Appendix D

Supplemental Rock Hardness/ Rippability Evaluation

Geosoils 2013

SUPPLEMENTAL ROCK HARDNESS/RIPPABILITY EVALUATION
11 ACRES AT 2115 AMANDA LANE
UNINCORPORATED ESCONDIDO, SAN DIEGO COUNTY
CALIFORNIA

FOR

NEW URBAN WEST, INC.
1733 OCEAN AVENUE, SUITE 350
SANTA MONICA, CALIFORNIA 90401

W.O. 6539-A-SC APRIL 15, 2013

GeoSoils, Inc.

Geotechnical • Geologic • Coastal • Environmental

5741 Palmer Way • Carlsbad, California 92010 • (760) 438-3155 • FAX (760) 931-0915 • www.geosoilsinc.com

April 15, 2013

W.O. 6535-A-SC

New Urban West, Inc.
1733 Ocean Avenue, Suite 350
Santa Monica, California 90401

Attention: Mr. Jason Han and Mr. Mark Brown

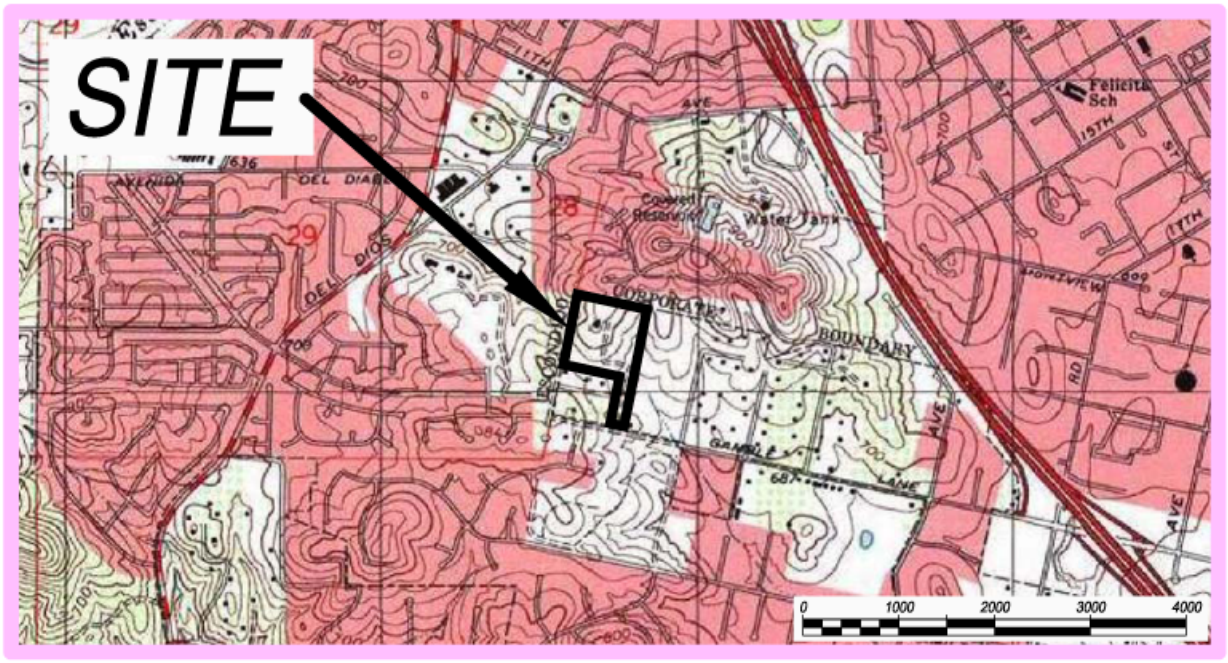
Subject: Supplemental Rock Hardness/Rippability Evaluation, 11 Acres at 2115 Amanda Lane, Unincorporated Escondido, San Diego County, California

Gentlemen:

