APPENDIX D: GEOTECHNICAL INVESTIGATION REPORT

GEOTECHNICAL INVESTIGATION

EASTERN MUNICIPAL WATER DISTRICT
MEAD VALLEY SEWER IMPROVEMENTS

Riverside County, California

PREPARED FOR:

Mr. Nate Olivas
Eastern Municipal Water District
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PREPARED BY:

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March 3, 2023

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Atlas No. 190063P4.2
Report No. 1962-1

MR. NATE OLIVAS
EASTERN MUNICIPAL WATER DISTRICT
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PERRIS, CALIFORNIA 92570

Subject: **Geotechnical Investigation**
Mead Valley Sewer Improvements
Eastern Municipal Water District
Riverside County, California

Dear Mr. Olivas,

In accordance with your request and our proposal No. 22-04013R2, Atlas performed a geotechnical investigation to assess the geologic conditions for the project, including potential geologic hazards, and to provide recommendations based on our findings. Our investigation consisted of a review of readily available geologic literature, site reconnaissance, exploratory borings, limited hydrogeologic testing and analysis, geotechnical laboratory testing, and the preparation of this report.

We appreciate the opportunity to be of service on this project. Should you have any questions related to this report, please contact the undersigned at your convenience.

Respectfully submitted,
Atlas Technical Consultants LLC

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1. INTRODUCTION

This report presents the results of the geotechnical investigation Atlas performed for the subject project. It is our understanding the project will consist of the design and construction of approximately 3½ miles of new sewer pipeline along Cajalco Road in Riverside County, California. Figure 1 presents the site vicinity.

2. SCOPE OF WORK

2.1 Investigations and Monitoring Wells

Atlas performed a geologic investigation to address potential geologic hazards and geotechnical conditions that could impact the proposed construction. Pertinent documents reviewed included published reports and mapping, aerial photographs, in-house geotechnical reports, and available reports by others. Atlas explored subsurface conditions by drilling thirteen (13) borings to depths of up to approximately 41½ feet below the existing ground surface using limited access and truck-mounted drill rigs equipped with a hollow stem auger in September 2022. Additionally, in January 2023, Atlas installed two temporary groundwater monitoring wells to depths of about 40 feet below ground surface using limited access and truck-mounted drill rigs equipped with a hollow stem auger and coring capabilities. Figure 2 presents the approximate locations and depths of the borings and monitoring wells.

An Atlas engineer and geologist logged the borings and collected samples of the material encountered for geotechnical laboratory testing. Soils and rocks recovered during the field investigation were observed in the field for soil and/or groundwater contamination with visual and olfactory methods. Soils were classified according to the Unified Soil Classification System illustrated in the Subsurface Exploration Legend (Appendix I). The rocks encountered were classified in general accordance with the California Department of Transportation (Caltrans) rock classification system. The boring logs and well design diagrams are presented in Appendix I.

2.2 Laboratory Testing

Selected samples from the exploratory borings were tested to evaluate pertinent soil classification and engineering properties. The laboratory testing consisted of in-situ moisture and density, particle-size distribution, percent finer than #200 sieve, corrosivity, direct shear, expansion index, Atterberg limits, R-value, and unconfined compressive strength. The laboratory testing standards and results are presented in Appendix II.

2.3 Geophysical Survey

Atlas performed a seismic refraction study at select locations along the proposed alignment to develop subsurface velocity profiles to assess depth of bedrock and apparent rippability of the subsurface materials on January 3 and 4, 2023. The seismic refraction study is presented in Appendix III.

2.4 Analysis and Report Preparation

The results of the field and laboratory tests were evaluated to develop conclusions and recommendations regarding the geotechnical aspects of the proposed project. The report includes the following:

- A plot plan showing the boring locations
- Exploration logs with soil characterization detailing the subsurface conditions noted at the boring locations
- A description of the above ground geologic conditions
- Groundwater levels and the necessity for dewatering
- Excavation characteristics of the subsurface materials encountered
- Backfill recommendations and the suitability of excavated materials for use as backfill and bedding
- Allowable temporary excavation side slope and shoring recommendations
- Lateral earth pressures and resistance to lateral loads
- Support for the pipeline
- Potential pipeline settlements
- Appropriate types of bedding and backfill materials as well as placement and compaction procedures
- Soil modulus E' for pipeline design
- Subgrade compaction beneath pavements
- New flexible pavement structural sections
- Corrosivity of earth materials

3. SITE AND PROJECT DESCRIPTION

The project alignment is along Cajalco Road between Wood Road and Robinson Street in Riverside County, California. The site topography generally descends towards the east, with site elevations along the alignment ranging from approximately 1577 to 1671 above mean sea level. Preliminary project documents indicate that proposed invert elevations extend to between 8 and 16 feet below the existing ground surface.

4. GEOLOGY AND SUBSURFACE CONDITIONS

The site is located within the Peninsular Ranges Geomorphic Province of California, which stretches from the Los Angeles basin south into Baja California. This province is characterized as a series of northwest-trending mountain ranges separated by subparallel fault zones and a coastal plain of subdued landforms. The mountain ranges are underlain primarily by Mesozoic metamorphic rocks that were intruded by plutonic rocks of the southern California batholith, while the coastal plain is underlain by subsequently deposited marine and non-marine sedimentary formations. The site is located in the coastal plain. The materials observed in our borings consisted of fill, very old axial-channel deposits, young wash deposits, and Val Verde tonalite (granitic rock). Figure 3 presents the regional geology, and descriptions of the materials encountered are provided below.

Fill (Qf): Fill was encountered in some of our borings below the existing ground surface and extends to depths of up to approximately 5 feet below ground surface. The fill materials encountered generally consisted of moist, medium dense sandy silt, silty sand, and clayey sand. Debris and boulders may be encountered.

Very old axial-channel deposits (Qvoa): Very old axial-channel deposits were encountered in a number of our borings at both existing ground surface and below the fill and extends up to about 24 feet below ground surface. The materials encountered generally consisted of moist, loose to medium dense poorly graded sand with silt, and loose to dense silty and clayey sand.

Young wash deposits (Qywa): Young wash deposits were encountered below fill in Borings B-12S and B-13S and extends to a depth of up to approximately 18 feet below ground surface. The materials encountered generally consisted of moist, medium dense to very dense silty and clayey sand.

Val Verde tonalite (Kvt): Val Verde tonalite was encountered in each of the borings below the surficial soils and extends to the total depths explored. The materials encountered generally consisted of intensely weathered to decomposed, soft to moderately hard igneous rock. The drilled cuttings could be characterized as moist to wet, poorly graded sand with silt or clay, silty and clayey sand, sandy silt, and hard, lean clay with sand. Gravels and cobbles may be expected. Encountering boulders is also possible.

Groundwater: Groundwater was observed as shallow as 13 feet below existing ground surface. Available literature indicates the groundwater could be shallower than approximately 10 feet below ground surface near Boring B-15S (SWRCB, 2022). It should be recognized that groundwater conditions may vary at a site over time. Fluctuations in the groundwater level may occur due to variations in ground surface topography, subsurface geologic conditions and structure, rainfall, irrigation, broken pipes, changes in site drainage, and other factors. These types of conditions can be most effectively assessed at the time of construction. Table 1 presents the observed groundwater levels relative to the ground surface.

To assist in assessing groundwater levels during construction, temporary groundwater monitoring wells were installed at boring locations B-2S and B-6S to observe the groundwater activity. The monitoring wells should be periodically monitored, and groundwater elevations be recorded by a qualified individual.

Table 1: Observed Groundwater Level

Boring Location	Depth to Encountered Groundwater (ft)	Boring Location	Depth to Encountered Groundwater (ft)
B-1S	22	B-9S	25
B-2S*	13	B-10S	27
B-3S	26	B-11S	Not encountered
B-4S	18	B-12S	39
B-5S	33	B-13S	Not encountered
B-6S*	14	B-14S	29
B-7S	37	B-15S	28
B-8S	Not encountered	*Empty*	

***Indicates monitoring well was installed. See Appendix I for installation details.**

4.1 Geologic Hazards

4.1.1 Fault-Rupture Hazard

Faulting in the Riverside County area is dominantly characterized by a series of Quaternary-age and older fault zones that typically consist of several individual echelon faults, generally striking in a northerly to northwesterly direction. Active fault zones are those that have shown conclusive evidence of faulting during the Holocene Epoch (the most recent 11,000 years) while potentially active fault zones have demonstrated movement during the Pleistocene Epoch (11,000 to 2.6 million years before the present) but no evidence of movement during Holocene time. Faults that can be shown to have experienced no movement within the Holocene or Pleistocene Epochs are generally considered to be inactive. The closest active fault, the Glen Ivy North fault, is about 10 miles west of the site (Jennings, 2010). Figure 4 presents the California fault activity. The project alignment is not located in an Alquist-Priolo Earthquake Fault Zone. No signs of faulting and no active faults are known to underlie or project toward the site. The probability of fault rupture is considered negligible.

4.1.2 CBC Seismic Design Parameters

A geologic hazard likely to affect the project is ground shaking because of movement along an active fault zone in the vicinity of the subject site (USGS, 2020). Based on the subsurface conditions encountered during our investigation and available online resources (Wills et al. 2015), the alignment could generally be classified as Site Class C. The mapped site coefficients and adjusted earthquake spectral response parameters in accordance with the 2022 CBC are presented below in Table 2. Please note that the seismic parameters are provided for the approximate coordinates tabulated for the site.

Table 2: 2022 California Building Code / ASCE 7-16 Site Specific Seismic Parameters

Site Coordinates	
Latitude	Longitude
33.8391°	-117.2819°
Site Coefficients and Spectral Response Acceleration Parameters	**Values**
Site Class	C – Very Dense Soil
Site Coefficients, F_a	1.2
Site Coefficients, F_v	1.446
Spectral Response Acceleration at Short Period, S_s	1.5g
Spectral Response Acceleration at 1-Second Period, S_1	0.554g
Design Spectral Acceleration at Short Period, S_{DS}	1.2g
Design Spectral Acceleration at 1-Second Period, S_{D1}	0.534g
Site Modified Peak Ground Acceleration, PGA_M	0.6g

4.1.3 Liquefaction and Dynamic Settlement

Liquefaction occurs when loose, saturated, generally fine sands and silts are subjected to strong ground shaking. The soils lose shear strength and become liquid, potentially resulting in large total and differential ground surface settlement as well as possible lateral spread during an earthquake. Liquefiable material is not mapped along the project alignment. Because of the relatively dense soils and depth to groundwater, it is our opinion that the potential liquefaction and dynamic settlement significantly affecting the proposed project is low.

4.1.4 Flooding, Tsunamis, and Seiches

Flood Insurance Rate Maps via the Federal Emergency Management Agency (FEMA) Flood Hazard Map online database were reviewed to evaluate if the subject site is located within an area susceptible to flooding (FEMA, 2022). The project site is designated as Flood Hazard Zone A, which designates the areas with a 1% annual chance of flooding. Published depth or base flood elevations are not provided for Zone A. The potential for flooding should be appropriately considered.

The site is not located within a mapped area on the State of California Tsunami Inundation Maps (CDC, 2022b). Seiches are periodic oscillations in large bodies of water such as lakes, harbors, bays, or open reservoirs. The site is not located adjacent to any bodies of water subject to seiches.

4.1.5 Landslides and Slope Stability

There are no mapped or known landslides underlying or adjacent to the project site (CDC, 2021a). Additionally, evidence of slope instabilities or landslides was not observed at the time of our site reconnaissance. The potential for slope instabilities or landslides to affect the site is considered low.

4.1.6 Subsidence

The project is not located in an area of known subsidence associated with fluid withdrawal (groundwater or petroleum) (USGS, 2022). Due to this, as well as the presence of very dense deposits, the potential for subsidence is low.

4.1.7 Hydro-Consolidation

Hydro-consolidation can occur in recently deposited sediments (less than 10,000 years old) that were deposited in a semi-arid environment. Examples of such sediments are eolian sands, alluvial fan deposits, and mudflow sediments deposited during flash floods. The pore spaces between the particle grains can re-adjust when inundated by groundwater, causing the material to consolidate. Due to the relatively dense and moist nature of the material encountered beneath the site, the potential for hydro-consolidation occurrence in the subsurface layers is considered low.

5. CONCLUSIONS

Based on the results of our investigation, we consider the project feasible from a geotechnical standpoint provided that the recommendations of this report are followed. In our opinion, the site conditions are suitable to install the pipelines using traditional open excavation trenching techniques; however, the contractor should be prepared for excavating in very dense granular materials, as well as igneous rock formations. The presence of cobbles and boulders are also expected at the site. There are no known geologic hazards of sufficient magnitude that preclude the intended improvements. The main geotechnical considerations affecting the project is the potential for difficult trench excavations and potentially groundwater. The materials anticipated below the pipeline depths are generally expected to provide good pipeline support. However, dewatering is anticipated depending on the elevation of groundwater at the time of construction.

6. RECOMMENDATIONS

The remainder of this report presents recommendations regarding earthwork construction as well as preliminary geotechnical recommendations for the design of the proposed improvements. These recommendations are based on empirical and analytical methods typical of the standard-of-practice in southern California. If these recommendations appear not to address a specific feature of the project, please contact our office for additions or revisions to the recommendations.

6.1 Earthwork

Grading and earthwork should be conducted in accordance with the local standards and the recommendations of this report. The following recommendations are provided regarding specific aspects of the proposed earthwork construction. These recommendations should be considered subject to revision based on field conditions observed by our office during construction.

6.1.1 Site Preparation

Site preparation should begin with the removal of existing improvements, vegetation, and debris. Subsurface improvements that are to be abandoned should be removed, and the resulting excavations should be backfilled and compacted in accordance with the recommendations of this report. Pipeline abandonment can consist of capping or rerouting at the project perimeter and removal within the project perimeter. If appropriate, abandoned pipelines can be filled with grout or slurry as recommended by and observed by the geotechnical consultant.

6.1.2 Excavation Characteristics

It is anticipated that excavation can be achieved with heavy-duty earthwork equipment in good working order. Excavations in fill may be locally unstable and may contain construction debris, cobbles, or boulders. Difficult drilling and excavation should be anticipated in areas with dense to very dense granular materials and/or igneous rock. The contractor should mobilize equipment capable of excavating granitic materials with variable fracturing, weathering, rock abrasiveness, and strength/hardness rock conditions. Rock breakers, carbide tipped teeth, or carbide/diamond tipped coring equipment may be required to excavate/drill hard rock materials.

6.1.3 Oversized Material

Excavations may generate oversized material. Oversized material is defined as rocks or cemented clasts greater than 6 inches in largest dimension. Oversized material should be broken down to no greater than 6 inches in the largest dimension for use within non-structural fill, such as landscape fill, or disposed of off site in accordance with regulatory requirements.

6.1.4 Temporary Excavations

Temporary excavations 4 feet deep or less can be made vertically. Temporary excavations deeper than 4 feet should not be steeper than 1½:1 (horizontal: vertical), per Cal/OSHA Type C soil classification. Excavations in competent bedrock can be made vertically. Unweathered (i.e., fresh), unfractured rock is considered competent. The faces of temporary slopes should be inspected daily by the contractor’s competent person before personnel are allowed to enter the excavation. Zones of potential instability, sloughing, or raveling should be brought to the attention of the engineer and corrective action implemented before personnel begin working in the trench.

Slopes steeper than those described above will require shoring. Soldier piles and lagging, corrugated metal pipe, internally braced shoring such as trench boxes or speed shoring could be used. If trench boxes or metal pipe are used, the soil immediately adjacent to the shoring is not directly supported. Ground surface deformations adjacent to the excavation could be greater when these methods are used compared to other methods of shoring leading to distress to overlying improvements.

If open trenches are to be maintained during the rainy season, berms are recommended along the tops of the trenches to prevent runoff water from entering the excavation.

6.1.5 Temporary Shoring

For design of cantilevered shoring, an active soil pressure equal to a fluid weighing 40 pounds per cubic foot (pcf) can be used for level retained ground or 65 pcf for 2:1 (horizontal:vertical) sloping ground. A passive soil pressure equal to a fluid weighing 330 pcf can be used for the design of cantilevered shoring. These values assume that shoring will take place above the groundwater level. The passive pressure should be reduced by one half below the groundwater table. The surcharge loads on shoring from traffic and construction equipment adjacent to the excavation can be modeled by assuming an additional 2 feet of soil behind the shoring.

6.1.6 Temporary Dewatering

During our geotechnical investigation, groundwater was observed as shallow as 13 feet below existing ground surface (see Table 1). Available literature indicates the groundwater could be shallower than approximately 10 feet. Additionally, groundwater seepage may occur locally along the project alignment due to local irrigation or following heavy rain. Shallow groundwater may impact project construction. An experienced and qualified specialty contractor should evaluate the need and design of a dewatering system, as appropriate. The contractor's geotechnical engineer should review proposed dewatering system designs.

6.1.7 Remedial Grading – Manhole Foundations

Proposed manhole foundations can be supported by firm and unyielding formational material, 2 feet of compacted fill, or geogrid. If placed on compacted fill, the on-site soils should be excavated to a depth of at least 2 feet below planned subgrade elevation. If competent, formational materials are exposed, excavation need not be performed. An Atlas representative should observe conditions exposed in the bottom of excavations to evaluate whether additional excavation is recommended.

6.1.8 Expansive Soil

The on-site materials tested have expansion indices ranging from 18 to 38, classified as very low to low expansion potential. The grading and foundation recommendations presented in this report assume materials with a low expansion potential.

6.1.9 Compacted Fill

On-site materials, except for soil containing roots, debris, and rock greater than 6 inches, can be used as compacted fill or trench backfill. Fill and backfill should be placed in horizontal lifts at a thickness appropriate for the equipment spreading, mixing, and compacting the material, but generally should not exceed 8 inches in loose thickness. Fill and backfill should be moisture conditioned within 2% of optimum moisture content and compacted to at least 90% relative compaction. The top 12 inches of subgrade beneath pavement should be compacted to at least 95%. The maximum dry density and optimum moisture content for evaluating relative compaction should be obtained using ASTM D1557.

6.1.10 Imported Soil

Imported soil should consist of predominately granular soil, free of organic matter, and rocks less than 6 inches. Imported soil should be observed and, if appropriate, tested by Atlas prior to transport to the site.

6.1.11 Bottom Stabilization

In areas where wet, soft, or yielding excavations bottoms are encountered, a geogrid reinforced soil mat could be installed to provide support for proposed manhole foundation construction. To stabilize soft or yielding bottoms, Atlas recommends placing one layer of Tensar® Triax TX-160 reinforcing geogrid or equivalent on the removal surface (e.g. excavation bottom) followed by at least 6 inches of aggregate base compacted using lightweight equipment to a relative compaction of 90%. A second layer of geogrid followed by at least 6 inches of compacted based should be placed. If yielding is still observed upon proof rolling, an additional layer of geogrid should be placed on the compacted base followed by at least 6 inches of aggregate base.

6.1.12 Grading Plan Review

Atlas should review the grading plans and earthwork specifications to ascertain whether the intent of the recommendations contained in this report have been implemented, and that no revised recommendations are needed due to changes in the development scheme.

6.2 Pipelines

6.2.1 Pipeline Support

It is anticipated that most of the materials along the pipeline alignment will provide adequate support for the pipe, although loose, soft, and otherwise unsuitable materials could be encountered. Unsuitable materials encountered near trench bottom levels should be excavated to competent material as determined by the geotechnical consultant. The excavated materials can be replaced with compacted fill or with pipe bedding material, as described below. Unsuitable materials should be removed from the full width of the trench. The bottoms of the excavations should be observed by the geotechnical consultant prior to placement of pipe bedding.

6.2.2 Backfill

Utility trench sections should conform to the minimum requirements of the EMWD and local jurisdictions. Backfill should be placed in loose lifts not exceeding 6 to 8 inches in thickness, moisture conditioned to near optimum moisture content, and compacted to at least 90% relative compaction.

On-site materials, except for soil containing roots, debris, and rock greater than 6 inches, can be used as compacted fill or trench backfill, provided that they have an expansion index of 50 or less. The maximum dry density and optimum moisture content for the evaluation of relative compaction should be determined in accordance with ASTM D1557.

6.2.3 Pipe Bedding

Pipe bedding as specified in the "Greenbook" can be used. Bedding material should consist of clean sand having a sand equivalent not less than 30 and should extend to at least 12 inches above the top of pipe. Alternative materials meeting the intent of the bedding specifications are also acceptable. Samples of materials proposed for use as bedding should be provided to the engineer for inspection and testing before the material is imported for use on the project. The on-site materials are not expected to meet "Greenbook" bedding specifications. The pipe bedding material should be placed over the full width of the trench. After placement of the pipe, the bedding should be brought up uniformly on both sides of the pipe to reduce the potential for unbalanced loads. No voids or uncompacted areas should be left beneath the pipe haunches. Ponding or jetting the pipe bedding should not be allowed.

6.2.4 Thrust Blocks

For level ground conditions, a passive earth pressure of 330 pounds per square foot (psf) per foot of depth below the lowest adjacent final grade can be used to compute allowable thrust block resistance. A value of 140 psf per foot should be used below groundwater level, if encountered.

6.2.5 Modulus of Soil Reaction

A modulus of soil reaction (E') of 1,000 pounds per square inch can be used to evaluate the deflection of buried flexible pipelines. This value assumes that granular bedding material is placed adjacent to the pipe and is compacted to at least 90% relative compaction.

6.3 Manholes

6.3.1 Foundations

The planned manholes can be supported on mat foundations with bottom levels on compacted fill, reinforced geogrid mats, or competent formational material.

Thickness and reinforcement of the mat foundation should be in accordance with the recommendations of the project structural engineer. Mat foundations typically experience some deflection due to loads placed on the mat and the reaction of the soils underlying the mat. A design modulus of subgrade reaction, K, of 150 pounds per cubic inch (pci) may be used in evaluating such deflections on dense to very dense granular soils or formational materials, and 75 pci on other loose soils. These values are based on an area of one square foot and should be adjusted for large mats. Adjusted values of the modulus of subgrade reaction, K_{BxB}, can be obtained from the following equation for square mats of various widths:

$$K_{B\times B} = K\left[\frac{\mathrm{B}+1}{2\mathrm{B}}\right]^2 (pci)$$

Where, B is the width of the mat in feet.

Where the mat slab is rectangular, adjusted values of the modulus of subgrade reaction, K', can be obtained from the following equation:

$$K' = \frac{K_{B\times B}(1 + 0.5\left(\frac{B}{L}\right))}{1.5}(pci)$$

Where, B is the width and L is the length of the mat in feet.

6.3.2 Allowable Soil Bearing Pressure

The planned manholes can be supported on mat foundations with bottom levels on compacted fill, reinforced geogrid mats, or competent formational material. An allowable bearing capacity of 3,000 psf can be used. The bearing value can be increased by ⅓ when considering short term loads.

Lateral loads will be resisted by friction between the bottoms of footings and passive pressure on the faces of footings and other structural elements below grade. An allowable coefficient of friction of 0.30 can be used. Passive pressure can be computed using a lateral pressure value of 300 psf per foot of depth below the ground surface for level ground conditions. Reductions for sloping ground should be made. The passive pressure can be increased by ⅓ when considering the total of loads, including wind or seismic forces. The upper 1 foot of soil should not be relied on for passive support unless the ground is covered with pavements or slabs.

6.3.3 Manhole Backfill

Manhole backfill should consist of granular, free-draining material having a sand equivalent of 20 or more. The backfill zone is defined by a 1:1 plane projected upward from the bottom of the manhole. Expansive or clayey soil should not be used. Backfill should be compacted to at least 90% relative compaction. Backfill should not be placed until the manhole walls have achieved adequate structural strength. Compaction of manhole backfill will be necessary to minimize settlement of the backfill and overlying settlement-sensitive improvements. However, some settlement should still be anticipated. Alternatively, a controlled low-strength material such as sand cement slurry may be considered for backfill. The controlled low-strength material should be thoroughly consolidated, have a maximum slump of 4 inches, and the slurry combined graded should meet the requirements of the local authority with jurisdiction.

6.4 Preliminary Pavement Section Recommendations

Atlas utilized the Caltrans Highway Design Manual (Caltrans, 2020) to prepare preliminary recommendations for flexible pavements. An R-value of 13 and assumed Traffic Indexes of 7, 9, and 11 were used for the design of preliminary pavement sections. The actual subgrade support characteristics should be evaluated after grading and final pavement sections are provided. Table 3 presents recommended flexible structural sections for the assumed Traffic Indexes and subgrade R-value:

Table 3: Preliminary Pavement Structural Sections

Traffic Type	Traffic Index	AC[1] over AB[2] (inches)	Full Depth AC (inches)
Roadways	7.0	6 over 10	11
	9.0	6 over 18	16
	11.0	10 over 18	22

[1] AC: Asphalt Concrete
[2] AB: Aggregate Base

The top 12 inches of subgrade should be scarified, moisture conditioned to near optimum moisture content, and compacted to at least 95% relative compaction (ASTM D1557). Soft or yielding areas should be removed and replaced with compacted fill or aggregate base. Aggregate base and asphalt concrete should conform to the Caltrans Standard Specifications and should be compacted to at least 95% relative compaction. Aggregate base should have an R-value of not less than 78. All materials and methods of construction should conform to good engineering practices and Caltrans standard specifications.

6.5 Soil Corrosivity

Representative samples of the on-site soils from the project alignment were tested to evaluate corrosion potential. The test results are presented in Appendix II. The project design engineer can use the sulfate results in conjunction with ACI 318 to specify the water/cement ratio, compressive strength and cementitious material types for concrete exposed to soil. A corrosion engineer should be contacted to provide specific corrosion control recommendations.

6.6 Geotechnical Engineering During Construction

The geotechnical engineer should review project plans and specifications prior to bidding and construction to check that the intent of the recommendations in this report has been incorporated. Observations and tests should be performed during construction. Atlas recommends a geotechnical engineer or engineering geologist be on site to observe tunneling operations. If the conditions encountered during construction differ from those anticipated based on the subsurface exploration program, the presence of the geotechnical engineer during construction will enable an evaluation of the exposed conditions and modifications of the recommendations in this report or development of additional recommendations in a timely manner.

7. CLOSURE

Atlas should be advised of changes in the project scope so that the recommendations contained in this report can be evaluated with respect to the revised plans. Changes in recommendations will be verified in writing. The findings in this report are valid as of the date of this report. Changes in the condition of the site can occur with the passage of time, whether they are due to natural processes or work on this or adjacent areas. In addition, changes in the standards of practice and government regulations can occur. Thus, the findings in this report may be invalidated wholly or in part by changes beyond our control. This report should not be relied upon after a period of two years without a review by us verifying the suitability of the conclusions and recommendations to site conditions at that time.

In the performance of our professional services, we comply with that level of care and skill ordinarily exercised by members of our profession currently practicing under similar conditions and in the same locality. The client recognizes that subsurface conditions may vary from those encountered at the boring locations and that our data, interpretations, and recommendations are based solely on the information obtained by us. We will be responsible for those data, interpretations, and recommendations, but shall not be responsible for interpretations by others of the information developed. Our services consist of professional consultation and observation only, and no warranty of any kind whatsoever, express or implied, is made or intended in connection with the work performed or to be performed by us, or by our proposal for consulting or other services, or by our furnishing of oral or written reports or findings.

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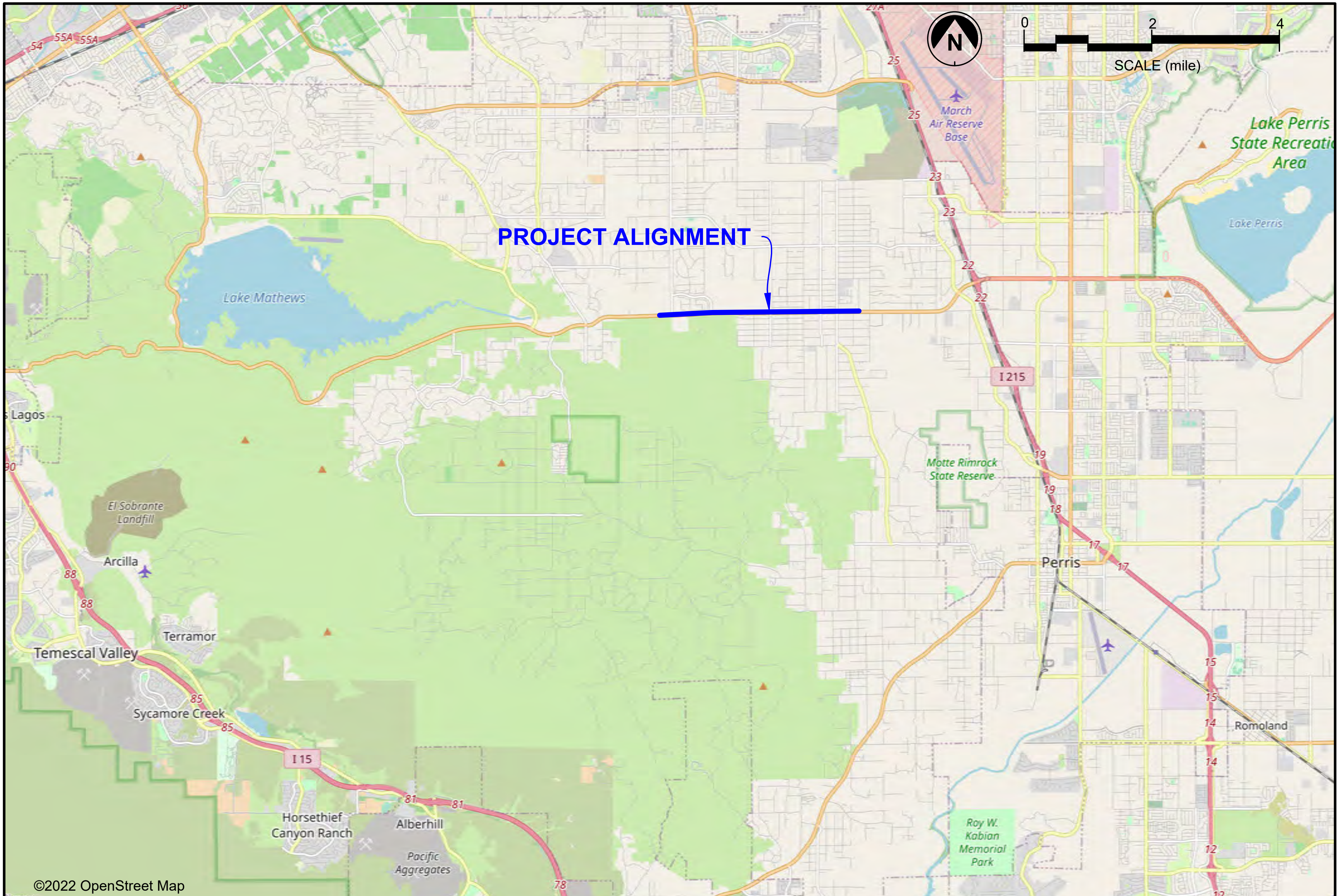
U.S. Geological Survey (USGS), 2020b, USGS Geologic Hazards Science Center, U.S. Quaternary Faults, accessed in May 2022: https://usgs.maps.arcgis.com/apps/webappviewer/

U.S. Geological Survey (USGS), 2022, Areas of Land Subsidence in California, accessed in December: https://ca.water.usgs.gov/land_subsidence/california-subsidence-areas.html



ATLAS

SITE VICINITY MAP

Mead Valley Sewer Improvements

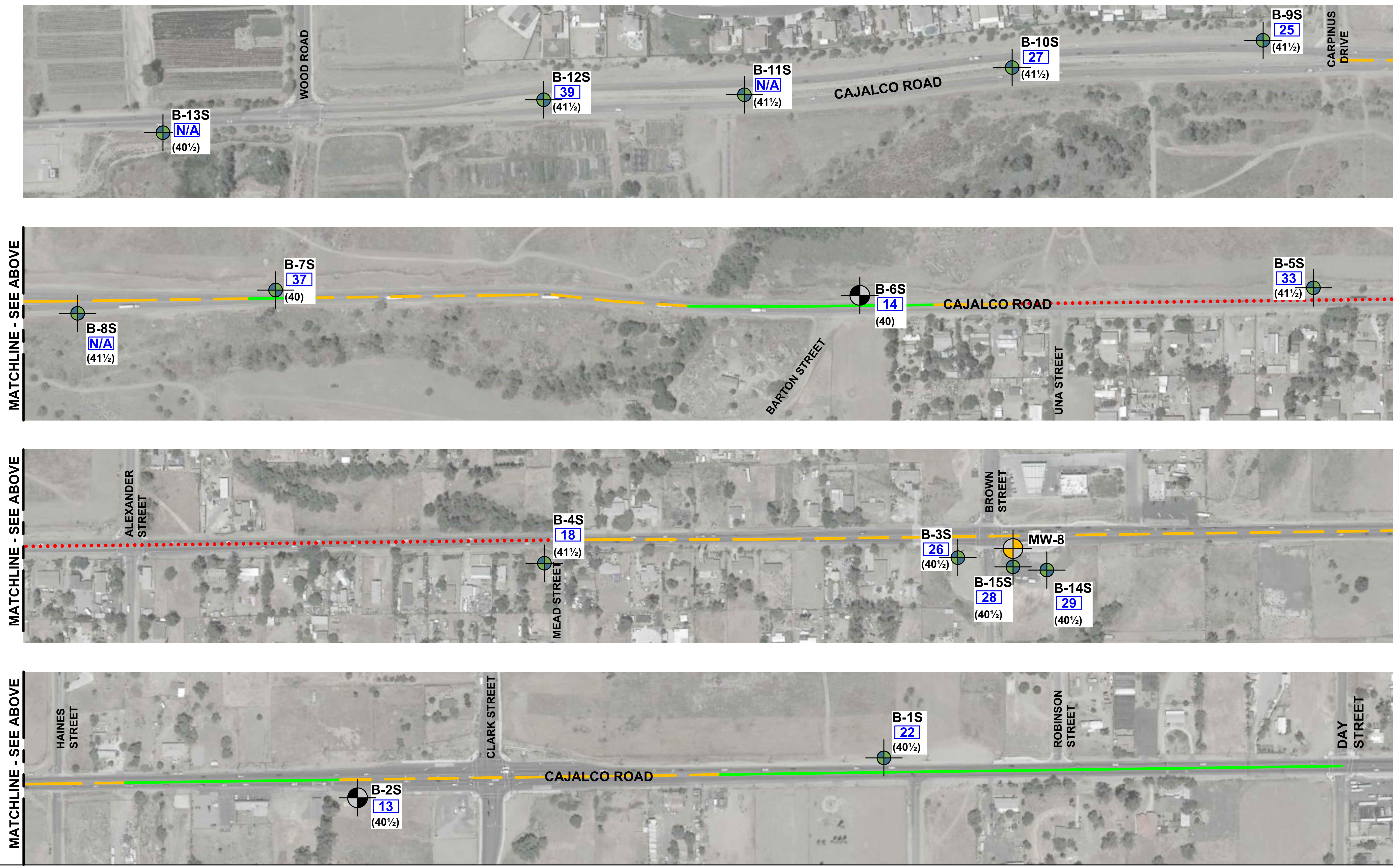
Riverside County, California

Date: March, 2023

By: CGI

Job No.: 190063P4.2 (1962)

Figure: 1



LEGEND:

B-15S (40½)	Location of Boring (Depth in Feet)	MW-8	Location of Monitoring Well by Others (ACCESS, 2022*)	Green solid	8-10 (Depth in Feet to Invert)
B-6S (40)	Location of Monitoring Well (Proposed Depth in Feet)	39	Depth to Encountered Groundwater (in Feet)	Orange dashed	10-13 (Depth in Feet to Invert)
				Red dotted	13-16 (Depth in Feet to Invert)

N

0 300 600

SCALE (feet)

NOTE: All Locations are approximate.

*Reference: ACCESS (2022), Groundwater Monitoring Report, Mobil Baldwin, 21020 Cajalco Road, Perris California, dated July 29

ARDURRA, Mead Valley Cajalco SWR Prelim Design - Plan and Profile, Received February 2023

Date: March, 2023

By: CGI

Job No.: 190063P4.2 (1962)

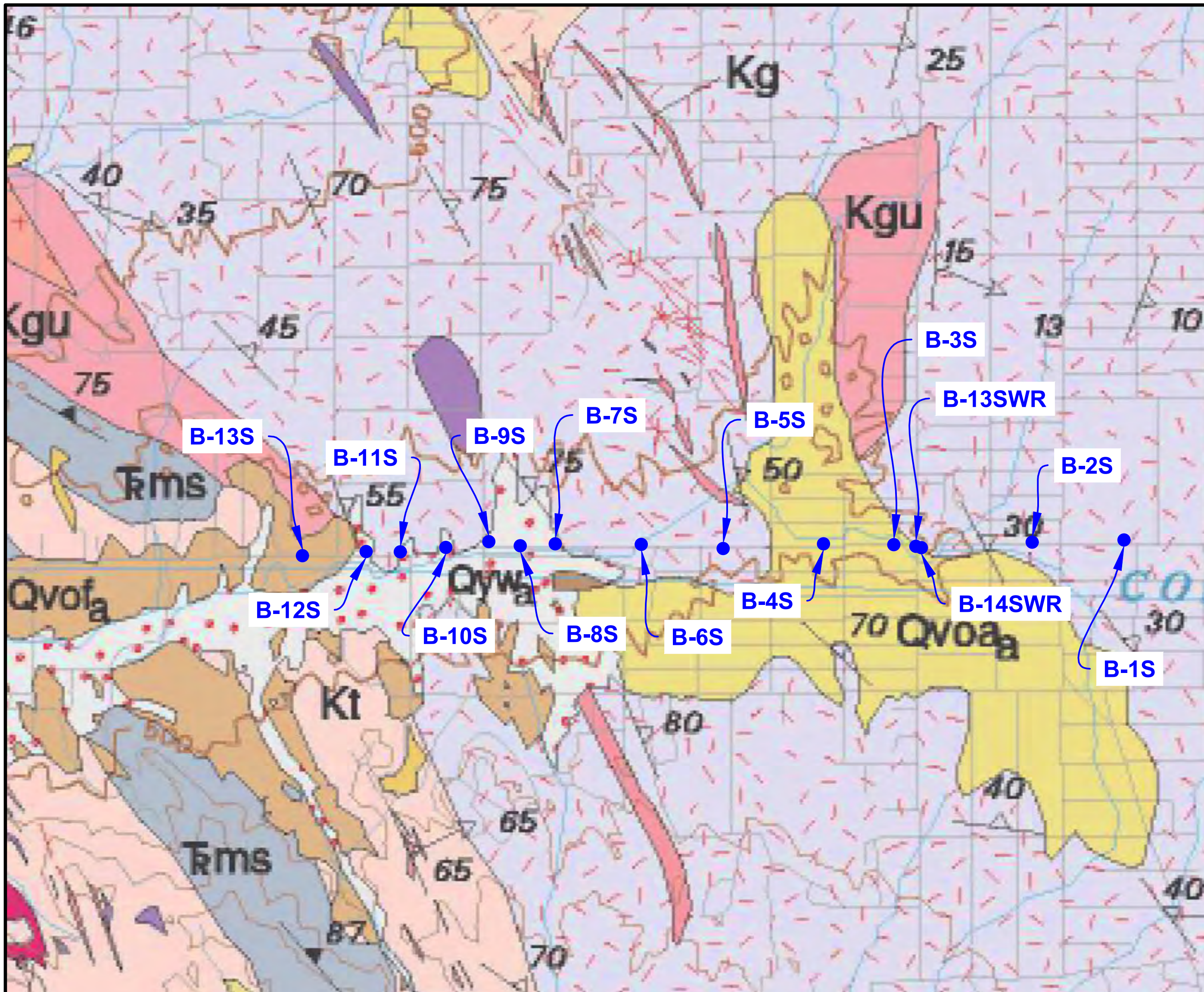
SUBSURFACE EXPLORATION MAP

Mead Valley Sewer Improvements

Riverside County, California

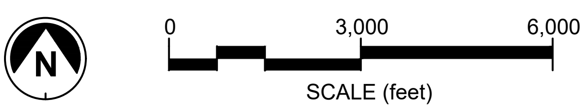
ATLAS

Figure: 2



EXPLANATION:

Qyw_a	Young wash deposits (Holocene and late Pleistocene)
$Qvoa_a$	Very old axial-channel deposits (middle to early Pleistocene)
$Qvof_a$	Very old alluvial-fan deposits (middle to early Pleistocene)
Kg	Granitic dikes (Cretaceous)
Kvt	Val Verde tonalite
Kvti	Inclusion-rich tonalite
kgb	Gabbro, undifferentiated (Cretaceous)
kpd	Granitic pegmatite dikes
kgu	Granite, undifferentiated (Cretaceous)
kt	Tonalite, undifferentiated (Cretaceous)
$T_R$ms	Schist



NOTE: All locations are approximate.

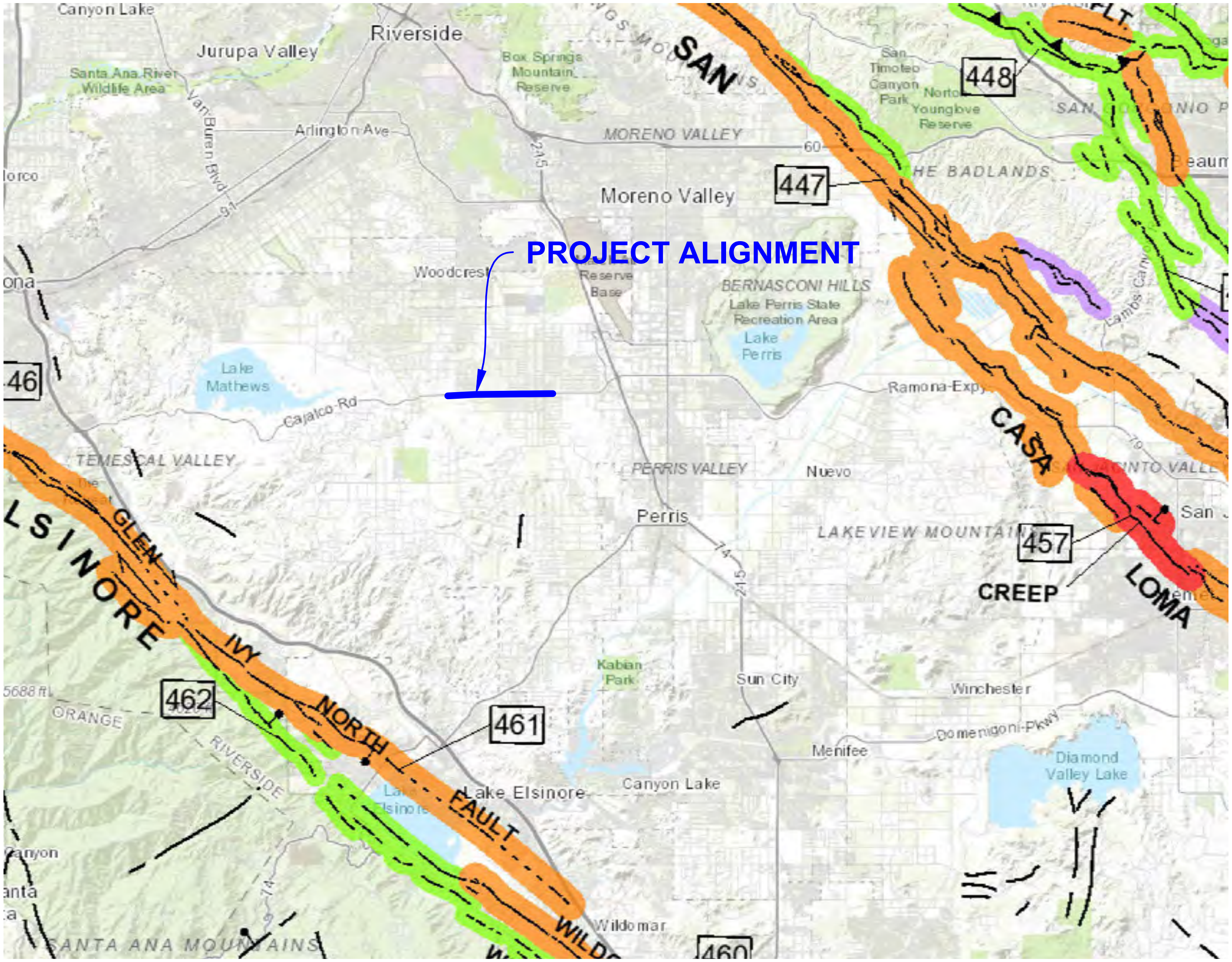
Reference:
Morton, D.M. and Miller, F.K., 2006, Geologic map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California, U.S. Geological Survey, 1:100,000.

ATLAS

REGIONAL GEOLOGY MAP
Mead Valley Sewer Improvements
Riverside County, California

Date:	March, 2023
By:	CGI
Job No.:	190063P4.2 (1962)

Figure: 3



EXPLANATION:

Fault along which historic (last 200 years) displacement has occurred

Holocene fault displacement (during past 11,700 years) without historic record.

Late Quaternary fault displacement (during past 700,000 years).

Quaternary fault (age undifferentiated).

Pre-Quaternary fault (older than 1.6 million years) or fault without recognized Quaternary displacement.

Low angle fault (barbs on upper plate).

447	Claremont fault - San Jacinto fault zone (concealed)
448	Cherry Valley fault - San Gorgonio Pass fault zone (concealed)
457	Casa Loma fault - San Jacinto fault zone (concealed)
461	Glen Ivy North fault - Elsinore fault zone (concealed)
462	Glen Ivy South fault - Elsinore fault zone (concealed)

N

0 5 10

SCALE (miles)

Reference:
Jennings, C.W., Bryant W.A., Fault Activity Map of California (2010), maps.conservation.ca.gov/cgs/fam; Accessed November, 2022

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CALIFORNIA FAULT ACTIVITY MAP
Mead Valley Sewer Improvements
Riverside County, California

Date: March, 2023
By: CGI
Job No.: 190063P4.2 (1962)

Figure: 4

APPENDIX I
SUBSURFACE EXPLORATION

Relatively undisturbed samples were obtained using a modified California (CAL) sampler, which is a ring-lined split tube sampler with a 3-inch outer diameter and 2½-inch inner diameter. Standard Penetration Tests (SPT) were performed using a 2-inch outer diameter and 1⅜-inch inner diameter split tube sampler. The CAL and SPT samplers were driven with a 140-pound weight dropping 30 inches. The number of blows needed to drive the samplers the final 12 inches of an 18-inch drive is noted on the boring logs as "Driving Resistance (blows/ft. of drive)." SPT and CAL sampler refusal was encountered when 50 blows were applied during any one of the three 6-inch intervals, a total of 100 blows was applied, or there was no discernible sampler advancement during the application of 10 successive blows. The SPT penetration resistance was normalized to a safety hammer (cathead and rope) with a 60% energy transfer ratio in accordance with ASTM D6066. The normalized SPT penetration resistance is noted on the boring logs as "N60." When auger refusal was encountered the drill rig used a diamond HQ core bit for rock coring to advance through the rock and recover rock core for identification and testing. Disturbed bulk samples were obtained from the SPT sampler and the drill cuttings. The soils are classified in accordance with the Unified Soil Classification System. The rock encountered were classified in accordance with the Caltrans rock classification system.

To assist in assessing groundwater levels during construction, temporary groundwater monitoring wells were installed at boring locations B-2S and B-6S to observe the groundwater activity. The monitoring wells should be periodically monitored, and groundwater elevations be recorded by a qualified individual. A diagram presenting the well construction is presented in Appendix I.

MAJOR DIVISIONS					TYPICAL NAMES
COARSE-GRAINED SOILS MORE THAN HALF IS COARSER THAN NO. 200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS WITH LESS THAN 15% FINES	GW		WELL-GRADED GRAVELS WITH OR WITHOUT SAND
			GP		POORLY GRADED GRAVELS WITH OR WITHOUT SAND
		GRAVELS WITH 15% OR MORE FINES	GM		SILTY GRAVELS WITH OR WITHOUT SAND
			GC		CLAYEY GRAVELS WITH OR WITHOUT SAND
	SANDS MORE THAN HALF COARSE FRACTION IS FINER THAN NO. 4 SIEVE SIZE	CLEAN SANDS WITH LESS THAN 15% FINES	SW		WELL-GRADED SANDS WITH OR WITHOUT GRAVEL
			SP		POORLY GRADED SANDS WITH OR WITHOUT GRAVEL
		SANDS WITH 15% OR MORE FINES	SM		SILTY SANDS WITH OR WITHOUT GRAVEL
			SC		CLAYEY SANDS WITH OR WITHOUT GRAVEL
FINE-GRAINED SOILS MORE THAN HALF IS FINER THAN NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT 50% OR LESS		ML		INORGANIC SILTS OF LOW TO MEDIUM PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
			CL		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
			OL		ORGANIC SILTS OR CLAYS OF LOW TO MEDIUM PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50%		MH		INORGANIC SILTS OF HIGH PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
			CH		INORGANIC CLAYS OF HIGH PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
			OH		ORGANIC SILTS OR CLAYS OF HIGH PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
HIGHLY ORGANIC SOILS			PT		PEAT AND OTHER HIGHLY ORGANIC SOILS

SAMPLE SYMBOLS

SAMPLE TYPES

- Bulk Sample
- CAL Modified California Sampler
- SPT Standard Penetration Test

LABORATORY SYMBOLS

AL - ATTERBERG LIMITS
CON - CONSOLIDATION
COR - CORROSIVITY TESTING
DS - DIRECT SHEAR
ENV - ENVIRONMENTAL, SOIL
GW - ENVIRONMENTAL, GROUNDWATER
RV - R-VALUE
PD - PARTICLE-SIZE DISTRIBUTION
UC - UNCONFINED COMPRESSIVE STRENGTH
WA - No. 200 WASH (% PASSING No. 200 SIEVE)

GROUNDWATER SYMBOLS

▽ WATER LEVEL AT TIME OF EXCAVATION OR AS INDICATED

RELATIVE DENSITY OF COHESIONLESS SOILS		CONSISTENCY OF COHESIVE SOILS		
RELATIVE DENSITY	SPT N60 BLOWS/FOOT	CONSISTENCY	SPT N60 BLOWS/FOOT	POCKET PENETROMETER MEASUREMENT (TSF)
VERY LOOSE	0 - 4	VERY SOFT	0 - 2	0 - 0.25
LOOSE	4 - 10	SOFT	2 - 4	0.25 - 0.50
MEDIUM DENSE	10 - 30	MEDIUM STIFF	4 - 8	0.50 - 1.0
DENSE	30 - 50	STIFF	8 - 15	1.0 - 2.0
VERY DENSE	OVER 50	VERY STIFF	15 - 30	2.0 - 4.0
		HARD	OVER 30	OVER 4.0

NUMBER OF BLOWS OF 140 LB HAMMER FALLING 30 INCHES TO DRIVE A 2 INCH O.D. (1-3/8 INCH I.D.) SPLIT-BARREL SAMPLER THE LAST 12 INCHES OF AN 18-INCH DRIVE (ASTM-1586 STANDARD PENETRATION TEST).
IF THE SEATING INTERVAL (1st 6 INCH INTERVAL) IS NOT ACHEIVED, N IS REPORTED AS REF.

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SUBSURFACE EXPLORATION LEGEND

LOG OF TEST BORING

ATLAS PROJECT NAME Mead Valley Sewer Improvements			**ATLAS PROJECT NUMBER** 1962.000-1		**B-1S**	
SITE Riverside County, CA			**START** 9/21/22	**END** 9/21/22	**SHEET NO.** 1	
DRILLING COMPANY Baja Exploration	**DRILL METHOD** Hollow Stem Auger		**LOGGED BY** HK		**REVIEWED BY** DAS/MM	
DRILLING EQUIPMENT CME-75	**BORING DIA. (in.)** 8	**TOTAL DEPTH (ft)** 40.5	**GROUND ELEV. (ft)** 1670	**DEPTH/ELEV. GROUND WATER (ft)**		
SAMPLING METHOD 140-lb Hammer, 30-in Drop	**NOTES** Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}			∇ **AT TIME OF DRILLING** 22.00 ft / Elev 1648.00 ft	▼ **AT END OF DRILLING** ---	▼ **AFTER DRILLING** ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
	0	X							**VERY OLD AXIAL-CHANNEL DEPOSITS (Qvoa)**: POORLY GRADED SAND with SILT (SP-SM), loose to medium dense, brown, moist, fine to coarse grained.	
	4								**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), grayish brown, intensely weathered to decomposed, soft to moderately hard; (Poorly Graded SAND with SILT (SP-SM), very dense, moist, fine to medium grained).	
1665	5		CAL	50/5		3.6	109.5			DS WA
1660	10		CAL	50/6						
1655	15		CAL	50/6						
1650	20		CAL	50/6					Wet, fine to coarse grained.	
									Dark brown; (POORLY GRADED SAND with CLAY (SP-SC), very dense, moist, fine to medium grained).	
	22 ∇								Groundwater observed at 22 feet.	

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LOG OF TEST BORING

ATLAS PROJECT NAME	ATLAS PROJECT NUMBER	
Mead Valley Sewer Improvements	1962.000-1	**B-1S**

SITE	START	END	SHEET NO.
Riverside County, CA	9/21/22	9/21/22	2

DRILLING COMPANY	DRILL METHOD	LOGGED BY	REVIEWED BY
Baja Exploration	Hollow Stem Auger	HK	DAS/MM

DRILLING EQUIPMENT	BORING DIA. (in.)	TOTAL DEPTH (ft)	GROUND ELEV. (ft)	DEPTH/ELEV. GROUND WATER (ft)
CME-75	8	40.5	1670	AT TIME OF DRILLING 22.00 ft / Elev 1648.00 ft

SAMPLING METHOD	NOTES	
140-lb Hammer, 30-in Drop	Hammer Efficiency = 80.0% N_{60}~$1.33N_{SPT}$	AT END OF DRILLING --- AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
			SPT	50/6					Dark brown; (POORLY GRADED SAND with CLAY (SP-SC), very dense, moist, fine to medium grained). *(continued)* (Micaceous).	
									Hard drilling.	
1640	30		SPT	50/2					Grayish brown; (fine to coarse grained).	
1635	35		SPT	50/2					(Increase in fine content).	
1630	40		SPT	50/2						
1625	45									

BORING TERMINATED AT 40½ FEET

Groundwater observed at 22 Feet

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LOG OF MONITOR WELL

ATLAS PROJECT NAME	ATLAS PROJECT NUMBER	B-2S
Mead Valley Sewer Improvements	1962.000-1	

SITE	START	END	SHEET NO.
Riverside County, CA	1/11/23	1/11/23	3

DRILLING COMPANY	DRILL METHOD	LOGGED BY	REVIEWED BY
Baja Exploration	Hollow Stem Auger	SD	DAS/MM

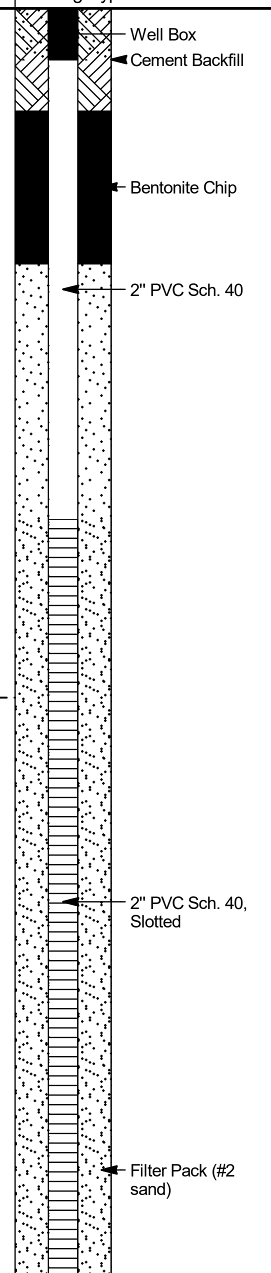
DRILLING EQUIPMENT	BORING DIA. (in.)	TOTAL DEPTH (ft)	GROUND ELEV. (ft)	DEPTH/ELEV. GROUND WATER (ft)
CME-95	8	40.5	1654	∇ AT TIME OF DRILLING 13.00 ft / Elev 1641.00 ft

SAMPLING METHOD	NOTES	
140-lb Hammer, 30-in Drop	Hammer Efficiency = 80.0% N_{60}~$1.33N_{SPT}$	▼ AT END OF DRILLING --- ▼ AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	0	X					**VERY OLD AXIAL-CHANNEL DEPOSITS (Qvoa)** : CLAYEY SAND (SC), medium dense, reddish brown, moist, fine grained sand.
1650	4						
	5		SPT	18	24		Dense.
1645	9						
	10		SPT	52	69		Very dense, weakly cemented, decreased fines.
	13					∇	Groundwater observed at 13 feet.
							VAL VERDE TONALITE (Kvt): IGNEOUS ROCK (QUARTZ DIORITE), pale brown, intensely weathered to decomposed, soft to moderately hard; (CLAYEY SAND (SC), very dense, moist, fine to medium grained, weakly cemented).
1640	14						
	15		SPT	57	76		
1635	19						
	20		SPT	62	83		
							(Increased fines)
1630	24						

WELL DIAGRAM

Casing Type: PVC



LOG OF MONITOR WELL

ATLAS PROJECT NAME Mead Valley Sewer Improvements	**ATLAS PROJECT NUMBER** 1962.000-1	**B-2S**	
SITE Riverside County, CA	**START** 1/11/23	**END** 1/11/23	**SHEET NO.** 4
DRILLING COMPANY Baja Exploration	**DRILL METHOD** Hollow Stem Auger	**LOGGED BY** SD	**REVIEWED BY** DAS/MM
DRILLING EQUIPMENT CME-95	**BORING DIA. (in.)** 8	**TOTAL DEPTH (ft)** 40.5	**GROUND ELEV. (ft)** 1654
SAMPLING METHOD 140-lb Hammer, 30-in Drop	**NOTES** Hammer Efficiency = 80.0% N_{60}~$1.33N_{SPT}$		

DEPTH/ELEV. GROUND WATER (ft)
- ∇ AT TIME OF DRILLING 13.00 ft / Elev 1641.00 ft
- ▼ AT END OF DRILLING ---
- ▼ AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	WELL DIAGRAM
			SPT	62	83		**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), pale brown, intensely weathered to decomposed, soft to moderately hard; (CLAYEY SAND (SC), very dense, moist, fine to medium grained, weakly cemented). *(continued)*	
1625								
	30							
			SPT	74	99		(SILTY SAND (SM), very dense, yellowish brown and gray, moist, fine to medium grained.)	
								2" PVC Sch. 40, Slotted
1620								
	35		SPT	50/5	67/5		Moderately soft to moderately hard; (Moderately cemented.)	
1615								
	40		SPT	50/6			(Strongly cemented.)	
1610								
	45							
1605								

BORING TERMINATED AT 40½ FEET
Groundwater observed at 13 Feet

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LOG OF TEST BORING

ATLAS PROJECT NAME	ATLAS PROJECT NUMBER	
Mead Valley Sewer Improvements	1962.000-1	**B-3S**

SITE	START	END	SHEET NO.
Riverside County, CA	9/29/22	9/29/22	5

DRILLING COMPANY	DRILL METHOD	LOGGED BY	REVIEWED BY
Baja Exploration	Hollow Stem Auger	SD	DAS/MM

DRILLING EQUIPMENT	BORING DIA. (in.)	TOTAL DEPTH (ft)	GROUND ELEV. (ft)	DEPTH/ELEV. GROUND WATER (ft)
CME-75	8	40.5	1638	∇ AT TIME OF DRILLING 26.00 ft / Elev 1612.00 ft

SAMPLING METHOD	NOTES	
140-lb Hammer, 30-in Drop	Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}	▼ AT END OF DRILLING --- ▼ AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
		X							**VERY OLD AXIAL-CHANNEL DEPOSITS (Qvoa)** : CLAYEY SAND (SC), medium dense, reddish brown, moist, fine grained sand.	AL EI RV WA
1635		X								
	5									
			CAL	24						
1630										
									VAL VERDE TONALITE (Kvt): IGNEOUS ROCK (QUARTZ DIORITE), brownish gray, intensely weathered to decomposed, soft to moderately hard; (SILTY SAND (SM), very dense, moist, fine to coarse grained).	
	10		CAL	50/6		5.7	115.2			
1625										
	15		CAL	50/6					(Decrease in fines content).	
1620										
	20		CAL	50/6					Greenish gray; (fine to medium grained).	
1615										

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LOG OF TEST BORING

ATLAS PROJECT NAME: Mead Valley Sewer Improvements	ATLAS PROJECT NUMBER: 1962.000-1		B-3S
SITE: Riverside County, CA	START: 9/29/22	END: 9/29/22	SHEET NO.: 6
DRILLING COMPANY: Baja Exploration	DRILL METHOD: Hollow Stem Auger	LOGGED BY: SD	REVIEWED BY: DAS/MM
DRILLING EQUIPMENT: CME-75	BORING DIA. (in.): 8	TOTAL DEPTH (ft): 40.5	GROUND ELEV. (ft): 1638
SAMPLING METHOD: 140-lb Hammer, 30-in Drop	NOTES: Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}		

DEPTH/ELEV. GROUND WATER (ft)
- ∇ AT TIME OF DRILLING 26.00 ft / Elev 1612.00 ft
- AT END OF DRILLING ---
- AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
			SPT	50/6					**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), brownish gray, intensely weathered to decomposed, soft to moderately hard; (SILTY SAND (SM), very dense, moist, fine to coarse grained). *(continued)* (Increase in fines content). Groundwater observed at 26 feet.	
1610										
	30		SPT	50/5						
1605										
	35		SPT	50/6					(Increase in fines content).	
1600										
	40		SPT	50/4						
									BORING TERMINATED AT 40½ FEET Groundwater observed at 26 Feet	
1595										
	45									
1590										

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LOG OF TEST BORING

ATLAS PROJECT NAME: Mead Valley Sewer Improvements			ATLAS PROJECT NUMBER: 1962.000-1		B-4S
SITE: Riverside County, CA		START: 9/27/22	END: 9/27/22		SHEET NO.: 7
DRILLING COMPANY: Baja Exploration	DRILL METHOD: Hollow Stem Auger		LOGGED BY: SD		REVIEWED BY: DAS/MM
DRILLING EQUIPMENT: CME-75	BORING DIA. (in.): 8	TOTAL DEPTH (ft): 41.5	GROUND ELEV. (ft): 1639	DEPTH/ELEV. GROUND WATER (ft): AT TIME OF DRILLING 18.00 ft / Elev 1621.00 ft; AT END OF DRILLING ---; AFTER DRILLING ---	
SAMPLING METHOD: 140-lb Hammer, 30-in Drop	NOTES: Hammer Efficiency = 80.0% N_{60}~$1.33N_{SPT}$				

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
	0	X					**FILL (Qf)**: SANDY SILT (ML), medium dense, brown, moist, fine grained.	
	2	X					**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), light brown, intensely weathered to decomposed, soft to moderately hard; (SILTY SAND (SM), dense, moist, fine to medium grained).	
1635		X						
	5							
			CAL	42				PD
1630								
	10							
			CAL	47			(Increase in medium to coarse grained sand).	
1625								
	15							
			CAL	53			Light brown.	
	18					▽	Groundwater observed at 18 feet.	
1620								
	20						(Weakly cemented, increase in palgioclase feldspar).	
			CAL	49				
							Grayish to yellowish brown; (POORLY GRADED SAND (SP), dense, wet, fine to coarse grained).	
1615								

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LOG OF TEST BORING

ATLAS PROJECT NAME	ATLAS PROJECT NUMBER	
Mead Valley Sewer Improvements	1962.000-1	**B-4S**

SITE	START	END	SHEET NO.
Riverside County, CA	9/27/22	9/27/22	8

DRILLING COMPANY	DRILL METHOD	LOGGED BY	REVIEWED BY
Baja Exploration	Hollow Stem Auger	SD	DAS/MM

DRILLING EQUIPMENT	BORING DIA. (in.)	TOTAL DEPTH (ft)	GROUND ELEV. (ft)	DEPTH/ELEV. GROUND WATER (ft)
CME-75	8	41.5	1639	AT TIME OF DRILLING 18.00 ft / Elev 1621.00 ft

SAMPLING METHOD	NOTES	
140-lb Hammer, 30-in Drop	Hammer Efficiency = 80.0% N_{60}~$1.33N_{SPT}$	AT END OF DRILLING --- AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
			SPT	36	48		Grayish to yellowish brown; (POORLY GRADED SAND (SP), dense, wet, fine to coarse grained). *(continued)*	
1610							Yellowish brown; (POORLY GRADED SAND with SILT (SP-SM), dense, wet, fine to coarse grained).	
	30							
			CAL	42				
1605							(SILTY SAND (SM), very dense, wet, fine to coarse grained).	
	35							
			SPT	51	68			
1600								
	40						(Increase in fines content).	
			SPT	65	87			
1595	45						**BORING TERMINATED AT 41½ FEET** Groundwater observed at 18 Feet	
1590								

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Figure

I-8

LOG OF TEST BORING

ATLAS PROJECT NAME: Mead Valley Sewer Improvements		ATLAS PROJECT NUMBER: 1962.000-1		B-5S
SITE: Riverside County, CA		START: 9/27/22	END: 9/27/22	SHEET NO.: 9
DRILLING COMPANY: Baja Exploration	DRILL METHOD: Hollow Stem Auger	LOGGED BY: SD		REVIEWED BY: DAS/MM
DRILLING EQUIPMENT: CME-75	BORING DIA. (in.): 8	TOTAL DEPTH (ft): 41.5	GROUND ELEV. (ft): 1634	DEPTH/ELEV. GROUND WATER (ft)
SAMPLING METHOD: 140-lb Hammer, 30-in Drop	NOTES: Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}			∇ AT TIME OF DRILLING 33.00 ft / Elev 1601.00 ft; ▼ AT END OF DRILLING ---; ▼ AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
		X							**FILL (Qf)**: SILTY SAND (SM), medium dense, brown, moist, fine to medium grained, low plasticity.	
		X							**VERY OLD AXIAL-CHANNEL DEPOSITS (Qvoa)**: CLAYEY SAND (SC), dense, light brown, moist, fine to medium grained, low plasticity, white mottling, micaceous.	
1630	5									
			CAL	43		10.6	129.3		Fine grained, weakly cemented, more micaceous.	WA
1625	10								**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), light reddish brown, intensely weathered to decomposed, soft to moderately hard; (CLAYEY SAND (SC), very dense, moist, fine to coarse grained, moderately cemented).	
			CAL	80/12"						
1620	15									
			CAL	50/6					(Decrease in fines).	
1615	20								(Increase in moisture).	
			CAL	82/9"						
1610									Reddish brown; (SANDY SILT (ML), very dense, moist, fine to medium grained).	

ATLAS

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LOG OF TEST BORING

ATLAS PROJECT NAME	ATLAS PROJECT NUMBER	
Mead Valley Sewer Improvements	1962.000-1	B-5S

SITE	START	END	SHEET NO.
Riverside County, CA	9/27/22	9/27/22	10

DRILLING COMPANY	DRILL METHOD	LOGGED BY	REVIEWED BY
Baja Exploration	Hollow Stem Auger	SD	DAS/MM

DRILLING EQUIPMENT	BORING DIA. (in.)	TOTAL DEPTH (ft)	GROUND ELEV. (ft)
CME-75	8	41.5	1634

SAMPLING METHOD	NOTES
140-lb Hammer, 30-in Drop	Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}

DEPTH/ELEV. GROUND WATER (ft)
- AT TIME OF DRILLING: 33.00 ft / Elev 1601.00 ft
- AT END OF DRILLING: ---
- AFTER DRILLING: ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
			SPT	50	67				Reddish brown; (SANDY SILT (ML), very dense, moist, fine to medium grained). *(continued)*	
									(Increase in sand content).	
1605	30									
			SPT	45	60				Yellowish brown, (SILTY SAND (SM), very dense, moist, fine to medium grained).	
									Groundwater observed at 33 feet.	
1600	35								(Poorly Graded SAND (SP), medium dense, wet, fine to coarse grained).	
			CAL	34						
1595	40									
			SPT	33	44				Reddish brown; (LEAN CLAY with SAND (CL), hard, wet, fine to medium grained).	
1590	45									
1585										

BORING TERMINATED AT 41½ FEET
Groundwater observed at 33 Feet

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Figure I-10

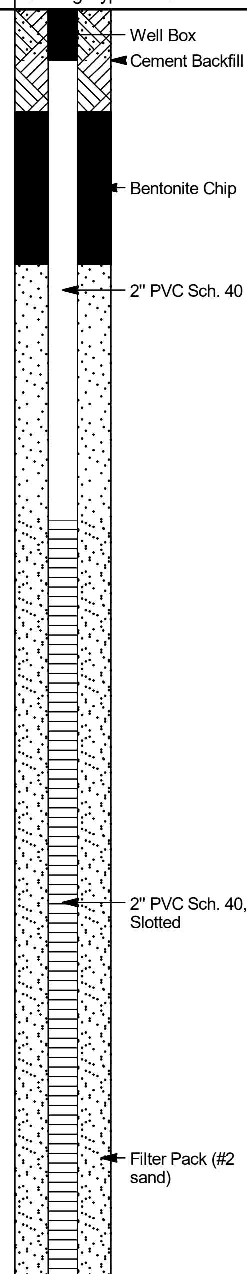
LOG OF MONITOR WELL

ATLAS PROJECT NAME: Mead Valley Sewer Improvements		ATLAS PROJECT NUMBER: 1962.000-1			B-6S
SITE: Riverside County, CA		START: 1/11/23	END: 1/13/23		SHEET NO.: 11
DRILLING COMPANY: Baja Exploration	DRILL METHOD: Hollow Stem Auger wt HQ rock coring	LOGGED BY: SD		REVIEWED BY: DAS/MM	
DRILLING EQUIPMENT: CME-95	BORING DIA. (in.): 8	TOTAL DEPTH (ft): 40	GROUND ELEV. (ft): 1618	DEPTH/ELEV. GROUND WATER (ft)	
SAMPLING METHOD: 140-lb Hammer, 30-in Drop	NOTES: Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}	∇ AT TIME OF DRILLING: 14.00 ft / Elev 1604.00 ft	▼ AT END OF DRILLING: ---	▼ AFTER DRILLING: ---	

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
	0	X					**VERY OLD AXIAL-CHANNEL DEPOSITS (Qvoa)**: CLAYEY SAND (SC), medium dense, reddish brown, moist, fine to coarse grained.	
1615								
	5		SPT	4	5		SILTY SAND (SM), loose, brown, moist, fine grained.	
1610								
	10		SPT	9	12		Medium dense.	
1605						∇	Groundwater observed at 14 feet	
	15		SPT	36	48		CLAYEY SAND (SC), very dense, grayish yellow, moist, fine to coarse grained.	
1600							**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), grayish brown, intensely weathered to decomposed, soft to moderately hard; (SILTY SAND (SM), very dense, moist, fine to medium grained).	
	20		SPT	50/3"	67/3"			
1595								

WELL DIAGRAM

Casing Type: PVC



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LOG OF MONITOR WELL

ATLAS PROJECT NAME	ATLAS PROJECT NUMBER	
Mead Valley Sewer Improvements	1962.000-1	B-6S

SITE	START	END	SHEET NO.
Riverside County, CA	1/11/23	1/13/23	12

DRILLING COMPANY	DRILL METHOD	LOGGED BY	REVIEWED BY
Baja Exploration	Hollow Stem Auger wt HQ rock coring	SD	DAS/MM

DRILLING EQUIPMENT	BORING DIA. (in.)	TOTAL DEPTH (ft)	GROUND ELEV. (ft)	DEPTH/ELEV. GROUND WATER (ft)
CME-95	8	40	1618	∇ AT TIME OF DRILLING 14.00 ft / Elev 1604.00 ft

SAMPLING METHOD	NOTES	
140-lb Hammer, 30-in Drop	Hammer Efficiency = 80.0% N_{60}~$1.33N_{SPT}$	▼ AT END OF DRILLING --- ▼ AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS	WELL DIAGRAM
			SPT	90/12"	120/12"		**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), grayish brown, intensely weathered to decomposed, soft to moderately hard; (SILTY SAND (SM), very dense, moist, fine to medium grained). *(continued)*		
1590									
	30		SPT	20/5"	27/5"				
1585							Switched to rock coring on 01/13/23		2" PVC Sch. 40, Slotted
							Fresh to slightly weathered, soft to moderately hard, slightly to moderately fractured.		
	35		RC						
1580			RC				RQD = 98 Recovery = 100	UC	
	40						**BORING TERMINATED AT 40 FEET** Groundwater observed at 14 Feet		
1575									
	45								
1570									

ATLAS LOG REPORT - - 3/3/23 10:53 - \\SD.SCST.COM\DFS_ROOTDATA\CLIENTS\EASTERN MUNICIPAL WATER DISTRICT\190063P4 - EMWD, AS-NEEDED ENGINEERING NON-DESIGN SERVICES\190063P4.2 - EMWD, GOOD HOPE & MEAD VALLEY WATER SI

LOG OF TEST BORING

ATLAS PROJECT NAME: Mead Valley Sewer Improvements		ATLAS PROJECT NUMBER: 1962.000-1		B-7S
SITE: Riverside County, CA	START: 9/22/22	END: 9/22/22		SHEET NO.: 13
DRILLING COMPANY: Baja Exploration	DRILL METHOD: Hollow Stem Auger	LOGGED BY: HK	REVIEWED BY: DAS/MM	
DRILLING EQUIPMENT: CME-75	BORING DIA. (in.): 8	TOTAL DEPTH (ft): 40	GROUND ELEV. (ft): 1597	DEPTH/ELEV. GROUND WATER (ft): AT TIME OF DRILLING 37.00 ft / Elev 1560.00 ft; AT END OF DRILLING ---; AFTER DRILLING ---
SAMPLING METHOD: 140-lb Hammer, 30-in Drop	NOTES: Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}			

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
	0	X							**VERY OLD AXIAL-CHANNEL DEPOSITS (Qvoa)**: SILTY SAND (SM), loose to medium dense, brown, moist, fine to coarse grained.	
1595		X								
	5								Medium dense, slightly micaceous.	
			CAL	29						
1590										
	10								Trace gravel.	
			CAL	15		9.6	112.9			WA
1585										
	15								Increase in moisture.	
			CAL	19						
1580										
	20								**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), grayish brown, intensely weathered to decomposed, soft to moderately hard; (Poorly Graded SAND (SP), very dense, moist, fine to medium grained).	
			CAL	50/6						
1575										

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LOG OF TEST BORING

ATLAS PROJECT NAME: Mead Valley Sewer Improvements	ATLAS PROJECT NUMBER: 1962.000-1		B-7S
SITE: Riverside County, CA	START: 9/22/22	END: 9/22/22	SHEET NO.: 14
DRILLING COMPANY: Baja Exploration	DRILL METHOD: Hollow Stem Auger	LOGGED BY: HK	REVIEWED BY: DAS/MM
DRILLING EQUIPMENT: CME-75	BORING DIA. (in.): 8	TOTAL DEPTH (ft): 40	GROUND ELEV. (ft): 1597
SAMPLING METHOD: 140-lb Hammer, 30-in Drop	NOTES: Hammer Efficiency = 80.0% N_{60}~$1.33N_{SPT}$		

DEPTH/ELEV. GROUND WATER (ft)
- ∇ AT TIME OF DRILLING 37.00 ft / Elev 1560.00 ft
- ▼ AT END OF DRILLING ---
- ▼ AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
			SPT	50/6					**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), grayish brown, intensely weathered to decomposed, soft to moderately hard; (Poorly Graded SAND (SP), very dense, moist, fine to medium grained). *(continued)*	
1570										
	30		SPT	50/6						
1565									Hard drilling.	
	35		SPT	50/4						
1560								∇	Groundwater observed at 37 feet.	
									(Increase in coarse material).	
	40								**BORING TERMINATED AT 40 FEET** Groundwater observed at 37 Feet	
1555										
	45									
1550										

LOG OF TEST BORING

ATLAS PROJECT NAME	ATLAS PROJECT NUMBER	
Mead Valley Sewer Improvements	1962.000-1	B-8S

SITE	START	END	SHEET NO.
Riverside County, CA	9/22/22	9/22/22	15

DRILLING COMPANY	DRILL METHOD	LOGGED BY	REVIEWED BY
Baja Exploration	Hollow Stem Auger	HK	DAS/MM

DRILLING EQUIPMENT	BORING DIA. (in.)	TOTAL DEPTH (ft)	GROUND ELEV. (ft)	DEPTH/ELEV. GROUND WATER (ft)
CME-75	8	41.5	1593	∇ AT TIME OF DRILLING ---

SAMPLING METHOD	NOTES	
140-lb Hammer, 30-in Drop	Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}	▼ AT END OF DRILLING --- ∇ AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
	0	X					**VERY OLD AXIAL-CHANNEL DEPOSITS (Qvoa)**: CLAYEY SAND (SC), loose to medium dense, brown, moist, fine to coarse grained.	
1590		X						AL WA
	5						**VAL VERDE TONALITE (Kvt)**: Grayish brown, intensely weathered to decomposed, soft to moderately hard; (CLAYEY SAND (SC), medium dense, moist, fine to coarse grained).	
			CAL	23				
1585								
	10							
			CAL	36			Dense.	WA
1580								
	15						Brown, (SILTY SAND (SM), very dense, moist, fine to coarse grained).	
			CAL	66				
1575								
	20							
			CAL	50/6				
1570								

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LOG OF TEST BORING

ATLAS PROJECT NAME Mead Valley Sewer Improvements	**ATLAS PROJECT NUMBER** 1962.000-1		**B-8S**
SITE Riverside County, CA	**START** 9/22/22	**END** 9/22/22	**SHEET NO.** 16
DRILLING COMPANY Baja Exploration	**DRILL METHOD** Hollow Stem Auger	**LOGGED BY** HK	**REVIEWED BY** DAS/MM
DRILLING EQUIPMENT CME-75	**BORING DIA. (in.)** 8	**TOTAL DEPTH (ft)** 41.5	**GROUND ELEV. (ft)** 1593
SAMPLING METHOD 140-lb Hammer, 30-in Drop	**NOTES** Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}		

DEPTH/ELEV. GROUND WATER (ft)
- ▽ AT TIME OF DRILLING ---
- ▼ AT END OF DRILLING ---
- ▽ AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
							Brown, (SILTY SAND (SM), very dense, moist, fine to coarse grained). *(continued)*	
			SPT	48	64			
1565								
	30							
			SPT	42	56			
1560								
	35							
			SPT	72/11"	96/11"			
							Hard drilling.	
1555								
							(Increase in moisture and coarse material).	
	40							
			SPT	19	25		(Medium dense).	
							BORING TERMINATED AT 41½ FEET Groundwater and Seepage not observed	
1550								
	45							
1545								

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LOG OF TEST BORING

ATLAS PROJECT NAME: Mead Valley Sewer Improvements		ATLAS PROJECT NUMBER: 1962.000-1		B-9S	
SITE: Riverside County, CA		START: 9/22/22	END: 9/22/22	SHEET NO.: 17	
DRILLING COMPANY: Baja Exploration	DRILL METHOD: Hollow Stem Auger	LOGGED BY: HK	REVIEWED BY: DAS/MM		
DRILLING EQUIPMENT: CME-75	BORING DIA. (in.): 8	TOTAL DEPTH (ft): 41.5	GROUND ELEV. (ft): 1593	DEPTH/ELEV. GROUND WATER (ft): AT TIME OF DRILLING 25.00 ft / Elev 1568.00 ft; AT END OF DRILLING ---; AFTER DRILLING ---	
SAMPLING METHOD: 140-lb Hammer, 30-in Drop	NOTES: Hammer Efficiency = 80.0% N_{60}~$1.33N_{SPT}$				

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
	0	X						SM	**VERY OLD AXIAL-CHANNEL DEPOSITS (Qvoa)**: SILTY SAND (SM), loose to medium dense, brown, moist, fine to coarse grained, roots, angular gravels.	
1590		X								RV WA
	5							SC	CLAYEY SAND (SC), brown, dense, moist, fine to coarse grained, micaceous.	
			CAL	40						EI
1585										
	10								Medium dense.	
			CAL	22		9.0	112.4			DS WA
1580										
	15								Trace gravel.	
			CAL	17						
1575										
	20								Loose, increase in moisture.	
			CAL	11						
1570										

LOG OF TEST BORING

ATLAS PROJECT NAME	ATLAS PROJECT NUMBER	B-9S
Mead Valley Sewer Improvements	1962.000-1	

SITE	START	END	SHEET NO.
Riverside County, CA	9/22/22	9/22/22	18

DRILLING COMPANY	DRILL METHOD	LOGGED BY	REVIEWED BY
Baja Exploration	Hollow Stem Auger	HK	DAS/MM

DRILLING EQUIPMENT	BORING DIA. (in.)	TOTAL DEPTH (ft)	GROUND ELEV. (ft)	DEPTH/ELEV. GROUND WATER (ft)
CME-75	8	41.5	1593	∇ AT TIME OF DRILLING 25.00 ft / Elev 1568.00 ft

SAMPLING METHOD	NOTES	
140-lb Hammer, 30-in Drop	Hammer Efficiency = 80.0% N_{60}~$1.33N_{SPT}$	▼ AT END OF DRILLING --- ▼ AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
			CAL	36					**VAL VERDE TONALITE (qdi)**: IGNEOUS ROCK (QUARTZ DIORITE), olive gray, intensely weathered to decomposed, soft to moderately hard; (POORLY GRADED SAND (SP), dense, wet, fine to medium grained). *(continued)* Groundwater observed at 25 feet.	
1565										
	30									
			SPT	34	45					
1560										
	35								(Very dense).	
			SPT	56	75					
1555										
	40									
			SPT	85/12"	113/12"					
									BORING TERMINATED AT 41½ FEET Groundwater observed at 25 Feet	
1550										
	45									
1545										

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LOG OF TEST BORING

ATLAS PROJECT NAME: Mead Valley Sewer Improvements		ATLAS PROJECT NUMBER: 1962.000-1		B-10S
SITE: Riverside County, CA		START: 9/23/22	END: 9/23/22	SHEET NO.: 19
DRILLING COMPANY: Baja Exploration	DRILL METHOD: Hollow Stem Auger	LOGGED BY: HK		REVIEWED BY: DAS/MM
DRILLING EQUIPMENT: CME-75	BORING DIA. (in.): 8	TOTAL DEPTH (ft): 41.5	GROUND ELEV. (ft): 1587	DEPTH/ELEV. GROUND WATER (ft): AT TIME OF DRILLING 27.00 ft / Elev 1560.00 ft; AT END OF DRILLING ---; AFTER DRILLING ---
SAMPLING METHOD: 140-lb Hammer, 30-in Drop	NOTES: Hammer Efficiency = 80.0% N_{60}~$1.33N_{SPT}$			

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	0	X					**FILL (Qf)**: SILTY SAND (SM), medium dense, brown, moist, fine to medium grained, low plasticity, trace gravel.
1585							
	5						**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), olive gray, intensely weathered to decomposed, soft to moderately hard; (POORLY GRADED SAND (SP), very dense, moist, fine to medium grained).
			CAL	27			
1580							
	10		CAL	50/6			(Very dense, weakly cemented).
1575							
	15		CAL	50/5			Light brown; (increase in moisture).
1570							
	20		CAL	50/6			
1565							

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LOG OF TEST BORING

ATLAS PROJECT NAME: Mead Valley Sewer Improvements	ATLAS PROJECT NUMBER: 1962.000-1	B-10S	
SITE: Riverside County, CA	START: 9/23/22	END: 9/23/22	SHEET NO.: 20
DRILLING COMPANY: Baja Exploration	DRILL METHOD: Hollow Stem Auger	LOGGED BY: HK	REVIEWED BY: DAS/MM
DRILLING EQUIPMENT: CME-75	BORING DIA. (in.): 8	TOTAL DEPTH (ft): 41.5	GROUND ELEV. (ft): 1587
SAMPLING METHOD: 140-lb Hammer, 30-in Drop	NOTES: Hammer Efficiency = 80.0% N_{60}~$1.33N_{SPT}$		

DEPTH/ELEV. GROUND WATER (ft)
- AT TIME OF DRILLING 27.00 ft / Elev 1560.00 ft
- AT END OF DRILLING ---
- AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			SPT	52	69		**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), olive gray, intensely weathered to decomposed, soft to moderately hard; (POORLY GRADED SAND (SP), very dense, moist, fine to medium grained). *(continued)* (Increase in coarse material). Groundwater observed at 27 feet.
1560							
	30						
			SPT	50	67		
1555							
	35						
			SPT	51	68		
1550							
	40						(Strongly cemented).
			SPT	80/12"	107/12"		
1545							**BORING TERMINATED AT 41½ FEET** Groundwater observed at 27 Feet
	45						
1540							

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LOG OF TEST BORING

ATLAS PROJECT NAME	ATLAS PROJECT NUMBER	
Mead Valley Sewer Improvements	1962.000-1	B-11S

SITE	START	END	SHEET NO.
Riverside County, CA	9/23/22	9/23/22	21

DRILLING COMPANY	DRILL METHOD	LOGGED BY	REVIEWED BY
Baja Exploration	Hollow Stem Auger	HK	DAS/MM

DRILLING EQUIPMENT	BORING DIA. (in.)	TOTAL DEPTH (ft)	GROUND ELEV. (ft)	DEPTH/ELEV. GROUND WATER (ft)
CME-75	8	41.5	1587	∇ AT TIME OF DRILLING ---

SAMPLING METHOD	NOTES	
140-lb Hammer, 30-in Drop	Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}	▼ AT END OF DRILLING --- ▼ AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
	0–5	X					**FILL (Qf)**: SILTY SAND (SM), medium dense, brown, moist, fine to medium grained, trace gravel, asphalt fragments.	COR
1585								
	5						**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), brown, intensely weathered to decomposed, soft to moderately hard; (SILTY SAND (SM), dense, moist, fine to medium grained).	
			CAL	37				PD
1580								
	10							
			CAL	30			(Medium dense, weakly cemented).	
1575								
	15						(Very dense, increase in moisture).	
			CAL	74				
1570								
	20							
			CAL	50/4			(Increase in coarse material).	
1565								

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LOG OF TEST BORING

ATLAS PROJECT NAME	ATLAS PROJECT NUMBER	
Mead Valley Sewer Improvements	1962.000-1	B-11S

SITE	START	END	SHEET NO.
Riverside County, CA	9/23/22	9/23/22	22

DRILLING COMPANY	DRILL METHOD	LOGGED BY	REVIEWED BY
Baja Exploration	Hollow Stem Auger	HK	DAS/MM

DRILLING EQUIPMENT	BORING DIA. (in.)	TOTAL DEPTH (ft)	GROUND ELEV. (ft)	DEPTH/ELEV. GROUND WATER (ft)
CME-75	8	41.5	1587	AT TIME OF DRILLING ---

SAMPLING METHOD	NOTES	
140-lb Hammer, 30-in Drop	Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}	AT END OF DRILLING --- AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
			SPT	81	108		**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), brown, intensely weathered to decomposed, soft to moderately hard; (SILTY SAND (SM), very dense, moist, fine to medium grained). *(continued)*	
1560								
	30							
			SPT	83/12"	111/12"			
1555								
	35		SPT	50/6	67/6			
1550								
	40		SPT	50/6	67/6			
1545							**BORING TERMINATED AT 41½ FEET** Groundwater and Seepage not observed	
	45							
1540								

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LOG OF TEST BORING

ATLAS PROJECT NAME: Mead Valley Sewer Improvements			ATLAS PROJECT NUMBER: 1962.000-1			B-12S
SITE: Riverside County, CA			START: 9/23/22	END: 9/23/22		SHEET NO.: 23
DRILLING COMPANY: Baja Exploration	DRILL METHOD: Hollow Stem Auger		LOGGED BY: HK		REVIEWED BY: DAS/MM	
DRILLING EQUIPMENT: CME-75	BORING DIA. (in.): 8	TOTAL DEPTH (ft): 41.5	GROUND ELEV. (ft): 1582	DEPTH/ELEV. GROUND WATER (ft): AT TIME OF DRILLING 39.00 ft / Elev 1543.00 ft; AT END OF DRILLING ---; AFTER DRILLING ---		
SAMPLING METHOD: 140-lb Hammer, 30-in Drop	NOTES: Hammer Efficiency = 80.0% N_{60}~$1.33N_{SPT}$					

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
1582	0	X					**FILL (Qf)**: SILTY SAND (SM), medium dense, brown, moist, fine to medium grained, trace gravel, asphalt fragments.	
1580		X						PD RV
1577	5						**YOUNG WASH DEPOSITS (Qywa)** : SILTY SAND, medium dense, moist, fine to coarse grained, slightly micaceous.	
			CAL	23				
1575								
1572	10							
			CAL	21				
1570								
1567	15						**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), light brown, intensely weathered to decomposed, soft to moderately hard; (POORLY GRADED SAND (SP), dense, moist, fine to medium grained).	
			CAL	40				
1565								
1562	20							
			CAL	69/12"			(Very dense).	
1560								

LOG OF TEST BORING

ATLAS PROJECT NAME: Mead Valley Sewer Improvements		ATLAS PROJECT NUMBER: 1962.000-1		B-12S	
SITE: Riverside County, CA		START: 9/23/22	END: 9/23/22	SHEET NO.: 24	
DRILLING COMPANY: Baja Exploration	DRILL METHOD: Hollow Stem Auger	LOGGED BY: HK	REVIEWED BY: DAS/MM		
DRILLING EQUIPMENT: CME-75	BORING DIA. (in.): 8	TOTAL DEPTH (ft): 41.5	GROUND ELEV. (ft): 1582	DEPTH/ELEV. GROUND WATER (ft): AT TIME OF DRILLING 39.00 ft / Elev 1543.00 ft; AT END OF DRILLING ---; AFTER DRILLING ---	
SAMPLING METHOD: 140-lb Hammer, 30-in Drop	NOTES: Hammer Efficiency = 80.0% N_{60}~$1.33N_{SPT}$				

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
			CAL	50/6			**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), light brown, intensely weathered to decomposed, soft to moderately hard; (POORLY GRADED SAND (SP), very dense, moist, fine to medium grained). *(continued)*	
1555								
	30						(Increase in coarse material).	
			SPT	51	68			
1550								
	35						Potassium feldspar, weakly cemented, (increased coarse material).	
			SPT	66	88			
1545								
						∇	Groundwater observed at 39 feet.	
	40							
			SPT	76/12"	101/12"			
1540								
	45							
1535								

BORING TERMINATED AT 41½ FEET
Groundwater observed at 39 Feet

LOG OF TEST BORING

ATLAS PROJECT NAME	ATLAS PROJECT NUMBER	
Mead Valley Sewer Improvements	1962.000-1	B-13S

SITE	START	END	SHEET NO.
Riverside County, CA	9/28/22	9/28/22	25

DRILLING COMPANY	DRILL METHOD	LOGGED BY	REVIEWED BY
Baja Exploration	Hollow Stem Auger	SD	DAS/MM

DRILLING EQUIPMENT	BORING DIA. (in.)	TOTAL DEPTH (ft)	GROUND ELEV. (ft)	DEPTH/ELEV. GROUND WATER (ft)
LAR-55	8	40.5	1577	▽ AT TIME OF DRILLING ---

SAMPLING METHOD	NOTES	
140-lb Hammer, 30-in Drop	Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}	▼ AT END OF DRILLING --- ▼ AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	0	X							**FILL (Qf)** : SILTY SAND (SM), medium dense, brown, moist, fine to coarse grained.
1575									
	5								**YOUNG WASH DEPOSITS (Qywa)** : CLAYEY SAND (SC), medium dense, pale brown, moist, fine to medium grained.
			CAL	12		8.7	119.9		
1570									
	10								
			CAL	79/9"					Very dense.
1565									
	15		CAL	50/6					Decrease in fine content.
1560									
									VAL VERDE TONALITE (Kvt): IGNEOUS ROCK (QUARTZ DIORITE), light brown, intensely weathered to decomposed, soft to moderately hard; (CLAYEY SAND (SC), very dense, moist, fine to coarse grained).
	20		CAL	50/6					
1555									Yellowish brown to dark brown.

