November 18, 2021

Rodney Boden
ViaWest Group
2390 East Camelback Road
Suite 305
Phoenix, Arizona 85016

Subject: **Supplemental Geotechnical Report**
New Industrial Building
2351 Meyers Avenue
Escondido, California
Partner Project No. 21-345508.1

Dear Rodney Boden

Partner Assessment Corporation (Partner) is pleased to submit this letter that serves to provide supplemental information regarding the planned construction described in the Geotechnical Evaluation prepared by EEI on November 2, 2020. Specifically, Partner was engaged to perform a seismic refraction survey on the site to assist the client in estimating the quantity of hard bedrock to be excavated on the site.

Scope of Work

Partner engaged Atlas Technical Consultants, LLC (Atlas) to perform three geophysical P-wave seismic refraction surveys in the area of interest. Their data and exhibits were used to estimate the depth to materials that would be difficult and/or impractical to excavate using heavy equipment and would require the use of jack-hammering, blasting or chemical splitting of rock material on the site. The report from Atlas is included as Attachment A to this report.

In addition to arranging for the geophysical surveys, Partner provided an engineering review of the geophysical data, as well as a review of available site information, including site plans, geotechnical reports, and readily available online resources. Based on this we have prepared this letter and attached exhibits.

Conclusions and Recommendations

Based on our review of available data, the planned construction requires maximum cuts on the order of 16 feet on the south edge of the building along a planned partially embedded loading dock, which corresponds with the high point of the site's natural topography. Geology on the site is listed as tonalite, which is a granite-like igneous rock. Surficial soils consist of colluvial and residual weathering products of the underlying rock, and transition into weathered rock and bedrock. Figures 1-3 depict the site and geology.

For the purposes of our report, "bedrock" is considered impractical to excavate if it cannot be ripped for mass grading effectively using a Caterpillar D-9 Dozer with single shank ripper or equivalent. For trenching it can be identified with a Caterpillar 375 Excavator equipped with a 24-inch bucket and rock teeth. Although we did not mobilize this specific equipment to the site, in general it is our experience that bedrock so defined corresponds with a roughly 7,000 feet per second (fps) seismic velocity for ripping with a dozer and closer to 5,500 fps for trenching. It also corresponds to auger refusal or N-values of 50 blows / 2 inches for grading and 50 blows / 4 inches for trenching.

In general, “bedrock” as described above should range from about 5 to 20 feet in depth below the ground surface across the site based on a seismic velocity of 7,000 fps. Four hollow-stem auger soil borings were advanced on the site in 2017 by EEI using a Mobile Drill B-53 drill rig which encountered refusal, indicating bedrock at depths ranging from 8 to 17.5 feet across the site. Test pits were also excavated on the site using a Deere 310 backhoe, but that equipment in our opinion does not have adequate horsepower or weight to be considered an acceptable tool for determining depth to bedrock as it may refuse in weathered rock.

In Figure 4, we have overlayed the estimated depth to bedrock using seismic and boring data on a grading plan where planned cut depths are also listed. Based on this we have indicated a shaded are where encountering bedrock is anticipated during grading and or the installation of foundations. We have not identified areas where rock could be possibly encountered during trenching. We roughly estimate that bedrock depths excavated for grading and foundations in this area could range from 1 to 6 feet, which would require chemical splitting, jack-hammering, or blasting. Roughly estimated the area is 35,000 to 40,000 sf. Using an average rock depth of 3.5 feet would yield roughly 4,500 to 5,200 cubic yards. Based on the methods employed, the actual quantities encountered could vary greatly.

The surface of bedrock is often irregular, and excavation depends not only on the equipment used, but the skill of the operator, the alignment of fractures or rock bedding and other factors that are difficult to predict or control. It is our recommendation that a method be approved by the owner and contractor for identifying and measuring the amount of rock ripping and other removal techniques utilized. A unit price for each type of excavation should also be agreed to in advance of the work. The quantities can be verified by truckloads, survey data or other techniques. A third party geologist on the site can provide verification of the need for different techniques.

Closing

The information provided is for informational uses only and actually encountered rock quantities could vary significantly. No study of this nature would be detailed enough to provide precise predictions of rock excavation and removal techniques. We have performed our work in accordance with standard industry practices to the best of our abilities. No other warranty or guarantee is made or implied. It is our preference that Partner be engaged as a third party agency for the excavation monitoring. As new data becomes available we may refine or revise the findings of this letter as needed.

