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# FAULT TRENCH INVESTIGATION
# HIDDEN VALLEY ELEMENTARY SCHOOL
# 3435 BONITA VISTA LANE
# SANTA ROSA, CALIFORNIA

September 15, 2025

Project 1079.120

Prepared For:
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CERTIFICATION

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**FAULT TRENCH INVESTIGATION
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## 1.0 INTRODUCTION

This report summarizes the results of Miller Pacific Engineering Group's (MPEG) Earthquake Fault Trench Investigation for the proposed new modular restroom structure at Hidden Valley Elementary School ("Site") on behalf of Santa Rosa City Schools (SRCS). The site is located at 3435 Bonita Vista Lane in Santa Rosa, California, as shown on Figure 1. Our services have been provided in accordance with the Professional Services Agreement dated April 9, 2025. This report has been prepared for the exclusive use of the Applicant and the design team for this project and site.

### 1.1 Regulatory Compliance

Our investigation has been performed for the purpose of satisfying the requirements of Title 24 of the California Code of Regulations (CCR) and Chapter 16 of the California Building Code (CBC, 2022). Our investigation has been performed in general accordance with the guidelines presented in California Geologic Survey (CGS) Special Publication 42, the most recent revision of which incorporates earlier CGS Notes 41 and 49 (CGS, 2018).

Per the provisions of the Field Act of 1933 and Title 24 of the California Code of Regulations, construction or rehabilitation of school structures is prohibited within 50 feet of active faults. Alquist-Priolo Earthquake Fault Zoning Act ("A-P" Act, 1972) and the Seismic Hazards Mapping Act (1990) direct the State Geologist to delineate regulatory "Earthquake Zones of Required Investigation", showing areas susceptible to surface fault rupture and seismic-induced landsliding, to reduce the threat to public health and safety and to minimize the loss of life and property posed by earthquake-triggered ground failures. These maps illustrate where geologic studies are required in order to evaluate the potential for fault surface rupture prior to development permitting and are prepared and periodically updated by CGS.

### 1.2 Project Background

The Hidden Valley Elementary School campus is located about 2.5 miles northeast of downtown Santa Rosa near the eastern margin of the active Rodgers Creek Fault Zone. Prior to 2024, official Alquist-Priolo Earthquake Fault Zone (APEFZ) maps showed the eastern margin of the zone to be about 1,500 feet west of the site. More recently and as shown on Figure 2, an updated Fault Evaluation Report was published in February of 2024, and the associated APEFZ map now shows the eastern edge of the site to be within an expanded APEFZ. The new map now encompasses a northeast-trending fault that branches off of the main fault zone, which is aligned along Paulin Creek about 400 feet west of the site. Although no specific plans have been prepared, we understand that the results of our study will be used for evaluating rehabilitation/redevelopment options in the future.

## 1.3 Purpose and Scope

The purpose of our investigation is generally twofold; 1) to assess whether active fault traces exist within the site and 2) to provide recommended setbacks for new structures from any identified active fault traces. According to CGS Special Publication 42 – "For the purposes of the A-P Act, an active fault is defined as one which has "had surface displacement within Holocene time" (the last 11,700 years).

This definition does not mean that faults lacking evidence for surface displacement within Holocene time are necessarily inactive. A fault may only be presumed to be inactive based on satisfactory geologic evidence; however, the evidence necessary to prove inactivity sometimes is difficult to obtain and locally may not exist. Because fault investigations are required by the A-P Act to assess the recency of fault movement, faults within an APEFZ are presumed to be active until adequate evidence shows otherwise.

The scope of our investigation is outlined in our proposal letter dated April 8, 2025, and includes review of available, published geologic maps and reports, fault investigation reports by others, aerial photography, and other background information relevant to the project. Our scope also includes subcontracting of excavation; site safety (fencing/shoring) and restoration services; excavation and logging of 3 trenches for observation of subsurface stratigraphy and geologic structure; coordination of field work and participation in field discussions and consultation with CGS personnel and the project's SRCS-appointed peer reviewer, Mr. Jared Pratt of RGH Consultants; and preparation of this report.

Our current study addresses only the potential for fault surface rupture and is intended to determine whether active faults exist within the campus. A more through geologic hazards investigation, including evaluation of seismic shaking and other hazards, should be performed as part of any future development at the site.

## 2.0 SITE SURFACE CONDITIONS

The Hidden Valley campus is located in northeastern Santa Rosa, along the north side of Chanate Road, about 500 feet east of Parker Hill Road and about 3,500 feet southeast of the Fountaingrove Golf Club. The site consists of an 8.22 acre, irregularly shaped parcel elongated in the northeast-southwest direction. Generally surrounded by single-family residential development, the site is bounded by Chanate Road to the south, Hidden Valley Park to the north, and single-family homes along Bonita Vista Lane and Glen Echo Court to the east and west, respectively. Paulin Creek flows south-southwest about 350 feet west of the campus, The site slopes gently to the south, with surface elevations ranging from approximately +365 feet above mean sea level (MSL) at the northern property line to approximately +310 feet above MSL along Chanate Road at the south end. The campus was developed in 1970 with the main classroom buildings in the southwestern part of the site. Additional buildings, including modular classrooms and a newer multipurpose building, have been added over the years, as well as an asphalt-paved play area and solar canopy in the central portion of the campus. A grass playfield occupies the northern portion of the site. A Site Plan is presented on Figure 2.

## 3.0 REGIONAL GEOLOGIC AND TECTONIC SETTING

Sonoma County lies within the Coast Ranges geomorphic province of California, a region characterized by active seismicity, steep, young topography, and abundant landsliding and erosion owing partly to its relatively high annual rainfall. The regional basement rock consists of sedimentary, igneous, and metamorphic rock of the Jurassic-Cretaceous age (65-190 million years ago) Franciscan Complex and marine sedimentary strata of the Great Valley Sequence, which is of similar age. Within central and northern California, the Franciscan and Great Valley rocks are locally overlain by a variety of late Cretaceous and Tertiary age sedimentary and volcanic rocks, including the Sonoma Volcanics, which have been deformed by episodes of folding and faulting. The youngest geologic units in the region are Quaternary age (last 1.8 million years) sedimentary deposits. These unconsolidated deposits partially fill many of the valleys of the region.

### 3.1 Regional and Local Geology

The project site lies in a shallow, north to south trending valley bordered by low foothills to the north, east and west. Regional geologic mapping (Fox et al, 1973; Huffman and Armstrong, 1980) shows upland areas, including along Bonita Vista Drive to the east and the hills west of Paulin Creek, to be underlain by andesite and basalt flows of the Sonoma Volcanics. The site itself is mapped as being underlain by the Pliocene-age Petaluma Formation (Tp), which consists of interbedded sand, gravel, and volcanic tuff derived from the Sonoma Volcanics and Franciscan Complex rocks.

More recent mapping (McLaughlin et al, 2008) indicates the northern and central parts of the project site, as well as a small area along Chanate Road at the south end of the site, are underlain by undivided alluvial deposits (Qhp) of late Pleistocene to early Holocene age. These materials are composed of interbedded gravel, sand, silt and clay deposited in fluvial and alluvial fan environments. The central part of the campus is shown to be underlain by the Petaluma Formation. A copy of the latest regional map by McLaughlin is presented on Figure 3.

### 3.2 Regional Fault Mapping

First recognized by Weaver (1949) and Gealey (1951), the Rodgers Creek Fault Zone has been recently mapped as exhibiting evidence of near-continuous Holocene displacement for at least 73 km, extending from the northern margin of San Pablo Bay, near Sears Point, to the foothills northwest of Healdsburg (Hecker and Randolph Loar, 2018). The project site lies about a mile east of the Santa Rosa floodplain, which serves as the boundary between the “northern” segment (also historically referred to as the Healdsburg Fault) and the “southern” segment of the Rodgers Creek Fault. South of the floodplain, the fault trends about N40ºW, extending across the northeast side of Taylor Mountain and beneath the floodplain alluvium just northeast of the County Fairgrounds (about 1.5 miles south of the site). North of the floodplain, the fault trends slightly more westerly, at about N50ºW, extending northward through the foothills along the east edge of the floodplain through northern Santa Rosa, Windsor, and Healdsburg.

In the immediate vicinity of the site, early mappers (Gealey, 1951; Fox et al, 1973; Huffman and Armstrong, 1980) show parallel fault traces, both striking about N45ºW, which pass about 500 feet northeast and 2,000 feet southwest of the site, respectively. Each map shows the faults to be approximately located. Fox’s map does not indicate the faults to be active, while Huffman and

Armstrong show the eastern trace, passing about 500 feet northwest of the campus, to be "potentially active" based on evidence indicative of Quaternary activity.

McLaughlin's 2008 map shows the main fault zone encompassing a series of subparallel and en-echelon right-lateral strike-slip fault traces which trend northwest across downtown Santa Rosa before passing through the now-abandoned Sonoma County Hospital Campus and the more recently built Cobblestone subdivision about 2,500 feet southwest of the site. That map plots a similar fault trace trending about N45ºW about 2,000 feet southwest of the site as previous workers. A more northerly trending branch, or splay fault, is shown trending about N12 ºE along Paulin Creek, some 350 feet west of the site. This fault is concealed and queried beneath younger alluvium. East of the site, the map shows a series of faults which form an arcuate shape along the crest of the foothills east and northeast of the site. These faults pass within about 700 feet of the northeast corner of the site and are locally concealed beneath alluvial deposits in the shallow valleys on the opposite side of the hills to the east and northeast, where they are queried to indicate a lesser level of certainty as to their location.

The CGS 2010 Fault Activity Map of California (Jennings and Bryant, 2010) reflects the same faults as McLaughlin east of the site and within the main fault zone a half mile southwest of the site but does not show the fault along Paulin Creek.

Mapping by Hecker (2016, 2018) shows the same fault along Paulin Creek as McLaughlin. South of Chanate Road, the fault is mapped as being part of a Holocene-active distributed displacement zone. North of Chanate Road, the fault is shown to be inferred and part of a long-term displacement zone that is "potentially" Holocene-active. No faults are shown to the east of the site on Hecker's map.

Most recently, CGS published an updated Fault Evaluation Report (FER) (Ladinsky and Zachariasen, 2024) which accompanies and serves as the basis for the updated APEFZ map released in February of 2024. The new map generally reflects similar mapping as shown by Hecker. The current APEFZ encompasses the branch fault along Paulin Creek about 350 feet west of the site, and the western margin of the school campus lies within the zone of required investigation, as shown on Figure 4.

### 3.3 Historic Seismicity

Several significant earthquakes have occurred in and around the Rodgers Creek Fault Zone in historical times, although no evidence appears in the written historical record of large earthquakes. Research by Hecker and others (2005) indicates that the most recent surface-rupturing event on the Rodgers Creek Fault occurred no earlier than 1690, and likely no earlier than 1715. They further concluded that the most recent large earthquake may have been time-correlative with the latest known pre-historic rupture on the Hayward Fault, sometime between 1640 and 1776.

Significant earthquakes known or suspected to have occurred along the Rodgers Creek Fault Zone include the March 31, 1898 "Mare Island" earthquake, centered beneath San Pablo Bay near the city of Vallejo. This earthquake has been estimated between MW=6.2 and Mw=6.7, generating a Modified Mercalli intensity of VII or greater throughout portions of the North Bay area (Toppozada et al, 1992; CGS, 2025). The most significant damage was concentrated between Vallejo/Mare Island and the Sonoma and Petaluma Valleys to the northwest, and aftershock reports were also more abundant in those areas, suggesting a source near the southern end of the Rodgers Creek Fault (Toppozada, et al, 1992). Damage in Santa Rosa was more moderate, limited mainly to cracked windows, fallen plaster, and a few collapsed chimneys (CGS, 2018b).

On August 9, 1893, an Mw=5.6 earthquake occurred with an epicenter along the southwest side of Taylor Mountain, on an apparent concealed splay of the Rodgers Creek Fault beneath the east edge of the Santa Rosa floodplain. This earthquake generated a Modified Mercalli intensity of VII, toppling chimneys and plaster throughout Santa Rosa and causing moderate structural damage (CGS, 2018b).

The largest earthquakes recorded in historic times on the Rodgers Creek Fault are the Mw=5.6 and Mw=5.7 Santa Rosa earthquakes of October 2, 1969 (Hecker, et al, 2005). These events occurred within about 90-minutes of one another and generated Modified Mercalli intensities of VII to VIII throughout Santa Rosa. Moderate damage, including fallen masonry and chimneys along with some structural damage, was observed to be concentrated within Santa Rosa (Wong and Bott, 1995). The earthquakes are generally thought to have been centered near the south end of the Healdsburg Fault, or on a blind, northeast-striking cross-fault within the right-stepover zone encompassing the project site (Wong and Bott, 1995).

Several smaller earthquakes have occurred near the site in historic times, the nearest of which are shown for reference on Figure 4 (USGS, 2025). The most significant of these occurred September 14, 2022, and included a Mw=4.4 earthquake located north of Cobblestone Drive, approximately 0.4 miles east of the site and an Mw=4.3 event centered beneath Leete Ave, approximately 0.6 miles north of the site. Neither event apparently caused significant damage. No documentation or evidence of fault surface rupture during any of these events is apparent in the literature.

### 3.4 Expected Future Seismicity

The historical records do not directly indicate either the maximum credible earthquake or the probability of such a future event. To evaluate earthquake probabilities in California, the USGS has assembled a group of researchers into the "Working Group on California Earthquake Probabilities" (USGS, 2003 and 2008; Field et al, 2015) to estimate the probabilities of earthquakes on active faults. These studies have been published cooperatively by the USGS, CGS, and Southern California Earthquake Center (SCEC) as the Uniform California Earthquake Rupture Forecast, Versions 1, 2, and 3 (aka UCERF, UCERF2, and UCERF3, respectively). In these studies, potential seismic sources were analyzed considering fault geometry, geologic slip rates, geodetic strain rates, historic activity, micro-seismicity, and other factors to arrive at estimates of earthquakes of various magnitudes on a variety of faults in California.

Conclusions from the 2015 UCERF3 indicate that the mean probability of an M>6.7 earthquake occurring on the Hayward-Rodgers Creek Fault by 2045 is about 32%. The highest probability of an M>6.7 earthquake occurring by 2045 on any of the active faults in the region is assigned to the San Andreas Fault, located approximately 33 kilometers southwest of the site, at 33%. It should be noted that these studies consider only the possibility that earthquakes of a given magnitude will occur, and do not consider surface rupture potential or the potential for other effects of such earthquakes. As noted above, research by Hecker et al (2005) suggests the most recent large, surface-rupturing earthquake on the Rodgers Creek Fault occurred sometime between about 1715 and 1776. Their research also indicates recurrence intervals of about 230 years ("certainly between 181 and 370 years") which suggests that a relatively large earthquake may statistically be expected in the near future.

## 4.0 INVESTIGATIVE METHODS

Investigative methods utilized for this project included a geologic reconnaissance of the project site and surrounding area; review of background information including regional geologic and fault mapping, historic aerial photographs, LiDAR-derived topographic mapping, and previous fault trench investigation reports in the site vicinity; and subsurface exploration with three investigatory fault trenches totaling 590 linear feet. Our review of regional geologic mapping and regional fault mapping is discussed above in Sections 3.1 and 3.2. Our background material review, exploratory fault trenching, seismic surveying, and radiocarbon dating are summarized in the following sections.

### 4.1 Review of Historic Aerial Photographs

We reviewed several historic aerial photographs provided by Pacific Aerial Surveys of Novato, California and spanning the time period between 1942 and 1993. Brief descriptions of the relevant photographs we reviewed are presented in the following paragraphs, and those photographs are presented for reference in Appendix A.

- 1942 (Date Unknown, SON AG 1942, Scale Unknown) – This is the earliest air photo of the Hidden Valley Elementary School site. The site appears to be occupied by agricultural fields of low-lying grasses. An early alignment of Chanate Road is visible to the south of the site. Orchards are present to the east and southwest of the site.

- July 19, 1953 (CSH-1953, frame 7K-130 1:20,000) – No major changes are visible between 1942 and 1953. The orchards on either side of the site are still present, and no development or change to agricultural use is visible at the project site A faint tonal lineament is visible in the northern half of the parcel, trending at approximately N40°W, about 70-degrees off trend from the mapped fault trace to the west of the project site.

- May 1, 1965 (CAS-65-130; frame 47-28 1:12,000) – Single family residential development is now visible to both the east and west of the site along what is currently Glen Echo Drive and Bonita Vista Drive. No development or change to agricultural use is visible in the project area. Tonal contrast across the site is still visible, and appears to strike along approximately N25°W.

- June 22, 1987 (NAPP, frame 513-72, 1:40,000) – This air photo exhibits some color distortion, but several notable features are visible. The main building for the school has been constructed and landscaping changes are visible both to the north and south of the new building. Bonita Vista Drive extends all the way north of the site, and additional residential development is visible in the surrounding neighborhood south of Chanate Drive.

- July 10, 1993 (NAPP-2C, frame 6361-80, 1:40,000) – Campus development is largely complete excepting the newer portable buildings. An asphalt play areas and grass playfield are in place, as is the northern driveway entrance.

## 4.2 Review of Topographic Data

We reviewed digital topographic contours and bare earth hillshade data[1] obtained through Sonoma County's VegMap website (https://sonomavegmap.org/data-downloads/). We also reviewed hillshades from the same source which are derived from more recent 2022 LiDAR data, although updated topographic contours do not yet appear to be available. The 2022 hillshade is shown on Figure 2.

## 4.3 Review of Previous Investigations by Others

We have reviewed the results of several previous subsurface fault investigation studies (by others) performed in the general vicinity of the project site. Each of these studies were performed within the pre-2024 APEFZ, several thousand feet east of the site. We are unaware of any previous site-specific studies of the currently-zoned trace along Paulin Creek. The approximate area covered by each report we reviewed is shown on Figure 5, and respective Alquist-Priolo file numbers are cited below. Reports we reviewed included the following:

- Moore and Taber (1976, A-P #409) conducted a preliminary geotechnical investigation for an eight-unit residential subdivision on Park Hill Road, Santa Rosa, located approximately 3,000 feet northwest of the Hidden Valley campus. This preliminary investigation included a desktop review of existing fault maps and topography maps, but no subsurface exploration was conducted. Four test pits were excavated the following year as a supplement to the original report. Although the logs of these test pits are not included in the file, Moore and Taber provided a supplementary letter which stated that no further evidence of Holocene age fault activity was encountered, and they judged further trenching was not required. A cover letter from the office of the State Geologist, Earl Hart, is included in the file and indicates that this resolution was not sufficient in his judgement. However, it appears no further investigation work was performed.