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LOG OF TEST BORING

ATLAS PROJECT NAME	ATLAS PROJECT NUMBER	
Mead Valley Sewer Improvements	1962.000-1	**B-13S**

SITE	START	END	SHEET NO.
Riverside County, CA	9/28/22	9/28/22	26

DRILLING COMPANY	DRILL METHOD	LOGGED BY	REVIEWED BY
Baja Exploration	Hollow Stem Auger	SD	DAS/MM

DRILLING EQUIPMENT	BORING DIA. (in.)	TOTAL DEPTH (ft)	GROUND ELEV. (ft)	DEPTH/ELEV. GROUND WATER (ft)
LAR-55	8	40.5	1577	AT TIME OF DRILLING ---

SAMPLING METHOD	NOTES	
140-lb Hammer, 30-in Drop	Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}	AT END OF DRILLING --- AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			SPT	50/6	67/6				**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), light brown, intensely weathered to decomposed, soft to moderately hard; (CLAYEY SAND (SC), very dense, moist, fine to coarse grained). *(continued)*
1550									
	30		CAL	50/6					
1545									
	35		SPT	50/2					
1540									
	40		SPT	50/2					
									BORING TERMINATED AT 40½ FEET Groundwater and Seepage not observed
1535									
	45								
1530									

LOG OF TEST BORING

ATLAS PROJECT NAME: Mead Valley Sewer Improvements			ATLAS PROJECT NUMBER: 1962.000-1			B-14S
SITE: Riverside County, CA			START: 9/29/22	END: 9/29/22		SHEET NO.: 27
DRILLING COMPANY: Baja Exploration		DRILL METHOD: Hollow Stem Auger		LOGGED BY: SD		REVIEWED BY: DAS/MM
DRILLING EQUIPMENT: CME-75	BORING DIA. (in.): 8	TOTAL DEPTH (ft): 40.5	GROUND ELEV. (ft): 1641	DEPTH/ELEV. GROUND WATER (ft)		
SAMPLING METHOD: 140-lb Hammer, 30-in Drop	NOTES: Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}			AT TIME OF DRILLING: 29.00 ft / Elev 1612.00 ft; AT END OF DRILLING: ---; AFTER DRILLING: ---		

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	0	X					**FILL (Qf)** : SILTY SAND (SM), medium dense, light reddish brown, moist, fine grained.
1640		X					
	2	X					**VERY OLD AXIAL-CHANNEL DEPOSITS (Qvoa)** : CLAYEY SAND (SC), dense, reddish brown, moist, fine to medium grained.
	4	X					**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), dark grayish brown, intensely weathered to decomposed, soft to moderately hard; (POORLY GRADED SAND (SP), very dense, moist, fine to coarse grained).
	5		CAL	50/6			
1635							
	10		CAL	50/6			
1630							
	15		CAL	50/6			
1625							
	20		CAL	50/6			
1620							

LOG OF TEST BORING

ATLAS PROJECT NAME	ATLAS PROJECT NUMBER	
Mead Valley Sewer Improvements	1962.000-1	B-14S

SITE	START	END	SHEET NO.
Riverside County, CA	9/29/22	9/29/22	28

DRILLING COMPANY	DRILL METHOD	LOGGED BY	REVIEWED BY
Baja Exploration	Hollow Stem Auger	SD	DAS/MM

DRILLING EQUIPMENT	BORING DIA. (in.)	TOTAL DEPTH (ft)	GROUND ELEV. (ft)	DEPTH/ELEV. GROUND WATER (ft)
CME-75	8	40.5	1641	∇ AT TIME OF DRILLING 29.00 ft / Elev 1612.00 ft

SAMPLING METHOD	NOTES	
140-lb Hammer, 30-in Drop	Hammer Efficiency = 80.0% N_{60}~$1.33N_{SPT}$	▼ AT END OF DRILLING --- ▼ AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			SPT	50/3	67/3		**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), dark grayish brown, intensely weathered to decomposed, soft to moderately hard; (POORLY GRADED SAND (SP), very dense, moist, fine to coarse grained). *(continued)* (Trace fines).
1615							
							∇ Groundwater observed at 29 feet.
	30		SPT	50/6			
1610							
	35		SPT	50/5			
1605							
	40		SPT	50/4			
1600							**BORING TERMINATED AT 40½ FEET** Groundwater observed at 29 Feet
	45						
1595							

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LOG OF TEST BORING

ATLAS PROJECT NAME: Mead Valley Sewer Improvements		ATLAS PROJECT NUMBER: 1962.000-1		B-15S
SITE: Riverside County, CA		START: 9/29/22	END: 9/29/22	SHEET NO.: 29
DRILLING COMPANY: Baja Exploration	DRILL METHOD: Hollow Stem Auger	LOGGED BY: SD		REVIEWED BY: DAS/MM
DRILLING EQUIPMENT: CME-75	BORING DIA. (in.): 8	TOTAL DEPTH (ft): 40.5	GROUND ELEV. (ft): 1641	DEPTH/ELEV. GROUND WATER (ft): AT TIME OF DRILLING 28.00 ft / Elev 1613.00 ft; AT END OF DRILLING ---; AFTER DRILLING ---
SAMPLING METHOD: 140-lb Hammer, 30-in Drop	NOTES: Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}			

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	DESCRIPTION AND CLASSIFICATION	LAB TESTS
1641–1636	0–5	X						**FILL (Qf)** : CLAYEY SAND (SC), medium dense, reddish brown, moist, fine to medium grained.	AL WA
1636	5		CAL	50/6				**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), brownish gray, intensely weathered to decomposed, soft to moderately hard; (POORLY GRADED SAND (SP), very dense, moist, fine to coarse grained).	
1631	10		SPT	50/6	67/6	13.8	116.4		
1626	15		CAL	50/6					
1621	20		CAL	50/5					

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LOG OF TEST BORING

ATLAS PROJECT NAME	ATLAS PROJECT NUMBER	
Mead Valley Sewer Improvements	1962.000-1	B-15S

SITE	START	END	SHEET NO.
Riverside County, CA	9/29/22	9/29/22	30

DRILLING COMPANY	DRILL METHOD	LOGGED BY	REVIEWED BY
Baja Exploration	Hollow Stem Auger	SD	DAS/MM

DRILLING EQUIPMENT	BORING DIA. (in.)	TOTAL DEPTH (ft)	GROUND ELEV. (ft)	DEPTH/ELEV. GROUND WATER (ft)
CME-75	8	40.5	1641	AT TIME OF DRILLING 28.00 ft / Elev 1613.00 ft

SAMPLING METHOD	NOTES	
140-lb Hammer, 30-in Drop	Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}	AT END OF DRILLING --- AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
			SPT	50/6					**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), brownish gray, intensely weathered to decomposed, soft to moderately hard; (POORLY GRADED SAND (SP), very dense, moist, fine to coarse grained). *(continued)*	
1615										
									Groundwater observed at 28 feet.	
	30		SPT	50/4						
1610										
									(SILTY SAND (SM), very dense, wet, fine to medium grained).	
	35		SPT	50/6						
1605										
	40		SPT	50/4						
1600									**BORING TERMINATED AT 40½ FEET** Groundwater observed at 28 Feet	
	45									
1595										

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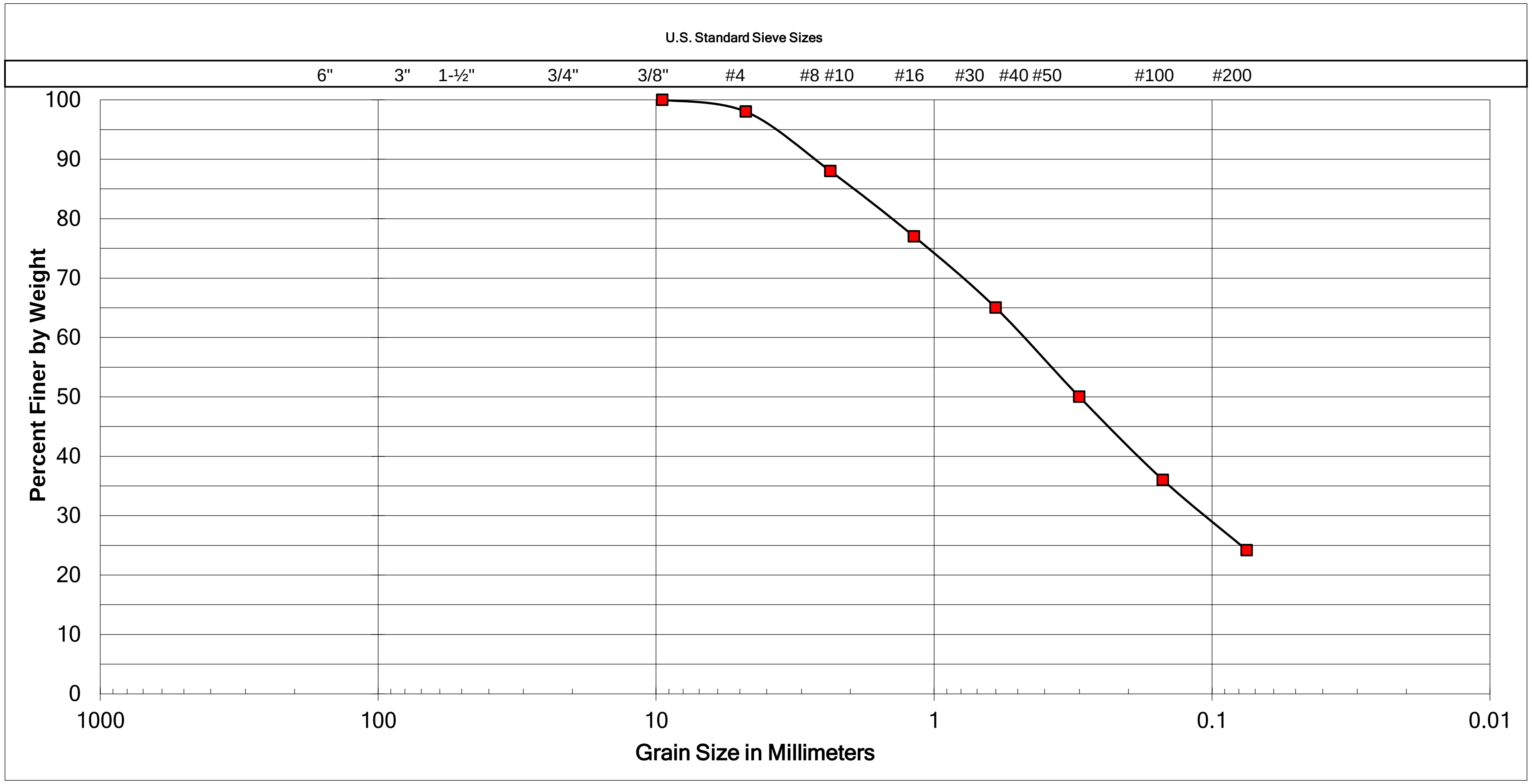
APPENDIX II
LABORATORY TESTING

Laboratory tests were performed to provide geotechnical parameters for engineering analyses. The following tests were conducted:

- **CLASSIFICATION:** Field classifications were verified in the laboratory by visual examination. The final soil classifications are in accordance with the Unified Soil Classification System.
- **IN SITU MOISTURE AND DENSITY:** The in-situ moisture content and dry unit weight were evaluated on samples collected from the borings. The test results are presented on the boring logs in Appendix I.
- **PARTICLE-SIZE DISTRIBUTION:** The particle-size distribution was evaluated on soil samples in accordance with ASTM D6913.
- **CORROSIVITY:** Corrosivity tests were performed on soil samples. The pH and minimum resistivity were evaluated in general accordance with California Test 643. The soluble sulfate content was evaluated in accordance with California Test 417. The total chloride ion content was evaluated in accordance with California Test 422.
- **PERCENT FINDER THAN #200:** This test was performed on soil samples in accordance with ASTM D1140.
- **DIRECT SHEAR:** This test was performed on soil samples in accordance with ASTM D3080. The shear stress was applied to inundated samples at a constant rate of strain of 0.003 inch per minute.
- **EXPANSION INDEX:** This test was performed on soil samples in accordance with ASTM D4289.
- **ATTERBERG LIMITS:** The Atterberg limits were evaluated on a selected soil sample in accordance with ASTM D4318.
- **R-VALUE:** This test was performed on soil samples in accordance with Caltrans Test Method 301.
- **UNCONFINED COMPRESSIVE STRENGTH:** This test was performed on intact rock samples in accordance with ASTM D7012.

Soil and rock samples not tested are stored in our laboratory for future reference and analysis, if needed. Unless notified to the contrary, all samples will be disposed of 30 days from the date of this report.



<table>
<tr><td rowspan="2">Cobbles</td><td colspan="2">Gravel</td><td colspan="3">Sand</td><td rowspan="2">Silt or Clay</td></tr>
<tr><td>Coarse</td><td>Fine</td><td>Coarse</td><td>Medium</td><td>Fine</td></tr>
</table>

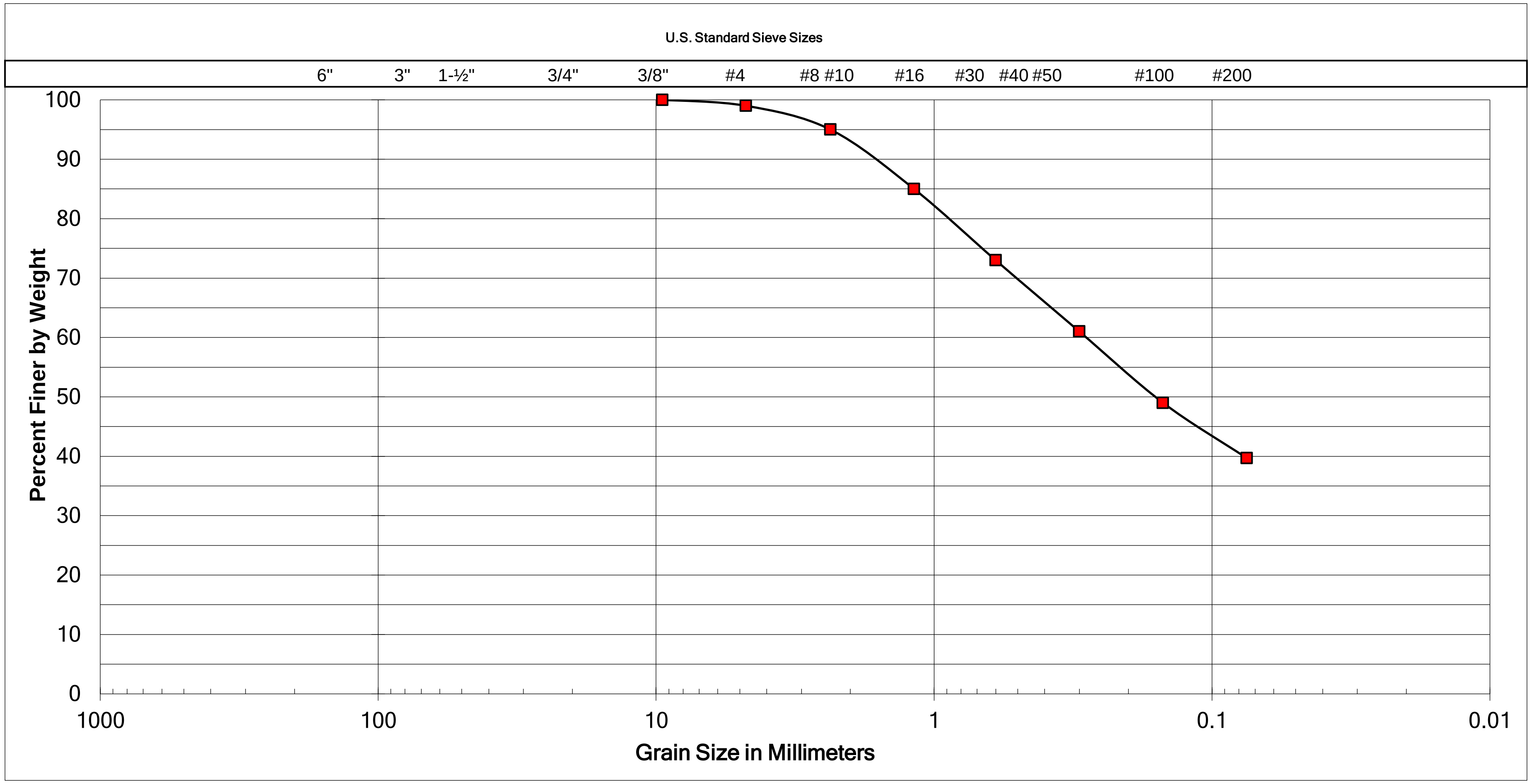
SAMPLE LOCATION
B-4S at 5 to 5½ feet
SAMPLE NUMBER
78201

UNIFIED SOIL CLASSIFICATION:	SM
DESCRIPTION	SILTY SAND

ATTERBERG LIMITS	
LIQUID LIMIT	-
PLASTIC LIMIT	-
PLASTICITY INDEX	-

ATLAS

Mead Valley Sewer Improvements Riverside County, California			
By:	JRD	Date:	March, 2023
Job Number:	1962.000-1	Figure:	II-1



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

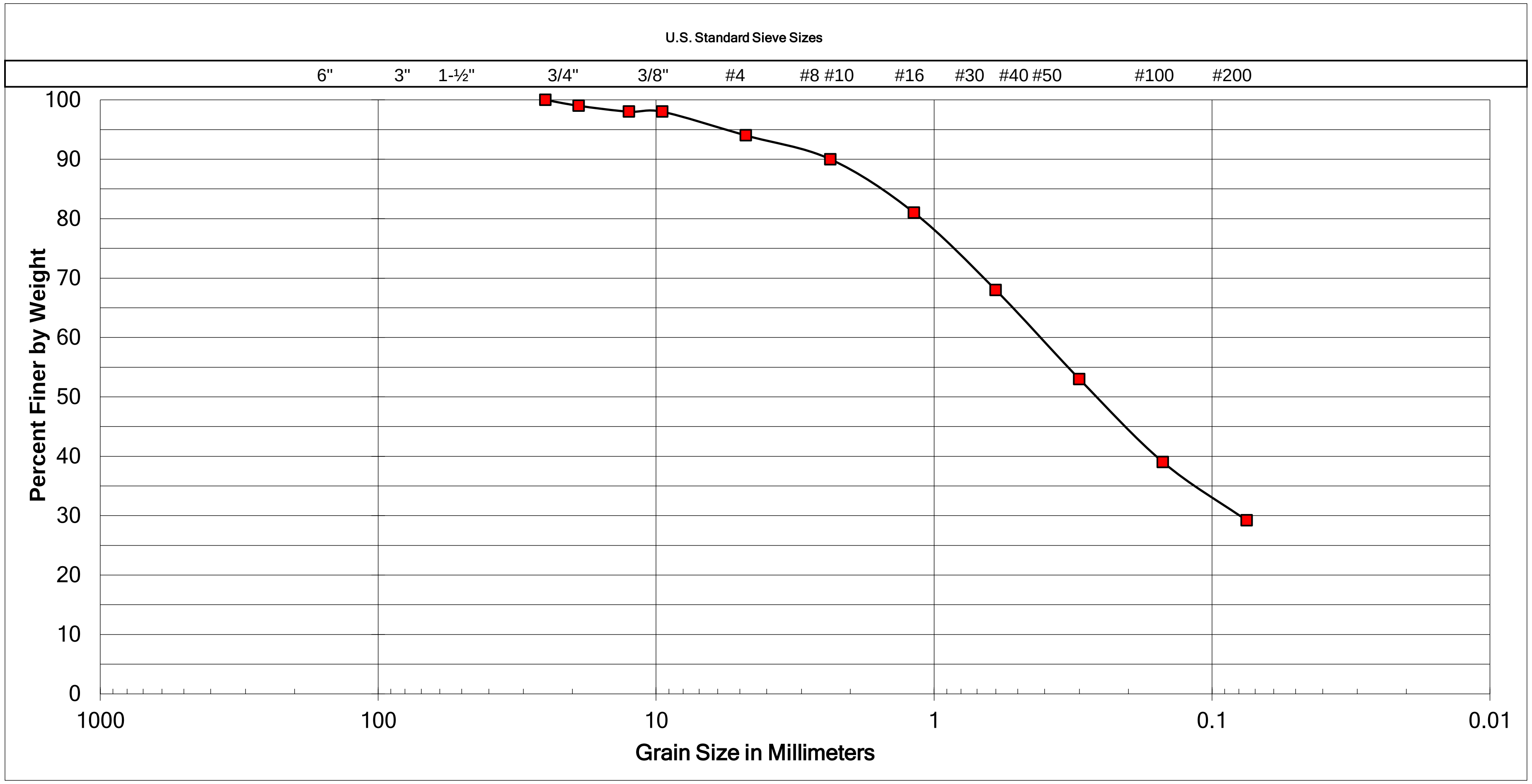
SAMPLE LOCATION
B-11S at 6 to 6½ feet
SAMPLE NUMBER
78210

UNIFIED SOIL CLASSIFICATION:	SM
DESCRIPTION	SILTY SAND

ATTERBERG LIMITS	
LIQUID LIMIT	-
PLASTIC LIMIT	-
PLASTICITY INDEX	-

ATLAS

Mead Valley Sewer Improvements Riverside County, California			
By:	JRD	Date:	March, 2023
Job Number:	1962.000-1	Figure:	II-2



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

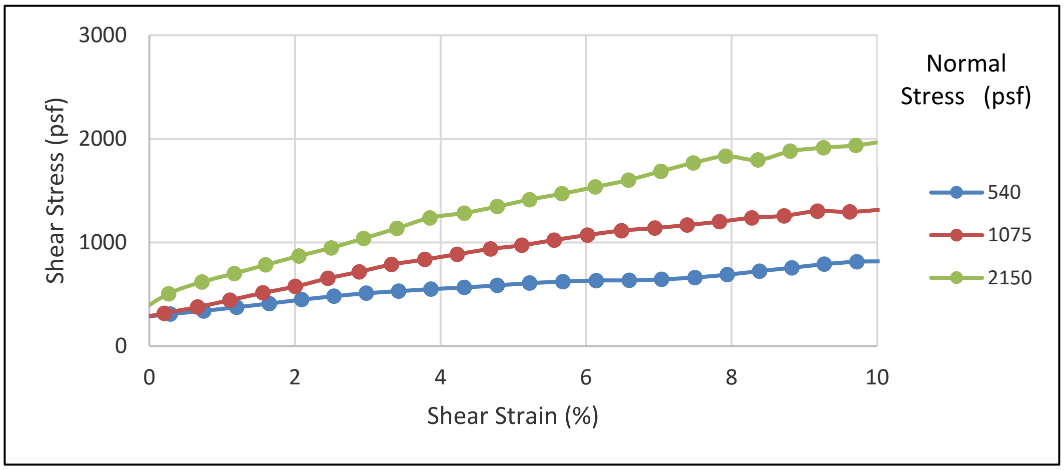
SAMPLE LOCATION
B-12S at 0 to 5 feet
SAMPLE NUMBER
78211

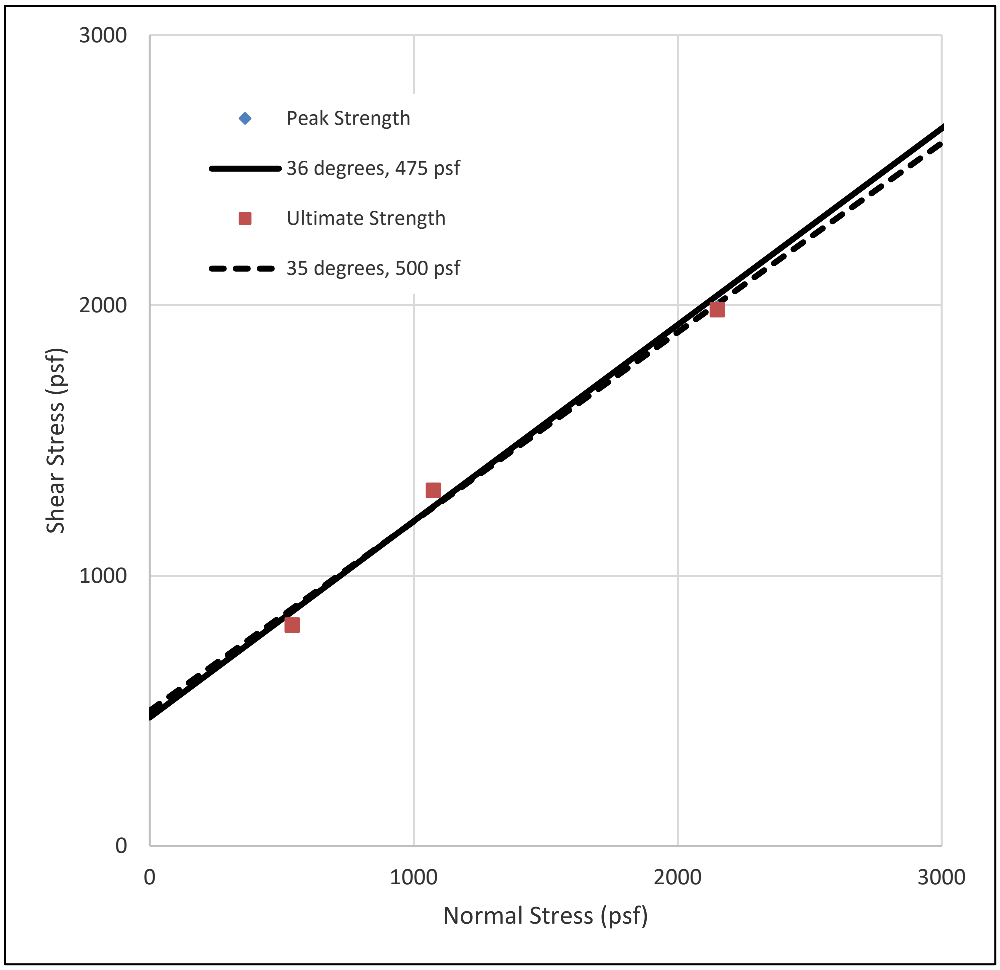
UNIFIED SOIL CLASSIFICATION:	SM
DESCRIPTION	SILTY SAND

ATTERBERG LIMITS	
LIQUID LIMIT	-
PLASTIC LIMIT	-
PLASTICITY INDEX	-

ATLAS

Mead Valley Sewer Improvements Riverside County, California			
By:	JRD	Date:	March, 2023
Job Number:	1962.000-1	Figure:	II-3





SAMPLE ID: B-1S at 5½ to 6 Feet

VAL VERDE TONALITE (Kvt):

Intensely Weathered to Decomposed Igneous Rock

NOTES: In Situ

Strain Rate: 0.003 in/min

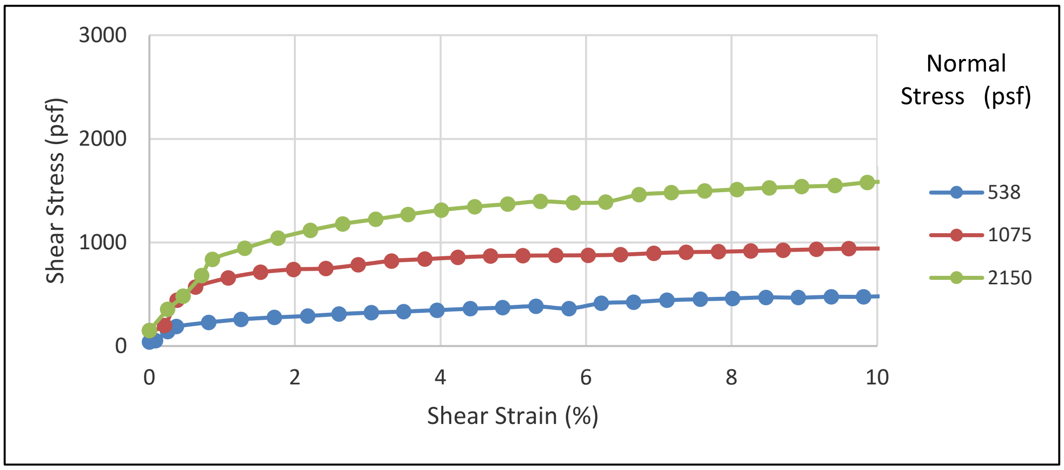
Sample was consolidated and drained

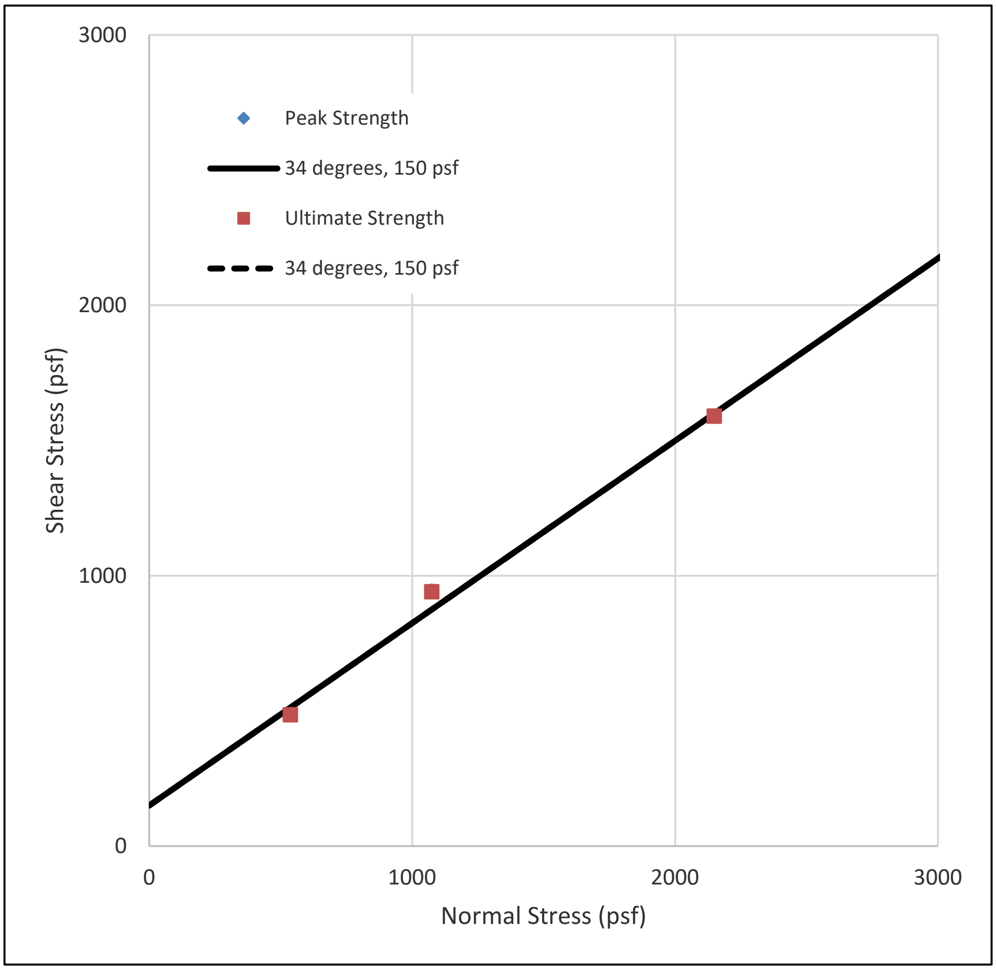
	Peak	Ultimate
Φ	36 °	35 °
c	475 psf	500 psf

	Initial	Final
γ_d	109.5 pcf	109.5 pcf
w_c	3.6 %	17.7 %
Saturation	18 %	90 %

ATLAS

Mead Valley Sewer Improvements Riverside County, California			
By:	JRD	Date:	March, 2023
Job Number:	1962.000-1	Figure:	II-4





SAMPLE ID: B-9S at 11 to 11½ Feet

VERY OLD AXIAL-CHANNEL DEPOSITS (Qvoa):

CLAYEY SAND (SC)

NOTES: In Situ

Strain Rate: 0.003 in/min

Sample was consolidated and drained

	Peak	Ultimate
Φ	34 °	34 °
c	150 psf	150 psf

	Initial	Final
γ_d	112.4 pcf	112.4 pcf
w_c	9.0 %	17.0 %
Saturation	50 %	93 %

ATLAS

Mead Valley Sewer Improvements
Riverside County, California

By:	JRD	Date:	March, 2023
Job Number:	1962.000-1	Figure:	II-5

RESISTIVITY, pH, SOLUBLE CHLORIDE and SOLUBLE SULFATE
pH & Resistivity (Cal 643, ASTM G51) , Soluble Chlorides (Cal 422) , Soluble Sulfate (Cal 417)

SAMPLE ID	pH	RESISTIVITY (Ω-CM)	CHLORIDE (%)	SULFATE (%)
B-11S at 0 to 5 feet	7.99	1250	0.005	0.014

EXPANSION INDEX
(ASTM D4289)

SAMPLE ID	EXPANSION INDEX	EXPANSION POTENTIAL	SOIL TYPE (USCS)
B-3S at 0 to 5 feet	*18*	Very Low	CLAYEY SAND (SC)
B-9S at 6 to 6½ feet	*38*	Low	CLAYEY SAND (SC)

Expansion Index	Expansion Potential
1-20	Very Low
21-50	Low
51-90	Medium
91-130	High
Above 130	Very High

Percent Passing No. 200 and No. 4
ASTM D1140

SAMPLE ID	PASSING NO. 200 (%)	PASSING NO. 4 (%)	SOIL TYPE (USCS)
B-1S at 5½ to 6 Feet	7.1	100	Poorly Graded SAND with SILT (SP-SM)
B-3S at 0 to 5 Feet	49.5	100	CLAYEY SAND (SC)
B-5S at 5 to 5½ Feet	45.9	100	CLAYEY SAND (SC)
B-7S at 11 to 11½ Feet	31.9	100	SILTY SAND (SM)
B-8S at 0 to 5 Feet	33.8	100	CLAYEY SAND (SC)
B-8S at 11 to 11½ Feet	40.9	100	CLAYEY SAND (SC)
B-9S at 0 to 5 Feet	36.7	100	SILTY SAND (SM)
B-9S at 11 to 11½ Feet	32.2	100	CLAYEY SAND (SC)
B-15S at 0 to 5 Feet	40.3	100	CLAYEY SAND (SC)

ATTERBERG LIMITS
(ASTM D4318)

SAMPLE ID	LIQUID LIMIT	PLASTIC LIMIT	PLASTIC INDEX	SOIL TYPE (USCS)
B-3S at 0 to 5 feet	27	17	10	CLAYEY SAND (SC)
B-8S at 0 to 5 feet	42	15	27	CLAYEY SAND (SC)
B-15S at 0 to 5 Feet	33	15	18	CLAYEY SAND (SC)

R-Value
(CTM 301)

SAMPLE ID	R-VALUE	SOIL TYPE (USCS)
B-3S at 0 to 5 feet	13	CLAYEY SAND (SC)
B-9S at 0 to 5 feet	24	SILTY SAND (SM)
B-12S at 0 to 5 feet	44	SILTY SAND (SM)

UNCONFINED COMPRESSIVE STRENGTH
(ASTM D7012)

SAMPLE ID	UNCONFINED COMPRESSIVE STRENGTH (PSI)			ROCK DESCRIPTION
	SPECIMEN 1	SPECIMEN 2	AVERAGE	
B-6S at 38 to 40 feet	2106	4037	3071	VAL VERDE TONALIATE (Kvt)

APPENDIX III
SEISMIC REFRACTION STUDY

Atlas performed a seismic refraction study to develop subsurface velocity profiles to assess depth of bedrock and apparent rippability of the subsurface materials on January 3rd and 4th, 2023. The seismic refraction study is presented in this appendix.

SEISMIC REFRACTION STUDY

EASTERN MUNICIPAL WATER DISTRICT
GOOD HOPE AND MEAD VALLEY WATER PROJECT

Riverside, California

PREPARED FOR:

Mr. Nate Olivas
Eastern Municipal Water District
2270 Trumble Road
Perris, CA 92570

PREPARED BY:

Atlas Technical Consultants LLC
6280 Riverdale Street
San Diego, CA 92120

January 31, 2023

6280 Riverdale Street
San Diego, CA 92120
(877) 215-4321 | oneatlas.com

January 31, 2023

Atlas No. 1962

MR. NATE OLIVAS
EASTERN MUNICIPAL WATER DISTRICT
2270 TRUMBLE ROAD
PERRIS, CA 92570

Subject: **Eastern Municipal Water District**
Good Hope and Mead Valley Water Project
Riverside, California

Dear Mr. Olivas:

In accordance with your authorization, Atlas has performed a seismic refraction study pertaining to the subject project located in Riverside County, California. Specifically, our evaluation consisted of performing six seismic P-wave refraction traverses at preselected locations. The purpose of our evaluation was to develop subsurface velocity profiles of the study areas in order to assess the depth to bedrock and apparent rippability of the subsurface materials. Our field services were conducted on January 3rd and 4th, 2022. This data report presents our methodology, equipment used, analysis, and results.

We appreciate the opportunity to be of service on this project. Should you have any questions related to this report, please contact the undersigned at your convenience.

Respectfully submitted,
Atlas Technical Consultants LLC

Paul W. Gresoro
Senior Staff Geophysicist

Patrick F. Lehrmann, P.G., P.Gp. 1043
Principal Geologist/Geophysicist

PWG:SL:PFL:ds

Distribution: olivasn@emwd.org

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FIGURES

1. INTRODUCTION

In accordance with your authorization, Atlas has performed a seismic refraction study pertaining to the subject project located in Riverside County, California. Specifically, our evaluation consisted of performing six seismic P-wave refraction traverses at preselected locations. The purpose of our evaluation was to develop subsurface velocity profiles of the study areas in order to assess the depth to bedrock and apparent rippability of the subsurface materials. Our field services were conducted on January 3rd and 4th, 2023. This data report presents our methodology, equipment used, analysis, and results.

2. SCOPE OF SERVICES

Our scope of services included:

- Performance of six seismic P-wave refraction traverses at the project site.
- Compilation and analysis of the data collected.
- Preparation of this data report presenting our results and conclusions.

3. SITE AND PROJECT DESCRIPTION

The project site was separated into two general areas, each containing three seismic traverses. SL-1 through SL-3 were located approximately 2 miles west of Interstate 215 adjacent to Cajalco Road in Mead Valley, California (Figure 1a). SL-4 through SL-6 were located within a residential area approximately 0.5 mile west of Highway 74 in Perris, California (Figure 1b). The seismic traverses were conducted in the study area locations selected by a representative from your office. The traverses were conducted in areas of minimal topographic relief. Figures 2a through 2f and Figures 3a and 3b show the seismic line locations and depict the general site conditions, respectively. Based on our discussions with you, it is our understanding that your office requested this study in advance of trenching activities for proposed pipeline alignments for the subject project. We also understand that the results of our study may be used in the formulation of design and construction parameters for the project.

4. STUDY METHODOLOGY

Six seismic P-wave (compression wave) refraction studies were conducted at the project sites to develop subsurface velocity profiles of the areas studied, and to assess the depth to bedrock and apparent rippability of the subsurface materials. The seismic refraction method uses first-arrival times of refracted seismic waves to estimate the thicknesses and seismic velocities of subsurface layers. Seismic P-waves generated at the surface, using a hammer and plate, are refracted at boundaries separating materials of contrasting velocities. These refracted seismic waves are then detected by a series of surface vertical component 14-Hz geophones and recorded with a 24-channel Geometrics Geode seismograph. The travel times of the seismic P-waves are used in conjunction with the shot-to-geophone distances to obtain thickness and velocity information on the subsurface materials.

Geophones were placed at intervals of 5 feet for SL-1 through SL-6. Profile lengths include the two innermost off-end shots for total profile lengths of 125 feet. The general locations and lengths of the lines were determined by surface conditions, site access, depth of investigation, and you and your office. Shot points (signal-generation locations) were conducted along the lines at the ends, midpoint, and intermediate points between the ends of the midpoint.

In general, classical seismic refraction theory requires that subsurface velocities increase with depth (generalized reciprocal method (GRM) and time-intercept modeling). In classical analysis methods a layer having a velocity lower than that of the layer above will not generally be detectable by the seismic refraction method and, therefore, could lead to errors in the depth calculations of subsequent layers. In addition, lateral variations in velocity such as those caused by core stones, intrusions, or boulders can also result in the misinterpretation of the subsurface conditions. However, application of seismic tomography methods, as was performed for this project by Atlas, produces velocity models which, in general, are not subject to this limitation. However, even the application of seismic tomography analysis does have certain limitations regarding vertical and horizontal resolution. When a velocity anomaly target is of similar scale length to the seismic wavelet (or smaller), then diffraction behavior dominates because scattering is governing the loci of the wavefronts. For travel time analysis a target feature must be at a scale versus its depth that is detectable relative to the scale length of the seismic wavelet we produce and receive. There is a general limit to what scale of feature seismic tomography methods can detect regarding relatively small velocity anomaly features, related to both source and to medium velocities, and travel time uncertainties. In effect, some relatively smaller scale features including "thin" velocity inversion layers or voids, and some types of lateral and vertical velocity variations caused by core stones and intrusions might not be detected in our results. In general, the effective depth of evaluation for a seismic refraction traverse is approximately one third to one-fifth of the length of the spread.

Generally, the seismic P-wave velocity of a material can be correlated to rippability (see Table 1 below), or to some degree "hardness." Table 1 is based on published information from the Caterpillar Performance Handbook (Caterpillar, 2018), as well as our experience with similar materials, and assumes that a Caterpillar D-9 dozer ripping with a single shank is used. We emphasize that the cutoffs in this classification scheme are approximate and that rock characteristic, such as fracture spacing and orientation, play a significant role in determining rock quality or rippability. The rippability of a mass is also dependent on the excavation equipment used and the skill and experience of the equipment operator.

For trenching operations, the rippability values should be scaled downward. For example, velocities as low as 3,500 feet/second may indicate difficult ripping during trenching operations. In addition, the presence of boulders, which can be troublesome in narrow trenching operations, should be anticipated.

Table 1 – Rippability Classification

Seismic P-wave Velocity	Rippability
0 to 2,000 feet/second	Easy
2,000 to 4,000 feet/second	Moderate
4,000 to 5,500 feet/second	Difficult, Possible Blasting
5,500 to 7,000 feet/second	Very Difficult, Probable Blasting
Greater than 7,000 feet/second	Blasting Generally Required

It should be noted that the rippability cutoffs presented in Table 1 are slightly more conservative than those published in the Caterpillar Performance Handbook. Accordingly, the above classification scheme should be used with discretion, and contractors should not be relieved of making their own independent evaluation of the rippability of the on-site materials prior to submitting their bids.

5. DATA ANALYSIS

The collected data were processed using SIPwin (Rimrock Geophysics, 2003), a seismic interpretation program, and analyzed using Rayfract® Version 4.02 (Intelligent Resources Inc., 2022) which employs wave path analysis. Rayfract first provides forward modeling of refraction, transmission, and diffraction and then back-projects travel-time residuals along wave paths also known as Fresnel volumes instead of conventional analysis by rays. This increases the numerical robustness of the inversion. A smooth minimum-structure one dimensional (1-D) starting velocity-depth profile model is determined automatically directly from the seismic travel-time data first arrival picks and elevation data to produce subsurface velocities by horizontally averaging via the Delta t-V method. The Delta t-V method is based on common mid-point sorted travel times and assumes multiple horizontal layers with constant interior velocity gradients (Rohdewald 2007; Gebrande 1985). Modeled seismic rays follow circular arcs inside each modeled layer. The Delta t-V starting model is then refined with 2-D Wavepath Eikonal Traveltime (WET) inversion method (Schuster, 1993). The resulting 2-D WET velocity model provides a 2-D tomographic image of the P-wave velocities which can be used to estimate subsurface geologic conditions. Both vertical and lateral velocity information is contained in the tomography model. Changes in layer velocity are generally revealed as gradients rather than discrete contacts, which typically are more representative of actual conditions.

6. RESULTS AND CONCLUSIONS

As previously indicated, six seismic traverses were conducted as part of our study and Figures 4a through 4f present the velocity models generated from our analysis. Based on the results, it appears that the study area is generally underlain by low velocity materials in the near subsurface and higher velocity material at depth. Distinct vertical and lateral velocity variations are evident in the models. Moreover, the degree of bedrock weathering and the depth to bedrock appears to be highly variable across the study areas. In addition, remnant boulders appear to be present in the subsurface in some areas.

Based on the refraction results, variability in the excavatability (including depth of rippability) of the subsurface materials may be expected across the project area. Furthermore, blasting may be required depending on the excavation, depth, location, equipment used, and desired rate of production. In addition, oversized materials should be expected. A contractor with excavation experience in similarly difficult conditions should be consulted for expert advice on excavation methodology, equipment, and production rate.

7. LIMITATIONS

The field evaluation and geophysical analyses presented in this report have been conducted in general accordance with current practice and the standard of care exercised by consultants performing similar tasks in the project area. No warranty, express or implied, is made regarding the conclusions, recommendations, and opinions presented in this report. There is no evaluation detailed enough to reveal every subsurface condition. Variations may exist and conditions not observed or described in this report may be present. Uncertainties relative to subsurface conditions can be reduced through additional subsurface exploration. Additional subsurface surveying will be performed upon request.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Atlas should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document. This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

8. SELECTED REFERENCES

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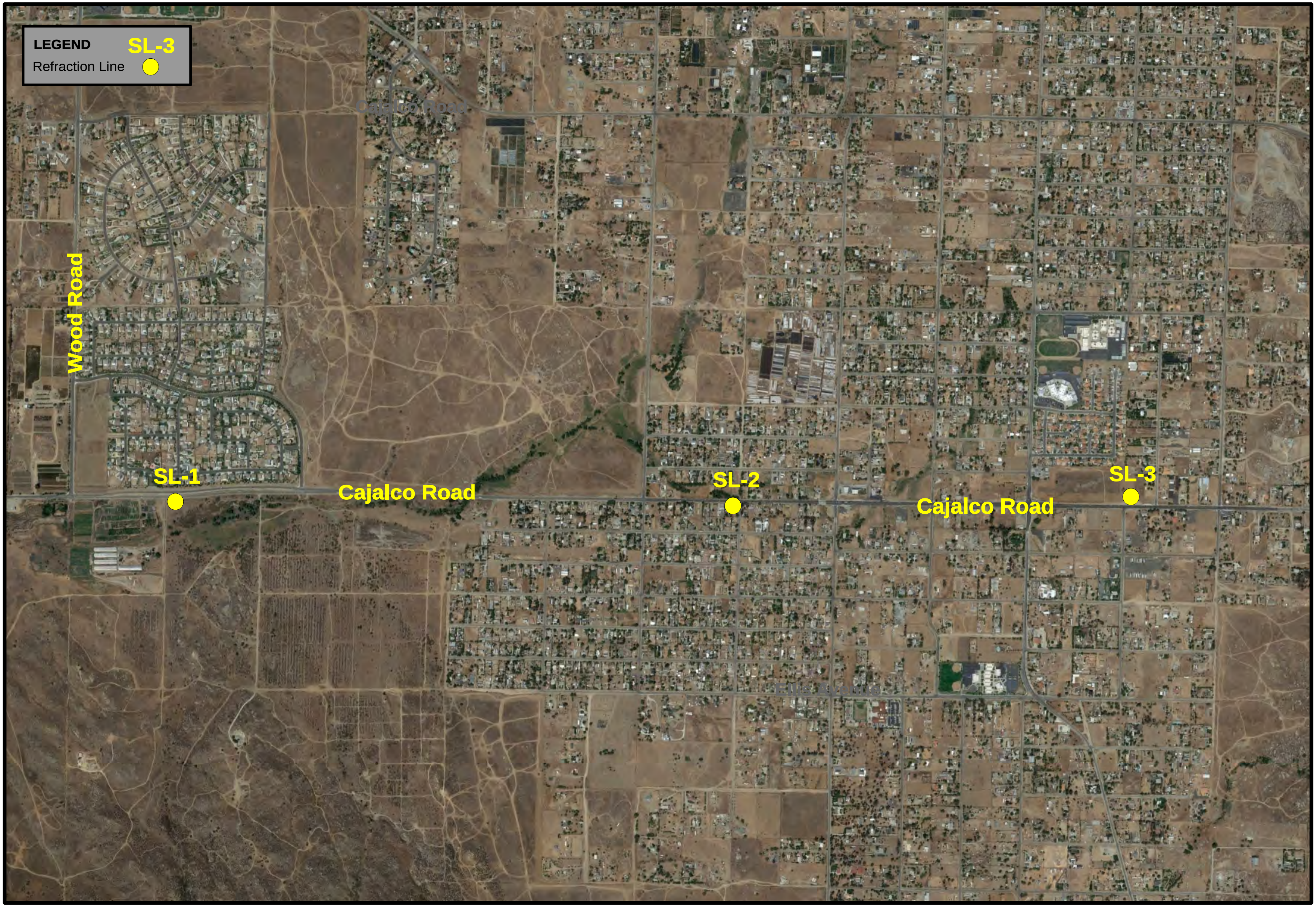


SITE LOCATION MAP

N

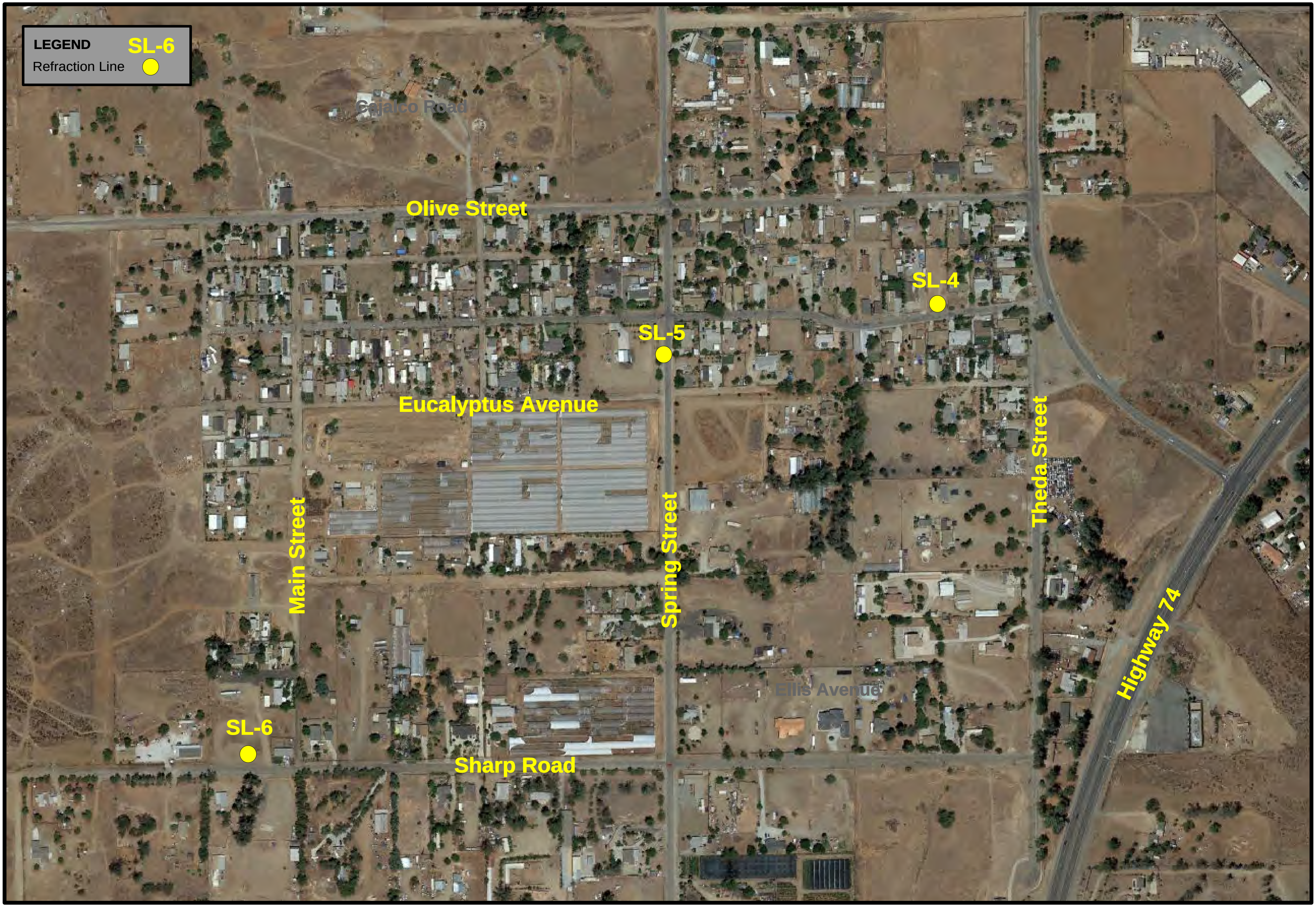
GOOD HOPE AND MEAD VALLEY
WATER PROJECT
RIVERSIDE, CALIFORNIA

Project No.: 1962

Date: 01/23

ATLAS

Figure 1a



SITE LOCATION MAP	N	GOOD HOPE AND MEAD VALLEY WATER PROJECT RIVERSIDE, CALIFORNIA	ATLAS Figure 1b
		Project No.: 1962 · Date: 01/23	

SEISMIC LINE LOCATION MAP SL-1	N	GOOD HOPE AND MEAD VALLEY WATER PROJECT RIVERSIDE, CALIFORNIA Project No.: 1962 Date: 01/23	ATLAS Figure 2a	0 75 150 approximate scale in feet

SEISMIC LINE LOCATION MAP
SL-2

N

GOOD HOPE AND MEAD VALLEY
WATER PROJECT
RIVERSIDE, CALIFORNIA

Project No.: 1962 | Date: 01/23

ATLAS

Figure 2b

0 50 100

approximate scale in feet

SEISMIC LINE LOCATION MAP
SL-3

N

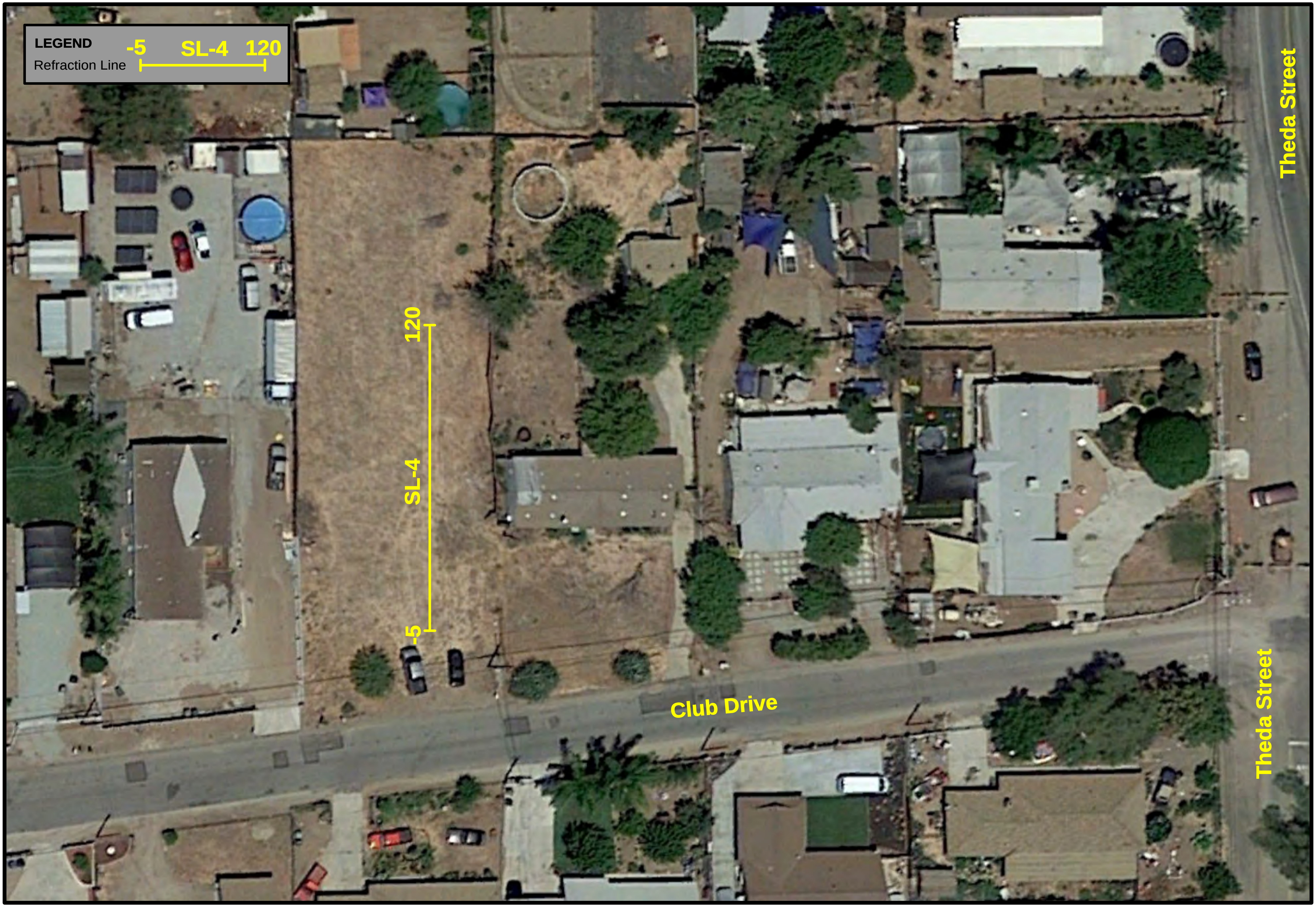
GOOD HOPE AND MEAD VALLEY
WATER PROJECT
RIVERSIDE, CALIFORNIA

Project No.: 1962
Date: 01/23

ATLAS

Figure 2c

0 50 100
approximate scale in feet



SEISMIC LINE LOCATION MAP
SL-4

N

GOOD HOPE AND MEAD VALLEY WATER PROJECT
RIVERSIDE, CALIFORNIA

Project No.: 1962

Date: 01/23

ATLAS

Figure 2d

0 50 100

approximate scale in feet

SEISMIC LINE LOCATION MAP
SL-5

N

GOOD HOPE AND MEAD VALLEY
WATER PROJECT
RIVERSIDE, CALIFORNIA

Project No.: 1962

Date: 01/23

ATLAS

Figure 2e

0 50 100

approximate scale in feet

SEISMIC LINE LOCATION MAP
SL-6

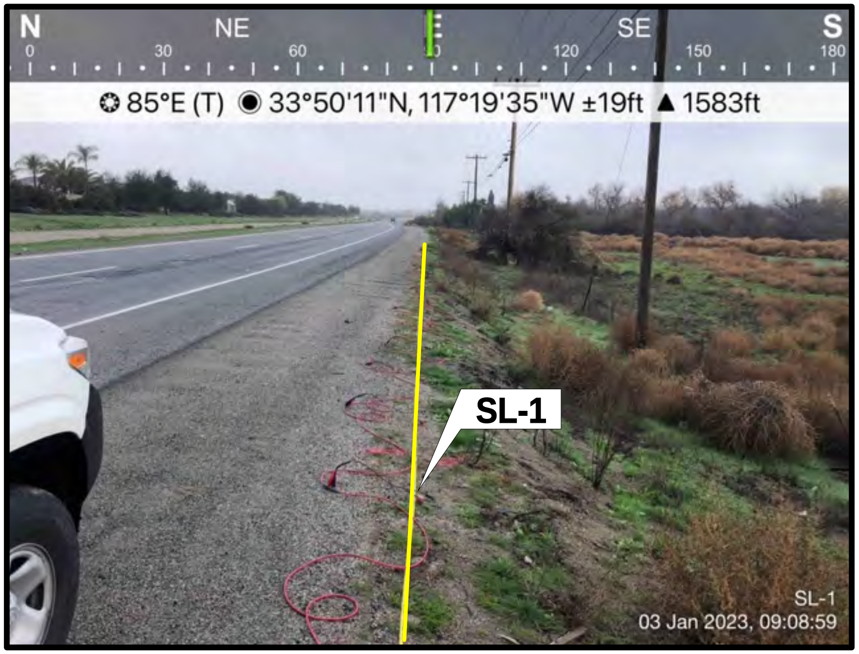
N

GOOD HOPE AND MEAD VALLEY
WATER PROJECT
RIVERSIDE, CALIFORNIA

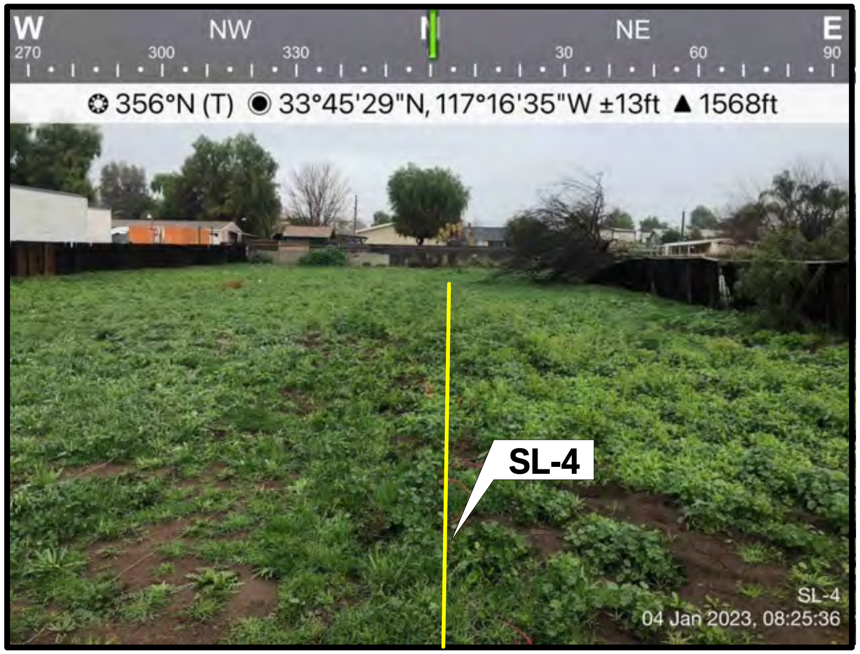
Project No.: 1962 Date: 01/23

ATLAS
Figure 2f

0 50 100
approximate scale in feet



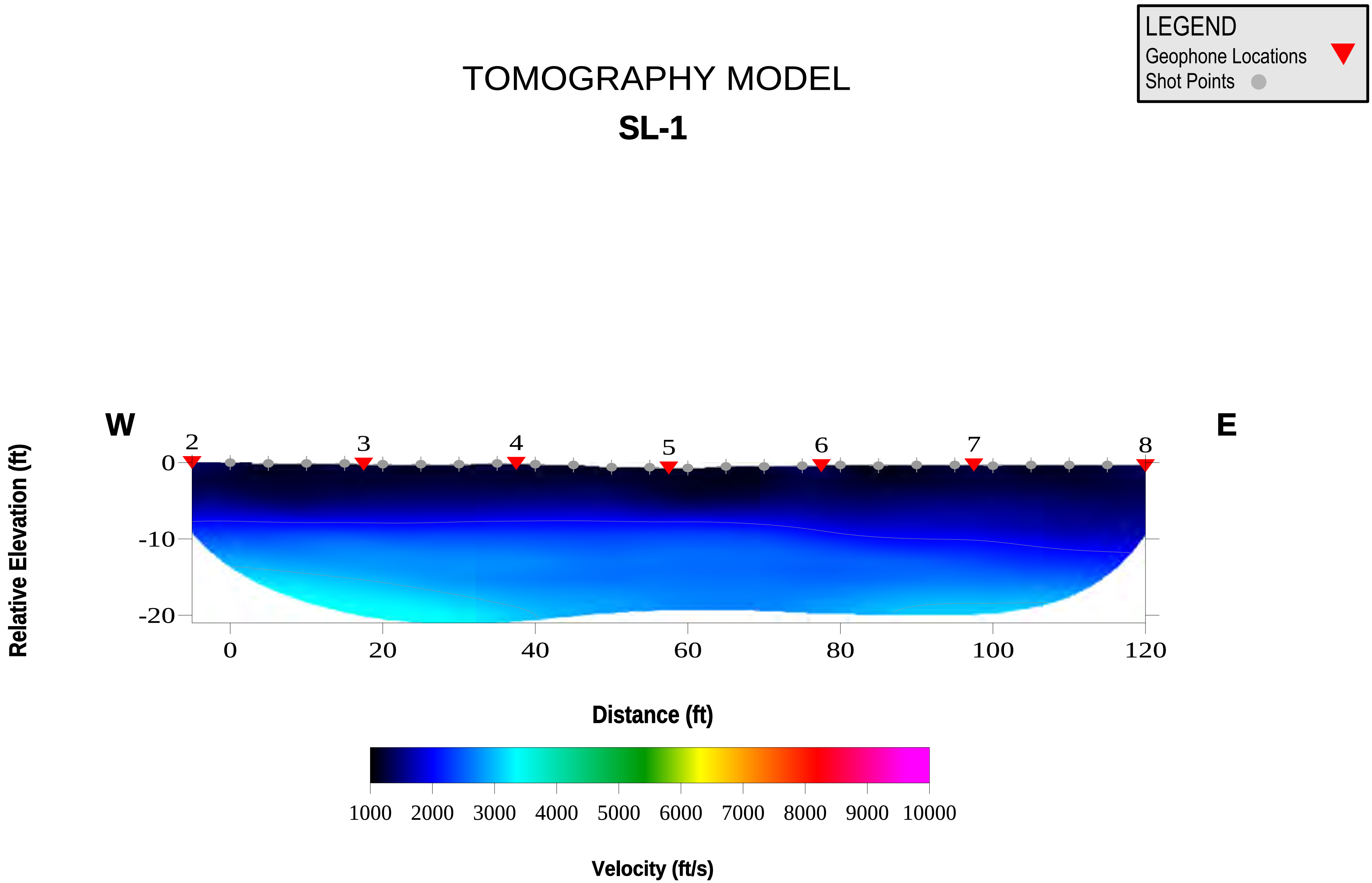
SITE PHOTOGRAPHS SL-1, SL-2 and SL-3	**GOOD HOPE AND MEAD VALLEY WATER PROJECT RIVERSIDE, CALIFORNIA** Project No.: 1962 Date: 01/23	ATLAS Figure 3a



SITE PHOTOGRAPHS **SL-4, SL-5 and SL-6**	**GOOD HOPE AND MEAD VALLEY** **WATER PROJECT** **RIVERSIDE, CALIFORNIA** Project No.: 1962 | Date: 01/23	ATLAS Figure 3b

TOMOGRAPHY MODEL

SL-1

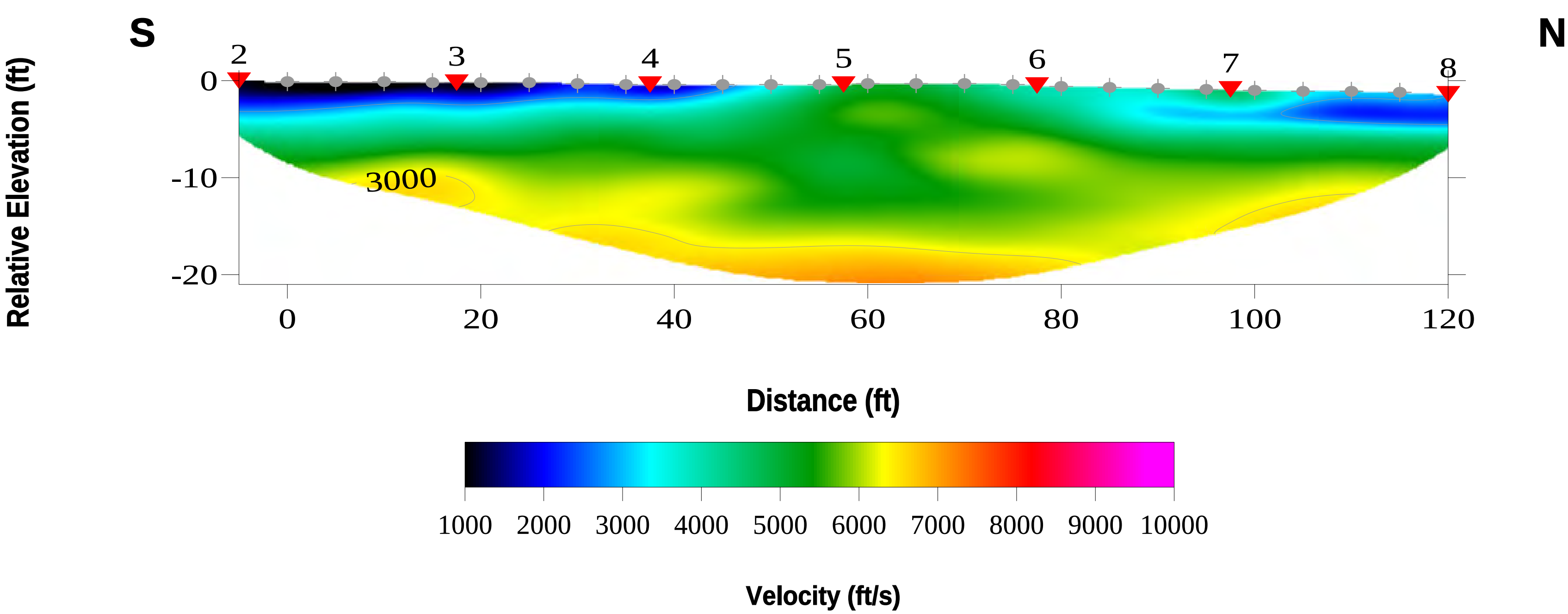


Note: Contour Interval = 1,000 feet per second

P-WAVE PROFILE SL-1	**GOOD HOPE AND MEAD VALLEY WATER PROJECT RIVERSIDE, CALIFORNIA**		ATLAS Figure 4a
	Project No.: 1962	Date: 01/23	

TOMOGRAPHY MODEL

SL-2



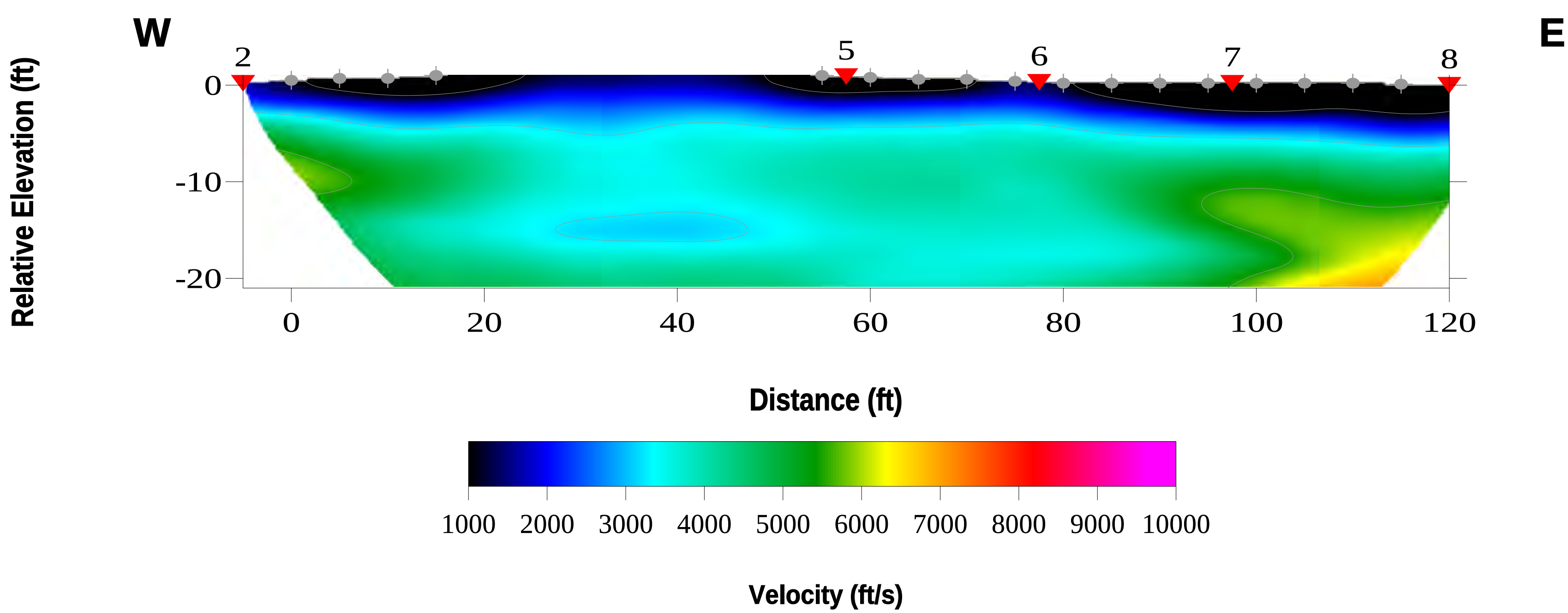
Note: Contour Interval = 1,000 feet per second

P-WAVE PROFILE **SL-2**	**GOOD HOPE AND MEAD VALLEY** **WATER PROJECT** **RIVERSIDE, CALIFORNIA** Project No.: 1962 — Date: 01/23	ATLAS Figure 4b

TOMOGRAPHY MODEL

SL-3

LEGEND
Geophone Locations
Shot Points

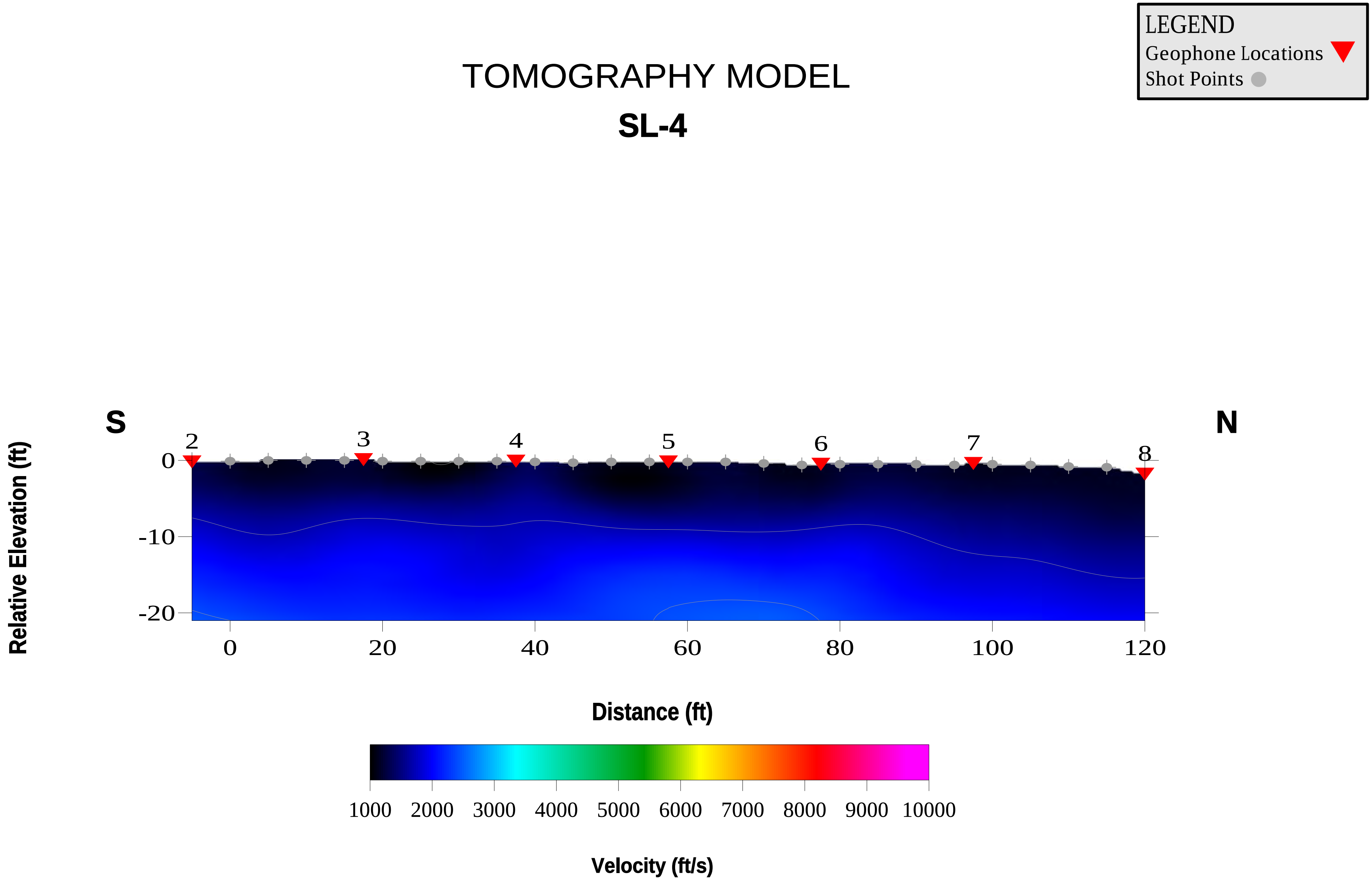


Note: Contour Interval = 1,000 feet per second

P-WAVE PROFILE SL-3	**GOOD HOPE AND MEAD VALLEY WATER PROJECT RIVERSIDE, CALIFORNIA**		ATLAS Figure 4c
	Project No.: 1962	Date: 01/23	

TOMOGRAPHY MODEL

SL-4



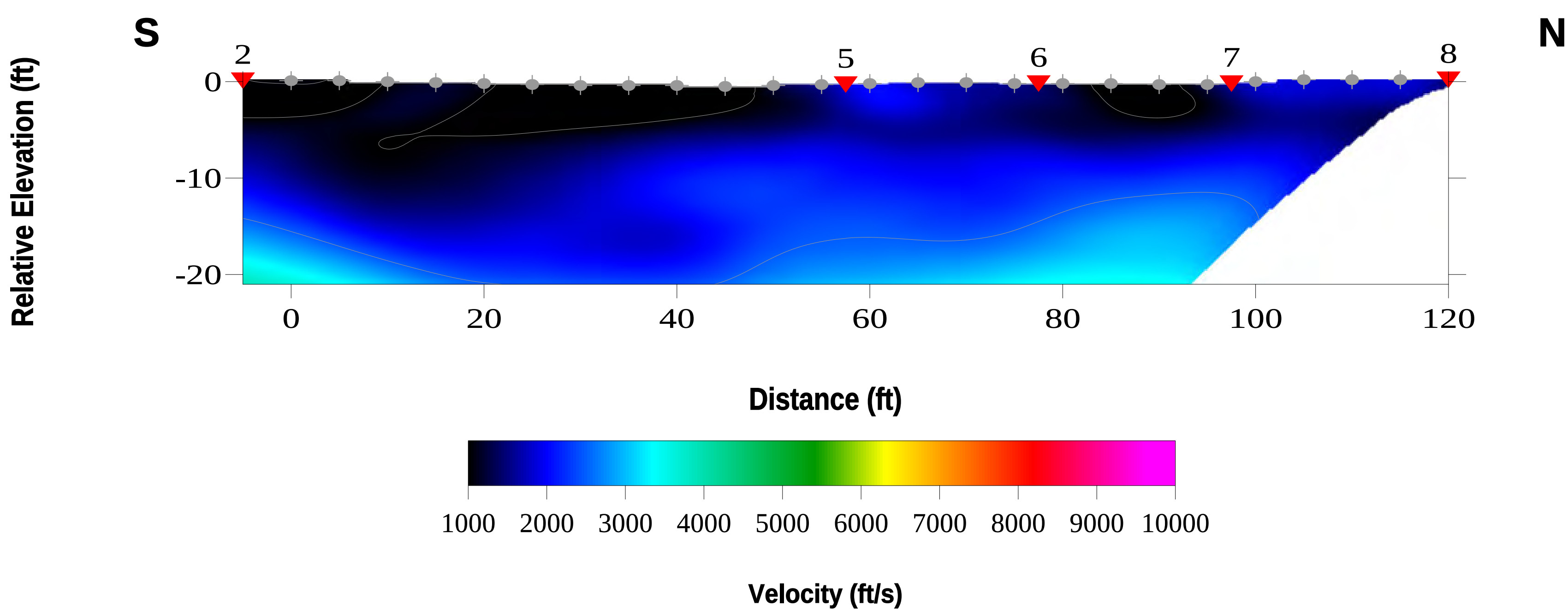
Note: Contour Interval = 1,000 feet per second

P-WAVE PROFILE SL-4	GOOD HOPE AND MEAD VALLEY WATER PROJECT RIVERSIDE, CALIFORNIA		ATLAS Figure 4d
	Project No.: 1962	Date: 01/23	

LEGEND
Geophone Locations
Shot Points

TOMOGRAPHY MODEL

SL-5

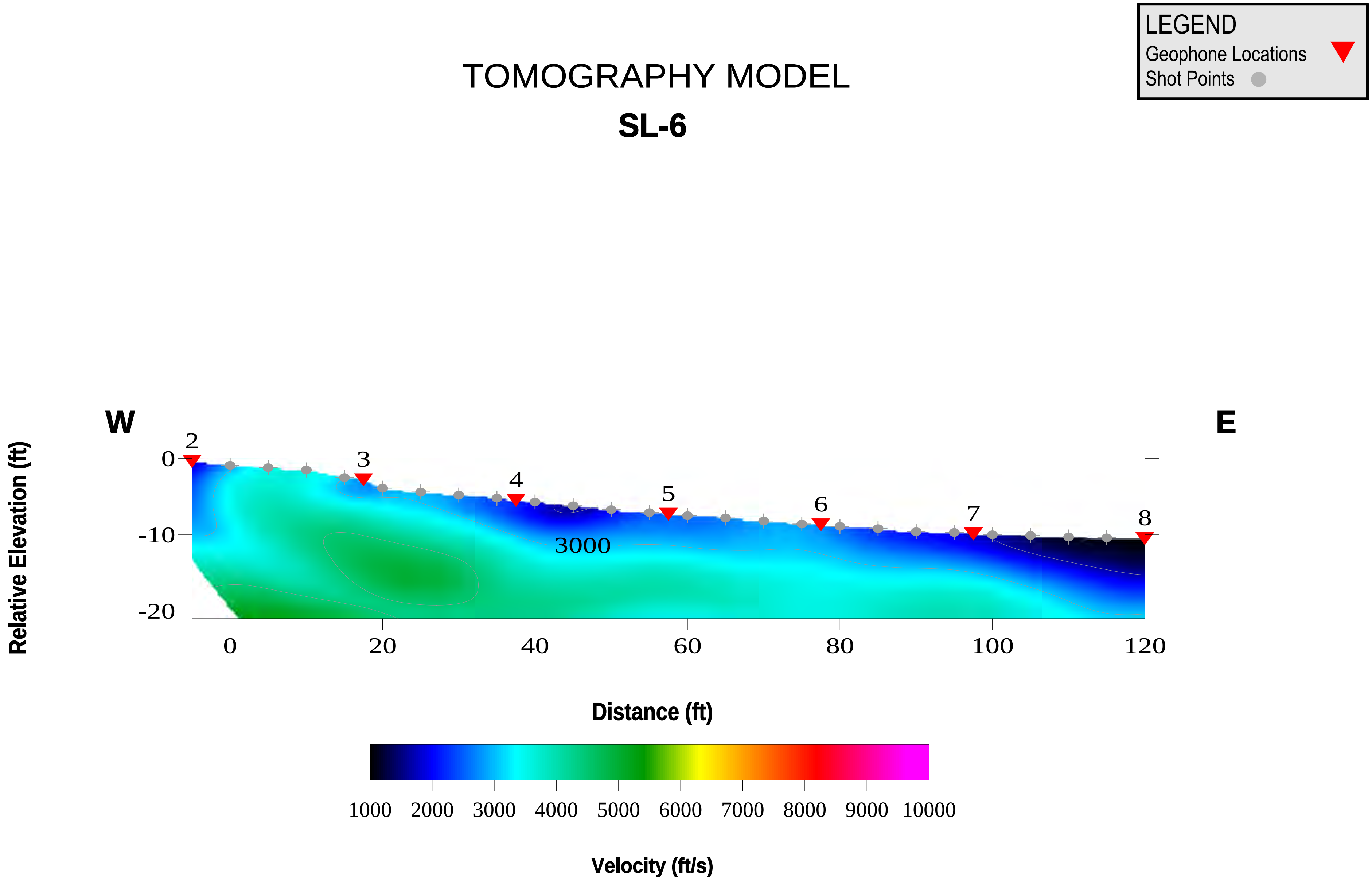


Note: Contour Interval = 1,000 feet per second

P-WAVE PROFILE SL-5	**GOOD HOPE AND MEAD VALLEY WATER PROJECT RIVERSIDE, CALIFORNIA** Project No.: 1962 / Date: 01/23	ATLAS Figure 4e

TOMOGRAPHY MODEL

SL-6



Note: Contour Interval = 1,000 feet per second

P-WAVE PROFILE SL-6	**GOOD HOPE AND MEAD VALLEY WATER PROJECT RIVERSIDE, CALIFORNIA**		ATLAS Figure 4f
	Project No.: 1962	Date: 01/23	

APPENDIX E: PRELIMINARY DESIGN REPORT

emwd

MEAD VALLEY CAJALCO SEWER PROJECT
DRAFT PRELIMINARY DESIGN REPORT

JANUARY 27, 2023

ARDURRA

DRAFT

PRELIMINARY DESIGN REPORT FOR MEAD VALLEY CAJALCO SEWER PROJECT

January 2023

Prepared by:

ARDURRA

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Temecula, CA 92590
T. 951.396.4980

______________________________	______________________________
Ryan Huston, PE Project Director	Jamie Fagnant, PE Project Manager

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FIGURES

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APPENDICES

SECTION 1: INTRODUCTION

1.1 Introduction

The Mead Valley Cajalco Sewer Project will extend Eastern Municipal Water District's (EMWD or District) collection system in Mead Valley. The goals of the Mead Valley Cajalco Sewer Project (Project) are to:

- extend sewer service to and promote economic development of the disadvantaged community of Mead Valley,
- redirect existing flow to the proposed trunk sewer in order to decommission the EMWD Clark Street Lift Station, and
- provide additional flow to Western Municipal Water District's (WMWD) Western Water Recycling Facility in order to produce additional recycled water.

The Mead Valley Cajalco Sewer Project is comprised of the following major elements as shown on Figure 1:

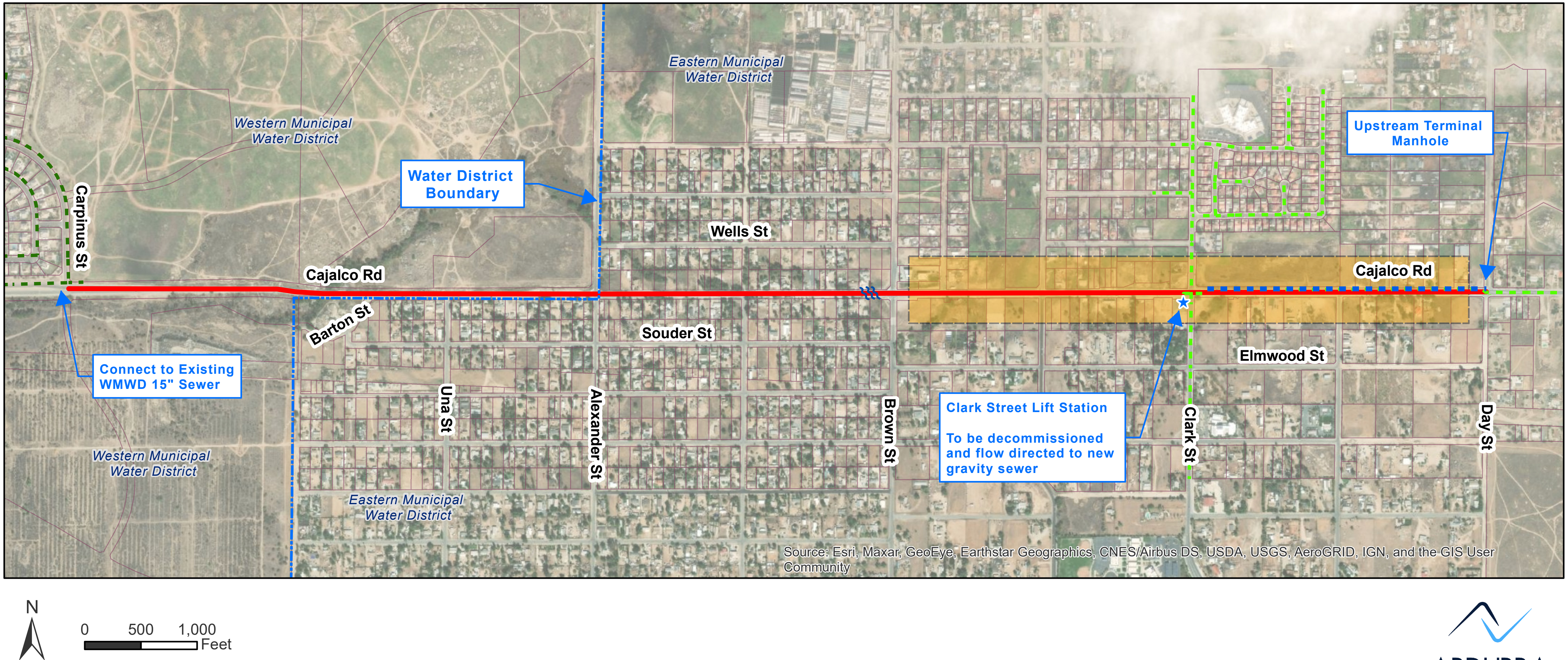
- 12,630 ft of new gravity trunk sewer, 8"–12" diameter, with manholes along Cajalco Road from Day Street to Carpinus Drive.
- An upstream dead end manhole at the upstream (eastern) end of the project and a connection to the Western Municipal Water District (WMWD) existing 15" sewer at the downstream (west) end of the project.
- Demolition of the Clark Street Sewer Lift Station with associated sewer connections to re-direct the incoming flows to the new Cajalco Sewer, and abandonment in place of the existing 6" force main that extends from Clark Street to Day Street and currently connects to EMWD's existing 18" sewer flowing east from Day Street.

1.2 Purpose

The purpose of the preliminary design presented herein is to:

- summarize the alternative alignment analysis performed as part of this Preliminary Design,
- present the hydraulic analysis of the proposed sewer to:
    - meet the required flow capacity and self-cleansing velocities, and
    - contrast self-cleansing velocities between the minimum required diameter and one pipe size larger,
- identify constructability and operation maintenance (O&M) issues and mitigating factors including,
    - proposed area of work and preliminary traffic control concepts for construction of the sewer,
    - geotechnical conditions including potential for rock and groundwater,
    - document the proposed service area and potential limitations on future septic-to-sewer conversions,

Author: Leah Russell Created 1/23/2023



ARDURRA

Legend

- Proposed Alignment
- Target Service Area
- Parcel Lines
- Exist Clark St. LS FM to be abandoned
- EMWD Existing Sewer
- WMWD Existing Sewer
- Arizona Crossing

Eastern Municipal Water District

PRELIMINARY DESIGN OF GRAVITY SEWER
FOR THE MEAD VALLEY CAJALCO ROAD PROJECT

Figure 1. Proposed Alignment

  - document criteria for manhole spacing and future O&M access,
  - identify proposed improvements to prevent inflow and infiltration due to location of portions of the sewer within the 100-year flood plain,
  - document proposed methods for crossing existing culverts of Cajalco Creek, and
  - document the County of Riverside's proposed Cajalco Road Improvement Project and impacts to future operation of the Project.
- identify required permits and utility coordination required to construct the sewer, and
- provide an Engineer's Opinion of Probable Construction Cost and Project Schedule

1.3 Report Content

This PDR is comprised of the following sections:

- **Section 1: Introduction** provides background information for the Project.
- **Section 2: Pipeline Alignment Analysis** summarizes the results of the previously completed study.
- **Section 3: Hydraulic Analysis** evaluates the capacity of the existing and proposed sewer systems to convey projected wastewater flows.
- **Section 4: Clark Street Lift Station Decommissioning** discusses the existing lift station, decommissioning, and site improvements.
- **Section 5: Design Criteria** discusses design of pipeline, traffic control, existing conditions, and maintenance and operations.
- **Section 6: Permit Requirements** identifies the permits that will be required to construct the Project.
- **Section 7: Opinion of Probable Construction Cost** provides the engineer's opinion of probable construction cost.
- **Section 8: Schedule** provides the anticipated design and construction schedule.

SECTION 2: PIPELINE ALIGNMENT ANALYSIS

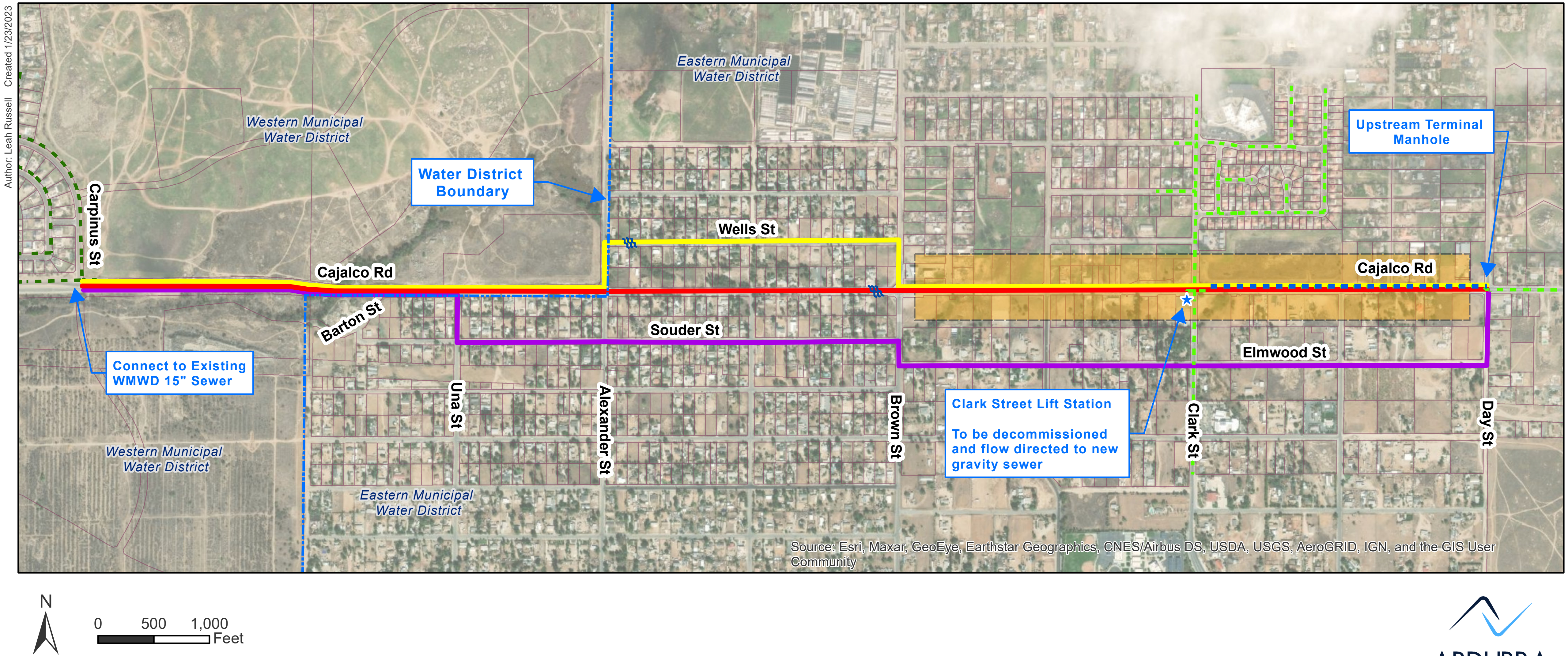
2.1 Alignment Analysis

Ardurra completed an Alternative Alignment Analysis Memorandum dated January 19, 2023, included as Appendix A. Three alternatives were identified and quantitatively and qualitatively evaluated on the basis of nine criteria:

- Hydraulics – does the project meet the District's requirements for sewer capacity as outlined in the EMWD Guidelines for Sewer System Plans?
- Utilities – are there potential existing or future utility conflicts along the alignment?
- Right-of-Way – is the alternative located in public right-of-way or existing easements?
- Traffic Impacts (Construction) – are there significant impacts to traffic during construction?
- Permitting – what permits are required?
- Constructability/Risk – will the alignment require sustained construction within areas with significant groundwater, potential for rock excavation, and/or sewer depths exceeding 20 ft in depth?
- Operations & Maintenance – will the alignment provide self-cleansing velocity at peak dry weather flow, require manholes located outside of heavily traveled roadways, or require collector sewers to service the targeted service area?
- Opinion of Probable Construction Cost – a planning level Engineer's Opinion of Probable Construction Cost was developed for each alternative for comparison purposes.

The three alternatives, and one sub-alternative that were identified are described below and shown in Figure 2.

- **Alternative 1** – This alternative extends from Day Street to Carpinus Drive, approximately 12,630 feet within Cajalco Road. This alignment is the most direct route between connection points and would maximize slope in the new alignment. This alignment would trench through the existing Arizona crossing just west of Brown Street.
- **Alternative 2** – This alternative is approximately 13,490 linear feet and is similar to Alternative 1, however, it turns north at Brown Street, east on Wells Street, and south on Alexander Street to rejoin Cajalco Road and continue west to Carpinus Drive. The main benefit of this alignment would be the avoidance of impacts on the existing Arizona crossing on Cajalco Road, just west of Brown Street. This alignment would impact an Arizona crossing on Wells Street, just east of Alexander Street.
- **Alternative 2A** – This alternative is similar to Alternative 2A (with a total length of 13,490 ft), except after turning north at Brown Street and east on Wells Street, it would turn south on Mead Street to rejoin Cajalco Road. This alignment was identified in discussions with District Staff as a potential alignment that does not require trenching through an existing Arizona crossing.



Legend

- Alternative 1
- Alternative 2
- Alternative 3
- Target Service Area
- Parcel Lines
- Exist Clark St. LS FM to be abandoned
- EMWD Existing Sewer
- WMWD Existing Sewer
- Arizona Crossing

ARDURRA

Eastern Municipal Water District

PRELIMINARY DESIGN OF GRAVITY SEWER FOR THE MEAD VALLEY CAJALCO ROAD PROJECT

Figure 2. Alignment Alternatives

However, Mead Street between Wells and Cajalco Roads is an undeveloped right-of-way with a double track dirt path that does not stay within public right-of-way. The actual right-of-way contains several mature trees and is proposed to be crossed in the future with an unlined earthen channel to convey the FEMA 100-year flood flows. Due to potential environmental impacts and the future liability of a sewer installation under an unlined flood channel, this alternative was not carried forward.

- **Alternative 3** – This alternative is located within Souder Street and Elmwood Street and would bypass Cajalco Road from Day Street to Una Street. This alternative requires that collector sewers would need to be installed along Cajalco Road to provide service to the target service area from Brown Street to Day Street. This alternative would comprise approximately 12,610 feet of trunk sewer and an additional 4,570 feet of collector sewer.

2.2 Proposed Alignment

The three alternatives were evaluated against the identified criteria. Alternative 1, the alignment directly along Cajalco Road, was selected as the preferred alternative due to having the shortest route, minimizing impacts to residences by avoiding narrow residential streets, avoiding sewer depths over 20 feet and having the lowest overall cost. After review by the District of the draft Alignment Analysis Memorandum, Alternative 1 was selected as the preferred Project.

SECTION 3: HYDRAULIC ANALYSIS

3.1 Determination of Flow

Considering the potential for receiving additional flow from the Mead Valley area, WMWD previously contracted with Dudek to perform a hydraulic analysis of the impact of the additional flow on WMWD's downstream facilities. This memorandum, titled Mead Valley Sewer Diversion Hydraulic Analysis, dated October 17, 2022 (Sewer Diversion TM), is included herein as Appendix B.

The Sewer Diversion TM identified tributary areas to the proposed Mead Valley Cajalco Sewer as identified below.

Table 3.1 – Existing Flow to the Clark Lift Station per Tributary Area per the Sewer Diversion TM

Land Use Type	Average Dry Weather Flow (gpd)	Peak Dry Weather Flow (gpd)	Peak Design Flow (gpd)
School	6,753	19,329	23,195
Public Facility	4,424	12,697	15,236
Medium Density Residential	32,430	93,074	111,689
Totals	**43,607**	**125,100**	**150,120**

In addition to the above inflow associated with land use types, the Sewer Diversion TM identified future flows from the proposed EMWD target service area and designated this area as the Mixed Used Policy Area, or MUPA, shown in orange in Figure 1 of the Sewer Diversion TM. The Sewer Diversion TM analyzed the respective EMWD and WMWD methodologies for analyzing proposed flows and identified the EMWD method as being more conservative. EMWD standards were therefore utilized to calculate the flow.

Per EMWD guidelines, Average Dry Weather Flow (ADWF) in gallons per day is calculated as 235 gallons per day per equivalent dwelling unit (EDU) at 5 EDU/acre. A peaking factor of 2.87 is applied to the ADWF to obtain the Peak Dry Weather Flow (PDWF). A peaking factor of 1.2 is applied to the PDWF to obtain the Peak Wet Weather Flow (PWWF). Ardurra identified influent acreage in the proposed new service area per reach and assigned corresponding flows. The per reach influent flow is identified in Appendix C - Mead Valley Cajalco Sewer Project Hydraulic Analysis.

