

Efaté Earthquake Engineering Technical Assistance

Port Vila CBD Geotechnical Hazard Study: Geotechnical Factual Report

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1 Introduction

Tonkin & Taylor International Ltd (T+TI) has been engaged by Egis NZ Limited (Egis) to provide specialist geotechnical engineering services for the New Zealand Ministry of Foreign Affairs and Trade (MFAT) Efate Earthquake Engineering Technical Assistance (EEETA) programme. This programme supports the Government of Vanuatu (GoV) in its recovery efforts following the 17 December 2024 earthquake, which caused significant damage to buildings and infrastructure in Port Vila.

As part of the programme, a geotechnical hazard study (the Study) is underway to increase the long-term resilience of Port Vila's built environment. The Study encompasses two distinct areas as shown on Figure 1.1. A summary of these areas is detailed in Section 1.2.

The Study is being delivered in the following stages:

1 Data Compilation and stakeholder collaboration
2 Geotechnical investigation
3 Ground zoning
4 Geotechnical Guidance Document
5 Digital deployment to GIS portal

This Geotechnical Factual Report (GFR) is the main deliverable of the geotechnical investigation (Stage 2) – undertaken across 7 November 2025 to 6 March 2026 – and provides key information to support the ground zoning and subsequent Geotechnical Guidance Document. The scope of work completed includes:

- LiDAR and photogrammetry drone survey
- Machine boreholes at 11 No. locations
- Installation of 3 No. shallow piezometers and subsequent continuous groundwater monitoring over a period of nine weeks from 16 December to 24 February.
- Laboratory testing on selected soil and rock samples, including:
  - 2 No. Atterberg Limit tests
  - 15 No. Particle Size Distribution tests
  - 3 No. Allophane tests
  - 9 No. Unconfined Compressive Strength tests
  - 3 No. Consolidated-Undrained (single stage) triaxial compression tests
- Downhole geophysical (shear wave) testing in 6 No. boreholes locations
- Surface geophysical surveys along key road corridors, including:
  - Multi-Channel Analysis of Surface Waves across 5.5 km in length
  - Seismic Refraction Tomography across 1 km in length
  - Horizontal-Vertical Spectral Ratio Analysis at 12 No. locations
- Preparation of this GFR summarising the factual details of the site investigation works

Interpretation of this factual data – including development of the ground model and hazard assessment to inform the ground zoning and geotechnical guidance document – will be provided in a separate Geotechnical Assessment Report.

1.1 Project background

The post-earthquake recovery in Port Vila presents a critical opportunity to guide the rebuilding of the CBD to be more resilient to future natural hazards. This opportunity was identified during initial observations from post-earthquake reconnaissance undertaken by T+TI in March and April 2025 (independent of the MFAT-funded EEETA programme), and by GNS which recommended similar actions in their May 2025 report[1].

These initial observations revealed marked variability in ground conditions in specific areas of the CBD, evidenced by distinct patterns of land deformation. There has been substantial uncertainty regarding these conditions due to a lack of consolidated geotechnical data and testing. Characterising these ground conditions is therefore recognised as essential to understanding the geohazards and to guide the adoption of appropriate structural designs for future development. This reduces uncertainty, and enables geohazards pertinent to the conditions to be appropriately addressed through design and construction.

As part of the EEETA inception visit to Port Vila from 18 to 23 May 2025, T+TI – alongside MFAT – met with key stakeholders including the Port Vila City Council (PVCC), the Ministry of Infrastructure and Public Works (MIPU) and the Department of Urban Affairs and Planning (DUAP) to confirm the need for geotechnical hazard guidance to support the resilient rebuilding of the Port Vila CBD. The EEETA programme aims to provide the engineering guidance necessary to support this resilient long-term redevelopment. Combining visual evidence of ground deformation with subsurface data provides an opportunity to more reliably calibrate earthquake design guidelines for use in future development of the CBD and surrounding areas.

1.2 Study definitions

This Study defines two distinct areas to align the level of detail that will be undertaken as part of the geotechnical assessment and Geotechnical Guidance Document based on availability of pre-existing geotechnical data, the distribution of observed damage following the 17 December 2024 earthquake, and the type of development. These factors informed the proposed level of investigation for each of the following zones:

- **Broader (high-level) Study Area (Blue outline):** This area defines the full spatial extent of the Study, encompassing the wider CBD area provided by the PVCC[2]. Spatially, this area includes the Detailed Study Area, however the term is used herein to denote the broader regional context. Development within this zone is characterised by lower density and likely to generally comprise structures less than three storeys in height. Assessment in this zone relies primarily on compiled historical data and geomorphic mapping, with limited targeted geotechnical investigations undertaken as part of this study.
- **Detailed Study Area (Red outline):** This area encompasses the Port Vila Central Business District (CBD) downtown area. Future development in this area is expected to be high-density, with numerous multi-storey buildings, containing the highest economic investment and critical infrastructure, where the consequences of ground damage are likely to be more significant to Port Vila. Consequently, this area was the primary focus of the geotechnical investigations, allowing for a better understanding of the ground to support the resilience of existing and future key assets.

[1] Massey, C. I., Boyes, A. F., Lin, S. L., Lukovic, B., Morgenstern, R., & Farr, J. A. (2025). *Support for Vanuatu Earthquake 2024 – Landslide hazard identification and risk assessment: Efate field reconnaissance* (GNS Science Consultancy Report 2025/42). GNS Science.

[2] Manses Fatdal, email to Christopher Hartnett, 21 May 2025, subject "Fw: Map," attachment: "Location map Kawenu area to CBD.jpeg.

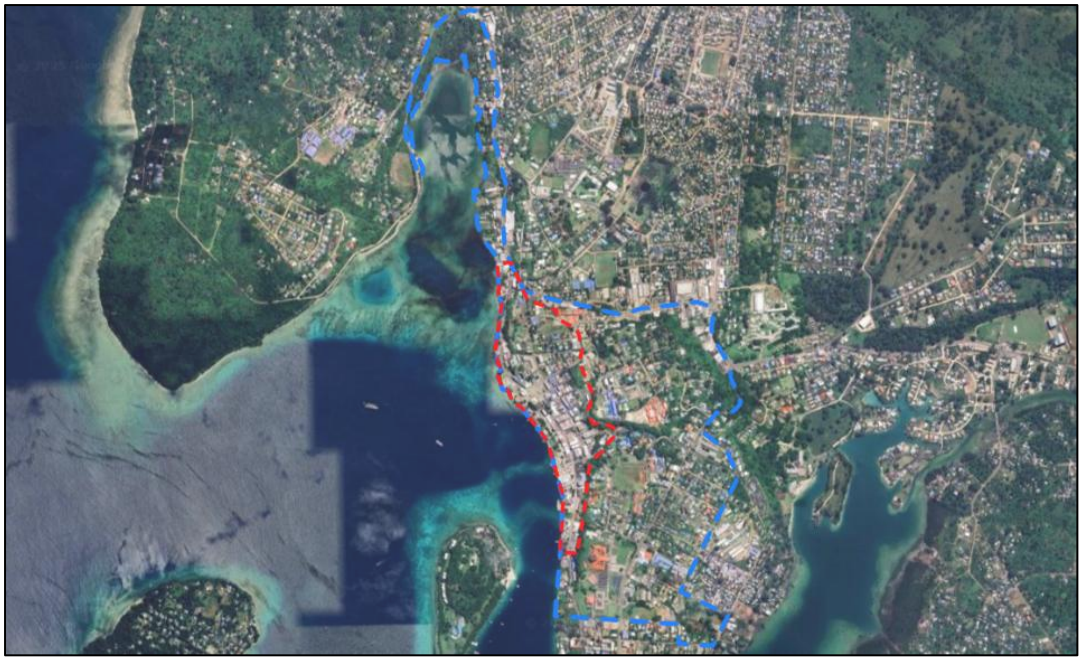

Figure 1.1: Proposed detailed study area (outlined red) and high-level study area (outlined blue).

1.3 Supplementary reports

Supplementary reports have been prepared as part of this geotechnical hazard study and should be read in conjunction with this report. These reports are summarised below Table 1.1.

Table 1.1: Summary of supplementary reports – 1097984.1000

Document	Date	Summary
Investigation Implementation Plan	3 November 2025	Sets out the proposed scope, methodology and locations for the geotechnical investigations, providing the planning framework to undertake the boreholes, groundwater monitoring, laboratory testing and geophysical survey.
Reconnaissance Report	18 December 2025	Documents the outcomes of the Request for Information (RFI) workshops and consolidates pre-existing geotechnical, geological and geospatial data from stakeholders and the T+TI database, forming the existing-information baseline that this GFR builds upon
Preliminary Ground Zoning Report	9 February 2026	Presents an initial geomorphic and ground-condition zoning of the Study Area developed from existing data and early field observations. The factual data compiled in this GFR will be used to refine and validate that zoning in the subsequent Geotechnical Assessment Report.
Traffic Management – Surface Geophysical Testing	12 February 2026	Describes the traffic management arrangements required to safely deliver the road-corridor to support the surface geophysical fieldwork reported in Section 3.5 of this GFR.
Investigation progress update and proposed changes	23 February 2026	An interim update on investigation progress and proposed scope adjustments (e.g. Deferral of BH01), explaining the changes from the original Implementation Plan that are reflected in the completed scope summarised in this GFR.

2 Published geology

The island of Efaté is predominantly volcanic in origin and lies within the Tertiary to Recent volcanic island arc system that forms Vanuatu. The volcanic sequence is dominated by the Efaté Pumice Formation which consists of a succession of non-welded pumice breccia and beds of sand and silt deposited during a major eruptive event approximately 1 Ma (million years ago).

The upper section of the Efaté Pumice Formation consists of the Rentabau Tuffs, a sequence of well sorted sand to silt beds. These beds were deposited within a submarine environment, likely as density currents[3]. These materials are extremely weak to weak in strength.

Upon the cessation of volcanic activity in the Pleistocene, abundant fringing coral reef growth occurred around Efaté, unconformably overlying the older volcanic deposits. These reef deposits form the Reef Limestone Formation[3]. Periods of uplift and fluctuating sea levels during glacial and interglacial periods of the Quaternary have resulted in the formation of several coral terraces up to 400 m above sea level in Efaté[4]. Large areas of Efaté Island's coastal edge have a capping of coral reefs. The published geological map presented in Figure 2.1 indicates that the site is underlain by recent raised reef, older raised reef and Efaté Pumice Formation.

The broad tectonic setting involves uplift of the island on the hanging wall of the Vanuatu Subduction Zone (VSZ). Inter-plate deformation includes extensional normal faulting as evidenced by reports of the trend and dip of the fault rupture in December 2024, and normal fault grabens that are observed across the island. Normal faults shown on the geological map (Figure 2.1) were mapped from lineations and scarps visible on aerial photographs.

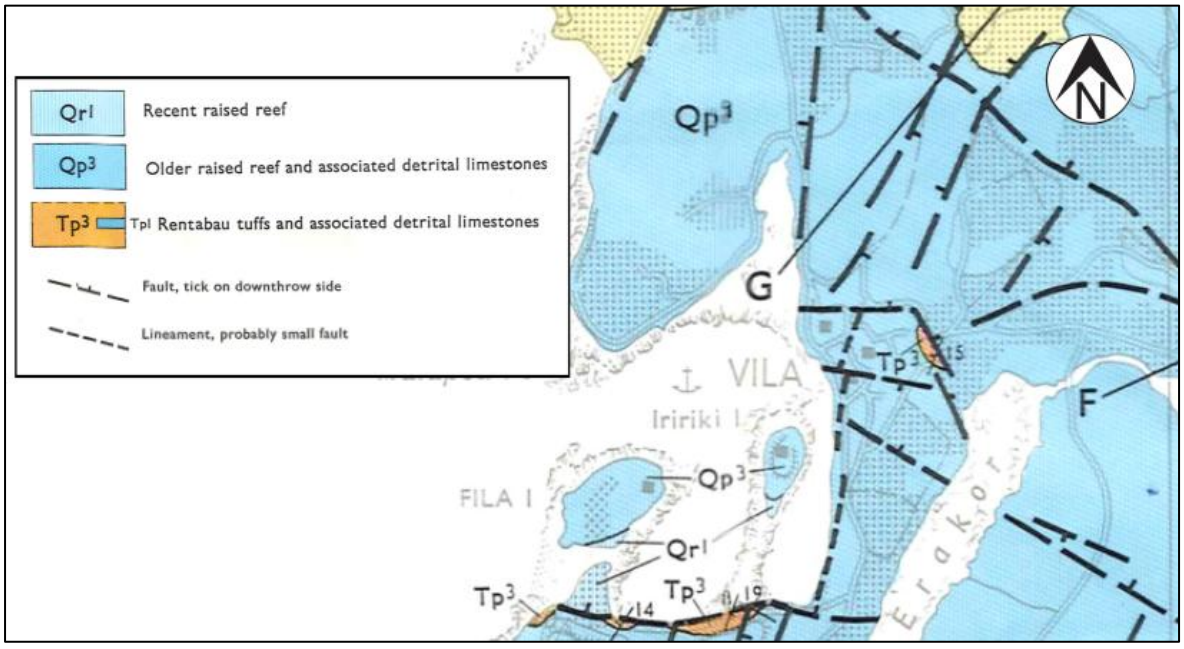

Figure 2.1: Geological setting of Port Vila (Geology of Efaté 1:100,000 New Hebrides Geological Survey Sheet 9).

[3] Roas, A. M., & McPhie, J. (2003). The submarine record of a large-scale explosive eruption in the Vanuatu Arc: ~ 1 Ma Efaté Pumice Formation. Explosive Subaqueous Volcanism, Geophysical Monograph 140, 273-283. American Geophysical Union.

[4] J. Lecolle & M. Bernat (1985), "Late Quaternary surrection history of Efaté Island, New Hebrides Island arc (Vanuatu): Th/U dates from uplifted terraces," in C. Gabrie & J. L. Toffart (Eds.), Proceedings of the Fifth International Coral Reef Congress, Tahiti, 27th May-1st June 1985 (pp. 179-184).

3 Site investigations

Site investigations to support the Port Vila CBD Geotechnical Hazard Study were undertaken between 7 November 2025 and 6 March 2026. The investigations comprised:

- Drone LiDAR and photogrammetry survey.
- Machine boreholes at 11 No. locations.
- Groundwater monitoring at 3 No. locations.
- Laboratory testing.
- Downhole geophysical testing at 6 No. locations.
- Surface geophysical testing to bridge the gaps between the borehole locations, including:
  - Multi-Channel Analysis of Surface Waves (MASW).
  - Seismic Refraction Tomography (SRT).
  - Horizontal-Vertical Spectral Ratio Analysis (HVSR).

T+TI selected the investigation locations to target key areas of interest within the Study Area, subject to site accessibility, the presence of buried and overhead services, and traffic management constraints.

3.1 Drone LiDAR and photogrammetry survey

A combined drone LiDAR and photogrammetry survey of the Study Area was undertaken by Kahuto Pacific – covering an area 2.776 km^2 – between 7 and 11 November 2025. The objective of the survey was to produce a high-resolution bare earth model and orthomosaic of the Study Area to support:

- Geomorphic mapping and ground zoning.
- Characterisation of the cliff and slope features to support assessment of slope susceptibility.
- Comparison against pre-earthquake LiDAR datasets to assess vertical and lateral ground displacement attributable to the seismic event.

Survey control comprised 17 No. ground control points (GCPs) distributed across the Study Area, supplemented by three No. LiDAR check grids established at elevated locations to validate vertical (Z) accuracy. GCP coordinates were tied to local site control with an as-specified tolerance of ≤ 50 mm in both plan and height. Coordinates are reported in horizontal projection WGS 84 / UTM Zone 59 South and vertical datum Mean Sea Level (Local).

Deliverables provided to T+TI comprise a high-resolution orthomosaic (TIF, ECW and PDF formats), a bare earth digital terrain model (DTM) (TIF format), contours (DWG format), point cloud (.laz format) and a five-sheet CAD plan set (PDF).The Kahuto Pacific report and associated PDF outputs are presented in Appendix E.

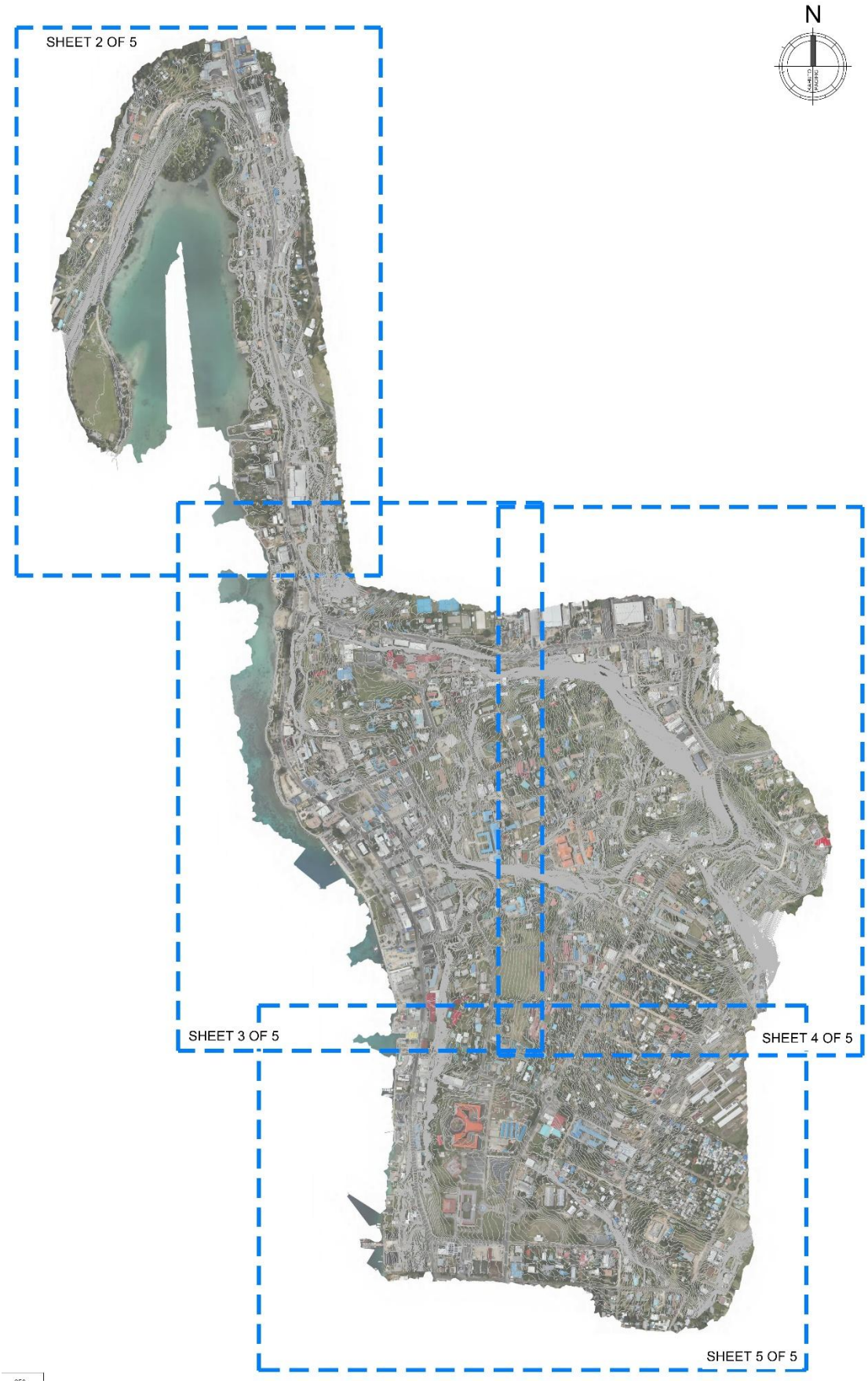

Figure 3.1: Kahuto overall contour plan (PDF format)

3.2 Machine boreholes

The drilling of eleven (11 No.) rotary cored machine boreholes was undertaken over the period between 2 December 2025 and 18 February 2026. The works were carried out using a rotary coring drilling rig, supplied and operated by Vanuatu Drilling. The boreholes were advanced from ground level to termination depth using HQ3 triple tube coring.

In situ Standard Penetration Testing (SPT) was carried out at regular (1.5 m) intervals through the soil horizon. All drilling works were completed under the full-time supervision of an engineering geologist from T+TI. The recovered drill core was photographed and logged to NZGS 'Field Description of Soil and Rock' guidelines.

The investigation locations are presented in Appendix A. Summary borehole logs and core photographs are presented in Appendix B. Summary borehole details are presented in Table 3.1 below.

Table 3.1: Machine borehole summary

BH ID	Location (UTM)[1]		Ground Surface Elevation RL (m)[2]	Depth (m)	Comments
	Easting	Northing			
BH01	-	-	-	-	Deferred due to drilling data from nearby BH02
BH02	215149.12	8036461.10	1.8	30.1	Reached target depth
BH03	215195.93	8036683.17	2.3	30.0	Reached target depth
BH04	215231.67	8036789.23	5.3	15.17	Reached target depth
BH04A	215216.66	8036784.92	5.3	21.0	Reached target depth
BH05	215067.75	8036836.62	2.1	19.5	Reached target depth
BH06	215241.97	8036922.62	21.6	30	Reached target depth
BH07	215044.21	8036984.14	4.0	31.5	Reached target depth
BH08	215478.74	8035894.82	35.6	6.45	Terminated due to rod deviation risking damaging equipment
BH08A	215482.60	8035894.02	35.4	3.0	
BH09	214759.26	8037694.22	1.4	31.0	Reached target depth
BH10	214853.80	8037021.40	2.0	20	Reached target depth
BH11	215442.62	8037108.41	51.1	23.2	Terminated due to risk of equipment getting stuck inground
BH12	215712.99	8037042.20	73.2	31.5	Reached target depth
BH12A	215656.80	8037036.20	68.3	12.0	Terminated due to risk of equipment getting stuck inground

Note: [1] Coordinates have been estimated using the Kahuto Pacific 2025 aerial imagery.
[2] Ground surface elevation have been estimated using the Kahuto Pacific 2025 LiDAR.

3.3 Groundwater monitoring

3.3.1 Piezometer details

Groundwater piezometers were installed in 3 No. of the machine boreholes. The standpipe piezometers were installed to monitor groundwater levels within the reclamation fill and quaternary sediments. Summary details of the piezometer installations are presented in Table 3.2 below. Installation records are attached to the summary borehole logs in Appendix B.

Table 3.2: Piezometer details

Borehole ID	Collar RL (m)	Installation depth (m)	Type	Geological unit over screened depth
BH04	5.30	6.0 – 9.0	Standpipe	Peri-reef Deposits[1]
BH05	2.10	3.0 – 6.0	Standpipe	Reef Limestone Formation
BH10	2.00	3.0 – 6.0	Standpipe	Peri-reef Deposits

Note: [1]Sediments that accumulate adjacent to, but outside the reef framework itself, including fore-reef, back-reef, intra-reef, and lagoonal sediments.

3.3.2 Groundwater levels

Groundwater levels were recorded within the open boreholes during drilling and within piezometers using an electronic dip meter. Continuous monitoring of groundwater levels was undertaken in the piezometers detailed above for a minimum period of two months using dataloggers installed into the 3 No. standpipe piezometers. The recorded groundwater levels are presented below in Table 3.3 as metres below ground level (mbgl) and the elevation reduced level (RL). A summary plot of continuous monitoring of the groundwater elevation is presented in Figure 3.2 below.

The continuous groundwater monitoring indicates tidal influence of between 0.2 to 0.4 m, due to proximity to the coastline.

Table 3.3: Groundwater summary

Borehole ID	Groundwater depth (mbgl)	Groundwater Elevation RL (m)	Investigation depth (mbgl)	Date and time[1]	Measurement type
BH02	1.6	0.2	10.95	21/01/2026 1649	During drilling
	1.6	0.2	30.0	22/01/2026 1600	Completion of drilling
BH03	2.1	0.2	21.0	23/01/2026 1622	During drilling
	2.2	0.1	24.0	24/01/2026 0704	During drilling
BH04	4.8	0.5	15	15/12/2025 0959	During drilling
	3.7	1.6	20	16/12/2025 1535	Completion of drilling
	4.82	0.48	-	16/01/2026 0800	Piezometer
	4.8	0.6	-	24/02/2026 1515	Piezometer
BH05	1.8	0.3	19.5	12/12/2025 0710	Completion of drilling
	1.3	0.8	-	16/12/2025 1524	Piezometer
	1.4	0.7	-	16/01/2026 0831	Piezometer
	1.5	0.6	-	24/02/2026 1505	Piezometer
BH06	Dry	-	9	02/12/2025	During drilling

Borehole ID	Groundwater depth (mbgl)	Groundwater Elevation RL (m)	Investigation depth (mbgl)	Date and time[1]	Measurement type
	Dry	-	12	03/12/2025	During drilling
	21.0	0.6	30	04/12/2025	On completion
BH07	3	1.0	13.5	05/12/2025	During drilling
	3.3	0.7	19.5	08/12/2025	During drilling
	3.4	0.6	31.5	09/12/2025	On completion
BH08	Dry	-	6.45	31/01/2026	During drilling
BH09	1.4	0.0	31.0	14/02/2026	On completion
BH10	1.7	0.3	15	11/12/2025	During drilling
	1.7	0.3	20	11/12/2025	On completion
	1.4	0.6	-	16/12/2025	Piezometer
	1.45	0.55	-	16/01/2026	Piezometer
	1.25	0.75	-	24/02/2026	Piezometer
BH11	Dry	-	7.95	19/01/2026	During drilling
	Dry	-	23.2	21/01/2026	On completion

Note: [1] Local time zone in Vanuatu (GMT+11)

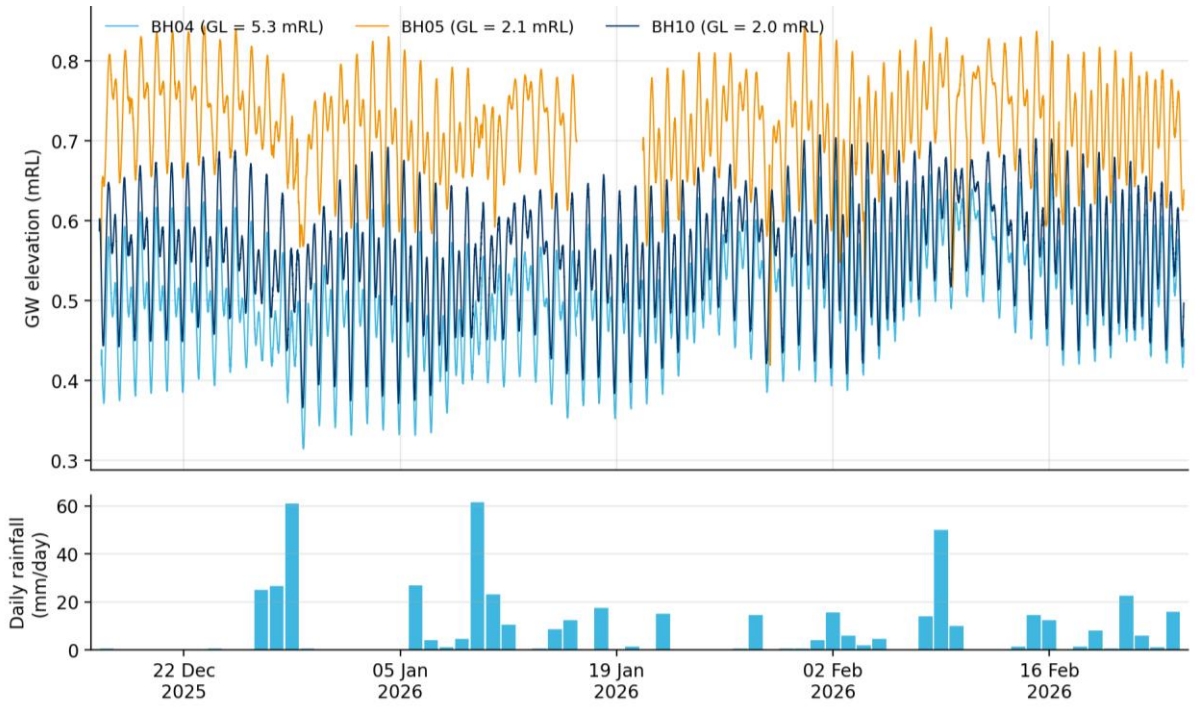

Figure 3.2: Continuous groundwater monitoring summary plot vs daily rainfall

3.4 Laboratory testing

Representative samples were collected from the material recovered during drilling and submitted for laboratory testing at Geotechnics Ltd laboratory in New Zealand. A total of 32 No. tests were undertaken including:

- 2 No. Atterberg Limits tests: NZS4402:1986 Test 2.2, 2.3 & 2.4 (**refer Table 3.4 and Figure 3.3**)
- 15 No. Particle Size Distribution (PSD) sieve tests: NZS 4402:1986 Test 2.8.1 **(refer Table 3.5 and Figure 3.4)**
- 3 No. Allophane tests: NZS4402:1986 Test 3.4 **(refer Table 3.6)**
- 9 No. Unconfined Compressive Strength (UCS) tests: NZS4402 Test 6.3.1 **(refer Table 3.7)**
- 3 No. Consolidated-Undrained (CU) triaxial compression tests, single stage: ISO 17892-8:2018 Part 9 **(refer Table 3.8)**

Detailed results of the laboratory testing are presented in Appendix C.

Table 3.4: Atterberg Limits test results

BH ID	Depth (m bgl)	Liquid Limit	Plastic Limit	Plasticity Index
BH11	0.0 – 0.4	82	39	43
BH12	7.5 – 7.95	115	86	29

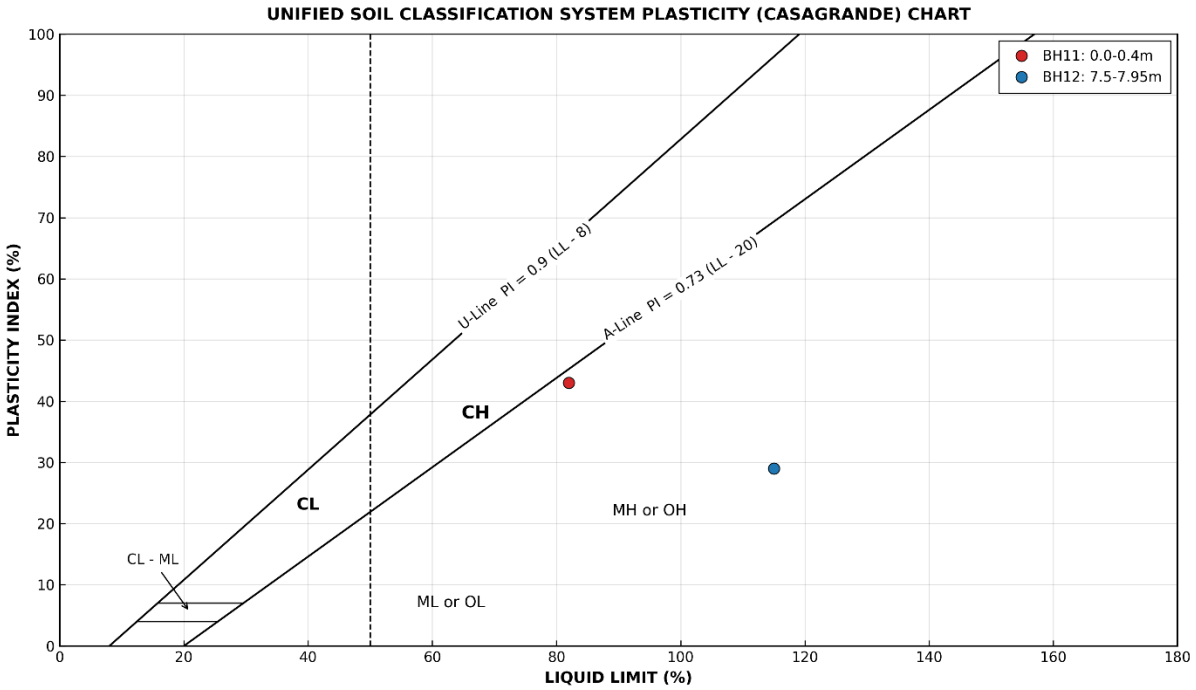

Figure 3.3: Atterberg Limit test results presented on a USCS Casagrande Chart

Table 3.5: Particle Size Distribution (PSD) test results

BH ID	Depth (m bgl)	Particle size distribution		
		Gravel (>2mm)	Sand (>0.06mm)	Fines (<0.06mm)
BH02	1.5 – 1.95	12	62	26
	3.0 – 3.45	43	36	21
	7.5 – 7.95	24	42	34
	9.0 – 9.45	36	32	32
	13.5 – 13.95	33	36	31
BH03	1.5 – 1.95	34	57	9
	4.5 – 4.95	42	43	15
	7.5 – 7.95	22	54	24
BH04	1.5 – 1.95	27	45	26
BH04A	3.0 – 3.45	49	46	5
	9.0 – 9.45	39	39	22
BH09	4.5 – 4.95	27	53	20
	9.0 – 9.45	31	26	43
	12.0 – 12.45	46	26	28
	15.0 – 15.45	40	34	26

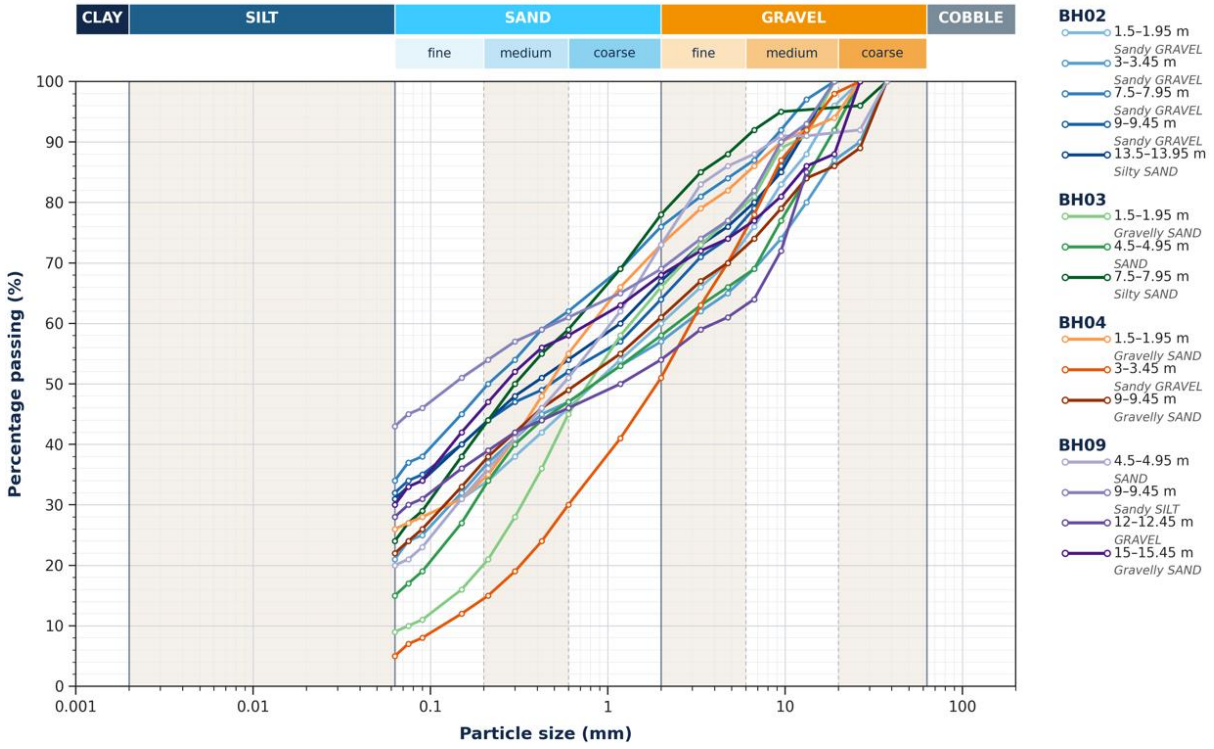

Figure 3.4: PSD test results

Table 3.6: Allophane test results

BH ID	Depth (m bgl)	Allophane content (%)
BH08	0.25 – 0.4	5 – 7 %
BH11	0.0 – 0.4	5 – 7 %
BH12	9.0 – 9.45	5 – 7 %

Table 3.7: Uniaxial Compression Strength test results

BH ID	Depth (m bgl)	Initial water content (%)	Initial bulk density (t/m³)	Peak UCS (MPa)	Axial Strain at Peak UCS (%)	Mode of failure
BH02	17.56 – 17.88	4.9	2.16	6.8	0.97	Axial
BH03	12.66 – 12.86	7.8	2.01	1.4	0.49	Axial
	13.7 – 13.8	4.3	2.26	8.1	1.46	Axial
BH05	9.35 – 9.55	8.1	1.94	2.0	0.35	Axial
BH06	8.57 – 8.79	5.5	1.99	2.5	0.25	Axial
BH09	20.7 – 20.8	29.8	1.90	9.9	0.89	Axial
BH10	8.69 – 8.9	6.1	1.98	7.6	0.35	Shear
	10.8 – 11.1	6.2	2.35	11.9	0.9	Axial
BH11	11.65 – 11.76	8.7	2.01	3.8	1.15	Axial

Table 3.8: Consolidated-undrained (CU) triaxial compression test results

BH ID	Depth (m bgl)	Initial water content (%)	Initial bulk density (t/m³)	Deviator stress at failure (MPa)	Undrained shear strength (kPa) $su = ½(\sigma_1 - \sigma_3)$ at failure	Mode of failure
BH12	14.10 – 14.25	16	2.05	10.8	5,400	Planar
BH12	25.05 – 25.25	18	2.07	11.4	5,600	Planar
BH12	29.7 – 29.82	34	1.76	1.9	900	Planar / Plastic

3.5 Geophysical testing

T+TI engaged the specialist geophysical investigation contractor Resource Development Consultants Limited (RDCL) to undertake the geophysical testing across the Study Area between 10 February and 6 March 2026. This included:

- Downhole shear wave testing in 6 No. boreholes locations
- Multi-Channel Analysis of Surface Waves across 5.5 km in length
- Seismic Refraction Tomography across 1 km in length
- Horizontal-Vertical Spectral Ratio Analysis at 12 No. locations

3.5.1 Downhole shear wave testing

Downhole shear wave testing was undertaken at BH02, BH03, BH06, BH07, BH09, and BH12.

It involves lowering a probe down a PVC tube that is grouted into place and measuring shear waves generated from a source at the surface. The seismic source is produced by a sledgehammer striking a shear beam weighted by a vehicle. Downhole shear wave testing was used to provide a measurement of variations in shear wave velocity (Vs) across the ground profile. By measuring the difference in arrival times of the waves at known depths, the seismic wave velocities can be calculated.

Shear wave velocities (Vs) were measured in the boreholes from ground surface to target depths of 30.0 m bgl with measurements at 1.0 m intervals.

The RDCL testing report is provided in Appendix D.

3.5.2 Multi-channel Analysis of Surface Waves (MASW)

A total of 5.55 km of MASW data was collected along 13 No. individual lines and 16 No. soundings. Where lines were not long enough to generate a quasi-2D Vs section, a 1D-sounding profile was undertaken. This occurred due to obstructions (such as road crossings) or tight bends in the road where the array could not be positioned in a straight line.

MASW was carried out by towing a 46 m long surface array consisting of 24 geophones placed at 2 m centres behind a vehicle. While stationary a seismic source was produced at the surface for the array to monitor. Seismic shots were created by striking a sledgehammer against a steel plate in quick succession. Each shot was stacked 3 to 5 times to improve signal to noise ratio.

The summary details of the MASW testing are shown below in Table 3.9.

Table 3.9: MASW summary details

Line ID	Length (m)	Approx. orientation	Start Location		End Location		Type
			Easting	Northing	Easting	Northing	
01a	380	SE-NW	215107.1	8036526	214939.8	8036880	Quasi-2D
01b	48	SE-NW	214889	8036912	214870.3	8036959	Sounding
01c	48	SE-NW	214851.3	8036978	214841.8	8037001	Sounding
02	270	SE-NW	215155.5	8036619	215020.5	8036857	Quasi-2D
03	680	NW-SE	214860.3	8037051	215200.7	8036477	Quasi-2D
04	470	SE-NW	215243.5	8036642	215015	8037080	Quasi-2D
05a	48	W-E	215020.1	8036765	215061	8036793	Sounding
05b	48	W-E	215088.1	8036834	215133.2	8036856	Sounding
05c	48	W-E	215152.8	8036863	215186.4	8036900	Sounding

Line ID	Length (m)	Approx. orientation	Start Location		End Location		Type
			Easting	Northing	Easting	Northing	
06a	48	W-E	215060.7	8036699	215102.8	8036726	Sounding
06b	48	W-E	215194.9	8036773	215147.7	8036756	Sounding
06c	48	W-E	215246.8	8036789	215223.3	8036780	Sounding
07a	48	W-E	215085	8036599	215135.9	8036614	Sounding
07b	90	W-E	215148.7	8036601	215268.7	8036631	Quasi-2D
08	48	W-E	215132.8	8036480	215197.8	8036497	Sounding
09	510	N-S	215188.2	8036518	215178.9	8036001	Quasi-2D
10a	48	W-E	214924.2	8036890	214979.6	8036941	Sounding
10b	48	W-E	215011.7	8036941	215056.3	8036963	Sounding
11a	60	E-W	215855	8036839	215791.1	8036879	Quasi-2D
11b	210	S-N	215714.9	8036896	215687.8	8037100	Quasi-2D
11c	50	E-W	215633.8	8037039	215578.2	8036989	Quasi-2D
12	430	N-S	214874.5	8037561	214850.1	8037068	Quasi-2D
13	330	N-S	214851.8	8037971	214870.6	8037626	Quasi-2D
14	48	W-E	214752	8037707	214813.7	8037690	Sounding
15	830	S-N	214398.3	8038130	214700.4	8038819	Quasi-2D
16	90	E-W	215270.8	8037531	215182.3	8037578	Sounding
17	430	W-E	215041.1	8037434	215444.2	8037346	Quasi-2D
18a	48	W-E	214981.8	8036854	215024.8	8036880	Sounding
18b	48	W-E	215046.9	8036888	215088.9	8036915	Sounding

3.5.3 Seismic Refraction Tomography (SRT)

SRT was carried out in conjunction with the MASW along key transit corridors. Four (4 No.) SRT lines were undertaken, totalling 972 m. SRT uses P-wave velocity (Vp) to identify subsurface geological layers and depth to interfaces, using seismic waves generated from an energy source (sledgehammer) and wave detection using 24 No. geophones placed at 2 m centres.

Summary details of the SRT testing is shown below in Table 3.10.

Table 3.10: SRT test summary details

Line ID	Length (m)	Approx. orientation	Start Location		End Location		Type
			Easting	Northing	Easting	Northing	
SRT01a	197	S-N	215113.1	8036533	215061.5	8036726	SRT
SRT01b	197	SE-NW	215060	8036725	214935	8036885	SRT
SRT02	289	N-S	215022.5	8036909	215181.2	8036644	SRT
SRT03	289	S-N	215235.7	8036642	215117.5	8036918	SRT

3.5.4 Horizontal-Vertical Spectral Ratio (HVSR)

HVSR was undertaken at 12 No. locations within the study area. The HVSR method analyses ambient seismic noise at the surface. A single three-component seismometer is placed on the ground to record ambient vibrations for several minutes. The ratio between the horizontal and vertical components of ground motion can vary depending on subsurface variability. Peaks in this ratio correspond to the resonance frequency of soft sediment layers overlying stiffer bedrock or a velocity contrast. A summary of the HVSR locations is shown in Table 3.11 below.

Table 3.11: HVSR test summary details

Line ID	Easting	Northing	Measured site period (T_0)
HVSR01	215147.6	8036752	0.25
HVSR02	215078.3	8036717	0.40
HVSR03	215074.2	8036802	0.31
HVSR04	215509.2	8037097	0.13
HVSR05	215806.6	8037029	0.06
HVSR06	215498.1	8036207	0.03
HVSR07	215920.7	8037121	0.20
HVSR08	215248.9	8037545	0.08
HVSR09	214756.5	8037689	0.22
HVSR10	214797.7	8037776	0.28
HVSR11	214552.1	8038762	0.03
HVSR12	214369.9	8038123	0.04

4 Applicability

This report has been prepared for the exclusive use of our client Egis NZ Limited, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Tonkin & Taylor International Ltd
Environmental and Engineering Consultants

Report prepared by:



.....

Conor Cussins
Engineering Geologist

Authorised for Tonkin & Taylor International Ltd by:



.....

Nathan Hickman
Project Director

Report reviewed by:



.....

Cole Brown

Senior Engineering Geologist

COCU
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Appendix A Figures

A1 Overall Site Plan

A2 Investigation Plan 1 of 3

A3 Investigation Plan 2 of 3

A4 Investigation Plan 3 of 3

COPYRIGHT ON THIS FIGURE IS RESERVED DO NOT SCALE FROM THIS FIGURE.

T:\Christchurch\TT Projects\1097984\1097984.1000\WorkingMaterial\GIS Layout: GFR - Figure A1 - Overall Site Plan 2026-May-07 1:37 am Drawn by CRB



NOTES:
1. COORDINATES: UTM59S. REDUCED LEVELS: MSL.
2. CONTOURS HAVE BEEN GENERATED USING THE 2025 KAHUTO PACIFIC LIDAR SURVEY.

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NOTES:
Basemap World Imagery: Vantor. World Imagery: Earthstar Geographics

REV	DESCRIPTION	GIS	CHK	DATE
0	First version	CRB	NAH	MAY.26

LOCATION PLAN

PROJECT No.	1097984.1000	
DESIGNED	CRB	MAY.26
DRAWN	CRB	MAY.26
CHECKED	NAH	MAY.26
APPROVED		DATE

CLIENT **EGIS NZ LIMITED**
PROJECT **EEETA**
TITLE PORT VILA CBD
OVERALL SITE PLAN
SCALE (A3) 1:15,000 FIG No. FIGURE A1. REV 1

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T:\Christchurch\TT Projects\1097984\1097984.1000\WorkingMaterial\GIS Layout: GFR - Figure A1 - Investigation Plan 1 of 3 2026-May-07 1:37 am Drawn by CRB

LEGEND

- 2026 RDCL Horizontal to Vertical Spectral Ratio Analysis
- 2026 RDCL Multichannel Analysis of Surface Waves (MASW)
- Broader Study Area

2025 Kahuto Pacific LiDAR Survey

- 1m contour interval
- 5m contour interval

HVSR11
HVSR12
HVSR10
MASW15
MASW13
0m
5m
10m
15m
20m

NOTES:

1. COORDINATES: UTM59S. REDUCED LEVELS: MSL.
2. CONTOURS HAVE BEEN GENERATED USING THE 2025 KAHUTO PACIFIC LIDAR SURVEY.
3. 2025 T+T MACHINE BOREHOLE LOCATIONS WERE RECORDED USING A HANDHELD GPS. REFER TO BOREHOLE LOGS FOR RECORDED LOCATIONS.
4. THE LOCATIONS OF THE RDCL INVESTIGATIONS ARE APPROXIMATED ONLY ON THIS PLAN. REFER TO RDCL REPORT (APPENDIX D) FOR RECORDED LOCATIONS.

A3 SCALE 1:5,000

0 60 120 180 240 300 m

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NOTES:
Basemap World Imagery: Vantor. World Imagery: Earthstar Geographics

REV	DESCRIPTION	GIS	CHK	DATE
0	First version	CRB	NAH	MAY.26

LOCATION PLAN

PROJECT No.	1097984.1000	
DESIGNED	CRB	MAY.26
DRAWN	CRB	MAY.26
CHECKED	NAH	MAY.26
APPROVED		DATE

CLIENT **EGIS NZ LIMITED**
PROJECT **EEETA**
TITLE PORT VILA CBD
INVESTIGATION PLAN 1 OF 3
SCALE (A3) 1:5,000 FIG No. FIGURE A2. REV 1

COPYRIGHT ON THIS FIGURE IS RESERVED DO NOT SCALE FROM THIS FIGURE.

T:\Christchurch\TT Projects\1097984\1097984.1000\WorkingMaterial\GIS Layout: GFR - Figure A3 - Investigation Plan 2 of 3 2026-May-07 1:37 am Drawn by CRB

LEGEND

- 2025 - 2026 T+TI Machine Borehole
- 2026 RDCL Horizontal to Vertical Spectral Ratio Analysis
- 2026 RDCL Multichannel Analysis of Surface Waves (MASW)
- 2026 RDCL Seismic Refraction Tomography (SRT)
- Detailed Study Area
- Broader Study Area

2025 Kahuto Pacific LiDAR Survey

- 1m contour interval
- 5m contour interval

HVSR10, MASW13, BH09, HVSR09, MASW14, HVSR08, MASW16, MASW17, MASW12, HVSR04, HVSR07, BH12A, BH12, HVSR05, MASW11b, MASW11c, BH10, BH07, MASW04, MASW03, MASW10b, MASW10a, GHS - BH06, SRT03, MASW18b, BH05, SRT02, MASW05c, MASW01, MASW18a, HVSR03, SRT01, BH04A, BH04, MASW02, HVSR01, MASW06c, HVSR02, MASW06b, MASW06a, MASW11a

0m, 5m, 10m, 15m, 20m, 25m, 30m, 35m, 40m, 45m, 50m, 55m, 60m, 65m, 70m, 75m, 80m, 85m, 90m, 95m

A3 SCALE 1:5,000

0 60 120 180 240 300 m

NOTES:

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REV	DESCRIPTION	GIS	CHK	DATE
0	First version	CRB	NAH	MAY.26

LOCATION PLAN

PROJECT No.	1097984.1000	
DESIGNED	CRB	MAY.26
DRAWN	CRB	MAY.26
CHECKED	NAH	MAY.26
APPROVED		DATE

CLIENT **EGIS NZ LIMITED**

PROJECT **EEETA**

TITLE PORT VILA CBD
INVESTIGATION PLAN 2 OF 3

SCALE (A3) 1:5,000 FIG No. FIGURE A3. REV 1

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LEGEND

- 2025 - 2026 T+TI Machine Borehole
- 2026 RDCL Horizontal to Vertical Spectral Ratio Analysis
- 2026 RDCL Multichannel Analysis of Surface Waves (MASW)
- 2026 RDCL Seismic Refraction Tomography (SRT)
- Detailed Study Area
- Broader Study Area

2025 Kahuto Pacific LiDAR Survey

- 1m contour interval
- 5m contour interval

BH04A, BH04, BH03, BH02, BH08 / BH08A

HVSR01, HVSR02, HVSR06

MASW01, MASW02, MASW03, MASW04, MASW06a, MASW06b, MASW06c, MASW07a, MASW7b, MASW08, MASW09

SRT01, SRT02, SRT03

0m, 5m, 10m, 15m, 20m, 25m, 30m, 35m, 40m, 45m, 50m, 55m, 60m, 65m, 70m, 75m

N

A3 SCALE 1:5,000

0 60 120 180 240 300 m

NOTES:

1. COORDINATES: UTM59S. REDUCED LEVELS: MSL.
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REV	DESCRIPTION	GIS	CHK	DATE
0	First version	CRB	NAH	MAY.26

LOCATION PLAN

PROJECT No.	1097984.1000	
DESIGNED	CRB	MAY.26
DRAWN	CRB	MAY.26
CHECKED	NAH	MAY.26
APPROVED		DATE

CLIENT **EGIS NZ LIMITED**

PROJECT **EEETA**

TITLE PORT VILA CBD
INVESTIGATION PLAN 3 OF 3

SCALE (A3) 1:5,000 FIG No. FIGURE A4. REV 1

Appendix B Field investigations

B1 Borehole Terminology

B2 Borehole Logs

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Engineering log terminology

General

Soil and rock descriptions follow the "Guidelines for the field classification and description of soil and rock for engineering purposes" by the New Zealand Geotechnical Society (2005). Refer to this document for methods of field determination.

Water



Core recovery

Expressed as percentage of the length of the core run recovered.

Drilling method/casing

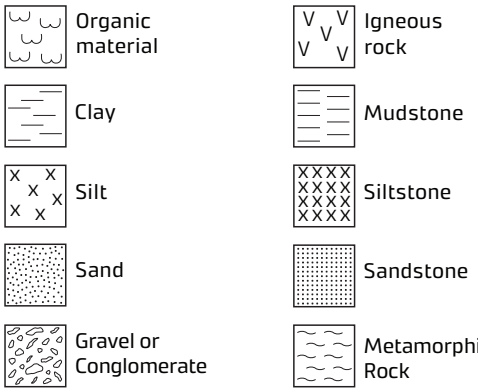
Common types:

OB	Open barrel
W	Wash
HQ3	HQ triple tube
PQ3	PQ triple tube
HSA	Hollow Stem Auger
WS	Window Sampler
HA	Hand Auger
HFS	High Frequency Sonic Drilling
LFS	Low Frequency Sonic Drilling

Graphic logs

The graphic log shows soil and rock types. The defect log indicates the location, orientation and abundance of defects of all types.

Typical material symbols:



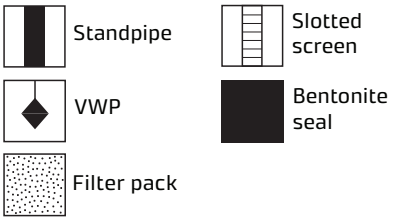
Tests

- **N=22:**SPT uncorrected blow count for 300 mm
- **75/12:**Undrained shear strength (peak /residual as measured by field vane.

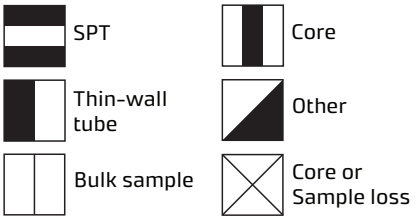
Laboratory test(s) carried out:

PMT	Pressuremeter test
LT	Lugeon test
LV	Laboratory vane
AL	Atterburg limits
UU	Undrained triaxial
PSD	Particle size distribution
c' Ø'	Effective stress
CONS	Consolidation
DS	Direct shear
COMP	Compaction
UCS	Unconfined compression
IS_{50}	Point load

Installation type



Sample type



Soil description

Moisture content

D	Dry, looks and feels dry
M	Moist, no free water on hand when remoulding
W	Wet, free water on hand when remoulding
S	Saturated, free water present on sample

Consistency/undrained shear strength

		S_u(kPa)
VS	Very soft	< 12
S	Soft	12 to 25
F	Firm	25 to 50
St	Stiff	50 to 100
VSt	Very stiff	100 to 200
H	Hard	> 200

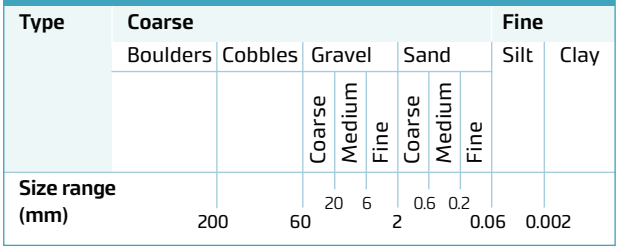
Density index

		SPT(N) - uncorrected
VL	Very loose	0 to 4
L	Loose	4 to 10
MD	Medium dense	10 to 30
D	Dense	30 to 50
VD	Very dense	> 50

Proportional terms definition (Coarse soils)

Fraction	**Term**	**% of soil mass**	**Example**
Major	(UPPER CASE)	Major constituent	GRAVEL
Subordinate	(lower case)	> 20	Sandy
Minor	with some... with minor...	12 - 20 5 - 12	with some sand with minor sand
	with trace of... (or slightly)...	< 5	with trace of sand (slightly sandy)

Grain size criteria



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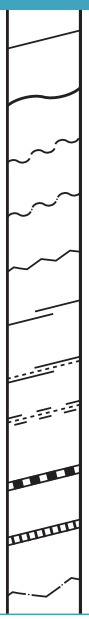
Engineering log terminology

Rock description



Signifcant defects

B	Bedding
J	Joint
Sc	Schistosity
Cl	Cleavage
BZ	Broken zone/crushed zone
F	Fault
Fg	Fault with gouge
SZ	Shear zone
Iz	Infilled seam
XD	Extremely weathered seam
DD	Drilling - induced defect



Weathering

UW	Unweathered
SW	Slightly weathered
MW	Moderately weathered
HW	Highly weathered
CW	Completely weathered
RS	Residual soil

Defect shape

ST	Stepped
UN	Undulating
PL	Planar

Roughness of defect surface

R	Rough
SM	Smooth
SL	Slickensided

Field strength

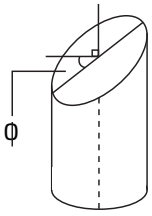
		UCS (MPa)	$I_{S(50)}$ (MPa)
EW	Extremely weak	< 1	N/A
VW	Very weak	1 - 5	N/A
W	Weak	5 - 20	N/A
MS	Moderately strong	20 - 50	1 - 2
S	Strong	50 - 100	2 - 5
VS	Very strong	100 - 250	5 - 10
ES	Extremely strong	> 250	> 10

Defect coding

Type
Angle (perpendicular to core axis)
Infilling description (as per soil description)

J 60˚, PL, SL, T, CV, STIFF GREEN CLAY

Infilling/coating type
Aperture
Roughness
Shape



Defect Orientation: for vertical unoriented boreholes defect orientation is measured normal to core axis e.g horizontal = 0˚(see diagram). For angled boreholes defect orientation is measured relative to core axis e.g parallel to core axis = 0˚.

Aperture

		Aperture (mm)
T	Tight	nil
VN	Very narrow	0 - 2
N	Narrow	2 - 6
MN	Moderately narrow	6 - 20
MW	Moderately wide	20 - 60
W	Wide	60 - 200
VW	Very wide	> 200

Infillings and coatings

CG	Clay gouge	Joints have openings between opposing faces of intact rock substance in excess of 1 mm filled with clay gouge. Clay is generally described in terms of soil properties.
CV	Clay veneers	Joints contain clay coating whose maximum thickness does not exceed 1 mm. Note: Describe clay in terms of soil properties.
PL	Penetrative limonite	Joint traces are marked in terms of well defined zones of slightly to moderately weathered ferruginised rock-substance within the adjacent rock.
FeSt	Limonite stained	Joint surfaces are stained or coated with limonite, although the rock substance immediately adjacent to the joints is fresh.
CT, SC	Coated	Joints exhibit coatings other than clay or limonite, e.g. Carbonate (CT) or Silica (SC).
CL, CS, CC	Cemented	Joints are cemented with limonite (CL), Silica (CS), or Carbonates (CC).
CN	Clean	Joint surface show no trace of clay, limonite, or other coatings.

Spacing

Term	Spacing
Very wide	> 2 m
Wide	0.6 - 2 m
Moderately wide	200 - 600 mm
Close	60 - 200 mm
Very close	20 - 60 mm
Extremely close	> 20 mm

Excavator penetration

Easy	1
Moderate	2
Difficult	3

RQD: Rock Quality Designation - percentage of core run consisting of sound rock longer than 10 cm.

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH02

SHEET: 1 OF 4

PROJECT: EEETA
JOB No.: 1097984.1000.2000
LOCATION: Main market

CO-ORDINATES: 168.31394600° (WGS84) -17.74074800°
DIRECTION: 180°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 1.80m
R.L. COLLAR: 1.80m
DATUM: ELLIPSOID
SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: REOL
CHECKED: CRB
START DATE: 21/01/2026
FINISH DATE: 22/01/2026
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Reclamation Fill	*0.00m:* Concrete pavement. [RECLAMATION FILL]																
	0.05m: Sandy SILT; brown. Soft to firm, moist, low plasticity; sand, fine to medium.																
	0.20m: Sandy fine to coarse GRAVEL; brownish black and white. Loosely packed, moist, well graded. Gravel, angular, coral; sand, fine to coarse.																
	0.60m: CORE LOSS - Suspect washed out.			HQTT	40												
	1.50m: Silty fine to medium GRAVEL, some sand; greyish brown. Medium dense, moist, well graded. Gravel, sub-angular, coral.			SPT	89	3/4 // 2/3/3/3 N=11							*1.50 - 1.95m:* PSD - 12% gravel, 62% sand and 26% fines				
	1.95m: CORE LOSS - Suspect washed out.			HQTT	33												
Peri-reef Deposits	*2.65m:* Fine to coarse GRAVEL, minor sand; grey and brownish white. Medium dense, moist, well graded. Gravel, sub-angular, coral. [PERI-REEF DEPOSITS]																
	3.00m: Silty fine to medium SAND; dark grey. Medium dense, moist, well graded.			SPT	89	4/4 // 3/4/4/4 N=15							*3.00 - 3.45m:* PSD - 43% gravel, 36% sand and 21% fines				
	3.10m: Sandy fine to coarse GRAVEL, some silt; brownish white. Medium dense, moist, well graded. Gravel, sub-angular, coral.																
	3.45m: CORE LOSS - Suspect washed out.			HQTT	19												
	4.30m: Sandy fine to coarse GRAVEL, some silt; brownish white. Loose, moist, poorly graded. Gravel, sub-angular, coral.			SPT	67	4/3 // 3/2/2/2 N=9											
	4.30 - 4.50m: Sand and silt washed out.																
	4.92m: CORE LOSS - Suspect washed out.			HQTT	19												
	5.80m: Fine to coarse GRAVEL, some silt and some sand; brownish white. Medium dense, wet, poorly graded. Gravel, sub-angular, coral.			SPT	67	3/1 // 2/3/3/3 N=11											
	5.80 - 5.90m: Sand and silt washed out.																
	6.45m: CORE LOSS - Suspect washed out.			HQTT	19												
	7.30m: Silty fine to coarse SAND, some gravel; brownish white. Medium dense, moist, well graded; gravel, fine to coarse, sub-angular, coral.			SPT	78	2/2 // 3/5/3/3 N=14							*7.50 - 7.95m:* PSD - 24% gravel, 42% sand and 34% fines				
	7.95m: CORE LOSS - Suspect washed out.			HQTT	10												Box 0.00-7.95m
	8.90m: Sandy fine to medium GRAVEL, some silt; light brown. Loose, moist, well graded. Gravel, angular, coral.			SPT	78	2/2 // 2/1/3/3 N=9							*9.00 - 9.45m:* PSD - 36% gravel, 32% sand and 32% fines				
	9.45m: CORE LOSS - Suspect washed out.			HQTT	14												

Water Level: 23/01/2026

COMMENTS: 1. Following completion of Drilling to 30m, the PVC installation and tremie pipe were installed with the flush toby at 8:30 am on 23/01/26. Grouting of the installation was subsequently completed on 24/01/26 and 26/01/26.

Hole Depth 30.1m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 5/05/2026 5:58:05 pm - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH02

SHEET: 2 OF 4

PROJECT: EEETA
JOB No.: 1097984.1000.2000
LOCATION: Main market

CO-ORDINATES: 168.31394600° (WGS84) -17.74074800°
DIRECTION: 180°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 1.80m
R.L. COLLAR: 1.80m
DATUM: ELLIPSOID
SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: REOL
CHECKED: CRB
START DATE: 21/01/2026
FINISH DATE: 22/01/2026
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Peri-reef Deposits	[CONT] *9.45m:* CORE LOSS - Suspect washed out.			HQTT	14		-9	11									
	10.35m: Sandy fine to coarse GRAVEL, some silt; brownish white. Medium dense, moist, poorly graded. Gravel, angular, coral.			SPT	100	5/5// 7/10/13/16 **N=46**											
	10.95m: CORE LOSS - Suspect washed out.			HQTT	57		-10	12									
	11.40m: COBBLES, some sand and some gravel; white. Medium dense, moist, poorly graded. Cobbles, up to 120mm, angular, coral.																
	12.00m: Sandy fine to coarse GRAVEL, some silt; brownish white. Medium dense, moist, well graded. Gravel, sub-angular, coral.			SPT	67	4/2// 4/8/5/4 **N=21**											
	12.45m: CORE LOSS - Suspect washed out.			HQTT	10		-11	13									
	13.40m: Silty fine to coarse SAND, some gravel; light brown. Medium dense, moist, well graded; gravel, fine to coarse, sub-angular, coral.			SPT	100	6/3// 4/3/4/3 **N=14**	-12	14					*13.50 - 13.95m:* PSD - 33% gravel, 36% sand and 31% fines				
	13.95m: CORE LOSS - Suspect washed out.			HQTT	24		-13	15									
	14.75m: Sandy fine to coarse GRAVEL, some silt; light brown. Medium dense, moist, well graded. Gravel, up to 50mm, sub-angular, coral.			SPT	67	4/5// 6/7/9/6 **N=28**											Box 7.95-15.45m
	15.45m: Sandy fine to coarse GRAVEL, some silt; light brown. Tightly packed, moist, poorly graded. Gravel, sub-angular, coral.						-14	16									
Reef Limestone Formation	*15.65m:* Slightly weathered, brownish white, LIMESTONE. Very weak, well cemented, coarse grained. [REEF LIMESTONE FORMATION]			HQTT	100	20 for 41mm **N>=50** Solid Cone Bouncing Refusal	-15	17									
						BH02_ UCS @ 17.56m	-16	18					*17.56 - 17.88m:* UCS - 68 MPa				
	18.00m: CORE LOSS - Suspect washed out.																
	18.15m: Slightly weathered, brownish white, LIMESTONE. Very weak, well cemented, coarse grained.			HQTT	92	20 for 35mm **N>=50** Solid Cone Bouncing Refusal	-17	19									Box 15.45-19.40m
				HQTT	100		-18										

COMMENTS: 1. Following completion of Drilling to 30m, the PVC installation and tremie pipe were installed with the flush toby at 8:30 am on 23/01/26. Grouting of the installation was subsequently completed on 24/01/26 and 26/01/26.

Hole Depth 30. 1m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 5/05/2026 5:58:06 pm - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH02

SHEET: 3 OF 4

PROJECT: EEETA
JOB No.: 1097984.1000.2000
LOCATION: Main market

CO-ORDINATES: 168.31394600° -17.74074800° (WGS84)
DIRECTION: 180°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 1.80m
R.L. COLLAR: 1.80m
DATUM: ELLIPSOID
SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: REOL
CHECKED: CRB
START DATE: 21/01/2026
FINISH DATE: 22/01/2026
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Reef Limestone Formation	[CONT] *18.15m:* Slightly weathered, brownish white, LIMESTONE. Very weak, well cemented, coarse grained.			HQTT	100		-19	21									
	21.00m: CORE LOSS - Suspect washed out.				0	25 for 45mm N>=50 Solid Cone Bouncing Refusal											
	21.15m: Slightly weathered, brownish white, LIMESTONE. Very weak, well cemented, coarse grained.			HQTT	93		-20	22									
	22.50m: CORE LOSS - Suspect washed out.																
	22.60m: Slightly weathered, brownish white, LIMESTONE. Very weak, well cemented, coarse grained.			HQTT	93		-21	23									Box 19.40-23.30m
	24.00m: CORE LOSS - Suspect washed out.			SPTC	0	15/12// 11/19/13/9 N>=50 Solid Cone	-22	24									
	24.50m: Slightly weathered, brownish white, LIMESTONE. Very weak, poorly cemented, coarse grained.			HQTT	95		-23	25									
	25.50m: CORE LOSS - Suspect washed out.																
	25.75m: Slightly weathered, brownish white, LIMESTONE. Very weak, well cemented, coarse grained.			HQTT	83		-24	26									
	27.00m: CORE LOSS - Suspect washed out.			SPTC	0	20/18// for 45mm N>=50 Solid Cone Bouncing Refusal	-25	27									
	27.35m: Slightly weathered, brownish white, LIMESTONE. Very weak, well cemented, coarse grained.			HQTT	83		-26	28									Box 23.30-28.35m
	29.05m: CORE LOSS - Suspect washed out.			HQTT	73		-27	29									
	29.45m: Slightly weathered, brownish white, LIMESTONE. Very weak, poorly cemented, coarse grained.						-28										

COMMENTS: 1. Following completion of Drilling to 30m, the PVC installation and tremie pipe were installed with the flush toby at 8:30 am on 23/01/26. Grouting of the installation was subsequently completed on 24/01/26 and 26/01/26.

Hole Depth 30. 1m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 5/05/2026 5:58:06 pm - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: BH02

SHEET: 4 OF 4

Tonkin+Taylor

PROJECT: EEETA
JOB No.: 1097984.1000.2000
LOCATION: Main market

CO-ORDINATES: 168.31394600° (WGS84) -17.74074800°
DIRECTION: 180°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 1.80m
R.L. COLLAR: 1.80m
DATUM: ELLIPSOID
SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: REOL
CHECKED: CRB
START DATE: 21/01/2026
FINISH DATE: 22/01/2026
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (HW SW MW DW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Reef Limestone Formation	*30.00m:* NO RECOVERY - Solid SPT, no overcore recovered. 30.1m: END OF BOREHOLE				0	18/10// for 25mm **N>=50** Solid Cone Bouncing Refusal	-29 -30 -31 -32 -33 -34 -35 -36 -37 -38	31 32 33 34 35 36 37 38 39									

COMMENTS: 1. Following completion of Drilling to 30m, the PVC installation and tremie pipe were installed with the flush toby at 8:30 am on 23/01/26. Grouting of the installation was subsequently completed on 24/01/26 and 26/01/26.

Hole Depth 30.1m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 5/05/2026 5:58:06 pm - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH02**

Hole Location: Main market

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.313946 (WGS84) -17.740748 R.L.: 1.80m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 21/01/2026 HOLE FINISHED: 22/01/2026 DRILLED BY: Vanuatu Drilling LOGGED BY: REOL CHECKED: CRB



0.00-7.95m



7.95-15.45m

TTNZ_20251211 - GeneralLog - 5/05/2026 5:58:06 pm - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH02**

Hole Location: Main market

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.313946 (WGS84) -17.740748 R.L.: 1.80m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 21/01/2026 HOLE FINISHED: 22/01/2026 DRILLED BY: Vanuatu Drilling LOGGED BY: REOL CHECKED: CRB



15.45-19.40m



19.40-23.30m

TTNZ_20251211 - GeneralLog - 5/05/2026 5:58:06 pm - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH02**

Hole Location: Main market

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.313946 (WGS84) -17.740748 R.L.: 1.80m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 21/01/2026 HOLE FINISHED: 22/01/2026 DRILLED BY: Vanuatu Drilling LOGGED BY: REOL CHECKED: CRB



23.30-28.35m



28.35-30.10m

TTNZ_20251211 - GeneralLog - 5/05/2026 5:58:06 pm - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH03

SHEET: 1 OF 3

PROJECT: EEETA
JOB No.: 1097984.1000.2000
LOCATION: Lolam House

CO-ORDINATES: 168.31441700° (WGS84) -17.73874900°
DIRECTION: 180°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 2.30m
R.L. COLLAR: 2.30m
DATUM: ELLIPSOID
SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: REOL
CHECKED: CRB
START DATE: 23/01/2026
FINISH DATE: 24/01/2026
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Reclamation Fill	*0.00m:* CORE LOSS - Suspect washed out. [RECLAMATION FILL]																
	0.60m: Sandy fine to coarse GRAVEL, some silt; light brown and grey. Medium dense, moist, poorly graded. Gravel, sub-angular, coral.			HQTT	60												
Peri-reef Deposits	*1.60m:* Gravelly fine to coarse SAND, minor silt; light brown. Medium dense, moist, well graded; gravel, fine to medium, sub-rounded, coral. [PERI-REEF DEPOSITS]			SPT	100	6/5// 5/5/5/4 N=19							*1.50 - 1.95m:* PSD - 34% gravel, 57% sand and 9% fines				
	1.95m: CORE LOSS - Suspect washed out. Small finger coral samples stuck in drill bit.			HQTT	0												
	3.00m: Fine to coarse GRAVEL, minor sand; brown and white. Medium dense, moist, well graded. Gravel, sub-rounded, coral and shell fragments.			SPT	100	3/2// 3/3/4/3 N=13											
	3.30m: Fine to coarse SAND, some silt, minor gravel; light brown. Medium dense, moist, poorly graded; gravel, medium, sub-rounded, coral.																
	3.45m: CORE LOSS - Suspect washed out. SAND and coral gravels.			HQTT	5												
	4.45m: Gravelly fine to coarse SAND, some silt; light brownish grey. Medium dense, moist, well graded; gravel, fine to coarse, sub-rounded, coral.			SPT	100	4/4// 5/5/5/3 N=18							*4.50 - 4.95m:* PSD - 42% gravel, 43% sand and 15% fines				
	4.95m: CORE LOSS - Suspect washed out. Light grey SAND and coral gravel.																
	5.20m: Fine to coarse SAND, some silt and some gravel; light brown. Medium dense, moist, well graded; gravel, fine to coarse, sub-rounded, coral.			HQTT	76												
				SPT	100	6/6// 6/4/5/5 N=20											
	6.45m: CORE LOSS - Suspect washed out. Grey SAND.			HQTT	0												
	7.50m: Silty fine to coarse SAND, some gravel; brownish grey. Medium dense, moist, well graded; gravel, fine to coarse.			SPT	100	3/2// 3/3/3/3 N=12							*7.50 - 7.95m:* PSD - 22% gravel, 54% sand and 24% fines				
	7.95m: CORE LOSS - Suspect washed out. Grey SAND.			HQTT	5												
	8.95m: Fine to coarse GRAVEL, some silt and some sand; brownish grey. Loosely packed, moist, poorly graded. Gravel, sub-rounded, coral. Sand and fines washed out.			SPT	100	4/6// 6/6/6/5 N=23											
	9.00m: Gravelly fine to coarse SAND, minor silt; yellowish light brown. Medium dense, moist, well graded; gravel, fine to coarse, sub-angular, coral.			HQTT	52												

Water Level / Fluid Loss (%): 25, 50, 75
Fracture Spacing (mm): 2000, 600, 200, 60, 20
Core Box No: Box 0.00-6.45m

COMMENTS: 1. Following completion of Drilling to 30m, the PVC installation and grouting with tremie pipe were installed on 24/01/26 and 26/01/26.

Hole Depth 30m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 9:01:34 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH03

SHEET: 2 OF 3

PROJECT: EEETA
JOB No.: 1097984.1000.2000
LOCATION: Lolam House

CO-ORDINATES: 168.31441700° (WGS84) -17.73874900°
DIRECTION: 180°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 2.30m
R.L. COLLAR: 2.30m
DATUM: ELLIPSOID
SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: REOL
CHECKED: CRB
START DATE: 23/01/2026
FINISH DATE: 24/01/2026
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Peri-reef Deposits	*9.45m:* CORE LOSS - Suspect washed out.			HQTT	52												
	9.95m: SAND and COBBLES, some gravel; light brown. Loosely packed, moist, poorly graded. Cobbles, up to 80mm, sub-angular, coral.			SPT	100	3,5// 9/16/11 for 50 mm **N>=50** Bouncing											
	10.50m: Sandy fine to coarse GRAVEL; brown. Very dense, moist, well graded. Gravel, sub-angular, coral. [REEF LIMESTONE FORMATION]																
	10.95m: Moderately weathered, dark brown and white, LIMESTONE. Very weak, well cemented. Shelly, crumbles to medium gravel. Fresh surfaces also dark brown. Small voids.			HQTT	100												
	12.00m: CORE LOSS - Suspect washed out.				0	20 for 60mm **N>=50** Solid Cone Bouncing Refusal											
	12.50m: Moderately weathered, white and dark brown, LIMESTONE. Extremely weak to very weak, well cemented, coarse grained. Shelly, crumbles to medium gravel. Fresh surfaces also dark brown. Small voids.			HQTT	69	BH03_UCS @ 12.66m							*12.66 - 12.86m:* UCS - 1.4 MPa				Box 6.45-13.00m
				SPTC	0	9/14// 11 for 50mm **N>=50** Solid Cone Bouncing							*13.70 - 13.80m:* UCS - 8.1 MPa				
						BH03_UCS @ 13.70m											
	14.00m: CORE LOSS - Suspect washed out.			HQTT	77												
	14.50m: Moderately weathered, dark brown and white, LIMESTONE. Extremely weak to very weak, well cemented. Shelly, crumbles to medium gravel. Fresh surfaces also dark brown. Small voids.																
	15.00m: CORE LOSS - Suspect washed out.			SPTC	0	10/4// 2,2,3,2 for 10 mm **N>=50** Solid Cone Bouncing											
	15.40m: Moderately weathered, dark brown and white, LIMESTONE. Extremely weak to very weak, poorly cemented to moderately cemented, coarse grained. Shelly, crumbles to medium gravel. Fresh surfaces also dark brown. Small voids.			HQTT	92												
	16.50m: CORE LOSS - Suspect washed out.			SPTC	0	11/20// for 65mm **N>=50** Solid Cone Bouncing Refusal											
	16.75m: Moderately weathered, white and dark brown, LIMESTONE. Extremely weak to very weak, poorly cemented to moderately cemented, coarse grained. Shelly, crumbles to medium gravel. Fresh surfaces also dark brown. Small voids.			HQTT	92												Box 13.00-17.70m
	18.00m: CORE LOSS - Suspect washed out.			SPTC	0	15/23// for 60mm **N>=50** Solid Cone Bouncing Refusal											
	18.50m: Moderately weathered, dark brown and white, LIMESTONE. Extremely weak to very weak, poorly cemented to moderately cemented, coarse grained. Shelly, crumbles to medium gravel. Fresh surfaces also dark brown. Small voids.			HQTT	74								*18.50 - 19.50m:* Shelly, crumbles to medium gravel. Fresh surfaces also dark brown. Small voids				
Reef Limestone Formation	*19.50m:* CORE LOSS - Suspect washed out.			HQTT	60												

COMMENTS: 1. Following completion of Drilling to 30m, the PVC installation and grouting with tremie pipe were installed on 24/01/26 and 26/01/26.

Hole Depth 30m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 9:01:34 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH03

SHEET: 3 OF 3

PROJECT: EEETA	CO-ORDINATES: 168.31441700° (WGS84) -17.73874900°	R.L. GROUND: 2.30m
JOB No.: 1097984.1000.2000		R.L. COLLAR: 2.30m
LOCATION: Lolam House	DIRECTION: 180°	DATUM: ELLIPSOID
	ANGLE FROM HORIZ.: -90°	SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: REOL
CHECKED: CRB
START DATE: 23/01/2026
FINISH DATE: 24/01/2026
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (HW SW MW HW VW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Reef Limestone Formation	[CONT] *19.50m:* CORE LOSS - Suspect washed out.																
	20.10m: Moderately weathered, dark brown and white, LIMESTONE. Extremely weak to very weak, poorly cemented to moderately cemented, coarse grained. Shelly, crumbles to medium gravel. Fresh surfaces also dark brown. Small voids.			HQTT	60		-18	21									
	21.00m: CORE LOSS - Suspect washed out.			SPTC	0	16/8// for 50mm **N>=50** Solid Cone Bouncing Refusal	-19										
	21.70m: Moderately weathered, greyish white, LIMESTONE. Very weak, moderately cemented, coarse grained. Finger coral recovered as coarse gravel.			HQTT	58			22									
	21.85m: Moderately weathered, white and dark brown, LIMESTONE. Extremely weak to very weak, poorly cemented to moderately cemented, coarse grained. Shelly, crumbles to medium gravel. Fresh surfaces also dark brown. Small voids.						-20										
	22.50m: CORE LOSS - Suspect washed out.																
	22.85m: Moderately weathered, white and dark brown, LIMESTONE. Extremely weak to very weak, poorly cemented, coarse grained. Shelly, crumbles to medium gravel. Fresh surfaces also dark brown. Small voids.			HQTT	43		-21	23									
	24.00m: CORE LOSS - Suspect washed out.			SPTC	0	11/12// 20/10 for 35 mm **N>=50** Solid Cone Bouncing	-22	24									
	24.40m: Moderately weathered, white and dark brown, LIMESTONE. Extremely weak to very weak, poorly cemented to moderately cemented, coarse grained. Shelly, crumbles to medium gravel. Fresh surfaces also dark brown. Small voids. Recovered as: sandy GRAVEL.			HQTT	89			25									
	25.50m: CORE LOSS - Suspect washed out.			SPTC	0	13/8// 13/18/7/6 **N=44** Solid Cone	-23	26									
	26.20m: Moderately weathered, white and dark brown, LIMESTONE. Extremely weak to very weak, poorly cemented to moderately cemented, coarse grained. Shelly, crumbles to medium gravel. Fresh surfaces also dark brown. Small voids. Recovered as: fine to medium GRAVEL, some sand.			HQTT	76		-24										
	27.00m: CORE LOSS - Suspect washed out.							27									
	27.80m: Moderately weathered, white and dark brown, LIMESTONE. Extremely weak to very weak, moderately cemented, coarse grained. Shelly, crumbles to medium gravel. Fresh surfaces also dark brown. Small voids.			HQTT	47		-25										
	28.50m: CORE LOSS - Suspect washed out.			SPTC	0	7/5// 3/5/18/2 for 5 mm **N>=50** Solid Cone		28									
	29.50m: Same as description above.			HQTT	45		-26										
	30m: END OF BOREHOLE						-27	29									

Box 17.70-24.00m

Box 24.00-30.00m

COMMENTS: 1. Following completion of Drilling to 30m, the PVC installation and grouting with tremie pipe were installed on 24/01/26 and 26/01/26.

Hole Depth 30m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 9:01:34 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH03**

Hole Location: Lolam House

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.314417 (WGS84) -17.738749 R.L.: 2.30m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 23/01/2026 HOLE FINISHED: 24/01/2026 DRILLED BY: Vanuatu Drilling LOGGED BY: REOL CHECKED: CRB



0.00-6.45m



6.45-13.00m

TTNZ_20251211 - GeneralLog - 6/05/2026 9:01:34 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH03**

Hole Location: Lolam House

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.314417 (WGS84) -17.738749 R.L.: 2.30m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 23/01/2026 HOLE FINISHED: 24/01/2026 DRILLED BY: Vanuatu Drilling LOGGED BY: REOL CHECKED: CRB



13.00-17.70m



17.70-24.00m

TTNZ_20251211 - GeneralLog - 6/05/2026 9:01:34 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH03**

Hole Location: Lolam House

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.314417 (WGS84) -17.738749 R.L.: 2.30m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 23/01/2026 HOLE FINISHED: 24/01/2026 DRILLED BY: Vanuatu Drilling LOGGED BY: REOL CHECKED: CRB



24.00-30.00m

TTNZ_20251211 - GeneralLog - 6/05/2026 9:01:34 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH04

SHEET: 1 OF 2

PROJECT: EEETA	CO-ORDINATES: 168.31476800° (WGS84) -17.73779600°	R.L. GROUND: 5.30m
JOB No.: 1097984.1000.2000		R.L. COLLAR: 5.30m
LOCATION: National Bank of Vanuatu	DIRECTION: 180°	DATUM: ELLIPSOID
	ANGLE FROM HORIZ.: -90°	SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: COCU
CHECKED: CRB
START DATE: 13/12/2025
FINISH DATE: 13/12/2025
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations
	SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation									
Fill	*0.00m:* Sandy fine to coarse GRAVEL; brown and white. Loosely packed, dry, poorly graded. Gravel, sub-rounded, coral; sand, fine to coarse. Plastic bag. [FILL]	HQTT	20		5	0				
	0.30m: CORE LOSS - Suspect washed out.									
	0.30 - 1.50m: Cuttings are light brownish white, sand comprising coral.				1	1				
Peri-reef Deposits	*1.50m:* Fine to medium SAND, some gravel, minor silt; light brownish white. Tightly packed, moist, uniformly graded; gravel, fine to medium, sub-angular, shell fragments. [PERI-REEF DEPOSITS]	SPT	100	3/4// 8/8/12/22 **N>=50**	4	2				*1.50 - 1.95m:* PSD - 27% gravel, 45% sand and 26% fines
	1.95m: BOULDERS, some gravel; white and light brown. Tightly packed, moist, poorly graded. Boulders, up to 500mm, Coral.	HQTT	100		3	3				
	2.85m: Fine to coarse GRAVEL, some sand; light brownish white. Loosely packed, moist, poorly graded. Gravel, rounded, Coral.				2	4				
	3.60m: CORE LOSS - Suspect washed out.	HQTT	40		1	4				
	4.50m: Fine to coarse GRAVEL, some sand; brownish white. Medium dense, moist, poorly graded. Gravel, sub-rounded to sub-angular, Coral.	SPT	100	4/3// 2/3/3/4 **N=12**	0	5				
	5.00m: COBBLES; light brown and white. Very dense, moist. Cobbles, Coral.	HQTT	100		-1	6				
				20 for 50mm **N>=50** Bouncing Refusal						
	6.40m: Fine to coarse GRAVEL, some sand; brownish white. Loosely packed, moist, poorly graded. Gravel, sub-rounded to sub-angular, Coral.	HQTT	38		-2	7				
	6.60m: CORE LOSS - Suspect washed out.									
	6.60 - 9.00m: Cuttings are light brown and white, sand comprising coral.				-3	8				
	7.50m: NO RECOVERY - Solid SPT, no overcore recovered.	SPTC	0	5/5// 5/5/4/4 **N=18** Solid Cone						
	7.95m: CORE LOSS - Suspect washed out.	HQTT	0		-4	9				
	9.00m: Sandy fine to coarse GRAVEL; brown. Loose to medium dense, moist, poorly graded. Gravel, sub-rounded, Coral.	SPT	100	2/3// 2/2/3/6 **N=13**						
Reef Limestone Formation	*9.40m:* Fine to coarse GRAVEL, some sand; brown and white. Medium dense, moist, poorly graded. Gravel, sub-angular, Coral. [REEF LIMESTONE FORMATION]	HQTT	38							

Water Level / Fluid Loss (%): 25, 50, 75 — 15/12/2025
Casing
Installation: Box 0.00-5.90m
Core Box No

COMMENTS: 1. Borehole has piezometer installation from 6 - 9 m. A Levelogger was installed at 8.8 m bgl. 2. Minimal water circulation the entire depth of borehole.

Hole Depth 15.17m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 9:14:03 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH04

SHEET: 2 OF 2

PROJECT: EEETA

JOB No.: 1097984.1000.2000

LOCATION: National Bank of Vanuatu

CO-ORDINATES: 168.31476800° (WGS84) -17.73779600°

DIRECTION: 180°

ANGLE FROM HORIZ.: -90°

R.L. GROUND: 5.30m

R.L. COLLAR: 5.30m

DATUM: ELLIPSOID

SURVEY: Map or aerial photograph

DRILLED BY: Jono

LOGGED BY: COCU

CHECKED: CRB

START DATE: 13/12/2025

FINISH DATE: 13/12/2025

CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Reef Limestone Formation	*9.85m:* CORE LOSS - Suspect washed out.			HQTT	38												
	10.50m: Fine to coarse GRAVEL, some sand; brown and white. Very dense, moist, poorly graded. Gravel, sub-angular, Coral.			SPT	100	7/10// 18/10/8/14 for 65mm **N>=50**											
	10.94m: Slightly weathered, white and brown, LIMESTONE. Very weak, well cemented, coarse grained.			HQTT	100												
				SPT	100	8/5// 6/17/18/9 for 65mm **N>=50**											Box 5.90-12.45m
	12.70m: CORE LOSS - Confirmed material left in bottom of hole, washed out on subsequent run.			HQTT	25												
	13.50m: NO RECOVERY - Solid SPT, no overcore recovered.			SPTC	0	2/3// 13/10/9/13 **N=45** Solid Cone											
	13.95m: Slightly weathered, white and brown, LIMESTONE. Very weak, well cemented, coarse grained. Recovered as: coarse GRAVEL, minor sand; white and brown. Tightly packed, moist, poorly graded. Gravel, sub-rounded, Coral.			HQTT	57												
	14.55m: CORE LOSS - Confirmed material left in bottom of hole, washed out on subsequent run.																Box 12.45-15.17m
	15.00m: NO RECOVERY - Solid SPT, no overcore recovered.			SPTC	0	8/12// 10 for 20mm **N>=50** Solid Cone Bouncing											
	15.17m: END OF BOREHOLE																

COMMENTS: 1. Borehole has piezometer installation from 6 - 9 m. A Levelogger was installed at 8.8 m bgl. 2. Minimal water circulation the entire depth of borehole.

Hole Depth 15.17m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 9:14:03 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH04**

Hole Location: National Bank of Vanuatu

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.314768 (WGS84) -17.737796 R.L.: 5.30m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 13/12/2025 HOLE FINISHED: 13/12/2025 DRILLED BY: Vanuatu Drilling LOGGED BY: COCU CHECKED: CRB



0.00-5.90m



5.90-12.45m

TTNZ_20251211 - GeneralLog - 6/05/2026 9:14:03 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH04**

Hole Location: National Bank of Vanuatu

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.314768 (WGS84) -17.737796 R.L.: 5.30m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 13/12/2025 HOLE FINISHED: 13/12/2025 DRILLED BY: Vanuatu Drilling LOGGED BY: COCU CHECKED: CRB



12.45-15.17m

TTNZ_20251211 - GeneralLog - 6/05/2026 9:14:04 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH04A

SHEET: 1 OF 3

PROJECT: EEETA

JOB No.: 1097984.1000.2000

LOCATION: National Bank of Vanuatu

CO-ORDINATES: 168.31462600° (WGS84) -17.73783300°

DIRECTION: 180°

ANGLE FROM HORIZ.: -90°

R.L. GROUND: 5.30m

R.L. COLLAR:

DATUM: ELLIPSOID

SURVEY: Map or aerial photograph

DRILLED BY: Jono

LOGGED BY: COCU

CHECKED: CRB

START DATE: 15/12/2025

FINISH DATE: 15/12/2025

CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Fill	*0.00m:* Sandy fine to coarse GRAVEL; brown and white. Loosely packed, moist, poorly graded. Gravel, sub-angular, coral. [FILL]			HQTT	40		5	0									
	0.45m: Fine to coarse GRAVEL; white. Loosely packed, moist, poorly graded. Gravel, sub-rounded, Coral and shell fragments.																
	0.60m: CORE LOSS - Suspect washed out.																
	1.50m: Fine to coarse GRAVEL, some sand; light brown white. Loosely packed, moist, poorly graded. Gravel, sub-rounded to sub-angular, Coral and shell fragments.			HQTT	37		4	1									
Peri-reef Deposits	*2.05m:* CORE LOSS - Suspect washed out. [PERI-REEF DEPOSITS]						3	2									
	3.00m: Fine to coarse GRAVEL, some sand; white. Medium dense, moist, well graded. Gravel, sub-rounded to sub-angular, Coral and shell fragments.			SPT	100	11/9// 8/8/6/5 **N=27**	2	3					*3.00 - 3.45m:* PSD - 49% gravel, 46% sand and 5% fines				
	3.80 - 3.95m: COBBLES. Cobbles, up to 130mm, sub-angular, coral.																
	3.95m: CORE LOSS - Suspect washed out.			HQTT	48		1	4									
	4.50m: Cobbly fine to coarse GRAVEL, some sand; white. Tightly packed, moist, well graded. Gravel, sub-angular, Coral and shell fragments; cobbles, up to 120mm. Calcite cement.						0	5									
	4.95m: CORE LOSS - Suspect washed out.			HQTT	30												
	4.95 - 6.00m: Cuttings are light brownish white, sand comprising coral.																
	6.00m: Sandy fine to coarse GRAVEL; white. Loose, moist, well graded. Gravel, sub-rounded, Coral and shell fragments.			SPT	100	3/2// 2/2/2/3 **N=9**	-1	6									
	6.45m: CORE LOSS - Suspect washed out.			HQTT	0												
	6.45 - 7.50m: Cuttings are light brownish white, sand comprising coral.						-2	7									
	7.50m: Fine to coarse GRAVEL, minor sand, trace silt; brown and white. Loosely packed, moist, poorly graded. Gravel, rounded, Coral and shell fragments.																
	7.80m: CORE LOSS - Suspect washed out.			HQTT	20		-3	8									
	7.80 - 9.00m: Cuttings are brown sand and coral.																
	9.00m: Gravelly fine to coarse SAND, some silt, trace organics; brownish grey speckled white. Medium dense, moist, well graded; gravel, fine to coarse, rounded, Coral and shell fragments; organics, wood fragments.			SPT	100	3/5// 5/2/2/2 **N=11**	-4	9					*9.00 - 9.45m:* PSD - 39% gravel, 39% sand and 22% fines				Box 0.00-9.45m
	9.70m: CORE LOSS - Suspect washed out.			HQTT	24												

COMMENTS: 1. Minimal water circulation the entire depth of borehole.

Hole Depth 21m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 9:15:00 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH04A

SHEET: 2 OF 3

PROJECT: EEETA

JOB No.: 1097984.1000.2000

LOCATION: National Bank of Vanuatu

CO-ORDINATES: 168.31462600° (WGS84) -17.73783300°

DIRECTION: 180°

ANGLE FROM HORIZ.: -90°

R.L. GROUND: 5.30m

R.L. COLLAR:

DATUM: ELLIPSOID

SURVEY: Map or aerial photograph

DRILLED BY: Jono

LOGGED BY: COCU

CHECKED: CRB

START DATE: 15/12/2025

FINISH DATE: 15/12/2025

CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Peri-reef Deposits	[CONT] *9.70m:* CORE LOSS - Suspect washed out.			HQTT	24		-5	11									
	10.50m: Gravelly fine to coarse SAND, trace organics; brownish grey speckled white. Loosely packed, moist, well graded; gravel, fine to coarse, rounded, Coral and shell fragments; organics, wood fragments.																
	10.80m: Sandy fine to coarse GRAVEL, trace silt; light brownish white. Loosely packed, moist, well graded. Gravel, sub-rounded, Coral and shell fragments.			HQTT	33		-6										
	11.00m: CORE LOSS - Suspect washed out.							12									
	12.00m: Fine to coarse GRAVEL, some sand, trace silt; brownish orange. Very dense, moist, poorly graded. Gravel, sub-angular, Coral and shell fragments.			SPT	100	5/8// 8/9/23/10 for 35mm **N>=50**	-7										
	12.75m: CORE LOSS - Suspect washed out.			HQTT	31		-8	13									
	13.50m: Cobbly coarse GRAVEL; white and brown. Tightly packed, moist. Gravel, sub-angular, Coral; cobbles, up to 100mm.																
	13.80m: CORE LOSS - Obstruction (recovered) in front of barrel.			HQTT	20		-9	14									
	13.80 - 15.00m: Cuttings are brown sand and coral.																
	15.00m: Fine to coarse GRAVEL, some sand, trace silt; brownish grey. Very dense, moist, poorly graded. Gravel, sub-angular, Coral and shell fragments.			SPT	100	3/5// 8/11/15/16 for 35mm **N>=50** Bouncing	-10	15									
	15.70m: Cobbly coarse GRAVEL; white. Tightly packed, moist. Gravel, sub-angular, Coral; cobbles, up to 90mm.			HQTT	50		-11										
	15.95m: CORE LOSS - Obstruction (recovered) in front of barrel.							16									
Reef Limestone Formation	*16.50m:* Slightly weathered, white and brown, LIMESTONE. Very weak, well cemented, coarse grained. [REEF LIMESTONE FORMATION]			HQTT	67		-12										
	17.50m: CORE LOSS - Obstruction (recovered) in front of barrel.							17									
	18.00m: Slightly weathered, light brownish white, LIMESTONE. Very weak, well cemented, coarse grained. Recovered as: cobbly coarse GRAVEL; light brownish white. Tightly packed, moist. Gravel, sub-angular, Coral; cobbles, up to 100mm.						-13	18									
	18.50m: CORE LOSS - Obstruction (recovered) in front of barrel.			HQTT	33												
	19.50m: Slightly weathered, light brownish white, LIMESTONE. Very weak, well cemented, coarse grained. Recovered as: cobbly coarse GRAVEL; light brownish white. Tightly packed,			HQTT	33		-14	19									Box 9.45-18.00m

COMMENTS: 1. Minimal water circulation the entire depth of borehole.

Hole Depth 21m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 9:15:00 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: BH04A

SHEET: 3 OF 3

PROJECT: EEETA

JOB No.: 1097984.1000.2000

LOCATION: National Bank of Vanuatu

CO-ORDINATES: 168.31462600° (WGS84) -17.73783300°

DIRECTION: 180°

ANGLE FROM HORIZ.: -90°

R.L. GROUND: 5.30m

R.L. COLLAR:

DATUM: ELLIPSOID

SURVEY: Map or aerial photograph

DRILLED BY: Jono

LOGGED BY: COCU

CHECKED: CRB

START DATE: 15/12/2025

FINISH DATE: 15/12/2025

CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (HW SW MW HW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Reef Limestone Formation	moist. Gravel, sub-angular, Coral; cobbles, up to 100mm.			HQTT	33		-15	21									Box 18.00-21.00m
	20.00m: CORE LOSS - Suspect material dropped out of barrel.																
	21m: END OF BOREHOLE						-16	22									
							-17	23									
							-18	24									
							-19	25									
							-20	26									
							-21	27									
							-22	28									
							-23	29									
							-24										

COMMENTS: 1. Minimal water circulation the entire depth of borehole.

Hole Depth 21m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 9:15:00 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH04A**

Hole Location: National Bank of Vanuatu

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.314626 (WGS84) -17.7378330 R.L.: 5.30m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 15/12/2025 HOLE FINISHED: 15/12/2025 DRILLED BY: Vanuatu Drilling LOGGED BY: COCU CHECKED: CRB



0.00-9.45m



9.45-18.00m

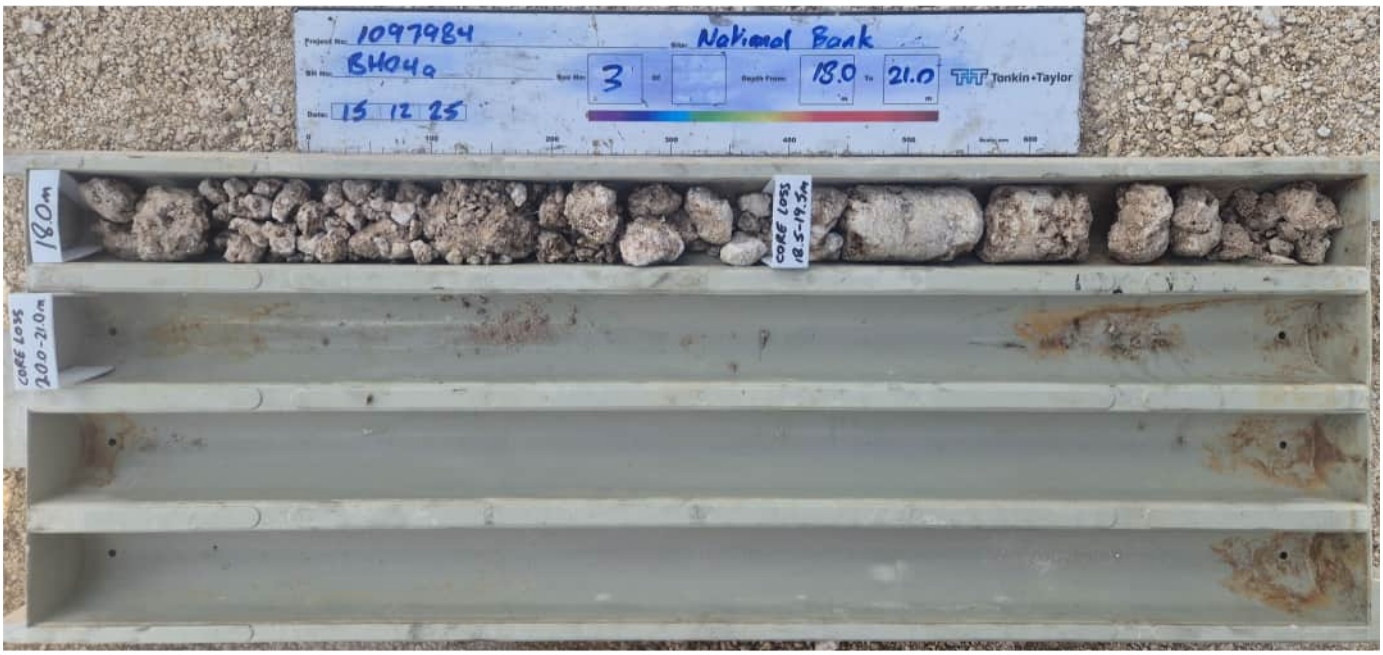
TTNZ_20251211 - GeneralLog - 6/05/2026 9:15:00 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH04A**

Hole Location: National Bank of Vanuatu

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.314626 (WGS84) -17.7378330 R.L.: 5.30m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 15/12/2025 HOLE FINISHED: 15/12/2025 DRILLED BY: Vanuatu Drilling LOGGED BY: COCU CHECKED: CRB



18.00-21.00m

TTNZ_20251211 - GeneralLog - 6/05/2026 9:15:00 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH05

SHEET: 1 OF 2

PROJECT: EEETA	CO-ORDINATES: 168.31323000° (WGS84) -17.73734700°	R.L. GROUND: 2.10m
JOB No.: 1097984.1000.2000		R.L. COLLAR: 2.10m
LOCATION: Jungle Cafe	DIRECTION: 180°	DATUM: ELLIPSOID
	ANGLE FROM HORIZ.: -90°	SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: COCU
CHECKED: CRB
START DATE: 12/12/2025
FINISH DATE: 13/12/2025
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Reclamation Fill	*0.00m:* COBBLES, some sand and some gravel; white and brown. Loosely packed, moist, poorly graded. Cobbles, up to 80mm; gravel, fine to coarse, sub-angular, coral. [RECLAMATION FILL]						2	0									
	0.65m: CORE LOSS - Suspect washed out.			HQTT	43		1	1									
Reef Limestone Formation	*1.50m:* Slightly weathered, white and light brown, LIMESTONE. Very weak, well cemented, coarse grained. [REEF LIMESTONE FORMATION]			HQTT	100	10/10// for 5 mm **N>=50** Bouncing Refusal	0	2									
	3.07m: CORE LOSS - Suspect washed out.					15 for 70mm **N>=50** Bouncing Refusal	-1	3									
	3.25m: Slightly weathered, white and light brown, LIMESTONE. Very weak, well cemented, coarse grained.			HQTT	87												
	4.94m: CORE LOSS - Suspect washed out.			SPT	100	5/9// 16/12/13/9 for 65mm **N>=50**	-3	5									Box 0.00-4.94m
	5.10m: Slightly weathered, white and light brown, LIMESTONE. Very weak, well cemented, coarse grained.			HQTT	85												
	6.00m: Gravelly fine to coarse SAND, some silt; brown. Medium dense, moist, poorly graded; gravel, fine to coarse, sub-angular, Coral.			SPT	100	3/2// 4/2/2/2 **N=10**	-4	6									
	6.50m: CORE LOSS - Confirmed material left in bottom of hole, washed out on subsequent run.			HQTT	5		-5	7									
	7.50m: Slightly weathered, white and light brown, LIMESTONE. Very weak, well cemented, coarse grained.			HQTT	100	20 for 50mm **N>=50** Bouncing Refusal	-6	8									
	8.80m: Slightly weathered, white, LIMESTONE. Very weak, well cemented, fine grained.			HQTT	100	20 for 70mm **N>=50** Bouncing Refusal BH05_UCS @ 9.35m	-7	9					*9.35 - 9.55m:* UCS - 2.0 MPa				Box 4.94-9.90m

Water Level / Fluid Loss (%): 25, 50, 75 — 13/12/2025

COMMENTS: 1. Borehole has piezometer installation from 3 - 6 m. A Levelogger was installed at 5.8 m bgl. 2. No water circulation the entire depth of borehole.

Hole Depth 19.5m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 9:18:59 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH05

SHEET: 2 OF 2

PROJECT: EEETA
JOB No.: 1097984.1000.2000
LOCATION: Jungle Cafe

CO-ORDINATES: 168.31323000° -17.73734700° (WGS84)
DIRECTION: 180°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 2.10m
R.L. COLLAR: 2.10m
DATUM: ELLIPSOID
SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: COCU
CHECKED: CRB
START DATE: 12/12/2025
FINISH DATE: 13/12/2025
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW EW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Reef Limestone Formation	[CONT] *8.80m:* Slightly weathered, white, LIMESTONE. Very weak, well cemented, fine grained.			HQTT	100	20 for 20mm **N>=50** Bouncing Refusal	-8										
	11.25m: CORE LOSS - Suspect washed out. Fine grained Limestone.			HQTT	51		-9	11									
	12.00m: Slightly weathered, white, LIMESTONE. Very weak, well cemented, coarse grained.			HQTT	100	10 for 20mm **N>=50** Solid Cone Bouncing Refusal	-10	12									
	13.80m: CORE LOSS - Suspect washed out. Highly fractured Limestone.			HQTT	18	20 for 40mm **N>=50** Solid Cone Bouncing Refusal	-11	13					*13.80 - 16.50m:* Driller comment: material is similar strength to core above. Cuttings are light brownish white sand, comprising coral. Suspect washing out highly fractured Limestone				
				HQTT	0	20 for 20mm **N>=50** Solid Cone Bouncing Refusal	-12	14									
							-13	15									
							-14	16									
	16.50m: Slightly weathered, brownish white, LIMESTONE. Extremely weak, well cemented, coarse grained. Recovered as: fine to coarse GRAVEL, minor cobbles, trace sand; brownish white. Very dense, moist, poorly graded. Gravel, angular, Coral.			HQTT	73		-15	17									Box 9.90-17.10m
	17.60m: CORE LOSS - Suspect washed out. Highly fractured Limestone.						-16	18									
	18.00m: Slightly weathered, brownish white, LIMESTONE. Extremely weak, well cemented, coarse grained. Recovered as: fine to coarse GRAVEL, minor cobbles, trace sand; brownish white. Very dense, moist, poorly graded. Gravel, angular, Coral.			HQTT	65	20 for 60mm **N>=50** Solid Cone Bouncing Refusal	-17	19									Box 17.10-19.50m
	19.00m: CORE LOSS - Suspect material dropped out of barrel.																
	19.5m: END OF BOREHOLE																

COMMENTS: 1. Borehole has piezometer installation from 3 - 6 m. A Levelogger was installed at 5.8 m bgl. 2. No water circulation the entire depth of borehole.

Hole Depth 19.5m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 9:18:59 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH05**

Hole Location: Jungle Cafe

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.31323 (WGS84) -17.737347 R.L.: 2.10m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 12/12/2025 HOLE FINISHED: 13/12/2025 DRILLED BY: Vanuatu Drilling LOGGED BY: COCU CHECKED: CRB



0.00-4.94m



4.94-9.90m

TTNZ_20251211 - GeneralLog - 6/05/2026 9:18:59 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH05**

Hole Location: Jungle Cafe

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.31323 (WGS84) -17.737347 R.L.: 2.10m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 12/12/2025 HOLE FINISHED: 13/12/2025 DRILLED BY: Vanuatu Drilling LOGGED BY: COCU CHECKED: CRB



9.90-17.10m



17.10-19.50m

TTNZ_20251211 - GeneralLog - 6/05/2026 9:18:59 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH06

SHEET: 1 OF 3

PROJECT: EEETA

JOB No.: 1097984.1000.2000

LOCATION: Municipality City Council

CO-ORDINATES: 168.31488300° (WGS84) -17.73659300°

DIRECTION: 180°

ANGLE FROM HORIZ.: -90°

R.L. GROUND: 21.60m

R.L. COLLAR: 21.60m

DATUM: ELLIPSOID

SURVEY: Map or aerial photograph

DRILLED BY: Jono

LOGGED BY: COCU

CHECKED: CRB

START DATE: 02/12/2025

FINISH DATE: 04/12/2025

CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (HW SW MW DW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Fill	*0.00m:* GRAVEL, some sand, minor silt; light brown and white. Stiff, dry; gravel, coarse, angular, Coral. [FILL]																
	0.05m: Clayey SILT, some gravel; dark brown mixed white. Stiff, moist, high plasticity; gravel, fine to coarse, sub-angular, Coral reef.																
Reef Limestone Formation	*0.52m:* Slightly to moderately weathered, light white, LIMESTONE. Extremely weak, poorly cemented, coarse grained. [REEF LIMESTONE FORMATION]			HQTT	83		21	0									
	1.25m: CORE LOSS - Suspect washed out.																
	1.50m: Slightly to moderately weathered, light white streaked brown, LIMESTONE. Extremely weak, poorly cemented, coarse grained.			SPT	100	3/7// 10/8/9/10 **N=37**	20	1									
				HQTT	100		19	2									
				SPT	100	5/10// 12/15/9/12 **N=48**	18	3									
				HQTT	100		17	4									Box 0.00-4.40m
	4.20m: Slightly weathered, light brownish white, LIMESTONE. Very weak, poorly cemented, coarse grained.			SPT	100	2/4// 6/10/21/13 for 65mm **N>=50**	16	5									
				HQTT	100		15	6									
	6.00m: Slightly weathered, white, LIMESTONE. Extremely weak, poorly cemented, fine grained. Recovered as: fine to coarse GRAVEL, some silt, minor sand; light brownish white. Medium dense, moist, poorly graded. Gravel, angular, limestone.			SPT	100	6/6// 4/6/15/10 **N=35**	14	7									
				HQTT	100		13	8									
	7.20m: Slightly weathered, lightbrownish white, LIMESTONE. Very weak, well cemented, coarse grained.			HQTT	100	20 for 20mm **N>=50** Solid Cone Bouncing Refusal	12	9									Box 4.40-7.85m
						BH06_UCS @ 8.57m							*8.57 - 8.79m:* UCS - 2.5 MPa				
	9.00m: NO RECOVERY - Solid SPT, no overcore recovered.			SPTC	0	7/10// 10 for 30mm **N>=50** Solid Cone Bouncing Refusal							*9.00m:* Grouted from 0 m to 9 m on 02.12 at end of day	DRY 02/12/2025			
	9.18m: CORE LOSS - Suspect washed out.																
	9.40m: Slightly weathered, brownish white, LIMESTONE. Very weak, well cemented, coarse grained.			HQTT	83												

COMMENTS: 1. Borehole has downhole geophysics installation. 2. No water circulation the entire depth of borehole. The borehole was grouted at the end of day at 9.0 m bgl and 12.0 m bgl.

Hole Depth 30m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 9:36:58 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH06

SHEET: 2 OF 3

PROJECT: EEETA
JOB No.: 1097984.1000.2000
LOCATION: Municipality City Council

CO-ORDINATES: 168.31488300° (WGS84) -17.73659300°
DIRECTION: 180°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 21.60m
R.L. COLLAR: 21.60m
DATUM: ELLIPSOID
SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: COCU
CHECKED: CRB
START DATE: 02/12/2025
FINISH DATE: 04/12/2025
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Reef Limestone Formation	[CONT] *9.40m:* Slightly weathered, brownish white, LIMESTONE. Very weak, well cemented, coarse grained.			HQTT	83												
	10.50m: NO RECOVERY - Solid SPT, no overcore recovered.			SPTC	0	12/9// 7/5/7/9 **N=28** Solid Cone											
	10.95m: CORE LOSS - Suspect washed out.																
	11.30m: Slightly weathered, brownish white, LIMESTONE. Extremely weak, poorly cemented, fine grained. Recovered as: coarse GRAVEL, some silt, minor sand; light brownish white. Dense, moist. Gravel, angular, limestone.			HQTT	67												
				SPT	100	11/7// 7/7/10/14 **N=38**							*12.00m:* Grouted from 0 m to 12 m on 03.12 at end of day	DRY 03/12/2025			
	12.80m: Slightly weathered, brownish white, LIMESTONE. Very weak, well cemented, coarse grained.			HQTT	81												
	13.30m: CORE LOSS - Suspect washed out.																
	13.50m: Slightly weathered, brownish white, LIMESTONE. Very weak, well cemented, coarse grained.			HQTT	100	20 for 50mm **N>=50** Bouncing Refusal											Box 7.85-12.85m
	15.00m: NO RECOVERY - Solid SPT, no overcore recovered.			SPTC	9	15/10// for 30mm **N>=50** Solid Cone Bouncing Refusal											
	15.10m: Slightly weathered, brownish white, LIMESTONE. Very weak, well cemented, coarse grained.			HQTT	100												
	16.50m: NO RECOVERY - Solid SPT, no overcore recovered.			SPTC	20	12/9// 14/10 for 20 mm **N>=50** Solid Cone Bouncing											
	16.70m: Slightly weathered, brownish white, LIMESTONE. Very weak, well cemented, coarse grained. Minor chemical disintegration.			HQTT	100												Box 12.85-17.10m
	18.00m: NO RECOVERY - Solid SPT, no overcore recovered.				0	20 for 70mm **N>=50** Solid Cone Bouncing Refusal											
	18.20m: Slightly weathered, brownish white, LIMESTONE. Very weak, well cemented, coarse grained.			HQTT	91												
	19.50m: NO RECOVERY - Solid SPT, no overcore recovered.			SPTC	63	10/8// 8/9/18/15 for 35mm **N>=50** Solid Cone Bouncing											
	19.65m: Slightly weathered, brownish white, LIMESTONE. Extremely weak, poorly cemented, fine grained. Recovered as:																

COMMENTS: 1. Borehole has downhole geophysics installation. 2. No water circulation the entire depth of borehole. The borehole was grouted at the end of day at 9.0 m bgl and 12.0 m bgl.

Hole Depth 30m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 9:36:58 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH06

SHEET: 3 OF 3

PROJECT: EEETA
JOB No.: 1097984.1000.2000
LOCATION: Municipality City Council

CO-ORDINATES: 168.31488300° -17.73659300° (WGS84)
DIRECTION: 180°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 21.60m
R.L. COLLAR: 21.60m
DATUM: ELLIPSOID
SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: COCU
CHECKED: CRB
START DATE: 02/12/2025
FINISH DATE: 04/12/2025
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Reef Limestone Formation	fine to coarse GRAVEL, some silt, minor sand; light brownish white. Very dense, moist, poorly graded. Gravel, sub-angular, limestone.			HQTT	100		1	21									
	20.65m: Slightly weathered, brownish white, LIMESTONE. Very weak, well cemented, coarse grained.			HQTT	100	20 for 40mm **N>=50** Solid Cone Bouncing Refusal	0	22						04/12/2025			Box 17.10-21.35m
	22.50m: NO RECOVERY - Solid SPT, no overcore recovered.			SPTC	0	13/12// 10/8/ 6/7 **N=31** Solid Cone	-1	23									
	22.95m: CORE LOSS - Suspect washed out. Calcareous SAND, poorly cemented.			HQTT	57		-2	24									
	23.40m: Slightly weathered, brownish white, LIMESTONE. Extremely weak, poorly cemented, fine grained. Recovered as: fine to coarse GRAVEL, some sand, minor cobbles; light brownish white. Tightly packed, moist, poorly graded. Gravel, sub-angular, limestone.																
	24.00m: NO RECOVERY - Solid SPT, no overcore recovered.			SPTC	11	14/15// 10/8/ 11/8 **N=37** Solid Cone	-3	25									
	24.40m: Slightly weathered, brownish white, LIMESTONE. Extremely weak, poorly cemented, fine grained. Recovered as: fine to coarse GRAVEL, some sand, minor cobbles; light brownish white. Dense, moist. Gravel, sub-angular, limestone.			HQTT	100		-4	26									
	24.75m: Slightly weathered, light brownish white, LIMESTONE. Extremely weak, poorly cemented, fine grained. Recovered as: fine to coarse SAND, some gravel, trace silt; light brownish white. Tightly packed, moist, well graded. Sand, Calcareous; gravel, fine to coarse, angular, coral and shell fragments.																
	25.50m: NO RECOVERY - Solid SPT, no overcore recovered.			SPTC	51	11/15// 15/14/13/8 for 55mm **N>=50** Solid Cone	-5	27									
	25.70m: Slightly weathered, light brownish white, LIMESTONE. Extremely weak, poorly cemented, fine grained. Recovered as: gravelly fine to coarse SAND, trace silt; light brownish white. Very dense, moist, well graded. Sand, Calcareous; gravel, fine to coarse, angular, Coral and shell fragments.			HQTT	100		-6	28									Box 21.35-26.70m
	27.00m: NO RECOVERY - Solid SPT, no overcore recovered.			SPTC	0	12/12// 14/13/27 for 70 mm **N>=50** Solid Cone	-7	29									
	27.45m: CORE LOSS - Suspect washed out.			HQTT	53		-8										
	27.90m: Slightly weathered, light brownish white, LIMESTONE. Extremely weak, poorly cemented, fine grained. Recovered as: gravelly fine to coarse SAND, trace silt; light brownish white. Tightly packed, moist, well graded. Sand, Calcareous; gravel, fine to coarse, angular, Coral and shell fragments.																
	28.50m: NO RECOVERY - Solid SPT, no overcore recovered.			SPTC	0	7/8// 6/7/10/8 **N=31** Solid Cone											
	28.95m: CORE LOSS - Suspect washed out Calcareous SAND.			HQTT	29												Box 26.70-30.00m
	29.70m: Same as description above																
	30m: END OF BOREHOLE																

COMMENTS: 1. Borehole has downhole geophysics installation. 2. No water circulation the entire depth of borehole. The borehole was grouted at the end of day at 9.0 m bgl and 12.0 m bgl.

Hole Depth 30m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 9:36:58 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH06**

Hole Location: Municipality City Council

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.314883 (WGS84) -17.736593 R.L.: 21.60m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 02/12/2025 HOLE FINISHED: 04/12/2025 DRILLED BY: Vanuatu Drilling LOGGED BY: COCU CHECKED: CRB



0.00-4.40m



4.40-7.85m

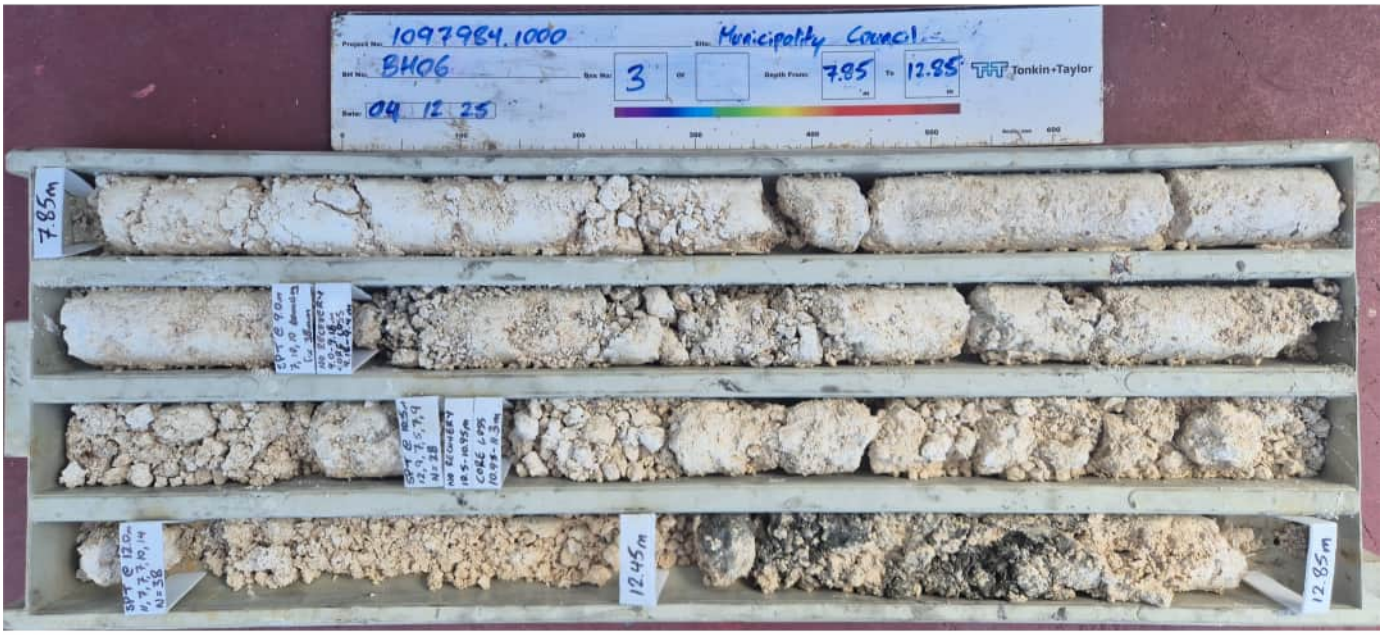
TTNZ_20251211 - GeneralLog - 6/05/2026 9:36:58 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH06**

Hole Location: Municipality City Council

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.314883 (WGS84) -17.736593 R.L.: 21.60m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 02/12/2025 HOLE FINISHED: 04/12/2025 DRILLED BY: Vanuatu Drilling LOGGED BY: COCU CHECKED: CRB



7.85-12.85m



12.85-17.10m

TTNZ_20251211 - GeneralLog - 6/05/2026 9:36:58 am - Produced with Core-GS by GeRoc

CORE PHOTOS

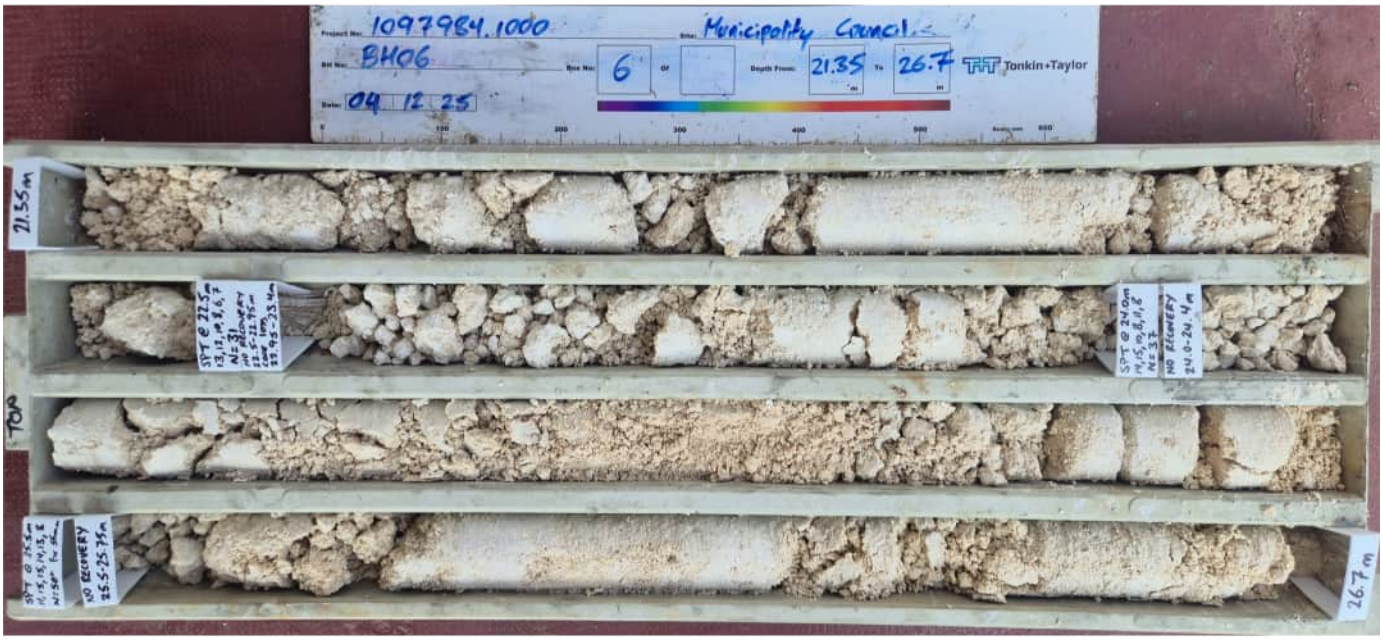
BOREHOLE No.: **BH06**

Hole Location: Municipality City Council

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.314883 (WGS84) -17.736593 R.L.: 21.60m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 02/12/2025 HOLE FINISHED: 04/12/2025 DRILLED BY: Vanuatu Drilling LOGGED BY: COCU CHECKED: CRB



17.10-21.35m



21.35-26.70m

TTNZ_20251211 - GeneralLog - 6/05/2026 9:36:58 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH06**

Hole Location: Municipality City Council

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.314883 (WGS84) -17.736593 R.L.: 21.60m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 02/12/2025 HOLE FINISHED: 04/12/2025 DRILLED BY: Vanuatu Drilling LOGGED BY: COCU CHECKED: CRB



26.70-30.00m

TTNZ_20251211 - GeneralLog - 6/05/2026 9:36:58 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH07

SHEET: 1 OF 4

PROJECT: EEETA
JOB No.: 1097984.1000.2000
LOCATION: Olympic

CO-ORDINATES: 168.31302800° -17.73601200° (WGS84)
DIRECTION: 180°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 4.00m
R.L. COLLAR: 4.00m
DATUM: ELLIPSOID
SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: COCU
CHECKED: CRB
START DATE: 05/12/2025
FINISH DATE: 09/12/2025
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Fill	*0.00m:* GRAVEL, minor sand; light brown and black. Loosely packed, moist; gravel, coarse, sub-angular, Coral and wood. [FILL]																
	0.15m: CONCRETE; grey mixed white. Loosely packed, dry.																
Reef Limestone Formation	*0.35m:* Slightly weathered, light brownish white, LIMESTONE. Very weak, well cemented, coarse grained. [REEF LIMESTONE FORMATION]			HQTT	73		3	1									
	1.10m: CORE LOSS - Suspect washed out.																
	1.50m: Slightly weathered, light brownish white, LIMESTONE. Extremely weak, well cemented, coarse grained. Recovered as: coarse GRAVEL, minor sand; light brownish white. Dense, moist, poorly graded. Gravel, sub-angular, Coral and shell fragments.			SPT	100	5/9// 11/8/ 9/11 **N=39**											
	2.35m: CORE LOSS - Suspect washed out.			HQTT	38		2	2									
	3.00m: NO RECOVERY - Suspect slipped out of SPT spoon.			SPT	0	10/4// 4/4/12/30 **N>=50** Bouncing	1	3									
	3.45m: Slightly weathered, light brownish white, LIMESTONE. Extremely weak, well cemented, coarse grained. Recovered as: coarse GRAVEL, minor sand; light brownish white. Tightly packed, moist, poorly graded. Gravel, sub-angular, Coral and shell fragments.			HQTT	81		0	4									
	4.30m: CORE LOSS - Suspect washed out.																
	4.50m: NO RECOVERY - Solid SPT, no overcore recovered.			SPTC	0	8/10// 10/10/8/8 **N=36** Solid Cone	-1	5									
	4.95m: CORE LOSS - Suspect washed out.																
	5.15m: Slightly weathered, light brownish white, LIMESTONE. Extremely weak, well cemented, coarse grained. Recovered as: coarse GRAVEL, minor sand; light brownish white. Medium dense to dense, moist, poorly graded. Gravel, sub-angular, Coral and shell fragments.			HQTT	81		-2	6									
				SPT	100	6/8// 9/7/6/6 **N=28**											
				HQTT	100		-3	7									
				SPT	100	10/6// 5/4/11/13 **N=33**	-4	8									
	8.20m: CORE LOSS - Suspect washed out.			HQTT	24												
	9.00m: Slightly weathered, light brownish white, LIMESTONE. Extremely weak, well cemented, coarse grained. Recovered as: coarse GRAVEL, some cobbles, trace sand; light brownish white. Very dense, moist, poorly graded. Gravel, sub-angular, Coral and shell fragments.			SPT	100	13/13// 14/10 for 25 mm **N>=50** Bouncing	-5	9									
				HQTT	100												

Box 0.00-6.00m

COMMENTS: 1. Borehole has downhole geophysics installation. 2. No water circulation the entire depth of borehole. The borehole was grouted at the end of day at 13.5 bgl.

Hole Depth 31.5m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 9:43:46 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH07

SHEET: 2 OF 4

PROJECT: EEETA
JOB No.: 1097984.1000.2000
LOCATION: Olympic

CO-ORDINATES: 168.31302800° -17.73601200° (WGS84)
DIRECTION: 180°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 4.00m
R.L. COLLAR: 4.00m
DATUM: ELLIPSOID
SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: COCU
CHECKED: CRB
START DATE: 05/12/2025
FINISH DATE: 09/12/2025
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Reef Limestone Formation	[CONT] *9.00m:* Slightly weathered, light brownish white, LIMESTONE. Extremely weak, well cemented, coarse grained. Recovered as: coarse GRAVEL, some cobbles, trace sand; light brownish white. Very dense, moist, poorly graded. Gravel, sub-angular, Coral and shell fragments.			HQTT / SPT	100 / 100	11/8// 6/21/8/ 15 for 65mm **N>=50**	-7	11									Box 6.00-10.50m
	10.94m: CORE LOSS - Suspect washed out.			HQTT	47												
	11.50m: Slightly weathered, light brownish white, LIMESTONE. Extremely weak, well cemented, coarse grained. Recovered as: coarse GRAVEL, some sand, minor silt; light brownish white. Tightly packed, moist, poorly graded. Gravel, sub-angular, Coral and shell fragments.			SPT	0	20 for 70mm **N>=50** Bouncing Refusal	-8	12									
	12.00m: Slightly weathered, light brownish white, LIMESTONE. Extremely weak, well cemented, coarse grained. Recovered as: coarse GRAVEL, some cobbles, trace sand; light brownish white. Very dense, moist, poorly graded. Gravel, sub-angular, Coral and shell fragments.			HQTT	87		-9	13									
	13.25m: CORE LOSS - Suspect washed out.																
	13.50m: Slightly weathered, light brownish white, LIMESTONE. Extremely weak, well cemented, coarse grained. Recovered as: coarse GRAVEL, some sand, minor silt; light brownish white. Very dense, moist, poorly graded. Gravel, sub-angular, Coral and shell fragments.			SPT	100	10/12// 10 for 20mm **N>=50** Bouncing	-10	14					*13.50m:* Borehole was grouted from 0 m to 13.5 m on the 05.12 at the end of day				
	14.10m: CORE LOSS - Suspect washed out.			HQTT	32												
	15.00m: Moderately weathered, light brown mottled orange, LIMESTONE. Extremely weak, well cemented, coarse grained. Recovered as: coarse GRAVEL, trace sand; light brown mottled orange. Medium dense, moist, poorly graded. Gravel, angular, Coral.			SPT	100	15/12// 9/5/13/8 **N=35**	-11	15									
	15.50m: Slightly weathered, light brownish white, LIMESTONE. Extremely weak, well cemented, coarse grained. Recovered as: coarse GRAVEL, some sand, minor silt; light brownish white. Tightly packed, moist, poorly graded. Gravel, sub-angular, Coral.			HQTT	90		-12	16									Box 10.50-16.00m
	16.40m: CORE LOSS - Suspect washed out.																
	16.50m: Slightly weathered, light brownish white, LIMESTONE. Extremely weak, well cemented, coarse grained. Recovered as: coarse GRAVEL, minor sand; light brownish white. Very dense, moist, poorly graded. Gravel, sub-angular, Coral.			SPT	100	8/6// 9/23/28 for 70 mm **N>=50**	-13	17									
	17.85m: CORE LOSS - Suspect washed out.			HQTT	87												
	18.00m: Slightly weathered, light brownish white, LIMESTONE. Extremely weak, well cemented, coarse grained. Recovered as: coarse GRAVEL, minor sand; light brownish white. Dense to very dense, moist, poorly graded. Gravel, sub-angular, Coral.			SPT	100	16/14// 10/16/14/9 **N=49**	-14	18									
				HQTT	100		-15	19									Box 16.00-19.95m
				SPT	100	9/6// 10/11/8/21 **N>=50**											

COMMENTS: 1. Borehole has downhole geophysics installation. 2. No water circulation the entire depth of borehole. The borehole was grouted at the end of day at 13.5 bgl.

Hole Depth 31.5m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 9:43:46 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH07

SHEET: 3 OF 4

PROJECT: EEETA
JOB No.: 1097984.1000.2000
LOCATION: Olympic

CO-ORDINATES: 168.31302800° (WGS84) -17.73601200°
DIRECTION: 180°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 4.00m
R.L. COLLAR: 4.00m
DATUM: ELLIPSOID
SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: COCU
CHECKED: CRB
START DATE: 05/12/2025
FINISH DATE: 09/12/2025
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log / Fracture Spacing (mm) / RQD (%) / Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Reef Limestone Formation	[CONT] *18.00m:* Slightly weathered, light brownish white, LIMESTONE. Extremely weak, well cemented, coarse grained. Recovered as: coarse GRAVEL, minor sand; light brownish white. Dense to very dense, moist, poorly graded. Gravel, sub-angular, Coral.			HQTT	100		-17	21						
				SPT	100	6/10// 14/17/19 for 40 mm **N>=50** Bouncing								
				HQTT	78		-18	22						
	22.25m: CORE LOSS - Suspect washed out.													
	22.50m: Slightly weathered, light brownish white, LIMESTONE. Extremely weak, well cemented, medium grained. Recovered as: coarse GRAVEL, some sand; light brownish white. Dense, moist, poorly graded. Gravel, sub-angular, Coral.			SPT	100	7/6// 10/11/12/6 **N=39**	-19	23						
	23.30m: Slightly weathered, light brownish white, LIMESTONE. Extremely weak, well cemented, coarse grained. Silt infill. Recovered as: coarse GRAVEL, some sand, minor silt; light brownish white. Tightly packed, moist, poorly graded. Gravel, sub-angular, Coral.			HQTT	81									
	23.80m: CORE LOSS - Suspect washed out.						-20	24						
	24.00m: Moderately weathered, brownish white, LIMESTONE. Extremely weak, well cemented, coarse grained. Silt infill. Recovered as: coarse GRAVEL, some sand, minor silt; brownish white. Medium dense, moist, poorly graded. Gravel, sub-angular, Coral.			SPT	100	4/1// 4/4/9/10 **N=27**								
	24.60 - 25.05m: Slightly weathered, white.			HQTT	57		-21	25						
	25.05m: CORE LOSS - Suspect washed out.													
	25.50m: Slightly weathered, white, LIMESTONE. Extremely weak, well cemented, coarse grained. Recovered as: coarse GRAVEL, minor sand; white. Medium dense to dense, moist, poorly graded. Gravel, sub-angular, Coral.			SPT	100	6/8// 6/7/5/7 **N=25**	-22	26						
				HQTT	100									
				SPT	100	6/5// 9/12/10/9 **N=40**	-23	27						
				HQTT	86		-24	28						
	28.35m: CORE LOSS - Suspect washed out.													
	28.50m: Slightly weathered, white, LIMESTONE. Extremely weak, well cemented, coarse grained. Recovered as: coarse GRAVEL, minor sand; white. Medium dense, moist, poorly graded. Gravel, sub-angular, Coral.			SPT	100	7/6// 7/7/9/12 **N=35**	-25	29						
				HQTT	90									

Box 19.95-24.45m

Box 24.45-28.95m

COMMENTS: 1. Borehole has downhole geophysics installation. 2. No water circulation the entire depth of borehole. The borehole was grouted at the end of day at 13.5 bgl.

Hole Depth 31.5m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 9:43:46 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: BH07

SHEET: 4 OF 4

Tonkin+Taylor

PROJECT: EEETA
JOB No.: 1097984.1000.2000
LOCATION: Olympic

CO-ORDINATES: 168.31302800° (WGS84) -17.73601200°
DIRECTION: 180°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 4.00m
R.L. COLLAR: 4.00m
DATUM: ELLIPSOID
SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: COCU
CHECKED: CRB
START DATE: 05/12/2025
FINISH DATE: 09/12/2025
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Reef Limestone Formation	*29.90m:* CORE LOSS - Suspect washed out. *30.00m:* Slightly weathered, white, LIMESTONE. Extremely weak, well cemented, coarse grained. Recovered as: coarse GRAVEL, minor sand; white. Dense, moist, poorly graded. Gravel, sub-angular, Coral.			SPT	100	9/15// 17/14/6/5 **N=42**	-27	31									Box 28.95-31.50m
				HQTT	100												
	31.5m: END OF BOREHOLE						-28	32									
							-29	33									
							-30	34									
							-31	35									
							-32	36									
							-33	37									
							-34	38									
							-35	39									

COMMENTS: 1. Borehole has downhole geophysics installation. 2. No water circulation the entire depth of borehole. The borehole was grouted at the end of day at 13.5 bgl.

Hole Depth 31.5m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 9:43:46 am - Produced with Core-GS by GeRoc

CORE PHOTOS

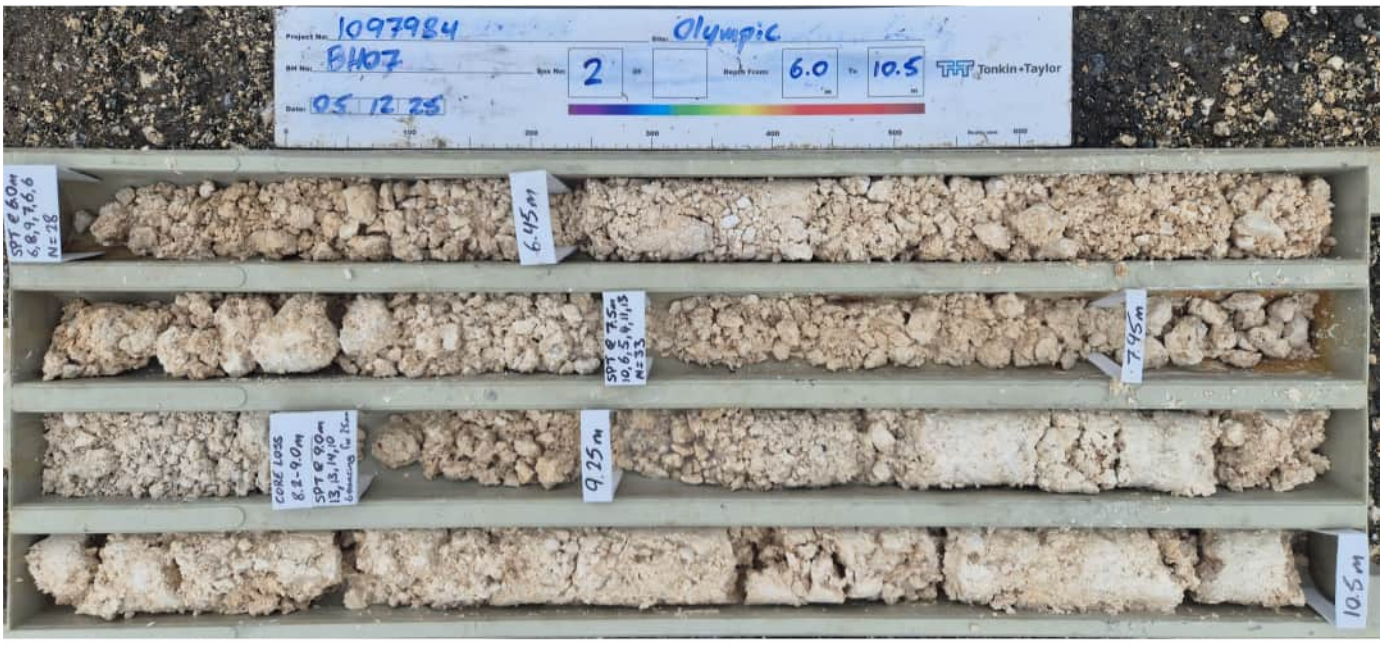
BOREHOLE No.: **BH07**

Hole Location: Olympic

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.313028 (WGS84) -17.736012 R.L.: 4.00m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 05/12/2025 HOLE FINISHED: 09/12/2025 DRILLED BY: Vanuatu Drilling LOGGED BY: COCU CHECKED: CRB



0.00-6.00m



6.00-10.50m

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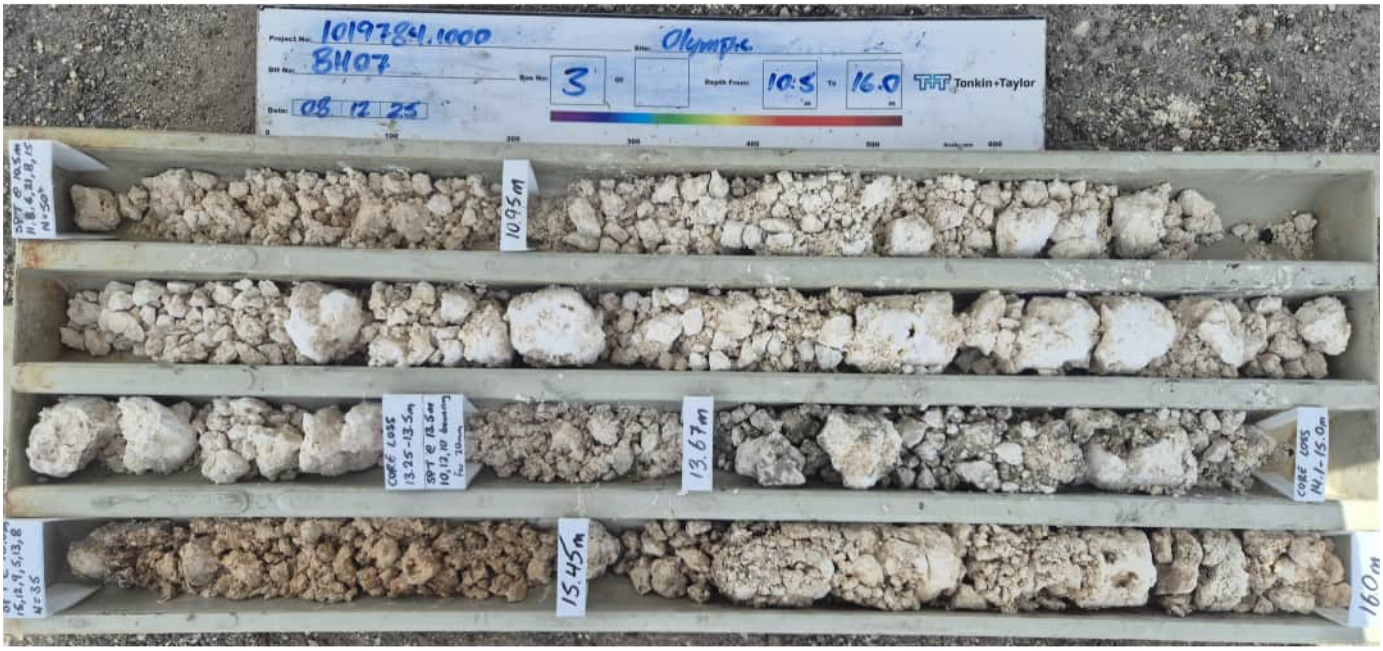
CORE PHOTOS

BOREHOLE No.: **BH07**

Hole Location: Olympic

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.313028 (WGS84) -17.736012 R.L.: 4.00m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 05/12/2025 HOLE FINISHED: 09/12/2025 DRILLED BY: Vanuatu Drilling LOGGED BY: COCU CHECKED: CRB



10.50-16.00m



16.00-19.95m

TTNZ_20251211 - GeneralLog - 6/05/2026 9:43:46 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH07**

Hole Location: Olympic

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.313028 (WGS84) -17.736012 R.L.: 4.00m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 05/12/2025 HOLE FINISHED: 09/12/2025 DRILLED BY: Vanuatu Drilling LOGGED BY: COCU CHECKED: CRB



19.95-24.45m



24.45-28.95m

TTNZ_20251211 - GeneralLog - 6/05/2026 9:43:46 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH07**

Hole Location: Olympic

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.313028 (WGS84) -17.736012 R.L.: 4.00m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 05/12/2025 HOLE FINISHED: 09/12/2025 DRILLED BY: Vanuatu Drilling LOGGED BY: COCU CHECKED: CRB



28.95-31.50m

TTNZ_20251211 - GeneralLog - 6/05/2026 9:43:46 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH08

SHEET: 1 OF 1

PROJECT: EEETA
JOB No.: 1097984.1000.2000
LOCATION: Saralana Park

CO-ORDINATES: 168.31706812° -17.74584731° (WGS84)
DIRECTION: 180°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 35.60m
R.L. COLLAR:
DATUM: ELLIPSOID
SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: REOL
CHECKED: CRB
START DATE: 30/01/2026
FINISH DATE: 31/01/2026
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (HW SW MW DW CW EW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
	0.00m: CLAY, minor silt; dark brown. Soft to firm, moist, medium plasticity.			HQTT	27		35	0									
	0.35m: CORE LOSS - Suspect washed out.																
	1.45m: CLAY, some silt; dark brown. Soft to firm, moist, medium plasticity.			SPT	67	5/2// 2/0/1/1 N=4	34	1									
	1.50m: CLAY and fine to coarse GRAVEL; dark brown and white. Very loose, moist, medium plasticity. Gravel, limestone.																
	1.95m: CORE LOSS - Suspect washed out. *1.95 - 2.75m:* Potential void.			HQTT	24		33	2									
Reef Limestone Formation	*2.75m:* Moderately weathered, brownish white, LIMESTONE. Extremely weak, poorly cemented, coarse grained. Recovered as: fine to coarse GRAVEL, minor silt; brownish white. Medium dense, moist, poorly graded. Gravel, sub-rounded, coral. [REEF LIMESTONE FORMATION]			SPT	67	2/3// 5/2/2/1 N=10	32	3									
	3.45m: CORE LOSS - Suspect washed out.																
	3.85m: Moderately weathered, brownish white, LIMESTONE. Extremely weak, poorly cemented. Recovered as: fine to coarse GRAVEL, some cobbles; brownish white. Loosely packed, moist, poorly graded. Gravel, sub-angular, coral.			HQTT	62		31	4									
	4.50m: Moderately weathered, brownish white. Extremely weak to very weak, poorly cemented, coarse grained. Recovered as: gravelly fine to coarse SAND; brownish white. Dense, moist, poorly graded; gravel, fine to coarse, coral.			SPT	100	5/10// 11/8/6/6 N=31	30	5									
	4.95m: Slightly weathered, brownish white, LIMESTONE. Extremely weak to very weak, moderately cemented, coarse grained. Recovered as: fine to coarse GRAVEL, some cobbles; brownish white. Medium dense, moist, poorly graded. Gravel, coral; cobbles, up to 110mm.			HQTT	100		29	6					*6.00m:* 30/01/26. End of day, grouted back to surface to prevent collapse, improve deviation and improve circulation with 250 L lightly chipped grout. 31/01/26. Returned to 6m, hole deviating beyond tolerance of rig.				Box 0.00-6.00m
				SPT	100	3/4// 5/7/4/6 N=22											Box 6.00-6.45m
	6.45m: Danger of damaging machine						26	9									

0.25 - 0.35m: Allophane content - 5 - 7 %

COMMENTS: Hole deviating away from vertical beyond machine tolerance. No water encountered

Hole Depth 6.45m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 9:47:14 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH08**

Hole Location: Saralana Park

SHEET: 1 OF 1

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.3170681235202 (WGS84) -17.745847311499908 R.L.: 35.60m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 30/01/2026 HOLE FINISHED: 31/01/2026 DRILLED BY: Vanuatu Drilling LOGGED BY: REOL CHECKED: CRB



0.00-6.00m



6.00-6.45m

TTNZ_20251211 - GeneralLog - 6/05/2026 9:47:14 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH08A

SHEET: 1 OF 1

PROJECT: EEETA
JOB No.: 1097984.1000.2000
LOCATION: Saraland Park alternative

CO-ORDINATES: 168.31701180° (WGS84) -17.74591118°
DIRECTION: 180°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 35.40m
R.L. COLLAR:
DATUM: ELLIPSOID
SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: REOL
CHECKED: CRB
START DATE: 02/02/2026
FINISH DATE: 02/02/2026
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Reef Limestone Formation	*0.00m:* Organic CLAY, some silt; dark brown. Soft to firm, moist, medium plasticity.						35	0	TS								
	0.35m: CORE LOSS - Suspect washed out.			HQTT	27			0.5									
	1.45m: Moderately weathered, brownish white, LIMESTONE. Extremely weak, poorly cemented, coarse grained. Recovered as: fine to coarse GRAVEL; brownish white. Very loose, dry, well graded. Gravel, sub-angular, coral. [REEF LIMESTONE FORMATION]						34	1									
	1.65m: VOID. SPT dropped beyond test depth with one blow, limited recovery.			SPT	44	1,0// 0,0/0/0 N=0		1.5	V0 V V0 V V0 V								
	2.40m: Slightly weathered, brownish white, LIMESTONE. Extremely weak, poorly cemented, coarse grained. Recovered as: COBBLES, some gravel; brownish white. Loosely packed, moist, poorly graded. Cobbles, up to 70mm, coral; gravel, fine to coarse.			HQTT	57		33	2									
	2.40 - 2.60m: Recovered with minor brown clay.							2.5									Box 0.00-3.00m
	3m: Danger of damaging machine						32	3									
								3.5									
							31	4									
								4.5									

COMMENTS: No circulation due to significant void encountered. Hole deviating beyond machine tolerance. No groundwater encountered

Hole Depth 3m

Scale 1:25

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 10:22:23 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH08A**

Hole Location: Saraland Park alternative

SHEET: 1 OF 1

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.31701179713085 (WGS84) -17.74591117608499 R.L.: 35.40m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 02/02/2026 HOLE FINISHED: 02/02/2026 DRILLED BY: Vanuatu Drilling LOGGED BY: REOL CHECKED: CRB



0.00-3.00m

TTNZ_20251211 - GeneralLog - 6/05/2026 10:22:23 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: BH09

SHEET: 1 OF 4

Tonkin+Taylor

PROJECT: EEETA
JOB No.: 1097984.1000.2000
LOCATION: Tana Russet

CO-ORDINATES: 168.31043900° (WGS84) -17.72956400°
DIRECTION: 180°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 1.40m
R.L. COLLAR: 1.40m
DATUM: ELLIPSOID
SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: COCU
CHECKED: CRB
START DATE: 11/02/2026
FINISH DATE: 12/02/2026
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Reclamation Fill	*0.00m:* Sandy fine to coarse GRAVEL, trace rootlets; brown and white. Loosely packed, dry, poorly graded. Gravel, sub-rounded, Coral; sand, fine to coarse. [RECLAMATION FILL]			HQTT	40		1	0									
	0.20m: Cobbly coarse GRAVEL, trace silt. Loosely packed, moist, poorly graded. Gravel, sub-angular, Coral; cobbles, up to 120mm.																
	0.60m: CORE LOSS - Suspect core bound.																
	1.50m: Fine to coarse GRAVEL, some sand, trace silt; brown and white. Loose to medium dense, moist, poorly graded. Gravel, sub-angular, Coral; sand, fine to coarse.			SPT	44	2/2 // 3/2/3/2 **N=10**	0	1									
	1.70m: NO RECOVERY - Confirmed slipped out of SPT spoon.			HQTT	67		-1	2									
	1.95m: Fine to coarse GRAVEL, some sand, trace silt; brown and white. Loosely packed, moist, poorly graded. Gravel, sub-angular, Coral; sand, fine to coarse.																
	2.40m: Coarse GRAVEL; black and white. Loosely packed, moist, poorly graded. Gravel, sub-angular, Coral, concrete and metal.																
	2.65m: CORE LOSS - Suspect core bound.			SPT	100	3/2 // 3/2/2/2 **N=9**	-2	3									
	3.00m: Fine to coarse SAND, some silt; black. Loose, moist.																
	3.05m: Gravelly fine to coarse SAND, some silt; light greyish white. Loose, moist, well graded. Sand, angular; gravel, fine to coarse, angular, basalt, Coral and Shell fragments.			HQTT	10		-3	4									
	3.45m: Fine to coarse GRAVEL, some sand, trace silt; brown and white. Loosely packed, moist, poorly graded. Gravel, sub-angular, Coral; sand, fine to coarse.																
	3.55m: CORE LOSS - Suspect washed out, coral sand and gravel. [PERI-REEF DEPOSITS]																
Peri-reef Deposits	*4.50m:* Fine to coarse SAND, some gravel, trace silt; light greyish white. Medium dense, moist, well graded; gravel, fine to coarse, sub-angular.			SPT	100	3/3 // 4/3/5/6 **N=18**	-4	5					*4.50 - 4.95m:* PSD - 27% gravel, 53% sand and 20% fines				
	5.15 - 5.25m: Locally. Black organic staining.																
	5.25m: CORE LOSS - Suspect washed out.			HQTT	29		-5	6									
	6.00m: Sandy fine to coarse GRAVEL, trace silt; brown and white. Loose, moist, poorly graded. Gravel, sub-angular, Coral and Shell fragments; sand, fine to coarse.			SPT	100	2/1 // 3/2/1/1 **N=7**	-6	7									
	6.60m: CORE LOSS - Suspect washed out. White coral SAND.			HQTT	14		-7	8									
	7.50m: Silty fine to medium SAND, some gravel; light brown. Loose to medium dense, moist, poorly graded; gravel, coarse, sub-rounded, Coral and Shell fragments.			SPT	100	3/2 // 2/3/1/4 **N=10**	-8	9									
	8.10m: CORE LOSS - Suspect washed out.			HQTT	14												
	9.00m: Sandy SILT, some gravel; light brownish white. Soft, moist, non-plastic, dilatant; sand, fine to medium; gravel, fine to coarse, sub-rounded, Coral.			SPT	100	2/1 // 0/1/0/1 **N=2**							*9.00 - 9.45m:* PSD - 31% gravel, 26% sand and 43% fines				
				HQTT	86												

Water Level / Fluid Loss (%): 25, 50, 75 — 14/02/2026

Box 0.00-7.95m

COMMENTS: 1. Borehole has downhole geophysics installation.

Hole Depth 31m

Scale 1:50

Rev.: A

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BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH09

SHEET: 2 OF 4

PROJECT: EEETA
JOB No.: 1097984.1000.2000
LOCATION: Tana Russet

CO-ORDINATES: 168.31043900° (WGS84) -17.72956400°
DIRECTION: 180°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 1.40m
R.L. COLLAR: 1.40m
DATUM: ELLIPSOID
SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: COCU
CHECKED: CRB
START DATE: 11/02/2026
FINISH DATE: 12/02/2026
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW EW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Peri-reef Deposits	[CONT] *9.00m:* Sandy SILT, some gravel; light brownish white. Soft, moist, non-plastic, dilatant; sand, fine to medium; gravel, fine to coarse, sub-rounded, Coral.			HQTT	86		-9										
	10.35m: CORE LOSS - Suspect core bound.			SPT	100	2/1// 4/8/9/6 **N=27**											
	10.50m: Fine to coarse SAND, some silt and some gravel; light brownish white. Very loose to loose, moist, well graded, dilatant slow; gravel, fine to coarse, sub-rounded, Coral.							11									
	10.70m: Coarse GRAVEL, minor sand; white. Medium dense, moist, poorly graded. Gravel, sub-angular, Coral.			HQTT	29		-10										
	10.95m: Fine to coarse GRAVEL, some sand, trace silt; light brownish white. Loosely packed, moist, poorly graded. Gravel, sub-angular, Coral and Shell fragments; sand, fine to coarse.																
	11.25m: CORE LOSS - Suspect washed out.			SPT	100	4/3// 3/2/2/1 **N=8**		12					*12.00 - 12.45m:* PSD - 46% gravel, 26% sand and 28% fines				
	12.00m: Fine to coarse GRAVEL, some sand, trace silt; light brownish white. Loose, moist, poorly graded. Gravel, sub-angular, Coral; sand, fine to coarse.						-11										
	12.60m: CORE LOSS - Suspect washed out.			HQTT	14			13									
	13.50m: Gravelly fine to coarse SAND, minor silt; light brown. Medium dense, moist, well graded; gravel, fine to coarse, sub-angular, Coral and Shell fragments.			SPT	105	3/3// 7/16/16/11 for 55mm **N>=50** Bouncing	-12										
	13.70m: Cobbly coarse GRAVEL, trace sand; white. Very dense, moist, poorly graded. Gravel, angular, Coral; cobbles, up to 150mm.			HQTT	98			14									Box 7.95-14.40m
	15.00m: Gravelly fine to coarse SAND, some silt; brownish grey. Loose, moist, well graded; gravel, fine to coarse, sub-angular, Coral and Shell fragments.			SPT	100	4/2// 2/2/2/2 **N=8**	-13						*15.00 - 15.45m:* PSD - 32% gravel, 38% sand and 30% fines				
	15.45m: Coarse GRAVEL, minor sand; white and light brown. Loosely packed, moist, poorly graded. Gravel, sub-rounded to sub-angular, Coral.							15									
	15.75m: CORE LOSS - Suspect washed out.			HQTT	29		-14										
	16.50m: Gravelly fine to coarse SAND, minor silt; light brownish grey. Loose to medium dense, moist, well graded; gravel, fine to coarse, sub-angular, Coral and Shell fragments.			SPT	100	4/3// 3/3/2/2 **N=10**		16									
	17.00m: Fine to coarse GRAVEL, minor sand; light brownish white. Loosely packed, moist, poorly graded. Gravel, sub-rounded, Coral; sand, fine to coarse.						-15										
	17.25m: CORE LOSS - Suspect washed out.			HQTT	29			17									
	18.00m: Sandy fine to coarse GRAVEL, trace silt; grey. Very dense, moist, poorly graded. Gravel, sub-angular, Coral and Shell fragments; sand, fine to coarse.			SPT	100	3/6// 8/27/15 for 30 mm **N>=50**	-16										
	18.33m: Fine to coarse GRAVEL, some sand, trace silt; light brownish white. Loosely packed, moist, poorly graded. Gravel, sub-rounded to sub-angular, Coral; sand, fine to coarse.							18									
	18.80m: CORE LOSS - Suspect washed out.			HQTT	40		-17										
	19.50m: Gravelly fine to coarse SAND; grey. Loose, moist, well graded; gravel, fine to coarse, sub-angular, Coral and Shell fragments.			SPT	100	2/2// 1/1/1/3 **N=6**		19									
							-18										

COMMENTS: 1. Borehole has downhole geophysics installation.

Hole Depth 31m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 10:32:57 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH09

SHEET: 3 OF 4

PROJECT: EEETA
JOB No.: 1097984.1000.2000
LOCATION: Tana Russet

CO-ORDINATES: 168.31043900° (WGS84) -17.72956400°
DIRECTION: 180°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 1.40m
R.L. COLLAR: 1.40m
DATUM: ELLIPSOID
SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: COCU
CHECKED: CRB
START DATE: 11/02/2026
FINISH DATE: 12/02/2026
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Peri-reef Deposits	*19.85m:* Fine to coarse SAND, some gravel, minor silt; brown. Loose, moist, well graded; gravel, fine to medium, angular, shell fragments.			HQTT	86	BH09_UCS @ 20.70m	-19										Box 14.40-20.50m
	19.95m: CORE LOSS - Suspect washed out.																
	20.10m: Fine to coarse SAND, some gravel, minor silt; grey. Loosely packed, moist, well graded; gravel, fine to medium, angular, shell fragments.							21					*20.70 - 20.90m:* UCS - 99 MPa				
	20.35m: Slightly weathered, white, LIMESTONE. Weak, well cemented, coarse grained. [REEF LIMESTONE FORMATION]					20 for 20mm **N>=50** Solid Cone Bouncing Refusal	-20										
	21.25m: Slightly weathered, light brown, LIMESTONE. Extremely weak, poorly cemented. Soil description: coarse GRAVEL, some sand; light brown. Tightly packed, moist, poorly graded. Gravel, sub-angular, Coral.			HQTT	34			22									
	21.50m: CORE LOSS - Suspect washed out. Sandy coralline material.						-21										
				SPT	0	1/1 // 0/3/5/9 **N=17**		23									
Reef Limestone Formation	*23.30m:* Slightly weathered, light brownish white, LIMESTONE. Extremely weak, poorly cemented, coarse grained. Soil description: fine to coarse GRAVEL, some sand; light brownish white. Very dense, moist, poorly graded. Gravel, sub-angular, Coral.			HQTT	67		-22										
						20 for 20mm **N>=50**		24									
				HQTT	61		-23										
	24.90m: CORE LOSS - Suspect core bound.							25									
	25.50m: Slightly weathered, light brownish white streaked black, LIMESTONE. Extremely weak, poorly cemented, coarse grained. Soil description: fine to coarse GRAVEL, some sand, trace silt; light brownish white streaked black. Very dense, moist, poorly graded. Gravel, sub-angular, Coral; sand, fine to coarse.			SPTC	100	20/30// for 65mm **N>=50** Solid Cone	-24										
				HQTT	74			26									
	26.50m: CORE LOSS - Suspect washed out.						-25										
				SPTC	0	14/15// 13/9/16/12 for 65mm **N>=50** Solid Cone		27									
	28.00m: Slightly weathered, light brownish white, LIMESTONE. Very weak, poorly cemented, coarse grained.			HQTT	47		-26										
	28.50m: CORE LOSS - Suspect washed out.			SPTC	0	12/15// 13/10/20/7 for 15mm **N>=50** Solid Cone		28									
	29.10m: Slightly weathered, light brownish white, LIMESTONE. Very weak, poorly cemented, coarse grained.			HQTT	81		-27										
								29									
							-28										Box 20.50-27.00m

COMMENTS: 1. Borehole has downhole geophysics installation.

Hole Depth 31m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 10:32:57 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: BH09

SHEET: 4 OF 4

Tonkin+Taylor

PROJECT: EEETA
JOB No.: 1097984.1000.2000
LOCATION: Tana Russet

CO-ORDINATES: 168.31043900° (WGS84) -17.72956400°
DIRECTION: 180°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 1.40m
R.L. COLLAR: 1.40m
DATUM: ELLIPSOID
SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: COCU
CHECKED: CRB
START DATE: 11/02/2026
FINISH DATE: 12/02/2026
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Reef Limestone Formation	[CONT] *29.10m:* Slightly weathered, light brownish white, LIMESTONE. Very weak, poorly cemented, coarse grained.			HQTT	100		-29	31									Box 27.00-31.00m
	31m: END OF BOREHOLE						-30	32									
							-31	33									
							-32	34									
							-33	35									
							-34	36									
							-35	37									
							-36	38									
							-37	39									
							-38										

COMMENTS: 1. Borehole has downhole geophysics installation.

Hole Depth 31m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 10:32:57 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH09**

Hole Location: Tana Russet

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.31043899999995 (WGS84) -17.729564 R.L.: 1.40m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 11/02/2026 HOLE FINISHED: 12/02/2026 DRILLED BY: Vanuatu Drilling LOGGED BY: COCU CHECKED: CRB



0.00-7.95m



7.95-14.40m

TTNZ_20251211 - GeneralLog - 6/05/2026 10:32:57 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH09**

Hole Location: Tana Russet

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.31043899999995 (WGS84) -17.729564 R.L.: 1.40m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 11/02/2026 HOLE FINISHED: 12/02/2026 DRILLED BY: Vanuatu Drilling LOGGED BY: COCU CHECKED: CRB



14.40-20.50m



20.50-27.00m

TTNZ_20251211 - GeneralLog - 6/05/2026 10:32:57 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH09**

Hole Location: Tana Russet

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.31043899999995 (WGS84) -17.729564 R.L.: 1.40m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 11/02/2026 HOLE FINISHED: 12/02/2026 DRILLED BY: Vanuatu Drilling LOGGED BY: COCU CHECKED: CRB



27.00-31.00m

TTNZ_20251211 - GeneralLog - 6/05/2026 10:32:57 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH10

SHEET: 1 OF 2

PROJECT: EEETA
JOB No.: 1097984.1000.2000
LOCATION: Anchor Inn

CO-ORDINATES: 168.31123900° (WGS84) -17.73565100°
DIRECTION: 180°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 2.00m
R.L. COLLAR: 2.00m
DATUM: ELLIPSOID
SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: COCU
CHECKED: CRB
START DATE: 09/12/2025
FINISH DATE: 11/12/2025
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Reclamation Fill	*0.00m:* Gravelly fine to coarse SAND, trace silt; brown mixed white. Loosely packed, dry, poorly graded; gravel, fine to coarse, sub-angular, Coral and concrete. [RECLAMATION FILL]			HQTT	50		2	0									
	0.40m: Fine to coarse GRAVEL, minor sand; white. Loosely packed, moist, poorly graded. Gravel, sub-rounded, Coral.																
	0.75m: CORE LOSS - Suspect washed out. *0.00 - 1.50m:* Cuttings are Brown sand.																
	1.50m: Fine to coarse GRAVEL, some sand, minor silt; light brownish white. Very dense, moist, poorly graded. Gravel, angular, Coral.			SPT	100	3/2// 2/3/22/23 for 25mm **N>=50** Bouncing	1	-1									
	1.90m: CORE LOSS - Suspect washed out. *1.60 - 1.75m:* Dark brown.																
Peri-reef Deposits	*2.35m:* Fine to coarse GRAVEL, some sand, minor silt; light brownish white. Loosely packed, moist, poorly graded. Gravel, sub-rounded, Coral. [PERI-REEF DEPOSITS]			HQTT	59		0	-2									
	2.75m: COBBLES, some gravel, minor silt; light brownish white. Very dense, moist, poorly graded. Cobbles, up to 150mm, sub-angular, coral reef.					10 for 20mm **N>=50** Bouncing Refusal	-1	-3									
	3.60m: CORE LOSS - Obstruction (recovered) in front of barrel. *3.00 - 4.50m:* Cuttings are Light Brownish white sand and fine gravel comprising coral.			HQTT	41		-2	-4									
	4.50m: Gravelly fine to coarse SAND, minor silt; light brownish white. Dense, moist, poorly graded; gravel, fine to coarse, sub-angular, Coral.			SPT	100	7/11// 13/5/ 9/11 **N=38**	-3	-5									
	4.95m: CORE LOSS - Suspect washed out. Poorly cemented Limestone sand.																
	5.65m: Fine to coarse GRAVEL, some sand, minor silt; light brownish white. Loose to medium dense, moist, poorly graded. Gravel, sub-angular, Coral.			HQTT	33		-4	-6									
	6.45m: CORE LOSS - Suspect washed out.																
	7.05m: Fine to coarse GRAVEL, some sand, minor silt; light brownish white. Loosely packed, moist, poorly graded. Gravel, sub-angular, Coral.			SPT	100	2/7// 3/2/2/3 **N=10**	-5	-7									
	7.50m: Fine to coarse SAND, some gravel, minor silt; light brown. Very loose, moist, poorly graded; gravel, fine to coarse, sub-rounded, Coral and shell fragments.			HQTT	43													
	7.95m: CORE LOSS - Suspect washed out. Poorly cemented Limestone sand.																
Reef Limestone Formation	*8.25m:* Slightly weathered, light brownish white, LIMESTONE. Very weak, well cemented, coarse grained. [REEF LIMESTONE FORMATION]			HQTT	71	1.0// 0/1/0/2 **N=3**	-6	-8					*8.69 - 8.90m:* UCS - 7.6 MPa				
						BH10_UCS @ 8.69m											
				SPT	100	3/3// 8/8/7/4 **N=27**	-7	-9									
	9.45m: CORE LOSS - Suspect washed out. Poorly cemented Limestone sand.			HQTT	76												
	9.70m: Slightly weathered, light brownish white, LIMESTONE.																

Water Level / Fluid Loss (%): 11/12/2025

Box 0.00-6.45m

COMMENTS: 1. Borehole has piezometer installation from 3 - 6 m. 2. No water circulation the entire depth of borehole.

Hole Depth 20m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 10:41:54 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH10

SHEET: 2 OF 2

PROJECT: EEETA
JOB No.: 1097984.1000.2000
LOCATION: Anchor Inn

CO-ORDINATES: 168.31123900° (WGS84) -17.73565100°
DIRECTION: 180°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 2.00m
R.L. COLLAR: 2.00m
DATUM: ELLIPSOID
SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: COCU
CHECKED: CRB
START DATE: 09/12/2025
FINISH DATE: 11/12/2025
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Reef Limestone Formation	Extremely weak, well cemented, coarse grained. Interbedded with: gravelly fine to coarse SAND, minor silt; light brownish white. Very dense, moist, well graded; gravel, fine to coarse, sub-rounded, Coral.			HQTT	76	20 for 60mm N>=50 Bouncing Refusal	-9	11									
	10.65m: Unweathered, light brownish white, LIMESTONE. Weak, well cemented, coarse grained.			HQTT	100	BH10_UCS @ 10.80m							*10.80 - 11. 10m:* UCS - 11.9 MPa				Box 6.45-11.10m
				HQTT	100	10 for 20mm N>=50 Solid Cone Bouncing Refusal	-10	12									
				HQTT	100	10 for 25mm N>=50 Solid Cone Bouncing Refusal	-11	13									
				HQTT	100	10 for 20mm N>=50 Solid Cone Bouncing Refusal	-12	14									Box 11.10-15.00m
				HQTT	100	20 for 30mm N>=50 Solid Cone Bouncing Refusal	-13	15									
				HQTT	100	10 for 40mm N>=50 Solid Cone Bouncing Refusal	-14	16									
	19.00m: CORE LOSS - Suspect material left in bottom of hole, washed out on subsequent run.			HQTT	72		-15	17									Box 15.00-19.00m
	19.45m: Unweathered, white, LIMESTONE. Very weak, well cemented, coarse grained. Vesicular (10% voids).			HQTT	100		-16	18									
	20m: END OF BOREHOLE						-17	19	VO V								Box 19.00-20.00m

COMMENTS: 1. Borehole has piezometer installation from 3 - 6 m. 2. No water circulation the entire depth of borehole.

Hole Depth 20m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 10:41:54 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH10**

Hole Location: Anchor Inn

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.311239 (WGS84) -17.735650999999997 R.L.: 2.00m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 09/12/2025 HOLE FINISHED: 11/12/2025 DRILLED BY: Vanuatu Drilling LOGGED BY: COCU CHECKED: CRB



0.00-6.45m



6.45-11.10m

TTNZ_20251211 - GeneralLog - 6/05/2026 10:41:54 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH10**

Hole Location: Anchor Inn

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.311239 (WGS84) -17.735650999999997 R.L.: 2.00m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 09/12/2025 HOLE FINISHED: 11/12/2025 DRILLED BY: Vanuatu Drilling LOGGED BY: COCU CHECKED: CRB



11.10-15.00m



15.00-19.00m

TTNZ_20251211 - GeneralLog - 6/05/2026 10:41:54 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH10**

Hole Location: Anchor Inn

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.311239 (WGS84) -17.735650999999997 R.L.: 2.00m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 09/12/2025 HOLE FINISHED: 11/12/2025 DRILLED BY: Vanuatu Drilling LOGGED BY: COCU CHECKED: CRB



19.00-20.00m

TTNZ_20251211 - GeneralLog - 6/05/2026 10:41:54 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: BH11

SHEET: 1 OF 3

Tonkin+Taylor

PROJECT: EEETA
JOB No.: 1097984.1000.2000
LOCATION: St Jean D'arc School

CO-ORDINATES: 168.31679900° (WGS84)
-17.73494100°
DIRECTION: 180°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 51.10m
R.L. COLLAR:
DATUM: ELLIPSOID
SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: REOL
CHECKED: CRB
START DATE: 19/01/2026
FINISH DATE: 21/01/2026
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Fill	*0.00m:* SILT, trace gravel; dark brown. Soft to firm, moist; gravel, fine, up to 4mm, limestone. [FILL]												*0.00 - 0.40m:* Atterberg Limits - LL = 82, PL = 39, and PI = 43 Allophane content - 5 - 7%				
Reef Limestone Formation	*0.43m:* Moderately weathered, brownish white, LIMESTONE. Extremely weak, poorly cemented, coarse grained. Recovered as: fine to coarse GRAVEL, some sand, minor silt; brownish white. Tightly packed, dry, poorly graded. Gravel, sub-angular, limestone. [REEF LIMESTONE FORMATION]			HQTT	61		51	0									
	0.92m: CORE LOSS - Suspect washed out.																
	1.50m: Moderately weathered, brownish white, LIMESTONE. Extremely weak, poorly cemented, coarse grained. Recovered as: sandy fine to coarse GRAVEL, some silt; brownish white. Medium dense, dry, well graded. Gravel, sub-angular, limestone.			SPT	100	5/15// 9/6/8/6 **N=29**	50	1									
	1.95m: CORE LOSS - Suspect washed out.			HQTT	10		49	2									
	2.90m: Moderately weathered, brownish white, LIMESTONE. Extremely weak, poorly cemented, coarse grained. Recovered as: sandy fine to coarse GRAVEL, minor silt; brownish white. Medium dense, dry, well graded. Gravel, sub-angular, limestone and shell fragments.			SPT	82	14/14// 10/4/ 4/10 **N=28**	48	3									
	3.45m: CORE LOSS - Suspect washed out.			HQTT	24		47	4									
	4.25m: Moderately weathered, brownish white, LIMESTONE. Extremely weak, poorly cemented, coarse grained. Recovered as: sandy fine to coarse GRAVEL, trace silt; brownish white. Medium dense, dry, well graded. Gravel, sub-angular, limestone and shell fragments.			SPT	71	3/2// 4/3/2/3 **N=12**	46	5									
	4.95m: CORE LOSS - Suspect washed out.																
	5.10m: Moderately weathered, brownish white, LIMESTONE. Extremely weak, poorly cemented, coarse grained. Recovered as: sandy fine to coarse GRAVEL, minor silt; brownish white. Very dense, dry, well graded. Gravel, limestone and shell fragments.			HQTT	86		45	6									Box 0.00-6.00m
				SPT	89	10/4// 11/19/18/20 **N>=50**											
	6.45m: CORE LOSS - Suspect washed out.			HQTT	12		44	7									
	7.37m: Moderately weathered, brownish white, LIMESTONE. Extremely weak, poorly cemented, coarse grained. Recovered as: sandy fine to coarse GRAVEL; brownish white. Dense, dry, poorly graded. Gravel, sub-angular, limestone.			SPT	89	6/5// 11/8/ 14/8 **N=41**	43	8						DRY 19/01/2026			
	7.95m: CORE LOSS - Suspect washed out.			HQTT	38												
	8.60m: Moderately weathered, light brown, LIMESTONE. Extremely weak, poorly cemented, coarse grained. Recovered as: fine to coarse GRAVEL, some sand, minor silt; light brown. Medium dense, dry, well graded. Gravel, sub-angular, limestone.			SPT	78	6/4// 5/6/7/5 **N=23**	42	9									
	9.45m: CORE LOSS - Suspect washed out.			HQTT	76												
	9.70m: Moderately weathered, light brown, LIMESTONE.																

COMMENTS: Losing circulation, drill bit getting stuck. Hole terminated. No groundwater encountered

Hole Depth 23.2m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 10:43:33 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH11

SHEET: 2 OF 3

PROJECT: EEETA
JOB No.: 1097984.1000.2000
LOCATION: St Jean D'arc School

CO-ORDINATES: 168.31679900° (WGS84)
-17.73494100°
DIRECTION: 180°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 51.10m
R.L. COLLAR:
DATUM: ELLIPSOID
SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: REOL
CHECKED: CRB
START DATE: 19/01/2026
FINISH DATE: 21/01/2026
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Reef Limestone Formation	Extremely weak, poorly cemented, coarse grained. Recovered as: sandy fine to coarse GRAVEL, minor silt; light brown. Medium dense, dry, poorly graded. Gravel, sub-angular, limestone.			HQTT	76		41										
				SPT	67	7,5// 6,5/4/3 N=18											
	10.95m: CORE LOSS - Suspect washed out.						40	11									
	11.05m: Moderately weathered, light brown, LIMESTONE. Extremely weak to very weak, poorly cemented, coarse grained.			HQTT	90	BH11_UCS @ 11.65m							*11.65 - 11.76m:* UCS - 3.8 MPa				Box 6.00-11.65m
				SPT	100	5,2// 2,4/3/2 N=11	39	12									
	12.45m: CORE LOSS - Suspect washed out.																
	12.70m: Moderately weathered, brownish white, LIMESTONE. Extremely weak to very weak, well cemented, coarse grained.			HQTT	76		38	13									
				SPT	89	6/10// 6/13,9/16 N=44											
	13.95m: CORE LOSS - Suspect washed out.						37	14									
	14.05m: Moderately weathered, brownish white, LIMESTONE. Very weak, well cemented, coarse grained.			HQTT	90												
				SPT	89	4,6// 17/28/24/13 N>=50	36	15									Box 11.65-15.45m
	15.45m: CORE LOSS - Suspect washed out.																
	15.70m: Moderately weathered, white and brown, LIMESTONE. Very weak, well cemented, coarse grained.			HQTT	76		35	16									
				SPT	8	12/14// 7/7/6/7 N=27											
	16.95m: CORE LOSS - Suspect washed out.						34	17									
	17.10m: Moderately weathered, light brown, LIMESTONE. Extremely weak, poorly cemented, coarse grained. Recovered as: fine to coarse GRAVEL, some sand; light brown. Loosely packed, moist, poorly graded. Gravel, angular, limestone.			HQTT	86												
	17.60m: Moderately weathered, brown and white, LIMESTONE. Very weak, poorly cemented, coarse grained.			SPT	78	7/12// 9/11/17/10 N=47	33	18									
	18.45m: CORE LOSS - Suspect washed out.																
	18.70m: Moderately weathered, brown and white, LIMESTONE. Very weak, poorly cemented, coarse grained.			HQTT	76		32	19									
	19.50m: CORE LOSS - Suspect washed out.			HQTT	100												Box 15.45-20.00m

COMMENTS: Losing circulation, drill bit getting stuck. Hole terminated. No groundwater encountered

Hole Depth 23.2m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 10:43:33 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH11

SHEET: 3 OF 3

PROJECT: EEETA	CO-ORDINATES: 168.31679900° (WGS84) -17.73494100°	R.L. GROUND: 51.10m
JOB No.: 1097984.1000.2000		R.L. COLLAR:
LOCATION: St Jean D'arc School	DIRECTION: 180°	DATUM: ELLIPSOID
	ANGLE FROM HORIZ.: -90°	SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: REOL
CHECKED: CRB
START DATE: 19/01/2026
FINISH DATE: 21/01/2026
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Reef Limestone Formation	*19.95m:* Moderately weathered, brownish white, LIMESTONE. Very weak, poorly cemented, coarse grained.			HQTT	40		31						*20.00m:* 20/01/26. Vibrating due to no circulation. Rods pulled. 300 L of grout back to 13 m bgl.	DRY 21/01/2026			Box 20.00-23.20m
	20.40m: CORE LOSS - Suspect washed out, loose limestone gravels.						30	21									
	21.85m: Moderately weathered, white stained brown, LIMESTONE. Extremely weak to very weak, poorly cemented, coarse grained.			HQTT	43		29	22									
	22.50m: CORE LOSS - Suspect washed out.																
	22.70m: Slightly weathered, brownish white, LIMESTONE. Very weak, poorly cemented, coarse grained.			HQTT	71		28	23									
	23.2m: Danger of damaging machine						27	24					*23.20m:* 21/01/26. Lost circulation. Bit getting stuck. Rods pulled and hole terminated.				
							26	25									
							25	26									
							24	27									
							23	28									
							22	29									

COMMENTS: Losing circulation, drill bit getting stuck. Hole terminated. No groundwater encountered

Hole Depth 23.2m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 10:43:33 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH11**

Hole Location: St Jean D'arc School

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.316799 (WGS84) -17.734940999999996 R.L.: 51.10m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 19/01/2026 HOLE FINISHED: 21/01/2026 DRILLED BY: Vanuatu Drilling LOGGED BY: REOL CHECKED: CRB



0.00-6.00m



6.00-11.65m

TTNZ_20251211 - GeneralLog - 6/05/2026 10:43:33 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH11**

Hole Location: St Jean D'arc School

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.316799 (WGS84) -17.734940999999996 R.L.: 51.10m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 19/01/2026 HOLE FINISHED: 21/01/2026 DRILLED BY: Vanuatu Drilling LOGGED BY: REOL CHECKED: CRB



11.65-15.45m



15.45-20.00m

TTNZ_20251211 - GeneralLog - 6/05/2026 10:43:33 am - Produced with Core-GS by GeRoc

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH11**

Hole Location: St Jean D'arc School

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.316799 (WGS84) -17.734940999999996 R.L.: 51.10m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 19/01/2026 HOLE FINISHED: 21/01/2026 DRILLED BY: Vanuatu Drilling LOGGED BY: REOL CHECKED: CRB



20.00-23.20m

TTNZ_20251211 - GeneralLog - 6/05/2026 10:43:33 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH12

SHEET: 1 OF 4

PROJECT: EEETA
JOB No.: 1097984.1000.2000
LOCATION: Vanuatu Supreme Court

CO-ORDINATES: 168.31933700° (WGS84) -17.73557400°
DIRECTION: 180°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 73.20m
R.L. COLLAR: 73.20m
DATUM: ELLIPSOID
SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: COCU
CHECKED: CRB
START DATE: 16/02/2026
FINISH DATE: 17/02/2026
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Fill	*0.00m:* Coarse GRAVEL; grey and white. Loosely packed, moist. Gravel, Concrete and coral; fill, concrete fragments. [FILL]			HQTT	40		73	0									
	0.10m: Medium to coarse GRAVEL, some sand, trace clay; light brownish white and reddish brown. Loosely packed, moist, poorly graded. Gravel, sub-angular, Coral. [REEF LIMESTONE FORMATION]																
	0.60m: CORE LOSS - Suspect washed out.						72	1									
Reef Limestone Formation	*1.50m:* Fine to coarse GRAVEL, some sand, trace silt; white and brown and black. Medium dense, moist, poorly graded. Gravel, sub-rounded to sub-angular, Coral.			SPT	100	6/5// 3/3/4/4 N=14											
	2.45m: CORE LOSS - Suspect washed out.			HQTT	48		71	2									
	3.00m: Fine to coarse GRAVEL, some sand, trace silt; white, brown and black. Medium dense, moist, poorly graded. Gravel, sub-rounded to sub-angular, Coral.			SPT	100	6/4// 2/3/3/5 N=13											
	3.45m: CORE LOSS - Suspect washed out.						70	3									
	3.60m: Sandy fine to coarse GRAVEL, minor silt; light grey and white. Loosely packed, moist, well graded. Gravel, sub-angular, Coral.			HQTT	86												
	4.05m: Highly weathered, light brownish white, LIMESTONE. Extremely weak, poorly cemented, coarse grained. Recovered as: fine to coarse GRAVEL, some sand; light brownish white. Medium dense, moist, poorly graded. Gravel, sub-angular.			SPT	100	4/2// 4/4/4/4 N=16	69	4									
	5.10m: CORE LOSS - Suspect core bound, washed away weathered tuff. [EFATE PUMICE FORMATION]			HQTT	14		68	5					*5.50 - 13.50m:* Brown silt cuttings				
Efate Pumice Formation	*6.00m:* Completely weathered, brown mixed white, TUFF. Extremely weak. Pumacious. Soil description: SILT, some gravel, minor clay and minor sand; brown mixed white. Stiff, moist, medium plasticity; gravel, fine to coarse, extremely weak, tuff and coral.			SPT	100	1/1// 2/1/3/2 N=8	67	6									Box 0.00-6.80m
	7.00m: Completely weathered, brown, TUFF. Extremely weak. Pumacious. Soil description: SILT, some clay, trace sand; brown. Stiff, moist, high plasticity.			HQTT	100		66	7									
				SPT	100	2/2// 3/2/3/2 N=10							*7.50 - 7.95m:* Atterberg Limits - LL = 115, PL = 86, and PI = 29				
	8.10m: Completely weathered, light brown banded orange and grey, TUFF. Extremely weak. Pumicious. Soil description: sandy SILT; light brown banded orange and grey. Stiff, moist, non-plastic, volcanic flecks. Laminations at 40 to 50 deg; sand, fine to medium.			HQTT	100		65	8					*8.60m:* BF, 50°, PL, SM, Cn				
				SPT	100	3/2// 2/2/2/1 N=7	64	9					*9.00 - 9.45m:* Allophane content - 5 - 7 %				
				HQTT	100												

Water Level / Fluid Loss (%): 25, 50, 75; 17/02/2026 Drilling fluid

COMMENTS: 1. Borehole has downhole geophysics installation. 2. Water circulation maintained after 5 m bgl

Hole Depth 31.5m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 7/05/2026 3:10:34 pm - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH12

SHEET: 2 OF 4

PROJECT: EEETA
JOB No.: 1097984.1000.2000
LOCATION: Vanuatu Supreme Court

CO-ORDINATES: 168.31933700° (WGS84) -17.73557400°
DIRECTION: 180°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 73.20m
R.L. COLLAR: 73.20m
DATUM: ELLIPSOID
SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: COCU
CHECKED: CRB
START DATE: 16/02/2026
FINISH DATE: 17/02/2026
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Efate Pumice Formation	[CONT] *8.10m:* Completely weathered, light brown banded orange and grey, TUFF. Extremely weak. Pumicious. Soil description: sandy SILT; light brown banded orange and grey. Stiff, moist, non-plastic, volcanic flecks. Laminations at 40 to 50 deg; sand, fine to medium.			HQTT	100		63						*10.05m:* BF, 40°, PL, SM, Cn				Box 6.80-10.50m
	10.50m: Completely weathered, brownish orange speckled black, TUFF. Extremely weak. Pumacious. Soil description: SILT, some gravel; brownish orange speckled black. Stiff, moist, non-plastic, volcanic flecks. Laminations at 40 to 50 deg; gravel, coarse, angular, Tuff.			SPT	100	2/3// 2/2/3/3 **N=10**	62	11									
	11.40m: Highly weathered, brownish grey speckled black, TUFF. Extremely weak, pumacious with volcanic flecks. Soil description: SILT, some sand and some gravel; brownish grey speckled black. Very stiff to hard, moist, non-plastic; gravel, fine to coarse, very weak, Tuff.			HQTT	100								*11.30m:* BF, 50°, PL, SM, Cn *11.40m:* BF, 50°, PL, SM, Cn				
				SPTC	100	4/5// 5/6/6/8 **N=25** Solid Cone	61	12									
	13.15m: Slightly weathered, grey banded black, TUFF. Very weak, laminations at 10 to 20 deg.			HQTT	100			13				33					
				SPT	100	20/30// for 45mm **N>=50** Solid Cone Bouncing	60										
				HQTT	100	BH12_Triaxial @ 14.11m	59	14				94					Box 10.50-14.40m
	14.60m: Slightly weathered, dark grey banded black, TUFF. Very weak, unwelded, laminations at 10 to 20 deg. Breaks down to silt between fingers.			SPT	100	30/20// for 25mm **N>=50** Solid Cone Bouncing	58	15					*15.20m:* J, 50°, PL, SM, Cn				
	15.30 - 15.80m: Light grey.			HQTT	100		57	16				85	*15.75m:* BF, 15°, PL, SM, Cn *16.10m:* BF, 20°, PL, SM, Cn *16.30m:* J, 70°, PL, SM, Cn				
				SPT	100	40/10// for 5 mm **N>=50** Solid Cone	56	17									
	16.90 - 17.50m: Light grey.			HQTT	100							95					Box 14.40-18.00m
				SPT	100	30/20// for 25mm **N>=50** Solid Cone	55	18									
				HQTT	100		54	19				100					
	19.70 - 20.00m: Light grey.			HQTT	100							100					

COMMENTS: 1. Borehole has downhole geophysics installation. 2. Water circulation maintained after 5 m bgl

Hole Depth 31.5m

Scale 1:50

Rev.: A

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BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH12

SHEET: 3 OF 4

PROJECT: EEETA
JOB No.: 1097984.1000.2000
LOCATION: Vanuatu Supreme Court

CO-ORDINATES: 168.31933700° (WGS84) -17.73557400°
DIRECTION: 180°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 73.20m
R.L. COLLAR: 73.20m
DATUM: ELLIPSOID
SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: COCU
CHECKED: CRB
START DATE: 16/02/2026
FINISH DATE: 17/02/2026
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Efate Pumice Formation	[CONT] *14.60m:* Slightly weathered, dark grey banded black, TUFF. Very weak, unwelded, laminations at 10 to 20 deg. Breaks down to silt between fingers.			HQTT	100		53	20				100					
	21.55 - 22.40m: Light grey.			HQTT	100		52	21				100					
	21.90 - 22.10m: Calcite veins less than 1 mm thick.																Box 18.00-21.90m
	22.70 - 23.20m: Black coarse sand beds, 1 to 5 cm thick.			HQTT	100		51	22									
							50	23				70					
	24.85m: Slightly weathered, light grey banded black, TUFF. Weak, densely welded, fine grained, volcanic flecks. Breaks down to silt between fingers.			HQTT	100	BH12_Triaxial @ 25.08m	49	24				90					
	25.30m: Slightly weathered, dark grey banded black, TUFF. Very weak, unwelded, fine grained, breaks down to silt between fingers.						48	25					*25.00m:* J, 60°, PL, SM, Cn				Box 21.90-25.50m
	26.15m: Slightly weathered, grey mixed red and orange, volcaniclastic BRECCIA. Very weak, fine to coarse grained, volcaniclastic clasts up to 50 mm.			HQTT	100		47	26				100					
	26.30m: Slightly weathered, grey spotted orange and white, TUFF. Weak, moderately welded, fine grained, volcaniclastic clasts up to 20 mm, in bands up to 80 mm thick.																
	27.20m: Slightly weathered, light grey banded black, TUFF. Weak, moderately welded, fine grained, volcaniclastic clasts up to 10 mm. Laminations at 10 degrees. Breaks down to silt between fingers.			HQTT	100		46	27				100					
	28.30 - 29.50m: Dark grey with black bands.						45	28				100					Box 25.50-29.00m
	29.40 - 30.10m: Black and orange coarse sand and pumice bed. 5 cm thick.			HQTT	100	BH12_triaxial @ 29.70m	44	29				93					

COMMENTS: 1. Borehole has downhole geophysics installation. 2. Water circulation maintained after 5 m bgl

Hole Depth 31.5m

Scale 1:50

Rev.: A

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BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH12

SHEET: 4 OF 4

PROJECT: EEETA

JOB No.: 1097984.1000.2000

LOCATION: Vanuatu Supreme Court

CO-ORDINATES: 168.31933700° (WGS84) -17.73557400°

DIRECTION: 180°

ANGLE FROM HORIZ.: -90°

R.L. GROUND: 73.20m

R.L. COLLAR: 73.20m

DATUM: ELLIPSOID

SURVEY: Map or aerial photograph

DRILLED BY: Jono

LOGGED BY: COCU

CHECKED: CRB

START DATE: 16/02/2026

FINISH DATE: 17/02/2026

CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Efate Pumice Formation	[CONT] *27.20m:* Slightly weathered, light grey banded black, TUFF. Weak, moderately welded, fine grained, volcaniclastic clasts up to 10 mm. Laminations at 10 degrees. Breaks down to silt between fingers.			HQTT	100		43					100					
	31.00m: Slightly weathered, light grey banded orange, TUFF. Weak, moderately welded, medium grained, breaks down to sand between fingers.						42	31									Box 29.00-31.50m
	31.5m: END OF BOREHOLE						41	32					*31.50m:* Suspected drilling fluid in borehole 24 hours after completion. Groundwater tabe below base of borehole				
							40	33									
							39	34									
							38	35									
							37	36									
							36	37									
							35	38									
							34	39									

COMMENTS: 1. Borehole has downhole geophysics installation. 2. Water circulation maintained after 5 m bgl

Hole Depth 31.5m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 7/05/2026 3:10:34 pm - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH12**

Hole Location: Vanuatu Supreme Court

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.319337 (WGS84) -17.735573999999996 R.L.: 73.20m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 16/02/2026 HOLE FINISHED: 17/02/2026 DRILLED BY: Vanuatu Drilling LOGGED BY: COCU CHECKED: CRB



0.00-6.80m



6.80-10.50m

TTNZ_20251211 - GeneralLog - 7/05/2026 3:10:34 pm - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH12**

Hole Location: Vanuatu Supreme Court

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.319337 (WGS84) -17.735573999999996 R.L.: 73.20m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 16/02/2026 HOLE FINISHED: 17/02/2026 DRILLED BY: Vanuatu Drilling LOGGED BY: COCU CHECKED: CRB



10.50-14.40m



14.40-18.00m

TTNZ_20251211 - GeneralLog - 7/05/2026 3:10:34 pm - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH12**

Hole Location: Vanuatu Supreme Court

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.319337 (WGS84) -17.735573999999996 R.L.: 73.20m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 16/02/2026 HOLE FINISHED: 17/02/2026 DRILLED BY: Vanuatu Drilling LOGGED BY: COCU CHECKED: CRB



18.00-21.90m



21.90-25.50m

TTNZ_20251211 - GeneralLog - 7/05/2026 3:10:34 pm - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH12**

Hole Location: Vanuatu Supreme Court

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.319337 (WGS84) -17.735573999999996 R.L.: 73.20m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 16/02/2026 HOLE FINISHED: 17/02/2026 DRILLED BY: Vanuatu Drilling LOGGED BY: COCU CHECKED: CRB



25.50-29.00m



29.00-31.50m

TTNZ_20251211 - GeneralLog - 7/05/2026 3:10:34 pm - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH12A

SHEET: 1 OF 2

PROJECT: EEETA

JOB No.: 1097984.1000.2000

LOCATION: Public prosecutors office

CO-ORDINATES: 168.31880674° -17.73562096° (WGS84)

DIRECTION: 180°

ANGLE FROM HORIZ.: -90°

R.L. GROUND: 68.30m

R.L. COLLAR:

DATUM: ELLIPSOID

SURVEY: Map or aerial photograph

DRILLED BY: Jono

LOGGED BY: REOL

CHECKED: CRB

START DATE: 26/01/2026

FINISH DATE: 30/01/2026

CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Reef Limestone Formation	*0.00m:* Gravelly fine to coarse SAND; dark brown. Loosely packed, moist; gravel, fine to coarse, limestone.			HQTT	30		68	0									
	0.20m: SILT; dark brown. Soft to firm, moist.																
	0.25m: CORE LOSS - Suspect washed out.																
	1.30m: Slightly weathered, brownish white, LIMESTONE. Very weak, poorly cemented, coarse grained. [REEF LIMESTONE FORMATION]			SPT / HQTT	96 / 87	6/20// for 40mm **N>=50** Bouncing Refusal	67	1 / 2									
	3.00m: Highly weathered, brown and white, LIMESTONE. Extremely weak, poorly cemented. Recovered as: sandy fine to coarse GRAVEL; brown and white. Medium dense, moist, poorly graded. Gravel, coral.			SPT	67	2/3// 3/3/3/5 **N=14**	66	2 / 3									
	3.50m: CORE LOSS - Suspect washed out.			HQTT	14		65	3 / 4					*3.45m:* 26/01/26 Vibration due to loss of circulation. Rods pulled. Grouted with 400 L, to 3.35 m. 27/01/26. Hole regrouted to surface with lightly woodchipped grout.				
	3.45 - 3.50m: Sand and fines washed out. Grey from grouting above.																
	4.40m: Highly weathered, light brown, LIMESTONE. Extremely weak, poorly cemented, coarse grained. Recovered as: gravelly fine to coarse SAND; light brown. Medium dense, moist, poorly graded; gravel, fine to coarse, sub-angular, coral.			SPT	100	4/3// 2/4/5/3 **N=14**	64	4 / 5									
	4.95m: CORE LOSS - Suspect washed out.			HQTT	29		63	5 / 6									
	5.70m: Highly weathered, light brown, LIMESTONE. Extremely weak, poorly cemented. Recovered as: gravelly fine to coarse SAND; light brown. Dense, moist, poorly graded; gravel, fine to coarse, sub-angular, coral.			SPT	100	6/7// 12/9/5/6 **N=32**	62	6 / 7									
	6.45m: CORE LOSS - Suspect washed out.			HQTT	90		61	7 / 8									Box 0.00-6.45m
	6.55m: Highly weathered, brownish white, LIMESTONE. Extremely weak, poorly cemented, coarse grained. Recovered as: gravelly fine to coarse SAND; brownish white. Loose, moist, poorly graded; gravel, fine to medium, sub-angular, coral.			SPT	100	3/2// 1/2/3/3 **N=9**	60	8 / 9									
	7.95m: CORE LOSS - Suspect washed out.			HQTT	76		59	9 / 10									
	8.20m: Highly weathered, light brown, LIMESTONE. Extremely weak, poorly cemented, coarse grained. Recovered as: gravelly fine to coarse SAND; light brown. Loosely packed, moist, poorly graded; gravel, fine to medium, sub-angular, coral.																
	8.70m: Moderately weathered, brownish white, LIMESTONE. Extremely weak, poorly cemented, coarse grained. Recovered as: sandy fine to coarse GRAVEL, some cobbles; brownish white. Medium dense, moist, poorly graded. Gravel, sub-angular, coral; cobbles, up to 70mm.			SPT	100	4/2// 5/4/7/8 **N=24**												
	9.45m: CORE LOSS - Suspect washed out.			HQTT	19								*9.45m:* 28/01/26. No circulation. Rods pulled. Grouted to surface with 300L of lightly woodchipped grout. 29/01/26. Grout redrilled to 4.5 m, loosing circulation at 3m. Used 5 inch reamer to widen hole and install 4 inch PVC grouted in to 4.5 m.				

COMMENTS: Hole collapsed back to 10.8 m. No water encountered.

Hole Depth 12m

Scale 1:50

Rev.: A

TTNZ_20251211 - GeneralLog - 6/05/2026 10:54:56 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: BH12A

SHEET: 2 OF 2

Tonkin+Taylor

PROJECT: EEETA
JOB No.: 1097984.1000.2000
LOCATION: Public prosecutors office

CO-ORDINATES: 168.31880674° (WGS84) -17.73562096°
DIRECTION: 180°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 68.30m
R.L. COLLAR:
DATUM: ELLIPSOID
SURVEY: Map or aerial photograph

DRILLED BY: Jono
LOGGED BY: REOL
CHECKED: CRB
START DATE: 26/01/2026
FINISH DATE: 30/01/2026
CONTRACTOR: Vanuatu Drilling

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW EW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Reef Limestone Formation	[CONT] *9.45m:* CORE LOSS - Suspect washed out.			HQTT	19		58										
	10.30m: Moderately weathered, brownish white, LIMESTONE. Extremely weak, poorly cemented, coarse grained. Recovered as: fine to coarse GRAVEL, some sand; brownish white. Medium dense, moist, poorly graded. Gravel, sub-angular, coral.			SPT	100	2/3// 3/4/5/10 **N=22**											
	10.95m: CORE LOSS - Suspect washed out.			HQTT	0		57	11					*10.80 - 12.00m:* Hole collapsed back to 10.8m. Rods pulled, hole terminated				Box 6.45-12.00m
	12m: Collapse						56	12									
							55	13									
							54	14									
							53	15									
							52	16									
							51	17									
							50	18									
							49	19									

COMMENTS: Hole collapsed back to 10.8 m. No water encountered.

Hole Depth 12m

Scale 1:50

Rev.: A

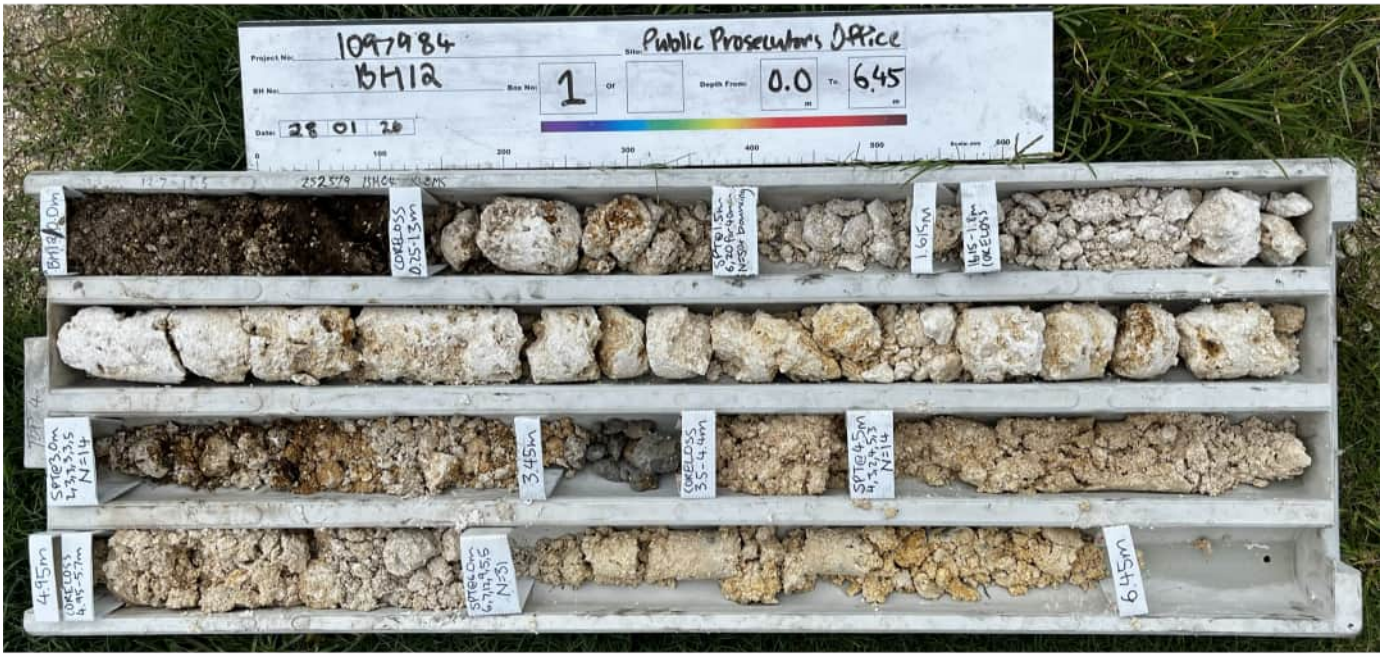
TTNZ_20251211 - GeneralLog - 6/05/2026 10:54:56 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH12A**

Hole Location: Public prosecutors office

PROJECT: EEETA	LOCATION: Port Vila	JOB No.: 1097984.1000.2000
CO-ORDINATES: 168.31880673766133 (WGS84) -17.735620963105823 R.L.: 68.30m DATUM: ELLIPSOID	DRILL TYPE: Trailer rig METHOD: Rotary cored	HOLE STARTED: 26/01/2026 HOLE FINISHED: 30/01/2026 DRILLED BY: Vanuatu Drilling LOGGED BY: REOL CHECKED: CRB



0.00-6.45m



6.45-12.00m

TTNZ_20251211 - GeneralLog - 6/05/2026 10:54:56 am - Produced with Core-GS by GeRoc

Appendix C Laboratory test results

C1 **Atterberg Limits tests**

C2 **Particle Size Distribution tests**

C3 **Allophane tests**

C4 **Unconfined Compressive Strength tests**

C5 **Consolidated-Undrained triaxial compression tests**

C1 Atterberg Limits tests

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Report Number	1102034.0000.0.0/Rep 9	04-03-2026
Test Schedule Reference	NZ01_307	

Customer Details

Customer	Tonkin + Taylor
Address	PO BOX 5271 AUCKLAND 1141
Project Name	Port Vila CBD Geotechnical Hazard Study
Project ID	1097984.1000

Laboratory Test Report

Liquid (4 point) and plastic limits, plasticity index - NZS 4402:1986 Test 2.2, 2.3, 2.4

Customer Sample Details

Location	**ID**	StJean1				
	Description	N/A				
	Data	E°: N/A	N°: N/A	Level: N/A	Chainage: N/A	Offset: N/A
Sample	**Geotechnics ID**	A2836		**Date Sampled**	19-01-2026	
	Reference	BH11_0.0 m		**Depth From**	0.0 m	**to** 0.4 m
	Description	SILT				
Customer Instructions	N/A					

Test Results

Liquid Limit	82
Plastic Limit	39
Plasticity Index	43
Date Tested	24-02-2026

Test Remarks

- Condition of the sample as received: Natural.
- The sample used for testing: Whole Sample.
- Liquid limit device: Manual
- Plastic limit device: Manual
- Liquid limit grooving tool: Original (Metal)
- Laboratory description: Gravely SAND, with minor silt; dark brown. Firm, moist, high plasticity.
- Sample description follows the NZGS Guidelines for field description of soil and rock.

General Remarks

- Samples have been tested as received and according to your instructions. Results apply only to the sample(s) tested.
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- Sample descriptions are enclosed for your information but are not covered under the IANZ endorsement of this report.

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Approved by KTP	Authorised by Project Director
	
Fergus Goldie	Steven Anderson

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

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Report Number	**1102034.0000.0.0/Rep 20**	**12-03-2026**
Test Schedule Reference	**NZ01_312**	

Customer Details

Customer	Tonkin + Taylor
Address	PO BOX 5271 AUCKLAND 1141
Project Name	Port Vila CBD Geotechnical Hazard Study
Project ID	1097984.1000

Laboratory Test Report

Liquid (4 point) and plastic limits, plasticity index - NZS 4402:1986 Test 2.2, 2.3, 2.4

Customer Sample Details

Location	**ID**	VSC1				
	Description	N/A				
	Data	E°: N/A	N°: N/A	Level: N/A	Chainage: N/A	Offset: N/A
Sample	**Geotechnics ID**	A2866		**Date Sampled**	16-02-2026	
	Reference	BH12_7.5m		**Depth From**	7.5 m	**to** 7.95 m
	Description	SILT some clay				
Customer Instructions	N/A					

Test Results

Liquid Limit	115
Plastic Limit	86
Plasticity Index	29
Date Tested	05-03-2026

Test Remarks

- Condition of the sample as received: Natural.
- The sample used for testing: Fraction Passing a 425 µm sieve. Mechanically pushed through the sieve. Estimated retained: N/A %.
- Liquid limit device: Mechanical
- Plastic limit device: Manual
- Liquid limit grooving tool: Original (Metal)
- Lab Description: Clayey SILT, with minor sand; brown. Firm, moist, high plasticity.
- Sample description follows the NZGS Guidelines for field description of soil and rock.

General Remarks

- Samples have been tested as received and according to your instructions. Results apply only to the sample(s) tested.
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C2 Particle Size Distribution tests

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Report Number	1102034.0000.0.0/Rep 4	23-02-2026
Test Schedule Reference	NZ01_309	

Customer Details

Customer	Tonkin + Taylor
Address	PO BOX 5271 AUCKLAND 1141
Project Name	Port Vila CBD Geotechnical Hazard Study
Project ID	1097984.1000

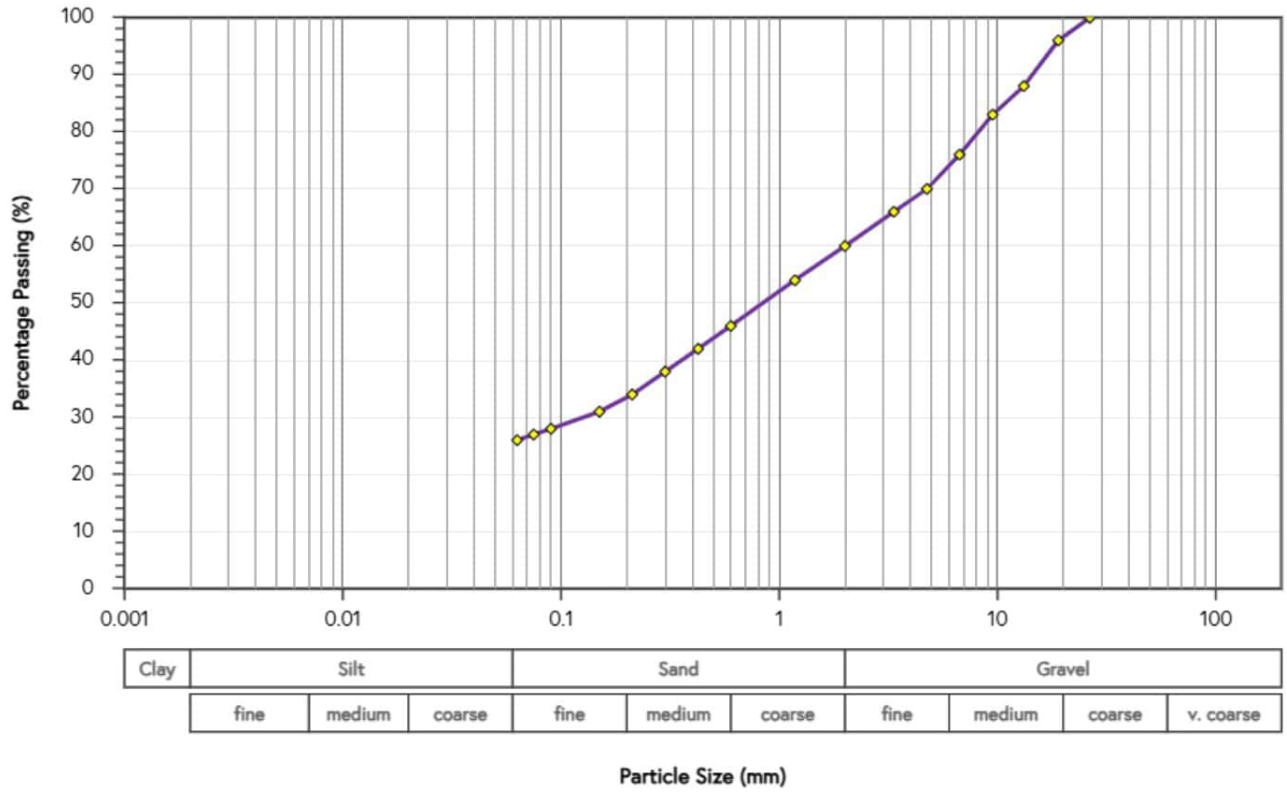
Laboratory Test Report

Determination of the Particle Size Distribution (Wet Sieve Method) - NZS 4402:1986 Test 2.8.1

Customer Sample Details

Location	**ID**	Market1				
	Description	N/A				
	Data	E°: N/A	N°: N/A	Level: N/A	Chainage: N/A	Offset: N/A
Sample	**Geotechnics ID**	A2831		**Date Sampled**	21-01-2026	
	Reference	BH02_SPT_1.5m		**Depth From**	1.5 m	**to** 1.95 m
	Description	Sandy GRAVEL				
Customer Instructions	N/A					

Test Results



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Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)
150	-	26.5	100	4.75	70	0.300	38
100	-	19.0	96	3.35	66	0.212	34
75	-	16.0	-	2.00	60	0.150	31
63	-	13.2	88	1.18	54	0.090	28
53	-	9.50	83	0.600	46	0.075	27
37.5	-	6.70	76	0.425	42	0.063	26

Test Remarks

- Condition of the sample as received: Natural.
- The sample used for testing: Whole Sample.
- The percentage passing the <0.063 mm sieve was obtained by difference.
- Laboratory description: Sandy GRAVEL, with some silt; dark brown. Moist.

Date Tested 18-02-2026

General Remarks

- Samples have been tested as received and according to your instructions. Results apply only to the sample(s) tested.
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Report Number	1102034.0000.0.0/Rep 5	23-02-2026
Test Schedule Reference	NZ01_309	

Customer Details

Customer	Tonkin + Taylor
Address	PO BOX 5271 AUCKLAND 1141
Project Name	Port Vila CBD Geotechnical Hazard Study
Project ID	1097984.1000

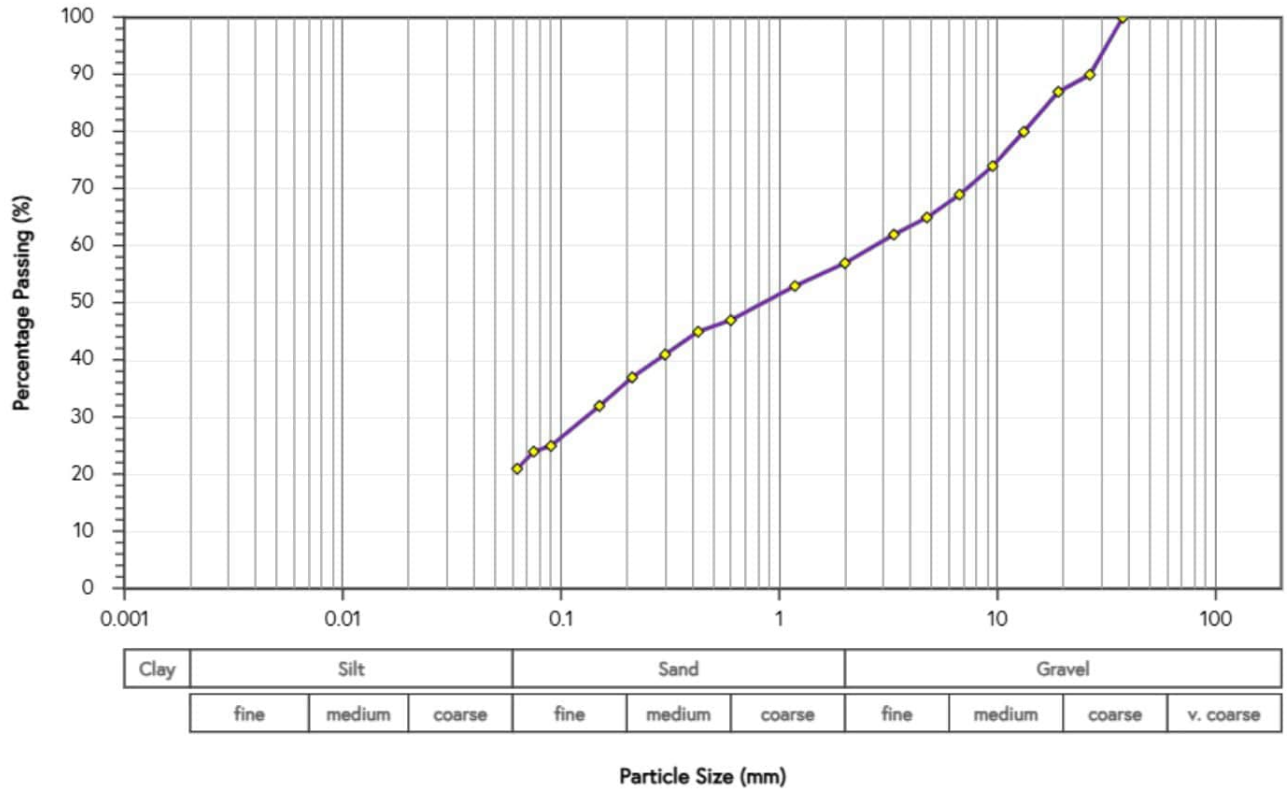
Laboratory Test Report

Determination of the Particle Size Distribution (Wet Sieve Method) - NZS 4402:1986 Test 2.8.1

Customer Sample Details

Location	**ID**	Market2				
	Description	N/A				
	Data	E°: N/A	N°: N/A	Level: N/A	Chainage: N/A	Offset: N/A
Sample	**Geotechnics ID**	A2832		**Date Sampled**	21-01-2026	
	Reference	BH02_SPT_3.0m		**Depth From**	3.0 m	**to** 3.45 m
	Description	Sandy GRAVEL				
Customer Instructions	N/A					

Test Results



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Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)
150	-	26.5	90	4.75	65	0.300	41
100	-	19.0	87	3.35	62	0.212	37
75	-	16.0	-	2.00	57	0.150	32
63	-	13.2	80	1.18	53	0.090	25
53	-	9.50	74	0.600	47	0.075	24
37.5	100	6.70	69	0.425	45	0.063	21

Test Remarks

- Condition of the sample as received: Natural.
- The sample used for testing: Whole Sample.
- The percentage passing the <0.063 mm sieve was obtained by difference.
- Laboratory description: Sandy GRAVEL, with some silt; brown with grey. Moist.

Date Tested 18-02-2026

General Remarks

- Samples have been tested as received and according to your instructions. Results apply only to the sample(s) tested.
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Report Number	1102034.0000.0.0/Rep 11	11-03-2026
Test Schedule Reference	NZ01_313	

Customer Details

Customer	Tonkin + Taylor
Address	PO BOX 5271 AUCKLAND 1141
Project Name	Port Vila CBD Geotechnical Hazard Study
Project ID	1097984.1000

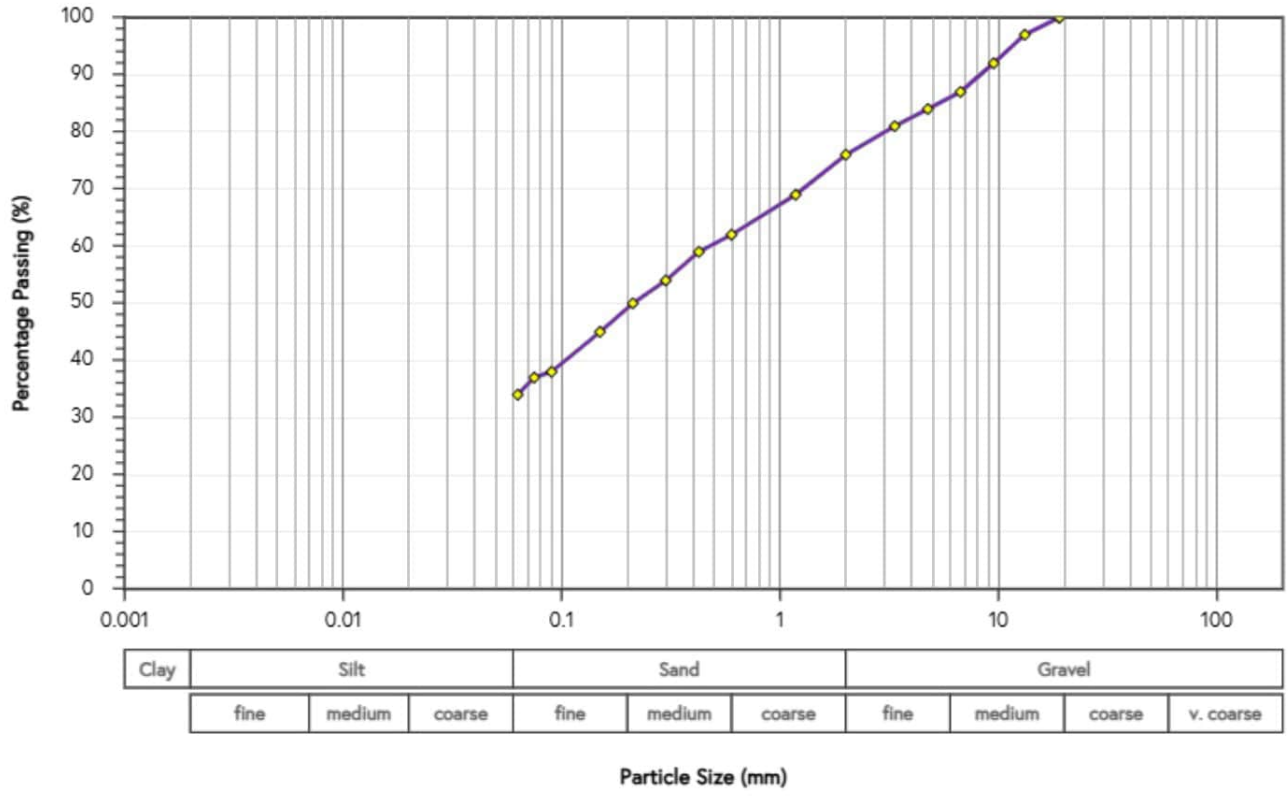
Laboratory Test Report

Determination of the Particle Size Distribution (Wet Sieve Method) - NZS 4402:1986 Test 2.8.1

Customer Sample Details

Location	**ID**	Market5				
	Description	N/A				
	Data	E°: N/A	N°: N/A	Level: N/A	Chainage: N/A	Offset: N/A
Sample	**Geotechnics ID**	A2856		**Date Sampled**	21-01-2026	
	Reference	BH02_7.5m		**Depth From**	7.5 m	**to** 7.95 m
	Description	Sandy GRAVEL				
Customer Instructions	N/A					

Test Results



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Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)
150	-	26.5	-	4.75	84	0.300	54
100	-	19.0	100	3.35	81	0.212	50
75	-	16.0	-	2.00	76	0.150	45
63	-	13.2	97	1.18	69	0.090	38
53	-	9.50	92	0.600	62	0.075	37
37.5	-	6.70	87	0.425	59	0.063	34

Test Remarks

- Condition of the sample as received: Natural.
- The sample used for testing: Whole Sample.
- The percentage passing the <0.063 mm sieve was obtained by difference.
- Laboratory description: Silty SAND, with some gravel; grey. Moist.

Date Tested 04-03-2026

General Remarks

- Samples have been tested as received and according to your instructions. Results apply only to the sample(s) tested.
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Report Number	1102034.0000.0.0/Rep 6	23-02-2026
Test Schedule Reference	NZ01_309	

Customer Details

Customer	Tonkin + Taylor
Address	PO BOX 5271 AUCKLAND 1141
Project Name	Port Vila CBD Geotechnical Hazard Study
Project ID	1097984.1000

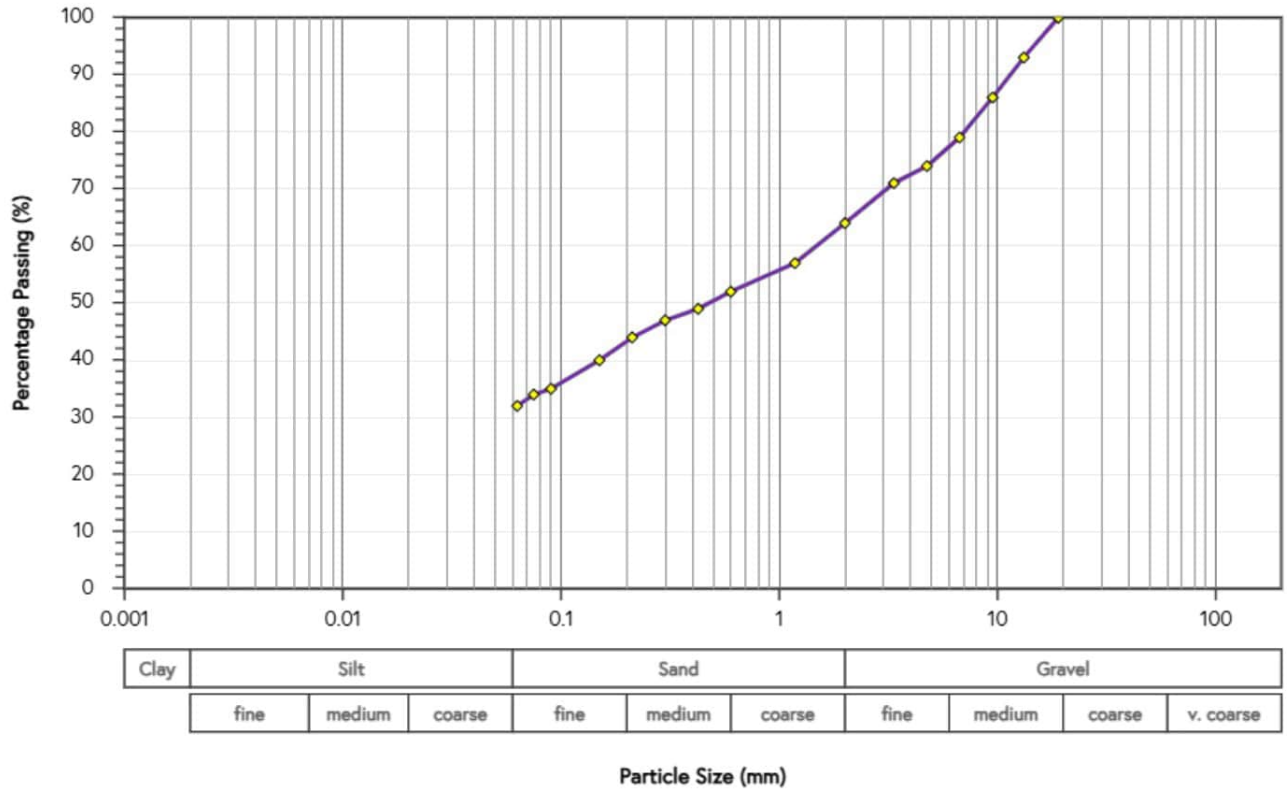
Laboratory Test Report

Determination of the Particle Size Distribution (Wet Sieve Method) - NZS 4402:1986 Test 2.8.1

Customer Sample Details

Location	**ID**	Market3				
	Description	N/A				
	Data	E°: N/A	N°: N/A	Level: N/A	Chainage: N/A	Offset: N/A
Sample	**Geotechnics ID**	A2833		**Date Sampled**	21-01-2026	
	Reference	BH02_SPT_9.0 m		**Depth From**	9.0 m	**to** 9.45 m
	Description	Sandy GRAVEL				
Customer Instructions	N/A					

Test Results



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Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)
150	-	26.5	-	4.75	74	0.300	47
100	-	19.0	100	3.35	71	0.212	44
75	-	16.0	-	2.00	64	0.150	40
63	-	13.2	93	1.18	57	0.090	35
53	-	9.50	86	0.600	52	0.075	34
37.5	-	6.70	79	0.425	49	0.063	32

Test Remarks

- Condition of the sample as received: Natural.
- The sample used for testing: Whole Sample.
- The percentage passing the <0.063 mm sieve was obtained by difference.
- Laboratory description: Sandy GRAVEL, with some silt; white and grey. Moist.

Date Tested 18-02-2026

General Remarks

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Report Number	1102034.0000.0.0/Rep 12	11-03-2026
Test Schedule Reference	NZ01_313	

Customer Details

Customer	Tonkin + Taylor
Address	PO BOX 5271 AUCKLAND 1141
Project Name	Port Vila CBD Geotechnical Hazard Study
Project ID	1097984.1000

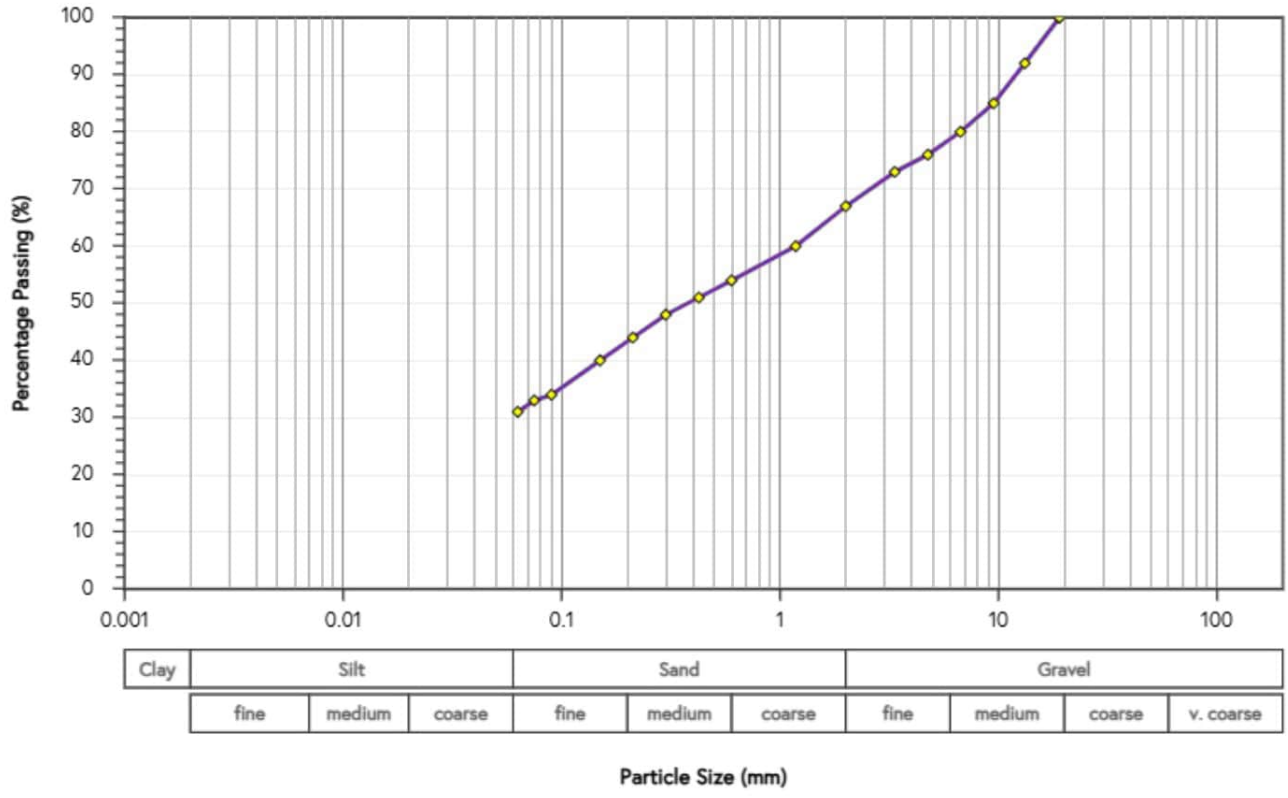
Laboratory Test Report

Determination of the Particle Size Distribution (Wet Sieve Method) - NZS 4402:1986 Test 2.8.1

Customer Sample Details

Location	**ID**	Market6				
	Description	N/A				
	Data	E°: N/A	N°: N/A	Level: N/A	Chainage: N/A	Offset: N/A
Sample	**Geotechnics ID**	A2857		**Date Sampled**	21-01-2026	
	Reference	BH02_13.5m		**Depth From**	13.5 m	**to** 13.95 m
	Description	Silty SAND				
Customer Instructions	N/A					

Test Results



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Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)
150	-	26.5	-	4.75	76	0.300	48
100	-	19.0	100	3.35	73	0.212	44
75	-	16.0	-	2.00	67	0.150	40
63	-	13.2	92	1.18	60	0.090	34
53	-	9.50	85	0.600	54	0.075	33
37.5	-	6.70	80	0.425	51	0.063	31

Test Remarks

- Condition of the sample as received: Natural.
- The sample used for testing: Whole Sample.
- The percentage passing the <0.063 mm sieve was obtained by difference.
- Laboratory description: Gravely SAND, with some silt; light brown. Moist.

Date Tested 04-03-2026

General Remarks

- Samples have been tested as received and according to your instructions. Results apply only to the sample(s) tested.
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Approved by KTP	Authorised by Project Director
Fergus Goldie	Steven Anderson

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Report Number	1102034.0000.0.0/Rep 13	11-03-2026
Test Schedule Reference	NZ01_313	

Customer Details

Customer	Tonkin + Taylor
Address	PO BOX 5271 AUCKLAND 1141
Project Name	Port Vila CBD Geotechnical Hazard Study
Project ID	1097984.1000

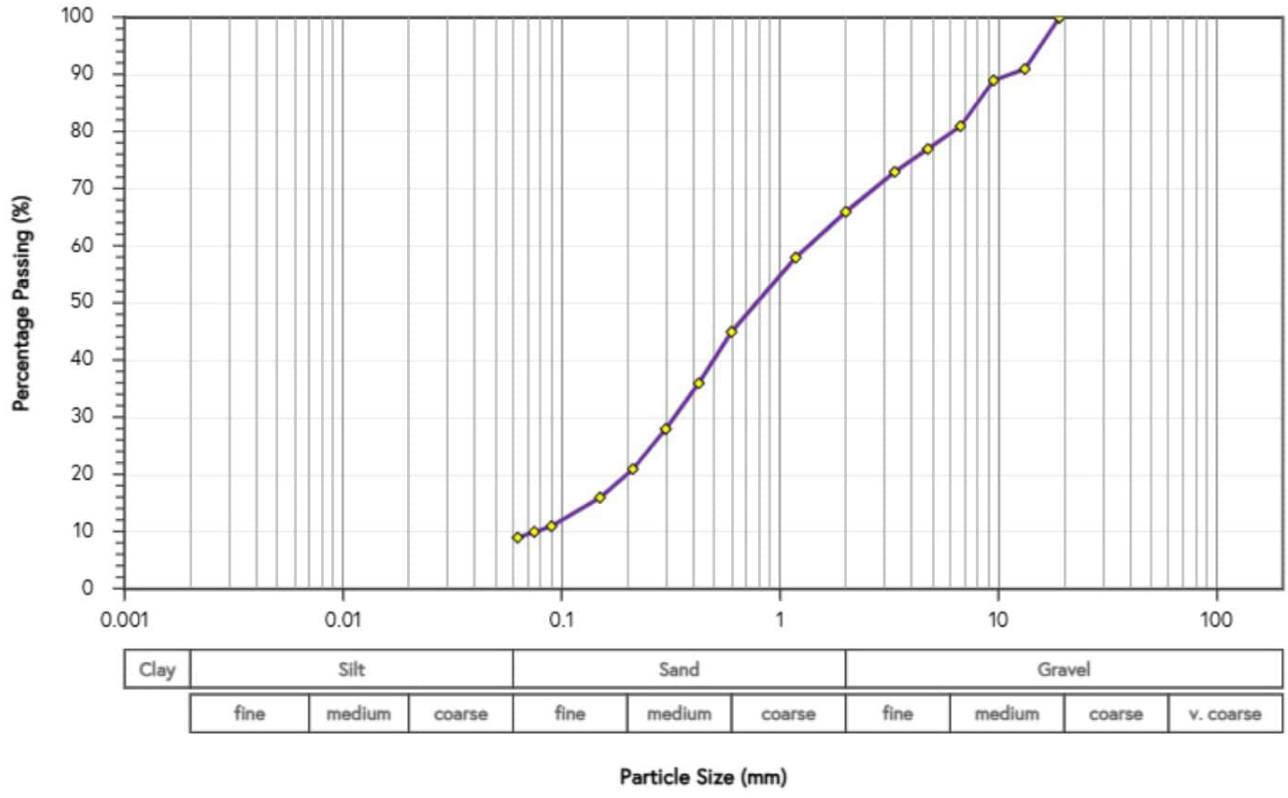
Laboratory Test Report

Determination of the Particle Size Distribution (Wet Sieve Method) - NZS 4402:1986 Test 2.8.1

Customer Sample Details

Location	**ID**	LolamHouse3				
	Description	N/A				
	Data	E°: N/A	N°: N/A	Level: N/A	Chainage: N/A	Offset: N/A
Sample	**Geotechnics ID**	A2858		**Date Sampled**	21-01-2026	
	Reference	BH03_1.5m		**Depth From**	1.5 m	**to** 1.95 m
	Description	Gravelly SAND				
Customer Instructions	N/A					

Test Results



GEOTECHNICS

Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)
150	-	26.5	-	4.75	77	0.300	28
100	-	19.0	100	3.35	73	0.212	21
75	-	16.0	-	2.00	66	0.150	16
63	-	13.2	91	1.18	58	0.090	11
53	-	9.50	89	0.600	45	0.075	10
37.5	-	6.70	81	0.425	36	0.063	9

Test Remarks

- Condition of the sample as received: Natural.
- The sample used for testing: Whole Sample.
- The percentage passing the <0.063 mm sieve was obtained by difference.
- Laboratory description: Gravely SAND, with minor silt; light brown. Moist.

Date Tested 04-03-2026

General Remarks

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Report Number	1102034.0000.0.0/Rep 14	11-03-2026
Test Schedule Reference	NZ01_313	

Customer Details

Customer	Tonkin + Taylor
Address	PO BOX 5271 AUCKLAND 1141
Project Name	Port Vila CBD Geotechnical Hazard Study
Project ID	1097984.1000

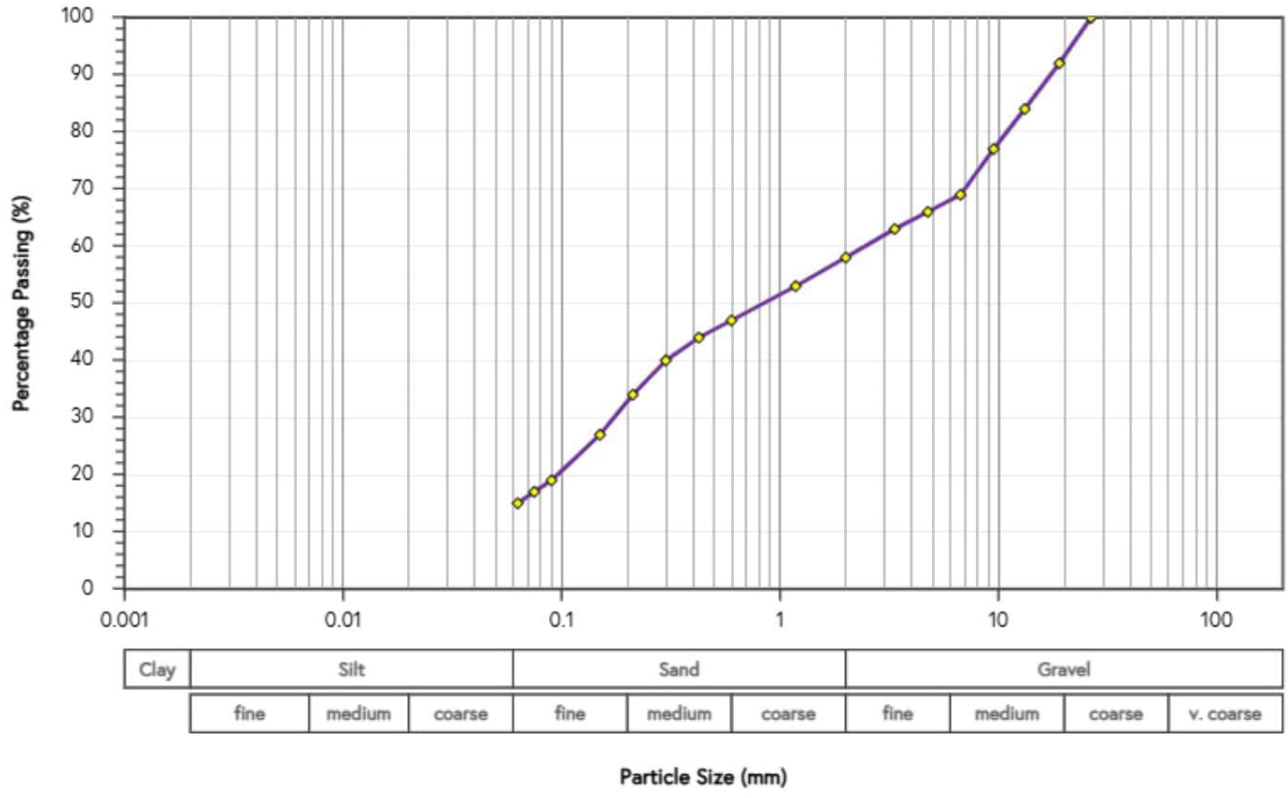
Laboratory Test Report

Determination of the Particle Size Distribution (Wet Sieve Method) - NZS 4402:1986 Test 2.8.1

Customer Sample Details

Location	**ID**	LolamHouse4				
	Description	N/A				
	Data	E°: N/A	N°: N/A	Level: N/A	Chainage: N/A	Offset: N/A
Sample	**Geotechnics ID**	A2859		**Date Sampled**	21-01-2026	
	Reference	BH03_4.5m		**Depth From**	4.5 m	**to** 4.95 m
	Description	SAND				
Customer Instructions	N/A					

Test Results



GEOTECHNICS

Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)
150	-	26.5	100	4.75	66	0.300	40
100	-	19.0	92	3.35	63	0.212	34
75	-	16.0	-	2.00	58	0.150	27
63	-	13.2	84	1.18	53	0.090	19
53	-	9.50	77	0.600	47	0.075	17
37.5	-	6.70	69	0.425	44	0.063	15

Test Remarks

- Condition of the sample as received: Natural.
- The sample used for testing: Whole Sample.
- The percentage passing the <0.063 mm sieve was obtained by difference.
- Laboratory description: Gravelly SAND, with minor silt; light brown. Moist.

Date Tested 04-03-2026

General Remarks

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Report Number	1102034.0000.0.0/Rep 15	11-03-2026
Test Schedule Reference	NZ01_313	

Customer Details

Customer	Tonkin + Taylor
Address	PO BOX 5271 AUCKLAND 1141
Project Name	Port Vila CBD Geotechnical Hazard Study
Project ID	1097984.1000

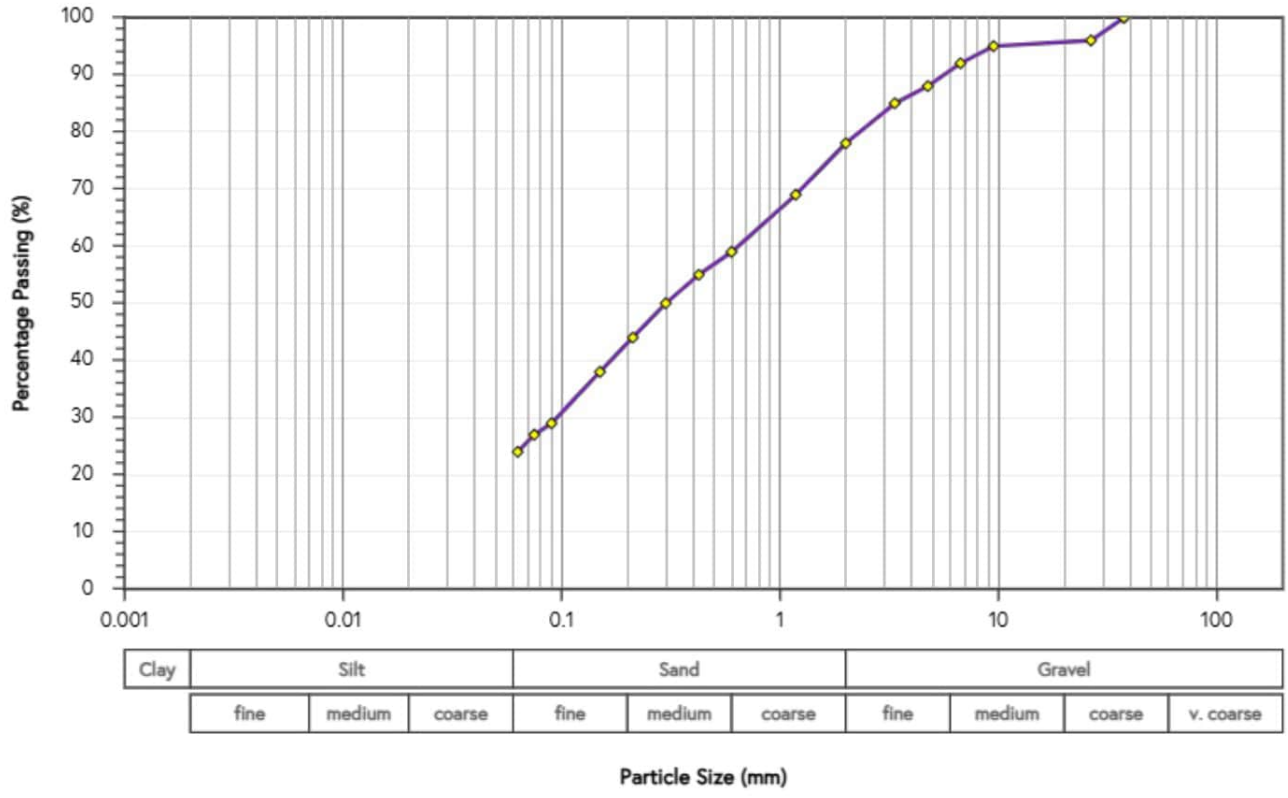
Laboratory Test Report

Determination of the Particle Size Distribution (Wet Sieve Method) - NZS 4402:1986 Test 2.8.1

Customer Sample Details

Location	**ID**	LolamHouse5				
	Description	N/A				
	Data	E°: N/A	N°: N/A	Level: N/A	Chainage: N/A	Offset: N/A
Sample	**Geotechnics ID**	A2860		**Date Sampled**	21-01-2026	
	Reference	BH03_7.5m		**Depth From**	7.5 m	**to** 7.95 m
	Description	Silty SAND				
Customer Instructions	N/A					

Test Results



GEOTECHNICS

Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)
150	-	26.5	96	4.75	88	0.300	50
100	-	19.0	-	3.35	85	0.212	44
75	-	16.0	-	2.00	78	0.150	38
63	-	13.2	-	1.18	69	0.090	29
53	-	9.50	95	0.600	59	0.075	27
37.5	100	6.70	92	0.425	55	0.063	24

Test Remarks

- Condition of the sample as received: Natural.
- The sample used for testing: Whole Sample.
- The percentage passing the <0.063 mm sieve was obtained by difference.
- Laboratory description: SAND, with some gravel and silt; light brownish grey. Moist.

Date Tested 04-03-2026

General Remarks

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- Sample descriptions are enclosed for your information but are not covered under the IANZ endorsement of this report.

Approved by KTP	Authorised by Project Director	
Fergus Goldie	Steven Anderson	ACCREDITED IANZ TESTING LABORATORY — All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

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Report Number	1102034.0000.0.0/Rep 3	03-02-2026
Test Schedule Reference	NZ01_304	

Customer Details

Customer	Tonkin + Taylor
Address	PO BOX 5271 AUCKLAND 1141
Project Name	Port Vila CBD Geotechnical Hazard Study
Project ID	1097984.1000

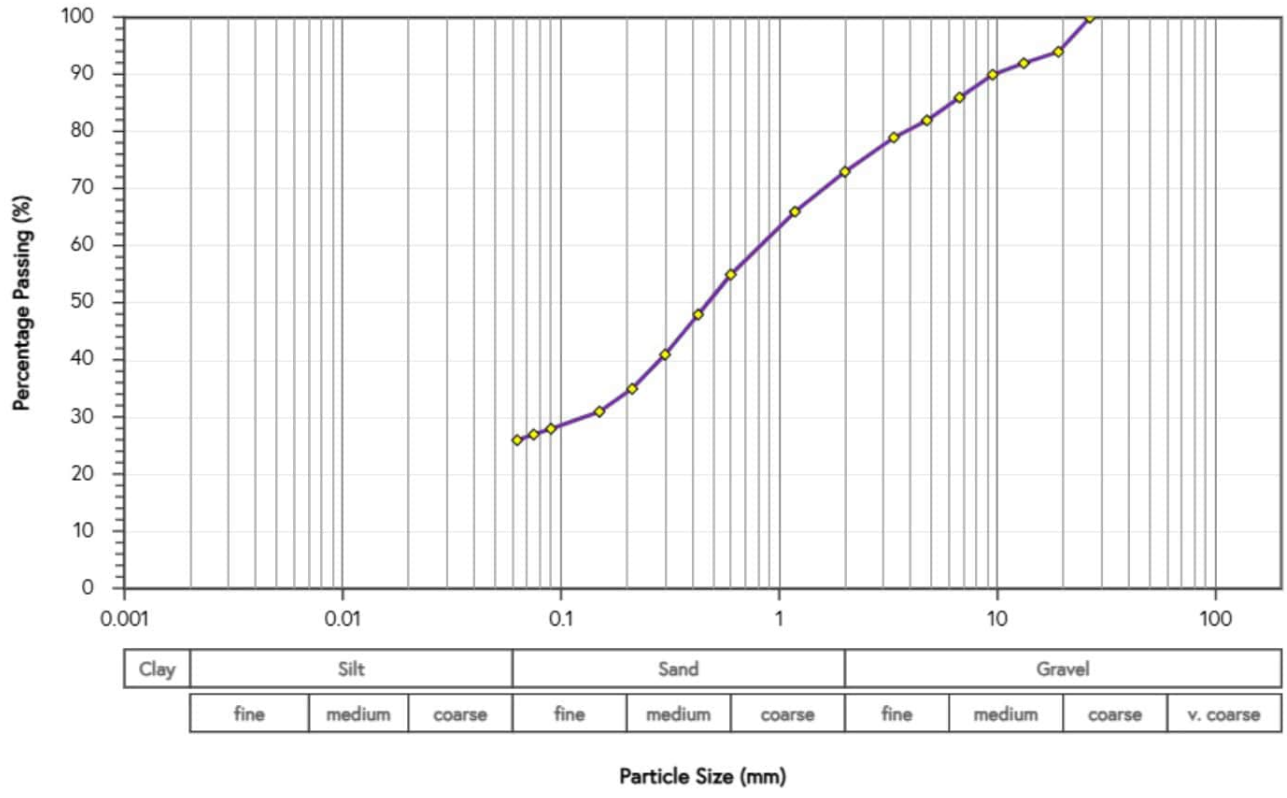
Laboratory Test Report

Determination of the Particle Size Distribution (Wet Sieve Method) - NZS 4402:1986 Test 2.8.1

Customer Sample Details

Location	**ID**	VNB1				
	Description	N/A				
	Data	E°: N/A	N°: N/A	Level: N/A	Chainage: N/A	Offset: N/A
Sample	**Geotechnics ID**	A2573	**Date Sampled**	14-12-2025		
	Reference	BH04_SPT_1.5 m	**Depth From**	1.5 m	**to**	1.95 m
	Description	Gravelly SAND, with some silt; White speckled brown. Wet.				
Customer Instructions	N/A					

Test Results



Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)
150	-	26.5	100	4.75	82	0.300	41
100	-	19.0	94	3.35	79	0.212	35
75	-	16.0	-	2.00	73	0.150	31
63	-	13.2	92	1.18	66	0.090	28
53	-	9.50	90	0.600	55	0.075	27
37.5	-	6.70	86	0.425	48	0.063	26

Test Remarks

- Condition of the sample as received: Oven Dried.
- The sample used for testing: Whole Sample.

Date Tested 04-02-2026

General Remarks

- Samples have been tested as received and according to your instructions. Results apply only to the sample(s) tested.
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Report Number	1102034.0000.0.0/Rep 2	03-02-2026
Test Schedule Reference	NZ01_304	

Customer Details

Customer	Tonkin + Taylor
Address	PO BOX 5271 AUCKLAND 1141
Project Name	Port Vila CBD Geotechnical Hazard Study
Project ID	1097984.1000

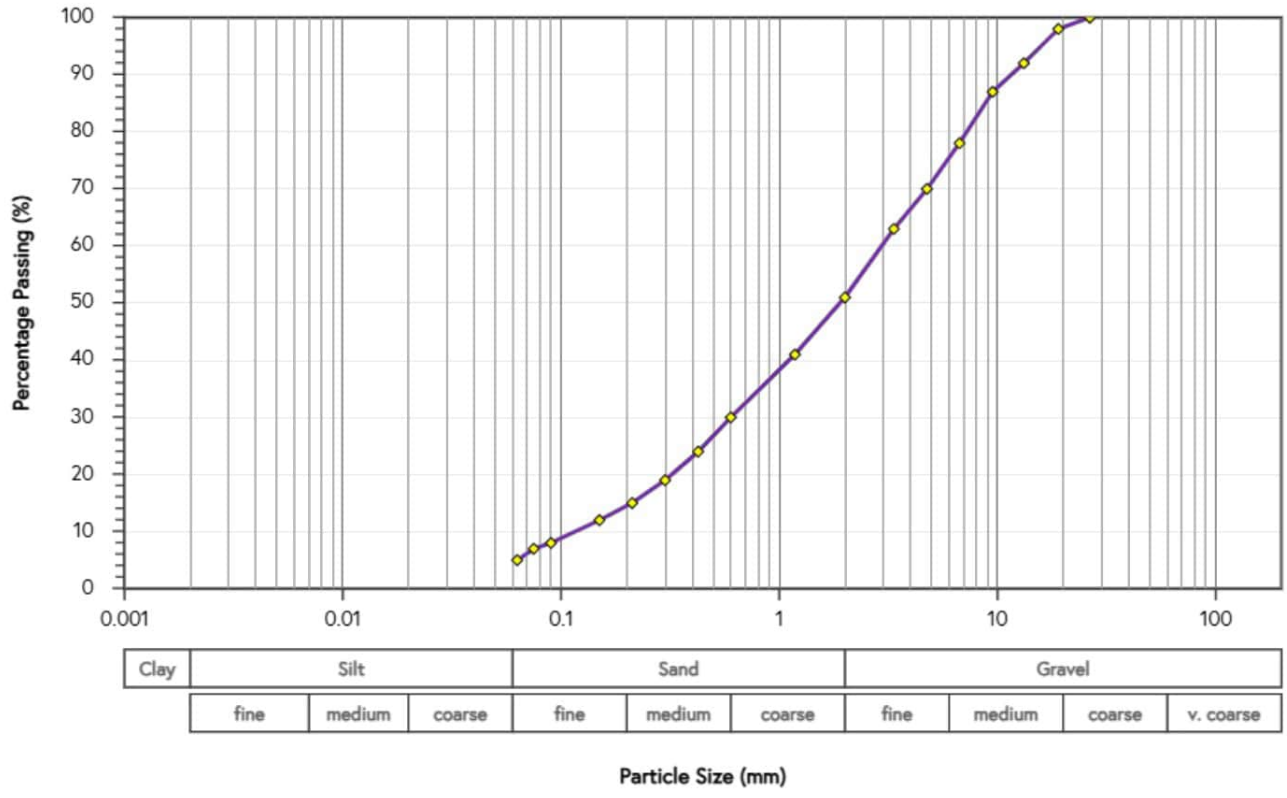
Laboratory Test Report

Determination of the Particle Size Distribution (Wet Sieve Method) - NZS 4402:1986 Test 2.8.1

Customer Sample Details

Location	**ID**	VNB2				
	Description	N/A				
	Data	E°: N/A	N°: N/A	Level: N/A	Chainage: N/A	Offset: N/A
Sample	**Geotechnics ID**	A2574	**Date Sampled**	15-12-2025		
	Reference	BH04A_SPT_3.0 m	**Depth From**	3.0 m	**to**	3.45 m
	Description	Sandy GRAVEL; White with some orange. Wet.				
Customer Instructions	N/A					

Test Results



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Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)
150	-	26.5	100	4.75	70	0.300	19
100	-	19.0	98	3.35	63	0.212	15
75	-	16.0	-	2.00	51	0.150	12
63	-	13.2	92	1.18	41	0.090	8
53	-	9.50	87	0.600	30	0.075	7
37.5	-	6.70	78	0.425	24	0.063	5

Test Remarks

- Condition of the sample as received: Oven Dried.
- The sample used for testing: Whole Sample.

Date Tested 04-02-2026

General Remarks

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Report Number	1102034.0000.0.0/Rep 1	03-02-2026
Test Schedule Reference	NZ01_304	

Customer Details

Customer	Tonkin + Taylor
Address	PO BOX 5271 AUCKLAND 1141
Project Name	Port Vila CBD Geotechnical Hazard Study
Project ID	1097984.1000

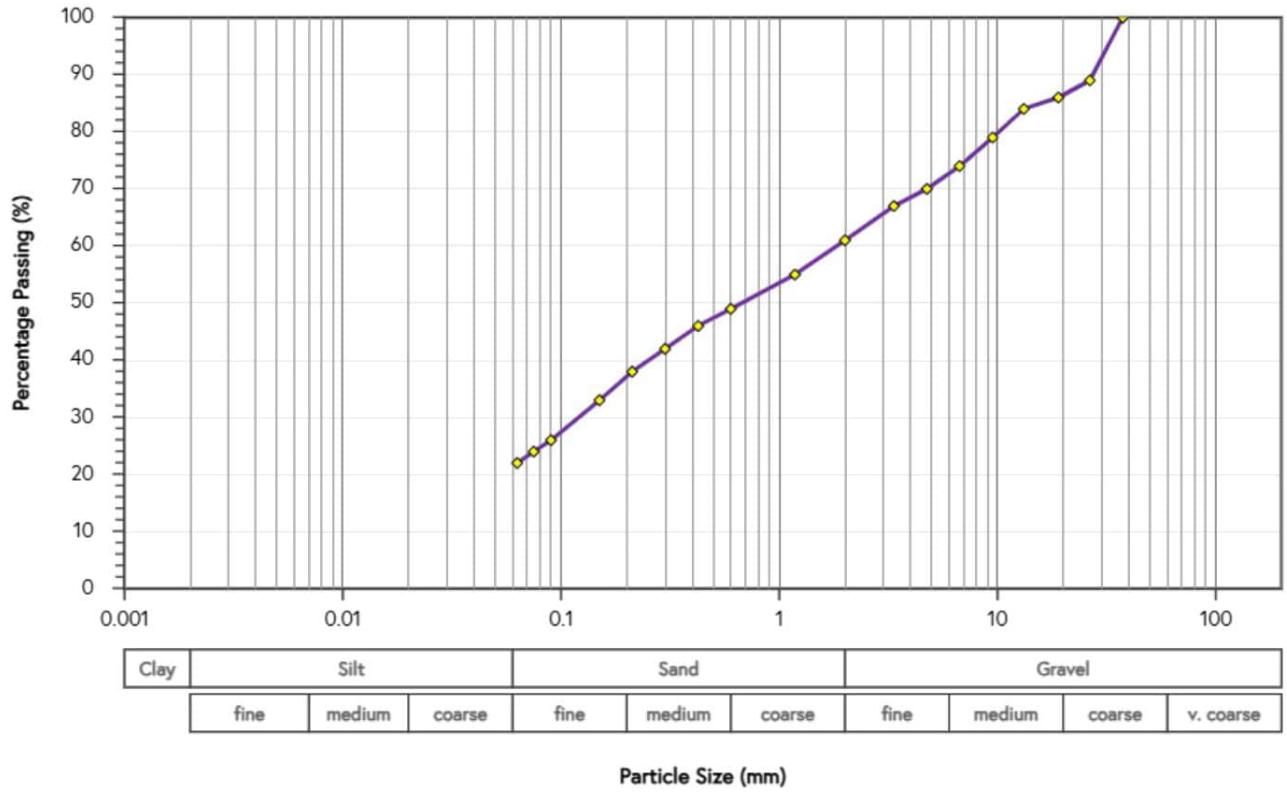
Laboratory Test Report

Determination of the Particle Size Distribution (Wet Sieve Method) - NZS 4402:1986 Test 2.8.1

Customer Sample Details

Location	**ID**	VNB3				
	Description	N/A				
	Data	E°: N/A	N°: N/A	Level: N/A	Chainage: N/A	Offset: N/A
Sample	**Geotechnics ID**	A2575	**Date Sampled**	15-12-2025		
	Reference	BH04A_SPT_9.0 m	**Depth From**	9.0 m	**to**	9.45 m
	Description	Gravelly SAND, with some silt; brown with some White. Wet.				
Customer Instructions	N/A					

Test Results



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Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)
150	-	26.5	89	4.75	70	0.300	42
100	-	19.0	86	3.35	67	0.212	38
75	-	16.0	-	2.00	61	0.150	33
63	-	13.2	84	1.18	55	0.090	26
53	-	9.50	79	0.600	49	0.075	24
37.5	100	6.70	74	0.425	46	0.063	22

Test Remarks

- Condition of the sample as received: Oven Dried.
- The sample used for testing: Whole Sample.

Date Tested 04-02-2026

General Remarks

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Report Number	**1102034.0000.0.0/Rep 16**	**11-03-2026**
Test Schedule Reference	**NZ01_313**	

Customer Details

Customer	Tonkin + Taylor
Address	PO BOX 5271 AUCKLAND 1141
Project Name	Port Vila CBD Geotechnical Hazard Study
Project ID	1097984.1000

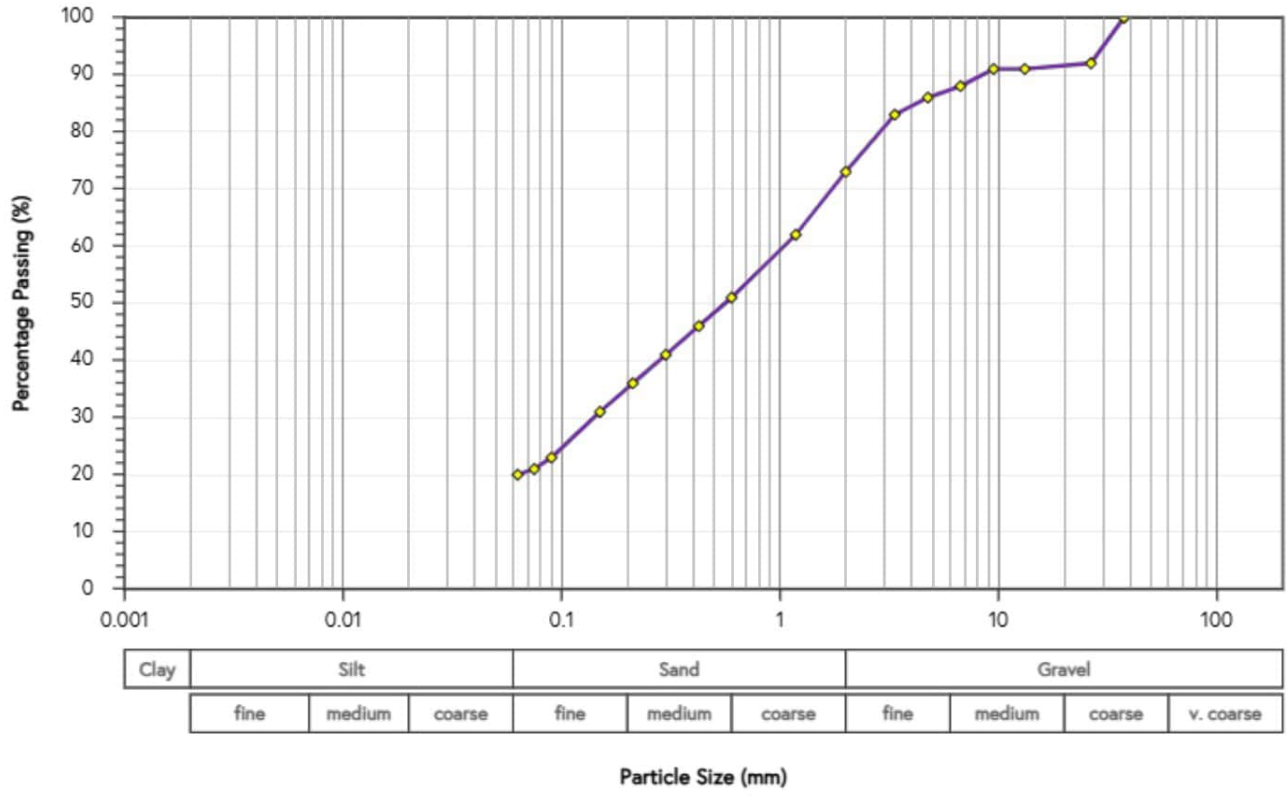
Laboratory Test Report

Determination of the Particle Size Distribution (Wet Sieve Method) - NZS 4402:1986 Test 2.8.1

Customer Sample Details

Location	**ID**	Tanna1				
	Description	N/A				
	Data	E°: N/A	N°: N/A	Level: N/A	Chainage: N/A	Offset: N/A
Sample	**Geotechnics ID**	A2861		**Date Sampled**	12-02-2026	
	Reference	BH09_4.5m		**Depth From**	4.5 m	**to** 4.95 m
	Description	SAND				
Customer Instructions	N/A					

Test Results



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Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)
150	-	26.5	92	4.75	86	0.300	41
100	-	19.0	-	3.35	83	0.212	36
75	-	16.0	-	2.00	73	0.150	31
63	-	13.2	91	1.18	62	0.090	23
53	-	9.50	91	0.600	51	0.075	21
37.5	100	6.70	88	0.425	46	0.063	20

Test Remarks

- Condition of the sample as received: Natural.
- The sample used for testing: Whole Sample.
- The percentage passing the <0.063 mm sieve was obtained by difference.
- Laboratory description: Gravely SAND, with some silt; greyish white. Moist.

Date Tested 04-03-2026

General Remarks

- Samples have been tested as received and according to your instructions. Results apply only to the sample(s) tested.
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Report Number	1102034.0000.0.0/Rep 17	11-03-2026
Test Schedule Reference	NZ01_313	

Customer Details

Customer	Tonkin + Taylor
Address	PO BOX 5271 AUCKLAND 1141
Project Name	Port Vila CBD Geotechnical Hazard Study
Project ID	1097984.1000

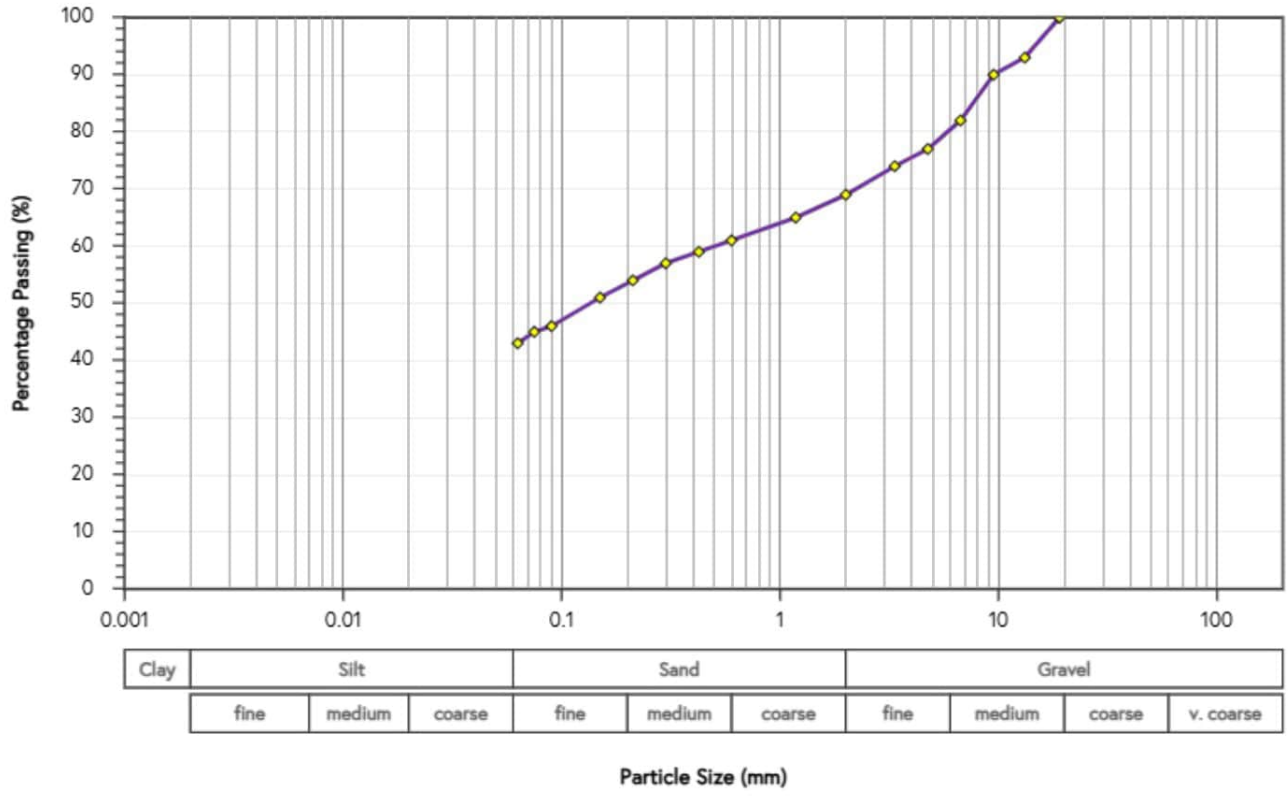
Laboratory Test Report

Determination of the Particle Size Distribution (Wet Sieve Method) - NZS 4402:1986 Test 2.8.1

Customer Sample Details

Location	**ID**	Tanna2				
	Description	N/A				
	Data	E°: N/A	N°: N/A	Level: N/A	Chainage: N/A	Offset: N/A
Sample	**Geotechnics ID**	A2862		**Date Sampled**	12-02-2026	
	Reference	BH09_9.0m		**Depth From**	9.0 m	**to** 9.45 m
	Description	Sandy SILT				
Customer Instructions	N/A					

Test Results



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Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)
150	-	26.5	-	4.75	77	0.300	57
100	-	19.0	100	3.35	74	0.212	54
75	-	16.0	-	2.00	69	0.150	51
63	-	13.2	93	1.18	65	0.090	46
53	-	9.50	90	0.600	61	0.075	45
37.5	-	6.70	82	0.425	59	0.063	43

Test Remarks

- Condition of the sample as received: Natural.
- The sample used for testing: Whole Sample.
- The percentage passing the <0.063 mm sieve was obtained by difference.
- Laboratory description: Silty GRAVEL, with some sand; light brownish white. Moist.