- Harding Lawson (1978, A-P #800) performed a soil and geologic investigation for the Cobblestone Project on Chanate Road (between Neilson Road and Parker Hill Road), located approximately 1,600 ft west of the Hidden Valley campus. The Cobblestone Project covered approximately 39 acres, and included 55 single-family residential lots. Subsurface exploration included a 260-foot-long trench excavated to an average depth of about 4 feet below ground surface, as well as 14 test pits excavated to a maximum depth of 8 feet below ground surface. The report notes that significant clay-filled fractures were observed in Sonoma Volcanics bedrock, some of which locally exhibit relative movement or displacement of up to a few inches. However, due to the irregular and discontinuous nature of the fractures, Harding Lawson judged that these fractures were likely not the result of active faulting. Instead, they concluded that the features likely developed during ancient folding and early development of the Sonoma Volcanics unit. No offset or relative movement was noted within the younger residual soils on the site. No setbacks were recommended in their report.

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[1] LiDAR data and orthophotography were provided by the University of Maryland under NASA grant NNX13AP69G from NASA's Carbon Monitoring System (Dr. Ralph Dubayah and Dr. George Hurtt, Principal Investigators).

- Harding Lawson (1986, A-P# conducted a geotechnical fault investigation for the Sonoma County Community Hospital on Chanate Road, approximately 2,400 feet southwest of the Hidden Valley Campus. Subsurface exploration consisted of approximately 140 linear feet of trenches excavated to an average depth of 5 feet below ground surface. Fault traces were observed in the eastern end of Trench 2, where Petaluma Formation bedrock was offset and in contact with the younger overlying soils. Other features indicative of active faulting were observed in the trench, including soil wedges, offset/truncated soil horizons, low angle thrust planes, and near vertical fault planes. Harding Lawson recommended a "no- build zone" that extended from a point 20 feet west of the observed fault trace to the eastern property line of the project site.

- Rutherford and Chekene (1987, AP# 2086) performed a fault trench investigation at the same site the following year at the request of the County of Sonoma. Subsurface exploration consisted of 520 feet of fault trenches excavated to an average depth of about 8 feet below ground surface and several seismic refraction surveys. Rutherford and Chekene documented 5 fault traces in Trench C but concluded that no significant fault-related features were revealed in the seismic surveys, and that activity on the faults documented in their trench was pre-Holocene (estimated at approximately 13,000 years old). Seismic refraction surveys were also performed at the site. They also concluded that faults observed by previous investigations by Harding Lawson and Cooper-Clark and Associates were likely older, and "inactive" as it pertains to the AP Act.

  Although various investigators of the hospital property were in apparent disagreement about the age of activity on the various faults encountered, the site lies within the current APEFZ, which reflects a fault trace similar to the alignment mapped by Harding Lawson in 1986.

- Quantum Geotechnical Inc. excavated two soil borings for design of the solar canopy north of the paved play yard in January 2023, as shown on Figure 2. The borings were excavated to depths of 21.5-feet and 31.5-feet below the ground. Each boring encountered several horizons of silty to sandy clay through the full depth of the boring, and groundwater was encountered at depths of around 11- to 12 feet. Quantum's boring logs are provided for reference in Appendix B.

### 4.4 Surface Reconnaissance

We performed a detailed reconnaissance of the project site and surrounding area on July 8, 2025. During our reconnaissance, we noted that existing campus improvements are in reasonably good condition given their age, and no significant geotechnical distress to existing campus structures and improvements was observed. Campus grades are typically gently-sloping, and no significant topographic or other features indicative of faulting were noted.

Outcrops of Sonoma Volcanics rocks are visible on the west-facing slopes above Bonita Vista Lane and Bonnie Lane east of the site, as well as at the crest of the low ridge between Hidden Valley Park and Sleepy Hollow Drive and on the east-facing slopes below the Cobblestone neighborhood, along the west side of Parker Hill Road.

Within the valley bottom, encompassing areas between Parker Hill Road and Bonita Vista Lane, surface soils (where exposed) typically consist of sandy clays to sandy silts. The banks along Paulin creek are accessible only at a small pedestrian bridge on the east side of Hidden Valley

Park. The channel banks are about 8- to 10 feet high and inclined at about 1:1. Observation of materials exposed in the creek is generally precluded by lack of access and thick vegetation.

Subsurface exploration performed for this study included excavation of three exploratory trenches and two soil borings. The fault trenches were conducted between June 15 and July 8, 2025, and the borings were performed on September 2, 2025. Detailed descriptions of the subsurface exploration are provided below.

### 4.5 Fault Trenching

Three fault trenches, totaling approximately 590 linear feet, were excavated at the locations shown on Figure 2 between June 9 and July 3, 2025. The primary basis for trench locations and alignments are, 1) the location and trend of the mapped AP fault and associated APEFZ, as summarized on Figures 2 and 4 and, 2) the locations of existing campus structures, utilities, and other improvements.

Trenches were excavated by the excavation contractor to typical depths of 6- to 10-feet below the ground surface using a 36-inch bucket. Following excavation, trenches were typically shored on 6-foot centers, and the north walls were cleaned with hand tools to expose soil and bedrock structure and stratigraphy. South walls were locally cleaned as needed to verify observations. Contacts between sedimentary units were marked with string lines nailed to the trench wall and 5-foot lateral intervals were marked with paint to ensure lateral positional accuracy. The trenches were carefully examined and logged at a scale of 1:60 (1-inch equals 5-feet), using the Unified Soil Classification System (USCS) nomenclature. A detailed summary of our cumulative fault trench findings and interpretations is provided in Appendix C. A stratigraphic column and explanation of the terms and methodology used for USCS classification is provided on Figure C-1. Exploratory trench logs are presented on Figures C-2 through C-11.

Prior to backfilling, we viewed and discussed the trench exposures with Mr. Jared Pratt of RGH Consultants (independent third-party reviewer) and Ms. Judy Zachariasen of the California Geological Survey (regulatory authority). Upon completion, trenches were backfilled and compacted with native soils under the supervision of our Staff Engineer, and existing improvements disturbed during our investigation were restored by the excavation contractor.

### 4.6 Soil Borings

In order to better assess subsurface conditions in the southern part of the site, where excavating trenches was precluded due to the existing structures, we excavated two soil borings on September 2, 2025 at the approximate locations shown on Figure 2. The borings were excavated to maximum explored depths of 17.5-feet and 31.5-feet below the ground surface by use of truck-mounted auger drilling equipment. Samples were collected at select intervals for visual examination and comparison to materials exposed in our fault trenches. Brief descriptions of the terms and methodology used in classifying earth materials are shown on the attached Soil and Rock Classification Charts, Figures D-1, and D-2, respectively. Our exploratory boring logs are presented on Figures D-3 through D-5.

### 4.7 Seismic Refraction Surveys

Field geophysical surveying was conducted by Terracon of Cotati, California on July 10, 2025, and included subsurface seismic refraction (SR) surveys along each of the four alignments shown on Figure 2. This work was performed for the purpose of corroborating stratigraphy with trench exposures in the north part of the site and borings in the eastern part of the site, and for identifying potential fault displacements via lateral variation in P-wave velocities.

In general, SR surveying indicates that materials in the upper 5- to 10 feet of the subsurface has P-wave velocities ranging from about 500 ft/sec (about 150 m/s) to 2,000 ft/sec (about 600 m/s), which is generally consistent with unconsolidated soils. Materials between about 10- and 40-feet have velocities in the range of 1,500 ft/sec to about 4,500 ft/sec (about 1,370 m/s), which is generally consistent with better-consolidated soils and/or weakly-cemented rock. Materials at depths between about 40 feet and the bottom of the profiles (ranging between about 40- and 60 feet below the subsurface) exhibit velocities between 4,500 ft/sec and about 6,000 ft/sec (about 1,800 m/s), which indicates denser materials, probably consisting either of well-cemented (older) sediment and/or weathered bedrock. Seismic profiles are shown on Figures 5 and 6, and Terracon’s geophysical report is provided in Appendix E.

## 5.0 SITE GEOLOGIC CONDITIONS

Based on comparison of exploratory boring and trench logs with the seismic refraction profiles, the results of our subsurface exploration generally confirm the regionally mapped geology as discussed in Section 3.1. In general, the site is underlain by 2- to 3 feet of light to dark gray clay, silt, and silty sand interpreted as Holocene alluvial fan or basin deposits. These materials are generally indicated by P-wave velocities below 1,000 ft/sec. Holocene soils are underlain by between about 3- and 10 feet of interpreted Pleistocene alluvial deposits having P-wave velocities between 1,000 and 2,000 ft/sec. These materials consist of clayey sand to sandy clay which is typically gray-brown with common orange mottling.

Sediments of the Petaluma Formation underlie the Pleistocene alluvium and consist of weakly-indurated siltstone and silty sandstone, as well as interbedded, unlithified silt, sand, and gravel. The Petaluma Formation was exposed in the bottoms of Trenches T-1 and T-2 at depths of about 5- to 7 feet below the ground surface, and was encountered in Borings 1 and 2 at depths of about 7- to 11 feet below the ground surface. Based on comparison of boring and trench logs, these materials have P-wave velocities greater than 3,000 ft/sec.

In the northern part of the site, contacts between the Holocene/Pleistocene alluvial deposits and the interpreted top of the Petaluma Formation are relatively uniform and rise gently from west to east as shown on Figure 5. Seismic line SR-1 reflects a cross-cut channel profile near the east end of the profile, which correlates well with a similar feature observed in Trench T-1.

Seismic lines 3 and 4 also correlate well with conditions in the northern part of the site and samples collected from our borings. As shown on Figure 6, interpreted contacts between the base of the Pleistocene alluvium and underlying Petaluma Formation are more undulatory, possibly reflecting more complex fluvial channel development or older deformation. Interpreted contacts between Holocene and Pleistocene materials at the 1,000 ft/sec velocity contour are also slightly undulatory. However, no abrupt lateral variations in velocities or other features suggestive of fault activity are apparent, and the non-level contacts are interpreted as the result of soil deposition on previously eroded and dissected topography.

## 6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on interpreted subsurface conditions as described in Section 5,0, we conclude that no Holocene active faults exist within the areas explored. However, it should be noted that because trenches could not be extended beyond the west property line, and because the AP Act requires minimum setbacks of 50 feet, we recommend that setbacks for new structures be imposed along the western margin of the site. As shown on Figure 7, the recommended “no build” zone extends 50-feet east from the western end of the seismic profiles.

Trenches also could not be extended beyond the east property line. However, we judge that since 1) the eastern portion of the project site is not located within the AP Zone, 2) no significant structures, deformation, or offset of the soil profile was observed during our investigation, and 3) no faults are mapped or suspected within 50-feet of the eastern parcel boundary, setbacks are not required on the eastern side of campus.

## 7.0 SUPPLEMENTAL GEOTECHNICAL SERVICES

If needed, further study could be performed to further evaluate areas beyond the western property line in order to "clear" the recommended "no build" zone shown on Figure 7. Such study would probably require coordination with neighboring landowners and/or the City of Santa Rosa to accommodate additional seismic surveying and/or subsurface trenching or drilling.

Supplemental services could include consultation with the District to evaluate potential redevelopment options in consideration of the recommended no-build zone and probable site geotechnical considerations. Services could also include more comprehensive subsurface exploration, lab testing, and analysis as part of a design-level Geologic and Geotechnical Investigation, if new improvements are planned.

## 8.0 LIMITATIONS

It is our opinion that this report has been prepared in accordance with generally accepted geotechnical engineering practices in the San Francisco Bay Area at the time the report was prepared. This report has been prepared for the exclusive use of Santa Rosa City Schools and/or its assignees specifically for this project. No other warranty, expressed or implied, is made. Our evaluations and recommendations are based on the data obtained during our subsurface exploration program and our experience with soil and geologic conditions in this geographic area.

Our approved scope of work did not include an environmental assessment of the site. Consequently, this report does not contain information regarding the presence or absence of toxic or hazardous wastes.

The evaluations and recommendations do not reflect variations in subsurface conditions that may exist between exploration locations or in unexplored portions of the site. Should such variations become apparent during construction, the general recommendations contained within this report will not be considered valid unless MPEG is given the opportunity to review such variations and revise or modify our recommendations accordingly. No changes may be made to the general recommendations contained herein without the written consent of MPEG.

We recommend that this report, in its entirety, be made available to project team members, contractors, and subcontractors for informational purposes and discussion. We intend that the information presented within this report be interpreted only within the context of the report as a whole. No portion of this report should be separated from the rest of the information presented herein. No single portion of this report shall be considered valid unless it is presented with and as an integral part of the entire report.

## 9.0 LIST OF REFERENCES

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Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community, City of Santa Rosa, Maxar

**SITE COORDINATES**
**38.7004°N**
**122.4733°W**

**MAP SCALE 1:2,400**

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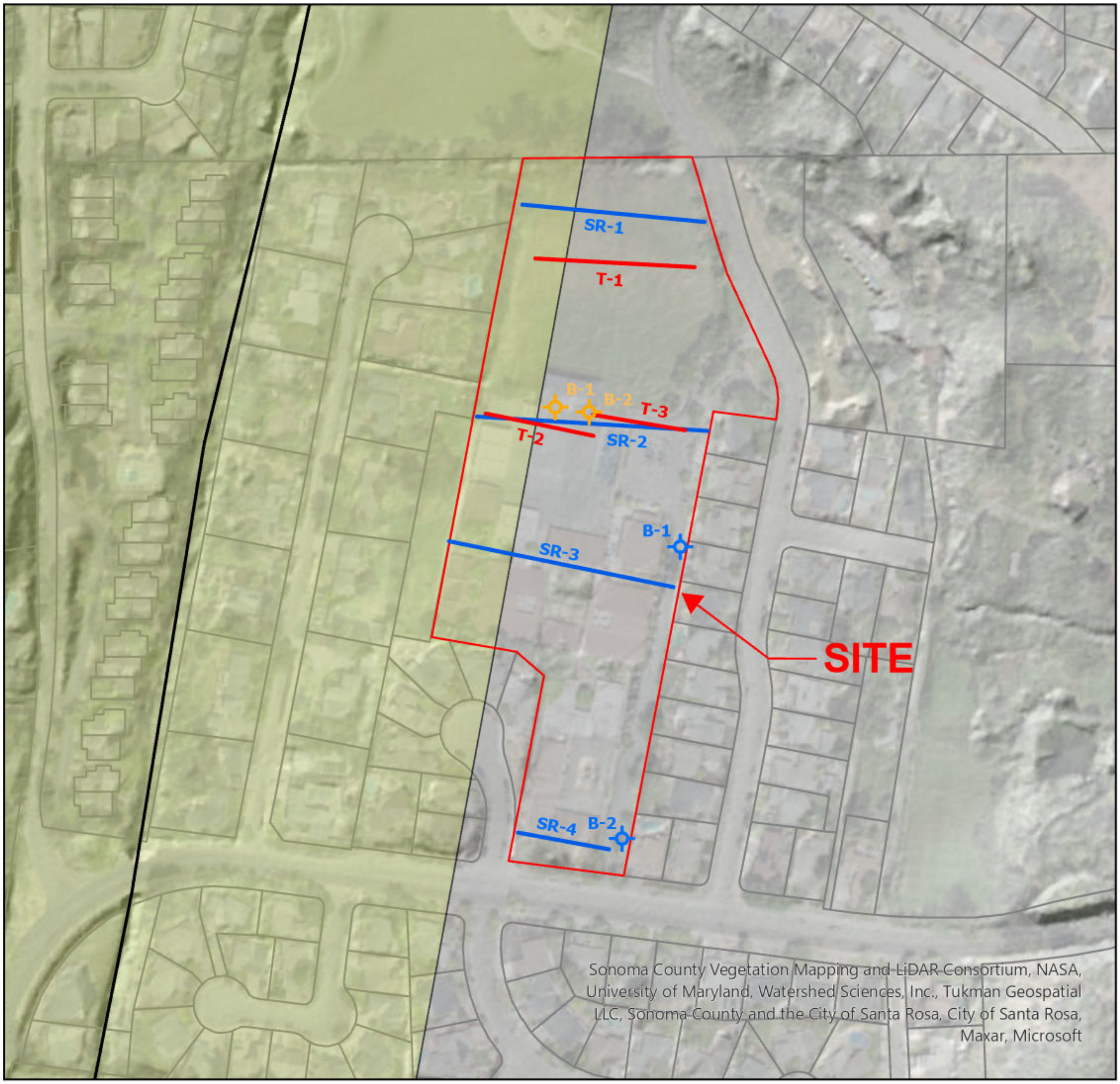
**SITE LOCATION MAP**

Hidden Valley Elementary School
3435 Bonita Vista Lane
Santa Rosa, California

Project No. 1079.120
Date: 9/12/2025 1:49 PM

**FIGURE**
1



**SITE COORDINATES**
**38.7004°N**
**122.4733°W**

**MAP SCALE 1:3,600**

0 150 300 600 Feet

N
W E
S

**Legend and Key to Map Symbols**

| | |
|---|---|
| ☐ Parcel Boundary | — Seismic Refraction Line |
| 🟨 CGS Alquist-Priolo Earthquake Fault Zone | ⌖ Boring by Quantum Geotechnical (2023) |
| — CGS Alquist-Priolo Fault Trace | ⌖ Boring by Miller Pacific (2025) |
| — Fault Trench (2025) | |