The total influent flow calculated per the EMWD Guidelines varies from that presented in the Sewer Diversion TM. The Cajalco Sewer Project Hydraulic Analysis identified a future influent flow of 80,311 gpd Average Dry Flow whereas the Sewer Diversion TM identified the same future influent flow as 61,100 gpd Average Dry Flow. This variance in proposed future flow could potentially be attributed to a difference in acreage of the proposed service area, or "Mixed Use Policy Area" as it is referred to in the Sewer Diversion TM. This variance needs to be coordinated with WMWD as the Project moves forward.

Additionally, the Sewer Diversion TM identified "School" and "Public Facility" acreages as currently on septic systems. Per EMWD, these existing service areas are currently serviced by EMWD sewers. This also needs to be coordinated with WMWD as the Project moves forward.

3.2 Pipeline Sizing

Using the estimated maximum influent flow described above, Ardurra applied the standards described in the EMWD Guidelines for Sewer System Plan to identify the minimum required diameter of the Project pipelines. These results are shown in Appendix C – Mead Valley Cajalco Sewer Hydraulic Analysis and on the Mead Valley Cajalco Sewer 30% Plans in Appendix D. The EMWD standards are summarized below:

- Maximum d/D (depth to diameter ratio) of 0.5 for sewers 12" and below during PWWF.
- Maximum d/D of 0.75 for sewers 15" and above during PWWF.
- Minimum velocity of 2 fps (feet per second) during PDWF.
- Minimum slopes as follows:

Table 3.2 – EMWD Minimum Slopes

Sewer Size	Minimum Slope
8"	0.004
10"	0.0032
12"	0.0024
15"	0.0016
18"	0.0014

The hydraulic analysis identified 8,560 linear feet of proposed minimum pipe size as 12" downstream (west of) of Clark Street, 1,335 linear feet of proposed minimum pipe size of 10" upstream of Clark Street to Haines Street, and 2,425 linear feet of proposed minimum pipe size of 8" upstream (east of) Haines Street. This pipe sizing satisfies the above EMWD sewer sizing requirements with the exception of the upstream dead end reach (400 ft in length) which will not meet the requirement for 2 fps self-cleansing flow. The minimal flows in this dead end reach would not allow for this requirement to be met regardless of slope.

The basis of design includes the currently undeveloped area along Cajalco Road. Ardurra performed an additional Hydraulic Analysis to check for self-cleansing velocities prior to development of this area. Prior to buildout, the sewer would be dry upstream of Clark Lift Station. Downstream of the lift station the sewer would not meet self-cleansing velocity between Haines Street (MH 21) and Una Street (MH 10) with velocities at Peak Dry Weather in these reaches between 15. Fps and 2.0 fps. The full results are shown in Appendix E - Hydraulic Analysis Prior to Buildout.

3.3 Potential for Upsizing Proposed Sizing

The District requested the potential for a larger pipe size to be evaluated to accommodate potential future septic-to-sewer conversions without compromising self-cleansing velocities for the current design flow. Note that the current design flow includes the target service area which is not yet built out and does not currently meet self cleansing velocities without the inclusion of the undeveloped target service area as discussed in Section 3.2 of this preliminary design report. Upsizing the proposed sewer to 15" while keeping the currently designed slopes constant was evaluated and is presented in Appendix E – Potential Upsizing Hydraulic Analysis. It should be noted that the proposed design already has adequate capacity to provide a larger flow than the design flow as noted in the below table under current design, maximum capacity. A summary of the results of the Potential Upsizing Hydraulic Analysis are shown in the below table.

Table 3.3 – Results of Potential Upsizing Hydraulic Analysis

Design	Sewer Sizing	Total Design Flow	Limiting Reach for Maximum Capacity	Maximum Capacity
Current Design	8,560 LF 12" from Carpinus Drive to Clark Street 1,335 LF 10" from Clark Street to Haines Street 2,425 LF 8" from Haines Street to Day Street	123,900 gpd ADWF/ 86.04 gpm ADWF/ 246.94 gpm PDWF/ 296.33 gpm PWWF/	Max d/D of 0.5 per minimum slope as designed of 0.0290 downstream of Alexander Street	180,167 gpd ADWF/ 125.11 gpm ADWF/ 359.1 gpm PDWF/ 430.9 gpm PWWF
Potential Upsizing	11,491 LF 15" from Carpinus Drive to Robinson Street 830 LF 8" from Robinson Street to Day Street	N/A	Max d/D of 0.75 per minimum slope as designed of 0.0290 downstream of Alexander Street	1833 gpm PWWF west of Una Street/ 1425 gpm PWWF east of Una Street

SECTION 4: CLARK STREET LIFT STATION DECOMMISSIONING

4.1 Existing Lift Station Configuration

The Clark Street Lift Station is a submersible lift station with two 4” 150 gpm submersible pumps. The precast wet well is approximately 20 feet deep and 8 feet in diameter. Influent flow is routed into the wet well from Clark Street via an 8” PVC sewer. A precast valve vault contains two 6” check valves, three 6” plug valves, and associated 6” ductile iron piping. A plug valve is buried on the discharge side of the valve vault. Effluent flow is routed north to Cajalco Road and is pumped east to a discharge manhole at Cajalco Road and Day Street via a 6” PVC force main. An existing pressure regulator is located in the southwest corner of the property and connected to the 18” waterline running along Cajalco Road via two 164’ lengths of 8” PVC. The lift station has an onsite emergency generator that was recently installed and served by an electrical service via a power pole in the southeast corner of the property. A condition assessment report prepared by V&A is included in Appendix G.

Clark Street Lift Station

4.2 Lift Station Decommissioning

Upon completion and acceptance of the proposed Mead Valley Cajalco Sewer, the Clark Street Lift Station is proposed for decommissioning. Decommissioning is understood to include the following:

- Demolition or salvage of above grade facilities including:
  - Emergency generator (salvage)
  - Motor control center and Automatic Transfer Switch (salvage)
  - Generator Shed
  - Approximately 560 feet of chain link fence, gates and barbed wire
  - Shade structure (salvage)
- Relocation of the existing Pressure Regulator into the street right of way along Cajalco Road
- Demolition or salvage of the existing wet well including:
  - Pumps (salvage)
  - 8” ductile iron pipe
  - Float switches and bubbler system

  - 20-ft deep, 8-ft diameter precast wet well – remove the cover and top three feet of precast concrete, fill with slurry or sand and abandon in place.
- Demolition or salvage of the valve vault
  - 3 plug valves
  - 2 check valves
  - Ductile iron pipe and fittings
  - Pipe supports
  - Ladder
  - Precast concrete wet well
- Buried piping and Manhole
  - Remove isolation valve and salvage
  - Plug existing 8” diameter PVC gravity sewer at wet well wall and abandon pipe in place.
  - Remove frame and cover and top 3 ft of manhole in Clark Street. Fill with slurry up to remaining manhole wall, and with compressed backfill to grade and abandon in place. Install paving to match existing pavement.
  - Plug 8” sewer at connection to new Mead Valley Cajalco Sewer and abandon remaining 8” sewer in place.
  - On lift station site, remove 6” force main to 3 ft below grade and plug remainder with concrete and abandon in place.
  - Along Cajalco Road, plug 6” forcemain with concrete and abandon in place.
  - Plug 6” force main inlet to receiving manhole and abandon 6” force main in place.

4.3 Lift Station Site Improvements

Following completion of decommissioning, the lift station site will have had existing buried utilities removed within the top three feet and will be covered in a layer of crushed rock to stabilize surface. The resulting site can then be repurposed by the District or sold for development.

4.4 Reduction of Flow to Existing 18” Sewer

Removal of the flow from the receiving 18” sewer east of Day Street will result in a dry sewer until lateral flow enters the sewer main. Remaining flow downstream of the existing force main connection point is not likely to meet self-cleansing velocities. Ardurra recommends the District conduct additional study to determine the length of sewer that will not meet self-cleansing velocity and put those reaches on an enhanced cleaning frequency of at least twice per year.

SECTION 5: DESIGN CRITERIA

5.1 Pipeline Materials

EMWD Guidelines require PVC or VCP pipe. VCP pipe is required for sewers 15” in diameter or greater. Based on the 12” diameter size defined by the analyses presented in Section 3, the proposed Project is currently designed with PVC pipe. If the District elects to upsize portions of the 12” sewer to 15”, the design will need to be modified to utilize VCP pipe for reaches 15” in diameter or larger.

Manholes are proposed to be constructed utilizing precast polymer concrete manholes. Due to the shallow groundwater in some areas, ballast slabs are proposed for the manholes to prevent flotation. Specific manholes requiring ballast slabs will be finalized during final design. Per EMWD standards, where groundwater is encountered, manholes shall be coated in the exterior by an approved material, Barricoat-R, Mel-Rol-LM, or approved equal. EMWD standards do not give explicit guidelines regarding the size of manholes other than providing standard details for four, five and, six foot manholes. Ardurra recommends the District consider four foot manholes for sewers 12” and smaller (including all manholes in the proposed project) and five foot manholes for sewers 15” and larger (if the District elects to increase the diameter of the proposed sewer).

5.2 Pipeline Alignment Refinement

Starting with the preferred conceptual sewer alignment (as described by the analysis in Section 2 above), Ardurra has refined the alignment based on several factors including the following:

- avoidance of conflict and preferred horizontal separation with existing utilities
- coordination opportunities that would align better with the County of Riverside’s plan for a future widening and construction of raised medians along Cajalco Road
- construction means and methods
- meeting funding deadlines
- impacts to the community, and
- impacts to traffic flow considering that Cajalco Rd is used as a thoroughfare connecting I-15 to I-215.

When considering construction means and methods, Ardurra took into consideration the following factors:

- width of the trench
- type of excavation equipment necessary
- the operation of the contractor for offloading spoils
- the safety and efficiency of the work zone for both workers and the motoring public, and
- how to effectively and efficiently construct the improvements in the shortest duration to minimize impacts to the community and motorists.

5.3 Construction Traffic Control Strategies

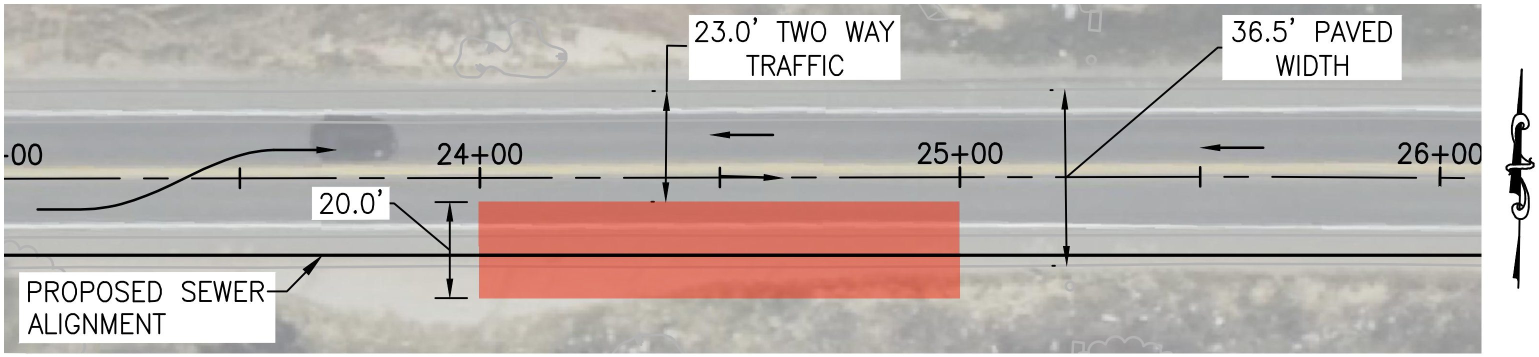
Cajalco Road is a heavily traveled arterial road that connects I-15 and I-215. The proposed alignment shown in the 30% plans (see Appendix D) provides both opportunities and challenges for traffic control strategies. While it is the Contractor's responsibility to tailor his means and methods to provide an adequate work zone and the Contractor is solely responsible for job site safety, Ardurra is presenting conceptual traffic control strategies herein in order to streamline the permitting process with the County. To provide for an adequate work zone, Ardurra proposes that the contractor be allowed a 20-ft to 25-ft wide work zone. This provides space for the excavation equipment centered over the trench, room for workers to maneuver both in and above the trench and around the equipment, and space for offloading to the side of the excavation.

Initial traffic control concepts are illustrated in Figure 3. Ardurra made an initial review of the available roadway widths and potential traffic control strategies along the different segments of the project alignment. For the segment of Cajalco Road. between Brown Street. and Day Street. (approximately 5,100 ft in length) there is adequate roadway width to provide for two lanes of traffic, one in each direction, parallel to the construction corridor.

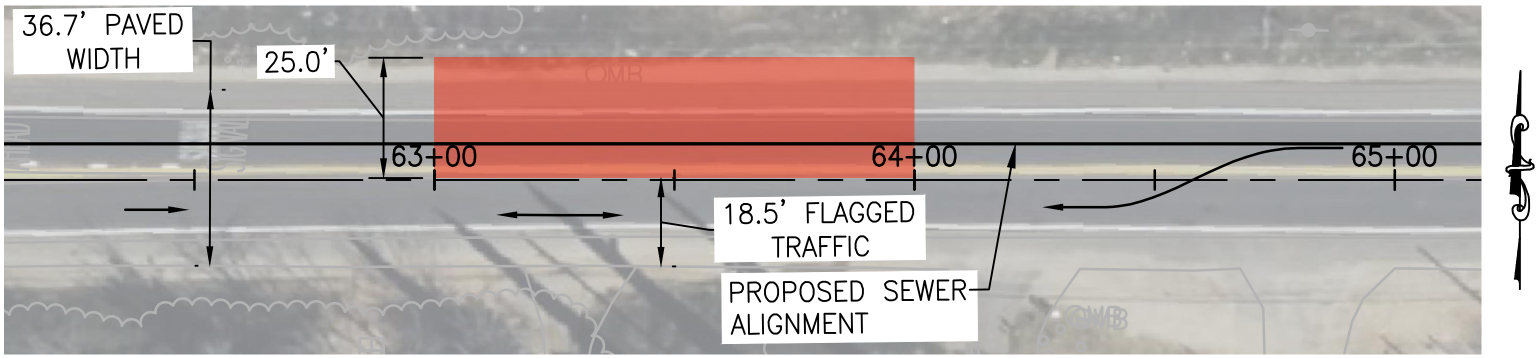
Along the segments between Carpinus Drive. and Barton Street. (approximately 2,600 ft in length) and between Barton Street and Brown Street (approximately 4,700 ft in length), the roadway is not wide enough to allow for two lanes of traffic in parallel with the construction corridor. Along these segments, the use of a single traffic lane controlled by flagging operations was initially considered. Subsequent discussions with EMWD and the County indicated a strong preference for maintaining two lanes of traffic without the need for flagging operations. There was also discussion about working hours and the possibility of performing night work for certain sections along Cajalco Road. Discussions regarding working hours included suggested reduced daytime working hours of 9AM to 3PM, and nighttime hours of 8PM to 5AM, although these were preliminary discussions. Final determination of working hours is expected to be received by the County upon submission of detailed traffic control plans.

Based on further review of the two narrow road segments, the following revised approaches are proposed at this preliminary design stage:

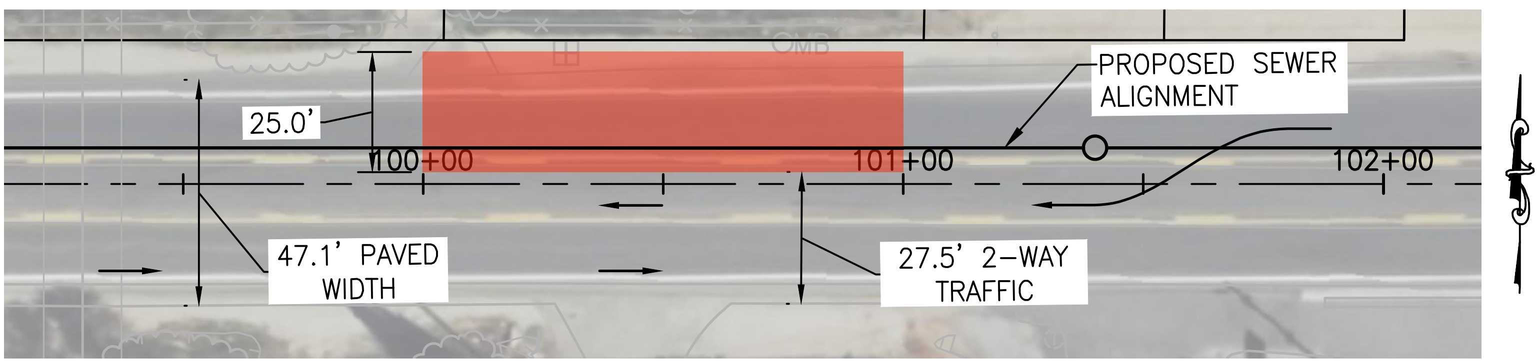
- Between Carpinus Drive and Barton Street – Two lanes of traffic can be provided by reducing the work area width to 20 feet. Although this will impact construction efficiency, the benefit of having two lanes for traffic is considered more valuable.
- Between Barton and Brown Streets – This segment is very constrained, and more survey and utility information is required to assess options for providing more space for traffic without a flagging operation. Strategies that will be evaluated further during final design will include modifying the proposed sewer alignment in this section, providing temporary paving along the unimproved shoulder area, and reducing the work zone width. Depending on the specific



TYPICAL AREA OF WORK
CAJALCO ROAD – CARPINUS DR. TO BARTON ST.



TYPICAL AREA OF WORK
CAJALCO ROAD – BARTON ST. TO BROWN ST.



TYPICAL AREA OF WORK
CAJALCO ROAD – BROWN ST. TO DAY ST.

LEGEND

AREA OF WORK 25' WIDE

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CAJALCO ROAD CONCEPTUAL TRAFFIC PLAN

FIGURE 3

constraints, potential trade-offs may include the decreased horizontal separation from existing utilities, placement of the sewer line inside the proposed alignment of a raised median (to be constructed as part of the County's future improvements along Cajalco Road., and impacts to properties along areas where temporary pavement is placed.

Recommendations for the traffic control approach for these alignment segments and associated project modifications will be performed during final design.

5.4 Geotechnical Conditions

A Draft Geotechnical Investigation has been performed by Atlas Technical Consultants LLC (Atlas); a copy of their report, stamped draft and dated January 13, 2023, is and included in Appendix H. Thirteen (13) borings to depths of up to approximately 41 feet below the existing ground service were performed in September 2022. Additionally, Atlas recently installed (January 2023) two temporary groundwater monitoring wells to a depth of about 40 feet below ground surface. These wells were added to Atlas' scope and installed following production of the Draft Geotechnical Report. Data from these monitoring wells will be included in the Final Geotechnical Report.

The geotechnical report indicated trenching operations may encounter very dense granular materials and potentially igneous rock formations. The presence of cobbles, boulders and groundwater are expected at the site. Fill was encountered in some borings to depths of five feet below grade. Fill materials were noted as moist, medium dense sandy silt, silty sand, and clayey sand and could cause the potential for trench sloughing.

5.4.1 Potential for Rock Excavation

The draft Geotechnical Report recommends that the Contractor be prepared to mobilize equipment (such as rock breakers, carbide tipped teeth, or carbide/diamond tipped coring equipment) to excavate/drill hard rock materials. A refraction survey to better assess rock hardness and excavatability was completed in January 2023 and will be included in the final Geotechnical Report. The final version of this preliminary design report will be updated accordingly to reflect these findings. Although a preliminary cost opinion is assigned to potential for rock excavation in this preliminary design report, it is anticipated that the results of the refraction survey will allow the project team to more accurately identify the potential and associated cost associated with rock excavation.

5.4.2 Potential for Groundwater

The proposed alignment crosses the historic drainage way of Cajalco Creek in two locations, west of Barton Street, and west of Brown Street. This drainageway was taken into account in siting the proposed groundwater monitoring wells. Monitoring wells associated with a remediation effort adjacent to a gas station at Brown Street and Cajalco Road are currently being monitored on a regular basis with information available on the Geotracker website. The most recent quarterly report, dated July 29, 2022 is included in Appendix I. Groundwater elevations during the period of the quarterly report varied between

9 feet and 11.5 feet below grade. The District obtained a sample of the groundwater during a site visit on October 27, 2022 and tested the sample in their lab. Results are shown below.

Table 5.1 – Water Quality Test Results, ug/L

Analysis	Results	Analysis	Results
Ag	<0.3	Mo	12.8
Al	3,440	Ni	7
As	2.6	Pb	<0.9
B	282	Sb	<0.12
Ba	344	Se	3.8
Be	<0.3	Sn	<0.6
Cd	<0.09	Sr	1410
Co	3.38	Tl	<0.9
Cr	7	V	147
Cu	7.2	Zn	20.3
Fe	10,600	pH	7.39
Mn	158		

The borings associated with the Geotechnical Report noted groundwater as shallow as 18 feet below grade. However, the report also noted available literature indicates the groundwater could be shallower than 10 feet below grade. Two groundwater monitoring wells were recently installed (January 2023) at the Cajalco Creek crossing west of Barton Street and west of Clark Street (Borings 6S and 2S, respectively) by Atlas. It is proposed that these wells be monitored by Atlas and EMWD with water loggers during preliminary and final design. The water loggers will be pulled quarterly and the water level records downloaded.

Based on these preliminary results it is expected that portions of the alignment will require dewatering. Options for dewatering disposal include:

- obtaining a discharge permit to discharge to an existing WMWD gravity sewer, or
- obtaining an NPDES discharge permit (estimated time to obtain is 9 months).

Ardurra recommends the feasibility of both options be explored during final design taking into account potential treatment requirements, timeline for permit approval, estimated flow rates, and anticipated locations where dewatering will be required.

5.5 Maintenance and Operations

5.5.1 Manholes

The EMWD Guidelines for Sewer System Plan require a minimum manhole spacing of 500 feet. Additionally, manholes should be installed where there is a change in alignment, and at intersections to capture potential future inflow. Limited future flow is expected as discussed further below. Additional manholes at intersections are located at Barton Street, Alexander Street, Mead Street, Brown Street, Haines Street, and Clark Street (to capture existing flow).

Traffic control required for accessing the sewer manholes for maintenance operations is divided into three broad phases:

- Carpinus Drive to Barton Street – The sewer alignment is located on the south shoulder. Traffic control for manhole access will require either flagging, or signage and cones to narrow and redirect traffic lanes to the north.
- Barton Street to Brown Street – The sewer alignment is located in the westbound traffic lane. Flagging is expected to be required for manhole access to this area.
- Brown Street to Day Street – The sewer alignment is located in a center turning lane. Traffic control to isolate the center lane from surrounding traffic is expected to be required for manhole access to this area.

5.5.2 County of Riverside Proposed Improvement Project

The County has completed a 30% design and is currently in the process of preparing environmental documents for a road and drainage improvement project along Cajalco Road. The proposed project would widen Cajalco Road, install new storm drains, and channelize the historical Cajalco Creek drainageway west of Barton Street. Although the County is the lead agency for this project, the channelization of the drainageway between Alexander Street and Brown Street is in accordance with the Riverside County Flood Control and Water Conservation District master planning efforts. The preliminary roadway plans indicate that minor grading will raise the elevation of Cajalco Road. West of Barton Street the project proposes dividing the west and east bound traffic lanes with the east bound lanes traversing the existing Cajalco Creek Crossing and constructing a new bridge over Cajalco Creek for the west bound lanes.

From Barton Street to Day Street, the County's proposed project includes a new median. The location of the proposed sewer alignment was selected, in part, to facilitate future access by placing the sewer alignment outside of the future median.

5.5.3 100 Year Flood Plain

Portions of the project are within the FEMA mapped flood plain for Cajalco Creek. FEMA Flood Insurance Rate Map Panel 1410G is included in Appendix J for reference. Ardurra recommends that during the final design, the manholes located within the mapped FEMA flood plain be identified and equipped with locking, gasketed composite manhole lids to prevent infiltration.

5.5.4 Future Sewer Connections

As discussed with the District, the proposed sewer profile will be designed for the ultimate capacity and self-cleansing flows to serve the tributary area described in Section 3 of this report. It is noted that even if the sewer has the hydraulic capacity to receive additional flow, the profile of the sewer may not provide enough slope to allow for capturing flow from adjacent low-lying areas not already included in the proposed tributary area.

5.5.5 Cajalco Creek Crossings

Cajalco Creek crosses Cajalco Road in two locations along the proposed alignment. The proposed design approach to each of these locations is described further below.

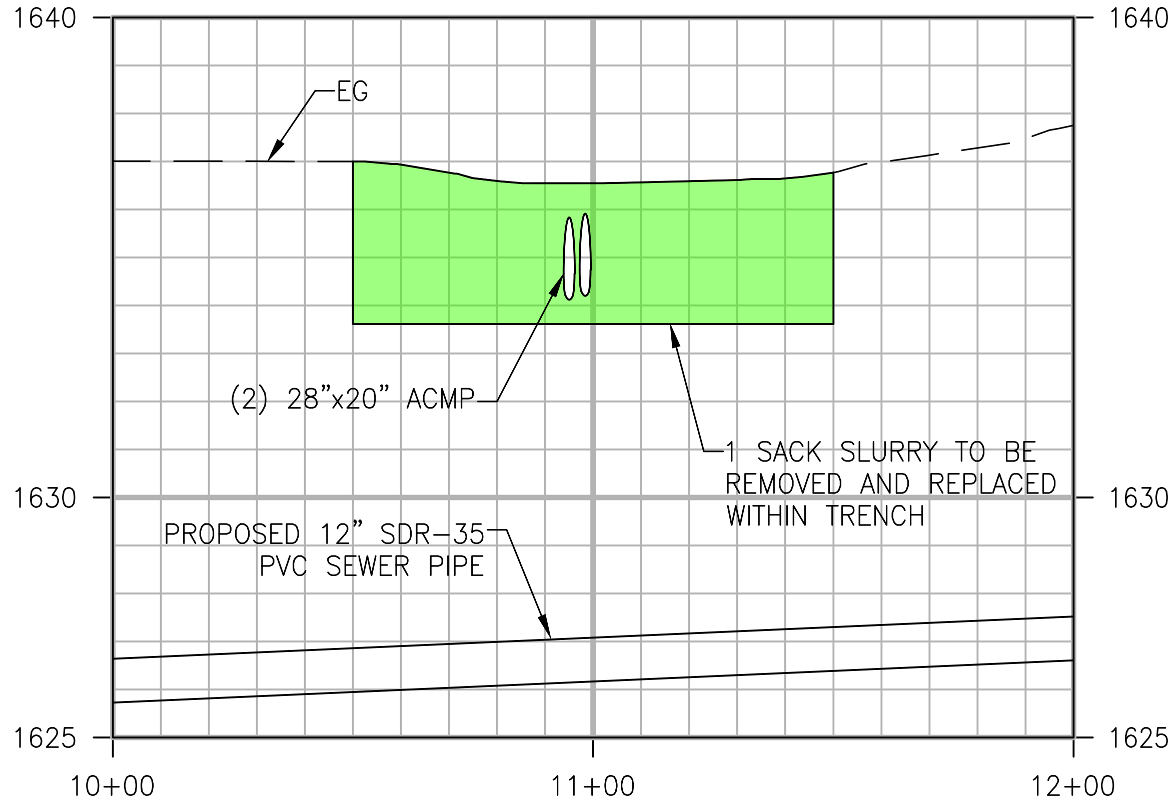
West of Barton Road, Cajalco Creek crosses the road via a culvert comprised of one 84" CMP (corrugated metal pipe) and one 60" CMP. Ardurra's survey results indicate that there is sufficient space to route the sewer alignment over these pipes. However, the County's proposed Cajalco Road Widening Project proposes replacing this culvert with a new triple box culvert. Ardurra has requested the County provide the invert and size of the proposed culvert in order to confirm that the proposed sewer will also clear the future culvert.

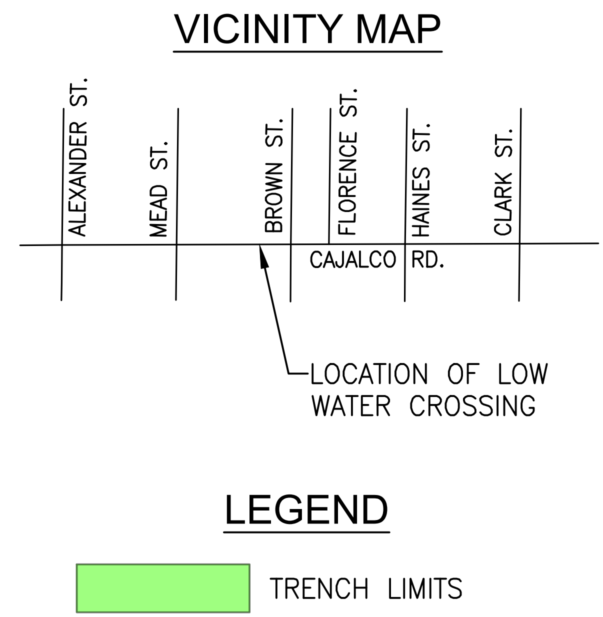
West of Brown Street, Cajalco Creek crosses Cajalco Road via a low water (Arizona crossing) and two parallel 28"x20" arch CMPs. The County's project proposes replacing this culvert with a new triple 8 ft W x 4 ft H box culvert at a lower invert elevation. Ardurra has designed the proposed sewer to accommodate this future drainage structure based on design information received from the County (see 30% Plans). Ardurra previously proposed that construction of the sewer across the existing low water crossing, which is comprised of a reinforced concrete pad extending 100 feet along Cajalco Road, be accomplished via open trench. This construction approach was presented to the County at a meeting on October 27, 2022. Following the meeting, Ardurra provided the narrative herein as Appendix K. Figure 4 diagrams the proposed open trench installation. The County has indicated that they are open to an open trench crossing of the low water crossing with the addition of the following preliminary input from the County's structural engineer:

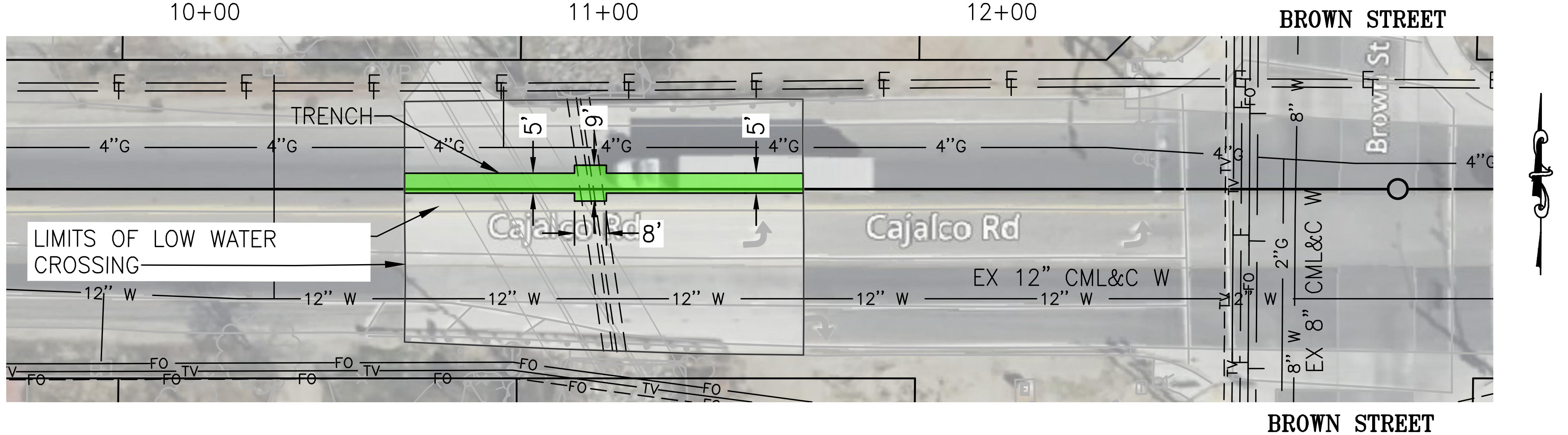
- Use proper compaction under and over the existing 20" pipes or use 1-2 sack slurry.
- When cutting the concrete slab, the contractor should avoid cutting the existing #4 rebar. Where damage to the rebar is unavoidable, use drill and dowel with an equivalent number of bars with adequate development length and embedment depth.

A full structural detail of the proposed replacement section for the Arizona crossing will be performed during final design.

Additionally, the District has contracted with Albert A. Webb & Associates (Webb) to complete the required environmental documents and permit applications associated with sewer construction across the Arizona crossing. Initial conversations with Webb indicate that an open trench approach may trigger additional agency permits. At this time, the District has directed Ardurra to proceed under the assumption that the open trench method will be utilized and included in the preliminary opinion of construction cost. This direction was given with the understanding that if during final design open trench construction triggers agency permits that impact the proposed project timeline significantly (e.g. such that it might not be completed in time for funding requirements), then additional study would be conducted to evaluate the feasibility of a trenchless construction approach.







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MEAD VALLEY CAJALCO SEWER PROJECT

CAJALCO ROAD LOW WATER CROSSING

FIGURE 4

SECTION 6: PERMIT REQUIREMENTS

6.1 County of Riverside Encroachment Permit

Ardurra and EMWD met with the County on October 27, 2022, and January 17, 2023 to discuss the proposed Project. Although the contractor will be responsible for pulling the encroachment permit, early outreach during the design process is intended to minimize comments and streamline this process. Ardurra recommends including the following design elements in the final design and submitting the project to the County for review and comment to facilitate timely approval of the permit:

- Traffic Control - Preliminary traffic control conceptual approaches are detailed in Section 5.3. The County has requested EMWD include detailed traffic control plans in the final design submittal for review in advance of awarding the construction contract. The contractor will then be responsible for developing the means and methods to accomplish the work within the prescribed work area, or to submit for approval alternate traffic control plans (at the Contractor's own risk and signed by a California registered engineer) that confine the construction activities to within the defined work area limits.
- Arizona Crossing near Brown Street - As discussed in section 5.5.5, the proposed approach at this location is to construct the proposed sewer via open trench. This approach has been preliminarily approved by the County, however, full details and approval will be obtained during the final design and incorporated into the Contract Documents.

6.2 CEQA and Resource Agency Permits

EMWD has contracted with Webb to complete the required environmental documents and resource permit applications. Design related input from Ardurra for completion of these documents will be provided during the preliminary design and final design stages as necessary.

SECTION 7: OPINION OF PROBABLE CONSTRUCTION COST

7.1 Opinion of Probable Construction Cost

A preliminary design level opinion of probable construction cost has been prepared based on the project description and assumptions presented in this report. A breakdown of the cost is included in Appendix L. The total opinion of probable construction cost for the proposed project is $8.5/=8M and includes a 30% contingency given the preliminary nature of the project description and an additional 10% escalation factor to reflect the mid-point of construction.

SECTION 8: PROJECT SCHEDULE

8.1 Proposed Final Design and Construction Schedule

A proposed schedule is included in Appendix M including final design and construction. Major milestones are noted below.

- Final Preliminary Design Report Submittal — March 2023
- 60% Design Submittal — June 2023
- 90% Design Submittal — July 2023
- 100% Design Submittal — August 2023
- Final Contract Documents — October 2023
- County of Riverside ROW Permit — October 2023
- CEQA Compliance — November 2023
- NPDES Discharge Permit (if applicable) — December 2024
- Completion of Bid/Award — January 2024
- Construction Completion — November 2025

APPENDIX A

Mead Valley Cajalco Sewer Project Alternative Alignment Analysis Technical Memorandum

EASTERN MUNICIPAL WATER DISTRICT
TECHNICAL MEMORANDUM

Date:	December 4, 2022 – Draft January 19, 2023 - Final
Subject:	**Mead Valley Cajalco Sewer Project** **Alternative Alignment Analysis**
Prepared By:	Jamie Fagnant, P.E.
Reviewed By:	Anders Egense, P.E., Ryan Huston, P.E.

PURPOSE

The purpose of this technical memorandum is to identify potential alternative alignments for the proposed Mead Valley Cajalco Sewer, develop ranking criteria, and apply the criteria to each alternative to identify the preferred alignment. This memorandum addresses only the alternative alignment analysis in order to support the development of the formal Preliminary Design Report and associated 30% design drawings.

BACKGROUND

The Mead Valley Cajalco Sewer Project will extend Eastern Municipal Water District's (EMWD or District) collection system in Mead Valley. The goals of the Mead Valley Cajalco Sewer Project is to:

- extend sewer service to and promote economic development of the disadvantaged community of Mead Valley,
- redirect existing flow to the trunk sewer in order to decommission the Clark Street Lift Station, and
- provide additional flow to Western Municipal Water District's (WMWD) Western Water Recycling Facility in order to produce additional recycled water.

A new trunk sewer is proposed along Cajalco Road from Day Street to Carpinus Drive where it would connect to Western Municipal Water District's (WMWD) existing 15" sewer. Proposed alternative alignments, location of the Clark Lift Station and the target service area are shown in the attached Figure 1.

A portion of the project is within the mapped FEMA 100 year flood plain. Cajalco Creek, an ephemeral waterway extends along part of Cajalco Road. Two Arizona crossings convey flow. These are located on Cajalco Road west of Brown Street (within Alignment 1), and on Wells Street east of Alexander Street (within Alignment 2). Riverside County is in the planning stages of the Cajalco Road Widening Project. The Cajalco Road Widening Project will widen Cajalco Road, raise the grade of Cajalco Road to remove the traveled way from the 100 year flood plain, and channelize the overland portions of Cajalco Creek along the Cajalco Road corridor. During the development of this technical memorandum, Ardurra and the District met with Riverside County to discuss the proposed road widening project and the impact to the existing Arizona crossings. As a follow-up to the meeting, Riverside County indicated they would allow the District to trench through and repair the Arizona crossing(s) to install the new trunk sewer, thus avoiding the risk and cost associated with trenchless construction under the existing Arizona crossing(s). Application of the alignment evaluation criterion was done with the understanding that the installation of the new trunk sewer under the existing Arizona crossing(s) would be undertaken via open trench.

ALTERNATIVE ALIGNMENTS

Ardurra has identified three potential alternative alignments as shown in Figure 1 and described below. Alternatives start at a new upstream manhole at Day Street and Cajalco Road and end at the downstream connection point, connecting to an existing WMWD 15" stub out at Carpinus Drive and Cajalco Road. The proposed sewer would intercept existing flow at Clark Street and Cajalco Road, where the existing Clark Street Lift Station is located, and convey it to the west. East of Clark Street the sewer would service future developments along Cajalco Road. For the purposes of comparing identified alternatives within this technical memorandum it is assumed that the sewer will be 12" downstream of the Clark Street and 8" upstream of Clark Street. Proposed sizing will be finalized in the full preliminary design report for the selected alignment.

- **Alternative 1** – This alternative extends from Day Street to Carpinus Drive, approximately 12,630 feet within Cajalco Road. This alignment is the most direct route between connection points and would maximize slope in the new alignment. This alignment would trench through the existing Arizona crossing just west of Brown Street.
- **Alternative 2** – This alternative is approximately 13,490 linear feet and is similar to Alternative 1, however, it turns north at Brown Street, east on Wells Street, and south on Alexander Street to rejoin Cajalco Road and continue west to Carpinus Drive. The main benefit of this alignment would be the avoidance of impacts on the existing Arizona crossing on Cajalco Road, just west of Brown Street. This alignment would impact an Arizona crossing on Wells Street, just east of Alexander Street.
- **Alternative 2A** – This alternative is similar to Alternative 2A (with a total length of 13,490 ft), except after turning north at Brown Street and east on Wells Street, it would turn south on Mead Street to rejoin Cajalco Road. This alignment was identified in discussions with District Staff as a potential alignment that not require trenching through an existing Arizona crossing. However, Mead Street between Wells and Cajalco Roads is an undeveloped right-of-way with a double track dirt path that does not stay within public right-of-way. The actual right-of-way contains several mature trees and is proposed to be crossed in the future with an unlined earthen channel to convey the FEMA 100-year flood flows. Due to potential environmental impacts and the future liability of a sewer installation under an unlined flood channel, this alternative was not carried forward.
- **Alternative 3** – This alternative is located within Souder Street and Elmwood Street and would bypass Cajalco Road from Day Street to Una Street. This alternative requires that collector sewers would need to be installed along Cajalco Road in order to provide service to the target service area from Brown Street to Day Street. This alternative would comprise approximately 12,610 feet of 12" trunk sewer and an additional 4,570 feet of 8" collector sewer.

Alignment Evaluation Criteria Development

A list of criteria was developed and reviewed with District staff. The criteria and methodology for applying them are detailed below.

Hydraulics – Does the project meet the District's requirements for sewer capacity as outlined in the EMWD Guidelines for Sewer System Plans? Weighted value of 10%. Design flows were provided in the Draft Technical Memorandum titled Mead Valley Sewer Diversion Hydraulic Analysis prepared by Dudek for WMWD. The District's capacity requirements are outlined below.

- Convey the Peak Wet Weather Flow (PWWF), 0.361 MGD, at a maximum d/D (depth to Diameter ratio) of 0.5 for sewers 12" and smaller and 0.75 for sewers 15" and larger
- Provide a minimum velocity of 2 fps (feet per second) at Peak Dry Weather Flow (PDWF), 0.299 MGD
- Allow for minimum slopes as shown in the below table:

Size	Minimum slope
8"	0.0040
10"	0.0032
12"	0.0024
15"	0.0016
18"	0.0014

A rating of 5 indicates the alignment meets the above criteria. A rating of 1 indicates the alignment does not meet the above criteria. A rating of 3 indicates the alignment meets the above criteria but would require depths exceeding 20 feet to do so. Additionally, a 1 rating would be applied to an alignment that would require collector sewers to provide service to the target service area as the low flow in the collector sewers and increased turbulence where these flows would connect to the main line is less hydraulically optimal.

Utilities (Existing & Future) – Are there any potential existing or future utility conflicts along the alignment? Weighted value of 10%. The Riverside County Cajalco Road Widening Project includes multiple new drainage crossings along Cajalco Road. A 5 rating indicates the alignment has very few existing utility conflicts. A 3 rating indicates existing and/or proposed utilities (including the proposed drainage crossings along Cajalco Road) in the project corridor but not in conflict with the proposed design. A 1 rating indicates a very congested utility corridor with a high potential for utility relocations and/or modifications to the proposed line and grade to avoid utility conflicts.

Right-of-Way – Is the alternative located in public right-of-way or existing easements? Weighted value of 10%. A 5 rating indicates the alignment is within public right-of-way, that the right-of-way is paved, and that no immediate improvements to the right-of-way are proposed. A 3 rating indicates that less than 50% of the alignment would require additional permanent and/or temporary easements. A 1 rating indicates that over 50% of the alignment will require easements.

Residential/Business Access Impacts – What is the extent of impacts to the residents and/or businesses? Weighted value of 10%. A 5 rating indicates the project does not cross directly in front of residences or disrupt the traffic flow into or out of businesses. If best management practices can maintain traffic to businesses, the alignment would still receive a 5 rating. A 3 rating indicates the project is in close proximity to residences and businesses and may temporarily impact ingress to parcels containing businesses. A 1 rating indicates the alignment crosses directly in front of residences on residential streets for over 50% of the alignment thereby causing significant impacts to residents.

Traffic Impacts (Construction) – Are there significant impacts to traffic during construction? Weighted value of 10%. A 5 rating indicates the project occurs along lightly traveled roadways. A 3 rating indicates the project occurs may be located within a major arterial road, but proper traffic control and reduced working hours could be implemented to minimize traffic disruptions. A 1 rating indicates the project occurs within a major arterial road without adequate roadway width to allow for continued flow of traffic and would therefore require night work to minimize traffic impacts.

Permitting – What permits, including regulatory are required? Weighted value of 5%. A 5 rating indicates basic encroachment permits are required for construction. A 3 rating indicates additional regulatory permitting is required including Army Corps of Engineers or California Department of Fish and Wildlife. A 1 rating indicates that regulatory permitting would be extremely difficult and costly to obtain.

Constructability/Risk – Will the alignment require sustained construction within areas with significant groundwater, potential for hard rock excavation, and/or sewer depths exceeding 20 ft in depth Weighted value of 10%. Although the geotechnical investigation is not yet completed, there are numerous granitic outcroppings in the project area. Additionally, groundwater monitoring wells exist at the intersection of Brown Street and Cajalco Road. At the time of preparation of this draft memorandum it is assumed that the three alternatives under evaluation have similar potential for rock and groundwater. A 5 rating indicates the alignment is expected to have no more than 25% of the length within areas with known high, or fluctuating to high groundwater, not expected to contain hard rock excavation, and sewer depths would not exceed 20 ft in depth. A 3 rating indicates the alignment may have between 25% to 50% of the length within areas with known high, or fluctuating to high, groundwater, and may contain hard rock excavations. A 3 rating would also require the sewer depth to be less than 20 ft. A 1 rating indicates over half the alignment is subject to groundwater, hard rock, and/or construction depths would be greater than 20 ft.

Operations & Maintenance – Will the alignment provide self-cleansing velocity at PDWF, involve manholes located outside of heavily traveled roadways (except for west of Barton Street on Cajalco which is common to all alternatives), and not require collector sewers to service the targeted service area (which would require additional cleaning). Weighted value of 15%. A 5 rating indicates the alignment would meet self-cleansing velocity at PDWF, site manholes outside of heavily traveled roadways, and not require collector sewers to service the targeted service area. A 3 rating indicates the alignment would meet self-cleansing velocity at PDWF but would entail manholes within heavily traveled roadways in a manner that would generally allow for a simple lane closure to access. A 1 rating indicates the majority of the manholes would be within heavily traveled roadways, would not meet self-cleansing velocity at PDWF, and/or may require collector sewers to service the targeted service area.

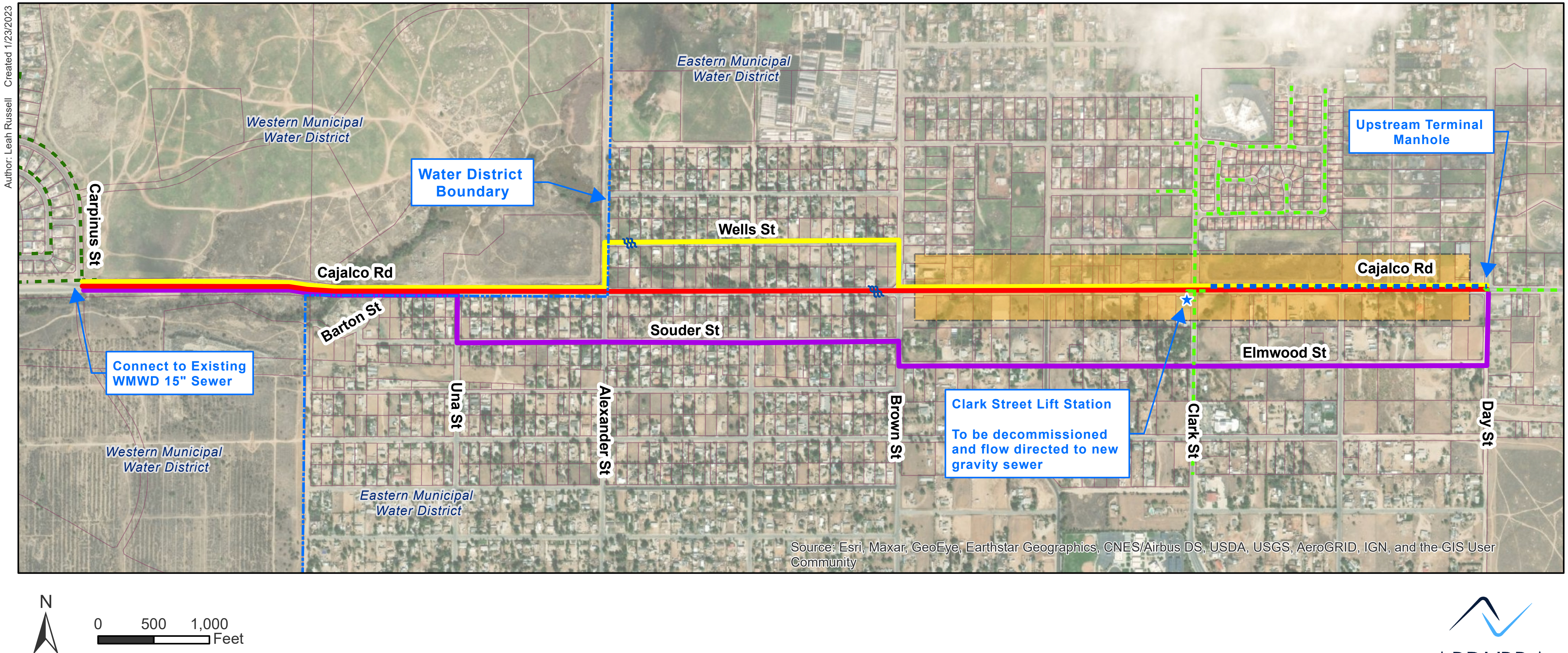
Opinion of Probable Construction Cost – A planning level Engineer's Opinion of Probable Construction Cost was developed for each alternative for comparison purposes. Since the geotechnical investigations and report are still in progress, all alternatives are considered to have similar costs regarding rock excavations, dewatering and contaminated soils. This assumption will be updated upon receipt of a detailed Geotechnical Report for the Project. Paving, rock excavation, and dewatering are assumed to be included in the pipeline unit costs. Cost is weighted at 20%. A rating of 5 indicates a cost between $7 and $8 million. A rating of 4 indicates a cost between $8 and $9 million. A rating of 5 indicates a cost between $9 and $10 million.

Alternate Alignments Evaluation Criterion Application

Results of applying the evaluation criterion to the three alignments are shown in the attached Table 1 - Application of Criteria to Alternative Alignments. Of the three alignments, Alternative 1 received the highest overall score. Alignment 1 is the shortest route, minimizes impacts to residences by avoiding narrow residential streets, avoids sewer depths over 20 feet, and has the lowest overall cost. Based on the information presented herein, it is recommended to move forward with the preliminary design utilizing Alignment 1.

ATTACHMENTS

Figure 1 – Alignment Alternatives
Table 1 – Application of Criterion to Alternative Alignments
Engineer's Opinion of Probable Construction Cost – Alignment 1, 2 & 3



Legend

- Alternative 1
- Alternative 2
- Alternative 3
- Target Service Area
- Parcel Lines
- Exist Clark St. LS FM to be abandoned
- EMWD Existing Sewer
- WMWD Existing Sewer
- Arizona Crossing

ARDURRA

Eastern Municipal Water District

PRELIMINARY DESIGN OF GRAVITY SEWER
FOR THE MEAD VALLEY CAJALCO ROAD PROJECT

Figure 1. Alignment Alternatives

Table 1 - Application of Criteria to Alternative Alignments

			Alternative 1 (Cajalco)			Alternative 2 (Cajalco/Wells)			Alternative 3 (Elmwood/Stouder)		
Criteria	**Weight**	**Scoring Description**	**Score**	**Weighted Score**	**Comment**	**Score**	**Weighted Score**	**Comment**	**Score**	**Weighted Score**	**Comment**
Hydraulics	10%	1-5 (Best)	5	10	most direct route	3	6	increased excavation depth required to maintain minimum slopes	1	2	collector sewers req'd
Utilities (Existing & Future)	10%	1-5 (Best)	3	6	proposed drainage crossings	3	6	proposed drainage crossings	5	10	
Right-of-Way	10%	1-5 (Best)	5	10	within existing public ROW	5	10	within existing public ROW	5	10	within existing public ROW
Residential/Business Impacts	10%	1-5 (Best)	5	10	minimizes impacts to residents	4	8	some impacts to residents	3	6	entirely adjacent to residential areas
Traffic Impacts (Construction)	10%	1-5 (Best)	3	6	within arterial	3	6	within arterial	4	8	mostly within lightly traveled roadways
Permitting	5%	1-5 (Best)	5	5	std encroachment	5	5	std encroachment	5	5	std encroachment
Constructability/Risk	10%	1-5 (Best)	3	6	fluctuating groundwater	1	2	fluctuating groundwater, deep installation	1	2	fluctuating groundwater, deep installation
O&M	15%	1-5 (Best)	3	9	within heavily traveled way	3	9	within heavily traveled way	1	3	collector sewers required
Sub-Total	**80%**		32	62		27	52		25	46	
Cost	20%	1-5 (Best)	5	20	$7.5M	4	16	$8.1M	3	12	$9.3M
Total	**100%**			82			68			58	

Eastern Municipal Water District
Mead Valley Cajalco Sewer
Engineer's Opinion of Probable Construction Cost
Alternative Analysis Planning Level Cost Opinion - Alternative 1
January 2022

Item	Quantity	Unit	Article	Unit Price	Extension
1	1	LS	Mobilization, Bonds, Permits, Cleanup, and Demobilization	$270,000	$270,000
2	1	LS	Excavation Support Systems	$250,000	$250,000
3	1	LS	Traffic Control	$100,000	$100,000
4	1	LS	Temporary Erosion Control/Storm Water Pollution Prevention Plan (SWPPP)	$50,000	$50,000
5	1	LS	Pothole Utilities	$50,000	$50,000
6	10,010	LF	Construct new 12-Inch PVC Sewer	$340	$3,403,400
7	2619	EA	Construct new 8-inch PVC Sewer	$290	$759,510
8	29	EA	Construct new 5' dia MH	$15,000	$435,000
				Subtotal	$5,317,910
				Contingency, 40%	$2,127,164
				Total	**$7,450,000**

The planning level opinions of construction cost presented herein represents Ardurra's judgment as a design-professional and is supplied for the general guidance of the District. Since Ardurra has no control over the cost of labor and material (particularly related to recent inflationary spikes and supply chain issues), or over competitive bidding or market conditions, Ardurra does not guarantee the accuracy of such opinions as compared to contractor bids or actual cost. This opinion of cost does not include estimates for other project elements including, but not limited to, design, inspection, construction management, District administration, environmental compliance, and right of way acquisition.

Eastern Municipal Water District
Mead Valley Trunk Sewer
Engineer's Opinion of Probable Construction Cost
Alternative Analysis Planning Level Cost Opinion - Alternative 2
January 2022

Item	Quantity	Unit	Article	Unit Price	Extension
1	1	LS	Mobilization, Bonds, Permits, Cleanup, and Demobilization	$289,000	$289,000
2	1	LS	Excavation Support Systems	$250,000	$250,000
3	1	LS	Traffic Control	$100,000	$100,000
4	1	LS	Temporary Erosion Control/Storm Water Pollution Prevention Plan (SWPPP)	$50,000	$50,000
5	1	LS	Pothole Utilities	$50,000	$50,000
6	10,866	LF	Construct new 12-Inch PVC Sewer	$350	$3,803,100
7	2,619	EA	Construct new 8-inch PVC Sewer	$290	$759,510
8	29	EA	Construct new 5' dia MH	$15,000	$435,000
9	2	EA	Construct new 6' dia MH (over 20')	$25,000	$50,000
				Subtotal	$5,786,610
				Contingency, 40%	$2,314,644
				Total	**$8,101,254**

The planning level opinions of construction cost presented herein represents Ardurra's judgment as a design-professional and is supplied for the general guidance of the District. Since Ardurra has no control over the cost of labor and material (particularly related to recent inflationary spikes and supply chain issues), or over competitive bidding or market conditions, Ardurra does not guarantee the accuracy of such opinions as compared to contractor bids or actual cost. This opinion of cost does not include estimates for other project elements including, but not limited to, design, inspection, construction management, District administration, environmental compliance, and right of way acquisition.

Eastern Municipal Water District
Mead Valley Trunk Sewer
Engineer's Opinion of Probable Construction Cost
Alternative Analysis Planning Level Cost Opinion - Alternative 3
January 2022

Item	Quantity	Unit	Article	Unit Price	Extension
1	1	LS	Mobilization, Bonds, Permits, Cleanup, and Demobilization	$332,000	$332,000
2	1	LS	Excavation Support Systems	$250,000	$250,000
3	1	LS	Traffic Control	$40,000	$40,000
4	1	LS	Temporary Erosion Control/Storm Water Pollution Prevention Plan (SWPPP)	$50,000	$50,000
5	1	LS	Pothole Utilities	$70,000	$70,000
6	12,612	LF	Construct new 12-Inch PVC Sewer	$320	$4,035,840
7	4,570	EA	Construct new 8-inch PVC Sewer	$270	$1,233,900
8	37	EA	Construct new 5' dia MH	$15,000	$555,000
9	2	EA	Construct new 6' dia MH (over 20')	$25,000	$50,000
				Subtotal	$6,616,740
				Contingency, 40%	$2,646,696
				Total	**$9,263,436**

The planning level opinions of construction cost presented herein represents Ardurra's judgment as a design-professional and is supplied for the general guidance of the District. Since Ardurra has no control over the cost of labor and material (particularly related to recent inflationary spikes and supply chain issues), or over competitive bidding or market conditions, Ardurra does not guarantee the accuracy of such opinions as compared to contractor bids or actual cost. This opinion of cost does not include estimates for other project elements including, but not limited to, design, inspection, construction management, District administration, environmental compliance, and right of way acquisition.

APPENDIX B

Mead Valley Sewer Diversion Hydraulic Analysis Technical Memorandum

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TECHNICAL MEMORANDUM

To:	Ryan Shaw, Western Municipal Water District (WMWD)
From:	Elizabeth Caliva, Dudek; Jenny Li, Dudek
Subject:	Mead Valley Sewer Diversion Hydraulic Analysis
Date:	October 17, 2022
cc:	Tony Pollak, WMWD; Laura Barraza, EMWD; Daniel Meacham, EMWD
Attachment(s):	EMWD Wastewater Design Criteria

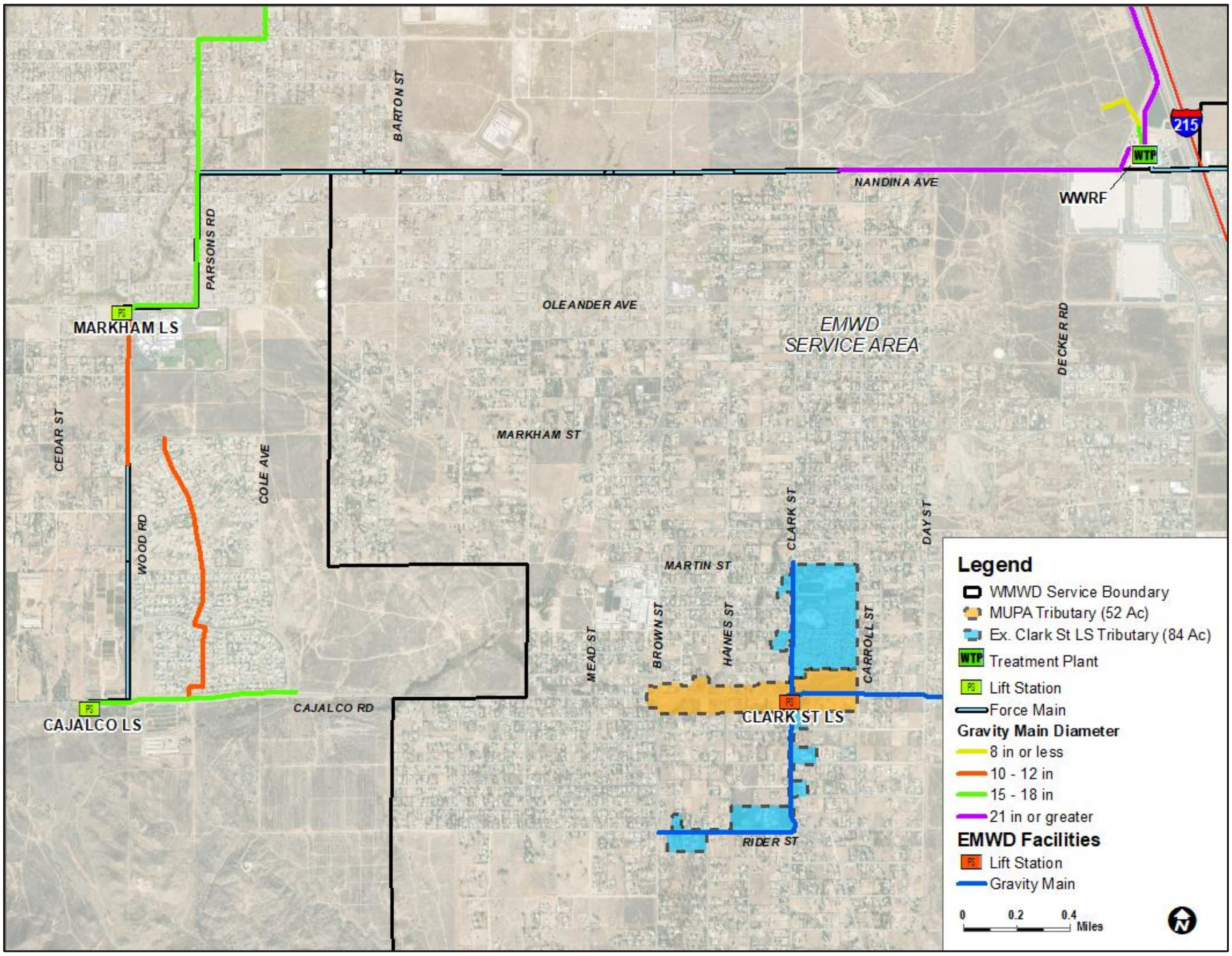
Eastern Municipal Water District (EMWD) proposes to divert all, or a fraction, of the flows currently being served by EMWD's Clark Street Lift Station (LS) to Western Municipal Water District's (WMWD) sewer collection system. This includes flows generated by planned septic to sewer conversion projects in Mead Valley. By diverting the additional sewer flows to WMWD, EMWD may avoid a costly relocation of its existing Clark St LS and associated infrastructure. The following technical memorandum evaluates the impacts of the proposed sewer diversion to WMWD's collection system, especially with regards to the CIP projects previously defined in Western's 2021 Riverside Facilities Master Plan (2021 FMP).

As shown in **Figure 1**, sewer flows from up to approximately 136 acres of various land use types within EMWD's service area may be diverted to the existing WMWD 15-inch gravity main in Cajalco Rd, just upstream of the Cajalco LS. Included in the total diversion area is a 52-acre region of predominantly vacant land known as a Mixed Use Policy Area (MUPA), currently zoned for future mixed-use commercial developments.

The memorandum is organized into the following sections:

- ***Section 1 – Sewer Flows Estimation & Loading*** – Describes the estimated sewer flows from the EMWD tributary area that may be diverted into WMWD's collection system.
- ***Section 2 – Pipeline Capacity Analysis*** – Analyzes the capacity of gravity and force mains within WMWD's collection system downstream of the added EMWD sewer flows.
- ***Section 3 – Lift Station Capacity Analysis*** – Analyzes the capacity of lift stations downstream of the added EMWD sewer flows.
- ***Section 4 –Treatment Plant Analysis*** – Analyzes the capacity of the Western Water Recycling Facility (WWRF) with the addition of EMWD sewer flows.
- ***Section 5 – Conclusion & Recommendations*** – Recommends any improvements to WMWD's collection system resulting from the added EMWD sewer flows, beyond what was previously defined in the 2021 FMP.

Figure 1: Location Map



1 Sewer Flows Estimation & Loading

EMWD wastewater flow factors (Attachment A) and existing indoor water use data were used to initially estimate sewer flows generated by the tributary areas shown in Figure 1. These sewer flow estimates were compared to those estimated using WMWD sewer flow factors. The EMWD estimates for peak design flow resulted in slightly higher estimates (total peak design flow of 0.361 MGD vs. 0.343 MGD); therefore, the EMWD estimates were utilized for the capacity analysis. In addition to the MUPA tributary area, the existing Clark St LS tributary area is comprised of medium density residential, school, and public facility land use types in varying stages of development. A portion of the existing Clark St LS tributary area is currently on septic, including the schools and some public facilities.

Table 1 presents the estimated total sewer flows generated by the EMWD tributary area in Mead Valley. In the following sections the total peak design flow, which is equivalent to the peak dry weather flow (PDWF) multiplied by a safety factor of 1.2, is used to evaluate the capacity of gravity mains and lift stations.

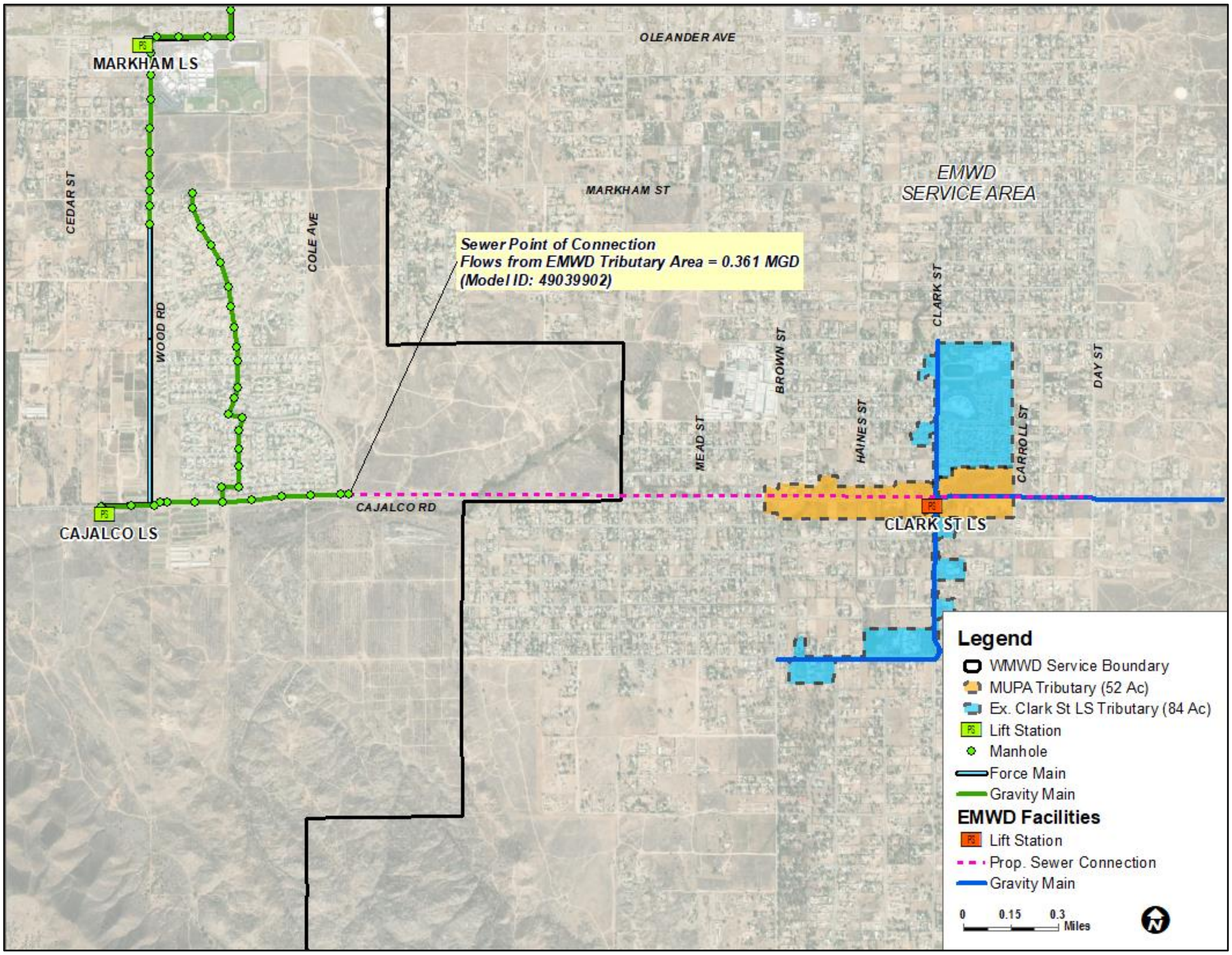
Table 1. Estimated Sewer Flows from EMWD Tributary Area (Mead Valley)

Land Use Type	Status	Area (Ac)	Unit Sewer Flow Factor	Average Dry Weather Flow (gpd)	Peak Dry Weather Flow[1] (gpd)	Peak Design Flow[2] (gpd)
School	Developed (On Septic)	41	N/A[3]	6,735[3]	19,329	23,195
Public Facility	Developed (On Septic)	11	N/A[3]	4,424[3]	12,697	15,236
Medium Density Residential (138 DUs)	Developed (111 DU), Undeveloped (27 DU)	32	235 gpd/EDU[4]	32,430	93,074	111,689
Mixed Used Policy Area (MUPA)	Undeveloped	52	235 gpd/EDU at 5 EDU/acre[4]	61,100	175,357	210,428
Total:		**136**	–	**104,689 gpd (0.105 MGD)**	**299,015 gpd (0.299 MGD)**	**360,548 gpd (0.361 MGD)**

Notes:
1 Peak dry weather flow (PDWF) calculated as the average dry weather flow (ADWF) multiplied by a diurnal peaking factor of 2.87 where ADWF is less than or equal to 0.1 MGD. Where ADWF is greater than 0.1 MGD, the following peaking factor equation is applied: $PF = 2.13 \times Q_{ADWF}^{0.13}$. Reference Appendix 3A of EMWD 2015 Wastewater Collection System Master Plan Update.
2 Peak Design Flow calculated as the PDWF multiplied by an additional safety factor of 1.2 to simulate PWWF. Reference Appendix 3A of EMWD 2015 Wastewater Collection System Master Plan Update.
3 Values based on historical indoor water usage data assuming 100% return rate.
4 Unit sewer flow factors per wastewater design criteria provided by EMWD.

As shown in **Figure 2**, EMWD will construct and maintain a sewer interconnection between the proposed tributary area and the easternmost WMWD manhole in Cajalco Rd, located at the intersection of Cajalco Rd and Carpinus Dr. After discharging to the 15-inch gravity main in Cajalco Rd, the diverted EMWD sewer flows will enter the Cajalco LS in conjunction with existing WMWD flows. From the Cajalco LS, flows travel directly downstream through the Markham LS before entering the Western Water Recycling Facility (WWRF).

Figure 2: Proposed EMWD-WMWD Sewer Interconnection & Loading Location



The pipeline capacity analysis in Section 2 assumes the total peak design flow of 0.361 MGD estimated in Table 1 is applied to the manhole at Cajalco Rd and Carpinus Dr (model ID: 49039902).

2 Pipeline Capacity Analysis

The following subsections evaluate the capacity of WMWD's gravity and force mains downstream of the proposed EMWD sewer interconnection under existing, Near-Term, and Ultimate scenarios.

The 2021 FMP evaluated WMWD's collection system under peak wet weather flow (PWWF) conditions. Therefore, each of the following model scenario analyses considers the impact of the added EMWD sewer flows on WMWD's collection system under PWWF conditions.

The latest WMWD InfoSewer model was updated with the additional peak design flow of 0.361 MGD from EMWD applied to the manhole specified in Figure 2. The existing "DAUCHY_PWWF" model pattern was applied to the PDWF load. Per Section 3.4.1.1 of the 2021 FMP, the size and land use of the Dauchy LS drainage basin most closely resembles that of the Cajalco LS and Markham LS. In the absence of viable data from the Cajalco LS and Markham LS flow meters, the Dauchy LS flow pattern was assumed for those basins.

Under PWWF conditions, WMWD design criteria state the maximum depth-to-diameter ratio (d/D) of a sewer gravity main shall not exceed 0.5 ft/ft in pipes with diameter less than 15-inch or 0.75 ft/ft in pipes with diameter equal to or greater than 15-inch. However, a d/D of 0.90 or greater is required to "trigger" a pipeline improvement project. Additionally, the maximum allowable velocity of force mains within WMWD's collection system is 7 fps under all operating conditions.

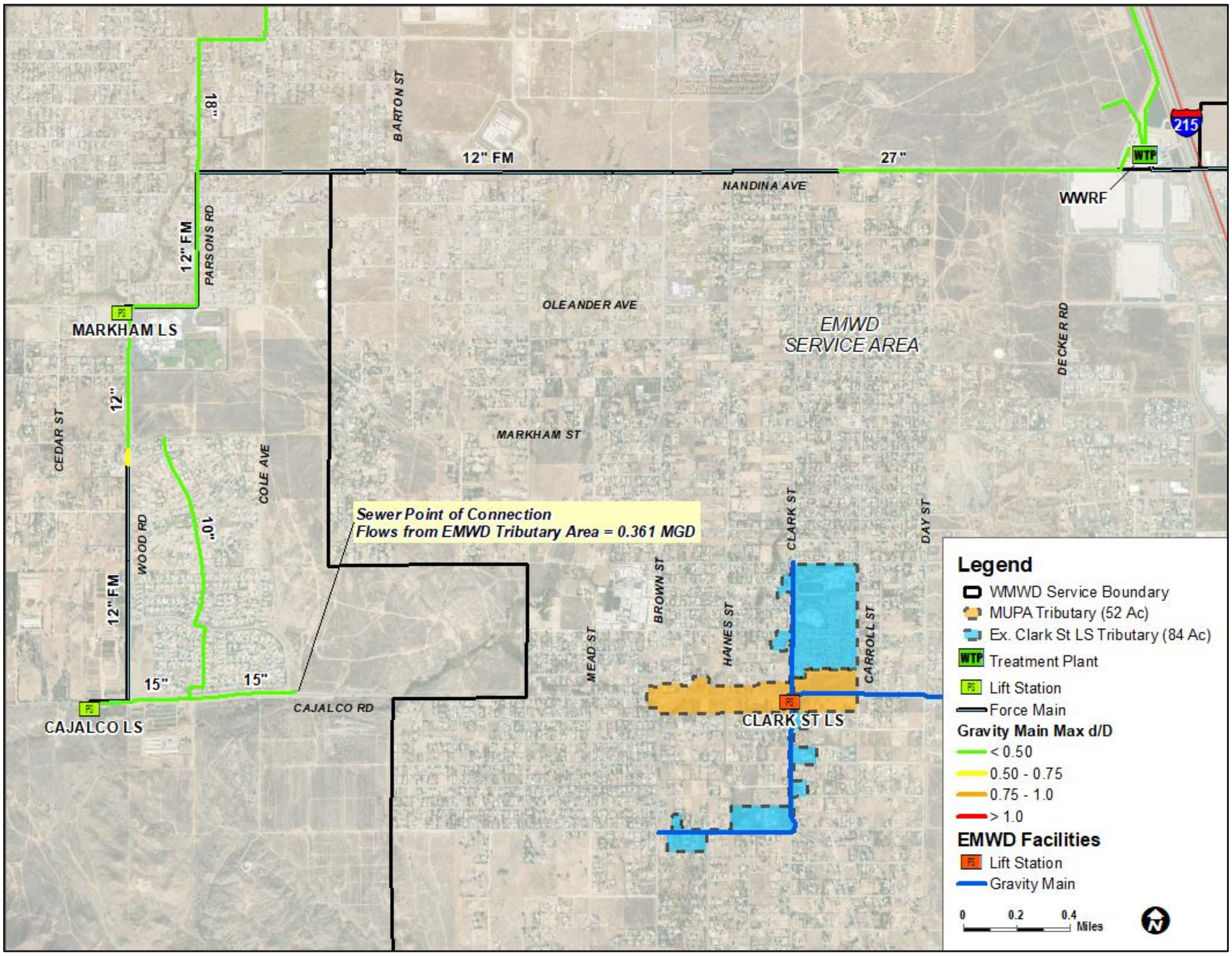
2.1 Existing PWWF Analysis

Model scenario "CAL_PWWF" was used to evaluate the impact of the total sewer flows diverted from EMWD on WMWD's existing collection system. The results shown in **Figure 3** indicate that under existing PWWF conditions, no gravity mains downstream of the proposed EMWD sewer point of connection are projected to violate WMWD design criteria for maximum d/D ratios.

A short segment of 12-inch gravity main just upstream of the Cajalco LS force main exhibits a maximum d/D of greater than 0.5 ft/ft, but less than 0.75 ft/ft. However, the 2021 FMP already identified the same gravity main as exceeding maximum d/D design criteria under existing PWWF conditions, without the additional flows from EMWD. Furthermore, the pipe segment does not meet the established "trigger" criteria of flowing at 90% full that would result in an upsizing improvement project.

Lastly, the velocities of force mains downstream of the EMWD sewer point of connection are not projected to exceed 7 fps. Therefore, under existing PWWF conditions no improvements to WMWD's sewer pipeline system are anticipated to be required as a result of the additional EMWD sewer flows.

Figure 3: Gravity Main Capacity Analysis under Existing PWWF Conditions with EMWD Sewer Flows

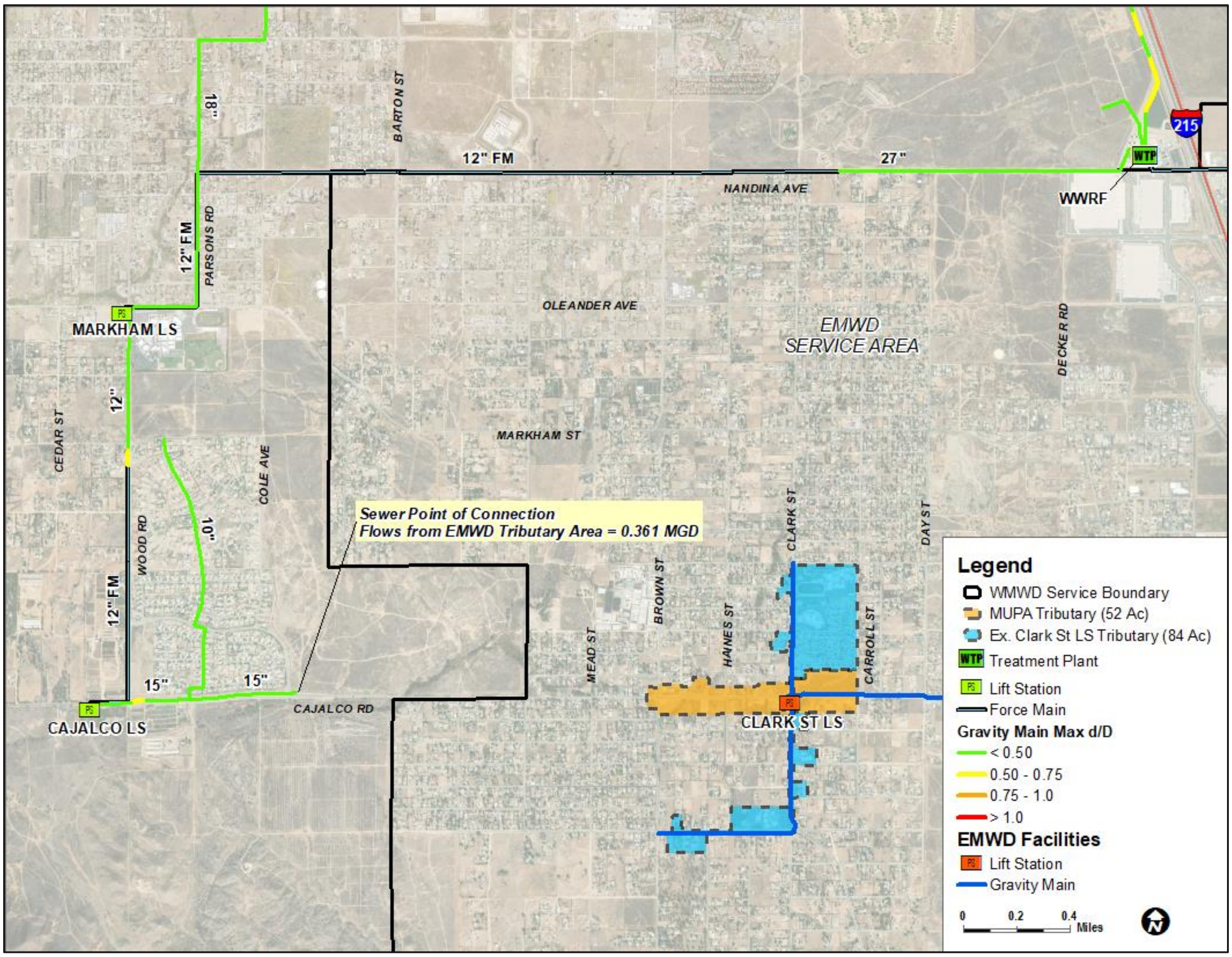


2.2 Near-Term (2030) PWWF Analysis

Model scenario "2030_PWWF" was used to evaluate the impact of the total sewer flows diverted from EMWD on WMWD's Near-Term collection system. The results shown in **Figure 4** indicate that under Near-Term PWWF conditions, no gravity mains downstream of the proposed EMWD sewer point of connection are projected to violate WMWD design criteria for maximum d/D ratios.

Furthermore, the velocities of force mains downstream of the EMWD sewer point of connection are not projected to exceed 7 fps. Therefore, under Near-Term PWWF conditions no improvements to WMWD's sewer pipeline system are anticipated to be required as a result of the additional EMWD sewer flows.

Figure 4: Gravity Main Capacity Analysis under Near-Term PWWF Conditions with EMWD Sewer Flows

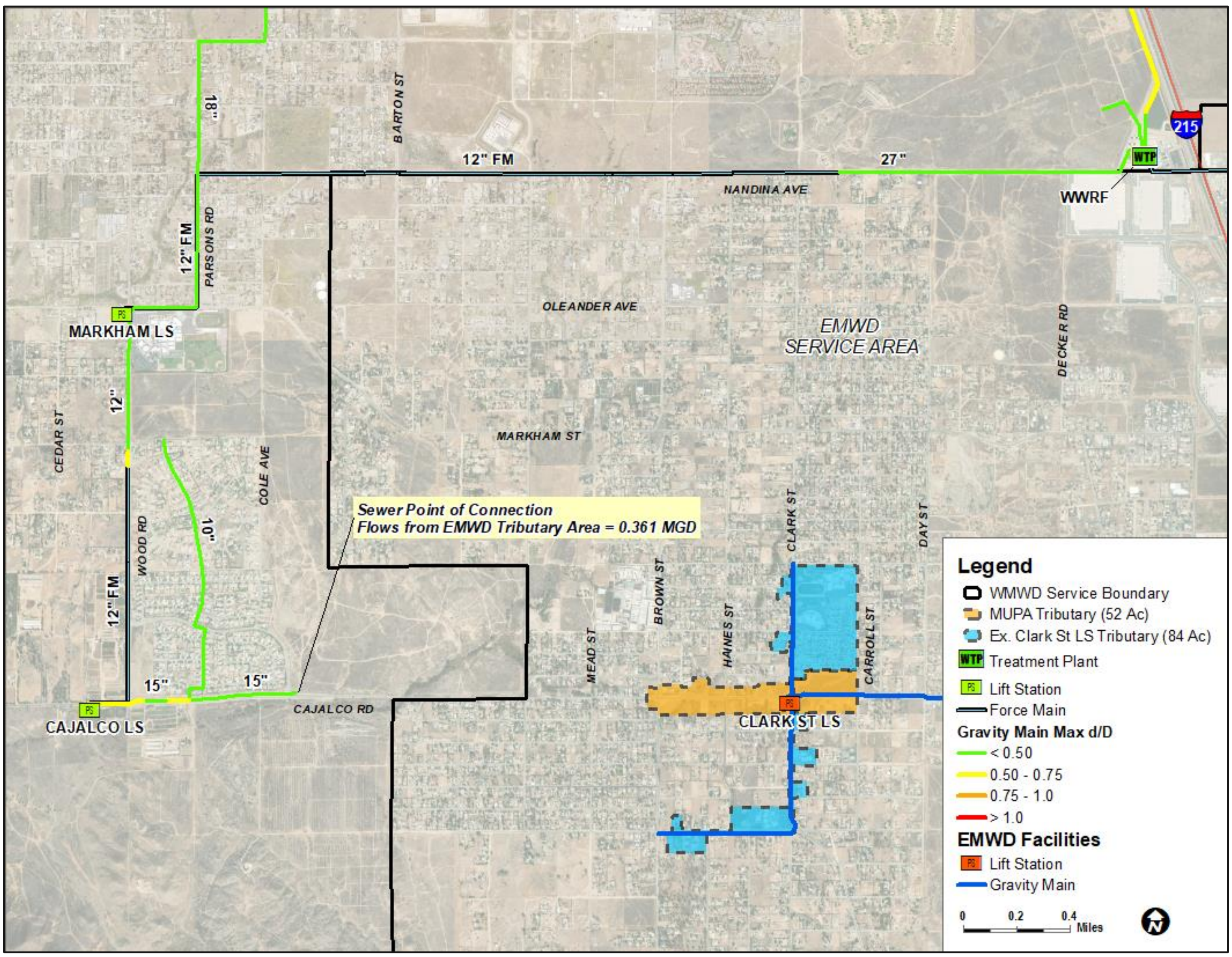


2.3 Ultimate (2040) PWWF Analysis

Model scenario "2040_PWWF" was used to evaluate the impact of the total sewer flows diverted from EMWD on WMWD's Ultimate collection system loading projections. The results shown in **Figure 5** indicate that under projected Ultimate PWWF conditions, no gravity mains downstream of the proposed EMWD sewer point of connection are anticipated to violate WMWD design criteria for maximum d/D ratios.

Furthermore, velocities of force mains downstream of the EMWD sewer point of connection are not projected to exceed 7 fps. Therefore, under Ultimate PWWF conditions no improvements to WMWD's sewer pipeline system are anticipated to be required as a result of the additional EMWD sewer flows.

Figure 5: Gravity Main Capacity Analysis under Ultimate PWWF Conditions with EMWD Sewer Flows



3 Lift Station Analysis

The following subsections evaluate the capacity within the Cajalco and Markham lift stations (LS) downstream of the proposed EMWD sewer interconnection under existing, Near-Term, and Ultimate conditions.

WMWD requires the firm capacity of any lift station within its system be greater than the influent PWWF. Firm capacity is the pumping capacity of a lift station with its largest pump taken out of service. The risk of sewage backing up into the gravity collection system or overflowing at the lift station increases when a lift station's firm capacity is less than the peak inflow.

3.1 Existing LS Capacity Analysis

The 2021 FMP compared the peak wet weather inflow measured at each existing lift station to the firm capacity of the lift station. **Table 2** presents the existing peak wet weather inflow and capacity of the Cajalco and Markham LSs as summarized in Table 8-2 of the 2021 FMP, as well as the revised inflow and capacity after addition of the total peak LS design flow diverted from EMWD (0.361 MGD).

The 2021 FMP identified the Markham LS as capacity deficient under existing peak inflow conditions. As such, the 2021 FMP recommended that WMWD increase the firm capacity of Markham LS from 1.44 MGD to 2.1 MGD by replacing both existing pumps with two new pumps, each capable of 1,500 gpm design flow. Since the Markham LS pumps operate on variable frequency drives (VFD), an expansion of the existing wet well structure was determined to not required.

Table 2. Cajalco & Markham LS Capacity Analysis – Existing PWWF

Lift Station	Capacity (gpm)		Total Capacity		Firm Capacity		Existing PWWF - Without EMWD (MGD)	Capacity Deficient Without EMWD	Existing PWWF - With EMWD[1] (MGD)	Capacity Deficient With EMWD
	Pump No. 1	Pump No. 2	(gpm)	(MGD)	(gpm)	(MGD)				
Cajalco	1,000	1,000	2,000	2.88	1,000	1.44	0.13	No	0.77	No
Markham	1,000	1,000	2,000	2.88	1,000	1.44	1.55[2]	Yes	2.05	Yes

Notes:
1 Results obtained from latest InfoSewer model after addition of total peak design flow diverted from EMWD tributary area (0.361 MGD) as calculated in Table 1.
2 Existing PWWF at Markham LS differs from Table 8-2 of 2021 FMP due to InfoSewer model updates since completion of the 2021 FMP.

As seem in Table 2, the firm capacity of the Cajalco LS is greater than its anticipated inflow both before and after addition of the EMWD tributary area flows. Therefore, the Cajalco LS is not capacity deficient under existing peak inflow conditions.

Meanwhile, the capacity deficit of the Markham LS increases upon addition of the EMWD tributary area flows. However, the overall peak inflow at Markham LS remains below the recommended improved firm capacity of 2.1 MGD as proposed in the 2021 FMP. Therefore, no modifications to the Markham LS improvement project originally recommended in the 2021 FMP are anticipated to be required under existing peak inflow conditions.

3.2 Near-Term (2030) LS Capacity Analysis

Table 3 presents the Near-Term peak wet weather inflow and capacity of the Cajalco and Markham LS as summarized in Table 8-5 of the 2021 FMP, as well as the revised inflow and capacity after addition of the total peak LS flow diverted from EMWD.

Table 3. Cajalco & Markham LS Capacity Analysis – Near-Term (2030) PWWF

Lift Station	Capacity (gpm)		Total Capacity		Firm Capacity		Near-Term PWWF - Without EMWD (MGD)	Capacity Deficient Without EMWD	Near-Term PWWF - With EMWD[1] (MGD)	Capacity Deficient With EMWD
	Pump No. 1	Pump No. 2	(gpm)	(MGD)	(gpm)	(MGD)				
Cajalco	1,000	1,000	2,000	2.88	1,000	1.44	0.59	No	1.24	No
Markham	1,000	1,000	2,000	2.88	1,000	1.44	1.87[2]	Yes	2.08	Yes

Notes:
1 Results obtained from latest InfoSewer model after addition of total peak design flow diverted from EMWD tributary area (0.361 MGD) as calculated in Table 1.
2 Near-Term PWWF at Markham LS differs from Table 8-5 of 2021 FMP due to InfoSewer model updates since completion of the 2021 FMP.

As seen in Table 3, the firm capacity of the Cajalco LS is greater than its anticipated inflow both before and after addition of the EMWD tributary area flows. Therefore, the Cajalco LS is not capacity deficient under Near-Term peak wet weather conditions.

As in the existing scenario, the peak inflow at Markham LS after addition of the EMWD tributary area flows remains below the recommended improved firm capacity of 2.1 MGD as proposed in the 2021 FMP. The peak inflow at Markham LS is not anticipated significantly increase between the existing and Near-Term scenarios due to the upstream Cajalco LS being a fixed speed pump and generating the same peak outflow in both situations, even as average flows increase.

3.3 Ultimate (2040) LS Capacity Analysis

Table 4 presents the Ultimate peak wet weather inflow and capacity of the Cajalco and Markham LS as summarized in Table 8-8 of the 2021 FMP, as well as the revised inflow and capacity after addition of the total peak LS flow diverted from EMWD.

Table 4. Cajalco & Markham LS Capacity Analysis – Ultimate (2040) PWWF

Lift Station	Capacity (gpm)		Total Capacity		Firm Capacity		Ultimate PWWF - Without EMWD (MGD)	Capacity Deficient Without EMWD	Ultimate PWWF - With EMWD[1] (MGD)	Capacity Deficient With EMWD
	Pump No. 1	Pump No. 2	(gpm)	(MGD)	(gpm)	(MGD)				
Cajalco	1,000	1,000	2,000	2.88	1,000	1.44	0.67	No	1.32	No
Markham	1,000	1,000	2,000	2.88	1,000	1.44	2.43[2]	Yes	2.62	Yes

Notes:
1. Results obtained from latest InfoSewer model after addition of total peak design flow diverted from EMWD tributary area (0.361 MGD) as calculated in Table 1.
2. Ultimate PWWF at Markham LS differs from Table 8-8 of 2021 FMP due to InfoSewer model updates since completion of the 2021 FMP.

As seen in Table 4, the firm capacity of the Cajalco LS is greater than its anticipated inflow both before and after addition of the EMWD tributary area flows. Therefore, the Cajalco LS is not capacity deficient under Ultimate peak wet weather conditions.

Given the uncertainty of projected developments beyond 2040, it is not recommended that WMWD increase the firm capacity of Markham LS by any more than what is required by the Near-Term scenario. Instead, WMWD should regularly measure inflows at the Markham LS as the Ultimate scenario year approaches and evaluate if further improvements to Markham LS are necessary.

4 Treatment Plant Analysis

The following evaluates the capacity of the Western Water Recycling Facility (WWRF) under existing, Near-Term, and Ultimate conditions. Treatment plant capacity is evaluated using average dry weather flows (ADWF). The current treatment capacity of WWRF is 3.0 MGD. Per the 2021 FMP, WMWD should begin evaluating options for expansion of WWRF when inflow under average dry weather conditions exceed 75% of the plant's current capacity.

4.1 Existing Treatment Capacity Analysis

The 2021 FMP compared the average dry weather flow at each treatment plant's inlet to the plant's established treatment capacity. The total treatment capacity of WWRF is 3.0 MGD. **Table 5** presents the existing ADWF and remaining available capacity at WWRF as summarized in Table 3-24 of the 2021 FMP, as well as the revised inflow and capacity after addition of the total ADWF diverted from EMWD. Under existing conditions, WWRF has ample capacity to treat anticipated ADWF both before and after addition of the EMWD tributary area flows.

Table 5. WWRF Treatment Capacity – Existing ADWF

Condition	ADWF (MGD)	Excess Capacity (MGD)	Capacity Utilized
Existing[1] – Without EMWD	1.15	1.85	38%
Existing – With EMWD[2]	1.25	1.75	42%

Notes:
1 Includes 0.35 MGD of flows diverted from City of Riverside. Reference Section 2.4.5 of 2021 FMP.
2 Equal to existing ADWF into WWRF (1.15 MGD) plus total ADWF from EMWD tributary area as calculated in Table 1 (0.105 MGD).

4.2 Near-Term (2030) Treatment Capacity Analysis

By 2030, a large light industrial development known as Meridian West Upper Plateau (MWUP) is likely to complete construction within WMWD's service area. MWUP will generate approximately 0.45 MGD of ADWF that will serve as additional inflow to WWRF. **Table 6** presents the projected ADWF and remaining available capacity at WWRF under various development conditions in the Near-Term scenario.

Table 6. WWRF Treatment Capacity – Near-Term (2030) ADWF

Condition	ADWF (MGD)	Excess Capacity (MGD)	Capacity Utilized
Near-Term[1] – Without EMWD & MWUP	2.32	0.68	77%
Near-Term – With EMWD[2] Only	2.42	0.58	81%
Near-Term – With MWUP[3] Only	2.77	0.23	92%
Near-Term – With EMWD & MWUP	2.87	0.13	96%

Notes:
[1] Includes 0.35 MGD of flows diverted from City of Riverside. Reference Section 2.4.5 of 2021 FMP.
[2] Equal to Near-Term ADWF into WWRF (2.32 MGD) plus total ADWF from EMWD tributary area as calculated in Table 1 (0.105 MGD).
[3] Equal to Near-Term ADWF into WWRF (2.32 MGD) plus total ADWF from proposed MWUP development (0.45 MGD).

With the addition of both EMWD tributary area and MWUP flows, WWRF approaches but does not exceed its total treatment capacity of 3.0 MGD. At the time of writing, MWUP was in midst of environmental permitting and no definite construction schedule was available, however the developer anticipates full buildout in approximately the next 10 years. Meanwhile, EMWD has already secured government funding and plans to complete construction of the sewer interconnection between its tributary area and WMWD's collection system by mid-2025.

4.3 Ultimate (2040) Treatment Capacity Analysis

Table 7 presents the projected ADWF and remaining available capacity at WWRF under various development conditions in the Ultimate scenario. Upon consideration of WWRF's minimal remaining available capacity in the Near-Term, WMWD staff directed Dudek to remove the additional 0.35 MGD of flows diverted from the City of Riverside from the following Ultimate scenario analysis.

Table 7. WWRF Treatment Capacity – Ultimate (2040) ADWF

Condition	ADWF (MGD)	Deficit Capacity (MGD)	Capacity Utilized
Ultimate[1] – Without EMWD & MWUP	3.27	0.27	> 100%
Near-Term – With EMWD[2] Only	3.37	0.37	> 100%
Near-Term – With MWUP[3] Only	3.72	0.72	> 100%
Near-Term – With EMWD & MWUP	3.82	0.82	> 100%

Notes:
[1] Does not include 0.35 MGD of flows diverted from City of Riverside. Reference Section 2.4.5 of 2021 FMP.
[2] Equal to Ultimate ADWF into WWRF (3.27 MGD) plus total ADWF from EMWD tributary area as calculated in Table 1 (0.105 MGD).
[3] Equal to Ultimate ADWF into WWRF (3.27 MGD) plus total ADWF from proposed MWUP development (0.45 MGD).

Even without either EMWD tributary area or MWUP flows, WWRF is projected to exceed its current treatment capacity of 3.0 MGD at Ultimate Buildout. However, development projects planned for 2040 and beyond are relatively undefined and subject to change or outright cancellation depending on economic conditions and numerous other factors outside of WMWD's purview. As WWRF approaches its projected Ultimate flow, WMWD will evaluate options to expand the treatment plant or divert excess flows to the City of Riverside.

5 Conclusions & Recommendations

The following summarizes the results of the pipeline, lift station, and treatment plant capacity analysis downstream of the proposed EMWD sewer interconnection.

