

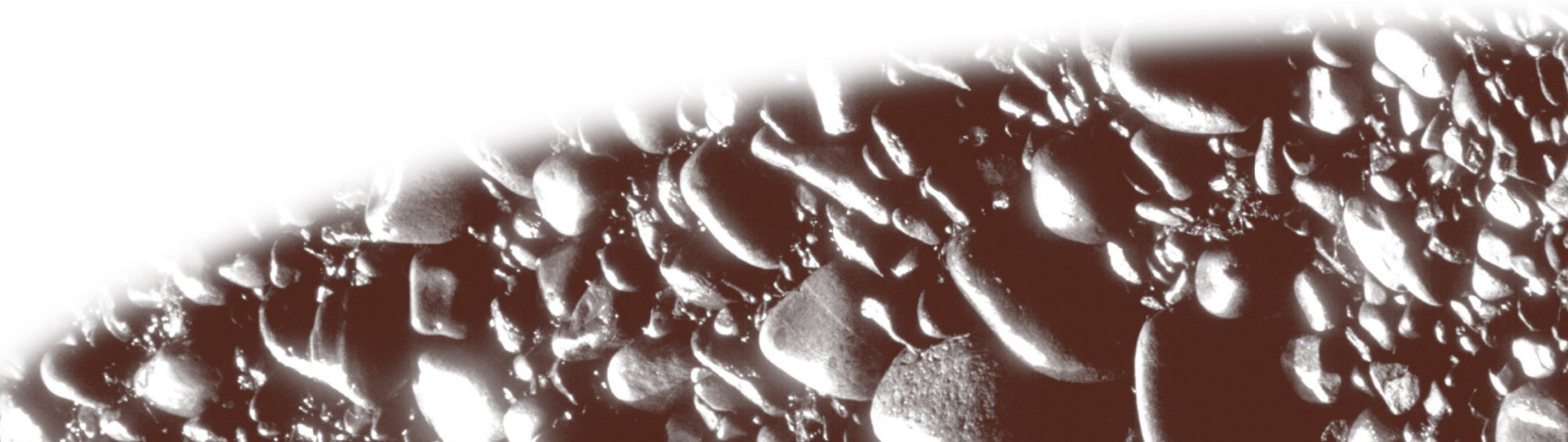
Geophysical Survey

**Proposed Public Storage Facility
424 Eagle Rock Avenue
West Orange, New Jersey**

Prepared for:

**Public Storage
Mount Laurel New Jersey**

**February 8, 2021
Project No. 9G-2101001**





GILES

ENGINEERING ASSOCIATES, INC.

GEOTECHNICAL, ENVIRONMENTAL & CONSTRUCTION MATERIALS CONSULTANTS

• Atlanta, GA
• Dallas, TX
• Los Angeles, CA
• Manassas, VA
• Milwaukee, WI

Public Storage, Inc.
139-A Gaither Drive
Mount Laurel, New Jersey

February 8, 2021

Attention: Mr. Frank Caccuro
Vice President of Construction - East

Subject: Geophysical Survey
Proposed Public Storage Facility
424 Eagle Rock Avenue
West Orange, New Jersey
Giles Project No. 9G-2101001

Dear Mr. Caccuro:

In accordance with your request and authorization, and in general accordance with Giles' Proposal No. 9GP-2011010, dated November 30 2020, a geophysical survey was conducted at the project site referenced above. The purpose of the Geophysical Survey was to further investigate the subsurface conditions, and to assist in evaluation of the variable-depth bedrock conditions at the site. This geophysical survey was performed at the request of Valvoline, and following a *Report of Geotechnical Engineering Exploration and Analysis* (Giles Project No. 9G-2008002), dated October 13, 2020. The survey was performed by our sub-consultant, Forrest Environmental Services, Inc. (FES) under the direct supervision of Giles Engineering Associates, Inc. (Giles), and the conclusions developed from the survey are discussed in the accompanying report.

A total of six seismic refraction (SR) lines were conducted at the site. The seismic refraction lines were selected and laid out at the site by Giles; the SR survey was performed by FES and monitored by a Giles representative. The lines were conducted in the vicinity of the proposed building footprint. Survey lines 1 and 2 were positioned in a south-to-north alignment, with each line starting at the south end of the line; survey lines 3, 4, 5, and 6 were aligned in a west-to-east alignment., with starting points at the west end of the line. The locations and alignment of each of the survey lines is shown for reference in Figure 1 of the attached Geophysical Survey report. Figures 2 through 7 provide the SR-date-interpretations for Lines 1 through 6 respectively (as indicated in the respective title blocks).

SR Line 1 (conducted along the west side of the proposed building) indicates that the depth to basalt bedrock appears to be about near ground surface in the south end of the site (in the portion of the site that is currently wooded and undeveloped), and dipping to about 25 feet in the north portion of the pad.

SR line 2, (conducted along the east side of the proposed building) indicates that the depth to basalt bedrock appears to be about near ground surface in the south end of the site (in the portion of the site that is currently wooded and undeveloped), and dipping to about 30 feet in the north portion of the pad.