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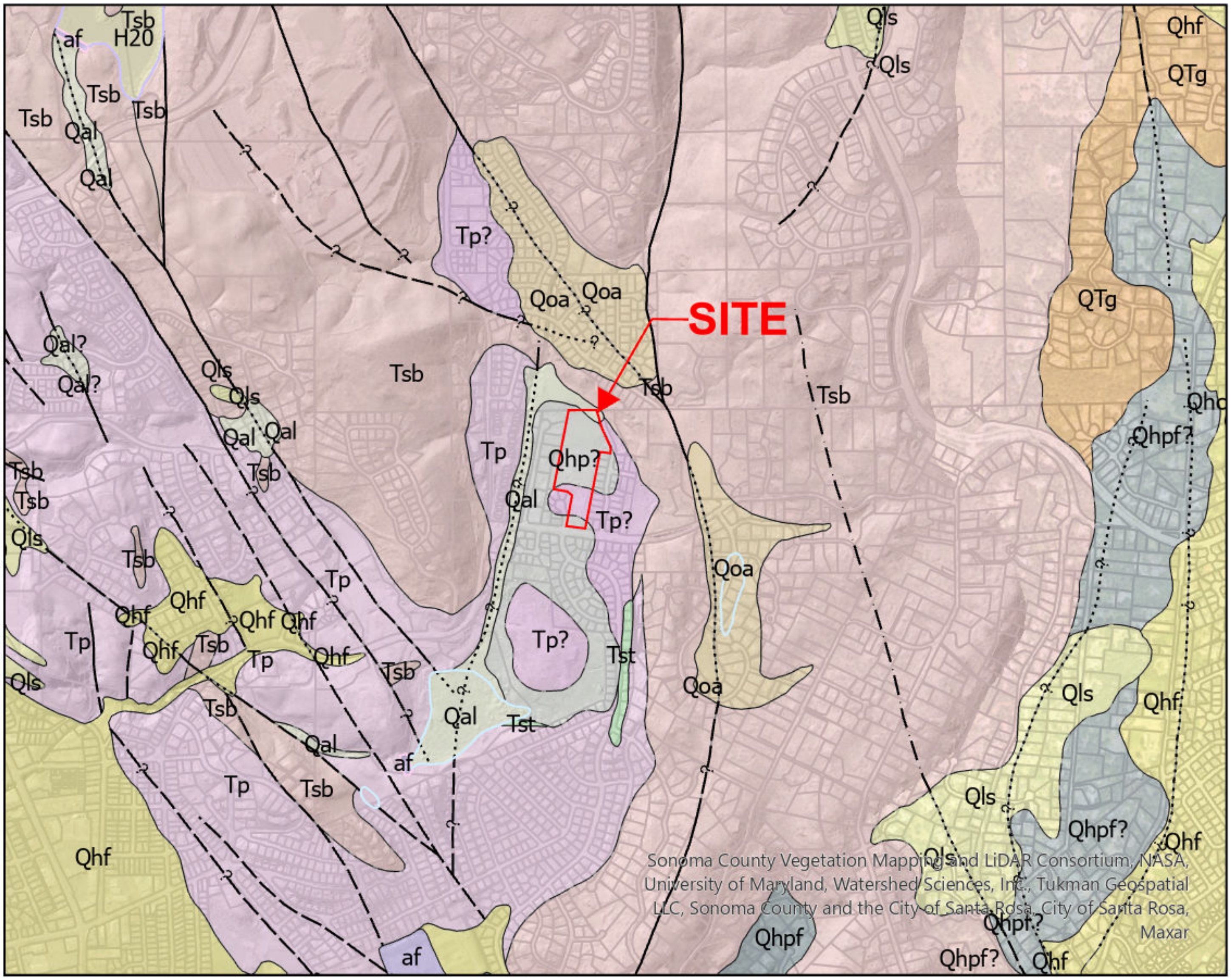
## SITE PLAN

Hidden Valley Elementary School
3435 Bonita Vista Lane
Santa Rosa, California

Project No. 1079.120 Date: 9/14/2025 9:25 AM

**FIGURE**
**2**



Sonoma County Vegetation Mapping and LiDAR Consortium, NASA, University of Maryland, Watershed Sciences, Inc., Tukman Geospatial LLC, Sonoma County and the City of Santa Rosa, City of Santa Rosa, Maxar

**SITE COORDINATES**
**38.4518°N**
**122.4733°W**

## MAP SCALE 1:24,000

0 500 1,000 2,000 3,000 4,000 Feet

N
W E
S

**Geologic Map Units**

| | |
|---|---|
| af | **Artificial fill** |
| Qhf | **Alluvial fan and fluvial terrace deposits, undivided (Holocene)** |
| Qal | **Alluvial deposits, undivided (Holocene and/or Pleistocene)** |
| Qhp | **Alluvial deposits, undivided (Holocene and Pleistocene)** |
| Qhpf | **Alluvial fan and terrace deposits (Holocene? and/or Pleistocene)** |
| Qls | **Landslide Deposits (Holocene and Pleistocene)** |
| Qoa | **Older alluvium, undivided (Pleistocene)** |
| Qtg | **Fluvial and lacustrine deposits (early Pleistocene and Pliocene)** |
| Tp | **Petaluma Formation (Pliocene - Miocene)** |
| Tsb | **Andesite, basaltic andesite, and basalt (late Tertiary)** |
| Tst | **Rhyolitic to dacitic and minor andesitic pumiceous tuff (late Tertiary)** |

**Map Symbols**

| | |
|---|---|
| — — · | **contact, approx. located** |
| —— | **contact, certain** |
| — — | **fault, approx. loc., queried** |
| — — · | **fault, approx. located** |
| —— | **fault, certain** |
| · · · · · · · · | **fault, concealed** |
| · · · · · · | **fault, concealed, queried** |
| — · — · — | **lineaments** |
| —— | **sag pond** |

**REFERENCE: McLaughlin, R.J., et al (2008), "Geologic and Geophysical Framework of the Santa Rosa 7.5-Minute Quadrangle, Sonoma County, California", United States Geological Survey Open-File Report 2008-1009, Sheet 1 of 3, Map Scale 1:24,000.**

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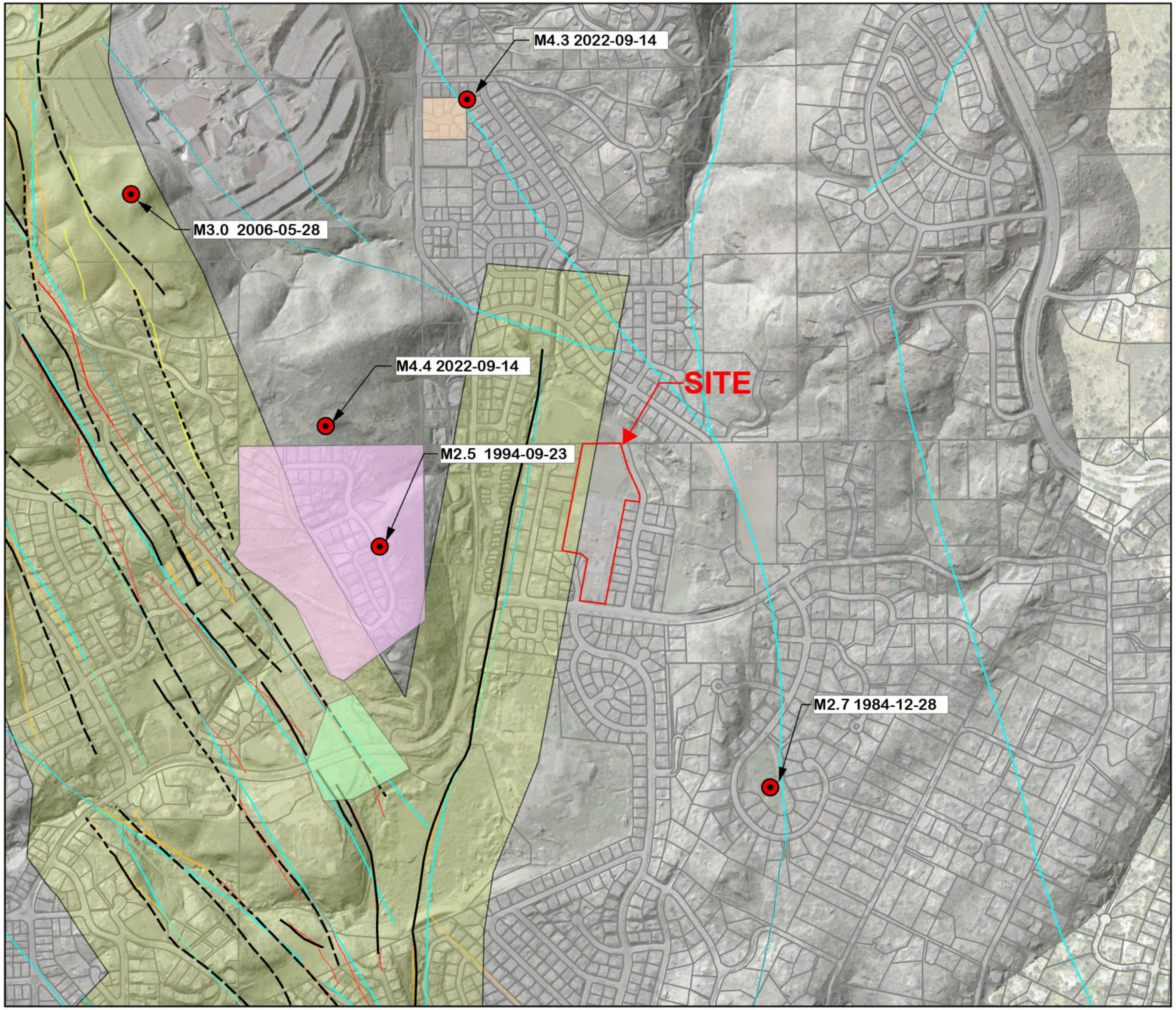
## REGIONAL GEOLOGIC MAP

Hidden Valley Elementary School
3435 Bonita Vista Lane
Santa Rosa, California

Project No. 1079.121 Date: 9/13/2025 10:20 AM

**FIGURE**
**3**



**Legend and Key to Map Symbols**

● Historic Earthquake Epicenter
⬜ CGS Alquist-Priolo Earthquake Fault Zone

**Alquist-Priolo Faults (Holocene)**

— Accurately Located
— — Approximately Located
- - - Inferred
······ Concealed

**Faults Mapped by Hecker (2018)**

— Part of Principal Displacement Zone (Holocene)
— Part of Distributed Displacement Zone (Holocene)

**Faults Mapped by McLaughlin et al. (2008)**

— Accurately Located (Age Undetermined)

**Previous Studies by Others**

🟪 Harding Lawson (1978)
🟩 Harding Lawson (1987); Rutherford & Chekene (1987)
🟧 Moore & Taber (1976)

**MAP SCALE 1:12,000**

0 500 1,000 2,000 3,000 4,000 Feet

N S W E

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**LOCAL FAULT MAP AND STUDIES BY OTHERS**

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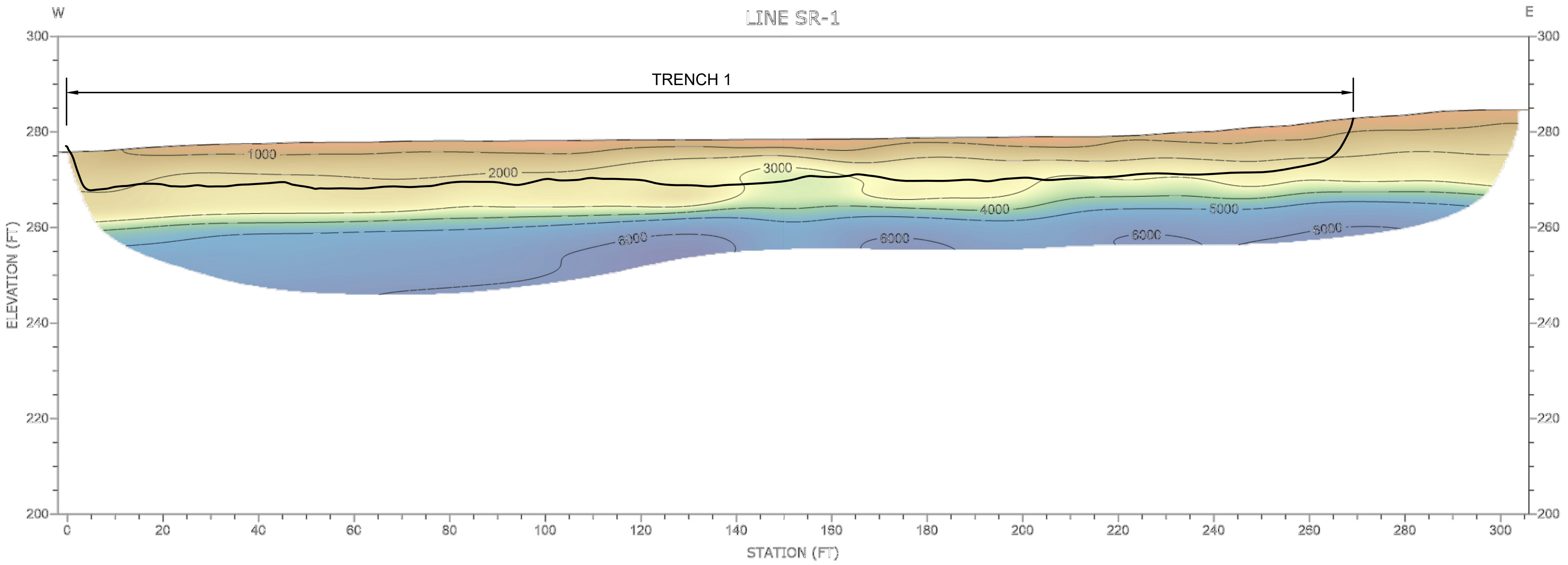
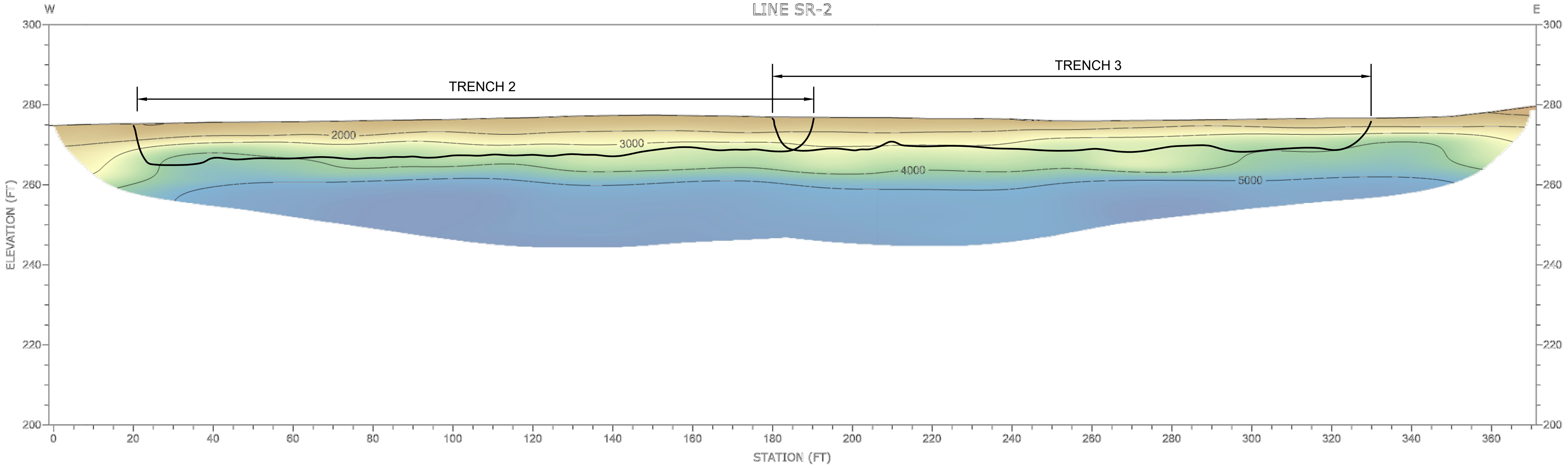
Santa Rosa, California

Project No. 1079.120
Date: 9/15/2025 10:14 AM

**FIGURE**
**4**





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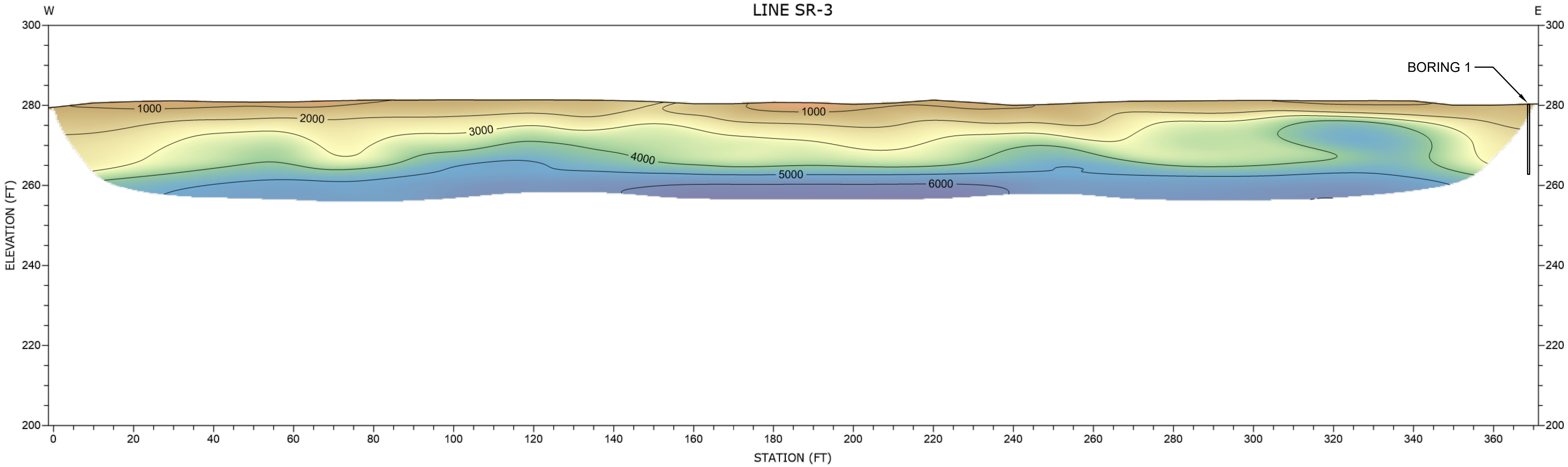
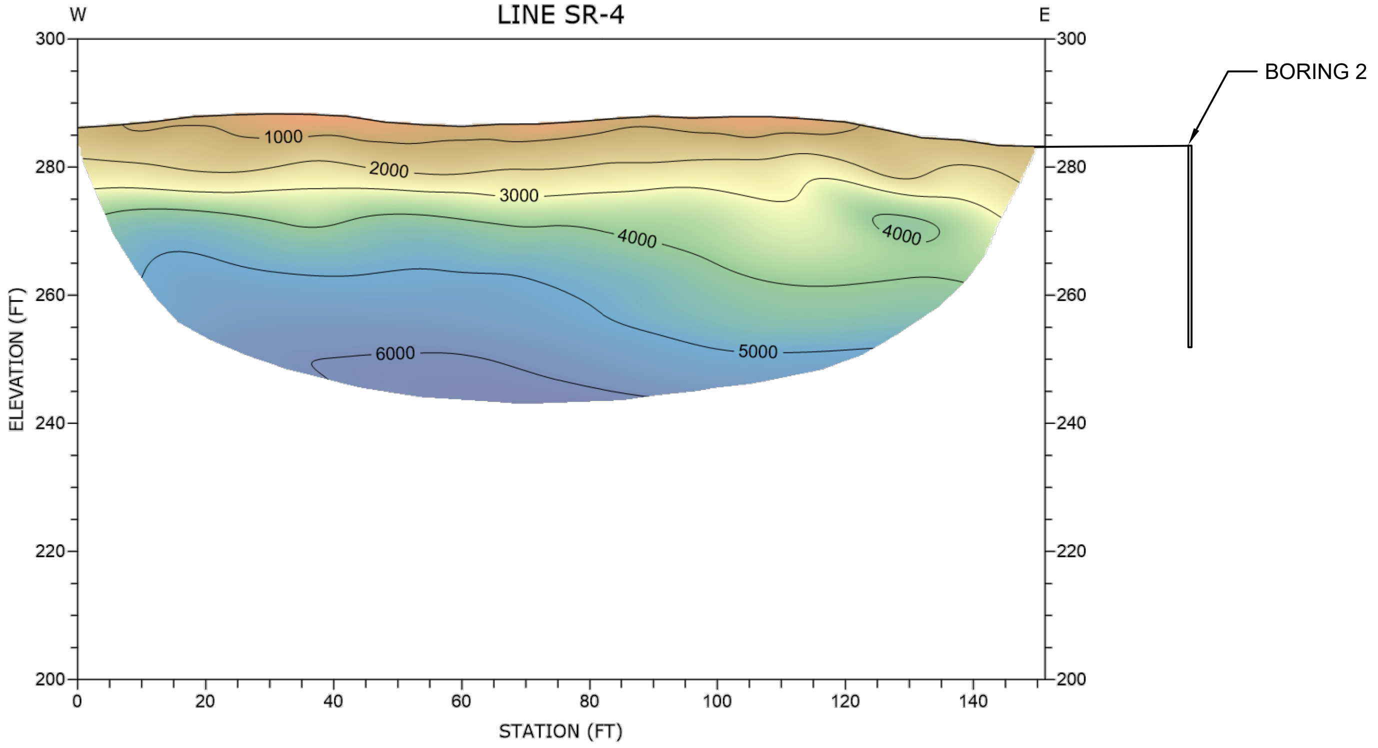
SEISMIC LINES WITH TRENCH ALIGNMENTS

