:33:30	77.14	90.92029	60.38455	20.94934	715.8182	715.8182	15.44545	6.6	15.44545	52.07273	476.6364	1.793636	6.768182	1.325148	0.077273
0:33:45	77.87	106.7891	61.32167	21.20129	708.5	708.5	15.35833	7.05	15.35833	52.40833	454.5833	1.8575	6.739167	1.322403	0.0875
0:34:00	78.70	121.2585	62.36364	20.98268	701	701	15.15455	7.036364	15.15455	51.66364	447.7273	1.877273	6.665455	1.315396	0.090909
0:34:15	79.49	135.7625	63.36364	21.05099	701.3636	701.3636	15.14545	7.090909	15.14545	52.77273	444.7273	1.903636	6.698182	1.318549	0.090909
0:34:30	80.36	151.3879	64.45083	20.53315	679.4167	679.4167	14.625	7.15	14.625	50.88333	422.6667	1.924167	6.525	1.302117	0.098333
0:34:45	81.34	165.6997	65.66636	20.48439	675.7273	675.7273	14.51818	7.236364	14.51818	51.88182	416.4545	2.052727	6.514545	1.301073	0.110909
0:35:00	82.36	181.3595	66.93083	20.69172	678.8333	678.8333	14.64167	7.316667	14.64167	51.41667	415.9167	1.988333	6.555	1.304979	0.106667
0:35:15	83.30	195.8295	68.08182	20.94007	686.9091	686.9091	14.88182	7.354545	14.88182	52.11818	423.6364	1.921818	6.665455	1.315456	0.095455
0:35:30	84.11	210.672	69.06455	21.26706	716.7273	716.7273	15.6	6.945455	15.6	54.60909	470.4545	1.764545	7.029091	1.349321	0.082727
0:35:45	84.81	225.8065	69.91455	21.86329	738.2727	738.2727	16.1	7.081818	16.1	57.01818	487.8182	1.745455	7.32	1.375864	0.073636
0:36:00	85.43	241.0179	70.66636	22.24988	744.2727	744.2727	16.2	7.481818	16.2	58.17273	481.3636	1.788182	7.397273	1.38285	0.066364
0:36:15	86.06	256.3676	71.42818	22.91179	753	753	16.5	8.027273	16.5	61.07273	474.3636	1.860909	7.538182	1.395429	0.071818
0:36:30	86.69	271.8002	72.18636	23.42444	761.6364	761.6364	16.79091	8.381818	16.79091	61.9	473.3636	1.87	7.622727	1.402967	0.064545
0:36:45	87.24	285.8858	72.842	23.78913	768.9	768.9	17.01	8.61	17.01	62.6	474.3	1.875	7.686	1.40856	0.061
0:37:00	87.72	301.3362	73.42091	23.63604	764.4545	764.4545	16.9	8.581818	16.9	60.89091	471.7273	1.825455	7.640909	1.40458	0.051818
0:37:15	88.21	316.8172	74.00455	23.84097	763.5455	763.5455	16.87273	8.981818	16.87273	61.86364	460.7273	1.882727	7.672727	1.407366	0.054545
0:37:30	88.69	330.9091	74.583	23.74498	761.6	761.6	16.86	8.92	16.86	62.57	462.4	1.924	7.693	1.409183	0.055
0:37:45	89.16	346.6064	75.13364	23.64244	773.0909	773.0909	17.19091	8.372727	17.19091	63.62727	492.7273	1.850909	7.897273	1.427032	0.048182
0:38:00	89.56	361.0336	75.614	24.64297	785.8	785.8	17.59	9.34	17.59	65.34	479.3	1.873	8.078	1.442719	0.046
0:38:15	89.97	376.7478	76.09091	24.12052	775.6364	775.7273	17.33636	9.009091	17.33636	64.42727	480.8182	1.904545	7.914545	1.428567	0.045455
0:38:30	90.37	391.0061	76.568	23.77999	775.5	775.5	17.3	8.5	17.3	64.07	493.9	1.877	7.883	1.425823	0.045
0:38:45	90.75	406.8976	77.01909	24.00084	788.0909	788.0909	17.67273	8.336364	17.67273	65.31818	513.0909	1.820909	8.100909	1.444682	0.038182
0:39:00	91.05	421.5857	77.371	24.46828	807.3	807.3	18.2	8.43	18.2	67.37	534.9	1.785	8.384	1.468817	0.033
0:39:15	91.33	436.4058	77.694	24.51658	816.4	816.4	18.46	8.37	18.46	69.04	553.2	1.801	8.541	1.482012	0.032
0:39:30	91.62	451.0788	78.043	23.61669	802.9	802.9	18.14	7.61	18.14	68.06	564.9	1.832	8.366	1.467291	0.041
0:39:45	92.05	466.8682	78.55	23.05466	777.1818	777.2727	17.45455	7.327273	17.45455	64.46364	533.8182	1.814545	7.993636	1.435402	0.05
0:40:00	92.53	481.0929	79.102	22.93513	768.6	768.7	17.18	7.42	17.18	63.75	518.5	1.854	7.845	1.422472	0.058
0:40:15	93.08	496.6568	79.75182	22.86298	758.8182	759.8182	16.99091	7.545455	16.99091	62.56364	503.6364	1.834545	7.758182	1.414901	0.062727
0:40:30	93.69	510.766	80.464	21.83195	751.6	753.3	16.85	6.43	16.85	61.04	535.1	1.756	7.713	1.410921	0.072
0:40:45	94.35	526.2779	81.23273	21.3354	752	755.8182	16.82727	5.8	16.82727	60.57273	556.0909	1.723636	7.704545	1.410171	0.075455
0:41:00	95.08	541.8567	82.07636	21.22065	758.9091	761.8182	16.93636	5.509091	16.93636	61.3	572.7273	1.727273	7.773636	1.416254	0.076364
0:41:15	95.78	556.0239	82.885	21.03141	760.7	761.9	16.94	5.31	16.94	60.73	582.9	1.705	7.779	1.416719	0.077
0:41:30	96.48	571.6396	83.69273	20.95038	765	766.6364	17.03636	5.2	17.03636	61.19091	594.9091	1.701818	7.811818	1.419609	0.077273
0:41:45	97.18	585.8429	84.5	20.99351	768.1	769.6	17.1	5.16	17.1	61.38	598.9	1.698	7.82	1.420334	0.077
0:42:00	97.88	601.4565	85.30727	20.93654	766.5455	768	17.07273	5.127273	17.07273	61.09091	598.6364	1.682727	7.81	1.419417	0.076364
0:42:15	98.59	615.7417	86.115	21.3684	776.3	776.7	17.3	5.35	17.3	62.16	599.5	1.702	7.914	1.428517	0.077
0:42:30	99.30	631.4532	86.92364	21.23421	775.7273	776.5455	17.29091	5.290909	17.29091	62.31818	604.3636	1.691818	7.911818	1.428318	0.077273
0:42:45	100.00	645.6682	87.731	20.92005	768.2	768.5	17.16	5.27	17.16	61.68	604.8	1.705	7.834	1.421507	0.077
0:43:00	100.71	661.2259	88.53818	20.98297	760.6364	763.1818	16.97273	5.463636	16.97273	60.65455	586.3636	1.732727	7.751818	1.414333	0.076364
0:43:15	101.42	675.5516	89.346	20.88366	773.6	776	17.31	5.14	17.31	62.34	618.3	1.695	7.961	1.432571	0.077

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
0:43:30	43.50	9:36:24	0.133	24	0.148	14	0.156	34	0.183	0.00319	121	100	0.078	55.01		48
0:43:45	43.75	9:36:39	0.136	27	0.146	14	0.161	34	0.196	0.00341	121	100	0.077	54.67		48
0:44:00	44.00	9:36:54	0.131	26	0.138	13	0.153	34	0.191	0.00348	122	100	0.077	54.34		48
0:44:15	44.25	9:37:09	0.132	23	0.139	12	0.155	34	0.189	0.00377	122	100	0.076	53.99		48
0:44:30	44.50	9:37:24	0.121	21	0.153	10	0.145	34	0.182	0.00334	121	100	0.074	53.58		48
0:44:45	44.75	9:37:39	0.124	16	0.168	12	0.103	20	0.188	0.00334	121	100	0.073	53.17		48
0:45:00	45.00	9:37:54	0.136	16	0.184	12	0.095	18	0.199	0.00312	121	100	0.073	52.80		48