Sincerely,

DRAFT

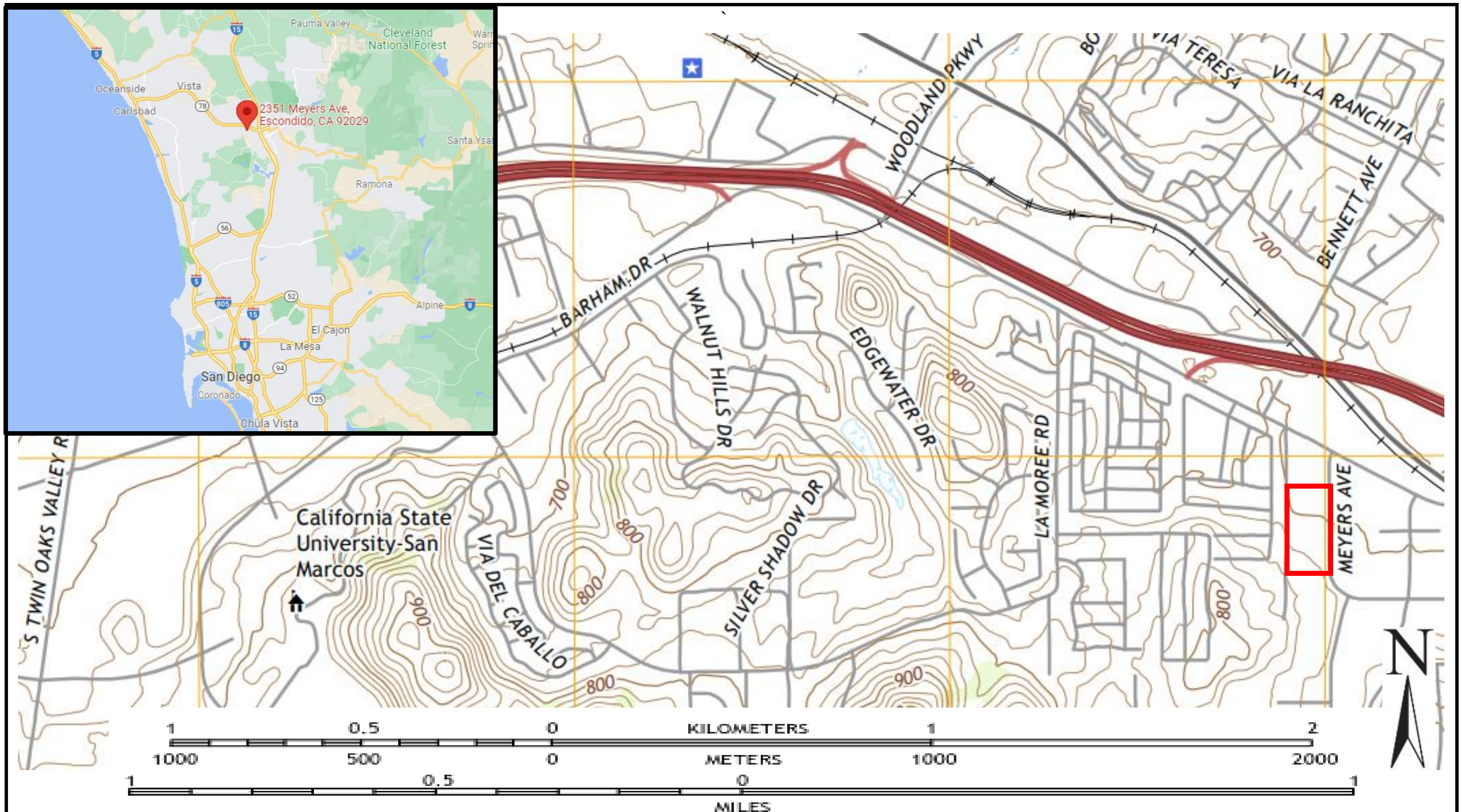
Matthew Marcus, PE, PG
Principal Geotechnical Engineer and Geologist

Attachments: Figure 1-3 Site Information
Figure 4 – Scaled Exploration Plan
Attachment A – Geophysical Evaluation (Atlas Technical Consultants)

FIGURES

- Site Vicinity Plan
- Aerial Photograph
- Geologic Map
- Scaled Exploration Plan

PARTNER



Source: USGS Topographic 7.5 San Marcos Quadrangle Map 2018.	**FIGURE 1 – SITE VICINITY PLAN**

