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TECHNICAL MEMORANDUM

Date:	January 29, 2019
To:	Mr. Alex Nattkemper and Ms. Ave' Brown, Contra Costa County Public Works Department
From:	Mr. Bobby Carpenter and Mr. Michael J. Leacox, PG, C.E.G.
Subject:	Danville Blvd. Underground Storage Tank Investigation

INTRODUCTION

NCE has prepared this Technical Memorandum for Contra Costa County (County) Public Works Department to present the findings of a subsurface investigation within and in the vicinity of the roadway shoulder southwest of the intersection of Danville Blvd. and Hemme Ave. in Alamo, California (Plate 1). The purpose of this investigation was to look for the presence of an alleged underground storage tank (UST) associated with historical property uses near this location. The subsurface investigation included the review of previous reports, a geophysical investigation and two separate instances of subsurface digging (potholing) at select locations.

BACKGROUND

Southwest of the corner of Danville Blvd. and Hemme Ave. is a 20 foot wide roadway shoulder. Further southwest is the recently constructed Hemme Station Park (Park) (Plates 1 and 2). Construction of the Park was completed by the County in 2017. It has been reported that between approximately 1930 and the 1960s, a portion of the property located near the intersection was occupied by the Shady Way Inn and gasoline station (Engeo, 2017). There have been suggestions that the UST(s) associated with that gasoline station were never removed and are still present. The suggested location of the alleged USTs was within the roadway shoulder.

During construction of the Park the County commissioned an investigation to look for the presence of the UST(s) within the Park. A supplemental characterization was conducted inside the Park in 2017 by Engeo and included soil sampling, a metallic survey using a Schonstedt GA-52Cx magnetometer (magnetic sensor) and ground penetrating radar (GPR). The limits of that survey were within the current Park boundaries. Engeo concluded that the data collected did not reveal evidence of buried UST(s). The Engeo report provided a description and general map of the

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investigation, and a detailed map of the GPR survey, but did not provide a detailed map of the location or findings from the magnetometer survey.

In April 2018, a subsequent geophysical investigation was conducted by F3 and Associates using a TW-6 metal detector. The limits of that survey were the area outside the current Park fence, within the roadway shoulder adjacent to the intersection of Danville Blvd. and Hemme Ave. (Plate 1). F3 and Associates concluded that the data suggested the presence of a 10 foot by 10 foot metallic anomaly in the immediate vicinity of the tree (Tree) just outside of the Park fence in the roadway shoulder (Plate 1) (F3, 2018). The F3 and Associates findings resulted in the County requesting NCE to conduct an investigation to further evaluate, and establish the presence, or lack thereof, of the alleged UST(s). Similar to the Engeo report, the F3 report provided verbal descriptions of the findings but did not provide a detailed map of the location or findings from the TW-6 metal detector survey.

FIELD EFFORT

In support of the County's request, NCE performed a geophysical investigation and a "pothole" investigation. The geophysical investigation was conducted on November 16, 2018 under County Encroachment Permit # 36435. The investigation was a one-day effort that included the use of two variances of electromagnetics (EM), a GPR survey and a pipe and cable locating system to scan for underground utilities. GPS referenced data were collected during both the EM and GPR surveys. The limits of this investigation were established in concert with County personnel on-site at the time of the investigation and are shown in Attachment 1.

Based on the findings of the geophysical investigation, on November 28, and January 4, 2019, potholes were excavated to depths of 5 feet below ground surfaces (bgs) at areas identified by the geophysical survey. This work was conducted under County Encroachment Permit #s 36584 and 36716. At the conclusion of the potholing, each pothole was backfilled with excavated soils to the ground surface.

FINDINGS

Geophysics

During the geophysical investigation, the GPR signal was estimated to have penetrated only approximately 3 feet due to soil conditions and did not return a subsurface profile indicative of a UST. Using one of two GPS enabled EM terrain conductivity meters, two geophysical anomalies were identified, one on the southeast side of the Tree and one on the northwest side. While not conclusive, the anomaly northwest of the Tree was suspected of being associated with EM interference of the nearby Park fence or other surface metal interference (EM31 Metal Anomaly Area, Plate 1). The anomaly southeast of the Tree was positively identified as a buried metallic object (EM31 Metal Anomaly Area, Plate 1). During the field work the presence of a concrete pad was verified at several locations by digging down approximately 1 foot. Initially, the full extent of this concrete pad could not be established because of the presence of landscape boulders grouped around the Tree

Potholing Round 1 (November 28, 2018)

The findings of the geophysical investigation led to further investigations using the potholing equipment. Prior to the field efforts, the County removed the landscape boulders from around the Tree to allow access for potholing. To assess the extent of the concrete pad discovered during the geophysical investigation, the surface soils in the area were removed. During this removal action, a type of fill port was found countersunk within the concrete pad. Affixed to the fill port was a metallic label with the wording "Standard's Supreme Gasoline" (with ethyl). An attempt was made to remove the fill port cap and was unsuccessful.

A total of five potholes were excavated (Ex. 1 through Ex. 5, Plate 2). During the excavation of Ex. 1 through Ex. 4, a UST associated with the fill port was positively identified. The margins of the UST appeared to be identified on three of four sides by the potholing excavations. The southwest limit of the UST was not established but at a minimum appeared to extend to the Park fence. The Park fence prohibited access by the potholing equipment. Based on the findings of the initial pothole investigation the UST appears to be a 4 foot diameter steel tank with a minimum length of 7.5 to 8 feet. A fifth pothole (Ex. 5) was excavated to the southeast of the UST within the M-Scope Buried Metal Area (Plate 2) to assess a potential second UST and the results were negative.

During the excavations of these potholes, there was no visual or olfactory evidence of petroleum hydrocarbons within the soils.

On December 13, 2018 a meeting was held with the County to discuss the findings of the first round of potholing. The outcome of the meeting was that the County elected to proceed with an additional day of potholing with the objective to assess the geophysical anomaly northwest of the Tree, and to establish the southwestern limits of the identified UST, attempt to remove the fill port cap, and check its contents.

Potholing Round 2 (January 4, 2019)

To assist with the second round of potholing, the County removed two sections of the Park fencing. The irrigation system within the Park was shut off. Traffic control was used during the excavations associated with the anomaly northwest of the Tree. A traffic control plan was submitted to the County and approved on January 3, 2018.