SR Line 3 (conducted along the north side of the proposed building) indicates that the depth to bedrock is variable, with depths at or near the surface at the east end of the line to depths of up to about 20 feet deep. It should be noted that, at positioning approximately 100 feet along Line 3, a

Geophysical Survey
Proposed Public Storage Facility
W. Orange, NJ
Project No. 9G-2101001
Page 2

probable pinnacle of shallow bedrock was identified. Though, considering the site conditions encountered from the previously-completed test borings, this is lost likely indicative of a large boulder (or cluster of boulders

SR Line 4 (conducted directly south of the existing building) indicates that the depth to bedrock is variable, with depths at or near the surface at the eastern end of the line, of up to about 30 feet deep.

SR Line 5 (conducted south end of the proposed building – within the wooded and undeveloped area) indicates that the depth to was at or near the ground surface to about 5 feet deep.

SR Line 6 (conducted within the southern portion of the proposed building – along the south edge of the existing parking lot) indicates that the depth to bedrock is variable, with depths at or near the surface to about 15 feet deep.

The basalt bedrock at the site is consistent with bedrock that typically requires removal by blasting, ripping, hoe-ramming, or other suitable rock-excavation methods.

The geologic features indicated by the geophysical survey that appear to be generally consistent with the findings from the test borings performed as part of Giles' previously referenced *Report of Geotechnical Engineering Exploration and Analysis*. The results of the seismic refraction survey lines and detailed summary of the survey methods and findings are provided in the attached report.

We appreciate the opportunity to have been of service on this project. For any questions or if we may be of further service, please contact us at your convenience.

Very truly yours,

Giles Engineering Associates, Inc.



Darryl B. Keating
District Manager

Distribution: Public Storage
Attn: Mr. Frank Caccuro (1 via email: FCaccuro@PublicStorage.com)

Attachments: Geophysical Survey Report

**Geophysical Survey
Proposed Public Storage Facility
424 Eagle Rock Avenue
West Orange, New Jersey**

Prepared For:

Giles Engineering Associates, Inc.
8132 Flannery Court
Manassas, Virginia 20109

Prepared By:

Forrest Environmental Services, Inc.

3057 Crosen Court
Oak Hill, Virginia 20171
(703) 648-9090

February 2021

FES Project No. 20236

Table of Contents

Section	Page
1.0 Introduction	1
2.0 Equipment and Procedures	2
3.0 Interpretation Methods	3
4.0 Survey Results	4

List of Figures

Figure	
1	Geophysical Site Map
2	SR Line 1
3	SR Line 2
4	SR Line 3
5	SR Line 4
6	SR Line 5
7	SR Line 6

1.0 Introduction

Forrest Environmental Services, Inc. (FES) performed a geophysical survey located for the proposed Public Storage Facility on 424 Eagle Rock Avenue in West Orange, New Jersey on the 27th and 28th January 2021. The investigation consisted of a seismic refraction survey (SR) to determine depth to bedrock and bedrock rippability.

Six seismic refraction (SR) lines were conducted at the site. The SR survey covered approximately 1,750 linear feet. The survey boundaries were selected by a Giles Engineering Associates, Inc. representative.

The geophone spacing was 10 feet and used 24 geophones for the SR lines 1 through 6. The total distance of SR lines 1 through 6 was approximately 250 feet during collection.

The 14370 Lee Highway site is located within the Piedmont Physiographic Province of New Jersey. The site geology includes the Orange Mountain Basalt. Bedrock outcrops or float were observed at the southern section of the survey.

Topographically, the site slopes mostly to the west. Survey locations and physical features are shown in Figure 1.

Details of the geophysical survey are described in the following sections.

2.0 Equipment and Procedures

Seismic refraction theory is based upon the physical characteristics of compressional waves as they travel through the subsurface. The velocity of these waves is dependent upon the density of the travel medium.

Seismic refraction measures density, thickness, and depth of geological strata using sound (acoustic) waves transmitted into the subsurface. Sound waves travel at different velocities in various soils and rocks and are refracted at the interface between layers. Geophones receive the vibrations of the sound energy and translate them to electrical signals. The signals are displayed on a seismograph.

Refraction soundings use the travel times of compressional sound waves (P-Waves) to determine depth to bedrock, the thicknesses, and velocities of subsurface materials.

Refraction sounding is based on measuring the first-arrival travel time from the sound source to the geophone. The first-arrival time versus distance to the geophone is plotted and the data is inverted into a model of subsurface velocities.

The seismic refraction survey used a 24-channel Geode Seismograph that was connecting to a laptop which collected data from a geophone spread consisting of 24 10-Hertz geophones. The source was a 12-pound hammer striking an aluminum plate and stacked 6 to 8 times at five different positions per array. Seismic lines 1 through 6 placed geophones at 10 foot intervals. Sources were placed at 10 feet from each end at stations 0 feet and 250 feet and three sources at the middle of the seismic array at stations 65 feet, 125 feet, and 185 feet.

3.0 Interpretation Methods

The seismic refraction method is based on three important assumptions:

- Acoustic velocity increases with depth;
- Sufficient acoustic velocity contrast exists between layers to allow differentiation between adjacent strata of interest; and
- The layers have sufficient thickness to permit detection.

Time versus distance plots of the first-arrival sound waves were used to locate depth of bedrock. The inverse of the slope of the time versus distance curves is the velocity of the strata.