KEY

Approximate Site Location

Source: Google Earth

FIGURE 2 – AERIAL PHOTOGRAPH

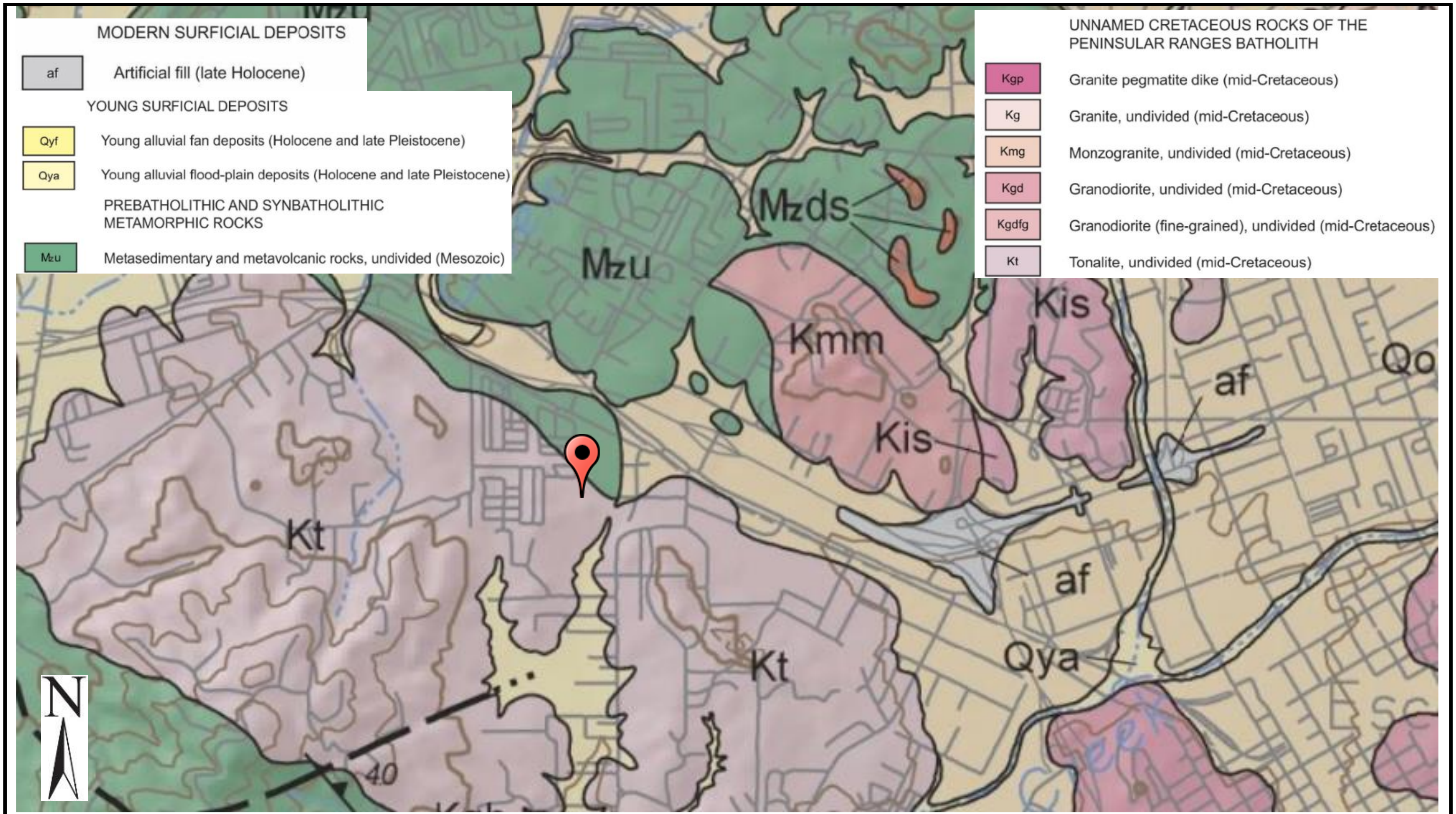
KEY

Approximate Boring Location

Approximate Seismic Refraction Survey

Approximate Project Limits

PARTNER

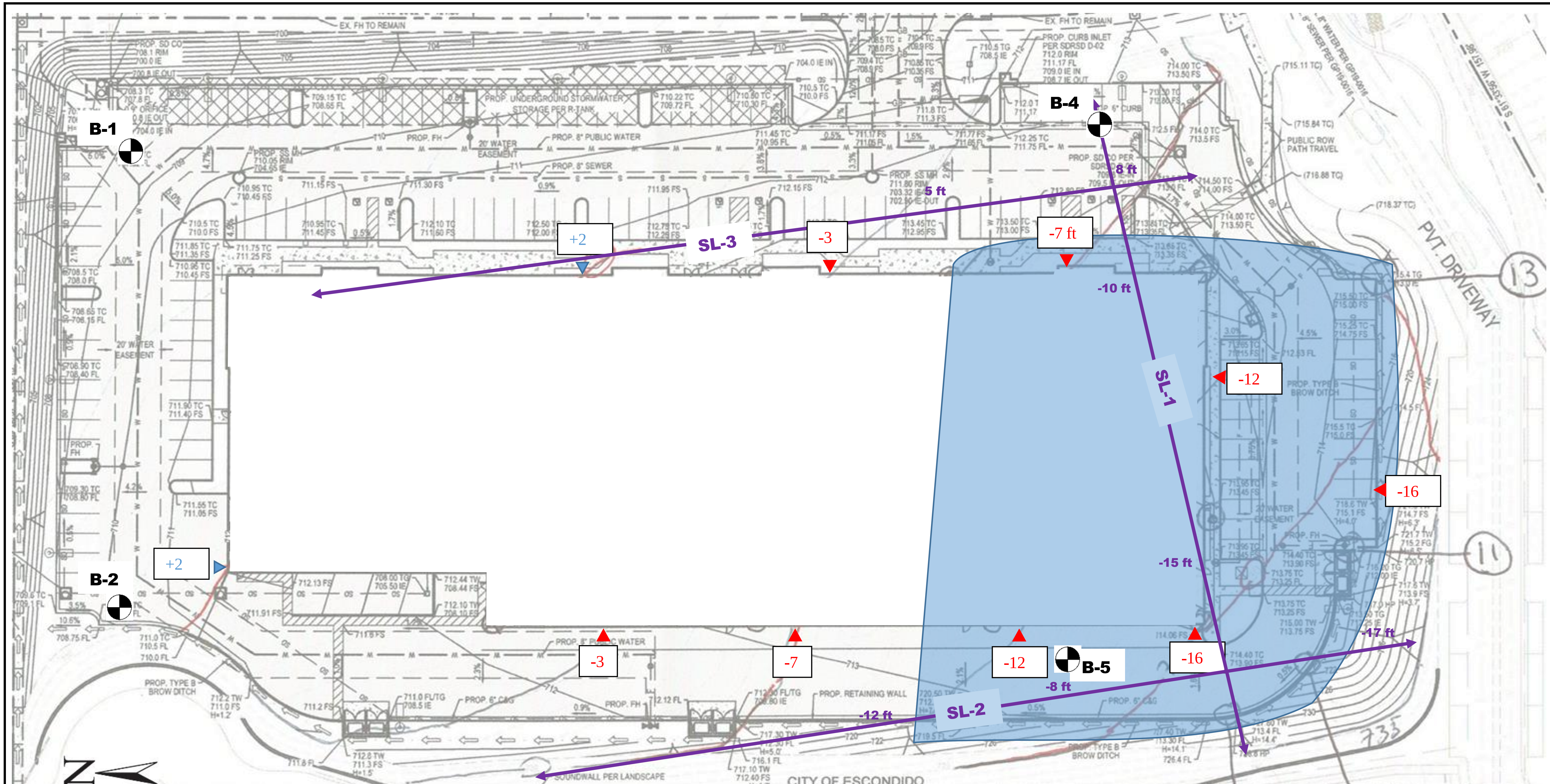


Source: Geologic Map of the Oceanside 30' x 60' Quadrangle, California 2007 M. Kennedy, S. Tan

FIGURE 3 – GEOLOGIC MAP

KEY

Approximate Site Location



Source: Pasco Laret Suiter & Associates, City of Escondido Plot Plan Sheet 3 of 3, Plot date 11/4/2020