Because the Park fence was removed, NCE first placed a temporary safety fence inside the Park at a 25 foot radius from any excavations (Plate 2). With traffic control in place an additional nine potholes were excavated along the Hemme Ave. roadway shoulder (Ex. 6 through Ex. 13, and Ex. 15, Plate 2), plus one pothole excavated within the Park (Ex. 14, Plate 2). Ex. 6 through Ex. 8 were located down the central axis of the EM31 Metal Anomaly Area. No evidence of a UST or other metallic objects were found in these excavations. In Ex. 9 a metallic object was encountered at a depth of 3.5 feet, a depth similar to the known UST discovered during the previous potholing event. The object was rusted metal and filled the entirety of the base of the excavation, when struck with a rock bar the metallic object had a hollow sound. The object was not encountered in the five subsequent potholes excavated around the Tree.

One pothole (Ex. 14) was excavated to a depth of 5 feet inside the Park fencing to assess the length of the known UST. Ex. 14 was expanded 2 feet further southwest into the Park to assess a potential UST oriented end to end with the known UST. No metallic object was encountered within the expanded excavation. After excavations were completed and backfilled, NCE worked with County personnel to temporarily replace the Park fence with stainless steel straps.

The findings of the second potholing effort suggest the possible presence of a second metallic object in the vicinity of the original UST and located directly under the Tree. The size and extent of this potential second metallic object, possibly a UST, were not established. The extent of the identified UST southeast of the Tree was established and appears to be approximately 8 feet to 10 feet in length and appears to extend no more than 2 feet into the Park. An additional UST located in the EM31 Metal Anomaly Area northwest of the Tree was not encountered.

During the excavations of these potholes, there was no visual or olfactory evidence of petroleum hydrocarbons within the soils.

The fill port cap was not able to be removed; accordingly, the presence of any contents is not known.

RECOMMENDATIONS

State regulations allow for the abandonment of USTs in-place, or removal of the USTs. In either scenario the work must be conducted under permit from the Contra Costa County Environmental Health Department. In addition, while no contaminated soil appeared to be present during the drilling of the excavations, the potential presence of contamination in the soil must be assessed in accordance with State guidance, and if present, addressed in accordance with the State of California Low-Threat Closure Policy.

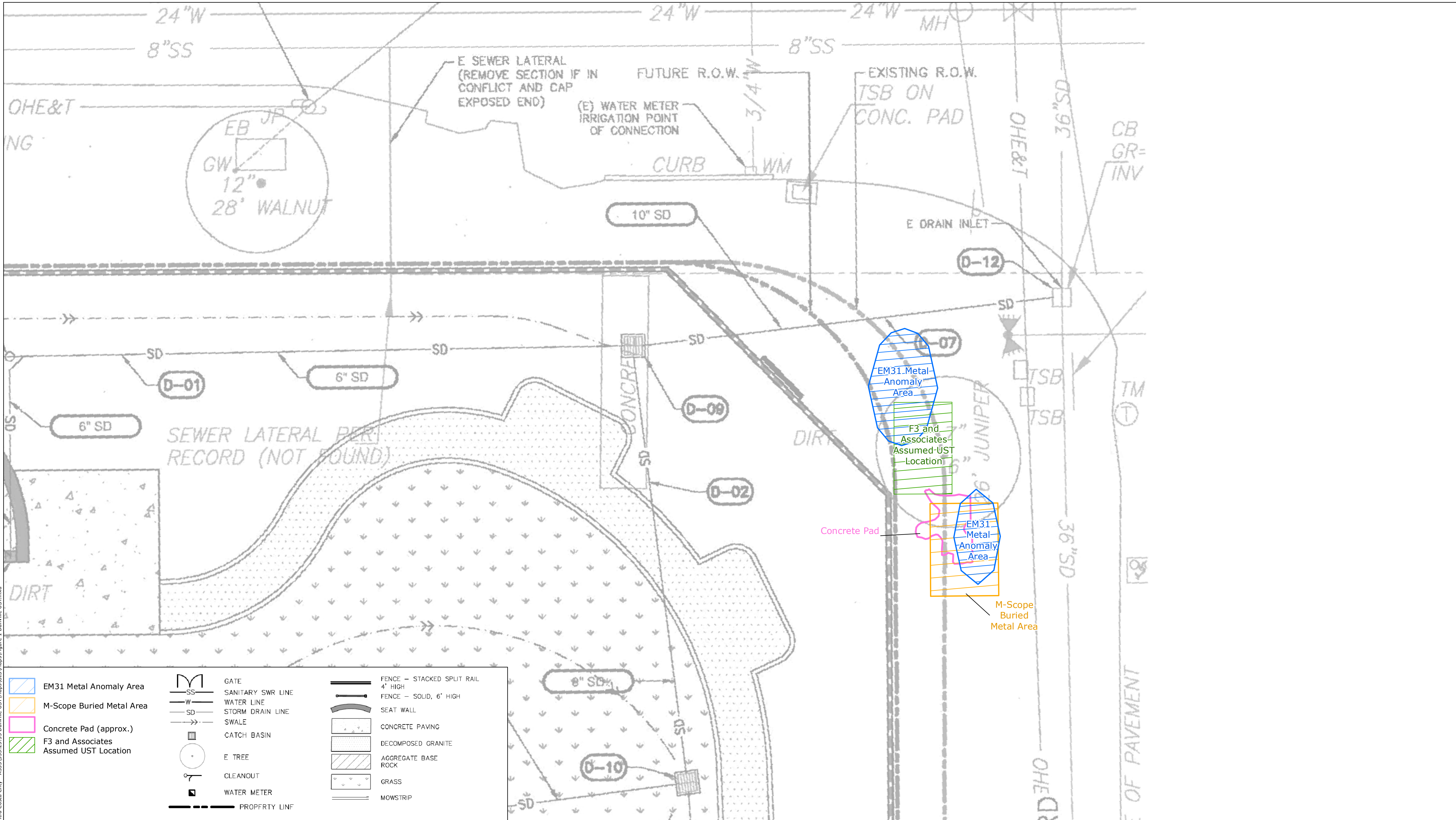
In the interim between now and UST closure, because there were no obvious signs of impacted soil, and there are no enclosed structures within the Park that are in the immediate vicinity of the UST(s), there does not appear to be an unacceptable risk to users of the Park.