Date Tested 04-03-2026

General Remarks

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Report Number	**1102034.0000.0.0/Rep 18**	**11-03-2026**
Test Schedule Reference	**NZ01_313**	

Customer Details

Customer	Tonkin + Taylor
Address	PO BOX 5271 AUCKLAND 1141
Project Name	Port Vila CBD Geotechnical Hazard Study
Project ID	1097984.1000

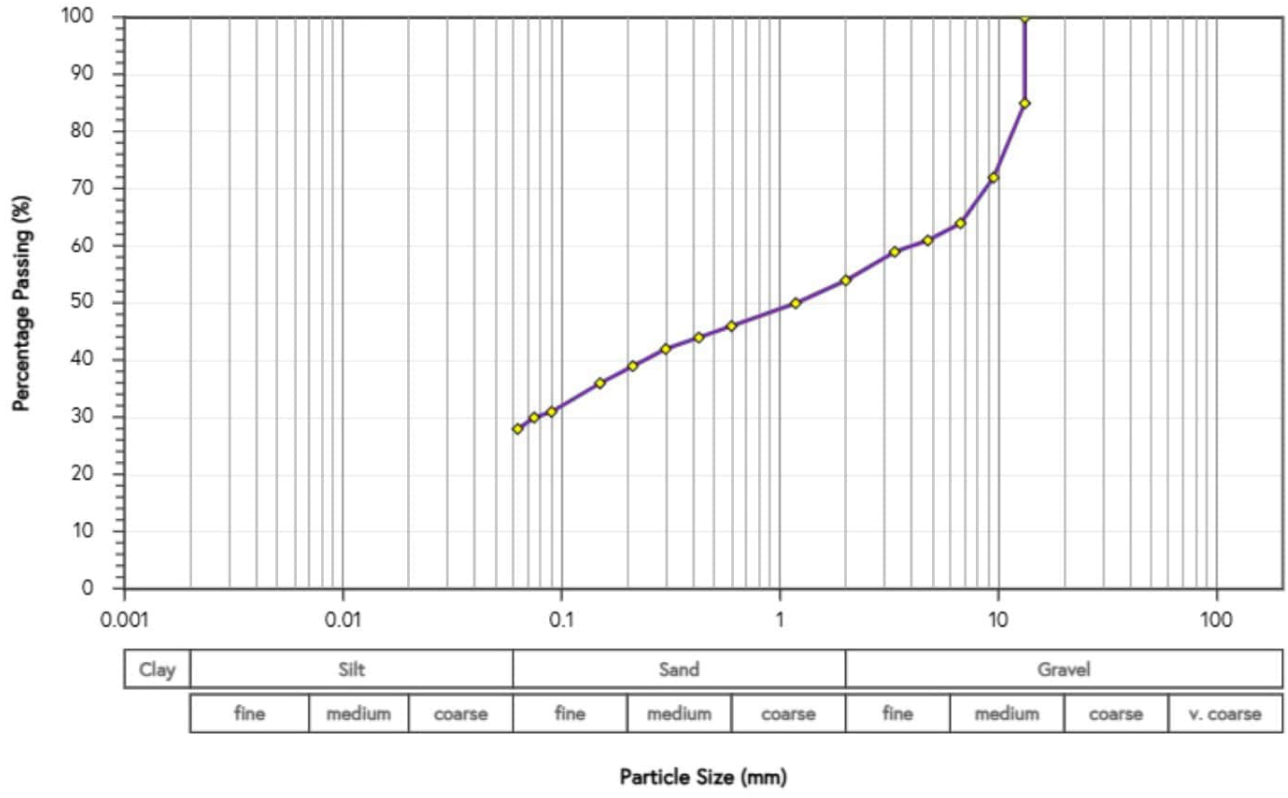
Laboratory Test Report

Determination of the Particle Size Distribution (Wet Sieve Method) - NZS 4402:1986 Test 2.8.1

Customer Sample Details

Location	**ID**	Tanna3				
	Description	N/A				
	Data	E°: N/A	N°: N/A	Level: N/A	Chainage: N/A	Offset: N/A
Sample	**Geotechnics ID**	A2863		**Date Sampled**	12-02-2026	
	Reference	BH09_12.0m		**Depth From**	12.0 m	**to** 12.45 m
	Description	GRAVEL				
Customer Instructions	N/A					

Test Results



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Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)
150	-	26.5	-	4.75	61	0.300	42
100	-	19.0	-	3.35	59	0.212	39
75	-	16.0	-	2.00	54	0.150	36
63	-	13.2	85	1.18	50	0.090	31
53	-	9.50	72	0.600	46	0.075	30
37.5	-	6.70	64	0.425	44	0.063	28

Test Remarks

- Condition of the sample as received: Natural.
- The sample used for testing: Whole Sample.
- The percentage passing the <0.063 mm sieve was obtained by difference.
- Laboratory description: Sandy GRAVEL, with some silt; brownish white. Moist.

Date Tested 04-03-2026

General Remarks

- Samples have been tested as received and according to your instructions. Results apply only to the sample(s) tested.
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- Sample descriptions are enclosed for your information but are not covered under the IANZ endorsement of this report.

Approved by KTP	Authorised by Project Director	
Fergus Goldie	Steven Anderson	All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

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Report Number	1102034.0000.0.0/Rep 19	11-03-2026
Test Schedule Reference	NZ01_313	

Customer Details

Customer	Tonkin + Taylor
Address	PO BOX 5271 AUCKLAND 1141
Project Name	Port Vila CBD Geotechnical Hazard Study
Project ID	1097984.1000

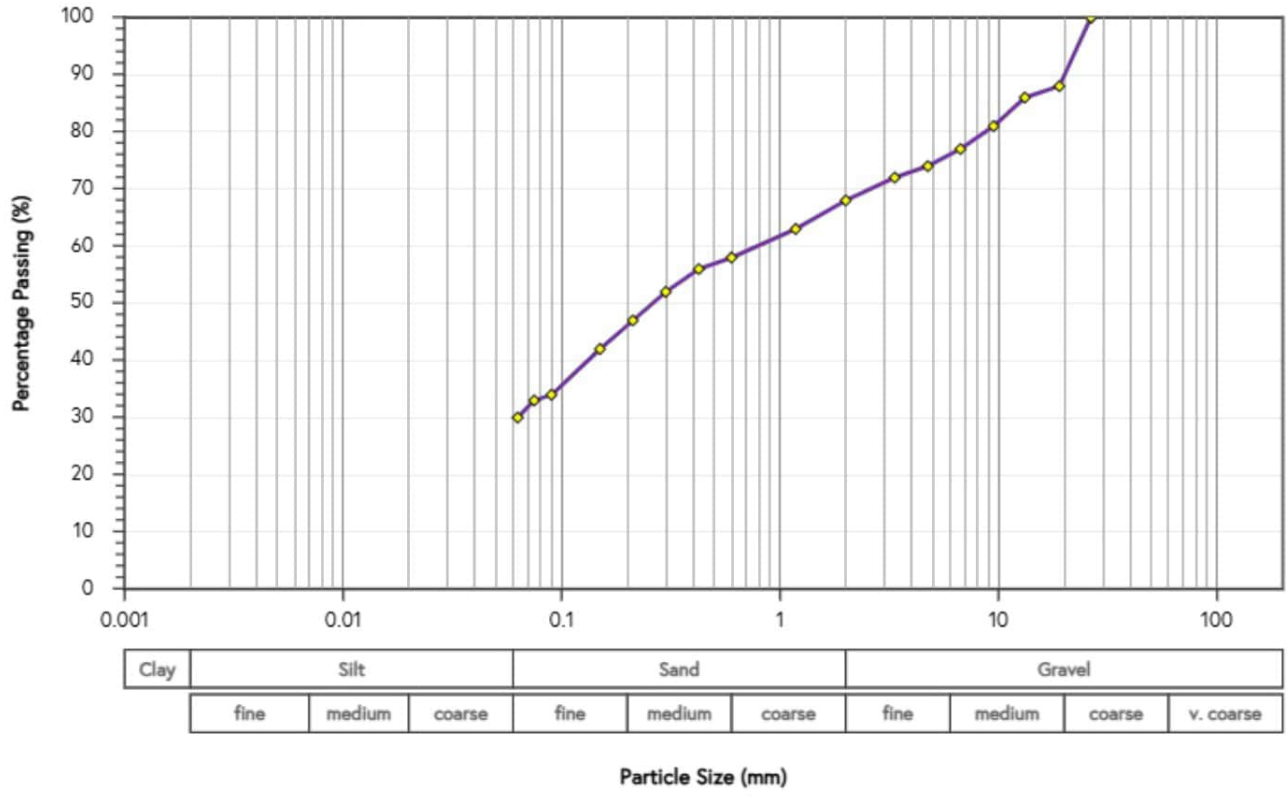
Laboratory Test Report

Determination of the Particle Size Distribution (Wet Sieve Method) - NZS 4402:1986 Test 2.8.1

Customer Sample Details

Location	**ID**	Tanna4				
	Description	N/A				
	Data	E°: N/A	N°: N/A	Level: N/A	Chainage: N/A	Offset: N/A
Sample	**Geotechnics ID**	A2864		**Date Sampled**	13-02-2026	
	Reference	BH09_15.0m		**Depth From**	15.0 m	**to** 15.45 m
	Description	Gravelly SAND				
Customer Instructions	N/A					

Test Results



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Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)
150	-	26.5	100	4.75	74	0.300	52
100	-	19.0	88	3.35	72	0.212	47
75	-	16.0	-	2.00	68	0.150	42
63	-	13.2	86	1.18	63	0.090	34
53	-	9.50	81	0.600	58	0.075	33
37.5	-	6.70	77	0.425	56	0.063	30

Test Remarks

- Condition of the sample as received: Natural.
- The sample used for testing: Whole Sample.
- The percentage passing the <0.063 mm sieve was obtained by difference.
- Laboratory description: Gravely SAND, with some silt; brownish grey. Moist. Not accredited due to not a representative mass.

Date Tested 04-03-2026

General Remarks

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Fergus Goldie	Steven Anderson

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C3 Allophane tests

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Report Number	1102034.0000.0.0/Rep 7	04-03-2026
Test Schedule Reference	NZ01_307	

Customer Details

Customer	Tonkin + Taylor
Address	PO BOX 5271 AUCKLAND 1141
Project Name	Port Vila CBD Geotechnical Hazard Study
Project ID	1097984.1000

Laboratory Test Report

Detection of presence of allophane in soils - NZS 4402:1986 Test 3.4

Customer Sample Details

Location	**ID**	Saralana1				
	Description	N/A				
	Data	E°: N/A	N°: N/A	Level: N/A	Chainage: N/A	Offset: N/A
Sample	**Geotechnics ID**	A2838		**Date Sampled**	28-01-2026	
	Reference	BH08_0.25m		**Depth From**	0.25 m	**to** 0.4 m
	Description	CLAY minor silt				
Customer Instructions	N/A					

Test Results

Allophane Colour Intensity	Pink to Red
Approximate Allophane Content	5 % to 7 %
Date Tested	25-02-2026

Test Remarks

- Condition of the sample as received: Natural.
- Laboratory description: Silty SAND, with some gravel; dark brown. Moist, high plasticity.

General Remarks

- Samples have been tested as received and according to your instructions. Results apply only to the sample(s) tested.
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Approved by KTP	Authorised by Project Director
Fergus Goldie	Steven Anderson

ACCREDITED IANZ TESTING LABORATORY

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Report Number	1102034.0000.0.0/Rep 8	04-03-2026
Test Schedule Reference	NZ01_307	

Customer Details

Customer	Tonkin + Taylor
Address	PO BOX 5271 AUCKLAND 1141
Project Name	Port Vila CBD Geotechnical Hazard Study
Project ID	1097984.1000

Laboratory Test Report

Detection of presence of allophane in soils - NZS 4402:1986 Test 3.4

Customer Sample Details

Location	**ID**	StJean1				
	Description	N/A				
	Data	E°: N/A	N°: N/A	Level: N/A	Chainage: N/A	Offset: N/A
Sample	**Geotechnics ID**	A2836		**Date Sampled**	19-01-2026	
	Reference	BH11_0.0 m		**Depth From**	0.0 m	**to** 0.4 m
	Description	SILT				
Customer Instructions	N/A					

Test Results

Allophane Colour Intensity	Pink to Red
Approximate Allophane Content	5 % to 7 %
Date Tested	25-02-2026

Test Remarks

- Condition of the sample as received: Natural.
- Laboratory description: Gravely SAND, with minor silt; dark brown. Moist, high plasticity.

General Remarks

- Samples have been tested as received and according to your instructions. Results apply only to the sample(s) tested.
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Report Number	1102034.0000.0.0/Rep 10	06-03-2026
Test Schedule Reference	NZ01_311	

Customer Details

Customer	Tonkin + Taylor
Address	PO BOX 5271 AUCKLAND 1141
Project Name	Port Vila CBD Geotechnical Hazard Study
Project ID	1097984.1000

Laboratory Test Report

Detection of presence of allophane in soils - NZS 4402:1986 Test 3.4

Customer Sample Details

Location	**ID**	VCS2					
	Description	N/A					
	Data	E°: N/A	N°: N/A	Level: N/A	Chainage: N/A	Offset: N/A	
Sample	**Geotechnics ID**	A2867		**Date Sampled**	16-02-2026		
	Reference	BH12_9.0m		**Depth From**	9.0 m	**to**	9.45 m
	Description	Sandy SILT					
Customer Instructions	N/A						

Test Results

Allophane Colour Intensity	Pink to Red
Approximate Allophane Content	5 % to 7 %
Date Tested	04-03-2026

Test Remarks

- Condition of the sample as received: Natural.
- Laboratory description: Sandy SILT; dark brown. Firm, moist, low plasticity.

General Remarks

- Samples have been tested as received and according to your instructions. Results apply only to the sample(s) tested.
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Fergus Goldie	Steven Anderson

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C4 Unconfined Compressive Strength tests

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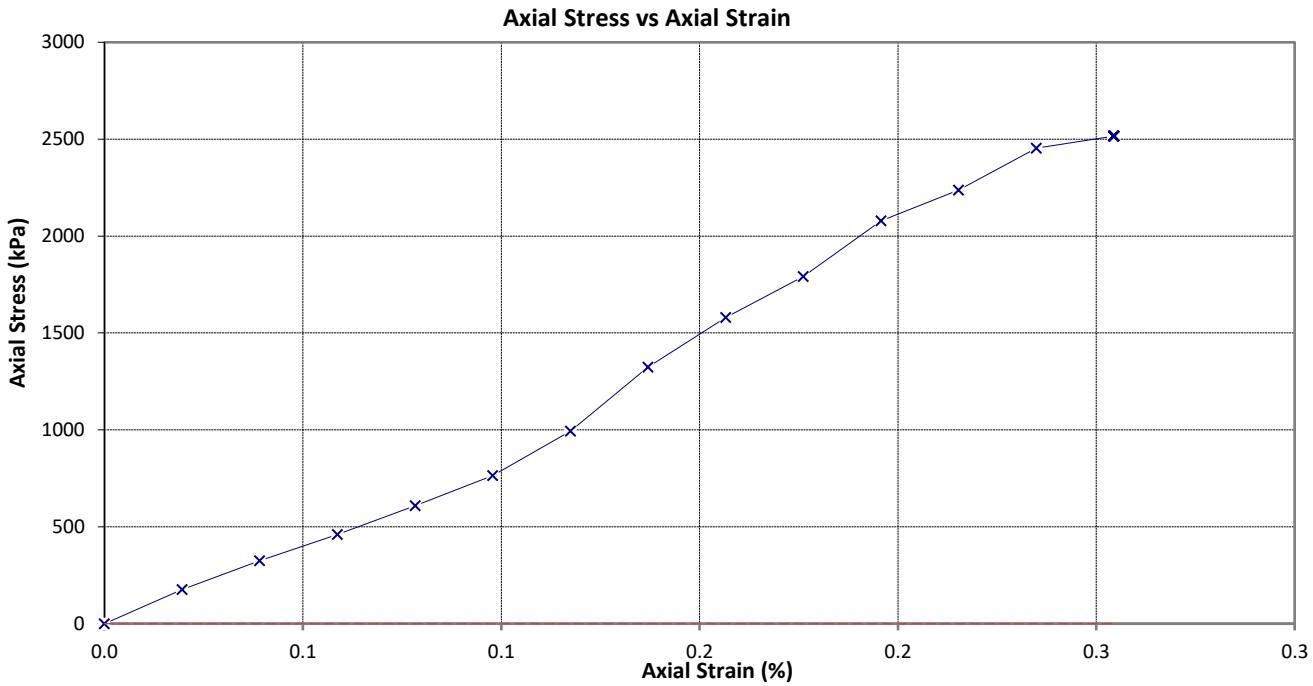
Geotechnics Project ID: **1102034.0000.0.0**
Customer Project ID: **1097984.1**

Site: Port Vila CBD Geotech Hazard
Location ID: BH06
Sample Ref.: BH06_8.57 m
Depth: 8.57-8.79 (m)
Test method used: NZS 4402:1986 Test 6.3.1 Determination of the Unconfined Compressive Strength of Cohesive Soil
NZS 4402:1986 Test 2.1 Determination of Water Content

UNCONFINED COMPRESSION STRENGTH TEST



Initial Sample Parameters:

Sample Length (mm)	127.74	Bulk Density (t/m³)	1.99
Sample Diameter (mm)	60.16	Dry Density (t/m³)	1.89
Test Length (mm)	127.74	Water Content (%)	5.5
Test Height / Diameter Ratio	2.12		

Failure Value:

Axial Strain ε (%)	Unconfined Compressive Strength q_u (kPa)	Rate of Compression (mm/min)
0.25	2516	0.20

Mode of Failure: Axial

Sample History: Undisturbed core trimmed at natural water content.

Sample Description: Slightly weathered, lightbrownish white, LIMESTONE. Very weak.

Test Remarks: Unconfined Compressive Strength reported to the nearest 1 kPa.

Failure Photo:



Tested by: ANHU Date: 30/01/2026 Approved by KTP: GEGO Date: 4/02/2026

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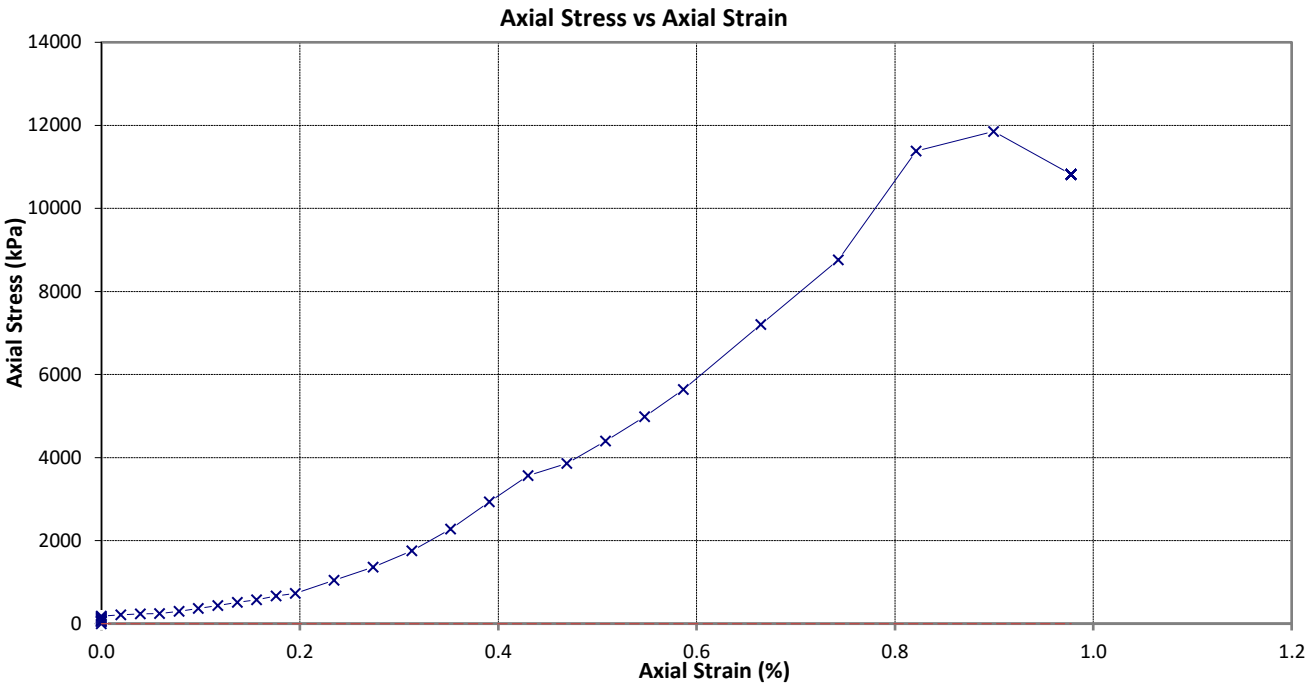
Geotechnics Project ID: **1102034.0000.0.0**
Customer Project ID: **1097984.1**

Site:	Port Vila CBD Geotech Hazard	Location ID:	BH10	
Sample Ref.:	BH10_10.8 m	Depth:	10.8-11.1	(m)
Test method used:	NZS 4402:1986 Test 6.3.1 Determination of the Unconfined Compressive Strength of Cohesive Soil NZS 4402:1986 Test 2.1 Determination of Water Content			

UNCONFINED COMPRESSION STRENGTH TEST



Initial Sample Parameters:

Sample Length (mm)	127.85	Bulk Density (t/m³)	2.35
Sample Diameter (mm)	61.14	Dry Density (t/m³)	2.21
Test Length (mm)	127.85	Water Content (%)	6.2
Test Height / Diameter Ratio	2.09		

Failure Value:

Axial Strain ε (%)	Unconfined Compressive Strength q_u (kPa)	Rate of Compression (mm/min)
0.90	11854	0.20

Mode of Failure: Axial

Sample History: Undisturbed core trimmed at natural water content.

Sample Description: Unweathered, light brownish white, LIMESTONE. Weak.

Test Remarks: Unconfined Compressive Strength reported to the nearest 1 kPa.

Failure Photo:



Tested by:	ANHU	Date:	2/02/2026	Approved by KTP:	GEGO	Date:	4/02/2026

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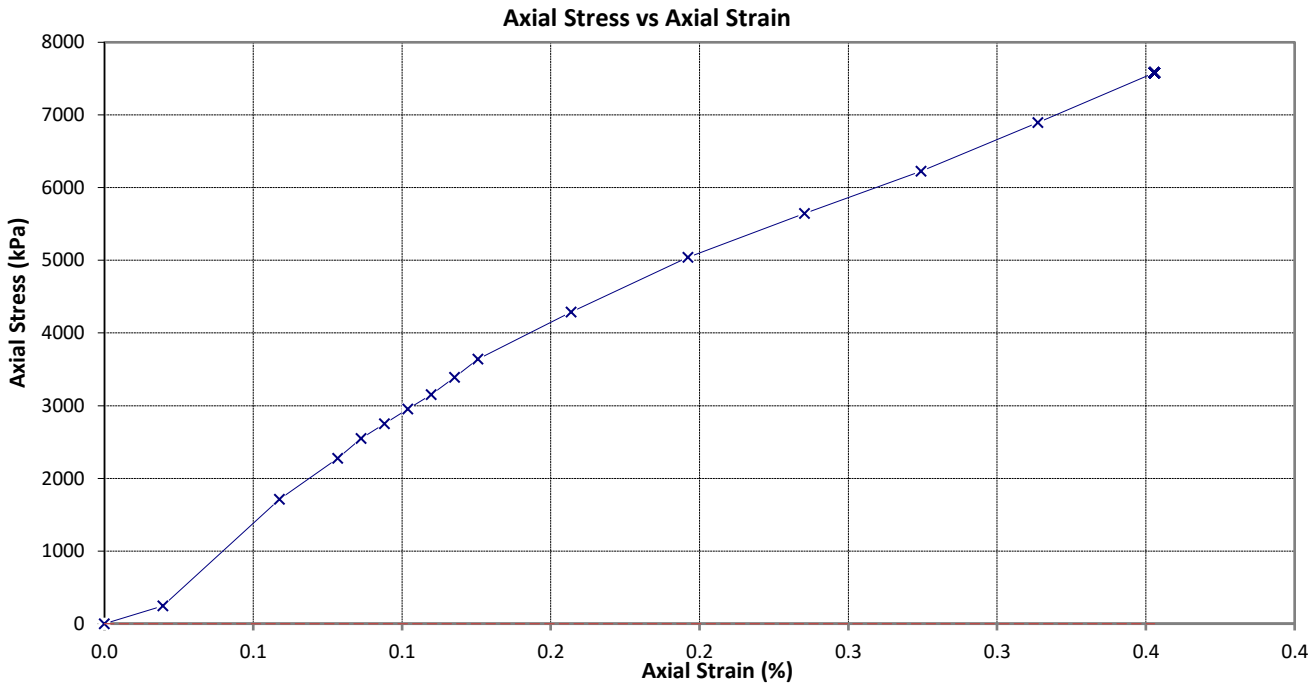
Geotechnics Project ID: **1102034.0000.0.0**
Customer Project ID: **1097984.1**

Site:	Port Vila CBD Geotech Hazard	Location ID:	BH10	
Sample Ref.:	BH10_8.69 m	Depth:	8.69-8.9	(m)
Test method used:	NZS 4402:1986 Test 6.3.1 Determination of the Unconfined Compressive Strength of Cohesive Soil NZS 4402:1986 Test 2.1 Determination of Water Content			

UNCONFINED COMPRESSION STRENGTH TEST



Initial Sample Parameters:

Sample Length (mm)	127.51	Bulk Density (t/m³)	1.98
Sample Diameter (mm)	60.97	Dry Density (t/m³)	1.87
Test Length (mm)	127.51	Water Content (%)	6.1
Test Height / Diameter Ratio	2.09		

Failure Value:

Axial Strain ε (%)	Unconfined Compressive Strength q_u (kPa)	Rate of Compression (mm/min)
0.35	7582	0.20

Mode of Failure: Shear

Sample History: Undisturbed core trimmed at natural water content.

Sample Description: Slightly weathered, light brownish white, LIMESTONE. Very weak,

Test Remarks: Unconfined Compressive Strength reported to the nearest 1 kPa.

Failure Photo:



Tested by:	ANHU	Date:	2/02/2026	Approved by KTP:	GEGO	Date:	4/02/2026

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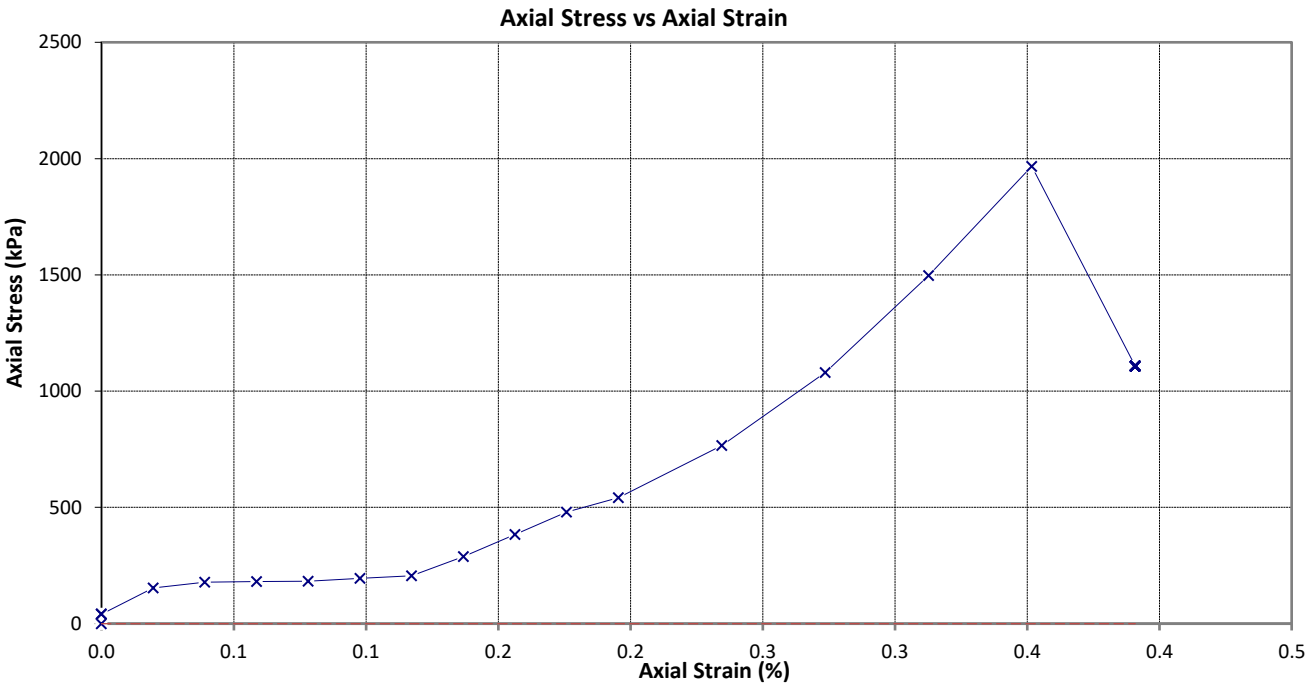
Geotechnics Project ID: **1102034.0000.0.0**
Customer Project ID: **1097984.1**

Site:	Port Vila CBD Geotech Hazard	Location ID:	BH05	
Sample Ref.:	BH05_9.35 m	Depth:	9.35-9.55	(m)
Test method used:	NZS 4402:1986 Test 6.3.1 Determination of the Unconfined Compressive Strength of Cohesive Soil NZS 4402:1986 Test 2.1 Determination of Water Content			

UNCONFINED COMPRESSION STRENGTH TEST



Initial Sample Parameters:

Sample Length (mm)	127.92	Bulk Density (t/m³)	1.94
Sample Diameter (mm)	60.70	Dry Density (t/m³)	1.80
Test Length (mm)	127.92	Water Content (%)	8.1
Test Height / Diameter Ratio	2.11		

Failure Value:

Axial Strain ε (%)	Unconfined Compressive Strength q_u (kPa)	Rate of Compression (mm/min)
0.35	1967	0.22

Mode of Failure: Axial

Sample History: Undisturbed core trimmed at natural water content.

Sample Description: Slightly weathered, white, LIMESTONE. Very weak.

Test Remarks: Unconfined Compressive Strength reported to the nearest 1 kPa.

Failure Photo:



Tested by:	ANHU	Date:	2/02/2026	Approved by KTP:	GEGO	Date:	4/02/2026

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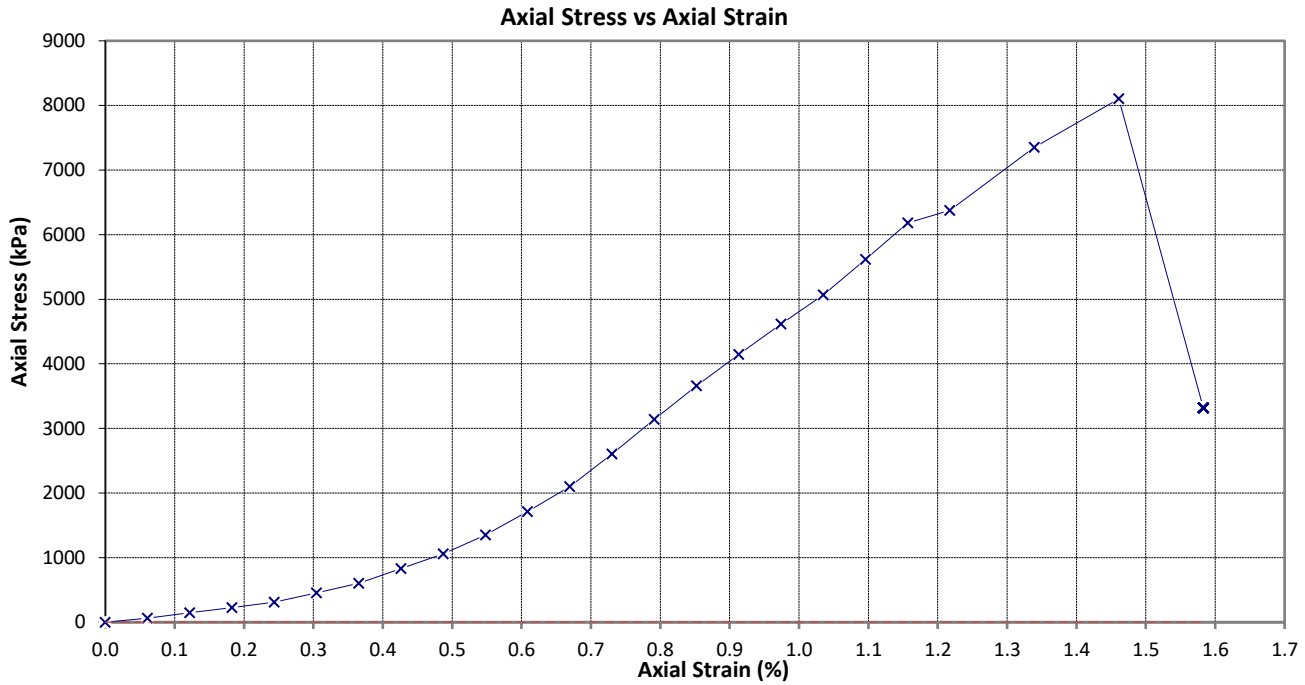
Geotechnics Project ID: **1102034**
Customer Project ID: **1097984**

Site:
Location ID: BH03
Sample Ref.: Port Vila CBD Geotechnical Hazard
Depth: 13.7 - 13.8 (m)
Test method used: NZS 4402:1986 Test 6.3.1 Determination of the Unconfined Compressive Strength of Cohesive Soil
NZS 4402:1986 Test 2.1 Determination of Water Content

UNCONFINED COMPRESSION STRENGTH TEST



Initial Sample Parameters:

Sample Length (mm)	82.13	Bulk Density (t/m³)	2.26
Sample Diameter (mm)	60.20	Dry Density (t/m³)	2.17
Test Length (mm)	82.13	Water Content (%)	4.3
Test Height / Diameter Ratio	1.36		

Failure Value:

Axial Strain ε (%)	Unconfined Compressive Strength q_u (kPa)	Rate of Compression (mm/min)
1.46	8102	0.16

Mode of Failure: Axial

Sample History: Undisturbed core trimmed at natural water content.

Sample Description: Moderately weathered, white and light brown, LIMESTONE; weak.

Test Remarks: Unconfined Compressive Strength reported to the nearest 1 kPa.

Failure Photo:



Tested by: KTAY Date: 9/03/2026 Approved by KTP: GEGO Date: 13/03/2026

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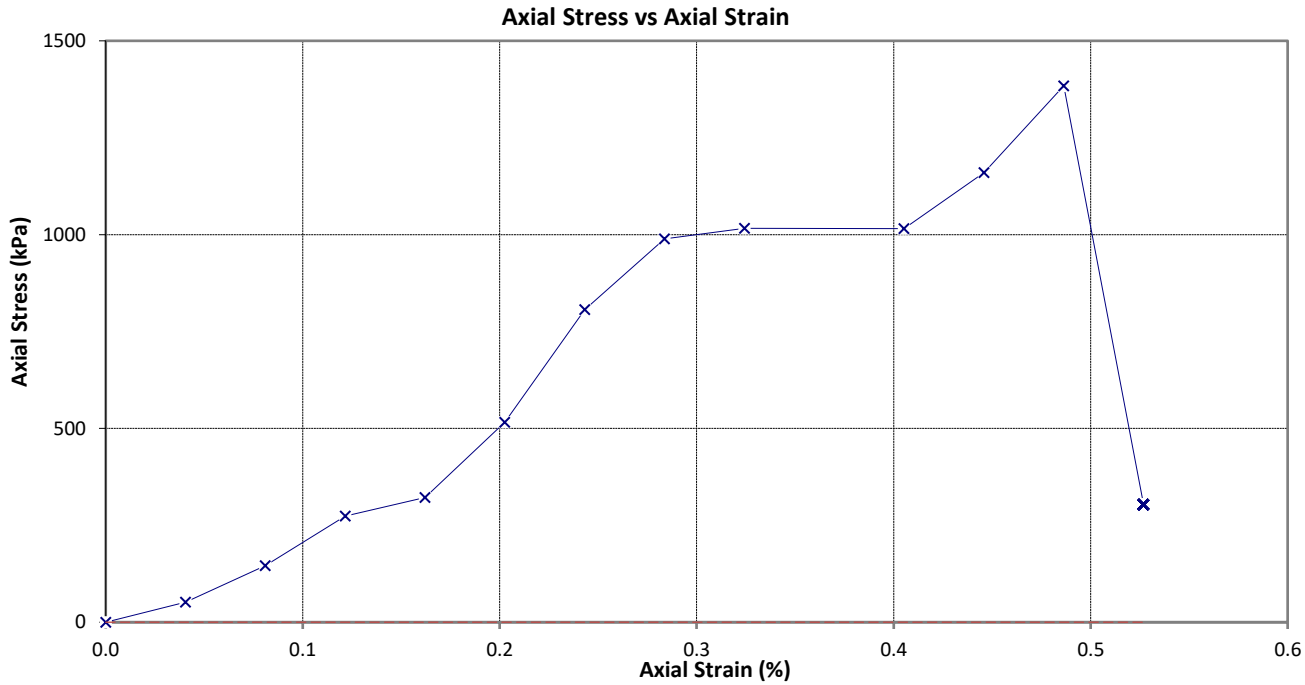
Geotechnics Project ID: **1102034**
Customer Project ID: **1097984**

Site: Port Vila CBD Geotechnical Hazard
Location ID: BH03
Sample Ref.:
Depth: 12.66 - 12.86 (m)

Test method used: NZS 4402:1986 Test 6.3.1 Determination of the Unconfined Compressive Strength of Cohesive Soil
NZS 4402:1986 Test 2.1 Determination of Water Content

UNCONFINED COMPRESSION STRENGTH TEST



Initial Sample Parameters:

Sample Length (mm)	123.37	Bulk Density (t/m³)	2.01
Sample Diameter (mm)	60.59	Dry Density (t/m³)	1.87
Test Length (mm)	123.37	Water Content (%)	7.8
Test Height / Diameter Ratio	2.04		

Failure Value:

Axial Strain ε (%)	Unconfined Compressive Strength q_u (kPa)	Rate of Compression (mm/min)
0.49	1384	0.20

Mode of Failure: Axial

Sample History: Undisturbed core trimmed at natural water content.

Sample Description: Slightly weathered, white and light brown, LIMESTONE; Very weak.

Test Remarks: Unconfined Compressive Strength reported to the nearest 1 kPa.

Failure Photo:



Tested by: KTAY Date: 9/03/2026 Approved by KTP: GEGO Date: 13/03/2026

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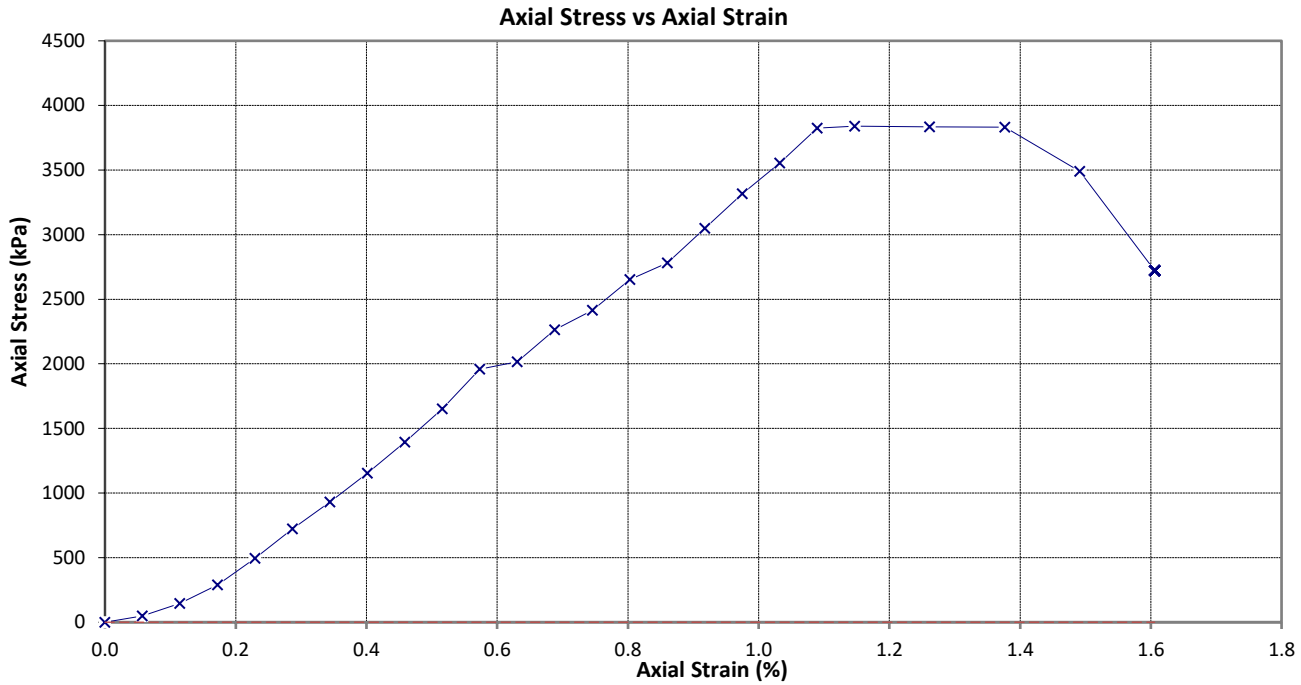
Geotechnics Project ID: **1102034**
Customer Project ID: **1097984**

Site: Port Vila CBD Geotechnical Hazard
Location ID: BH11
Sample Ref.:
Depth: 11.65 - 11.76 (m)
Test method used: NZS 4402:1986 Test 6.3.1 Determination of the Unconfined Compressive Strength of Cohesive Soil
NZS 4402:1986 Test 2.1 Determination of Water Content

UNCONFINED COMPRESSION STRENGTH TEST



Initial Sample Parameters:

Sample Length (mm)	87.18	Bulk Density (t/m³)	2.01
Sample Diameter (mm)	60.76	Dry Density (t/m³)	1.85
Test Length (mm)	87.18	Water Content (%)	8.7
Test Height / Diameter Ratio	1.43		

Failure Value:

Axial Strain ε (%)	Unconfined Compressive Strength q_u (kPa)	Rate of Compression (mm/min)
1.15	3839	0.21

Mode of Failure: Axial

Sample History: Undisturbed core trimmed at natural water content.

Failure Photo:



Sample Description: Moderately weathered, light brown, LIMESTONE; very weak.

Test Remarks: Unconfined Compressive Strength reported to the nearest 1 kPa.

Tested by: KTAY Date: 6/03/2026 Approved by KTP: GEGO Date: 13/03/2026

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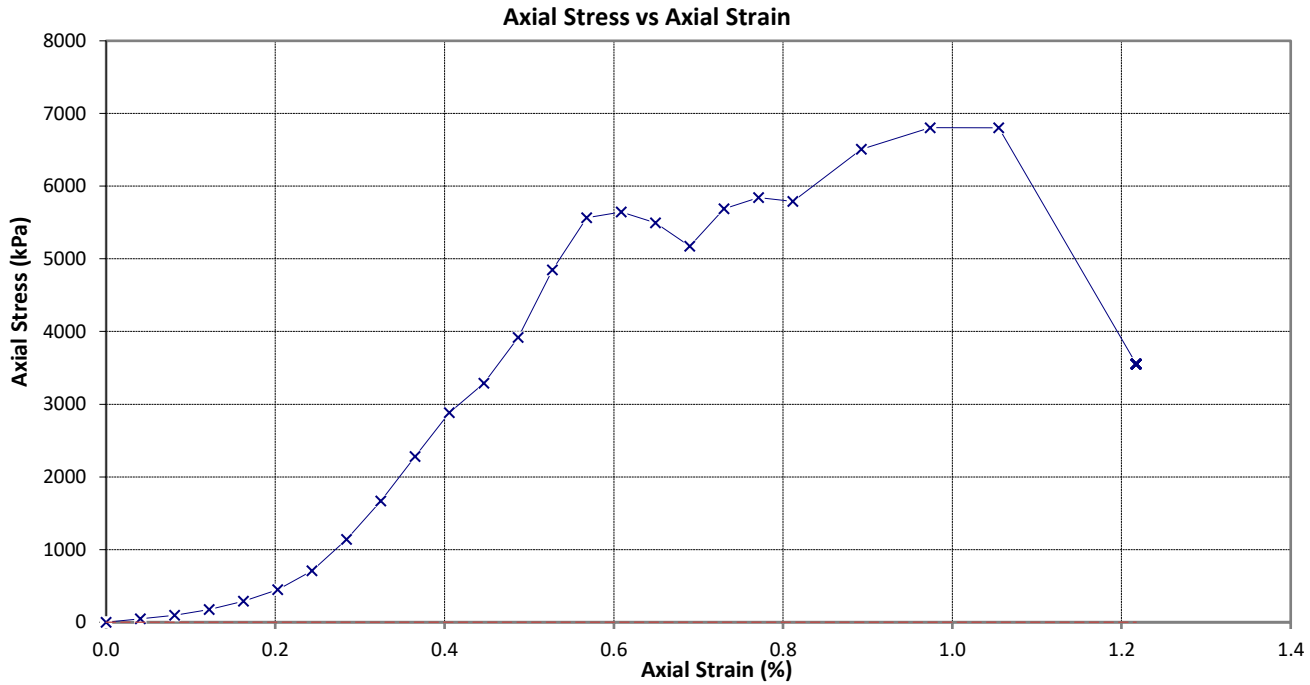
Geotechnics Project ID: **1102034**
Customer Project ID: **1097984**

Site: Port Vila CBD Geotechnical Hazard
Location ID: BH02
Sample Ref.:
Depth: 17.56 - 17.88 (m)
Test method used: NZS 4402:1986 Test 6.3.1 Determination of the Unconfined Compressive Strength of Cohesive Soil
NZS 4402:1986 Test 2.1 Determination of Water Content

UNCONFINED COMPRESSION STRENGTH TEST



Initial Sample Parameters:

Sample Length (mm)	123.21	Bulk Density (t/m³)	2.16
Sample Diameter (mm)	60.72	Dry Density (t/m³)	2.06
Test Length (mm)	123.21	Water Content (%)	4.9
Test Height / Diameter Ratio	2.03		

Failure Value:

Axial Strain ε (%)	Unconfined Compressive Strength q_u (kPa)	Rate of Compression (mm/min)
0.97	6805	0.21

Mode of Failure:

Sample History: Undisturbed core trimmed at natural water content.

Sample Description: Moderately weathered, brownish white, LIMESTONE; weak.

Test Remarks: Unconfined Compressive Strength reported to the nearest 1 kPa.

Failure Photo:



Tested by: KTAY Date: 9/03/2026 Approved by KTP: GEGO Date: 13/03/2026

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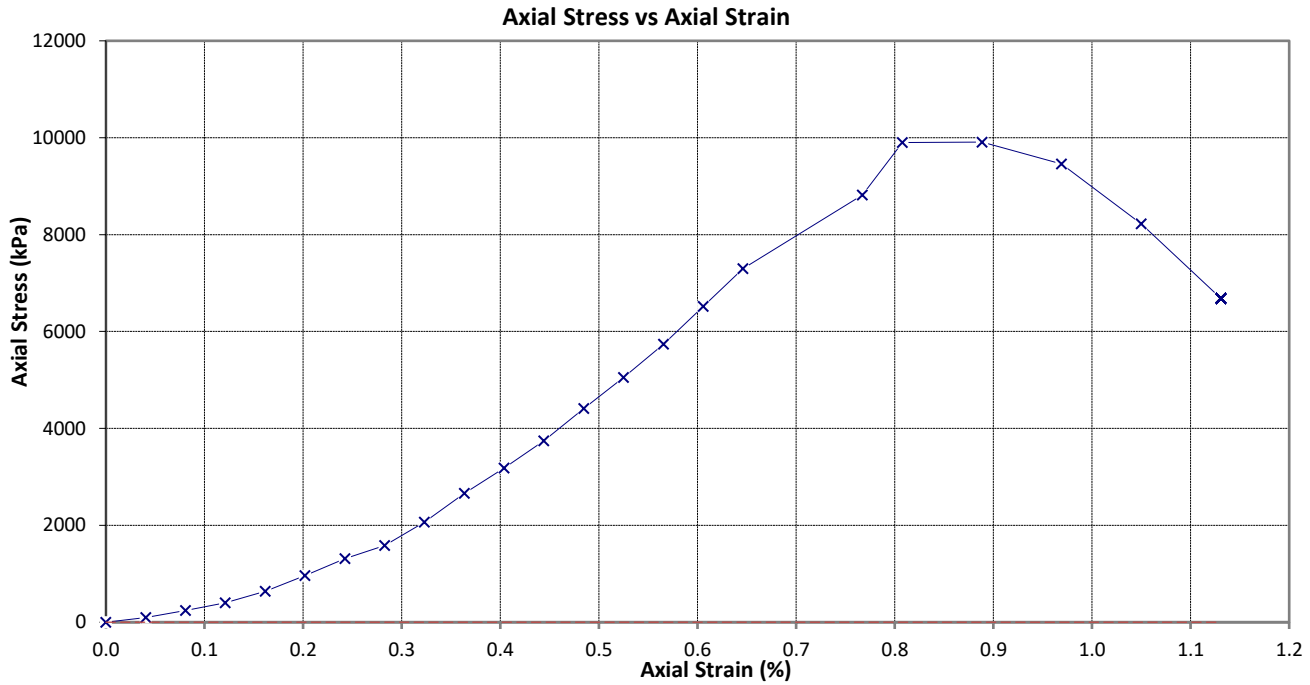
Geotechnics Project ID: **1102034**
Customer Project ID: **1097984.1000**

Site: Port Vila CBD Geotechnical Hazard
Location ID: BH09
Sample Ref.:
Depth: 20.7-20.9 (m)
Test method used: NZS 4402:1986 Test 6.3.1 Determination of the Unconfined Compressive Strength of Cohesive Soil
NZS 4402:1986 Test 2.1 Determination of Water Content

UNCONFINED COMPRESSION STRENGTH TEST



Initial Sample Parameters:

Sample Length (mm)	123.81	Bulk Density (t/m³)	1.90
Sample Diameter (mm)	60.83	Dry Density (t/m³)	1.46
Test Length (mm)	123.81	Water Content (%)	29.8
Test Height / Diameter Ratio	2.04		

Failure Value:

Axial Strain ε (%)	Unconfined Compressive Strength q_u (kPa)	Rate of Compression (mm/min)
0.89	9910	0.17

Mode of Failure: Axial

Sample History: Undisturbed core trimmed at natural water content.

Sample Description: Moderately Weathered, white, LIMESTONE; Weak.

Test Remarks: Unconfined Compressive Strength reported to the nearest 1 kPa.

Failure Photo:



Tested by: KTAY/KAPO Date: 9/03/2026 Approved by KTP: GEGO Date: 13/03/2026

C5 Consolidated-Undrained triaxial compression tests

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Customer Project ID: 1097984.1000
Testing Schedule Reference: --

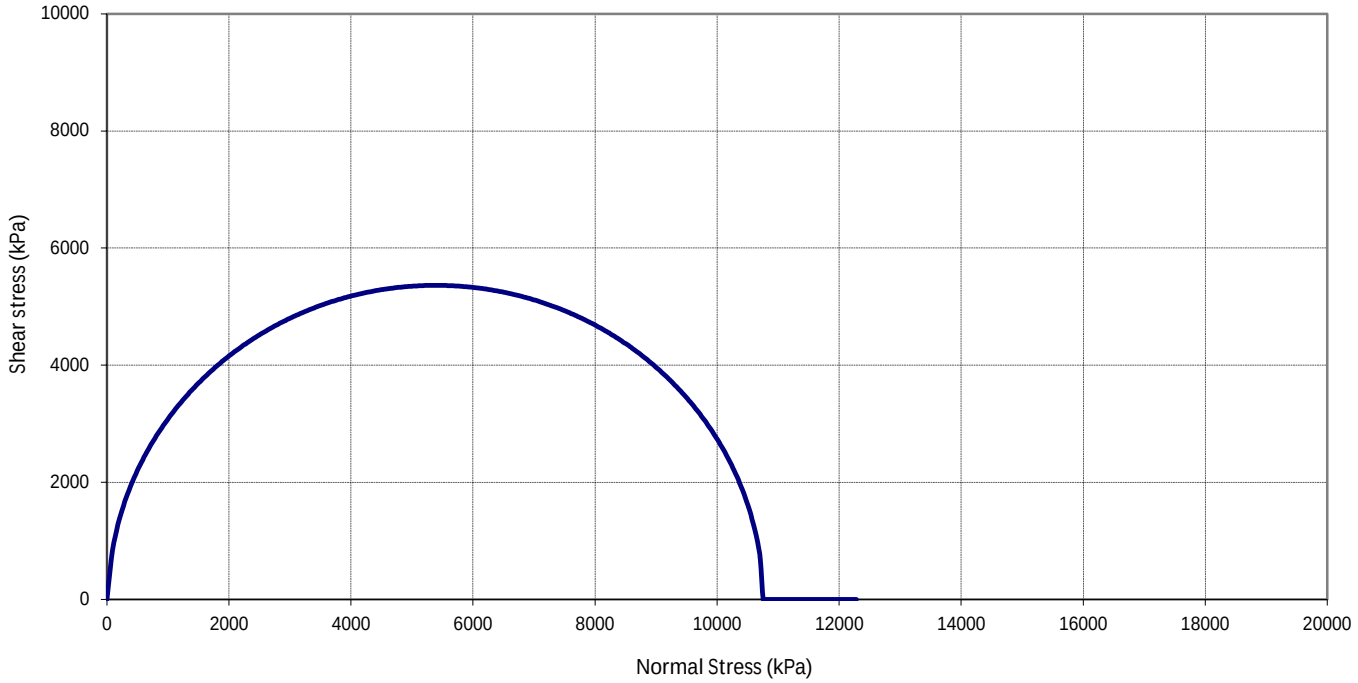
Site: Port Vila CBD Location ID: BH12

Sample Ref.: -- Geotechnics ID: -- Depth: 14.11 - 14.22 (m)

Test method used: ISO 17892-9:2018 Part 9 Isotropic consolidated-undrained triaxial compression test on water saturated soils (CIU)
NZS 4402:1986 Test 2.1 Determination of Water Content

CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST (SINGLE-STAGE)

MOHR CIRCLES OF EFFECTIVE STRESSES



General Sample Parameters

Initial Sample Height:	110.58	mm	Initial Water Content:	16.0	%
Initial Sample Diameter:	60.08	mm	Initial Bulk Density:	2.05	t/m³
Initial B Value:	0	%	Initial Dry Density:	1.77	t/m³
B Value before Consolidation:	94	%	Final Water Content:	17.4	%

Test Results

At the End of Consolidation Stage					Failure Values					
Effective Stress		Back Pressure (kPa)	Volumetric Strain		Deviator Stress ($\sigma_v' - \sigma_h'$) (kPa)	Vertical Strain ε (%)	Effective Stress		Corrections (kPa)	
Horizontal σ_h'(kPa)	Vertical σ_v'(kPa)		Strain (%)	Rate (%/hr)			Vertical σ_v' (kPa)	Horizontal σ_h'(kPa)	Membrane $(\Delta\sigma_v)_m$	Filter P $(\Delta\sigma_v)_{fp}$
100	101	300	0.38	0.00	10727.32	0.65	10752.72	25.40	0.51	1.24

Failure Mode & Photo

Planar



Sample History: Undisturbed core trimmed at natural water content.

Soil description: SILTSTONE, weak, dark brownish grey.

Test Speed: 0.009 (mm/min)

Test Remarks: The sample was saturated by increments of cell pressure and back pressure.
It was drained from radial boundary and both ends in the consolidation stage.
Failure for compression stage was determined by the maximum effective stress ratio.

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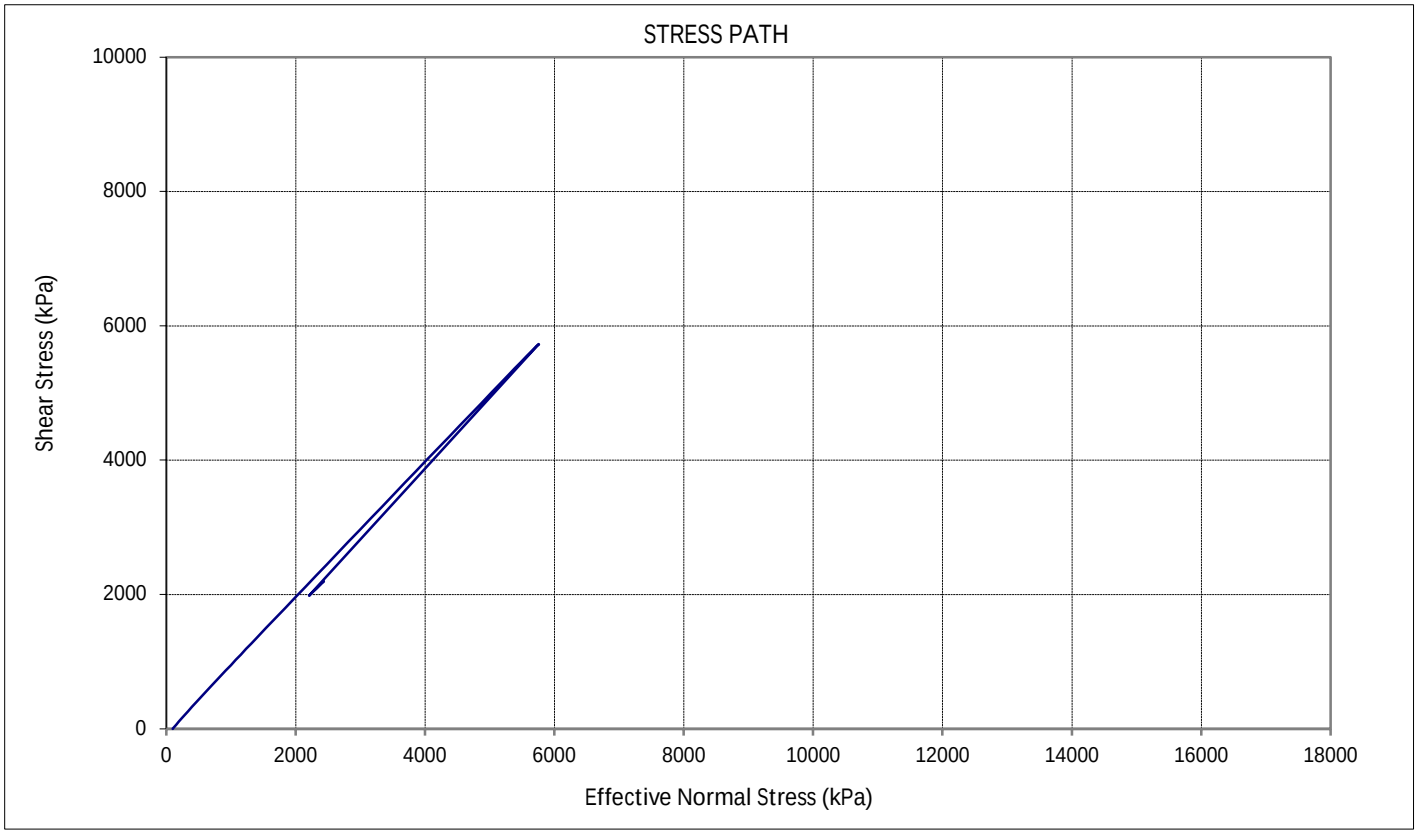
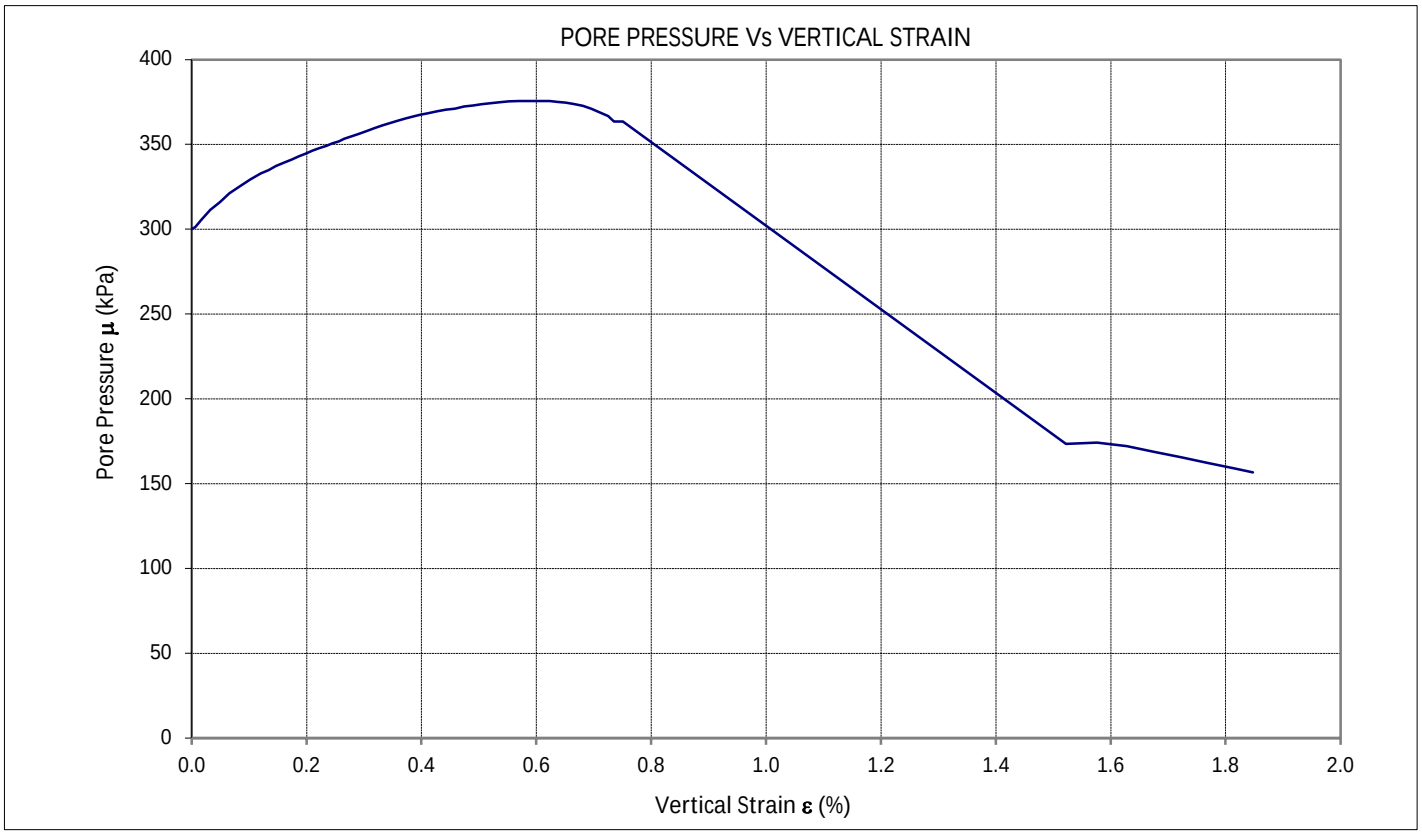
Testing Schedule Reference: --

Site: Port Vila CBD Location ID: BH12
Sample Ref.: -- Geotechnics ID: -- Depth: 14.11 - 14.22 (m)
Test method used: ISO 17892-9:2018 Part 9 Isotropic consolidated-undrained triaxial compression test on water saturated soils (CIU)
NZS 4402:1986 Test 2.1 Determination of Water Content

GRAPHS





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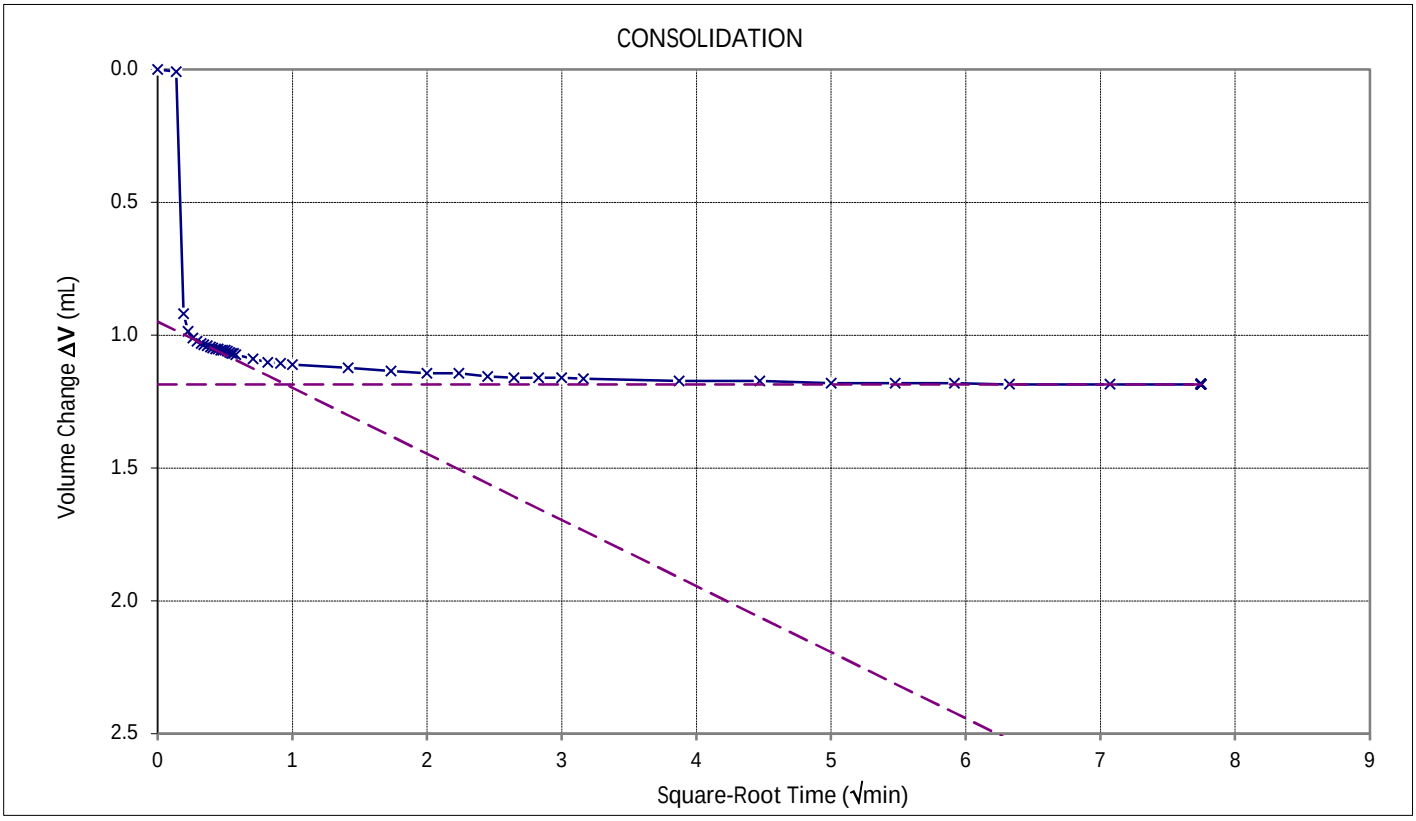
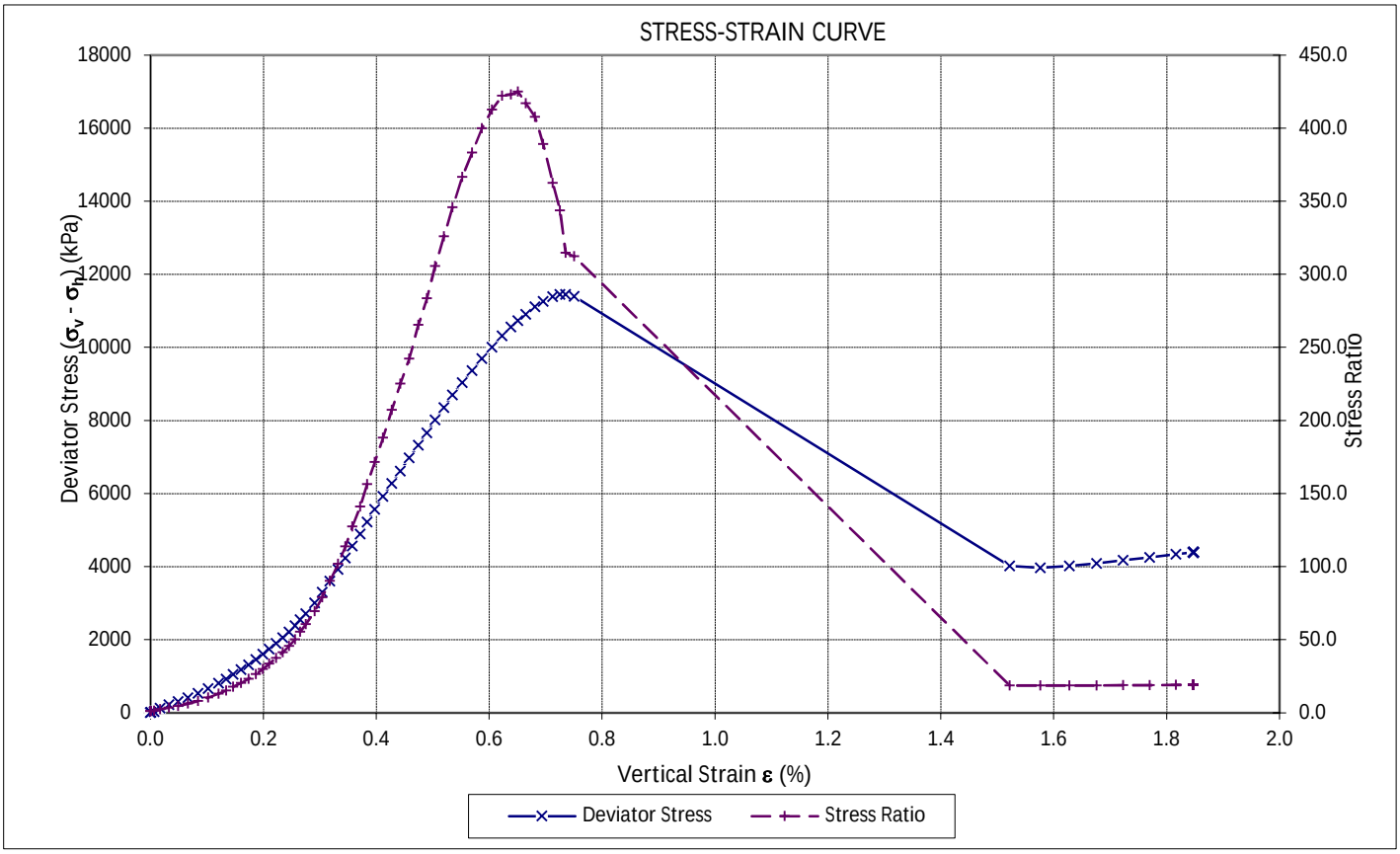
Testing Schedule Reference: --

Site: Port Vila CBD Location ID: BH12
Sample Ref.: -- Geotechnics ID: -- Depth: 14.11 - 14.22 (m)
Test method used: ISO 17892-9:2018 Part 9 Isotropic consolidated-undrained triaxial compression test on water saturated soils (CIU)
NZS 4402:1986 Test 2.1 Determination of Water Content

GRAPHS





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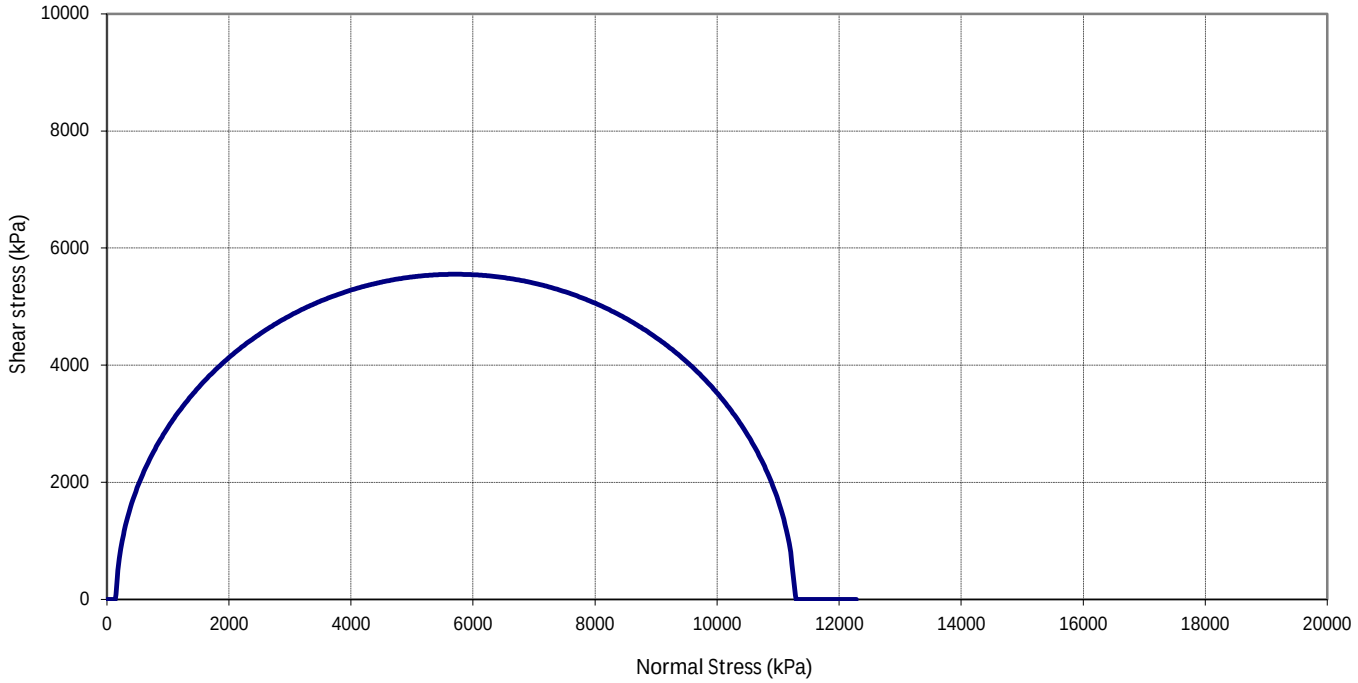
Customer Project ID: 1097984.1000
Testing Schedule Reference: --

Site: Port Vila CBD Location ID: BH12
Sample Ref.: -- Geotechnics ID: -- Depth: 25.08 - 25.22 (m)
Test method used: ISO 17892-9:2018 Part 9 Isotropic consolidated-undrained triaxial compression test on water saturated soils (CIU)
NZS 4402:1986 Test 2.1 Determination of Water Content

CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST (SINGLE-STAGE)

MOHR CIRCLES OF EFFECTIVE STRESSES



General Sample Parameters

Initial Sample Height:	138.65	mm	Initial Water Content:	18.0	%
Initial Sample Diameter:	60.55	mm	Initial Bulk Density:	2.07	t/m³
Initial B Value:	8	%	Initial Dry Density:	1.76	t/m³
B Value before Consolidation:	98	%	Final Water Content:	18.8	%

Test Results

At the End of Consolidation Stage					Failure Values					
Effective Stress		Back Pressure (kPa)	Volumetric Strain		Deviator Stress ($\sigma_v' - \sigma_h'$) (kPa)	Vertical Strain ε (%)	Effective Stress		Corrections (kPa)	
Horizontal σ_h'(kPa)	Vertical σ_v'(kPa)		Strain (%)	Rate (%/hr)			Vertical σ_v' (kPa)	Horizontal σ_h'(kPa)	Membrane $(\Delta\sigma_v)_m$	Filter P $(\Delta\sigma_v)_{fp}$
600	601	300	0.75	0.02	11106.21	0.67	11263.91	157.70	0.53	1.26

Failure Mode & Photo

Planar



Sample History: Undisturbed core trimmed at natural water content.

Soil description: SILTSTONE, weak, light brownish grey.

Test Speed: 0.026 (mm/min)

Test Remarks: The sample was saturated by increments of cell pressure and back pressure.
It was drained from radial boundary and both ends in the consolidation stage.
Failure for compression stage was determined by the maximum effective stress ratio.

The specimen membrane punctured at 1.87% axial (vertical) strain during shearing. This compromised the specimen boundary (potential loss of confinement and/or partial drainage); therefore, pore-pressure measurements recorded after 1.87% strain are unreliable/not representative.

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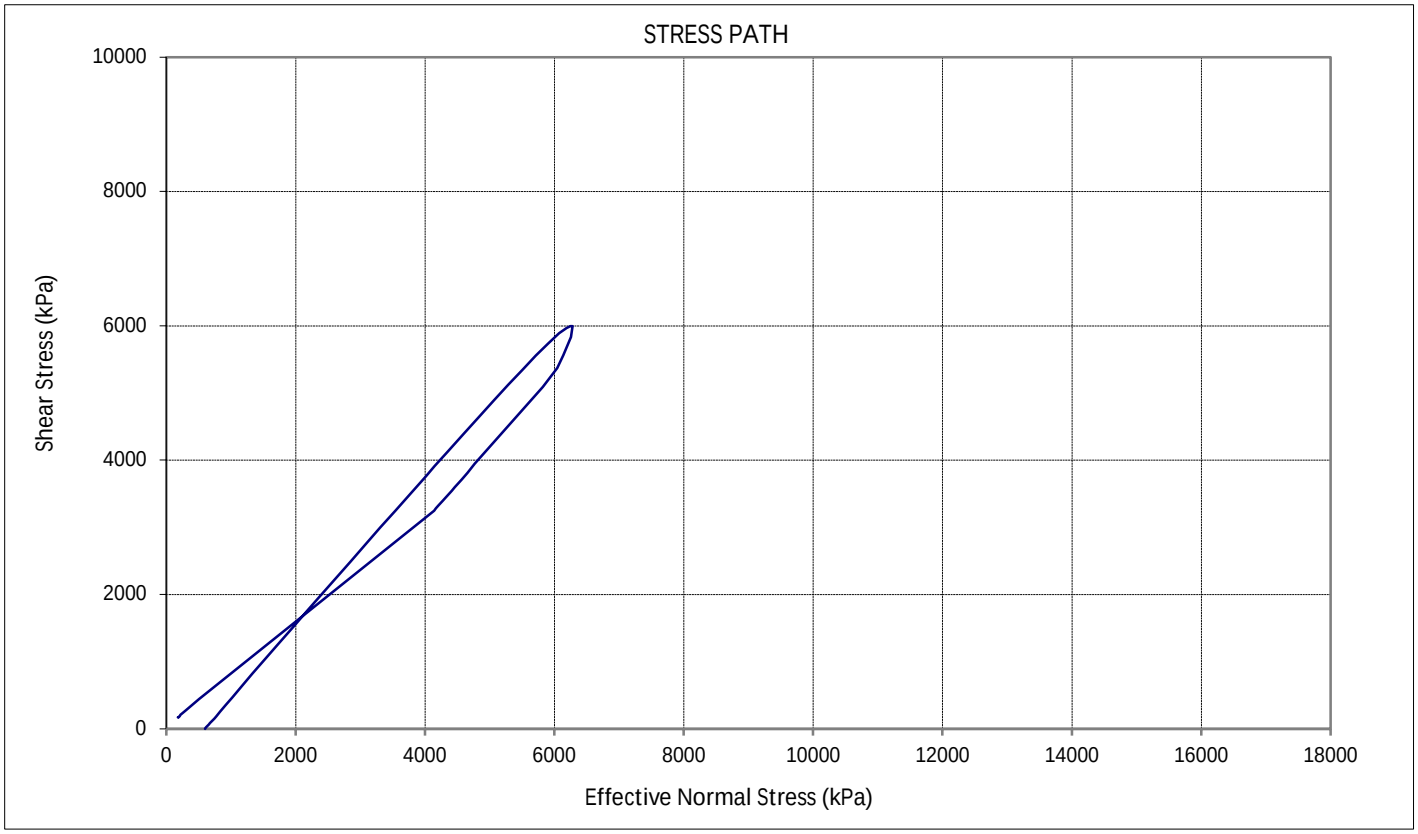
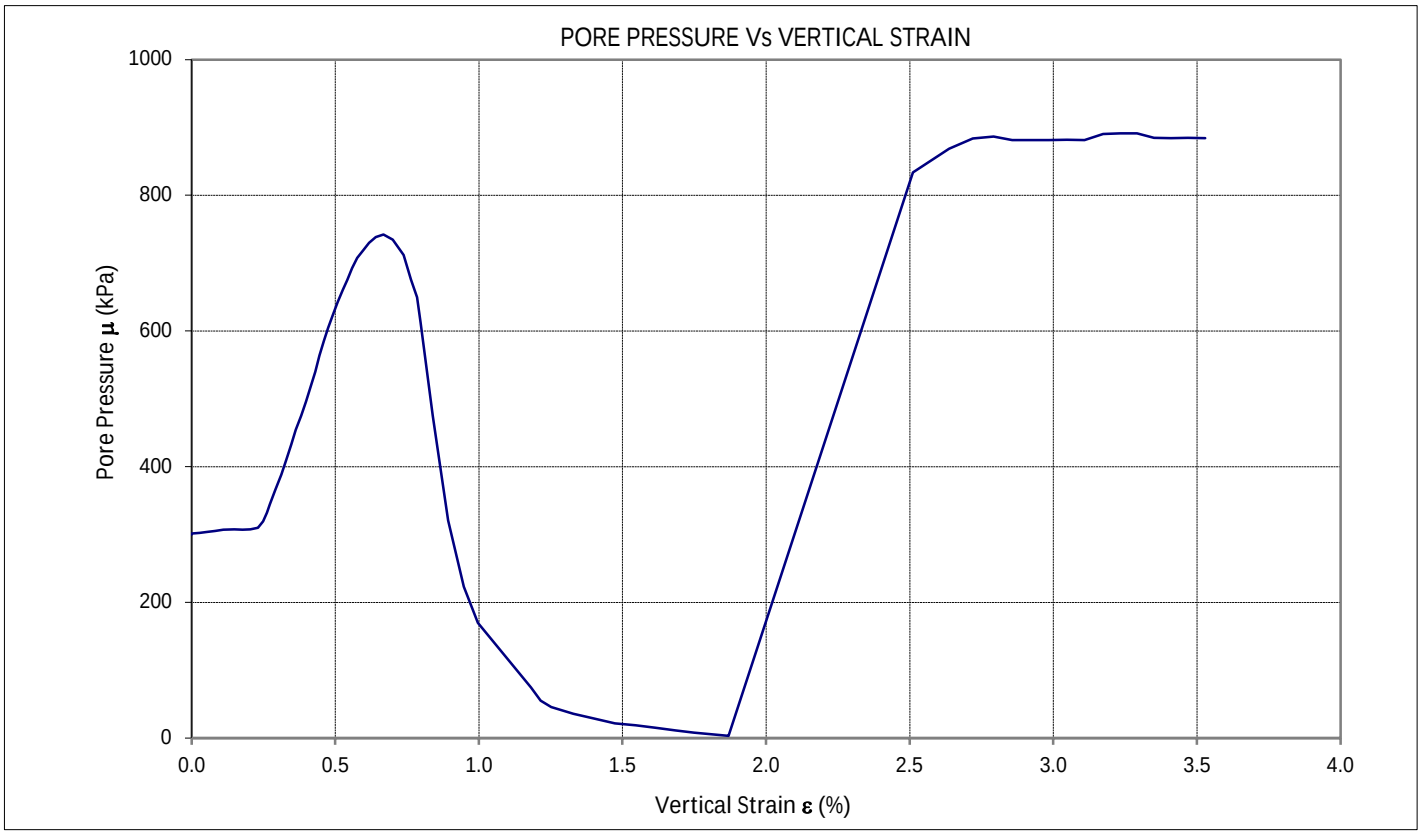
Testing Schedule Reference: --

Site: Port Vila CBD Location ID: BH12
Sample Ref.: -- Geotechnics ID: -- Depth: 25.08 - 25.22 (m)
Test method used: ISO 17892-9:2018 Part 9 Isotropic consolidated-undrained triaxial compression test on water saturated soils (CIU)
NZS 4402:1986 Test 2.1 Determination of Water Content

GRAPHS





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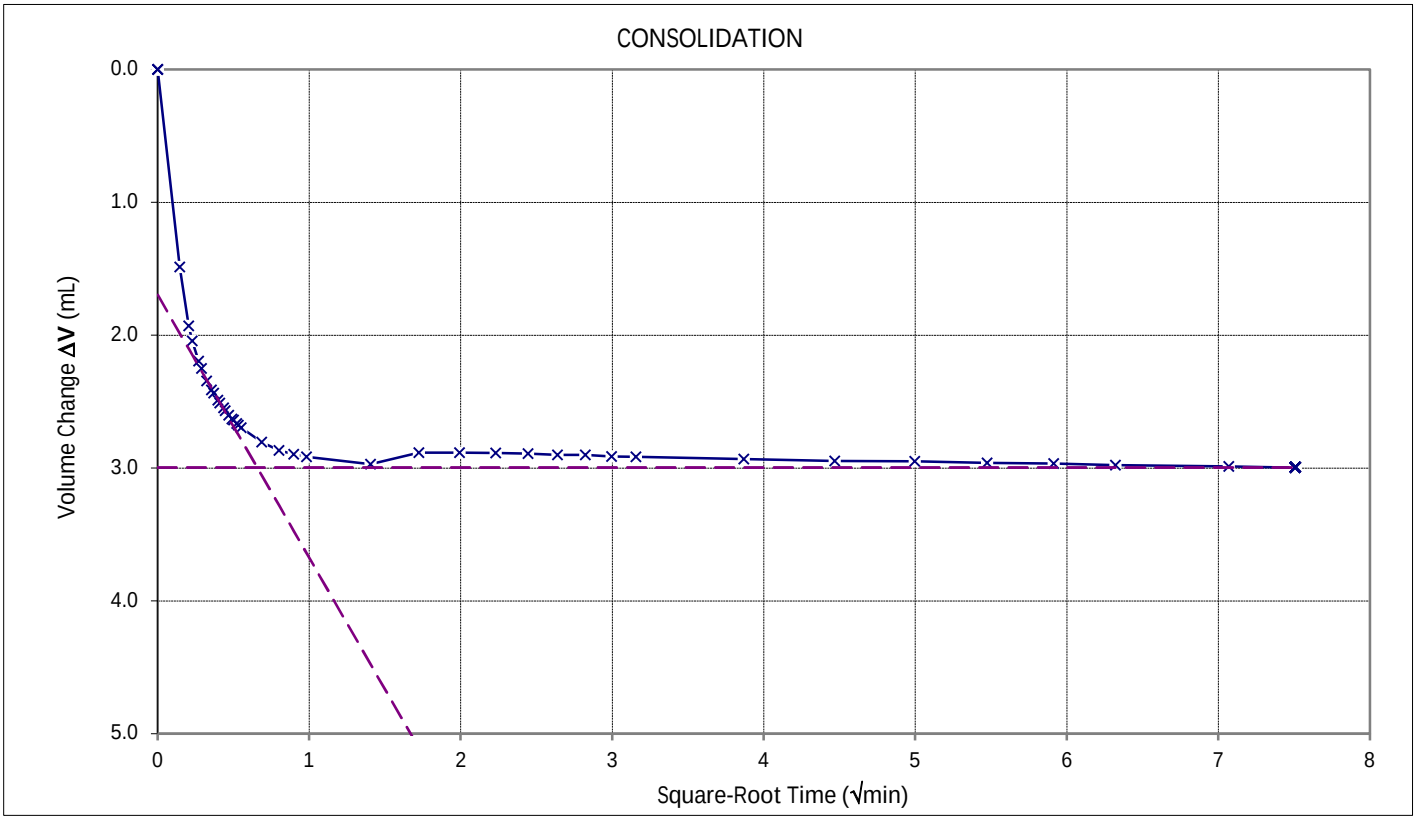
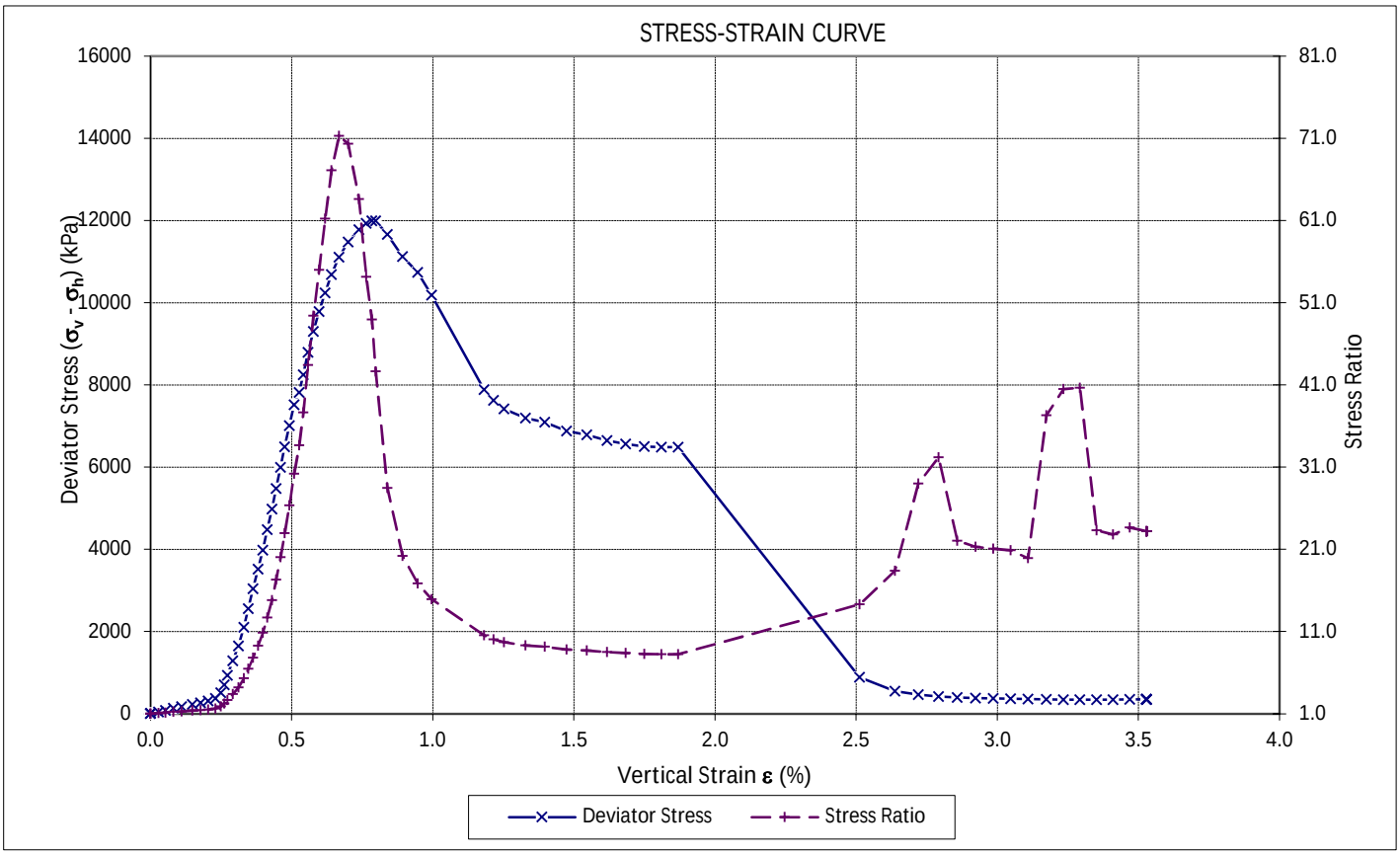
Testing Schedule Reference: --

Site: Port Vila CBD Location ID: BH12
Sample Ref.: -- Geotechnics ID: -- Depth: 25.08 - 25.22 (m)
Test method used: ISO 17892-9:2018 Part 9 Isotropic consolidated-undrained triaxial compression test on water saturated soils (CIU)
NZS 4402:1986 Test 2.1 Determination of Water Content

GRAPHS





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Testing Schedule Reference: --

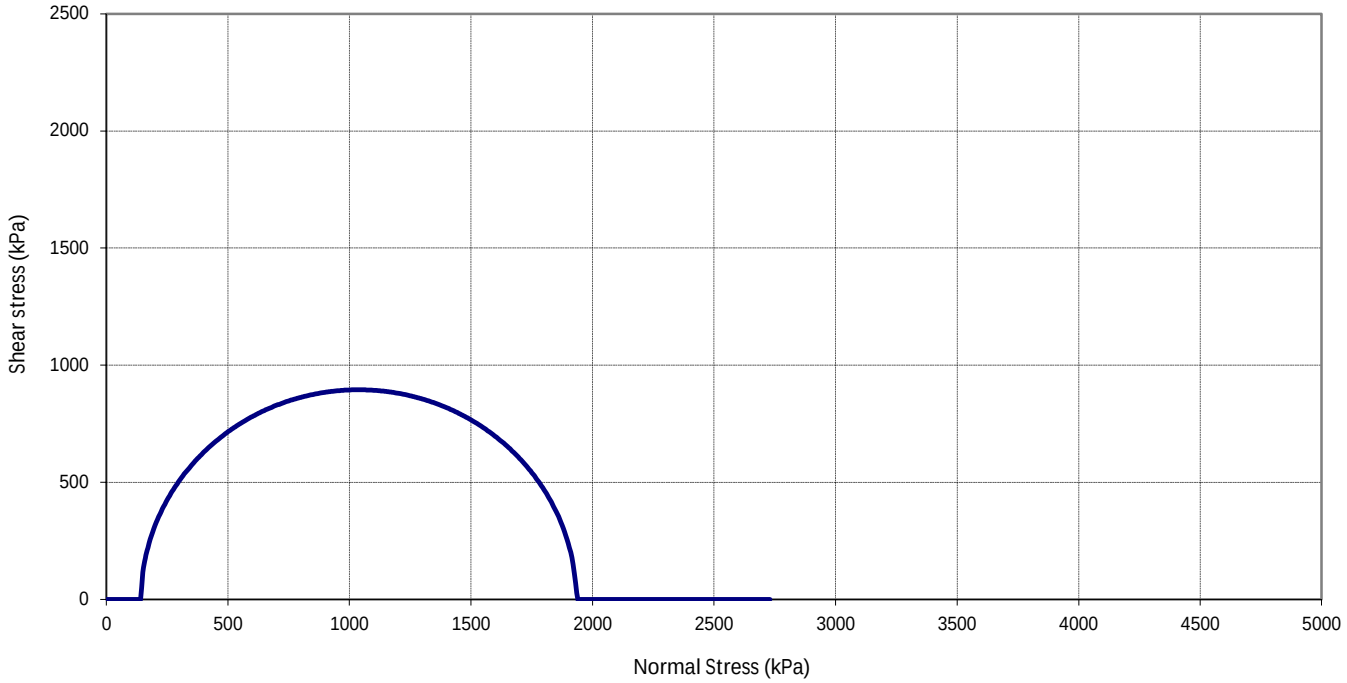
Site: Port Vila CBD Location ID: BH12

Sample Ref.: -- Geotechnics ID: -- Depth: 29.70 - 29.82 (m)

Test method used: ISO 17892-9:2018 Part 9 Isotropic consolidated-undrained triaxial compression test on water saturated soils (CIU)
NZS 4402:1986 Test 2.1 Determination of Water Content

CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST (SINGLE-STAGE)

MOHR CIRCLES OF EFFECTIVE STRESSES



General Sample Parameters

Initial Sample Height:	125.28	mm	Initial Water Content:	34.0	%
Initial Sample Diameter:	60.09	mm	Initial Bulk Density:	1.76	t/m³
Initial B Value:	--	%	Initial Dry Density:	1.32	t/m³
B Value before Consolidation:	98	%	Final Water Content:	34.7	%

Test Results

At the End of Consolidation Stage					Failure Values						Failure Mode & Photo
Effective Stress		Back Pressure (kPa)	Volumetric Strain		Deviator Stress ($\sigma_v' - \sigma_h'$) (kPa)	Vertical Strain ε (%)	Effective Stress		Corrections (kPa)		
Horizontal σ_h'(kPa)	Vertical σ_v'(kPa)		Strain (%)	Rate (%/hr)			Vertical σ_v' (kPa)	Horizontal σ_h'(kPa)	Membrane $(\Delta\sigma_v)_m$	Filter P $(\Delta\sigma_v)_{fp}$	
300	301	300	1.49	0.00	1790.29	1.23	1932.70	142.41	0.99	2.35	Planar / Plastic



Sample History: Undisturbed core trimmed at natural water content.

Soil description: SILTSTONE, very weak, light grey.

Test Speed: 0.016 (mm/min)

Test Remarks: The sample was saturated by increments of cell pressure and back pressure.
It was drained from radial boundary and both ends in the consolidation stage.
Failure for compression stage was determined by the maximum effective stress ratio.

Tested by: PIHE Date: 25/03/2026 Approved by KTP: Date: 15/04/2026

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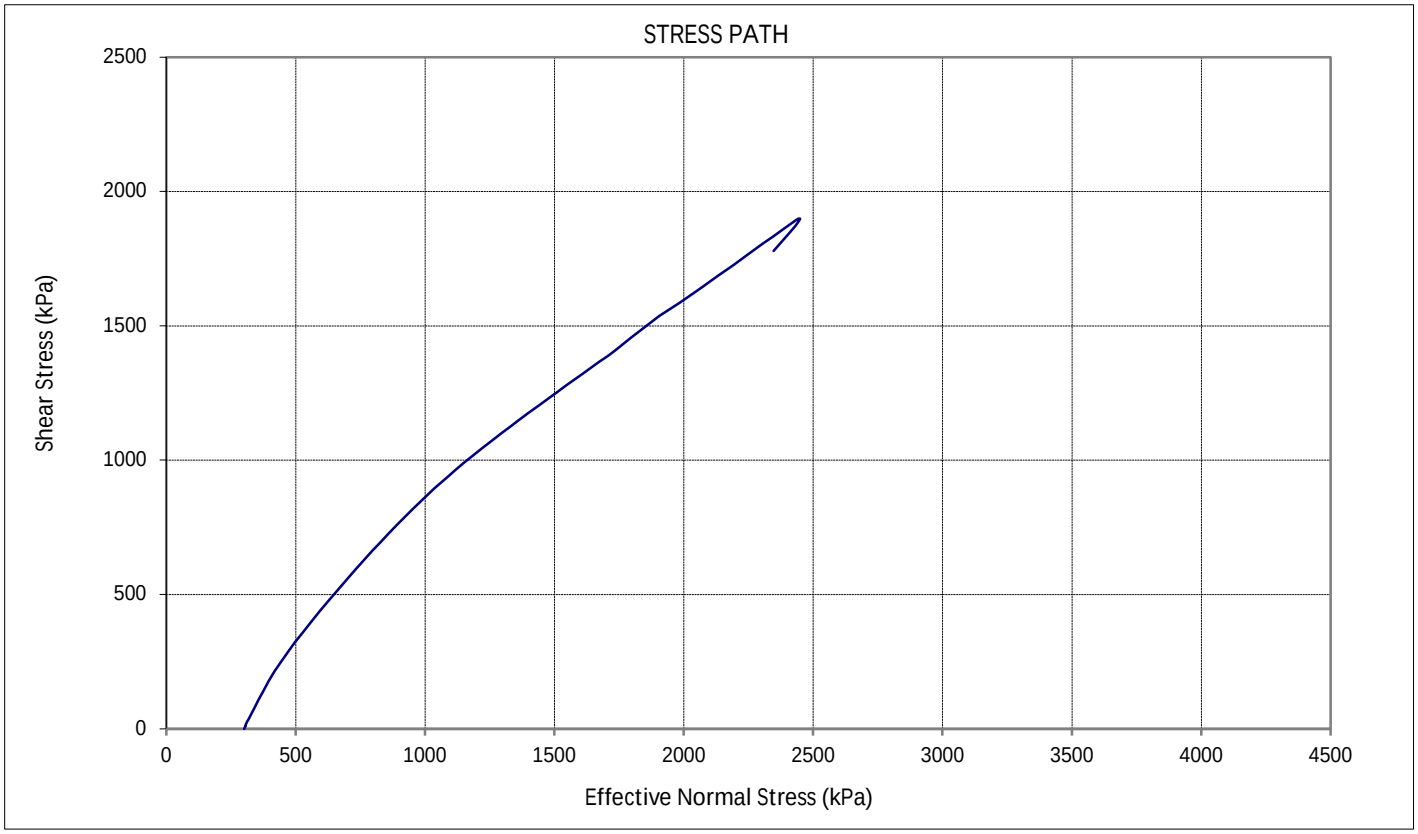
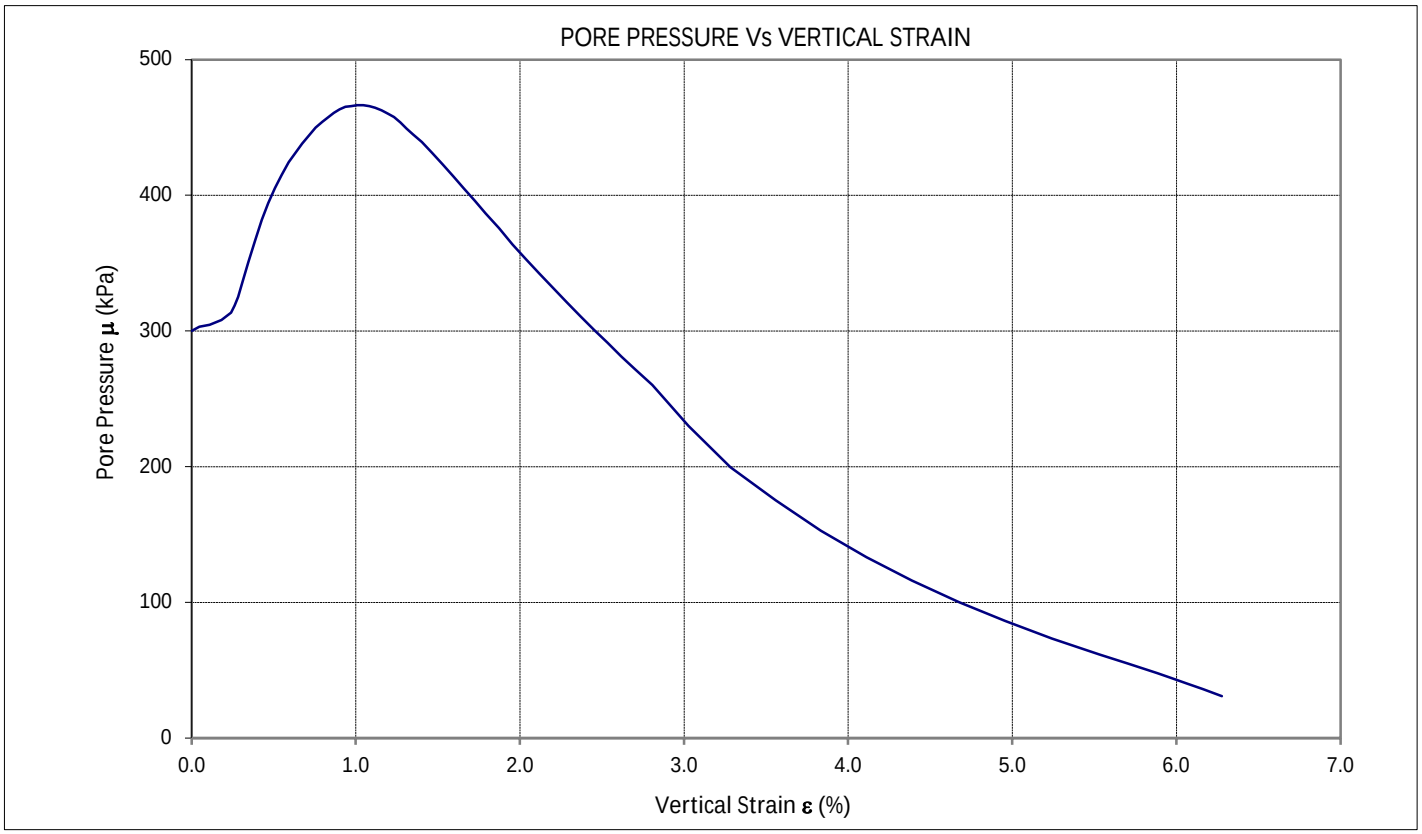
Testing Schedule Reference: --

Site: Port Vila CBD Location ID: BH12
Sample Ref.: -- Geotechnics ID: -- Depth: 29.70 - 29.82 (m)
Test method used: ISO 17892-9:2018 Part 9 Isotropic consolidated-undrained triaxial compression test on water saturated soils (CIU)
NZS 4402:1986 Test 2.1 Determination of Water Content

GRAPHS





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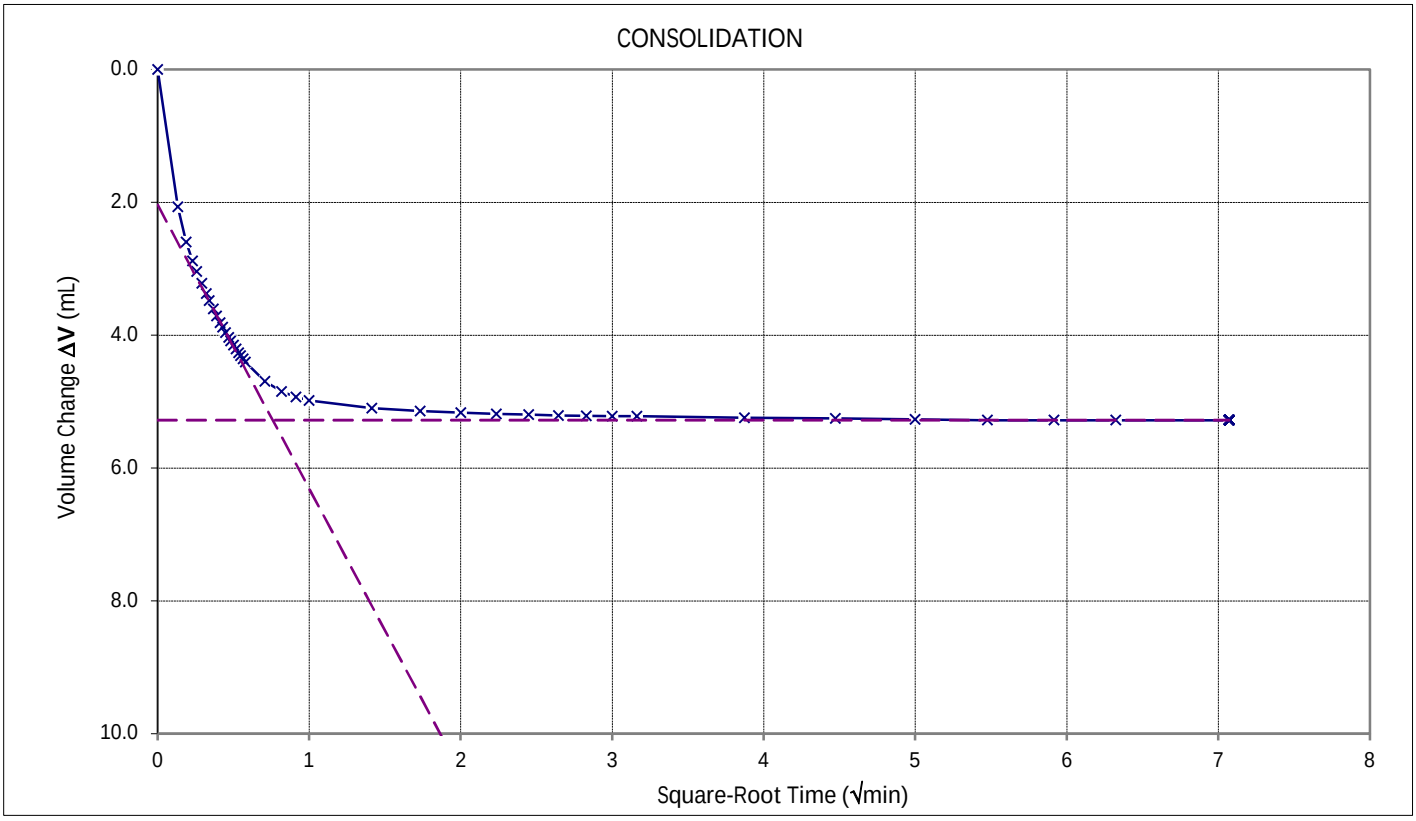
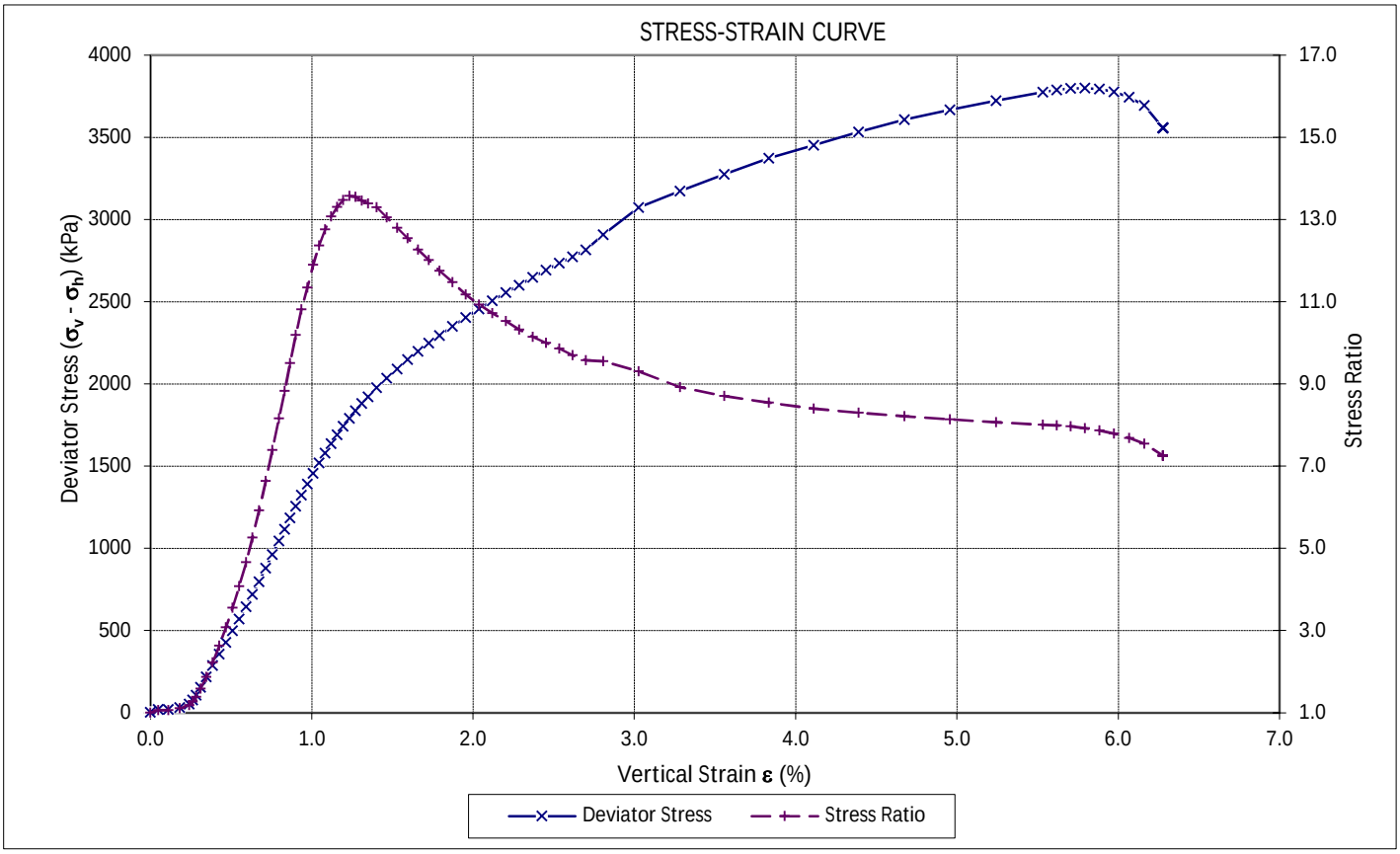
Testing Schedule Reference: --

Site: Port Vila CBD Location ID: BH12
Sample Ref.: -- Geotechnics ID: -- Depth: 29.70 - 29.82 (m)
Test method used: ISO 17892-9:2018 Part 9 Isotropic consolidated-undrained triaxial compression test on water saturated soils (CIU)
NZS 4402:1986 Test 2.1 Determination of Water Content

GRAPHS





Tested by: PIHE Date: 25/03/2026 Approved by KTP: yhw Date: 15/04/2026

Appendix D Geophysical survey

D1 2026 RDCL Downhole Seismic Testing

D2 2026 RDCL Surface Geophysical Survey

REPORT ON:

DOWNHOLE SEISMIC TESTING

PROJECT:

PORT VILLA VANUATU

DOWNHOLE SEISMIC

CLIENT:

TONKIN + TAYLOR INTERNATIONAL
161 VICTORIA STREET
TE ARO
WELLINGTON 6011
NEW ZEALAND

RDCL®

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1.2 Objectives 5
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Figure 01 – Test Location Map
Figure 02 – BH02 Shear Wave Tx Curve- First Break
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Figure 04 – BH02 Shear Wave Tx Curve- Max Peak
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Figure 07 – BH02 Shear Wave Trace Gather
Figure 08 – BH03 Shear Wave Tx Curve- First Break

FIGURE 09 – BH03 SHEAR WAVE TX CURVE- FIRST PEAK
FIGURE 10 – BH03 SHEAR WAVE TX CURVE- MAX PEAK
FIGURE 11 – BH03 SHEAR WAVE LAYER VELOCITIES
FIGURE 12 – BH03 SHEAR WAVE INTERVAL VELOCITIES
FIGURE 13 – BH03 SHEAR WAVE TRACE GATHER
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FIGURE 16 – BH06 SHEAR WAVE LAYER VELOCITIES
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FIGURE 21 – BH07 SHEAR WAVE LAYER VELOCITIES
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FIGURE 24 – BH09 SHEAR WAVE TX CURVE- FIRST BREAK
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FIGURE 27 – BH09 SHEAR WAVE LAYER VELOCITIES
FIGURE 28 – BH09 SHEAR WAVE INTERVAL VELOCITIES
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FIGURE 30 – BH12 SHEAR WAVE TX CURVE- FIRST BREAK
FIGURE 31 – BH12 SHEAR WAVE TX CURVE- FIRST PEAK
FIGURE 32 – BH12 SHEAR WAVE LAYER VELOCITIES
FIGURE 33 – BH12 SHEAR WAVE INTERVAL VELOCITIES
FIGURE 34 – BH12 SHEAR WAVE TRACE GATHER

APPENDICES

APPENDIX A – ACQUISITION AND PROCESSING METHODOLOGY

1 INTRODUCTION

Tonkin + Taylor International (T+TI, the client) engaged Resource Development Ltd. (RDCL) to undertake geophysical testing at Port Villa, Efate Island, Vanuatu.

The investigation included Downhole Seismic (DHS) testing, Multi-channel Analysis of Surface Waves (MASW), Seismic Refraction Tomography (SRT) and Horizontal to Vertical Spectral Ratio (HVSR) testing.

This report is only concerned with the downhole seismic testing. The locations of all downhole seismic surveys are displayed in Figure 1.

1.1 BACKGROUND INFORMATION

RDCL understands that the client is undertaking ground investigations as part of the Port Villa redevelopment project. As part of the investigation, the following testing was agreed upon:

- Six (6) Downhole Seismic (DHS) tests to 30 m below ground level (bgl).
- Ten (10) night shifts of Multi-channel Analysis of Surface Waves (MASW) testing along roads.
- Two (2) night shifts of Seismic Refraction Tomography (SRT).
- Four (4) night shifts of Horizontal to Vertical Spectral Ratio (HVSR) tests.

This is a report on the downhole seismic testing in six (6) drillholes: BH02, BH03, BH06, BH07, BH09, BH12. The location of each drillhole is shown in Figure 1.

RDCL received T+TI's logs for all six boreholes. A geological summary of each log is presented in Tables 1 through 6. These summaries were used to partially inform the geophysical models.

TABLE 1: SUMMARY OF GEOTECHNICAL LOG FOR BH02.

From (m)	To (m)	Material
0.0	2.05	Fill, LIMESTONE, SAND
2.05	6.1	Very weak LIMESTONE
6.1	9	Sandy GRAVEL
9	16.5	Weak LIMESTONE
16.5	20.5	Weak LIMESTONE
20.5	29.5	Weak LIMESTONE

TABLE 2: SUMMARY OF GEOTECHNICAL LOG FOR BH03.

From (m)	To (m)	Material
0.0	5.5	GRAVEL/SAND
5.5	10.5	GRAVEL/SAND
10.5	13.5	LIMESTONE
13.5	23.5	LIMESTONE
23.5	29.5	LIMESTONE

TABLE 3: SUMMARY OF GEOTECHNICAL LOG FOR BH06.

From (m)	To (m)	Material
0.0	4.5	LIMESTONE
4.5	10.5	LIMESTONE
10.5	15.5	LIMESTONE
15.5	22.5	LIMESTONE
22.5	25.5	LIMESTONE
25.5	28.5	LIMESTONE

TABLE 4: SUMMARY OF GEOTECHNICAL LOG FOR BH07.

From (m)	To (m)	Material
0.0	3.5	LIMESTONE
3.5	7.5	LIMESTONE
7.5	14.5	LIMESTONE

TABLE 5: SUMMARY OF GEOTECHNICAL LOG FOR BH09.

From (m)	To (m)	Material
0.0	4.5	GRAVEL
4.5	8.5	GRAVEL/SANDS
8.5	13.5	GRAVELS
13.5	19.5	GRAVEL/SANDS
19.5	23.5	LIMESTONE
23.5	29.5	LIMESTONE

TABLE 6: SUMMARY OF GEOTECHNICAL LOG OF BH12.

From (m)	To (m)	Material
0.0	4	GRAVEL
4	6	TUFF
6	11.5	TUFF
11.5	16.5	TUFF
16.5	23.5	TUFF
23.5	26.5	TUFF
26.5	29.5	TUFF

1.2 OBJECTIVES

The survey objectives were as follows:

- Acquire Downhole Seismic data in six drillholes
- Produce a 1D shear wave velocity (Vs) profile for each drillhole.

2 SCOPE OF WORK

The scope of downhole seismic work included:

- Six shear wave velocity profiles in each borehole.
  - Vs profile to at least 30 m bgl.
- Delivery of a technical report summarising site activities, processing and results.

2.1 DELIVERABLES

Deliverables for the project include:

- Raw seismic data (.sg2).
- 1D Vs profiles.
- Technical report.

2.2 TERMS OF REFERENCE

This investigation employed geophysical methods and therefore the findings presented here are the result of the measurement and interpretation of seismic (acoustic) signals. As such any results derived from the geophysical investigation should be taken in the context of and in reference to the complete ground investigation. Reasonable skill and care were taken to ensure that the results are accurate and reliable, including reference where appropriate to published date from this and/or other sites. However, as with other indirect methods there is a possibility of localised inconsistencies and inaccuracies within the results.

3 METHODOLOGY

Field acquisition and processing methodology are described in Appendix A.

4 RESULTS

4.1 BH02 – Vs Profile

Signal to noise ratios (SNR) in BH02 were generally good. Data was clearly polarised and the shear wave was identifiable.

Shear wave velocities were recorded in the range of 150 – 1630 m/s (Figures 02 – 05). Data are summarised in Table 7.

Velocities calculated from the three picking methods were in close agreement. The range of values for each velocity layer may be treated as an uncertainty range.

TABLE 7: BH02 SEISMIC VELOCITY PROFILE.

From	To	Vs First Break	Vs First Peak	Vs Max Peak	Vs Average
m	m	m/s	m/s	m/s	m/s
0	2.05	170	150		**160**
2.05	6.1	240	272	168	**227**
6.1	9	309	248	162	**240**
9	16.5	373	355	329	**352**
16.5	20.5	1630	1512	948	**1363**
20.5	29.5	514	548	569	**544**

4.2 BH03 – Vs Profile

Signal to noise ratios (SNR) in BH03 were generally good. Data was clearly polarised and the shear wave was identifiable.

Shear wave velocities were recorded in the range of 169 – 1109 m/s (Figures 08 – 10). Data are summarised in Table 8.

Velocities calculated from the three picking methods were in close agreement. The range of values for each velocity layer may be treated as an uncertainty range.

TABLE 8: BH03 SEISMIC VELOCITY PROFILE

From	To	Vs First Break	Vs First Peak	Vs Max Peak	Vs Average
m	m	m/s	m/s	m/s	m/s
0	5.5	182	177	169	**176**
5.5	10.5	318	302	309	**310**
10.5	13.5	906	728	738	**791**
13.5	23.5	1109	1084	792	**995**
23.5	29.5	818	754	736	**769**

4.3 BH06 – VS PROFILE

Signal to noise ratios (SNR) in BH06 were generally good. Data was clearly polarised and the shear wave was identifiable. The max peak was not consistently identifiable and has therefore not been picked.

Shear wave velocities were recorded in the range of 530 – 1103 m/s (Figures 14 – 15). Data are summarised in Table 9.

Velocities calculated from the three picking methods were in close agreement. The range of values for each velocity layer may be treated as an uncertainty range.

TABLE 9: BH06 SEISMIC VELOCITY PROFILE.

From	To	Vs First Break	Vs First Peak	Vs Average
m	m	m/s	m/s	m/s
0	4.5	584	530	**557**
4.5	10.5	1096	989	**1043**
10.5	15.5	727	736	**732**
15.5	22.5	1103	1024	**1064**
22.5	25.5	721	861	**791**
25.5	28.5	608	644	**626**

4.4 BH07 – Vs Profile

An obstruction in drillhole BH07 caused a foreshortened end to the survey. The survey was terminated at 13.9 m below ground level.

Signal to noise ratios (SNR) in BH07 were generally good. Data was clearly polarised and the shear wave was identifiable. The max peak was not consistently identifiable and has therefore not been picked.

Shear wave velocities were recorded in the range of 280 – 648 m/s (Figures 19 – 20). Data are summarised in Table 10.

Velocities calculated from the three picking methods were in close agreement. The range of values for each velocity layer may be treated as an uncertainty range.

TABLE 10: BH07 SEISMIC VELOCITY PROFILE.

From	To	Vs First Break	Vs First Peak	Vs Average
m	m	m/s	m/s	m/s
0	3.5	331	280	**305.5**
3.5	7.5	558	648	**603**
7.5	14.5	406	398	**402**

4.5 BH09 – Vs Profile

Signal to noise ratios (SNR) in BH09 were generally good. Data was clearly polarised and the shear wave was identifiable.

Shear wave velocities were recorded in the range of 113 – 1037 m/s (Figures 24 – 26). Data are summarised in Table 11.

Velocities calculated from the three picking methods were in close agreement. The range of values for each velocity layer may be treated as an uncertainty range.

TABLE 11: BH09 SEISMIC VELOCITY PROFILE.

From	To	Vs First Break	Vs First Peak	Vs Max Peak	Vs Average
m	m	m/s	m/s	m/s	m/s
0	4.5	149	125	113	**129**
4.5	8.5	204	237	273	**238**
8.5	13.5	362	389	318	**356**
13.5	19.5	521	510	439	**490**
19.5	23.5	350	427	440	**406**
23.5	29.5	1037	631	623	**764**

4.6 BH12 – VS PROFILE

Signal to noise ratios (SNR) in BH12 were generally good. Data was clearly polarised and the shear wave was identifiable. The max peak was not consistently identifiable and has therefore not been picked.

Shear wave velocities were recorded in the range of 157 – 688 m/s (Figures 30 – 31). Data are summarised in Table 12.

Velocities calculated from the three picking methods were in close agreement. The range of values for each velocity layer may be treated as an uncertainty range.

TABLE 12: BH12 SEISMIC VELOCITY PROFILE.

From	To	Vs First Break	Vs First Peak	Vs Average
m	m	m/s	m/s	m/s
0	4	157	164	**160.5**
4	6	267	230	**249**
6	11.5	253	239	**246**
11.5	16.5	571	504	**538**
16.5	23.5	599	543	**571**
23.5	26.5	292	230	**261**
26.5	29.5	455	688	**572**

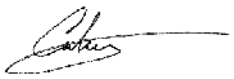
5 LIMITATIONS

- This report has been prepared for the particular purpose outlined in the project brief and no responsibility is accepted for the use of any part in other contexts or for any other purpose.
- This investigation employed geophysical methods and therefore the majority of the findings presented here are the result of the measurement and interpretation of seismic (acoustic) signals. As such any results derived from the geophysical investigation should be taken in the context of and in reference to the complete ground investigation. Reasonable skill and care was taken to ensure that the results are accurate and reliable, including reference where appropriate to published data from this and/or other sites. However, as with other indirect methods there is a possibility of localised inconsistencies and inaccuracies within the results.
- Ground conditions assessed in this report are inferred from data provided by the Client, published sources, site inspection and the investigations described. Variations from the interpreted conditions may occur, and special conditions relating to the site may not have been revealed by this investigation, and which are therefore not taken into account. No warranty is included either expressed or implied that the actual conditions will conform to the interpretation contained in this report.
- No responsibility is accepted by Resource Development Consultants Ltd for inaccuracies in data supplied by others. Where data has been supplied by others, it has been assumed that this information is correct.
- This report is provided for sole use by the Client and is confidential to the Client and their professional advisors. No responsibility whatsoever for the contents of this report shall be accepted for any person other than the Client.

6 CLOSURE

We trust this meets your current needs. Should you wish to discuss any aspect of the contents of this document please contact Oliver Gibson at ogibson@rdcl.co.nz.

Prepared by:





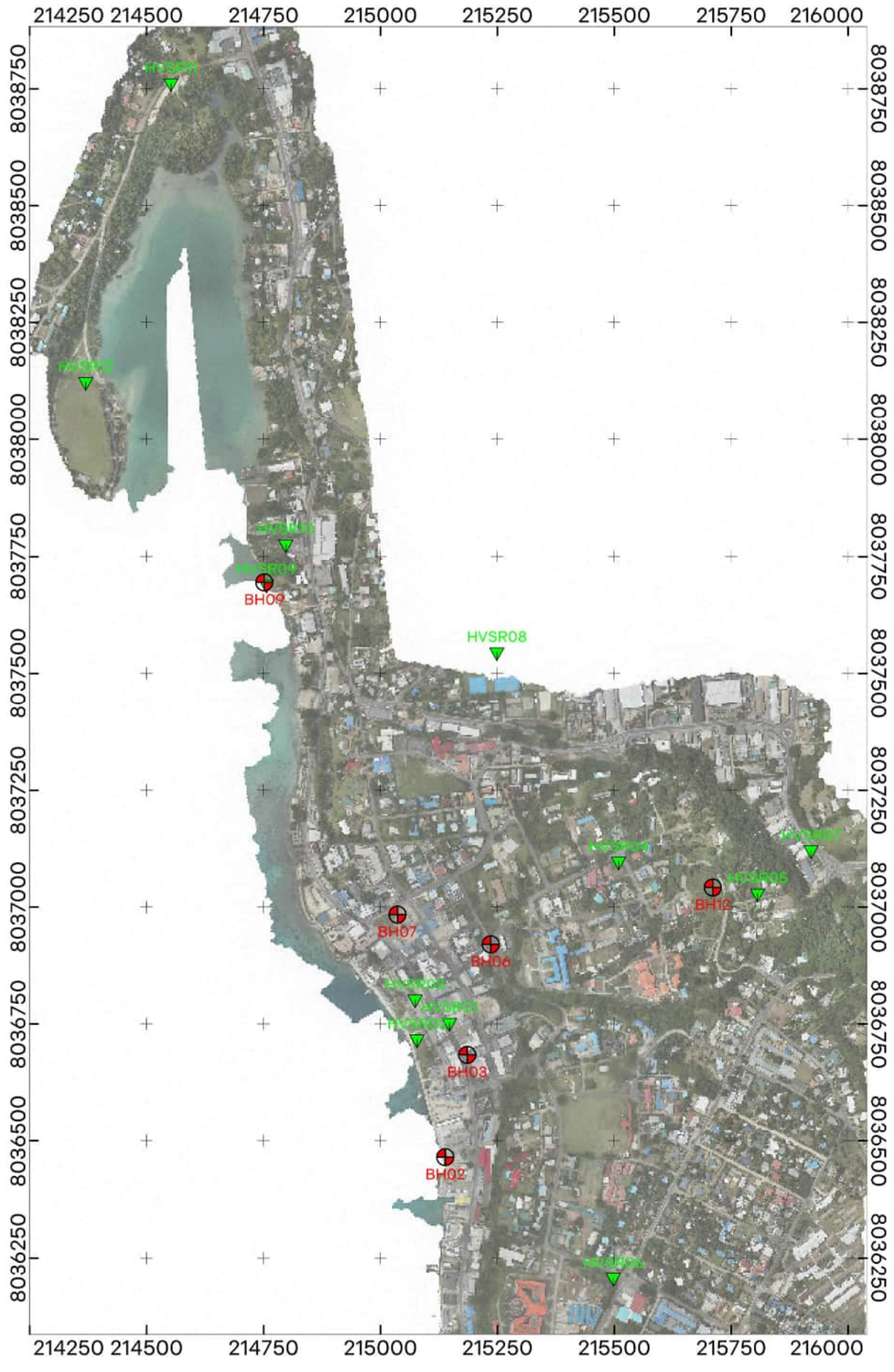
C Petre	O Gibson
BSc GPHS Geol	BSc, MRes
Graduate Geophysicist	Principal Geophysicist

Attached:

Figures 1 – 34

Appendix A

FIGURES



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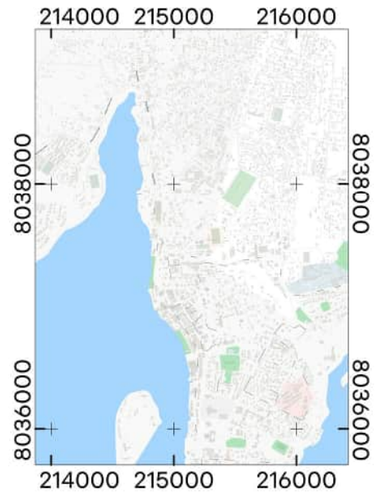

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1000 0 1000 2000

metres

WGS 84 / UTM zone 59S

SCALE: Scale 1:12000

250 0 250 500

metres

WGS 84 / UTM zone 59S

LEGEND:

- Downhole Seismic Test Location
- HVSR Test Location

NOTES:

1. Imagery data provided to RDCL by the client.
2. Absolute accuracy of test location ±3 m.

CLIENT: T+T

PROJECT: PORT VILA, VANUATU GEOPHYSICS

TITLE: HVSR & DOWNHOLE SEISMIC TEST LOCATIONS

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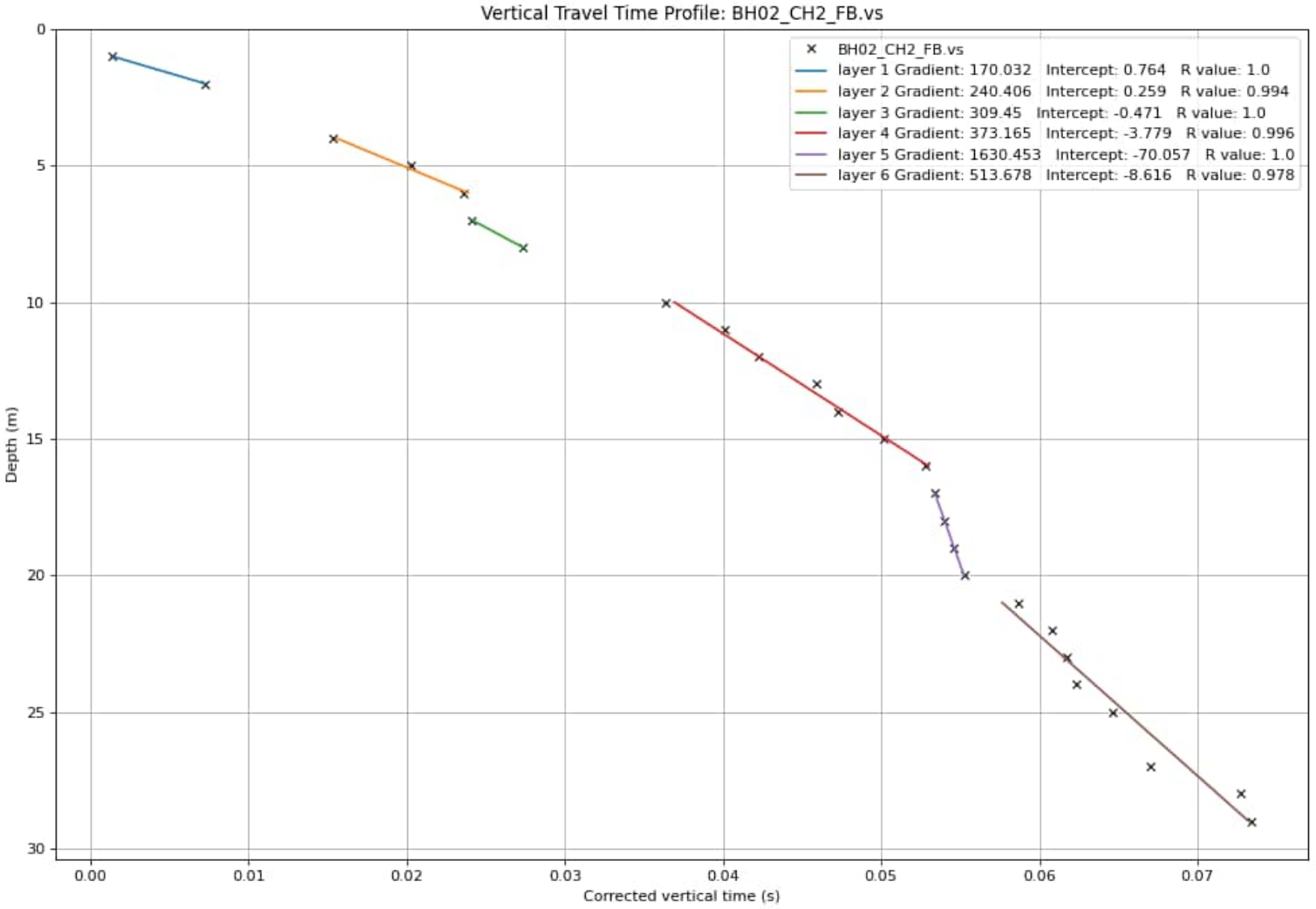
CHECKED BY: SJ	DATE: 01/04/2026	APPROVED BY: SJ	DATE: 01/04/2026

CONTRACT No.: 250306 FIGURE 01

FILE NAME: 250306.gpf
PLOTTED DRAWING SIZE: A3 (420 x 297)

RDCL
Unit 2, 2 Raiha Street, Elsdon
Porirua, Wellington, New Zealand
Tel: +64 4 282 1564
Email: info@rdcl.co.nz www.rdcl.co.nz

RDCL



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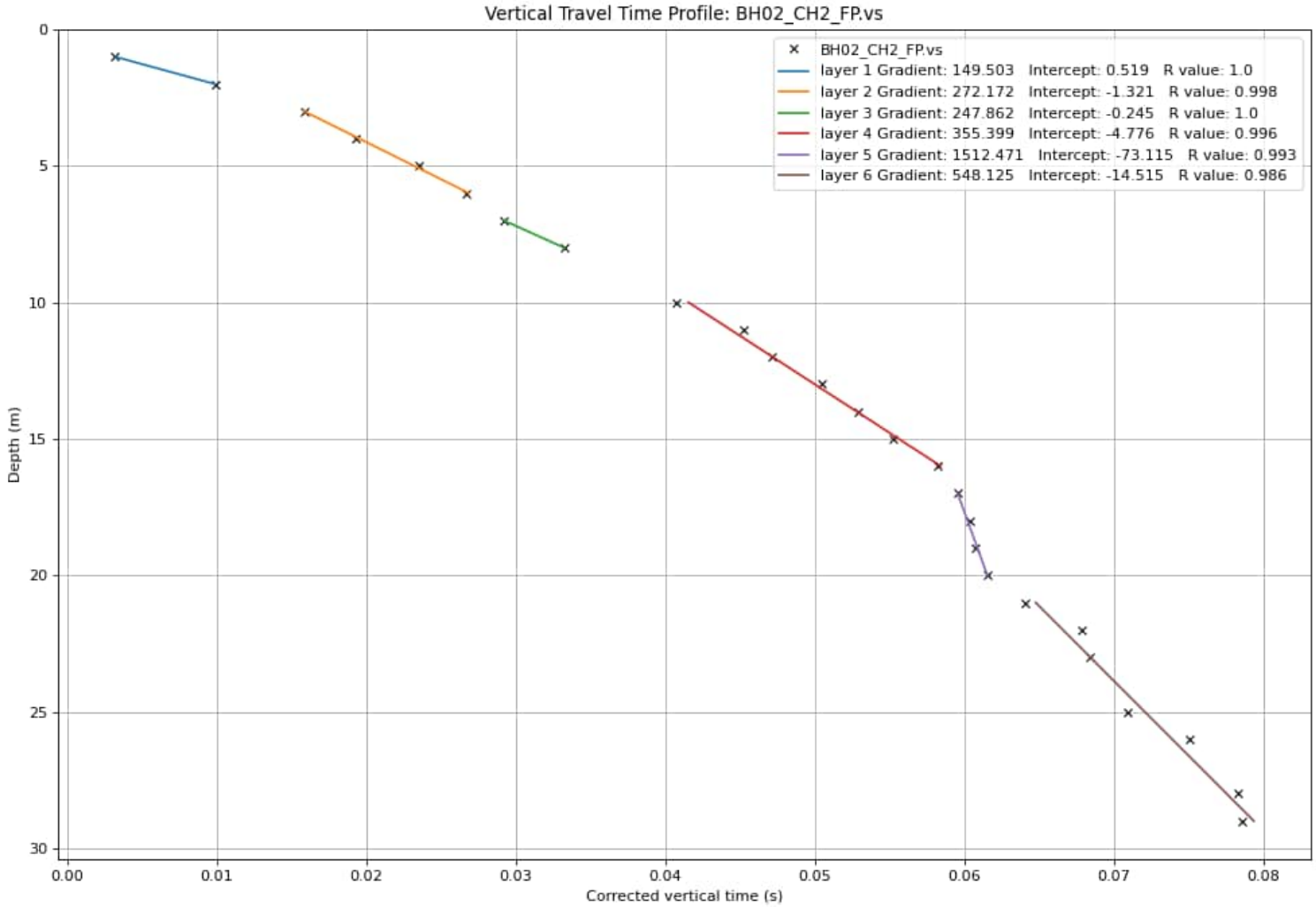

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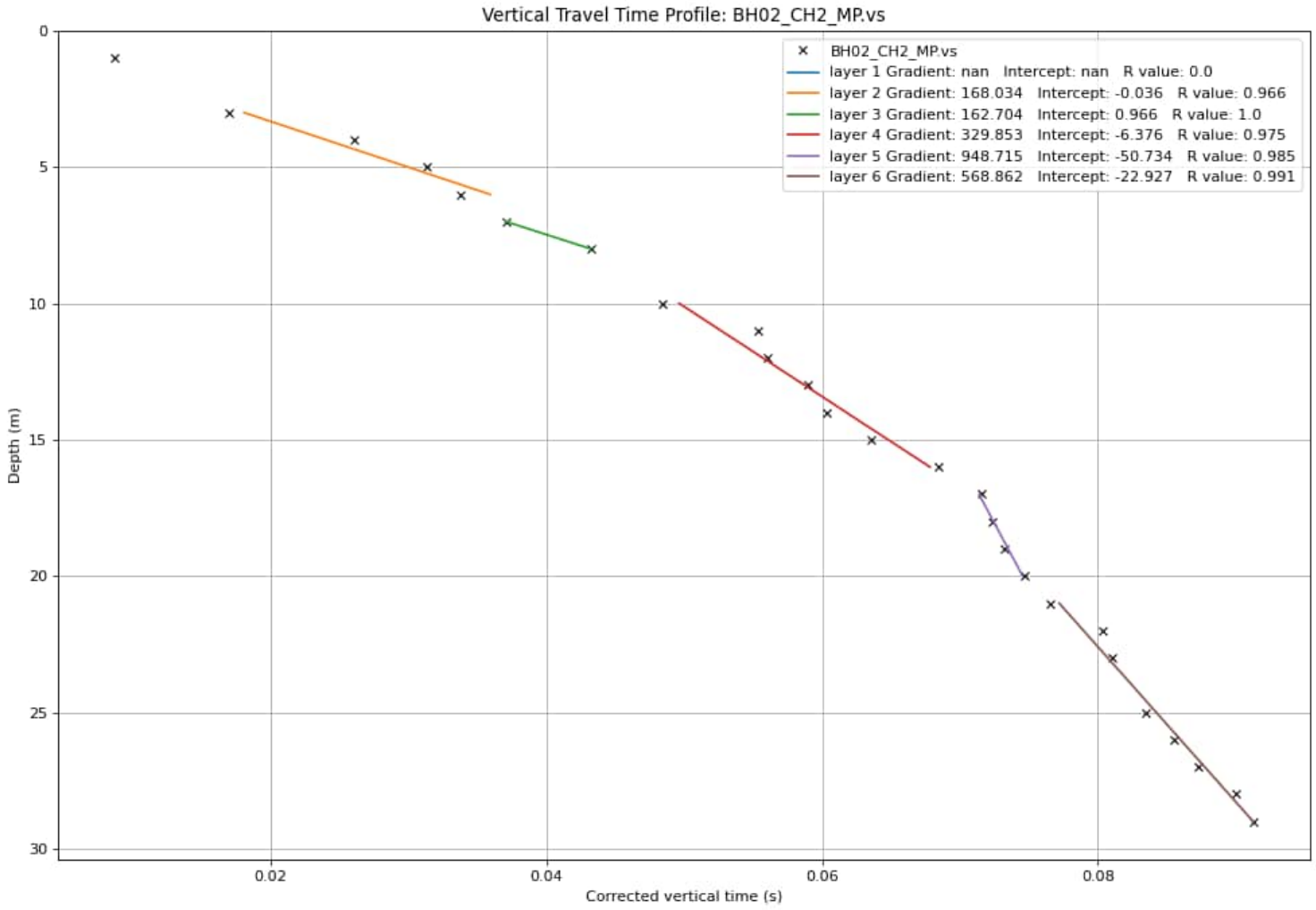

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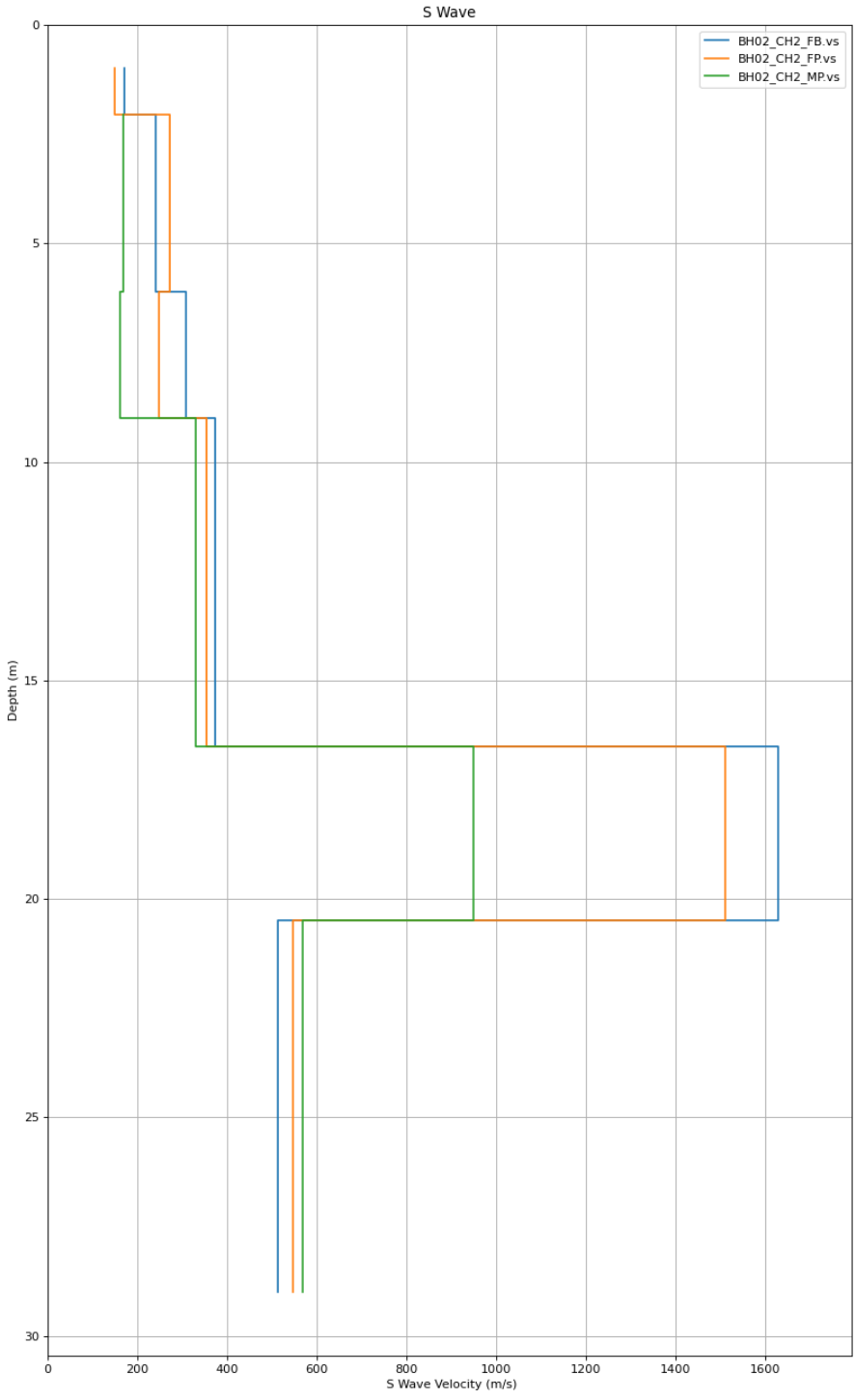

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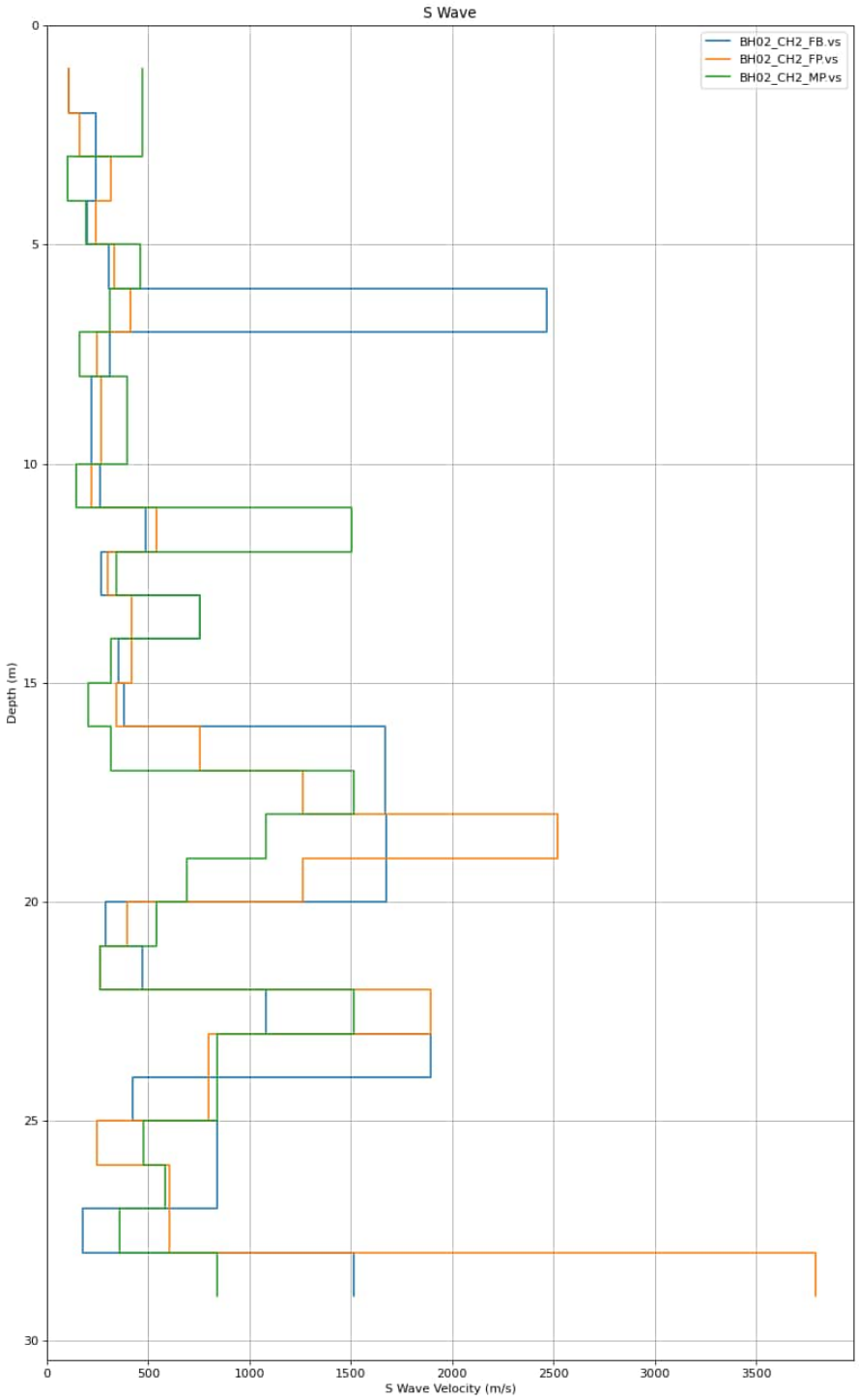

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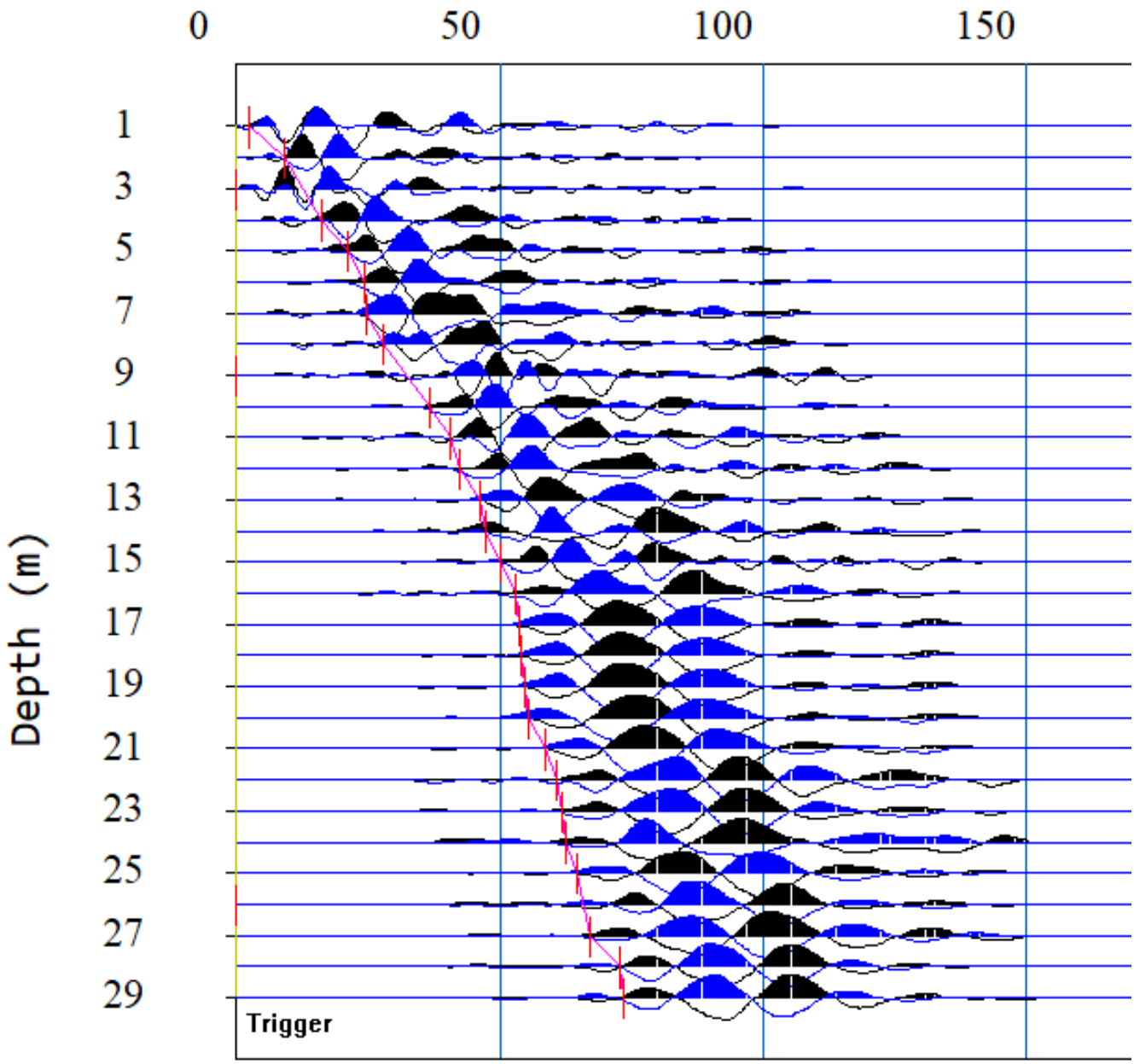

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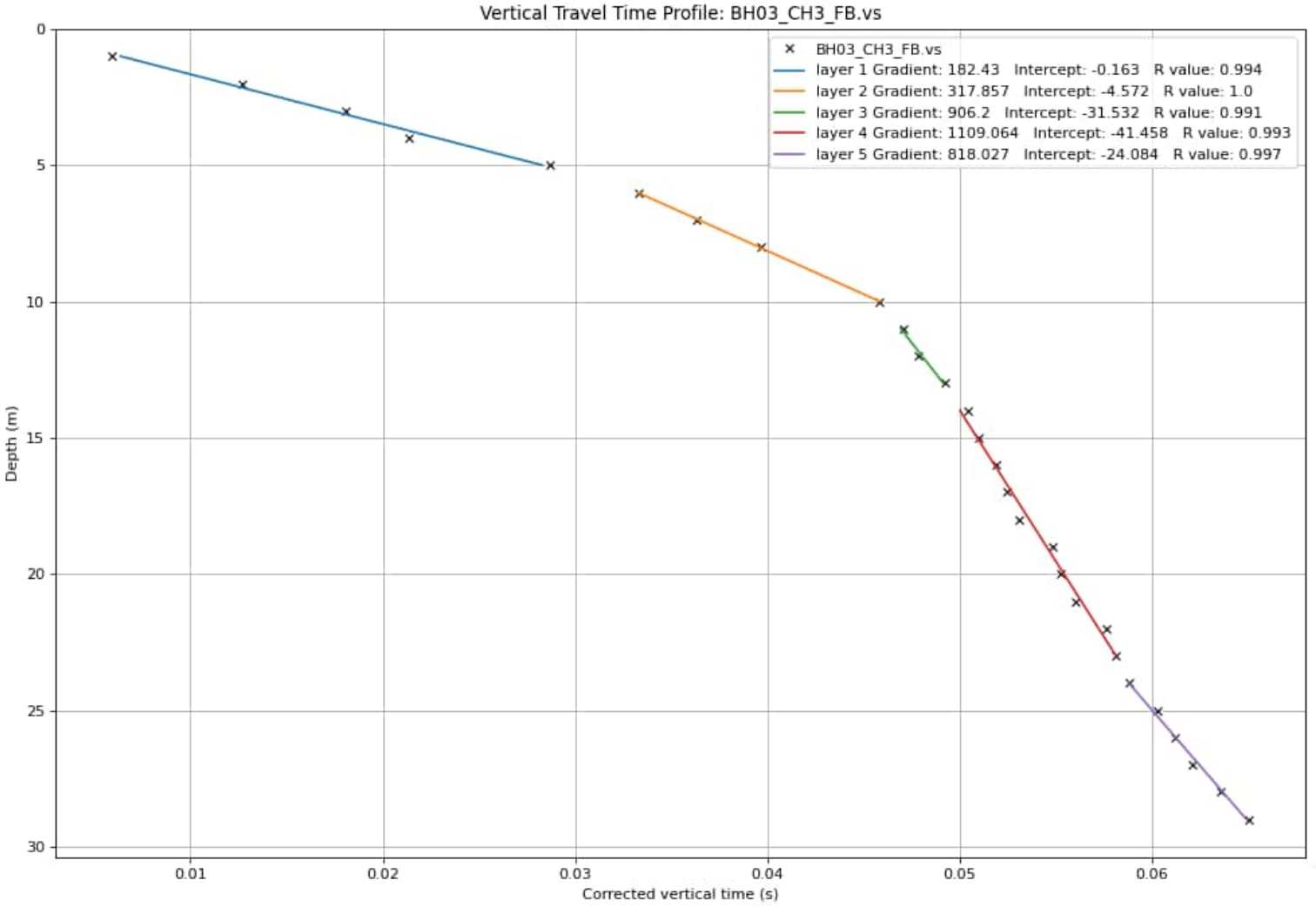

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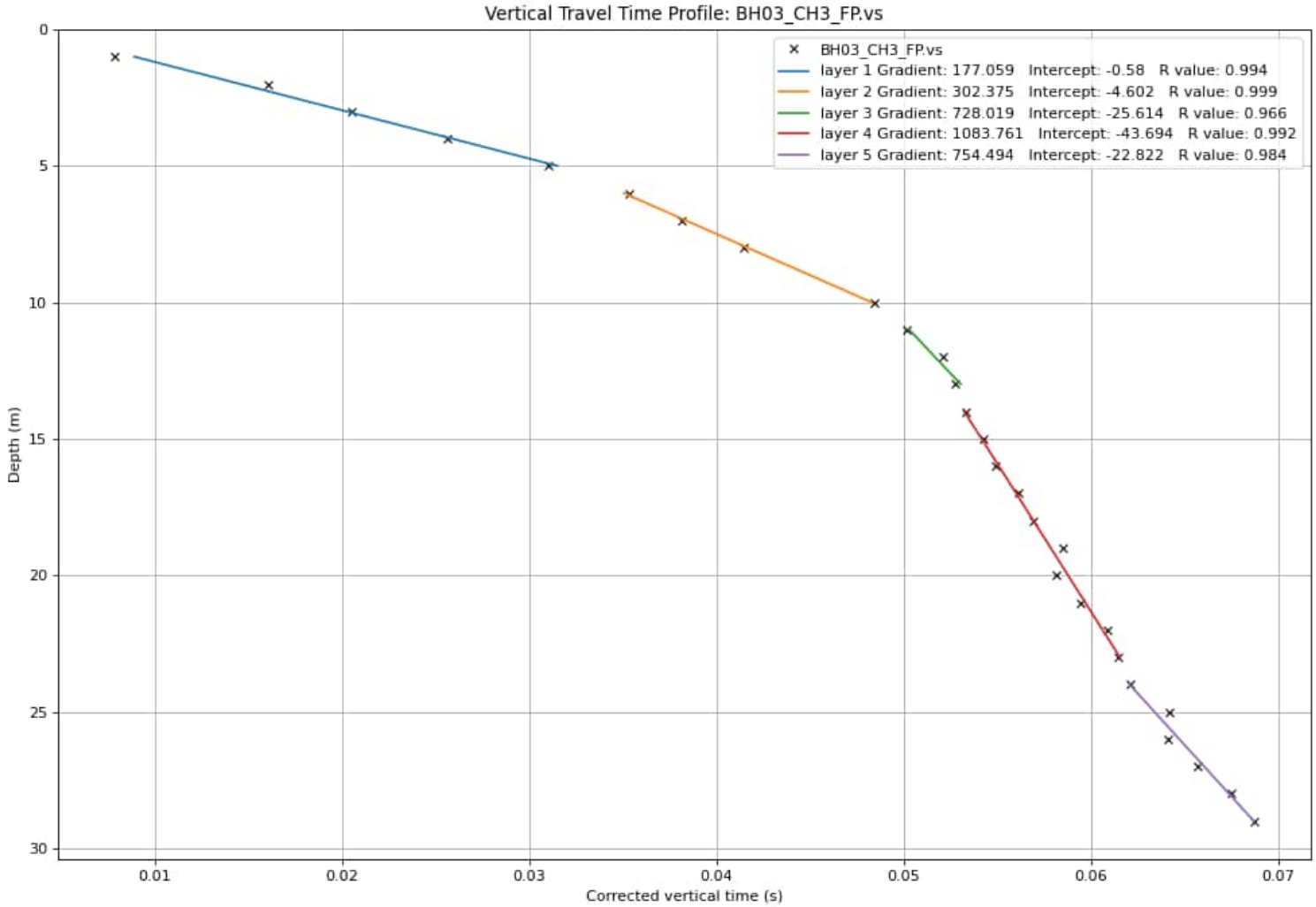

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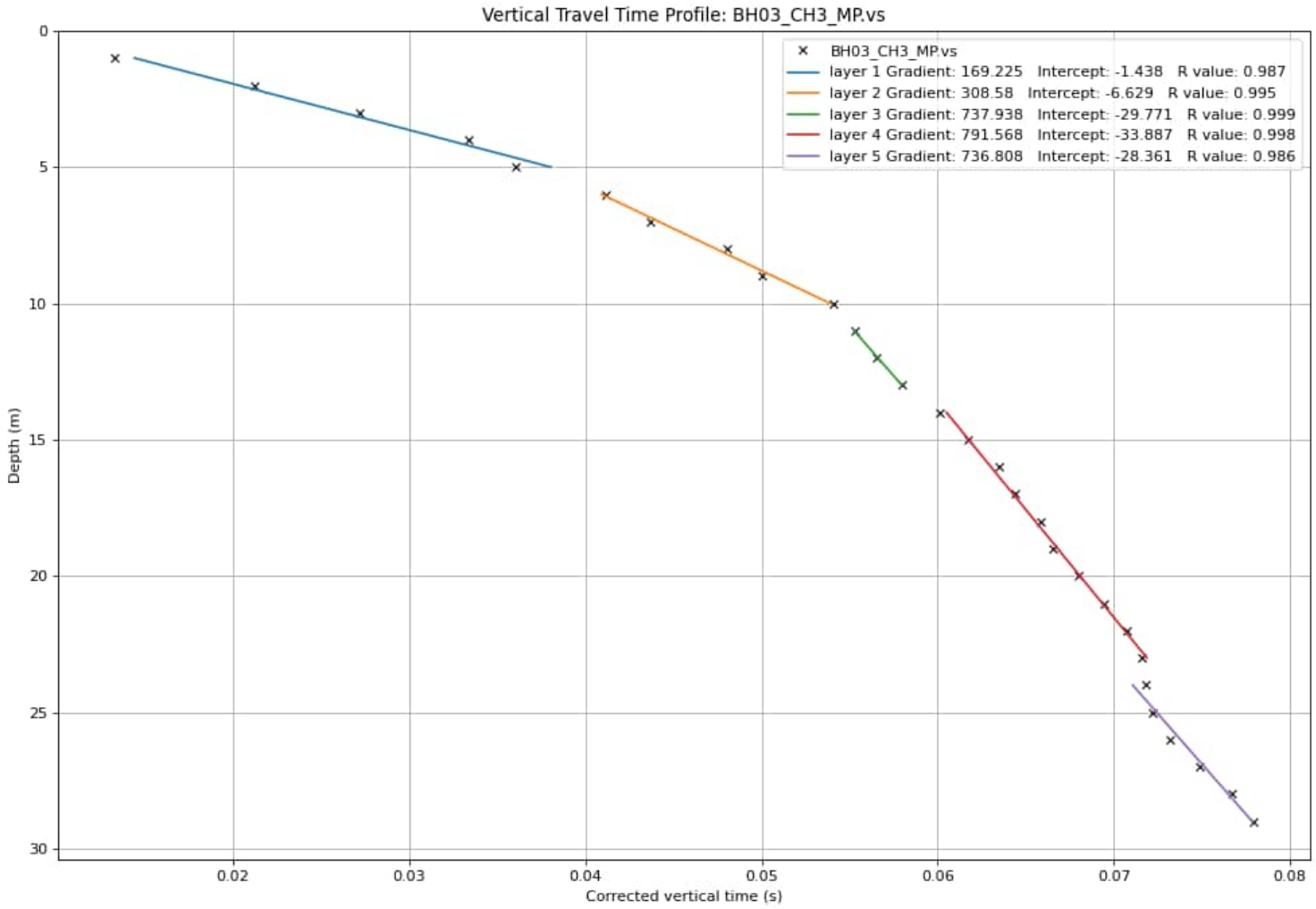

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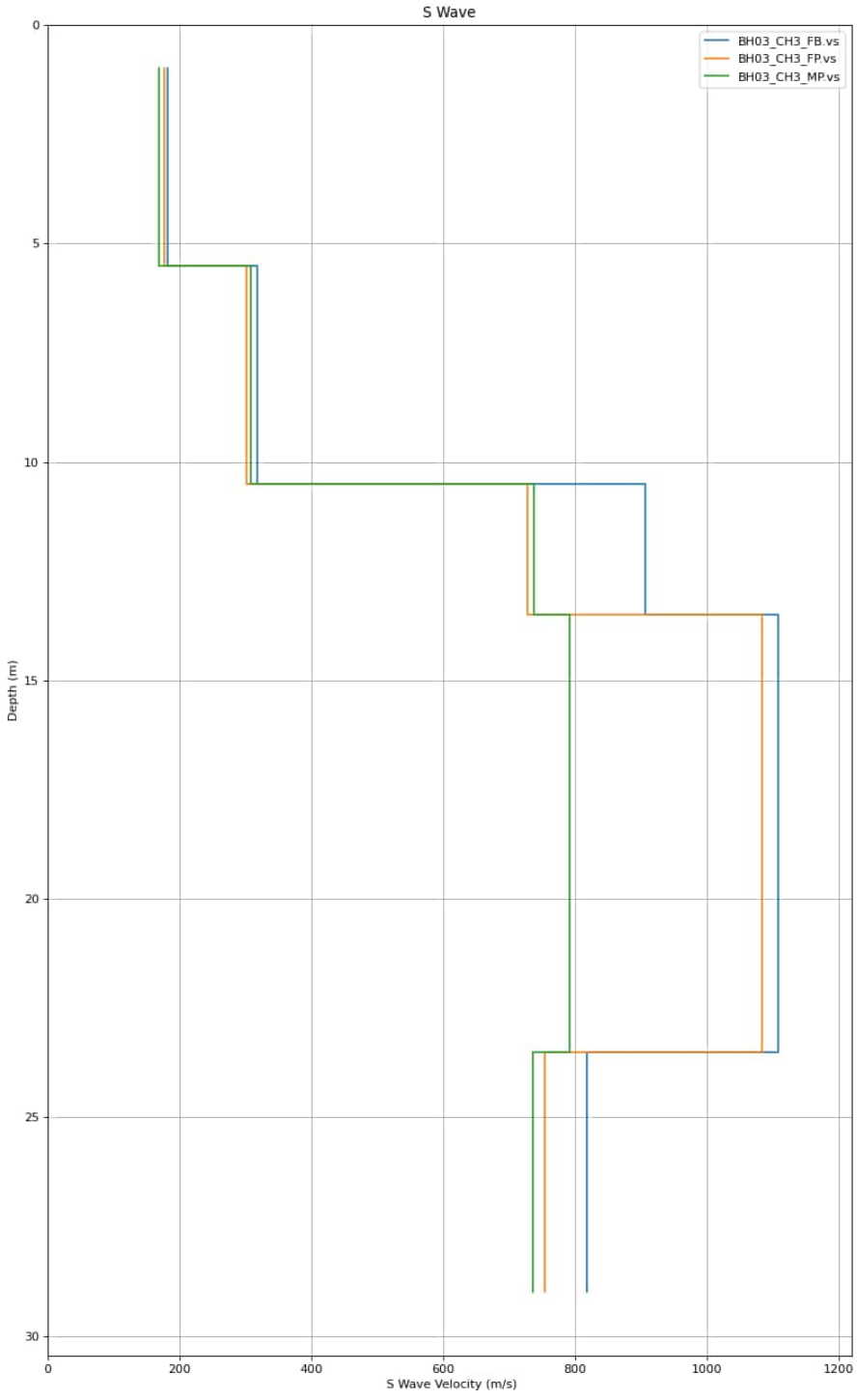

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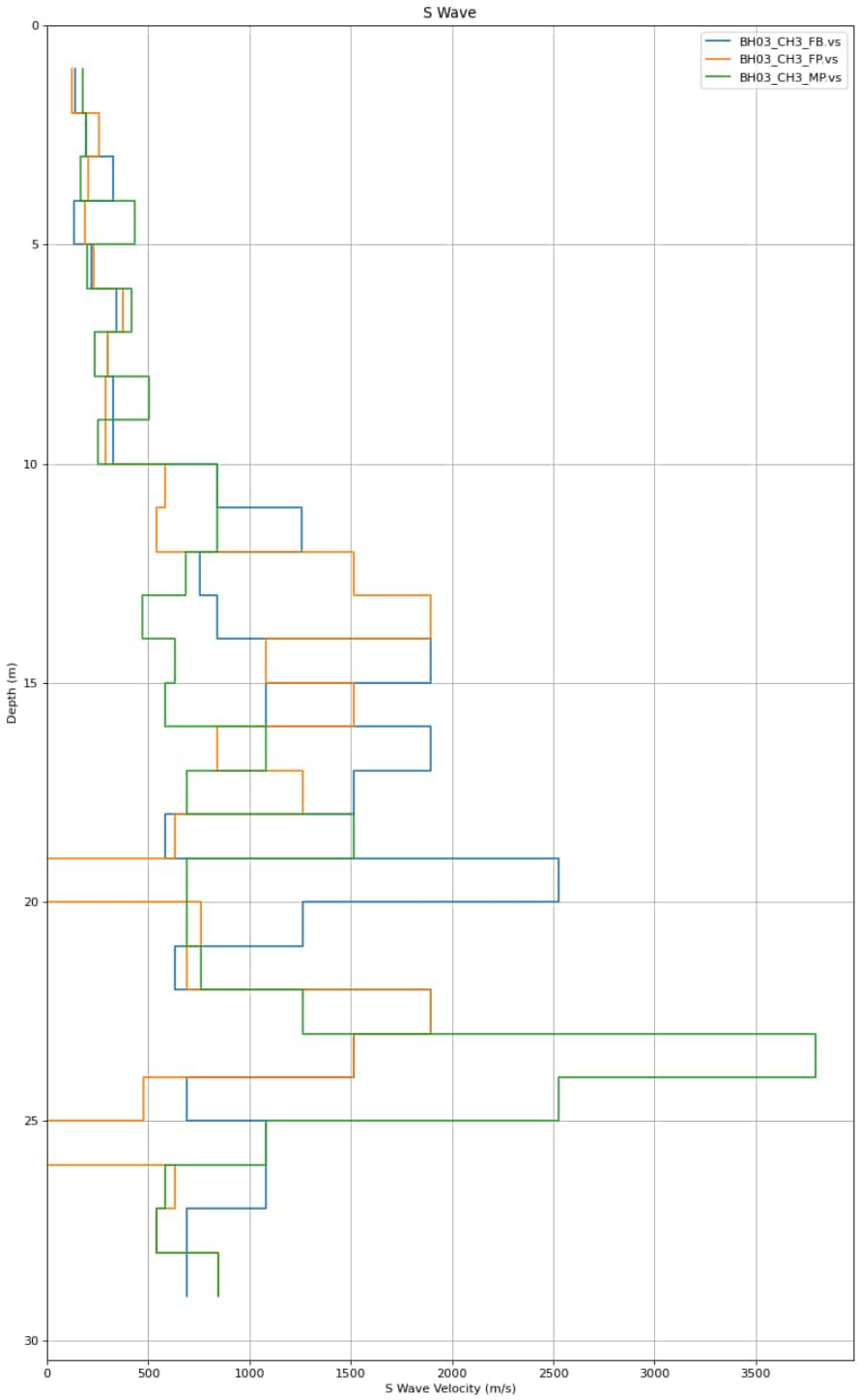

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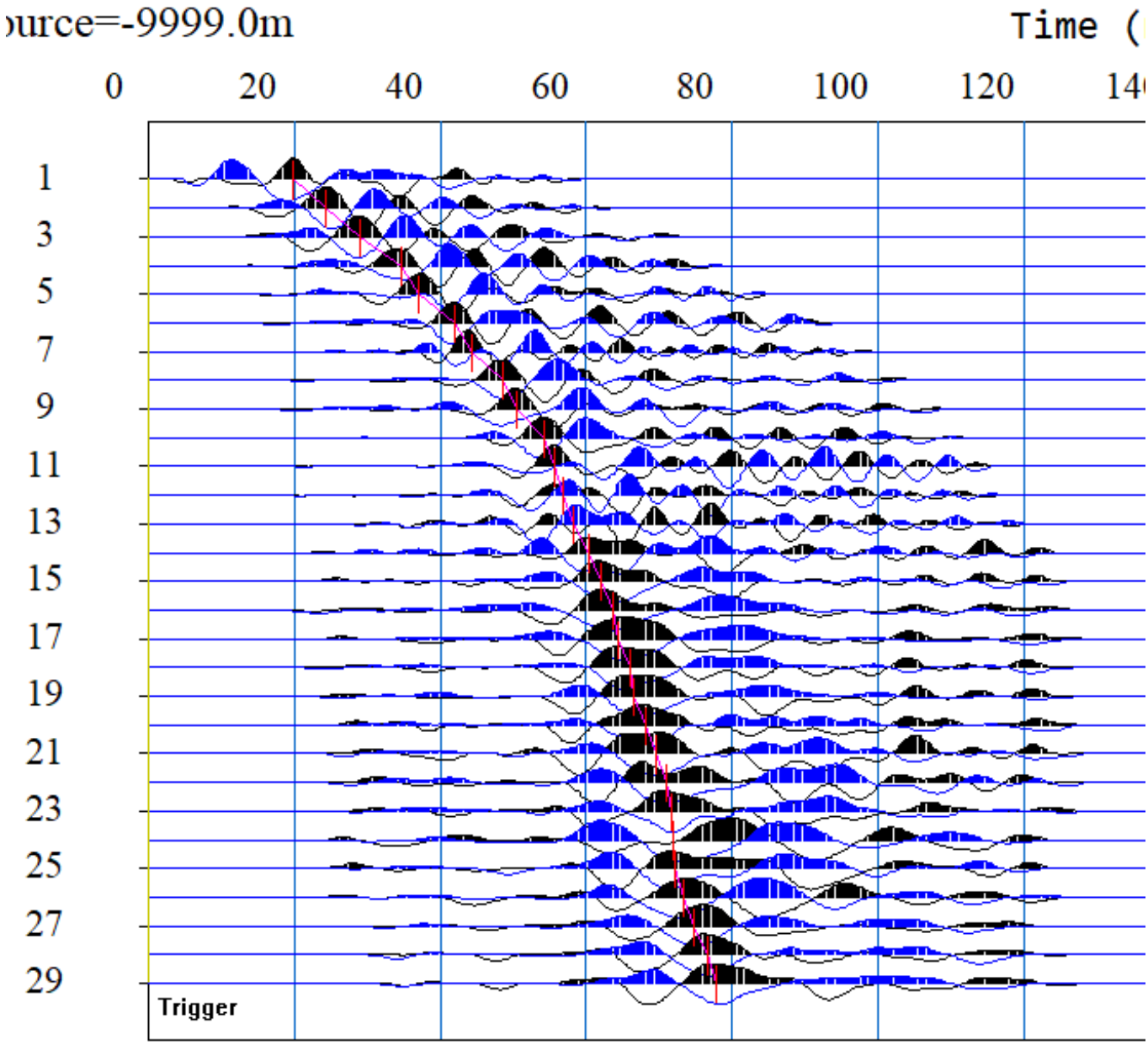

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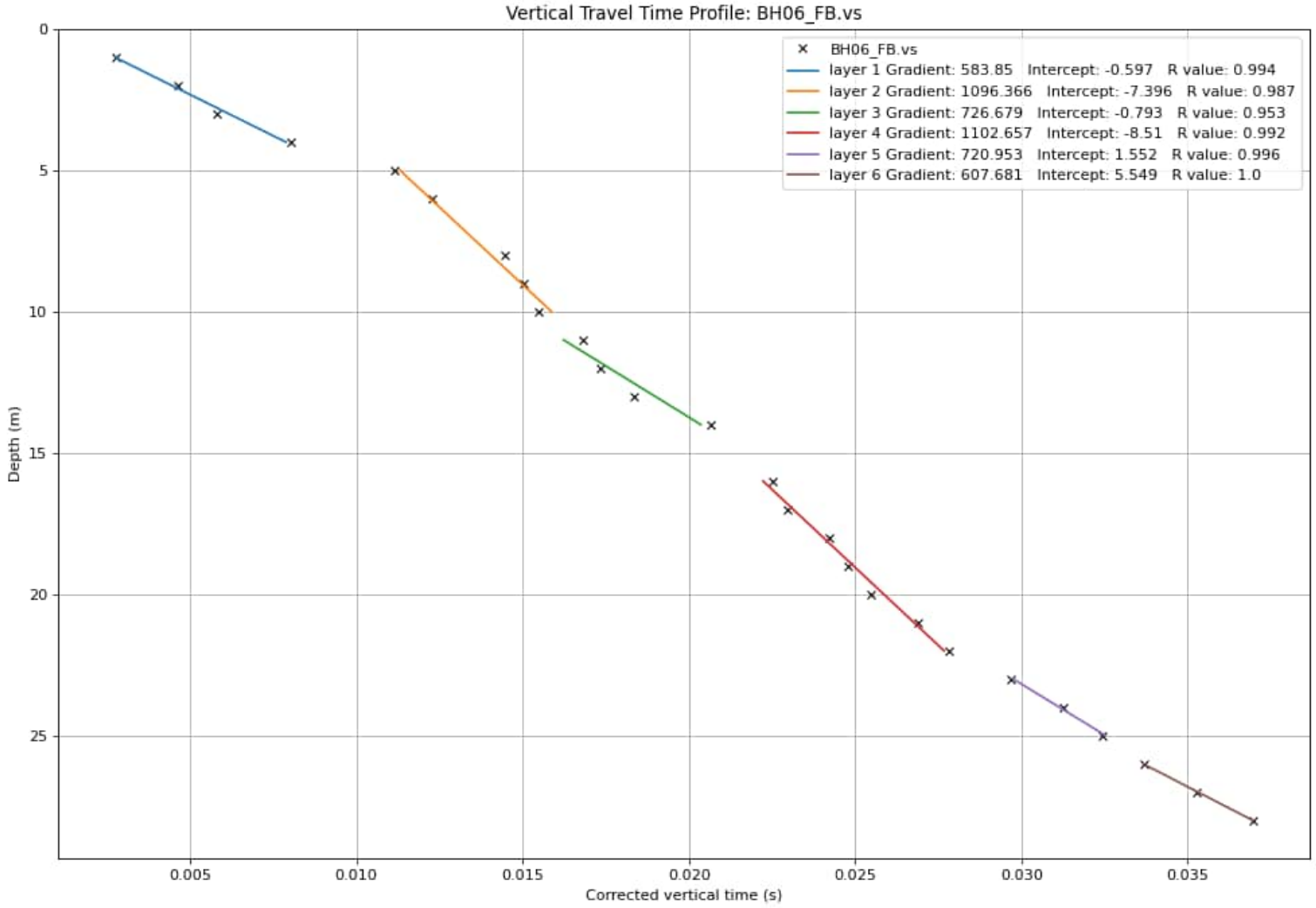

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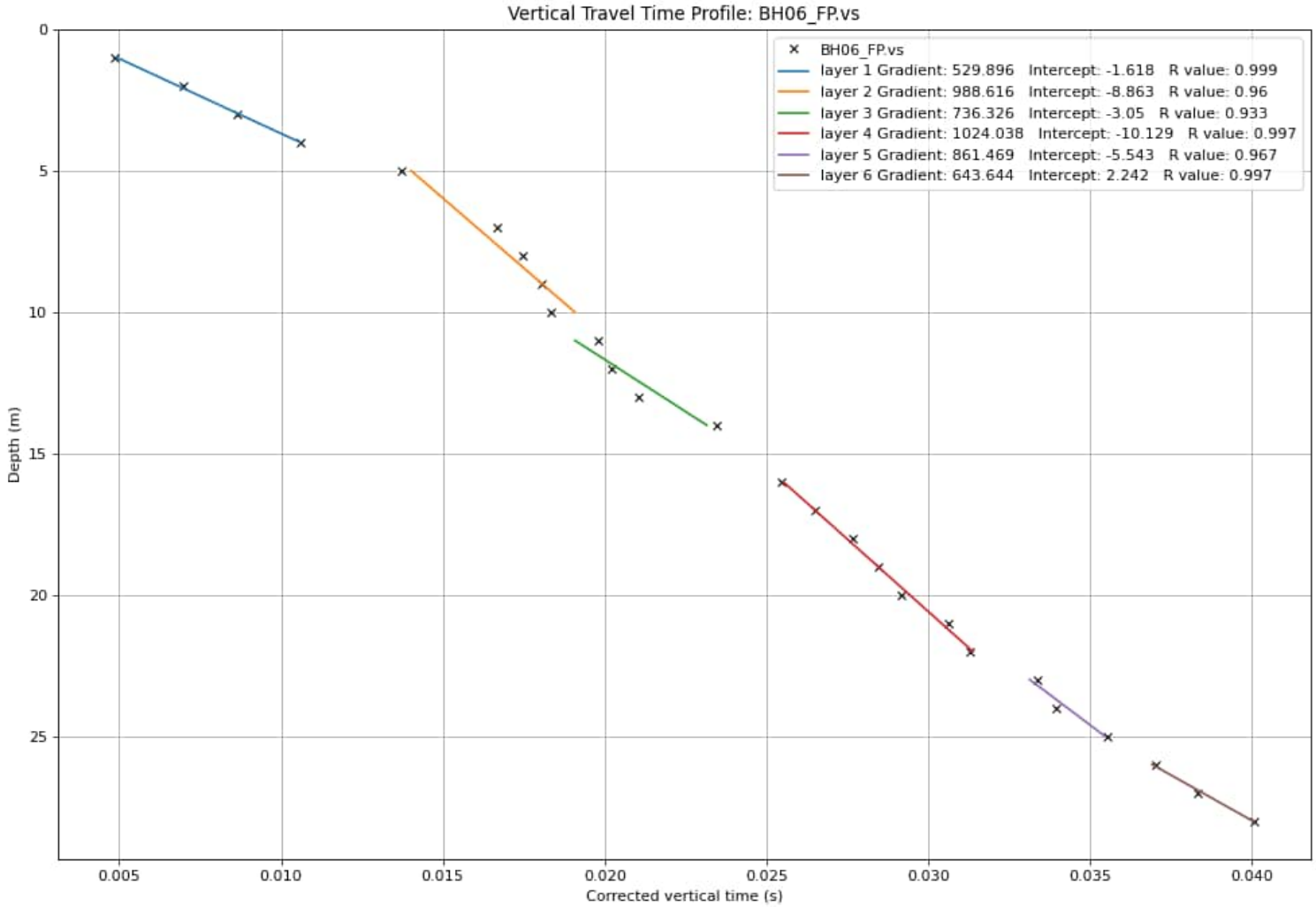

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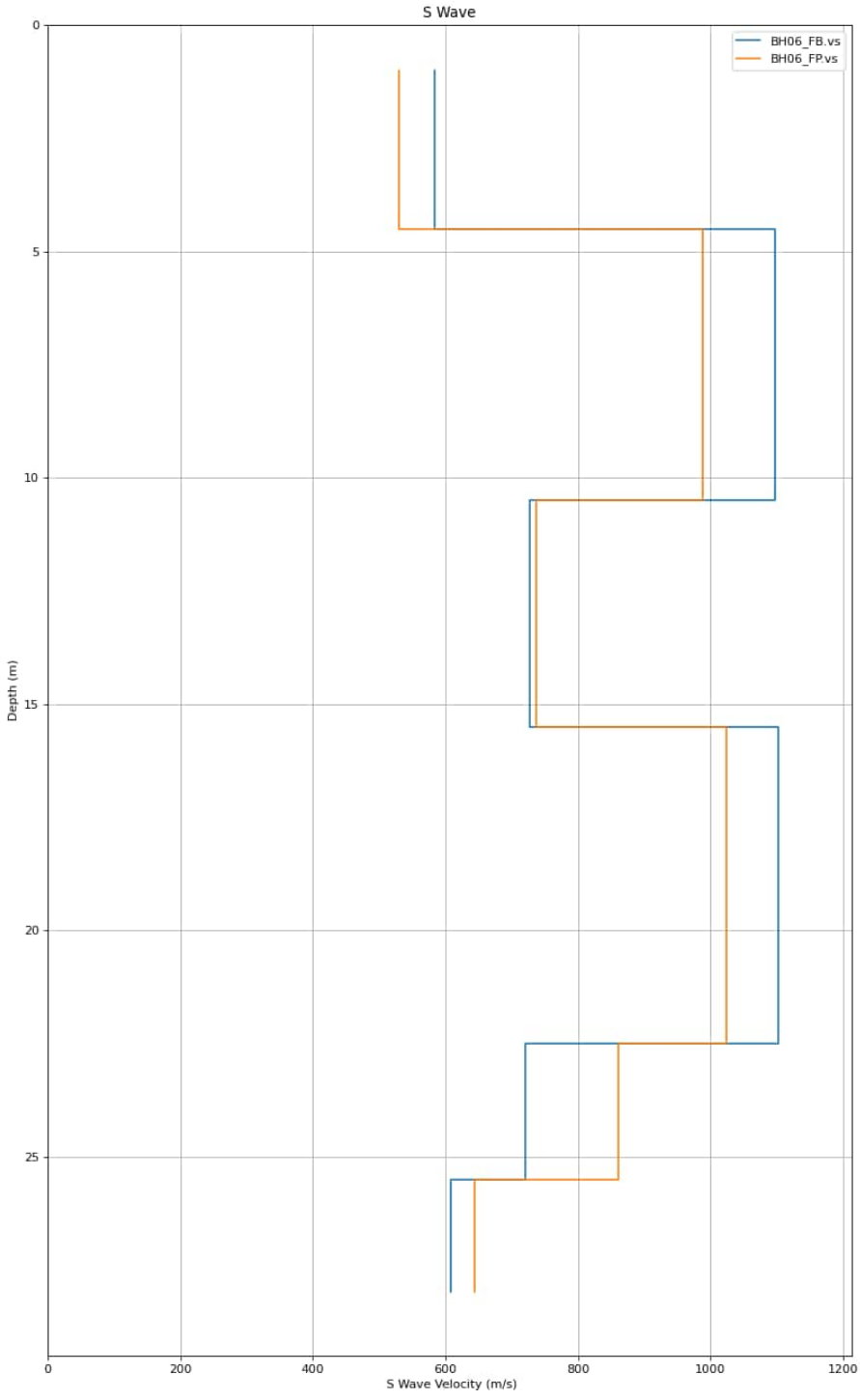

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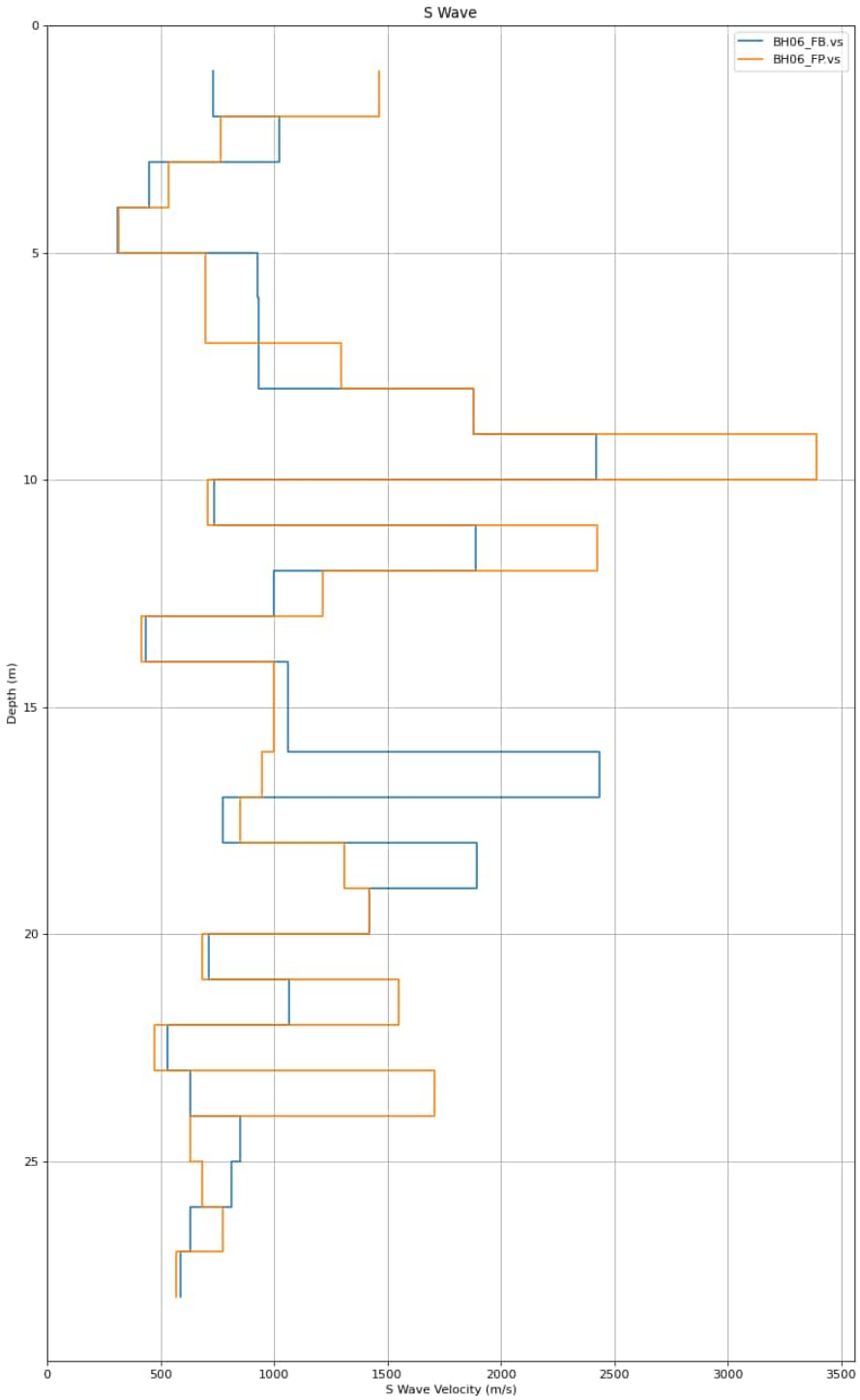

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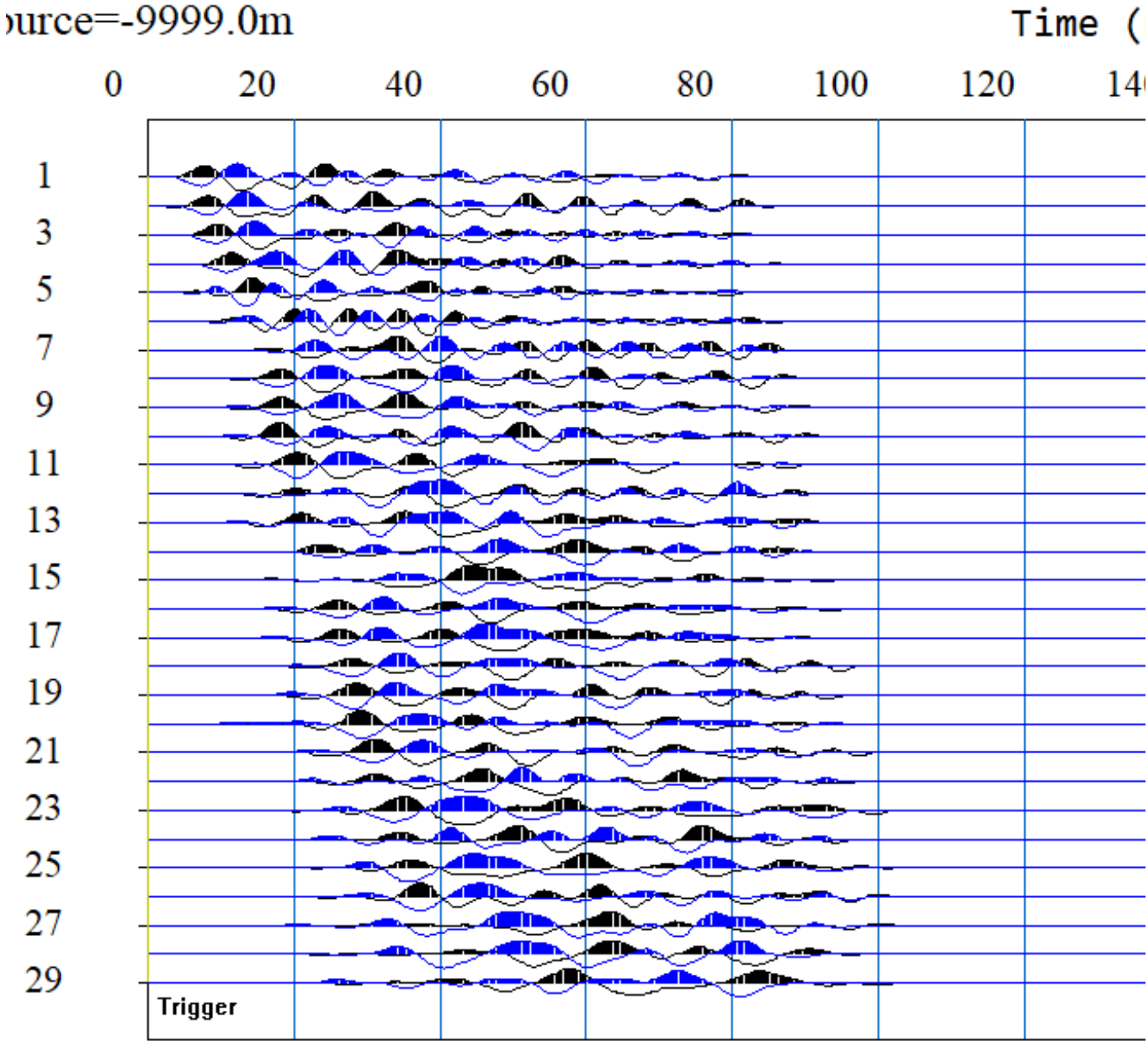

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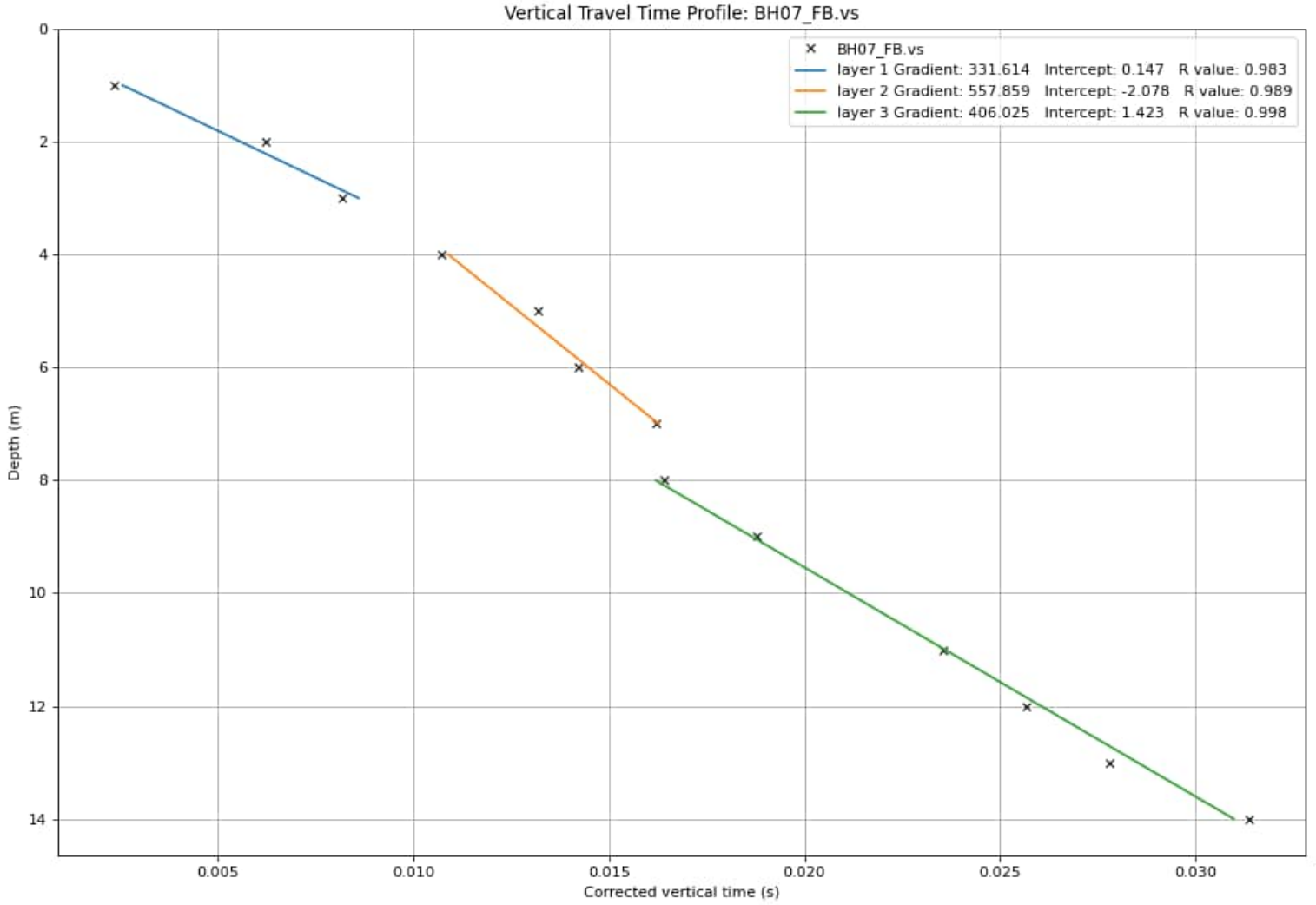

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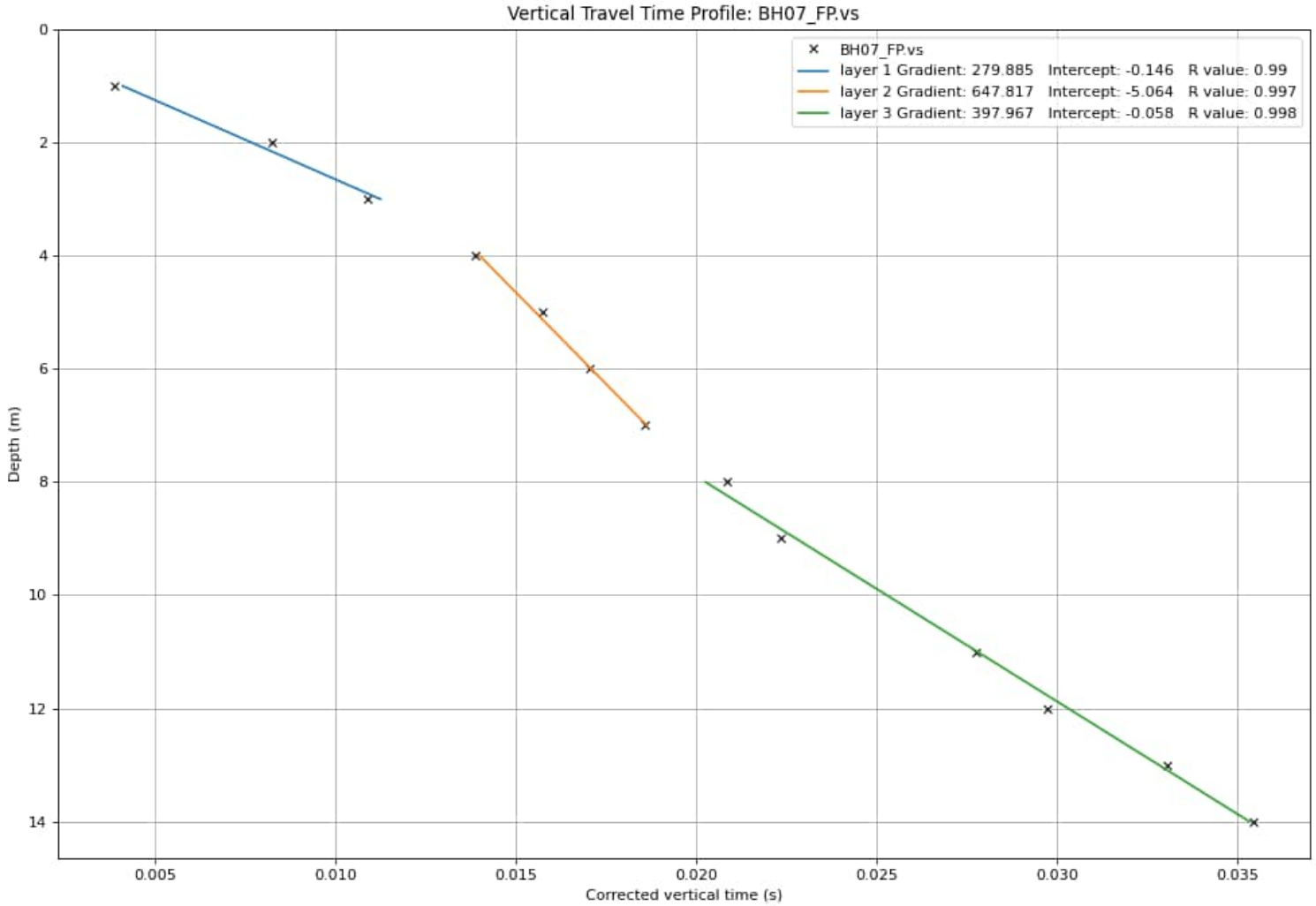

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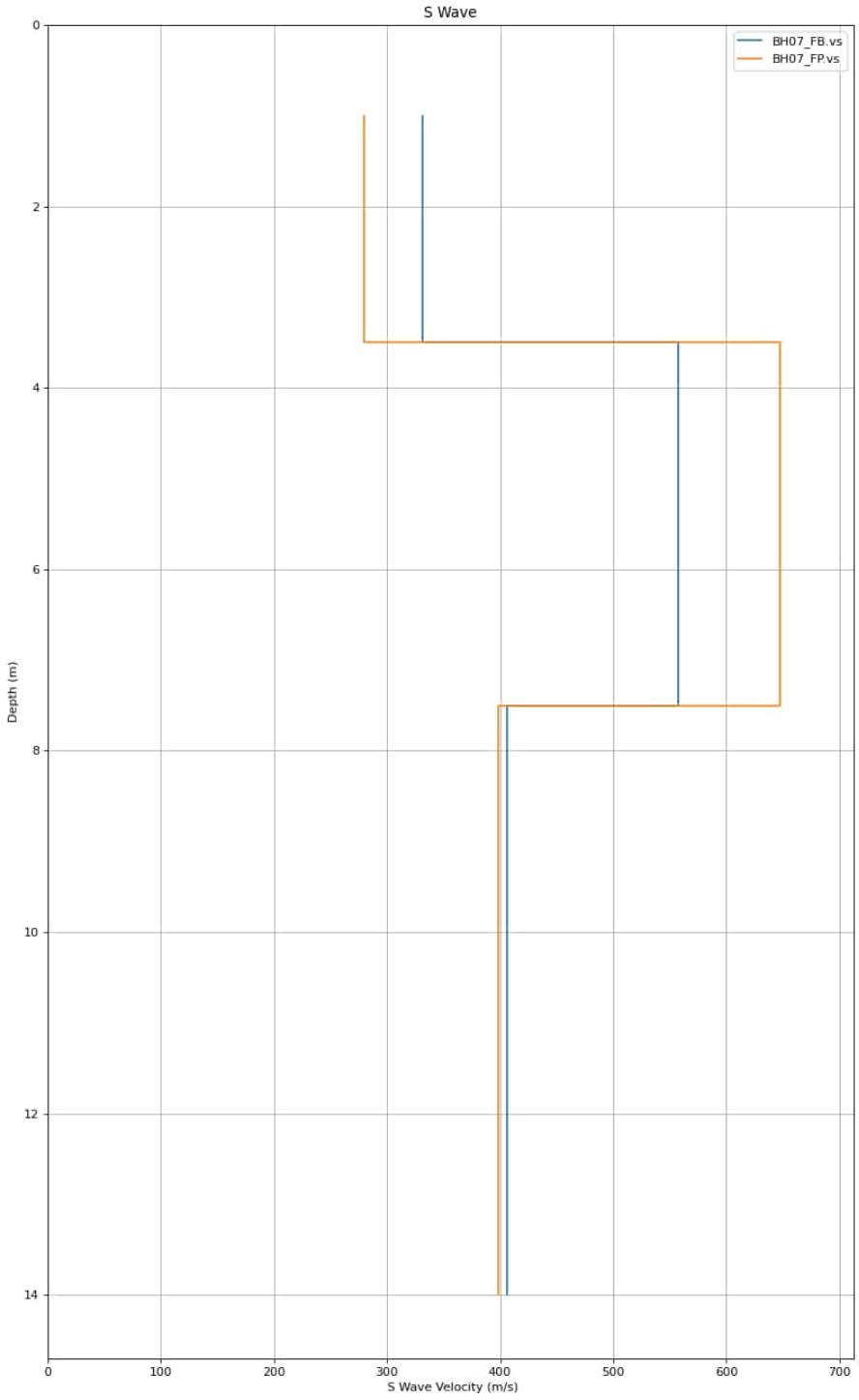

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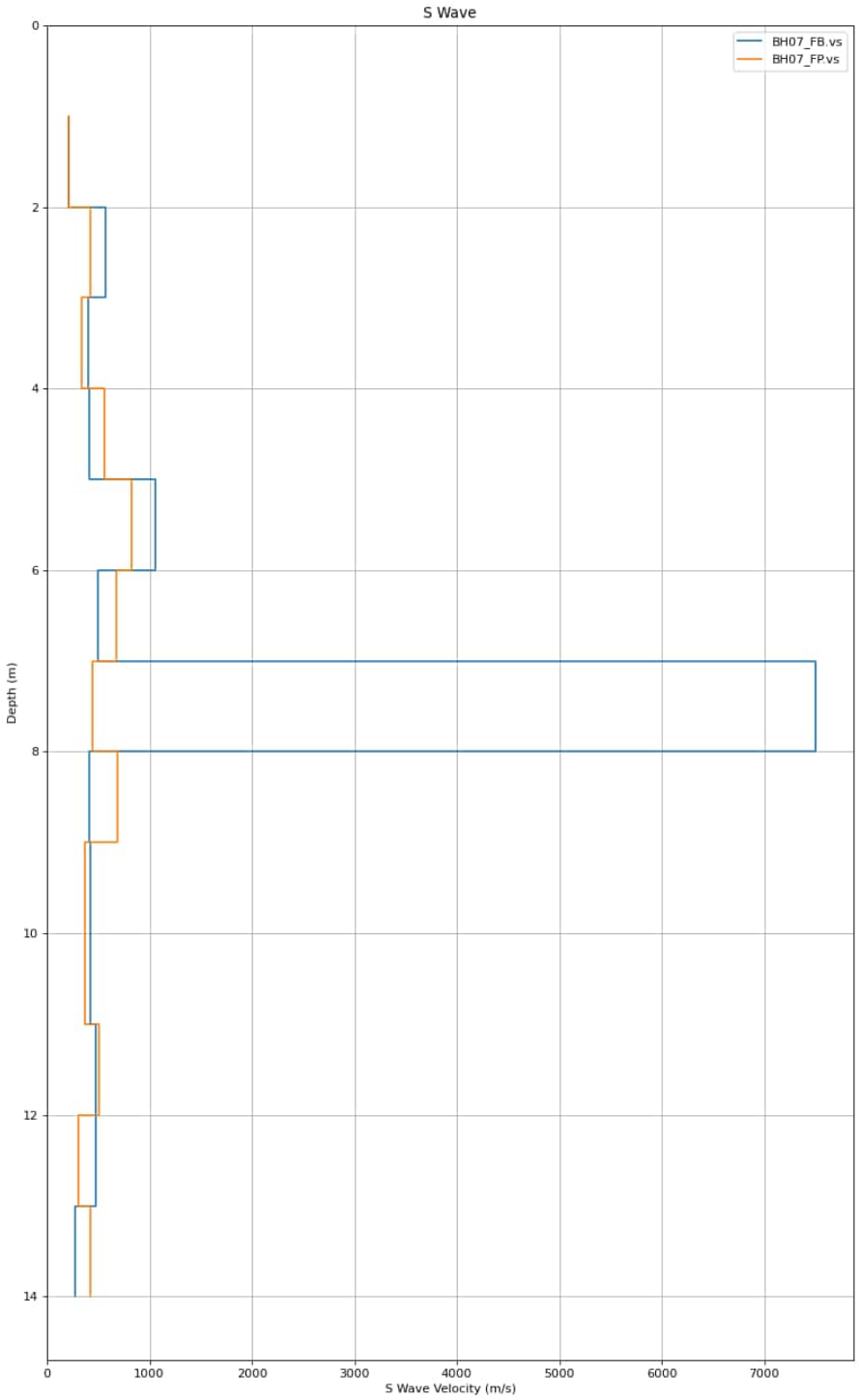

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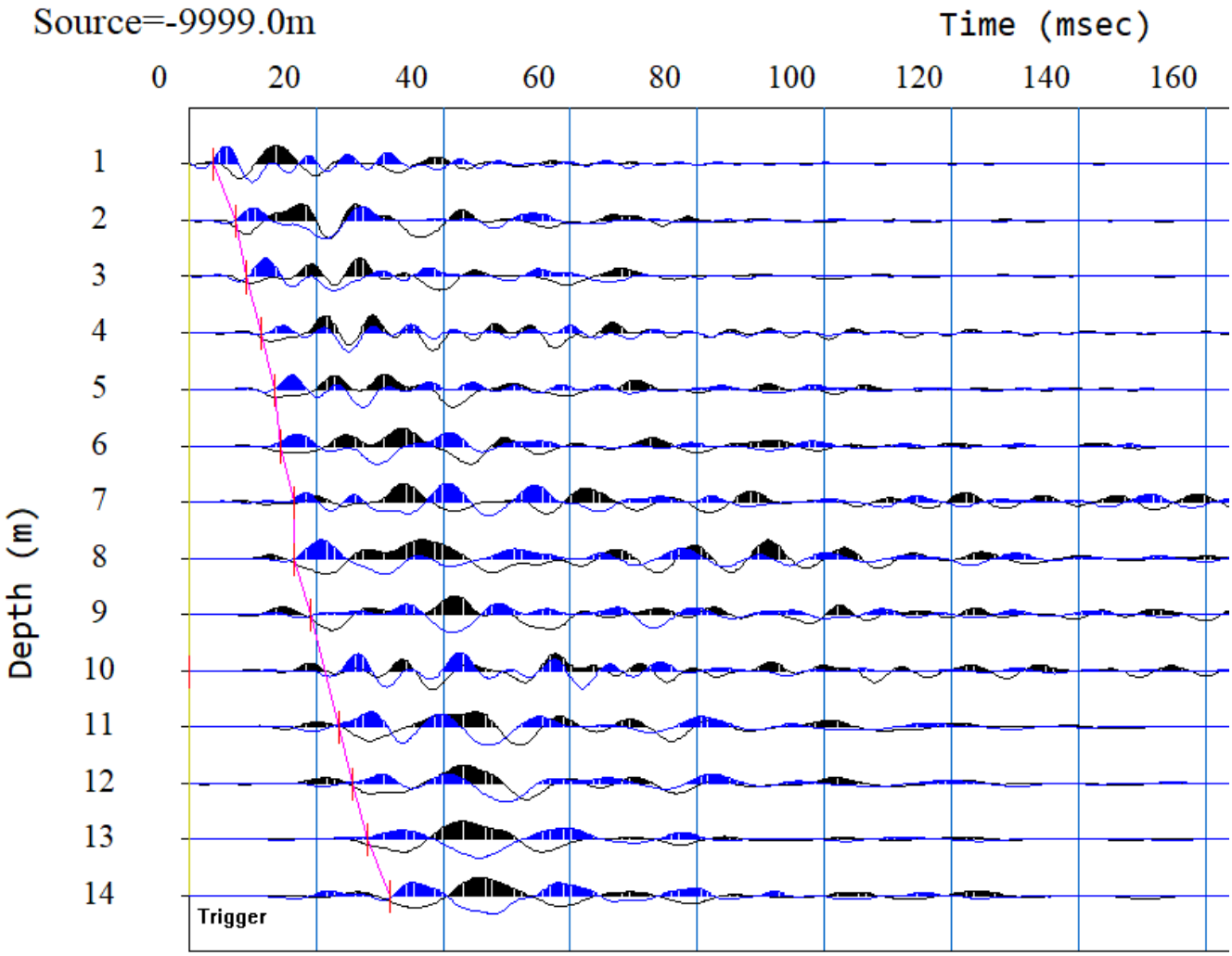

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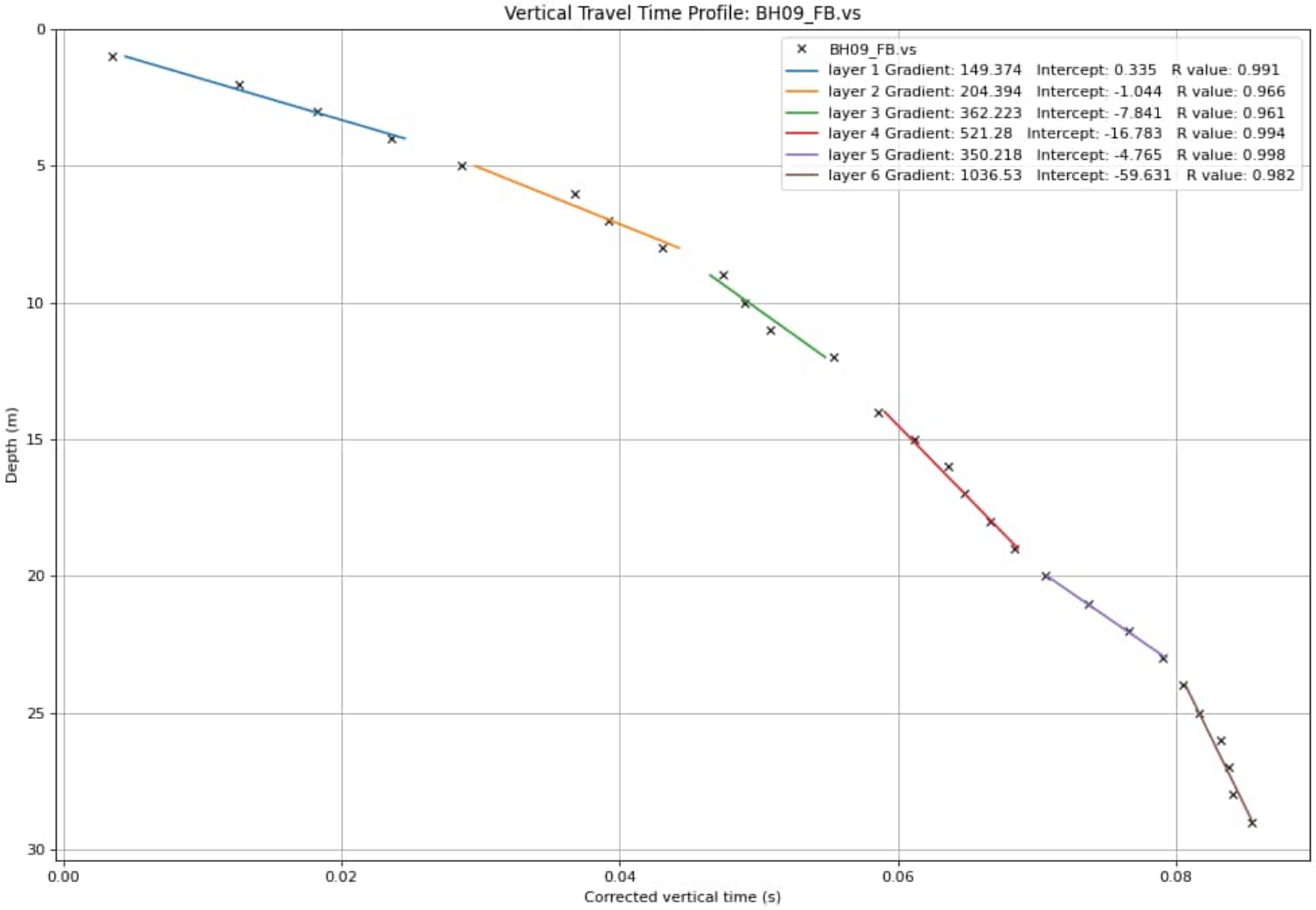

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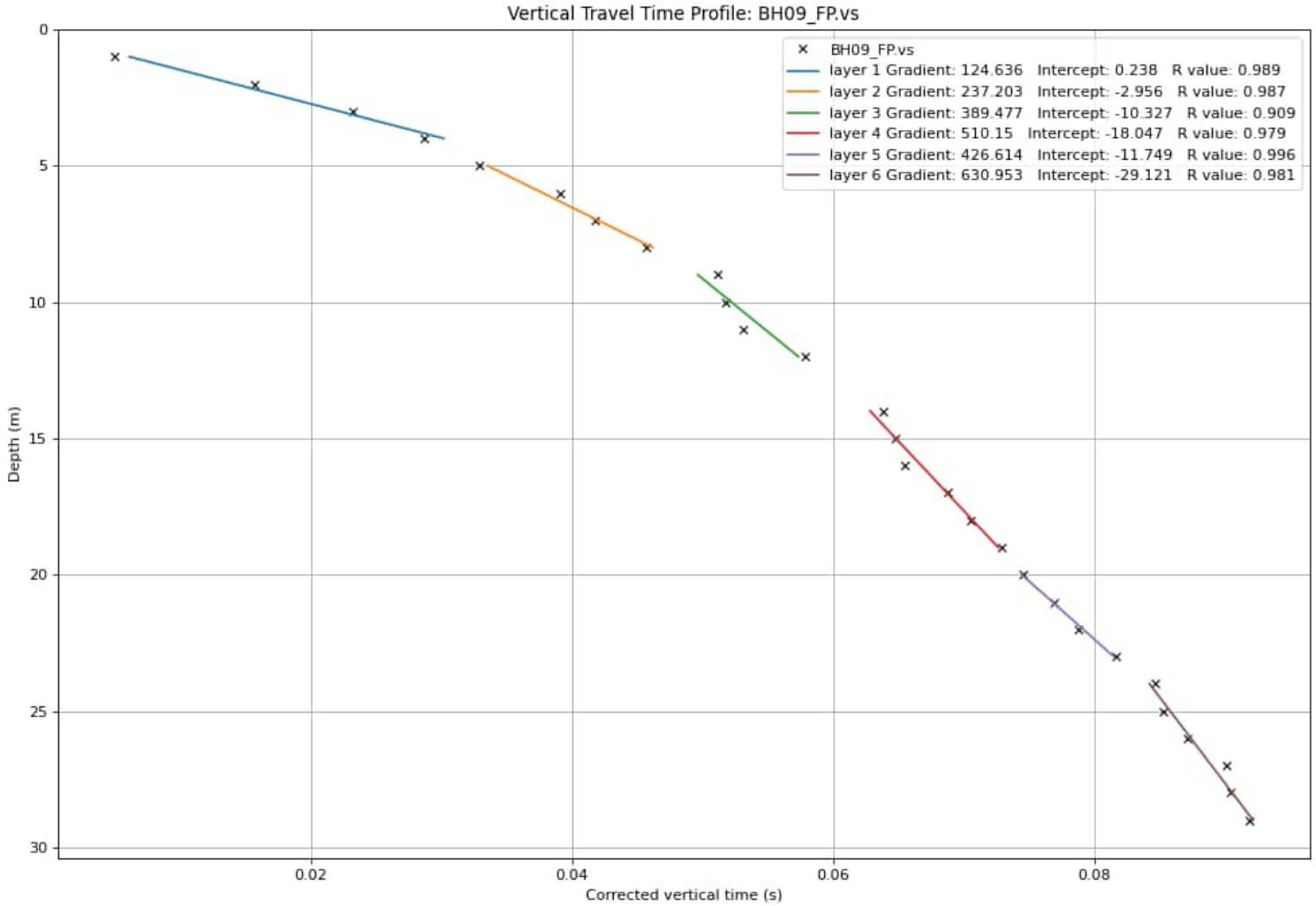

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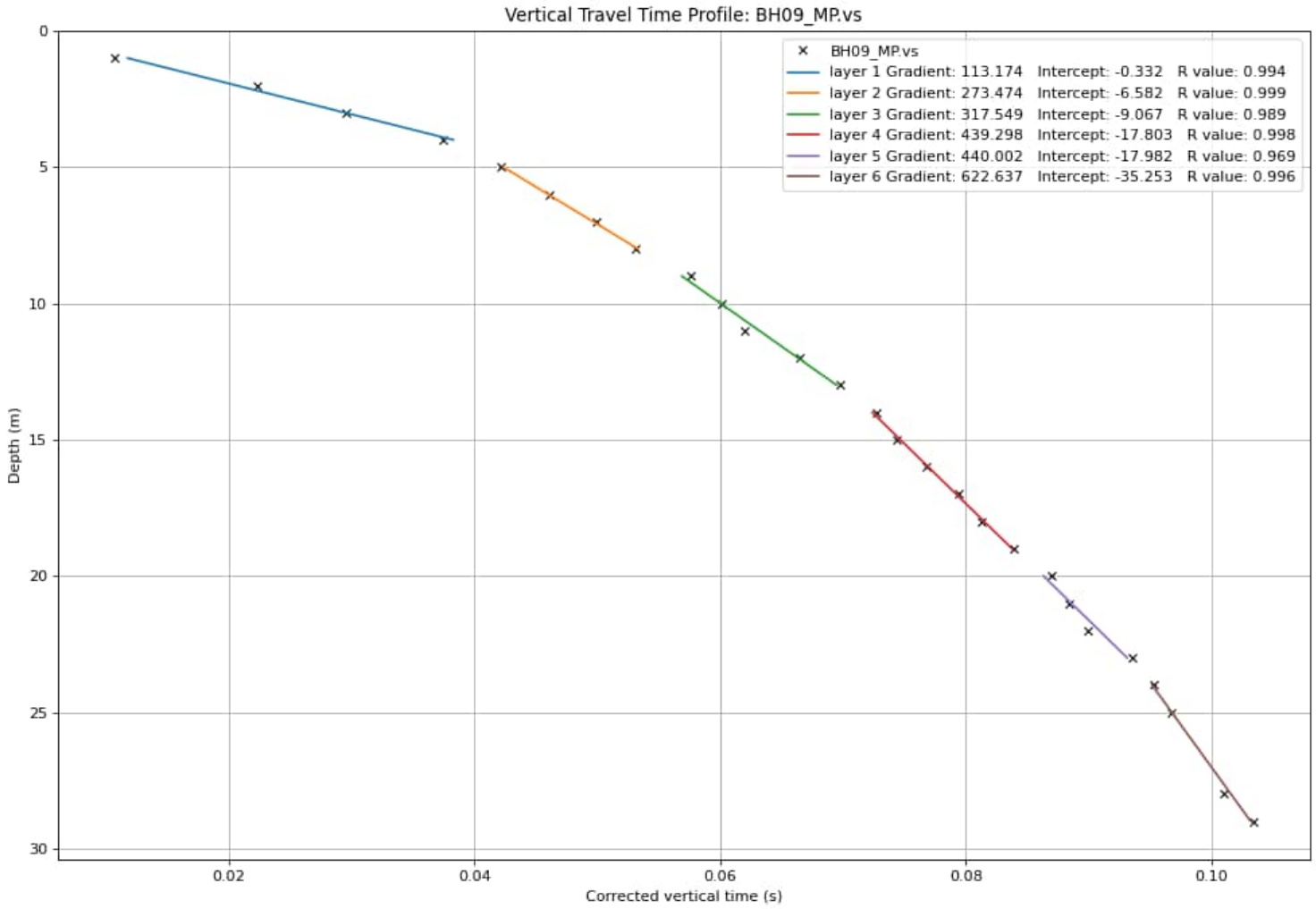

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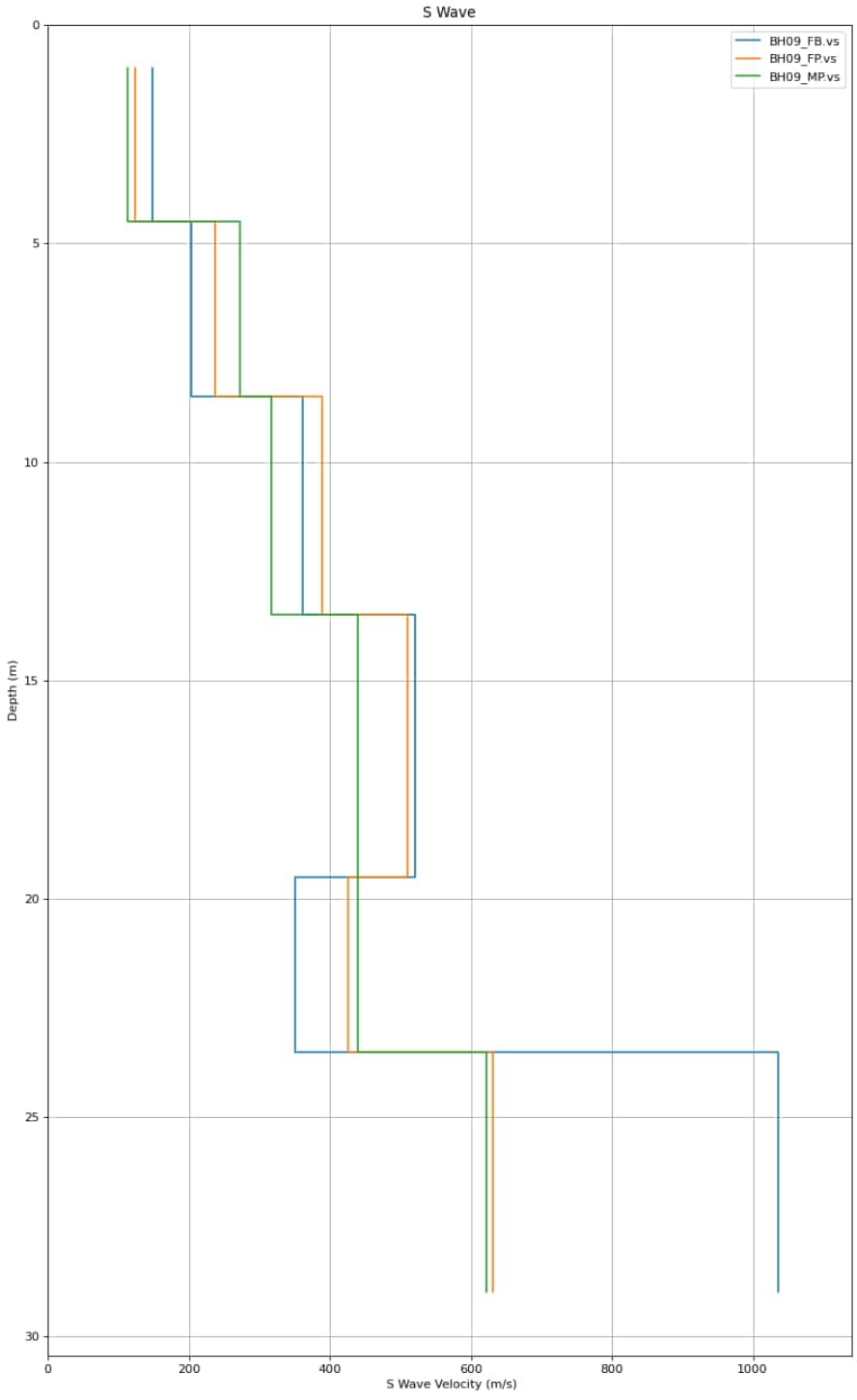

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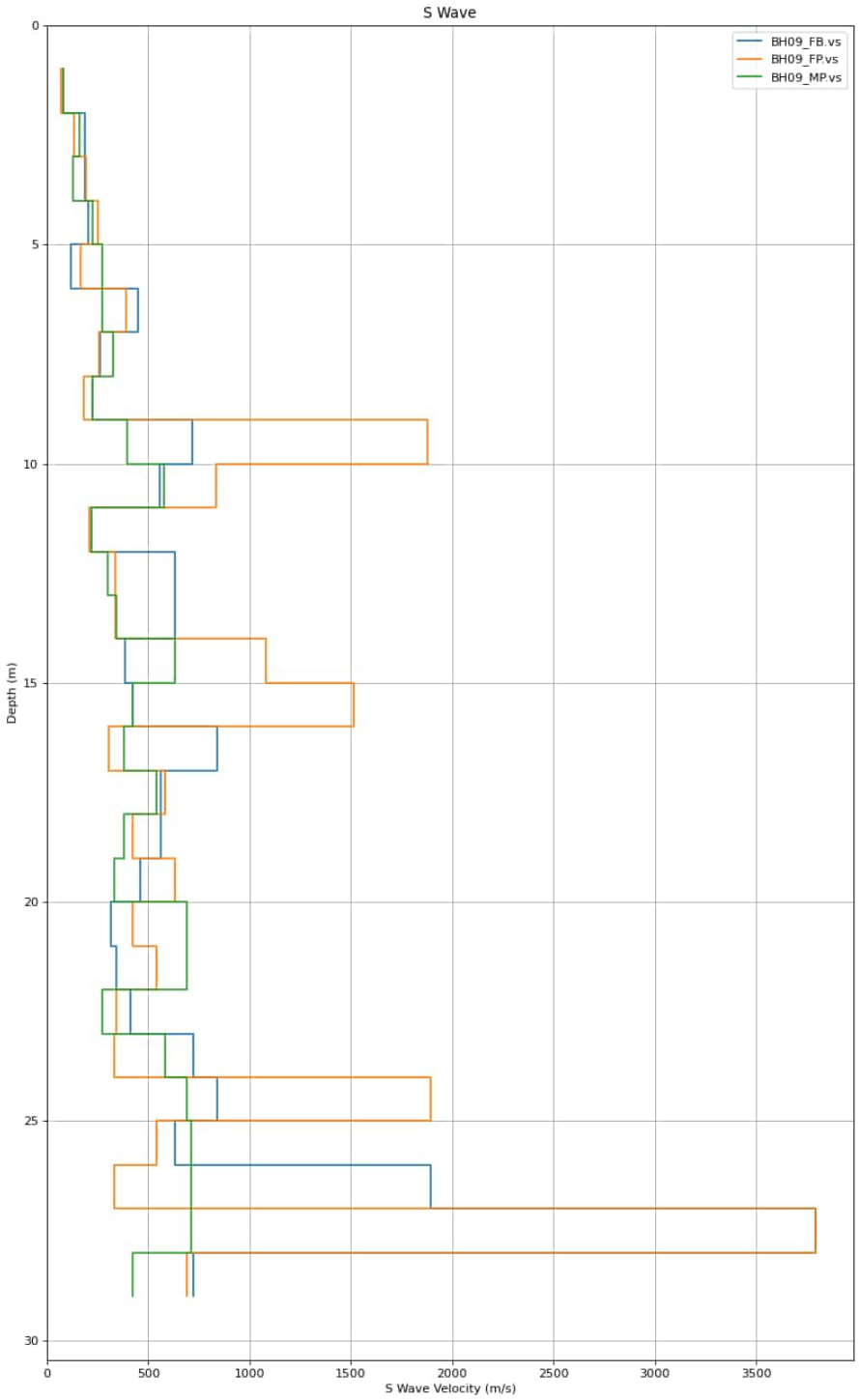

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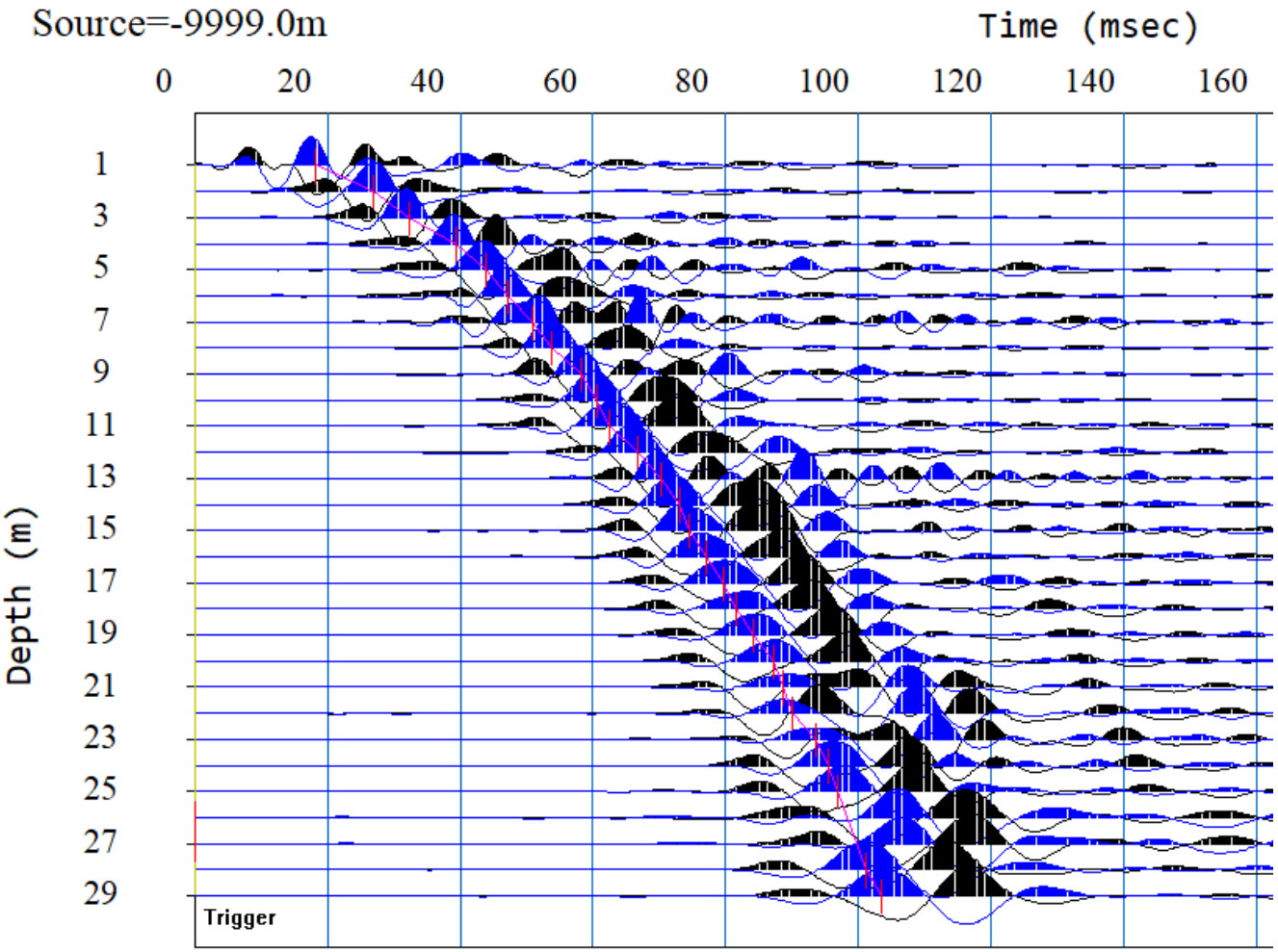

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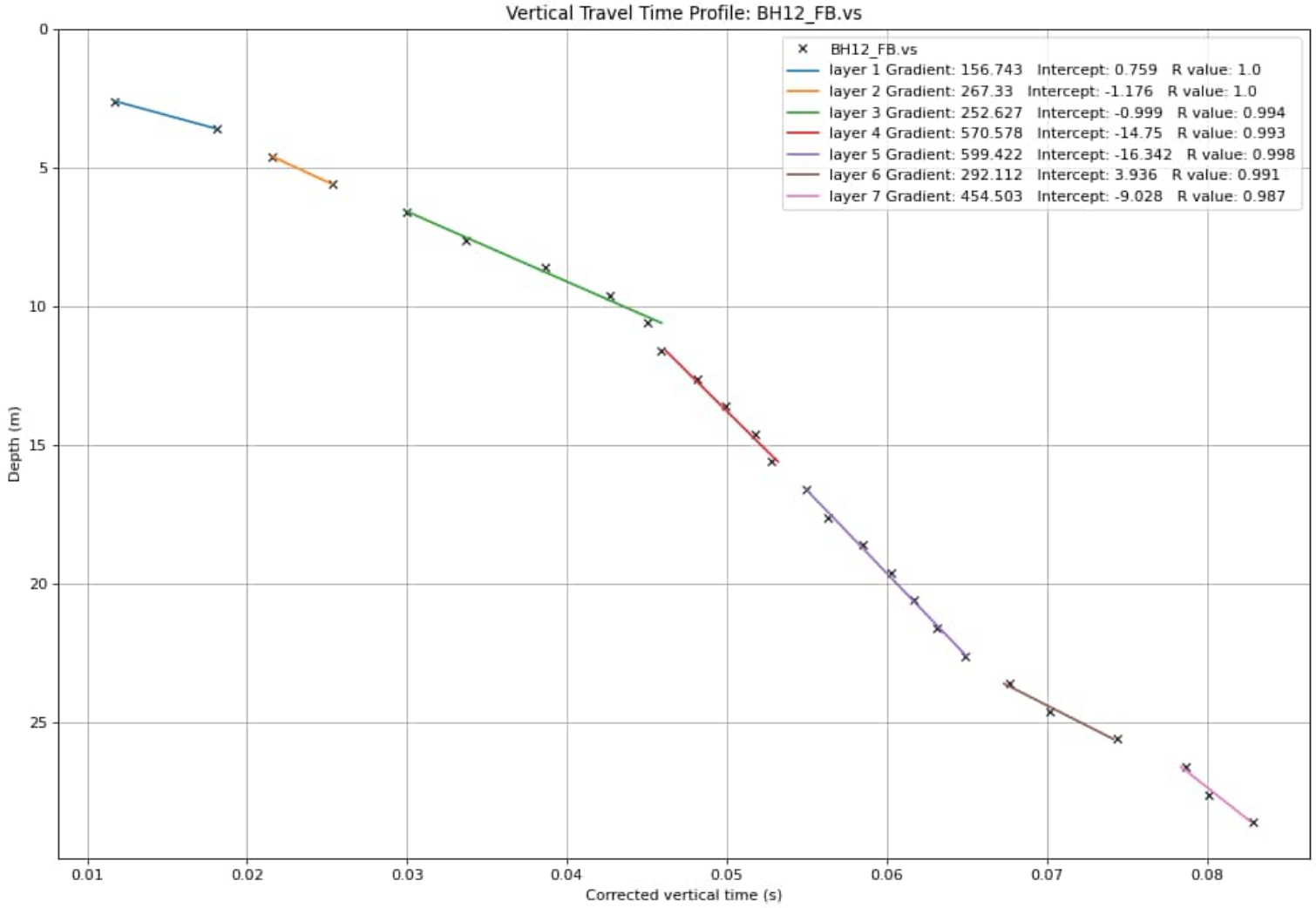

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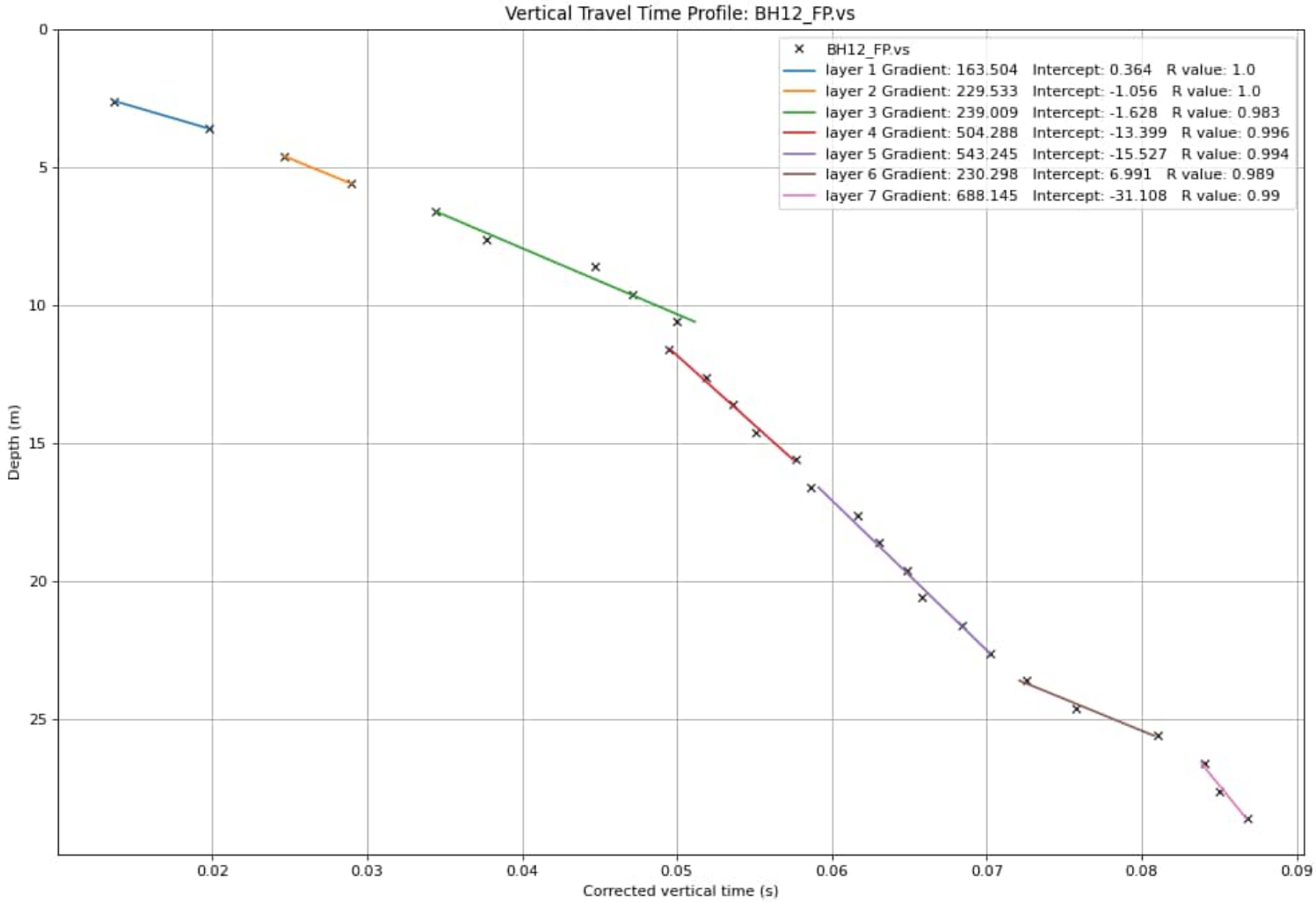
	PROJECT	Port Vila, Vanuatu Seismic Survey	DRAWN BY	OG	DATE	27/03/26	FIG
	CLIENT	T+T	CHECKED BY	SJ	DATE	27/03/26	30



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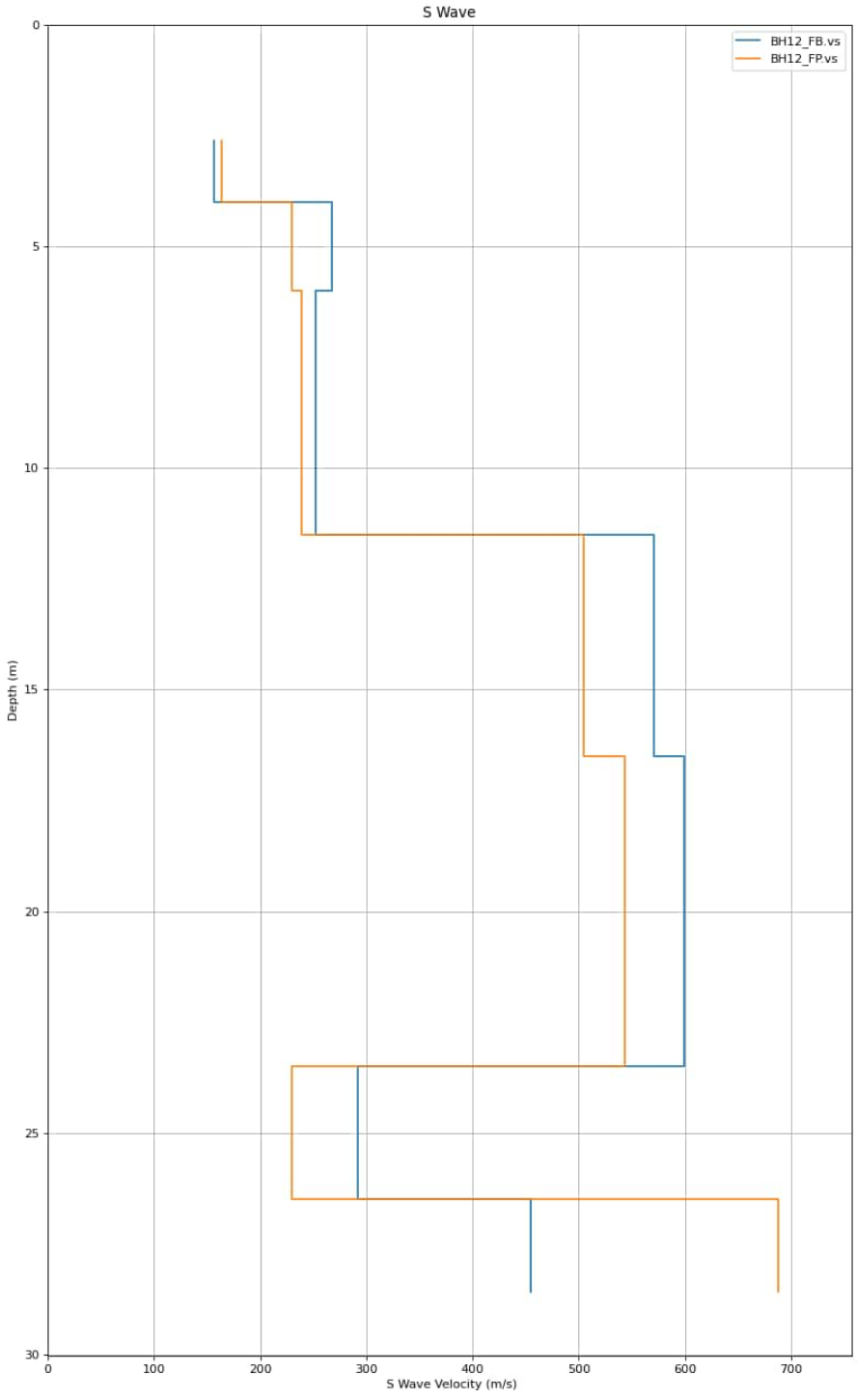

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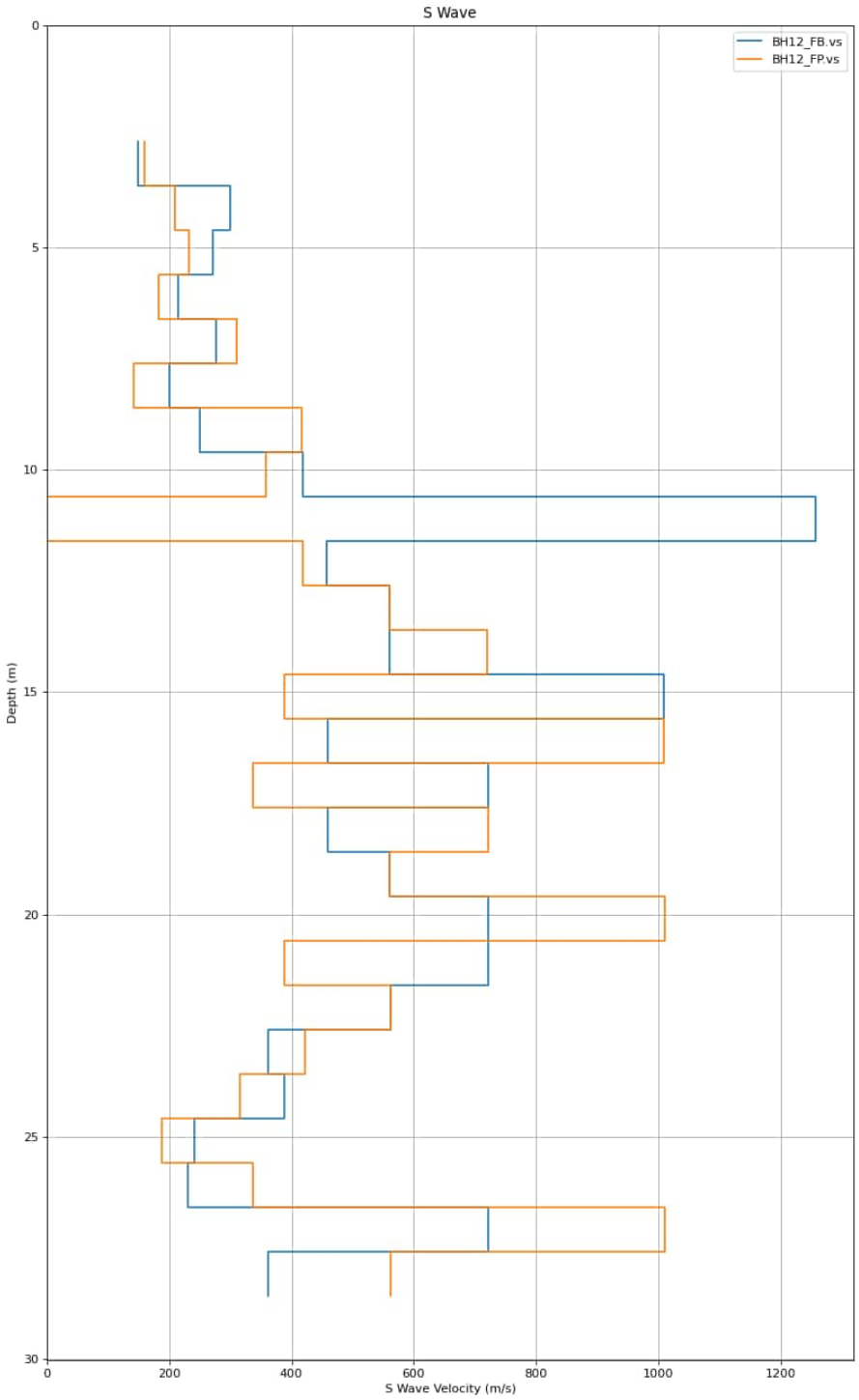

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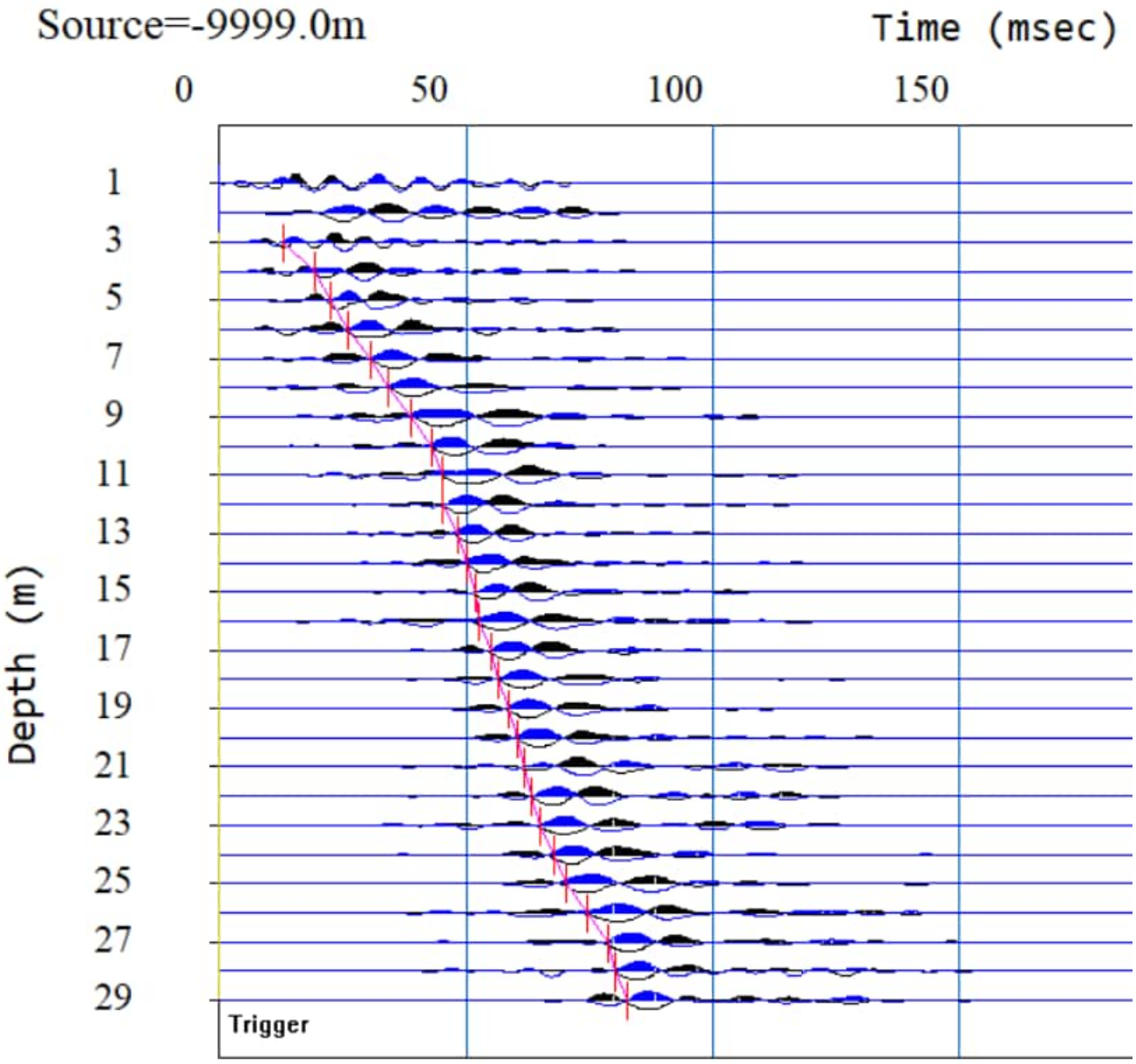

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CHECKED BY	SJ	DATE	27/03/26	PROJECT No.	250306	Figure No.	34

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A1 DOWNHOLE SEISMIC SURVEY (DHS)

Downhole seismic testing was used to provide a measurement of variations in shear wave velocity (Vs). By measuring the difference in arrival times of the waves at known depths, the seismic wave velocities can be calculated.

Identification of shear waves was achieved by using the fact that shear waves can be polarised. By striking a shear beam in opposing directions, polarised shear waves are created. Seismic traces can then be superimposed allowing the polarisation to be observed, and shear waves to be therefore distinguished from the coda ("tail") of the earlier arriving P-waves.

A1.1 DOWNHOLE SEISMIC ACQUISITION METHOD

A1.1.1 ACQUISITION SYSTEM

Acquisition of downhole seismic data was conducted using a tri-axial Geostuff BHG-5 downhole clamping geophone.

Test intervals were spaced at 1 metre intervals from surface to the bottom of the hole.

A1.1.2 Seismic Source

Shots were:

- Produced by a sledgehammer for seismic signal generation ("shots").
- Stacked (three to seven shots) to improve signal to noise ratio.
- Horizontally polarised "shear" wave shots were acquired in opposite directions by striking a shear beam weighted by a vehicle (to improve coupling). The shear beam was orientated to align with the orientation of one of the transverse components of the tri-axial geophone sensor.

A1.1.3 Acquisition Parameters

Acquisition parameters were:

- Record Length - 250 ms
- Delay - 0 ms
- Sample Interval - 0.25 ms
- Acquisition Filters - OUT
- Source Offsets - BH02: 1.42 m
  BH03: 1.1 m
  BH06: 1.2 m
  BH07: 1.2 m
  BH09: 1.35 m
  BH12: 1.35 m
- Drillhole Stickup - BH02: 0.1 m
  BH03: 0 m
  BH06: 0 m
  BH07: 0.1 m
  BH09: 0 m
  BH12: 0.4 m

A1.1.4 Positional Control

Positional control downhole was obtained using 1 m interval marks on the geophone cable. Downhole measurements were made relative to the top of the stickup during acquisition.

- Therefore, downhole positional accuracy is likely to be of the order of ±0.05 m.

Horizontal offsets to the shear beam were measured using a tape measure.

- Therefore, positional accuracy is likely to be of the order of ±0.05 m.

A1.1.5 Verticality

Drill hole verticality was assumed. A direct ray path method is used, and no travel time corrections are applied associated with variations in verticality.

A1.1.6 Quality Assurance

There are three main field-testing QC steps.

- Before data acquisition seismic channels are checked for signal to noise interference. This is used to assess poor drill hole wall coupling or external noise on site (unwanted sound). This is commonly referred to as a noise shot.
    - A noise shot is recorded at surface, to assess signal to noise ratio and to confirm electronic systems are functioning and correct timing and trigger errors.
    - A noise shot is also recorded at depth, typically at a mid-point in the drill hole. This confirms in-hole signal to noise ratio and to ensure the tool is functioning after deployment.
- Every shot interval has stacked signal shots of three to five shots per test depth. Each shot is checked for timing errors and poor coupling before being saved to the data sets. Shots were stacked in field to improve signal to noise ratios.

- Shear wave seismic shots are recorded in opposing directions to establish a polarised shear wave. Polarised shear waves reduce the chances of tube waves being confused with shear wave arrivals.

A1.1.7 Resolution Limitations

Layer velocities were defined based on changes in arrival time slopes and geological intervals detailed in drill hole logs provided to RDCL. Velocities are calculated from calculating the slope from the Tx curves (time depth). It is usually not appropriate to calculate interval velocities using just two points (over successive measurements) as large errors in velocity are likely (ASTM – D7400-08).

A1.2 Downhole Seismic Processing

Data processing consisted of:

- Phase 1 – Initial processing and data filtering.
- Phase 2 – First break picking and wave amplitude picking.
- Phase 3 – Data presentation and calculation of interval velocities.

A1.2.1 Phase 1 – Initial Processing

Raw data files were imported into an RDCL proprietary Python script. The script undertook the following generalised processes:

- Split of channels 1, 2 and 3 (data orientated in the vertical, north and east components).
- Sort into left, right and vertically polarised shots.
- Deletion of unrequired traces.
- Correct assignment of depth geometry from header.
- Merge of traces into separate gathers for left, right and vertical polarised shots.
- Bandpass filtering.

- Visual assessment of traces.

A1.2.2 Phase 2 – Arrival Time 'Picks'

Gathers were subsequently imported into the Seisimager Pickwin module software for picking.

Shear wave arrival times were manually picked by identifying waves that were polarised.

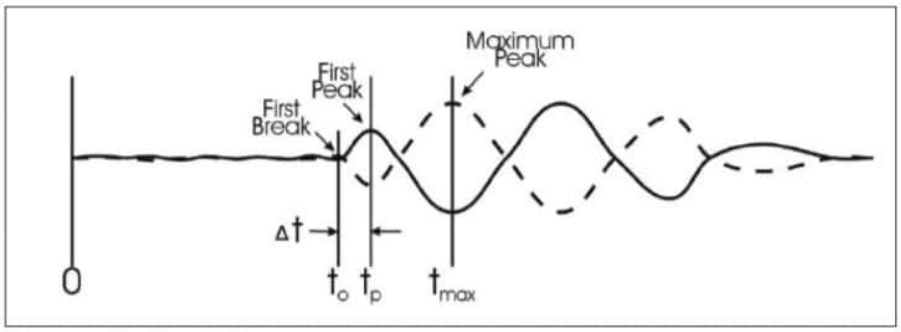
Where waves could not be reliably identified, a gap was left, and that data was not picked.

Shear wave identification may be affected by:

- Decreases in signal to noise ratio.
- Interference from tube waves.
- Disturbance by the coda of the P-wave arrivals.

In processing downhole seismic surveys RDCL usually makes picks at three separate locations on each trace (Schematic 1) and interval/layer velocities are calculated using each of these picking methods.

Schematic 1 - Shear Wave Velocity Picking



The three methods are called:

- First Break (FB)
- First Peak (FP).
- Maximum Peak (MP).

Three methods of shear wave picking are used to reduce and assess the uncertainty in the shear wave velocity interval/layer calculations.

P-wave arrivals were picked using only the "First Break" method, as there is usually minimal ambiguity when picking P-waves.

Arrival times were exported from Pickwin into Python code to create a velocity model.

A1.2.3 Phase 3 – Velocity Calculations

Arrival times were imported into an RDCL proprietary Python script for presentation and calculation of interval velocities and layer velocities. Intervals were defined from changes in slope in the arrival time data and the drill hole log provided to RDCL.

Geometric corrections were made to the travel times for shot/collar horizontal offsets and casing stick up.

A2 REFERENCES

Dunkin, J. W. (1965). Computation of modal solutions in layered, elastic media at high frequencies. Bulletin of the Seismological Society of America, 55(2), 335-358.

REPORT ON:
SURFACE GEOPHYSICAL SURVEY

PROJECT:
PORT VILA, VANUATU
GEOPHYSICS
MASW, SRT & HVSR SURVEY

CLIENT:

TONKIN + TAYLOR INTERNATIONAL

161 VICTORIA STREET
TE ARO WELLINGTON 6011,
NEW ZEALAND

250306

RDCL®

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EXECUTIVE SUMMARY

Tonkin + Taylor International (the Client) engaged Resource Development Consultants Ltd (RDCL) to undertake a surface geophysical investigation in Port Vila, Efate Island, Vanuatu, to support a broader ground investigation programme associated with redevelopment works.

The survey comprised Multi-channel Analysis of Surface Waves (MASW), Seismic Refraction Tomography (SRT), and Horizontal-to-Vertical Spectral Ratio (HVSR) testing, undertaken between 10 February and 5 March 2026.

A total of 29 MASW lines and soundings, four SRT lines, and twelve HVSR soundings were acquired. MASW results indicate near-surface shear wave velocities typically ranging between approximately 200 m/s and 600 m/s, with higher velocities (>800–1000 m/s) encountered at depth and in elevated inland areas. Lower velocities are generally associated with coastal and low-lying areas, suggesting softer or more unconsolidated materials.

SRT results show compressional wave velocities ranging from approximately 800 m/s near surface to greater than 4000–5000 m/s at depth, generally increasing with depth. Some SRT profiles display relatively homogeneous velocity distributions, which are locally inconsistent with MASW results and may reflect limitations in data quality or method sensitivity.

HVSR testing identified fundamental site frequencies (f_0) ranging from approximately 3.98 Hz to over 30 Hz, indicating variable subsurface conditions and suggesting spatial variability in sediment thickness and stiffness across the site.

Overall, the results indicate a heterogeneous subsurface, with softer near-surface materials in coastal and low-lying areas transitioning to stiffer materials or rock at depth and at higher elevations. These findings provide a valuable geophysical framework to support geotechnical interpretation; however, results should be considered alongside intrusive investigations due to the inherent limitations and non-uniqueness of geophysical methods.

1 INTRODUCTION

1.1 GENERAL

Tonkin + Taylor International (T+TI , the Client) engaged Resource Development Consultants Ltd (RDCL) to undertake a geophysical investigation in Port Vila, Efate Island, Vanuatu. The purpose of the survey was to support T+TI's ground investigation that was part of the Port Vila redevelopment project.

1.2 OBJECTIVES

The objectives of this survey were to acquire:

- 6 (six) Downhole Seismic (DHS) test to 30 m bgl (reported separately).
- Undertake 10 (ten) night shifts of Multi-channel Analysis of Surface Waves (MASW) testing along roads. The tests would use a 46 m (2 m spaced) landstreamer with a theoretical survey depth of ~23 m.
- Undertake 2 (two) night shifts of Seismic Refraction Tomography (SRT).
- Undertake (four) night shifts of Horizontal to Vertical Spectral Ration (HVSR) tests.

