FAULT TRENCH INVESTIGATION
SANTA ROSA MEMORIAL HOSPICE HOUSE
520 DOYLE PARK DRIVE
SANTA ROSA, CALIFORNIA

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Project 2964.001

Prepared For:
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CERTIFICATION

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TABLE OF CONTENTS

FIGURES

APPENDIX A – HISTORIC AERIAL PHOTOGRAPHS

APPENDIX B – SUMMARY OF FAULT TRENCH FINDINGS

APPENDIX C – CPT AND SHEAR-WAVE VELOCITY PLOTS

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1.0 INTRODUCTION

1.1 Project Description and Background

This report summarizes the results of Miller Pacific Engineering Group's (MPEG) Phase 1 Earthquake Fault Trench Investigation for the proposed Santa Rosa Memorial Hospice House at 520 Doyle Park Drive ("Site") on behalf of the Santa Rosa Memorial Hospital Foundation (SRMHF, "Owner"). The site is located at 520 Doyle Park Drive in Santa Rosa, California, as shown on Figure 1. Our Phase 1 services have been provided in accordance with our Agreement dated January 27, 2020. This report has been prepared for the exclusive use of the Owner and the design team for this project and site.

Based on review of preliminary drawings, the project includes construction of a new 12-bed hospice house, sited in the north-central part of the property, and having a footprint encompassing about 8,500 square-feet. A new driveway and parking area will occupy the western side of the site along Doyle Park Drive, and a small chapel structure is proposed at a "flag" portion at the rear (east) end of the lot. Ancillary improvements are expected to include new underground utilities, exterior flatwork/hardscape areas, landscaping, and other miscellaneous improvements. A Site Plan indicating the approximate extents of the planned improvements is shown on Figure 2.

The project site is located between Montgomery Drive and Sonoma Avenue, just east of downtown Santa Rosa, and is within the Alquist-Priolo Earthquake Fault Zone (APEFZ) associated with the active Rodgers Creek Fault. The Alquist-Priolo Act ("A-P Act", 1972) expressly prohibits construction of habitable structures within 50-feet of active faults. In accordance with the provisions of the A-P Act, the County is requiring a Fault Trench Investigation be performed to define recommended setbacks for new structures.

Our current Phase 1 study addresses only the potential for fault surface rupture and is intended to determine whether active faults exist within 50-feet of the proposed building envelope. Future phases of work are anticipated to include a design-level Geotechnical Investigation (Phase 2), Geotechnical Consultation and Plan Review (Phase 3), and Geotechnical Observation and Testing during construction (Phase 4).

1.2 Regulatory Compliance

We understand that the project will not be subject to review by the California Office of Statewide Health Planning and Development (OSHPD); however, we anticipate that the project will be peer-reviewed by a subcontracted Engineering Geologist (Jared Pratt, CEG, of RGH Consultants). Our investigation is intended to satisfy the requirements of Title 24, California Code of Regulations, and Chapter 16 of the California Building Code (2019 CBC).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, 2018a).

1.3 Purpose and Scope

The purpose of our investigation is generally twofold; 1) to determine whether or not active fault traces exist within 50-feet of the proposed structures and 2) to provide recommended setbacks from any identified active fault traces. According to CGS Special Publication 42 (revised 2018) – "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. By virtue that fault investigations are required by the A-P Act to assess the recency of fault movement implies that faults within an EFZ are presumed to be active until determined otherwise."

The scope of our investigation is outlined in our proposal letter dated October 4, 2019, 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. Also included is: performance of 10 Cone Penetration Tests (CPTs); subcontracting of excavation; site safety (fencing/shoring) and restoration services; excavation and logging of 1 trench for observation of subsurface stratigraphy and geologic structure; coordination of field work and participation in field discussions and consultation with CGS/USGS personnel and the project's SRCS-appointed peer reviewer, Mr. Jared Pratt of RGH Consultants; and preparation of this report.

2.0 SITE SURFACE CONDITIONS

The project site is located just east of downtown Santa Rosa, between Sonoma Avenue and Montgomery Drive, about 750-feet north of Spring Creek. The site is comprised of 4 assessor's parcels covering approximately 0.54-acres and is generally elongated in the northeast-southwest direction. The site is bounded to the west by Doyle Park Drive, to the north by existing medical development, and to the south and east by existing single-family residential development.

The site is generally level, with surface elevations of about +185-feet above sea level. The site was previously developed with several small structures, apparently including a residence, garage, and cabinet shop, which were demolished sometime in the last several years. While shallow depressions remain where foundations were removed, remaining improvements are generally limited to isolated patches of gravel in former building pads, utility stubs near the street frontage, and an asphalt-surfaced driveway along the southern property line that is shared with the adjoining property. Several mature trees line the northern and southern parcel boundaries, and a grove of mature redwoods occupies a shallow depression just beyond the northeast property corner.

3.0 REGIONAL GEOLOGIC AND TECTONIC SETTING

3.1 Regional and Local Geology

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 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.

The project site is located just east of downtown Santa Rosa, where Spring Creek emanates from the low foothills which divide the Santa Rosa floodplain to the west from Rincon and Bennett Valleys to the east. Regional geologic mapping (Fox et al, 1973; Huffman and Armstrong, 1980; McLaughlin et al, 2008) indicates upland areas east of the site and the Santa Rosa floodplain are underlain primarily by volcanic rocks of the Tertiary-age Sonoma Volcanics, with limited exposures of the Plio-Pleistocene Glen Ellen formation.

The Santa Rosa floodplain, including the project site, is mapped as being underlain by older alluvial fan deposits, with Fox indicating the alluvium grades headward/eastward into terrace deposits with increased gravel content. McLaughlin's map combines younger and older deposits separated by previous mappers into a single "Holocene alluvial fan" unit. A copy of the latest regional geologic map by McLaughlin is shown 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 near the eastern edge 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, extending northward along the east edge of the floodplain through eastern Santa Rosa, Windsor, and Healdsburg.

In the immediate vicinity of the site, early mappers (Gealey, 1951; Fox et al, 1973; Huffman and Armstrong, 1980) projected a continuous fault trace from the southern segment, extending northward beneath the alluvium along Doyle Park Drive and the western property line, to the Healdsburg Fault north of the floodplain. Fox indicates faults are "recently active" on the basis of topographic interpretation, while Huffman and Armstrong show the relevant fault traces as exhibiting evidence of Quaternary rupture. Mapping by Earl Hart (1982) aligned the fault farther east, roughly along Talbot Drive. This alignment is also reflected by the Alquist-Priolo Special Studies Zone map, a copy of which is shown on Figure 4 (CDMG, 1983).

More recent mapping by McLaughlin et al (2008) does not show a continuous fault trace projecting beneath the alluvium, but instead shows the southern traces as terminating on the south site of Matanzas Creek, about 1,000-feet south of the site.

The 2010 Fault Activity Map of California (Jennings and Bryant, 2010) shows the Rodgers Creek Fault as being Holocene-active along most of its length, and shows the same concealed alignment passing along the western site boundary as shown on earlier maps.

More refined mapping of the Santa Rosa floodplain area encompassing the site was performed by Hecker et al (2016) and was based on review of recently collected LiDAR data as well as previous regional gravity and aeromagnetic studies by others. Their work revealed the coincidence of gravity and magnetic boundaries with several topographic lineaments detected in the LiDAR data, which suggest a broad, westerly bend in the fault as it passes from south to north under the alluvial cover.

Most recently, Hecker (2018) performed more detailed and extensive analysis of the LiDAR data, at greater resolution than previous efforts using a 3-meter bare earth model. Both the 2016 and 2018 maps reflect a similar alignment to earlier maps, with a primary Holocene-active trace now plotted passing the northeast edge of the property. The locations and interpreted ages of fault traces mapped near the site by Hecker (2016 and 2018) are shown on Figure 5.

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, 2018b). 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). Note, that as shown on Figure 5, the magnitudes have more recently been revised by USGS and are now indicated to be M=4.6 and M=5.1

Several smaller earthquakes have occurred near the site in historic times, the nearest of which are shown for reference on Figure 5 (USGS, 2020). The most significant of these was a 2003, Mw=4.1 earthquake centered near Montecito Avenue about a mile north of the site, while an Mw=2.6 event centered beneath Bryden Lane about ¾-mile north-northwest of the site occurred that same day. Neither event apparently caused significant damage.

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 generally included a surficial geologic reconnaissance of the project site and surrounding area, review of regional geologic and fault mapping, review of historic aerial photographs, review of selected fault trench investigation reports prepared previously by others, subsurface exploration with one investigatory fault trench totaling 285 linear feet, and performance of 10 Cone Penetration Tests (CPTs). Our review of regional geologic mapping and regional fault mapping is discussed above in Sections II(A) and II(B). Discussion of our site reconnaissance, aerial photograph review, review of previous fault investigation studies by others, exploratory fault trenching, and CPT exploration is presented in the following sections.

4.1 Surface Reconnaissance

We performed a detailed reconnaissance of the project site and surrounding residential area on December 5, 2019. During our reconnaissance, we noted that the site is largely unimproved, and understand that formerly existing buildings, including a small house, garage, and cabinet shop, were demolished several years ago. Remaining improvements are generally limited to thin layers of compacted gravel in former building pad areas and an existing gas line stub near the west end of the lot. Although surface grades are relatively level within the site, we noted that the adjacent parcel to the north, at 510 Doyle Park Drive, appears to have been filled at the east end, with the edge of the parking lot supported by a low concrete retaining wall. East of the parking lot, a small grove of redwood trees occupies a shallow but conspicuous depression just beyond the northeast site boundary.

The surrounding residential development is typically several decades old, and we observed abundant local repairs and patches to heaved and offset sidewalks, driveways, and other flatwork. We noted extensive apparent root heave and possible expansive soil effects which would likely obscure small-scale fault-related surface displacements or offsets. Topographic breaks along Sonoma Avenue (generally consisting of a broad, gentle rise between Doyle Park Drive and Alderbrook Drive to the east) noted by others (Hecker, 2016 and 2018; Fugro William Lettis, 2011) were confirmed. We noted that the medical parking garage north of the site at the corner of Doyle Park Drive and Montgomery Drive includes a subterranean parking garage supported by concrete masonry unit (CMU) retaining walls with sloping backfills. Walls were observed to be in apparently reasonable condition, although we did note extensive apparent settlement of wall backfills and landscape soils along the east edge of that property. No other significant evidence of fault activity was observed during our reconnaissance.

4.2 Review of Historic Aerial Photographs

We reviewed several historic aerial photographs from the Sonoma County Vegetation Mapping and LiDAR Program (2020) and Pacific Aerial Surveys of Novato, California and spanning the time period between 1942 and 1980. Little information was gleaned from the photos, as by 1942 surrounding development had obscured virtually all-natural features. 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 low-resolution image is the oldest photograph of the site we were able to obtain. Doyle Park Drive, Montgomery Drive, Sonoma Avenue, and Talbot Avenue are all in place, as are some of the existing residences along Talbot Avenue east of the site. The west side of Doyle Park Drive and the existing

Santa Rosa Memorial Hospital site just to the northwest remain developed with apparent fruit orchards. The project site itself appears to be developed with 2 small structures in the southwestern corner of the parcel.

- June 12, 1956 (AV222-3-5; Scale 1:24,000) – Residential development east of the site has continued, and the Memorial Hospital site is under construction at the northeast corner of Doyle Park Drive and Montgomery Drive. Some of the orchards along the west side of Doyle Park Drive have now been redeveloped with new structures. A larger, third structure now occupies the rear of the project site.

- April 10, 1968 (AV844-4-5, Scale 1:36,000) – Infill development has replaced the former orchards and now surrounds the site.

- May 4, 1980 (CIR-SON-18-20; Scale 1:24,000) – Little significant change in site conditions or the surrounding area is apparent.

4.3 Review of Previous Fault Investigation Studies by Others

We have reviewed the results of several previous subsurface fault investigation studies (by others) performed in the immediate vicinity of the project Site. The approximate area covered by each report is shown on Figure 5, and respective Alquist-Priolo (A-P) file numbers are cited below.

- Thomas D. Hays & Associates (1977, A-P #508) conducted a fault trench investigation for construction of new office buildings at the south corner of Fourth Street and Talbot Avenue, about 1,900-feet northwest of the site. Approximately 120-feet of trench was excavated to an average depth of about 12-feet, and exposed interbedded, apparently young sediments, although no age constraints are noted in the report. No evidence of faulting was observed.

- Cooper-Clark & Associates (1978, A-P #799) performed a fault trench investigation for a new medical office building at 510 Doyle Park Drive, adjacent to the site's northern property boundary. The study identified an apparent normal fault with a down-to-the-east sense of motion and postulated the feature to represent an en-echelon or branch fault. Apparent displacement of up to 10-inches were observed along the upper and lower contacts of a clean gravel horizon about 6- to 12-feet below the ground surface. Cooper-Clark recommended that no new construction across or east of the fault trace be planned, and recommended 20-foot setbacks to the west (on the footwall side) of the fault trace, or special structural design of new elements within the 20-foot setback zone. We note, as others have (including Herzog, 1989; Bace, 1992; and apparently Earl Hart, 1982 as noted by Herzog) that offsets do not affect deeper horizons, and the feature therefore is unlikely representative of a fault.

- Donald Herzog & Associates (1980, A-P #1231) conducted a fault trench investigation for a new office building at 1604 Fourth Street, about 2,000 northeast of the site and a few doors northeast of Hays' 1977 study. A pair of trenches were excavated across the north and south side of the relatively narrow parcel, encountering generally flat-lying alluvial deposits. No suspected faults were found.

- Burton H. Marliave (1981, A-P #1426) conducted a fault trench investigation for a new office building at 1623 Terrace Way, about 4,500-feet northwest of the site. The study identified a zone of sheared, slickensided claystone bedrock, but did not document evidence of fault movement on overlying clayey alluvial/colluvial soils. Regardless, 20-foot setbacks from the bedrock shear zone were recommended.

- Herzog Associates (1989, A-P #2313) performed a fault trench investigation for new office development north of and adjacent to the Doyle Park Drive site investigated previously by Cooper-Clark in 1978, at the intersection with Montgomery Drive. Herzog concluded that the feature interpreted previously by Cooper-Clark did not offset deeper horizons, and is more likely evidence of previous creek scour or bank lurching. Herzog concluded no active faults cross the site, and postulated that the main trace of the Rodgers Creek Fault is located east of the site, along Talbot Drive as shown on the Alquist-Priolo map (CDMG, 1983).

- Bace Geotechnical (1992, A-P #2933) performed a fault trench investigation at the Doyle Park Elementary School campus, located about 2,000-feet southeast of the site. Trenches were excavated across the south side of the campus and the adjacent property to the east up to depths of about 11-feet, and no faults were found. We note that more recent mapping (Hecker 2016 and 2018) indicates the main trace of the Rodgers Creek Fault passes through the eastern edge of the campus, in the vicinity of Trench Station 370-375, where several apparently conformable depositional contacts are shown, but no indication of faulting or related features.

- Fugro William Lettis & Associates (2011) performed a fault investigation for evaluation of the Santa Rosa aqueduct where it crosses the Rodgers Creek Fault along Sonoma Avenue just south of the site. The study included collection and review of LiDAR imagery and 2-D seismic imagery, along with 12 Cone Penetration Tests (CPT) and 1 soil boring. No trenching was apparently performed for the project.

  Analysis of subsurface data along the Sonoma Avenue transect revealed a total of 5 fault traces which merge at depth, and together define a positive flower structure. The 2 western traces, each of which are steeply east-dipping thrust faults, project to the surface beneath the Doyle Park School site previously explored and "cleared" by Bace Geotechnical, but are not shown to offset contacts in the upper 50-feet of the subsurface. The main deformation zone is shown to be bounded on each side by a vertical strike-slip fault, and extending from Talbot Avenue on the east to Bishop Drive on the west. The east side of the flower structure is defined by a steeply west-dipping thrust fault which projects to the surface just west of Alderbrook Drive.

  We note that while the presented data and interpretations present a compelling case for the locations of these faults, none are projected significantly north of Fugro's study area. As shown on Figure 5, we also note that despite a general agreement in the approximate breadth and location of the deformation zone around the Rodgers Creek Fault, there are at-times significant discrepancies in the locations and surface projections of the faults as determined through Fugro's subsurface exploration and as determined through Hecker's

LiDAR study. Because Fugro's data better depicts actual geologic conditions and is essentially free of error introduced at the ground surface via human activity and development, we judge that Fugro's map is generally more likely to be accurate. However, it is clear that significant geometric complexity exists, and that confident lateral projection of fault traces identified at one location is not possible barring additional data.

- Miller Pacific Engineering Group (2018) performed a fault investigation for evaluation of a new restroom structure at the Proctor Terrace Elementary School campus, located at the corner of Fourth Street and Bryden Lane about 3,400-feet northeast of the site. The study included 130 linear feet of trench excavated to depths of 12-feet and encountered flat-lying alluvium interpreted as overbank/floodplain deposits. No evidence of faulting was observed.

4.4 Fault Trenching

Subsurface exploration performed for this study included excavation of one exploratory trench, totaling approximately 285 linear feet, at the location shown on Figure 2 between December 2 and December 14, 2019. The trench location and alignment were chosen based on 1) the alignment of active fault traces shown by previous mappers and summarized on Figures 2 and 5 and, 2) the spatial extent of the planned improvements.

The trench was excavated by the contractor to typical depths of 9-feet below the ground surface using a 36-inch bucket. Following excavation, the trench was shored on 6-foot centers and protected from the elements with visqueen plastic; however, intermittent rainstorms necessitated daily pumping of groundwater and local reinstallation of shoring to maintain safe working conditions.

Following excavation, shoring, and dewatering, the north wall of the trench was cleaned with hand tools for examination of in-situ soil properties and stratigraphy. The south wall was locally cleaned as needed to verify observations. The relatively flat surface topography was surveyed using an eye-level and 5-foot lateral intervals were marked with paint or string to ensure lateral positional accuracy. The trench was carefully examined and logged at a scale of 1:60 (1-inch equals 5-feet); more detailed logging at a scale of 1:12 (1 inch = 1-foot) was performed to capture detail as needed. A detailed summary of our fault trench findings and interpretations is also included in Appendix B, and exploratory trench logs are presented on Figures B-1 through B-6.

Prior to backfilling, we viewed and discussed the trench exposures on December 11 and 12, 2019 with a variety of professionals, including Mr. Jared Pratt of RGH Consultants (independent third-party reviewer), Ms. Suzanne Hecker of the United States Geological Survey (public research and fault mapping), and Ms. Judy Zachariasen of the California Geological Survey (public research and fault mapping).

Upon completion, trenches were backfilled and compacted with native soils under the supervision of our Staff Engineer, and existing improvements disturbed during the course of our investigation were restored by the excavation contractor.

4.5 Cone Penetration Testing

Due to the relatively thick deposits of Holocene alluvium at the site which make direct excavation/observation infeasible due to shallow groundwater and safety concerns, we performed a total of 10 Cone Penetration Tests (CPTs) at the locations shown on Figure 2. The Cone Penetration Test (CPT) is a special exploration technique that provides a continuous profile of data throughout the depth of exploration. It is particularly useful in defining stratigraphy for the purpose of this study, as well as in assessing relative soil strength and liquefaction potential for eventual structural design.

The CPT is a cylindrical probe, 35 mm in diameter, which is pushed into the ground at a constant rate of 2 cm/sec. The device is instrumented to obtain continuous measurements of cone bearing (tip resistance), sleeve friction and pore water pressure. The data is sensed by strain gages and load cells inside the instrument. Electronic signals from the instrument are continuously recorded by an on-board computer at the surface, which permits an initial evaluation of subsurface conditions during the exploration.

The recorded data is transferred to an in-office computer for reduction and analysis. The analysis of cone bearing and sleeve friction (i.e. friction ratio) indicates the soil type, the cone bearing alone indicates soil density or strength, and the pore pressure indicates the presence of clay. Variations in the data profile indicate changes in stratigraphy. This test method has been standardized and is described in detail by the ASTM Standard Test Method D3441 "Deep, Quasi-Static Cone and Friction Cone Penetration Tests of Soil." A schematic diagram of the CPT instrument and a CPT Soil Interpretation Chart are shown on Figure C-1, and CPT plots are shown on Figures C-2 through C-11.

In addition to continuous measurement of soil properties under "static" conditions, shear wave velocity measurements are facilitated at selected intervals via use of an incorporated tri-axial geophone. A steel plate is placed at the ground surface and struck with a hammer; and the shear wave velocity is determined based on the time between which the plate is struck and the seismic wave arrives at the geophone. For this study, we performed shear-wave velocity measurements on 5-foot intervals at each CPT location. The results of these tests are shown on Figures C-12 through C-21.

5.0 SITE GEOLOGIC CONDITIONS

The results of our subsurface exploration generally confirm the regionally-mapped geology as discussed in Section III(A). The project site is underlain by generally flat-lying alluvial soils of interpreted Middle to Late Holocene age. These deposits are presumed correlative to map unit "Qhf" as shown on Figure 3, and generally consist of moderately- to well-sorted, interbedded clays, silts, sands, and gravels deposited in channel and floodplain/overbank environments. Simplified geologic cross-sections, prepared based on CPT data interpretation, are shown on Figure 6.

One thrust fault plane was identified in the north wall of the trench at Station 253, as shown on Figure B-5. The fault dips steeply to the east and has an apparent "up to the east" sense of motion. The fault projects across the trench along a strike of approximately N12°W, offsetting at least 5 relatively sharp stratigraphic contacts between 5- and 10-feet below the ground surface, with apparent vertical offsets measured at about 9-inches. A second thrust fault also having an "up to the east" sense of motion was identified at Station 255 in the south wall of the trench at Station 254, offsetting two contacts about 7- to 10-feet below the ground surface, and exhibiting apparent vertical offsets of about 4-inches.

Coarse gravelly soils encountered in the east end of the trench, extending from Stations 255 to 285, were found to contain considerable groundwater and resulted in significant caving and instability of the trench walls. This area was not logged for safety reasons. Additionally, unstable trench conditions were encountered in the zone of an apparent cross-cutting channel or shallow basin deposit of soft sandy silt between Stations 230 and about 250. This area was logged, although conditions generally precluded definitive observation of an absence of faults or other structures.