REFERENCES

Engeo, 2017. Supplemental Characterization Report, Hemme Station Park Alamo, California. May 1, 2017.

F3 & Associates Inc., 2018. Abandoned Fuel Tank Investigation. Hemme Station Park 1193 Danville Blvd. Alamo, CA. April 26, 2018.

PLATES



NCE

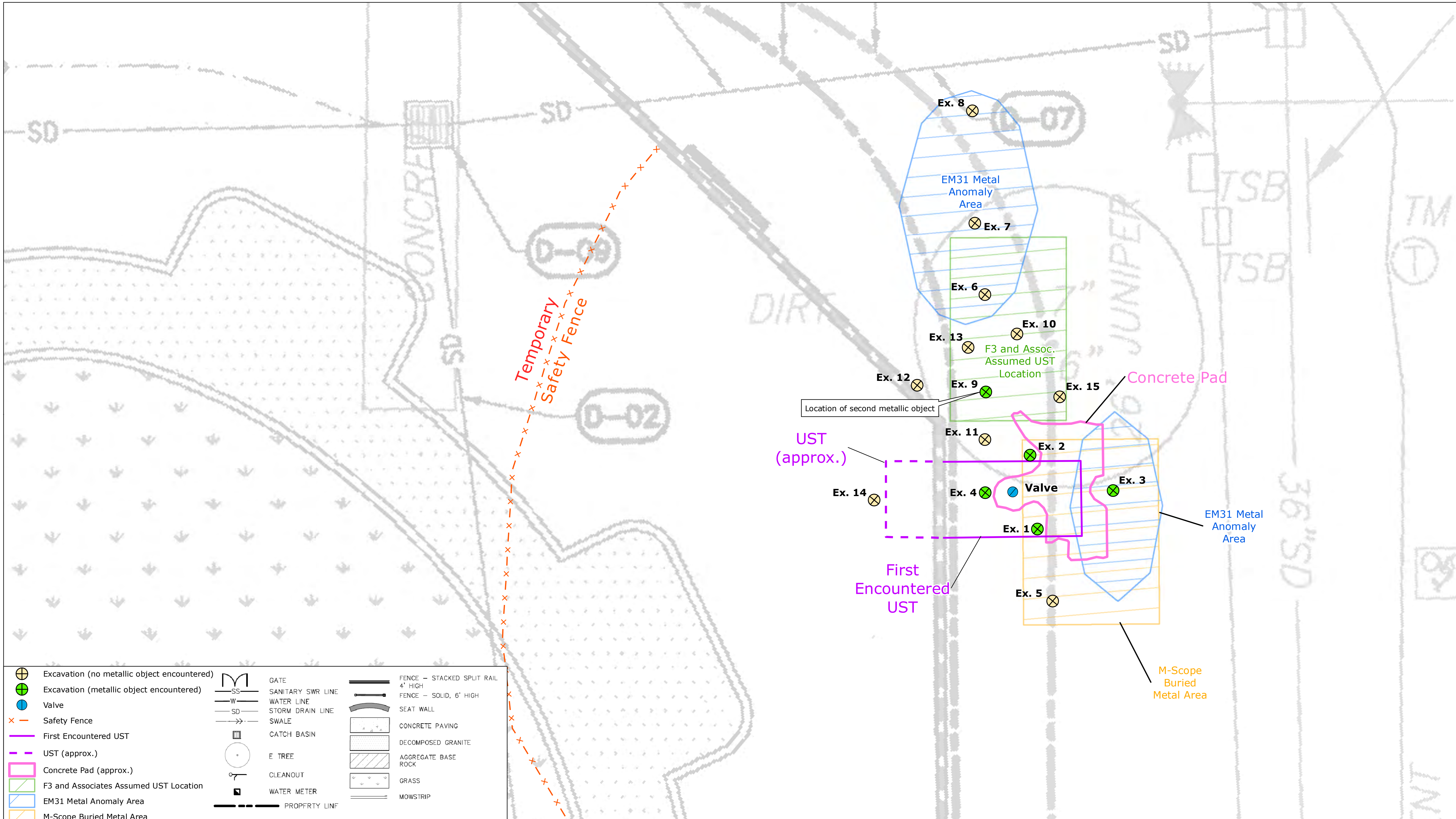
Geophysical Results

Contra Costa County, CA

PLATE 1

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Contra Costa County, Advanced Geological Services, NCE	636.21.25	kando	12/7/2018	1/14/2018	

Document Path: P:\Active Projects\Contra Costa Cnty - A533\533.25.55 Danville UST\Maps\GIS\Maps\Figure 1 Danville UST.mxd



NCE

Potholing Results

Contra Costa County, CA

1 in. = 5 ft.

0 2.5 5 ft.

PLATE 2

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Contra Costa County, Advanced Geological Services, NCE	636.21.25	kando	12/7/2018	1/14/2018	

ATTACHMENT 1

GEOPHYSICAL REPORT

ADVANCED GEOLOGICAL SERVICES

1605 School Street, #4
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December 4, 2018

Mr. Bobby Carpenter
NCE
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Subject: **Geophysical Investigation Results**
Underground Storage Tank (UST) Investigation
1193 Danville Boulevard
Alamo, California

Mr. Carpenter-

1.0 INTRODUCTION

This letter presents the findings of Advanced Geological Services, Inc. (AGS) geophysical investigation to look for a suspected underground storage tank (UST) at the corner of Danville Boulevard and Hemme Avenue in Alamo, California (Figure 1).

Figure 1 – Site Location in Alamo, California

The field work was performed on November 16, 2018 by AGS geophysicist Roark Smith, who used a Geonics EM31 electromagnetic (EM) terrain conductivity meter with digital recording capabilities and ground penetrating radar (GPR). In addition, AGS used a RadioDetection RD-8000 pipe-and-cable locating system to scan for underground utilities. Oversight and guidance in the field were provided by Mr. Bobby Carpenter of NCE, and a number of Contra Costa County personnel were on hand to observe the field work.