Hidden Valley Elementary School
3435 Bonita Vista Drive
Santa Rosa, California
Project No. 1079.120 Date: 9/12/2025

Designed ZMS
Drawn ZMS
Checked MFJ

5
FIGURE





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SEISMIC LINES WITH TRENCH ALIGNMENTS

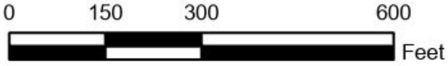
Hidden Valley Elementary School
3435 Bonita Vista Drive
Santa Rosa, California
Project No. 1079.120 Date: 9/12/2025

Designed ZMS
Drawn ZMS
Checked MFJ

6
FIGURE

**SITE COORDINATES**
**38.7004°N**
**122.4733°W**

**MAP SCALE 1:3,600**



**Legend and Key to Map Symbols**

🟧 Recommended "No Build" Zone

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**RECOMMENDED "NO BUILD" ZONE**

Hidden Valley Elementary School
3435 Bonita Vista Lane
Santa Rosa, California

Project No. 1079.120 Date: 9/13/2025 11:28 AM

**FIGURE**

**7**

# APPENDIX A
# HISTORIC AERIAL PHOTOGRAPHS

SITE COORDINATES
LAT. 38.4733°
LON. -122.7005°

REFERENCE: UCSB Frame Finder, 2025

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## AERIAL PHOTO - 1942

Hidden Valley Elementary School
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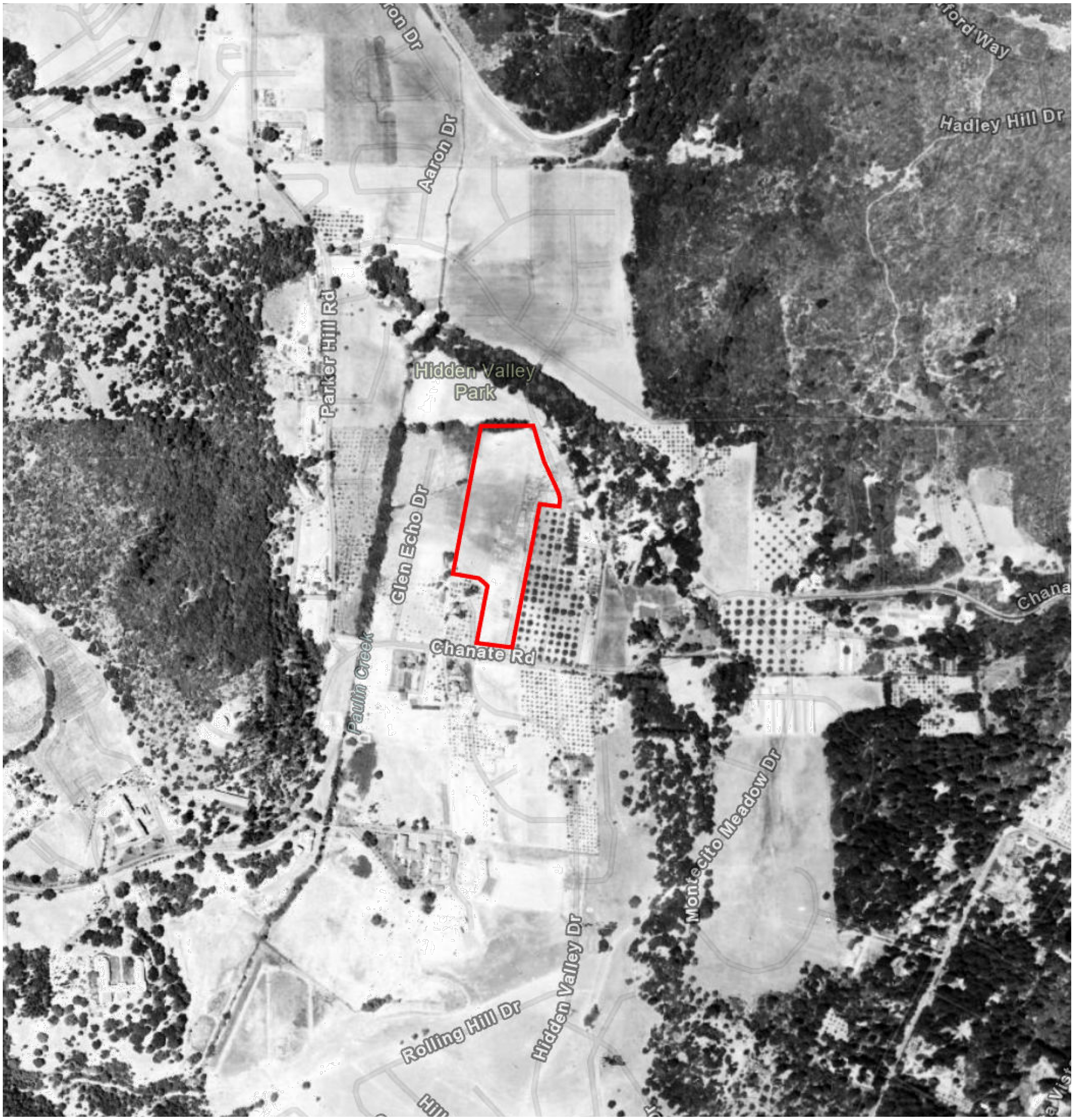
Santa Rosa, California

Project No. 1079.120 Date: 9/15/2025

Drawn ZMS
Checked

A-1
FIGURE



SCALE

0 500 1000 2000 FEET

| SITE COORDINATES |
|---|
| LAT. 38.4733° |
| LON. -122.7005° |

N

REFERENCE: UCSB Frame Finder, 2025

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## AERIAL PHOTO - 1953

Hidden Valley Elementary School
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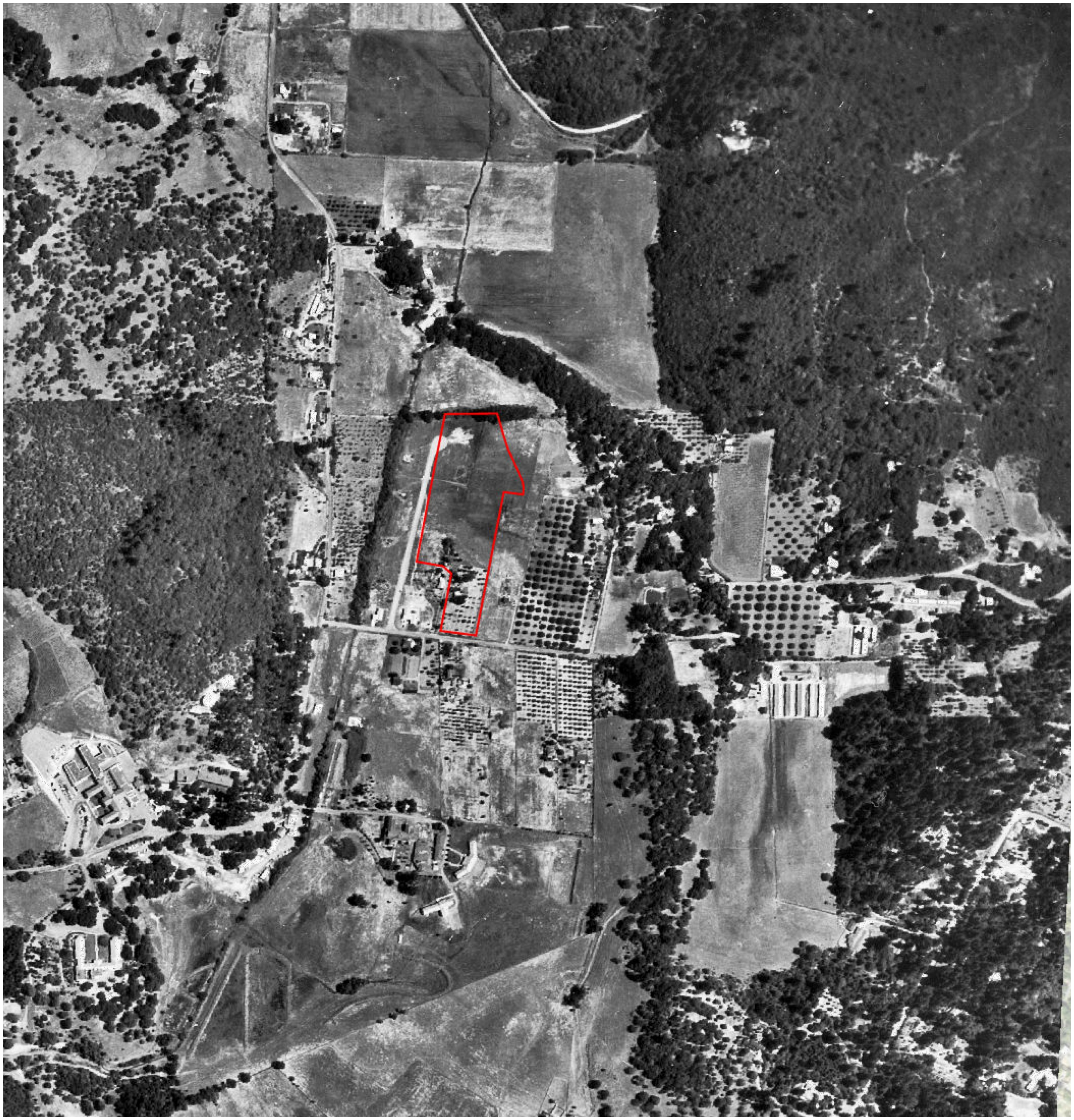
Santa Rosa, California

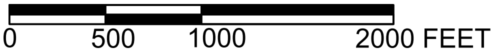
Project No. 1079.120 Date: 9/15/2025

Drawn ZMS
Checked

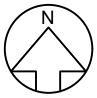
A-2
FIGURE



SCALE



| SITE COORDINATES |
|---|
| LAT. 38.4733° |
| LON. -122.7005° |



REFERENCE: UCSB Frame Finder, 2025

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# AERIAL PHOTO - 1957

Hidden Valley Elementary School
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Project No. 1079.120
Date: 9/15/2025

Drawn ZMS
Checked

A-3
FIGURE

SCALE

0 500 1000 2000 FEET

| SITE COORDINATES |
|---|
| LAT. 38.4733° |
| LON. -122.7005° |

N

REFERENCE: UCSB Frame Finder, 2025

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## AERIAL PHOTO - 1965

Hidden Valley Elementary School
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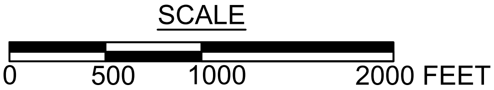
Santa Rosa, California

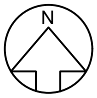
Project No. 1079.120 Date: 9/15/2025

Drawn ZMS
Checked

A-4
FIGURE



| SITE COORDINATES |
|---|
| LAT. 38.4733° |
| LON. -122.7005° |



REFERENCE: UCSB Frame Finder, 2025

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## AERIAL PHOTO - 1987

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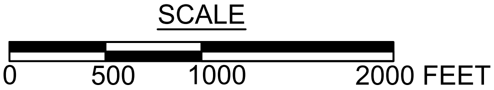
Santa Rosa, California

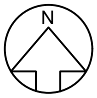
Project No. 1079.120
Date: 9/15/2025

Drawn ZMS
Checked

A-5
FIGURE



| SITE COORDINATES |
|---|
| LAT. 38.4733° |
| LON. -122.7005° |



REFERENCE: UCSB Frame Finder, 2025

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# AERIAL PHOTO - 1993

Hidden Valley Elementary School
3435 Bonita Vista Lane
Santa Rosa, California

Project No. 1079.120 Date: 9/15/2025

Drawn ZMS
Checked

A-6
FIGURE

# APPENDIX B
# PREVIOUS SUBSURFACE EXPLORATION LOGS BY OTHERS

| | | |
|---|---|---|
| Project: **Hidden Valley Elementary School**<br>Project Location: **3435 Bonita Vista Lane, Santa Rosa CA**<br>Project Number: **J065.G** | # Log of Boring B-1<br>**Sheet 1 of 1** | **Quantum Geotechnical Inc.**<br>1110 Burnett Avenue., Ste. B<br>Concord, CA, 94520 |

| | | |
|---|---|---|
| Date(s) Drilled **1/25/23** | Logged By **JF** | Checked By |
| Drilling Method **Hollow Stem Auger** | Drill Bit Size/Type **4"ID/7"OD** | Total Depth of Borehole **21.5 feet bgs** |
| Drill Rig Type **Deep Rock DR 8000** | Drilling Contractor **Clear Heart Drilling** | Approximate Surface Elevation |
| Groundwater Level and Date Measured **11.2** | Sampling Method(s) **Grab, Modified California** | Hammer Data **Auto Trip Hammer** |
| Borehole Backfill **Cement Grout and Soils** | Location **See Site Plan** | |

| Elevation (feet) | Depth (feet) | Sample Type | Sample Number | Sampling Resistance, blows/ft | Material Type | Graphic Log | MATERIAL DESCRIPTION | Water Content, % | Dry Unit Weight, pcf | Percent Fines | LL, % | PI, % | UC, ksf |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | | | Grass | | GRASS- 4-inch thick sod | | | | | | |
| | | | | | CL | ▨ | Organic CLAY (CL) - black, moist, medium stiff, some organics | | | | | | |
| | | ☐ | 1 | | | | | 23.2 | | | 38 | 14 | |
| | | | | | CL-CH | ▨ | Sandy FAT CLAY (CH) - reddish-brown with gray mottles, moist, very stiff, fine sand, moderately plastic | | | | | | |
| | 5 | ■ | 2 | 38 | | | | 24.8 | 98.2 | | | | |
| | | | | | CH | ▨ | Sandy CLAY with Gravel (CH) - reddish-brown with gray mottles, wet, medium stiff, little fine to coarse sand, fine gravel, moderately plastic | | | | | | |
| | 10 | ■ | 3 | 8 | | | ∇ | 32.8 | 87.8 | | 51 | 25 | |
| | | | | | CL-CH | ▨ | Silty CLAY (CL) - olive-gray, moist, very stiff, moderately plasticity silt and clay fines, trace organics | | | | | | |
| | 15 | ■ | 4 | 31 | | | | 31.0 | 91.8 | | 43 | 15 | |
| | 20 | ■ | 5 | 18 | | | - change to grayish-yellow | 45.6 | 75.5 | 95 | | | |
| | | | | | | | Bottom of Borehole at 21.5 feet below ground surface (bgs). Groundwater at 11.2 feet deep. Backfilled with cement grout. | | | | | | |
| | 25 | | | | | | | | | | | | |
| | 30 | | | | | | | | | | | | |

C:\Users\simon\quantumgeotechnical.com\Quantum Geotechnical - Document Storage\Projects\J Projects\J065.G Santa Rosa Schools, Syserco\Draft Boring Logs All Schools\Hidden Valley ES Boring Logs.bg4[Lab Template Black and White Concord Address.tpl]

| | | |
|---|---|---|
| Project: **Hidden Valley Elementary School**<br>Project Location: **3435 Bonita Vista Lane, Santa Rosa CA**<br>Project Number: **J065.G** | # Log of Boring B-2<br>**Sheet 1 of 2** | **Quantum Geotechnical Inc.**<br>1110 Burnett Avenue., Ste. B<br>Concord, CA, 94520 |

| | | |
|---|---|---|
| Date(s) Drilled **1/25/23** | Logged By **JF** | Checked By |
| Drilling Method **Hollow Stem Augers** | Drill Bit Size/Type **4-inch ID/7-inch OD** | Total Depth of Borehole **31.5 feet bgs** |
| Drill Rig Type **Deep Rock DR 8000** | Drilling Contractor **Clear Heart Drilling** | Approximate Surface Elevation |
| Groundwater Level and Date Measured **12.7** | Sampling Method(s) **Modified California, SPT** | Hammer Data **Auto Trip Hammer** |
| Borehole Backfill **Cement Grout and Soils** | Location **See Site Plan** | |

| Elevation (feet) | Depth (feet) | Sample Type | Sample Number | Sampling Resistance, blows/ft | Material Type | Graphic Log | MATERIAL DESCRIPTION | Water Content, % | Dry Unit Weight, pcf | Percent Fines | LL, % | PI, % | UC, ksf |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | | | Grass | | GRASS SOD- 2-inch thick | | | | | | |
| | | | | | CL | | CLAY with Sand (CH) - dark brown, moist, stiff, highly plastic, little fine sand, few organics, few fine gravel | | | | | | |
| | | ■ | 1 | 19 | | | | 26.1 | 99.8 | | | | |
| | 5 | ■ | 2 | 18 | | | - change to mottled reddish-brown and gray, no organics | 31.6 | 89.4 | | | | |
| | | | | | CH | | Sandy CLAY (CH) - yellow-brown, wet, medium stiff, highly plastic, fine sand | | | | | | |
| | 10 | ■ | 3 | 6 | | | | 34.5 | 86.0 | | | | |
| | | | | | | | - change to stiff, gray and brown ▽ | | | | | | |
| | | ■ | 4 | 13 | | | | 38.7 | 82.8 | 78 | 60 | 26 | |
| | 15 | | | | | | | | | | | | |
| | | | | | CH | | Silty CLAY (CH) - pale brown, moist, very stiff | | | | | | |
| | | ■ | 5 | 30 | | | | 32.4 | 90.1 | 73 | | | |
| | 20 | | | | | | | | | | | | |
| | 25 | ■ | 6 | 69 | | | - change to hard | | | | | | |
| | | | | | | | - change to olive-brown, very stiff | | | | | | |
| | 30 | | | | | | | | | | | | |

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Project: **Hidden Valley Elementary School**
Project Location: **3435 Bonita Vista Lane, Santa Rosa CA**
Project Number: **J065.G**

# Log of Boring B-2

## Sheet 2 of 2

**Quantum Geotechnical Inc.**
1110 Burnett Avenue., Ste. B
Concord, CA, 94520

| Elevation (feet) | Depth (feet) | Sample Type | Sample Number | Sampling Resistance, blows/ft | Material Type | Graphic Log | MATERIAL DESCRIPTION | Water Content, % | Dry Unit Weight, pcf | Percent Fines | LL, % | PI, % | UC, ksf |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | 30 | ▧ | 7 | 15 |  | ▨ | ↓ - change to olive-brown, very stiff | 50.7 |  | 94.0 | 81 | 31 |  |
|  |  |  |  |  |  |  | Bottom of Borehole at 31.5 feet below ground surface (bgs). Groundwater at 12.7 feet during drilling. Backfilled with neat cement grout. |  |  |  |  |  |  |
|  | 35 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 40 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 45 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 50 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 55 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 65 |  |  |  |  |  |  |  |  |  |  |  |  |

# APPENDIX C
# SUMMARY OF FAULT TRENCH FINDINGS

Fault trenching was performed in June and July of 2025. Excavation, shoring, and trench backfill were performed by Maggiora & Ghilotti of San Rafael, California.