6.0 CONCLUSIONS

Alluvium in the bottom of the trench, at depths of about 9- to 10-feet, is interpreted to be on the order of about 5,000- to 8,000 years old based on general comparison of soil properties (structure development, color, clay films, etc.) with those from previous, nearby studies (Miller Pacific, 2018). Since both fault planes clearly offset several Holocene-age soil horizons, we judge these faults should be considered "active" for the purpose of developments complying with the provisions of the Alquist-Priolo act. Our observations suggest vertical offsets of up to about 9-inches are possible and significant lateral displacements may also be possible. Based on previous work by William Fugro Lettis (2011) and Hecker et al (2005, 2016, 2018), these faults likely represent the western margin of a positive, transpressional "flower structure" within the Rodgers Creek/Healdsburg Fault Zone.

Although we were unable to directly observe the entirety of the Holocene record in areas west of the mapped fault trace shown on Figure 2, we note that previous research by Hecker et al (2005) suggests an average recurrence interval for large earthquakes on the Rodgers Creek Fault of about 300-years. Therefore, since 1) we observed continuous and largely conformable contacts west of Station 230 in our trench exposures and CPT soundings; 2) we exposed several recurrence intervals' worth of geologic record; and 3) no evidence of active faulting or ground deformation is shown on regional maps or was observed at the ground surface, we judge no active faults are present at the site west of Station 230.

7.0 RECOMMENDATIONS

Based on our observations, we recommend minimum building setbacks of 50-feet from the active fault traces, as shown on Figure 2. Although it is possible additional faults or related ground deformation exists between Stations 230 and 250, we judge additional setbacks to the west are not required given that this zone is already encompassed by the recommended 50-foot setback.

8.0 SUPPLEMENTAL GEOTECHNICAL SERVICES

Supplemental services may include supplemental planning-level consultation, performance of a design-level geotechnical investigation, design-level geotechnical consultation and plan review, and/or geotechnical observation and testing during construction.

9.0 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 St. Joseph Health/Santa Rosa Memorial Hospital, 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.

10.0 LIST OF REFERENCES

Bace Geotechnical (1992), "Fault Hazard Investigation, Doyle Park Elementary School, 1350 Sonoma Avenue, Santa Rosa, California", Job No. 10590.1, dated September 21, 1992.

Borchardt, G. (2010), "Soil Stratigraphy for Trench Logging, Third Edition", A Continuing Education Short Course presented by Soil Tectonic Inc. and sponsored by AEG (Short Course Textbook).

Burton H. Marliave (1981), "Geologic Hazards Study for Zada Project, 1625 Terrace Way, Santa Rosa, California", dated July 10, 1981 (A-P #1426)

California Geological Survey (2018a), "Earthquake Fault Zones – A Guide for Government Agencies, Property Owners/Developers, and Geoscience Practitioners for Assessing Fault Rupture Hazards in California", Special Publication 42, Revised 2018.

California Geological Survey (2018b), "Historic Earthquake Online Database", http://maps.conservation.ca.gov/cgs/historicearthquakes/, accessed February 6, 2020.

California Department of Conservation, Division of Mines and Geology (1983), "Revised Official Map of Earthquake Fault Hazard Zones, Santa Rosa Quadrangle", effective July 1, 1983.

Cooper-Clark & Associates (1978), "Report, Fault Hazard Investigation, Proposed Medical Center, Santa Rosa, California", Job No. 2048-A, dated June 5, 1978 (A-P #799).

Donald Herzog & Associates (1980), "Report, Soil and Geologic Investigation, Proposed Office Building, 1604 Fourth Street, Santa Rosa, California", Job No. 5074.1, dated September 30, 1980 (A-P #1231).

Field, E.H. et al (2015), "Long-Term Time-Dependent Probabilities for the Third Uniform California Earthquake Rupture Forecast (UCERF3)", Bulletin of the Seismological Society of America, Volume 105, No. 2A, 33pp., April 2015, doi: 10.1785/0120140093

Fox, K.F. et al (1973), "Preliminary Geologic Map of Eastern Sonoma County and Western Napa County, California" Untied States Geological Survey Miscellaneous Field Studies Map MF-483, Sheet 2 of 4, Map Scale 1:62,500.

Fugro William Lettis & Associates (2011), "Draft Report, Geologic and Geotechnical Evaluation of The Santa Rosa Aqueduct Crossing of the Rodgers Creek Fault, Santa Rosa, California", Project No. 04.79218600, dated September 2011.

Gealey, W.K. (1951), "Geology of the Healdsburg Quadrangle, California", California Department of Natural Resources, Division of Mines Bulletin 161.

Hecker, S. et al (2005), "The Most Recent Large Earthquake on the Rodgers Creek Fault, San Francisco Bay Area" in Bulletin of the Seismological Society of America, Vol. 95, No. 3, pp. 844-860, June 2005, doi: 10.1785/0120040134

Hecker, S. et al (2016), "Detailed Mapping and Rupture Implications of the 1-km Releasing Bend in the Rodgers Creek Fault at Santa Rosa, California", Bulletin of the Seismological Society of America, Vol. 106, No. 2, pp. 575-594, April 2016, doi: 10.1785/0120150152

Hecker, S. and Randolph Loar, C.E. (2018), "Map of Recently Active Traces of the Rodgers Creek Fault, Sonoma County, California", United States Geological Survey Scientific Investigations Map 3410, Sheet 1, https://doi.org/10.3133/sim3410.

Huffman, M.E. and Armstrong, C.F. (1980), "Geologic Map Exclusive of Landslides, Southern Sonoma County, California" *in* Geology for Planning in Sonoma County, California Department of Conservation, Division of Mines and Geology Special Report 120, Plate 3A, Map Scale 1:62,500.

Jennings, C.W. and Bryant, W.A. (2010), "2010 Fault Activity Map of California", California Department of Conservation, California Geological Survey Geologic Data Map No. 6, http://www.quake.ca.gov/gmaps/FAM/faultactivitymap.html#, accessed November 1, 2018.

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.

Miller Pacific Engineering Group (2018), "Fault Trench Investigation, New Modular Restroom, Proctor Terrace Elementary School, 1711 Bryden Lane, Santa Rosa, California", Project No. 1079.114, dated November 29, 2018.

Sonoma County Vegetation Mapping and LiDAR Program (2020), "Sonoma County – Then and Now", (web-based historic aerial photograph viewer tool), http://sonomavegmap.org/1942/, accessed February 10, 2020.

Thomas D. Hays & Associates (1977), "Preliminary Geologic Investigation, Proposed Site for Office Buildings, South Corner of 4th and Talbot, Santa Rosa, California", Job No. 77-380, dated June 14, 1977 (A-P #508)

Toppozada, T. R et al. (1992), "1898 "Mare Island" earthquake at the southern end of the Rodgers Creek Fault" *in* Conference on Earthquake Hazards in Eastern San Francisco Bay Area, 2nd, Hayward, Calif., Proceedings, Borchardt, G., and others, eds.: California Department of Conservation, Division of Mines and Geology Special Publication 113, p. 385-392.

United States Geological Survey (USGS)(2003), "Earthquake Probabilities in the San Francisco Bay Region, 2002 to 2031 – A Summary of Finding," The Working Group on California Earthquake Probabilities, Open File Report 99-517.

United States Geological Survey (USGS)(2008), "The Uniform California Earthquake Rupture Forecast, Version 2 (UCERF 2), 2007 Working Group on California Earthquake Probabilities, USGS Open File Report 2007-1437, CGS Special Report 203, SCEC Contribution #1138.

United States Geological Survey (2020), "Historic Earthquake Catalogue Search", https://earthquake.usgs.gov/earthquakes/search/, accessed February 6, 2020.

Weaver, C.E. (1949), “Geology of the Coast Ranges immediately north of the San Francisco Bay region, California:, Geological Society of America, Memoir 35, Map Scale 1:62,500.

Wong, I.G. and Bott, J.D.J (1995), “A New Look Back at the 1969 Santa Rosa, California Earthquakes” in Bulletin of the Seismological Society of America, Vol. 85, No. 1, pp. 334-341, February 1995.

SITE COORDINATES
LAT. 38.4423°
LON. -122.6981°

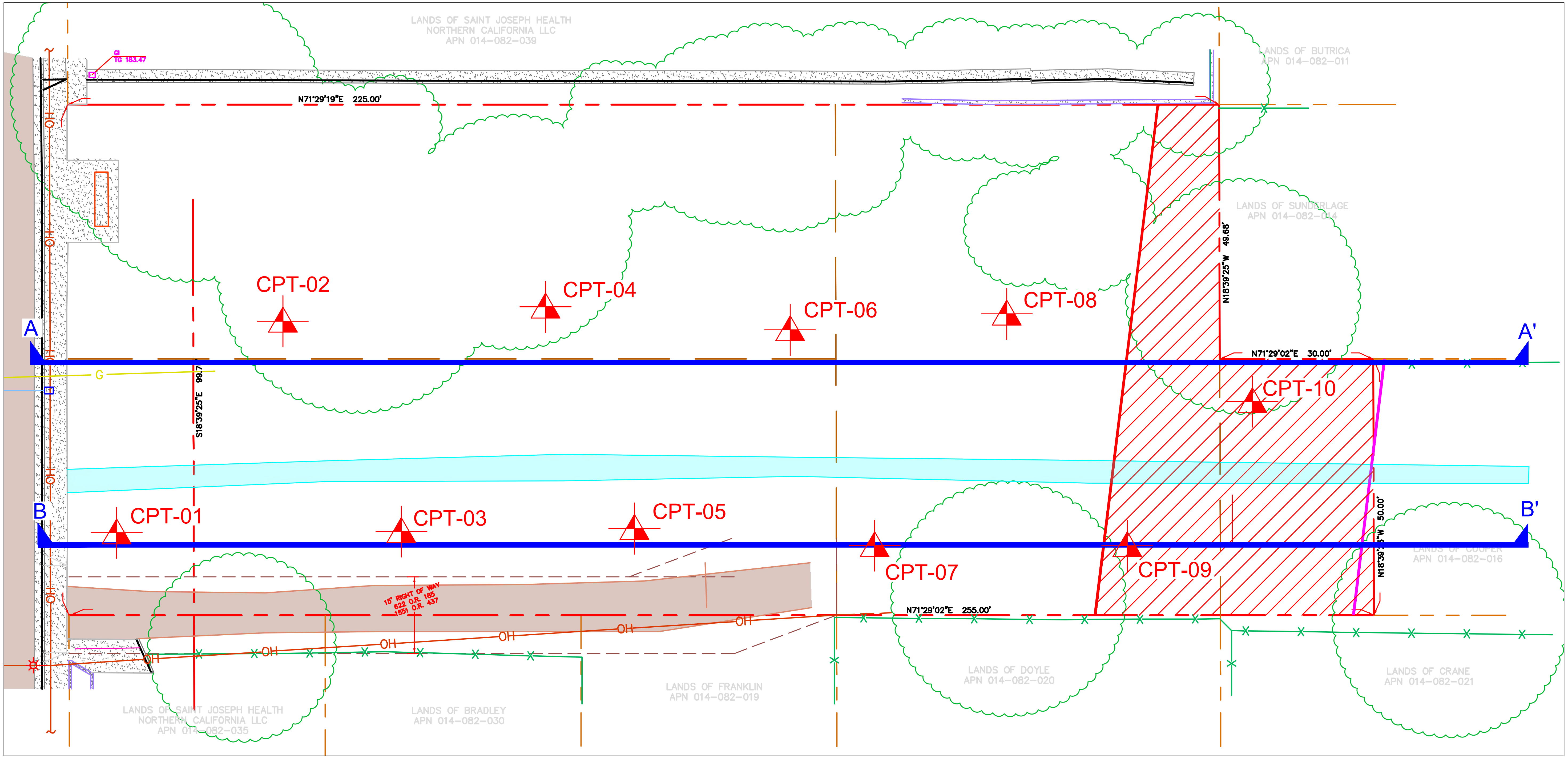
SITE LOCATION

N.T.S.

NORTH

REFERENCE: Google Earth, 2020

MPEG MILLER PACIFIC ENGINEERING GROUP	504 Redwood Blvd.	SITE LOCATION MAP		
	Suite 220			
	Novato, CA 94947	Santa Rosa Memorial Hospice House	Drawn MFJ	1
	T 415 / 382-3444	520 Doyle Park Drive	Checked	
A CALIFORNIA CORPORATION, © 2020, ALL RIGHTS RESERVED	F 415 / 382-3450	Santa Rosa, California		
FILENAME: 2964.001 Figures.dwg	www.millerpac.com	Project No. 2964.001 Date: 2/10/2020		FIGURE



LEGEND

- PARCEL BOUNDARY
- FAULT TRENCH BY MILLER PACIFIC, DECEMBER 2019
- ACTIVE TRACE OF RODGERS CREEK FAULT
- GEOLOGIC CROSS-SECTION, SEE FIGURE
- CPT BY MILLER PACIFIC, 2010
- RECOMMENDED "NO-BUILD" ZONE

SCALE
0 10 20 40 FEET

NORTH

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SITE PLAN

Santa Rosa Memorial Hospice House
520 Doyle Park Drive
Santa Rosa, California

Project No. 2964.001 Date: 8/3/2016

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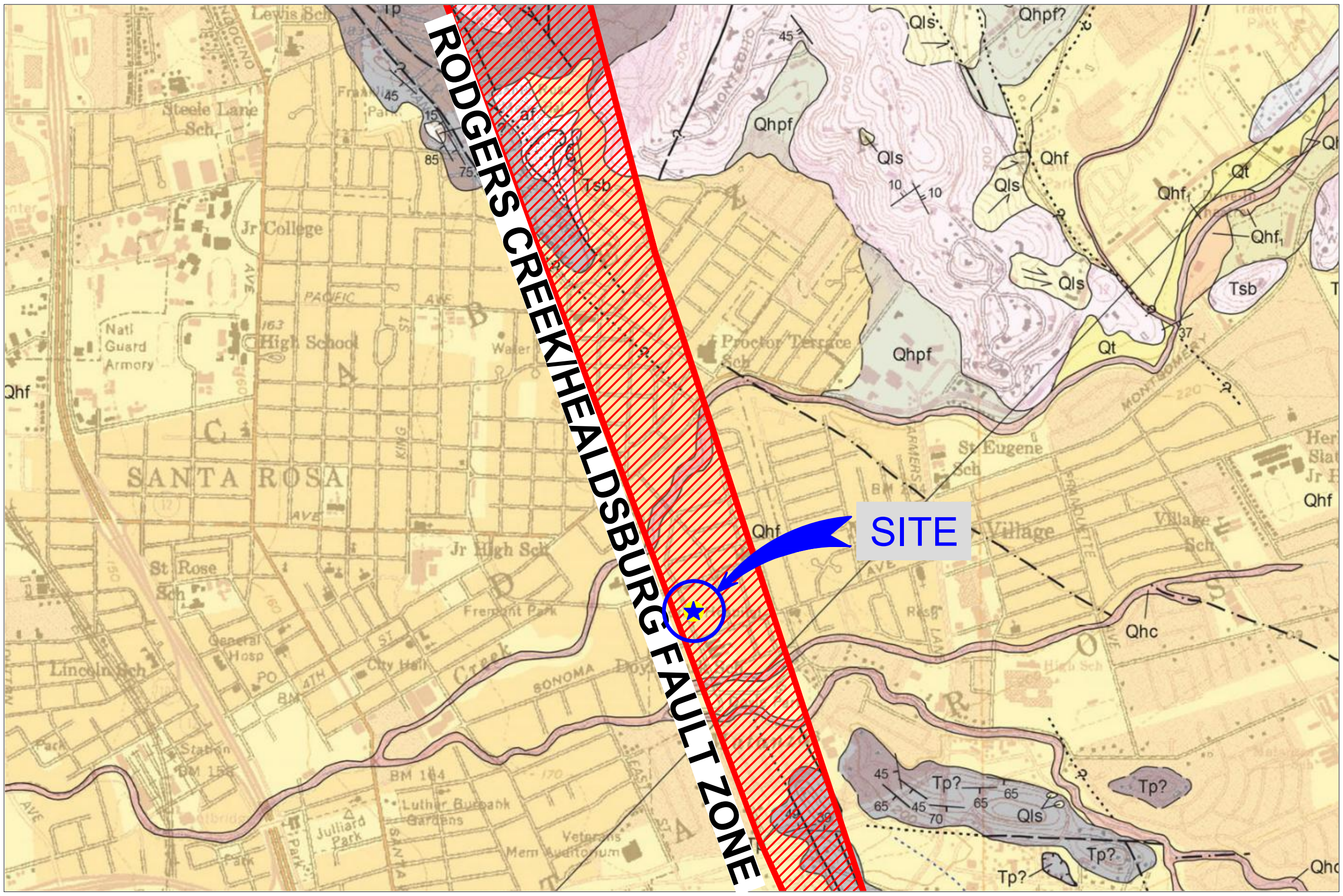
Drawn	MFJ
Checked	MFJ

2
FIGURE



REGIONAL GEOLOGIC MAP

(NOT TO SCALE)

NORTH

LEGEND

Qhc - CHANNELS (HOLOCENE) - Incise older deposits.

Qhf - ALLUVIAL FAN AND FLUVIAL TERRACE DEPOSITS, UNDIVIDED (HOLOCENE)
Gravel, sand and silt, derived primarily from Pleistocene and older sedimentary and igneous units.

Qhpf - ALLUVIAL FAN AND FLUVIAL TERRACE DEPOSITS, UNDIVIDED (PLEISTOCENE)
Gravel, sand and silt, characterized by unsorted character, a relict fan-like morphology.

Tp - PETALUMA FORMATION - Dominantly sandy to silty gravel, silty sandstone, siltstone, and mudstone.

- CONTACT - Dashed where approximately located; dotted where concealed; queried where uncertain.

- FAULT - Dashed where approximately located or inferred; dotted where concealed; queried where uncertain

- LIMITS OF ALQUIST-PRIOLO EARTHQUAKE FAULT ZONE

REFERENCES:
McLaughlin, R.J., Langenheim, V.E., and Sarna-Wojcicki, A.M., "Geologic and Geophysical Framework of the Santa Rosa 7.5' Quadrangle, Sonoma County, California", U.S. Department of the Interior, U.S. Geological Survey, Open-File Report 2008-2009, Plate 1.

California Department of Conservation, California Geologic Survey, “Digital Images of the Alquist Priolo Maps” http://www.conservation.ca.gov/cgs/rghm/ap/Pages/Index.aspx, 2018.

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REGIONAL GEOLOGIC MAP

Santa Rosa Memorial Hospice House
520 Doyle Park Drive
Santa Rosa, California

Project No. 2964.001 Date: 2/10/2020

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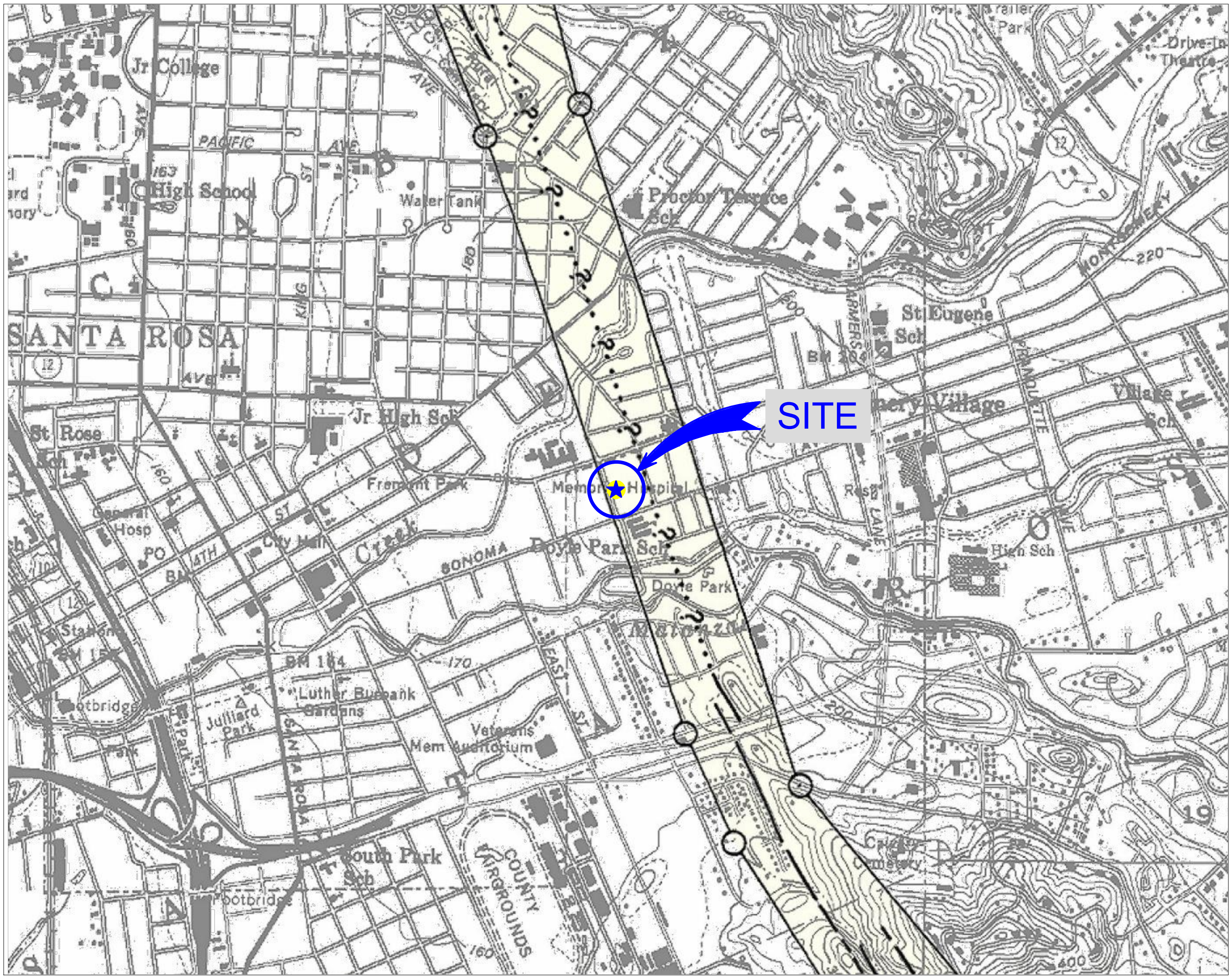
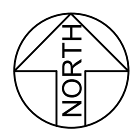
FIGURE 3



ALQUIST-PRIOLO SPECIAL STUDIES ZONE MAP

(NOT TO SCALE)



MAP EXPLANATION

Potentially Active Faults

Faults considered to have been active during Holocene time and to have a relatively high potential for surface rupture; solid line where accurately located, long dash where approximately located, short dash where inferred, dotted where concealed; query (?) indicates additional uncertainty. Evidence of historic offset indicated by year of earthquake-associated event or C for displacement caused by creep or possible creep

Special Studies Zone Boundaries

These are delineated as straight-line segments that connect encircled turning points so as to define special studies zone segments

Seaward projection of zone boundary

REFERENCES:
California Department of Conservation, Division of Mines and Geology (1983), “Revised Official Map of Earthquake Fault Hazard Zones, Santa Rosa Quadrangle”, effective July 1, 1983.