FIGURE 4 – SCALED EXPLORATION PLAN

KEY

Approximate Boring Location | Seismic Line | -3 Cut (red)/Fill (blue) Depth | -12 ft Depth to presumed bedrock (7,000 fps) | Area of presumed non-rippable rock

Scale
1 inch = 50 feet

0 50' 100' 150' 200' 400' 600'

ATTACHMENT A

Geophysical Evaluation (Atlas)

PARTNER

GEOPHYSICAL EVALUATION

MEYERS AVENUE REFRACTION STUDY

Escondido, California

PREPARED FOR:

Mr. Matthew Marcus, PE, PG
Partner Engineering and Science, Inc.
2154 Torrance Boulevard
Torrance, CA 90501

PREPARED BY:

Atlas Technical Consultants LLC
6280 Riverdale Street
San Diego, CA 92120

November 12, 2021

ATLAS

6280 Riverdale Street
San Diego, CA 92120
(877) 215-4321 | oneatlas.com

November 12, 2021

Atlas No. 121432SWG
Report No. 1

MR. MATTHEW MARCUS, PE, PG
PARTNER ENGINEERING AND SCIENCE, INC.
2154 TORRANCE BOULEVARD
TORRANCE, CA 90501

Subject: **Geophysical Services Meyers Avenue**
Seismic Refraction Study
Escondido, California

Dear Mr. Marcus:

In accordance with your authorization, Atlas performed a P-wave seismic refraction study pertaining to the Meyers Avenue project located in Escondido, California. Specifically, our evaluation consisted of performing three seismic P-wave refraction traverses (SL-1 through SL-3). The traverses varied in length: SL-1 measured 250 linear feet, SL-2 and SL-3 measured 380 linear feet. The purpose of our study was to develop velocity profiles of the subsurface and to assess the depth to bedrock and apparent rippability of the subsurface materials. Our field services were conducted on November 8th, 2021. This data report presents our methodology, equipment used, analysis, and results.

If you have any questions, please call us at (619) 280-4321.

Respectfully submitted,
Atlas Technical Consultants LLC

REGISTERED PROFESSIONAL GEOPHYSICIST
PATRICK F. LEHRMANN
No. 1043
Exp. 1/31/2022
STATE OF CALIFORNIA

Orion Adah
Senior Staff Geophysicist

Patrick F. Lehrmann, P.G., P.Gp.
Principal Geologist/Geophysicist

OAA:TSW:ASB:PFL:ds

Distribution: MMarcus@partneresi.com

CONTENTS

TABLE

FIGURES

1. INTRODUCTION

In accordance with your authorization, Atlas performed a P-wave seismic refraction study pertaining to the Meyers Avenue project located in Escondido, California (Figure 1). Specifically, our evaluation consisted of performing three seismic P-wave refraction traverses (SL-1 through SL-3). The traverses varied in length: SL-1 measured 250 linear feet, and SL-2 and SL-3 measured 380 linear feet. The purpose of our study was to develop velocity profiles of the subsurface and to assess the depth to bedrock and apparent rippability of the subsurface materials. Our field services were conducted on November 8th, 2021. This data report presents our methodology, equipment used, analysis, and results.

2. SCOPE OF SERVICES

Our scope of services included:

- Performance of three seismic P-wave refraction traverses at the project site.
- Compilation and analysis of the data collected.
- Preparation of data report presenting our results and conclusions.

3. SITE AND PROJECT DESCRIPTION

The project site is an open undeveloped field located south of Highway 78 and northwest of the intersection of Corporate Drive and Meyers Avenue in Escondido, California (Figure 1). The seismic traverses were conducted in locations selected by project stakeholders. Specifically, seismic traverses were conducted in accessible areas consisting of surface soils and/or rock, and sparse vegetation. Figures 2 and 3 depict the general site conditions in the area of the seismic traverses.

Based on our discussions with you, it is our understanding that your office requested this study in advance of construction activities for the subject project. We also understand that the results of our study may be used in the formulation of design and construction parameters for the project.

4. STUDY METHODOLOGY

A seismic P-wave (compression wave) refraction study was conducted at the project site to develop subsurface velocity profiles of the areas studied, and to assess the depth to bedrock and apparent rippability of the subsurface materials. The seismic refraction method uses first-arrival times of refracted seismic waves to estimate the thicknesses and seismic velocities of subsurface layers. Seismic P-waves generated at the surface, using a hammer and plate, are refracted at boundaries separating materials of contrasting velocities. These refracted seismic waves are then detected by a series of surface vertical component 14-Hz geophones and recorded with a 24-channel Geometrics Geode seismograph. The travel times of the seismic P-waves are used in conjunction with the shot-to-geophone distances to obtain thickness and velocity information on the subsurface materials.

Three seismic traverses (SL-1 to SL-3) were conducted in the study area. The general location and length of the line was determined by surface conditions, site access, and depth of investigation, as determined by project stakeholders. Shot points (signal generation locations) were conducted along the lines at the ends, midpoint, and intermediate points between the ends and the midpoint. In general, classical seismic refraction theory requires that subsurface velocities increase with depth (generalized reciprocal method (GRM) and time-intercept modeling). In classical analysis methods a layer having a velocity lower than that of the layer above will not generally be detectable by the seismic refraction method and, therefore, could lead to errors in the depth calculations of subsequent layers. In addition, lateral variations in velocity such as those caused by core stones, intrusions, or boulders can also result in the misinterpretation of the subsurface conditions. However, the application of seismic tomography methods performed for this project are not subject to this limitation.

In general, the seismic P-wave velocity of a material can be correlated to rippability (see Table 1 below), or to some degree "hardness." Table 1 is based on published information from the Caterpillar Performance Handbook (Caterpillar, 2018), as well as our experience with similar materials, and assumes that a Caterpillar D-9 dozer ripping with a single shank is used. We emphasize that the cutoffs in this classification scheme are approximate and that rock characteristics, such as fracture spacing and orientation, play a significant role in determining rock quality or rippability. The rippability of a mass is also dependent on the excavation equipment used and the skill and experience of the equipment operator.