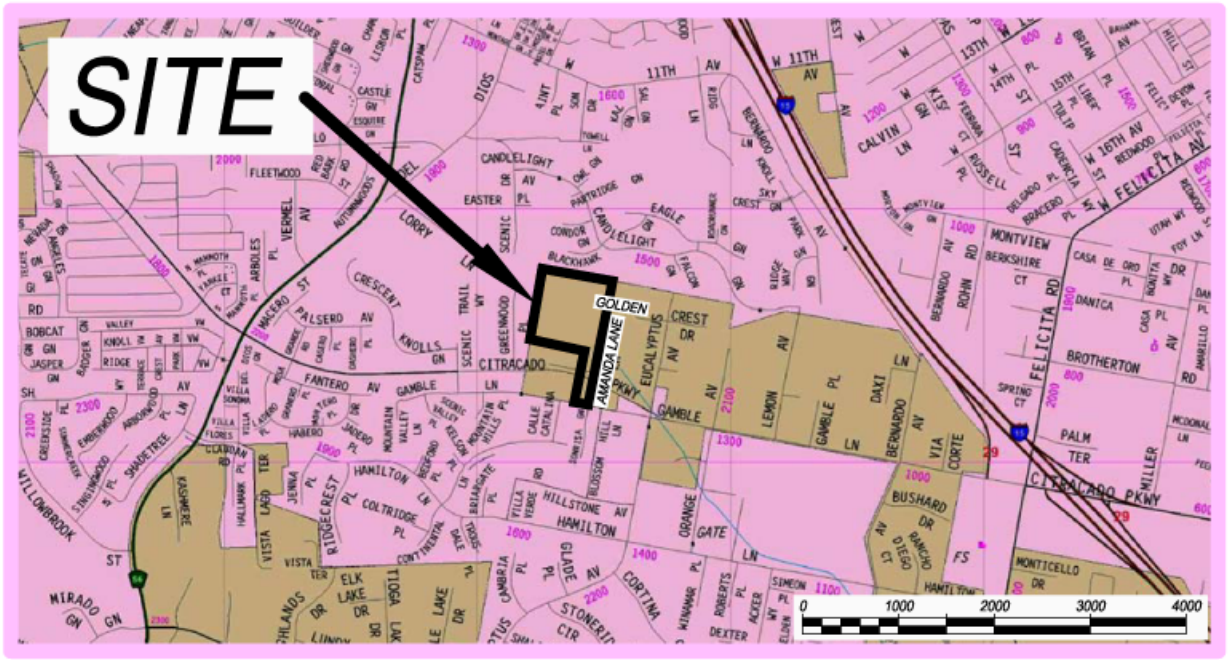
In accordance with your request and authorization, GeoSoils, Inc. (GSI), is presenting this summary of our supplemental rock hardness and rippability evaluation to the existing preliimnary geotechnical evaluation previously completed for this site (GSI, 2011 [Appendix A]). The purpose of this evaluation was to provide a quantitative evaluation regarding the depths to both non-trenchable hard rock and hard rock requiring blasting to excavate. The scope of our services has included a review of the existing geotechnical report for the site (GSI, 2011), the performance of two (2) seismic refraction surveys, and preparation of this summary report.

SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The site consists of approximately 11 acres located at 2115 Amanda Lane in the unincorporated area of Escondido, California (see Figure 1, Site Location Map). The property is bounded by Amanda Lane to the south, and existing residential development on the remaining sides. Topographically, the site is situated across a low, south trending ridge line. The eastern flank of the ridge line slopes eastward, at gradients on the order of 5:1 (horizontal:vertical [h:v]), while the western flank slopes westward, at gradients on the order of 4:1 (h:v). Maximum elevations across the site range from approximately 820 to 840 feet Mean Sea Level (MSL) along the crest of the ridge line, to minimum elevations ranging from approximately 750 to 780 feet MSL near the base of the lower, flanking slopes, for an overall topographic relief across the site of approximately 90 feet. Site drainage appears to be directed offsite to the west and southeast, via tributary drainages. Existing site improvements consist of a single family residential structure, detached garage, and small outbuilding, located along the ridge line, with the remaining property relatively undeveloped. It is our understanding that the site was formerly used for agricultural purposes. Site vegetation consists of several trees in close proximity to the existing



Base Map: TOPO!® ©2003 National Geographic, U.S.G.S Escondido Quadrangle, California -- San Diego Co., 7.5 Minute, dated 1996, current, 1999.