California Department of Conservation, California Geologic Survey, “Digital Images of the Alquist Priolo Maps” http://www.conservation.ca.gov/cgs/rghm/ap/Pages/Index.aspx, 2018.

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ALQUIST-PRIOLO SPECIAL STUDIES ZONE MAP

Santa Rosa Memorial Hospice House
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Project No. 2964.001 Date: 2/10/2020

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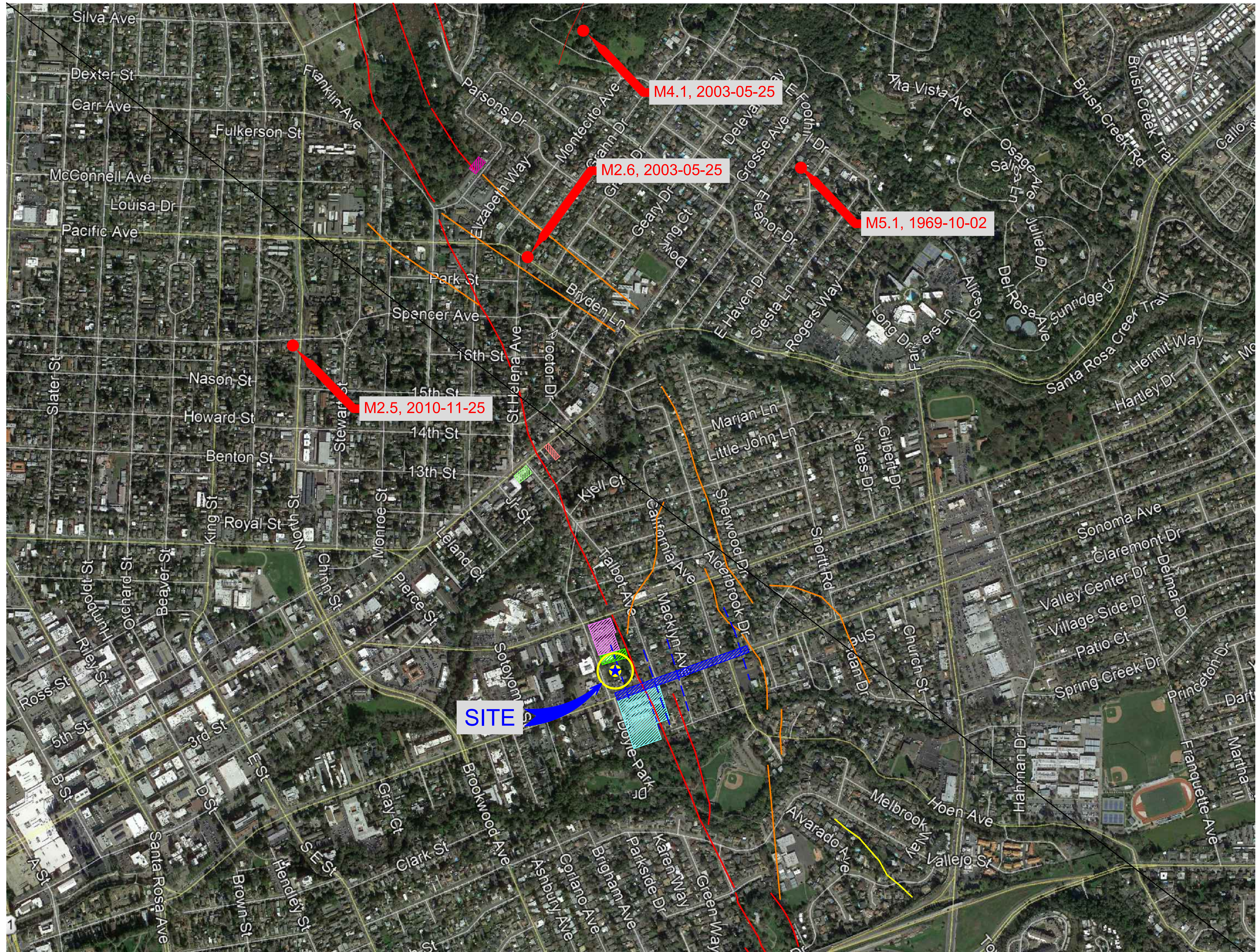
FIGURE 4

LEGEND AND KEY TO MAP SYMBOLS

- Thomas D. Hays & Associates, 1977
- Cooper-Clark & Associates, 1978
- Donald Herzog & Associates, 1980
- Burton H. Marliave, 1981
- Donald Herzog & Associates, 1989
- Bace Geotechnical, 1992
- Fugro William Lettis & Associates (2011)
- Holocene-Active Fault Mapped by Fugro WIlliam Lettis (2011)
- Presumed Inactive Fault Mapped by Fugro WIlliam Lettis (2011)
- Holocene-Active Fault Mapped by Hecker (2018) [Part of principal displacement zone]
- Holocene-Active Fault Mapped by Hecker (2018) [Part of distributed displacement zone]
- Questionable Holocene Fault Mapped by Hecker (2018)
- Historic Earthquake Epicenter (USGS, 2020)



NORTH

SCALE

0 500 1,000 2,000 FEET

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LOCAL FAULT MAP AND STUDIES BY OTHERS

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Project No. 2964.001 Date: 8/3/2016

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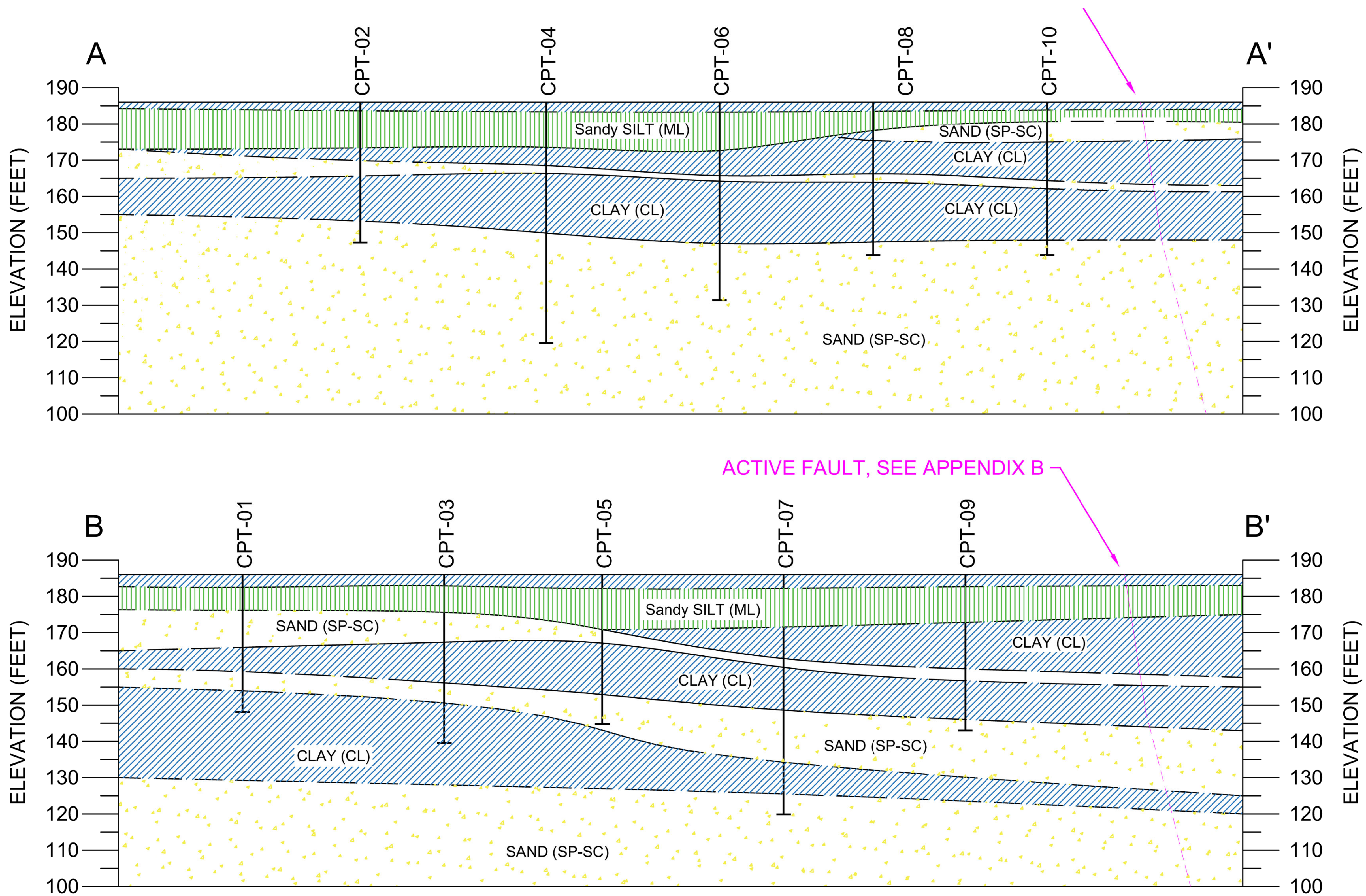
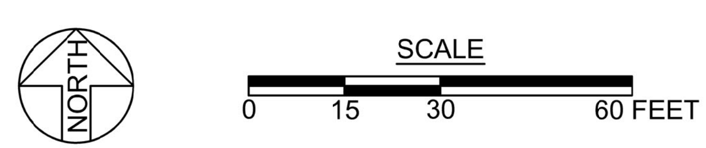
5
FIGURE





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SIMPLIFIED GEOLOGIC CROSS-SECTIONS

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Project No. 2964.001 Date: 8/3/2016

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6
FIGURE

APPENDIX A
HISTORIC AERIAL PHOTOGRAPHS

(NOT TO SCALE)

NORTH

Source: Sonoma County Vegetation Mapping and LiDAR Program (2020), "Sonoma County - Then and Now" (web-based historic imagery viewer tool), http://sonomavegmap.org/1942/, accessed February 10, 2020.

MPEG MILLER PACIFIC ENGINEERING GROUP	504 Redwood Blvd. Suite 220 Novato, CA 94947 T 415 / 382-3444 F 415 / 382-3450 www.millerpac.com	HISTORIC AERIAL PHOTOGRAPH (1942)		
		Santa Rosa Memorial Hospice House 520 Doyle Park Drive Santa Rosa, California	Drawn MFJ Checked	A-1 FIGURE
		Project No. 2964.001 Date: 2/10/2020		

FILE: 1079.001AppendixA.dwg

Source: Pacific Aerial Surveys, Novato, CA

SCALE

0 125 250 500 FEET

NORTH

MPEG MILLER PACIFIC ENGINEERING GROUP

FILE: 1079.001AppendixA.dwg

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HISTORIC AERIAL PHOTOGRAPH (1956)

Santa Rosa Memorial Hospice House
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Project No. 2964.001 Date: 2/10/2020

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A-2
FIGURE

Source: Pacific Aerial Surveys, Novato, CA

SCALE

0 125 250 500 FEET

NORTH

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FILE: 1079.001AppendixA.dwg

HISTORIC AERIAL PHOTOGRAPH (1968)

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Drawn MFJ
Checked

A-3
FIGURE

Source: Pacific Aerial Surveys, Novato, CA

SCALE

0 125 250 500 FEET

NORTH

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FILE: 1079.001AppendixA.dwg

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HISTORIC AERIAL PHOTOGRAPH (1980)

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A-4
FIGURE

APPENDIX B

SUMMARY OF FAULT TRENCH FINDINGS

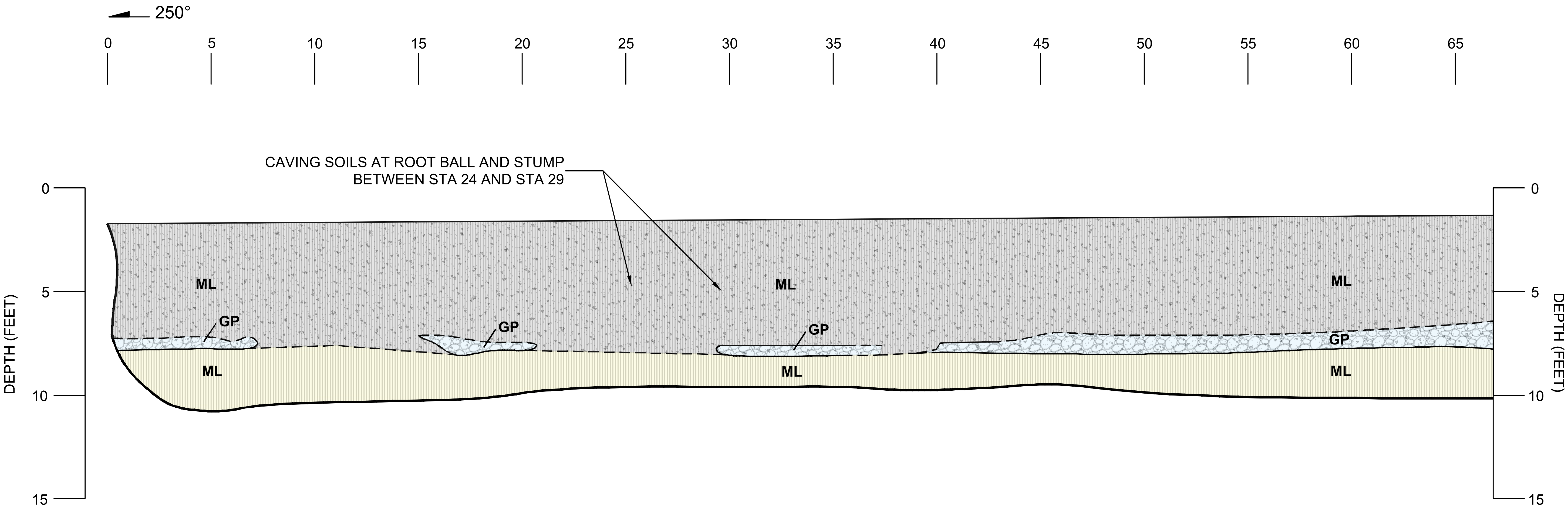
Fault trenching was performed in December of 2019. Excavation, shoring, and trench backfill were performed by Robison Construction of Petaluma, California. Our trench was excavated at the location shown on Figure 2 by use of a hydraulic excavator equipped with a 36-inch bucket. The trench was excavated to typical depths of about 10-feet below existing grade, and aluminum “speed-shores” with 7-foot rails were installed on minimum 6-foot centers as excavation progressed. Relatively consistent groundwater infiltration was observed at depths of about 9.5-feet below the ground surface in the east end of the trench following intermittent heavy rains in early and mid-December, which required daily, continuous pumping to maintain safe conditions.

Following trench excavation and shoring, the north wall was thoroughly and carefully cleaned with hand tools to expose natural soil structure and stratigraphy. The south wall was 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 the trench was surveyed using a hand-level, and the trench was fitted with level string lines on 5-foot intervals for accurate depth measurements. Positional/lateral accuracy was achieved by marking stations with paint and string lines on 5-foot horizontal intervals. The trench was logged at a scale of 1:60 (1 inch = 5-feet) using standard USCS soil classifications and terminology.

1. Trench T-1

Trench T-1 was excavated to a total length of 285-feet, extending from the back-of-sidewalk along Doyle Park Drive to a point 30-feet east of the eastern property boundary. The trench exposed essentially flat-lying, apparently conformable alluvial soils of interpreted Middle to Late Holocene age. One thrust fault plane was identified in the north wall of the trench at Station 253, as shown on Figure B-5. The fault dips steeply to the east and has an apparent “up to the east” sense of motion. The fault projects across the trench along a strike of approximately N12°W, offsetting at least 5 relatively sharp stratigraphic contacts between 5- and 10-feet below the ground surface, with apparent vertical offsets measured at about 9-inches. A second thrust fault also having an “up to the east” sense of motion was identified at Station 255 in the south wall of the trench at Station 254, offsetting two contacts about 7- to 10-feet below the ground surface, and exhibiting apparent vertical offsets of about 4-inches.

Coarse gravelly soils encountered in the east end of the trench, extending from Stations 255 to 285, were found to contain considerable groundwater and resulted in significant caving and instability of the trench walls. This area was not logged for safety reasons. Additionally, unstable trench conditions were encountered in the zone of an apparent cross-cutting channel or shallow basin deposit of soft sandy silt between Stations 230 and about 250. This area was logged, although conditions generally precluded definitive observation of an absence of faults or other structures.



STRATIGRAPHIC COLUMN AND KEY TO LOG SYMBOLS

ML SANDY SILT (ML)
Medium to dark gray, frequently mottled medium brown, moist to wet, soft to medium-stiff, locally gravelly with isolated sand and gravel lenses [LATE HOLOCENE FLOODPLAIN/OVERBANK DEPOSITS]

SANDY GRAVEL WITH SILT (GP)
Medium dense, well-rounded sand and gravel with variable silt content.
[LATE HOLOCENE CHANNEL DEPOSITS]

SP SAND WITH SILT (SP)
Light brown, medium dense, fine to coarse well-rounded sand with ~15% silt.
[LATE HOLOCENE FLOODPLAIN DEPOSITS]

GP SANDY GRAVEL (GP)
Loose to medium-dense, subangular to subrounded gravels and cobbles to 2.5-inches with 30-40% medium to coarse sand. [LATE HOLOCENE CHANNEL DEPOSITS]

ML SILT (ML)
Light brown with orange mottling, medium-stiff, locally with 15-20% fine sand.
[MIDDLE TO LATE HOLOCENE FLOODPLAIN/OVERBANK DEPOSITS]

SP GRAVELLY SAND (SP)
Dark gray, loose to medium-dense, fine to coarse well-rounded sand with 30-35% subrounded gravel to 1-inch. [MIDDLE TO LATE HOLOCENE CHANNEL DEPOSITS]

SM SILTY SAND (SM)
Medium gray with yellow mottling, moist, loose to medium-dense, fine-grained sand with 30-40% silt [MIDDLE TO LATE HOLOCENE FLOODPLAIN/OVERBANK DEPOSITS]

GP GRAVEL WITH SAND (GP)
Coarse, sub- to well-rounded gravels and cobbles to 6-inches diameter, medium-dense, with 15-30% fine to coarse sand. [MIDDLE TO LATE HOLOCENE CHANNEL DEPOSITS]

GEOLOGIC CONTACT, SHARP
GEOLOGIC CONTACT, GRADATIONAL
GROUNDWATER ELEVATION 12/14/2019
ACTIVE FAULT,
DASHED WHERE UNCERTAIN
ARROWS INDICATE SENSE OF MOTION

SCALE
0 2.5 5 10 FEET

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FAULT TRENCH T-1 - LOG OF NORTH WALL

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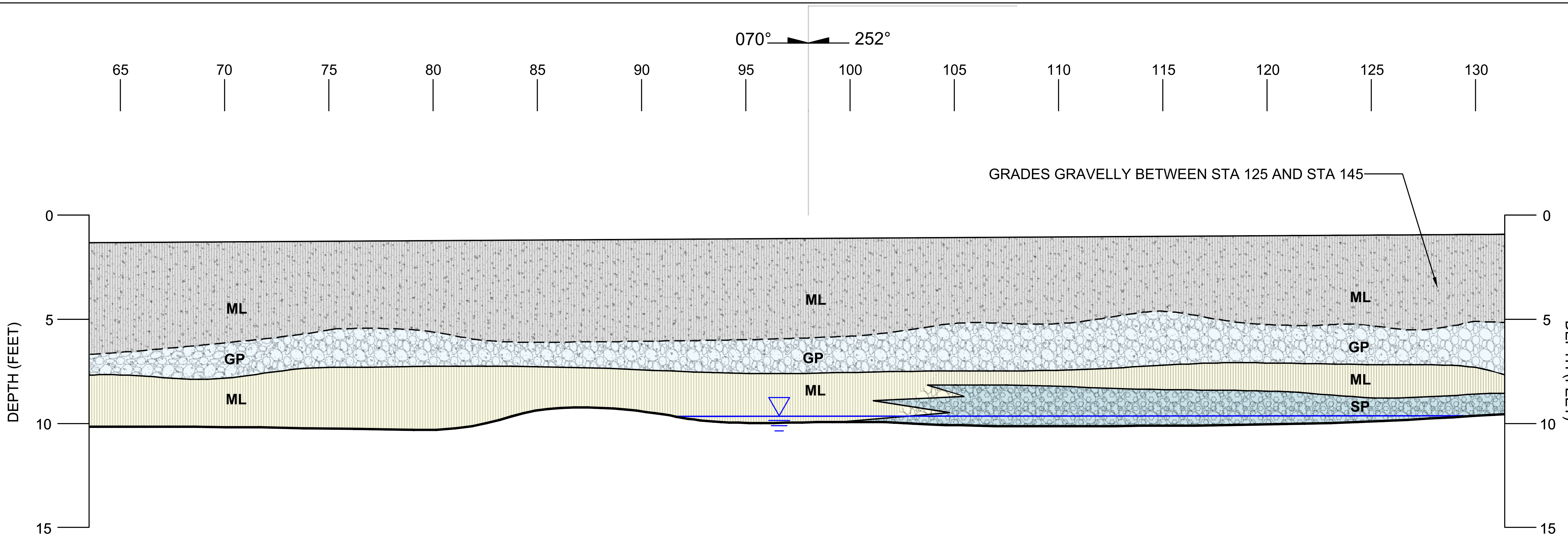
Santa Rosa, California
Project No. 2964.001 Date: 2/7/2020