Filters, sampling intervals, etc., were all performed in field. The raw data was reduced and interpreted using WinSIP Software (Rimrock Geophysics, Inc.). WinSIP aids in determining "first picks". Rayfract Seismic Refraction Tomography Software (Intelligent Resources, Inc.) was used to calculate arrival times, constructing time vs. distance graphs, and forming seismic cross-sections. The ground surface elevations were determined by a USGS topographic quadrangle.

Typical overburden velocities are approximately less than 2,500 feet/second (blue). Bedrock velocities typically measure greater than 4,000 feet per second (yellow to red).

4.0 Survey Results and Conclusions

The objective of the SR survey was to locate determine depth to bedrock and bedrock rippability. The horizontal scale is in feet. The vertical scale is in approximate feet above sea level.

SR Line 1 indicates depth to bedrock appears to be about near ground surface at approximately 60 feet North to about 25 feet below ground surface at approximately 220 feet North (Figure 2).

SR Line 2 indicates depth to bedrock appears to be about near ground surface at approximately 350 feet West to about 30 feet below ground surface at approximately 240 feet North (Figure 3).

SR Line 3 indicates depth to bedrock appears to be about near ground surface at approximately 240 feet East to about 20 feet below ground surface at approximately 130 feet East.

SR Line 4 indicates depth to bedrock appears to be about near ground surface at approximately 240 feet East to about 30 feet below ground surface at approximately 70 feet East.

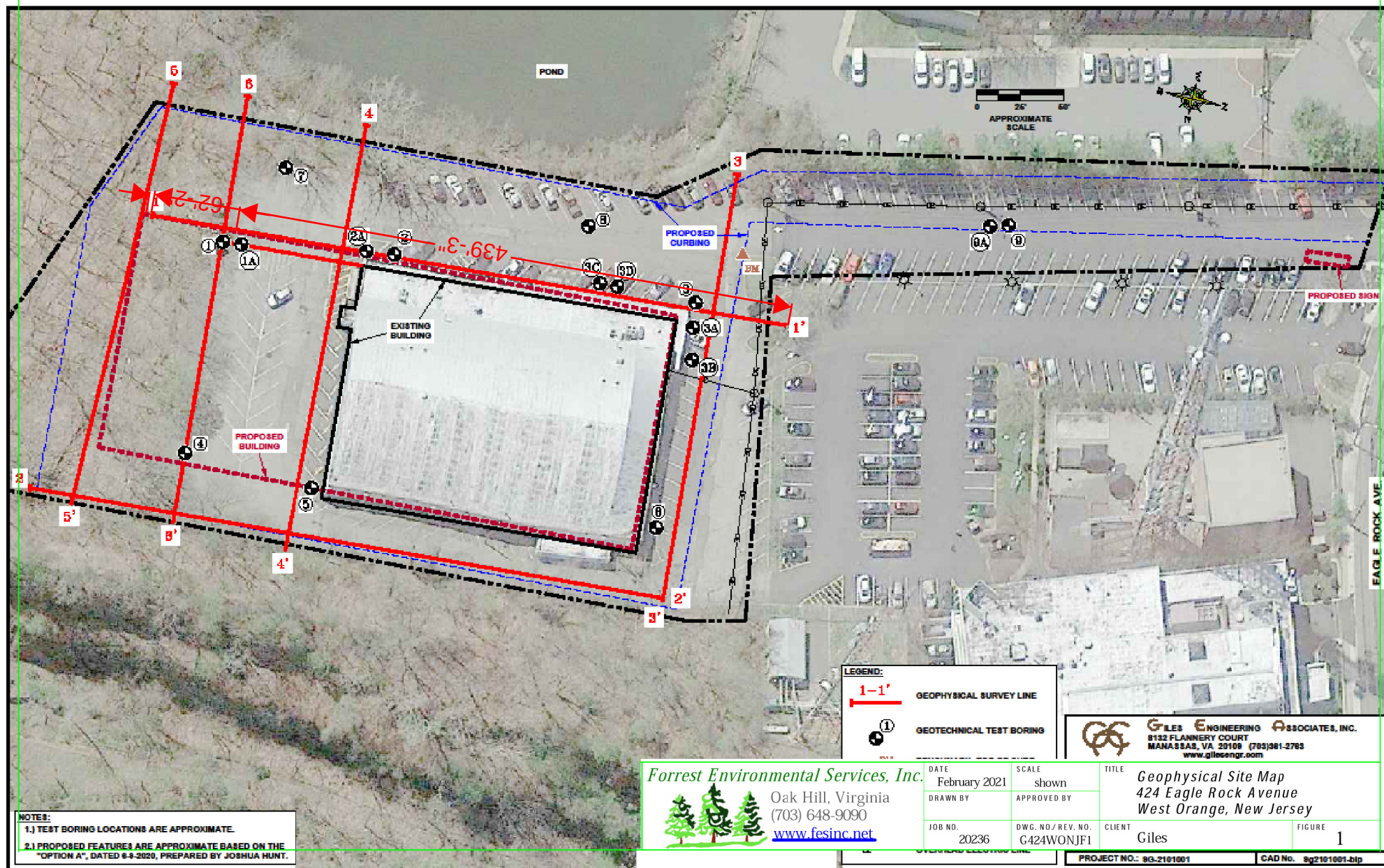
SR Line 5 indicates depth to bedrock appears to be about near ground surface at approximately 250 feet East to about 15 feet below ground surface at approximately 190 feet East.