Base Map: The Thomas Guide, San Diego Co., Street Guide and Directory, 2005 Edition, by Thomas Bros. Maps, page 1129.

N

GeoSoils, Inc.

W.O. 6539-A-SC

SITE LOCATION MAP

Figure 1

residence, with grasses, weeds, and scattered shrubs throughout the remaining property. Existing site conditions are shown on Figure 2 (Geotechnical Map).

While a preliminary site plan was not available, it is our understanding that the 11 acre property will be subdivided into smaller residential parcels, with lots conceptually ranging from approximately ⅓ to 1 acre in size, dependant on various factors, including site grading, sewage disposal, etc. Residential structures will likely be one, or two story, with typical foundation systems and concrete slab-on-grade floors.

Cut and fill grading techniques are anticipated to bring the site to the desired configuration. While a preliminary grading plan has not been developed, cut, and/or fill slopes up to approximately 20 to 30 feet in height, and at gradients ranging from 1.5:1 (h:v) for cut slopes, to 2:1 (h:v) for fill slopes, are anticipated at this time.

ROCK HARDNESS EVALUATION

The site is underlain by dense granitic bedrock of Tonalite composition. Site work completed prior to this evaluation indicates practical refusal on hard rock at depths ranging from approximately 6 to 9 feet below existing grades, using a Caterpillar 420D backhoe. Observation of existing cut slopes offsite in the vicinity indicate excavation depths completed to at least 15 feet into similar granitic bedrock, consisting of scattered "corestones" in a matrix of weathered, "disintegrated granite," or "DG."

A seismic refraction survey was performed IN April 2012 within areas of relatively deep cuts where the site is underlain with near surface granitic bedrock. The survey consisting of three seismic refraction lines, conducted using a Geometrics SmartSeis 12-channel exploration seismograph, with a hammer and plate energy source. The approximate seismic line locations are shown on Figure 2, and the velocity and depth interval results are graphically shown, and included in Appendix B. An example of the raw seismic data is also included in Appendix B), and illustrates a forward and split spread shot from the same line.

The first arrival information, shot point locations, geophone locations, and line geometry from each survey are utilized in the computer programs SIPwin (Rimrock Geophysics, 2002) which produces time-distance plots for each of the survey lines (see example, Appendix B). The graphic curves reflect the actual time-distance plots generated by the program, showing the shot points and phone locations. The first curve, from left to right shows the forward spread from the first shot. The second, or split spread shot point creates two curves in opposite directions from the shot in the middle of the spread. The third curve represent the reverse shot from the distant end of the spread.

LEGEND

- **afu** — Artificial fill – undocumented
- **Kgr** — Cretaceous–age Granitic Bedrock
- **88°** — Attitude of Fracture
- **?** — Approximate location of geologic contact (queried where uncertain)
- — Surficial outcrops of Kgr
- **840** — Topographic Contour, with elevation in feet (MSL)
- **TP-12** — Approximate location of exploratory test pit
- **SL-2** — Approximate location of seismic refraction line (this study)

TP-6, TP-7, TP-8, TP-9, TP-10, TP-11, TP-12, TP-1, TP-2, TP-3, TP-4, TP-5

SL-1, SL-2

Kgr, afu

840, 820, 800, 780, 760

88°, 60°, 81°

GREENWOOD PLACE

GOLDEN CREST DRIVE

AMANDA LANE

N

GRAPHIC SCALE

100 0 50 100 200 400

1" = 100'

Map Image and Topo Provided by: Google Earth, 2010

ALL LOCATIONS ARE APPROXIMATE

This document or efile is not a part of the Construction Documents and should not be relied upon as being an accurate depiction of design.