Drawn MFJ
Checked

B-1
FIGURE



STRATIGRAPHIC COLUMN AND KEY TO LOG SYMBOLS

ML SANDY SILT (ML)
Medium to dark gray, frequently mottled medium brown, moist to wet, soft to medium-stiff, locally gravelly with isolated sand and gravel lenses [LATE HOLOCENE FLOODPLAIN/OVERBANK DEPOSITS]

GP SANDY GRAVEL WITH SILT (GP)
Medium dense, well-rounded sand and gravel with variable silt content.
[LATE HOLOCENE CHANNEL DEPOSITS]

SP SAND WITH SILT (SP)
Light brown, medium dense, fine to coarse well-rounded sand with ~15% silt.
[LATE HOLOCENE FLOODPLAIN DEPOSITS]

GP SANDY GRAVEL (GP)
Loose to medium-dense, subangular to subrounded gravels and cobbles to 2.5-inches with 30-40% medium to coarse sand. [LATE HOLOCENE CHANNEL DEPOSITS]

ML SILT (ML)
Light brown with orange mottling, medium-stiff, locally with 15-20% fine sand.
[MIDDLE TO LATE HOLOCENE FLOODPLAIN/OVERBANK DEPOSITS]

SP GRAVELLY SAND (SP)
Dark gray, loose to medium-dense, fine to coarse well-rounded sand with 30-35% subrounded gravel to 1-inch. [MIDDLE TO LATE HOLOCENE CHANNEL DEPOSITS]

SM SILTY SAND (SM)
Medium gray with yellow mottling, moist, loose to medium-dense, fine-grained sand with 30-40% silt [MIDDLE TO LATE HOLOCENE FLOODPLAIN/OVERBANK DEPOSITS]

GP GRAVEL WITH SAND (GP)
Coarse, sub- to well-rounded gravels and cobbles to 6-inches diameter, medium-dense, with 15-30% fine to coarse sand. [MIDDLE TO LATE HOLOCENE CHANNEL DEPOSITS]

GEOLOGIC CONTACT, SHARP
GEOLOGIC CONTACT, GRADATIONAL
GROUNDWATER ELEVATION 12/14/2019
ACTIVE FAULT,
DASHED WHERE UNCERTAIN
ARROWS INDICATE SENSE OF MOTION

SCALE
0 2.5 5 10 FEET

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FAULT TRENCH T-1 - LOG OF NORTH WALL

Santa Rosa Memorial Hospice House
520 Doyle Park Drive
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Project No. 2964.001 Date: 2/7/2020

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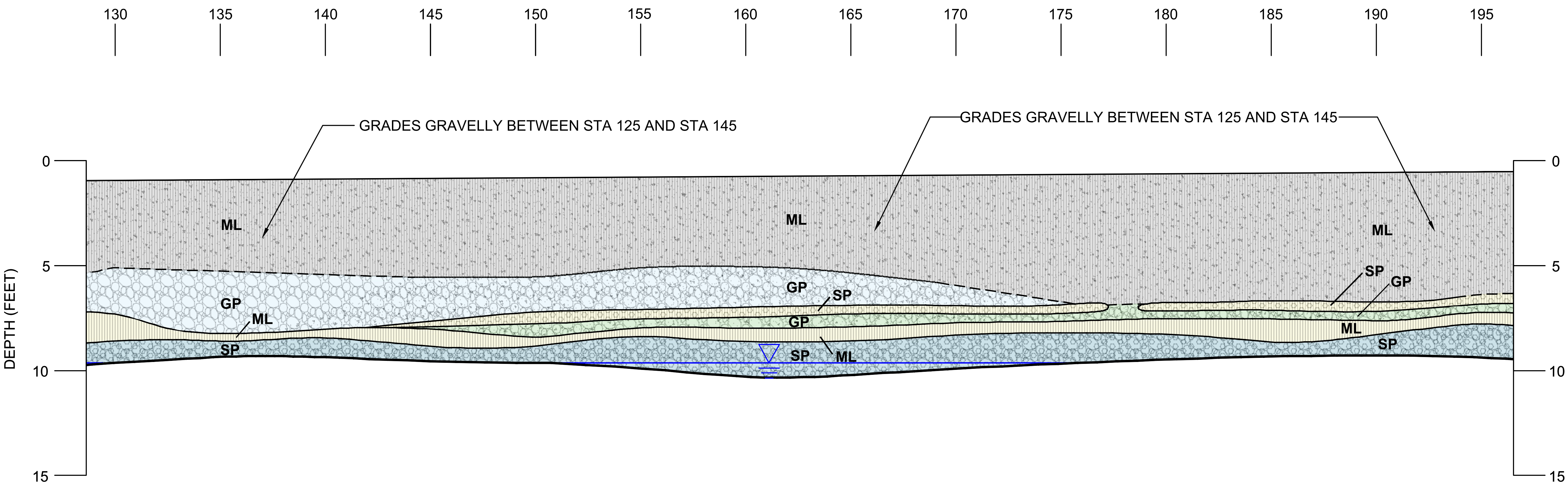
B-2
FIGURE



STRATIGRAPHIC COLUMN AND KEY TO LOG SYMBOLS

ML — SANDY SILT (ML)
Medium to dark gray, frequently mottled medium brown, moist to wet, soft to medium-stiff, locally gravelly with isolated sand and gravel lenses [LATE HOLOCENE FLOODPLAIN/OVERBANK DEPOSITS]

SANDY GRAVEL WITH SILT (GP)
Medium dense, well-rounded sand and gravel with variable silt content.
[LATE HOLOCENE CHANNEL DEPOSITS]

SP — SAND WITH SILT (SP)
Light brown, medium dense, fine to coarse well-rounded sand with ~15% silt.
[LATE HOLOCENE FLOODPLAIN DEPOSITS]

GP — SANDY GRAVEL (GP)
Loose to medium-dense, subangular to subrounded gravels and cobbles to 2.5-inches with 30-40% medium to coarse sand. [LATE HOLOCENE CHANNEL DEPOSITS]

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[MIDDLE TO LATE HOLOCENE FLOODPLAIN/OVERBANK DEPOSITS]

SP — GRAVELLY SAND (SP)
Dark gray, loose to medium-dense, fine to coarse well-rounded sand with 30-35% subrounded gravel to 1-inch. [MIDDLE TO LATE HOLOCENE CHANNEL DEPOSITS]

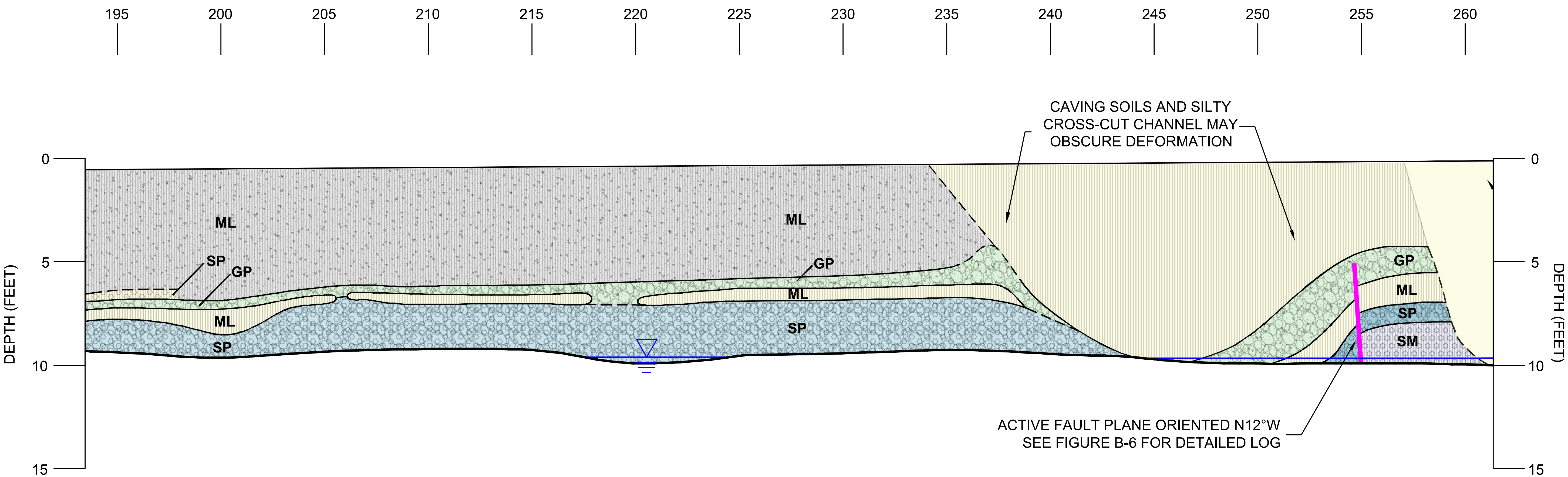
SM — SILTY SAND (SM)
Medium gray with yellow mottling, moist, loose to medium-dense, fine-grained sand with 30-40% silt [MIDDLE TO LATE HOLOCENE FLOODPLAIN/OVERBANK DEPOSITS]

GP — GRAVEL WITH SAND (GP)
Coarse, sub- to well-rounded gravels and cobbles to 6-inches diameter, medium-dense, with 15-30% fine to coarse sand. [MIDDLE TO LATE HOLOCENE CHANNEL DEPOSITS]

GEOLOGIC CONTACT, SHARP
GEOLOGIC CONTACT, GRADATIONAL
GROUNDWATER ELEVATION 12/14/2019
ACTIVE FAULT,
DASHED WHERE UNCERTAIN
ARROWS INDICATE SENSE OF MOTION

SCALE
0 2.5 5 10 FEET

Miller Pacific ENGINEERING GROUP	135 Camino Dorado Suite 3 Napa, CA 94558 T 707 / 265-7936 F 707 / 265-7962 www.millerpac.com	FAULT TRENCH T-1 - LOG OF NORTH WALL
 FILE: 2964.001TL.dwg		Santa Rosa Memorial Hospice House 520 Doyle Park Drive Santa Rosa, California Project No. 2964.001 Date: 2/7/2020 Drawn MFJ Checked B-3 FIGURE



STRATIGRAPHIC COLUMN AND KEY TO LOG SYMBOLS

ML SANDY SILT (ML)
Medium to dark gray, frequently mottled medium brown, moist to wet, soft to medium-stiff, locally gravelly with isolated sand and gravel lenses [LATE HOLOCENE FLOODPLAIN/OVERBANK DEPOSITS]

SANDY GRAVEL WITH SILT (GP)
Medium dense, well-rounded sand and gravel with variable silt content.
[LATE HOLOCENE CHANNEL DEPOSITS]

SP SAND WITH SILT (SP)
Light brown, medium dense, fine to coarse well-rounded sand with ~15% silt.
[LATE HOLOCENE FLOODPLAIN DEPOSITS]

GP SANDY GRAVEL (GP)
Loose to medium-dense, subangular to subrounded gravels and cobbles to 2.5-inches with 30-40% medium to coarse sand. [LATE HOLOCENE CHANNEL DEPOSITS]

ML SILT (ML)
Light brown with orange mottling, medium-stiff, locally with 15-20% fine sand.
[MIDDLE TO LATE HOLOCENE FLOODPLAIN/OVERBANK DEPOSITS]

SP GRAVELLY SAND (SP)
Dark gray, loose to medium-dense, fine to coarse well-rounded sand with 30-35% subrounded gravel to 1-inch. [MIDDLE TO LATE HOLOCENE CHANNEL DEPOSITS]

SM SILTY SAND (SM)
Medium gray with yellow mottling, moist, loose to medium-dense, fine-grained sand with 30-40% silt [MIDDLE TO LATE HOLOCENE FLOODPLAIN/OVERBANK DEPOSITS]

GP GRAVEL WITH SAND (GP)
Coarse, sub- to well-rounded gravels and cobbles to 6-inches diameter, medium-dense, with 15-30% fine to coarse sand. [MIDDLE TO LATE HOLOCENE CHANNEL DEPOSITS]

GEOLOGIC CONTACT, SHARP
GEOLOGIC CONTACT, GRADATIONAL
GROUNDWATER ELEVATION 12/14/2019
ACTIVE FAULT,
DASHED WHERE UNCERTAIN
ARROWS INDICATE SENSE OF MOTION

SCALE
0 2.5 5 10 FEET

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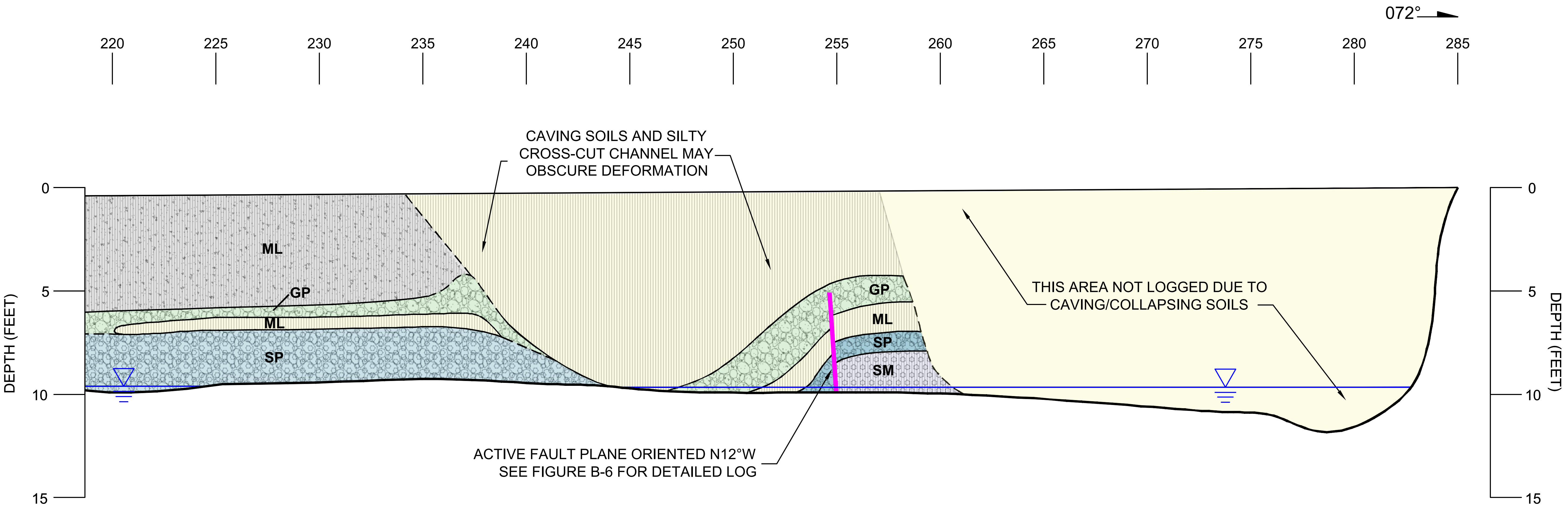
FAULT TRENCH T-1 - LOG OF NORTH WALL

Santa Rosa Memorial Hospice House
520 Doyle Park Drive
Santa Rosa, California
Project No. 2964.001 Date: 2/7/2020

Drawn MFJ
Checked

B-4
FIGURE



STRATIGRAPHIC COLUMN AND KEY TO LOG SYMBOLS

ML SANDY SILT (ML)
Medium to dark gray, frequently mottled medium brown, moist to wet, soft to medium-stiff, locally gravelly with isolated sand and gravel lenses [LATE HOLOCENE FLOODPLAIN/OVERBANK DEPOSITS]

SANDY GRAVEL WITH SILT (GP)
Medium dense, well-rounded sand and gravel with variable silt content.
[LATE HOLOCENE CHANNEL DEPOSITS]

SP SAND WITH SILT (SP)
Light brown, medium dense, fine to coarse well-rounded sand with ~15% silt.
[LATE HOLOCENE FLOODPLAIN DEPOSITS]

GP SANDY GRAVEL (GP)
Loose to medium-dense, subangular to subrounded gravels and cobbles to 2.5-inches with 30-40% medium to coarse sand. [LATE HOLOCENE CHANNEL DEPOSITS]

ML SILT (ML)
Light brown with orange mottling, medium-stiff, locally with 15-20% fine sand.
[MIDDLE TO LATE HOLOCENE FLOODPLAIN/OVERBANK DEPOSITS]

SP GRAVELLY SAND (SP)
Dark gray, loose to medium-dense, fine to coarse well-rounded sand with 30-35% subrounded gravel to 1-inch. [MIDDLE TO LATE HOLOCENE CHANNEL DEPOSITS]

SM SILTY SAND (SM)
Medium gray with yellow mottling, moist, loose to medium-dense, fine-grained sand with 30-40% silt [MIDDLE TO LATE HOLOCENE FLOODPLAIN/OVERBANK DEPOSITS]

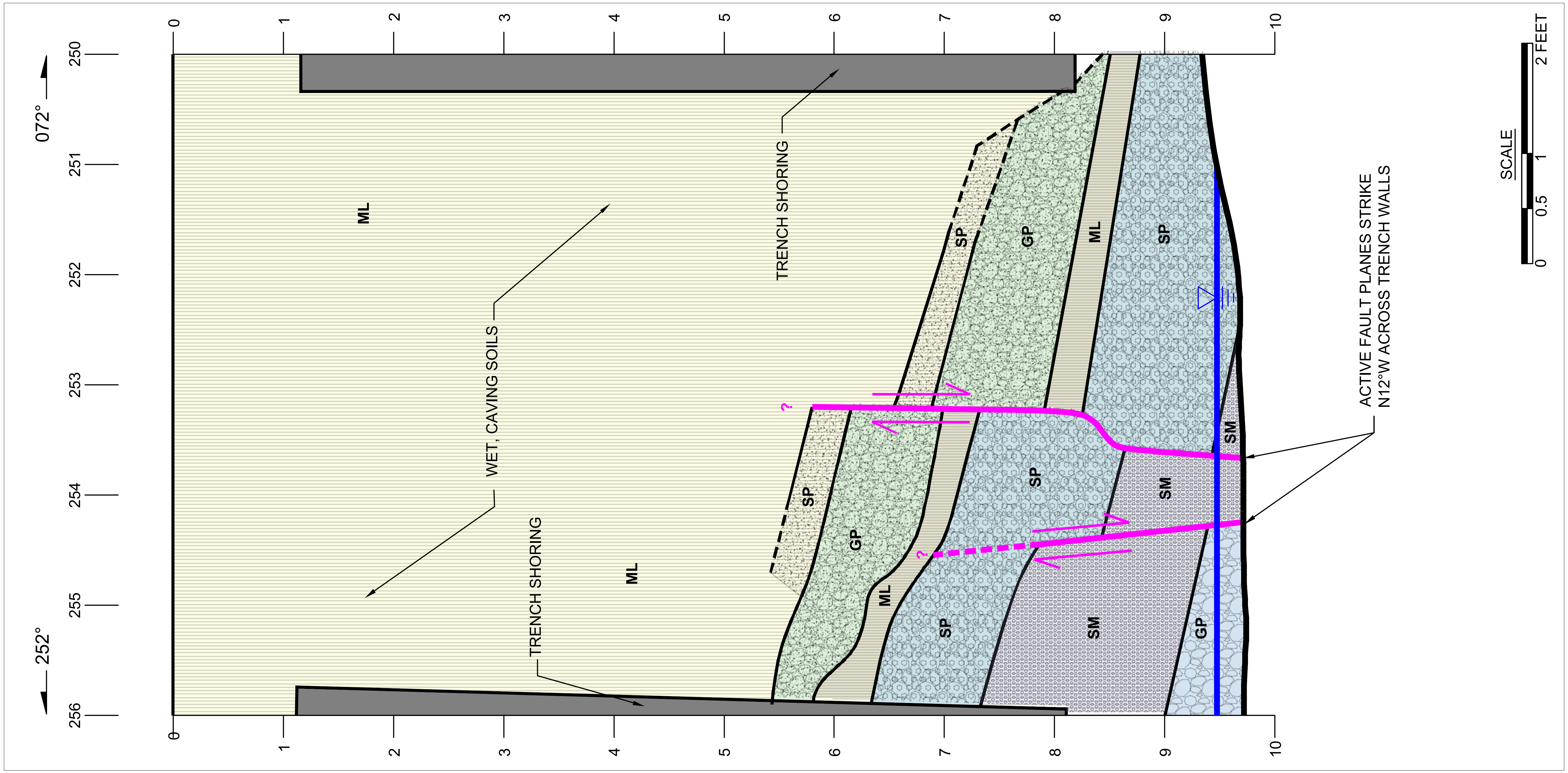
GP GRAVEL WITH SAND (GP)
Coarse, sub- to well-rounded gravels and cobbles to 6-inches diameter, medium-dense, with 15-30% fine to coarse sand. [MIDDLE TO LATE HOLOCENE CHANNEL DEPOSITS]

GEOLOGIC CONTACT, SHARP
GEOLOGIC CONTACT, GRADATIONAL
GROUNDWATER ELEVATION 12/14/2019
ACTIVE FAULT,
DASHED WHERE UNCERTAIN
ARROWS INDICATE SENSE OF MOTION

SCALE
0 2.5 5 10 FEET

Miller Pacific ENGINEERING GROUP	135 Camino Dorado Suite 3 Napa, CA 94558 T 707 / 265-7936 F 707 / 265-7962 www.millerpac.com	FAULT TRENCH T-1 - LOG OF NORTH WALL Santa Rosa Memorial Hospice House 520 Doyle Park Drive Santa Rosa, California Project No. 2964.001 Date: 2/7/2020	Drawn MFJ Checked	B-5 FIGURE