SR Line 6 indicates depth to bedrock appears to be about near ground surface at approximately 80 feet East to about 5 feet below ground surface at approximately 180 feet East.

The geophysical survey indicated depth to bedrock appears to be from about near ground surface to about 30 feet below ground surface that typically requires removal by blasting, ripping, or hoe-ramming, rock trenching/sawing or other suitable rock excavation methods.



Photo 1 - Seismic Meter and Geophones at SR Line 4



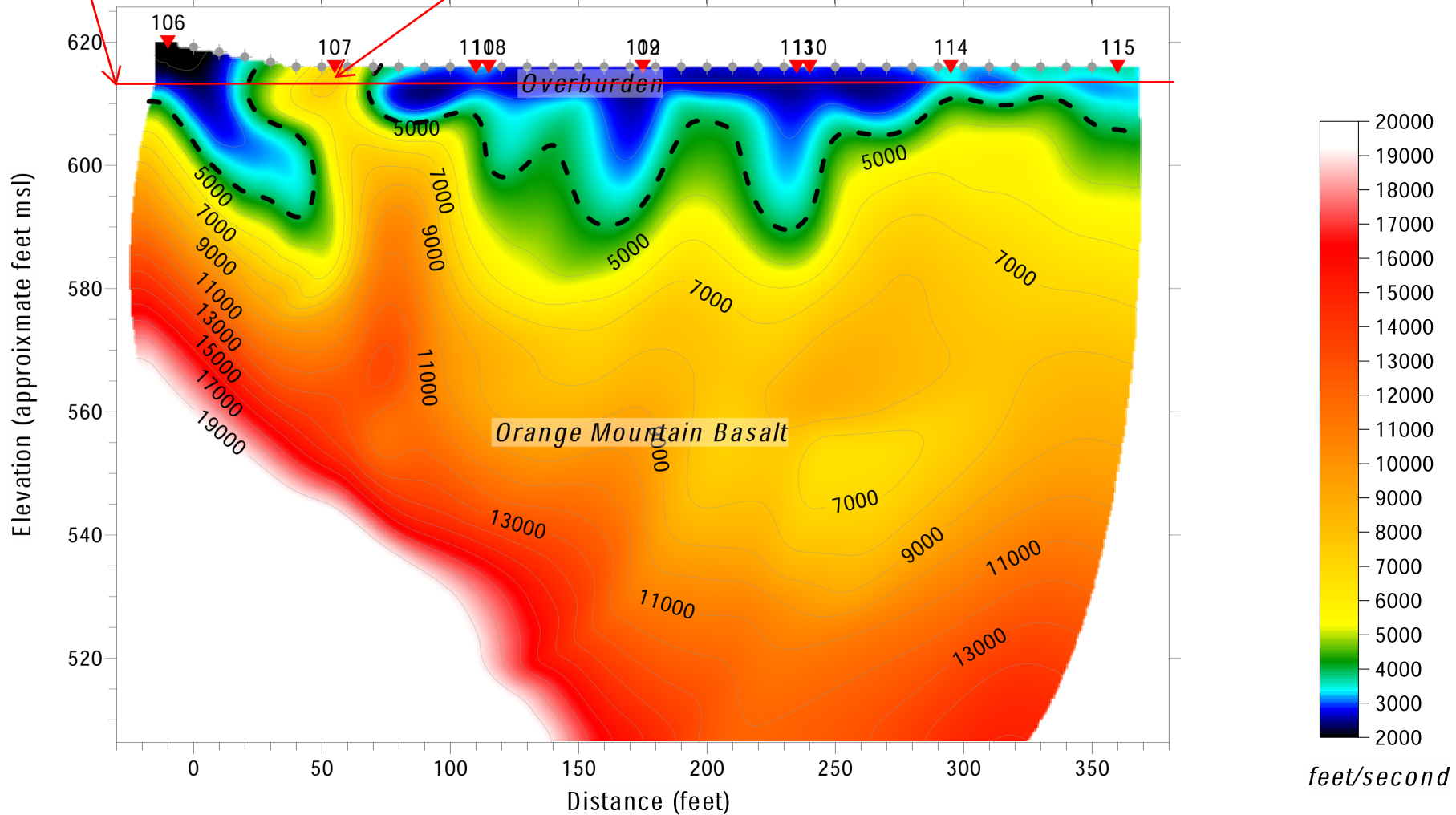
Bedrock at surface.

Building
Elevation
is 617
minus 3
= 614.

SR Line 1 RMS error 2.7%=1.17ms 20 WET iters. 50Hz Width 3.0% initial GRADIENT.GRD Vers. 3.35

South

North



Forrest Environmental Services, Inc.