Briefly, the EM31 was used to look for areas of buried metal representing possible UST locations, and GPR was used to obtain graphical profiles of the subsurface to obtain help identify buried metal objects detected by the EM31 survey. USTs, in particular, can produce a distinctive image that is readily identified on GPR profiles. EM surveying can be an important part of a UST investigation because it usually provides a deeper investigation depth than GPR, which can be as shallow as two feet at some sites. Depending on their size, EM surveying can detect objects as deep as 10 feet. The RD-8000 was used to look for underground utilities so that the associated EM and/or GPR responses would not be mistaken for indications of a UST.

2.0 RESULTS SUMMARY

- No USTs were definitively detected; however, a buried metal anomaly was observed at the reported UST location. A second EM anomaly was observed north of the first anomaly, however this anomaly may have been caused when the EM31 sensor brushed against a metal fence.

- Numerous buried utilities were detected, including electrical and telephone cables, natural gas and water pipes, and a storm drain.

- No UST images were observed on the GPR records. GPR achieved an investigation depth of approximately three feet below ground surface (bgs).

3.0 SITE DESCRIPTION

The UST investigation was performed within an approximately 25-foot wide, 80- by 90-foot "L-" shaped area at the southwest corner of Hemme Avenue and Danville Boulevard in the town of Alamo, California (Figure 2). At the time of the investigation, the site was bracketed by metal gridwall fencing to the south and west and by Hemme Avenue and Danville Boulevard to the north and east, respectively. The ground surface was unpaved and contained large landscape boulders, which were grouped around a single large tree near the reported UST location near the site "elbow". Also in this area, AGS uncovered some shallowly-buried concrete pavement where the reported UST is thought to be located. It is worth noting that the suspected UST search area was tightly constrained by the tree, the nearby fence and by the large landscape boulders. Finally, AGS observed a number of utility appurtenances, such and pull boxes, valves, vault lids and light standards, which indicate that several underground utilities run through the investigation area.

4.0 GEOPHYSICAL METHODS AND EQUIPMENT

The geophysical investigation was performed using the following geophysical methods:

- Frequency-domain Electromagnetics (EM), using a Geonics EM31 terrain conductivity meter/ metal detector.

- Ground Penetrating Radar (GPR) using a GSSI SIR-3000 connected to a 400-MHz antenna.

- Utility Locating using a RadioDetection RD-8000 Pipe-and-Cable locating system.

In addition, AGS used a Trimble Pro-XR Global Positioning System (GPS) to map the site and also to obtain positioning data for the EM31 survey.

Frequency-Domain Electromagnetics (EM) using a Geonics EM31
The EM31 measures the electrical conductivity of subsurface materials; it is used for shallow geologic and groundwater investigations and to look for areas of buried refuse. It can also detect larger metal items, such as USTs, and metallic underground utilities. The instrument measures conductivity by

inducing small electrical currents to flow in the subsurface in such a manner that the strength of the induced current is proportional to electrical conductivity. The EM31 consists of a transmitter and receiver coils on a fixed PVC boom. Briefly, alternating electrical current flowing within the transmitter coil produces a magnetic field that penetrates into the subsurface, causing (inducing) small electrical currents to flow in the subsurface. These subsurface currents have their own magnetic fields, which are detected and measured by the receiver coils. The induced current strength is proportional to conductivity, which allows the EM31 to be calibrated to measure conductivity directly. For subsurface investigations, variations in the quadrature-phase ("terrain conductivity") component of the EM31 response can indicate changes in the material properties of soil, rock, and fill material, the presence of buried refuse, and buried utilities and other types of metallic substructures. When looking for USTs in particular the "in-phase" component of the EM signal can be more useful because it is more sensitive to metal objects and can detect them at greater depths.

Ground Penetrating Radar (GPR) using a GSSI SIR-3000
GPR uses radar technology to produce a graphical profile of the subsurface that shows soil layering and images of buried objects. GPR systems typically use a single transceiving antenna (both transmits and receives) that is dragged along the ground surface. The antenna emits a radar pulse into the ground; some of the radar energy reflects off of interfaces between materials with different electrical properties (e.g., soil and metal) and returns to the surface where it is detected by the antenna and sent via a cable to a separate control unit where it is amplified and displayed on a computer screen as a "wiggle trace," which is a vertical plot of changes in reflection amplitudes over time (although the vertical scale of a GPR profile is usually considered as depth, it actually measures the travel-time of the radar pulse from the surface to a reflecting interface and back to the surface). A subsurface profile is built as the antenna is pulled along the survey line and successive wiggle traces are recorded. GPR data are usually displayed as an array of closely-spaced traces, a technique that produces an image of the subsurface as the reflections (wiggles) on adjacent traces merge into coherent patterns.

Soil layer boundaries appear as laterally continuous horizontal bands across a GPR profile. Depending on their composition, buried objects appear as localized, high-amplitude (darker) reflection patterns, with the reflection amplitude ("darkness") being a function of burial depth and the degree of contrast between the object and the surrounding soil. Metallic objects usually produce strong reflections, while concrete can produce weak reflections because its electrical properties are so similar to those of sandy soil. Buried pipes and USTs often exhibit a characteristic "upside down U" hyperbolic pattern, which allows them to be readily identified on a GPR record. Buried refuse often appears as zones of chaotic reflection patters that disrupt the horizontal layering on a GPR profile. However, GPR is subject to investigation depth limitations; in electrically conductive soil (e.g., moist, fine-grained soil), the GPR signal may only penetrate 2 feet. Additionally, sites with heterogeneous fill material often produce "cluttered" GPR records that can mask utility images. And finally, a subsurface target requires a certain minimum diameter to be imaged by GPR; a good rule-of-thumb is that a target requires a least 1 inch of diameter for each foot of burial to be imaged with GPR. In other words, a 2-inch pipe buried 4 feet deep probably will not be imaged.