FILE: 2964.001TL.dwg



STRATIGRAPHIC COLUMN AND KEY TO LOG SYMBOLS

ML SANDY SILT (ML)
Medium to dark gray, frequently mottled medium brown, moist to wet, soft to medium-stiff, locally gravelly with isolated sand and gravel lenses [LATE HOLOCENE FLOODPLAIN/OVERBANK DEPOSITS]

SANDY GRAVEL WITH SILT (GP)
Medium dense, well-rounded sand and gravel with variable silt content.
[LATE HOLOCENE CHANNEL DEPOSITS]

SP SAND WITH SILT (SP)
Light brown, medium dense, fine to coarse well-rounded sand with ~15% silt.
[LATE HOLOCENE FLOODPLAIN DEPOSITS]

GP SANDY GRAVEL (GP)
Loose to medium-dense, subangular to subrounded gravels and cobbles to 2.5-inches with 30-40% medium to coarse sand. [LATE HOLOCENE CHANNEL DEPOSITS]

ML SILT (ML)
Light brown with orange mottling, medium-stiff, locally with 15-20% fine sand.
[MIDDLE TO LATE HOLOCENE FLOODPLAIN/OVERBANK DEPOSITS]

SP GRAVELLY SAND (SP)
Dark gray, loose to medium-dense, fine to coarse well-rounded sand with 30-35% subrounded gravel to 1-inch. [MIDDLE TO LATE HOLOCENE CHANNEL DEPOSITS]

SM SILTY SAND (SM)
Medium gray with yellow mottling, moist, loose to medium-dense, fine-grained sand with 30-40% silt [MIDDLE TO LATE HOLOCENE FLOODPLAIN/OVERBANK DEPOSITS]

GP GRAVEL WITH SAND (GP)
Coarse, sub- to well-rounded gravels and cobbles to 6-inches diameter, medium-dense, with 15-30% fine to coarse sand. [MIDDLE TO LATE HOLOCENE CHANNEL DEPOSITS]

GEOLOGIC CONTACT, SHARP
GEOLOGIC CONTACT, GRADATIONAL
GROUNDWATER ELEVATION 12/14/2019
ACTIVE FAULT,
DASHED WHERE UNCERTAIN
ARROWS INDICATE SENSE OF MOTION

FAULT TRENCH T-1 - DETAIL LOG OF SOUTH WALL

Santa Rosa Memorial Hospice House
520 Doyle Park Drive
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Project No. 2964.001 Date: 00/00/08

Drawn MFJ
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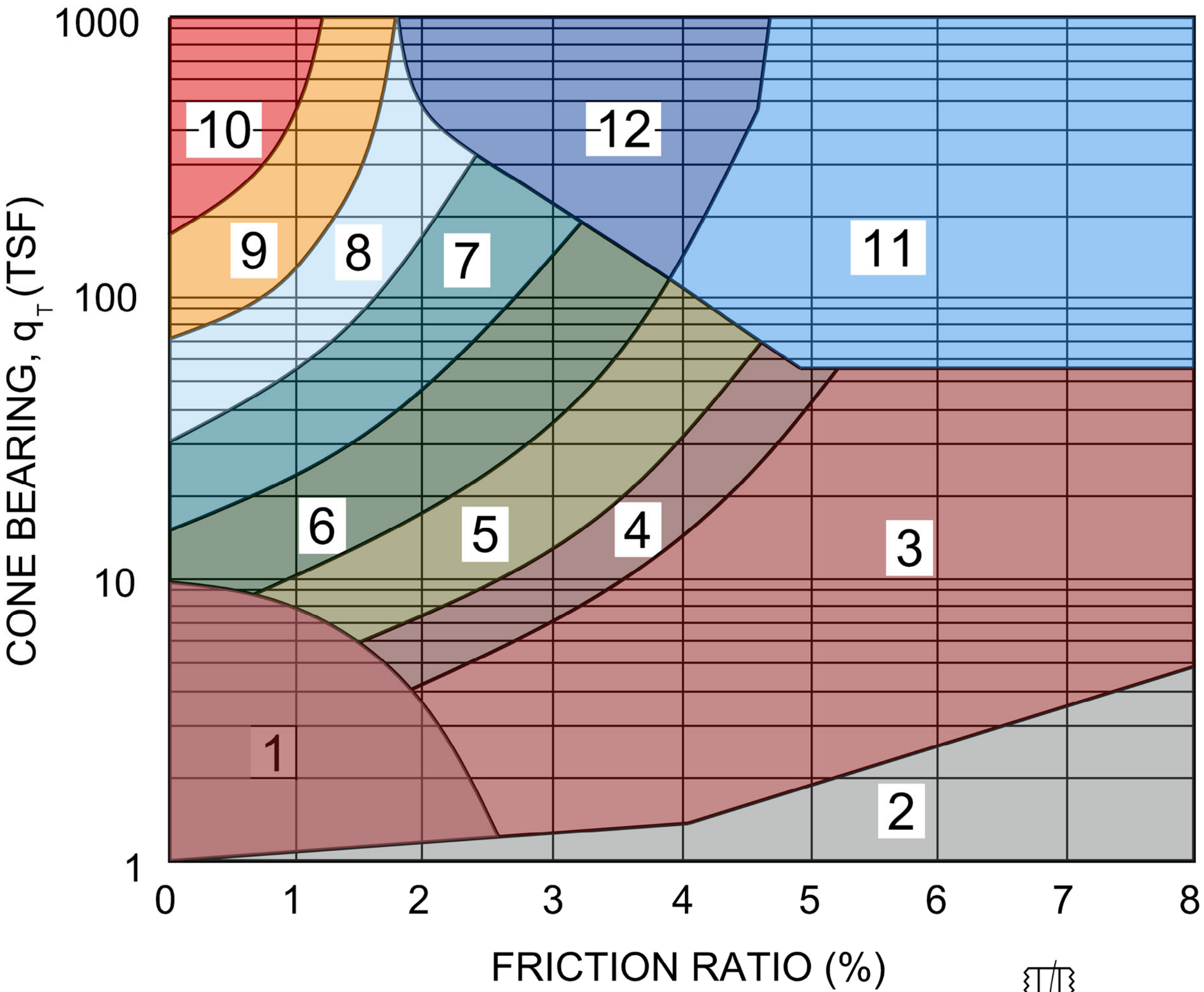
FILE: xxx.dwg

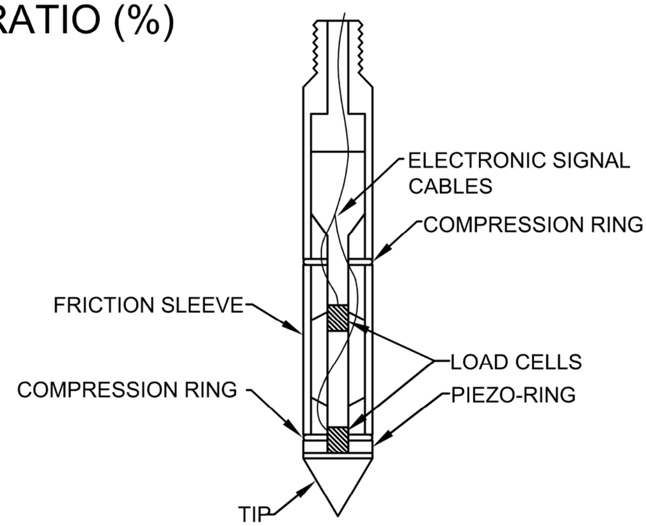
FIGURE
B-6

APPENDIX C
CPT AND SHEAR-WAVE VELOCITY DATA PLOTS



Zone:	Qc/N	Soil Behavior Type:
1)	2	Sensitive Fine Grained
2)	1	Organic Material
3)	1	Clay
4)	1.5	Silty Clay to Clay
5)	2	Clayey Silt to Silty Clay
6)	2.5	Sandy Silt to Clayey Silt
7)	3	Silty Sand to Sandy Silt
8)	4	Sand to Silty Sand
9)	5	Sand
10)	6	Gravelly Sand to Sand
11)	1	Very Stiff Fine Grained (*)
12)	2	Sand to Clayey Sand (*)

(*) Overconsolidated or Cemented



CONE PENETROMETER

(NO SCALE)

Reference: Robertson, P.K. (1986), "In-Situ Testing and Its Application to Geotechnical Engineering," Canadian Geotechnical Journal, Vol. 23; No. 23; No. 4, pp. 573-594

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FILENAME: 2964.001 Appendix C - CPT Logs.dwg

CPT SOIL INTERPRETATION CHART

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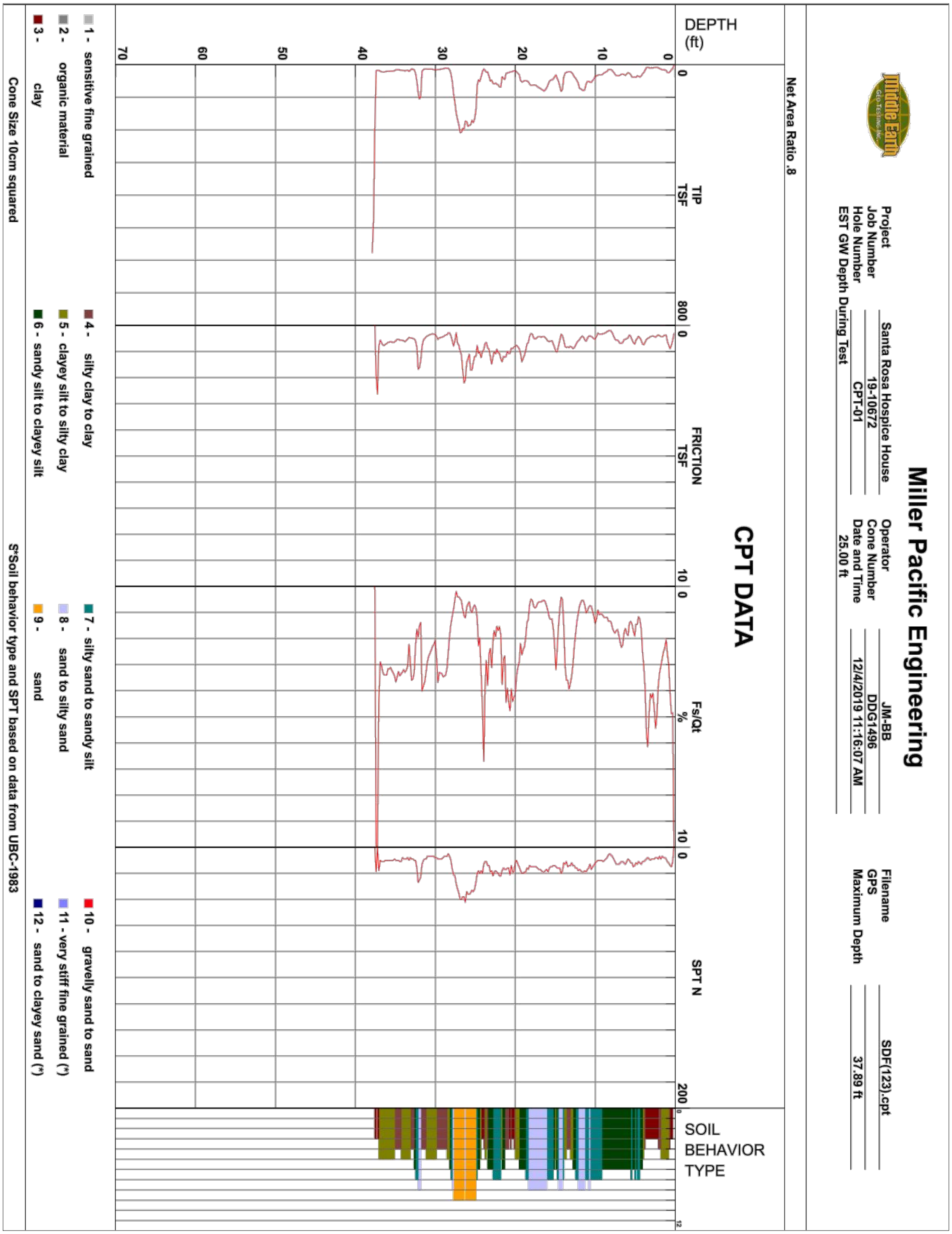
520 Doyle Park Drive
Santa Rosa, California

Project No. 2964.001 Date: 2/10/2020

Drawn MFJ
Checked

C-1
FIGURE



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CPT PLOT

Santa Rosa Memorial Hospice House
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Santa Rosa, California

Project No. 2964.001 Date: 2/10/2020

Drawn MFJ
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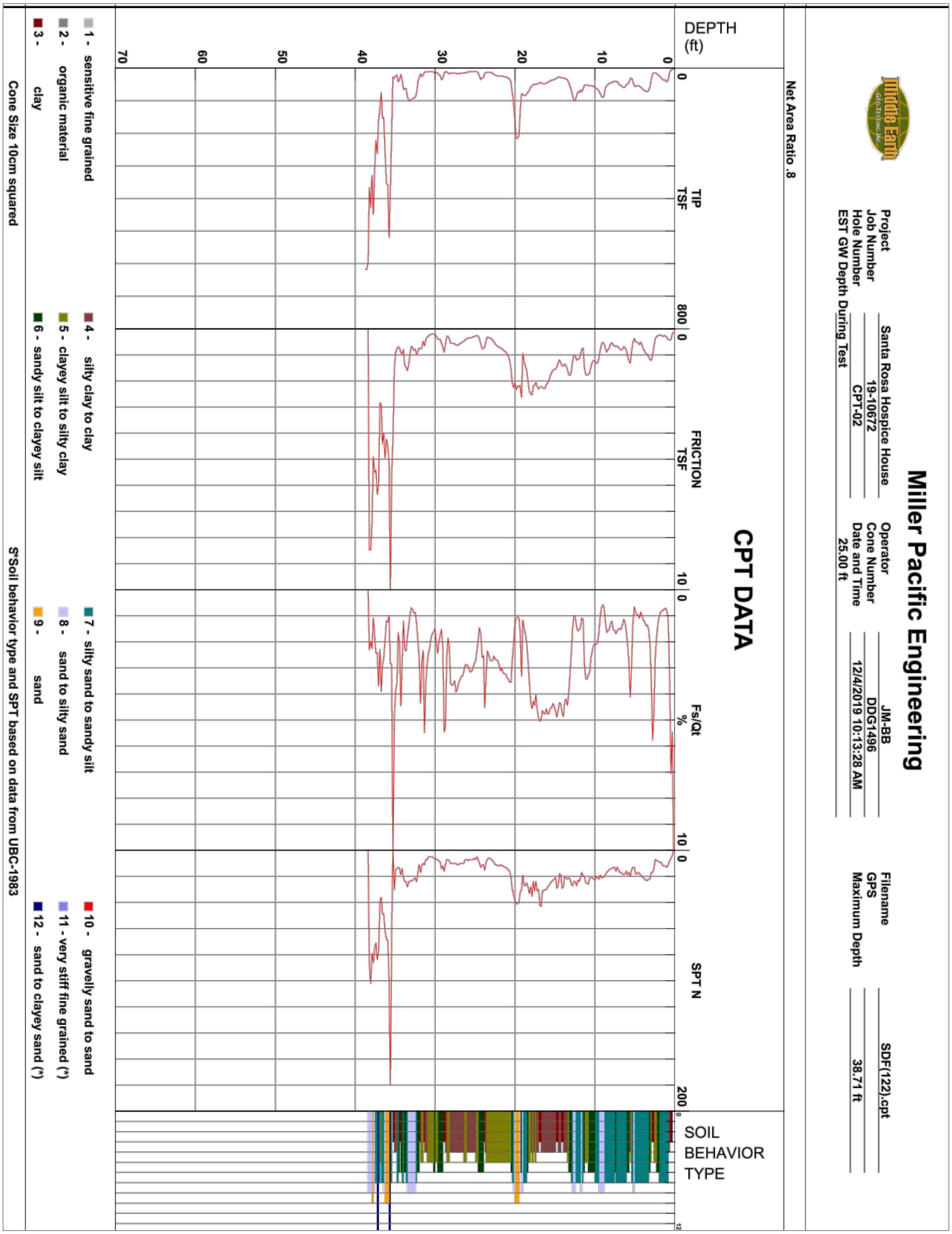
C-2
FIGURE



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CPT PLOT

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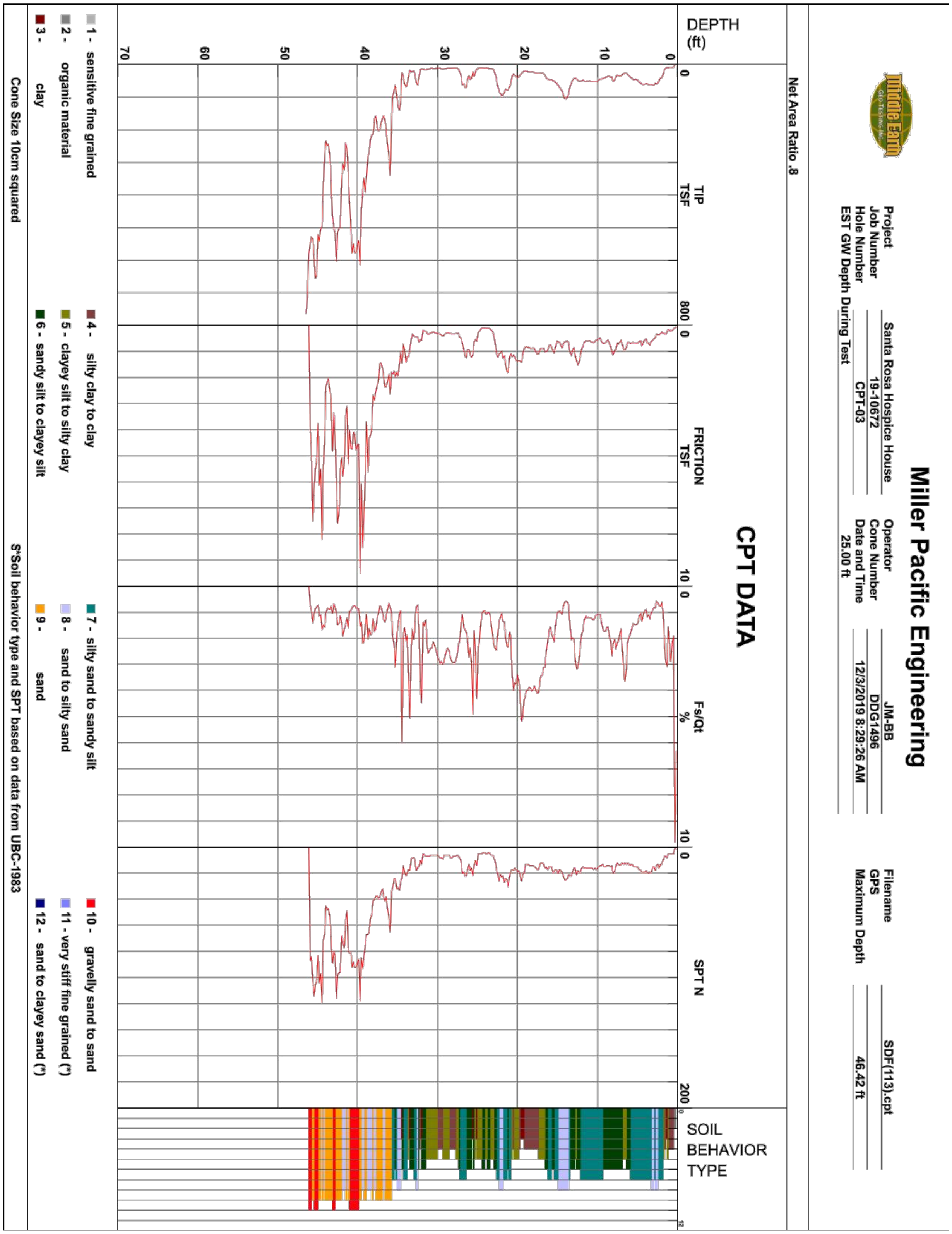
Santa Rosa, California

Project No. 2964.001 Date: 2/10/2020

Drawn MFJ
Checked

C-3
FIGURE



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CPT PLOT

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Project No. 2964.001 Date: 2/10/2020

Drawn MFJ
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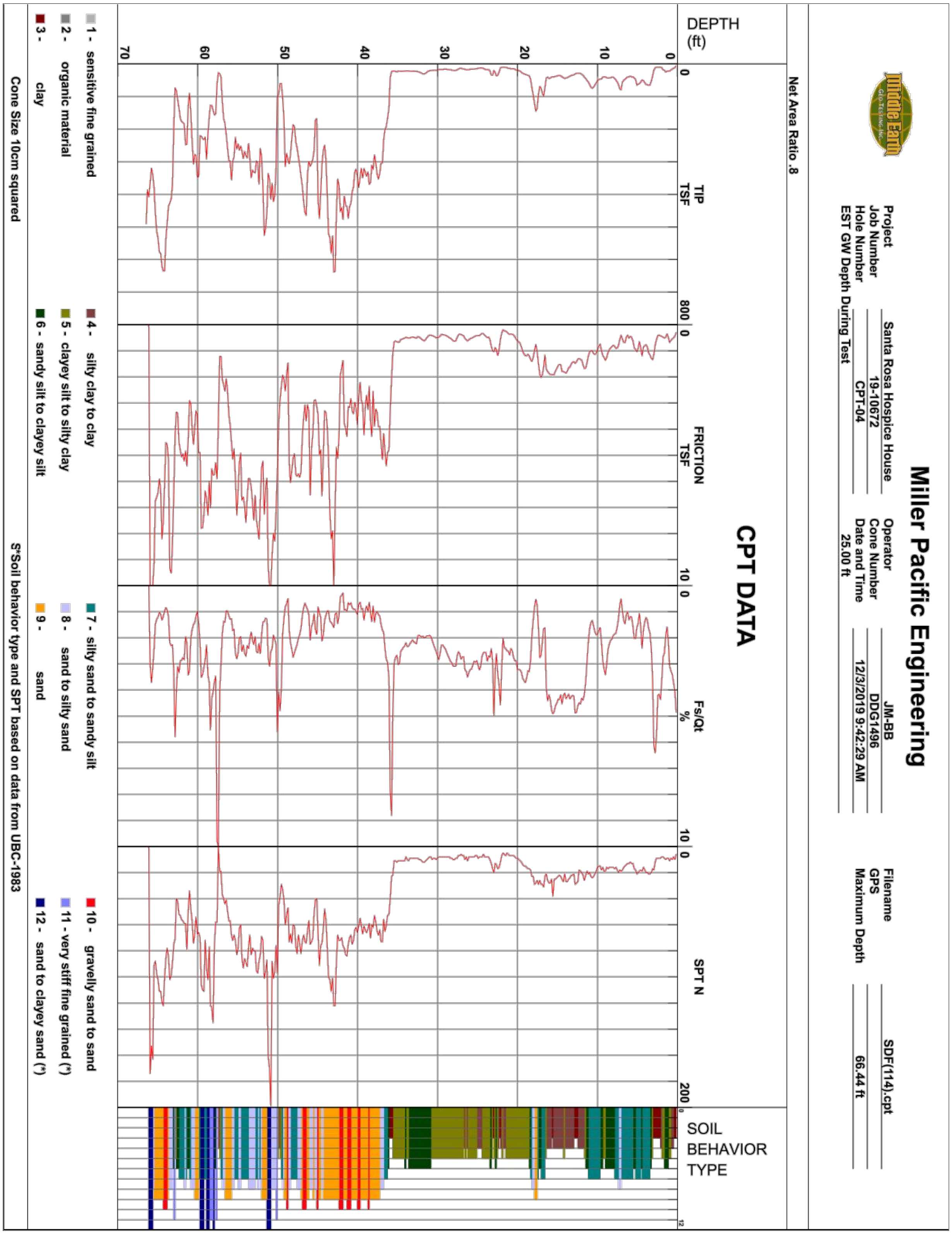
C-4
FIGURE