Pipeline Capacity:

- Through the Ultimate scenario, the gravity and force mains within WMWD's collection system are anticipated to be able to accommodate the total peak flows diverted from EMWD without violating WMWD design criteria.
- No improvements to WMWD's pipeline network as a direct result of the proposed EMWD sewer interconnection are recommended at this time.

Lift Station Capacity:

- Through the Ultimate scenario, the Cajalco LS is anticipated to be able to accommodate the total peak flows diverted from EMWD without exceeding its firm capacity.
- As determined in the 2021 FMP, the Markham LS is capacity deficient in the existing scenario. Addition of any EMWD tributary area flows will exacerbate the deficiency.
- The 2021 FMP had recommended increasing the firm capacity of Markham LS from 1.44 MGD to 2.1 MGD to accommodate projected Near-Term flows. If WMWD completes the improvement project as recommended in the 2021 FMP, the Markham LS is anticipated to be able to accommodate the total peak flows diverted from EMWD without exceeding its firm capacity through the Near-Term scenario.

WWRF (Treatment Plant) Capacity:

- Through the Near-Term scenario, WWRF has sufficient capacity to accommodate its total projected inflow including both EMWD tributary area and MWUP flows.
- By the Ultimate Buildout scenario, WWRF will exceed its total treatment capacity regardless of any additional flows diverted from EMWD or produced by MWUP. Before such conditions are met, WMWD should evaluate options for expanding WWRF's treatment capacity or diverting excess flows to neighboring systems like the City of Riverside.

ATTACHMENT A
EMWD WASTEWATER DESIGN CRITERIA

EMWD Design Criteria for Wastewater Flow Factors and Land Use Density					
Land Use Category	**Units**	**Res Density (DU/acre)**	**Residential EDU/DU**	**EDU/Acre**	**Calculated and rounded Residential Flow gpd/~~EDU~~acre**
Agriculture	acre	0		0	
Business Park/Light Industrial	acre	0		5	1200
Business Park/Light Industrial/Warehouse	acre	0		1.25	300
Commercial Office	acre	0		5	1200
Commercial Retail	acre	0		5	1200
Estate Density Residential	DU	0.5	1.5	0.75	350
Heavy Industrial	acre	0		7.5	1800
High Density Residential	DU	12	0.70	8.4	165
Hospital	acre	0		5	1200
Low Density Residential	DU	2	1.3	2.6	310
Medium Density Residential	DU	4.5	1.0	4.5	235
Medium High Density Residential	DU	6	0.9	5.4	210
Mobile Home Park	DU	10	0.65	6.5	150
Mixed Use Policy Area	acre	0		5	1200
Open Space Conservation	acre	0		0	
Open Space Landscape	acre	0		0	
Open Space Recreation	acre	0		0	
Open Space Rural	acre	0.1		0	
Open Space Water	acre	0		0	
OSC	acre	0		0	
Public Facilities	acre	0		5	1200
Public Facilities College	acre	0		5	1200
Public Facilities Elementary School	acre	0		5	1200
Public Facilities High School	acre	0		5	1200
Public Facilities Middle School	acre	0		5	1200
Rural Mountainous	DU	0.1		0	
Rural Residential	DU	0.2		0	
Very High Density Residential	DU	17	0.65	11.1	150
Very Low Density Residential	DU	1		0	

Note:

1. Wastewater flow generation based on 235 gpd/EDU.
2. Business Park/Light Industrial/Warehouse is specific to Moreno Valley and Perris Valley (North) service areas.
3. The following residential uses should be excluded from wastewater flow generation calculations:
Open Space Rural, Rural Mountainous, Rural Residential, and Very Low Density Residential.
4. Estate Denity and Low Density Residential designations are included/excluded from flow generation calculations on a case-by-case basis.

APPENDIX C

Mead Valley Cajalco Sewer Project Hydraulic Analysis

ARDURRA

Average Dry Weather Flow from Dudek TM			
		(gpd)	(gpm)
School		6735	4.68
Public Facility		4424	3.07
Medium Density Residential		32430	22.52
Total Clark LS Influent Flow		43589	30.2701

Flow Influent to MH #	Reach No.	Intersection	Trib Area (ac)	Ave Dry Influent to MH (gpd)	Ave Dry in Reach (gpd)	Ave Dry in Reach (gpm)	PDWF in Reach (gpm)	V (PDWF) (fps)	PWWF (gpm)	d/D (PWWF)	Slope	Sewer Size	MH Size	MH Depth	Reach Length (ft)	Rim El	CL El	Sta
MH No. 31		Day St	0	0									48"	9.1		1686.03	1677.3	13450
	30		6.16		7238	5.03	14.43	1.7	17.31	0.12	0.0143	8"			400			
MH No. 30				7238									48"	10.3		1681.57	1671.6	13050
	29		5.61		13830	9.60	27.56	2.1	33.08	0.16	0.0145	8"			400			
MH No. 29		Robinson St		13830									48"	10.2		1675.62	1665.8	12650
	28		5.55		20351	14.13	40.56	2.3	48.67	0.19	0.0142	8"			400			
MH No. 28		Carroll St		20351									48"	9.3		1669.06	1660.1	12250
	27		9.83		31901	22.15	63.58	2.8	76.30	0.22	0.0178	8"			500			
MH No. 27				31901									48"	10.7		1661.58	1651.2	11750
	26		6.13		39104	27.16	77.94	2.4	93.52	0.29	0.0091	8"			350			
MH No. 26				39104									48"	11.4		1659.04	1648	11400
	25		4.69		44615	30.98	88.92	2.4	106.70	0.32	0.0084	8"			375.28			
MH No. 25		Clark St		88204									48"	12.6		1657.01	1644.86	11024.72
	24		4.93		93997	65.28	187.34	3.0	224.81	0.34	0.0088	10"			444.72			
MH No. 24				93997									48"	11.4		1651.7	1640.7	10580
	23		4.5		99284	68.95	197.88	3.0	237.45	0.35	0.0089	10"			440			
MH No. 23				99284									48"	9.5		1646	1636.9	10140
	22		4.47		104536	72.59	208.35	3.3	250.02	0.34	0.0105	10"			450			
MH No. 22		Haines St		104536									48"	12.5		1644	1632	9690
	21		7.39		113220	78.62	225.65	2.3	270.78	0.36	0.004	12"			430			
MH No. 21				113220									48"	12.2		1642	1630.3	9260
	20		5.33		119482	82.97	238.13	2.4	285.76	0.36	0.0041	12"			440			
MH No. 20		Florence St		119482									48"	13.0		1641.02	1628.5	8820
	19		3.76		123900	86.04	246.94	2.4	296.33	0.37	0.0041	12"			440			
MH No. 19		Brown St		123900									48"	13.1		1639.32	1626.7	8380
	18				123900	86.04	246.94	2.4	296.33	0.37	0.0041	12"			440			
MH No. 18				123900									48"	11.9		1636.34	1624.9	7940
	17				123900	86.04	246.94	2.1	296.33	0.41	0.003	12"			440			
MH No. 17				123900									48"	2.9		1635	1632.6	7500
	16				123900	86.04	246.94	2.1	296.33	0.41	0.003	12"			440			
MH No. 16		Mead St		123900									48"	13.8		1635.64	1622.3	7060
	15				123900	86.04	246.94	2.1	296.33	0.41	0.003	12"			440			
MH No. 15				123900									48"	13.5		1634	1621	6620

Eastern Municipal Water District
Mead Valley Cajalco Sewer Project
Hydraulic Analysis

ARDURRA

Flow Influent to MH #	Reach No.	Intersection	Trib Area (ac)	Ave Dry Influent to MH (gpd)	Ave Dry in Reach (gpd)	Ave Dry in Reach (gpm)	PDWF in Reach (gpm)	V (PDWF) (fps)	PWWF (gpm)	d/D (PWWF)	Slope	Sewer Size	MH Size	MH Depth	Reach Length (ft)	Rim El	CL El	Sta
	14				123900	86.04	246.94	2.1	296.33	0.41	0.003	12"			440			
MH No. 14				123900									48"	17.1		1636.31	1619.7	6180
	13				123900	86.04	246.94	2.1	296.33	0.41	0.003	12"			470			
MH No. 13		Alexander St		123900									48"	17.2		1635.02	1618.3	5710
	12				123900	86.04	246.94	2.1	296.33	0.41	0.0029	12"			480			
MH No. 12				123900									48"	16.6		1633.05	1616.9	5230
	11				123900	86.04	246.94	2.1	296.33	0.41	0.0029	12"			480			
MH No. 11				123900									48"	16.0		1631.04	1615.5	4750
	10				123900	86.04	246.94	2.2	296.33	0.4	0.0031	12"			480			
MH No. 10		Una St		123900									48"	14.0		1627.46	1614	4270
	9				123900	86.04	246.94	3.3	296.33	0.3	0.0094	12"			500			
MH No. 9				123900									48"	9.2		1618.03	1609.3	3770
	8				123900	86.04	246.94	3.1	296.33	0.31	0.0083	12"			60			
MH No. 8		Barton St		123900									48"	9.1		1617.39	1608.8	3710
	7				123900	86.04	246.94	2.8	296.33	0.34	0.0061	12"			460			
MH No. 7				123900									48"	10.5		1616	1606	3250
	6				123900	86.04	246.94	3.3	296.33	0.29	0.011	12"			300			
MH No. 6				123900									48"	12.1		1614.29	1602.7	2950
	5				123900	86.04	246.94	2.7	296.33	0.34	0.0057	12"			300			
MH No. 5				123900									48"	11.2		1611.65	1601	2650
	4				123900	86.04	246.94	4.1	296.33	0.25	0.0194	12"			360			
MH No. 4				123900									48"	11.5		1604.97	1594	2290
	3				123900	86.04	246.94	3.8	296.33	0.27	0.0155	12"			380			
MH No. 3				123900									48"	9.9		1597.48	1588.1	1910
	2				123900	86.04	246.94	3.8	296.33	0.26	0.016	12"			400			
MH No. 2				123900									48"	11.6		1595	1583.9	1510
	1				123900	86.04	246.94	3.4	296.33	0.29	0.0048	12"			380.38			
MH No. 1		Carpinus Dr		123900									48"	12.8		1592	1579.67	1129.62

Total Quantities

12" PVC	8560.38
10" PVC	1334.72
8" PVC	2425.28
Total Length	12320.38

APPENDIX D

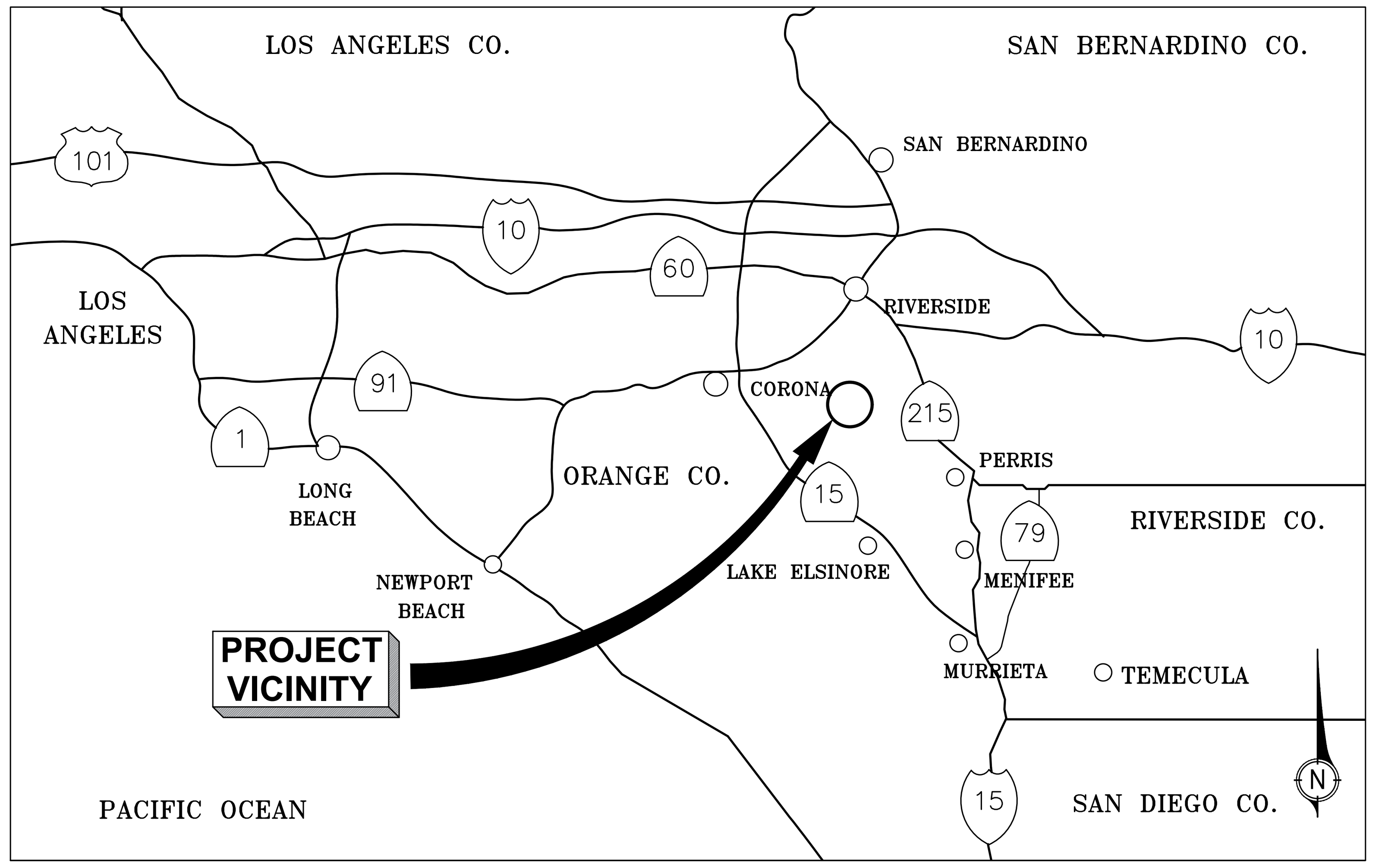
Mead Valley Cajalco Sewer Project 30% Design Plans

EASTERN MUNICIPAL WATER DISTRICT

RIVERSIDE COUNTY, CALIFORNIA

MEAD VALLEY CAJALCO SEWER PRELIMINARY DESIGN PROJECT

30% DESIGN



VICINITY MAP
NTS

emwd

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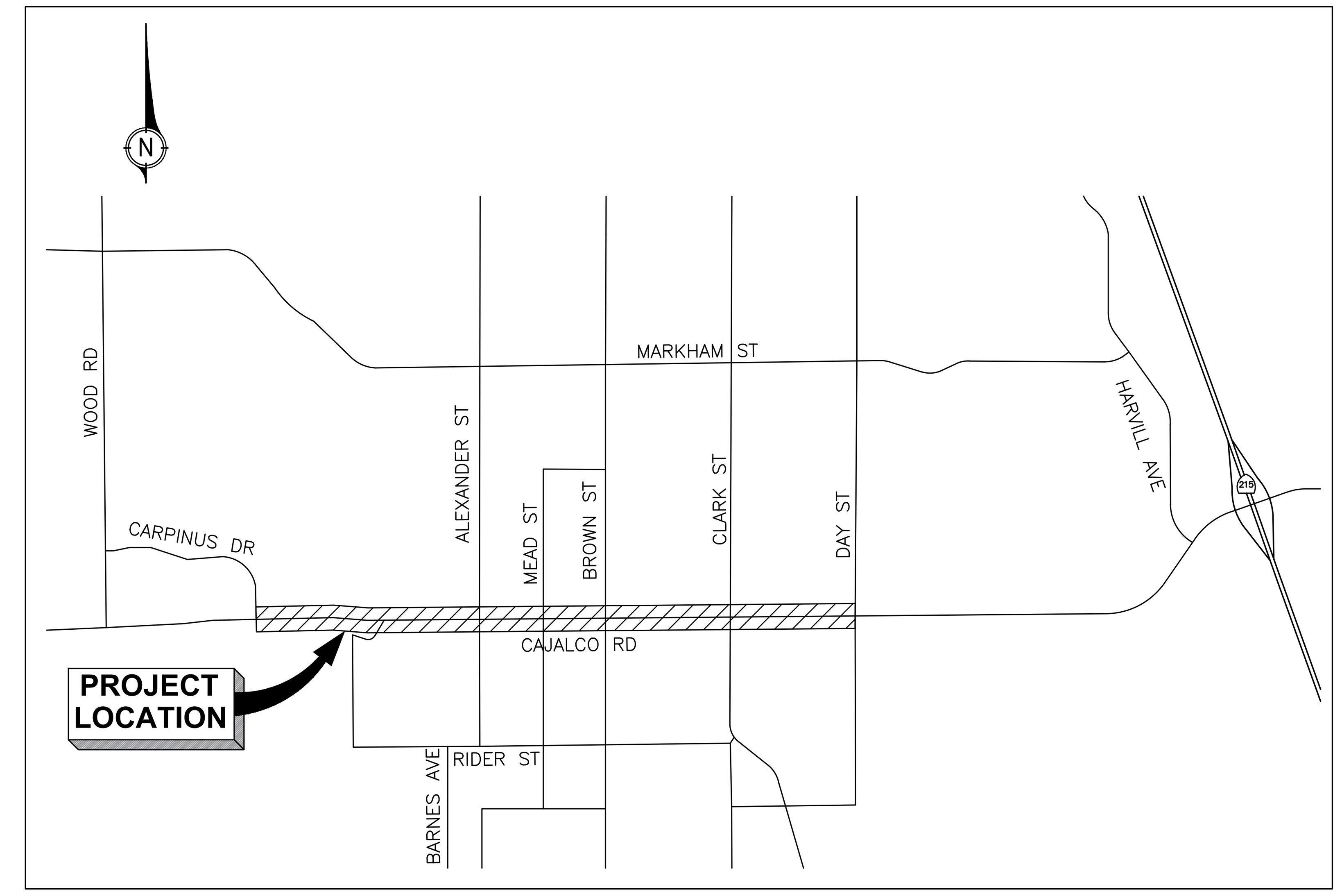
APPROVED BY: ______________________ DATE ________

LANAYA VOELZ ALEXANDER, P.E.
ASSISTANT GENERAL MANAGER OF PLANNING, ENGINEERING AND CONSTRUCTION



LOCATION MAP
NTS

SHEET INDEX

FILE No.	SHEET No.	DISCIPLINE	SHEET TITLE
D-XXXXX	1	G-1	TITLE SHEET
D-XXXXX	2	G-2	GENERAL NOTES, LEGEND AND ABBREVIATIONS
D-XXXXX	3	C-1	PLAN AND PROFILE STA 9+00 TO STA 19+00
D-XXXXX	4	C-2	PLAN AND PROFILE STA 19+00 TO STA 29+00
D-XXXXX	5	C-3	PLAN AND PROFILE STA 29+00 TO STA 39+00
D-XXXXX	6	C-4	PLAN AND PROFILE STA 39+00 TO STA 49+00
D-XXXXX	7	C-5	PLAN AND PROFILE STA 49+00 TO STA 59+00
D-XXXXX	8	C-6	PLAN AND PROFILE STA 59+00 TO STA 69+00
D-XXXXX	9	C-7	PLAN AND PROFILE STA 69+00 TO STA 79+00
D-XXXXX	10	C-8	PLAN AND PROFILE STA 79+00 TO STA 89+00
D-XXXXX	11	C-9	PLAN AND PROFILE STA 89+00 TO STA 99+00
D-XXXXX	12	C-10	PLAN AND PROFILE STA 99+00 TO STA 109+00
D-XXXXX	13	C-11	PLAN AND PROFILE STA 109+00 TO STA 119+00
D-XXXXX	14	C-12	PLAN AND PROFILE STA 119+00 TO STA 129+00
D-XXXXX	15	C-13	PLAN AND PROFILE STA 129+00 TO STA 138+00

DECLARATION OF RESPONSIBLE CHARGE

I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER DESIGN OF THIS PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS OF EASTERN MUNICIPAL WATER DISTRICT IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

BY ______________________
RYAN HUSTON P.E. # 60324 DATE

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UNDER THE SUPERVISION OF:
RYAN M. HUSTON C60324 6/30/24
PROFESSIONAL ENGINEER R.C.E. No. DATE

REGISTERED PROFESSIONAL ENGINEER
RYAN M. HUSTON
No. C60324
CIVIL
STATE OF CALIFORNIA

REVISIONS

NO.	DATE	INITIAL	DESCRIPTION	APP'VD/DATE

APPROVED BY:
SENIOR DIRECTOR OF ENGINEERING DATE
REFERENCES

EASTERN MUNICIPAL WATER DISTRICT
PROJECT MANAGER DATE

APPROVALS		INITIAL	DATE
	PROJECT ENGR.		
	INSPECTION		
	OPERATIONS		
	MAINTENANCE		

	DATE
DESIGNED	
DRAWN	
CHECKED	
SUBMITTED	

SCALE: AS SHOWN

EASTERN MUNICIPAL WATER DISTRICT
RIVERSIDE COUNTY, CALIFORNIA
MEAD VALLEY CAJALCO SWR PRELIM DESIGN
TITLE SHEET

I.D.
S.A.
W.O.
C.O.
COORD.
SHT. 1 OF 15
D-XXXXX
G-1

LEGEND

- ROAD CL DATA
- PIPE ALIGNMENT DATA
- EXISTING RIGHT OF WAY
- EXISTING PROPERTY LINE
- EXISTING CENTERLINE
- PROPOSED SEWER
- PROPOSED SEWER MANHOLE
- ABANDON EXISTING UTILITY
- DEMOLISH EXISTING STRUCTURE
- EXISTING OVERHEAD CATV
- EXISTING BURIED CATV
- EXISTING OVERHEAD ELECTRIC
- EXISTING BURIED ELECTRIC
- EXISTING OVERHEAD FIBER OPTIC
- EXISTING BURIED FIBER OPTIC
- EXISTING OVERHEAD TELEPHONE
- EXISTING GAS VALVE
- EXISTING GAS LATERAL
- EXISTING 2" GAS MAIN
- EXISTING 4" GAS MAIN
- EXISTING 6" GAS MAIN
- EXISTING SEWER MANHOLE
- EXISTING 6" SEWER FORCE MAIN
- EXISTING 8" SEWER MAIN
- EXISTING 10" SEWER MAIN
- EXISTING 12" SEWER MAIN
- EXISTING 15" SEWER MAIN
- EXISTING 18" SEWER MAIN
- EXISTING 14" RECYCLED WATER MAIN
- EXISTING 16" RECYCLED WATER MAIN
- EXISTING WATER LATERAL
- EXISTING FIRE HYDRANT LATERAL
- EXISTING WATER VALVE
- EXISTING FIRE HYDRANT
- EXISTING 4" WATER MAIN
- EXISTING 6" WATER MAIN
- EXISTING 12" WATER MAIN
- EXISTING 16" WATER MAIN
- EXISTING 18" WATER MAIN
- EXISTING STORM DRAIN MANHOLE
- EXISTING STORM DRAIN
- EXISTING FENCE
- EXISTING EDGE OF PAVEMENT
- EXISTING EDGE OF PAVEMENT
- EXISTING POWER POLE
- EXISTING ELECTRICAL BOX
- EXISTING TELEPHONE BOX
- EXISTING MAILBOX
- EXISTING STREETLIGHT
- EXIST PALM TREE
- EXIST TREE/BUSH

DETAIL REFERENCE

SECTION (LETTER)
DETAIL (NUMERAL)

DRAWING NUMBER
DRAWN ON

ABBREVIATIONS

ABAN	ABANDONED
AC	ASBESTOS-CEMENT
AVAR	AIR VACUUM AND AIR RELEASE VALVE
AVE	AVENUE
BO	BLOW OFF
BOT	BOTTOM
CATV	CABLE TELEVISION
CDF	CONTROL DENSITY FILL
CG	CENTER GRADE
CL	CENTERLINE
CLR	CLEARANCE
CML&C	CEMENT MORTAR LINED & COATED
CONC	CONCRETE
CTS	CORROSION TEST STATION
DCDA	DOUBLE CHECK DETECTOR ASSEMBLY
DEFL	DEFLECTION
DWG	DRAWING
(E), EXIST	EXISTING
EL	ELEVATION
ELEC,E	ELECTRICAL
EMWD	EASTERN MUNICIPAL WATER DISTRICT
FCA	FLANGE COUPLING ADAPTER
FH	FIRE HYDRANT
FLG	FLANGE
FO	FIBER OPTIC
G	GAS
GPM	GALLON PER MINUTE
GV	GATE VALVE
H	HUB
HDC	HIGH DEFLECTION COUPLING
LAT	LATERAL
MIN	MINIMUM
(N)	NEW, PROPOSED
OH	OVER HEAD
PH	POT HOLE
PI	POINT OF INTERSECTION
PP	POWER POLE
PVC	POLYVINYL CHLORIDE PIPE
RBS	RIDGEMOOR BOOSTER STATION
RCFC&WCD	RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RD	ROAD
RSGV	RESILIENT SEATED GATE VALVE
SC	SPECIAL CONDITION
SCG	SOUTHERN CALIFORNIA GAS COMPANY
SD	STORM DRAIN
SFM	SEWER FORCE MAIN
S	SLOPE
SS	SANITARY SEWER
SHT	SHEET
SLT	STREET LIGHT
STA	STATION
STD	STANDARD
TEL	TELEPHONE
TEMP	TEMPORARY
TS	TRAFFIC SIGNAL
TYP	TYPICAL
UG	UNDERGROUND
UNK	UNKNOWN
VERT	VERTICAL
W	WATER
XING	CROSSING

GENERAL CONSTRUCTION NOTES

ENGINEER'S NOTE TO CONTRACTOR

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITIES OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES SHOWN, AND ANY OTHER LINES OR STRUCTURES NOT SHOWN ON THESE PLANS, AND IS RESPONSIBLE FOR THE PROTECTION OF, AND ANY DAMAGE TO THESE LINES OR STRUCTURES.

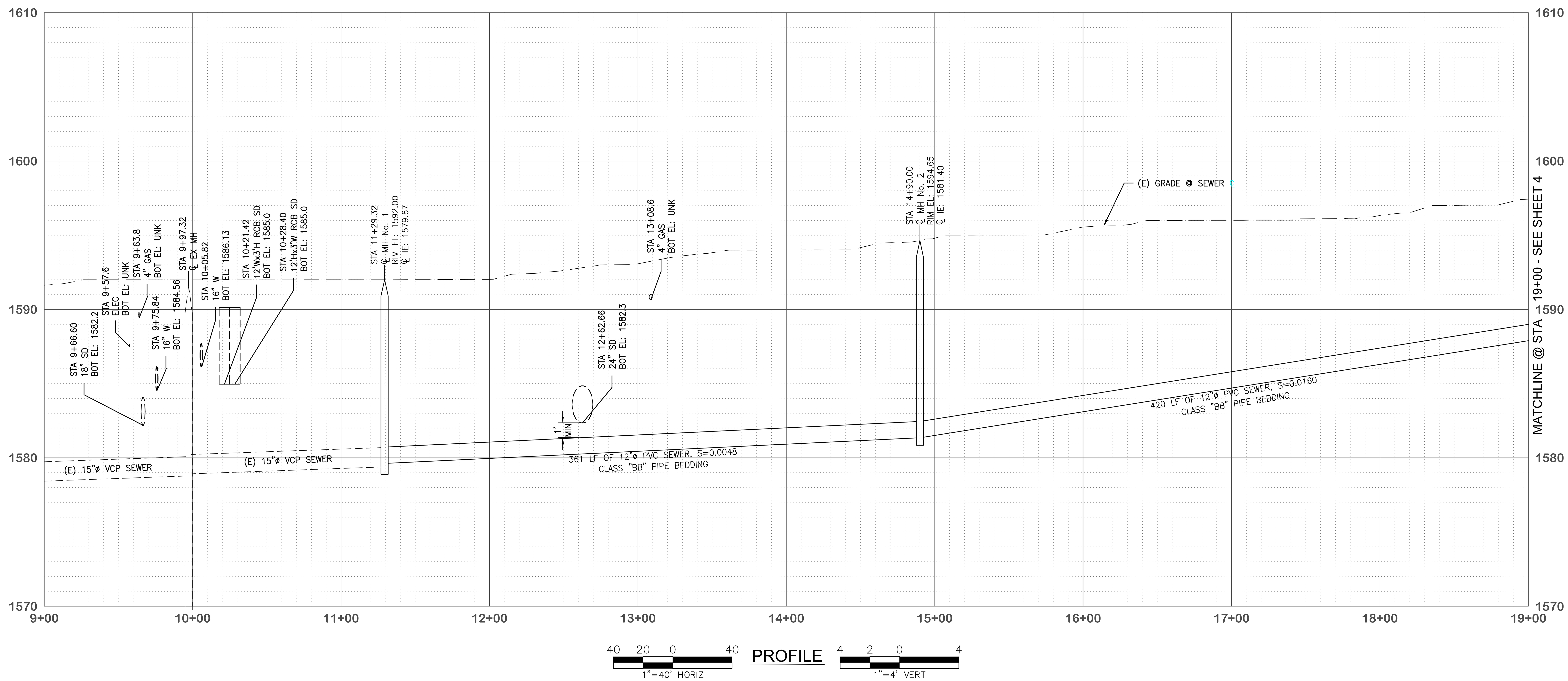
CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL AND EMWD HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT.

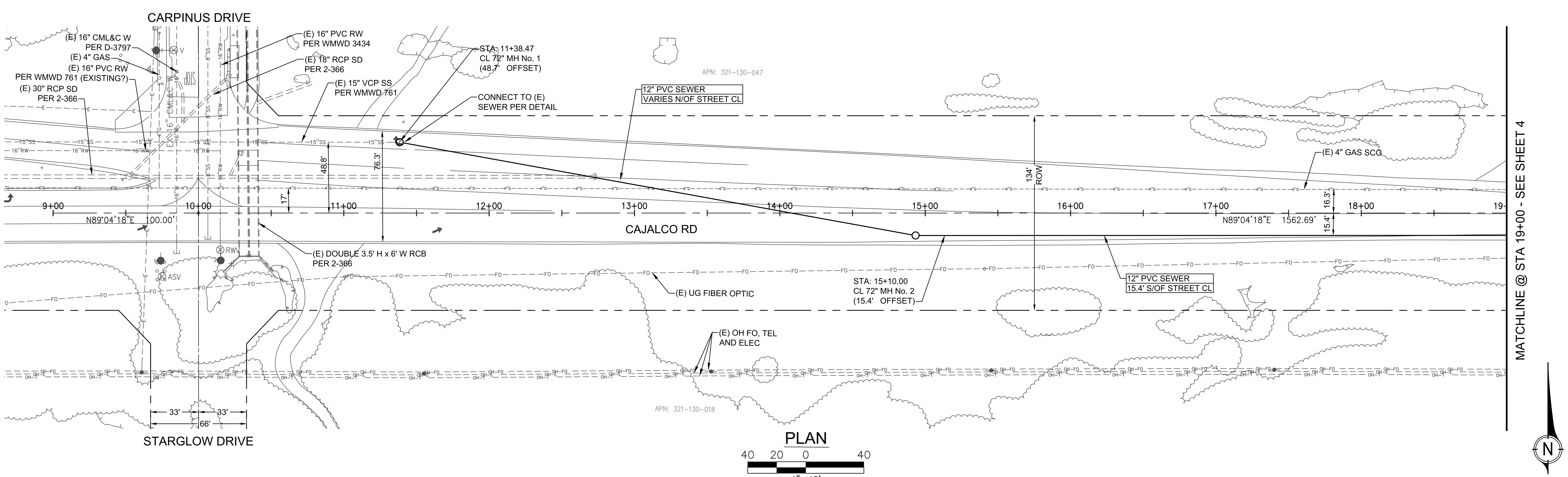
THE CONTRACTOR SHALL BE RESPONSIBLE TO REPORT DISCREPANCIES IN PLANS AND/OR CONDITIONS IMMEDIATELY TO THE DISTRICT AND THE DESIGN ENGINEER FOR RESOLUTION PRIOR TO CONSTRUCTION, AND SHALL BE RESPONSIBLE FOR DISCREPANCIES NOT SO REPORTED AND RESOLVED.

NOTE TO CONTRACTOR

1. ALL EXISTING UNDERGROUND UTILITY LOCATIONS SHOWN HEREON ARE FROM PLANS FURNISHED BY THE RESPECTIVE UTILITY COMPANIES. CONTRACTOR SHALL CONTACT "UNDERGROUND SERVICE ALERT" (USA 811) TO VERIFY EXISTING UTILITY LOCATIONS ON SITE BEFORE COMMENCING CONSTRUCTIONS.
2. CONTRACTOR SHALL MAKE ALL NECESSARY SERVICE CONNECTIONS TO THE NEW PIPELINE, REGARDLESS OF EXISTING UTILITY CONFLICTS AND SHALL INCLUDE IN THEIR BID ACCORDINGLY.
3. WHERE INVESTIGATIONS OF SUBSURFACE CONDITIONS HAVE BEEN MADE BY EMWD IN RESPECT TO FOUNDATION OR OTHER STRUCTURAL DESIGN, AND THAT INFORMATION IS SHOWN IN THE PLANS, SAID INFORMATION REPRESENTS ONLY THE STATEMENT BY EMWD AS TO THE CHARACTER OF THE MATERIAL WHICH HAS BEEN ACTUALLY ENCOUNTERED BY IT IN ITS INVESTIGATIONS, AND IS ONLY INCLUDED FOR THE CONVENIENCE OF BIDDERS. INVESTIGATIONS OF SUBSURFACE CONDITIONS ARE MADE FOR THE PURPOSE OF DESIGN, AND EMWD ASSUMES NO RESPONSIBILITY WHATSOEVER IN RESPECT TO THE SUFFICIENCY OR ACCURACY OF THE BORINGS OR OF THE LOG OF TEST BORINGS OR OTHER PRELIMINARY INVESTIGATIONS, OR OF THE INTERPRETATION THEREOF, AND THERE IS NO GUARANTY EITHER EXPRESSED OR IMPLIED, THAT THE CONDITIONS INDICATED ARE REPRESENTATIVE OF THOSE EXISTING THROUGHOUT THE WORK OR ANY PART OF IT, OR THAT UNLOCKED FOR DEVELOPMENTS MAY NOT OCCUR.
4. MAKING SUCH INFORMATION AVAILABLE TO BIDDERS IS NOT TO BE CONSTRUED IN ANY WAY AS WAIVER OF THE PROVISIONS OF THE FIRST PART OF THIS ARTICLE AND BIDDERS MUST BE SATISFY THEMSELVES THROUGH THEIR OWN INVESTIGATIONS AS TO CONDITIONS TO BE ENCOUNTERED.

WATER NOTES





Underground Service Alert

Call: TOLL FREE

811

TWO WORKING DAYS BEFORE YOU DIG

VERIFY SCALES

BAR IS ONE INCH ON ORIGINAL DRAWING

0 1"

IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

PLANS PREPARED BY:
43410 BUSINESS PARK DRIVE
TEMECULA, CA 92590
T 951.396.4980

ARDURRA
COLLABORATE. INNOVATE. CREATE.

UNDER THE SUPERVISION OF:

RYAN M. HUSTON C60324 6/30/24
PROFESSIONAL ENGINEER R.C.E. No. DATE

REGISTERED PROFESSIONAL ENGINEER
RYAN M. HUSTON
No. C60324
CIVIL
STATE OF CALIFORNIA

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	OPERATIONS		
	MAINTENANCE		

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CHECKED		
SUBMITTED		

SCALE: AS SHOWN

EASTERN MUNICIPAL WATER DISTRICT

RIVERSIDE COUNTY, CALIFORNIA

MEAD VALLEY CAJALCO SWR PRELIM DESIGN

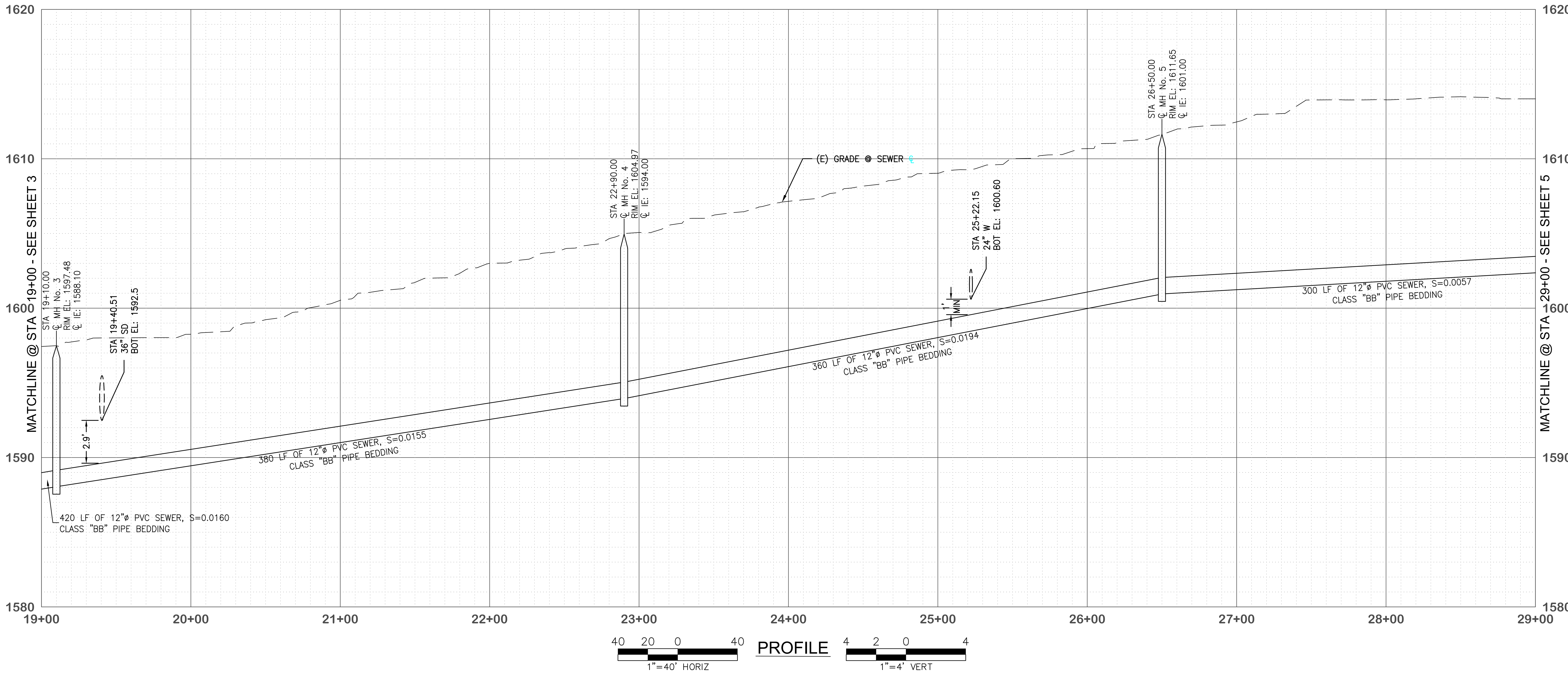
PLAN AND PROFILE

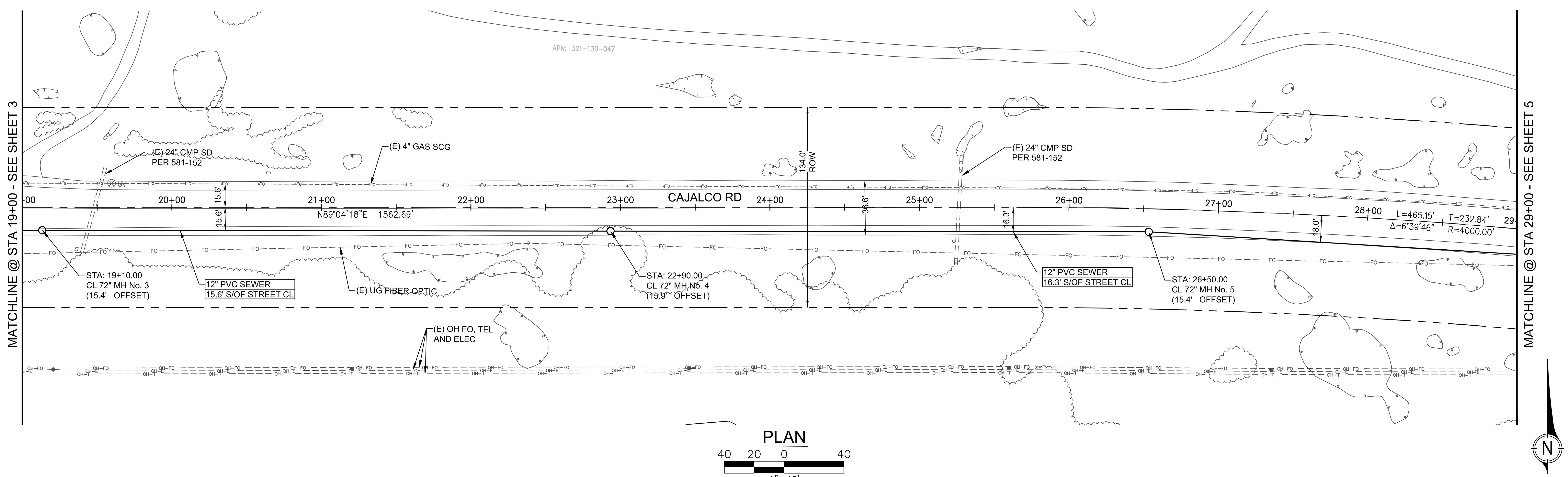
STA 9+00 TO STA 19+00

I.D.
S.A.
W.O.
C.O.
COORD.
SHT. 3 OF 15

D-XXXXX

C-1





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PROFESSIONAL ENGINEER — R.C.E. No. — DATE

REGISTERED PROFESSIONAL ENGINEER — RYAN M. HUSTON — No. C60324 — CIVIL — STATE OF CALIFORNIA

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PROJECT MANAGER — DATE

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PROJECT ENGR.		
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MAINTENANCE		

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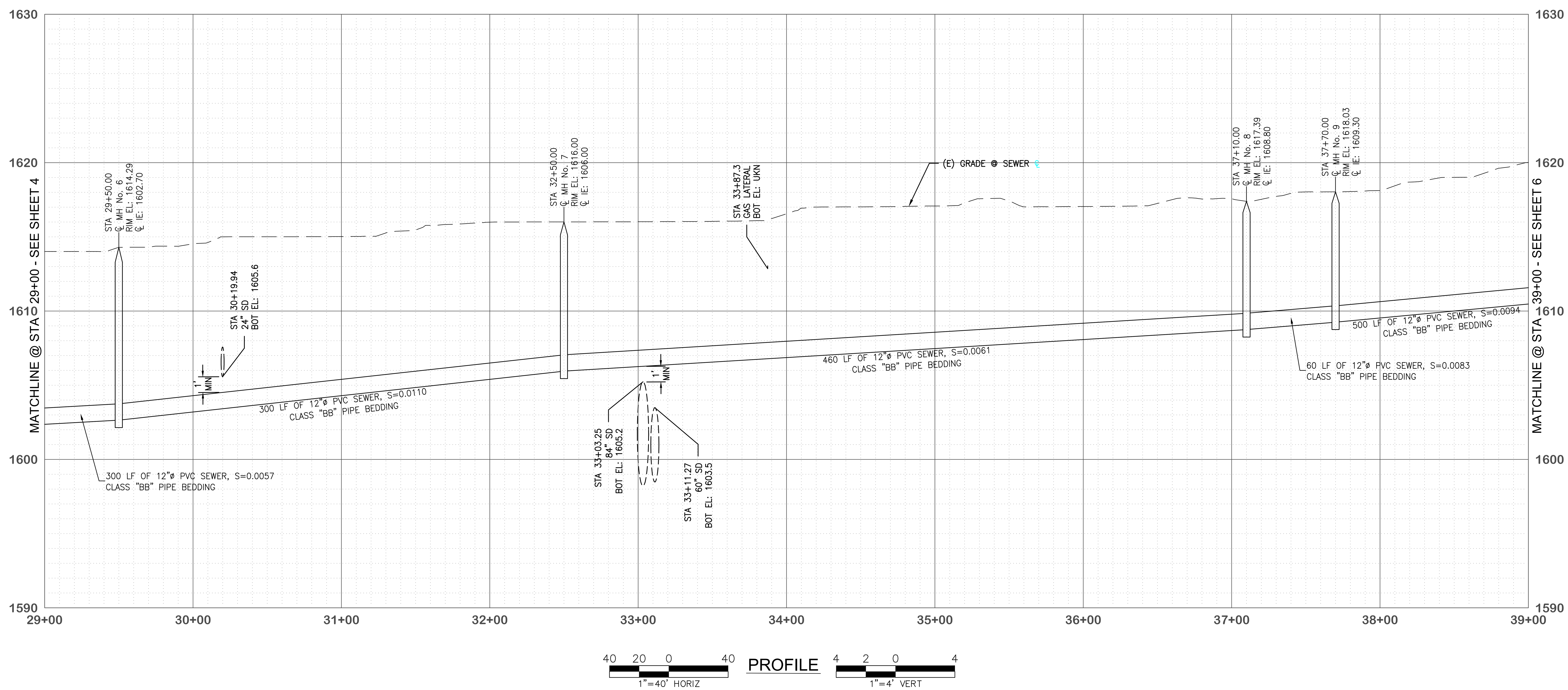
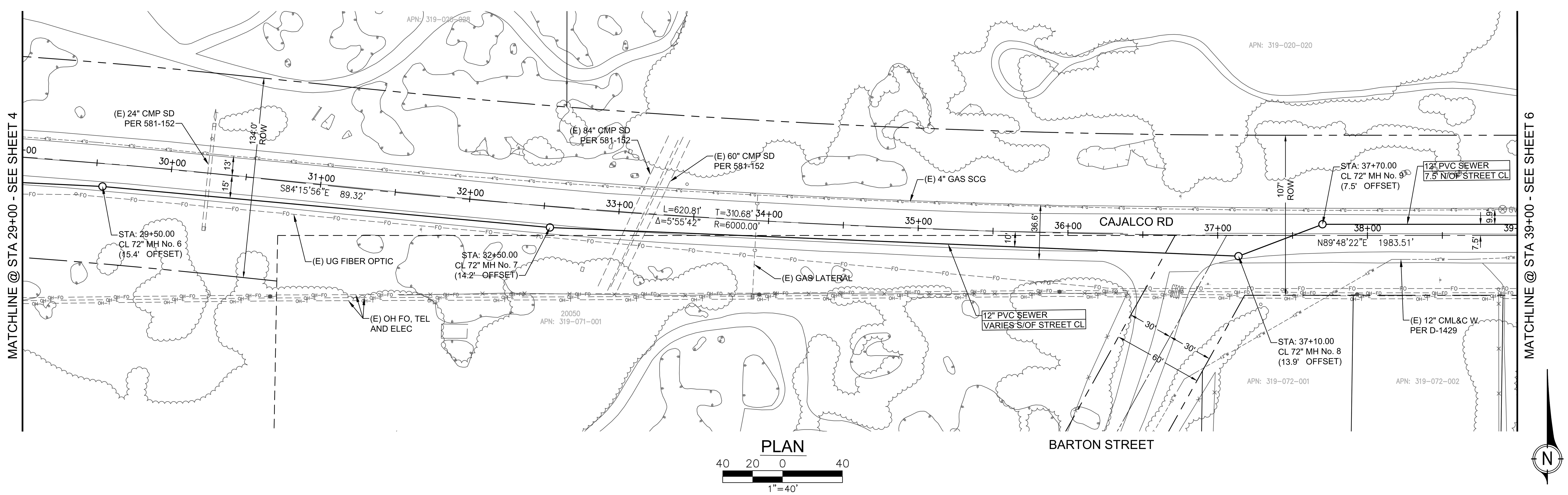
SUBMITTED	

SCALE: AS SHOWN

EASTERN MUNICIPAL WATER DISTRICT
RIVERSIDE COUNTY, CALIFORNIA
MEAD VALLEY CAJALCO SWR PRELIM DESIGN
PLAN AND PROFILE
STA 19+00 TO STA 29+00

I.D.
S.A.
W.O.
C.O.
COORD.
SHT. 4 OF 15
D-XXXXX
C-2





Underground Service Alert	VERIFY SCALES	PLANS PREPARED BY:
Call: TOLL FREE 811	BAR IS ONE INCH ON ORIGINAL DRAWING	43410 BUSINESS PARK DRIVE, TEMECULA, CA 92590, T 951.396.4980
TWO WORKING DAYS BEFORE YOU DIG	IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY	UNDER THE SUPERVISION OF: RYAN M. HUSTON, C60324, 6/30/24 — PROFESSIONAL ENGINEER, R.C.E. No., DATE

ARDURRA — COLLABORATE. INNOVATE. CREATE.

REGISTERED PROFESSIONAL ENGINEER — RYAN M. HUSTON — No. C60324 — CIVIL — STATE OF CALIFORNIA

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PROJECT MANAGER — DATE

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	INSPECTION		
	OPERATIONS		
	MAINTENANCE		

	DATE
DESIGNED	
DRAWN	
CHECKED	
SUBMITTED	

SCALE: AS SHOWN

EASTERN MUNICIPAL WATER DISTRICT
RIVERSIDE COUNTY, CALIFORNIA

MEAD VALLEY CAJALCO SWR PRELIM DESIGN

PLAN AND PROFILE
STA 29+00 TO STA 39+00

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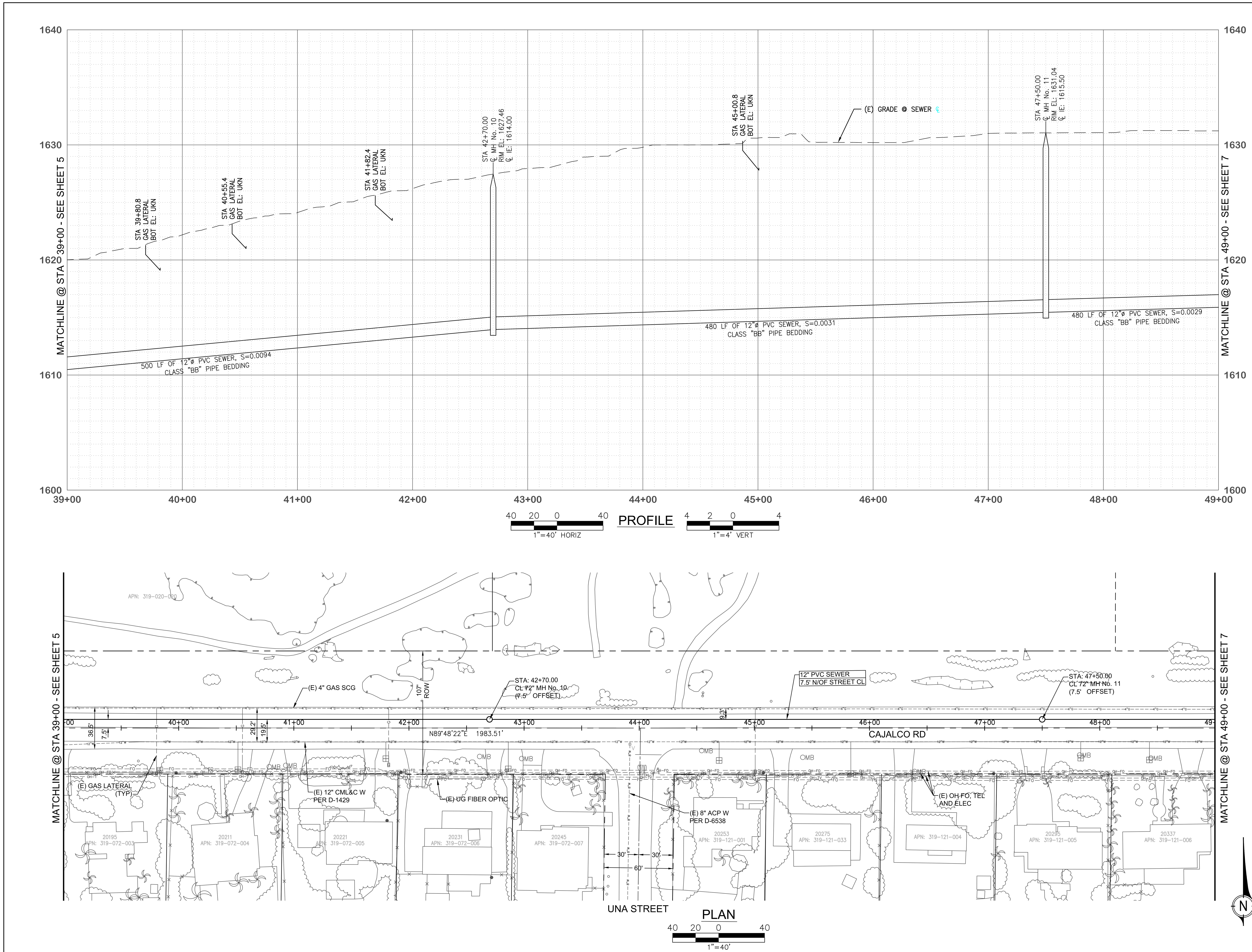
C-3	



Underground Service Alert	VERIFY SCALES	PLANS PREPARED BY:
Call: TOLL FREE 811	BAR IS ONE INCH ON ORIGINAL DRAWING	43410 BUSINESS PARK DRIVE TEMECULA, CA 92590 T 951.396.4980
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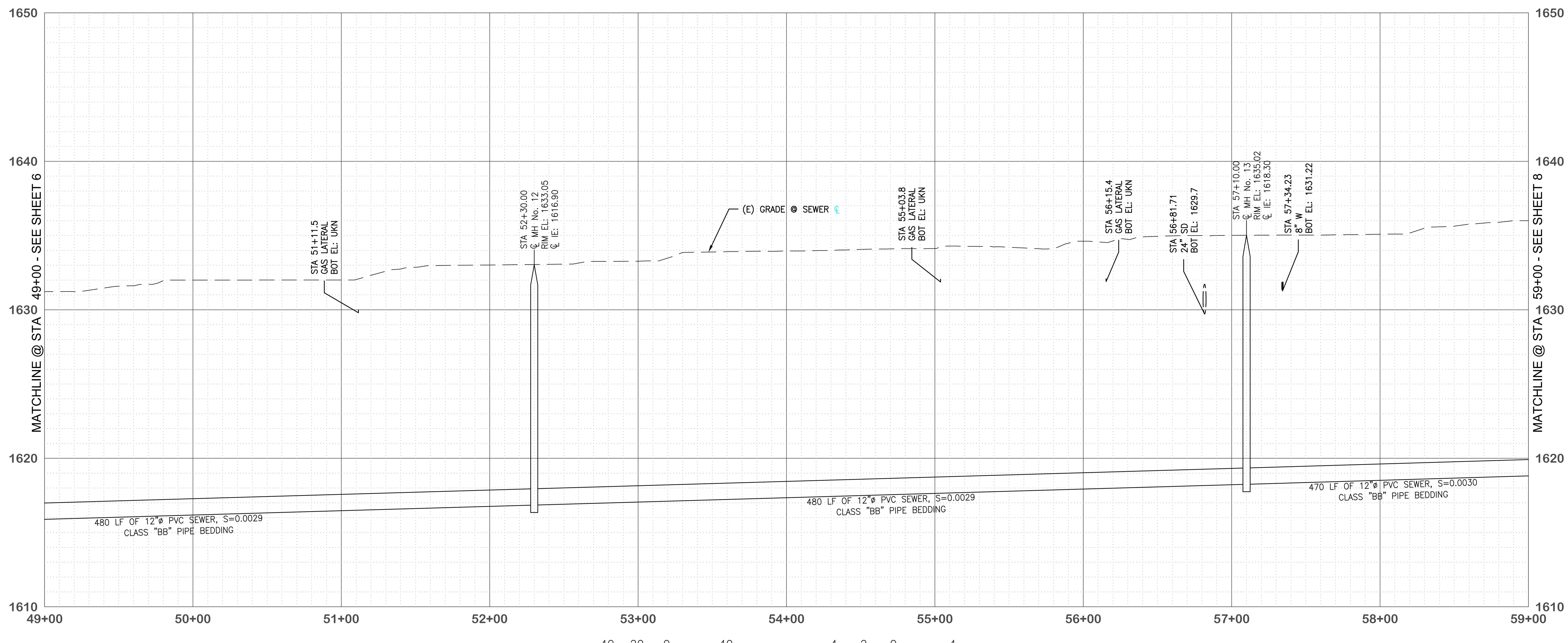
SCALE: AS SHOWN

EASTERN MUNICIPAL WATER DISTRICT
RIVERSIDE COUNTY, CALIFORNIA

MEAD VALLEY CAJALCO SWR PRELIM DESIGN

PLAN AND PROFILE
STA 39+00 TO STA 49+00

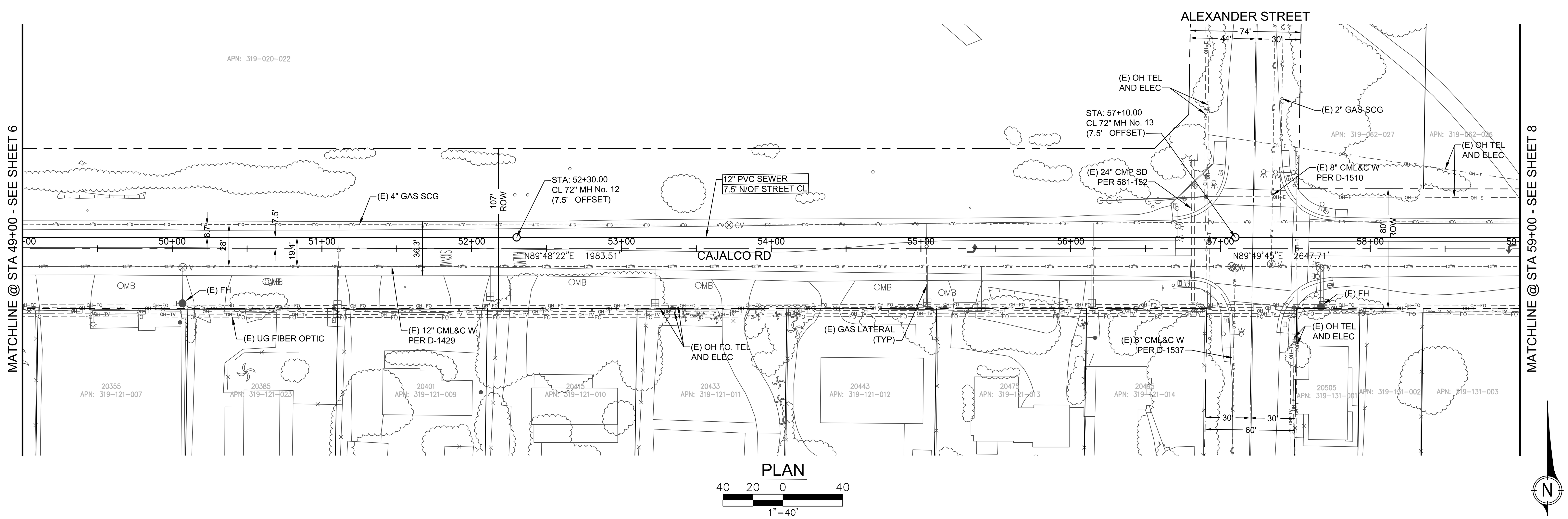
I.D.
S.A.
W.O.
C.O.
COORD.
SHT. 6 OF 15
D-XXXXX
C-4



PROFILE

1"=40' HORIZ

1"=4' VERT



PLAN

1"=40'

Underground Service Alert
Call: TOLL FREE
811
TWO WORKING DAYS BEFORE YOU DIG

VERIFY SCALES
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0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

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43410 BUSINESS PARK DRIVE
TEMECULA, CA 92590
T 951.396.4980
UNDER THE SUPERVISION OF:
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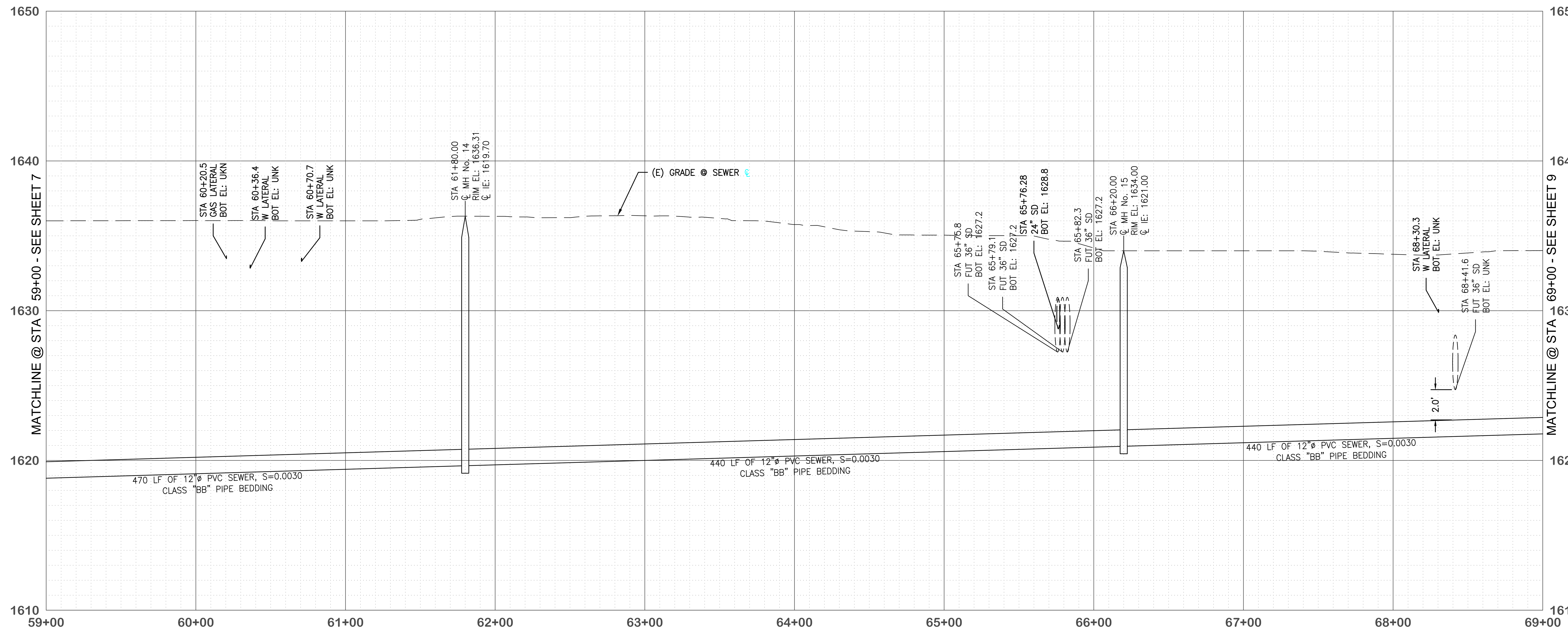
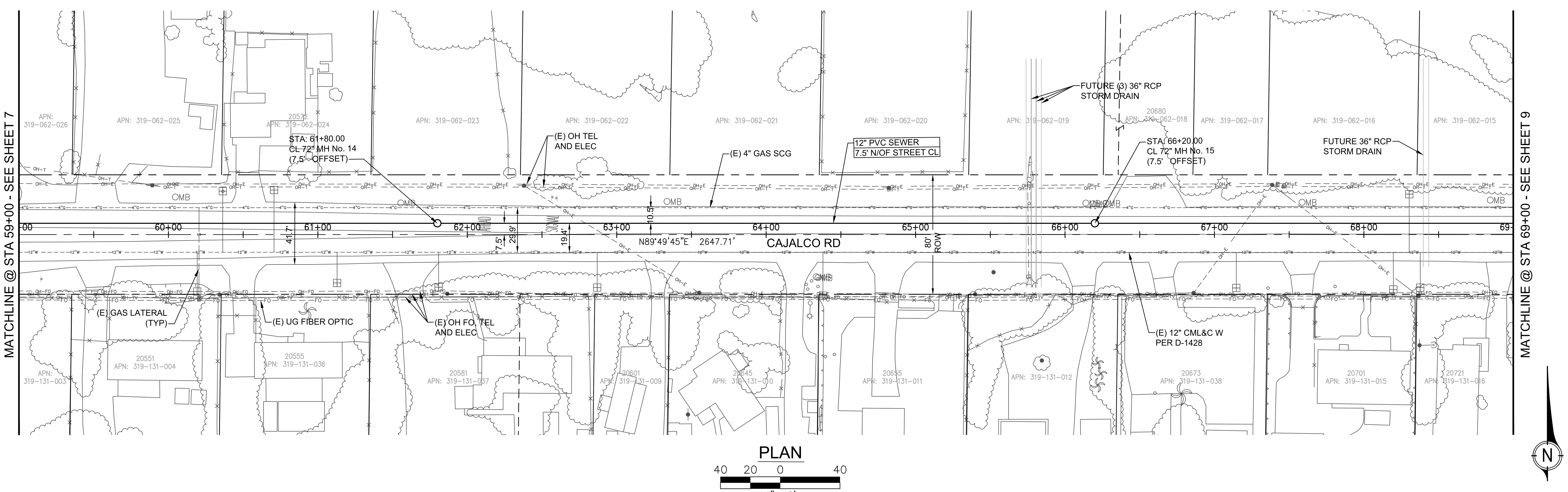
SCALE: AS SHOWN

EASTERN MUNICIPAL WATER DISTRICT
RIVERSIDE COUNTY, CALIFORNIA
MEAD VALLEY CAJALCO SWR PRELIM DESIGN
PLAN AND PROFILE
STA 49+00 TO STA 59+00

I.D.
S.A.
W.O.
C.O.
COORD.
SHT. 7 OF 15
D-XXXXX
C-5



40 20 0 40 — 1"=40' HORIZ **PROFILE** 4 2 0 4 — 1"=4' VERT



PLAN

40 20 0 40 — 1"=40'

Underground Service Alert Call: TOLL FREE 811 TWO WORKING DAYS BEFORE YOU DIG	**VERIFY SCALES** BAR IS ONE INCH ON ORIGINAL DRAWING 0 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY	**PLANS PREPARED BY:** 43410 BUSINESS PARK DRIVE TEMECULA, CA 92590 T 951.396.4980 UNDER THE SUPERVISION OF: RYAN M. HUSTON C60324 6/30/24 PROFESSIONAL ENGINEER R.C.E. No. DATE	ARDURRA COLLABORATE. INNOVATE. CREATE.

REGISTERED PROFESSIONAL ENGINEER RYAN M. HUSTON No. C60324 CIVIL STATE OF CALIFORNIA

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EASTERN MUNICIPAL WATER DISTRICT
RIVERSIDE COUNTY, CALIFORNIA

MEAD VALLEY CAJALCO SWR PRELIM DESIGN

PLAN AND PROFILE
STA 59+00 TO STA 69+00

I.D.
S.A.
W.O.
C.O.
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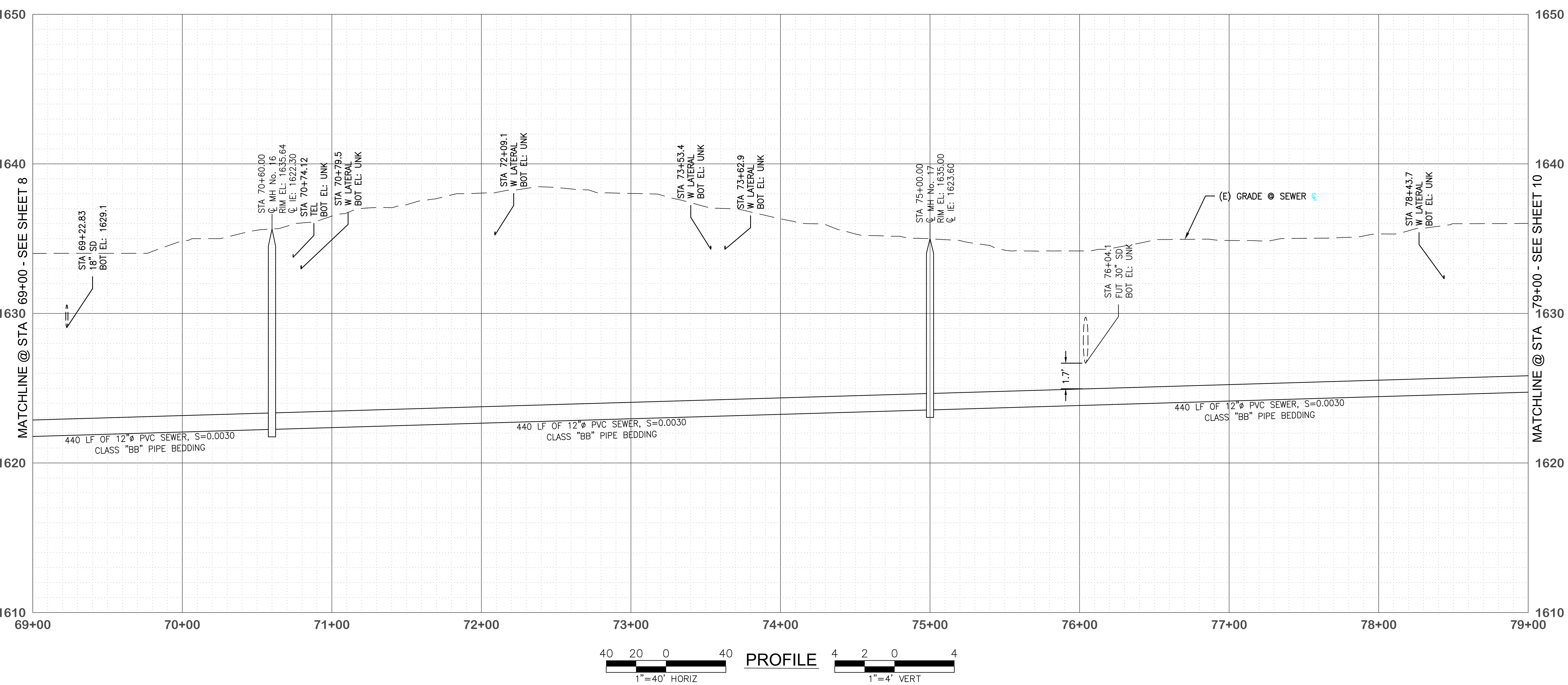
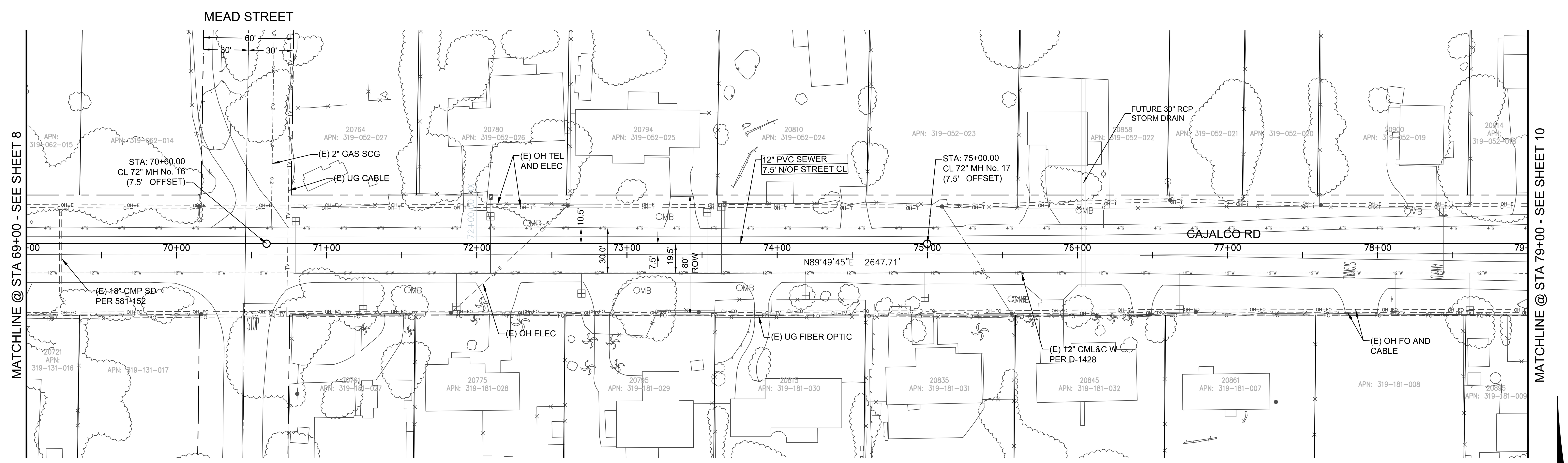
SHT. 8 OF 15
D-XXXXX
C-6



PROFILE

1"=40' HORIZ

1"=4' VERT



PLAN

1"=40'

Underground Service Alert

Call: TOLL FREE 811

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EASTERN MUNICIPAL WATER DISTRICT
RIVERSIDE COUNTY, CALIFORNIA

MEAD VALLEY CAJALCO SWR PRELIM DESIGN

PLAN AND PROFILE

STA 69+00 TO STA 79+00

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S.A.
W.O.
C.O.
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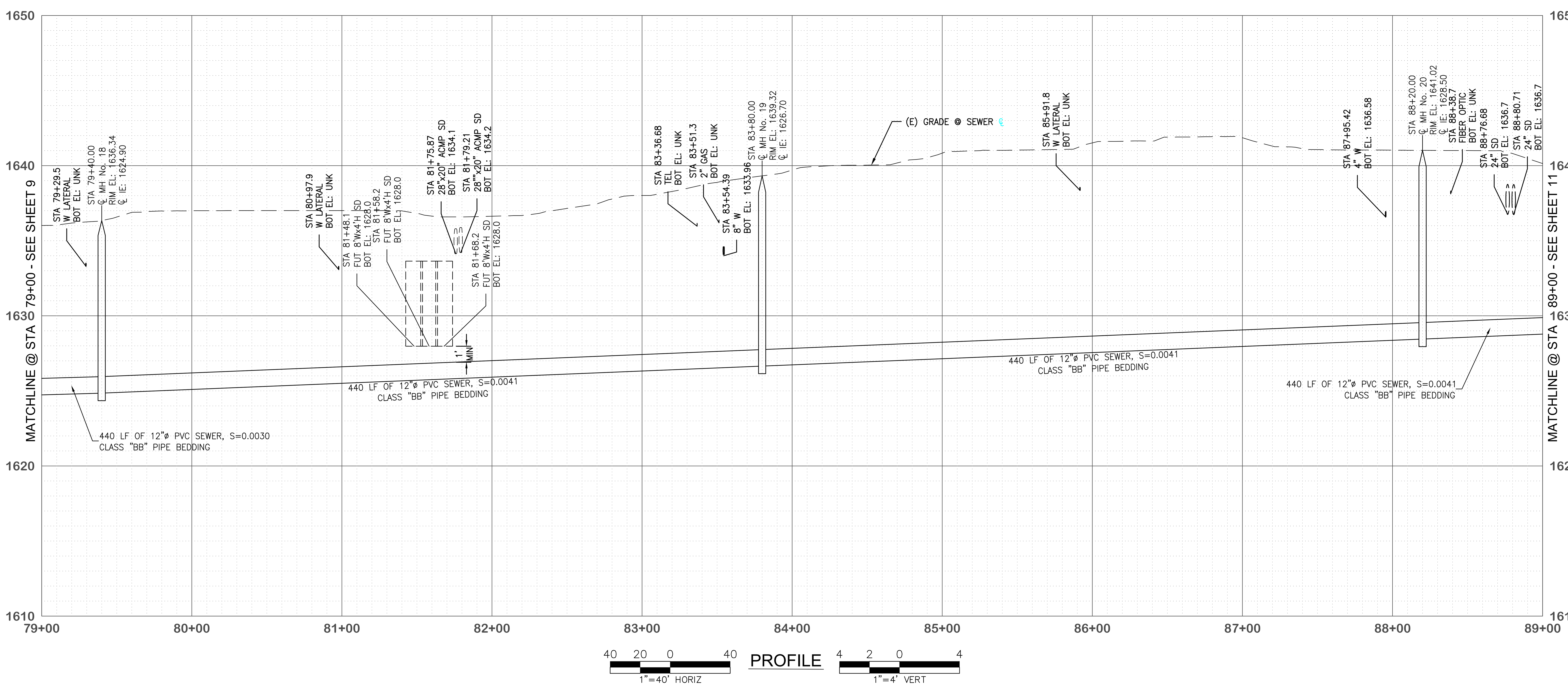
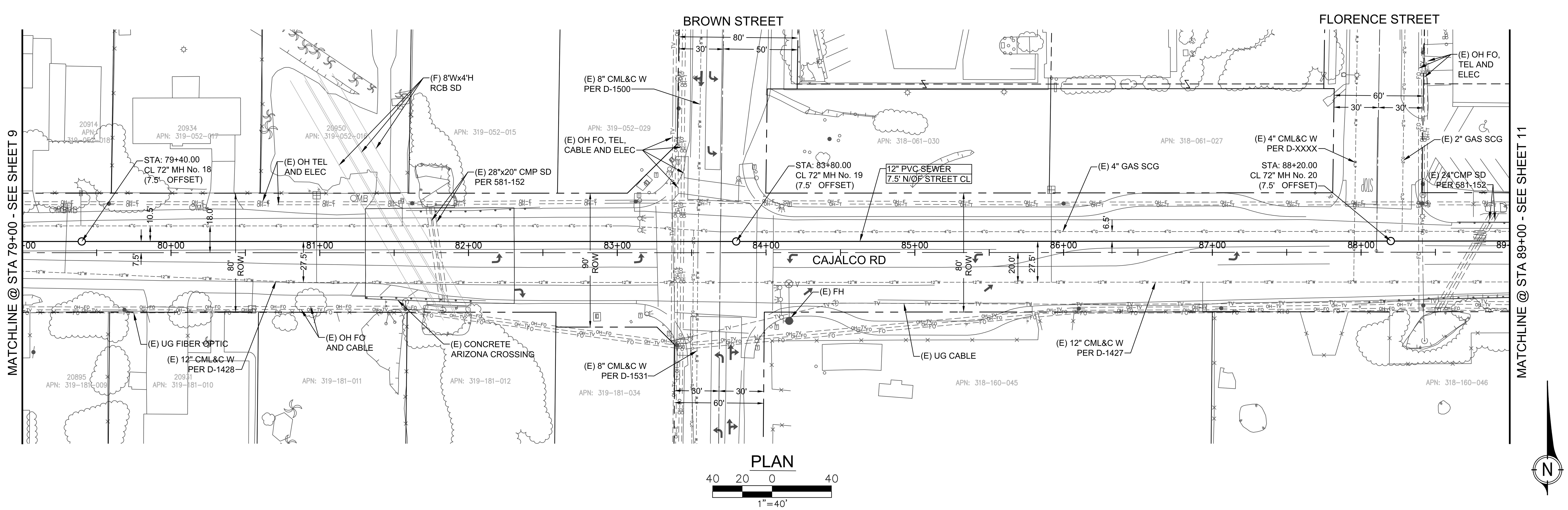
SHT. 9 OF 15
D-XXXXX
C-7



PROFILE

1"=40' HORIZ

1"=4' VERT



PLAN

1"=40'

Underground Service Alert	VERIFY SCALES	PLANS PREPARED BY:
Call: TOLL FREE 811	BAR IS ONE INCH ON ORIGINAL DRAWING	43410 BUSINESS PARK DRIVE, TEMECULA, CA 92590, T 951.396.4980
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RIVERSIDE COUNTY, CALIFORNIA

MEAD VALLEY CAJALCO SWR PRELIM DESIGN

PLAN AND PROFILE

STA 79+00 TO STA 89+00

I.D.
S.A.
W.O.
C.O.
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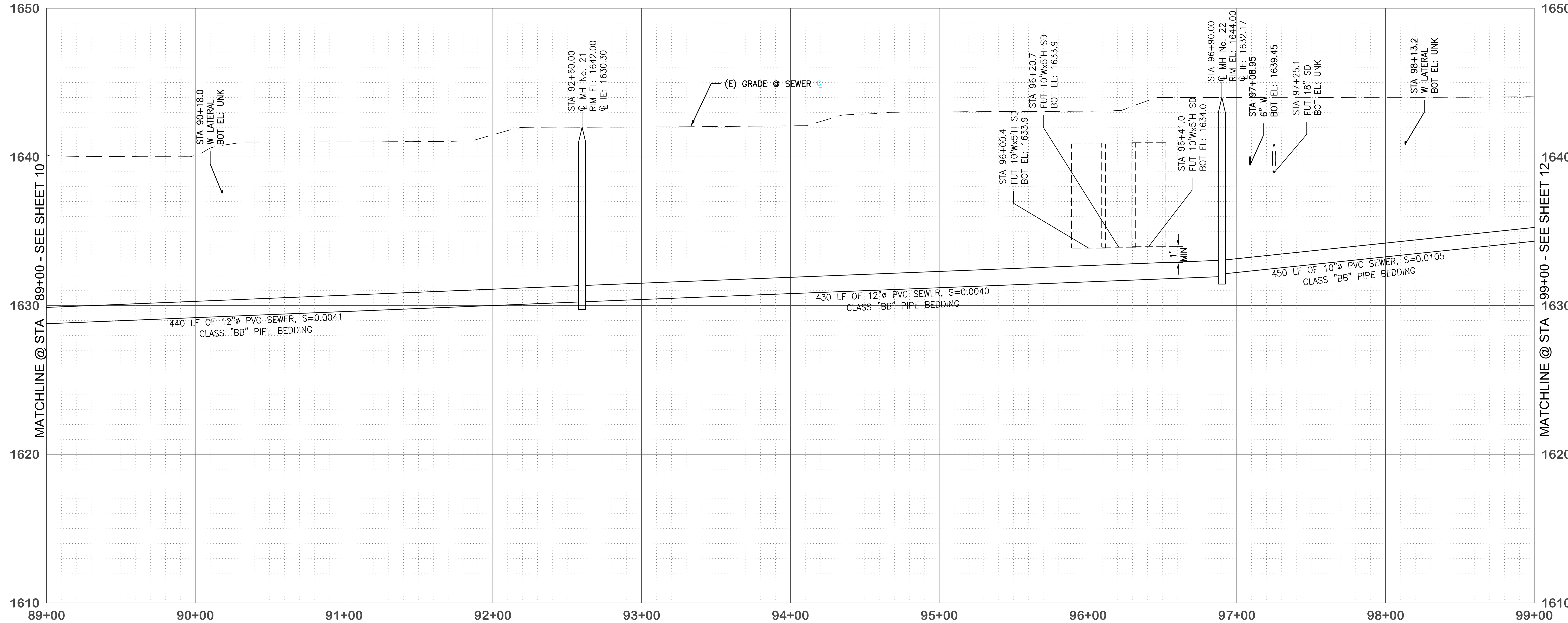
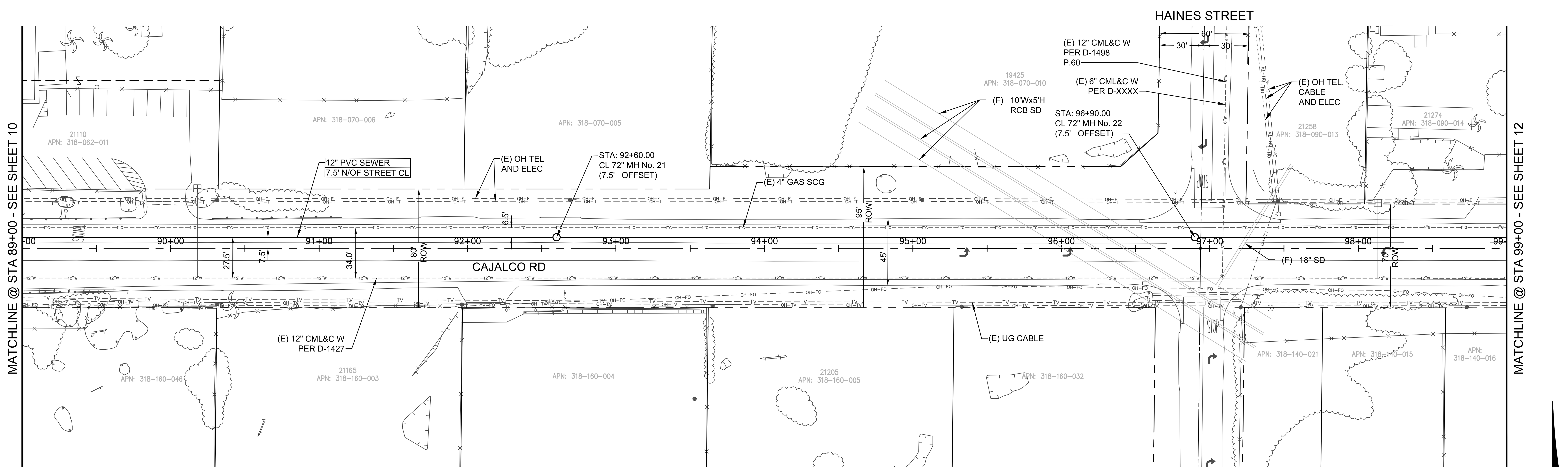
SHT. 10 OF 15
D-XXXXX
C-8



40 20 0 40
1"=40' HORIZ

PROFILE

4 2 0 4
1"=4' VERT



PLAN

40 20 0 40
1"=40'

Underground Service Alert
Call: TOLL FREE
811
TWO WORKING DAYS BEFORE YOU DIG

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

PLANS PREPARED BY:
43410 BUSINESS PARK DRIVE
TEMECULA, CA 92590
T 951.396.4980
ARDURRA
COLLABORATE. INNOVATE. CREATE.
UNDER THE SUPERVISION OF:
RYAN M. HUSTON C60324 6/30/24
PROFESSIONAL ENGINEER R.C.E. No. DATE

REGISTERED PROFESSIONAL ENGINEER
RYAN M. HUSTON
No. C60324
CIVIL
STATE OF CALIFORNIA

REVISIONS

NO.	DATE	INITIAL	DESCRIPTION	APP'VD/DATE

APPROVED BY:
SENIOR DIRECTOR OF ENGINEERING DATE
REFERENCES

EASTERN MUNICIPAL WATER DISTRICT
PROJECT MANAGER DATE

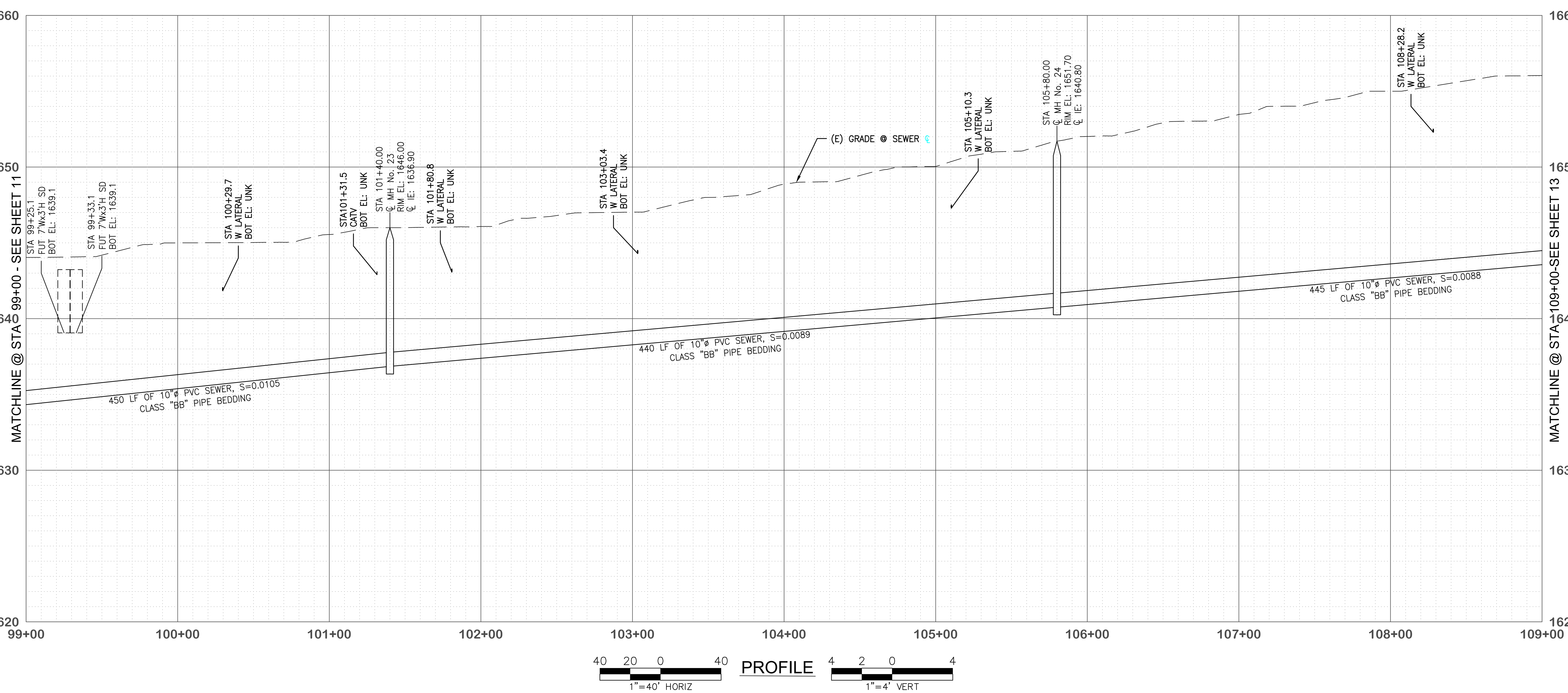
APPROVALS		INITIAL	DATE
	PROJECT ENGR.		
	INSPECTION		
	OPERATIONS		
	MAINTENANCE		

	DATE
DESIGNED	
DRAWN	
CHECKED	
SUBMITTED	

SCALE: AS SHOWN

EASTERN MUNICIPAL WATER DISTRICT
RIVERSIDE COUNTY, CALIFORNIA
MEAD VALLEY CAJALCO SWR PRELIM DESIGN
PLAN AND PROFILE
STA 89+00 TO STA 99+00

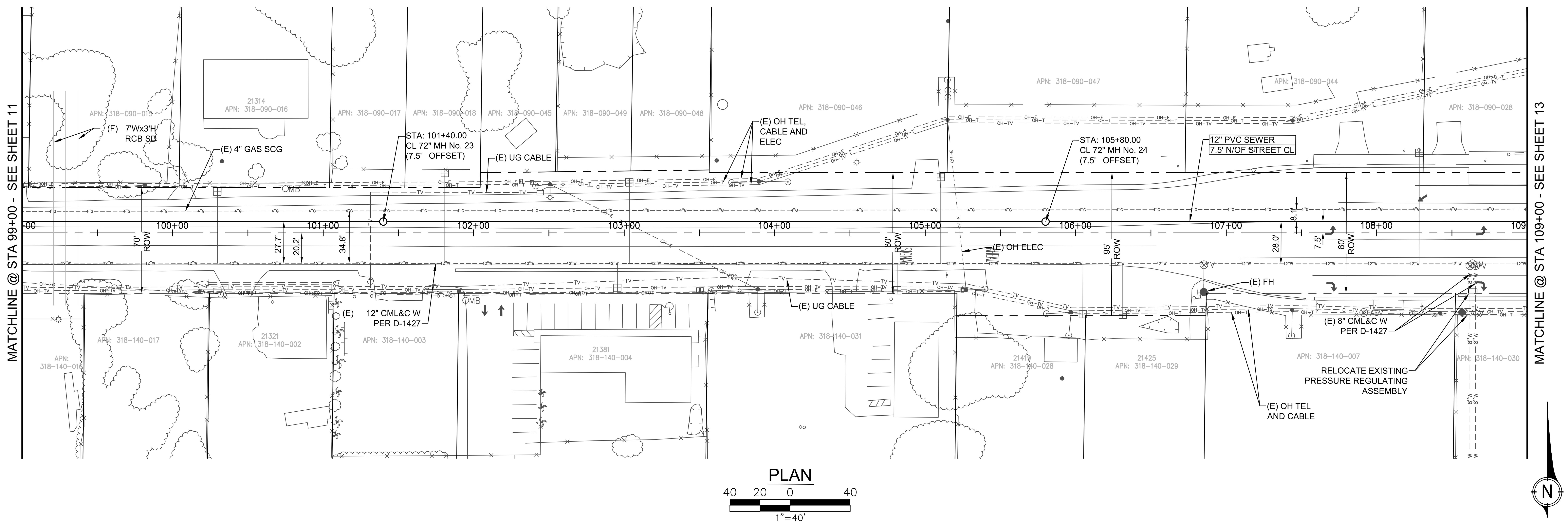
I.D.
S.A.
W.O.
C.O.
COORD.
SHT. 11 OF 15
D-XXXXX
C-9



PROFILE

40 20 0 40
1"=40' HORIZ

4 2 0 4
1"=4' VERT



PLAN

40 20 0 40
1"=40'

Underground Service Alert Call: TOLL FREE 811 TWO WORKING DAYS BEFORE YOU DIG	**VERIFY SCALES** BAR IS ONE INCH ON ORIGINAL DRAWING 0 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY	**PLANS PREPARED BY:** 43410 BUSINESS PARK DRIVE TEMECULA, CA 92590 T 951.396.4980 ARDURRA COLLABORATE. INNOVATE. CREATE. UNDER THE SUPERVISION OF: RYAN M. HUSTON C60324 6/30/24 PROFESSIONAL ENGINEER R.C.E. No. DATE REGISTERED PROFESSIONAL ENGINEER RYAN M. HUSTON No. C60324 CIVIL STATE OF CALIFORNIA

REVISIONS

NO.	DATE	INITIAL	DESCRIPTION	APP'VD/DATE

APPROVED BY:

SENIOR DIRECTOR OF ENGINEERING DATE

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EASTERN MUNICIPAL WATER DISTRICT

PROJECT MANAGER DATE

APPROVALS		INITIAL	DATE
	PROJECT ENGR.		
	INSPECTION		
	OPERATIONS		
	MAINTENANCE		

	DATE
DESIGNED	
DRAWN	
CHECKED	
SUBMITTED	

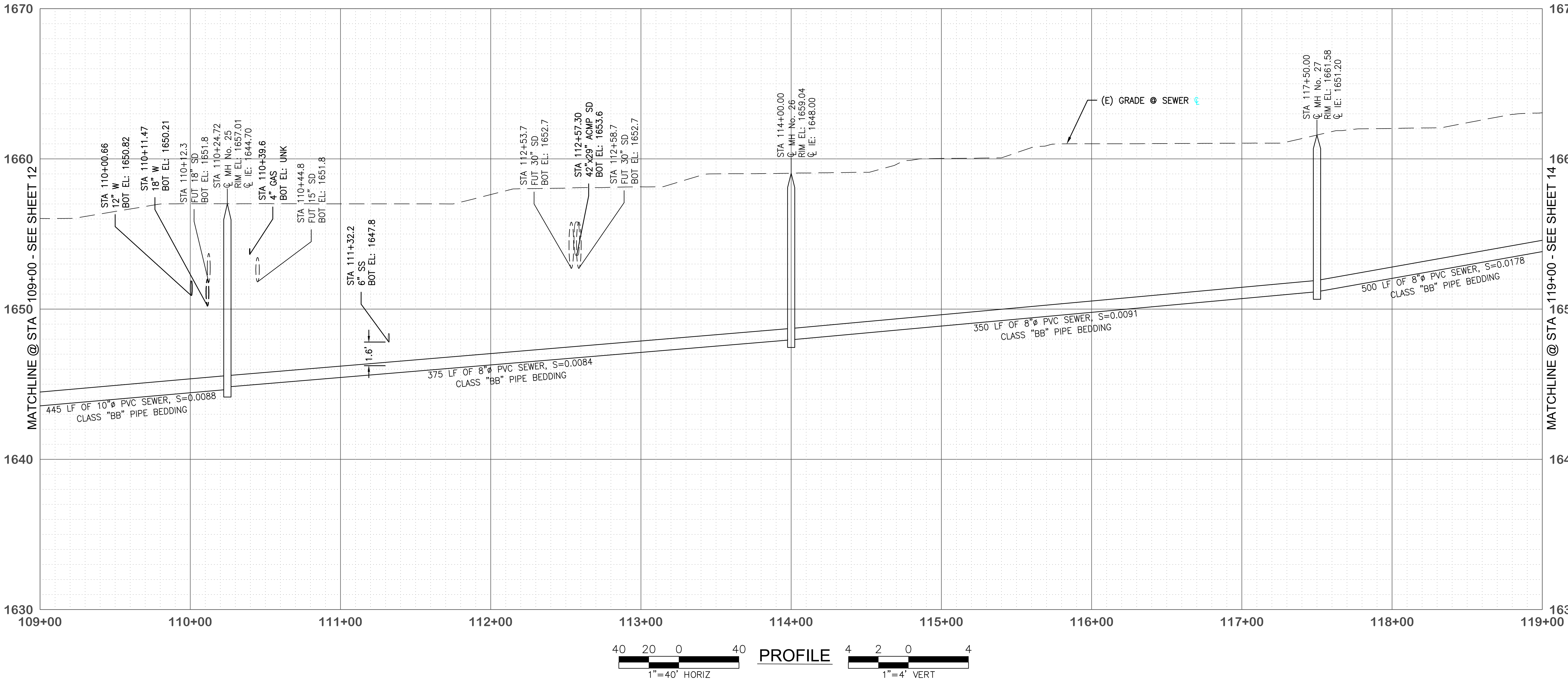
SCALE: AS SHOWN

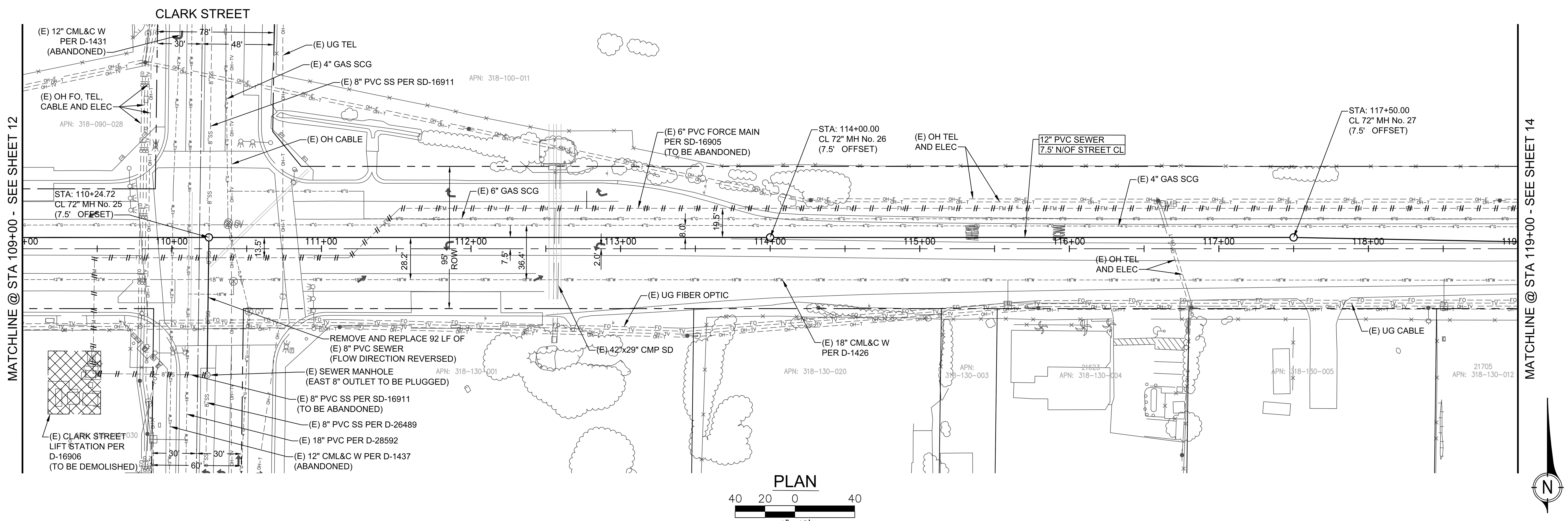
EASTERN MUNICIPAL WATER DISTRICT
RIVERSIDE COUNTY, CALIFORNIA

MEAD VALLEY CAJALCO SWR PRELIM DESIGN

PLAN AND PROFILE
STA 99+00 TO STA 109+00

I.D.
S.A.
W.O.
C.O.
COORD.
SHT. 12 OF 15
D-XXXXX
C-10





Underground Service Alert	VERIFY SCALES	PLANS PREPARED BY:
Call: TOLL FREE 811	BAR IS ONE INCH ON ORIGINAL DRAWING	43410 BUSINESS PARK DRIVE, TEMECULA, CA 92590, T 951.396.4980
TWO WORKING DAYS BEFORE YOU DIG	IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY	UNDER THE SUPERVISION OF: RYAN M. HUSTON, C60324, 6/30/24 — PROFESSIONAL ENGINEER, R.C.E. No., DATE

ARDURRA — COLLABORATE. INNOVATE. CREATE.