GeoSoils, Inc.

RIVERSIDE CO.
ORANGE CO.
SAN DIEGO CO.

GEOTECHNICAL MAP

Figure 2

W.O. 6539-A-SC	DATE: 4/13	SCALE: 1" = 100'

The data for the surveys performed generally show a three-layer case. The uppermost layer is generally thin as would be expected, reflecting the surficial materials (i.e., colluvium [topsoil]). Undulations in time-distance curves can be attributed to a lack of elevation corrections to the raw data, possible minor disturbances from noise (e.g., wind or traffic), decreased energy at distant geophones, and discontinuities in the subsurface.

The velocity-depth models, or cross-sections, generated are included as Plates B-3 and B-4 for seismic traverses ST-1, and ST-2, respectively. As can be seen on these plates, the boundaries between various seismic velocity layers appear to be somewhat undulatory, typical of fractured and weathered crystalline (i.e., granitic) rocks where there is a access to the subsurface for air and water. Fracture, or joint density/frequency also contributes to the variation in depth of weathering and therefore differences in seismic velocities.

Layer boundaries tend to mimic the surface topography, although variations are common depending upon the depth of weathering, fracturing, etc. In general, the survey indicated a near surface layer (Layer 1) thickness (i.e., colluvium), on the order of about ±4 feet, but generally appears to average on the order of ±3½ to ±4 feet. The average velocity of Layer 1 material is about ±1,125fps, and is considered typical for such near surface material. The depth to the Layer 1/Layer 2 transition (bedrock) is approximately 4 feet below existing grades, with the depth to the Layer 2/Layer 3 transition on the order of about 25 to 38 feet below existing surface grades. The average velocity of Layer 2 is about ±2,020 fps, with some variability. Layer 3 occurs at depths on the order of 25 to 38 feet, with average velocities in Layer 3 (unweathered bedrock) ranging from 8,850 to 13,333 fps. At depths where velocities are greater than about 6,000 fps, rippability is ambiguous and blasting usually is required.

An evaluation has been made of the seismic refraction line data to estimate the approximate depth to non-rippable trenching (i.e., utility excavation) and to non-rippable bedrock. Approximate cut-off velocities of ±3,800 and ±6,000 fps are generally used as a basis for non-rippable trenching (assuming a Cat 235 Hoe [a large trackhoe], or equivalent), and non-rippable bedrock (assuming a D9L, or equivalent), respectively.

Bedrock excavatability with respect to trenching shallower than the approximate ±3,800 fps cut-off depth is expected to vary from easy to very difficult and the necessity for localized areas requiring rock breaking, or blasting should be anticipated. Similarly, bedrock rippability shallower than the approximate ±6,000 fps cut-off depth is expected to vary from easy to very difficult, and the necessity for localized areas requiring rock breaking and/or blasting cannot be entirely precluded.

Variations should be expected. As such, bedrock excavations from the surface downward may generate oversize rock. Isolated “floaters or corestones may also be encountered. The bulk of the materials derived from the weathered portion of the bedrock (up to and including the ±3,800 to 6,000 fps cut-off) are anticipated to disintegrate to approximately 12 to 24 inches and smaller constituents. Any oversize materials (> 12 inches) generated

would require special handling for use in fills, and may not be placed within 10 feet of finish grade or used as backfill in utility trenches. Oversize materials typically become commonplace during excavation into 5,000 fps materials, usually requiring specialized placement techniques during grading.