Oak Hill, Virginia
(703) 648-9090

www.fesinc.net

DATE
January 2021

SCALE
shown

TITLE
SR Line 1
424 Eagle Rock Avenue
West Orange, New Jersey

JOB NO.
20236

DWG. NO./REV. NO.
G242W0N1F2

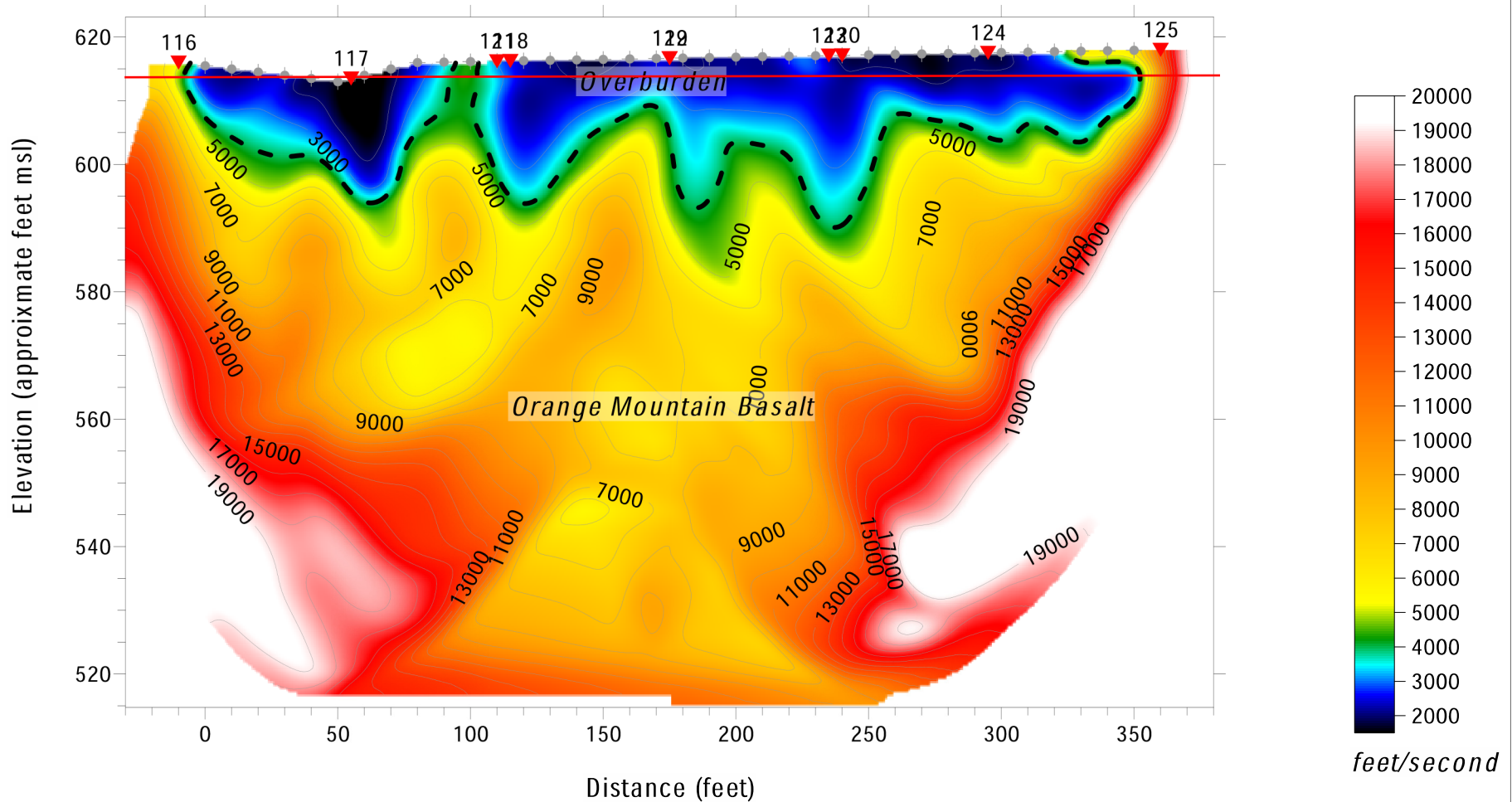
CLIENT
Giles Engineering Associates

FIGURE
2

SR Line 2 RMS error 4.1%=1.39ms 20 WET iters. 50Hz Width 3.0% initial GRADIENT.GRD Vers. 3.35