0:45:15	45.25	9:38:09	0.134	16	0.177	11	0.111	30	0.189	0.00312	121	100	0.073	52.44		48
0:45:30	45.50	9:38:24	0.116	15	0.169	12	0.144	32	0.181	0.00326	121	100	0.072	52.12		48
0:45:45	45.75	9:38:39	0.135	16	0.176	11	0.125	30	0.193	0.00326	121	100	0.071	51.79		48
0:46:00	46.00	9:38:54	0.151	16	0.166	14	0.114	18	0.207	0.00326	121	100	0.071	51.46		48
0:46:15	46.25	9:39:09	0.15	16	0.18	14	0.106	17	0.218	0.00348	122	100	0.070	51.11		48
0:46:30	46.50	9:39:24	0.154	18	0.183	15	0.107	34	0.225	0.00334	121	100	0.069	50.79		48
0:46:45	46.75	9:39:39	0.164	16	0.189	15	0.105	32	0.226	0.00312	121	100	0.069	50.51		48
0:47:00	47.00	9:39:54	0.166	16	0.165	15	0.101	32	0.212	0.00276	120	100	0.070	50.31		48
0:47:15	47.25	9:40:09	0.141	21	0.144	13	0.106	17	0.184	0.00254	119	100	0.071	50.17		48
0:47:30	47.50	9:40:24	0.164	24	0.129	13	0.107	37	0.187	0.00254	119	100	0.072431	50.04277		48
0:47:45	47.75	9:40:39	0.175	24	0.114	10	0.105	39	0.194	0.00268	119	100	0.073033	49.93554		48
0:48:00	48.00	9:40:54	0.18	24	0.116	17	0.0975	39	0.199	0.00247	119	100	0.072084	49.83829		48
0:48:15	48.25	9:41:09	0.18	24	0.118	17	0.0944	43	0.199	0.00239	118	100	0.070883	49.7345		48
0:48:30	48.50	9:41:24	0.181	23	0.129	16	0.0938	43	0.208	0.00203	117	100	0.071459	49.62646		48
0:48:45	48.75	9:41:39	0.176	22	0.119	15	0.0831	43	0.202	0.00196	117	100	0.069812	49.51337		48
0:49:00	49.00	9:41:54	0.174	22	0.121	13	0.0813	43	0.198	0.00174	116	100	0.070169	49.412		48
0:49:15	49.25	9:42:09	0.185	22	0.114	16	0.0813	43	0.203	0.00167	115	100	0.070773	49.32112		48
0:49:30	49.50	9:42:24	0.197	23	0.114	18	0.09	47	0.213	0.00174	116	39	0.071022	49.24183		48
0:49:45	49.75	9:42:39	0.216	23	0.109	18	0.0894	43	0.229	0.00196	117	100	0.07151	49.17706		48
0:50:00	50.00	9:42:54	0.226	24	0.103	18	0.0825	43	0.238	0.00189	116	100	0.071895	49.13122		48
0:50:15	50.25	9:43:09	0.241	24	0.107	22	0.0881	43	0.251	0.0016	115	100	0.072508	49.09246		48
0:50:30	50.50	9:43:24	0.245	24	0.114	11	0.101	43	0.256	0.00174	116	100	0.073597	49.05439		48
12:50:45 AM	50.75	0.405313	0.254	26	0.133	11	0.111	39	0.265	0.00174	116	100	0.073842	49.02111		48
12:51:00 AM	51	0.405486	0.255	26	0.128	10	0.113	39	0.268	0.00174	116	20	0.073483	48.991		48
12:51:15 AM	51.25	0.40566	0.258	26	0.125	11	0.113	43	0.269	0.00167	115	21	0.072994	48.96042		48
12:51:30 AM	51.5	0.405833	0.256	26	0.128	11	0.113	43	0.268	0.00167	115	28	0.073064	48.92952		48
12:51:45 AM	51.75	0.406007	0.256	24	0.128	10	0.113	43	0.27	0.00152	114	22	0.072391	48.89899		48
12:52:00 AM	52	0.406181	0.258	26	0.13	10	0.113	39	0.271	0.0016	115	100	0.072895	48.86901		48
12:52:15 AM	52.25	0.406354	0.261	24	0.137	10	0.114	43	0.275	0.0016	115	100	0.072895	48.83995		48
12:52:30 AM	52.5	0.406528	0.261	24	0.135	10	0.119	43	0.275	0.00152	114	30	0.072344	48.81595		48
0.036631944	52.75	0.406701	0.258	24	0.137	10	0.128	39	0.276	0.00174	116	100	0.072583	48.7938		48
0.036805556	53	0.406875	0.263	26	0.14	26	0.13	39	0.283	0.00167	115	21	0.073505	48.77442		48
0.036979167	53.25	0.407049	0.269	24	0.148	24	0.136	21	0.29	0.00174	116	28	0.071339	48.75632		48
0.037152778	53.5	0.407222	0.264	26	0.146	20	0.141	37	0.285	0.00174	116	19				

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
0:43:30	102.11	691.5262	90.12818	20.42298	788.0909	790.5455	17.69091	4.490909	17.69091	63.34545	669.3636	1.613636	8.189091	1.45224	0.070909
0:43:45	102.74	705.9591	90.833	20.35039	780.4	781.2	17.52	4.56	17.52	62.37	657.4	1.616	8.085	1.443284	0.066
0:44:00	103.36	721.8368	91.53364	20.28155	780	780.0909	17.49091	4.518182	17.49091	62.76364	658.7273	1.627273	8.086364	1.443432	0.067273
0:44:15	104.03	736.1663	92.293	20.36192	774.3	775.1	17.26	4.76	17.26	61.98	639.5	1.658	7.965	1.432945	0.08
0:44:30	104.82	751.7159	93.18545	20.43643	761.0909	763.1818	16.78182	5.136364	16.78182	60.13636	602.2727	1.708182	7.743636	1.413603	0.088182
0:44:45	105.65	765.781	94.121	20.50334	753.7	759	16.55	5.44	16.55	59.69	581.9	1.742	7.663	1.406507	0.086
0:45:00	106.44	781.3072	95	20.3885	757.5455	762.5455	16.6	5.236364	16.6	59.95455	592.9091	1.719091	7.719091	1.411475	0.083636
0:45:15	107.22	795.624	95.871	19.74445	772.9	779.8	16.99	4.31	16.99	60.94	653.2	1.628	7.951	1.431673	0.081
0:45:30	107.95	811.4172	96.69273	19.35632	771.4545	779.3636	17.03636	3.981818	17.03636	60.70909	670.6364	1.620909	7.997273	1.435745	0.077273
0:45:45	108.71	825.535	97.542	19.86798	751.5	761.5	16.46	4.82	16.46	59.13	603.4	1.7	7.723	1.411784	0.084
0:46:00	109.53	841.0939	98.45455	20.405	752.5455	764.2727	16.51818	5.281818	16.51818	60.06364	583.6364	1.747273	7.752727	1.414445	0.09
0:46:15	110.43	856.7071	99.45455	19.92458	756.6364	774	16.52727	4.881818	16.52727	60.44545	609	1.728182	7.809091	1.41938	0.090909
0:46:30	111.29	870.8472	100.409	19.98394	749.2	777	16.24	5.13	16.24	58.97	586.5	1.722	7.748	1.414008	0.091
0:46:45	112.06	886.5717	101.2645	19.68556	765.8182	810.9091	16.33636	4.727273	16.33636	59.20909	620.2727	1.595455	7.925455	1.429507	0.070909
0:47:00	112.68	901.3247	101.943	19.82028	819.6	866.6	17.22	4.14	17.22	63.01	706.6	1.491	8.461	1.475298	0.057
0:47:15	113.10	916.1674	102.413	20.1286	843.5	889.6	17.48	4.21	17.48	64.76	728.4	1.504	8.568	1.484272	0.044
0:47:30	113.4976	931.2668	102.848	20.51213	908.5	908.5	18.02	3.95	18.02	67.58	800.2	1.523	8.877	1.509934	0.043
0:47:45	113.8457	946.4541	103.232	20.53795	912.6	922.6	18.2	3.89	18.2	69.13	811	1.547	8.985	1.518739	0.035
0:48:00	114.1695	961.5556	103.589	20.76622	921.6	921.6	18.09	4.09	18.09	67.73	805.3	1.539	8.88	1.51015	0.036
0:48:15	114.5244	976.4609	103.98	20.81281	913.7	913.7	17.75	4.41	17.75	65.9	780.6	1.541	8.644	1.49053	0.042