These overall objectives translate into the following specific survey objectives:

- Produce in hole shear wave velocity (Vs) measurements from the downhole seismic measurements.
- Produce 2D sections and 1D soundings (depending on line length) of unconstrained shear wave velocity (Vs) models from the MASW testing.
- Produce 2D sections of compressional wave velocity (Vp) models from the SRT testing.
- Produce H/V plots and calculate f_0 from the HVSR testing.

1.3 SITE WORK

The geophysical surveys were carried out between the 10th of February and the 5th of March 2026 (excluding mobilisation and demobilisation).

1.4 Report Scope

This geophysical report details the MASW, SRT and HVSR surveys undertaken as part of this survey. The downhole seismic survey has been reported separately.

1.5 Terms of Reference

This investigation employed seismic geophysical methods. Most of the findings presented here are the result of the measurement and interpretation of electrical signals. As such any results derived from the geophysical investigation should be taken in the context of and in reference to the complete ground investigation. Reasonable skill and care were taken to ensure that the results are accurate and reliable, including reference where appropriate to published data from this and/or other sites. As with other indirect methods there is a possibility of localised inconsistencies and inaccuracies within the results.

2 SURVEY PARAMETERS

2.1 MULTI-CHANNEL ANALYSIS OF SURFACE WAVES (MASW)

The MASW survey consisted of 29 lines or soundings and was acquired with a towed landstreamer with twenty-four geophones spaced at 2 m.

Where lines were not long enough to generate a quasi-2D Vs section soundings were undertaken. This was due to obstructions (such as roads) or extreme bends in the road where the array could not be positioned in a straight line.

MASW Line locations are plotted on Figures 02, 03, 04 & 05. Parameters are given in Table 1 below.

TABLE 1 - MASW LINE PARAMETERS

			Start Location		End Location		
Line ID	Length (m)	Approx. Orientation	Easting (m)	Northing (m)	Easting (m)	Northing (m)	Type
01a	380	SE-NW	215107.1	8036526	214939.8	8036880	Quasi-2D
01b	48	SE-NW	214889	8036912	214870.3	8036959	Sounding
01c	48	SE-NW	214851.3	8036978	214841.8	8037001	Sounding
2	270	SE-NW	215155.5	8036619	215020.5	8036857	Quasi-2D
3	680	NW-SE	214860.3	8037051	215200.7	8036477	Quasi-2D
4	470	SE-NW	215243.5	8036642	215015	8037080	Quasi-2D
05a	48	W-E	215020.1	8036765	215061	8036793	Sounding
05b	48	W-E	215088.1	8036834	215133.2	8036856	Sounding
05c	48	W-E	215152.8	8036863	215186.4	8036900	Sounding
06a	48	W-E	215060.7	8036699	215102.8	8036726	Sounding
06b	48	W-E	215194.9	8036773	215147.7	8036756	Sounding
06c	48	W-E	215246.8	8036789	215223.3	8036780	Sounding
07a	48	W-E	215085	8036599	215135.9	8036614	Sounding
07b	90	W-E	215148.7	8036601	215268.7	8036631	Quasi-2D
8	48	W-E	215132.8	8036480	215197.8	8036497	Sounding
9	510	N-S	215188.2	8036518	215178.9	8036001	Quasi-2D
10a	48	W-E	214924.2	8036890	214979.6	8036941	Sounding
10b	48	W-E	215011.7	8036941	215056.3	8036963	Sounding
11a	60	E-W	215855	8036839	215791.1	8036879	Quasi-2D
11b	210	S-N	215714.9	8036896	215687.8	8037100	Quasi-2D
11c	50	E-W	215633.8	8037039	215578.2	8036989	Quasi-2D
12	430	N-S	214874.5	8037561	214850.1	8037068	Quasi-2D
13	330	N-S	214851.8	8037971	214870.6	8037626	Quasi-2D
14	48	W-E	214752	8037707	214813.7	8037690	Sounding
15	830	S-N	214398.3	8038130	214700.4	8038819	Quasi-2D

			Start Location		End Location		
Line ID	Length (m)	Approx. Orientation	Easting (m)	Northing (m)	Easting (m)	Northing (m)	Type
16	90	E-W	215270.8	8037531	215182.3	8037578	Sounding
17	430	W-E	215004.1	8037434	215444.2	8037346	Quasi-2D
18a	48	W-E	214981.8	8036854	215024.8	8036880	Sounding
18b	48	W-E	215046.9	8036888	215088.9	8036915	Sounding

2.2 Survey Rationale - MASW

MASW is an active source seismic technique which uses analysis of surface waves to measure shear wave velocity in the subsurface. For the purposes of this survey the technique involves the deployment of a 24-channel geophone array mounted on a landstreamer at 2 m spacings.

The depth of investigation of the MASW technique is equal to roughly half the array length, while maximum vertical resolution at the surface is equal to roughly the geophone spacing. Vertical resolution decreases with depth. A 2 m spaced array will be 46 m long and have a maximum depth of investigation of ~23 m.

Seismic shots were made using a sledgehammer. Shot offset distances were located at an optimum separation for the site conditions, considering the required depth of investigation and site restrictions. Each shot was stacked 3 – 5 times to improve signal-to-noise ratio.

For this survey the results produced were unconstrained by the geology or other a priori data except the dispersion curves and should be considered as such.

The 2D outputs should be considered quasi-2D as they are made up of a series of 1D soundings and interpolated between. Generally, soundings were recorded every 20 m along the lines. Full acquisition and processing methods are detailed in Appendix A.

2.3 Seismic Refraction Tomography (SRT)

The SRT survey consisted of three (3) lines and was acquired with a towed landstreamer with twenty-four geophones spaced at 2 m.

SRT Line locations are plotted on Figure 06. Parameters are given in Table 2 below.

TABLE 2 - SRT LINE PARAMETERS

			Start Location		End Location		
Line ID	Length (m)	Approx. Orientation	Easting (m)	Northing (m)	Easting (m)	Northing (m)	Type
SRT01a	197	S-N	215113.1	8036533	215061.5	8036726	SRT
SRT01b	197	SE-NW	215060	8036725	214935	8036885	SRT
SRT02	289	N-S	215022.5	8036909	215181.2	8036644	SRT
SRT03	289	S-N	215235.7	8036642	215117.5	8036918	SRT

2.4 SURVEY RATIONALE - SRT

SRT is an active source seismic technique that measures the compressional wave velocity of the Earth's subsurface. For the purposes of this survey the technique involves the deployment of a 24-channel geophone array mounted on a landstreamer at 2 m spacings.

The depth of investigation of the SRT is equal to between a quarter and a fifth of the array length. In this case the theoretical depth of investigation was between 12 and 9.6 m bgl.

Seismic shots were made using a sledgehammer. Shots were recorded offend and at regular intervals along the array. Each shot was stacked 3 – 5 times to improve signal-to-noise ratio.

Full acquisition and processing methods are detailed in Appendix A.

2.5 HORIZONTAL TO VERTICAL SPECTRAL RATIOS (HVSR)

The HVSR survey consisted of twelve (12) soundings. Data was recorded using a Geometrics ATOM seismograph coupled to a 2 Hz tri-axial geophone.

Typically, soundings were recorded for of the order of an hour.

HVSR locations are plotted on Figures 01. Parameters are given in Table 3 below.

2.6 SURVEY RATIONALE - HVSR

SRT is an active

The Horizontal-to-Vertical Spectral Ratio (HVSR) technique is a passive seismic method used to estimate site resonance characteristics and infer subsurface stratigraphy, particularly the depth to impedance contrasts such as bedrock. The method utilises ambient seismic noise, recording three-component ground motion and analysing the ratio of horizontal to vertical spectral amplitudes. A fundamental resonance frequency (f_0) is identified, which is primarily controlled by the shear wave velocity and thickness of overlying materials. HVSR is well suited to urban and constrained environments due to its non-invasive nature, rapid deployment, and minimal logistical requirements. It provides a cost-effective means of deriving first-order estimates of sediment thickness and dynamic site response, supporting seismic hazard assessments and geotechnical investigations.

TABLE 3 - HVSR TEST LOCATIONS

Line ID	Easting (m)	Northing (m)
HVSR01	215147.6	8036752
HVSR02	215078.3	8036717
HVSR03	215074.2	8036802
HVSR04	215509.2	8037097
HVSR05	215806.6	8037029
HVSR06	215498.1	8036207
HVSR07	215920.7	8037121
HVSR08	215248.9	8037545
HVSR09	214756.5	8037689
HVSR10	214797.7	8037776
HVSR11	214552.1	8038762
HVSR12	214369.9	8038123

3 SURVEY METHODOLOGIES

The survey and processing methodologies for the MASW, SRT and HVSR surveys are described in Appendix A.

4 MASW RESULTS

4.1 DATA PRESENTATION

Data was presented using Geosoft's Oasis Montaj for the quasi-2D outputs and from Geogiga's Surface Plus module for the 1D soundings.

Shear wave velocity (Vs) values were measured in the range of 198 m/s to 1414 m/s across the entire dataset. Gridding was undertaken using a kriging algorithm.

The same standard linear colour scale (350–700 m/s) was applied to all quasi-2D sections to maintain consistency and show the maximum change over the largest range possible without being affected by outliers.

Contours were plotted at 50 m/s intervals using a Hanning filter.

Figures 07 – 35 detail the MASW results.

4.2 PROFILE PARAMETERS

MASW quasi-2D profile parameters are detailed in Table 4 below.

TABLE 4 - QUASI-2D MASW PROFILE PARAMETERS

Line ID	Min Vs (m/s)	Max Vs (m/s)
01a	215	523
2	234	662
3	232	951
4	327	714
07b	308	515
9	295	1341
11a	404	847
11b	241	796
11c	456	1080
12	223	609
13	306	1346
15	198	1229
17	201	1414

5 SRT RESULTS

5.1 DATA PRESENTATION

Data was presented using Geosoft's Oasis Montaj for the SRT 2D outputs.

Compressional wave velocity (Vp) values were measured in the range of 828 m/s to 5952 m/s across the entire dataset. Gridding was undertaken using a kriging algorithm.

The same standard linear colour scale (1500–5000 m/s) was applied to sections 01a and 01b to show the maximum change over the largest range possible.

The same standard linear colour scale (1000–2500 m/s) was applied to sections 02 and 03 to show the maximum change over the largest range possible

Contours were plotted at 500 m/s intervals using a Hanning filter.

Figures 36 – 39 detail the SRT results.

5.2 PROFILE PARAMETERS

SRT 2D profile parameters are detailed in Table 5 below.

TABLE 5 - SRT PROFILE PARAMETERS

Line ID	Min Vp (m/s)	Max Vp (m/s)
SRT01a	1094	4749
SRT01b	1177	5952
SRT02	828	2560
SRT03	828	2682

6 HVSR RESULTS

6.1 DATA PRESENTATION

Data was presented and processed using Geophysical Signal Database for Noise Array Processing (GEOPSY) for the HVSR outputs.

Processing is described in more detail in Appendix A but typically HVSR results were plotted using a 0.5 -45 Hz range and 60 second time windows.

Figures 40 – 51 detail the HVSR results.

6.2 HVSR RESULTS

HVSR results are detailed in Table 6 below.

TABLE 6 - HVSR RESULTS

HVSR#	f_0	f_{min}	f_{max}	A_0	A_{min}	A_{max}	T_0	T_{min}	T_{max}
Unit	Hz	Hz	Hz				s	s	s
1	3.98	3.41	4.64	2.00	1.78	2.24	0.25	0.29	0.22
2	2.52	2.15	2.96	2.06	1.86	2.29	0.40	0.47	0.34
3	3.23	2.73	3.84	1.33	1.13	1.55	0.31	0.37	0.26
4	7.99	6.97	9.17	2.41	2.04	2.85	0.13	0.14	0.11
5	15.50	15.12	15.90	1.65	1.34	2.04	0.06	0.07	0.06
6	30.49	28.32	32.83	3.40	2.95	3.92	0.03	0.04	0.03
7	5.10	4.58	5.68	1.32	1.20	1.46	0.20	0.22	0.18
8	12.81	10.28	15.96	2.13	1.93	2.36	0.08	0.10	0.06
9	4.55	4.02	5.14	2.30	2.03	2.60	0.22	0.25	0.19
10	3.58	3.03	4.23	1.77	1.56	2.01	0.28	0.33	0.24
11	30.66	30.25	31.08	4.42	3.44	5.69	0.03	0.03	0.03
12	26.61	24.55	28.86	1.50	1.20	1.88	0.04	0.04	0.03

7 OBSERVATIONS AND INTERPRETATIONS

7.1 MASW LINE 01A

MASW Line 1a was deployed in a SE-NW direction (Figure 07). The total line was 380 m long (not including shot offsets).

The MASW profile can be divided into two broad sections:

- Chainage 0 – 260 m. This section exhibited slow (<400 m/s) shear wave velocities to ~20 m bgl (blue colours). Below 20 m bgl velocities increase to 400 m/s (greens). The velocities in this area are typically slower than the rest of the survey area, which is indicative of the line's coastal location.
- Chainage 260 m - EOL. This section exhibited slow (<400 m/s) shear wave velocities to ~10 m bgl. Below 10 m bgl velocities increase to 400 m/s. The velocities in this area are typically slower than the rest of the survey area, which is indicative of the line's coastal location.

The MASW profiles was aborted at 380 m as the width of the pathway didn't allow the vehicle and landstreamer to progress further.

7.2 MASW LINE 01B

MASW Line 1b was deployed in a SE-NW direction (Figure 08). The total line was 48 m long (not including shot offsets) and can be considered a sounding.

The following observations can be made about the sounding:

- Modelled shear wave velocities range between 239 and 392 m/s not including the half-space (bottom layer).
- The model is similar to nearby 2D model (MASW line 01a).
- There is good agreement between the experimental (recorded) and model data.
- Model misfits are low at 2.28 %.

7.3 MASW Line 01c

MASW Line 1c was deployed in a SE-NW direction (Figure 09). The total line was 48 m long (not including shot offsets) and can be considered a sounding.

The following observations can be made about the sounding:

- Modelled shear wave velocities range between 282 and 585 m/s not including the half-space (bottom layer).
- A Vs velocity inversion is observed below 12 m bgl (fast over slow). This can indicate a poor model fit; however, the model appears to match the experimental (recorded) dispersion curve.
- The model is similar to nearby 2D model (MASW line 03).
- There is reasonable agreement between the experimental (recorded) and model data.
- Model misfits are acceptable at 3.09 %.

7.4 MASW Line 02

MASW Line 2 was deployed in a SE-NW direction (Figure 10). The total line was 270 m long (not including shot offsets).

The MASW profile can be divided into three broad sections:

- Chainage 0 – 150 m. This section exhibited slow (<400 m/s) shear wave velocities to ~10 m bgl (blue colours). Below 10 m bgl velocities increase to 400 m/s (greens). The velocities in this area are typically slower than the rest of the survey area which is indicative of the low-lying coastal location.
- Chainage 150 m – 220 m. This section exhibited faster (400 m/s) shear wave velocities to ~5 m bgl. Below 5 m bgl there appears to be a subtle velocity inversion to ~10 m bgl. Below 10 m bgl velocities increase again in a similar manner to chainages 0 – 150 m.
- Chainage 220 m – EOL. This section exhibited slow (<400 m/s) shear wave velocities to ~10 m bgl (blue colours). Below 10 m bgl velocities increase to 400 m/s (greens). The velocities in this area are typically

slower than the rest of the survey area which is indicative of the low-lying coastal location.

7.5 MASW Line 03

MASW Line 3 was deployed in a NW-SE direction (Figure 11). The total line was 680 m long (not including shot offsets).

The MASW profile can be divided into four broad sections:

- Chainage 0 – 220 m. This section exhibited relative fast and variable (400 – 600 m/s) shear wave velocities to ~10 m bgl. Below 10 m bgl velocities increase from 500 m/s (yellows to pinks). The velocities in this area are typically faster than the rest of the line.
- Chainage 220 m – 320 m. This section exhibited slow (<400 m/s) shear wave velocities to ~5 m bgl (blue colours). Below 5 m bgl velocities increase significantly from 400 to 900 m/s.
- Chainage 320 m – 390 m. This section exhibited relative fast and variable (400 – 550 m/s) shear wave velocities to ~10 m bgl. Below 10 m bgl velocities increase from 500 m/s (yellows to pinks). The velocities in this area are typically faster than the rest of the line.
- Chainage 390 m – 680 m. This section exhibited slow (<400 m/s) shear wave velocities to ~15 m bgl (blue colours). Below 15 m bgl velocities increase to 400 m/s (greens). The velocities in this area are typically slower than the rest of the survey area which is indicative of the low-lying coastal location.

7.6 MASW Line 04

MASW Line 4 was deployed in a SE-NW direction (Figure 12). The total line was 470 m long (not including shot offsets).

The MASW profile can be divided into two broad sections:

- Chainage 0 – 210 m. This section exhibited relatively slow and homogenous (~400 – 500 m/s) shear wave velocities to the bottom of the model.

- Chainage 210 m – EOL m. This section exhibited relatively fast (>400 m/s) shear wave velocities to ~11 m bgl (greens and yellow colours). Below 11 m bgl velocities typically increase significantly to 600 m/s.

Velocities are generally higher than parallel lines 01, 02 and 03 due to this lines greater distance from the coast and higher elevation.

7.7 MASW Line 05a

MASW Line 5a was deployed in a W-E direction (Figure 13). The total line was 48 m long (not including shot offsets) and can be considered a sounding.

The following observations can be made about the sounding:

- Modelled shear wave velocities range between 255 and 422 m/s not including the half-space (bottom layer).
- A Vs velocity inversion is observed below 11 m bgl (fast over slow). This can be an indication of a poor model fit, but the model seems to match the experimental (recorded data) in the dispersion curve.
- The model is similar to the nearby 2D model (MASW line 02) which it intersects.
- Frequencies greater than 25 Hz were not recorded so resolution in the near surface may be constrained.
- There is good agreement between the experimental (recorded) and model data.
- Model misfits are good at 1.08 %.

7.8 MASW Line 05b

MASW Line 5b was deployed in a W-E direction (Figure 14). The total line was 48 m long (not including shot offsets) and can be considered a sounding.

The following observations can be made about the sounding:

- Modelled shear wave velocities range between 310 and 433 m/s not including the half-space (bottom layer).

- The model is similar to the nearby 2D model (MASW line 02) which it intersects.
- Frequencies greater than 25 Hz were not recorded so resolution in the near surface may be constrained.
- There is good agreement between the experimental (recorded) and model data.
- Model misfits are good at 2.35 %.

7.9 MASW Line 05C

MASW Line 5c was deployed in a W-E direction (Figure 15). The total line was 48 m long (not including shot offsets) and can be considered a sounding.

The following observations can be made about the sounding:

- Modelled shear wave velocities range between 322 and 481 m/s not including the half-space (bottom layer).
- The model is similar to the nearby 2D model (MASW line 03) which it intersects.
- There is reasonable agreement between the experimental (recorded) and model data.
- Model misfits are acceptable at 3.00 % after 15 iterations.

7.10 MASW Line 06a

MASW Line 6a was deployed in a W-E direction (Figure 16). The total line was 48 m long (not including shot offsets) and can be considered a sounding.

The following observations can be made about the sounding:

- Modelled shear wave velocities range between 226 and 383 m/s not including the half-space (bottom layer).
- The model is similar to the nearby 2D model (MASW line 01) which it intersects.
- There is good agreement between the experimental (recorded) and model data.

- Model misfits are good at 0.74 % after 15 iterations.

7.11 MASW Line 06B

MASW Line 6b was deployed in a W-E direction (Figure 17). The total line was 48 m long (not including shot offsets) and can be considered a sounding.

The following observations can be made about the sounding:

- Modelled shear wave velocities range between 263 and 447 m/s not including the half-space (bottom layer).
- The model is similar to the nearby 2D model (MASW line 03) which it which it intersects or is near.
- There is good agreement between the experimental (recorded) and model data.
- Model misfits are good at 0.86 % after 15 iterations.

7.12 MASW Line 06C

MASW Line 6c was deployed in a W-E direction (Figure 18). The total line was 48 m long (not including shot offsets) and can be considered a sounding.

The following observations can be made about the sounding:

- Modelled shear wave velocities range between 404 and 586 m/s not including the half-space (bottom layer).
- The model is similar to the nearby 2D model (MASW line 04) which it which it intersects or is near.
- There is reasonable agreement between the experimental (recorded) and model data.
- Model misfits are acceptable at 4.01 % after 15 iterations.

7.13 MASW Line 07A

MASW Line 7a was deployed in a W-E direction (Figure 19). The total line was 48 m long (not including shot offsets) and can be considered a sounding.

The following observations can be made about the sounding:

- Modelled shear wave velocities range between 223 and 548 m/s not including the half-space (bottom layer).
- The model is similar to the nearby 2D model (MASW line 01) which it which it intersects or is near.
- There is good agreement between the experimental (recorded) and model data.
- Model misfits are good at 2.01 % after 15 iterations.

7.14 MASW Line 07b

MASW Line 07b was deployed in a W-E direction (Figure 20). The total line was 90 m long (not including shot offsets).

The MASW profile can be described as such:

- From 0 – 10 m bgl velocities generally increase from around 350 m/s to 450 m/s from the start of the line (20 m) to the end of the line (90 m).
- Below 10 m bgl velocities are relatively homogenous (>400 m/s).

The shear wave velocity increases as the testing moves away from the coast as might be expected as bedrock/less weathered rock is encountered.

7.15 MASW Line 08

MASW Line 8 was deployed in a W-E direction (Figure 21). The total line was 48 m long (not including shot offsets) and can be considered a sounding.

The following observations can be made about the sounding:

- Modelled shear wave velocities range between 279 and 521 m/s not including the half-space (bottom layer).
- The model is similar to the nearby 2D model (MASW line 03) which it which it intersects or is near. Note it differs from MASW line 09 due to issues with the data at the start of this model (see next section).
- There is good agreement between the experimental (recorded) and model data.
- Model misfits are good at 2.49 % after 15 iterations.

7.16 MASW Line 09

MASW Line 9 was deployed in a NW-SE direction (Figure 22). The total line was 510 m long (not including shot offsets).

The MASW profile can be divided into five broad sections:

- Chainage 0 – 100 m. Data in this section was poor and should be discounted from any analysis. It does not match other lines that intersected it. Poor data may have been the result of a large underlying service or similar.
- Chainage 100 m – 190 m. This section exhibited slow (<400 m/s) shear wave velocities to ~7 m bgl (blue colours). Below 7 m bgl velocities are still relatively low and are generally above or near 400 m/s.
- Chainage 190 m – 270 m. This section exhibited homogenous (~400 m/s) shear wave velocities to ~7 m bgl. Below 7 m bgl velocities decrease below 400 m/s (blues). In MASW modelling velocity inversion like this (fast over soft) can be indicative of modelling/data issues. In this case dispersion curves indicate that the observed model is likely to be realistic.
- Chainage 270 m – 370 m. This section exhibited homogenous (~400 m/s) shear wave velocities to ~7 m bgl (green colours). Below 7 m bgl velocities increase to 700 m/s.
- Chainage 370 m – EOL. This section exhibited slower (<400 m/s) shear wave velocities to ~7 m bgl (blue colours) just before the test line starts to go up the hill. Below 7 m bgl velocities increase to 700 m/s.

7.17 MASW Line 10a

MASW Line 10a was deployed in a W-E direction (Figure 23). The total line was 48 m long (not including shot offsets) and can be considered a sounding.

The following observations can be made about the sounding:

- Modelled shear wave velocities range between 287 and 448 m/s not including the half-space (bottom layer).
- The model is similar to the nearby 2D model (MASW line 03) which it which it intersects or is near.

- There is acceptable agreement between the experimental (recorded) and model data.
- Model misfits are average at 9.31 % after 15 iterations.

7.18 MASW Line 10b

MASW Line 10b was deployed in a W-E direction (Figure 24). The total line was 48 m long (not including shot offsets) and can be considered a sounding.

The following observations can be made about the sounding:

- Modelled shear wave velocities range between 316 and 585 m/s not including the half-space (bottom layer).
- The model exhibits a velocity inversion (fast over soft) below 5.35 m bgl. This can indicate model instability, but the observation matches the input experimental data (dispersion curve). As such there can be some confidence in the output Vs model.
- There is acceptable agreement between the experimental (recorded) and model data.
- Model misfits are average at 4.59 % after 15 iterations.

7.19 MASW Line 11a

MASW Line 11a was deployed in a E_W direction (Figure 25). The total line was 60 m long (not including shot offsets).

The MASW profile can be described as such:

- From 0 – 7 m bgl velocities are generally homogenous around 500 m/s from the start of the line (20 m) to the end of the line (60 m).
- Below 7 m bgl velocities increase gradually to around 800 m/s.

This quasi-2D section was made up of only three soundings due to space available onsite.

7.20 MASW Line 11b

MASW Line 11b was deployed in a S-N direction (Figure 26). The total line was 210 m long (not including shot offsets).

The MASW profile can be divided into three broad sections:

- Chainage 0 – 90 m. This section exhibited relatively homogenous shear wave velocities from surface to TD (400 – 500 m/s).
- Chainage 90 m – 160 m. This section exhibited slow (<400 m/s) shear wave velocities to ~15 m bgl (blue colours). Below 15 m bgl velocities are still relatively low and are generally above or near 400 m/s.
- Chainage 160 m – EOL. This section exhibited slow (<400 m/s) shear wave velocities to ~10 m bgl (blue colours). Below 10 m bgl velocities increase to up to 700 m/s.

This MASW model is interesting because (relatively) low shear wave velocities are observed at what are relatively high elevations. This could be due to variations in geology or weathering conditions.

7.21 MASW Line 11c

MASW Line 11c was deployed in a E_W direction (Figure 27). The total line was 50 m long (not including shot offsets).

The MASW profile can be described as such:

- From 0 – 9 m bgl velocities are generally homogenous around 500 m/s from the start of the line (20 m) to the end of the line (50 m).
- Below 9 m bgl velocities increase gradually to around 1000 m/s.

This quasi-2D section was made up of only three soundings due to space available onsite.

7.22 MASW Line 12

MASW Line 12 was deployed in a NW-SE direction (Figure 28). The total line was 430 m long (not including shot offsets).

The MASW profile can be divided into three broad sections:

- Chainage 0 – 100 m. This section exhibited relatively homogenous low shear wave velocities from surface to TD (~400 m/s).
- Chainage 100 m – 220 m. This section exhibited moderate (~400 m/s) shear wave velocities to TD.
- Chainage 220 m – EOL. This section exhibited slow (<400 m/s) shear wave velocities to ~10 m bgl (blue colours). Below 10 m bgl velocities increase to up to 500 m/s.

Data recorded along this line was relatively noisy due to the higher traffic volumes along this road.

7.23 MASW Line 13

MASW Line 13 was deployed in a NW-SE direction (Figure 29). The total line was 330 m long (not including shot offsets).

The MASW profile can be divided into three broad sections:

- Chainage 0 – 90 m. This section exhibited a gradual increase in shear wave velocity with depth. The model appears to represent a dipping structure that pinches out at ~90 m.
- Chainage 90 m – 200 m. This section exhibited low and reasonably homogenous (~400 m/s) shear wave velocities to TD.
- Chainage 200 m – EOL. This section exhibited slow (<400 m/s) shear wave velocities to ~5 m bgl (blue colours). Below 5 m bgl velocities increase gradually to up to 600 m/s.

Data recorded along this line was relatively noisy due very heavy rain experienced onsite.

7.24 MASW Line 14

MASW Line 14 was deployed in a W-E direction (Figure 30). The total line was 48 m long (not including shot offsets) and can be considered a sounding.

The following observations can be made about the sounding:

- Modelled shear wave velocities range between 325 and 525 m/s not including the half-space (bottom layer).

- The model exhibits a velocity inversion (fast over soft) below 4.88 m bgl. This can indicate model instability, but the observation matches the input experimental data (dispersion curve). As such there can be some confidence in the output Vs model.
- There is acceptable agreement between the experimental (recorded) and model data.
- Model misfits are average at 3.03 % after 15 iterations.

7.25 MASW Line 15

MASW Line 15 was deployed in a S-N direction (Figure 31). The total line was 830 m long (not including shot offsets).

The MASW profile can be divided into four broad sections:

- Chainage 0 – 160 m. This section exhibited relatively low shear wave velocities (~400 m/s) to around 7 m bgl. Below 7 m bgl velocities increase rapidly to ~1000 m/s. This model was indicative of the softer materials in the near surface associated with the coastline.
- Chainage 160 m – 340 m. This section exhibited relatively moderate shear wave velocities (<600 m/s) to around 7 m bgl. Below 7 m bgl velocities increase rapidly to ~1000 m/s. This model was observed as the line went up the hill.
- Chainage 340 m – 640 m. This section exhibited high (~1000 m/s) shear wave velocities to TD (pink colours). Such fast shear wave velocities are not ideal for surface wave testing like MASW that relies on dispersion. Relative shear wave velocities are indicative.
- Chainage 640 m – EOL. This section exhibited relatively moderate shear wave velocities (<600 m/s) to around 7 – 10 m bgl. Below 7 – 10 m bgl velocities generally increase rapidly to ~1000 m/s. This model was observed as the line went down the hill.

7.26 MASW Line 16

MASW Line 11c was deployed in a E_W direction (Figure 32). The total line was 90 m long (not including shot offsets).

The MASW profile can be described as such:

- Generally, the overall model was homogenous along its entire length with Vs values increase gradually from around 300 m/s in the near surface to 1000 m at depth.
- The slowest shear wave velocities pinch out at higher chainages as the line went up the hill.

This quasi-2D section was made up of only four soundings due to space available onsite.

7.27 MASW Line 17

MASW Line 17 was deployed in a W-E direction (Figure 33). The total line was 430 m long (not including shot offsets).

The MASW profile can be divided into four broad sections:

- Chainage 0 – 60 m. This section exhibited relatively low shear wave velocities (~500 m/s) to around 7 m bgl. Below 7 m bgl velocities increase gradually to ~1000 m/s.
- Chainage 60 m – 210 m. This section exhibited relatively low shear wave velocities (<400 m/s) to around 7 m bgl. Below 7 m bgl velocities increase rapidly to ~1000 m/s.
- Chainage 210 m – 340 m. This section exhibited lower shear wave velocities with the maximum shear wave velocity observed being ~600 m/s.
- Chainage 340 m – EOL. This section exhibited lower shear wave velocities (<400 m/s) to around 7 – 10 m bgl. Below 7 – 10 m bgl velocities generally increase to ~1000 m/s in contrast to chainages 210 – 340 m. This model was observed as the line went up the hill.

7.28 MASW Line 18a

MASW Line 18a was deployed in a W-E direction (Figure 34). The total line was 48 m long (not including shot offsets) and can be considered a sounding.

The following observations can be made about the sounding:

- Modelled shear wave velocities range between 228 and 337 m/s not including the half-space (bottom layer).
- The model exhibits reasonable agreement with the end of MASW line 2 that it intersects/is near.
- There is acceptable agreement between the experimental (recorded) and model data.
- Model misfits are average at 3.00 % after 15 iterations.

7.29 MASW Line 18b

MASW Line 18b was deployed in a W-E direction (Figure 35). The total line was 48 m long (not including shot offsets) and can be considered a sounding.

The following observations can be made about the sounding:

- Modelled shear wave velocities range between 299 and 449 m/s not including the half-space (bottom layer).
- The model exhibits reasonable agreement with MASW line 3 that it which it intersects or is near.
- There is acceptable agreement between the experimental (recorded) and model data.
- Model misfits are average at 4.13 % after 15 iterations.
- Model misfits are average at 4.13 % after 15 iterations.

7.30 SRT Line 01a

SRT Line 01a was deployed in a S-N direction (Figure 36). The total line was 197 m long (not including off-end shots).

The SRT profile can be described generally as:

- Compressional wave velocities are generally laterally homogeneous. Vp values appear to increase consistently with depth from just under 1500 m/s to ~4500 m/s.
- This model is unexpected considering the expected geological model and the coincident MASW data.

- Faster materials (>4500 m/s) are observed slightly more shallowly between chainages -10 m – 10 m and 100 – 140 m.
- Signal to noise ratios were relatively low for this SRT line.

7.31 SRT Line 01b

SRT Line 01b was deployed in a SE-NW direction (Figure 37). The total line was 197 m long (not including off-end shots).

The SRT profile can be described generally as:

- Compressional wave velocities are generally laterally homogeneous. Vp values appear to increase consistently with depth from just under 1500 m/s to ~5000 m/s.
- This model is unexpected considering the expected geological model and the coincident MASW data.
- Faster materials (>4500 m/s) are observed at shallower depths between chainages 130 m – 197 m.
- Signal to noise ratios were relatively low for this SRT line.

7.32 SRT Line 02

SRT Line 02 was deployed in a N-S direction (Figure 38). The total line was 289 m long (not including off-end shots).

The SRT profile can be divided into three broad sections:

- Chainage 0 – 110 m. This section exhibited compressional wave velocities increasing gradually from just under 1000 m/s in the near surface to ~2200 m/s at TD.
- Chainage 110 m – 150 m. This section exhibited compressional wave velocities increasing gradually from just under 1000 m/s in the near surface to ~2500 m/s at TD. The higher Vp values were coincident with a topographic high along the profile.
- Chainage 150 m – EOL. This section exhibited generally lower compressional wave velocities increasing gradually from just under 1000 m/s in the near surface to ~1500 m/s at 7 m bgl.

7.33 SRT Line 03

SRT Line 03 was deployed in a S-N direction (Figure 39). The total line was 289 m long (not including off-end shots).

The SRT profile can be divided into three broad sections:

- Chainage 0 – 50 m. This section exhibited compressional wave velocities increasing gradually from just under 1000 m/s in the near surface to ~2500 m/s at TD.
- Chainage 50 m – 140 m. This section exhibited generally lower compressional wave velocities increasing gradually from just under 1000 m/s in the near surface to ~1500 m/s at 10 m bgl.
- Chainage 140 m – EOL. This section exhibited compressional wave velocities increasing gradually from just under 1000 m/s in the near surface to ~2000 m/s at TD.

7.34 3D Representations

Appendix C (digital data only) consists of 3D Leapfrog enabled outputs.

7.35 Raw Data

Appendix D (digital data only) consists of raw seismic data.

7.36 Vs sounding outputs

Appendix E consists of Vs Sounding outputs.

8 REFERENCES

- Reynolds, J. M. (2011). An introduction to applied and environmental geophysics. John Wiley & Sons.

9 LIMITATIONS

- This report has been prepared for the particular purpose outlined in the project brief and no responsibility is accepted for the use of any part in other contexts or for any other purpose.
- Ground conditions assessed in this report are inferred from published sources, site inspection and the investigations described. Variations from the interpreted conditions may occur, and special conditions relating to the site may not have been revealed by this investigation, and which are therefore not taken into account. No warranty is included either expressed or implied that the actual conditions will conform to the interpretation contained in this report.
- No responsibility is accepted by Resource Development Consultants Ltd for inaccuracies in data supplied by others. Where data has been supplied by others, it has been assumed that this information is correct.
- Groundwater conditions can vary with season or due to other events. Any comments on groundwater conditions are based on observations at the time.
- This report is provided for sole use by the client and is confidential to the client and their professional advisors. No responsibility whatsoever for the contents of this report shall be accepted for any person other than the client.

10 CLOSURE

We trust this meets your current needs. Should you wish to discuss any aspect of the contents of this document please contact Siru Jylhänkangas (sjylhankangas@rdcl.co.nz, 04 282 1564).

Faithfully,

Prepared by:



O Gibson

BSc, MRes

Principal Geophysicist

Reviewed by:

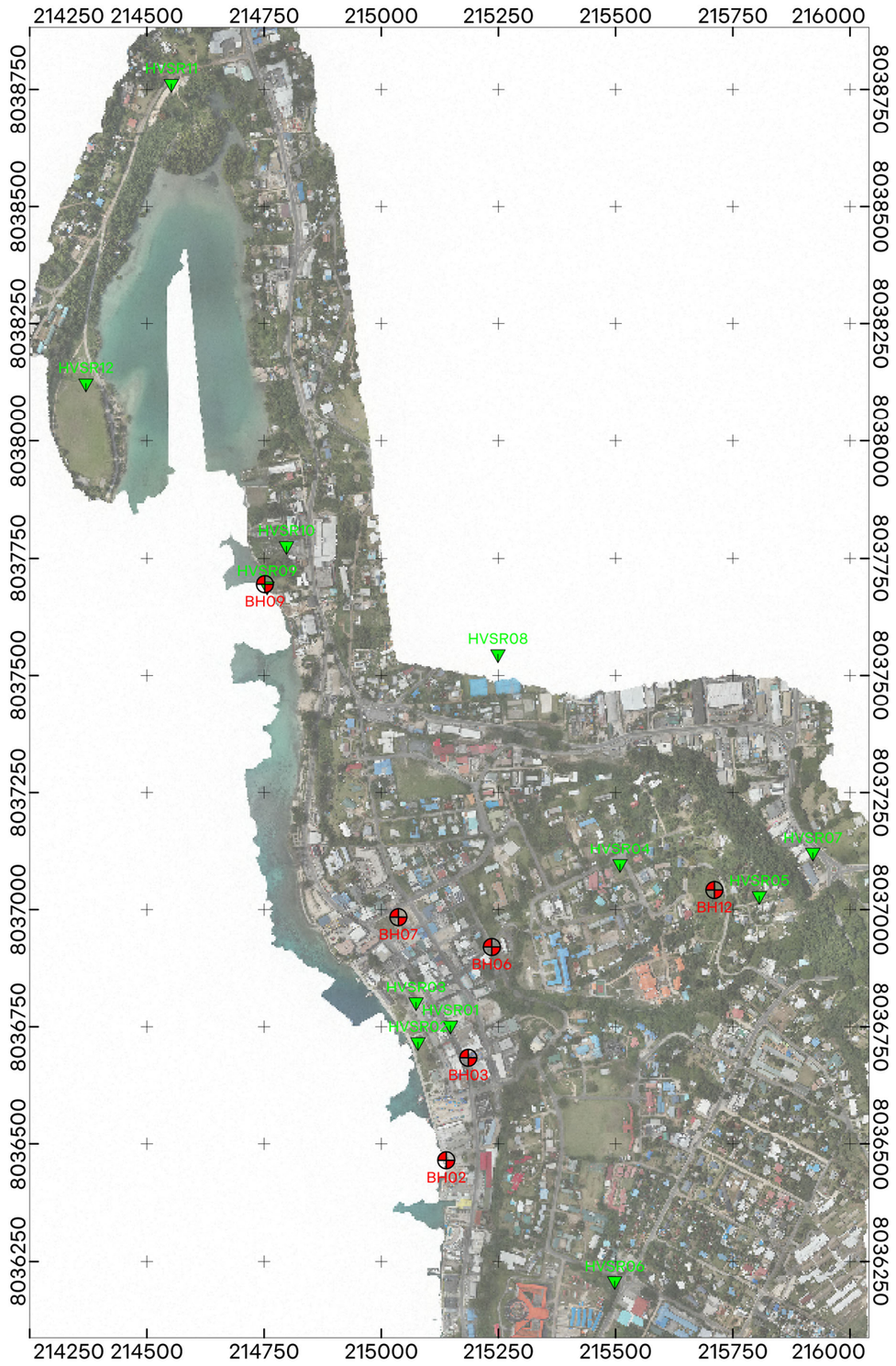


S Jylhänkangas

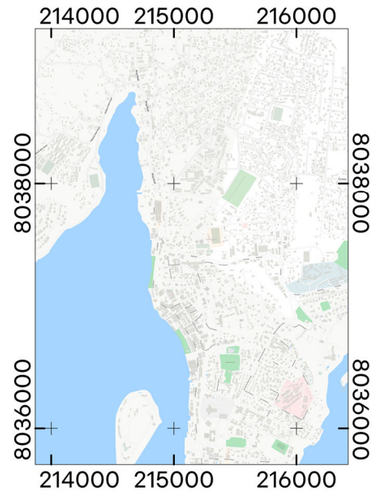
BSc Geol GPHS, MSc GPHS

Geophysicist

FIGURES



GENERAL LOCATION PLAN:



GENERAL LOCATION PLAN SCALE:

Scale 1:50000

1000 0 1000 2000

metres

WGS 84 / UTM zone 59S

SCALE:

Scale 1:12000

250 0 250 500

metres

WGS 84 / UTM zone 59S

LEGEND:

- Downhole Seismic Test Location
- HVSR Test Location

NOTES:

1. Imagery data provided to RDCL by the client.
2. Absolute accuracy of test location ±3 m.

CLIENT: T+T

PROJECT: PORT VILA, VANUATU GEOPHYSICS

TITLE: HVSR & DOWNHOLE SEISMIC TEST LOCATIONS

INTERP. BY: OG	DATE: 01/04/2026	DRAWN BY: OG	DATE: 01/04/2026
CHECKED BY: SJ	DATE: 01/04/2026	APPROVED BY: SJ	DATE: 01/04/2026

CONTRACT No.: 250306 FIGURE 01

FILE NAME: 250306.gpf
PLOTTED DRAWING SIZE: A3 (420 x 297)

RDCL
Unit 2, 2 Raiha Street, Elsdon
Porirua, Wellington, New Zealand
Tel: +64 4 282 1564
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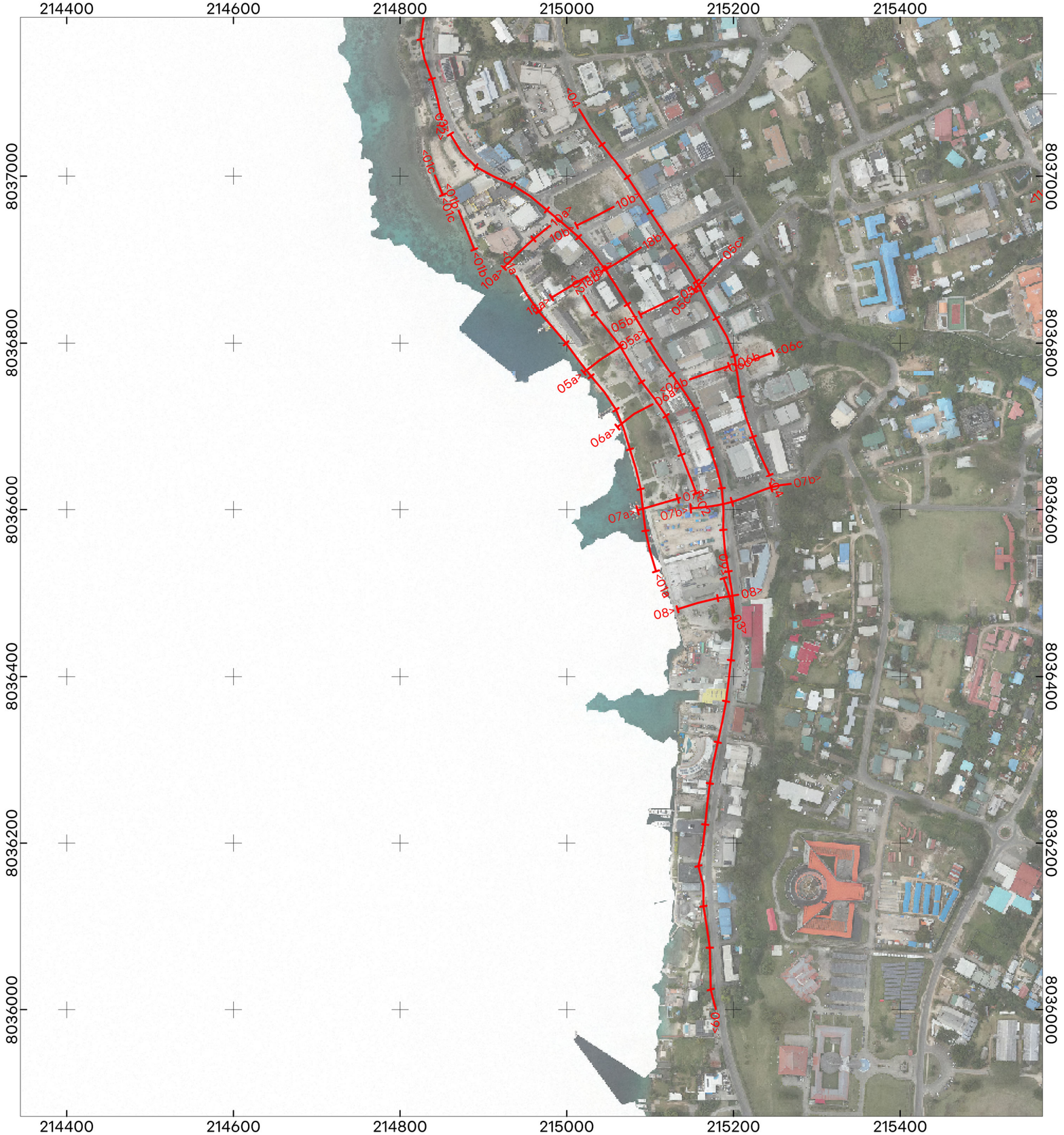
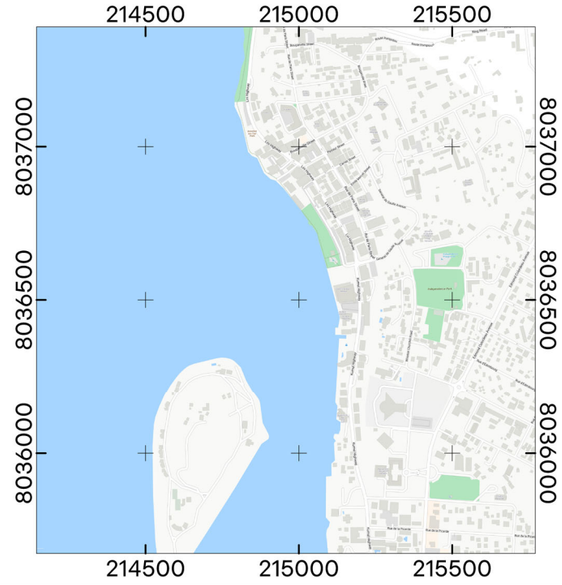


GENERAL LOCATION PLAN:



GENERAL LOCATION PLAN SCALE: Scale 1:20000

500 0 500 1000

metres

WGS 84 / UTM zone 59S

SCALE: Scale 1:5000

100 0 100 200

metres

WGS 84 / UTM zone 59S

LEGEND:

MASW Line

NOTES:

1. Imagery data provided to RDCL by the client.
2. Absolute accuracy of test location ±3 m.

CLIENT: T+T

PROJECT: PORT VILA, VANUATU
GEOPHYSICS

TITLE: MASW CBD
TEST LOCATIONS

INTERP. BY: OG	DATE: 02/04/2026	DRAWN BY: OG	DATE: 02/04/2026
CHECKED BY: SJ	DATE: 02/04/2026	APPROVED BY: SJ	DATE: 02/04/2026

CONTRACT No.: 250306 FIGURE 02

FILE NAME: 250306.gpf
PLOTTED DRAWING SIZE: A3 (420 x 297)

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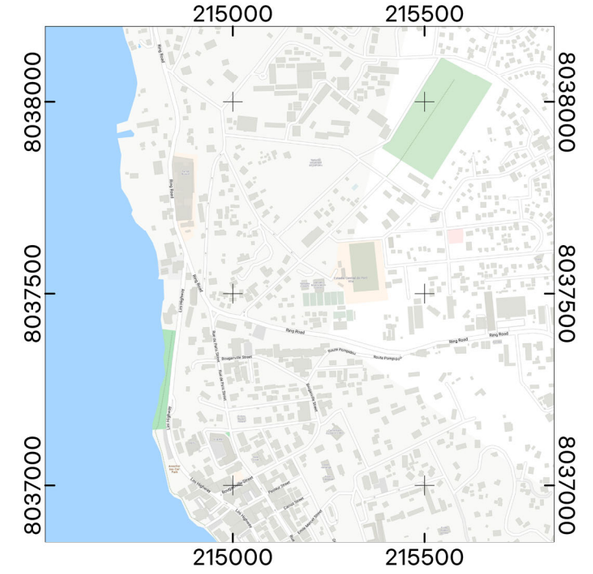
GENERAL LOCATION PLAN:



GENERAL LOCATION PLAN SCALE: Scale 1:16000

250 0 250 500 750 1000

metres

WGS 84 / UTM zone 59S

SCALE: Scale 1:4000

100 0 100 200

metres

WGS 84 / UTM zone 59S

LEGEND:

MASW Line

NOTES:

1. Imagery data provided to RDCL by the client.
2. Absolute accuracy of test location ±3 m.

CLIENT: T+T

PROJECT: PORT VILA, VANUATU GEOPHYSICS

TITLE: MASW NORTH CBD TEST LOCATIONS

INTERP. BY: OG	DATE: 02/04/2026	DRAWN BY: OG	DATE: 02/04/2026
CHECKED BY: SJ	DATE: 02/04/2026	APPROVED BY: SJ	DATE: 02/04/2026

CONTRACT No.: 250306 FIGURE 03

FILE NAME: 250306.gpf
PLOTTED DRAWING SIZE: A3 (420 x 297)

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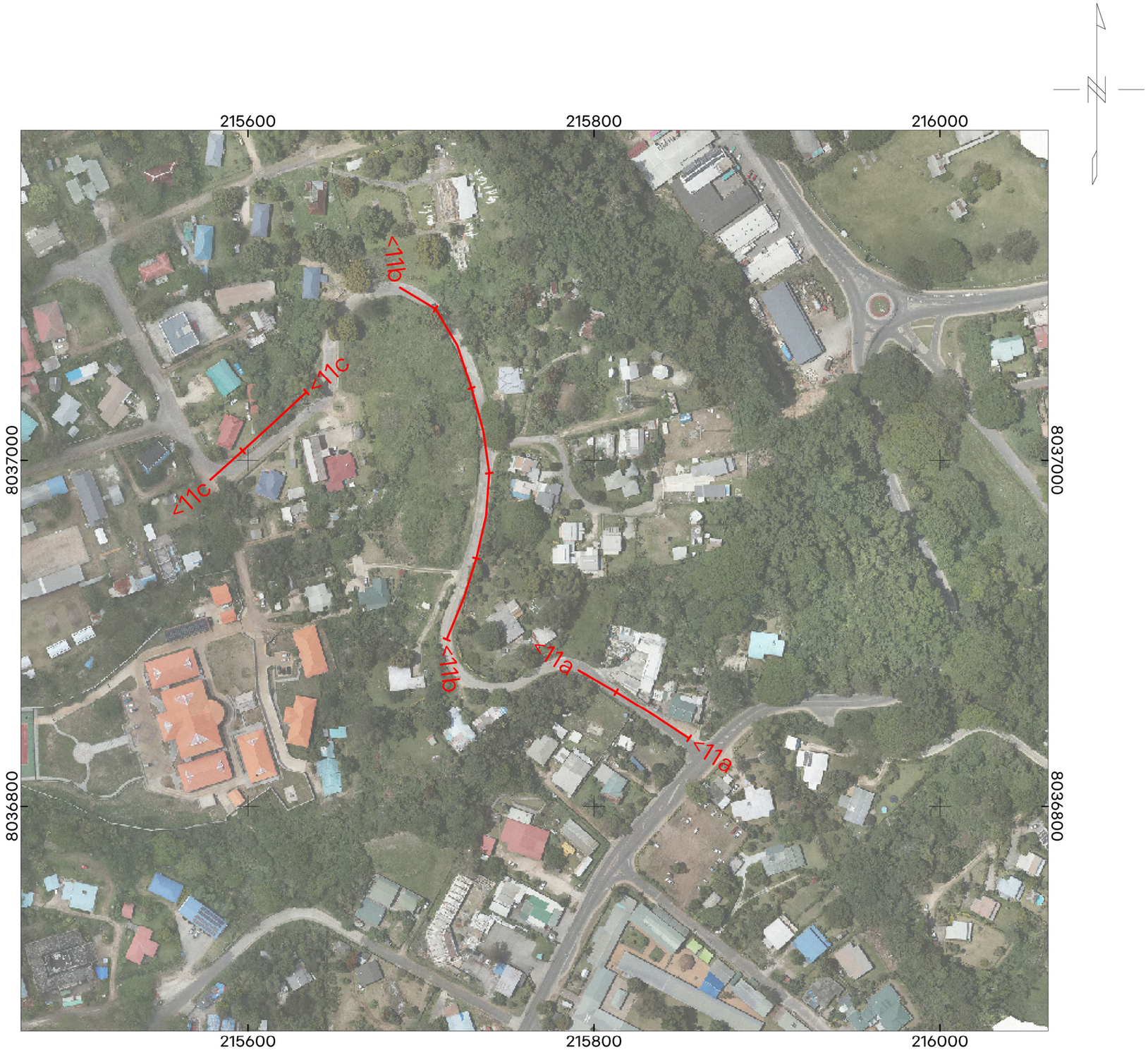
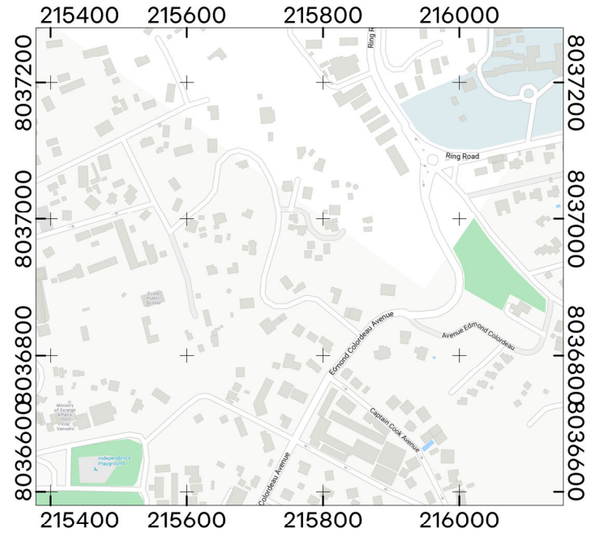


GENERAL LOCATION PLAN:



GENERAL LOCATION PLAN SCALE: Scale 1:9000

200 0 200 400

metres

WGS 84 / UTM zone 59S

SCALE: Scale 1:2500

50 0 50 100

metres

WGS 84 / UTM zone 59S

LEGEND:

MASW Line

NOTES:

1. Imagery data provided to RDCL by the client.
2. Absolute accuracy of test location ±3 m.

CLIENT: T+T

PROJECT: PORT VILA, VANUATU
GEOPHYSICS

TITLE: MASW EAST
TEST LOCATIONS

INTERP. BY: OG	DATE: 02/04/2026	DRAWN BY: OG	DATE: 02/04/2026
CHECKED BY: SJ	DATE: 02/04/2026	APPROVED BY: SJ	DATE: 02/04/2026

CONTRACT No.: 250306 FIGURE 04

FILE NAME: 250306.gpf
PLOTTED DRAWING SIZE: A3 (420 x 297)

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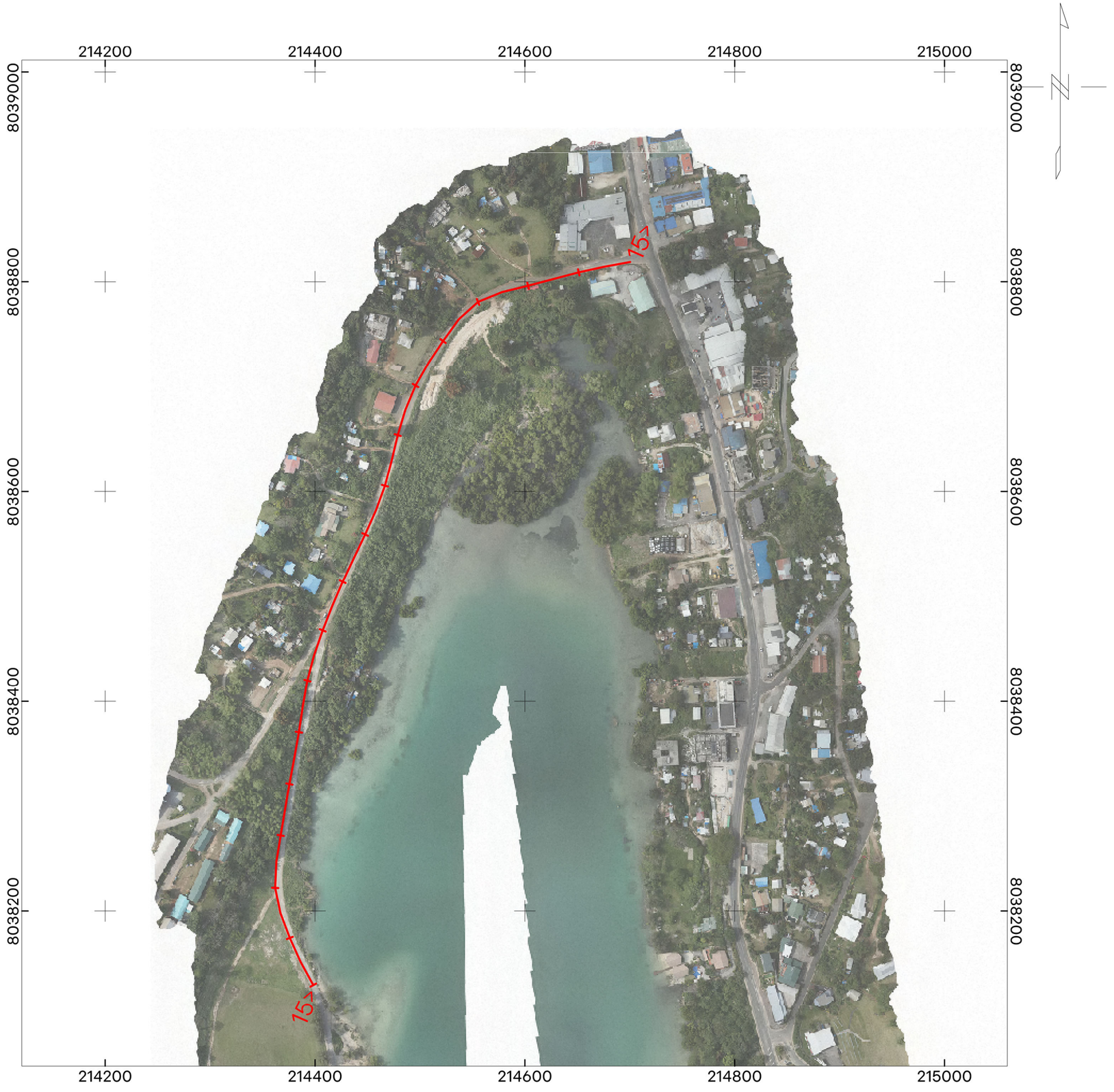
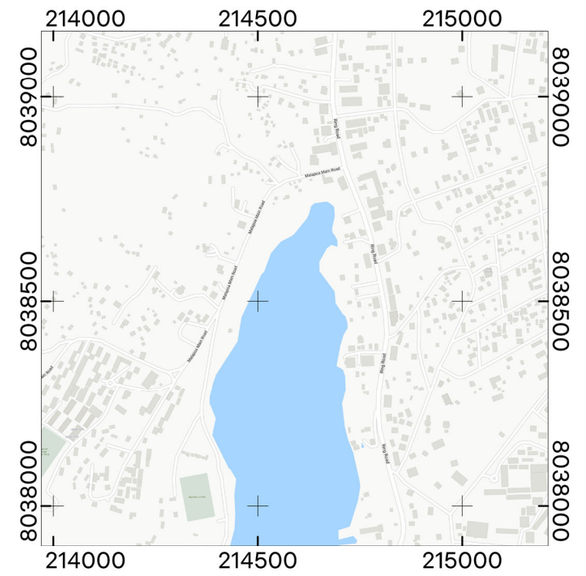


GENERAL LOCATION PLAN:



GENERAL LOCATION PLAN SCALE: Scale 1:15000

250 0 250 500 750

metres

WGS 84 / UTM zone 59S

SCALE: Scale 1:4000

100 0 100 200

metres

WGS 84 / UTM zone 59S

LEGEND:

MASW Line

NOTES:

1. Imagery data provided to RDCL by the client.
2. Absolute accuracy of test location ±3 m.

CLIENT: T+T

PROJECT: PORT VILA, VANUATU
GEOPHYSICS

TITLE: MASW LINE 15
TEST LOCATIONS

INTERP. BY: OG	DATE: 02/04/2026	DRAWN BY: OG	DATE: 02/04/2026
CHECKED BY: SJ	DATE: 02/04/2026	APPROVED BY: SJ	DATE: 02/04/2026

CONTRACT No.: 250306 FIGURE 05

FILE NAME: 250306.gpf
PLOTTED DRAWING SIZE: A3 (420 x 297)

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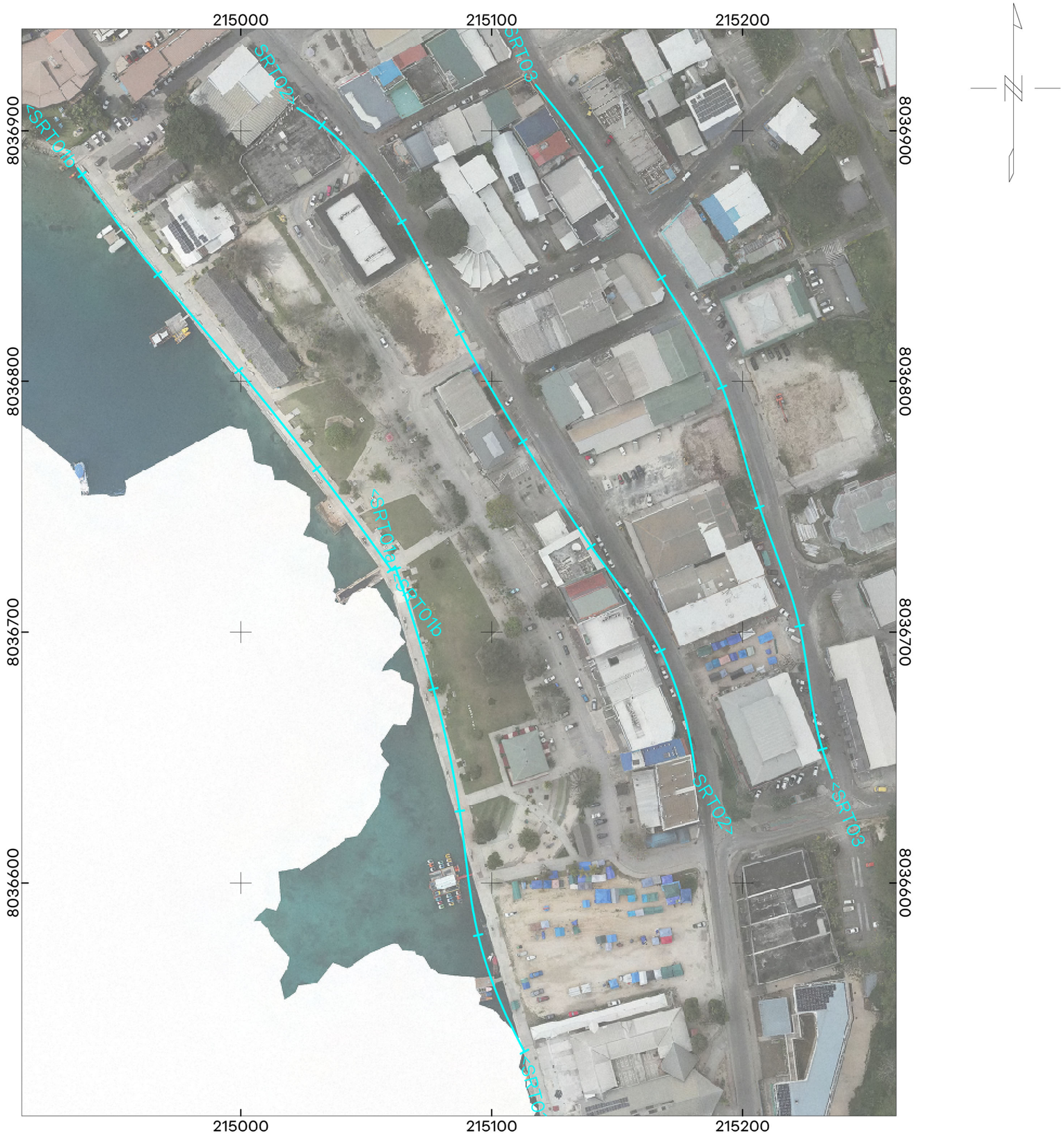

GENERAL LOCATION PLAN:



GENERAL LOCATION PLAN SCALE: Scale 1:6000

100 0 100 200 300

metres

WGS 84 / UTM zone 59S

SCALE: Scale 1:1700

25 0 25 50 75 100

metres

WGS 84 / UTM zone 59S

LEGEND:

SRT Line

NOTES:

1. Imagery data provided to RDCL by the client.
2. Absolute accuracy of test location ±3 m.

CLIENT: T+T

PROJECT: PORT VILA, VANUATU
GEOPHYSICS

TITLE: SRT
TEST LOCATIONS

INTERP. BY: OG	DATE: 03/04/2026	DRAWN BY: OG	DATE: 03/04/2026
CHECKED BY: SJ	DATE: 03/04/2026	APPROVED BY: SJ	DATE: 03/04/2026

CONTRACT No.: 250306 FIGURE 06

FILE NAME: 250306.gpf
PLOTTED DRAWING SIZE: A3 (420 x 297)

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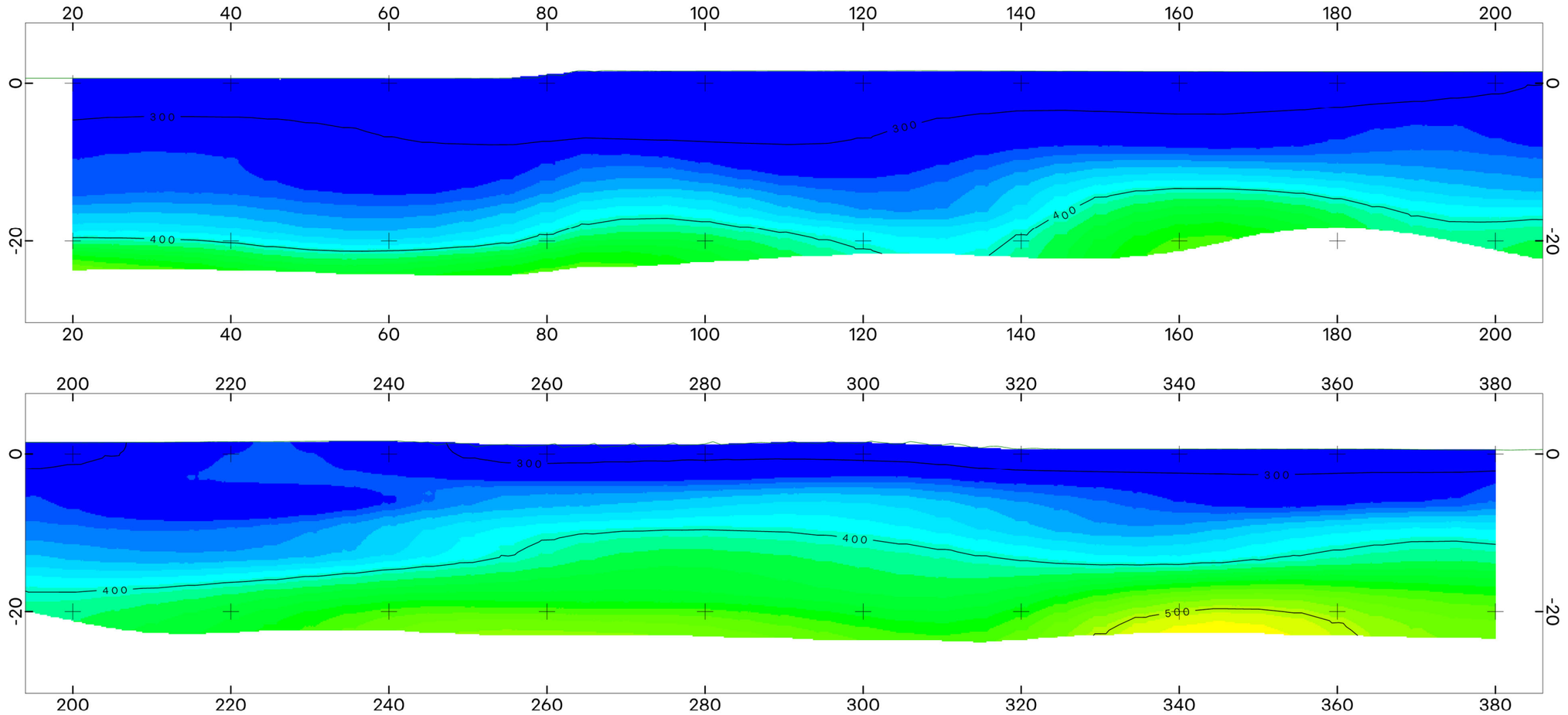
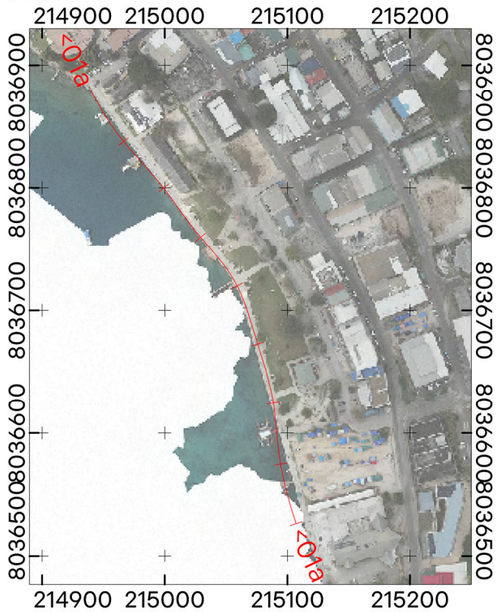
RDCL

SOUTH EAST

NORTH WEST



GENERAL LOCATION PLAN:



SCALE:

Scale 1:600

10 0 10 20 30

metres

GENERAL LOCATION PLAN SCALE:

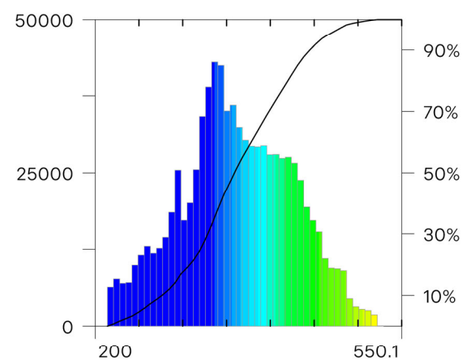
Scale 1:5000

100 0 100 200

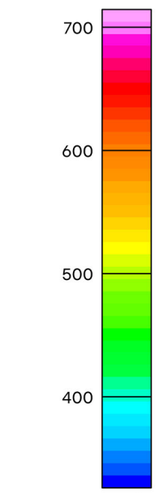
metres

WGS 84 / UTM zone 59S

GRID HISTOGRAM:



LEGEND:



Model Vs (m/s)

NOTES:

1. Imagery data provided to RDCL by the client.

CLIENT: T+T

PROJECT: PORT VILA, VANUATU GEOPHYSICS

TITLE: MASW LINE 01a PSEUDO Vs SECTION

INTERP. BY: OG	DATE: 08/04/2026	DRAWN BY: OG	DATE: 08/04/2026
CHECKED BY: SL	DATE: 08/04/2026	APPROVED BY: SJ	DATE: 08/04/2026

CONTRACT No.: 250306 FIGURE 07

FILE NAME: 250306.gpf

PLOTTED DRAWING SIZE: A3 (420 x 297)

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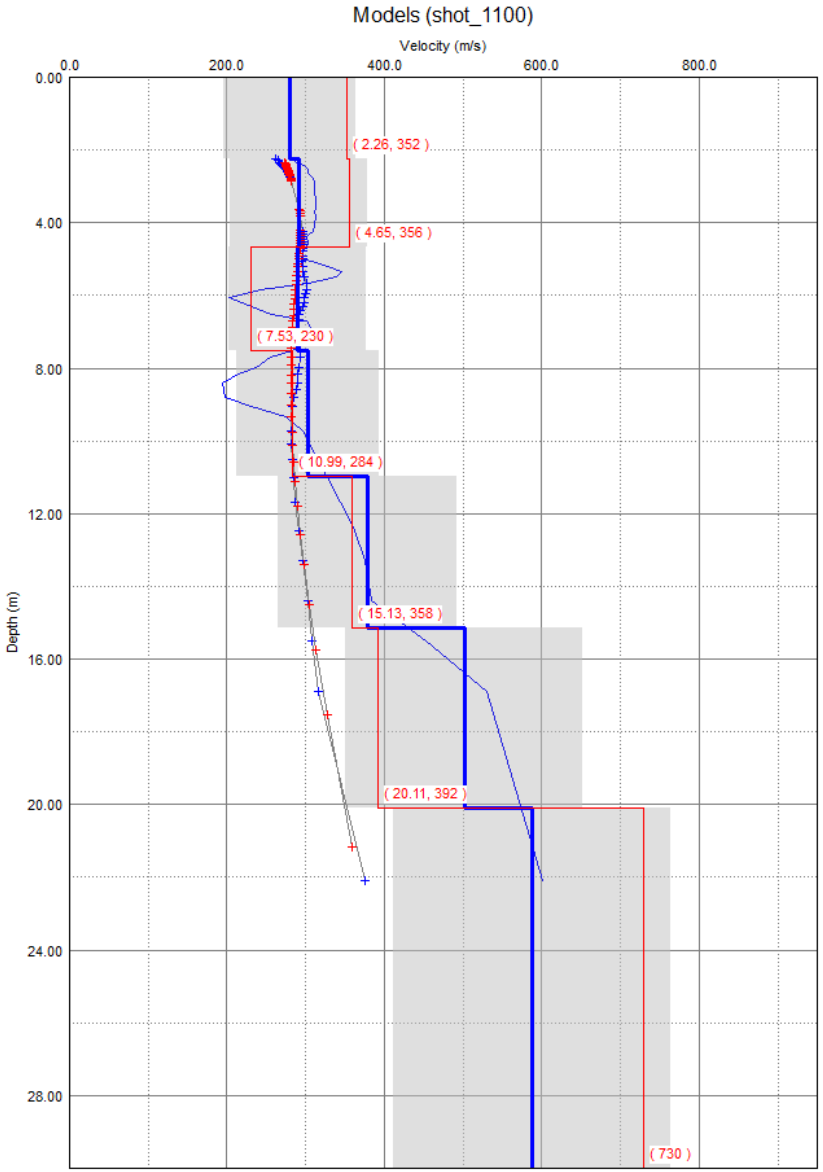
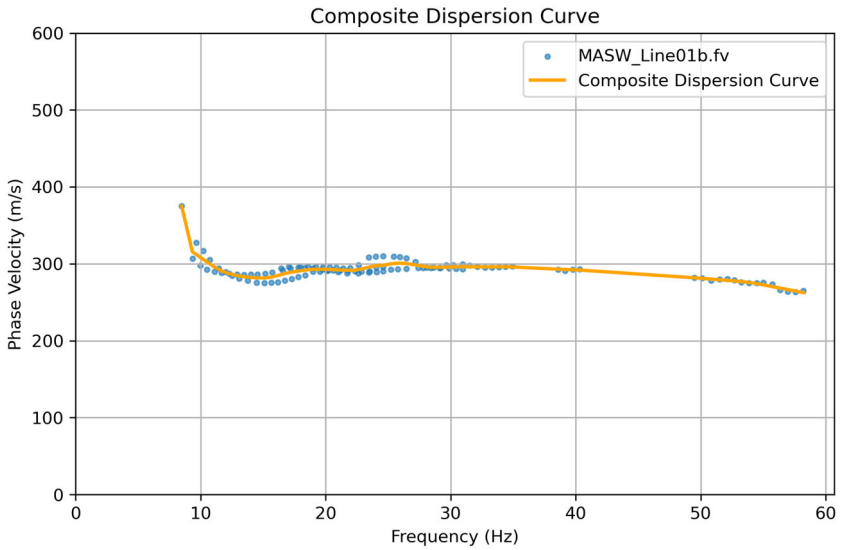
Ground Model

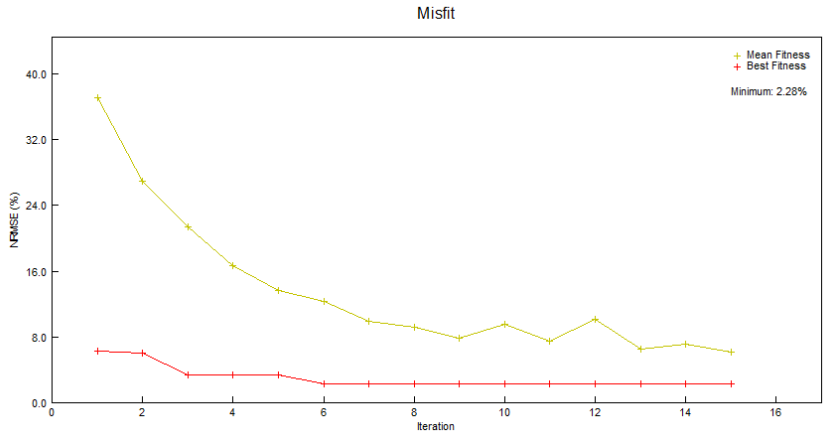


Final Model

Composite Dispersion Curve

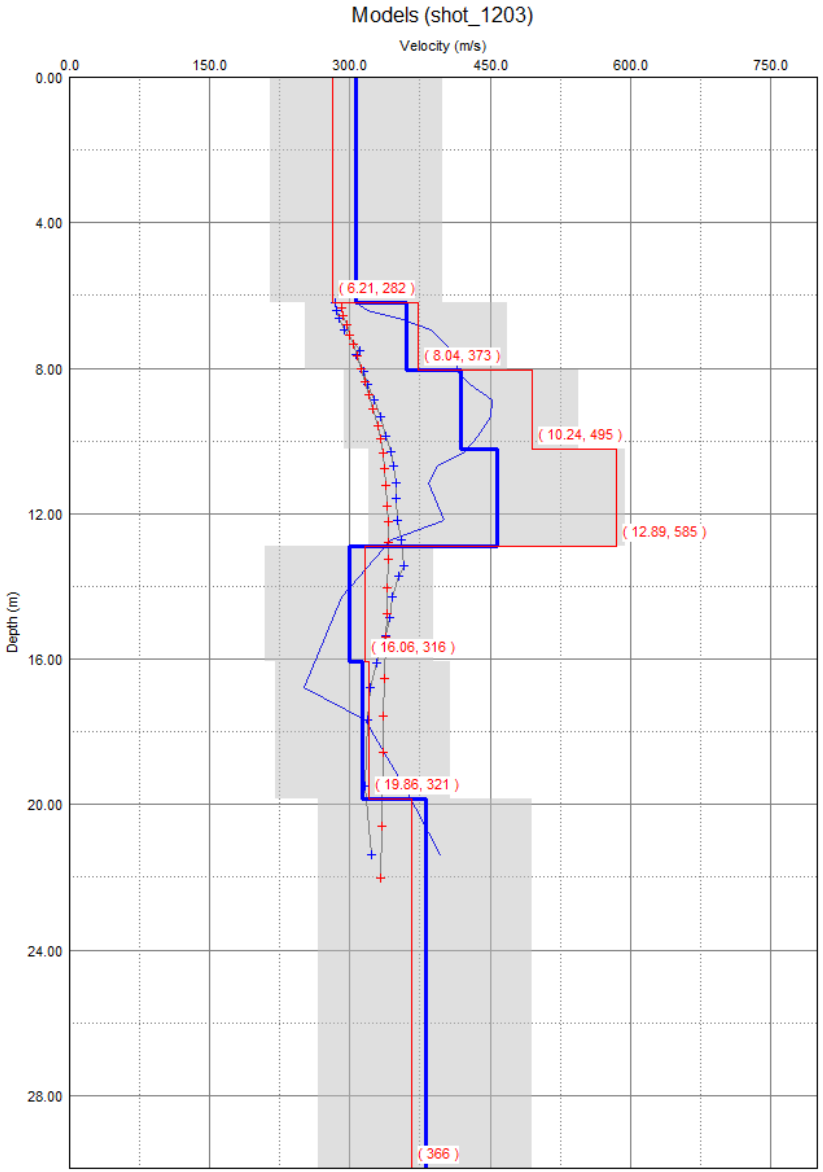


Plot of Misfit



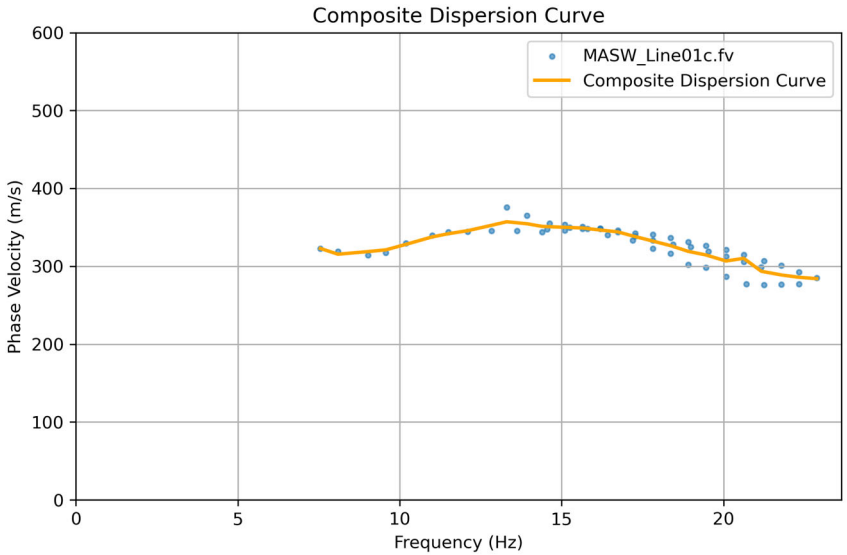
TITLE	MASW Line 01b Sounding	PROJECT				
PROJECT	Port Vila, Vanuatu Geophysics	DRAWN BY	OG	DATE	13/04/26	FIG
CLIENT	T+T	CHECKED BY	SL	DATE	13/04/26	08

Ground Model

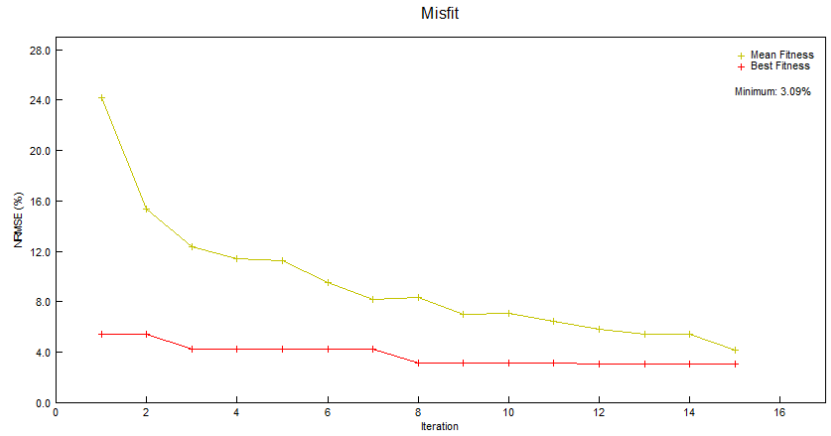


Final Model

Composite Dispersion Curve



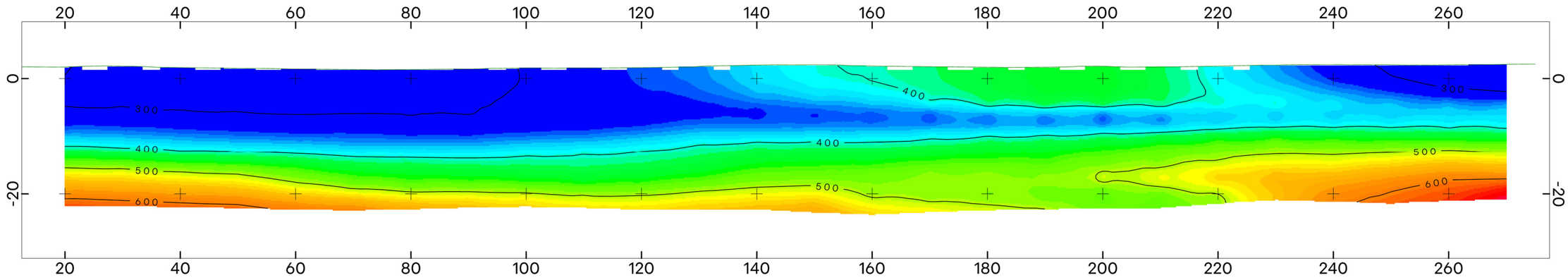
Plot of Misfit



RDCL®	TITLE	MASW Line 01c Sounding	PROJECT	250306		
	PROJECT	Port Vila, Vanuatu Geophysics	DRAWN BY	OG	DATE	13/04/26	FIG
	CLIENT	T+T	CHECKED BY	SL	DATE	13/04/26	09

SOUTH EAST

NORTH WEST



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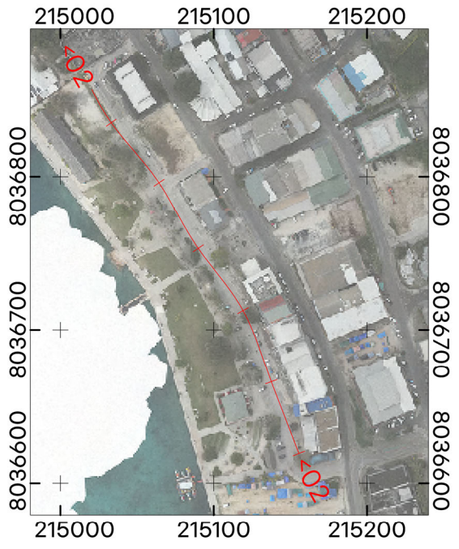


SCALE:

Scale 1:750

10 0 10 20 30 40

metres

GENERAL LOCATION PLAN SCALE:

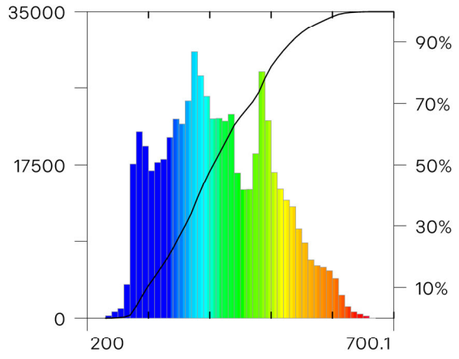
Scale 1:4000

100 0 100 200

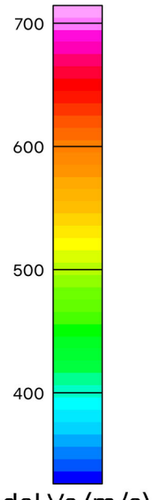
metres

WGS 84 / UTM zone 59S

GRID HISTOGRAM:



LEGEND:



Model Vs (m/s)

NOTES:

1. Imagery data provided to RDCL by the client.

CLIENT:

T+T

PROJECT:

PORT VILA, VANUATU
GEOPHYSICS

TITLE:

MASW LINE 02
PSEUDO Vs SECTION

INTERP. BY: OG	DATE: 08/04/2026	DRAWN BY: OG	DATE: 08/04/2026
CHECKED BY: SL	DATE: 08/04/2026	APPROVED BY: SJ	DATE: 08/04/2026

CONTRACT No.: 250306 FIGURE 10

FILE NAME: 250306.gpf
PLOTTED DRAWING SIZE: A3 (420 x 297)

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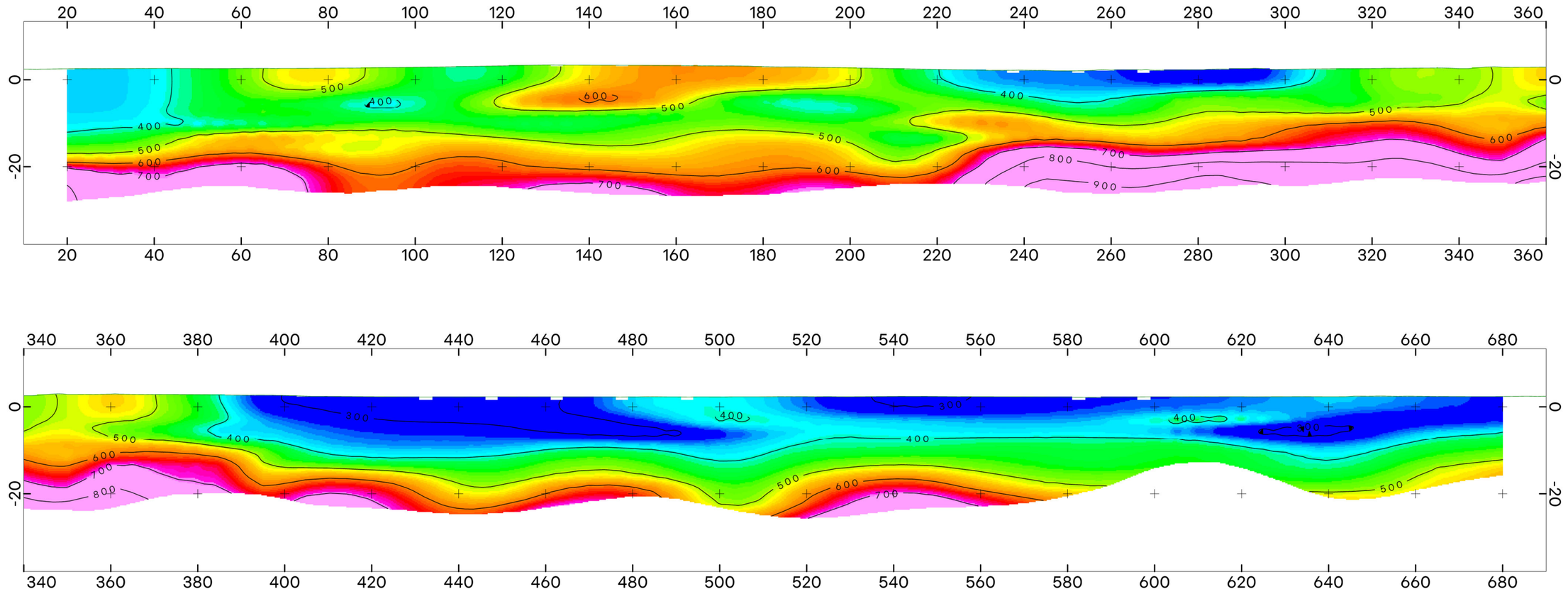
RDCL

NORTH WEST

SOUTH EAST



GENERAL LOCATION PLAN:



SCALE:

Scale 1:1000

20 0 20 40

metres

GENERAL LOCATION PLAN SCALE:

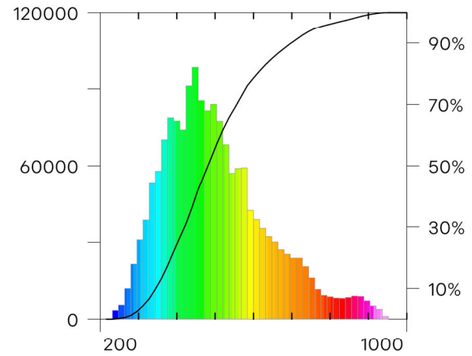
Scale 1:10000

200 0 200 400

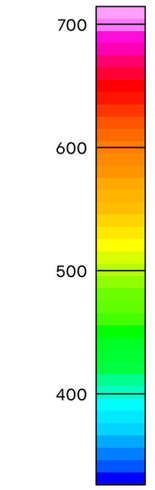
metres

WGS 84 / UTM zone 59S

GRID HISTOGRAM:



LEGEND:



Model Vs (m/s)

NOTES:

1. Imagery data provided to RDCL by the client.

CLIENT:

T+T

PROJECT:

PORT VILA, VANUATU
GEOPHYSICS

TITLE:

MASW LINE 03
PSEUDO Vs SECTION

INTERP. BY: OG	DATE: 07/04/2026	DRAWN BY: OG	DATE: 07/04/2026
CHECKED BY: SL	DATE: 07/04/2026	APPROVED BY: SJ	DATE: 07/04/2026

CONTRACT No.: 250306

FIGURE 11

FILE NAME: 2XXXXXXXXXX

PLOTTED DRAWING SIZE: A3 (420 x 297)

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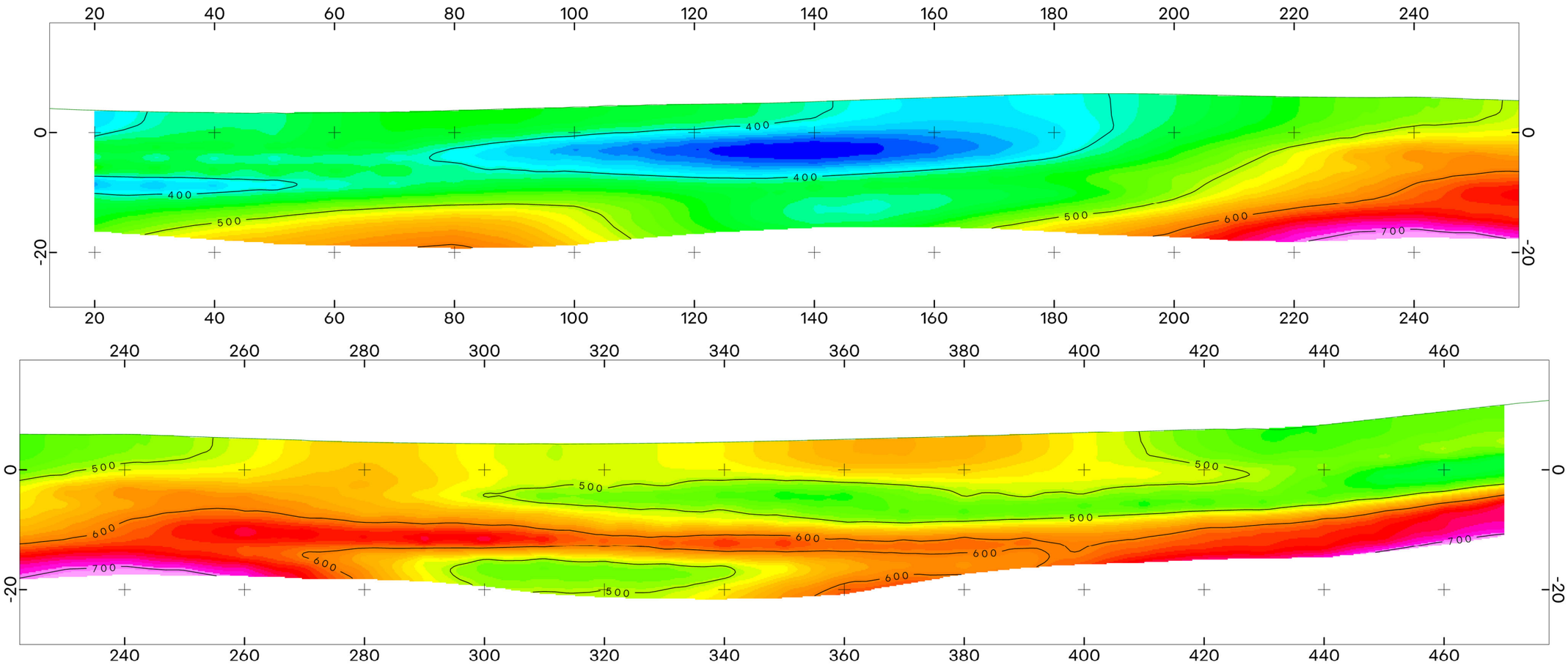
RDCL

SOUTH EAST

NORTH WEST



GENERAL LOCATION PLAN:



SCALE:

Scale 1:750

10 0 10 20 30 40

metres

GENERAL LOCATION PLAN SCALE:

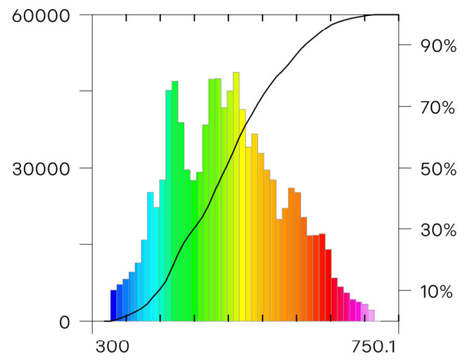
Scale 1:7500

100 0 100 200 300 400

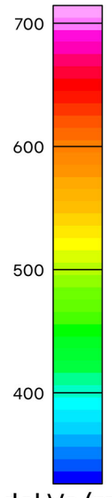
metres

WGS 84 / UTM zone 59S

GRID HISTOGRAM:



LEGEND:



Model Vs (m/s)

NOTES:

1. Imagery data provided to RDCL by the client.

CLIENT: T+T

PROJECT: PORT VILA, VANUATU GEOPHYSICS

TITLE: MASW LINE 04 PSEUDO Vs SECTION

INTERP. BY: OG	DATE: 08/04/2026	DRAWN BY: OG	DATE: 08/04/2026
CHECKED BY: SL	DATE: 08/04/2026	APPROVED BY: SJ	DATE: 08/04/2026

CONTRACT No.: 250306 FIGURE 12

FILE NAME: 250306.gpf

PLOTTED DRAWING SIZE: A3 (420 x 297)

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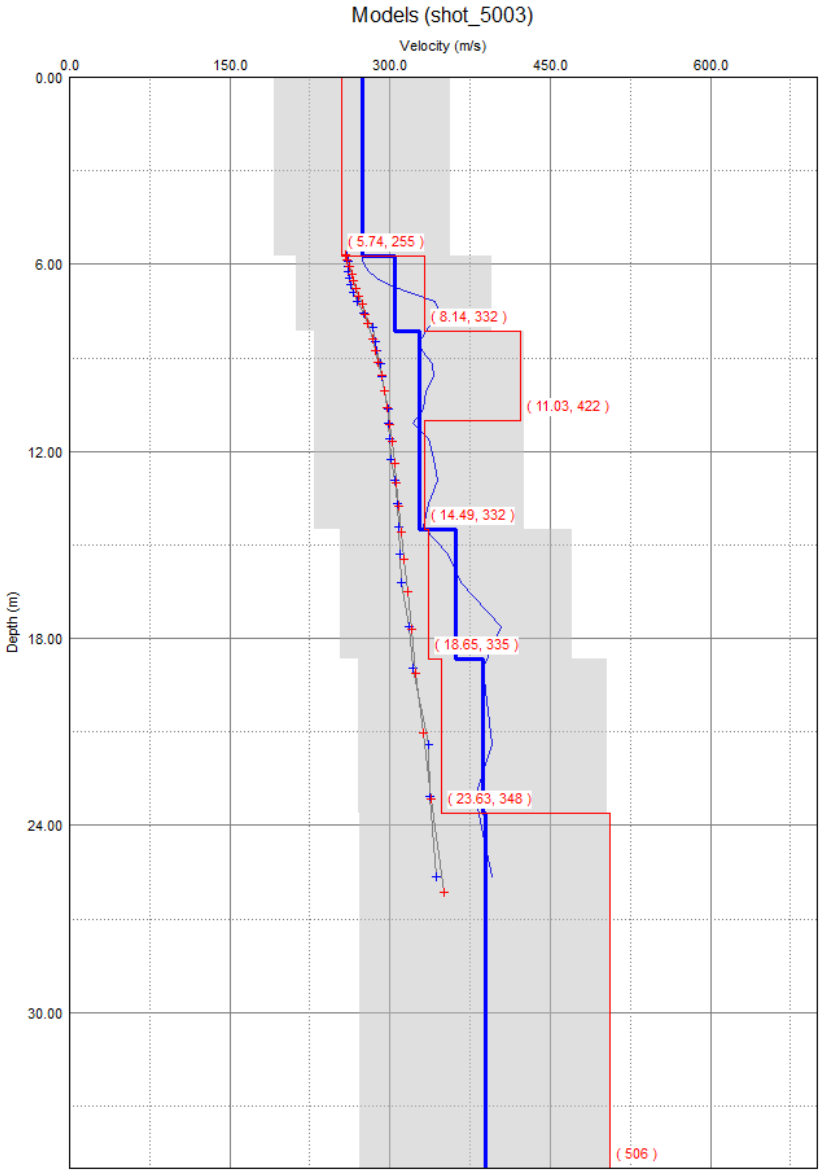
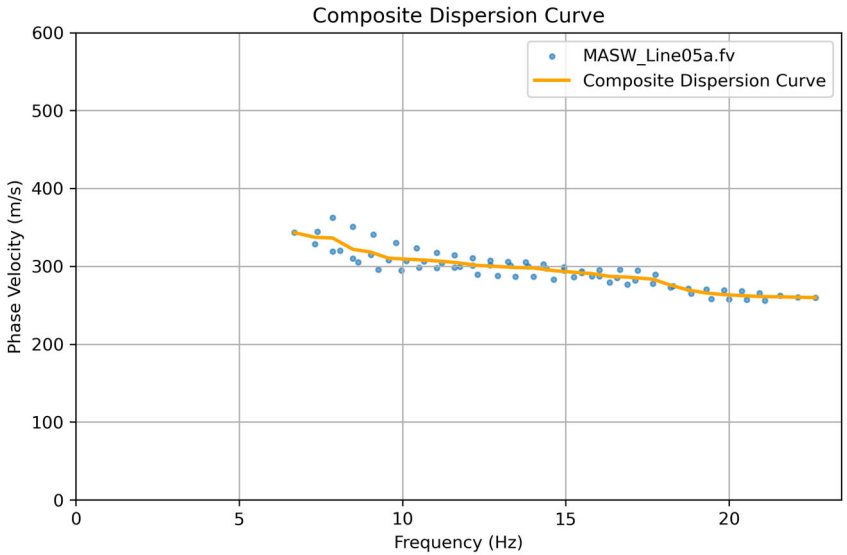
RDCL

Ground Model

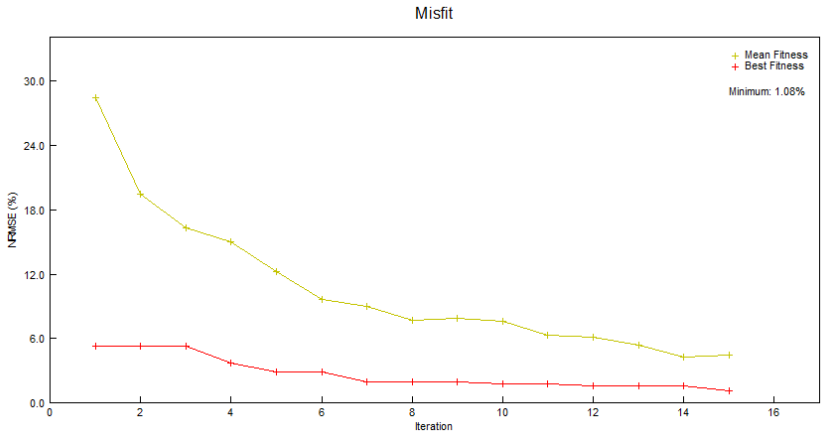


Final Model

Composite Dispersion Curve



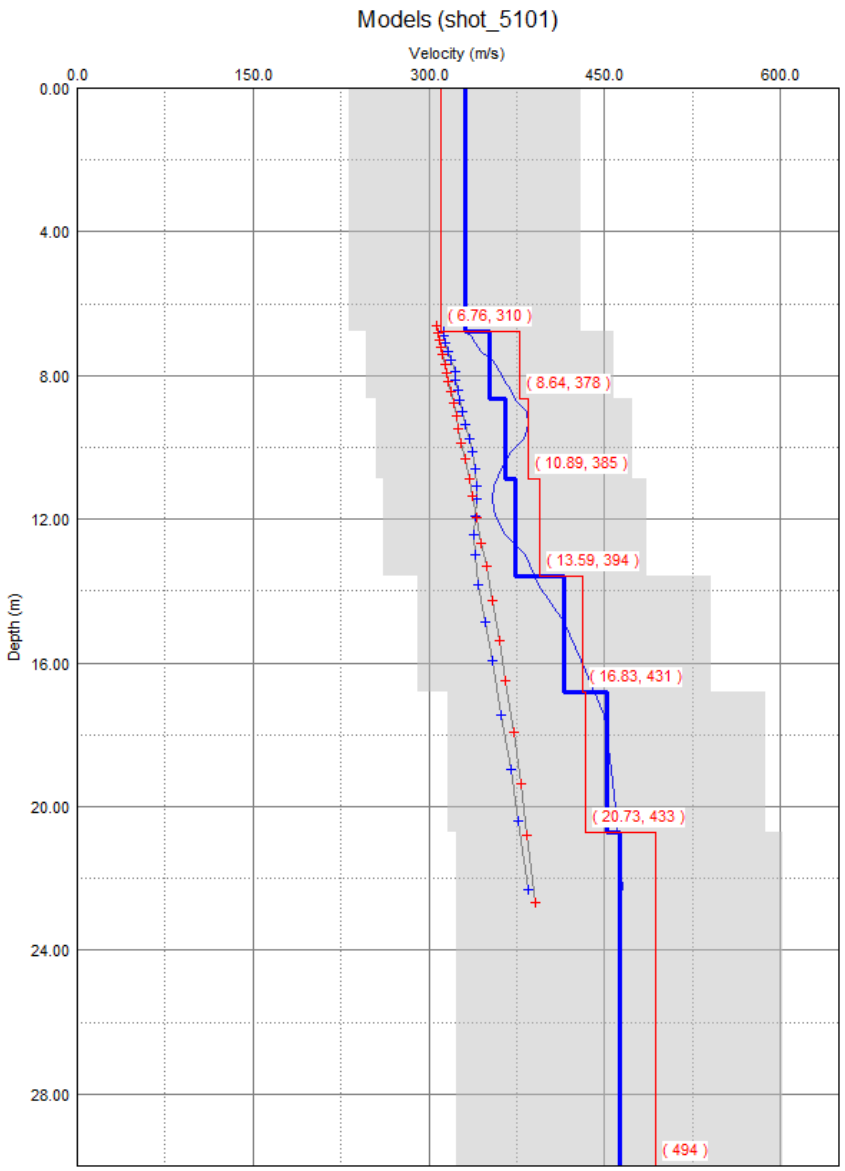
Plot of Misfit



RDCL®

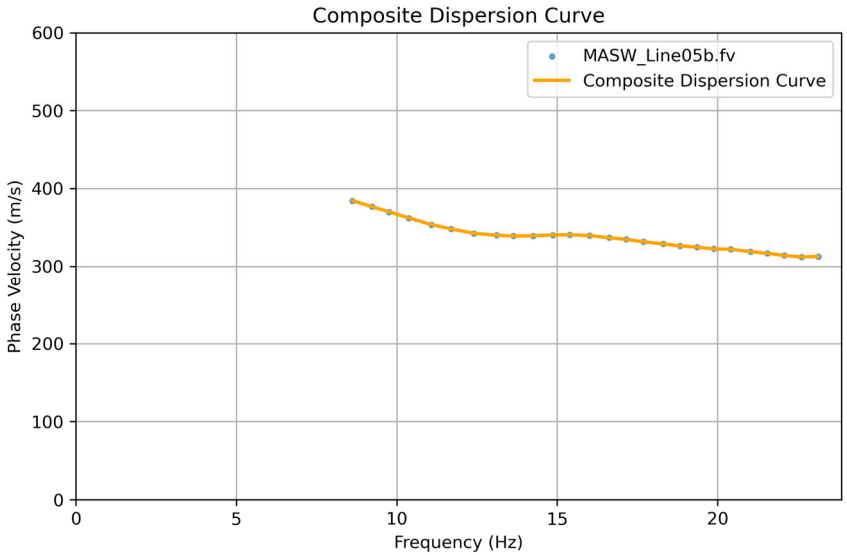
TITLE	MASW Line 05a Sounding	PROJECT	250306			
PROJECT	Port Vila, Vanuatu Geophysics	DRAWN BY	OG	DATE	13/04/26	FIG
CLIENT	T+T	CHECKED BY	SL	DATE	13/04/26	13

Ground Model

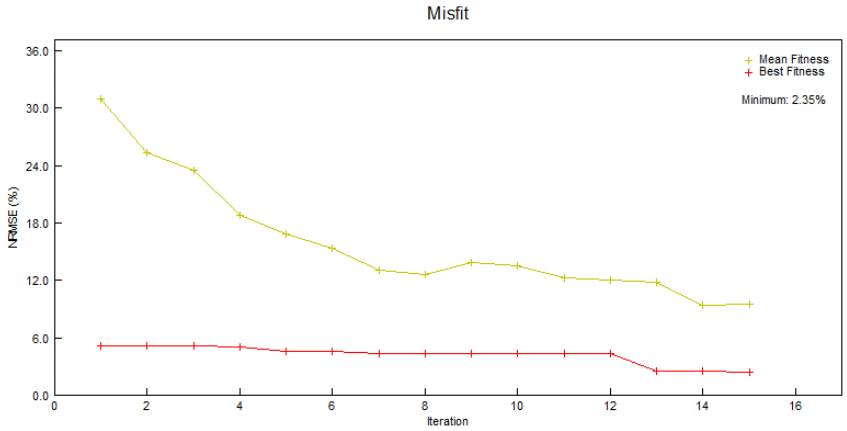


Final Model

Composite Dispersion Curve

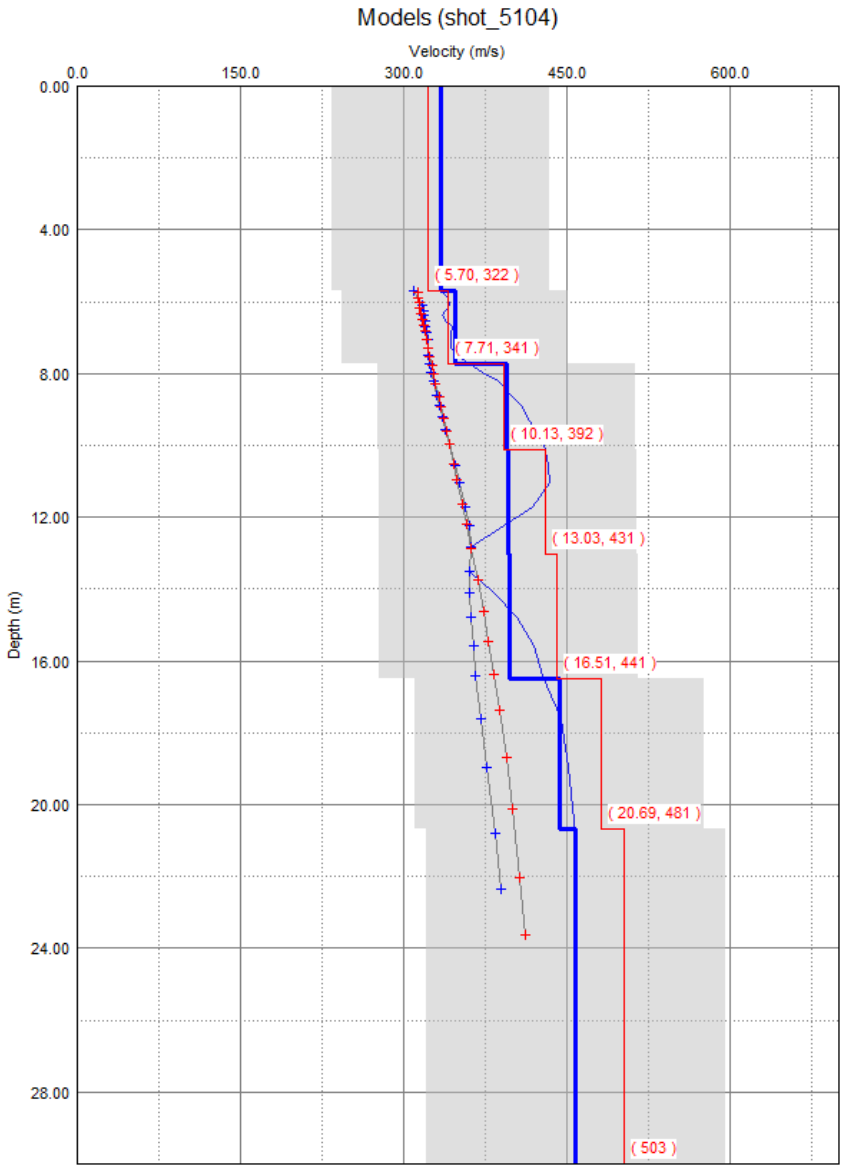


Plot of Misfit



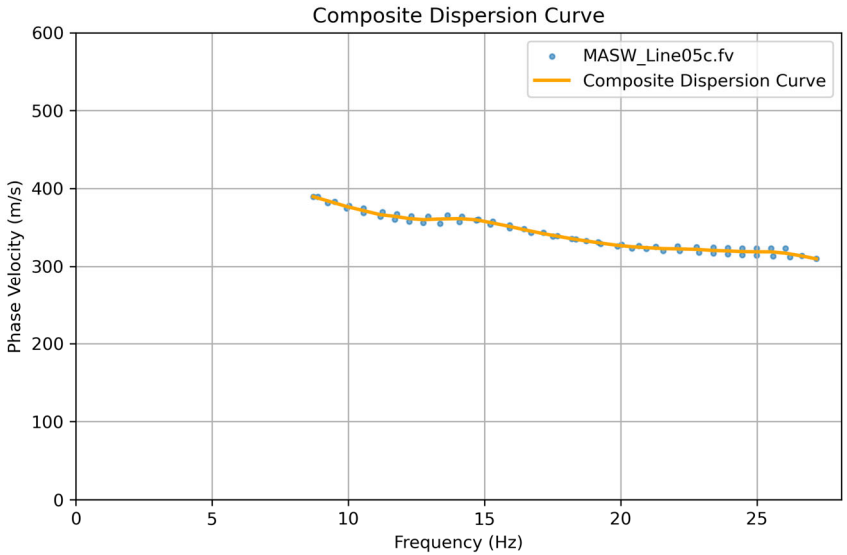
RDCL®	TITLE	MASW Line 05b Sounding	PROJECT	250306		
	PROJECT	Port Vila, Vanuatu Geophysics	DRAWN BY	OG	DATE	13/04/26	FIG
	CLIENT	T+T	CHECKED BY	SL	DATE	13/04/26	14

Ground Model

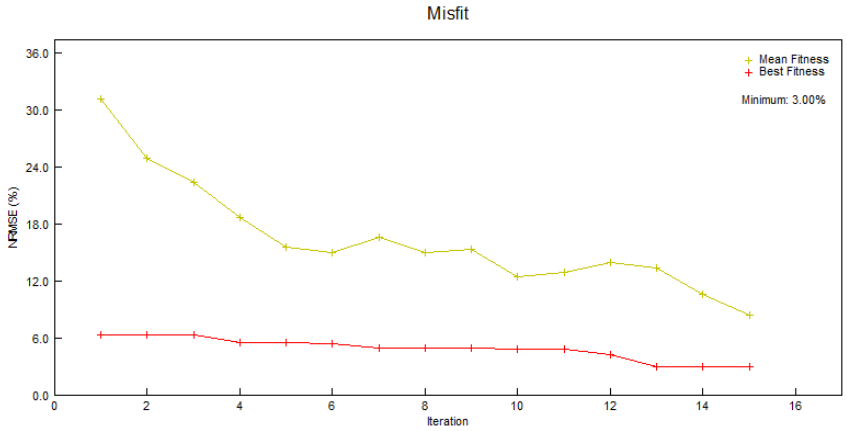


Final Model

Composite Dispersion Curve

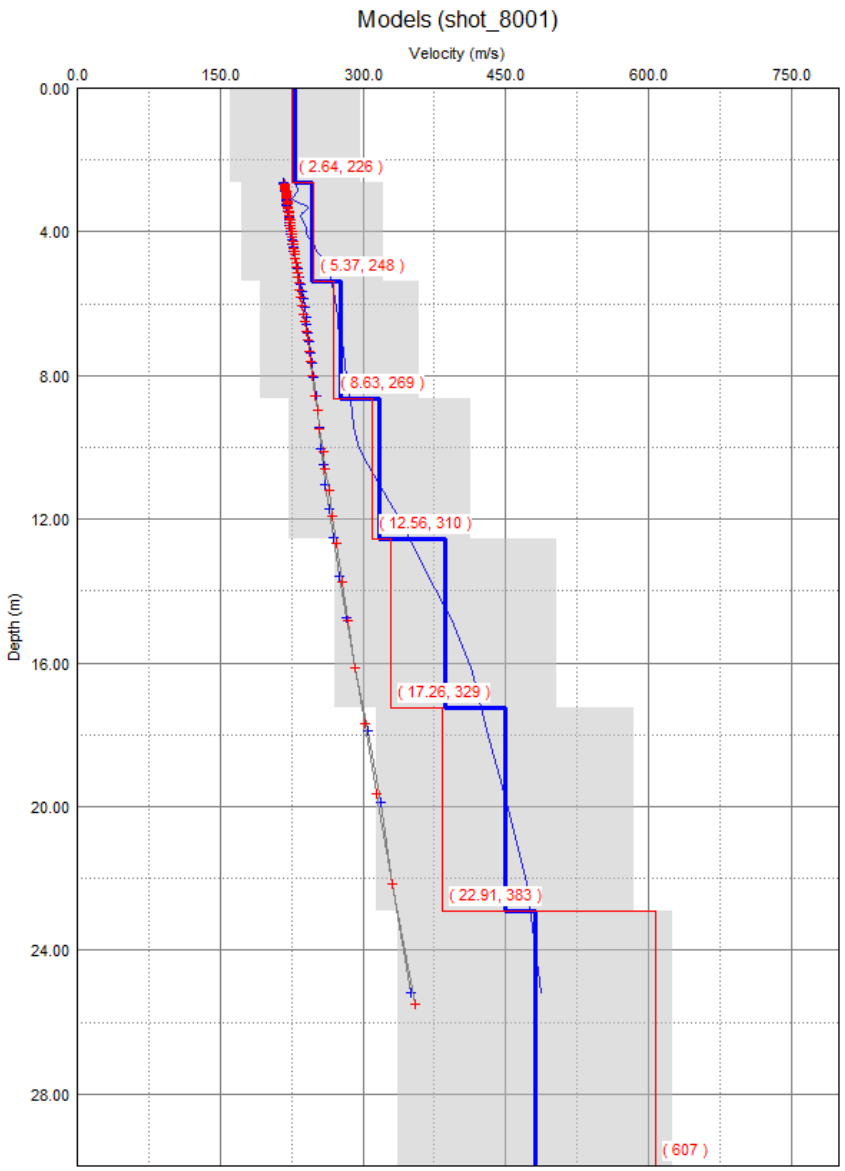


Plot of Misfit



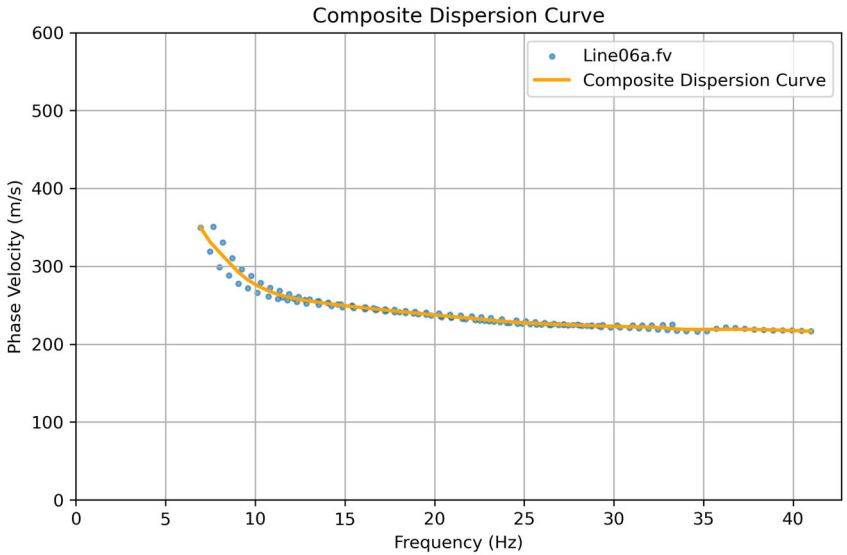
RDCL®	TITLE	MASW Line 05c Sounding	PROJECT	250306		
	PROJECT	Port Vila, Vanuatu Geophysics	DRAWN BY	OG	DATE	13/04/26	FIG
	CLIENT	T+T	CHECKED BY	SL	DATE	13/04/26	15

Ground Model

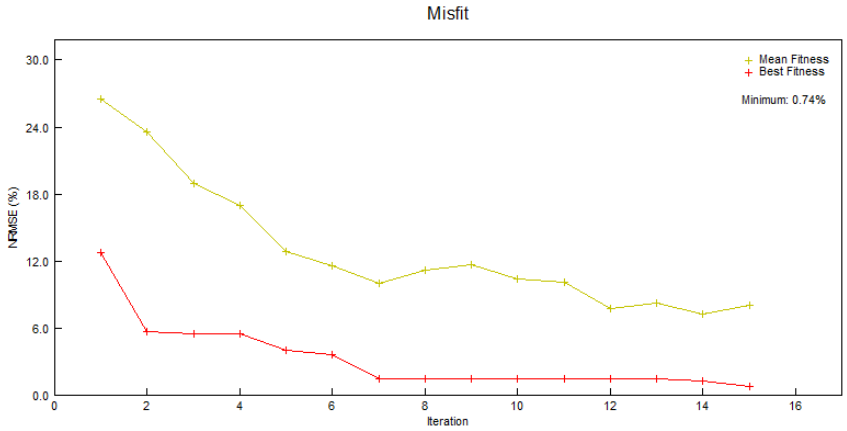


Final Model

Composite Dispersion Curve

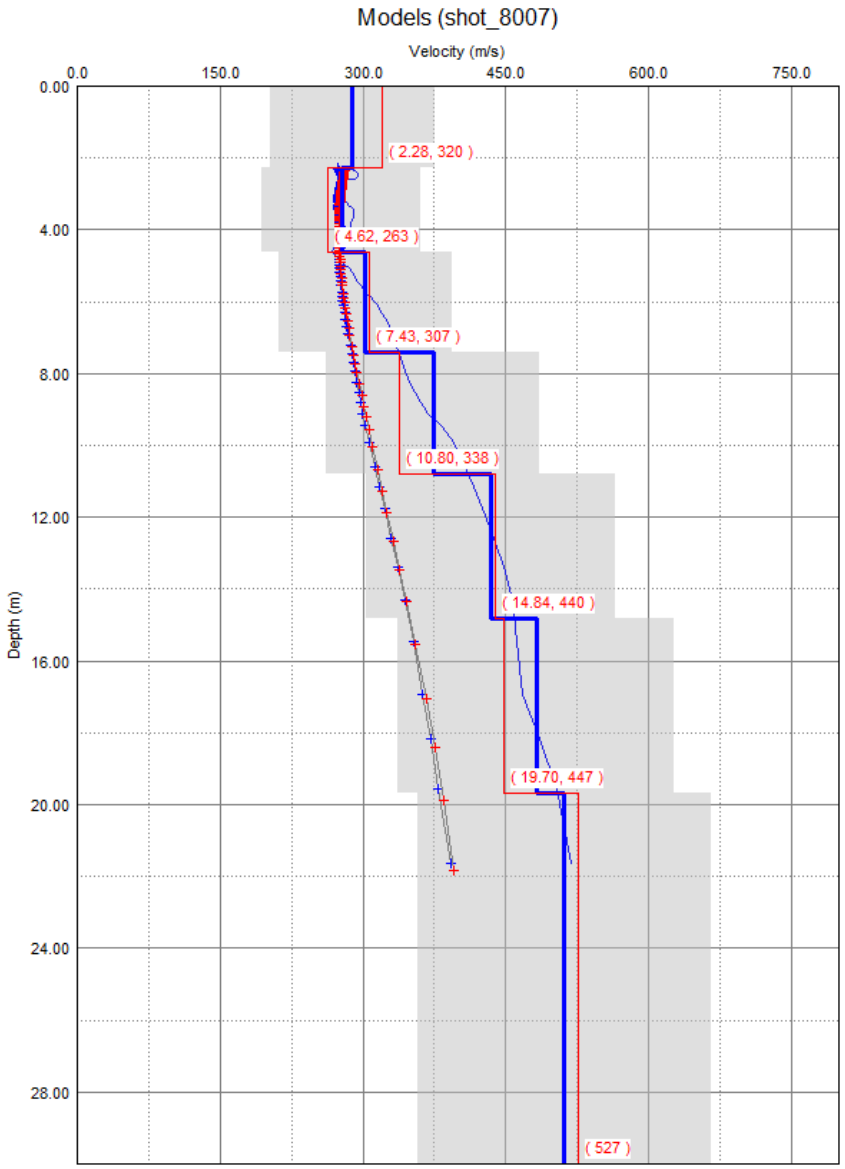


Plot of Misfit



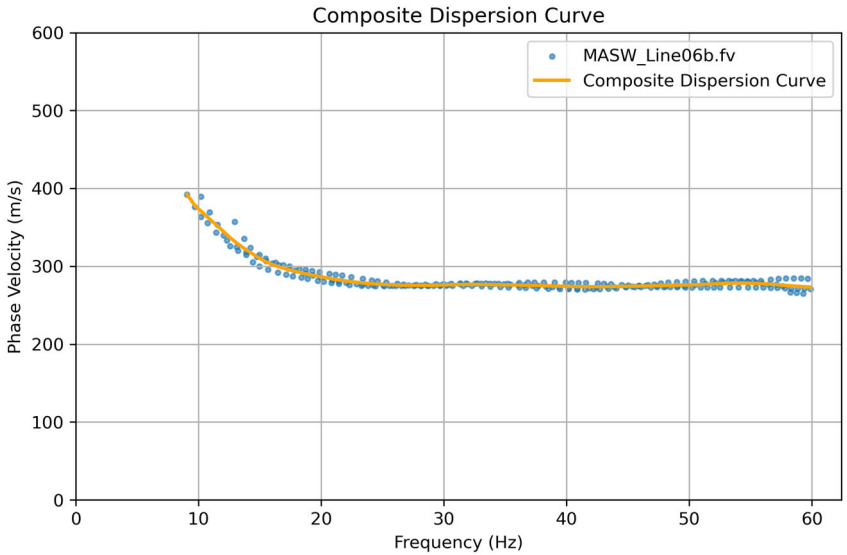
RDCL®	TITLE	MASW Line 06a Sounding	PROJECT	250306		
	PROJECT	Port Vila, Vanuatu Geophysics	DRAWN BY	OG	DATE	13/04/26	FIG
	CLIENT	T+T	CHECKED BY	SL	DATE	13/04/26	16

Ground Model

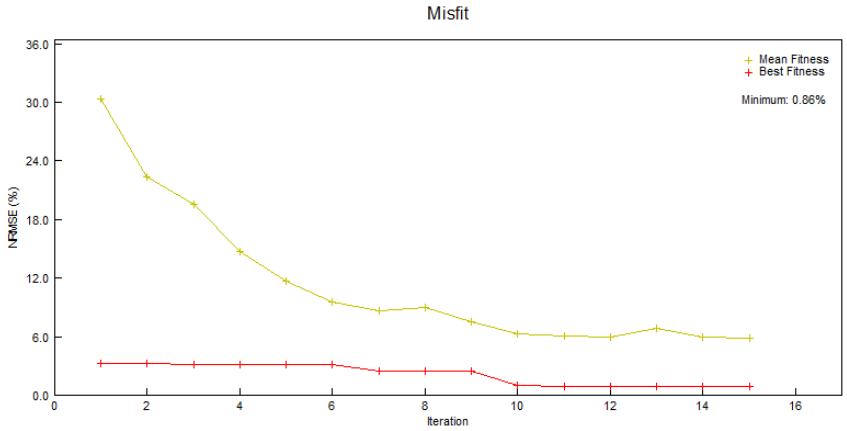


Final Model

Composite Dispersion Curve

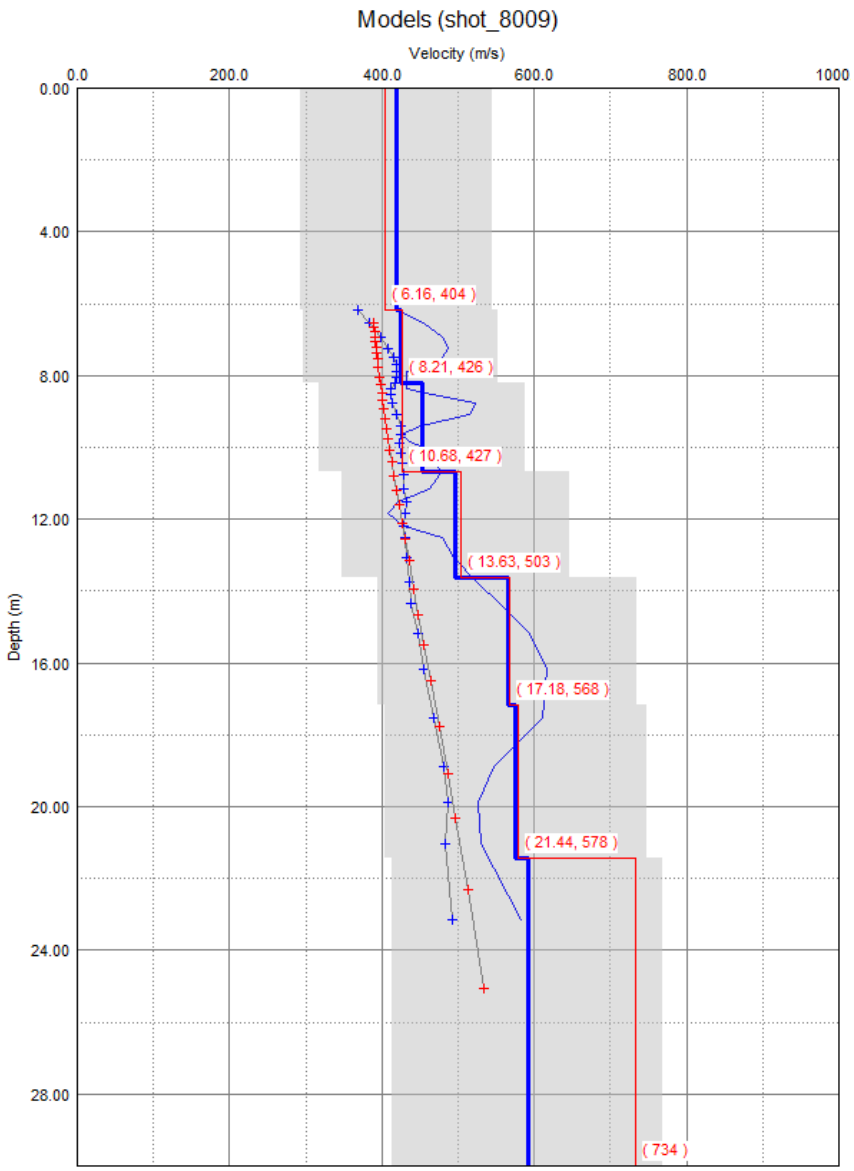


Plot of Misfit



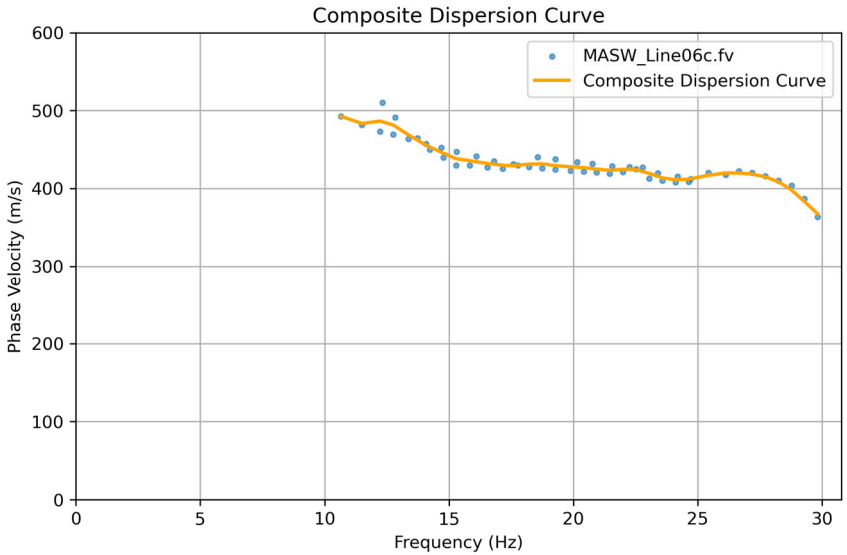
RDCL®	TITLE	MASW Line 06b Sounding	PROJECT	250306		
	PROJECT	Port Vila, Vanuatu Geophysics	DRAWN BY	OG	DATE	13/04/26	FIG
	CLIENT	T+T	CHECKED BY	SL	DATE	13/04/26	17

Ground Model

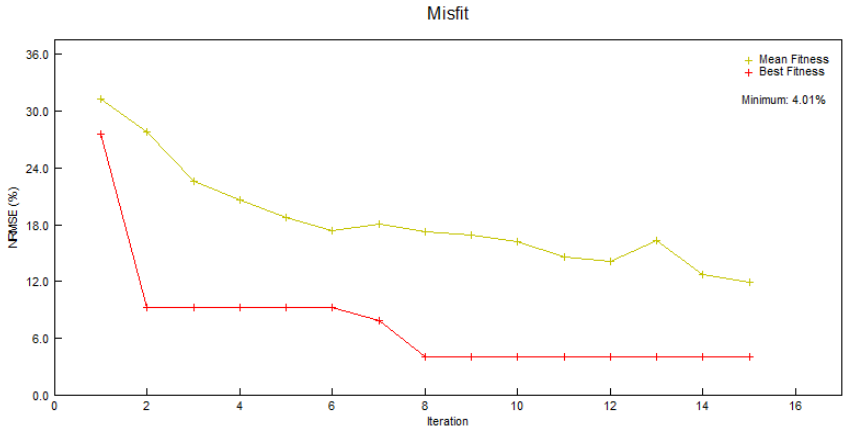


Final Model

Composite Dispersion Curve



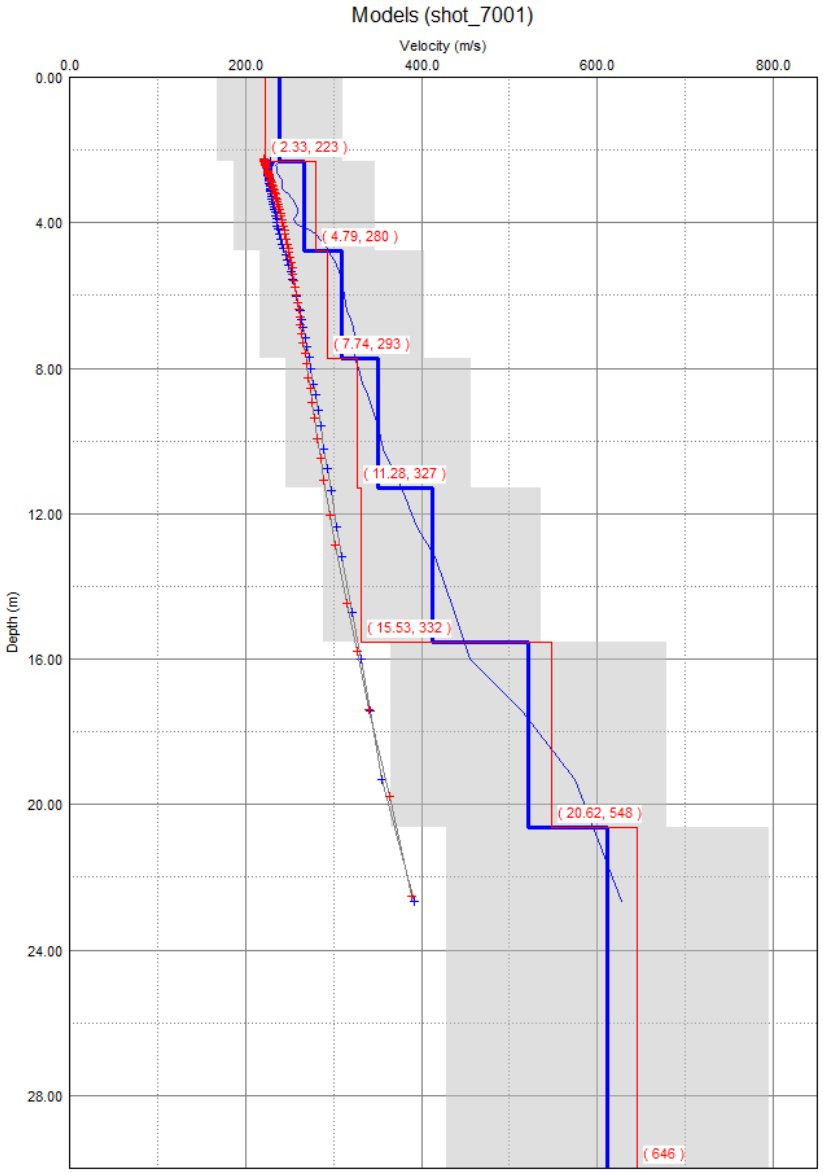
Plot of Misfit



RDCL®

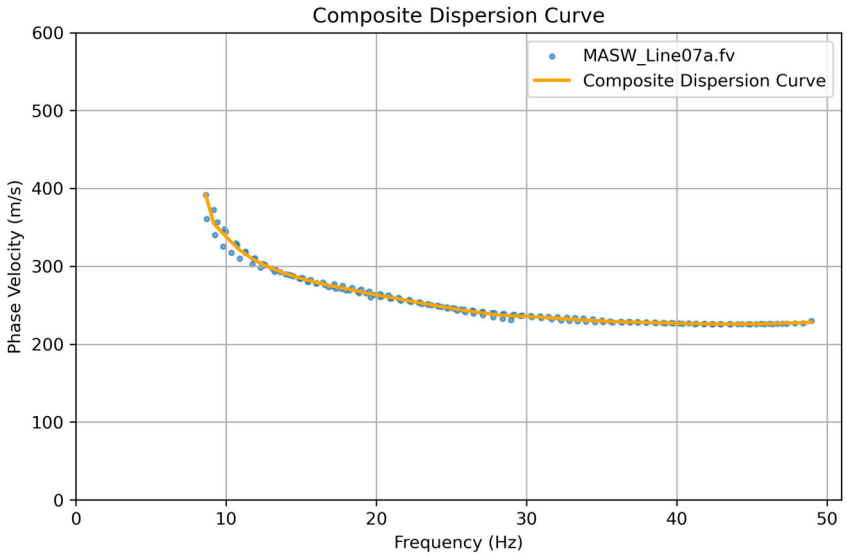
TITLE	MASW Line 06c Sounding	PROJECT	250306			
PROJECT	Port Vila, Vanuatu Geophysics	DRAWN BY	OG	DATE	13/04/26	FIG
CLIENT	T+T	CHECKED BY	SL	DATE	13/04/26	18

Ground Model

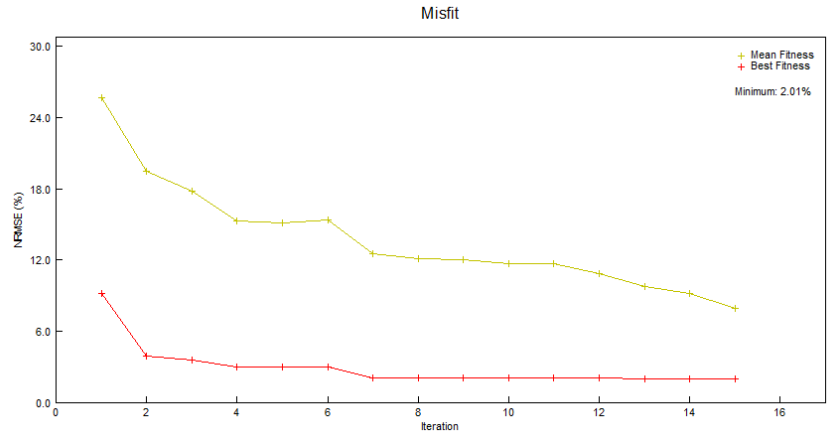


Final Model

Composite Dispersion Curve



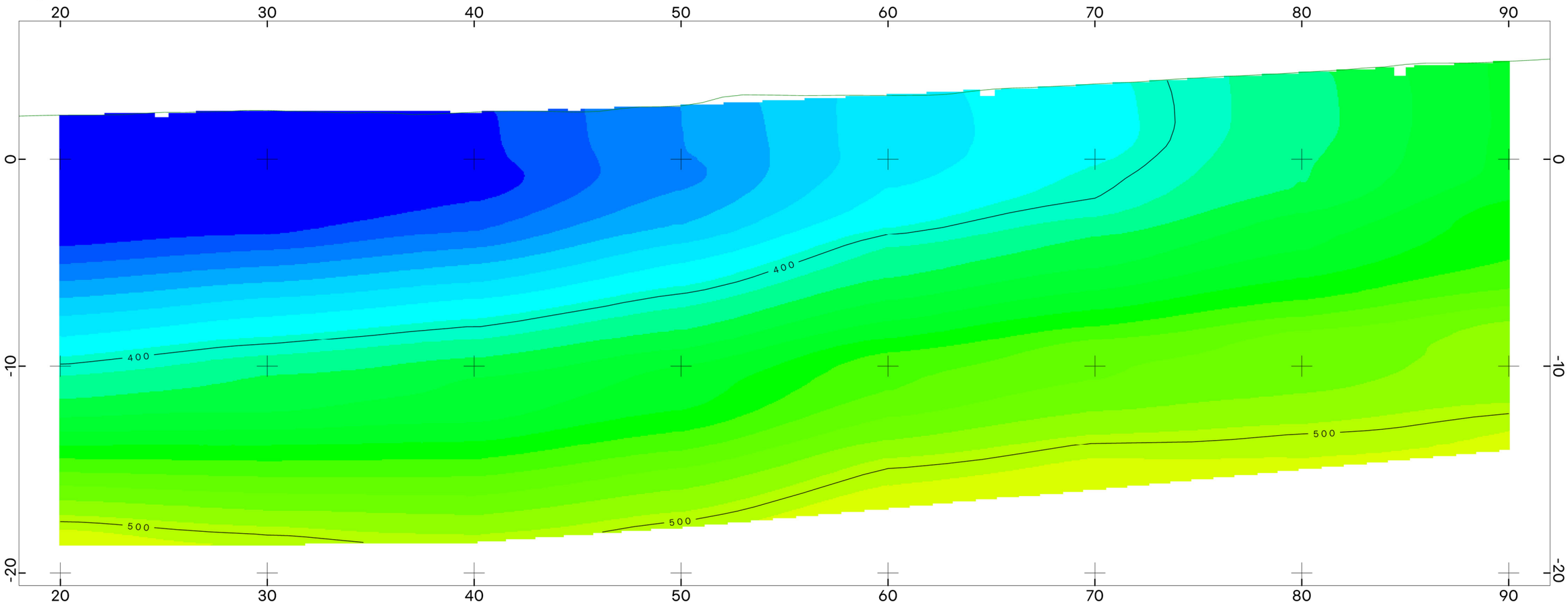
Plot of Misfit



RDCL®	TITLE	MASW Line 07a Sounding	PROJECT	250306		
	PROJECT	Port Vila, Vanuatu Geophysics	DRAWN BY	OG	DATE	13/04/26	FIG
	CLIENT	T+T	CHECKED BY	SL	DATE	13/04/26	19

WEST

EAST



GENERAL LOCATION PLAN:



SCALE:

Scale 1:200

5 0 5 10

metres

GENERAL LOCATION PLAN SCALE:

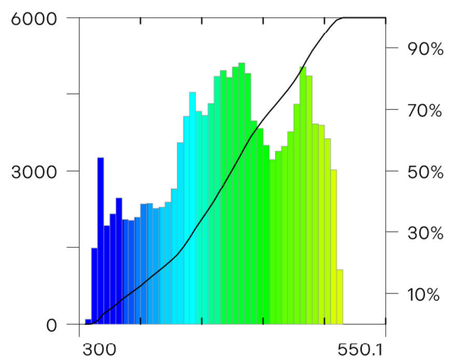
Scale 1:1500

25 0 25 50 75

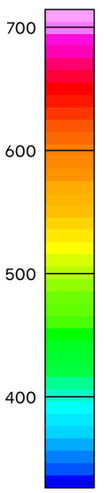
metres

WGS 84 / UTM zone 59S

GRID HISTOGRAM:



LEGEND:



Model Vs (m/s)

NOTES:

1. Imagery data provided to RDCL by the client.

CLIENT: T+T

PROJECT: PORT VILA, VANUATU
GEOPHYSICS

TITLE: MASW LINE 07b
PSEUDO Vs SECTION

INTERP. BY: OG	DATE: 12/04/2026	DRAWN BY: OG	DATE: 12/04/2026
CHECKED BY: SL	DATE: 12/04/2026	APPROVED BY: SJ	DATE: 12/04/2026

CONTRACT No.: 250306 FIGURE 20

FILE NAME: 250306.gpf
PLOTTED DRAWING SIZE: A3 (420 x 297)

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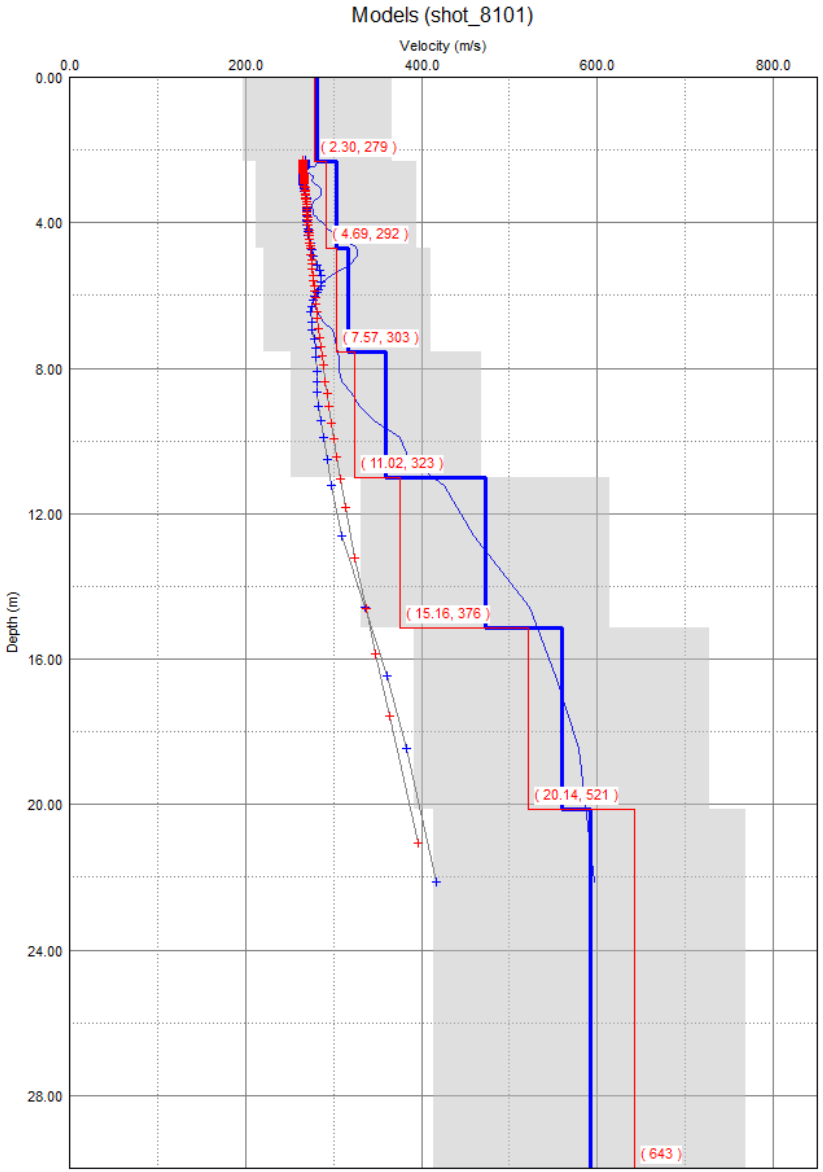
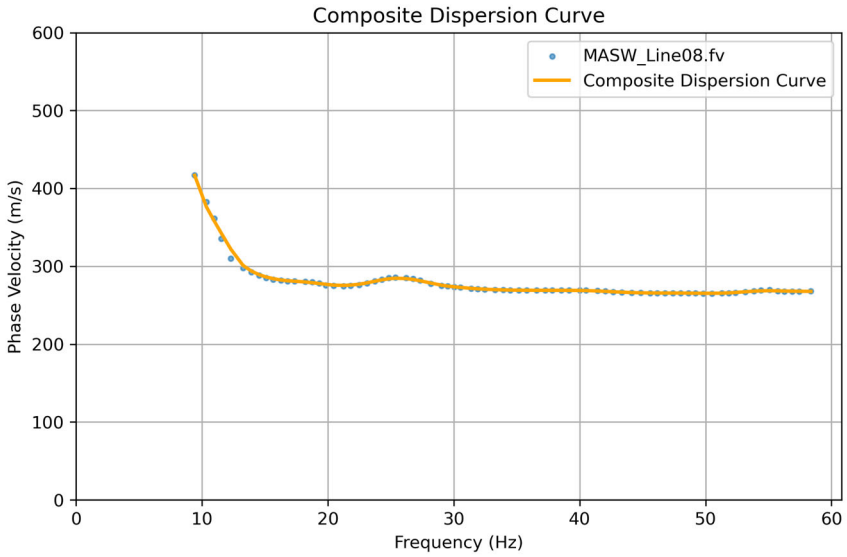
RDCL

Ground Model

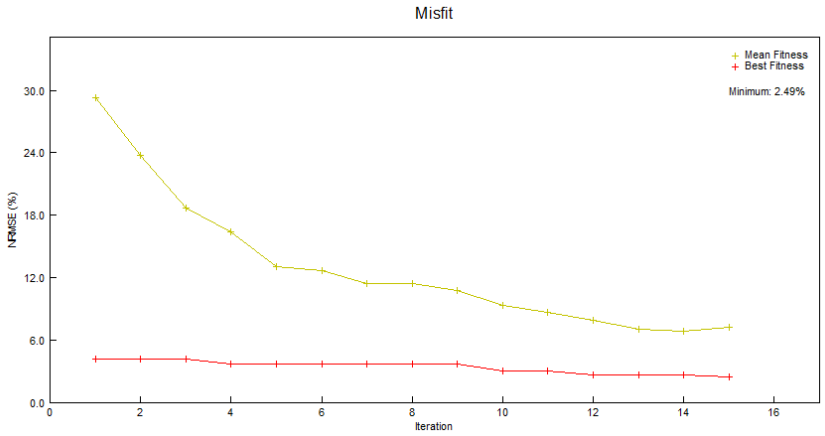


Final Model

Composite Dispersion Curve



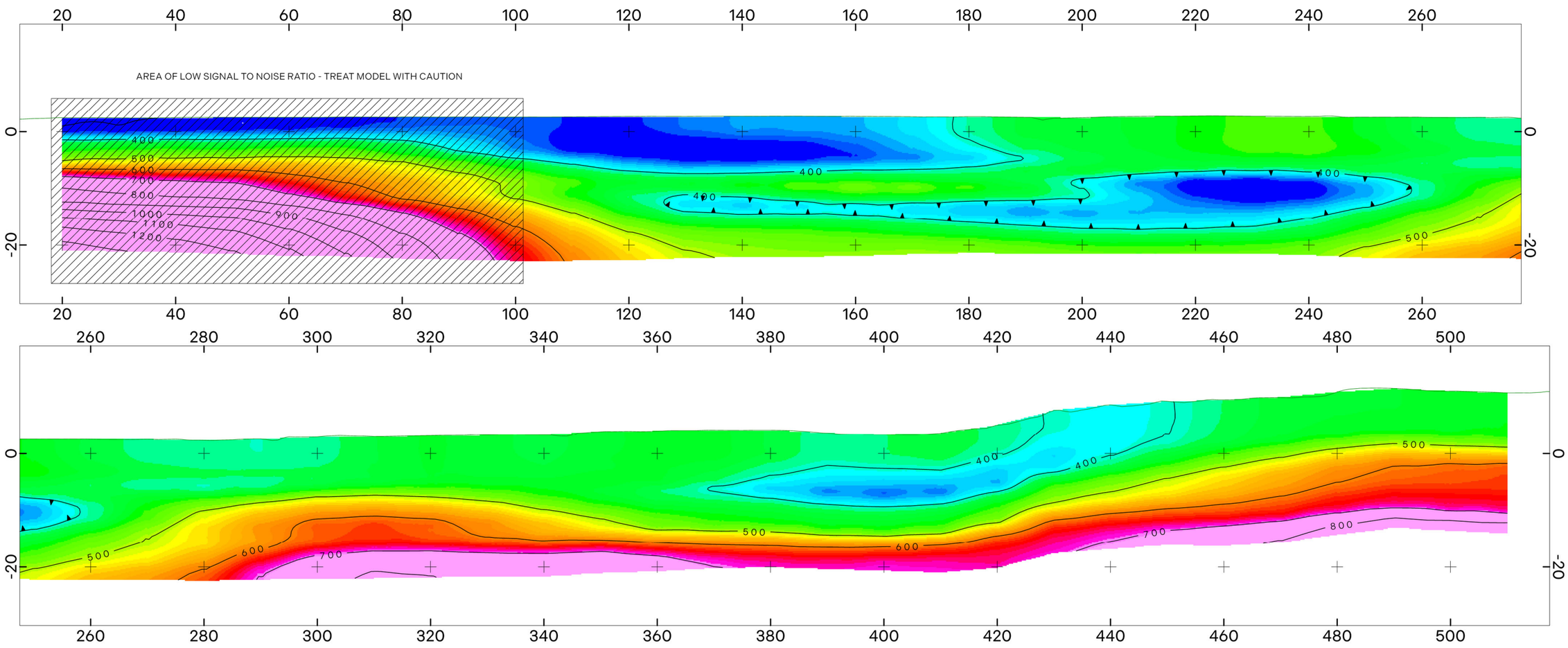
Plot of Misfit



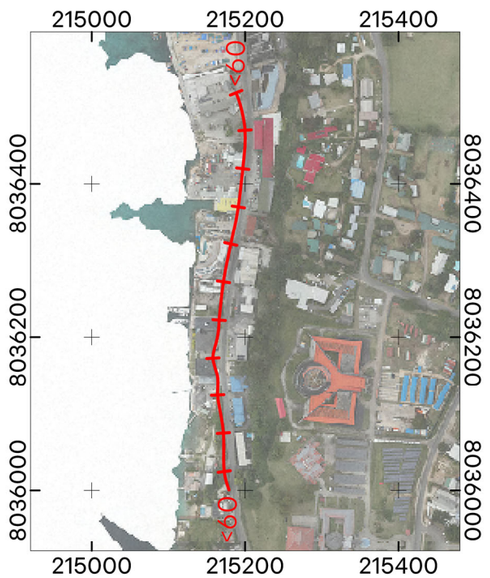
TITLE	MASW Line 08 Sounding	PROJECT	250306			
PROJECT	Port Vila, Vanuatu Geophysics	DRAWN BY	OG	DATE	13/04/26	FIG
CLIENT	T+T	CHECKED BY	SL	DATE	13/04/26	21

NORTH WEST

SOUTH EAST



GENERAL LOCATION PLAN:



SCALE:

Scale 1:750

10 0 10 20 30 40

metres

GENERAL LOCATION PLAN SCALE:

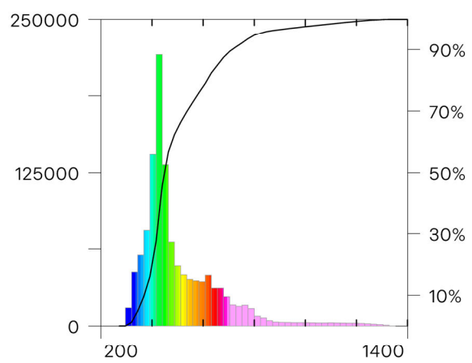
Scale 1:8000

200 0 200 400

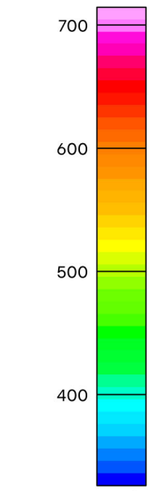
metres

WGS 84 / UTM zone 59S

GRID HISTOGRAM:



LEGEND:



Model Vs (m/s)

NOTES:

1. Imagery data provided to RDCL by the client.

CLIENT: T+T

PROJECT: PORT VILA, VANUATU GEOPHYSICS

TITLE: MASW LINE 09 PSEUDO Vs SECTION

INTERP. BY: OG	DATE: 09/04/2026	DRAWN BY: OG	DATE: 09/04/2026
CHECKED BY: SL	DATE: 09/04/2026	APPROVED BY: SJ	DATE: 09/04/2026

CONTRACT No.: 250306 FIGURE 22

FILE NAME: 250306.gpf

PLOTTED DRAWING SIZE: A3 (420 x 297)

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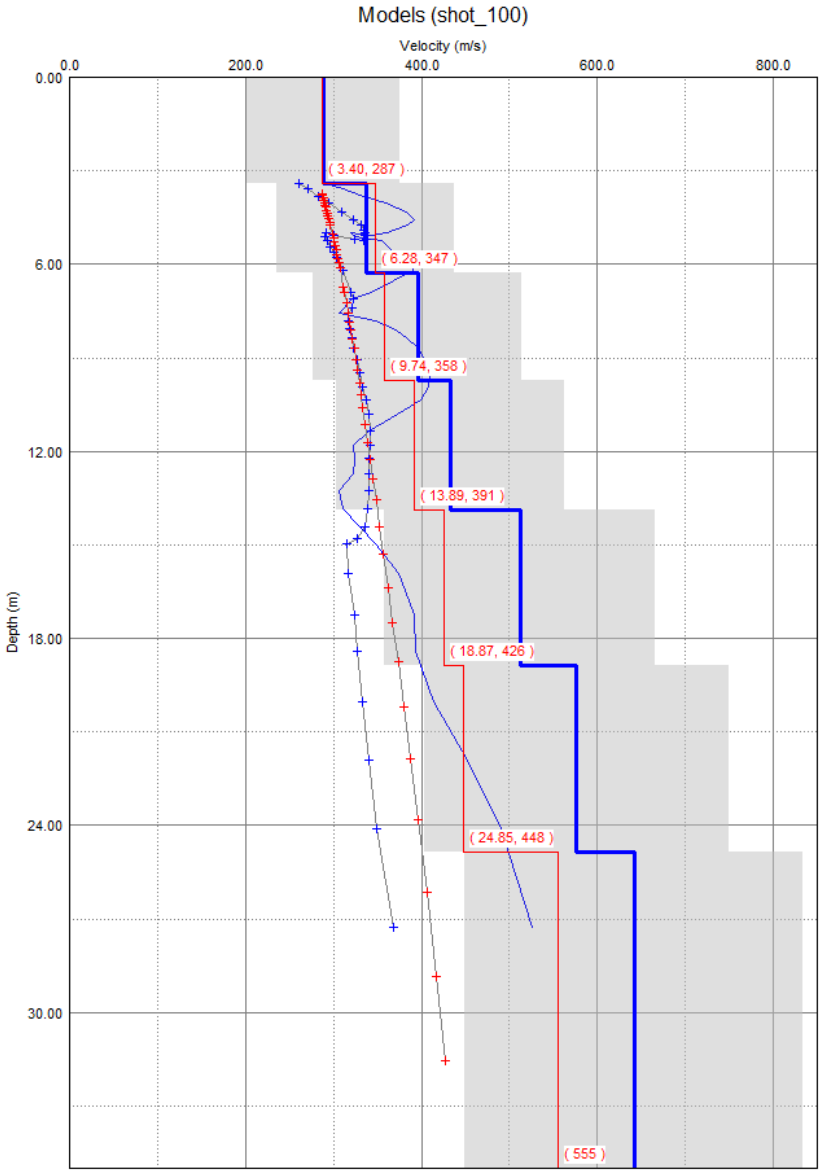
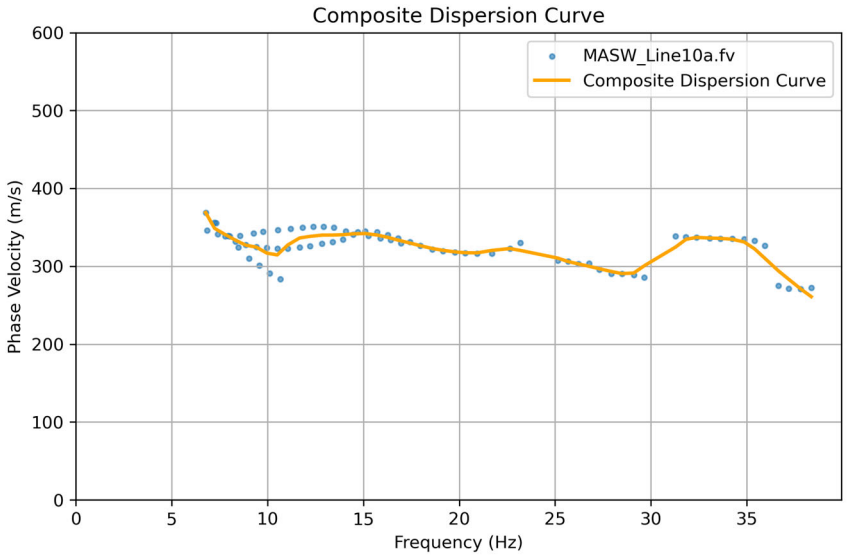
RDCL

Ground Model

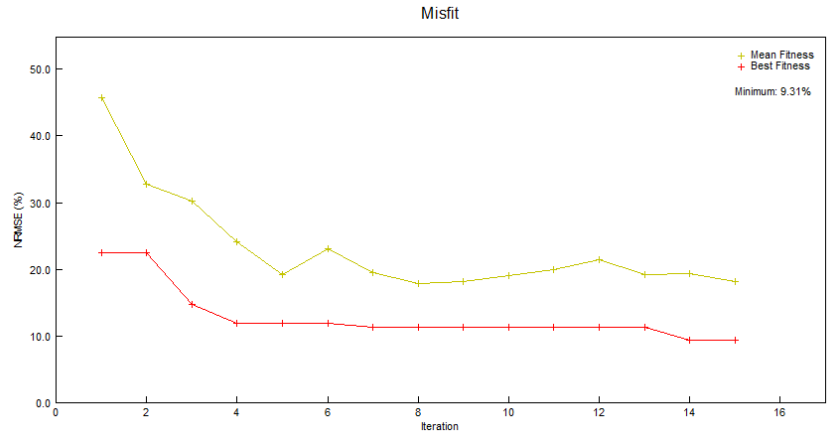


Final Model

Composite Dispersion Curve

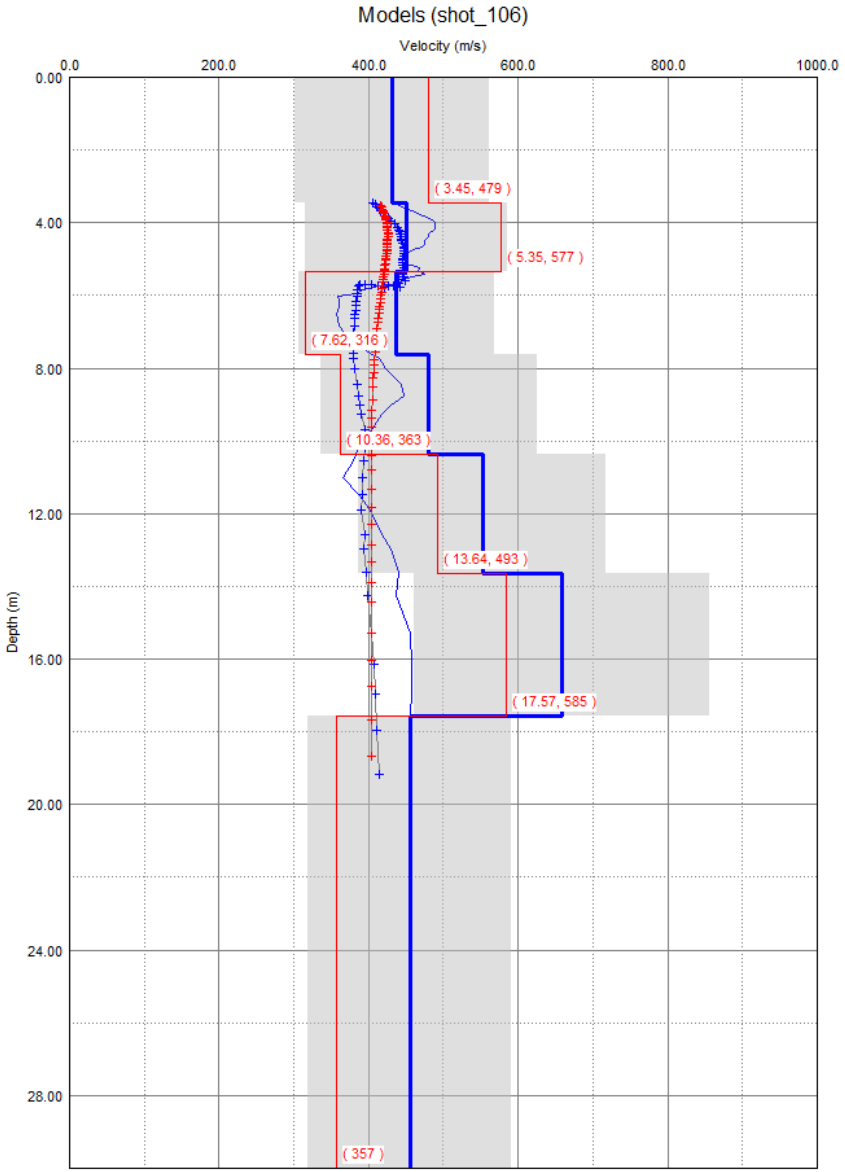


Plot of Misfit



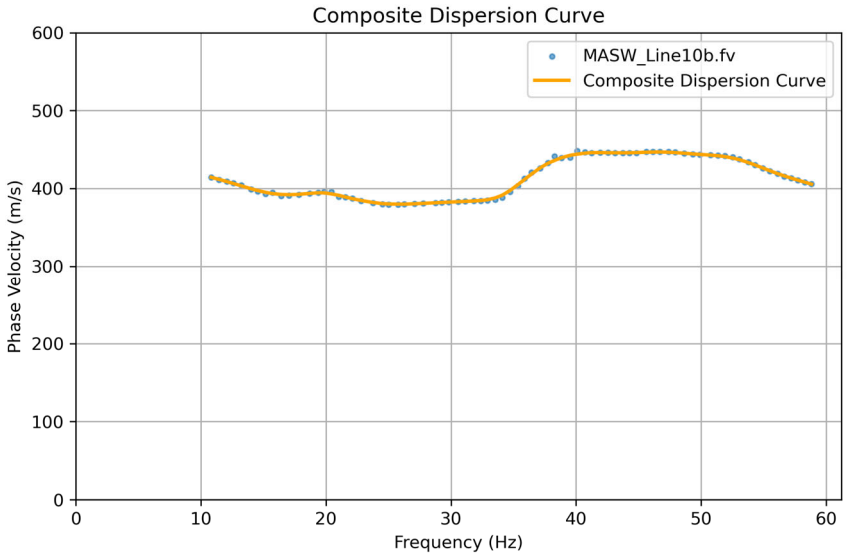
RDCL®	TITLE	MASW Line 10a Sounding	PROJECT	250306		
	PROJECT	Port Vila, Vanuatu Geophysics	DRAWN BY	OG	DATE	13/04/26	FIG
	CLIENT	T+T	CHECKED BY	SL	DATE	13/04/26	23

Ground Model

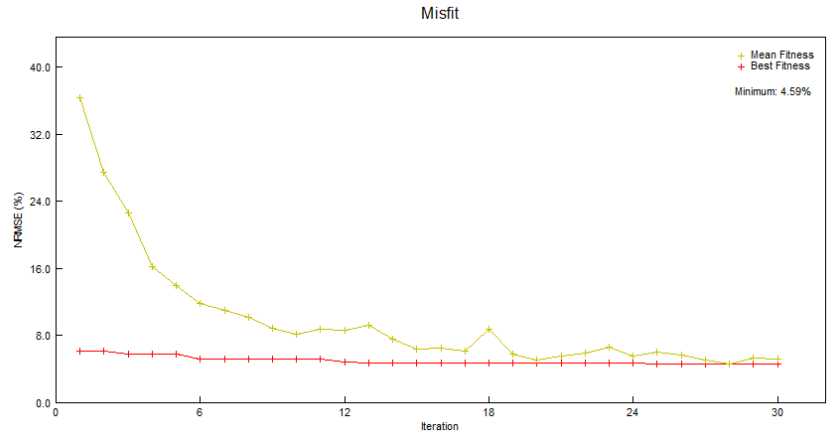


Final Model

Composite Dispersion Curve



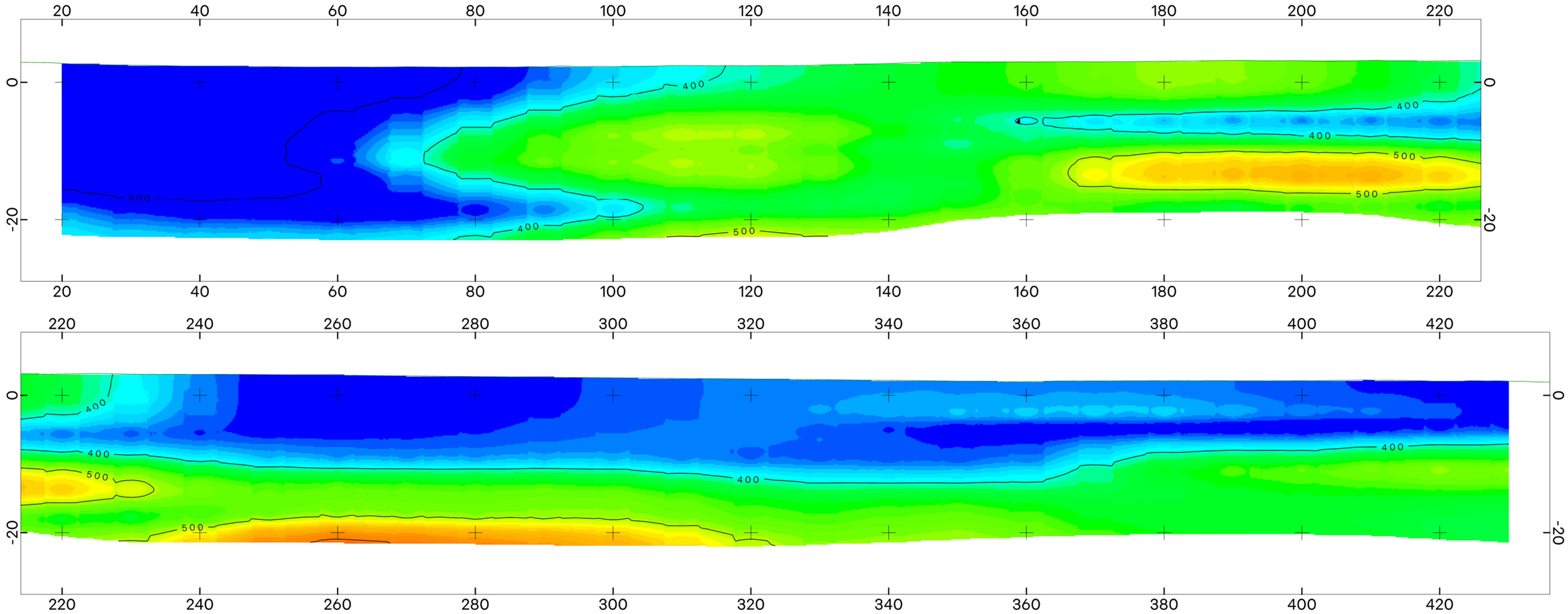
Plot of Misfit



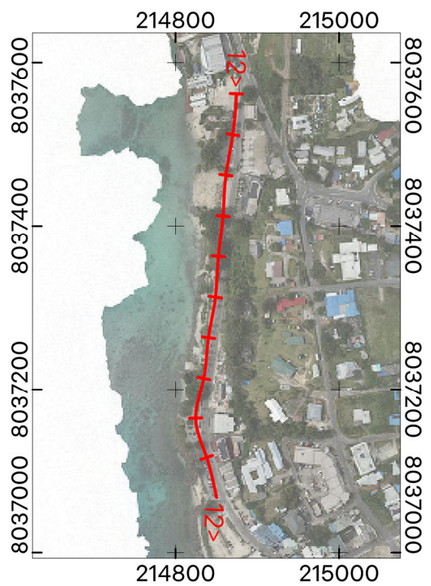
RDCL®	TITLE	MASW Line 10b Sounding	PROJECT	250306		
	PROJECT	Port Vila, Vanuatu Geophysics	DRAWN BY	OG	DATE	13/04/26	FIG
	CLIENT	T+T	CHECKED BY	SL	DATE	13/04/26	24

NORTH WEST

SOUTH EAST



GENERAL LOCATION PLAN:



SCALE:

Scale 1:600

10 0 10 20 30

metres

GENERAL LOCATION PLAN SCALE:

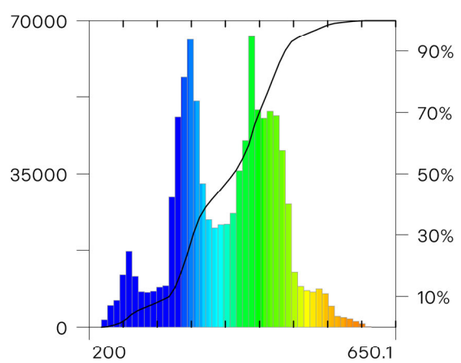
Scale 1:7500

100 0 100 200 300 400

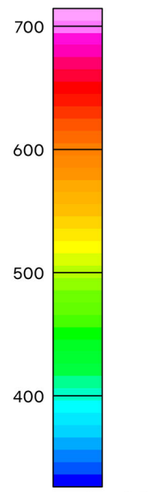
metres

WGS 84 / UTM zone 59S

GRID HISTOGRAM:



LEGEND:



NOTES:

1. Imagery data provided to RDCL by the client.

CLIENT: T+T

PROJECT: PORT VILA, VANUATU GEOPHYSICS

TITLE: MASW LINE 12 PSEUDO Vs SECTION

INTERP. BY: OG	DATE: 10/04/2026	DRAWN BY: OG	DATE: 10/04/2026
CHECKED BY: SL	DATE: 10/04/2026	APPROVED BY: SJ	DATE: 10/04/2026

CONTRACT No.: 250306 FIGURE 24

FILE NAME: 250306.gpf

PLOTTED DRAWING SIZE: A3 (420 x 297)

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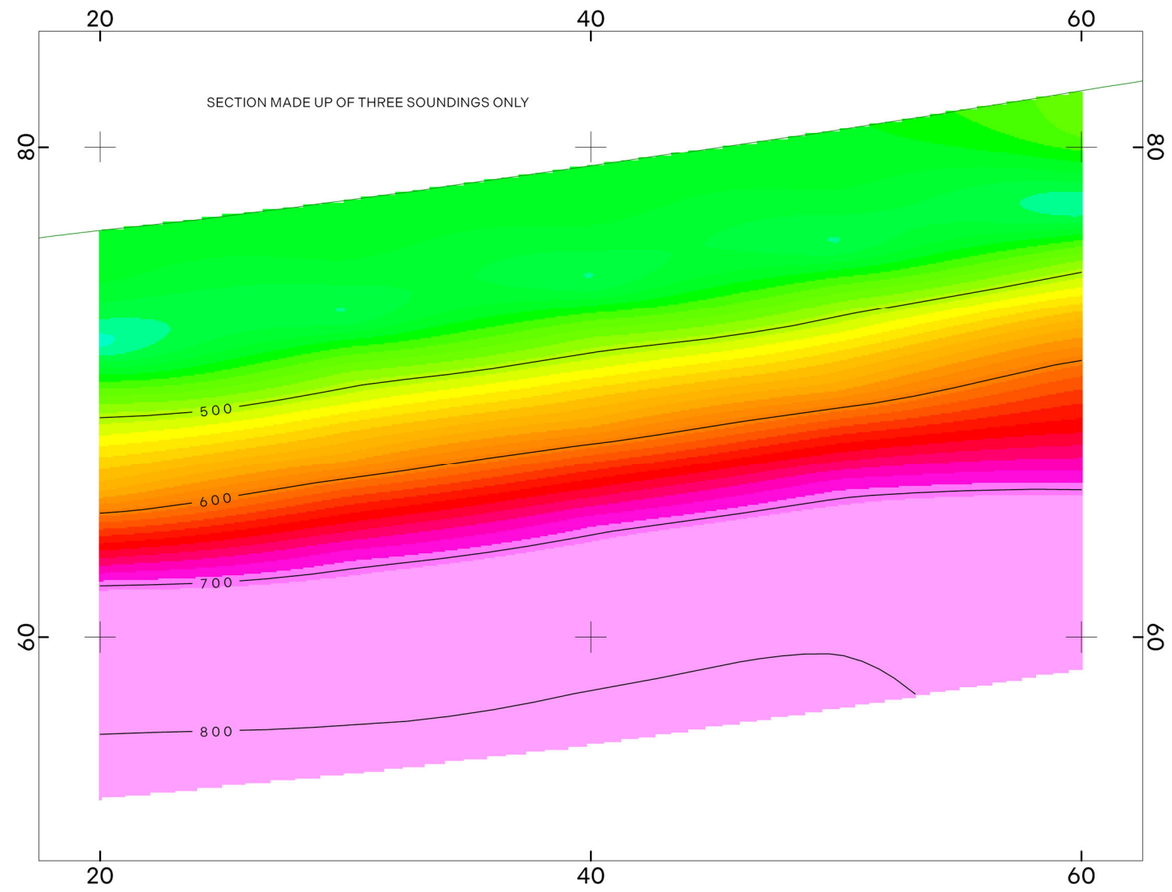
RDCL

EAST

WEST



GENERAL LOCATION PLAN:



SCALE:

Scale 1:250

5 0 5 10

metres

GENERAL LOCATION PLAN SCALE:

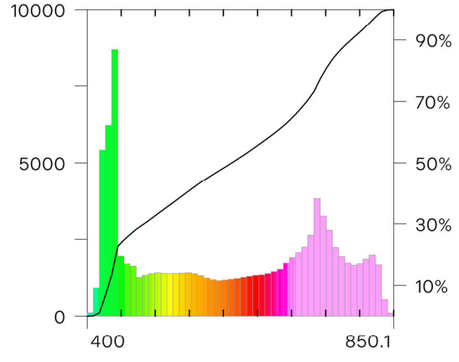
Scale 1:1000

20 0 20 40

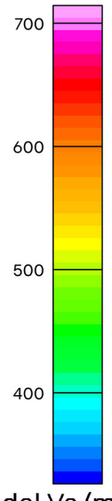
metres

WGS 84 / UTM zone 59S

GRID HISTOGRAM:



LEGEND:



Model Vs (m/s)

NOTES:

1. Imagery data provided to RDCL by the client.

CLIENT: T+T

PROJECT: PORT VILA, VANUATU
GEOPHYSICS

TITLE: MASW LINE 11a
PSEUDO Vs SECTION

INTERP. BY: OG	DATE: 11/04/2026	DRAWN BY: OG	DATE: 11/04/2026
CHECKED BY: SL	DATE: 11/04/2026	APPROVED BY: SJ	DATE: 11/04/2026

CONTRACT No.: 250306 FIGURE 25

FILE NAME: 250306.gpf
PLOTTED DRAWING SIZE: A3 (420 x 297)

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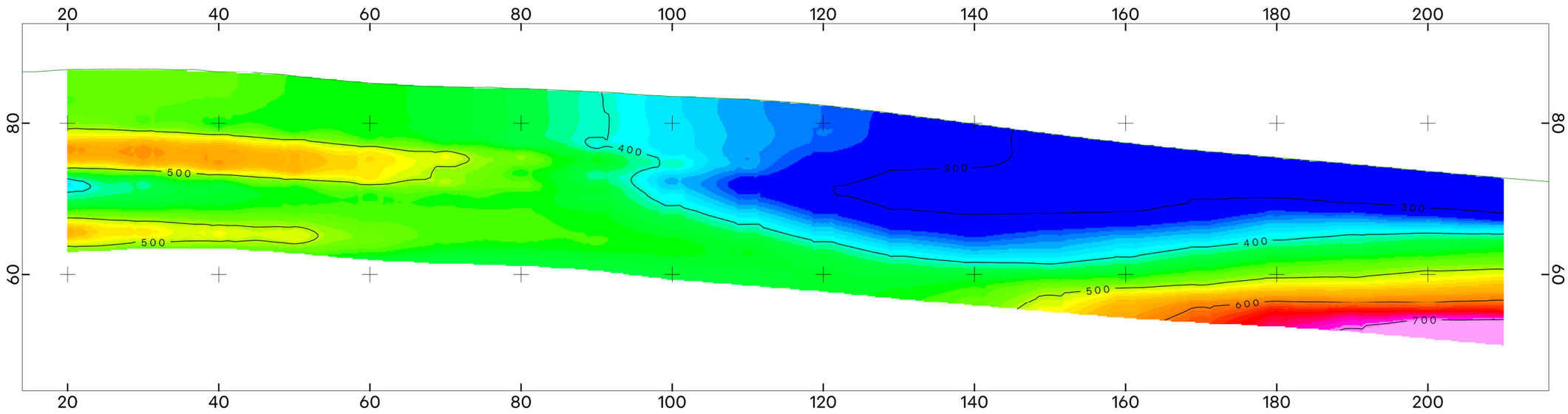
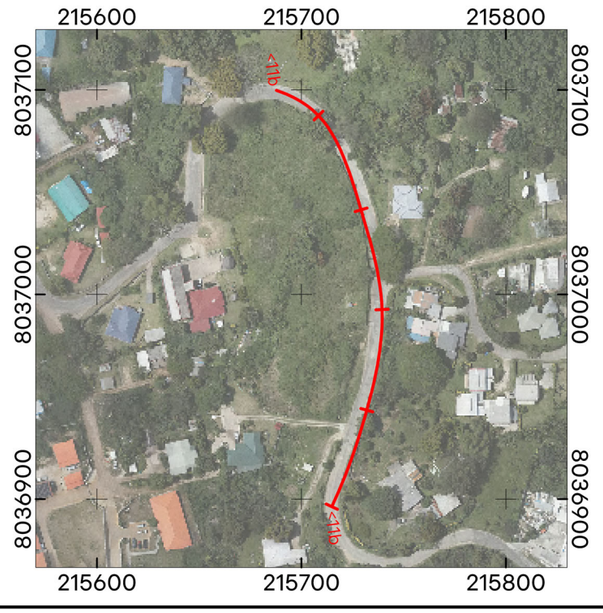
RDCL

SOUTH

NORTH



GENERAL LOCATION PLAN:



SCALE:

Scale 1:600

10 0 10 20 30

metres

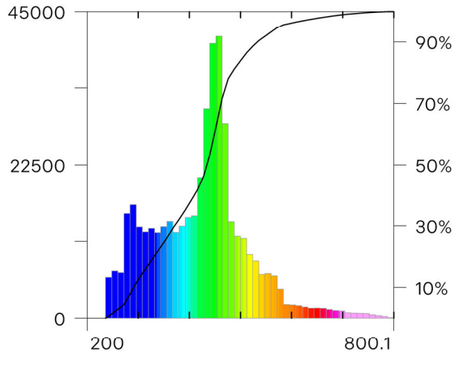
GENERAL LOCATION PLAN SCALE: Scale 1:3000

50 0 50 100 150

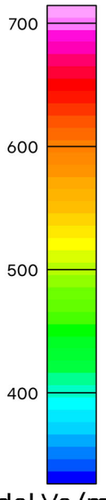
metres

WGS 84 / UTM zone 59S

GRID HISTOGRAM:



LEGEND:



Model Vs (m/s)

NOTES:

1. Imagery data provided to RDCL by the client.

CLIENT: T+T

PROJECT: PORT VILA, VANUATU
GEOPHYSICS

TITLE: MASW LINE 11b
PSEUDO Vs SECTION

INTERP. BY: OG	DATE: 11/04/2026	DRAWN BY: OG	DATE: 11/04/2026
CHECKED BY: SL	DATE: 11/04/2026	APPROVED BY: SJ	DATE: 11/04/2026

CONTRACT No.: 250306 FIGURE 26

FILE NAME: 250306.gpf
PLOTTED DRAWING SIZE: A3 (420 x 297)

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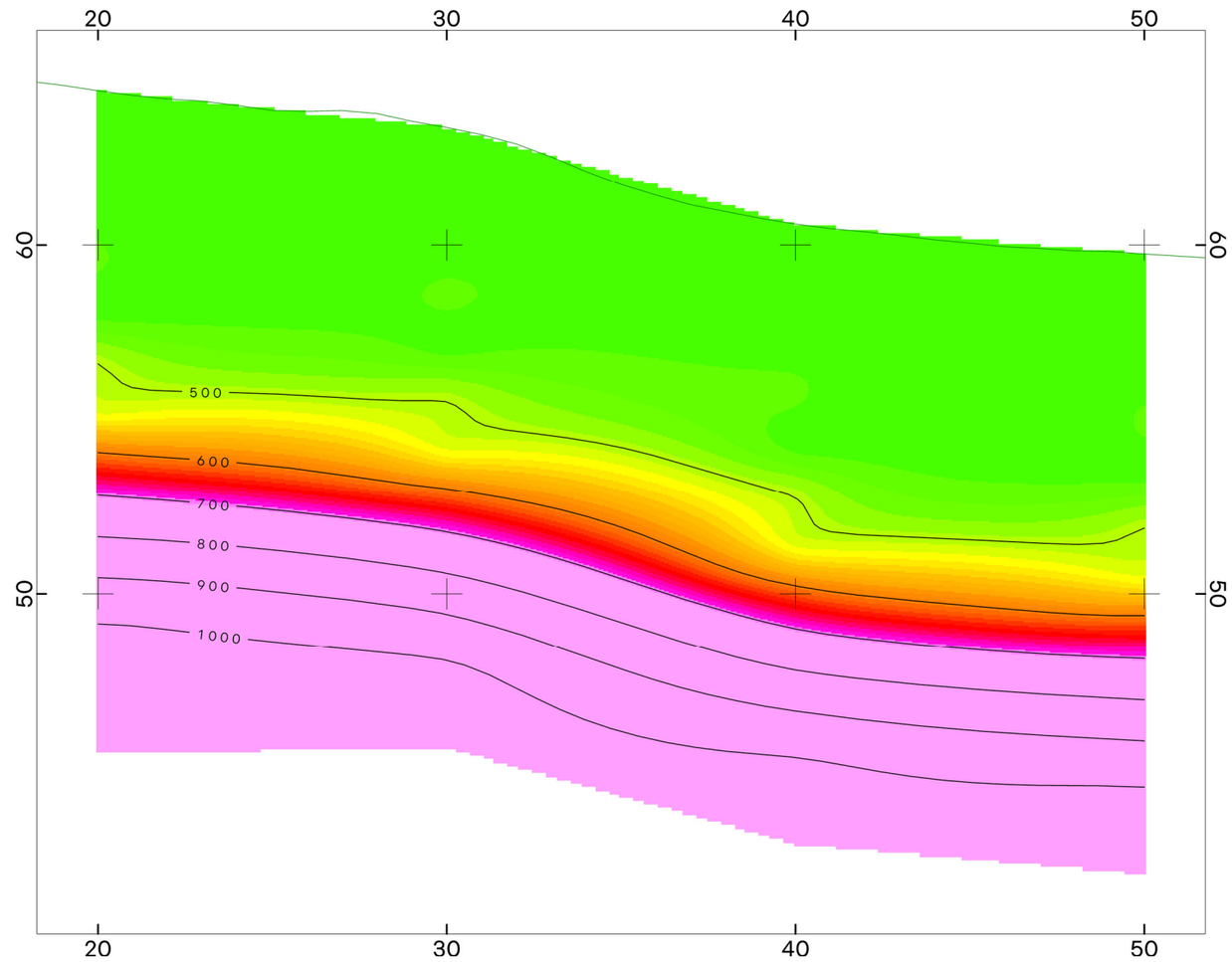
RDCL

EAST

WEST



GENERAL LOCATION PLAN:



SCALE:

Scale 1:175

2.5 0 2.5 5 7.5 10

metres

GENERAL LOCATION PLAN SCALE:

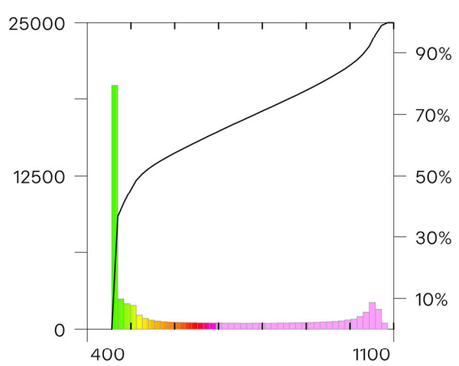
Scale 1:800

20 0 20 40

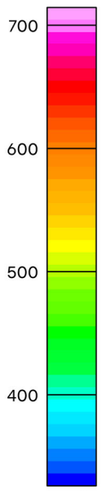
metres

WGS 84 / UTM zone 59S

GRID HISTOGRAM:



LEGEND:



Model Vs (m/s)

NOTES:

1. Imagery data provided to RDCL by the client.

CLIENT: T+T

PROJECT: PORT VILA, VANUATU
GEOPHYSICS

TITLE: MASW LINE 11c
PSEUDO Vs SECTION

INTERP. BY: OG	DATE: 12/04/2026	DRAWN BY: OG	DATE: 12/04/2026
CHECKED BY: SL	DATE: 12/04/2026	APPROVED BY: SJ	DATE: 12/04/2026
CONTRACT No.: 250306		FIGURE 27	
FILE NAME: 250306.gpf PLOTTED DRAWING SIZE: A3 (420 x 297)			

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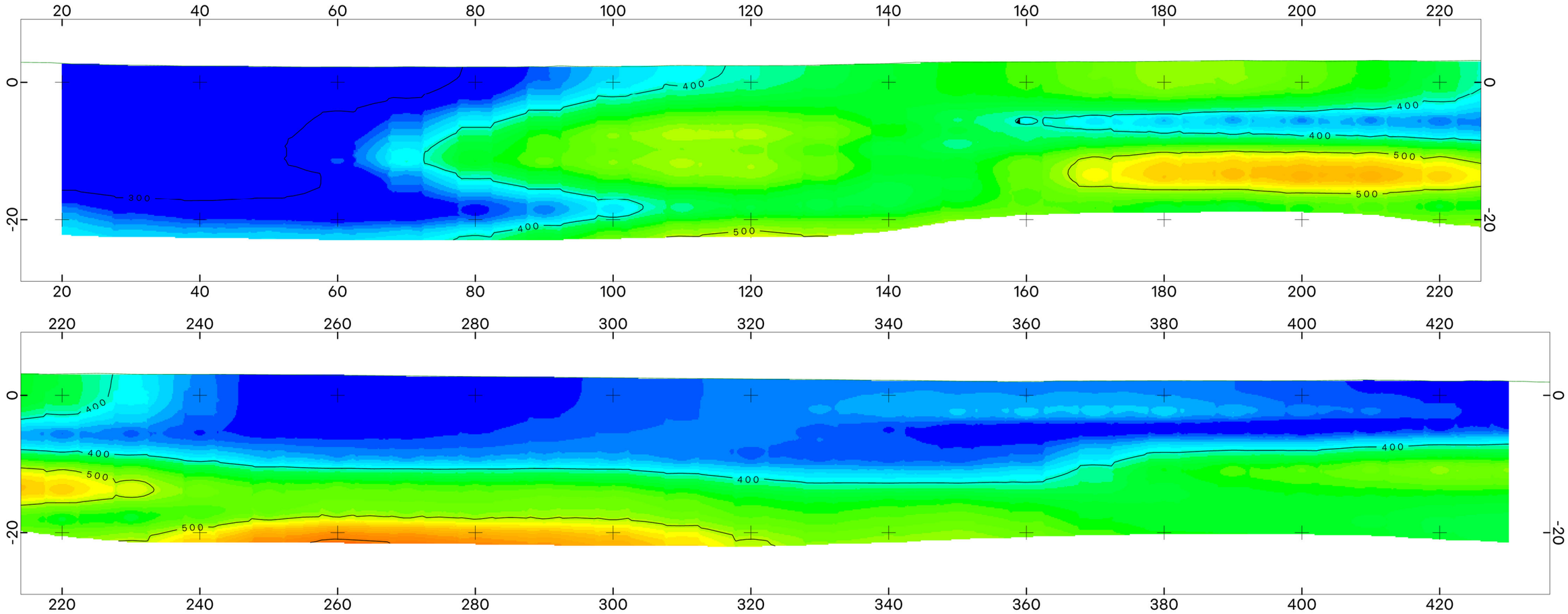
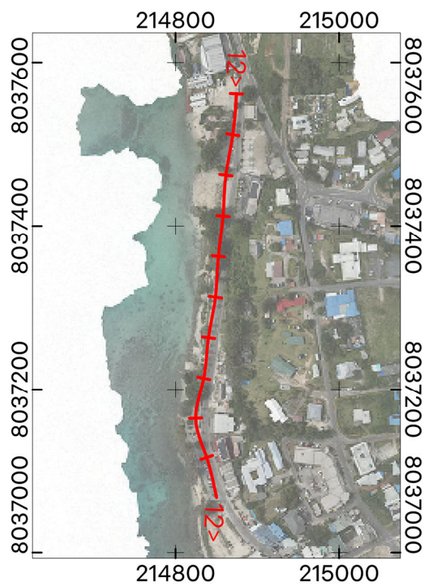
RDCL

NORTH WEST

SOUTH EAST



GENERAL LOCATION PLAN:



SCALE:

Scale 1:600

10 0 10 20 30

metres

GENERAL LOCATION PLAN SCALE:

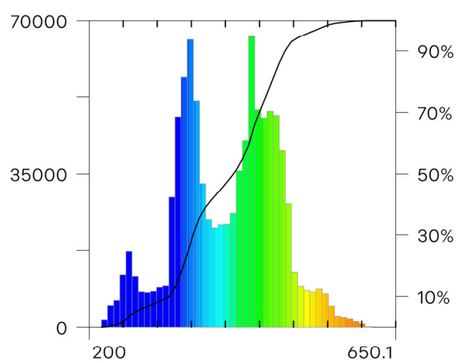
Scale 1:7500

100 0 100 200 300 400

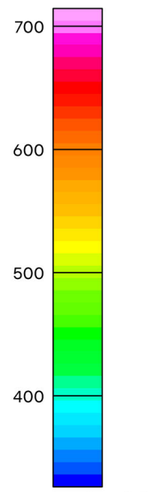
metres

WGS 84 / UTM zone 59S

GRID HISTOGRAM:



LEGEND:



NOTES:

1. Imagery data provided to RDCL by the client.

CLIENT: T+T

PROJECT: PORT VILA, VANUATU
GEOPHYSICS

TITLE: MASW LINE 12
PSEUDO Vs SECTION

INTERP. BY: OG	DATE: 10/04/2026	DRAWN BY: OG	DATE: 10/04/2026
CHECKED BY: SL	DATE: 10/04/2026	APPROVED BY: SJ	DATE: 10/04/2026
CONTRACT No.: 250306		FIGURE 28	
FILE NAME: 250306.gpf PLOTTED DRAWING SIZE: A3 (420 x 297)			

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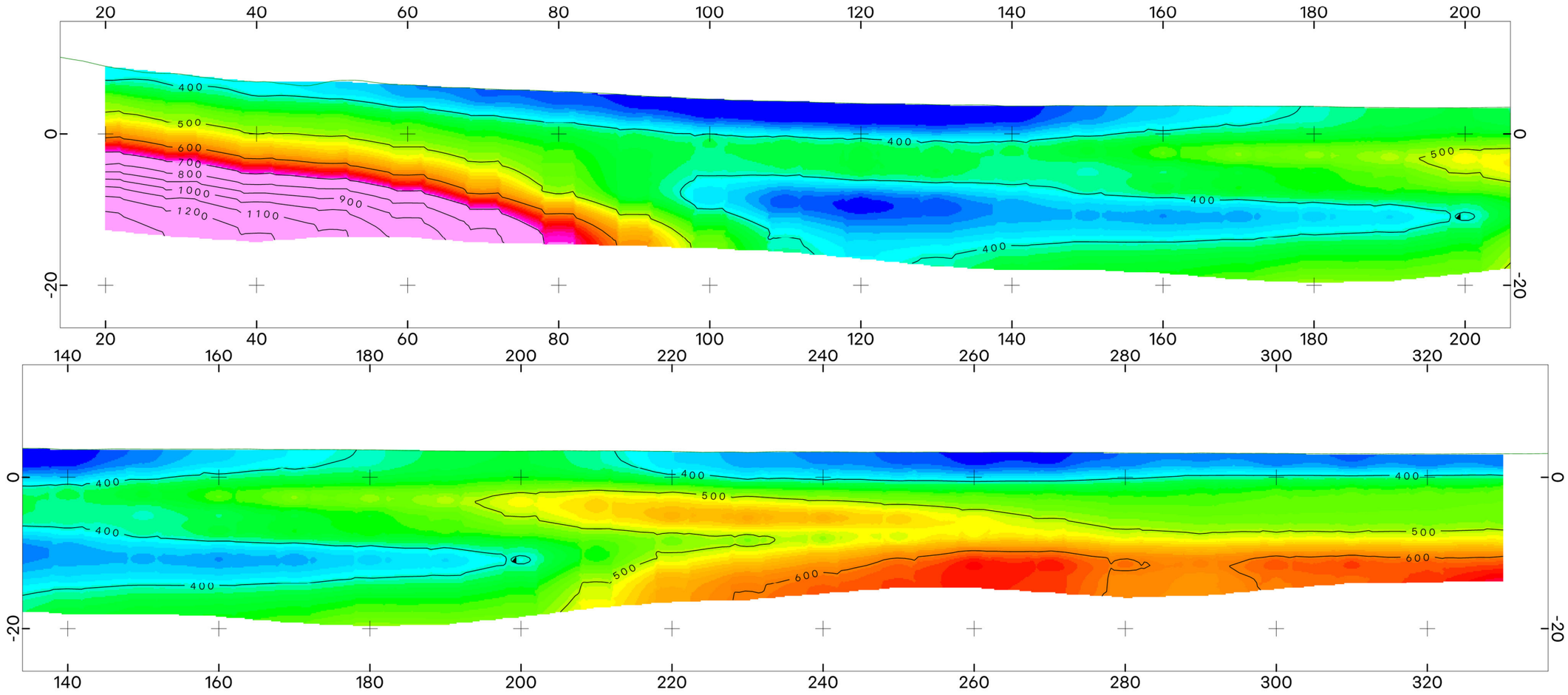
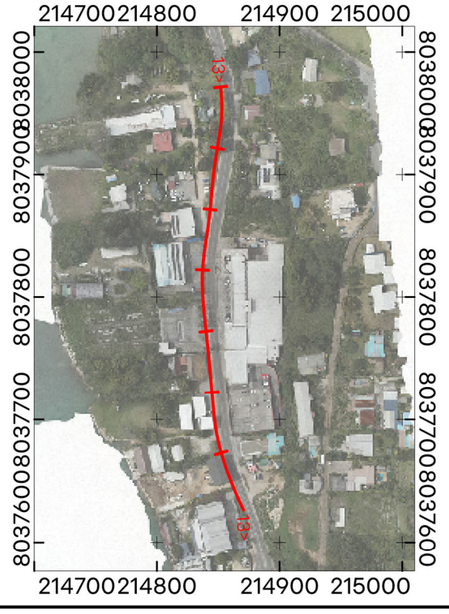
RDCL

NORTH WEST

SOUTH EAST



GENERAL LOCATION PLAN:



SCALE:

Scale 1:600

10 0 10 20 30

metres

GENERAL LOCATION PLAN SCALE:

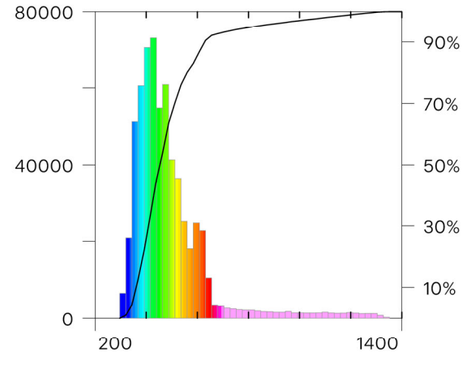
Scale 1:5000

100 0 100 200

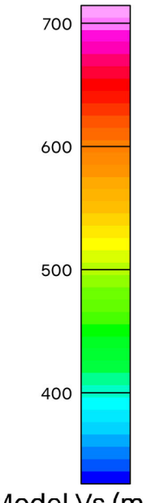
metres

WGS 84 / UTM zone 59S

GRID HISTOGRAM:



LEGEND:



Model Vs (m/s)

NOTES:

1. Imagery data provided to RDCL by the client.

CLIENT: T+T

PROJECT: PORT VILA, VANUATU
GEOPHYSICS

TITLE: MASW LINE 13
PSEUDO Vs SECTION

INTERP. BY: OG	DATE: 11/04/2026	DRAWN BY: OG	DATE: 11/04/2026
CHECKED BY: SL	DATE: 11/04/2026	APPROVED BY: SJ	DATE: 11/04/2026

CONTRACT No.: 250306 FIGURE 29

FILE NAME: 250306.gpf
PLOTTED DRAWING SIZE: A3 (420 x 297)

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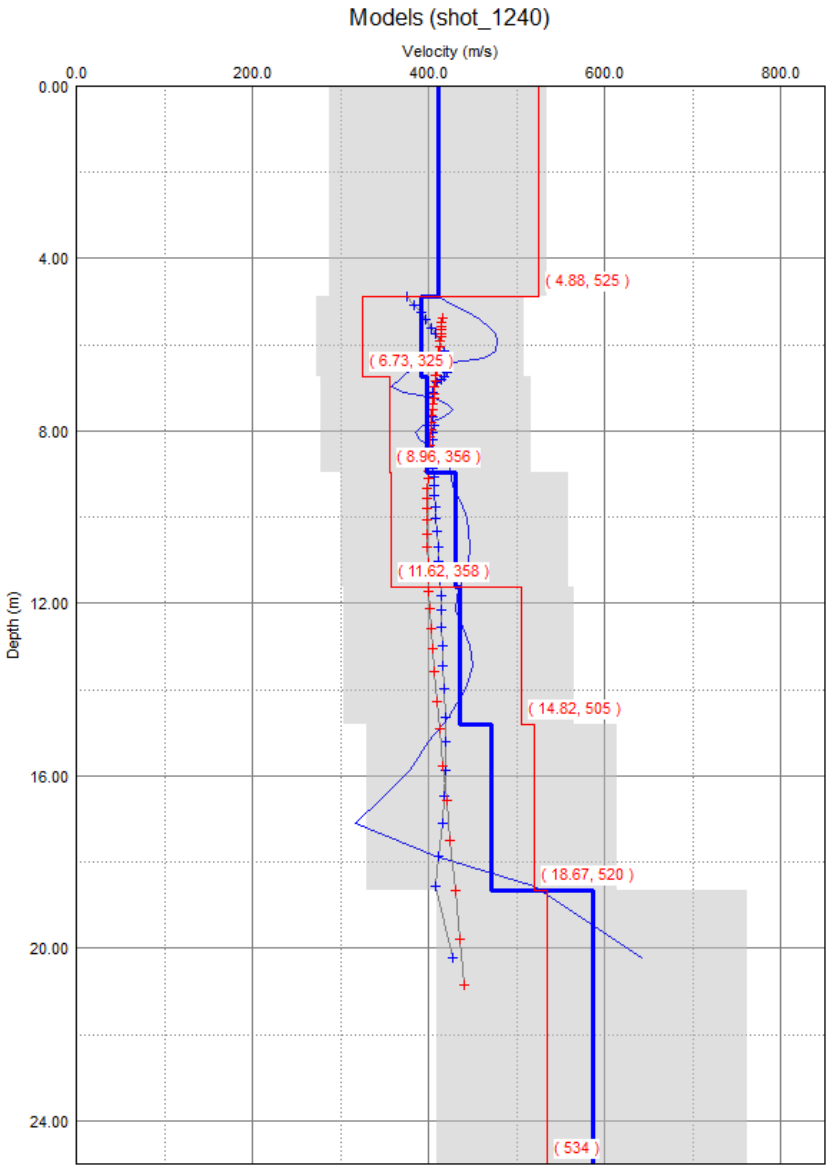
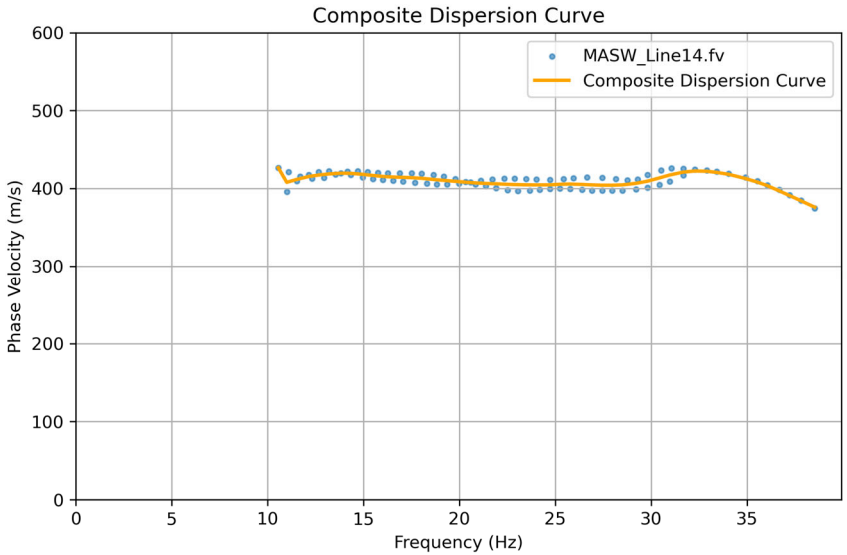
Ground Model

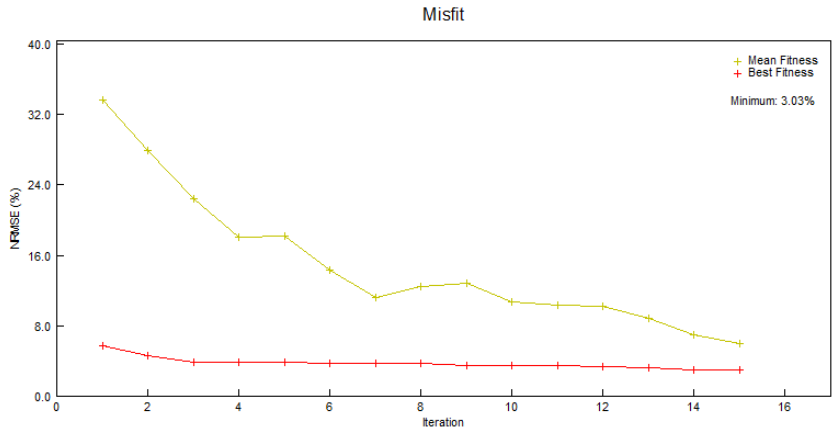


Final Model

Composite Dispersion Curve



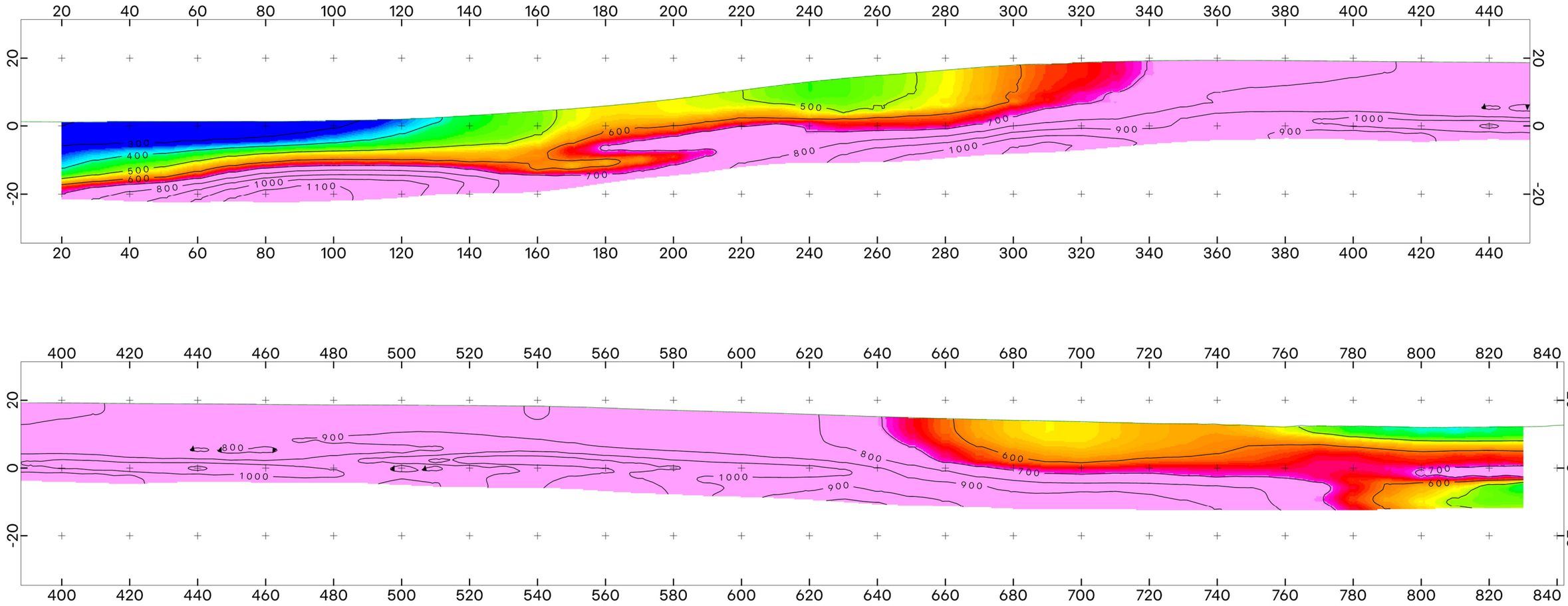
Plot of Misfit



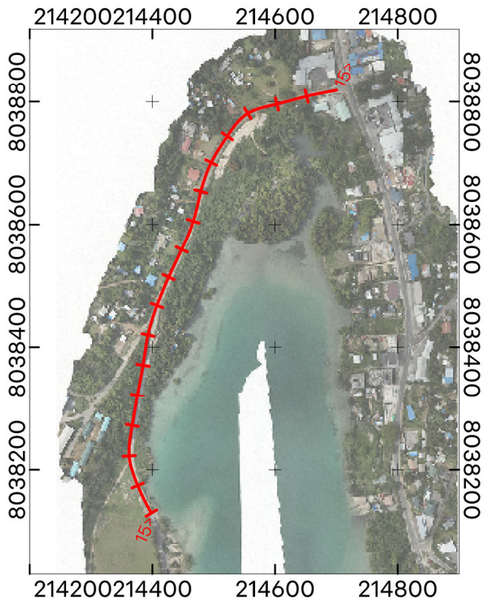
RDCL®	TITLE	MASW Line 14 Sounding	PROJECT	250306		
	PROJECT	Port Vila, Vanuatu Geophysics	DRAWN BY	OG	DATE	13/04/26	FIG
	CLIENT	T+T	CHECKED BY	SL	DATE	13/04/26	30

SOUTH

NORTH



GENERAL LOCATION PLAN:



SCALE:

Scale 1:1200

25 0 25 50

metres

GENERAL LOCATION PLAN SCALE:

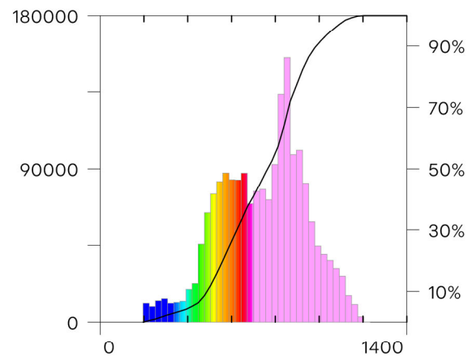
Scale 1:10000

200 0 200 400

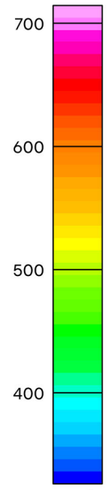
metres

WGS 84 / UTM zone 59S

GRID HISTOGRAM:



LEGEND:



Model Vs (m/s)

NOTES:

1. Imagery data provided to RDCL by the client.

CLIENT: T+T

PROJECT: PORT VILA, VANUATU GEOPHYSICS

TITLE: MASW LINE 15 PSEUDO Vs SECTION

INTERP. BY: OG	DATE: 11/04/2026	DRAWN BY: OG	DATE: 11/04/2026
CHECKED BY: SL	DATE: 11/04/2026	APPROVED BY: SJ	DATE: 11/04/2026

CONTRACT No.: 250306 FIGURE 31

FILE NAME: 250306.gpf

PLOTTED DRAWING SIZE: A3 (420 x 297)

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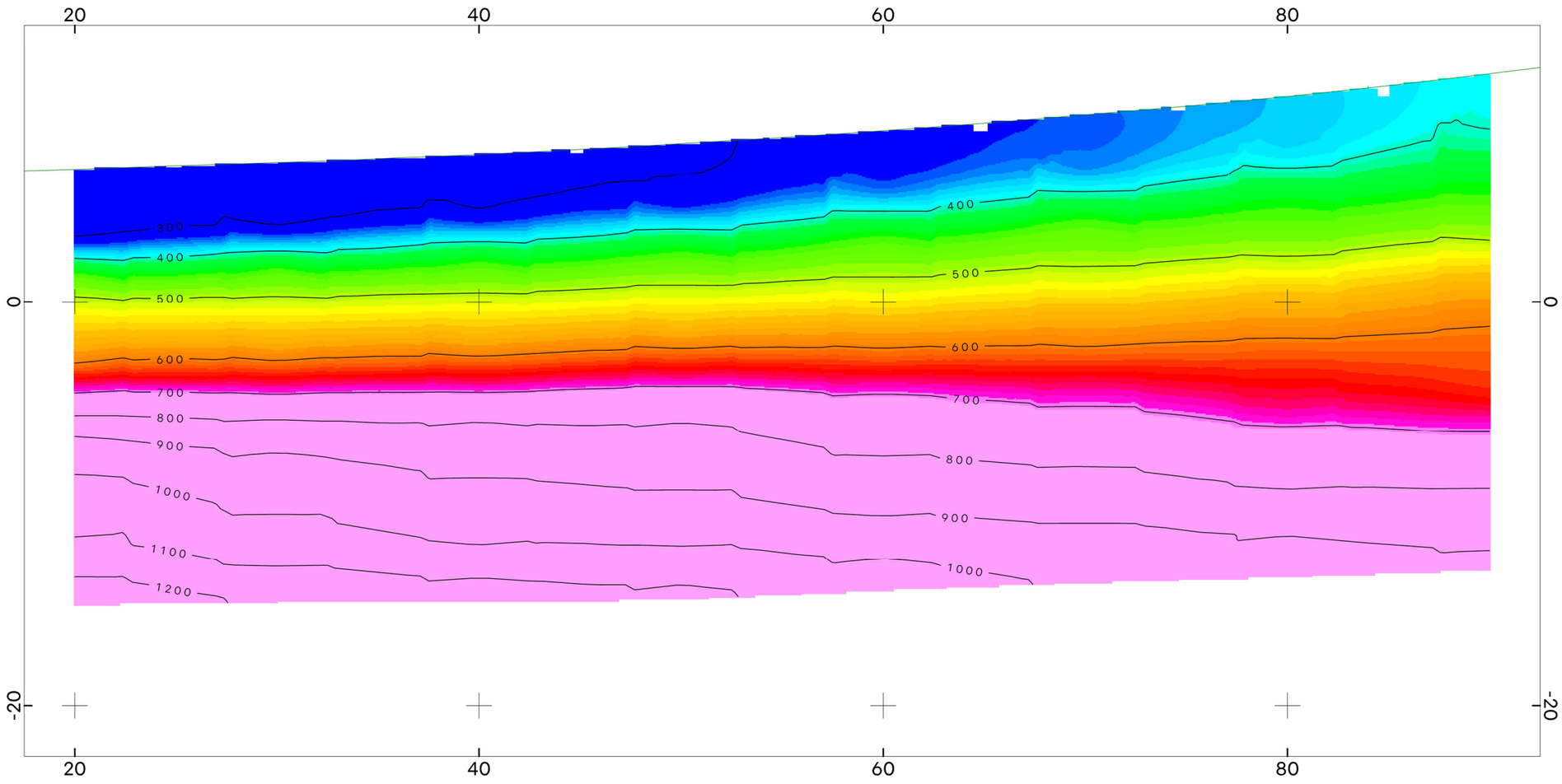
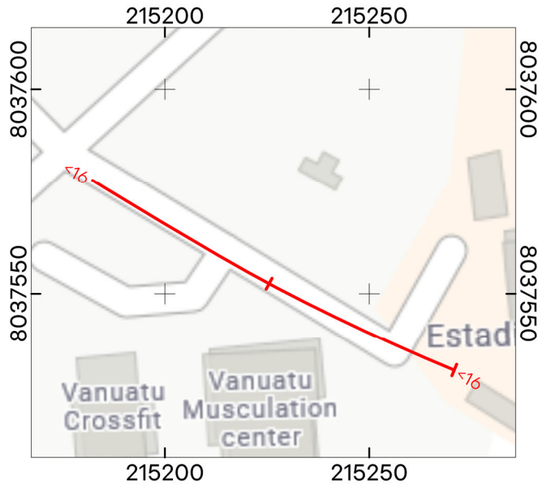
EAST

WEST



GENERAL LOCATION PLAN:



SCALE:

Scale 1:250

5 0 5 10

metres

GENERAL LOCATION PLAN SCALE:

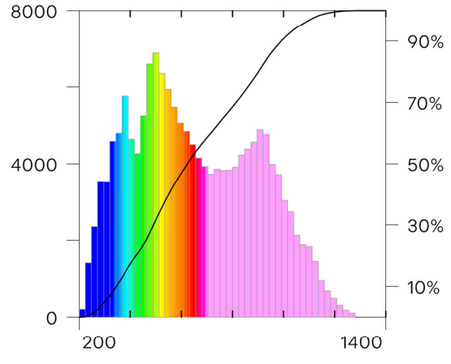
Scale 1:1500

25 0 25 50 75

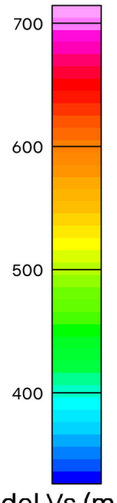
metres

WGS 84 / UTM zone 59S

GRID HISTOGRAM:



LEGEND:



Model Vs (m/s)

NOTES:

CLIENT: T+T

PROJECT: PORT VILA, VANUATU GEOPHYSICS

TITLE: MASV LINE 16 PSEUDO Vs SECTION

INTERP. BY: OG	DATE: 11/04/2026	DRAWN BY: OG	DATE: 11/04/2026
CHECKED BY: SL	DATE: 11/04/2026	APPROVED BY: SJ	DATE: 11/04/2026

CONTRACT No.: 250306 FIGURE 32

FILE NAME: 250306.gpf

PLOTTED DRAWING SIZE: A3 (420 x 297)

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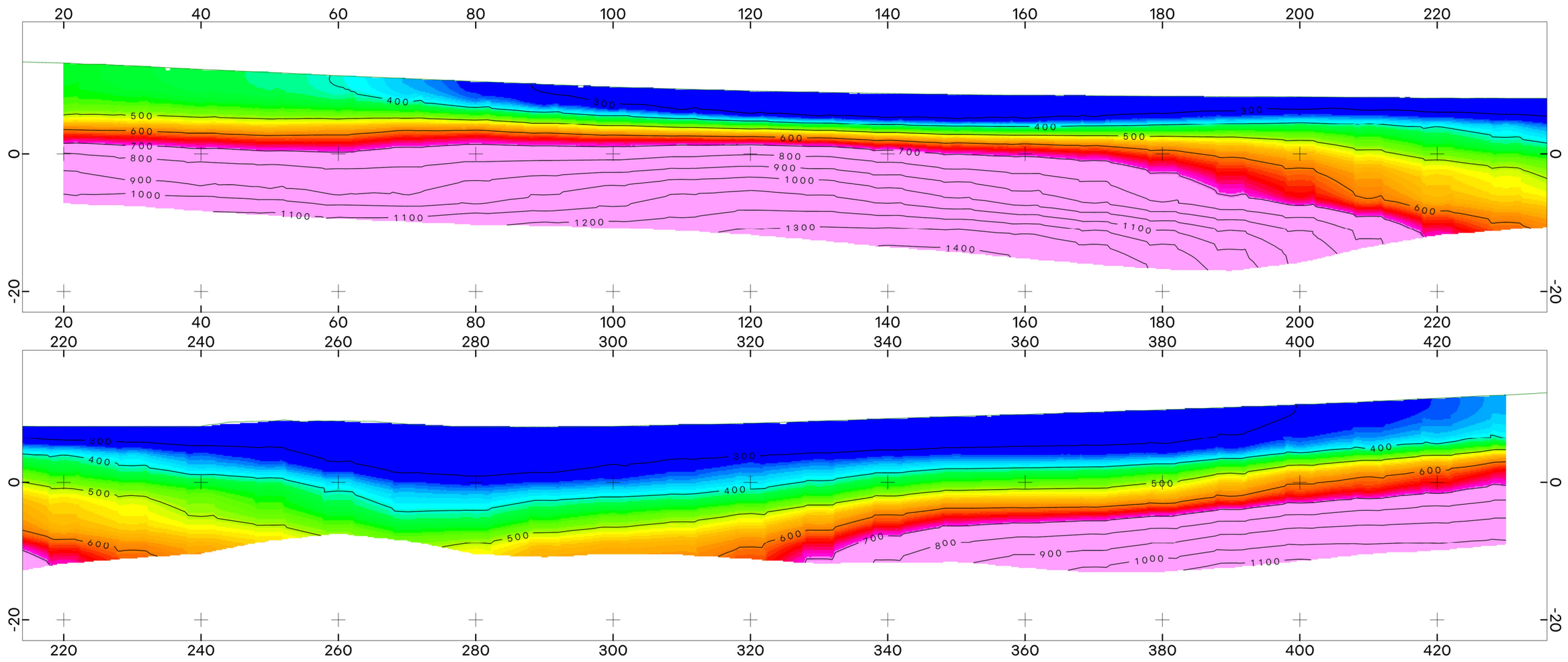
RDCL

WEST

EAST



GENERAL LOCATION PLAN:



SCALE:

Scale 1:600

10 0 10 20 30

metres

GENERAL LOCATION PLAN SCALE:

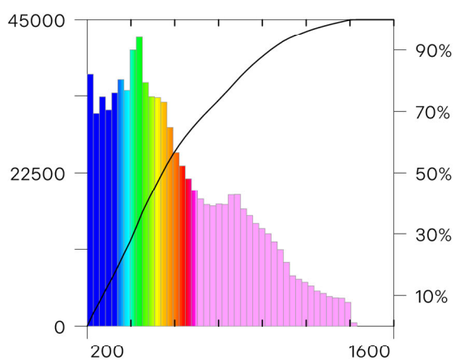
Scale 1:6000

100 0 100 200 300

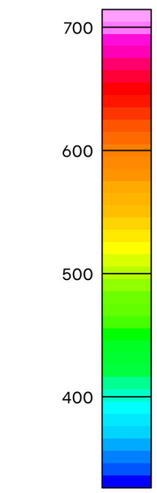
metres

WGS 84 / UTM zone 59S

GRID HISTOGRAM:



LEGEND:



Model Vs (m/s)

NOTES:

1. Imagery data provided to RDCL by the client.

CLIENT: T+T

PROJECT: PORT VILA, VANUATU
GEOPHYSICS

TITLE: MASW LINE 17
PSEUDO Vs SECTION

INTERP. BY: OG	DATE: 11/04/2026	DRAWN BY: OG	DATE: 11/04/2026
CHECKED BY: SL	DATE: 11/04/2026	APPROVED BY: SJ	DATE: 11/04/2026

CONTRACT No.: 250306 FIGURE 33

FILE NAME: 250306.gpf
PLOTTED DRAWING SIZE: A3 (420 x 297)

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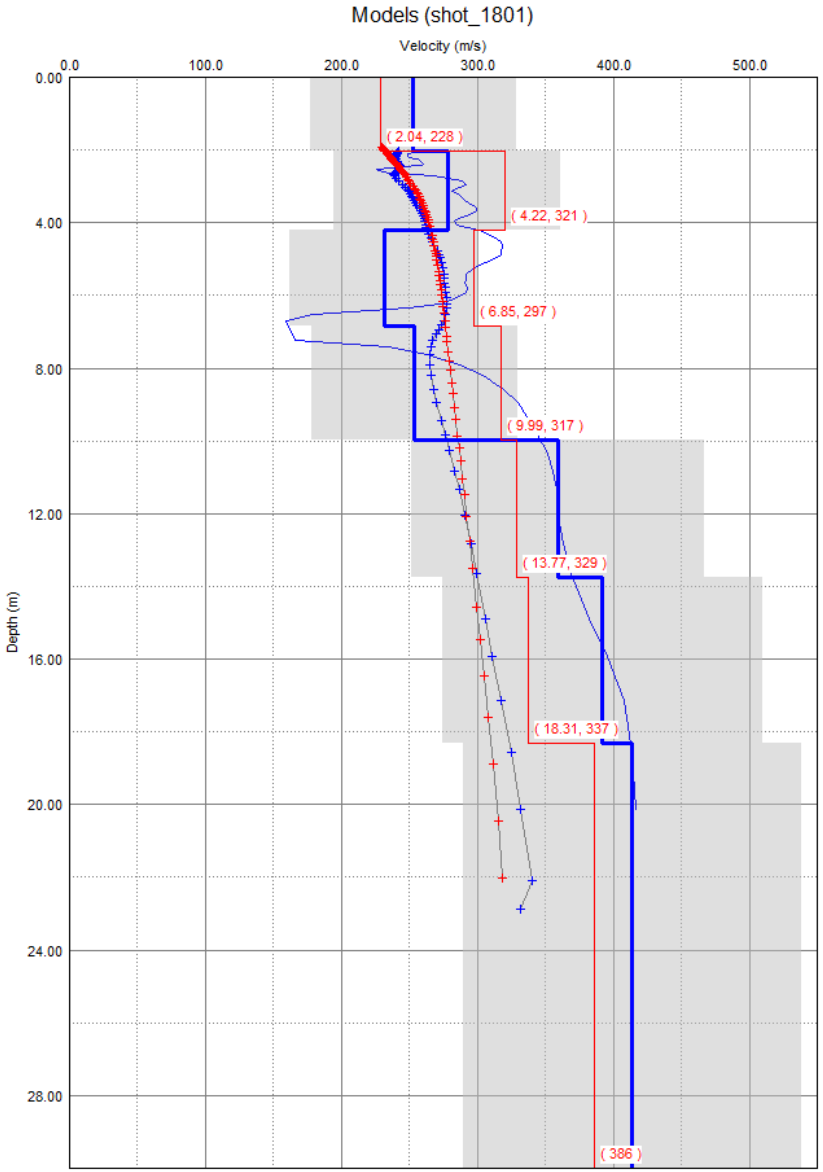
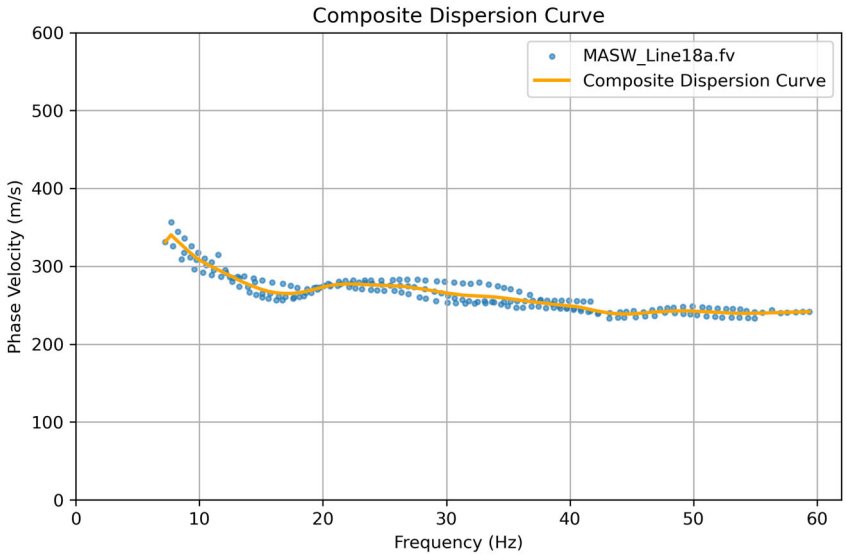
RDCL

Ground Model

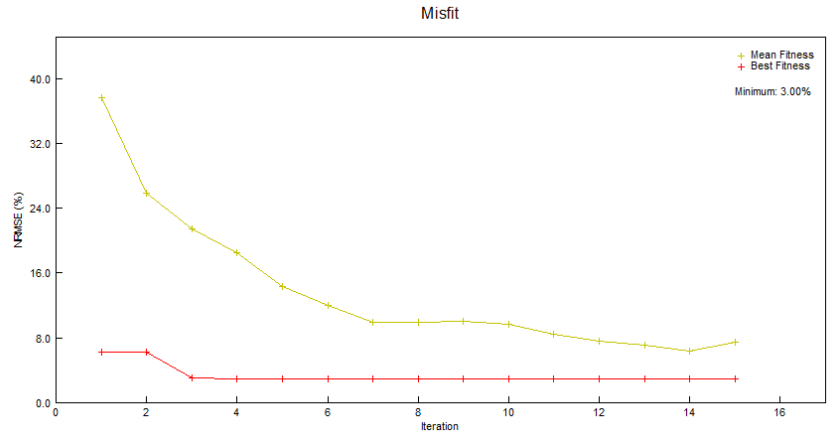


Final Model

Composite Dispersion Curve



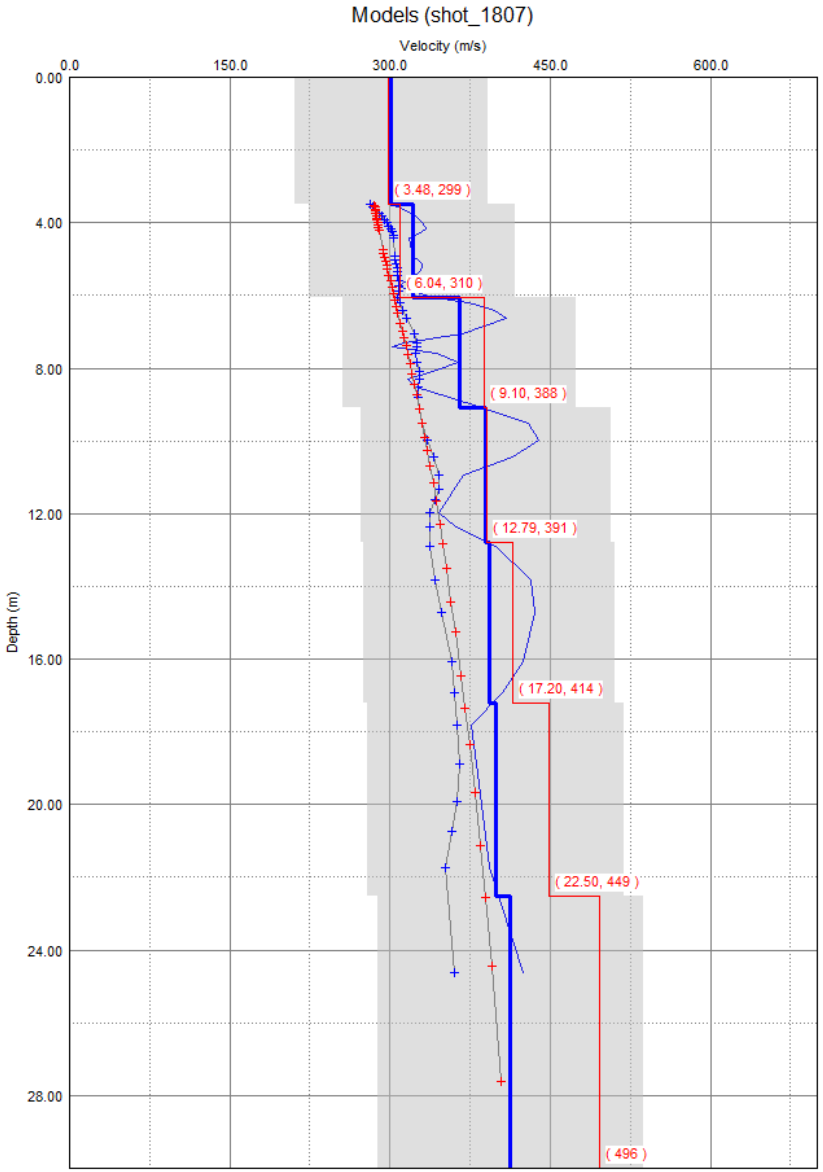
Plot of Misfit



RDCL®

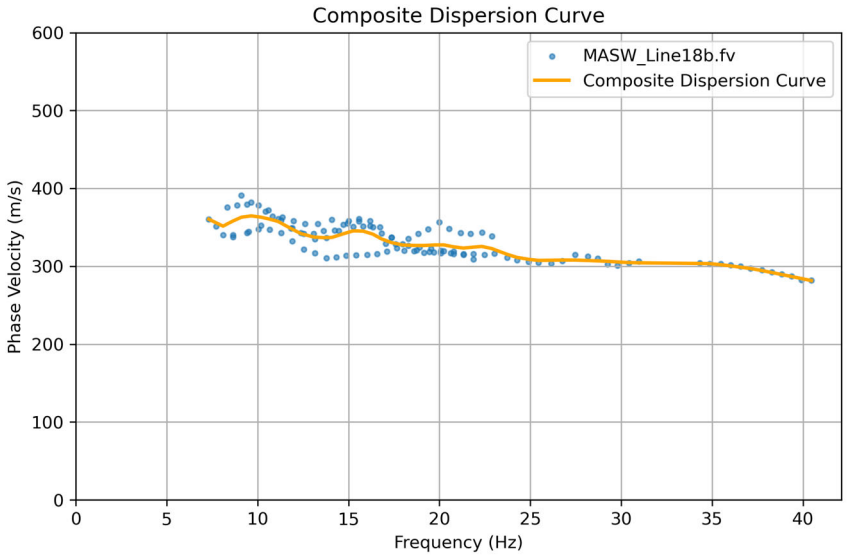
TITLE	MASW Line 18a Sounding	PROJECT	250306			
PROJECT	Port Vila, Vanuatu Geophysics	DRAWN BY	OG	DATE	13/04/26	FIG
CLIENT	T+T	CHECKED BY	SL	DATE	13/04/26	34

Ground Model

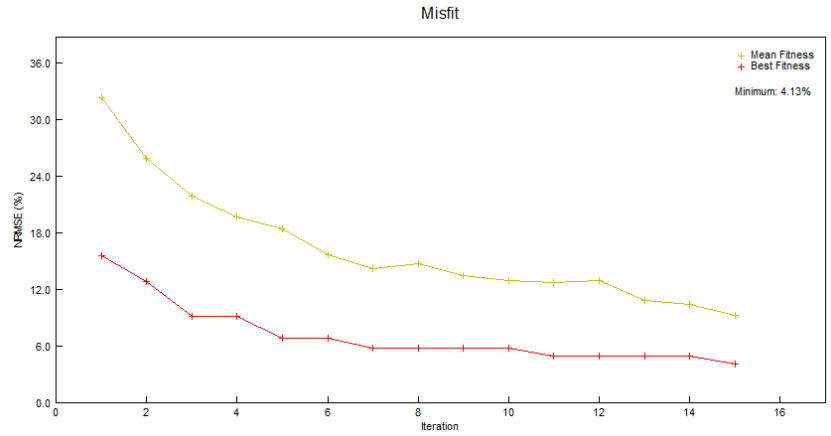


Final Model

Composite Dispersion Curve



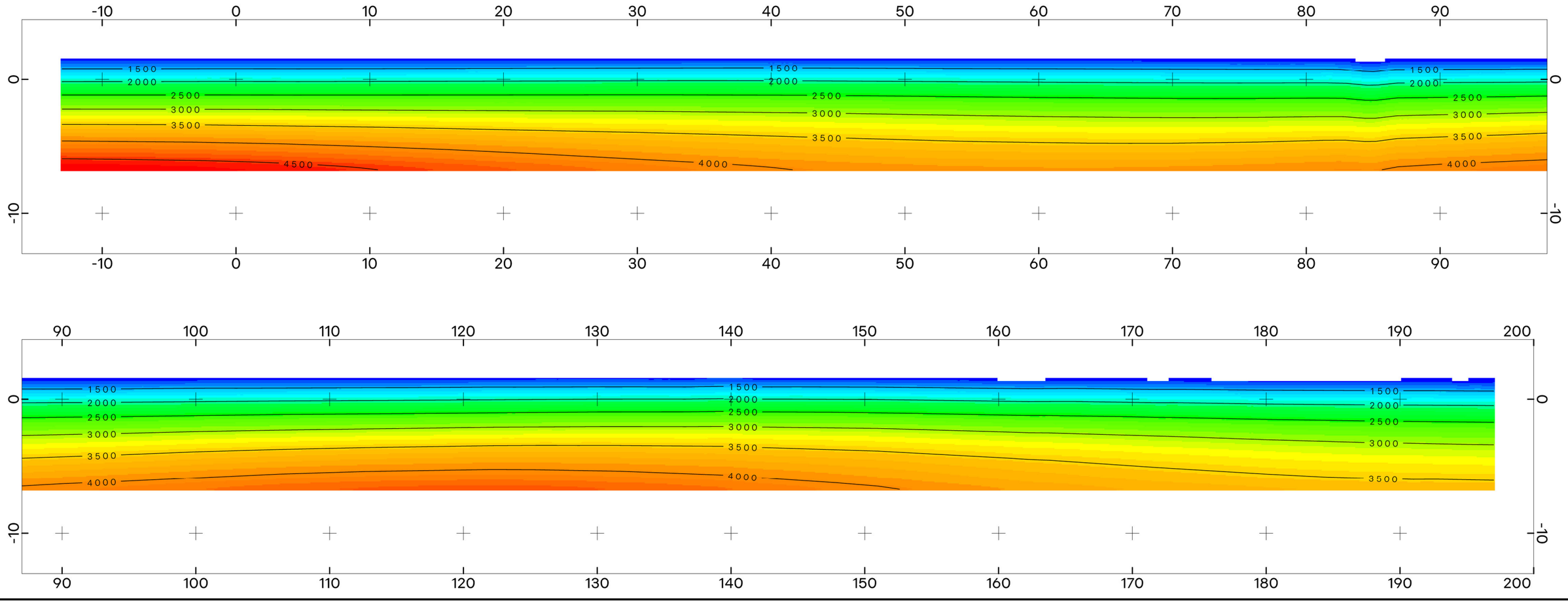
Plot of Misfit



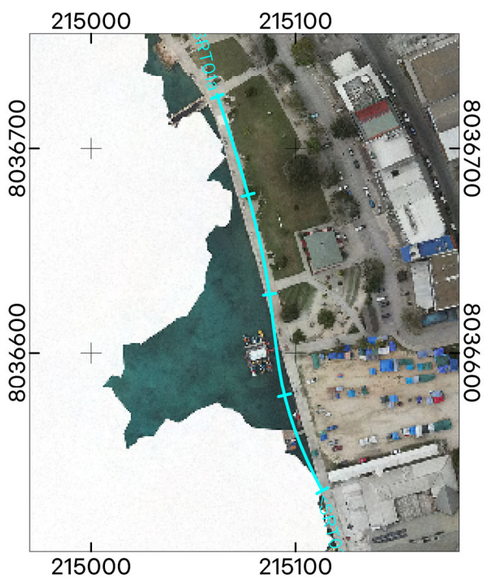
RDCL®	TITLE	MASW Line 18b Sounding	PROJECT	250306		
	PROJECT	Port Vila, Vanuatu Geophysics	DRAWN BY	OG	DATE	13/04/26	FIG
	CLIENT	T+T	CHECKED BY	SL	DATE	13/04/26	35

SOUTH

NORTH



GENERAL LOCATION PLAN:



SCALE:

Scale 1:300

5 0 5 10 15

metres

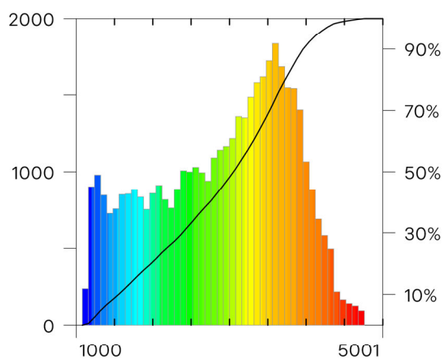
GENERAL LOCATION PLAN SCALE: Scale 1:3000

50 0 50 100 150

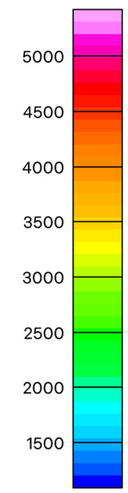
metres

WGS 84 / UTM zone 59S

GRID HISTOGRAM:



LEGEND:



Model Vp (m/s)

NOTES:

1. Imagery data provided to RDCL by the client.

CLIENT: T+T

PROJECT: PORT VILA, VANUATU GEOPHYSICS

TITLE: SRT LINE 01a Vp SECTION

INTERP. BY: OG	DATE: 15/04/2026	DRAWN BY: OG	DATE: 15/04/2026
CHECKED BY: SL	DATE: 15/04/2026	APPROVED BY: SJ	DATE: 15/04/2026

CONTRACT No.: 250306 FIGURE 36

FILE NAME: 250306.gpf

PLOTTED DRAWING SIZE: A3 (420 x 297)

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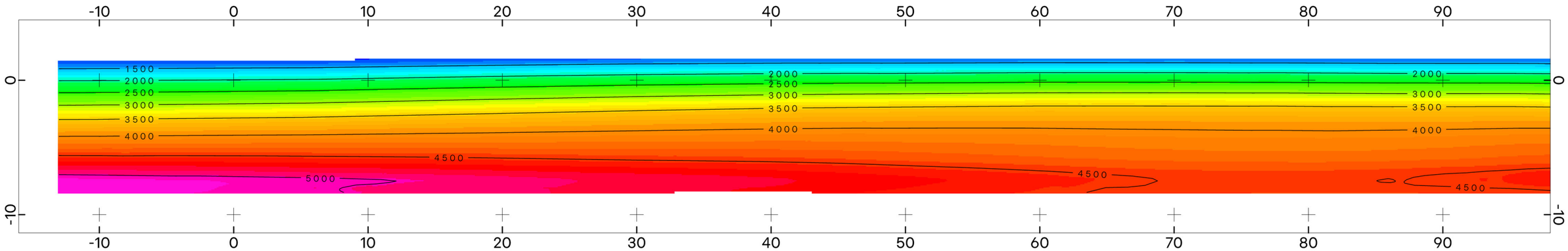
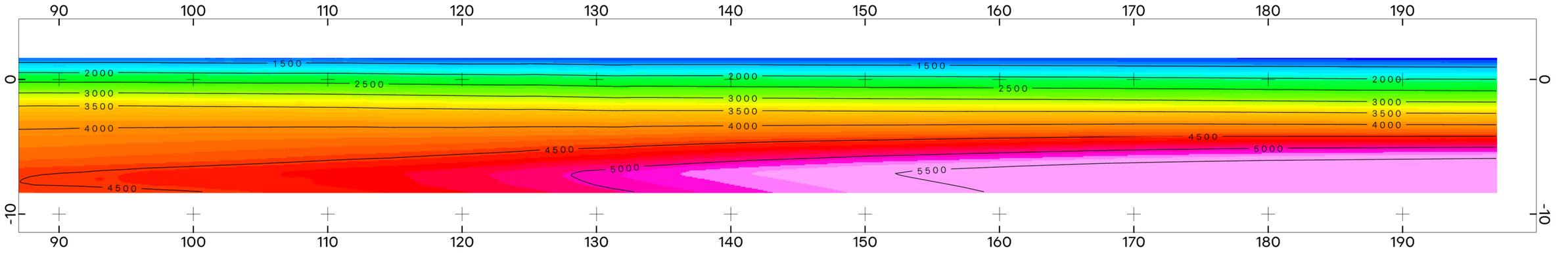
SOUTHEAST

NORTHWEST





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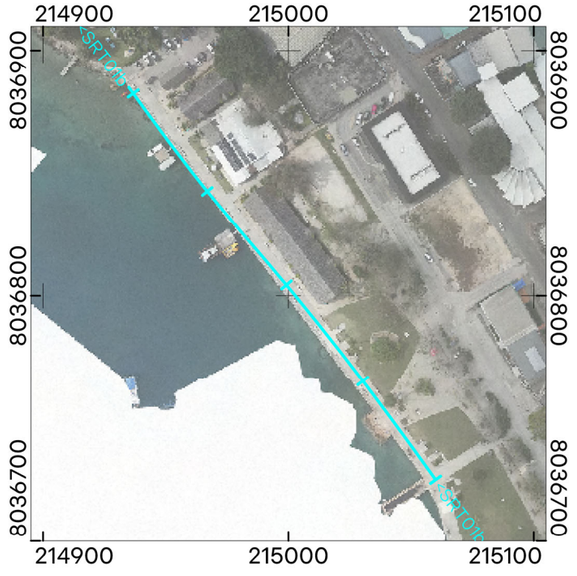

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metres

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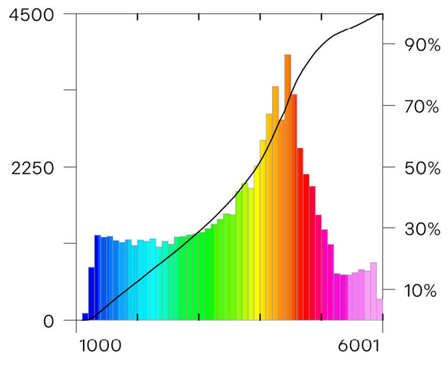
metres

WGS 84 / UTM zone 59S

GRID HISTOGRAM:



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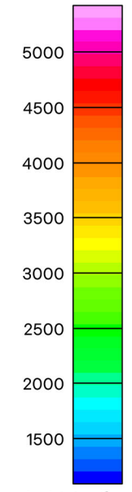

Model Vp (m/s)

NOTES:

1. Imagery data provided to RDCL by the client.

CLIENT:

T+T

PROJECT:

PORT VILA, VANUATU
GEOPHYSICS

TITLE:

SRT LINE 01b
Vp SECTION

INTERP. BY: OG	DATE: 15/04/2026	DRAWN BY: OG	DATE: 15/04/2026
CHECKED BY: SL	DATE: 15/04/2026	APPROVED BY: SJ	DATE: 15/04/2026

CONTRACT No.: 250306 FIGURE 37

FILE NAME: 250306.gpf
PLOTTED DRAWING SIZE: A3 (420 x 297)

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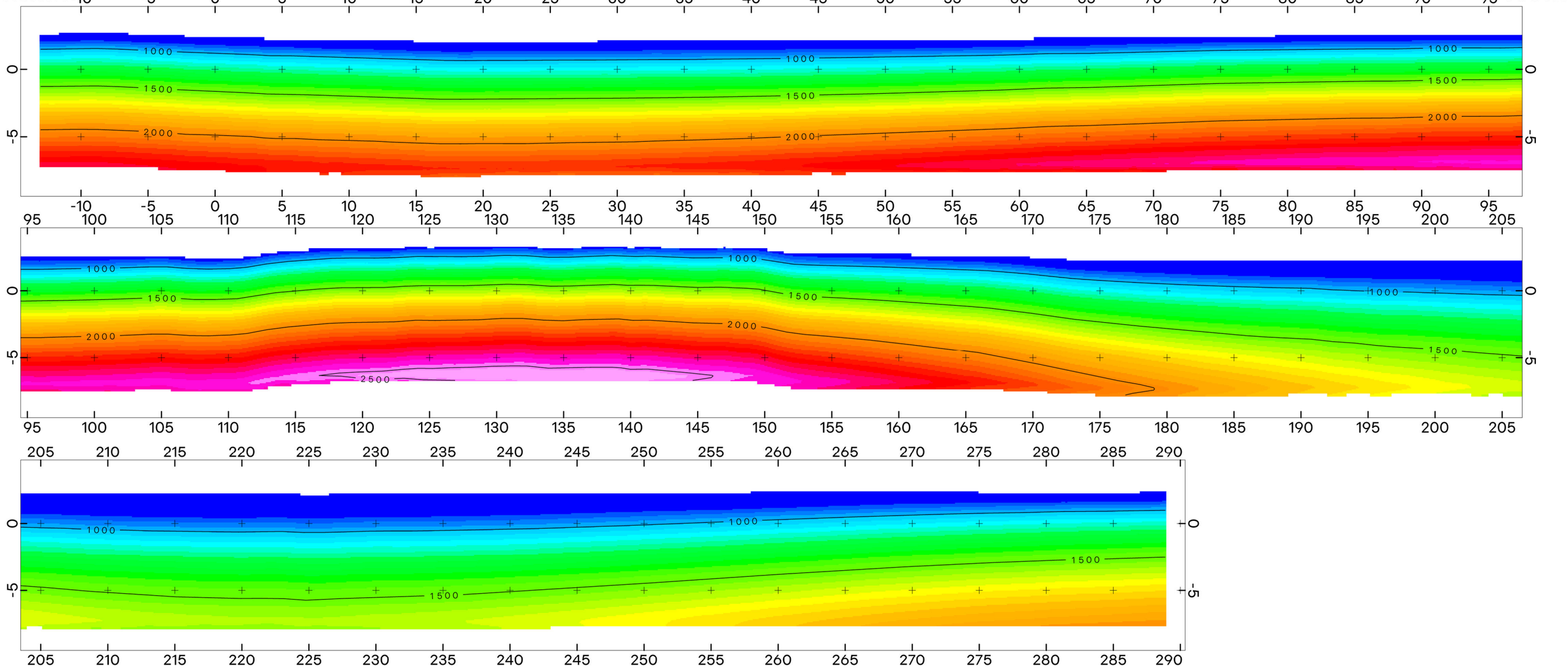
NORTH



SOUTH

GENERAL LOCATION PLAN:



SCALE:

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metres

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metres

WGS 84 / UTM zone 59S

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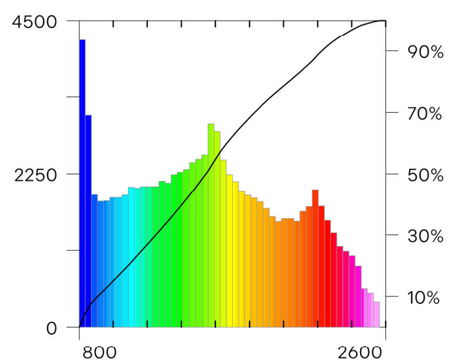

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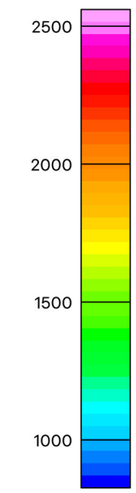

Model Vp (m/s)

NOTES:

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CLIENT: T+T

PROJECT: PORT VILA, VANUATU GEOPHYSICS

TITLE: SRT LINE 02 Vp SECTION

INTERP. BY: OG	DATE: 15/04/2026	DRAWN BY: OG	DATE: 15/04/2026
CHECKED BY: SL	DATE: 15/04/2026	APPROVED BY: SJ	DATE: 15/04/2026

CONTRACT No.: 250306 FIGURE 38

FILE NAME: 250306.gpf

PLOTTED DRAWING SIZE: A3 (420 x 297)

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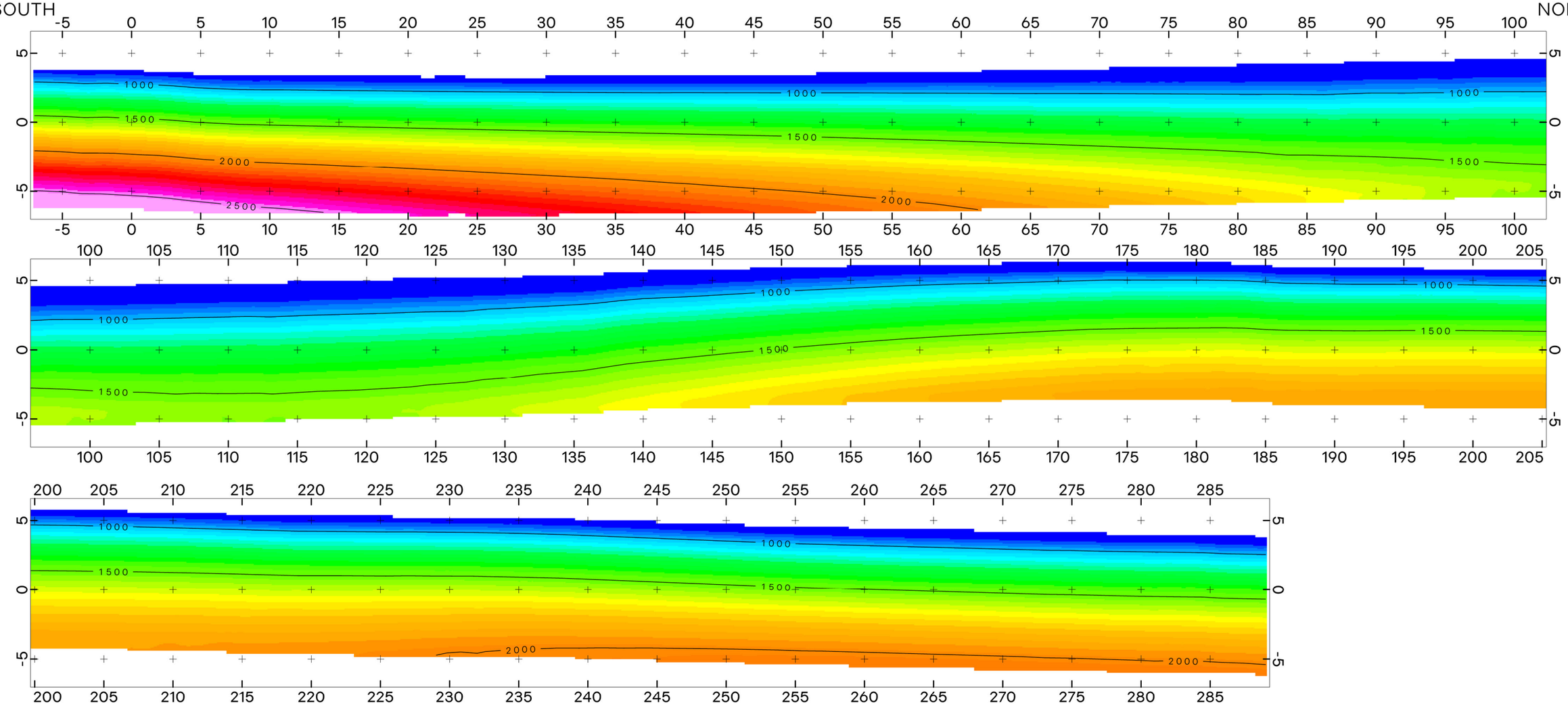
SOUTH

NORTH



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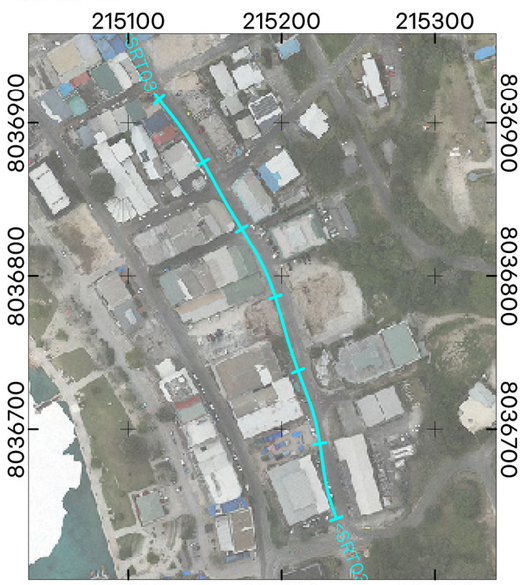

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GENERAL LOCATION PLAN SCALE:

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metres

WGS 84 / UTM zone 59S

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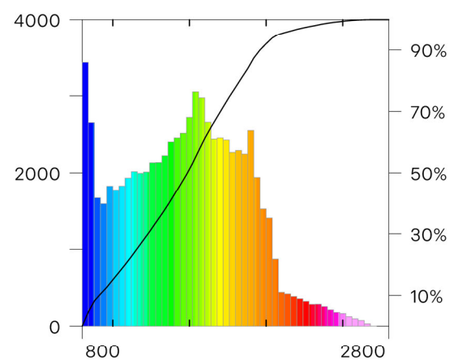

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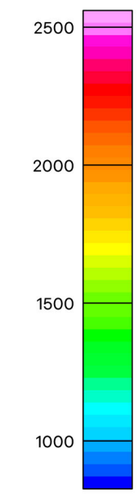

Model Vp (m/s)

NOTES:

1. Imagery data provided to RDCL by the client.

CLIENT: T+T

PROJECT: PORT VILA, VANUATU
GEOPHYSICS

TITLE: SRT LINE 03
Vp SECTION

INTERP. BY: OG	DATE: 16/04/2026	DRAWN BY: OG	DATE: 16/04/2026
CHECKED BY: SL	DATE: 16/04/2026	APPROVED BY: SJ	DATE: 16/04/2026

CONTRACT No.: 250306 FIGURE 39

FILE NAME: 250306.gpf
PLOTTED DRAWING SIZE: A3 (420 x 297)

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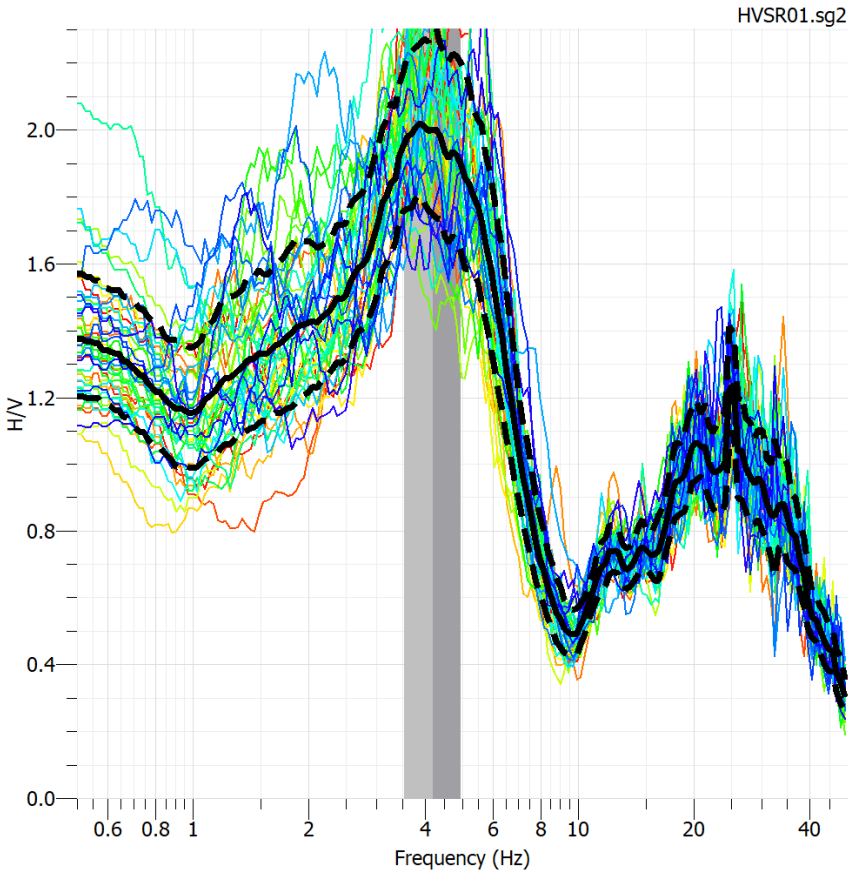

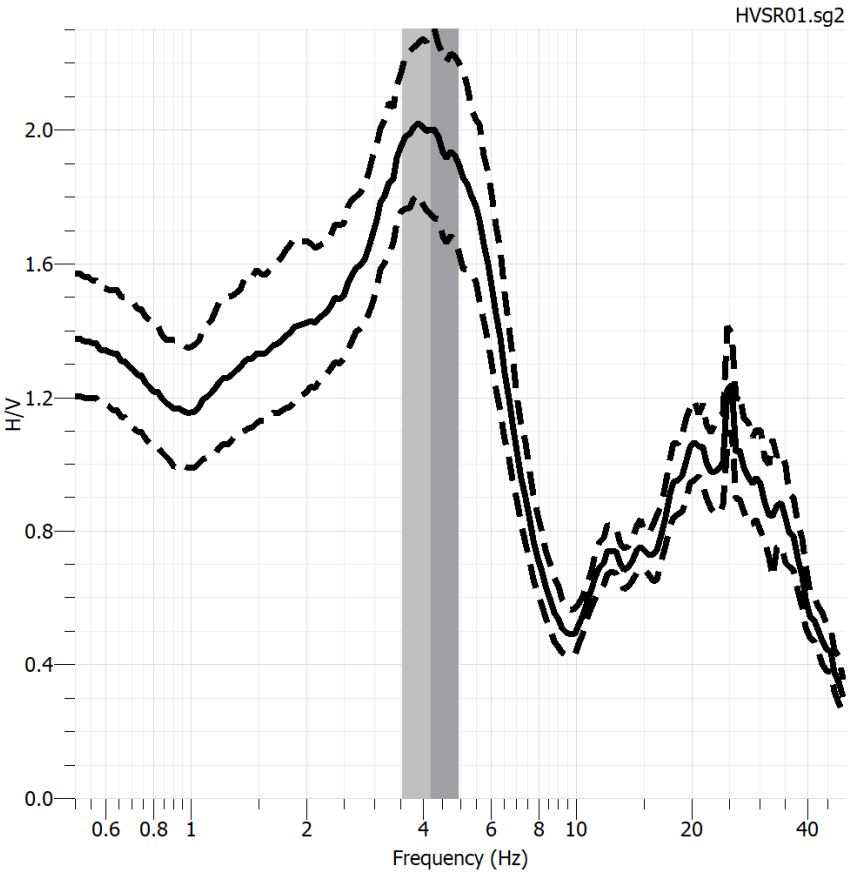

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RDCL®

TITLE	HVSR01	PROJECT	250306			
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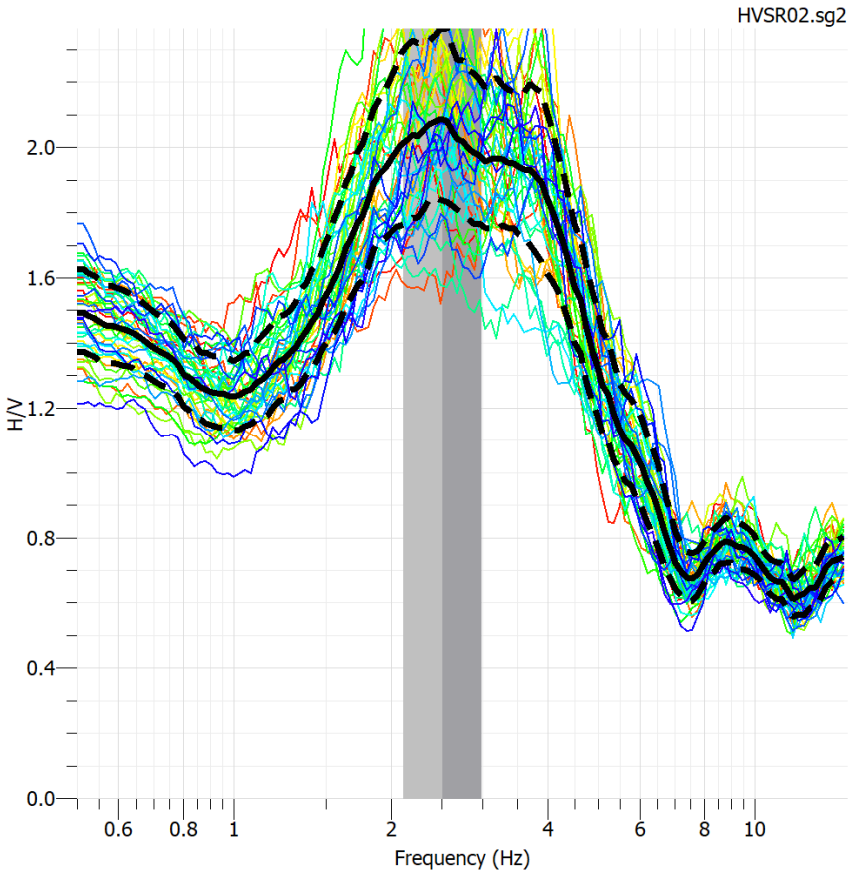