Based upon our experience in this area, and the seismic refraction data obtained, the following table reflects our estimates of the rippability and trenchability at the locations of the seismic refraction survey lines; other interpretations are possible:

SEISMIC LINE NO.	GENERAL RIPPABILITY (ASSUMING A D9L DOZER OR CAT 235 HOE, OR EQUIVALENT)
ST-1	Rippable and trenchable to depths of ±35 to ±38 feet. Non-trenchable and not rippable below, where localized blasting and/or rock breaking may not be precluded.
ST-2	Rippable and trenchable to depths of ±4 feet. Rippable but not trenchable to depths of ±25 to ±32 feet. Not rippable or trenchable below. Localized blasting and/or rock breaking may not be precluded.

Rock Hardness Summary

In general, utilizing the seismic data, it appears that the area in the vicinity of our seismic lines site may be characterized as being underlain by a surficial soils (colluvium) to depths of about ±4 below existing grades. At depths greater than approximately 25 to 38 feet, relatively fresh and very dense granitic bedrock exists. Based on all of the above, the need for overexcavation, blasting and/or line shooting would be anticipated on the site, should proposed cut grades exceed the depths indicated herein, in areas underlain with granitic bedrock. It should be noted that a conventional rubber-tired backhoe will experience non-productive trenching at seismic velocities much less than ±2,000 to 2,500 fps. The seismic refraction data presented herein should be further reviewed in conjunction with final grading plans (when available). It should be noted that due to the variability of bedrock weathering, and the potential for local boulders, or less weathered bedrock, very difficult ripping, rock breaking, and/or blasting cannot be entirely precluded at shallower depths. Consideration should be given to undercutting street sections during grading in order to facilitate utility construction.

CLOSURE

The materials encountered on the project site and utilized for our analysis are believed representative of the area; however, soil and bedrock materials vary in character between excavations and natural outcrops or conditions exposed during mass grading. Site conditions may vary due to seasonal changes or other factors.

Inasmuch as this study is based upon our review and engineering analyses, the conclusions and recommendations are professional opinions. These opinions have been derived in accordance with current standards of practice, and no warranty is express or implied. Standards of practice are subject to change with time. GSI assumes no responsibility or liability for work or testing performed by others, or their inaction; or work performed when GSI is not requested to be onsite, to evaluate if our recommendations have been properly implemented.

The opportunity to be of service is sincerely appreciated. If you should have any questions, please do not hesitate to contact our office.

Respectfully submitted,

GeoSoils, Inc.

PROFESSIONAL GEOLOGIST
ROBERT G. CRISMAN
No. 1934
Certified
Engineering
Geologist
STATE OF CALIFORNIA

Robert G. Crisman
Engineering Geologist, CEG 1934

REGISTERED PROFESSIONAL ENGINEER
DAVID W. SKELLY
No. RCE 47857
Exp. 12/31/13
CIVIL
STATE OF CALIFORNIA

David W. Skelly
Civil Engineer, RCE 47857

RGC/DWS/JPF/jh

Attachments: Appendix A - References
Appendix B - Seismic Data

Distribution: (4) Addressee

APPENDIX A

REFERENCES

APPENDIX A

REFERENCES

GeoSoils, Inc., 2011, Preliminary geotechnical evaluation, 11 acres at 2115 Amanda Lane, unincorporated Escondido, San Diego County, California, W.O. 6269-A-SC, dated July 1.

Rimrock Geophysics, 2004, SIPwin, BV-2.78, Seismic refraction interpretation program for Windows.

_____, 2002, SIPwin, BV-2.7, A personal computer program for interpreting seismic refraction data using modeling and iterative ray tracing techniques.

_____, 1997, SIPLOT, V-4.1, personal computer program for reading OUT files created by SIPT2 and plotting depth cross sections and time-distance graphs on a variety of printers and plotters, and writing graphic files to disk in various raster, vector and spreadsheet formats.

_____, 1995a, SIPIK, V-4.1, A personal computer program for picking first breaks on Geometrics SmartSeis, StrataView, ES-2401 and SeisView Seismic waveform data files.

_____, 1995b, SIPIN, V-4.1, personal computer program for creating data files for input to the seismic refraction interpretation programs SIPT2 and SIPLUS.