South

North



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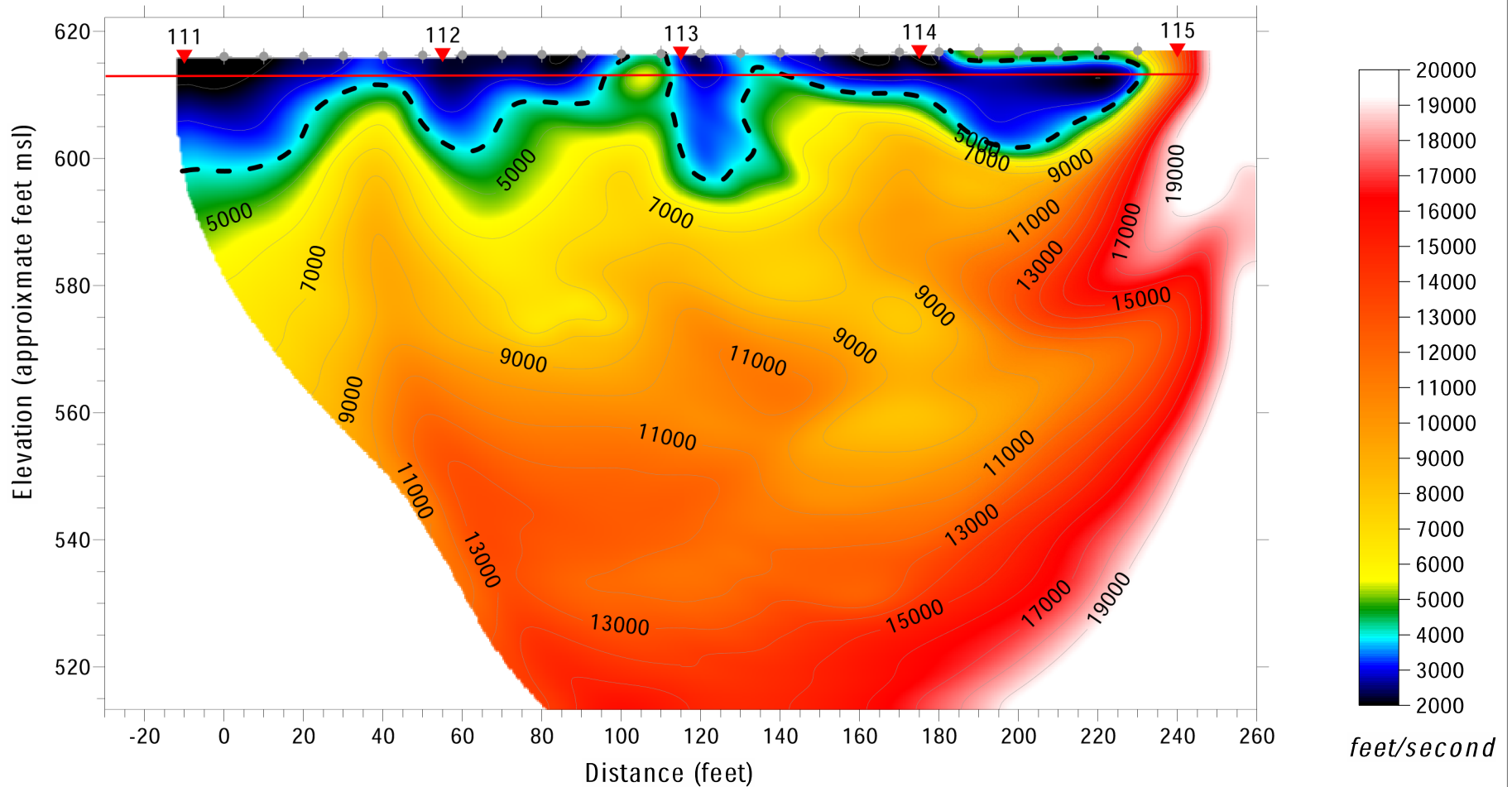
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(703) 648-9090
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DATE January 2021	SCALE shown	TITLE SR Line 2 424 Eagle Rock Avenue West Orange, New Jersey	
DRAWN BY	APPROVED BY		
JOB NO. 20236	DWG. NO./REV. NO. G242W0N1F3	CLIENT Giles Engineering Associates	FIGURE 3

SR Line 3 RMS error 3.5%=0.96ms 20 WET iters. 50Hz Width 2.5% initial GRADIENT.GRD Vers. 3.35

West

East



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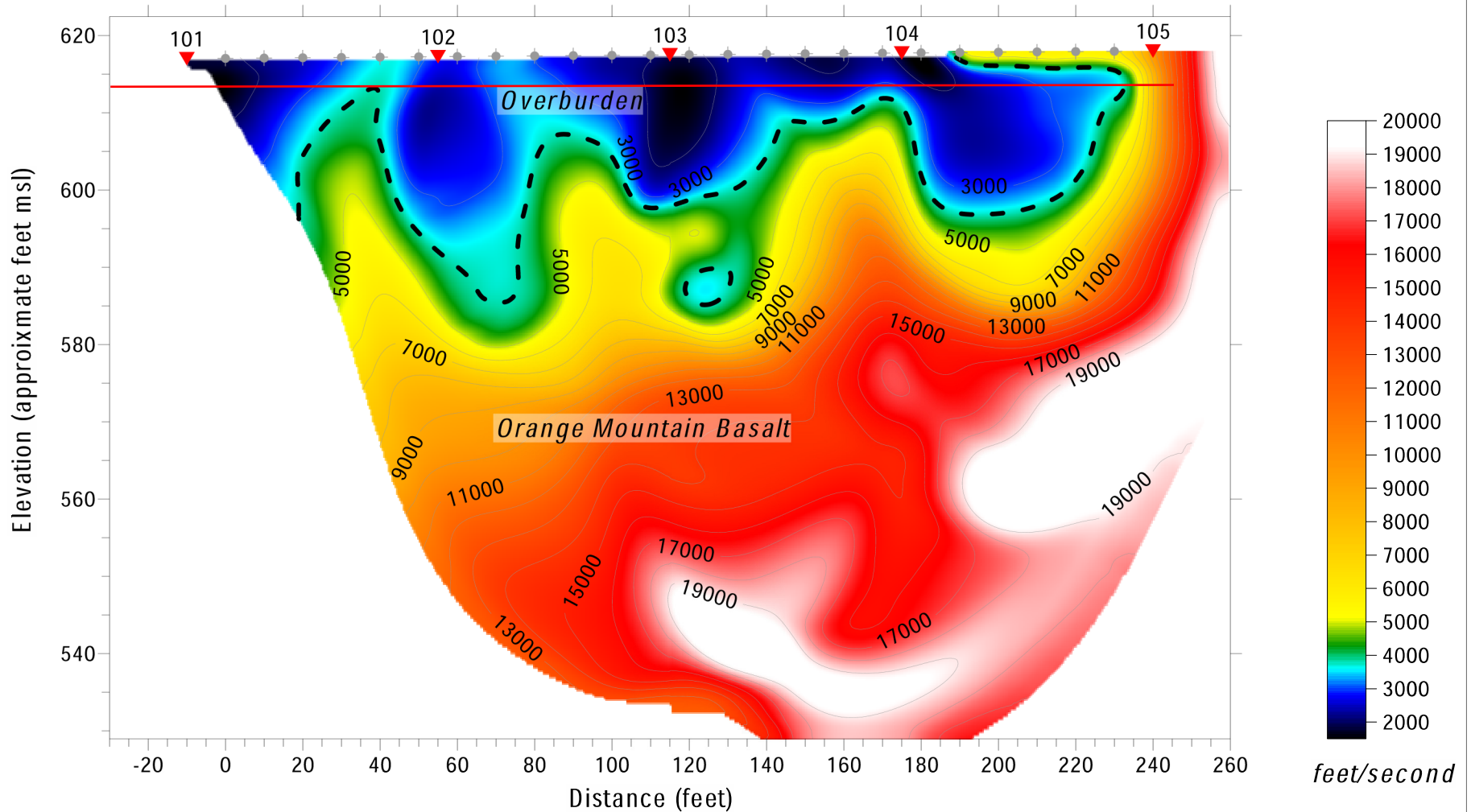
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SR Line 4 RMS error 3.2%=1.46ms 20 WET iters. 50Hz Width 3.0% initial GRADIENT.GRD Vers. 3.35