MPEG MILLER PACIFIC ENGINEERING GROUP

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CPT PLOT

Santa Rosa Memorial Hospice House
520 Doyle Park Drive
Santa Rosa, California

Project No. 2964.001 Date: 2/10/2020

Drawn MFJ
Checked

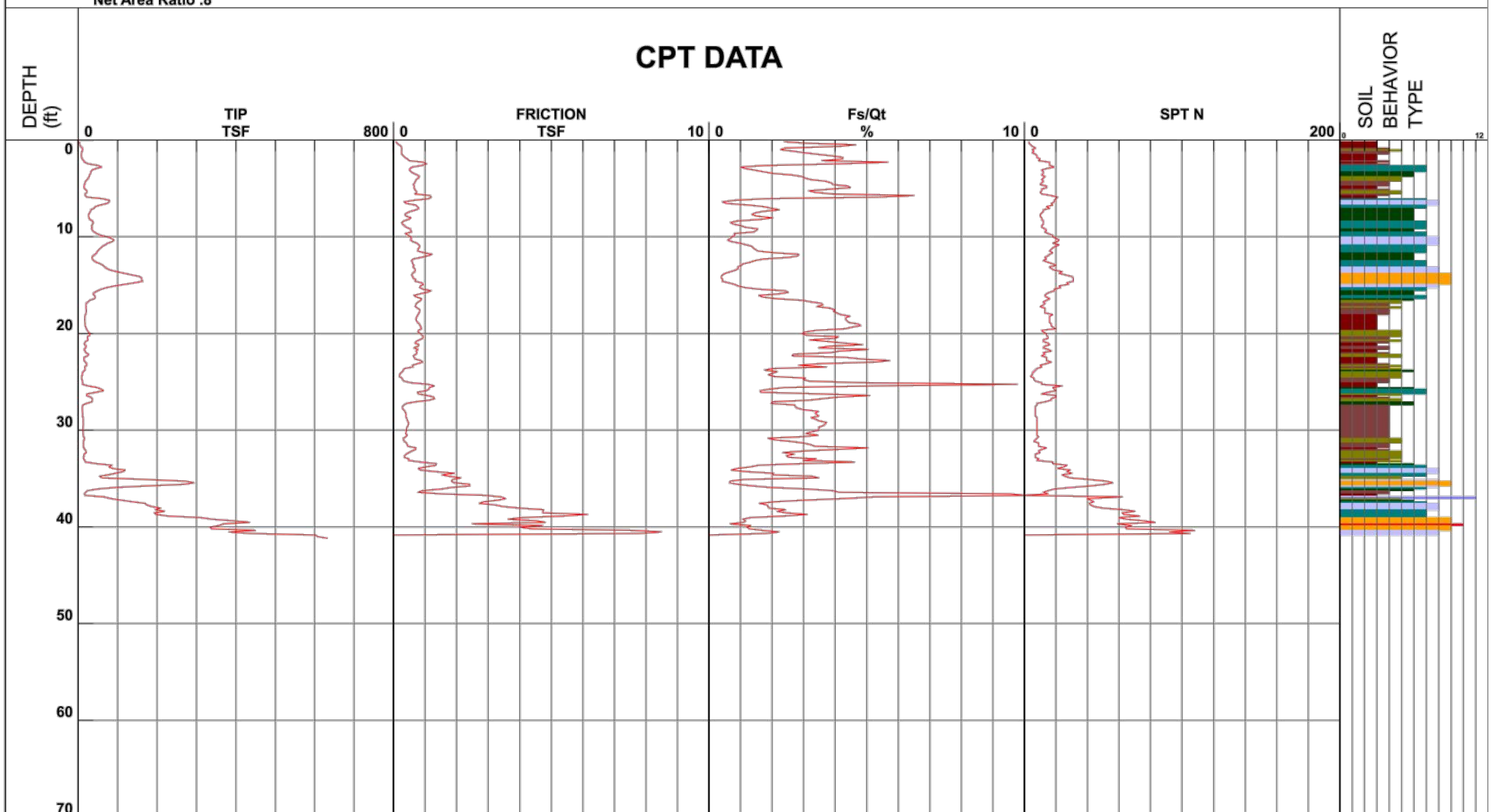
C-5
FIGURE

Miller Pacific Engineering

Project	Santa Rosa Hospice House	Operator	JM-BB	Filename	SDF(115).cpt
Job Number	19-10672	Cone Number	DDG1496	GPS	
Hole Number	CPT-05	Date and Time	12/3/2019 11:09:52 AM	Maximum Depth	41.17 ft
EST GW Depth During Test		25.00 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained	4 - silty clay to clay	7 - silty sand to sandy silt	10 - gravelly sand to sand
2 - organic material	5 - clayey silt to silty clay	8 - sand to silty sand	11 - very stiff fine grained (*)
3 - clay	6 - sandy silt to clayey silt	9 - sand	12 - sand to clayey sand (*)

Cone Size 10cm squared

S*Soil behavior type and SPT based on data from UBC-1983

CPT PLOT

Santa Rosa Memorial Hospice House
520 Doyle Park Drive
Santa Rosa, California

Project No. 2964.001   Date: 2/10/2020

Drawn MFJ
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C-6
FIGURE

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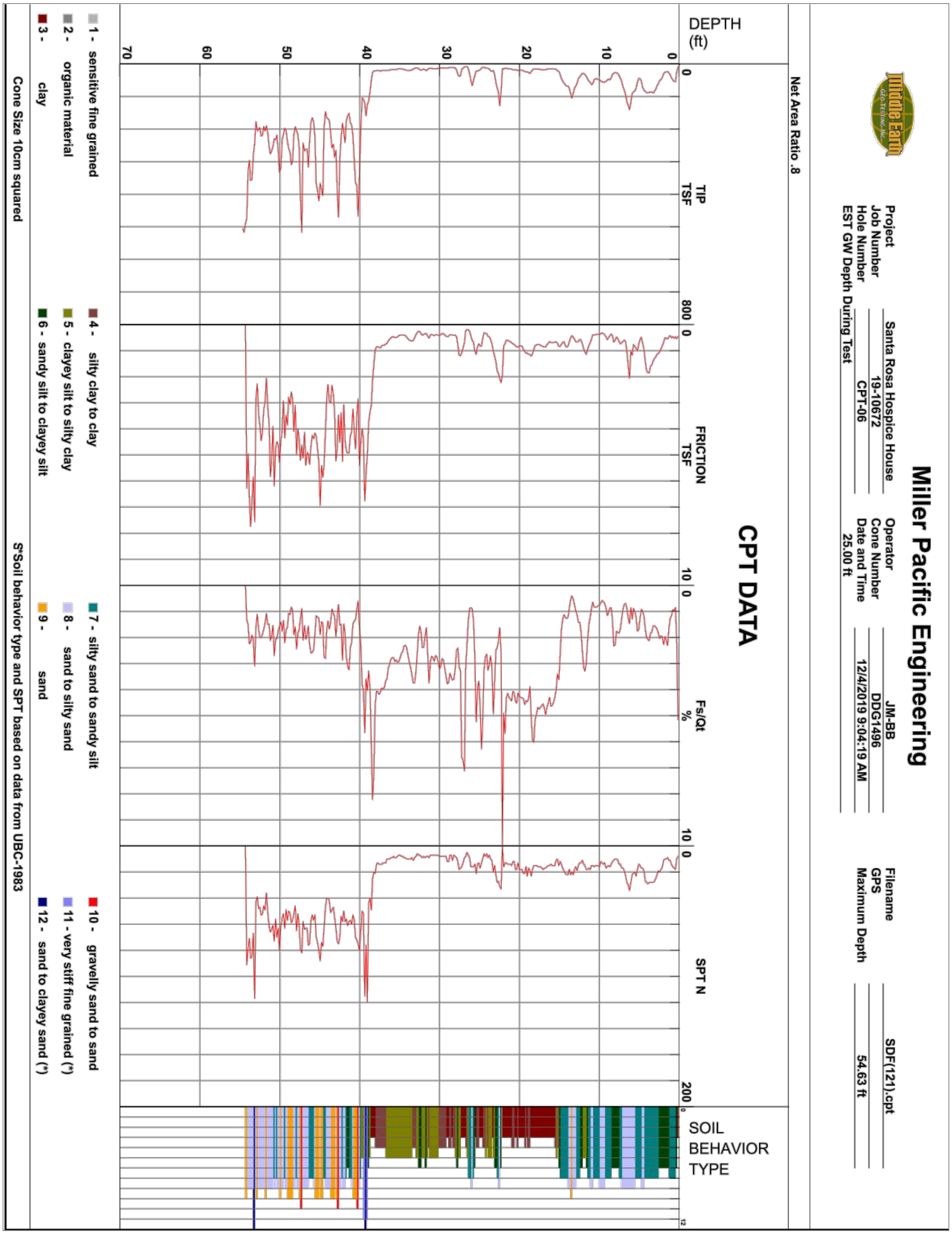
FILENAME: 2964.001 CPT LOGS.dwg



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FILENAME: 2964.001 CPT LOGS.dwg

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CPT PLOT

Santa Rosa Memorial Hospice House
520 Doyle Park Drive
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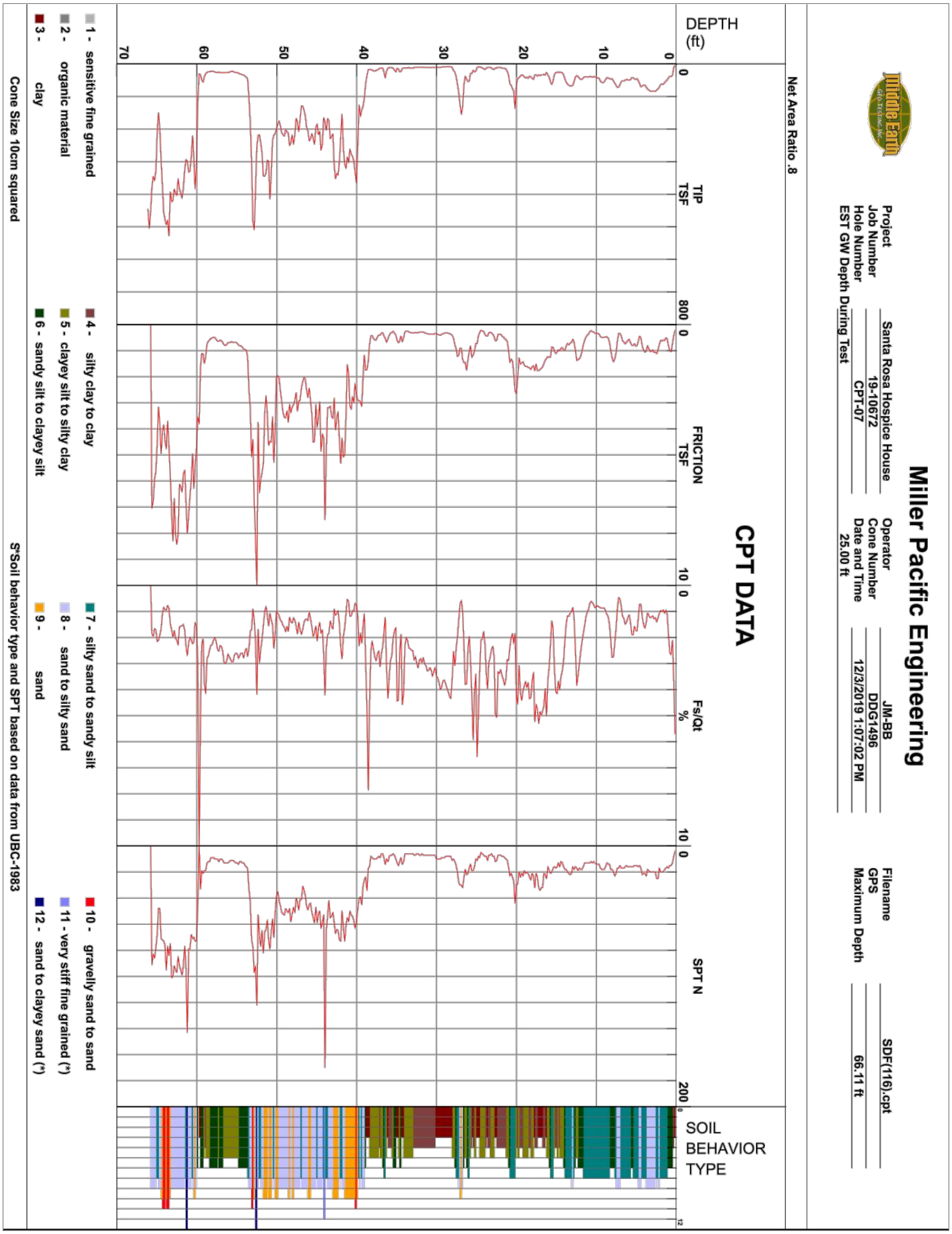
Project No. 2964.001 Date: 2/10/2020

Drawn MFJ
Checked

C-7
FIGURE



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FILENAME: 2964.001 CPT LOGS.dwg

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CPT PLOT

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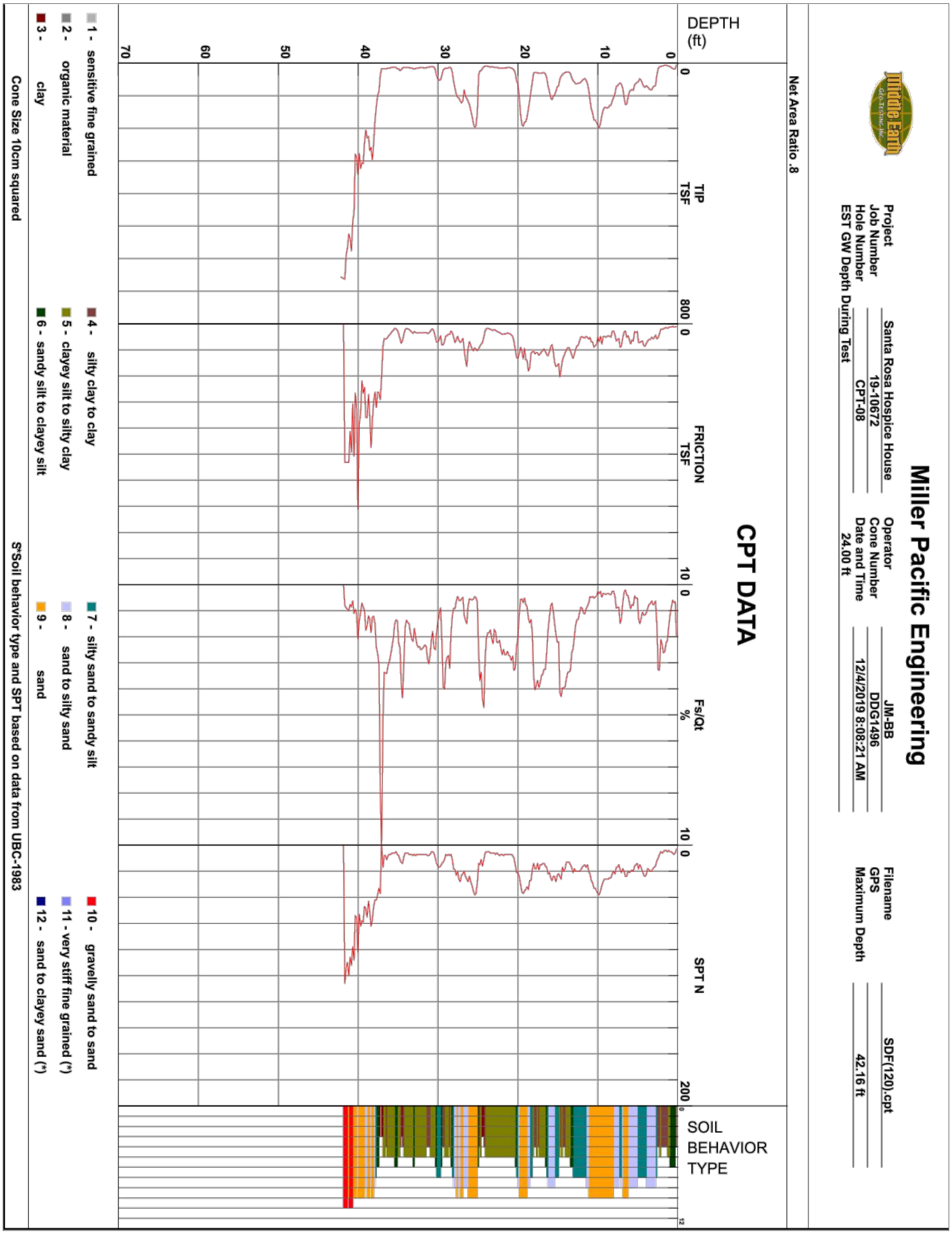
Project No. 2964.001 Date: 2/10/2020

Drawn MFJ
Checked

C-8
FIGURE



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FILENAME: 2964.001 CPT LOGS.dwg

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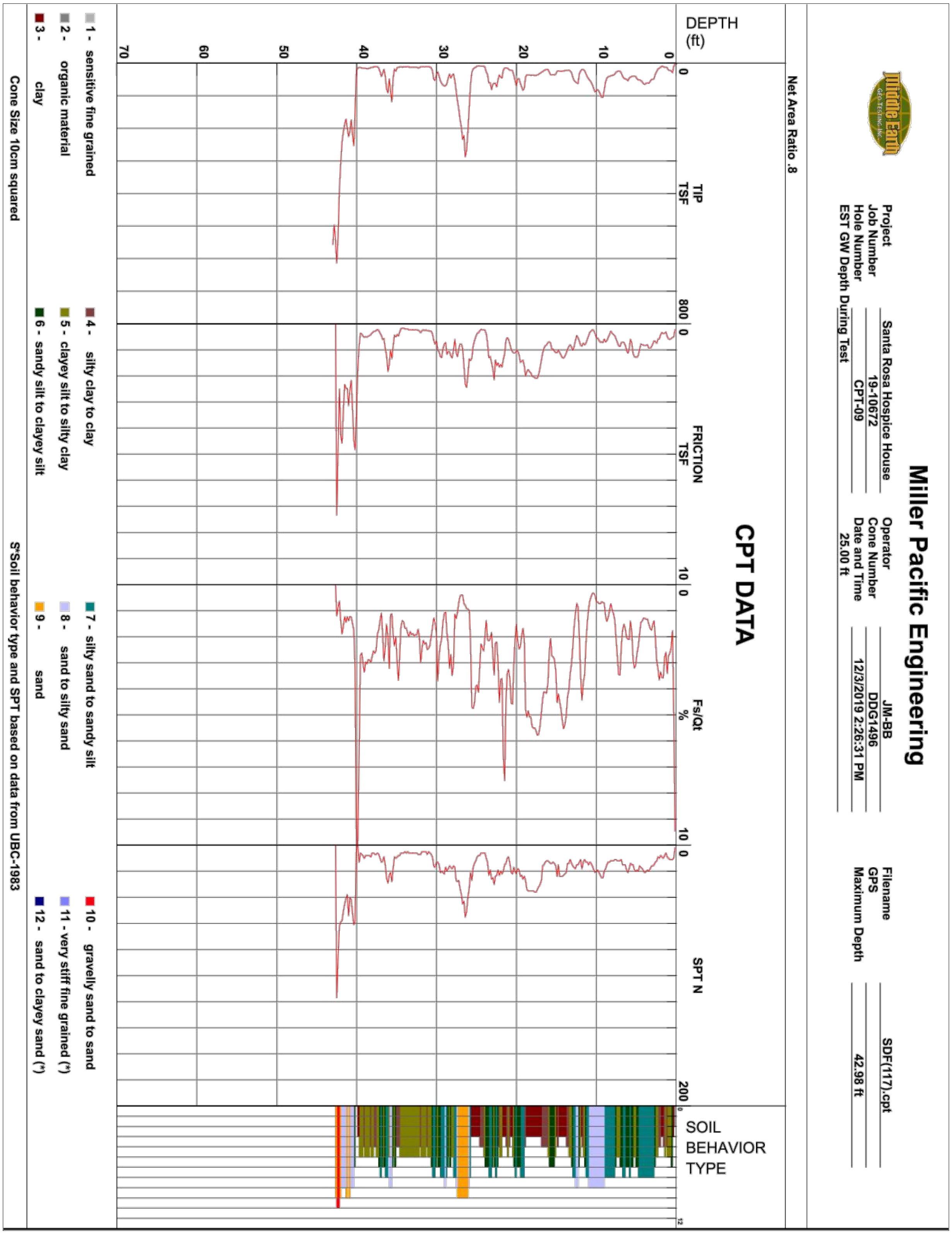
CPT PLOT