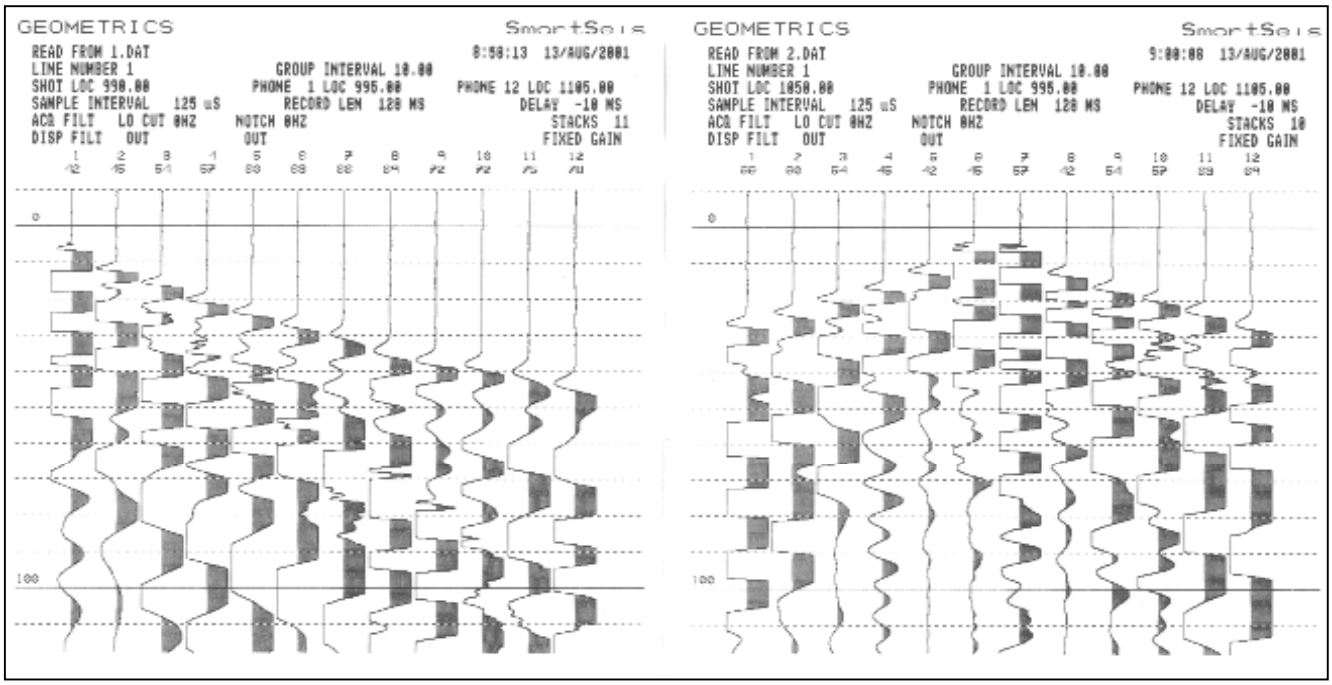
_____, 1995c, SIPT2, V-4.1, A personal computer program for interpreting seismic refraction data using modeling and iterative ray tracing techniques.

_____, 1993, SIPQC, V-4.0, Quality control programs for quick interpretation of seismic refraction data on Geometrics seismographs.