0:48:30	114.905	991.4251	104.399	21.51374	923.9	923.9	17.97	4.81	17.97	67.42	769.9	1.587	8.714	1.49642	0.043
0:48:45	115.3167	1006.226	104.852	21.06471	907.8	907.8	17.59	4.6	17.59	64.81	756.8	1.549	8.518	1.480088	0.044
0:49:00	115.6987	1021.16	105.272	21.05857	915.2	915.2	17.86	4.3	17.86	65.91	776.2	1.526	8.677	1.493392	0.042
0:49:15	116.0528	1036.212	105.661	21.05829	916.5	916.5	18.03	4.26	18.03	67.46	784.9	1.529	8.82	1.505223	0.036
0:49:30	116.3715	1051.39	106.011	21.19173	932.4	942.1	18.29	4.08	18.29	68.31	806.3	1.51	8.973	1.517792	0.034
0:49:45	116.6394	1066.742	106.305	21.40977	970.6	970.6	18.63	3.89	18.63	69.57	849.8	1.507	9.187	1.535216	0.025
0:50:00	116.8334	1080.631	106.5178	21.30489	970.4444	970.4444	18.82222	3.7	18.82222	70.55556	862.5556	1.51	9.285556	1.543175	0.021111
0:50:15	117.0004	1096.177	106.701	21.16838	974.5	974.5	18.98	3.51	18.98	71.97	879.4	1.518	9.429	1.55465	0.019
0:50:30	117.1674	1111.891	106.884	21.11258	981.1	981.1	19.32	3.23	19.32	74.36	903.2	1.538	9.639	1.571344	0.017
12:50:45 AM	117.3158	1126.093	107.0467	20.9743	978.5556	978.5556	19.45556	3.055556	19.45556	75.04444	912.5556	1.544444	9.723333	1.578036	0.016667
12:51:00 AM	117.452	1141.825	107.196	20.7375	962.3	962.3	19.32	3	19.32	74.49	900.7	1.534	9.663	1.573195	0.016
12:51:15 AM	117.5926	1155.937	107.35	20.6029	949.3333	949.3333	19.22222	2.966667	19.22222	73.67778	889.3333	1.521111	9.596667	1.568002	0.016667
12:51:30 AM	117.7369	1171.681	107.508	20.42588	936.1	943.3	19.25	2.82	19.25	74	885	1.518	9.677	1.574383	0.016
12:51:45 AM	117.8818	1185.758	107.6667	19.69899	886.3333	924.8889	19.04444	2.488889	19.04444	72.82222	857.8889	1.502222	9.55	1.56412	0.016667
12:52:00 AM	118.0264	1201.504	107.825	19.79704	880.1	919.1	19.3	2.29	19.3	74.02	858.5	1.51	9.68	1.574609	0.017
12:52:15 AM	118.169	1215.683	107.9811	19.60013	885	909.7778	19.34444	2.011111	19.34444	74.2	873.8889	1.51	9.691111	1.575462	0.015556
12:52:30 AM	118.2886	1231.429	108.112	18.98872	887	906.4	19.35	1.53	19.35	73.23	902.7	1.493	9.68	1.574597	0.013
0.036631944	118.4006	1245.644	108.2344	18.47109	887.8889	912.3333	19.42222	1.088889	19.42222	73.85556	929.2222	1.492222	9.741111	1.579386	0.012222
0.036805556	118.4998	1261.56	108.343	18.10807	893	933	19.59	0.75	19.59	75.87	957.4	1.51	9.897	1.591632	0.011
0.036979167	118.5936	1275.667	108.4456	17.3477	880	911.5556	19.08889	0.422222	19.08889	71.57778	955.6667	1.456667	9.593333	1.567478	0.011111
0.037152778															

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
1:26:25	86.42	11:53:45	0.14	39	0.17	34	0.29	27	0.327	0.00087	110	100	0.068	63.62		64
1:26:40	86.67	11:54:00	0.155	30	0.17	34	0.285	27	0.335	0.00087	110	100	0.068	62.55		64
1:26:55	86.92	11:54:15	0.155	30	0.14	22	0.25	32	0.285	0.0008	109	37	0.054	61.62		64
1:27:10	87.17	11:54:30	0.12	30	0.145	22	0.21	26	0.262	0.0008	109	37	0.054	60.70		64
1:27:25	87.42	11:54:45	0.125	47	0.15	24	0.21	27	0.264	0.0008	109	34	0.056	59.87		64
1:27:40	87.67	11:55:00	0.13	47	0.16	23	0.215	28	0.274	0.0008	109	32	0.054	58.96		64
1:27:55	87.92	11:55:15	0.135	43	0.165	24	0.21	28	0.275	0.00094	110	51	0.055	57.96		64
1:28:10	88.17	11:55:30	0.15	43	0.17	24	0.225	28	0.281	0.00109	111	23	0.054	57.00		64
1:28:25	88.42	11:55:45	0.15	43	0.17	23	0.225	28	0.281	0.00102	111	100	0.053	56.04		64
1:28:40	88.67	11:56:00	0.155	47	0.17	23	0.215	28	0.278	0.00116	112	100	0.052	55.00		64
1:28:55	88.92	11:56:15	0.15	43	0.17	24	0.21	30	0.274	0.00123	113	100	0.053	53.96		64
1:29:10	89.17	11:56:30	0.15	43	0.165	24	0.205	28	0.266	0.00131	113	100	0.053	52.91		64
1:29:25	89.42	11:56:45	0.14	43	0.165	23	0.2	28	0.26	0.00123	113	100	0.051	51.87		64
1:29:40	89.67	11:57:00	0.135	43	0.16	24	0.2	30	0.26	0.00131	113	100	0.052	50.82		64
1:29:55	89.92	11:57:15	0.13	43	0.155	23	0.2	28	0.256	0.00152	114	100	0.050	49.74		64
1:30:10	90.17	11:57:30	0.13	39	0.155	22	0.225	28	0.265	0.00145	114	100	0.049	48.82		64
1:30:25	90.42	11:57:45	0.125	43	0.15	17	0.235	30	0.273	0.00123	113	100	0.043	48.17		64
1:30:40	90.67	11:58:00	0.115	43	0.15	17	0.22	30	0.253	0.00116	112	100	0.043	47.64		64
1:30:55	90.92	11:58:15	0.11	30	0.155	17	0.22	32	0.244	0.00116	112	100	0.042	47.08		64
1:31:10	91.17	11:58:30	0.12	30	0.15	16	0.22	32	0.247	0.00102	111	100	0.041	46.50		64
1:31:25	91.42	11:58:45	0.13	30	0.155	16	0.215	32	0.245	0.00116	112	100	0.041	45.89		64
1:31:40	91.67	11:59:00	0.135	30	0.15	30	0.22	34	0.248	0.00123	113	100	0.055	45.22		64
1:31:55	91.92	11:59:15	0.135	32	0.155	32	0.215	34	0.242	0.00116	112	100	0.057	44.52		64
1:32:10	92.17	11:59:30	0.135	32	0.155	30	0.21	34	0.238	0.00138	114	100	0.055	43.95		64
1:32:25	92.42	11:59:45	0.14	32	0.15	30	0.2	34	0.227	0.00123	113	100	0.055	43.35		64
1:32:40	92.67	12:00:00	0.135	30	0.145	30	0.195	34	0.219	0.00123	113	100	0.054	42.68		64
1:32:55	92.92	12:00:15	0.125	32	0.135	30	0.185	34	0.206	0.00116	112	100	0.054	42.00		64
1:33:10	93.17	12:00:30	0.12	32	0.12	32	0.17	32	0.193	0.00116	112	100	0.056	41.32		64
1:33:25	93.42	12:00:45	0.125	30	0.12	15	0.17	34	0.188	0.00109	111	100	0.038	40.68		64
1:33:40	93.67	12:01:00	0.12	30	0.13	16	0.17	32	0.182	0.00109	111	100	0.039	40.10		64
1:33:55	93.92	12:01:15	0.11	28	0.125	16	0.165	32	0.176	0.00109	111	100	0.039	39.55		64
1:34:10	94.17	12:01:30	0.105	28	0.125	16	0.155	32	0.163	0.00123	113	100	0.039	39.02		64
1:34:25	94.42	12:01:45	0.105	28	0.12	17	0.16	32	0.167	0.00116	112	100	0.040	38.50		64
1:34:40	94.67	12:02:00	0.1	34	0.12	17	0.16	34	0.168	0.00138	114	100	0.039	37.98		64
1:34:55	94.92	12:02:15	0.1	28	0.115	17	0.16	34	0.171	0.00116	112	100	0.039	37.44		64
1:35:10	95.17	12:02:30	0.1	32	0.1	17	0.16	34	0.173	0.00138	114	100	0.039	36.81		64