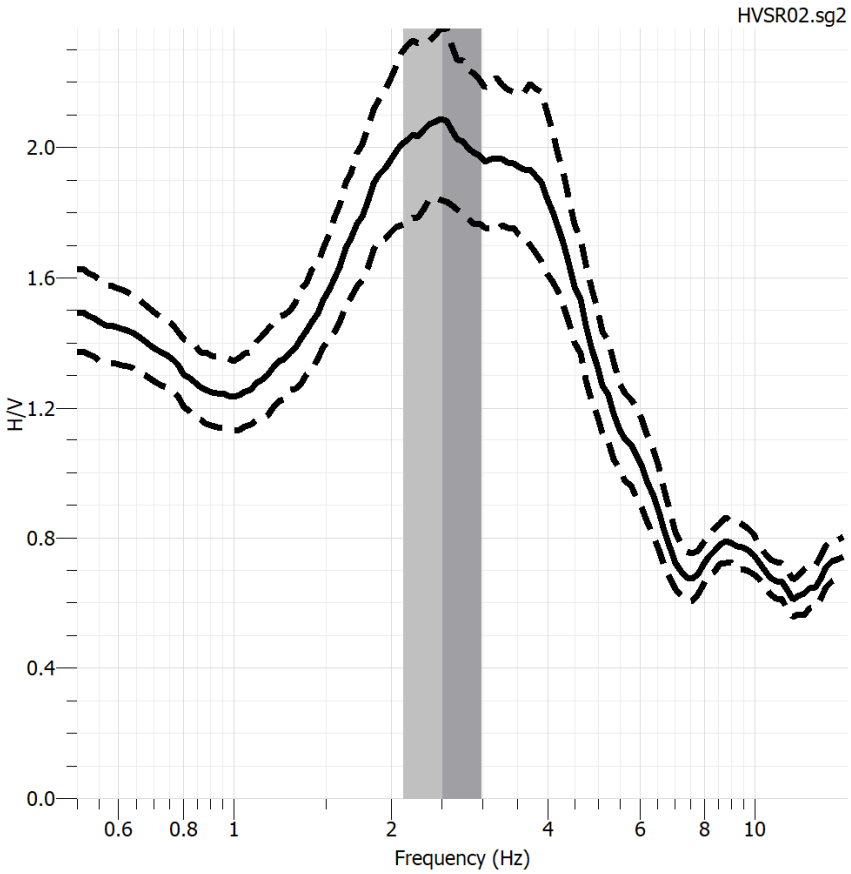

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RDCL®	TITLE	HVSR02	PROJECT	250306			
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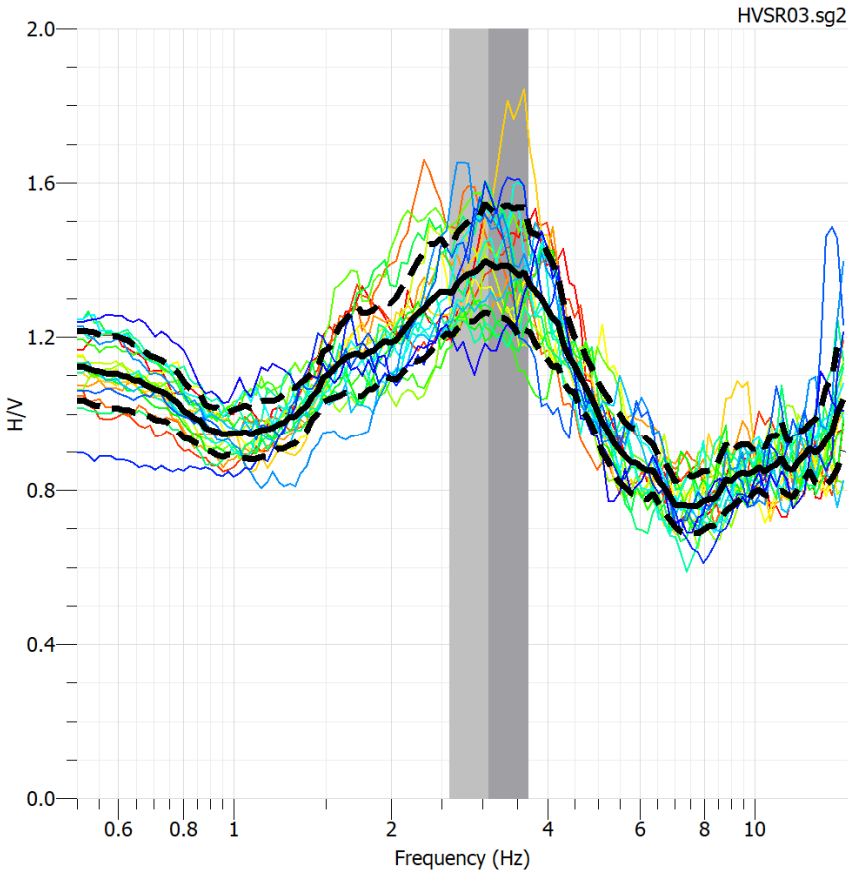

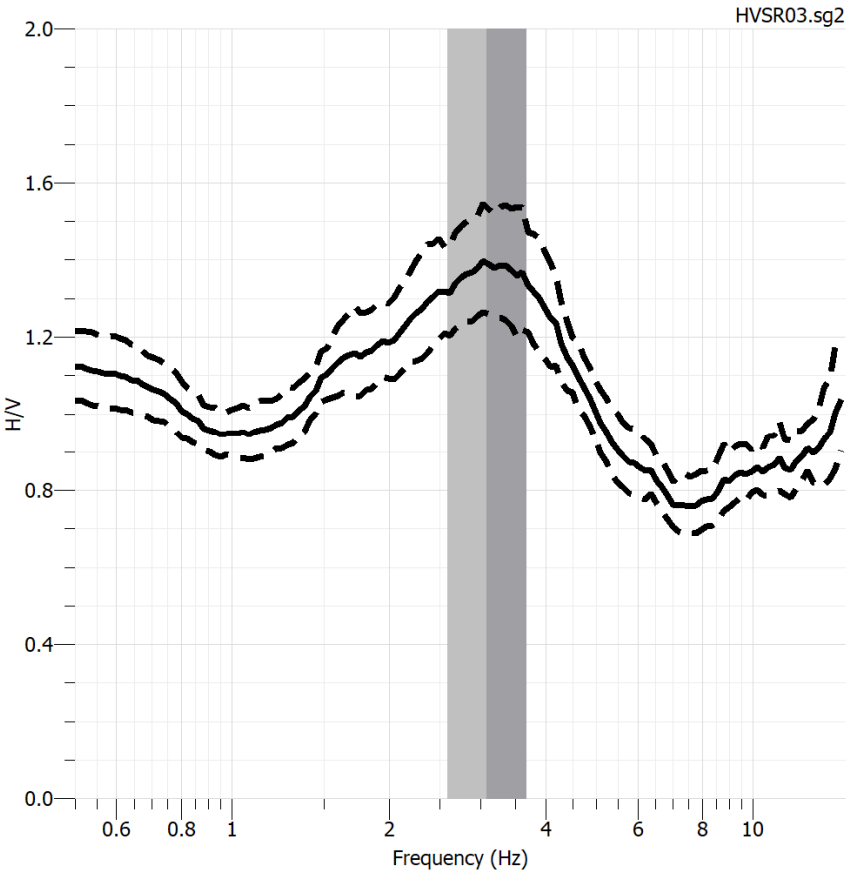

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RDCL®

TITLE	HVSR03	PROJECT	250306				
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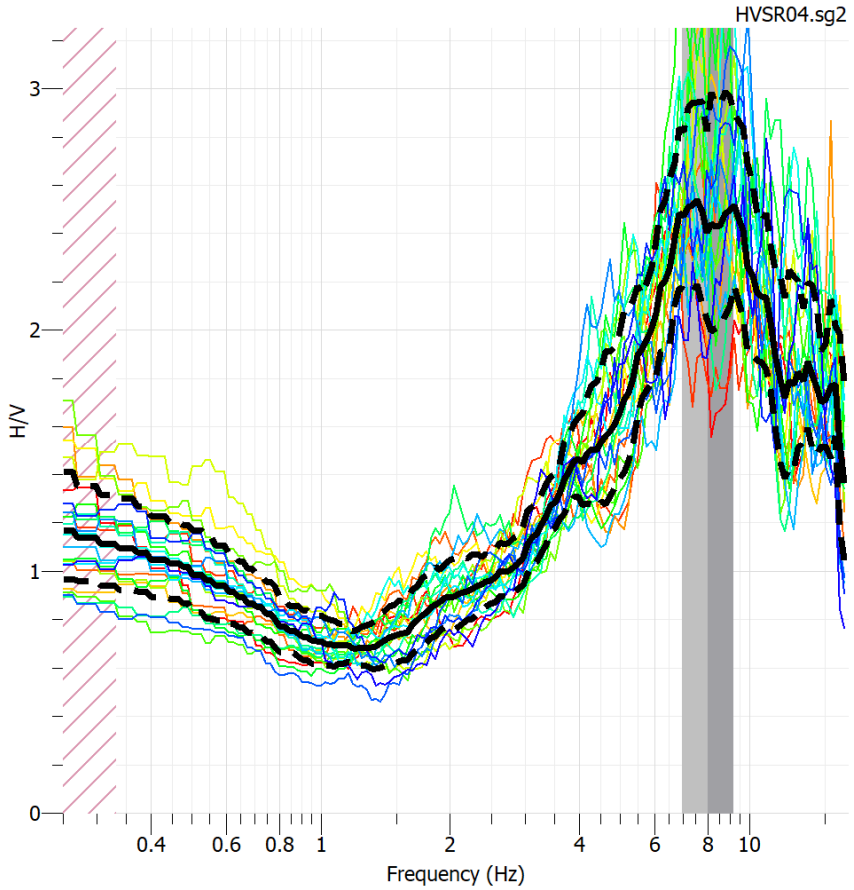

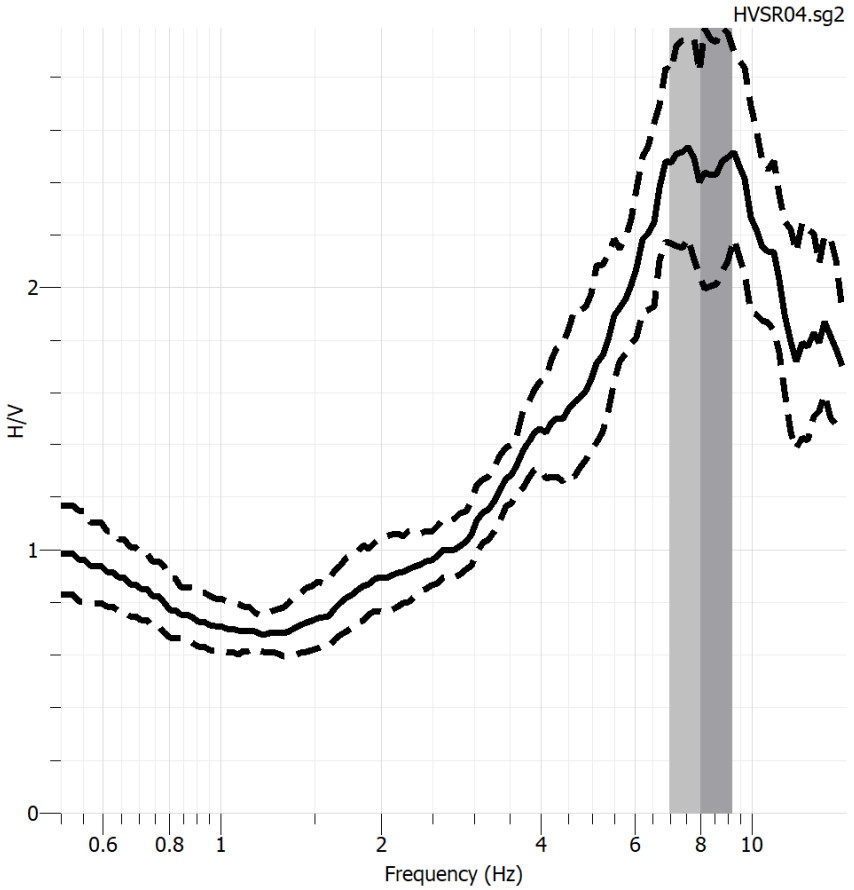

HVSR#	f0	fmin	fmax	A0	Amin	Amax	T0	Tmin	Tmax
	Hz	Hz	Hz				s	s	s
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RDCL®

TITLE	HVSR04	PROJECT	250306			
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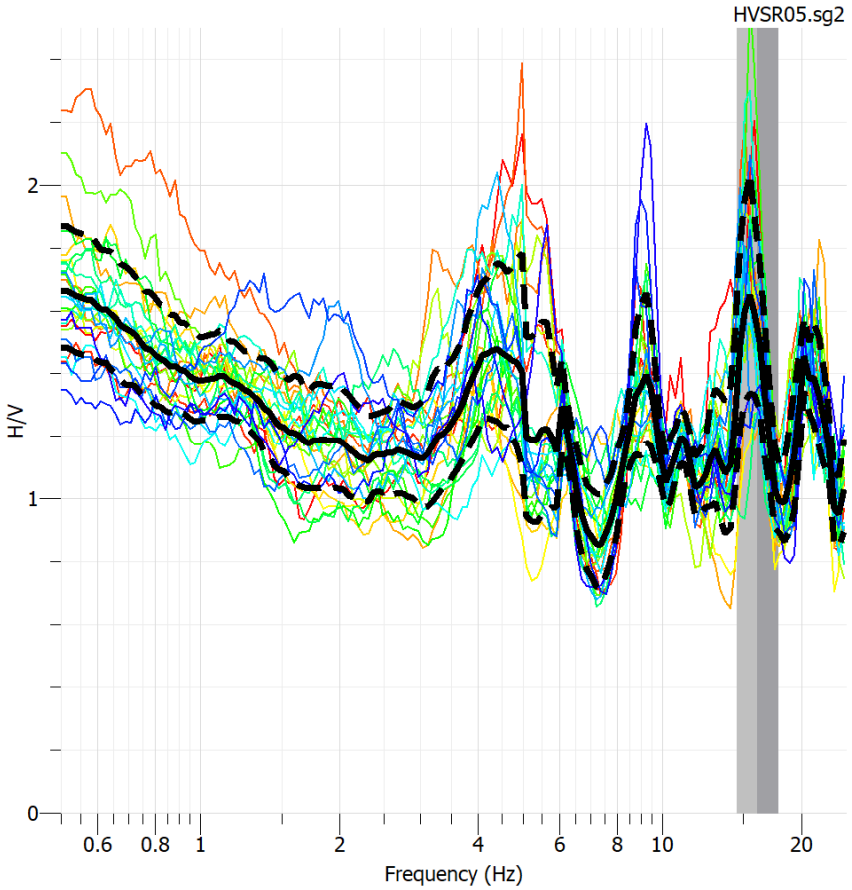
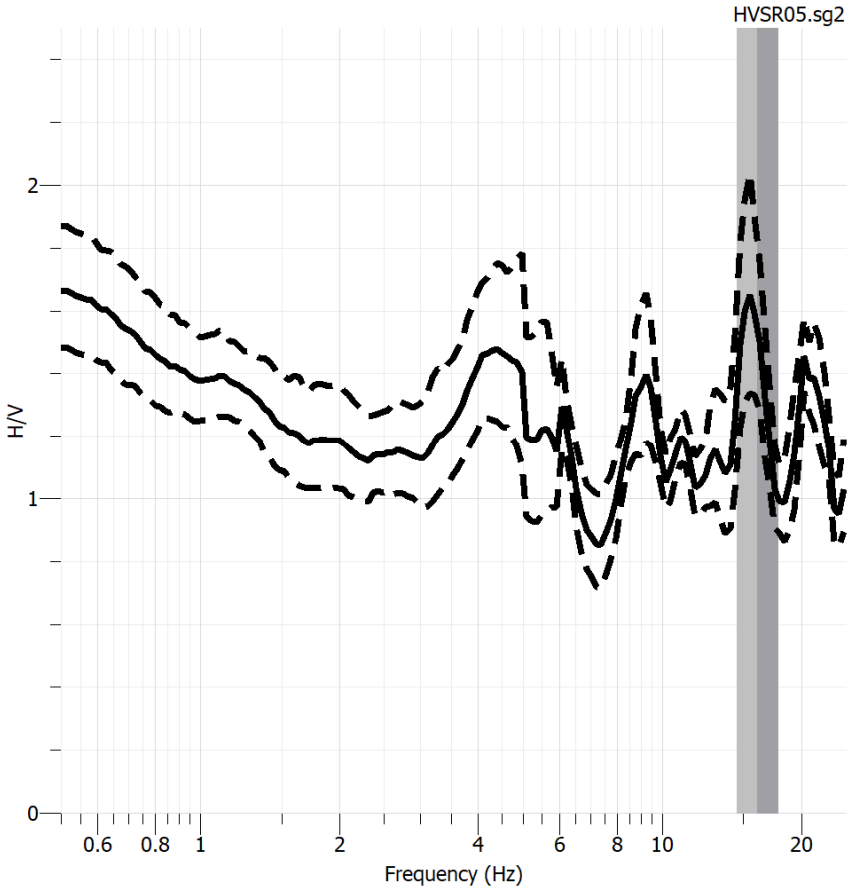
CLIENT	T+T	CHECKED BY	SL	DATE	13/04/26	43





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RDCL®

TITLE	HVSR05	PROJECT	250306				
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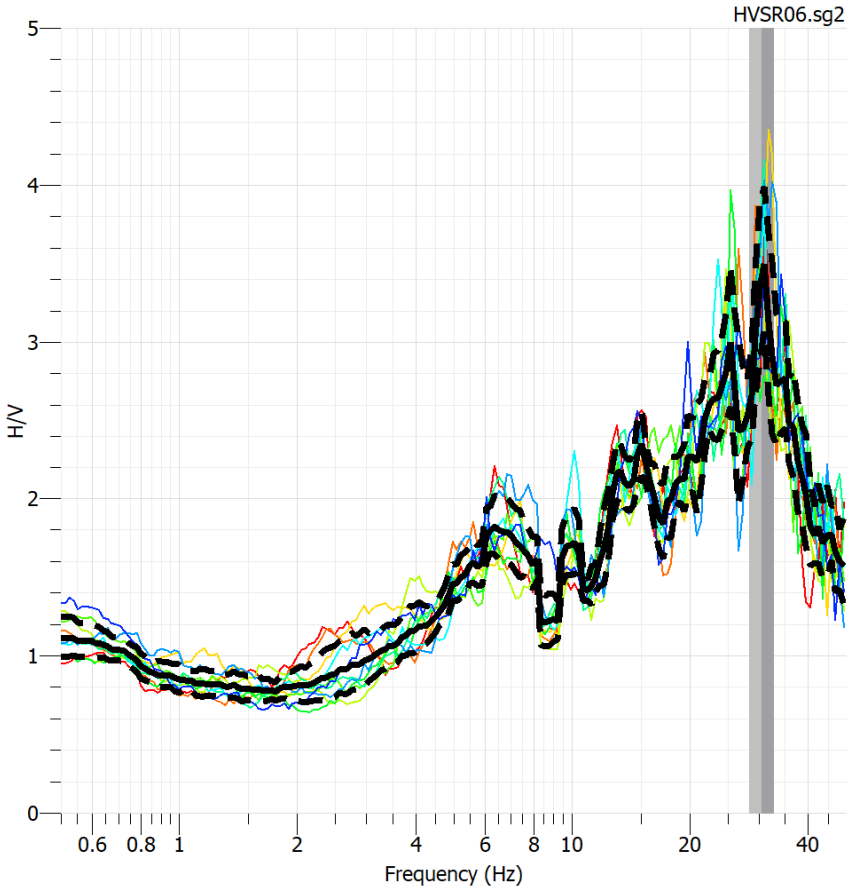

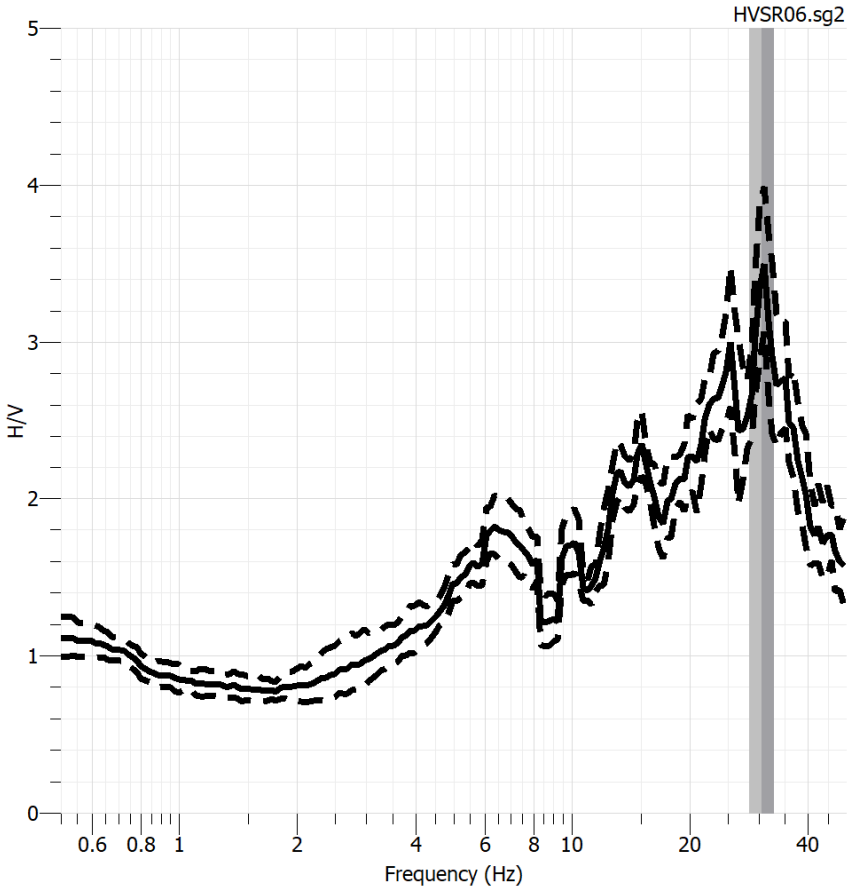

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RDCL®

TITLE	HVSR06	PROJECT	250306			
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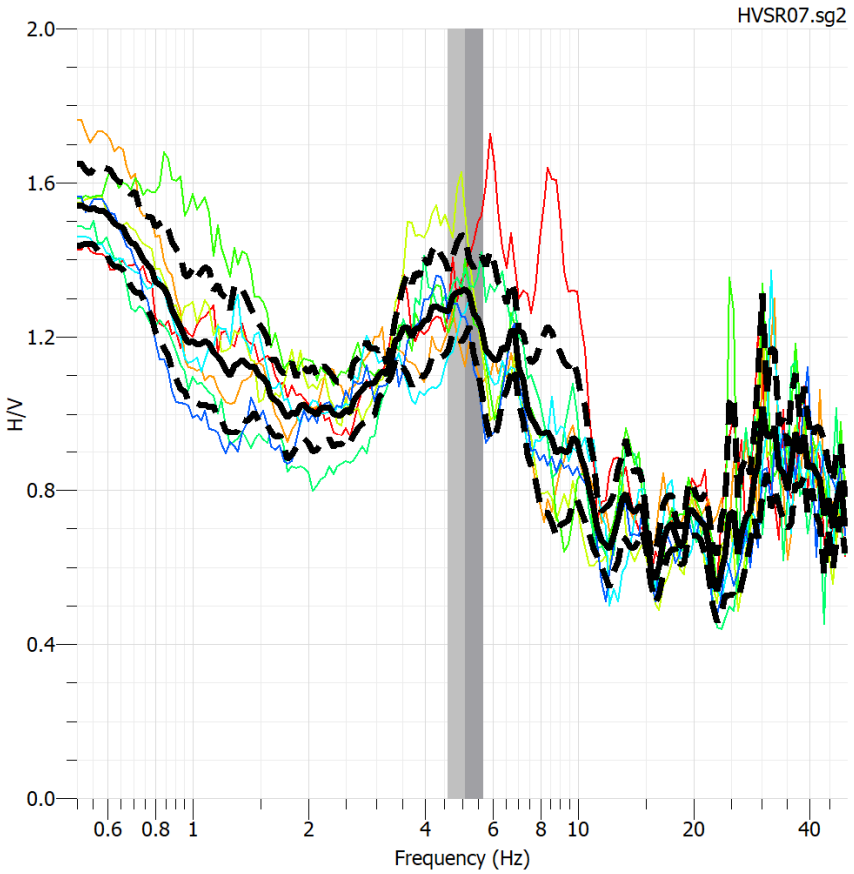

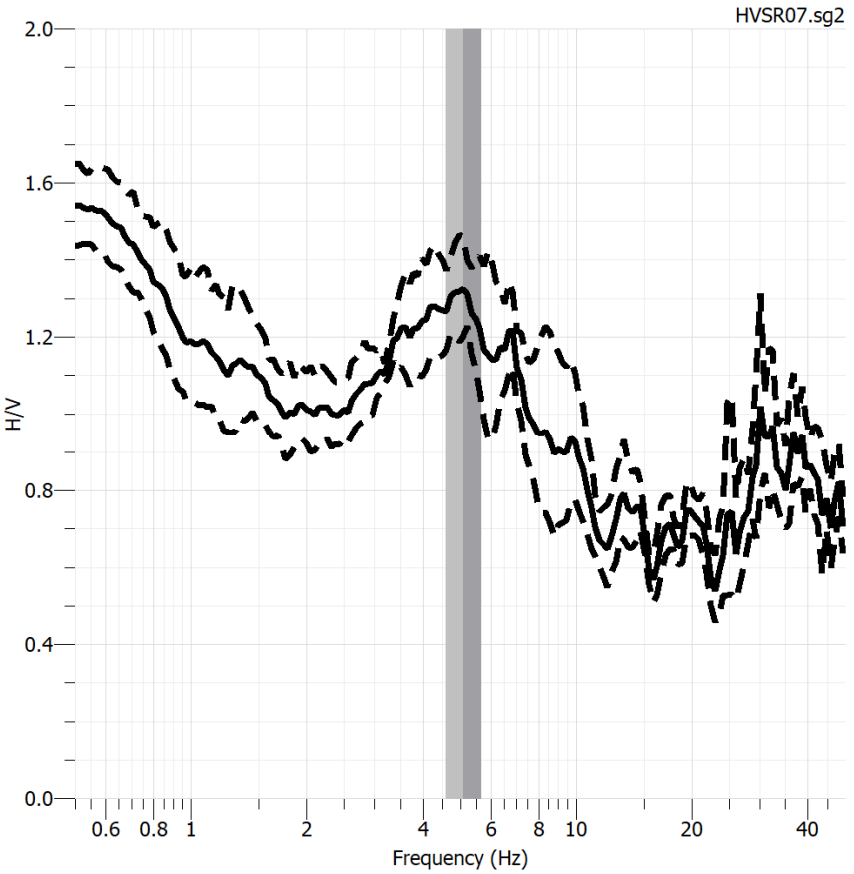

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7	5.10	4.58	5.68	1.32	1.20	1.46	0.20	0.22	0.18

RDCL®

TITLE	HVSR07	PROJECT	250306			
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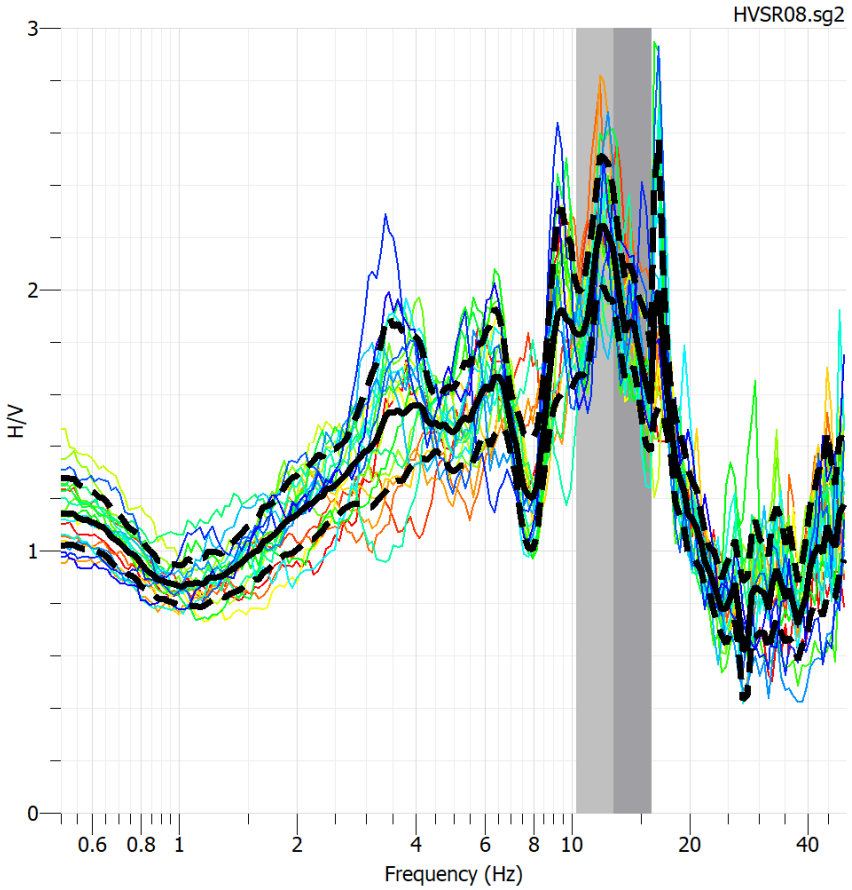

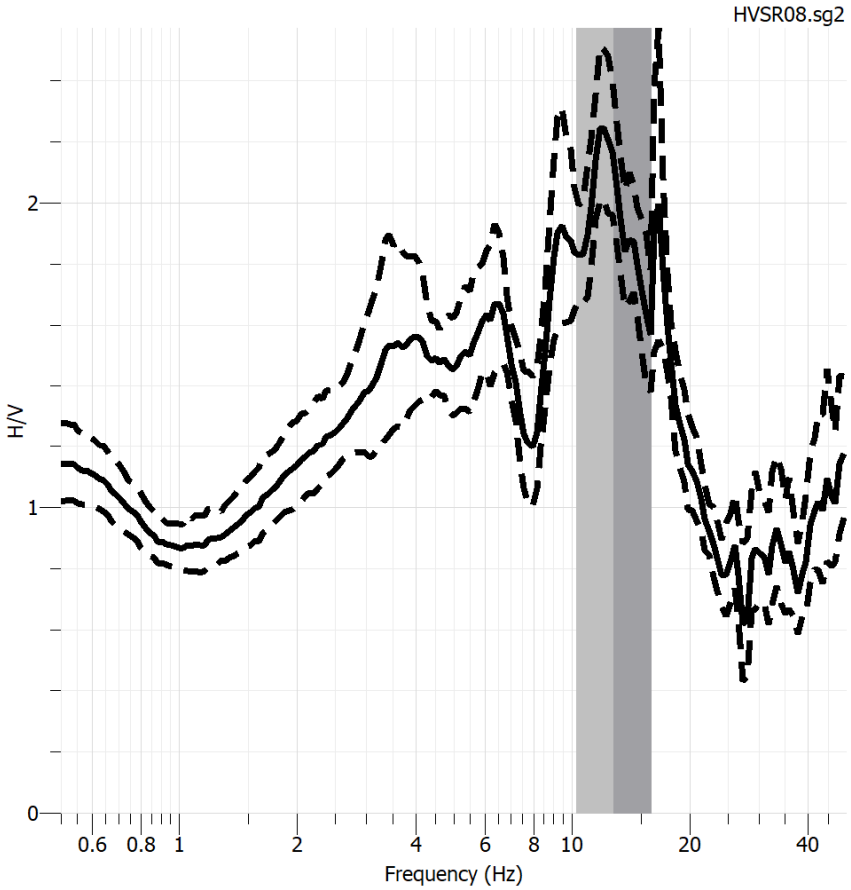

HVSR#	f0	fmin	fmax	A0	Amin	Amax	T0	Tmin	Tmax
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8	12.81	10.28	15.96	2.13	1.93	2.36	0.08	0.10	0.06

RDCL®

TITLE	HVSR08	PROJECT	250306			
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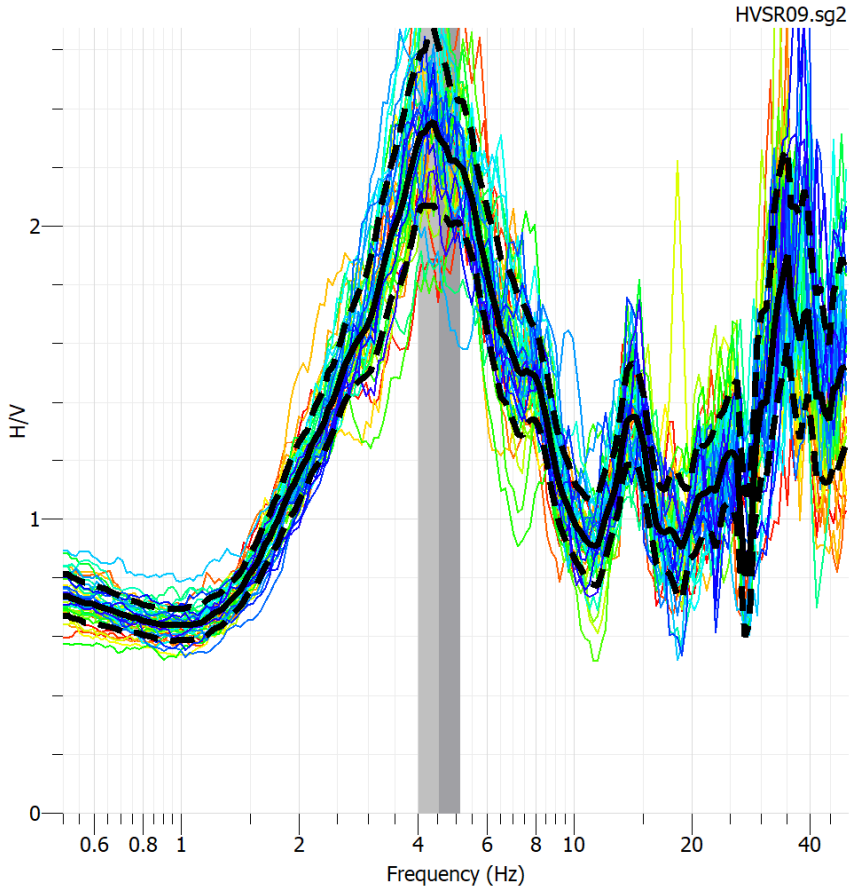
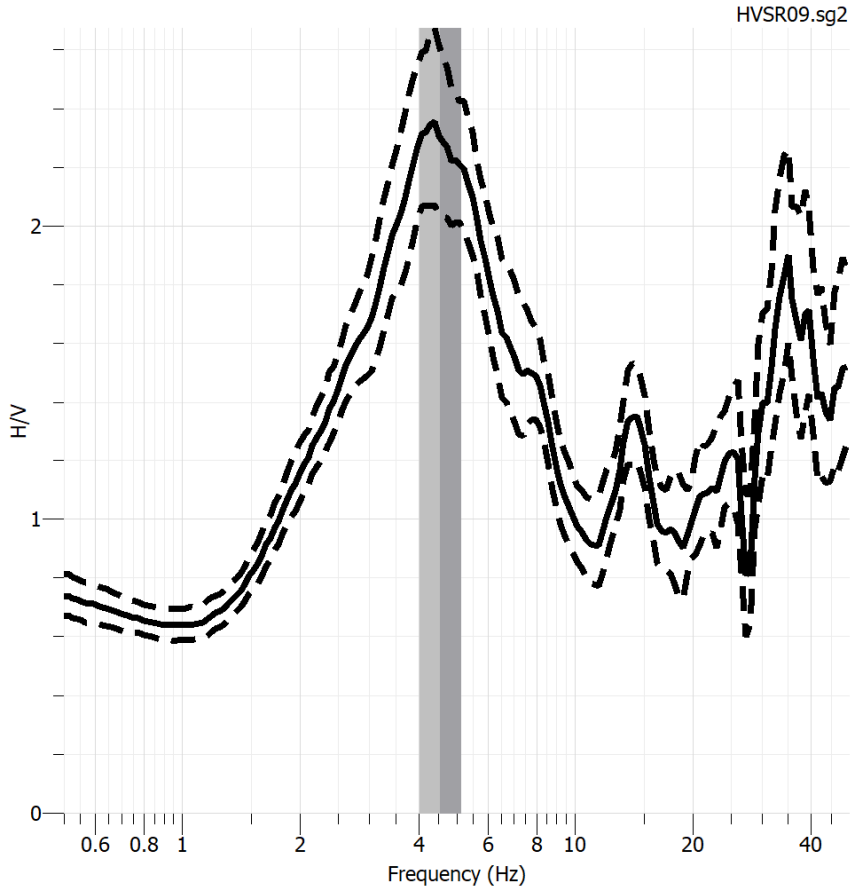
CLIENT	T+T	CHECKED BY	SL	DATE	13/04/26	47





HVSR#	f0	fmin	fmax	A0	Amin	Amax	T0	Tmin	Tmax
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9	4.55	4.02	5.14	2.30	2.03	2.60	0.22	0.25	0.19

RDCL®

TITLE	HVSR09	PROJECT	250306			
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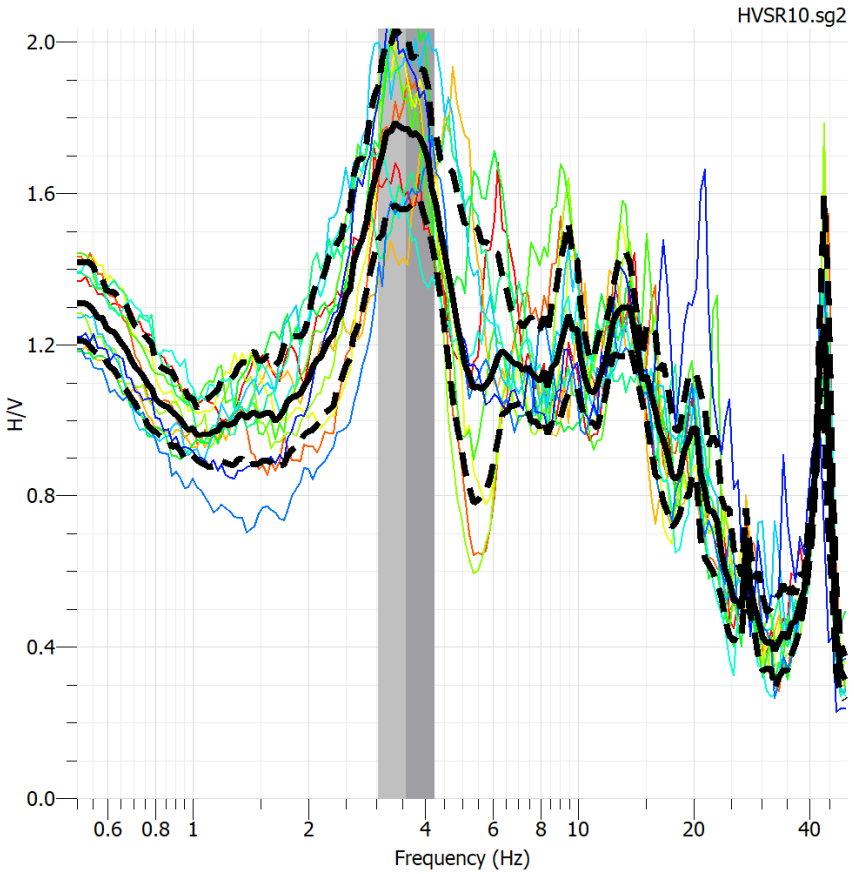
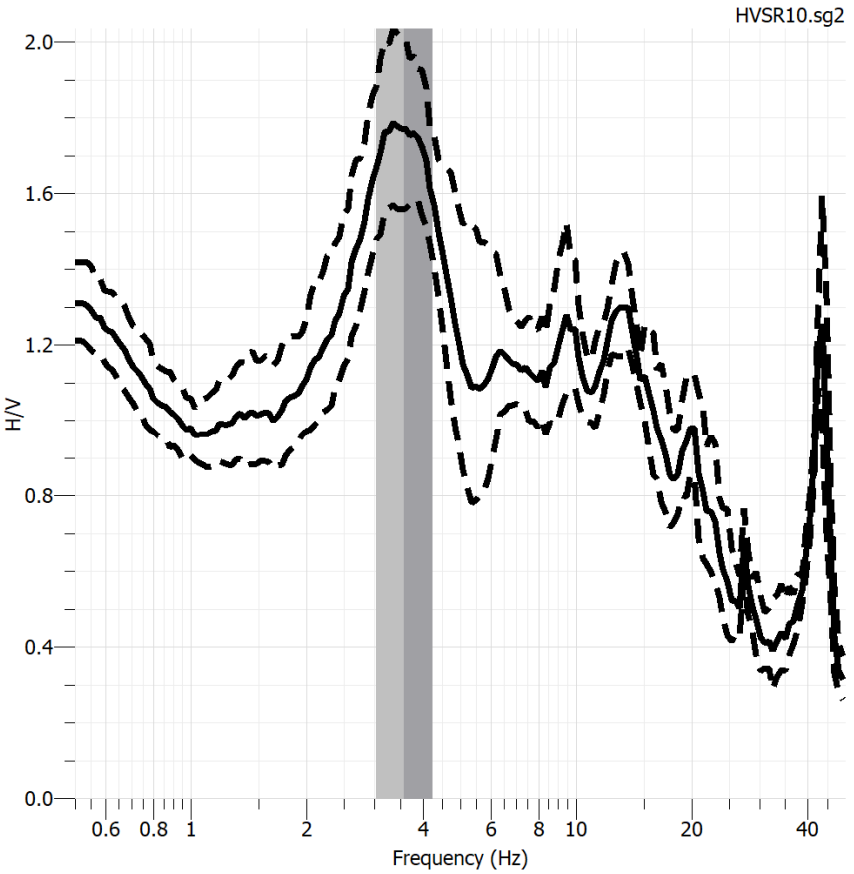
CLIENT	T+T	CHECKED BY	SL	DATE	13/04/26	48





HVSR#	f0	fmin	fmax	A0	Amin	Amax	T0	Tmin	Tmax
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RDCL®

TITLE	HVSR10	PROJECT	250306			
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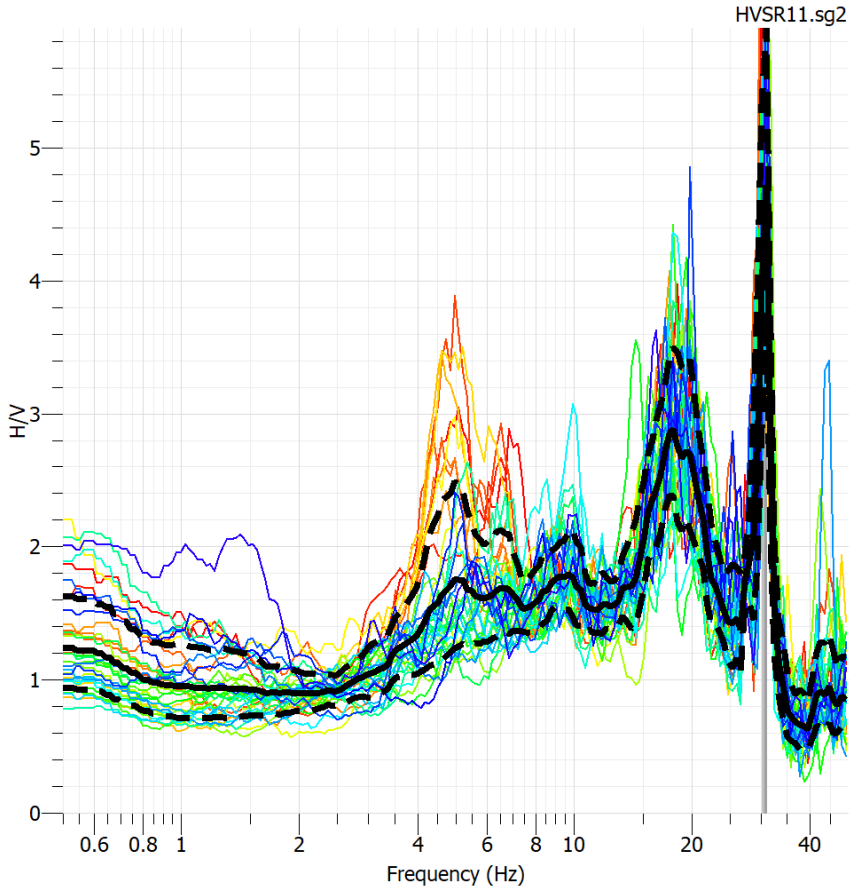

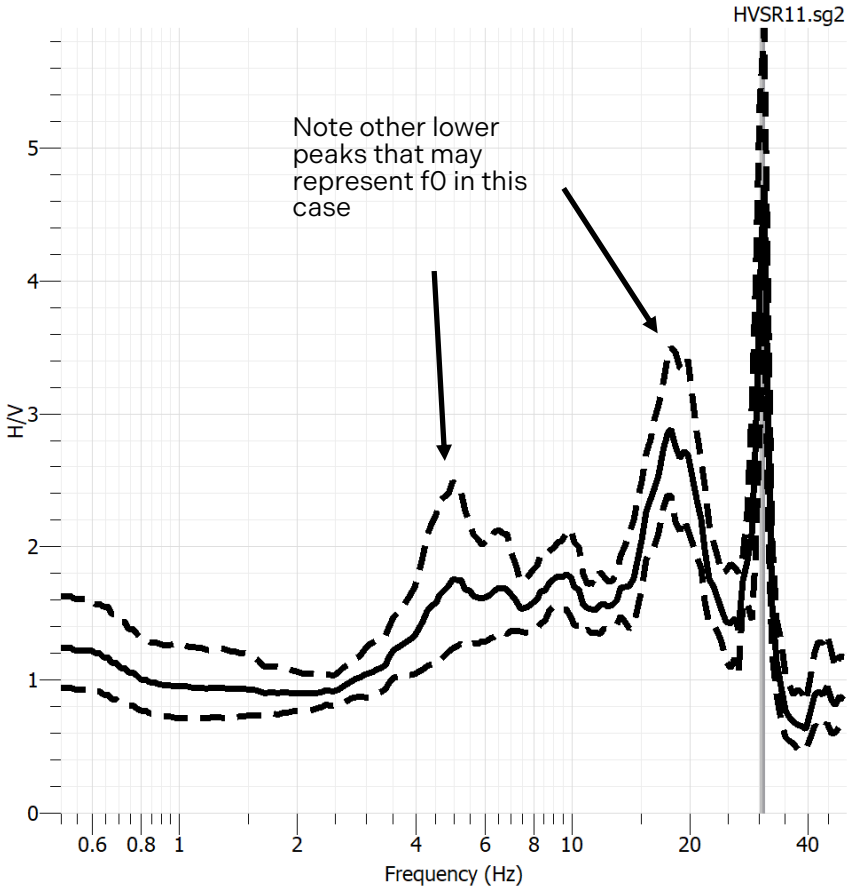

HVSR#	f0	fmin	fmax	A0	Amin	Amax	T0	Tmin	Tmax
	Hz	Hz	Hz				s	s	s
11	30.66	30.25	31.08	4.42	3.44	5.69	0.03	0.03	0.03

RDCL®

TITLE	HVSR11	PROJECT	250306			
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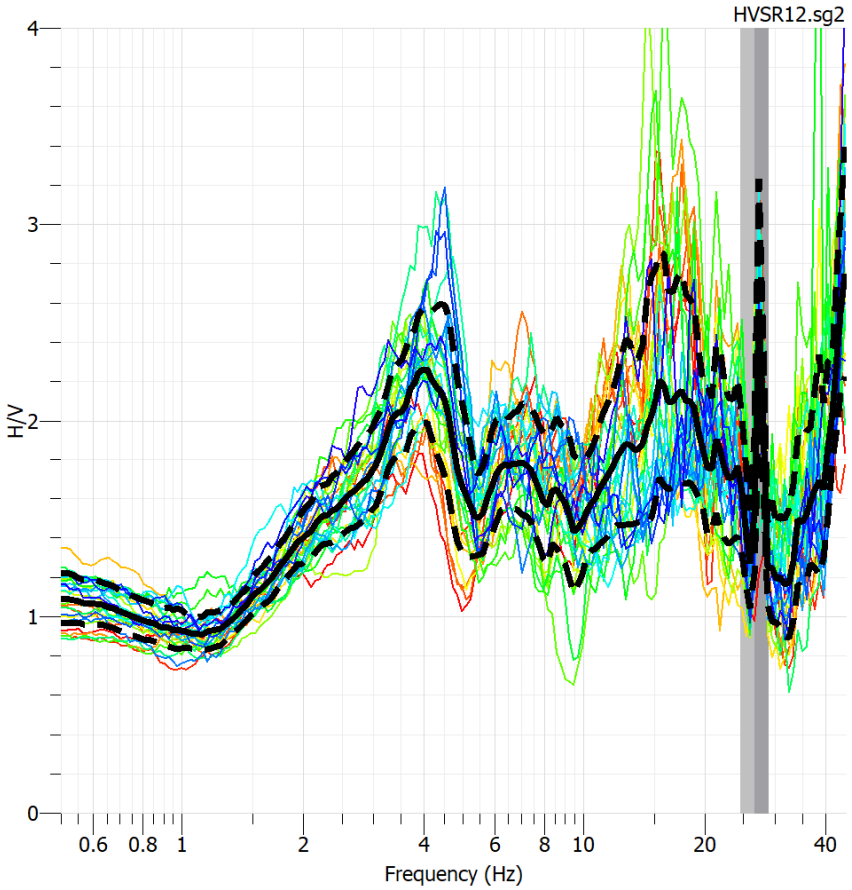

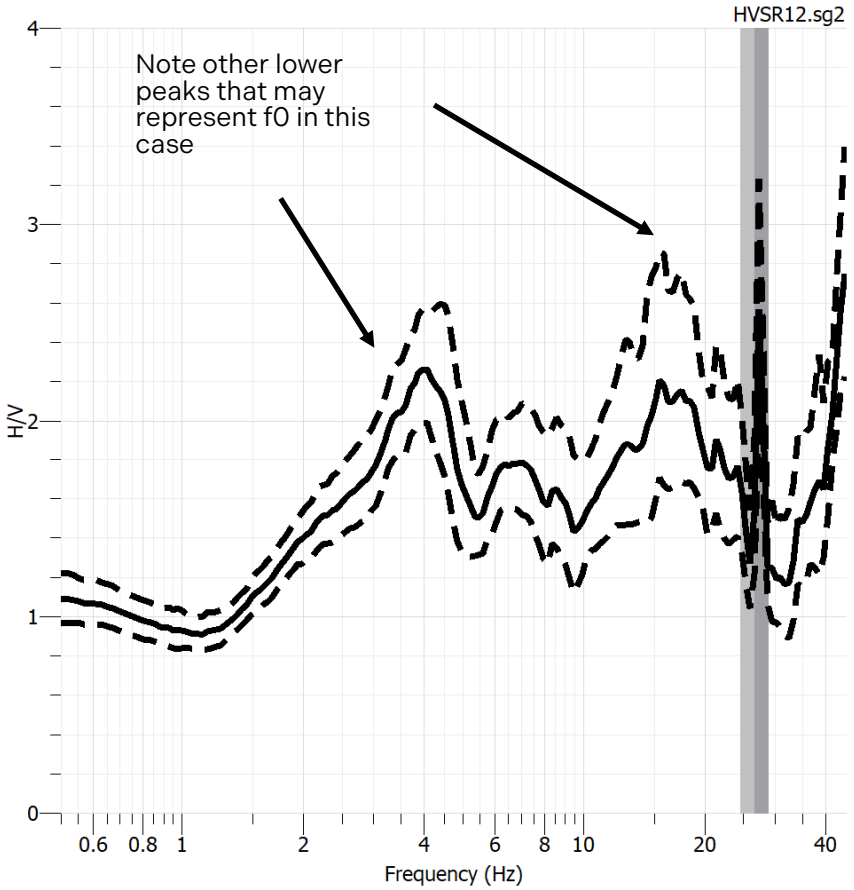

HVSR#	f0	fmin	fmax	A0	Amin	Amax	T0	Tmin	Tmax
	Hz	Hz	Hz				s	s	s
12	26.61	24.55	28.86	1.50	1.20	1.88	0.04	0.04	0.03

RDCL®

TITLE	HVSR12	PROJECT	250306				
PROJECT	Port Vila, Vanuatu Geophysics	DRAWN BY	OG	DATE	13/04/26	FIG	
CLIENT	T+T	CHECKED BY	SL	DATE	13/04/26	51	

APPENDIX A

METHODOLOGIES

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A4 REFERENCES 11

A1 MULTI-CHANNEL ANALYSIS OF SURFACE WAVES (MASW)

A1.1 MASW Acquisition Method

A1.1.1 Equipment

RDCL deployed the following equipment:

- One twenty-four channel Geometrics Geode exploration seismograph.
- One 2 m spaced Geomatrix landstreamer with twenty-four 4.5 Hz geophones.
- Instrumented sledgehammer as a seismic source.
- Logging computer and ancillary equipment.

A1.1.2 Rolling MASW Array Deployments

The 2D MASW surveys comprised a 24-channel geophone array mounted at 2 m spacings on a landstreamer for a total array length of 46 m. The landstreamer was advanced by 20 m for every shot. A walkaway test was conducted at the start of the first line to assess the optimum offset from shot to geophone array.

Each shot consisted of 3 – 7 stacked blows of the sledgehammer.

A1.1.3 Field Quality Assurance

Onsite quality control was undertaken during the survey. QC was limited to qualitative assessments of:

- Signal to noise ratios.
- Trigger errors.
- Geophone coupling.

A1.1.4 Acquisition Parameters

Acquisition parameters for the active source acquisition were:

- Record Length 0.6 s

- Delay 0 s
- Sample interval 62.5 µs
- Acquisition filters OUT

A1.1.5 POSITIONAL CONTROL

The start and end points of the MASW lines and every 50 m were picked up with the mobile phone GPS.

Relative positional control on the MASW lines was provided by a tape measure. Relative lateral accuracy was therefore likely to be on the order of ± 0.3 m.

A1.2 MASW DATA PROCESSING

Data processing consisted of four phases.

- Phase 1: Initial processing and data filtering of the data.
- Phase 2: Generation of overtone images from the data and picking of dispersion curves.
- Phase 3: Developing appropriate starting models to match the dispersion curves.
- Phase 4: Inversion of the data within the Surface Plus module of Geogiga.

A1.2.1 PHASE 1

The purpose of Phase 1 was to check raw seismic traces were ready to import into software and were free of unwanted seismic noise.

Raw active source data files were imported into Geogiga Seismic Pro 10.0 software for initial qualitative quality assessments. Anthropogenic noise (human-made unwanted seismic waves) generated nearby can make this stage critical.

Processing which can be applied to data files during this phase includes:

- Data import of .sg2.
- Visual inspection of seismic traces.

- Generation of frequency spectrum (pre-filter).
- Appropriate lowpass or Butterworth bandpass filtering (noise removal).
- Generation of frequency spectrum (post-filter).
- Visual inspection of seismic traces.
- .sg2 file export.

A1.2.2 PHASE 2

The purpose of Phase 2 was to convert time domain seismic data into frequency domain and develop a dispersion curve for further processing in Phase 3.

Overtone images (Appendix B) were developed from each MASW shot. An overtone image is a representation in the frequency domain of phase velocity versus the frequency of the surface waves recorded.

A dispersion curve was picked from each overtone image. A dispersion curve is a plot of phase velocity versus frequency and indicates how fast surface waves of different frequencies (wavelengths) travel through the near surface.

To pick the dispersion curve the maxima of the fundamental mode was selected by the processing geophysicist. To improve the accuracy of the picking the Geogiga software automatically selects the maxima nearest to where the processing geophysicist placed their pick.

A1.2.3 PHASE 3

The purpose of Phase 3 was to develop an initial starting model from each dispersion curve. The starting model was used to constrain the Vs models generated during the inversion process.

The first step is to examine the dispersion curves generated for the site (Appendix B). As a rule of thumb, the resolvable thickness of the surface layers is equal to half the shortest wavelength picked (highest frequency).

Converting from the frequency domain into the wavelength domain:

$$Min\ layer\ thickness\ (approximate\ average) = \frac{c/f}{2} = \frac{300/56}{2} = \sim 2.7\ m$$

Similarly, the maximum depth layers can be resolved at is half the average maximum wavelength (lowest frequency):

$$Max\ depth\ resolved\ (approximate\ average) = \frac{c/f}{2} = \frac{530/12.2}{2} = \sim 21.8\ m$$

Where:

c = velocity

f = frequency

The values calculated above help define the bounds of the starting model developed within Geogiga Surface Plus. Each shot has a unique starting model, positioned at the centre of the array.

Shear wave velocities for each layer were automatically assigned by Geogiga such that the calculated dispersion curve was a reasonable fit to the observed dispersion curve. These were tweaked manually during the modelling process.

A constant density of 2000 kg/m^3 was assumed for all layers. Note the density estimation has a minor effect on calculated velocities.

A1.2.4 Phase 4

The purpose of Phase 4 was to invert the observed dispersion curves from Phase 3 and develop an unconstrained pseudo-2D site-specific shear wave velocity profile model for each MASW line.

Phase 4 comprised running the inversion process within Geogiga Surface Plus. Each dispersion curve was inverted independently. The velocity of each layer was usually allowed to vary by 30% from the starting model.

During inversions the rate of improvement of Normalised Root-Mean-Squared (NRMS) error, a measure of model fit, with iteration was observed. Models were usually run for 15 iterations. In some cases, the starting model or number of iterations were tweaked to improve the output model fit.

Vs model for the line was then gridded, resulting in a pseudo - 2D profiles.

Where lines were not long enough to create a 2D pseudo profile 1D soundings were generated. Here composite dispersion curves were developed from multiple offset shots.

A2 SEISMIC REFRACTION TOMOGRAPHY (SRT)

A2.1 EQUIPMENT

RDCL deployed the following equipment:

- One twenty-four channel Geometrics Geode exploration seismograph.
- One 2 m spaced Geomatrix landstreamer with twenty-four 4.5 Hz geophones.
- Instrumented sledgehammer as a seismic source.
- Logging computer and ancillary equipment.

A2.2 SRT ARRAY DEPLOYMENTS

Four SRT lines were deployed. The lines were placed along the length of the profile. Shots were undertaken at:

- Every 9 m along the array.
- At 6 and 12 m offset at the end of each array.

Once these shots were recorded the array was dragged so that the first geophone was in the same location as the last geophone. The shots were then repeated.

Each shot was repeated and stacked between 3-5 times.

A2.2.1 FIELD QUALITY ASSURANCE

Onsite quality control was undertaken during each survey. QC was limited to qualitative assessments of:

- Signal to noise ratios.
- Trigger errors.
- Geophone coupling.

A2.2.2 Acquisition Parameters

Generic acquisition parameters for the active source acquisition were:

- Delay 0 s
- Sample interval 62.5 µs
- Acquisition filters OUT
- Record length 0.2 seconds

A2.2.3Positional Control

Geophones were placed on the ground using a 100 m tape measure. Relative positional accuracy was therefore likely to be on the order of ± 0.1 m.

A2.3 SRT Data Processing

Data processing consisted of four phases.

- Phase 1: Initial processing and data filtering of the SRT data.
- Phase 2: Picking of first arrivals of the compressional waves for each shot location.
- Phase 3: Undertaking a tomographic inversion to produce 2D profiles showing compressional wave velocities.
- Phase 4: Presentation of 2D profiles and interpretation.

A2.3.1 Phase 1

The purpose of Phase 1 was to check raw SRT seismic traces were ready to import into software and were free of unwanted seismic noise.

Raw active source data files were imported into Geogiga Seismic Pro 7.1 software for initial qualitative quality assessments. Anthropogenic noise (human-made unwanted seismic waves) generated nearby can make this stage critical.

Processing which can be applied to data files during this phase includes:

- Data import of .sg2.

- Visual inspection of seismic traces.
- Generation of frequency spectrum (pre-filter).
- Appropriate lowpass or Butterworth bandpass filtering (noise removal).
- Generation of frequency spectrum (post-filter).
- Visual inspection of seismic traces.
- .sg2 file export.

A2.3.2 PHASE 2

Phase 2 comprised importing the .sg2 files into the DW Tomo module of Geogiga's Seismic Pro software package.

Seismic data files were read into the software and first breaks (refracted compressional waves) identified and picked. Each seismic file was read and the refracted waves picked with reference to the previous picks.

Finally, the ray trace diagram (Appendix B) was examined for anomalous picks and appropriate corrections made.

A2.3.3 PHASE 3

Phase 3 first involved importing elevation data into DW Tomo to make a topographic related static correction. Subsequently data was assessed for reciprocity and corrections made where appropriate.

An initial starting velocity model was developed from the arrival time picks and seismic refraction tomography modelling was undertaken. Raypaths, velocities and fit were all monitored during the inversion process.

The resulting 2D Vp profile grid was trimmed according to raypaths and geophone positions and exported as a text file.

A2.3.4 PHASE 4

Phase 4 involved import of the 2D Vp profile section to Geosoft's Oasis Montaj software. The sections are presented in Figures 36 - 39.

A3 HORIZONTAL TO VERTICAL SPECTRAL RATIO (HVSR)

A3.1 HVSR Acquisition

Data was acquired with reference to the SESAME 2004 guidelines. The following process was followed:

- The spikes of the triaxial geophone were inserted into the ground and a sandbag placed on top.
- Firm coupling was checked.
- Verticality was checked.
- The site was assessed for controllable and unwanted transients (temporary noise sources) for example overhead trees, nearby excavating, idling vehicles etc. The test was relocated as required.
- GPS lock was confirmed.
- Data was recorded for 1 hour.

A3.1.1 Field Quality Assurance

During acquisition the Geophysicist recorded:

- Start and End times.
- Location.
- Weather.
- Coupling.
- The timing of any noise transients.

A3.1.2 Acquisition Parameters

The HVSR survey was configured to acquisition parameters:

- Record length 1 hour
- Delay 0 ms
- Sample interval 2 ms
- Acquisition filters OUT

A3.2 HVSR Data Processing

A3.2.1 Phase 1

The purpose of Phase 1 was to import the seismic data and convert into common time blocks (CTB's). This process included:

- Download of H/V data from the ATOM digitiser using Geometrics ATOM downloader.
- Conversion of .atm data to SEG2 format.
- Division of data in CTB's for each test location

A3.2.2Phase 2

The purpose of Phase 2 was to generate frequency/amplitude plots. The process involved:

- Import of SEG2 data into Geopsy software.
- Visual inspection of seismic traces.
- Semi-automatic assessment of non-transient trace periods into 60 second time windows (typically).
- Generation of frequency/amplitude plots.

A3.2.3 Phase 3

The purpose of Phase 3 was to assess the frequency/amplitude plot. The process involved:

- Assessing the "peakiness" of the H/V peak frequency (f_0).
- Recording the amplitude and frequency of the peak.
- Assessing the error.
- Converting the Peak Frequency to a Period.

A4 REFERENCES

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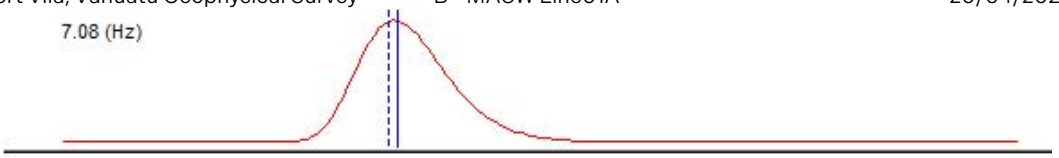
APPENDIX B

DISPERSION CURVES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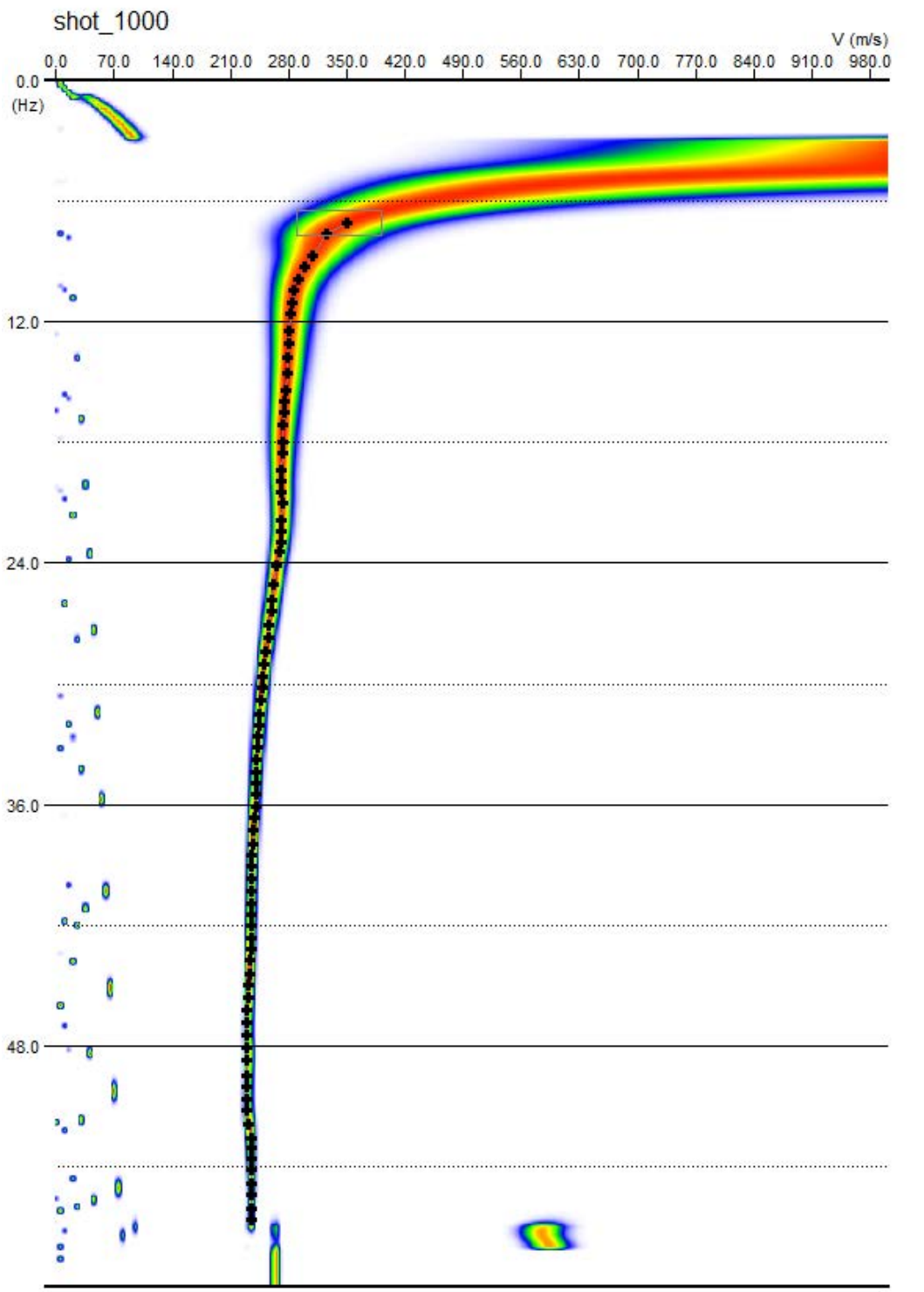
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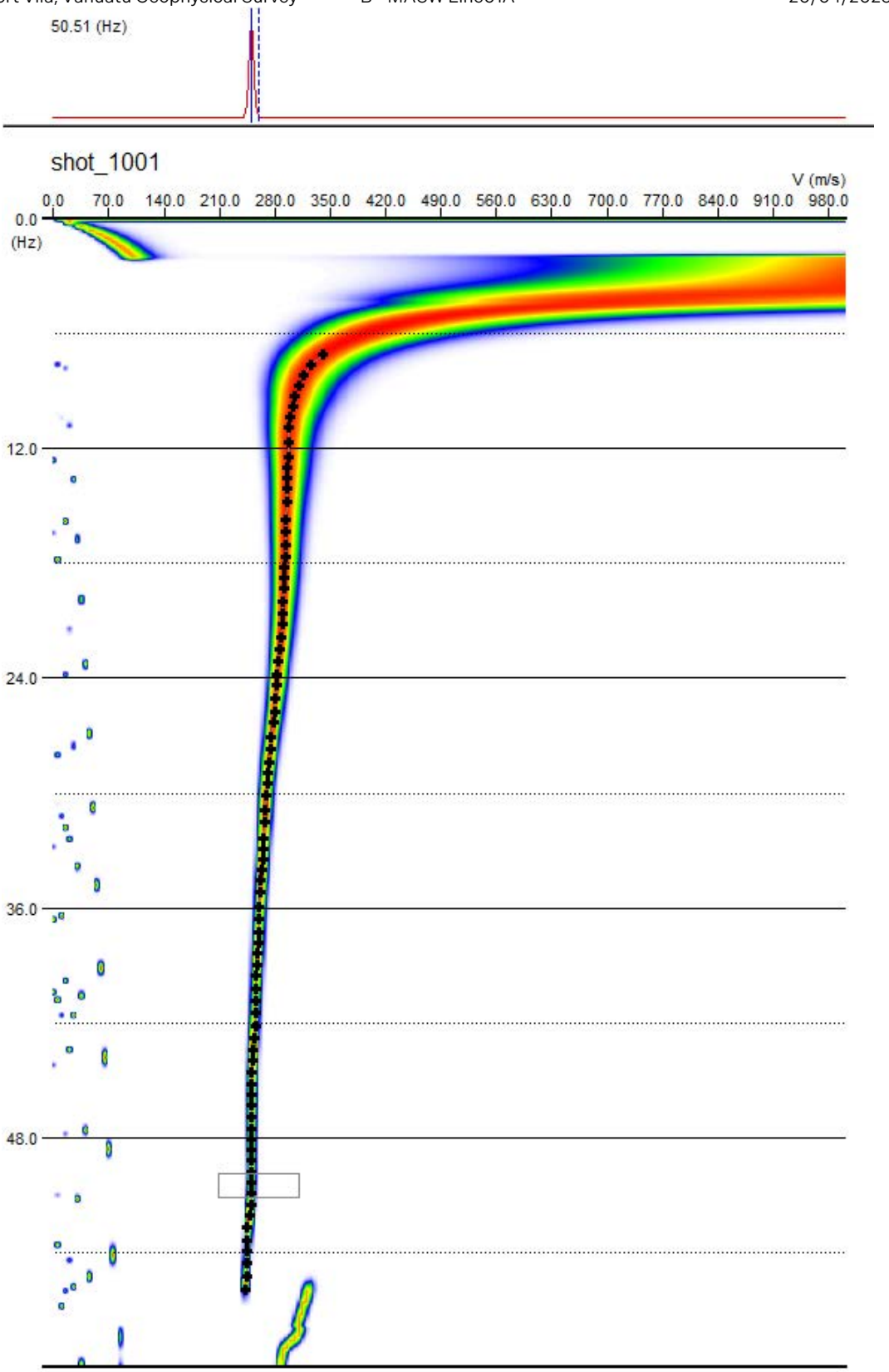
V (m/s)
0.0 70.0 140.0 210.0 280.0 350.0 420.0 490.0 560.0 630.0 700.0 770.0 840.0 910.0 980.0
0.0
(Hz)
12.0
24.0
36.0
48.0


50.51 (Hz)
shot_1001
V (m/s)
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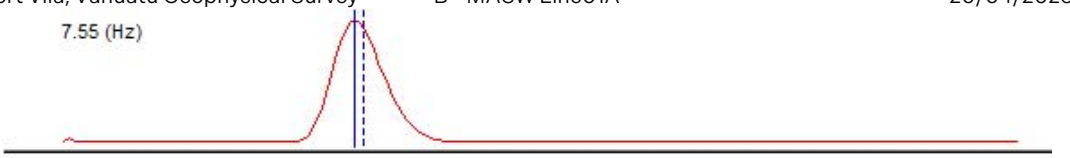
0.0
(Hz)
12.0
24.0
36.0
48.0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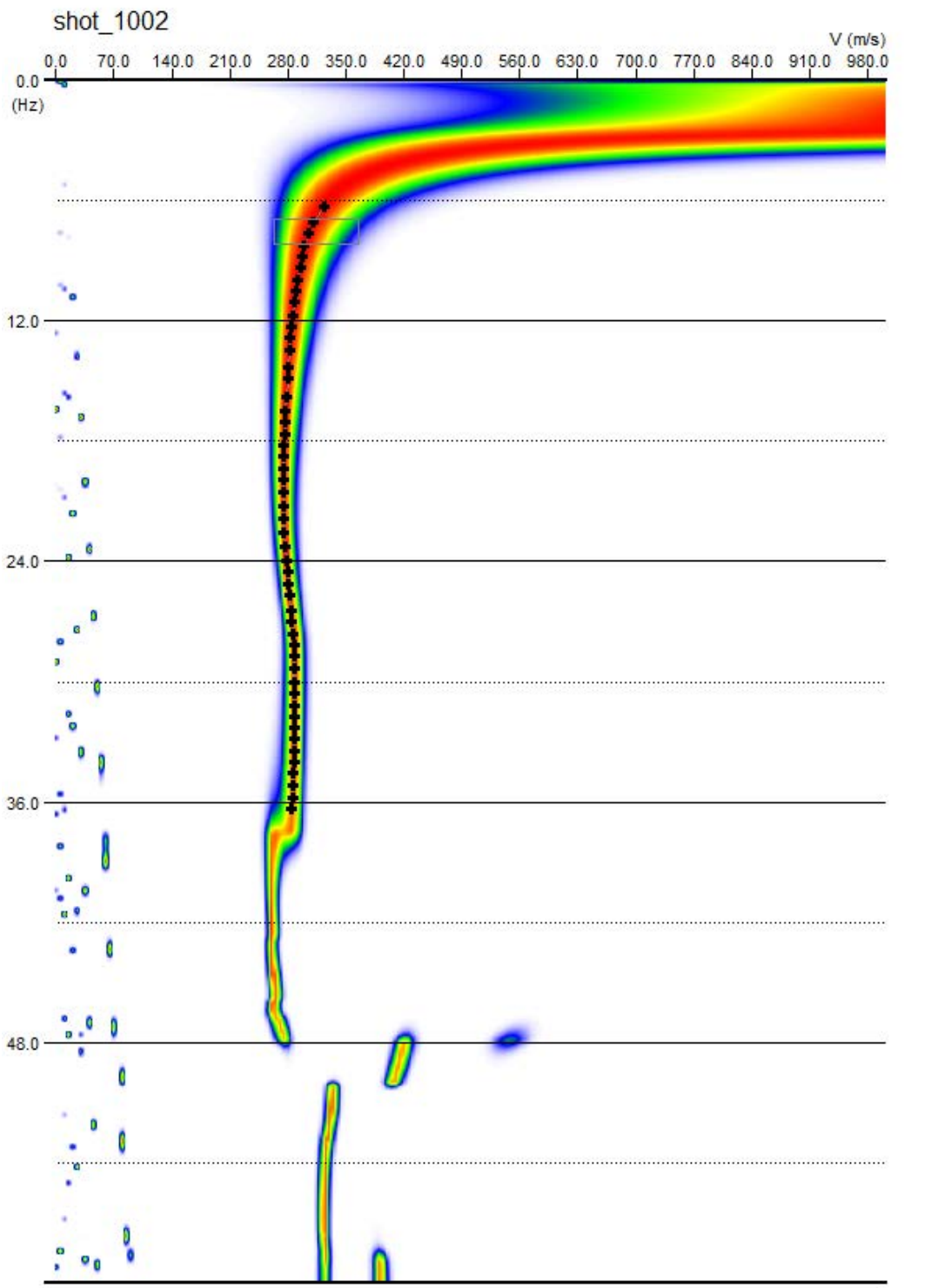
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490.0
560.0
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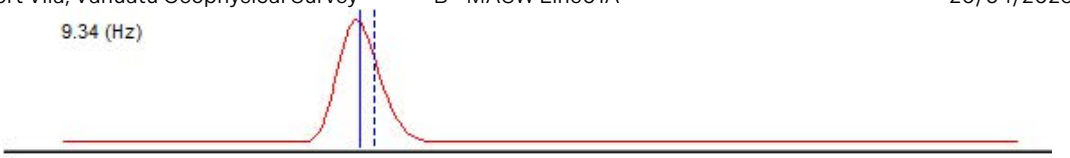
770.0
840.0
910.0
980.0
0.0
(Hz)
12.0
24.0
36.0
48.0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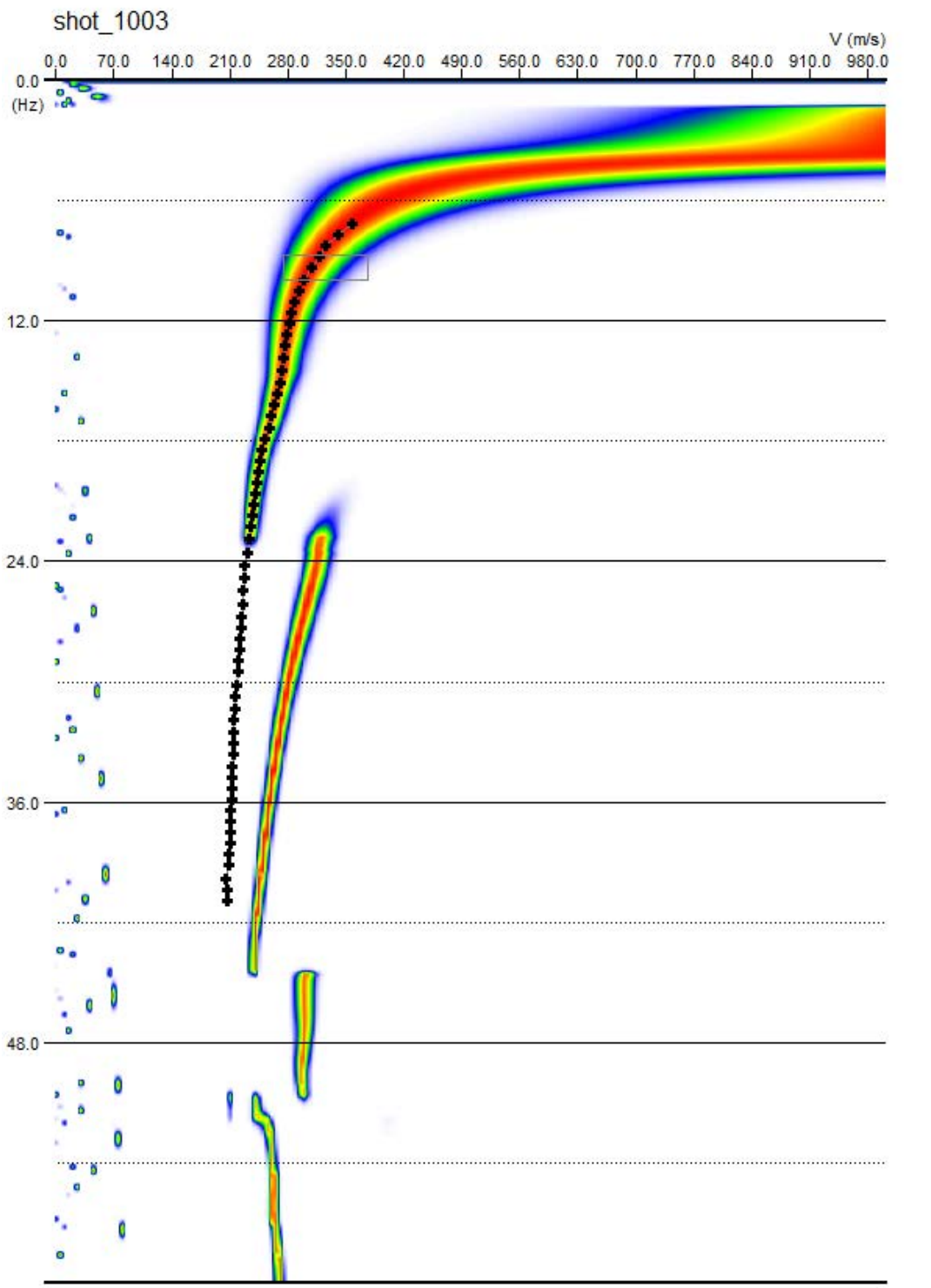
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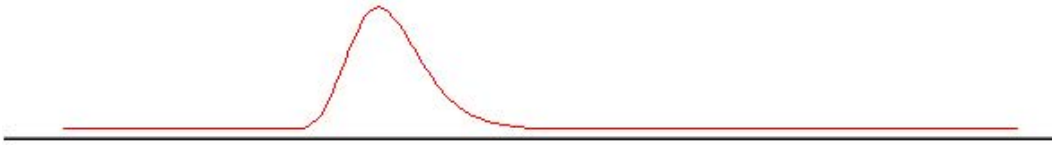
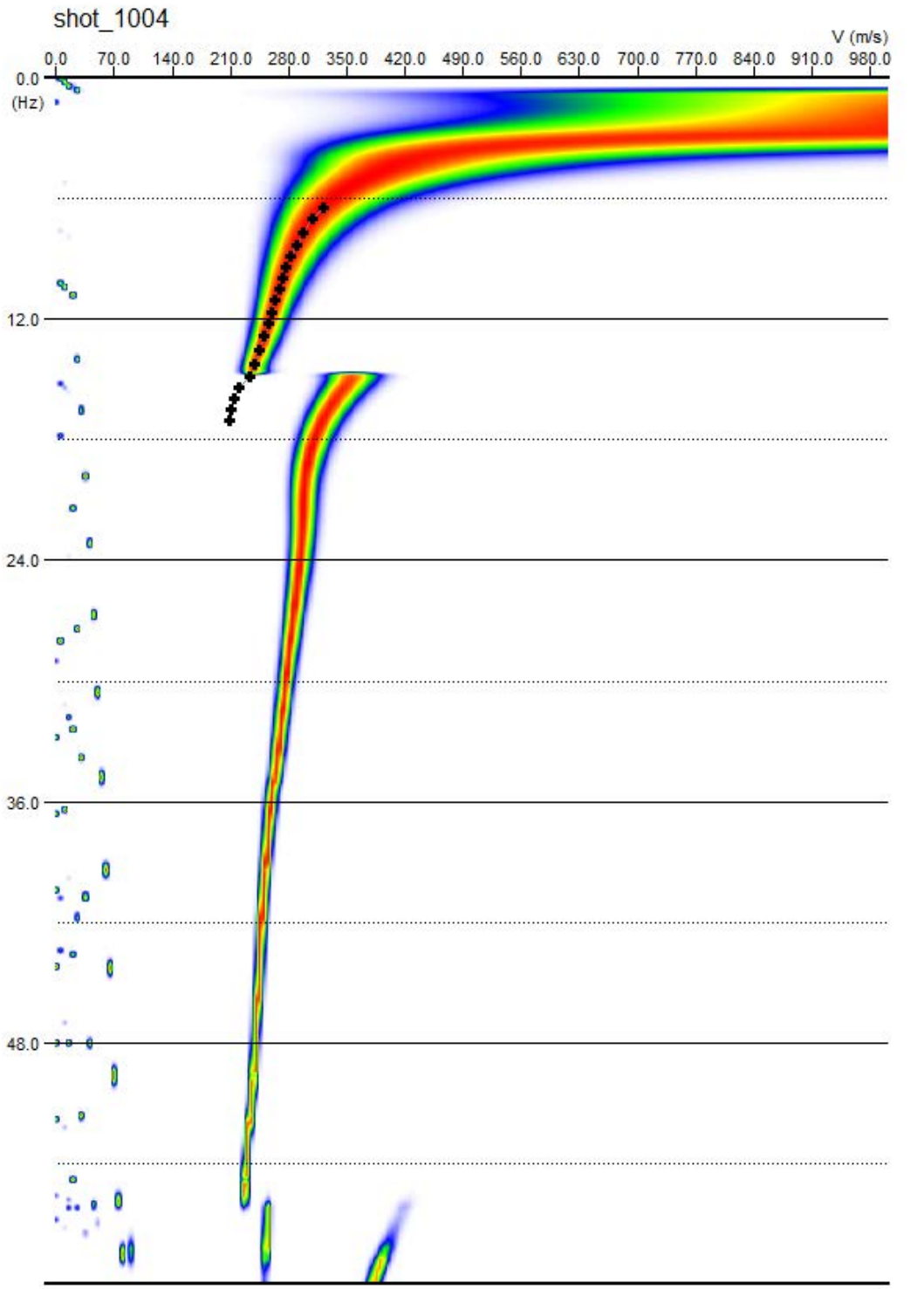
350.0
420.0
490.0
560.0
630.0
700.0
770.0
840.0
910.0
980.0
0.0
(Hz)
12.0
24.0
36.0
48.0

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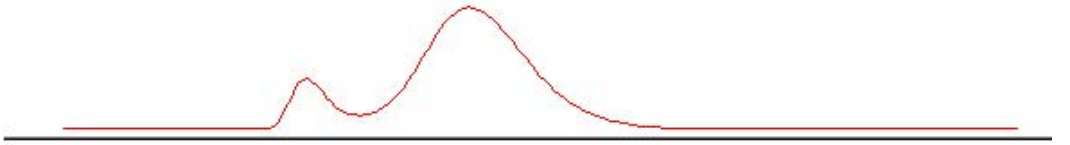
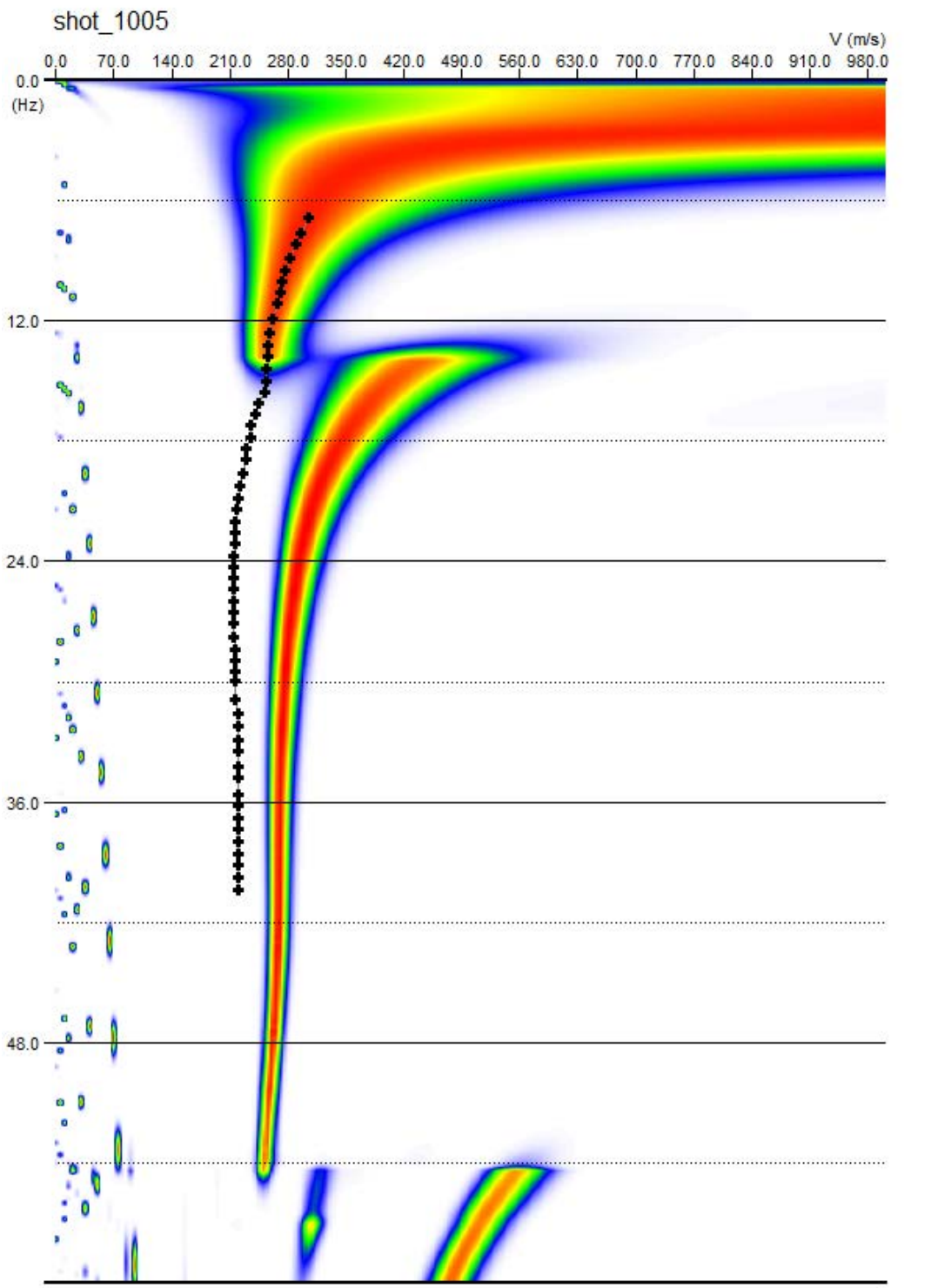
350.0
420.0
490.0
560.0
630.0
700.0
770.0
840.0
910.0
980.0
0.0
(Hz)
12.0
24.0
36.0
48.0

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560.0
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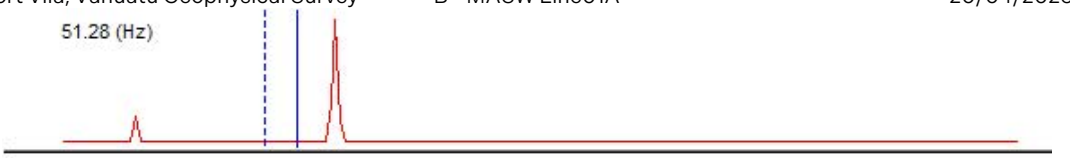
770.0
840.0
910.0
980.0
0.0
(Hz)
12.0
24.0
36.0
48.0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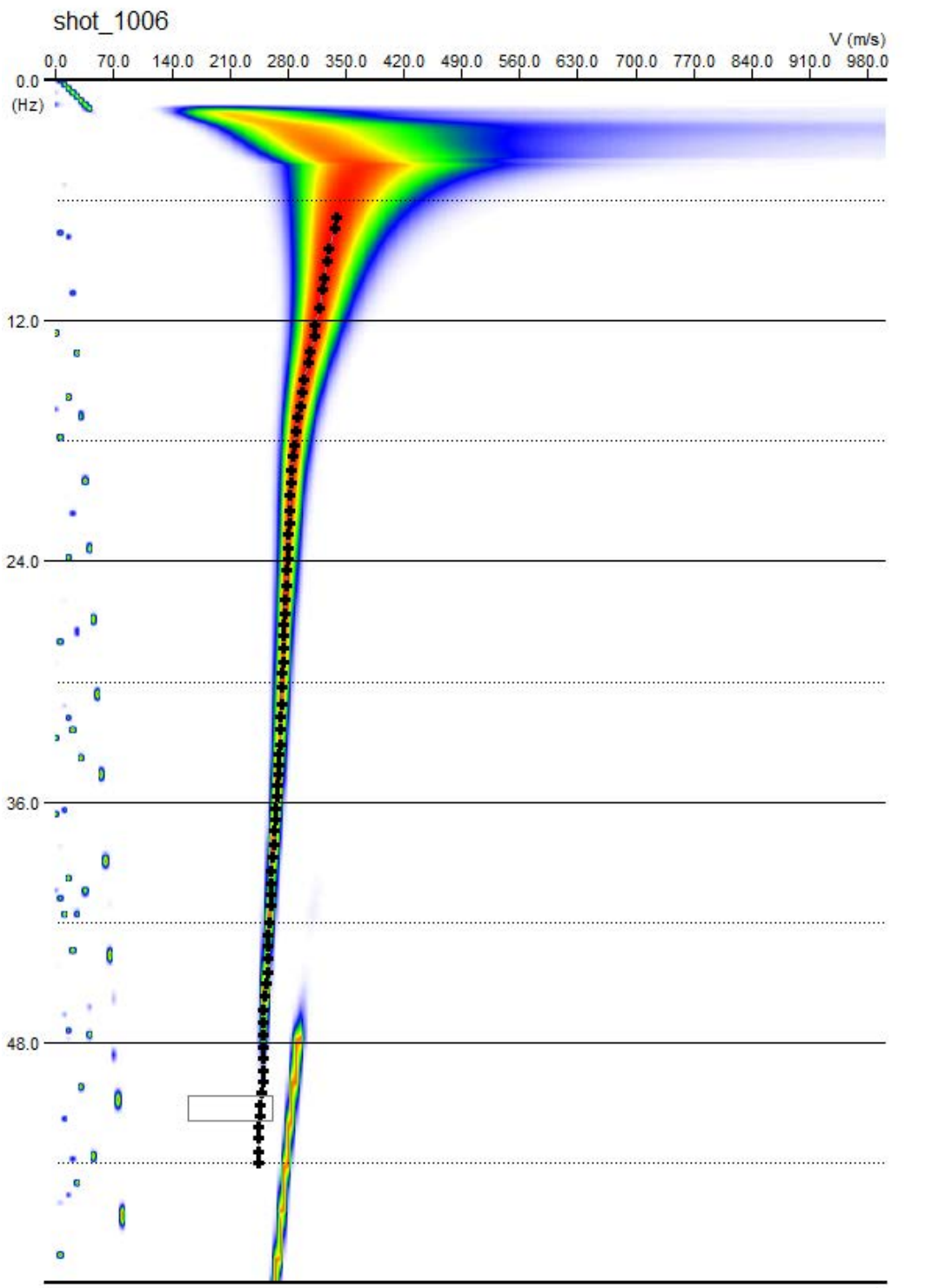
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210.0
280.0
350.0
420.0
490.0
560.0
630.0
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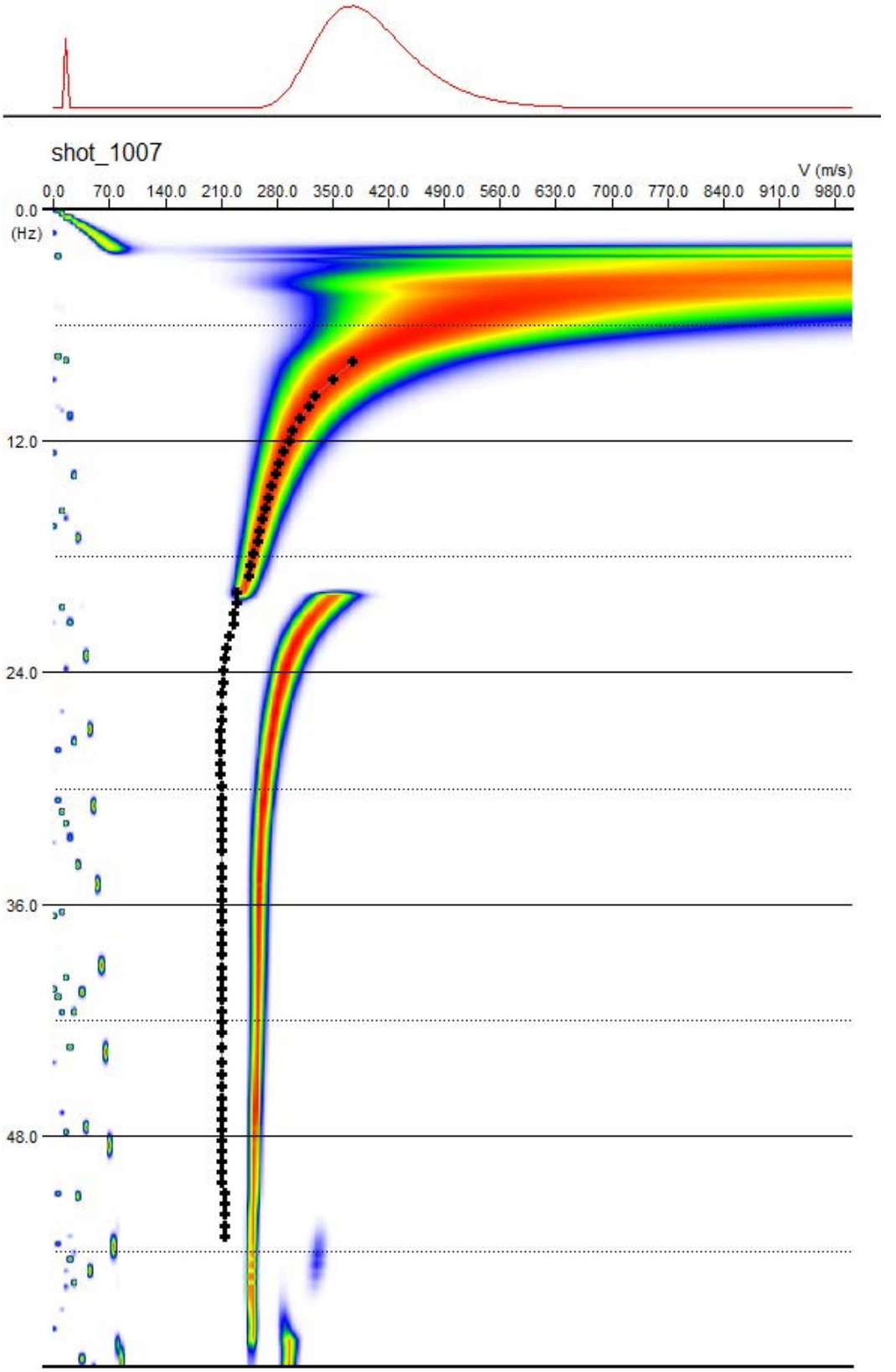
770.0
840.0
910.0
980.0
0.0
(Hz)
12.0
24.0
36.0
48.0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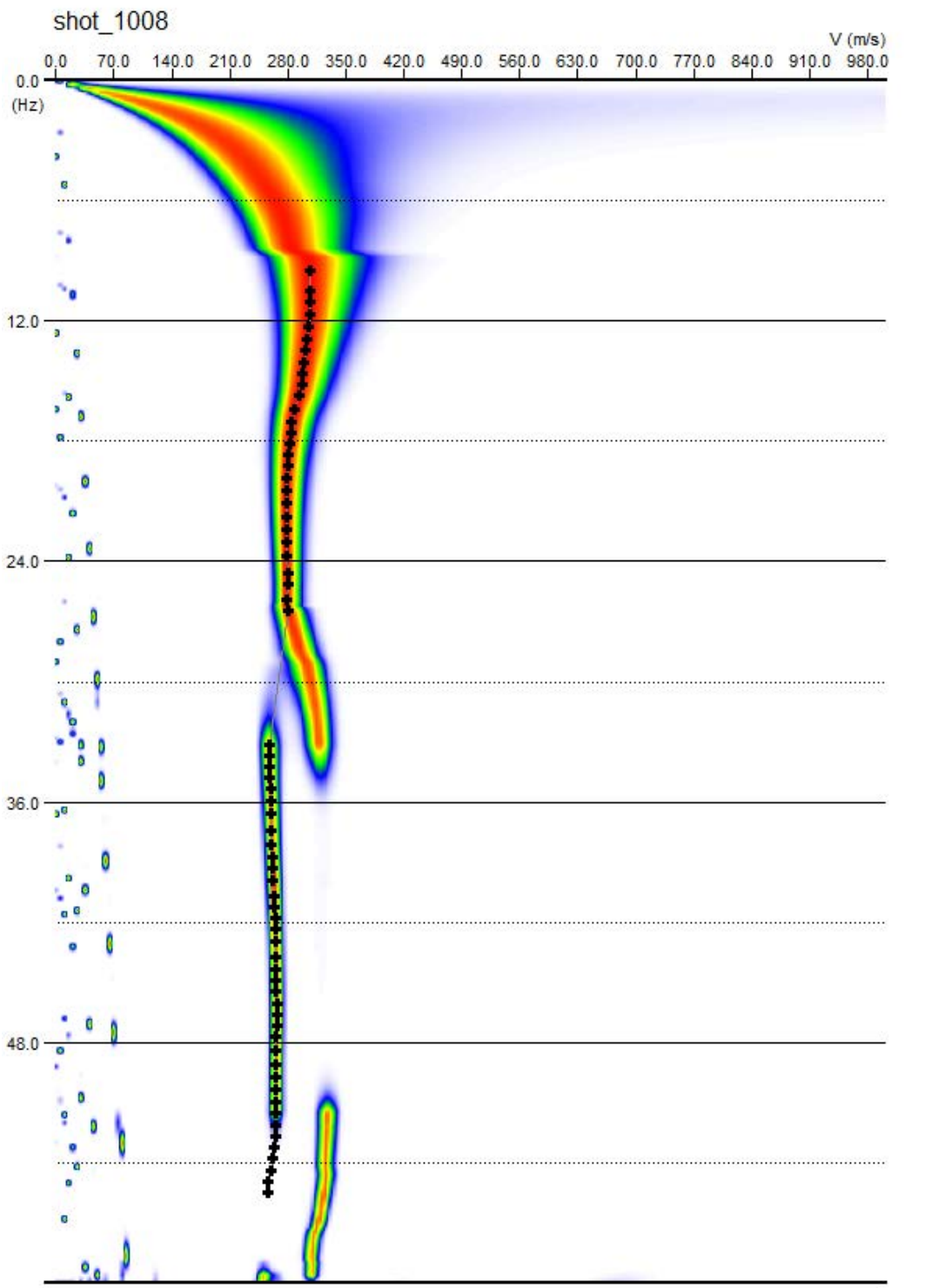
210.0
280.0
350.0
420.0
490.0
560.0
630.0
700.0
770.0
840.0
910.0
980.0
0.0
(Hz)
12.0
24.0
36.0
48.0

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V (m/s)
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210.0
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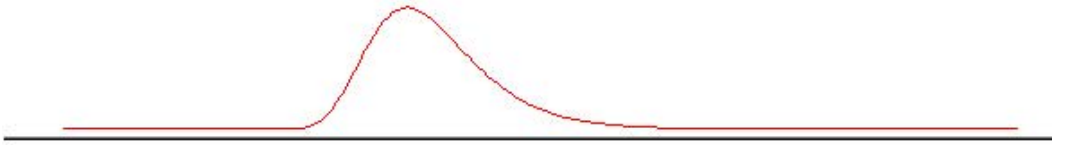
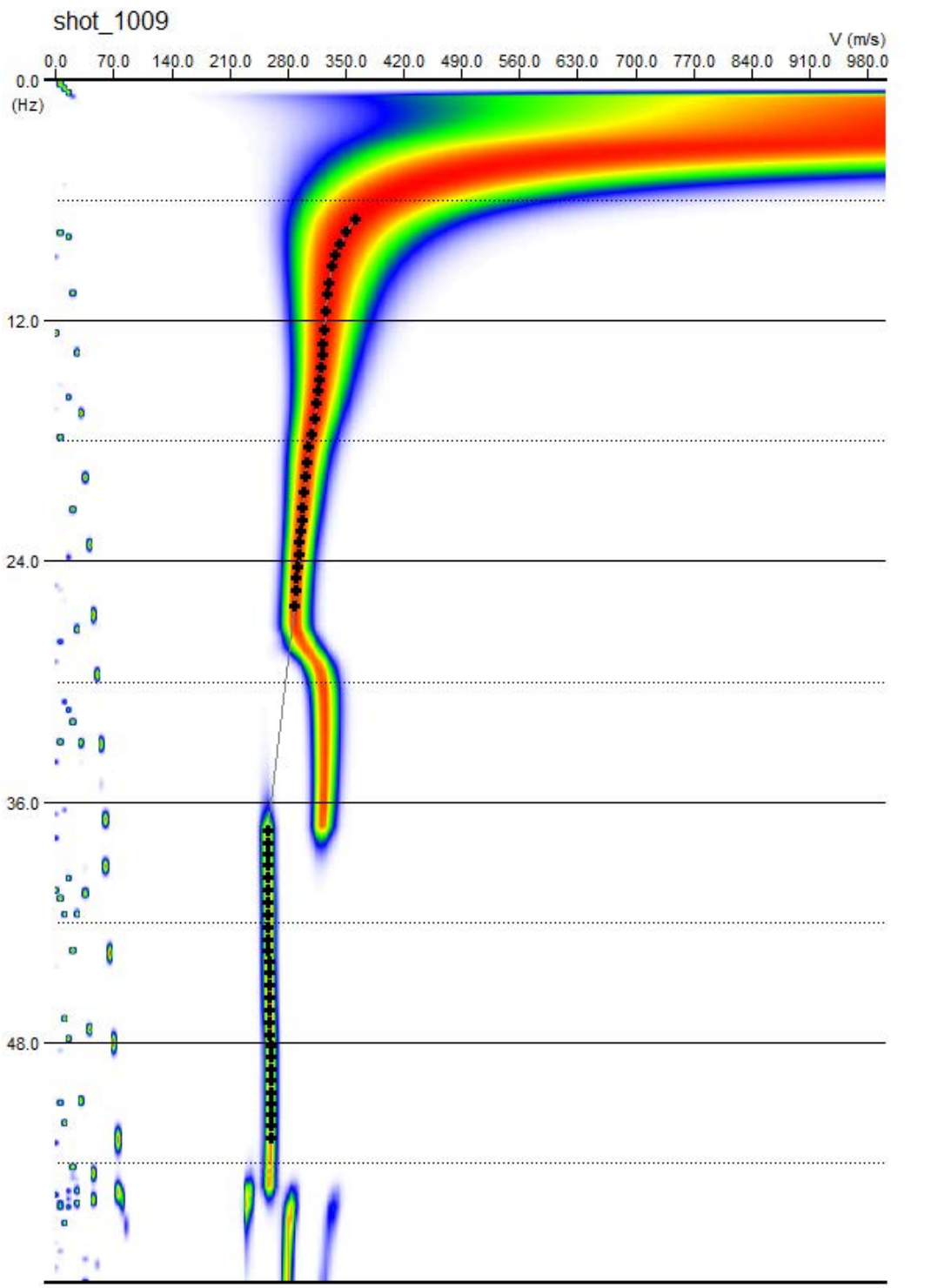
350.0
420.0
490.0
560.0
630.0
700.0
770.0
840.0
910.0
980.0
0.0
(Hz)
12.0
24.0
36.0
48.0

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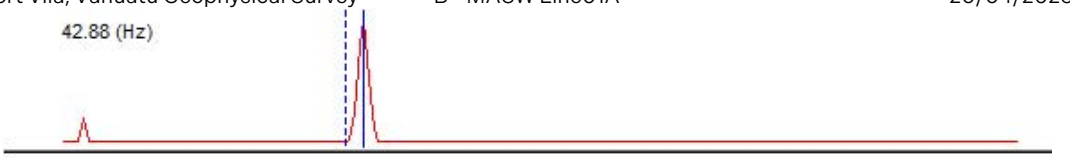
210.0
280.0
350.0
420.0
490.0
560.0
630.0
700.0
770.0
840.0
910.0
980.0
0.0
(Hz)
12.0
24.0
36.0
48.0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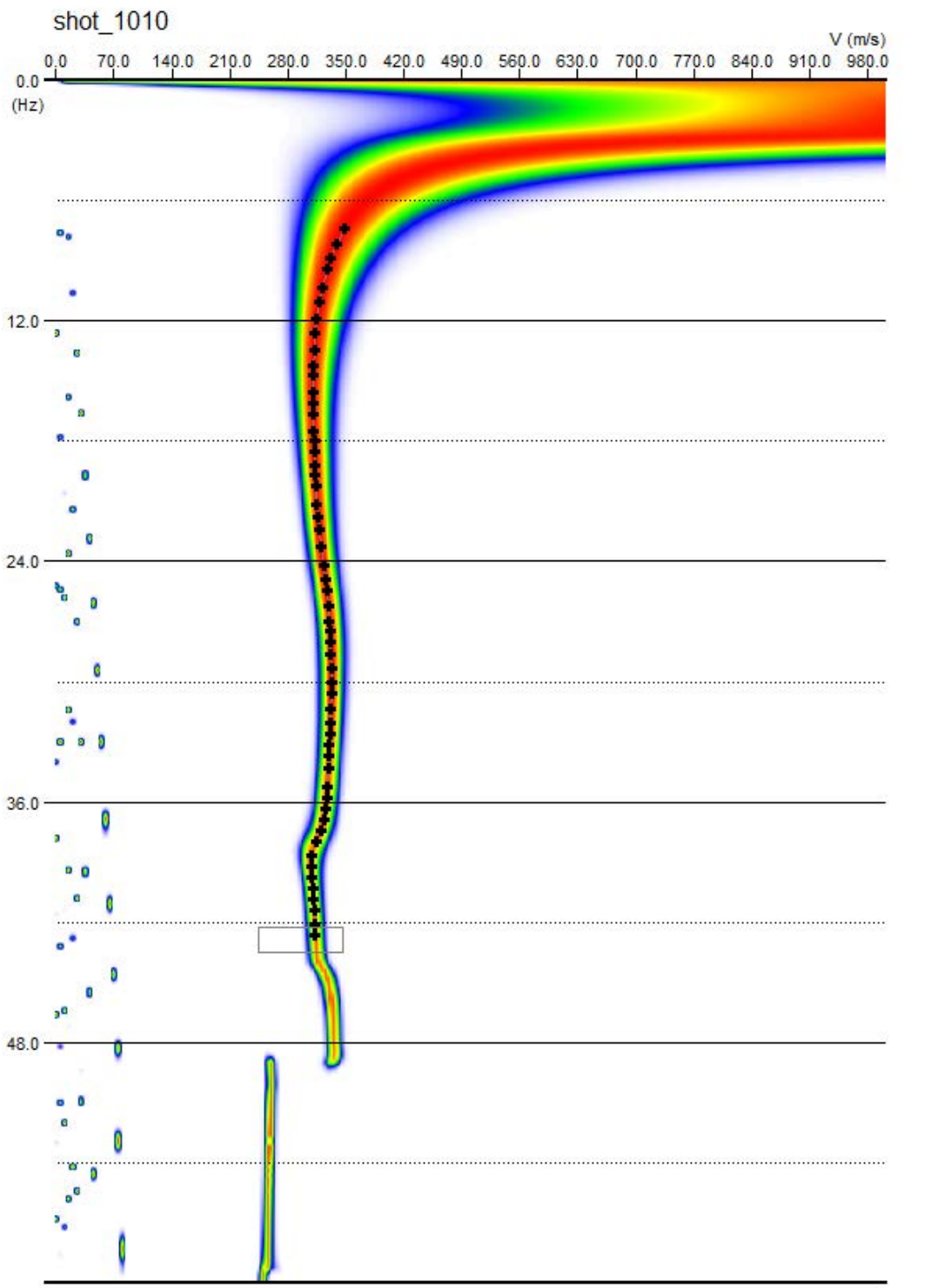
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V (m/s)
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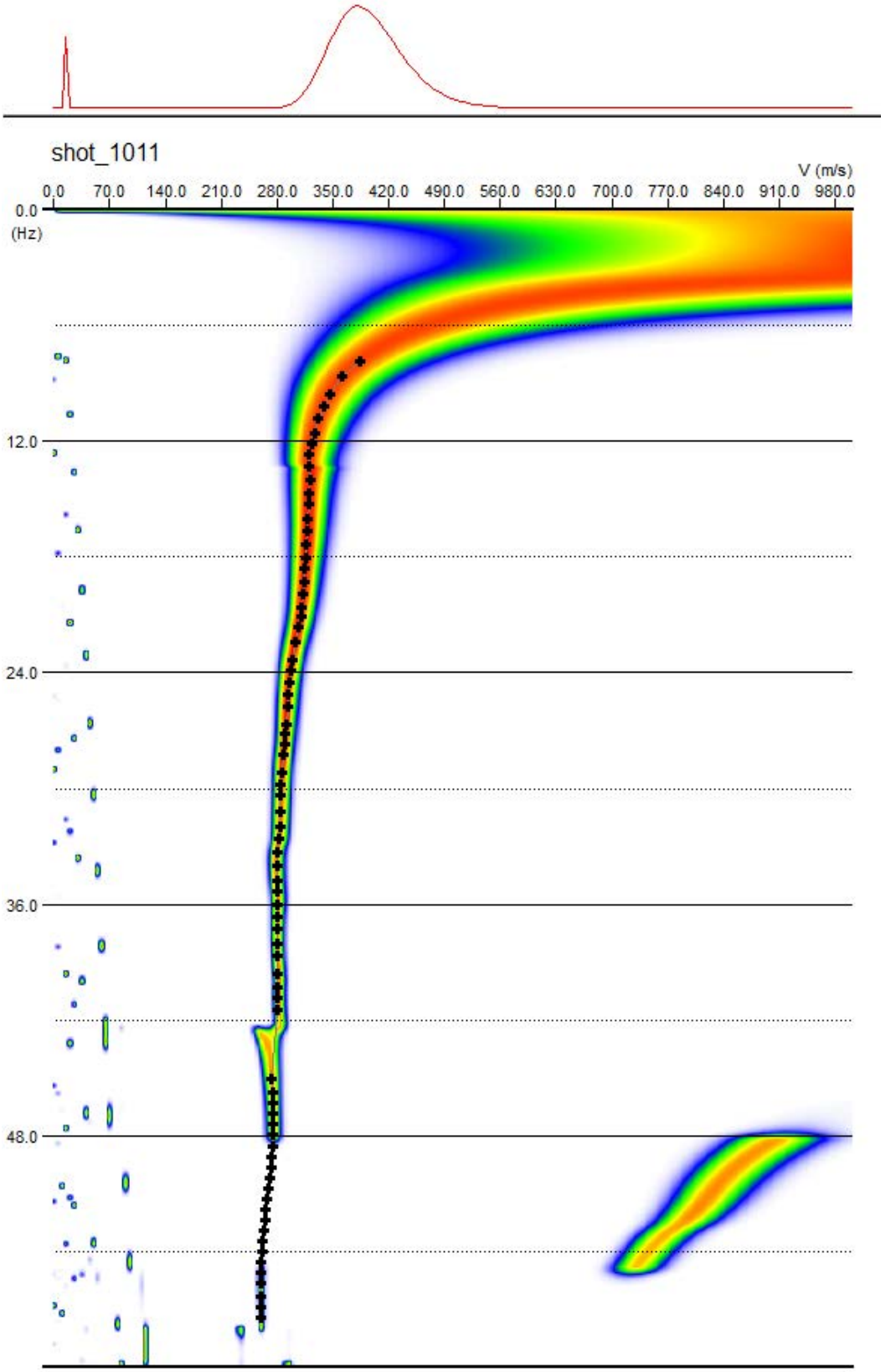
140.0
210.0
280.0
350.0
420.0
490.0
560.0
630.0
700.0
770.0
840.0
910.0
980.0
0.0
(Hz)
12.0
24.0
36.0
48.0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V (m/s)
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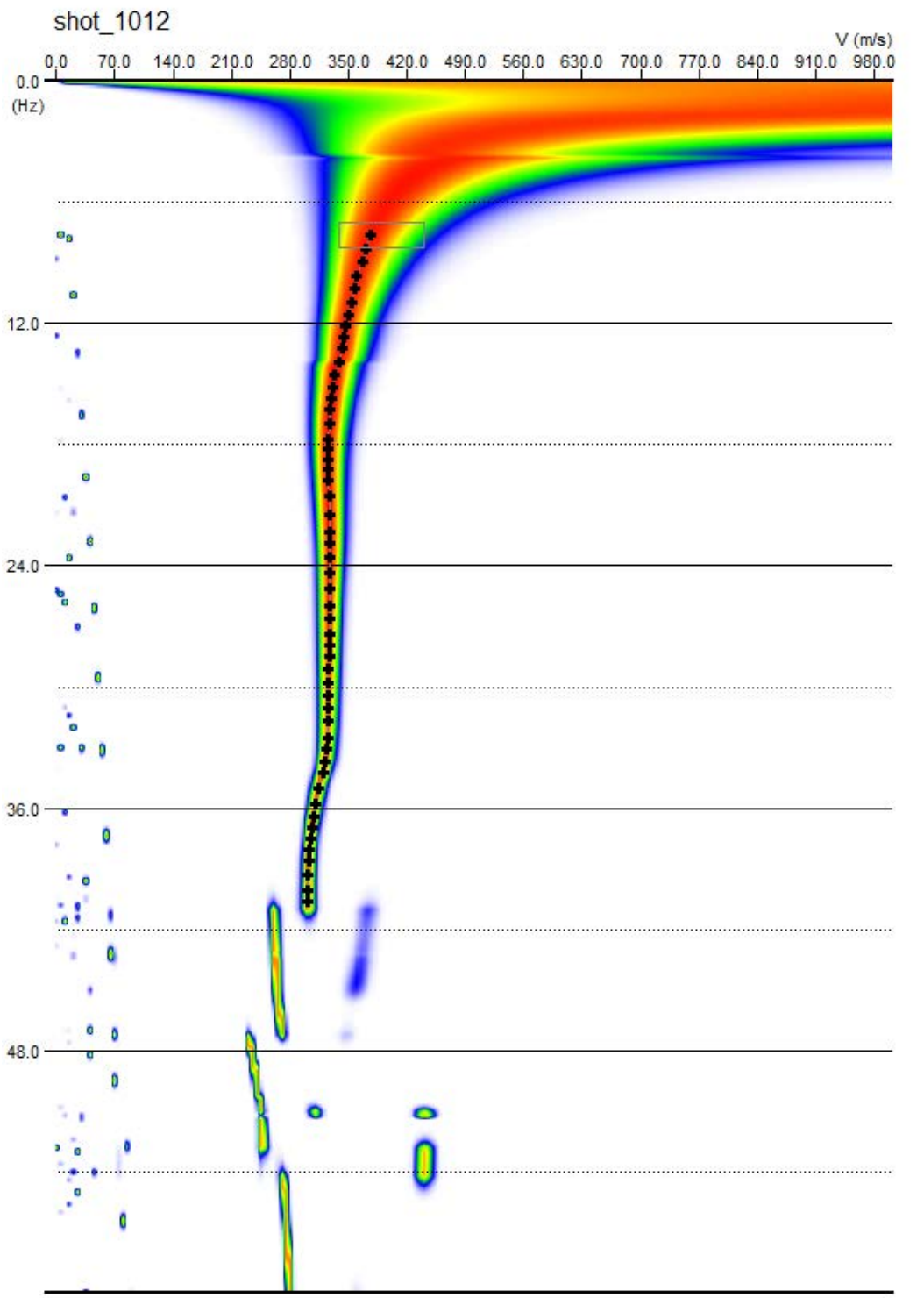
(Hz)
12.0
24.0
36.0
48.0


7.63 (Hz)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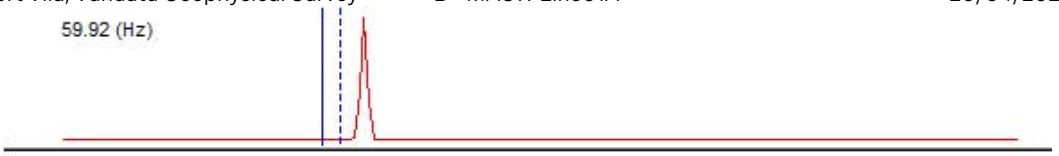
210.0
280.0
350.0
420.0
490.0
560.0
630.0
700.0
770.0
840.0
910.0
980.0
0.0
(Hz)
12.0
24.0
36.0
48.0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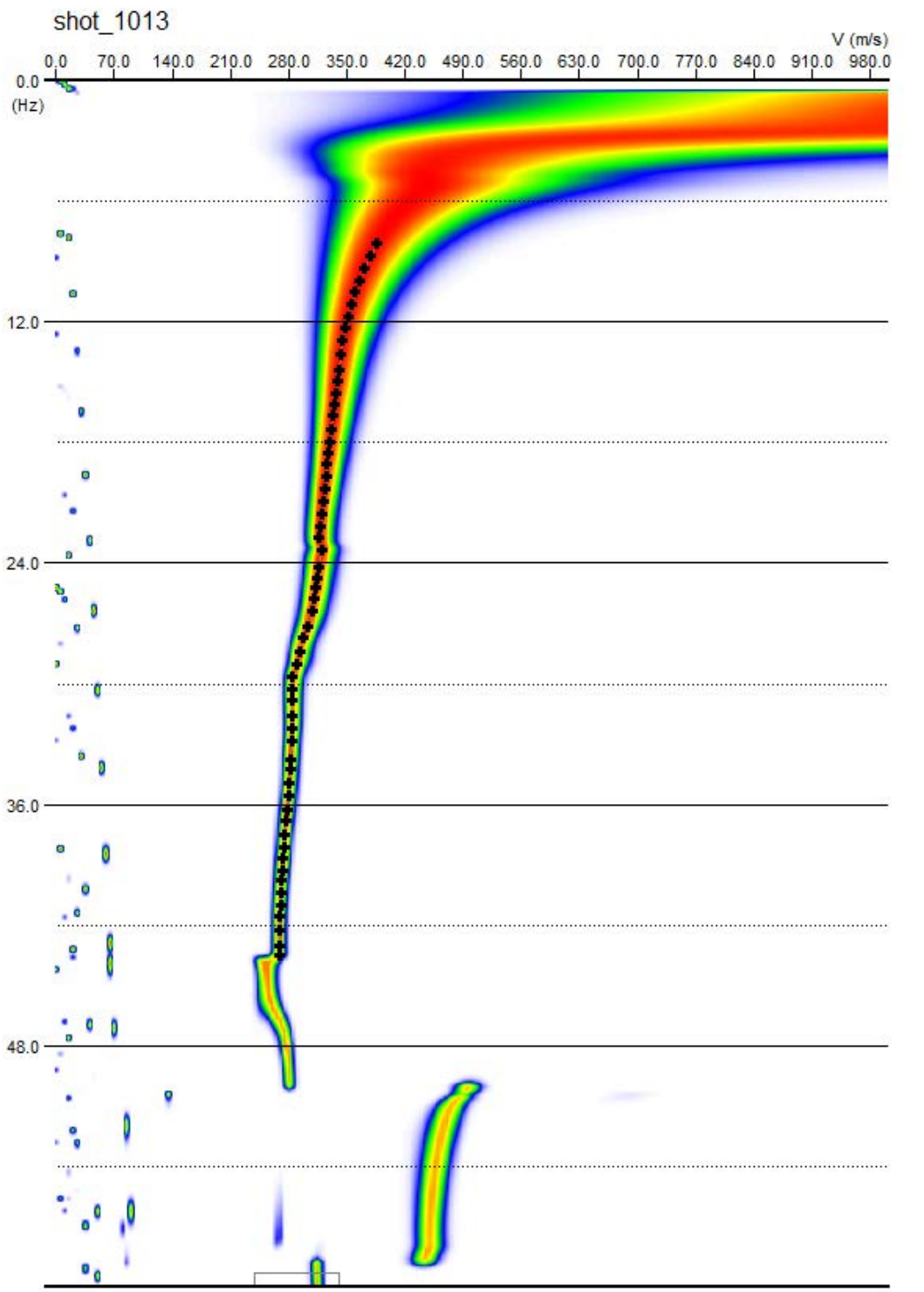
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V (m/s)
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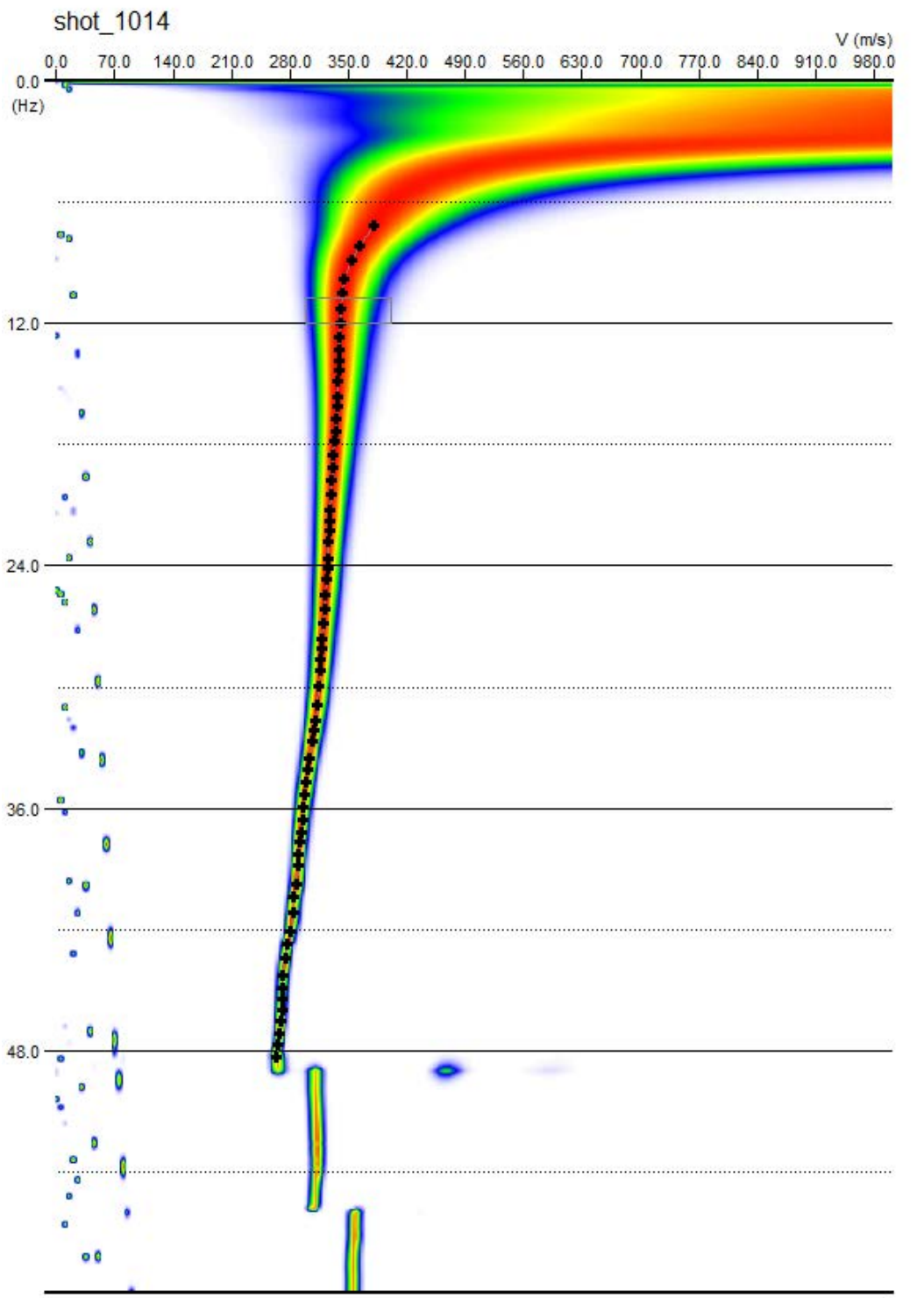
280.0
350.0
420.0
490.0
560.0
630.0
700.0
770.0
840.0
910.0
980.0
0.0
(Hz)
12.0
24.0
36.0
48.0


11.36 (Hz)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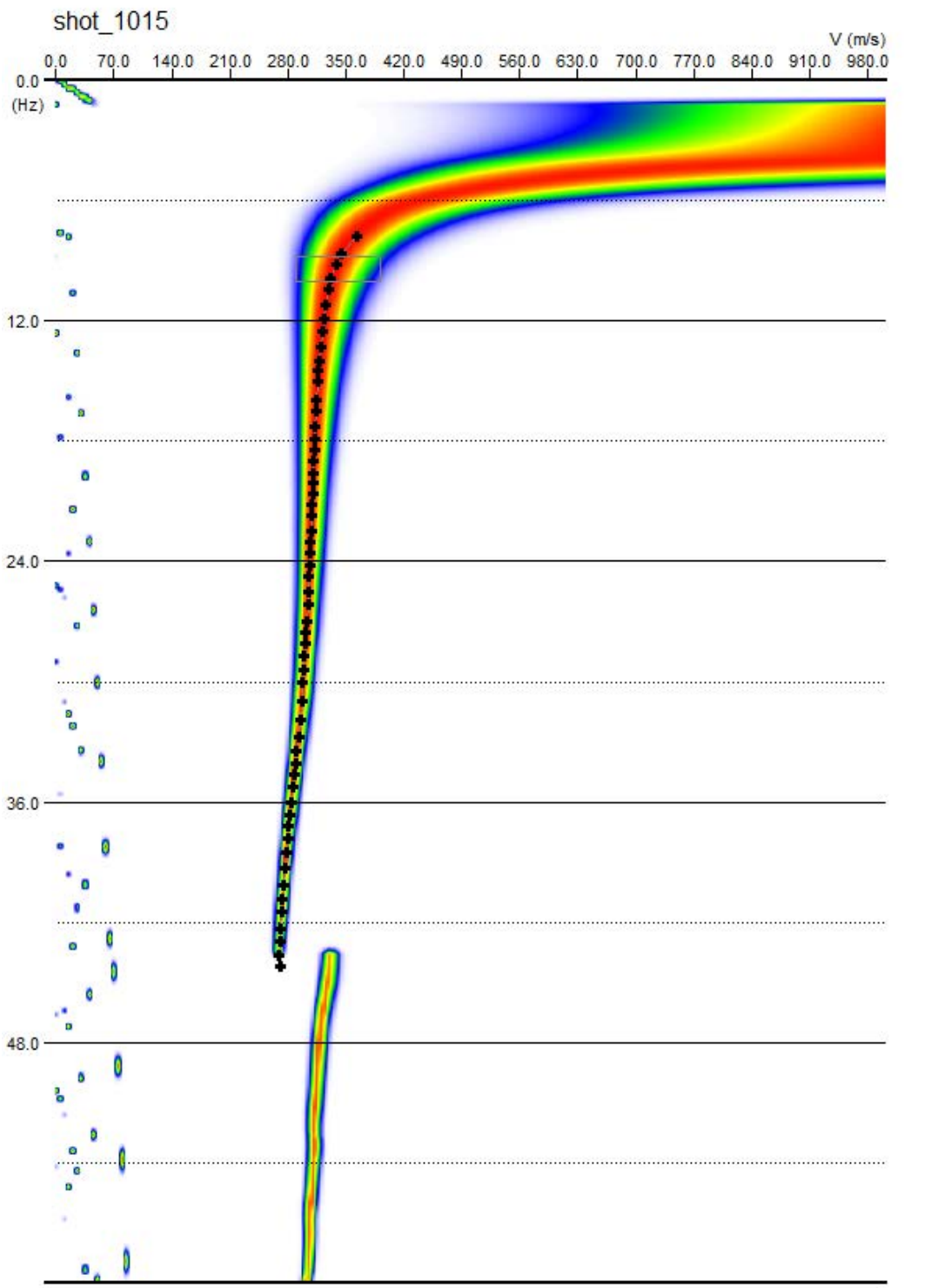
280.0
350.0
420.0
490.0
560.0
630.0
700.0
770.0
840.0
910.0
980.0
0.0
(Hz)
12.0
24.0
36.0
48.0


9.42 (Hz)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V (m/s)
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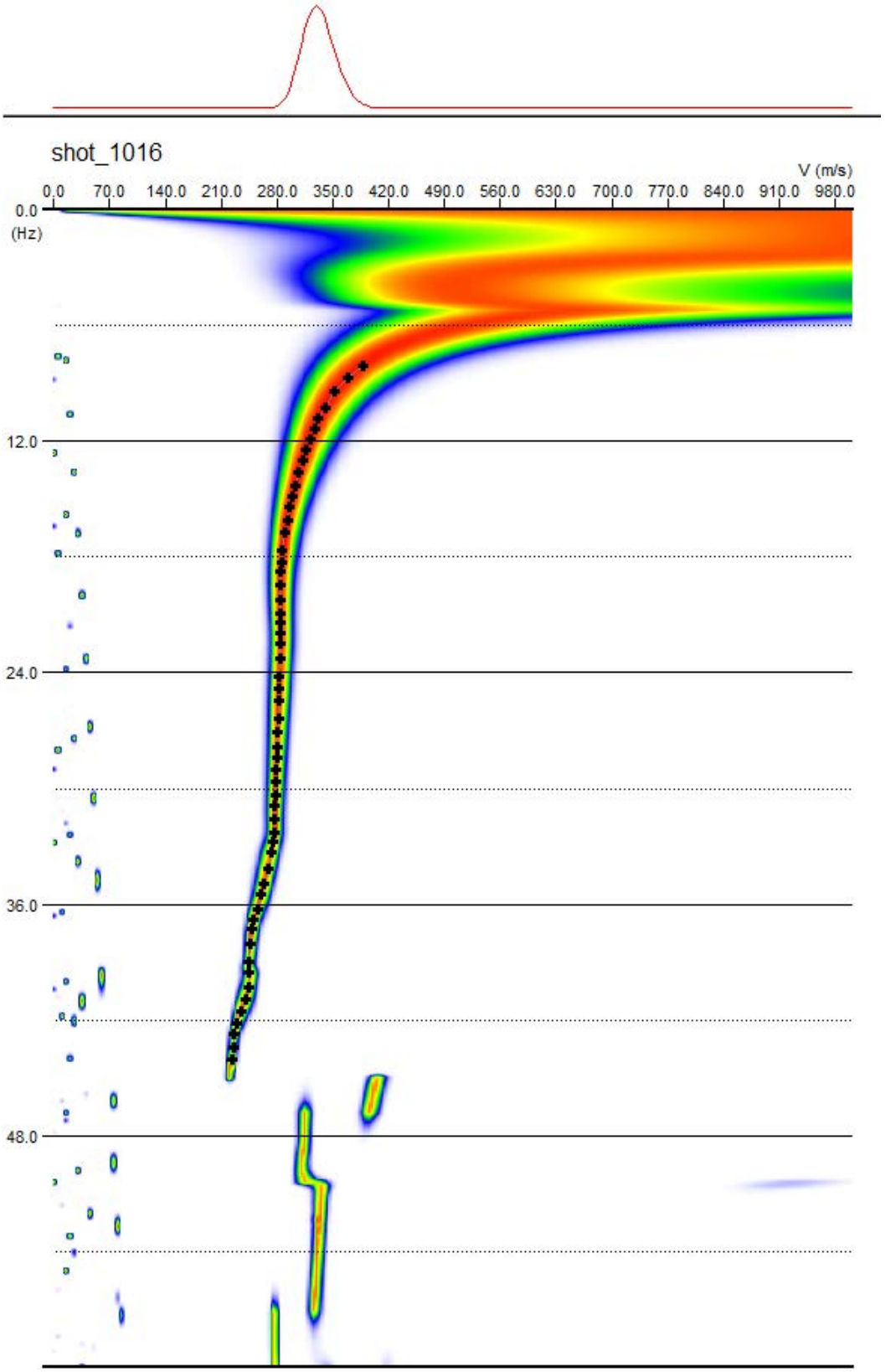
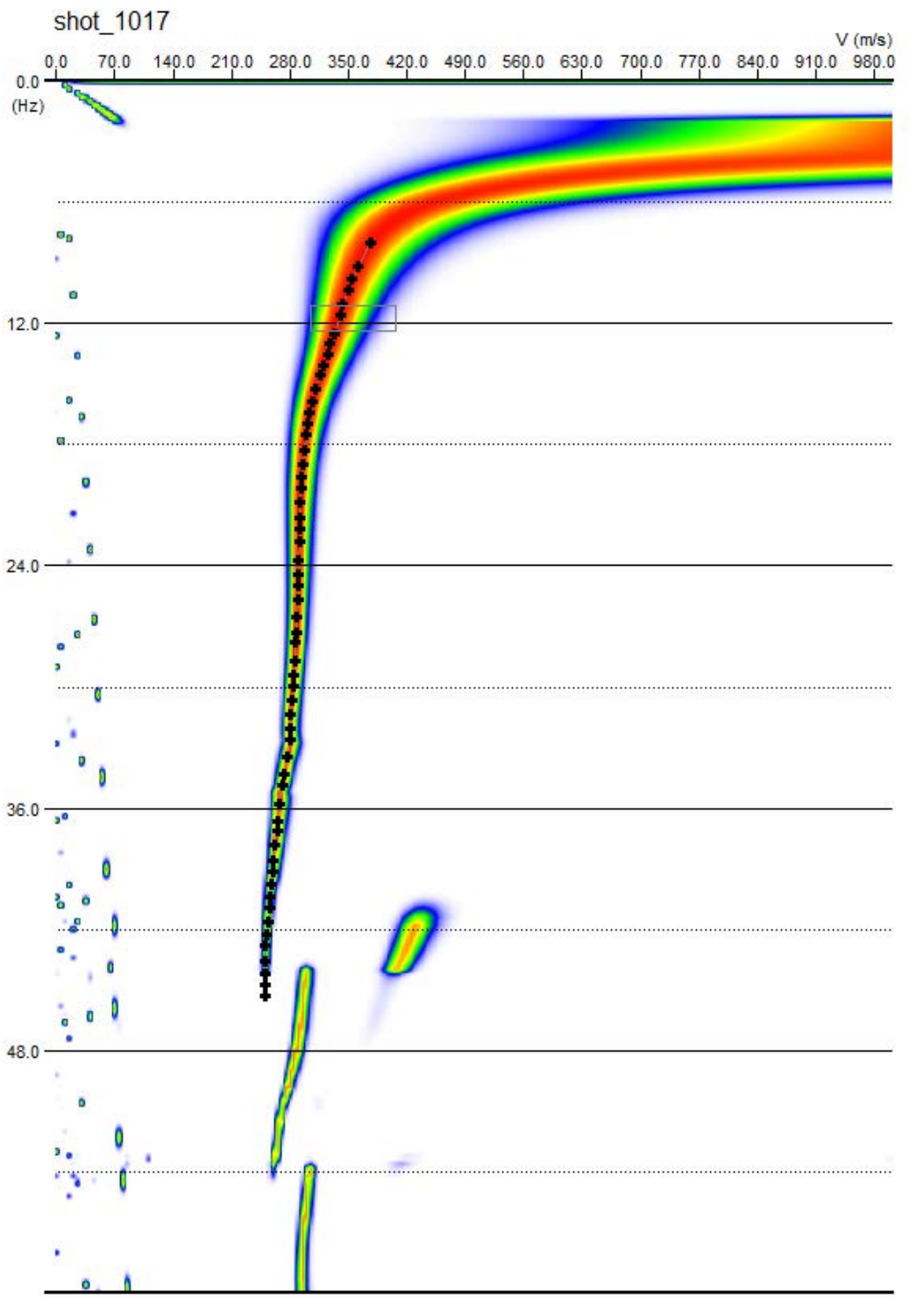
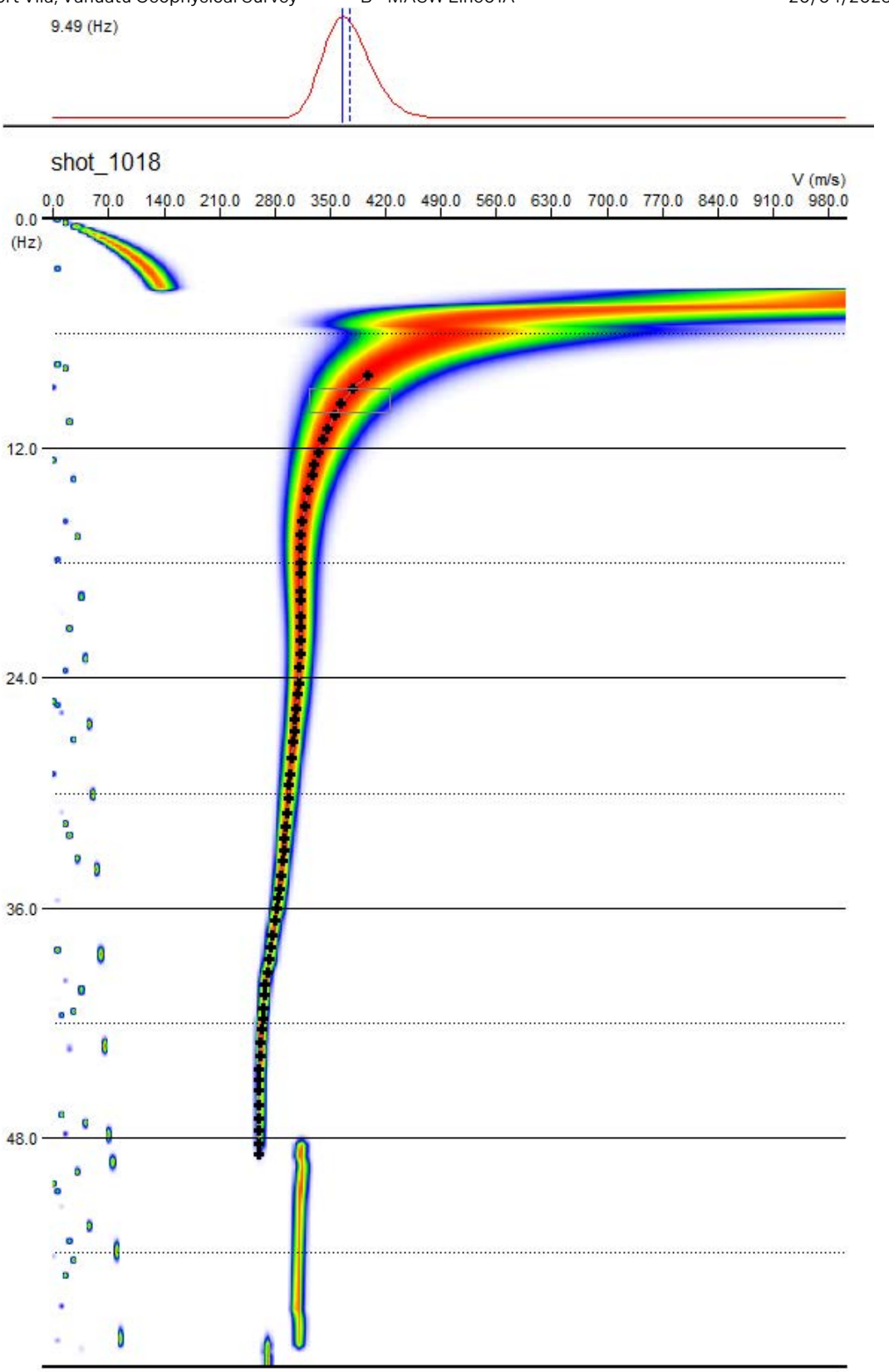
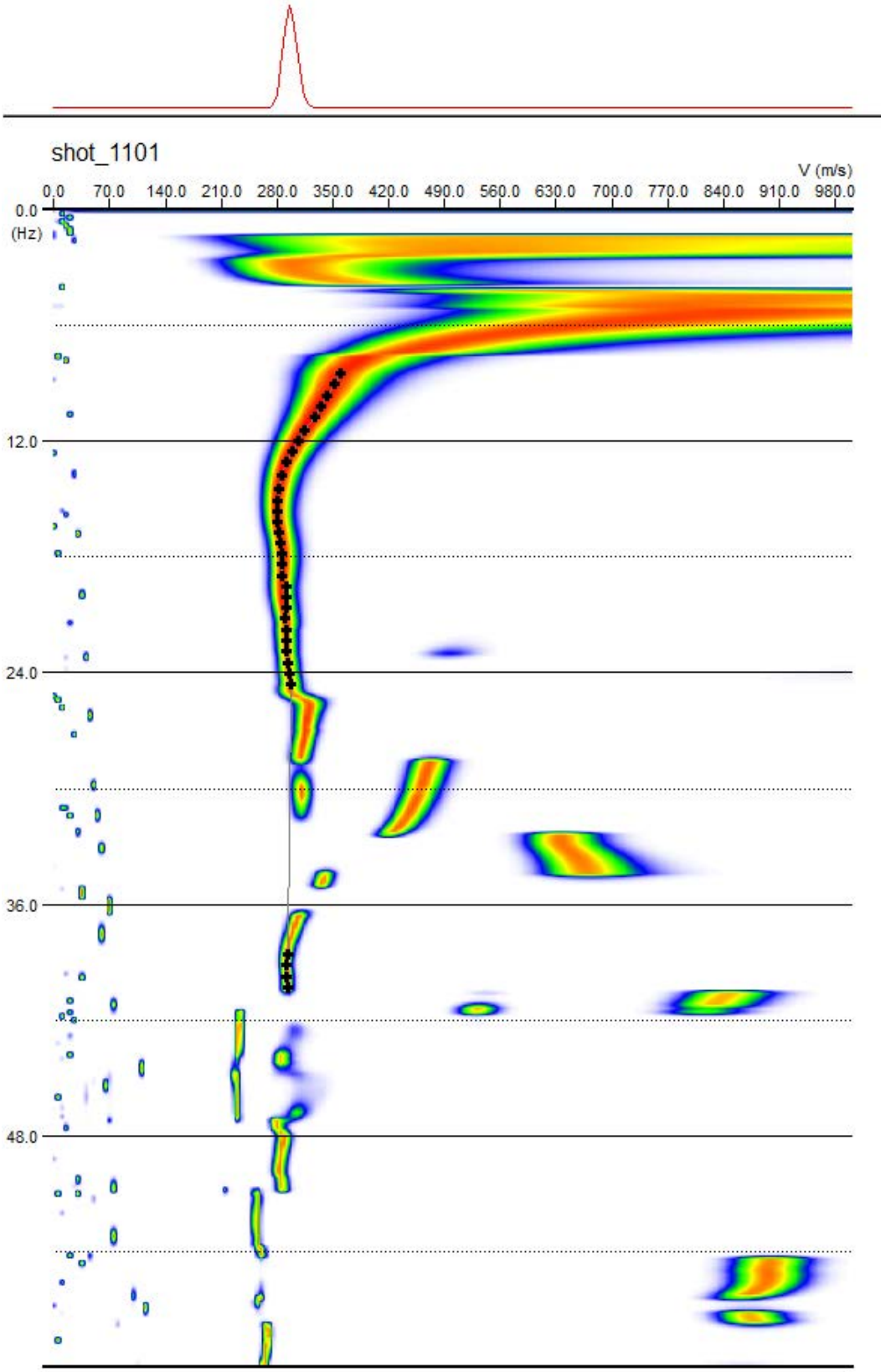
140.0
210.0
280.0
350.0
420.0
490.0
560.0
630.0
700.0
770.0
840.0
910.0
980.0
0.0
(Hz)
12.0
24.0
36.0
48.0

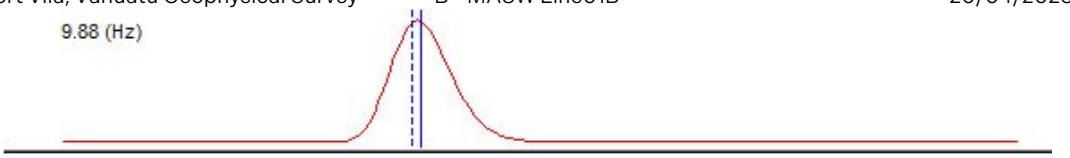

shot_1016
V (m/s)
0.0
70.0
140.0
210.0
280.0
350.0
420.0
490.0
560.0
630.0
700.0
770.0
840.0
910.0
980.0
0.0
(Hz)
12.0
24.0
36.0
48.0

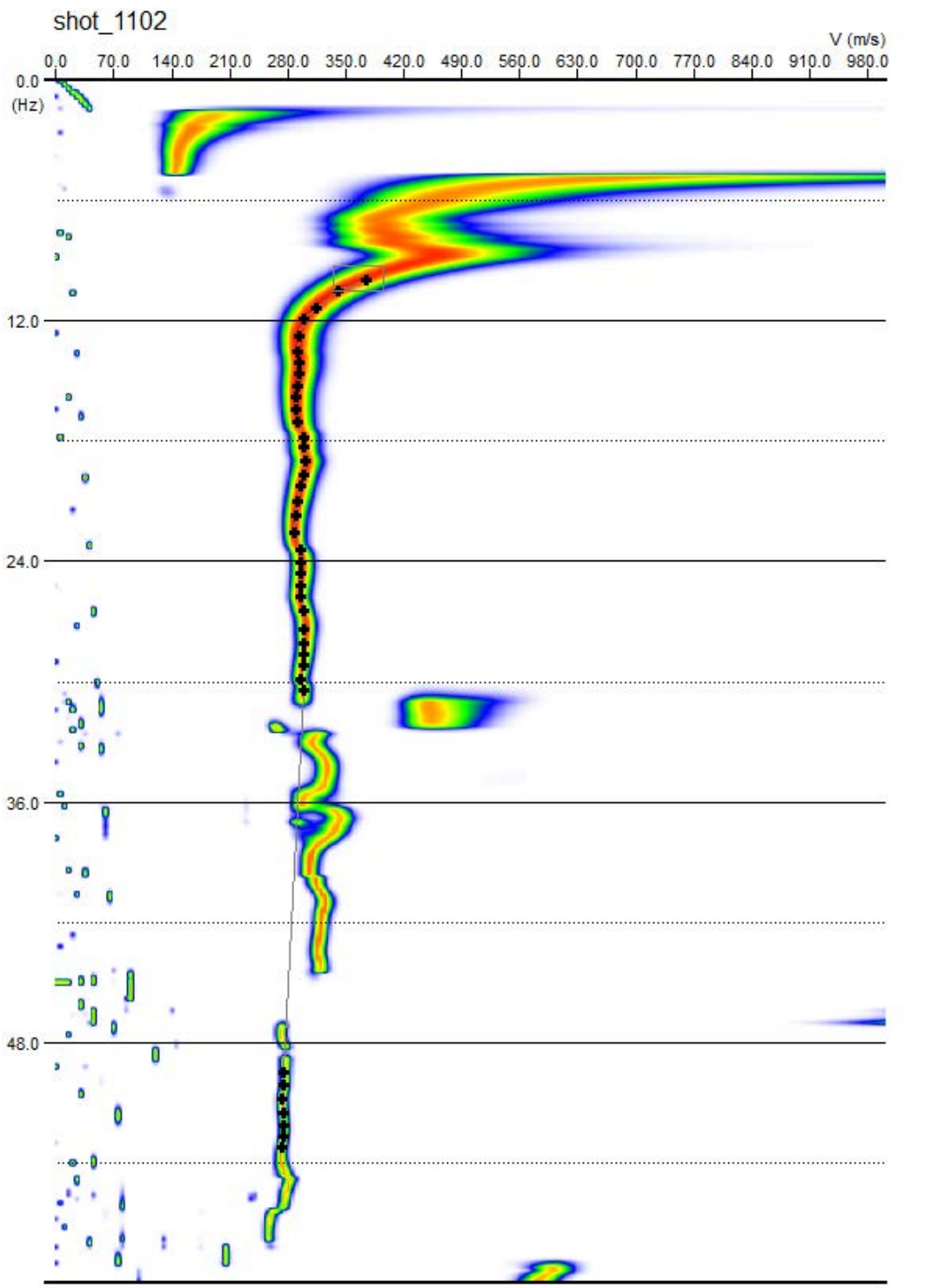

11.75 (Hz)

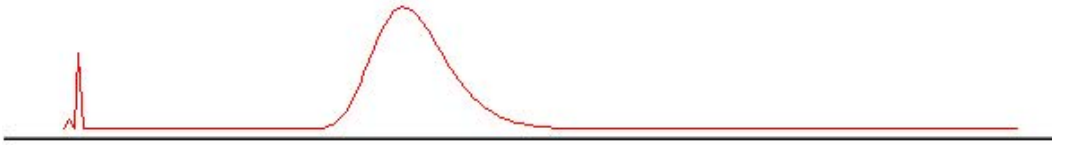

shot_1017
V (m/s)
0.0 70.0 140.0 210.0 280.0 350.0 420.0 490.0 560.0 630.0 700.0 770.0 840.0 910.0 980.0
0.0
(Hz)
12.0
24.0
36.0
48.0

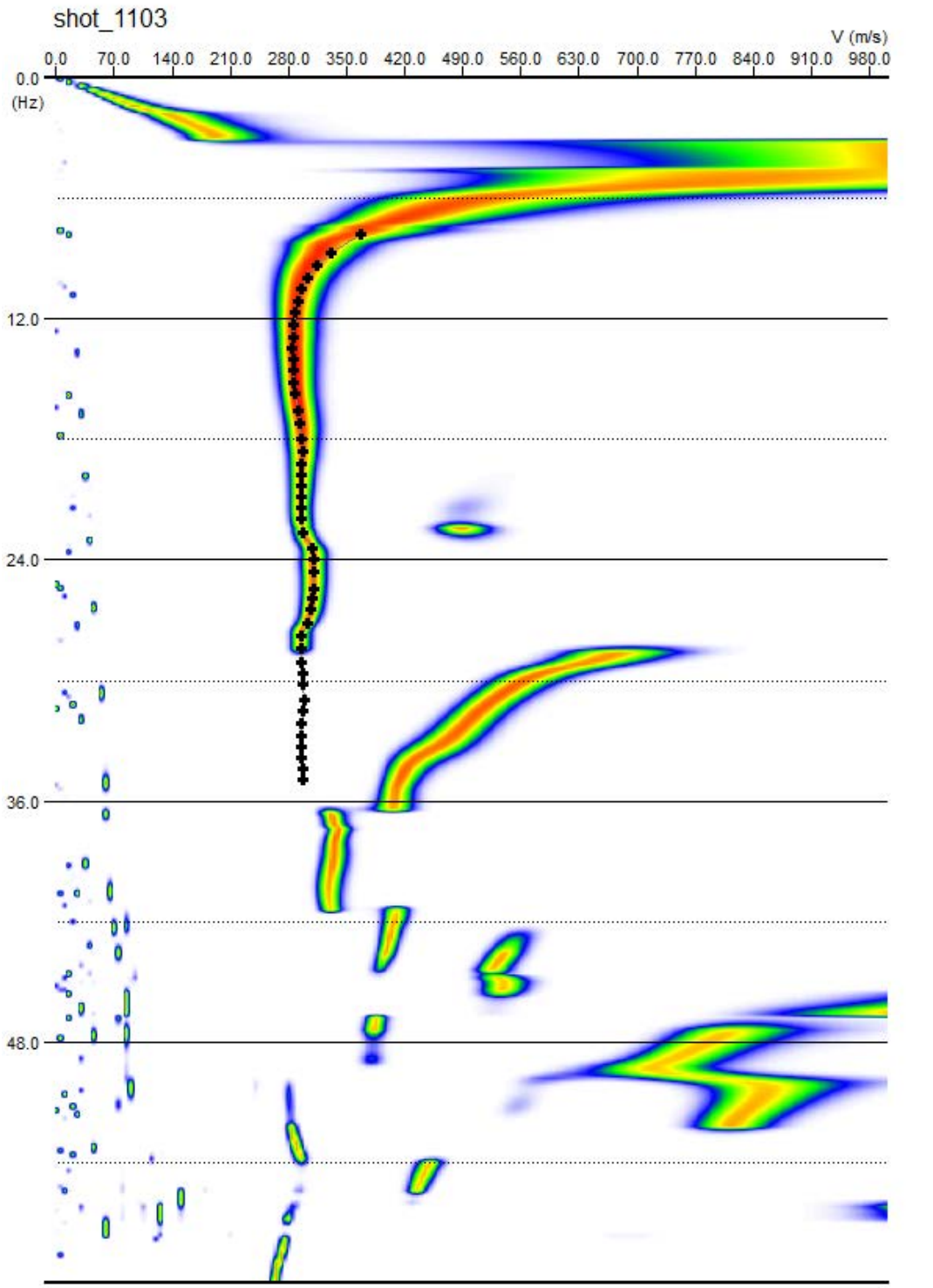

9.49 (Hz)
shot_1018
V (m/s)
0.0
70.0
140.0
210.0
280.0
350.0
420.0
490.0
560.0
630.0
700.0
770.0
840.0
910.0
980.0
0.0
(Hz)
12.0
24.0
36.0
48.0

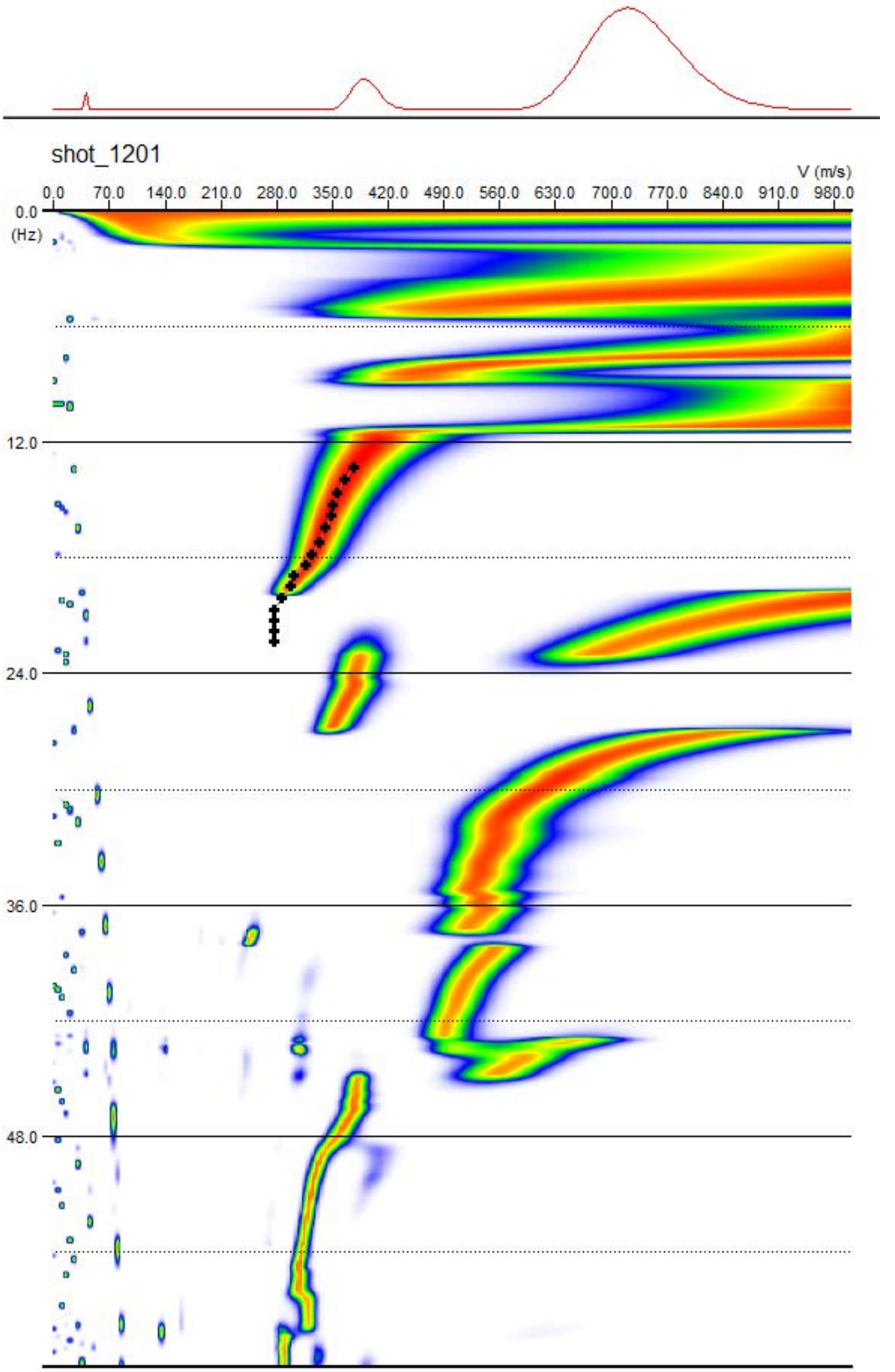

shot_1101
V (m/s)
0.0
70.0
140.0
210.0
280.0
350.0
420.0
490.0
560.0
630.0
700.0
770.0
840.0
910.0
980.0
0.0
(Hz)
12.0
24.0
36.0
48.0

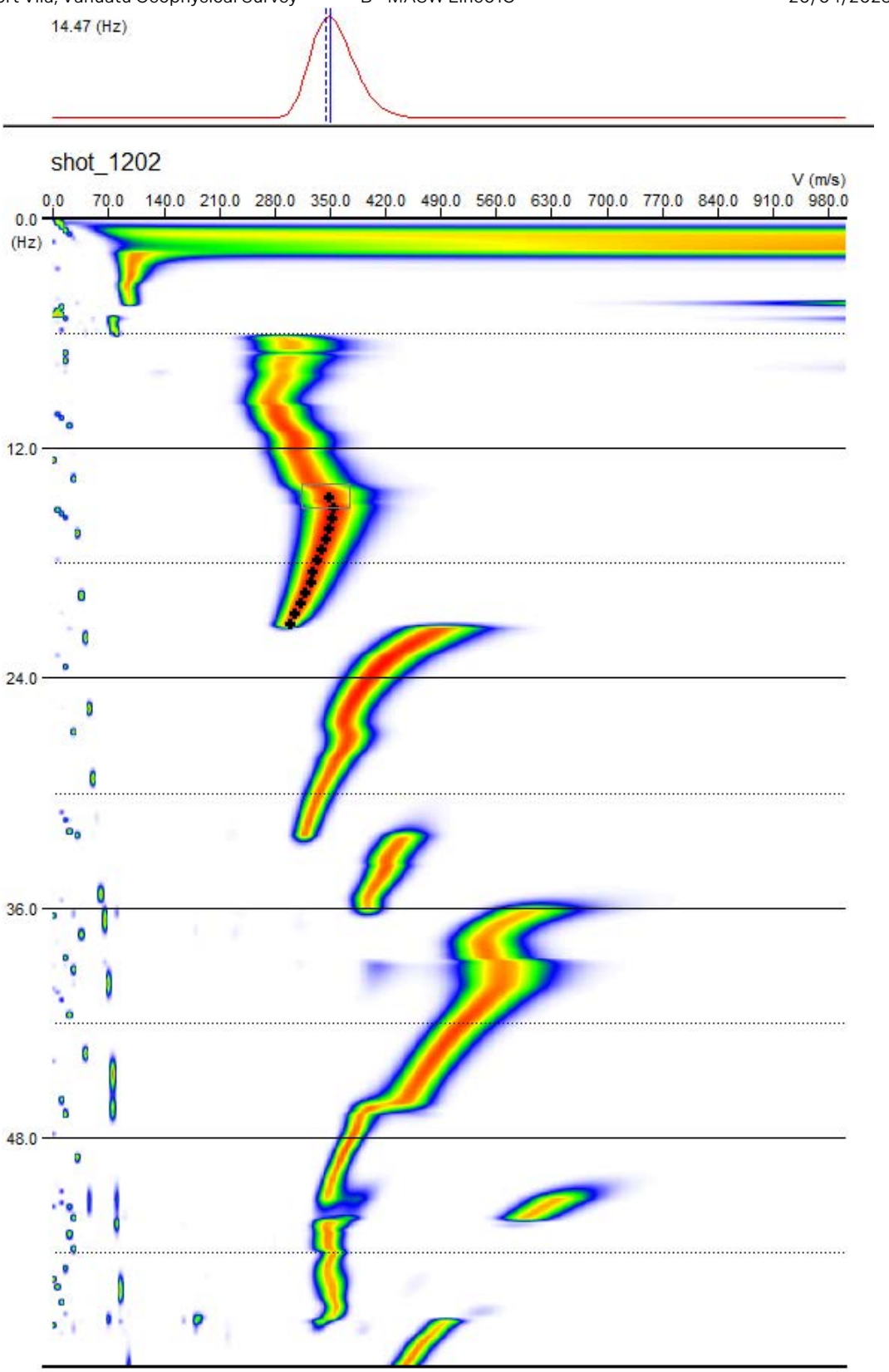

9.88 (Hz)

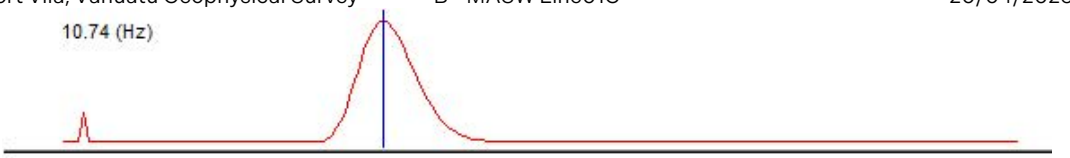

shot_1102
V (m/s)
0.0
70.0
140.0
210.0
280.0
350.0
420.0
490.0
560.0
630.0
700.0
770.0
840.0
910.0
980.0
0.0
(Hz)
12.0
24.0
36.0
48.0

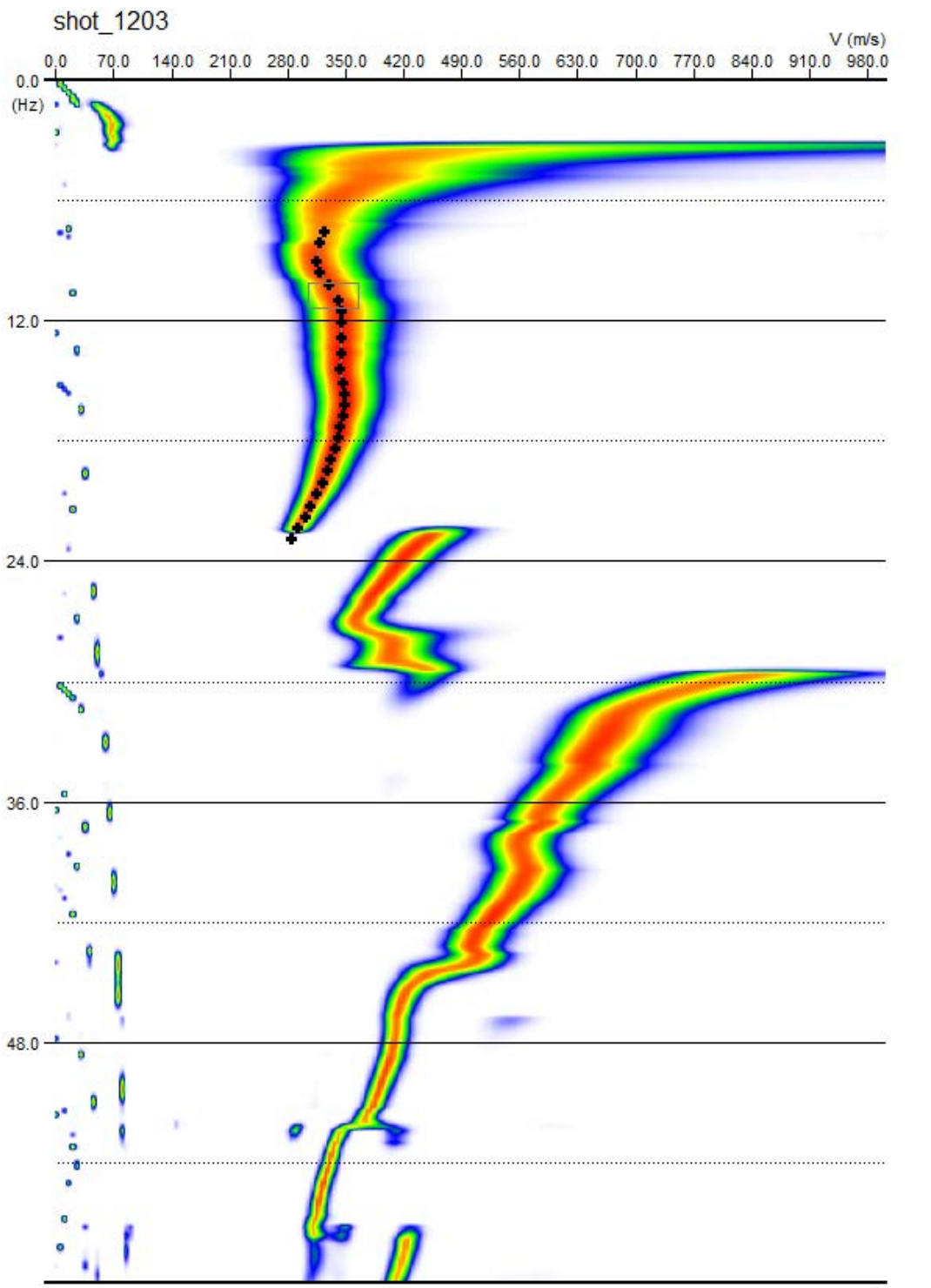


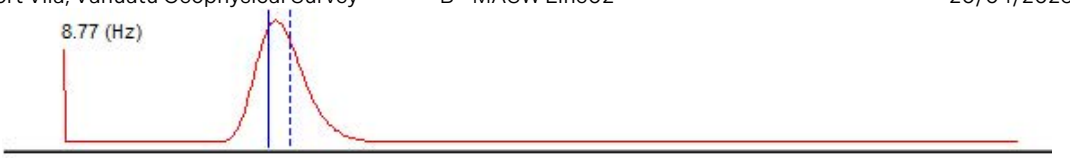

shot_1103
V (m/s)
0.0
70.0
140.0
210.0
280.0
350.0
420.0
490.0
560.0
630.0
700.0
770.0
840.0
910.0
980.0
0.0
(Hz)
12.0
24.0
36.0
48.0

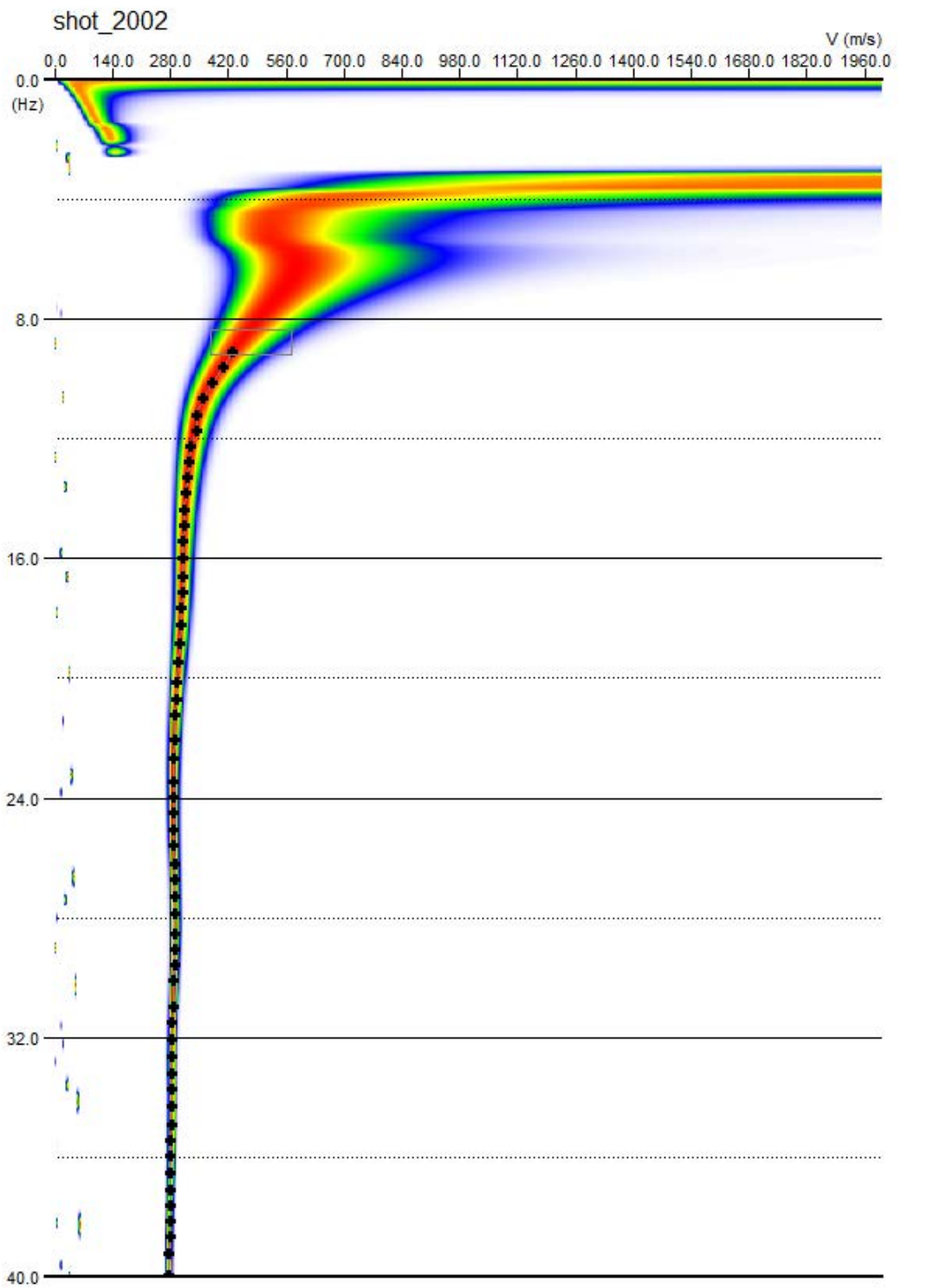

shot_1201
V (m/s)
0.0
70.0
140.0
210.0
280.0
350.0
420.0
490.0
560.0
630.0
700.0
770.0
840.0
910.0
980.0
0.0
(Hz)
12.0
24.0
36.0
48.0

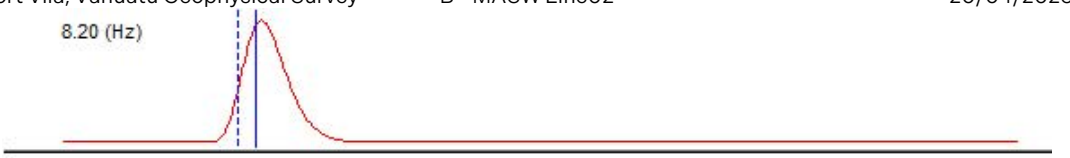

14.47 (Hz)
shot_1202
V (m/s)
0.0
70.0
140.0
210.0
280.0
350.0
420.0
490.0
560.0
630.0
700.0
770.0
840.0
910.0
980.0
0.0
(Hz)
12.0
24.0
36.0
48.0

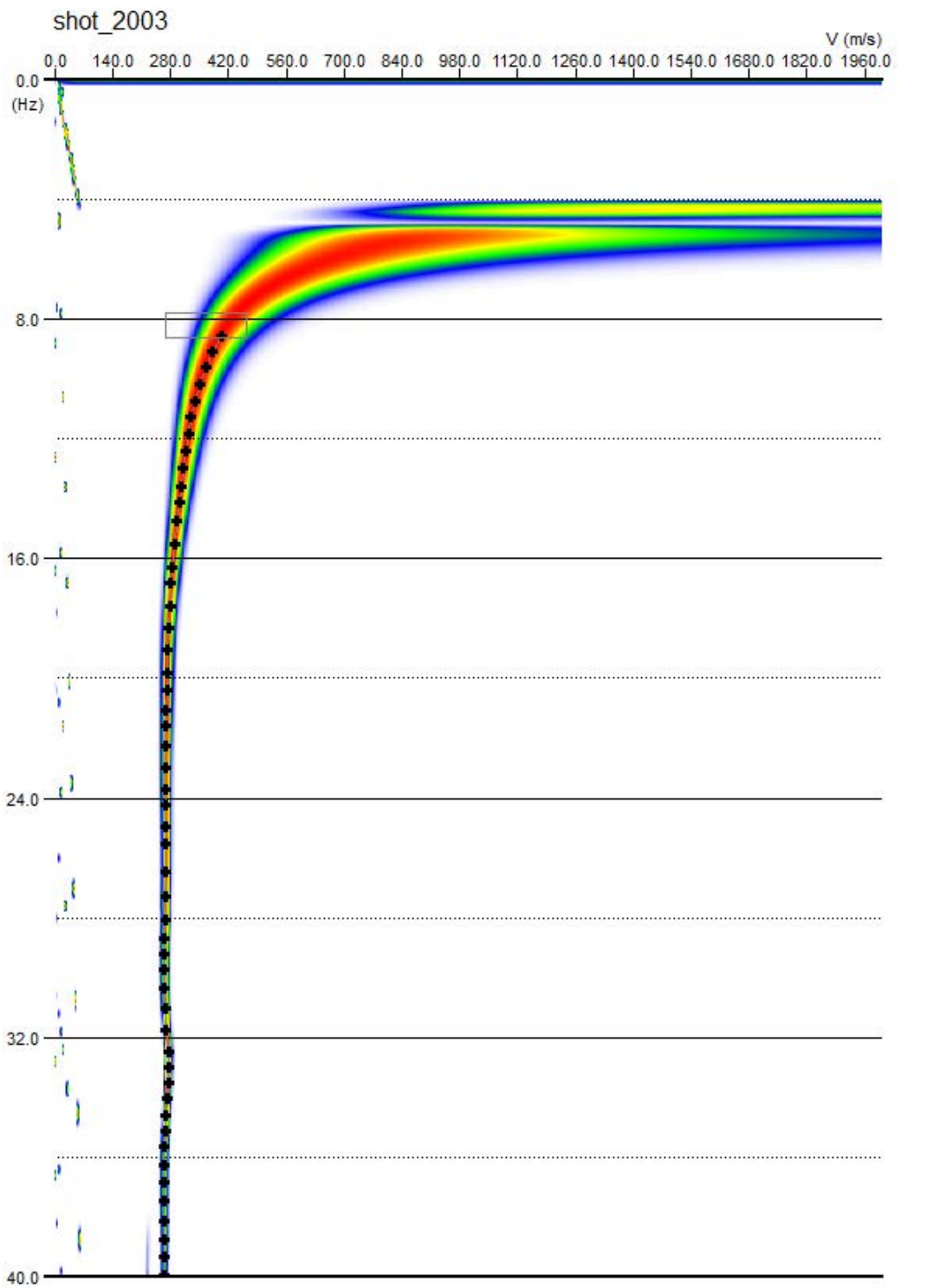

10.74 (Hz)

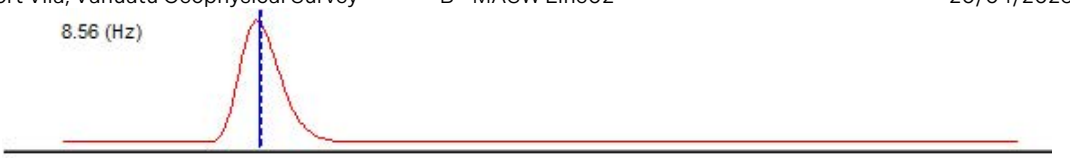

shot_1203
V (m/s)
0.0
70.0
140.0
210.0
280.0
350.0
420.0
490.0
560.0
630.0
700.0
770.0
840.0
910.0
980.0
0.0
(Hz)
12.0
24.0
36.0
48.0

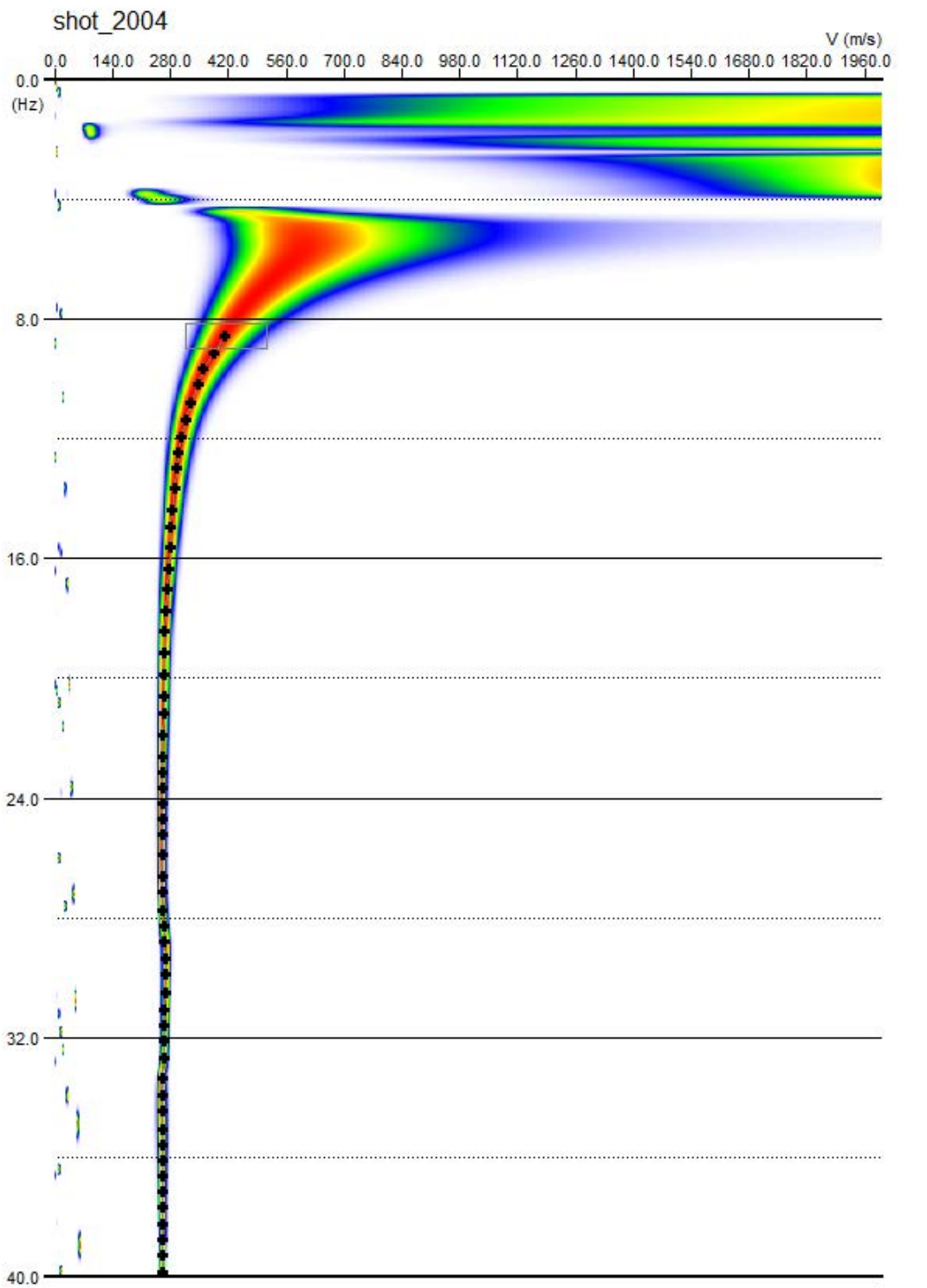

8.77 (Hz)

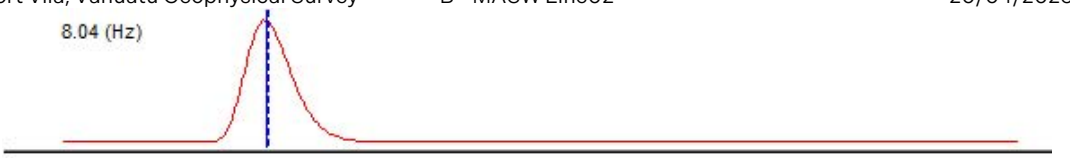

shot_2002
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

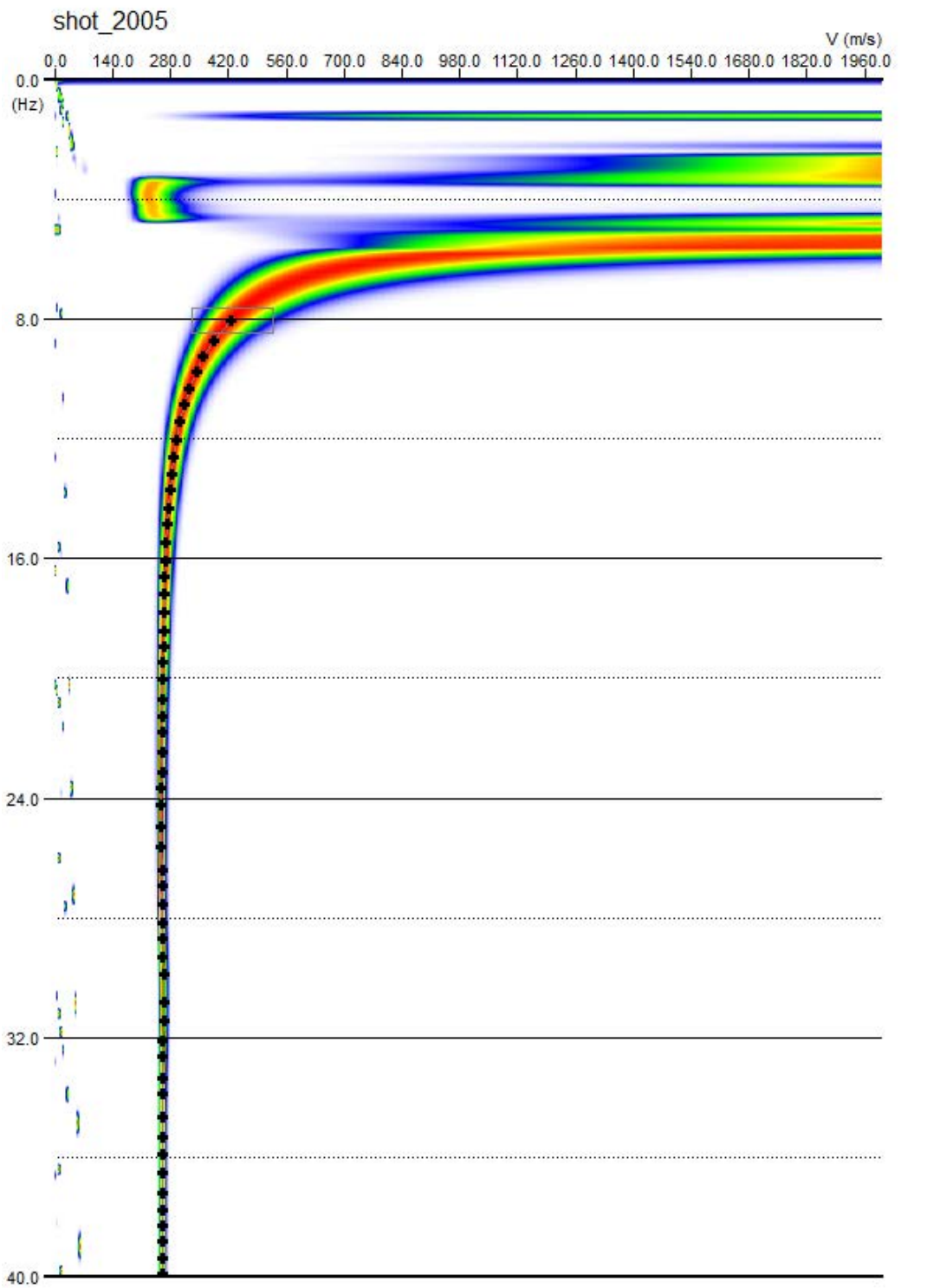

8.20 (Hz)

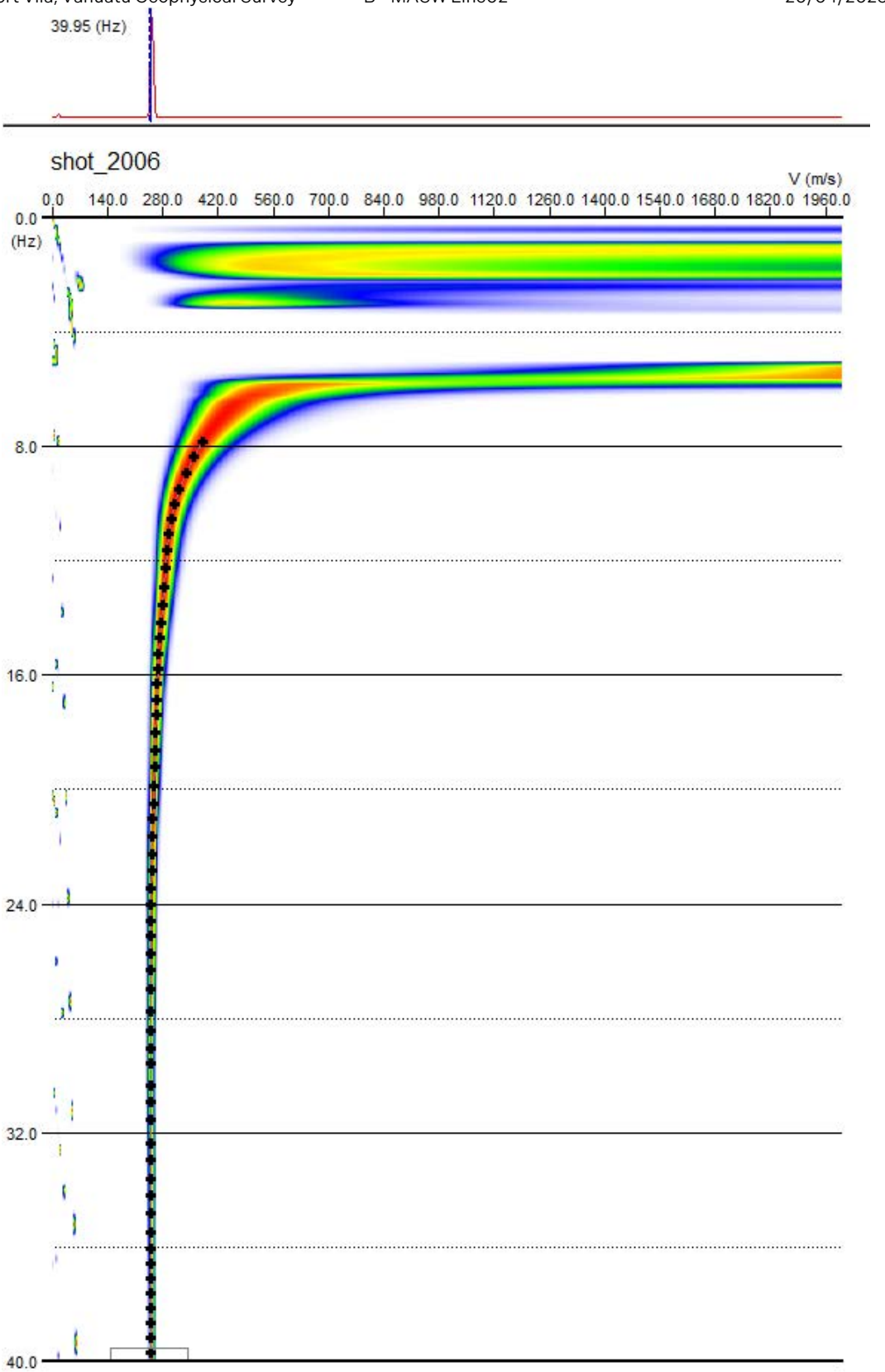

shot_2003
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

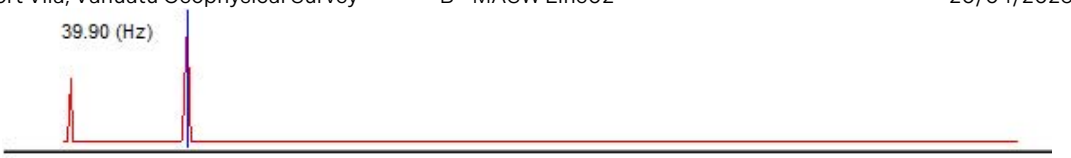

8.56 (Hz)

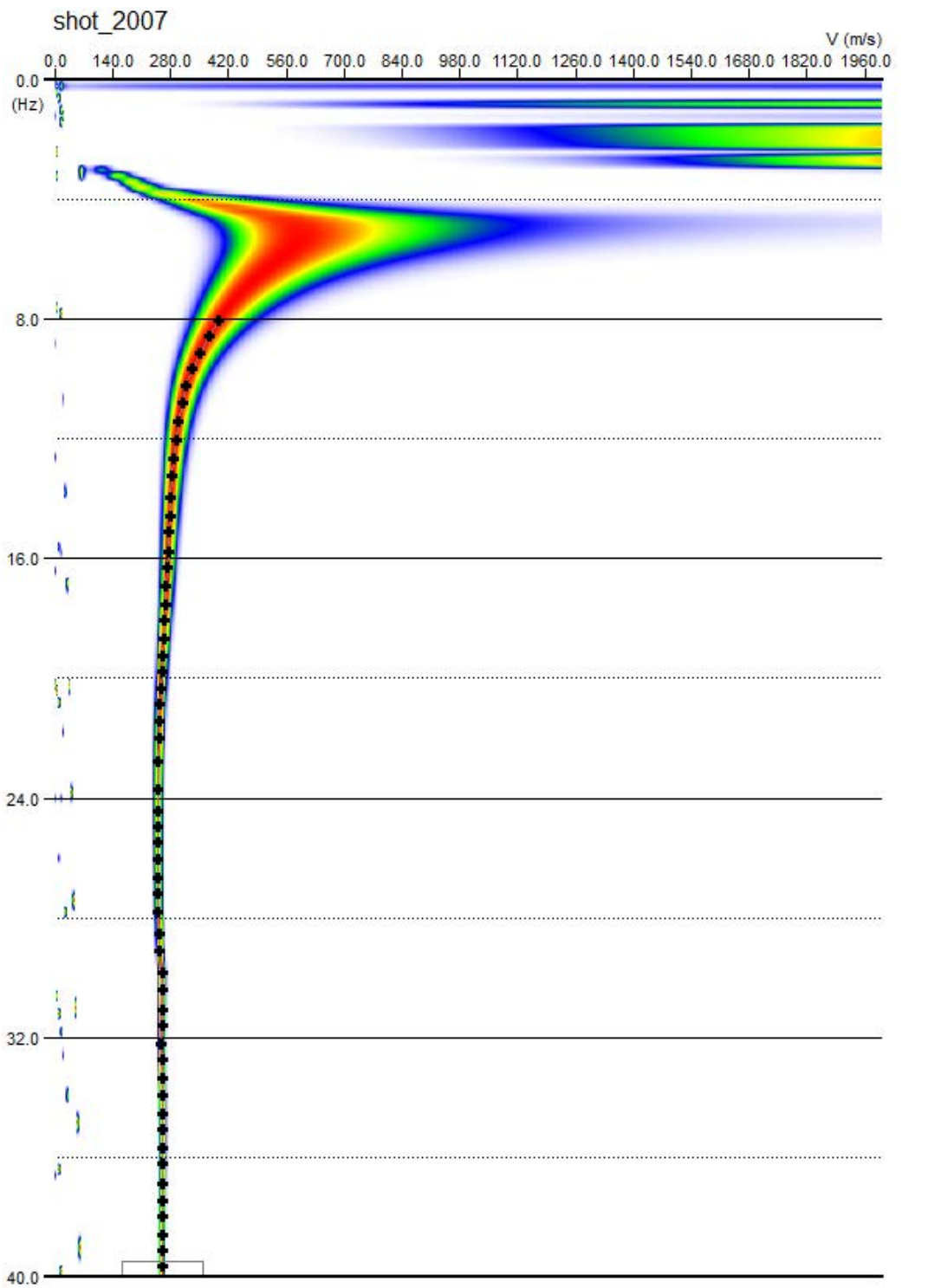

shot_2004
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0


8.04 (Hz)

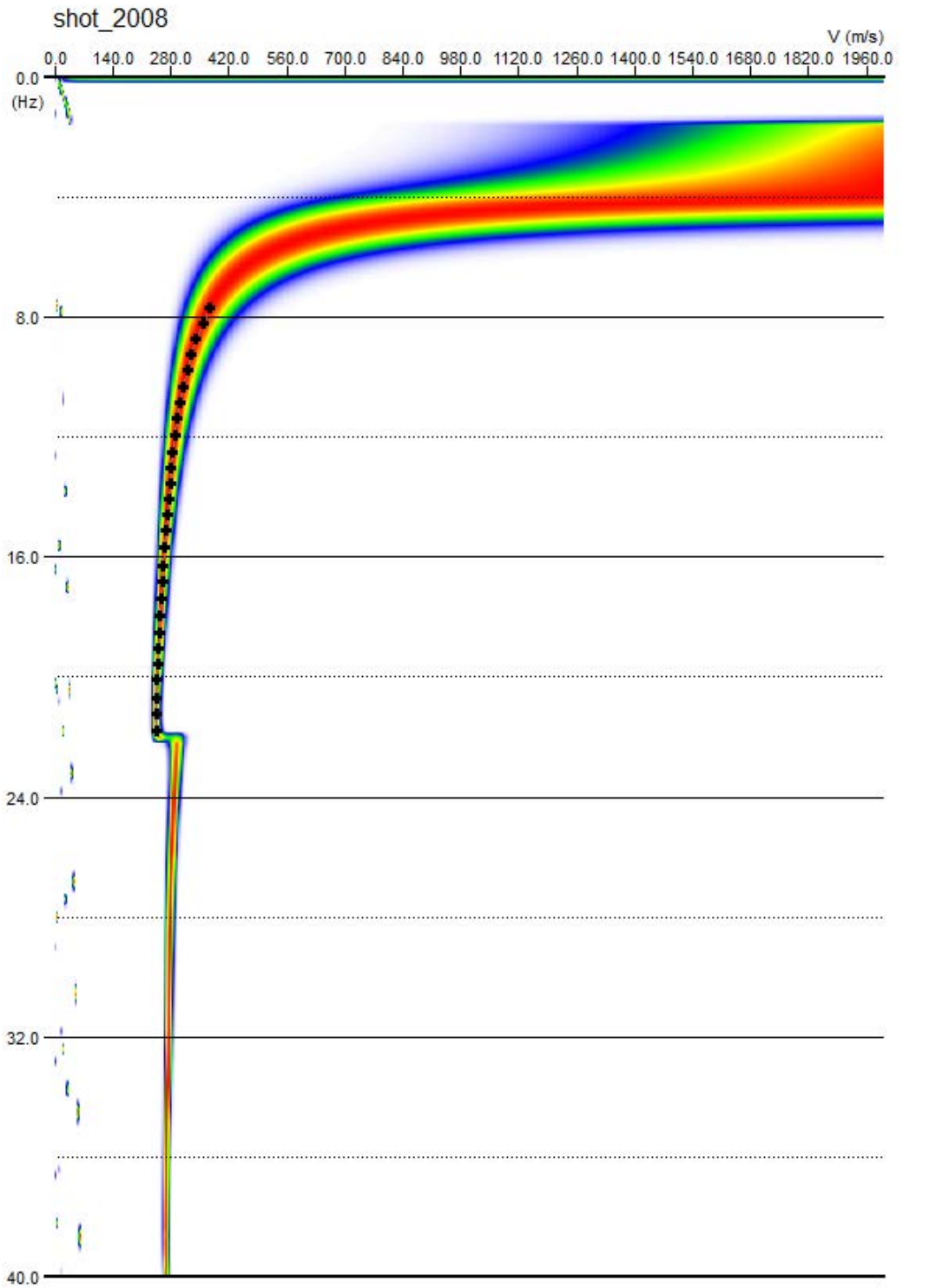

shot_2005
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0


39.95 (Hz)
shot_2006
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

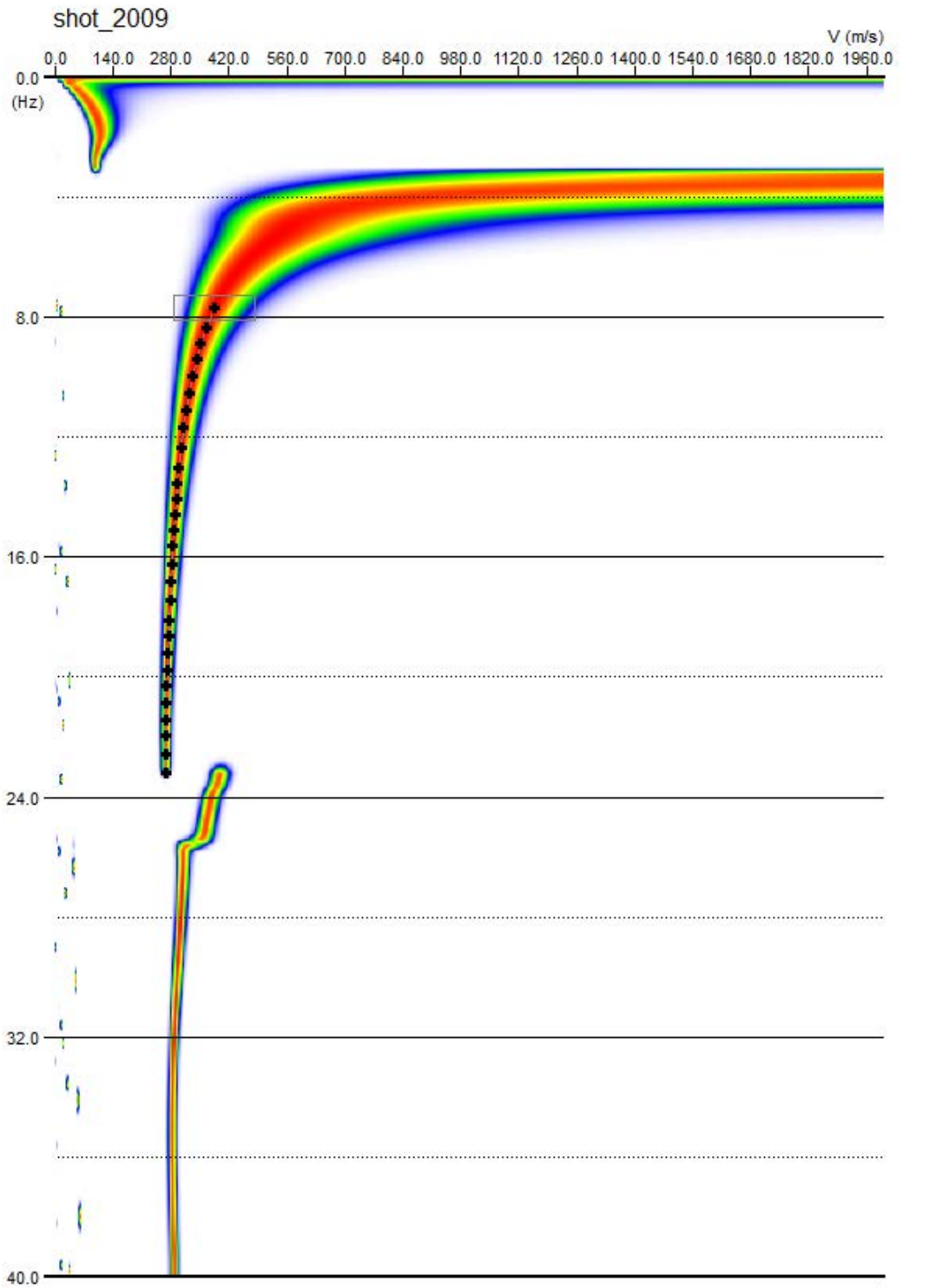

39.90 (Hz)


shot_2007
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

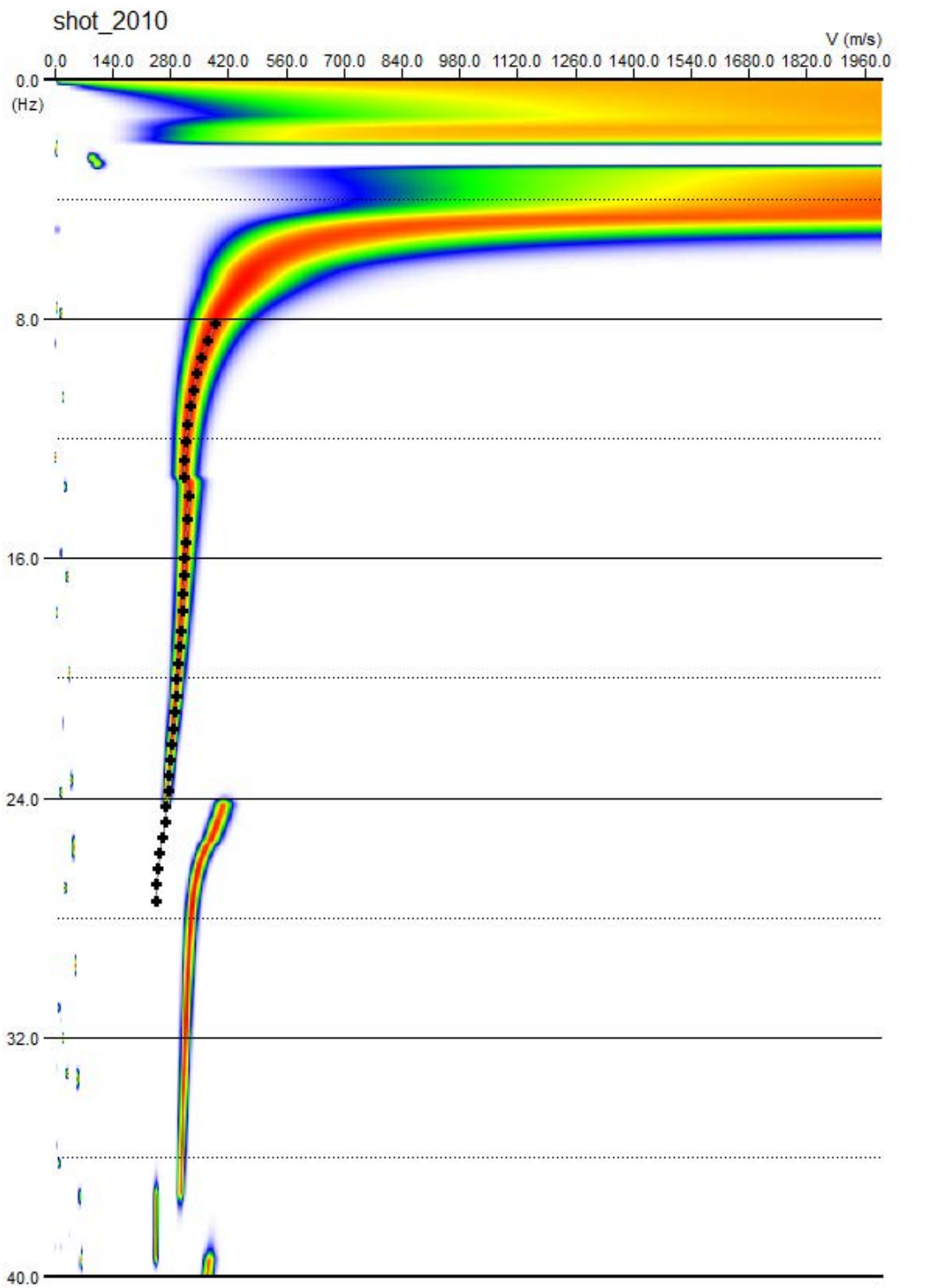


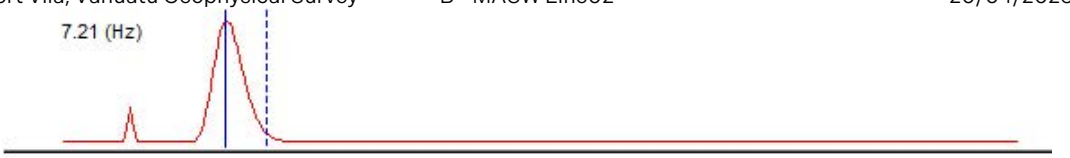

shot_2008
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

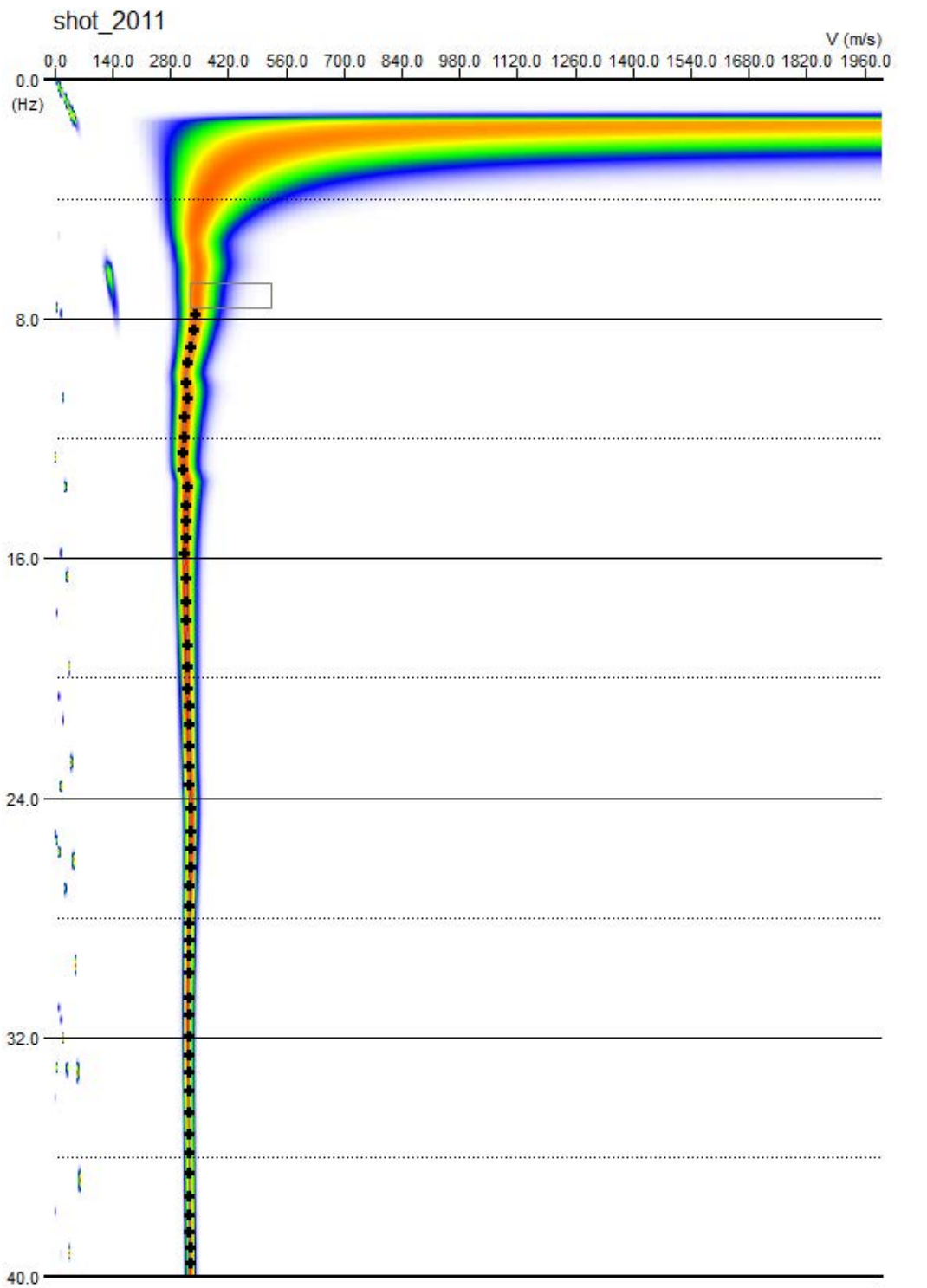

7.68 (Hz)

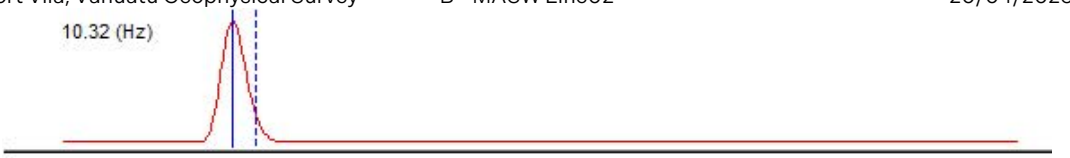

shot_2009
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

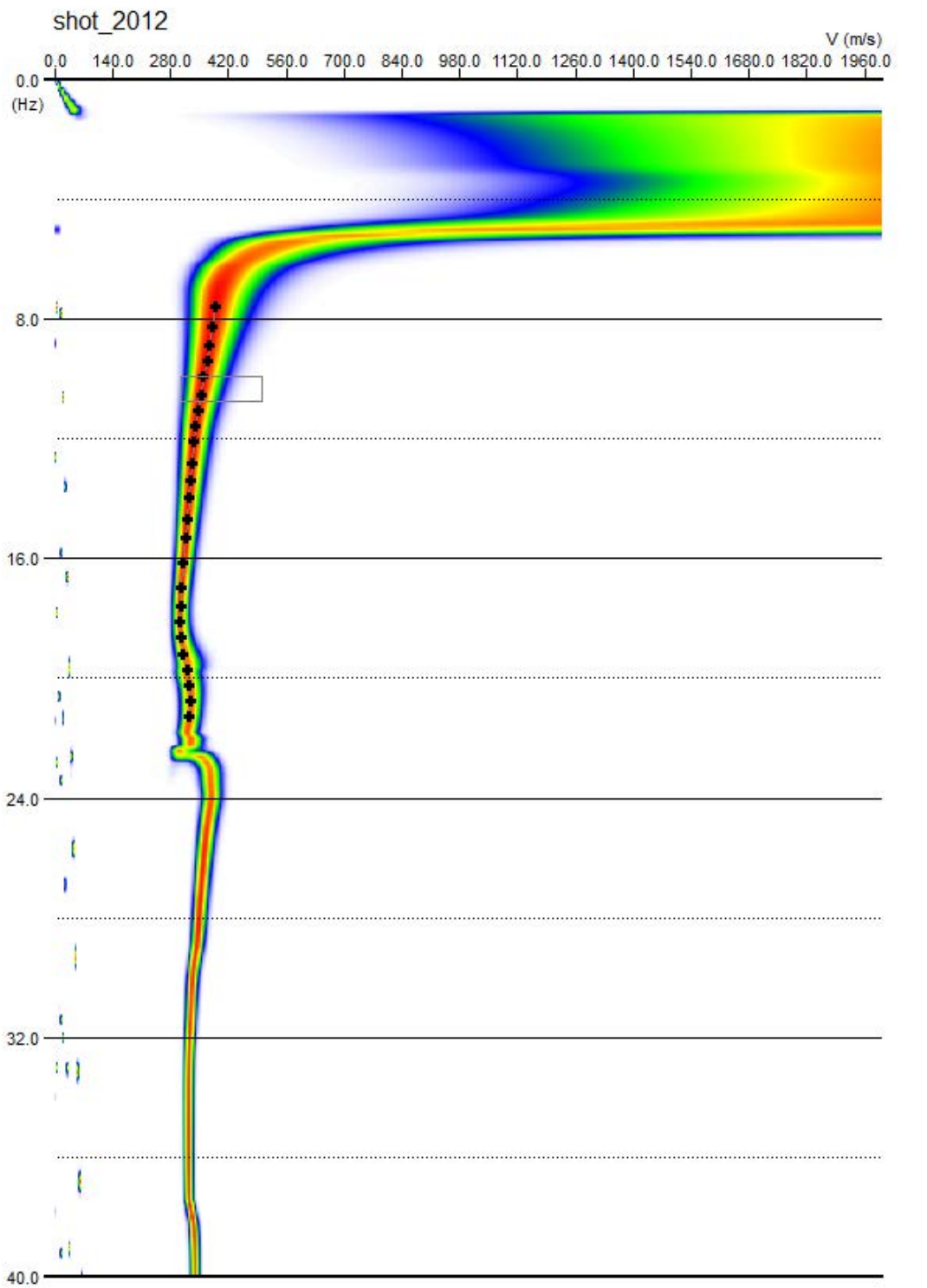


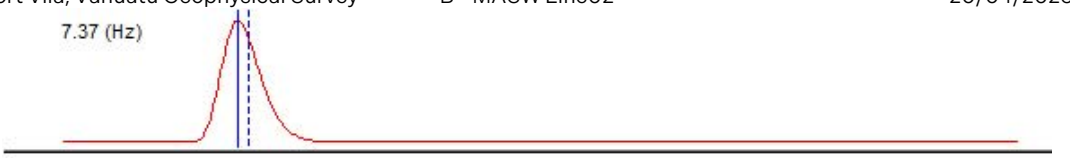

shot_2010
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

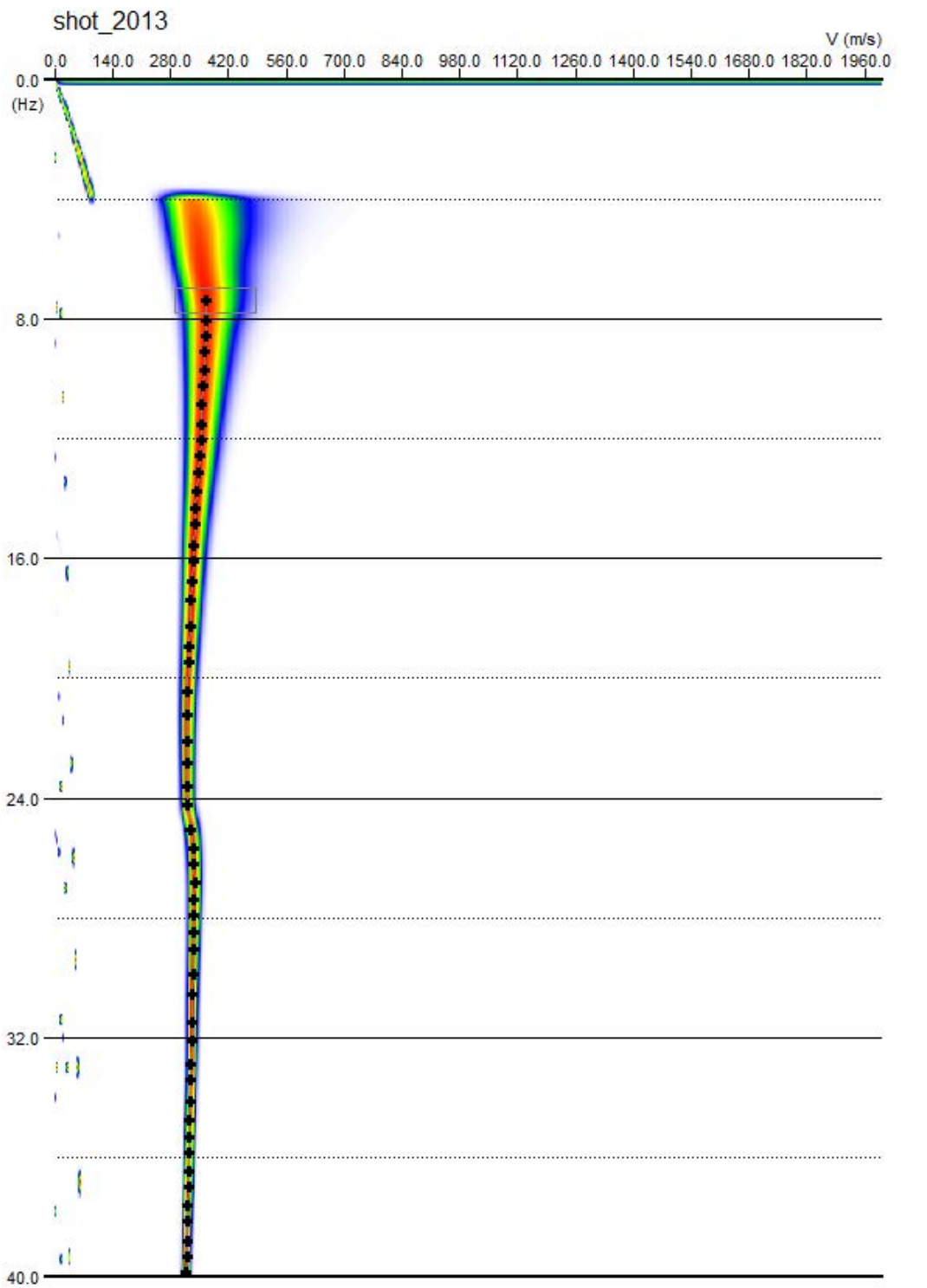

7.21 (Hz)

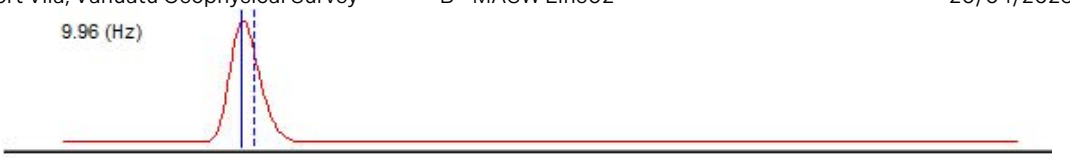

shot_2011
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

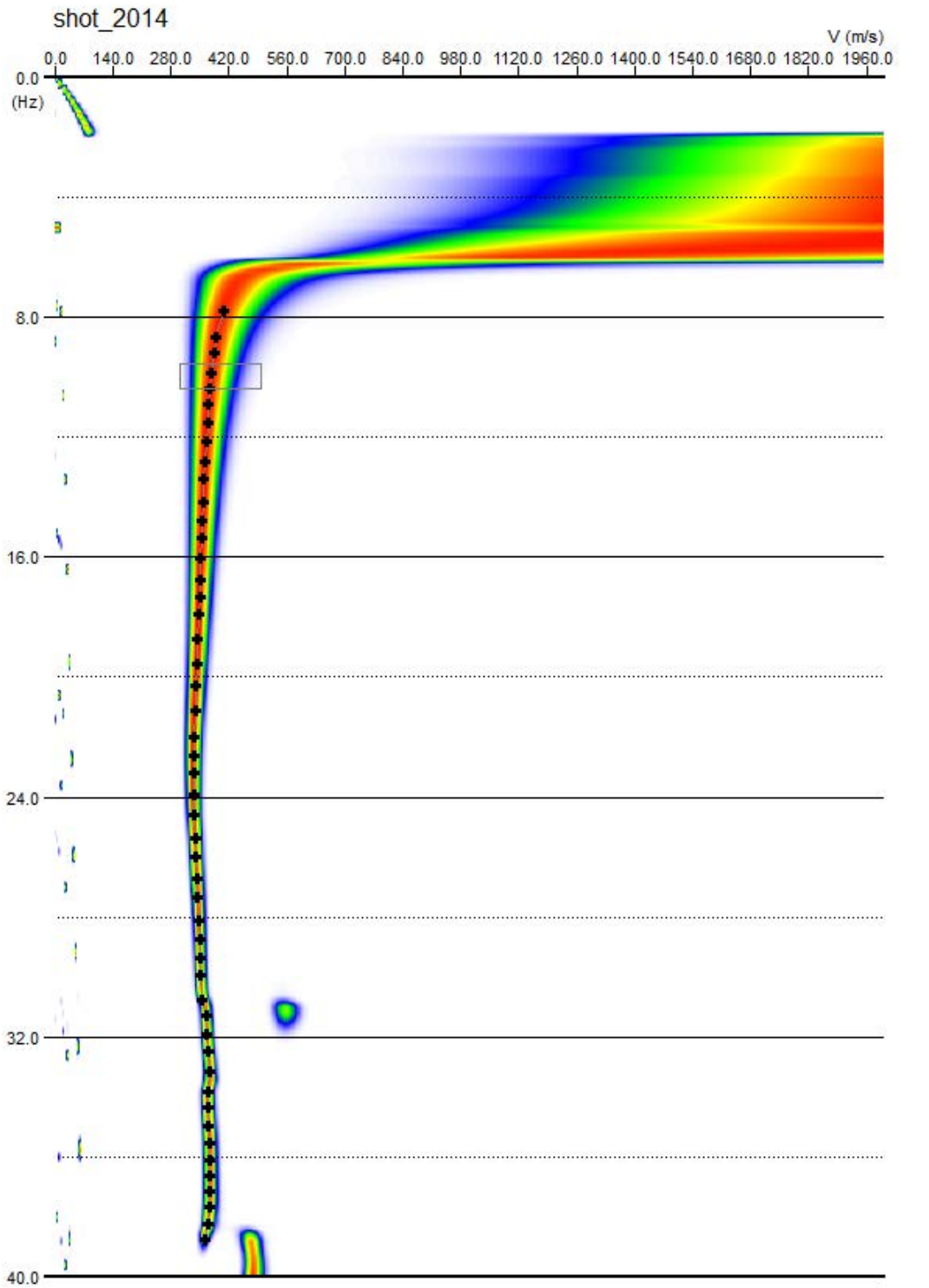

10.32 (Hz)

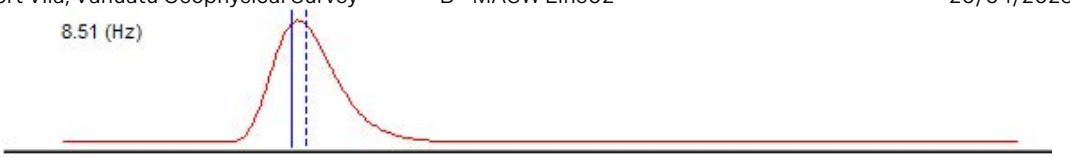

shot_2012
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

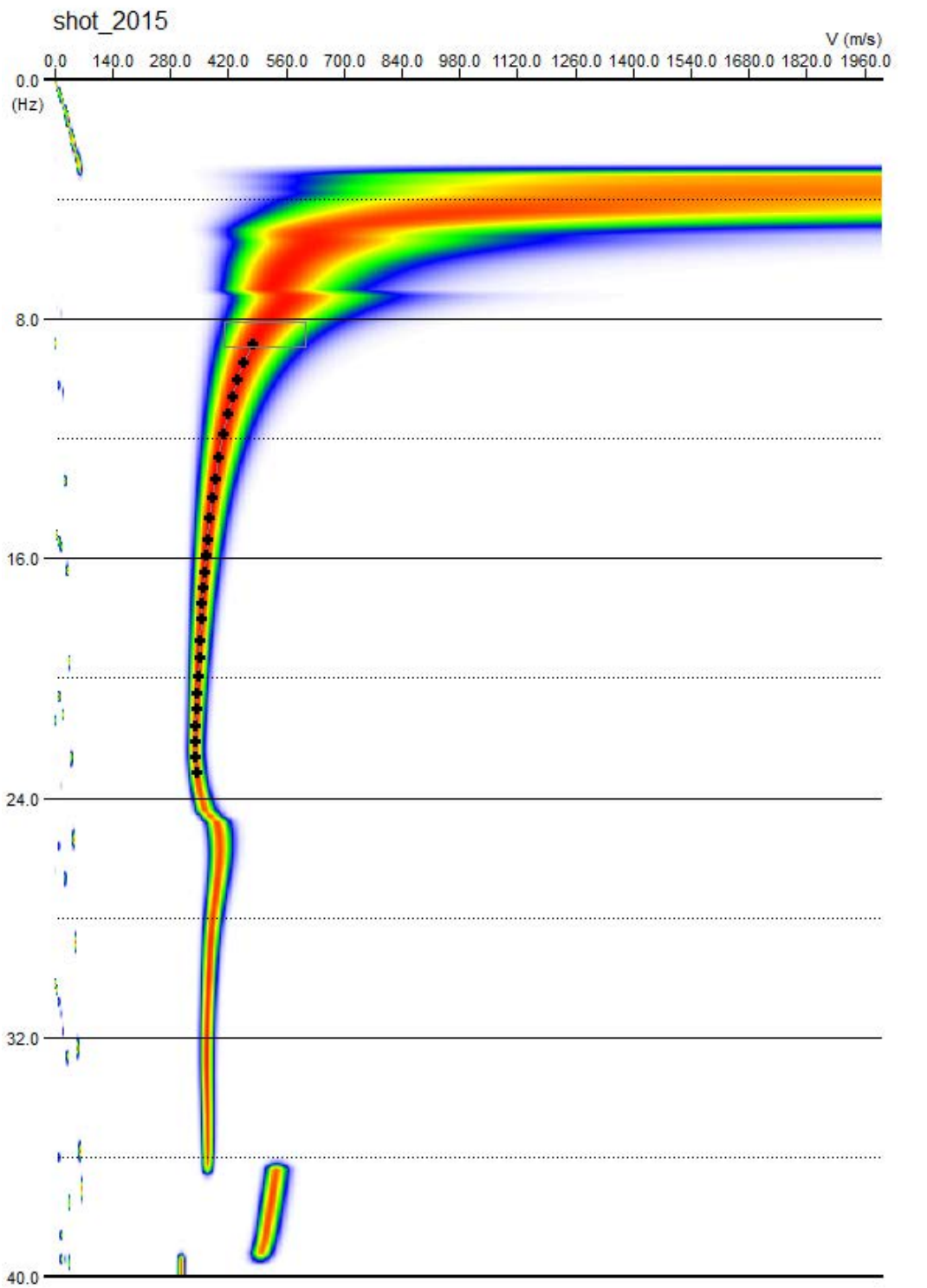

7.37 (Hz)

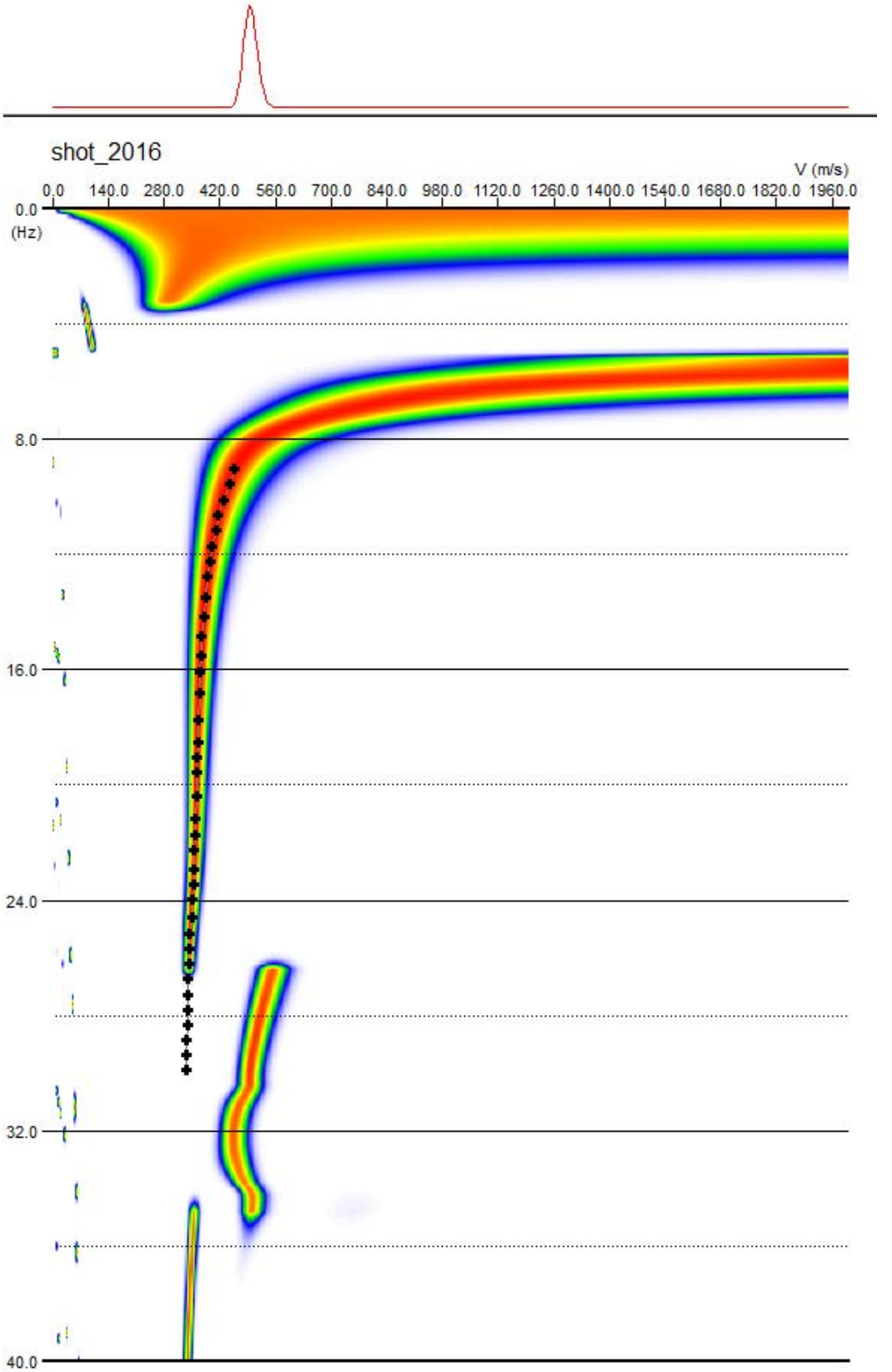

shot_2013
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

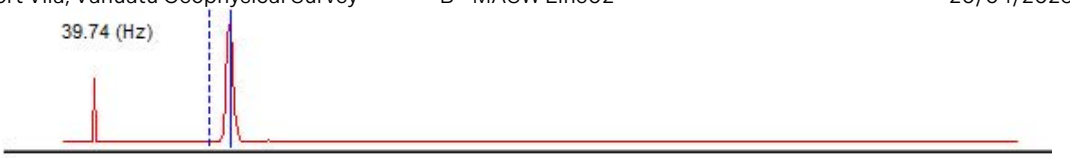

9.96 (Hz)

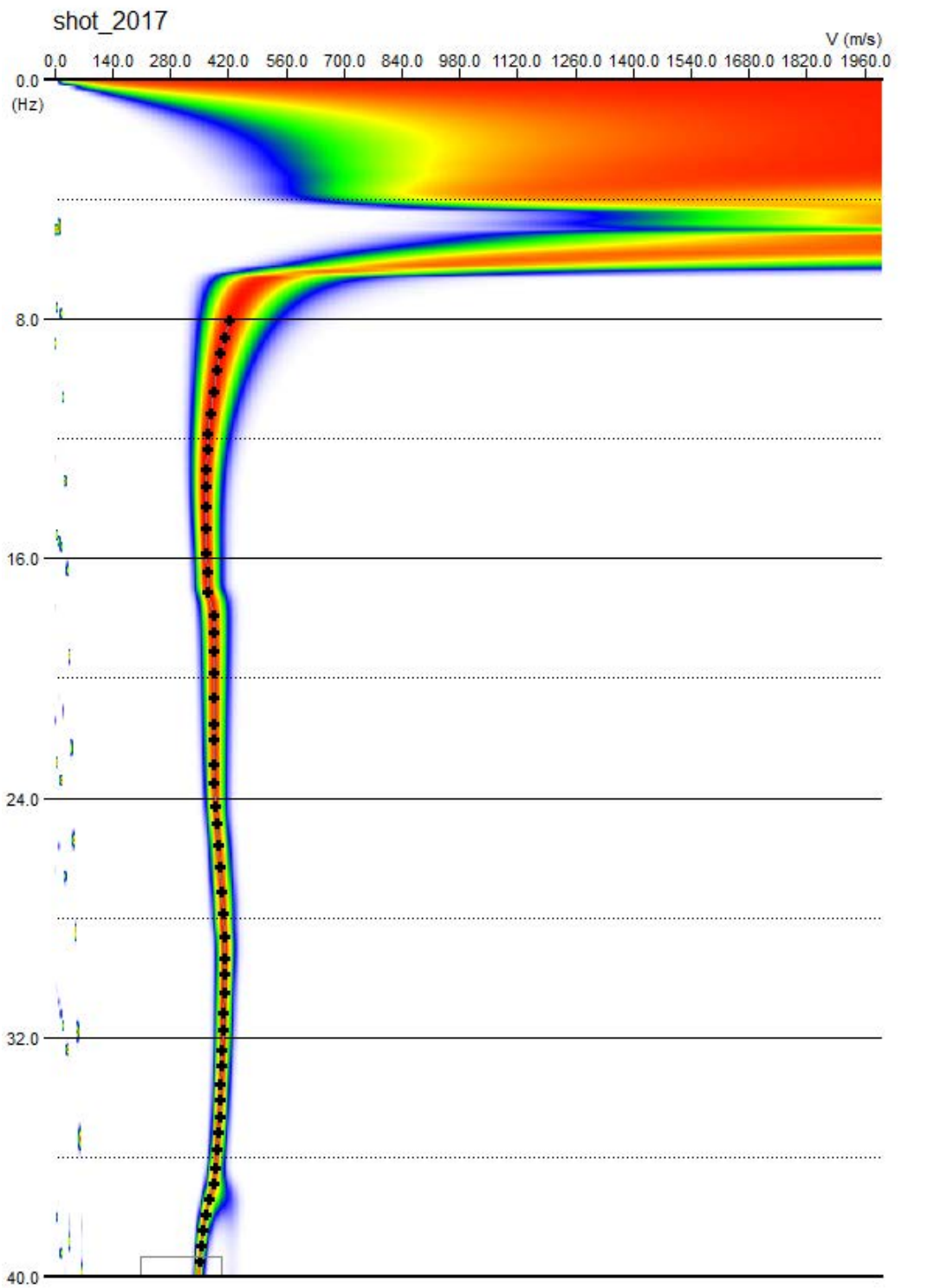

shot_2014
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

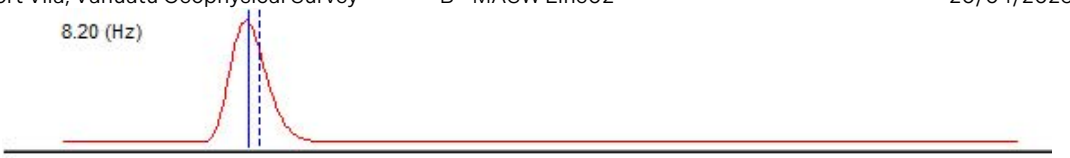

8.51 (Hz)

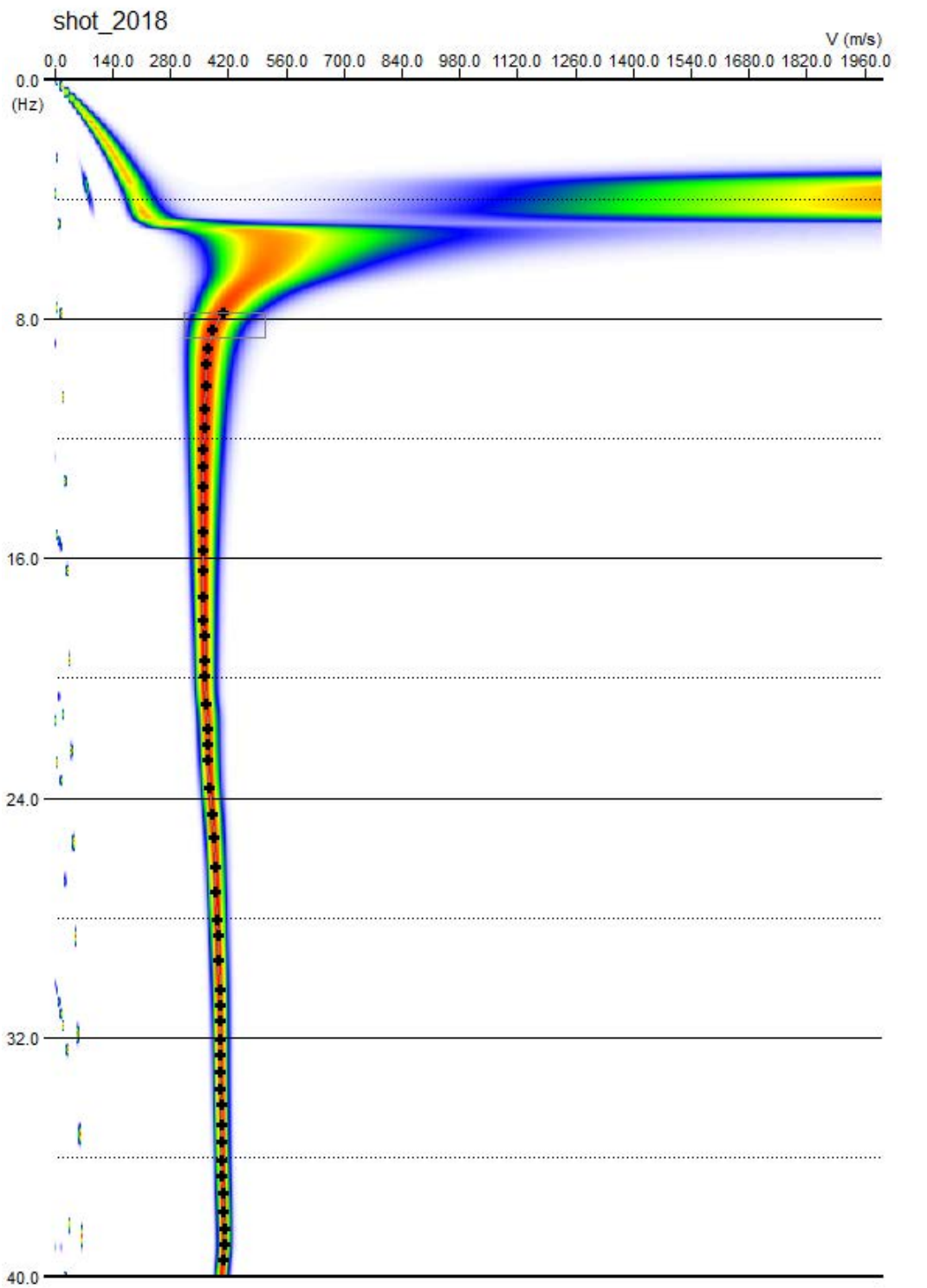

shot_2015
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

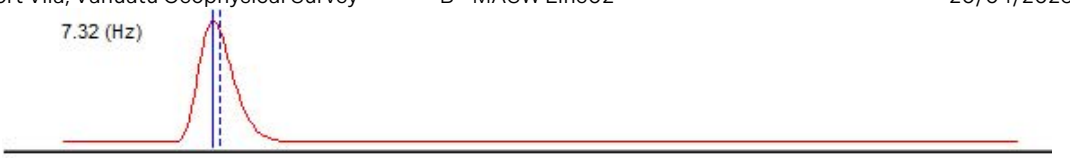

shot_2016
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

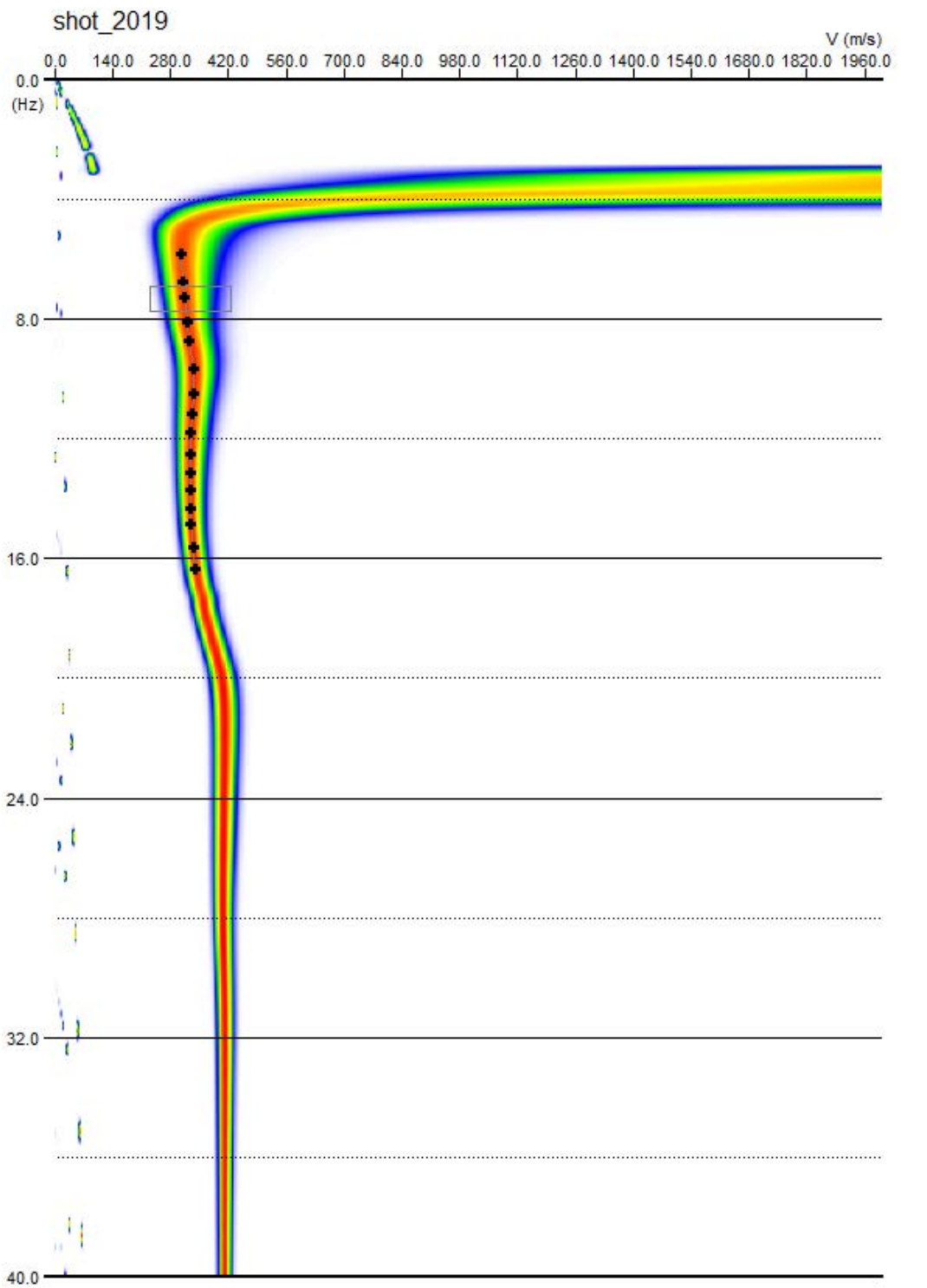

39.74 (Hz)

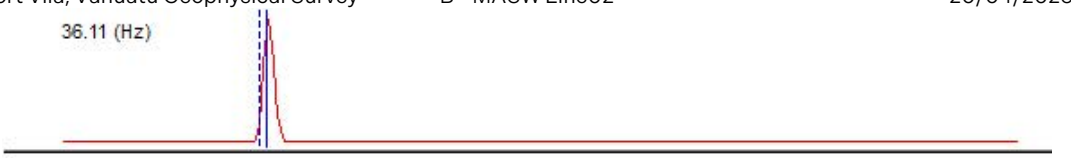

shot_2017
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

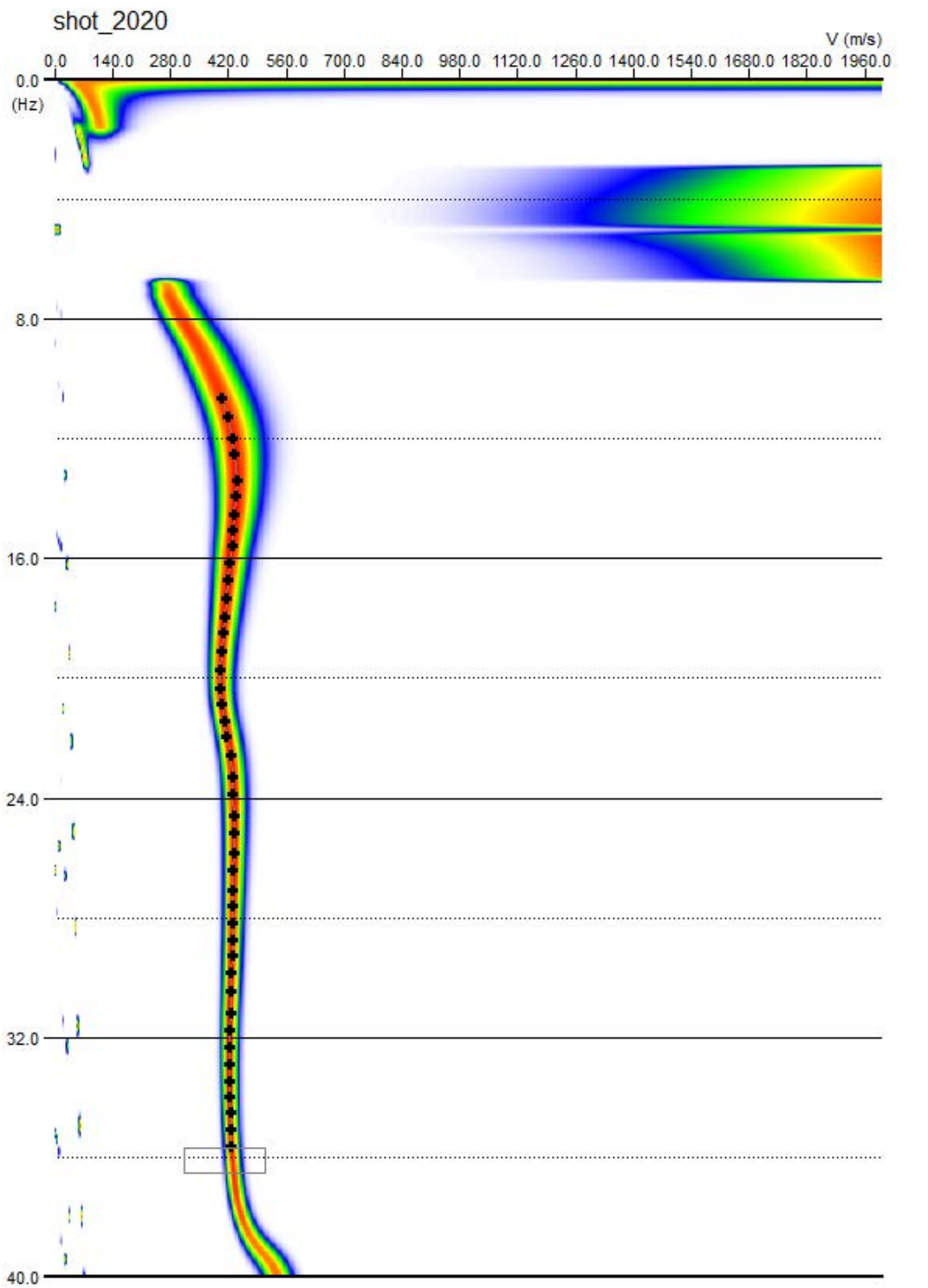

8.20 (Hz)

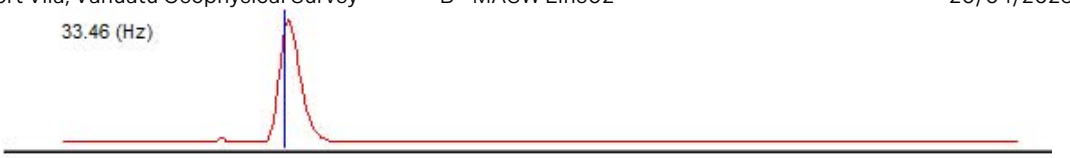

shot_2018
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

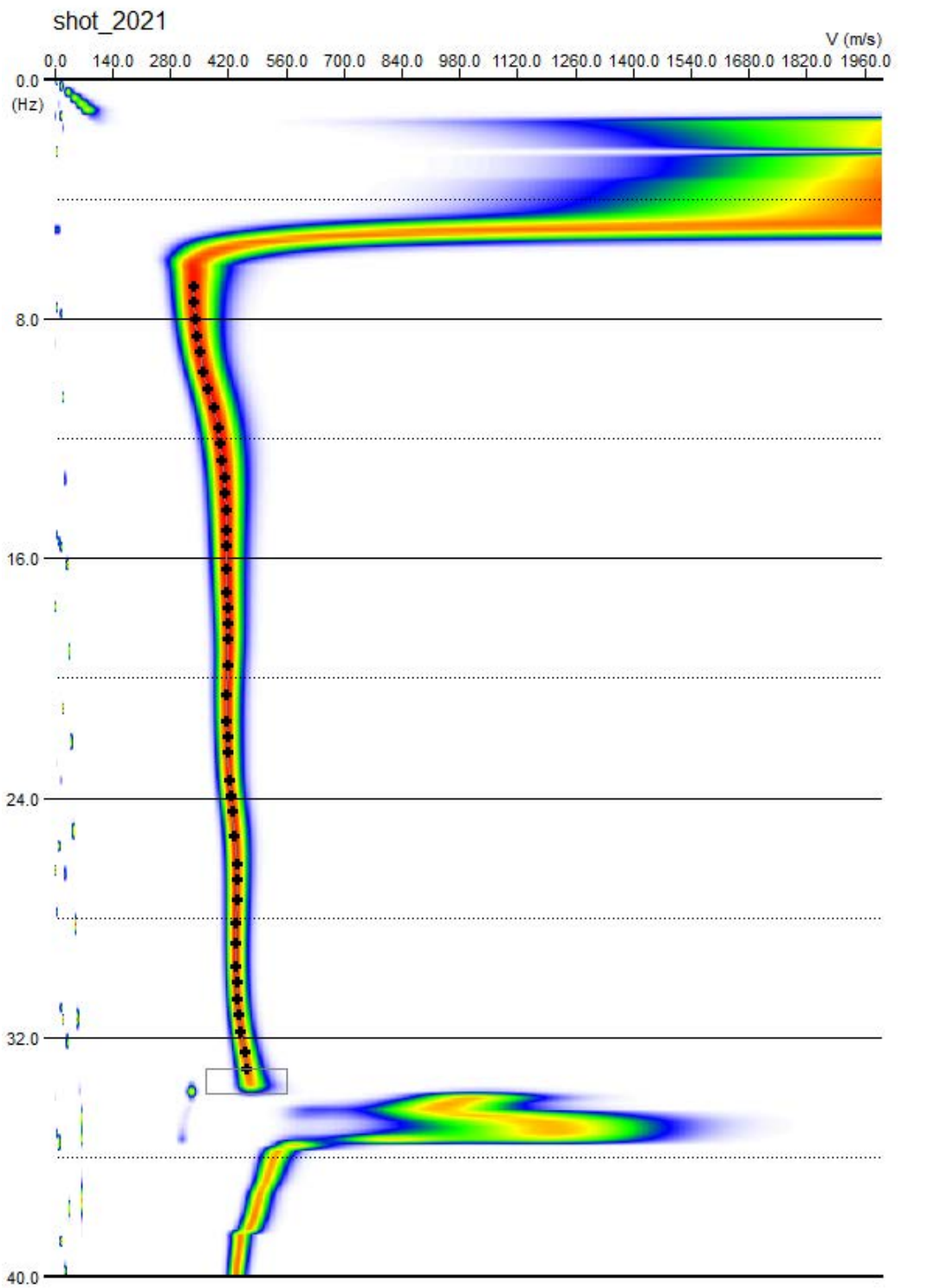

7.32 (Hz)

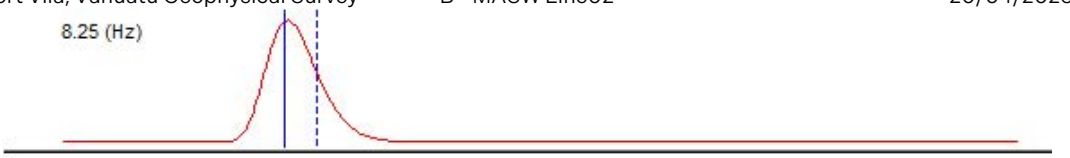

shot_2019
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

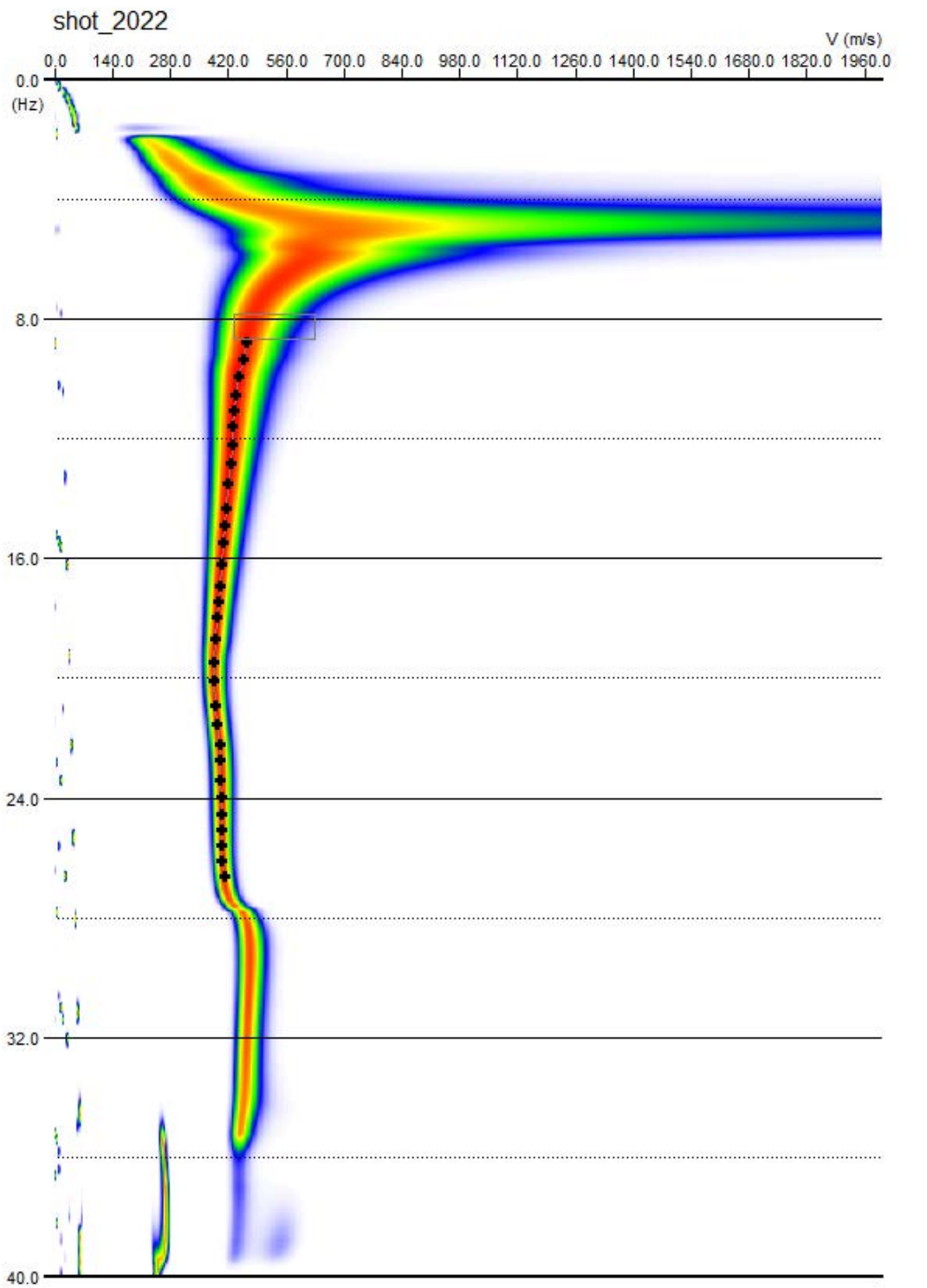

36.11 (Hz)

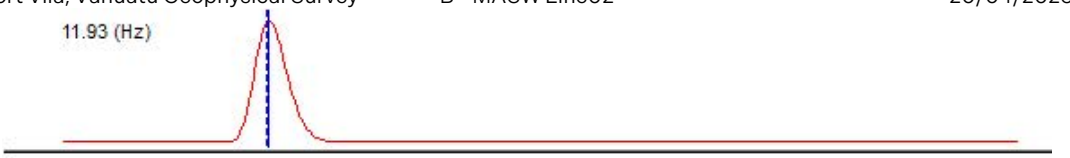

shot_2020
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

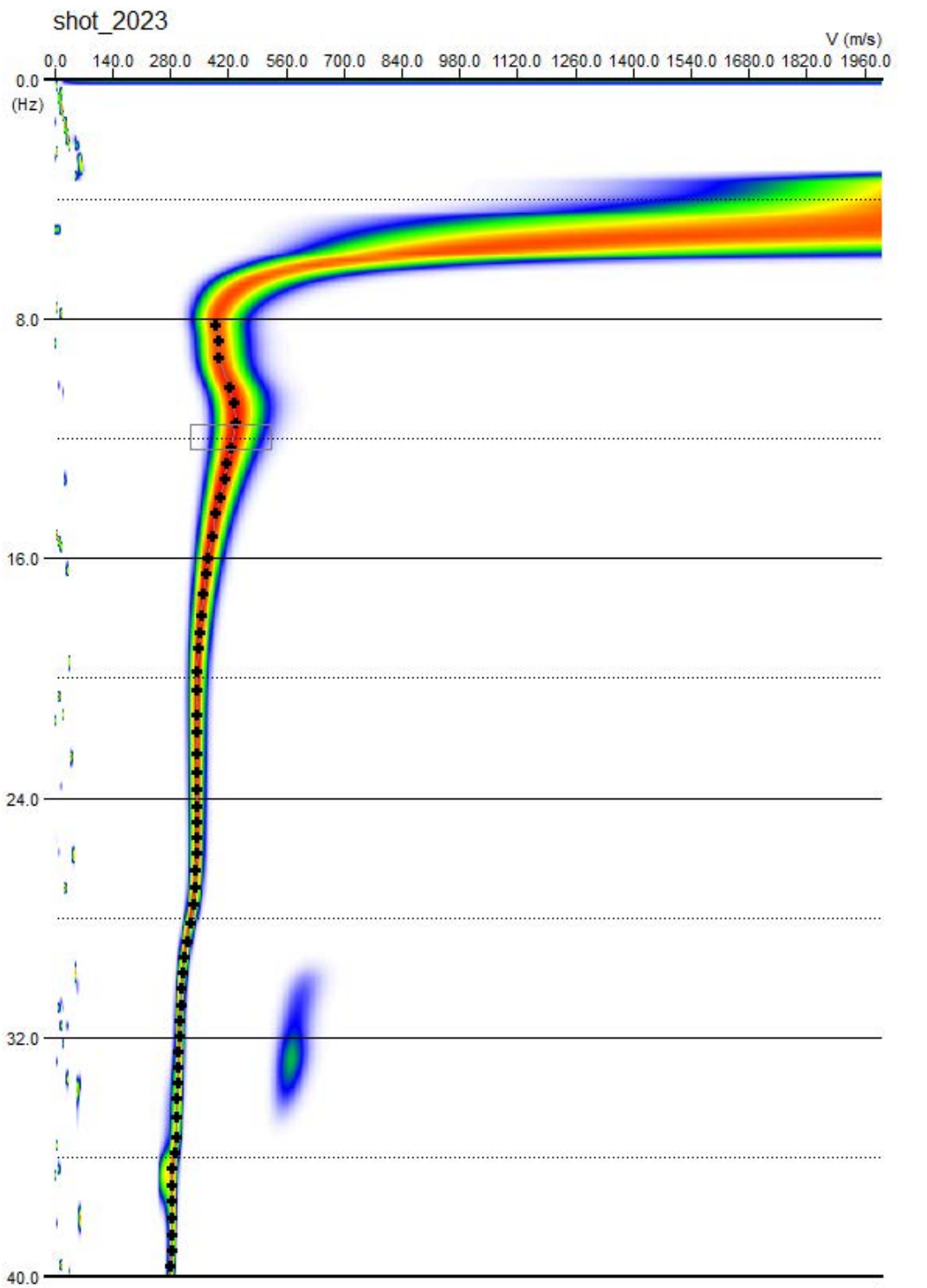

33.46 (Hz)

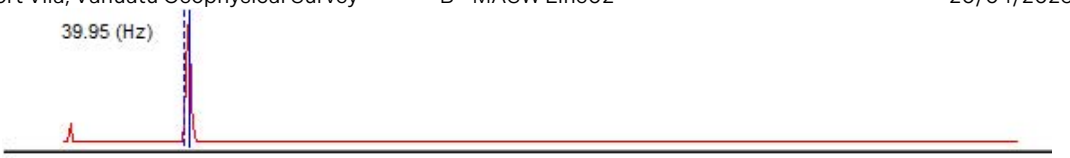

shot_2021
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

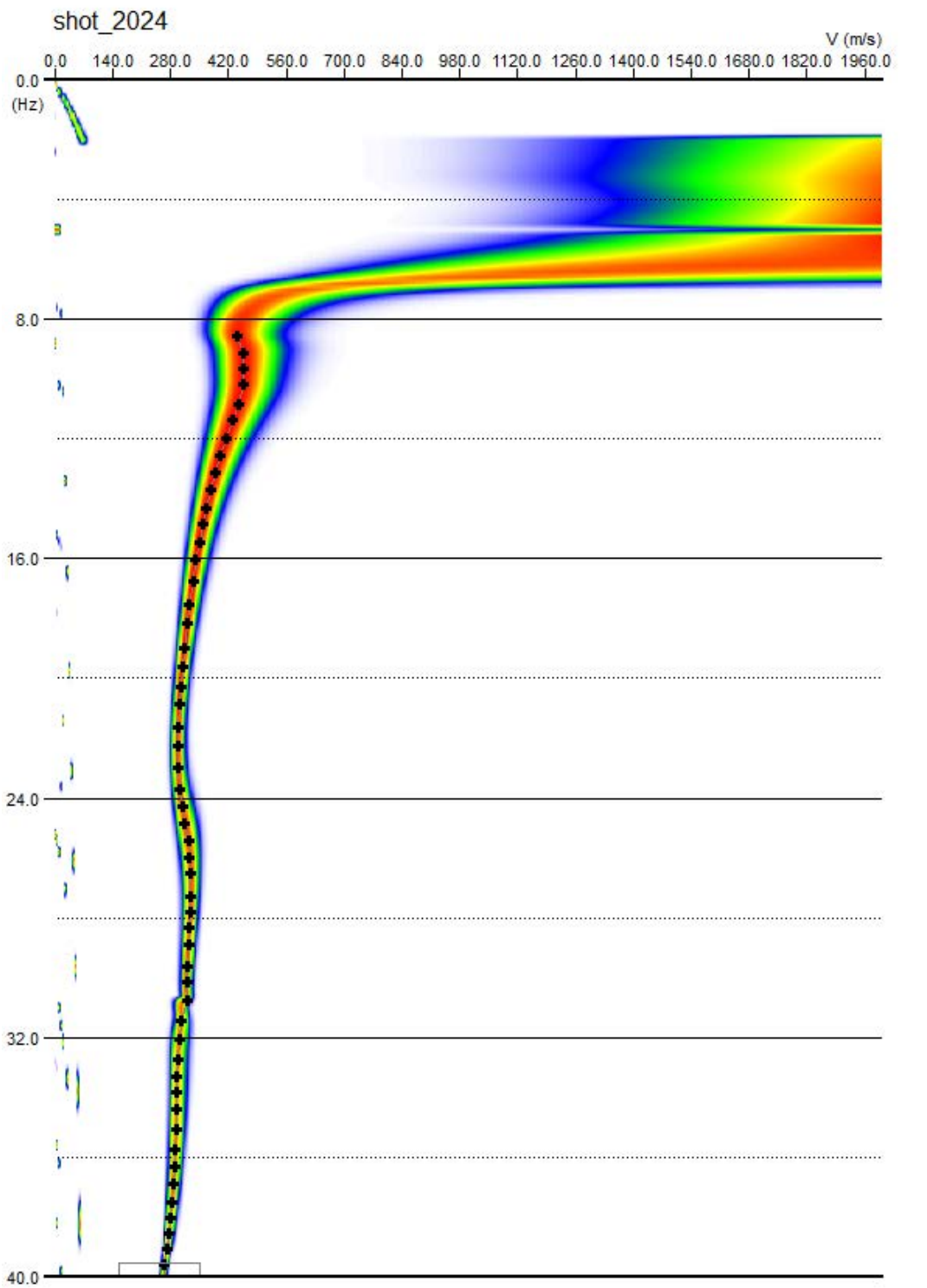

8.25 (Hz)


shot_2022
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

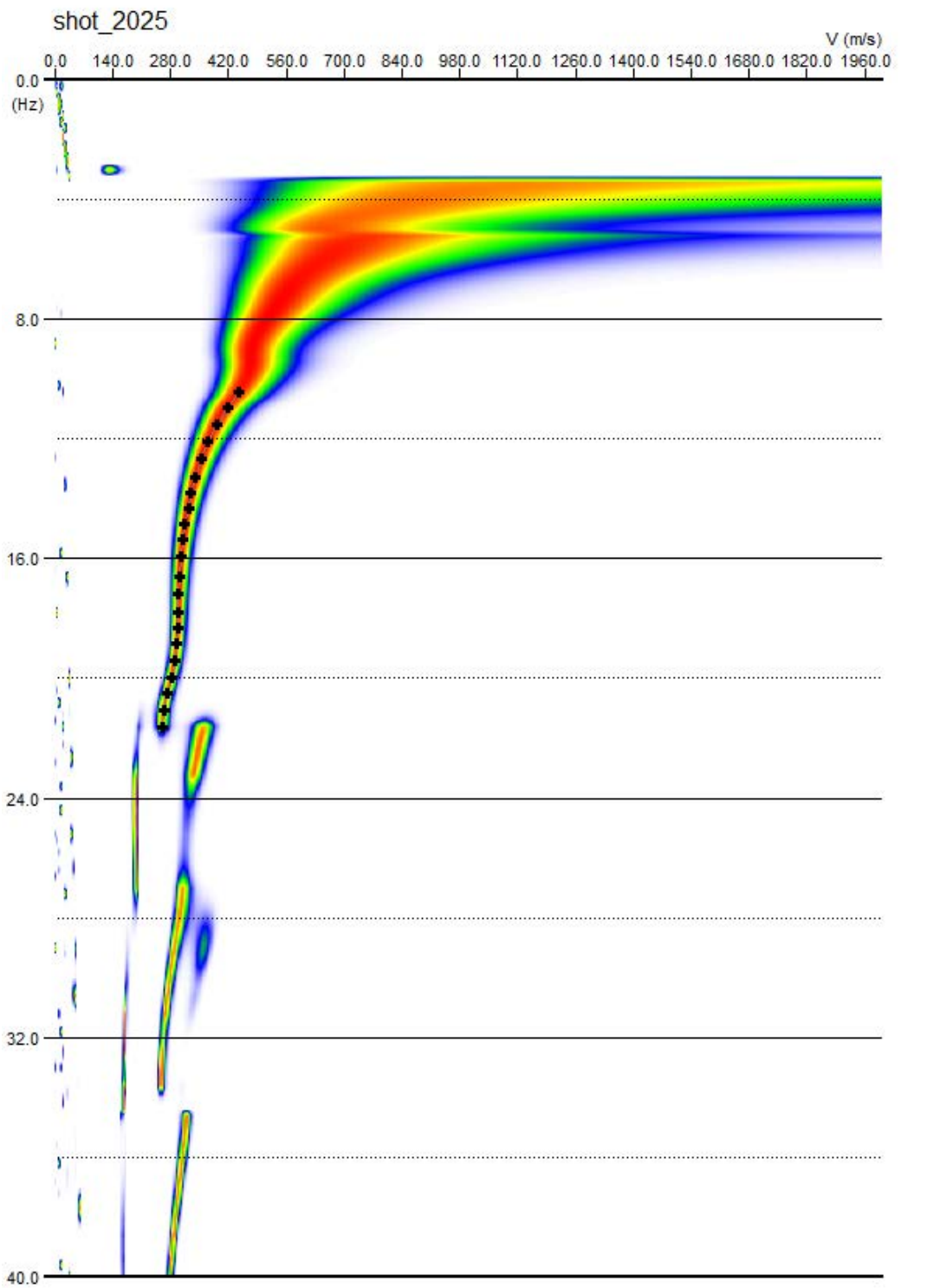

11.93 (Hz)