Trenches were excavated at the locations shown on Figure 2 by use of a hydraulic excavator equipped with a 36-inch bucket. Trenches were excavated to typical depths of around 8 to 12 feet below existing grade, and aluminum "speed-shores" were installed on maximum 6-foot centers as excavation progressed.

Following trench excavation and shoring, the north walls were thoroughly and carefully cleaned with hand tools to expose natural soil structure and stratigraphy. The south walls were locally cleaned as needed to obtain better exposures or confirm features and contacts observed on the north wall during initial cleaning. Surface topography along the north side of each trench was surveyed using a hand-level, and contacts were marked with string line for accurate depth measurements from the top of trench. Positional/lateral accuracy was achieved by marking stations with paint 5-foot horizontal intervals. Each trench was logged at a scale of 1:60 (1 inch = 5-feet) using the Unified Soil Classification System (USCS). Brief explanations of the terms and methodology used in classifying earth materials are provided along with a stratigraphic column on Figure C-1.

### Trench T-1 (2025) – Figures C-2 through C-5

T-1 was located in the grassy field on the northern portion of the project site as shown on Figure 2. Trench 1 was excavated to a total length of about 270-feet and to typical depths ranging between 8- and 10-feet.

Trench 1 exposed flat-lying, apparently conformable contacts that span from Holocene to Pleistocene age. Surface soils, including tilled/reworked native soil and aggregate base rock, were encountered in the upper 1.5- to 3.0-feet of the profile. Below this layer, we encountered Holocene age alluvial fan/basin deposits predominantly composed silty sand with clay to a typical depth of 5-feet below the ground surface (bgs). Older, Pleistocene age alluvial fan deposits were observed deeper in the profile and extended to approximately 8-feet bgs. These older alluvial fan deposits were composed of clay with sand to clayey sand and exhibited fining in the westward direction. The trench bottomed in Pliocene age Petaluma Formation, which was generally composed of interbedded, weakly indurated clay, silt, sand, and gravel, with locally better lithified siltstone and silty sandstone. Aside from an interpreted, approximately south-flowing channel exposed from STA 1+30 to 1+60, no significant structures, disruption, or deformation of the soil profile were observed.

### Trench T-2 (2025) – Figures C-6 through C-8

This trench was located within the asphalt play area in the center of the project site as shown on Figure 2. Trench 2 was excavated to a total length of 170-feet, and to typical depths ranging from 7- to 10-feet. Stratigraphy was noted to be very similar to Trench T-1, and no significant structures or other disruption or deformation of the soil profile was observed.

### Trench T-3 – Figures C-9 through C-11

Trench T-3 was located in the asphalt play area and parking lot in roughly the center of the project site as shown on Figure 2. Trench 3 was excavated to a total length of about 150 feet, and to typical depths of 4- to 7-feet. Trench T-3 exposed the same general stratigraphy as Trenches T-1 and T-2, and no significant structures or other disruption or deformation of the soil profile was observed.

# STRATIGRAPHIC COLUMN AND KEY TO LOG SYMBOLS

| | |
|---|---|
| 1 | Sandy CLAY to Clayey SAND - Dark gray brown, moist to dry, medium dense/stiff, locally re-worked/plowed, includes various debris and is locally mixed with (or includes layers of) aggregate baserock [HOLOCENE FILL/ALLUVIUM] |
| 2 | CLAY (CL) - Dark gray brown, moist, medium stiff, moderate plasticity, approximately 10% fine to coarse grained sand [HOLOCENE ALLUVIAL FAN/BASIN DEPOSITS] |
| 3 | SILT with Clay (ML) - Light gray, moist, medium stiff to stiff, low plasticity, approximately 10% fine to medium grained sub-rounded pebbles, weak granular structure, abundant rootlets [HOLOCENE ALLUVIAL FAN/BASIN DEPOSITS] |
| 4 | Silty SAND with with CLAY (SM/SC) - red brown to brown, moist, medium dense, very fine to medium grained sand, typically 15-20% fines but locally up to 40% fines, isolated/minor gravel, thin rootlets, massive/structureless. Local lenses of fine gravel/perlite at upper portion of unit [HOLOCENE ALLUVIAL FAN/BASIN DEPOSITS] |
| 5 | CLAY with Sand (CH) - Brown to gray brown with local orange mottling, moist to wet, stiff to very stiff, moderate to high plasticity, approximately 5-15% fine grained sand, desiccation cracks up to 0.5-in wide (western portion of site) [PLEISTOCENE ALLUVIAL FAN DEPOSITS] |
| 6 | Sandy CLAY with Gravel (CL) - Gray brown with orange mottling, moist, medium stiff, low to moderate plasticity clay, approximately 15-35% approximately fine to medium grained sand, approximately 15% sub-angular to sub-rounded gravel with diameter ranging from 0.25-in to 1.0 in, local lenses up to 30% gravel (central portion of site) [PLEISTOCENE ALLUVIAL FAN DEPOSITS] |
| 7 | Clayey SAND with Gravel (SC) - Gray brown with orange mottling, moist, medium dense, fine to coarse grained, approximately 20-40% low to moderate plasticity clay, approximately 15% sub-angular to sub-rounded gravel with diameter ranging from 0.25-in to 1.0 in (eastern side of site) [PLEISTOCENE ALLUVIAL FAN DEPOSITS] |
| 8 | **Petaluma Formation** - Interbedded, weakly indurated clay, silt, sand and gravel with locally better lithified siltstone and silty sandstone. Typically is light gray brown, low hardness, friable to weak, and highly weathered. Manganese oxide weathering locally present on fractures/bedding planes. Locally includes lenses of rounded to sub-rounded cobbles of volcanic origin. [PLIOCENE] |

—— GEOLOGIC CONTACT, SHARP

- - - - GEOLOGIC CONTACT, GRADATIONAL

# UNITED SOIL CLASSIFICATION SYSTEM

| MAJOR DIVISIONS | | ABBR. | DESCRIPTION |
|---|---|---|---|
| COARSE GRAINED SOILS over 50% sand and gravel | CLEAN GRAVEL | GW | Well-graded gravels or gravel-sand mixtures, little or no fines |
| | | GP | Poorly-graded gravels or gravel-sand mixtures, little or no fines |
| | GRAVEL with fines | GM | Silty gravels, gravel-sand-silt mixtures |
| | | GC | Clayey gravels, gravel-sand-clay mixtures |
| | CLEAN SAND | SW | Well-graded sands or gravelly sands, little or no fines |
| | | SP | Poorly-graded sands or gravelly sands, little or no fines |
| | SAND with fines | SM | Silty sands, sand-silt mixtures |
| | | SC | Clayey sands, sand-clay mixtures |
| FINE GRAINED SOILS over 50% silt and clay | SILT AND CLAY liquid limit <50% | ML | Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity |
| | | CL | Inorganic clays of low to medium plasticity, gravely clays, sandy clays, silty clays, lean clays |
| | | OL | Organic silts and organic silt-clays of low plasticity |
| | SILT AND CLAY liquid limit >50% | MH | Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts |
| | | CH | Inorganic clays of high plasticity, fat clays |
| | | OH | Organic clays of medium to high plasticity |
| HIGHLY ORGANIC SOILS | | PT | Peat, muck, and other highly organic soils |
| ROCK | | | Undifferentiated as to type or composition |

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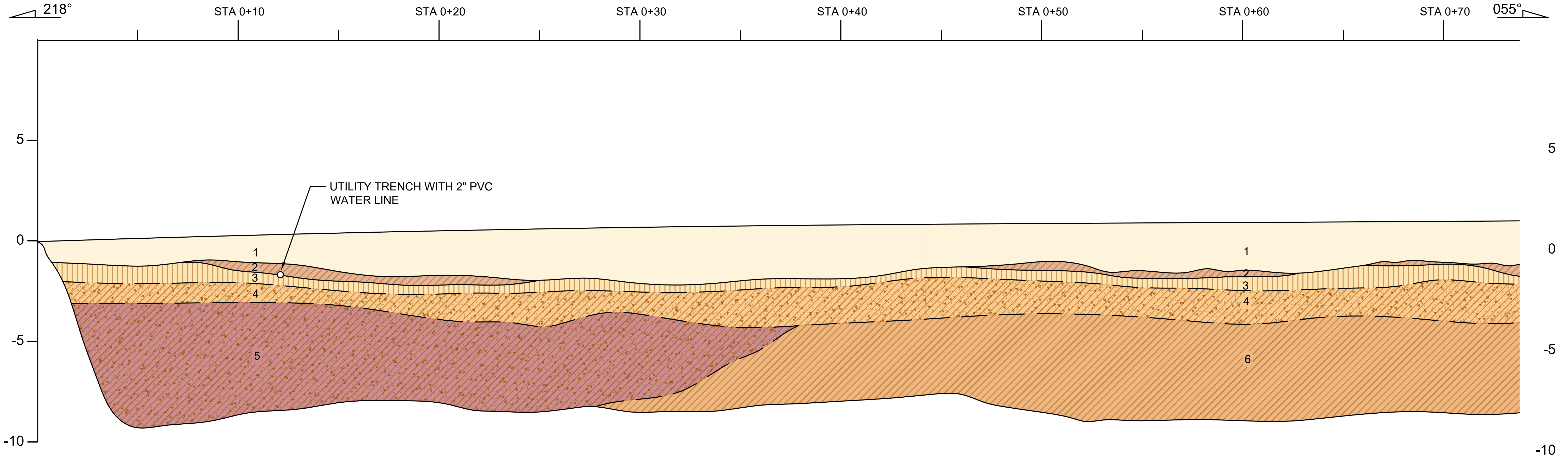
STRATIGRAPHIC COLUMN AND KEY TO LOG SYMBOLS

Hidden Valley Elementary School
3435 Bonita Vista Lane
Santa Rosa, California
Project No. 1079.120 Date: 9/15/2025

Designed ZMS
Drawn ZMS
Checked ZMS

C-1
FIGURE



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| 4 | Silty SAND with CLAY (SM/SC) - red brown to brown, moist, medium dense, very fine to medium grained sand, typically 15-20% fines but locally up to 40% fines, isolated/minor gravel, thin rootlets, massive/structureless. Local lenses of fine gravel/perlite at upper portion of unit [HOLOCENE ALLUVIAL FAN/BASIN DEPOSITS] |
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| 6 | Sandy CLAY with Gravel (CL) - Gray brown with orange mottling, moist, medium stiff, low to moderate plasticity clay, approximately 15-35% approximately fine to medium grained sand, approximately 15% sub-angular to sub-rounded gravel with diameter ranging from 0.25-in to 1.0 in, local lenses up to 30% gravel (central portion of site) [PLEISTOCENE ALLUVIAL FAN DEPOSITS] |
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| 8 | **Petaluma Formation** - Interbedded, weakly indurated clay, silt, sand and gravel with locally better lithified siltstone and silty sandstone. Typically is light gray brown, low hardness, friable to weak, and highly weathered. Manganese oxide weathering locally present on fractures/bedding planes. Locally includes lenses of rounded to sub-rounded cobbles of volcanic origin. [PLIOCENE] |
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| - - - | GEOLOGIC CONTACT, GRADATIONAL |

SCALE
0 2.5 5 10 FEET

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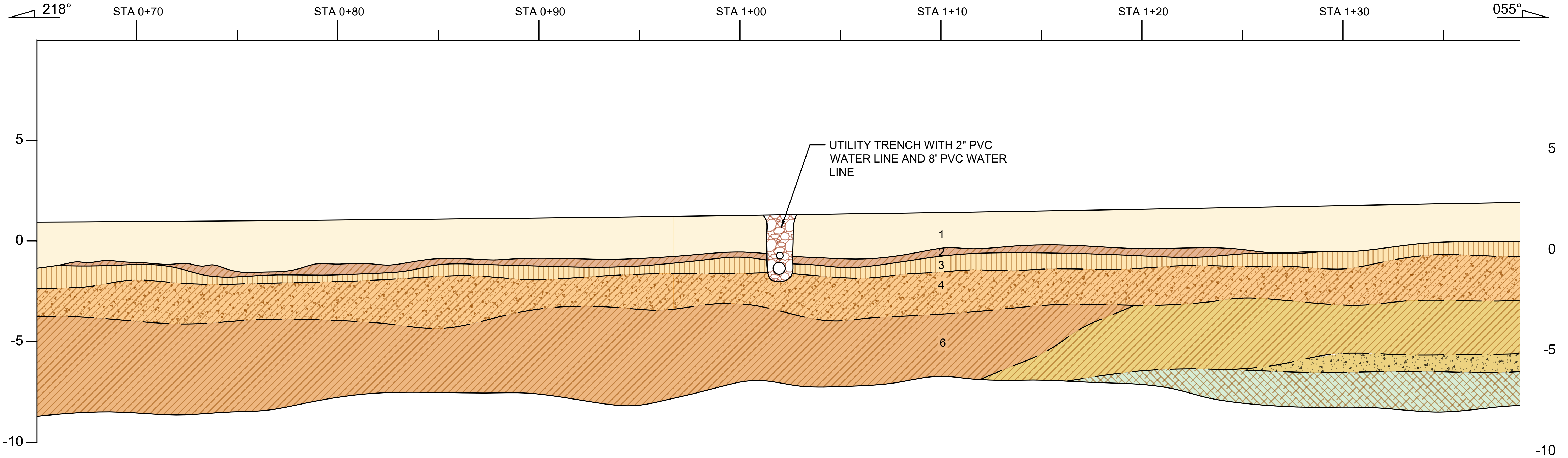
Santa Rosa, California
Project No. 1079.120 Date: 9/15/2025

Designed ZMS
Drawn ZMS
Checked ZMS

C-2
FIGURE



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SCALE
0 2.5 5 10 FEET

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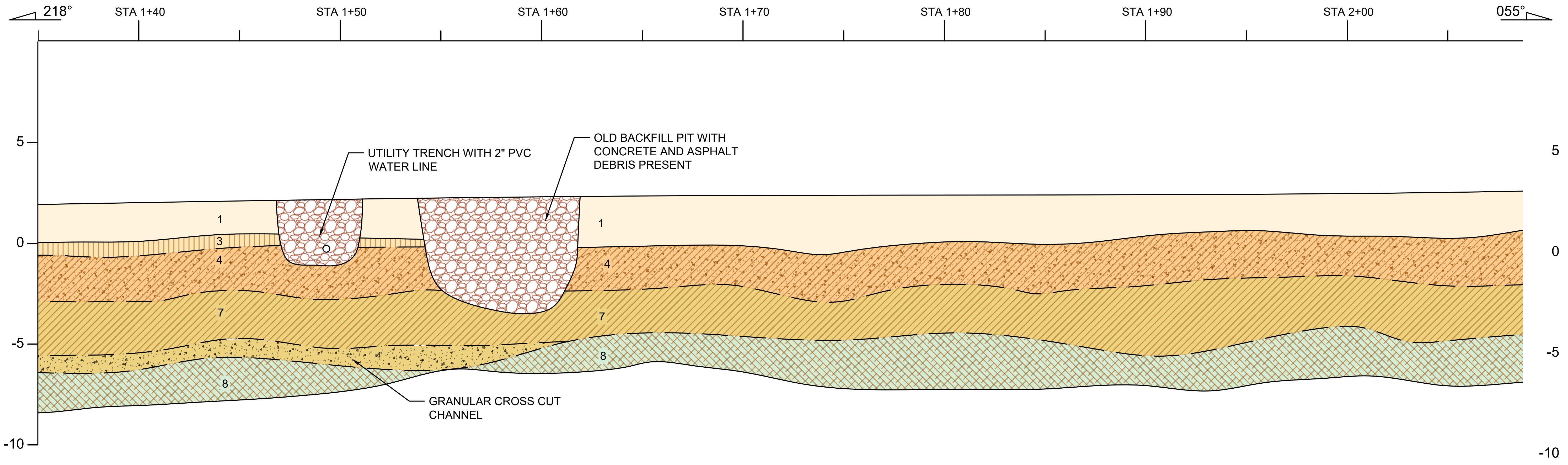
Santa Rosa, California
Project No. 1079.120 Date: 9/15/2025

Designed ZMS
Drawn ZMS
Checked ZMS

C-3
FIGURE



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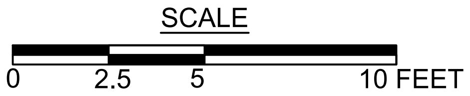