1:35:25	95.42	12:02:45	0.085	34	0.095	16	0.14	34	0.162	0.00145	114	100	0.038	36.18		64
1:35:40	95.67	12:03:00	0.085	34	0.095	16	0.14	32	0.162	0.00123	113	100	0.038	35.60		64
1:35:55	95.92	12:03:15	0.08	34	0.09	21	0.135	34	0.16	0.00109	111	100	0.043	34.97		64
1:36:10	96.17	12:03:30	0.075	34	0.09	22	0.13	34	0.153	0.00116	112	100	0.044	34.33		64
1:36:25	96.42	12:03:45	0.075	34	0.095	16	0.13	32	0.15	0.00145	114	100	0.037	33.72		64
1:36:40	96.67	12:04:00	0.065	37	0.095	23	0.13	32	0.15	0.00145	114	100	0.044	33.06		64
1:36:55	96.92	12:04:15	0.06	37	0.09	16	0.135	32	0.155	0.00145	114	100	0.037	32.38		64
1:37:10	97.17	12:04:30	0.065	47	0.095	16	0.14	32	0.157	0.00138	114	100	0.037	31.73		64
1:37:25	97.42	12:04:45	0.065	37	0.1	26	0.145	32	0.161	0.00152	114	100	0.046	31.03		64

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
1:26:25	85.63	15.70572	56.88417	17.77709	599.6667	599.6667	14.36667	5.183333	14.36667	50.60833	470.5833	1.739167	5.9925	1.30881	0.1075
1:26:40	86.34	31.00163	57.95	18.05835	580.9167	580.9167	13.95	5.666667	13.95	47.31667	425.4167	1.7675	6.24	1.274659	0.08
1:26:55	86.97	46.21836	58.885	17.98212	573.6667	574.1667	13.74167	5.691667	13.74167	46.28333	413.1667	1.765833	6.1725	1.268061	0.0775
1:27:10	87.59	61.35481	59.8025	18.21867	567.25	567.5	13.60833	6.008333	13.60833	46.35	392.75	1.845	6.105	1.261371	0.074167
1:27:25	88.16	76.48071	60.63333	18.22481	569.25	569.9167	13.61667	5.916667	13.61667	46.30833	394.8333	1.833333	6.095833	1.260492	0.066667
1:27:40	88.79	91.65241	61.54167	18.44197	573.1667	573.1667	13.70833	5.983333	13.70833	46.98333	394	1.863333	6.134167	1.264309	0.083333
1:27:55	89.48	106.7295	62.54167	18.29434	565.5	565.5	13.51667	6.058333	13.51667	46.10833	384.6667	1.88	6.054167	1.256427	0.083333
1:28:10	90.16	120.5908	63.5	18.37128	564.1818	564.1818	13.53636	6.136364	13.53636	46.32727	381.1818	1.869091	6.091818	1.260115	0.083636
1:28:25	90.83	135.6224	64.45833	18.17234	553.8333	554.1667	13.3	6.225	13.3	45.71667	369.4167	1.931667	6.015833	1.252629	0.083333
1:28:40	91.58	150.6464	65.5	17.77386	550.8333	550.8333	13.18333	5.858333	13.18333	44.98333	377.0833	1.870833	6.01	1.252003	0.09
1:28:55	92.32	165.6249	66.54167	17.79997	548.5	548.5	13.15	5.966667	13.15	44.875	372.5	1.911667	5.971667	1.24821	0.083333
1:29:10	93.08	180.6283	67.59	17.92184	548.8333	548.8333	13.175	6.041667	13.175	45.16667	369.1667	1.938333	5.9925	1.250281	0.09
1:29:25	93.84	195.6854	68.62583	18.05721	555.75	555.75	13.35	5.95	13.35	45.64167	377.5833	1.9025	6.0375	1.254761	0.084167
1:29:40	94.61	210.7329	69.68167	17.98534	559.8333	559.8333	13.375	5.8	13.375	45.7	385.3333	1.924167	6.029167	1.253953	0.090833
1:29:55	95.41	226.0085	70.7625	18.48487	580.9167	580.9167	13.88333	5.741667	13.88333	47.425	406.75	1.846667	6.223333	1.272972	0.085833
1:30:10	96.09	241.8005	71.6775	19.00741	618.4167	618.4167	14.91667	5.15	14.91667	50.59167	463.5833	1.6325	6.671667	1.315997	0.07
1:30:25	96.58	256.764	72.33364	19.29587	652.3636	652.3636	15.86364	4.563636	15.86364	54.6	522.4545	1.603636	7.149091	1.360323	0.047273
1:30:40	96.98	271.7984	72.85818	19.45179	656.4545	656.4545	16.03636	4.7	16.03636	55.95455	527.1818	1.672727	7.219091	1.36676	0.049091
1:30:55	97.40	286.6591	73.42091	19.31307	642.4545	642.4545	15.64545	4.945455	15.64545	54.84545	503.6364	1.700909	7.046364	1.350975	0.051818
1:31:10	97.84	301.2815	74.00455	18.73329	621.1818	621.1818	15.15455	4.790909	15.15455	52.84545	485.7273	1.704545	6.812727	1.329311	0.054545
1:31:25	98.30	315.8337	74.61091	18.40721	614.5455	614.5455	14.89091	4.8	14.89091	52.49091	481.4545	1.716364	6.744545	1.322921	0.055455
1:31:40	98.81	331.6416	75.2825	18.29929	607.4167	607.4167	14.70833	4.941667	14.70833	51.625	471.5	1.73	6.685	1.317328	0.061667
1:31:55	99.35	346.1818	75.98364	18.36932	609	609	14.75455	4.954545	14.75455	52.15455	472.1818	1.752727	6.732727	1.321831	0.056364
1:32:10	99.78	360.6585	76.55	18.02074	603.0909	603.0909	14.59091	4.809091	14.59091	51.44545	473.2727	1.745455	6.671818	1.316071	0.05
1:32:25	100.24	376.4447	77.15167	18.08135	603.8333	603.8333	14.59167	4.875	14.59167	51.58333	471.75	1.746667	6.665833	1.315512	0.055833
1:32:40	100.76	390.8593	77.82364	17.94786	600.1818	600.1818	14.43636	4.909091	14.43636	51.05455	467.2727	1.786364	6.611818	1.31042	0.059091
1:32:55	101.28	406.5509	78.5	17.80729	597	597	14.3	4.85	14.3	51.06667	464.25	1.82	6.5825	1.307634	0.058333
1:33:10	101.81	420.9943	79.17636	17.85814	600.5455	600.5455	14.40909	4.781818	14.40909	51.59091	470	1.790909	6.64	1.313035	0.059091
1:33:25	102.31	435.5904	79.82091	18.20326	613	613	14.71818	4.727273	14.71818	52.17273	481.0909	1.729091	6.787273	1.326919	0.057273
1:33:40	102.77	451.6853	80.405	18.77228	622.5	622.5833	15.025	5.041667	15.025	54.26667	480.6667	1.765	6.940833	1.341244	0.0475
1:33:55	103.19	466.4724	80.95182	18.87433	625.7273	625.8182	15.08182	5.136364	15.08182	55.04545	482.1818	1.777273	6.973636	1.344276	0.047273
1:34:10	103.61	481.3496	81.47636	19.04311	631.4545	631.5455	15.28182	5.054545	15.28182	55.10909	489.0909	1.742727	7.062727	1.352475	0.047273
1:34:25	104.02	496.259	82	18.68608	632.6364	633.0909	15.30909	4.654545	15.30909	54.78182	504.8182	1.692727	7.094545	1.355403	0.048182
1:34:40	104.43	511.1317	82.52364	18.05716	631	631.2727	15.21818	4.281818	15.21818	54.32727	523.5455	1.683636	7.058182	1.352062	0.047273
1:34:55	104.86	525.8723	83.06273	17.79526	621	621.1818	14.88182	4.209091	14.88182	53.03636	510.7273	1.7	6.928182	1.340058	0.051818
1:35:10	105.36	541.7525	83.69417	17.92865	609.1667	609.1667	14.56667	4.475	14.56667	51.6	481.9167	1.751667	6.749167	1.323349	0.055833