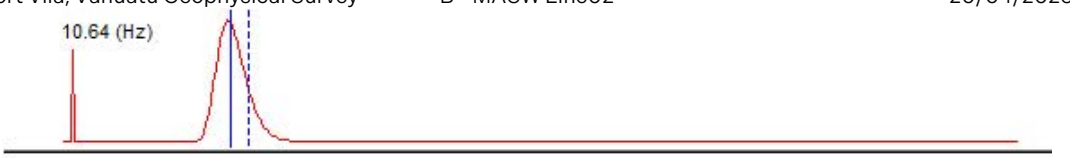

shot_2023
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

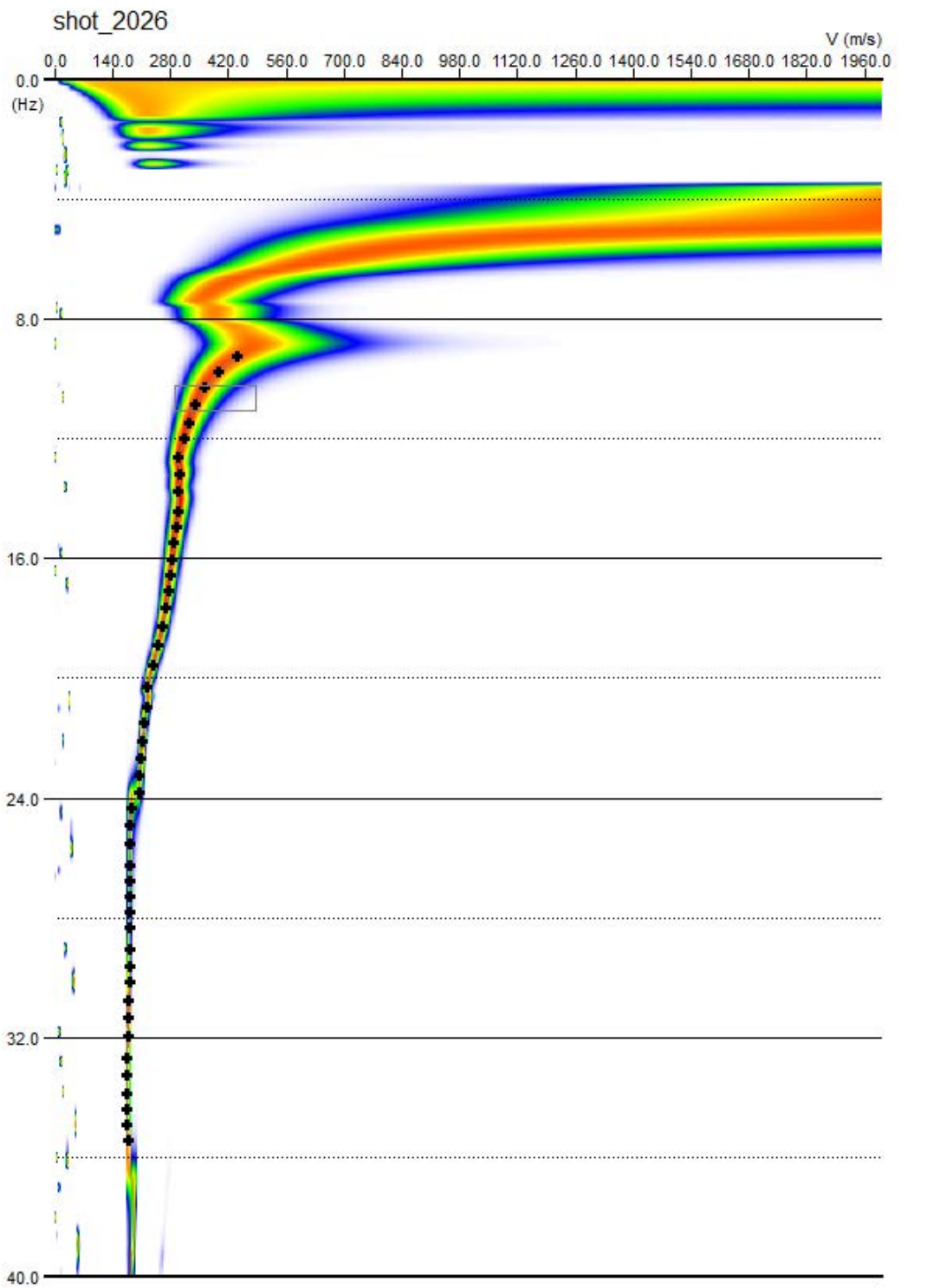

39.95 (Hz)

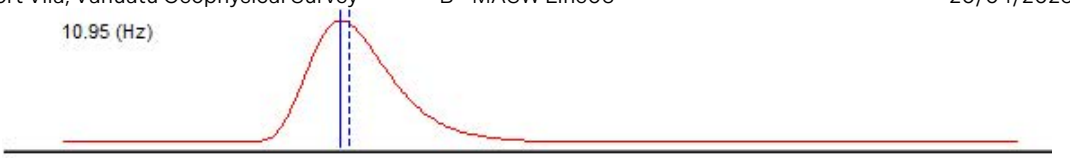

shot_2024
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

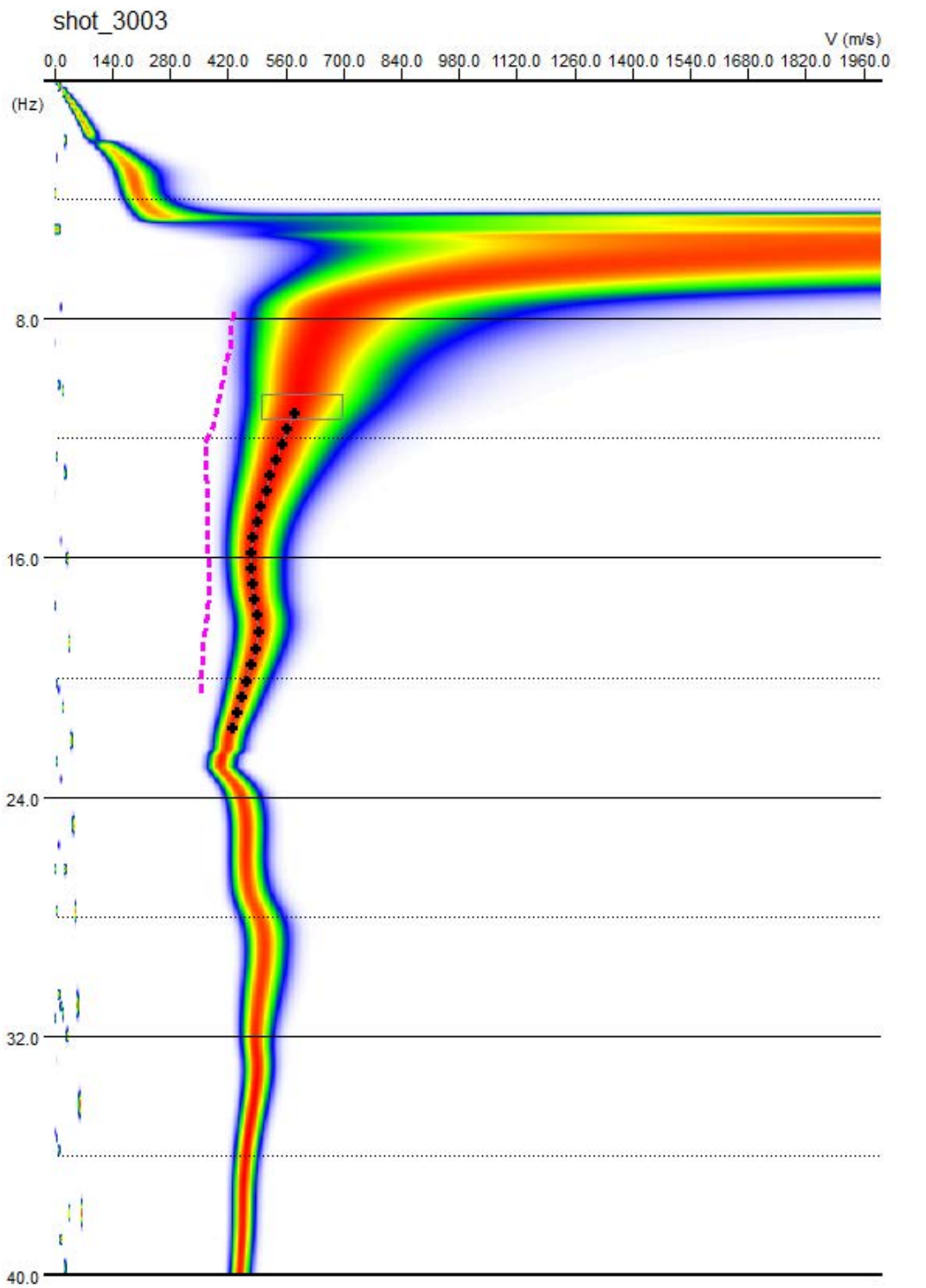


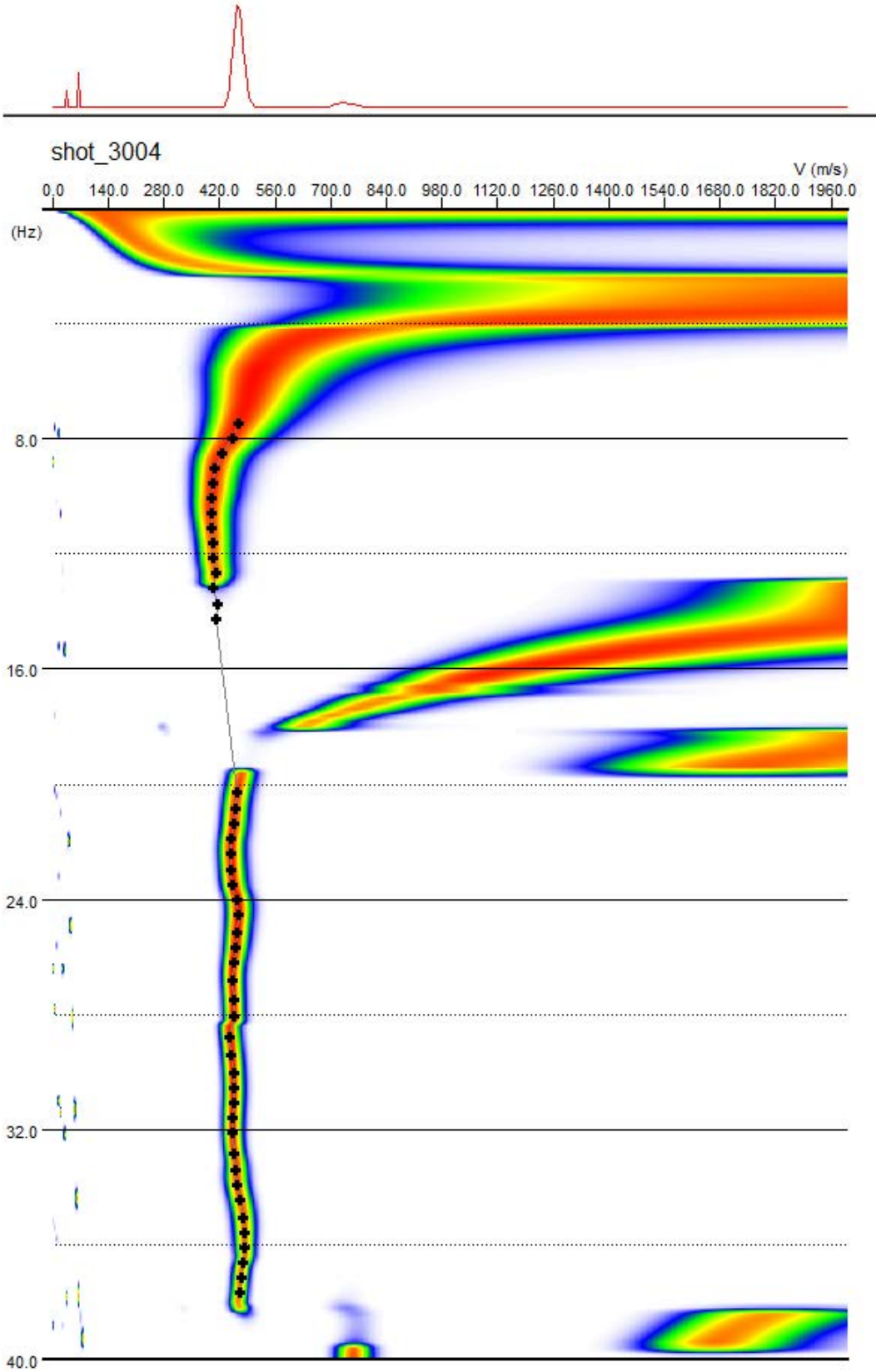

shot_2025
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0


10.64 (Hz)

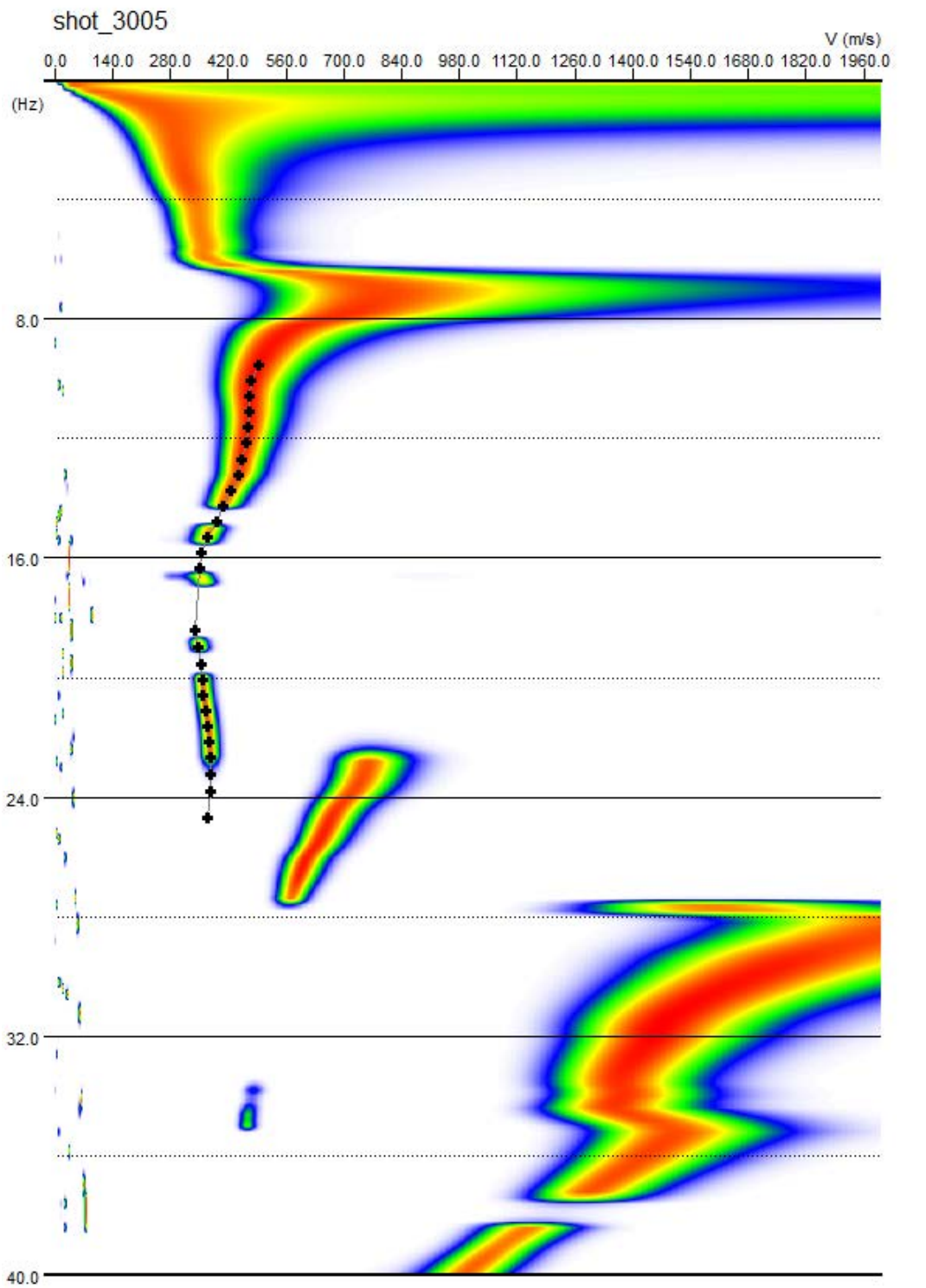

shot_2026
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0


10.95 (Hz)

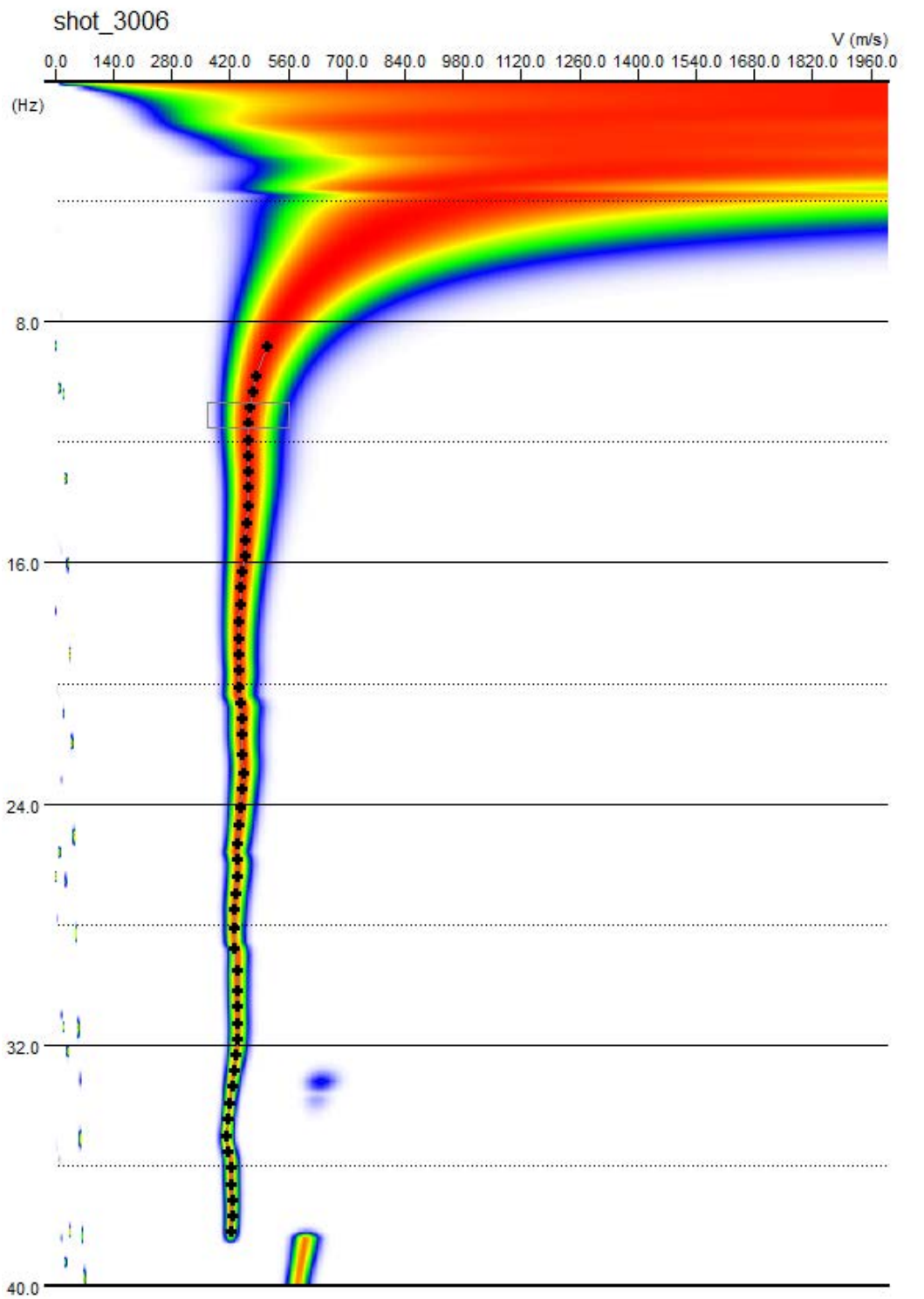

shot_3003
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
(Hz)
8.0
16.0
24.0
32.0
40.0


shot_3004
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
(Hz)
8.0
16.0
24.0
32.0
40.0

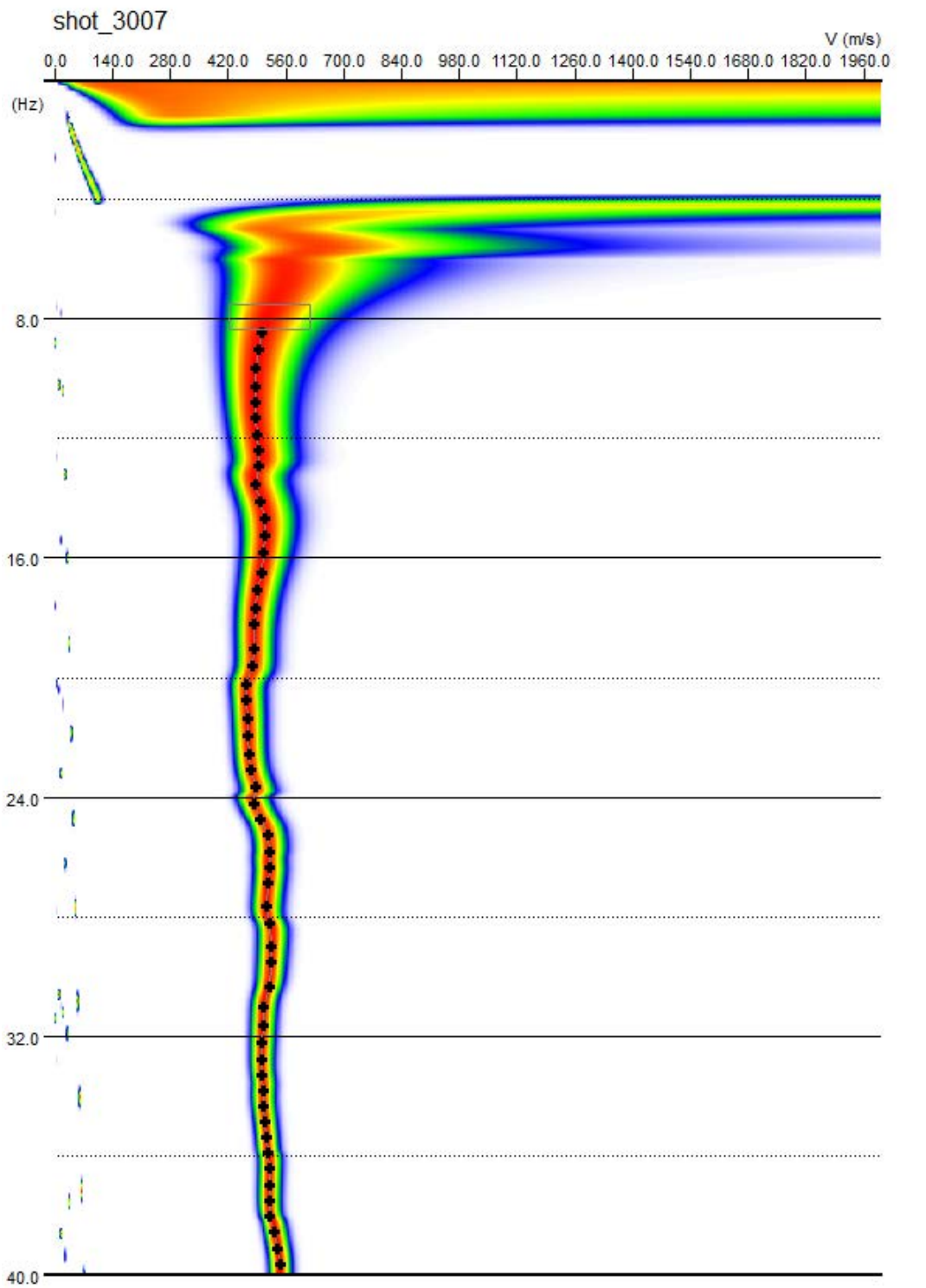


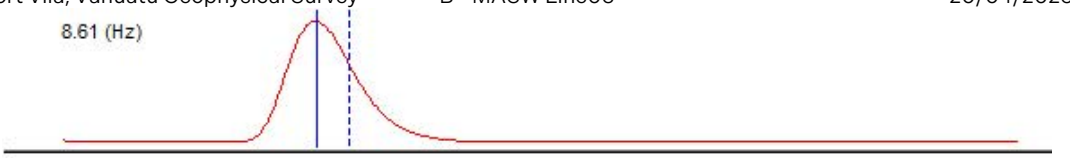

shot_3005
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
(Hz)
8.0
16.0
24.0
32.0
40.0

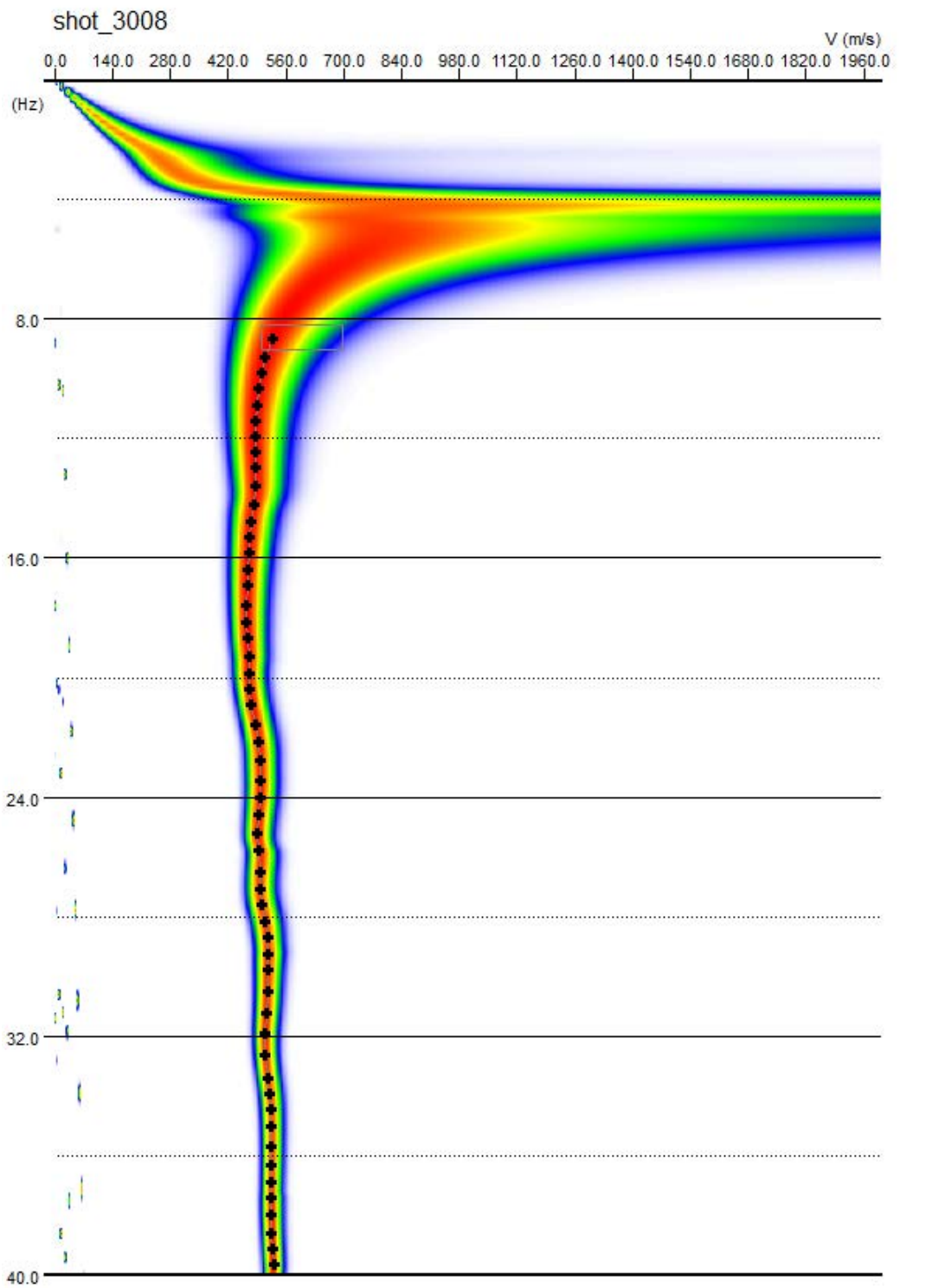

11.10 (Hz)

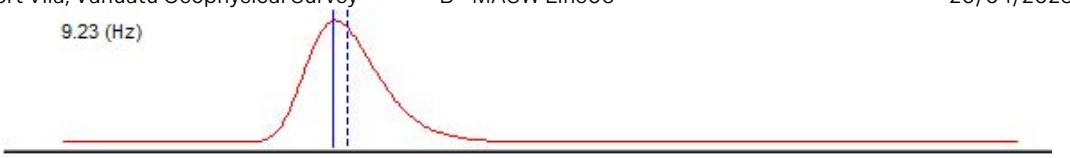

shot_3006
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
(Hz)
8.0
16.0
24.0
32.0
40.0

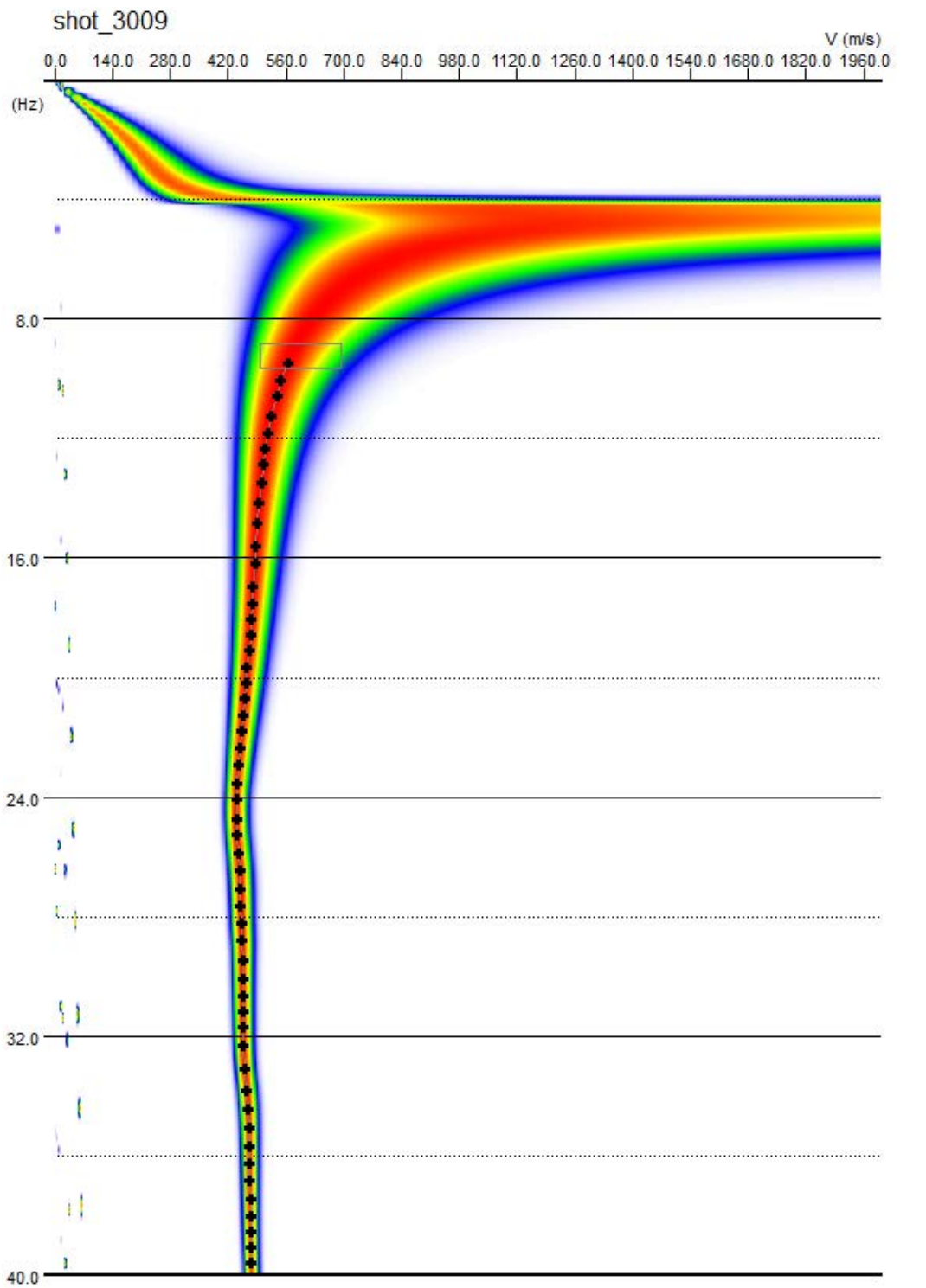

7.94 (Hz)

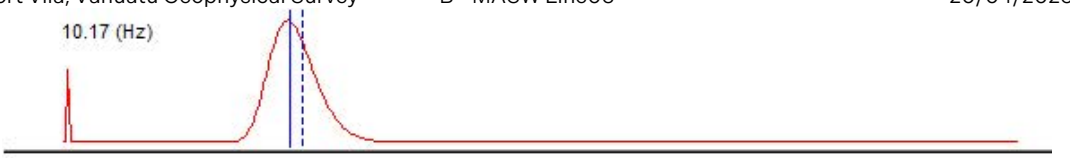

shot_3007
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
(Hz)
8.0
16.0
24.0
32.0
40.0

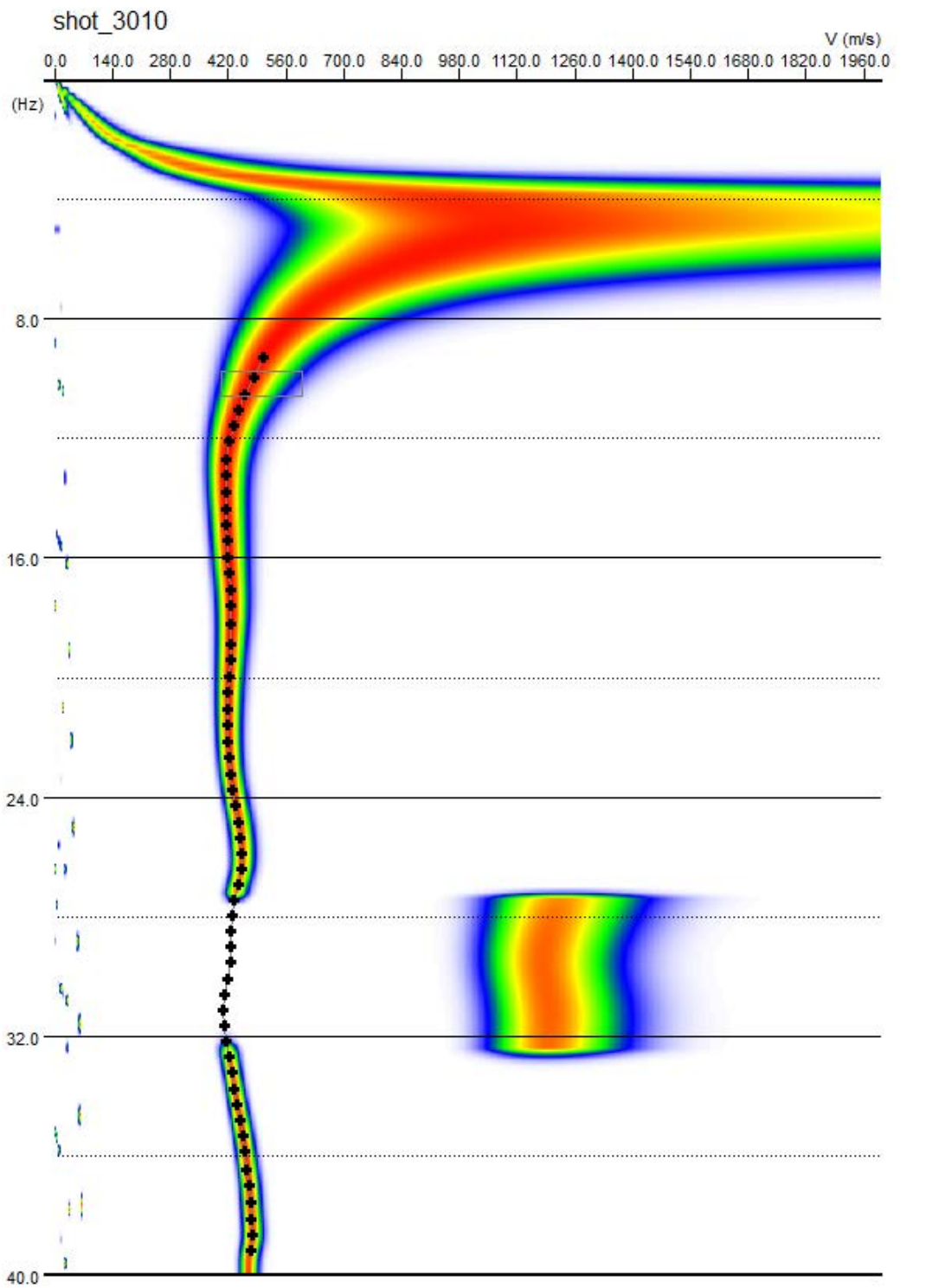

8.61 (Hz)

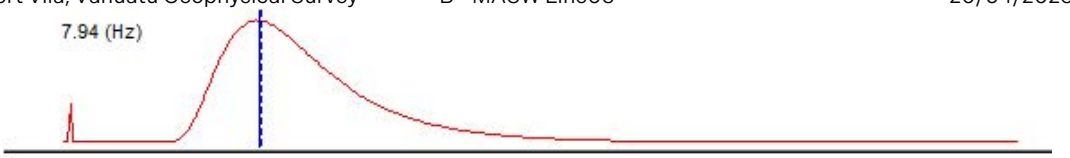

shot_3008
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
(Hz)
8.0
16.0
24.0
32.0
40.0

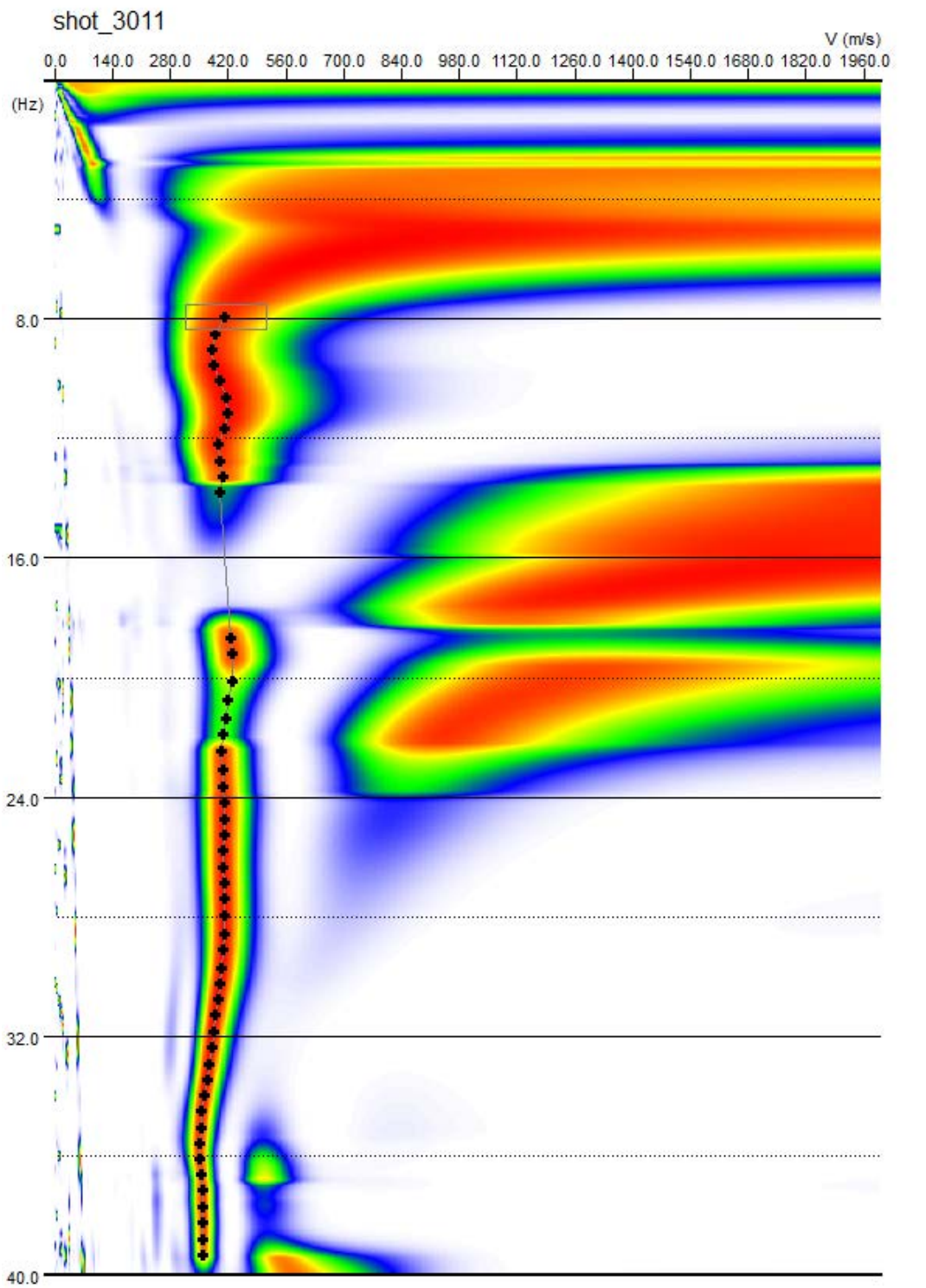

9.23 (Hz)


shot_3009
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
(Hz)
8.0
16.0
24.0
32.0
40.0

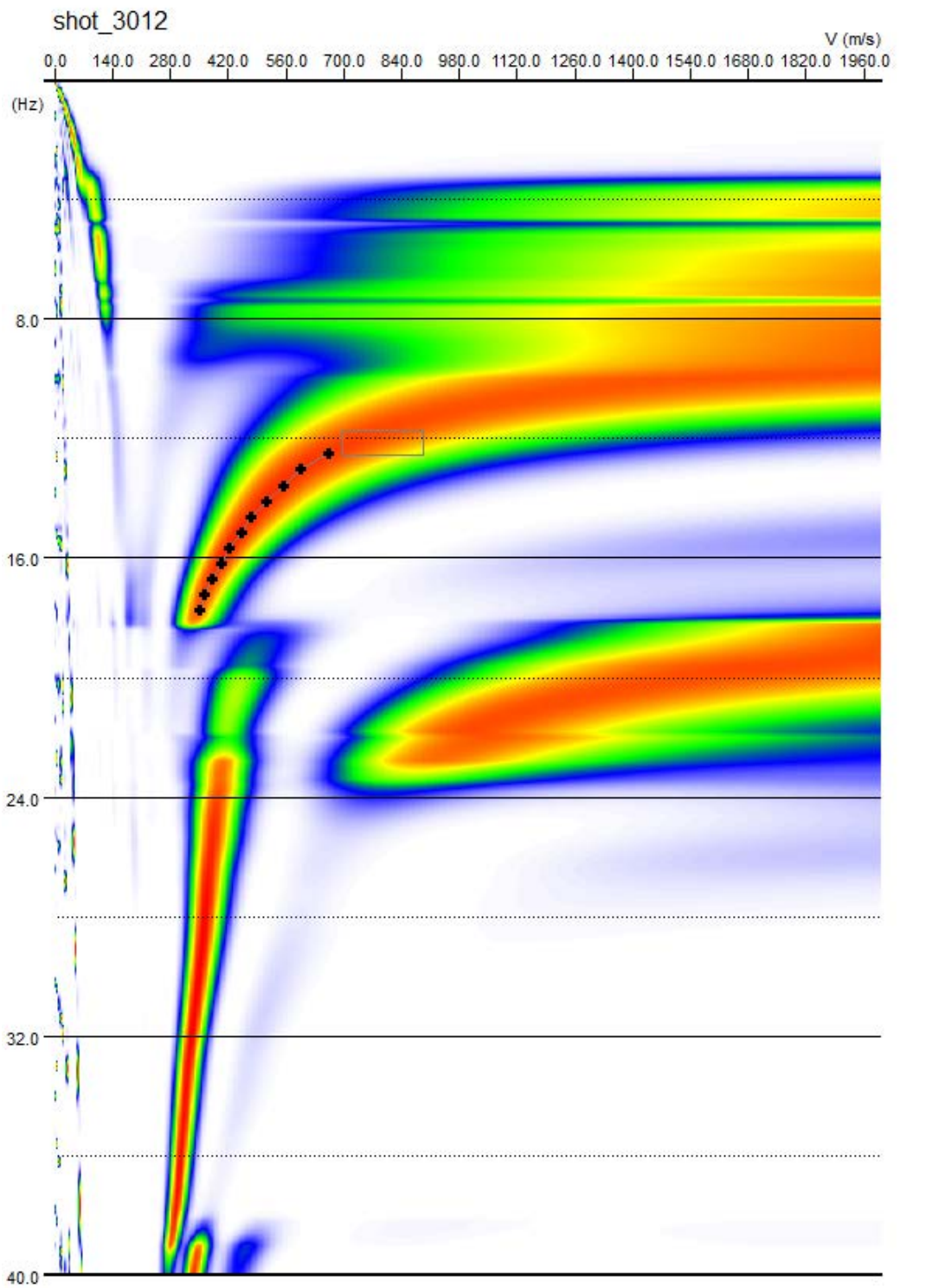

10.17 (Hz)

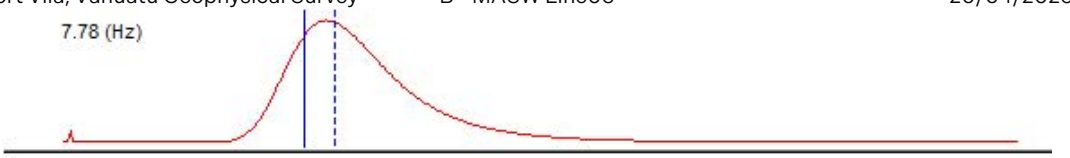

shot_3010
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
(Hz)
8.0
16.0
24.0
32.0
40.0

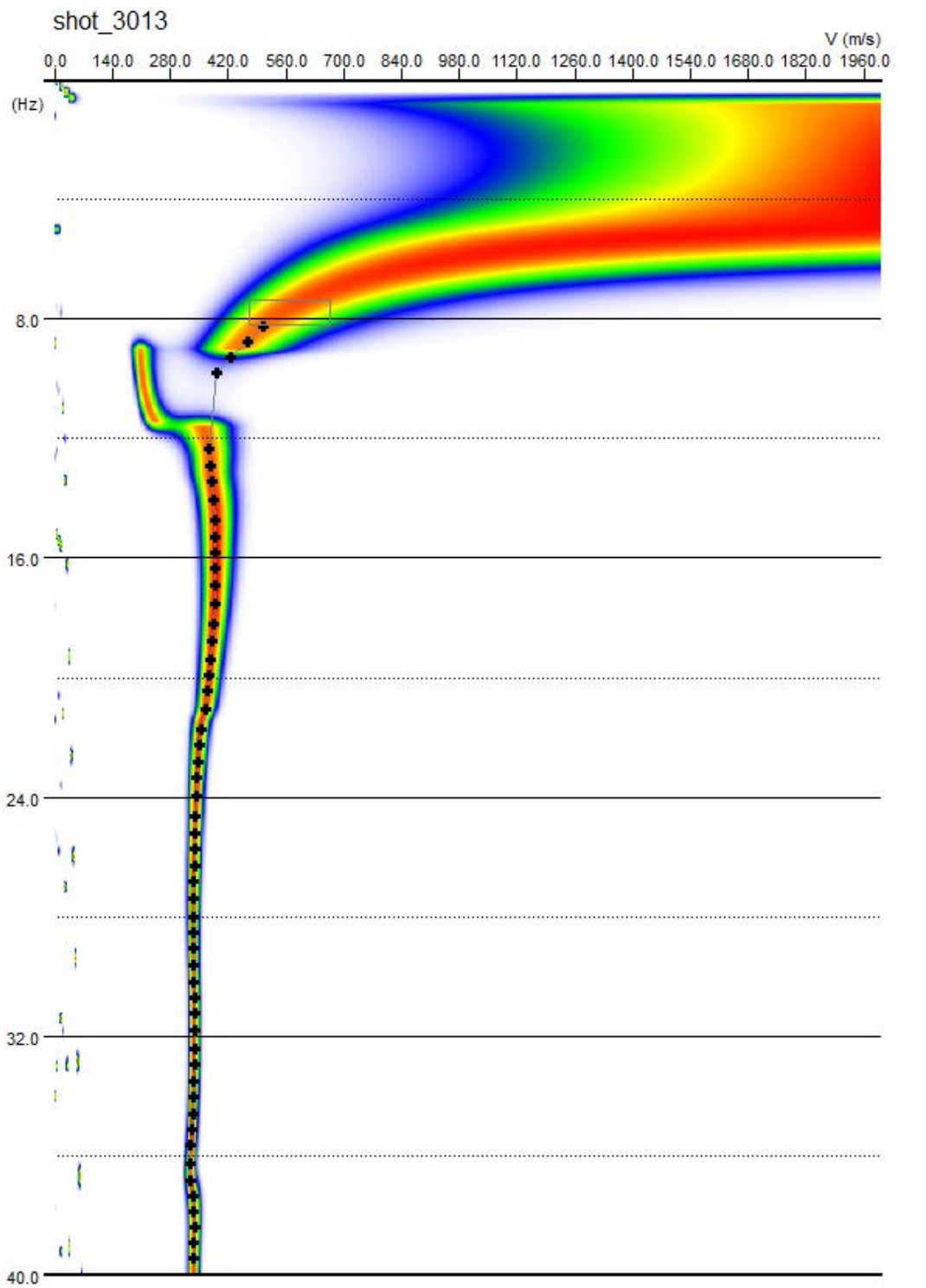

7.94 (Hz)

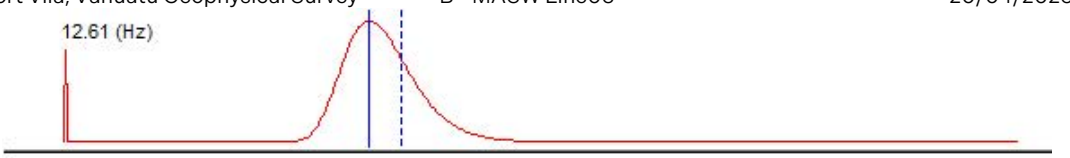

shot_3011
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
(Hz)
8.0
16.0
24.0
32.0
40.0

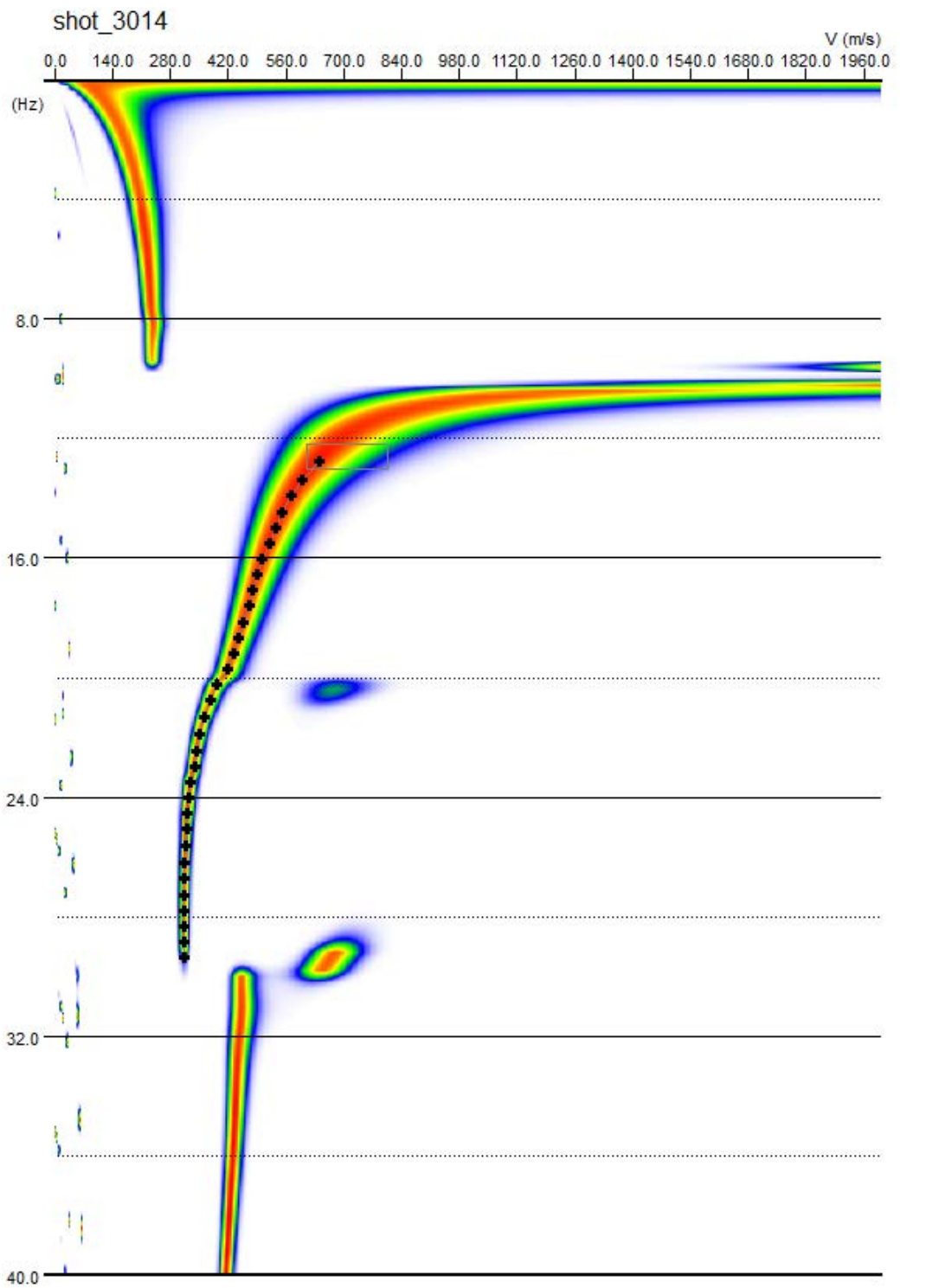

12.14 (Hz)


shot_3012
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
(Hz)
8.0
16.0
24.0
32.0
40.0

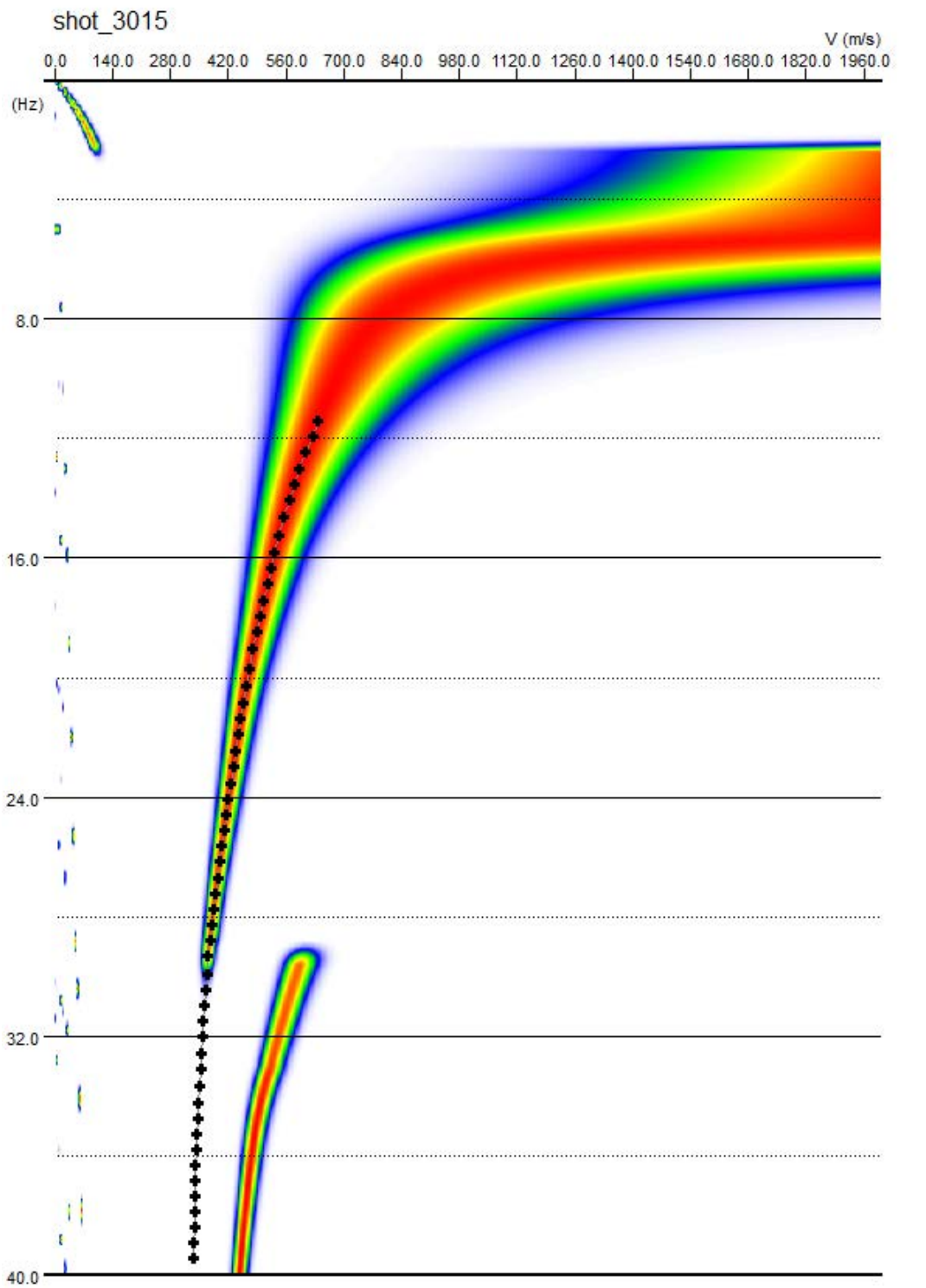

7.78 (Hz)

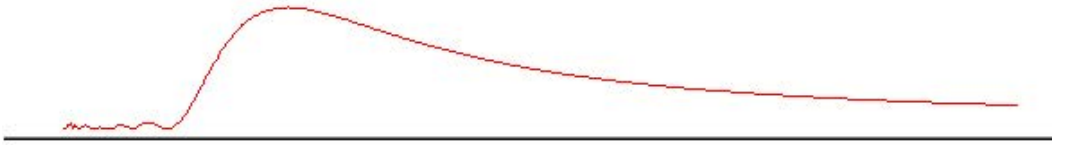

shot_3013
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
(Hz)
8.0
16.0
24.0
32.0
40.0

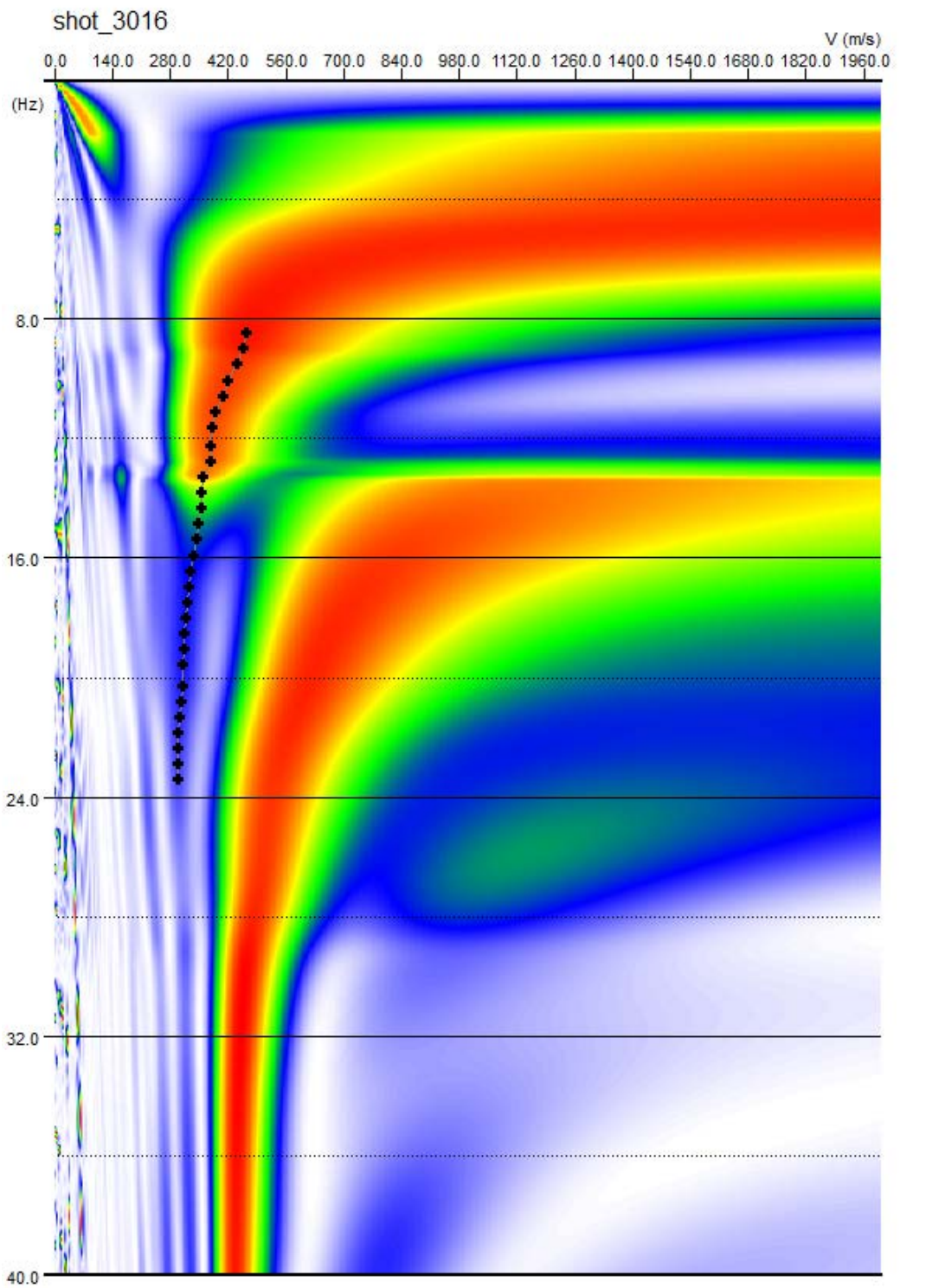

12.61 (Hz)

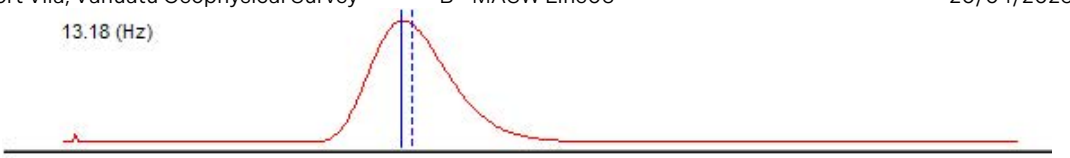

shot_3014
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
(Hz)
8.0
16.0
24.0
32.0
40.0

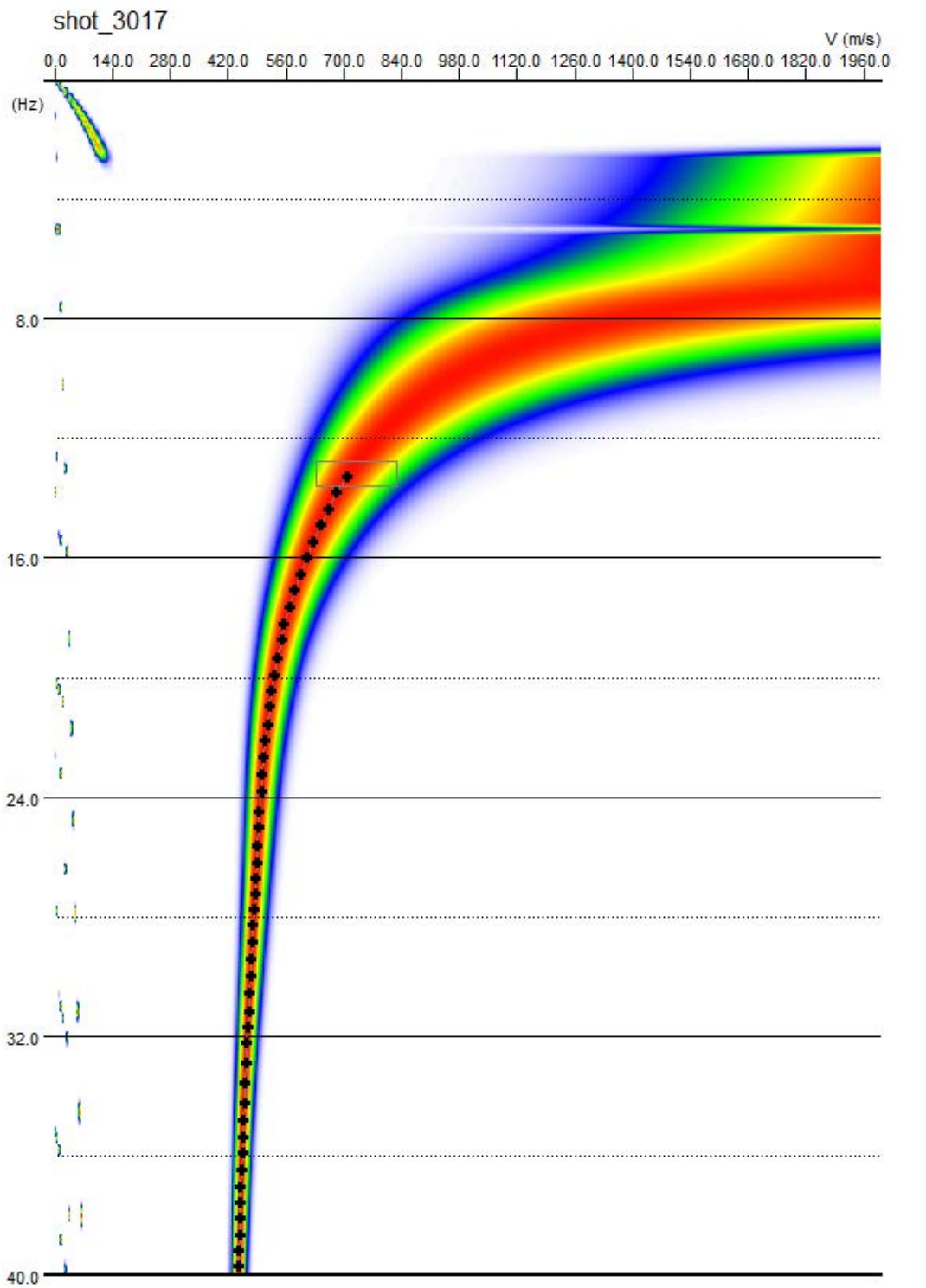


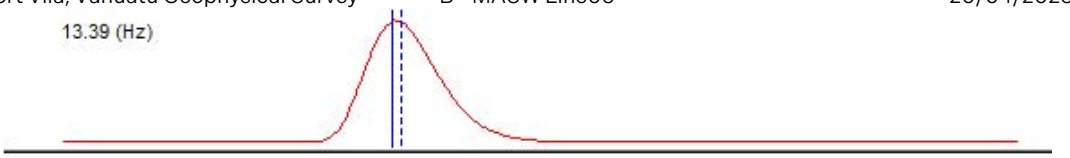

shot_3015
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
(Hz)
8.0
16.0
24.0
32.0
40.0

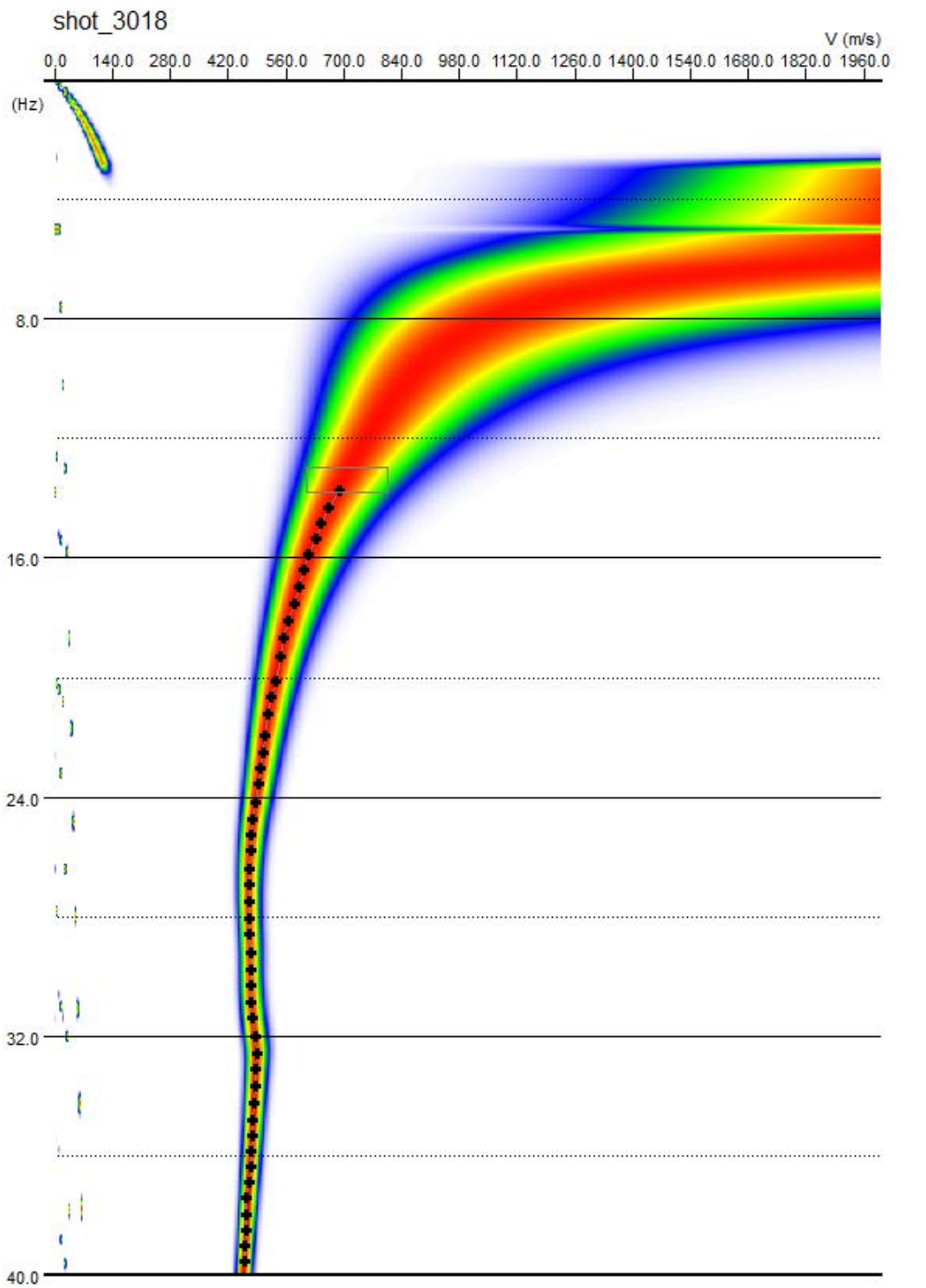



shot_3016
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
(Hz)
8.0
16.0
24.0
32.0
40.0

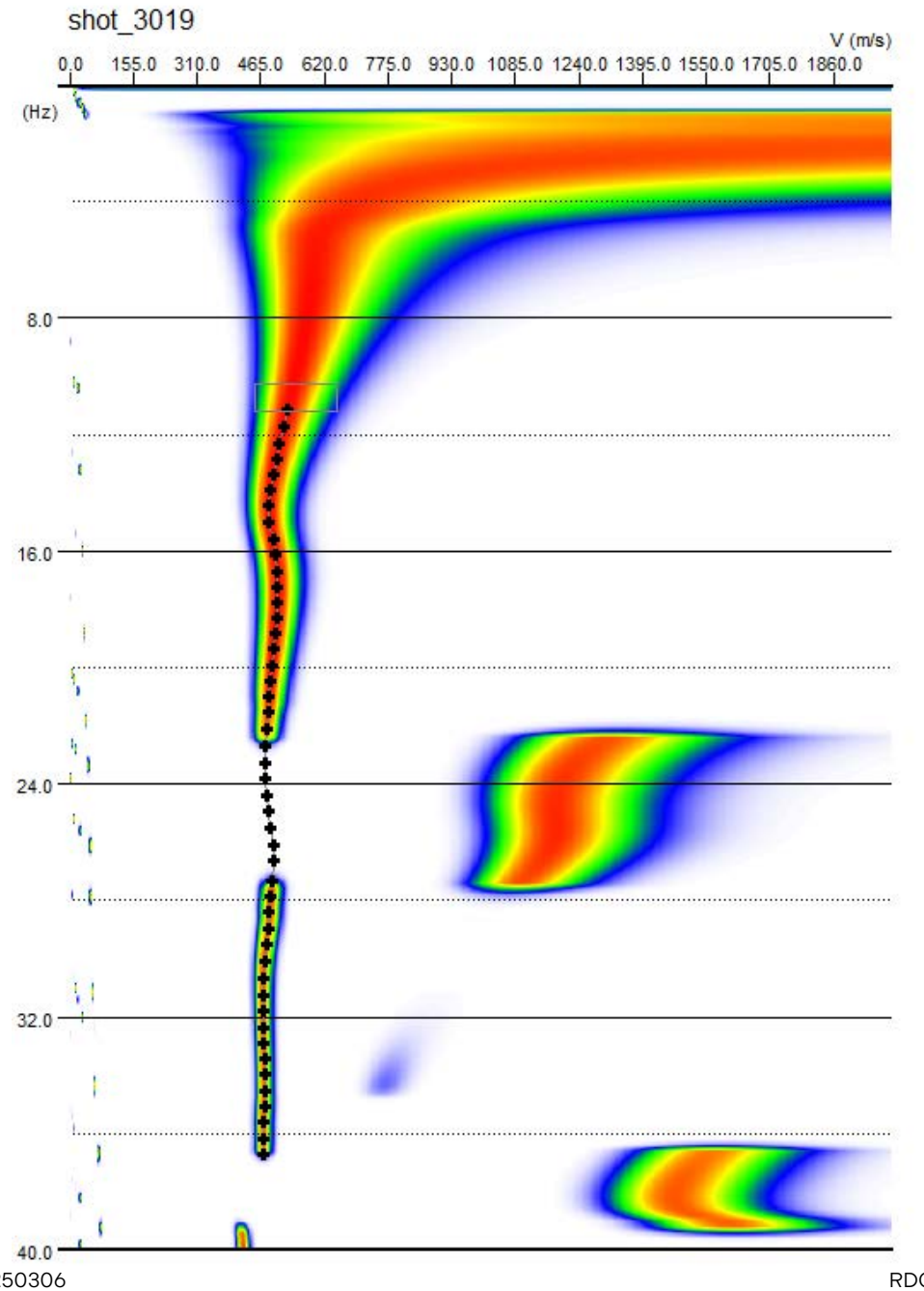

13.18 (Hz)

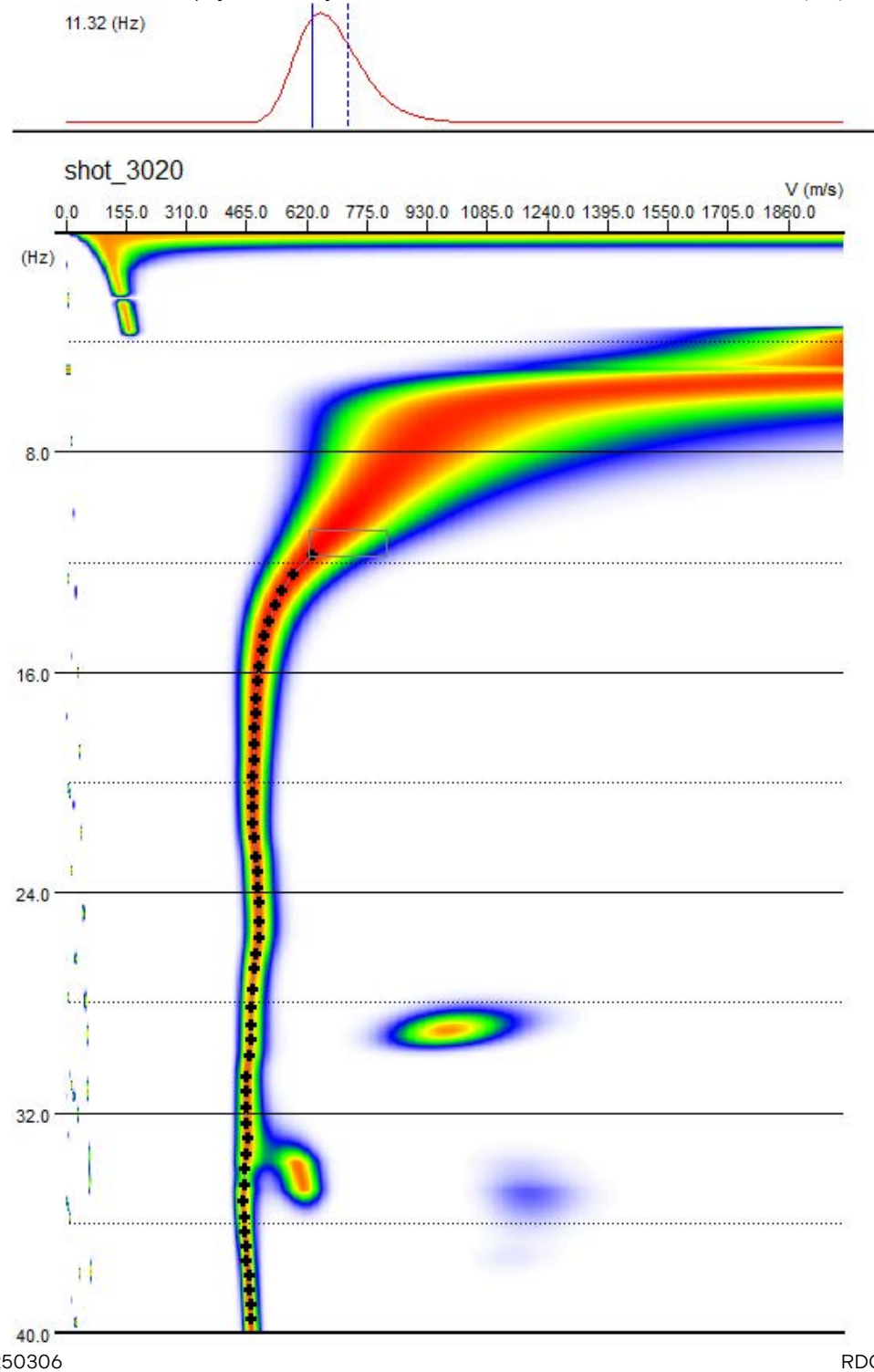

shot_3017
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
(Hz)
8.0
16.0
24.0
32.0
40.0

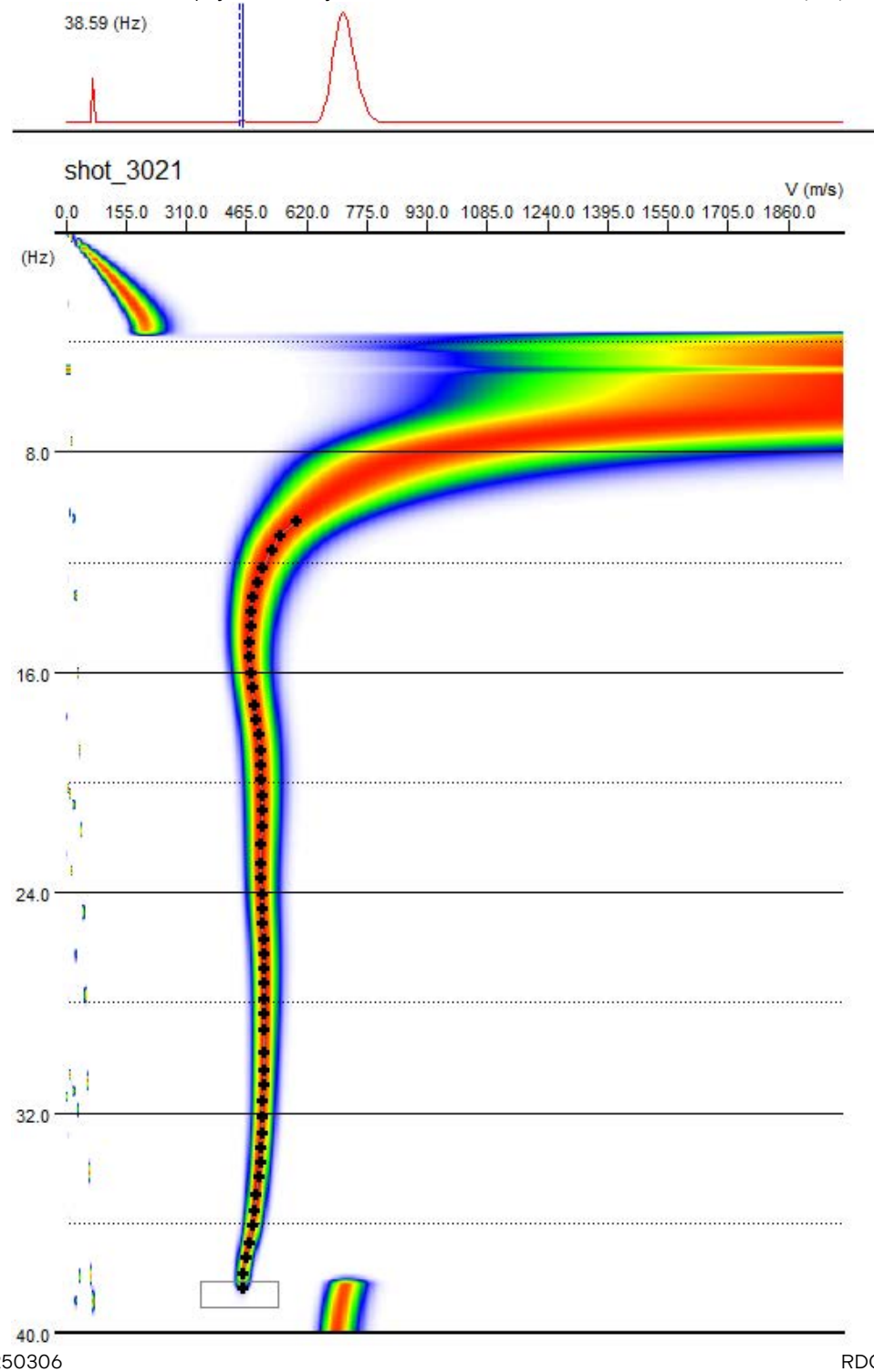

13.39 (Hz)

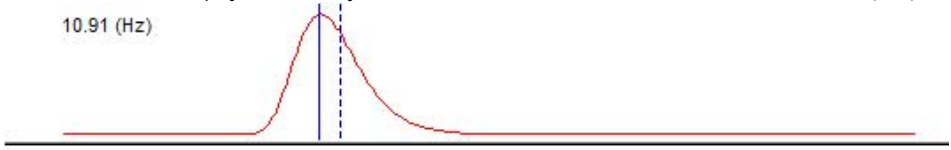

shot_3018
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
(Hz)
8.0
16.0
24.0
32.0
40.0

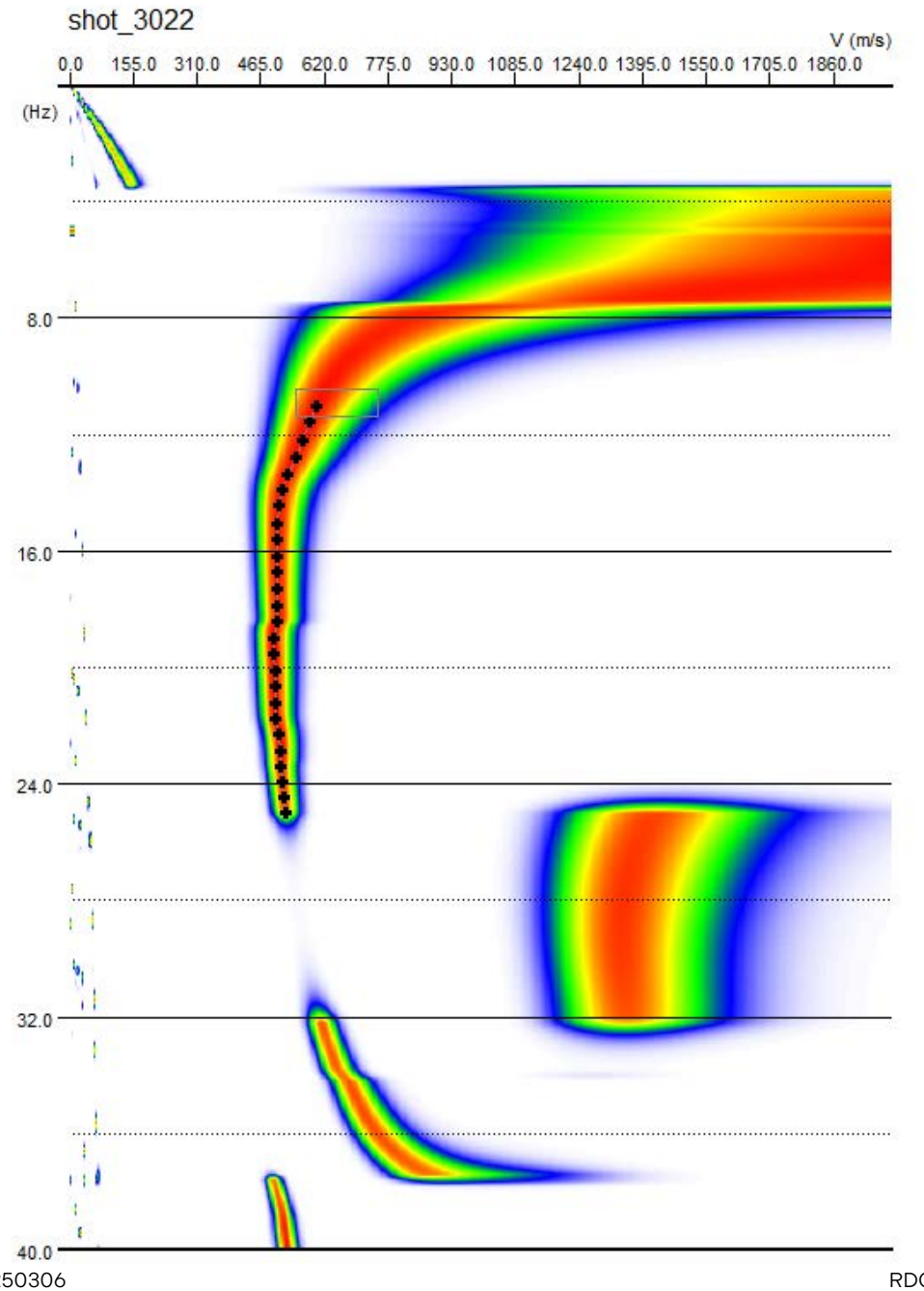

10.73 (Hz)

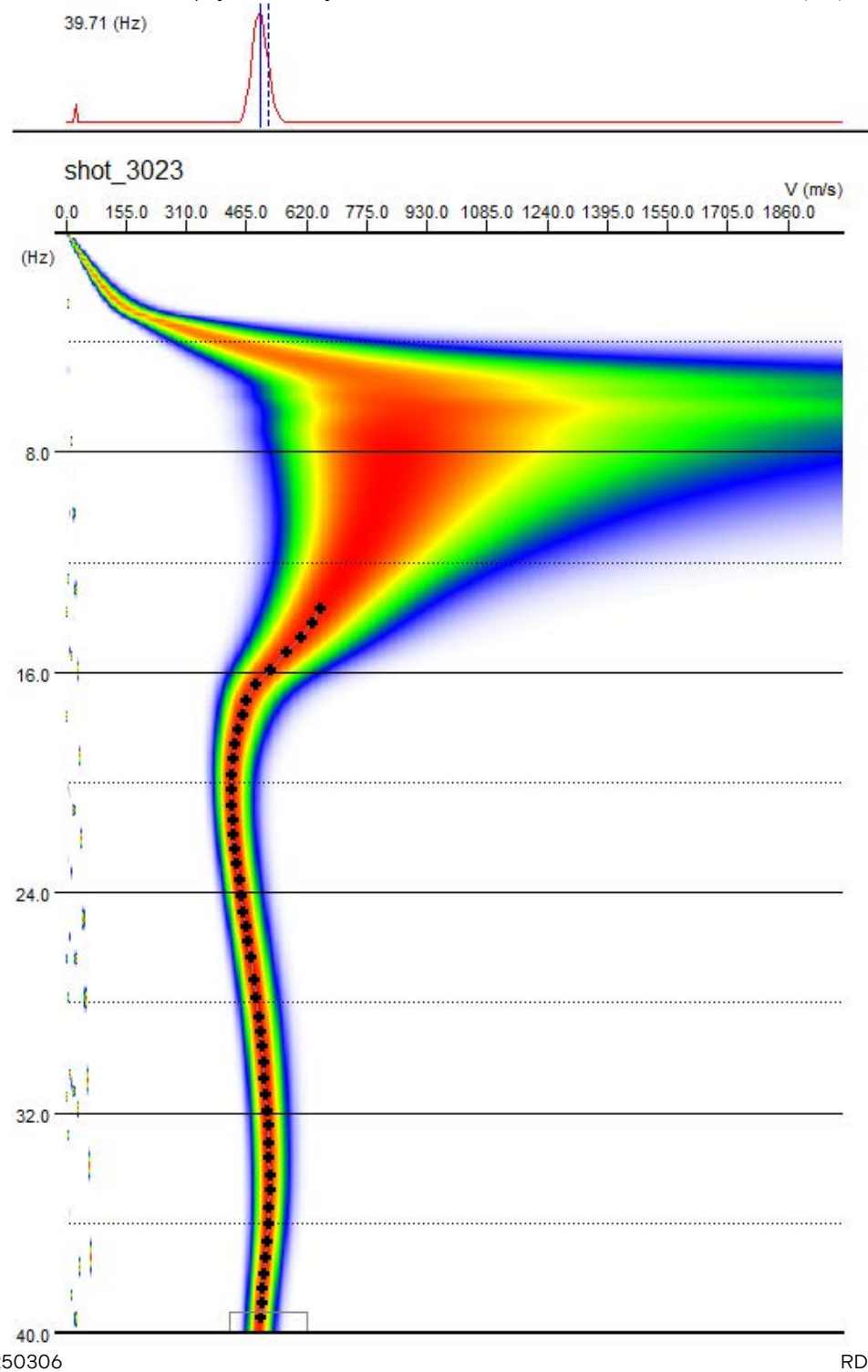

shot_3019
V (m/s)
0.0
155.0
310.0
465.0
620.0
775.0
930.0
1085.0
1240.0
1395.0
1550.0
1705.0
1860.0
(Hz)
8.0
16.0
24.0
32.0
40.0


11.32 (Hz)
shot_3020
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
(Hz)
8.0
16.0
24.0
32.0
40.0

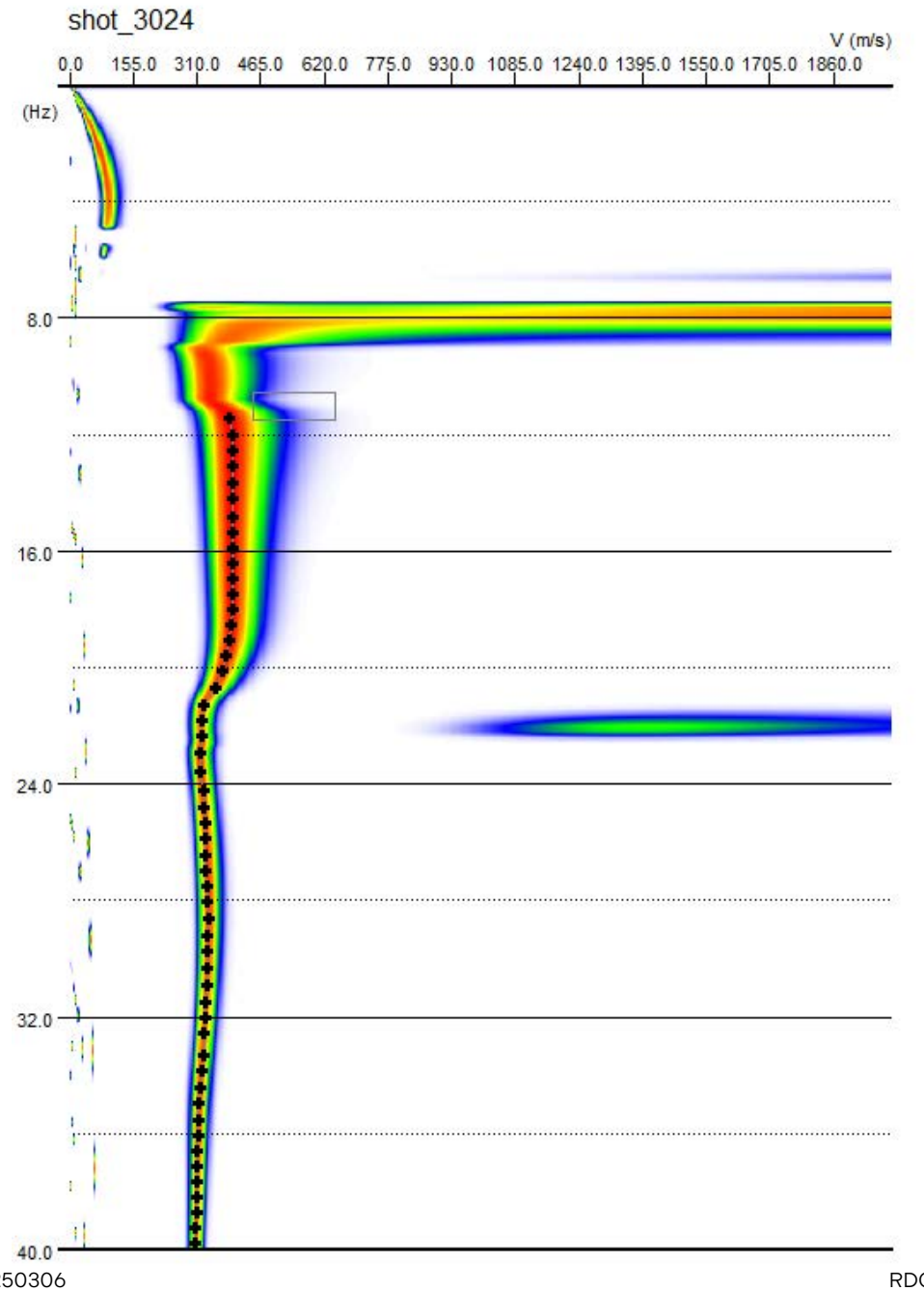

38.59 (Hz)
shot_3021
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
(Hz)
8.0
16.0
24.0
32.0
40.0

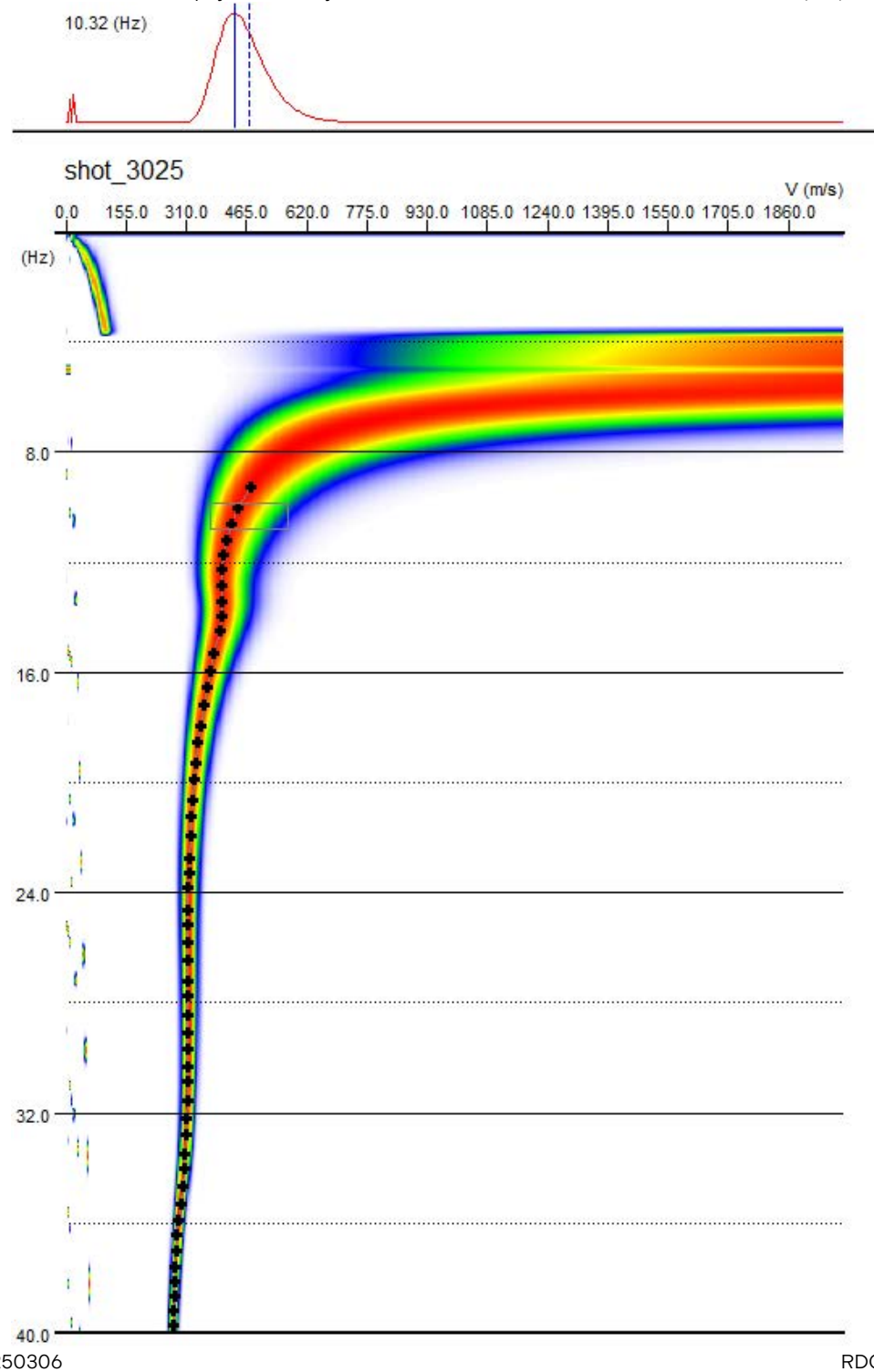

10.91 (Hz)


shot_3022
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
(Hz)
8.0
16.0
24.0
32.0
40.0

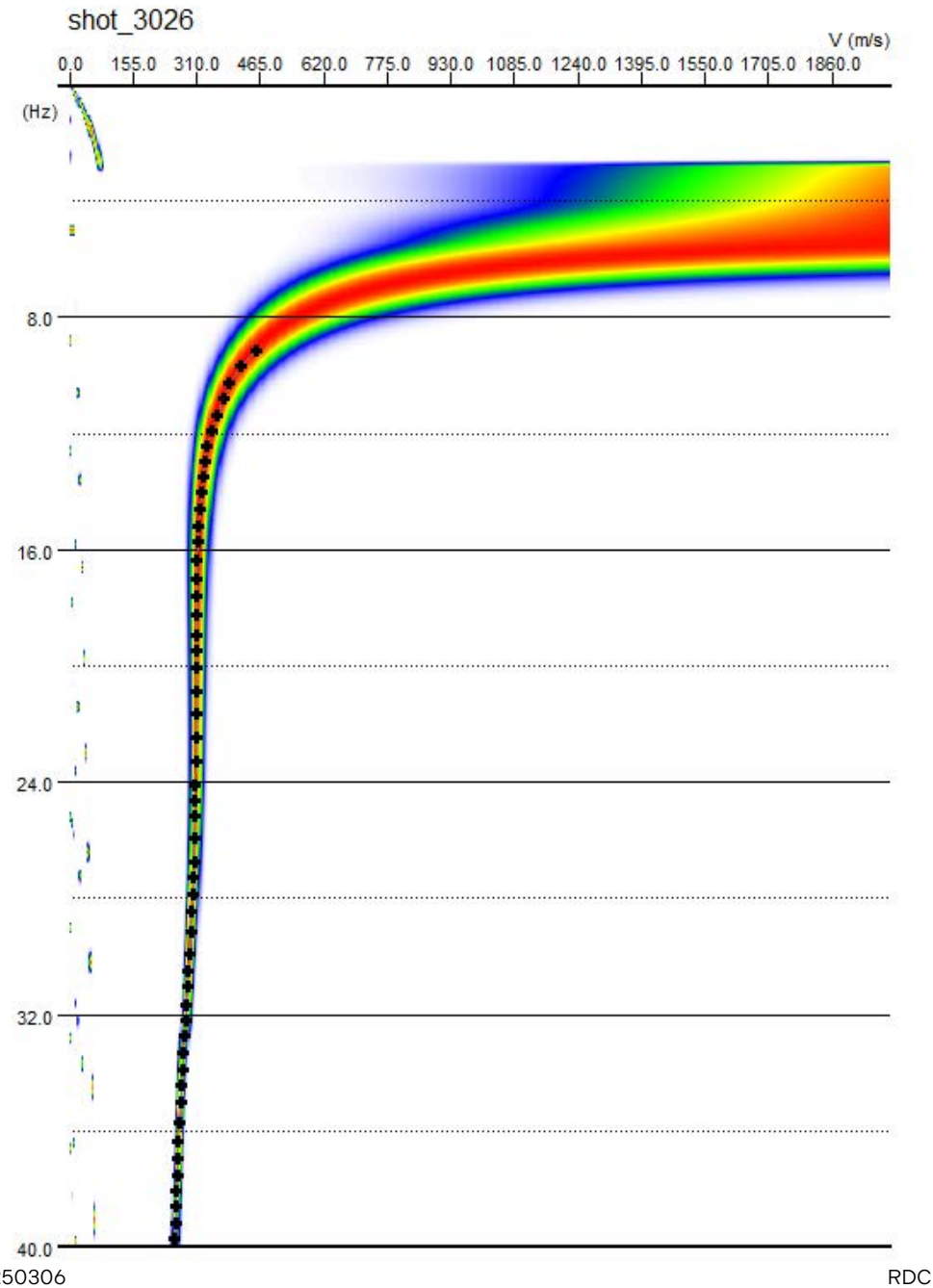

39.71 (Hz)
shot_3023
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
(Hz)
8.0
16.0
24.0
32.0
40.0

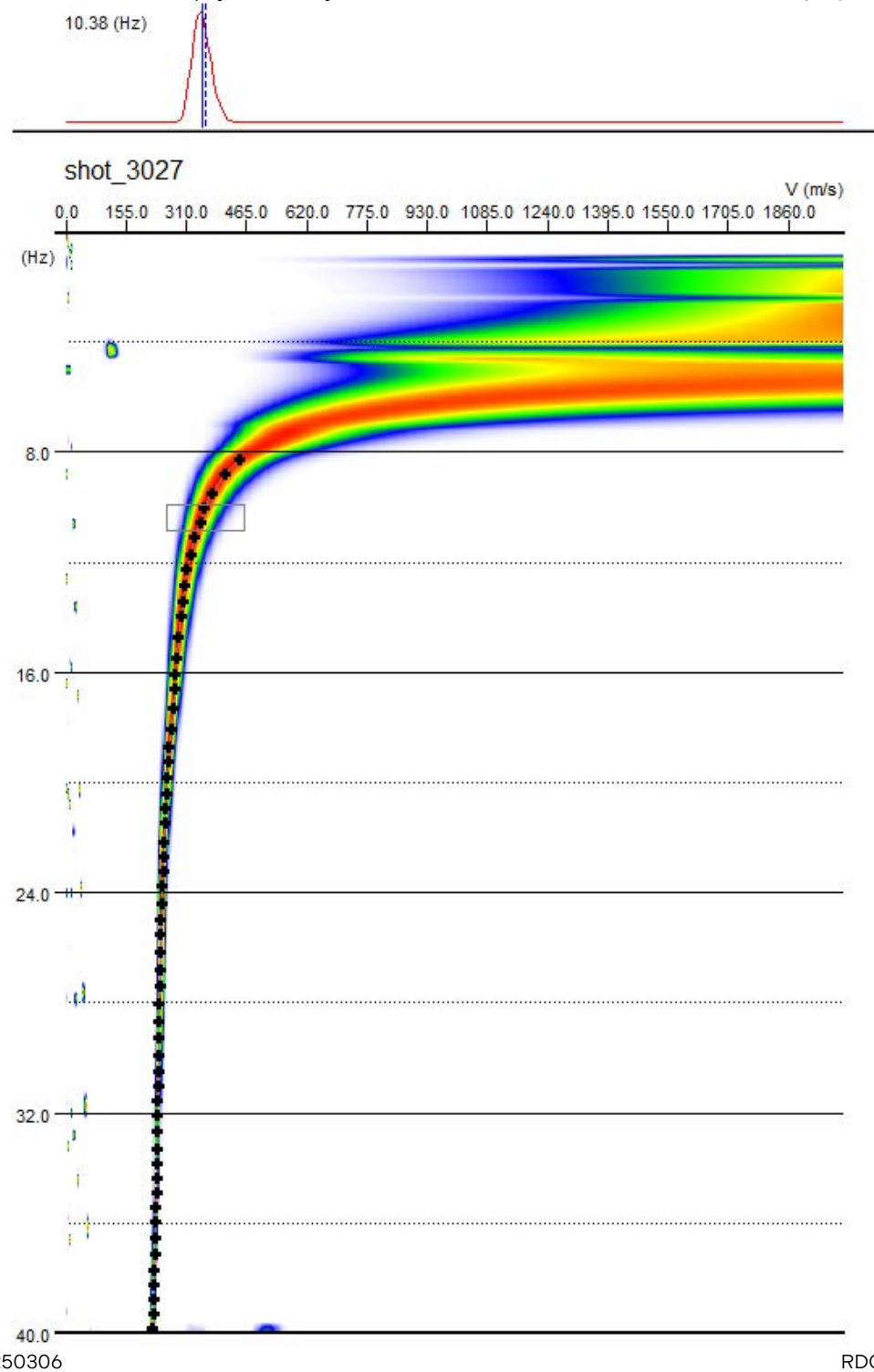

11.03 (Hz)


shot_3024
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
(Hz)
8.0
16.0
24.0
32.0
40.0

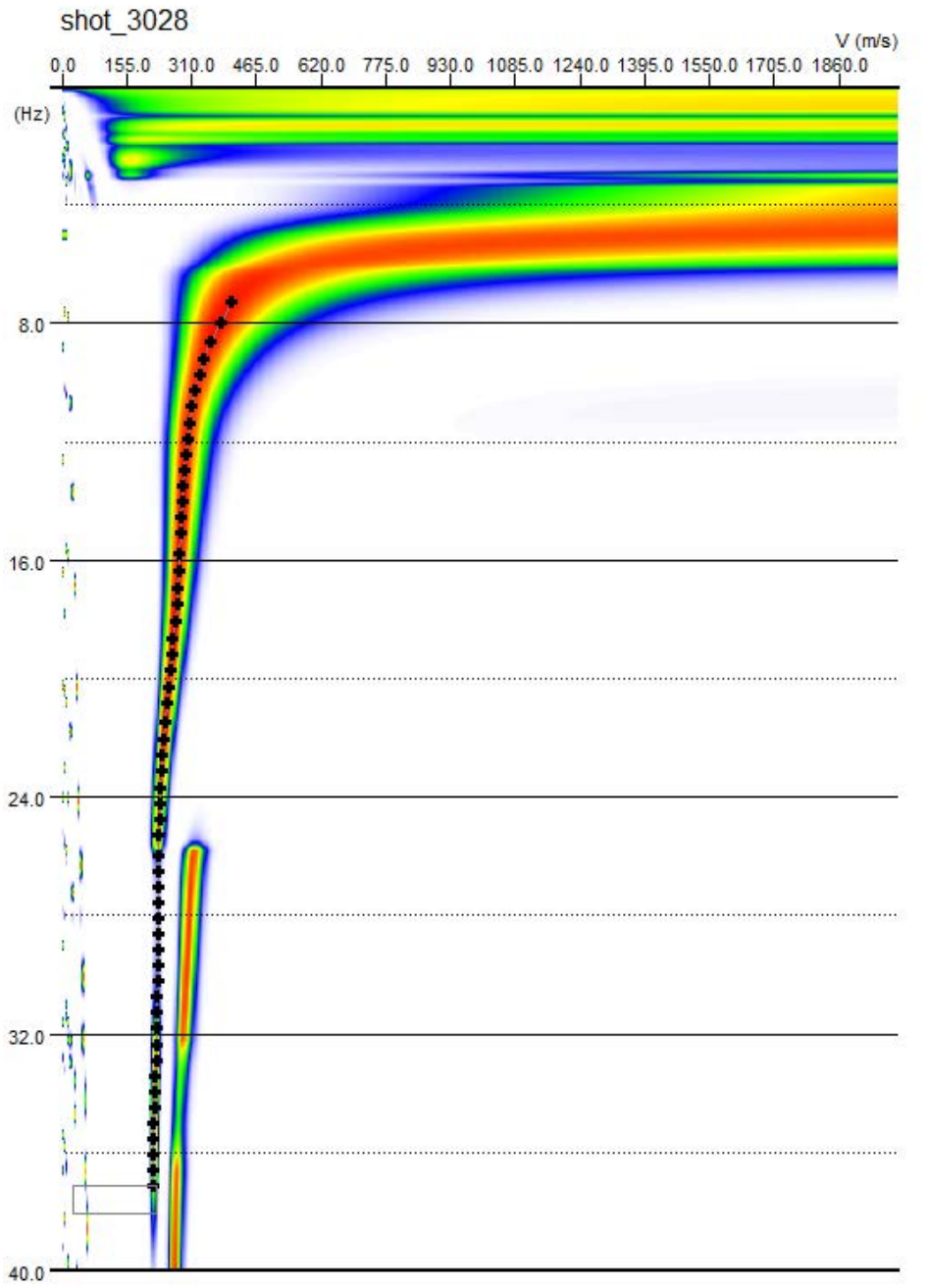

10.32 (Hz)
shot_3025
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
(Hz)
8.0
16.0
24.0
32.0
40.0



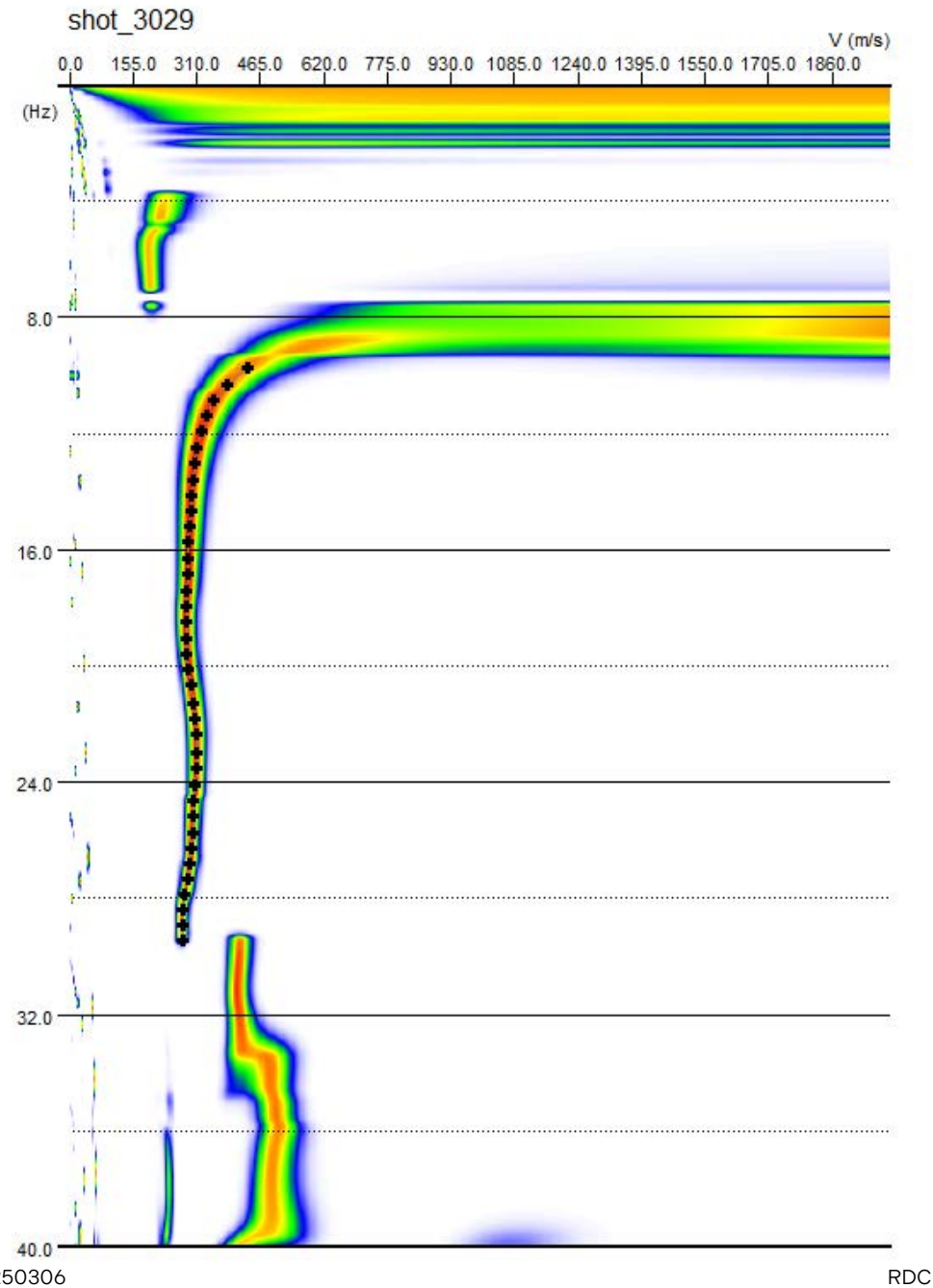

shot_3026
V (m/s)
0.0
155.0
310.0
465.0
620.0
775.0
930.0
1085.0
1240.0
1395.0
1550.0
1705.0
1860.0
(Hz)
8.0
16.0
24.0
32.0
40.0

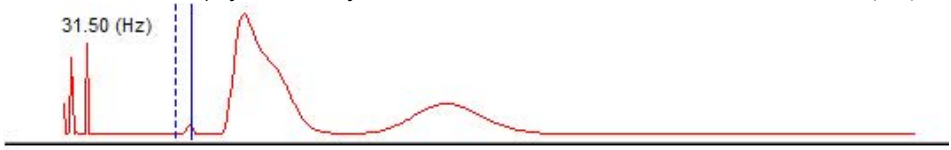

10.38 (Hz)
shot_3027
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
(Hz)
8.0
16.0
24.0
32.0
40.0

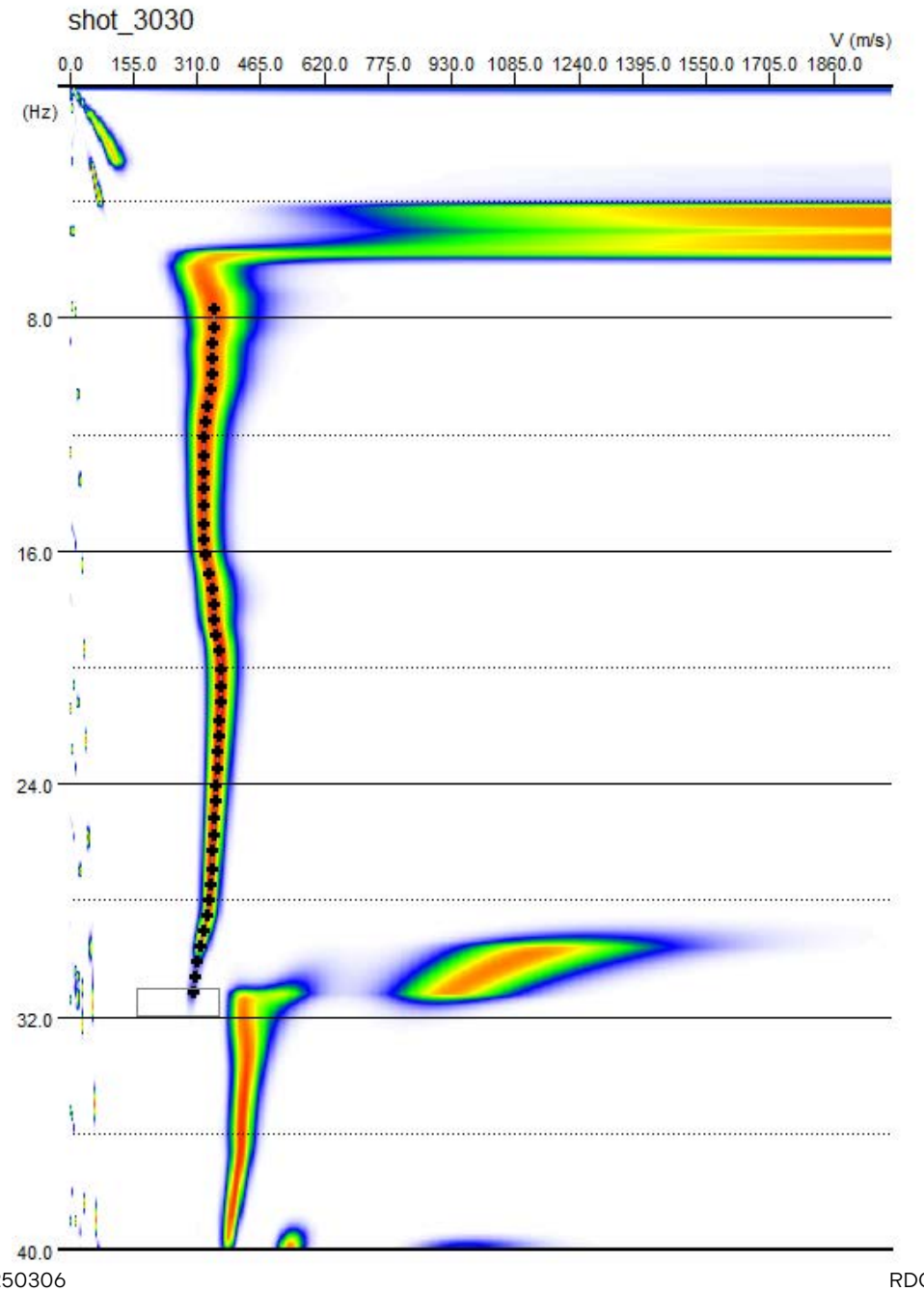

37.60 (Hz)


shot_3028
V (m/s)
0.0
155.0
310.0
465.0
620.0
775.0
930.0
1085.0
1240.0
1395.0
1550.0
1705.0
1860.0
(Hz)
8.0
16.0
24.0
32.0
40.0

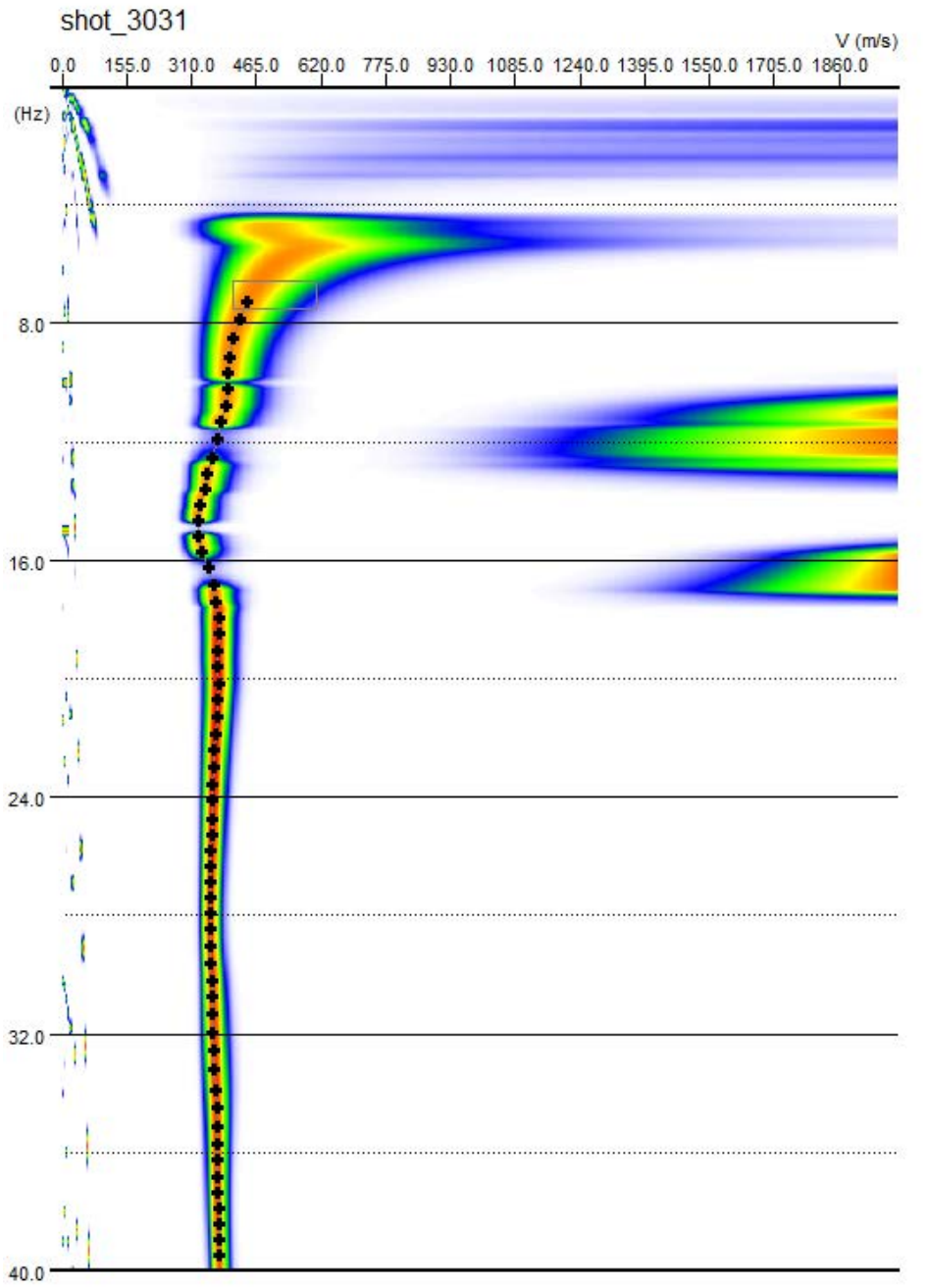



shot_3029
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
(Hz)
8.0
16.0
24.0
32.0
40.0

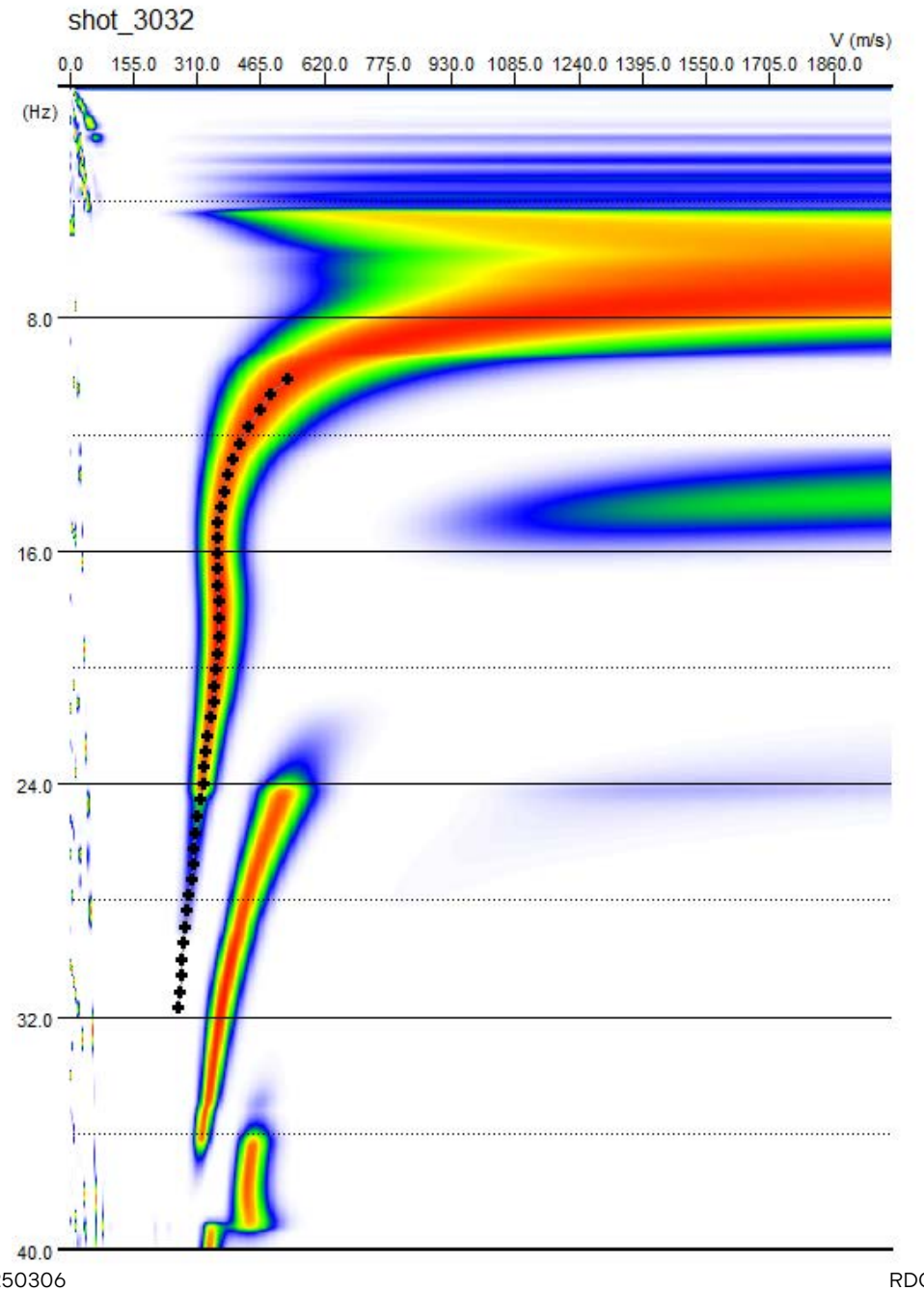

31.50 (Hz)


shot_3030
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
(Hz)
8.0
16.0
24.0
32.0
40.0

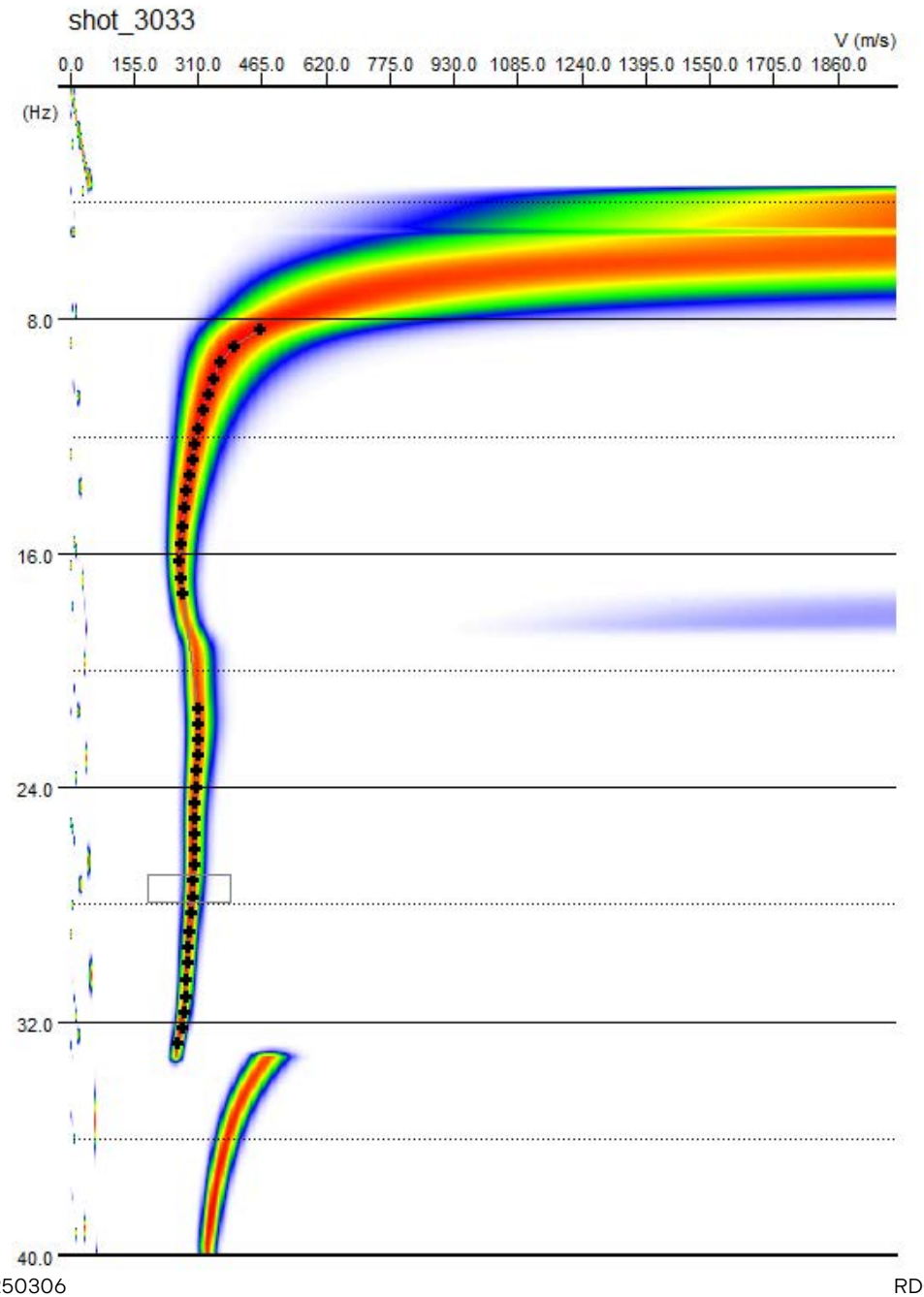

7.04 (Hz)


shot_3031
V (m/s)
0.0
155.0
310.0
465.0
620.0
775.0
930.0
1085.0
1240.0
1395.0
1550.0
1705.0
1860.0
(Hz)
8.0
16.0
24.0
32.0
40.0

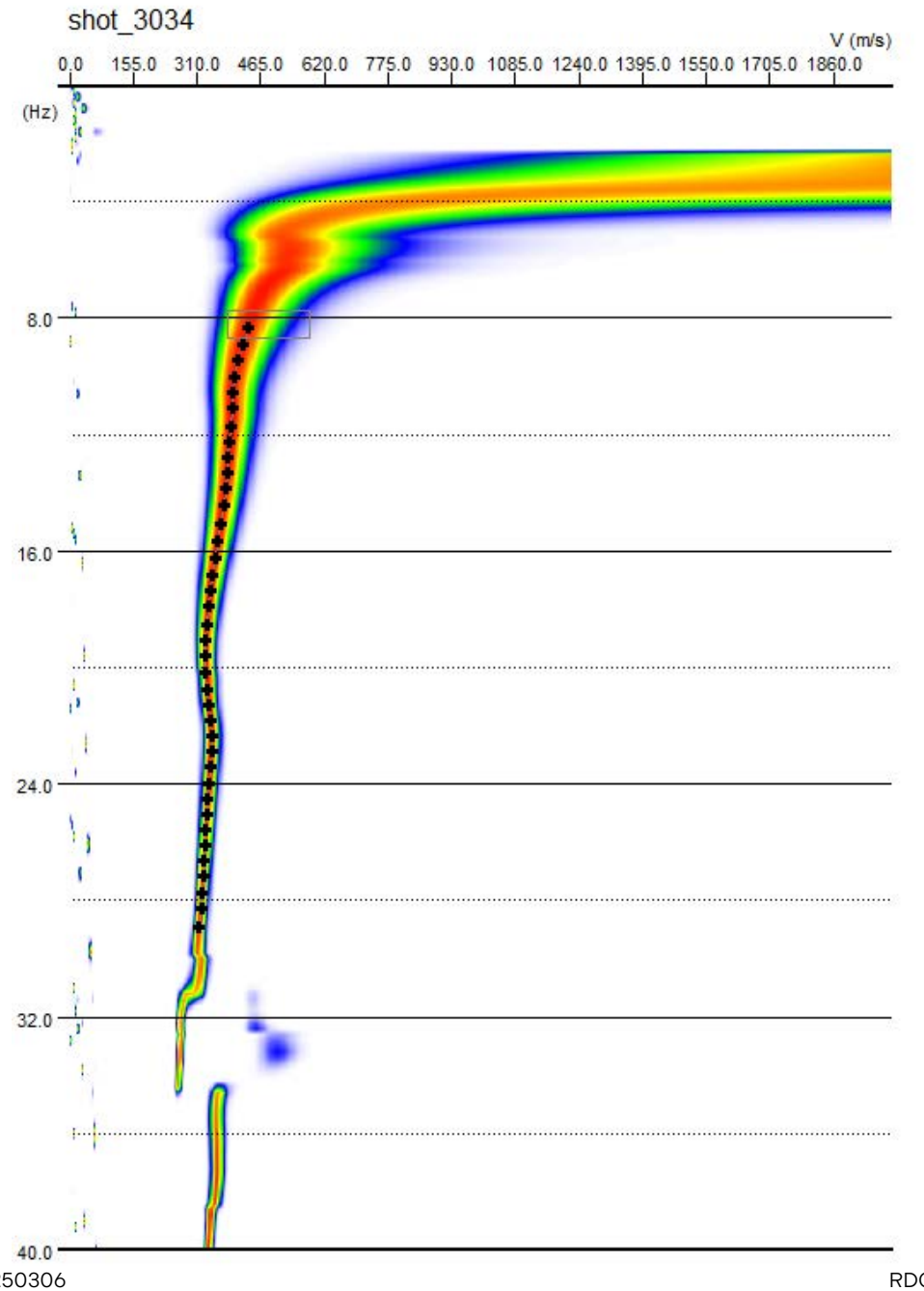


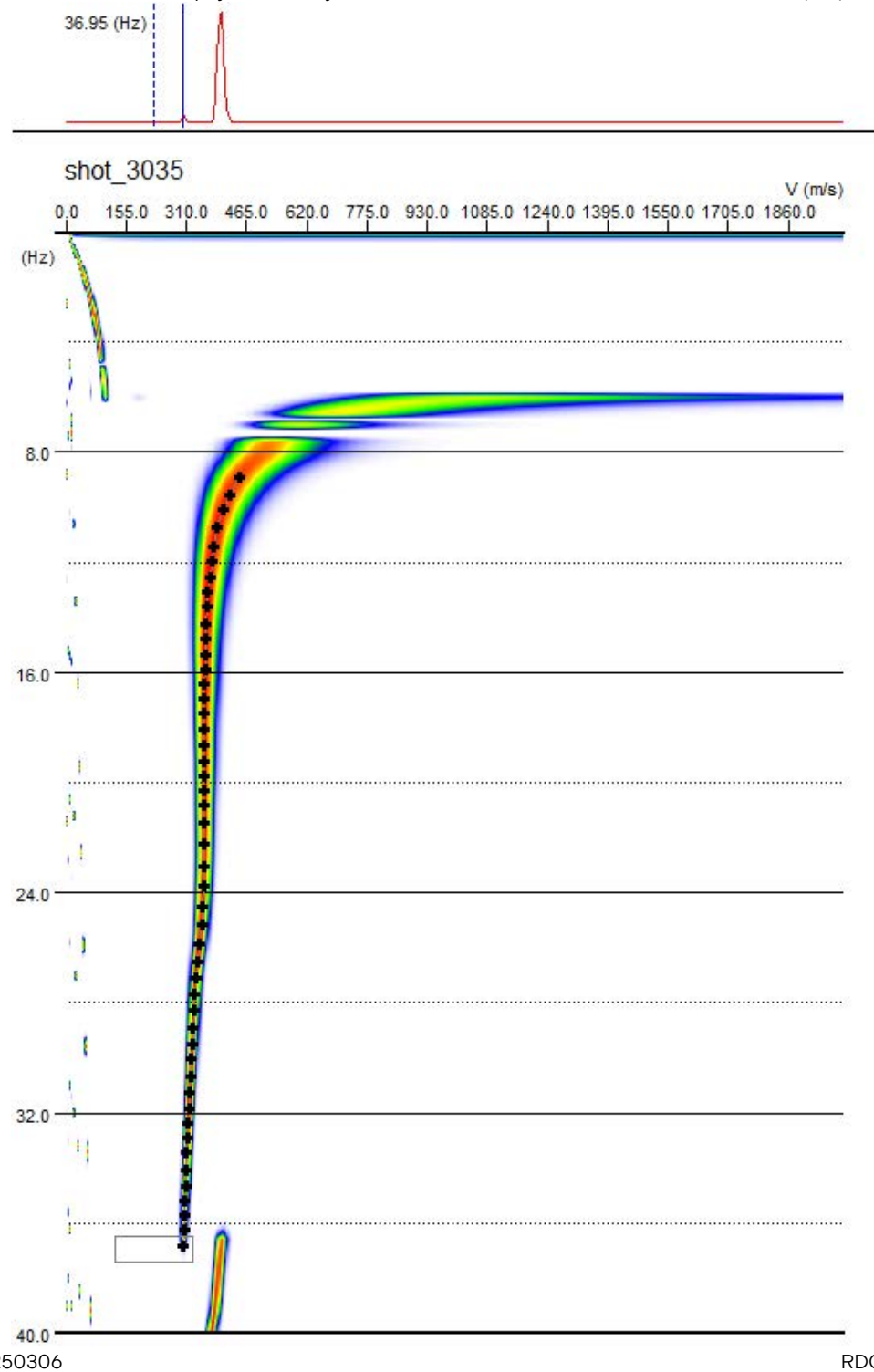

shot_3032
V (m/s)
0.0
155.0
310.0
465.0
620.0
775.0
930.0
1085.0
1240.0
1395.0
1550.0
1705.0
1860.0
(Hz)
8.0
16.0
24.0
32.0
40.0


27.45 (Hz)

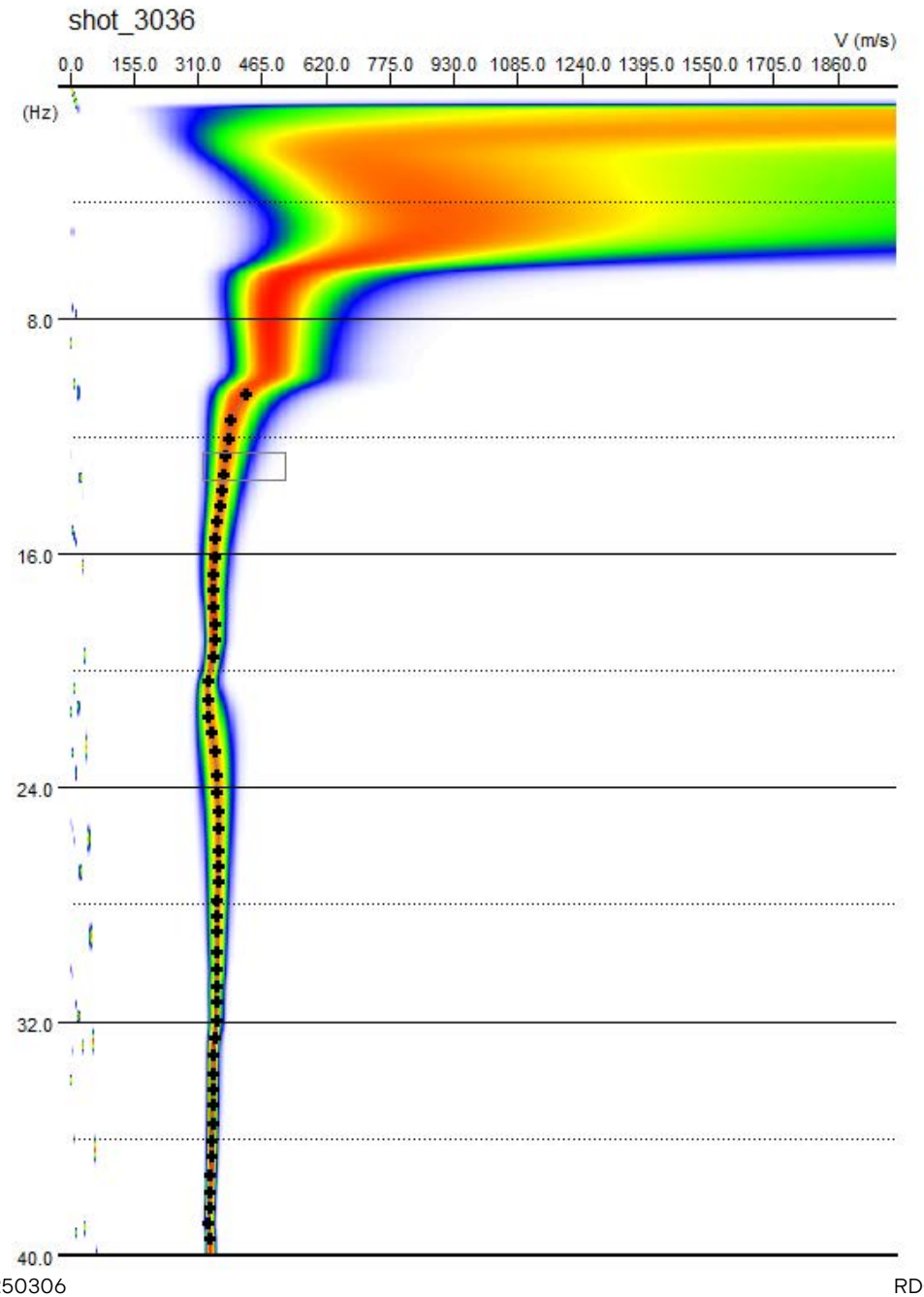

shot_3033
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
(Hz)
8.0
16.0
24.0
32.0
40.0

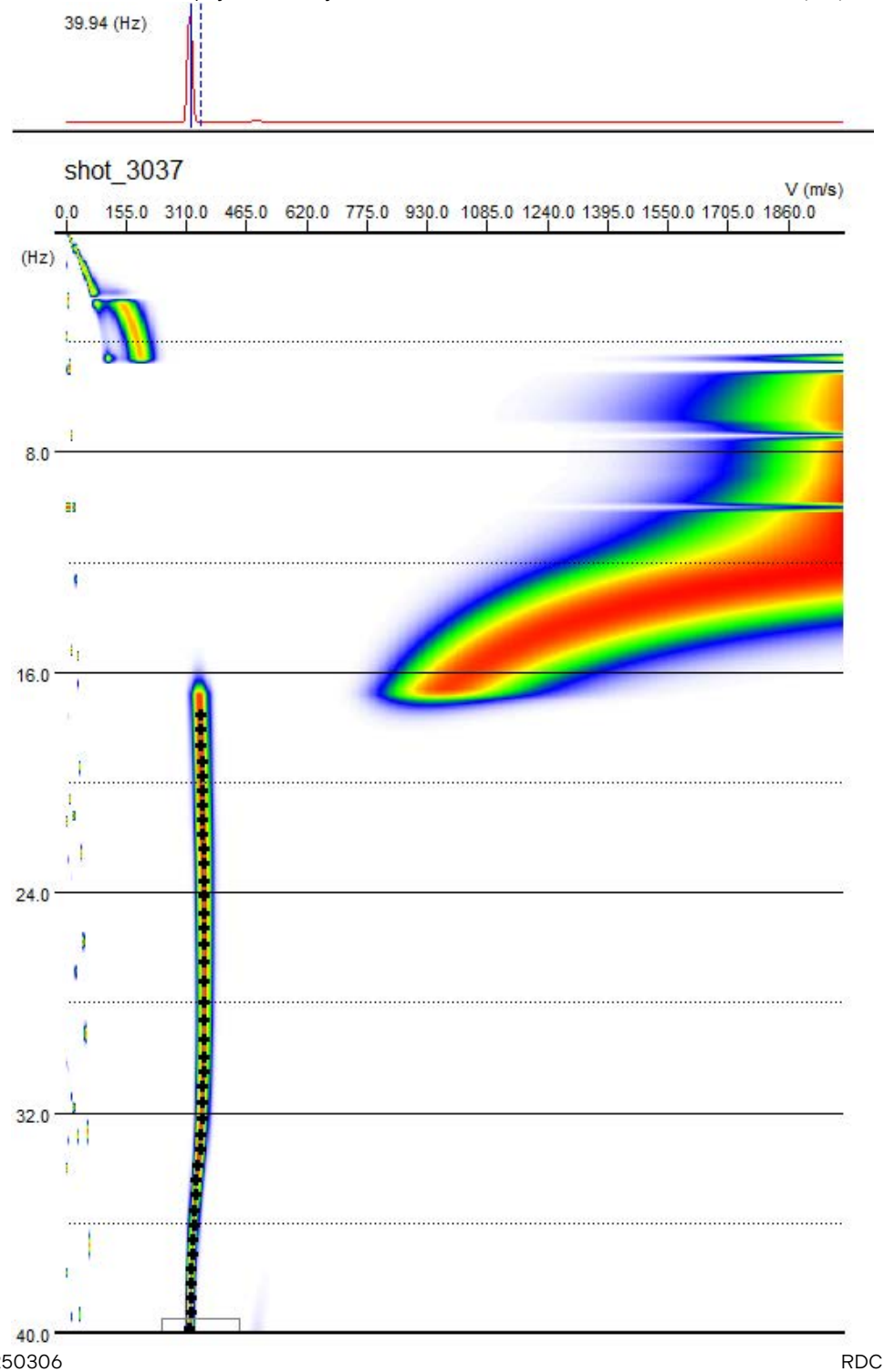

8.21 (Hz)


shot_3034
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
(Hz)
8.0
16.0
24.0
32.0
40.0

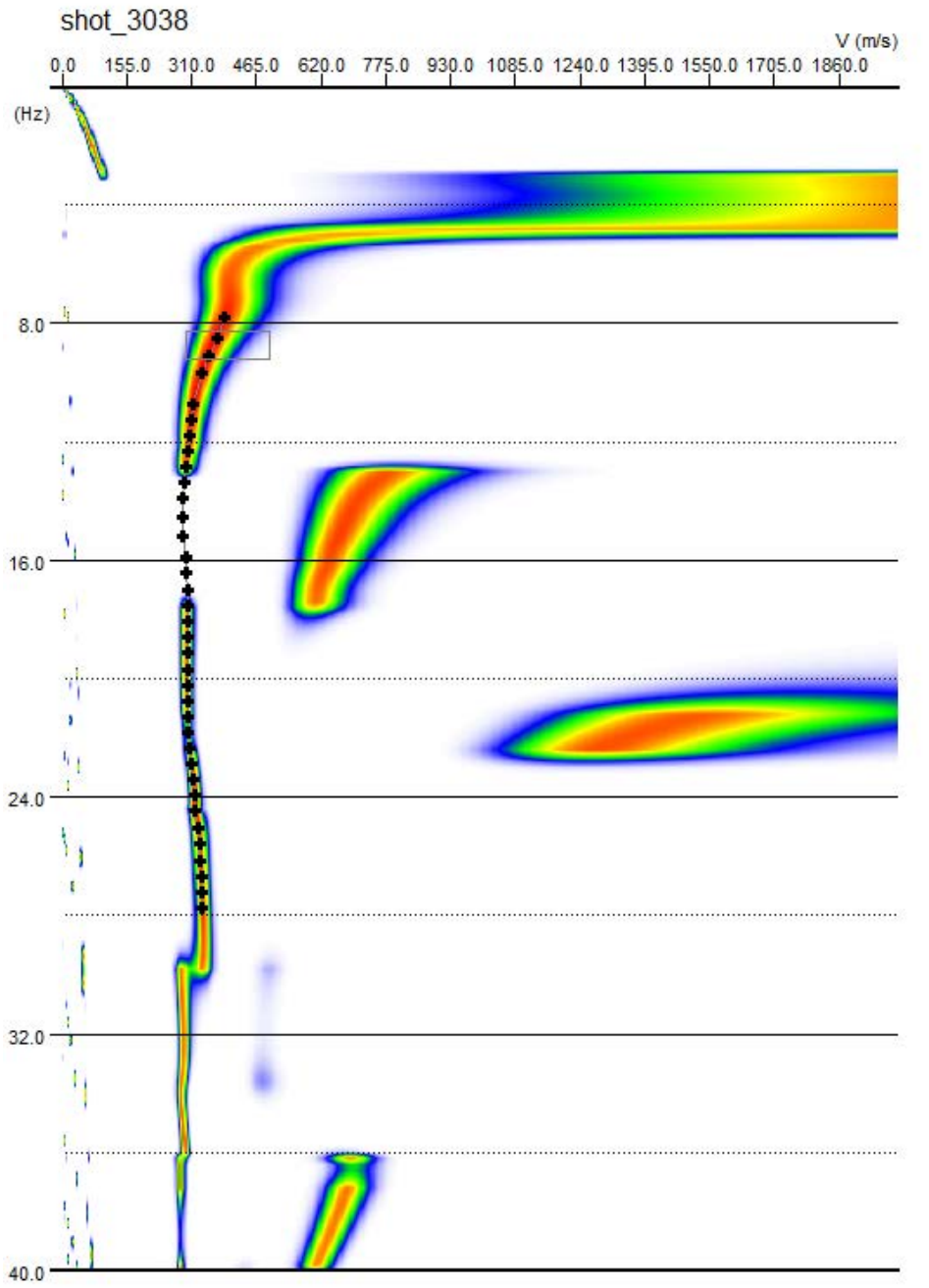

36.95 (Hz)
shot_3035
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
(Hz)
8.0
16.0
24.0
32.0
40.0

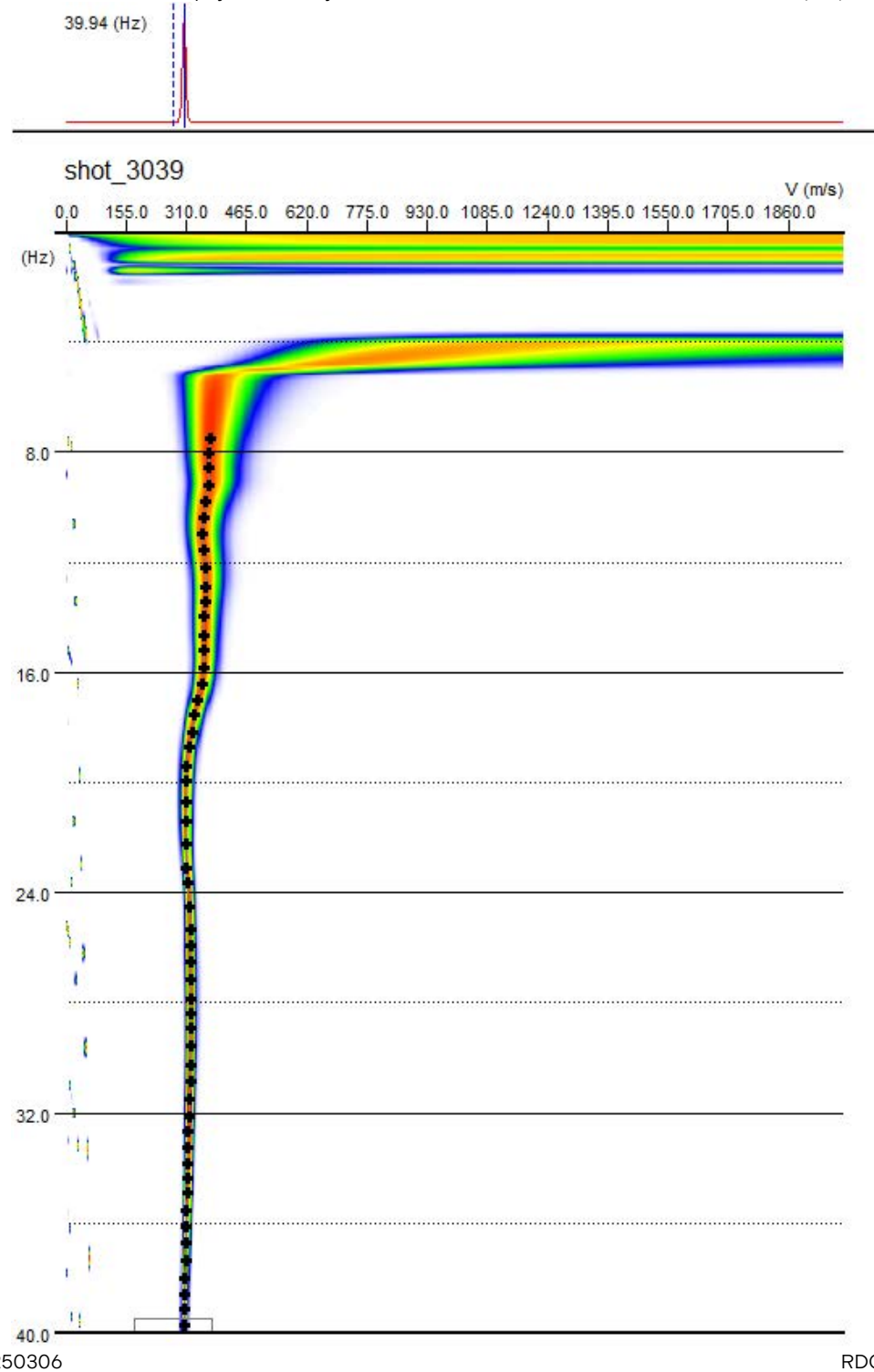

13.02 (Hz)

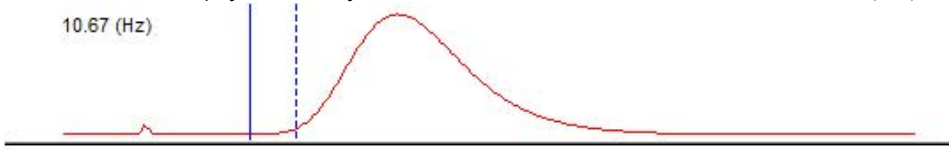

shot_3036
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
(Hz)
8.0
16.0
24.0
32.0
40.0

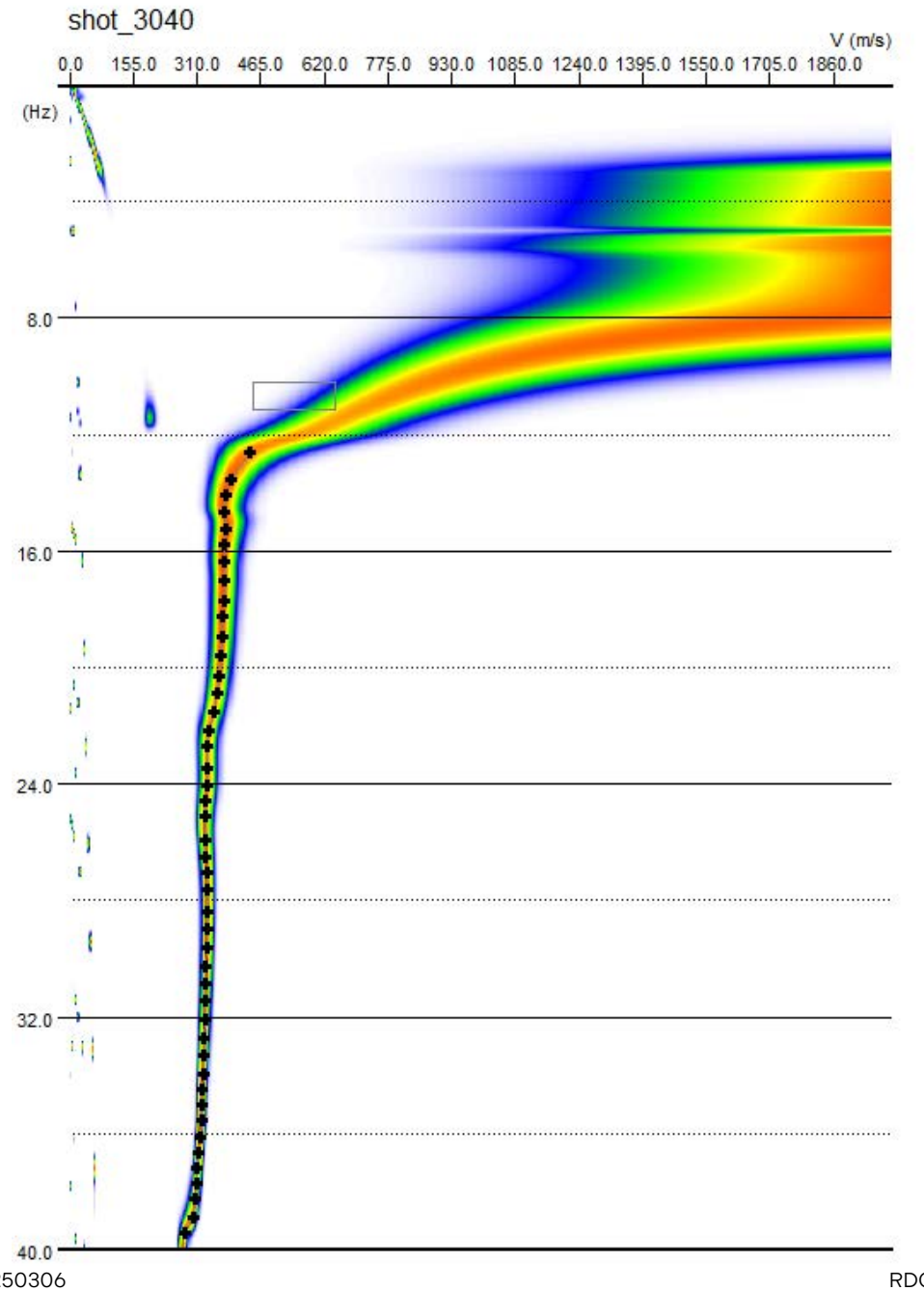

39.94 (Hz)
shot_3037
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
(Hz)
8.0
16.0
24.0
32.0
40.0

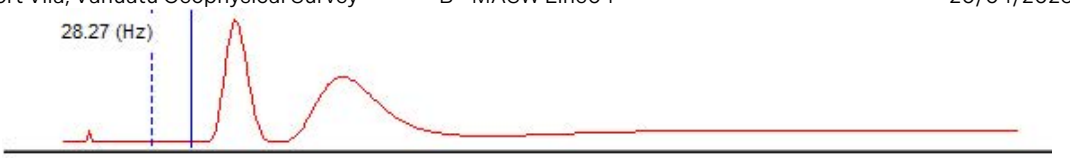

8.74 (Hz)

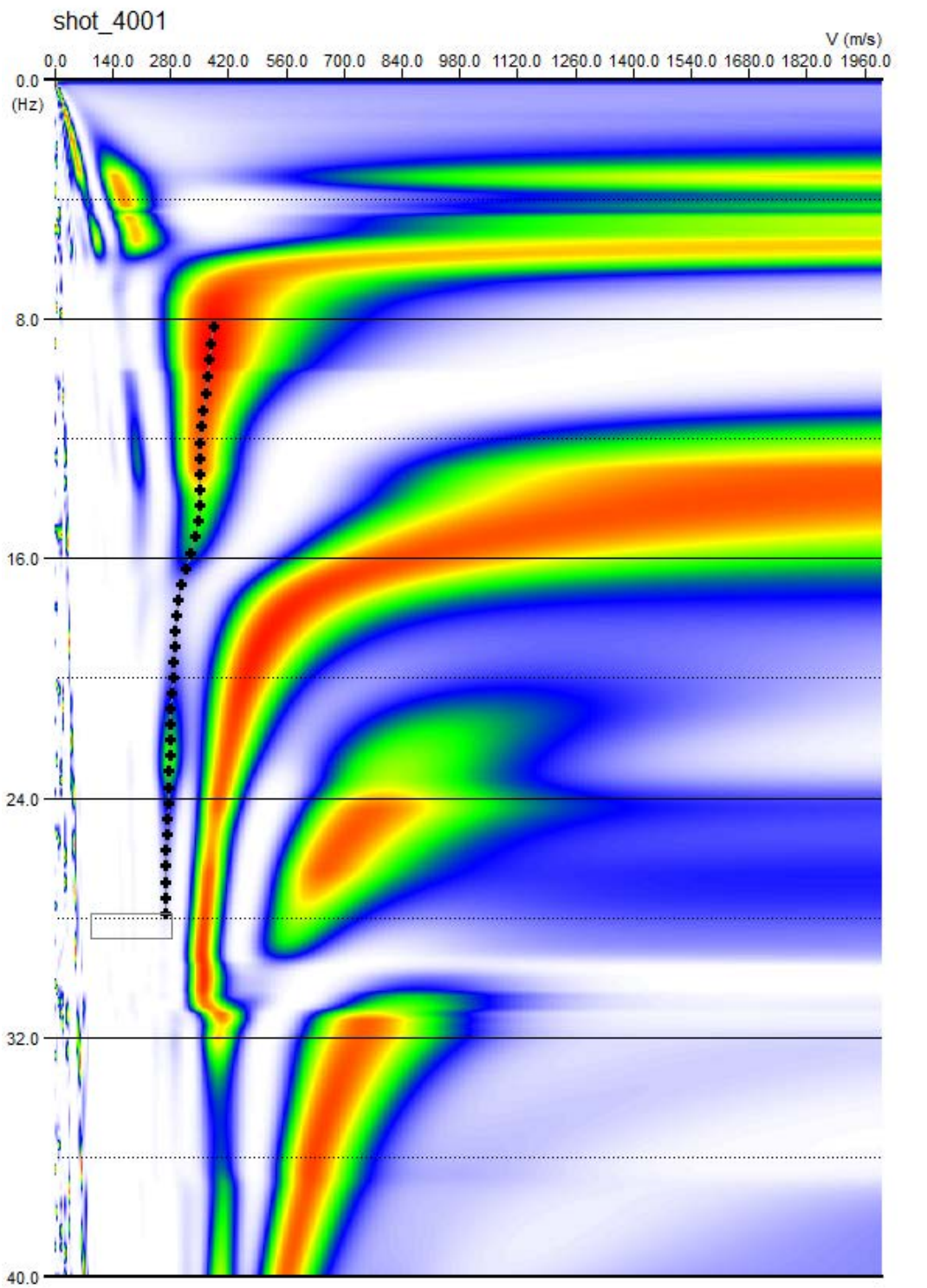

shot_3038
V (m/s)
0.0
155.0
310.0
465.0
620.0
775.0
930.0
1085.0
1240.0
1395.0
1550.0
1705.0
1860.0
(Hz)
8.0
16.0
24.0
32.0
40.0

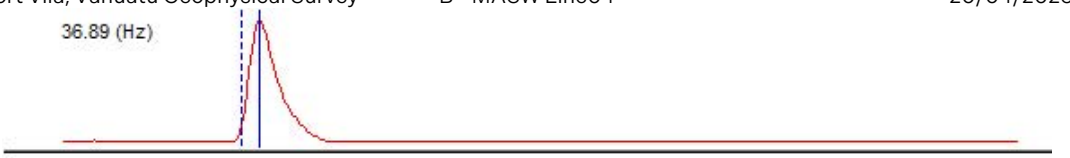

39.94 (Hz)
shot_3039
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
(Hz)
8.0
16.0
24.0
32.0
40.0

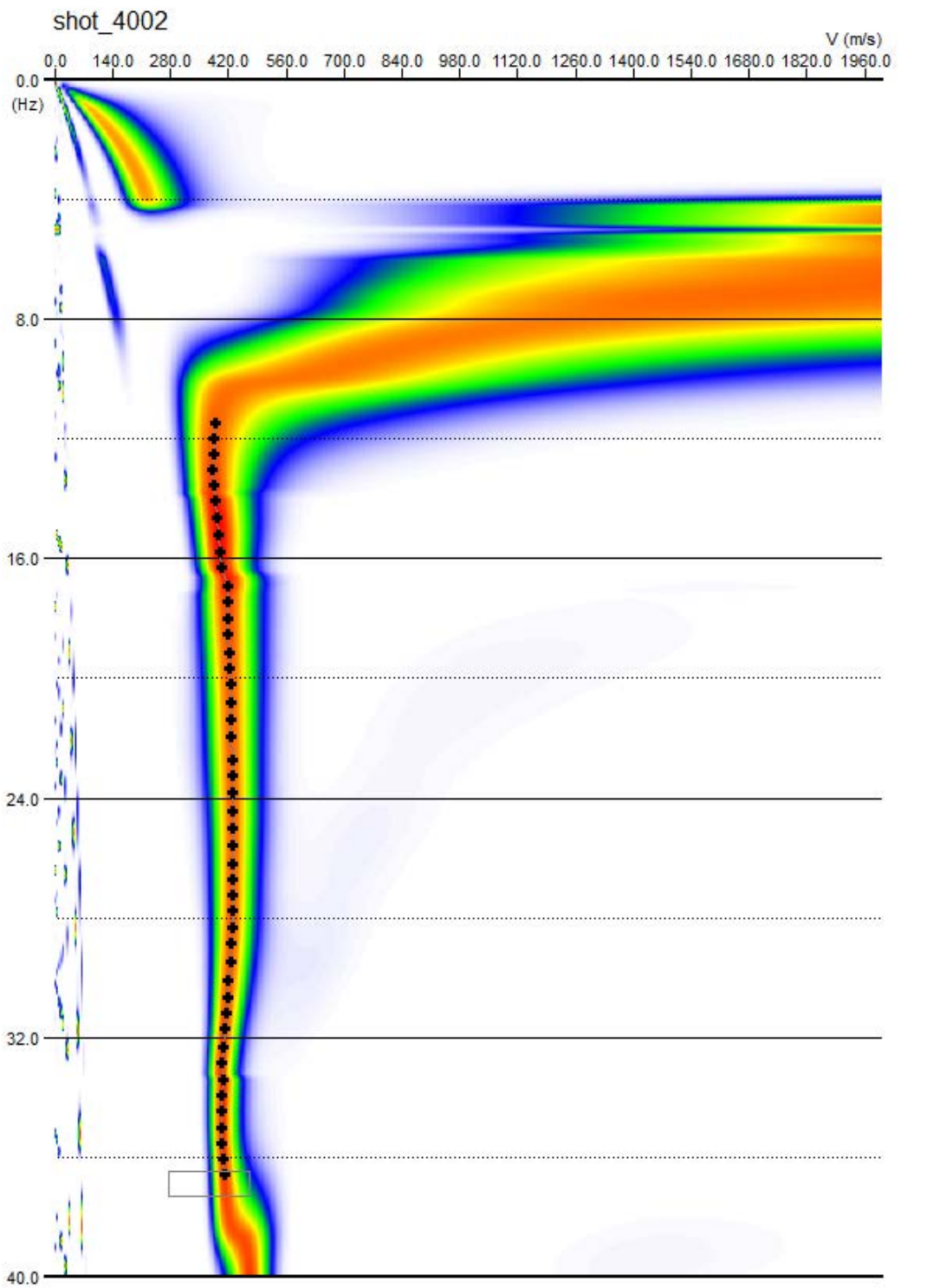

10.67 (Hz)

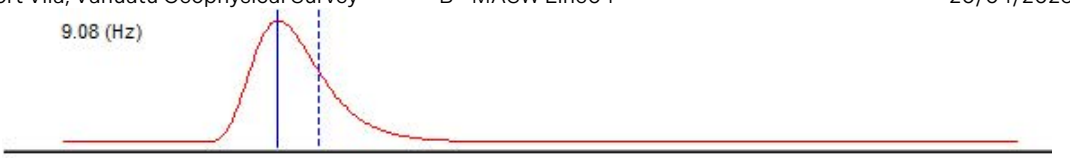

shot_3040
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
(Hz)
8.0
16.0
24.0
32.0
40.0

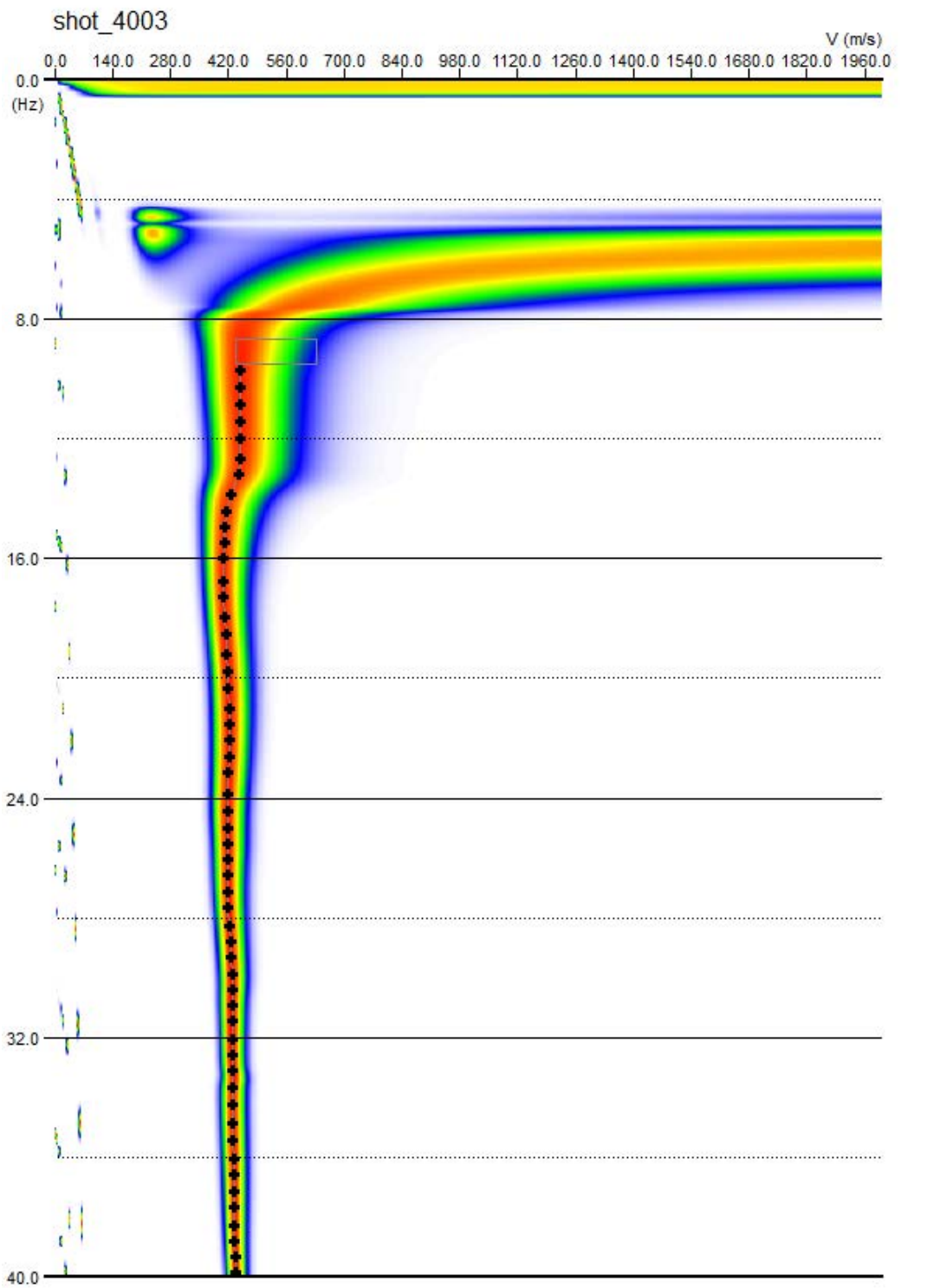

28.27 (Hz)

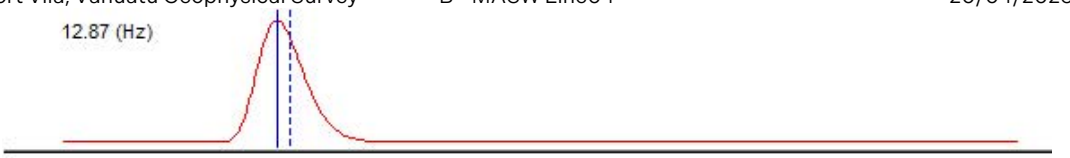

shot_4001
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

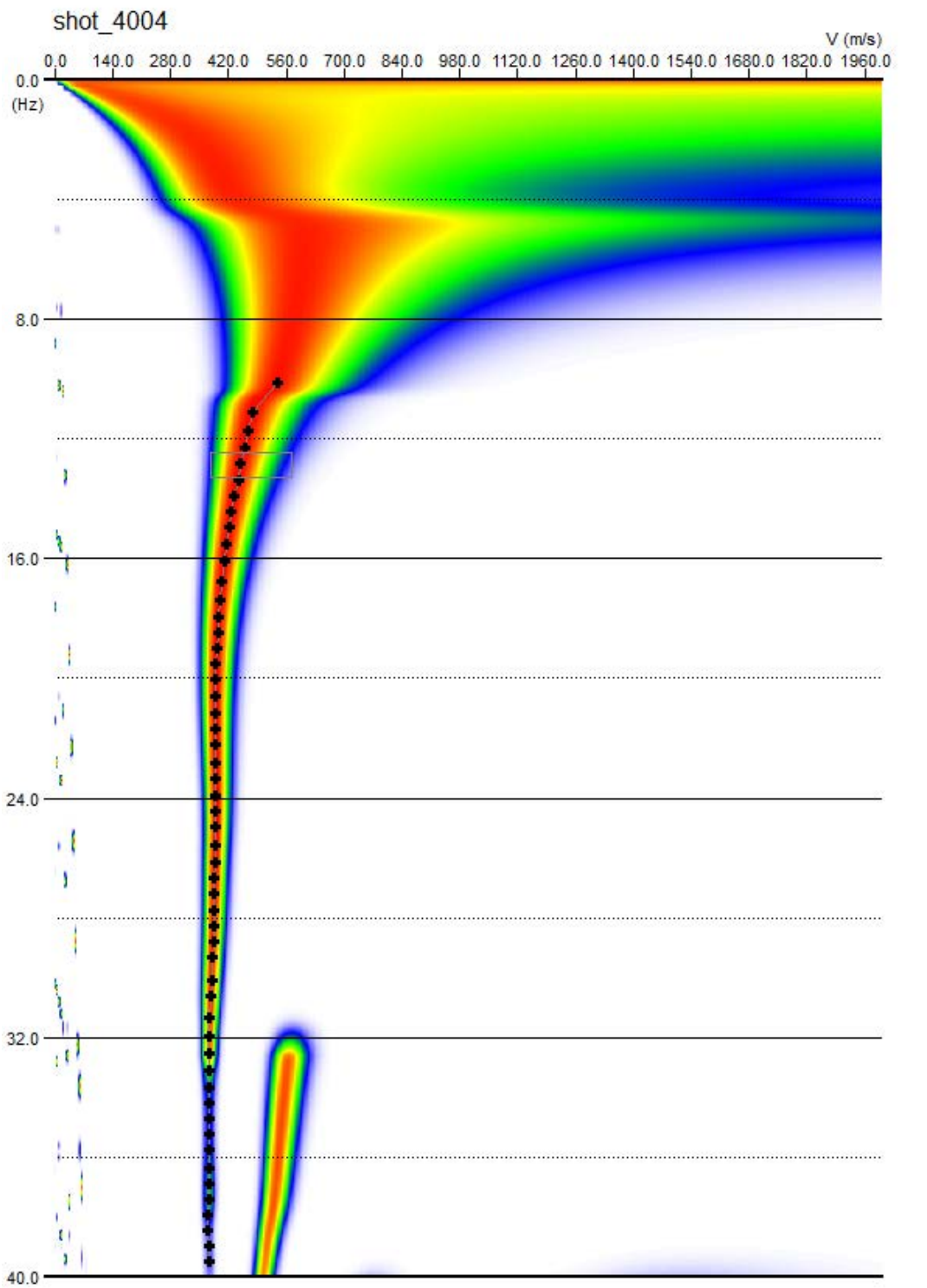

36.89 (Hz)

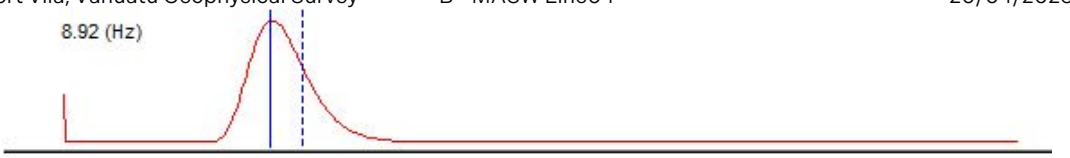

shot_4002
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

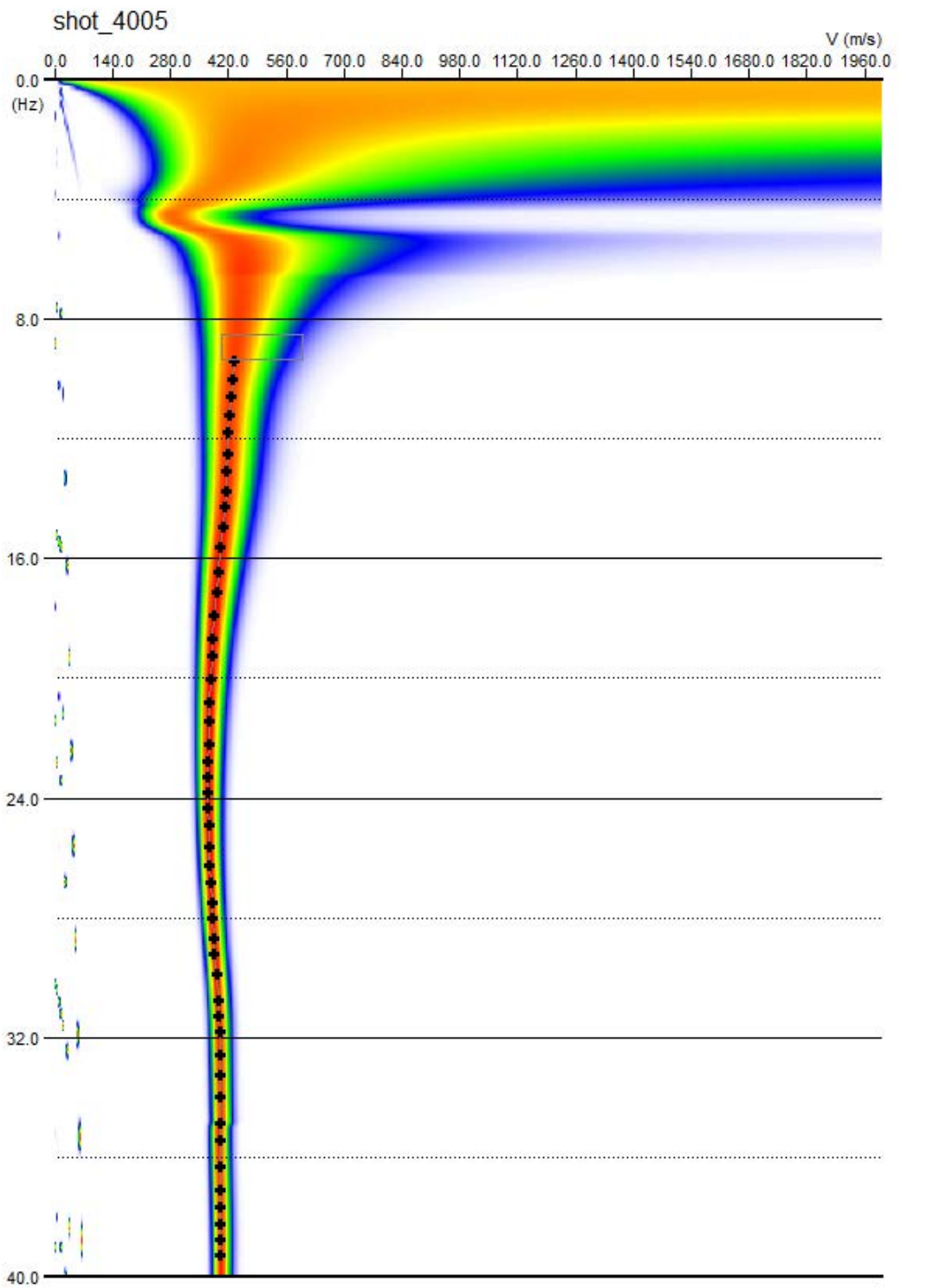

9.08 (Hz)


shot_4003
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

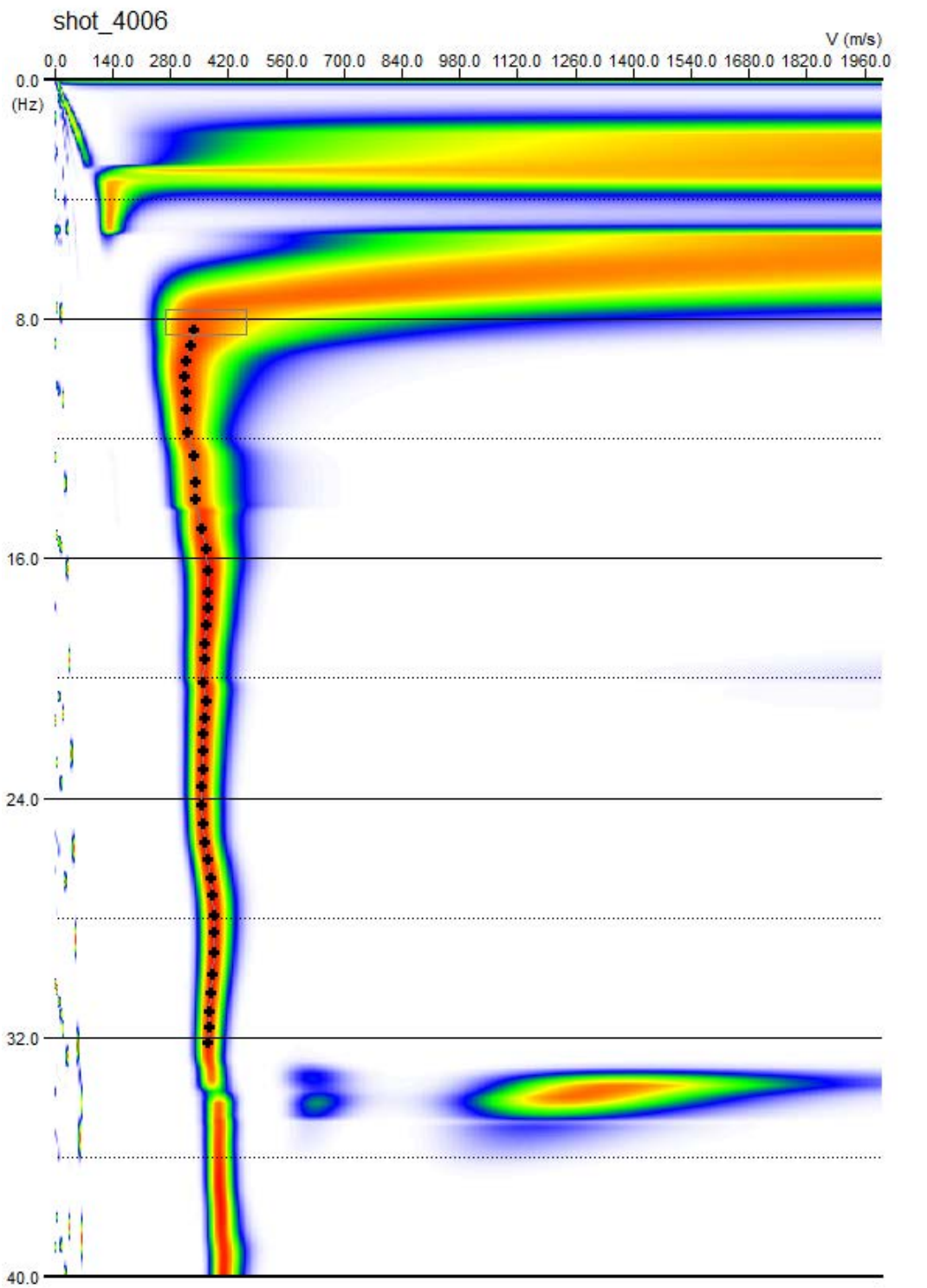

12.87 (Hz)


shot_4004
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

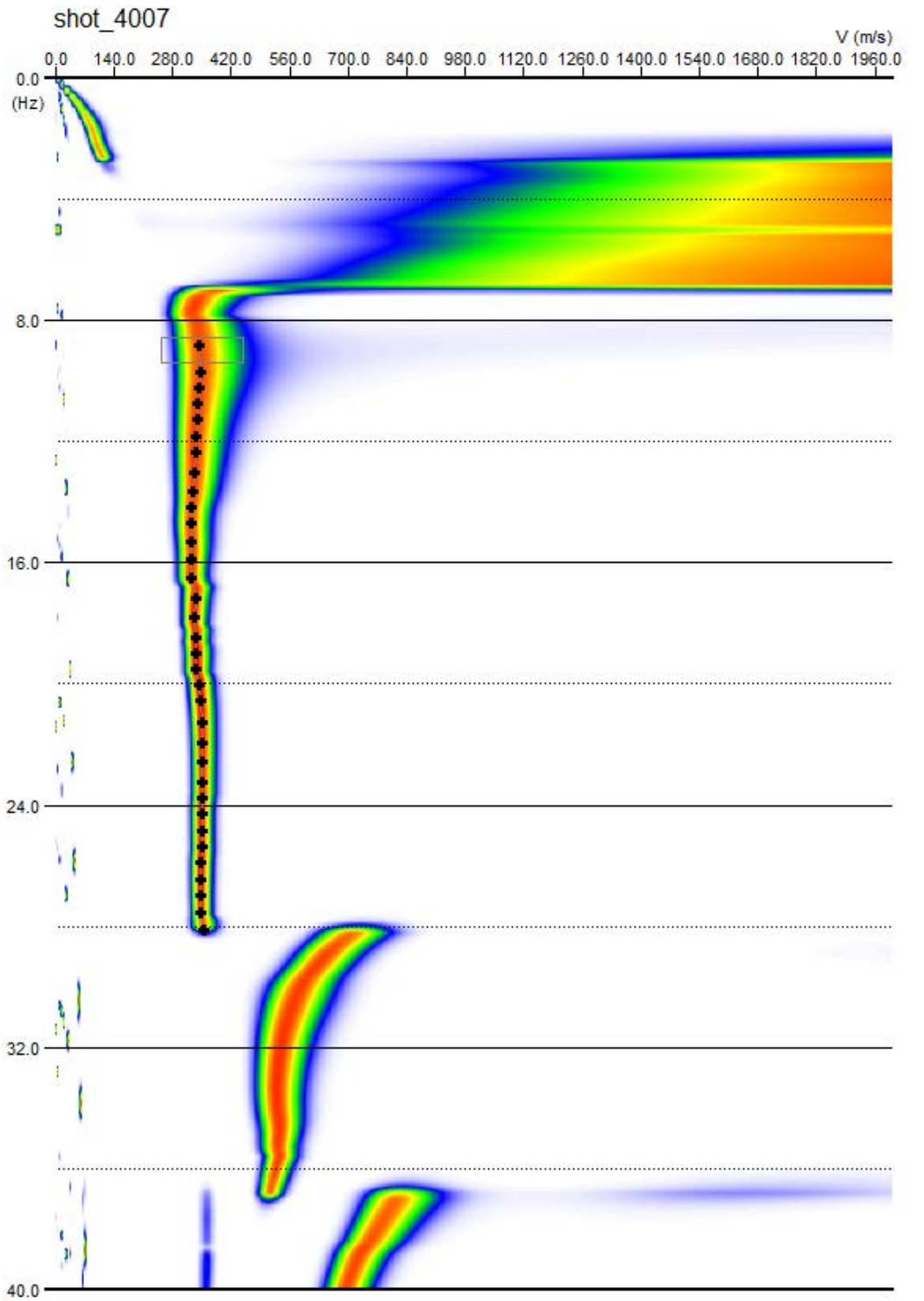

8.92 (Hz)

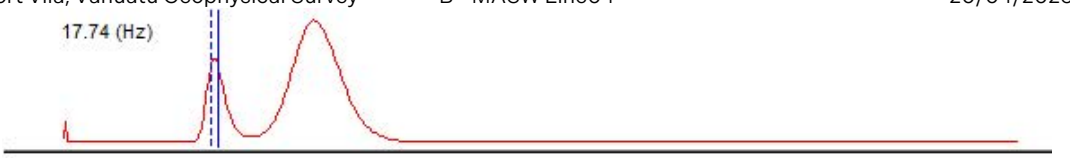

shot_4005
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

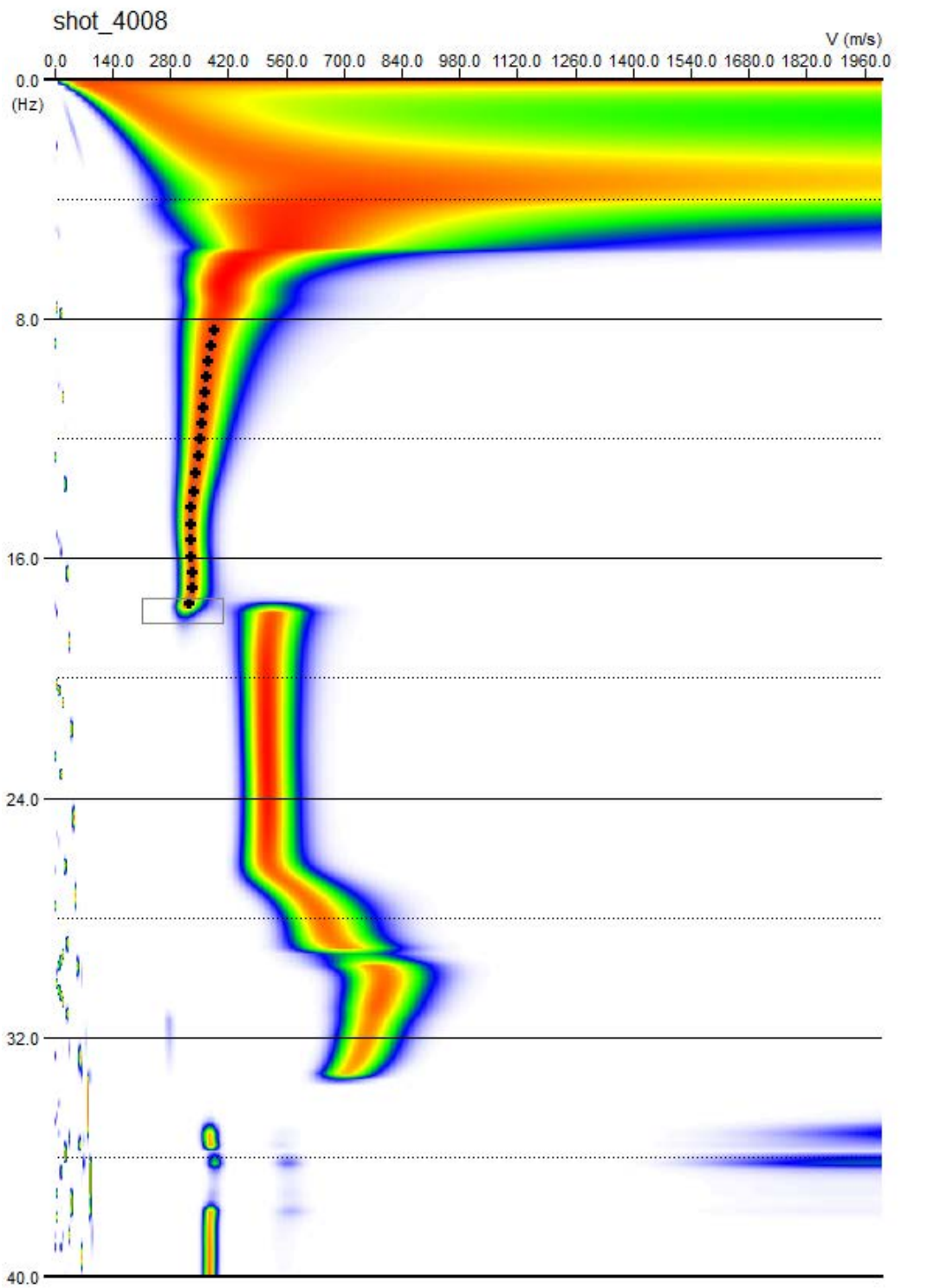

8.09 (Hz)

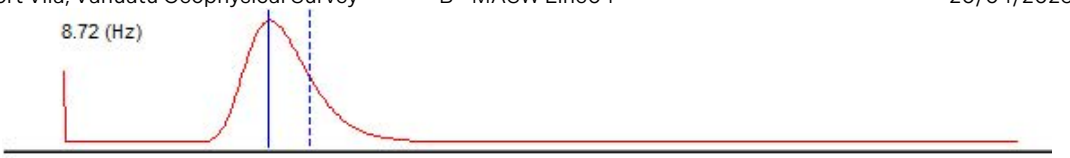

shot_4006
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

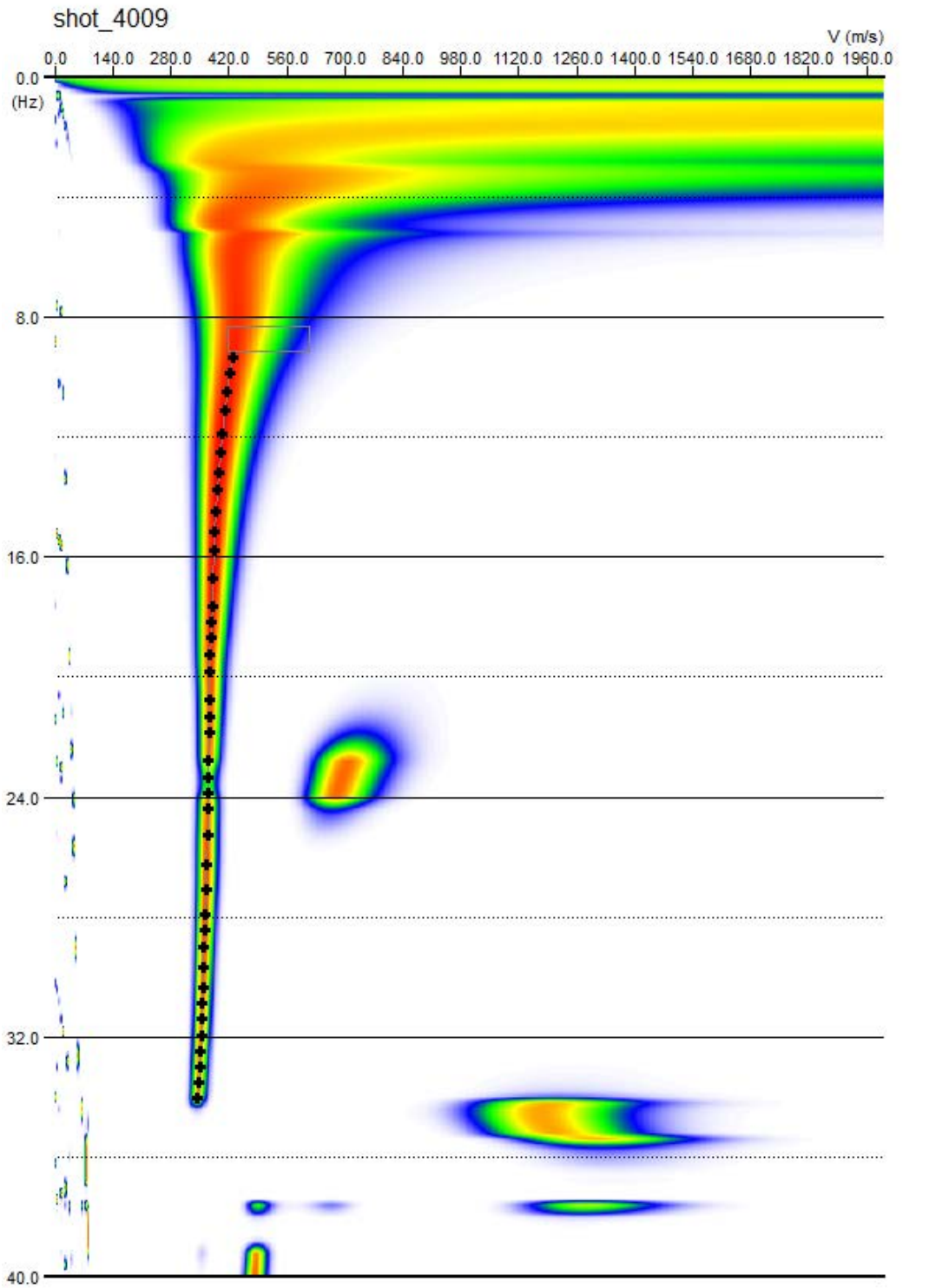

8.98 (Hz)

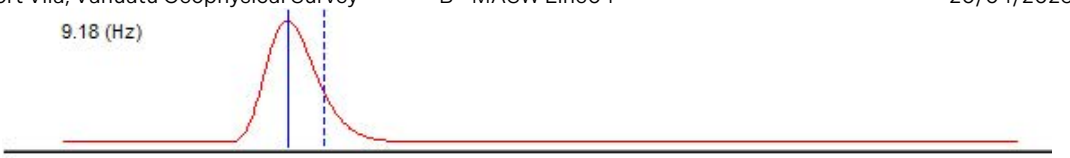

shot_4007
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

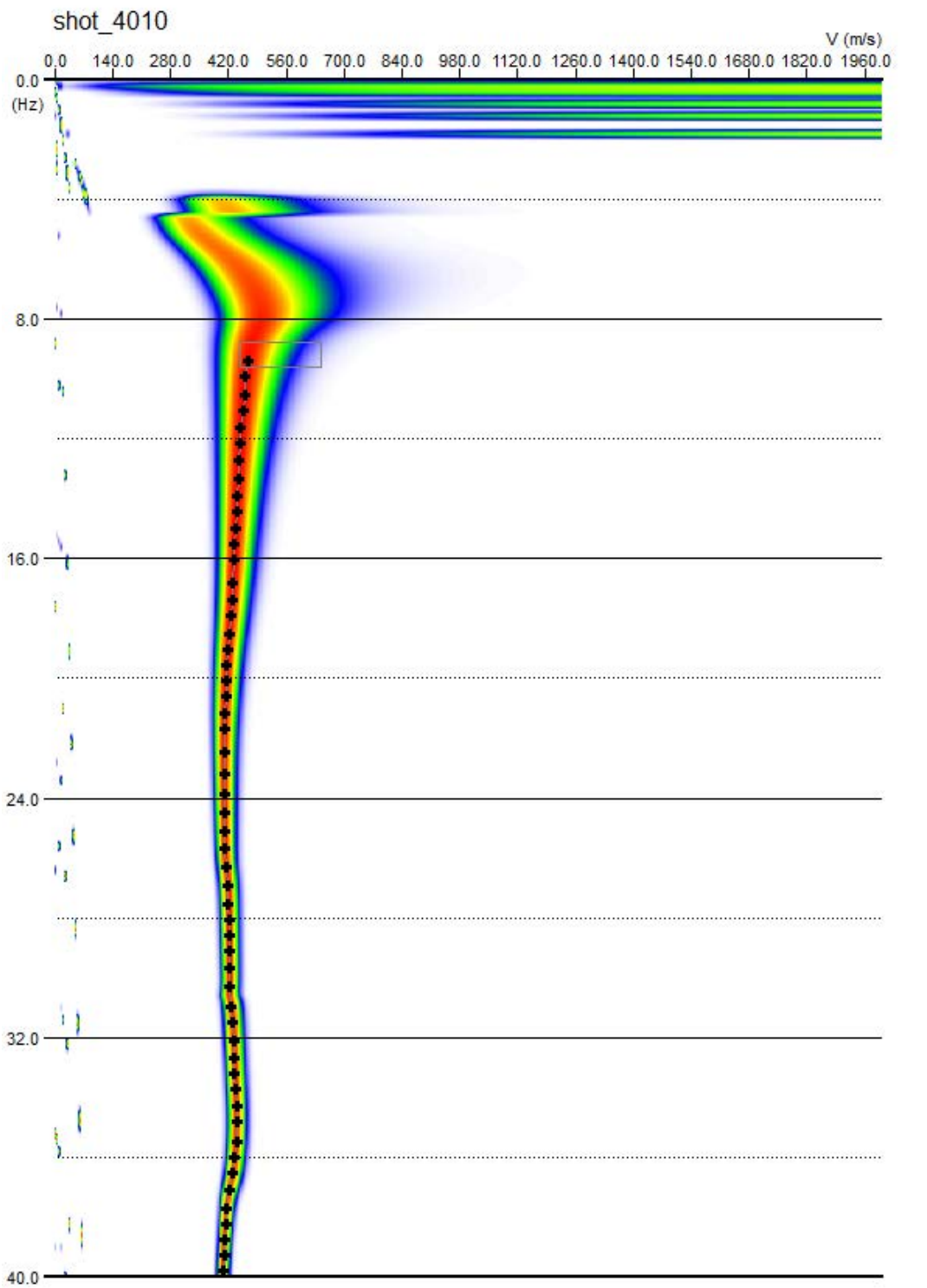

17.74 (Hz)

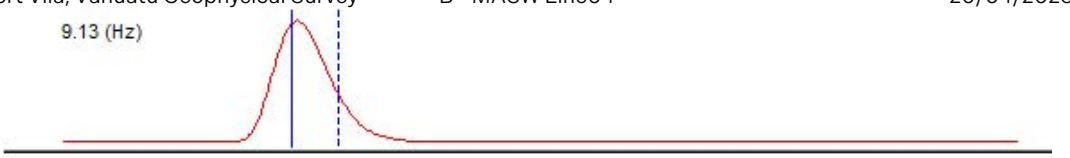

shot_4008
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

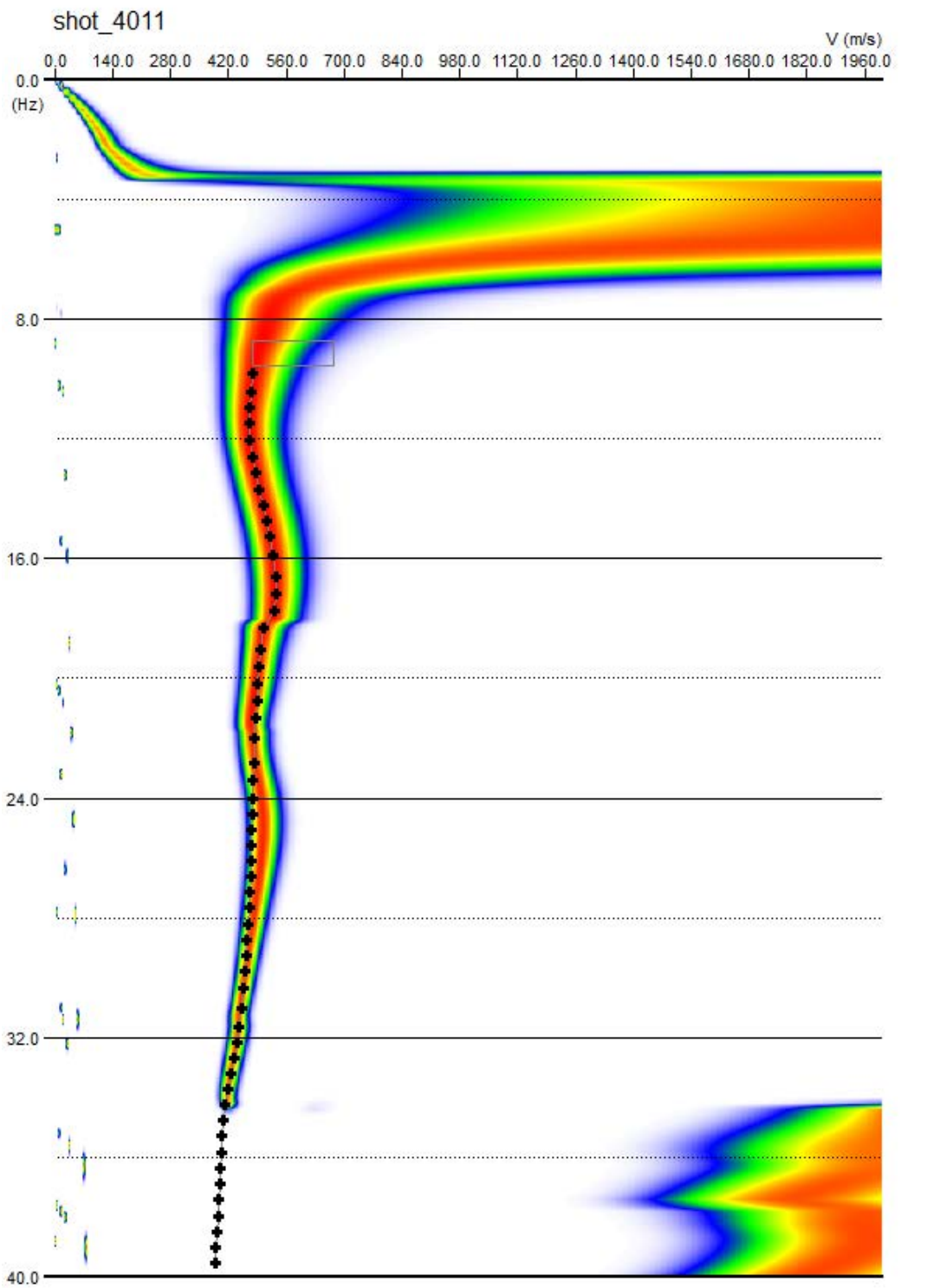

8.72 (Hz)


shot_4009
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

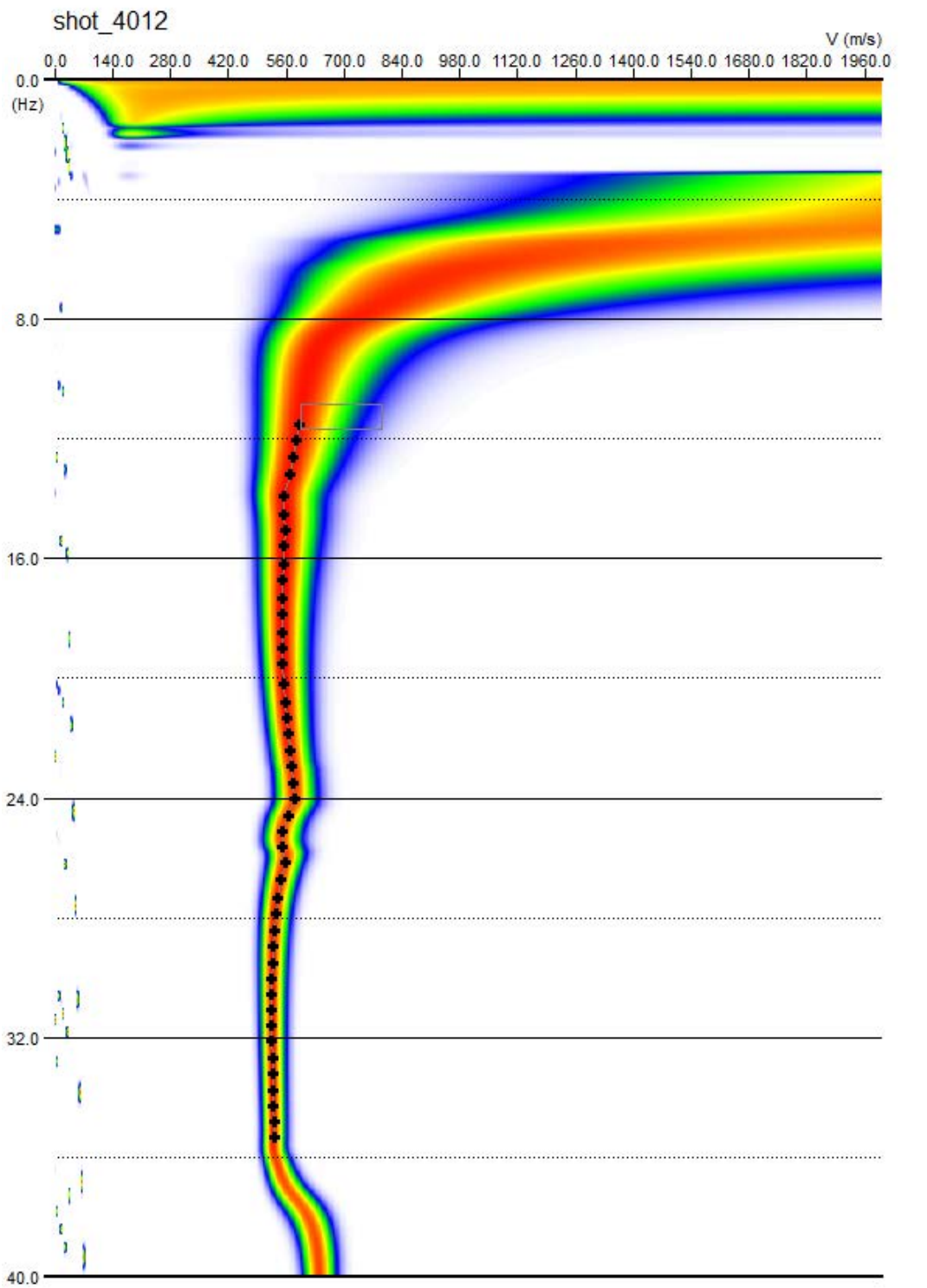

9.18 (Hz)

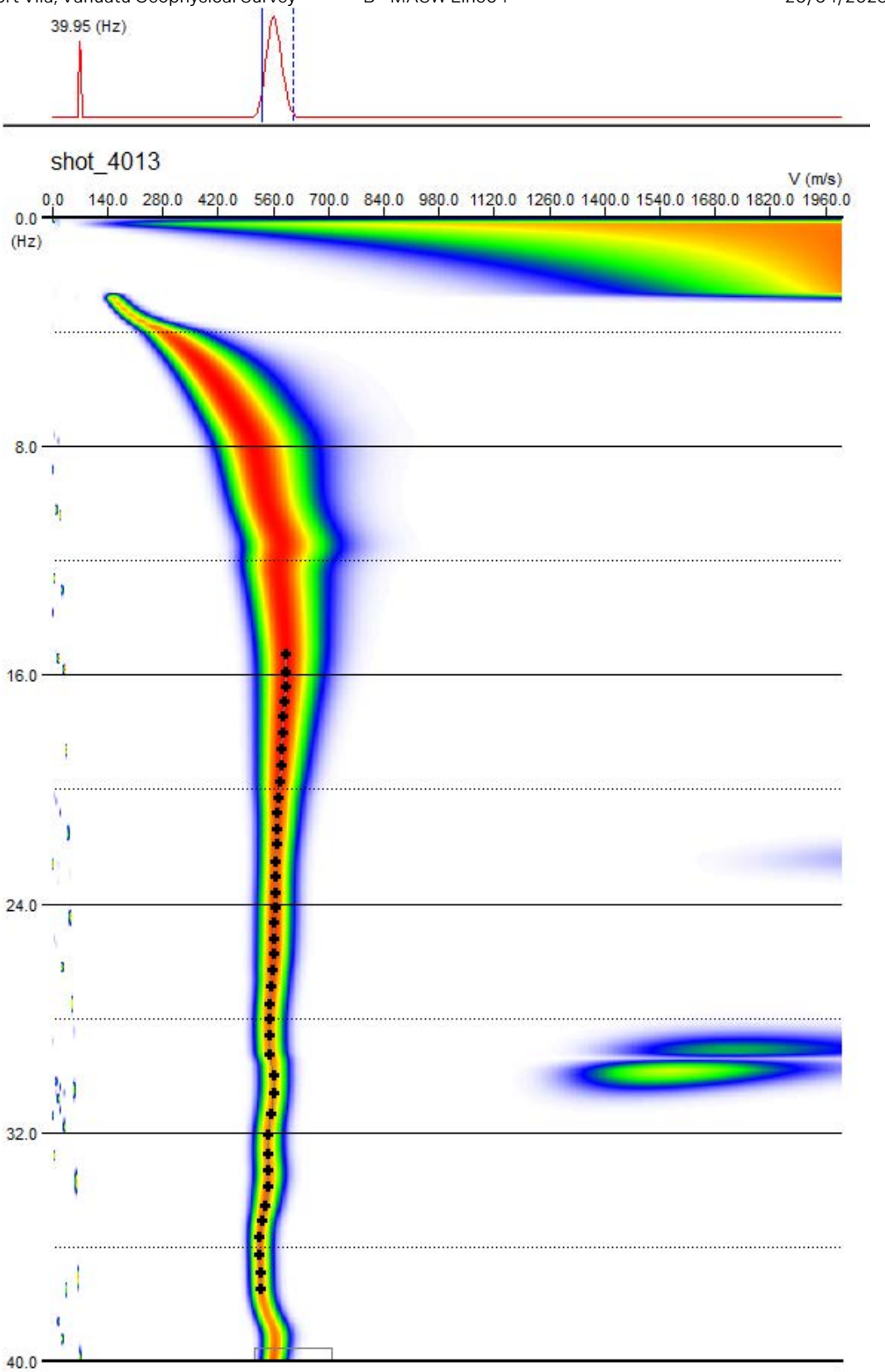

shot_4010
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

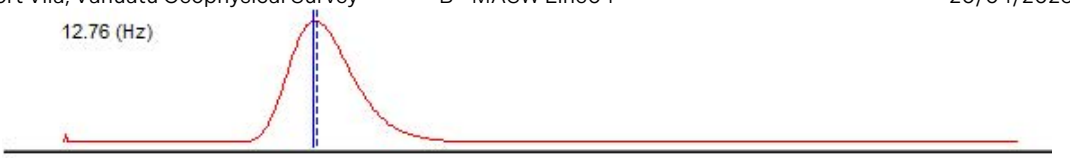

9.13 (Hz)

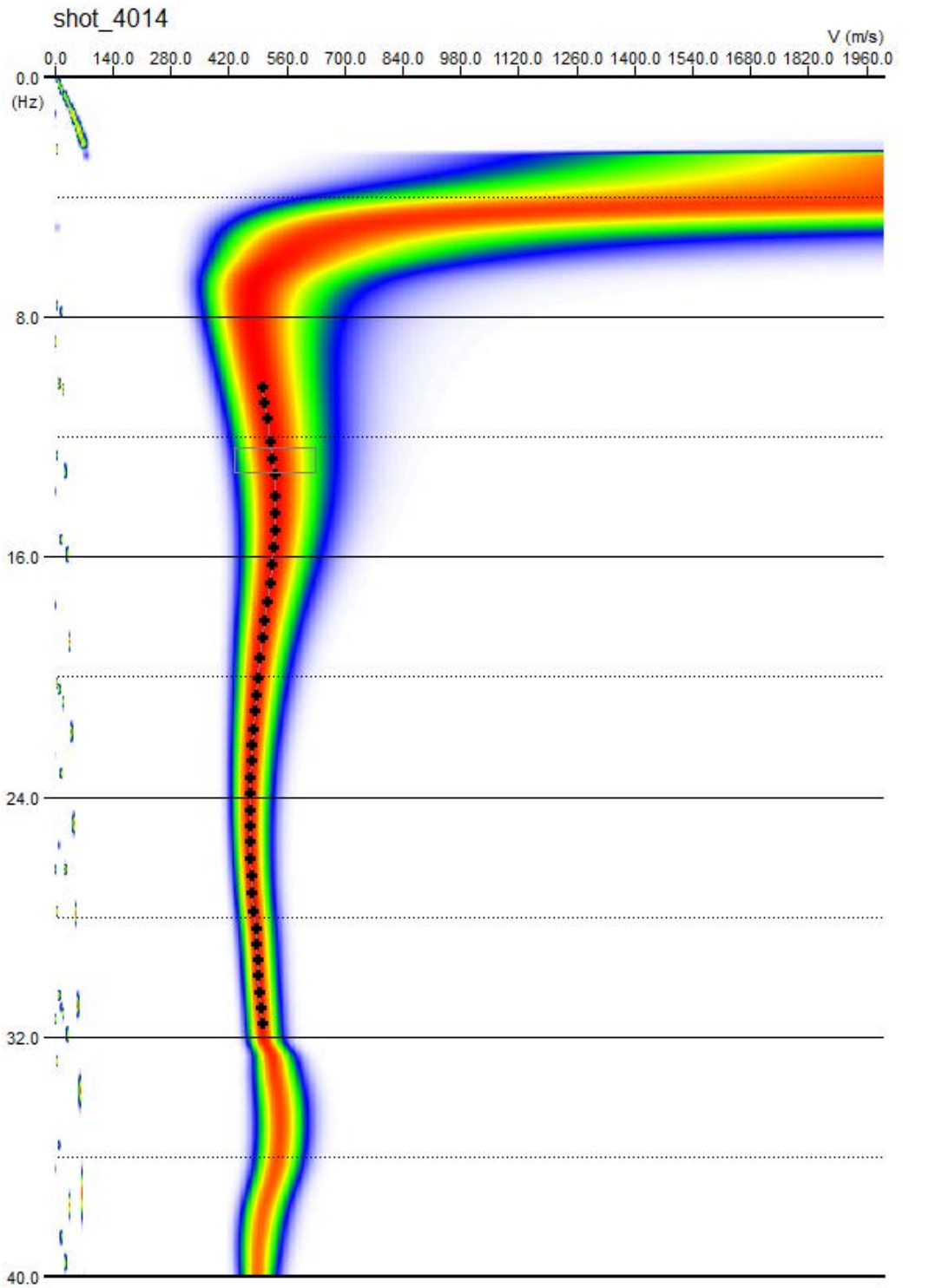

shot_4011
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

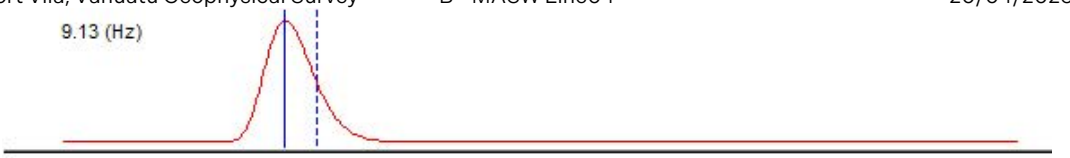

11.26 (Hz)

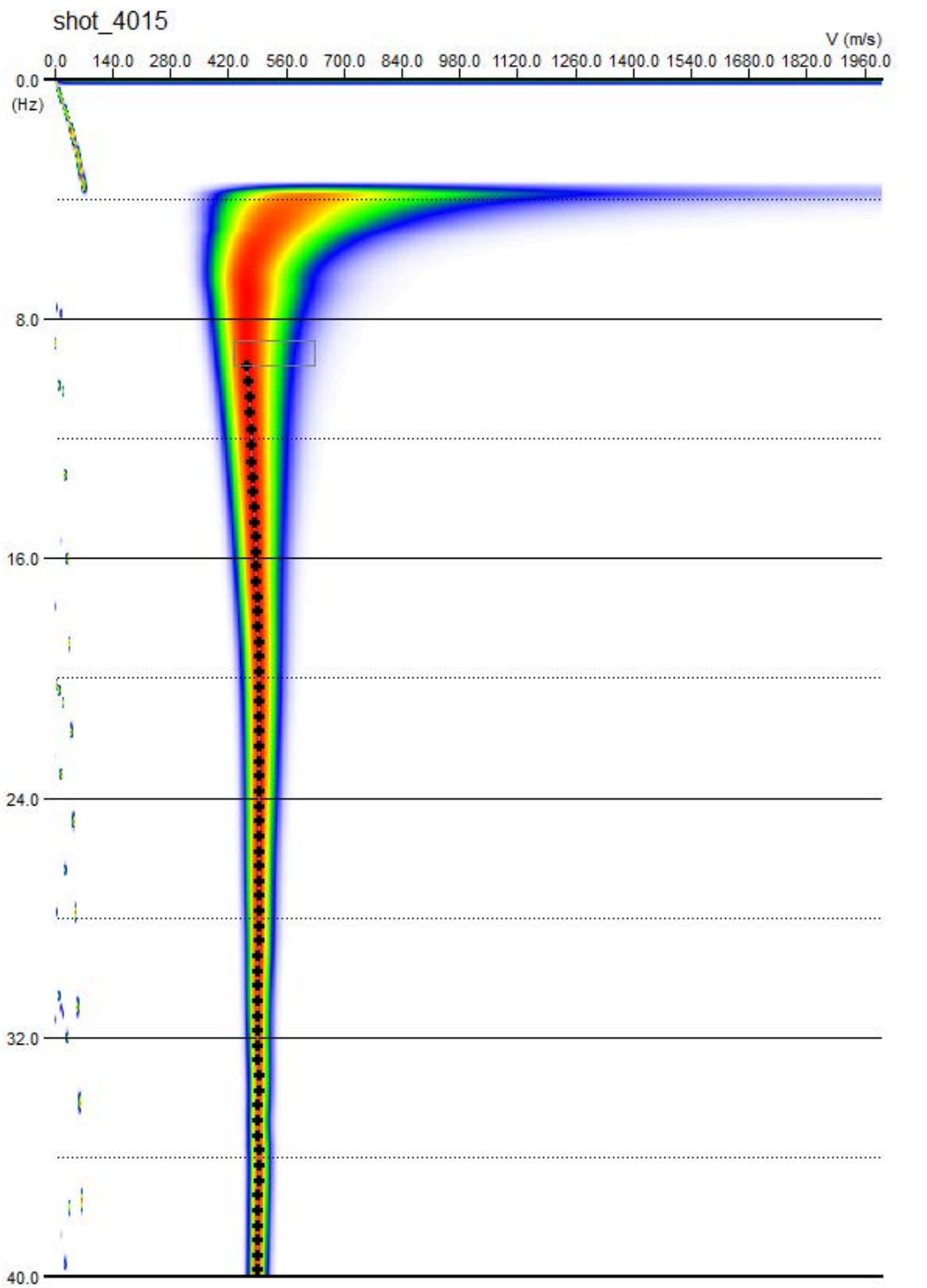

shot_4012
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

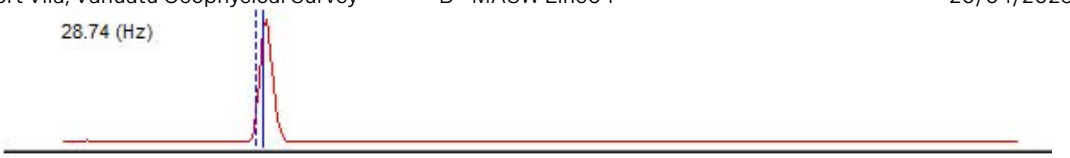

39.95 (Hz)
shot_4013
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

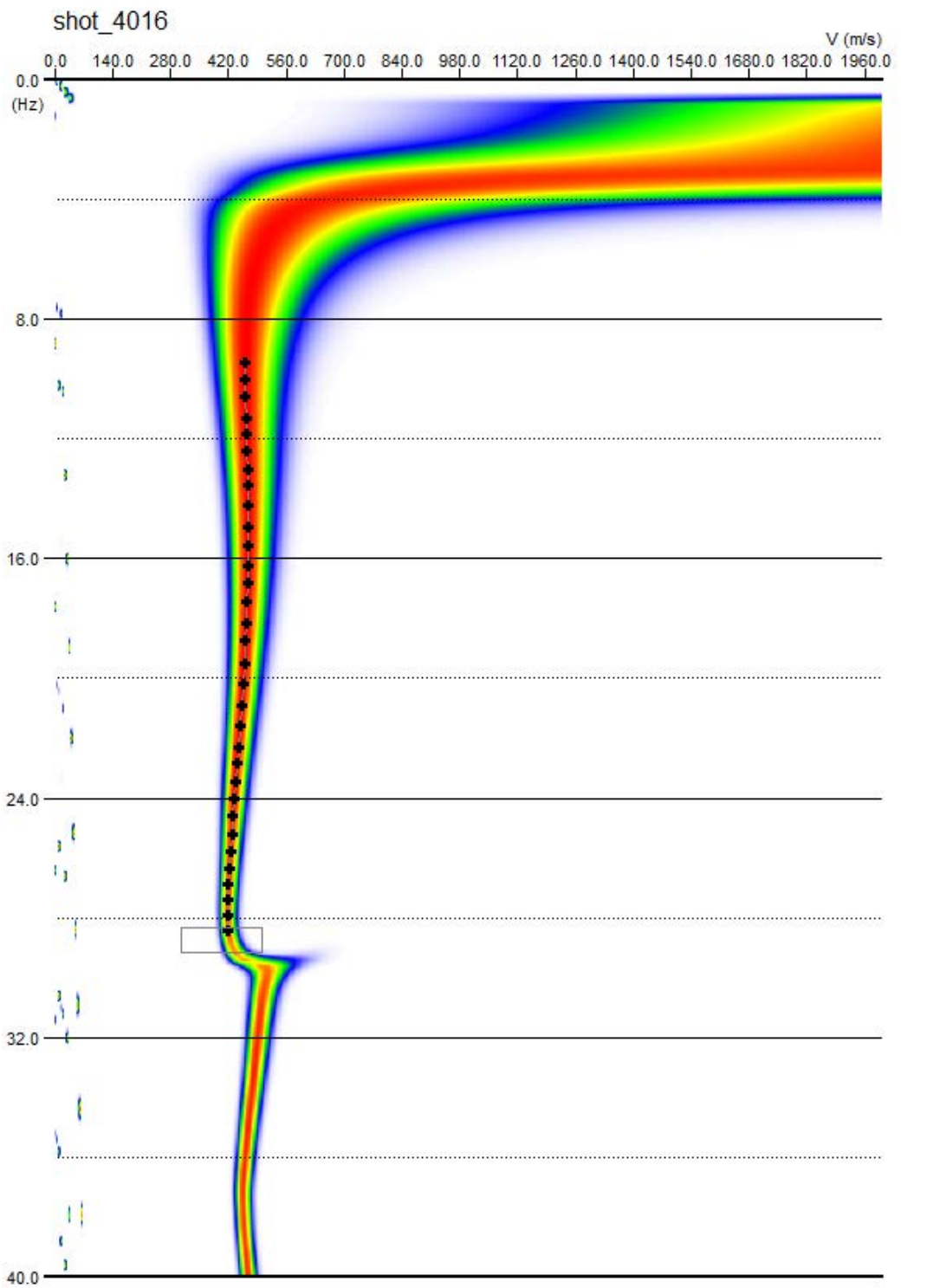

12.76 (Hz)


shot_4014
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

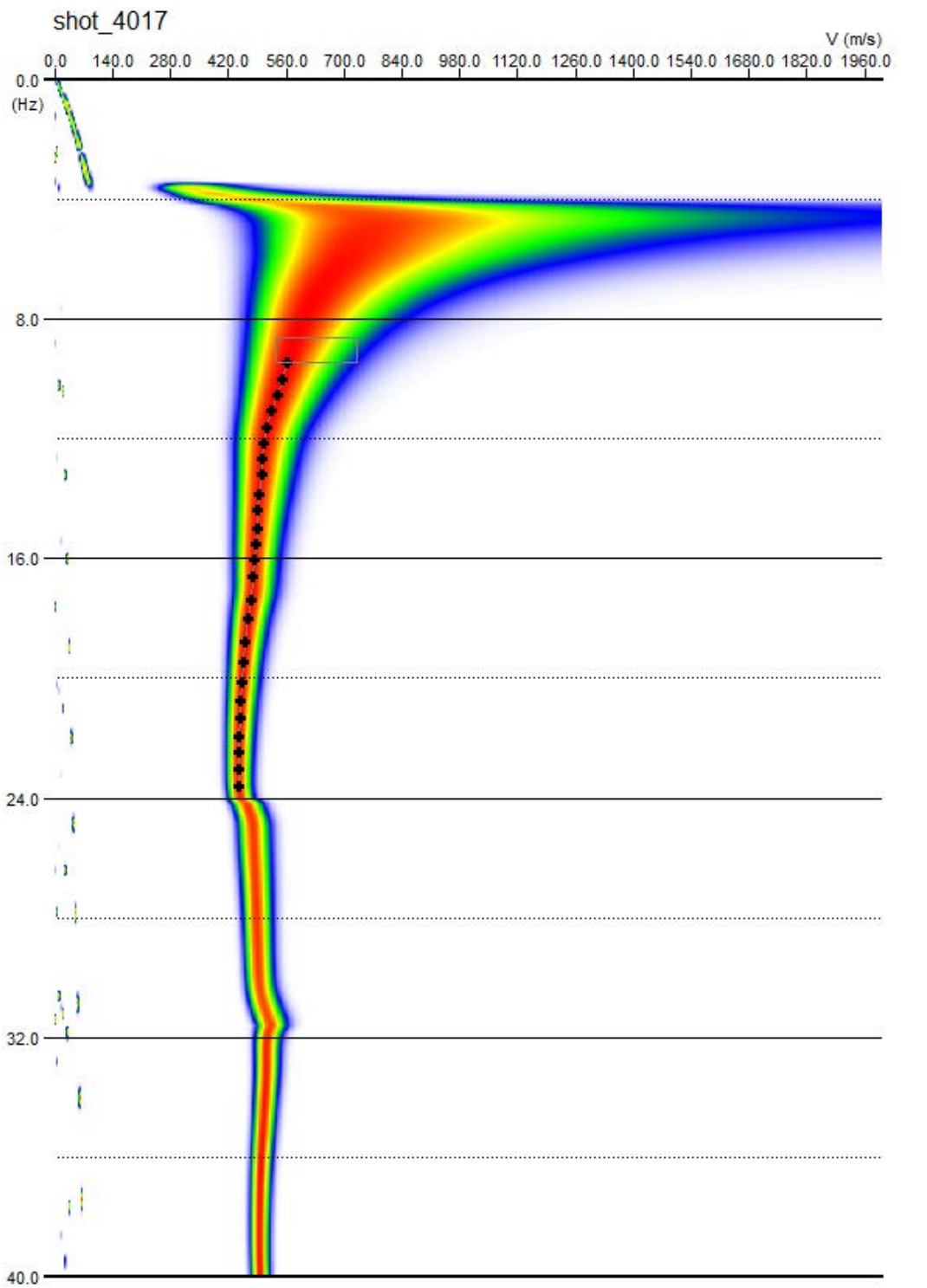

9.13 (Hz)

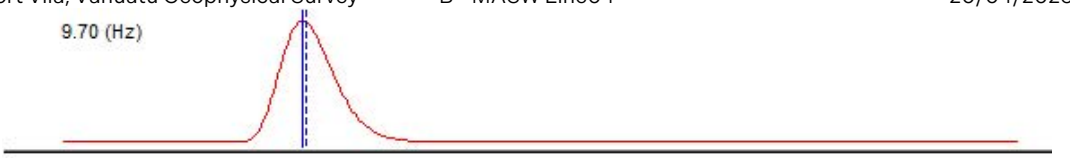

shot_4015
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

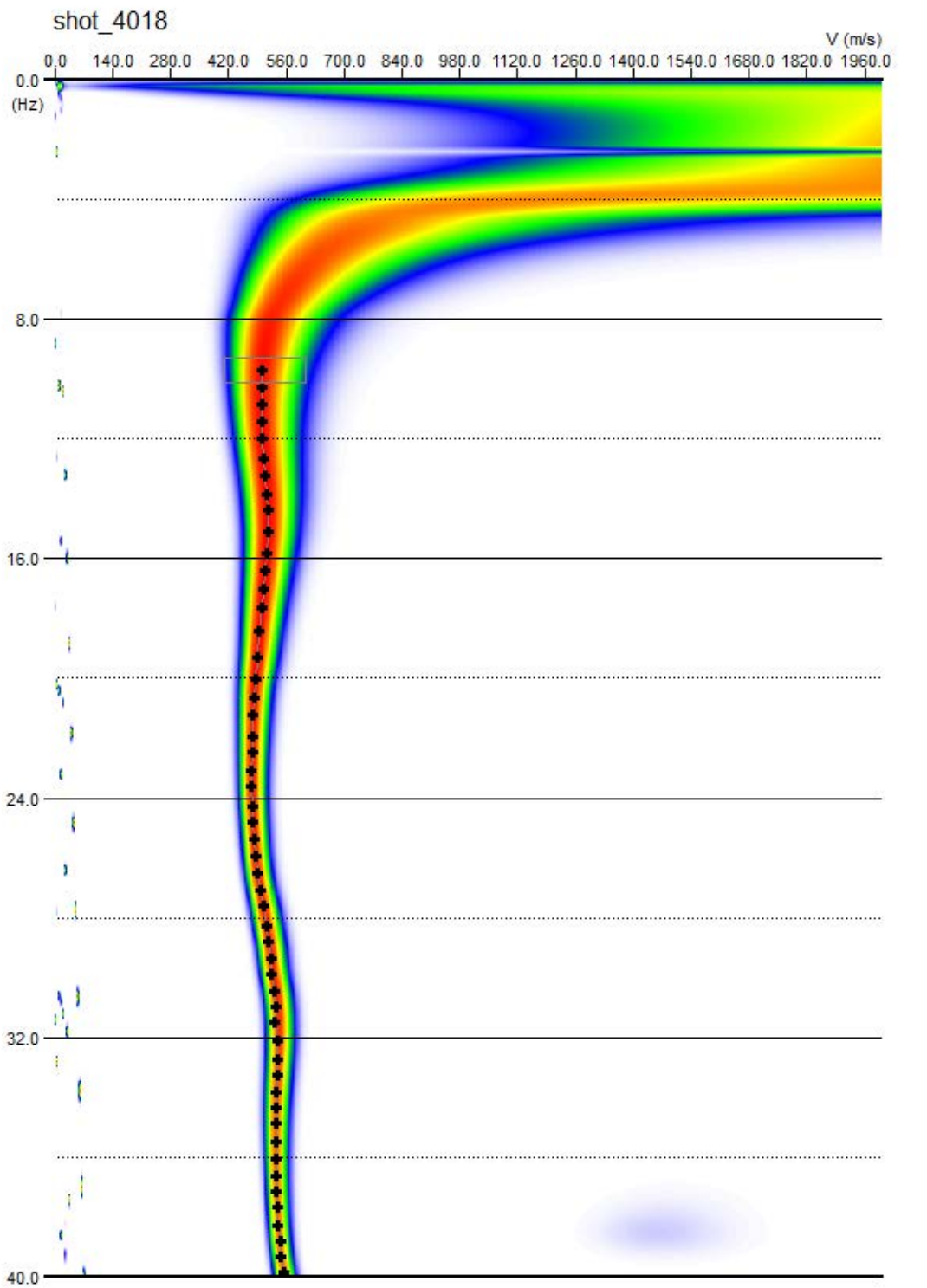

28.74 (Hz)

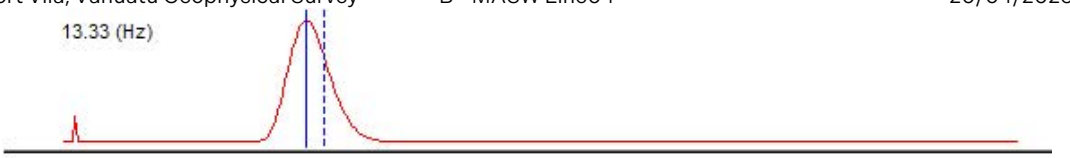

shot_4016
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

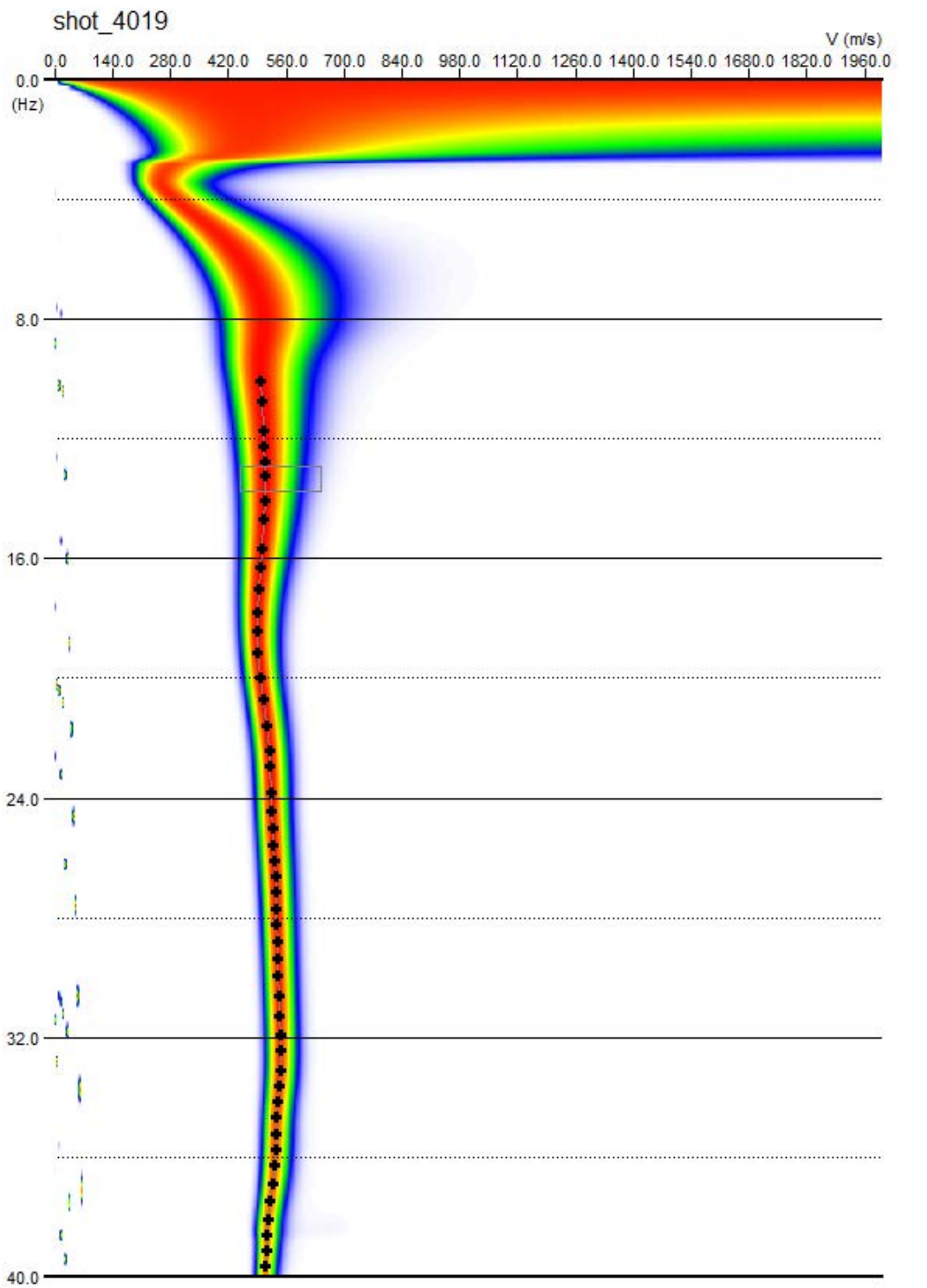

9.03 (Hz)

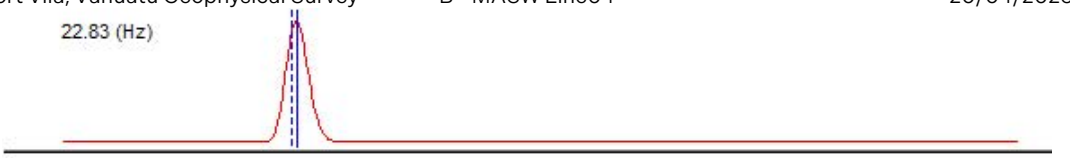

shot_4017
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

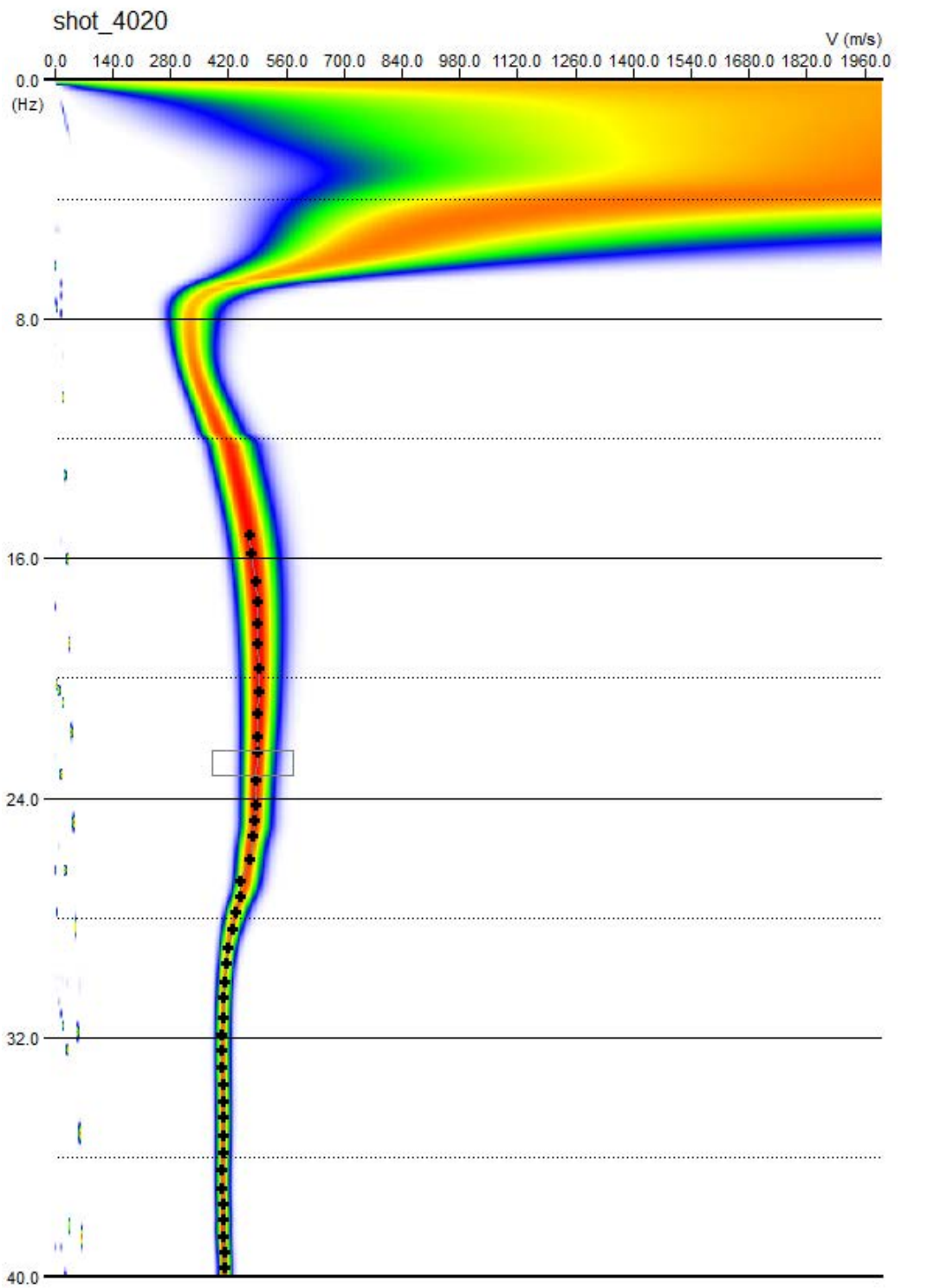

9.70 (Hz)

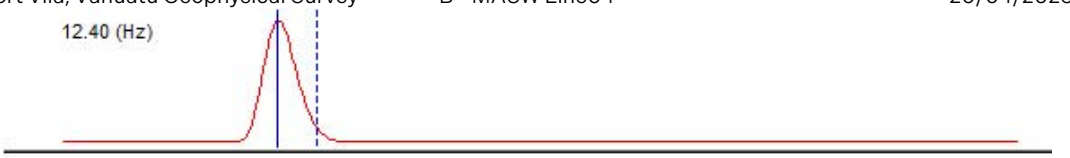

shot_4018
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

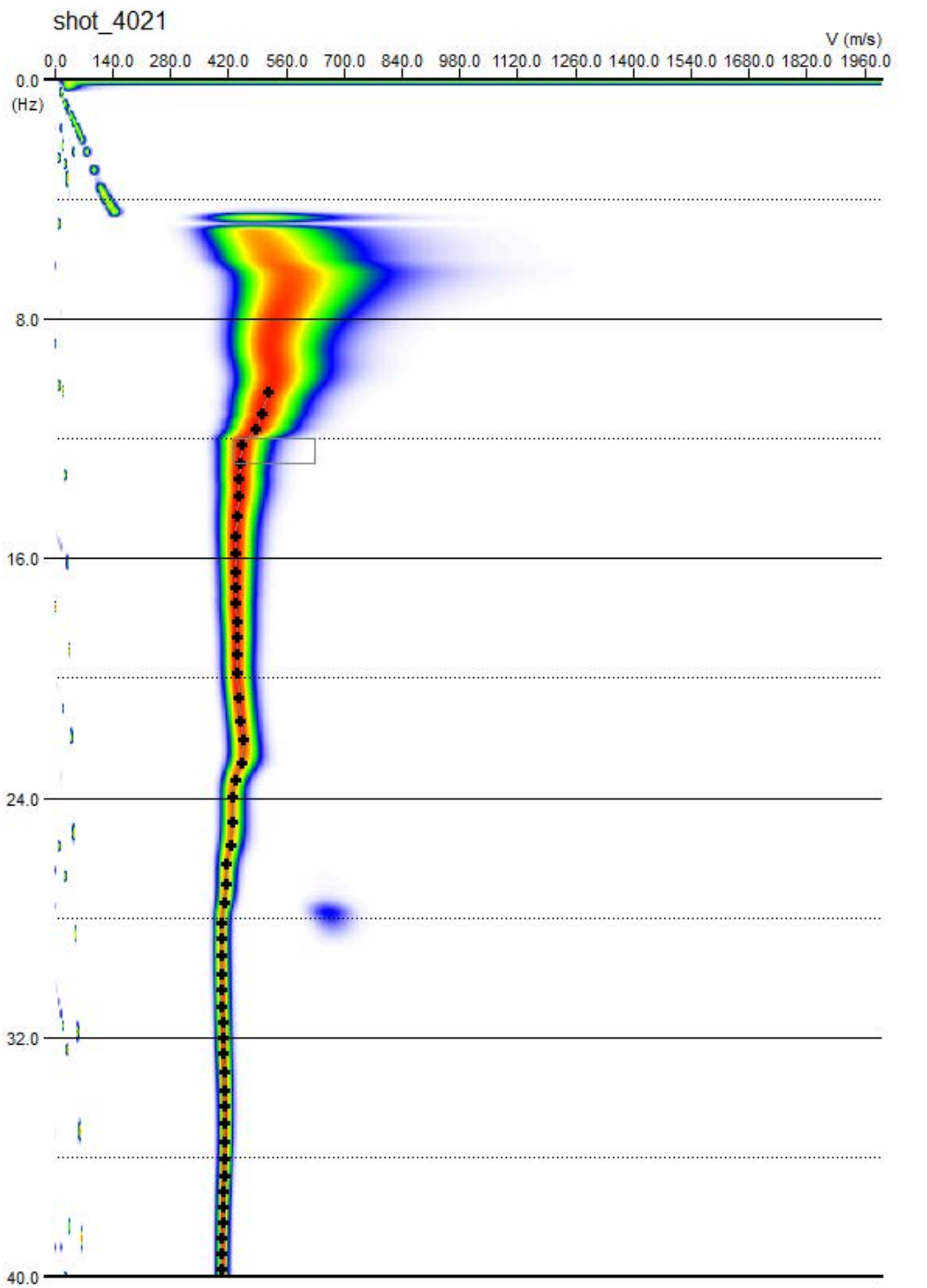

13.33 (Hz)

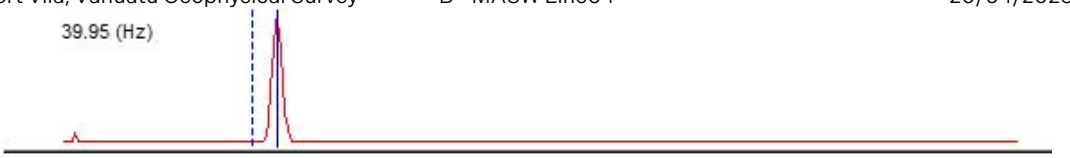

shot_4019
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

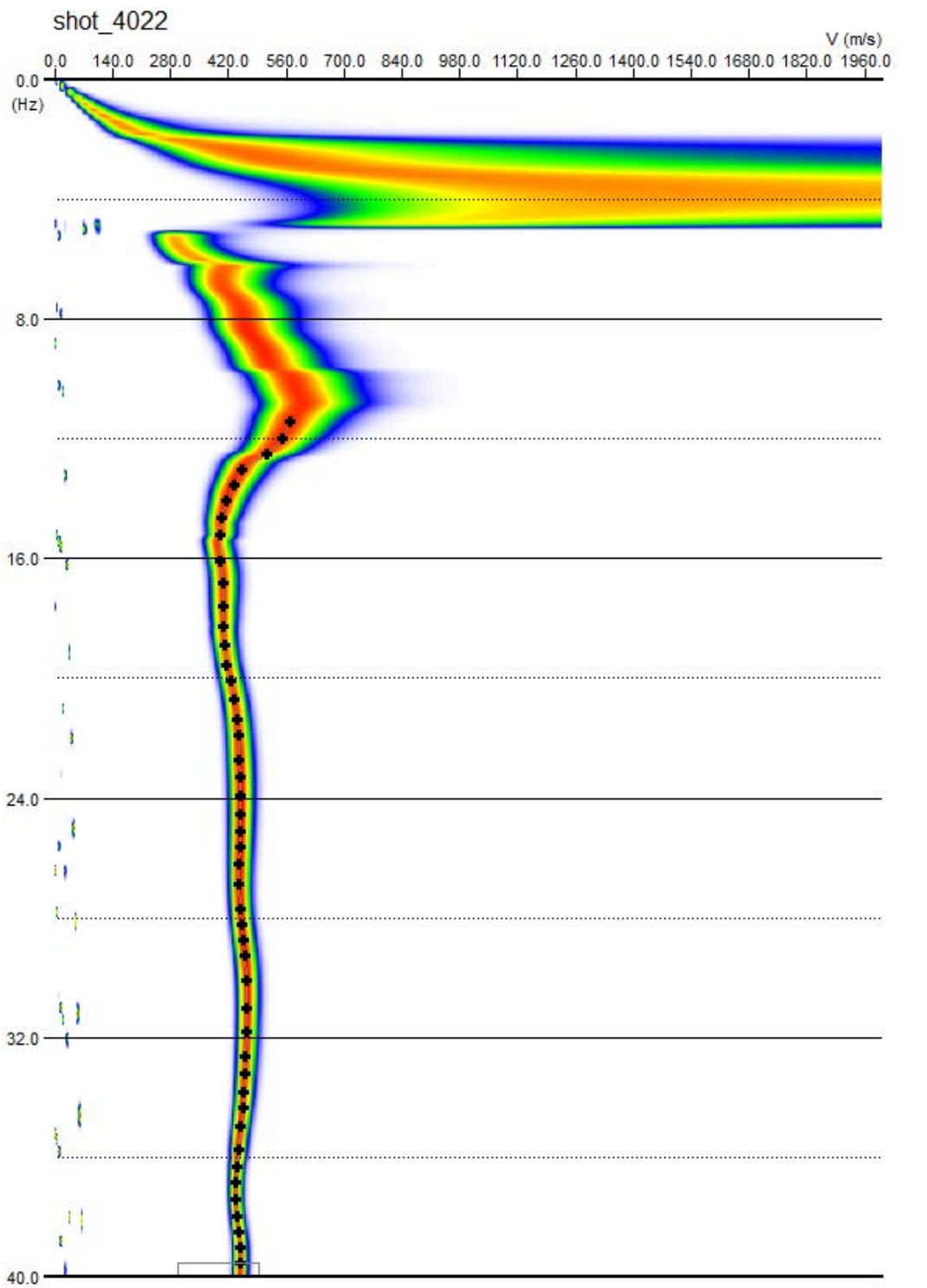

22.83 (Hz)

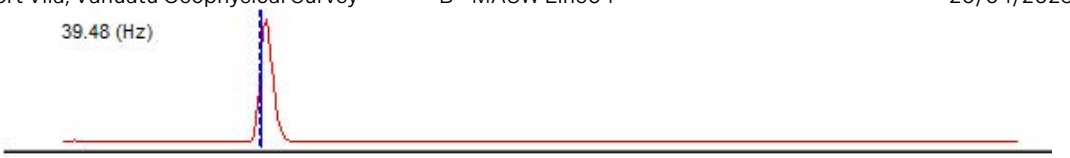

shot_4020
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

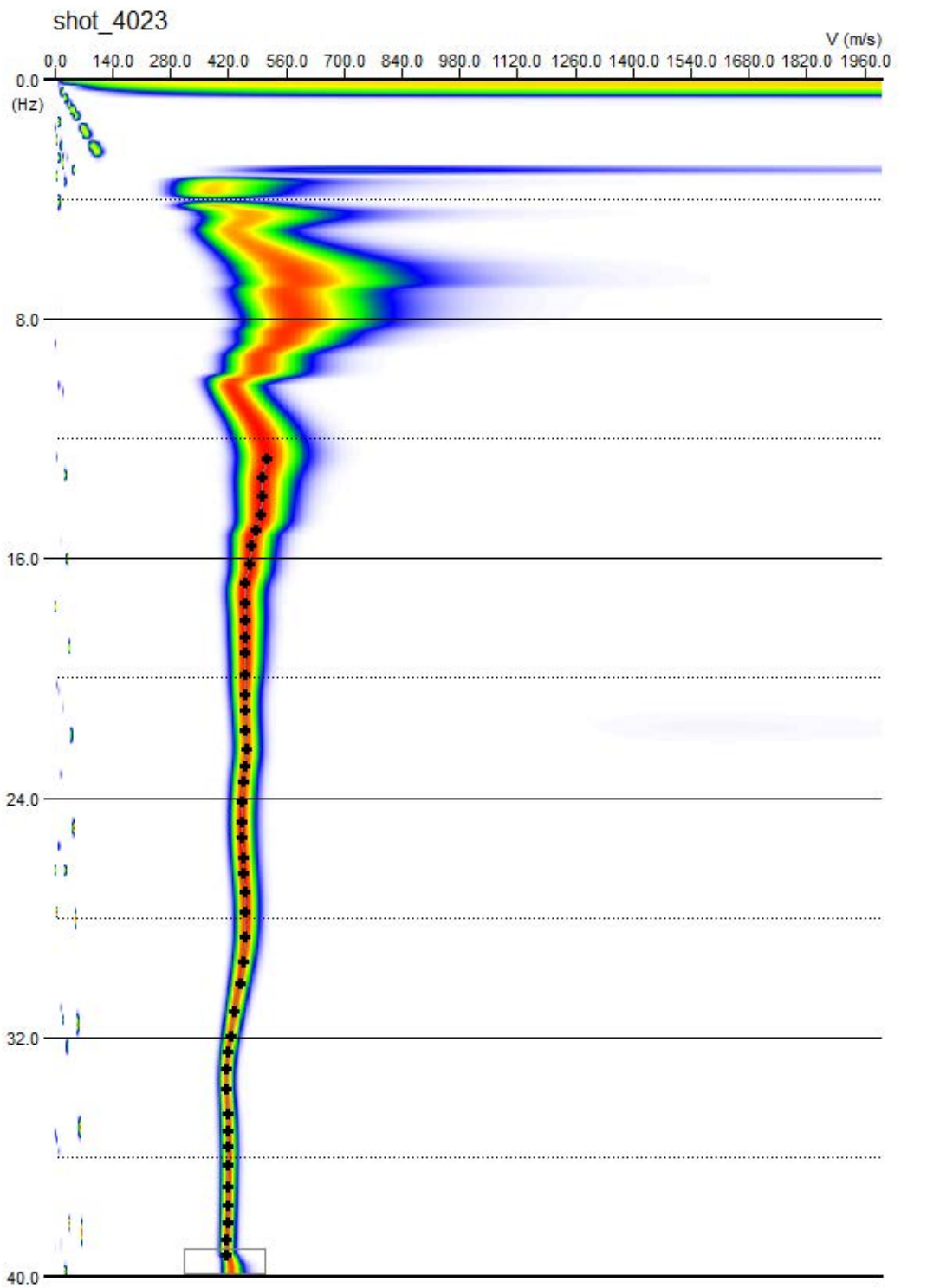

12.40 (Hz)

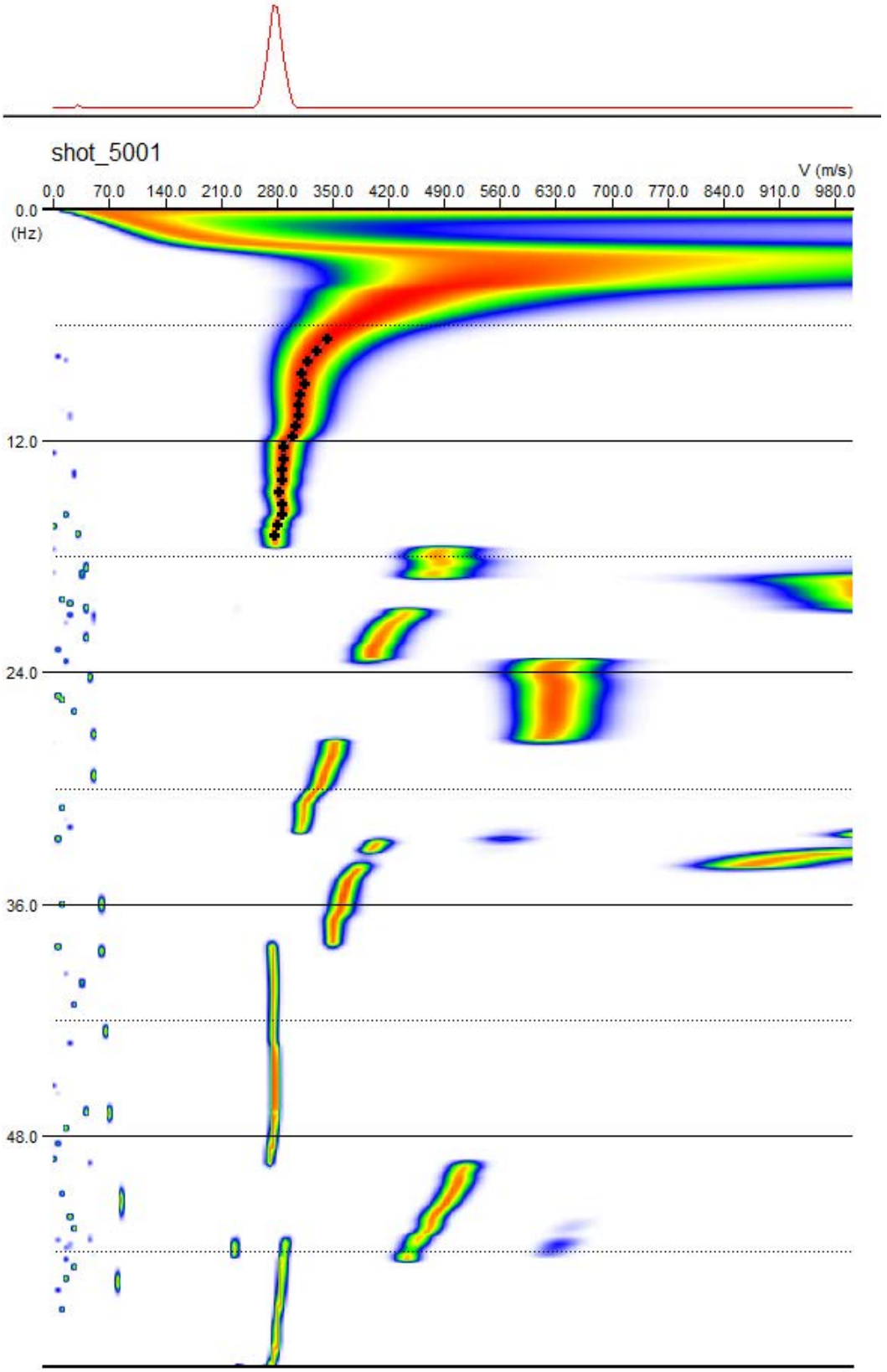

shot_4021
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

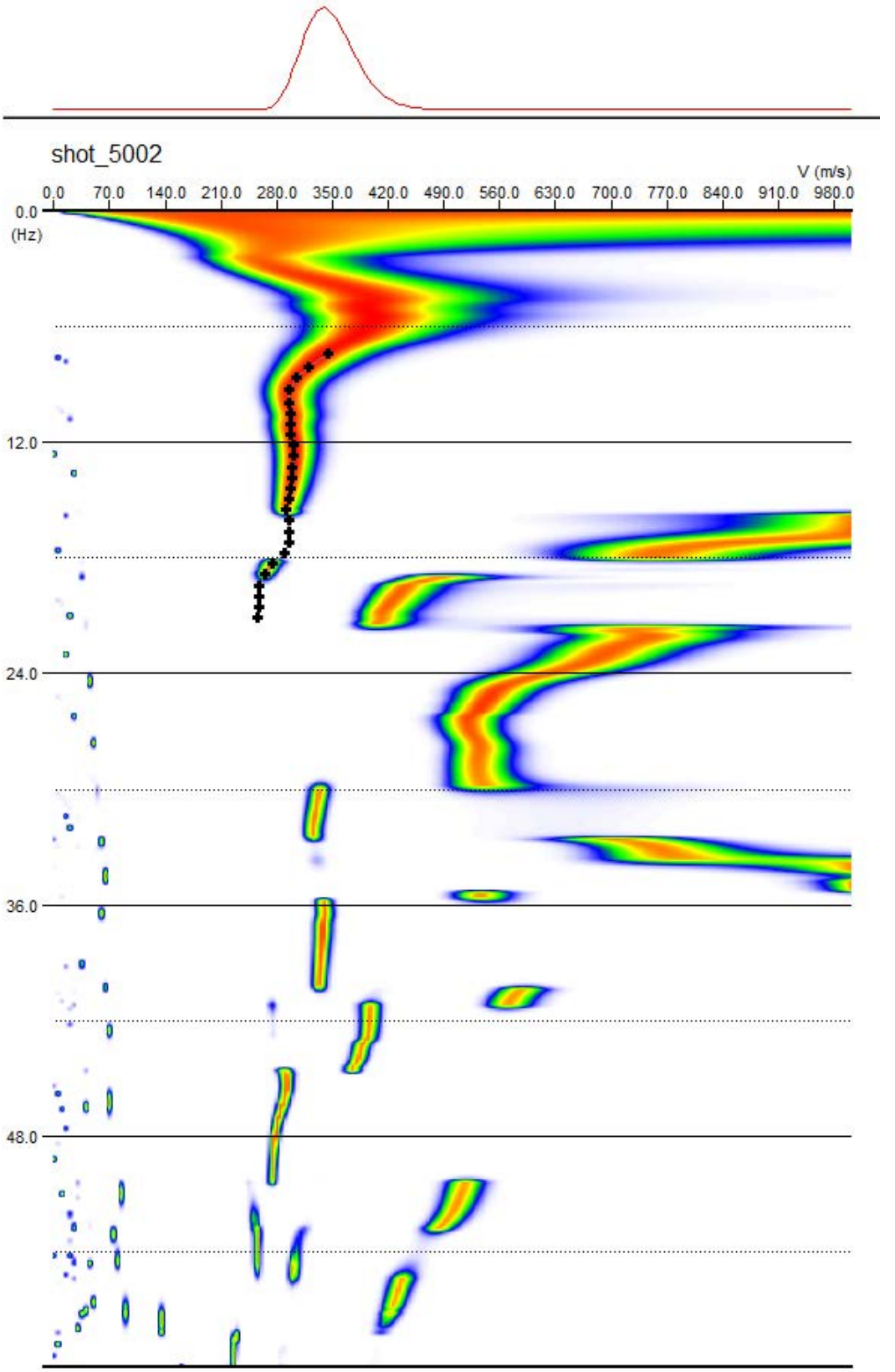

39.95 (Hz)