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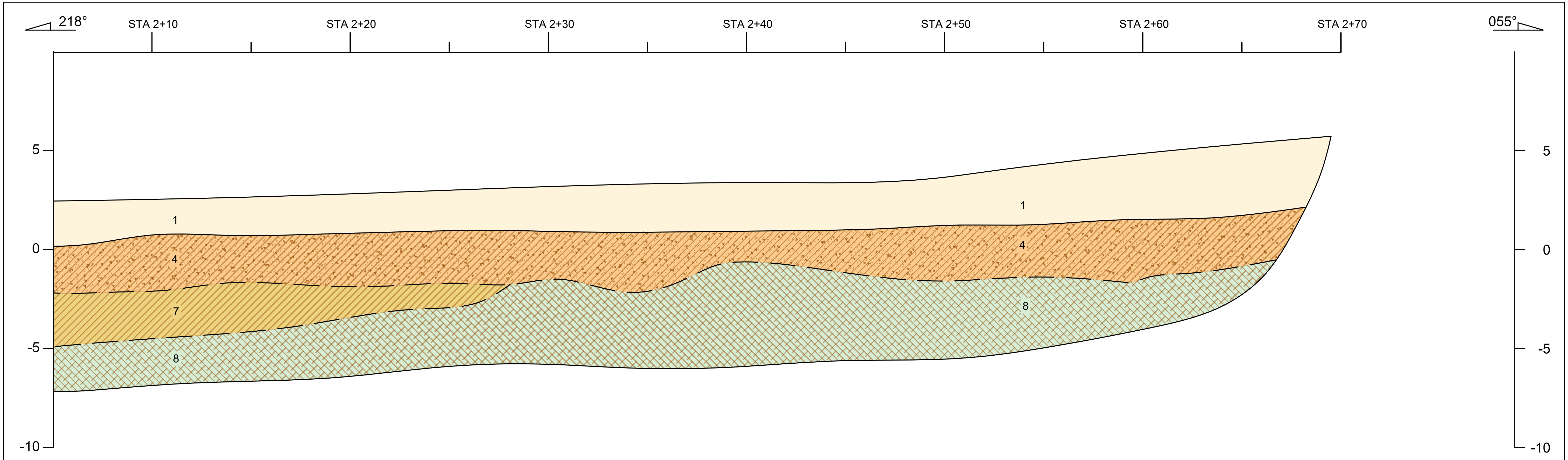
Project No. 1079.120 Date: 9/15/2025

Designed ZMS
Drawn ZMS
Checked ZMS

C-4
FIGURE



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SCALE
0 2.5 5 10 FEET

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Project No. 1079.120 Date: 9/15/2025

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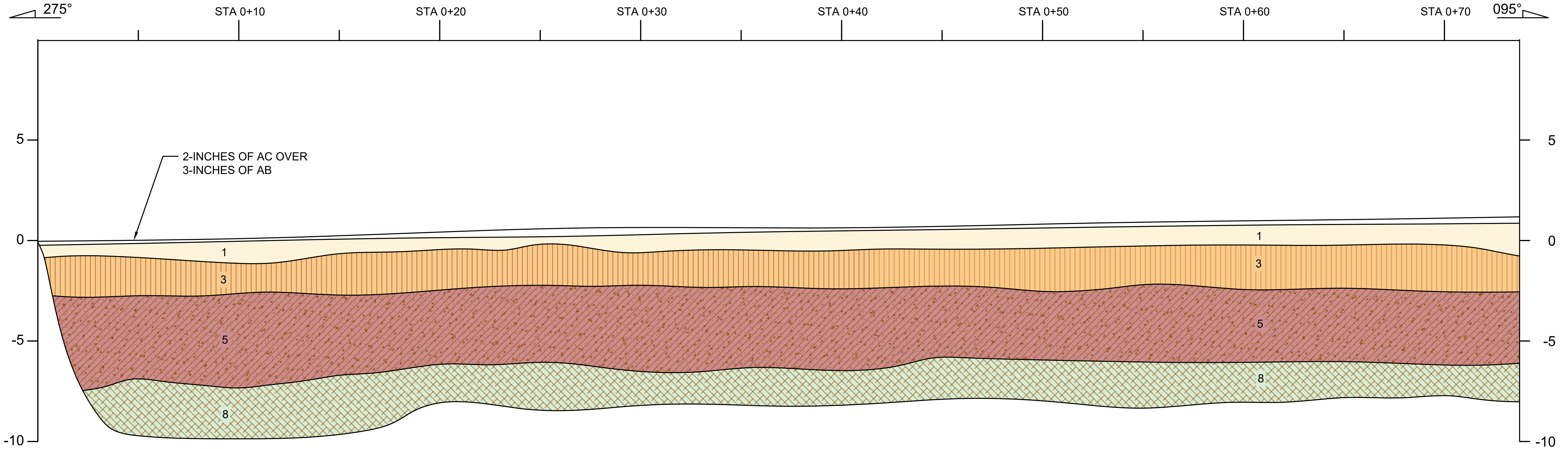
C-5
FIGURE



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| —— | GEOLOGIC CONTACT, SHARP |
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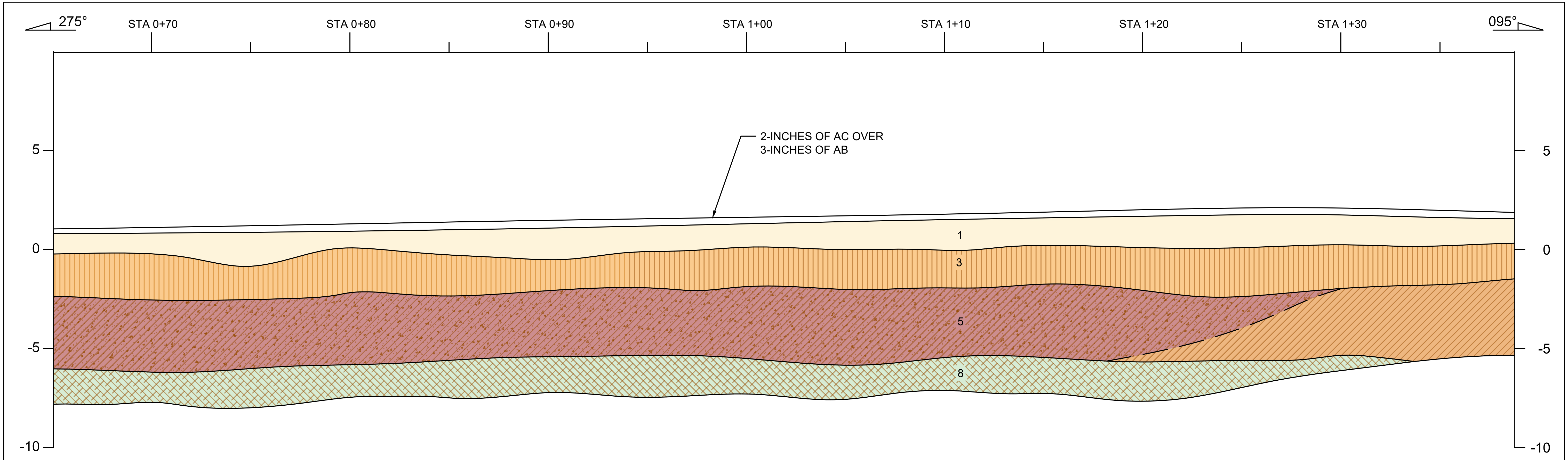
Designed ZMS
Drawn ZMS
Checked ZMS

C-6
FIGURE



## STRATIGRAPHIC COLUMN AND KEY TO LOG SYMBOLS

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— GEOLOGIC CONTACT, SHARP

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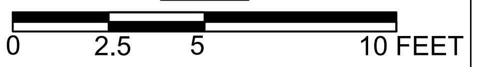

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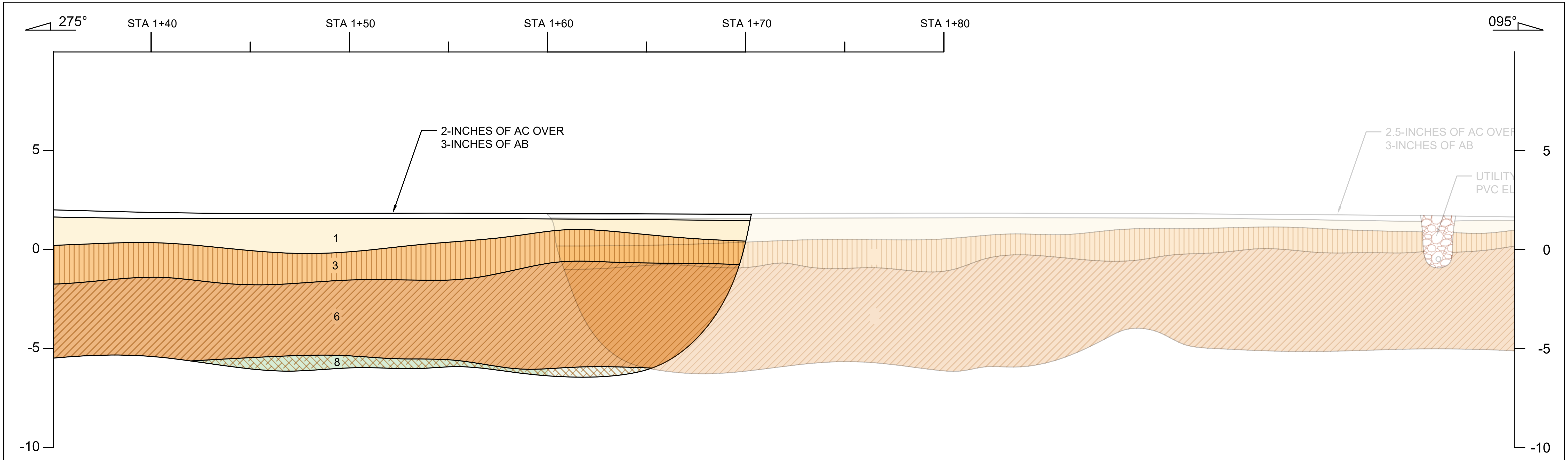
Designed ZMS
Drawn ZMS
Checked ZMS

C-7
FIGURE



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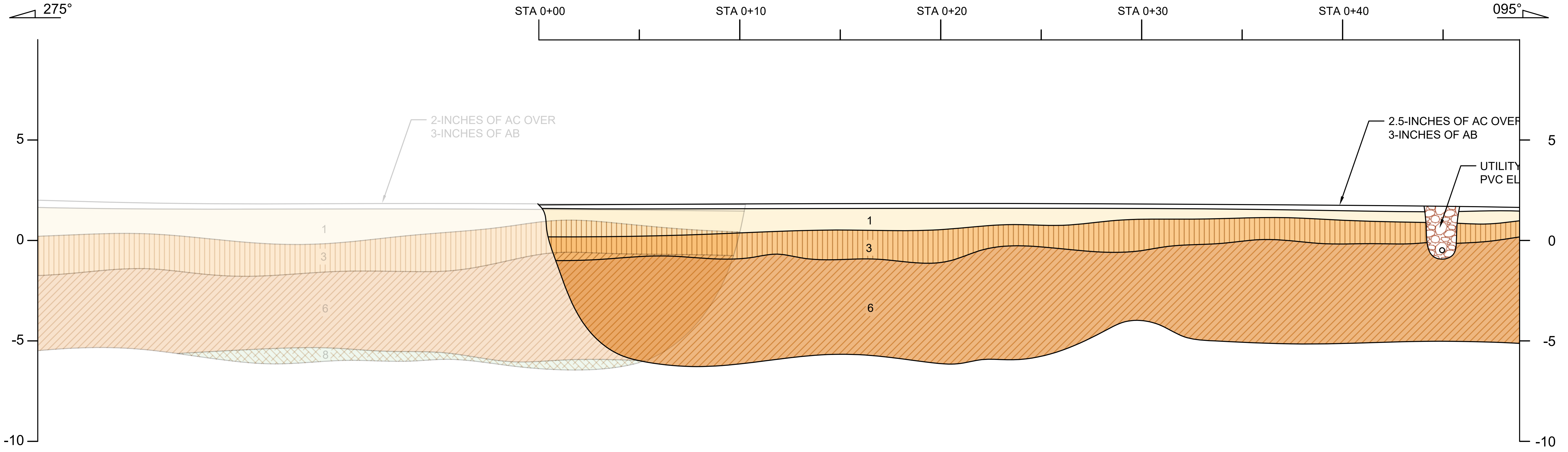
Designed ZMS
Drawn ZMS
Checked ZMS

C-8
FIGURE



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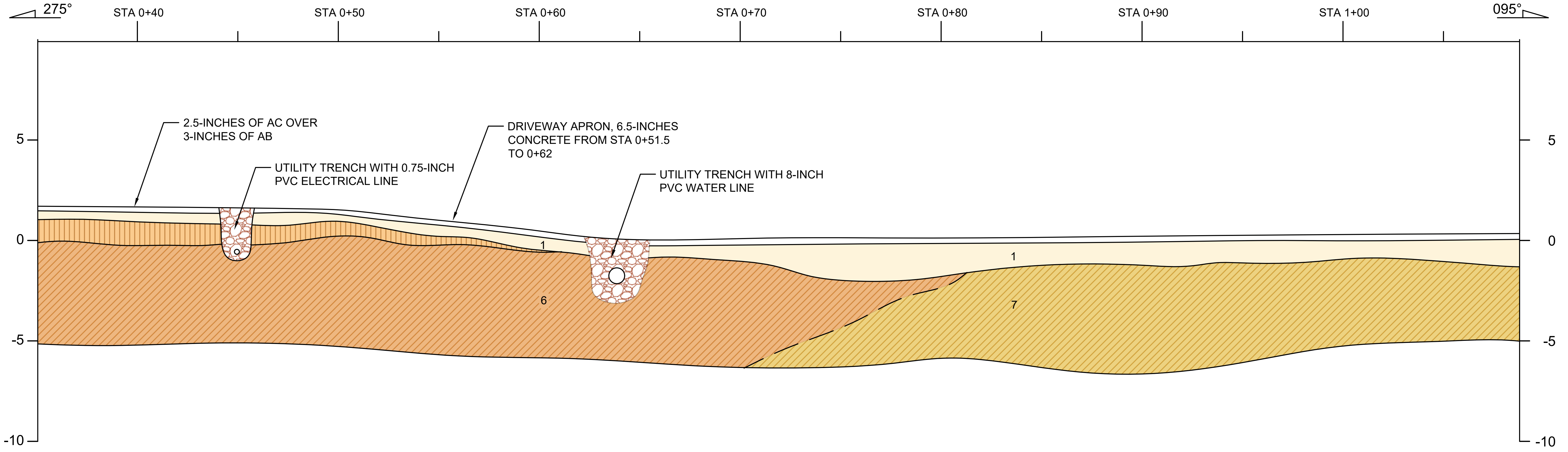
Designed ZMS
Drawn ZMS
Checked ZMS

C-9
FIGURE



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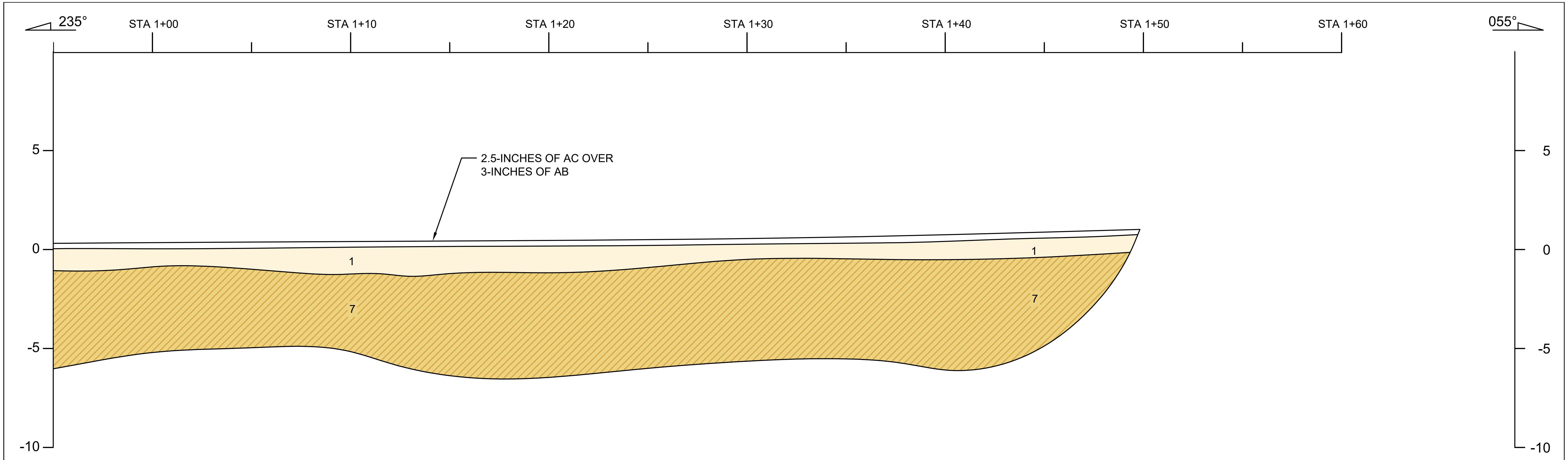
Designed ZMS
Drawn ZMS
Checked ZMS

C-10
FIGURE



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Designed ZMS
Drawn ZMS
Checked ZMS

C-11
FIGURE

# APPENDIX D
## SOIL BORINGS

In order to obtain soil samples in the southern part of the site and corroborate interpreted conditions based on trenches and seismic profiles, we excavated two soil borings on September 2, 2025, at the approximate locations shown on Figure 2. The borings were drilled to depths between 17.5- and 31.5 feet below the ground surface by use of a truck mounted, hydraulic-powered mobile B-53 drill rig equipped with 6.0-inch, solid-stem, continuous flight augers. Materials encountered were examined and logged by our Geologist, who collected samples at select intervals for detailed examination.

Relatively “undisturbed” samples were collected by driving a 2.5-inch diameter, 18-inch long, split-spoon “Modified California” sampler or a 2.0-inch diameter, 18-inch long, split-spoon, Standard Penetration Test (SPT) sampler. Samplers were driven by a 140-pound safety hammer falling 30-inches, and the number of blows required to drive the sampler were recorded on the boring logs.

Brief descriptions of the terms and methodology used in classifying earth materials are shown on the attached Soil and Rock Classification Charts, Figures D-1 and D-2, respectively. Exploratory boring logs are shown on Figures D-3 through D-6.