1:35:25	105.85	556.3442	84.31636	18.21545	614.3636	614.4545	14.67273	4.590909	14.67273	52.5	480.2727	1.789091	6.782727	1.326517	0.052727
1:35:40	106.32	570.8797	84.89636	18.07273	609.7273	609.7273	14.56364	4.472727	14.56364	51.45455	476.9091	1.764545	6.728182	1.321405	0.053636
1:35:55	106.82	586.7131	85.5275	18.05194	609.1667	609.1667	14.56667	4.4	14.56667	51.25833	477.25	1.755833	6.7075	1.319454	0.055
1:36:10	107.33	601.3017	86.16636	18.08353	612.5455	612.5455	14.62727	4.390909	14.62727	52.22727	481.7273	1.763636	6.78	1.32624	0.055455
1:36:25	107.83	615.8641	86.77818	18.04528	612.2727	612.2727	14.58182	4.290909	14.58182	51.49091	481.1818	1.756364	6.754545	1.323856	0.056364
1:36:40	108.36	631.7717	87.44167	18.19361	616.5	616.5	14.70833	4.3	14.70833	52.375	484.5833	1.779167	6.773333	1.325627	0.058333
1:36:55	108.91	646.3904	88.11727	18.10631	620.3636	620.3636	14.81818	4.127273	14.81818	52.47273	495.9091	1.757273	6.809091	1.328973	0.059091
1:37:10	109.43	660.999	88.76545	17.93578	620.2727	620.2727	14.81818	4	14.81818	52.11818	502.2727	1.739091	6.799091	1.328058	0.06
1:37:25	110.00	675.7847	89.46636	17.84753	633.5455	633.5455	15.14545	3.618182	15.14545	52.99091	531.2727	1.651818	6.972727	1.344154	0.066364

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
1:37:40	97.67	12:05:00	0.065	37	0.105	26	0.15	34	0.164	0.00145	114	100	0.046	30.30		64
1:37:55	97.92	12:05:15	0.07	43	0.105	24	0.16	34	0.171	0.00145	114	100	0.044	29.57		64
1:38:10	98.17	12:05:30	0.07	39	0.11	27	0.165	34	0.176	0.00138	114	100	0.046	28.87		64
1:38:25	98.42	12:05:45	0.065	39	0.11	27	0.165	34	0.174	0.0016	115	100	0.046	28.19		64
1:38:40	98.67	12:06:00	0.065	39	0.11	24	0.17	34	0.175	0.00138	114	100	0.043	27.50		64
1:38:55	98.92	12:06:15	0.065	39	0.115	28	0.175	34	0.182	0.00145	114	100	0.047	26.81		64
1:39:10	99.17	12:06:30	0.07	39	0.115	28	0.18	32	0.185	0.00152	114	100	0.046	26.12		64
1:39:25	99.42	12:06:45	0.065	39	0.115	28	0.175	34	0.181	0.0016	115	100	0.046	25.44		64
1:39:40	99.67	12:07:00	0.075	43	0.12	28	0.19	34	0.195	0.00152	114	100	0.046	24.73		64
1:39:55	99.92	12:07:15	0.075	47	0.125	30	0.195	34	0.2	0.00167	115	100	0.047	23.98		64
1:40:10	100.17	12:07:30	0.085	43	0.12	30	0.195	32	0.202	0.0016	115	100	0.047	23.25		64
1:40:25	100.42	12:07:45	0.085	43	0.115	32	0.19	37	0.199	0.00152	114	100	0.048	22.50		64
1:40:40	100.67	12:08:00	0.08	47	0.115	32	0.19	37	0.197	0.00167	115	100	0.048	21.87		64
1:40:55	100.92	12:08:15	0.07	43	0.115	28	0.18	34	0.185	0.00145	114	100	0.045	21.21		64
1:41:10	101.17	12:08:30	0.08	47	0.12	30	0.19	34	0.196	0.00131	113	100	0.046	20.56		64
1:41:25	101.42	12:08:45	0.08	43	0.115	32	0.19	34	0.197	0.00131	113	100	0.047	19.93		64
1:41:40	101.67	12:09:00	0.125	34	0.115	30	0.175	34	0.181	0.00123	113	100	0.045773	19.393		64
1:41:55	101.92	12:09:15	0.165	37	0.095	23	0.115	34	0.178	0.00123	113	100	0.039984	19.058		64
1:42:10	102.17	12:09:30	0.18	37	0.085	20	0.12	32	0.196	0.00109	111	100	0.037203	18.74545		64
1:42:25	102.42	12:09:45	0.19	39	0.085	34	0.125	30	0.202	0.00094	110	100	0.048402	18.437		64
1:42:40	102.67	12:10:00	0.185	37	0.08	20	0.13	30	0.198	0.00102	111	100	0.037057	18.185		64
1:42:55	102.92	12:10:15	0.18	39	0.08	20	0.125	30	0.197	0.00102	111	100	0.03699	17.929		64
1:43:10	103.17	12:10:30	0.17	39	0.085	20	0.12	30	0.186	0.00116	112	100	0.036915	17.63909		64
1:43:25	103.42	12:10:45	0.16	39	0.09	24	0.12	34	0.171	0.00094	110	100	0.040344	17.303		64
1:43:40	103.67	12:11:00	0.145	37	0.09	27	0.13	34	0.156	0.00094	110	100	0.042681	16.934		64
1:43:55	103.92	12:11:15	0.13	37	0.095	30	0.135	34	0.14	0.00094	110	100	0.044859	16.52		64
1:44:10	104.17	12:11:30	0.11	37	0.095	30	0.145	34	0.147	0.00102	111	100				64

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
1:37:40	110.60	691.8294	90.2025	17.98864	627.6667	627.6667	14.98333	3.9	14.98333	52.725	513.9167	1.714167	6.895833	1.337054	0.058333
1:37:55	111.20	706.5505	90.93273	18.09407	631.6364	631.6364	15.11818	3.845455	15.11818	53.11818	519	1.733636	6.909091	1.338284	0.068182
1:38:10	111.76	721.3992	91.62636	17.92054	646.7273	646.7273	15.50909	3.4	15.50909	53.69091	555.4545	1.631818	7.034545	1.349885	0.062727
1:38:25	112.33	736.3712	92.31364	17.97829	659.5455	659.5455	15.84545	3.245455	15.84545	54.68182	578.8182	1.58	7.157273	1.361091	0.062727
1:38:40	112.89	751.3154	93.00091	18.30548	655.1818	655.1818	15.70909	3.554545	15.70909	54.93636	556.9091	1.654545	7.129091	1.358561	0.061818
1:38:55	113.46	766.1798	93.68909	18.21047	650.0909	650.0909	15.56364	3.572727	15.56364	54.34545	549.9091	1.671818	7.05	1.351314	0.062727
1:39:10	114.03	781.1898	94.37636	17.95634	661.6364	661.7273	15.80909	3.172727	15.80909	55.3	580.3636	1.613636	7.194545	1.364543	0.062727
1:39:25	114.60	796.2403	95.06364	17.816	663.7273	663.7273	15.82727	3.036364	15.82727	54.77273	588.4545	1.568182	7.235455	1.36823	0.062727
1:39:40	115.19	811.1296	95.77364	18.21065	652.5455	652.5455	15.51818	3.545455	15.51818	54.2	550.6364	1.668182	7.074545	1.35357	0.068182
1:39:55	115.81	825.9154	96.52364	18.04719	644.4545	644.4545	15.30909	3.536364	15.30909	52.90909	540.8182	1.663636	6.972727	1.344163	0.068182
1:40:10	116.42	840.7623	97.25273	18.09898	649.4545	649.4545	15.45455	3.436364	15.45455	53.25455	549.3636	1.648182	7.032727	1.349719	0.063636
1:40:25	117.05	855.6615	97.99818	17.91385	651.7273	651.7273	15.5	3.272727	15.5	53.27273	560.3636	1.607273	7.084545	1.354469	0.065455
1:40:40	117.58	870.8133	98.63273	17.23527	663.2727	663.7273	15.81818	2.518182	15.81818	54.24545	609.6364	1.491818	7.337273	1.377435	0.058182
1:40:55	118.13	886.0702	99.29	16.33783	664.5455	664.9091	15.84545	1.863636	15.84545	54.4	645.9091	1.446364	7.443636	1.38699	0.056364