REGISTERED PROFESSIONAL ENGINEER — RYAN M. HUSTON — No. C60324 — CIVIL — STATE OF CALIFORNIA

REVISIONS

NO.	DATE	INITIAL	DESCRIPTION	APP'VD/DATE

APPROVED BY:

SENIOR DIRECTOR OF ENGINEERING — DATE

REFERENCES

EASTERN MUNICIPAL WATER DISTRICT

PROJECT MANAGER — DATE

APPROVALS		INITIAL	DATE
	PROJECT ENGR.		
	INSPECTION		
	OPERATIONS		
	MAINTENANCE		

	DATE
DESIGNED	
DRAWN	
CHECKED	
SUBMITTED	

SCALE: AS SHOWN

EASTERN MUNICIPAL WATER DISTRICT

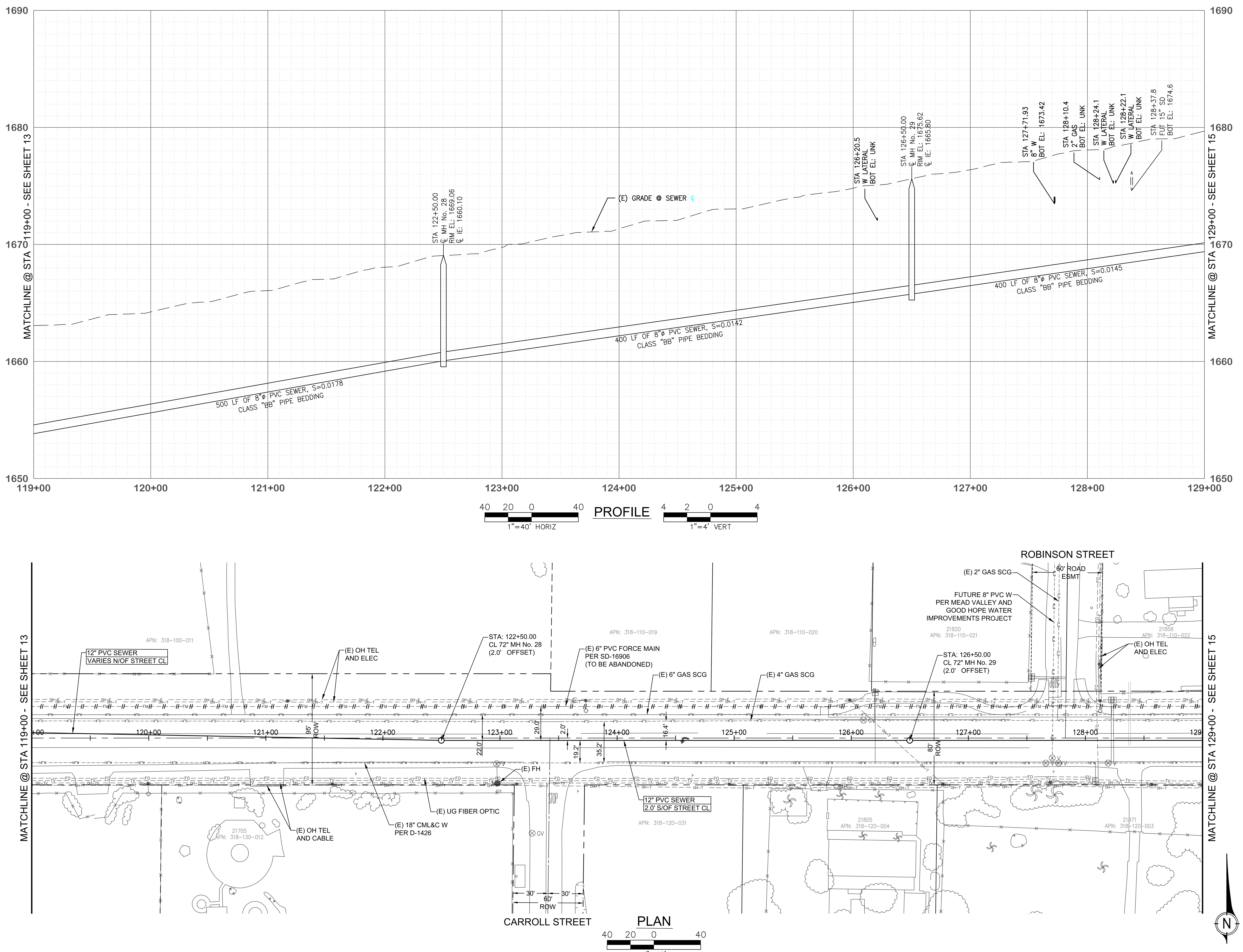
RIVERSIDE COUNTY, CALIFORNIA

MEAD VALLEY CAJALCO SWR PRELIM DESIGN

PLAN AND PROFILE

STA 109+00 TO STA 119+00

I.D.
S.A.
W.O.
C.O.
COORD.
SHT. 13 OF 15
D-XXXXX
C-11



Underground Service Alert	VERIFY SCALES	PLANS PREPARED BY:
Call: TOLL FREE 811	BAR IS ONE INCH ON ORIGINAL DRAWING	43410 BUSINESS PARK DRIVE, TEMECULA, CA 92590, T 951.396.4980
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ARDURRA
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REGISTERED PROFESSIONAL ENGINEER — RYAN M. HUSTON — No. C60324 — CIVIL — STATE OF CALIFORNIA

REVISIONS

NO.	DATE	INITIAL	DESCRIPTION	APP'VD/DATE

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PROJECT MANAGER DATE

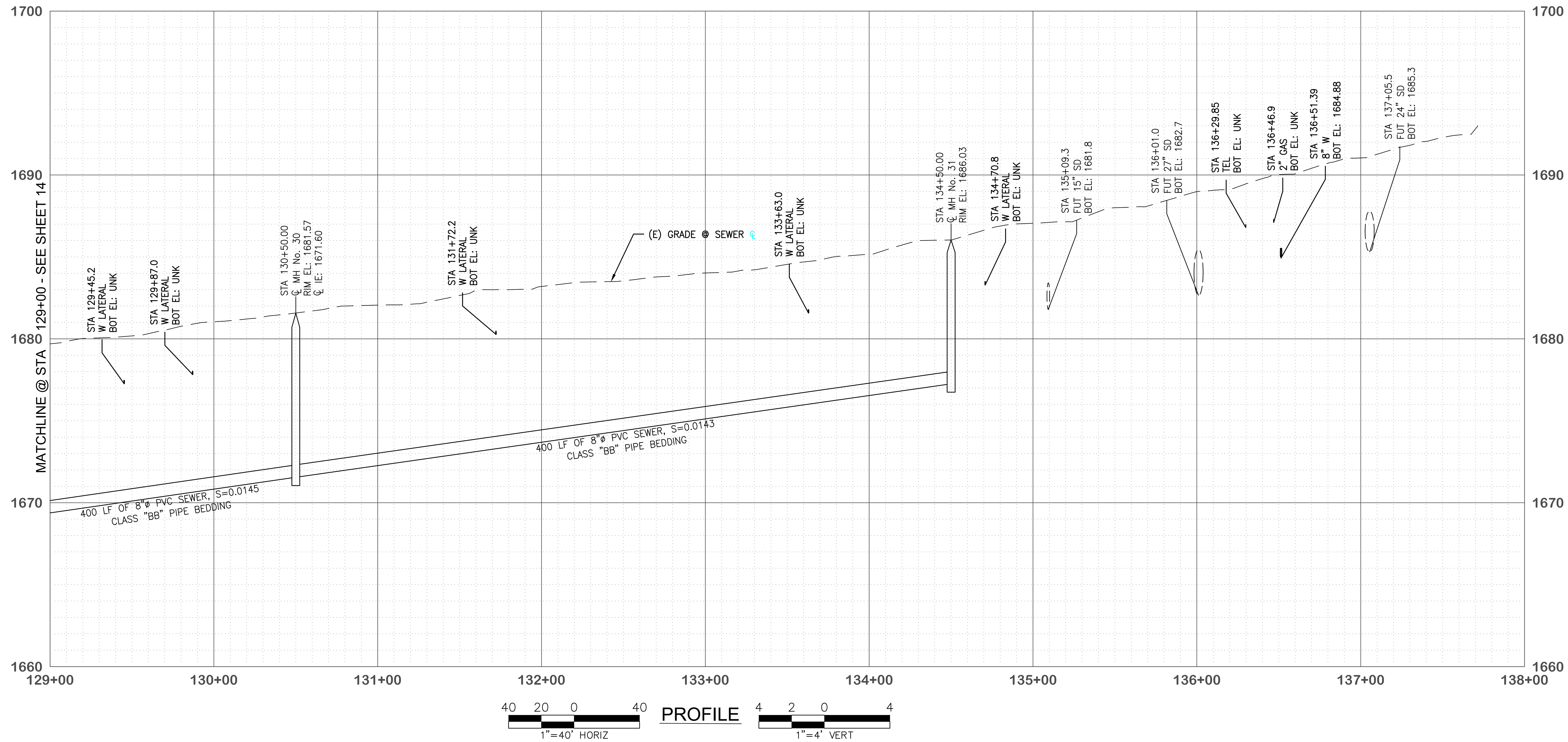
APPROVALS		INITIAL	DATE
	PROJECT ENGR.		
	INSPECTION		
	OPERATIONS		
	MAINTENANCE		

	DATE
DESIGNED	
DRAWN	
CHECKED	
SUBMITTED	

SCALE: AS SHOWN

EASTERN MUNICIPAL WATER DISTRICT
RIVERSIDE COUNTY, CALIFORNIA
MEAD VALLEY CAJALCO SWR PRELIM DESIGN
PLAN AND PROFILE
STA 119+00 TO STA 129+00

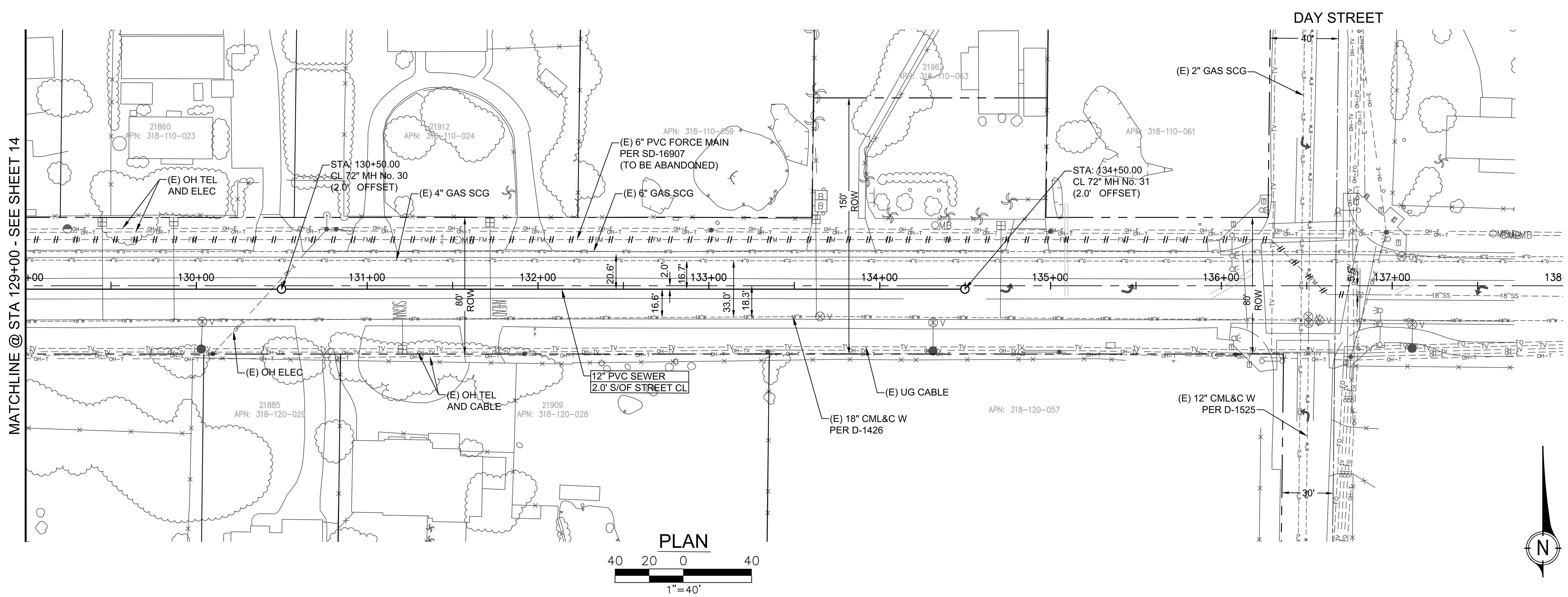
I.D.
S.A.
W.O.
C.O.
COORD.
SHT. 14 OF 15
D-XXXXX
C-12



PROFILE

40 20 0 40 1"=40' HORIZ

4 2 0 4 1"=4' VERT



PLAN

40 20 0 40 1"=40'

Underground Service Alert Call: TOLL FREE 811 TWO WORKING DAYS BEFORE YOU DIG	VERIFY SCALES BAR IS ONE INCH ON ORIGINAL DRAWING 0 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY	PLANS PREPARED BY: 43410 BUSINESS PARK DRIVE TEMECULA, CA 92590 T 951.396.4980 ARDURRA COLLABORATE. INNOVATE. CREATE. UNDER THE SUPERVISION OF: RYAN M. HUSTON C60324 6/30/24 PROFESSIONAL ENGINEER R.C.E. No. DATE	REGISTERED PROFESSIONAL ENGINEER RYAN M. HUSTON No. C60324 CIVIL STATE OF CALIFORNIA

REVISIONS

NO.	DATE	INITIAL	DESCRIPTION	APP'VD/DATE

APPROVED BY:

SENIOR DIRECTOR OF ENGINEERING DATE

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EASTERN MUNICIPAL WATER DISTRICT

PROJECT MANAGER DATE

APPROVALS		INITIAL	DATE
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	INSPECTION		
	OPERATIONS		
	MAINTENANCE		

	DATE
DESIGNED	
DRAWN	
CHECKED	
SUBMITTED	

SCALE: AS SHOWN

EASTERN MUNICIPAL WATER DISTRICT
RIVERSIDE COUNTY, CALIFORNIA

MEAD VALLEY CAJALCO SWR PRELIM DESIGN

PLAN AND PROFILE
STA 129+00 TO STA 138+00

I.D.
S.A.
W.O.
C.O.
COORD.
SHT. 15 OF 15
D-XXXXX
C-13

APPENDIX E

Hydraulic Analysis Prior to Buildout

Average Dry Weather Flow from Dudek TM			
		(gpd)	(gpm)
	School	6735	4.68
	Public Facility	4424	3.07
	Medium Density Residential	32430	22.52
	Total Clark LS Influent Flow	43589	30.2701

Flow Influent to MH #	Reach No.	Intersection	Trib Area (ac)	Ave Dry Influent to MH (gpd)	Ave Dry in Reach (gpd)	Ave Dry in Reach (gpm)	PDWF in Reach (gpm)	V (PDWF) (fps)	PWWF (gpm)	d/D (PWWF)	Slope	Sewer Size	MH Size	MH Depth	Reach Length (ft)	Rim El	CL El	Sta
MH No. 31		Day St		0									48"	9.1		1686.03	1677.3	13450
	30				0	0.00	0.00	0.0	0.00	0	0.0143	8"			400			
MH No. 30				0									48"	10.3		1681.57	1671.6	13050
	29				0	0.00	0.00	0.0	0.00	0	0.0145	8"			400			
MH No. 29		Robinson St		0									48"	10.2		1675.62	1665.8	12650
	28				0	0.00	0.00	0.0	0.00	0	0.0142	8"			400			
MH No. 28		Carroll St		0									48"	9.3		1669.06	1660.1	12250
	27				0	0.00	0.00	0.0	0.00	0	0.0178	8"			500			
MH No. 27				0									48"	10.7		1661.58	1651.2	11750
	26				0	0.00	0.00	0.0	0.00	0	0.0091	8"			350			
MH No. 26				0									48"	11.4		1659.04	1648	11400
	25				0	0.00	0.00	0.0	0.00	0	0.0084	8"			375.28			
MH No. 25		Clark St		43589									48"	12.6		1657.01	1644.86	11024.72
	24				43589	30.27	86.88	2.4	104.25	0.23	0.0088	10"			444.72			
MH No. 24				43589									48"	11.4		1651.7	1640.7	10580
	23				43589	30.27	86.88	2.4	104.25	0.23	0.0089	10"			440			
MH No. 23				43589									48"	9.5		1646	1636.9	10140
	22				43589	30.27	86.88	2.5	104.25	0.22	0.0105	10"			450			
MH No. 22		Haines St		43589									48"	12.5		1644	1632	9690
	21				43589	30.27	86.88	1.7	104.25	0.22	0.004	12"			430			
MH No. 21				43589									48"	12.2		1642	1630.3	9260
	20				43589	30.27	86.88	1.8	104.25	0.22	0.0041	12"			440			
MH No. 20		Florence St		43589									48"	13.0		1641.02	1628.5	8820
	19				43589	30.27	86.88	1.8	104.25	0.22	0.0041	12"			440			
MH No. 19		Brown St		43589									48"	13.1		1639.32	1626.7	8380
	18				43589	30.27	86.88	1.8	104.25	0.22	0.0041	12"			440			
MH No. 18				43589									48"	11.9		1636.34	1624.9	7940
	17				43589	30.27	86.88	1.6	104.25	0.24	0.003	12"			440			
MH No. 17				43589									48"	2.9		1635	1632.6	7500
	16				43589	30.27	86.88	1.6	104.25	0.24	0.003	12"			440			
MH No. 16		Mead St		43589									48"	13.8		1635.64	1622.3	7060
	15				43589	30.27	86.88	1.6	104.25	0.24	0.003	12"			440			
MH No. 15				43589									48"	13.5		1634	1621	6620

Eastern Municipal Water District
Mead Valley Cajalco Sewer Project
Hydraulic Analysis

ARDURRA

Flow Influent to MH #	Reach No.	Intersection	Trib Area (ac)	Ave Dry Influent to MH (gpd)	Ave Dry in Reach (gpd)	Ave Dry in Reach (gpm)	PDWF in Reach (gpm)	V (PDWF) (fps)	PWWF (gpm)	d/D (PWWF)	Slope	Sewer Size	MH Size	MH Depth	Reach Length (ft)	Rim El	CL El	Sta
	14				43589	30.27	86.88	1.6	104.25	0.24	0.003	12"			440			
MH No. 14				43589									48"	17.1		1636.31	1619.7	6180
	13				43589	30.27	86.88	1.6	104.25	0.24	0.003	12"			470			
MH No. 13		Alexander St		43589									48"	17.2		1635.02	1618.3	5710
	12				43589	30.27	86.88	1.5	104.25	0.24	0.0029	12"			480			
MH No. 12				43589									48"	16.6		1633.05	1616.9	5230
	11				43589	30.27	86.88	1.5	104.25	0.24	0.0029	12"			480			
MH No. 11				43589									48"	16.0		1631.04	1615.5	4750
	10				43589	30.27	86.88	1.6	104.25	0.24	0.0031	12"			480			
MH No. 10		Una St		43589									48"	14.0		1627.46	1614	4270
	9				43589	30.27	86.88	2.4	104.25	0.18	0.0094	12"			500			
MH No. 9				43589									48"	9.2		1618.03	1609.3	3770
	8				43589	30.27	86.88	2.2	104.25	0.18	0.0083	12"			60			
MH No. 8		Barton St		43589									48"	9.1		1617.39	1608.8	3710
	7				43589	30.27	86.88	2.0	104.25	0.2	0.0061	12"			460			
MH No. 7				43589									48"	10.5		1616	1606	3250
	6				43589	30.27	86.88	2.5	104.25	0.17	0.011	12"			300			
MH No. 6				43589									48"	12.1		1614.29	1602.7	2950
	5				43589	30.27	86.88	2.1	104.25	0.2	0.0057	12"			300			
MH No. 5				43589									48"	11.2		1611.65	1601	2650
	4				43589	30.27	86.88	3.0	104.25	0.15	0.0194	12"			360			
MH No. 4				43589									48"	11.5		1604.97	1594	2290
	3				43589	30.27	86.88	2.8	104.25	0.16	0.0155	12"			380			
MH No. 3				43589									48"	9.9		1597.48	1588.1	1910
	2				43589	30.27	86.88	2.8	104.25	0.16	0.016	12"			400			
MH No. 2				43589									48"	11.6		1595	1583.9	1510
	1				43589	30.27	86.88	2.5	104.25	0.17	0.0048	12"			380.38			
MH No. 1		Carpinus Dr		43589									48"	12.8		1592	1579.67	1129.62

Total Quantities

12" PVC	8560.38
10" PVC	1334.72
8" PVC	2425.28
Total Length	12320.38

APPENDIX F

Potential Upsizing Hydraulic Analysis

Eastern Municipal Water District
Mead Valley Cajalco Sewer Project
Hydraulic Analysis

ARDURRA

Average Dry Weather Flow from Dudek TM			
		(gpd)	(gpm)
School		6735	4.68
Public Facility		4424	3.07
Medium Density Residential		32430	22.52
Total Clark LS Influent Flow		43589	30.2701

Flow Influent to MH #	Reach No.	Intersection	Trib Area (ac)	Ave Dry Influent to MH (gpd)	Ave Dry in Reach (gpd)	Ave Dry in Reach (gpm)	Design PDWF in Reach (gpm)	Design V (PDWF) (fps)	Max PWWF (gpm)	Max d/D (PWWF)	Slope	Sewer Size	MH Size	MH Depth	Reach Length (ft)	Rim El	CL El	Sta
MH No. 31		Day St	0	0									48"	9.1		1686.03	1677.3	13450
	30	limited by V	6.16		7238	5.03	14.43	1.7	324.52	0.12	0.0143	8"			400			
MH No. 30				7238									48"	10.3		1681.57	1671.6	13050
	29	limited by V	5.61		13830	9.60	27.56	2.1	326.78	0.5	0.0145	8"			400			
MH No. 29		Robinson St		13830									48"	10.2		1675.62	1665.8	12650
	28		5.55		20351	14.13	40.56	2.0	1424.98	0.45	0.0142	15"			400			
MH No. 28		Carroll St		20351									48"	9.3		1669.06	1660.1	12250
	27		9.83		31901	22.15	63.58	2.6	1424.98	0.42	0.0178	15"			500			
MH No. 27				31901									48"	10.7		1661.58	1651.2	11750
	26		6.13		39104	27.16	77.94	2.1	1424.98	0.51	0.0091	15"			350			
MH No. 26				39104									48"	11.4		1659.04	1648	11400
	25		4.69		44615	30.98	88.92	2.2	1424.98	0.53	0.0084	15"			375.28			
MH No. 25		Clark St		88204									48"	12.6		1657.01	1644.86	11024.72
	24		4.93		93997	65.28	187.34	2.7	1424.98	0.52	0.0088	15"			444.72			
MH No. 24				93997									48"	11.4		1651.7	1640.7	10580
	23		4.5		99284	68.95	197.88	2.9	1424.98	0.52	0.0089	15"			440			
MH No. 23				99284									48"	9.5		1646	1636.9	10140
	22		4.47		104536	72.59	208.35	3.0	1424.98	0.49	0.0105	15"			450			
MH No. 22		Haines St		104536									48"	12.5		1644	1632	9690
	21		7.39		113220	78.62	225.65	2.2	1424.98	0.67	0.004	15"			430			
MH No. 21				113220									48"	12.2		1642	1630.3	9260
	20		5.33		119482	82.97	238.13	2.3	1424.98	0.66	0.0041	15"			440			
MH No. 20		Florence St		119482									48"	13.0		1641.02	1628.5	8820
	19		3.76		123900	86.04	246.94	2.3	1424.98	0.66	0.0041	15"			440			
MH No. 19		Brown St		123900									48"	13.1		1639.32	1626.7	8380
	18				123900	86.04	246.94	2.3	1424.98	0.66	0.0041	15"			440			
MH No. 18				123900									48"	11.9		1636.34	1624.9	7940
	17				123900	86.04	246.94	2.1	1424.98	0.74	0.003	15"			440			
MH No. 17				123900									48"	2.9		1635	1632.6	7500
	16				123900	86.04	246.94	2.1	1424.98	0.74	0.003	15"			440			
MH No. 16		Mead St		123900									48"	13.8		1635.64	1622.3	7060
	15				123900	86.04	246.94	2.1	1424.98	0.74	0.003	15"			440			
MH No. 15				123900									48"	13.5		1634	1621	6620

Flow Influent to MH #	Reach No.	Intersection	Trib Area (ac)	Ave Dry Influent to MH (gpd)	Ave Dry in Reach (gpd)	Ave Dry in Reach (gpm)	Design PDWF in Reach (gpm)	Design V (PDWF) (fps)	Max PWWF (gpm)	Max d/D (PWWF)	Slope	Sewer Size	MH Size	MH Depth	Reach Length (ft)	Rim El	CL El	Sta
	14				123900	86.04	246.94	2.1	1424.98	0.74	0.003	15"			440			
MH No. 14				123900									48"	17.1		1636.31	1619.7	6180
	13				123900	86.04	246.94	2.1	1424.98	0.74	0.003	15"			470			
MH No. 13		Alexander St		123900									48"	17.2		1635.02	1618.3	5710
	12	limiting reach, max d/D			123900	86.04	246.94	2.1	1424.98	0.75	0.0029	15"			480			
MH No. 12				123900									48"	16.6		1633.05	1616.9	5230
	11	limiting reach, max d/D			123900	86.04	246.94	2.1	1424.98	0.75	0.0029	15"			480			
MH No. 11				123900									48"	16.0		1631.04	1615.5	4750
	10	third limiting reach, max d/D			123900	86.04	246.94	2.1	1473.30	0.75	0.0031	15"			480			
MH No. 10		Una St		123900									48"	14.0		1627.46	1614	4270
	9				123900	86.04	246.94	3.1	1833.29	0.6	0.0094	15"			500			
MH No. 9				123900									48"	9.2		1618.03	1609.3	3770
	8				123900	86.04	246.94	3.0	1833.29	0.62	0.0083	15"			60			
MH No. 8		Barton St		123900									48"	9.1		1617.39	1608.8	3710
	7				123900	86.04	246.94	2.7	1833.29	0.69	0.0061	15"			460			
MH No. 7				123900									48"	10.5		1616	1606	3250
	6				123900	86.04	246.94	3.3	1833.29	0.58	0.011	15"			300			
MH No. 6				123900									48"	12.1		1614.29	1602.7	2950
	5				123900	86.04	246.94	2.6	1833.29	0.72	0.0057	15"			300			
MH No. 5				123900									48"	11.2		1611.65	1601	2650
	4				123900	86.04	246.94	4.0	1833.29	0.49	0.0194	15"			360			
MH No. 4				123900									48"	11.5		1604.97	1594	2290
	3				123900	86.04	246.94	3.7	1833.29	0.51	0.0155	15"			380			
MH No. 3				123900									48"	9.9		1597.48	1588.1	1910
	2				123900	86.04	246.94	3.7	1833.29	0.49	0.016	15"			400			
MH No. 2				123900									48"	11.6		1595	1583.9	1510
	1	second limiting reach, max d/D			123900	86.04	246.94	2.6	1833.29	0.75	0.0048	15"			380.38			
MH No. 1		Carpinus Dr		123900									48"	12.8		1592	1579.67	1129.62

Total Quantities

12" PVC	8560.38
10" PVC	1334.72
8" PVC	2425.28
Total Length	12320.38

APPENDIX G

Clark Lift Station Condition Assessment Field Report

4.34 L3526 Clark St LS

Site Information

Figure 4.34-1 – Clark St LS Location Map [33.8369822, -117.2878794]

Clark St LS is located near 19519 Clark St in Perris, CA. Upgraded in 1993, it has the capacity for 150 gpm with two pumps in service. The following components were assessed by V&A during the condition assessment:

1. Pump Assemblies
2. Wet Wells

Non-destructive testing (UT and DFT) locations for Green Acres LS are illustrated in Figure 4.34-2 below.

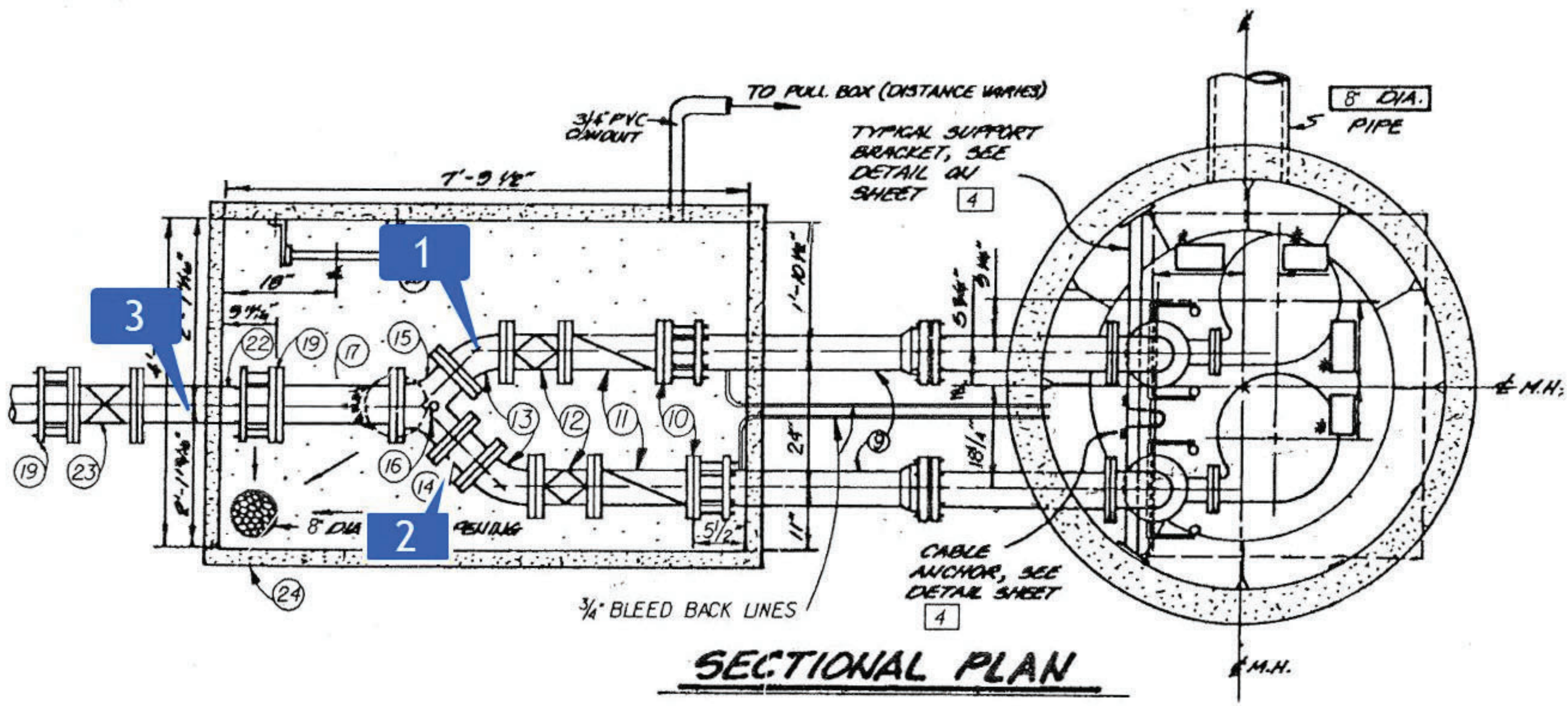

Figure 4.34-2 - Non-Destructive Testing Locations

Findings

Pump Assemblies

UT and DFT measurements 1-3 were taken at the locations shown in Figure 4.34-2. Band 4 was taken on the 8-in potable water regulated zone piping, with the UT/DFT reading location shown in the photos. The piping consisted primarily of 6-in ductile iron pipe. The results of the UT and DFT testing are shown in the tables below.

Table 4.34-1 - UT Measurements

Band	Piping	Minimum (inches)	Maximum (inches)	Average (inches)	Max. Wall Loss (in.)	Maximum Metal Loss (%)
1	Pump Assembly 1	0.121	0.127	0.124	0.129	52%(1)
2	Pump Assembly 2	0.128	0.185	0.144	0.122	49%(1)
3	Common Discharge	0.420	0.426	0.418	0.010	2%
4	Potable Water Zone Piping	0.303	0.319	0.309	0.027	8%

(1) Assumed nominal thickness of 0.25-in, UT readings questionable

Table 4.34-2 - DFT Measurements

Band	Piping	Minimum (mils)	Maximum (mils)	Average (mils)	Recommended thickness (mils)(1)
1	Pump Assembly 1	8.2	14.8	11.6	6 to 9
2	Pump Assembly 2	7.5	19.1	12.6	6 to 9
3	Common Discharge	5.6	9.8	7.8	6 to 9
4	Potable Water Zone Piping	1.0	1.9	1.4	6 to 9

(1) Piping exposed to sunlight is recommended to have 4 to 6 mils of epoxy coating with an additional 2 to 3 mils of aliphatic polyurethane

Photo 4.34-1 through Photo 4.34-6 illustrate the general condition of the pump assemblies at Clark St LS.

Photo 4.34-1 – Pump Assemblies 1-2

Photo 4.34-2 – Pump Assemblies 1-2

Photo 4.34-3 – Common header

Photo 4.34-4 – Rust staining at flanges/bolts where coating has thinned (typical)

Photo 4.34-5 – Mead Valley Regulated Zone Piping Assembly

Photo 4.34-6 – Regulated Zone Piping Assembly UT-4 location

Comments: Piping and coating in good overall condition, surface corrosion evident where coating has thinned or flaked off

Condition Rating: 2

Wet Wells

Photo 4.34-7 through Photo 4.34-12 illustrate the general condition of the Wet Well at Clark St LS.

Photo 4.34-7 – Wet well exterior

Photo 4.34-8 – Wet well, topside

Photo 4.34-9 – Submersible pump discharge piping heavily corroded throughout

Photo 4.34-10 – Coating failure and corrosion on discharge piping (closeup)

Photo 4.34-11 – Wet well interior (closeup)

Photo 4.34-12 – Wet well interior (closeup)

Comments:
-Wet well liner in good condition
-Wet well submersible pump discharge piping coating is failing with heavy corrosion throughout
Condition Rating: 3

Additional findings:

Photo 4.34-13 – Corrosion throughout electrical panels

Photo 4.34-14 – Corrosion throughout electrical panels (typical)

Recommendations

Based on the findings of the Clark St LS condition assessment, V&A recommends the following for Hazen & Sawyer and the District to consider:

1. Touch-up coating as needed at flanges/bolts throughout aboveground piping, including the uncoated spool on the potable water piping.

2. Replace submersible pump discharge piping with fusion bonded epoxy-coated and lined steel piping.

APPENDIX H

Draft Geotechnical Investigation Report

GEOTECHNICAL INVESTIGATION

EASTERN MUNICIPAL WATER DISTRICT
MEAD VALLEY SEWER IMPROVEMENTS

Riverside County, California

PREPARED FOR:

Mr. Nate Olivas
Eastern Municipal Water District
2270 Trumble Road
Perris, California 92570

PREPARED BY:

Atlas Technical Consultants LLC
6280 Riverdale Street
San Diego, California 92120

DRAFT

January 13, 2023

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San Diego, CA 92120
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January 13, 2023

Atlas No. 190063P4.2
Report No. 1962-1

MR. NATE OLIVAS
EASTERN MUNICIPAL WATER DISTRICT
2270 TRUMBLE ROAD
PERRIS, CALIFORNIA 92570

Subject: **Geotechnical Investigation**
Mead Valley Sewer Improvements
Eastern Municipal Water District
Riverside County, California

Dear Mr. Olivas,

In accordance with your request and our proposal No. 22-04013R2, Atlas performed a geotechnical investigation to assess the geologic conditions for the project, including potential geologic hazards, and to provide recommendations based on our findings. Our investigation consisted of a review of readily available geologic literature, site reconnaissance, exploratory borings, limited hydrogeologic testing and analysis, geotechnical laboratory testing, and the preparation of this report.

We appreciate the opportunity to be of service on this project. Should you have any questions related to this report, please contact the undersigned at your convenience.

Respectfully submitted,
Atlas Technical Consultants LLC

DRAFT ONLY – DO NOT RELY ON THIS REPORT

Jason Dale, EIT
Project Manager

DRAFT ONLY – DO NOT RELY ON THIS REPORT

Doug Skinner, PG 2472
Senior Engineering Geologist

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DRAFT

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DRAFT

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1. INTRODUCTION

This report presents the results of the geotechnical investigation Atlas performed for the subject project. It is our understanding the project will consist of the design and construction of approximately 3½ miles of new sewer pipeline along Cajalco Road in Riverside County, California. Figure 1 presents the site vicinity.

2. SCOPE OF WORK

2.1 Investigations and Monitoring Wells

Atlas performed a geologic investigation to address potential geologic hazards and geotechnical conditions that could impact the proposed construction. Pertinent documents reviewed included published reports and mapping, aerial photographs, in-house geotechnical reports, and available reports by others. Atlas explored subsurface conditions by drilling thirteen (13) borings to depths of up to approximately 41½ feet below the existing ground surface using limited access and truck-mounted drill rigs equipped with a hollow stem auger in September 2022. Additionally, Atlas will install two temporary groundwater monitoring wells to a depth of about 40 feet below ground surface in January 2023. Figure 2 presents the approximate locations and depths of the borings and proposed monitoring wells.

An Atlas engineer and geologist logged the borings and collected samples of the material encountered for geotechnical laboratory testing. Soils and rocks recovered during the field investigation were observed in the field for soil and/or groundwater contamination with visual and olfactory methods. Soils were classified according to the Unified Soil Classification System illustrated in the Subsurface Exploration Legend (Appendix I). The rocks encountered were classified in general accordance with the California Department of Transportation (Caltrans) rock classification system. The boring logs are presented in Appendix I.

2.2 Geophysical Survey

The scope of our work also included performing a geophysical survey at select locations on the project alignment. The geophysical study is currently underway and will be included in the final report.

2.3 Laboratory Testing

Selected samples from the exploratory borings were tested to evaluate pertinent soil classification and engineering properties. The laboratory testing consisted of in-situ moisture and density, particle-size distribution, percent finer than #200 sieve, corrosivity, direct shear, expansion index, Atterberg limits, and R-value. The laboratory testing standards and results are presented in Appendix II.

2.4 Analysis and Report Preparation

The results of the field and laboratory tests were evaluated to develop conclusions and recommendations, including the following:

- A plot plan showing the boring locations
- Exploration logs with soil characterization detailing the subsurface conditions noted at the boring locations
- A description of the above ground geologic conditions
- Groundwater levels and the necessity for dewatering
- Excavation characteristics of the subsurface materials encountered
- Backfill recommendations and the suitability of excavated materials for use as backfill and bedding
- Allowable temporary excavation side slope and shoring recommendations
- Lateral earth pressures and resistance to lateral loads
- Support for the pipeline
- Potential pipeline settlements
- Appropriate types of bedding and backfill materials as well as placement and compaction procedures
- Soil modulus E’ for pipeline design
- Subgrade compaction beneath pavements
- New flexible pavement structural sections
- Corrosivity of earth materials

3. SITE AND PROJECT DESCRIPTION

The project alignment is along Cajalco Road between Wood Road and Robinson Street in Riverside County, California. The site topography descends towards the east, with site elevations along the alignment ranging from approximately 1577 to 1671 above mean sea level.

4. GEOLOGY AND SUBSURFACE CONDITIONS

The site is located within the Peninsular Ranges Geomorphic Province of California, which stretches from the Los Angeles basin south into Baja California. This province is characterized as a series of northwest-trending mountain ranges separated by subparallel fault zones and a coastal plain of subdued landforms. The mountain ranges are underlain primarily by Mesozoic metamorphic rocks that were intruded by plutonic rocks of the southern California batholith, while the coastal plain is underlain by subsequently deposited marine and non-marine sedimentary formations. The site is located in the coastal plain. The materials observed in our borings consisted of fill, very old axial-channel deposits, young wash deposits, and Val Verde tonalite (granitic rock). Figure 3 presents the regional geology, and descriptions of the materials encountered are provided below.

<u>Fill (Qf)</u>: Fill was encountered in some of our borings below the existing ground surface and extends to depths of up to approximately 5 feet below ground surface. The fill materials encountered generally consisted of moist, medium dense sandy silt, silty sand, and clayey sand. Debris and boulders may be encountered.

<u>Very old axial-channel deposits (Qvoa)</u>: Very old axial-channel deposits were encountered in a number of our borings at both existing ground surface and below the fill and extends up to about 24 feet below ground surface. The materials encountered generally consisted of moist, loose to medium dense poorly graded sand with silt, and loose to dense silty and clayey sand.

<u>Young wash deposits (Qywa):</u> Young wash deposits were encountered below fill in Borings B-12S and B-13S and extends to a depth of up to approximately 18 feet below ground surface. The materials encountered generally consisted of moist, medium dense to very dense silty and clayey sand.

<u>Val Verde tonalite (Kvt)</u>: Val Verde tonalite was encountered in each of the borings below the surficial soils and extends to the total depths explored. The materials encountered generally consisted of intensely weathered to decomposed, very soft igneous rock. The excavated material could be characterized as moist to wet, poorly graded sand with silt or clay, silty and clayey sand, sandy silt, and hard, lean clay with sand. Gravels and cobble may be expected. Boulders are possible.

<u>Groundwater</u>: Groundwater was observed as shallow as 18 feet below existing ground surface. Available literature indicates the groundwater could be shallower than approximately 10 feet below ground surface near Boring B-15S (SWRCB, 2022). It should be recognized that groundwater conditions may vary at a site over time. Fluctuations in the groundwater level may occur due to variations in ground surface topography, subsurface geologic conditions and structure, rainfall, irrigation, broken pipes, changes in site drainage, and other factors. These types of conditions can be most effectively assessed at the time of construction. Table 1 presents the observed groundwater levels relative to the ground surface.

To assist in assessing groundwater levels during construction, temporary groundwater monitoring wells will be installed at boring locations B-2S and B-6S to observe the groundwater activity. The monitoring wells should be periodically monitored, and groundwater elevations be recorded by a qualified individual. A diagram presenting the well construction is in Appendix I.

Table 1: Observed Groundwater Level

Boring Location	Depth to Encountered Groundwater (ft)	Boring Location	Depth to Encountered Groundwater (ft)
B-1S	22	B-9S	25
B-2S	*Pending*	B-10S	27
B-3S	26	B-11S	Not encountered
B-4S	18	B-12S	39
B-5S	33	B-13S	Not encountered
B-6S	*Pending*	B-14S	29
B-7S	37	B-15S	28
B-8S	Not encountered	*Empty*	

4.1 Geologic Hazards

4.1.1 Fault-Rupture Hazard

Faulting in the Riverside County area is dominantly characterized by a series of Quaternary-age and older fault zones that typically consist of several individual echelon faults, generally striking in a northerly to northwesterly direction. Active fault zones are those that have shown conclusive evidence of faulting during the Holocene Epoch (the most recent 11,000 years) while potentially active fault zones have demonstrated movement during the Pleistocene Epoch (11,000 to 2.6 million years before the present) but no evidence of movement during Holocene time. Faults that can be shown to have experienced no movement within the Holocene or Pleistocene Epochs are generally considered to be inactive. The closest active fault, the Glen Ivy North fault, is about 10 miles west of the site (Jennings, 2010). Figure 4 presents the California fault activity. The project alignment is not located in an Alquist-Priolo Earthquake Fault Zone. No signs of faulting and no active faults are known to underlie or project toward the site. The probability of fault rupture is considered negligible.

4.1.2 CBC Seismic Design Parameters

A geologic hazard likely to affect the project is ground shaking because of movement along an active fault zone in the vicinity of the subject site (USGS, 2020). Based on the subsurface conditions encountered during our investigation and available online resources (Wills et al. 2015), the alignment could generally be classified as Site Class C. The mapped site coefficients and adjusted earthquake spectral response parameters in accordance with the 2019 CBC are presented below in Table 2. Please note that the seismic parameters are provided for the approximate coordinates tabulated for the site.

Table 2: 2019 California Building Code / ASCE 7-16 Site Specific Seismic Parameters

Site Coordinates	
Latitude	Longitude
33.8391°	-117.2819°

Site Coefficients and Spectral Response Acceleration Parameters	Values
Site Class	C – Very Dense Soil
Site Coefficients, F_a	1.2
Site Coefficients, F_v	1.446
Spectral Response Acceleration at Short Period, S_s	1.5g
Spectral Response Acceleration at 1-Second Period, S_1	0.554g
Design Spectral Acceleration at Short Period, S_{DS}	1.2g
Design Spectral Acceleration at 1-Second Period, S_{D1}	0.534g
Site Modified Peak Ground Acceleration, PGA_M	0.6g

4.1.3 Liquefaction and Dynamic Settlement

Liquefaction occurs when loose, saturated, generally fine sands and silts are subjected to strong ground shaking. The soils lose shear strength and become liquid, potentially resulting in large total and differential ground surface settlement as well as possible lateral spread during an earthquake. Liquefiable material is not mapped along the project alignment. Because of the relatively dense soils and depth to groundwater, it is our opinion that the potential liquefaction and dynamic settlement significantly affecting the proposed project is low.

4.1.4 Flooding, Tsunamis, and Seiches

Flood Insurance Rate Maps via the Federal Emergency Management Agency (FEMA) Flood Hazard Map online database were reviewed to evaluate if the subject site is located within an area susceptible to flooding (FEMA, 2022). The project site is designated as Flood Hazard Zone A, which designates the areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Published depth or base flood elevations are not provided for Zone A. The potential for flooding should be considered.

The site is not located within a mapped area on the State of California Tsunami Inundation Maps (CDC, 2022b). Seiches are periodic oscillations in large bodies of water such as lakes, harbors, bays, or open reservoirs. The site is not located adjacent to any bodies of water subject to seiches.

4.1.5 Landslides and Slope Stability

There are no mapped or known landslides underlying or adjacent to the project site (CDC, 2021a). Additionally, evidence of slope instabilities or landslides was not observed at the time of our site reconnaissance. The potential for slope instabilities or landslides to affect the site is considered low.

4.1.6 Subsidence

The project is not located in an area of known subsidence associated with fluid withdrawal (groundwater or petroleum) (USGS, 2022). Due to this, as well as the presence of very dense deposits, the potential for subsidence is low.

4.1.7 Hydro-Consolidation

Hydro-consolidation can occur in recently deposited sediments (less than 10,000 years old) that were deposited in a semi-arid environment. Examples of such sediments are eolian sands, alluvial fan deposits, and mudflow sediments deposited during flash floods. The pore spaces between the particle grains can re-adjust when inundated by groundwater, causing the material to consolidate. Due to the relatively dense and moist nature of the material encountered beneath the site, the potential for hydro-consolidation occurrence in the subsurface layers is considered low.

5. CONCLUSIONS

Based on the results of our investigation, we consider the project feasible from a geotechnical standpoint provided that the recommendations of this report are followed. In our opinion, the site conditions are suitable to install the pipelines using traditional open excavation trenching techniques; however, the contractor should be prepared for excavating in very dense granular materials, as well as igneous rock formations. The presence of cobbles and boulders are also expected at the site. There are no known geologic hazards of sufficient magnitude that preclude the intended improvements. The main geotechnical considerations affecting the project is the potential for difficult trench excavations and potentially groundwater. The materials anticipated below the pipeline depths are generally expected to provide good pipeline support. However, dewatering is anticipated depending on the elevation of groundwater at the time of construction.

6. RECOMMENDATIONS

The remainder of this report presents recommendations regarding earthwork construction as well as preliminary geotechnical recommendations for the design of the proposed improvements. These recommendations are based on empirical and analytical methods typical of the standard-of-practice in southern California. If these recommendations appear not to address a specific feature of the project, please contact our office for additions or revisions to the recommendations.

6.1 Earthwork

Grading and earthwork should be conducted in accordance with the local standards and the recommendations of this report. The following recommendations are provided regarding specific aspects of the proposed earthwork construction. These recommendations should be considered subject to revision based on field conditions observed by our office during construction.

6.1.1 Site Preparation

Site preparation should begin with the removal of existing improvements, vegetation, and debris. Subsurface improvements that are to be abandoned should be removed, and the resulting excavations should be backfilled and compacted in accordance with the recommendations of this report. Pipeline abandonment can consist of capping or rerouting at the project perimeter and removal within the project perimeter. If appropriate, abandoned pipelines can be filled with grout or slurry as recommended by and observed by the geotechnical consultant.

6.1.2 Excavation Characteristics

It is anticipated that excavation can be achieved with heavy-duty earthwork equipment in good working order. Excavations in fill may be locally unstable and may contain construction debris, cobbles, or boulders. Difficult drilling and excavation should be anticipated in areas with dense to very dense granular materials and/or igneous rock. The contractor should mobilize equipment capable of excavating granitic materials with variable fracturing, weathering, rock abrasiveness, and strength/hardness rock conditions. Rock breakers, carbide tipped teeth, or carbide/diamond tipped coring equipment may be required to excavate/drill hard rock materials.

6.1.3 Oversized Material

Excavations may generate oversized material. Oversized material is defined as rocks or cemented clasts greater than 6 inches in largest dimension. Oversized material should be broken down to no greater than 6 inches in largest dimension for use toward non-structural fill purposes, such as landscape fill, or disposed of outside the site perimeter.

6.1.4 Temporary Excavations

Temporary excavations 4 feet deep or less can be made vertically. Temporary excavations deeper than 4 feet should not be steeper than 1½:1 (horizontal: vertical), per Cal/OSHA Type C soil classification. Excavations in competent bedrock can be made vertically. Unweathered (i.e., fresh), unfractured rock is considered competent. The faces of temporary slopes should be inspected daily by the contractor's competent person before personnel are allowed to enter the excavation. Zones of potential instability, sloughing, or raveling should be brought to the attention of the engineer and corrective action implemented before personnel begin working in the trench.

Slopes steeper than those described above will require shoring. Soldier piles and lagging, corrugated metal pipe, internally braced shoring such as trench boxes or speed shoring could be used. If trench boxes or metal pipe are used, the soil immediately adjacent to the shoring is not directly supported. Ground surface deformations adjacent to the excavation could be greater when these methods are used compared to other methods of shoring leading to distress to overlying improvements.

If open trenches are to be maintained during the rainy season, berms are recommended along the tops of the trenches to prevent runoff water from entering the excavation.

6.1.5 Temporary Shoring

For design of cantilevered shoring, an active soil pressure equal to a fluid weighing 40 pounds per cubic foot (pcf) can be used for level retained ground or 65 pcf for 2:1 (horizontal:vertical) sloping ground. A passive soil pressure equal to a fluid weighing 330 pcf can be used for the design of cantilevered shoring. These values assume that shoring will take place above the groundwater level. The passive pressure should be reduced by one half below the groundwater table. The surcharge loads on shoring from traffic and construction equipment adjacent to the excavation can be modeled by assuming an additional 2 feet of soil behind the shoring.

6.1.6 Temporary Dewatering

Groundwater was observed as shallow as 18 feet below existing ground surface. Available literature indicates the groundwater could be shallower than approximately 10 feet. Groundwater seepage may occur locally due to local irrigation or following heavy rain. An experienced and qualified specialty contractor should design the dewatering system. The contractor's geotechnical engineer should review the design.

6.1.7 Remedial Grading – Manhole Foundations

Proposed manhole foundations can be supported by firm and unyielding formational material, 2 feet of compacted fill, or geogrid. If placed on compacted fill, the on-site soils should be excavated to a depth of at least 2 feet below planned subgrade elevation. If competent, formational materials are exposed, excavation need not be performed. An Atlas representative should observe conditions exposed in the bottom of excavations to evaluate whether additional excavation is recommended.

6.1.8 Expansive Soil

The on-site materials tested have expansion indices ranging from 18 to 38, classified as very low to low expansion potential. The grading and foundation recommendations presented in this report assume materials with a low expansion potential.

6.1.9 Compacted Fill

On-site materials, except for soil containing roots, debris, and rock greater than 6 inches, can be used as compacted fill or trench backfill. Fill and backfill should be placed in horizontal lifts at a thickness appropriate for the equipment spreading, mixing, and compacting the material, but generally should not exceed 8 inches in loose thickness. Fill and backfill should be moisture conditioned within 2% of optimum moisture content and compacted to at least 90% relative compaction. The top 12 inches of subgrade beneath pavement should be compacted to at least 95%. The maximum dry density and optimum moisture content for evaluating relative compaction should be obtained using ASTM D1557.

6.1.10 Imported Soil

Imported soil should consist of predominately granular soil, free of organic matter, and rocks less than 6 inches. Imported soil should be observed and, if appropriate, tested by Atlas prior to transport to the site.

6.1.11 Bottom Stabilization

Although not anticipated, in areas encountering wet, soft or yielding excavations bottoms, a geogrid reinforced soil mat could be installed to provide support for proposed manhole foundation construction. To stabilize soft or yielding bottoms, Atlas recommends placing one layer of Tensar® Triax TX-160 reinforcing geogrid or equivalent on the removal surface (e.g. excavation bottom) followed by at least 6 inches of aggregate base compacted using lightweight equipment to a relative compaction of 90%. A second layer of geogrid followed by at least 6 inches of compacted based should be placed. If yielding is still observed upon proof rolling, an additional layer of geogrid should be placed on the compacted base followed by at least 6 inches of aggregate base.

6.1.12 Grading Plan Review

Atlas should review the grading plans and earthwork specifications to ascertain whether the intent of the recommendations contained in this report have been implemented, and that no revised recommendations are needed due to changes in the development scheme.

6.2 Pipelines

6.2.1 Pipeline Support

It is anticipated that most of the materials along the pipeline alignment will provide adequate support for the pipe, although loose, soft, and otherwise unsuitable materials could be encountered. Unsuitable materials encountered near trench bottom levels should be excavated to competent material as determined by the geotechnical consultant. The excavated materials can be replaced with compacted fill or with pipe bedding material, as described below. Unsuitable materials should be removed from the full width of the trench. The bottoms of the excavations should be observed by the geotechnical consultant prior to placement of pipe bedding.

6.2.2 Backfill

Utility trench sections should conform to the minimum requirements of the EMWD and local jurisdictions. Backfill should be placed in 6-inch to 8-inch thick loose lifts, moisture conditioned to near optimum moisture content, and compacted to at least 90% relative compaction.

On-site materials, except for soil containing roots, debris, and rock greater than 6 inches, can be used as compacted fill or trench backfill, provided that they have an expansion index of 50 or less. The maximum dry density and optimum moisture content for the evaluation of relative compaction should be determined in accordance with ASTM D1557.

6.2.3 Pipe Bedding

Pipe bedding as specified in the "Greenbook" can be used. Bedding material should consist of clean sand having a sand equivalent not less than 30 and should extend to at least 12 inches above the top of pipe. Alternative materials meeting the intent of the bedding specifications are also acceptable. Samples of materials proposed for use as bedding should be provided to the engineer for inspection and testing before the material is imported for use on the project. The on-site materials are not expected to meet "Greenbook" bedding specifications. The pipe bedding material should be placed over the full width of the trench. After placement of the pipe, the bedding should be brought up uniformly on both sides of the pipe to reduce the potential for unbalanced loads. No voids or uncompacted areas should be left beneath the pipe haunches. Ponding or jetting the pipe bedding should not be allowed.

6.2.4 Thrust Blocks

For level ground conditions, a passive earth pressure of 330 pounds per square foot (psf) per foot of depth below the lowest adjacent final grade can be used to compute allowable thrust block resistance. A value of 140 psf per foot should be used below groundwater level, if encountered.

6.2.5 Modulus of Soil Reaction

A modulus of soil reaction (E') of 1,000 pounds per square inch can be used to evaluate the deflection of buried flexible pipelines. This value assumes that granular bedding material is placed adjacent to the pipe and is compacted to at least 90% relative compaction.

6.3 Manholes

6.3.1 Foundations

The planned manholes can be supported on mat foundations with bottom levels on compacted fill, reinforced geogrid mats, or competent formational material.

Thickness and reinforcement of the mat foundation should be in accordance with the recommendations of the project structural engineer. Mat foundations typically experience some deflection due to loads placed on the mat and the reaction of the soils underlying the mat. A design modulus of subgrade reaction, K, of 150 pounds per cubic inch (pci) may be used in evaluating such deflections on dense to very dense granular soils or formational materials, and 75 pci on other loose soils. These values are based on an area of one square foot and should be adjusted for large mats. Adjusted values of the modulus of subgrade reaction, K_{BxB}, can be obtained from the following equation for square mats of various widths:

$$K_{B\times B} = K\left[\frac{\mathrm{B}+1}{2\mathrm{B}}\right]^2 (pci)$$

Where, B is the width of the mat in feet.

Where the mat slab is rectangular, adjusted values of the modulus of subgrade reaction, K', can be obtained from the following equation:

$$K' = \frac{K_{B \times B}(1 + 0.5\left(\frac{B}{L}\right))}{1.5}(pci)$$

Where, B is the width and L is the length of the mat in feet.

6.3.2 Allowable Soil Bearing Pressure

The planned manholes can be supported on mat foundations with bottom levels on compacted fill, reinforced geogrid mats, or competent formational material. An allowable bearing capacity of 3,000 psf can be used. The bearing value can be increased by ⅓ when considering short term loads.

Lateral loads will be resisted by friction between the bottoms of footings and passive pressure on the faces of footings and other structural elements below grade. An allowable coefficient of friction of 0.30 can be used. Passive pressure can be computed using a lateral pressure value of 300 psf per foot of depth below the ground surface for level ground conditions. Reductions for sloping ground should be made. The passive pressure can be increased by ⅓ when considering the total of loads, including wind or seismic forces. The upper 1 foot of soil should not be relied on for passive support unless the ground is covered with pavements or slabs.

6.3.3 Manhole Backfill

Manhole backfill should consist of granular, free-draining material having a sand equivalent of 20 or more. The backfill zone is defined by a 1:1 plane projected upward from the bottom of the manhole. Expansive or clayey soil should not be used. Backfill should be compacted to at least 90% relative compaction. Backfill should not be placed until the manhole walls have achieved adequate structural strength. Compaction of manhole backfill will be necessary to minimize settlement of the backfill and overlying settlement-sensitive improvements. However, some settlement should still be anticipated. Alternatively, a controlled low-strength material such as sand cement slurry may be considered for backfill. The controlled low-strength material should be thoroughly consolidated, have a maximum slump of 4 inches, and the slurry combined graded should meet the requirements of the local authority with jurisdiction.

6.4 Preliminary Pavement Section Recommendations

Atlas utilized the Caltrans Highway Design Manual (Caltrans, 2020) to prepare preliminary recommendations for flexible pavements. An R-value of 13 and assumed Traffic Indexes of 7, 9, and 11 were used for the design of preliminary pavement sections. The actual subgrade support characteristics should be evaluated after grading and final pavement sections are provided. Table 3 presents recommended flexible structural sections for the assumed Traffic Indexes and subgrade R-value:

Table 3: Preliminary Pavement Structural Sections

Traffic Type	Traffic Index	AC[1] over AB[2] (inches)	Full Depth AC (inches)
Roadways	7.0	6 over 10	11
	9.0	6 over 18	16
	11.0	10 over 18	22

[1] AC: Asphalt Concrete
[2] AB: Aggregate Base

The top 12 inches of subgrade should be scarified, moisture conditioned to near optimum moisture content, and compacted to at least 95% relative compaction (ASTM D1557). Soft or yielding areas should be removed and replaced with compacted fill or aggregate base. Aggregate base and asphalt concrete should conform to the Caltrans Standard Specifications and should be compacted to at least 95% relative compaction. Aggregate base should have an R-value of not less than 78. All materials and methods of construction should conform to good engineering practices and Caltrans standard specifications.

6.5 Soil Corrosivity

Representative samples of the on-site soils from the project alignment were tested to evaluate corrosion potential. The test results are presented in Appendix II. The project design engineer can use the sulfate results in conjunction with ACI 318 to specify the water/cement ratio, compressive strength and cementitious material types for concrete exposed to soil. A corrosion engineer should be contacted to provide specific corrosion control recommendations.

6.6 Geotechnical Engineering During Construction

The geotechnical engineer should review project plans and specifications prior to bidding and construction to check that the intent of the recommendations in this report has been incorporated. Observations and tests should be performed during construction. Atlas recommends a geotechnical engineer or engineering geologist be on site to observe tunneling operations. If the conditions encountered during construction differ from those anticipated based on the subsurface exploration program, the presence of the geotechnical engineer during construction will enable an evaluation of the exposed conditions and modifications of the recommendations in this report or development of additional recommendations in a timely manner.

7. CLOSURE

Atlas should be advised of changes in the project scope so that the recommendations contained in this report can be evaluated with respect to the revised plans. Changes in recommendations will be verified in writing. The findings in this report are valid as of the date of this report. Changes in the condition of the site can occur with the passage of time, whether they are due to natural processes or work on this or adjacent areas. In addition, changes in the standards of practice and government regulations can occur. Thus, the findings in this report may be invalidated wholly or in part by changes beyond our control. This report should not be relied upon after a period of two years without a review by us verifying the suitability of the conclusions and recommendations to site conditions at that time.

In the performance of our professional services, we comply with that level of care and skill ordinarily exercised by members of our profession currently practicing under similar conditions and in the same locality. The client recognizes that subsurface conditions may vary from those encountered at the boring locations and that our data, interpretations, and recommendations are based solely on the information obtained by us. We will be responsible for those data, interpretations, and recommendations, but shall not be responsible for interpretations by others of the information developed. Our services consist of professional consultation and observation only, and no warranty of any kind whatsoever, express or implied, is made or intended in connection with the work performed or to be performed by us, or by our proposal for consulting or other services, or by our furnishing of oral or written reports or findings.

8. REFERENCES

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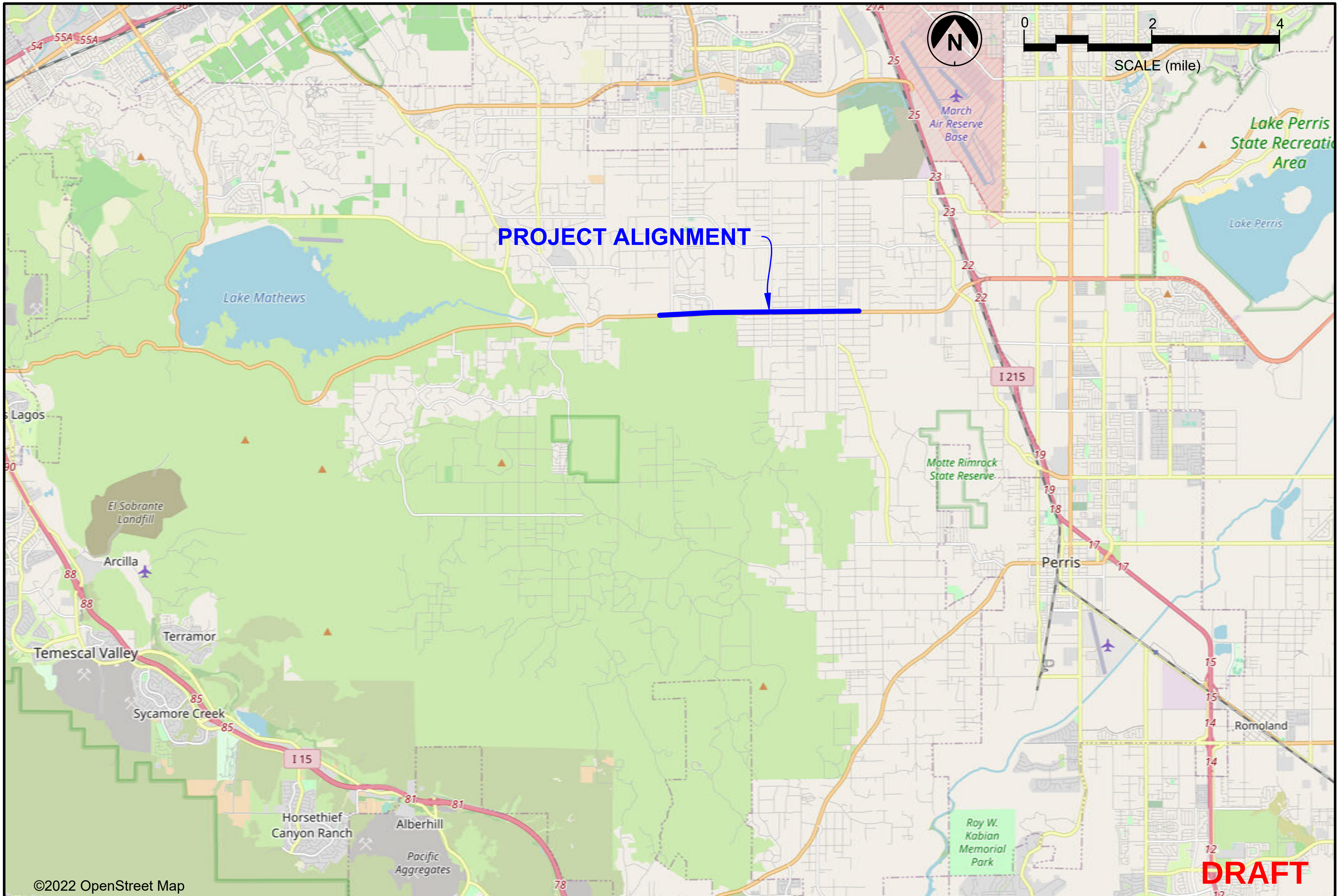

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SITE VICINITY MAP

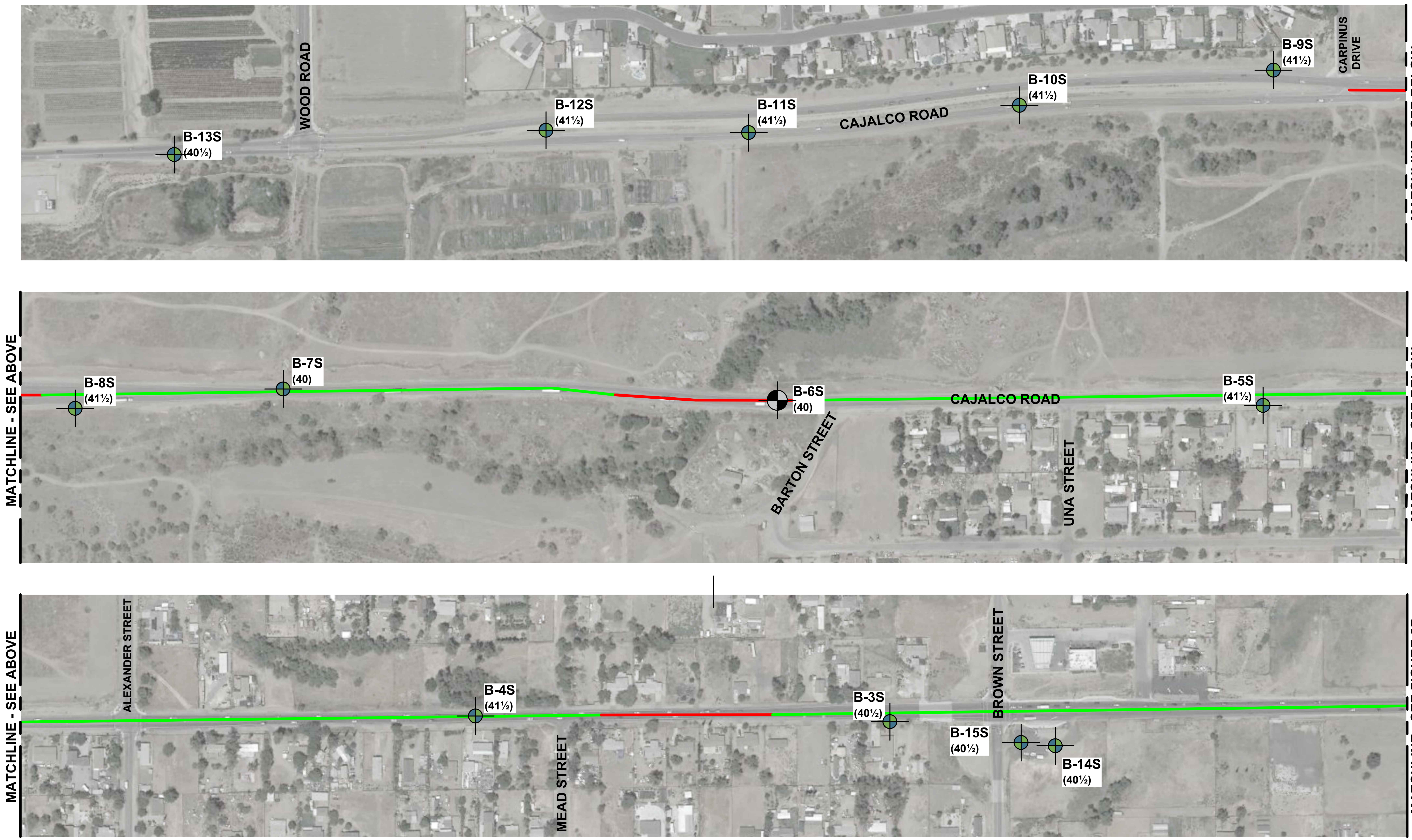
Mead Valley Sewer Improvements

Riverside County, California

Date:	January, 2023
By:	CGI
Job No.:	190063P4.2 (1962)

Figure:

1



LEGEND:

B-15S (40½)	Location of Boring (Depth in Feet)	Red line	7-10 (Depth in Feet to Invert)
B-6S (40)	Location of Monitoring Well (Proposed Depth in Feet)	Green line	10-15 (Depth in Feet to Invert)

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N

0 300 600

SCALE (feet)

NOTE: All Locations are approximate.

Date: January, 2023

By: CGI

Job No.: 190063P4.2 (1962)

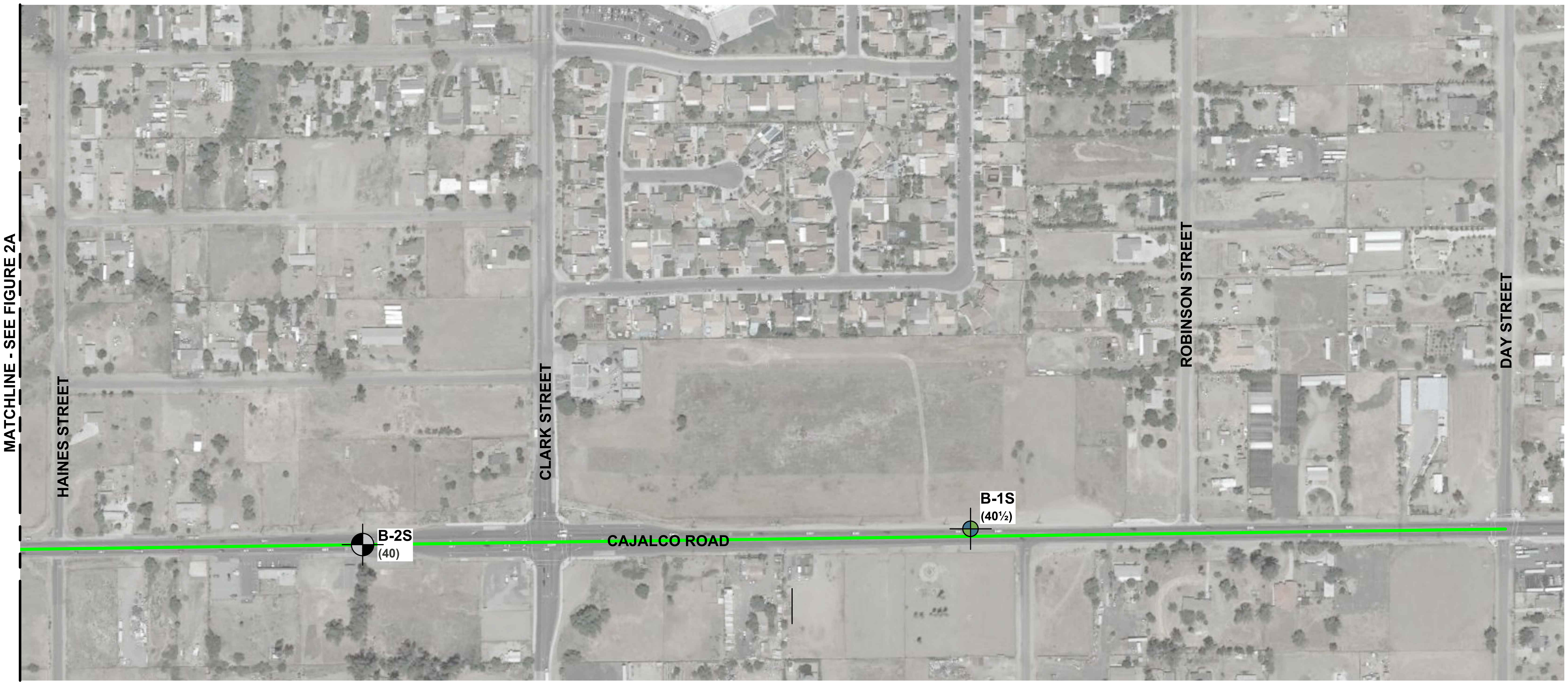
SUBSURFACE EXPLORATION MAP

Mead Valley Sewer Improvements
Riverside County, California

ATLAS

Figure:

2A



LEGEND:

B-1S (40½)	Location of Boring (Depth in Feet)	red line	7-10 (Depth in Feet to Invert)
B-2S (40)	Location of Monitoring Well (Proposed Depth in Feet)	green line	10-15 (Depth in Feet to Invert)

DRAFT

N

0 300 600

SCALE (feet)

NOTE: All Locations are approximate.

Date: January, 2023
By: CGI
Job No.: 190063P4.2 (1962)

SUBSURFACE EXPLORATION MAP
Mead Valley Sewer Improvements
Riverside County, California

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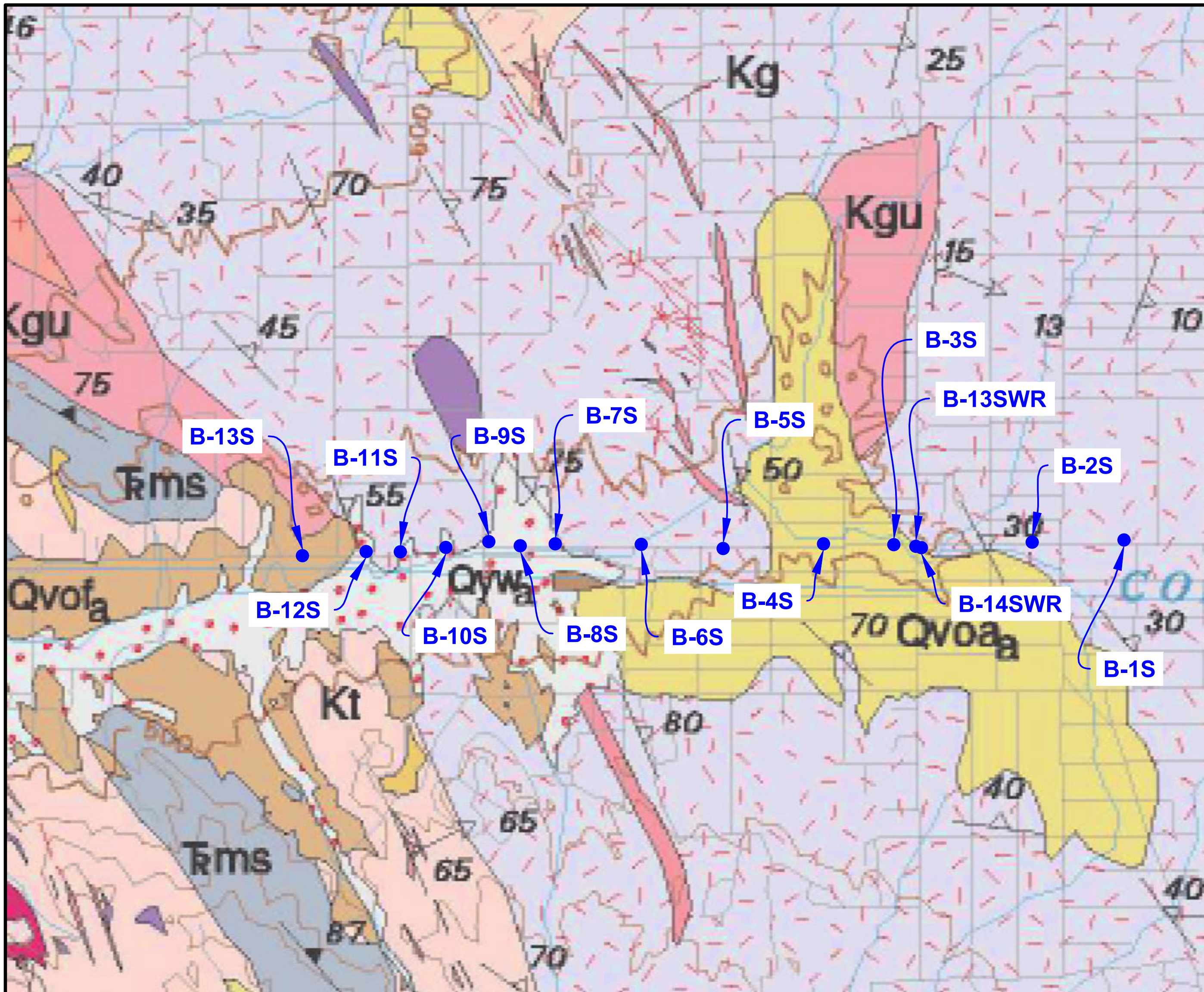
Figure:
2B



EXPLANATION:

Qyw_a	Young wash deposits (Holocene and late Pleistocene)
$Qvoa_a$	Very old axial-channel deposits (middle to early Pleistocene)
$Qvof_a$	Very old alluvial-fan deposits (middle to early Pleistocene)
Kg	Granitic dikes (Cretaceous)
Kvt	Val Verde tonalite
Kvti	Inclusion-rich tonalite
kgb	Gabbro, undifferentiated (Cretaceous)
kpd	Granitic pegmatite dikes
kgu	Granite, undifferentiated (Cretaceous)
kt	Tonalite, undifferentiated (Cretaceous)
T_Rms	Schist

N

0 3,000 6,000

SCALE (feet)

NOTE: All locations are approximate.

Reference:
Morton, D.M. and Miller, F.K., 2006, Geologic map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California, U.S. Geological Survey, 1:100,000.

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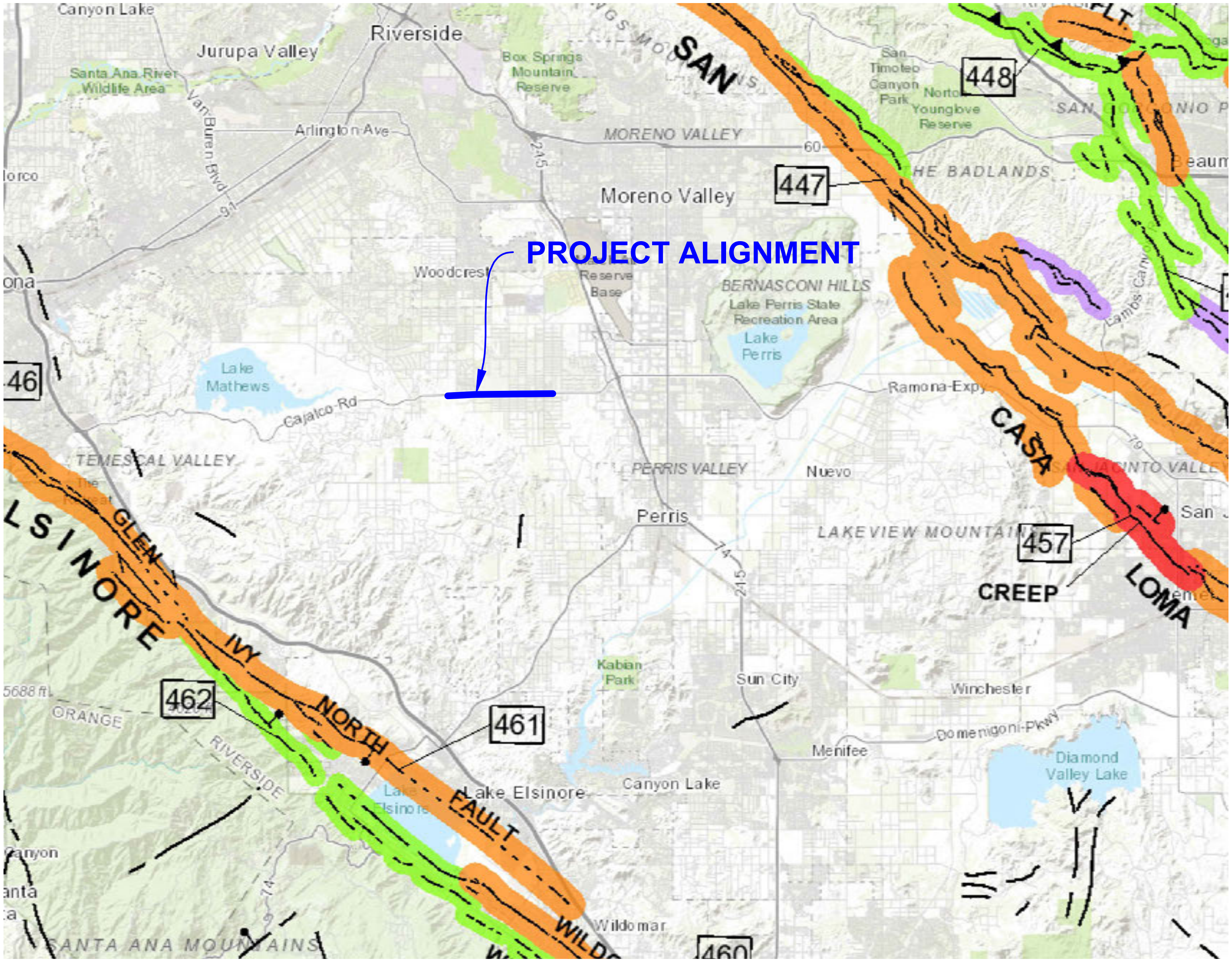
REGIONAL GEOLOGY MAP
Mead Valley Sewer Improvements
Riverside County, California

Date: January, 2023
By: CGI
Job No.: 190063P4.2 (1962)

Figure: 3



EXPLANATION:

Fault along which historic (last 200 years) displacement has occurred

Holocene fault displacement (during past 11,700 years) without historic record.

Late Quaternary fault displacement (during past 700,000 years).

Quaternary fault (age undifferentiated).

Pre-Quaternary fault (older than 1.6 million years) or fault without recognized Quaternary displacement.

Low angle fault (barbs on upper plate).

447	Claremont fault - San Jacinto fault zone (concealed)
448	Cherry Valley fault - San Gorgonio Pass fault zone (concealed)
457	Casa Loma fault - San Jacinto fault zone (concealed)
461	Glen Ivy North fault - Elsinore fault zone (concealed)
462	Glen Ivy South fault - Elsinore fault zone (concealed)

N

0 5 10

SCALE (miles)

Reference:
Jennings, C.W., Bryant W.A., Fault Activity Map of California (2010), maps.conservation.ca.gov/cgs/fam; Accessed November, 2022

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CALIFORNIA FAULT ACTIVITY MAP
Mead Valley Sewer Improvements
Riverside County, California

Date: January, 2023
By: CGI
Job No.: 190063P4.2 (1962)

Figure: 4

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APPENDIX I
SUBSURFACE EXPLORATION

Relatively undisturbed samples were obtained using a modified California (CAL) sampler, which is a ring-lined split tube sampler with a 3-inch outer diameter and 2½-inch inner diameter. Standard Penetration Tests (SPT) were performed using a 2-inch outer diameter and 1⅜-inch inner diameter split tube sampler. The CAL and SPT samplers were driven with a 140-pound weight dropping 30 inches. The number of blows needed to drive the samplers the final 12 inches of an 18-inch drive is noted on the boring logs as “Driving Resistance (blows/ft. of drive).” SPT and CAL sampler refusal was encountered when 50 blows were applied during any one of the three 6-inch intervals, a total of 100 blows was applied, or there was no discernible sampler advancement during the application of 10 successive blows. The SPT penetration resistance was normalized to a safety hammer (cathead and rope) with a 60% energy transfer ratio in accordance with ASTM D6066. The normalized SPT penetration resistance is noted on the boring logs as “N60.” When auger refusal was encountered the drill rig used a diamond HQ core bit for rock coring to advance through the rock and recover rock core for identification and testing. Disturbed bulk samples were obtained from the SPT sampler and the drill cuttings. The soils are classified in accordance with the Unified Soil Classification System. The rock encountered were classified in accordance with the Caltrans rock classification system.

Temporary groundwater monitoring wells will be installed at boring locations B-2S and B-6S to observe groundwater levels over time. The monitoring wells should be periodically monitored, and groundwater elevations recorded by a qualified individual. A diagram presenting the well construction will be presented in Appendix I.

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MAJOR DIVISIONS					TYPICAL NAMES
COARSE-GRAINED SOILS MORE THAN HALF IS COARSER THAN NO. 200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS WITH LESS THAN 15% FINES	GW		WELL-GRADED GRAVELS WITH OR WITHOUT SAND
			GP		POORLY GRADED GRAVELS WITH OR WITHOUT SAND
		GRAVELS WITH 15% OR MORE FINES	GM		SILTY GRAVELS WITH OR WITHOUT SAND
			GC		CLAYEY GRAVELS WITH OR WITHOUT SAND
	SANDS MORE THAN HALF COARSE FRACTION IS FINER THAN NO. 4 SIEVE SIZE	CLEAN SANDS WITH LESS THAN 15% FINES	SW		WELL-GRADED SANDS WITH OR WITHOUT GRAVEL
			SP		POORLY GRADED SANDS WITH OR WITHOUT GRAVEL
		SANDS WITH 15% OR MORE FINES	SM		SILTY SANDS WITH OR WITHOUT GRAVEL
			SC		CLAYEY SANDS WITH OR WITHOUT GRAVEL
FINE-GRAINED SOILS MORE THAN HALF IS FINER THAN NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT 50% OR LESS		ML		INORGANIC SILTS OF LOW TO MEDIUM PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
			CL		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
			OL		ORGANIC SILTS OR CLAYS OF LOW TO MEDIUM PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50%		MH		INORGANIC SILTS OF HIGH PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
			CH		INORGANIC CLAYS OF HIGH PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
			OH		ORGANIC SILTS OR CLAYS OF HIGH PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
HIGHLY ORGANIC SOILS			PT		PEAT AND OTHER HIGHLY ORGANIC SOILS

SAMPLE SYMBOLS

SAMPLE TYPES

- Bulk Sample
- CAL Modified California Sampler
- SPT Standard Penetration Test

LABORATORY SYMBOLS

- AL - ATTERBERG LIMITS
- CON - CONSOLIDATION
- COR - CORROSIVITY TESTING
- DS - DIRECT SHEAR
- EI - EXPANSION INDEX
- GW - ENVIRONMENTAL, GROUNDWATER
- RV - R-VALUE
- PD - PARTICLE-SIZE DISTRIBUTION
- UC - UNCONFINED COMPRESSIVE
- WA - STRENGTH No. 200 WASH (% PASSING No. 200 SIEVE)

GROUNDWATER SYMBOLS

WATER LEVEL AT TIME OF EXCAVATION OR AS INDICATED

RELATIVE DENSITY OF COHESIONLESS SOILS		CONSISTENCY OF COHESIVE SOILS		
RELATIVE DENSITY	SPT N60 BLOWS/FOOT	CONSISTENCY	SPT N60 BLOWS/FOOT	POCKET PENETROMETER MEASUREMENT (TSF)
VERY LOOSE	0 - 4	VERY SOFT	0 - 2	0 - 0.25
LOOSE	4 - 10	SOFT	2 - 4	0.25 - 0.50
MEDIUM DENSE	10 - 30	MEDIUM STIFF	4 - 8	0.50 - 1.0
DENSE	30 - 50	STIFF	8 - 15	1.0 - 2.0
VERY DENSE	OVER 50	VERY STIFF	15 - 30	2.0 - 4.0
		HARD	OVER 30	OVER 4.0

NUMBER OF BLOWS OF 140 LB HAMMER FALLING 30 INCHES TO DRIVE A 2 INCH O.D. (1-3/8 INCH I.D.) SPLIT-BARREL SAMPLER THE LAST 12 INCHES OF AN 18-INCH DRIVE (ASTM-1586 STANDARD PENETRATION TEST).
IF THE SEATING INTERVAL (1st 6 INCH INTERVAL) IS NOT ACHEIVED, N IS REPORTED AS REF.

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SUBSURFACE EXPLORATION LEGEND

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LOG OF TEST BORING

ATLAS PROJECT NAME: Mead Valley Sewer Improvements			ATLAS PROJECT NUMBER: 190063P4.2 (1962-1)		B-1S
SITE: Riverside County, CA			START: 9/21/22	END: 9/21/22	SHEET NO.: 1
DRILLING COMPANY: Baja Exploration	DRILL METHOD: Hollow Stem Auger		LOGGED BY: HK		REVIEWED BY:
DRILLING EQUIPMENT: CME-75	BORING DIA. (in.): 8	TOTAL DEPTH (ft): 40.5	GROUND ELEV. (ft): 1670	DEPTH/ELEV. GROUND WATER (ft)	
SAMPLING METHOD: 140-lb Hammer, 30-in Drop	NOTES: Hammer Efficiency = 80.0% N_{60}~$1.33N_{SPT}$		∇ AT TIME OF DRILLING: 22.00 ft / Elev 1648.00 ft; ▼ AT END OF DRILLING: ---; ▼ AFTER DRILLING: ---		

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
	0–5	X							**VERY OLD AXIAL-CHANNEL DEPOSITS (Qvoa)**: POORLY GRADED SAND with SILT (SP-SM), loose to medium dense, brown, moist, fine to coarse grained.	
	4								**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), grayish brown, intensely weathered to decomposed, very soft; (Poorly Graded SAND with SILT (SP-SM), very dense, moist, fine to medium grained).	
1665	5		CAL	50/5		3.6	109.5			DS WA
1660	10		CAL	50/6						
1655	15		CAL	50/6						
1650	20		CAL	50/6					Wet, fine to coarse grained.	
	20								Dark brown; (POORLY GRADED SAND with CLAY (SP-SC), very dense, moist, fine to medium grained).	
	22							∇	Groundwater observed at 22 feet.	