As shown on the Boring Logs, poorly lithified rock and poorly consolidated sediments of the late Tertiary Petaluma Formation were encountered in Boring 1 at a depth of about 11 feet, and in Boring 2 at a depth of 7 feet. As shown on Figures 5 and 6, the interpreted depth to these materials are in good agreement with seismic profiles, with the 3,000 ft/sec contour at approximately the same depth and interpreted to approximate the boundary between the Petaluma Formation and overlying Quaternary alluvial deposits.

| MAJOR DIVISIONS | | SYMBOL | | DESCRIPTION |
|---|---|---|---|---|
| COARSE GRAINED SOILS over 50% sand and gravel | CLEAN GRAVEL | GW | ▨ | Well-graded gravels or gravel-sand mixtures, little or no fines |
| | | GP | ▨ | Poorly-graded gravels or gravel-sand mixtures, little or no fines |
| | GRAVEL with fines | GM | ▨ | Silty gravels, gravel-sand-silt mixtures |
| | | GC | ▨ | Clayey gravels, gravel-sand-clay mixtures |
| | CLEAN SAND | SW | ▨ | Well-graded sands or gravelly sands, little or no fines |
| | | SP | ▨ | Poorly-graded sands or gravelly sands, little or no fines |
| | SAND with fines | SM | ▨ | Silty sands, sand-silt mixtures |
| | | SC | ▨ | Clayey sands, sand-clay mixtures |
| FINE GRAINED SOILS over 50% silt and clay | SILT AND CLAY liquid limit <50% | ML | ▥ | Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity |
| | | CL | ▨ | Inorganic clays of low to medium plasticity, gravely clays, sandy clays, silty clays, lean clays |
| | | OL | ▥ | Organic silts and organic silt-clays of low plasticity |
| | SILT AND CLAY liquid limit >50% | MH | ▥ | Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts |
| | | CH | ▨ | Inorganic clays of high plasticity, fat clays |
| | | OH | ▨ | Organic clays of medium to high plasticity |
| HIGHLY ORGANIC SOILS | | PT | ▤ | Peat, muck, and other highly organic soils |
| ROCK | | | ▦ | Undifferentiated as to type or composition |

## KEY TO BORING AND TEST PIT SYMBOLS

### CLASSIFICATION TESTS

| | |
|---|---|
| PI | PLASTICITY INDEX |
| LL | LIQUID LIMIT |
| SA | SIEVE ANALYSIS |
| HYD | HYDROMETER ANALYSIS |
| P200 | PERCENT PASSING NO. 200 SIEVE |
| P4 | PERCENT PASSING NO. 4 SIEVE |

### SAMPLER TYPE

| | | | |
|---|---|---|---|
| ■ | MODIFIED CALIFORNIA | ⊠ | HAND SAMPLER |
| ⧄ | STANDARD PENETRATION TEST | ⊠ | ROCK CORE |
| ▮ | CALIFORNIA | X | DISTURBED OR BULK SAMPLE |

NOTE: Test boring and test pit logs are an interpretation of conditions encountered at the excavation location during the time of exploration. Subsurface rock, soil or water conditions may vary in different locations within the project site and with the passage of time. Boundaries between differing soil or rock descriptions are approximate and may indicate a gradual transition.

### STRENGTH TESTS

| | |
|---|---|
| UC | LABORATORY UNCONFINED COMPRESSION |
| TXCU | CONSOLIDATED UNDRAINED TRIAXIAL |
| TXUU | UNCONSOLIDATED UNDRAINED TRIAXIAL |
| | UC, CU, UU = 1/2 Deviator Stress |
| DS (2.0) | DRAINED DIRECT SHEAR (NORMAL PRESSURE, ksf) |

### SAMPLER DRIVING RESISTANCE

Modified California and Standard Penetration Test samplers are driven 18 inches with a 140-pound hammer falling 30 inches per blow. Blows for the initial 6-inch drive seat the sampler. Blows for the final 12-inch drive are recorded onto the logs. Sampler refusal is defined as 50 blows during a 6-inch drive. Examples of blow records are as follows:

| | |
|---|---|
| 25 | sampler driven 12 inches with 25 blows after initial 6-inch drive |
| 85/7" | sampler driven 7 inches with 85 blows after initial 6-inch drive |
| 50/3" | sampler driven 3 inches with 50 blows during initial 6-inch drive or beginning of final 12-inch drive |

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## SOIL CLASSIFICATION CHART

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Drawn PHA
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D-1
FIGURE

## FRACTURING AND BEDDING

| Fracture Classification | Spacing | Bedding Classification |
|---|---|---|
| Crushed | less than 3/4 inch | Laminated |
| Intensely fractured | 3/4 to 2-1/2 inches | Very thinly bedded |
| Closely fractured | 2-1/2 to 8 inches | Thinly bedded |
| Moderately fractured | 8 to 24 inches | Medium bedded |
| Widely fractured | 2 to 6 feet | Thickly bedded |
| Very widely fractured | greater than 6 feet | Very thickly bedded |

## HARDNESS

| | |
|---|---|
| Low | Carved or gouged with a knife |
| Moderate | Easily scratched with a knife, friable |
| Hard | Difficult to scratch, knife scratch leaves dust trace |
| Very hard | Rock scratches metal |

## STRENGTH

| | |
|---|---|
| Friable | Crumbles by rubbing with fingers |
| Weak | Crumbles under light hammer blows |
| Moderate | Indentations <1/8 inch with moderate blow with pick end of rock hammer |
| Strong | Withstands few heavy hammer blows, yields large fragments |
| Very strong | Withstands many heavy hammer blows, yields dust, small fragments |

## WEATHERING

| | |
|---|---|
| Complete | Minerals decomposed to soil, but fabric and structure preserved |
| High | Rock decomposition, thorough discoloration, all fractures are extensively coated with clay, oxides or carbonates |
| Moderate | Fracture surfaces coated with weathering minerals, moderate or localized discoloration |
| Slight | A few stained fractures, slight discoloration, no mineral decomposition, no affect on cementation |
| Fresh | Rock unaffected by weathering, no change with depth, rings under hammer impact |

NOTE: Test boring and test pit logs are an interpretation of conditions encountered at the location and time of exploration. Subsurface rock, soil and water conditions may differ in other locations and with the passage of time.

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ROCK CLASSIFICATION CHART

Hidden Valley Elementary School
3435 Bonita Vista Lane
Santa Rosa, California

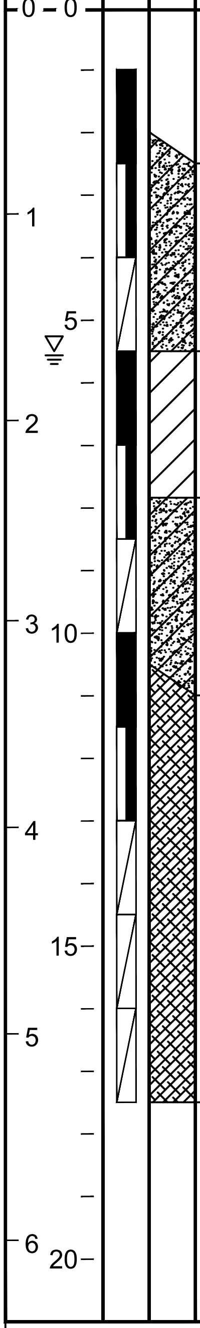
Project No. 1079.120 Date: 9/15/2025

Drawn PHA
Checked

D-2
FIGURE

# BORING 1

EQUIPMENT: Truck Mounted B53 with 6.0-inch Solid Flight Auger
DATE: 9/2/25
ELEVATION: 281 - feet*
*REFERENCE: Google Earth, 2025



| Description | BLOWS / FOOT (1) | DRY UNIT WEIGHT pcf (2) | MOISTURE CONTENT (%) | SHEAR STRENGTH psf (3) | OTHER TEST DATA | OTHER TEST DATA |
|---|---|---|---|---|---|---|
| 3.5-inches Asphalt Concrete over 24-inches Aggregate Base | 24 | | | | | |
| Clayey SAND with Gravel (SC)<br>Orange brown to reddish brown, moist, medium dense, fine to medium grained sand, moderate to high plasticity clay, sub-rounded gravel with 0.5-inch typical diameter, gravel content generally decreasing with depth [Holocene Fill/Alluvium] | 9<br>5 | | | | | |
| CLAY with Sand (CH)<br>Gray-brown with local orange mottling, saturated, medium stiff, medium to high plasticity, fine grained sand, decomposed roots/organics present [Holocene Alluvial Fan/Basin Deposit] | 8 | | | | | |
| Clayey SAND (SC)<br>Gray brown with local orange mottling, saturated, very loose coarse rounded grains, high plasticity clay, up to 10% rounded pebbles/gravel up to 1/4" [Pleistocene Alluvial Fan Deposit] | 3<br>4 | | | | | |
| Siltstone<br>Light gray-brown with zones of blue-green in upper portion, low hardness, friable, completely weathered, fractures coated with oxidation minerals, locally contains medium to coarse sand lenses [Petaluma Formation] | 18<br>12<br>10<br>12<br>16 | | | | | |
| Boring terminated at 17.5 feet.<br>Groundwater encountered at 5.5 feet. | | | | | | |

▽ Water level encountered during drilling
▼ Water level measured after drilling

NOTES:
(1) UNCORRECTED FIELD BLOW COUNTS
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m$^3$ = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(4) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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FILENAME: 1079.120 Boring Logs.dwg

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BORING LOG

Hidden Valley Elementary School
3435 Bonita Vista Lane
Santa Rosa, California

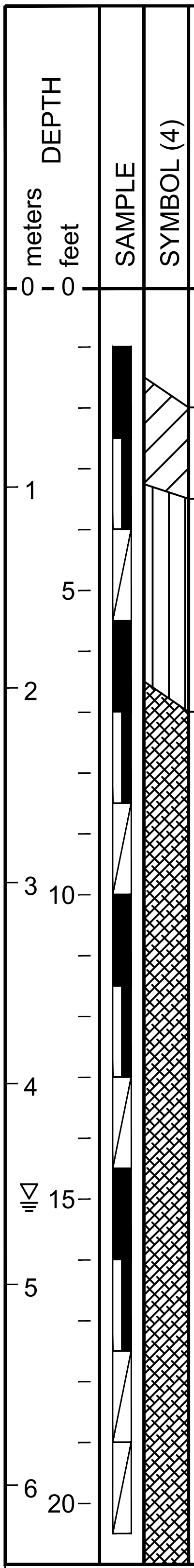
Project No. 1079.120 Date: 9/15/2025

Drawn PHA
Checked

D-3
FIGURE

# BORING 2

EQUIPMENT: Truck Mounted B53 with 6.0-inch Solid Flight Auger
DATE: 9/2/25
ELEVATION: 287 - feet*
*REFERENCE: Google Earth, 2025



| | BLOWS / FOOT (1) | DRY UNIT WEIGHT pcf (2) | MOISTURE CONTENT (%) | SHEAR STRENGTH psf (3) | OTHER TEST DATA | OTHER TEST DATA |
|---|---|---|---|---|---|---|
| 2.5" Asphalt Concrete over 18" Aggregate Base | | | | | | |
| CLAY (CH)<br>Gray-brown, medium stiff, medium to high plasticity, trace fine sand [Holocene Fill/Alluvium] | 10 | | | | | |
| SILT (MH) / CLAY (CH)<br>Light gray-brown, moist, medium stiff, medium to high plasticity, blocky structure, fine to medium grained sand, small (<1/4") charcoal inclusions, trace isolated gravel up to 3/4" diameter [Pleistocene Alluvial Fan Deposit] | 12 | | | | | |
| | 19 | | | | | |
| | 37 | | | | | |
| SILTSTONE<br>Light gray brown, low hardness, friable to weak, highly to completely weathered, rock structure/fabric present, includes local sand lenses [Petaluma Formation] | 24 | | | | | |
| | 20 | | | | | |
| | 28 | | | | | |
| | 28 | | | | | |
| Sand lens from 14'-15.5' | 21 | | | | | |
| | 38 | | | | | |
| | 31 | | | | | |
| Grades to dark orange-brown, includes coarse sand lenses | 14 | | | | | |
| | 24 | | | | | |

∇ Water level encountered during drilling
▼ Water level measured after drilling

NOTES:
(1) UNCORRECTED FIELD BLOW COUNTS
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m$^3$ = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(4) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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## BORING LOG

Hidden Valley Elementary School
3435 Bonita Vista Lane
Santa Rosa, California
Project No. 1079.120
Date: 9/15/2025

Drawn PHA
Checked

D-4
FIGURE

| DEPTH meters / feet | SAMPLE | SYMBOL (4) | BORING 2 (CONTINUED) | BLOWS / FOOT (1) | DRY UNIT WEIGHT pcf (2) | MOISTURE CONTENT (%) | SHEAR STRENGTH psf (3) | OTHER TEST DATA | OTHER TEST DATA |
|---|---|---|---|---|---|---|---|---|---|
| 20 | | ▨ | SILTSTONE<br>Dark gray brown, low hardness, friable to weak, highly to completely weathered, rock structure/fabric present, includes local sand lenses [Petaluma Formation] | | | | | | |
| 7 | | ▨ | | | | | | | |
| 25 | ▯ | ▨ | Grades to medium to dark orange-brown, rare sub-rounded to rounded gravel of volcanic origin (basalt) up to 3/4" | 31 | | | | | |
| 8 | | ▨ | | | | | | | |
| | | ▨ | Grades dark gray-blue completely weathered claystone | | | | | | |
| 9 | | ▨ | | | | | | | |
| 30 | ▯ | ▨ | | 22 | | | | | |
| | | | Boring terminated at 31.5 feet.<br>Groundwater encountered at 15.0 feet. | | | | | | |
| 10 | | | | | | | | | |
| 35 | | | | | | | | | |
| 11 | | | | | | | | | |
| 12 | | | | | | | | | |
| 40 | | | | | | | | | |

▽ Water level encountered during drilling

▼ Water level measured after drilling

NOTES:
(1) UNCORRECTED FIELD BLOW COUNTS
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/$m^3$ = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(4) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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BORING LOG

Hidden Valley Elementary School
3435 Bonita Vista Lane
Santa Rosa, California

Project No. 1079.120
Date: 9/15/2025

Drawn PHA
Checked

D-5
FIGURE

# APPENDIX E
# SEISMIC REFRACTION SURVEY REPORT

# Hidden Valley Seismic Refraction Survey

## Geophysical Exploration Report

## Santa Rosa, CA

**Prepared for:**

Miller Pacific Engineering Group
504 Redwood Blvd., Suite 220
Novato, CA 94947

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July 3, 2025

Miller Pacific Engineering Group
504 Redwood Blvd., Suite 220
Novato, CA 94947

**Attn:** Ms. Zoe Stephens
P: (415) 382-3444
E: zstephens@millerpac.com

**RE:** Hidden Valley Seismic Refraction Survey
3435 Bonita Vista Way
Santa Rosa, CA
Terracon Report No. NS255109

Dear Ms. Stephens,

We have completed the scope of services for the above referenced project in general accordance with the Terracon agreement dated May 27, 2025. This report presents the findings and interpretations of the geophysical exploration for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,

**Terracon**

David Hagin

Max Sperry
Field Geophysicist

David T. Hagin, Reviewer
Senior Geophysicist

PROFESSIONAL GEOPHYSICIST
DAVID T HAGIN
No. 1033
STATE OF CALIFORNIA

7-3-2025

# Table of Contents

# Attachments

**Plate 1 – Site Map**
**Plate 2 – Seismic Refraction Profiles 1 & 2**
**Plate 3 – Seismic Refraction Profiles 3 & 4**

# Introduction

This report presents the results of our geophysical exploration performed for the SRCS Hidden Valley project located at 3435 Bonita Vista Way in Santa Rosa, CA. The purpose of these services was to provide geophysical information regarding lateral variations in p-wave velocity with the goal of locating the Rodgers Creek Fault.

The geophysical exploration Scope of Services for this project included seismic refraction, geophysical interpretation, and preparation of this report.

Graphical plates are attached at the end of this report that present the **Site Location** and **SR Profiles**. More in-depth information on the methods used can be found in the **Exploration and Testing Procedures**.

# Site Conditions

The following description of site conditions is derived from our site visit in association with the geophysical exploration and our review of publicly available geologic and topographic maps.

| Item | Description |
|---|---|
| **Parcel Information** | The site is located at Hidden Vally Elementary School in Santa Rosa, CA. It lies on the path of the Rodgers Creek Fault<br>See **Plate 1 – Site Map**. |
| **Current Ground Cover** | The geophysical survey lines ran along asphalt pavement, concrete roads and walkways, and grass fields. |
| **Existing Topography** | The site is largely flat with elevations between 275- to 285-ft (NAVD88). |
| **Geology** | The Pliocene-age Petaluma Formation (non-marine siltstone, claystone, and mudstone) is present in Hidden Valley. The surrounding hills are composed of the Pliocene-age Sonoma Volcanics. The right-lateral Rodgers Creek Fault curves around the site, approximately 600-ft to the northwest at its closest point (USGS, 2010). |

# Project Description

Miller Pacific aims to locate and characterize the Rodgers Creek Fault, if it occurs within the site. The goal of the geophysical survey is to detect lateral variation in p-wave velocities (Vp) that may indicate compositional differences on either side of the fault. Vp variations may indicate the location and possibly the angle of the fault.

In the proposal document, the line lengths were described as 450, 400, and 180 ft long but in practice, they were shorter (exact line lengths can be found in the table below). The lines cover the proposed area, but this area is smaller than originally thought.

# Geophysical Exploration Methodology

The surface geophysics consisted of 4 lines of 2D seismic refraction (compressional wave) data designated as SR-1, SR-2, SR-3, and SR-4. Each line is oriented west-to-east, roughly perpendicular to the local trend of the Rodgers Creek Fault, in order to best image any potential fault-related features.

**2D Seismic Refraction data** was collected along relatively straight lines in general accordance with ASTM D5777 *Standard Guide for Using the Seismic Refraction Method for Subsurface Investigation* using a 24-channel Geometrics seismograph with 4.5 Hz geophones. Three of the four lines consisted of two overlapping spreads. A seismic source consisting of a 16-pound sledgehammer impacting a metal plate in contact with the ground was used to generate seismic waves at five points along each spread (10 total shot points on the long lines). Data were processed using SeisImager and Rayfract software to yield 2D contoured profiles depicting p-wave velocity versus depth under the line.

The actual line lengths do not match those listed in Terracon's proposal. They do, however, adhere to the map containing the proposed line locations. This discrepancy is due to an inaccuracy in our early measurement of the size of the site.

| Seismic Line | Line Length | Proposed Line Length | Spreads | Ground Cover |
|---|---|---|---|---|
| SR-1 | 304 ft | 400 ft | 2 | Grass Field |
| SR-2 | 370 ft | 450 ft | 2 | Playground Asphalt |
| SR-3 | 370 ft | 450 ft | 2 | Concrete Walkway & Lawn |
| SR-4 | 150 ft | 180 ft | 1 | Grass Lawn & Road |

Geophysical data quality was good at this site.

# Geophysical Results

## SR Profiles

The results of the SR survey are illustrated by the cross-sections (profiles) shown on **Plates 2A and 2B – Seismic Refraction Profiles**. On each profile, the vertical axes represent elevation (NAVD88), and the horizontal axes represent the survey stationing established for each SR line with the zero-value at the westernmost end of each line. The unit of measure for all axes is the US Survey Foot. The solid black line along the top of the contoured portion of the profiles represents the ground surface.

The Vp measured by the seismic refraction survey range from below 500 ft/sec near the surface to greater than 6,500 ft/sec at depth.

| Vp Range (ft/sec) | Color Shading | Assumed Lithology |
|---|---|---|
| 500 – 4,000 | Tan-yellow-green | Soils, alluvium, unconsolidated sediments |
| 4,000 – 5,000 | Teal-blue | Consolidated/cemented sediments or possibly highly weathered/fractured rock |
| > 5,000 | Blue-purple | Moderately weathered and/or fractured bedrock |

## Observations

SR profiles 1-3 all exhibit a similarly thick layer of low Vp in the upper 10- to 15-ft below the surface. This layer likely corresponds to soil and unconsolidated sediment. Below this is a thin layer of moderate Vp between the 4,000 and 5,000 ft/sec contour lines which represents highly weathered rock. Finally, a layer of high Vp extends to the bottom of the profiles. Line SR-4 is similar to these three, although the moderate Vp layer is somewhat thicker.