Santa Rosa Memorial Hospice House
520 Doyle Park Drive
Santa Rosa, California

Project No. 2964.001 Date: 2/10/2020

Drawn MFJ
Checked

C-9
FIGURE



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CPT PLOT

Santa Rosa Memorial Hospice House
520 Doyle Park Drive
Santa Rosa, California

Project No. 2964.001 Date: 2/10/2020

Drawn MFJ
Checked

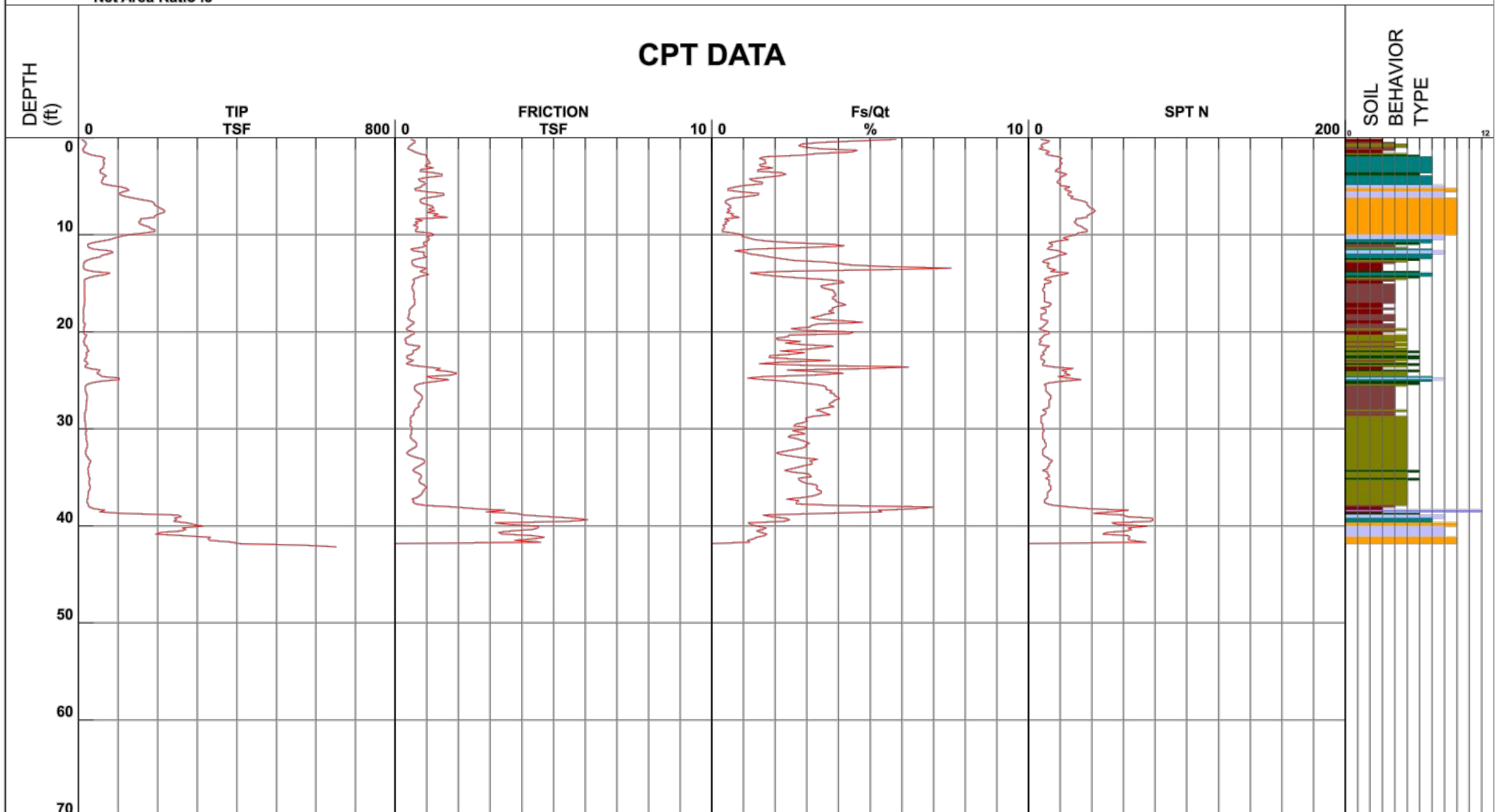
C-10
FIGURE

Miller Pacific Engineering

Project	Santa Rosa Hospice House	Operator	JM-BB	Filename	SDF(119).cpt
Job Number	19-10672	Cone Number	DDG1496	GPS	
Hole Number	CPT-10	Date and Time	12/3/2019 3:36:18 PM	Maximum Depth	42.16 ft
EST GW Depth During Test	23.00 ft				

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

S*Soil behavior type and SPT based on data from UBC-1983

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FILENAME: 2964.001 CPT LOGS.dwg

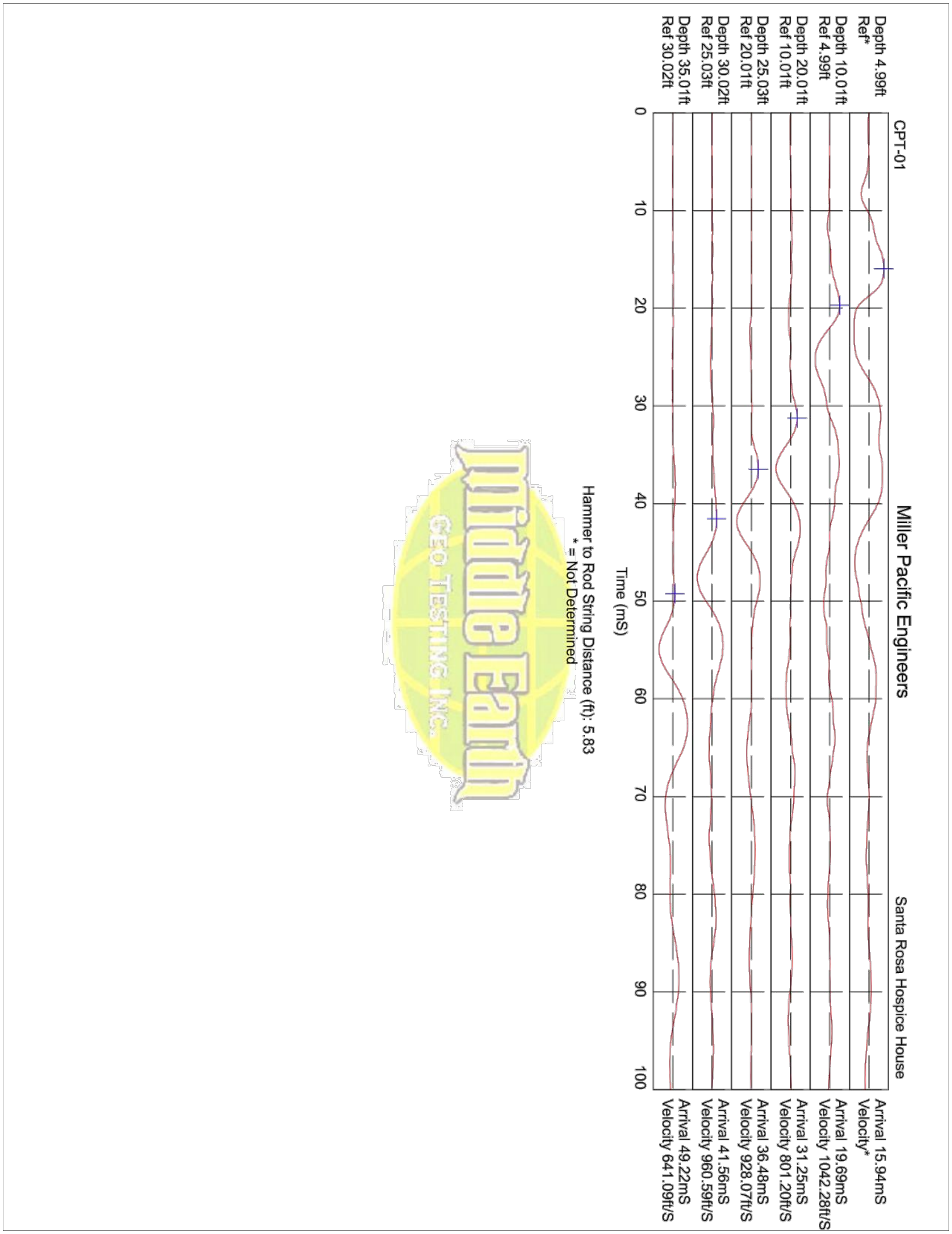
CPT PLOT

Santa Rosa Memorial Hospice House
520 Doyle Park Drive
Santa Rosa, California

Project No. 2964.001 Date: 2/10/2020

Drawn MFJ
Checked

C-11
FIGURE



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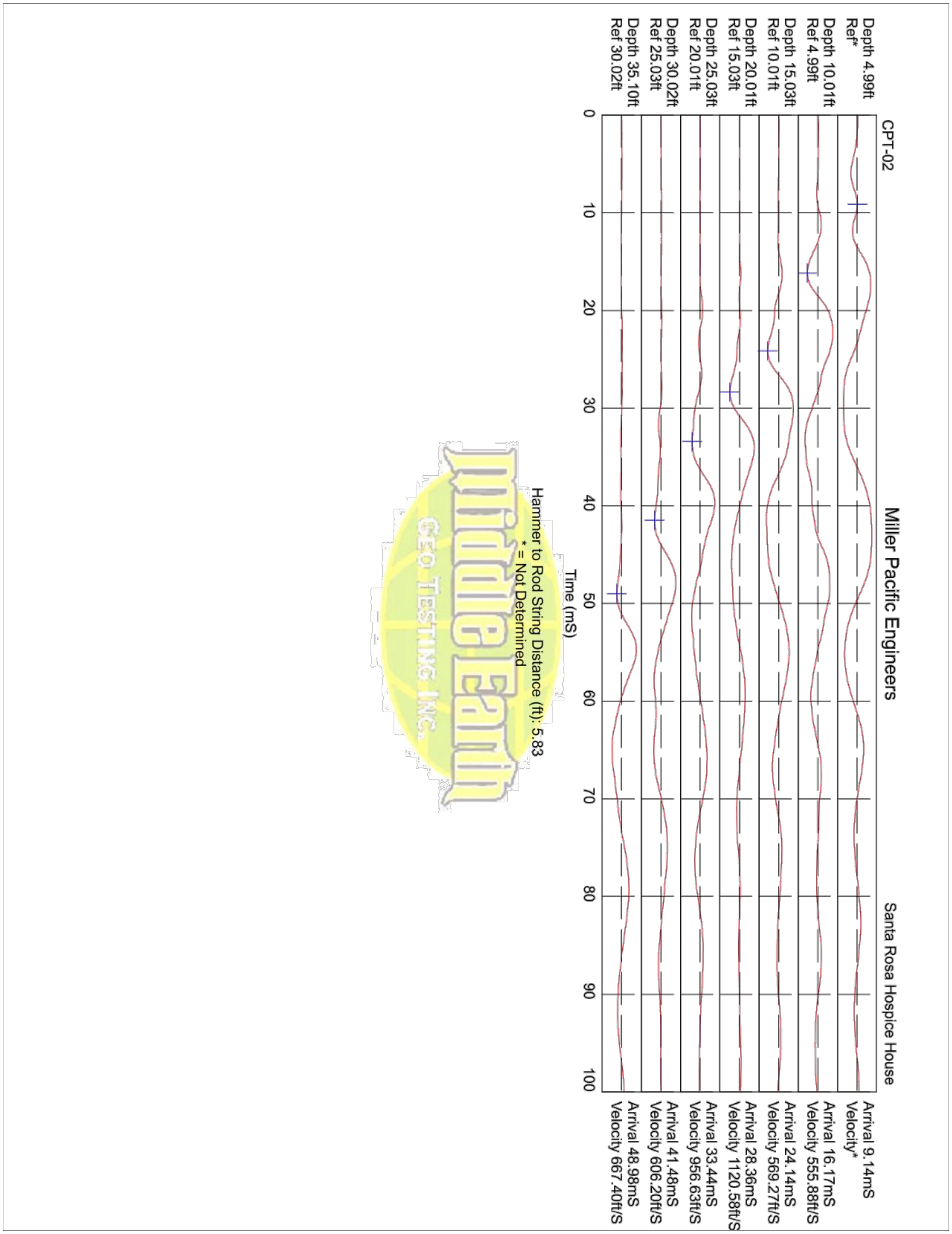
SHEAR WAVE VEOLCITY PLOT

Santa Rosa Memorial Hospice House
520 Doyle Park Drive
Santa Rosa, California

Project No. 2964.001 Date: 2/10/2020

Drawn MFJ
Checked

C-12
FIGURE



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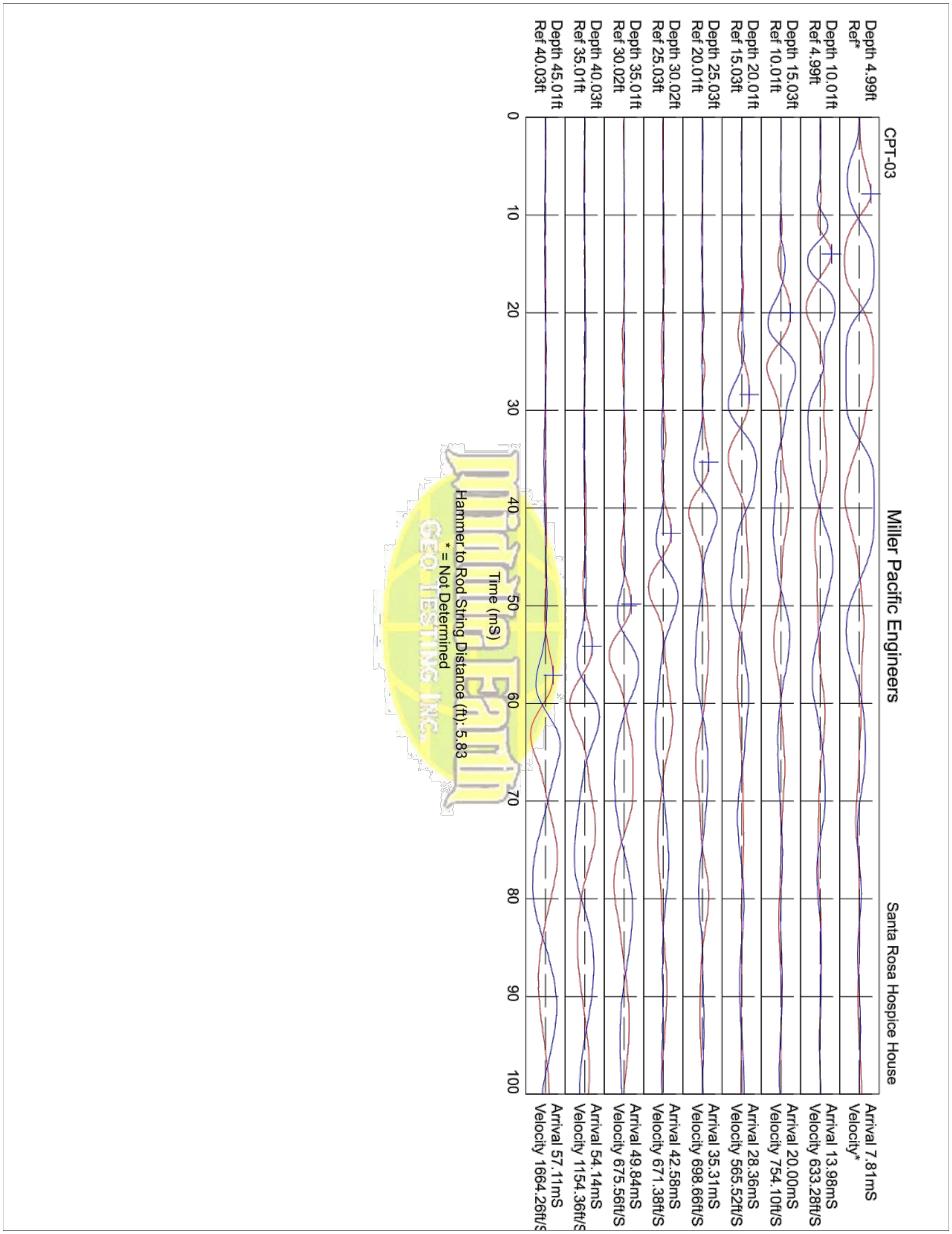
SHEAR WAVE VEOLCITY PLOT

Santa Rosa Memorial Hospice House
520 Doyle Park Drive
Santa Rosa, California

Project No. 2964.001 Date: 2/10/2020

Drawn MFJ
Checked

C-13
FIGURE



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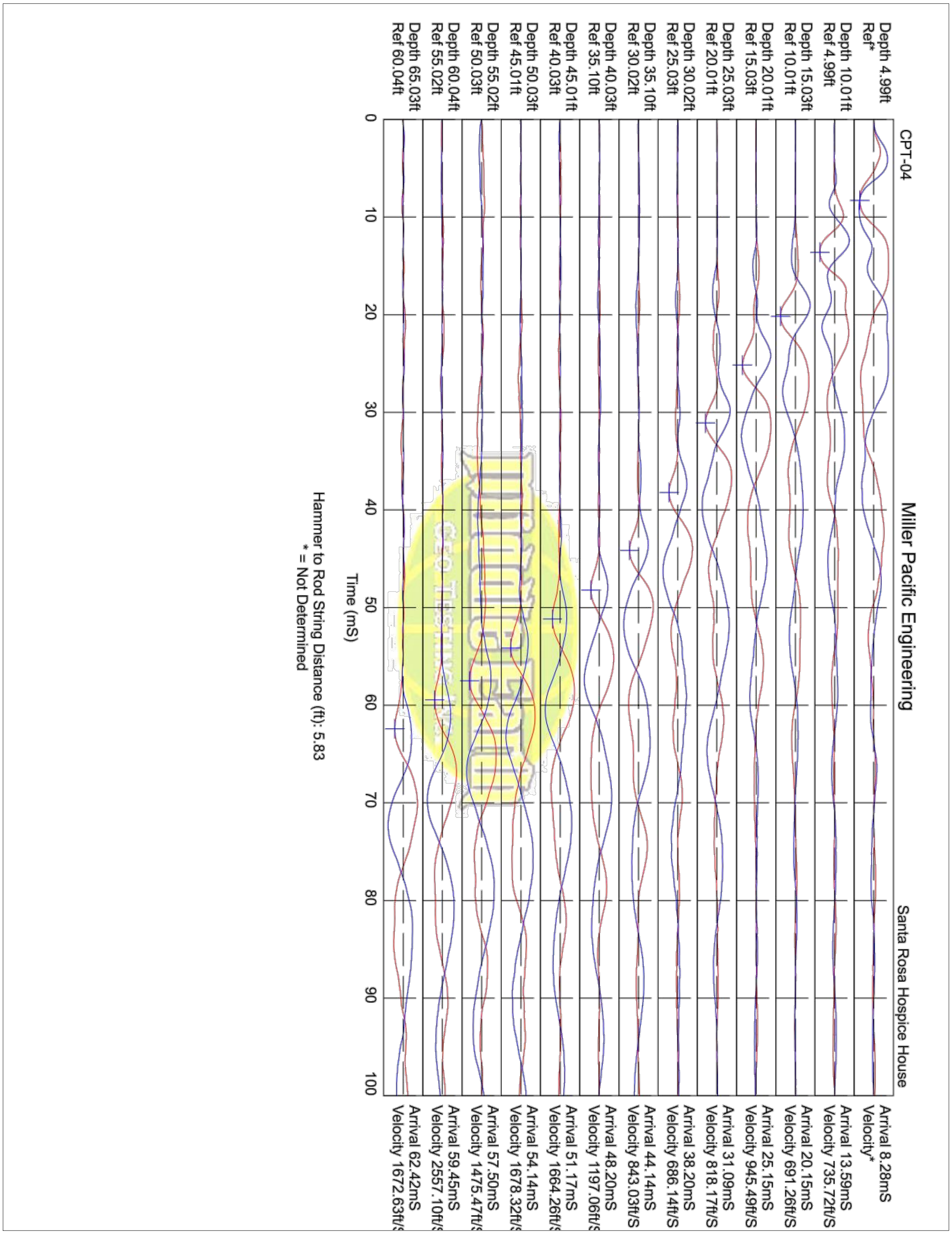
SHEAR WAVE VEOLCITY PLOT

Santa Rosa Memorial Hospice House
520 Doyle Park Drive
Santa Rosa, California

Project No. 2964.001 Date: 2/10/2020

Drawn MFJ
Checked

C-14
FIGURE



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FILENAME: 2964.001 CPT LOGS.dwg