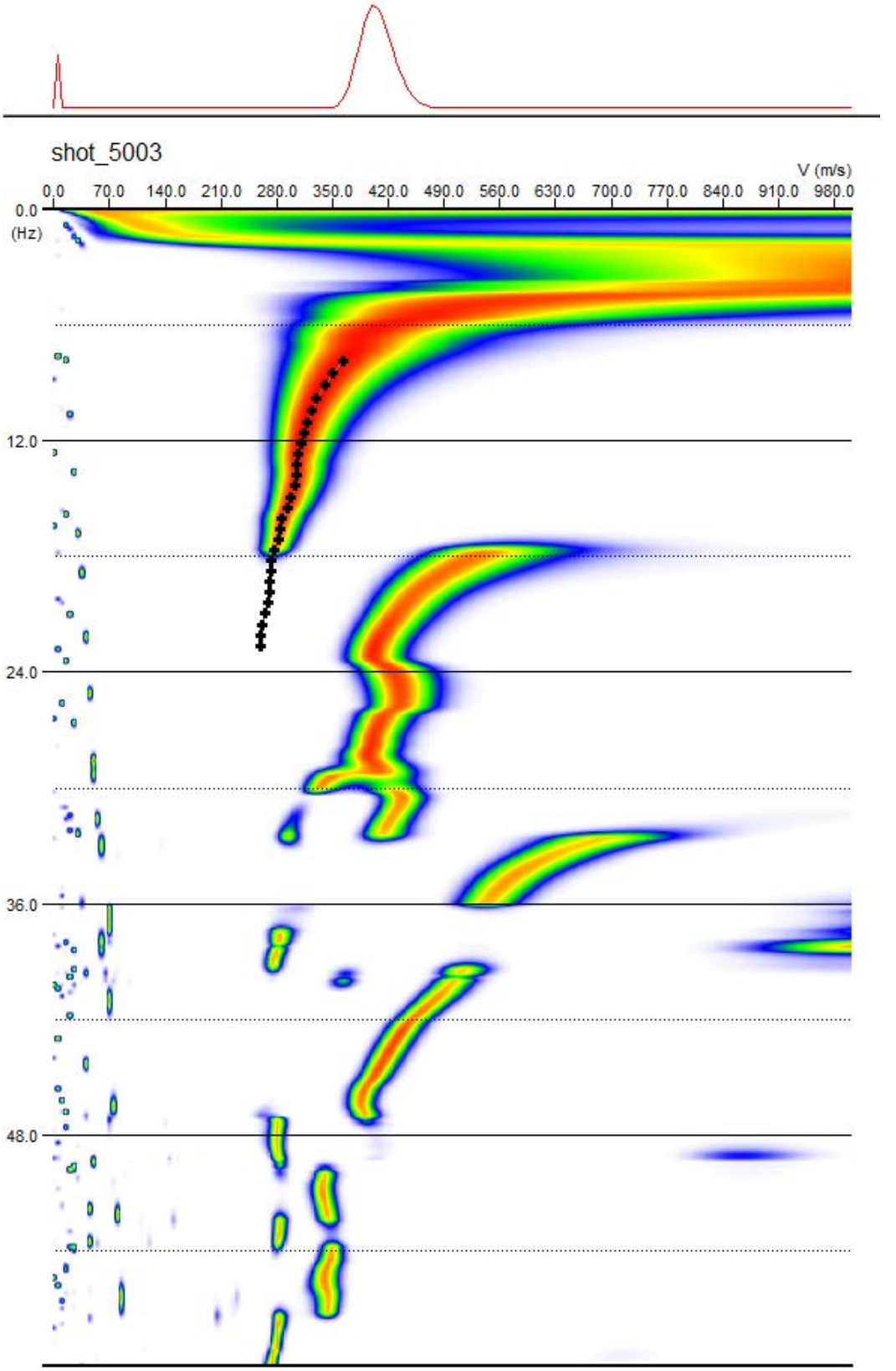

shot_4022
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

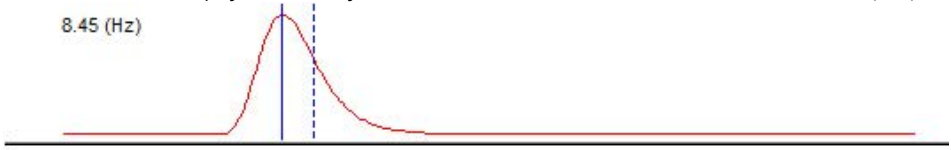

39.48 (Hz)

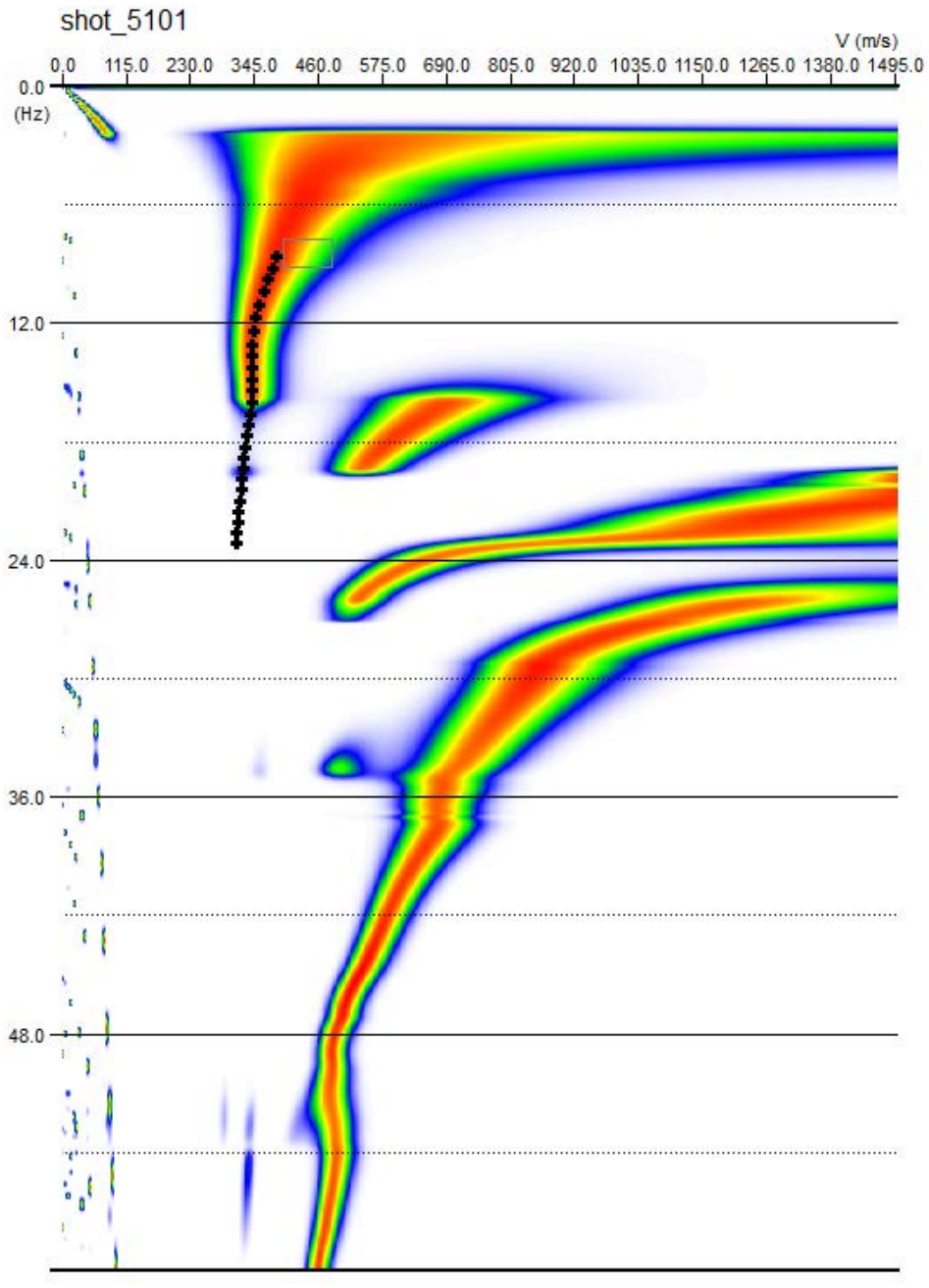

shot_4023
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

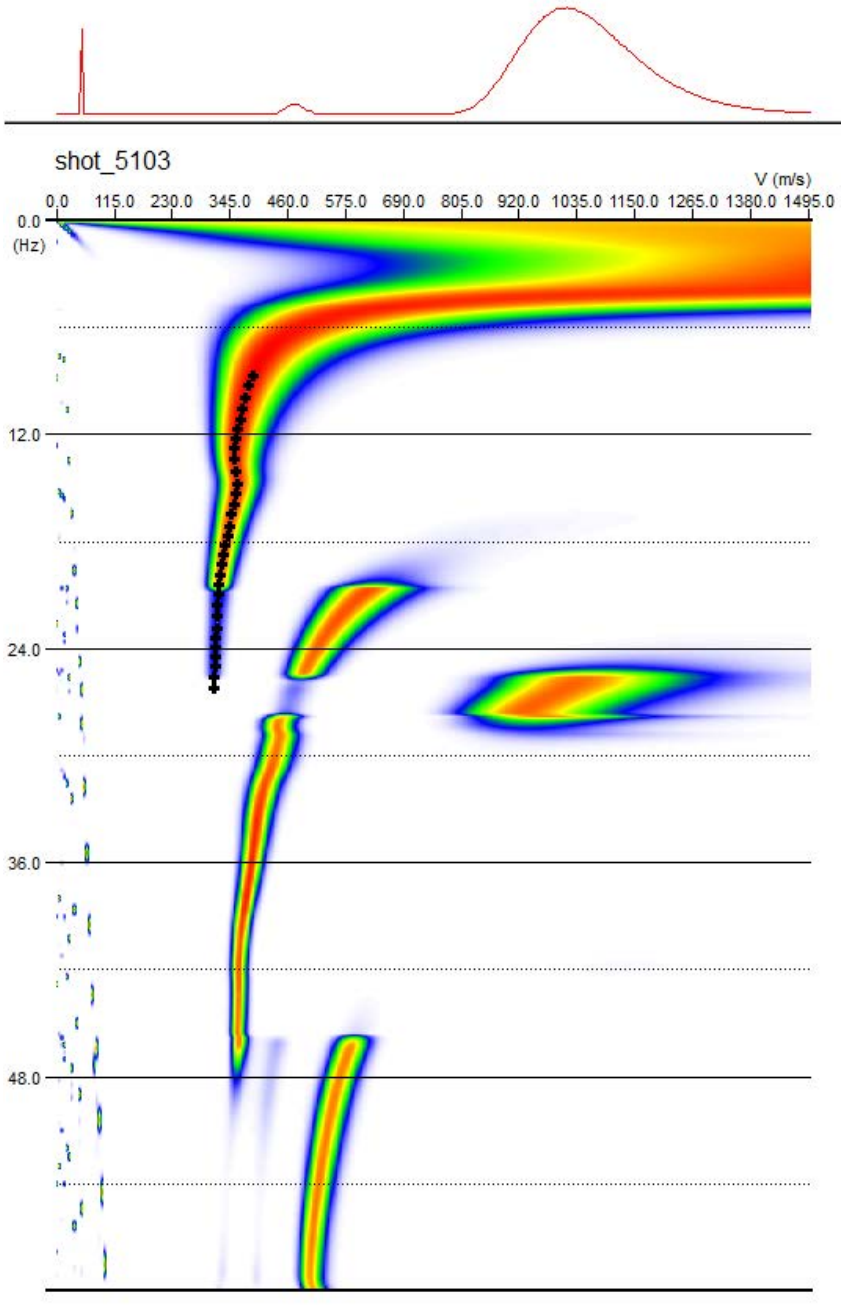

shot_5001
V (m/s)
0.0
70.0
140.0
210.0
280.0
350.0
420.0
490.0
560.0
630.0
700.0
770.0
840.0
910.0
980.0
0.0
(Hz)
12.0
24.0
36.0
48.0

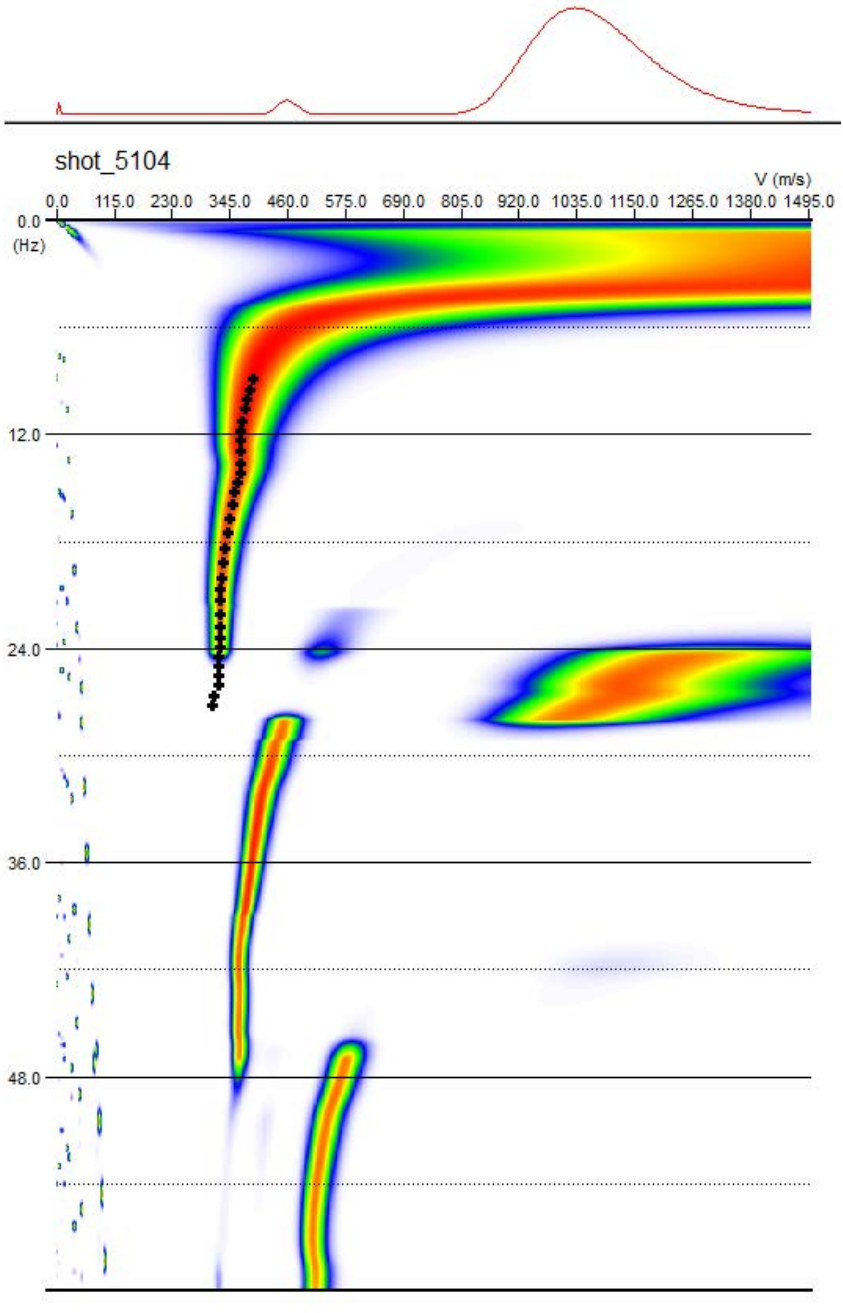

shot_5002
V (m/s)
0.0
70.0
140.0
210.0
280.0
350.0
420.0
490.0
560.0
630.0
700.0
770.0
840.0
910.0
980.0
0.0
(Hz)
12.0
24.0
36.0
48.0


shot_5003
V (m/s)
0.0
70.0
140.0
210.0
280.0
350.0
420.0
490.0
560.0
630.0
700.0
770.0
840.0
910.0
980.0
0.0
(Hz)
12.0
24.0
36.0
48.0

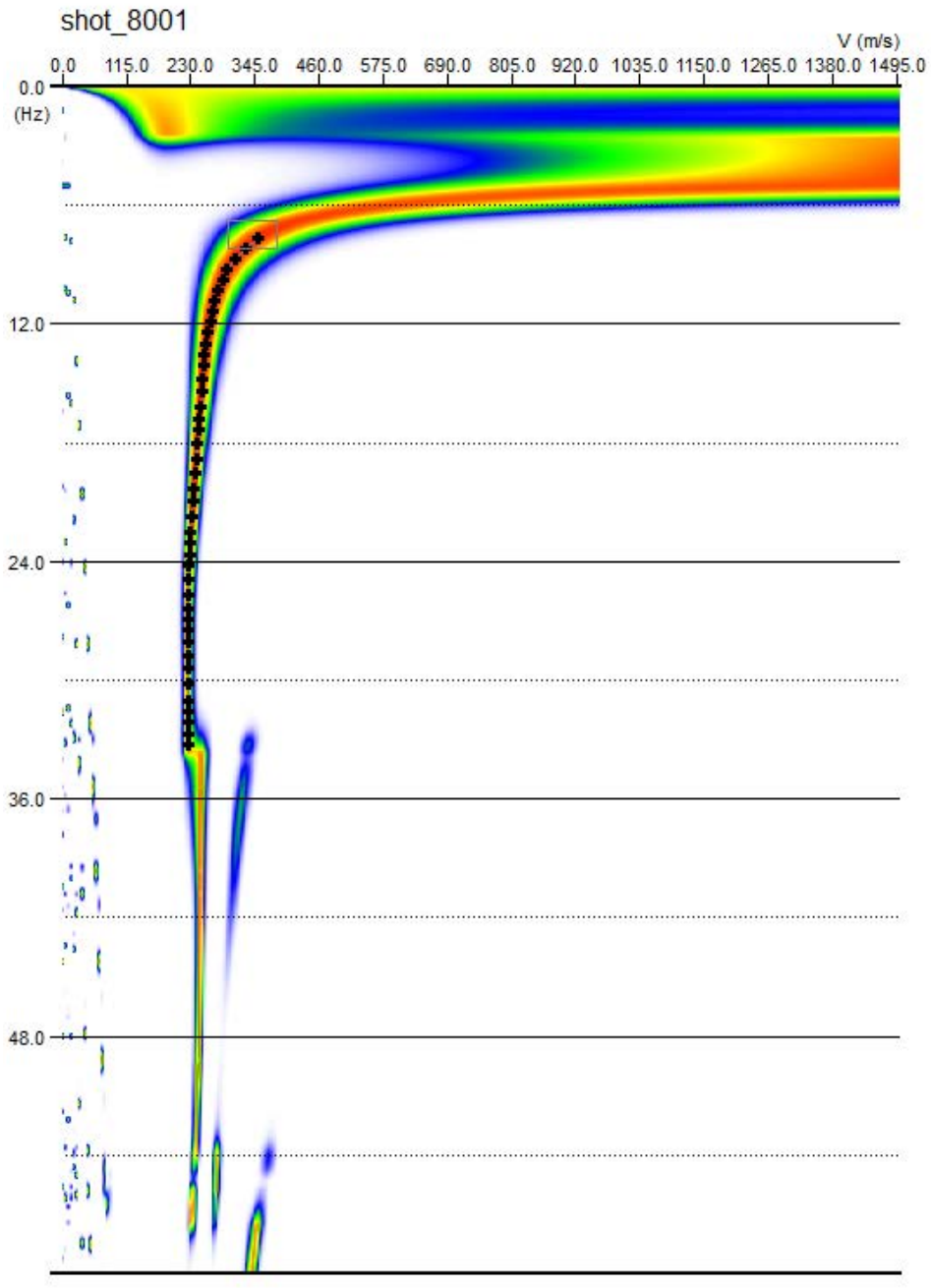

8.45 (Hz)


shot_5101
V (m/s)
0.0 115.0 230.0 345.0 460.0 575.0 690.0 805.0 920.0 1035.0 1150.0 1265.0 1380.0 1495.0
0.0
(Hz)
12.0
24.0
36.0
48.0

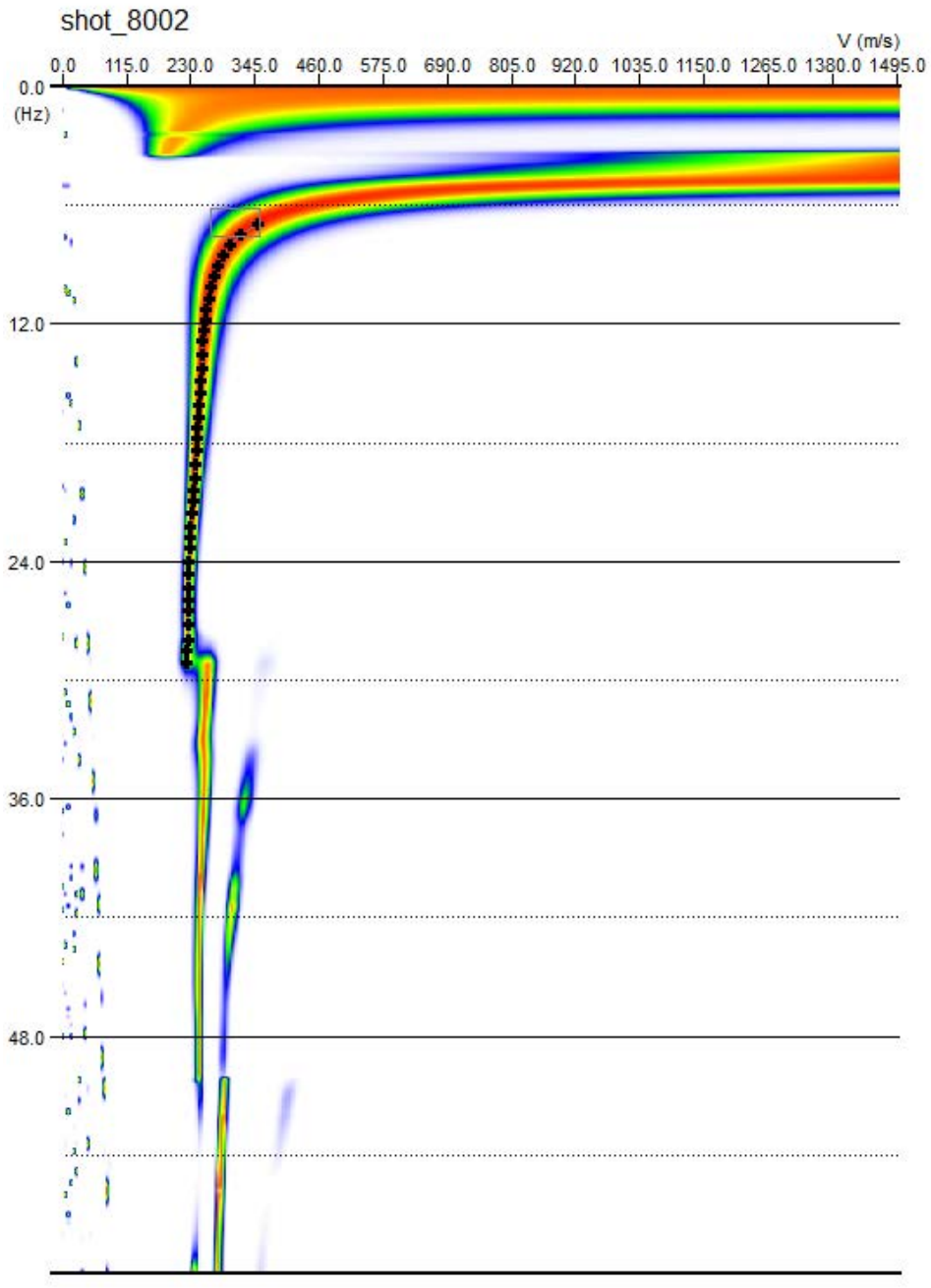

shot_5103
V (m/s)
0.0 115.0 230.0 345.0 460.0 575.0 690.0 805.0 920.0 1035.0 1150.0 1265.0 1380.0 1495.0
0.0
(Hz)
12.0
24.0
36.0
48.0


shot_5104
V (m/s)
0.0 115.0 230.0 345.0 460.0 575.0 690.0 805.0 920.0 1035.0 1150.0 1265.0 1380.0 1495.0
0.0
(Hz)
12.0
24.0
36.0
48.0

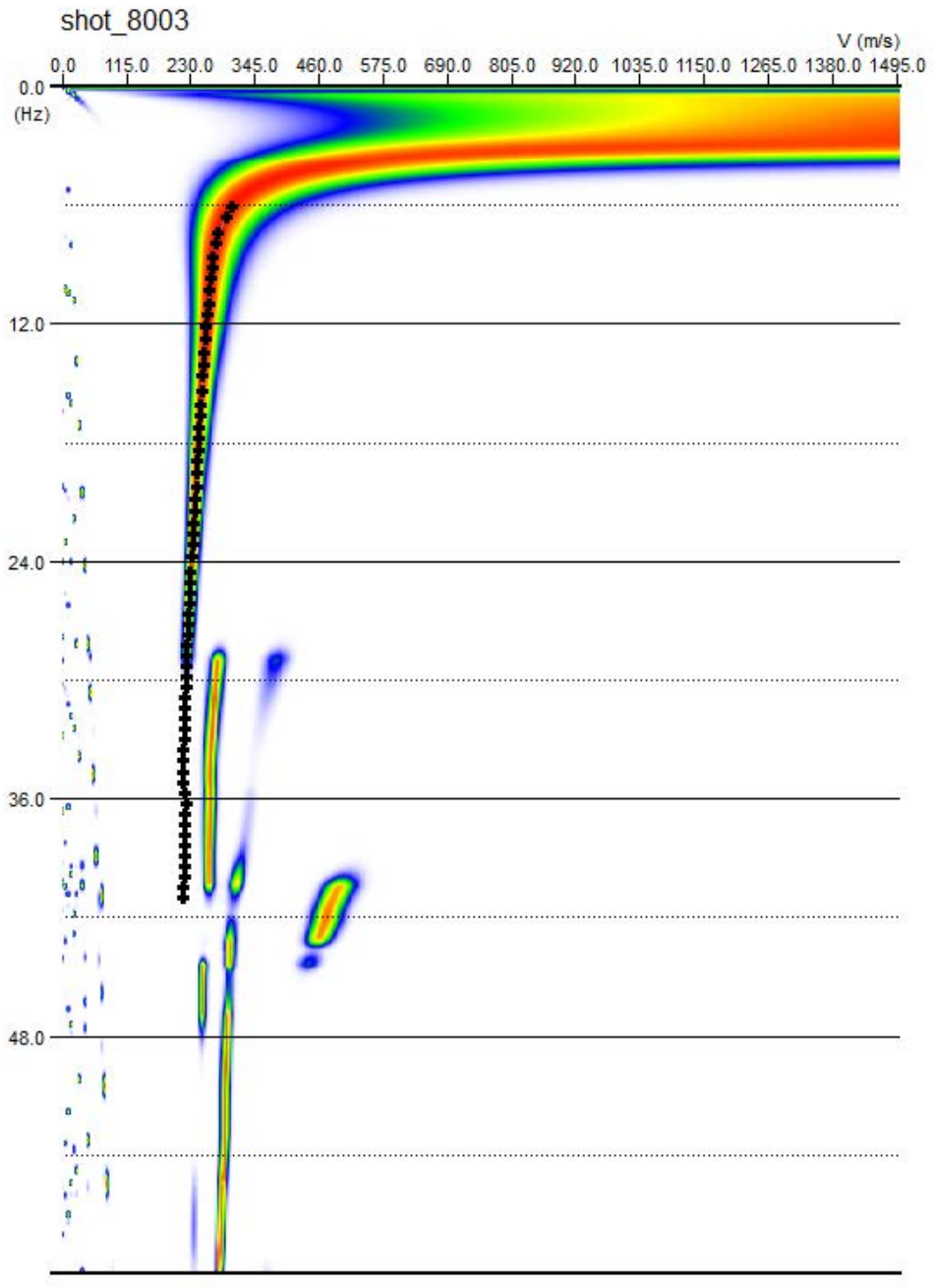

7.48 (Hz)

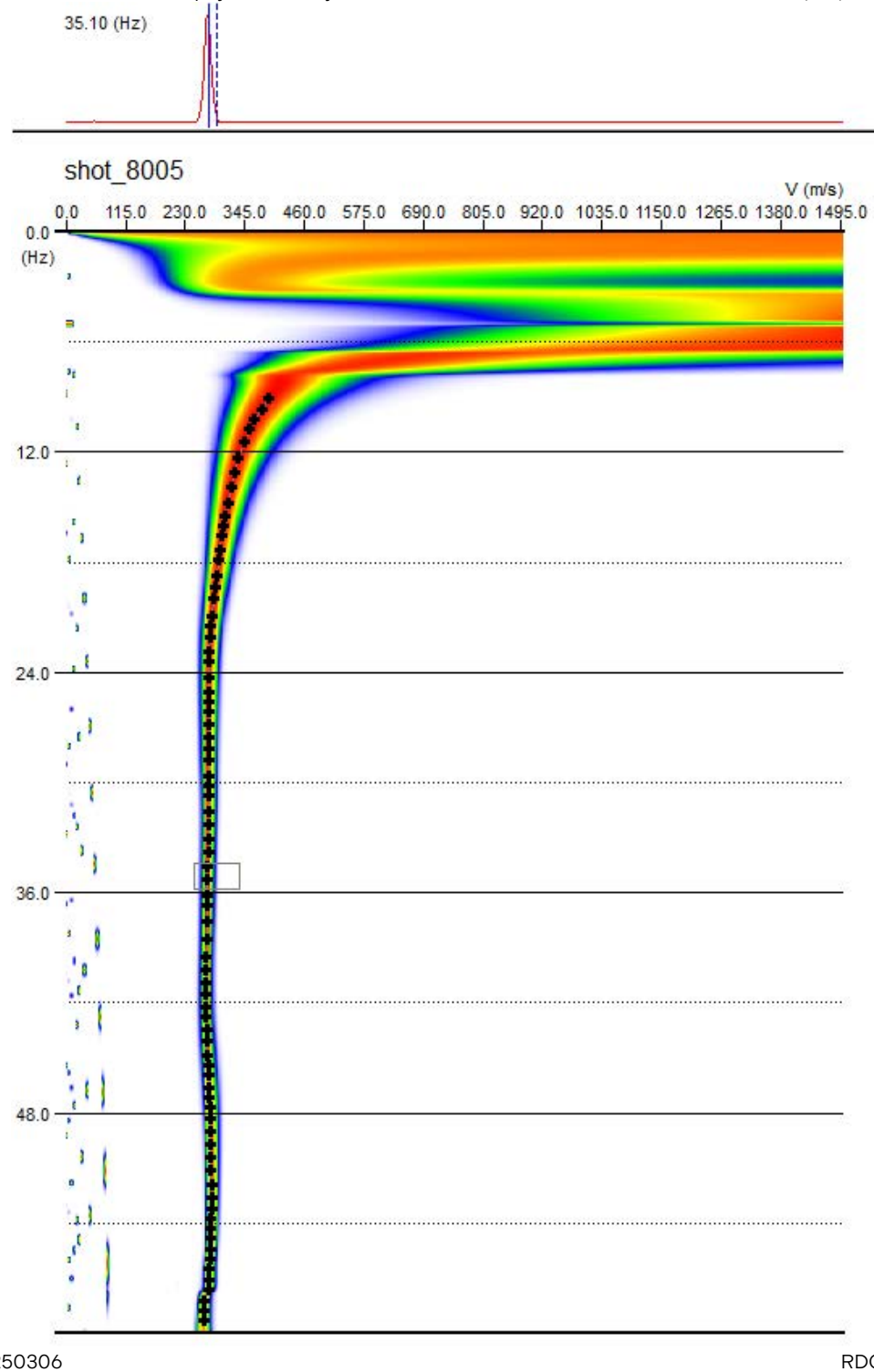

shot_8001
V (m/s)
0.0 115.0 230.0 345.0 460.0 575.0 690.0 805.0 920.0 1035.0 1150.0 1265.0 1380.0 1495.0
0.0
(Hz)
12.0
24.0
36.0
48.0

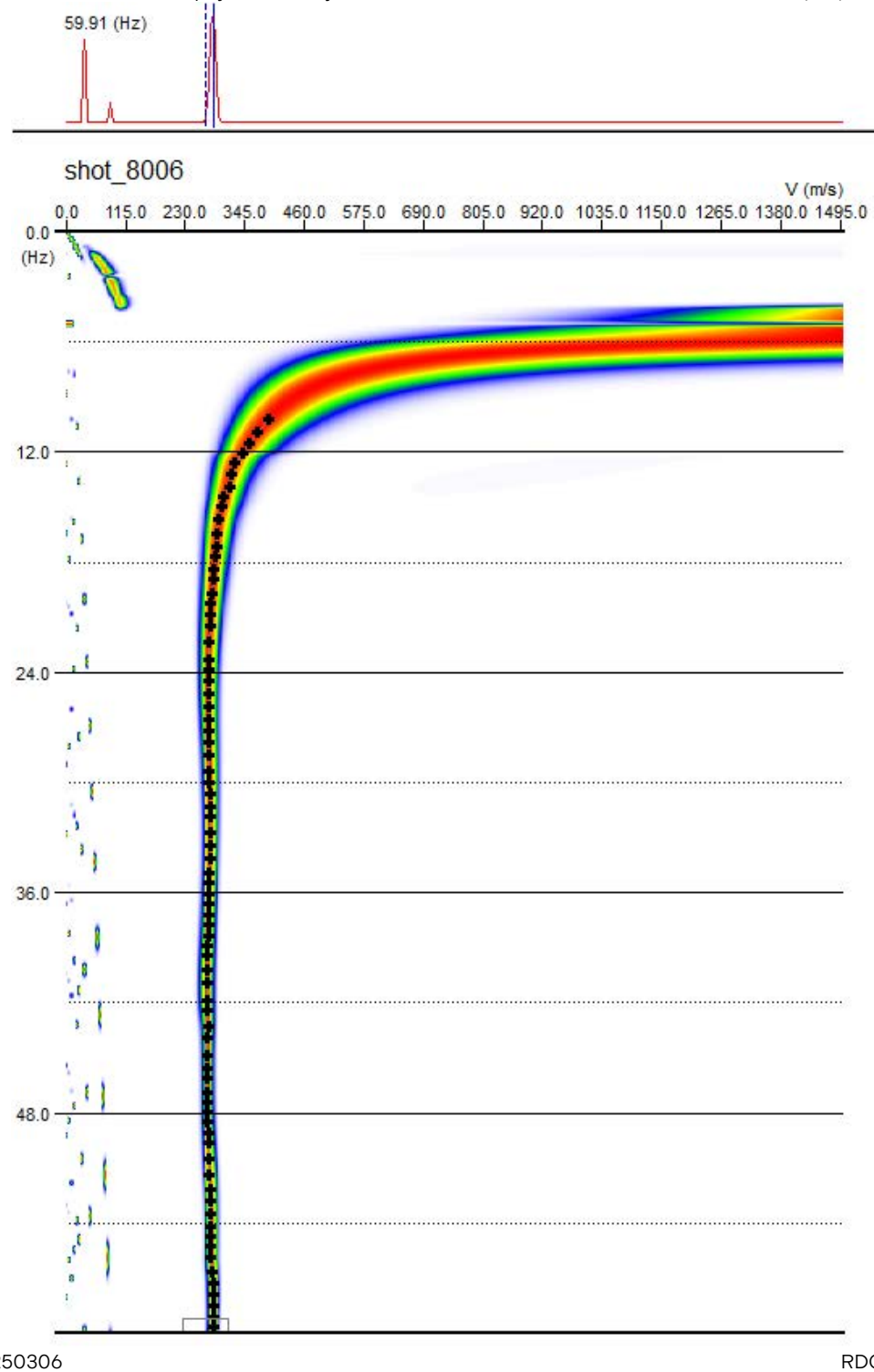

6.86 (Hz)


shot_8002
V (m/s)
0.0 115.0 230.0 345.0 460.0 575.0 690.0 805.0 920.0 1035.0 1150.0 1265.0 1380.0 1495.0
0.0
(Hz)
12.0
24.0
36.0
48.0

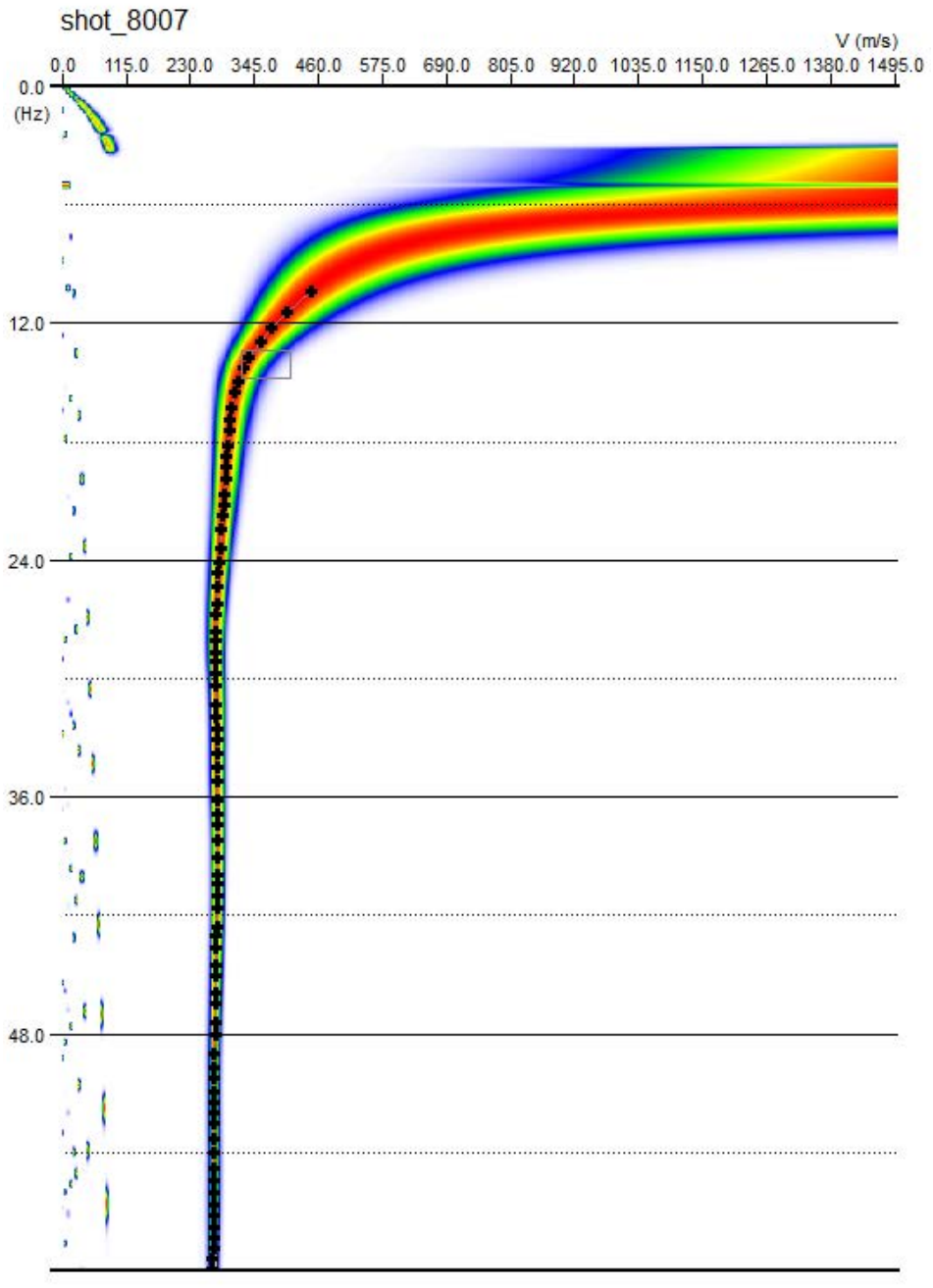



shot_8003
V (m/s)
0.0 115.0 230.0 345.0 460.0 575.0 690.0 805.0 920.0 1035.0 1150.0 1265.0 1380.0 1495.0
0.0
(Hz)
12.0
24.0
36.0
48.0

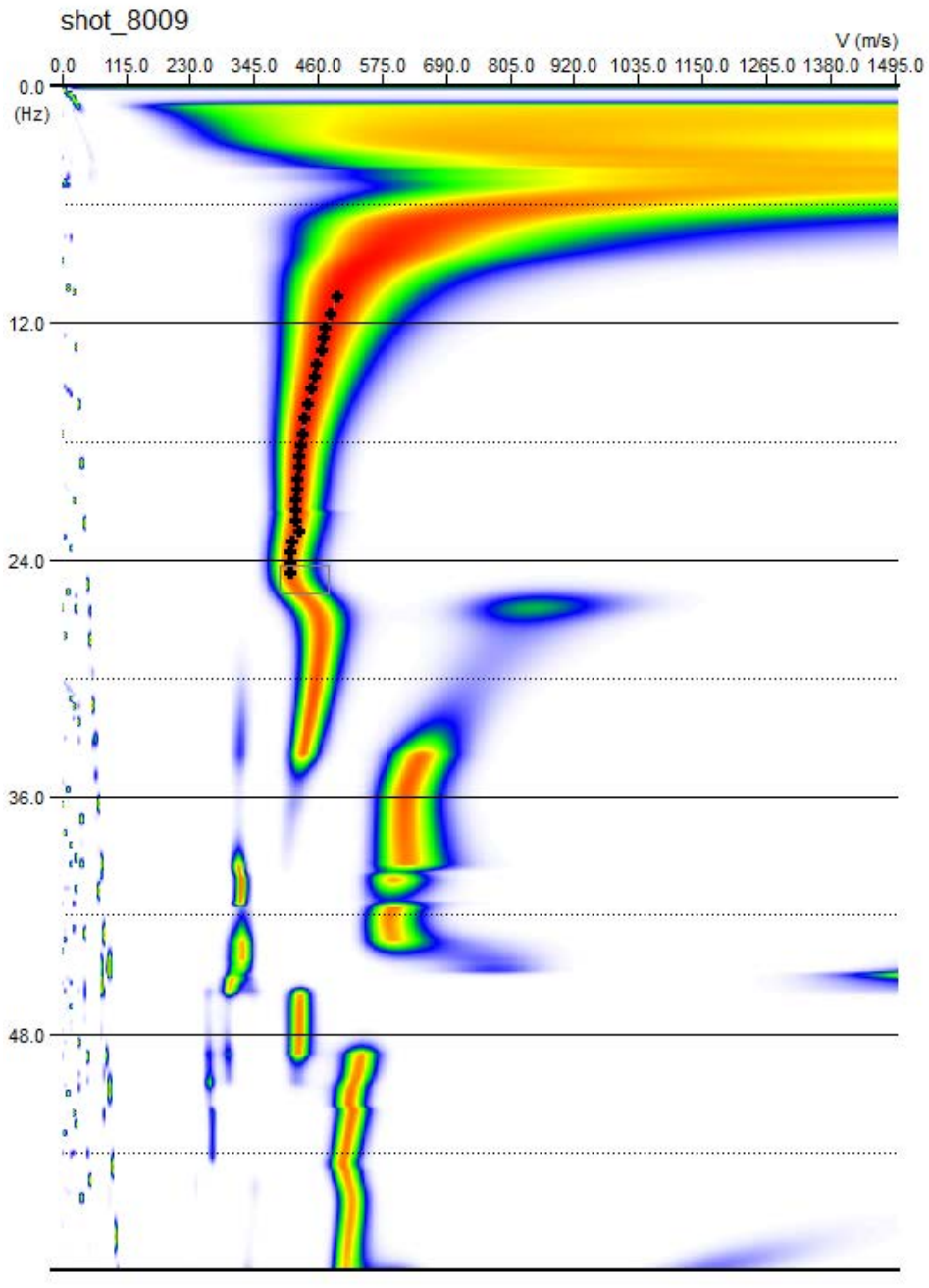

35.10 (Hz)
shot_8005
V (m/s)
0.0 115.0 230.0 345.0 460.0 575.0 690.0 805.0 920.0 1035.0 1150.0 1265.0 1380.0 1495.0
0.0
(Hz)
12.0
24.0
36.0
48.0

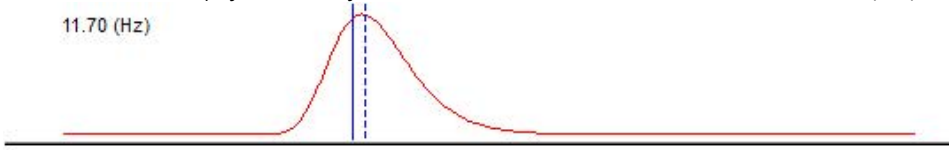

59.91 (Hz)
shot_8006
V (m/s)
0.0 115.0 230.0 345.0 460.0 575.0 690.0 805.0 920.0 1035.0 1150.0 1265.0 1380.0 1495.0
0.0
(Hz)
12.0
24.0
36.0
48.0

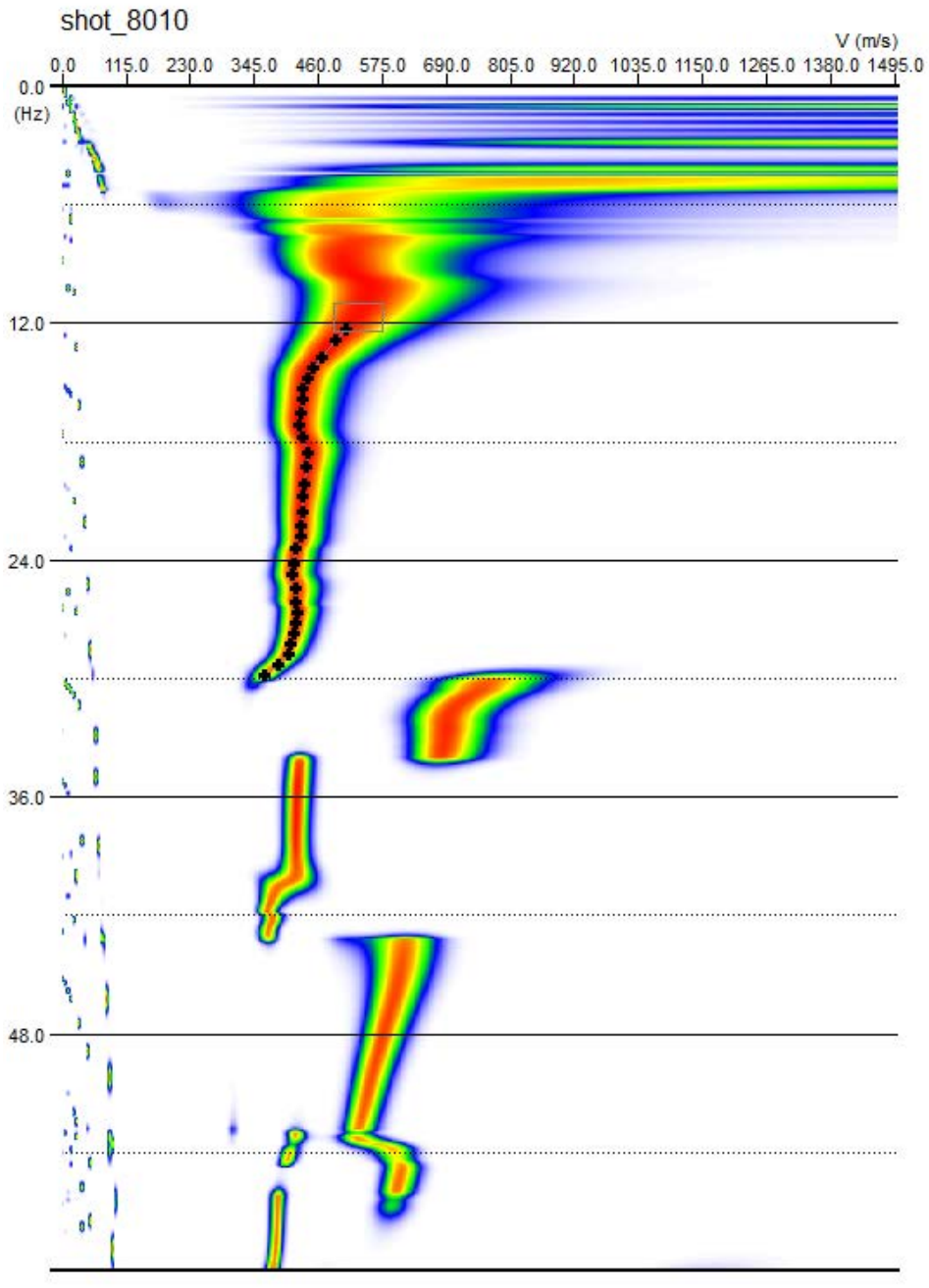

14.08 (Hz)


shot_8007
V (m/s)
0.0 115.0 230.0 345.0 460.0 575.0 690.0 805.0 920.0 1035.0 1150.0 1265.0 1380.0 1495.0
0.0
(Hz)
12.0
24.0
36.0
48.0

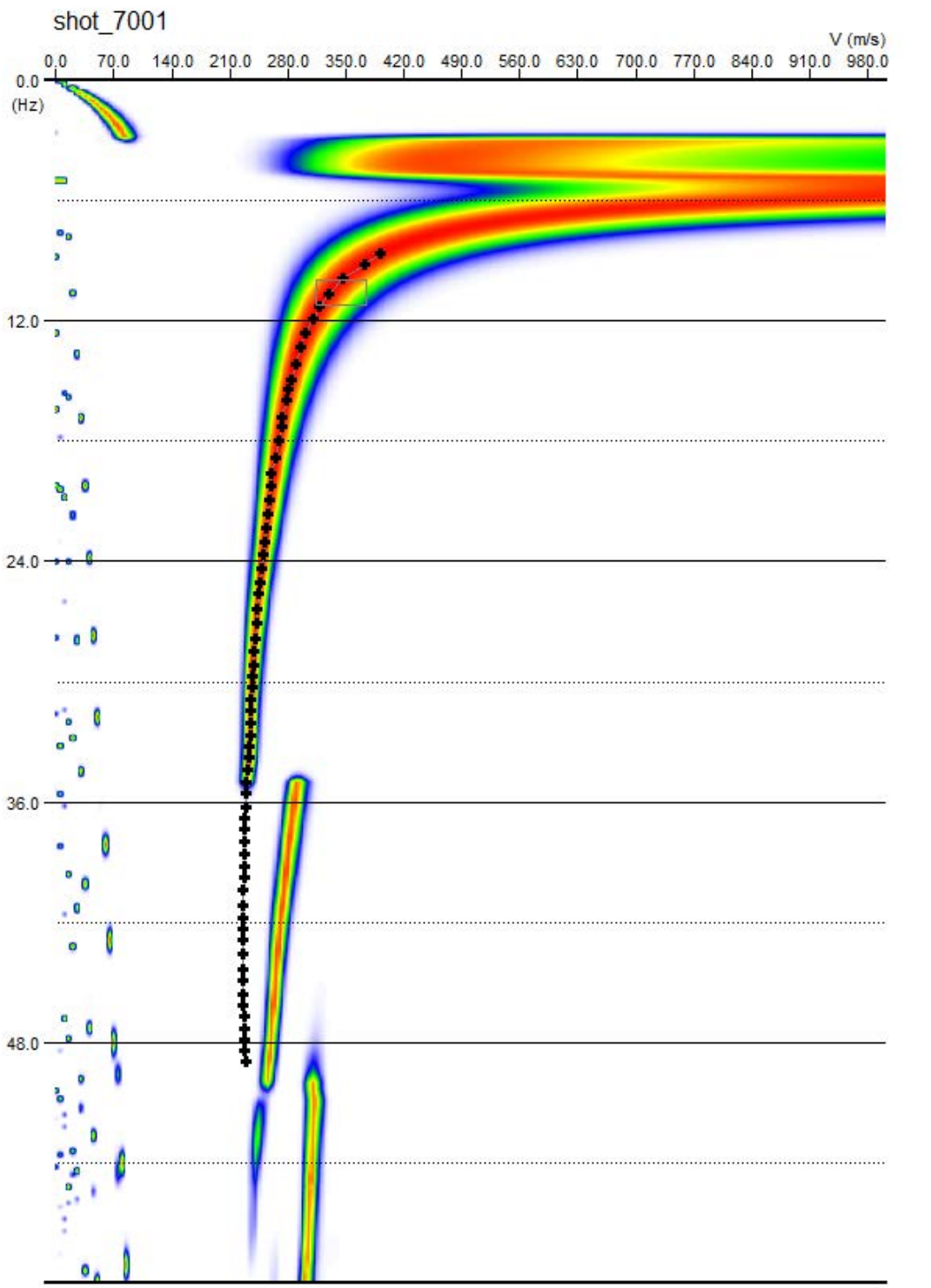

24.99 (Hz)

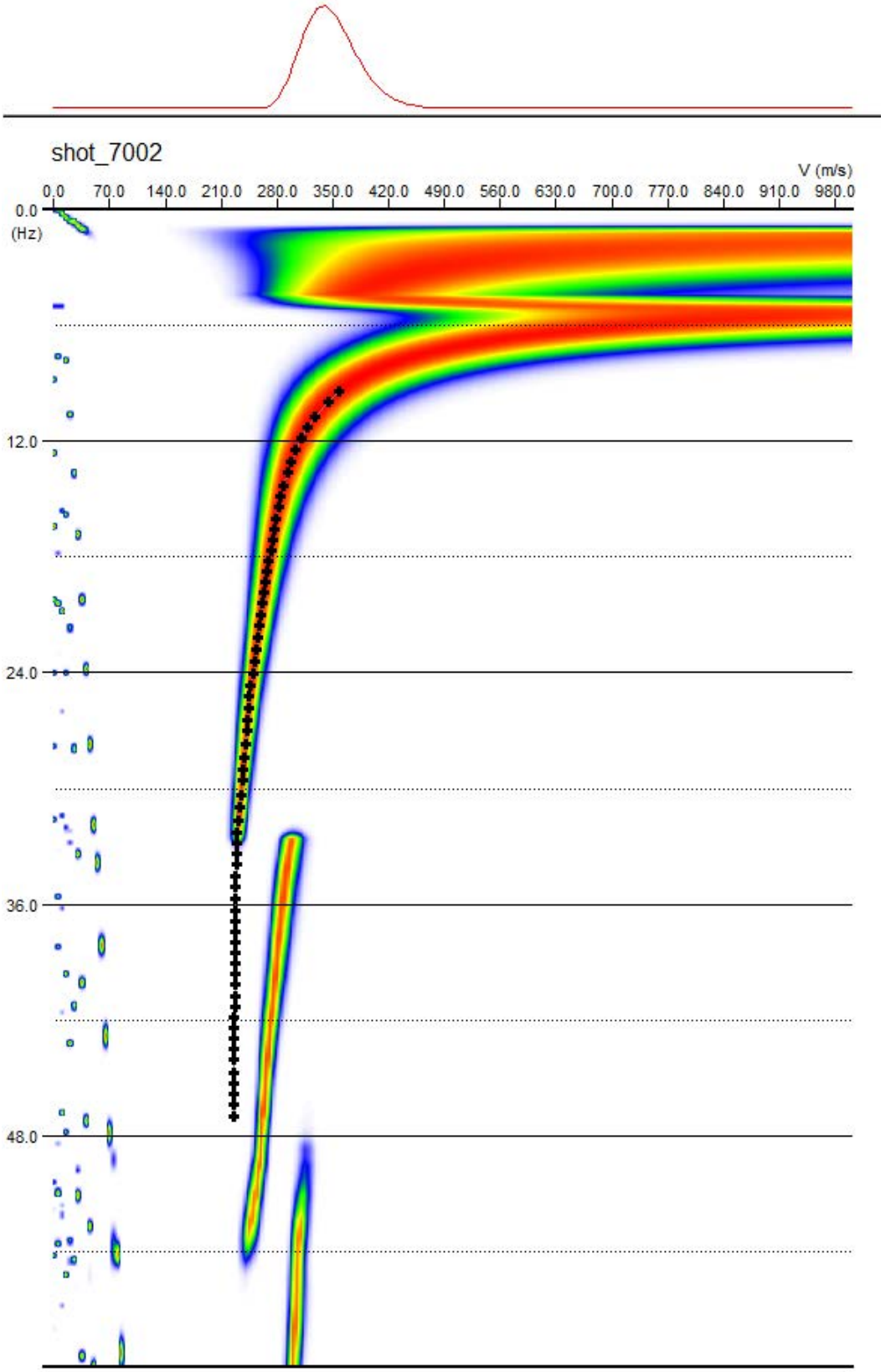

shot_8009
V (m/s)
0.0
115.0
230.0
345.0
460.0
575.0
690.0
805.0
920.0
1035.0
1150.0
1265.0
1380.0
1495.0
0.0
(Hz)
12.0
24.0
36.0
48.0

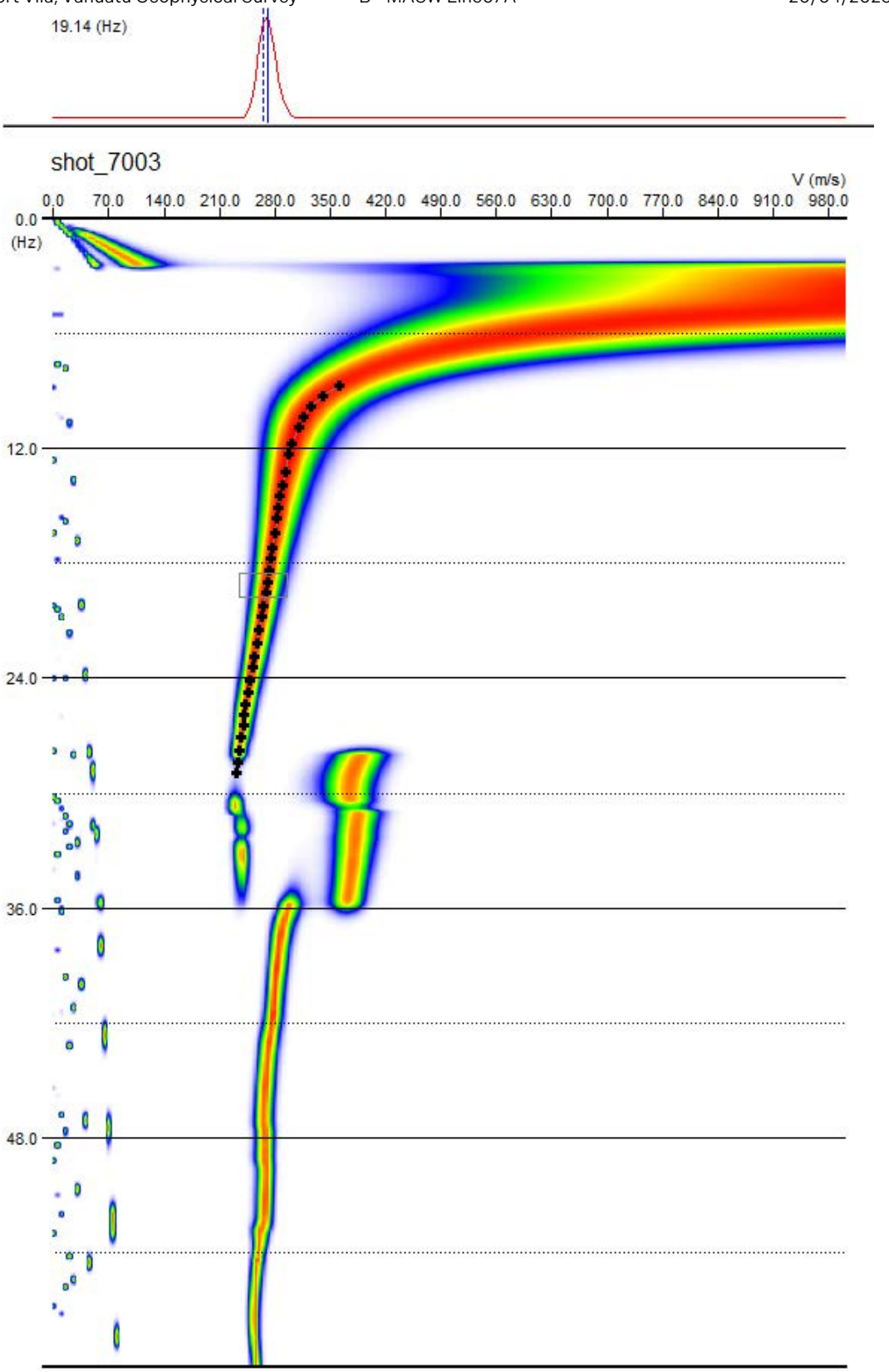

11.70 (Hz)

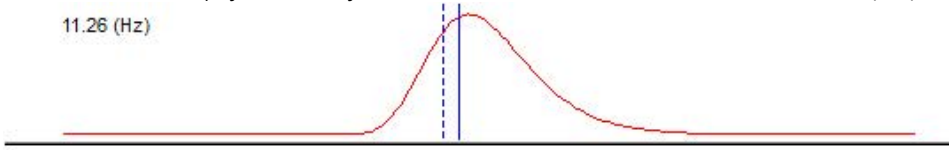

shot_8010
V (m/s)
0.0 115.0 230.0 345.0 460.0 575.0 690.0 805.0 920.0 1035.0 1150.0 1265.0 1380.0 1495.0
0.0
(Hz)
12.0
24.0
36.0
48.0

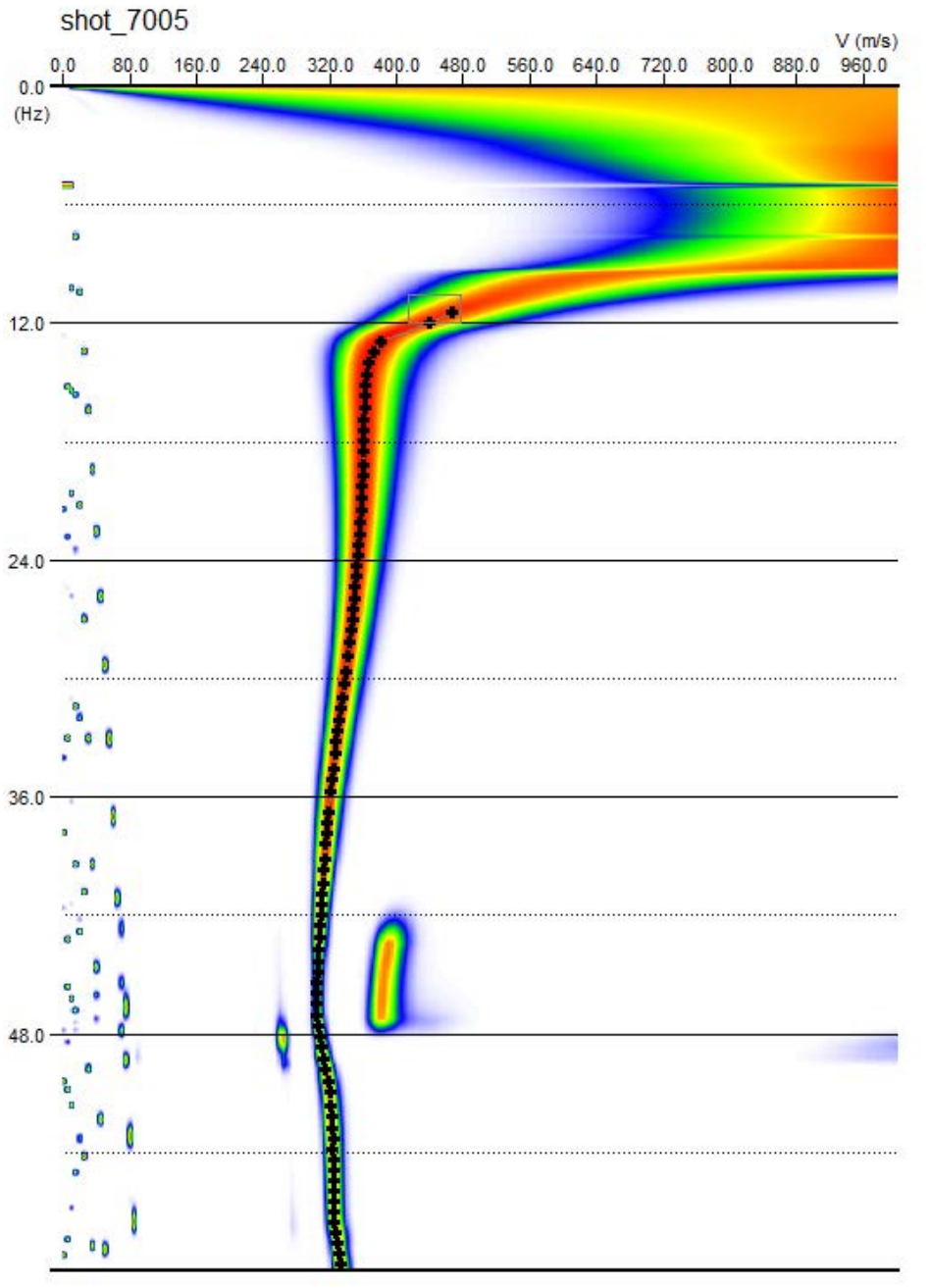

10.58 (Hz)

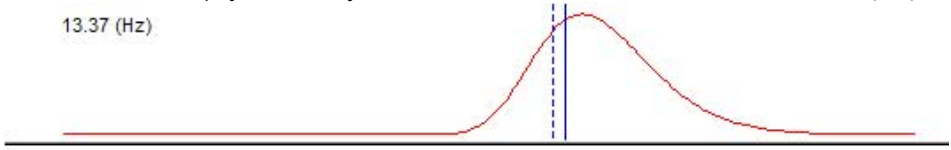

shot_7001
V (m/s)
0.0
70.0
140.0
210.0
280.0
350.0
420.0
490.0
560.0
630.0
700.0
770.0
840.0
910.0
980.0
0.0
(Hz)
12.0
24.0
36.0
48.0

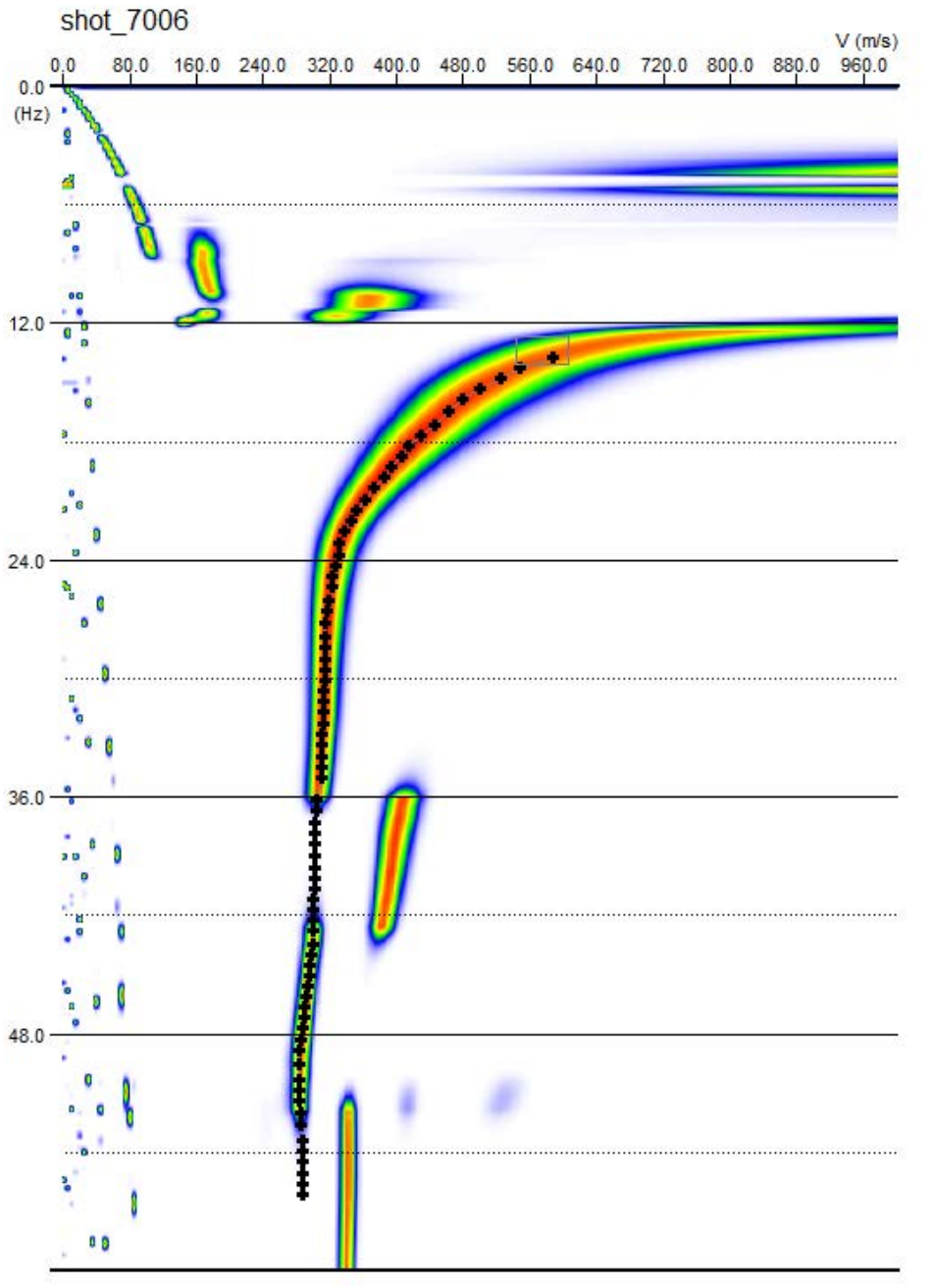

shot_7002
V (m/s)
0.0
70.0
140.0
210.0
280.0
350.0
420.0
490.0
560.0
630.0
700.0
770.0
840.0
910.0
980.0
0.0
(Hz)
12.0
24.0
36.0
48.0


19.14 (Hz)
shot_7003
V (m/s)
0.0 70.0 140.0 210.0 280.0 350.0 420.0 490.0 560.0 630.0 700.0 770.0 840.0 910.0 980.0
0.0
(Hz)
12.0
24.0
36.0
48.0

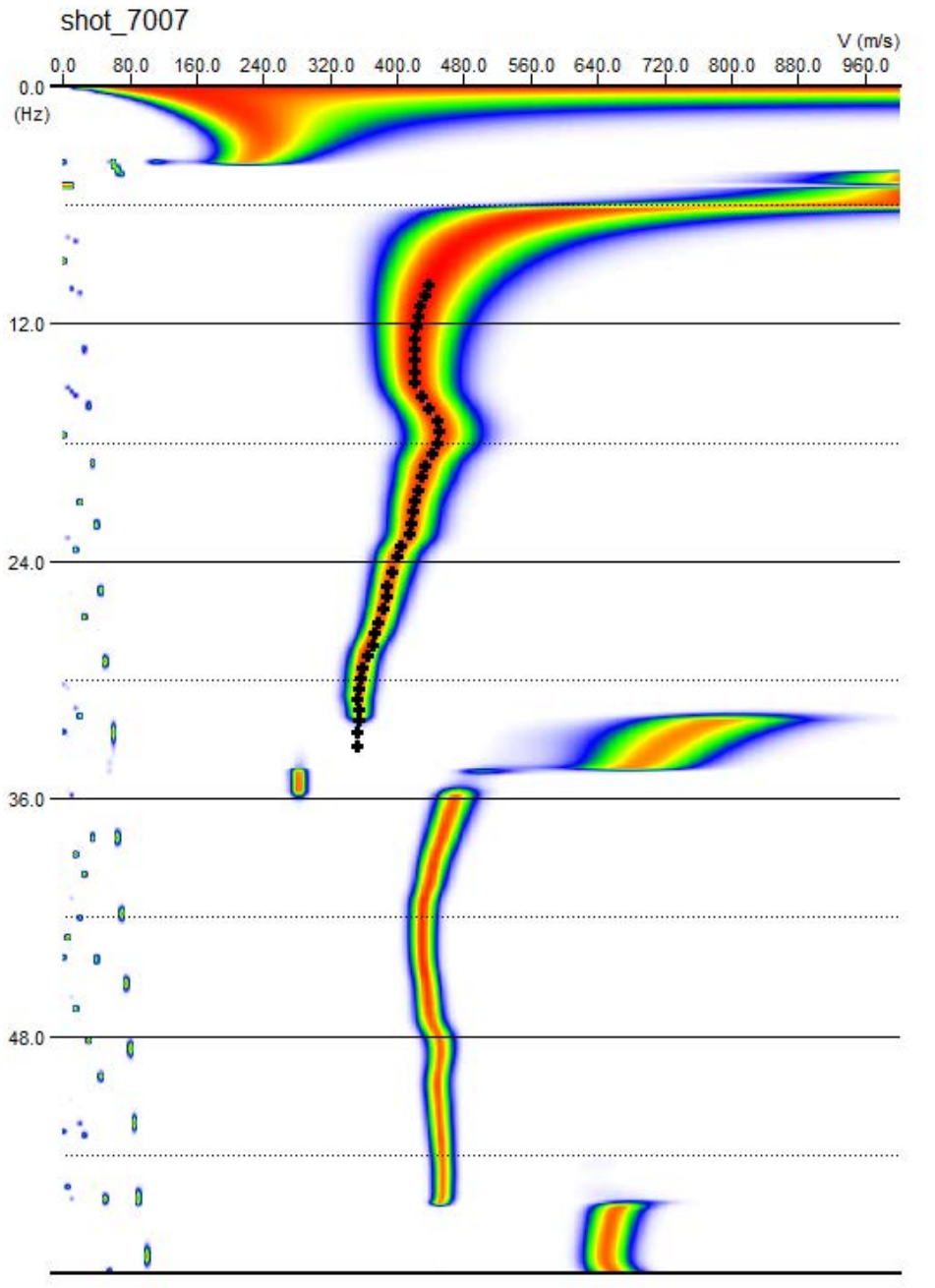

11.26 (Hz)

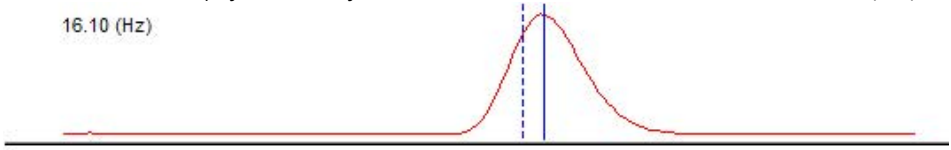

shot_7005
V (m/s)
0.0
80.0
160.0
240.0
320.0
400.0
480.0
560.0
640.0
720.0
800.0
880.0
960.0
0.0
(Hz)
12.0
24.0
36.0
48.0

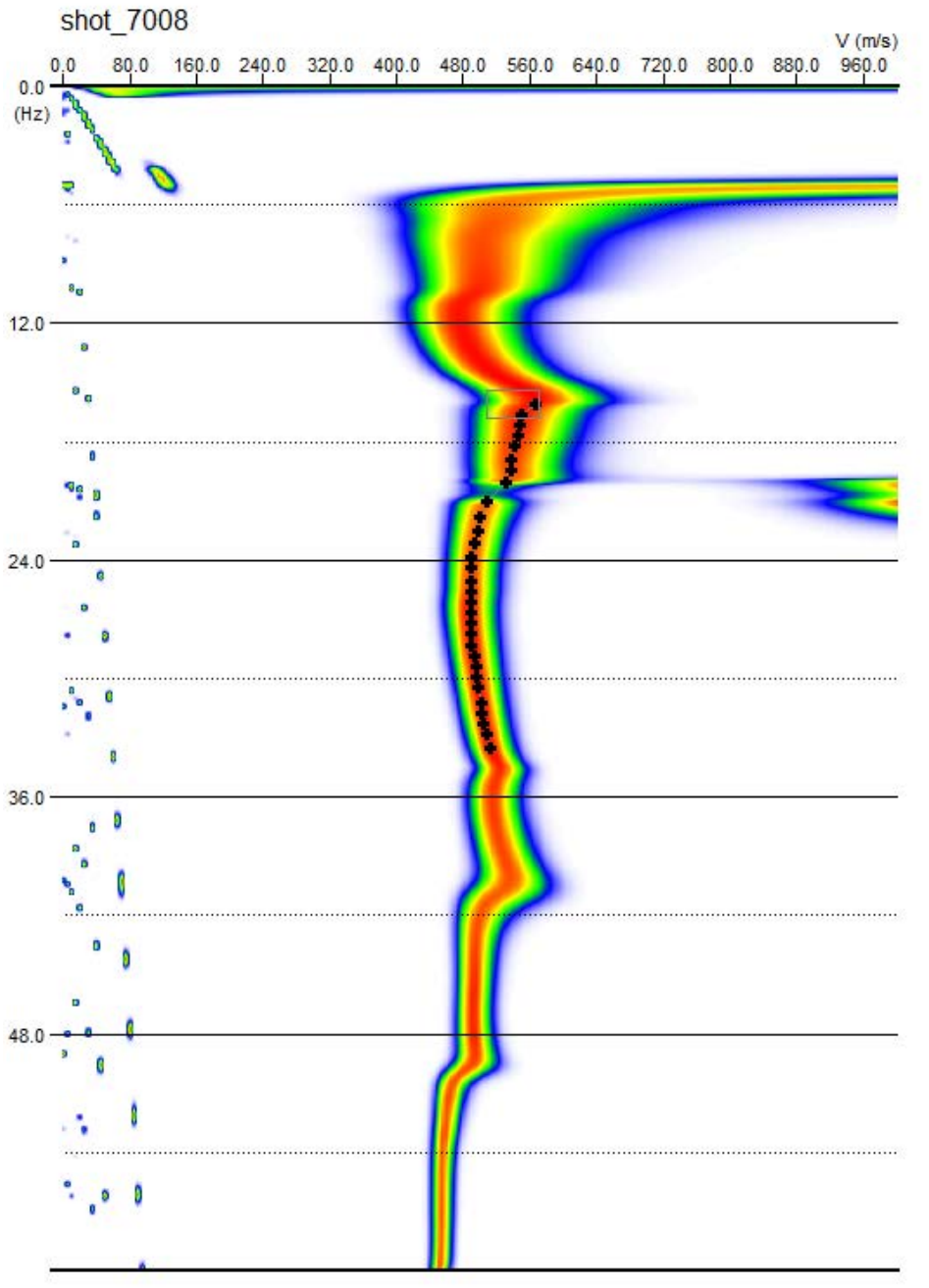

13.37 (Hz)

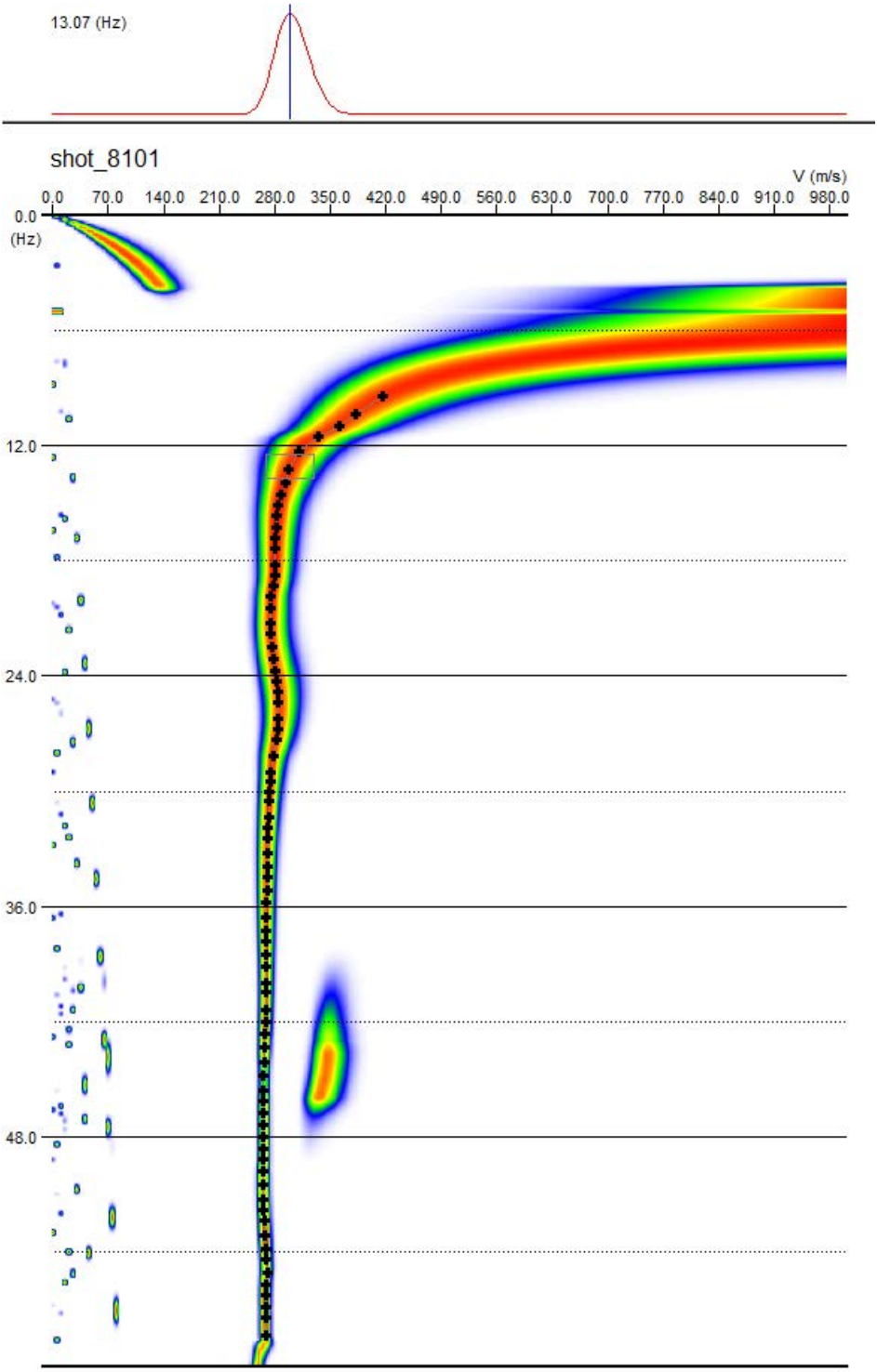

shot_7006
V (m/s)
0.0
80.0
160.0
240.0
320.0
400.0
480.0
560.0
640.0
720.0
800.0
880.0
960.0
0.0
(Hz)
12.0
24.0
36.0
48.0

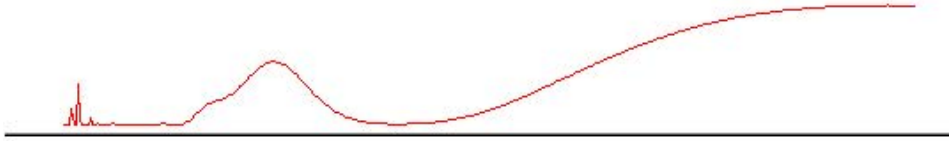


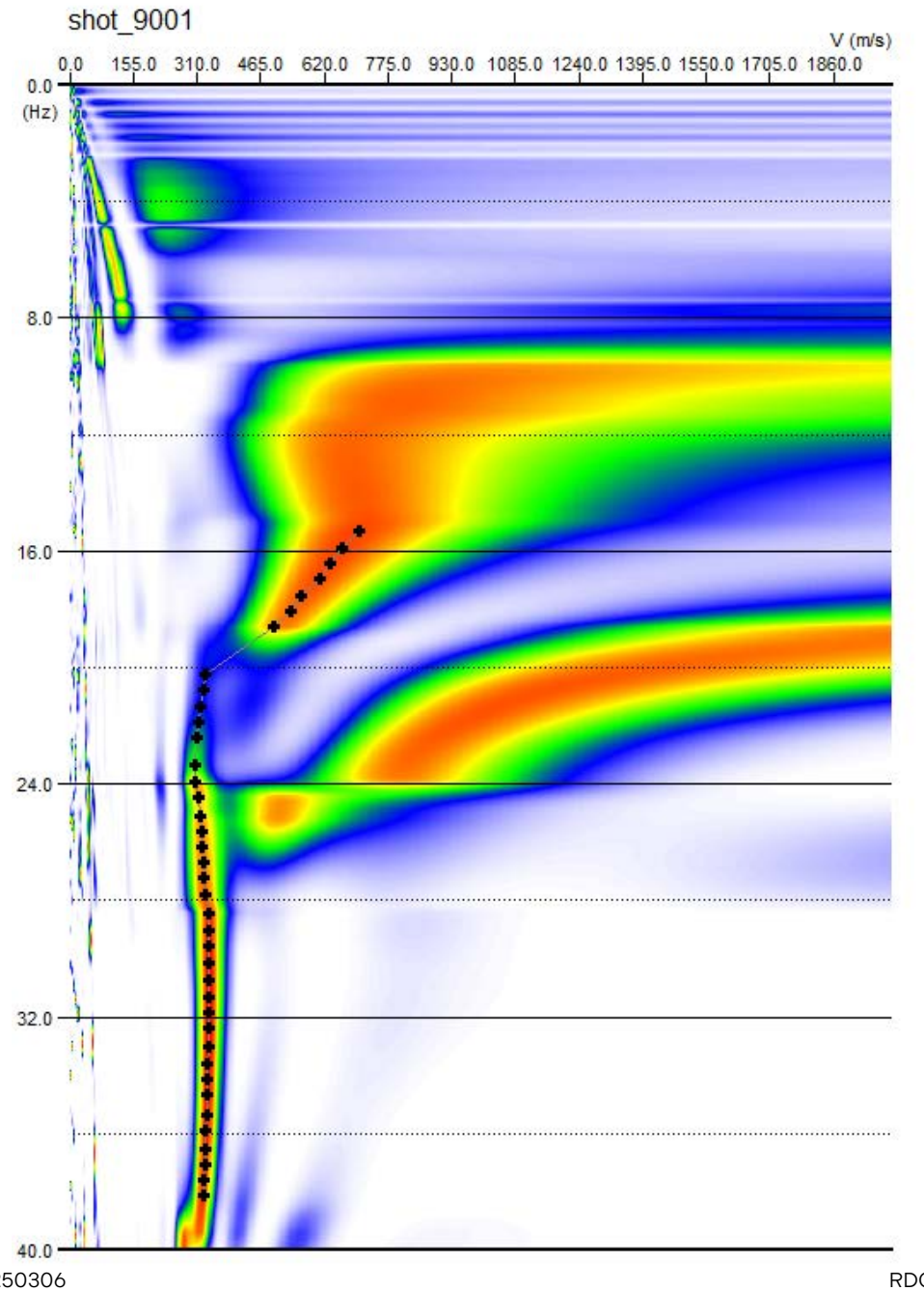

shot_7007
V (m/s)
0.0 80.0 160.0 240.0 320.0 400.0 480.0 560.0 640.0 720.0 800.0 880.0 960.0
0.0
(Hz)
12.0
24.0
36.0
48.0

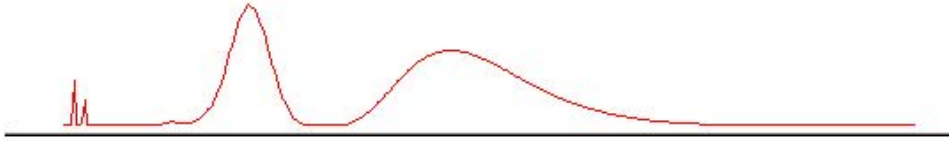

16.10 (Hz)

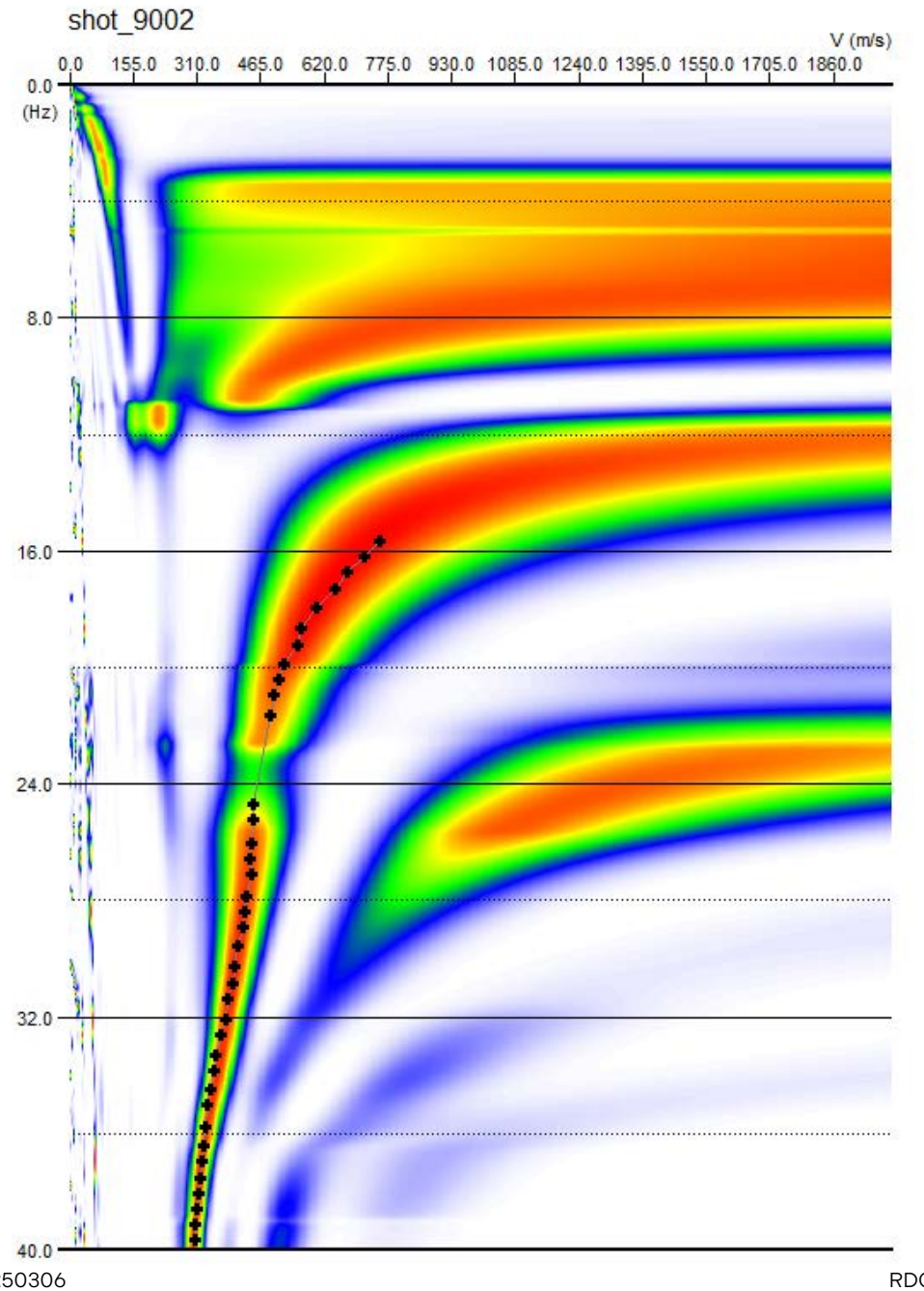

shot_7008
V (m/s)
0.0
80.0
160.0
240.0
320.0
400.0
480.0
560.0
640.0
720.0
800.0
880.0
960.0
0.0
(Hz)
12.0
24.0
36.0
48.0

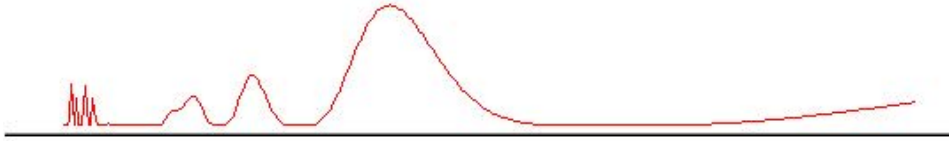

13.07 (Hz)
shot_8101
V (m/s)
0.0 70.0 140.0 210.0 280.0 350.0 420.0 490.0 560.0 630.0 700.0 770.0 840.0 910.0 980.0
0.0
(Hz)
12.0
24.0
36.0
48.0

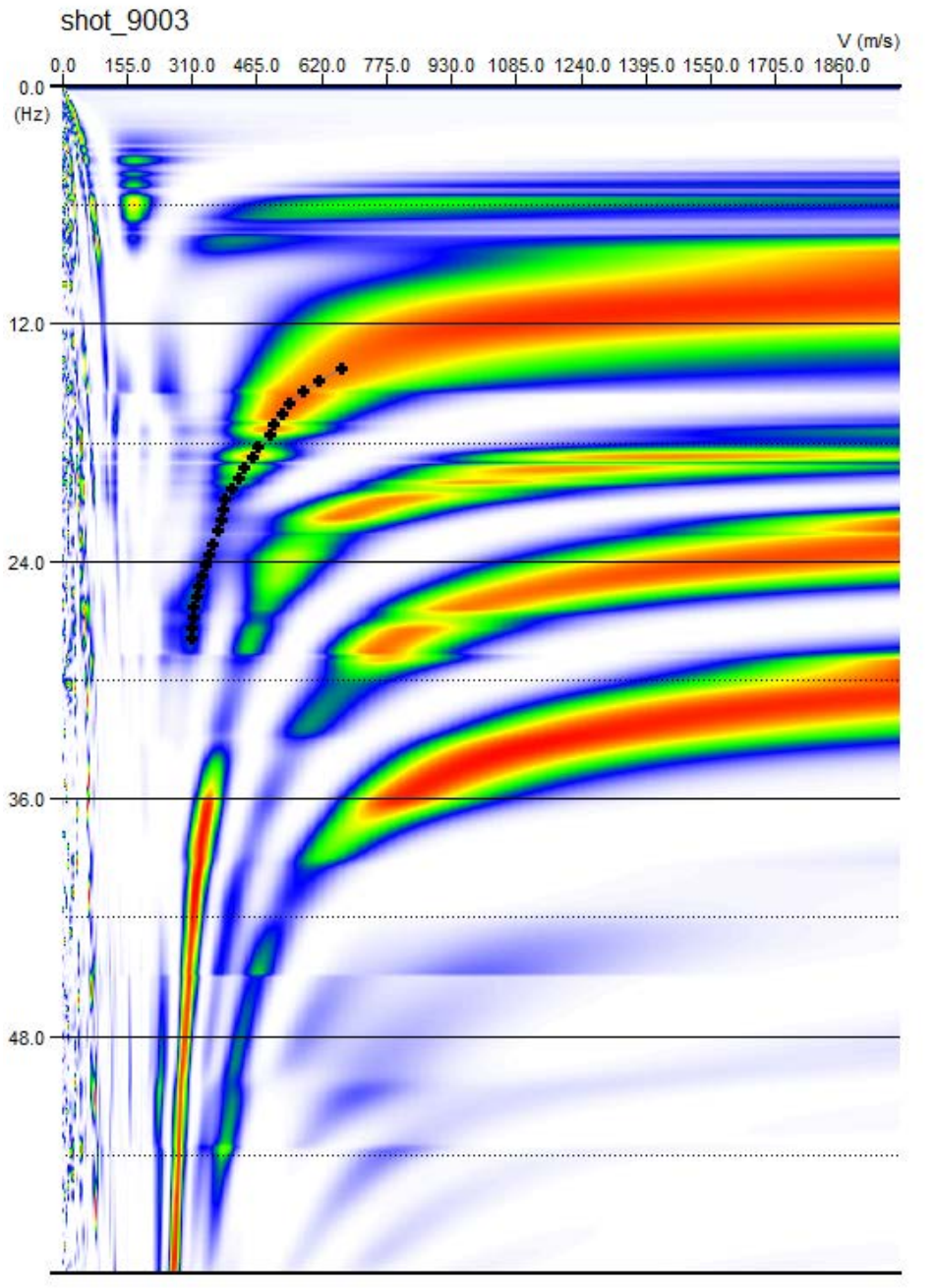



shot_9001
V (m/s)
0.0
155.0
310.0
465.0
620.0
775.0
930.0
1085.0
1240.0
1395.0
1550.0
1705.0
1860.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

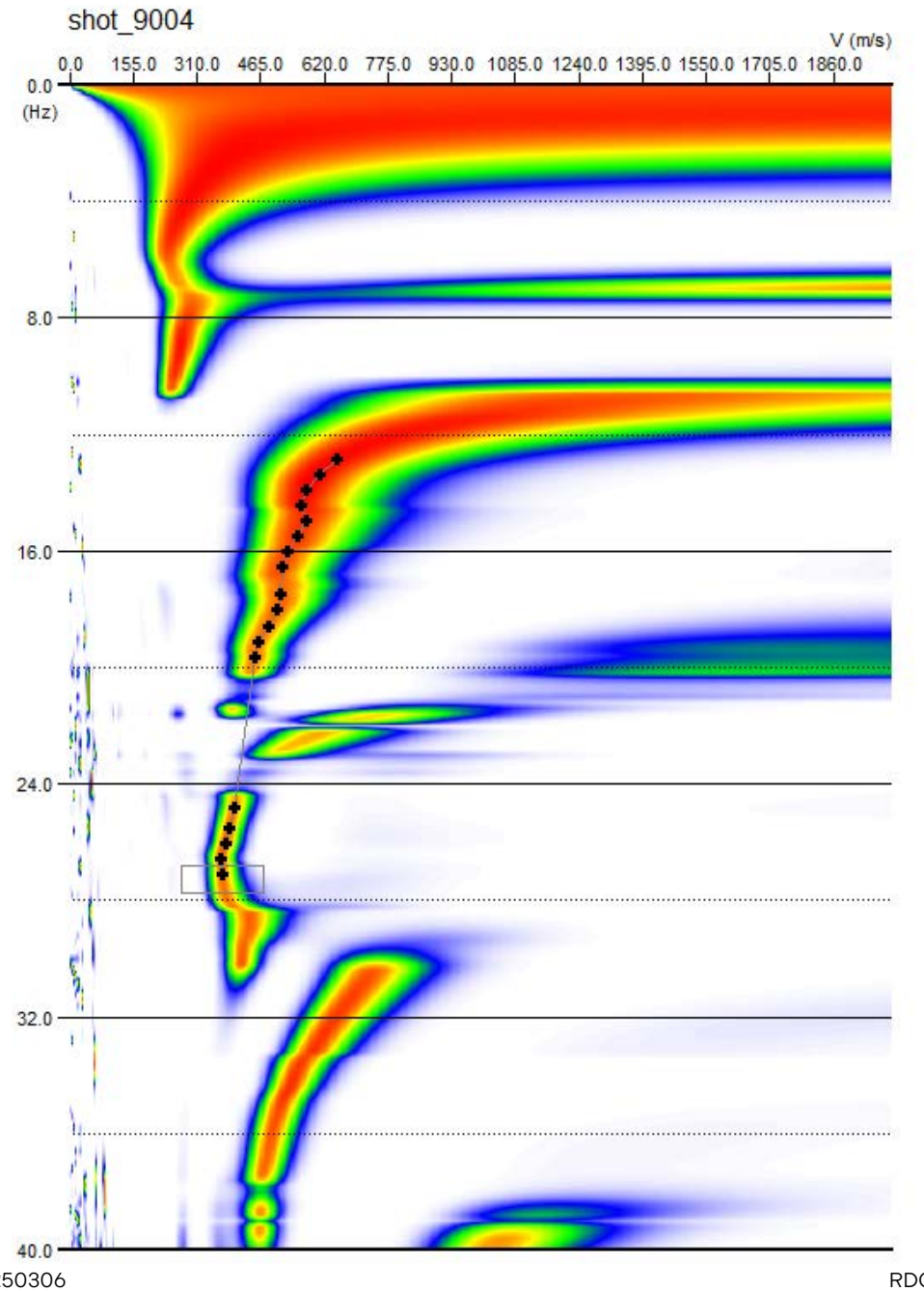


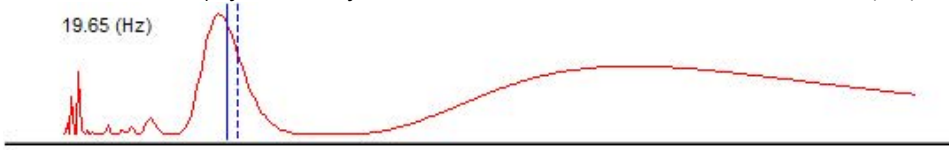

shot_9002
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

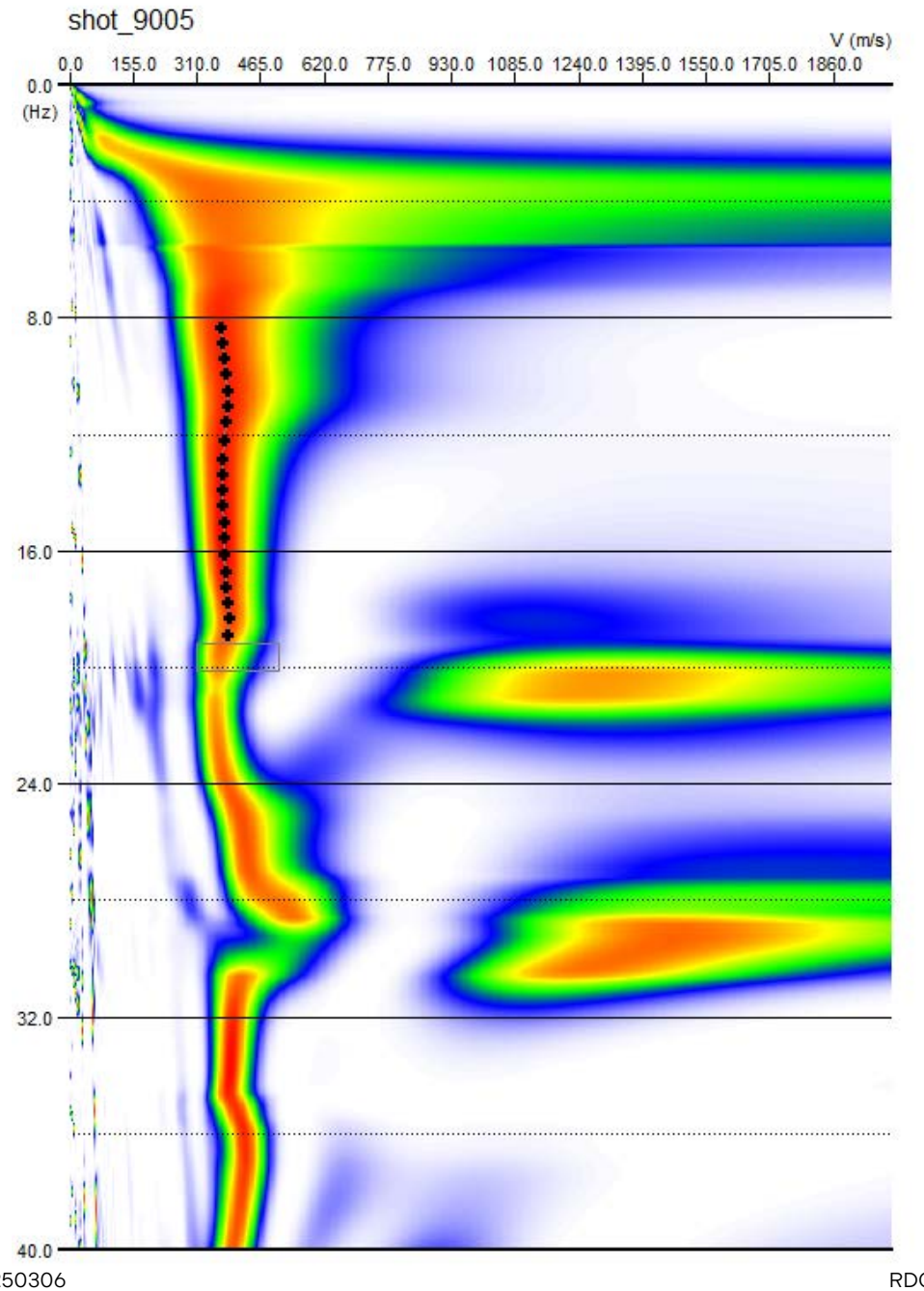


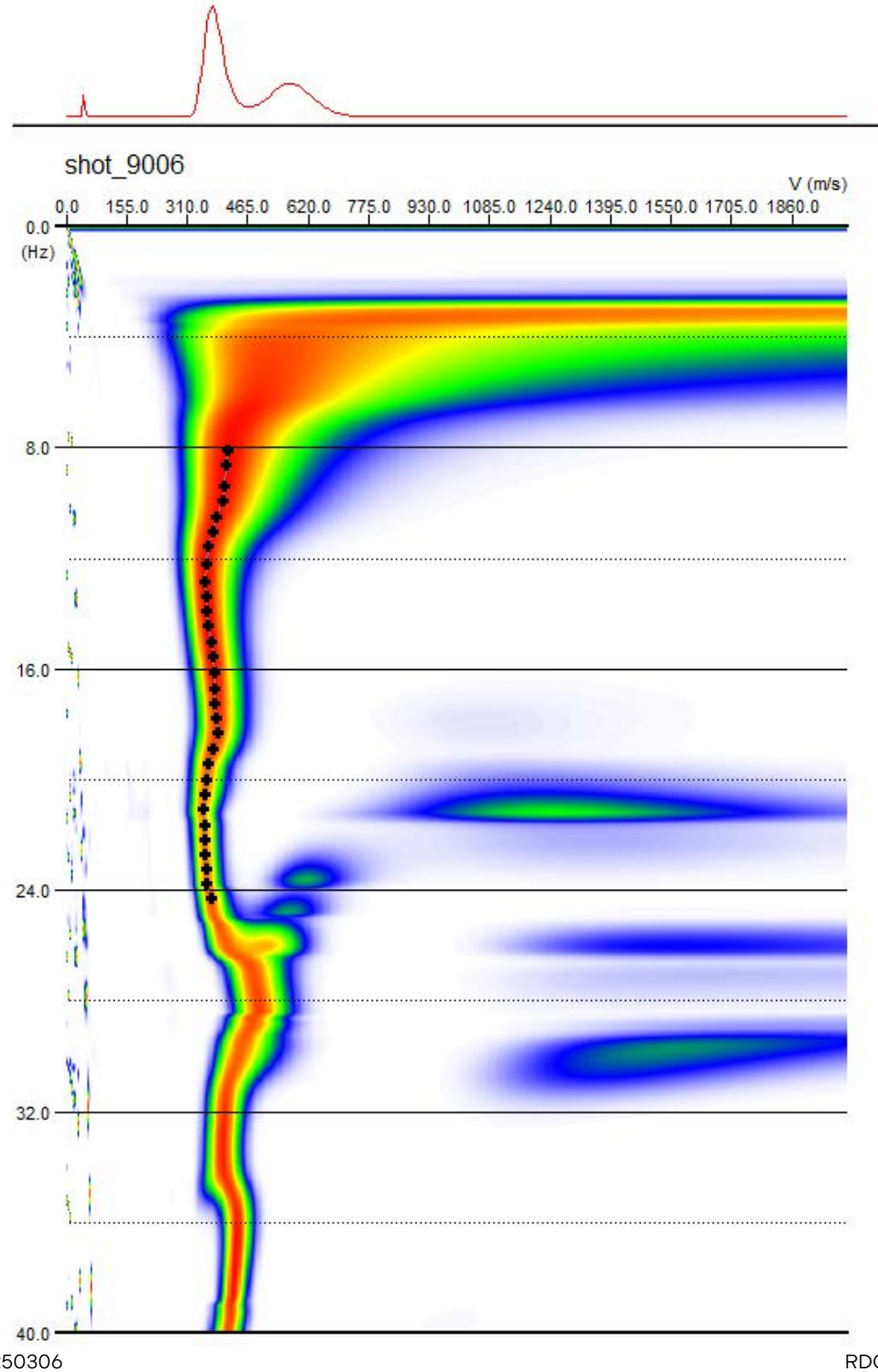

shot_9003
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
0.0
(Hz)
12.0
24.0
36.0
48.0

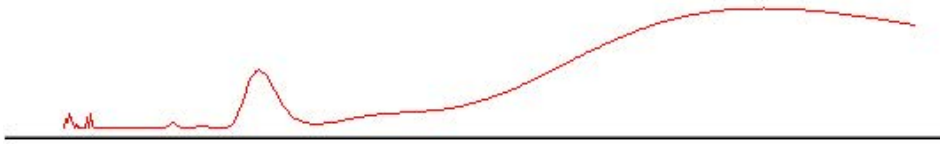

27.27 (Hz)

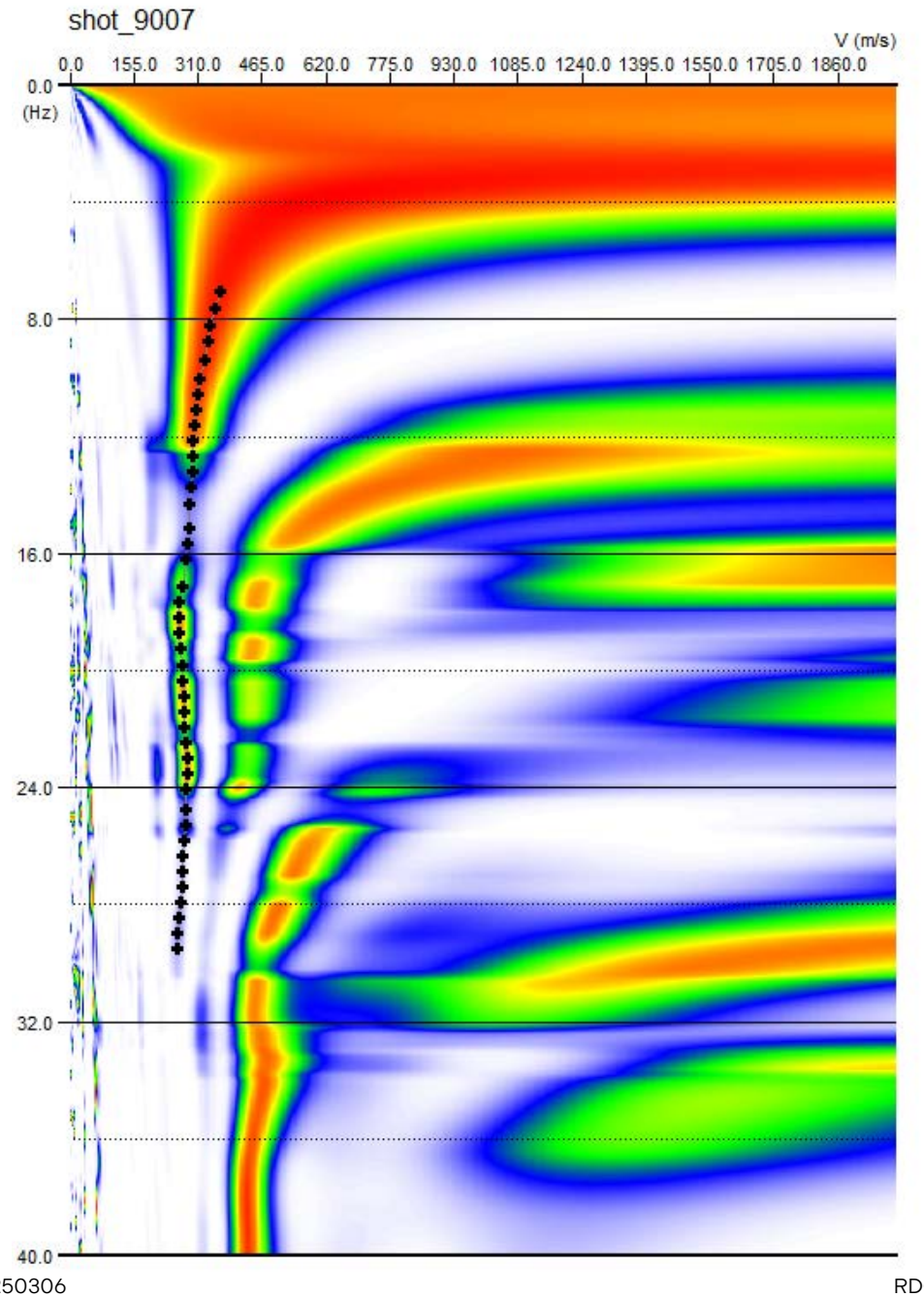

shot_9004
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

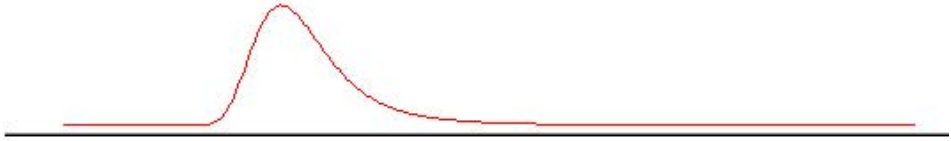

19.65 (Hz)

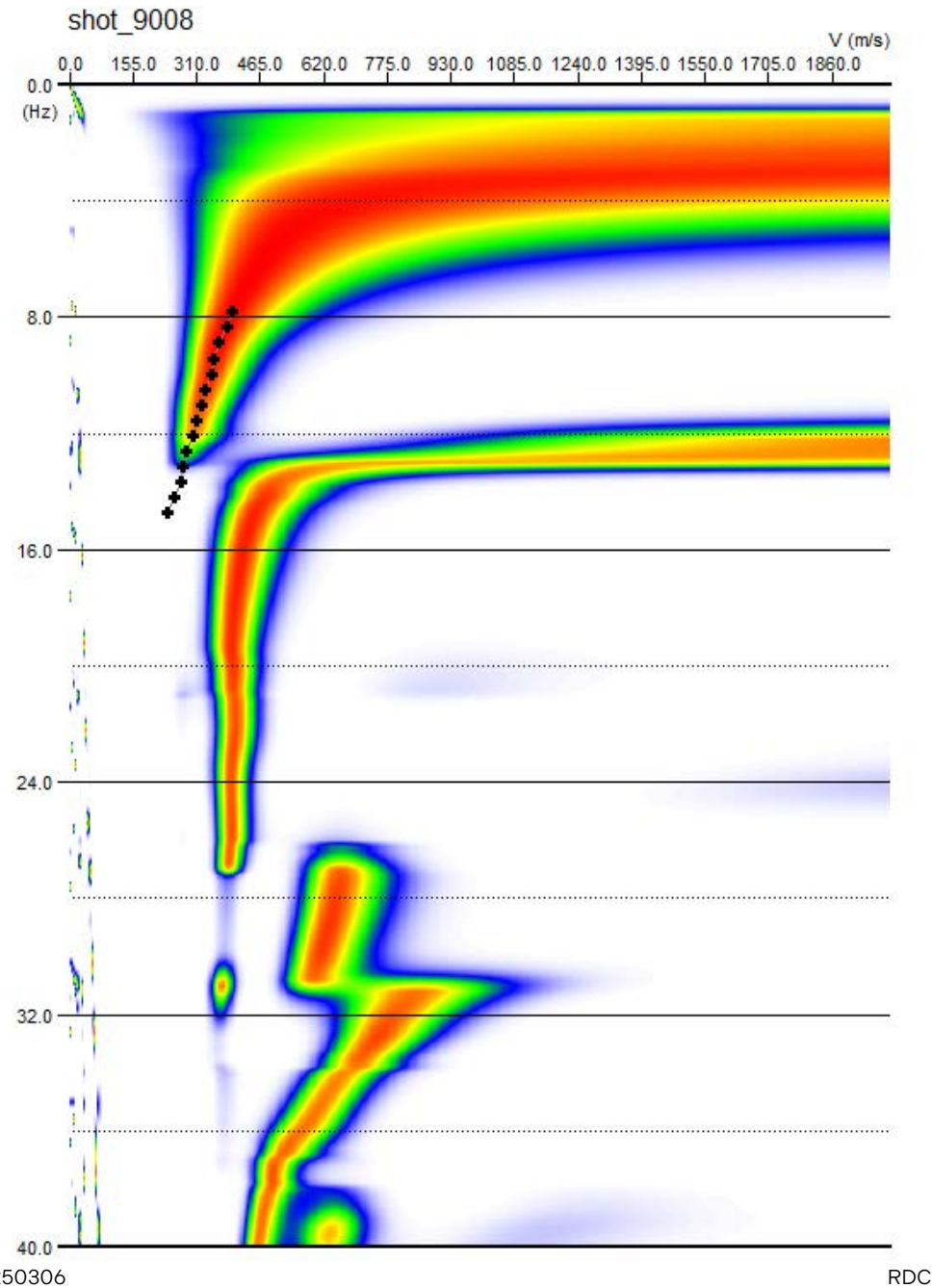

shot_9005
V (m/s)
0.0
155.0
310.0
465.0
620.0
775.0
930.0
1085.0
1240.0
1395.0
1550.0
1705.0
1860.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

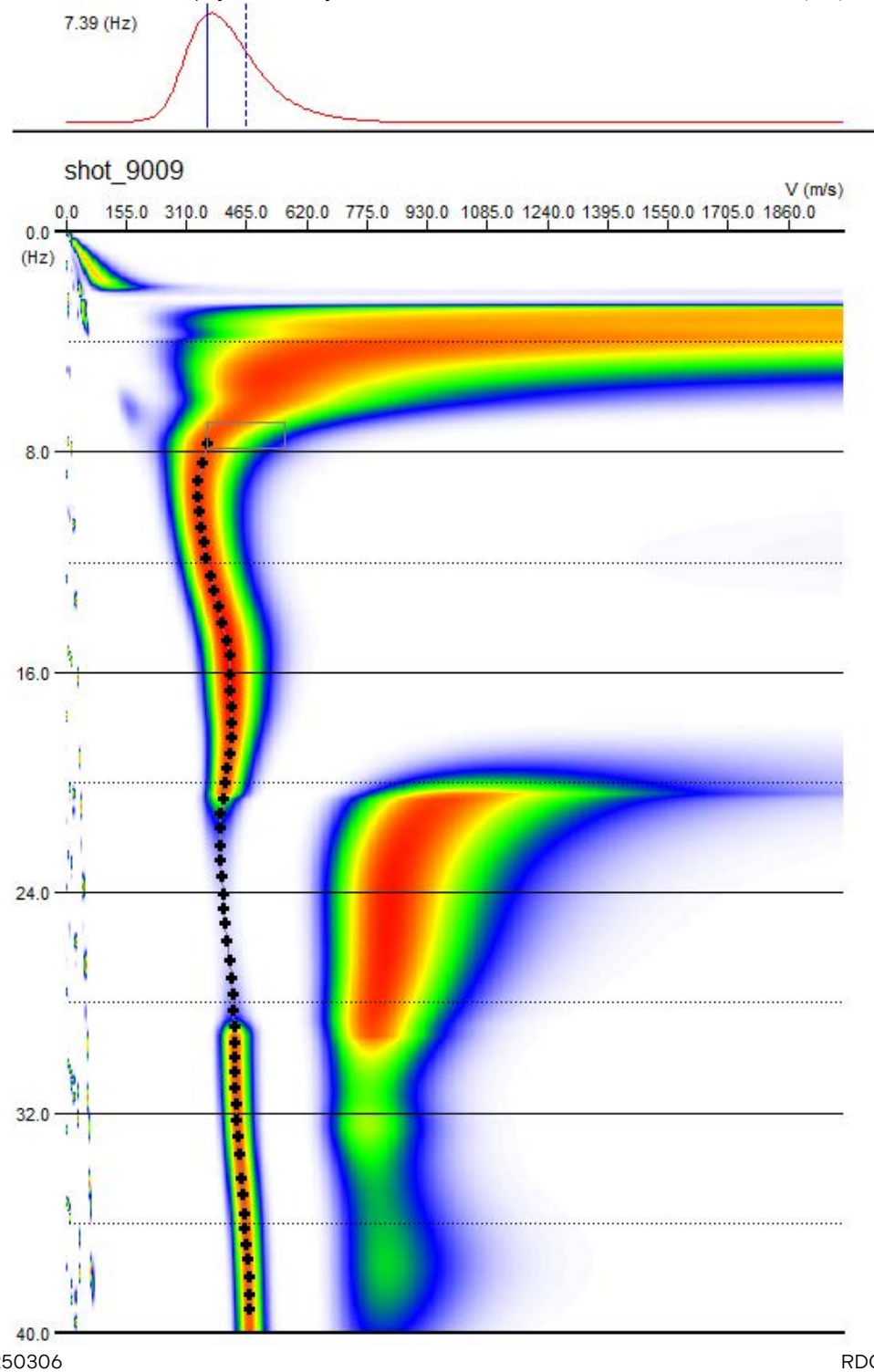

shot_9006
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0



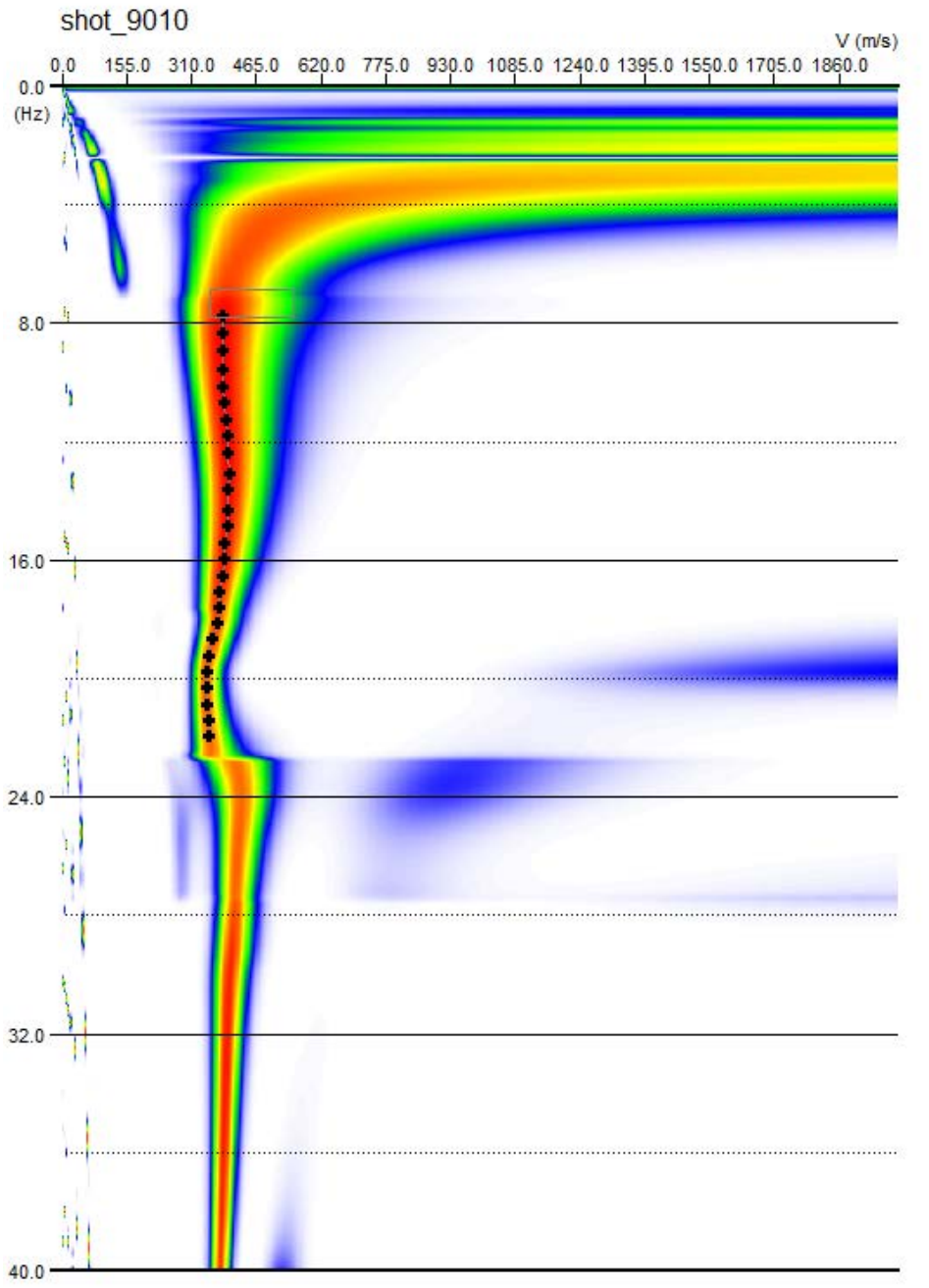

shot_9007
V (m/s)
0.0
155.0
310.0
465.0
620.0
775.0
930.0
1085.0
1240.0
1395.0
1550.0
1705.0
1860.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

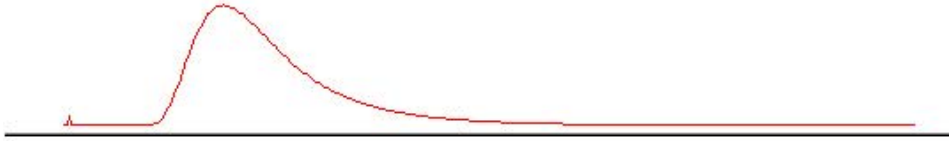


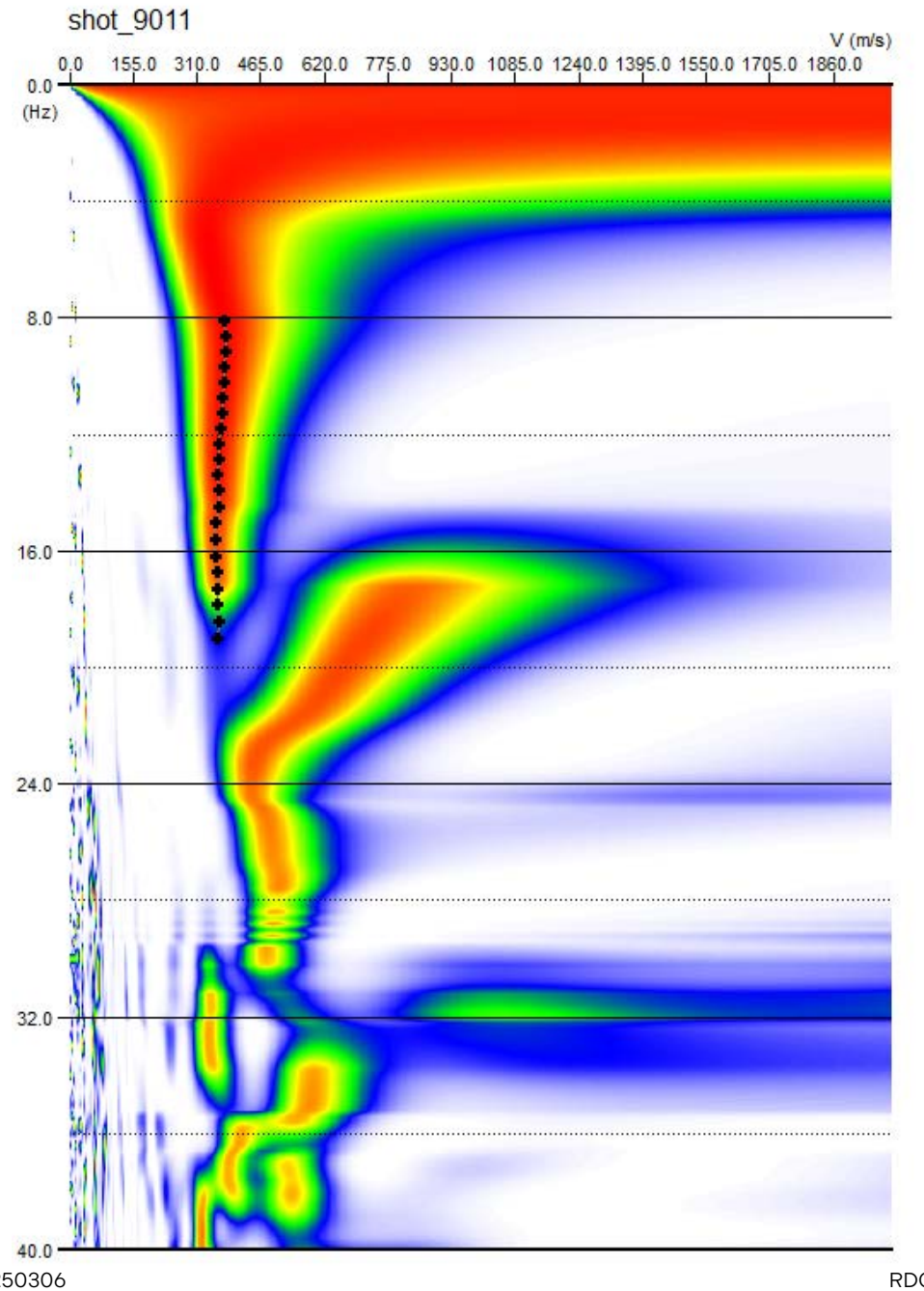

shot_9008
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

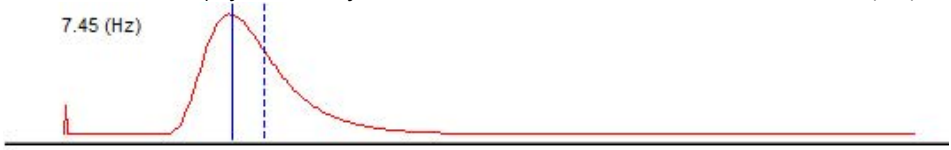

7.39 (Hz)
shot_9009
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

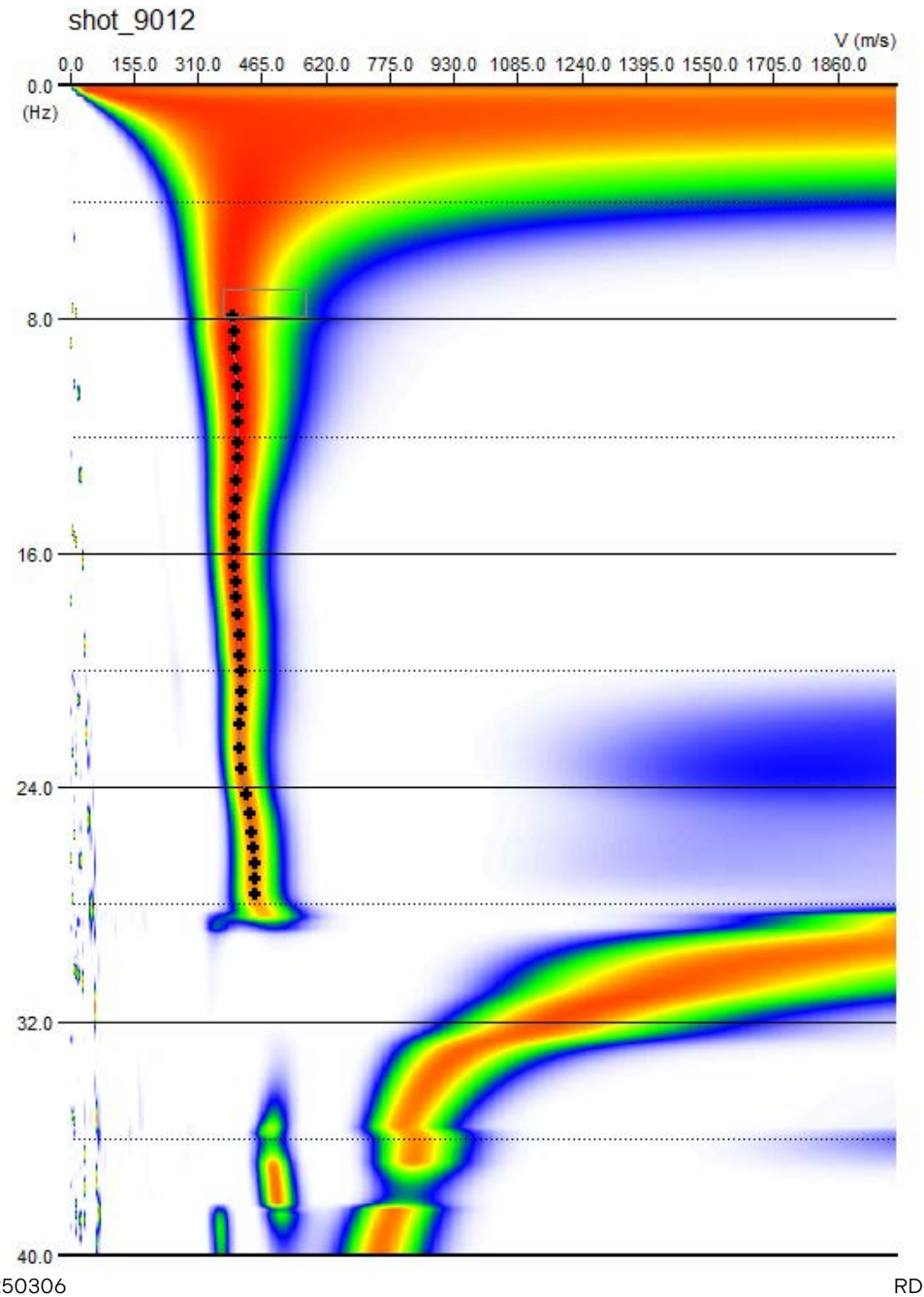

7.33 (Hz)


shot_9010
V (m/s)
0.0
155.0
310.0
465.0
620.0
775.0
930.0
1085.0
1240.0
1395.0
1550.0
1705.0
1860.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

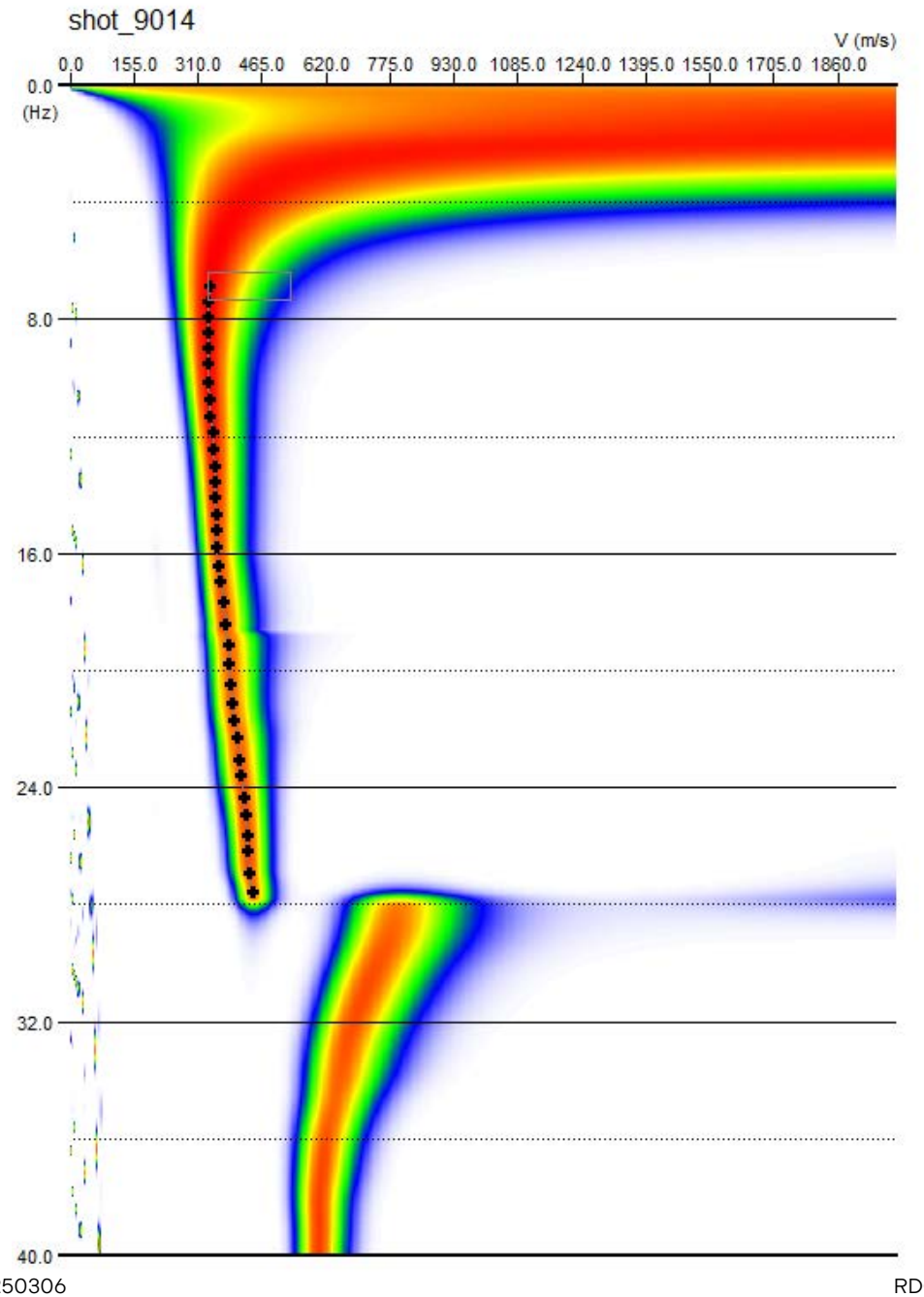


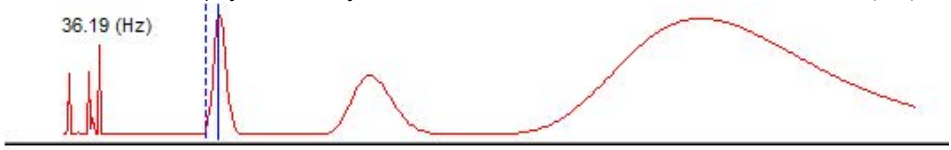

shot_9011
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

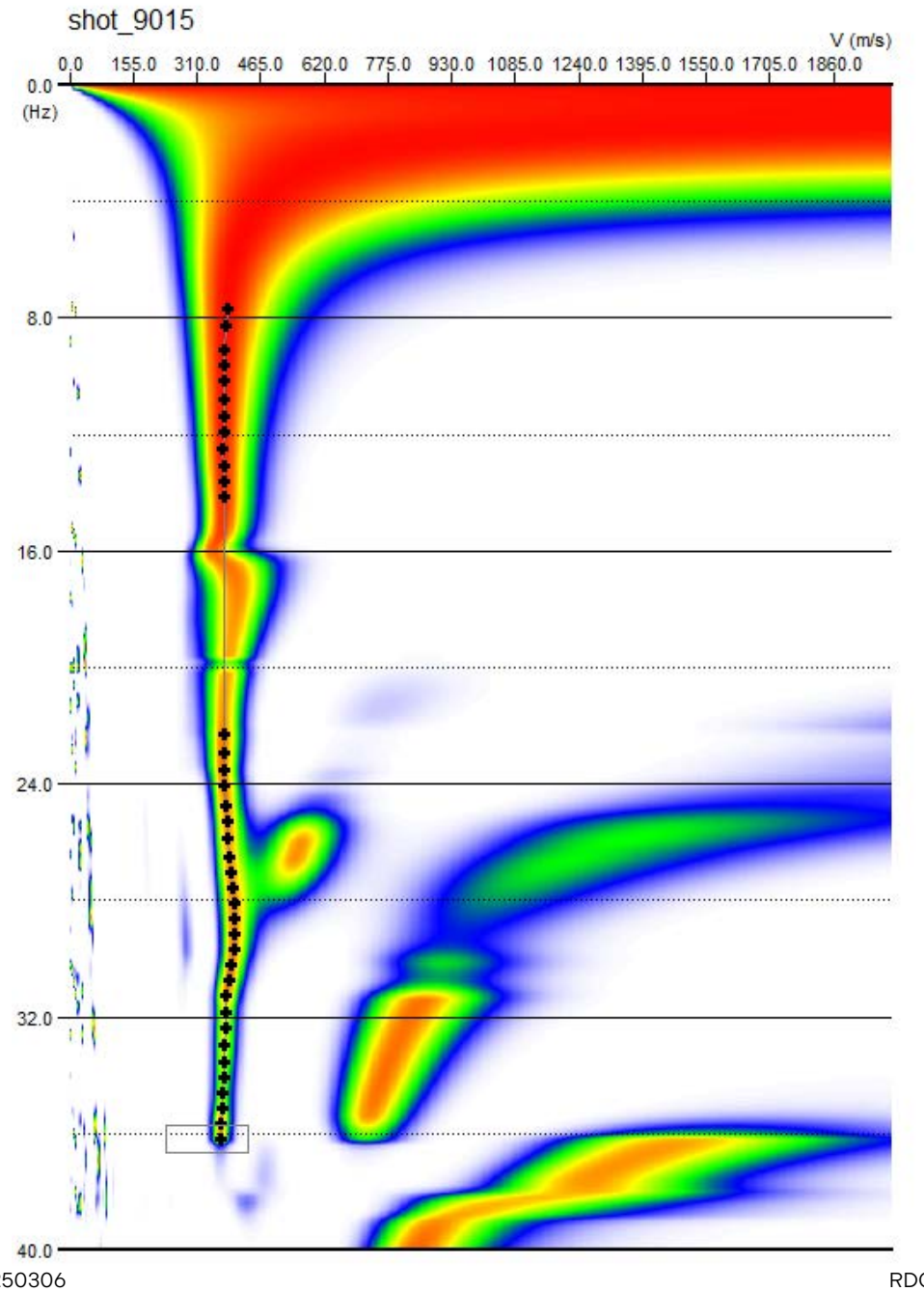

7.45 (Hz)

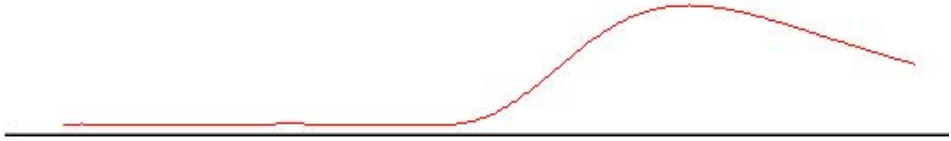

shot_9012
V (m/s)
0.0
155.0
310.0
465.0
620.0
775.0
930.0
1085.0
1240.0
1395.0
1550.0
1705.0
1860.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

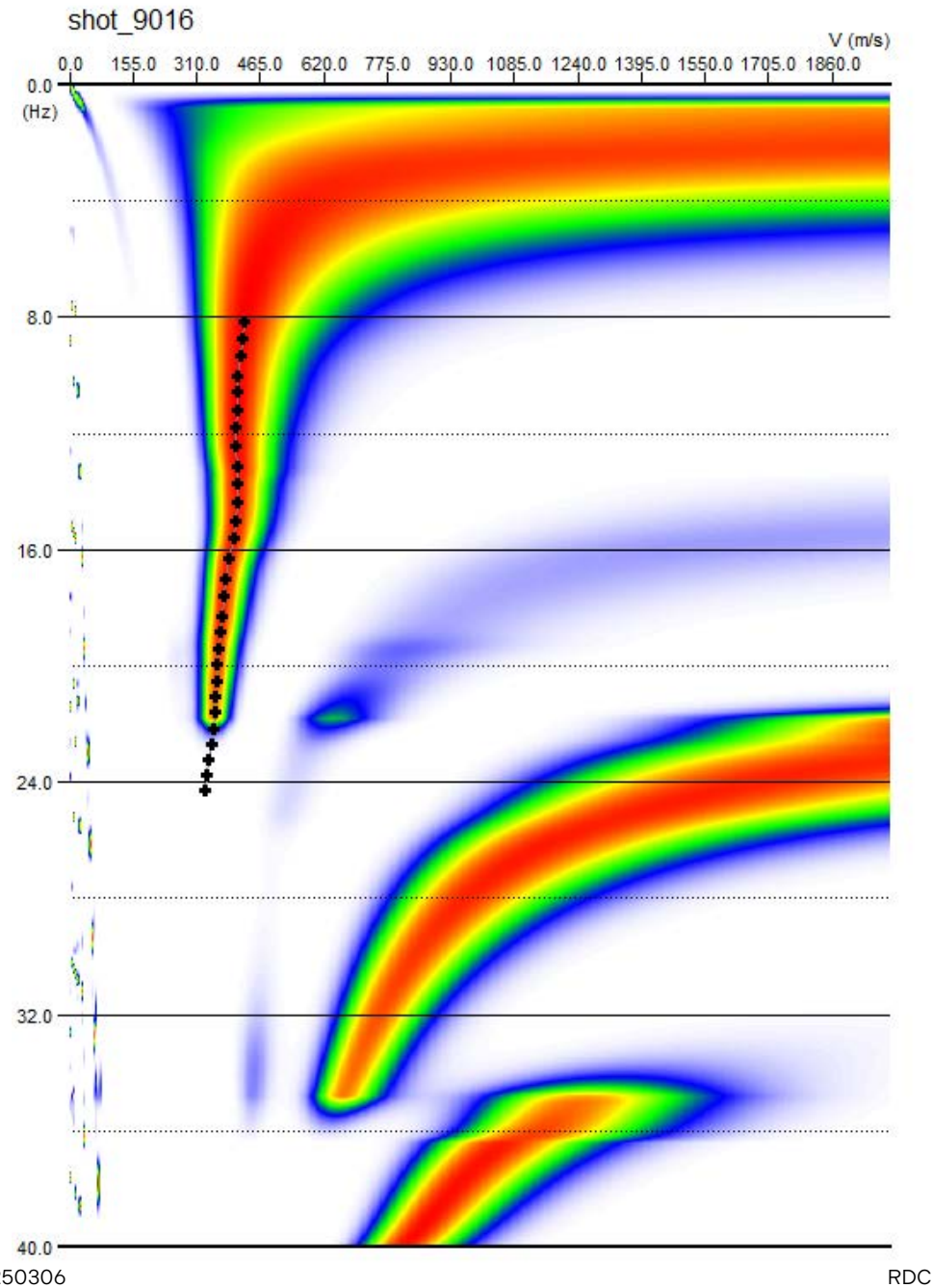

6.86 (Hz)

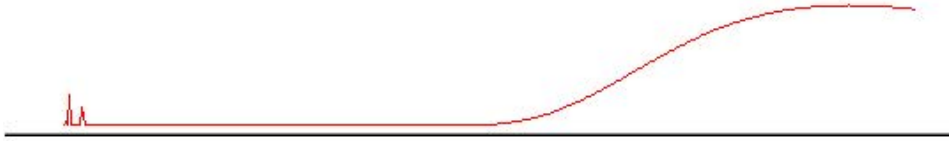

shot_9014
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

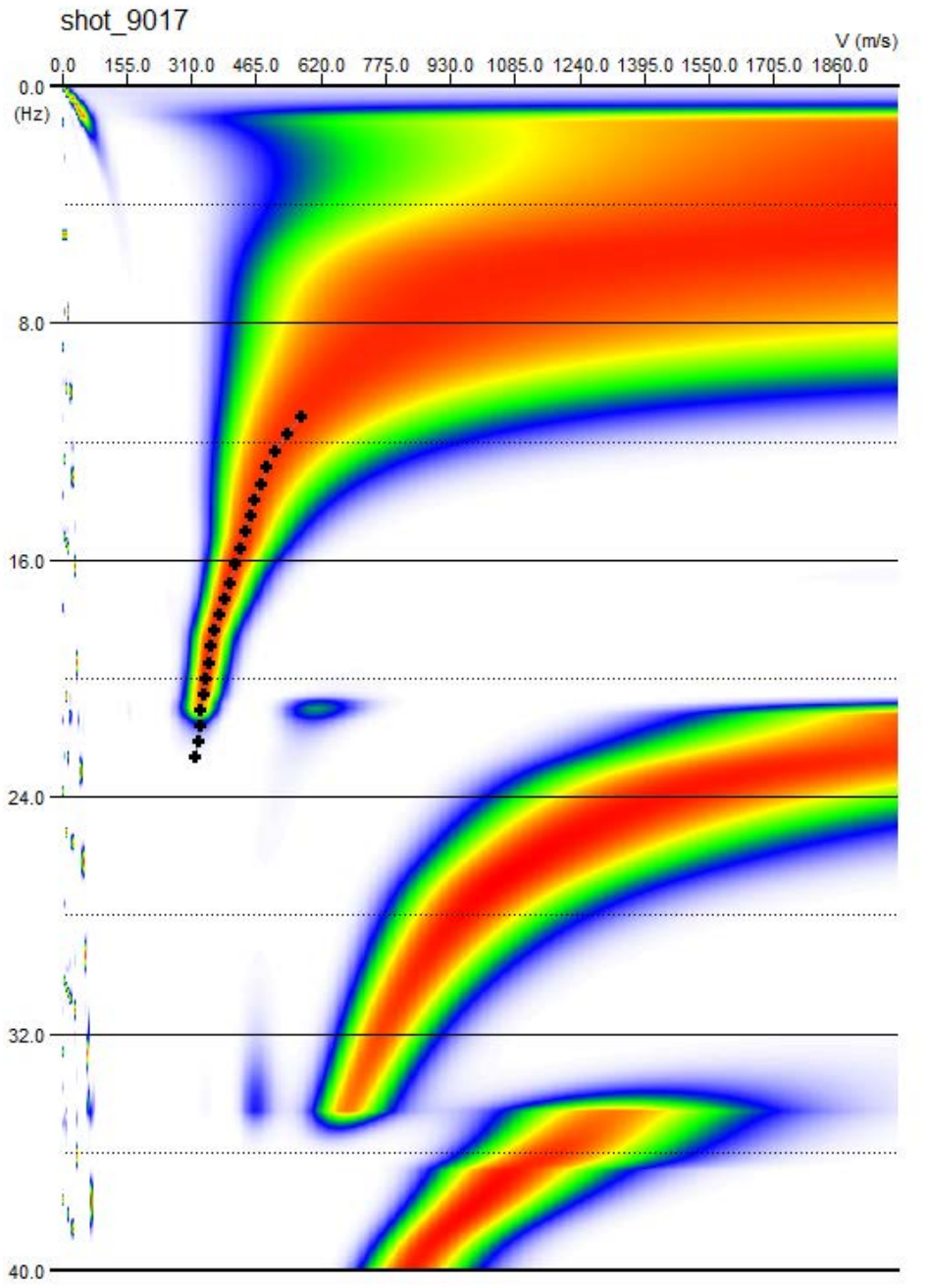

36.19 (Hz)

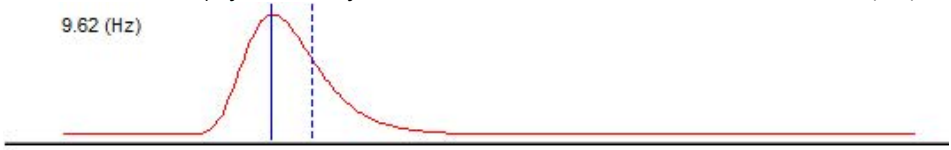

shot_9015
V (m/s)
0.0
155.0
310.0
465.0
620.0
775.0
930.0
1085.0
1240.0
1395.0
1550.0
1705.0
1860.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

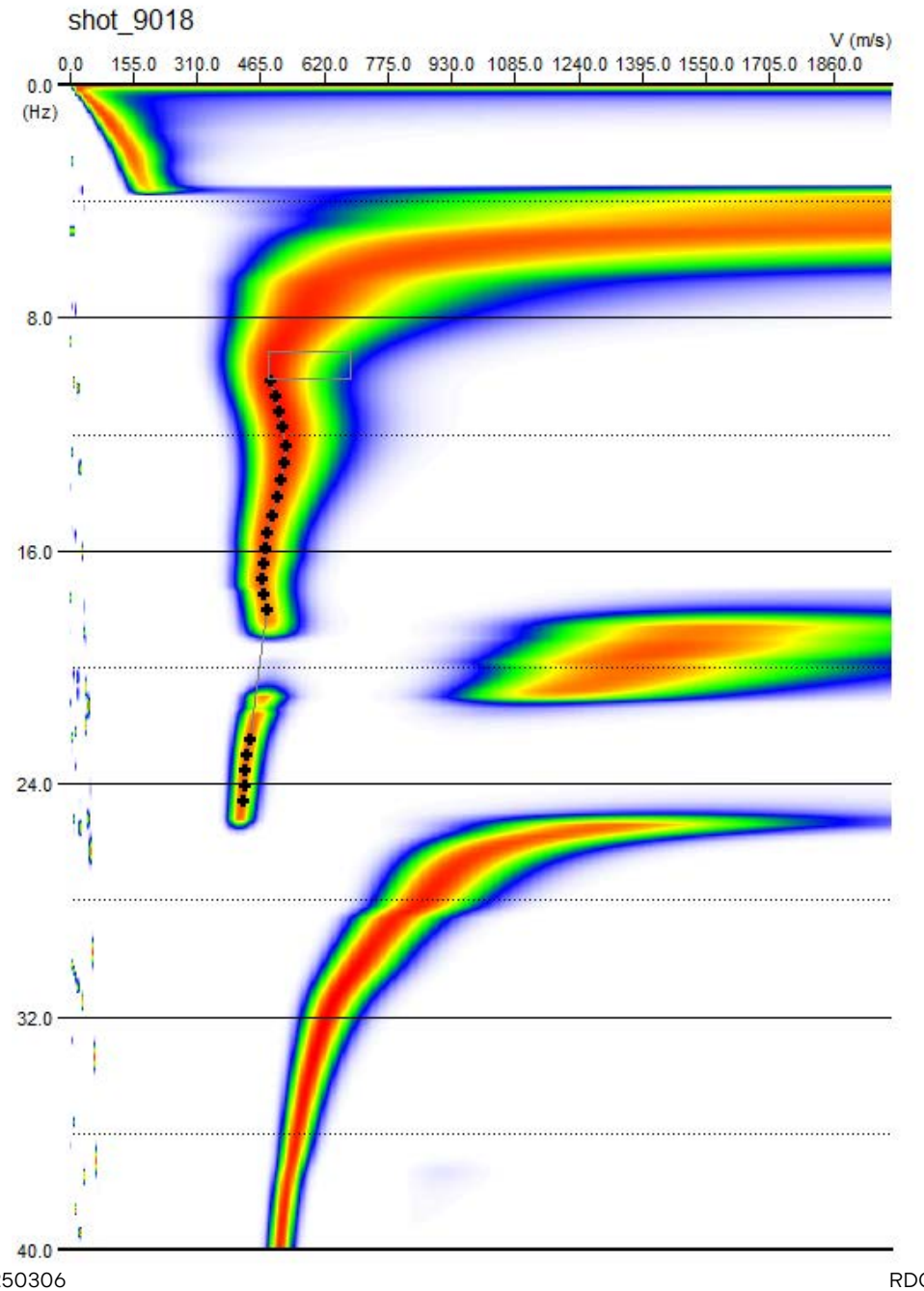



shot_9016
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

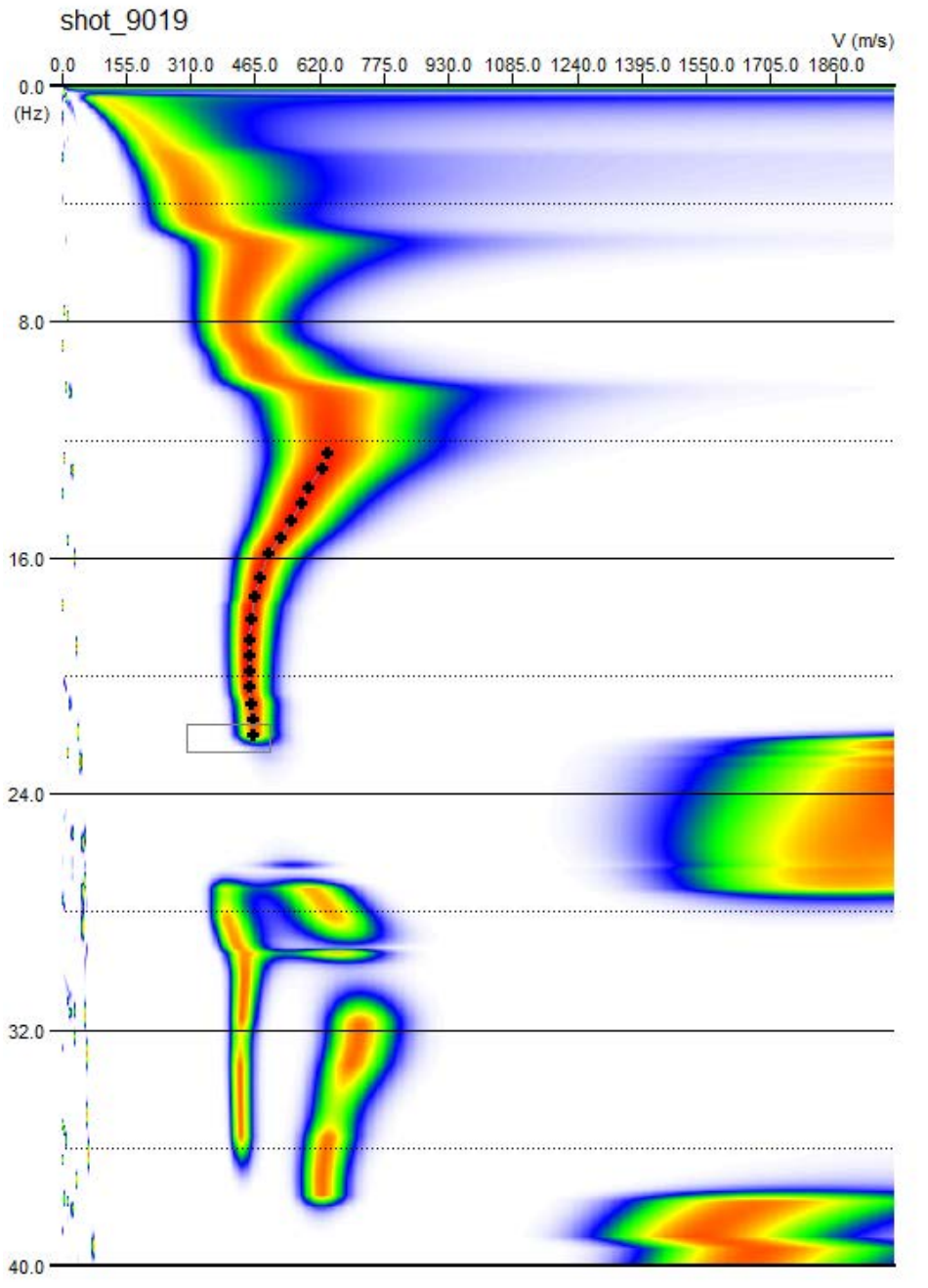



shot_9017
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

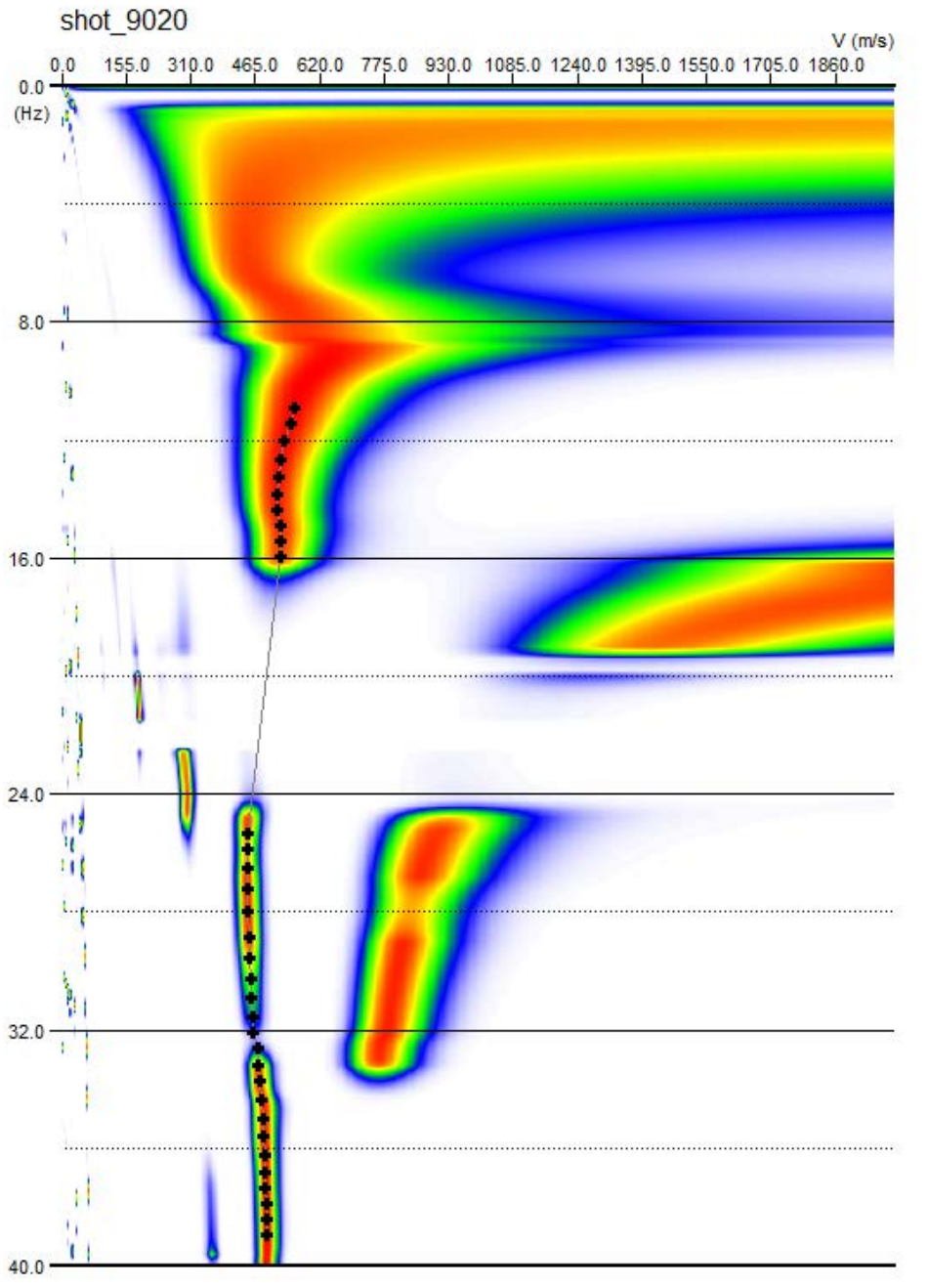

9.62 (Hz)

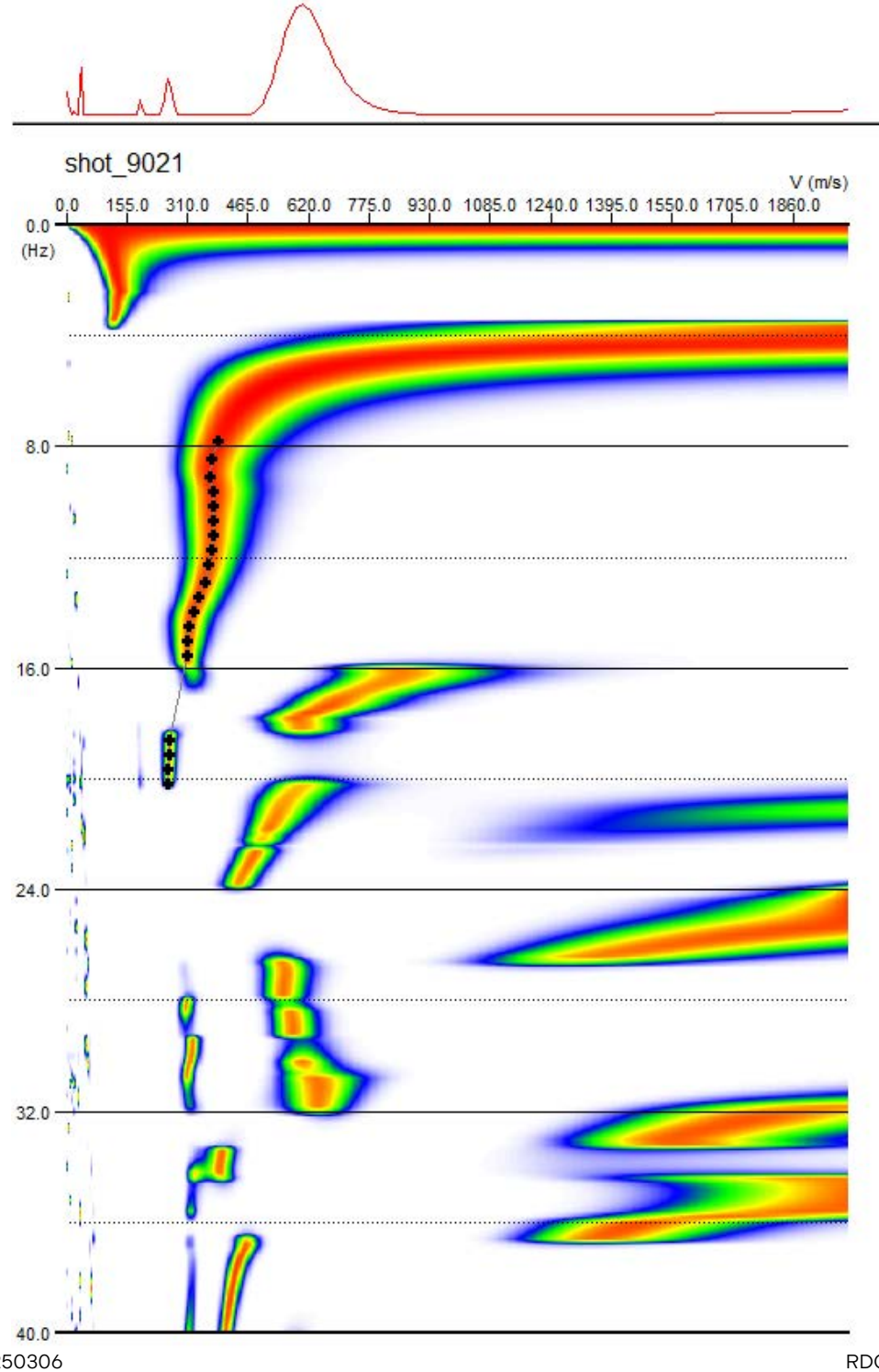

shot_9018
V (m/s)
0.0
155.0
310.0
465.0
620.0
775.0
930.0
1085.0
1240.0
1395.0
1550.0
1705.0
1860.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

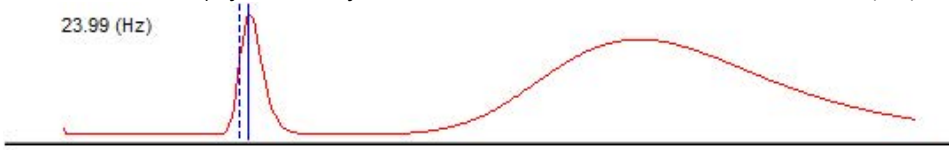

22.11 (Hz)

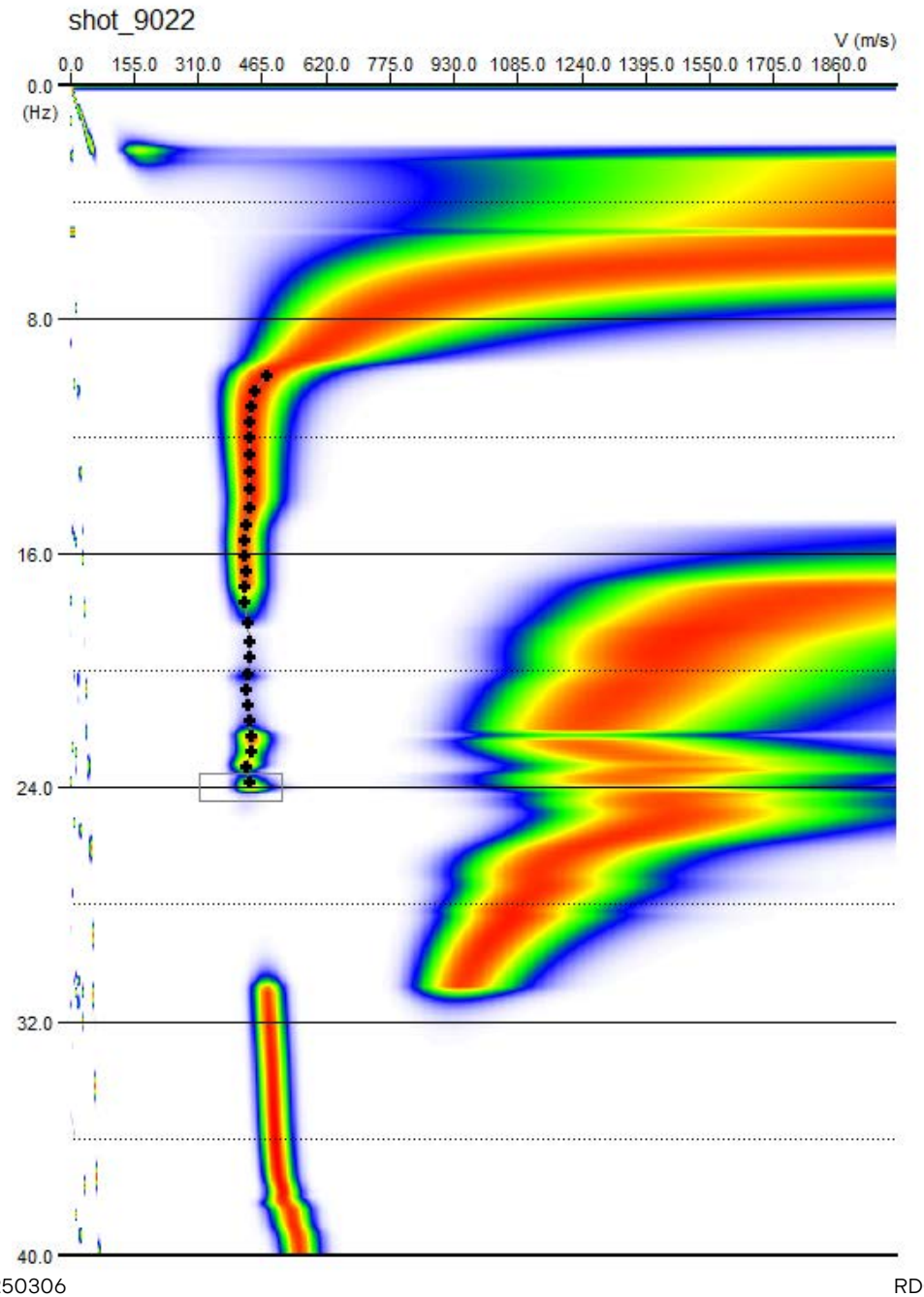

shot_9019
V (m/s)
0.0
155.0
310.0
465.0
620.0
775.0
930.0
1085.0
1240.0
1395.0
1550.0
1705.0
1860.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

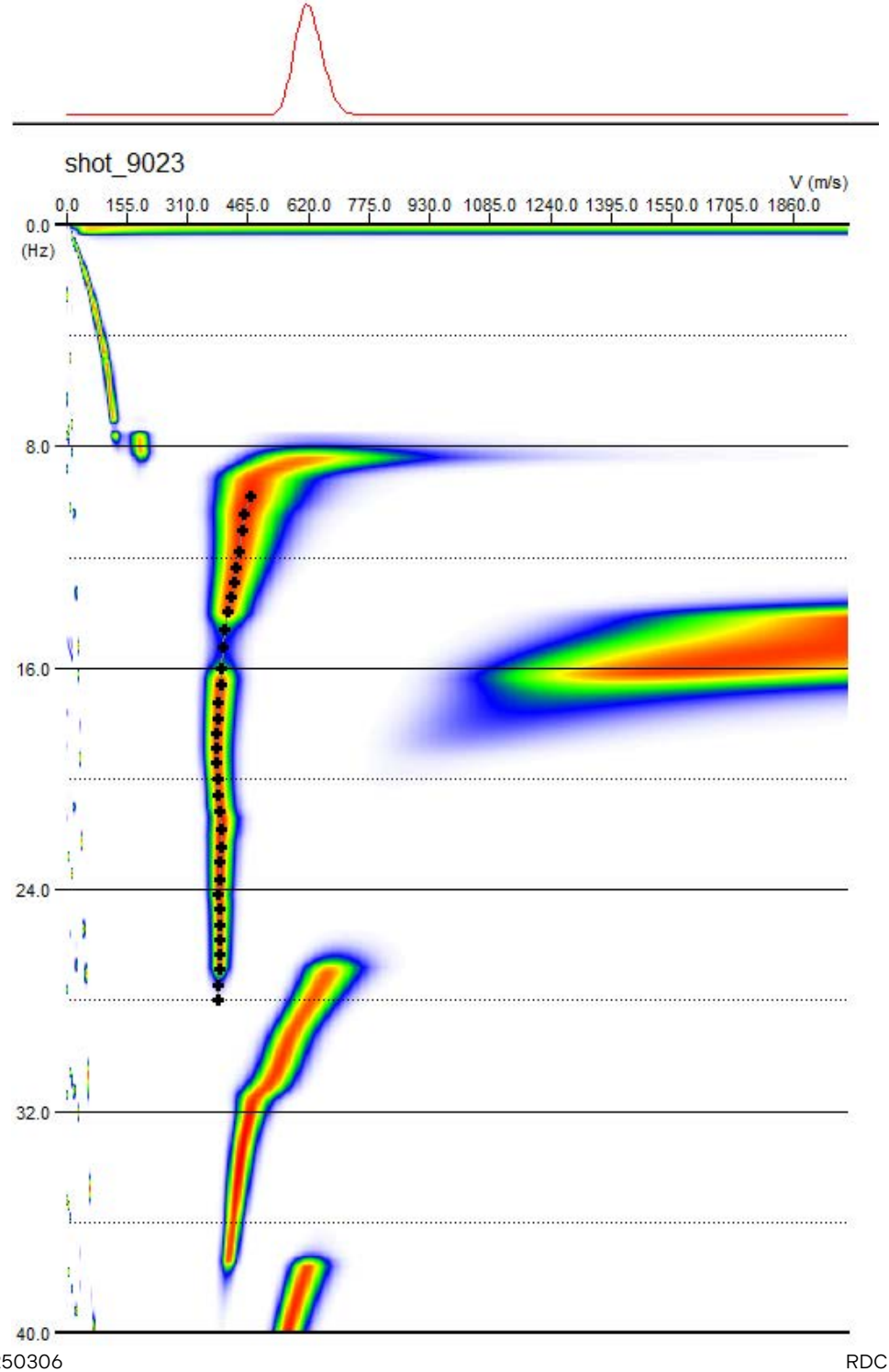


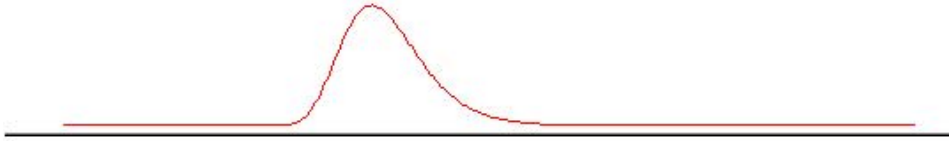

shot_9020
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

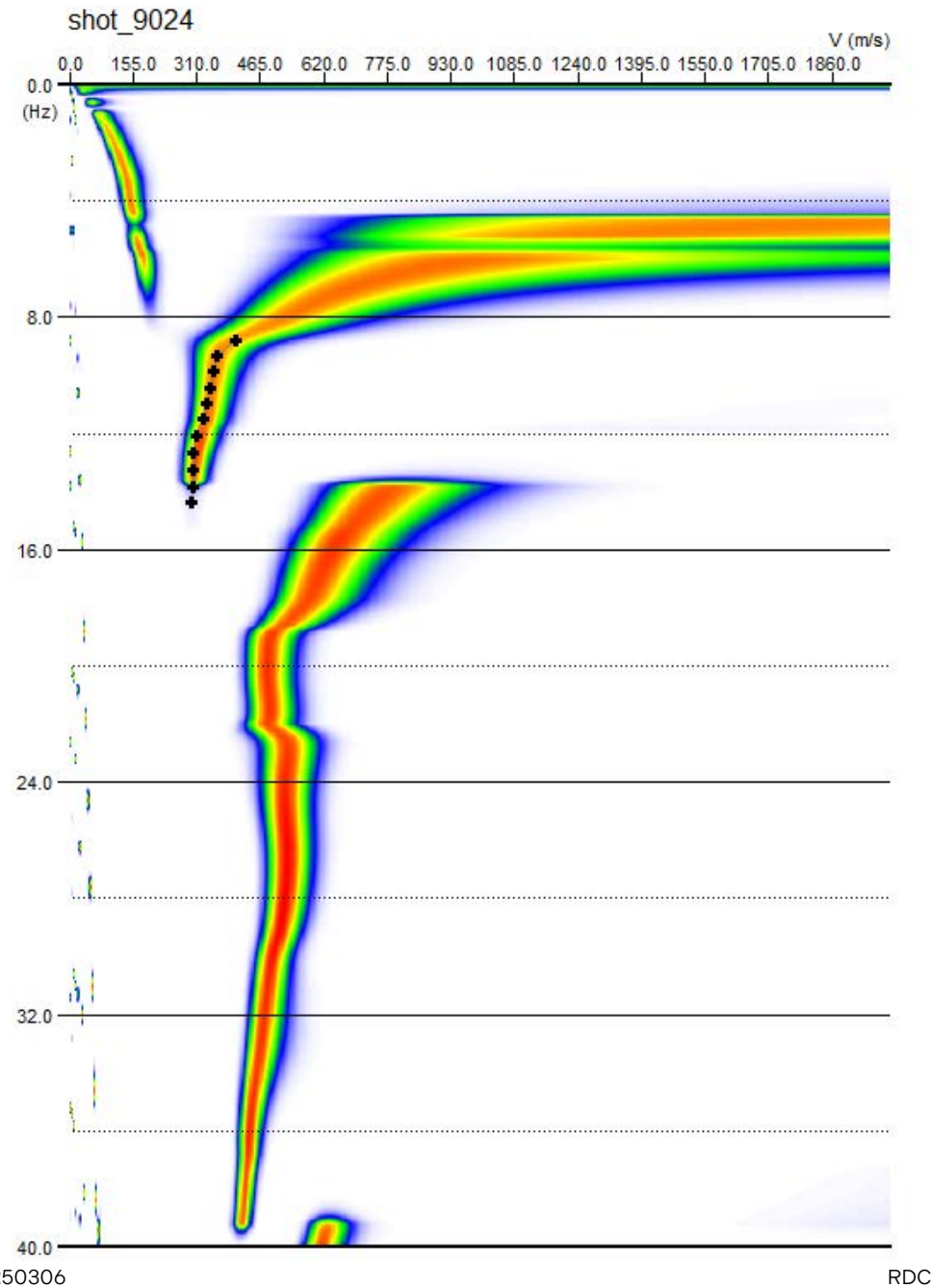

shot_9021
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

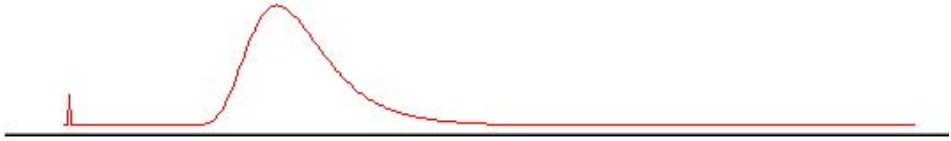

23.99 (Hz)

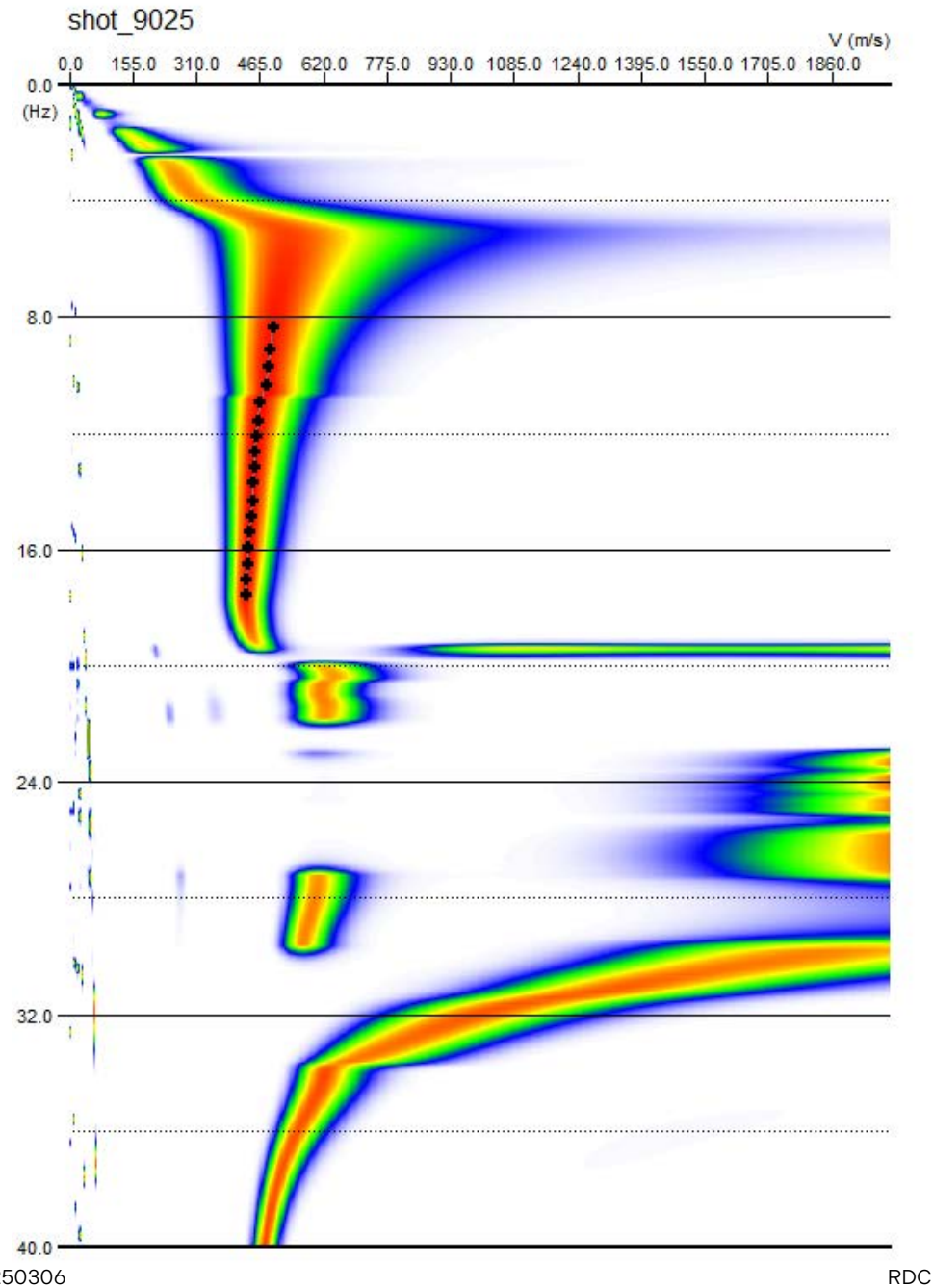

shot_9022
V (m/s)
0.0
155.0
310.0
465.0
620.0
775.0
930.0
1085.0
1240.0
1395.0
1550.0
1705.0
1860.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

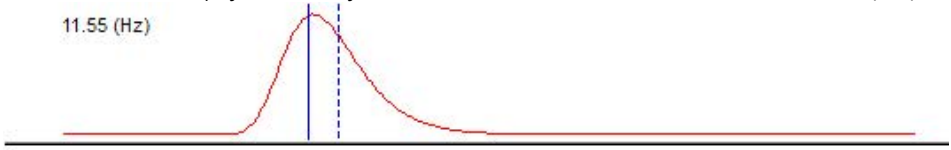

shot_9023
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

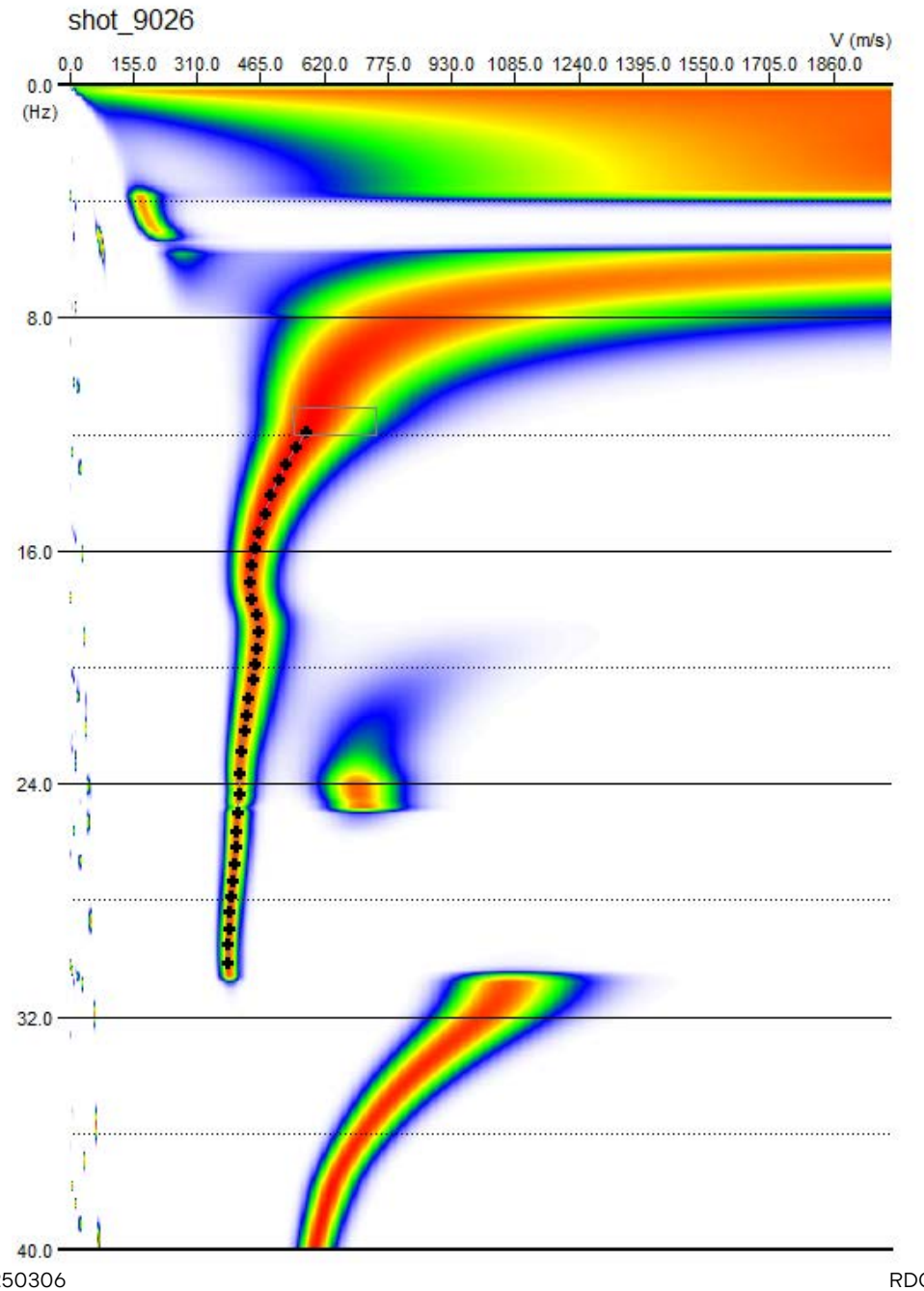


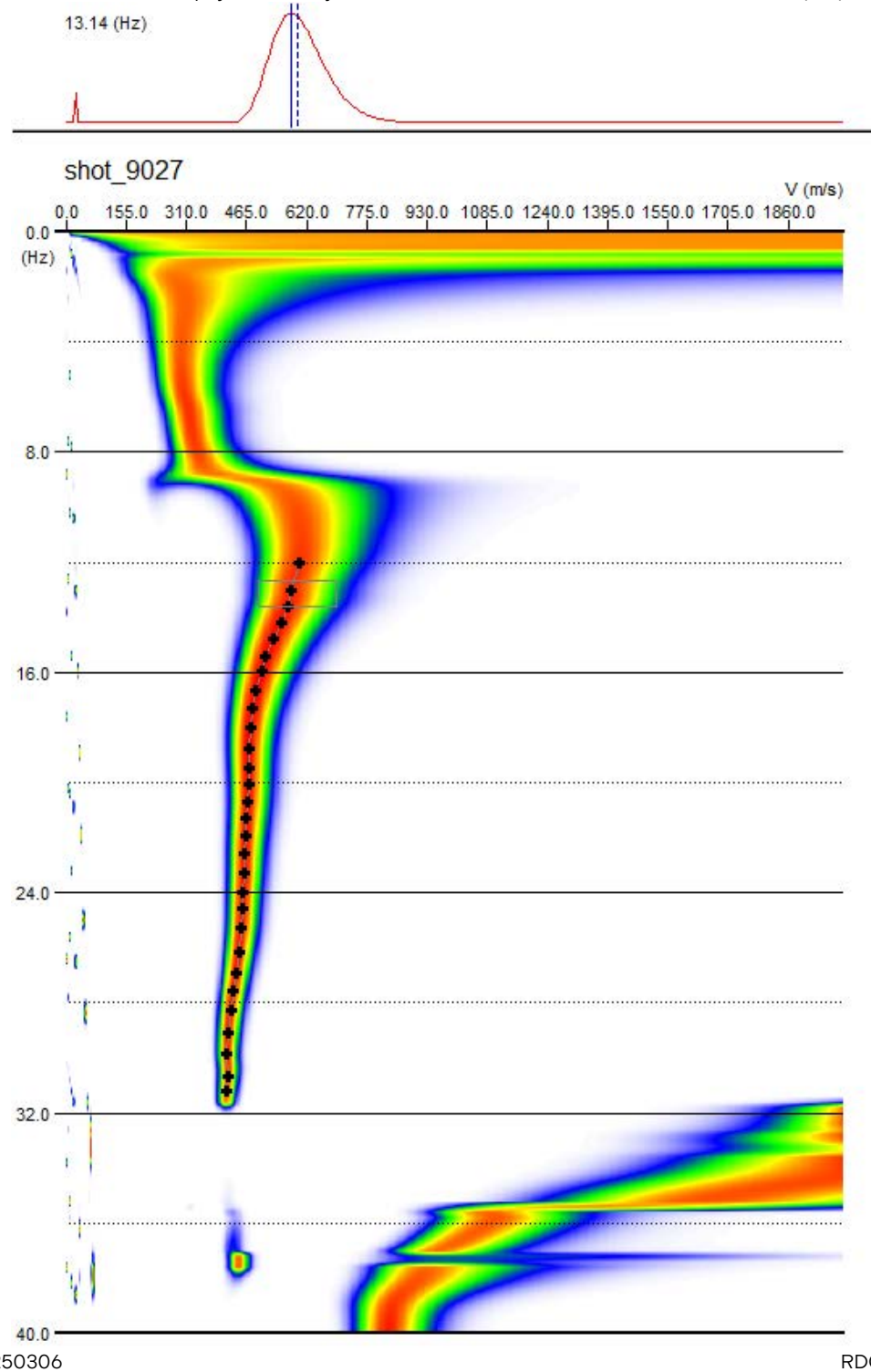

shot_9024
V (m/s)
0.0
155.0
310.0
465.0
620.0
775.0
930.0
1085.0
1240.0
1395.0
1550.0
1705.0
1860.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0



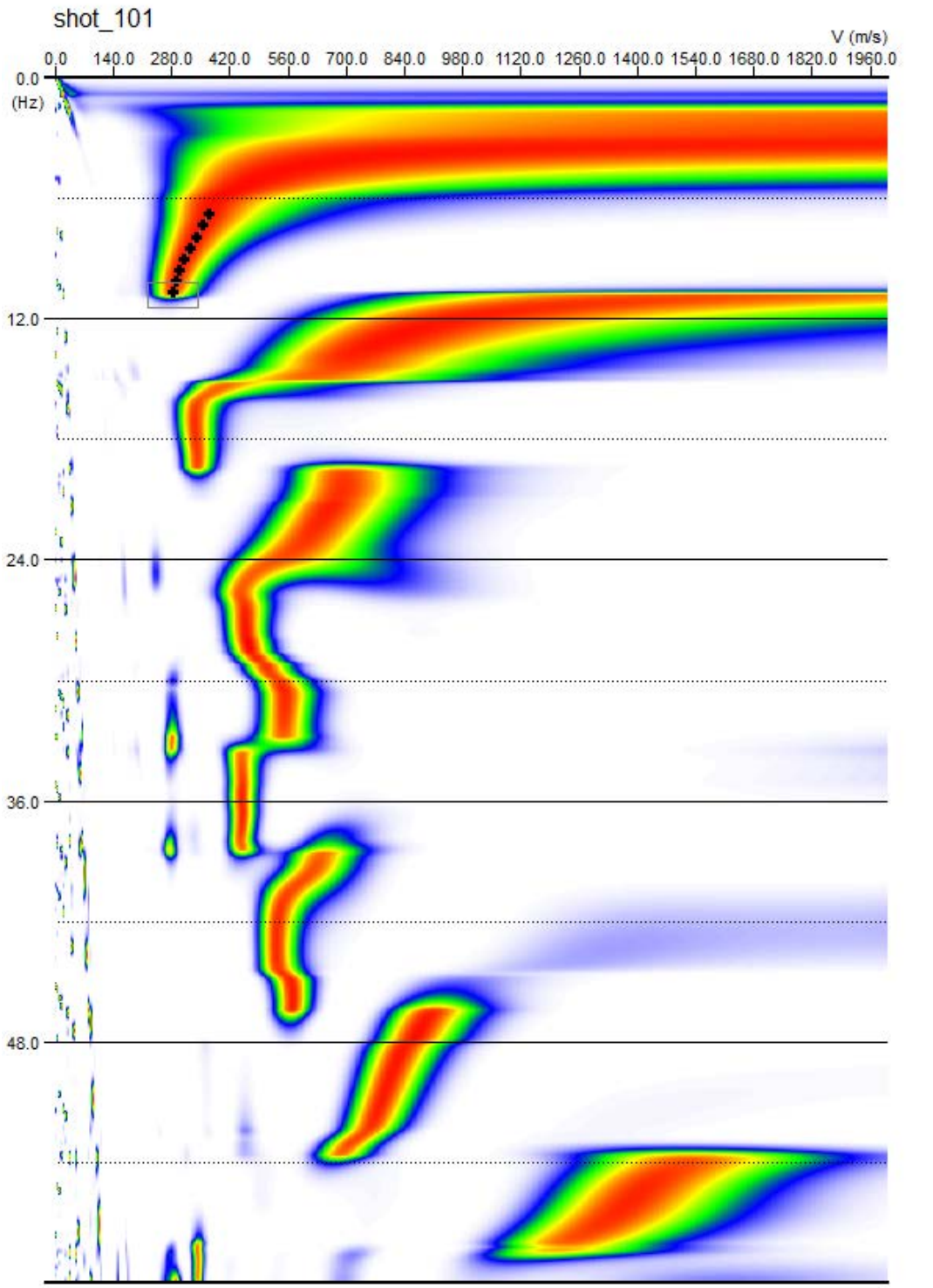

shot_9025
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0


11.55 (Hz)

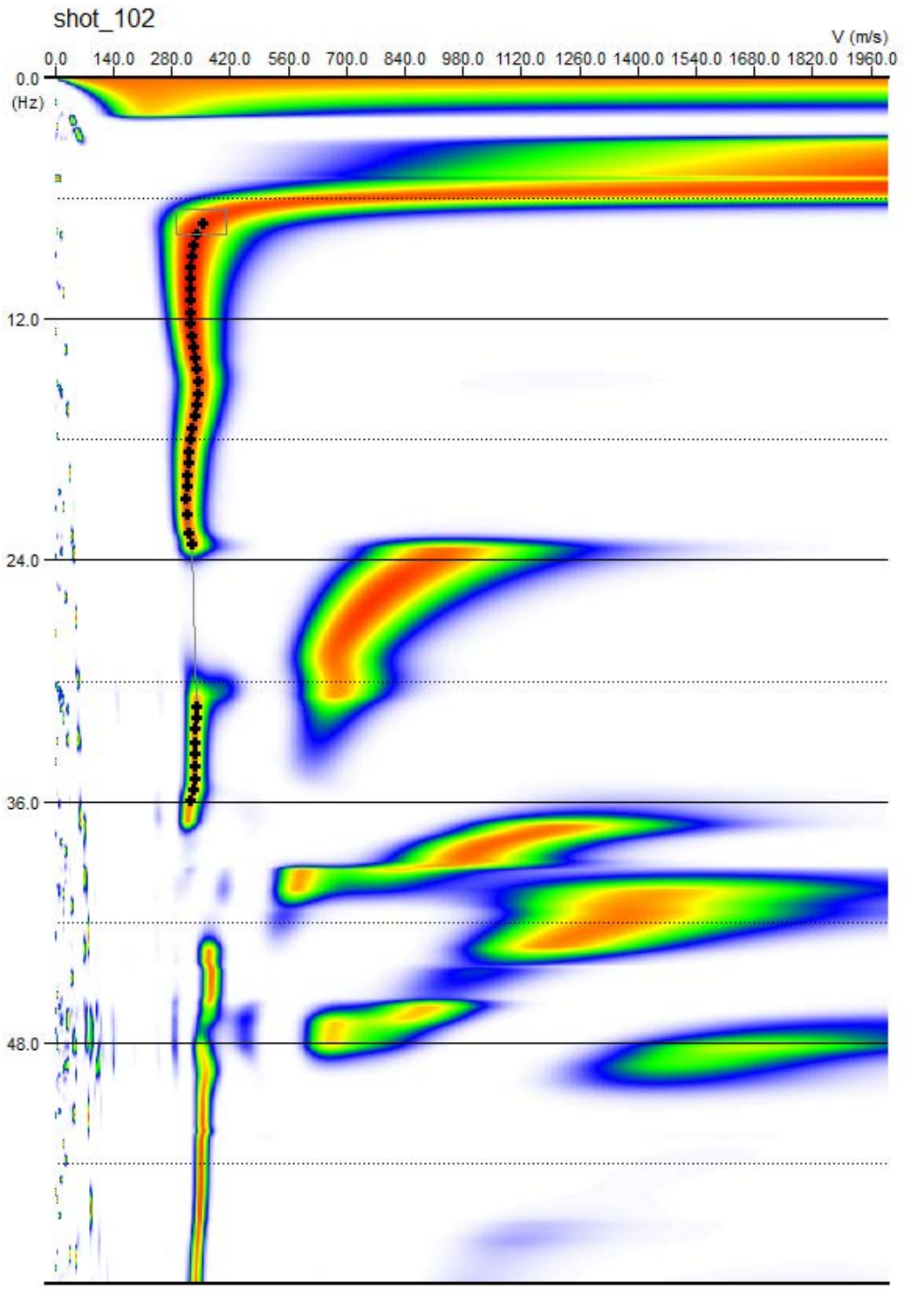

shot_9026
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

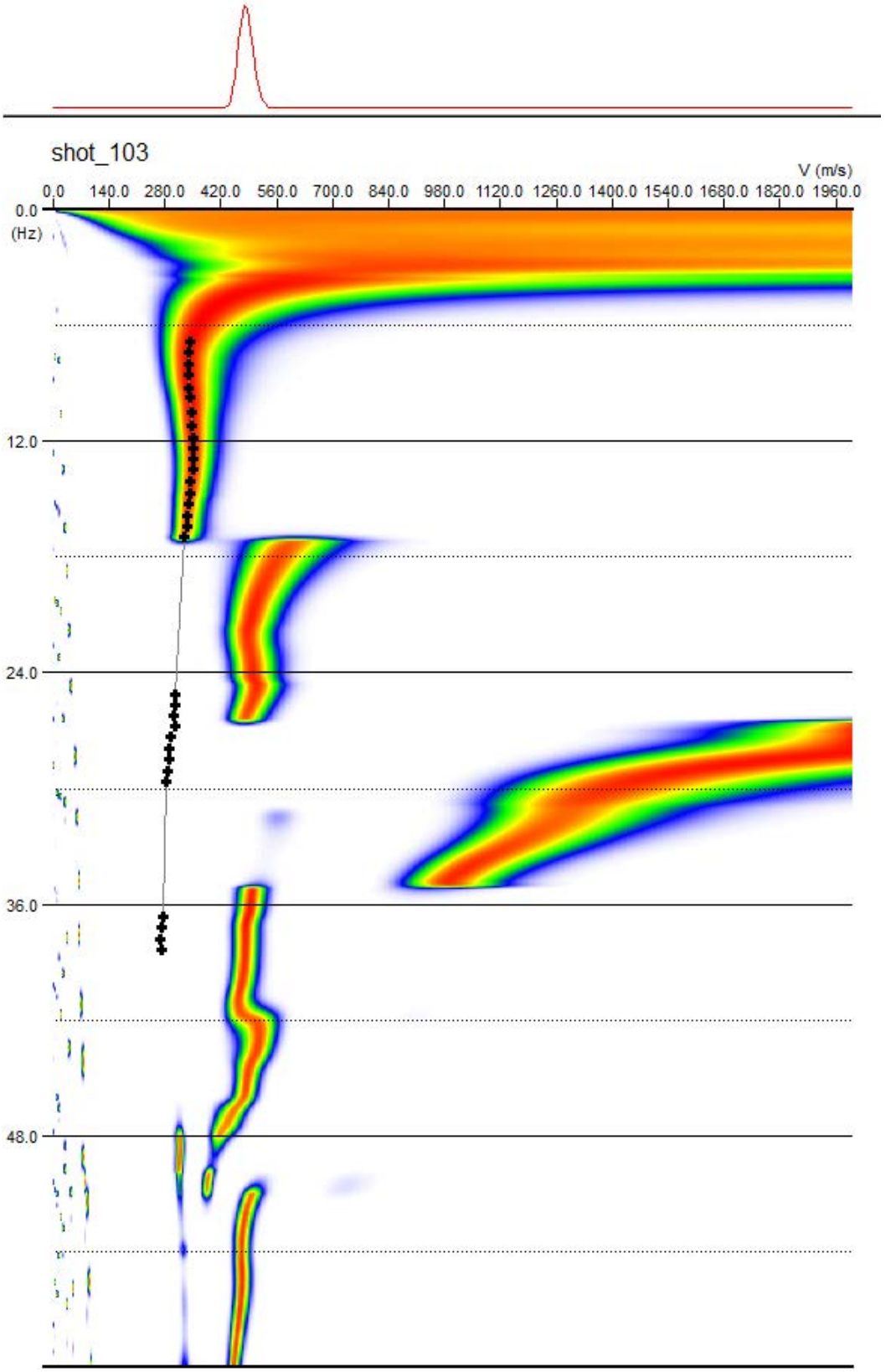

13.14 (Hz)
shot_9027
V (m/s)
0.0 155.0 310.0 465.0 620.0 775.0 930.0 1085.0 1240.0 1395.0 1550.0 1705.0 1860.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

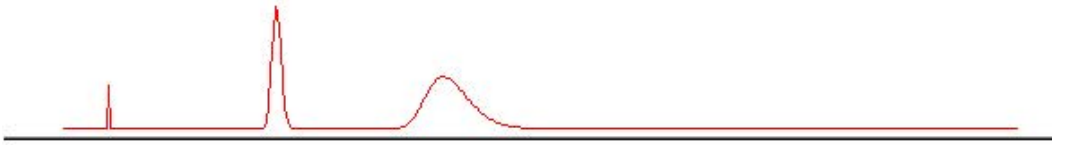

10.82 (Hz)

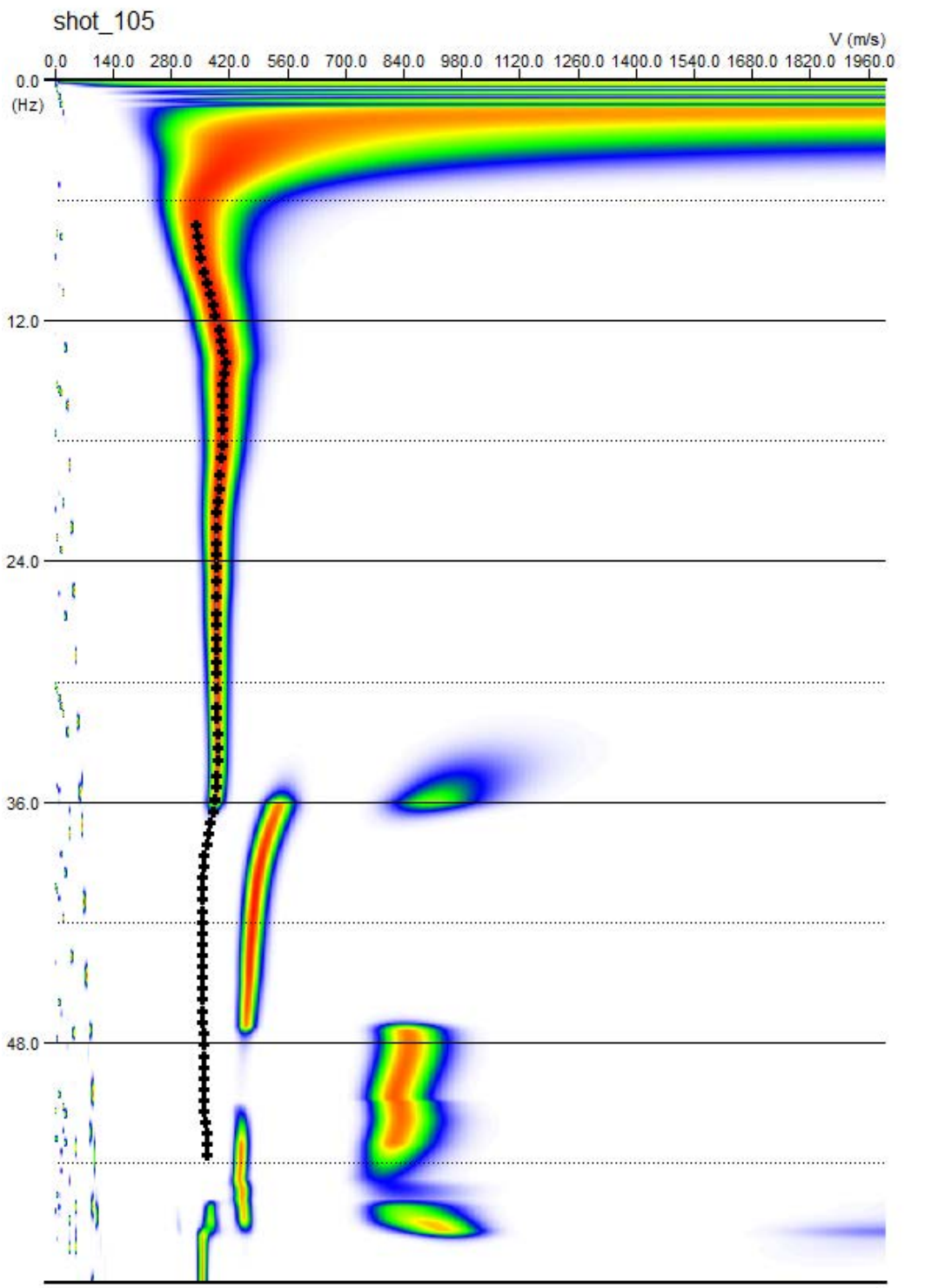

shot_101
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0

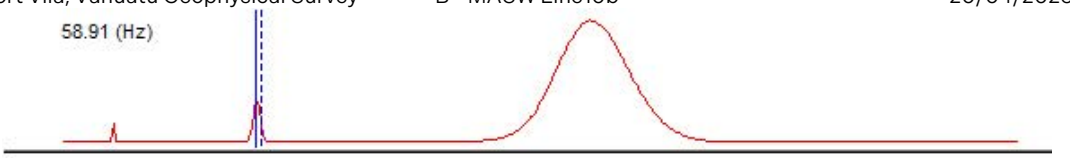

7.16 (Hz)

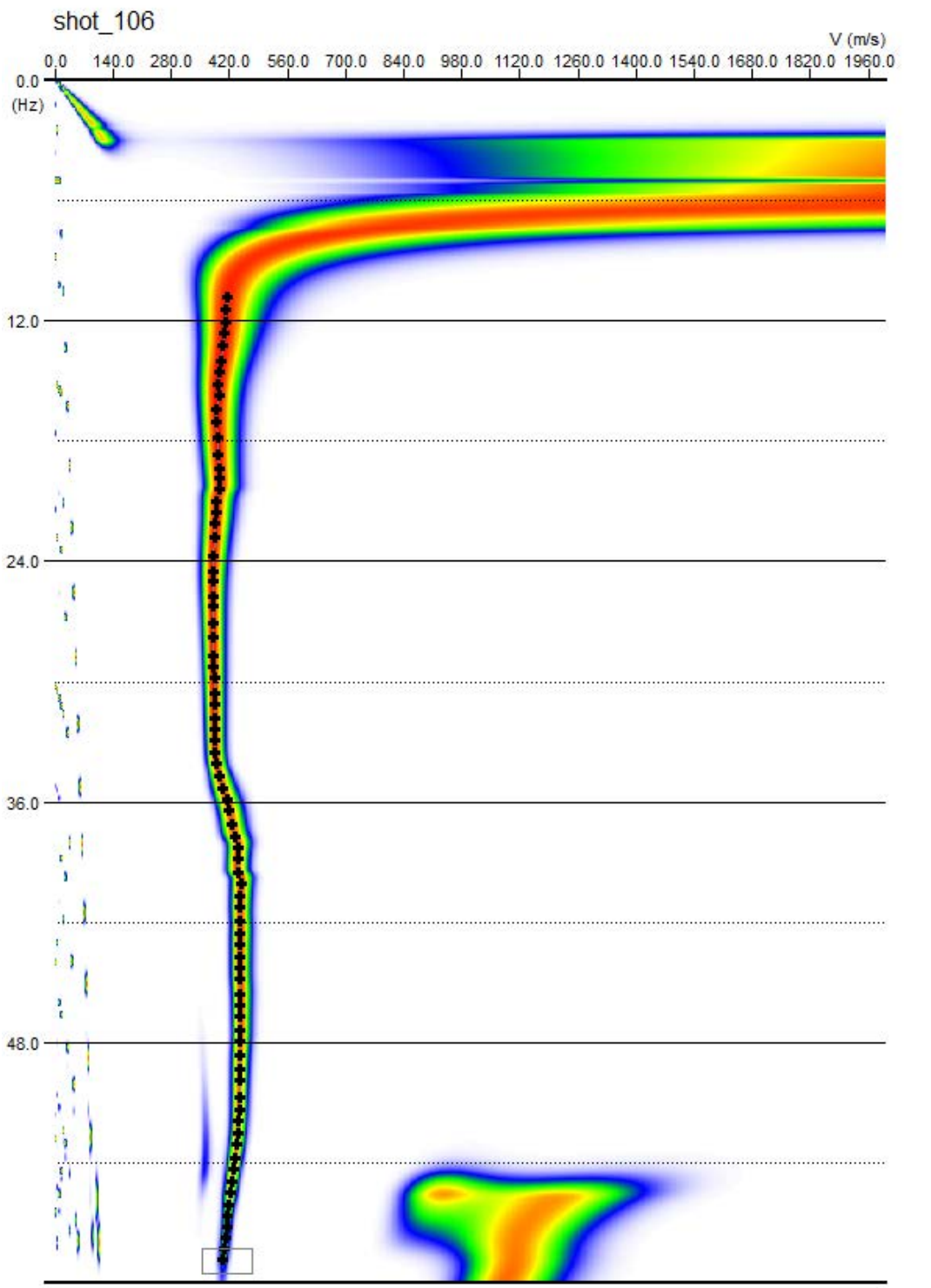

shot_102
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0

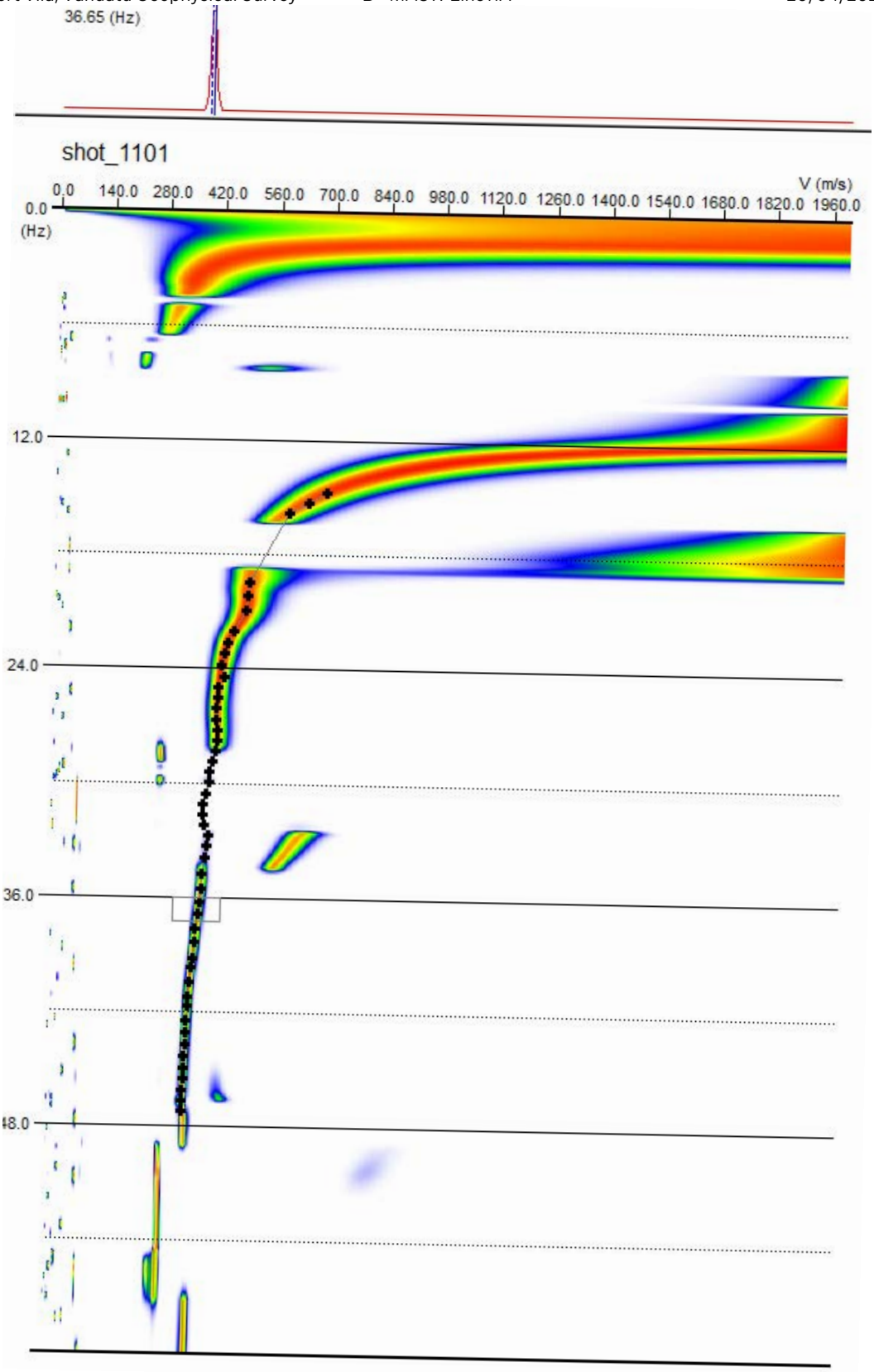

shot_103
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0

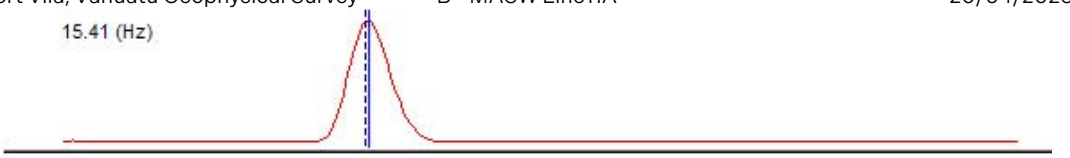


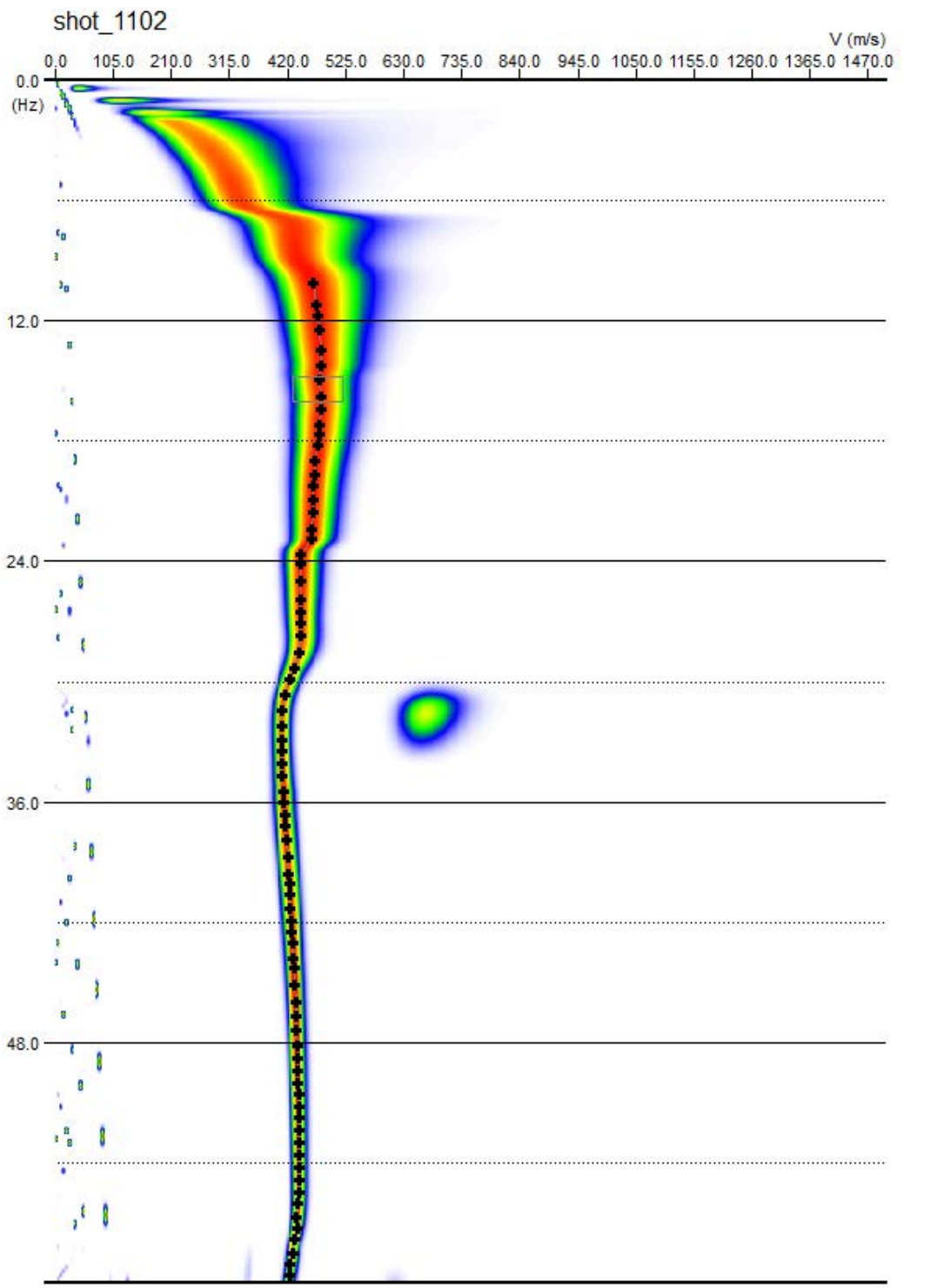

shot_105
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0


58.91 (Hz)

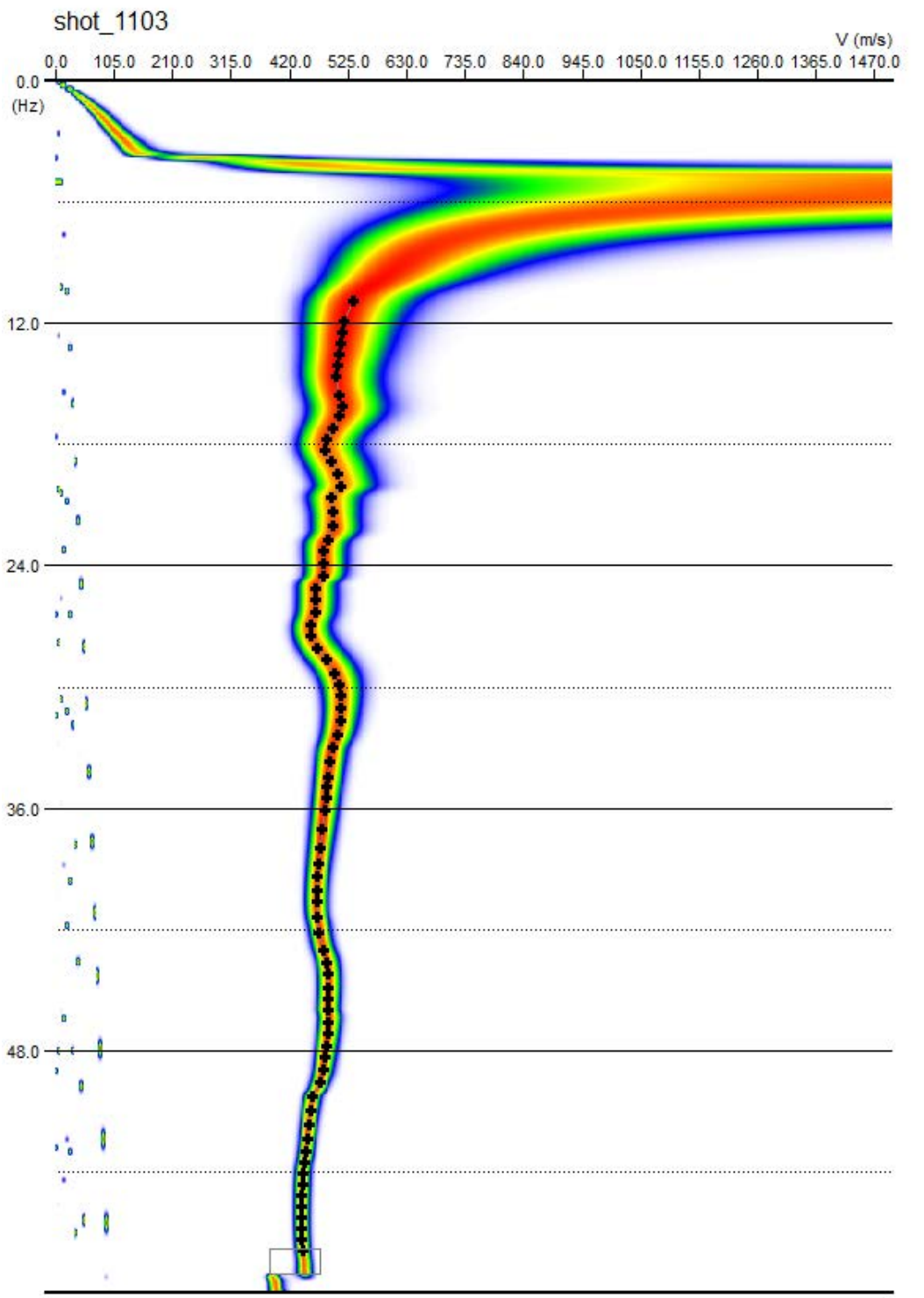

shot_106
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0

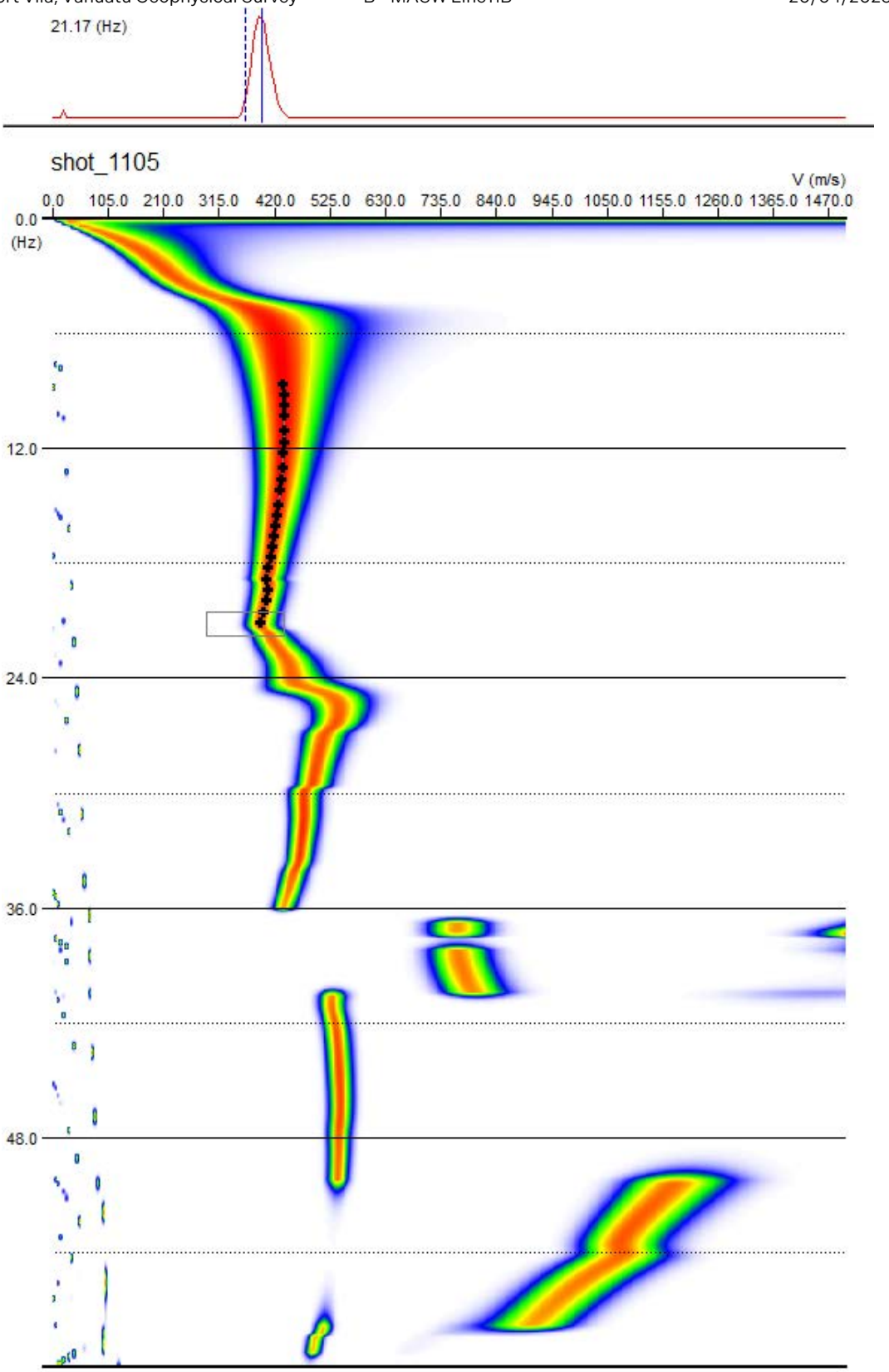

36.65 (Hz)
shot_1101
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
V (m/s)
0.0
(Hz)
12.0
24.0
36.0
48.0

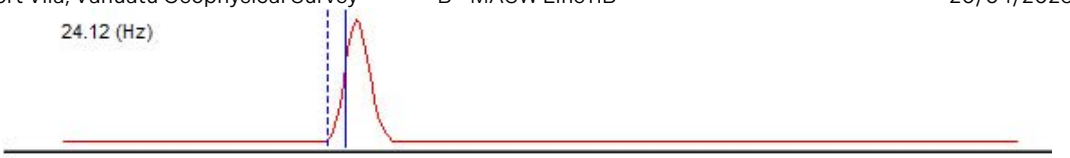

15.41 (Hz)

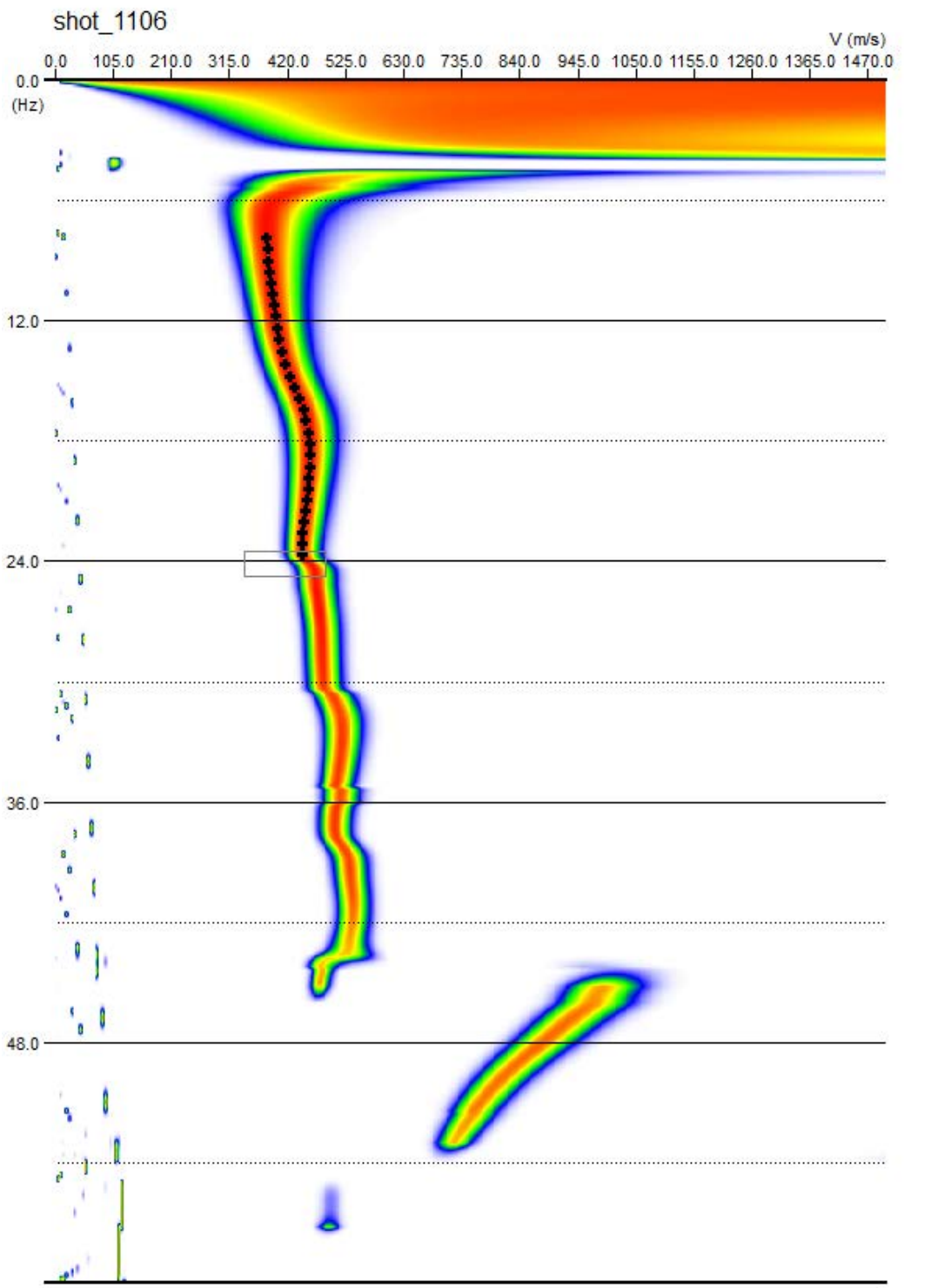

shot_1102
V (m/s)
0.0
105.0
210.0
315.0
420.0
525.0
630.0
735.0
840.0
945.0
1050.0
1155.0
1260.0
1365.0
1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0


58.44 (Hz)

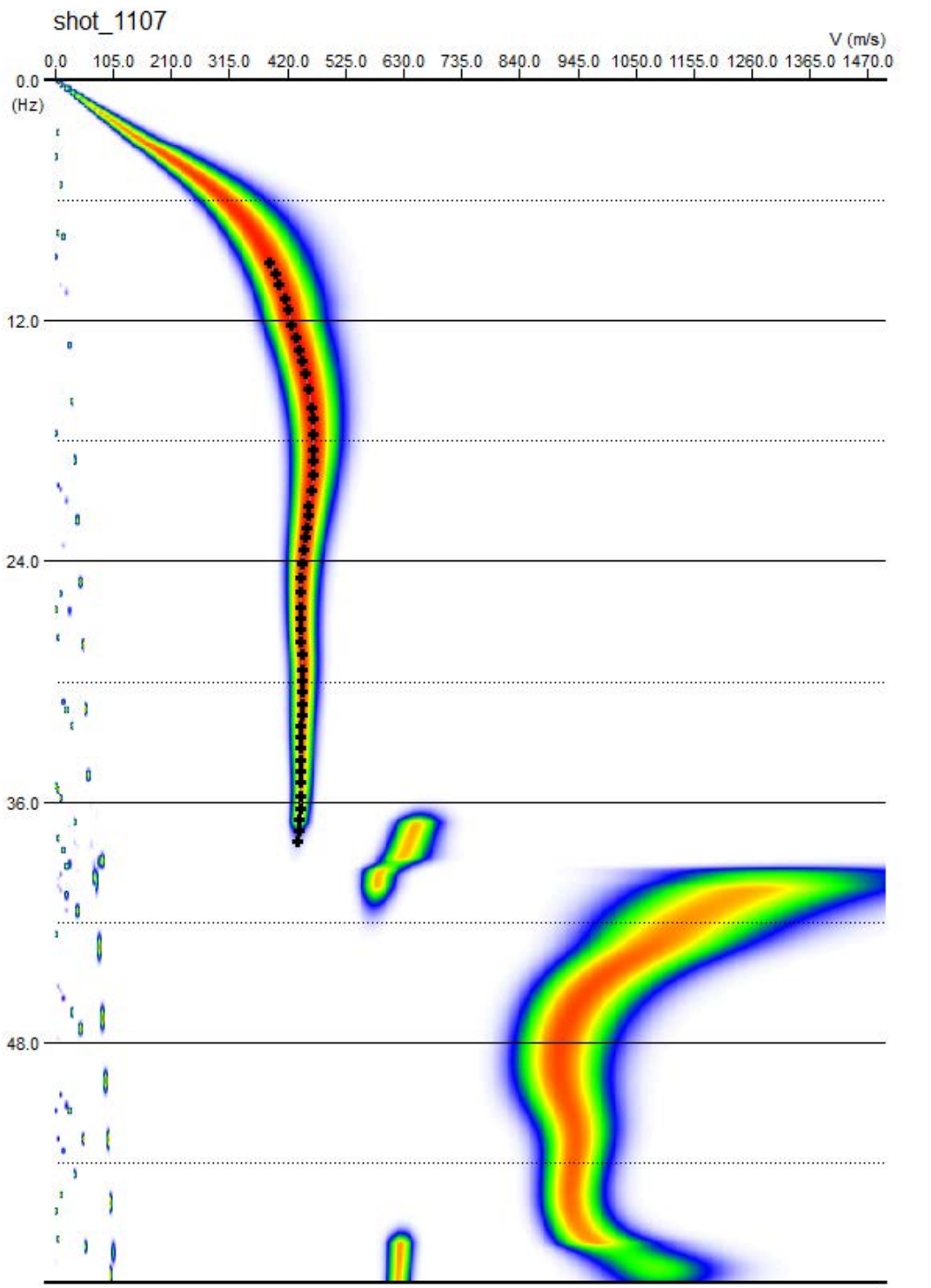

shot_1103
V (m/s)
0.0
105.0
210.0
315.0
420.0
525.0
630.0
735.0
840.0
945.0
1050.0
1155.0
1260.0
1365.0
1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0

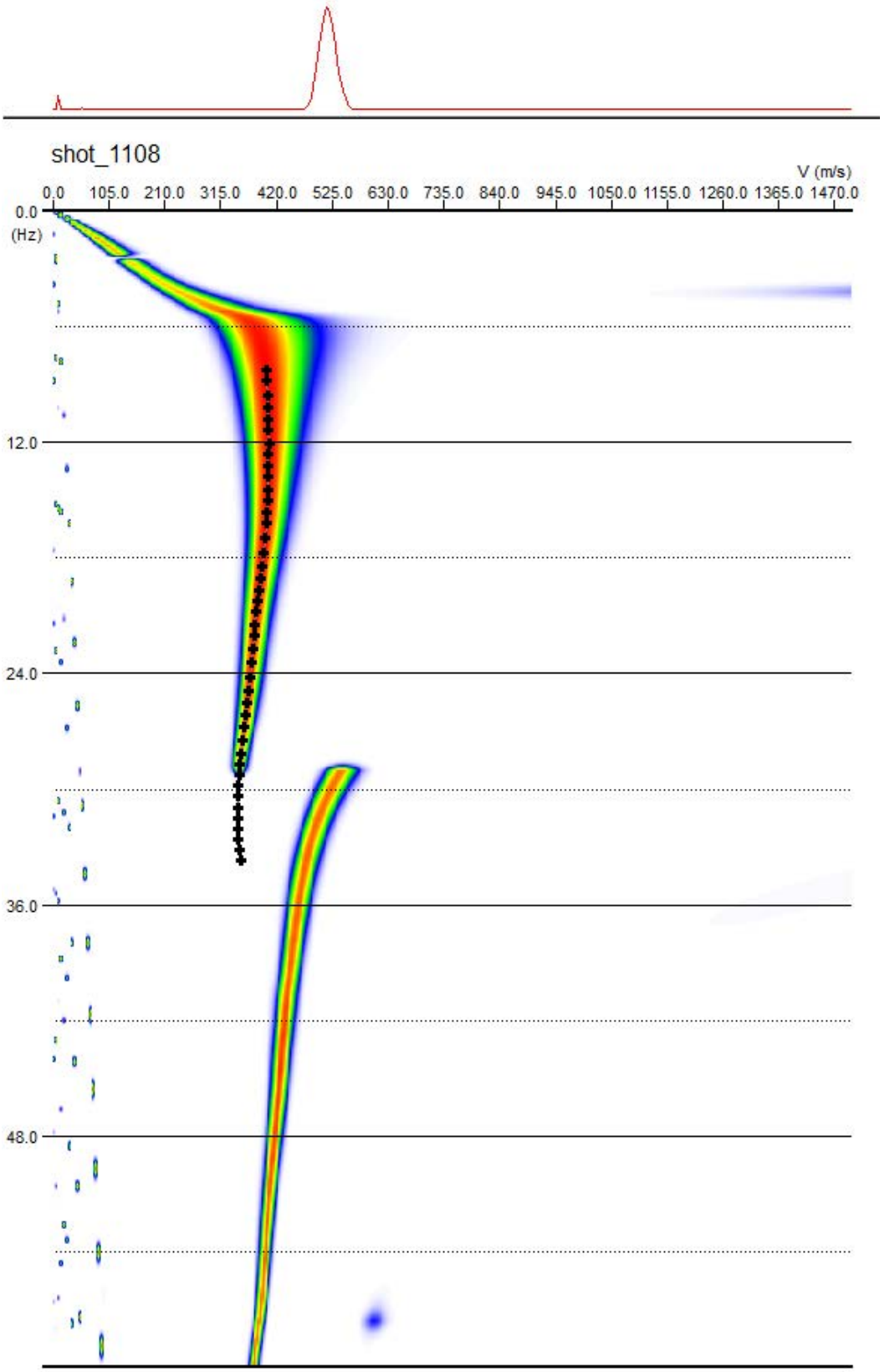

21.17 (Hz)
shot_1105
V (m/s)
0.0 105.0 210.0 315.0 420.0 525.0 630.0 735.0 840.0 945.0 1050.0 1155.0 1260.0 1365.0 1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0

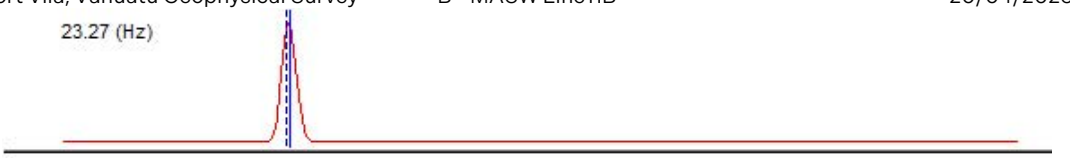

24.12 (Hz)

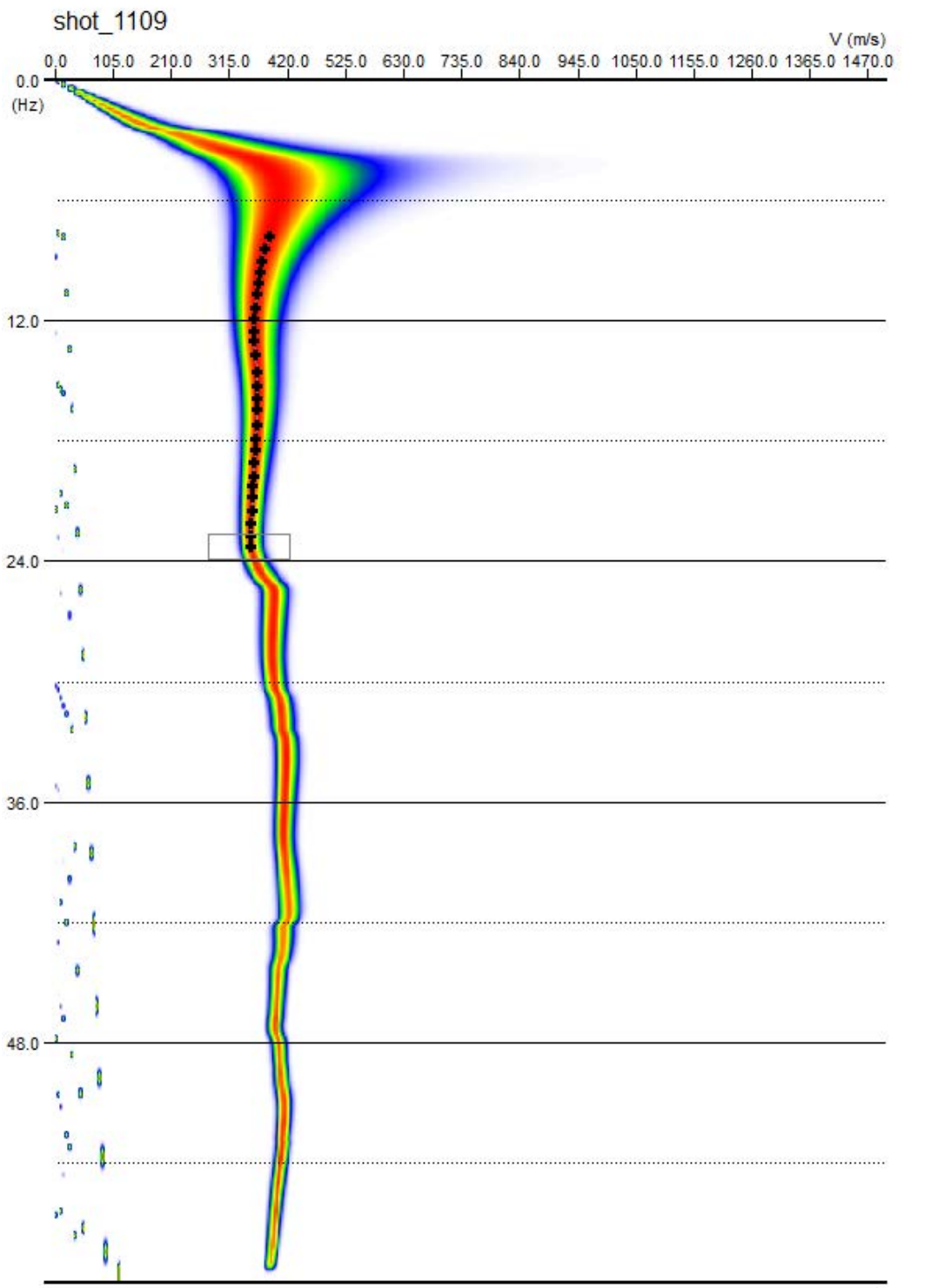

shot_1106
V (m/s)
0.0 105.0 210.0 315.0 420.0 525.0 630.0 735.0 840.0 945.0 1050.0 1155.0 1260.0 1365.0 1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0

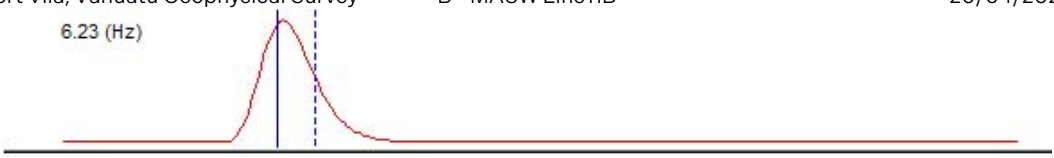


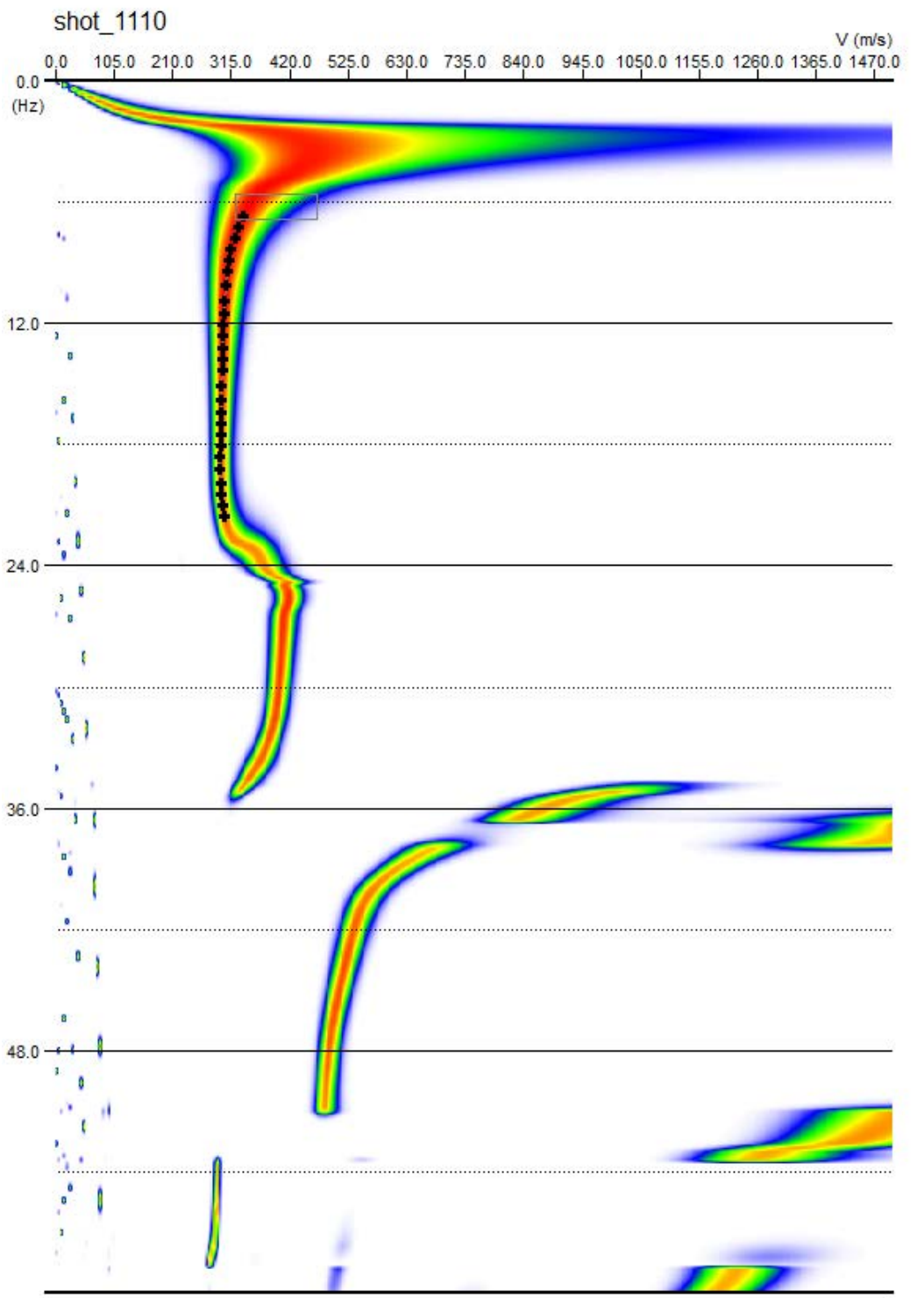

shot_1107
V (m/s)
0.0 105.0 210.0 315.0 420.0 525.0 630.0 735.0 840.0 945.0 1050.0 1155.0 1260.0 1365.0 1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0

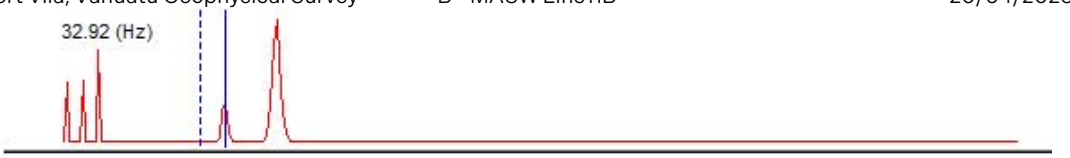

shot_1108
V (m/s)
0.0 105.0 210.0 315.0 420.0 525.0 630.0 735.0 840.0 945.0 1050.0 1155.0 1260.0 1365.0 1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0

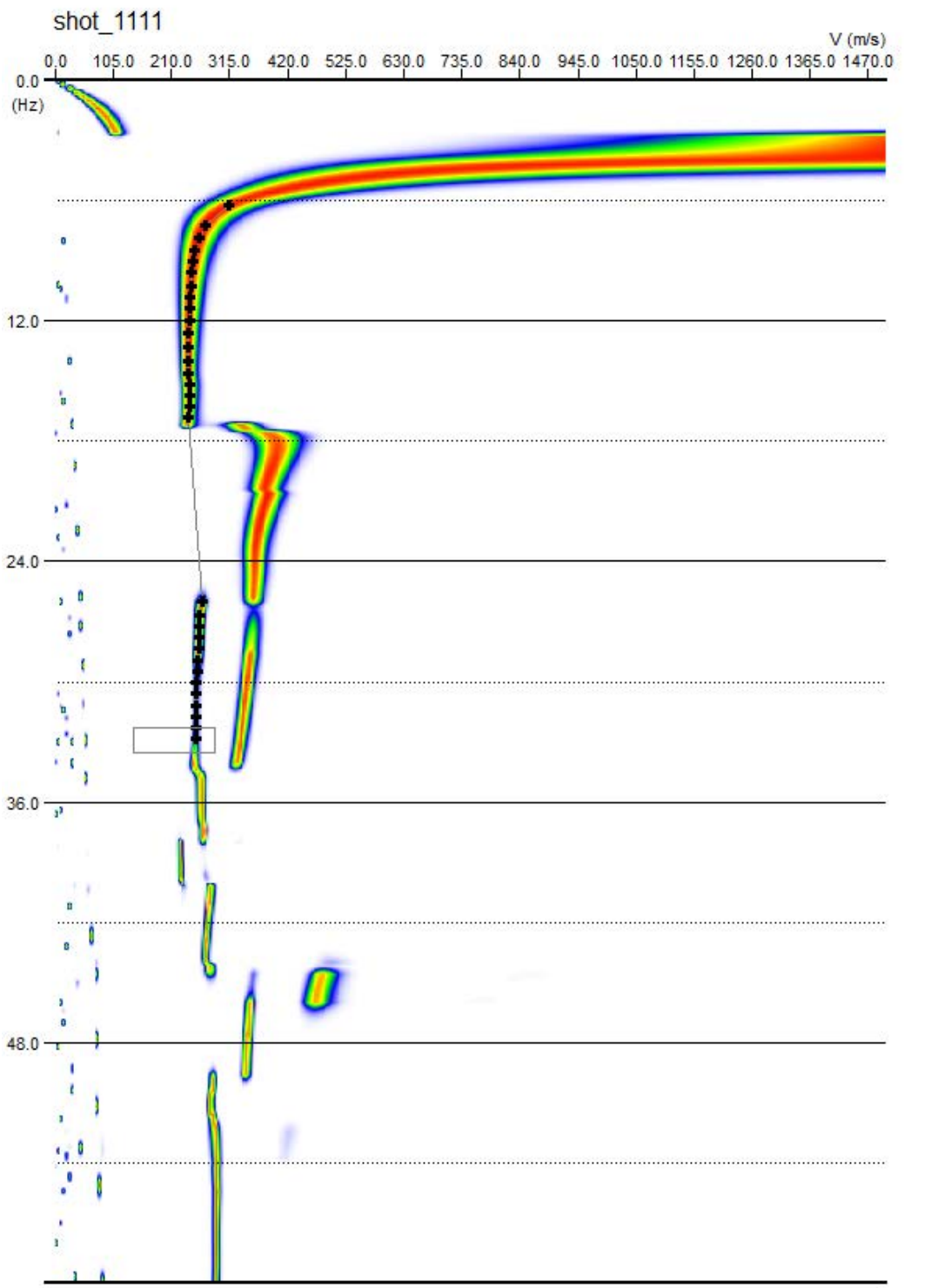

23.27 (Hz)

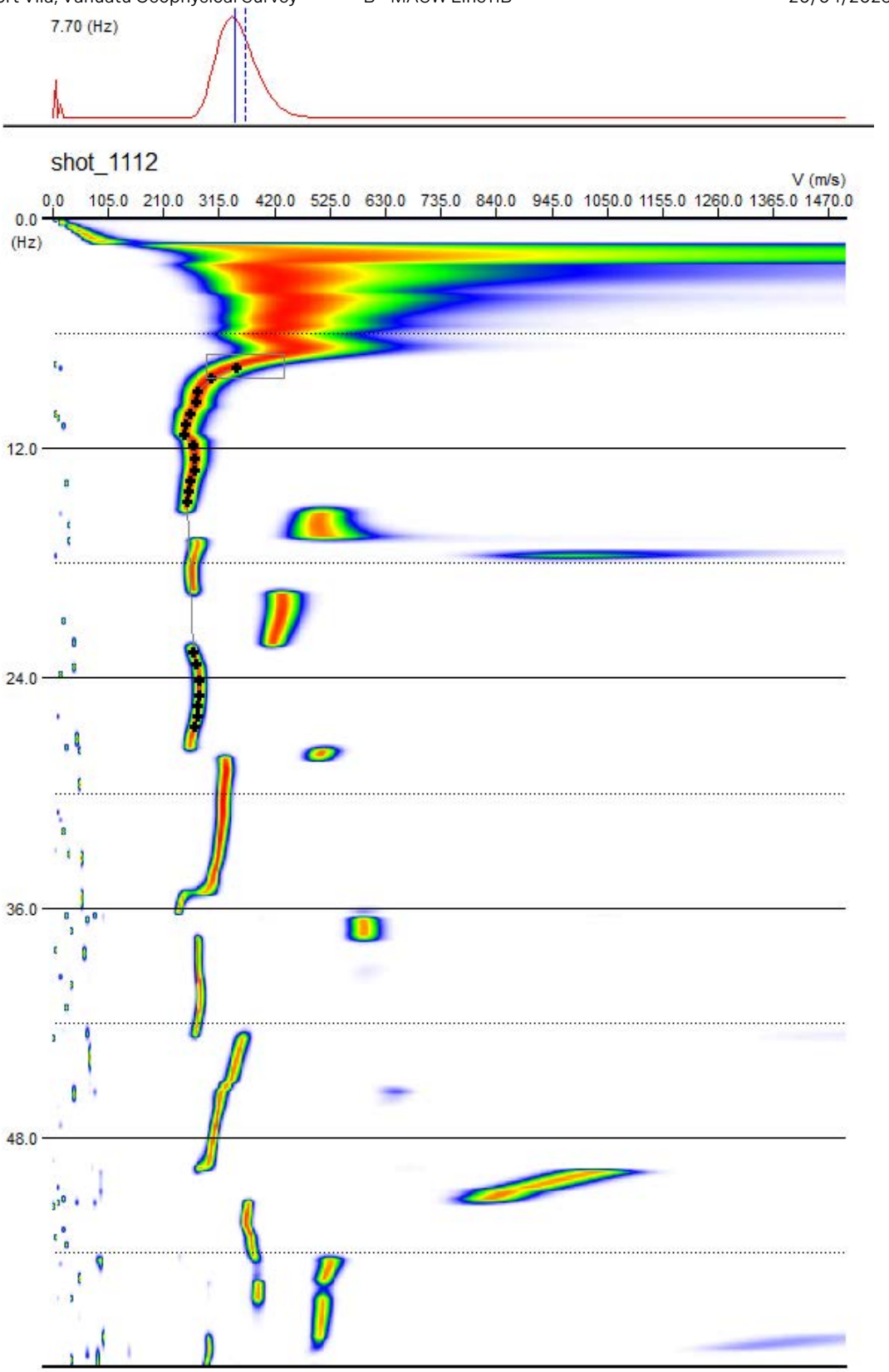

shot_1109
V (m/s)
0.0
105.0
210.0
315.0
420.0
525.0
630.0
735.0
840.0
945.0
1050.0
1155.0
1260.0
1365.0
1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0

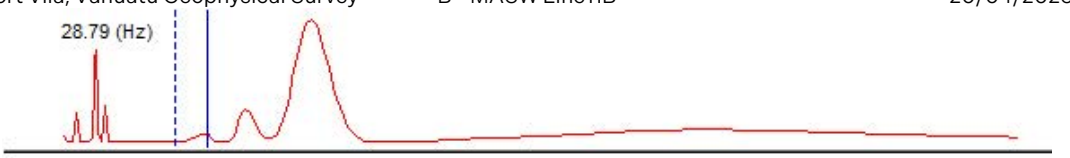

6.23 (Hz)

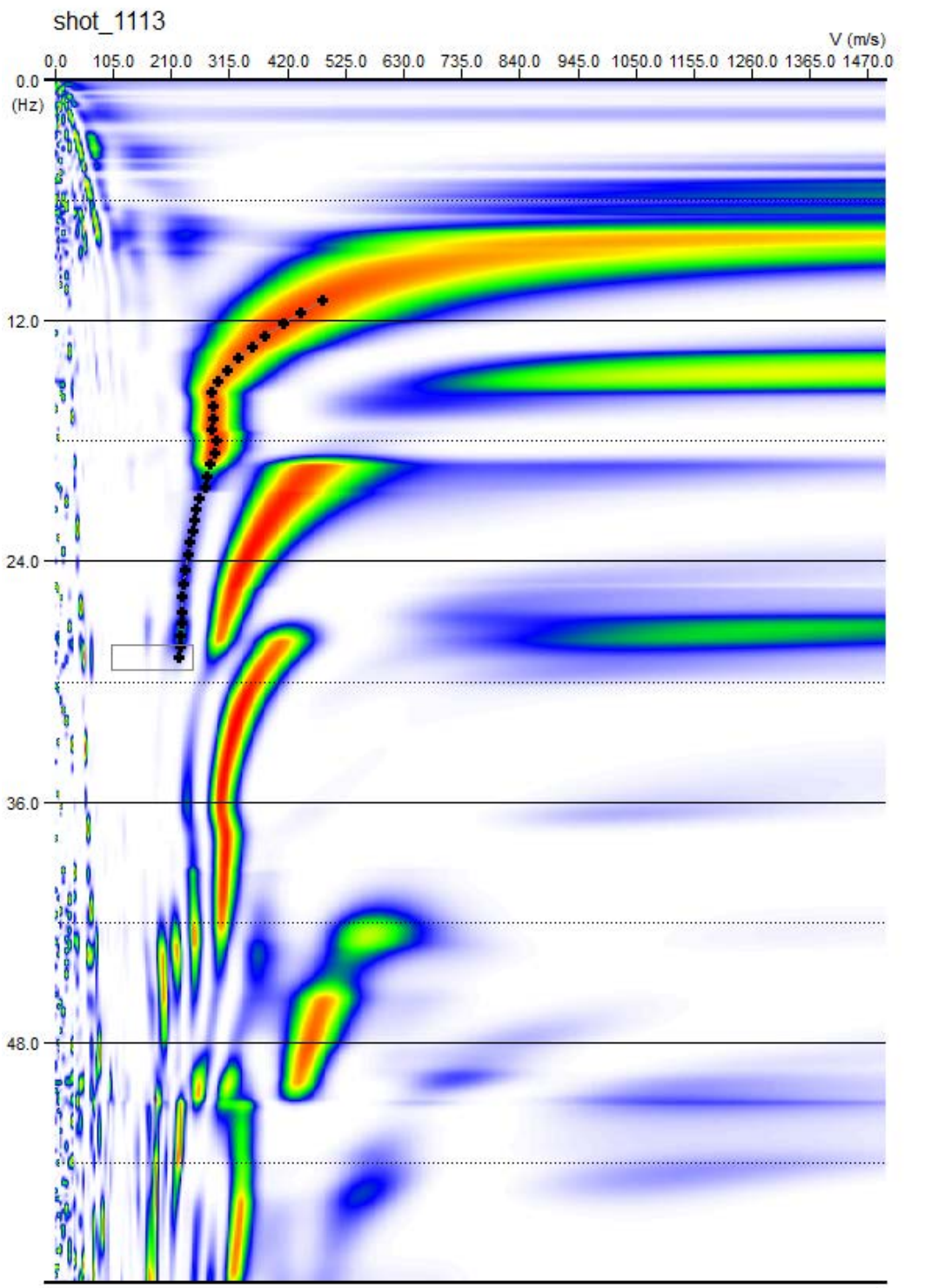

shot_1110
V (m/s)
0.0
105.0
210.0
315.0
420.0
525.0
630.0
735.0
840.0
945.0
1050.0
1155.0
1260.0
1365.0
1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0


32.92 (Hz)