For trenching operations, the rippability values should be scaled downward. For example, velocities as low as 3,500 feet/second may indicate difficult ripping during trenching operations. In addition, the presence of boulders, which can be troublesome in narrow trenching operations, should be anticipated.

Table 1 – Rippability Classification

Seismic P-wave Velocity	Rippability
0 to 2,000 feet/second	Easy
2,000 to 4,000 feet/second	Moderate
4,000 to 5,500 feet/second	Difficult, Possible Blasting
5,500 to 7,000 feet/second	Very Difficult, Probable Blasting
Greater than 7,000 feet/second	Blasting Generally Required

It should be noted that the rippability cutoffs presented in Table 1 are slightly more conservative than those published in the Caterpillar Performance Handbook. Accordingly, the above classification scheme should be used with discretion, and contractors should not be relieved of making their own independent evaluation of the rippability of the on-site materials prior to submitting their bids.

5. DATA ANALYSIS

The collected data was processed using SIPwin (Rimrock Geophysics, 2003), a seismic interpretation program, and analyzed using SeisOpt Pro (Optim, 2008). SeisOpt Pro uses first arrival picks and elevation data to produce subsurface velocity models through a nonlinear optimization technique called adaptive simulated annealing. The resulting velocity model provides a tomography image of the estimated geologic conditions. Both vertical and lateral velocity information is contained in the tomography model. Changes in layer velocity are revealed as gradients rather than discrete contacts, which typically are more representative of actual conditions.

6. RESULTS AND CONCLUSIONS

As previously indicated, seismic traverses were performed at three preselected areas as part of our study. Figures 4a through 4c presents the velocity models generated from our analysis. The results of our seismic study revealed distinct layers/zones that likely represent soil overlying bedrock with varying degrees of weathering.

Based on the refraction results, variability in the excavatability (including depth of rippability) of the subsurface materials may be expected across the project area. Furthermore, blasting may be required depending on the excavation, depth, location, equipment used, and desired rate of production. In addition, oversized materials should be expected. A contractor with excavation experience in similarly difficult conditions should be consulted for expert advice on excavation methodology, equipment, and production rate.

7. LIMITATIONS

The field evaluation and geophysical analyses presented in this report have been conducted in general accordance with current practice and the standard of care exercised by consultants performing similar tasks in the project area. No warranty, express or implied, is made regarding the conclusions, recommendations, and opinions presented in this report. There is no evaluation detailed enough to reveal every subsurface condition. Variations may exist and conditions not observed or described in this report may be present. Uncertainties relative to subsurface conditions can be reduced through additional subsurface exploration. Additional subsurface surveying will be performed upon request.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Atlas should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document. This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

8. SELECTED REFERENCES

Caterpillar, Inc., 2018, Caterpillar Performance Handbook, Edition 48, Caterpillar, Inc., Peoria, Illinois.

Mooney, H.M., 1976, Handbook of Engineering Geophysics, dated February.

Optim, Inc., 2008, SeisOpt Pro, V-5.0.