ATLAS

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

Figure I-1

DRAFT

LOG OF TEST BORING

ATLAS PROJECT NAME	ATLAS PROJECT NUMBER	
Mead Valley Sewer Improvements	190063P4.2 (1962-1)	B-1S

SITE	START	END	SHEET NO.
Riverside County, CA	9/21/22	9/21/22	2

DRILLING COMPANY	DRILL METHOD	LOGGED BY	REVIEWED BY
Baja Exploration	Hollow Stem Auger	HK	

DRILLING EQUIPMENT	BORING DIA. (in.)	TOTAL DEPTH (ft)	GROUND ELEV. (ft)	DEPTH/ELEV. GROUND WATER (ft)
CME-75	8	40.5	1670	AT TIME OF DRILLING 22.00 ft / Elev 1648.00 ft; AT END OF DRILLING ---; AFTER DRILLING ---

SAMPLING METHOD	NOTES
140-lb Hammer, 30-in Drop	Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
			SPT	50/6					Dark brown; (POORLY GRADED SAND with CLAY (SP-SC), very dense, moist, fine to medium grained). *(continued)* (Micaceous).	
									Hard drilling.	
1640	30		SPT	50/2					Grayish brown; (fine to coarse grained).	
1635	35		SPT	50/2					(Increase in fine content).	
1630	40		SPT	50/2						
									BORING TERMINATED AT 40½ FEET Groundwater observed at 22 Feet	
1625	45									

ATLAS

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

Figure I-2

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LOG OF TEST BORING

ATLAS PROJECT NAME Mead Valley Sewer Improvements		**ATLAS PROJECT NUMBER** 190063P4.2 (1962-1)		**B-3S**	
SITE Riverside County, CA		**START** 9/29/22	**END** 9/29/22	**SHEET NO.** 3	
DRILLING COMPANY Baja Exploration	**DRILL METHOD** Hollow Stem Auger	**LOGGED BY** SD		**REVIEWED BY**	
DRILLING EQUIPMENT CME-75	**BORING DIA. (in.)** 8	**TOTAL DEPTH (ft)** 40.5	**GROUND ELEV. (ft)** 1638	**DEPTH/ELEV. GROUND WATER (ft)**	
SAMPLING METHOD 140-lb Hammer, 30-in Drop	**NOTES** Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}			AT TIME OF DRILLING 26.00 ft / Elev 1612.00 ft; AT END OF DRILLING ---; AFTER DRILLING ---	

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
	0	X							**VERY OLD AXIAL-CHANNEL DEPOSITS (Qvoa)** : CLAYEY SAND (SC), medium dense, reddish brown, moist, fine grained sand.	EI RV WA
1635										
	5		CAL	24						
1630										
	9								**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), brownish gray, intensely weathered to decomposed, very soft; (SILTY SAND (SM), very dense, moist, fine to coarse grained).	
	10		CAL	50/6		5.7	115.2			
1625										
	15		CAL	50/6					(Decrease in fine content).	
1620										
	20		CAL	50/6					Greenish gray, (fine to medium grained).	
1615										

ATLAS

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

Figure

I-3

DRAFT

LOG OF TEST BORING

ATLAS PROJECT NAME: Mead Valley Sewer Improvements	ATLAS PROJECT NUMBER: 190063P4.2 (1962-1)		B-3S
SITE: Riverside County, CA	START: 9/29/22	END: 9/29/22	SHEET NO.: 4
DRILLING COMPANY: Baja Exploration	DRILL METHOD: Hollow Stem Auger	LOGGED BY: SD	REVIEWED BY:
DRILLING EQUIPMENT: CME-75	BORING DIA. (in.): 8	TOTAL DEPTH (ft): 40.5	GROUND ELEV. (ft): 1638
SAMPLING METHOD: 140-lb Hammer, 30-in Drop	NOTES: Hammer Efficiency = 80.0% N_{60}~$1.33N_{SPT}$		

DEPTH/ELEV. GROUND WATER (ft)
- AT TIME OF DRILLING 26.00 ft / Elev 1612.00 ft
- AT END OF DRILLING ---
- AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
			SPT	50/6					**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), brownish gray, intensely weathered to decomposed, very soft; (SILTY SAND (SM), very dense, moist, fine to coarse grained). *(continued)* (Increase in fine content). Groundwater observed at 26 feet.	
1610										
	30		SPT	50/5						
1605										
	35		SPT	50/6					Iincrease in fine content).	
1600										
	40		SPT	50/4						
									BORING TERMINATED AT 40½ FEET Groundwater observed at 26 Feet	
1595										
	45									
1590										

ATLAS

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

Figure I-4

DRAFT

LOG OF TEST BORING

ATLAS PROJECT NAME	Mead Valley Sewer Improvements
ATLAS PROJECT NUMBER	190063P4.2 (1962-1)
Boring	B-4S
SITE	Riverside County, CA
START	9/27/22
END	9/27/22
SHEET NO.	5
DRILLING COMPANY	Baja Exploration
DRILL METHOD	Hollow Stem Auger
LOGGED BY	SD
REVIEWED BY	
DRILLING EQUIPMENT	CME-75
BORING DIA. (in.)	8
TOTAL DEPTH (ft)	41.5
GROUND ELEV. (ft)	1639
SAMPLING METHOD	140-lb Hammer, 30-in Drop
NOTES	Hammer Efficiency = 80.0% N_{60}~$1.33N_{SPT}$
DEPTH/ELEV. GROUND WATER (ft)	
∇ AT TIME OF DRILLING	18.00 ft / Elev 1621.00 ft
AT END OF DRILLING	---
AFTER DRILLING	---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
	0	X					**FILL (Qf)**: SANDY SILT (ML), medium dense, brown, moist, fine grained.	
	2	X					**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), light brown, intensely weathered to decomposed, very soft; (SILTY SAND (SM), dense, moist, fine to medium grained).	
1635								
	5							
			CAL	42				PD
1630								
	10							
			CAL	47			(Increase in medium to coarse grained sand).	
1625								
	15							
			CAL	53			Light brown.	
	18					∇	Groundwater observed at 18 feet.	
1620								
	20						(Weakly cemented, increase in palgioclase feldspar).	
			CAL	49				
							Grayish to yellowish brown; (POORLY GRADED SAND (SP), dense, wet, fine to coarse grained).	
1615								

ATLAS

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

DRAFT

LOG OF TEST BORING

ATLAS PROJECT NAME	ATLAS PROJECT NUMBER	
Mead Valley Sewer Improvements	190063P4.2 (1962-1)	**B-4S**

SITE	START	END	SHEET NO.
Riverside County, CA	9/27/22	9/27/22	6

DRILLING COMPANY	DRILL METHOD	LOGGED BY	REVIEWED BY
Baja Exploration	Hollow Stem Auger	SD	

DRILLING EQUIPMENT	BORING DIA. (in.)	TOTAL DEPTH (ft)	GROUND ELEV. (ft)	DEPTH/ELEV. GROUND WATER (ft)
CME-75	8	41.5	1639	▽ AT TIME OF DRILLING 18.00 ft / Elev 1621.00 ft

SAMPLING METHOD	NOTES	
140-lb Hammer, 30-in Drop	Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}	▼ AT END OF DRILLING --- ; ▼ AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
							Grayish to yellowish brown; (POORLY GRADED SAND (SP), dense, wet, fine to coarse grained). *(continued)*	
			SPT	36	48			
1610							Yellowish brown; (POORLY GRADED SAND with SILT (SP-SM), dense, wet, fine to coarse grained).	
	30							
			CAL	42				
1605							(SILTY SAND (SM), very dense, wet, fine to coarse grained).	
	35							
			SPT	51	68			
1600								
	40						(Increase in fine content).	
			SPT	65	87			
1595								
	45							
1590								

BORING TERMINATED AT 41½ FEET
Groundwater observed at 18 Feet

ATLAS

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

Figure

I-6

DRAFT

LOG OF TEST BORING

ATLAS PROJECT NAME	Mead Valley Sewer Improvements
ATLAS PROJECT NUMBER	190063P4.2 (1962-1)
Boring	B-5S
SITE	Riverside County, CA
START	9/27/22
END	9/27/22
SHEET NO.	7
DRILLING COMPANY	Baja Exploration
DRILL METHOD	Hollow Stem Auger
LOGGED BY	SD
REVIEWED BY	
DRILLING EQUIPMENT	CME-75
BORING DIA. (in.)	8
TOTAL DEPTH (ft)	41.5
GROUND ELEV. (ft)	1634
SAMPLING METHOD	140-lb Hammer, 30-in Drop
NOTES	Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}
DEPTH/ELEV. GROUND WATER (ft)	
AT TIME OF DRILLING	33.00 ft / Elev 1601.00 ft
AT END OF DRILLING	---
AFTER DRILLING	---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	DESCRIPTION AND CLASSIFICATION	LAB TESTS
	0	X						**FILL (Qf)**: SILTY SAND (SM), medium dense, brown, moist, fine to medium grained, low plasticity.	
	2.75	X						**VERY OLD AXIAL-CHANNEL DEPOSITS (Qvoa)**: CLAYEY SAND (SC), dense, light brown, moist, fine to medium grained, low plasticity, white mottling, micaceous.	
1630									
	5								
			CAL	43		10.6	129.3	(Fine grained, weakly cemented, more micaceous).	WA
1625								**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), light reddish brown, intensely weathered to decomposed, very soft; (CLAYEY SAND (SC), very dense, moist, fine to coarse grained, moderately cemented).	
	10								
			CAL	80/12"					
1620									
	15		CAL	50/6					
								(Decrease in fines).	
1615									
	20							(Increase in moisture).	
			CAL	82/9"					
1610								Reddish brown; (SANDY SILT (ML), very dense, moist, fine to medium grained).	

ATLAS

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

DRAFT

LOG OF TEST BORING

ATLAS PROJECT NAME	ATLAS PROJECT NUMBER	
Mead Valley Sewer Improvements	190063P4.2 (1962-1)	B-5S

SITE	START	END	SHEET NO.
Riverside County, CA	9/27/22	9/27/22	8

DRILLING COMPANY	DRILL METHOD	LOGGED BY	REVIEWED BY
Baja Exploration	Hollow Stem Auger	SD	

DRILLING EQUIPMENT	BORING DIA. (in.)	TOTAL DEPTH (ft)	GROUND ELEV. (ft)	DEPTH/ELEV. GROUND WATER (ft)
CME-75	8	41.5	1634	AT TIME OF DRILLING 33.00 ft / Elev 1601.00 ft; AT END OF DRILLING ---; AFTER DRILLING ---

SAMPLING METHOD	NOTES
140-lb Hammer, 30-in Drop	Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
									Reddish brown; (SANDY SILT (ML), very dense, moist, fine to medium grained). *(continued)*	
			SPT	50	67					
									(Increase in sand content).	
1605										
	30									
			SPT	45	60				Yellowish brown, (SILTY SAND (SM), very dense, moist, fine to medium grained).	
									Groundwater observed at 33 feet.	
1600										
	35								(Poorly Graded SAND (SP), medium dense, wet, fine to coarse grained).	
			CAL	34						
1595										
	40									
			SPT	33	44				Reddish brown; (LEAN CLAY with SAND (CL), hard, wet, fine to medium grained).	

BORING TERMINATED AT 41½ FEET
Groundwater observed at 33 Feet

ELEVATION (ft)	DEPTH (ft)
1590	
	45
1585	

ATLAS

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

Figure

I-8

DRAFT

LOG OF TEST BORING

ATLAS PROJECT NAME Mead Valley Sewer Improvements		**ATLAS PROJECT NUMBER** 190063P4.2 (1962-1)		**B-7S**
SITE Riverside County, CA	**START** 9/22/22	**END** 9/22/22		**SHEET NO.** 9
DRILLING COMPANY Baja Exploration	**DRILL METHOD** Hollow Stem Auger	**LOGGED BY** HK		**REVIEWED BY**
DRILLING EQUIPMENT CME-75	**BORING DIA. (in.)** 8	**TOTAL DEPTH (ft)** 40	**GROUND ELEV. (ft)** 1597	**DEPTH/ELEV. GROUND WATER (ft)** AT TIME OF DRILLING 37.00 ft / Elev 1560.00 ft; AT END OF DRILLING ---; AFTER DRILLING ---
SAMPLING METHOD 140-lb Hammer, 30-in Drop	**NOTES** Hammer Efficiency = 80.0% N_{60}~$1.33N_{SPT}$			

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	DESCRIPTION AND CLASSIFICATION	LAB TESTS
	0	X						**VERY OLD AXIAL-CHANNEL DEPOSITS (Qvoa)**: SILTY SAND (SM), loose to medium dense, brown, moist, fine to coarse grained.	
1595		X							
	5							Medium dense, slightly micaceous.	
			CAL	29					
1590									
	10							Trace gravel.	
			CAL	15		9.6	112.9		WA
1585									
	15							Increase in moisture.	
			CAL	19					
1580									
	20							**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), grayish brown, intensely weathered to decomposed, very soft; (Poorly Graded SAND (SP), very dense, moist, fine to medium grained).	
			CAL	50/6					
1575									

ATLAS

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

Figure

I-9

DRAFT

LOG OF TEST BORING

ATLAS PROJECT NAME: Mead Valley Sewer Improvements			ATLAS PROJECT NUMBER: 190063P4.2 (1962-1)		B-7S
SITE: Riverside County, CA			START: 9/22/22	END: 9/22/22	SHEET NO.: 10
DRILLING COMPANY: Baja Exploration	DRILL METHOD: Hollow Stem Auger		LOGGED BY: HK	REVIEWED BY:	
DRILLING EQUIPMENT: CME-75	BORING DIA. (in.): 8	TOTAL DEPTH (ft): 40	GROUND ELEV. (ft): 1597	DEPTH/ELEV. GROUND WATER (ft): AT TIME OF DRILLING 37.00 ft / Elev 1560.00 ft; AT END OF DRILLING ---; AFTER DRILLING ---	
SAMPLING METHOD: 140-lb Hammer, 30-in Drop	NOTES: Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}				

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
			SPT	50/6					**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), grayish brown, intensely weathered to decomposed, very soft; (Poorly Graded SAND (SP), very dense, moist, fine to medium grained). *(continued)*	
1570										
	30		SPT	50/6						
1565									Hard drilling.	
	35		SPT	50/4						
1560									Groundwater observed at 37 feet.	
									(Increase in coarse material).	
	40								**BORING TERMINATED AT 40 FEET** Groundwater observed at 37 Feet	
1555										
	45									
1550										

ATLAS

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

Figure I-10

DRAFT

LOG OF TEST BORING

ATLAS PROJECT NAME	ATLAS PROJECT NUMBER	B-8S
Mead Valley Sewer Improvements	190063P4.2 (1962-1)	

SITE	START	END	SHEET NO.
Riverside County, CA	9/22/22	9/22/22	11

DRILLING COMPANY	DRILL METHOD	LOGGED BY	REVIEWED BY
Baja Exploration	Hollow Stem Auger	HK	

DRILLING EQUIPMENT	BORING DIA. (in.)	TOTAL DEPTH (ft)	GROUND ELEV. (ft)	DEPTH/ELEV. GROUND WATER (ft)
CME-75	8	41.5	1593	AT TIME OF DRILLING ---
				AT END OF DRILLING ---
				AFTER DRILLING ---

SAMPLING METHOD	NOTES
140-lb Hammer, 30-in Drop	Hammer Efficiency = 80.0% N_{60}~$1.33N_{SPT}$

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
	0	X					**VERY OLD AXIAL-CHANNEL DEPOSITS (Qvoa)**: CLAYEY SAND (SC), loose to medium dense, brown, moist, fine to coarse grained.	
1590								AL WA
	5						**VAL VERDE TONALITE (Kvt)**: Grayish brown, intensely weathered to decomposed, very soft; (CLAYEY SAND (SC), medium dense, moist, fine to coarse grained).	
			CAL	23				
1585								
	10							
			CAL	36				WA
1580								
	15						Brown, (SILTY SAND (SM), very dense, moist, fine to coarse grained).	
			CAL	66				
1575								
	20							
			CAL	50/6				
1570								

ATLAS

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

DRAFT

LOG OF TEST BORING

ATLAS PROJECT NAME: Mead Valley Sewer Improvements			ATLAS PROJECT NUMBER: 190063P4.2 (1962-1)			B-8S
SITE: Riverside County, CA			START: 9/22/22	END: 9/22/22		SHEET NO.: 12
DRILLING COMPANY: Baja Exploration	DRILL METHOD: Hollow Stem Auger		LOGGED BY: HK	REVIEWED BY:		
DRILLING EQUIPMENT: CME-75	BORING DIA. (in.): 8	TOTAL DEPTH (ft): 41.5	GROUND ELEV. (ft): 1593	DEPTH/ELEV. GROUND WATER (ft): AT TIME OF DRILLING --- ; AT END OF DRILLING --- ; AFTER DRILLING ---		
SAMPLING METHOD: 140-lb Hammer, 30-in Drop	NOTES: Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}					

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
							Brown, (SILTY SAND (SM), very dense, moist, fine to coarse grained). *(continued)*	
			SPT	48	64			
1565								
	30							
			SPT	42	56			
1560								
	35							
			SPT	72/11"	96/11"			
							Hard drilling.	
1555								
							(Increase in moisture and coarse material).	
	40							
			SPT	19	25		(Medium dense).	

BORING TERMINATED AT 41½ FEET
Groundwater and Seepage not observed

ELEVATION (ft)	DEPTH (ft)
1550	
	45
1545	

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

DRAFT

LOG OF TEST BORING

ATLAS PROJECT NAME	ATLAS PROJECT NUMBER	
Mead Valley Sewer Improvements	190063P4.2 (1962-1)	**B-9S**

SITE	START	END	SHEET NO.
Riverside County, CA	9/22/22	9/22/22	13

DRILLING COMPANY	DRILL METHOD	LOGGED BY	REVIEWED BY
Baja Exploration	Hollow Stem Auger	HK	

DRILLING EQUIPMENT	BORING DIA. (in.)	TOTAL DEPTH (ft)	GROUND ELEV. (ft)	DEPTH/ELEV. GROUND WATER (ft)
CME-75	8	41.5	1593	∇ AT TIME OF DRILLING 25.00 ft / Elev 1568.00 ft

SAMPLING METHOD	NOTES	
140-lb Hammer, 30-in Drop	Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}	▼ AT END OF DRILLING --- ▼ AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	DESCRIPTION AND CLASSIFICATION	LAB TESTS
		X						**VERY OLD AXIAL-CHANNEL DEPOSITS (Qvoa)**: SILTY SAND (SM), loose to medium dense, brown, moist, fine to coarse grained, roots, angular gravels.	
1590									RV WA
	5							CLAYEY SAND (SC), brown, dense, moist, fine to coarse grained, micaceous.	
			CAL	40					EI
1585									
	10							Medium dense.	
			CAL	22		9.0	112.4		DS WA
1580									
	15							Trace gravel.	
			CAL	17					
1575									
	20							Loose, increase in moisture.	
			CAL	11					
1570									

ATLAS

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

Figure I-13

DRAFT

LOG OF TEST BORING

ATLAS PROJECT NAME	ATLAS PROJECT NUMBER	
Mead Valley Sewer Improvements	190063P4.2 (1962-1)	B-9S

SITE	START	END	SHEET NO.
Riverside County, CA	9/22/22	9/22/22	14

DRILLING COMPANY	DRILL METHOD	LOGGED BY	REVIEWED BY
Baja Exploration	Hollow Stem Auger	HK	

DRILLING EQUIPMENT	BORING DIA. (in.)	TOTAL DEPTH (ft)	GROUND ELEV. (ft)
CME-75	8	41.5	1593

SAMPLING METHOD	NOTES
140-lb Hammer, 30-in Drop	Hammer Efficiency = 80.0% N_{60}~$1.33N_{SPT}$

DEPTH/ELEV. GROUND WATER (ft)
- AT TIME OF DRILLING 25.00 ft / Elev 1568.00 ft
- AT END OF DRILLING ---
- AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
			CAL	36					**VAL VERDE TONALITE (qdi)**: IGNEOUS ROCK (QUARTZ DIORITE), olive gray, intensely weathered to decomposed, very soft; (POORLY GRADED SAND (SP), dense, wet, fine to medium grained). *(continued)* Groundwater observed at 25 feet.	
1565										
	30									
			SPT	34	45					
1560										
	35								(Very dense).	
			SPT	56	75					
1555										
	40									
			SPT	85/12"	113/12"					
1550									**BORING TERMINATED AT 41½ FEET** Groundwater observed at 25 Feet	
	45									
1545										

ATLAS

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

DRAFT

LOG OF TEST BORING

ATLAS PROJECT NAME: Mead Valley Sewer Improvements		ATLAS PROJECT NUMBER: 190063P4.2 (1962-1)		B-10S	
SITE: Riverside County, CA		START: 9/23/22	END: 9/23/22	SHEET NO.: 15	
DRILLING COMPANY: Baja Exploration	DRILL METHOD: Hollow Stem Auger	LOGGED BY: HK	REVIEWED BY:		
DRILLING EQUIPMENT: CME-75	BORING DIA. (in.): 8	TOTAL DEPTH (ft): 41.5	GROUND ELEV. (ft): 1587	DEPTH/ELEV. GROUND WATER (ft): AT TIME OF DRILLING 27.00 ft / Elev 1560.00 ft; AT END OF DRILLING ---; AFTER DRILLING ---	
SAMPLING METHOD: 140-lb Hammer, 30-in Drop	NOTES: Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}				

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	0	X					**FILL (Qf)**: SILTY SAND (SM), medium dense, brown, moist, fine to medium grained, low plasticity, trace gravel.
1585							
	5		CAL	27			**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), olive gray, intensely weathered to decomposed, very soft; (POORLY GRADED SAND (SP), medium dense, moist, fine to medium grained).
1580							
	10		CAL	50/6			(Very dense, weakly cemented).
1575							
	15		CAL	50/5			Light brown; (increase in moisture).
1570							
	20		CAL	50/6			
1565							

ATLAS

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

Figure I-15

LOG OF TEST BORING

ATLAS PROJECT NAME	ATLAS PROJECT NUMBER	
Mead Valley Sewer Improvements	190063P4.2 (1962-1)	B-10S

SITE	START	END	SHEET NO.
Riverside County, CA	9/23/22	9/23/22	16

DRILLING COMPANY	DRILL METHOD	LOGGED BY	REVIEWED BY
Baja Exploration	Hollow Stem Auger	HK	

DRILLING EQUIPMENT	BORING DIA. (in.)	TOTAL DEPTH (ft)	GROUND ELEV. (ft)	DEPTH/ELEV. GROUND WATER (ft)
CME-75	8	41.5	1587	AT TIME OF DRILLING 27.00 ft / Elev 1560.00 ft

SAMPLING METHOD	NOTES	
140-lb Hammer, 30-in Drop	Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}	AT END OF DRILLING --- AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			SPT	52	69		**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), olive gray, intensely weathered to decomposed, very soft; (POORLY GRADED SAND (SP), medium dense, moist, fine to medium grained). *(continued)* (Increase in coarse material). Groundwater observed at 27 feet.
1560							
	30						
			SPT	50	67		
1555							
	35						
			SPT	51	68		
1550							
	40						(Strongly cemented).
			SPT	80/12"	107/12"		
1545							**BORING TERMINATED AT 41½ FEET** Groundwater observed at 27 Feet
	45						
1540							

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

DRAFT

LOG OF TEST BORING

ATLAS PROJECT NAME: Mead Valley Sewer Improvements		ATLAS PROJECT NUMBER: 190063P4.2 (1962-1)		B-11S
SITE: Riverside County, CA		START: 9/23/22	END: 9/23/22	SHEET NO.: 17
DRILLING COMPANY: Baja Exploration	DRILL METHOD: Hollow Stem Auger	LOGGED BY: HK	REVIEWED BY:	
DRILLING EQUIPMENT: CME-75	BORING DIA. (in.): 8	TOTAL DEPTH (ft): 41.5	GROUND ELEV. (ft): 1587	DEPTH/ELEV. GROUND WATER (ft): AT TIME OF DRILLING --- ; AT END OF DRILLING --- ; AFTER DRILLING ---
SAMPLING METHOD: 140-lb Hammer, 30-in Drop	NOTES: Hammer Efficiency = 80.0% N_{60}~$1.33N_{SPT}$			

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
1585	0–5	X					**FILL (Qf)**: SILTY SAND (SM), medium dense, brown, moist, fine to medium grained, trace gravel, asphalt fragments.	COR
	5		CAL	37			**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), brown, intensely weathered to decomposed, very soft; (SILTY SAND (SM), dense, moist, fine to medium grained).	PD
1580								
	10		CAL	30			(Weakly cemented).	
1575								
	15		CAL	74			(Very dense, increase in moisture).	
1570								
	20		CAL	50/4			(Increase in coarse material).	
1565								

ATLAS

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

DRAFT

LOG OF TEST BORING

ATLAS PROJECT NAME	ATLAS PROJECT NUMBER	
Mead Valley Sewer Improvements	190063P4.2 (1962-1)	B-11S

SITE	START	END	SHEET NO.
Riverside County, CA	9/23/22	9/23/22	18

DRILLING COMPANY	DRILL METHOD	LOGGED BY	REVIEWED BY
Baja Exploration	Hollow Stem Auger	HK	

DRILLING EQUIPMENT	BORING DIA. (in.)	TOTAL DEPTH (ft)	GROUND ELEV. (ft)	DEPTH/ELEV. GROUND WATER (ft)
CME-75	8	41.5	1587	AT TIME OF DRILLING ---

SAMPLING METHOD	NOTES	
140-lb Hammer, 30-in Drop	Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}	AT END OF DRILLING --- AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
			SPT	81	108		**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), brown, intensely weathered to decomposed, very soft; (SILTY SAND (SM), dense, moist, fine to medium grained). *(continued)*	
1560								
	30							
			SPT	83/12"	111/12"			
1555								
	35							
			SPT	50/6	67/6			
1550								
	40							
			SPT	50/6	67/6			
1545							**BORING TERMINATED AT 41½ FEET** Groundwater and Seepage not observed	
	45							
1540								

ATLAS

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

DRAFT

LOG OF TEST BORING

ATLAS PROJECT NAME: Mead Valley Sewer Improvements	ATLAS PROJECT NUMBER: 190063P4.2 (1962-1)		B-12S
SITE: Riverside County, CA	START: 9/23/22	END: 9/23/22	SHEET NO.: 19
DRILLING COMPANY: Baja Exploration	DRILL METHOD: Hollow Stem Auger	LOGGED BY: HK	REVIEWED BY:
DRILLING EQUIPMENT: CME-75	BORING DIA. (in.): 8	TOTAL DEPTH (ft): 41.5	GROUND ELEV. (ft): 1582
SAMPLING METHOD: 140-lb Hammer, 30-in Drop	NOTES: Hammer Efficiency = 80.0% N_{60}~$1.33N_{SPT}$		

DEPTH/ELEV. GROUND WATER (ft)
- AT TIME OF DRILLING: 39.00 ft / Elev 1543.00 ft
- AT END OF DRILLING: ---
- AFTER DRILLING: ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
	0	X					**FILL (Qf)**: SILTY SAND (SM), medium dense, brown, moist, fine to medium grained, trace gravel, asphalt fragments.	
1580								PD RV
	5						**YOUNG WASH DEPOSITS (Qywa)** : SILTY SAND, medium dense, moist, fine to coarse grained, slightly micaceous.	
			CAL	23				
1575								
	10							
			CAL	21				
1570								
	15						**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), light brown, intensely weathered to decomposed, very soft; (POORLY GRADED SAND (SP), dense, moist, fine to medium grained).	
			CAL	40				
1565								
	20							
			CAL	69/12"				
1560								

ATLAS

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

DRAFT

LOG OF TEST BORING

ATLAS PROJECT NAME Mead Valley Sewer Improvements		**ATLAS PROJECT NUMBER** 190063P4.2 (1962-1)		**B-12S**
SITE Riverside County, CA		**START** 9/23/22	**END** 9/23/22	**SHEET NO.** 20
DRILLING COMPANY Baja Exploration	**DRILL METHOD** Hollow Stem Auger	**LOGGED BY** HK	**REVIEWED BY**	
DRILLING EQUIPMENT CME-75	**BORING DIA. (in.)** 8	**TOTAL DEPTH (ft)** 41.5	**GROUND ELEV. (ft)** 1582	**DEPTH/ELEV. GROUND WATER (ft)** ∇ AT TIME OF DRILLING 39.00 ft / Elev 1543.00 ft; AT END OF DRILLING ---; AFTER DRILLING ---
SAMPLING METHOD 140-lb Hammer, 30-in Drop	**NOTES** Hammer Efficiency = 80.0% N_{60}~$1.33N_{SPT}$			

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
			CAL	50/6			**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), light brown, intensely weathered to decomposed, very soft; (POORLY GRADED SAND (SP), dense, moist, fine to medium grained). *(continued)*	
1555								
	30						(Increase in coarse material).	
			SPT	51	68			
1550								
	35						Potassium feldspar, weakly cemented, (increased coarse material).	
			SPT	66	88			
1545								
						∇	Groundwater observed at 39 feet.	
	40							
			SPT	76/12"	101/12"			
1540							**BORING TERMINATED AT 41½ FEET** Groundwater observed at 39 Feet	
	45							
1535								

ATLAS

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

DRAFT

LOG OF TEST BORING

ATLAS PROJECT NAME: Mead Valley Sewer Improvements		ATLAS PROJECT NUMBER: 190063P4.2 (1962-1)		B-13S	
SITE: Riverside County, CA		START: 9/28/22	END: 9/28/22	SHEET NO.: 21	
DRILLING COMPANY: Baja Exploration	DRILL METHOD: Hollow Stem Auger	LOGGED BY: SD	REVIEWED BY:		
DRILLING EQUIPMENT: LAR-55	BORING DIA. (in.): 8	TOTAL DEPTH (ft): 40.5	GROUND ELEV. (ft): 1577	DEPTH/ELEV. GROUND WATER (ft)	
SAMPLING METHOD: 140-lb Hammer, 30-in Drop	NOTES: Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}			AT TIME OF DRILLING --- / AT END OF DRILLING --- / AFTER DRILLING ---	

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	0	X							**FILL (Qf)** : SILTY SAND (SM), medium dense, brown, moist, fine to coarse grained.
1575									
	5								**YOUNG WASH DEPOSITS (Qywa)** : CLAYEY SAND (SC), medium dense, pale brown, moist, fine to medium grained.
			CAL	12		8.7	119.9		
1570									
	10		CAL	79/9"					(Very dense).
1565									
	15		CAL	50/6					(Decrease in fine content).
1560									
									VAL VERDE TONALITE (Kvt): IGNEOUS ROCK (QUARTZ DIORITE), light brown, intensely weathered to decomposed, very soft; (CLAYEY SAND (SC), very dense, moist, fine to coarse grained).
	20		CAL	50/6					
1555									Yellowish brown to dark brown.

ATLAS

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

DRAFT

LOG OF TEST BORING

ATLAS PROJECT NAME Mead Valley Sewer Improvements	**ATLAS PROJECT NUMBER** 190063P4.2 (1962-1)	**B-13S**	
SITE Riverside County, CA	**START** 9/28/22	**END** 9/28/22	**SHEET NO.** 22
DRILLING COMPANY Baja Exploration	**DRILL METHOD** Hollow Stem Auger	**LOGGED BY** SD	**REVIEWED BY**
DRILLING EQUIPMENT LAR-55	**BORING DIA. (in.)** 8	**TOTAL DEPTH (ft)** 40.5	**GROUND ELEV. (ft)** 1577
SAMPLING METHOD 140-lb Hammer, 30-in Drop	**NOTES** Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}	**DEPTH/ELEV. GROUND WATER (ft)** AT TIME OF DRILLING --- ; AT END OF DRILLING --- ; AFTER DRILLING ---	

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			SPT	50/6	67/6				**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), light brown, intensely weathered to decomposed, very soft; (CLAYEY SAND (SC), very dense, moist, fine to coarse grained). *(continued)*
1550									
	30		CAL	50/6					
1545									
	35		SPT	50/2					
1540									
	40		SPT	50/2					
1535									**BORING TERMINATED AT 40½ FEET** Groundwater and Seepage not observed
	45								
1530									

ATLAS

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

Figure

I-22

DRAFT

LOG OF TEST BORING

ATLAS PROJECT NAME	ATLAS PROJECT NUMBER	
Mead Valley Sewer Improvements	190063P4.2 (1962-1)	B-14S

SITE	START	END	SHEET NO.
Riverside County, CA	9/29/22	9/29/22	23

DRILLING COMPANY	DRILL METHOD	LOGGED BY	REVIEWED BY
Baja Exploration	Hollow Stem Auger	SD	

DRILLING EQUIPMENT	BORING DIA. (in.)	TOTAL DEPTH (ft)	GROUND ELEV. (ft)	DEPTH/ELEV. GROUND WATER (ft)
CME-75	8	40.5	1641	▽ AT TIME OF DRILLING 29.00 ft / Elev 1612.00 ft

SAMPLING METHOD	NOTES	
140-lb Hammer, 30-in Drop	Hammer Efficiency = 80.0% N_{60}~1.33N_{SPT}	▼ AT END OF DRILLING --- ▼ AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	0	X					**FILL (Qf)** : SILTY SAND (SM), medium dense, light reddish brown, moist, fine grained.
1640		X					
	2	X					**VERY OLD AXIAL-CHANNEL DEPOSITS (Qvoa)** : CLAYEY SAND (SC), dense, reddish brown, moist, fine to medium grained.
	4	X					**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), dark grayish brown, intensely weathered to decomposed, very soft; (POORLY GRADED SAND (SP), very dense, moist, fine to coarse grained).
	5		CAL	50/6			
1635							
	10		CAL	50/6			
1630							
	15		CAL	50/6			
1625							
	20		CAL	50/6			
1620							

ATLAS

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

Figure I-23

DRAFT

LOG OF TEST BORING

ATLAS PROJECT NAME	ATLAS PROJECT NUMBER	
Mead Valley Sewer Improvements	190063P4.2 (1962-1)	**B-14S**

SITE	START	END	SHEET NO.
Riverside County, CA	9/29/22	9/29/22	24

DRILLING COMPANY	DRILL METHOD	LOGGED BY	REVIEWED BY
Baja Exploration	Hollow Stem Auger	SD	

DRILLING EQUIPMENT	BORING DIA. (in.)	TOTAL DEPTH (ft)	GROUND ELEV. (ft)	DEPTH/ELEV. GROUND WATER (ft)
CME-75	8	40.5	1641	AT TIME OF DRILLING 29.00 ft / Elev 1612.00 ft

SAMPLING METHOD	NOTES	
140-lb Hammer, 30-in Drop	Hammer Efficiency = 80.0% N_{60}~$1.33N_{SPT}$	AT END OF DRILLING --- AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
1615			SPT	50/3	67/3		**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), dark grayish brown, intensely weathered to decomposed, very soft; (POORLY GRADED SAND (SP), very dense, moist, fine to coarse grained). *(continued)* (Trace fines).
							Groundwater observed at 29 feet.
1610	30		SPT	50/6			
1605	35		SPT	50/5			
1600	40		SPT	50/4			
1595	45						

BORING TERMINATED AT 40½ FEET
Groundwater observed at 29 Feet

ATLAS

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

DRAFT

LOG OF TEST BORING

ATLAS PROJECT NAME	ATLAS PROJECT NUMBER	
Mead Valley Sewer Improvements	190063P4.2 (1962-1)	B-15S

SITE	START	END	SHEET NO.
Riverside County, CA	9/29/22	9/29/22	25

DRILLING COMPANY	DRILL METHOD	LOGGED BY	REVIEWED BY
Baja Exploration	Hollow Stem Auger	SD	

DRILLING EQUIPMENT	BORING DIA. (in.)	TOTAL DEPTH (ft)	GROUND ELEV. (ft)	DEPTH/ELEV. GROUND WATER (ft)
CME-75	8	40.5	1641	AT TIME OF DRILLING 28.00 ft / Elev 1613.00 ft; AT END OF DRILLING ---; AFTER DRILLING ---

SAMPLING METHOD	NOTES
140-lb Hammer, 30-in Drop	Hammer Efficiency = 80.0% N_{60}~$1.33N_{SPT}$

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
1640	0	X							**FILL (Qf)** : CLAYEY SAND (SC), medium dense, reddish brown, moist, fine to medium grained.	AL WA
1635	5		CAL	50/6					**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), brownish gray, intensely weathered to decomposed, very soft; (POORLY GRADED SAND (SP), very dense, moist, fine to coarse grained).	
1630	10		SPT	50/6	67/6	13.8	116.4			
1625	15		CAL	50/6						
1620	20		CAL	50/5						

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

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LOG OF TEST BORING	ATLAS PROJECT NAME: Mead Valley Sewer Improvements	ATLAS PROJECT NUMBER: 190063P4.2 (1962-1)	B-15S
SITE: Riverside County, CA	START: 9/29/22	END: 9/29/22	SHEET NO.: 26
DRILLING COMPANY: Baja Exploration	DRILL METHOD: Hollow Stem Auger	LOGGED BY: SD	REVIEWED BY:
DRILLING EQUIPMENT: CME-75	BORING DIA. (in.): 8	TOTAL DEPTH (ft): 40.5	GROUND ELEV. (ft): 1641
SAMPLING METHOD: 140-lb Hammer, 30-in Drop	NOTES: Hammer Efficiency = 80.0% N_{60}~$1.33N_{SPT}$	DEPTH/ELEV. GROUND WATER (ft): AT TIME OF DRILLING 28.00 ft / Elev 1613.00 ft; AT END OF DRILLING ---; AFTER DRILLING ---	

ELEVATION (ft)	DEPTH (ft)	BULK SAMPLE	DRIVE SAMPLE	BLOWS PER FOOT	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION	LAB TESTS
1615			SPT	50/6					**VAL VERDE TONALITE (Kvt)**: IGNEOUS ROCK (QUARTZ DIORITE), brownish gray, intensely weathered to decomposed, very soft; (POORLY GRADED SAND (SP), very dense, moist, fine to coarse grained). *(continued)*	
									Groundwater observed at 28 feet.	
1610	30		SPT	50/4						
									(SILTY SAND (SM), very dense, wet, fine to medium grained).	
1605	35		SPT	50/6						
1600	40		SPT	50/4						
1595	45									

BORING TERMINATED AT 40½ FEET
Groundwater observed at 28 Feet

ATLAS

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

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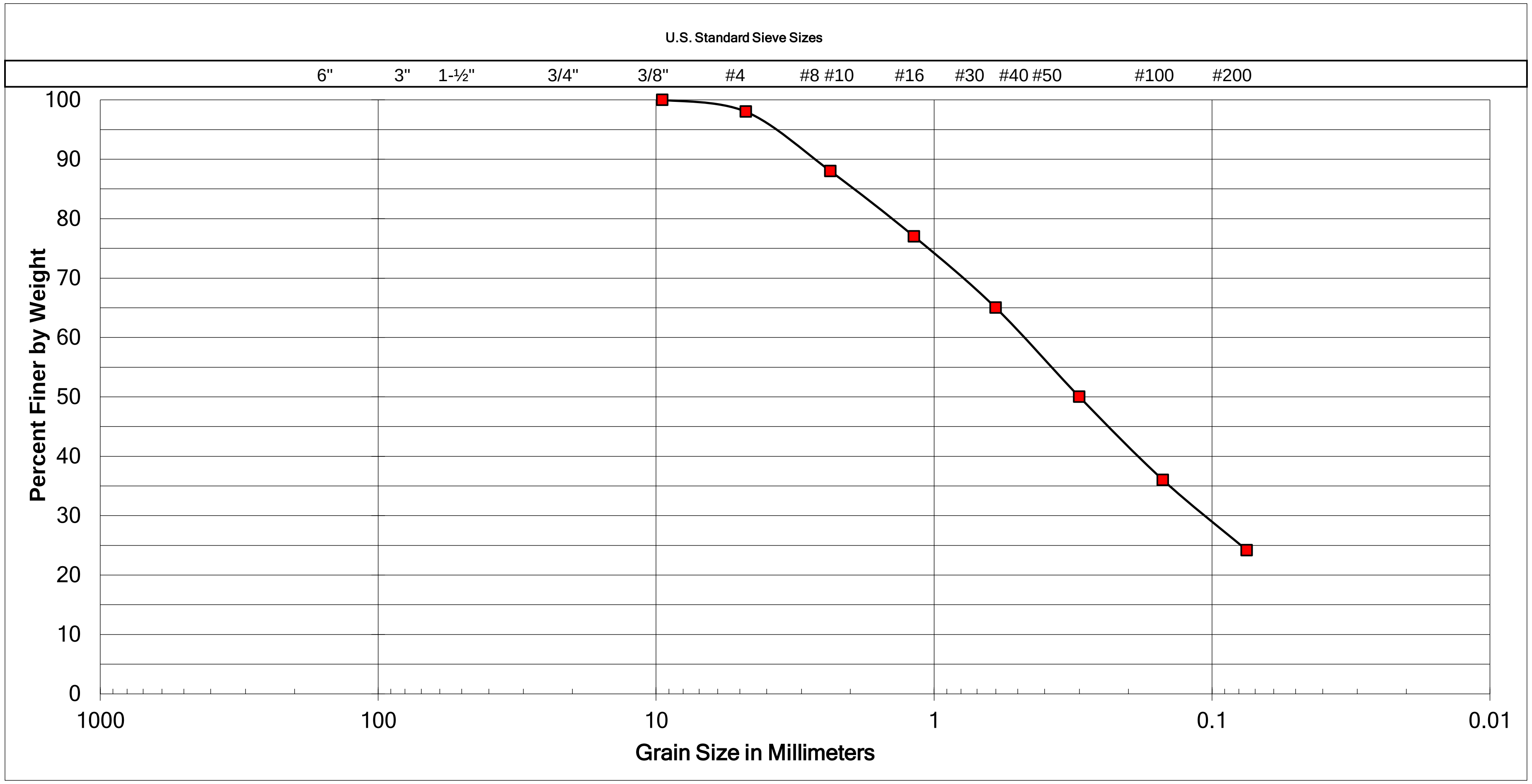
APPENDIX II
LABORATORY TESTING

Laboratory tests were performed to provide geotechnical parameters for engineering analyses. The following tests were conducted:

- **CLASSIFICATION:** Field classifications were verified in the laboratory by visual examination. The final soil classifications are in accordance with the Unified Soil Classification System.
- **IN SITU MOISTURE AND DENSITY:** The in-situ moisture content and dry unit weight were evaluated on samples collected from the borings. The test results are presented on the boring logs in Appendix I.
- **PARTICLE-SIZE DISTRIBUTION:** The particle-size distribution was evaluated on soil samples in accordance with ASTM D6913.
- **CORROSIVITY:** Corrosivity tests were performed on soil samples. The pH and minimum resistivity were evaluated in general accordance with California Test 643. The soluble sulfate content was evaluated in accordance with California Test 417. The total chloride ion content was evaluated in accordance with California Test 422.
- **PERCENT FINDER THAN #200:** This test was performed on soil samples in accordance with ASTM D1140.
- **DIRECT SHEAR:** This test was performed on soil samples in accordance with ASTM D3080. The shear stress was applied to inundated samples at a constant rate of strain of 0.003 inch per minute.
- **EXPANSION INDEX:** This test was performed on soil samples in accordance with ASTM D4289.
- **ATTERBERG LIMITS:** The Atterberg limits were evaluated on a selected soil sample in accordance with ASTM D4318.
- **R-VALUE:** This test was performed on soil samples in accordance with Caltrans Test Method 301.

Soil and rock samples not tested are stored in our laboratory for future reference and analysis, if needed. Unless notified to the contrary, all samples will be disposed of 30 days from the date of this report.

DRAFT



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

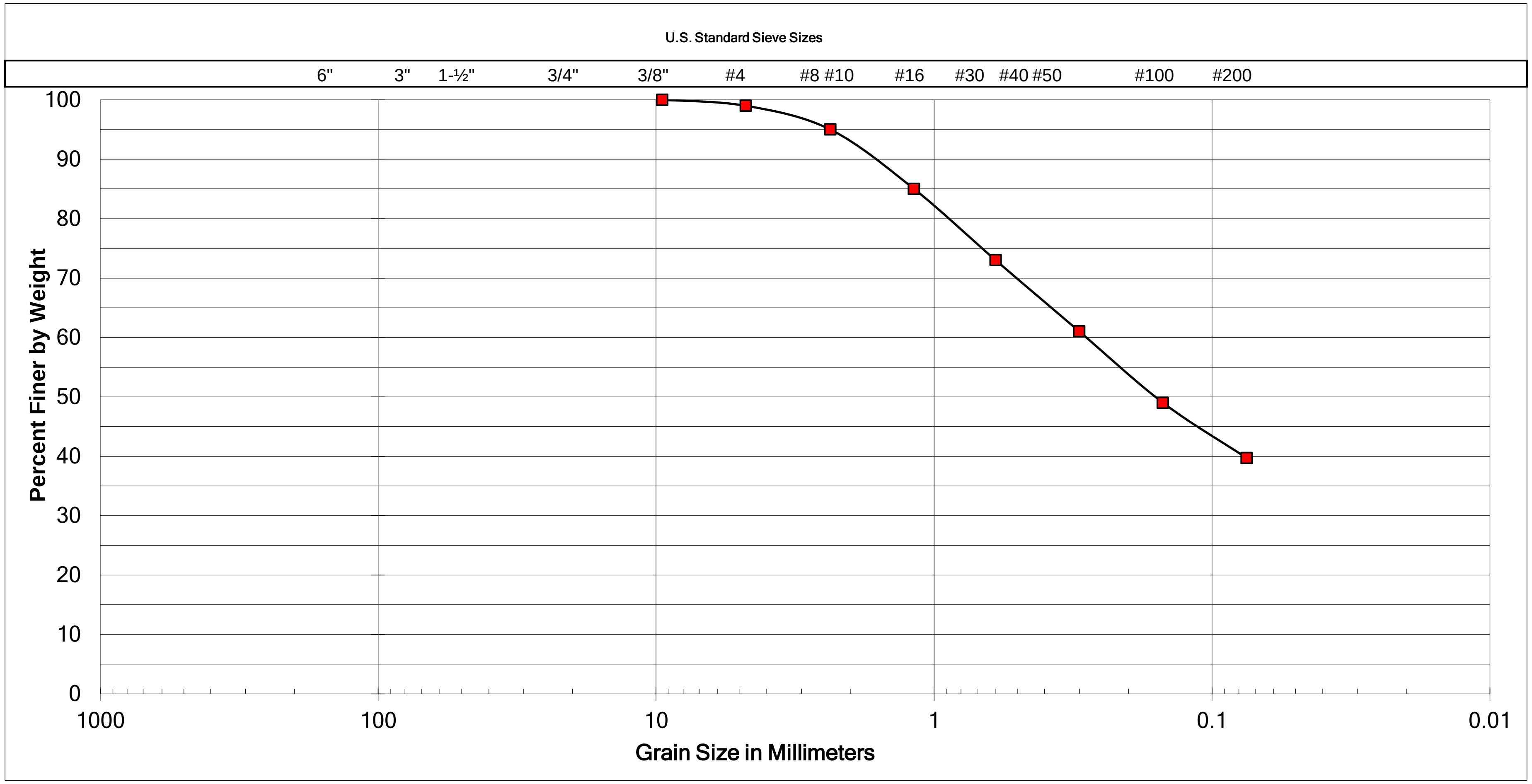
SAMPLE LOCATION
B-4S at 5 to 5½ feet
SAMPLE NUMBER
78201

UNIFIED SOIL CLASSIFICATION:	SM
DESCRIPTION	SILTY SAND

ATTERBERG LIMITS	
LIQUID LIMIT	-
PLASTIC LIMIT	-
PLASTICITY INDEX	-

Mead Valley Sewer Improvements Riverside County, California			
By: JRD		Date: January, 2023	
Job Number: 190063P4.2 (1962-1)		Figure: II-1	

DRAFT



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

SAMPLE LOCATION
B-11S at 6 to 6½ feet
SAMPLE NUMBER
78210

UNIFIED SOIL CLASSIFICATION:	SM
DESCRIPTION	SILTY SAND

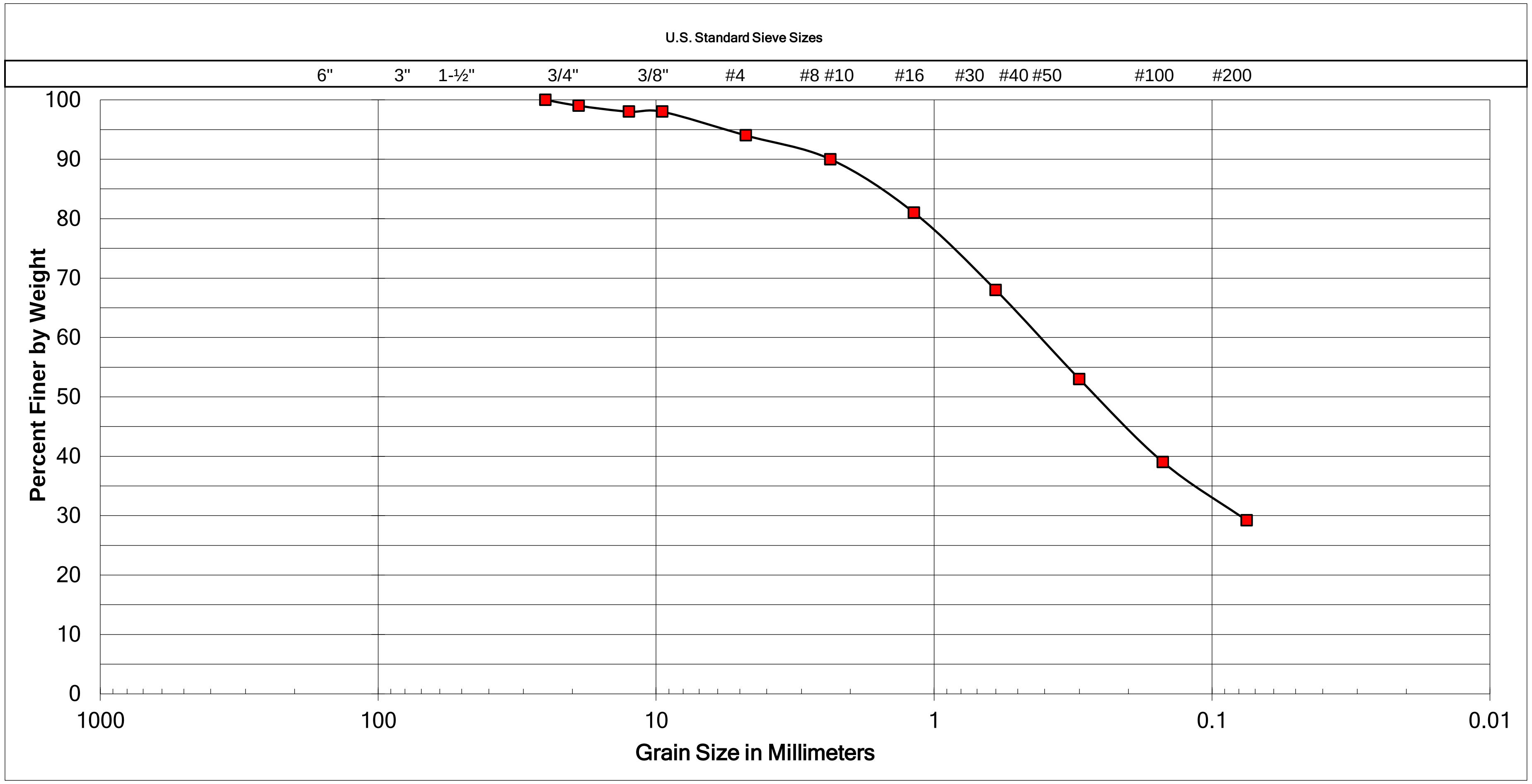
ATTERBERG LIMITS	
LIQUID LIMIT	-
PLASTIC LIMIT	-
PLASTICITY INDEX	-

ATLAS

Mead Valley Sewer Improvements
Riverside County, California

By:	JRD	Date:	January, 2023
Job Number:	190063P4.2 (1962-1)	Figure:	II-2

DRAFT



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

SAMPLE LOCATION
B-12S at 0 to 5 feet
SAMPLE NUMBER
78211

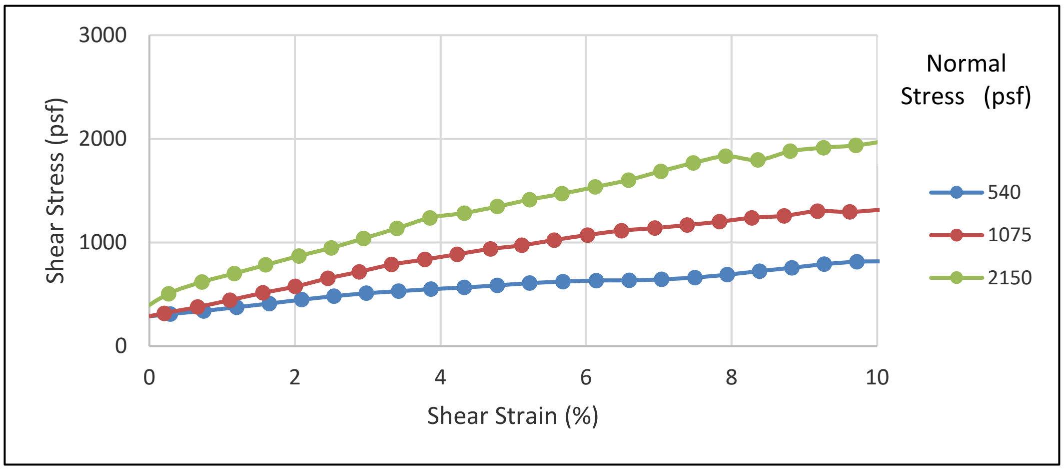
UNIFIED SOIL CLASSIFICATION:	SM
DESCRIPTION	SILTY SAND

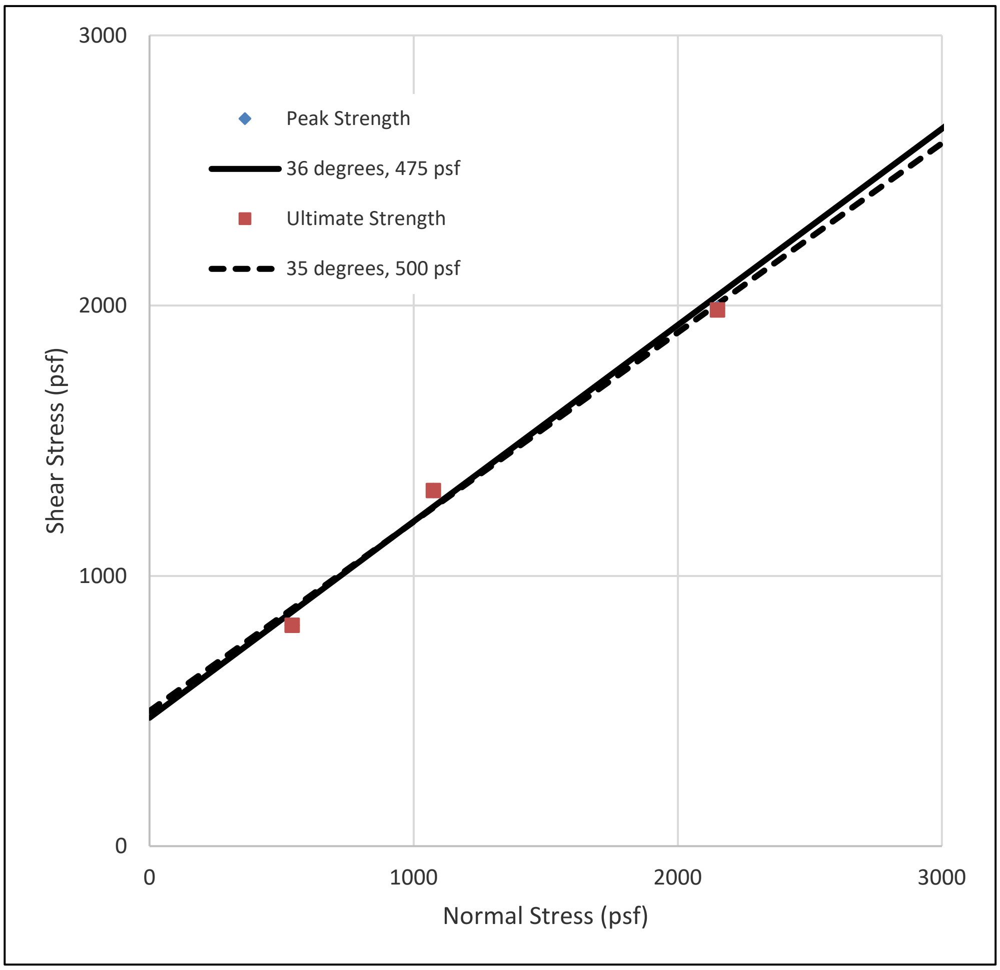
ATTERBERG LIMITS	
LIQUID LIMIT	-
PLASTIC LIMIT	-
PLASTICITY INDEX	-

ATLAS

Mead Valley Sewer Improvements Riverside County, California			
By: JRD		Date: January, 2023	
Job Number: 190063P4.2 (1962-1)		Figure: II-3	

DRAFT





SAMPLE ID: B-1S at 5½ to 6 Feet

VAL VERDE TONALITE (Kvt):

Intensely Weathered to Decomposed Igneous Rock

NOTES: In Situ

Strain Rate: 0.003 in/min

Sample was consolidated and drained

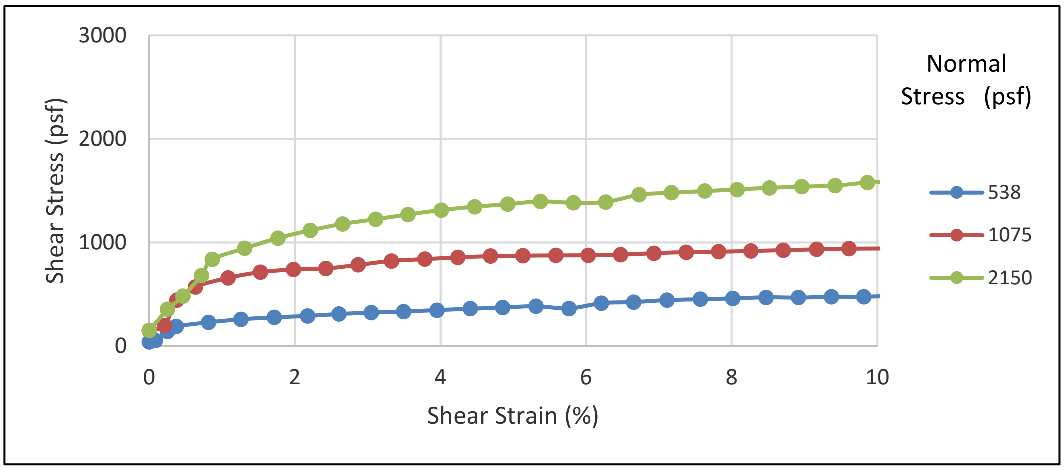
	Peak	Ultimate
Φ	36 °	35 °
c	475 psf	500 psf

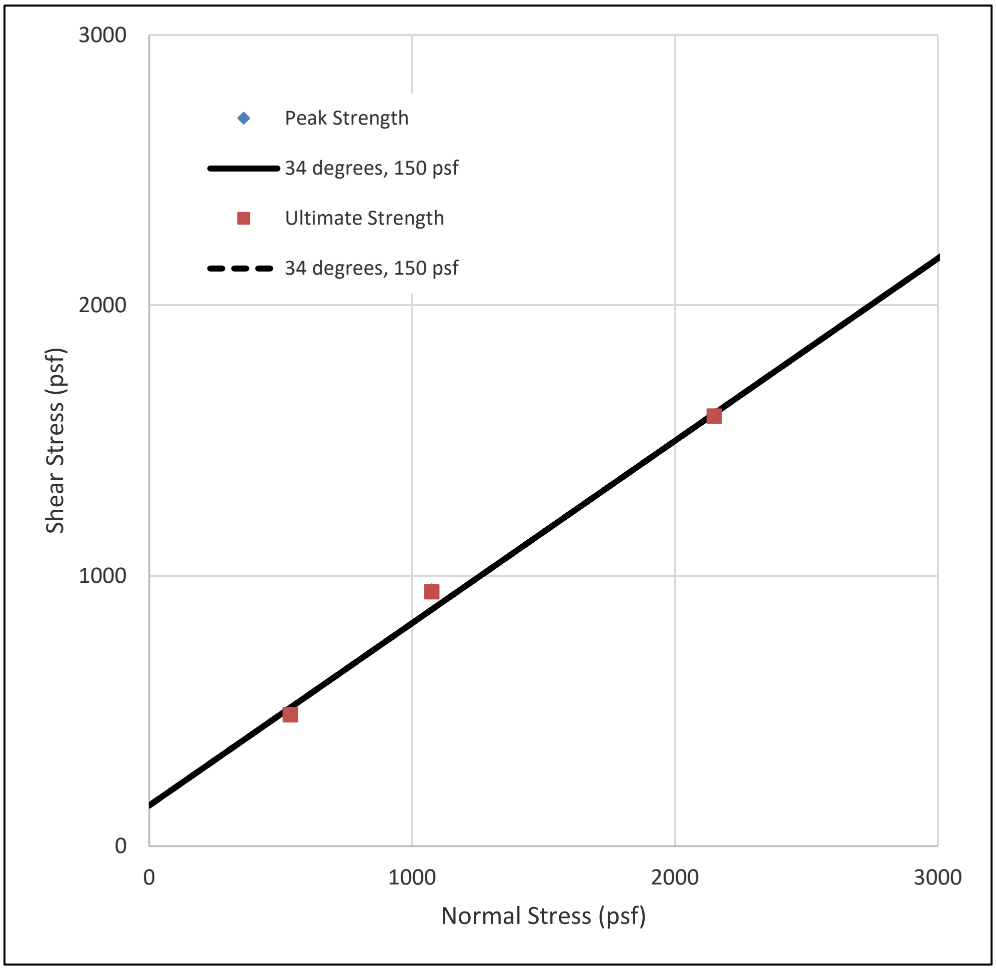
	Initial	Final
γ_d	109.5 pcf	109.5 pcf
w_c	3.6 %	17.7 %
Saturation	18 %	90 %

ATLAS

Mead Valley Sewer Improvements Riverside County, California			
By:	JRD	Date:	January, 2023
Job Number:	190063P4.2 (1962-1)	Figure:	II-4

DRAFT





SAMPLE ID: B-9S at 11 to 11½ Feet

VERY OLD AXIAL-CHANNEL DEPOSITS (Qvoa):

CLAYEY SAND (SC)

NOTES: In Situ

Strain Rate: 0.003 in/min

Sample was consolidated and drained

	Peak	Ultimate
Φ	34 °	34 °
c	150 psf	150 psf

	Initial	Final
γ_d	112.4 pcf	112.4 pcf
w_c	9.0 %	17.0 %
Saturation	50 %	93 %

ATLAS

Mead Valley Sewer Improvements
Riverside County, California

By:	JRD	Date:	January, 2023
Job Number:	190063P4.2 (1962-1)	Figure:	II-5

DRAFT

RESISTIVITY, pH, SOLUBLE CHLORIDE and SOLUBLE SULFATE
pH & Resistivity (Cal 643, ASTM G51) , Soluble Chlorides (Cal 422) , Soluble Sulfate (Cal 417)

SAMPLE ID	pH	RESISTIVITY (Ω-CM)	CHLORIDE (%)	SULFATE (%)
B-11S at 0 to 5 feet	7.99	1250	0.005	0.014

EXPANSION INDEX
(ASTM D4289)

SAMPLE ID	EXPANSION INDEX	EXPANSION POTENTIAL	SOIL TYPE (USCS)
B-3S at 0 to 5 feet	*18*	Very Low	CLAYEY SAND (SC)
B-9S at 6 to 6½ feet	*38*	Low	CLAYEY SAND (SC)

Expansion Index	Expansion Potential
1-20	Very Low
21-50	Low
51-90	Medium
91-130	High
Above 130	Very High

Percent Passing No. 200 and No. 4
ASTM D1140

SAMPLE ID	PASSING NO. 200 (%)	PASSING NO. 4 (%)	SOIL TYPE (USCS)
B-1S at 5½ to 6 Feet	7.1	100	Poorly Graded SAND with SILT (SP-SM)
B-3S at 0 to 5 Feet	49.5	100	CLAYEY SAND (SC)
B-5S at 5 to 5½ Feet	45.9	100	CLAYEY SAND (SC)
B-7S at 11 to 11½ Feet	31.9	100	SILTY SAND (SM)
B-8S at 0 to 5 Feet	33.8	100	CLAYEY SAND (SC)
B-8S at 11 to 11½ Feet	40.9	100	CLAYEY SAND (SC)
B-9S at 0 to 5 Feet	36.7	100	SILTY SAND (SM)
B-9S at 11 to 11½ Feet	32.2	100	CLAYEY SAND (SC)
B-15S at 0 to 5 Feet	40.3	100	CLAYEY SAND (SC)

ATTERBERG LIMITS
(ASTM D4318)

SAMPLE ID	LIQUID LIMIT	PLASTIC LIMIT	PLASTIC INDEX	SOIL TYPE (USCS)
B-3S at 0 to 5 feet	27	17	10	CLAYEY SAND (SC)
B-8S at 0 to 5 feet	42	15	27	CLAYEY SAND (SC)
B-15S at 0 to 5 Feet	33	15	18	CLAYEY SAND (SC)

R-Value
(CTM 301)

SAMPLE ID	R-VALUE	SOIL TYPE (USCS)
B-3S at 0 to 5 feet	13	CLAYEY SAND (SC)
B-9S at 0 to 5 feet	24	SILTY SAND (SM)
B-12S at 0 to 5 feet	44	SILTY SAND (SM)

ATLAS

Mead Valley Sewer Improvements Riverside County, California			
By:	JRD	Date:	January, 2023
Job Number:	190063P4.2 (1962-1)	Figure:	II-6

APPENDIX I

Groundwater Monitoring Report

ACCES
ENVIRONMENTAL ENGINEERING

GROUNDWATER MONITORING REPORT

FIRST SEMI-ANNUAL 2022
(SECOND QUARTER 2022)

MOBIL BALDWIN
21020 Cajalco Road
Perris, California 92370

JULY 29, 2022

Prepared for:

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Groundwater Monitoring Data	
Monitoring and sampling period covered	**1st SEMI-ANNUAL 2022**
Frequency of groundwater sampling	Semi-annual
Groundwater sampling event date	June 30, 2022
Number of groundwater (gw) monitoring wells existing at the site	11
Number of gw monitoring wells sampled this sampling event	9
Number of gw monitoring wells not sampled this sampling event	2 (MW-5 and MW-7)
Range of depth to groundwater (feet bgs)	9.12 – 11.63
Range of groundwater elevation (feet amsl)	1,629.92 - 1,631.46
Groundwater flow direction	West-southwest
No. of wells with reportable dissolved-phase hydrocarbon concentration	3 of 9 wells sampled
Reportable TPH_G concentrations range (µg/L)	1,390 µg/L – 77,800 µg/L
Reportable TPH_D concentrations range (µg/L)	NA
Reportable Benzene concentrations range (µg/L)	125 µg/L – 30,300 µg/L
Reportable Toluene concentrations range (µg/L)	1.1 µg/L – 33,300 µg/L
Reportable Ethylbenzene concentrations range (µg/L)	612 µg/L – 3,640 µg/L
Reportable Xylenes concentrations range (µg/L)	3.3 µg/L – 20,760 µg/L
Reportable MTBE concentrations range (µg/L)	ND
Reportable ETBE concentrations range (µg/L)	ND
Reportable DIPE concentrations range (µg/L)	ND
Reportable TAME concentrations range (µg/L)	ND
Reportable TBA concentrations range (µg/L)	ND
Wells with free product or sheen	None
Frequency of free product recovery this monitoring period	NA
Range of free product thickness this sampling event	NA
Free product/contaminated groundwater recovered to date	NA

Remedial Action Data	
Remedial action performed during this monitoring period	None
Dates of remedial action	NA
TPH_G removed to date	13,582.6 lbs
Benzene removed to date	362.2 lbs
MTBE removed to date	NA
Free product removed to date	NA
Bulk soil removed to date	740 yd^3

NA = Not Applicable

1.0 INTRODUCTION

Associated Consulting Civil and Environmental Services, Inc. (A.C.C.E.S., Inc.) was retained by Mr. Fayez Sedrak to prepare this report for submittal to the Santa Ana Regional Water Quality Control Board (SARWQCB). The report summarizes groundwater monitoring activities performed at Mobil Baldwin located at 21020 Cajalco Road in Perris, California (Figure 1). The sampling event for First Semi-annual 2022 was conducted on June 30, 2022.

1.1 Report Overview

This report describes the field procedures and observations, laboratory analytical results of groundwater samples, and conclusions resulting from the June 30, 2022 sampling event.

This report is submitted in compliance with the reporting requirements of the County of Riverside Community Health Agency Department of Environmental Health contained in "Site Assessment and Cleanup Corrective Action Guidelines"

1.2 Site Description

The subject site is located at the northeast corner of Cajalco Road and Brown Avenue in Perris, California, an unincorporated area of the County of Riverside. Near the subject site, Brown Street runs north-south and Cajalco Road runs east-west. According to the United States Geological Survey (USGS) Topographic Map for Steele Peak, California Quadrangle, the site is located in Township 4 South, Range 4 West, Section 10, and the elevation is approximately 1,640 feet above mean sea level (AMSL). The site is rectangular in shape and measures approximately 190 feet long by 174 feet wide. The site has been vacant for a number of years. In 2014, a new gasoline station (76 Gas Station) was constructed just to the north of the former Mobil Baldwin. Structures currently present at the site include a canopy that covers dispenser islands and a building that houses a shop and food mart. The surrounding properties are residential/commercial. Figure 2 illustrates the plan view of the site with the location of the existing monitoring wells, former and existing USTs and dispenser islands.

1.3 Background

In the past, the site included fuel retail dispensing facilities with five (5) USTs: two (2) 10,000-gallon and three (3) 4,000-gallon petroleum tanks.

Due to changing UST regulations, the USTs at the site were removed on June 1, 2000 at the request of the County of Riverside Department of Environmental Health (CRDEH). Use of these USTs had been suspended in 1990 and the required temporary closure permits were obtained from the CRDEH until the USTs were removed. Based on the analytical results of the soil samples collected during the UST removal, an unauthorized release report dated July 19, 2000 was filed for the site and the CRDEH required further site assessment to define the horizontal and vertical extent of the released hydrocarbons.

EAR was retained in August of 2000 to provide assistance in connection with the application process with the California State Water Resources Control Board (CSWRCB), Underground Storage Tank Cleanup Fund (USTCF) and the required site assessment activities. EAR submitted a Site Assessment Plan dated November 5, 2001 to the CRDEH to address the site assessment requirements.

The CRDEH approved the work plan in a letter dated January 2, 2002. Cost pre-approval by the USTCF was granted in their February 26, 2002 letter, however, only Geoprobe soil gas and soil sampling activities were approved based on the cost estimate provided.

The Geoprobe survey, which consisted of advancing a total of 16 soil gas and 9 soil-sampling points, was conducted on March 28, 2002 to assess the extent of petroleum hydrocarbon impact at the soil site. The analytical results of these samples indicated significant concentrations of total petroleum hydrocarbons in the gasoline range (TPH_G), benzene, toluene, ethylbenzene and xylenes (BTEX) and methyl tertiary butyl ether (MTBE) in the samples collected in the southwest quadrant of the site.

In a Site Assessment Plan dated August 12, 2002, EAR proposed that seven additional borings (one up gradient, two down gradient, three cross gradient, and one in the former small USTs pit) and sampling be conducted using a conventional drill rig with hollow stem augers to a depth of approximately 40 feet below ground surface (bgs). On December 30, 2002 EAR completed four 32-foot deep borings as groundwater monitoring wells MW-1, MW-3, MW-4, and MW-5 and two 35-foot deep borings as groundwater monitoring wells MW-2 and MW-7. On December 31, 2002, one 32-foot deep boring was completed as groundwater monitoring well MW-6.

Quarterly monitoring of the wells during the first and second quarters of 2003 indicated elevated concentrations of TPH_G and BTEX in monitoring wells MW-1, MW-4 and MW-5. MTBE was also detected in those wells during the first and second quarter sampling events and in the down gradient well (MW-7) during the first quarter sampling event. Based on the concentrations observed in the first and second quarter of 2003 groundwater monitoring events and in pursuant to the directives of the CRDEH in a letter dated June 26, 2003, EAR prepared a Further Site Assessment (FSA) and Interim Remedial Action Plan (IRAP) dated August 5, 2003. In the FSA and IRAP, EAR recommended installing one additional well to the south of the release and to conduct source removal excavation. In a letter dated September 29, 2003, the CRDEH approved the proposed work. On February 25, 2004, EAR installed groundwater monitoring well MW-8 to the south of the property. Laboratory analysis of soil and water samples collected at MW-8 indicated concentrations below laboratory detection limits. Based on the soil sampling completed on and off-site, it is evident that the impact to the subsurface soil is completely defined in all directions.

In order to meet USTCF requirements, as per discussion with Mr. James Young of the USTFC, it was decided to conduct a soil vapor extraction (SVE) feasibility study. The *Soil Vapor Extraction Feasibility Test (SVEFT) Work Plan* dated March 9, 2005 was prepared and submitted to the CRDEH for review and approval. In response, Ms. Linda Shurlow of the CRDEH issued a letter dated March 28, 2005 accepting the work plan. The three proposed vapor wells were installed on May 2, 2005, and the SVEFT was attempted on May 19, 2005.

The CRDEH issued a letter dated September 15, 2005 stating that oversight responsibilities were transferred from the CRDEH to the CRWQCB. The details of this well installation and SVERFT were submitted to the CRWQCB in a report dated November 2, 2005. The report concluded that due to shallow/semi or fully confining groundwater conditions, SVEFT could not be completed at the site. Therefore, in order to better address the site remediation, it was recommended to conduct soil excavation and the installation of an infiltration gallery as described in *Further Site Assessment and Interim Remedial Action Plan* dated August 5, 2003 and its addendum dated September 29, 2003.
In a meeting between EAR and CRWQCB on January 24, 2006, it was concluded that soil

excavation is the most suitable remedial alternative, keeping in view the limited extent of the benzene contamination plume. CRWQCB issued a letter dated January 26, 2006 which summarized the corrective action recommendations as follows:

- Conduct aquifer pump test to develop strategy for addressing groundwater to be encountered during excavation.
- Remedial excavation of soil near the tank and dispenser areas.
- Evaluate installing a reactive barrier consisting of an oxygen-release compound.
- Reinstallation of the wells destroyed during excavation
- Based on the aquifer pump test results, evaluate installation of extraction gallery through the backfill.
- Removal of product piping, dispenser and vapor recovery lines which was not removed during tank removal. Collect soil samples for laboratory analysis if petroleum hydrocarbon impact is suspected.

An aquifer pump test was conducted on April 12 and 13, 2006 by EAR. Single well tests were conducted at two-inch diameter wells VE-2 to VE-4 on April 12, 2006 and a six-hour step drawdown test was conducted at four-inch diameter well MW-1 on April 13, 2006. Based on hydraulic conductivity measured from single well tests, saturated soil to a depth of approximately 15 feet bgs has a very low permeability characteristic of a clayey silt or silty clay. Very little groundwater inflow to an excavation would be expected from this interval.

A.C.C.E.S. Inc. conducted remedial action at the site using excavation and disposal method on January 23, 28, 29, 30, February 7, March 26, 27 and 28, 2008. Before remedial actions began, MW-1 was properly destroyed on January 15, 2008. MW-1 was re-installed to its original location on September 16, 2008. During the excavation process, an underground storage tank was discovered in the excavation. The UST was discovered on January 28, 2008 and was removed on February 7, 2008. Remedial activities were temporarily suspended after the February 7, 2008 activities to complete additional permit conditions by the County of Riverside Community Health Agency. A.C.C.E.S. Inc. resumed work on March 26, 2008 with the continuation of the excavation and the removal of product piping, dispenser and vapor recovery lines that were not removed during the June 1, 2000 tank removal activities. During that remedial action, a total of twenty-nine (29) soil samples were obtained at various depths within and along the peripheries of the pre-determined excavation site (Figure 2). The results of laboratory analysis revealed that TPH_G and BTEX were reported in samples collected within and along the peripheries of the excavation area from 4 feet bgs down to the maximum depth of 14 feet bgs. At the completion of the remedial action on March 27, 2008, approximately 740 yd^3 of contaminated soil was excavated and transported to a disposal facility. Dewatering was conducted during the entire excavation process. Approximately 4,200 gallons of water were collected. The collected groundwater was temporarily stored on-site and was transported to a recycling facility for treatment and disposal. Based on laboratory analytical results, PID readings and field observations, impacted soils extend beyond the lateral and vertical extents of the excavation.

MW-2 was inadvertently destroyed by one of the transporter trucks during the soil remediation process. On September 16, 2008 MW-1 was re-installed to its original location and MW-2 was re-installed to within one foot from its original location. MW-1 and MW-2 were re-installed to the maximum depth of 30 feet and screened from 5 to 30 feet below ground surface (bgs). A.C.C.E.S. Inc. started quarterly groundwater monitoring at the site in the fourth quarter of 2006. Quarterly groundwater monitoring of the wells during the fourth quarter of 2007 indicated elevated concentrations of TPH_G, BTEX and MTBE in monitoring well MW-1. TPH_G and BTEX concentrations were also reported at MW-4 and MW-5. Following the 2008 remedial action, results of chemical analyses of groundwater samples collected during quarterly investigations indicated fluctuations in contaminant concentrations.

A.C.C.E.S. Inc. performed additional subsurface soil and groundwater investigation at the site on February 15-16, 2012. During this phase of the investigation, two (2) soil borings, AB-5 and AB-6, were drilled to the maximum depth of 25 feet below ground surface (bgs) and converted to groundwater monitoring wells as MW-9 and MW-10; four (4) soil borings, AB-1 through AB-4, were drilled to the maximum depth of 15 feet bgs; and one (1) boring was drilled to the maximum depth of 20 feet bgs and converted to a sparge well (SW-1). Additionally, a 20-foot long slotted pipe was installed horizontally during this investigation to address extraction of soil vapor during remedial action. Based on state certified laboratory analytical results during this investigation, soils to the north, northeast and east of MW-1 were impacted by petroleum hydrocarbon contaminants.

MW-9 and MW-10 were developed on February 22, 2012. Based upon state certified laboratory analytical results during this investigation, the groundwater contamination plume appears to have extended to the north and east of MW-1.

A.C.C.E.S., Inc. performed remedial action feasibility study at the site consisting of vapor extraction combined with air sparge pilot tests on December 10-14, 2012. The results of the study indicated that that method of remediation can be implemented successfully at the site.

On December 10, 2012, vapor extraction well VE-1 was tested under applied vacuum of 55 inches of water column (*in. WC*) and flow rate of 155 cubic feet per minute (cfm). The zone of vacuum influence was determined to extend to 12 feet.

Air sparge well SW-1 was initially tested under a pressure of 30 psi with a flow rate of less than 10 cfm on December 11, 2012. The pressure and flow rate became steady at 22 psi and 15 cfm, respectively, after 4 hours of operation. The 9-hour air sparging test was performed in combination with vapor extraction. Results of the test indicated maximum hydraulic mounding at 4.5 feet at MW-1 (located 10 feet from SW-1). Marginal hydraulic mounding can be observed at MW-4, MW-5, MW-9 and MW-10 which are located 21-44 feet from SW-1. Four hours after the start of injection of air, groundwater dropped sharply at observation wells located within 44 feet of SW-1. Likewise at that point in time, positive pressure was recorded at MW-1 at 0.2 in. WC. Dissolved oxygen (DO) was observed to have increased at all existing groundwater monitoring wells at the subject site.

To further evaluate the feasibility of air sparging combined with vapor extraction and in order to determine the mass removal efficiency of the air sparging process, air sparging combined with vapor extraction operations were extended for 18 hours (9 hours each day on December 12 and 14, 2012). Overall, after 37 hours of operation, 595.108 lbs of TPH_G and 13.932 lbs of VOCs were removed during the remedial action feasibility study.

Groundwater samples were collected from all existing groundwater monitoring wells before and after air sparging. Although there were changes observed in the contaminant concentrations, the test was too short to gauge the effect of biodegradation.

In addition to the existing remediation system, four (4) air sparge wells (SW-2 through SW-5) and four (4) horizontal vapor extraction lines (VE-2 through VE-5) were installed on March 18, 2014. Remedial action consisting of air sparging combined with vapor extraction at the five air sparge wells and five horizontal vapor extraction lines was conducted by A.C.C.E.S., Inc. on March 24 to May 6, 2014. Approximately 12,983.51 lbs of TPH_G and 1,362.14 lbs of VOCs (Benzene, Toluene, Ethylbenzene and Xylenes) were removed during the 500 hours of air sparging combined with vapor extraction operations at SW-1 and VE-1 through SW-5 and VE-5 in this phase of the remedial action.

2.0 SCOPE OF WORK

The tasks completed during the sampling were authorized by Mr. Fayez Sedrak. The scope of work for this groundwater monitoring program consisted of the following major tasks:

- Depth to groundwater measurements at nine (9) of eleven (11) monitoring wells,
- Purging of nine monitoring wells,
- Collection of groundwater samples at nine wells,
- Analytical laboratory testing of groundwater samples,
- Data analysis, &
- Report preparation

3.0 FIELD ACTIVITIES

All groundwater monitoring and sampling activities were performed in general accordance with A.C.C.E.S., Inc. protocols and the A.C.C.E.S. Inc. Site Safety Plan (SSP). Nine (9) of eleven (11) existing groundwater monitoring wells were sampled during this monitoring period. MW-5 was covered with compacted dirt overlay and cannot be located, thus, was not gauged, purged or sampled. MW-7 was covered with concrete due to the road expansion project by Riverside County and was not located and re-commissioned during this monitoring event.

3.1 Depth to Groundwater Measurements

Depth to groundwater measurements were performed prior to purging and sampling of each groundwater monitoring well. The measurements were taken using a Solinst™ water level indicator. A surveyed mark on top of the PVC casing of each well was used as the reference point.

3.2 Monitoring Well Purging and Sampling

Prior to the collection of each groundwater sample, a minimum of three (3) saturated casing volumes of water was purged from each well to ensure that stagnant well water was replaced by formation water. The saturated casing volume (CV) was calculated as follows:

$CV = \pi r^2 d$ (7.481 gal/ft^3), where:
r= the radius measured from the center of the casing to the inside surface of the casing (feet); and
d= the thickness of the column of water standing in the well (feet)

Each well was purged using a 2-inch diameter, submersible pump which draws current from a 110-V AC supply outlet. Each well was pumped at a rate of approximately 0.75 to 1.5 gallons per minute. Measurements of pH, conductivity, turbidity and temperature were recorded during purging and allowed to stabilize to within the following limits:

Parameter	Variance
pH	0.1 pH units
Conductivity	± 5%
Temperature	± 5%
Turbidity	± 10%

If a well was purged dry prior to removal of three casing volumes of water, the water level in the well was allowed to recover to eighty percent (80%) of its static level. As soon as this level was reached in the well, measurements for pH, conductivity and temperature were repeated to determine water quality, and a groundwater sample was collected. If the time for recovery to 80% of the static level exceeded two hours, a groundwater sample was collected as soon as a sufficient volume of water was available.

Groundwater samples were collected in the order of the analytical parameters' volatility starting at the well with the lowest concentration of aromatic volatile organics. Each respective sample was collected using a new, inert, disposable bailer dedicated to each well.

Groundwater generated during well purging activities and water generated during equipment decontamination activities was contained on-site in 55-gallon drums for proper handling and disposal following receipt of chemical analyses. Each 55-gallon drum was appropriately labeled with its contents, estimated volume, date and source.

3.3 Field Logs

A field log was used to record all monitoring and sampling activities. The field log was used to record the following:

- Name of the project,
- Appearance of the samples,
- Description of sampling point and sampling methodology,
- Date and time of collection,
- Type of sample,
- Sample identification numbers,
- References such as maps or photographs of the sampling site,
- Field observations,
- Location of the sampling point, &
- Field measurements made (e.g. organic vapor, water level, etc.).

4.0 QUALITY ASSURANCE PLAN

To ensure the accuracy and reliability of the data collected, standard quality assurance/quality control (QA/QC) procedures were followed. A trained field technician monitored all field activities and was responsible for the proper collection and preservation of groundwater samples.

4.1 Sample Handling

Groundwater samples were collected from the monitoring wells using new, inert, disposable bailers dedicated to each well. Each sample was transferred from the bailer, with as little agitation as possible, into pre cleaned, properly preserved laboratory- provided Volatile Organic Analyses (VOA) containers. Three VOA bottles for each location were prepared. Sample bottles for VOA were filled completely, allowing no headspace. Filled sample containers were immediately labeled, and placed into an ice cooler with blue ice. Samples were delivered to the laboratory with a completed chain-of-custody form.

4.2 Equipment Decontamination

To minimize the potential of cross-contamination of the wells, all down-hole purging and sounding equipment were thoroughly decontaminated prior to first use and between each purging event. The well purging equipment was decontaminated by using a soapy water wash, followed by a tap water rinse, and a final de-ionized water rinse. Decontamination water was stored on site in a 55-gallon drum. Each 55-gallon drum was appropriately labeled.

4.3 Laboratory Analysis

Chemical analyses were performed by Jones Environmental, Inc. (JEI). JEI is a California Department of Health Services (CA DHS) certified analytical laboratory with approved internal quality assurance/quality control (QA/QC) procedures.

5.0 REPORT FINDINGS

5.1 Groundwater Elevations/Flow Direction

Depth to groundwater measurements were performed at nine (9) of eleven (11) existing groundwater monitoring wells on June 30, 2022. MW-5 was covered with compacted dirt overlay and MW-7 was covered with concrete overlay, thus, those wells were not measured for depth to water. Top-of-casing (TOC) elevations were re-surveyed last August 8, 2019 and the results are presented below. Based on the new TOC elevations and nine wells, the groundwater flow direction appears to be to the west-southwest, as shown in Figure 3. The current groundwater elevation data is presented in Table 5.1. Historic groundwater elevations versus time are included in Appendix D.

Table 5.1: Groundwater elevations at the monitoring wells measured on June 30, 2022

WELL NO.	TOTAL WELL DEPTH (ft)	SCREENED INTERVAL (ft. bgs)	ELEVATION OF TOP OF CASING (ft. amsl)	DEPTH FROM TOP OF WELL TO GROUNDWATER (ft)	THICKNESS OF FREE PRODUCT (ft)	GROUNDWATER ELEVATION (ft. amsl)
MW-1	30	5-30	1640.63	9.95	Not Observed	1630.68
MW-2	30	5-30	1642.41	11.24	Not Observed	1631.17
MW-3	32	7-32	1643.09	11.63	Not Observed	1631.46
MW-4	32	7-32	1640.99	10.32	Not Observed	1630.67
MW-5	32	7-32	1639.63	NM	Not Observed	------
MW-6	32	7-32	1639.09	9.17	Not Observed	1629.92

WELL NO.	TOTAL WELL DEPTH (ft)	SCREENED INTERVAL (ft. bgs)	ELEVATION OF TOP OF CASING (ft. amsl)	DEPTH FROM TOP OF WELL TO GROUNDWATER (ft)	THICKNESS OF FREE PRODUCT (ft)	GROUNDWATER ELEVATION (ft. amsl)
MW-7	35	10-35	1637.31	NM	Not Observed	------
MW-8	26	6-26	1639.89	9.12	Not Observed	1630.77
MW-9	25	5-25	1640.79	9.98	Sheen	1630.81
MW-10	25	5-25	1642.27	11.30	Not Observed	1630.97
MW-11	20	5-20	1641.17	10.42	Not Observed	1630.75

NM = Not Measured

5.2 Analytical Results of Groundwater Sampling

For ease of discussion, the analytical results are presented according to the contaminant type. Analytical results from the Second Semi-annual 2021 (Fourth Quarter 2021) sampling event at Mobil Baldwin are presented in Table 5.2. See Appendix A for complete laboratory analytical reports. For a history of groundwater analytical data, refer to Appendix B. Contaminant Concentrations versus Time are included in Appendix C.

Table 5.2: Tabulated results of analytical tests for groundwater samples collected on June 30, 2022

Sample ID	8015M	Method 8260B										
	TPH_G µg/L	Benzene µg/L	Toluene µg/L	Ethyl-benzene µg/L	Xylenes µg/L	MTBE µg/L	ETBE µg/L	DIPE µg/L	TAME µg/L	TBA µg/L	Ethanol mg/L	Naph-thalene µg/L
MW-1	13,400	815	325	2,790	4,757	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	ND<25	484
MW-2	ND<100	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	ND<25	ND<2.5
MW-3	ND<100	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	ND<25	ND<2.5
MW-4	1,390	125	1.1	612	3.3	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	ND<25	20.7
MW-5	ND<100	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	ND<25	ND<2.5
MW-6	ND<100	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	ND<25	ND<2.5
MW-7	ND<100	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	ND<25	ND<2.5
MW-8	ND<100	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	ND<25	ND<2.5
MW-9	77,800	30,300	30,300	3,640	20,760	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	ND<25	708
MW-10	ND<100	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	ND<25	ND<2.5
MW-11	ND<100	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	ND<25	ND<2.5
RL	*100*	*0.5*	*0.5*	*0.5*	*0.5*	*2.5*	*2.5*	*2.5*	*2.5*	*25*	*25*	*0.5*

RL= Reporting Limit ND=Not Detected (below RL) NS=Not Sampled

5.2.1 Total Petroleum Hydrocarbons as Gasoline (TPH_G)

Groundwater samples were analyzed for Total Petroleum Hydrocarbons (TPH) as gasoline (TPH_G) by LUFT GC/MS Method. TPH_G concentrations were reported in milligram per liter (mg/L). TPH_G concentrations were converted to microgram per liter (µg/L) unit in this report for presentation and uniformity purposes.

Elevated TPH_G concentrations were detected at monitoring wells MW-1, MW-4 and MW-9 at 13,400; 1,390 and 77,800 µg/L, respectively. Isopleths of TPH_G are shown in Figure 4.

5.2.2 Aromatic Volatile Organic Compounds

Groundwater samples from each monitoring well were analyzed for BTEX (Benzene, Toluene, Ethylbenzene, Xylenes) by EPA Method 8260B. All concentrations were reported in microgram per liter (µg/L) units.

Elevated Benzene concentrations were detected at MW-1, MW-4 and MW-9 at 815; 125 and 30,300 µg/L, respectively. Isopleths of Benzene are shown in Figure 5. Of the wells sampled, Toluene, Ethybenzen and Xylenes were detected at MW-1, MW-4 and MW-9, with the highest detected at MW-9 at 30,300; 3,640 and 20,760 µg/L, respectively.

Of the wells sampled, reportable Naphthalene concentrations ranged from 20.7 – 708 µg/L

5.2.3 Fuel Additive Oxygenates

Groundwater samples from each monitoring well were also analyzed for fuel additive oxygenates (MTBE, ETBE, DIPE, TAME, and TBA) by EPA Method 8260B. Concentrations were reported in microgram per liter (µg/L) units. MTBE, ETBE, DIPE, TAME, TBA and Ethanol concentrations were not reported in this sampling event.

5.3 Laboratory QA/QC

Laboratory blanks (i.e., method blanks) were part of QA protocols utilized by the analytical laboratory to ensure that contamination was not introduced during the sample extraction or chemical analysis procedures. The laboratory did not report any detectable concentrations of contaminants in the laboratory blanks.

The laboratory also includes, as part of each complete laboratory report, a QA/QC summary sheet. The QA/QC summary sheet presents the matrix spike (MS) and matrix spike duplicate (MSD) percent recoveries, the relative percent difference, and their acceptable ranges. All MS/MSD data presented were within acceptable QC limits for the samples collected during this quarterly groundwater monitoring event.

6.0 CONCLUSIONS

Based on the results presented in this report, A.C.C.E.S., Inc. has the following conclusions:

- Based on depth to groundwater measurements at nine wells, the direction of groundwater at the site was to the west-southwest during this investigation.
- Elevated TPH_G and Benzene concentrations were detected at MW-1 (13,400 and 815 µg/L), MW-4 (1,390 and 125 µg/L) and MW-9 (77,800 and 30,300 µg/L).
- Sheen was not observed at MW-9 during this monitoring event

7.0 RECOMMENDATIONS

The following recommendations are made:

1. Continue to observe all existing groundwater monitoring wells, particularly MW-9, for floating

product or sheen. If floating product reappears at MW-9 in the next few groundwater investigations, an appropriate and cost effective floating product recovery program will be recommended.

2. Additional remedial action is recommended to address the elevated petroleum hydrocarbons contamination at the site.

3. Groundwater monitoring is recommended to be continued to determine whether the contamination plume is steady or changing in size.

4. Locate and expose MW-5 and resume monitoring of that groundwater monitoring well. MW-7 appears to be under the newly-constructed concrete curb and may be difficult and costly to recommission and it is recommended that MW-7 be relocated. A workplan will be prepared and submitted to address the issues with MW-5 and MW-7.

8.0 LIMITATIONS

It is possible that variations in the subsurface conditions could exist beyond points explored during the course of the assessment. Therefore, it should be recognized that evaluation of geologic conditions is difficult, and an inexact process. Judgments leading to conclusions are often made with an incomplete knowledge of the existing subsurface conditions. Changes in existing conditions could occur at some time in the future due to variations in rainfall, temperature, and other factors not apparent at the time of the field investigation. This assessment was performed in accordance with the general standard of practice exercised by other consultants working under similar conditions in Southern California at the time of the investigation. No warranty, express or implied, is made.

Thank you for this opportunity to be of service. If you have any further questions or comments, please do not hesitate to call us.