APPENDIX B

SEISMIC DATA

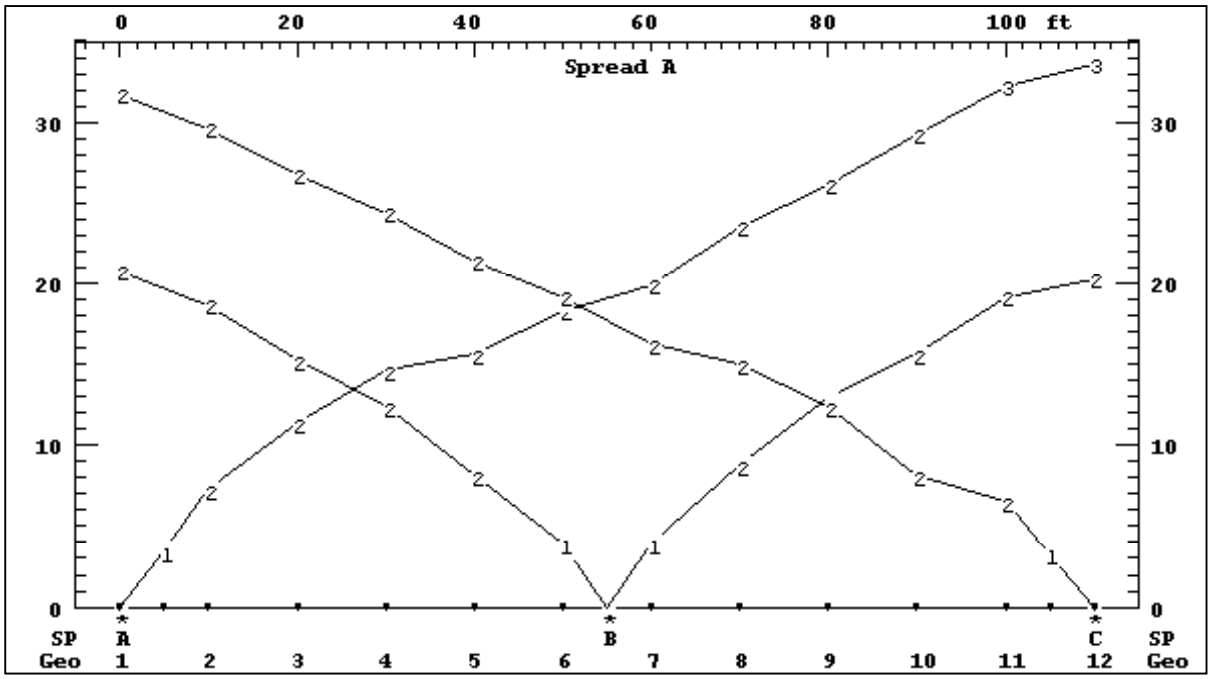
Example
Raw Seismic Data



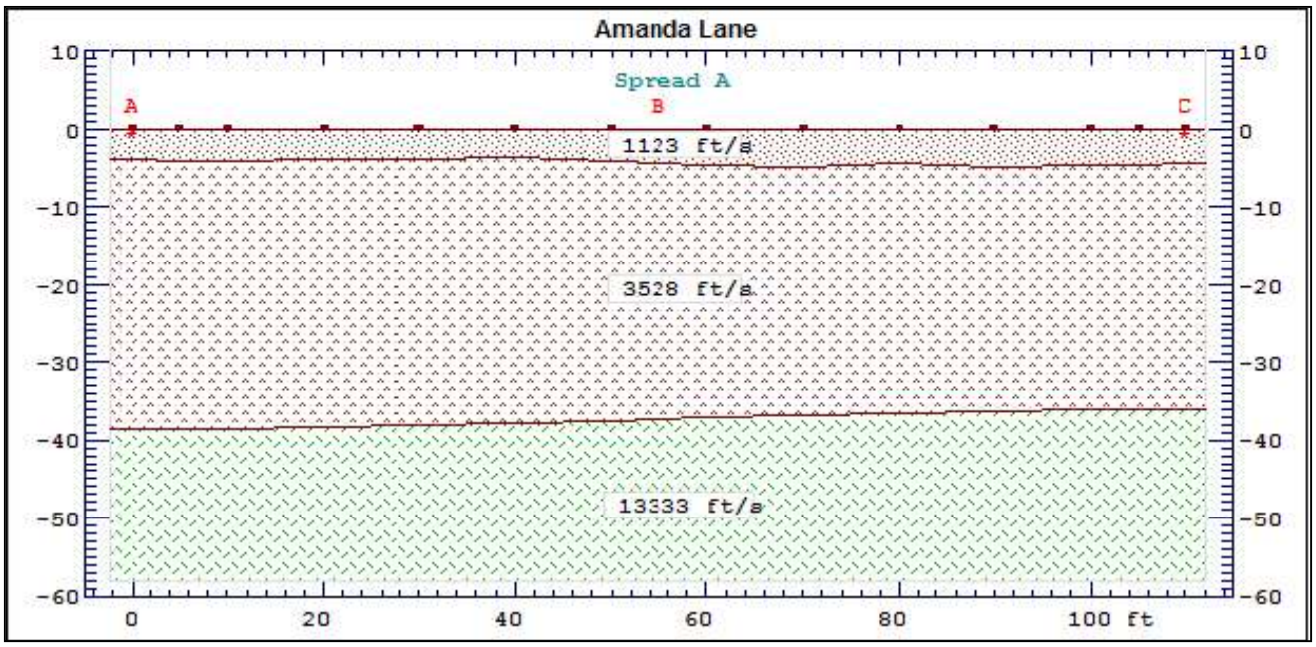
Example