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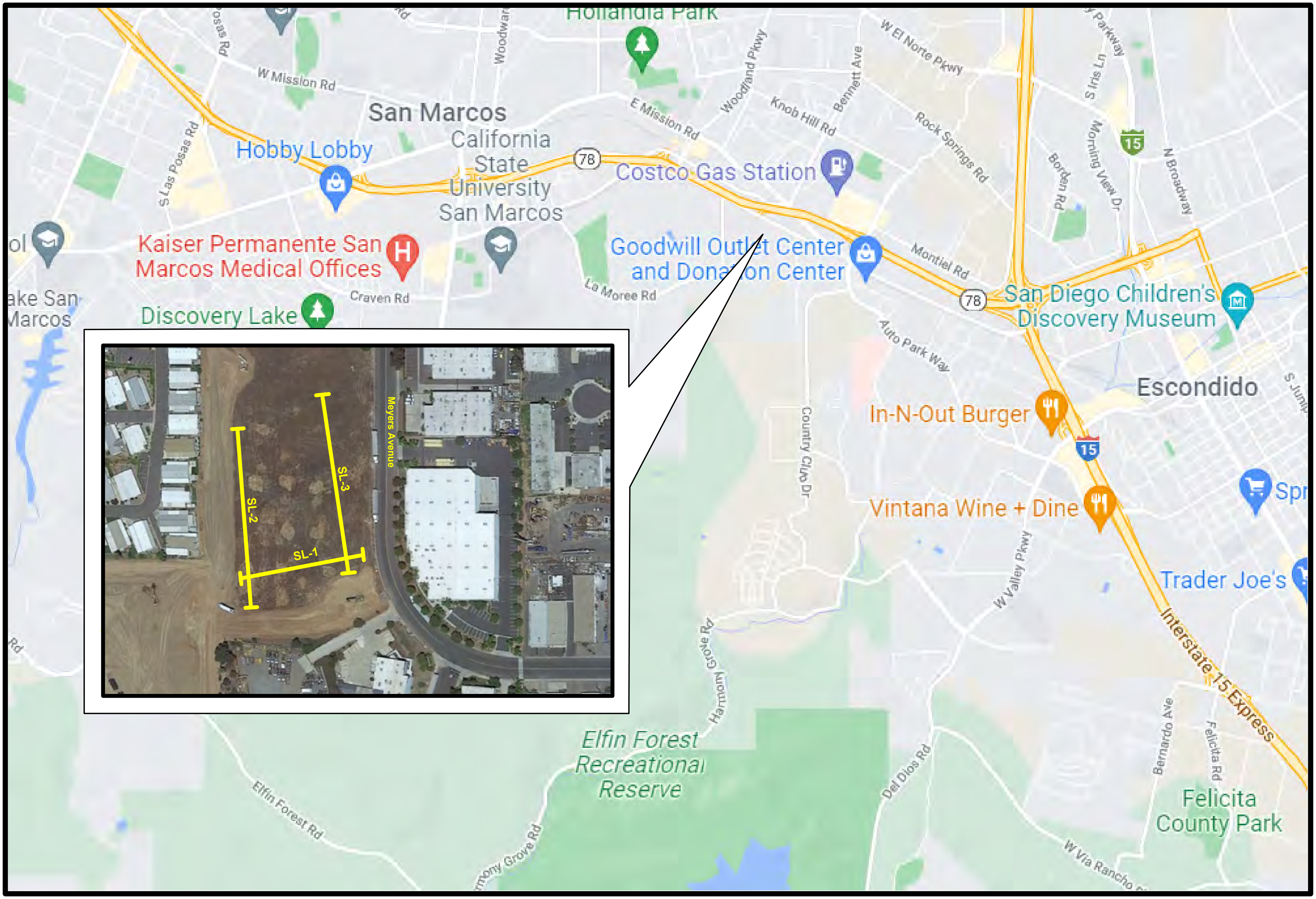
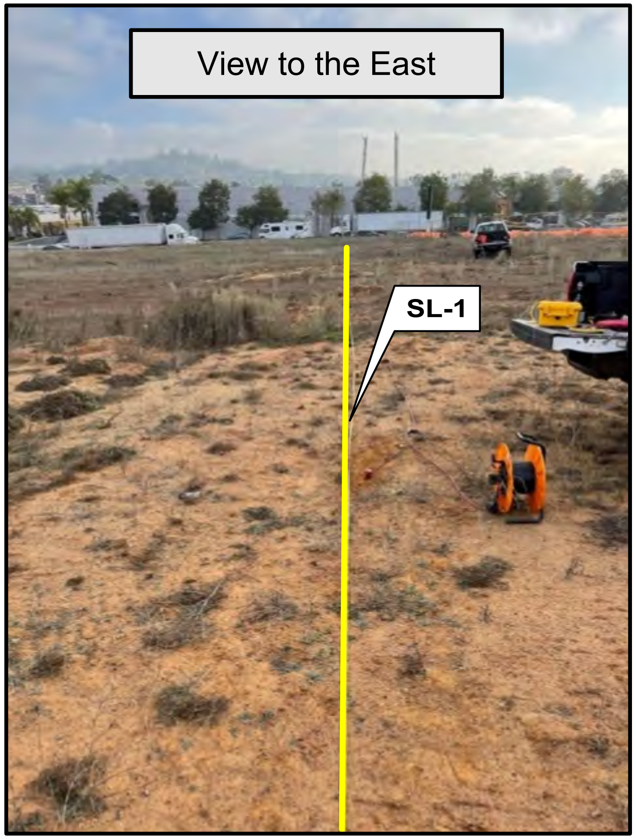
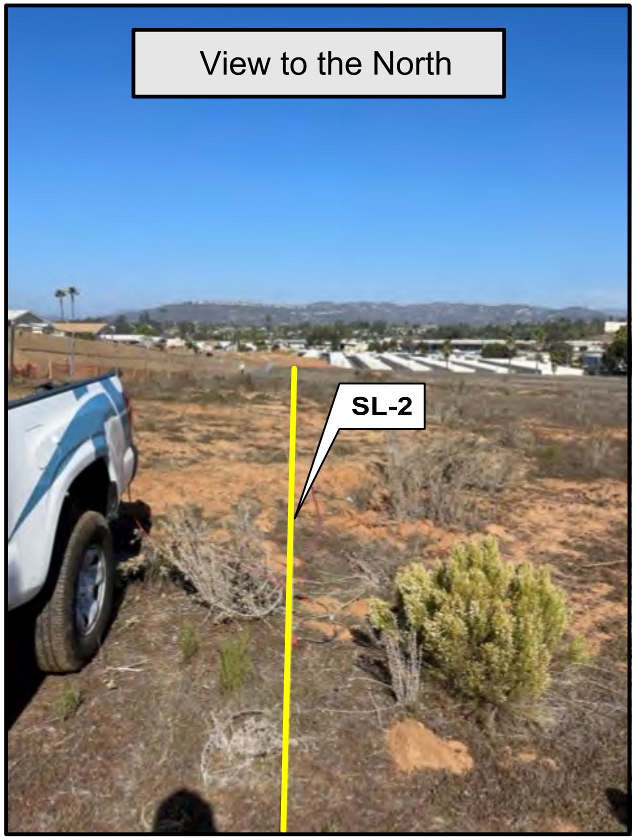
Telford, W.M., Geldart, L.P., Sheriff, R.E., and Keys, D.A., 1976, Applied Geophysics, Cambridge University Press.