Utility Locating using the RD-8000 Pipe and Cable Locating System
The RD-8000 system comprises separate transmitter and receiver units. Used alone in "passive mode", the receiver can locate energized electrical power cables by detecting the magnetic field associated with flowing electrical current. Used in conjunction with the transmitter, the RD-8000 receiver can be used to locate metal pipes and unenergized cables by detecting the magnetic field associated with a tracing signal (a weak electrical current) that is applied with the transmitter to the target pipe or cable. The tracing signals can be applied in a variety of ways. By far, the most effective way to apply a tracing signal is to directly connect the transmitter (via a jumper wire) to an exposed portion of a metallic utility or the associated tracer wire of a non-metallic pipe, if one was installed (a metal ground stake is used to complete the circuit). For insulated cables and cables inside conduit, a tracing signal can be applied using an inductive clamp, which wraps around the target utility. In addition, the RD-8000 transmitter can simply be placed on the ground surface and set to broadcast a tracing signal over a wide area; this approach enables a tracing signal to indirectly couple to nearby utilities via electromagnetic induction. Finally, the RD-8000 receiver can be used alone in "passive mode" to locate metallic utilities by detecting radio signals traveling within them; the radio signals are ambient signals from distant sources (e.g., a radio station transmitter) that are captured naturally by the utility, which acts as a buried radio antenna.

5.0 FIELD PROCEDURES

Guided by Mr. Carpenter, AGS first scanned the site with the RD-8000 pipe-and-cable locating system to look for buried utilities. RD-8000 scanning was accomplished by monitoring the instruments' response while carrying it back-and-forth across the site along north-south and east-west lines spaced approximately five feet apart. AGS also opened pull boxes and used the RD-8000 inductive clamp to apply a tracing signal to the electrical wires exposed therein. Detected utilities were marked on the ground surface with pink spray paint as the survey progressed.

Next, AGS performed the terrain conductivity survey by hand-carrying the EM31 instrument back-and-forth across the site along north-south and east-west lines spaced approximately four feet apart. Horizontal positioning data were obtained using a backpack-mounted Trimble Pro-XR Global Positioning System (GPS). The EM31 was programmed to obtain two readings a second, which corresponds to a conductivity reading every three feet along the survey lines. Approximately 1,500 line-feet of EM31 terrain conductivity data were obtained for this investigation.

AGS then performed the GPR survey. GPR data were obtained by wheeling the cart-mounted GPR system back-and-forth across the site along north-south and east-west survey transects spaced approximately 5 feet apart, and additional more closely-spaced GPR scans were obtained across the reported UST area. It is worth noting that the large landscape boulders were moved by hand, to the extent possible, to facilitate the GPR survey.

After the geophysical survey work was completed AGS used a combination of a GPS and fiberglass tape measures to map prominent site features, such as the streets and gridwall fence, pull boxes and the concrete pavement, to prepare a basemap upon which the investigation results would be presented (Figures 2 and 3). AGS took particular care to map the locations of surface metal objects and buried utilities so the associated EM responses would not be mistaken for a UST indication.

6.0 DATA PROCESSING AND ANALYSIS

EM31 Data

AGS monitored the EM31 data in the field as the survey progressed to look for buried metal areas, which produce a localized large, rapid deflection in the instrument display meter. Upon returning to the office, AGS processed the EM31 data using the GEOSOFT Oasis montaj earth science software system. A GEOSOFT kriging algorithm was used to prepare a color-filled contour map showing EM31 response variations across the site (Figure 3). As part of the analysis, AGS looked for high-amplitude responses not readily attributable to known metallic site features, such as vehicles and metal fences. Such responses are considered “anomalies” and are attributed to subsurface source bodies, which may include USTs, buried utilities, reinforced concrete foundations, and miscellaneous metallic debris.

On the color contour map, EM31 anomalies can appear as both “hot” and “cool” (blue) colors representing terrain conductivity measurements above and below background readings, respectively. In general, large buried metal objects such as USTs produce below background (and even negative) EM readings, which appear as “cool” (i.e., dark blue) colors on a color-contour map. AGS incorporated its site map into the EM31 contour map so that responses associated with surface metal objects (e.g., the metal fence) and underground utilities could be identified and disregarded from consideration as a possible UST indication. As a further aid to the analysis, data profiles for each survey transect were prepared and inspected. The profiles are especially useful for assessing anomaly amplitudes and for identifying bad data caused by, say, a low-battery condition or a loose connection or other type of equipment malfunction.

GPR and RD-8000 Pipe-and-Cable Locator

Using the instrument’s viewing monitor, AGS examined the GPR profiles on a line-by-line basis as the survey progressed to look for reflection patterns indicative of USTs and other substructures. In particular, AGS looked for the broad, high-amplitude (“dark”) “upside-down U” image that is a near-certain indication of a UST. GPR data were saved in digital format (as .dzt files) to the GPR system’s computer memory and were later archived to AGS’ external hard drive backup system.

RD-8000 responses were also interpreted in the field as the investigation progressed; its receiver was adjusted to emit a “buzz” sound when it was carried over a buried utility. In addition, the RD-8000 display includes directional arrows and “peak signal” indicators that help pinpoint the utility location, which was marked on the ground surface. Because the RD-8000 has no digital output, no data were recorded for that instrument.

7.0 RESULTS

Investigation results are shown on Figure 2, which is a site map showing the locations of two metal-indicating EM anomalies representing possible UST locations, along with the locations buried utilities detected during the investigation. The EM31 data are presented on Figure 3 as a color-filled contour map of the in-phase EM response, whereon above-ground metal-containing areas are indicated by “hot” (redorange-pink) colors and buried metal areas are indicated by dark blue colors. For completeness, EM31 and GPR survey lines are shown on Figure 4.

Overall, no UST was definitively detected; however, a buried metal anomaly was observed at the reported UST location. A second EM anomaly was observed north of the first anomaly, however this anomaly may have been caused when the EM31 sensor brushed against the metal grid fence. In addition, numerous buried utilities were detected, including electrical and telephone cables, natural gas and water pipes, and a storm drain. These utilities, along with the metal grid fence, produced high levels of EM noise, which interfered with the EM instrument's ability to scan the subsurface for a UST. GPR can be helpful in such instances, however no UST images were observed on the GPR records. GPR achieved an investigation depth of approximately three feet below ground surface (bgs).