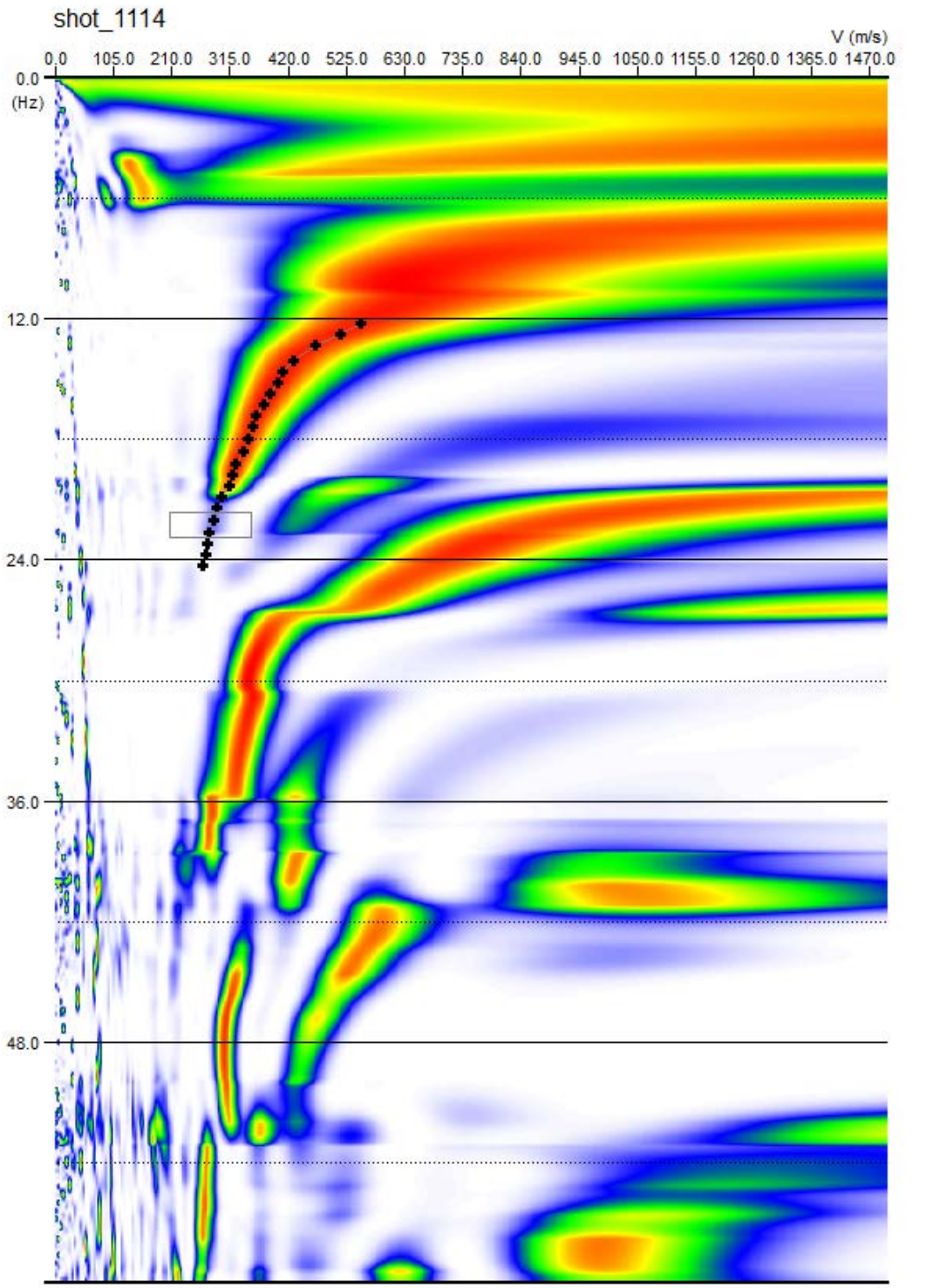

shot_1111
V (m/s)
0.0 105.0 210.0 315.0 420.0 525.0 630.0 735.0 840.0 945.0 1050.0 1155.0 1260.0 1365.0 1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0

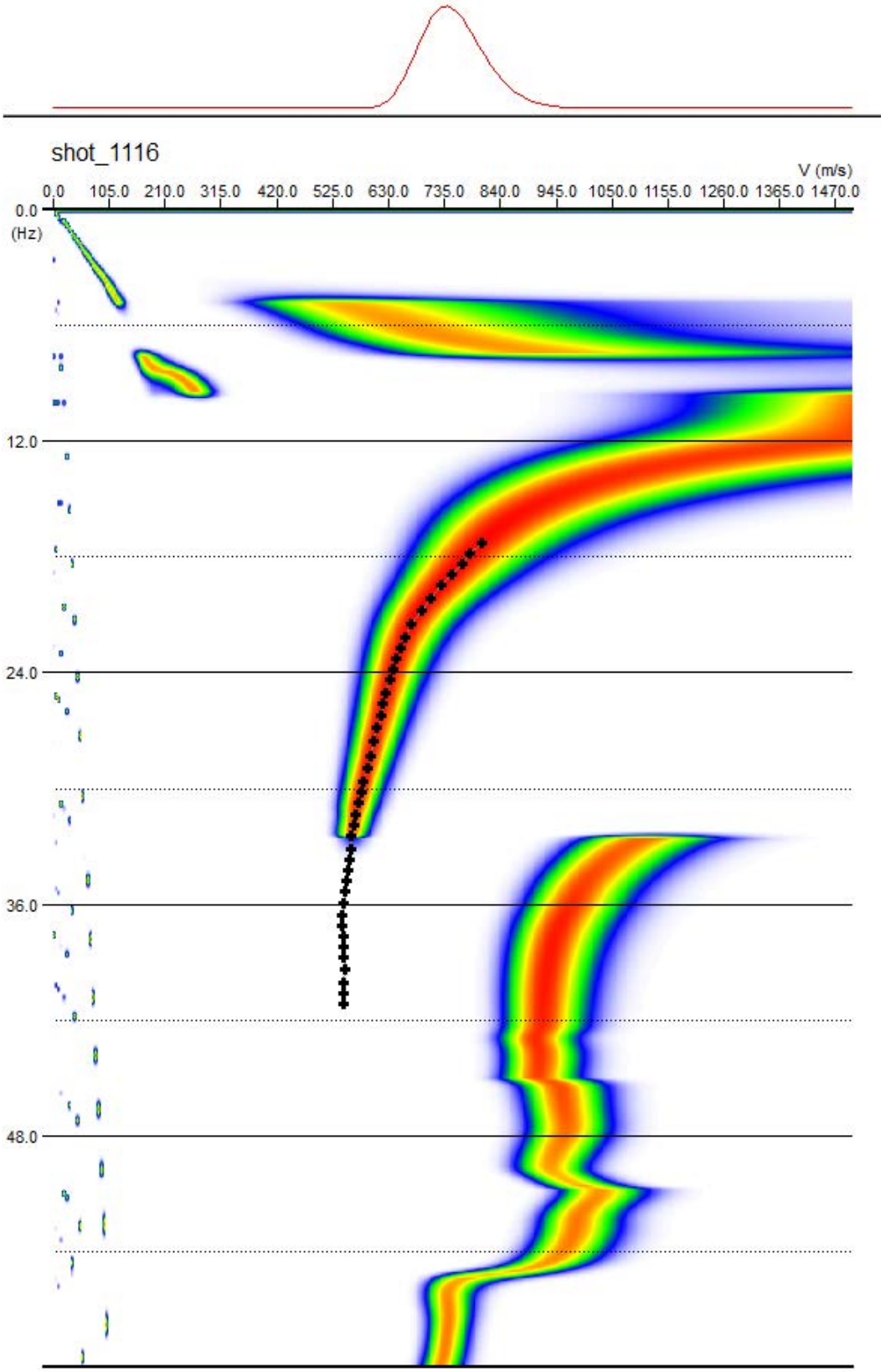

7.70 (Hz)
shot_1112
V (m/s)
0.0 105.0 210.0 315.0 420.0 525.0 630.0 735.0 840.0 945.0 1050.0 1155.0 1260.0 1365.0 1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0

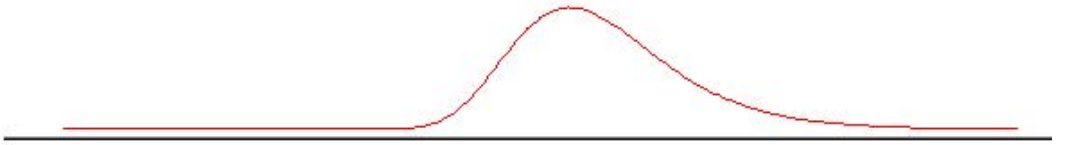

28.79 (Hz)

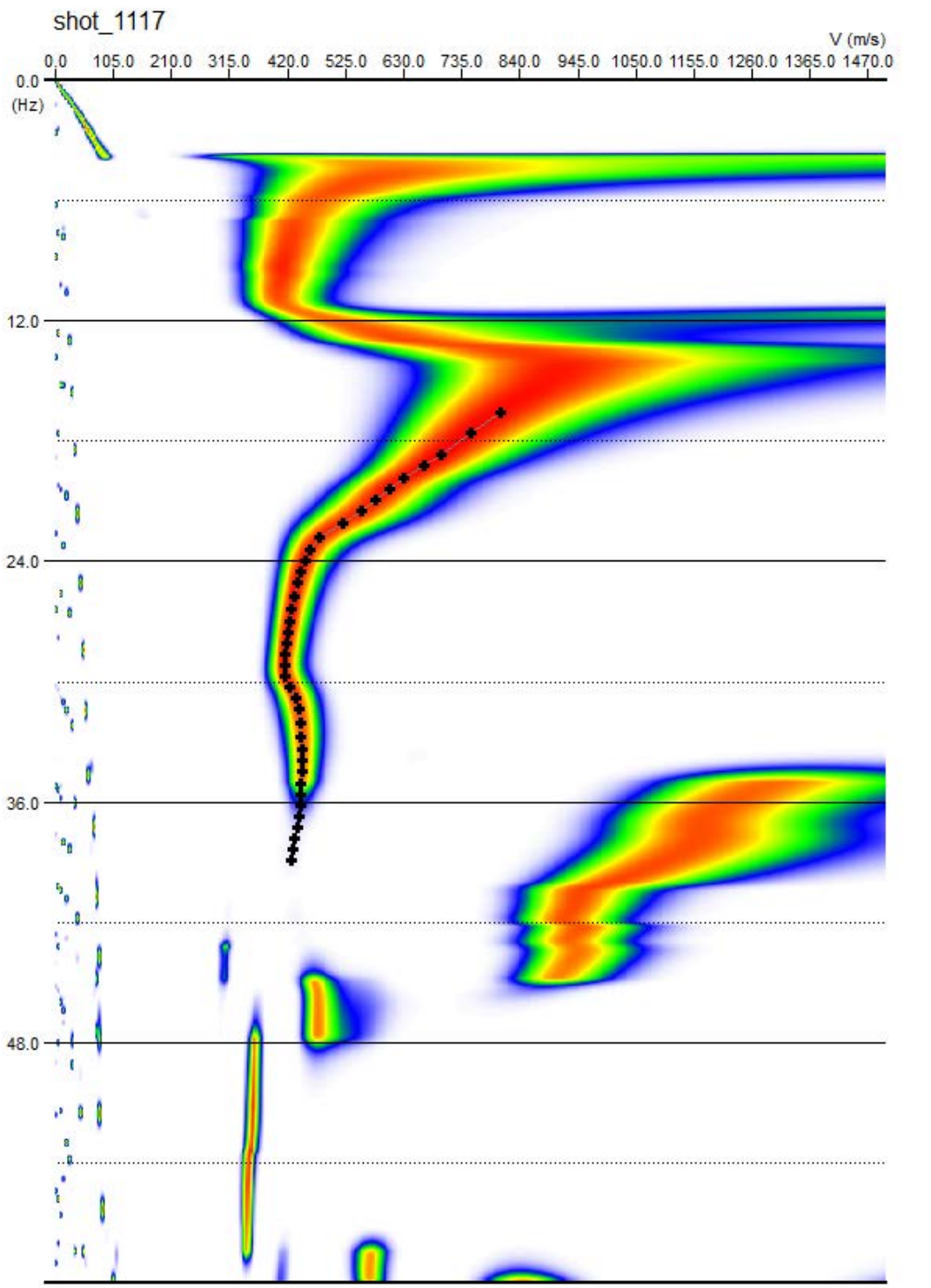

shot_1113
V (m/s)
0.0
105.0
210.0
315.0
420.0
525.0
630.0
735.0
840.0
945.0
1050.0
1155.0
1260.0
1365.0
1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0


22.26 (Hz)

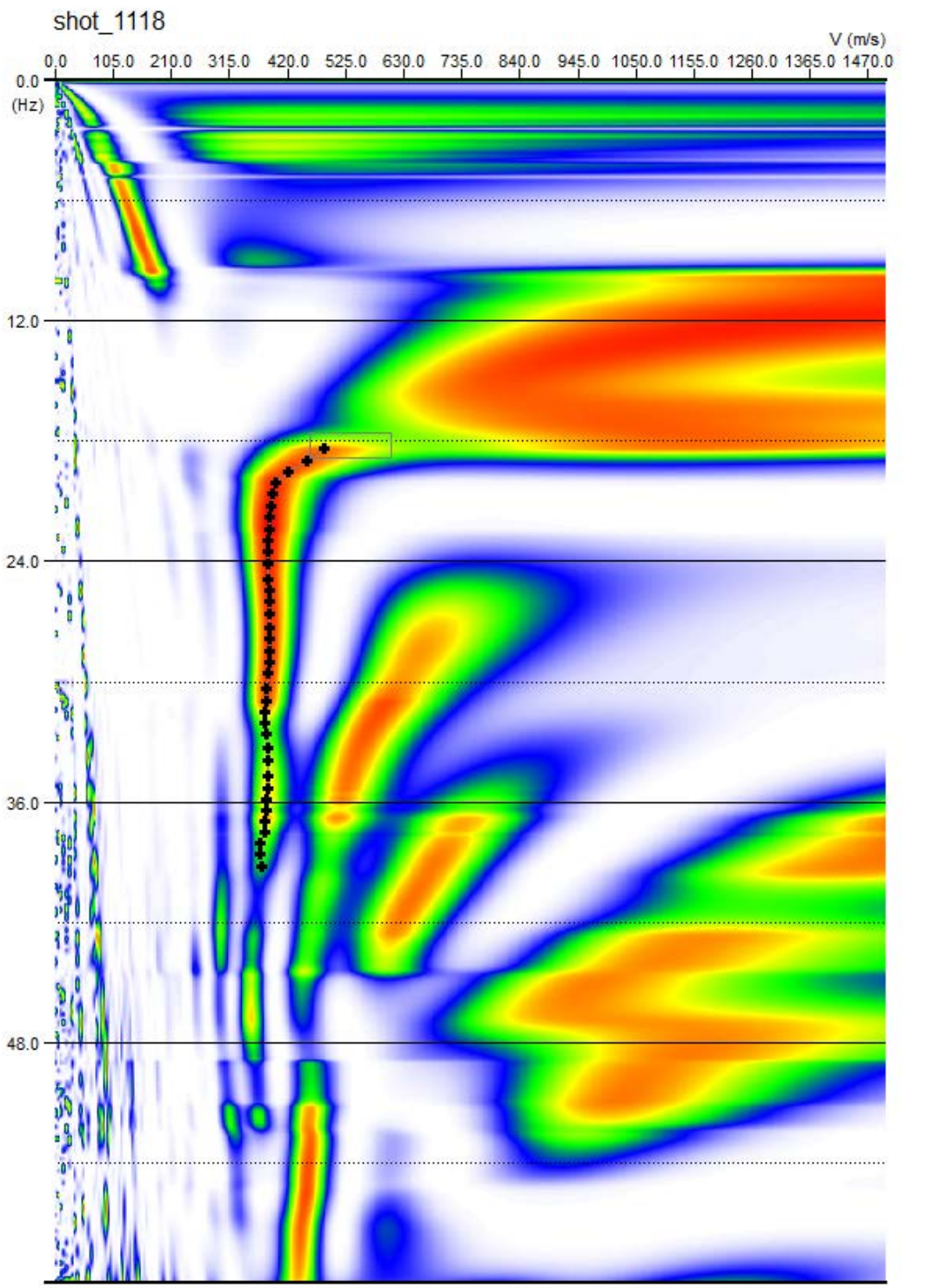

shot_1114
V (m/s)
0.0
105.0
210.0
315.0
420.0
525.0
630.0
735.0
840.0
945.0
1050.0
1155.0
1260.0
1365.0
1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0

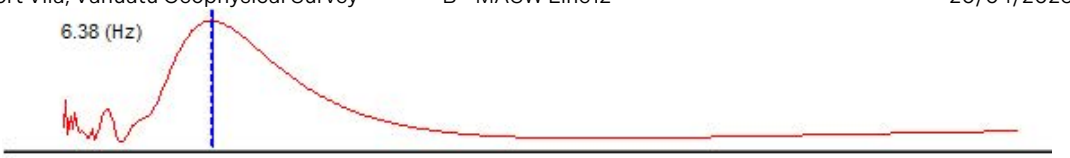

shot_1116
V (m/s)
0.0 105.0 210.0 315.0 420.0 525.0 630.0 735.0 840.0 945.0 1050.0 1155.0 1260.0 1365.0 1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0

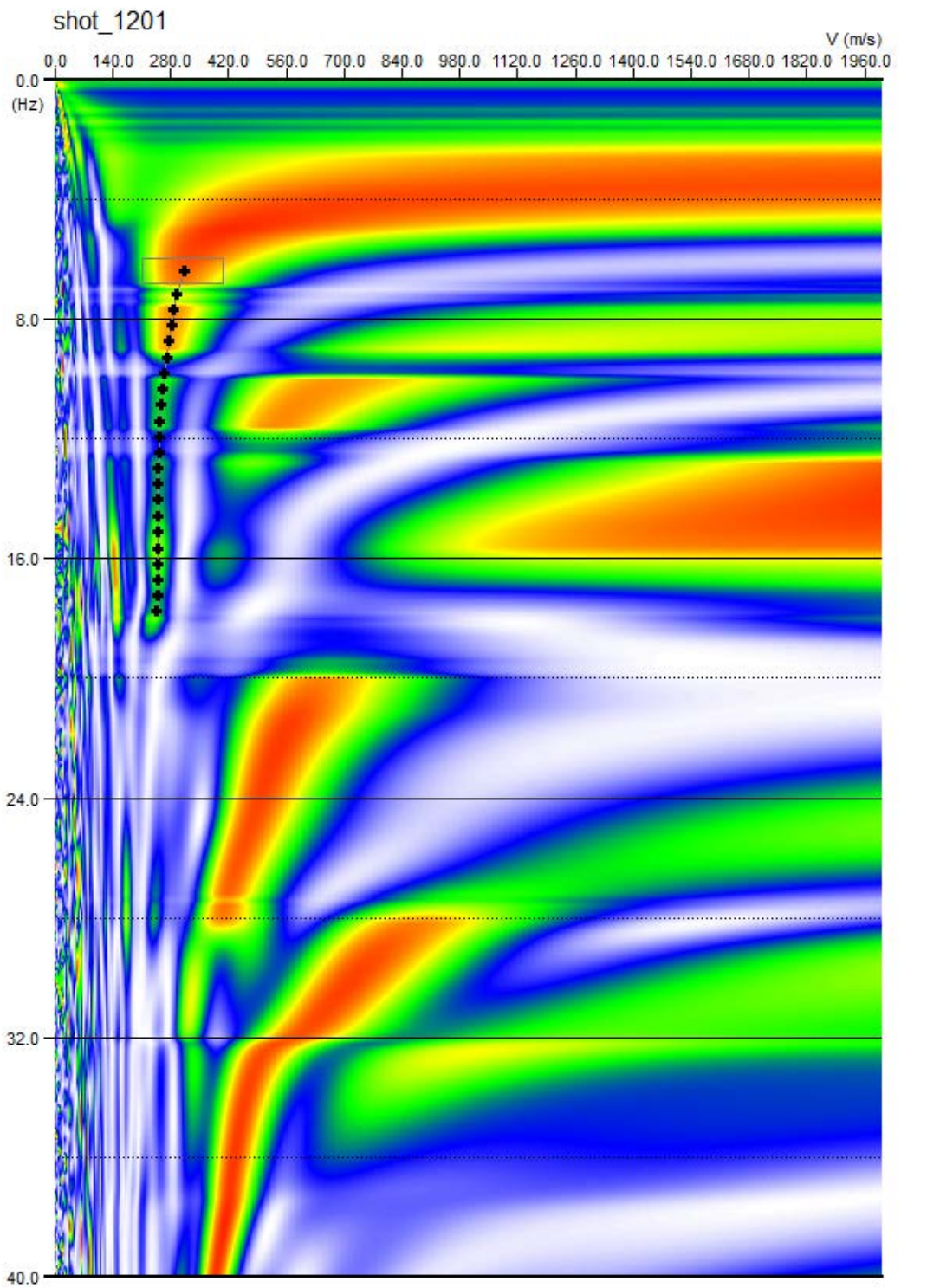


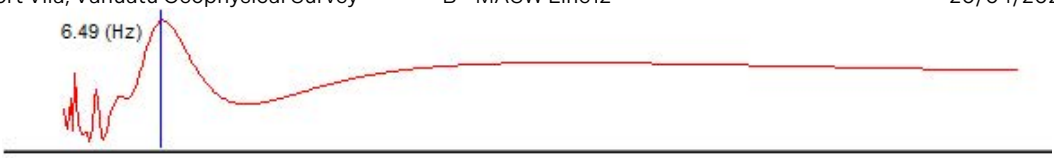

shot_1117
V (m/s)
0.0
105.0
210.0
315.0
420.0
525.0
630.0
735.0
840.0
945.0
1050.0
1155.0
1260.0
1365.0
1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0

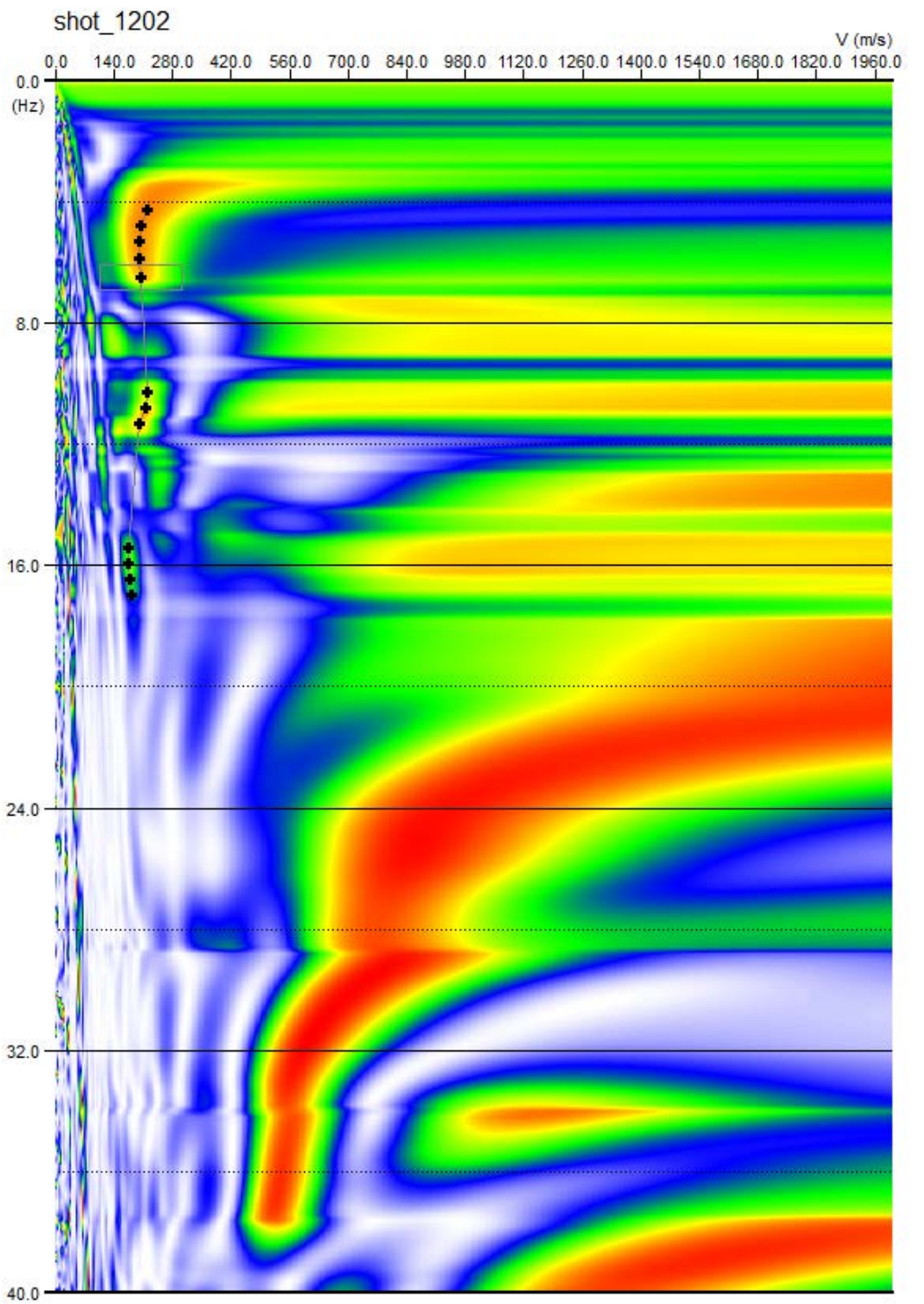

18.21 (Hz)

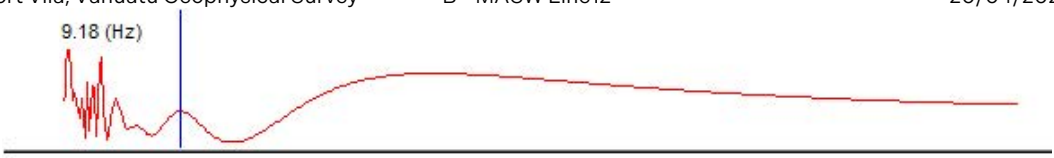

shot_1118
V (m/s)
0.0 105.0 210.0 315.0 420.0 525.0 630.0 735.0 840.0 945.0 1050.0 1155.0 1260.0 1365.0 1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0

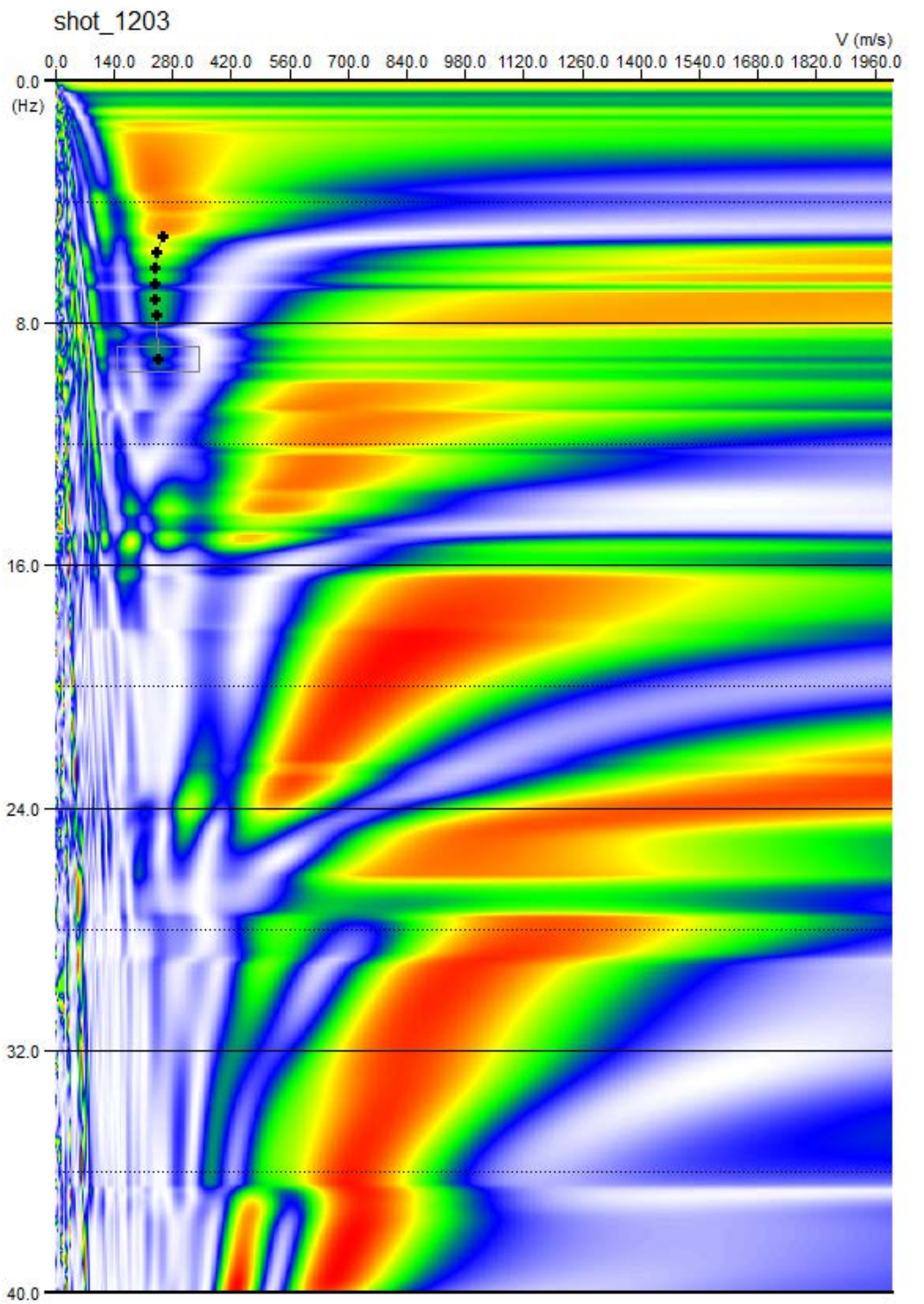

6.38 (Hz)

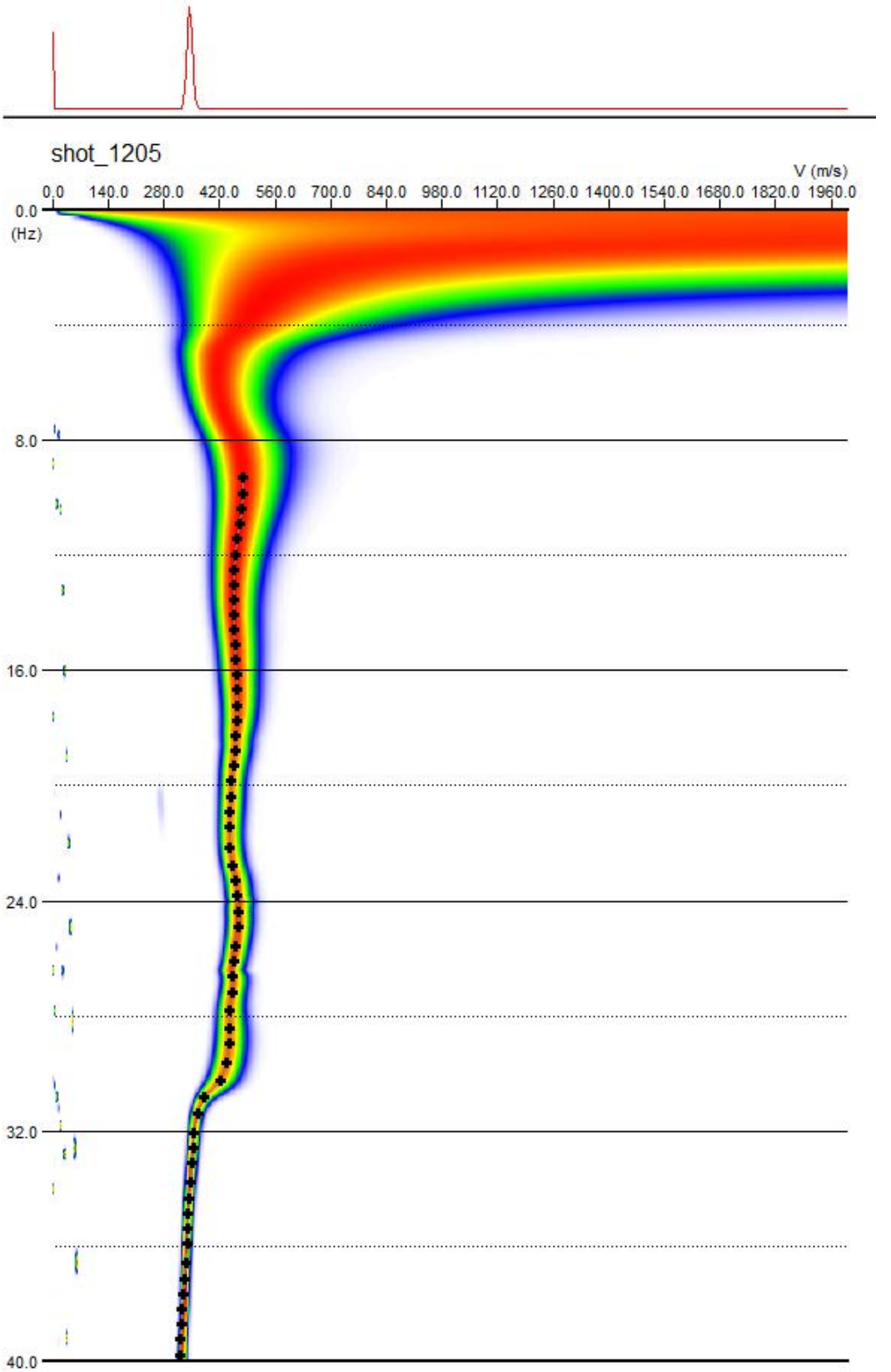

shot_1201
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

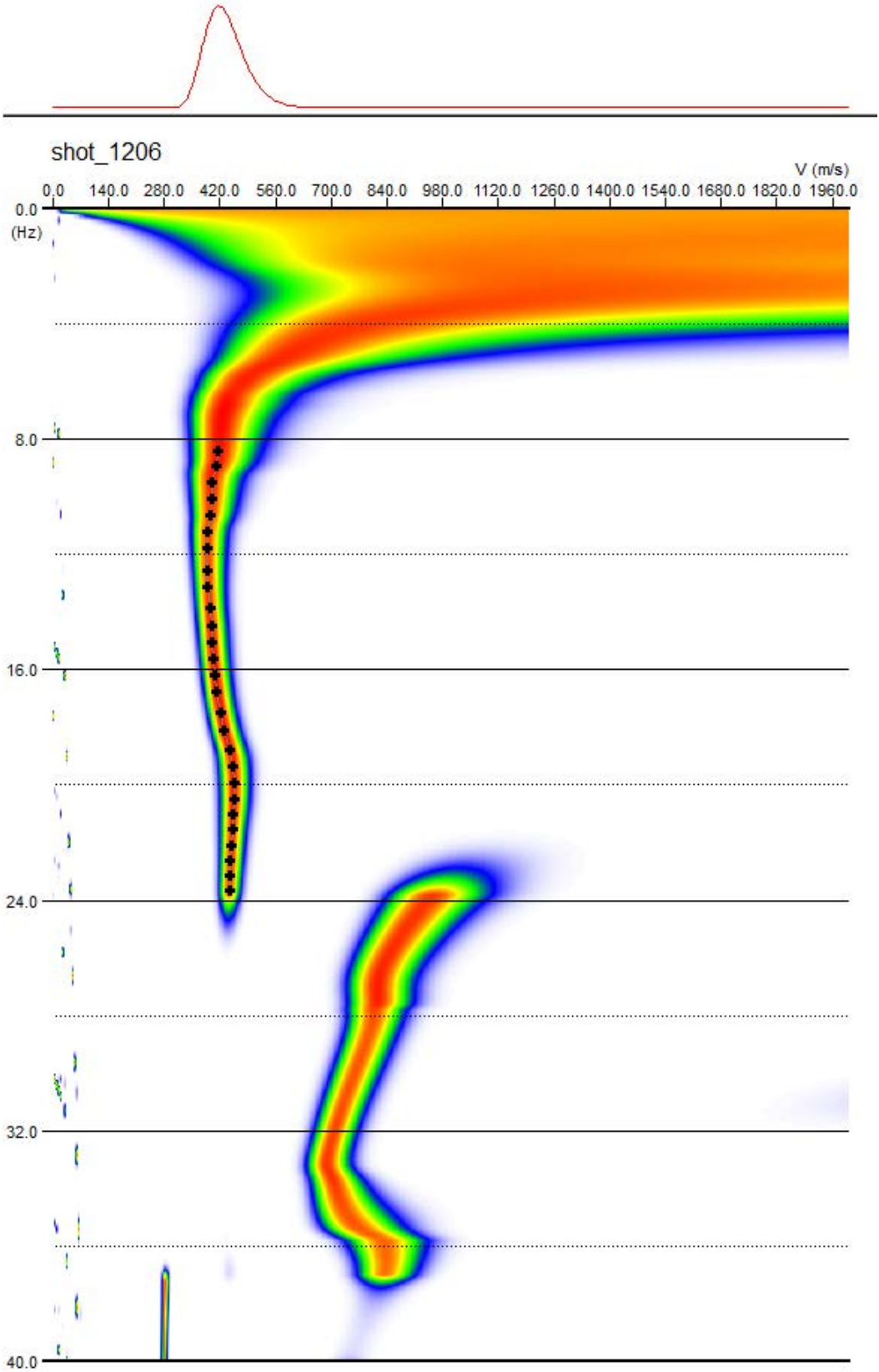

6.49 (Hz)

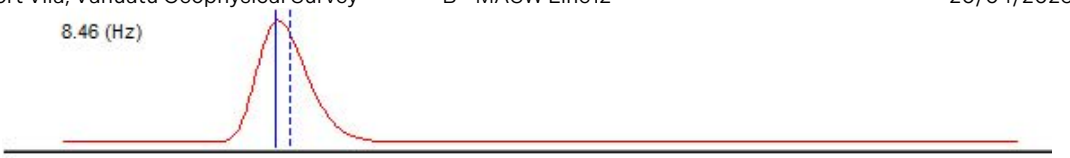

shot_1202
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

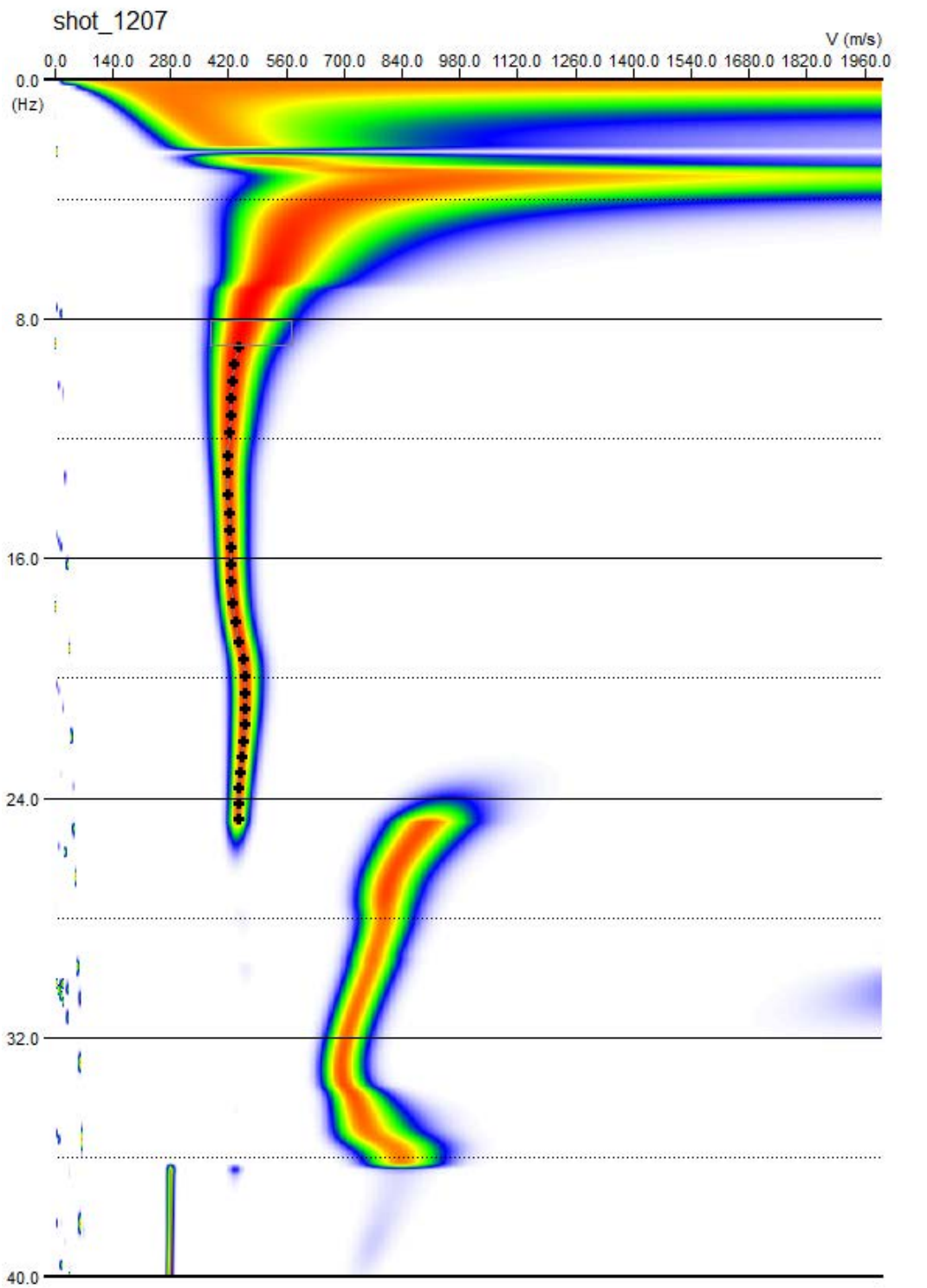

9.18 (Hz)

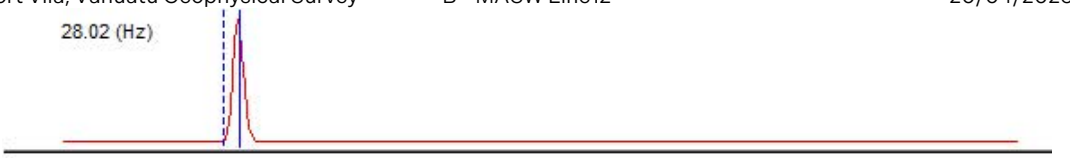

shot_1203
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

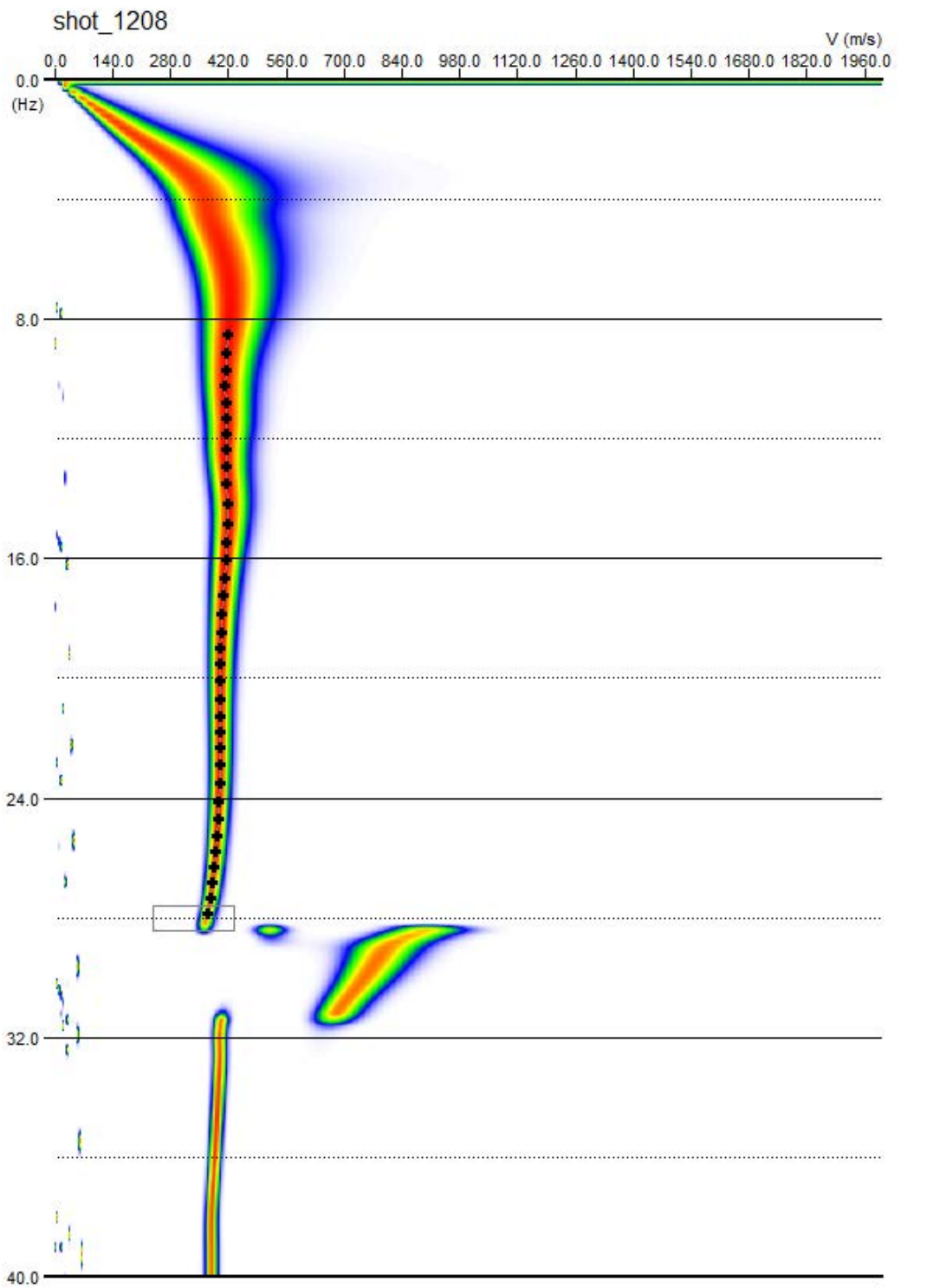

shot_1205
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

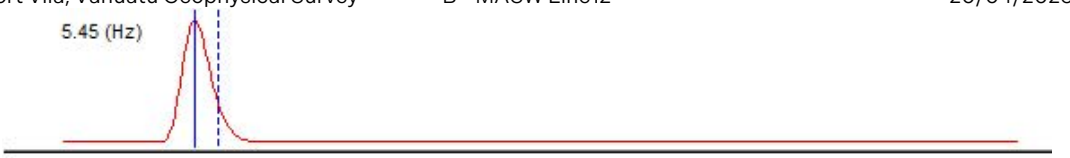

shot_1206
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

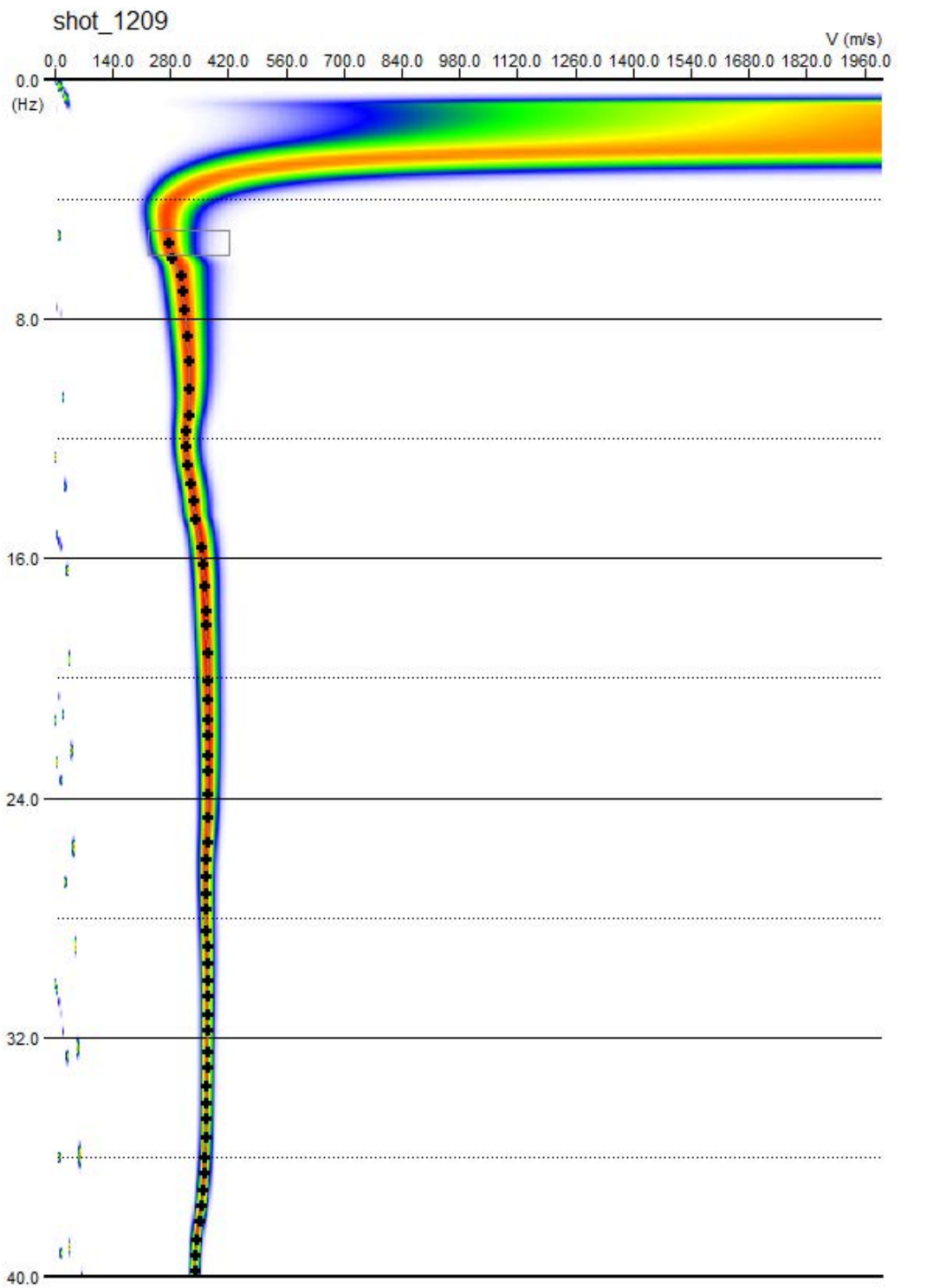

8.46 (Hz)

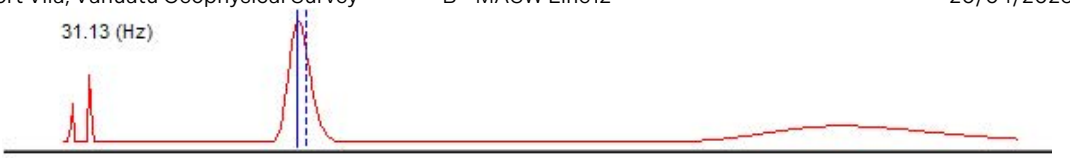

shot_1207
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

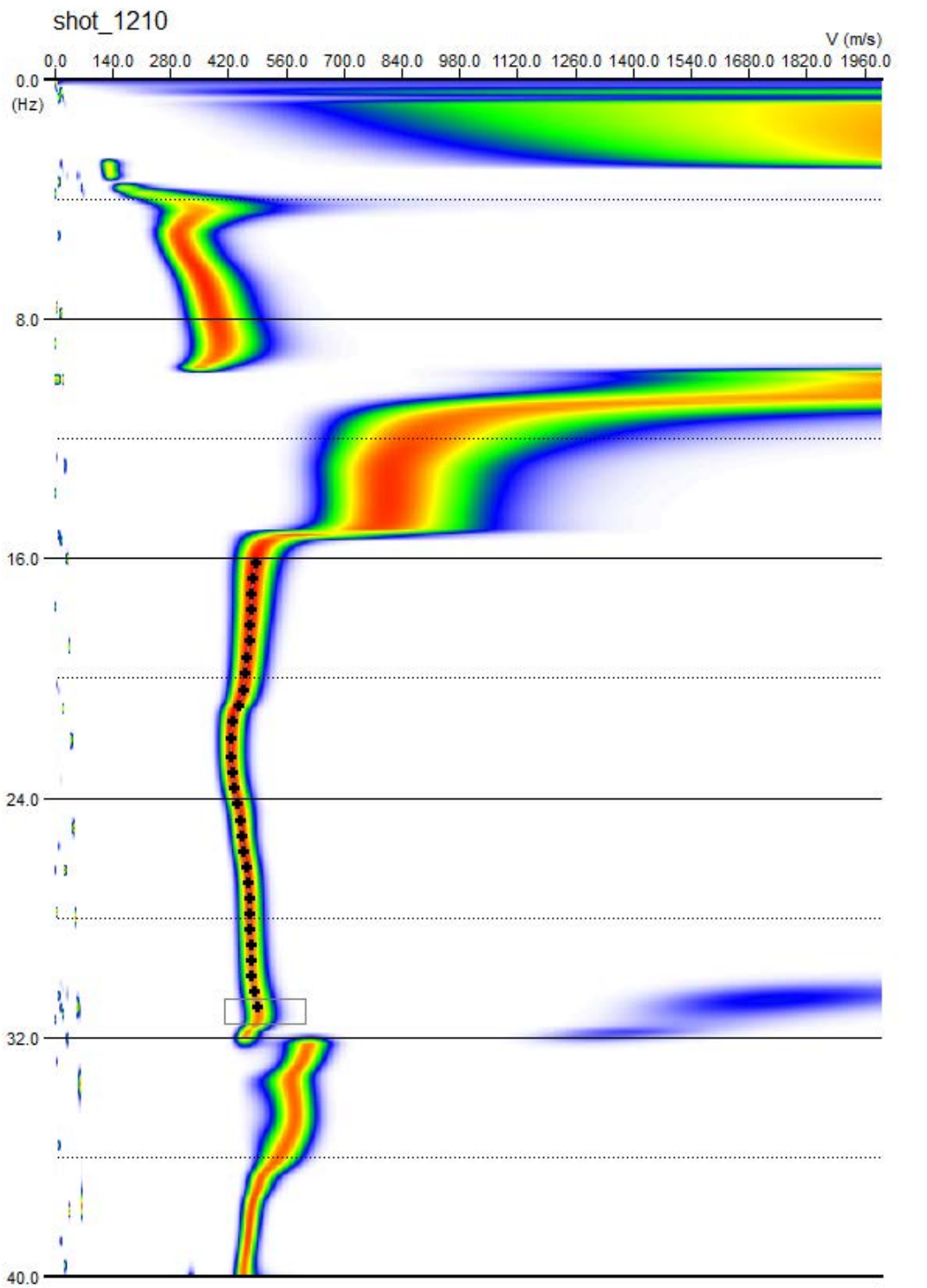

28.02 (Hz)

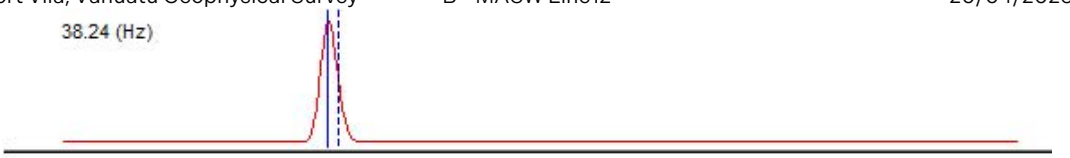

shot_1208
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

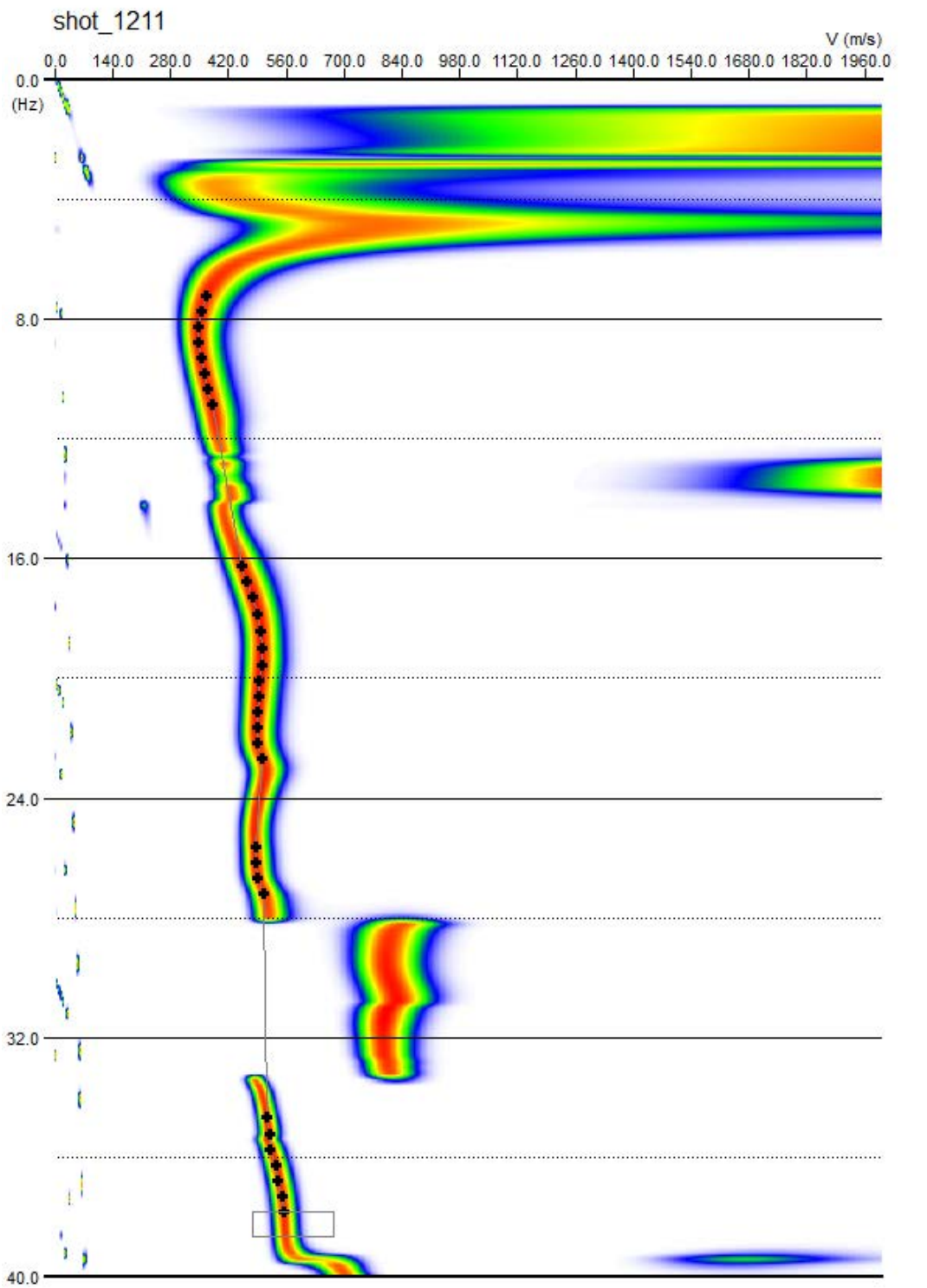

5.45 (Hz)

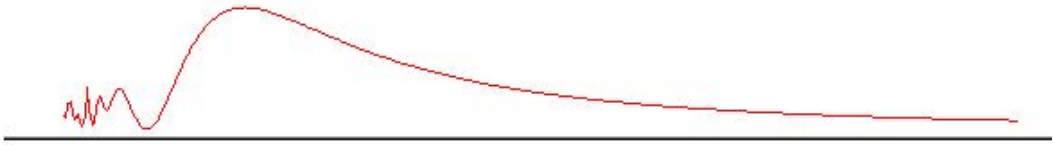

shot_1209
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

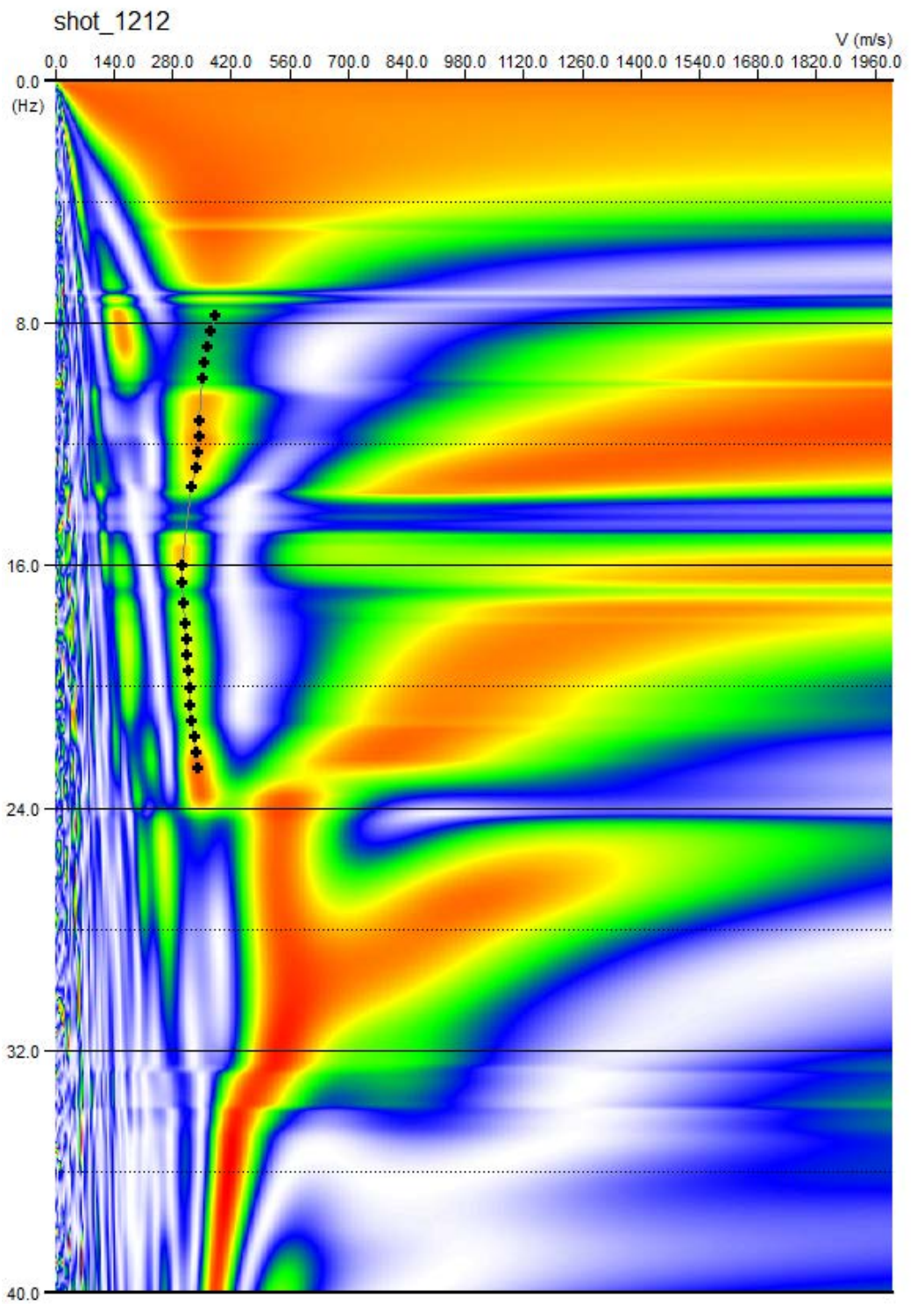

31.13 (Hz)


shot_1210
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

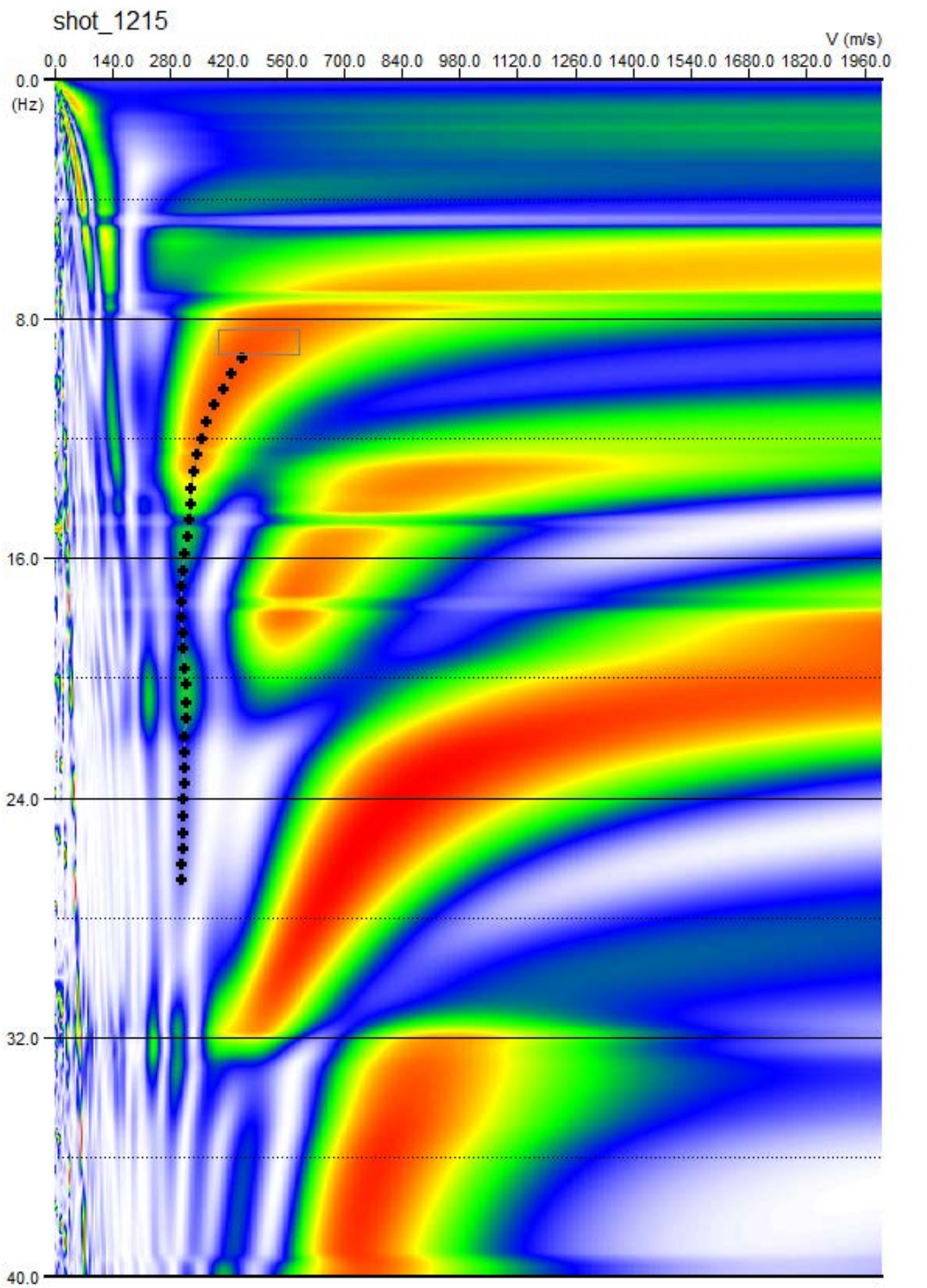

38.24 (Hz)

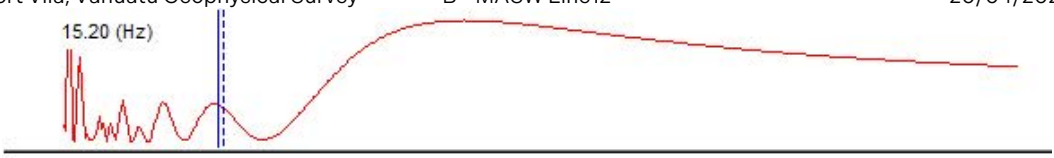

shot_1211
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

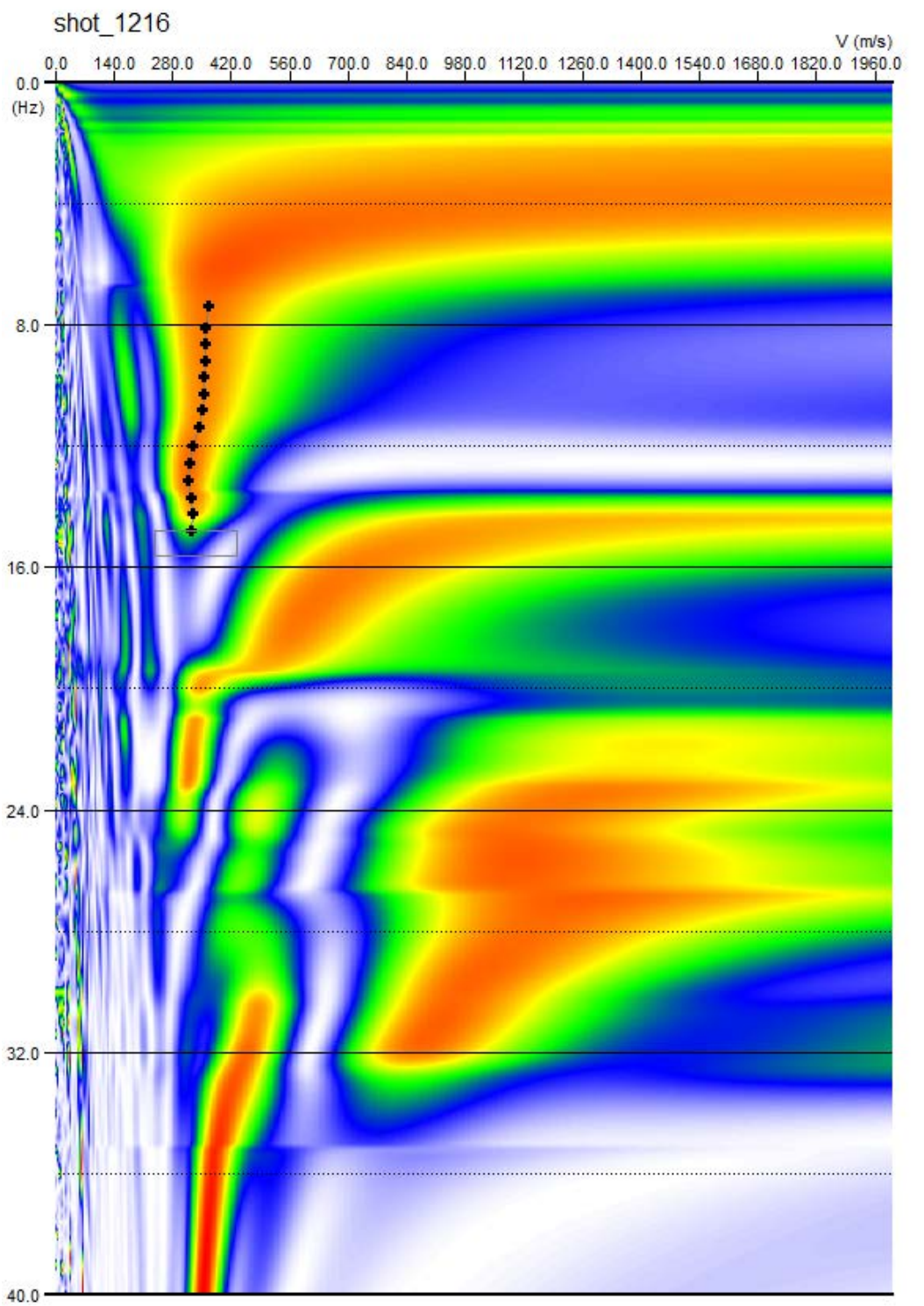



shot_1212
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

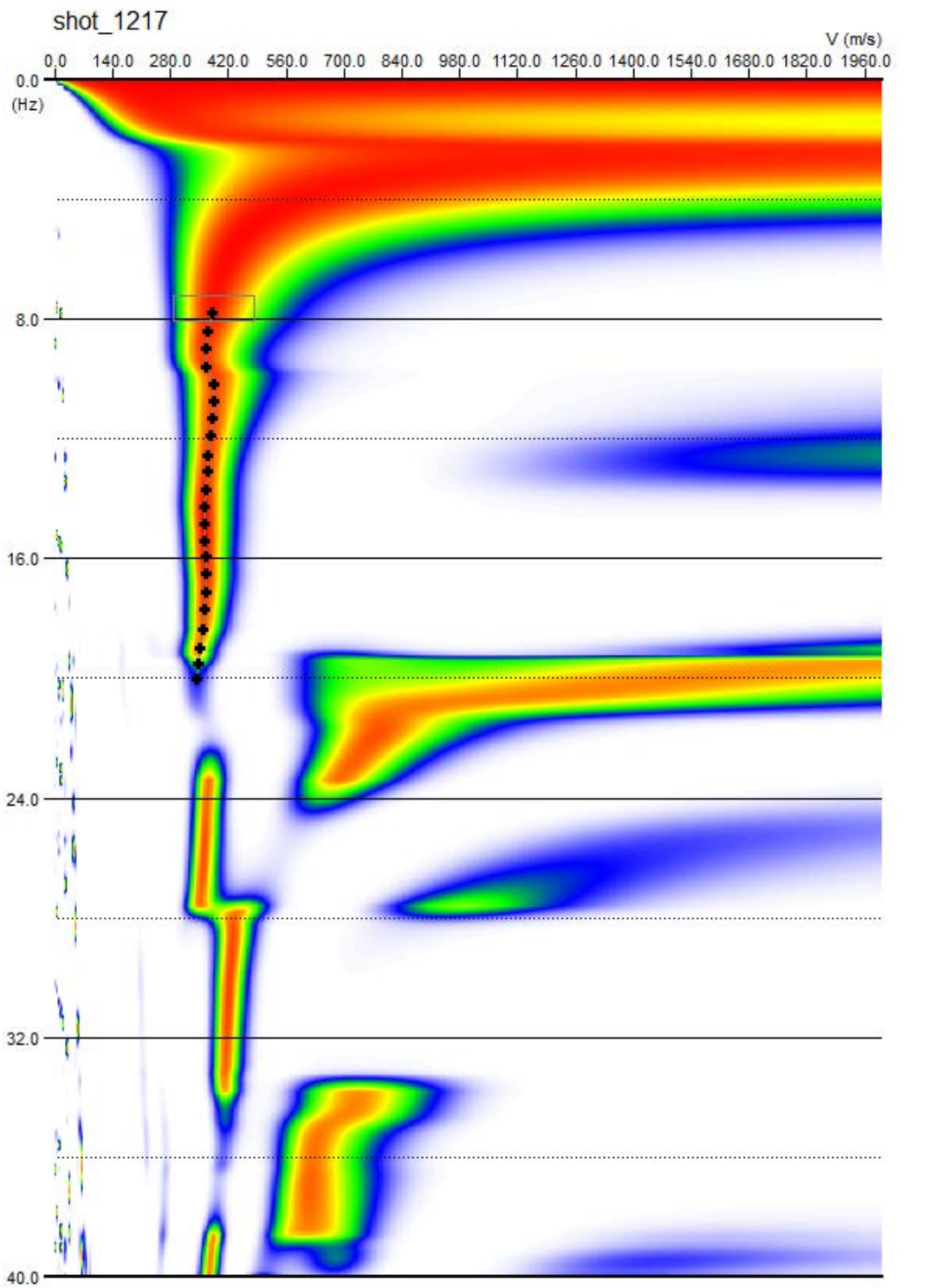

8.77 (Hz)


shot_1215
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

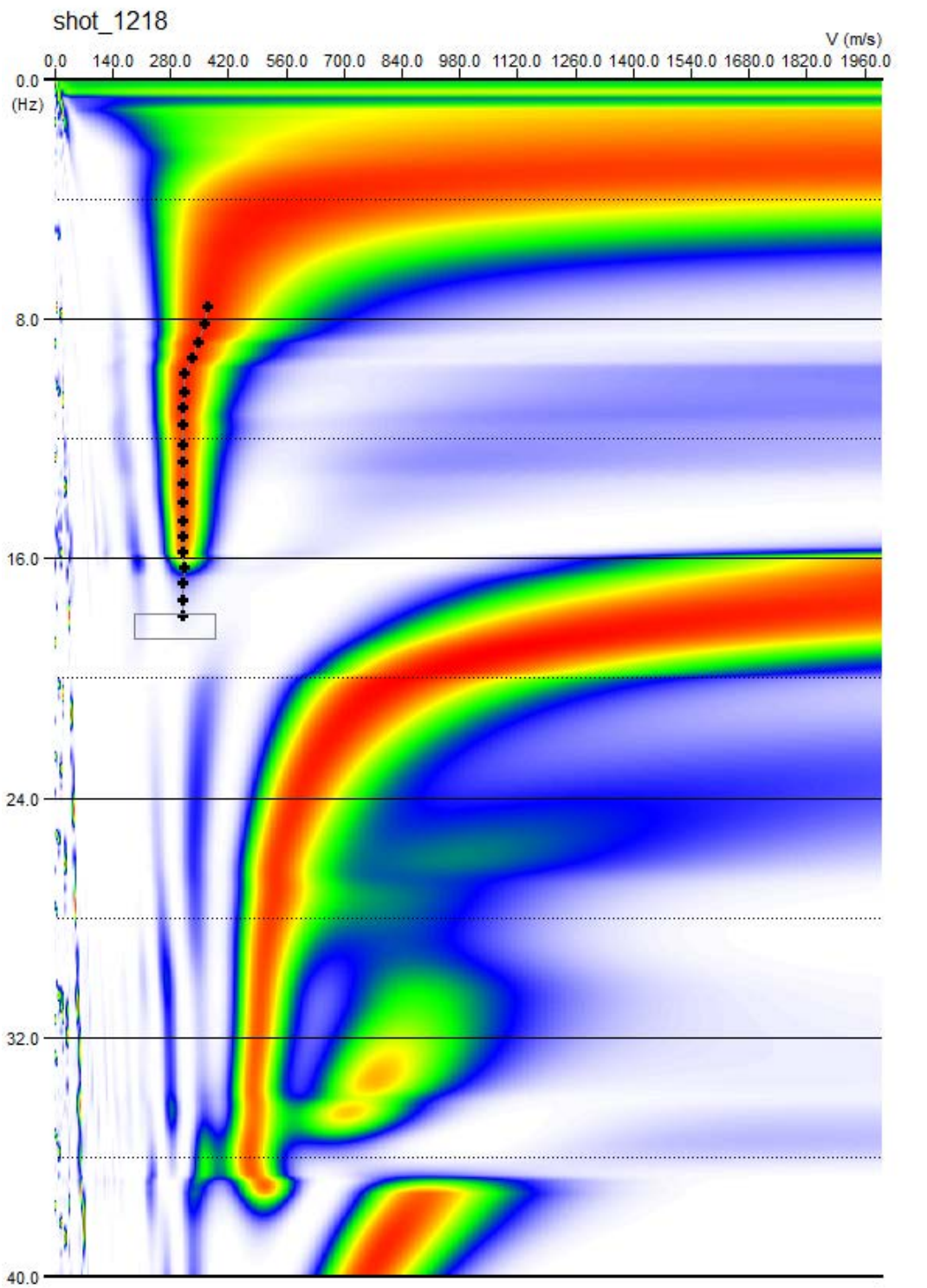

15.20 (Hz)

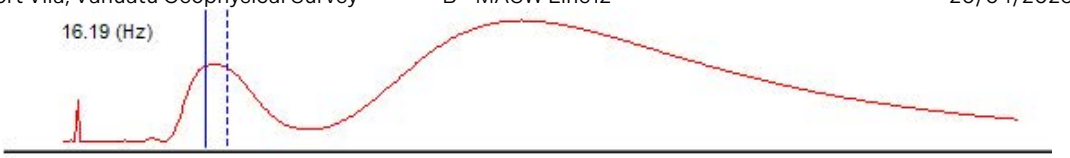

shot_1216
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

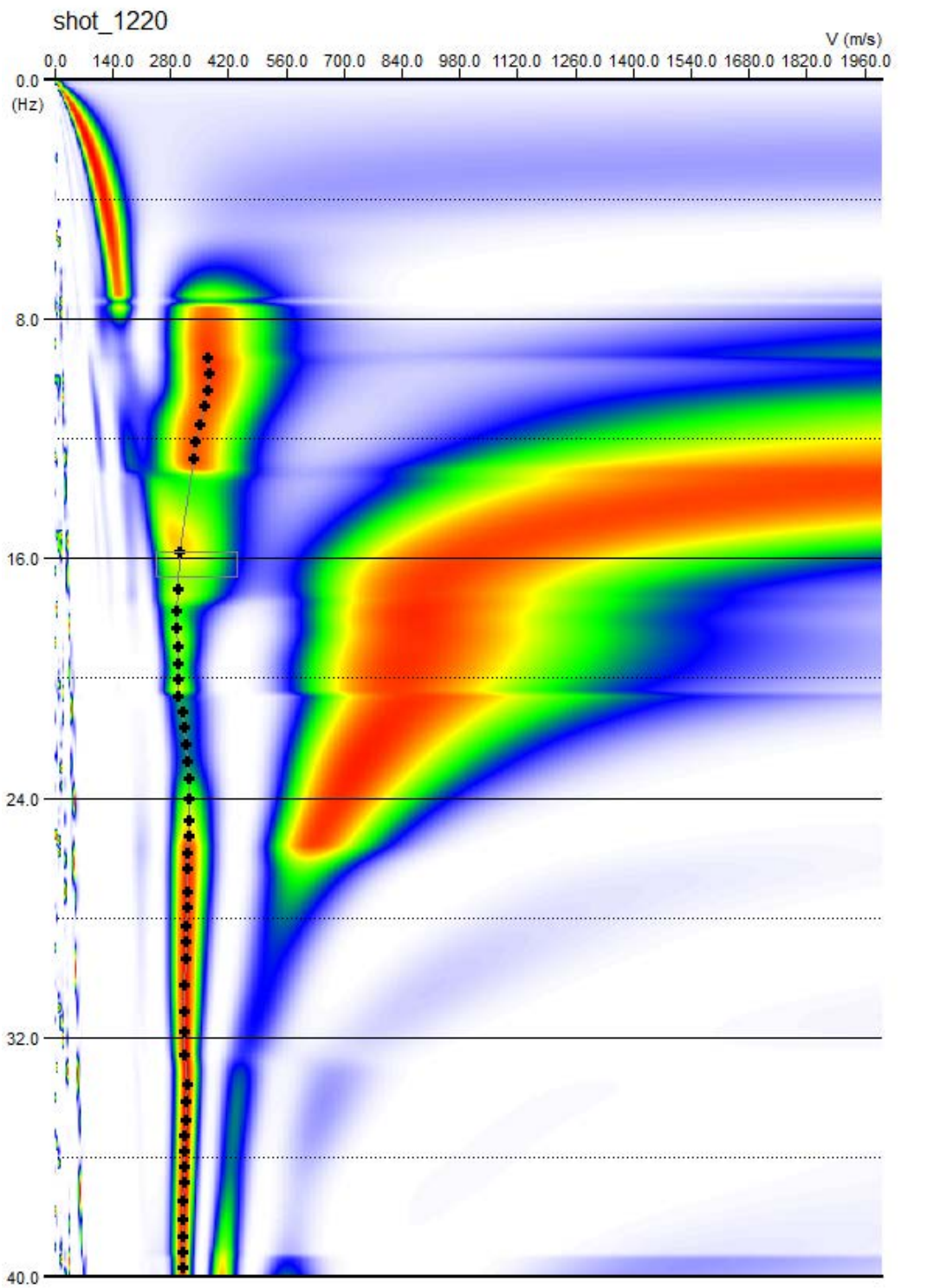

7.63 (Hz)


shot_1217
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

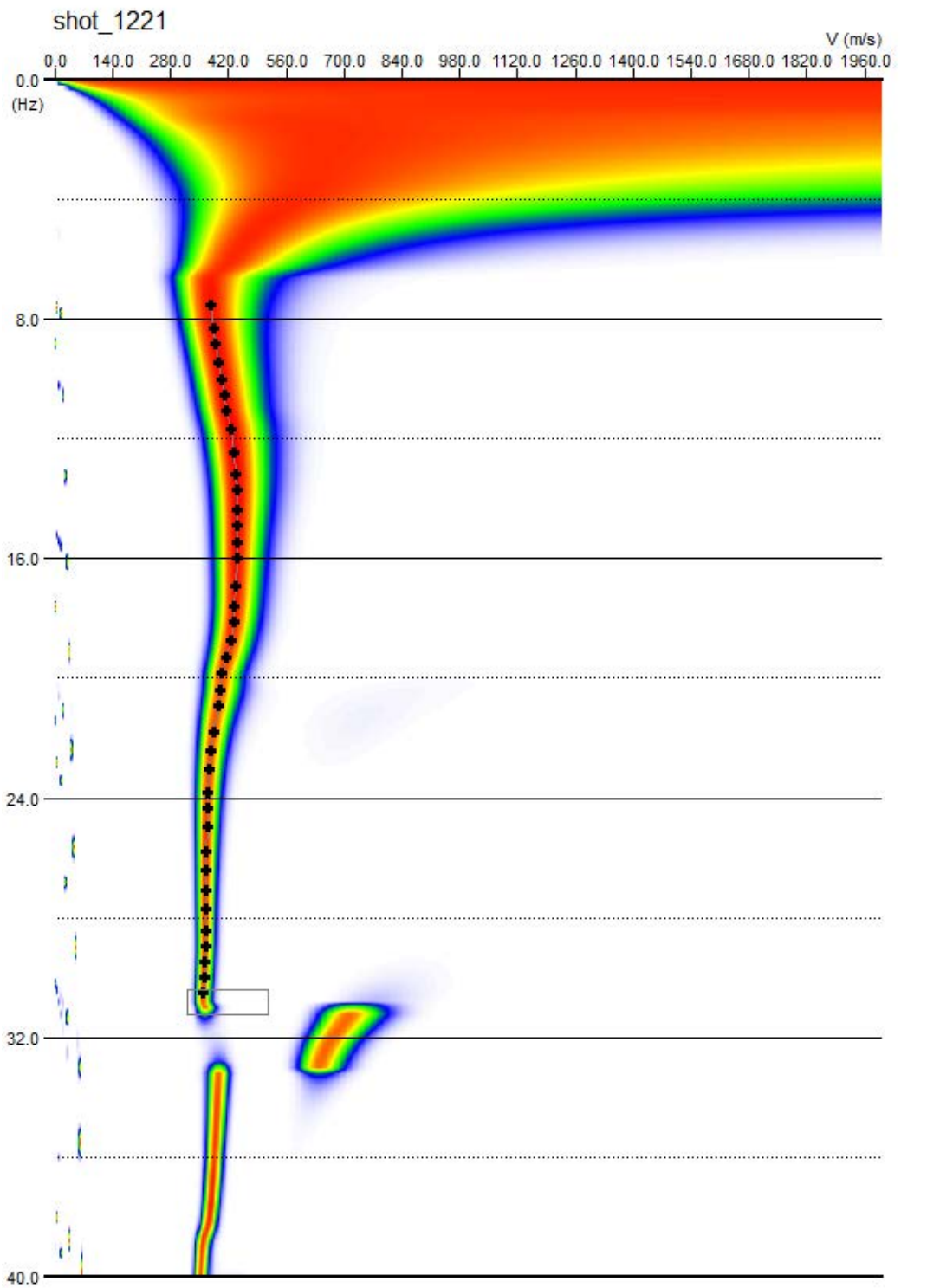

18.26 (Hz)

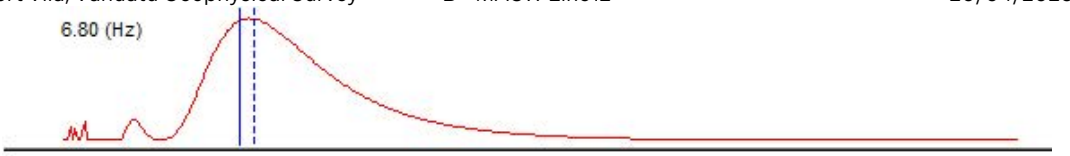

shot_1218
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

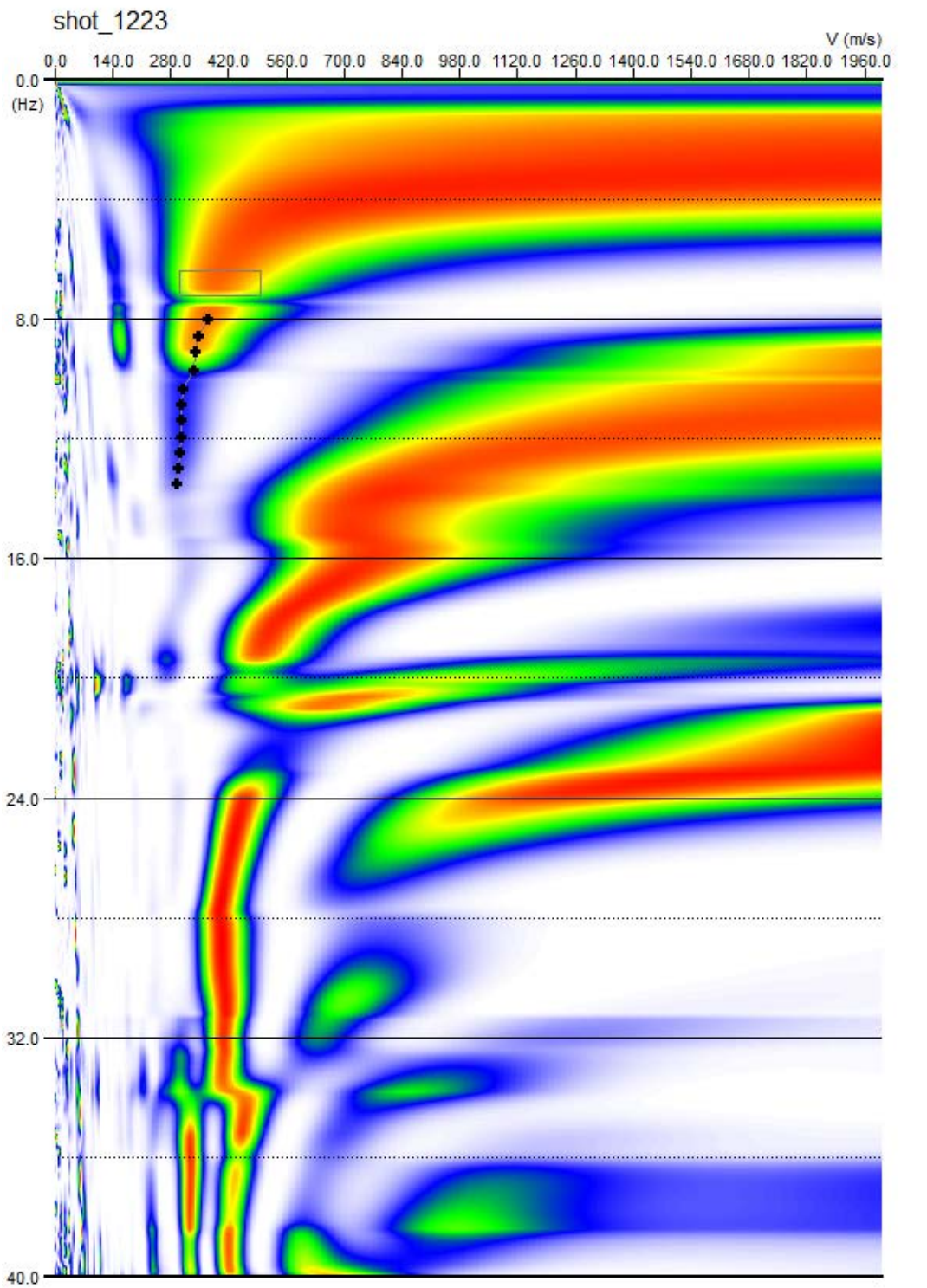

16.19 (Hz)

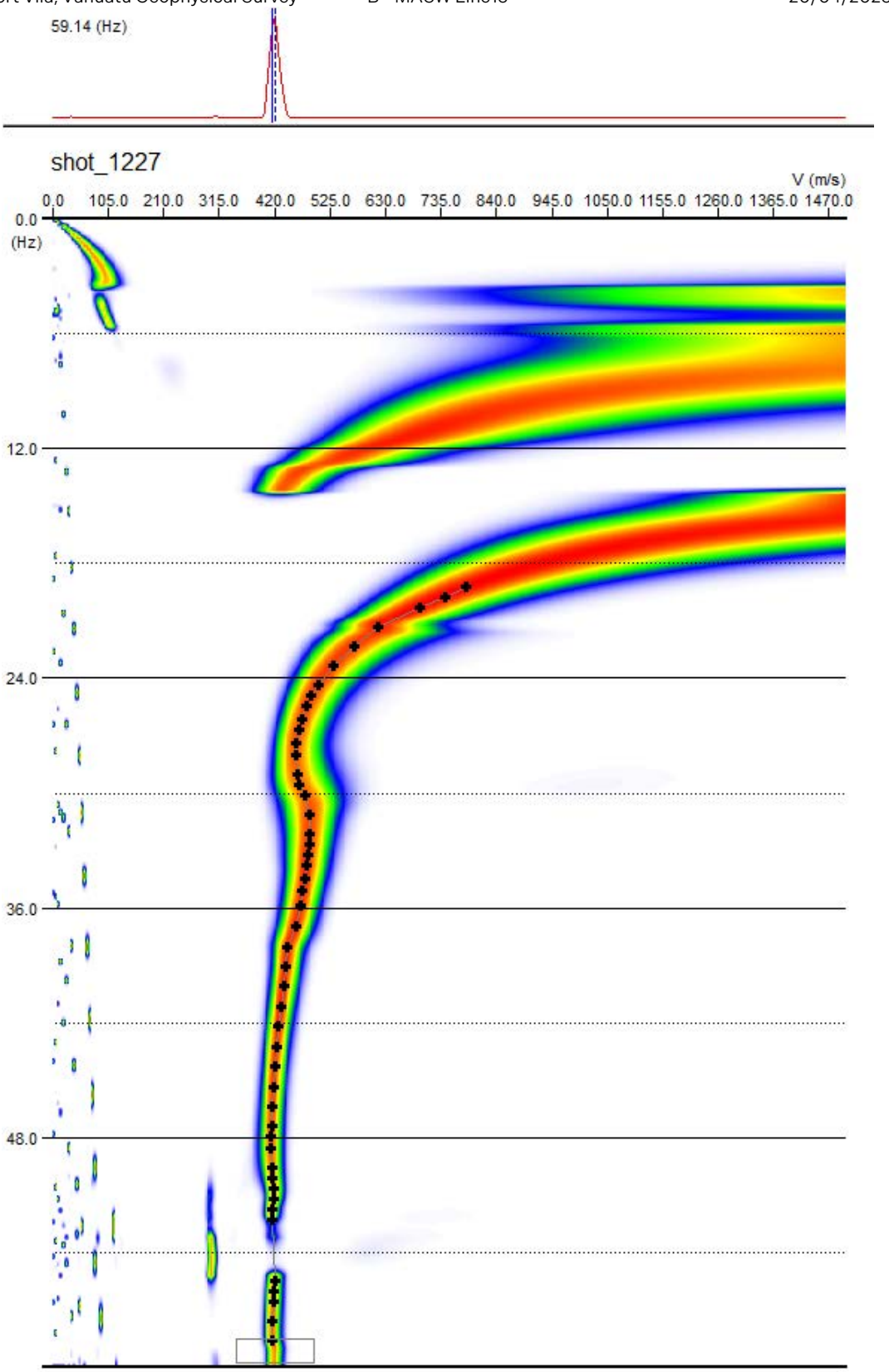

shot_1220
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0


30.82 (Hz)

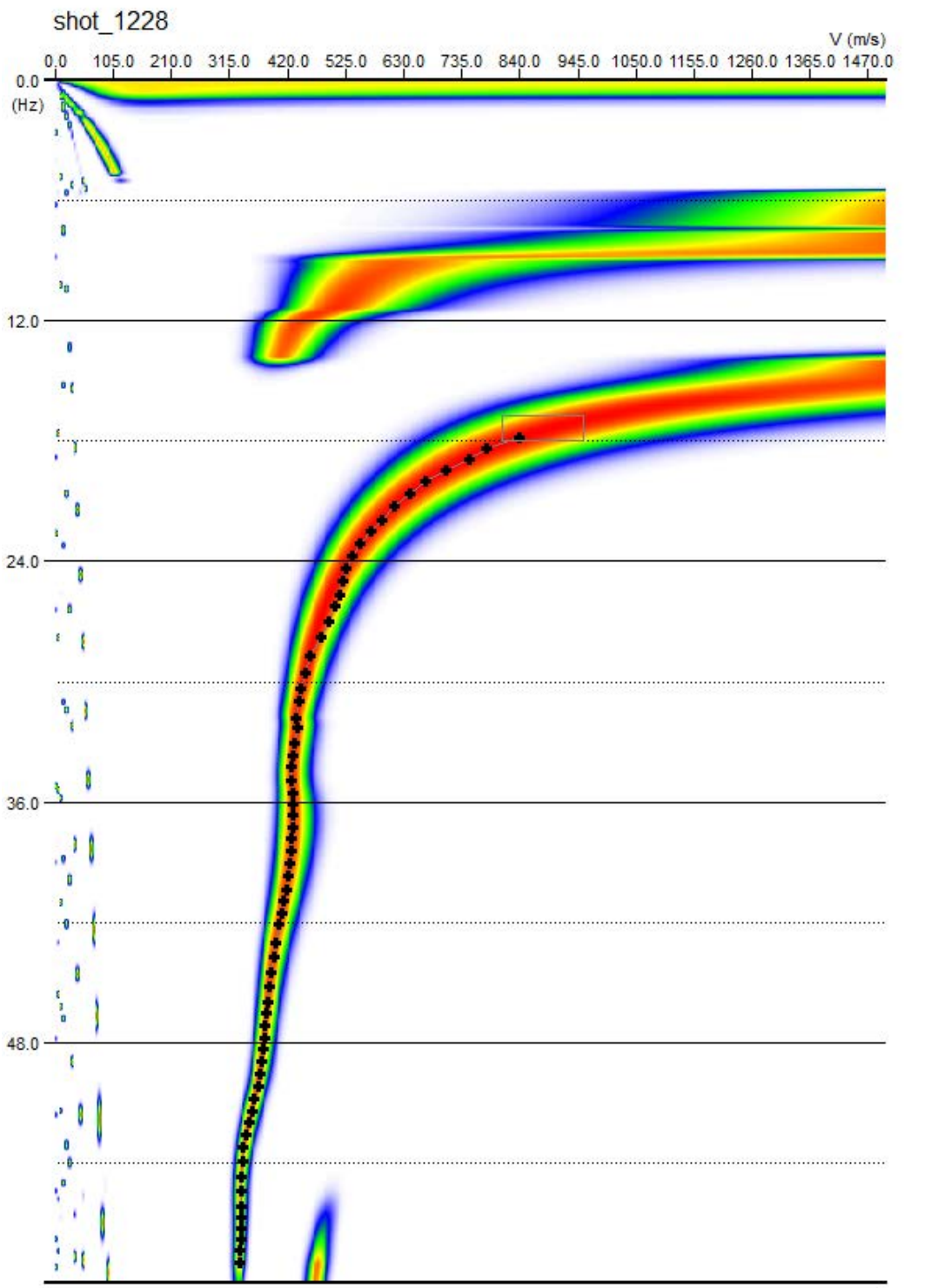

shot_1221
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

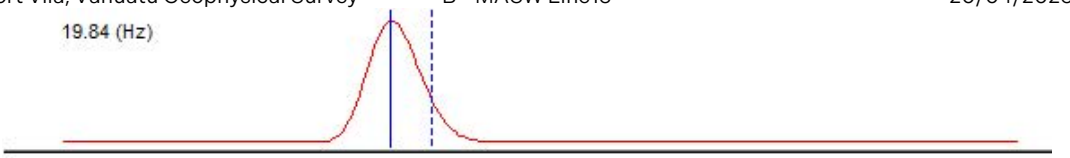

6.80 (Hz)

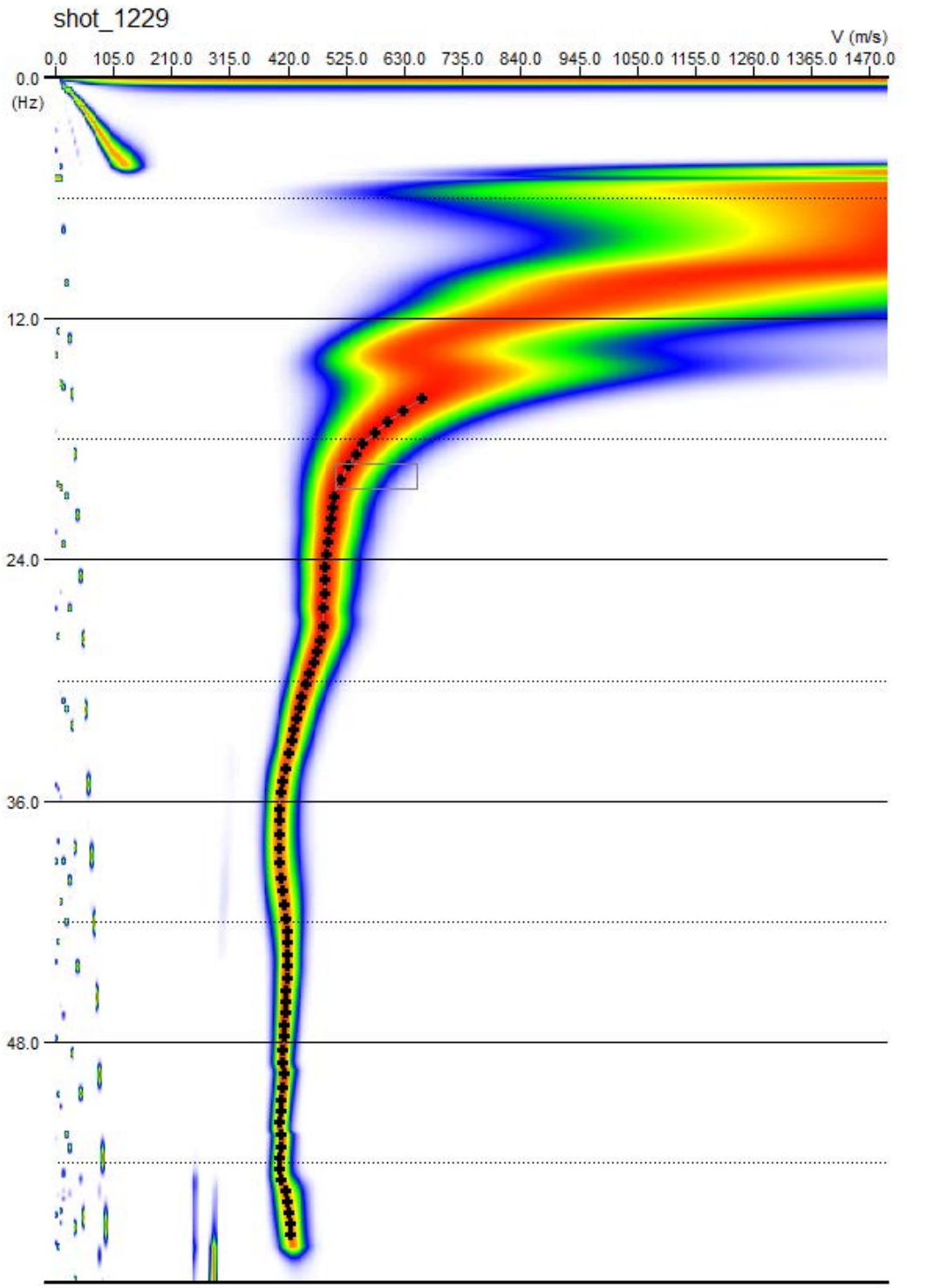

shot_1223
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
8.0
16.0
24.0
32.0
40.0

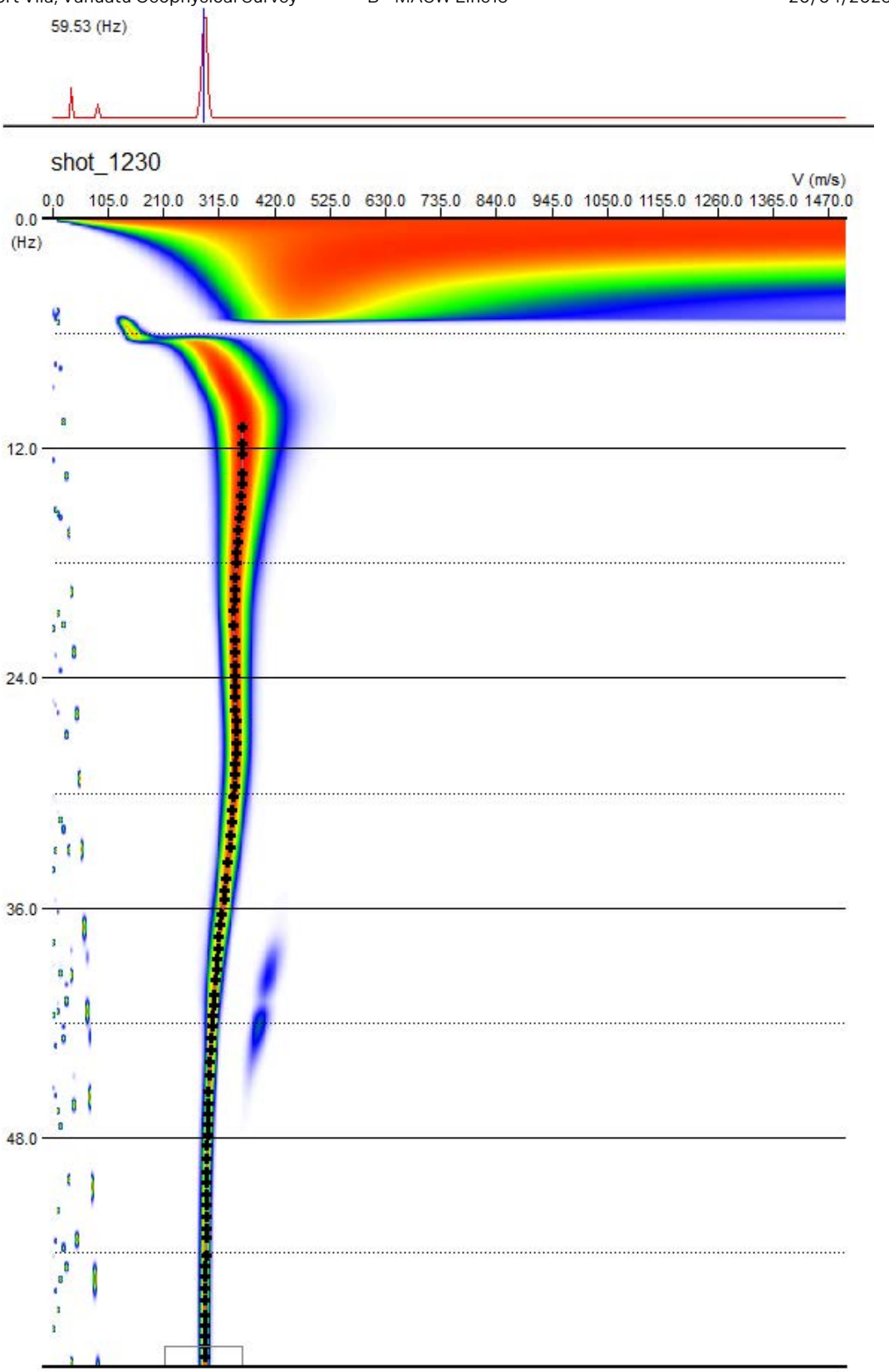

59.14 (Hz)
shot_1227
V (m/s)
0.0 105.0 210.0 315.0 420.0 525.0 630.0 735.0 840.0 945.0 1050.0 1155.0 1260.0 1365.0 1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0

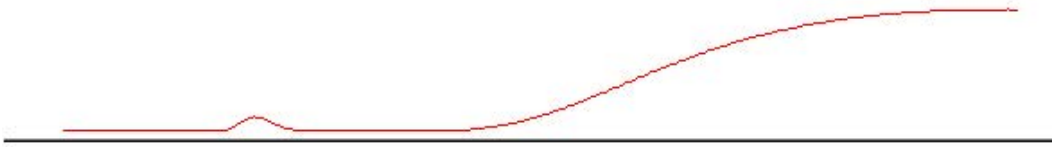

17.35 (Hz)

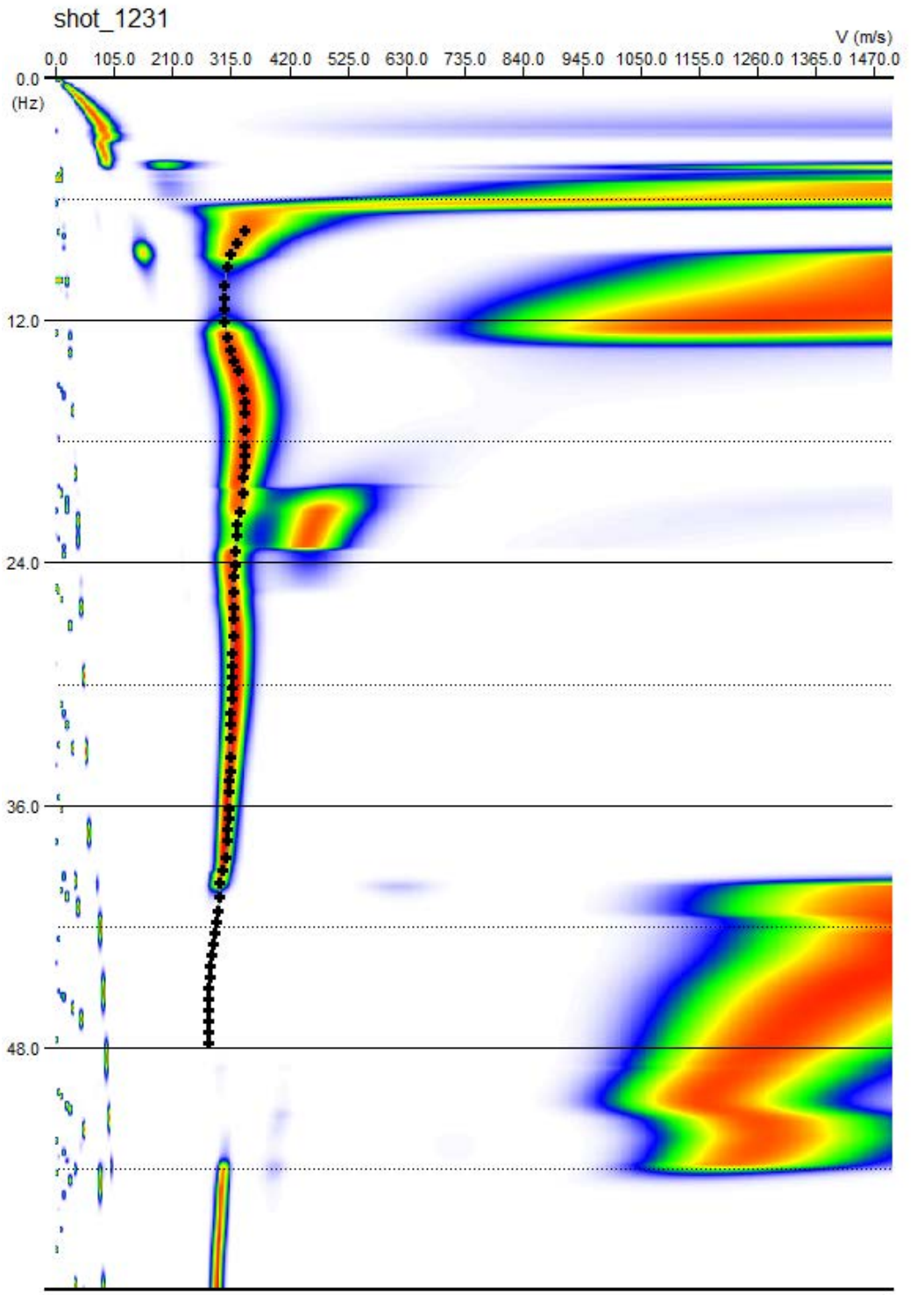

shot_1228
V (m/s)
0.0
105.0
210.0
315.0
420.0
525.0
630.0
735.0
840.0
945.0
1050.0
1155.0
1260.0
1365.0
1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0

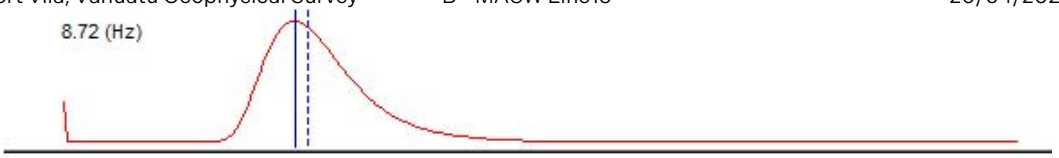

19.84 (Hz)

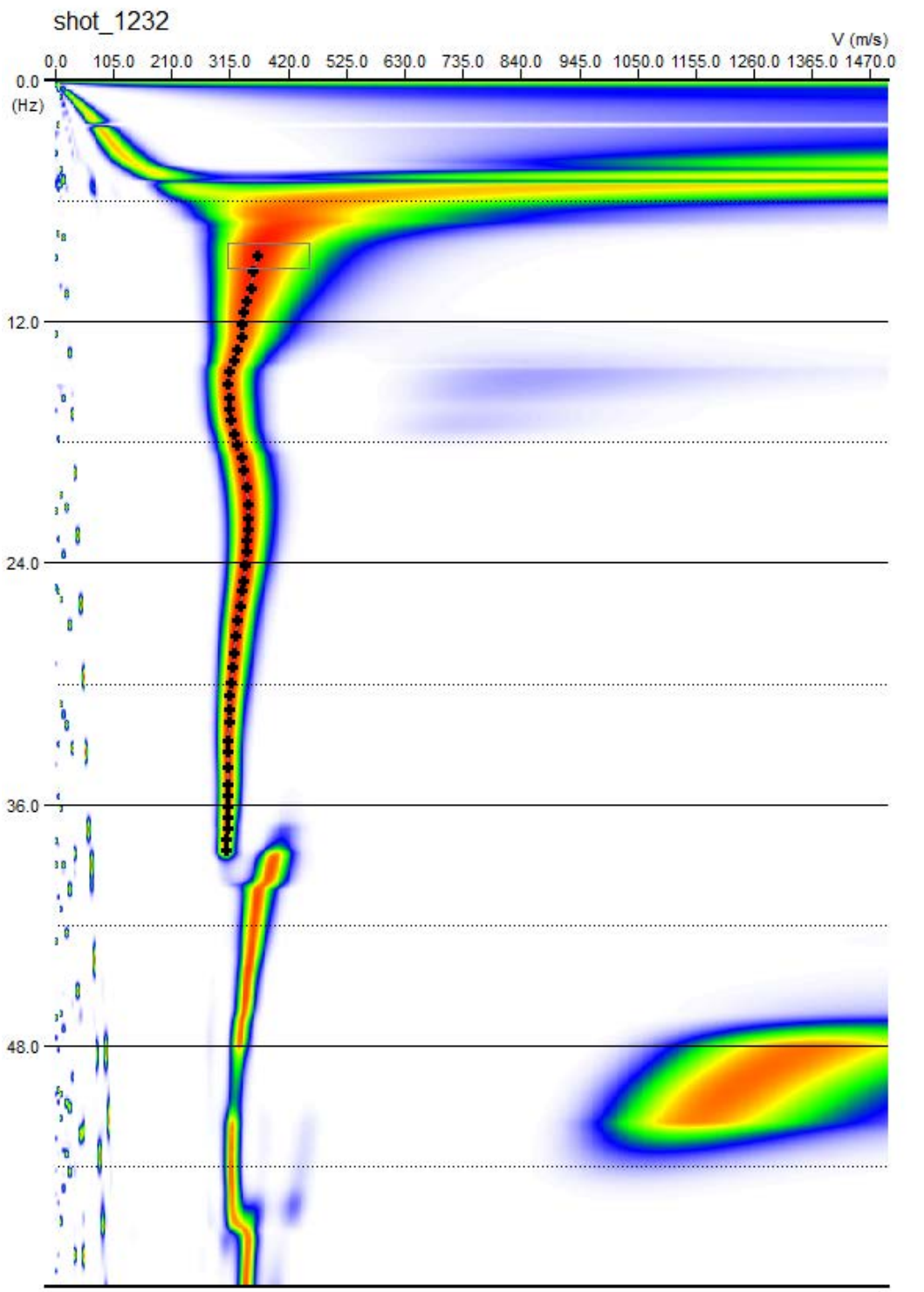

shot_1229
V (m/s)
0.0
105.0
210.0
315.0
420.0
525.0
630.0
735.0
840.0
945.0
1050.0
1155.0
1260.0
1365.0
1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0

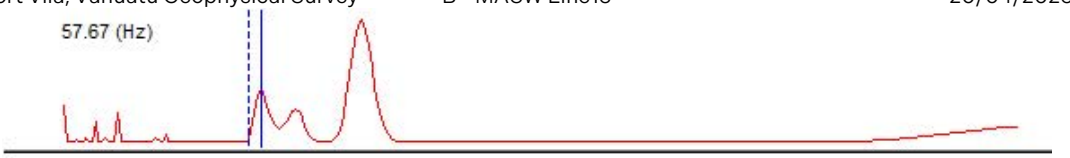

59.53 (Hz)
shot_1230
V (m/s)
0.0 105.0 210.0 315.0 420.0 525.0 630.0 735.0 840.0 945.0 1050.0 1155.0 1260.0 1365.0 1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0

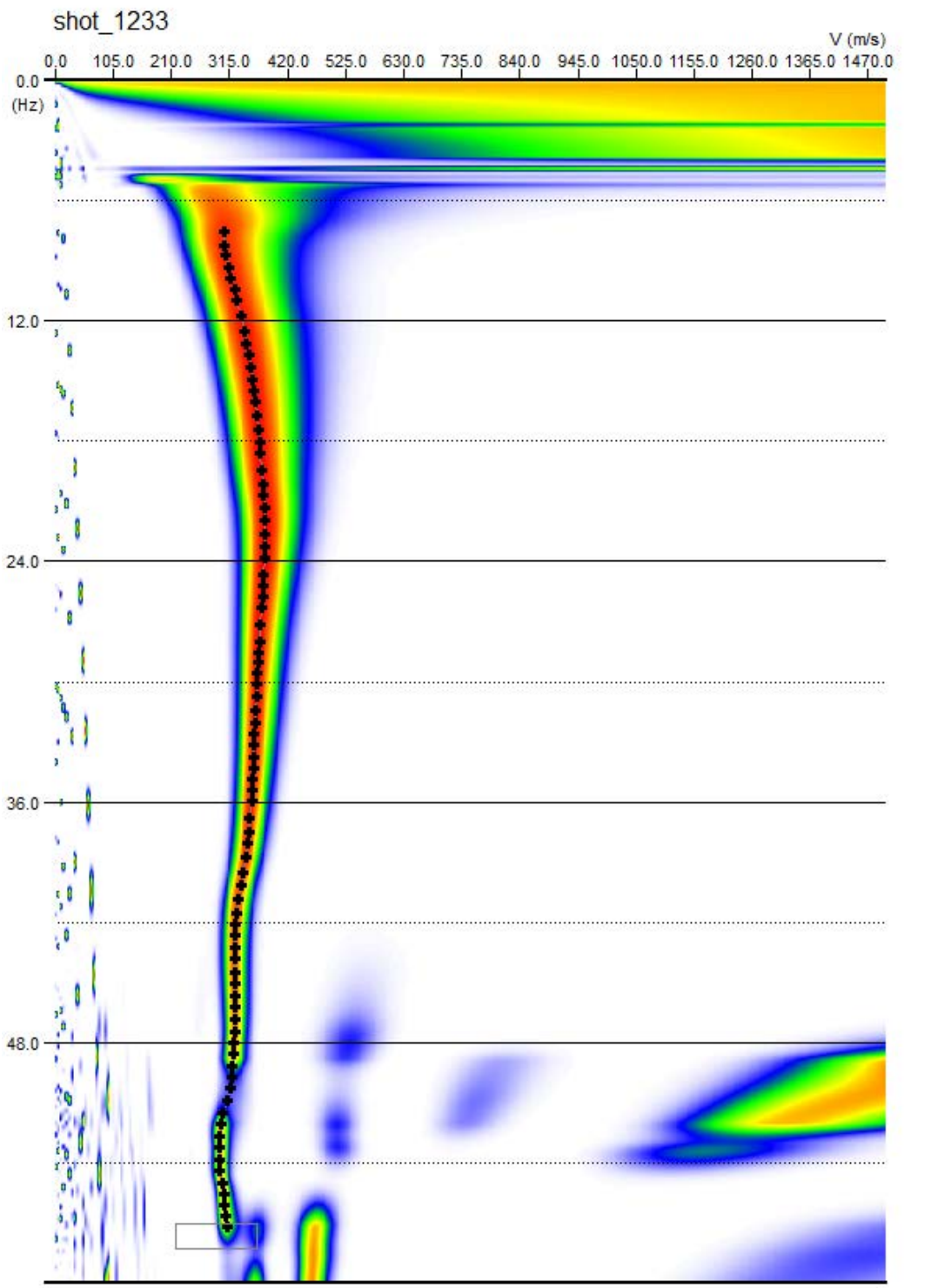


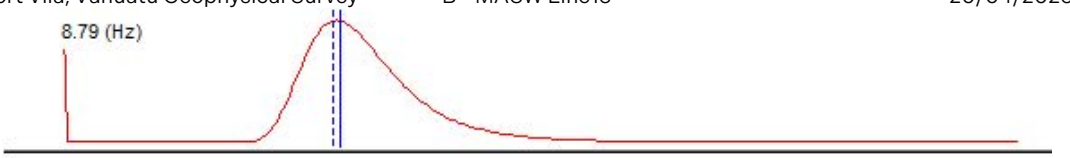

shot_1231
V (m/s)
0.0 105.0 210.0 315.0 420.0 525.0 630.0 735.0 840.0 945.0 1050.0 1155.0 1260.0 1365.0 1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0

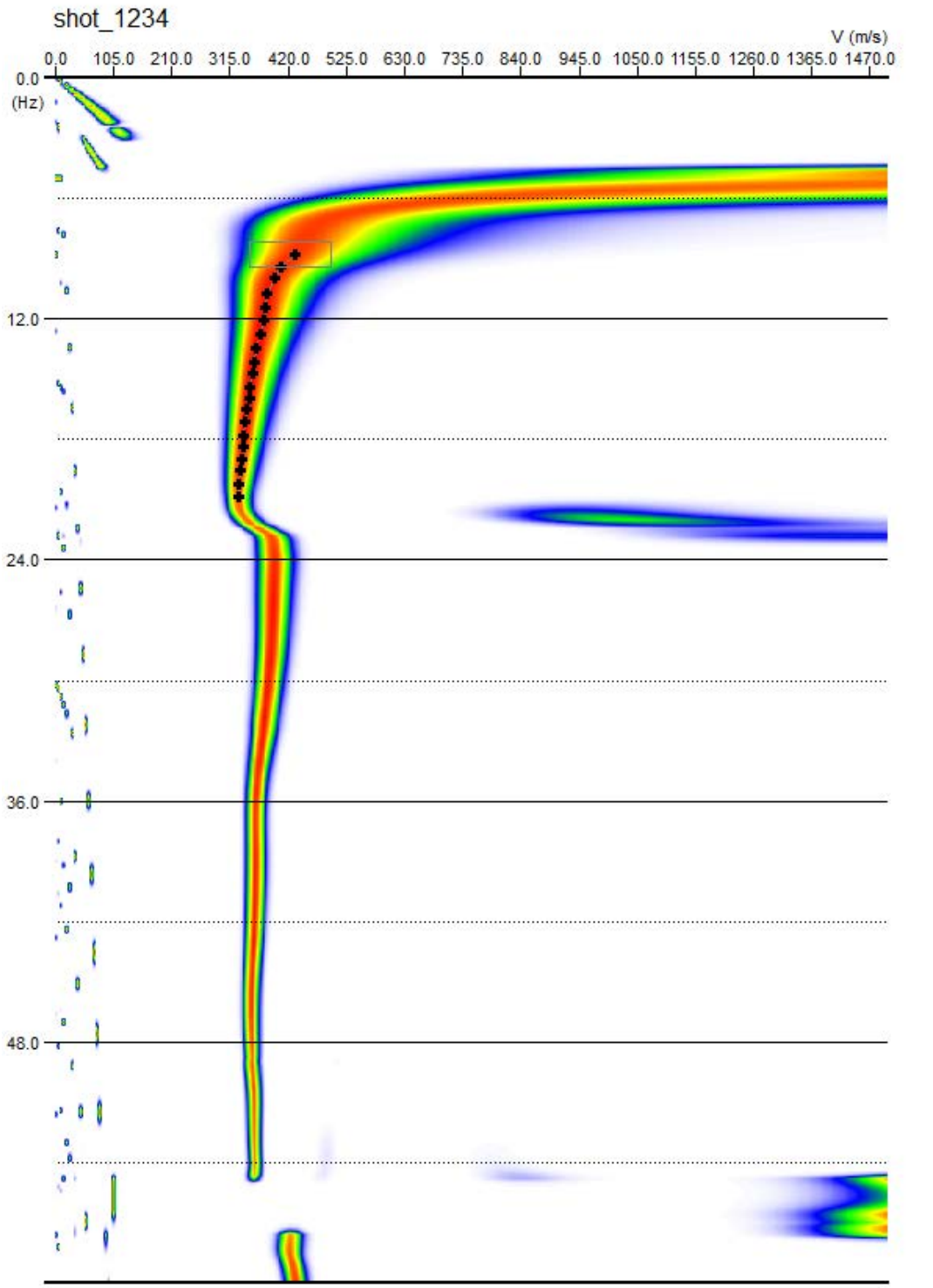

8.72 (Hz)

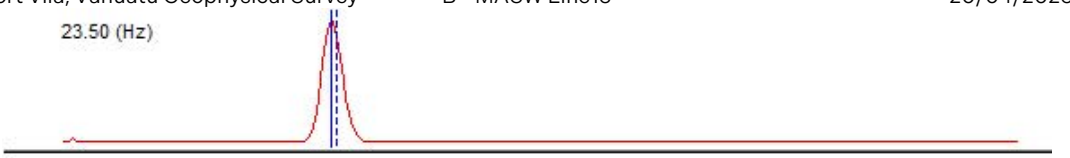

shot_1232
V (m/s)
0.0
105.0
210.0
315.0
420.0
525.0
630.0
735.0
840.0
945.0
1050.0
1155.0
1260.0
1365.0
1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0

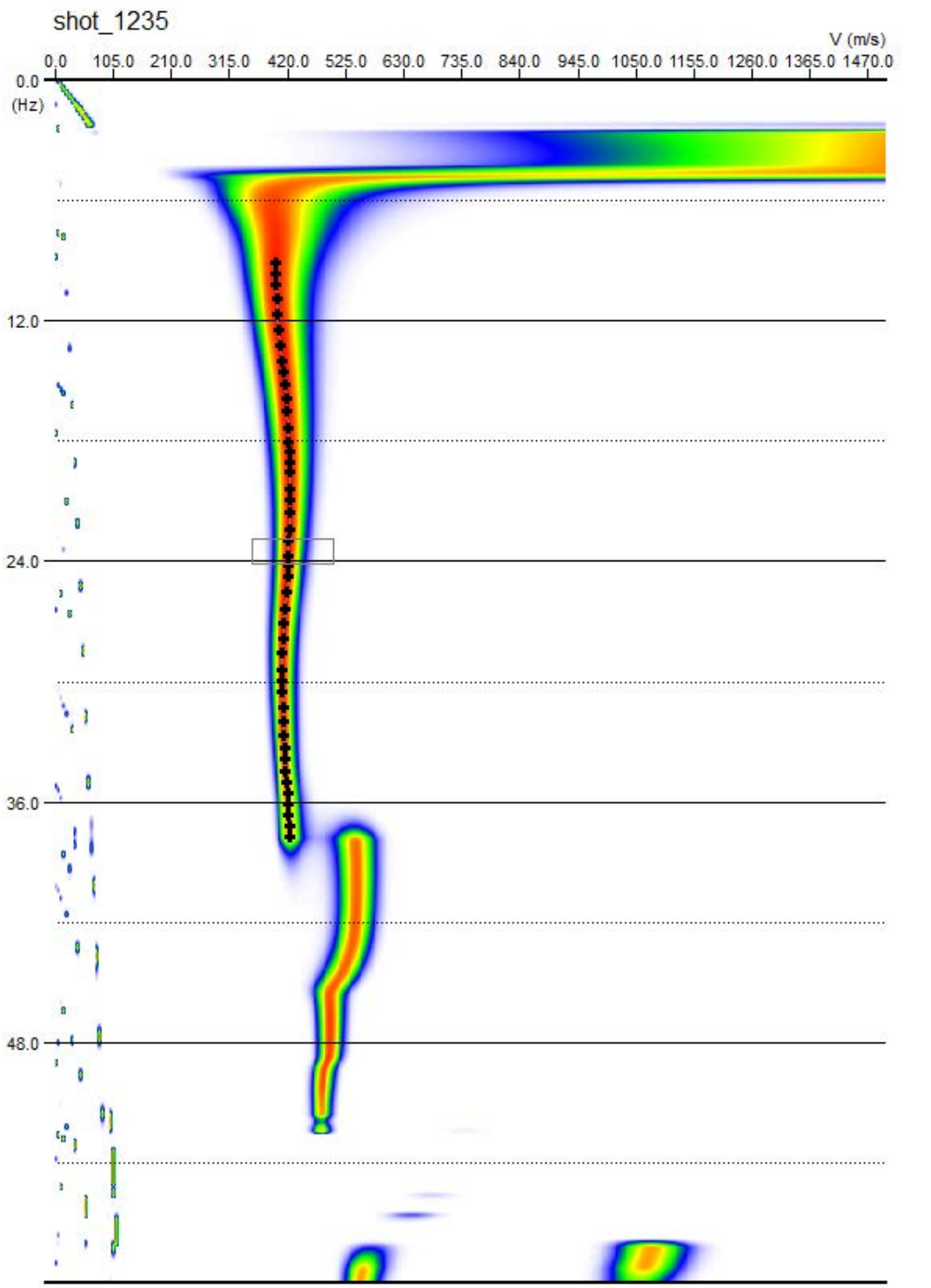

57.67 (Hz)

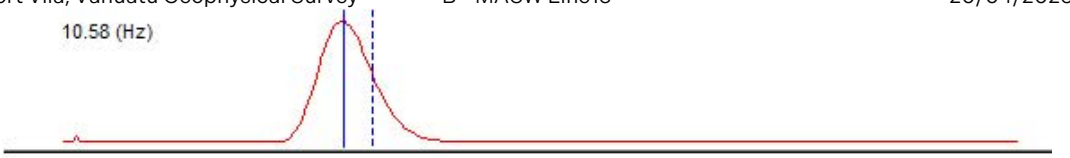

shot_1233
V (m/s)
0.0
105.0
210.0
315.0
420.0
525.0
630.0
735.0
840.0
945.0
1050.0
1155.0
1260.0
1365.0
1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0

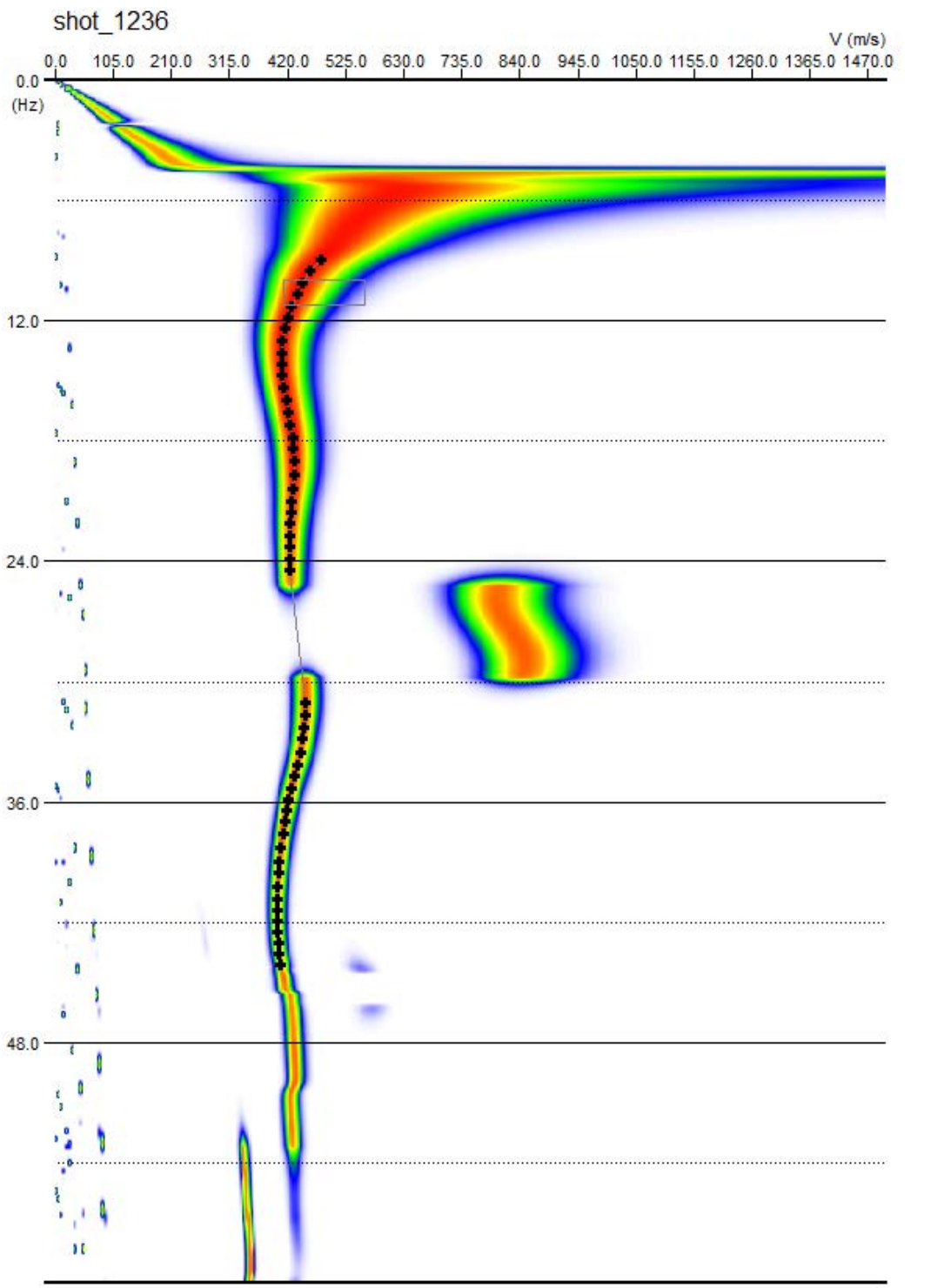

8.79 (Hz)

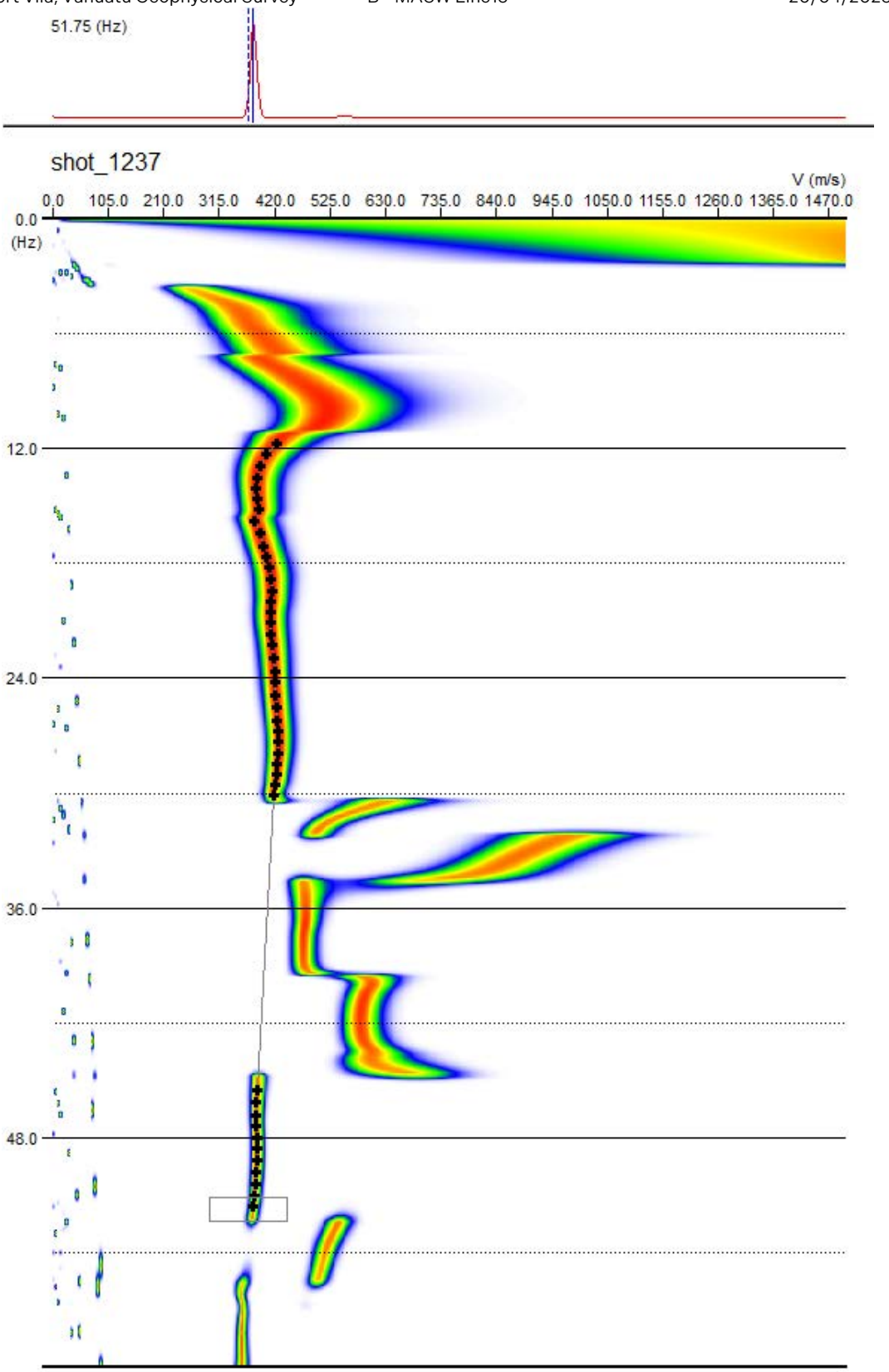

shot_1234
V (m/s)
0.0
105.0
210.0
315.0
420.0
525.0
630.0
735.0
840.0
945.0
1050.0
1155.0
1260.0
1365.0
1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0


23.50 (Hz)

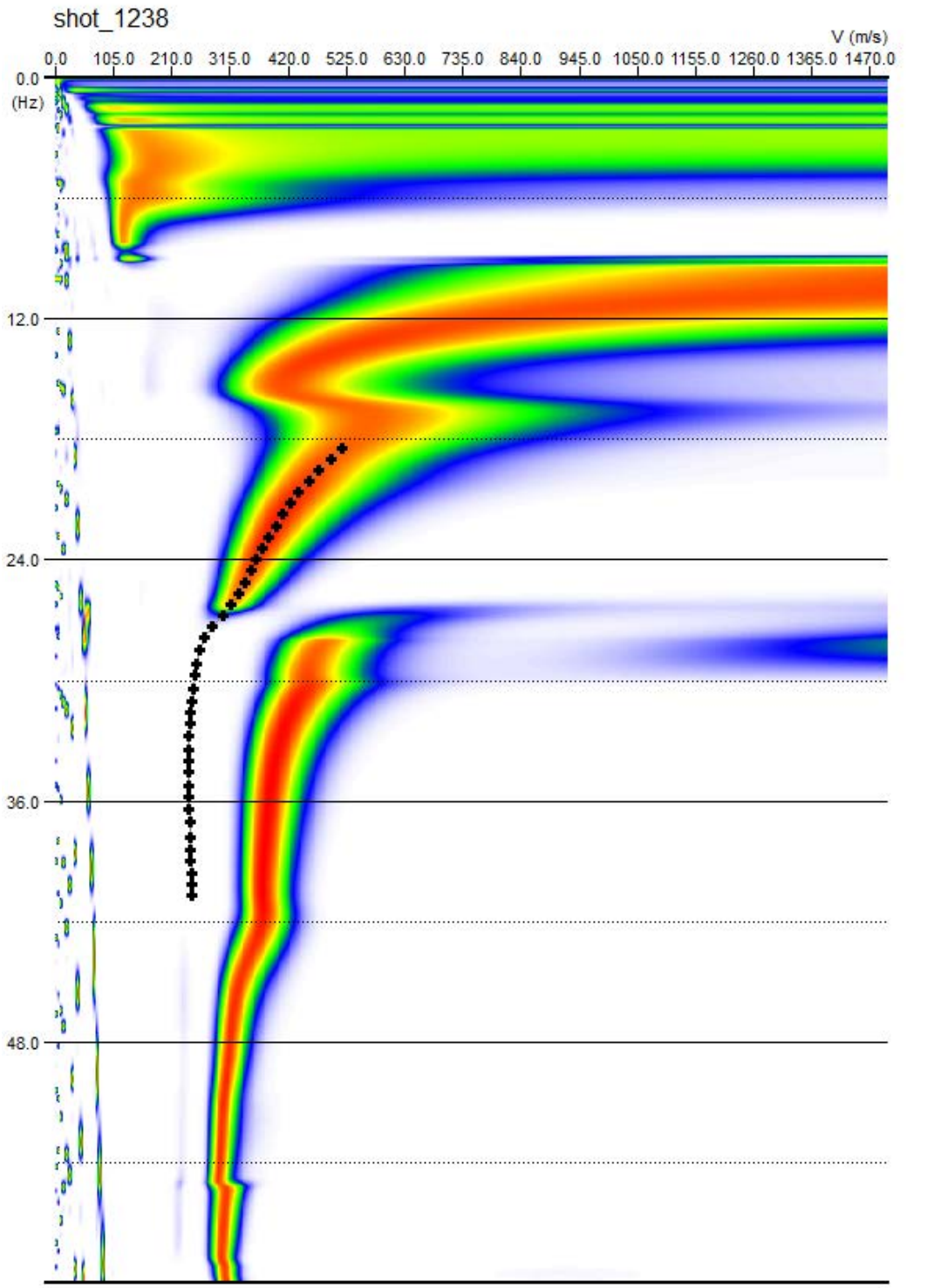

shot_1235
V (m/s)
0.0 105.0 210.0 315.0 420.0 525.0 630.0 735.0 840.0 945.0 1050.0 1155.0 1260.0 1365.0 1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0

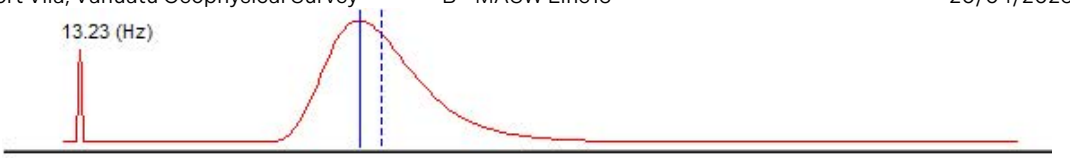

10.58 (Hz)

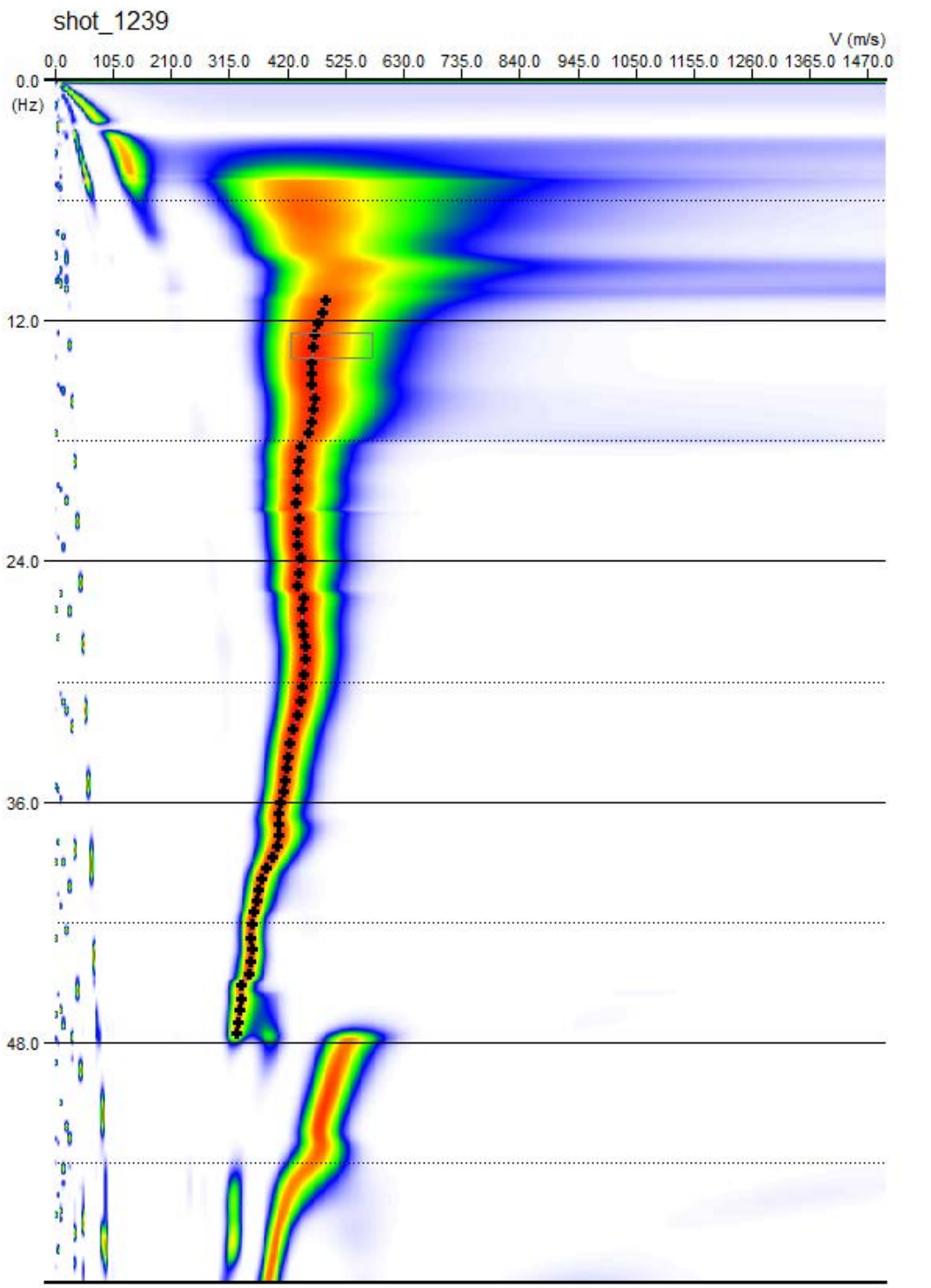

shot_1236
V (m/s)
0.0
105.0
210.0
315.0
420.0
525.0
630.0
735.0
840.0
945.0
1050.0
1155.0
1260.0
1365.0
1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0

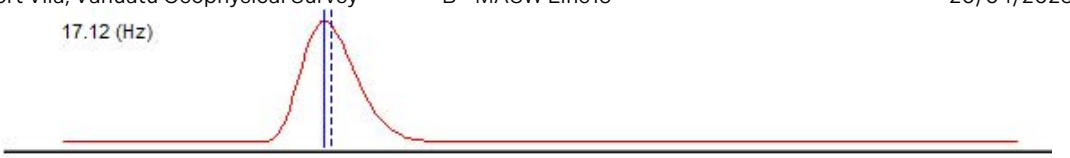

51.75 (Hz)
shot_1237
V (m/s)
0.0 105.0 210.0 315.0 420.0 525.0 630.0 735.0 840.0 945.0 1050.0 1155.0 1260.0 1365.0 1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0

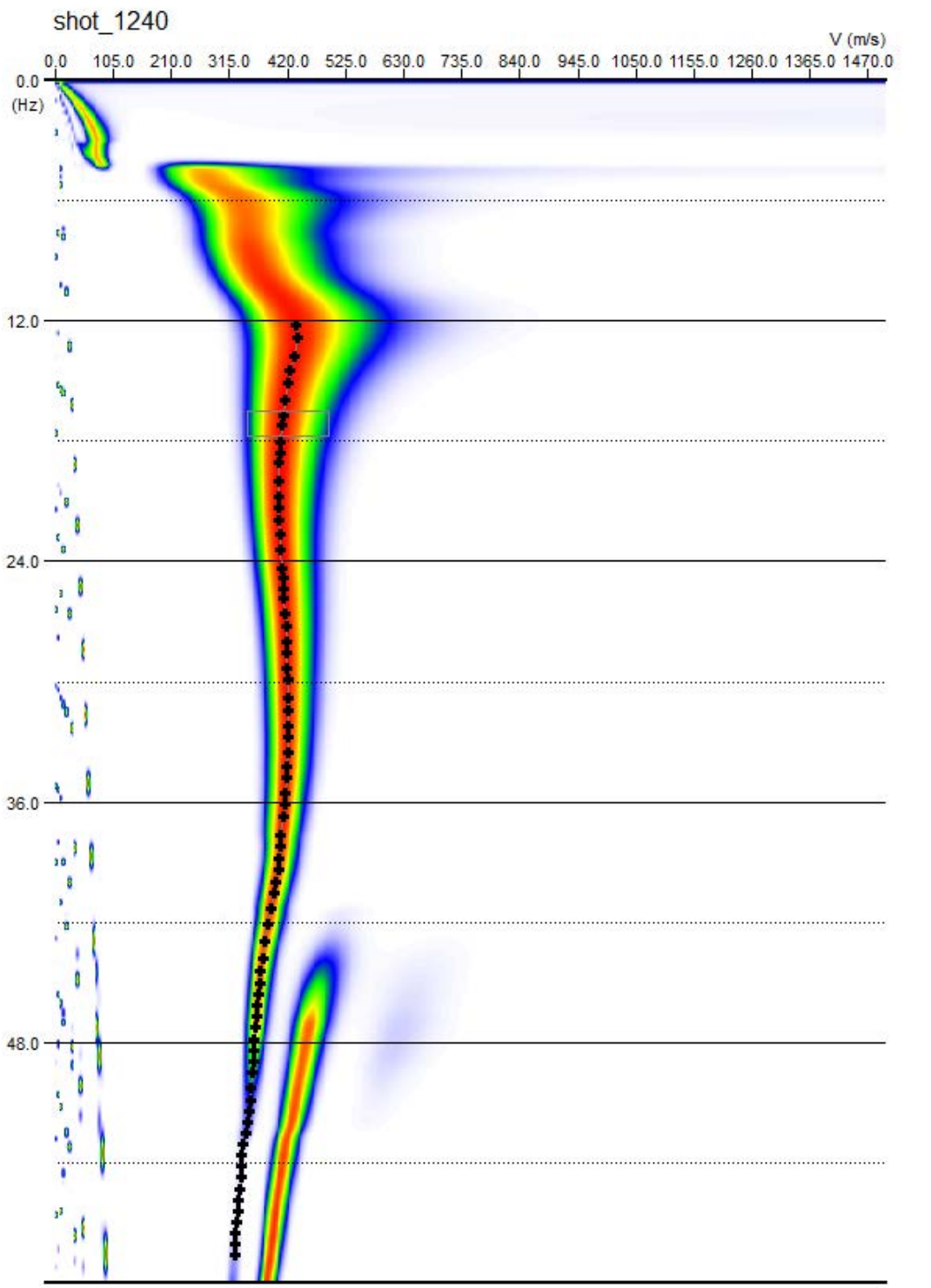


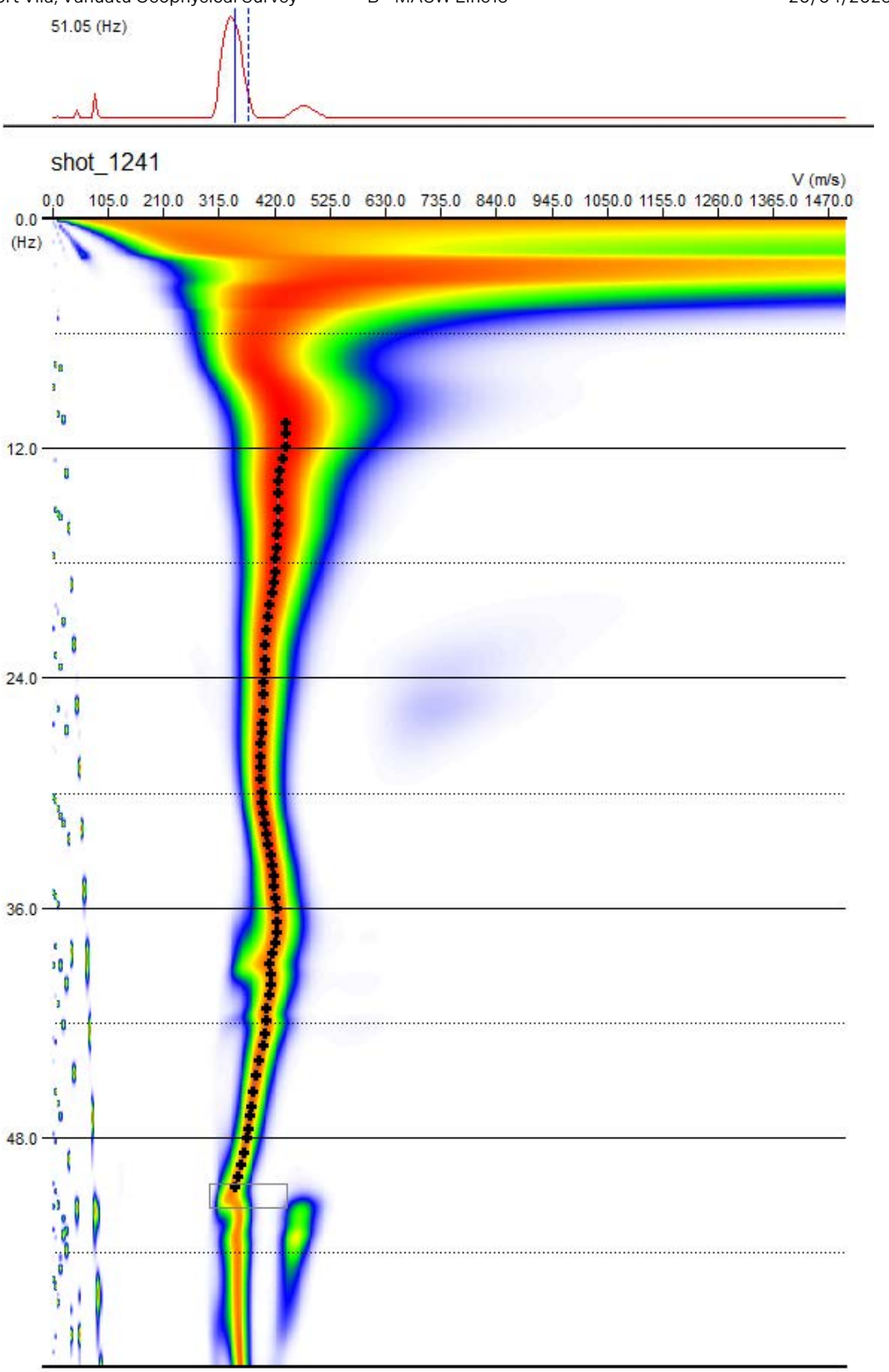

shot_1238
V (m/s)
0.0
105.0
210.0
315.0
420.0
525.0
630.0
735.0
840.0
945.0
1050.0
1155.0
1260.0
1365.0
1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0


13.23 (Hz)

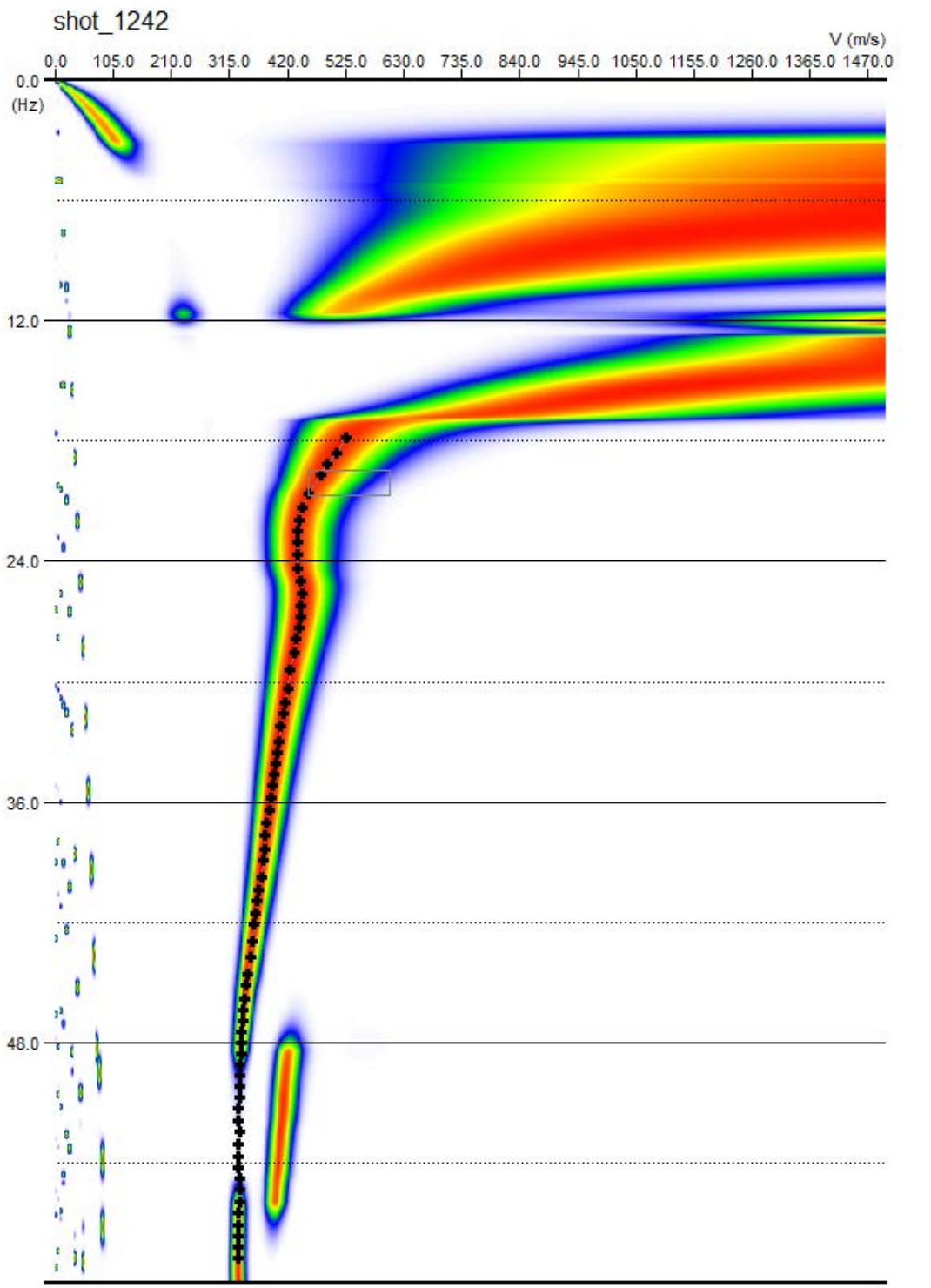

shot_1239
V (m/s)
0.0
105.0
210.0
315.0
420.0
525.0
630.0
735.0
840.0
945.0
1050.0
1155.0
1260.0
1365.0
1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0

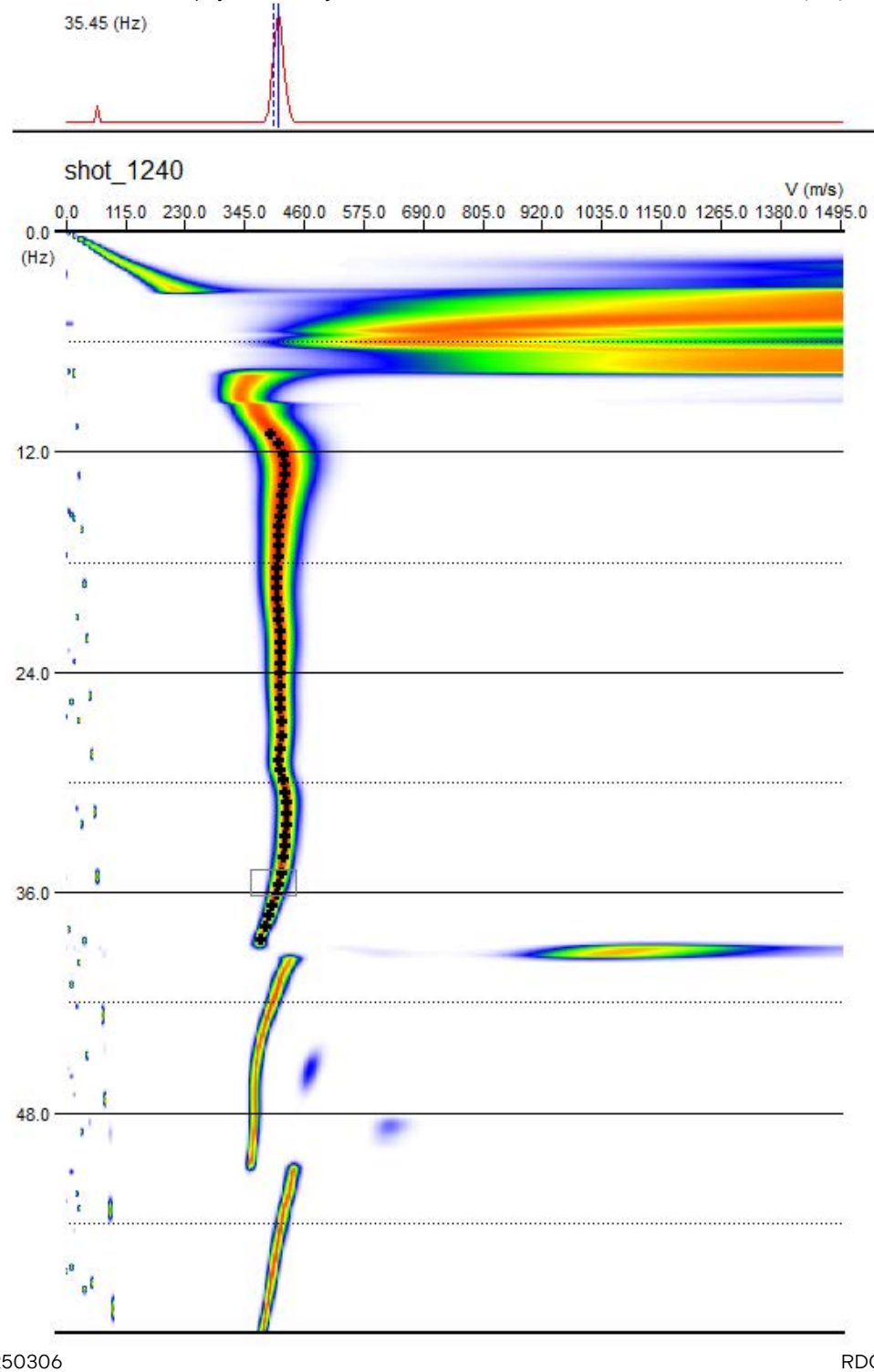

17.12 (Hz)


shot_1240
V (m/s)
0.0
105.0
210.0
315.0
420.0
525.0
630.0
735.0
840.0
945.0
1050.0
1155.0
1260.0
1365.0
1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0

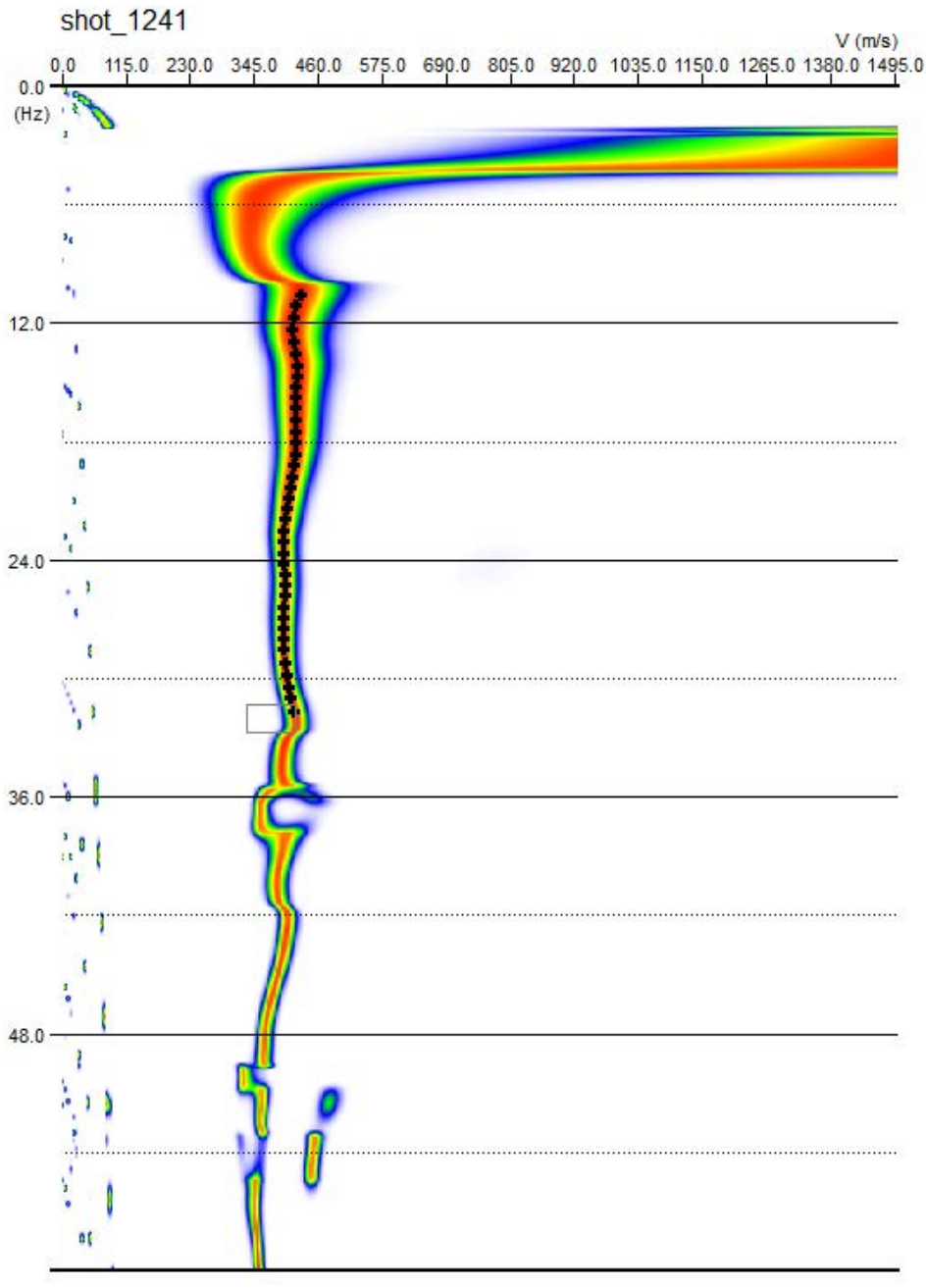

51.05 (Hz)
shot_1241
V (m/s)
0.0 105.0 210.0 315.0 420.0 525.0 630.0 735.0 840.0 945.0 1050.0 1155.0 1260.0 1365.0 1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0

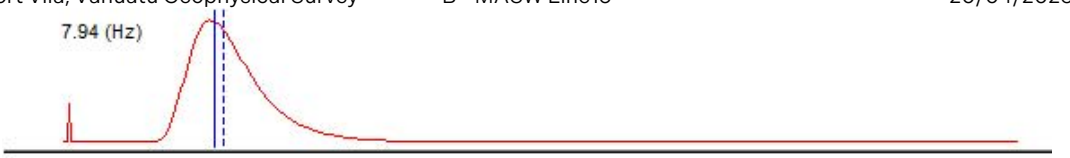

20.08 (Hz)

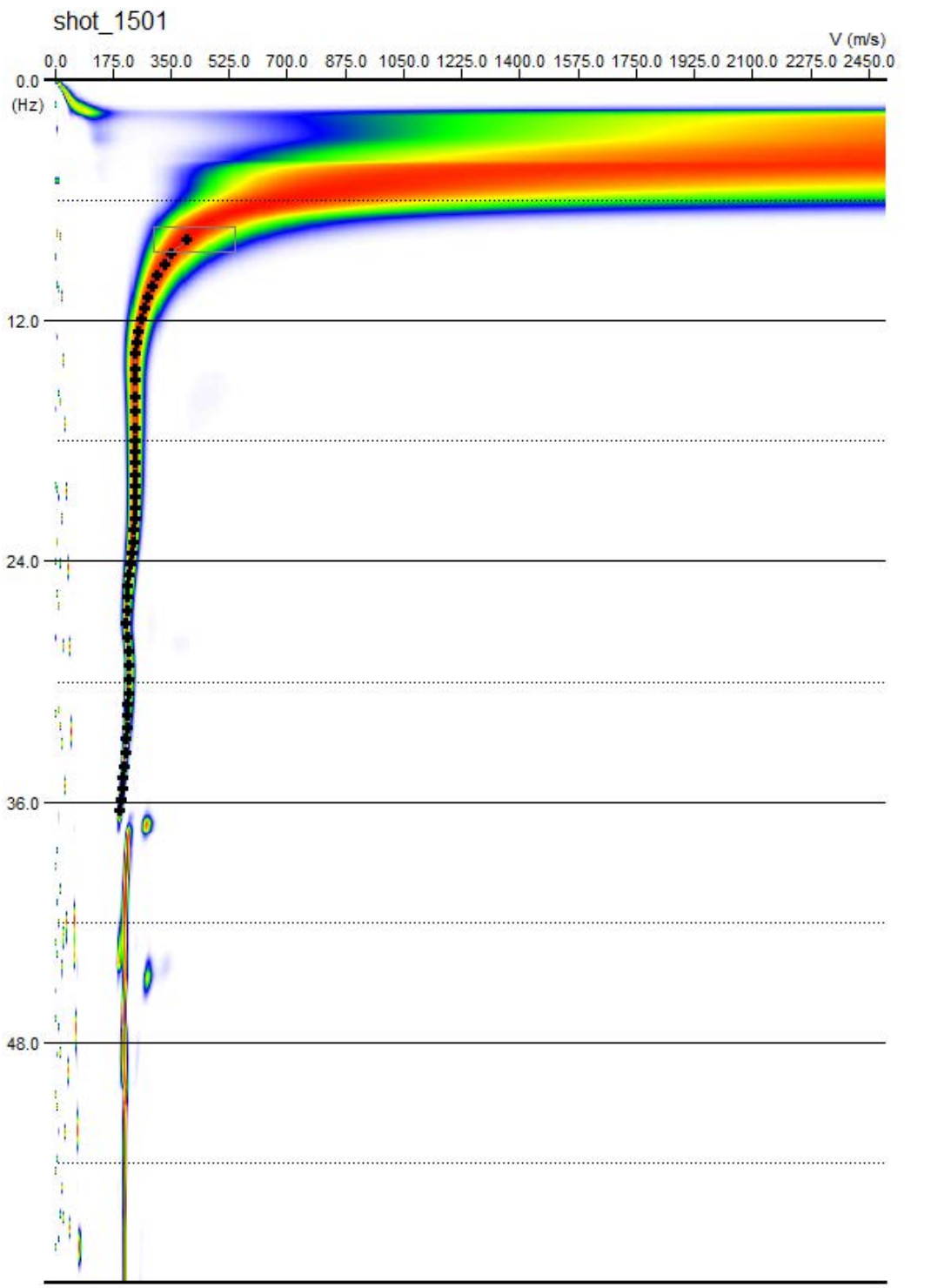

shot_1242
V (m/s)
0.0
105.0
210.0
315.0
420.0
525.0
630.0
735.0
840.0
945.0
1050.0
1155.0
1260.0
1365.0
1470.0
0.0
(Hz)
12.0
24.0
36.0
48.0


35.45 (Hz)
shot_1240
V (m/s)
0.0 115.0 230.0 345.0 460.0 575.0 690.0 805.0 920.0 1035.0 1150.0 1265.0 1380.0 1495.0
0.0
(Hz)
12.0
24.0
36.0
48.0

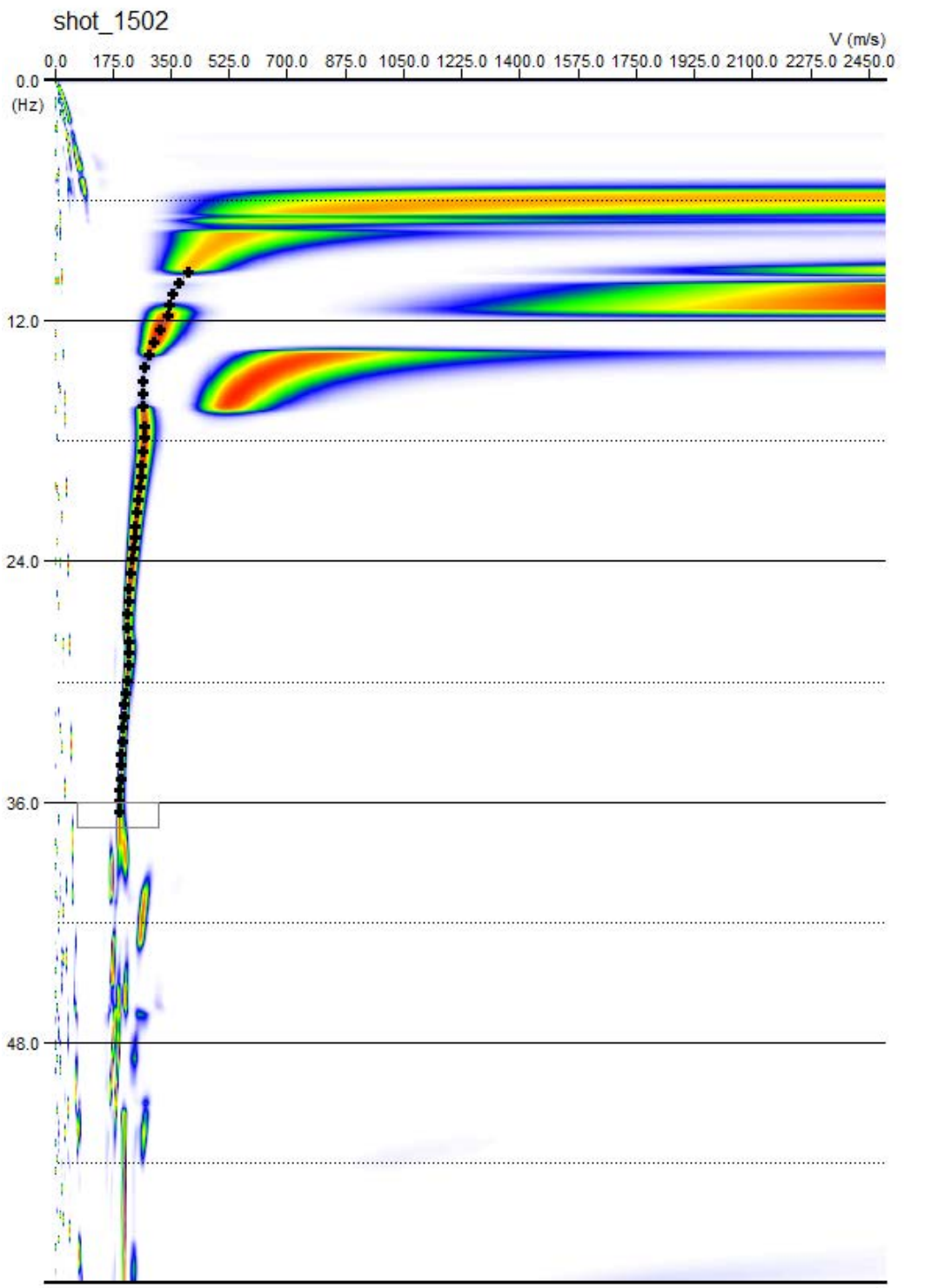

32.02 (Hz)


shot_1241
V (m/s)
0.0 115.0 230.0 345.0 460.0 575.0 690.0 805.0 920.0 1035.0 1150.0 1265.0 1380.0 1495.0
0.0
(Hz)
12.0
24.0
36.0
48.0

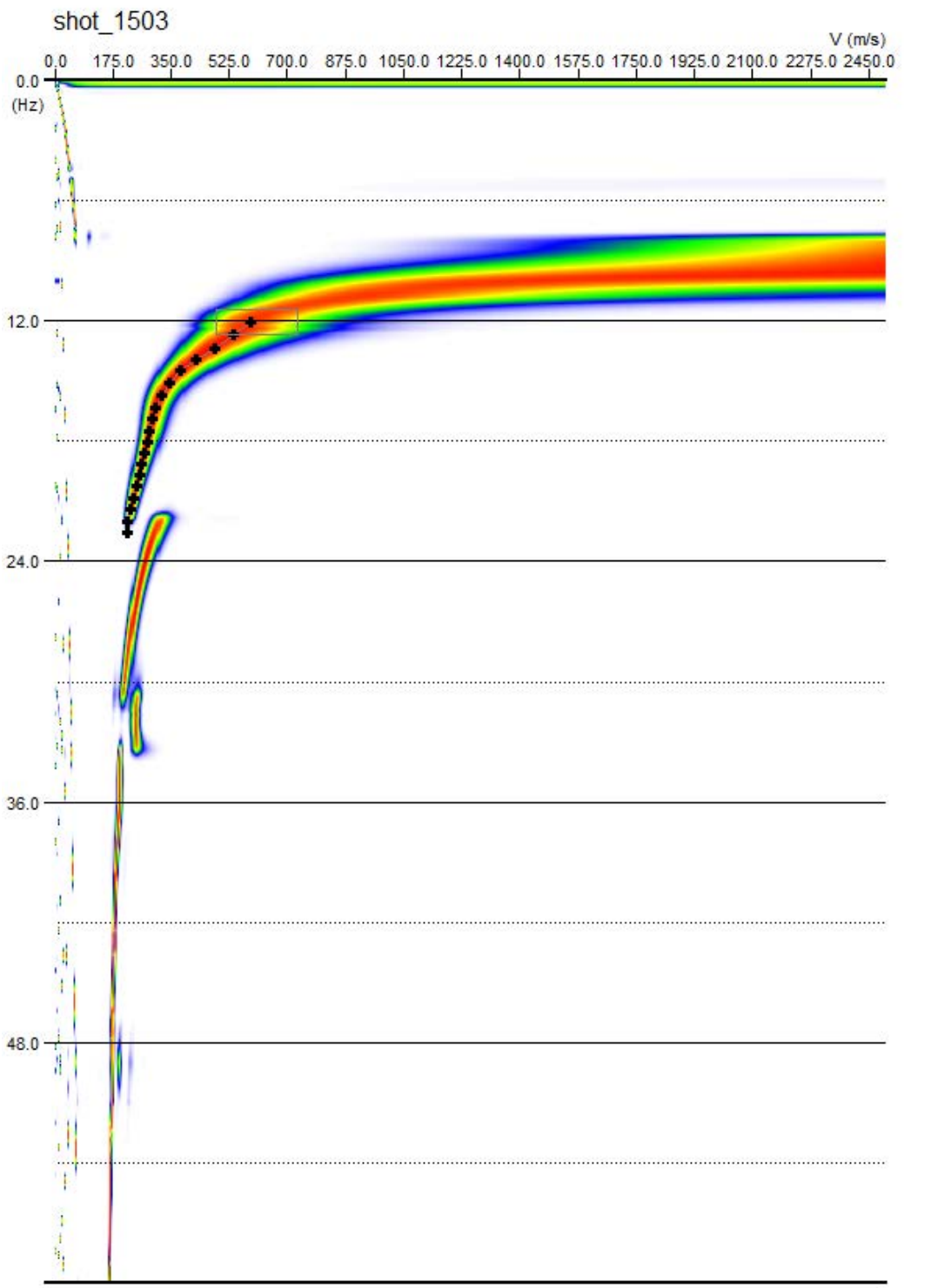

7.94 (Hz)

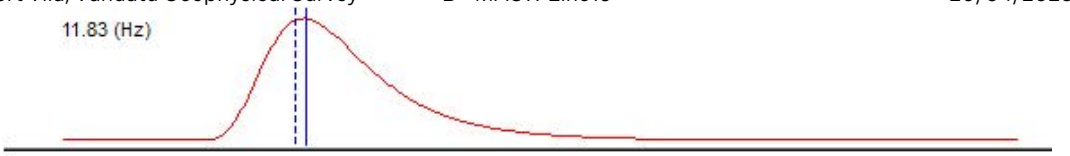

shot_1501
V (m/s)
0.0 175.0 350.0 525.0 700.0 875.0 1050.0 1225.0 1400.0 1575.0 1750.0 1925.0 2100.0 2275.0 2450.0
0.0
(Hz)
12.0
24.0
36.0
48.0

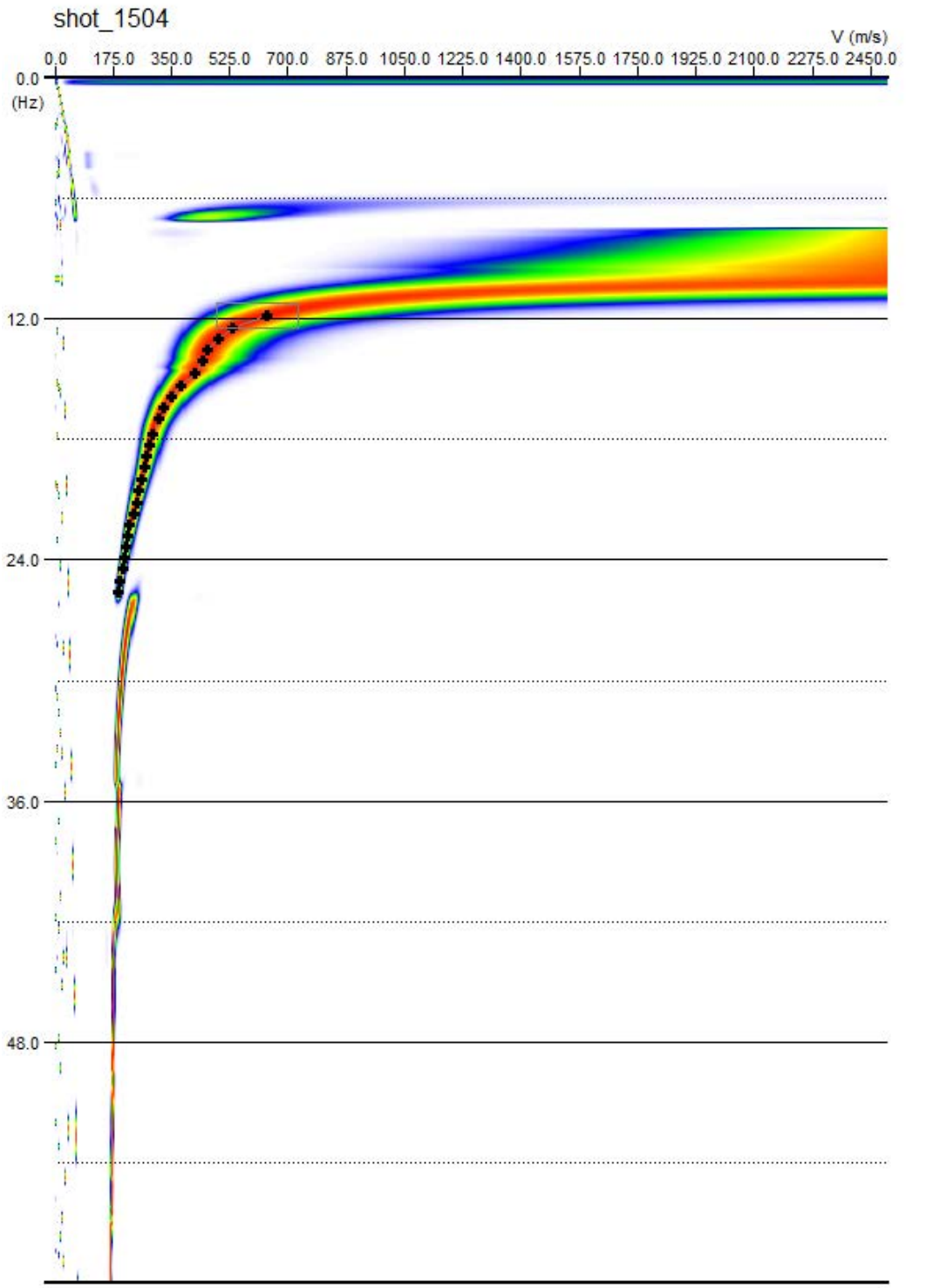

36.65 (Hz)

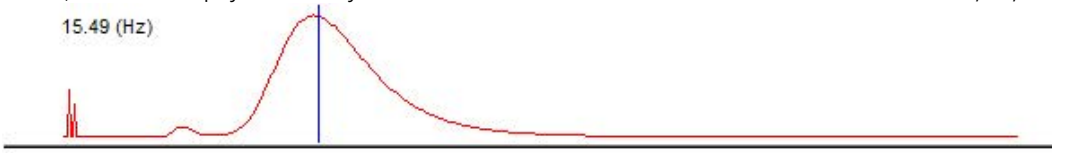

shot_1502
V (m/s)
0.0
175.0
350.0
525.0
700.0
875.0
1050.0
1225.0
1400.0
1575.0
1750.0
1925.0
2100.0
2275.0
2450.0
0.0
(Hz)
12.0
24.0
36.0
48.0

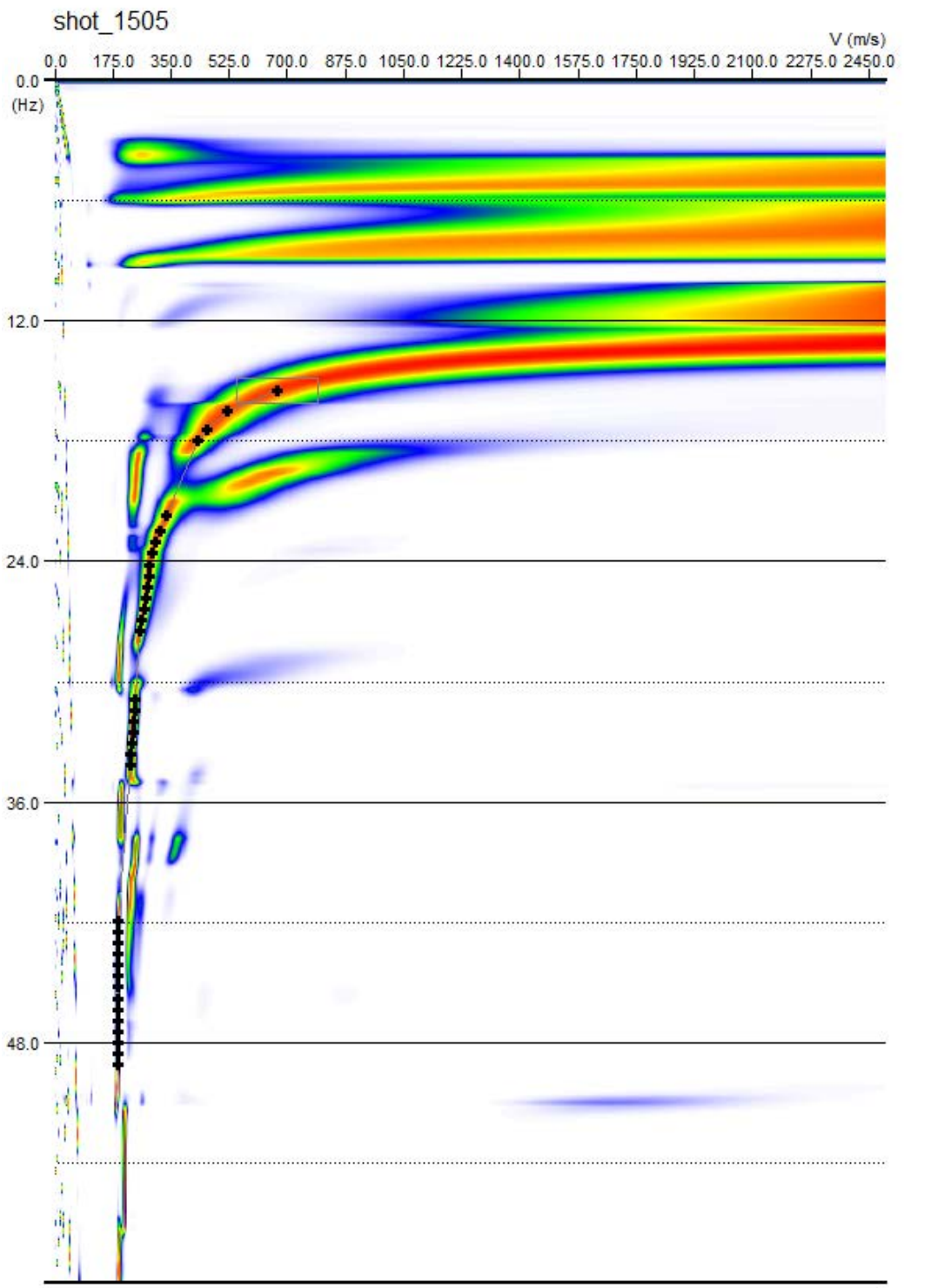

12.06 (Hz)

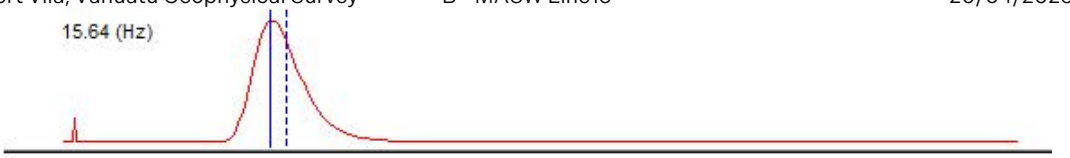

shot_1503
V (m/s)
0.0 175.0 350.0 525.0 700.0 875.0 1050.0 1225.0 1400.0 1575.0 1750.0 1925.0 2100.0 2275.0 2450.0
0.0
(Hz)
12.0
24.0
36.0
48.0

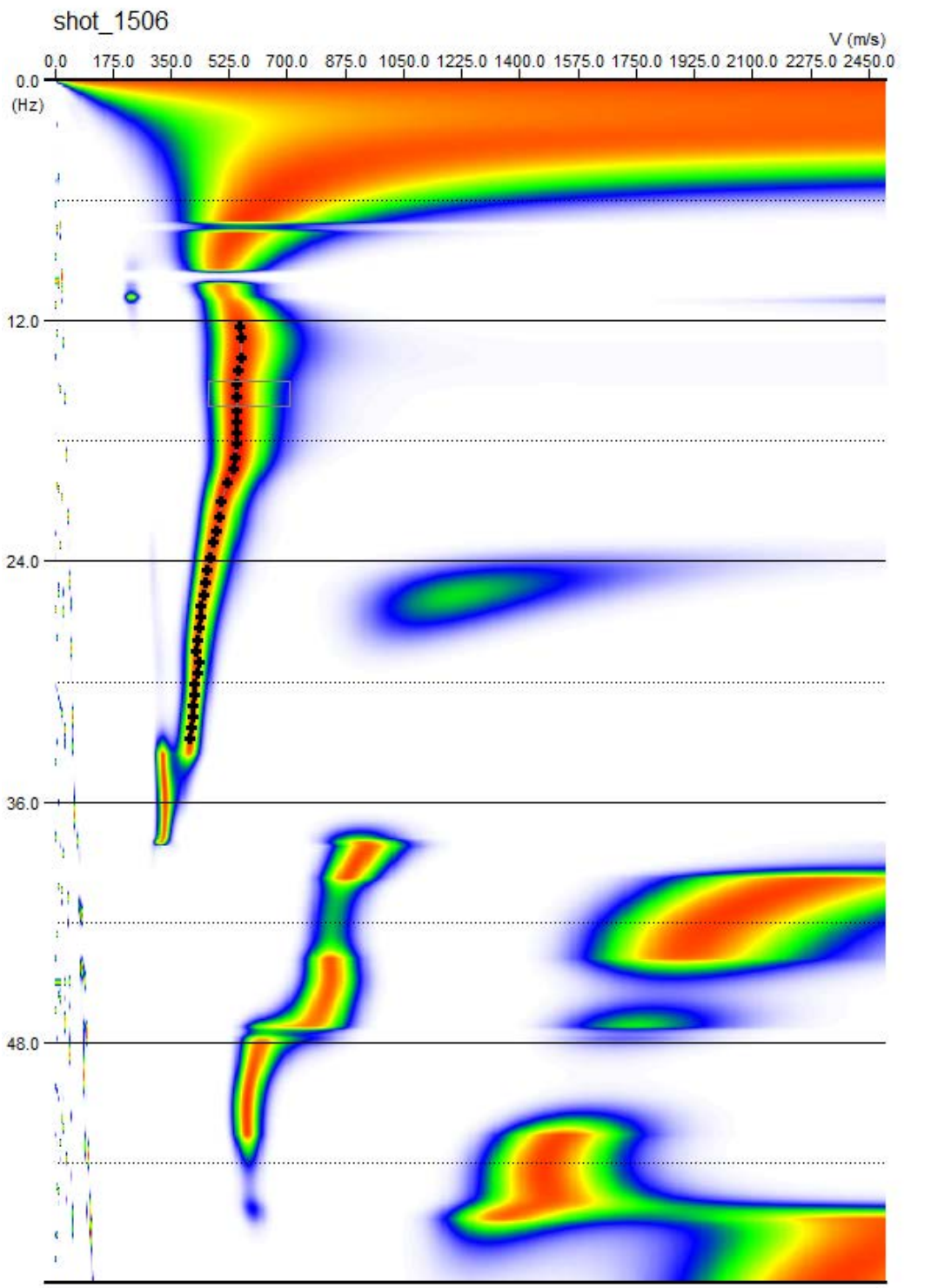

11.83 (Hz)

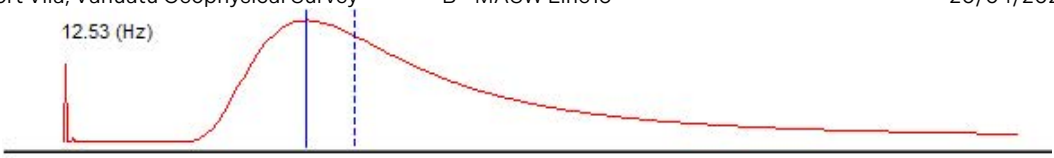

shot_1504
V (m/s)
0.0 175.0 350.0 525.0 700.0 875.0 1050.0 1225.0 1400.0 1575.0 1750.0 1925.0 2100.0 2275.0 2450.0
0.0
(Hz)
12.0
24.0
36.0
48.0

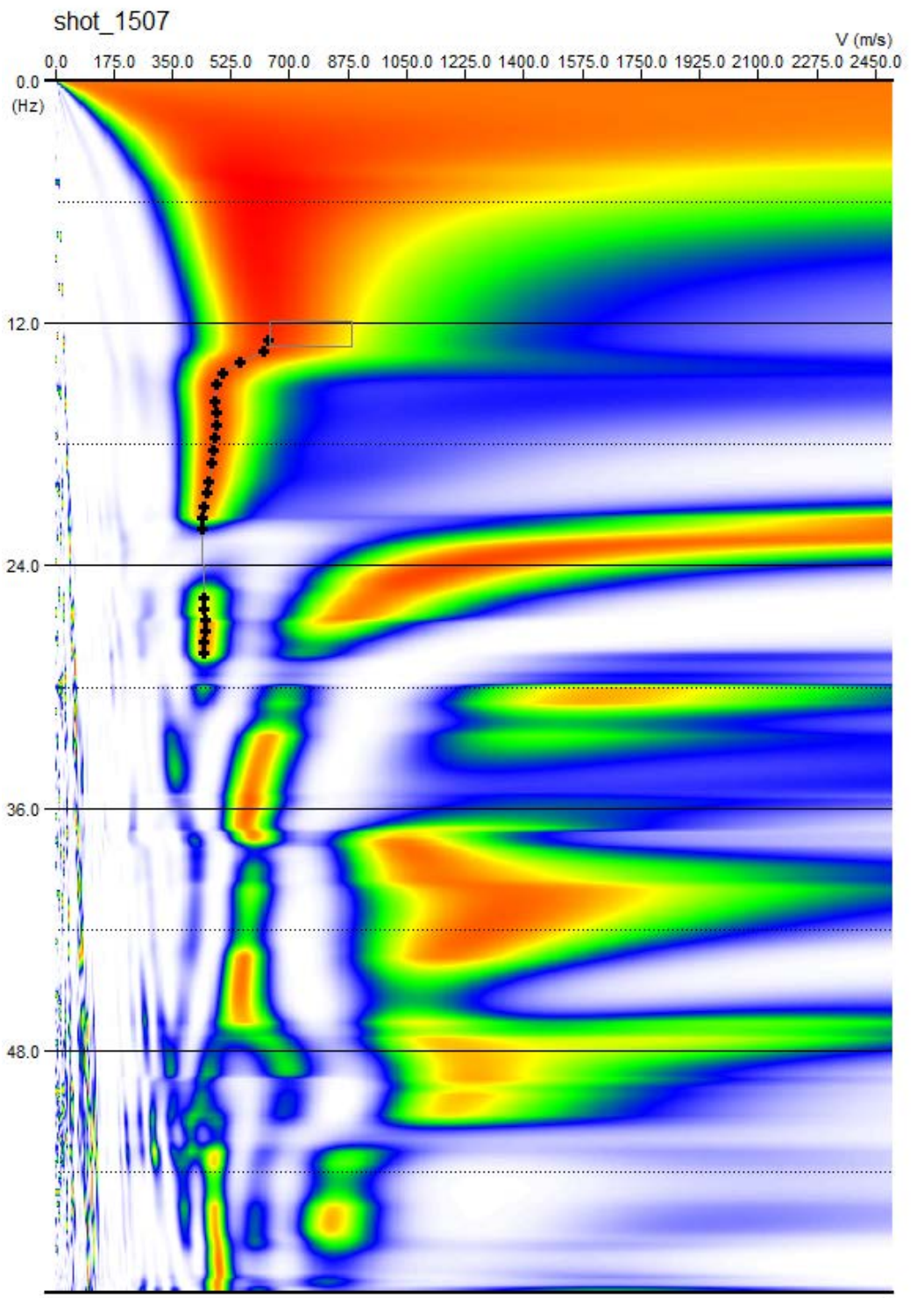

15.49 (Hz)

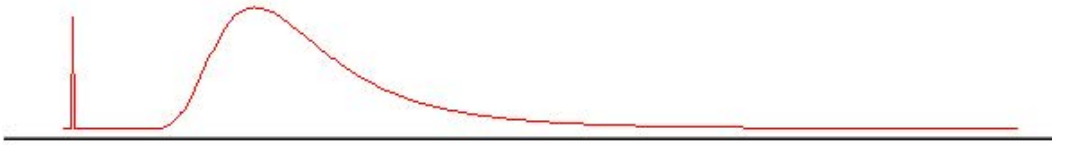

shot_1505
V (m/s)
0.0
175.0
350.0
525.0
700.0
875.0
1050.0
1225.0
1400.0
1575.0
1750.0
1925.0
2100.0
2275.0
2450.0
0.0
(Hz)
12.0
24.0
36.0
48.0

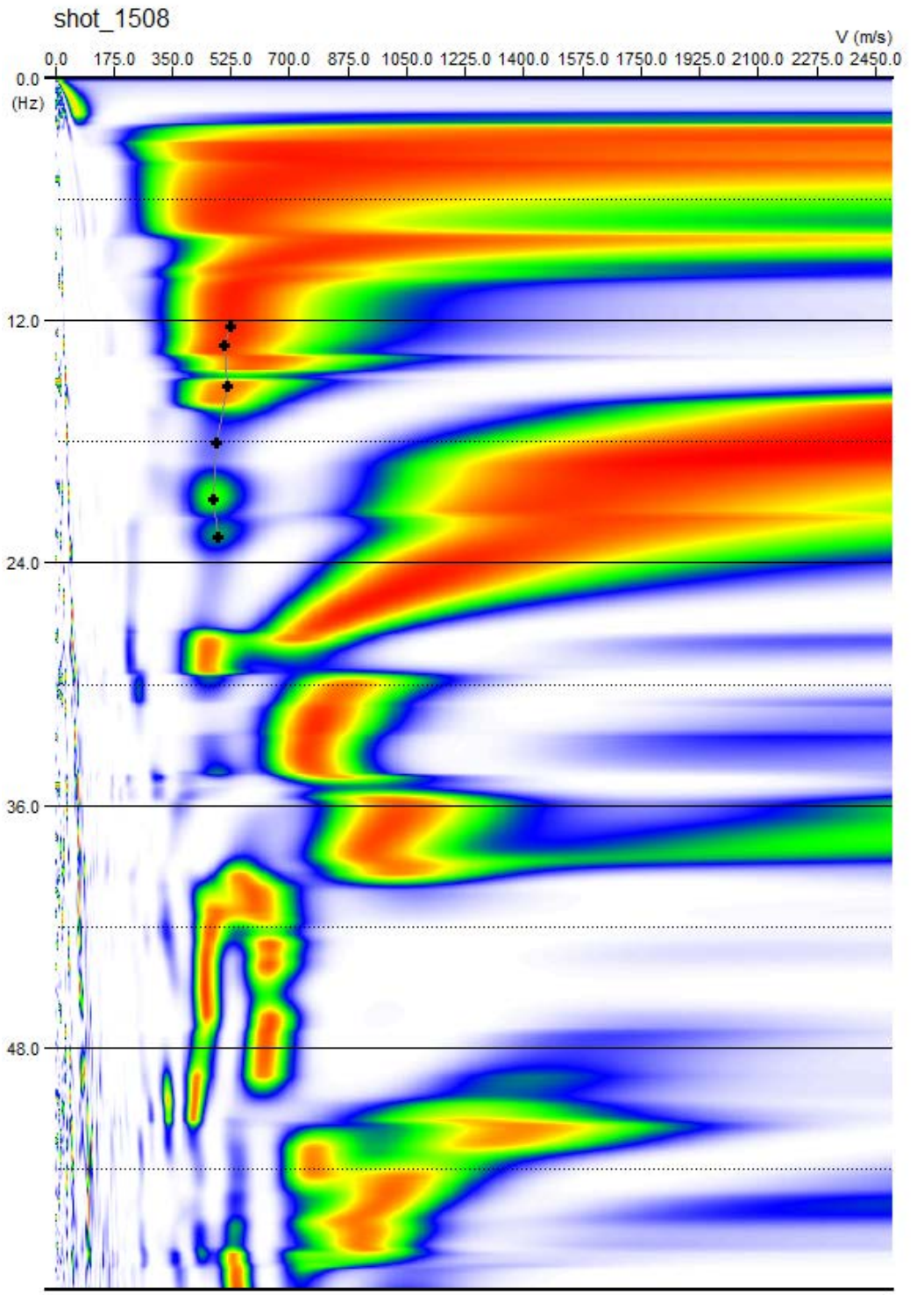

15.64 (Hz)

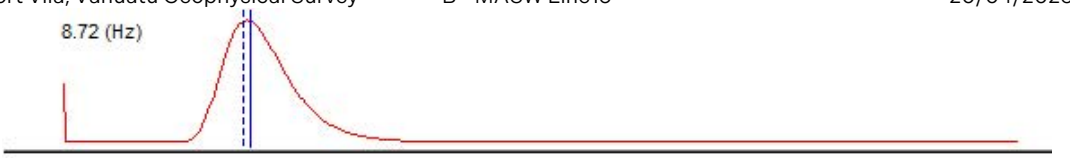

shot_1506
V (m/s)
0.0 175.0 350.0 525.0 700.0 875.0 1050.0 1225.0 1400.0 1575.0 1750.0 1925.0 2100.0 2275.0 2450.0
0.0
(Hz)
12.0
24.0
36.0
48.0

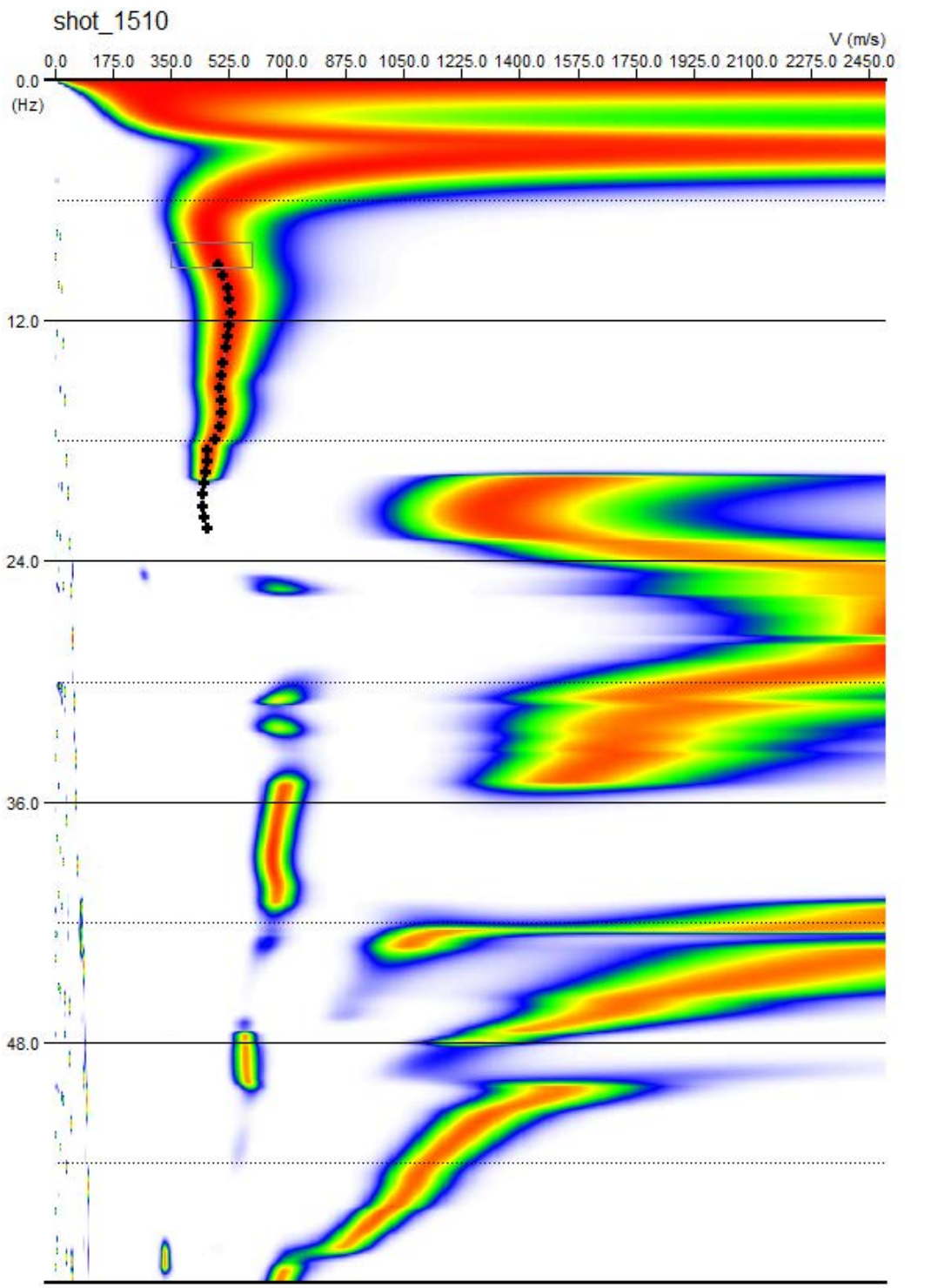

12.53 (Hz)

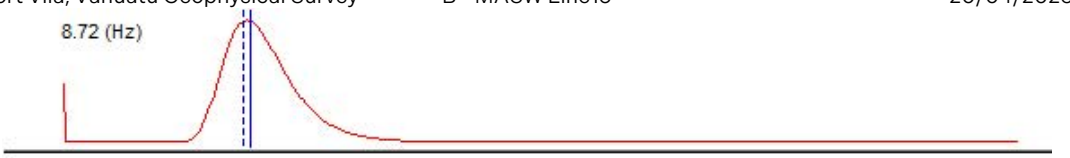

shot_1507
V (m/s)
0.0 175.0 350.0 525.0 700.0 875.0 1050.0 1225.0 1400.0 1575.0 1750.0 1925.0 2100.0 2275.0 2450.0
0.0
(Hz)
12.0
24.0
36.0
48.0

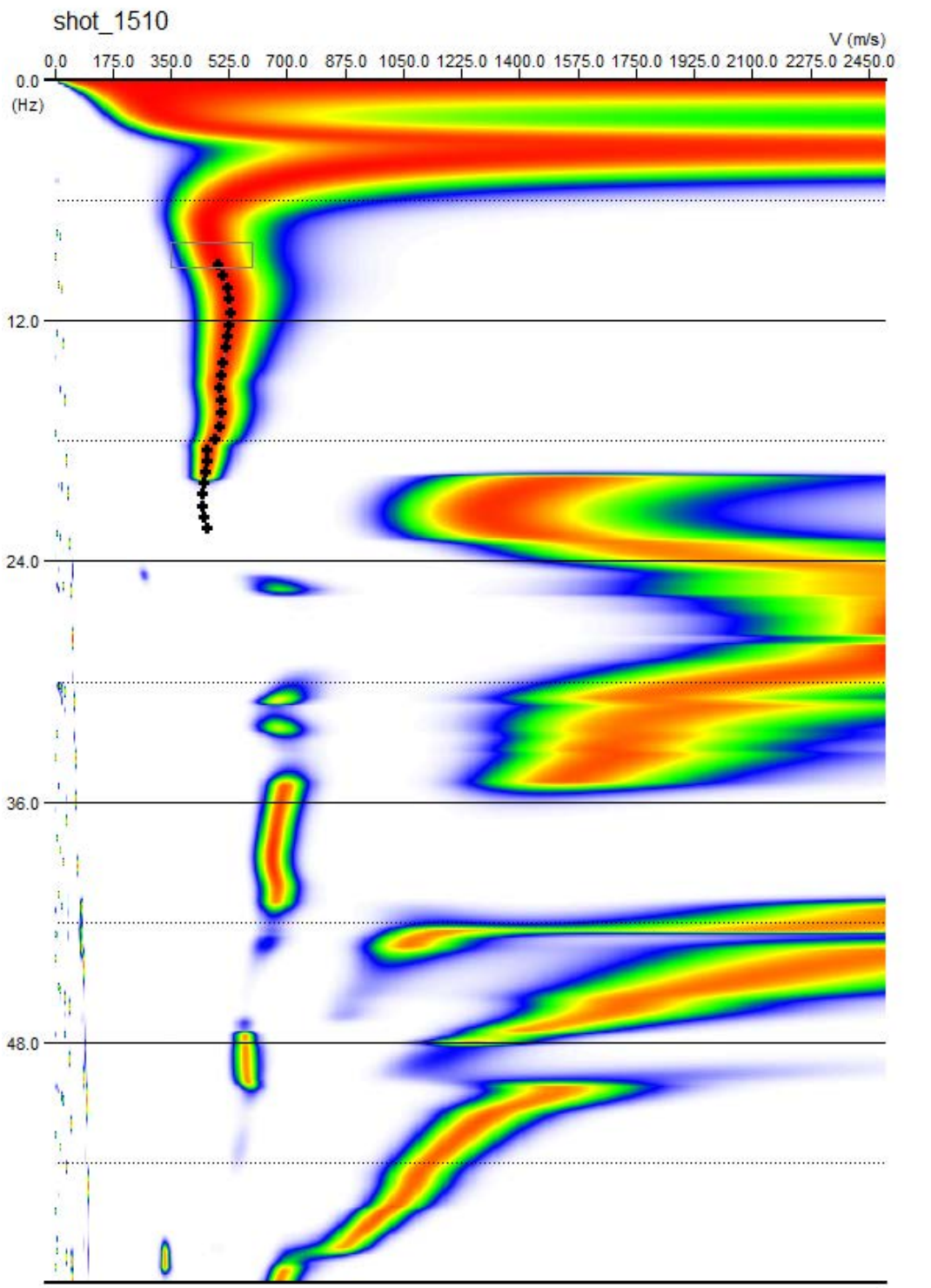


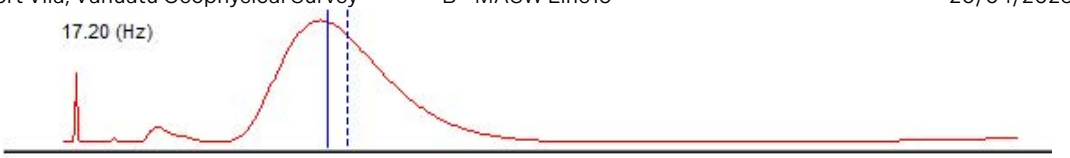

shot_1508
V (m/s)
0.0 175.0 350.0 525.0 700.0 875.0 1050.0 1225.0 1400.0 1575.0 1750.0 1925.0 2100.0 2275.0 2450.0
0.0
(Hz)
12.0
24.0
36.0
48.0

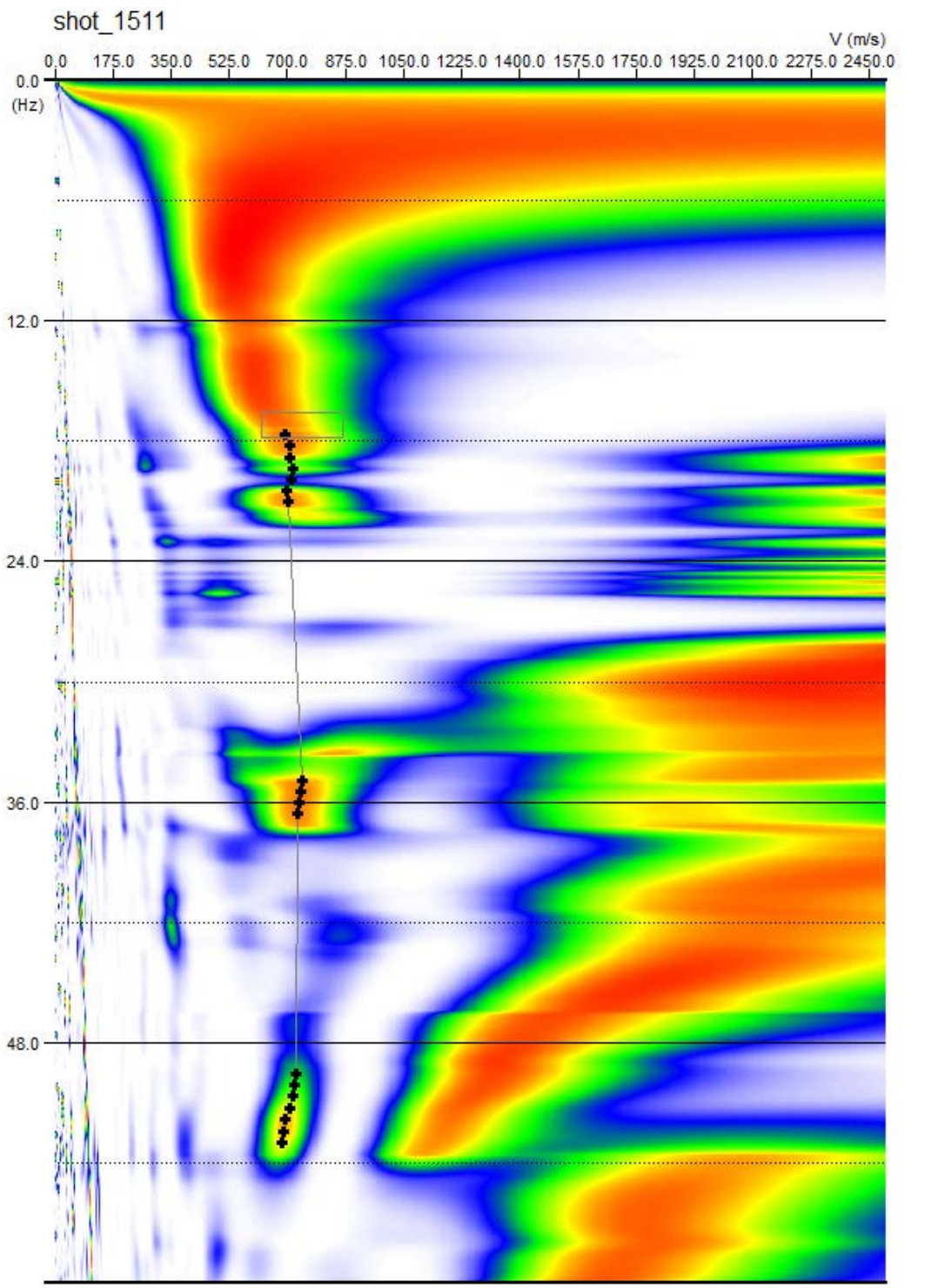

8.72 (Hz)


shot_1510
V (m/s)
0.0
175.0
350.0
525.0
700.0
875.0
1050.0
1225.0
1400.0
1575.0
1750.0
1925.0
2100.0
2275.0
2450.0
0.0
(Hz)
12.0
24.0
36.0
48.0

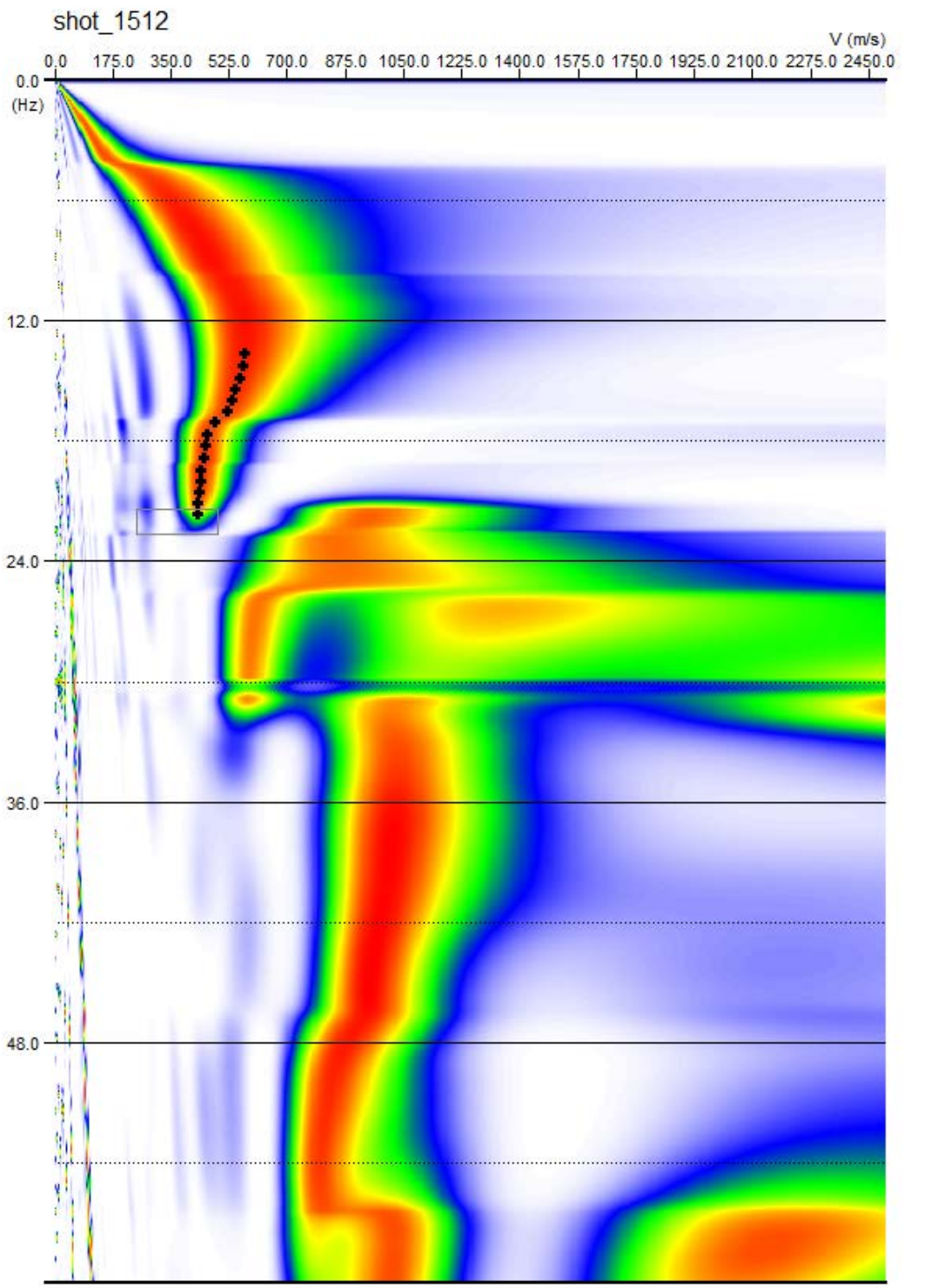

8.72 (Hz)

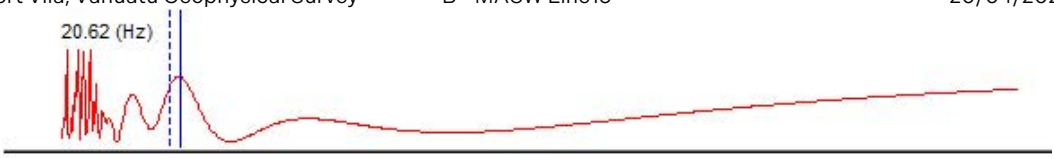

shot_1510
V (m/s)
0.0
175.0
350.0
525.0
700.0
875.0
1050.0
1225.0
1400.0
1575.0
1750.0
1925.0
2100.0
2275.0
2450.0
0.0
(Hz)
12.0
24.0
36.0
48.0

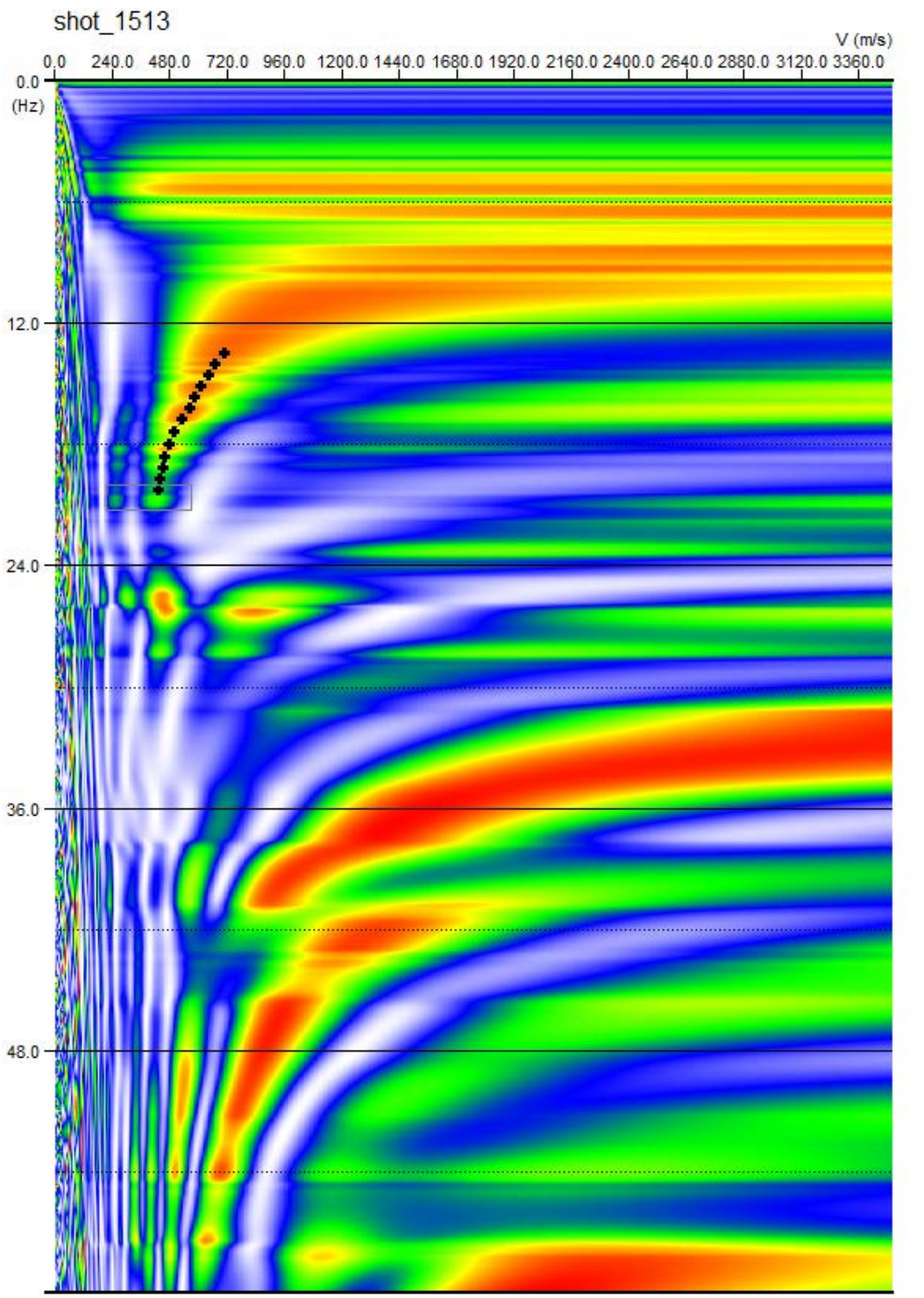

17.20 (Hz)

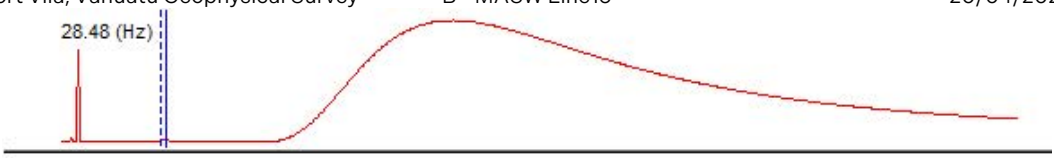

shot_1511
V (m/s)
0.0 175.0 350.0 525.0 700.0 875.0 1050.0 1225.0 1400.0 1575.0 1750.0 1925.0 2100.0 2275.0 2450.0
0.0
(Hz)
12.0
24.0
36.0
48.0

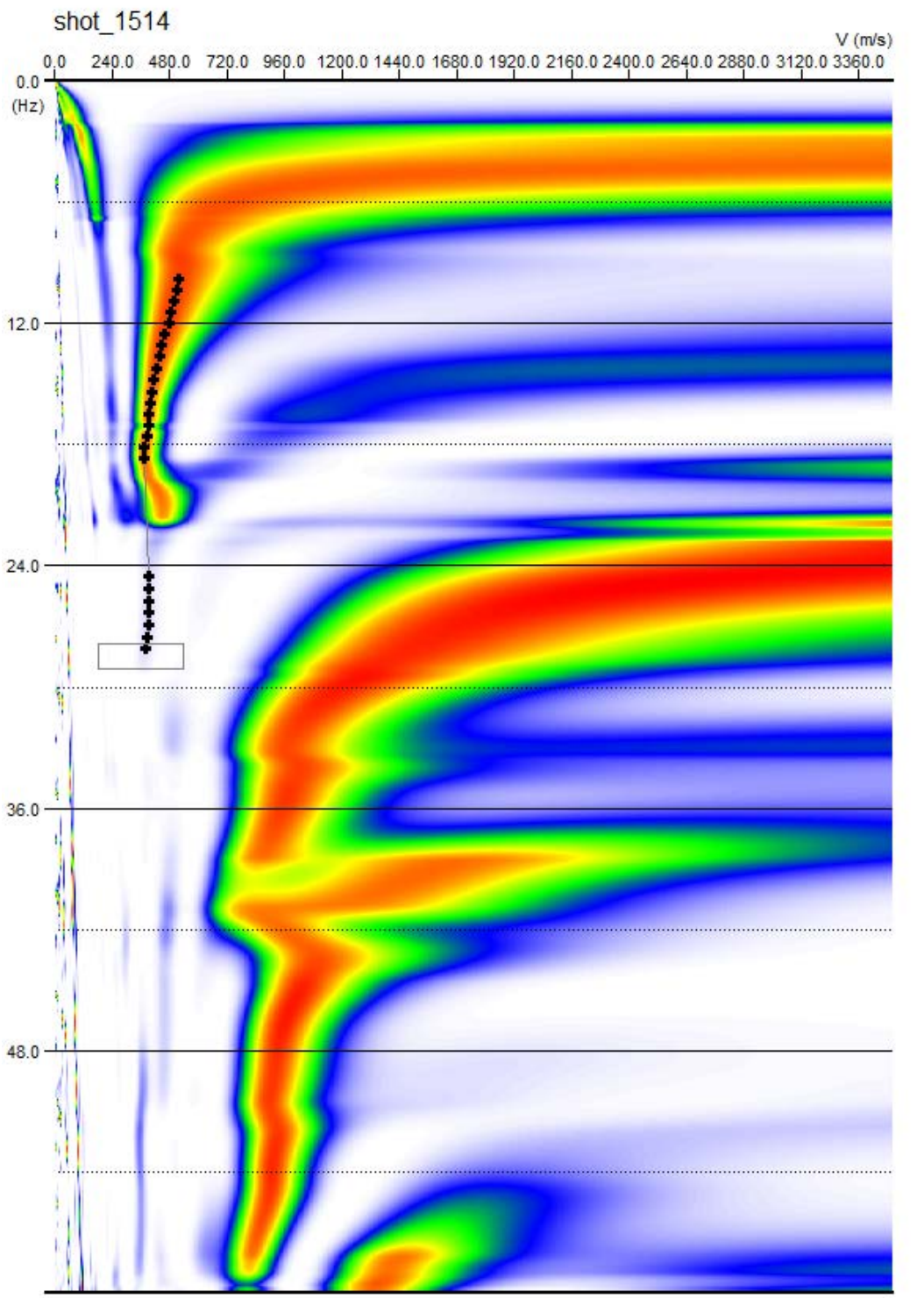

22.02 (Hz)

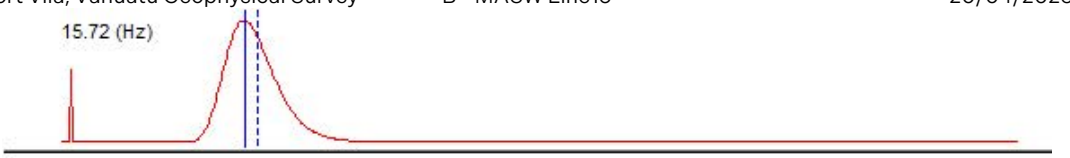

shot_1512
V (m/s)
0.0 175.0 350.0 525.0 700.0 875.0 1050.0 1225.0 1400.0 1575.0 1750.0 1925.0 2100.0 2275.0 2450.0
0.0
(Hz)
12.0
24.0
36.0
48.0

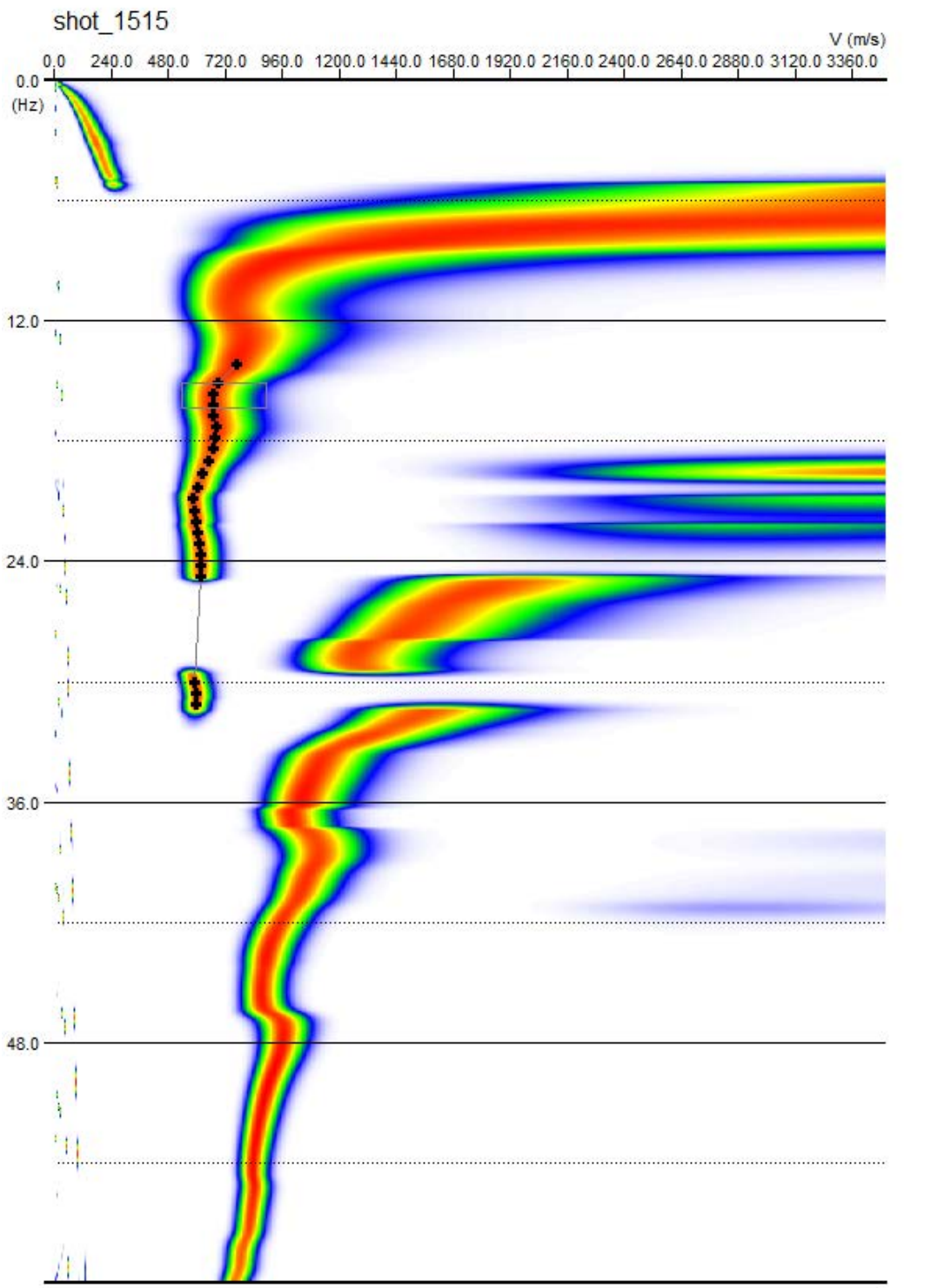

20.62 (Hz)

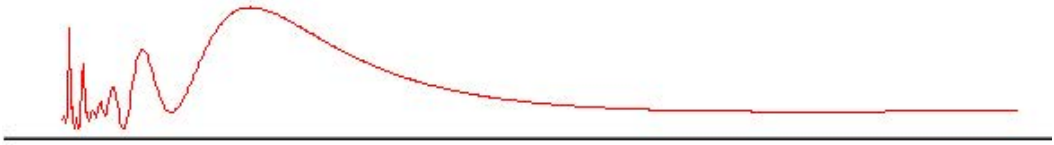

shot_1513
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

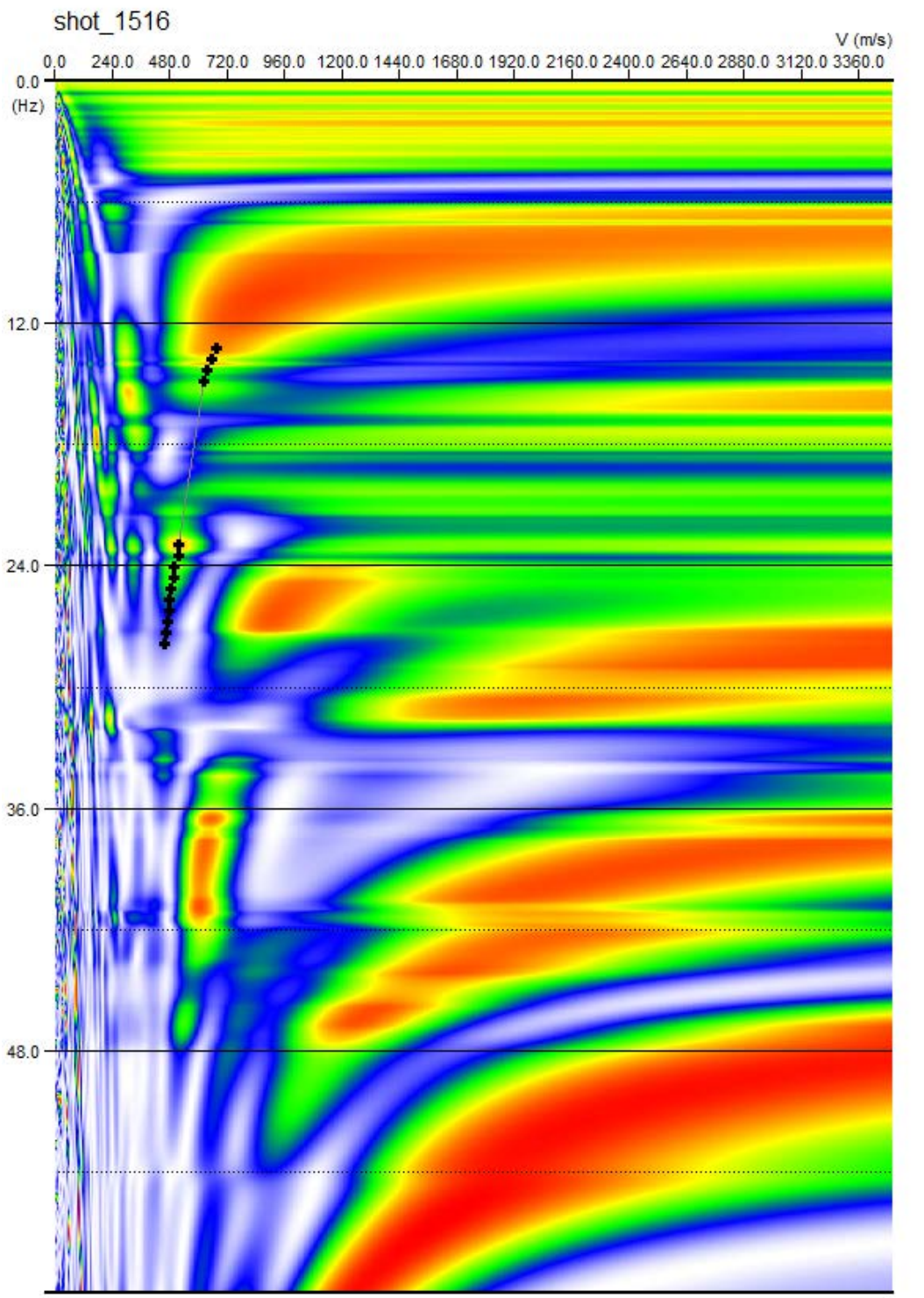

28.48 (Hz)

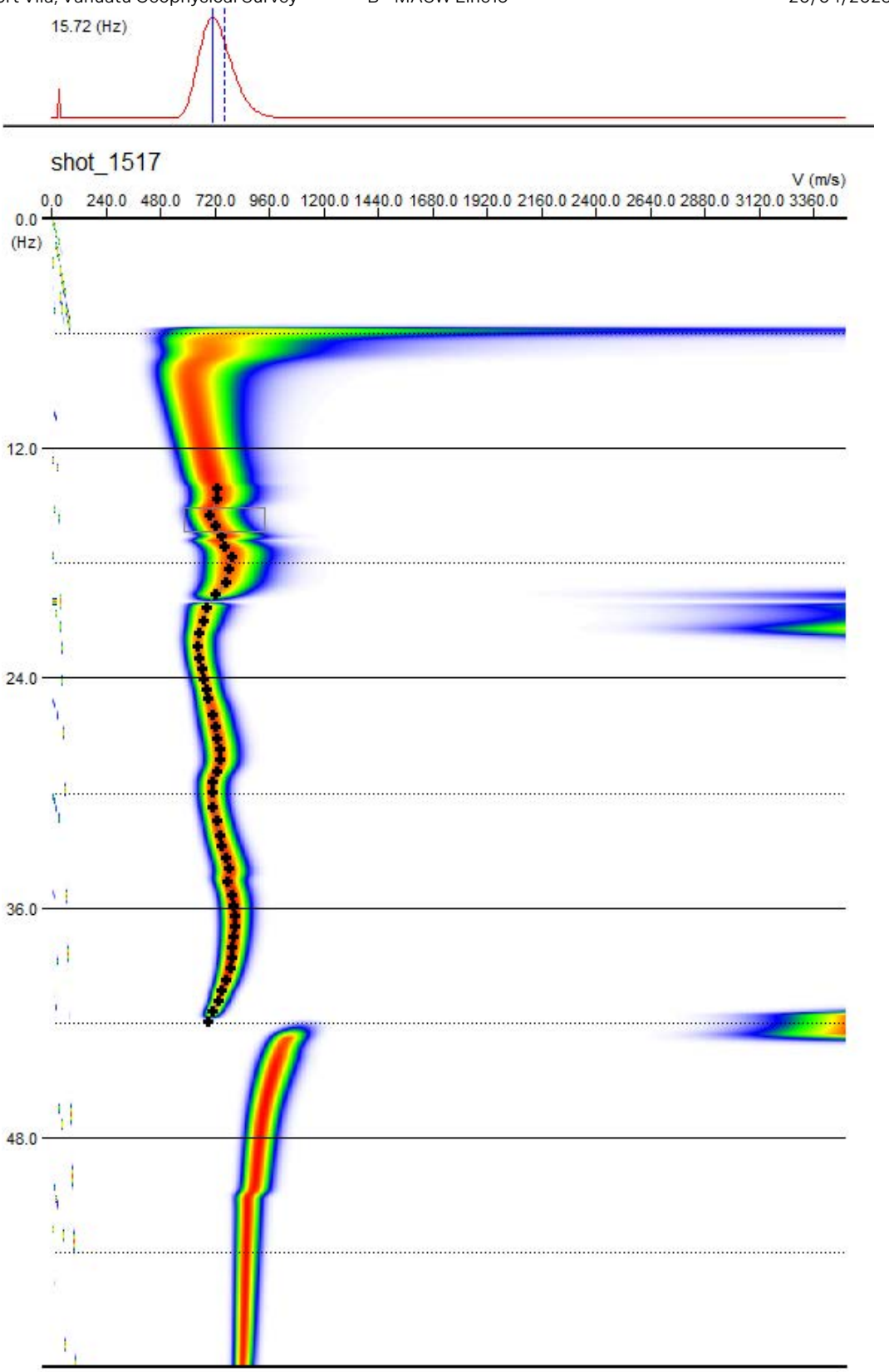

shot_1514
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

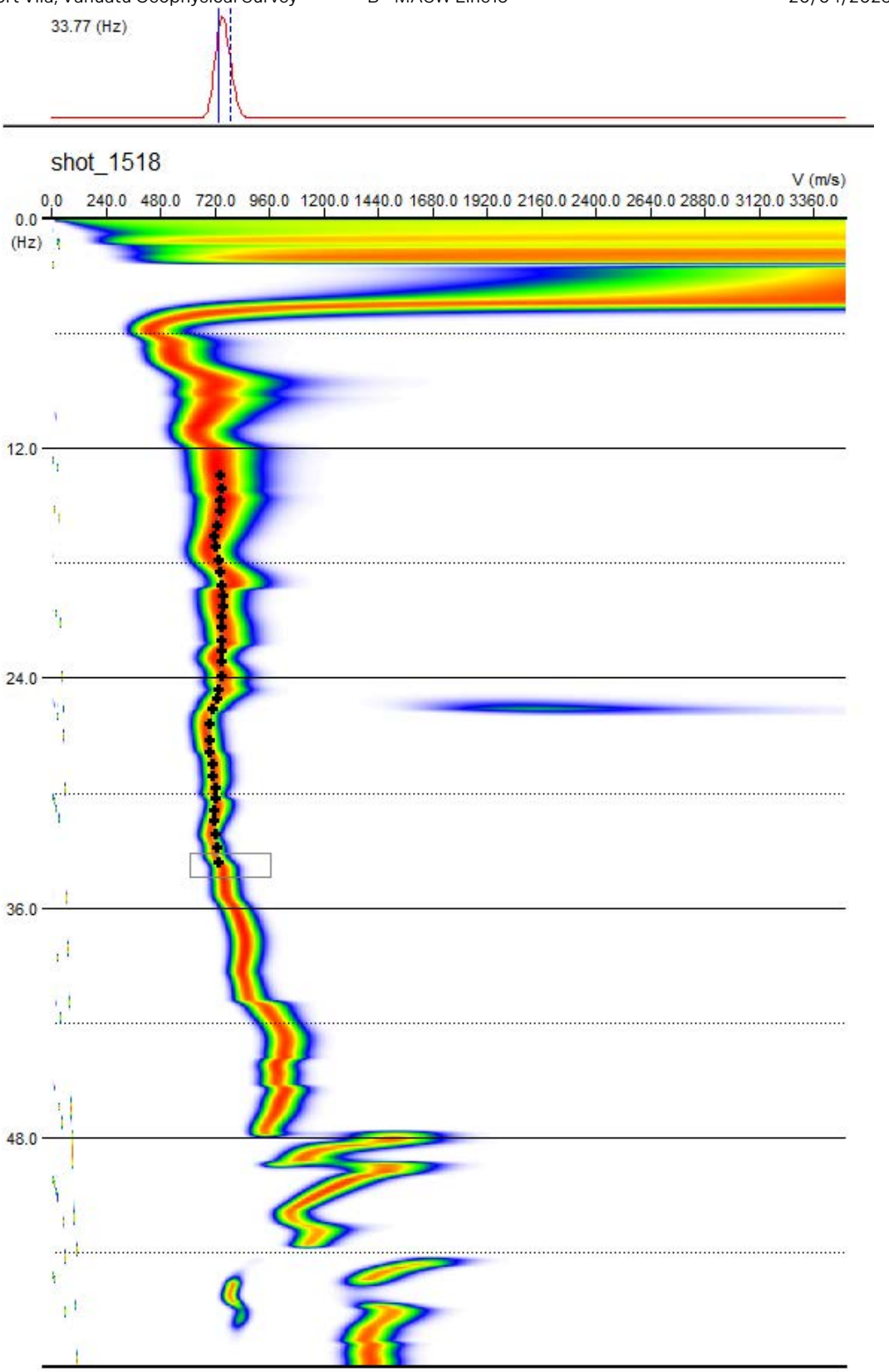

15.72 (Hz)

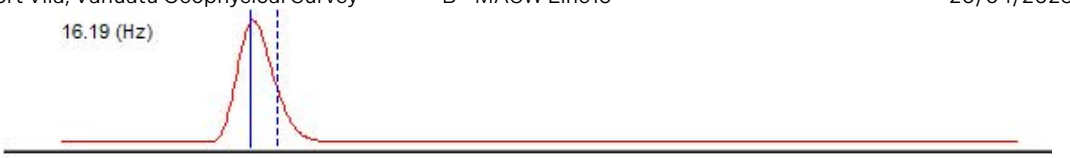

shot_1515
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

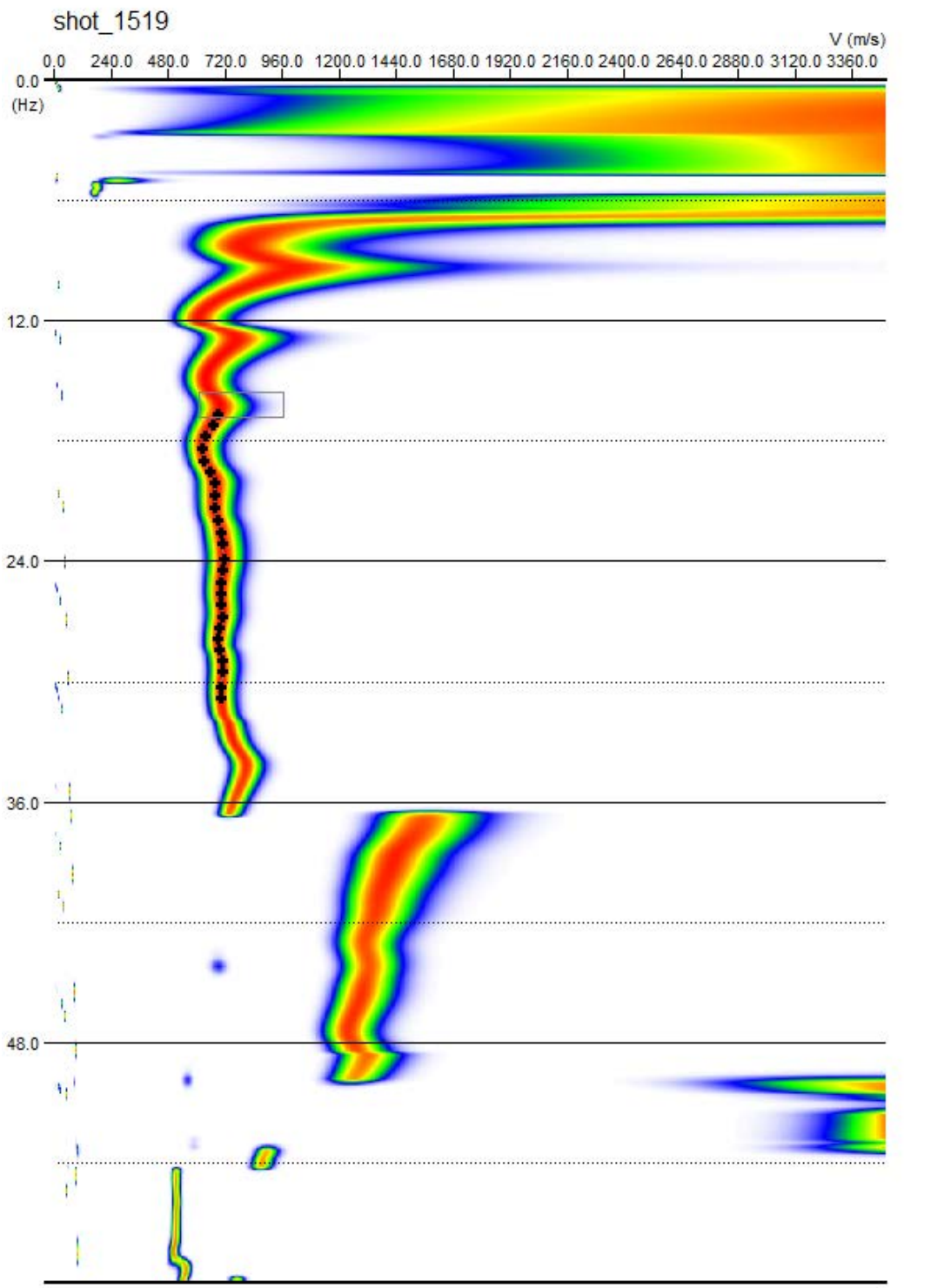


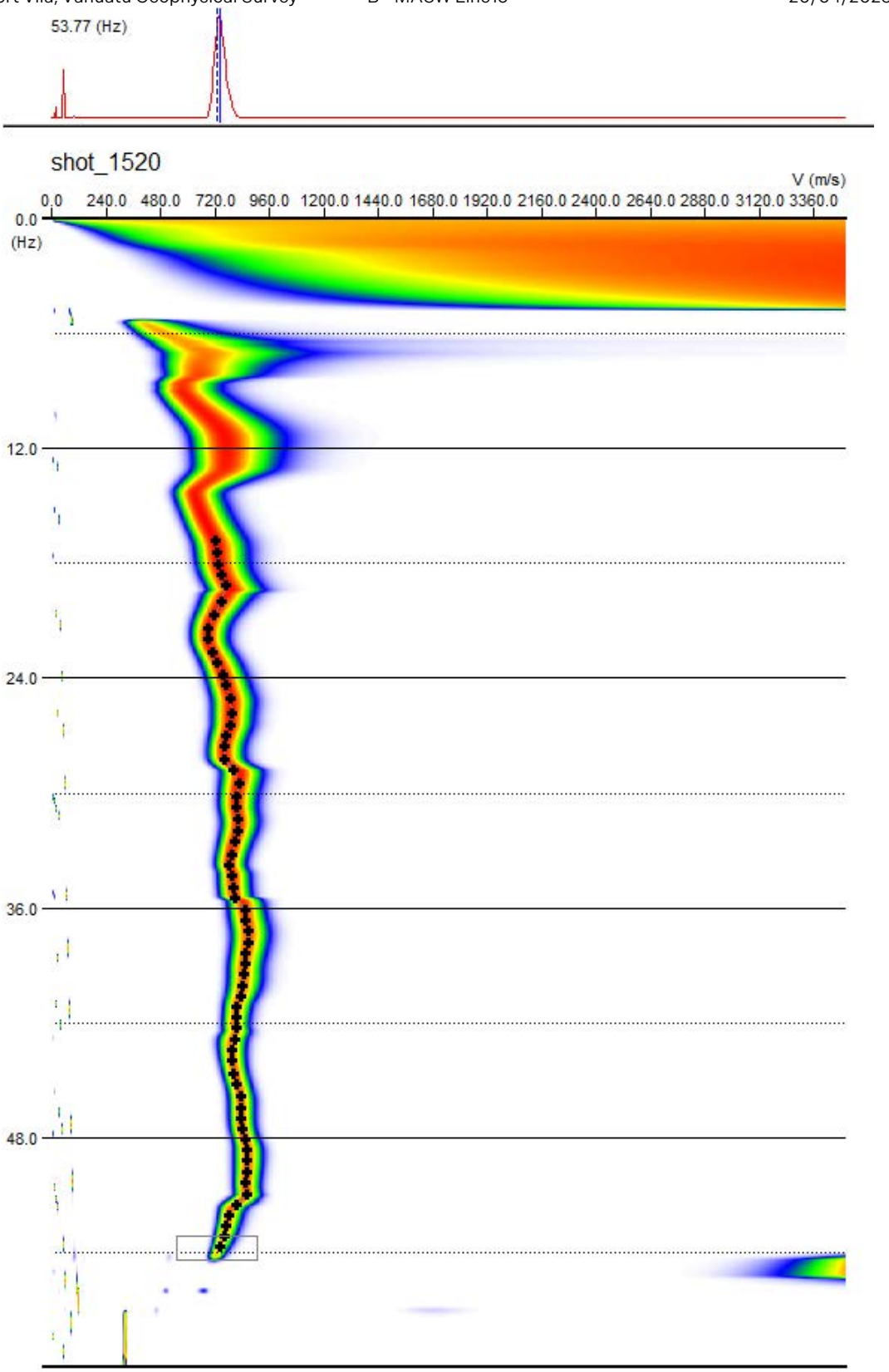

shot_1516
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

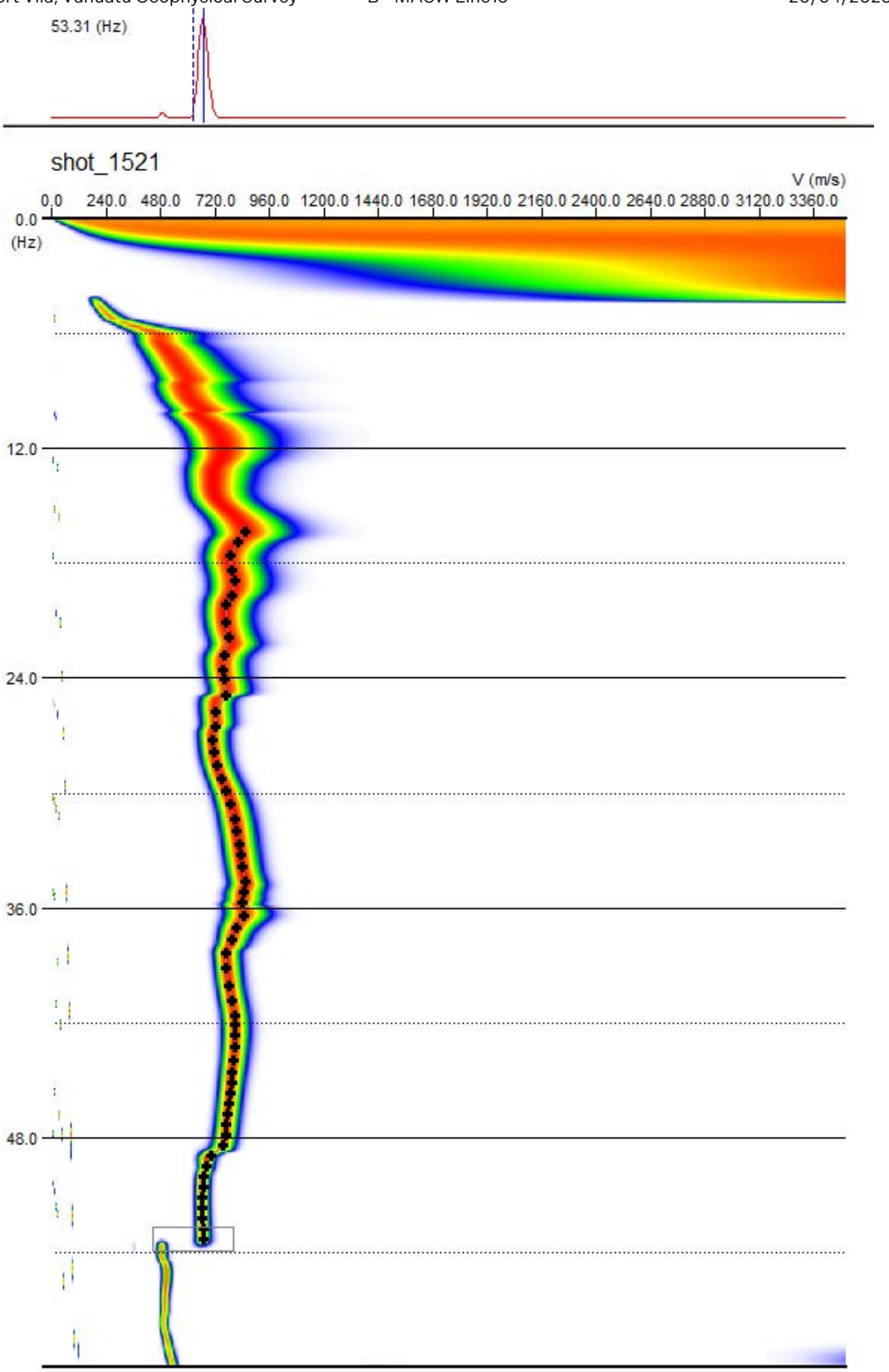

15.72 (Hz)
shot_1517
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

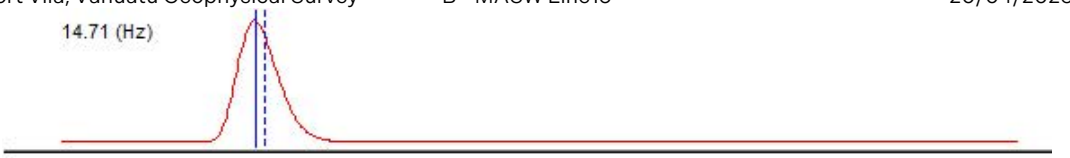

33.77 (Hz)
shot_1518
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

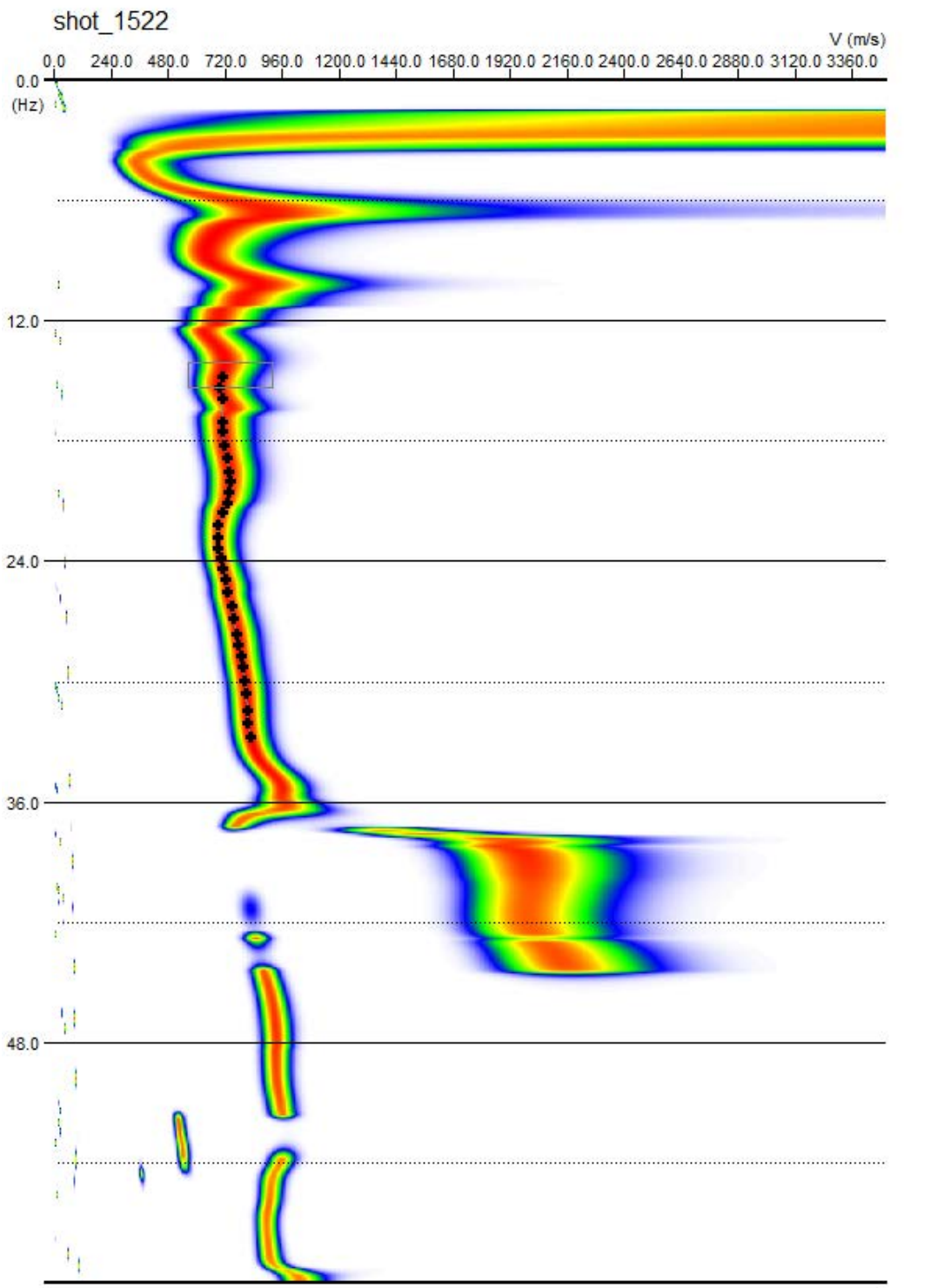

16.19 (Hz)


shot_1519
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

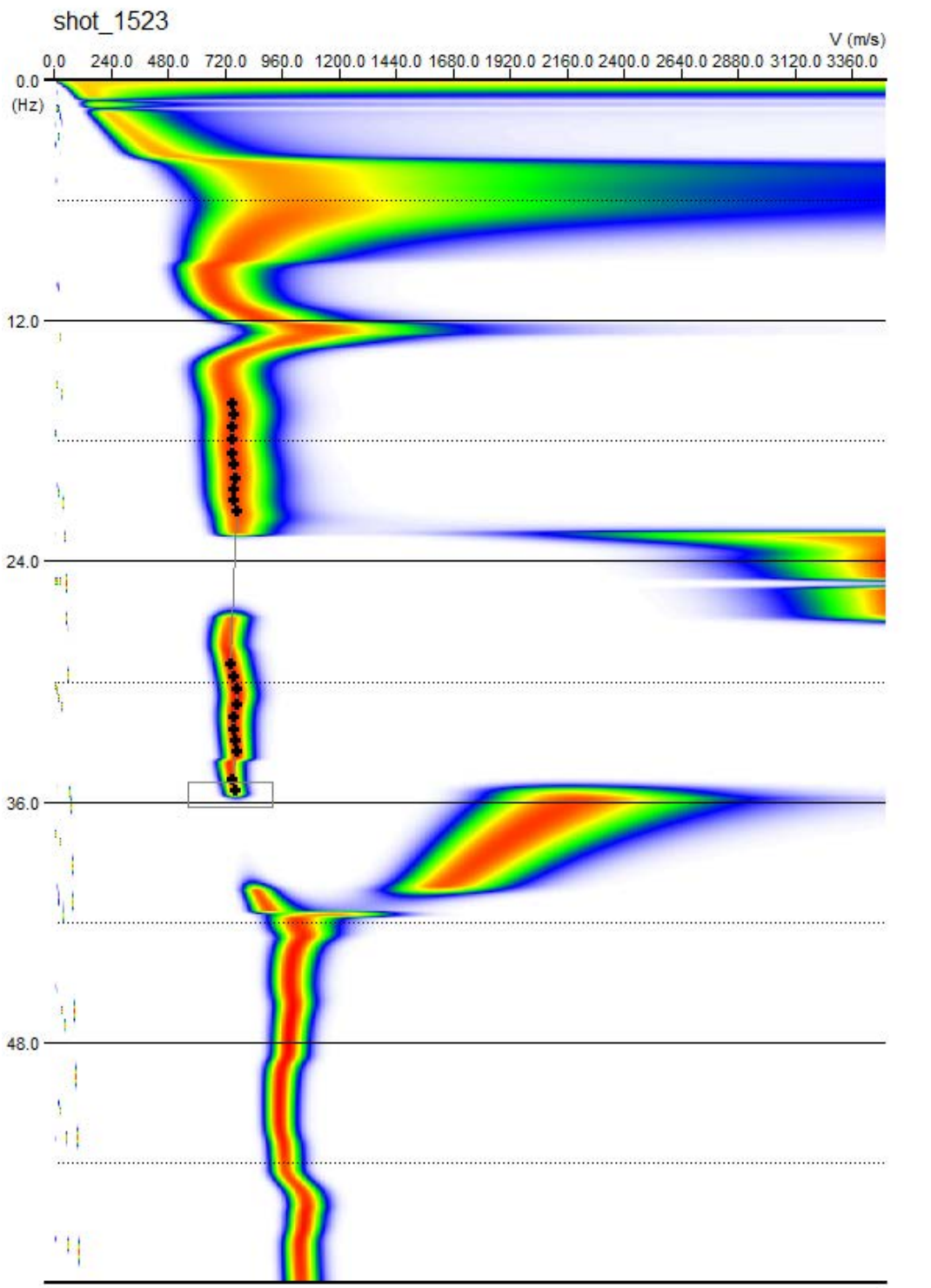

53.77 (Hz)
shot_1520
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

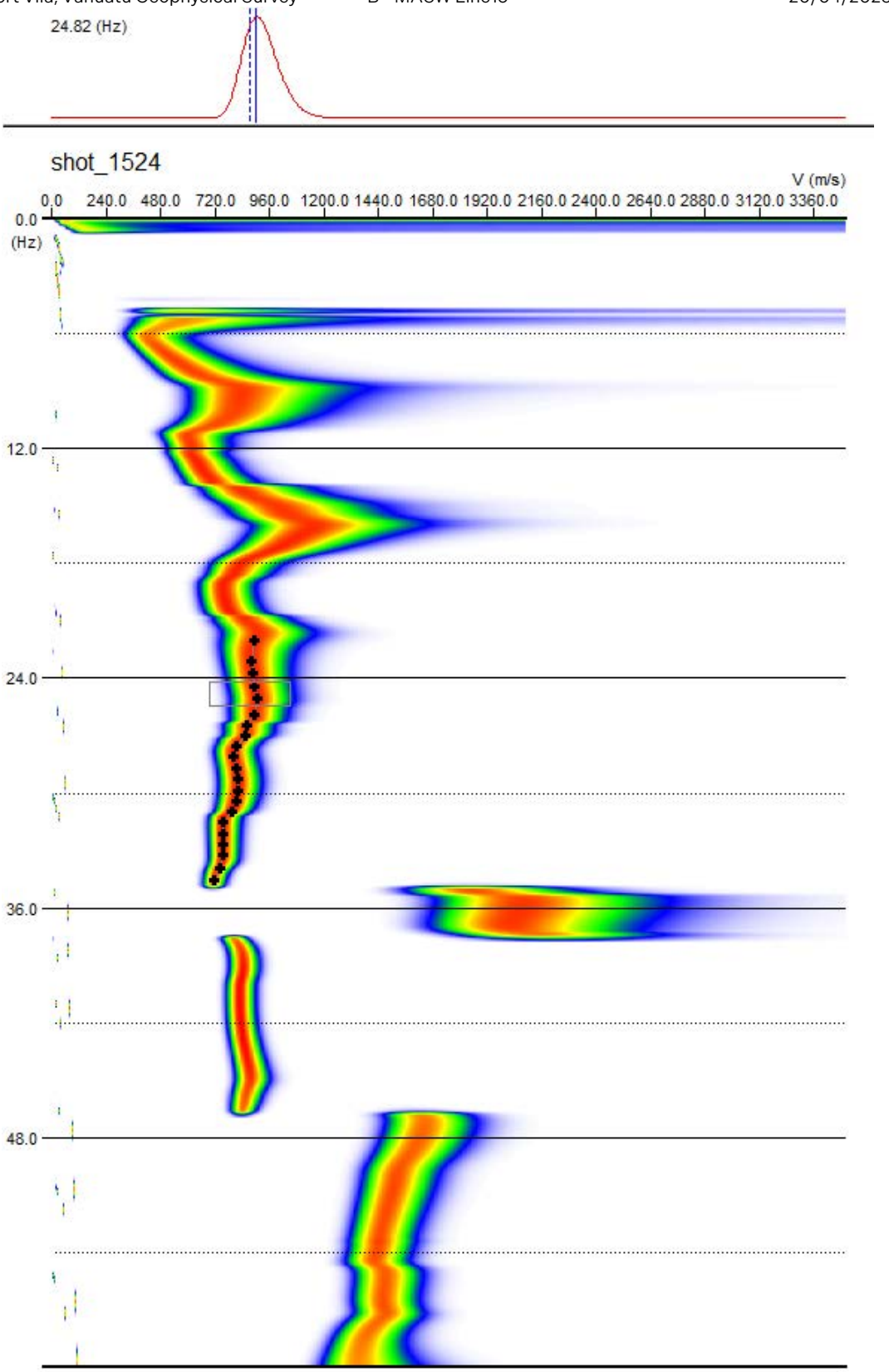

53.31 (Hz)
shot_1521
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

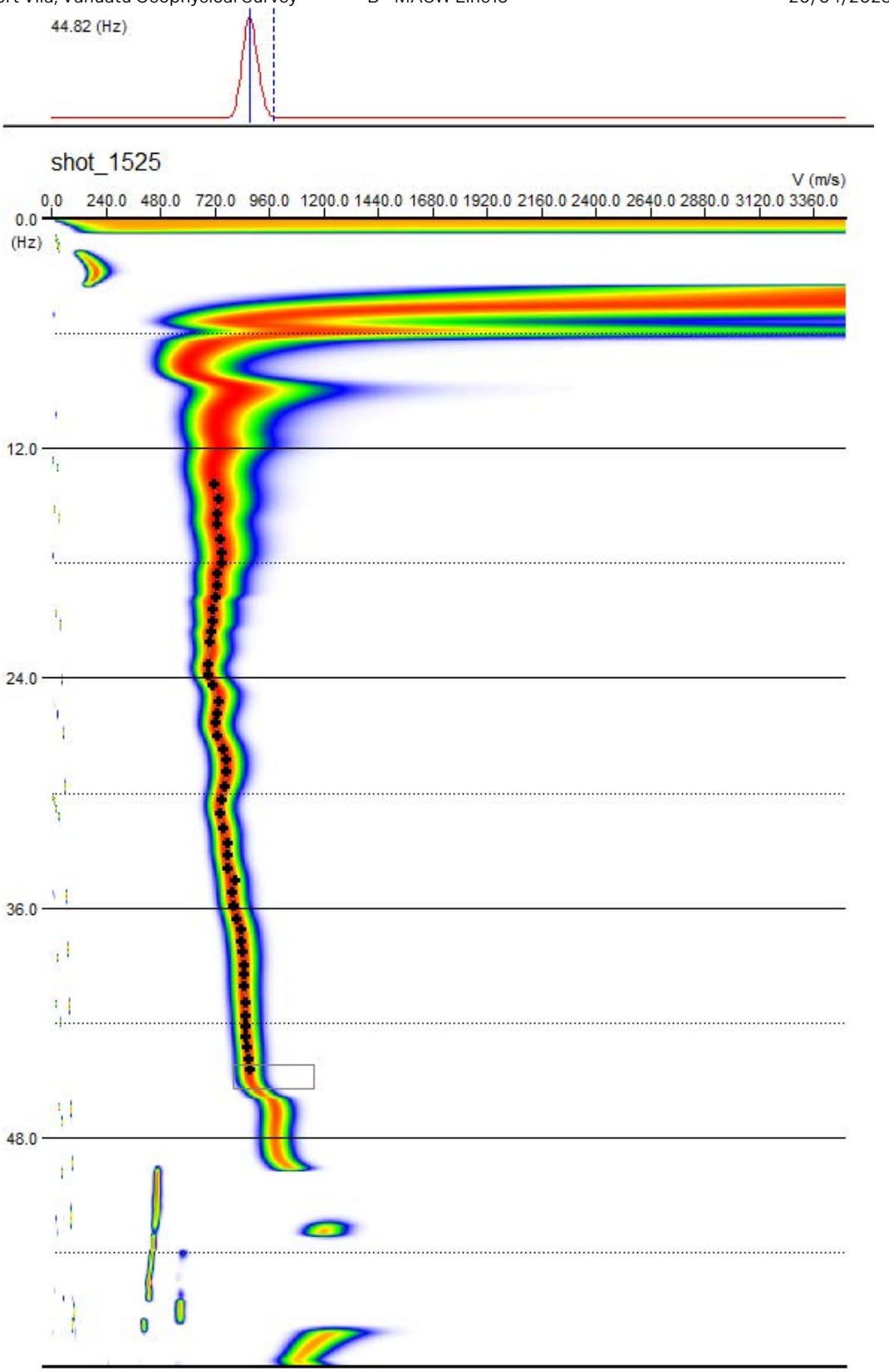

14.71 (Hz)