1:41:10	118.68	901.2084	99.93909	17.05877	655.3636	656.4545	15.62727	2.527273	15.62727	54.00909	601.1818	1.489091	7.323636	1.376202	0.062727
1:41:25	119.21	916.5964	100.5745	16.49886	674.7273	676.0909	16.18182	1.754545	16.18182	55.75455	662.7273	1.436364	7.578182	1.39891	0.057273
1:41:40	119.6605	931.0527	101.107	16.99921	712.5	713.5	17.2	1.51	17.2	62.07	720.1	1.515	8.112	1.445634	0.037
1:41:55	119.9437	945.7001	101.442	16.73947	720.6	725.1	17.54	1.17	17.54	63.62	750.9	1.532	8.336	1.464733	0.033
1:42:10	120.2081	961.8839	101.7545	16.31894	721.8182	725.9091	17.7	0.918182	17.7	64.95455	774.0909	1.546364	8.412727	1.471261	0.03
1:42:25	120.4693	976.5755	102.063	16.10063	720.5	722.2	17.67	0.83	17.67	64.24	779.9	1.538	8.388	1.469158	0.027
1:42:40	120.6829	991.3194	102.315	16.36671	725.7	726.6	17.73	0.95	17.73	64.95	777.3	1.549	8.45	1.474391	0.025
1:42:55	120.9	1005.963	102.571	16.08444	714.3	715.3	17.49	0.96	17.49	63.33	767.5	1.525	8.331	1.46433	0.026
1:43:10	121.1461	1021.958	102.8609	15.78668	702.1818	702.4545	17.21818	0.981818	17.21818	62.00909	756.3636	1.510909	8.210909	1.454101	0.028182
1:43:25	121.4315	1036.406	103.197	15.65782	699.1	699.1	17.14	0.91	17.14	61.02	755.2	1.486	8.102	1.444774	0.036
1:43:40	121.7453	1050.781	103.566	15.46933	694.2	694.2	16.97	0.88	16.97	59.79	751	1.465	8.018	1.43751	0.039
1:43:55	122.0977	1065.091	103.98	15.36615	686.6	689.3	16.74	1	16.74	59.16	738.6	1.448	7.943	1.431028	0.042
1:44:10															

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
1:37:00	97.00	17:04:38	0.195	34	0.355	18	0.155	24	0.369	0.00109	111	85	0.122	65.52		25
1:37:15	97.25	17:04:53	0.215	30	0.355	19	0.285	26	0.388	0.00109	111	51	0.113	64.92		25
1:37:30	97.50	17:05:08	0.165	30	0.255	24	0.31	23	0.364	0.00094	110	73	0.111	64.45		25
1:37:45	97.75	17:05:23	0.16	34	0.255	9	0.28	13	0.319	0.00116	112	85	0.114	63.95		25
1:38:00	98.00	17:05:38	0.155	22	0.24	14	0.235	34	0.27	0.00123	113	85	0.111	63.36		25
1:38:15	98.25	17:05:53	0.155	23	0.275	12	0.235	32	0.316	0.00109	111	85	0.108	62.70		25
1:38:30	98.50	17:06:08	0.155	37	0.31	12	0.225	12	0.347	0.00109	111	85	0.106	62.00		25
1:38:45	98.75	17:06:23	0.16	37	0.315	8.7	0.235	12	0.353	0.00123	113	100	0.104	61.30		25
1:39:00	99.00	17:06:38	0.155	39	0.31	8.5	0.245	12	0.348	0.00145	114	100	0.103	60.59		25
1:39:15	99.25	17:06:53	0.15	37	0.315	8.5	0.25	11	0.352	0.00152	114	100	0.103	59.82		25
1:39:30	99.50	17:07:08	0.155	37	0.285	8.5	0.25	11	0.326	0.00145	114	100	0.099	58.94		25
1:39:45	99.75	17:07:23	0.15	34	0.295	8.4	0.25	12	0.334	0.00131	113	100	0.098	58.15		25
1:40:00	100.00	17:07:38	0.145	26	0.29	8.4	0.26	26	0.331	0.00116	112	32	0.098	57.36		25
1:40:15	100.25	17:07:53	0.155	37	0.27	8.3	0.27	24	0.315	0.00102	111	100	0.094	56.43		25
1:40:30	100.50	17:08:08	0.15	37	0.28	8.5	0.24	12	0.322	0.00116	112	100	0.093	55.50		25
1:40:45	100.75	17:08:23	0.16	37	0.27	8.4	0.25	12	0.311	0.00145	114	100	0.092	54.56		25
1:41:00	101.00	17:08:38	0.16	34	0.27	8.5	0.25	12	0.316	0.0016	115	100	0.092	53.60		25
1:41:15	101.25	17:08:53	0.16	34	0.275	12	0.245	12	0.324	0.00145	114	100	0.092	52.68		25
1:41:30	101.50	17:09:08	0.155	34	0.285	8.5	0.24	12	0.328	0.00102	111	100	0.093	51.81		25
1:41:45	101.75	17:09:23	0.145	37	0.27	12	0.23	12	0.314	0.00116	112	100	0.094	51.07		25
1:42:00	102.00	17:09:38	0.125	24	0.24	12	0.225	20	0.282	0.00094	110	100	0.092	50.42		25
1:42:15	102.25	17:09:53	0.125	24	0.24	17	0.22	21	0.259	0.00094	110	100	0.091	49.79		25
1:42:30	102.50	17:10:08	0.125	37	0.235	17	0.22	23	0.252	0.00094	110	100	0.091	49.20		25
1:42:45	102.75	17:10:23	0.115	37	0.23	17	0.215	22	0.264	0.0008	109	100	0.089	48.62		25
1:43:00	103.00	17:10:38	0.11	39	0.23	17	0.21	20	0.263	0.00087	110	100	0.089	48.05		25
1:43:15	103.25	17:10:53	0.11	23	0.24	17	0.205	20	0.257	0.00087	110	100	0.090	47.50		25
1:43:30	103.50	17:11:08	0.105	21	0.245	17	0.195	20	0.26	0.00094	110	100	0.090	47.02		25
1:43:45	103.75	17:11:23	0.1	30	0.245	18	0.18	20	0.252	0.00102	111	100	0.089	46.62		25
1:44:00	104.00	17:11:38	0.095	30	0.235	18	0.155	20	0.245	0.00109	111	100	0.090	46.22		25
1:44:15	104.25	17:11:53	0.105	17	0.235	18	0.14	18	0.251	0.00116	112	100	0.091	45.85		25
1:44:30	104.50	17:12:08	0.11	17	0.235	19	0.15	20	0.251	0.00102	111	100	0.091	45.50		25
1:44:45	104.75	17:12:23	0.115	20	0.225	18	0.16	20	0.235	0.00094	110	100	0.092	45.23		25
1:45:00	105.00	17:12:38	0.12	20	0.22	18	0.175	20	0.235	0.00102	111	100	0.091	44.97		25
1:45:15	105.25	17:12:53	0.125	20	0.215	18	0.185	21	0.232	0.00116	112	100	0.090	44.71		25
1:45:30	105.50	17:13:08	0.12	21	0.215	18	0.19	21	0.227	0.00116	112	100	0.091	44.48		25
1:45:45	105.75	17:13:23	0.125	21	0.23	17	0.2	22	0.239	0.00138	114	100	0.088	44.26		25
1:46:00	106.00	17:13:38	0.12	39	0.215	17	0.2	21	0.233	0.00116	112	100	0.089	44.02		25
1:46:15	106.25	17:13:53	0.12	34	0.22	17	0.2	22	0.238	0.00123	113	100	0.088	43.71		25
1:46:30	106.50	17:14:08	0.115	21	0.225	17	0.185	21	0.24	0.00109	111	100	0.087	43.40		25
1:46:45	106.75	17:14:23	0.11	22	0.24	18	0.17	20	0.264	0.00109	111	100	0.084	43.01		25
1:47:00	107.00	17:14:38	0.11	20	0.245	18	0.14	18	0.27	0.00131	113	100	0.084	42.63		25
1:47:15	107.25	17:14:53	0.1	19	0.245	18	0.14	17	0.274	0.00123	113	100	0.083	42.21		25
1:47:30	107.50	17:15:08	0.11	20	0.245	18	0.14	15	0.281	0.00109	111	100	0.081	41.80		25
1:47:45	107.75	17:15:23	0.11	20	0.245	17	0.135	15	0.283	0.00102	111	100	0.081	41.33		25
1:48:00	108.00	17:15:38	0.11	20	0.245	17	0.13	14	0.282	0.00116	112	100	0.081	40.86		25

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
1:37:00	61.73	16.62658	56.44167	14.40382	649	666.25	14.99167	3.008333	15.775	56.80833	671.25	1.535	6.7225	1.385548	0.058333