Seismic Line

Time Distance Curves

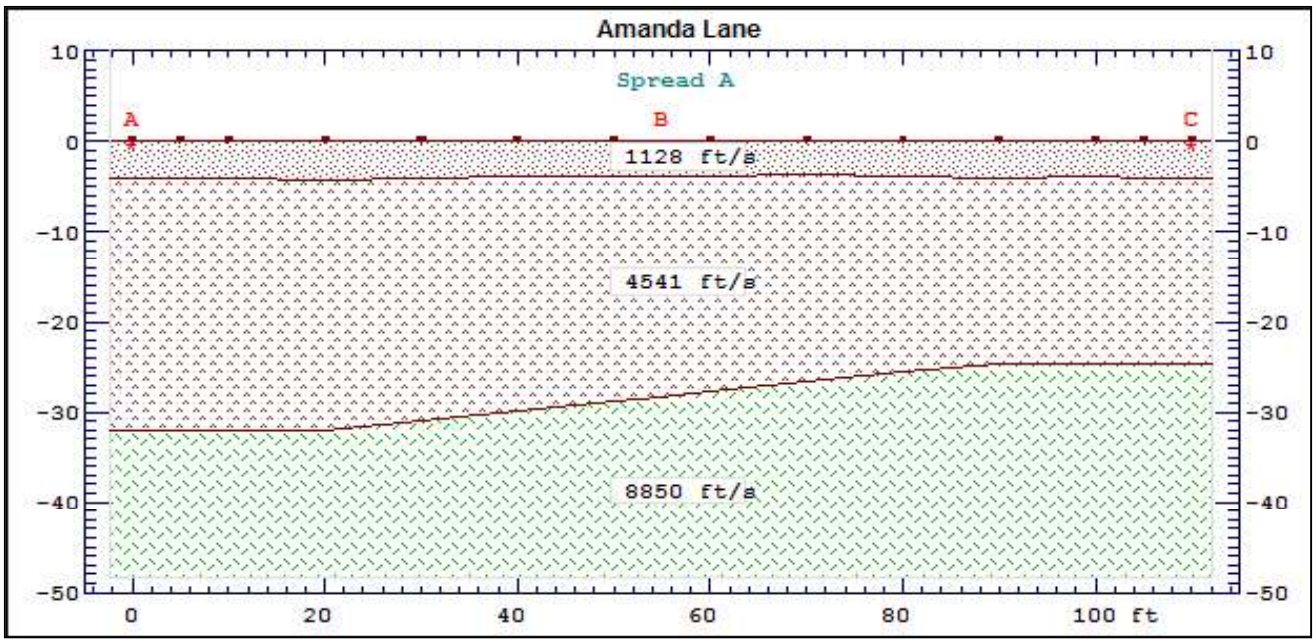


Seismic Line
ST-1



North South

Seismic Line
ST-2



North South