There is little lateral variation in any of the four SR profiles. This suggests that either the fault does not offset geologic units with contrasting Vp values, or it does not lie within the survey area.

# General Comments

As with any geophysical method, the processes rely on measured responses to provide indications of physical conditions in the field. Responses can be affected by on-site conditions beyond the control of the operator, such as, but not limited to, cultural features (e.g., utilities, buried metallic objects, etc.), soil/material types, soil/material moisture, and/or groundwater table depth. Interpretation is based on known factors combined with the experience of the operator and the geophysicist evaluating the results. Detailed descriptions of the limitations specific to each geophysical method are provided in the **Exploration and Testing Procedures**.

Sampling and testing of select areas using subsurface exploration methods is recommended to correlate the results from the geophysical surveys. As with all geophysical methods, the geophysical results provide information regarding subsurface conditions at the site but should not be considered absolute. We cannot be responsible for the interpretation of geophysical results by others.

Our analysis and opinions are based upon our understanding of the project, the geophysical conditions in the area, and the data obtained from our site exploration. Natural variations will occur between exploration locations or due to the modifying effects of construction (if applicable) or weather. If variations appear, we can provide further evaluation and supplemental recommendations via change order.

Our Scope of Services does not include either specifically or by implication any geotechnical, environmental, or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the client is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geophysical practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client, and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, cost estimating, including excavation support, and dewatering requirements/design are the responsibilities of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we are retained to review the changes and either verify or modify our conclusions in writing.

# Exploration and Testing Procedures

Terracon utilized the following test methods in our investigation.

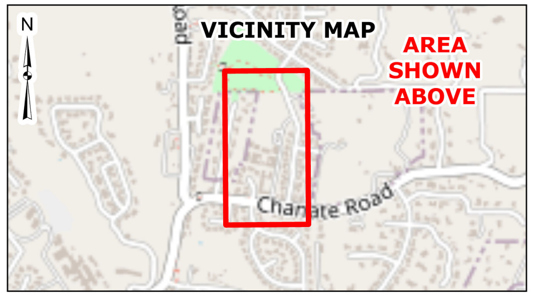
## Seismic Refraction (SR) Profiling Survey (ASTM D5777)

The seismic refraction (SR) method provides information regarding the seismic velocity structure of the subsurface. An impulsive (mechanical or explosive) source is used to produce compressional (P) wave seismic energy. The P-waves propagate into the earth and are refracted along interfaces caused by an increase in velocity. A portion of the P-wave energy is refracted back to the surface where it is detected by sensors (geophones) that are coupled to the ground surface in a collinear array (spread). The detected signals are recorded on a multichannel seismograph and are analyzed to determine the shot point-to-geophone travel times. These data can be used along with the corresponding shot point-to-geophone distances to determine the depth, thickness, and velocity of subsurface seismic layers.

**Limitations:** The seismic refraction method provides a 2-D cross-section (profile) depicting the distribution of compressional (P) wave velocities versus distance and depth beneath a seismic line. These variations in velocity can be related to lithologic variations by correlating the seismic data with other subsurface information such as borehole geological and/or geophysical logs. In the absence of ground truth, certain assumptions can be made according to the interpreter’s knowledge of the local geology and experience in similar surveys. In either case, the resulting seismic velocity profile represents a model of the subsurface, not an exact depiction.

SR data quality can be reduced by extraneous seismic energy sources such as wind, traffic or nearby machinery. It is also subject to induced noise by power lines or other field-generating sources. To overcome these issues, the SR energy source can be “stacked” (multiple shots) to achieve an acceptable signal-to-noise ratio. However, in extremely noisy conditions it may not be possible to achieve an acceptable signal-to-noise ratio for the greatest shot-to-receiver distance, possibly reducing the maximum depth of investigation.

Furthermore, SR data quality can be reduced when surveys are conducted on asphalt or concrete surfaces. This situation poses the unique problem of placing a thin layer of higher velocity material (the asphalt or concrete) over the target of the survey (the underlying geology). This typically causes noise in the geophone traces nearest the source where the seismic energy traveling through the asphalt masks the information from the shallow geology. This may result in a loss of shallow data for the modelling process.



## LEGEND

— 2D SEISMIC REFRACTION PROFILE

HORIZONTAL SCALE
0 50 100 150 200
(1 inch = 100 feet)

DATA SOURCES:
ESRI - Basemaps

**Terracon**
Geophysical Services

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PROFESSIONAL GEOPHYSICIST
JAMES
EARNEST SAGE
WAGNER III
No. 1109
STATE OF CALIFORNIA

SITE LOCATION MAP
HIDDEN VALLEY ELEMENTARY
3435 BONITA VISTA LANE

LOCATION: SANTA ROSA, CALIFORNIA

CLIENT: MILLER PACIFIC ENGINEERING GROUP

PROJ #: NS255109

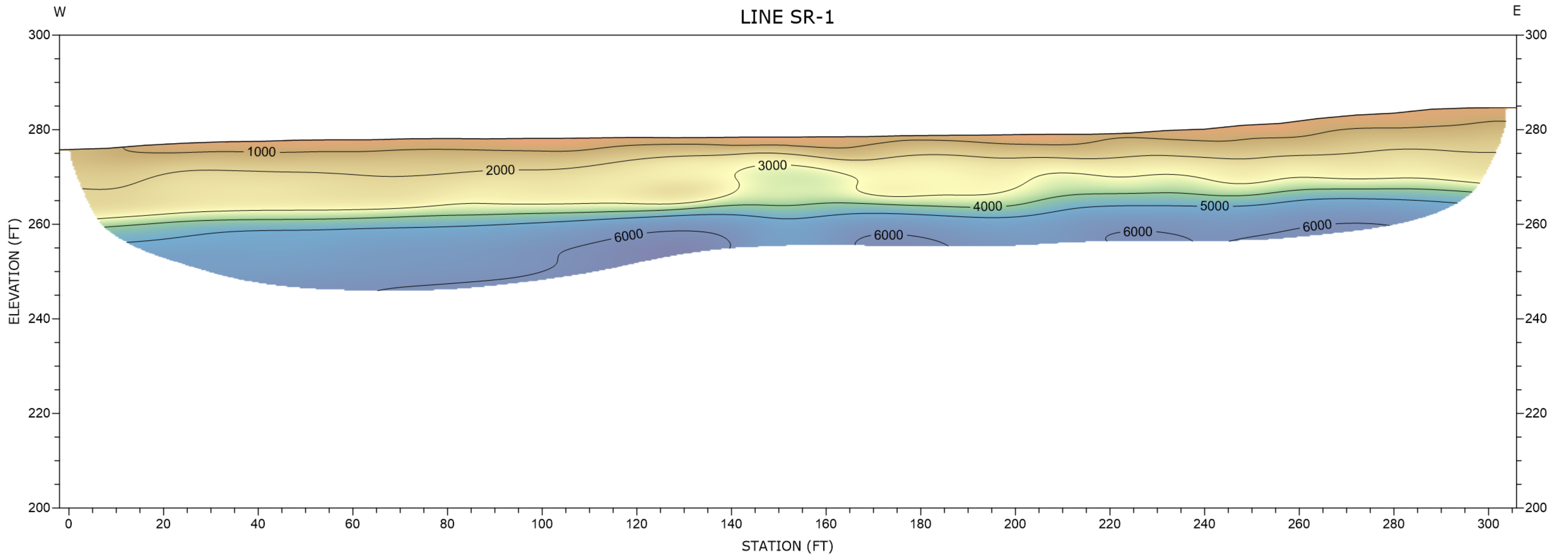
DATE: JUL 2025

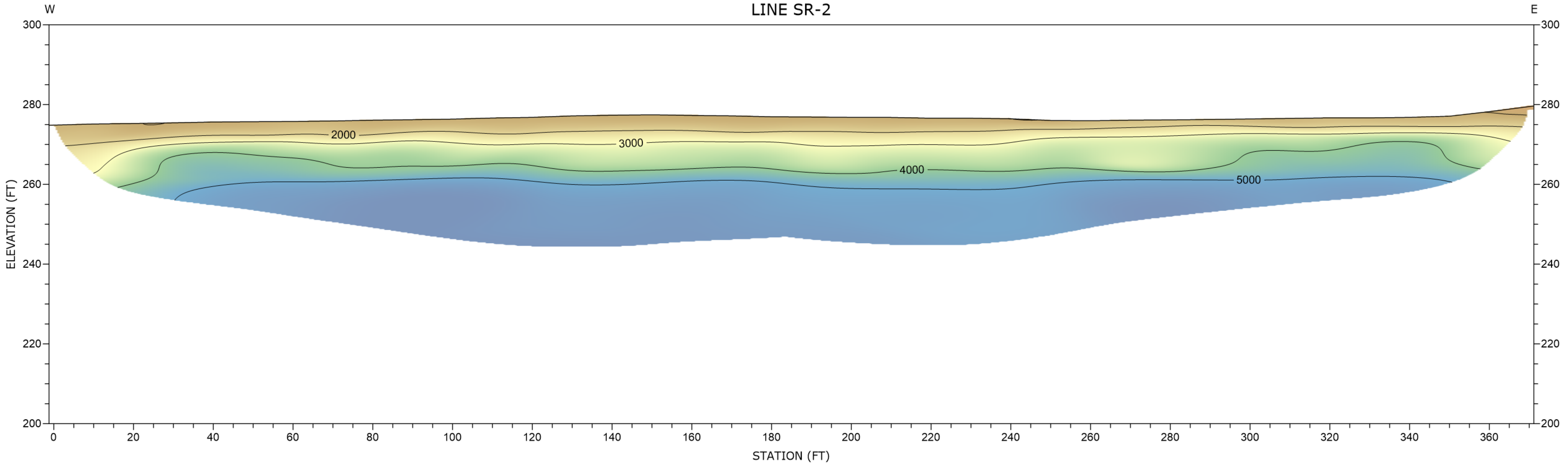
DRAWN BY:M.ELSHALKANY

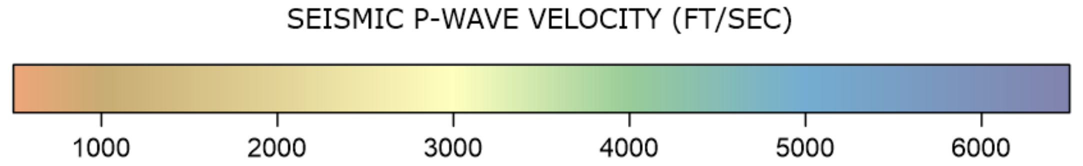
APPROVED BY: JSW

J. Sage Wagner 7/3/2025

PLATE
1







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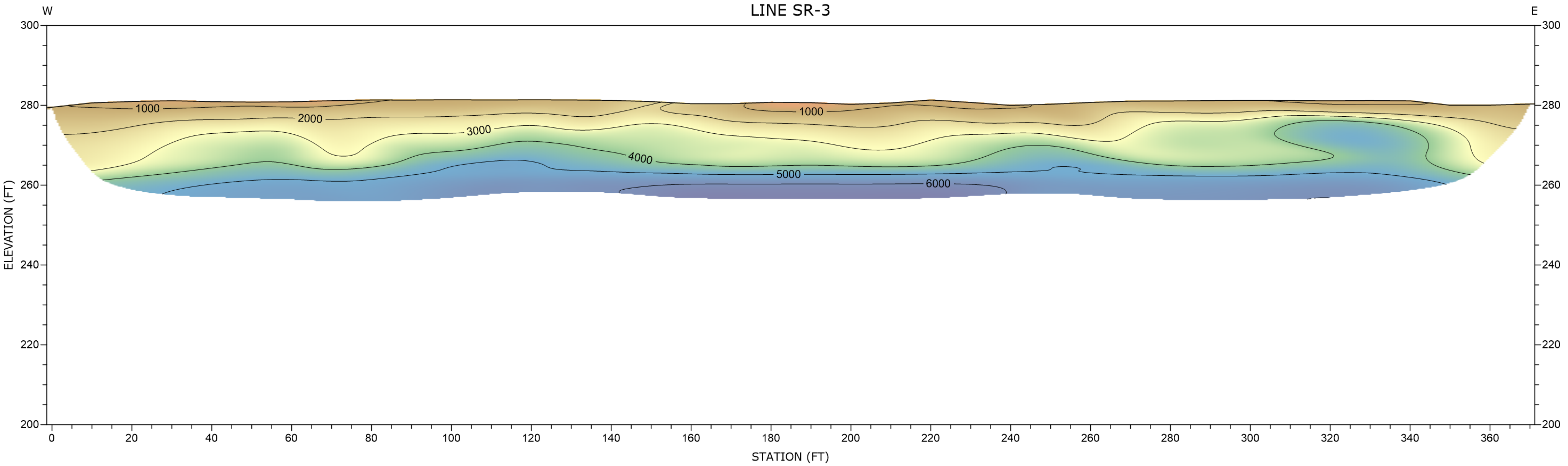
SEISMIC REFRACTION PROFILES
LINES 1 & 2
3435 BONITA VISTA LANE

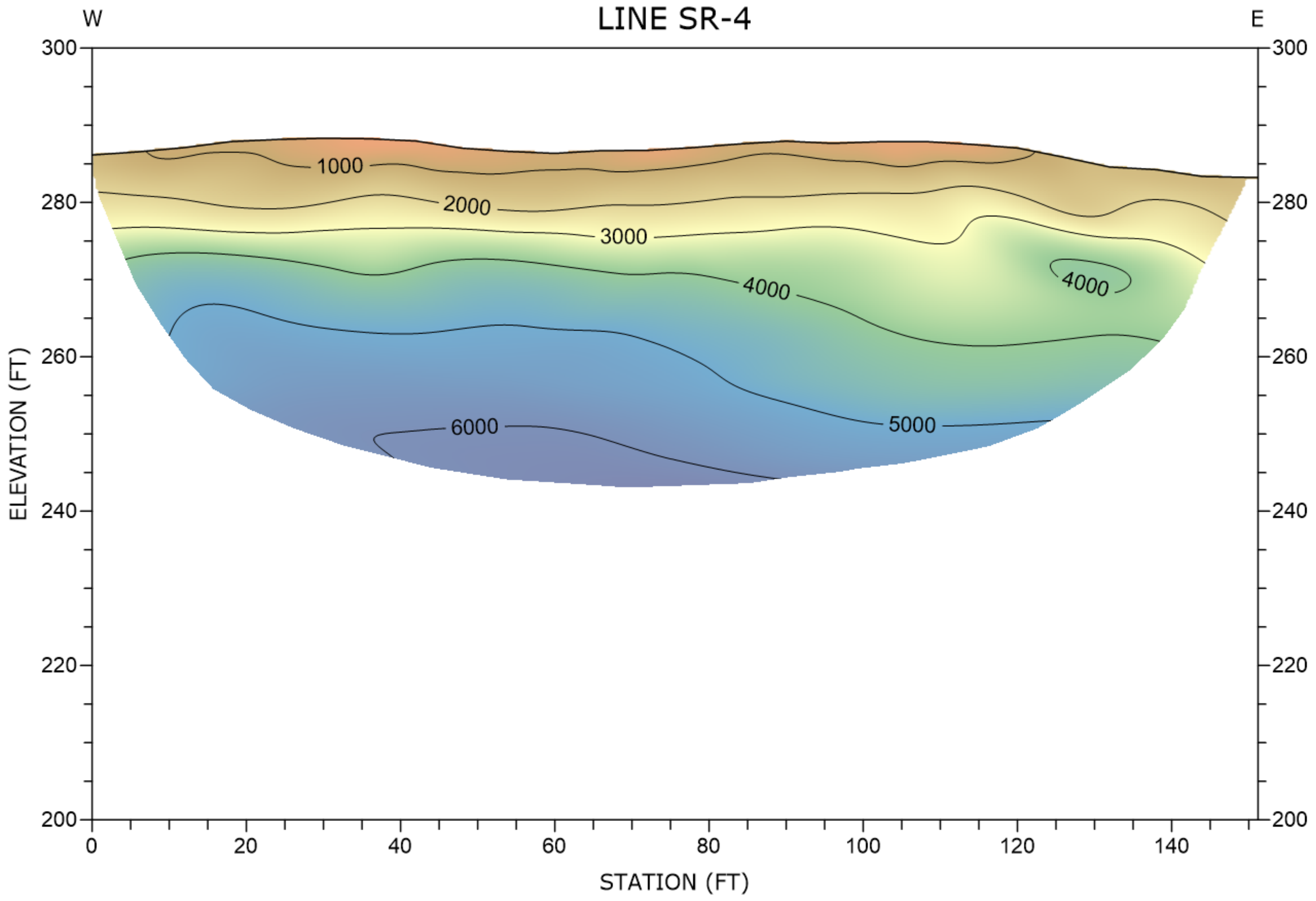
LOCATION: SANTA ROSA, CALIFORNIA
CLIENT: MILLER PACIFIC

| | | |
|---|---|---|
| JOB #: NS255109 | DATE: JULY 2025 | PLATE |
| DRAWN BY: M. SPERRY | APPROVED BY: JSW | 2A |

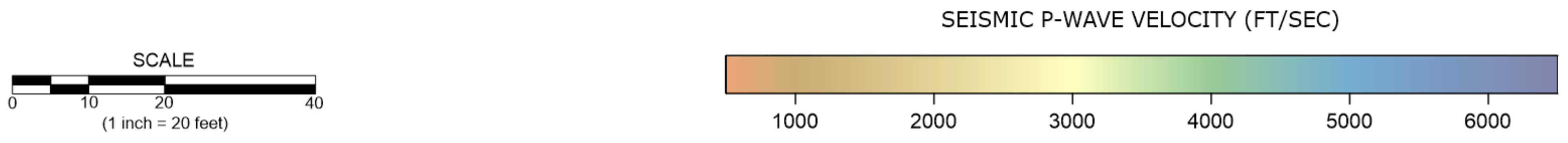
J Sage Wagner 7/7/2025



LINE SR-3



LINE SR-4



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JAMES EARNEST SAGE WAGNER III
No. 1109

SEISMIC REFRACTION PROFILES
LINES 3 & 4
3435 BONITA VISTA LANE

LOCATION: SANTA ROSA, CALIFORNIA

CLIENT: MILLER PACIFIC

JOB #: NS255109

DATE: JULY 2025

DRAWN BY: M. SPERRY

APPROVED BY: JSW

J Sage Wagner 7/7/2025

PLATE
2B