1:37:15	62.32	31.17193	57.08364	15.0142	625	633.8182	14.32727	3.490909	15.02727	49.40909	599	1.467273	6.739091	1.322305	0.050909
1:37:30	62.78	45.6223	57.59091	15.41448	618.5455	622.9091	14.17273	3.709091	14.81818	48.47273	571.5455	1.471818	6.646364	1.31367	0.045455
1:37:45	63.29	61.5671	58.14333	16.10361	632.4167	633.8333	14.525	4.025	15.15833	52.025	572.6667	1.548333	6.806667	1.328734	0.051667
1:38:00	63.87	76.0422	58.77909	15.82313	619.1818	621.6364	14.20909	3.927273	14.8	50.18182	558.0909	1.540909	6.671818	1.315918	0.057273
1:38:15	64.54	91.66026	59.5	15.80998	604.9167	606.8333	13.84167	4.025	14.35833	48.30833	530.4167	1.54	6.518333	1.301504	0.066667
1:38:30	65.25	105.9345	60.26636	15.73986	590.4545	599.0909	13.64545	4.172727	14.20909	47.97273	511.1818	1.556364	6.478182	1.297654	0.066364
1:38:45	65.96	121.4223	61.03333	15.40605	579.25	588.8333	13.43333	4.075	14.06667	47.34167	504.5833	1.556667	6.405	1.290653	0.066667
1:39:00	66.67	135.5842	61.80273	15.6778	581.1818	589.0909	13.42727	4.145455	14.02727	47.27273	496	1.570909	6.371818	1.28745	0.068182
1:39:15	67.46	151.0634	62.65417	16.38199	592.5	593.6667	13.61667	4.433333	14.125	48.03333	487.8333	1.6075	6.3975	1.289928	0.0775
1:39:30	68.36	166.3531	63.62417	15.79939	577.25	581.8333	13.29167	4.216667	13.675	45.7	482.3333	1.589167	6.235	1.274147	0.0825
1:39:45	69.18	180.5857	64.5	15.00149	574.9091	599.2727	13.53636	3.690909	14.02727	46.16364	519.4545	1.494545	6.439091	1.293869	0.071818
1:40:00	69.99	196.1407	65.37583	14.81143	568	594.3333	13.475	3.708333	14.075	47	517.4167	1.5375	6.463333	1.296248	0.080833
1:40:15	70.96	211.4922	66.41	14.3284	547	576.0833	13.025	3.708333	13.625	44.61667	497.6667	1.559167	6.2875	1.279296	0.09
1:40:30	71.94	225.5689	67.45455	13.79057	537.4545	570.3636	12.90909	3.609091	13.58182	45.1	504.0909	1.594545	6.291818	1.279697	0.090909
1:40:45	72.92	240.9407	68.5	14.66479	552.6667	572.0833	13.03333	3.783333	13.63333	45.25833	490.9167	1.603333	6.305	1.280983	0.090833
1:41:00	73.95	256.3494	69.59083	15.74731	582.75	585.25	13.43333	3.941667	13.84167	46.40833	495.1667	1.628333	6.336667	1.28406	0.090833
1:41:15	74.93	270.5365	70.63545	15.97834	590.3636	592.2727	13.59091	4.009091	14.05455	47.69091	500	1.66	6.395455	1.28974	0.09
1:41:30	75.86	286.1698	71.62417	16.14982	599.5833	604.1667	13.86667	4.025	14.425	49.36667	513.1667	1.6275	6.5325	1.302772	0.0825
1:41:45	76.66	300.7662	72.46636	16.44516	626	627.8182	14.46364	3.8	15.04545	52.09091	551	1.579091	6.787273	1.326945	0.066364
1:42:00	77.37	316.7692	73.21833	16.16542	628.6667	629.6667	14.48333	3.45	15.04167	50.99167	565	1.509167	6.858333	1.333582	0.063333
1:42:15	78.05	331.443	73.93909	16.09826	629.4545	630.4545	14.48182	3.354545	15.00909	50.41818	568.2727	1.489091	6.862727	1.333985	0.062727
1:42:30	78.70	346.1281	74.62636	16.20838	633.0909	633.6364	14.57273	3.418182	15.1	51.01818	571.1818	1.519091	6.873636	1.335009	0.062727
1:42:45	79.34	360.7634	75.29455	16.02964	629.0909	629.5455	14.46364	3.354545	14.96364	50.27273	569.8182	1.505455	6.825455	1.33048	0.059091
1:43:00	79.97	376.7701	75.96667	15.91867	631.3333	632.75	14.525	3.341667	15.075	51.01667	578.5833	1.51	6.8625	1.33389	0.0575
1:43:15	80.59	391.5959	76.61091	16.01311	639.1818	645.6364	14.75455	3.336364	15.32727	52.57273	591.5455	1.512727	7.011818	1.347798	0.055455
1:43:30	81.12	406.529	77.17182	16.33098	647.3636	648.4545	14.90909	3.427273	15.50909	53.42727	593.5455	1.517273	7.118182	1.357555	0.045455
1:43:45	81.58	421.4804	77.65273	16.0565	637.4545	646.2727	14.83636	3.463636	15.41818	52.92727	591.2727	1.514545	7.136364	1.359222	0.043636
1:44:00	82.02	436.469	78.11909	15.56069	627	650.9091	14.85455	3.445455	15.51818	54.00909	600.2727	1.538182	7.173636	1.362598	0.040909
1:44:15	82.44	451.6108	78.56	16.13277	645.7273	667.2727	15.22727	3.645455	15.85455	56.25455	611.4545	1.58	7.327273	1.376527	0.04
1:44:30	82.85	466.8591	78.98636	16.50844	662.2727	668	15.46364	3.709091	16.11818	57.46364	622.7273	1.602727	7.434545	1.386207	0.035455
1:44:45	83.16	480.786	79.308	15.38114	632.8	674.1	15.36	3.47	16.16	57.96	632	1.596	7.507	1.392689	0.029
1:45:00	83.45	496.1102	79.61909	15.22366	638.9091	668.4545	15.29091	3.254545	16.16364	57.24545	641.4545	1.571818	7.511818	1.393115	0.029091
1:45:15	83.76	511.4345	79.93727	14.13224	615.1818	667.3636	15.05455	3.009091	16.07273	56.84545	650.0909	1.553636	7.511818	1.393119	0.029091
1:45:30	84.02	525.5068	80.213	13.77634	625.9	674.3	15.1	2.77	16.32	58.21	676	1.555	7.672	1.40723	0.025
1:45:45	84.27	540.8362	80.47545	13.41773	616.2727	663.5455	14.86364	2.554545	16	55.59091	671	1.506364	7.517273	1.39358	0.024545
1:46:00	84.55	556.1916	80.76545	13.51584	618.4545	668.5455	14.95455	2.5	16.06364	56.19091	672.9091	1.514545	7.543636	1.395942	0.03
1:46:15	84.90	571.4494	81.14091	13.9804	616.8182	665.1818	15.06364	2.581818	15.95455	55.35455	657.8182	1.504545	7.445455	1.387077	0.034545
1:46:30	85.27	586.6112	81.52636	13.84352	609.1818	663.2727	14.93636	2.563636	15.71818	54.76364	650.5455	1.501818	7.347273	1.378348	0.04
1:46:45	85.73	601.6092	82.00091	13.60907	599.3636	645.3636	14.58182	2.481818	15.32727	52.1	636.1818	1.457273	7.183636	1.363452	0.041818
1:47:00	86.17	616.565	82.46636	13.70429	598.5455	647.8182	14.55455	2.536364	15.24545	51.97273	630.7273	1.46	7.142727	1.359616	0.044545
1:47:15	86.67	631.4726	82.98909	13.62247	595.8182	640	14.47273	2.518182	15.17273	51.54545	628	1.459091	7.092727	1.355233	0.046364
1:47:30	87.16	646.3118	83.5	13.46124	590.3636	632	14.30909	2.372727	14.96364	50.13636	622.4545	1.430909	7.025455	1.349022	0.049091
1:47:45	87.73	661.1338	84.09364	13.4115	589.5455	630.7273	14.25455	2.345455	14.97273	49.98182	621.4545	1.43	7.009091	1.347457	0.054545