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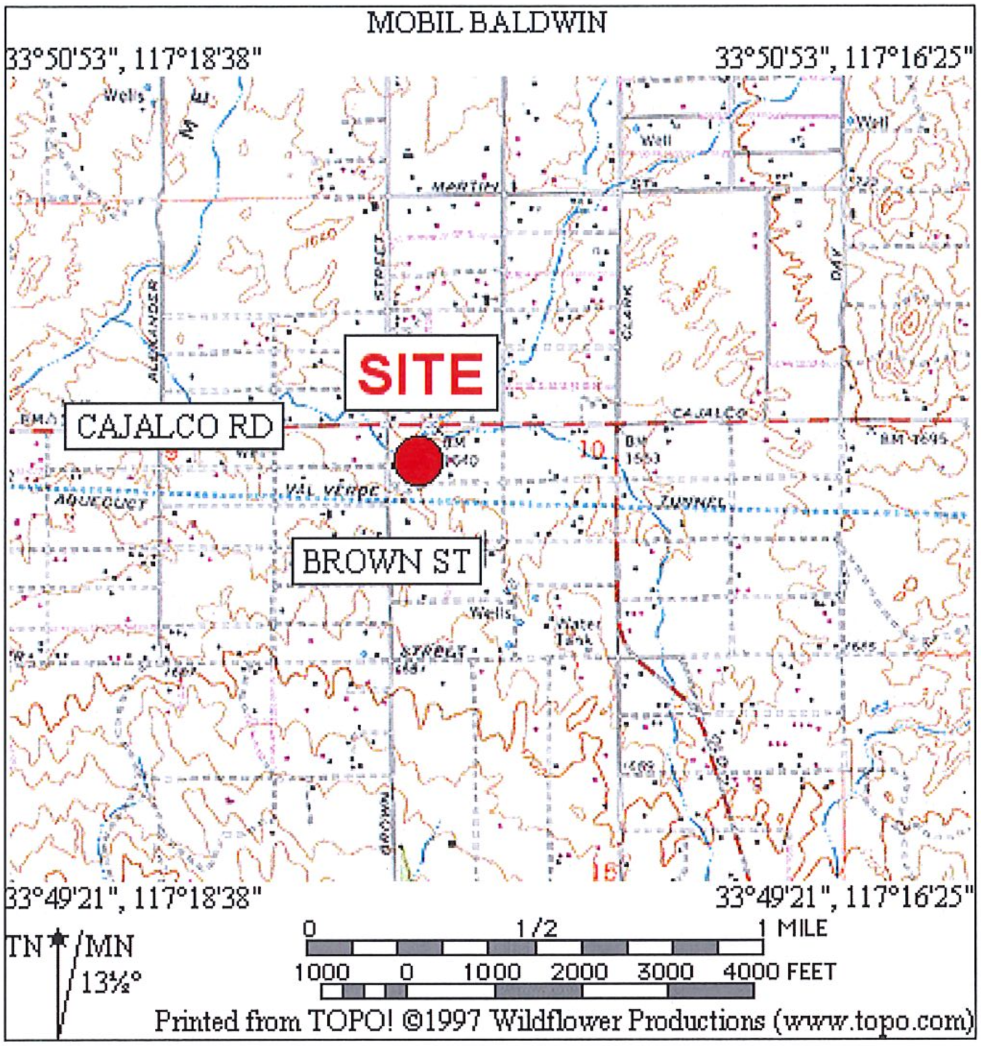
FIGURES



SITE VICINITY MAP

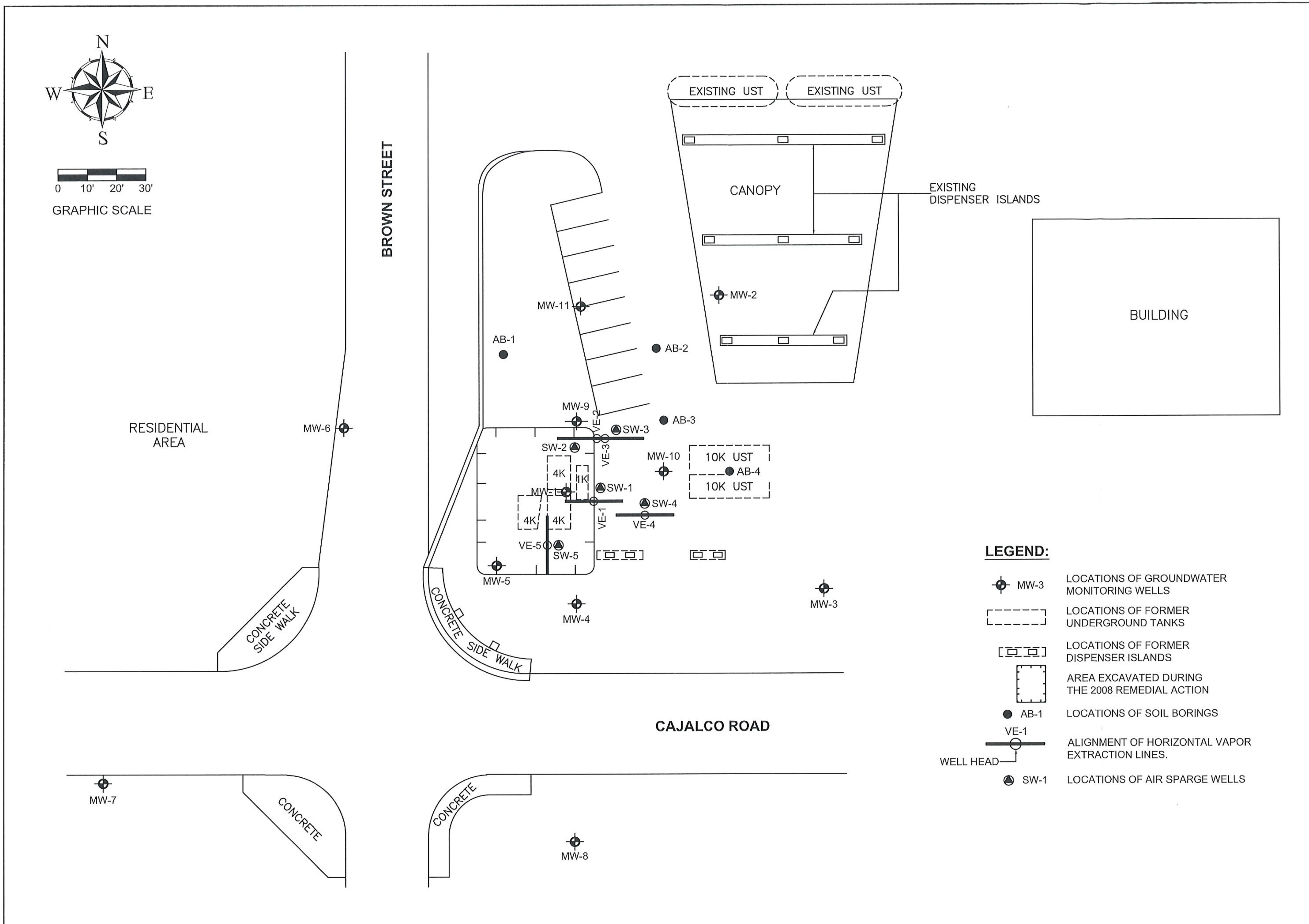
MOBIL BALDWIN

21020 CAJALCO ROAD. PERRIS, CA 92570

NOTE:

SOURCE OF MAP: TOPO INTERACTIVE MAPS

A.C.C.E.S. INC. ENVIRONMENTAL ASSOCIATED CONSULTING CIVIL & ENVIRONMENTAL SERVICES INC. P.O. Box 641607, Los Angeles, California 90064 Tel: 310 / 822 - 3800 Fax: 310 / 822 - 3804 www.accesengineering.com	TITLE: SITE VICINITY MAP	DWN BY: GS	SCALE: NOT TO SCALE
	PROJECT: GROUNDWATER MONITORING 1ST SEMI ANNUAL 2022	CHK BY: HA	DATE: 07/26/2022
	SITE: MOBIL BALDWIN 21020 CAJALCO ROAD, PERRIS, CA 92570	PROJECT No. 20145	DWG NO: FIGURE 1



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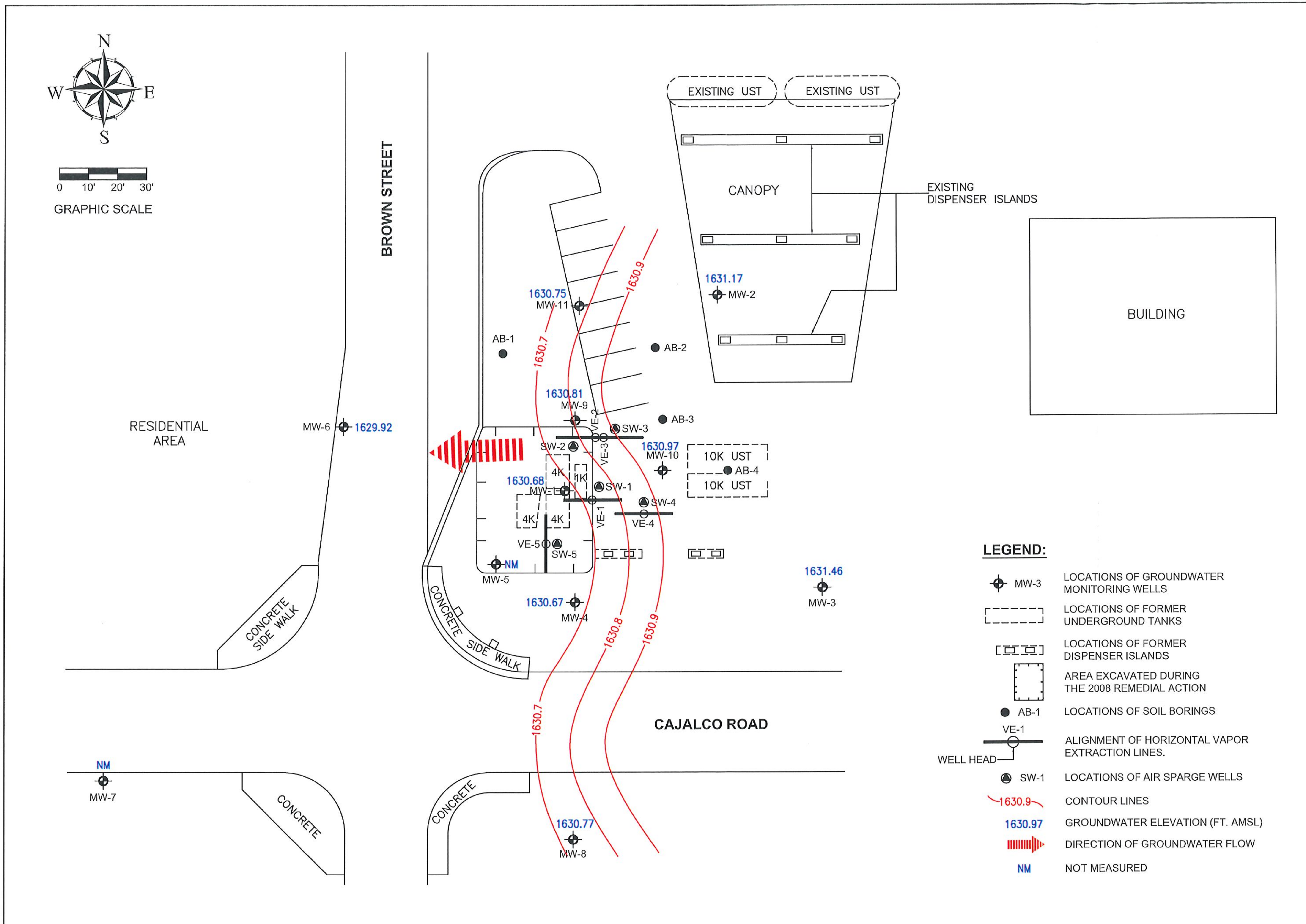
Tel: 310 / 822 - 3800 Fax: 310 / 822 - 3803
www.accesengineering.com

REVISION:	A	DATE
	B	DATE
	C	DATE
TITLE:	PLAN VIEW OF SITE LOCATION OF MONITORING WELLS	
PROJECT:	GROUNDWATER MONITORING 1ST SEMI - ANNUAL 2022	
ADDRESS:	MOBIL BALDWIN	
ADDRESS:	21020 CAJALCO ROAD, PERRIS, CA 92370	
DRAWN BY:	GS	
CHECK BY:	HA	
DATE:	07/26/2022	
JOB No:	20145	
SCALE:	1" = 30'	
DWG No:	FIGURE 2	



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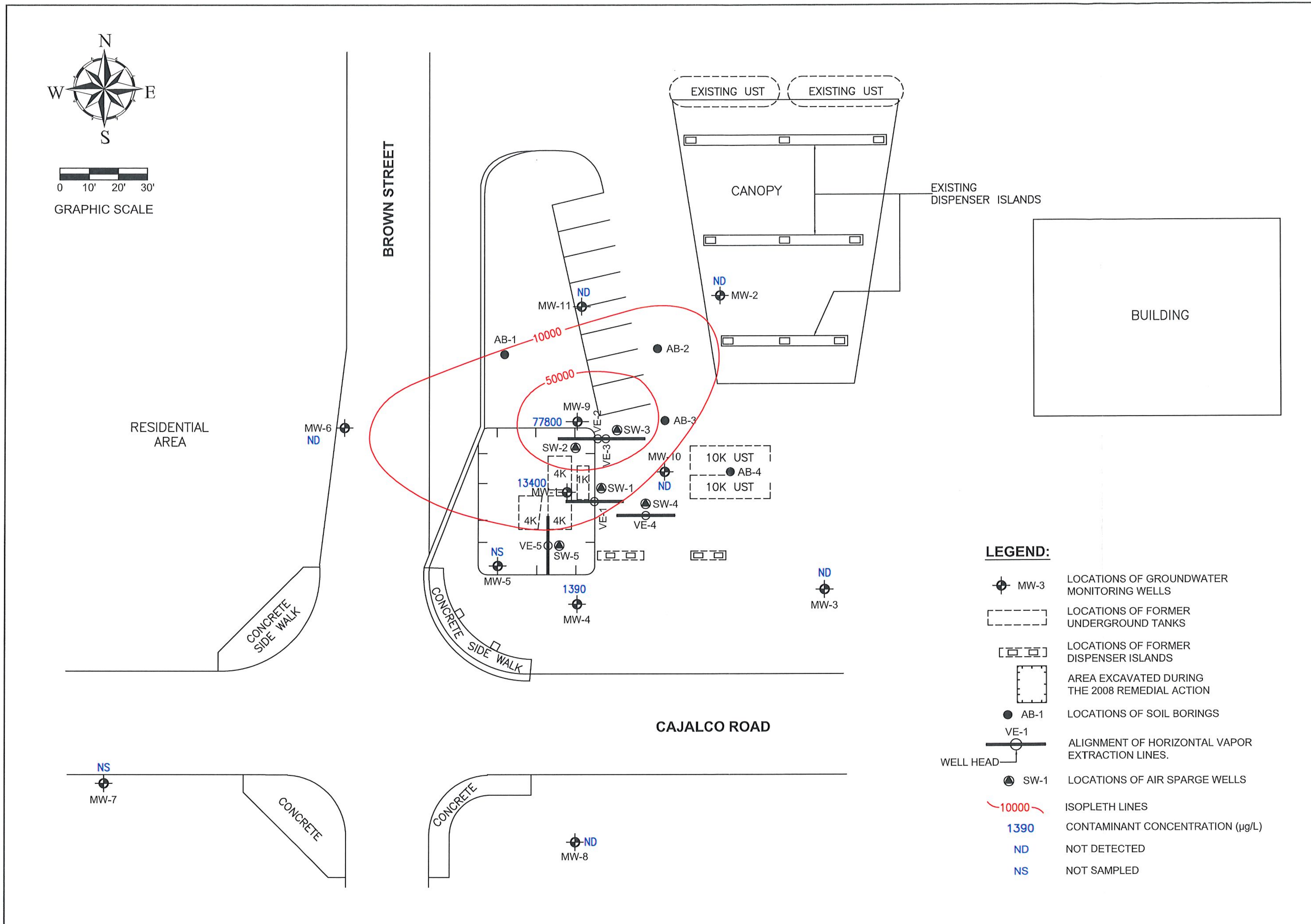
P.O. Box 641607, Los Angeles, California 90064
Tel: 310 / 822 - 3800 Fax: 310 / 822 - 3803
www.accesengineering.com

REVISION:	
A	DATE
B	DATE
C	DATE
TITLE:	PLAN VIEW OF SITE GROUNDWATER ELEVATION CONTOUR MAP
PROJECT:	GROUNDWATER MONITORING 1ST SEMI - ANNUAL 2022
ADDRESS:	MOBIL BALDWIN
ADDRESS:	21020 CAJALCO ROAD, PERRIS, CA 92370
DRAWN BY:	GS
CHECK BY:	HA
DATE:	07/26/2022
JOB No:	20145
SCALE:	1" = 30'
DWG No:	FIGURE 3



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P.O. Box 641607, Los Angeles, California 90064
Tel: 310 / 822 - 3800 Fax: 310 / 822 - 3803
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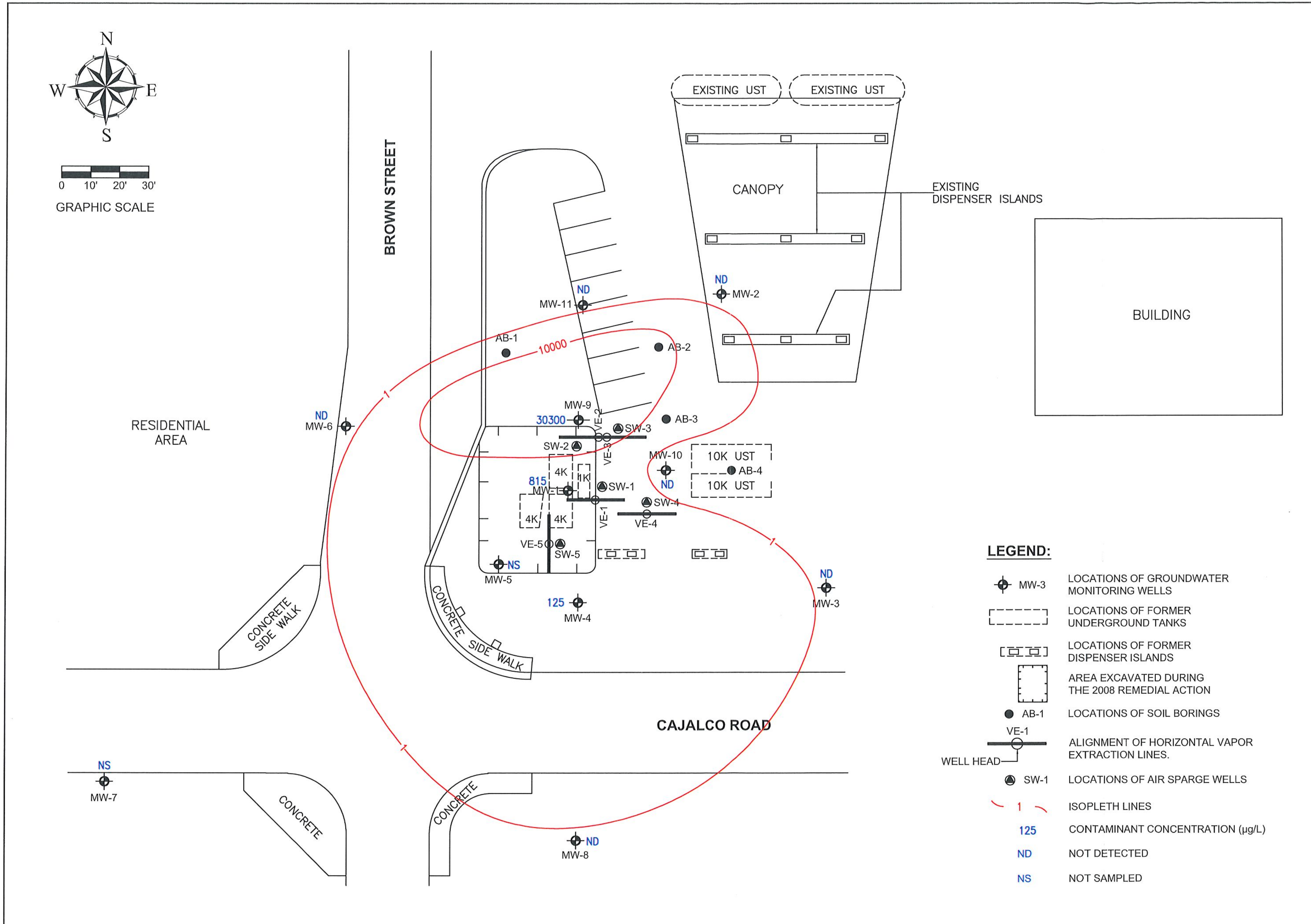
REVISION:		
A	DATE	
B	DATE	
C	DATE	

TITLE:	PLAN VIEW OF SITE ISOPLETHS OF TPH-g (µg/L) IN GROUNDWATER
PROJECT:	GROUNDWATER MONITORING 1ST SEMI - ANNUAL 2022
ADDRESS:	MOBIL BALDWIN
ADDRESS:	21020 CAJALCO ROAD, PERRIS, CA 92370
DRAWN BY:	GS
CHECK BY:	HA
DATE:	07/26/2022
JOB No:	20145
SCALE:	1" = 30'
DWG No:	FIGURE 4



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P.O. Box 641607, Los Angeles, California 90064
Tel: 310 / 822 - 3800 Fax: 310 / 822 - 3803
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REVISION:	A DATE / B DATE / C DATE
TITLE:	PLAN VIEW OF SITE ISOPLETH OF BENZENE (µg/L) IN GROUNDWATER
PROJECT:	GROUNDWATER MONITORING 1ST SEMI - ANNUAL 2022
ADDRESS:	MOBIL BALDWIN
ADDRESS:	21020 CAJALCO ROAD, PERRIS, CA 92370
DRAWN BY:	GS
CHECK BY:	HA
DATE:	07/26/2022
JOB No:	20145
SCALE:	1" = 30'
DWG No:	FIGURE 5

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APPENDIX A

JONES ENVIRONMENTAL, INC.
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JONES ENVIRONMENTAL
LABORATORY RESULTS

Client:	Acces Inc.	**Report date:**	7/15/2022
Client Address:	PO Box 641607 Los Angeles, CA	**Jones Ref. No.:**	ST-20140
Attn:	Ronaldo	**Date Sampled:**	6/30/2022
		Date Received:	6/30/2022
Project:	Mobil Baldwin	**Date Analyzed:**	7/7-8/2022
Project Address:	21020 Cajalco Rd. Perris, CA 92570	**Physical State:**	Water

ANALYSES REQUESTED

1. EPA 8260B by 5030B – Volatile Organics by GC/MS + Oxygenates/Gasoline Range Organics

Approval: Juan Camacho

Juan Camacho, M.S.
Stationary Lab Technical Manager

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JONES ENVIRONMENTAL LABORATORY RESULTS

Client:	Acces Inc.	**Report date:**	7/15/2022
Client Address:	PO Box 641607 Los Angeles, CA	**Jones Ref. No.:**	ST-20140
Attn:	Ronaldo	**Date Sampled:**	6/30/2022
		Date Received:	6/30/2022
Project:	Mobil Baldwin	**Date Analyzed:**	7/7-8/2022
Project Address:	21020 Cajalco Rd. Perris, CA 92570	**Physical State:**	Water

EPA 8260B by 5030 – Volatile Organics by GC/MS + Oxygenates/Gasoline Range Organics

Sample ID:	MW-1	MW-2	MW-3	MW-4	MW-6		
Jones ID:	ST-20140-01	ST-20140-02	ST-20140-03	ST-20140-04	ST-20140-05	**Reporting Limit**	**Units**
Analytes:							
Benzene	**815**	ND	ND	**125**	ND	0.5	μg/L
Bromobenzene	ND	ND	ND	ND	ND	0.5	μg/L
Bromodichloromethane	ND	ND	ND	ND	ND	0.5	μg/L
Bromoform	ND	ND	ND	ND	ND	0.5	μg/L
n-Butylbenzene	ND	ND	ND	ND	ND	0.5	μg/L
sec-Butylbenzene	ND	ND	ND	**7.0**	ND	0.5	μg/L
tert-Butylbenzene	ND	ND	ND	ND	ND	0.5	μg/L
Carbon tetrachloride	ND	ND	ND	ND	ND	0.5	μg/L
Chlorobenzene	ND	ND	ND	ND	ND	0.5	μg/L
Chloroform	ND	ND	ND	ND	ND	0.5	μg/L
2-Chlorotoluene	ND	ND	ND	ND	ND	0.5	μg/L
4-Chlorotoluene	ND	ND	ND	ND	ND	0.5	μg/L
Dibromochloromethane	ND	ND	ND	ND	ND	0.5	μg/L
1,2-Dibromo-3-chloropropane	ND	ND	ND	ND	ND	0.5	μg/L
1,2-Dibromoethane (EDB)	ND	ND	ND	ND	ND	0.5	μg/L
Dibromomethane	ND	ND	ND	ND	ND	0.5	μg/L
1,2- Dichlorobenzene	ND	ND	ND	ND	ND	0.5	μg/L
1,3-Dichlorobenzene	ND	ND	ND	ND	ND	0.5	μg/L
1,4-Dichlorobenzene	ND	ND	ND	ND	ND	0.5	μg/L
1,1-Dichloroethane	ND	ND	ND	ND	ND	0.5	μg/L
1,2-Dichloroethane	ND	ND	ND	ND	ND	0.5	μg/L
1,1-Dichloroethene	ND	ND	ND	ND	ND	0.5	μg/L
cis-1,2-Dichloroethene	ND	ND	ND	ND	ND	0.5	μg/L
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	0.5	μg/L
1,2-Dichloropropane	ND	ND	ND	ND	ND	0.5	μg/L
1,3-Dichloropropane	ND	ND	ND	ND	ND	0.5	μg/L
2,2-Dichloropropane	ND	ND	ND	ND	ND	0.5	μg/L
1,1-Dichloropropene	ND	ND	ND	ND	ND	0.5	μg/L
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	0.5	μg/L

JONES ENVIRONMENTAL LABORATORY RESULTS

EPA 8260B by 5030 – Volatile Organics by GC/MS + Oxygenates/Gasoline Range Organics

Sample ID:	**MW-1**	**MW-2**	**MW-3**	**MW-4**	**MW-6**		
Jones ID:	**ST-20140-01**	**ST-20140-02**	**ST-20140-03**	**ST-20140-04**	**ST-20140-05**	**Reporting Limit**	**Units**
Analytes:							
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	0.5	µg/L
Ethylbenzene	**2790**	ND	ND	**612**	ND	0.5	µg/L
Freon 11	ND	ND	ND	ND	ND	2.5	µg/L
Freon 12	ND	ND	ND	ND	ND	2.5	µg/L
Freon 113	ND	ND	ND	ND	ND	2.5	µg/L
Hexachlorobutadiene	ND	ND	ND	ND	ND	0.5	µg/L
Isopropylbenzene	ND	ND	ND	**25.4**	ND	0.5	µg/L
4-Isopropyltoluene	ND	ND	ND	ND	ND	0.5	µg/L
Methylene chloride	ND	ND	ND	ND	ND	0.5	µg/L
Naphthalene	**484**	ND	ND	**20.7**	ND	2.5	µg/L
n-Propylbenzene	**230**	ND	ND	**82.6**	ND	0.5	µg/L
Styrene	ND	ND	ND	ND	ND	0.5	µg/L
1,1,1,2-Tetrachloroethane	ND	ND	ND	ND	ND	0.5	µg/L
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	0.5	µg/L
Tetrachloroethene	ND	ND	ND	ND	ND	0.5	µg/L
Toluene	**325**	ND	ND	**1.1**	ND	0.5	µg/L
1,2,3-Trichlorobenzene	ND	ND	ND	ND	ND	0.5	µg/L
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND	0.5	µg/L
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	0.5	µg/L
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	0.5	µg/L
Trichloroethene	ND	ND	ND	ND	ND	0.5	µg/L
1,2,3-Trichloropropane	ND	ND	ND	ND	ND	0.5	µg/L
1,2,4-Trimethylbenzene	**1120**	ND	ND	**3.0**	ND	0.5	µg/L
1,3,5-Trimethylbenzene	**252**	ND	ND	**0.5**	ND	0.5	µg/L
Vinyl chloride	ND	ND	ND	ND	ND	0.5	µg/L
m,p-Xylene	**4370**	ND	ND	**3.3**	ND	1.0	µg/L
o-Xylene	**387**	ND	ND	ND	ND	0.5	µg/L
Methyl-tert-butylether	ND	ND	ND	ND	ND	2.5	µg/L
Ethyl-tert-butylether	ND	ND	ND	ND	ND	2.5	µg/L
Di-isopropylether	ND	ND	ND	ND	ND	2.5	µg/L
tert-amylmethylether	ND	ND	ND	ND	ND	2.5	µg/L
tert-Butylalcohol	ND	ND	ND	ND	ND	25.0	µg/L
Gasoline Range Organics (C4-C12)	**13.4**	ND	ND	**1.39**	ND	0.10	mg/L
Dilution Factor	100	1	1	1	1		
Surrogate Recoveries:						**QC Limits**	
Dibromofluoromethane	105%	103%	103%	105%	105%	60 - 140	
Toluene-d_8	98%	98%	96%	95%	95%	60 - 140	
4-Bromofluorobenzene	104%	93%	90%	109%	90%	60 - 140	
Batch:	VOC7-070822-01	VOC7-070722-01	VOC7-070722-01	VOC7-070822-01	VOC7-070722-01		

ND = Value less than reporting limit

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JONES ENVIRONMENTAL LABORATORY RESULTS

Client Address:	Acces Inc. PO Box 641607 Los Angeles, CA	**Report date:**	7/15/2022
		Jones Ref. No.:	ST-20140
Attn:	Ronaldo	**Date Sampled:**	6/30/2022
		Date Received:	6/30/2022
Project:	Mobil Baldwin	**Date Analyzed:**	7/7-8/2022
Project Address:	21020 Cajalco Rd. Perris, CA 92570	**Physical State:**	Water

EPA 8260B by 5030 – Volatile Organics by GC/MS + Oxygenates/Gasoline Range Organics

Sample ID:	**MW-8**	**MW-9**	**MW-10**	**MW-11**		
Jones ID:	**ST-20140-06**	**ST-20140-07**	**ST-20140-08**	**ST-20140-09**	**Reporting Limit**	**Units**
Analytes:						
Benzene	ND	**30300**	ND	ND	0.5	µg/L
Bromobenzene	ND	ND	ND	ND	0.5	µg/L
Bromodichloromethane	ND	ND	ND	ND	0.5	µg/L
Bromoform	ND	ND	ND	ND	0.5	µg/L
n-Butylbenzene	ND	ND	ND	ND	0.5	µg/L
sec-Butylbenzene	ND	ND	ND	ND	0.5	µg/L
tert-Butylbenzene	ND	ND	ND	ND	0.5	µg/L
Carbon tetrachloride	ND	ND	ND	ND	0.5	µg/L
Chlorobenzene	ND	ND	ND	ND	0.5	µg/L
Chloroform	ND	ND	ND	ND	0.5	µg/L
2-Chlorotoluene	ND	ND	ND	ND	0.5	µg/L
4-Chlorotoluene	ND	ND	ND	ND	0.5	µg/L
Dibromochloromethane	ND	ND	ND	ND	0.5	µg/L
1,2-Dibromo-3-chloropropane	ND	ND	ND	ND	0.5	µg/L
1,2-Dibromoethane (EDB)	ND	ND	ND	ND	0.5	µg/L
Dibromomethane	ND	ND	ND	ND	0.5	µg/L
1,2- Dichlorobenzene	ND	ND	ND	ND	0.5	µg/L
1,3-Dichlorobenzene	ND	ND	ND	ND	0.5	µg/L
1,4-Dichlorobenzene	ND	ND	ND	ND	0.5	µg/L
1,1-Dichloroethane	ND	ND	ND	ND	0.5	µg/L
1,2-Dichloroethane	ND	ND	ND	ND	0.5	µg/L
1,1-Dichloroethene	ND	ND	ND	ND	0.5	µg/L
cis-1,2-Dichloroethene	ND	ND	ND	ND	0.5	µg/L
trans-1,2-Dichloroethene	ND	ND	ND	ND	0.5	µg/L
1,2-Dichloropropane	ND	ND	ND	ND	0.5	µg/L
1,3-Dichloropropane	ND	ND	ND	ND	0.5	µg/L
2,2-Dichloropropane	ND	ND	ND	ND	0.5	µg/L
1,1-Dichloropropene	ND	ND	ND	ND	0.5	µg/L
cis-1,3-Dichloropropene	ND	ND	ND	ND	0.5	µg/L

JONES ENVIRONMENTAL LABORATORY RESULTS

EPA 8260B by 5030 – Volatile Organics by GC/MS + Oxygenates/Gasoline Range Organics

Sample ID:	MW-8	MW-9	MW-10	MW-11		
Jones ID:	ST-20140-06	ST-20140-07	ST-20140-08	ST-20140-09	**Reporting Limit**	**Units**
Analytes:						
trans-1,3-Dichloropropene	ND	ND	ND	ND	0.5	µg/L
Ethylbenzene	ND	**3640**	ND	ND	0.5	µg/L
Freon 11	ND	ND	ND	ND	2.5	µg/L
Freon 12	ND	ND	ND	ND	2.5	µg/L
Freon 113	ND	ND	ND	ND	2.5	µg/L
Hexachlorobutadiene	ND	ND	ND	ND	0.5	µg/L
Isopropylbenzene	ND	ND	ND	ND	0.5	µg/L
4-Isopropyltoluene	ND	ND	ND	ND	0.5	µg/L
Methylene chloride	ND	ND	ND	ND	0.5	µg/L
Naphthalene	ND	**708**	ND	ND	2.5	µg/L
n-Propylbenzene	ND	**202**	ND	ND	0.5	µg/L
Styrene	ND	ND	ND	ND	0.5	µg/L
1,1,1,2-Tetrachloroethane	ND	ND	ND	ND	0.5	µg/L
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	0.5	µg/L
Tetrachloroethene	ND	ND	ND	ND	0.5	µg/L
Toluene	ND	**30300**	ND	ND	0.5	µg/L
1,2,3-Trichlorobenzene	ND	ND	ND	ND	0.5	µg/L
1,2,4-Trichlorobenzene	ND	ND	ND	ND	0.5	µg/L
1,1,1-Trichloroethane	ND	ND	ND	ND	0.5	µg/L
1,1,2-Trichloroethane	ND	ND	ND	ND	0.5	µg/L
Trichloroethene	ND	ND	ND	ND	0.5	µg/L
1,2,3-Trichloropropane	ND	ND	ND	ND	0.5	µg/L
1,2,4-Trimethylbenzene	ND	**2750**	ND	ND	0.5	µg/L
1,3,5-Trimethylbenzene	ND	**640**	ND	ND	0.5	µg/L
Vinyl chloride	ND	ND	ND	ND	0.5	µg/L
m,p-Xylene	ND	**15700**	ND	ND	1.0	µg/L
o-Xylene	ND	**5060**	ND	ND	0.5	µg/L
Methyl-tert-butylether	ND	ND	ND	ND	2.5	µg/L
Ethyl-tert-butylether	ND	ND	ND	ND	2.5	µg/L
Di-isopropylether	ND	ND	ND	ND	2.5	µg/L
tert-amylmethylether	ND	ND	ND	ND	2.5	µg/L
tert-Butylalcohol	ND	ND	ND	ND	25.0	µg/L
Gasoline Range Organics (C4-C12)	ND	**77.8**	ND	ND	0.10	mg/L
Dilution Factor	1	200	1	1		
Surrogate Recoveries:					**QC Limits**	
Dibromofluoromethane	105%	97%	105%	104%	60 - 140	
Toluene-d_8	97%	101%	96%	95%	60 - 140	
4-Bromofluorobenzene	91%	95%	91%	96%	60 - 140	
Batch:	VOC7-070722-01	VOC7-070822-01	VOC7-070722-01	VOC7-070722-01		

ND = Value less than reporting limit

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JONES ENVIRONMENTAL LABORATORY RESULTS

Client:	Acces Inc.		**Report date:**	7/15/2022
Client Address:	PO Box 641607		**Jones Ref. No.:**	ST-20140
	Los Angeles, CA		**Client Ref. No.:**	
Attn:	Ronaldo		**Date Sampled:**	6/30/2022
			Date Received:	6/30/2022
Project:	Mobil Baldwin		**Date Analyzed:**	7/7-8/2022
Project Address:	21020 Cajalco Rd.		**Physical State:**	Water
	Perris, CA 92570			

EPA 8260B by 5030 – Volatile Organics by GC/MS + Oxygenates/Gasoline Range Organics

Sample ID:	**METHOD BLANK #1**	**METHOD BLANK #2**		
Jones ID:	**070722-V7MB1**	**070822-V7MB1**	**Reporting Limit**	**Units**
Analytes:				
Benzene	ND	ND	0.5	μg/L
Bromobenzene	ND	ND	0.5	μg/L
Bromodichloromethane	ND	ND	0.5	μg/L
Bromoform	ND	ND	0.5	μg/L
n-Butylbenzene	ND	ND	0.5	μg/L
sec-Butylbenzene	ND	ND	0.5	μg/L
tert-Butylbenzene	ND	ND	0.5	μg/L
Carbon tetrachloride	ND	ND	0.5	μg/L
Chlorobenzene	ND	ND	0.5	μg/L
Chloroform	ND	ND	0.5	μg/L
2-Chlorotoluene	ND	ND	0.5	μg/L
4-Chlorotoluene	ND	ND	0.5	μg/L
Dibromochloromethane	ND	ND	0.5	μg/L
1,2-Dibromo-3-chloropropane	ND	ND	0.5	μg/L
1,2-Dibromoethane (EDB)	ND	ND	0.5	μg/L
Dibromomethane	ND	ND	0.5	μg/L
1,2- Dichlorobenzene	ND	ND	0.5	μg/L
1,3-Dichlorobenzene	ND	ND	0.5	μg/L
1,4-Dichlorobenzene	ND	ND	0.5	μg/L
1,1-Dichloroethane	ND	ND	0.5	μg/L
1,2-Dichloroethane	ND	ND	0.5	μg/L
1,1-Dichloroethene	ND	ND	0.5	μg/L
cis-1,2-Dichloroethene	ND	ND	0.5	μg/L
trans-1,2-Dichloroethene	ND	ND	0.5	μg/L
1,2-Dichloropropane	ND	ND	0.5	μg/L
1,3-Dichloropropane	ND	ND	0.5	μg/L
2,2-Dichloropropane	ND	ND	0.5	μg/L
1,1-Dichloropropene	ND	ND	0.5	μg/L
cis-1,3-Dichloropropene	ND	ND	0.5	μg/L

JONES ENVIRONMENTAL LABORATORY RESULTS

EPA 8260B by 5030 – Volatile Organics by GC/MS + Oxygenates/Gasoline Range Organics

Sample ID:	METHOD BLANK #1	METHOD BLANK #2	Reporting Limit	Units
Jones ID:	070722-V7MB1	070822-V7MB1		
Analytes:				
trans-1,3-Dichloropropene	ND	ND	0.5	µg/L
Ethylbenzene	ND	ND	0.5	µg/L
Freon 11	ND	ND	2.5	µg/L
Freon 12	ND	ND	2.5	µg/L
Freon 113	ND	ND	2.5	µg/L
Hexachlorobutadiene	ND	ND	0.5	µg/L
Isopropylbenzene	ND	ND	0.5	µg/L
4-Isopropyltoluene	ND	ND	0.5	µg/L
Methylene chloride	ND	ND	0.5	µg/L
Naphthalene	ND	ND	2.5	µg/L
n-Propylbenzene	ND	ND	0.5	µg/L
Styrene	ND	ND	0.5	µg/L
1,1,1,2-Tetrachloroethane	ND	ND	0.5	µg/L
1,1,2,2-Tetrachloroethane	ND	ND	0.5	µg/L
Tetrachloroethene	ND	ND	0.5	µg/L
Toluene	ND	ND	0.5	µg/L
1,2,3-Trichlorobenzene	ND	ND	0.5	µg/L
1,2,4-Trichlorobenzene	ND	ND	0.5	µg/L
1,1,1-Trichloroethane	ND	ND	0.5	µg/L
1,1,2-Trichloroethane	ND	ND	0.5	µg/L
Trichloroethene	ND	ND	0.5	µg/L
1,2,3-Trichloropropane	ND	ND	0.5	µg/L
1,2,4-Trimethylbenzene	ND	ND	0.5	µg/L
1,3,5-Trimethylbenzene	ND	ND	0.5	µg/L
Vinyl chloride	ND	ND	0.5	µg/L
m,p-Xylene	ND	ND	1.0	µg/L
o-Xylene	ND	ND	0.5	µg/L
Methyl-tert-butylether	ND	ND	2.5	µg/L
Ethyl-tert-butylether	ND	ND	2.5	µg/L
Di-isopropylether	ND	ND	2.5	µg/L
tert-amylmethylether	ND	ND	2.5	µg/L
tert-Butylalcohol	ND	ND	25.0	µg/L
Gasoline Range Organics (C4-C12)	ND	ND	0.10	mg/L
Dilution Factor	1	1		
Surrogate Recoveries:			**QC Limits**	
Dibromofluoromethane	100%	104%	60 - 140	
Toluene-d_8	96%	98%	60 - 140	
4-Bromofluorobenzene	94%	97%	60 - 140	
Batch:	VOC7-070722-01	VOC7-070822-01		

ND = Value less than reporting limit

JONES ENVIRONMENTAL, INC.
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562-646-1611
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SANTA FE SPRINGS, CA 90670
WWW.JONESENV.COM

JONES ENVIRONMENTAL QUALITY CONTROL INFORMATION

Client:	Acces Inc.	**Report date:**	7/15/2022
Client Address:	PO Box 641607	**Jones Ref. No.:**	ST-20140
	Los Angeles, CA	**Client Ref. No.:**	
Attn:	Ronaldo	**Date Sampled:**	6/30/2022
		Date Received:	6/30/2022
Project:	Mobil Baldwin	**Date Analyzed:**	7/7-8/2022
Project Address:	21020 Cajalco Rd.	**Physical State:**	Water
	Perris, CA 92570		

EPA 8260B by 5030 – Volatile Organics by GC/MS + Oxygenates/Gasoline Range Organics

GC#: VOC7-070722-01

Jones ID:	070722-V7LCS1	070722-V7LCSD1			070722-V7CCV1	
Parameter	LCS Recovery (%)	LCSD Recovery (%)	RPD	Acceptability Range (%)	CCV	Acceptability Range (%)
Vinyl chloride	101%	103%	1.6%	60 - 140	95%	80 - 120
1,1-Dichloroethene	105%	111%	5.8%	60 - 140	117%	80 - 120
Cis-1,2-Dichloroethene	105%	108%	2.9%	70 - 130	119%	80 - 120
1,1,1-Trichloroethane	96%	103%	6.8%	70 - 130	116%	80 - 120
Benzene	105%	110%	5.1%	70 - 130	115%	80 - 120
Trichloroethene	101%	108%	6.0%	70 - 130	114%	80 - 120
Toluene	102%	109%	6.3%	70 - 130	110%	80 - 120
Tetrachloroethene	93%	99%	5.7%	70 - 130	105%	80 - 120
Chlorobenzene	106%	113%	6.2%	70 - 130	115%	80 - 120
Ethylbenzene	99%	104%	5.1%	70 - 130	113%	80 - 120
1,2,4 Trimethylbenzene	95%	103%	7.8%	70 - 130	111%	80 - 120
Gasoline Range Organics (C4-C12)	100%	106%	6.0%	70 - 130		
Surrogate Recovery:						
Dibromofluoromethane	102%	102%		60 - 140	116%	60 - 140
Toluene-d_8	97%	97%		60 - 140	108%	60 - 140
4-Bromofluorobenzene	95%	95%		60 - 140	130%	60 - 140

LCS = Laboratory Control Sample
LCSD = Laboratory Control Sample Duplicate
CCV = Continuing Calibration Verification
RPD = Relative Percent Difference; Acceptability range for RPD is ≤ 20%

JONES ENVIRONMENTAL, INC.

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11007 FOREST PLACE
SANTA FE SPRINGS, CA 90670
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JONES ENVIRONMENTAL QUALITY CONTROL INFORMATION

Client: Acces Inc.
Client Address: PO Box 641607
Los Angeles, CA

Report date: 7/15/2022
Jones Ref. No.: ST-20140

Attn: Ronaldo

Date Sampled: 6/30/2022
Date Received: 6/30/2022
Date Analyzed: 7/7-8/2022
Physical State: Water

Project: Mobil Baldwin
Project Address: 21020 Cajalco Rd.
Perris, CA 92570

EPA 8260B by 5030 – Volatile Organics by GC/MS + Oxygenates/Gasoline Range Organics

GC#: VOC7-070822-01

Jones ID:	070822-V7LCS1	070822-V7LCSD1			070822-V7CCV1	
Parameter	LCS Recovery (%)	LCSD Recovery (%)	RPD	Acceptability Range (%)	CCV	Acceptability Range (%)
Vinyl chloride	94%	95%	1.6%	60 - 140	89%	80 - 120
1,1-Dichloroethene	90%	99%	9.5%	60 - 140	101%	80 - 120
Cis-1,2-Dichloroethene	91%	104%	12.8%	70 - 130	107%	80 - 120
1,1,1-Trichloroethane	83%	90%	7.9%	70 - 130	93%	80 - 120
Benzene	93%	104%	10.9%	70 - 130	104%	80 - 120
Trichloroethene	95%	107%	12.1%	70 - 130	104%	80 - 120
Toluene	91%	104%	13.2%	70 - 130	99%	80 - 120
Tetrachloroethene	82%	91%	10.3%	70 - 130	87%	80 - 120
Chlorobenzene	99%	112%	12.8%	70 - 130	107%	80 - 120
Ethylbenzene	92%	101%	9.4%	70 - 130	100%	80 - 120
1,2,4 Trimethylbenzene	105%	107%	2.1%	70 - 130	105%	80 - 120
Gasoline Range Organics (C4-C12)	95%	104%	8.8%	70 - 130		
Surrogate Recovery:						
Dibromofluoromethane	99%	100%		60 - 140	102%	60 - 140
Toluene-d_8	97%	97%		60 - 140	94%	60 - 140
4-Bromofluorobenzene	95%	97%		60 - 140	103%	60 - 140

LCS = Laboratory Control Sample
LCSD = Laboratory Control Sample Duplicate
CCV = Continuing Calibration Verification
RPD = Relative Percent Difference; Acceptability range for RPD is ≤ 20%

JONES ENVIRONMENTAL, INC.

11007 Forest Pl.
Santa Fe Springs, CA 90670
(714) 449-9937
Fax(714)449-9685
www.jonesenv.com

Chain-of-Custody Record

Client: ACCES INC

Date:

Project Name: MOBIL BALDWIN

Client Project #:

Project Address: 21020 CAJALCO RD.
PERRIS, CA 92570

Email: rarboleda@accesengineering.com

Phone: 310-822-3800

Report To: Ronaldo

Sampler:

Turn Around Requested:
- ☐ Immediate Attention
- ☐ Rush 24 Hours
- ☐ Rush 48 Hours
- ☐ Rush 72 Hours
- ☑ Normal

Report Options
- EDD ______
- EDF* - 10% Surcharge ✓
- *Global ID T0606599148

LAB USE ONLY

Jones Project # ST-20140

Page 1 of 1

Sample Condition as Received:
- Chilled ☐ yes ☐ no
- Sealed ☐ yes ☐ no

Sample Container / Preservative Abbreviations
- V - VOAS
- AS - Acetate Sleeve
- SS - Stainless Steel Sleeve
- BS - Brass Sleeve
- G - Glass Jar
- AB - Amber Bottle
- P - Plastic
- SOBI - Sodium Bisulfate
- MeOH - Methanol
- HCl - Hydrochloric Acid
- HNO3 - Nitric Acid
- O - Other (See Notes)

Analysis Requested

Sample ID	Date	Sample Collection Time	Jones ID Lab Use Only	Preservative	Sample Container	Sample Matrix: Soil (S), Sludge (SL), Aqueous (A), Free Product (FP)	8260B: TPHg, BTEX	OXYGENATES, FULL SCAN VOCs									Hold	Number of Containers	Notes & Special Instructions
MW-1	6/30/22	11:55	ST-20140-01	HCl	40 ml Vials	A	X	X											
MW-2		10:05	ST-20140-02																
MW-3		10:40	ST-20140-03																
MW-4		11:15	ST-20140-04																
MW-6		9:30	ST-20140-05																
MW-8		8:55	ST-20140-06																
MW-9		9:25	ST-20140-07																
MW-10		12:35	ST-20140-08																
MW-11		1:00	ST-20140-09																

Relinquished By (Signature): [signature]
Printed Name: ERIC. R
Company: ACCES INC
Date: 6/30/22
Time:

Received By (Signature):
Printed Name:
Company:
Date:
Time:

Total Number of Containers:

Relinquished By (Signature):
Printed Name:
Company:
Date:
Time:

Received By Laboratory (Signature): [signature]
Printed Name: Kiara
Company: Jones
Date: 6/30/22
Time: 1430

Client signature on this Chain of Custody form constitutes acknowledgment that the above analyses have been requested, and the information provided herein is correct and accurate

A.C.C.E.S. INC. – 2336 S. Sepulveda Blvd, Los Angeles, CA 90064
310-822-3800

APPENDIX B

TABULATED GROUNDWATER SAMPLE ANALYTICAL RESULTS

MOBIL BALDWIN

SAMPLE SOURCE	DATE SAMPLED	TPH AS GASOLINE (µg/L)	TPH AS DIESEL (µg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL-BENZENE (µg/L)	XYLENES (µg/L)	MTBE (µg/L)	ETBE (µg/L)	DIPE (µg/L)	TAME (µg/L)	TBA (µg/L)	DEPTH TO G.W. (FT)	G.W. ELEVATION (FT - AMSL)
MW-1	01/08/03	24,620.0	NA	4,841.0	6,768.0	691.0	3,518.0	82.0	NA	NA	NA	NA	11.090	1,607.420
	04/16/03	9,570.0	NA	1,734.0	1,562.0	55.0	1,102.0	214.0	NA	NA	NA	NA	6.280	1,612.230
	07/14/03	48,094.0	NA	12,343.0	9,325.0	888.0	3,653.0	389.0	NA	NA	NA	NA	8.430	1,610.080
	10/14/03	26,809.0	NA	9,525.0	5,150.0	637.0	1,895.0	283.0	NA	NA	NA	NA	11.280	1,607.230
	03/05/04	4,325.0	NA	1,187.0	403.0	ND	321.0	51.0	NA	NA	NA	NA	7.620	1,610.890
	05/13/04	34,815.0	NA	6,482.0	4,223.0	839.0	2,217.0	1,270.0	NA	NA	NA	NA	8.000	1,610.510
	07/28/04	52,082.0	NA	12,736.0	9,552.0	1,781.0	3,823.0	381.0	NA	NA	NA	NA	9.600	1,608.910
	10/26/04	28,801.0	NA	14,979.0	8,910.0	427.0	767.0	70.0	NA	NA	NA	NA	9.940	1,608.570
	01/25/05	1,062.0	NA	423.0	74.0	5.0	111.0	59.0	NA	NA	NA	NA	3.940	1,614.570
	05/13/05	42,026.0	NA	17,977.0	11,270.0	1,027.0	2,210.0	353.0	NA	NA	NA	NA	5.160	1,613.350
	07/21/05	66,131.0	NA	20,366.0	10,783.0	1,162.0	3,453.0	164.0	NA	NA	NA	NA	7.060	1,611.450
	10/04/05	61,313.0	NA	31,399.0	13,672.3	1,129.6	3,853.3	280.9	NA	NA	NA	NA	8.520	1,609.990
	01/04/06	8,414.0	NA	1,393.8	306.8	84.0	217.9	102.0	NA	NA	NA	NA	7.440	1,611.070
**	12/08/06	108,000.0	NA	26,100.0	23,900.0	1,640.0	8,950.0	167.0	ND	ND	ND	ND	9.100	1,609.410
	03/15/07	217,000.0	NA	39,900.0	52,800.0	3,100.0	19,000.0	ND	ND	ND	ND	ND	6.210	1,612.300
	06/08/07	56,900.0	ND	17,000.0	12,600.0	1,280.0	5,010.0	408.0	ND	ND	ND	ND	7.340	1,611.170
	09/07/07	67,200.0	NA	24,200.0	19,300.0	1,520.0	6,320.0	318.0	ND	ND	ND	ND	7.530	1,610.980
	12/14/07	12,500.0	NA	4,430.0	736.0	157.0	673.0	76.5	ND	ND	ND	ND	7.520	1,610.990
	03/28/08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA***	
	05/23/08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA***	
	08/26/08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA***	
	01/06/09	5,650.0	NA	850.0	194.0	NA	505.0	10.0	ND	ND	ND	ND	8.100	1,610.243
	03/13/09	ND	NA	ND	ND	NA	ND	2.4	ND	ND	ND	ND	6.380	1,611.963
	06/11/09	39,900.0	NA	9,200.0	4,970.0	NA	2,430.0	103.0	ND	ND	ND	ND	7.510	1,610.833
	09/03/09	66,100.0	NA	16,800.0	12,900.0	NA	5,150.0	150.0	ND	ND	ND	ND	9.500	1,608.843
	12/08/09	69,500.0	NA	19,700.0	13,800.0	NA	7,300.0	196.0	ND	ND	ND	ND	10.110	1,608.233
	02/18/10	3,200.1	NA	59.1	133.0	NA	239.0	4.4	ND	ND	ND	ND	4.780	1,613.563
	05/19/10	23,800.0	NA	4,420.0	3,120.0	718.0	2,940.0	42.9	ND	ND	ND	ND	6.390	1,611.953
	09/29/10	91,400.0	NA	20,100.0	21,600.0	2,110.0	10,500.0	32.4	ND	ND	ND	ND	10.760	1,607.583
	12/16/10	40,600.0	NA	10,100.0	5,960.0	1,040.0	4,850.0	98.5	ND	ND	ND	ND	10.560	1,607.783
	03/17/11	1,200.0	NA	208.0	127.0	16.1	93.0	8.4	ND	ND	ND	ND	4.430	1,613.913
	06/17/11	55,000.0	NA	12,800.0	16,400.0	1,470.0	5,470.0	160.0	ND	4.4	ND	283.0	6.550	1,611.793
	09/13/11	117,000.0	NA	23,800.0	18,200.0	2,260.0	10,500.0	334.0	ND	ND	ND	ND	9.000	1,609.343
	11/11/11	71,900.0	NA	19,100.0	15,800.0	1,760.0	10,480.0	ND	ND	ND	ND	ND	10.100	1,608.243
	02/10/12	4,480.0	NA	1,690.0	187.0	152.0	151.0	ND	ND	ND	ND	ND	7.760	1,610.583
	05/15/12	1,030.0	NA	382.0	3.9	ND	28.3	31.7	ND	ND	ND	ND	8.140	1,610.203
	08/24/12	23,500.0	NA	8,170.0	1,720.0	980.0	3,120.0	66.4	NA	NA	NA	NA	10.500	1,607.843
	12/10/12	15,200.0	NA	9,920.0	118.0	129.0	1,040.0	ND	ND	ND	ND	ND	10.680	1,607.663
	02/28/13	2,780.0	NA	1,370.0	11.7	ND	71.4	26.6	ND	ND	ND	ND	7.620	1,610.723

** first sampling event conducted by AI, data prior to this date was generated by EAR
* Not Analyzed for this Contaminant
*** not analyzed as well was destroyed in soil excavation 03/2008.
**** Not analyzed as car was parked over the monitoring well.

TABULATED GROUNDWATER SAMPLE ANALYTICAL RESULTS
MOBIL BALDWIN

SAMPLE SOURCE	DATE SAMPLED	TPH AS GASOLINE (µg/L)	TPH AS DIESEL (µg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL-BENZENE (µg/L)	XYLENES (µg/L)	MTBE (µg/L)	ETBE (µg/L)	DIPE (µg/L)	TAME (µg/L)	TBA (µg/L)	DEPTH TO G.W. (FT)	G.W. ELEVATION (FT - AMSL)
	05/09/13	10,500.0	NA	4,740.0	409.0	387.0	307.0	43.7	ND	ND	ND	ND	7.690	1,610.653
	09/24/13	44,400.0	NA	21,800.0	1,930.0	1,220.0	8,240.0	328.0	ND	ND	ND	ND	10.320	1,608.023
	12/11/13	1,620.0	NA	160.0	260.0	29.7	240.0	22.6	ND	ND	ND	ND	8.220	1,610.123
	03/07/14	1,170.0	NA	7.8	83.8	24.1	221.0	1.4	ND	ND	ND	ND	8.500	1,609.843
	05/09/14	106,000.0	NA	26,800.0	38,300.0	1,930.0	15,900.0	ND	ND	ND	ND	ND	8.600	1,609.743
	11/17/14	115,000.0	NA	15,200.0	31,300.0	2,520.0	18,600.0	ND	ND	ND	ND	ND	11.980	1,606.363
	07/02/15	48,400.0	NA	4,370.0	10,300.0	1,050.0	7,180.0	ND	ND	ND	ND	ND	10.920	1,607.423
	10/21/15	54,900.0	NA	6,380.0	11,300.0	2,040.0	12,300.0	ND	ND	ND	ND	ND	11.740	1,606.603
	06/27/16	51,500.0	NA	3,810.0	8,000.0	1,810.0	3,240.0	ND	ND	ND	ND	ND	10.710	1,607.633
	01/23/17	210.0	NA	ND	ND	2.6	35.6	ND	ND	ND	ND	ND	12.220	1,606.123
	06/13/17	22,700.0	NA	2,020.0	3,090.0	1,480.0	7,040.0	ND	ND	ND	ND	ND	8.120	1,610.223
	10/25/17	9,050.0	NA	8,350.0	613.0	3,890.0	13,650.0	ND	ND	ND	ND	9.6	10.660	1,607.683
	05/09/18	21,500.0	NA	1,000.0	1,950.0	1,740.0	7,070.0	ND	ND	ND	ND	ND	9.580	1,608.763
	11/30/18	52,200.0	NA	17,300.0	12,700.0	ND<0.5	5,305.0	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	12.090	1,606.253
	06/05/19	12,600.0	NA	313.0	1,420.0	336.0	787.0	ND<5	ND<5	ND<5	ND<5	ND<50	6.500	1,611.843
	11/06/19	26,500.0	NA	2,200.0	1,530.0	2,720.0	4,857.0	59.7	ND<2.5	ND<2.5	ND<2.5	ND<25	10.550	1,630.080
	06/22/20	2,670.0	NA	74.3	390.0	ND<0.5	581.0	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	6.280	1,634.350
	12/14/20	10,400.0	NA	2,160.0	ND<0.5	1,290.0	620.0	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	10.080	1,630.550
	05/20/21	16,300.0	NA	394.0	509.0	1,420.0	3,631.0	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	8.070	1,632.560
	11/04/21	19,100.0	NA	2,300.0	425.0	2,750.0	4,166.0	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	10.920	1,629.710
	06/30/22	13,400.0	NA	815.0	325.0	2,790.0	4,757.0	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	9.950	1,630.680
MW-2	01/08/03	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	9.800	1,607.810
	04/16/03	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	4.410	1,613.200
	07/14/03	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	7.100	1,610.510
	10/14/03	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	10.000	1,607.610
	03/05/04	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	6.300	1,611.310
	05/13/04	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	6.720	1,610.890
	07/28/04	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	8.300	1,609.310
	10/26/04	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	8.780	1,608.830
	01/25/05	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	1.880	1,615.730
	05/13/05	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	3.750	1,613.860
	07/21/05	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	6.200	1,611.410
	10/04/05	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	7.250	1,610.360
	01/04/06	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	6.100	1,611.510
**	12/08/06	ND	NA	2.3	2.2	ND	ND	ND	ND	ND	ND	ND	7.960	1,609.650
	03/15/07	206,000.0	NA	43,600.0	37,600.0	2,810.0	17,900.0	328.0	ND	29.9	ND	728.0	7.260	1,610.350
	06/08/07	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.150	1,611.460
	09/07/07	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.240	1,611.370
	12/14/07	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.220	1,611.390
	03/28/08		NA		NA	NA	NA		NA	NA	NA	NA	NA***	

** first sampling event conducted by AI, data prior to this date was generated by EAR

* Not Analyzed for this Contaminant

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TABULATED GROUNDWATER SAMPLE ANALYTICAL RESULTS
MOBIL BALDWIN

SAMPLE SOURCE	DATE SAMPLED	TPH AS GASOLINE (µg/L)	TPH AS DIESEL (µg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL-BENZENE (µg/L)	XYLENES (µg/L)	MTBE (µg/L)	ETBE (µg/L)	DIPE (µg/L)	TAME (µg/L)	TBA (µg/L)	DEPTH TO G.W. (FT)	G.W. ELEVATION (FT - AMSL)
	05/23/08		NA		NA	NA	NA		NA	NA	NA	NA	NA***	
	08/26/08		NA		NA	NA	NA		NA	NA	NA	NA	NA***	
	01/06/09	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.410	1,610.642
	03/13/09	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.810	1,612.242
	06/11/09		NA		NA	NA	NA		NA	NA	NA	NA	NA****	
	09/03/09	169.0	NA	3.9	17.3	6.5	30.1	ND	ND	ND	ND	ND	8.900	1,608.152
	12/08/09	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.430	1,607.622
	02/18/10	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.950	1,613.102
	05/19/10	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.720	1,610.332
	09/29/10	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.100	1,606.952
	12/16/10	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.880	1,607.172
	03/17/11	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.740	1,613.312
	06/17/11	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.870	1,611.182
	09/13/11	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.800	1,609.252
	11/11/11	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.520	1,607.532
	02/10/12	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.060	1,609.992
	05/15/12	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.780	1,607.272
	08/24/12	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	9.820	1,607.232
	12/10/12	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.400	1,606.652
	02/28/13	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.000	1,610.052
	05/09/13	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.920	1,610.132
	09/24/13	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.630	1,607.422
	12/11/13	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.730	1,606.322
	03/07/14	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.450	1,607.602
	05/09/14	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.680	1,608.372
	11/17/14	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	13.550	1,603.502
	07/02/15	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	12.360	1,604.692
	10/21/15	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	13.360	1,603.692
	06/27/16	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	New TOC	
	01/23/17	ND	NA	ND	3.4	ND	2.5	ND	ND	ND	ND	ND	New TOC	
	06/13/17	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	New TOC	
	10/25/17	300.0	NA	5.2	1.5	3.9	14.2	ND	ND	ND	ND	ND	New TOC	
	05/09/18	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	New TOC	
	11/30/18	ND<100	NA	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	New TOC	
	06/05/19	ND<200	NA	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<5	ND<5	ND<5	ND<5	ND<50	New TOC	
	11/06/19	ND<100	NA	1.3	1.4	2.8	6.1	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	11.810	1,630.060
	06/22/20	ND<100	NA	ND<0.5	1.3	0.8	3.0	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	7.520	1,634.890
	12/14/20	6,000.0	NA	1.5	806.0	453.0	673.0	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	11.350	1,631.060
	05/20/21	ND<100	NA	2.2	ND<0.5	2.1	0.8	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	9.320	1,633.090
	11/04/21	ND<100	NA	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	12.320	1,630.090
	06/30/22	ND<100	NA	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	11.240	1,631.170

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TABULATED GROUNDWATER SAMPLE ANALYTICAL RESULTS
MOBIL BALDWIN

SAMPLE SOURCE	DATE SAMPLED	TPH AS GASOLINE (µg/L)	TPH AS DIESEL (µg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL-BENZENE (µg/L)	XYLENES (µg/L)	MTBE (µg/L)	ETBE (µg/L)	DIPE (µg/L)	TAME (µg/L)	TBA (µg/L)	DEPTH TO G.W. (FT)	G.W. ELEVATION (FT - AMSL)
MW-3	01/08/03	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	12.440	1,608.260
	04/16/03	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	7.300	1,613.400
	07/14/03	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	9.750	1,610.950
	10/14/03	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	12.560	1,608.140
	03/05/04	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	9.090	1,611.610
	05/13/04	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	9.540	1,611.160
	07/28/04	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	11.150	1,609.550
	10/26/04	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	11.190	1,609.510
	01/25/05	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	5.650	1,615.050
	05/13/05	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	6.320	1,614.380
	07/21/05	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	8.670	1,612.030
	10/04/05	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	9.940	1,610.760
	01/04/06	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	8.800	1,611.900
**	12/08/06	139.0	NA	13.2	20.9	4.6	19.8	ND	ND	ND	ND	ND	10.420	1,610.280
	03/15/07	469.0	NA	41.1	2.4	8.0	8.9	ND	ND	ND	ND	ND	7.180	1,613.520
	06/08/07	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.690	1,612.010
	09/07/07	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.750	1,611.950
	12/14/07	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.740	1,611.960
	03/28/08	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.320	1,613.380
	05/23/08	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.650	1,612.050
	08/26/08	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	11.790	1,608.910
	01/06/09	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.700	1,611.000
	03/13/09	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.400	1,612.300
	06/11/09	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.160	1,611.540
	09/03/09	63.0	NA	1.6	4.6	2.9	11.6	ND	ND	ND	ND	ND	11.130	1,609.570
	12/08/09	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	11.800	1,608.900
	02/18/10	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.440	1,614.260
	05/19/10	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.140	1,611.560
	09/29/10	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	12.480	1,608.220
	12/16/10	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	12.240	1,608.460
	03/17/11	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.270	1,614.430
	06/17/11	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.230	1,612.470
	09/13/11	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	11.300	1,609.400
	11/11/11	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	11.840	1,608.860
	02/10/12	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.500	1,611.200
	05/15/12	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.780	1,610.920
	08/24/12	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	12.180	1,608.520
	12/10/12	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	12.420	1,608.280
	02/28/13	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.480	1,611.220
	05/09/13	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.400	1,611.300

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TABULATED GROUNDWATER SAMPLE ANALYTICAL RESULTS
MOBIL BALDWIN

SAMPLE SOURCE	DATE SAMPLED	TPH AS GASOLINE (µg/L)	TPH AS DIESEL (µg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL-BENZENE (µg/L)	XYLENES (µg/L)	MTBE (µg/L)	ETBE (µg/L)	DIPE (µg/L)	TAME (µg/L)	TBA (µg/L)	DEPTH TO G.W. (FT)	G.W. ELEVATION (FT - AMSL)
	09/24/13	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	12.150	1,608.550
	12/11/13	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	11.080	1,609.620
	03/07/14	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.520	1,610.180
	05/09/14	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	11.170	1,609.530
	11/17/14	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	13.850	1,606.850
	07/02/15	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	12.830	1,607.870
	10/21/15	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	13.750	1,606.950
	06/27/16	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	12.700	1,608.000
	01/23/17	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	14.320	1,606.380
	06/13/17	ND	NA	ND	1.0	2.0	2.5	ND	ND	ND	ND	ND	9.950	1,610.750
	10/25/17	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	12.360	1,608.340
	05/09/18	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.150	1,610.550
	11/30/18	ND<100	NA	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	13.300	1,607.400
	06/05/19	ND<200	NA	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<5	ND<5	ND<5	ND<5	ND<50	8.470	1,612.230
	11/06/19	ND<100	NA	0.6	0.7	1.4	2.8	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	12.140	1,630.950
	06/22/20	ND<100	NA	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	8.180	1,634.910
	12/14/20	ND<100	NA	ND<0.5	2.6	3.6	4.0	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	11.670	1,631.420
	05/20/21	ND<100	NA	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	9.790	1,633.300
	11/04/21	ND<100	NA	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	12.530	1,630.560
	06/30/22	ND<100	NA	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	11.630	1,631.460
MW-4	01/08/03	947.0	NA	27.0	3.0	ND	338.0	ND	NA	NA	NA	NA	11.120	1,607.470
	04/16/03	3,161.0	NA	61.0	340.0	45.0	408.0	6.0	NA	NA	NA	NA	5.950	1,612.640
	07/14/03	11,051.0	NA	1,214.0	1,403.0	228.0	1,099.0	ND	NA	NA	NA	NA	8.420	1,610.170
	10/14/03	22,790.0	NA	1,828.0	1,768.0	2.0	1,833.0	ND	NA	NA	NA	NA	11.210	1,607.380
	03/05/04	2,067.0	NA	455.0	240.0	8.0	153.0	ND	NA	NA	NA	NA	7.720	1,610.870
	05/13/04	8,684.0	NA	714.0	1,038.0	264.0	626.0	ND	NA	NA	NA	NA	8.150	1,610.440
	07/28/04	23,912.0	NA	3,037.0	3,807.0	953.0	1,926.0	ND	NA	NA	NA	NA	9.700	1,608.890
	10/26/04	18,047.0	NA	3,939.0	7,465.0	376.0	1,444.0	ND	NA	NA	NA	NA	9.930	1,608.660
	01/25/05	467.0	NA	12.0	33.0	ND	20.0	ND	NA	NA	NA	NA	3.880	1,614.710
	05/13/05	4,565.0	NA	711.0	859.0	246.0	270.0	ND	NA	NA	NA	NA	5.050	1,613.540
	07/21/05	13,966.0	NA	1,424.0	2,630.0	433.0	1,166.0	ND	NA	NA	NA	NA	7.220	1,611.370
	10/04/05	25,931.0	NA	3,474.4	6,555.5	610.1	2,229.0	ND	NA	NA	NA	NA	8.380	1,610.210
	01/04/06	2,219.0	NA	107.3	99.1	23.3	117.9	ND	NA	NA	NA	NA	7.340	1,611.250
**	12/08/06	9,300.0	NA	1,930.0	156.0	308.0	1,330.0	ND	ND	ND	ND	ND	9.200	1,609.390
	03/15/07	101,000.0	NA	18,000.0	20,300.0	1,830.0	11,700.0	ND	ND	ND	ND	1,650.0	6.290	1,612.300
	06/08/07	2,030.0	ND	435.0	73.7	60.8	354.0	ND	ND	ND	ND	ND	7.280	1,611.310
	09/07/07	16,500.0	NA	3,430.0	574.0	952.0	3,670.0	ND	ND	ND	ND	ND	7.330	1,611.260
	12/14/07	564.0	NA	267.0	1.8J	3.5J	2.8J	ND	ND	ND	ND	ND	7.310	1,611.280
	03/28/08	1,120.0	NA	9.5	106.0	40.7	207.0	ND	ND	ND	ND	ND	6.030	1,612.560
	05/23/08	2,640.0	NA	200.0	212.0	100.0	275.0	ND	ND	ND	ND	ND	7.180	1,611.410

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MOBIL BALDWIN

SAMPLE SOURCE	DATE SAMPLED	TPH AS GASOLINE (µg/L)	TPH AS DIESEL (µg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL-BENZENE (µg/L)	XYLENES (µg/L)	MTBE (µg/L)	ETBE (µg/L)	DIPE (µg/L)	TAME (µg/L)	TBA (µg/L)	DEPTH TO G.W. (FT)	G.W. ELEVATION (FT - AMSL)
	08/26/08	13,700.0	NA	2,600.0	143.0	929.0	2,790.0	ND	ND	ND	ND	ND	10.220	1,608.370
	01/06/09	65.0	NA	7.4	ND	0.6J	3.4	ND	ND	ND	ND	ND	8.300	1,610.290
	03/13/09	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.700	1,611.890
	06/11/09	4,270.0	NA	601.0	10.9	190.0	451.0	ND	ND	ND	ND	ND	7.730	1,610.860
	09/03/09	9,470.0	NA	1,850.0	125.0	562.0	1,180.0	ND	ND	ND	ND	ND	9.660	1,608.930
	12/08/09	1,350.0	NA	341.0	ND	72.8	12.9	ND	ND	ND	ND	ND	10.300	1,608.290
	02/18/10	ND	NA	4.8	ND	ND	5.9	ND	ND	ND	ND	ND	5.080	1,613.510
	05/19/10	1,780.0	NA	200.0	54.0	117.0	223.0	ND	ND	ND	ND	ND	7.700	1,610.890
	09/29/10	18,700.0	NA	3,040.0	106.0	937.0	2,260.0	ND	ND	ND	ND	ND	10.960	1,607.630
	12/16/10	3,840.0	NA	521.0	28.0	197.0	365.0	ND	ND	ND	ND	ND	10.740	1,607.850
	03/17/11	90.0	NA	5.1	0.6	1.1	1.9	ND	ND	ND	ND	ND	4.790	1,613.800
	06/17/11	3,400.0	NA	607.0	21.1	86.9	132.0	ND	ND	ND	ND	ND	6.760	1,611.830
	09/13/11	16,100.0	NA	1,970.0	108.0	880.0	1,870.0	ND	ND	ND	ND	ND	9.200	1,609.390
	11/11/11	8,520.0	NA	1,540.0	48.8	423.0	1,420.0	ND	ND	ND	ND	ND	10.350	1,608.240
	02/10/12	1,500.0	NA	81.0	2.6	85.9	65.6	ND	ND	ND	ND	ND	8.040	1,610.550
	05/15/12	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.380	1,610.210
	08/24/12	3,490.0	NA	928.0	33.5	302.0	160.0	ND	NA	NA	NA	NA	10.700	1,607.890
	12/10/12	163.0	NA	23.9	ND	ND	23.4	ND	ND	ND	ND	ND	10.740	1,607.850
	02/28/13	ND	NA	0.7	ND	ND	ND	ND	ND	ND	ND	ND	8.080	1,610.510
	05/09/13	ND	NA	21.8	ND	ND	ND	ND	ND	ND	ND	ND	8.000	1,610.590
	09/24/13	4,220.0	NA	1,410.0	91.9	577.0	344.0	ND	ND	ND	ND	ND	10.610	1,607.980
	12/11/13	24,100.0	NA	2,400.0	4,490.0	1,330.0	4,180.0	ND	ND	ND	ND	ND	10.330	1,608.260
	03/07/14	10,100.0	NA	2,400.0	4,495.0	445.0	976.0	ND	ND	ND	ND	ND	9.600	1,608.990
	05/09/14	23,100.0	NA	4,010.0	76.5	597.0	9,780.0	ND	ND	ND	ND	ND	9.700	1,608.890
	11/17/14	114,000.0	NA	8,070.0	31,800.0	3,420.0	30,500.0	ND	ND	ND	ND	ND	12.330	1,606.260
	07/02/15	49,300.0	NA	5,900.0	4,310.0	2,370.0	9,770.0	ND	ND	ND	ND	ND	11.310	1,607.280
	10/21/15	28,300.0	NA	4,260.0	1,980.0	2,240.0	7,550.0	ND	ND	ND	ND	ND	12.270	1,606.320
	06/27/16	32,700.0	NA	3,960.0	676.0	2,043.0	8,370.0	ND	ND	ND	ND	ND	11.240	1,607.350
	01/23/17	3,310.0	NA	509.0	414.0	33.4	1,057.0	ND	ND	ND	ND	ND	12.850	1,605.740
	06/13/17	3,150.0	NA	106.0	414.0	293.0	1,017.0	2.6	ND	ND	ND	ND	8.630	1,609.960
	10/25/17	15,500.0	NA	3,620.0	24.0	1,920.0	5,947.3	ND	ND	ND	ND	ND	11.100	1,607.490
	05/09/18	14,100.0	NA	2,160.0	397.0	1,040.0	2,516.0	ND	ND	ND	ND	ND	11.170	1,608.420
	11/30/18	18,900.0	NA	3,050.0	113.0	ND<0.5	3,117.0	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	12.620	1,605.970
	06/05/19	20,500.0	NA	2,830.0	325.0	400.0	729.0	ND<5	ND<5	ND<5	ND<5	ND<50	7.220	1,611.370
	11/06/19	12,300.0	NA	2,420.0	29.7	2,010.0	660.5	13.3	ND<2.5	ND<2.5	ND<2.5	ND<25	10.880	1,630.110
	06/22/20	57,200.0	NA	20,200.0	277.0	ND<0.5	3,890.0	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	6.800	1,634.190
	12/14/20	2,400.0	NA	1,120.0	4.8	512.0	9.2	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	10.400	1,630.590
	05/20/21	10,200.0	NA	1,510.0	81.8	1,370.0	839.0	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	8.490	1,632.500
	11/04/21	7,660.0	NA	1,420.0	ND<0.5	1,400.0	104.0	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	11.240	1,629.750
	06/30/22	1,390.0	NA	125.0	1,1	612.0	3.3	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	10.320	1,630.670

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TABULATED GROUNDWATER SAMPLE ANALYTICAL RESULTS
MOBIL BALDWIN

SAMPLE SOURCE	DATE SAMPLED	TPH AS GASOLINE (µg/L)	TPH AS DIESEL (µg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL-BENZENE (µg/L)	XYLENES (µg/L)	MTBE (µg/L)	ETBE (µg/L)	DIPE (µg/L)	TAME (µg/L)	TBA (µg/L)	DEPTH TO G.W. (FT)	G.W. ELEVATION (FT - AMSL)
MW-5	01/08/03	12,158.0	NA	2,581.0	2,935.0	26.0	2,203.0	291.0	NA	NA	NA	NA	9.950	1,607.300
	04/16/03	2,757.0	NA	235.0	163.0	ND	287.0	122.0	NA	NA	NA	NA	4.700	1,612.550
	07/14/03	9,252.0	NA	1,740.0	1,033.0	146.0	990.0	171.0	NA	NA	NA	NA	7.300	1,609.950
	10/14/03	25,327.0	NA	3,707.0	860.0	55.0	996.0	158.0	NA	NA	NA	NA	10.050	1,607.200
	03/05/04	1,185.0	NA	399.0	19.0	ND	34.0	66.0	NA	NA	NA	NA	6.410	1,610.840
	05/13/04	7,233.0	NA	1,407.0	805.0	138.0	432.0	627.0	NA	NA	NA	NA	6.820	1,610.430
	07/28/04	26,511.0	NA	160.0	5,546.0	4,363.0	1,870.0	ND	NA	NA	NA	NA	8.400	1,608.850
	10/26/04	1,666.0	NA	330.0	227.0	8.0	89.0	66.0	NA	NA	NA	NA	8.800	1,608.450
	01/25/05	ND	NA	13.0	ND	ND	ND	20.0	NA	NA	NA	NA	2.500	1,614.750
	05/13/05	7,233.0	NA	1,407.0	805.0	138.0	432.0	627.0	NA	NA	NA	NA	3.960	1,613.290
	07/21/05	3,185.0	NA	536.0	193.0	52.0	117.0	89.0	NA	NA	NA	NA	6.120	1,611.130
	10/04/05	8,789.0	NA	2,041.5	485.0	172.3	333.7	162.2	NA	NA	NA	NA	7.220	1,610.030
	01/04/06	535.0	NA	30.0	8.6	1.5	17.2	54.2	NA	NA	NA	NA	6.460	1,610.790
**	12/08/06	4,020.0	NA	1,230.0	387.0	80.8	468.0	37.5	ND	ND	ND	ND	7.860	1,609.390
	03/15/07	ND	NA	3.1	0.5J	ND	ND	15.1	ND	ND	ND	ND	6.010	1,611.240
	06/08/07	2,340.0	ND	744.0	438.0	101.0	309.0	36.5	ND	ND	ND	ND	6.090	1,611.160
	09/07/07	14,500.0	NA	4,300.0	2,780.0	424.0	1,270.0	59.8	ND	ND	ND	ND	6.210	1,611.040
	12/14/07	72.6	NA	4.0	0.7J	ND	1.1J	43.6	ND	ND	ND	ND	6.200	1,611.050
	03/28/08	973.0	NA	28.3	34.9	3.2	78.3	33.0	ND	ND	ND	ND	4.790	1,612.460
	05/23/08	595.0	NA	103.0	34.5	9.8	33.4	14.2	ND	ND	ND	ND	5.950	1,611.300
	08/26/08	18,700.0	NA	2,500.0	1,330.0	493.0	2,280.0	40.2	ND	ND	ND	ND	9.800	1,607.450
	01/06/09	2,440.0	NA	422.0	272.0	86.4	535.0	4.1	ND	ND	ND	ND	7.080	1,610.170
	03/13/09	497.0	NA	164.0	5.3	1.1	123.0	ND	ND	ND	ND	ND	5.400	1,611.850
	06/11/09	5,570.0	NA	1,280.0	107.0	286.0	1,440.0	7.2	ND	ND	ND	ND	6.540	1,610.710
	09/03/09	11,800.0	NA	2,360.0	796.0	339.0	1,480.0	13.9	ND	ND	ND	ND	8.510	1,608.740
	12/08/09	8,950.0	NA	2,530.0	110.0	154.0	1,010.0	ND	ND	ND	ND	ND	9.100	1,608.150
	02/18/10	134.0	NA	17.1	ND	2.4	17.5	2.3	ND	ND	ND	ND	5.780	1,611.470
	05/19/10	3,040.0	NA	421.0	68.9	132.0	547.0	4.5	ND	ND	ND	ND	6.500	1,610.750
	09/29/10	4,010.0	NA	2,030.0	269.0	149.0	548.0	19.1	ND	ND	ND	ND	9.760	1,607.490
	12/16/10	1,100.0	NA	180.0	26.3	22.0	46.2	3.6	ND	ND	ND	ND	9.550	1,607.700
	03/17/11	ND	NA	3.7	ND	ND	ND	11.3	ND	ND	ND	ND	3.500	1,613.750
	06/17/11	6,890.0	NA	1,020.0	74.4	161.0	744.0	7.4	ND	ND	ND	ND	5.550	1,611.700
	09/13/11	17,200.0	NA	4,160.0	506.0	502.0	1,560.0	16.1	ND	ND	ND	ND	8.500	1,608.750
	11/11/11	3,970.0	NA	1,060.0	73.2	194.0	614.0	ND	ND	ND	ND	ND	9.140	1,608.110
	02/10/12	967.0	NA	551.0	1.4	61.3	27.1	ND	ND	ND	ND	ND	6.800	1,610.450
	05/15/12	ND	NA	1.3	ND	ND	ND	ND	ND	ND	ND	ND	7.160	1,610.090
	08/24/12	23,900.0	NA	11,300.0	218.0	1,450.0	3,630.0	ND	NA	NA	NA	NA	9.580	1,607.670
	12/10/12	735.0	NA	255.0	4.1	ND	13.2	ND	ND	ND	ND	ND	9.750	1,607.500
	02/28/13	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.800	1,611.450
	05/09/13	ND	NA	0.9	ND	ND	ND	ND	ND	ND	ND	ND	6.750	1,610.500
	09/24/13	3,970.0	NA	2,700.0	34.7	23.4	317.0	ND	ND	ND	ND	ND	9.400	1,607.850

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TABULATED GROUNDWATER SAMPLE ANALYTICAL RESULTS
MOBIL BALDWIN

SAMPLE SOURCE	DATE SAMPLED	TPH AS GASOLINE (µg/L)	TPH AS DIESEL (µg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL-BENZENE (µg/L)	XYLENES (µg/L)	MTBE (µg/L)	ETBE (µg/L)	DIPE (µg/L)	TAME (µg/L)	TBA (µg/L)	DEPTH TO G.W. (FT)	G.W. ELEVATION (FT - AMSL)
	12/11/13	3,520.0	NA	1,550.0	80.6	89.0	142.0	ND	ND	ND	ND	ND	9.580	1,607.670
	03/07/14	9,990.0	NA	3,700.0	56.2	186.0	92.1	ND	ND	ND	ND	ND	8.400	1,608.850
	05/09/14	2,960.0	NA	2,830.0	ND	100.0	150.0	ND	ND	ND	ND	ND	8.450	1,608.800
	11/17/14	35,600.0	NA	8,270.0	489.0	624.0	6,450.0	ND	ND	ND	ND	ND	11.170	1,608.080
	07/02/15	4,280.0	NA	886.0	20.8	126.0	504.0	ND	ND	ND	ND	ND	10.020	1,607.230
	10/21/15	4,060.0	NA	1,360.0	52.7	211.0	386.0	ND	ND	ND	ND	ND	10.990	1,606.260
	06/27/16	1,340.0	NA	250.0	24.6	45.2	163.0	ND	ND	ND	ND	ND	9.910	1,607.340
	01/23/17	1,000.0	NA	29.7	28.0	19.4	131.7	ND	ND	ND	ND	ND	11.480	1,605.770
	06/13/17	950.0	NA	290.0	6.3	83.6	124.0	ND	ND	ND	ND	ND	7.310	1,609.940
	10/25/17	910.0	NA	289.0	6.2	60.3	8.2	ND	ND	ND	ND	ND	9.820	1,607.430
	05/09/18	1,800.0	NA	473.0	17.3	63.3	60.9	8.1	ND	ND	ND	ND	9.920	1,607.330
	11/30/18	14,400.0	NA	3,690.0	433.0	ND<0.5	2,497.0	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	11.390	1,605.860
	06/05/19	6,100.0	NA	1,430.0	26.7	289.0	1,618.6	ND<5	ND<5	ND<5	ND<5	ND<50	5.850	1,611.400
	11/06/19	3,650.0	NA	1,270.0	27.9	222.0	157.8	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	9.690	1,629.940
	06/22/20	2,630.0	NA	934.0	24.0	ND<0.5	465.9	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	5.490	1,634.140
	12/14/20	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NM	
	05/20/21	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NM	
	11/04/21	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NM	
	06/30/22	ND<100	NA	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	NM	
MW-6	01/08/03	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	9.570	1,607.170
	04/16/03	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	4.410	1,612.330
	07/14/03	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	7.200	1,609.540
	10/14/03	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	9.900	1,606.840
	03/05/04	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	6.240	1,610.500
	05/13/04	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	6.710	1,610.030
	07/28/04	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	8.300	1,608.440
	10/26/04	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	8.380	1,608.360
	01/25/05	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	2.580	1,614.160
	05/13/05	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	3.740	1,613.000
	07/21/05	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	6.000	1,610.740
	10/04/05	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	7.000	1,609.740
	01/04/06	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	5.750	1,610.990
**	12/08/06	ND	NA	3.0	1.1	ND	3.1	ND	ND	ND	ND	ND	7.300	1,610.940
	03/15/07	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.800	1,610.940
	06/08/07	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.915	1,610.825
	09/07/07	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.050	1,610.690
	12/14/07	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.040	1,610.700
	03/28/08	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.580	1,612.160
	05/23/08	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.780	1,610.960
	08/26/08	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.900	1,607.840

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MOBIL BALDWIN

SAMPLE SOURCE	DATE SAMPLED	TPH AS GASOLINE (µg/L)	TPH AS DIESEL (µg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL-BENZENE (µg/L)	XYLENES (µg/L)	MTBE (µg/L)	ETBE (µg/L)	DIPE (µg/L)	TAME (µg/L)	TBA (µg/L)	DEPTH TO G.W. (FT)	G.W. ELEVATION (FT - AMSL)
	01/06/09	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.820	1,609.920
	03/13/09	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.200	1,611.540
	06/11/09	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.440	1,610.300
	09/03/09	308.0	NA	10.2	29.9	13.4	50.8	ND	ND	ND	ND	ND	8.400	1,608.340
	12/08/09	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.900	1,607.840
	02/18/10	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.670	1,613.070
	05/19/10	ND	NA	6.2	ND	ND	ND	ND	ND	ND	ND	ND	6.360	1,610.380
	09/29/10	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.720	1,607.020
	12/16/10	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.420	1,607.320
	03/17/11	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.480	1,613.260
	06/17/11	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.440	1,611.300
	09/13/11	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.300	1,611.440
	11/11/11	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.920	1,607.820
	02/10/12	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.650	1,610.090
	05/15/12	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.800	1,608.940
	08/24/12	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	9.470	1,607.270
	12/10/12	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.680	1,607.060
	02/28/13	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.610	1,610.130
	05/09/13	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.680	1,610.060
	09/24/13	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.330	1,607.410
	12/11/13	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.940	1,606.800
	03/07/14	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.380	1,608.360
	05/09/14	254.0	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.390	1,608.350
	11/17/14	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	11.040	1,605.700
	07/02/15	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.050	1,606.690
	10/21/15	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	11.020	1,605.720
	06/27/16	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.950	1,606.790
	01/23/17	ND	NA	ND	4.5	ND	5.3	ND	ND	ND	ND	ND	11.500	1,605.240
	06/13/17	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.460	1,609.280
	10/25/17	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.950	1,606.790
	05/09/18	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.130	1,607.610
	11/30/18	ND<100	NA	4.9	10.5	1.4	10.4	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	11.400	1,605.340
	06/05/19	ND<200	NA	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<5	ND<5	ND<5	ND<5	ND<50	6.000	1,610.740
	11/06/19	ND<100	NA	1.2	ND<0.5	1.0	1.0	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	9.740	1,629.350
	06/22/20	ND<100	NA	2.3	ND<0.5	1.1	2.6	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	5.550	1,633.540
	12/14/20	ND<100	NA	2.1	ND<0.5	1.4	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	9.190	1,629.900
	05/20/21	ND<100	NA	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	7.330	1,631.740
	11/04/21	ND<100	NA	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	10.060	1,629.030
	06/30/22	ND<100	NA	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	9.170	1,629.920
MW-7	01/08/03	ND	NA	ND	ND	ND	ND	3.0	NA	NA	NA	NA	8.480	1,606.460

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TABULATED GROUNDWATER SAMPLE ANALYTICAL RESULTS

MOBIL BALDWIN

SAMPLE SOURCE	DATE SAMPLED	TPH AS GASOLINE (µg/L)	TPH AS DIESEL (µg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL-BENZENE (µg/L)	XYLENES (µg/L)	MTBE (µg/L)	ETBE (µg/L)	DIPE (µg/L)	TAME (µg/L)	TBA (µg/L)	DEPTH TO G.W. (FT)	G.W. ELEVATION (FT - AMSL)
	04/16/03	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	2.720	1,612.220
	07/14/03	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	6.650	1,608.290
	10/14/03	ND	NA	ND	ND	ND	ND	5.0	NA	NA	NA	NA	9.100	1,605.840
	03/05/04	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	5.210	1,609.730
	05/13/04	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	6.220	1,608.720
	07/28/04	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	7.740	1,607.200
	10/26/04	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	6.430	1,608.510
	01/25/05	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	1.920	1,613.020
	05/13/05	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	2.300	1,612.640
	07/21/05	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	4.030	1,610.910
	10/04/05	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	5.730	1,609.210
	01/04/06	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	4.220	1,610.720
**	12/08/06	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.720	1,607.220
	03/15/07	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.310	1,610.930
	06/08/07	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.755	1,610.185
	09/07/07	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.950	1,609.990
	12/14/07	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.950	1,609.990
	03/28/08	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.480	1,611.460
	05/23/08	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.490	1,610.450
	08/26/08	ND	NA	ND	ND	ND	ND	4.8	ND	ND	ND	ND	7.900	1,607.040
	01/06/09	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.320	1,608.620
	03/13/09	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.260	1,610.680
	06/11/09	ND	NA	ND	ND	ND	ND	6.0	ND	ND	ND	ND	5.590	1,609.350
	09/03/09	364.0	NA	8.5	28.3	13.1	54.0	8.8	ND	ND	ND	ND	7.690	1,607.250
	12/08/09	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.310	1,607.630
	02/18/10	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.630	1,611.310
	05/19/10	ND	NA	ND	ND	ND	ND	6.4	ND	ND	ND	ND	5.600	1,609.340
	09/29/10	ND	NA	ND	ND	ND	ND	12.4	ND	ND	ND	ND	9.040	1,605.900
	12/16/10	ND	NA	ND	ND	ND	ND	9.4	ND	ND	ND	ND	8.250	1,606.690
	03/17/11	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.460	1,612.480
	06/17/11	ND	NA	ND	ND	ND	ND	6.9	ND	ND	ND	ND	4.590	1,610.350
	09/13/11	ND	NA	ND	ND	ND	ND	5.7	ND	ND	ND	ND	6.900	1,608.040
	11/11/11	ND	NA	ND	ND	ND	ND	3.4	ND	ND	ND	ND	7.760	1,607.180
	02/10/12	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.410	1,609.530
	05/15/12	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.160	1,608.780
	08/24/12	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	8.920	1,606.020
	12/10/12	ND	NA	ND	ND	ND	ND	2.2	ND	ND	ND	ND	8.640	1,606.300
	02/28/13	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.610	1,609.330
	05/09/13	ND	NA	ND	ND	ND	ND	2.1	ND	ND	ND	ND	6.020	1,608.920
	09/24/13	ND	NA	ND	ND	ND	ND	11.6	ND	ND	ND	ND	9.810	1,605.130
	12/11/13	ND	NA	ND	ND	ND	ND	12.6	ND	ND	ND	ND	8.660	1,606.280

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* Not Analyzed for this Contaminant

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**** Not analyzed as car was parked over the monitoring well.

TABULATED GROUNDWATER SAMPLE ANALYTICAL RESULTS
MOBIL BALDWIN

SAMPLE SOURCE	DATE SAMPLED	TPH AS GASOLINE (μg/L)	TPH AS DIESEL (μg/L)	BENZENE (μg/L)	TOLUENE (μg/L)	ETHYL-BENZENE (μg/L)	XYLENES (μg/L)	MTBE (μg/L)	ETBE (μg/L)	DIPE (μg/L)	TAME (μg/L)	TBA (μg/L)	DEPTH TO G.W. (FT)	G.W. ELEVATION (FT - AMSL)
	03/07/14	ND	NA	ND	ND	ND	ND	2.2	ND	ND	ND	ND	7.350	1,607.590
	05/09/14	ND	NA	ND	ND	ND	ND	9.2	ND	ND	ND	ND	7.850	1,607.090
	11/17/14	ND	NA	ND	ND	ND	ND	19.0	ND	ND	ND	ND	9.300	1,605.640
	07/02/15	ND	NA	ND	ND	ND	ND	25.0	ND	ND	ND	ND	9.710	1,605.230
	10/21/15	ND	NA	ND	ND	ND	ND	19.0	ND	ND	ND	ND	10.650	1,604.290
	06/27/16	ND	NA	ND	ND	ND	ND	19.0	ND	ND	ND	ND	9.810	1,605.130
	01/23/17	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	11.100	1,603.840
	06/13/17	ND	NA	1.8	ND	ND	ND	13.1	ND	ND	ND	ND	7.550	1,607.390
	10/25/17	ND	NA	ND	ND	0.6	2.2	36.2	ND	ND	ND	ND	9.930	1,605.010
	05/09/18	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.300	1,605.640
	11/30/18	ND<100	NA	1.1	ND<0.5	ND<0.5	2.0	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	11.050	1,603.890
	06/05/19	ND<200	NA	ND<1.0	ND<1.0	ND<1.0	ND<1.0	18.9	ND<5	ND<5	ND<5	ND<50	6.280	1,608.660
	11/06/19	ND<100	NA	ND<0.5	ND<0.5	0.7	ND<0.5	20.8	ND<2.5	ND<2.5	ND<2.5	ND<25	9.650	1,627.660
	06/22/20	ND<100	NA	0.7	ND<0.5	0.6	1.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	5.460	1,631.850
	12/14/20	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NM	
	05/20/21	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NM	
	11/04/21	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NM	
	06/30/22	ND<100	NA	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	NM	
MW-8	03/05/04	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	6.900	1,610.630
	05/13/04	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	6.900	1,610.630
	07/28/04	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	8.500	1,609.030
	10/26/04	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	8.120	1,609.410
	01/25/05	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	3.550	1,613.980
	05/13/05	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	4.880	1,612.650
	07/21/05	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	5.800	1,611.730
	10/04/05	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	6.980	1,610.550
	01/04/06	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	5.900	1,611.630
**	12/08/06	92.8	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.280	1,611.250
	03/15/07	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.810	1,611.720
	06/08/07	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.820	1,611.710
	09/07/07	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.920	1,611.610
	12/14/07	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.910	1,611.620
	03/28/08	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.700	1,612.830
	05/23/08	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.840	1,611.690
	08/26/08	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.920	1,608.610
	01/06/09	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.800	1,610.730
	03/13/09	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.440	1,612.090
	06/11/09	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.390	1,611.140
	09/03/09	646.0	NA	32.9	56.1	23.4	97.7	ND	ND	ND	ND	ND	8.280	1,609.250
	12/08/09	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.760	1,608.770

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TABULATED GROUNDWATER SAMPLE ANALYTICAL RESULTS
MOBIL BALDWIN

SAMPLE SOURCE	DATE SAMPLED	TPH AS GASOLINE (µg/L)	TPH AS DIESEL (µg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL-BENZENE (µg/L)	XYLENES (µg/L)	MTBE (µg/L)	ETBE (µg/L)	DIPE (µg/L)	TAME (µg/L)	TBA (µg/L)	DEPTH TO G.W. (FT)	G.W. ELEVATION (FT - AMSL)
	02/18/10	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.950	1,613.580
	05/19/10	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.520	1,611.010
	09/29/10	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.710	1,607.820
	12/16/10	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.400	1,608.130
	03/17/11	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.760	1,613.770
	06/17/11	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.580	1,611.950
	09/13/11	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.400	1,608.130
	11/11/11	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.920	1,608.610
	02/10/12	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.670	1,610.860
	05/15/12	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.800	1,609.730
	08/24/12	ND	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	9.380	1,608.150
	12/10/12	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.620	1,607.910
	02/28/13	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.660	1,609.870
	05/09/13	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.720	1,610.810
	09/24/13	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.400	1,608.130
	12/11/13	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.390	1,608.140
	03/07/14	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.100	1,609.430
	05/09/14	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.460	1,609.070
	11/17/14	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	11.000	1,606.530
	07/02/15	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.120	1,607.410
	10/21/15	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	11.030	1,606.500
	06/27/16	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.100	1,607.430
	01/23/17	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	11.700	1,605.830
	06/13/17	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.570	1,609.960
	10/25/17	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.850	1,607.680
	05/09/18	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.900	1,608.630
	11/30/18	ND<100	NA	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	11.380	1,606.150
	06/05/19	ND<200	NA	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<5	ND<5	ND<5	ND<5	ND<50	6.250	1,611.280
	11/06/19	ND<100	NA	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	9.590	1,630.300
	06/22/20	ND<100	NA	ND<0.5	ND<0.5	ND<0.5	1.1	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	5.870	1,634.020
	12/14/20	ND<100	NA	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	9.100	1,630.790
	05/20/21	ND<100	NA	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	7.330	1,632.560
	11/04/21	ND<100	NA	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	9.920	1,629.970
	06/30/22	ND<100	NA	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	9.120	1,630.770
MW-9	02/22/12	96,500.0	NA	18,000.0	27,800.0	2,530.0	14,300.0	ND	ND	ND	ND	ND	7.500	1,612.512
	05/15/12	302.0	NA	1.2	ND	ND	18.7	ND	ND	ND	ND	ND	9.380	1,610.632
	08/24/12	111,000.0	NA	34,900.0	37,100.0	2,550.0	16,400.0	ND	NA	NA	NA	NA	10.420	1,609.592
	12/10/12	78,500.0	NA	21,000.0	16,200.0	1,420.0	7,530.0	ND	ND	ND	ND	ND	10.540	1,609.472
	02/28/13	866.0	NA	366.0	2.4	ND	23.4	ND	ND	ND	ND	ND	7.650	1,612.362
	05/09/13	48,400.0	NA	14,700.0	13,200.0	1,060.0	4,010.0	ND	ND	ND	ND	ND	7.580	1,612.432

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TABULATED GROUNDWATER SAMPLE ANALYTICAL RESULTS
MOBIL BALDWIN

SAMPLE SOURCE	DATE SAMPLED	TPH AS GASOLINE (µg/L)	TPH AS DIESEL (µg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL-BENZENE (µg/L)	XYLENES (µg/L)	MTBE (µg/L)	ETBE (µg/L)	DIPE (µg/L)	TAME (µg/L)	TBA (µg/L)	DEPTH TO G.W. (FT)	G.W. ELEVATION (FT - AMSL)
	09/24/13	137,000.0	NA	34,600.0	35,200.0	2,100.0	11,800.0	ND	ND	ND	ND	ND	10.220	1,609.792
	12/11/13	179,000.0	NA	37,900.0	46,700.0	3,100.0	6,280.0	ND	ND	ND	ND	ND	10.370	1,609.642
	03/07/14	173,000.0	NA	34,700.0	41,200.0	2,100.0	14,500.0	ND	ND	ND	ND	ND	9.670	1,610.342
	05/09/14	132,000.0	NA	28,600.0	52,200.0	1,660.0	21,600.0	ND	ND	ND	ND	ND	9.770	1,610.242
	11/17/14	194,000.0	NA	34,200.0	69,300.0	3,420.0	26,300.0	ND	ND	ND	ND	ND	12.160	1,607.852
	07/02/15	277,000.0	NA	49,100.0	82,300.0	6,800.0	99,600.0	ND	ND	ND	ND	ND	11.050	1,608.962
	10/21/15	145,000.0	NA	35,400.0	54,700.0	3,420.0	23,700.0	ND	ND	ND	ND	ND	12.020	1,607.992
	06/27/16	169,000.0	NA	29,100.0	47,400.0	3,050.0	23,500.0	ND	ND	ND	ND	ND	New TOC	
	01/23/17	69,900.0	NA	12,400.0	22,300.0	2,040.0	14,740.0	ND	ND	ND	ND	ND	New TOC	
	06/13/17	84,900.0	NA	17,200.0	21,600.0	9,650.0	15,550.0	ND	ND	ND	ND	ND	New TOC	
	10/25/17	182,000.0	NA	31,900.0	38,800.0	5,030.0	24,500.0	ND	ND	ND	ND	ND	New TOC	
	05/09/18	161,000.0	NA	32,400.0	47,100.0	3,730.0	33,100.0	ND	ND	ND	ND	ND	New TOC	
	11/30/18	89,100.0	NA	49,600.0	45,400.0	ND<0.5	46,300.0	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	New TOC	
	06/05/19	148,000.0	NA	22,300.0	28,700.0	2,590.0	19,840.0	ND<5	ND<5	ND<5	ND<5	ND<50	New TOC	
	11/06/19	177,000.0	NA	1,100.0	20,200.0	2,130.0	18,500.0	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	10.610	1,630.180
	06/22/20	49,700.0	NA	70,500.0	52,800.0	9,470.0	40,000.0	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	6.370	1,634.420
	12/14/20	13,700.0	NA	4,190.0	2,660.0	650.0	2,205.0	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	10.140	1,630.650
	05/20/21	68,100.0	NA	15,900.0	18,500.0	1,840.0	13,230.0	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	8.130	1,632.660
	11/04/21	73,700.0	NA	27,000.0	12,500.0	2,770.0	13,020.0	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	10.960	1,629.830
	06/30/22	77,800.0	NA	30,300.0	30,300.0	3,640.0	20,760.0	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	9.980	1,630.810
MW-10	02/22/12	2,650.0	NA	6.3	40.6	78.7	403.0	ND	ND	ND	ND	ND	8.860	1,610.898
	05/15/12	61,300.0	NA	17,400.0	22,300.0	863.0	6,950.0	ND	ND	ND	ND	ND	8.600	1,611.158
	08/24/12	10,400.0	NA	5,630.0	11,100.0	389.0	1,310.0	ND	NA	NA	NA	NA	11.740	1,608.018
	12/10/12	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	11.980	1,607.778
	02/28/13	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.030	1,610.728
	05/09/13	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.970	1,610.788
	09/24/13	ND	NA	5.4	ND	ND	1.1J	ND	ND	ND	ND	ND	11.590	1,608.168
	12/11/13	577.0	NA	1.2	4.5	5.2	206.0	ND	ND	ND	ND	ND	9.870	1,609.888
	03/07/14	ND	NA	3.5	5.1	ND	1.8J	ND	ND	ND	ND	ND	10.250	1,609.508
	05/09/14	10,700.0	NA	955.0	1,440.0	323.0	2,460.0	ND	ND	ND	ND	ND	10.720	1,609.038
	11/17/14	6,650.0	NA	38.3	16.7	818.0	ND	ND	ND	ND	ND	ND	13.420	1,606.338
	07/02/15	105.0	NA	1.0	0.7J	8.9	3.7	ND	ND	ND	ND	ND	12.350	1,607.408
	10/21/15	138.0	NA	1.5	ND	7.2	1.4J	ND	ND	ND	ND	ND		
	06/27/16	155.0	NA	3.9	2.3	11.8	46.3	ND	ND	ND	ND	ND	12.180	1,607.578
	01/23/17	ND	NA	ND	2.6	ND	2.2	ND	ND	ND	ND	ND	13.770	1,605.988
	06/13/17	ND	NA	13.0	31.5	113.0	156.3	ND	ND	ND	ND	ND	9.520	1,610.238
	10/25/17	ND	NA	6.8	ND	9.3	21.1	ND	ND	ND	ND	ND	1205.000	1,607.708
	05/09/18	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.870	1,608.888
	11/30/18	ND<100	NA	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	10.600	1,609.158
	06/05/19	ND<200	NA	0.6	ND<1.0	0.7	2.7	ND<5	ND<5	ND<5	ND<5	ND<50	8.010	1,611.748

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TABULATED GROUNDWATER SAMPLE ANALYTICAL RESULTS

MOBIL BALDWIN

SAMPLE SOURCE	DATE SAMPLED	TPH AS GASOLINE (µg/L)	TPH AS DIESEL (µg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL-BENZENE (µg/L)	XYLENES (µg/L)	MTBE (µg/L)	ETBE (µg/L)	DIPE (µg/L)	TAME (µg/L)	TBA (µg/L)	DEPTH TO G.W. (FT)	G.W. ELEVATION (FT - AMSL)
	11/06/19	280.0	NA	23.2	31.6	7.4	39.8	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	11.830	1,630.440
	06/22/20	220.0	NA	37.7	41.3	11.3	41.9	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	7.730	1,634.540
	12/14/20	270.0	NA	11.8	1.0	46.9	25.7	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	11.380	1,630.890
	05/20/21	ND<100	NA	ND<0.5	ND<0.5	2.2	3.8	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	9.420	1,632.850
	11/04/21	ND<100	NA	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	12.230	1,630.040
	06/30/22	ND<100	NA	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	11.300	1,630.970
MW-11	08/08/19	10,400.0	NA	3.0	3,230.0	556.0	2,149.0	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	9.060	1,632.110
	11/06/19	2,900.0	NA	5.3	241.0	97.5	391.0	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	10.980	1,630.190
	06/22/20	ND<100	NA	1.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	6.760	1,634.410
	12/14/20	5,430.0	NA	ND<0.5	656.0	35.2	1,201.0	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	10.500	1,630.670
	05/20/21	1,190.0	NA	ND<0.5	48.3	31.0	60.6	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	8.500	1,632.670
	11/04/21	1,170.0	NA	ND<0.5	183.0	45.0	171.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	11.380	1,629.790
	06/30/22	ND<100	NA	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<25	10.420	1,630.750

** first sampling event conducted by AI, data prior to this date was generated by EAR
* Not Analyzed for this Contaminant
*** not analyzed as well was destroyed in soil excavation 03/2008.
**** Not analyzed as car was parked over the monitoring well.