8.0 LIMITATIONS OF GEOPHYSICAL LOCATING METHODS

In general, a geophysical method's limitations for detecting a particular target are related to the target's size, burial depth, the amount of contrast in material properties between the target and surrounding material, and finally, the amount of interference from surrounding site features. For a target to be detected it must have sufficient size to reflect or otherwise disturb some the incoming energy used for detection. It also must have enough contrast with the surrounding material to reflect or otherwise disturb enough of the incoming energy so as to be detected. And, finally, it can't be buried so deeply that the reflected/disturbed energy is so dissipated that it is too weak to be detected when it returns to the surface. Weak energy returns during geophysical investigations are further exacerbated by ambient noise like that produced by natural and cultural features, such as utilities, fences, parked vehicles, vegetative cover, and debris. In general, the 1193 Danville Boulevard site contained numerous noise sources— buried utilities, and metal gridwall fencing— which interfered with the EM survey's ability to detect a buried metal UST. In addition, the survey coverage was constrained by the fence, tree, and large landscape boulders, which physically blocked access to portions of the survey area. Accordingly, conditions at the 1193 Danville Boulevard site were not favorable for UST detection. GPR is not susceptible to EM interference and can be helpful in such high-noise environments. GPR achieved a signal penetration depth of about 3.0 feet below ground surface, accordingly objects buried deeper than 3.0 feet would not be detected by GPR.

9.0 CLOSING

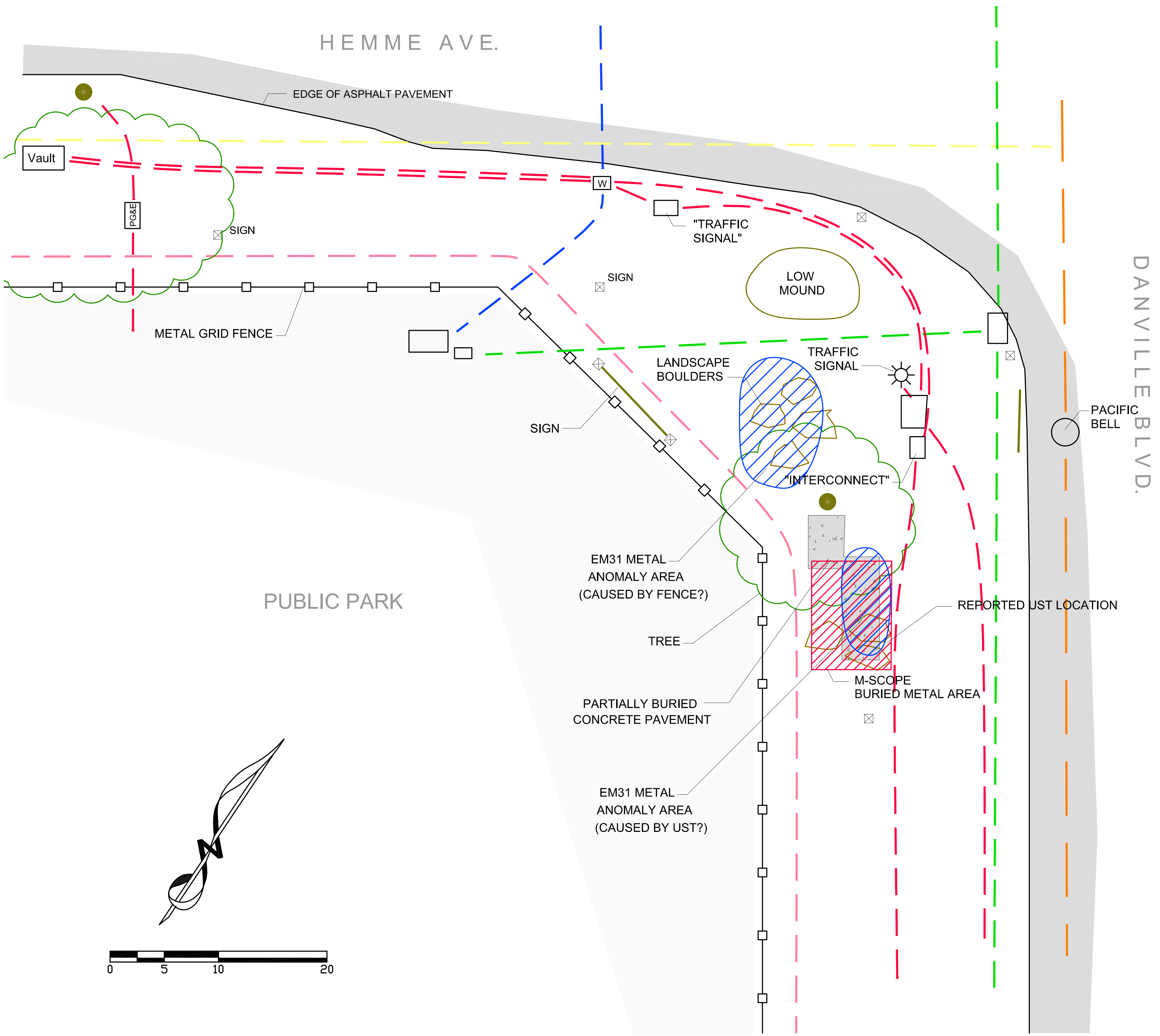
All geophysical data and field notes collected for this investigation will be archived at the AGS office. The data collection and interpretation methods used in this investigation are consistent with standard practices applied to similar geophysical investigations. The correlation of geophysical responses with probable subsurface features is based on the past results of similar surveys although it is possible that some variation could exist at this site. Due to the nature of geophysical data, no guarantees can be made or implied regarding the targets identified or the presence or absence of additional objects or targets.

We appreciated working for you on this project and hope to work with you again. If you have any questions, I can be reached at (925) 808-8965 or Rsmith@Advancedgeo.com.

Respectfully,

Roark W. Smith, GP 987
Senior Geophysicist
Advanced Geological Services

Figures:



EXPLANATION

EM31 BURIED METAL ANOMALY

BURIED METAL AREA DELINEATE WITH M-SCOPE*

Underground Utilities Detected:

- WATER
- ELECTRICAL (Traffic Signal & Street Lighting)
- TELEPHONE
- STORM DRAIN
- NATURAL GAS
- UNIDENTIFIED

* NOTE: GPR SCANNING WAS PERFORMED IN THIS AREA. GPR SIGNAL PENETRATION DEPTH WAS ABOUT 3 FEET BGS NO UST OR OTHER TYPE OF SUBSTUCTURE WAS IMAGED, INDICATING THAT THE DETECTED OBJECT IS BURIED DEEPER THAN 3 FEET.