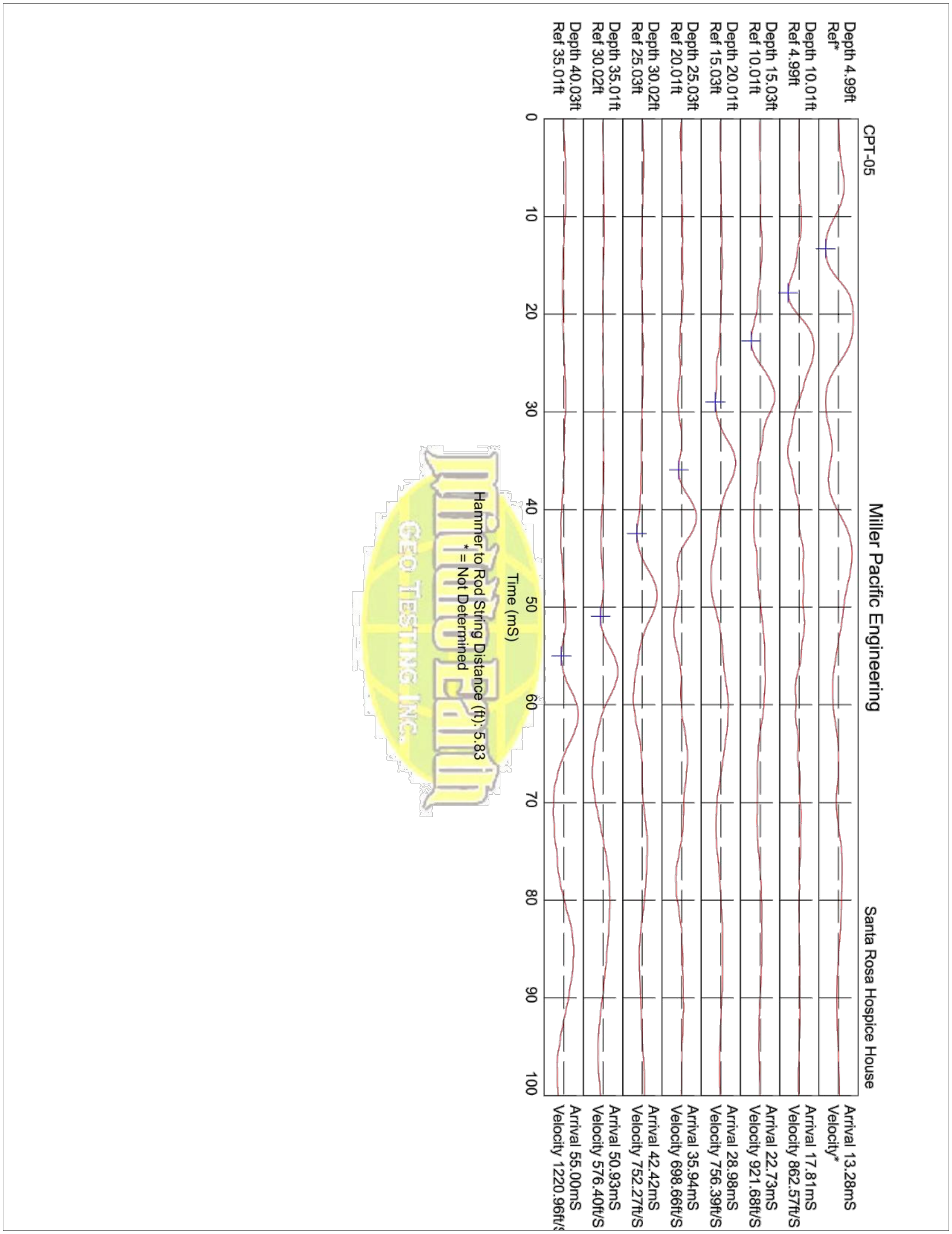
SHEAR WAVE VEOLCITY PLOT

Santa Rosa Memorial Hospice House
520 Doyle Park Drive
Santa Rosa, California

Project No. 2964.001 Date: 2/10/2020

Drawn MFJ
Checked

C-15
FIGURE



MPEG
MILLER PACIFIC ENGINEERING GROUP

FILENAME: 2964.001 CPT LOGS.dwg

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SHEAR WAVE VEOLCITY PLOT

Santa Rosa Memorial Hospice House
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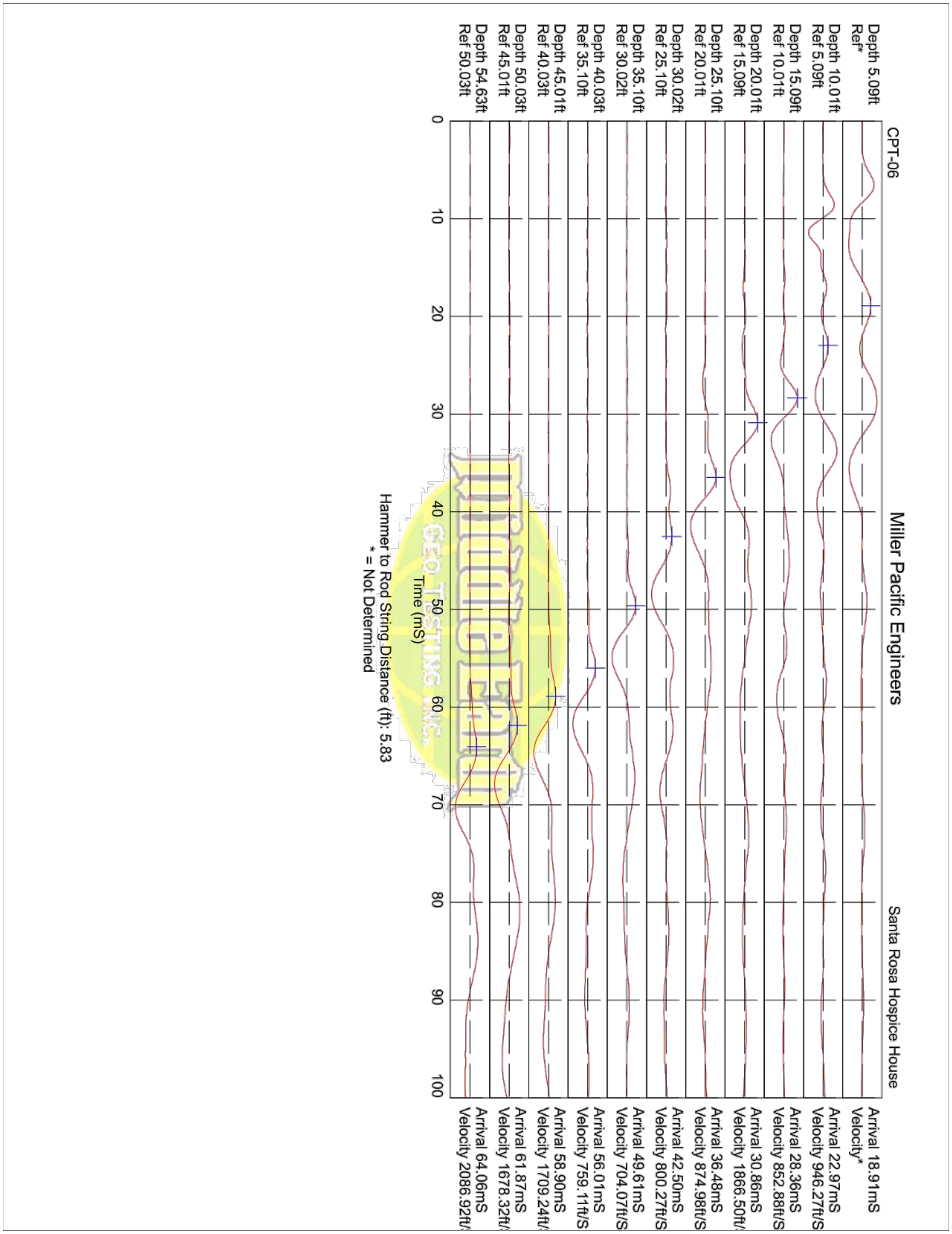
Santa Rosa, California

Project No. 2964.001 Date: 2/10/2020

Drawn MFJ
Checked

C-16
FIGURE



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SHEAR WAVE VEOLCITY PLOT

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520 Doyle Park Drive
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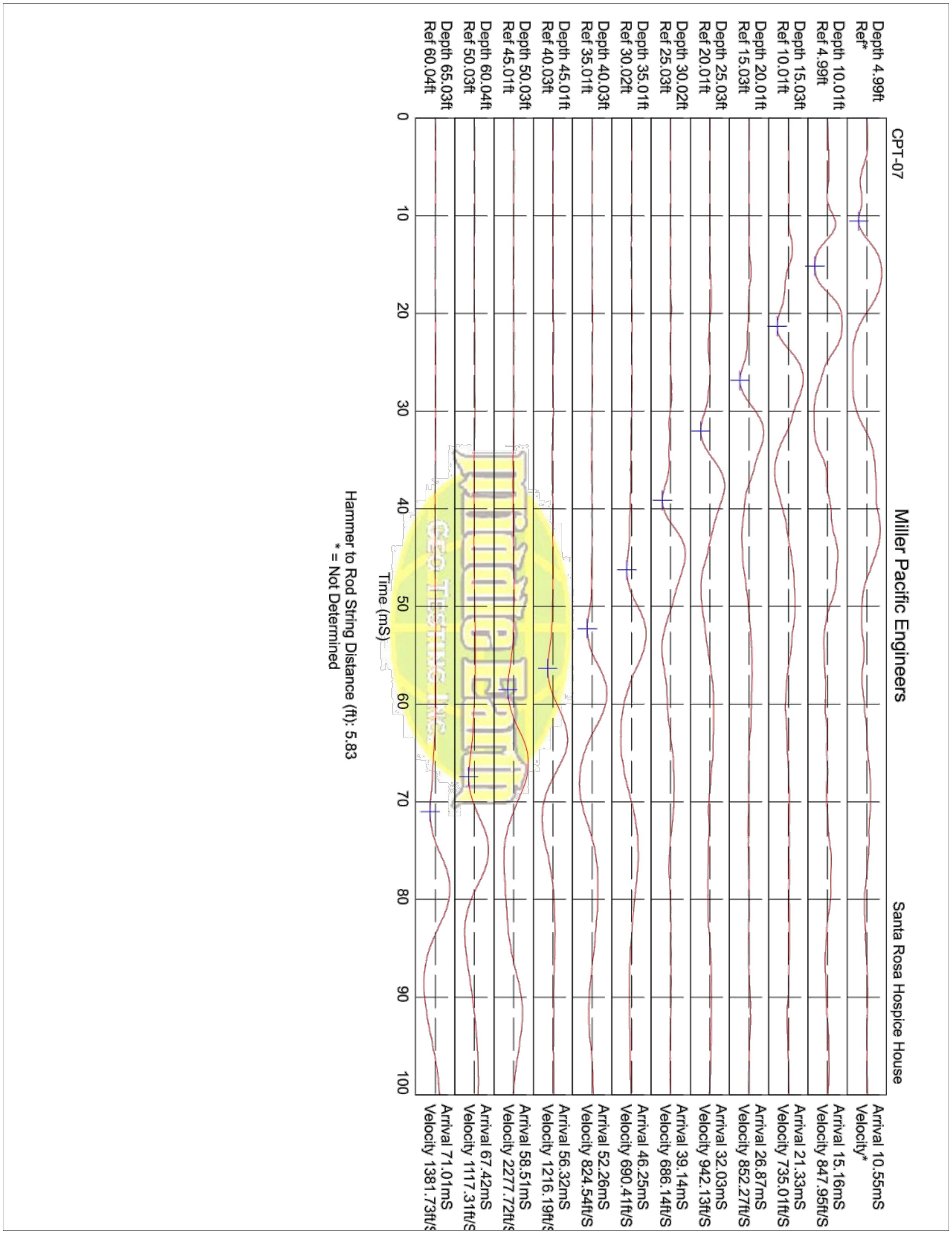
Project No. 2964.001 Date: 2/10/2020

Drawn MFJ
Checked

C-17
FIGURE



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SHEAR WAVE VEOLCITY PLOT

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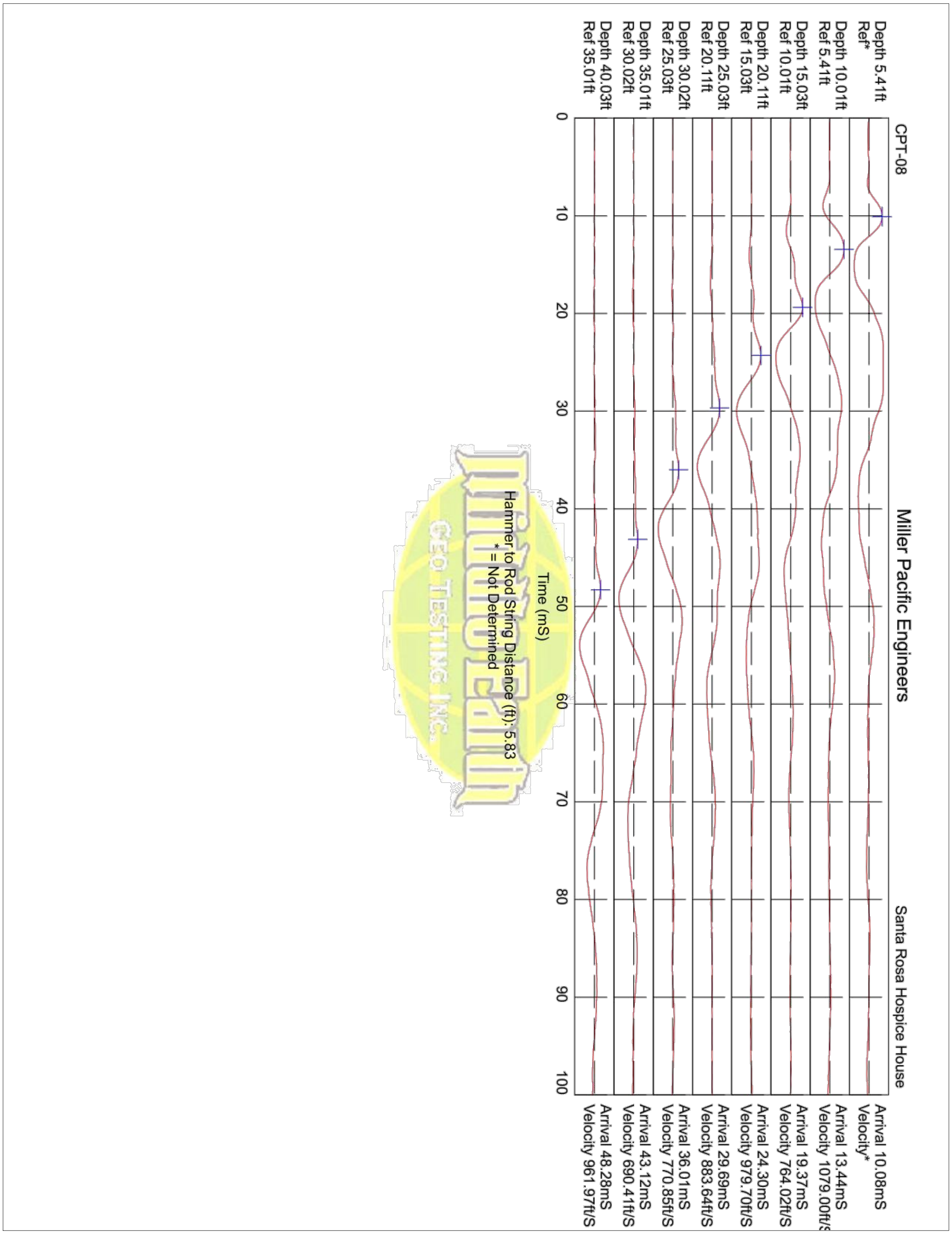
Checked

C-18
FIGURE



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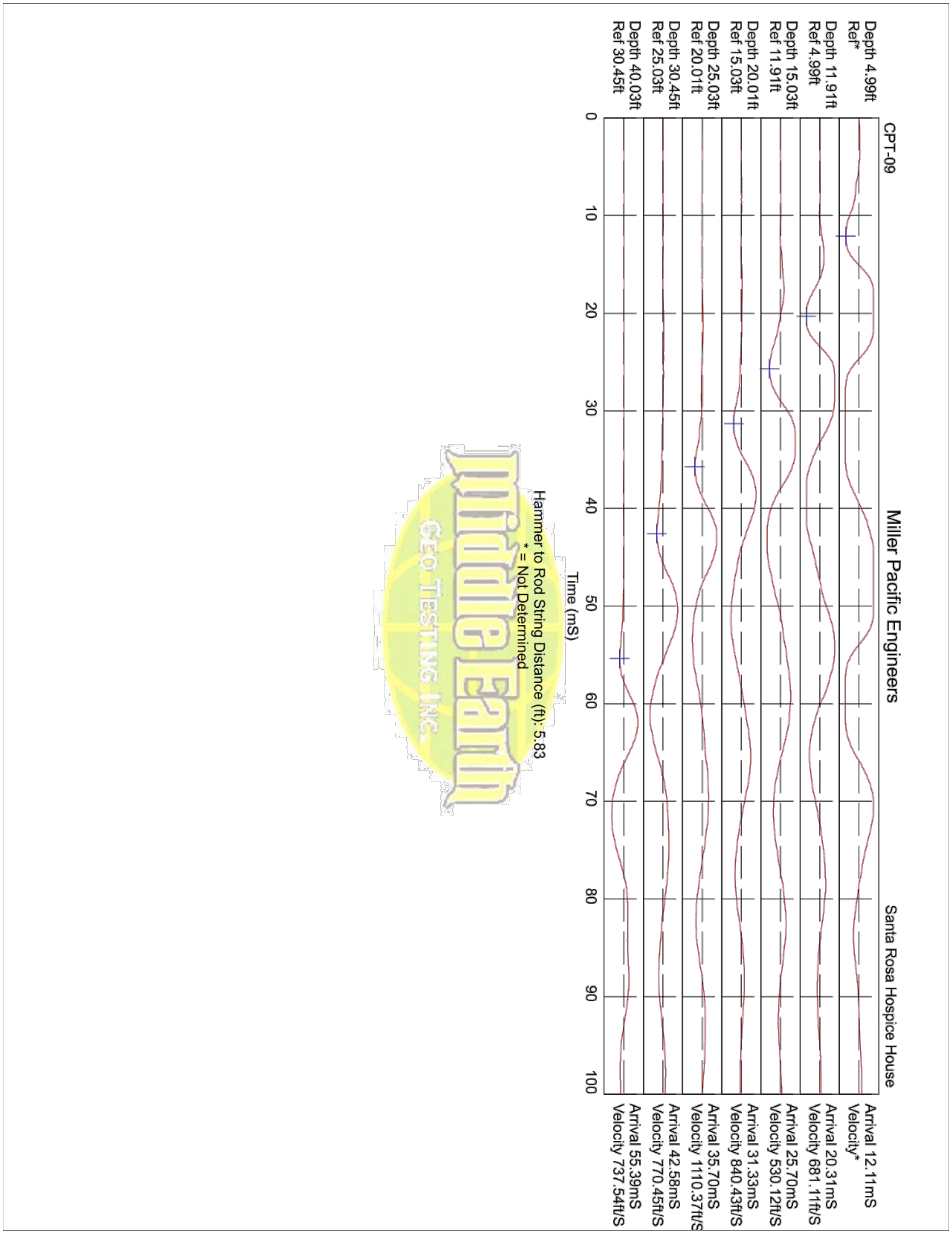

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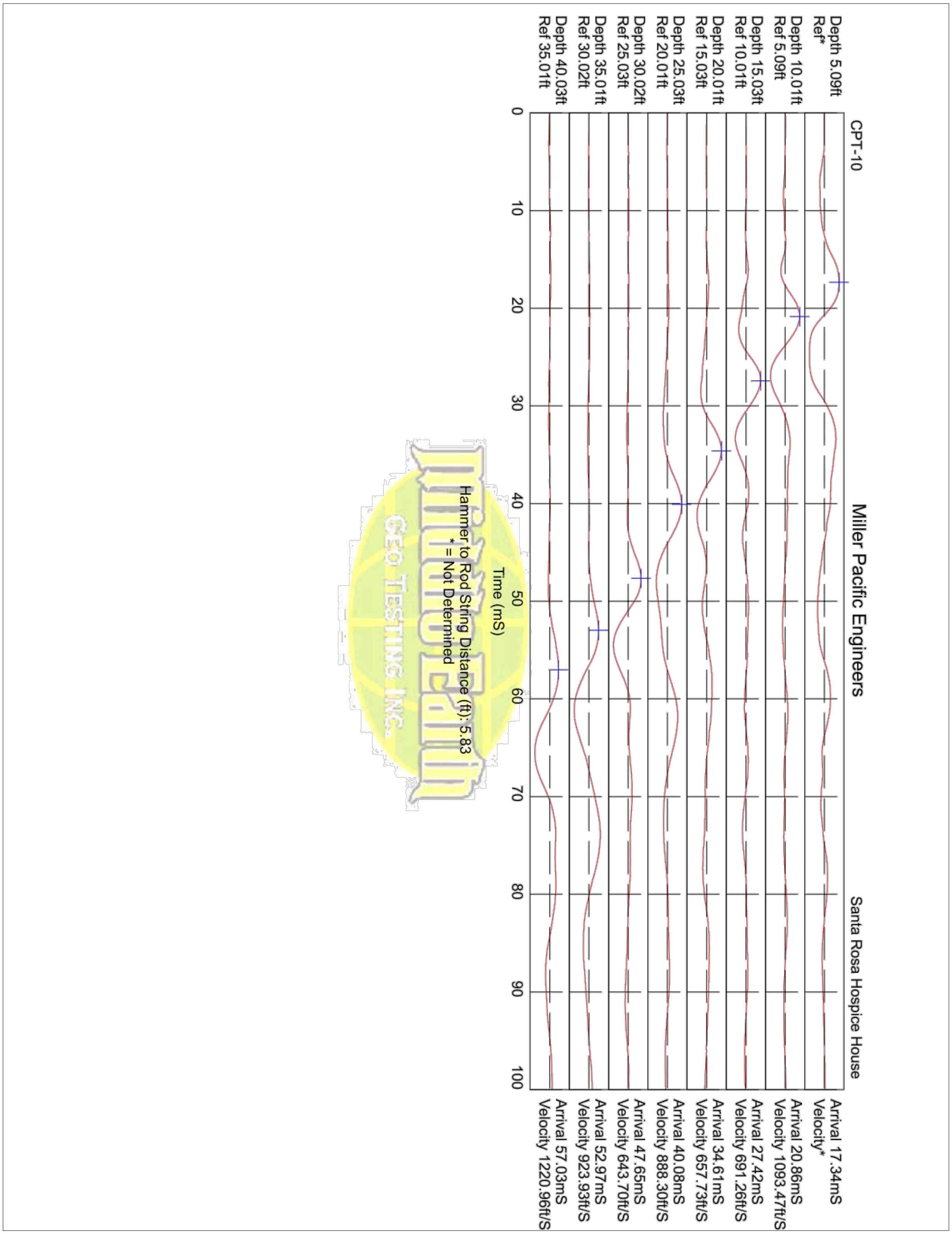
C-20
FIGURE



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C-21
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