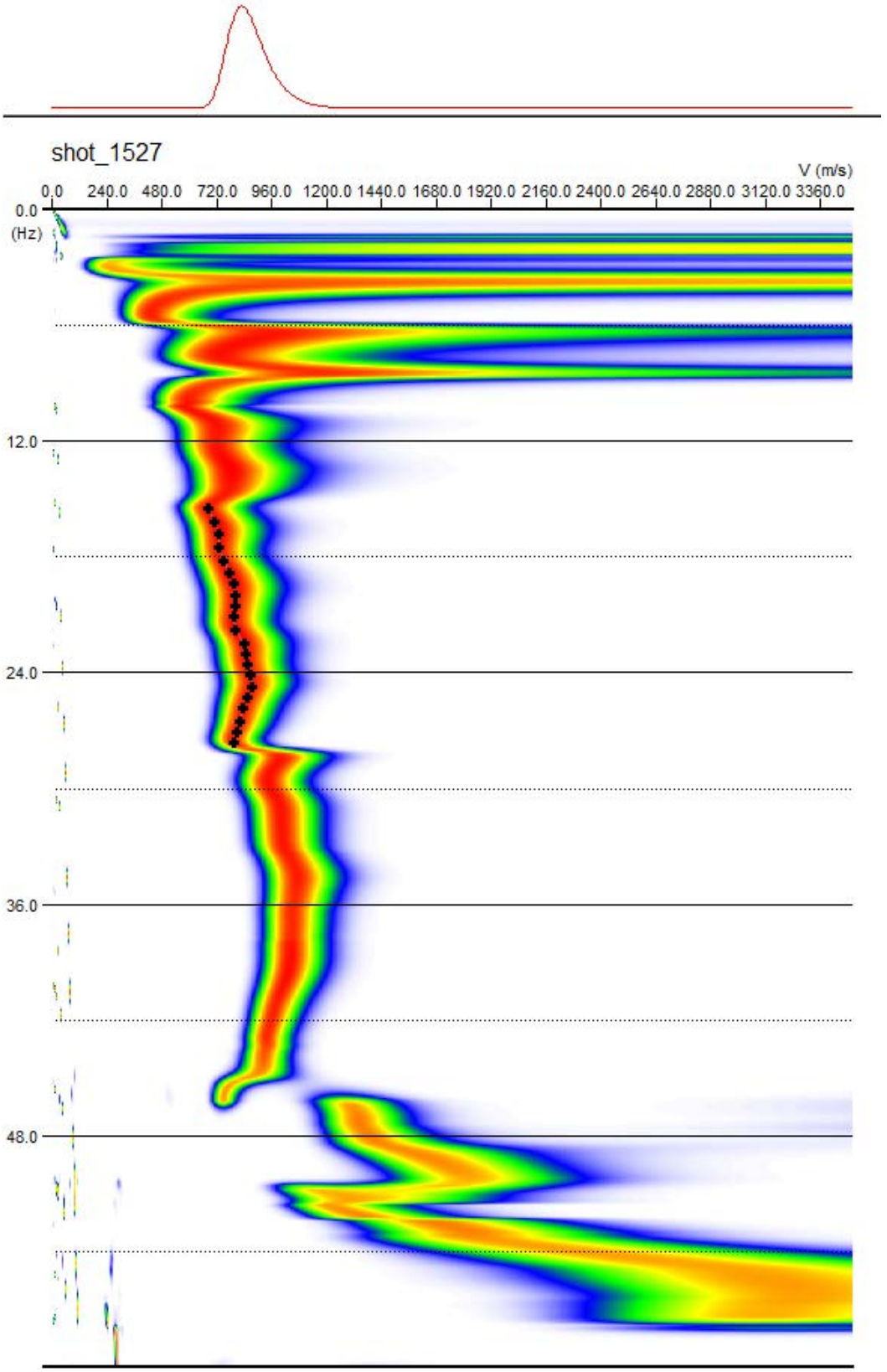

shot_1522
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

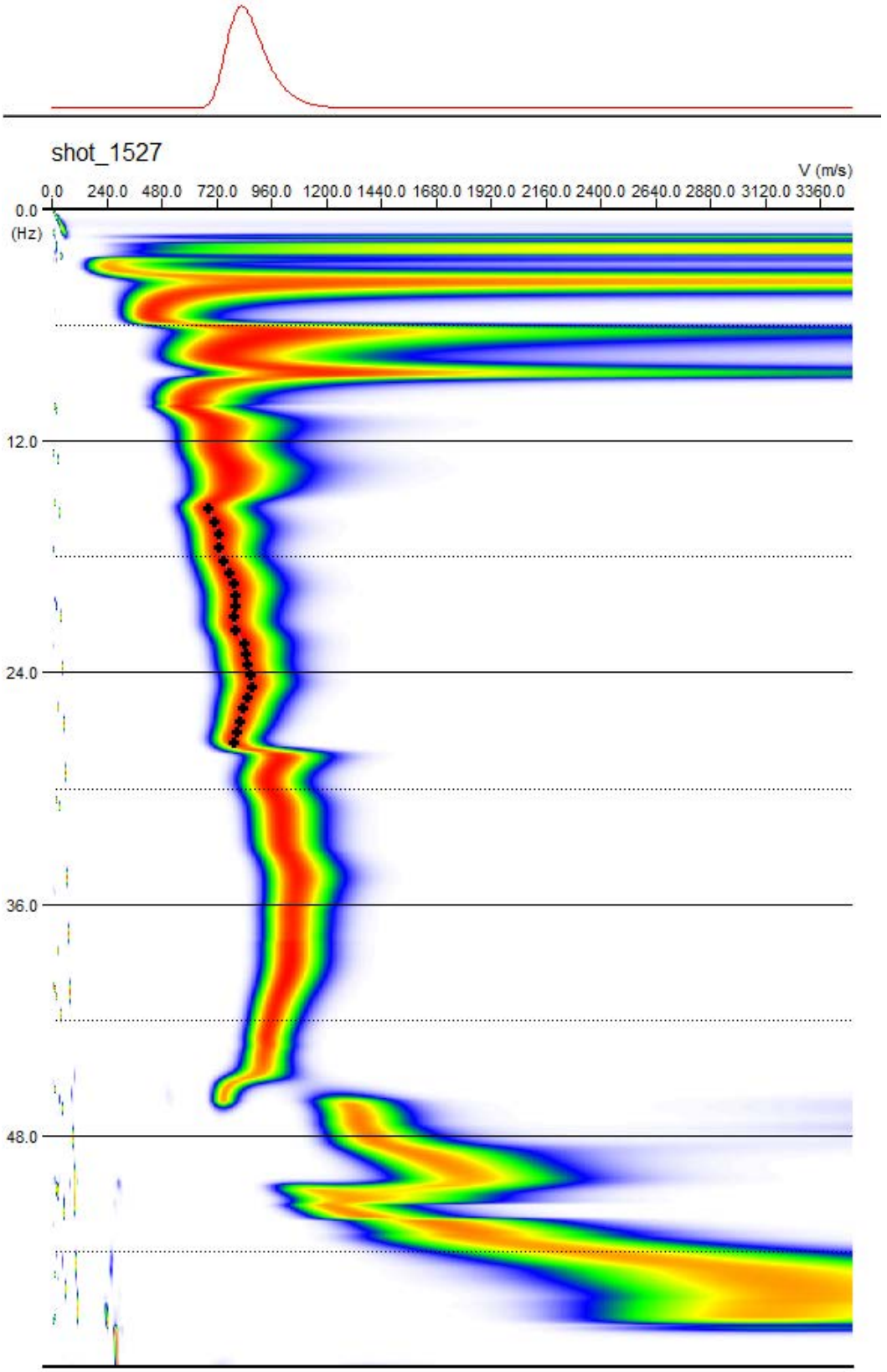

35.64 (Hz)


shot_1523
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

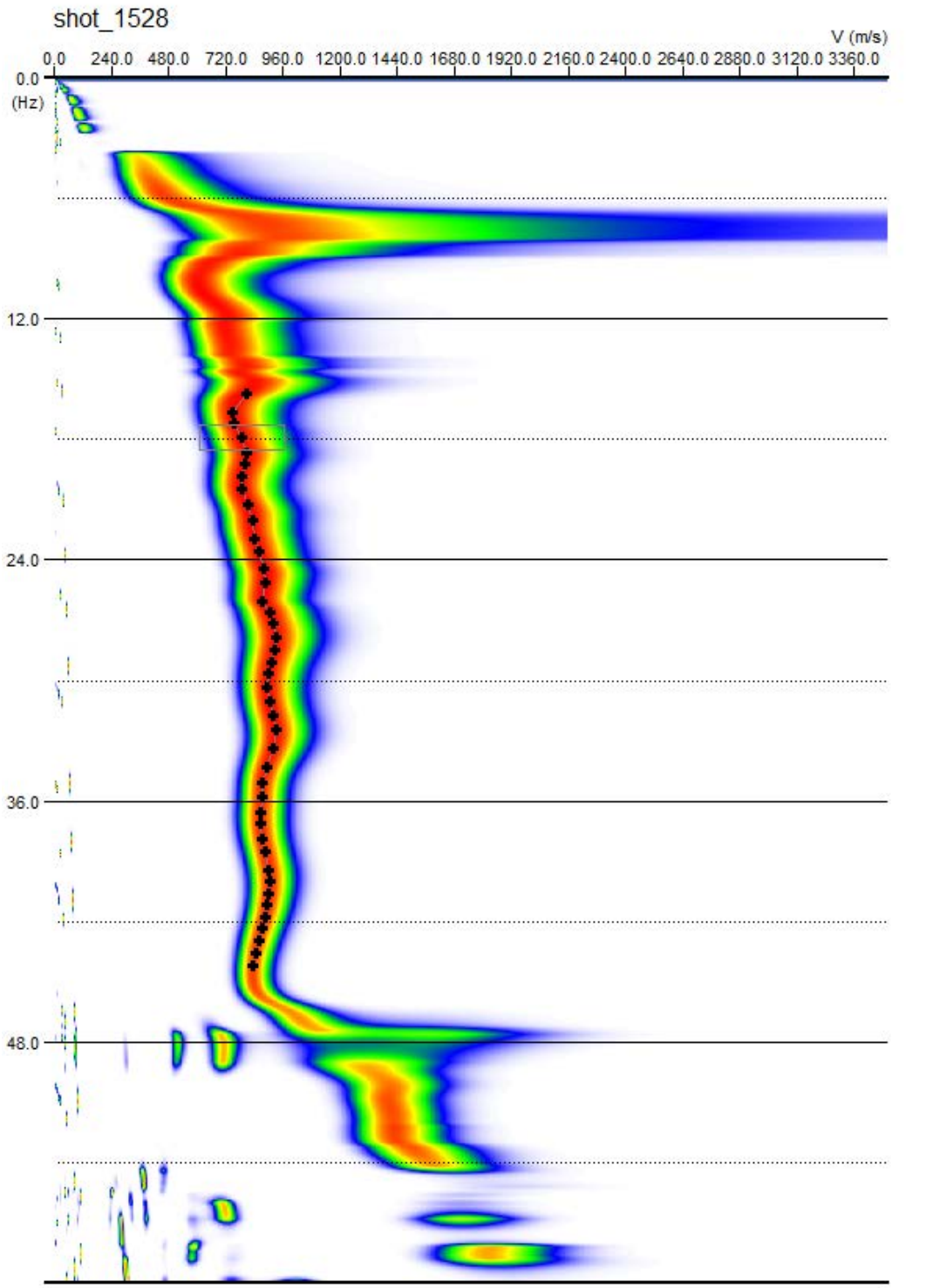

24.82 (Hz)
shot_1524
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

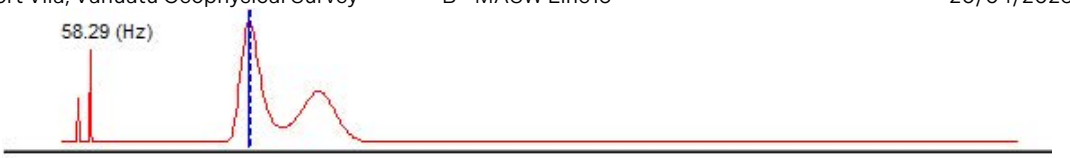

44.82 (Hz)
shot_1525
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

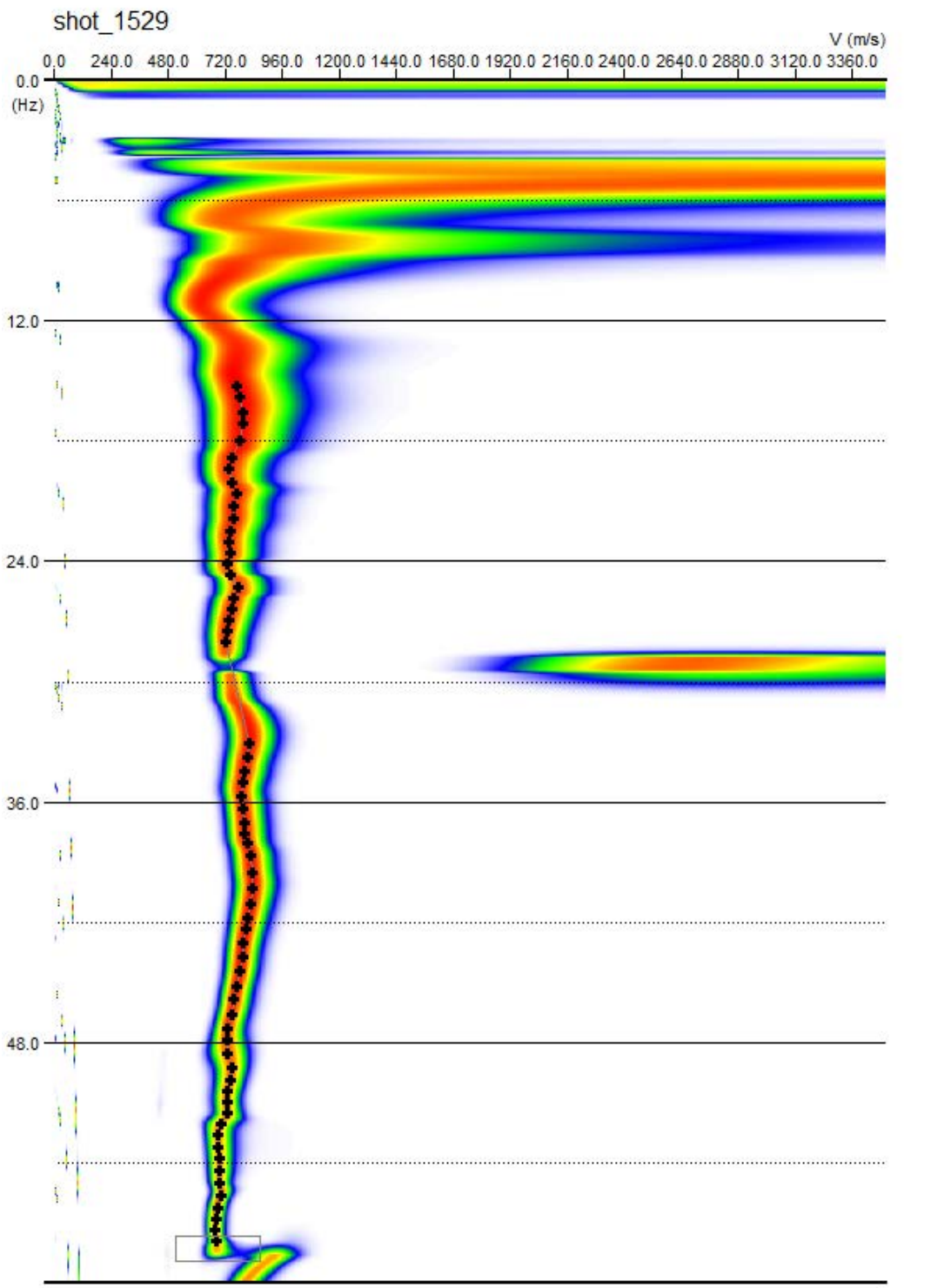

shot_1527
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

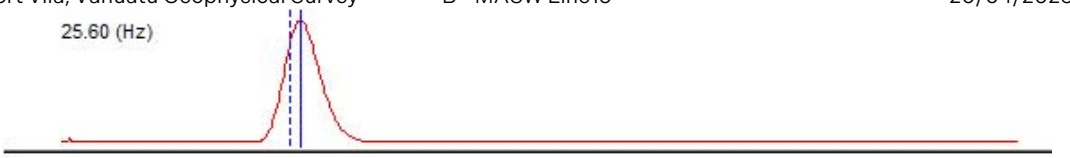

shot_1527
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

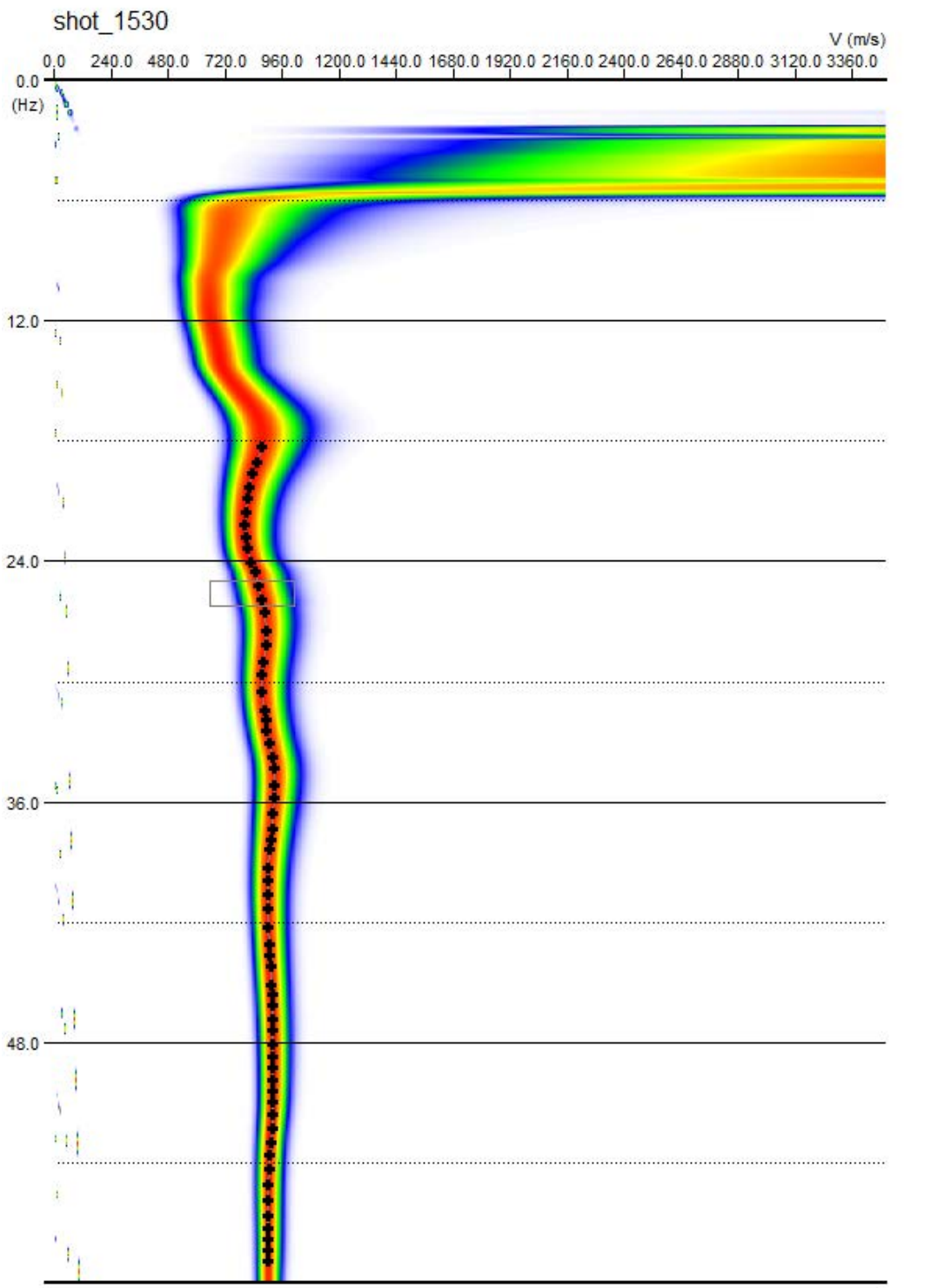

17.90 (Hz)

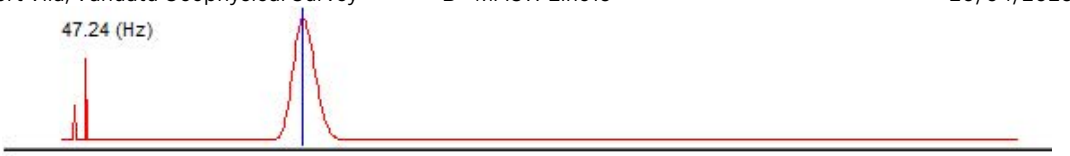

shot_1528
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

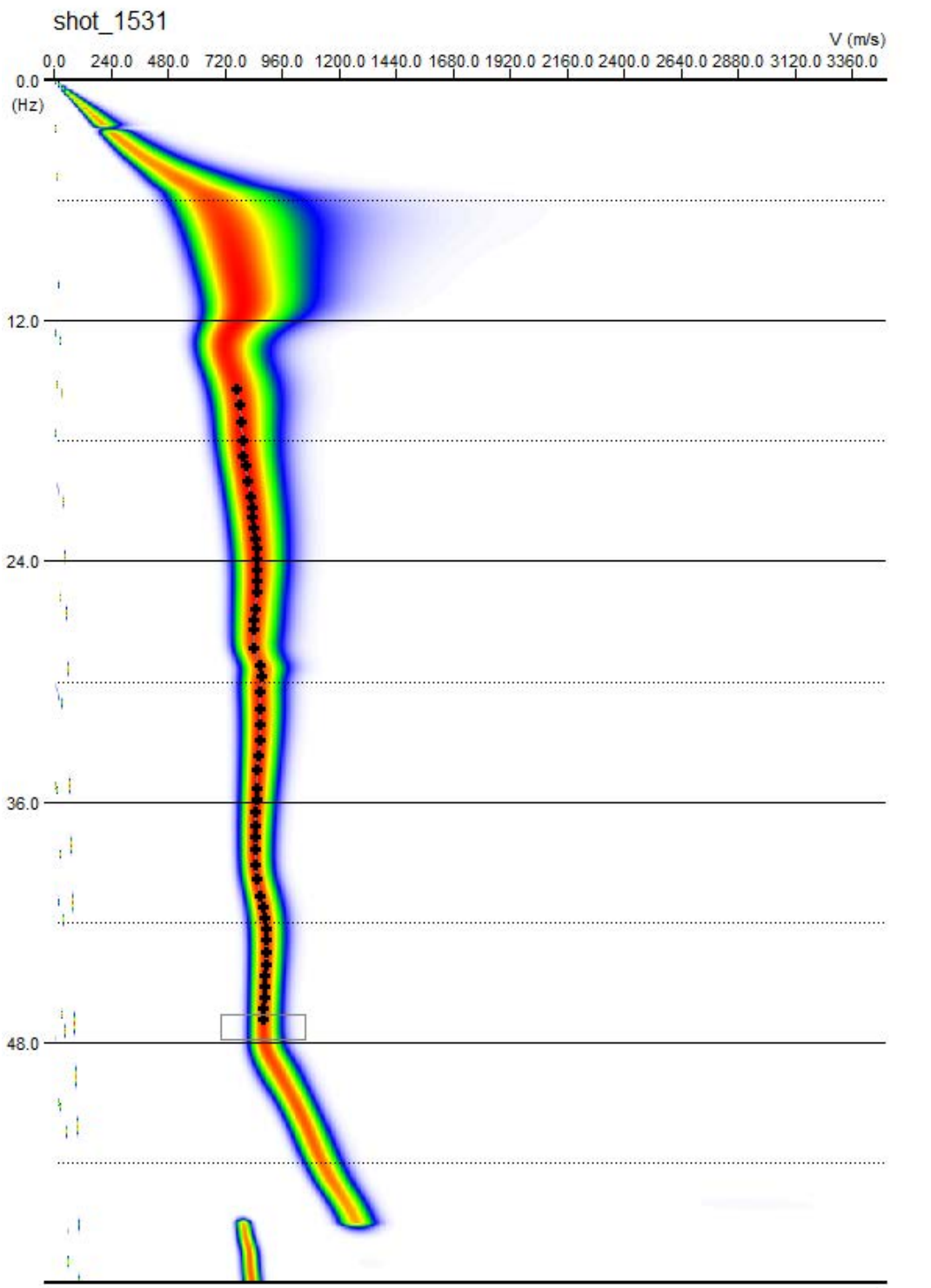

58.29 (Hz)

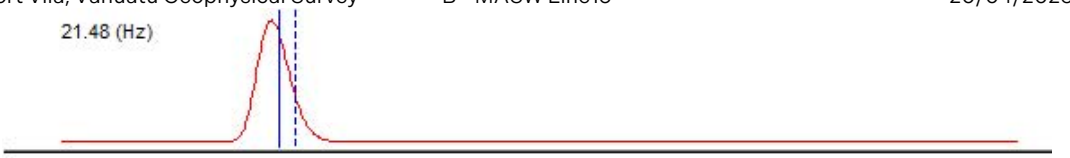

shot_1529
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

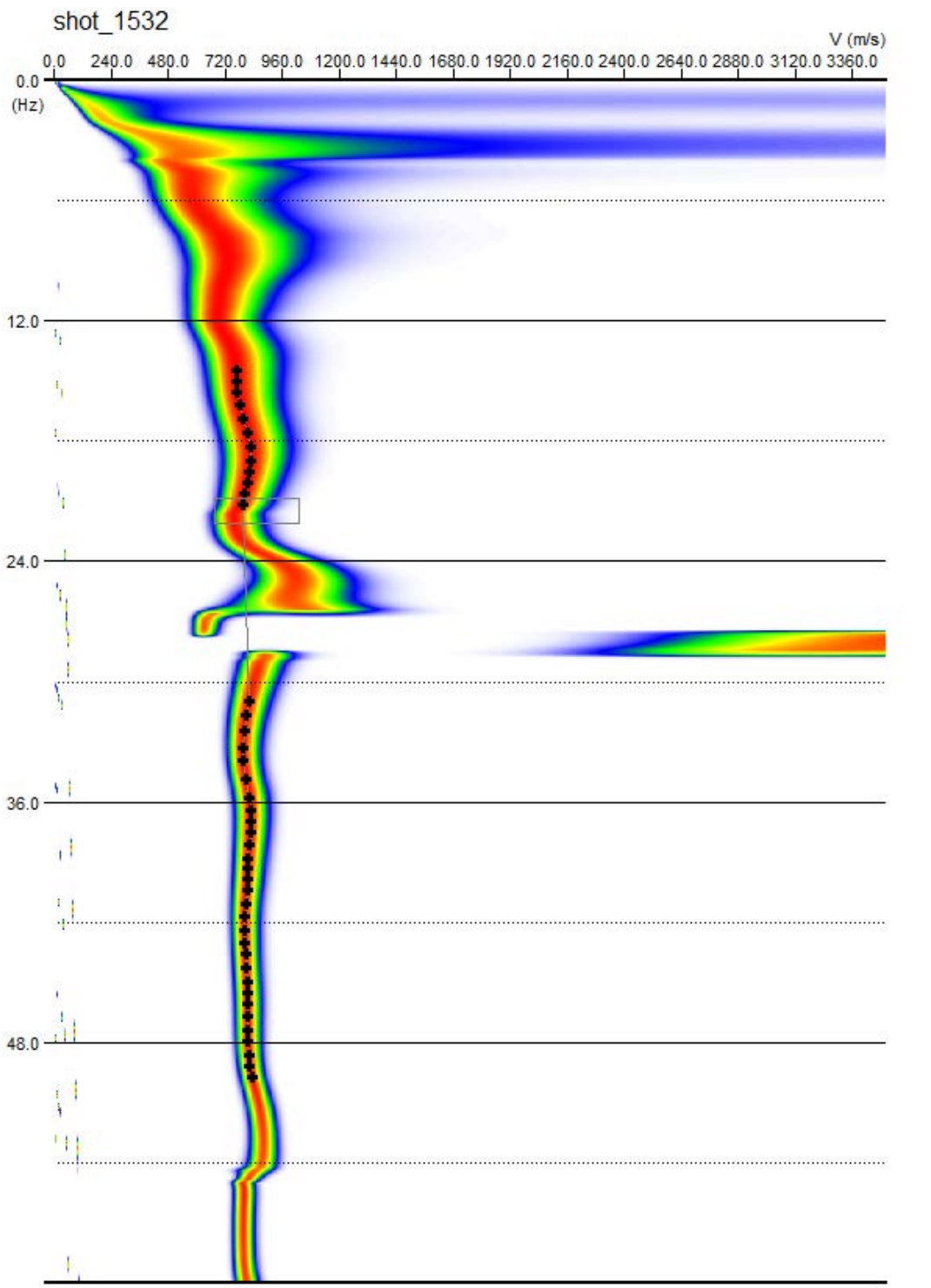

25.60 (Hz)

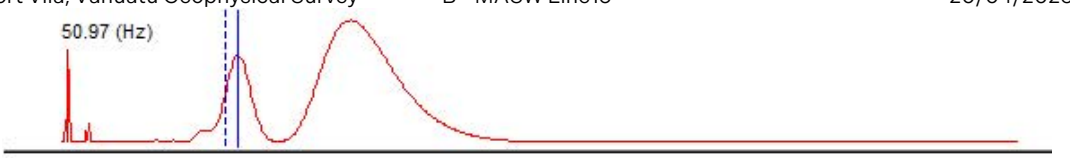

shot_1530
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

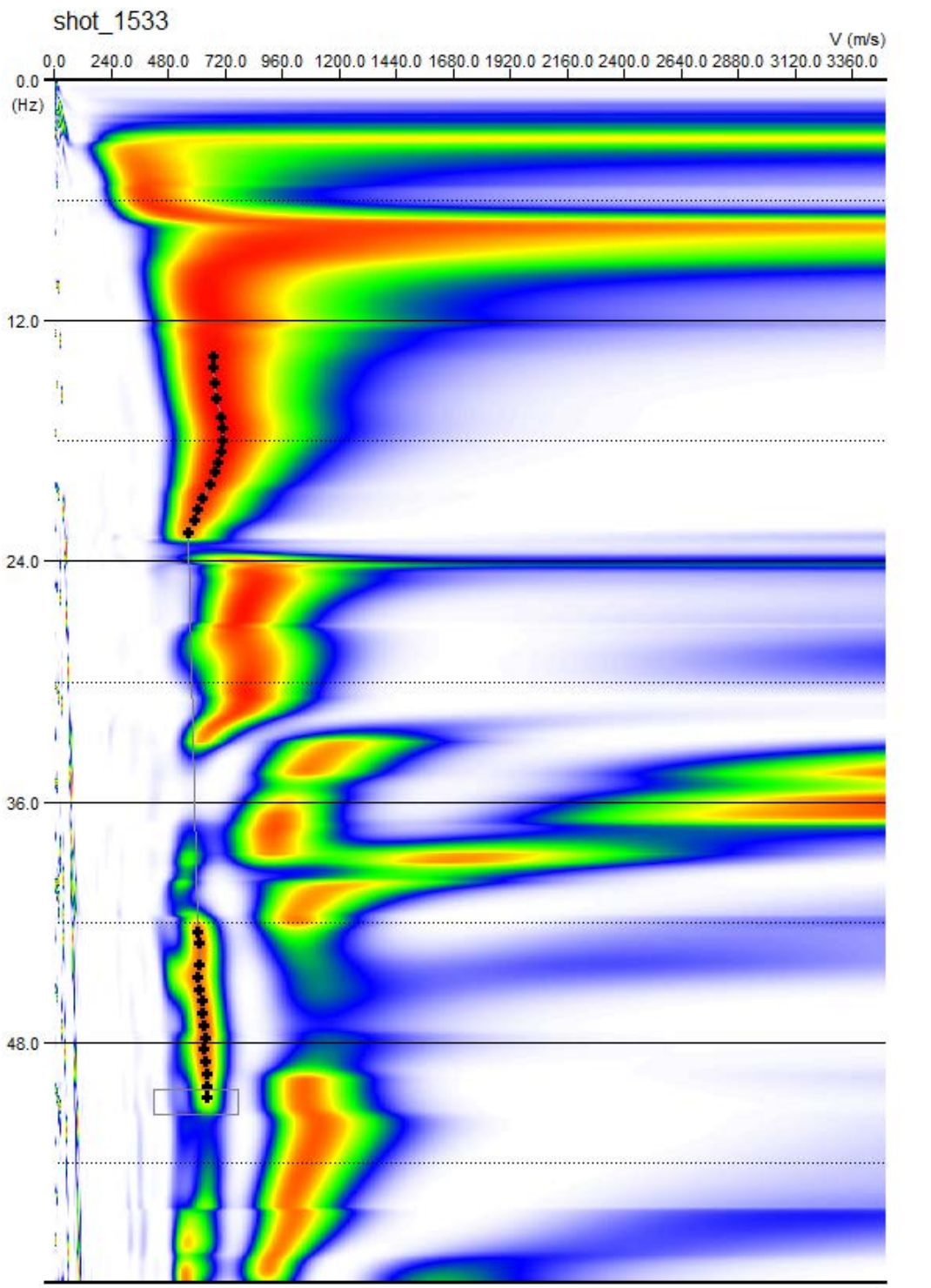

47.24 (Hz)


shot_1531
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

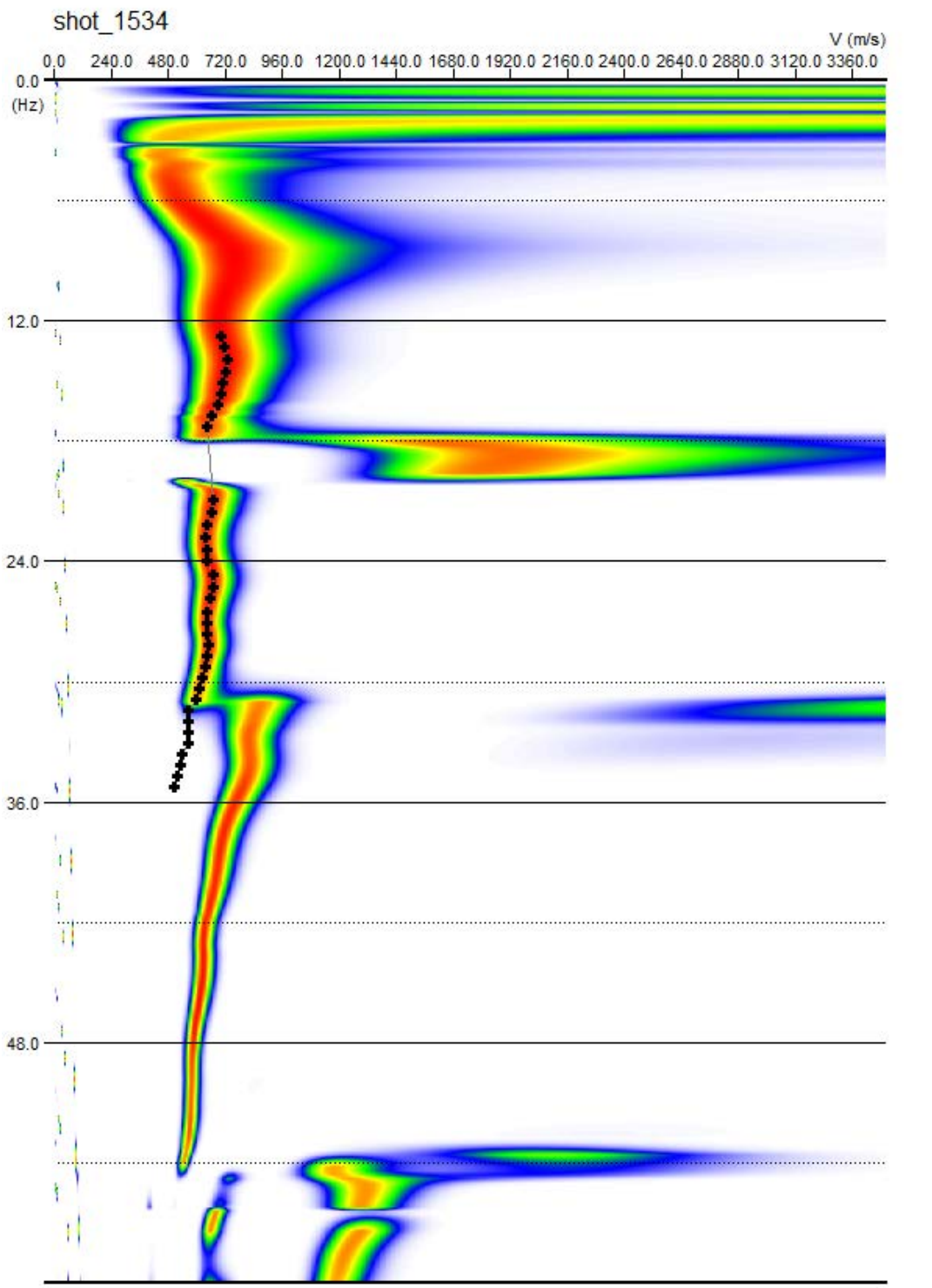

21.48 (Hz)

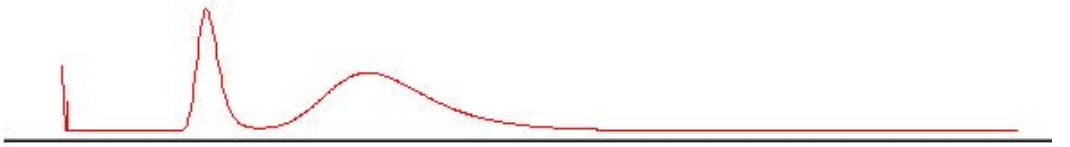

shot_1532
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

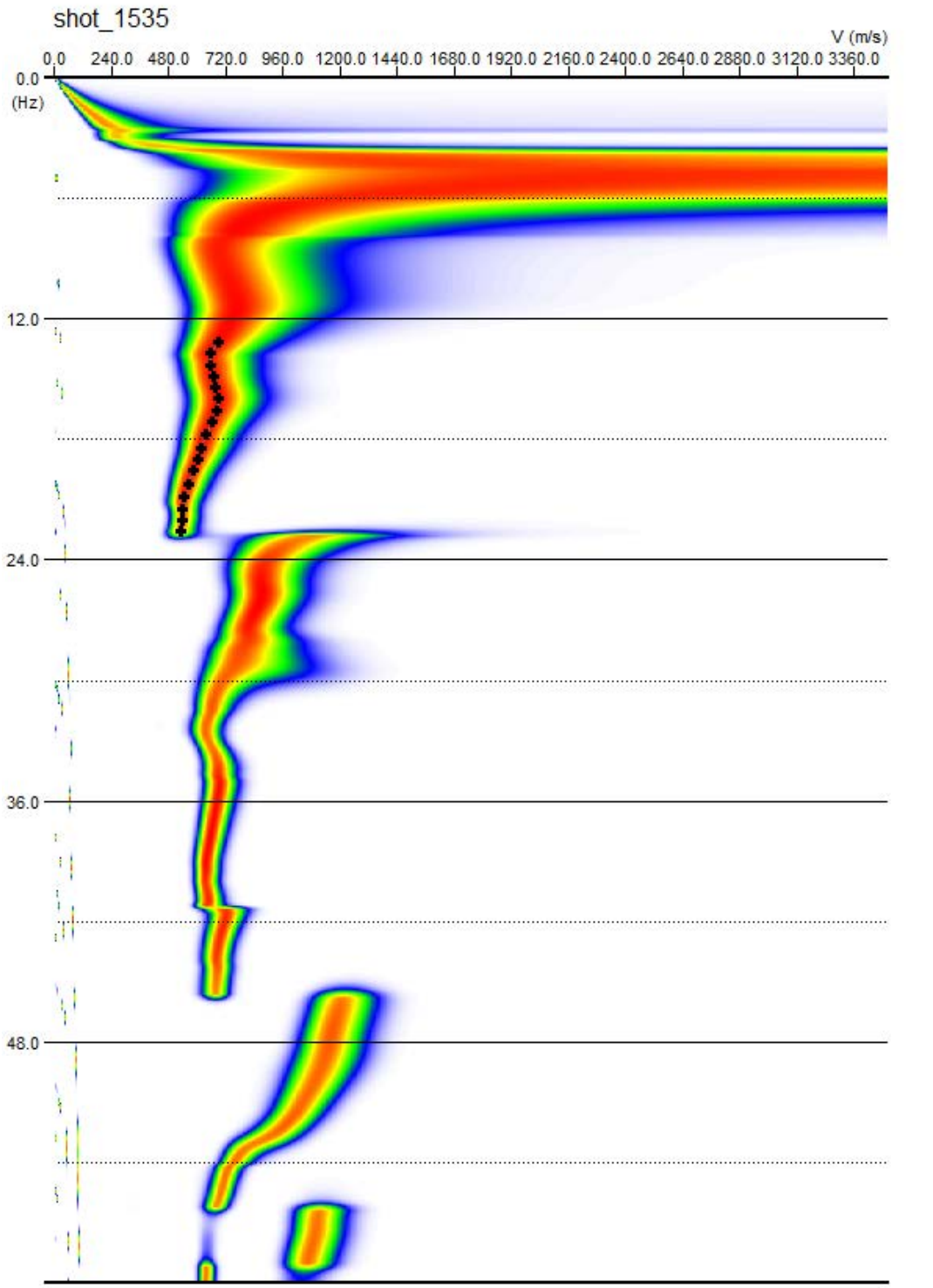

50.97 (Hz)

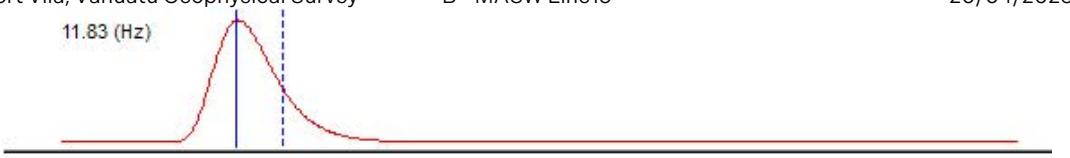

shot_1533
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

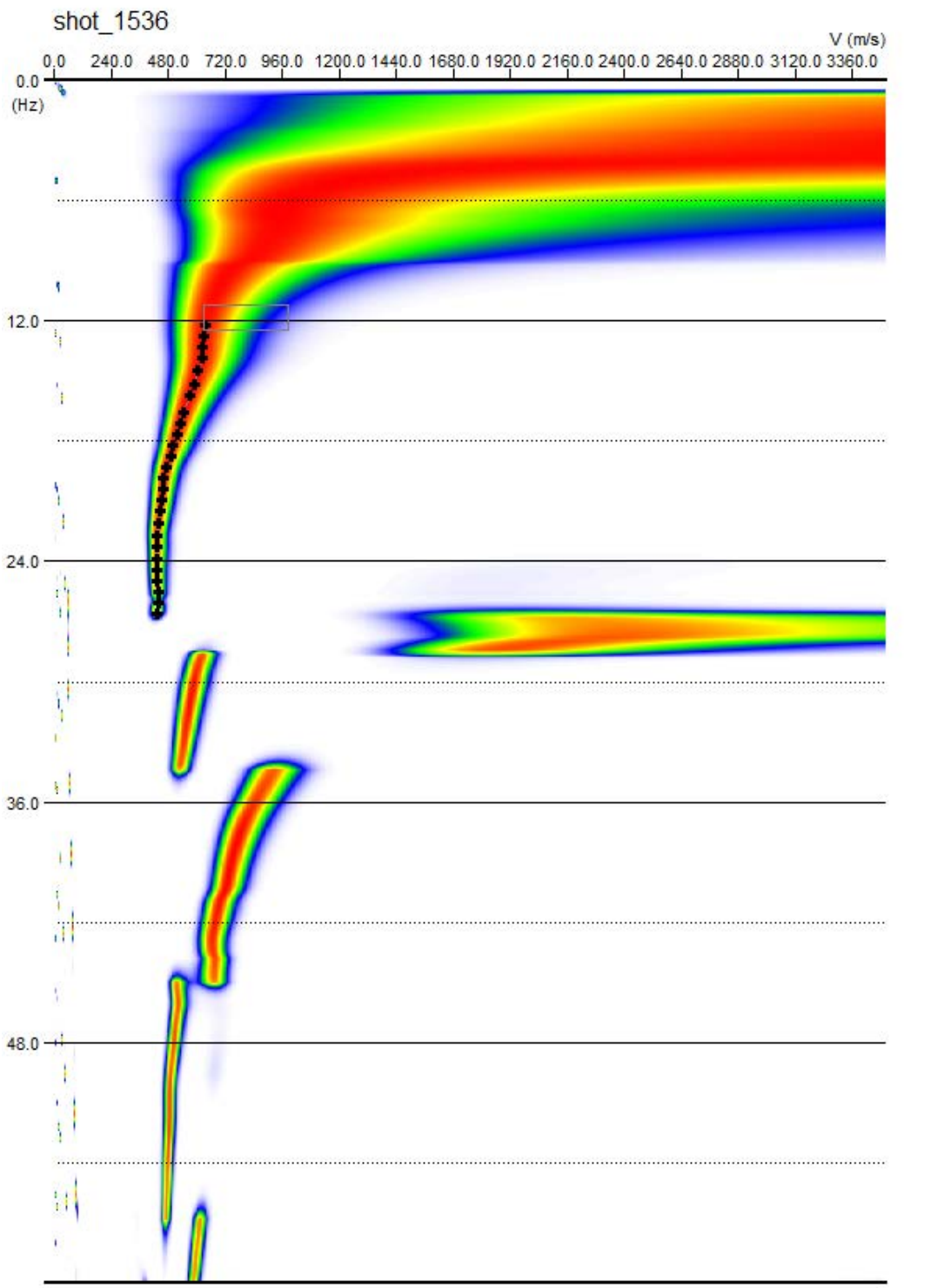


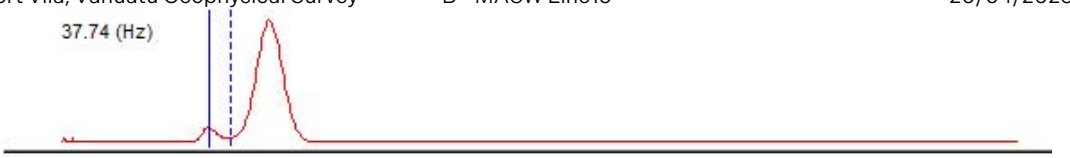

shot_1534
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

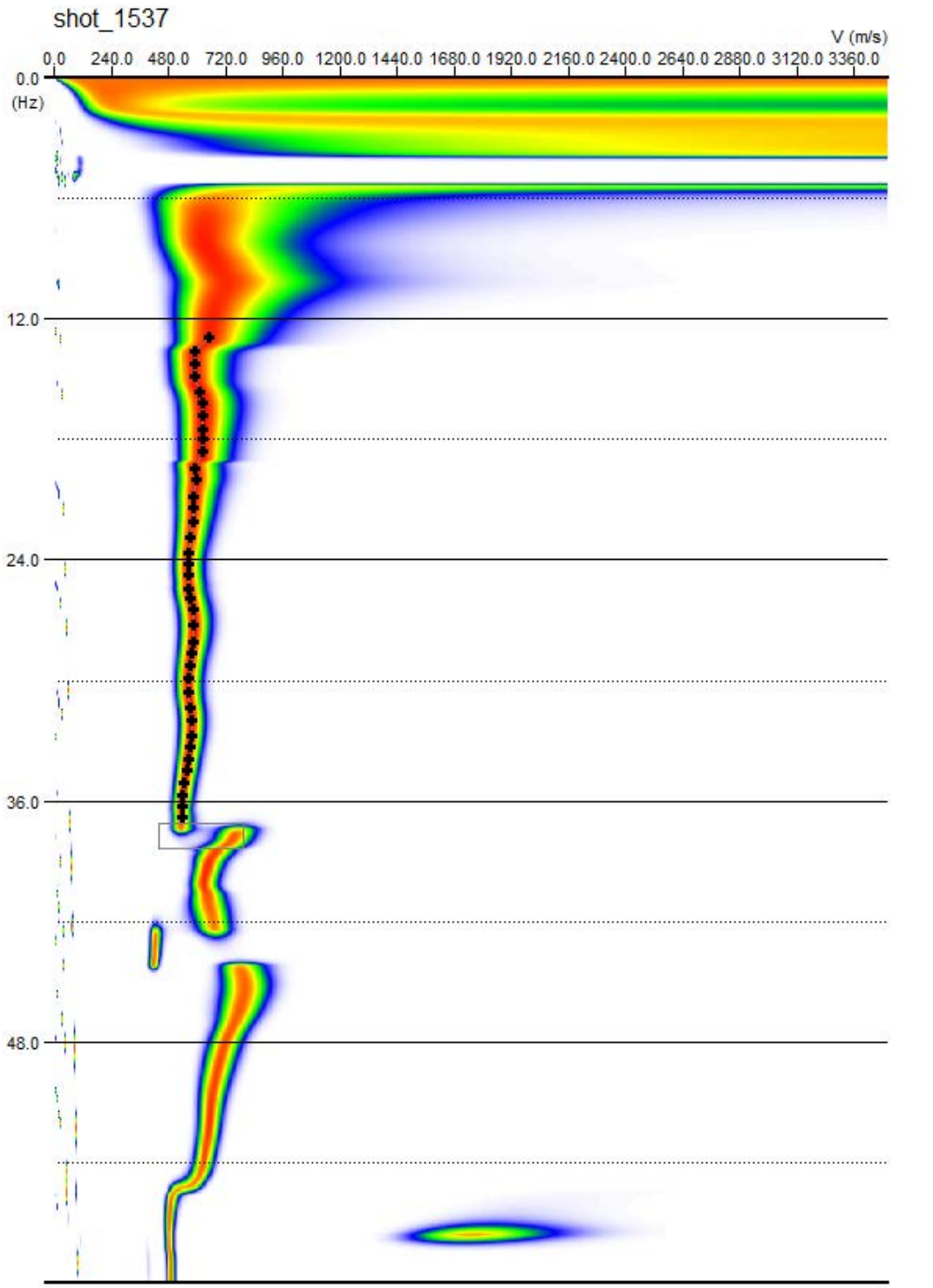


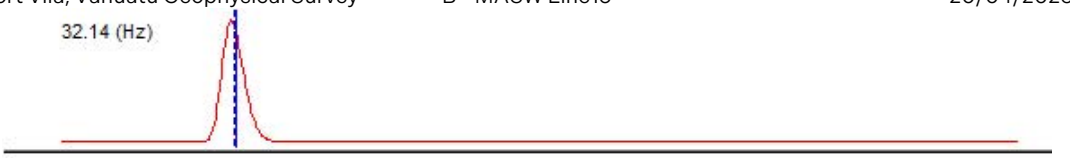

shot_1535
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

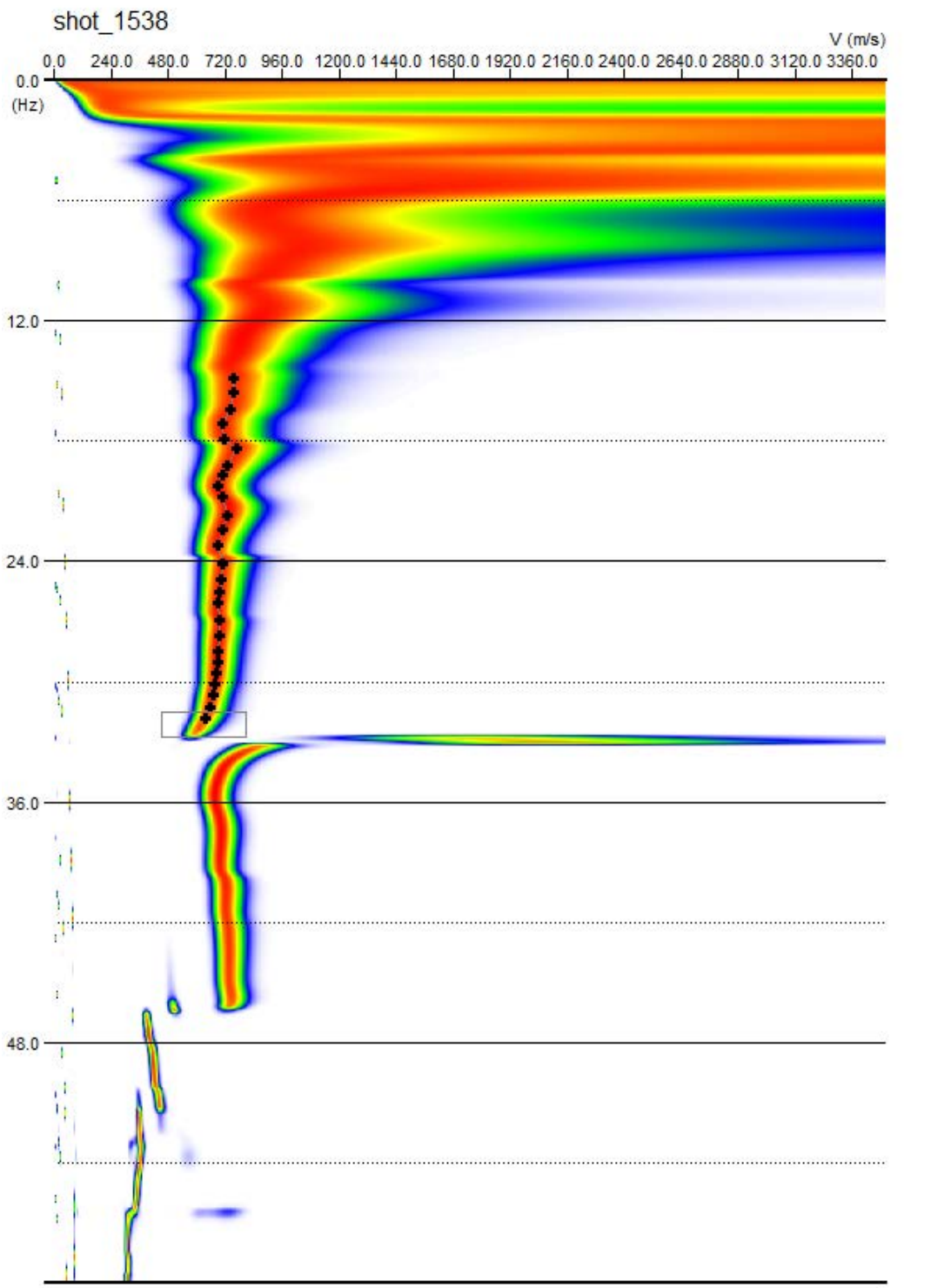

11.83 (Hz)

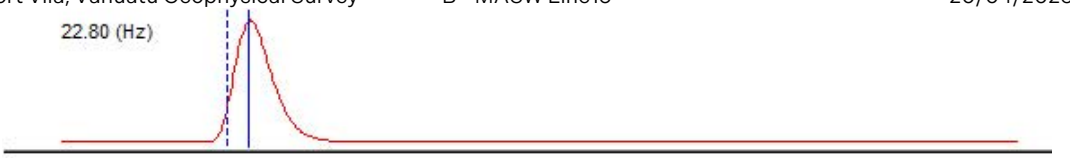

shot_1536
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

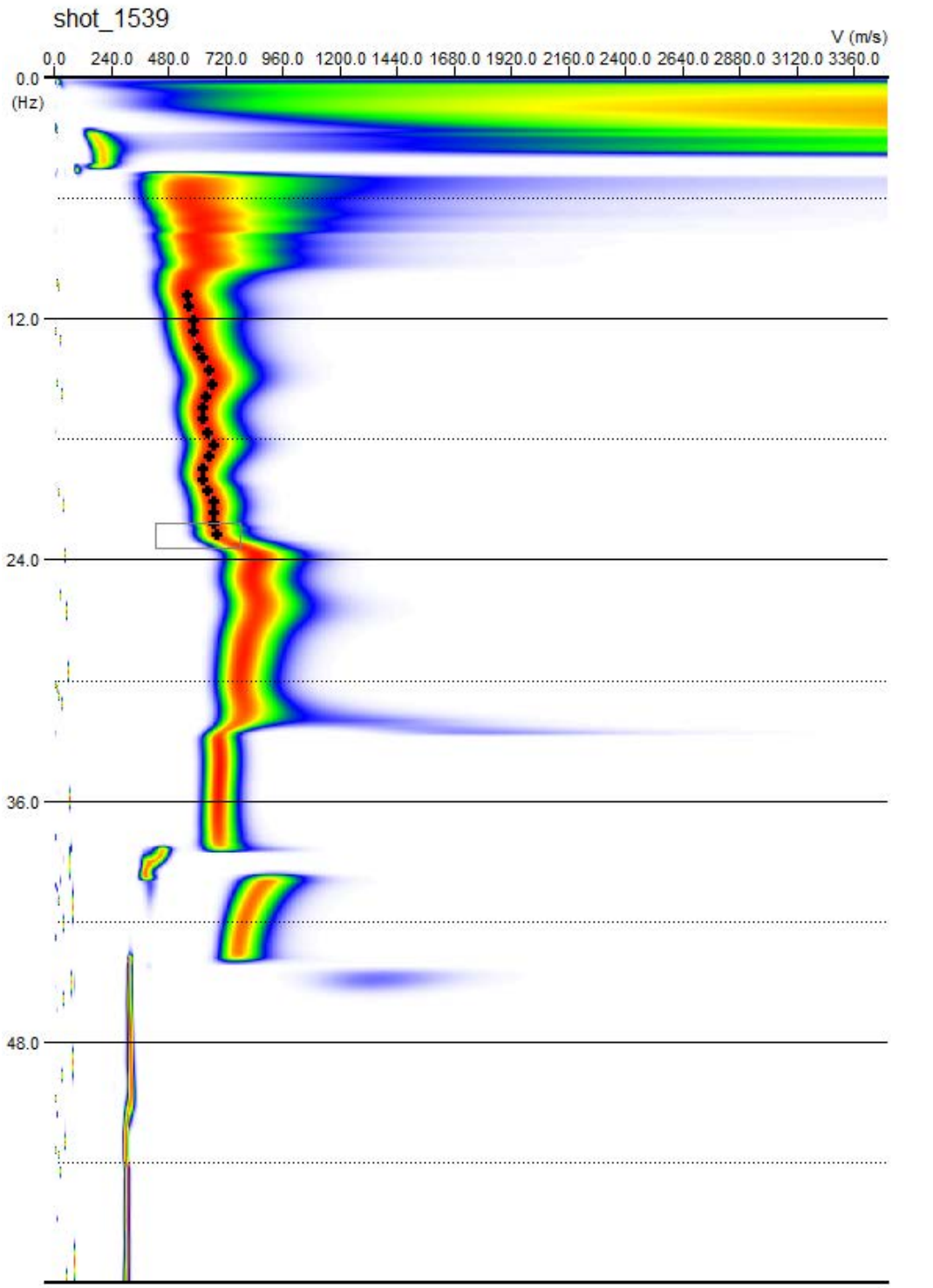

37.74 (Hz)

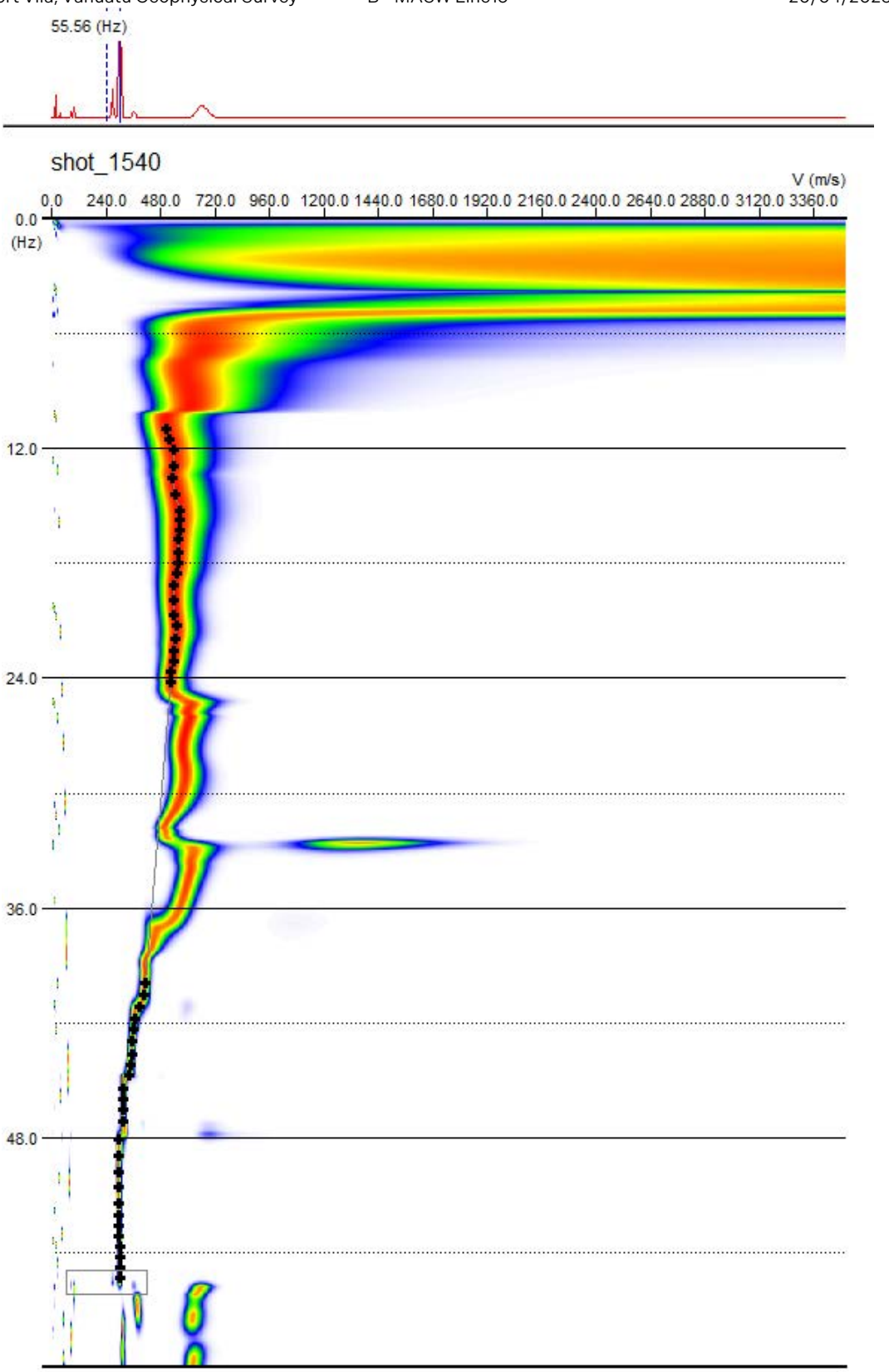

shot_1537
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0


32.14 (Hz)

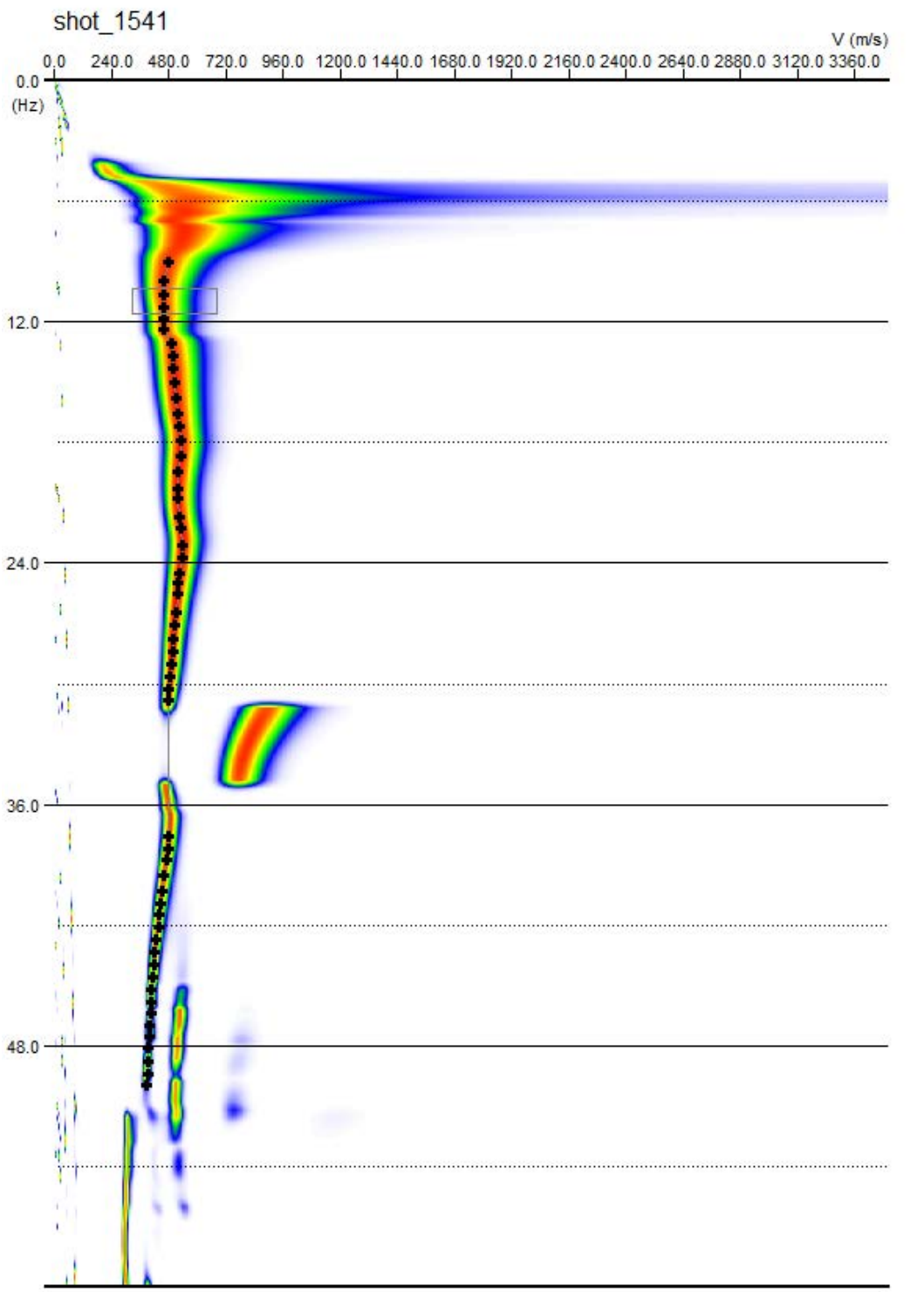

shot_1538
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

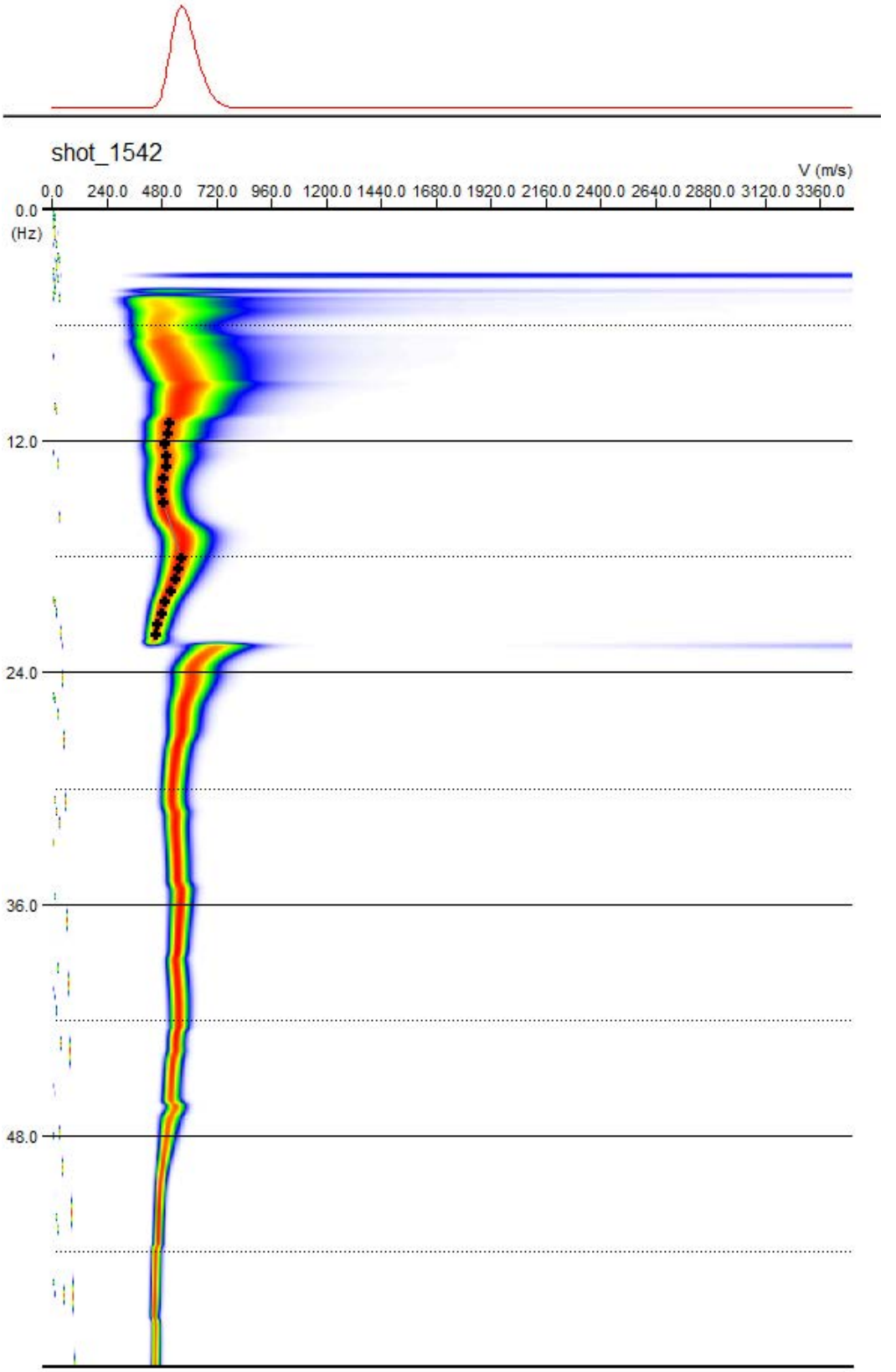

22.80 (Hz)


shot_1539
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

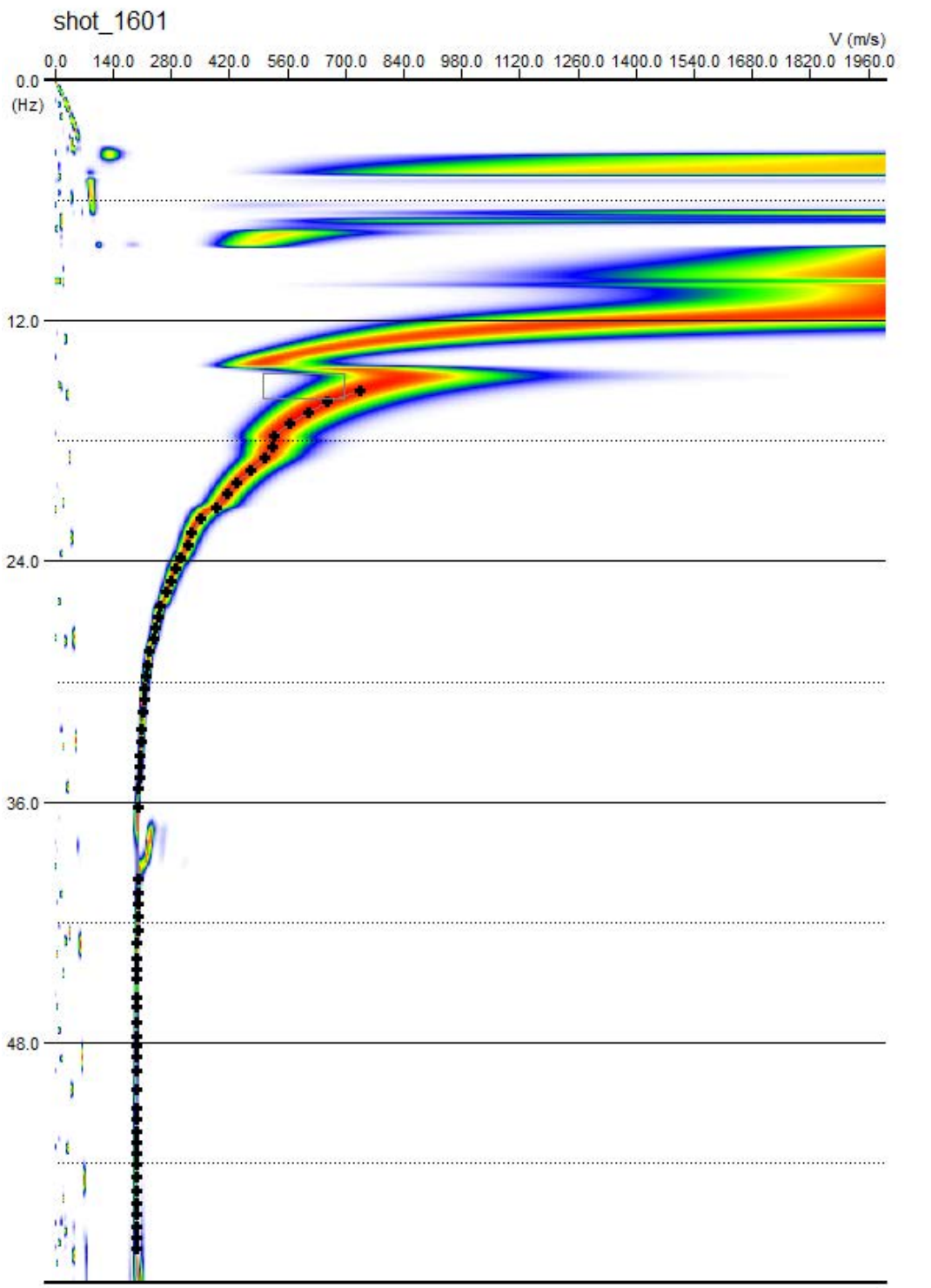

55.56 (Hz)
shot_1540
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

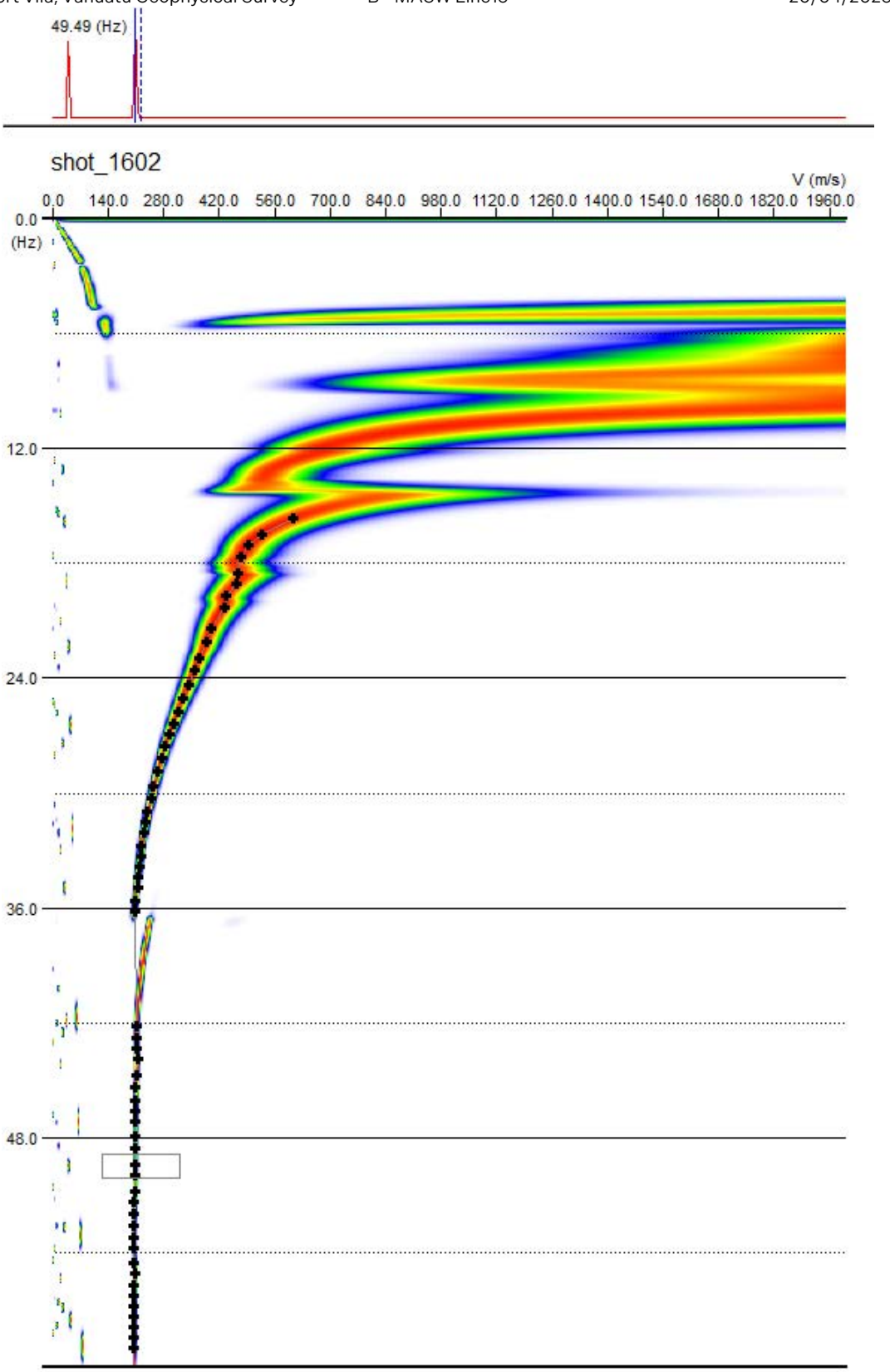

10.97 (Hz)

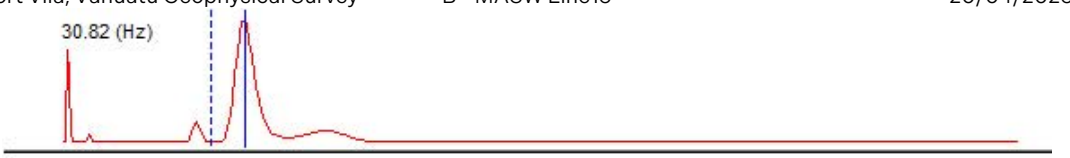

shot_1541
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

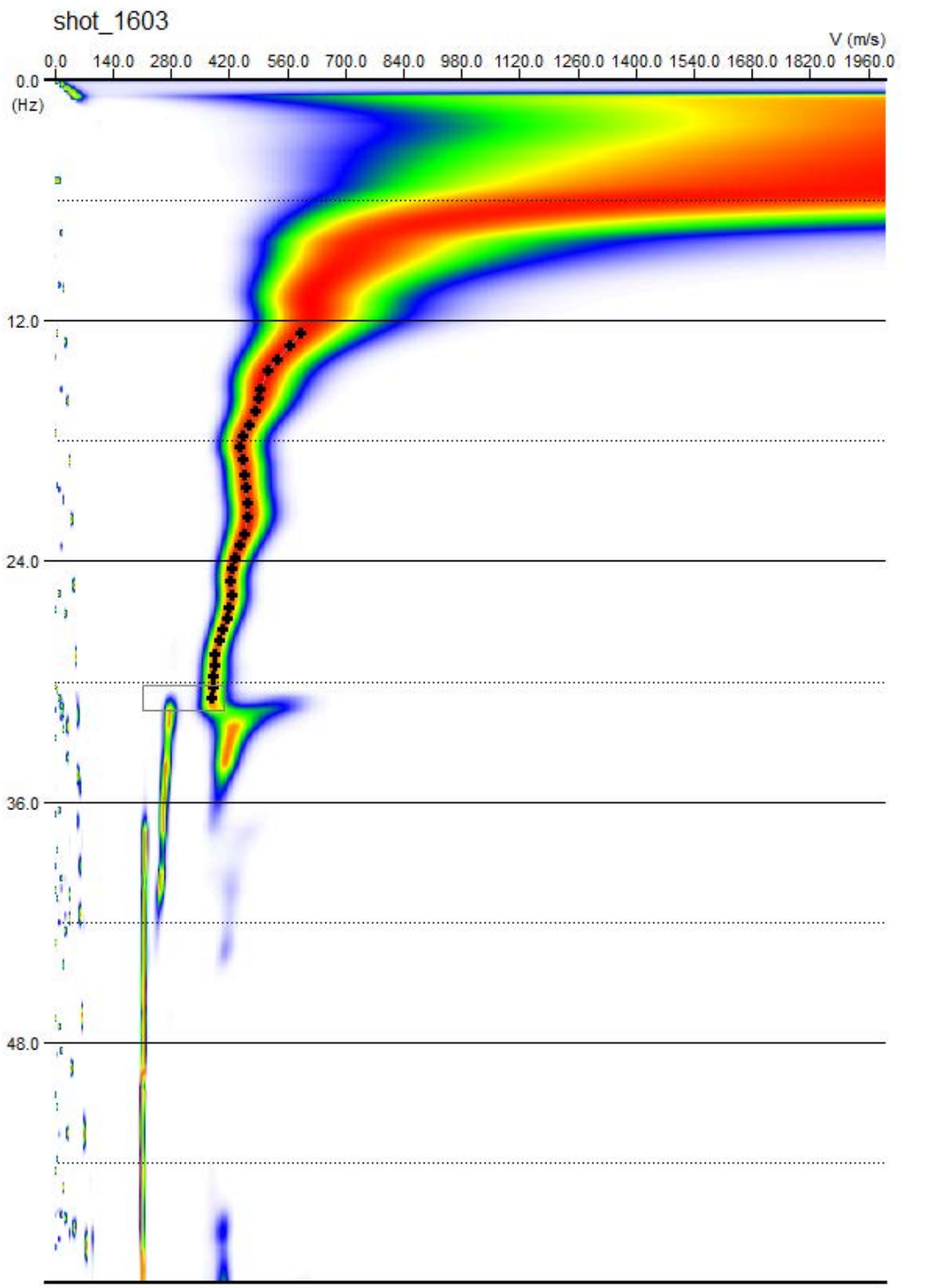

shot_1542
V (m/s)
0.0 240.0 480.0 720.0 960.0 1200.0 1440.0 1680.0 1920.0 2160.0 2400.0 2640.0 2880.0 3120.0 3360.0
0.0
(Hz)
12.0
24.0
36.0
48.0

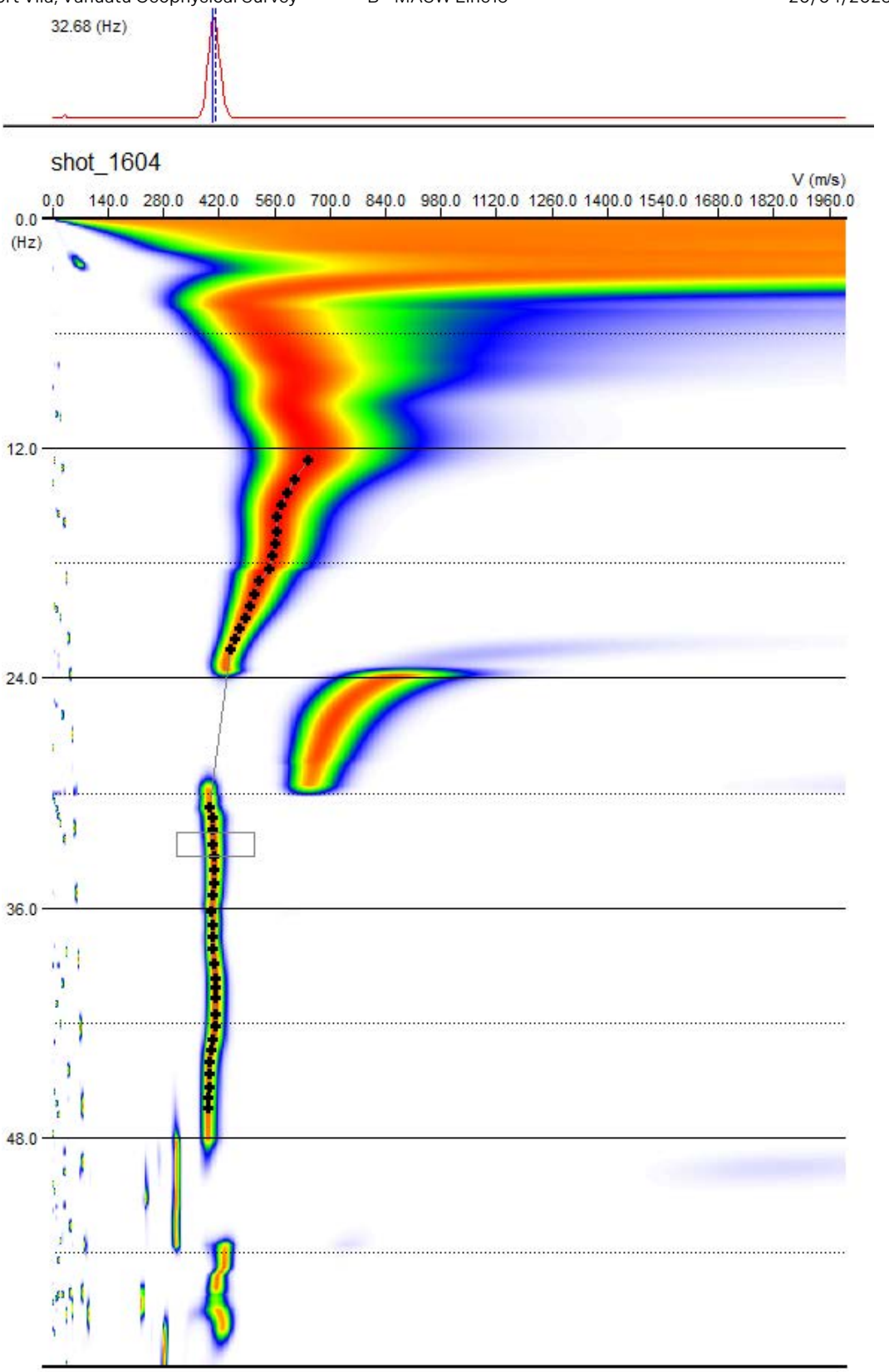

15.25 (Hz)

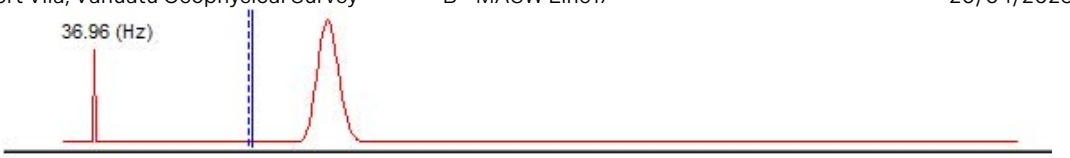

shot_1601
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0

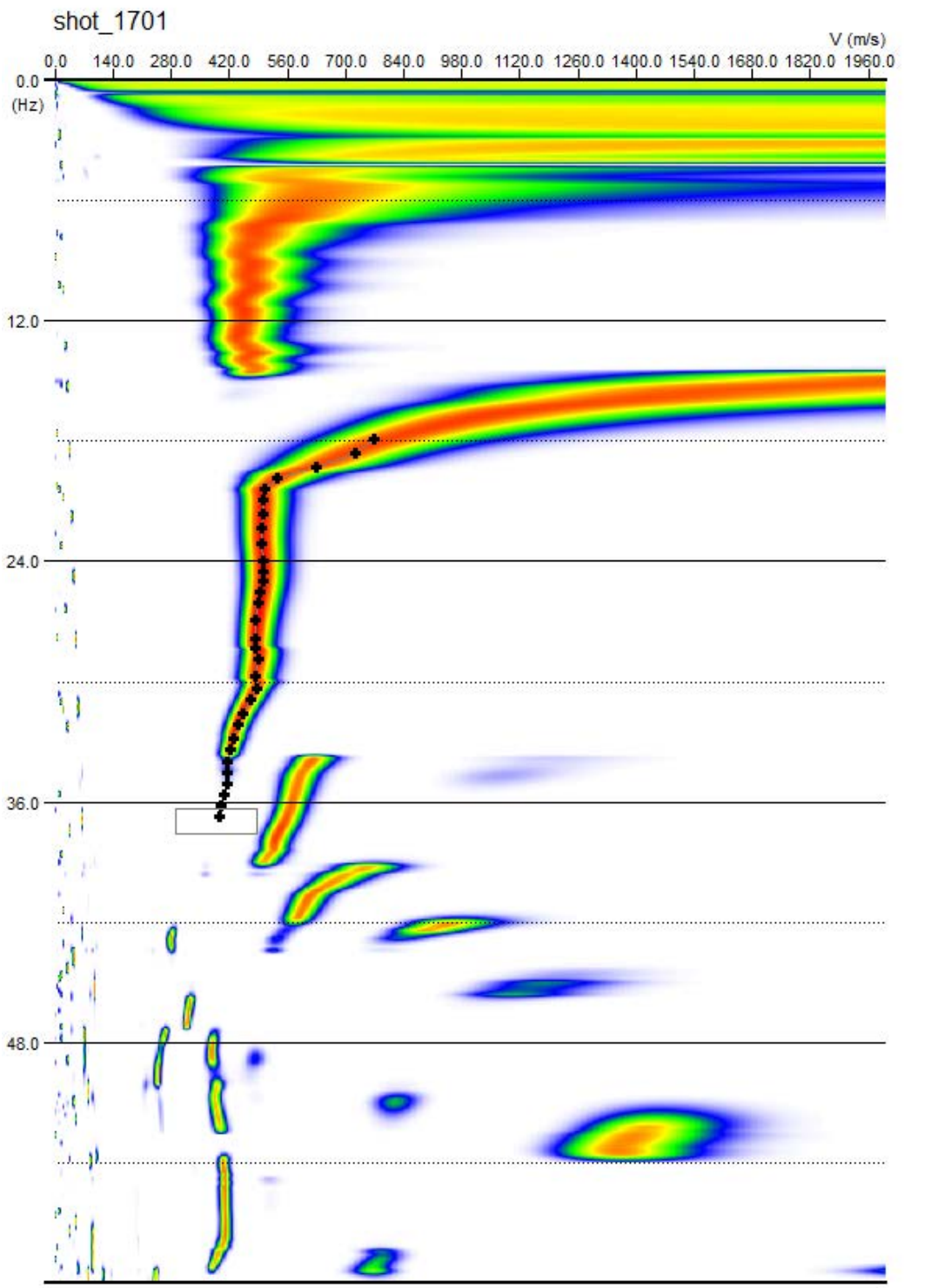

49.49 (Hz)
shot_1602
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0


30.82 (Hz)

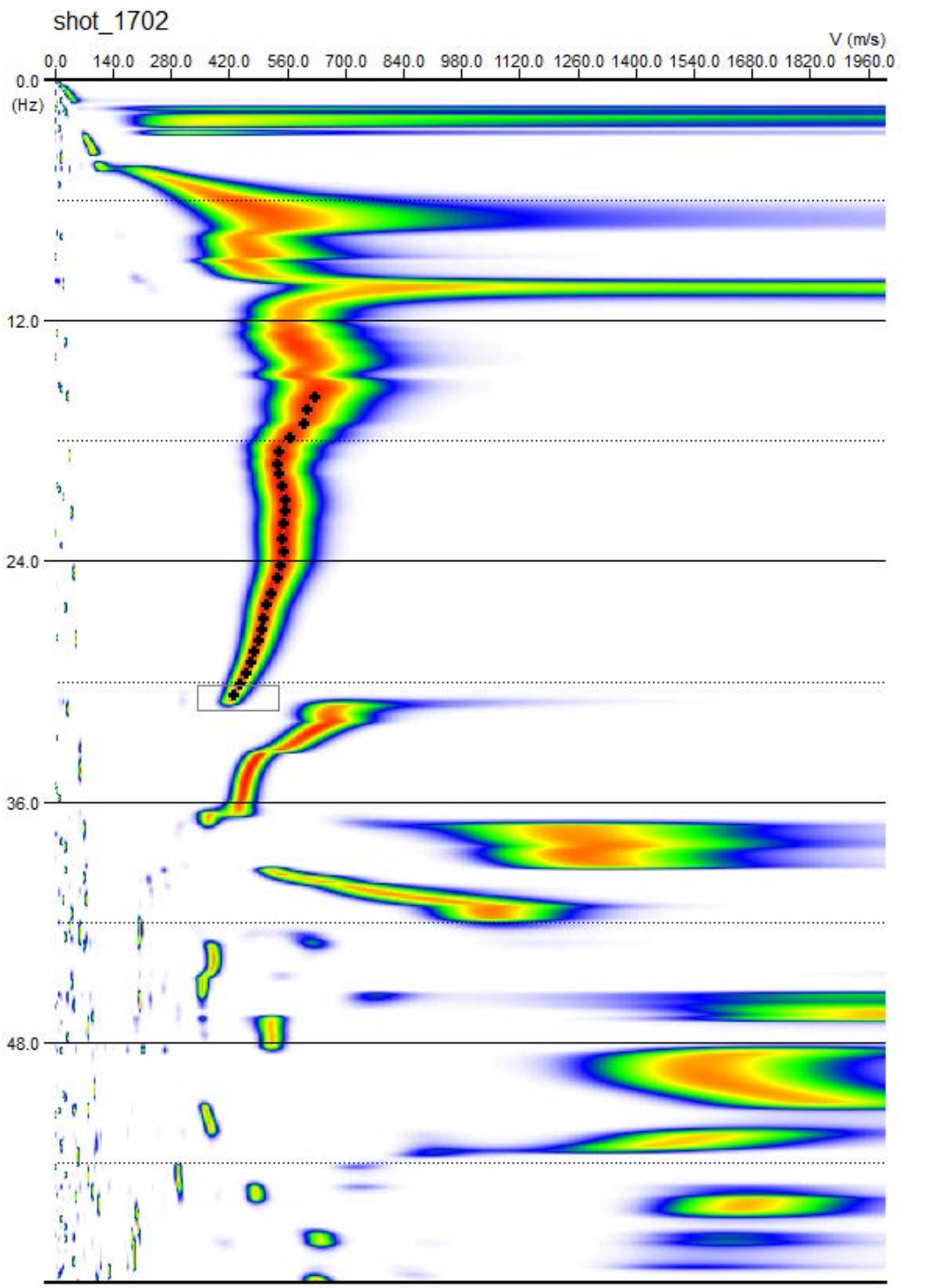

shot_1603
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0


32.68 (Hz)
shot_1604
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0

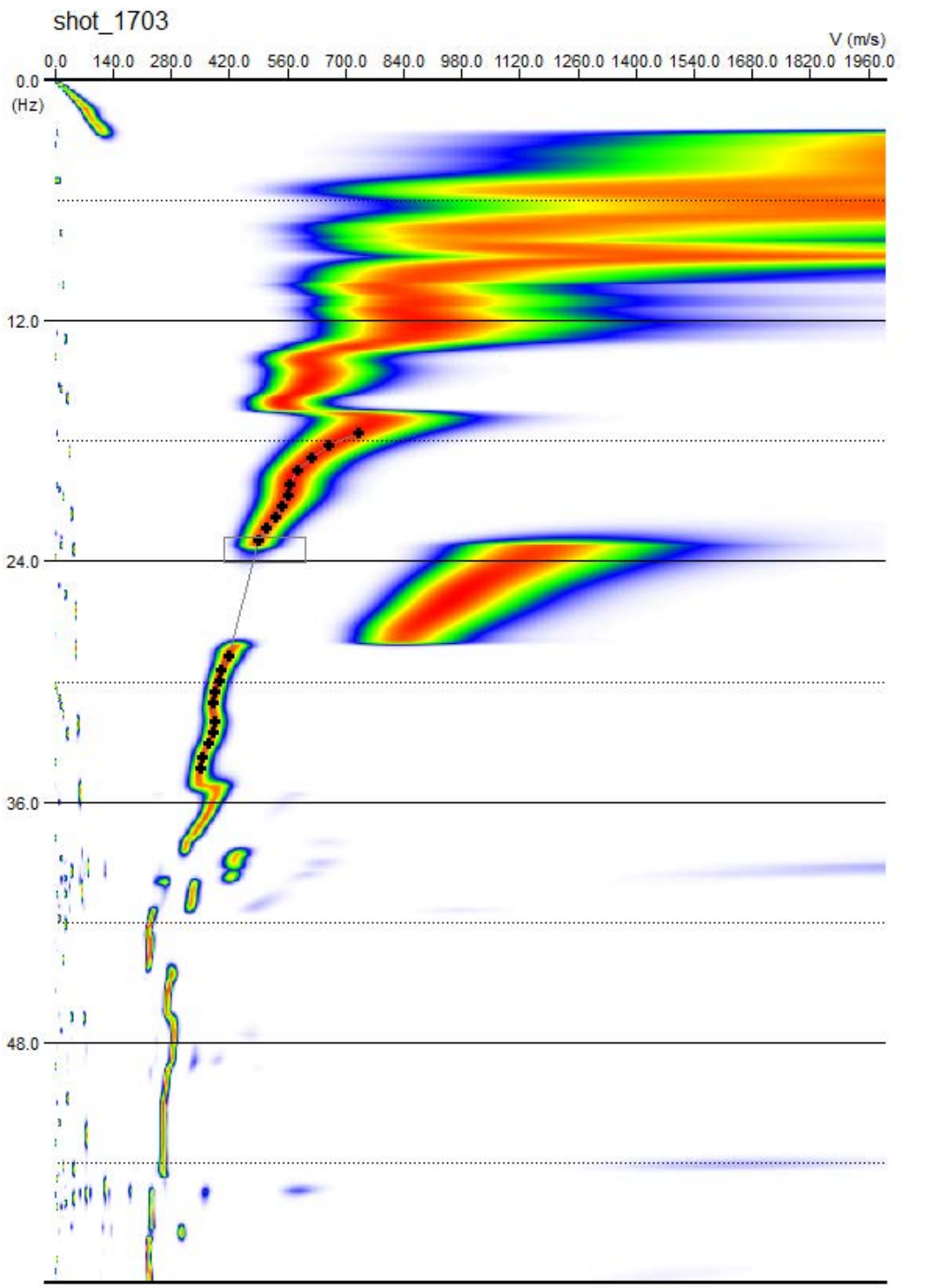

36.96 (Hz)

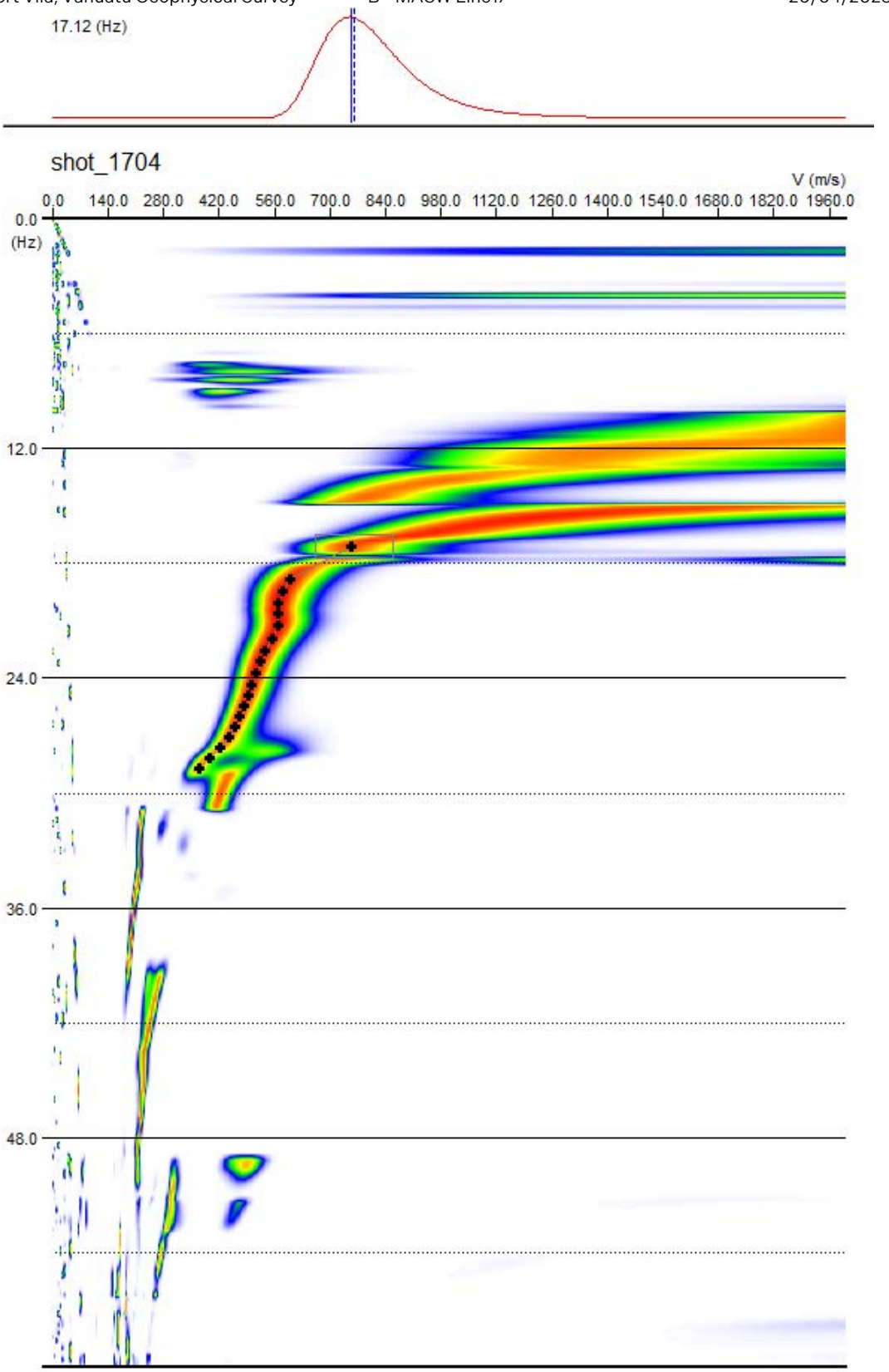

shot_1701
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0

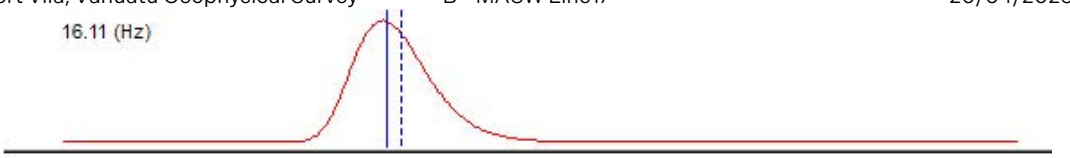

30.82 (Hz)

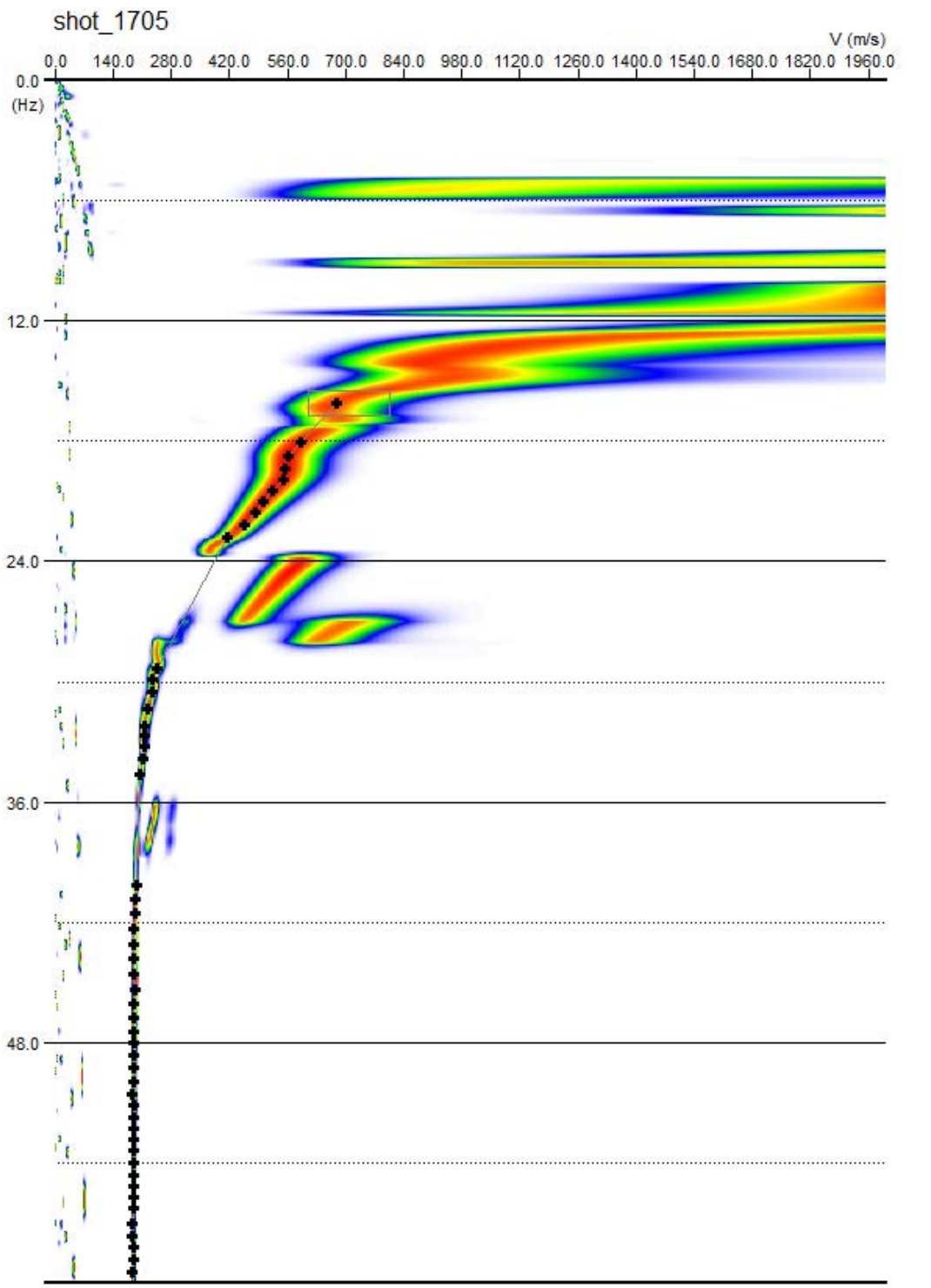

shot_1702
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0


23.42 (Hz)

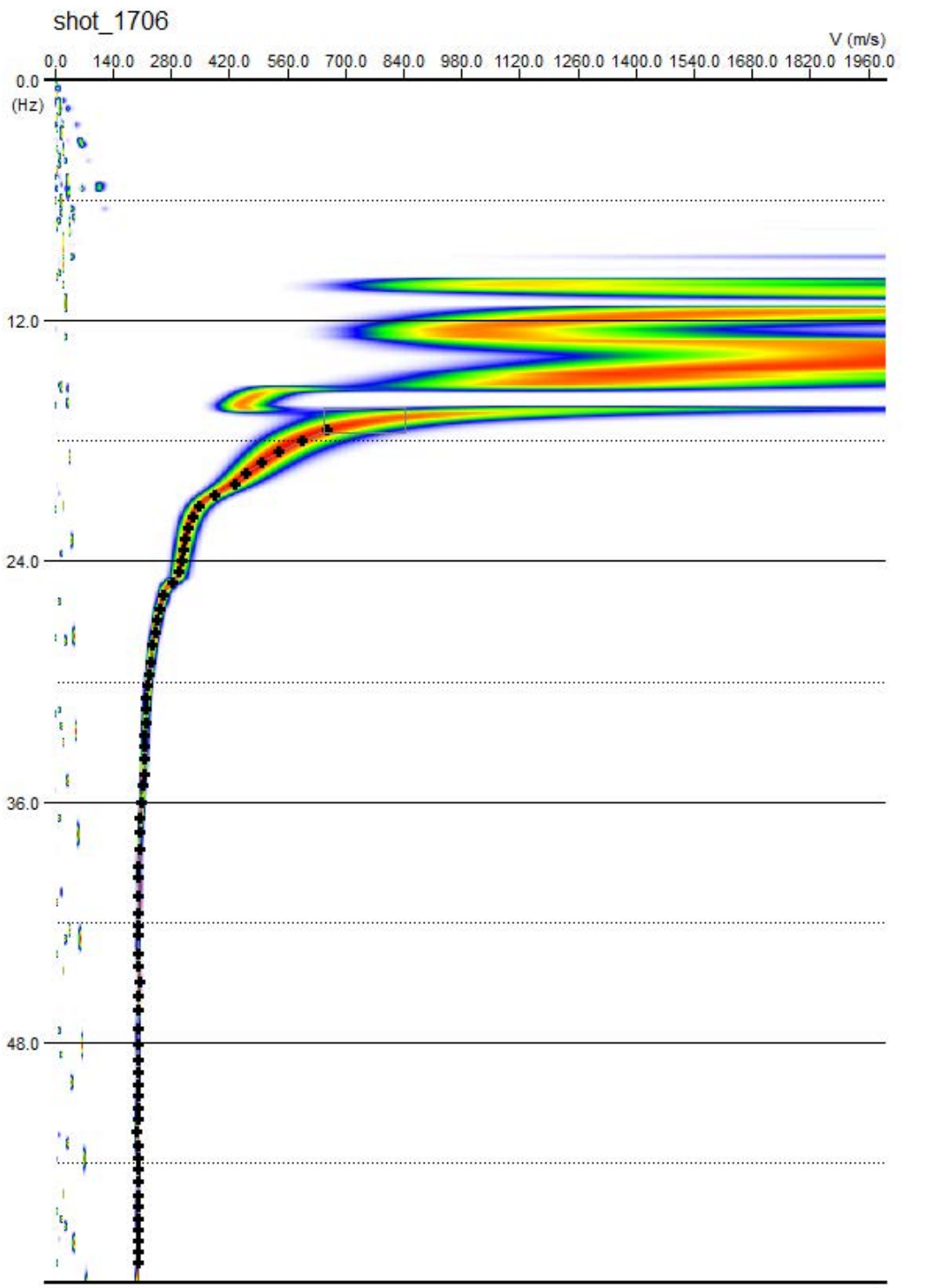

shot_1703
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0


17.12 (Hz)
shot_1704
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0

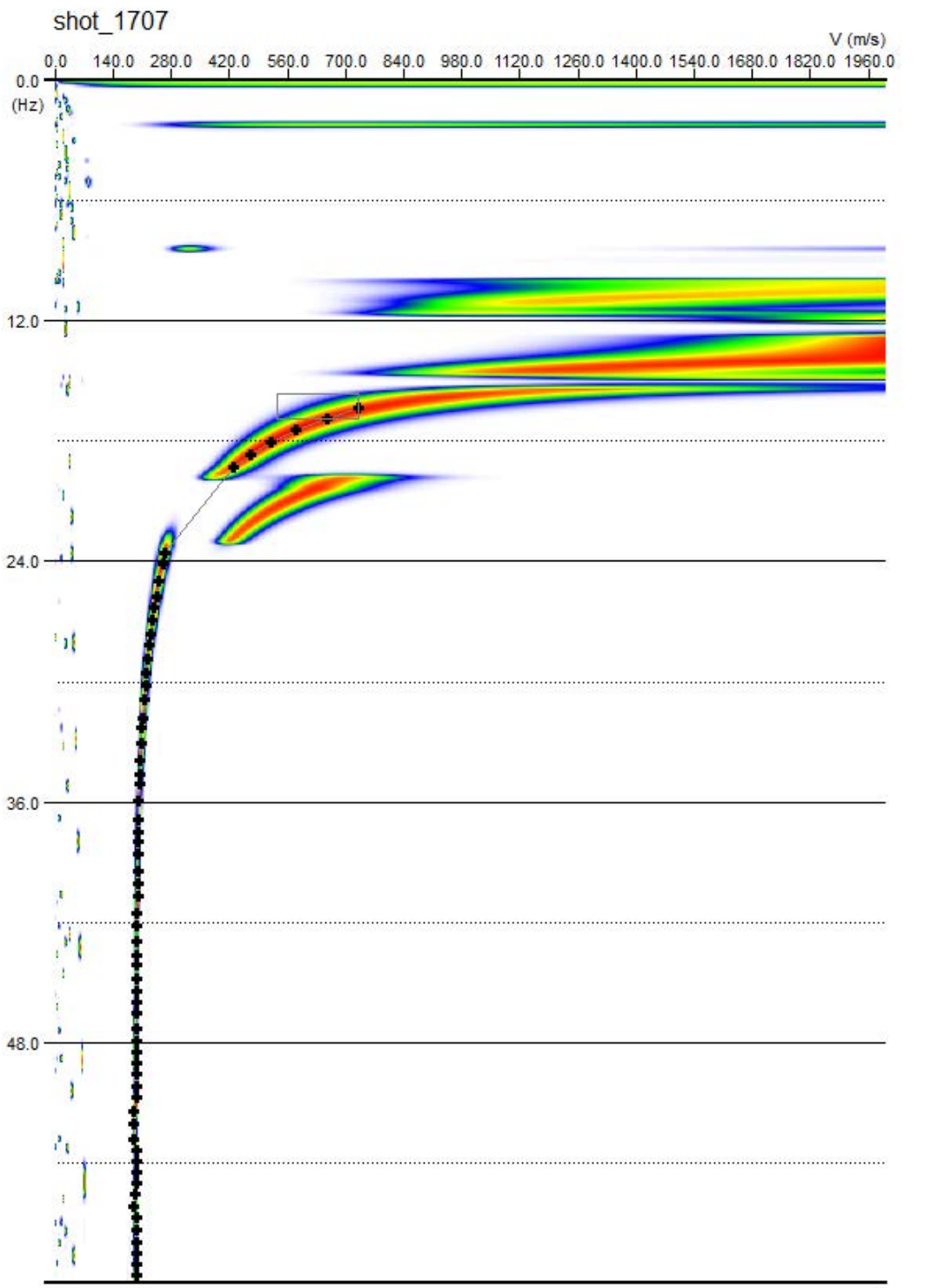

16.11 (Hz)


shot_1705
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0

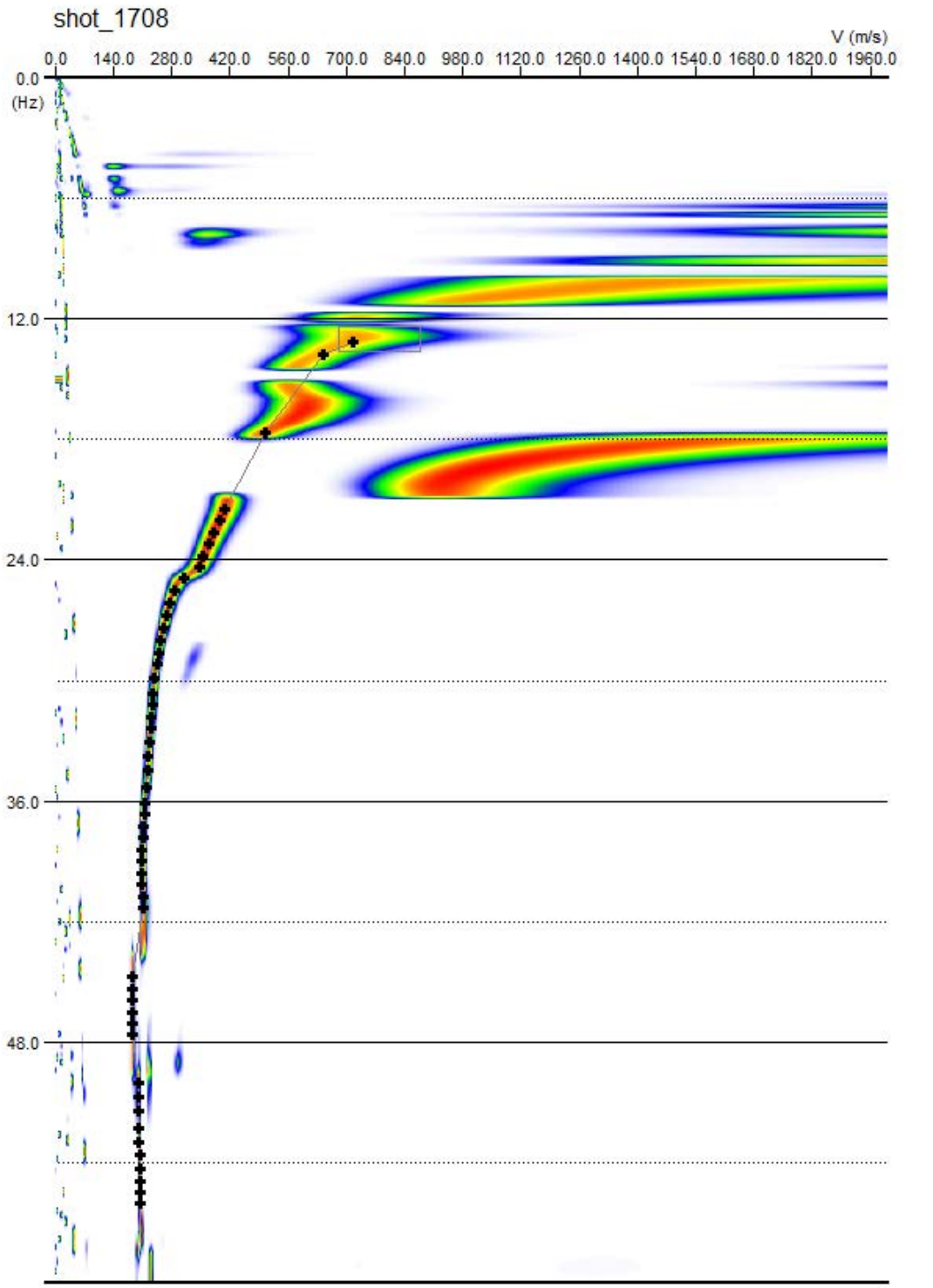

16.96 (Hz)


shot_1706
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0

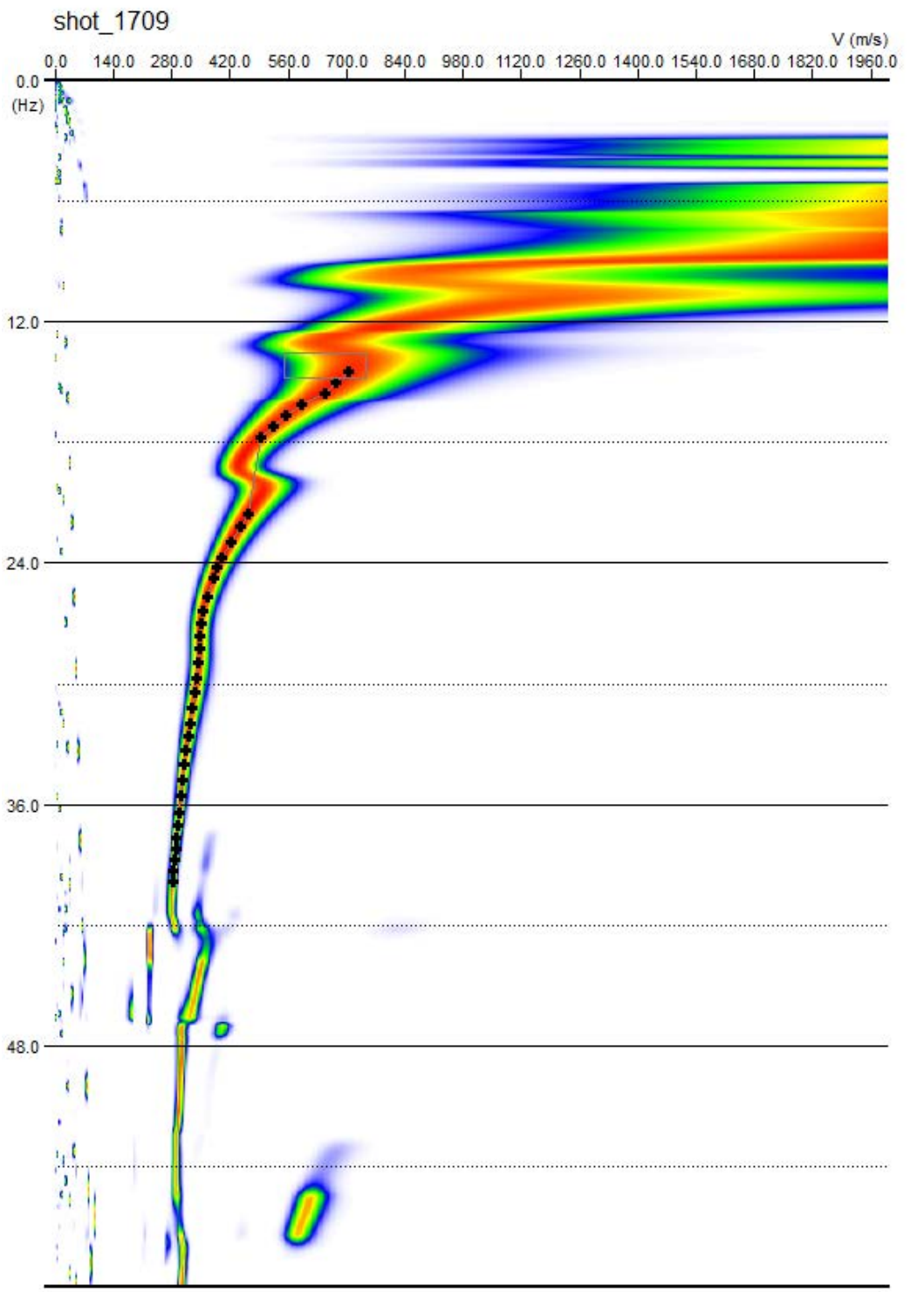

16.26 (Hz)

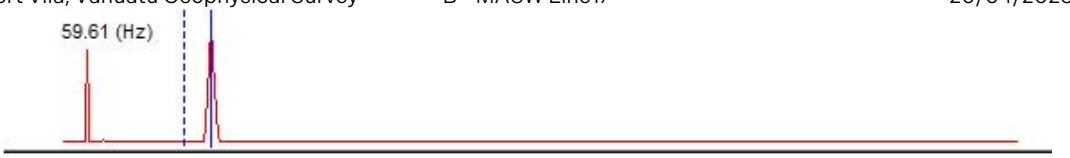

shot_1707
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0

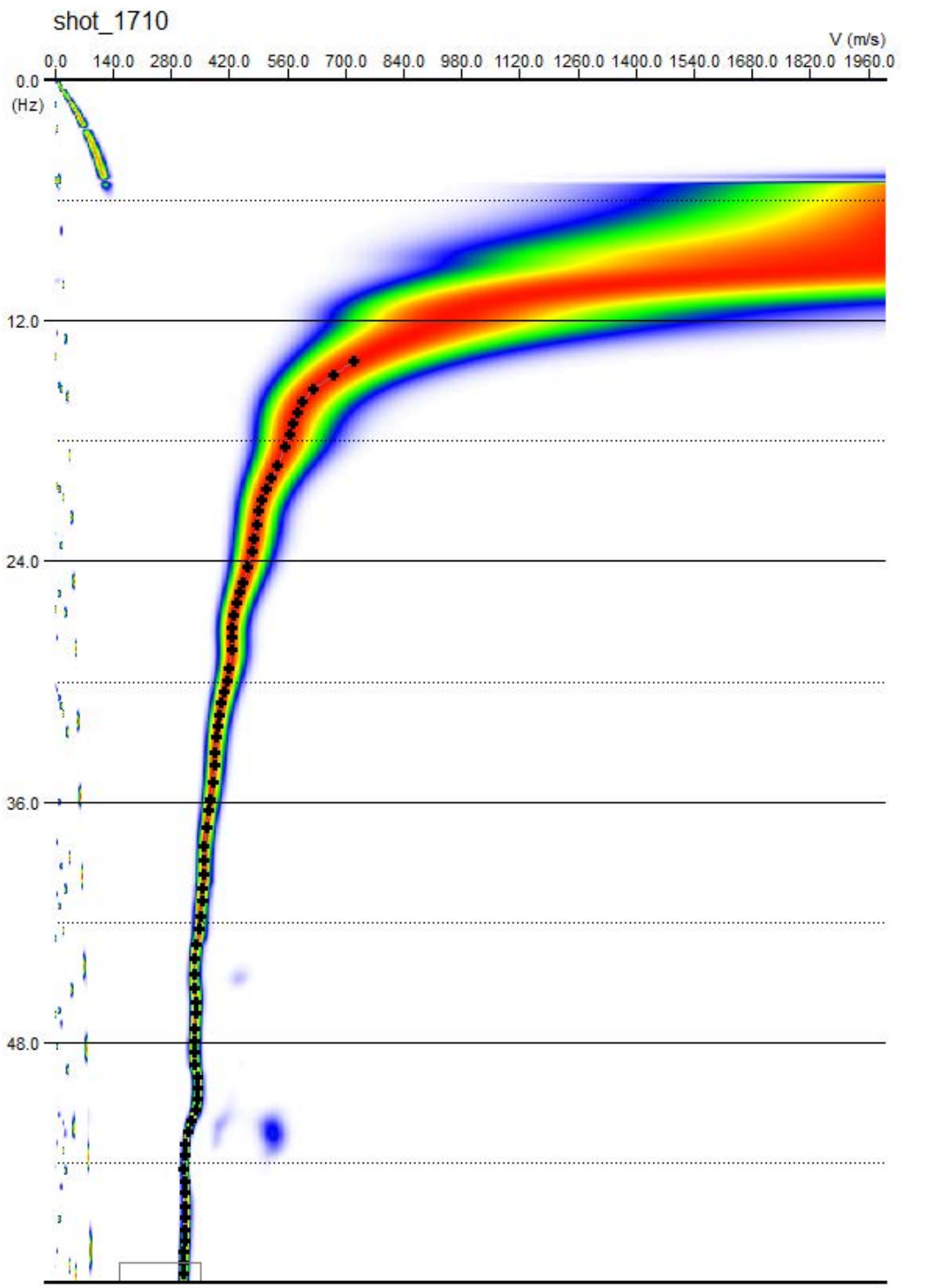

13.00 (Hz)

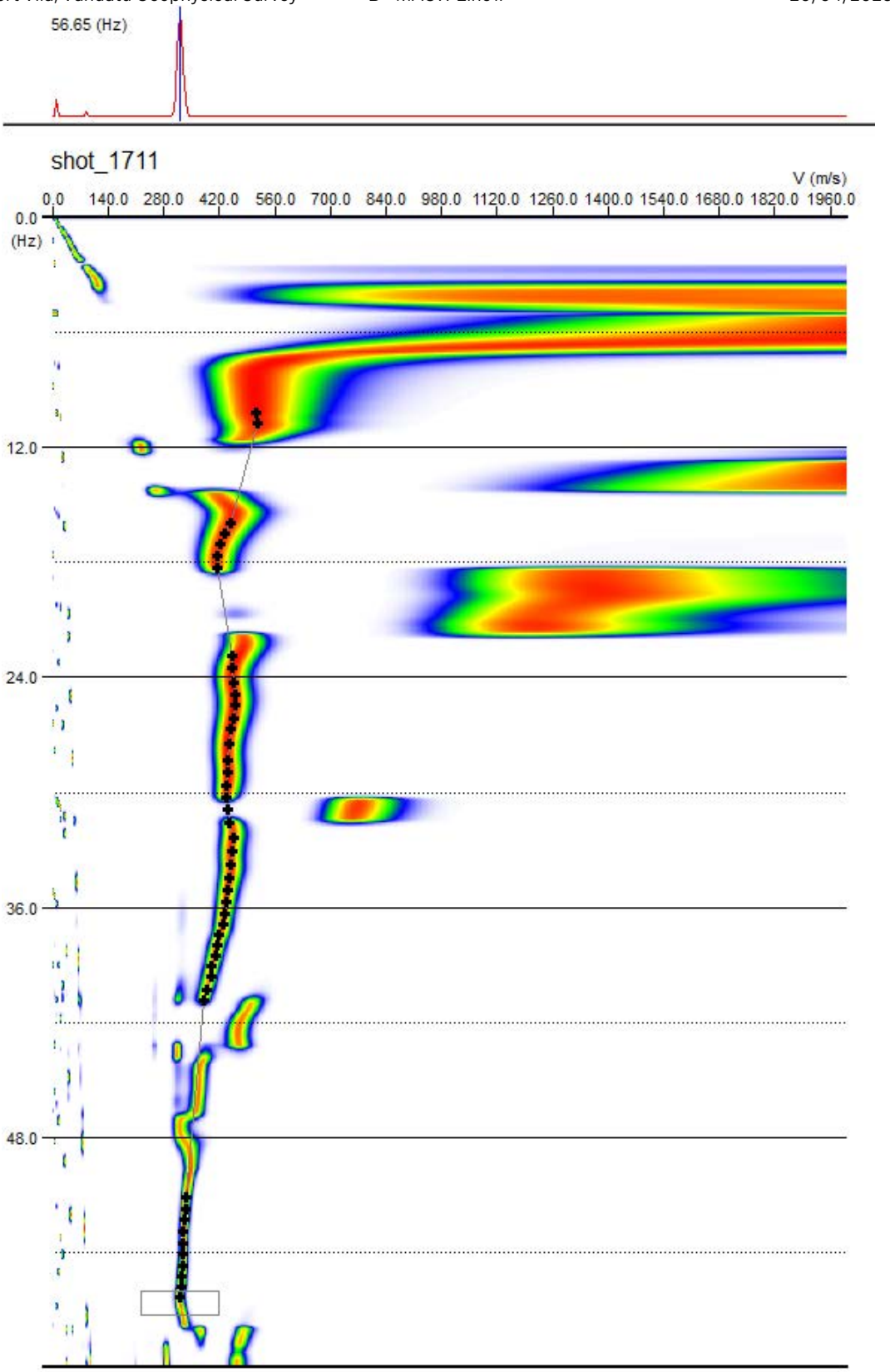

shot_1708
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0

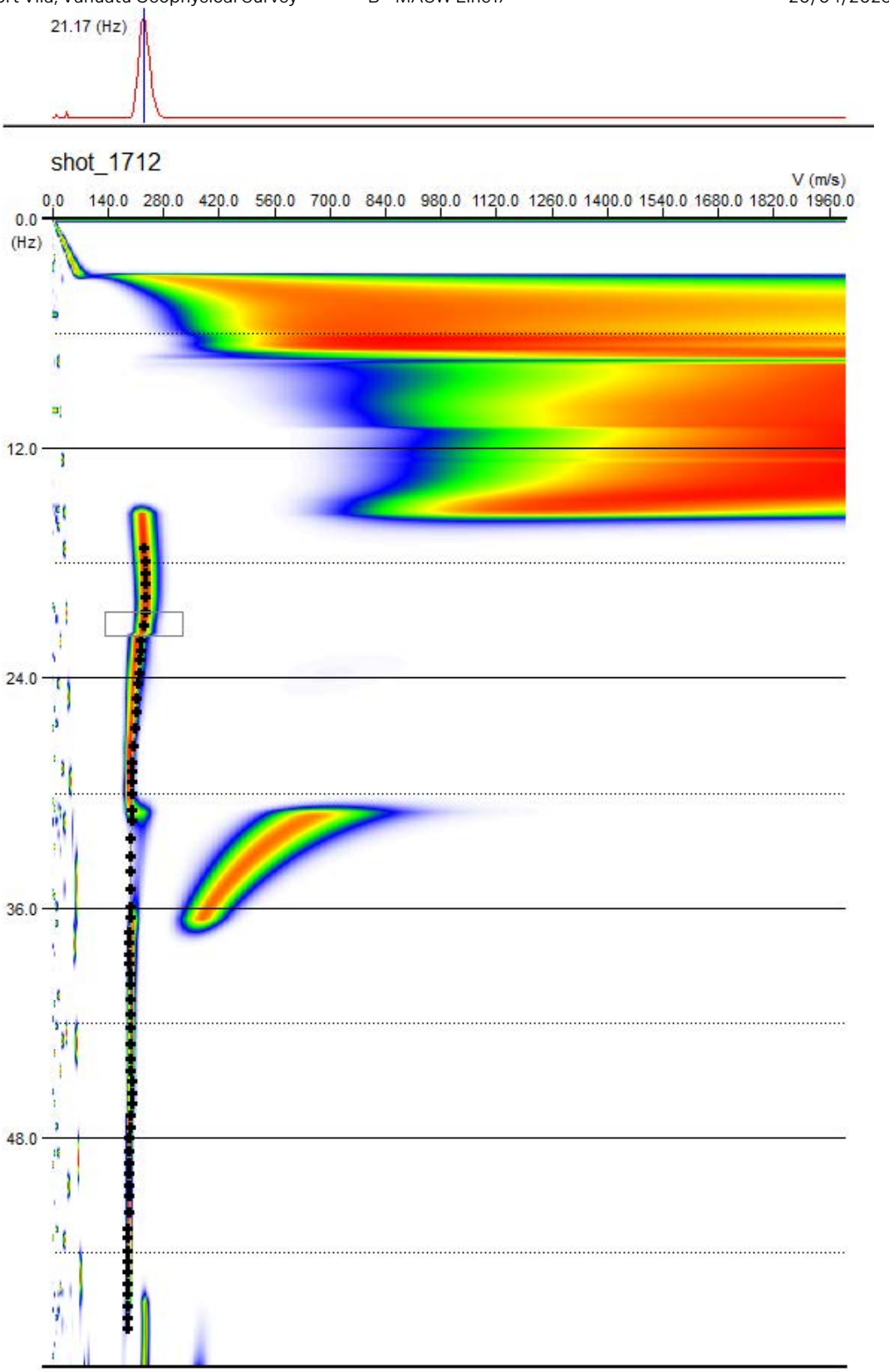

14.16 (Hz)


shot_1709
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0

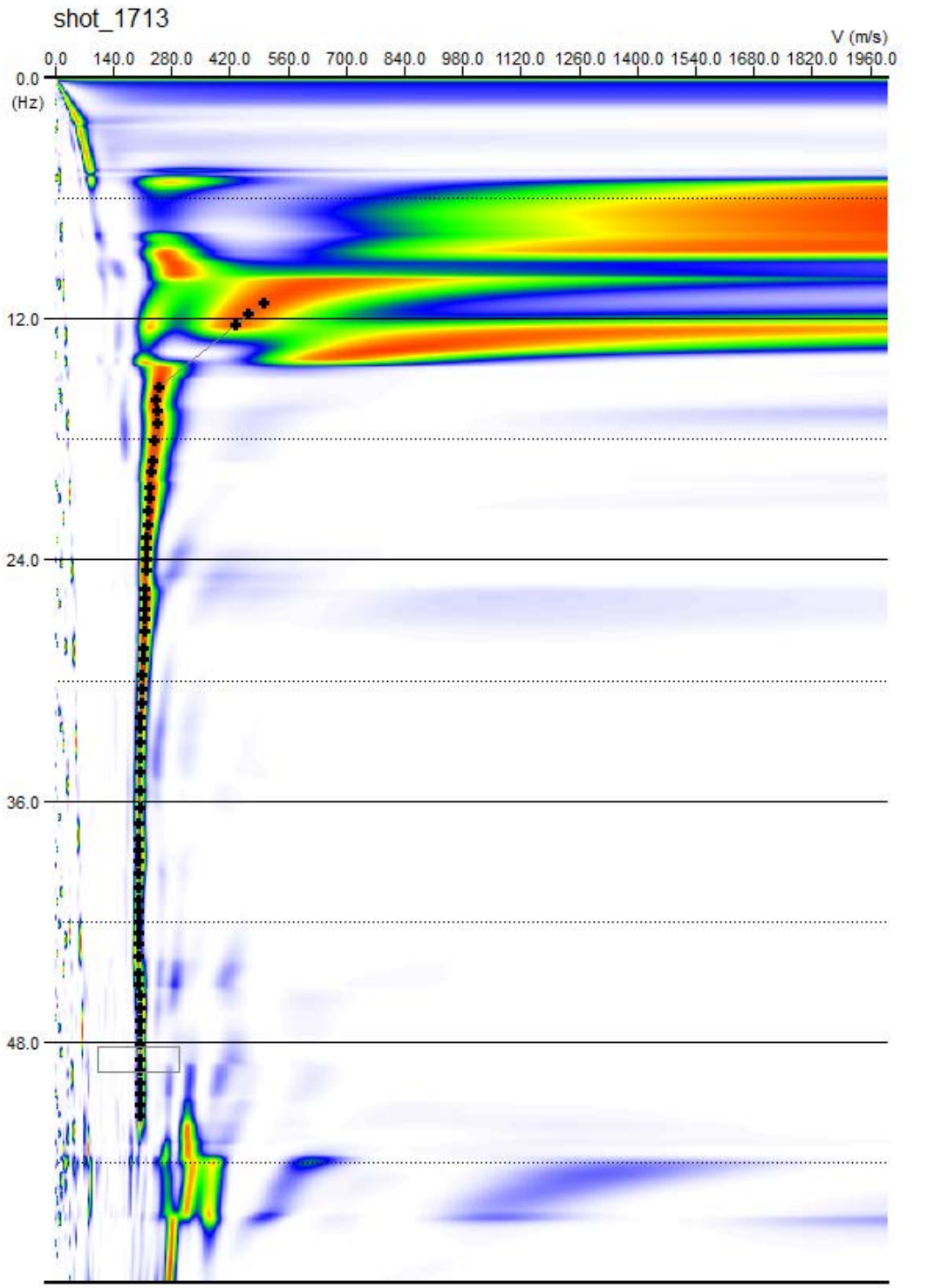

59.61 (Hz)


shot_1710
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0

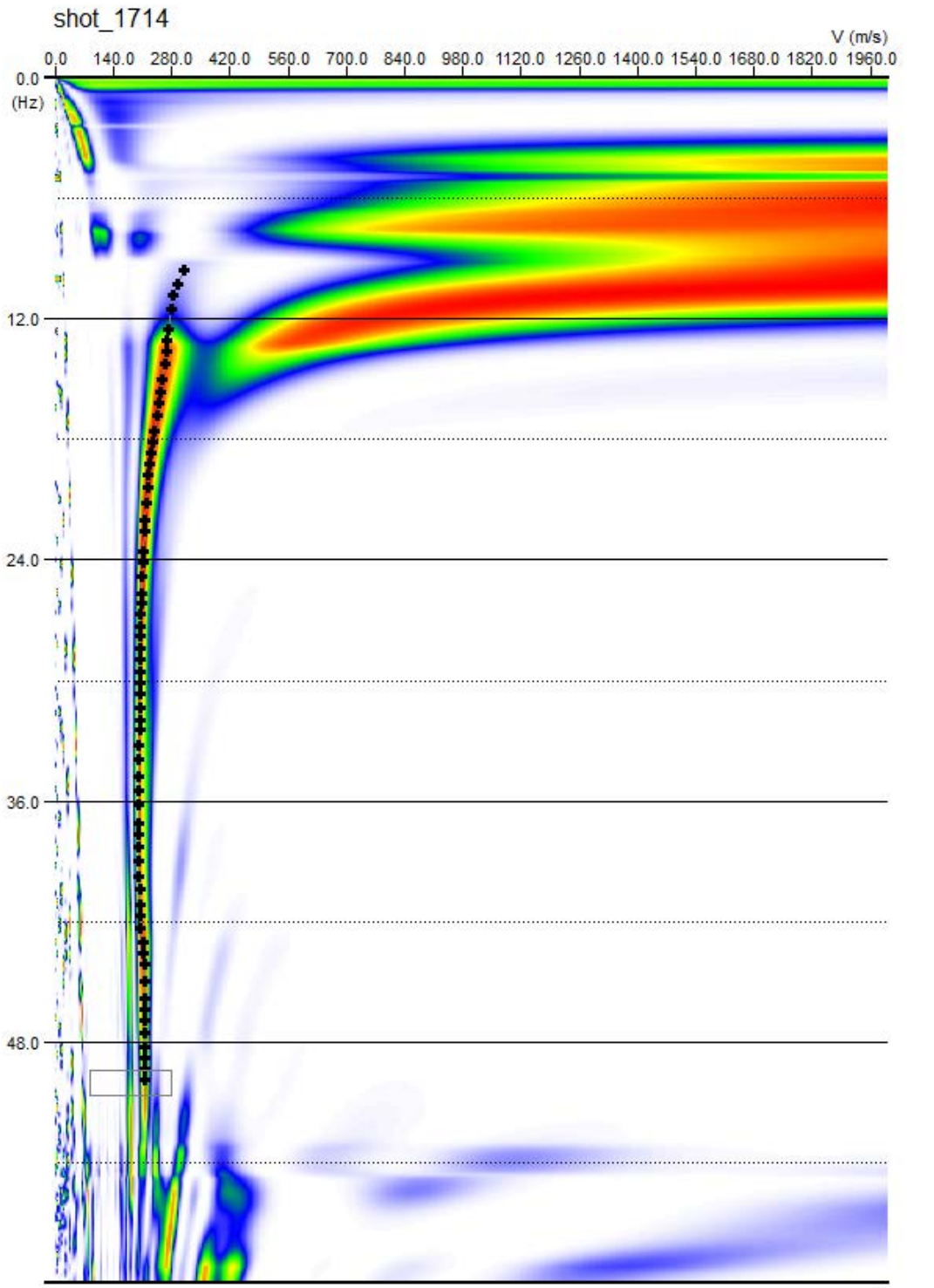

56.65 (Hz)
shot_1711
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0


21.17 (Hz)
shot_1712
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0

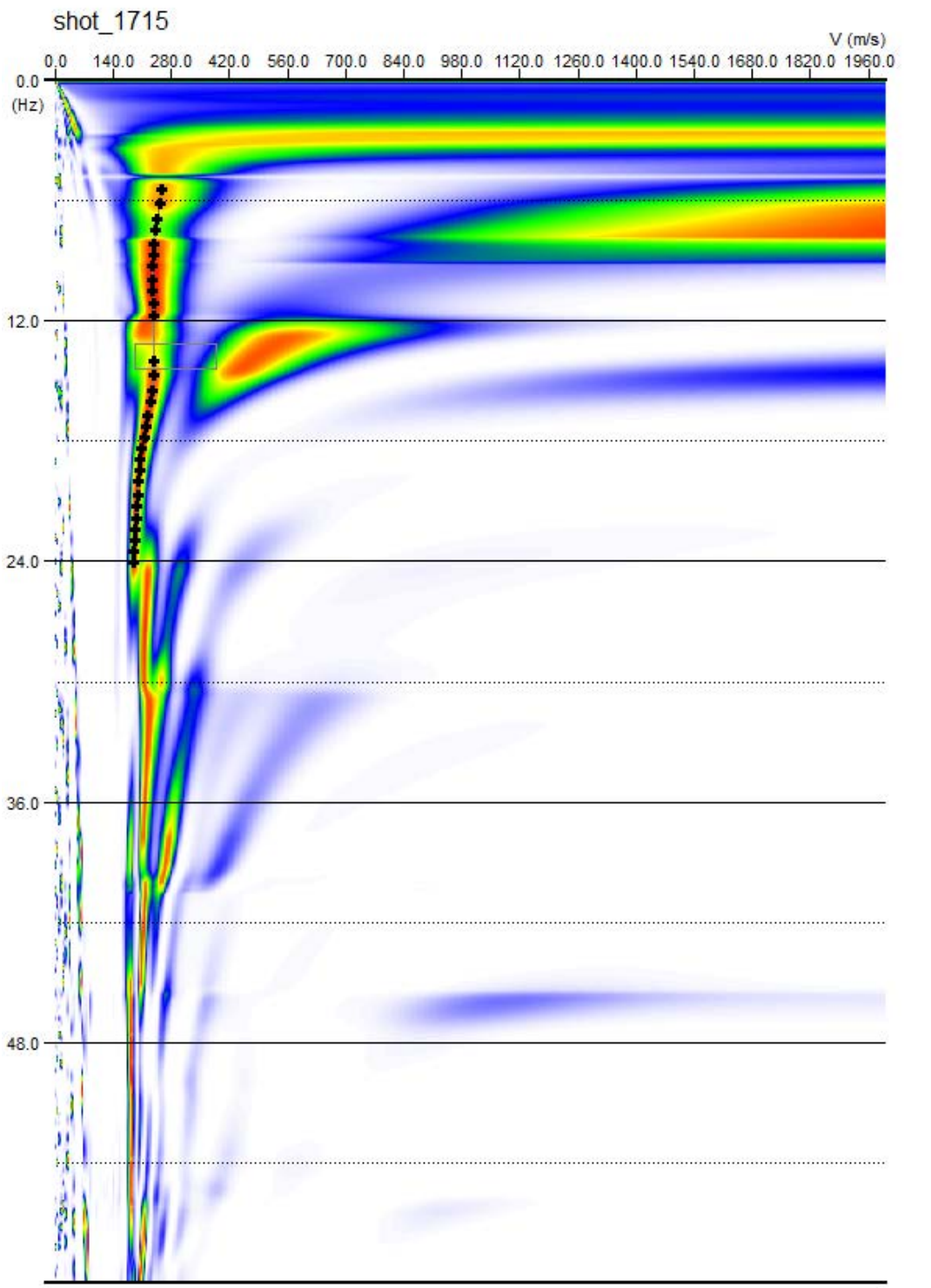

48.87 (Hz)

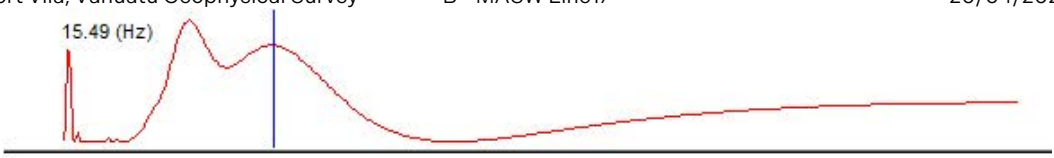

shot_1713
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0


50.04 (Hz)


shot_1714
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0


13.77 (Hz)


shot_1715
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0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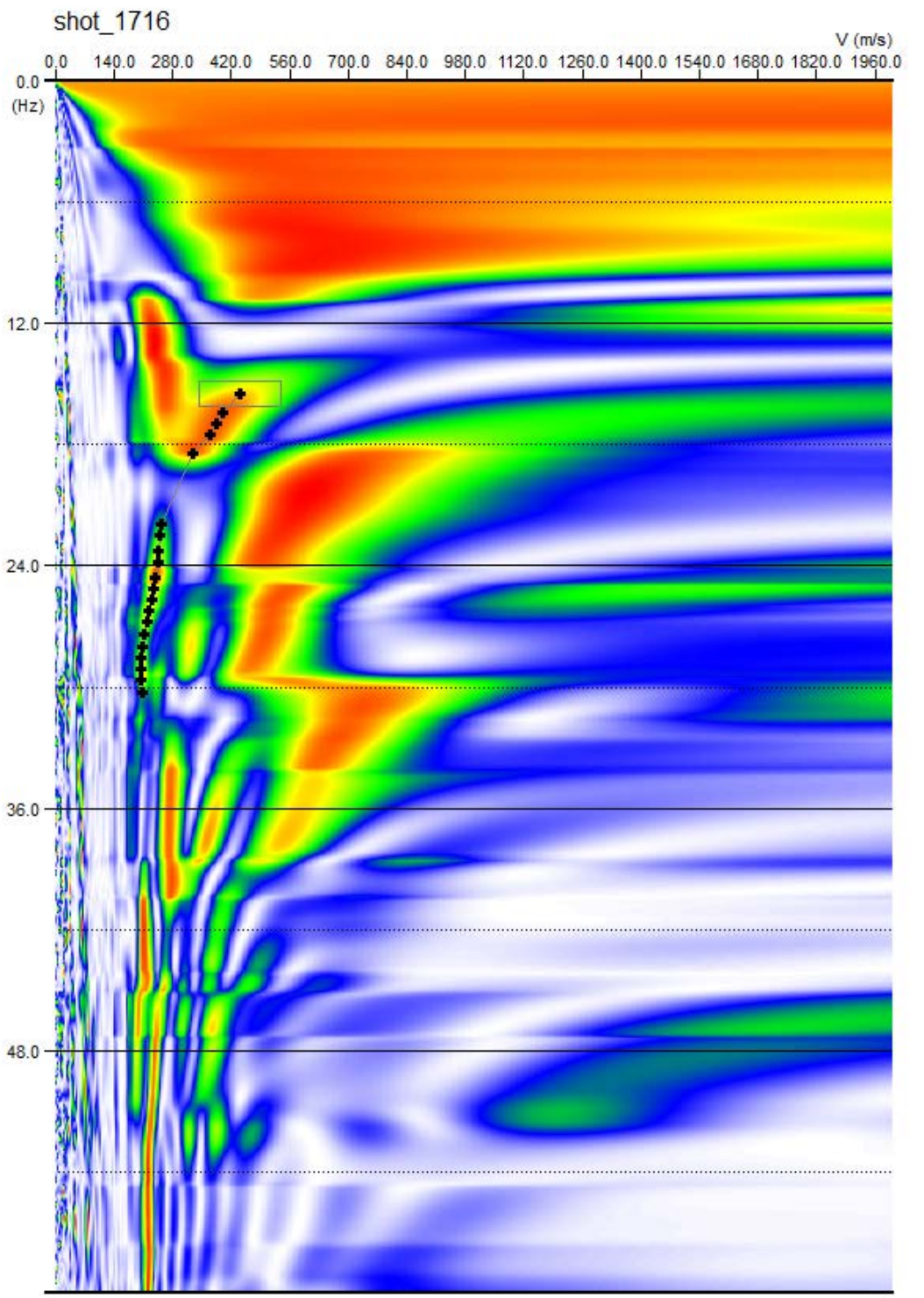
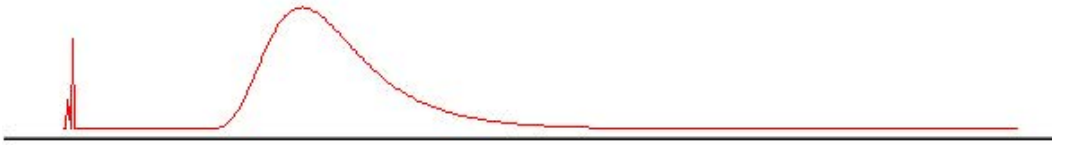
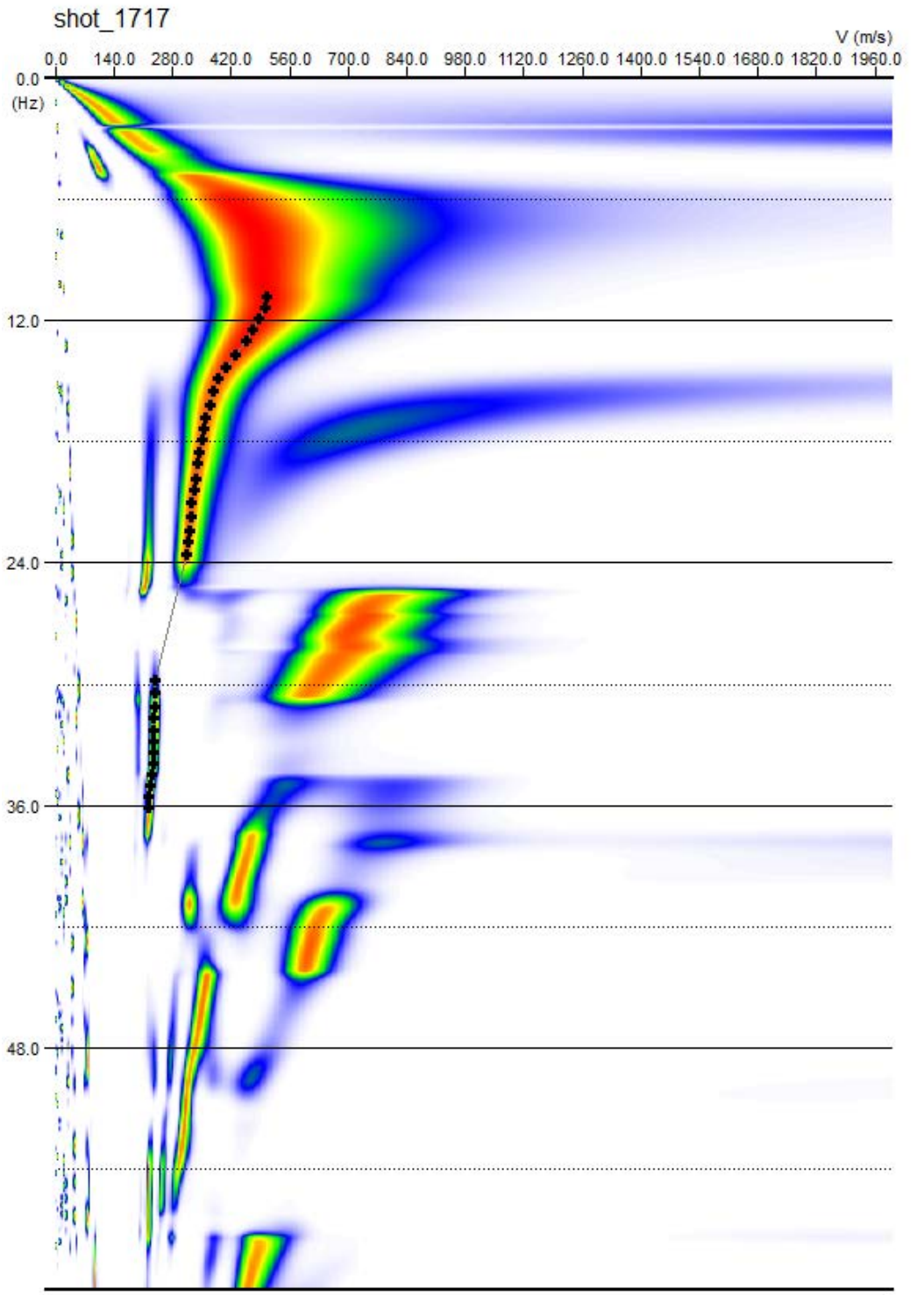
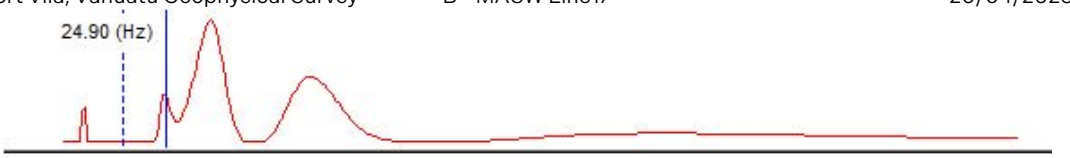
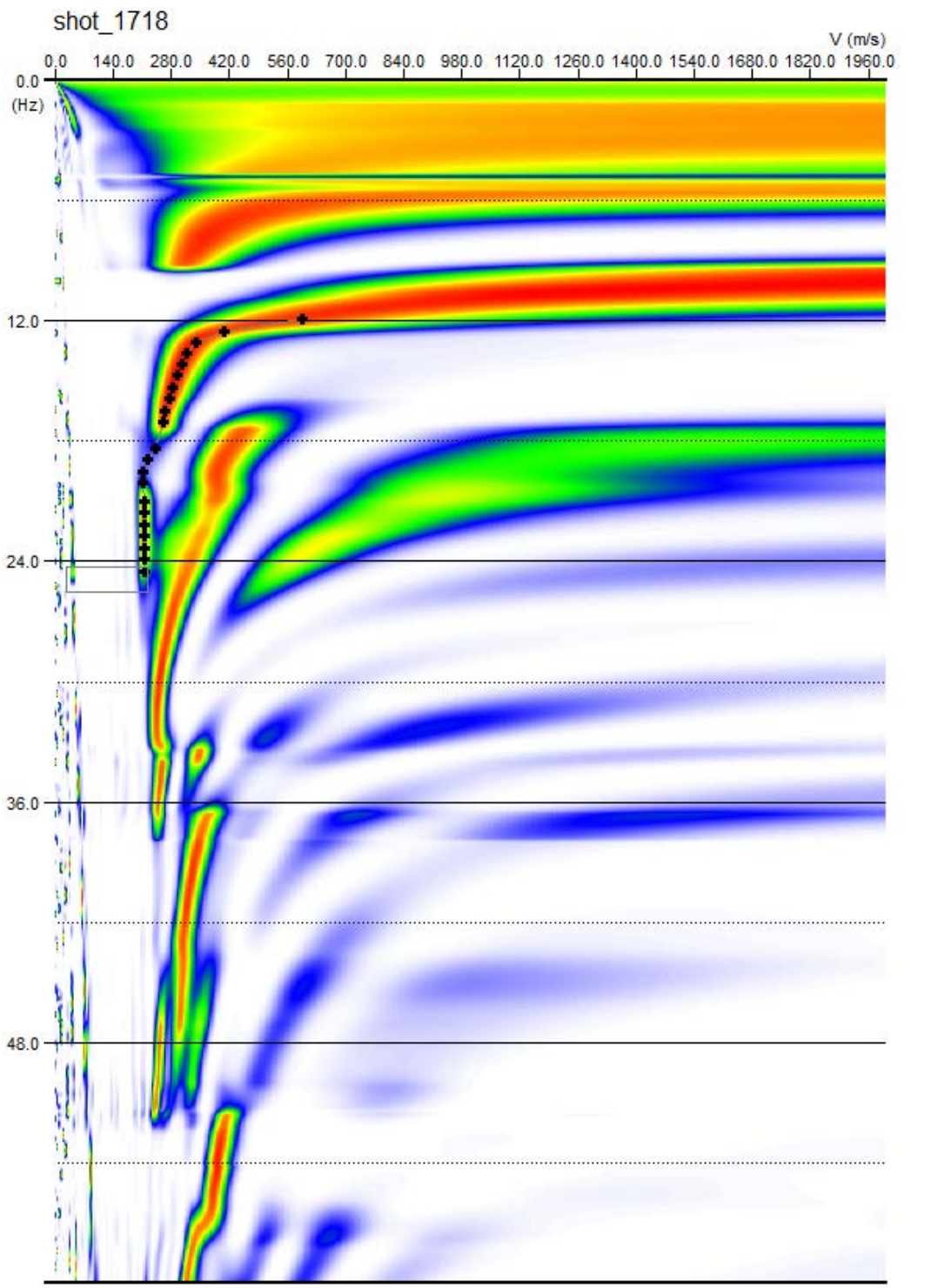
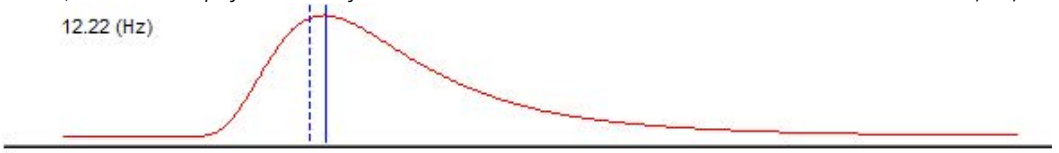

shot_1716
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0




shot_1717
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0


24.90 (Hz)


shot_1718
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0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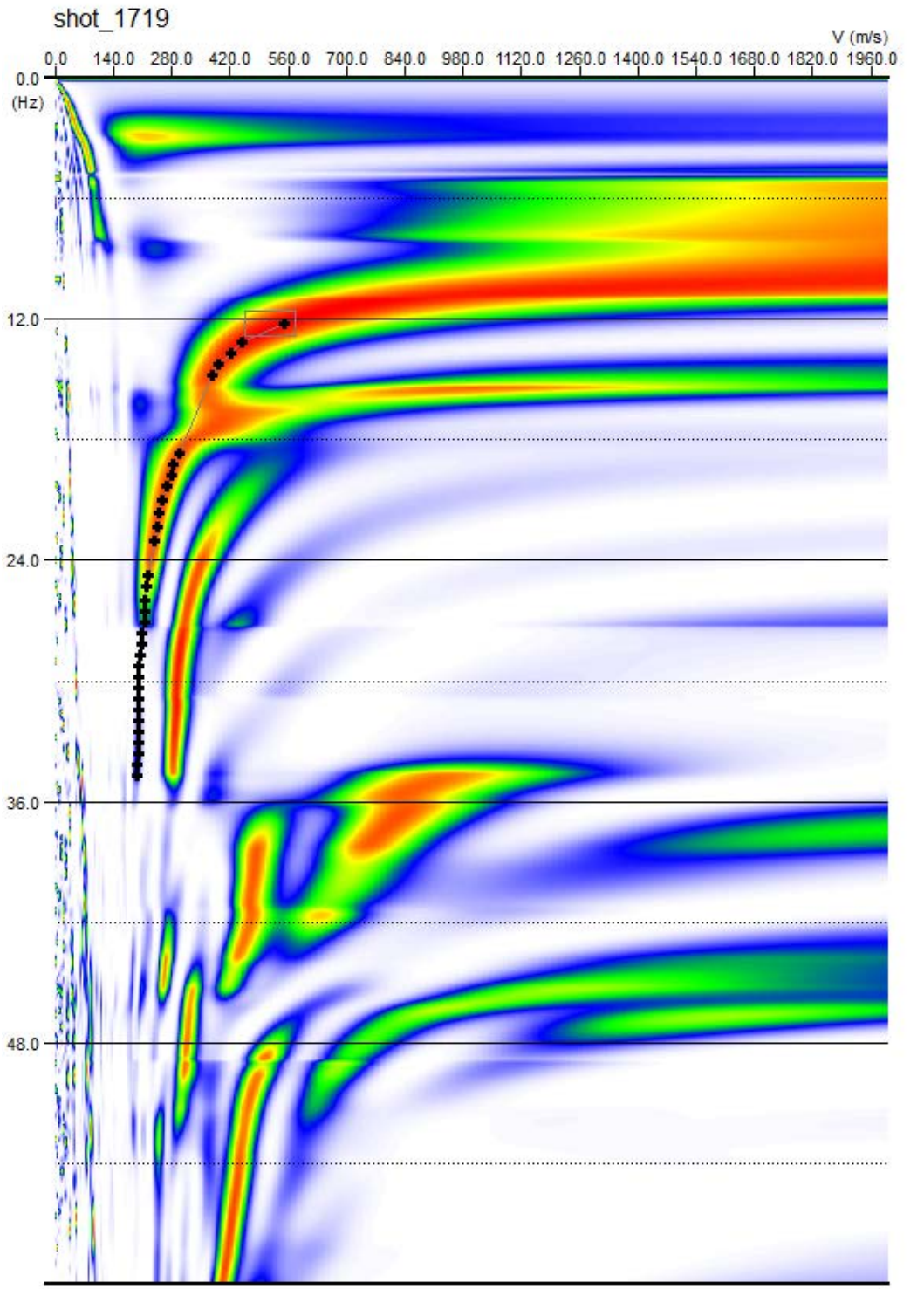
shot_1719
V (m/s)
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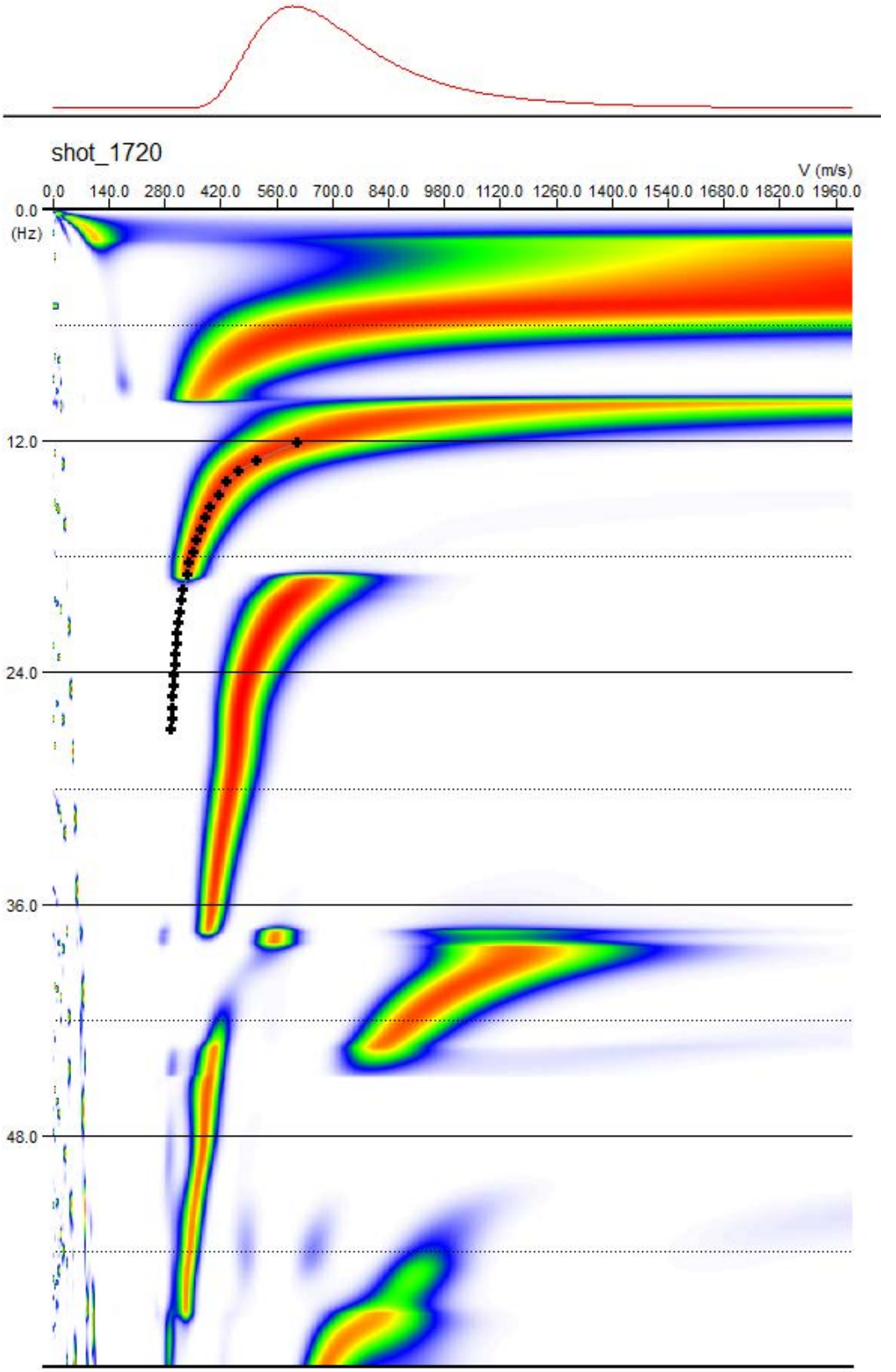
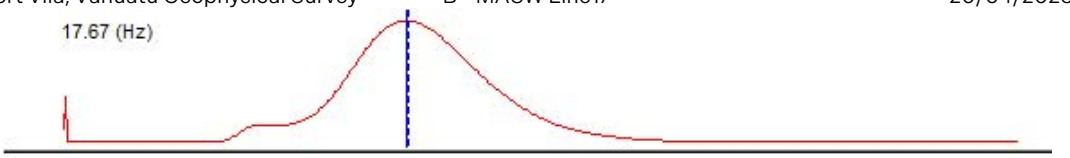
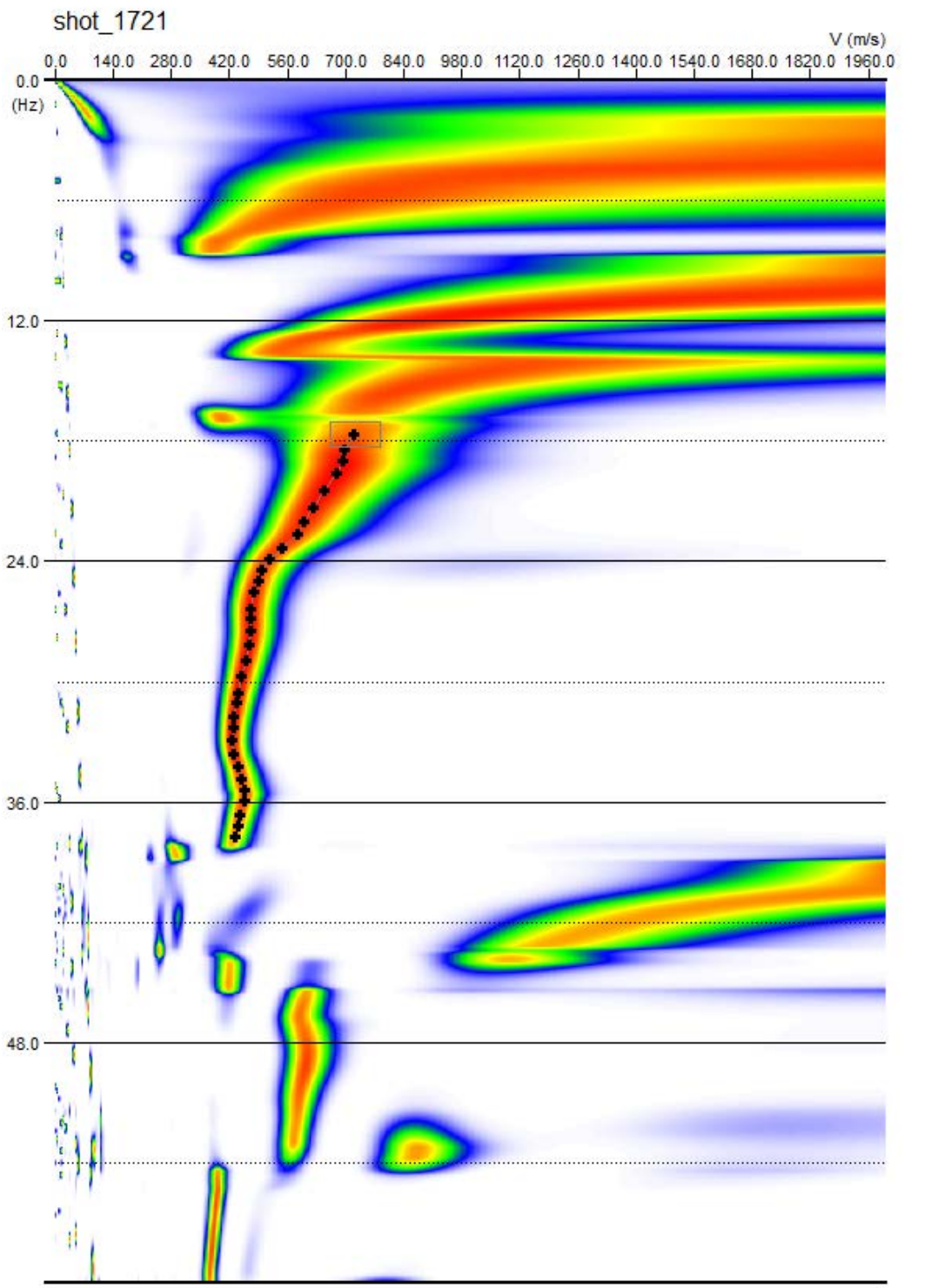
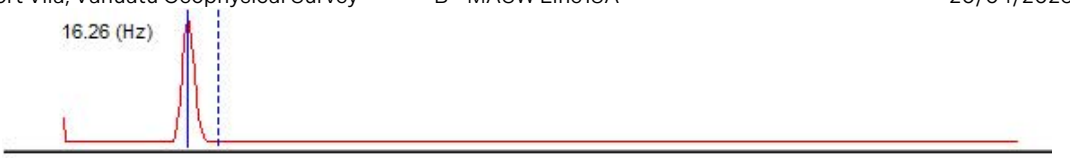
0.0
(Hz)
12.0
24.0
36.0
48.0


shot_1720
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0


17.67 (Hz)


shot_1721
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0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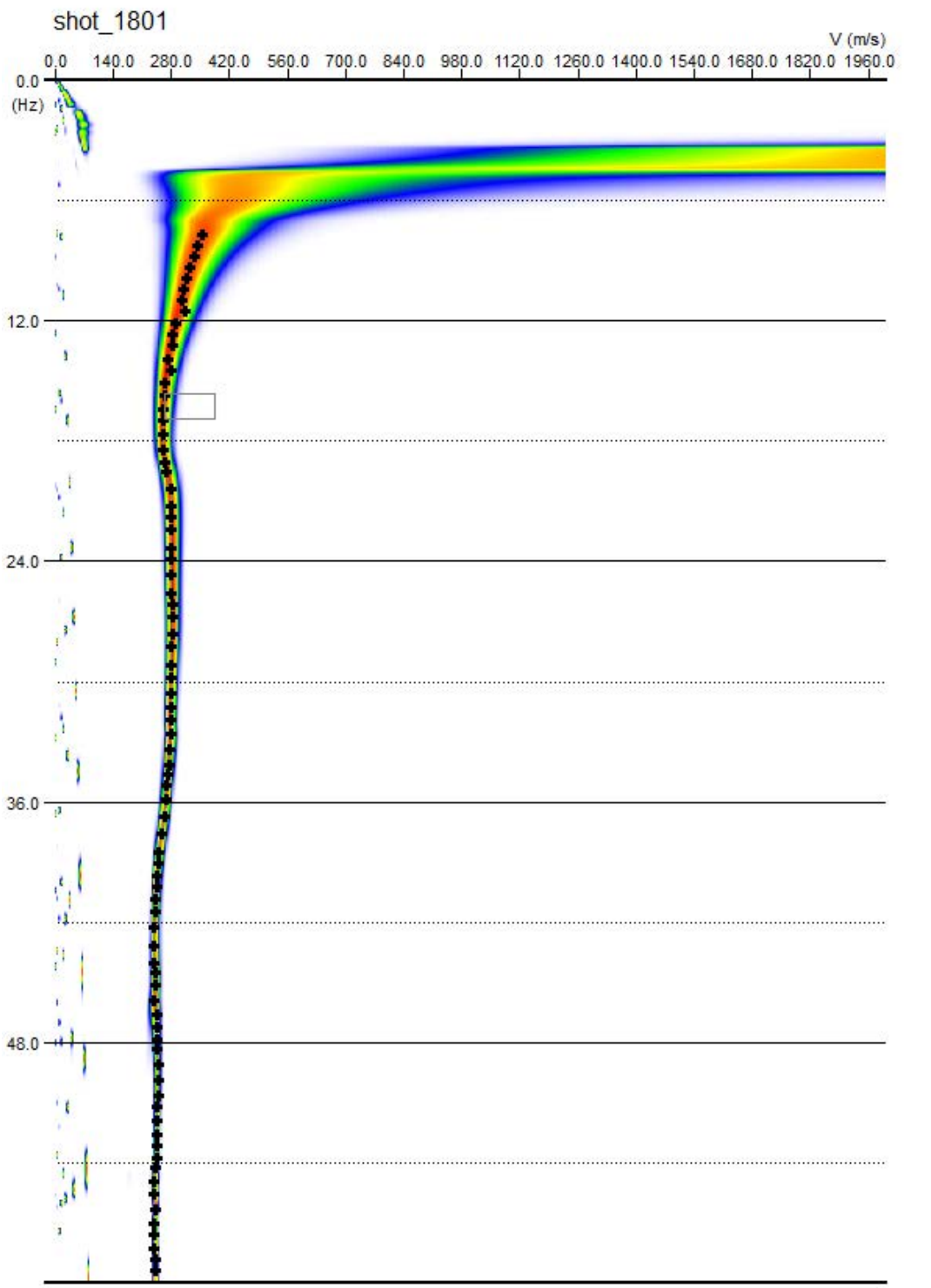
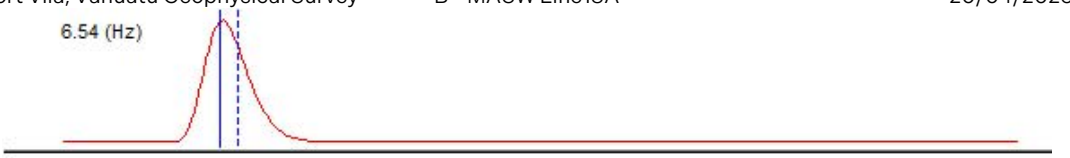

shot_1801
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0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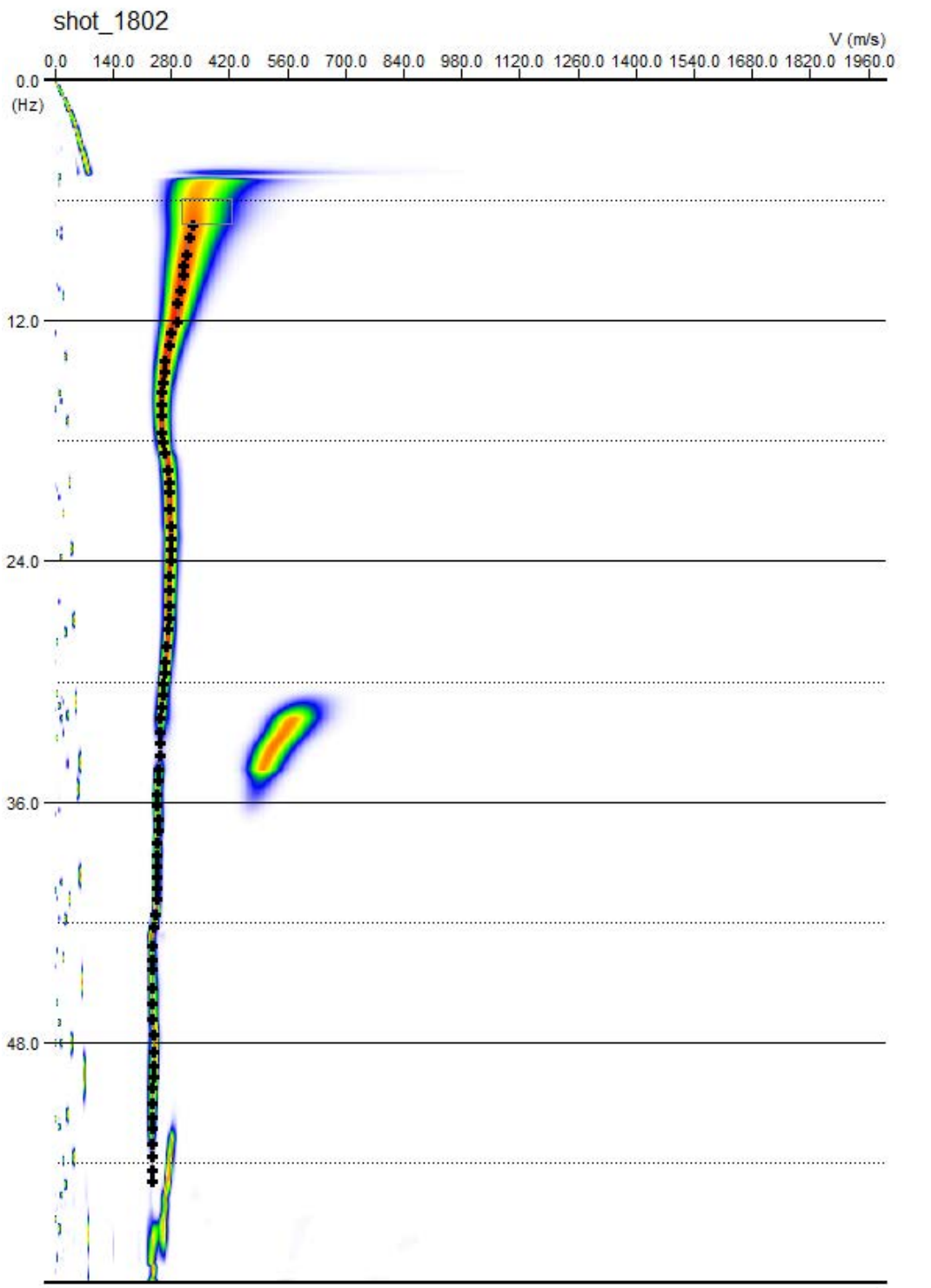
shot_1802
V (m/s)
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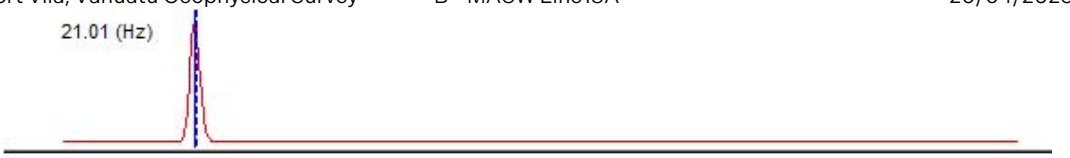
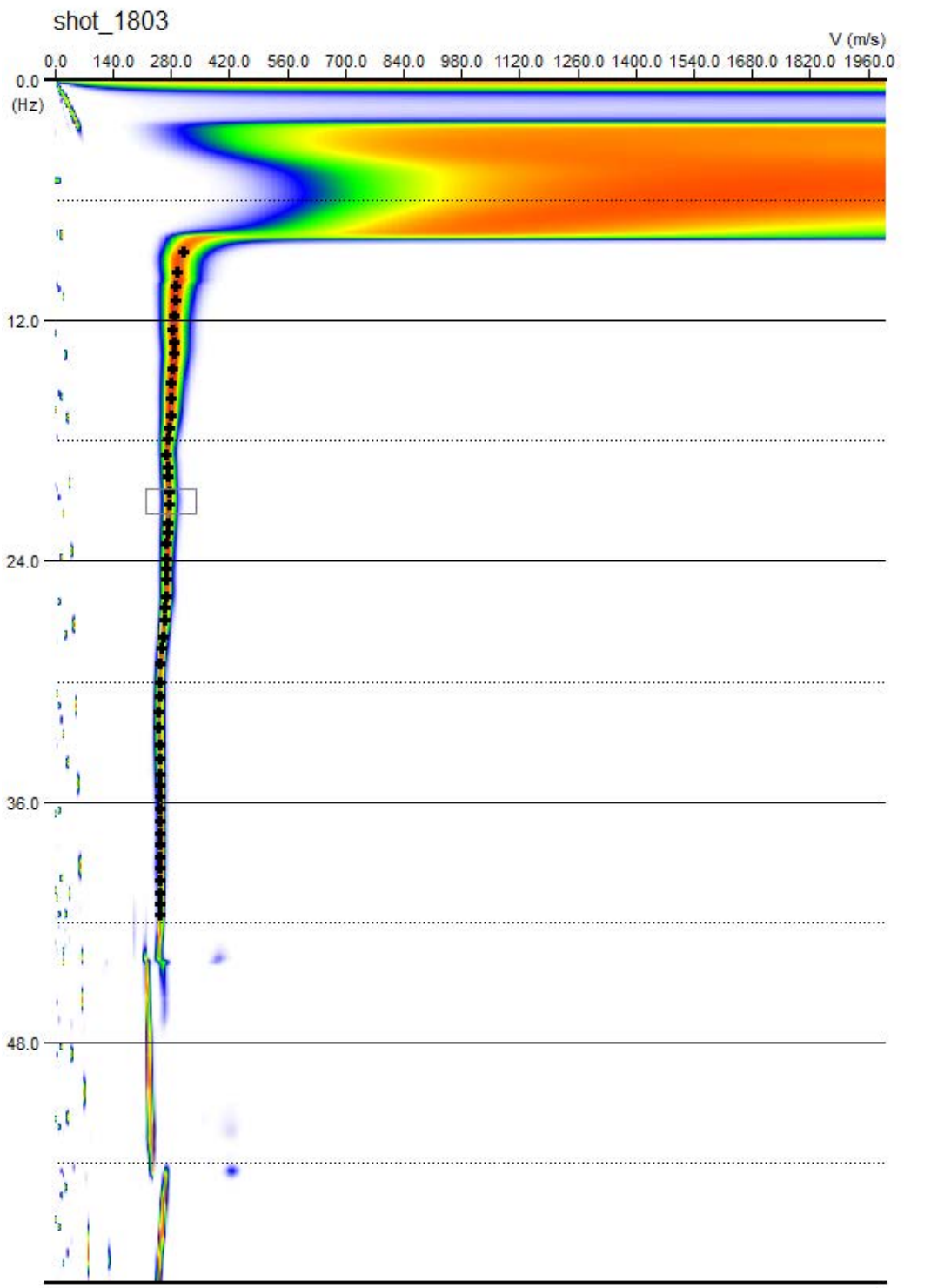
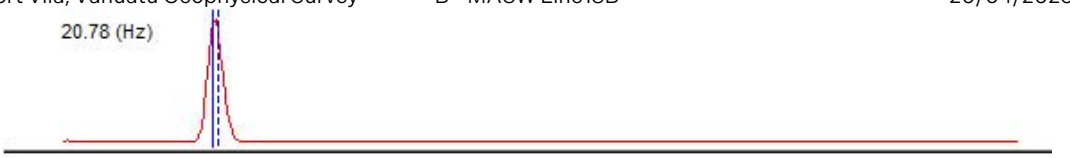
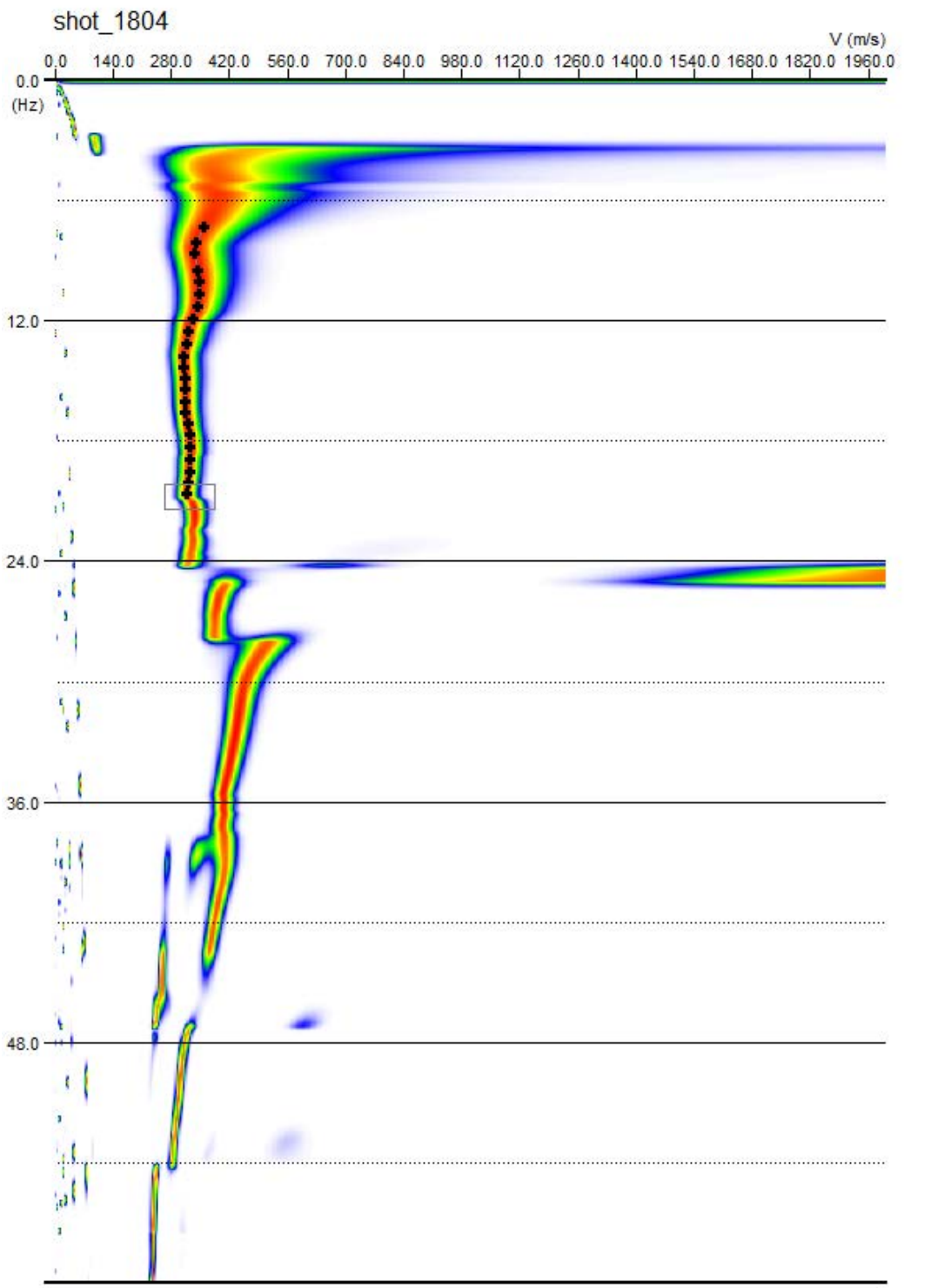
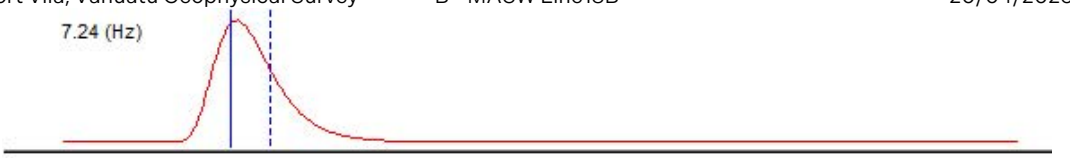
0.0
(Hz)
12.0
24.0
36.0
48.0

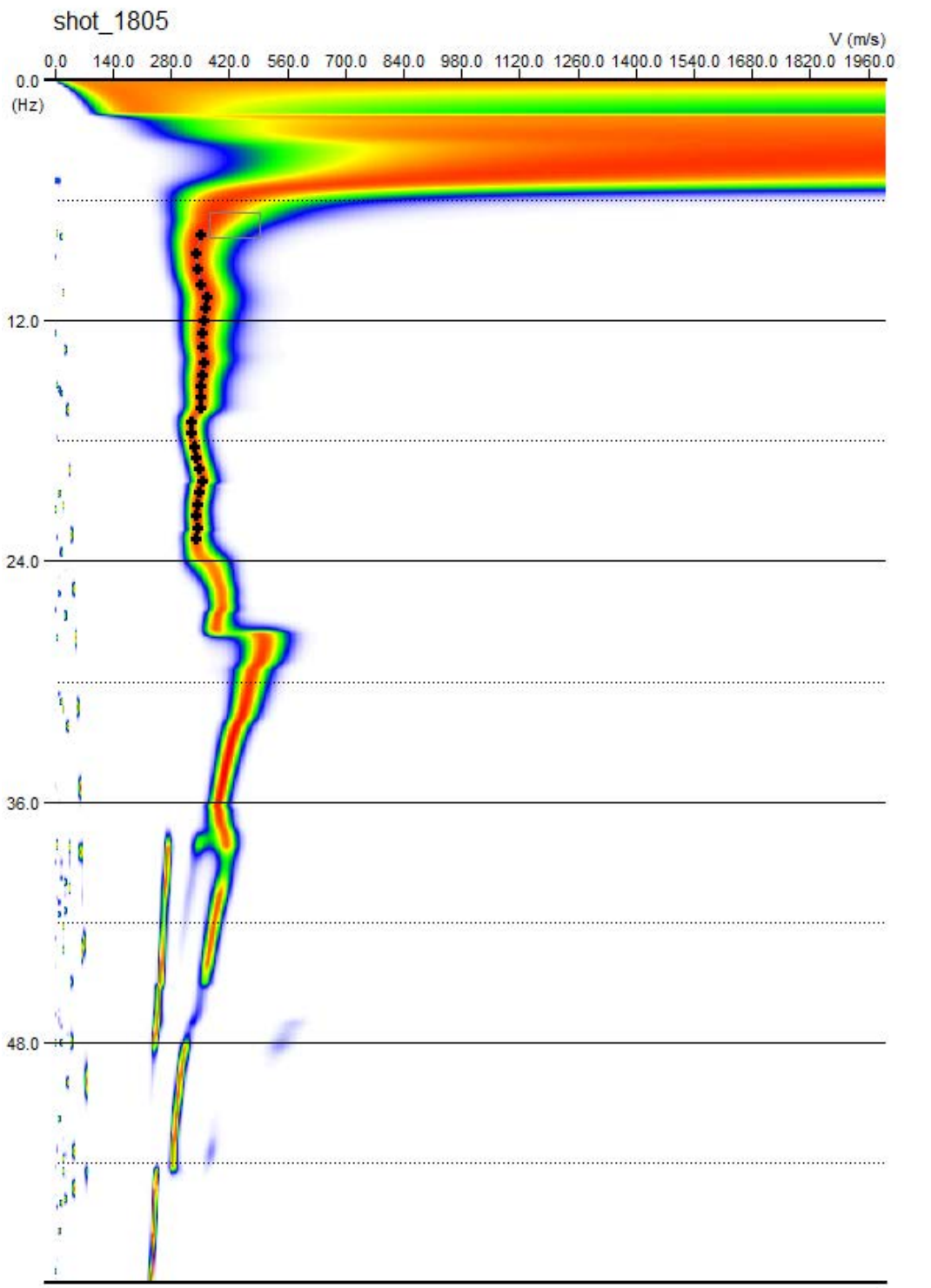

21.01 (Hz)


shot_1803
V (m/s)
0.0 140.0 280.0 420.0 560.0 700.0 840.0 980.0 1120.0 1260.0 1400.0 1540.0 1680.0 1820.0 1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0

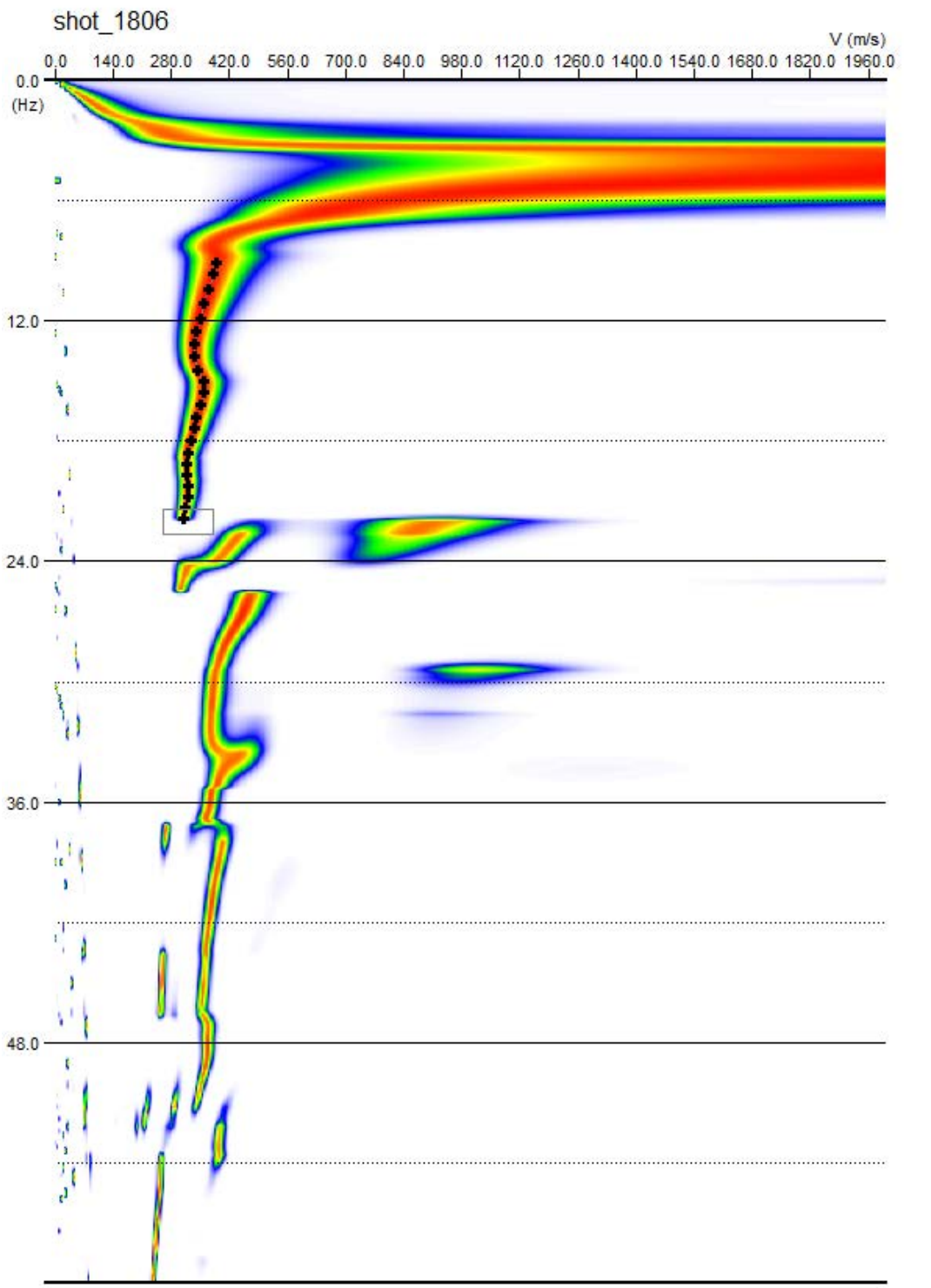

20.78 (Hz)

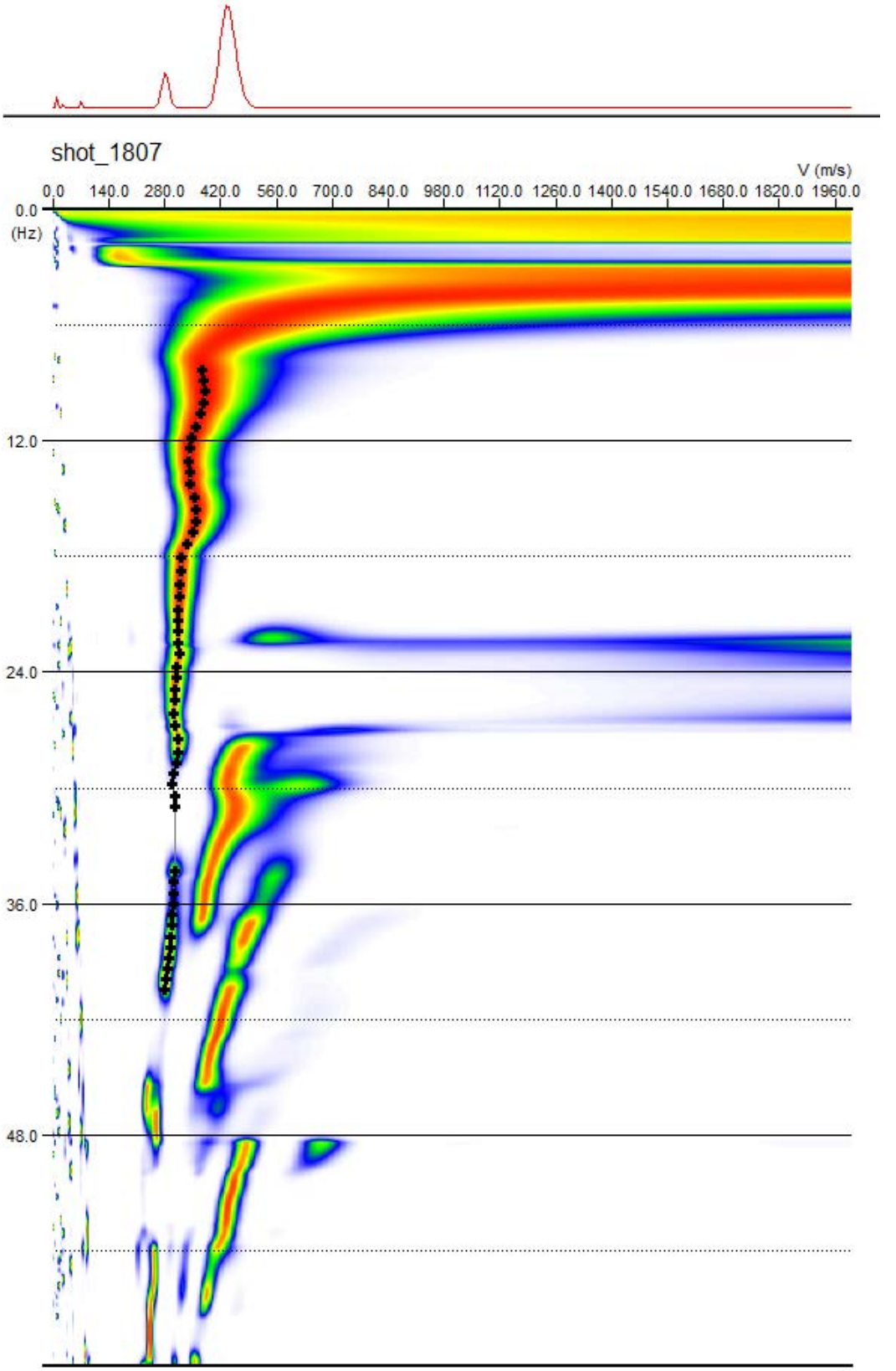

shot_1804
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0

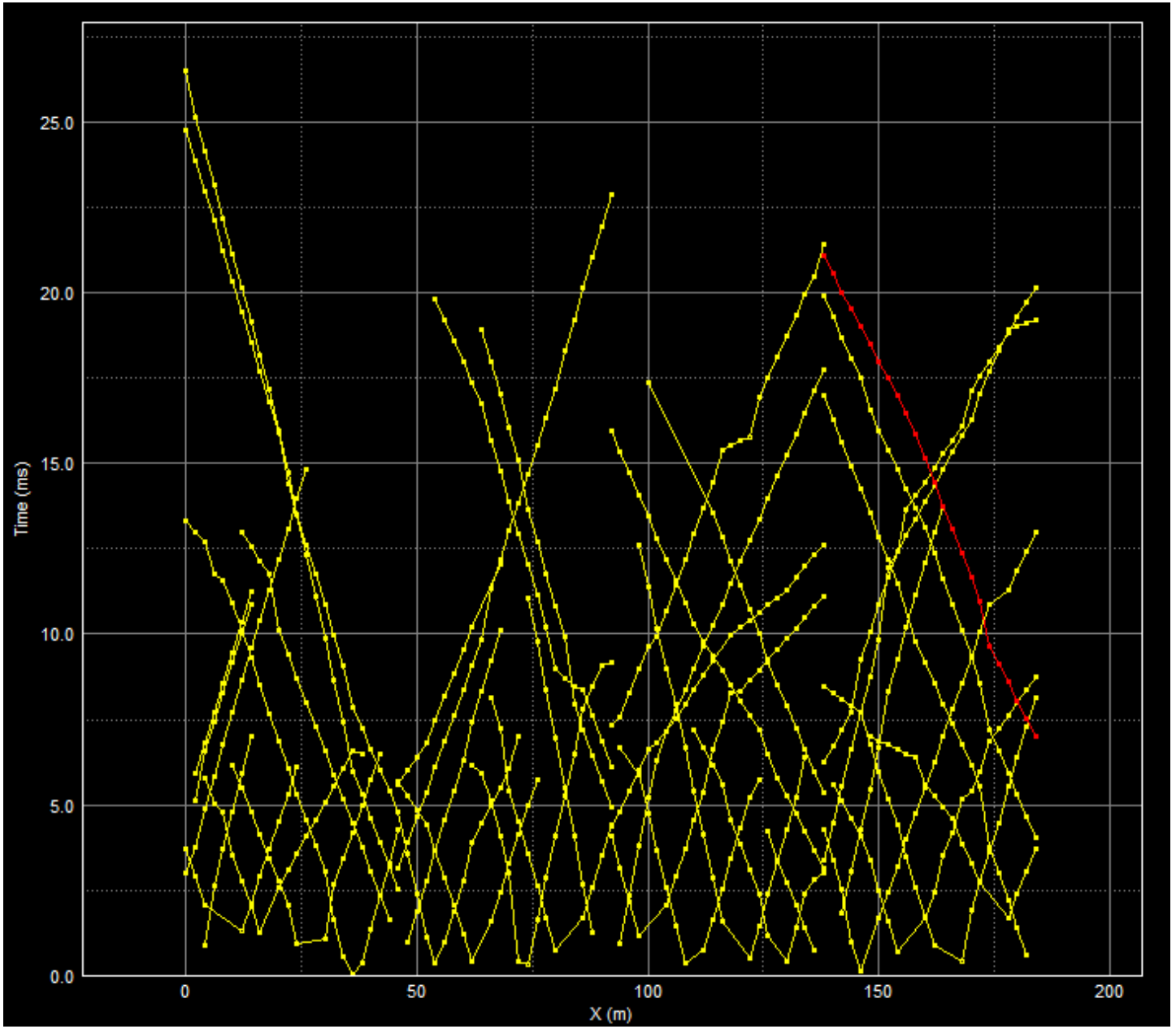

7.24 (Hz)


shot_1805
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0


22.02 (Hz)

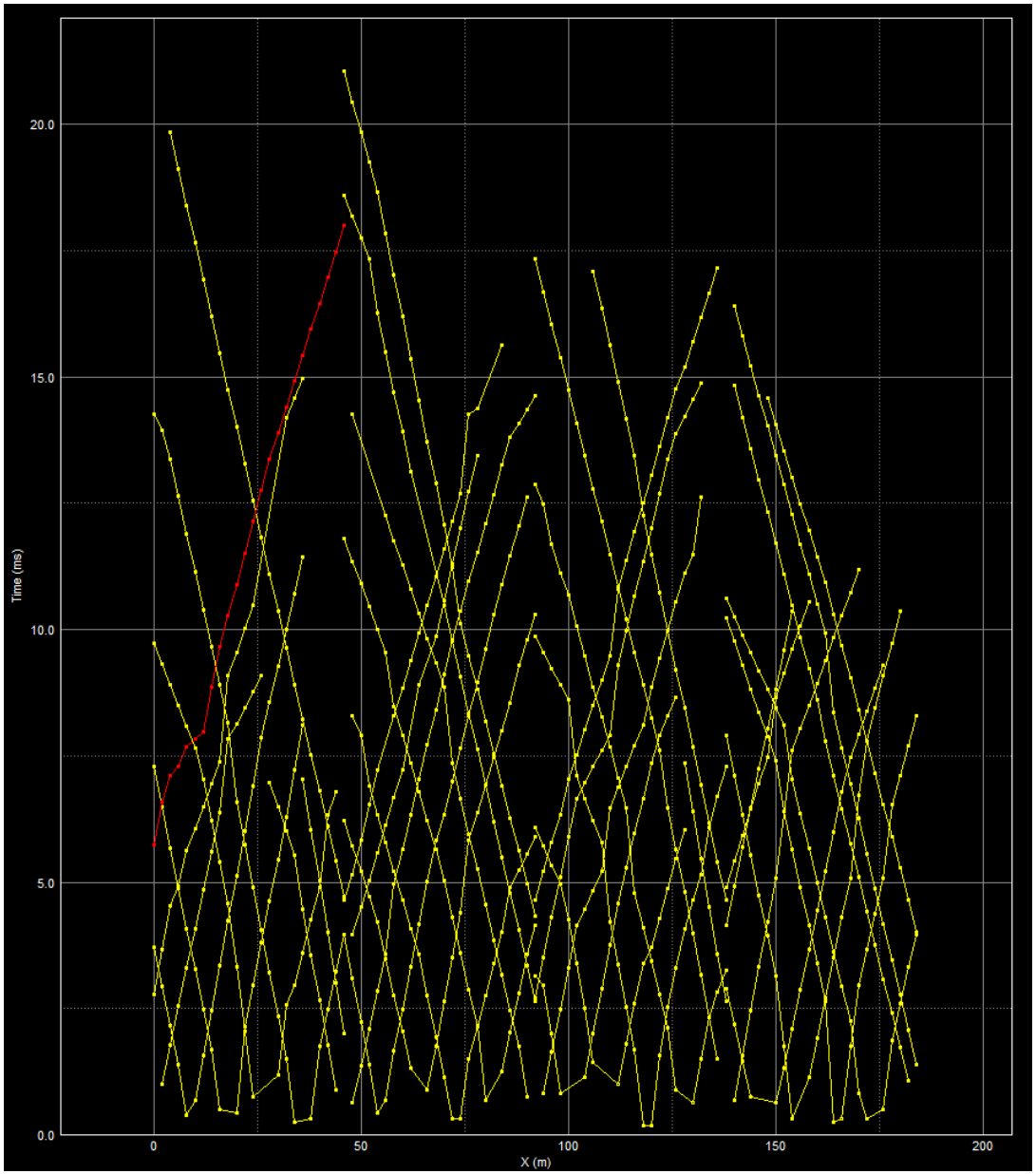

shot_1806
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0


shot_1807
V (m/s)
0.0
140.0
280.0
420.0
560.0
700.0
840.0
980.0
1120.0
1260.0
1400.0
1540.0
1680.0
1820.0
1960.0
0.0
(Hz)
12.0
24.0
36.0
48.0

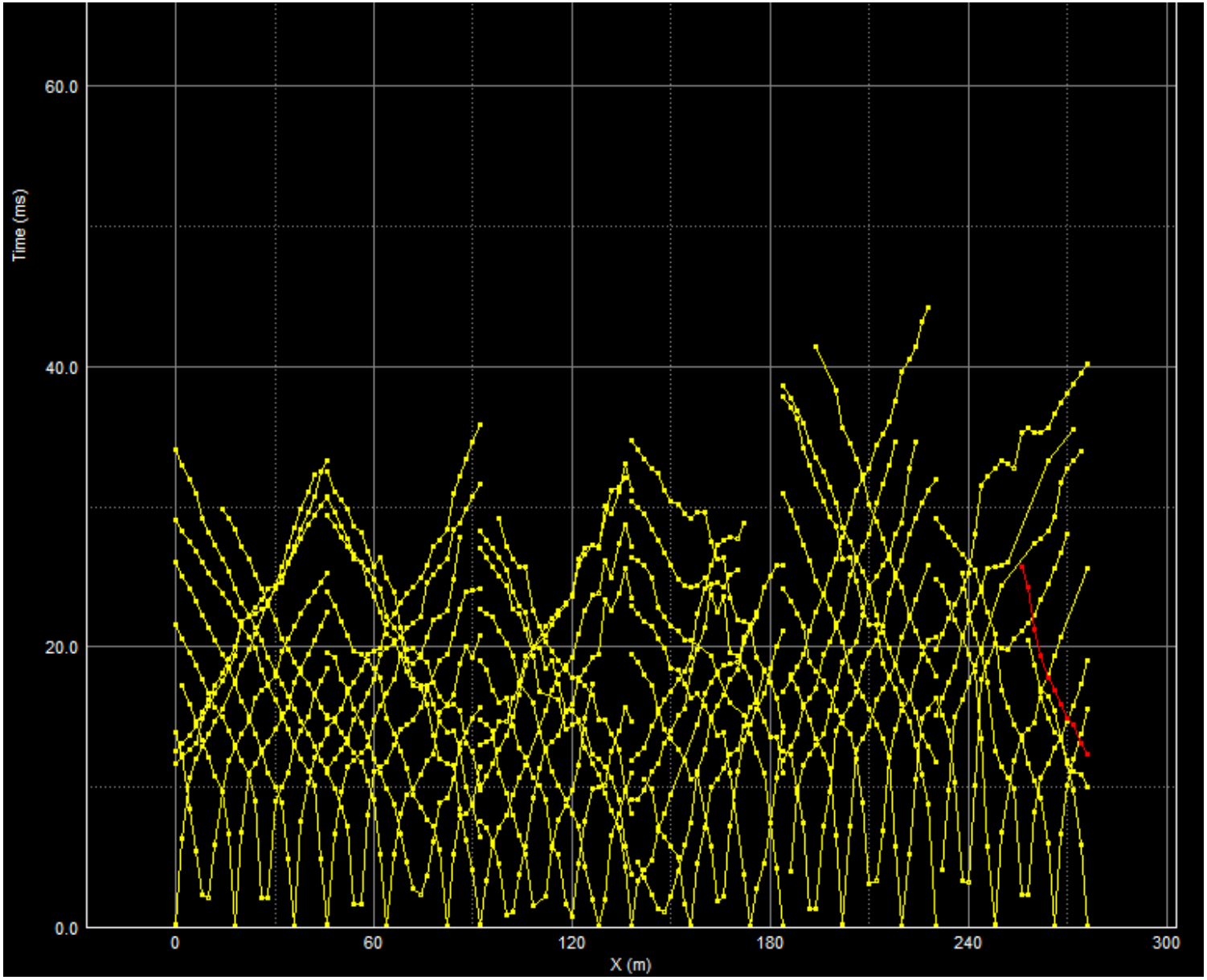


RDCL®

TITLE	SRT Line 01a Travel Time Curve	PROJECT	250306			
PROJECT	Port Vila, Vanuatu Seismic Survey	DRAWN BY	OG	DATE	27/03/26	FIG
CLIENT	T+T	CHECKED BY	SJ	DATE	27/03/26	B01

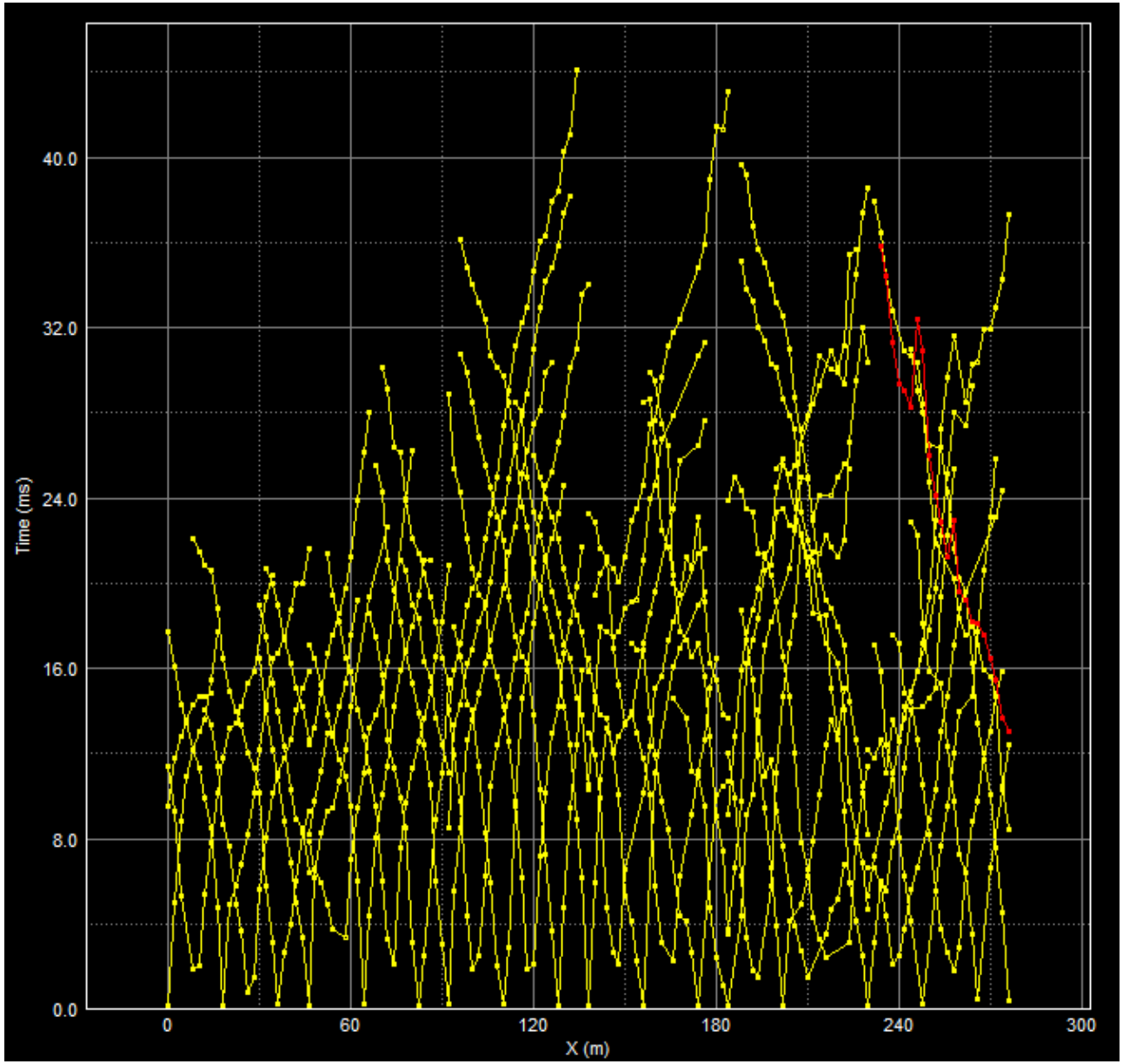


RDCL®	TITLE	SRT Line 01b Travel Time Curve	PROJECT	250306			
	PROJECT	Port Vila, Vanuatu Seismic Survey	DRAWN BY	OG	DATE	27/03/26	FIG
	CLIENT	T+T	CHECKED BY	SJ	DATE	27/03/26	B02



RDCL®

TITLE	SRT Line 02 Travel Time Curve	PROJECT	250306			
PROJECT	Port Vila, Vanuatu Seismic Survey	DRAWN BY	OG	DATE	27/03/26	FIG
CLIENT	T+T	CHECKED BY	SJ	DATE	27/03/26	B03



RDCL®	TITLE	SRT Line 03 Travel Time Curve	PROJECT	250306			
	PROJECT	Port Vila, Vanuatu Seismic Survey	DRAWN BY	OG	DATE	27/03/26	FIG
	CLIENT	T+T	CHECKED BY	SJ	DATE	27/03/26	B04

APPENDIX C

3D LEAPFROG OUTPUTS

APPENDIX D

RAW DATA (DIGITAL ONLY)

APPENDIX E

Vs SOUNDINGS OUTPUTS

TABLES

TABLE E1: SOUNDING 01B. E1
TABLE E2: SOUNDING 01C. E1
TABLE E3: SOUNDING 05A. E2
TABLE E4: SOUNDING 05B. E2
TABLE E5: SOUNDING 05C. E2
TABLE E6: SOUNDING 06A. E3
TABLE E7: SOUNDING 06B. E3
TABLE E8: SOUNDING 06C. E3
TABLE E9: SOUNDING 07A. E4
TABLE E10: SOUNDING 08. E4
TABLE E11: SOUNDING 10A. E4
TABLE E12: SOUNDING 10B. E5
TABLE E13: SOUNDING 14. E5
TABLE E14: SOUNDING 18A. E5
TABLE E15: SOUNDING 18B. E6

TABLE E1: SOUNDING 01B.

From	To	Layer Thickness	Vs
m	m	m	m/s
0	2.26	2.26	352
2.26	4.65	2.39	356
4.65	7.53	2.88	230
7.53	10.99	3.46	284
10.99	15.13	4.14	358
15.13	20.11	4.98	392
20.11	30	9.89	730

TABLE E2: SOUNDING 01C.

From	To	Layer Thickness	Vs
m	m	m	m/s
0	6.21	6.21	282
6.21	8.04	1.83	373
8.04	10.24	2.2	495
10.24	12.89	2.65	585
12.89	16.06	3.17	316
16.06	19.86	3.8	321
19.86	30	10.14	366

TABLE E3: SOUNDING 05A.

From	To	Layer Thickness	Vs
m	m	m	m/s
0	5.74	5.74	255
5.74	8.14	2.4	332
8.14	11.03	2.89	422
11.03	14.49	3.46	332
14.49	18.65	4.16	335
18.65	23.63	4.98	348
23.63	35	11.37	506

TABLE E4: SOUNDING 05B.

From	To	Layer Thickness	Vs
m	m	m	m/s
0	6.76	6.76	309.89
6.76	8.64	1.88	377.78
8.64	10.89	2.25	384.83
10.89	13.59	2.7	394.32
13.59	16.83	3.24	430.74
16.83	20.73	3.9	433.39
20.73	30	9.27	494.05

TABLE E5: SOUNDING 05C.

From	To	Layer Thickness	Vs
m	m	m	m/s
0	5.7	5.7	322.17
5.7	7.71	2.01	341.26
7.71	10.13	2.42	392.2
10.13	13.03	2.9	430.61
13.03	16.51	3.48	441.1
16.51	20.69	4.18	481.05
20.69	30	9.31	502.72

TABLE E6: SOUNDING 06A.

From	To	Layer Thickness	Vs
m	m	m	m/s
0	2.64	2.64	226.3
2.64	5.37	2.73	247.58
5.37	8.63	3.26	268.83
8.63	12.56	3.93	309.74
12.56	17.26	4.7	329.41
17.26	22.91	5.65	382.77
22.91	30	7.09	607.19

TABLE E7: SOUNDING 06B.

From	To	Layer Thickness	Vs
m	m	m	m/s
0	2.28	2.28	319.72
2.28	4.62	2.34	262.9
4.62	7.43	2.81	306.58
7.43	10.8	3.37	337.78
10.8	14.84	4.04	439.61
14.84	19.7	4.86	447.41
19.7	30	10.3	527.06

TABLE E8: SOUNDING 06C.

From	To	Layer Thickness	Vs
m	m	m	m/s
0	6.16	6.16	404.15
6.16	8.21	2.05	426
8.21	10.68	2.47	426.89
10.68	13.63	2.95	503.43
13.63	17.18	3.55	568.32
17.18	21.44	4.26	578.03
21.44	30	8.56	733.91

TABLE E9: SOUNDING 07A.

From	To	Layer Thickness	Vs
m	m	m	m/s
0	2.33	2.33	222.63
2.33	4.79	2.46	280.25
4.79	7.74	2.95	293.16
7.74	11.28	3.54	326.96
11.28	15.53	4.25	332.03
15.53	20.62	5.09	548.41
20.62	30	9.38	645.84

TABLE E10: SOUNDING 08.

From	To	Layer Thickness	Vs
m	m	m	m/s
0	2.3	2.3	278.67
2.3	4.69	2.39	291.79
4.69	7.57	2.88	303.31
7.57	11.02	3.45	323.43
11.02	15.16	4.14	375.62
15.16	20.14	4.98	521.13
20.14	30	9.86	642.84

TABLE E11: SOUNDING 10A.

From	To	Layer Thickness	Vs
m	m	m	m/s
0	3.4	3.4	286.95
3.4	6.28	2.88	347.35
6.28	9.74	3.46	357.65
9.74	13.89	4.15	391.48
13.89	18.87	4.98	425.86
18.87	24.85	5.98	448.12
24.85	35	10.15	554.95

TABLE E12: SOUNDING 10B.

From	To	Layer Thickness	Vs
m	m	m	m/s
0	3.45	3.45	479.27
3.45	5.35	1.9	576.75
5.35	7.62	2.27	316.18
7.62	10.36	2.74	362.63
10.36	13.64	3.28	493.01
13.64	17.57	3.93	584.74
17.57	30	12.43	357.04

TABLE E13: SOUNDING 14.

From	To	Layer Thickness	Vs
m	m	m	m/s
0	4.88	4.88	524.59
4.88	6.73	1.85	325.42
6.73	8.96	2.23	355.69
8.96	11.62	2.66	357.88
11.62	14.82	3.2	505.23
14.82	18.67	3.85	520.31
18.67	25	6.33	534.29

TABLE E14: SOUNDING 18A.

From	To	Layer Thickness	Vs
m	m	m	m/s
0	2.04	2.04	228.5
2.04	4.22	2.18	320.69
4.22	6.85	2.63	297.22
6.85	9.99	3.14	317
9.99	13.77	3.78	329.32
13.77	18.31	4.54	337.37
18.31	30	11.69	385.64

TABLE E15: SOUNDING 18B.

From	To	Layer Thickness	Vs
m	m	m	m/s
0	3.48	3.48	298.87
3.48	6.04	2.56	309.63
6.04	9.1	3.06	388.28
9.1	12.79	3.69	390.92
12.79	17.2	4.41	414.35
17.2	22.5	5.3	448.95
22.5	30	7.5	495.93

Appendix E Kahuto drone survey

KAHUTO



Tonkin & Taylor Port Villa CBD Vanuatu LiDAR and Imagery Project Report

11th December 2025

Project Summary

Kahuto Pacific has been contracted to provide UAV LiDAR and imagery work at CBD Vanuatu.

Objectives

The objective of the drone survey is to provide an accurate and precise complete site model for the Port Vila CBD area. It was specifically requested for survey points calibrated for post-earthquake tectonic movement. This calibration is essential as the client plans to compare the resulting bare earth model with pre-earthquake models to accurately identify both vertical and potential horizontal ground displacement caused by the seismic event.

Scope of work

The drone survey services is to include, but not be limited to, the following:

- Acquire the necessary permits for drone flight and flightpath.
- Conduct preliminary ground surveys to establish all necessary control points across the subject area. The proposed origins of datums and survey stations must be presented for approval.
- The lateral and height tolerance shall not exceed 50mm.
- Cover the extents within UTM59s Coordinates:

i) 215131, 8035809
ii)215941, 80335666
iii) 216190, 8036870
iv) 215882, 8037451
v)215017, 8037515
vi)214719, 8038918
vii) 214337, 8037953
viii)214900,8036980

LOCATION: The proposed development is located at Port Vila CBD, Vanuatu.

Kahuto will be required to undertake;

- Lidar (Drone) survey
- Imagery (Drone) survey
- Survey Control (GNSS)

Deliverables

The following deliverables should be provided upon completion of the project:

- Controls Survey report in PDF
- LiDAR & Imagery report in PDF
- Drone LiDAR, Imagery GNSS survey to generate complete site model for baseline

topography.

- Bare Earth surface (DEM) as RASTER and DWG
- Contours as DWG
- Ortho Photo as GeoTiff, Ecw, Pdf
- Final plans in PDF and CAD ready format

The delivery of the project is summarized with the below key processes.

- Pre project planning
- Mobilize to site with required equipment
- Transfer control to site with high precision
- Place Control for UAV survey and site control
- Undertake detailed UAV LiDAR imagery acquisition of site
- Process acquired data to project deliverables
- Perform quality control checks on all acquired data and duplicate raw data

Kahuto mobilized to the site and undertook the UAV surveys between the 7th of November to the 11th of November 2025.

During this time, site control was also placed to ensure accurate ties to the previous site datum.

A detailed survey report is provided as an appendix to this report.

Our control used for the site consisted of a number of 17 GCP points and also 3 LiDAR check grids to ensure the LiDAR and imagery work are well aligned to the site coordinates. These control points and coordinates are shown below and can be provided as requested in csv both in UTM59s and TM77 Efate projections.

Acquired UAV LiDAR data was processed, integrated with the survey control and topographic data generated to cover the full area of interest. A high resolution ortho-photo has also been generated.

Flight Planning and Execution

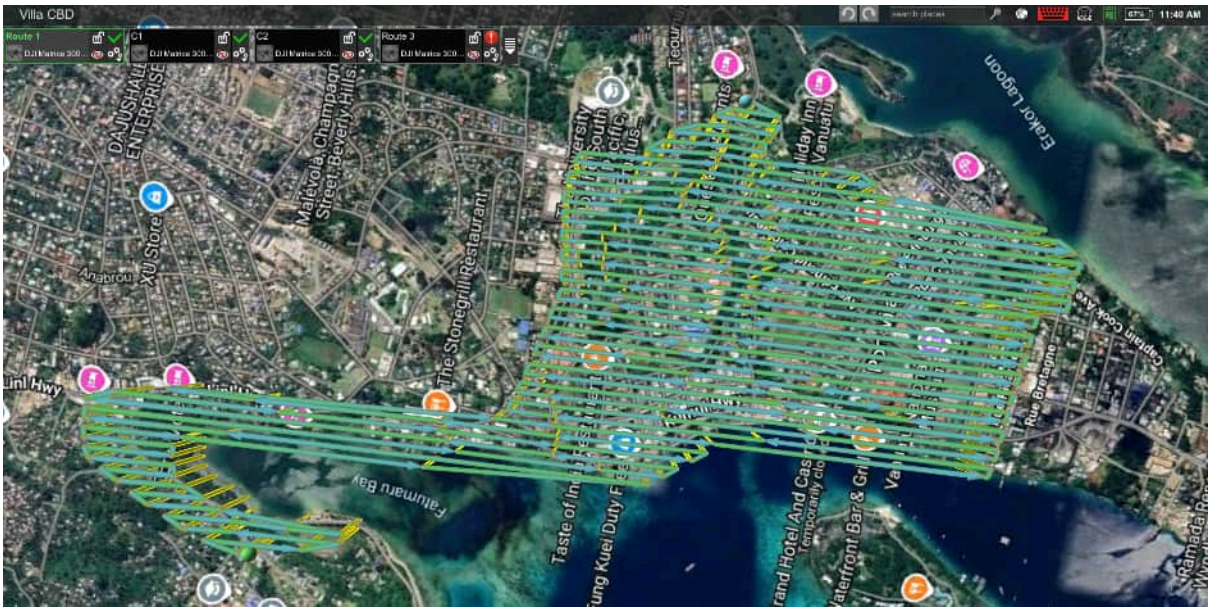
A sufficient 30m buffer was incorporated into the original KML file provided by the client. This ensured comprehensive coverage and high overlap of the area of extent.17 Ground Control Points (GCPs) were sufficient for the site ensuring all region was covered, as is important to provide accurate, on the ground reference coordinates that will tie the drone acquisition data to real-world positions. A total of 3 LiDAR grids are also established at coordinated elevated levels throughout the site, to ensure high Z level accuracy.

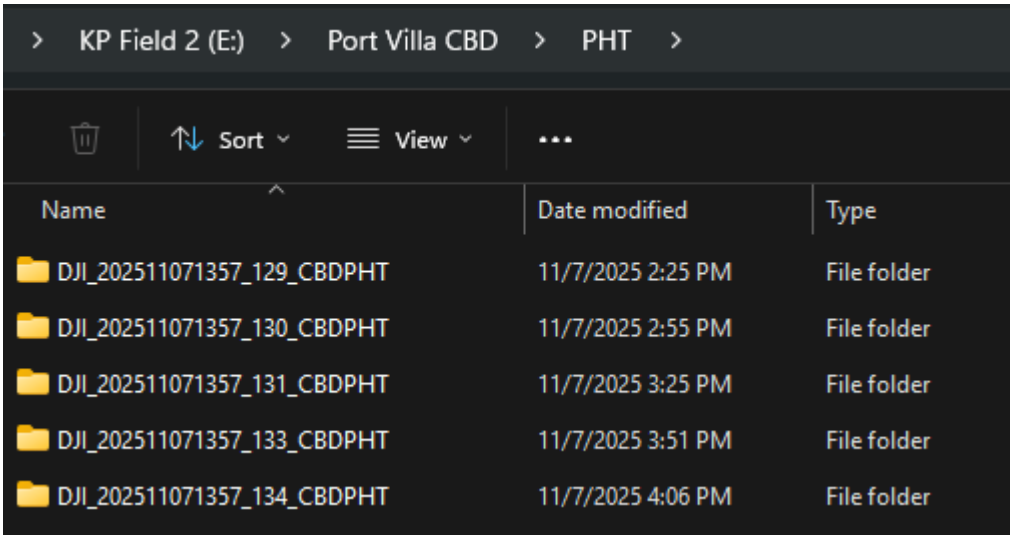
Appropriate Civil aviation NOTAM has been lodged and issued prior to being on site. Following confirmation from the Vanuatu Air Traffic Control team, photogrammetry flights commenced on November 7th, with a total of five flights. LiDAR data acquisition began after completion of photogrammetry, with a total of nine LiDAR flights of the overall site. Followed by 7 concentrated lower altitude flights over the designated slopes/cliffs completed by November 10th. The team promptly ensured all flight data was copied onto secured hard drives and cloud storage. List of remote sensing equipment used and flight planning conducted along with screenshots of the photogrammetry and LiDAR storage folders is provided below.

Photogrammetry Flight plan & Equipment

- IMAGERY: Zenmuse 45MP P1

Positioning: RTK and IMU (site based RTK)



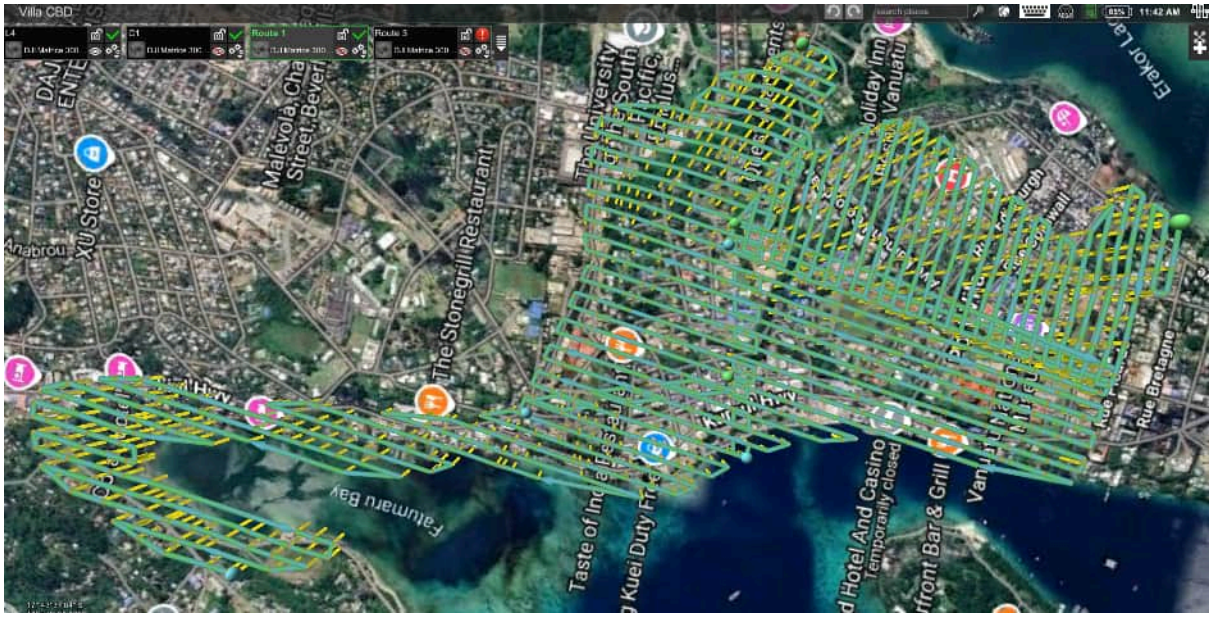


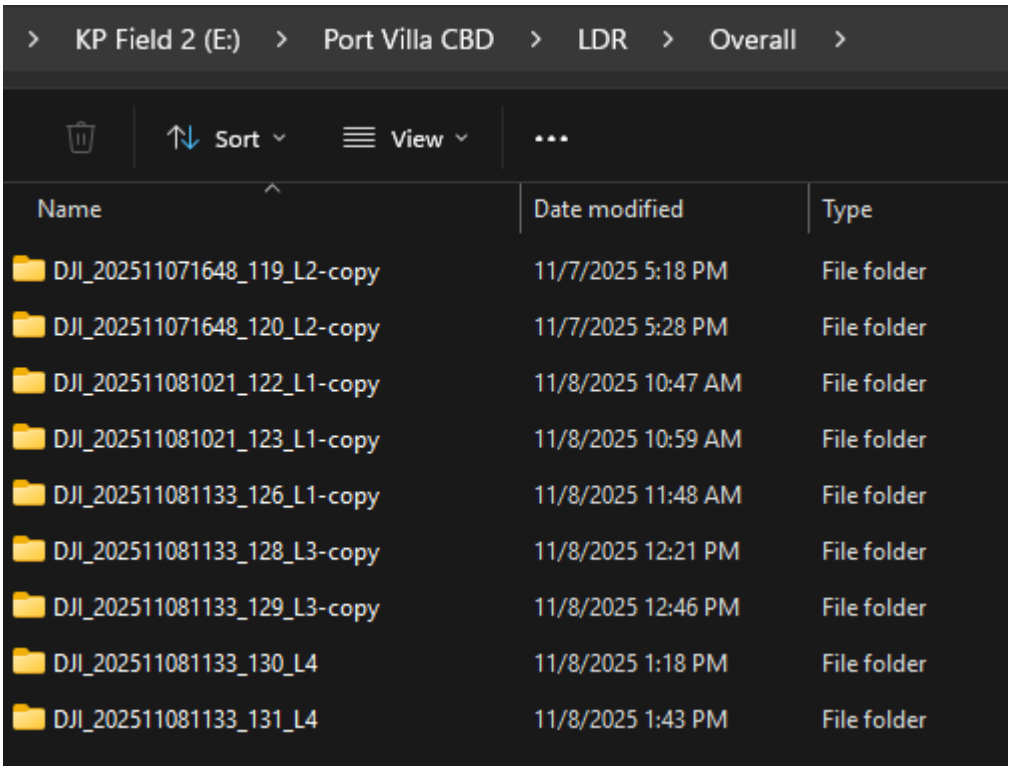
LiDAR flight Plan

- LIDAR: Zenmuse L2 LiDAR Sensor

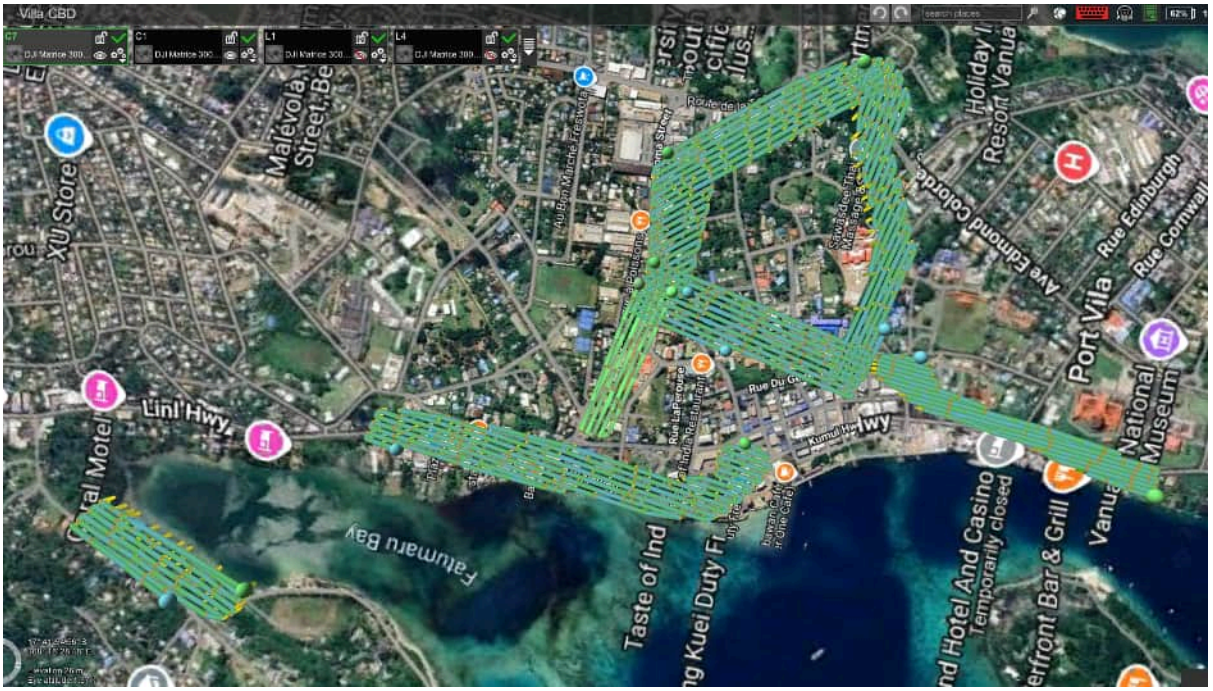
Positioning: RTK and IMU (site based RTK)

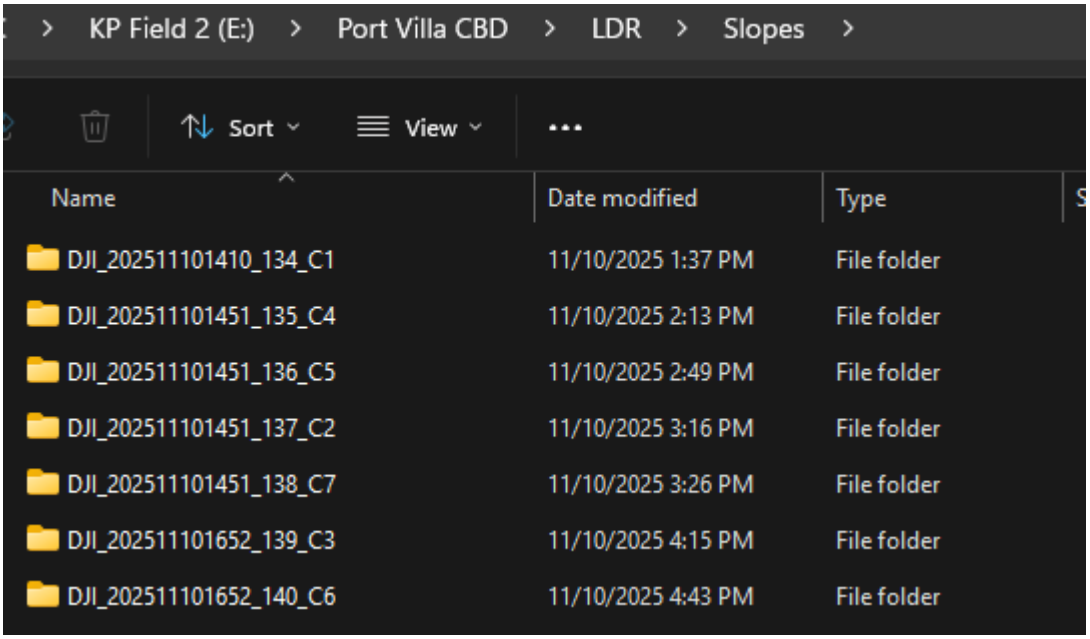
(Flight route for overall site)





(Flight route for slopes)


Villa CBD
Malevola Street
XU Store
Linl Hwy
Fatumaru Bay
Taste of Ind
Port Vila
National Museum
Rue Edinburgh
Rue Cornwall
Ave Edmond Colorado
Holiday Resort Vanua
Hotel And Casino
Temporarily closed
Bar & Grill


KP Field 2 (E:) › Port Villa CBD › LDR › Slopes ›
Sort
View
Name
Date modified
Type
DJI_202511101410_134_C1 11/10/2025 1:37 PM File folder
DJI_202511101451_135_C4 11/10/2025 2:13 PM File folder
DJI_202511101451_136_C5 11/10/2025 2:49 PM File folder
DJI_202511101451_137_C2 11/10/2025 3:16 PM File folder
DJI_202511101451_138_C7 11/10/2025 3:26 PM File folder
DJI_202511101652_139_C3 11/10/2025 4:15 PM File folder
DJI_202511101652_140_C6 11/10/2025 4:43 PM File folder

Survey Projection & Datum

Horizontal Projection: WGS 84 / UTM zone 59 South

Vertical: MSL (Local)

LOCAL COORDINATES - WGS 84 / UTM zone 59 South

GCP	NORTHING	EASTING	MSL (Height)
GCP1	8037986.921	214428.536	1.23
GCP2	8038463.264	21408.094	19.142
GCP3	8038814.651	214717.75	14.311
GCP4	8037451.373	214858.638	2.537
GCP5	8038355.317	214805.095	19.213
GCP6	8037355.108	214840.794	4.785
GCP7	8037355.108	215255.225	21.103
GCP8	8037012.91	214830.416	2.192
GCP9	8036771.245	215366.856	18.949
GCP10	8036737.822	215054.076	1.55
GCP 12	8036460.162	215149.428	1.907
GCP 13	8037381.029	215843.074	31.91
GCP 14	8037114.414	215510.039	55.841
GCP 15	8036852.201	216127.994	42.138
GCP 16	8036431.659	215629.006	45.629
GCP 17	8035838.607	215901.464	21.044
GCP 18	8035903.399	215199.336	19.636

Data acquired was processed through the standard Kahuto workflows for both LiDAR and Imagery, which includes checks to ground control.

The photogrammetry process using arbitrary CRS as a method enabled us to process photogrammetry in Horizontal Projection: WGS 84 / UTM zone 59 South, Vertical: MSL (Local). Summary of processing photogrammetry below which ground control points

Quality Report

PIX4Dmatic v1.81.1

PIX4D

Camera	DJI_ZenmuseP1_35.0_8192x5460
Area covered	2.776 km²
Average GSD	2.1 cm
Project CRS	WGS 84 / UTM zone 59S + MSL height - EPSG:32759+5714 [Geoid height ~ +63.940 m]
Dense point count	586,326,045

Quality check

Matches	Median of 6745 matches per calibrated image	✓
Dataset	100% calibrated (2380/2380 images), 1 calibration block	✓
Camera optimization	0.23% relative difference between initial and optimized internal camera parameters	✓
GCPs	17 GCPs, Mean RMS position error 0.005 m / Sigma 0.005	✓
ATPs	4536322 ATPs	

Ground control points (GCPs)

Label	Position error			Reprojection error [px]	Accuracy		Verified/ Marked
	X [m]	Y [m]	Z [m]		X/Y [m]	Z [m]	
GCP1	-0.000	0.000	0.001	0.4	0.020	0.020	19/19
GCP2	0.002	-0.001	-0.002	0.3	0.020	0.020	18/18
GCP3	0.002	0.001	0.001	0.2	0.020	0.020	25/25
GCP4	0.006	-0.006	-0.003	0.2	0.020	0.020	23/23
GCP5	-0.003	-0.003	0.002	0.2	0.020	0.020	18/18
GCP6	-0.000	0.002	0.001	0.2	0.020	0.020	22/22
GCP7	-0.009	0.010	0.004	0.1	0.020	0.020	24/24
GCP8	-0.003	-0.007	0.000	0.2	0.020	0.020	15/15
GCP9	0.015	-0.007	0.005	0.5	0.020	0.020	23/23
GCP10	-0.009	0.003	0.000	0.2	0.020	0.020	16/16
GCP12	-0.003	0.001	-0.000	0.3	0.020	0.020	21/21
GCP13	0.001	0.002	-0.002	0.3	0.020	0.020	22/22
GCP14	-0.004	-0.006	-0.005	0.5	0.020	0.020	20/20
GCP15	0.006	0.005	-0.006	0.4	0.020	0.020	21/21
GCP16	0.003	0.007	-0.003	0.5	0.020	0.020	17/17
GCP17	0.000	0.002	-0.003	0.4	0.020	0.020	21/21
GCP18	0.000	-0.003	0.003	0.3	0.020	0.020	26/26
Min	-0.009	-0.007	-0.006	0.1			
Max	0.015	0.010	0.005	0.5			
Mean	0.000	-0.000	-0.000	0.3			
Median	0.000	0.001	0.000	0.3			
Sigma	0.006	0.005	0.003	0.1			
RMS	0.006	0.005	0.003	0.3			

The Photogrammetry quality report indicates a strong and reliable dataset. A large area of **2.776km²** was processed using a **DJI Zenmuse P1** camera, achieving an **average GSD of 2.1 cm**.

Calibration quality is excellent, with **100% of images successfully calibrated (2380/2380)** and a **median of 6745 keypoint matches per calibrated image**, confirming strong image overlap and feature detection.

Geospatial accuracy is high:

- **17 Ground Control Points (GCPs)** were used, achieving a **mean RMS error of only 0.005 m** with **sigma = 0.005**, demonstrating very tight alignment between the photogrammetric model and ground truth.
- Camera optimization results show a minimal **0.23% relative difference**, indicating stable

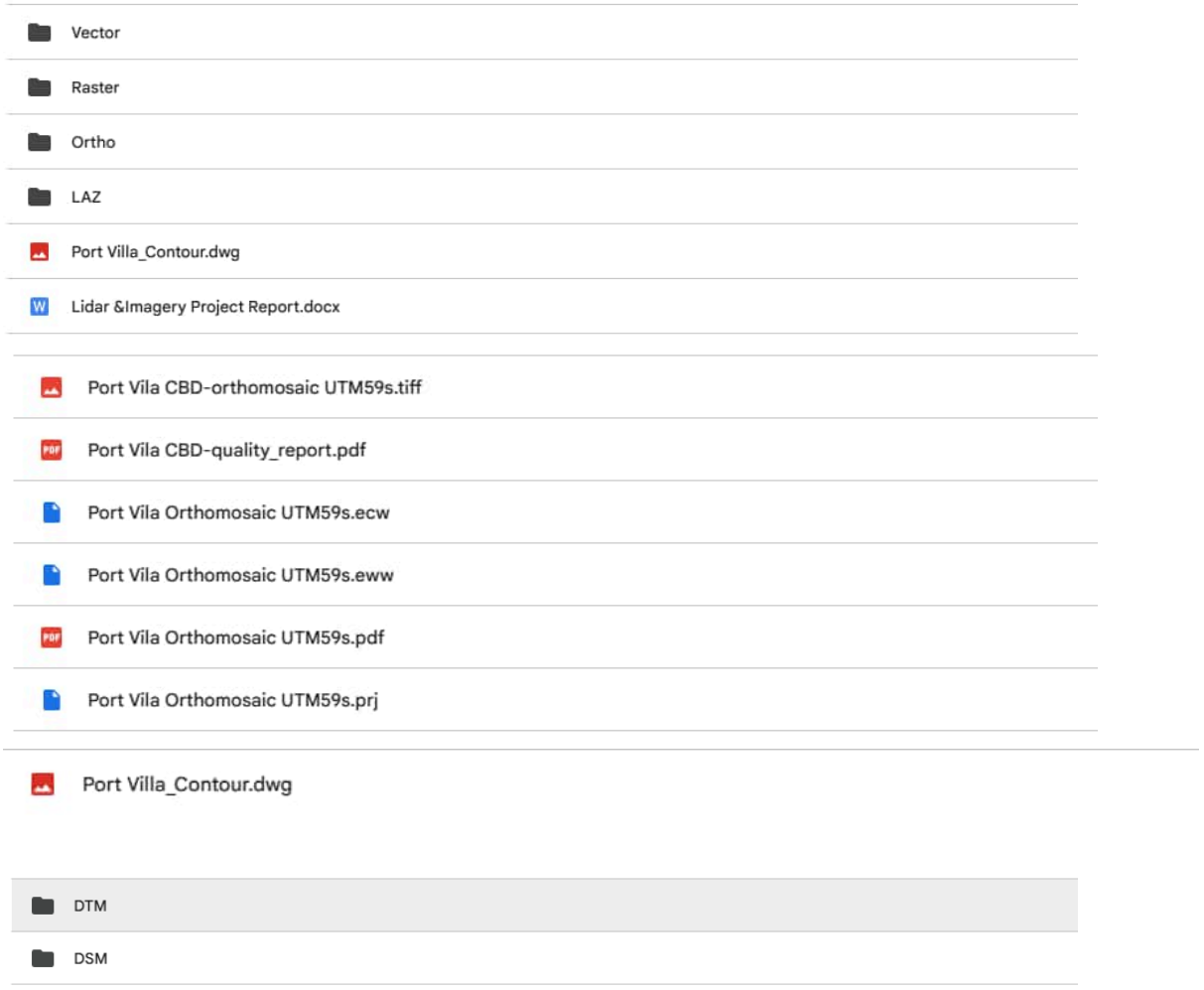
and accurate internal camera parameter estimation.

The dense point cloud contains **586,326,045 points**, reflecting high detail and robust reconstruction.

CAD

A total of five sheets were determined to be sufficient for this project because the overall scope and level of detail can be clearly communicated within that layout. The design elements follow standard conventions and do not require additional breakdowns or enlarged views. This approach ensures all required information is included while maintaining clarity, consistency, and an efficient review process.

The following deliverables were created for the client as well as PDF plans.
Some examples of the deliverables are shown below.

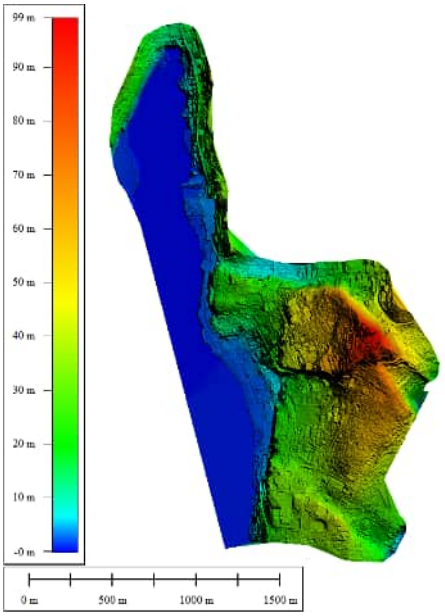


Some examples of the product deliverables are shown below.

Ortho (TIFF,ECW,PDF)



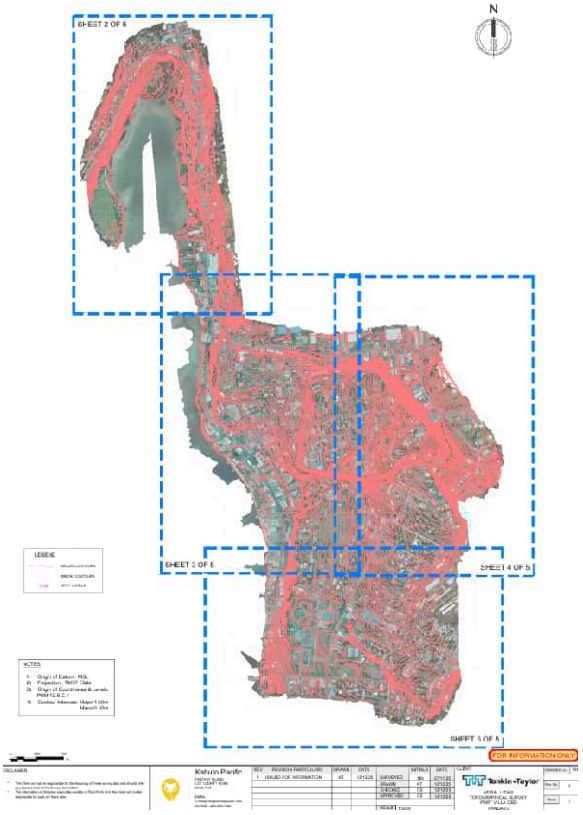
DTM (TIFF,DWG,PDF)



Contours (DWG,DXF) *also provided in final CAD plan



CAD (PDF 5 sheets,DWG)



Kahuto Pacific thank you for involving us in your project.

Chris Saili



Managing Director
Kahuto Investments Pte Ltd

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KAHUTO PACIFIC

SHEET 2 OF 5

SHEET 3 OF 5

SHEET 4 OF 5

SHEET 5 OF 5

LEGEND

14.7 m CONTOURS

22.21 SPOT LEVELS

NOTES

1) Origin of Datum : MSL
2) Projection : TM77 Efate
3) Origin of Coordinates & Levels: PSM 12.9.C.1
4) Contour Intervals: 0.50m

0 125 250 m

FOR INFORMATION ONLY

DISCLAIMER

* The Client will not be responsible for the Accuracy of these survey data and should refer any queries back to the Survey Consultant.
* The information on this plan cannot be used by a Third Party and the Client will not be responsible for such act there after.

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REV	REVISION PARTICULARS	DRAWN	DATE
1	ISSUED FOR INFORMATION	KT	12/12/25
2	ISSUED FOR INFORMATION	KT	10/02/2026

	INITIALS	DATE
SURVEYED	NN	07/11/25
DRAWN	KT	12/12/25
CHECKED	CS	12/12/25
APPROVED	CS	12/12/25

SCALE: 1:5000

CLIENT

Tonkin+Taylor

AERIAL LIDAR
TOPOGRAPHICAL SURVEY
PORT VILLA CBD
VANUATU

DRAWING No. 1049

Rev No 2

Sheet 1

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KAHUTO PACIFIC



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LEGEND

14.7 m — CONTOURS

22.21 — SPOT LEVELS

0 125 250 m

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SCALE: 1:5000

CLIENT

Tonkin+Taylor

AERIAL LIDAR
TOPOGRAPHICAL SURVEY
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VANUATU

DRAWING No. 1049

Rev No 2

Sheet 1

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KAHUTO PACIFIC

LEGEND

14.7 m — CONTOURS

22.21 — SPOT LEVELS

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APPROVED	CS	12/12/25
SCALE: 1:2000		

CLIENT

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AERIAL LIDAR
TOPOGRAPHICAL SURVEY
PORT VILLA CBD
VANUATU

DRAWING No. 1049

Rev No 2

Sheet 3

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KAHUTO PACIFIC



LEGEND

14.7 m — CONTOURS

22.21 — SPOT LEVELS

NOTES

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DRAWN	KT	12/12/25
CHECKED	CS	12/12/25
APPROVED	CS	12/12/25

SCALE: 1:2000

CLIENT

Tonkin+Taylor

AERIAL LIDAR
TOPOGRAPHICAL SURVEY
PORT VILLA CBD
VANUATU

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Rev No 2

Sheet 4

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LEGEND

14.7 m — CONTOURS

22.21 — SPOT LEVELS

NOTES

1) Origin of Datum : MSL
2) Projection : TM77 Efate
3) Origin of Coordinates & Levels: PSM 12.9.C.1
4) Contour Intervals: 0.50m

0 12.5 25 m

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ANY OBJECTS OUT SIDE OF THE DRG. BORDER TO BE REMOVED BEFORE PUBLISHED

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				APPROVED	CS	12/12/2025
				SCALE:	1:2000	

CLIENT

Tonkin+Taylor

AERIAL LIDAR
TOPOGRAPHICAL SURVEY
PORT VILLA CBD
VANUATU

CONSULTANT/CONTRACTOR:-

APPROVED BY : - CS

DRAWING No. 1049 | Original | Rev No 2 | Sht No 5

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50 m 250 m 450 m



Together we create + sustain a better world