1:48:00	88.29	675.9566	84.68	13.87196	599.2727	631.2727	14.30909	2.427273	15.1	50.88182	615.8182	1.45	7.009091	1.347528	0.054545

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Time	Minutes	Time	Tran PPV in/s	Tran Freq Hz	Vert PPV in/s	Vert Freq Hz	Long PPV in/s	Long Freq Hz	Geo PVS in/s	MicL PSPL psi(L)	MicL PSPL dB(L)	MicL Freq Hz	D/Sqrt EM	Hammer-M Dist (ft)	Horiz Dist (ft)	
1:48:15	108.25	17:15:53	0.115	19	0.25	18	0.125	24	0.285	0.00116	112	100	0.080	40.38		25
1:48:30	108.50	17:16:08	0.11	19	0.245	17	0.125	23	0.278	0.00116	112	100	0.080	39.87		25
1:48:45	108.75	17:16:23	0.11	20	0.24	17	0.12	23	0.275	0.00109	111	100	0.079	39.31		25
1:49:00	109.00	17:16:38	0.11	20	0.235	17	0.125	21	0.273	0.00109	111	100	0.078	38.76		25
1:49:15	109.25	17:16:53	0.105	19	0.23	16	0.13	13	0.267	0.00116	112	100	0.078	38.24		25
1:49:30	109.50	17:17:08	0.095	18	0.22	16	0.135	13	0.251	0.00123	113	100	0.077	37.68		25
1:49:45	109.75	17:17:23	0.105	19	0.225	16	0.14	14	0.252	0.00138	114	100	0.077	37.13		25
1:50:00	110.00	17:17:38	0.105	19	0.22	16	0.15	15	0.241	0.00152	114	100	0.078	36.63		25
1:50:15	110.25	17:17:53	0.14	21	0.215	17	0.135	16	0.247	0.00152	114	100	0.079	36.22		25
1:50:30	110.50	17:18:08	0.135	22	0.21	28	0.11	20	0.247	0.00145	114	100	0.080	35.87		25
1:50:45	110.75	17:18:23	0.135	27	0.205	27	0.115	21	0.244	0.00138	114	100	0.078	35.50		25
1:51:00	111.00	17:18:38	0.13	30	0.2	27	0.12	21	0.244	0.00116	112	100	0.078	35.05		25
1:51:15	111.25	17:18:53	0.115	32	0.2	26	0.125	22	0.244	0.00123	113	100	0.078	34.63		25
1:51:30	111.50	17:19:08	0.115	32	0.205	26	0.125	21	0.254	0.00131	113	100	0.077	34.26		25
1:51:45	111.75	17:19:23	0.12	30	0.21	26	0.13	23	0.255	0.00138	114	100	0.077	33.87		25
1:52:00	112.00	17:19:38	0.115	30	0.21	26	0.135	22	0.255	0.00123	113	100	0.077	33.43		25
1:52:15	112.25	17:19:53	0.11	34	0.205	26	0.14	22	0.256	0.00123	113	100	0.075465	32.93971		25
1:52:30	112.50	17:20:08	0.11	39	0.19	13	0.135	21	0.245	0.00123	113	100	0.073751	32.38342		25
1:52:45	112.75	17:20:23	0.12	39	0.185	13	0.125	16	0.221	0.00123	113	100	0.073056	31.80827		25
1:53:00	113.00	17:20:38	0.12	37	0.2	13	0.125	15	0.231	0.00109	111	100	0.072318	31.27522		25
1:53:15	113.25	17:20:53	0.115	37	0.195	13	0.13	14	0.222	0.00131	113	100	0.072038	30.75705		25
1:53:30	113.50	17:21:08	0.115	37	0.185	13	0.12	14	0.215	0.00131	113	17	0.070655	30.39787		25
1:53:45	113.75	17:21:23	0.11	39	0.185	13	0.12	13	0.213	0.00167	115	100				

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Time	Seismic Dist (ft)	Total Time	LP ft	VTOE ft/s	FT1 kips	FMX kips	VT1 feet/secon	VT2 feet/secon	VMX feet/secon	EMX kip-feet	RTL kips	DMX inches	STK feet	Time seconds	Set ft
1:48:15	88.88	690.7776	85.29	14.78943	624.1818	633.2727	14.43636	2.490909	15.14545	50.83636	610.8182	1.445455	7.007273	1.347361	0.055455
1:48:30	89.50	705.5896	85.93909	14.83902	626.2727	633.8182	14.40909	2.454545	15.09091	50.90909	610	1.441818	6.998182	1.346544	0.062727
1:48:45	90.19	721.7443	86.6575	14.88783	628.6667	633.0833	14.41667	2.458333	15.10833	51.13333	610.8333	1.446667	6.995	1.346229	0.0625
1:49:00	90.88	736.5782	87.37636	14.85274	628.3636	634.5455	14.46364	2.327273	15.16364	50.36364	613.6364	1.415455	7.02	1.348536	0.062727
1:49:15	91.55	751.4627	88.06909	14.96234	633.0909	637.6364	14.56364	2.290909	15.21818	50.79091	618	1.417273	7.07	1.353136	0.066364
1:49:30	92.27	766.3913	88.81364	14.65816	631.9091	643	14.59091	2.090909	15.3	50.98182	629.3636	1.397273	7.113636	1.357147	0.064545
1:49:45	92.97	781.3457	89.54636	14.72779	639.7273	644.7273	14.71818	2	15.33636	51.09091	639.3636	1.391818	7.139091	1.359485	0.068182
1:50:00	93.63	796.5011	90.23364	14.66354	658.2727	661.3636	15.17273	1.554545	15.81818	53.20909	677.5455	1.382727	7.341818	1.377766	0.056364
1:50:15	94.16	811.8657	90.78455	14.19611	678.3636	679.5455	15.66364	0.890909	16.22727	55.42727	733.9091	1.409091	7.553636	1.396783	0.045455
1:50:30	94.64	825.9072	91.275	14.40461	689.5	689.7	15.9	0.94	16.44	57.29	746.1	1.443	7.637	1.404147	0.05
1:50:45	95.14	841.2228	91.80091	14.42085	681.0909	681.7273	15.68182	1.145455	16.29091	55.6	728.8182	1.412727	7.503636	1.392328	0.050909
1:51:00	95.75	856.5539	92.42727	15.01478	685.7273	685.7273	15.75455	1.5	16.31818	55.90909	713.7273	1.42	7.519091	1.39374	0.058182
1:51:15	96.34	871.8771	93.03909	15.09215	688.0909	688.0909	15.74545	1.454545	16.24545	56.26364	712.8182	1.424545	7.510909	1.393015	0.054545
1:51:30	96.86	885.8381	93.576	14.83623	689.5	689.5	15.79	1.25	16.28	55.76	725.6	1.416	7.546	1.396101	0.051
1:51:45	97.42	901.1576	94.15455	14.56359	684.4545	684.9091	15.66364	1.181818	16.22727	55.74545	726.0909	1.409091	7.507273	1.392682	0.057273
1:52:00	98.05	916.489	94.81364	14.51057	685.4545	686.1818	15.70909	1.136364	16.26364	56.34545	730.8182	1.418182	7.519091	1.393764	0.062727
1:52:15	98.76816	931.7248	95.55182	14.54252	680.6364	681.3636	15.52727	1.272727	16.09091	55.55455	717.9091	1.411818	7.421818	1.385074	0.071818
1:52:30	99.60479	946.8117	96.41636	14.87901	668.9091	669.4545	15.22727	1.718182	15.69091	53.96364	682.0909	1.442727	7.271818	1.371534	0.082727
1:52:45	100.493	961.8525	97.33364	15.40793	670.9091	670.9091	15.21818	2.045455	15.51818	53.9	663.7273	1.5	7.225455	1.367347	0.083636
1:53:00	101.3401	975.5056	98.208	15.25812	666	666	15.2	1.98	15.58	53.71	663.8	1.483	7.203	1.365307	0.083
1:53:15	102.1889	990.5926	99.08364	15.27513	668.4545	669.8182	15.27273	1.981818	15.7	54.19091	668.3636	1.481818	7.271818	1.371542	0.083636
1:53:30	102.7939	996.0472	99.7075	15.17266	664.75	664.75	15.1	1.975	15.45	52.75	662	1.4725	7.185	1.363667	0.0825
1:53:45															