ADVANCED GEOLOGICAL SERVICES
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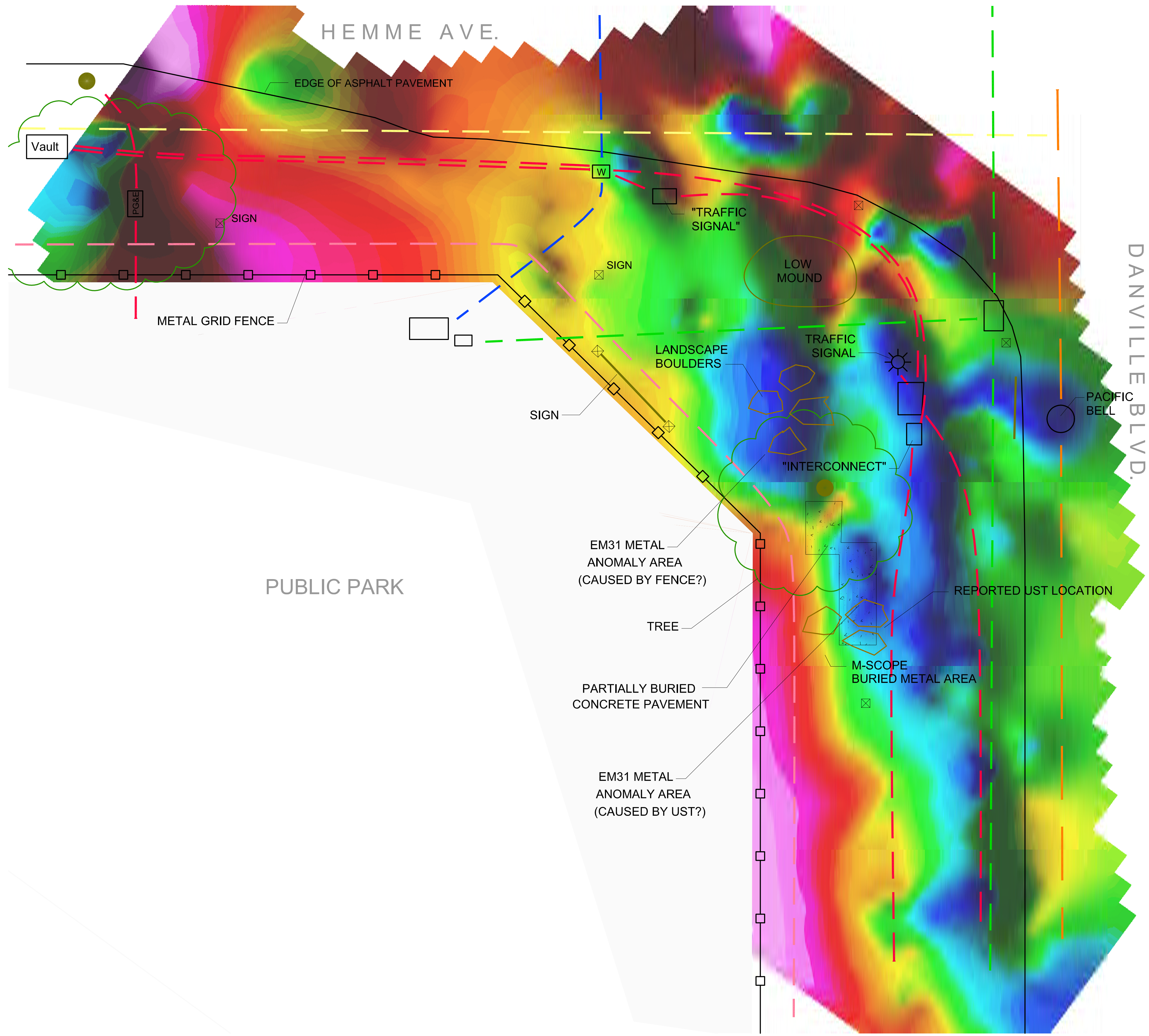
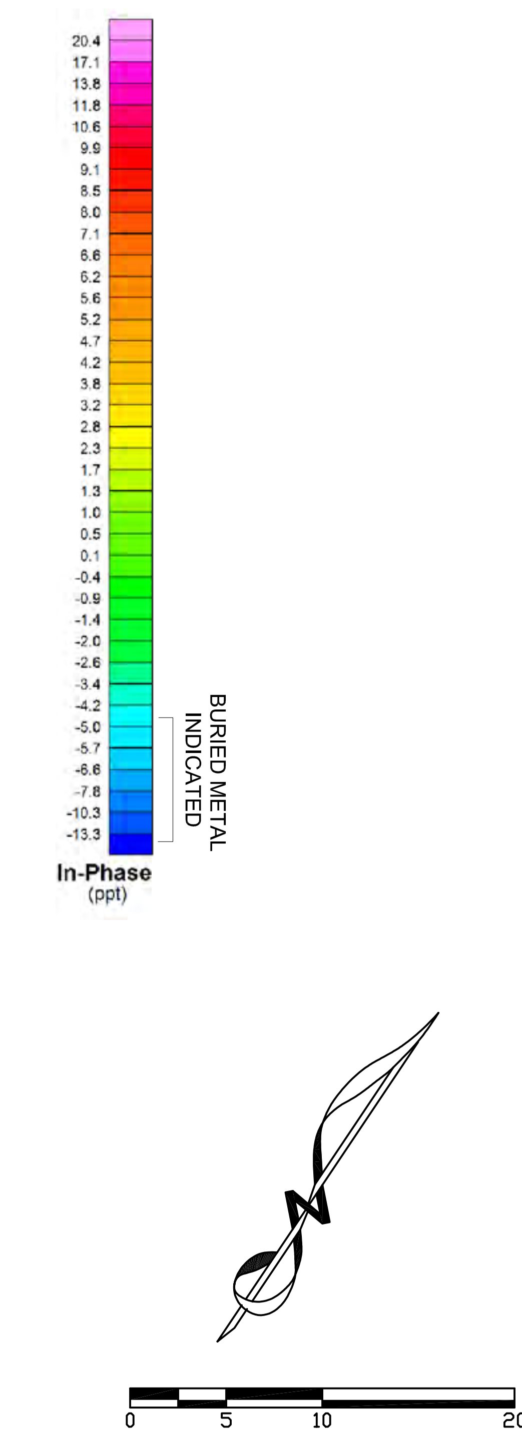
Geophysical Investigation Results
UST Investigation
1193 Danville Blvd