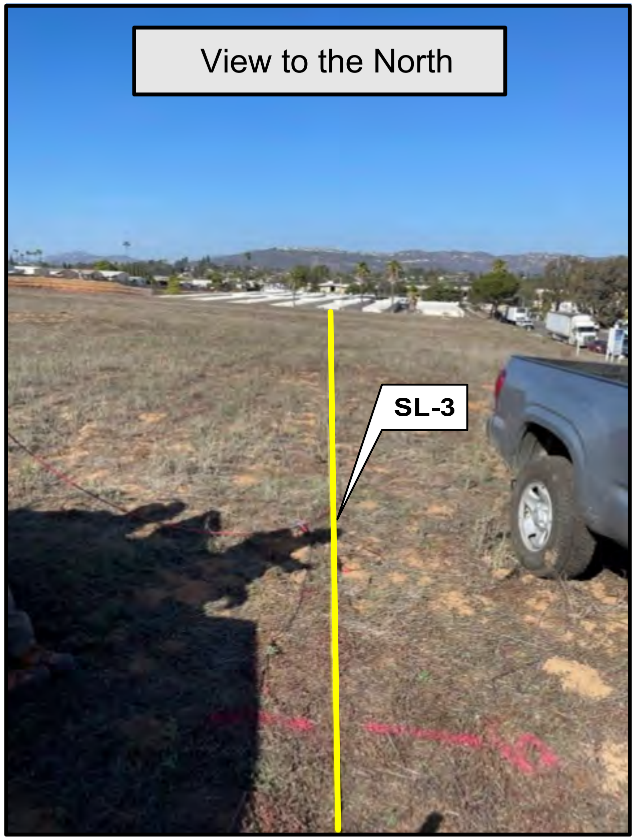


SITE LOCATION MAP	N	Meyers Avenue Escondido, California	ATLAS Figure 1
		Project No.: 121432SWG Date: 11/21	

SEISMIC LINE LOCATION MAP	N	Meyers Avenue Escondido, California	ATLAS Figure 2	0 100 200 approximate scale in feet
		Project No.: 121432SWG Date: 11/21		



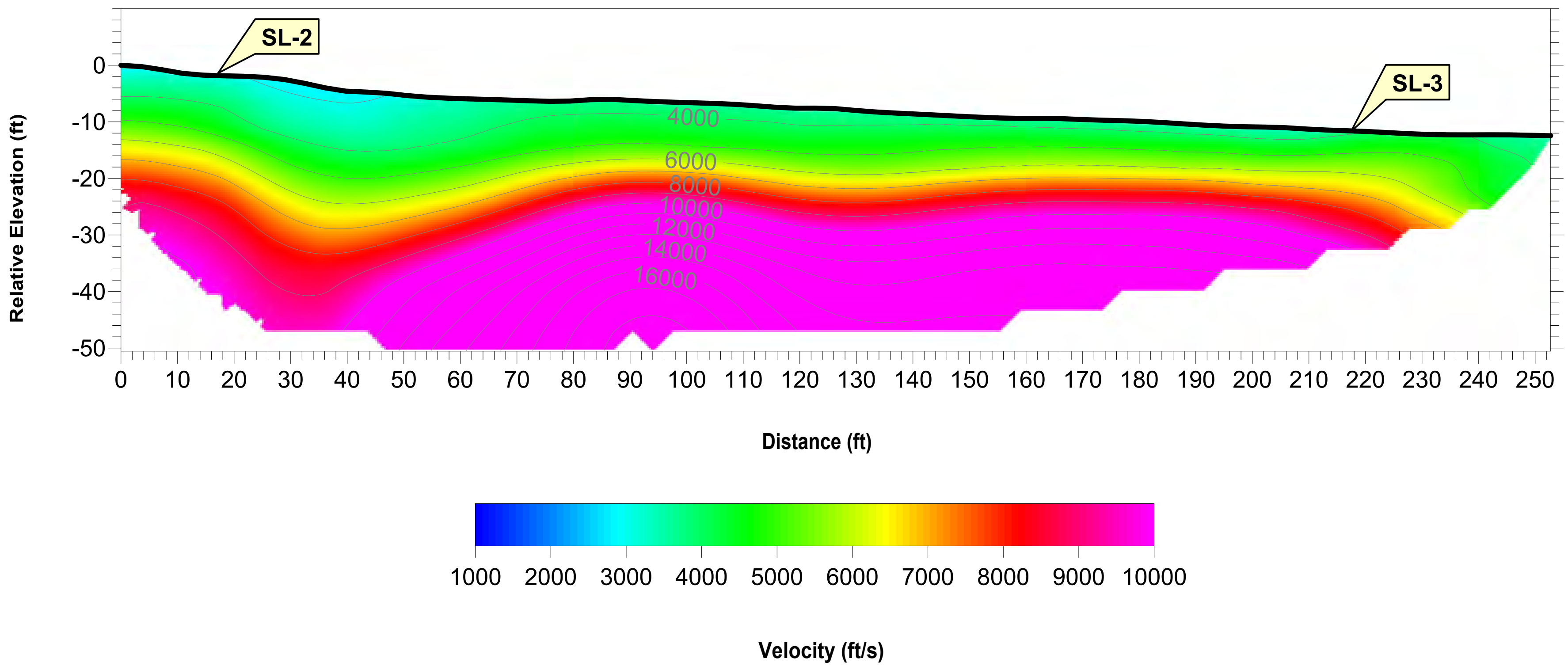




SITE PHOTOGRAPHS	Meyers Avenue Escondido, California		ATLAS Figure 3
	Project No.: 121432SWG	Date: 11/21	