West

East



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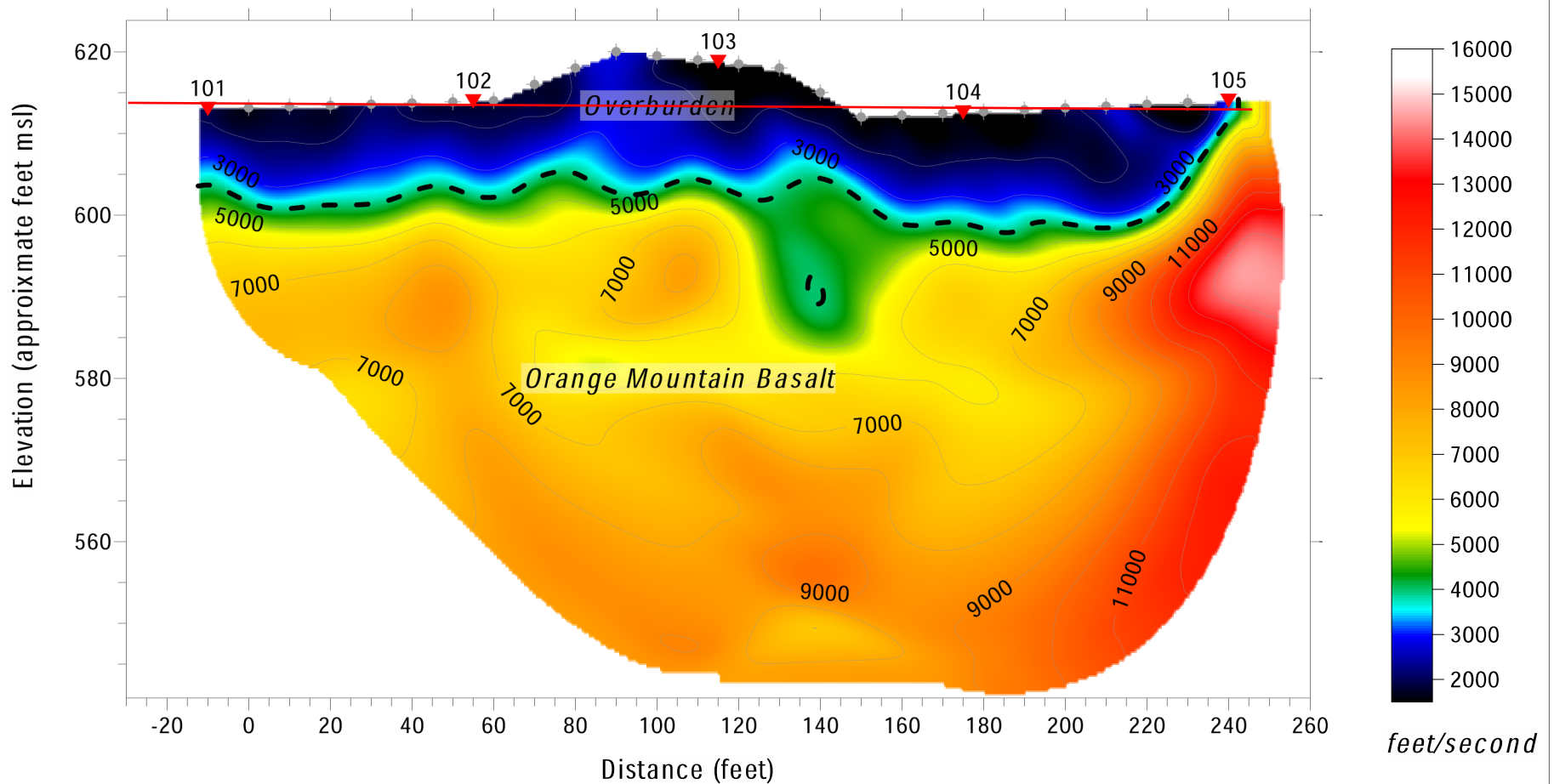
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SR Line 5 RMS error 2.2%=0.68ms 20 WET iters. 50Hz Width 2.5% initial GRADIENT.GRD Vers. 3.35