LOCATION: Alamo, California
CLIENT: Nichols Consulting Engineers, Chtd.
PROJECT #: 18-111-1CA
DATE: Dec 4, 2018 DRAWN BY: R. SMITH
FIGURE 2





ADVANCED GEOLOGICAL SERVICES

1605 School Street
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(925) 631-1989

EM31 Terrain Conductivity Contour Map
UST Investigation
1193 Danville Blvd

LOCATION: Alamo, California

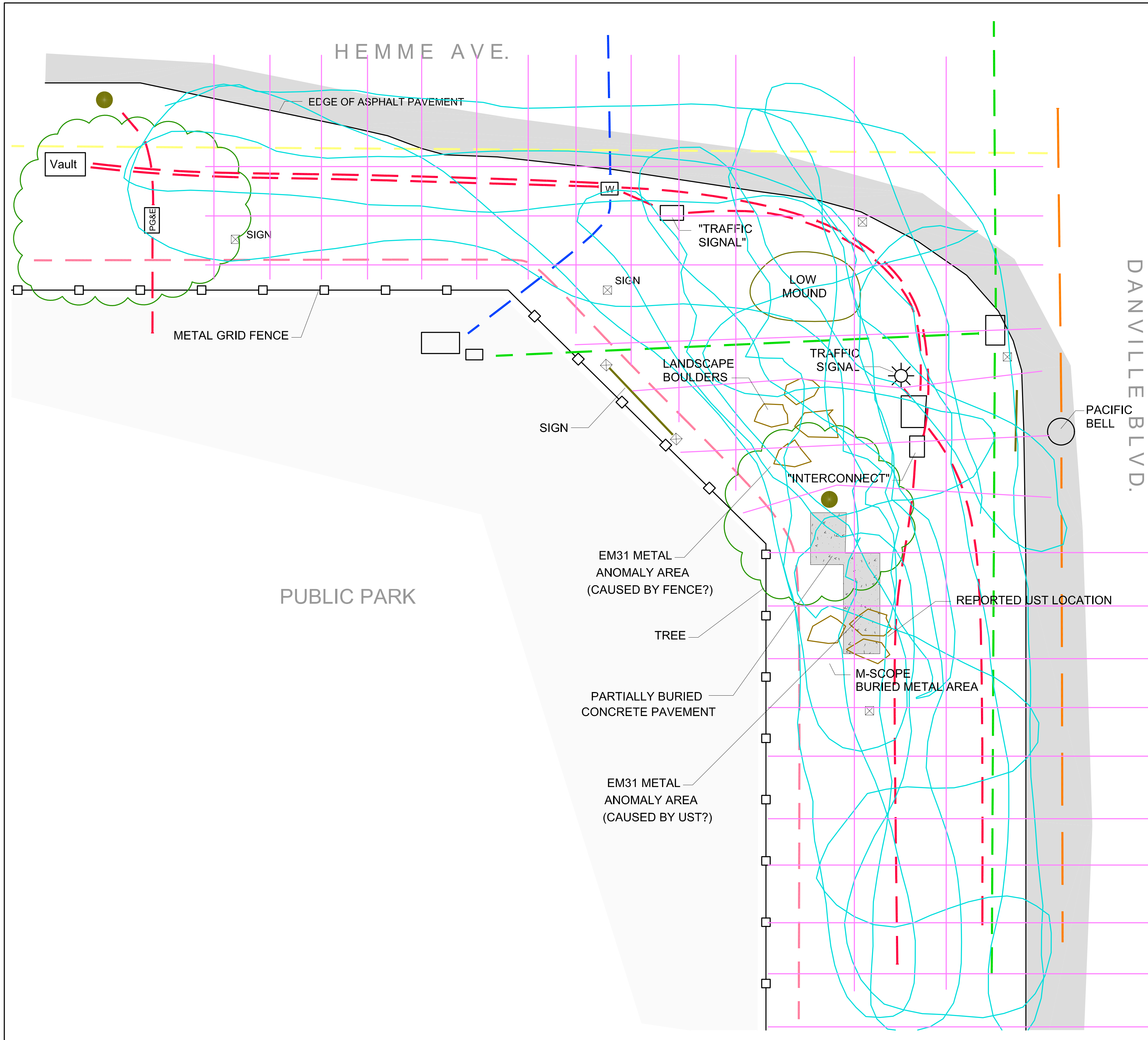
CLIENT: Nichols Consulting Engineers, Chtd.

PROJECT #: 18-111-1CA

DATE: Dec 4, 2018

DRAWN BY: R. SMITH

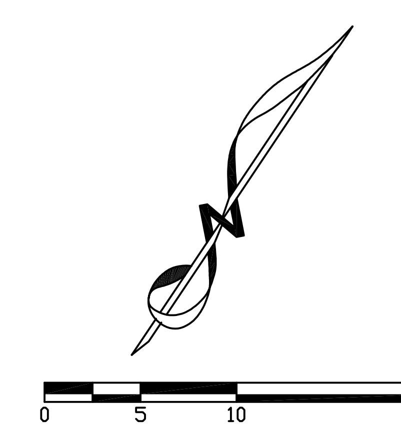
FIGURE 3



EXPLANATION

EM31 SURVEY LINE

GPR SURVEY LINE



ADVANCED GEOLOGICAL SERVICES

1605 School Street
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Geophysical Survey Coverage
UST Investigation
1193 Danville Blvd

LOCATION: Alamo, California

CLIENT: Nichols Consulting Engineers, Chtd.

PROJECT #: 18-111-1CA

DATE: Dec 4, 2018

DRAWN BY: R. SMITH

FIGURE 4