TOMOGRAPHY MODEL

SL-1

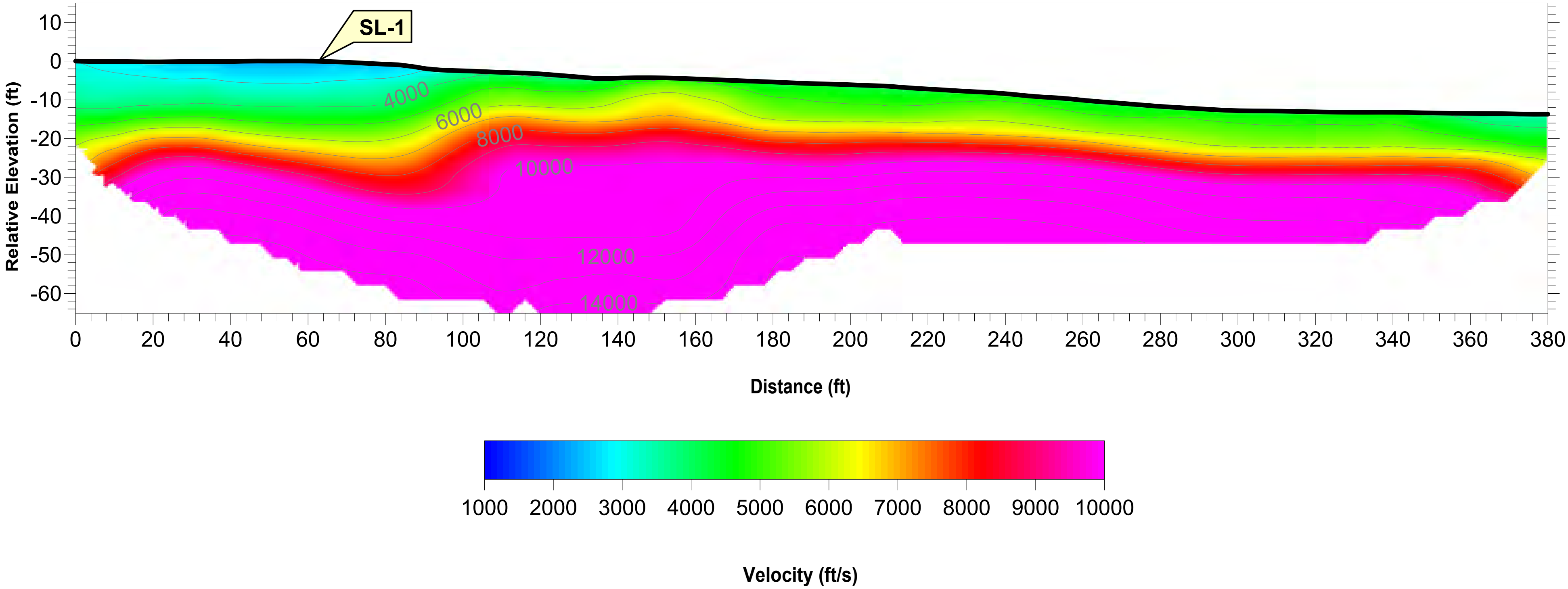


Note: Contour Interval = 1,000 feet per second

SEISMIC PROFILE SL-1	Meyers Avenue Escondido, California		ATLAS Figure 4a
	Project No.: 121432SWG	Date: 11/22	

TOMOGRAPHY MODEL

SL-2

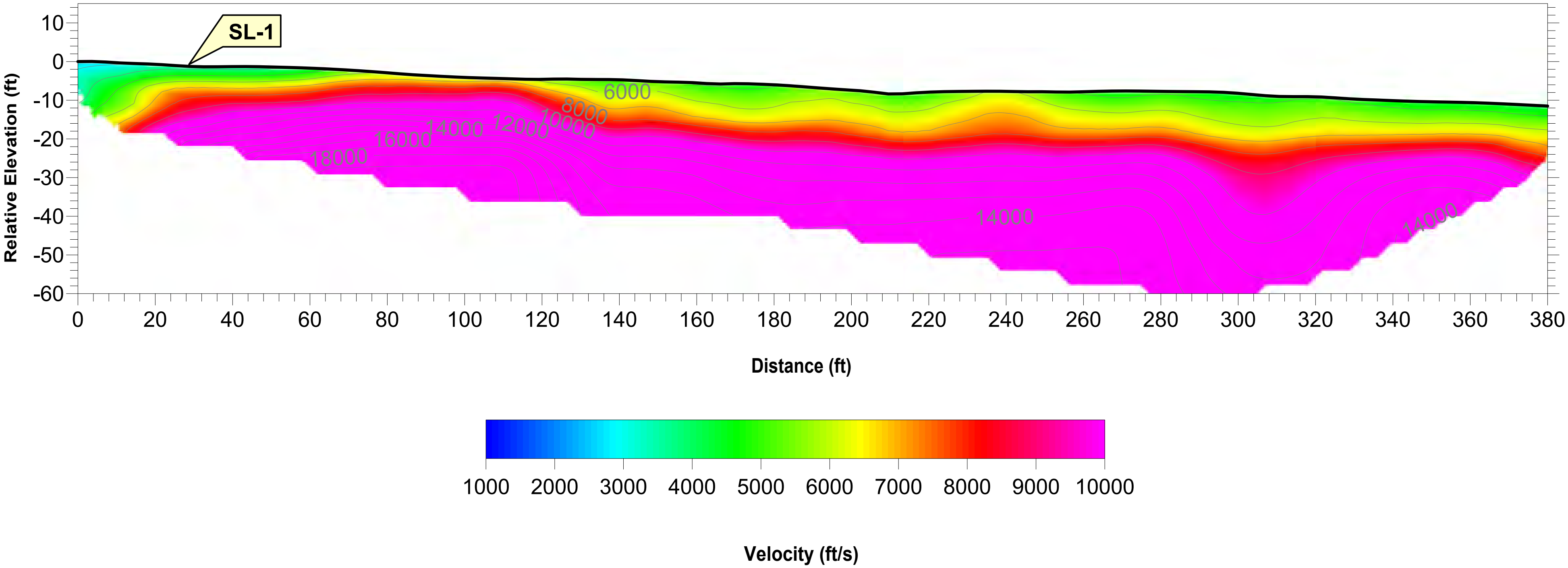


Note: Contour Interval = 1,000 feet per second

SEISMIC PROFILE SL-2	Meyers Avenue Escondido, California		ATLAS Figure 4b
	Project No.: 121432SWG	Date: 11/22	

TOMOGRAPHY MODEL

SL-3



SEISMIC PROFILE SL-3	Meyers Avenue Escondido, California	ATLAS Figure 4c
	Project No.: 121432SWG Date: 11/22	

Note: Contour Interval = 1,000 feet per second