West

East



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DATE	January 2021	SCALE	shown
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JOB NO.	20236	DWG. NO./REV. NO.	G242W0N1F6

TITLE
SR Line 5
424 Eagle Rock Avenue
West Orange, New Jersey

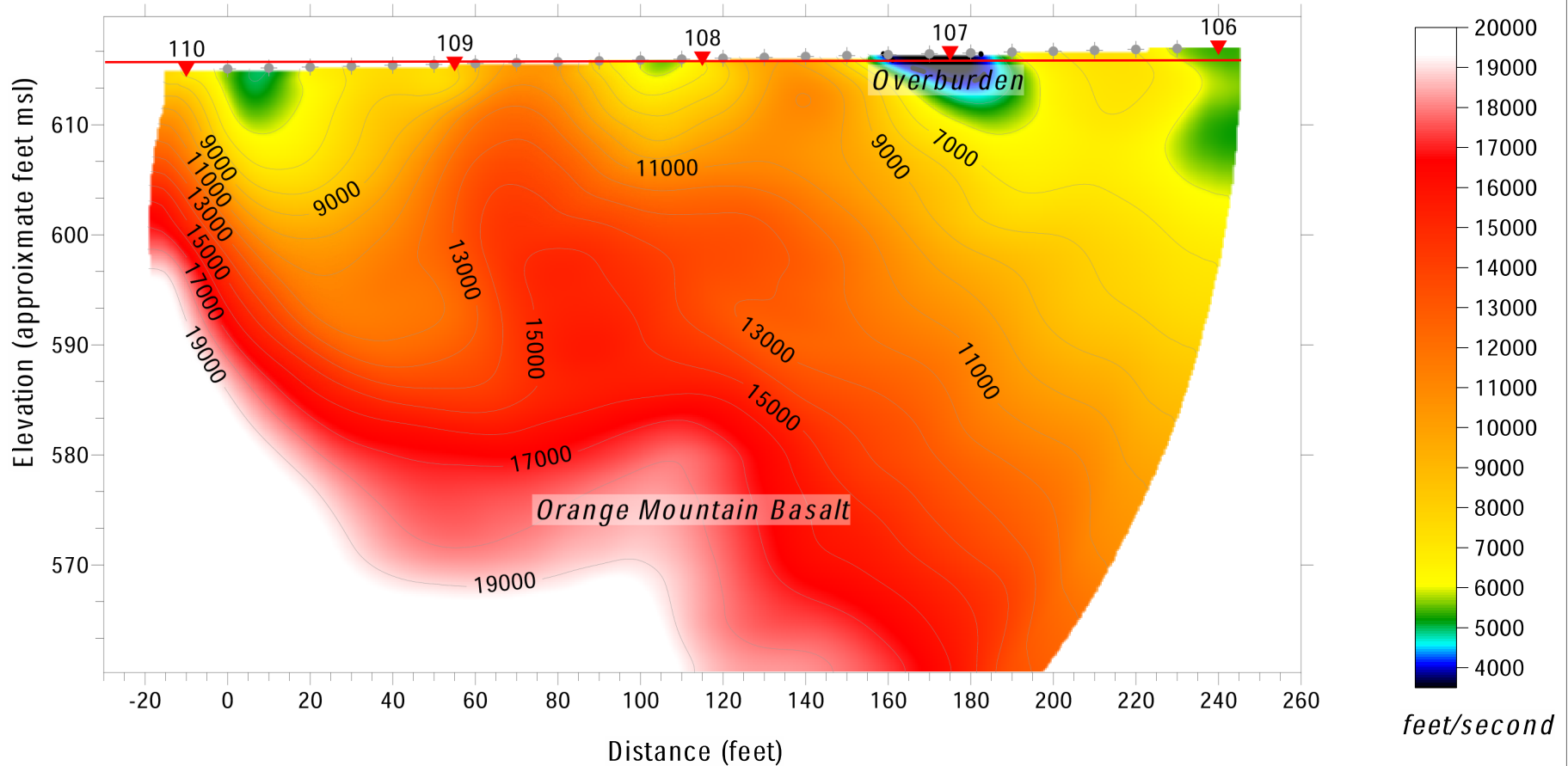
CLIENT
Giles Engineering Associates

FIGURE
6

SR Line 6 RMS error 1.4%=0.32ms 20 WET iters. 50Hz Width 2.3% initial GRADIENT.GRD Vers. 3.35

West

East



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DATE January 2021	SCALE shown	TITLE <i>SR Line 6 424 Eagle Rock Avenue West Orange, New Jersey</i>	
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JOB NO. 20236	DWG. NO./REV. NO. G242W0N1F7	CLIENT Giles Engineering Associates	FIGURE 7