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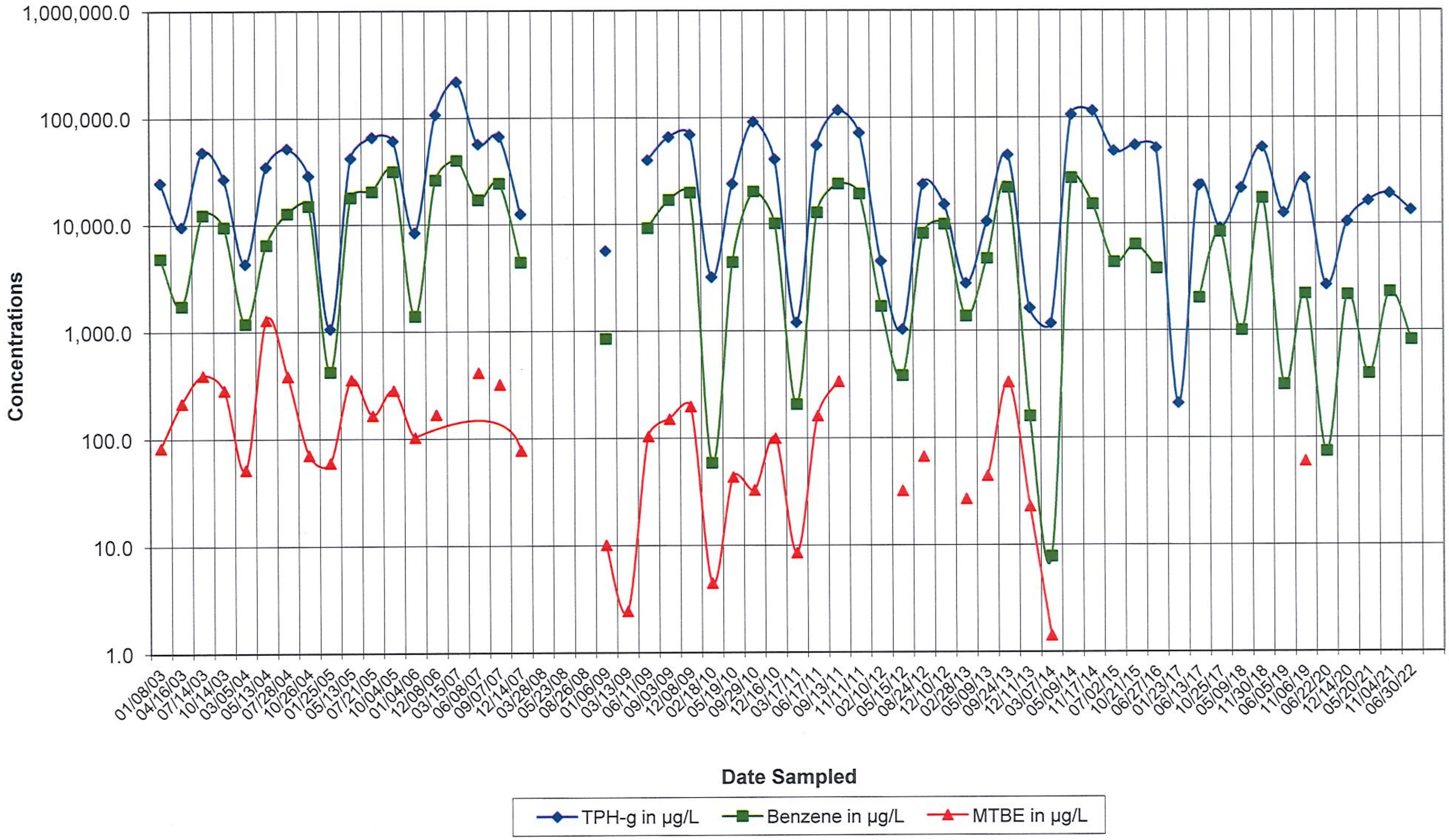
310-822-3800

APPENDIX C

A.C.C.E.S. INC.
ENVIRONMENTAL ENGINEERING

MOBIL BALDWIN

Contaminant Concentrations v. Time for MW-1

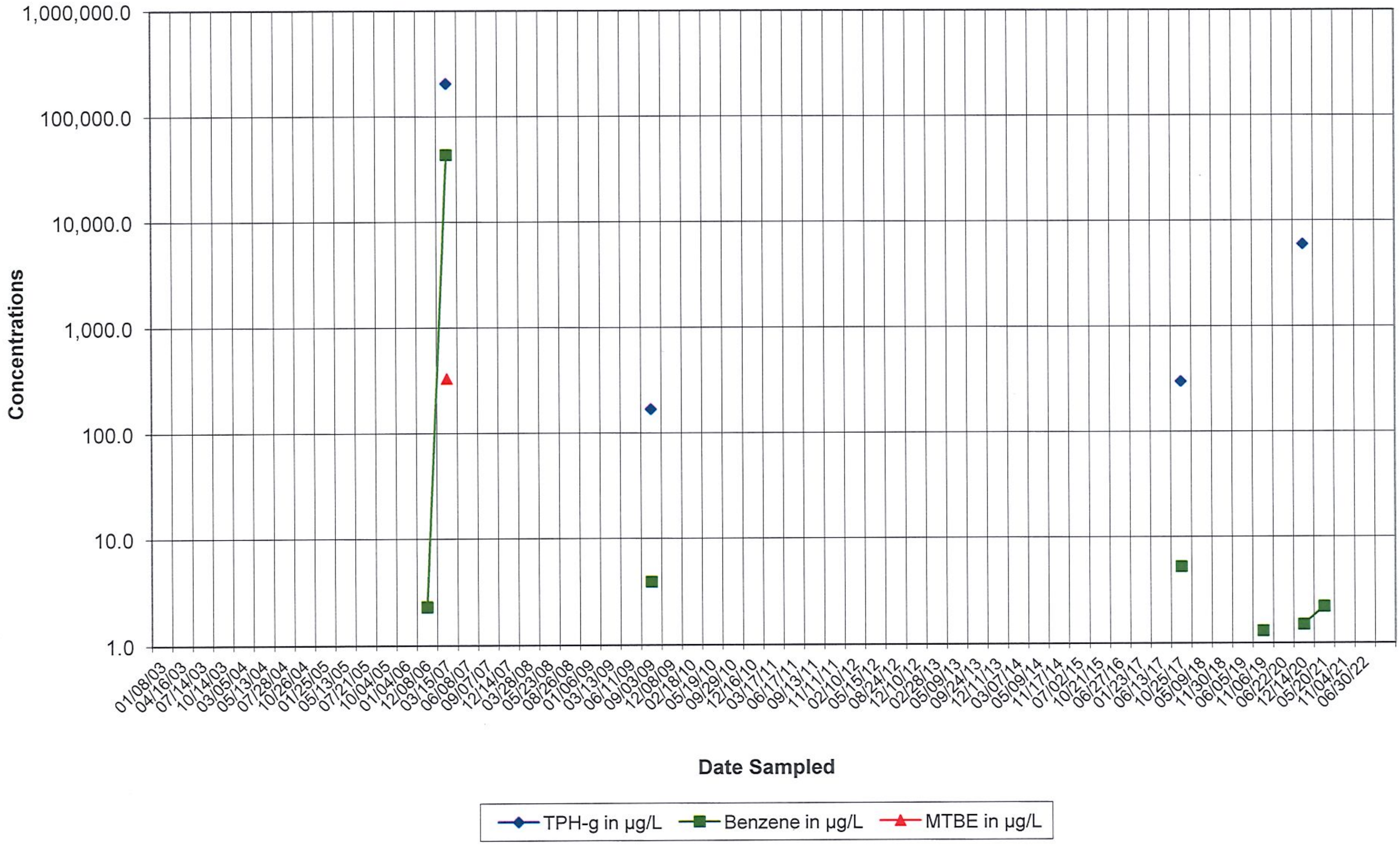


*** not analyzed as well was destroyed during 3/28/08 soil excavation.

A.C.C.E.S. INC.
ENVIRONMENTAL ENGINEERING

MOBIL BALDWIN

Contaminant Concentrations v. Time for MW-2

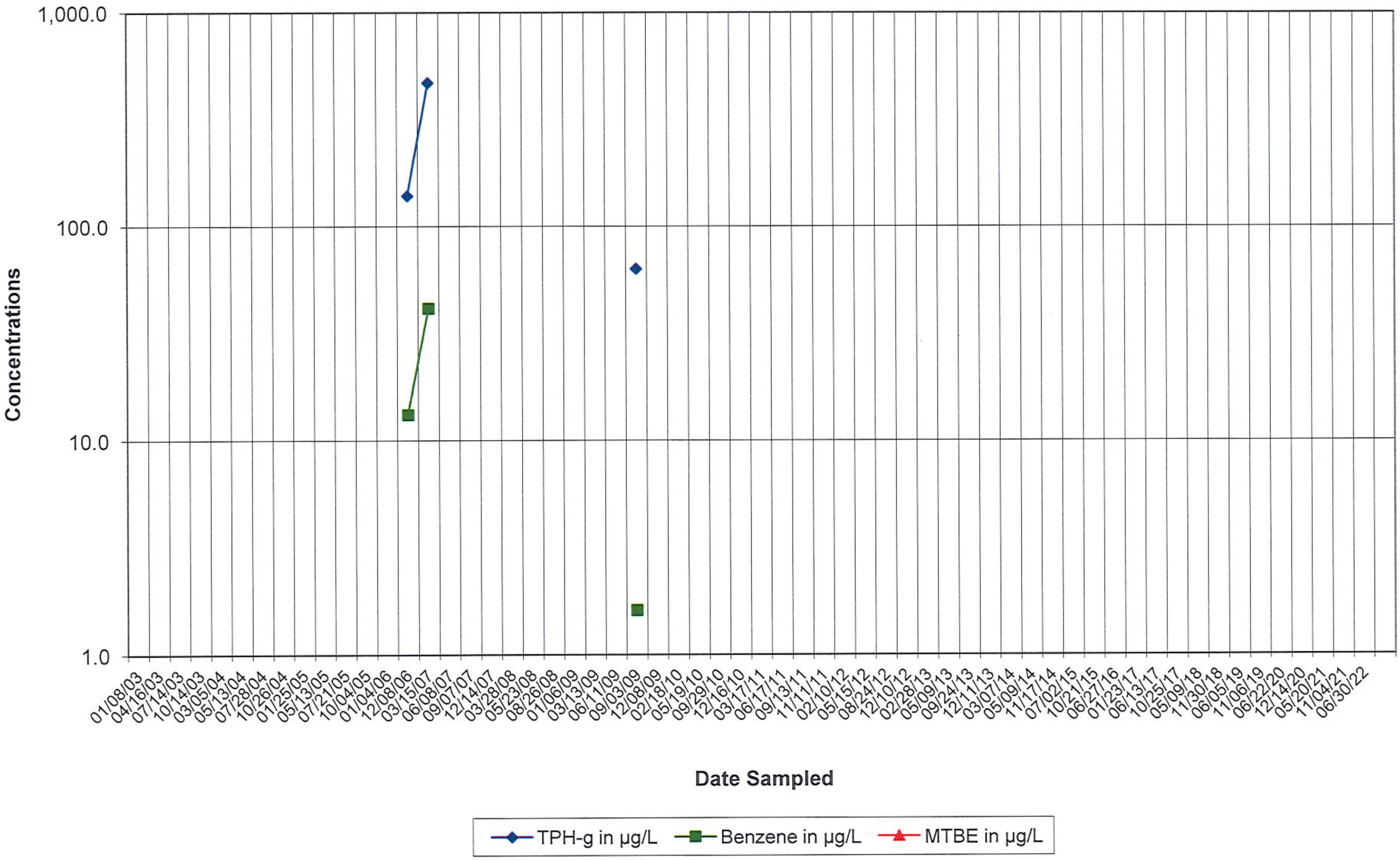


*** not analyzed as well was destroyed during 3/28/08 soil excavation.
**** Not analyzed as car was parked over the monitoring well.

A.C.C.E.S. INC.
ENVIRONMENTAL ENGINEERING

MOBIL BALDWIN

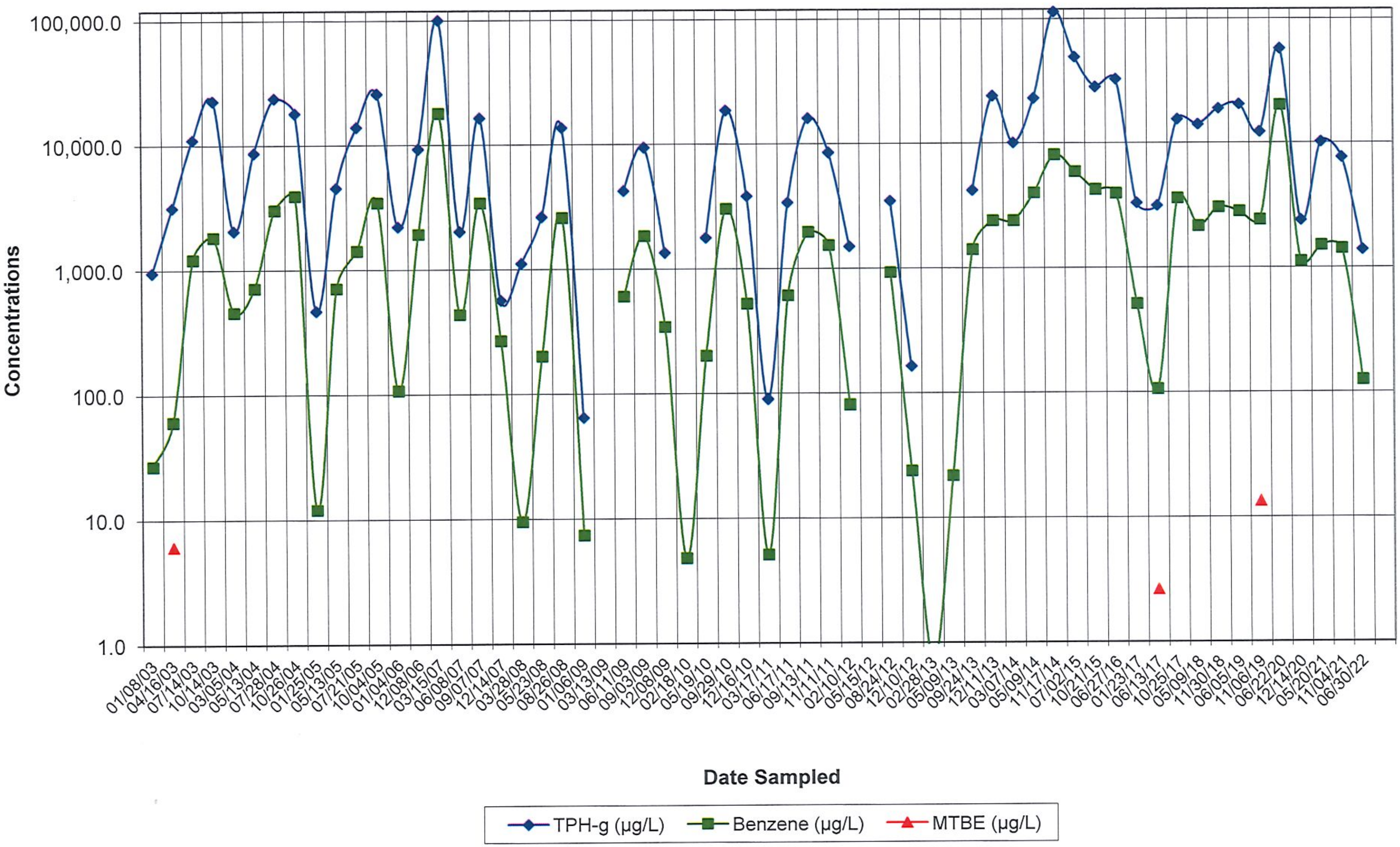
Contaminant Concentrations v. Time for MW-3



A.C.C.E.S. INC.
ENVIRONMENTAL ENGINEERING

MOBIL BALDWIN

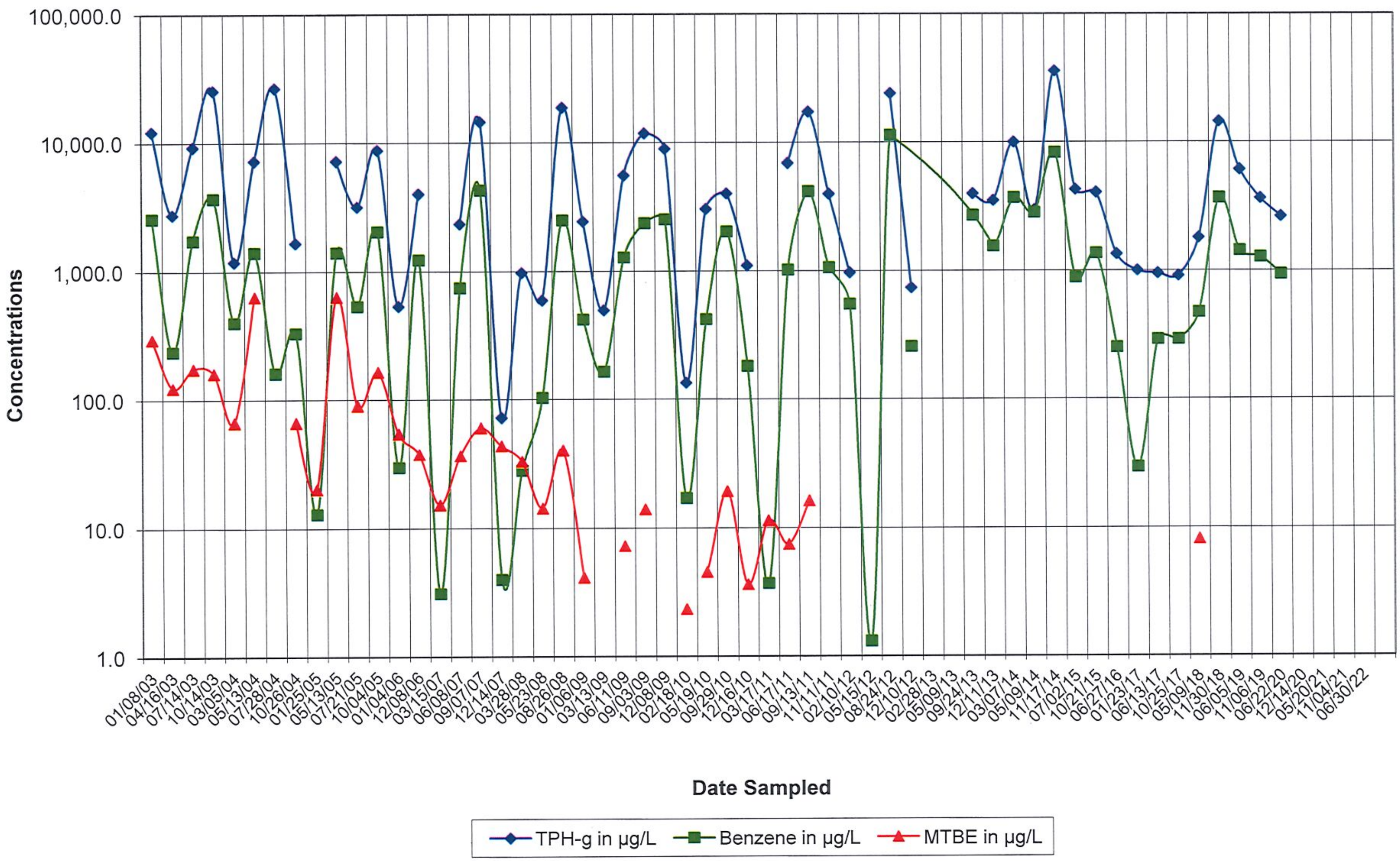
Contaminant Concentrations v. Time for MW-4



A.C.C.E.S. INC.
ENVIRONMENTAL ENGINEERING

MOBIL BALDWIN

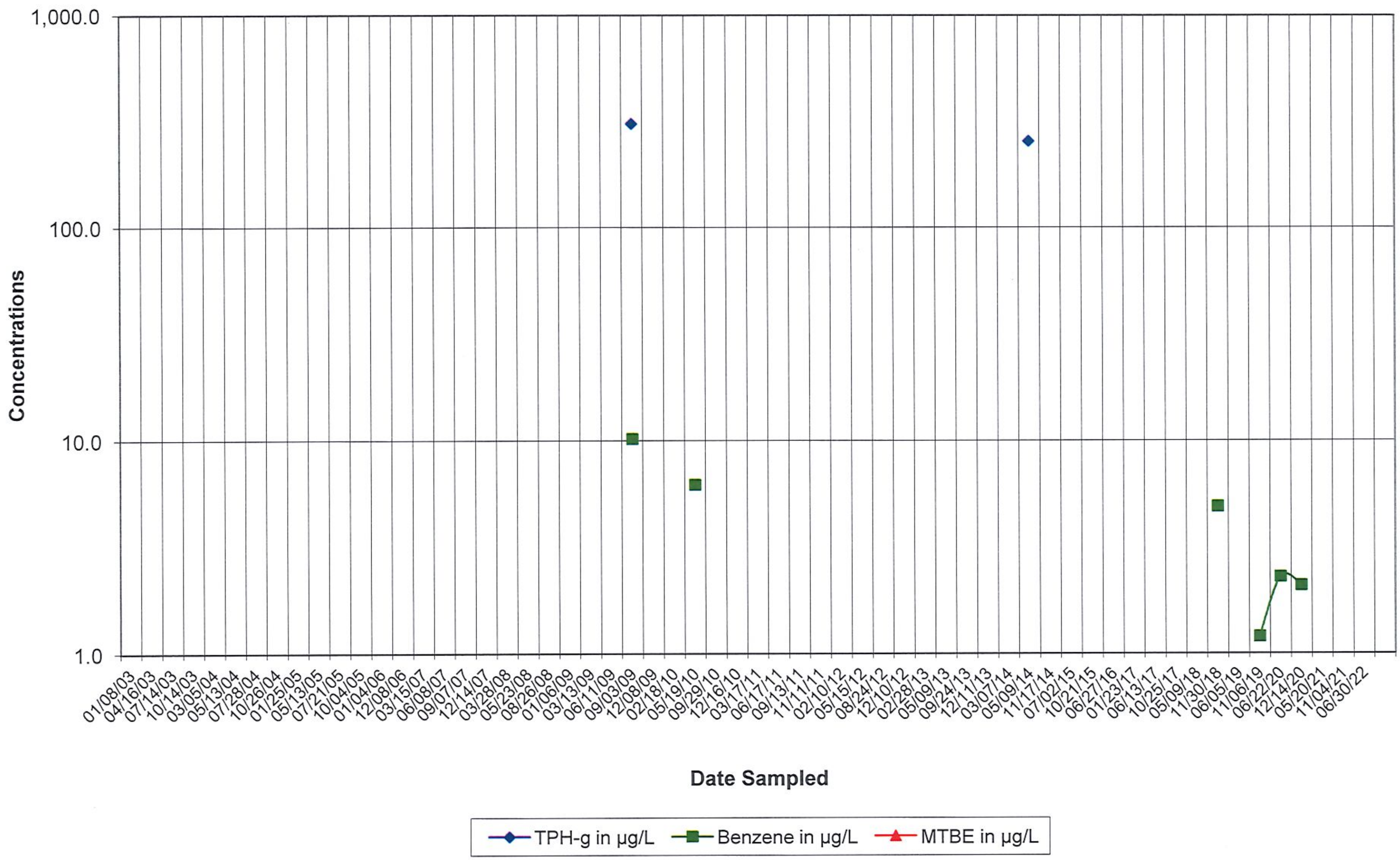
Contaminant Concentrations v. Time for MW-5



A.C.C.E.S. INC.
ENVIRONMENTAL ENGINEERING

MOBIL BALDWIN

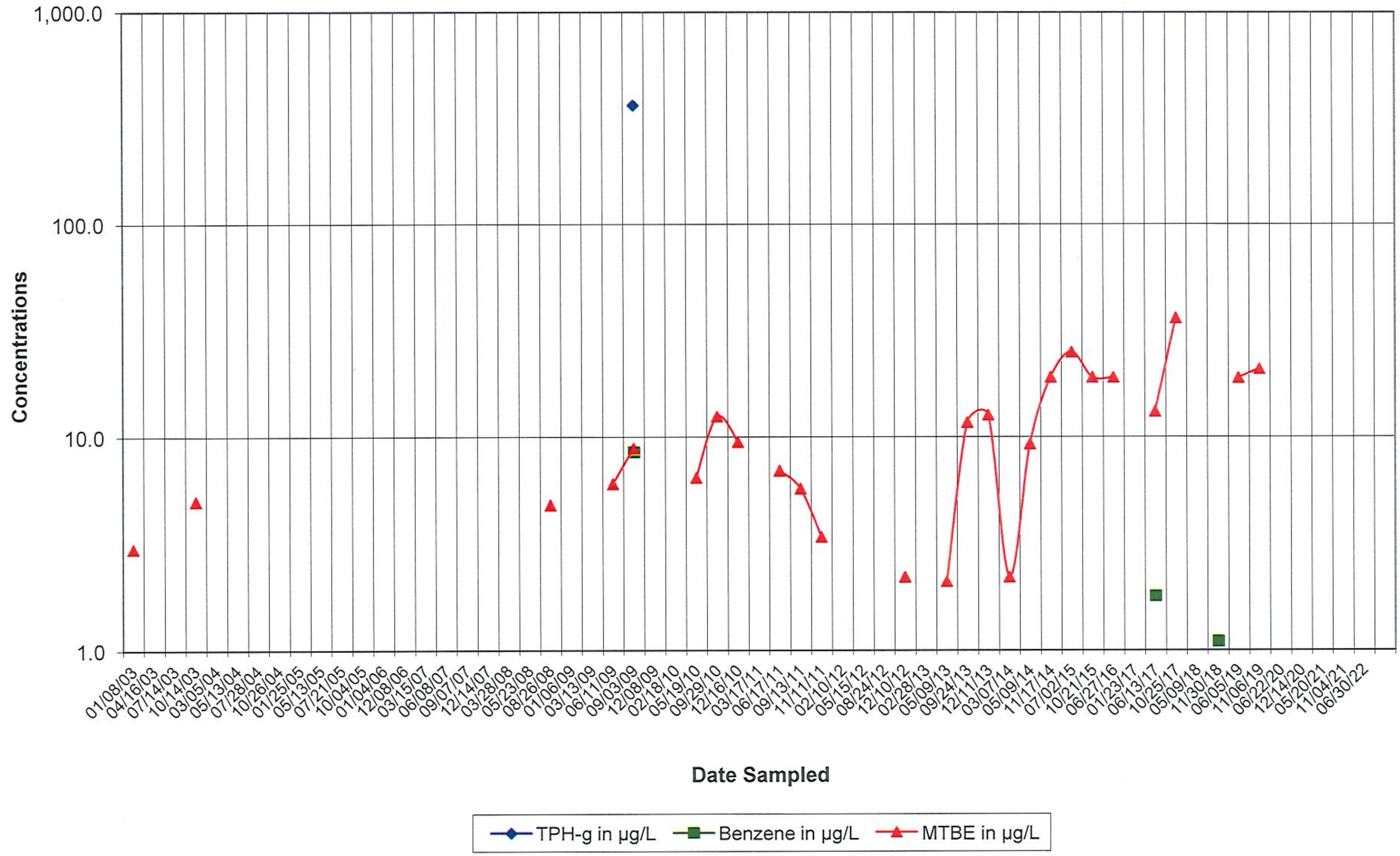
Contaminant Concentrations v. Time for MW-6



A.C.C.E.S. INC.
ENVIRONMENTAL ENGINEERING

MOBIL BALDWIN

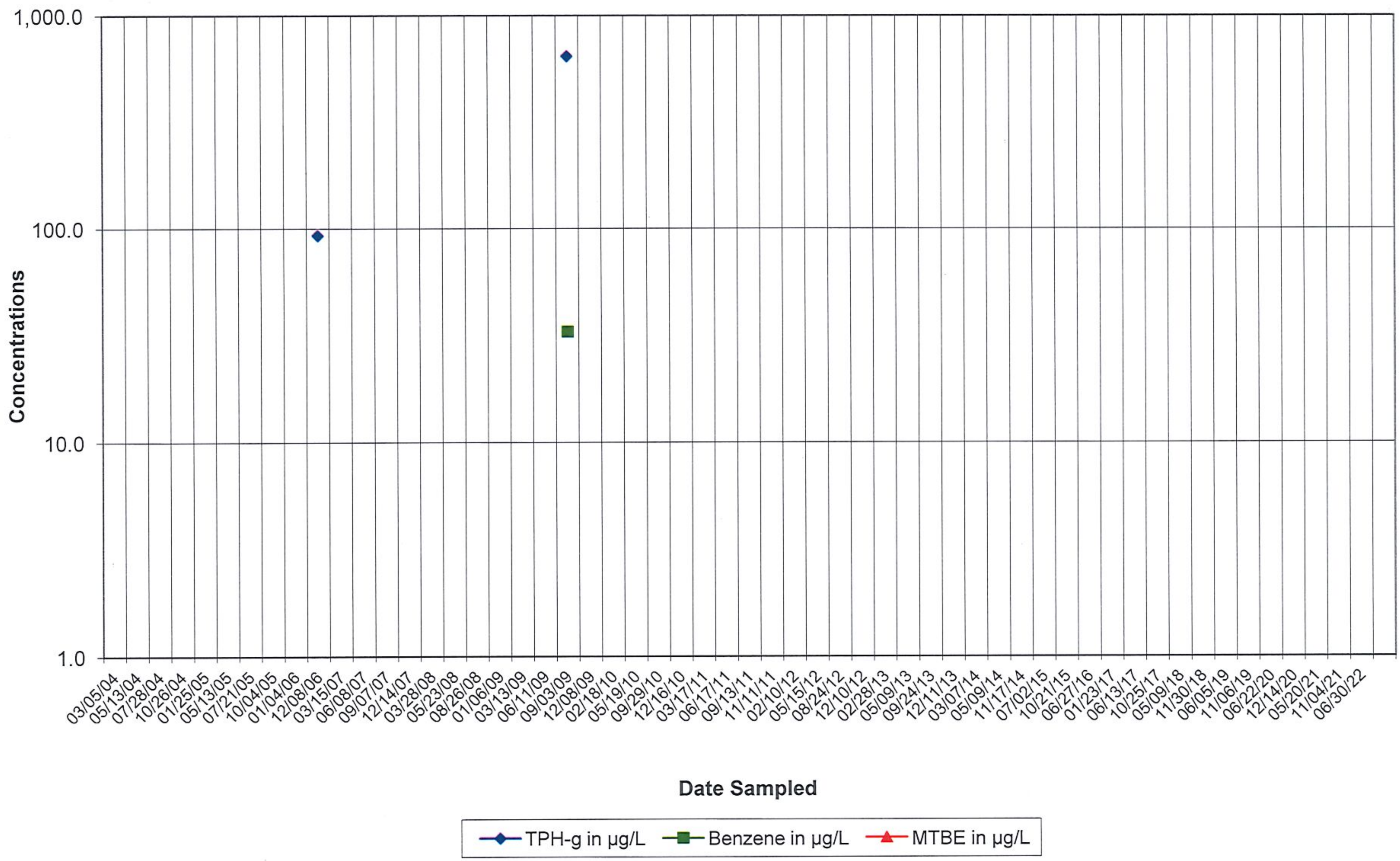
Contaminant Concentrations v. Time for MW-7

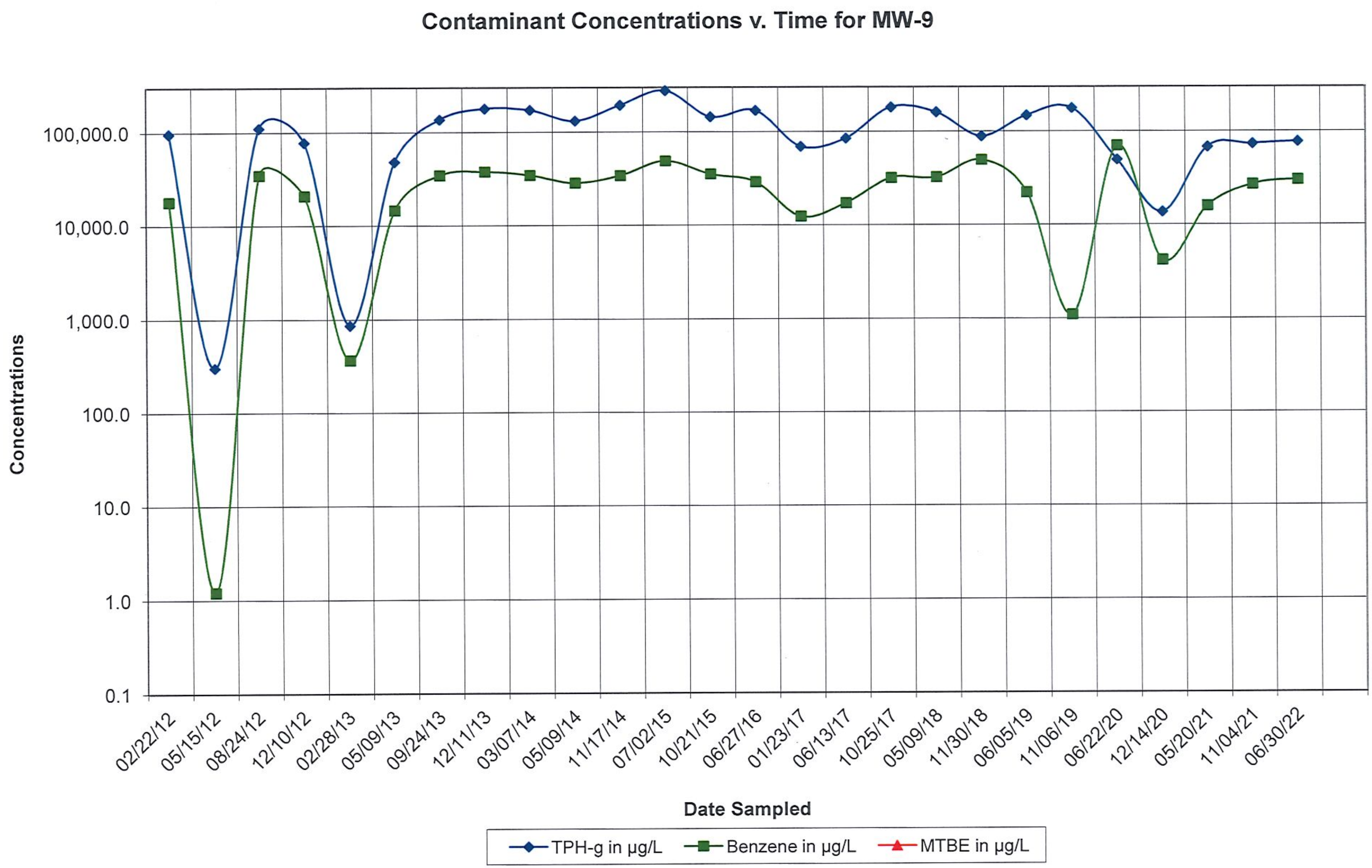


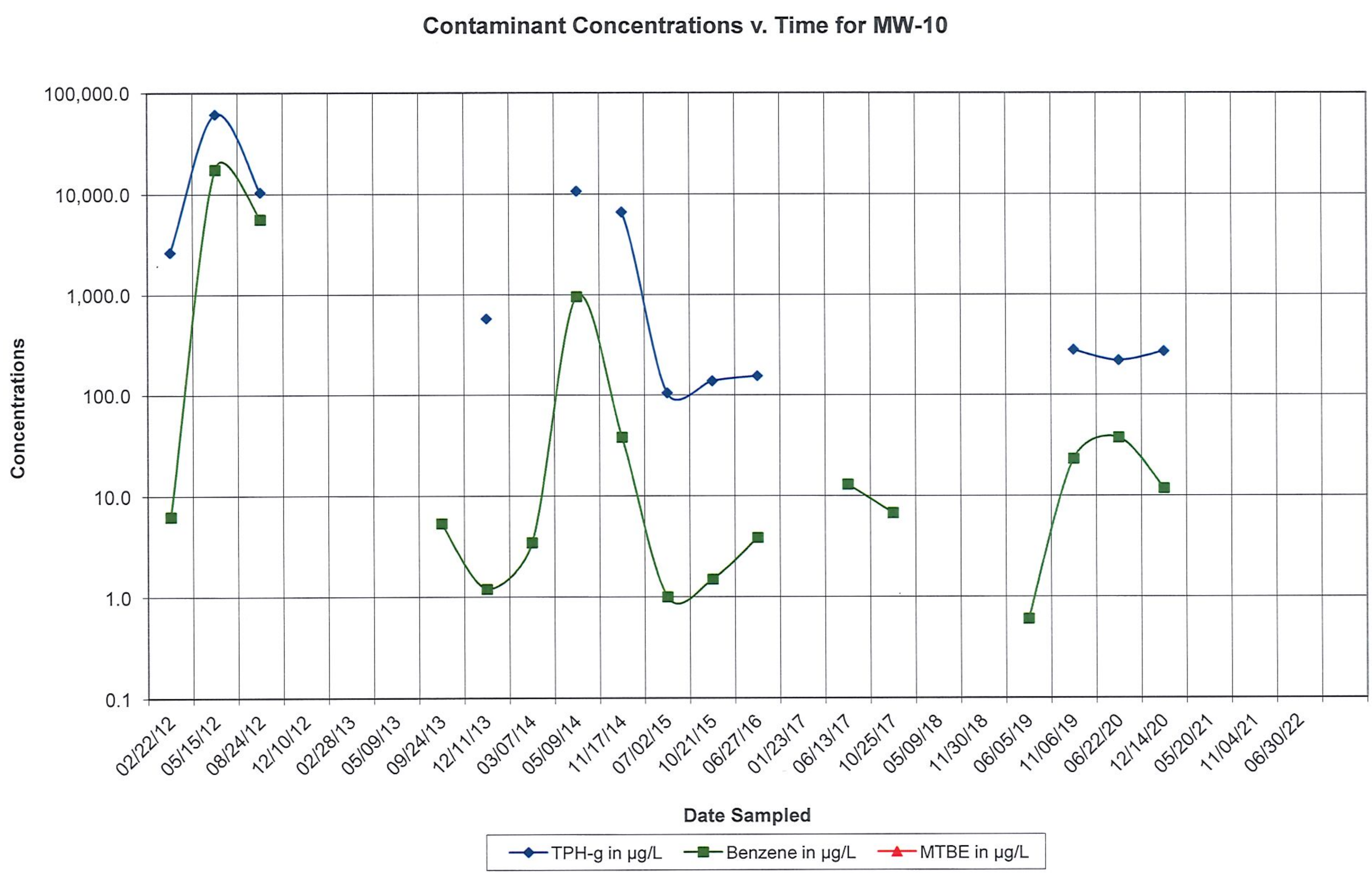
A.C.C.E.S. INC.
ENVIRONMENTAL ENGINEERING

MOBIL BALDWIN

Contaminant Concentrations v. Time for MW-8

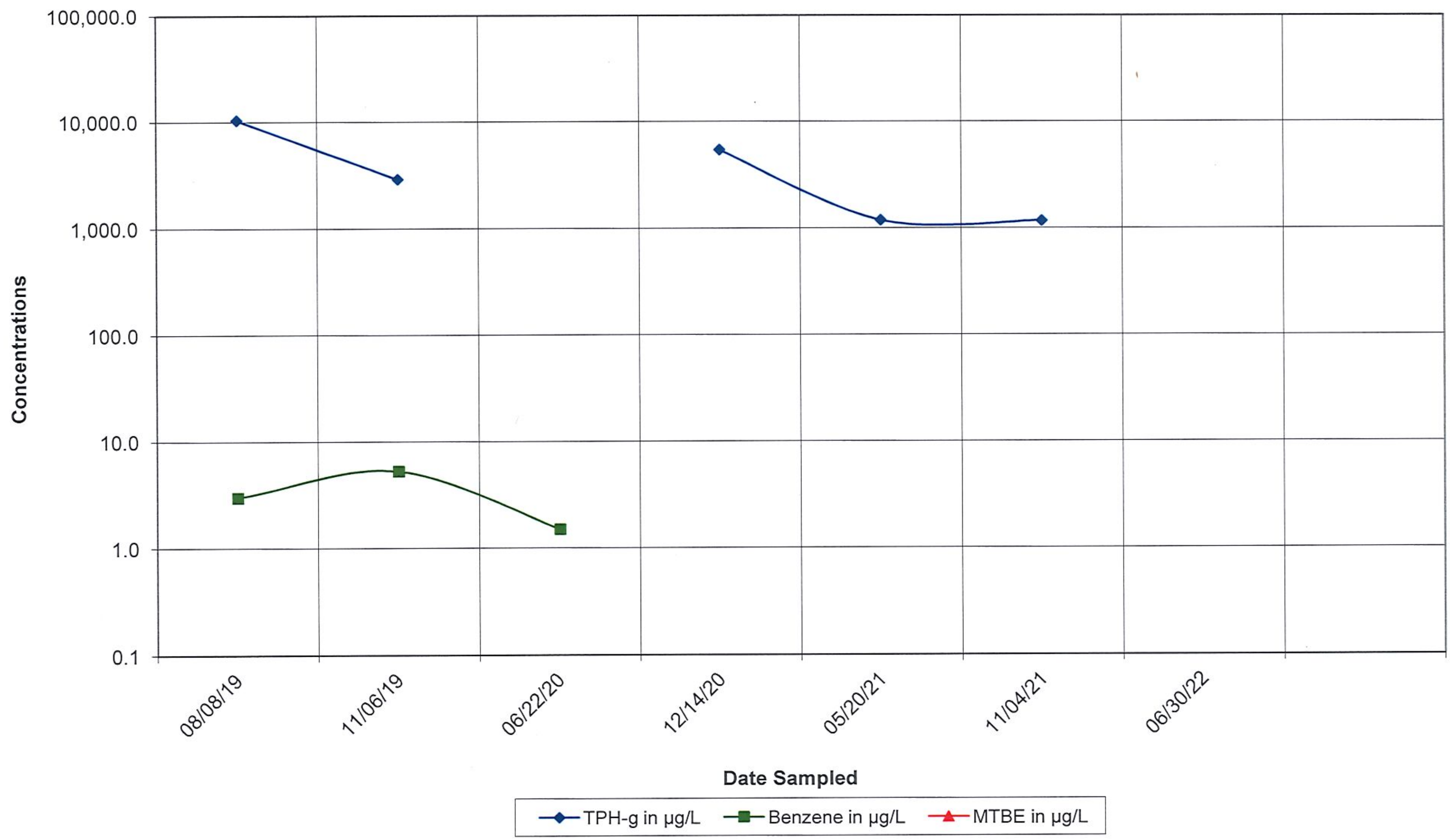



Contaminant Concentrations v. Time for MW-9
Concentrations
100,000.0
10,000.0
1,000.0
100.0
10.0
1.0
0.1
02/22/12
05/15/12
08/24/12
12/10/12
02/28/13
05/09/13
09/24/13
12/11/13
03/07/14
05/09/14
11/17/14
07/02/15
10/21/15
06/27/16
01/23/17
06/13/17
10/25/17
05/09/18
11/30/18
06/05/19
11/06/19
06/22/20
12/14/20
05/20/21
11/04/21
06/30/22
Date Sampled
TPH-g in µg/L
Benzene in µg/L
MTBE in µg/L



Contaminant Concentrations v. Time for MW-10
Concentrations
100,000.0
10,000.0
1,000.0
100.0
10.0
1.0
0.1
02/22/12
05/15/12
08/24/12
12/10/12
02/28/13
05/09/13
09/24/13
12/11/13
03/07/14
05/09/14
11/17/14
07/02/15
10/21/15
06/27/16
01/23/17
06/13/17
10/25/17
05/09/18
11/30/18
06/05/19
11/06/19
06/22/20
12/14/20
05/20/21
11/04/21
06/30/22
Date Sampled
TPH-g in µg/L
Benzene in µg/L
MTBE in µg/L

Contaminant Concentrations v. Time for MW-11



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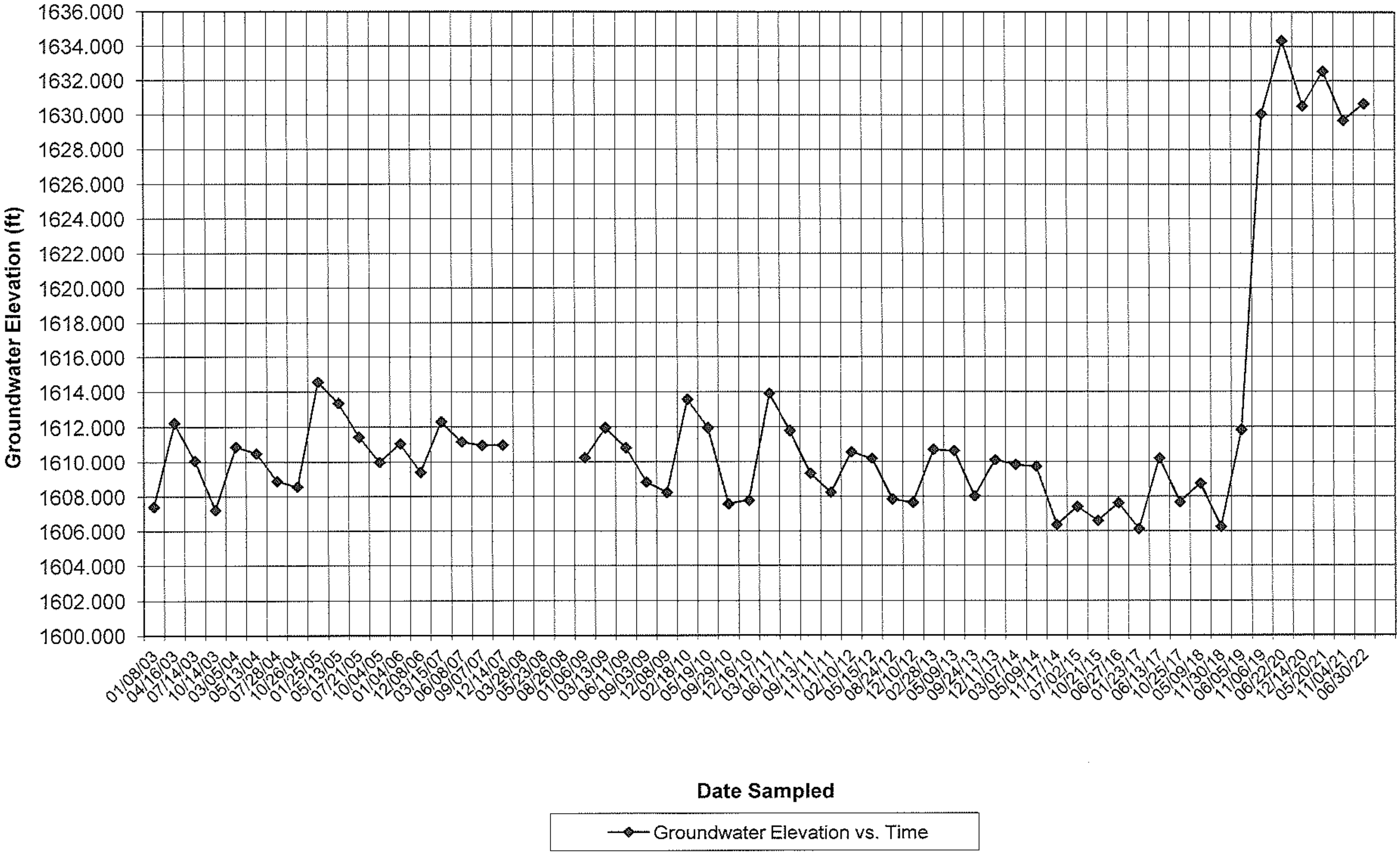
310-822-3800

APPENDIX D

A.C.C.E.S. INC.
ENVIRONMENTAL ENGINEERING

MOBIL BALDWIN

Groundwater Elevation vs. Time for MW-1

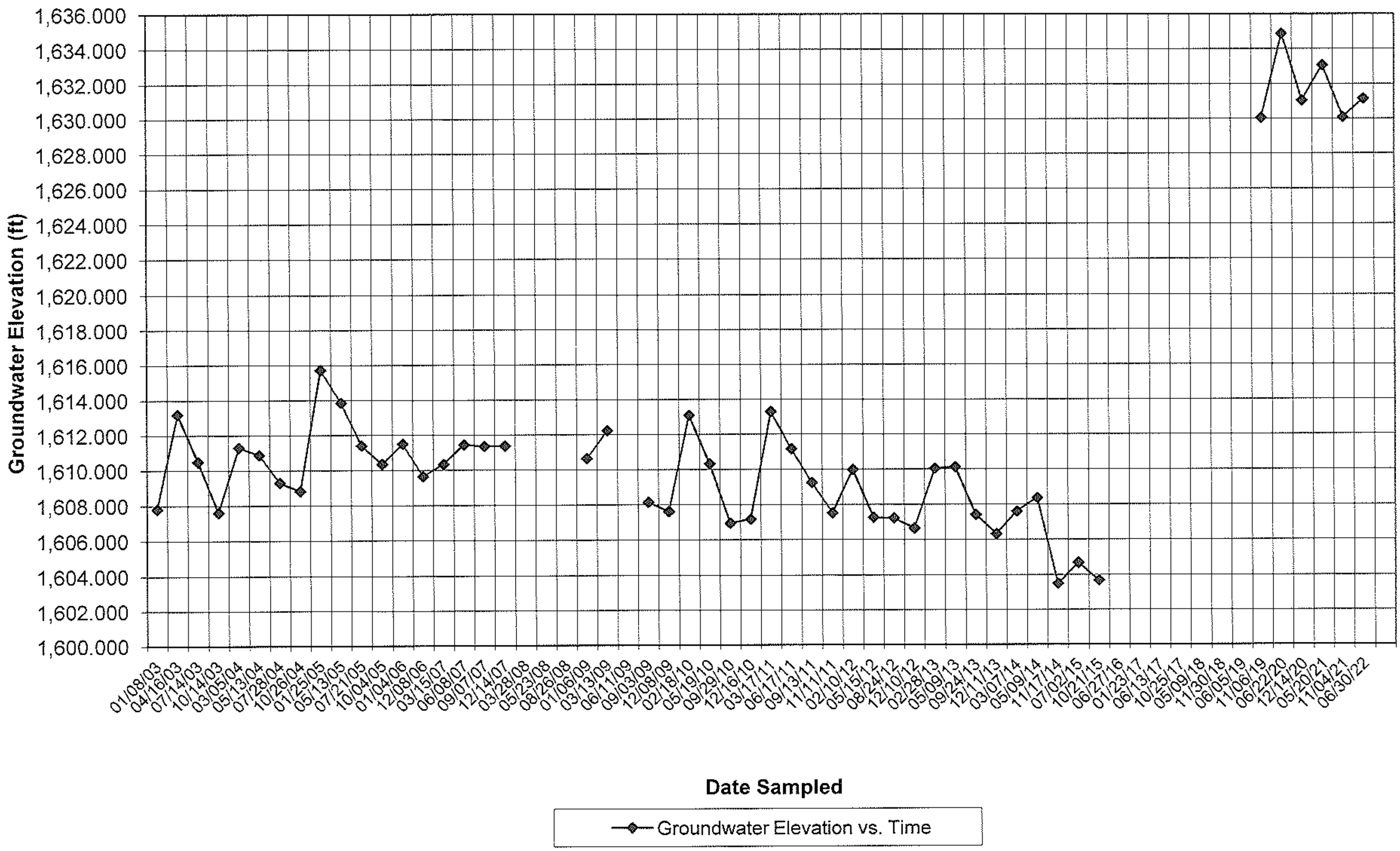


***Not measured as well was destructed during Spring 2008 Soil Excavation.

A.C.C.E.S. INC.
ENVIRONMENTAL ENGINEERING

MOBIL BALDWIN

Groundwater Elevation vs. Time for MW-2

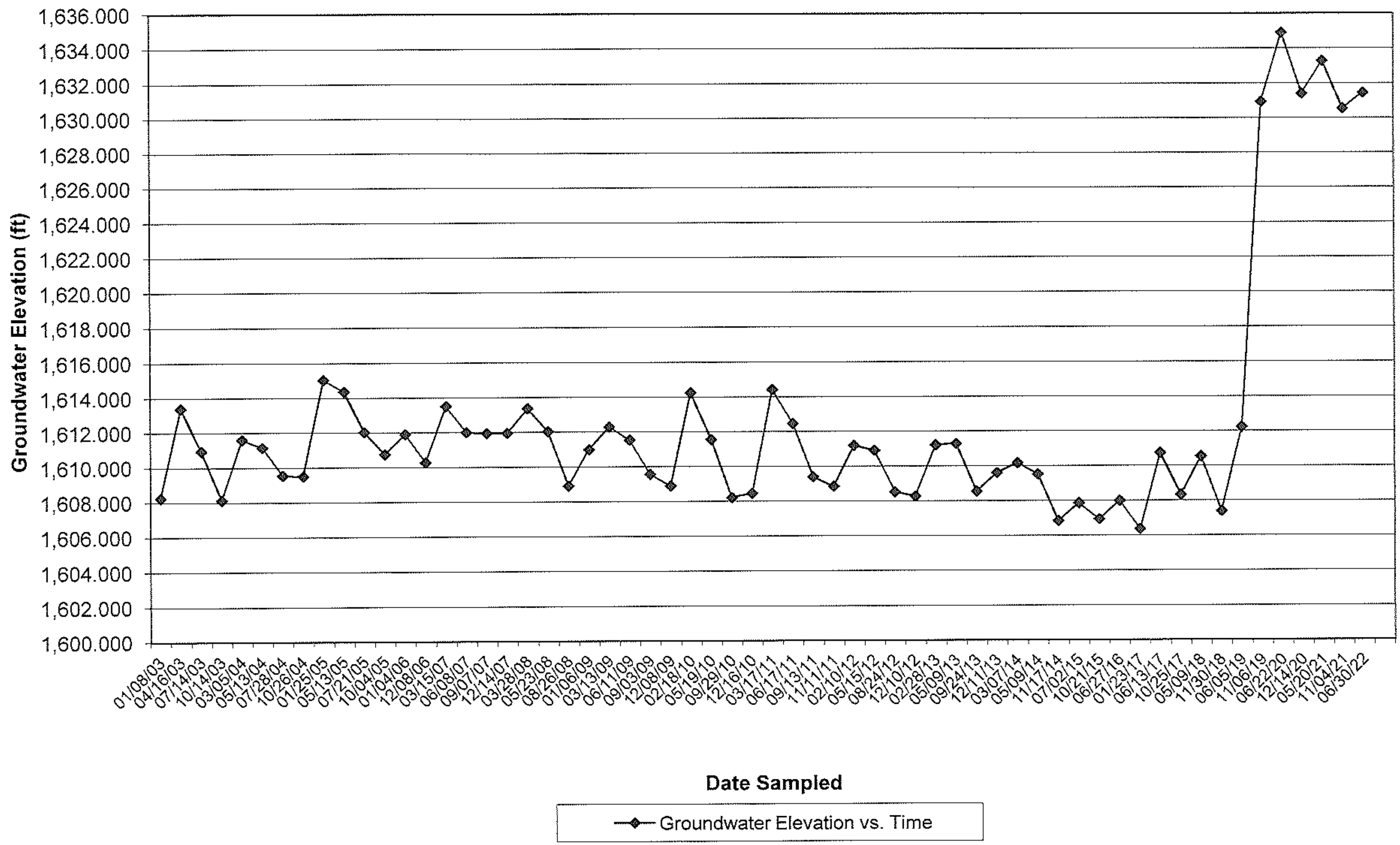


*** Not measured as well was destructed during Spring 2008 Soil Excavation.
**** Not measured as car was parked over monitoring well.

A.C.C.E.S. INC.
ENVIRONMENTAL ENGINEERING

MOBIL BALDWIN

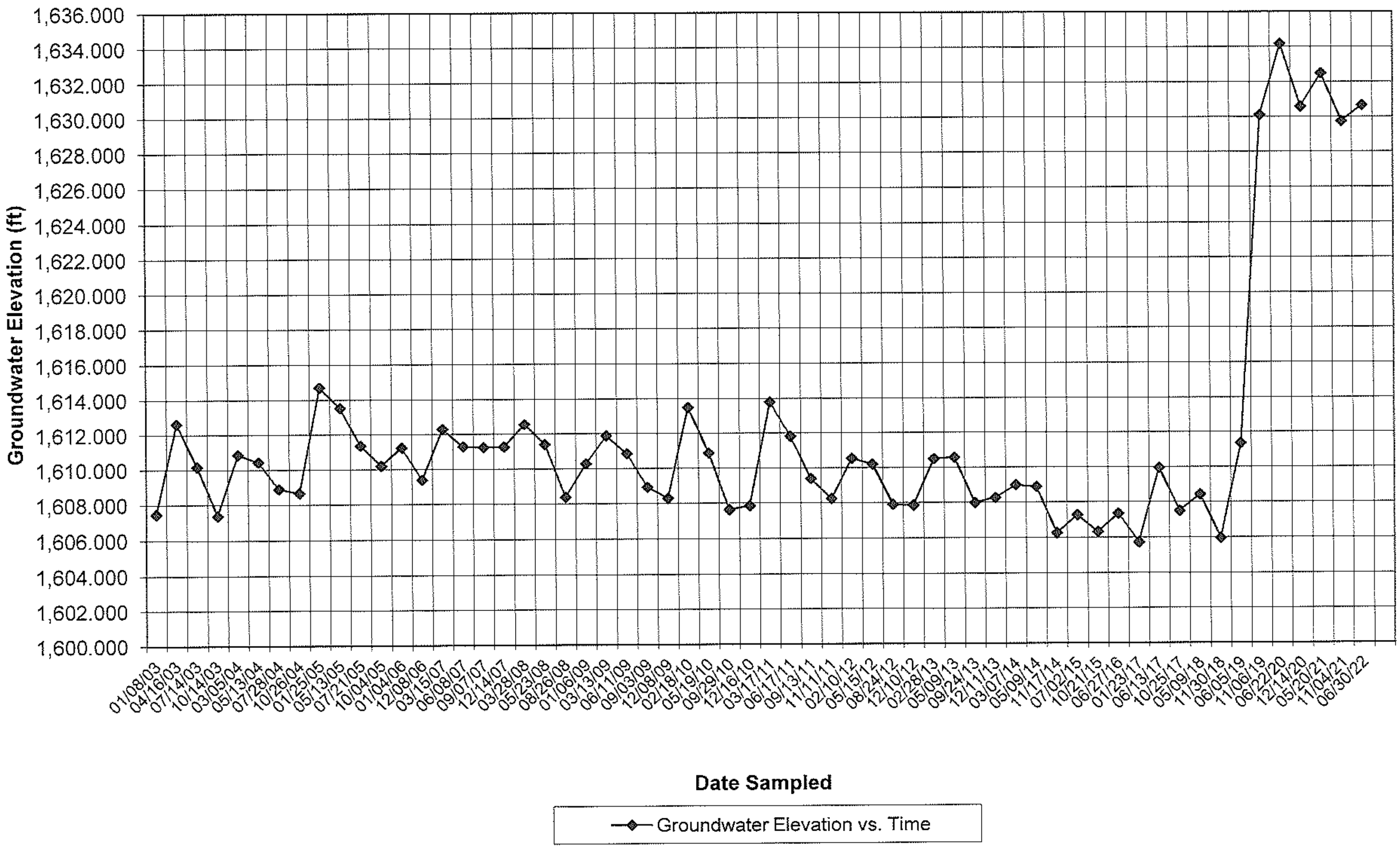
Groundwater Elevation vs. Time for MW-3



A.C.C.E.S. INC.
ENVIRONMENTAL ENGINEERING

MOBIL BALDWIN

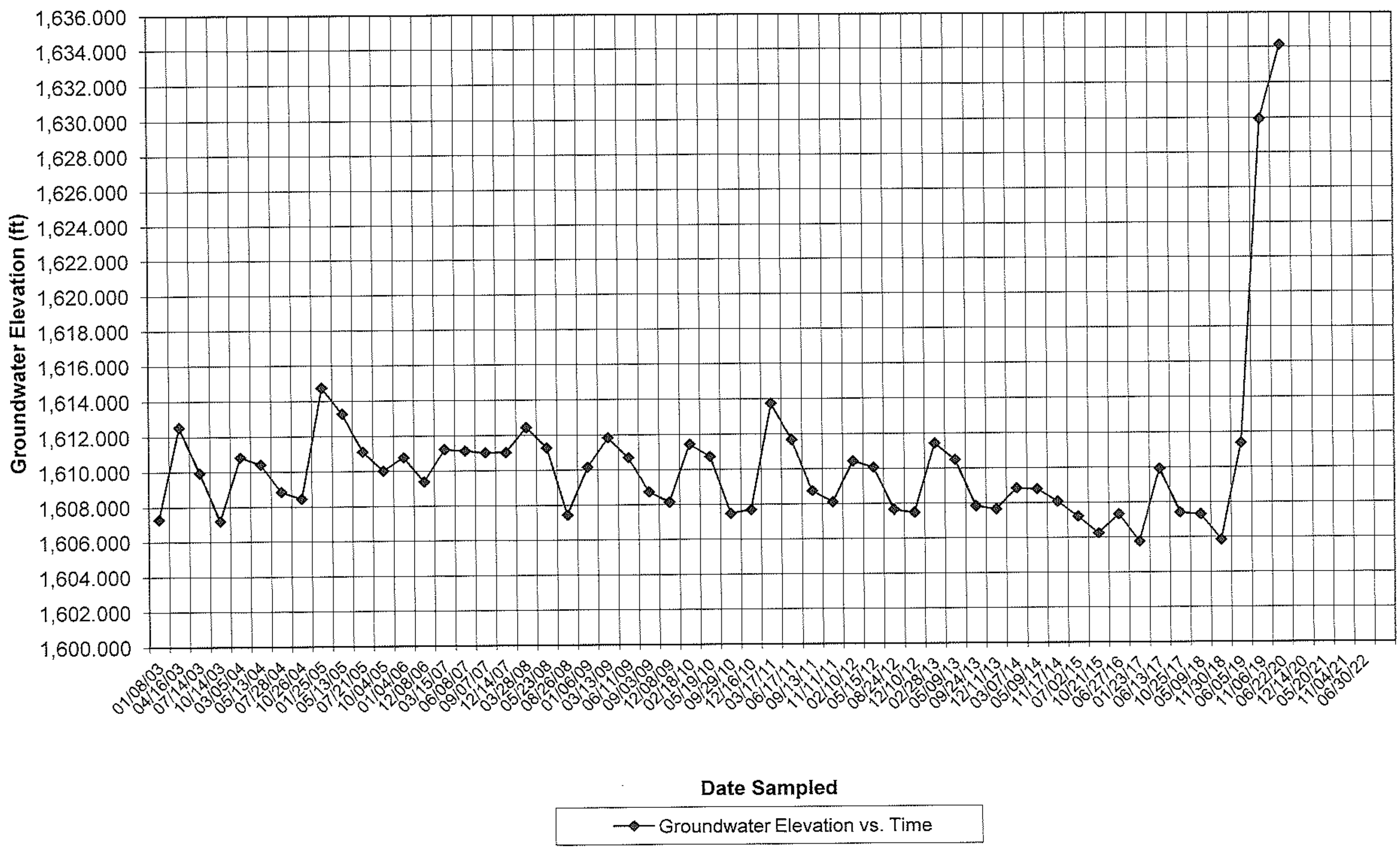
Groundwater Elevation vs. Time for MW-4



A.C.C.E.S. INC.
ENVIRONMENTAL ENGINEERING

MOBIL BALDWIN

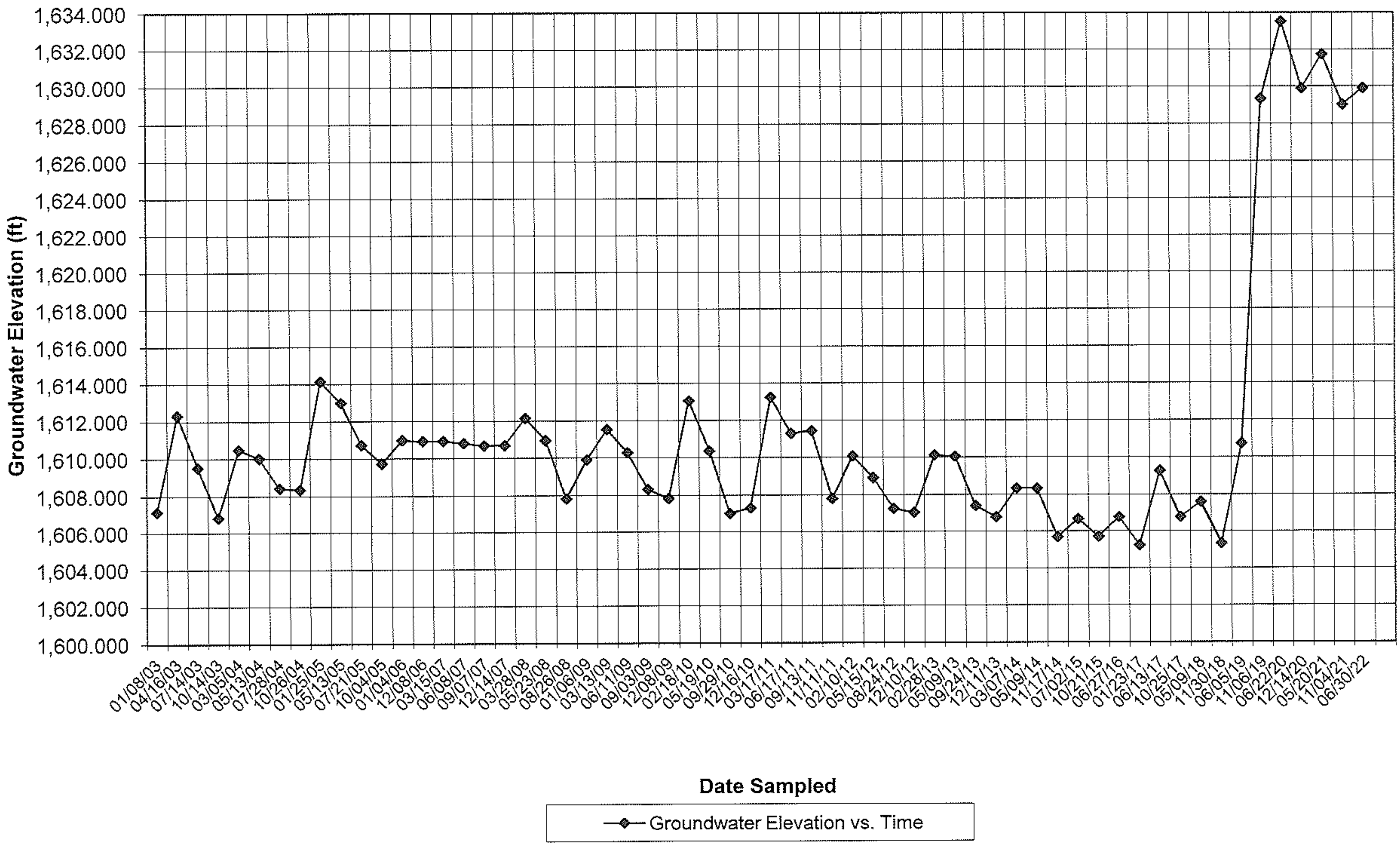
Groundwater Elevation vs. Time for MW-5



A.C.C.E.S. INC.
ENVIRONMENTAL ENGINEERING

MOBIL BALDWIN

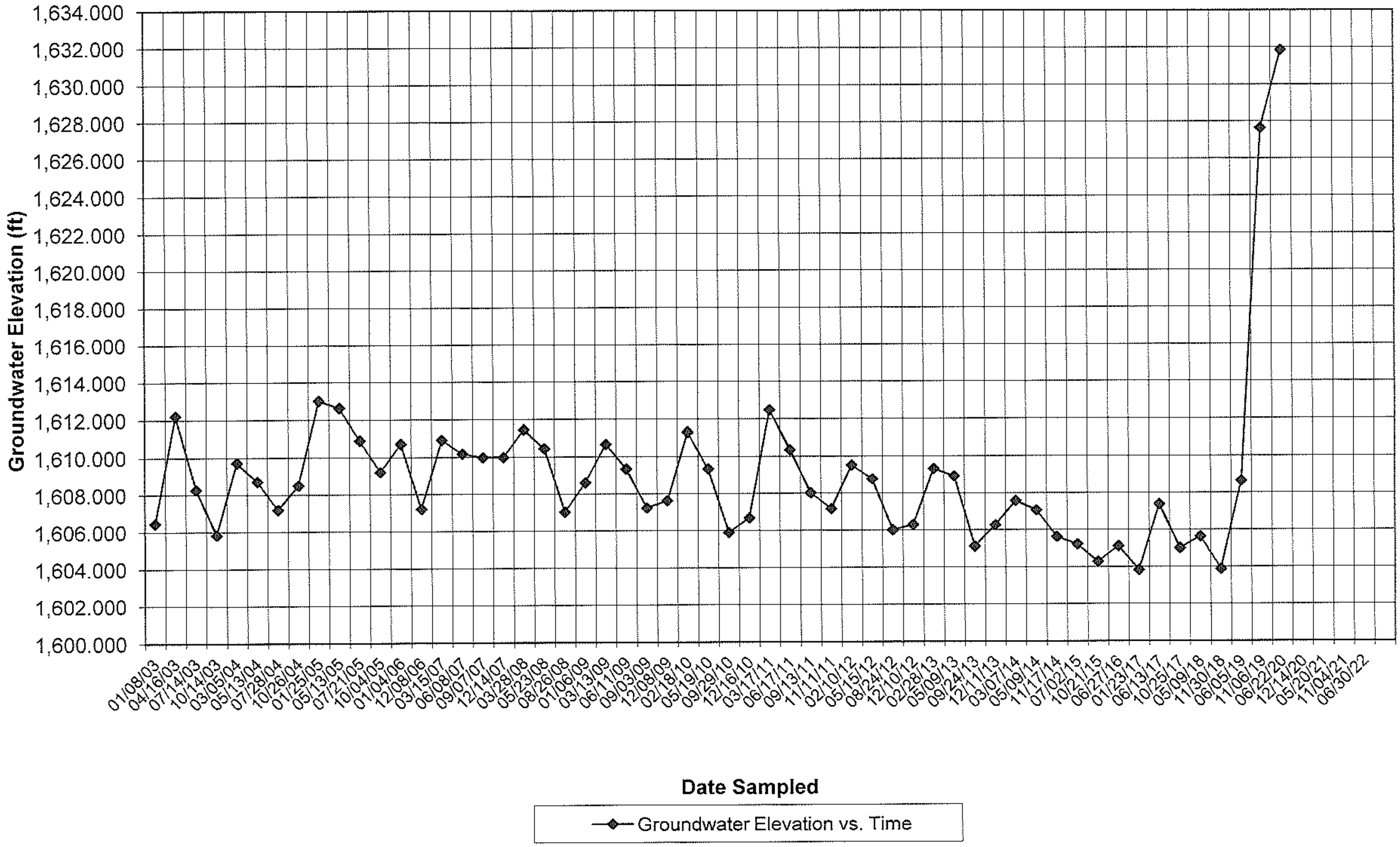
Groundwater Elevation vs. Time for MW-6



A.C.C.E.S. INC.
ENVIRONMENTAL ENGINEERING

MOBIL BALDWIN

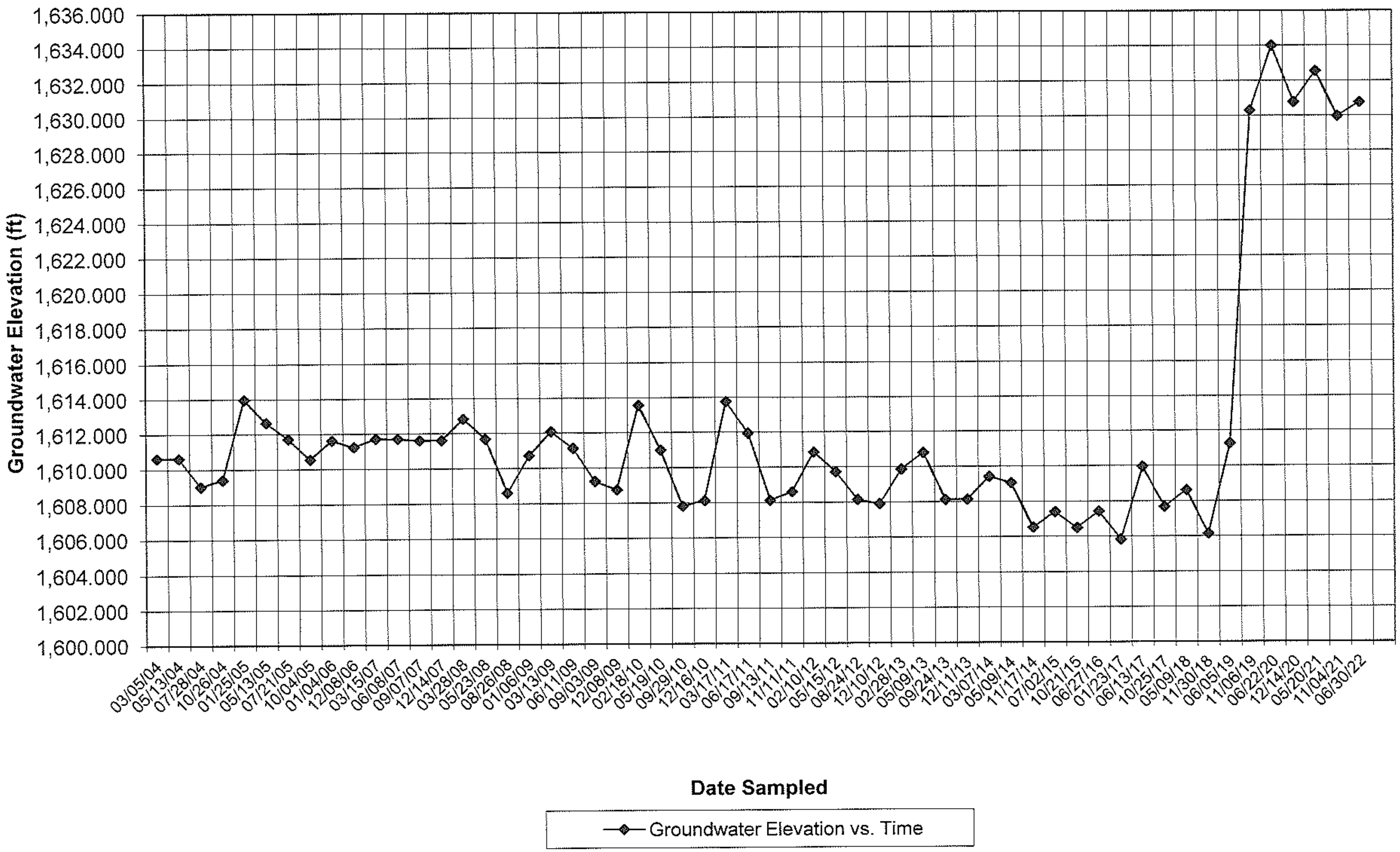
Groundwater Elevation vs. Time for MW-7



A.C.C.E.S. INC.
ENVIRONMENTAL ENGINEERING

MOBIL BALDWIN

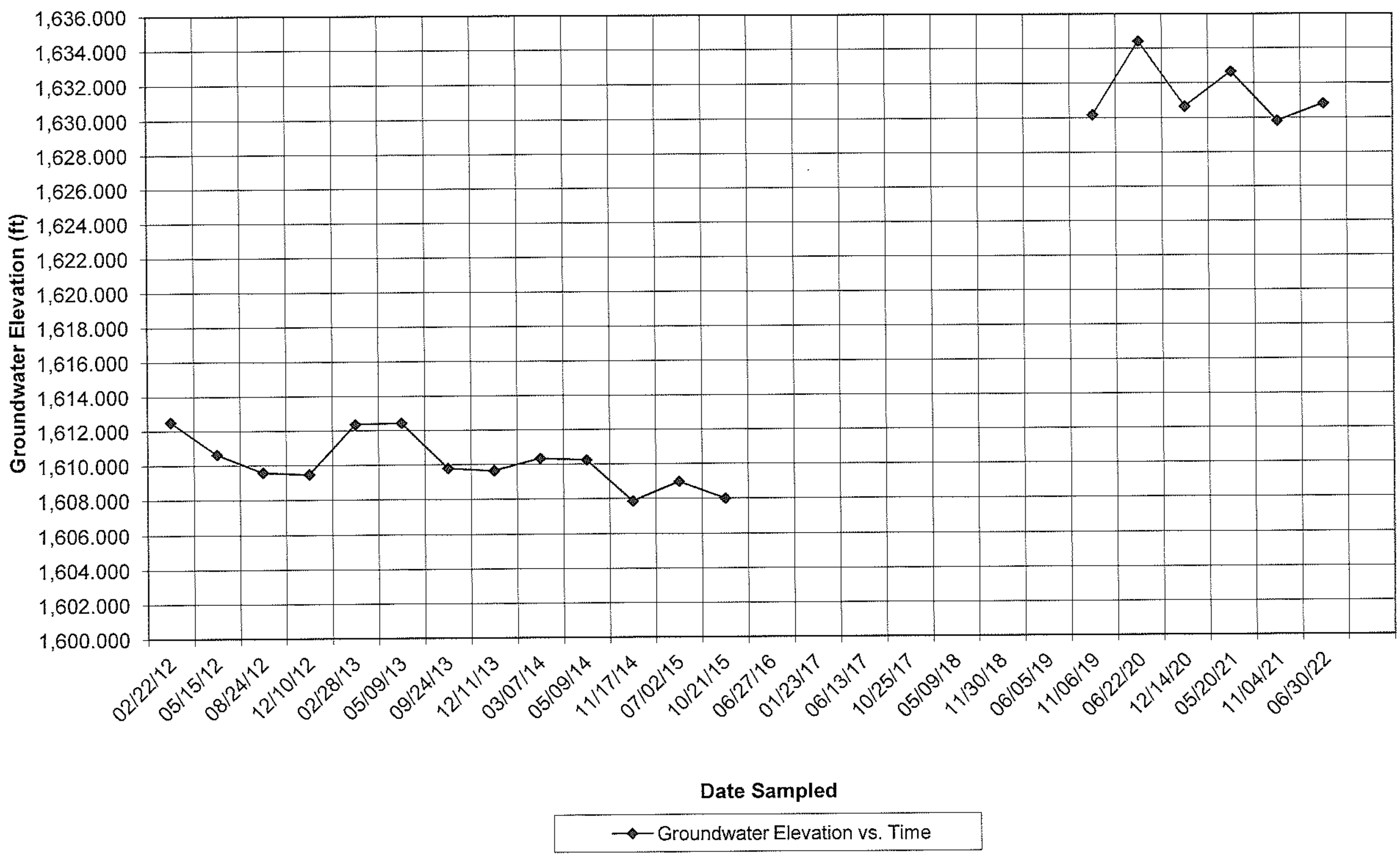
Groundwater Elevation vs. Time for MW-8



A.C.C.E.S. INC.
ENVIRONMENTAL ENGINEERING

MOBIL BALDWIN

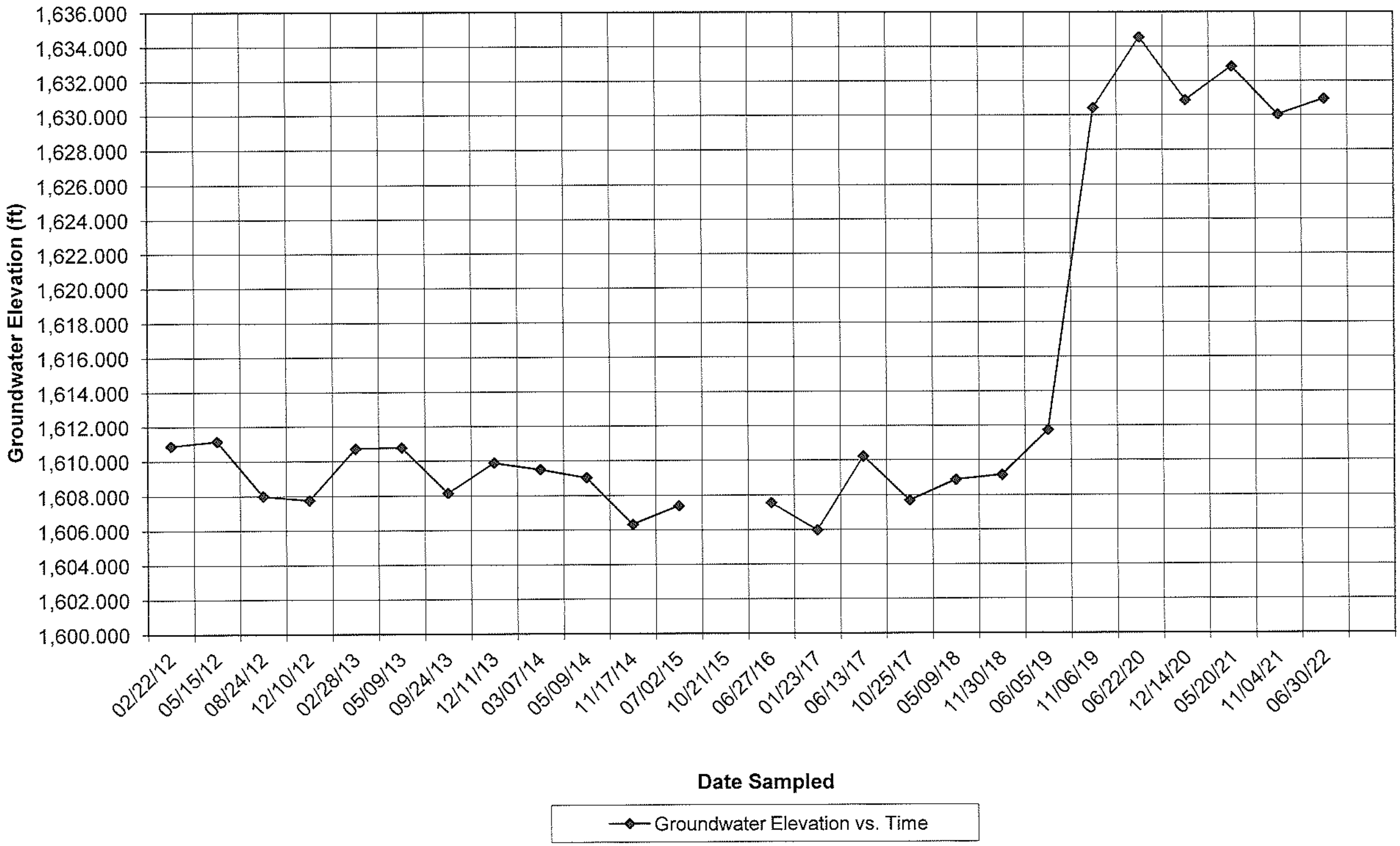
Groundwater Elevation vs. Time for MW-9



A.C.C.E.S. INC.
ENVIRONMENTAL ENGINEERING

MOBIL BALDWIN

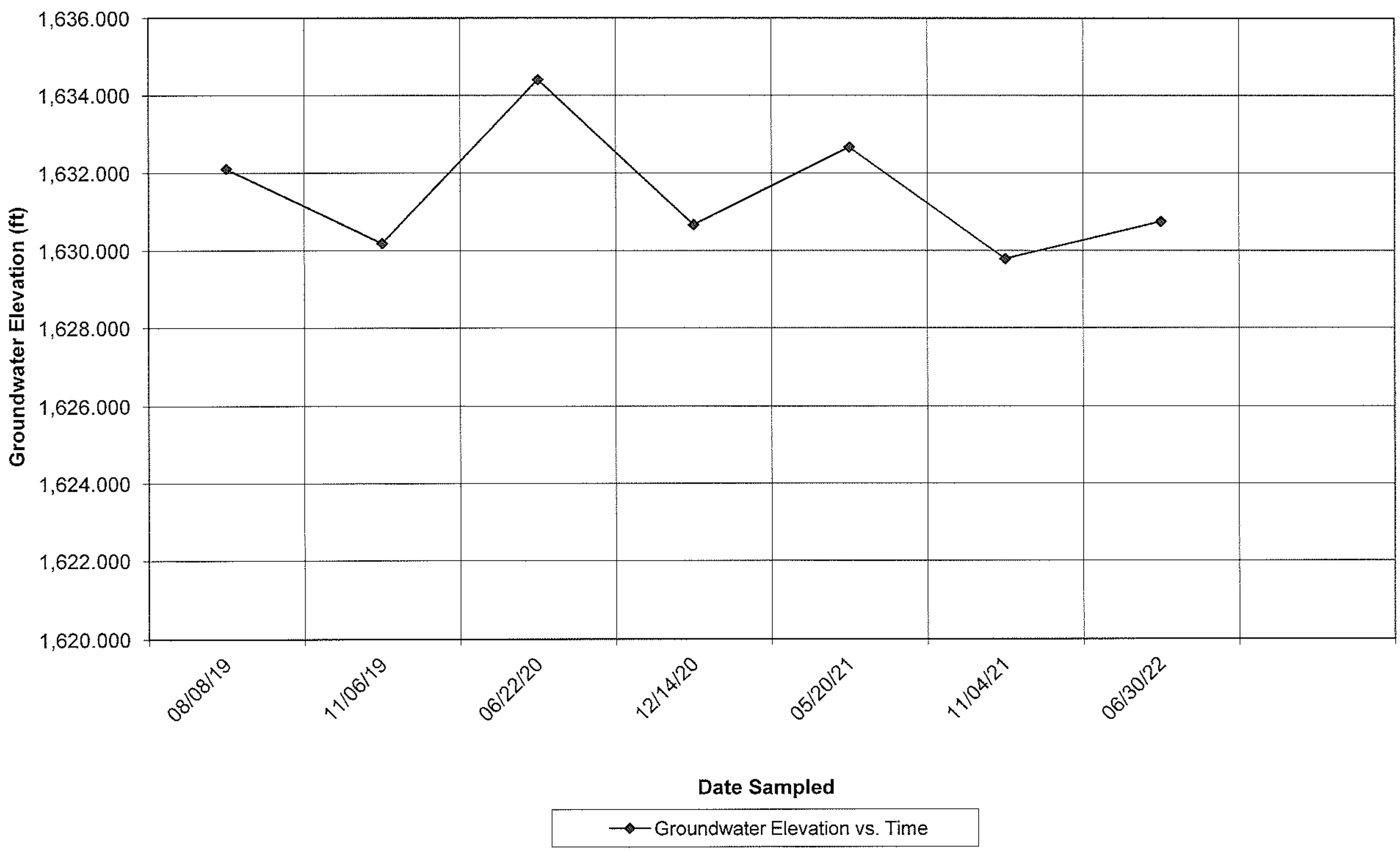
Groundwater Elevation vs. Time for MW-10



A.C.C.E.S. INC.
ENVIRONMENTAL ENGINEERING

MOBIL BALDWIN

Groundwater Elevation vs. Time for MW-11



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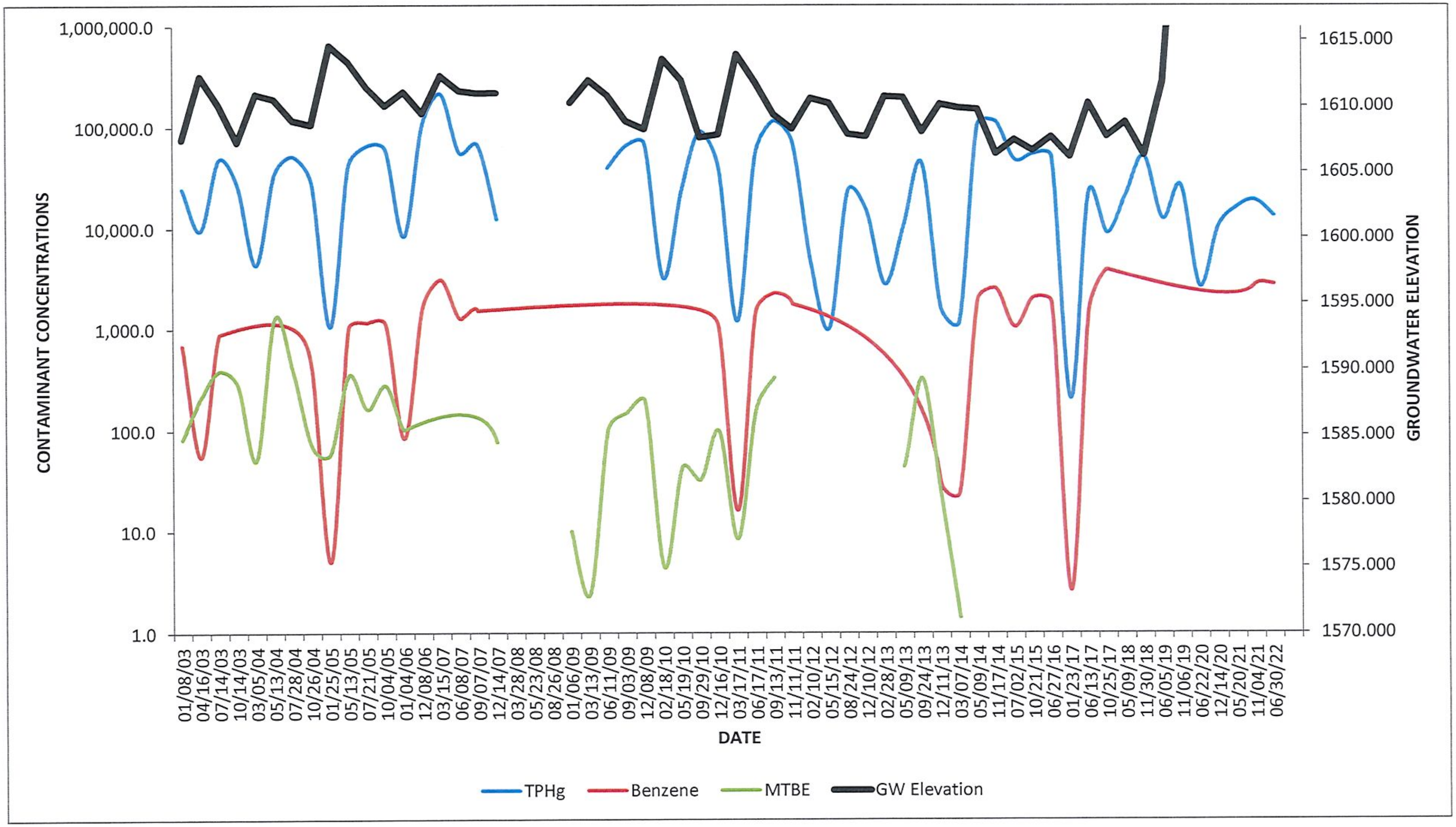
310-822-3800

APPENDIX E

A.C.C.E.S. INC.
ENVIRONMENTAL ENGINEERING

HYDROGRAPH OVER CONCENTRATIONS
MOBIL BALDWIN MW-1



APPENDIX F

A.C.C.E.S. INC. – 2336 S. Sepulveda Blvd, Los Angeles, CA 90064
310-822-3800

A.C.C.E.S. Inc. 2336 S Sepulveda Blvd, Los Angeles, CA 90064

WATER WELL PURGE AND SAMPLE DATA SHEET

JOB NAME MOBIL BALDWIN DATE 6/30/22

Well ID: MW-1

TOC Elevation (feet): 1640.63

Well Depth (feet): 30

Field Supervisor(s):

Technician(s): ERIC Jorge

BEFORE PURGE:

Depth to Groundwater (feet): 9.95

Elevation of Groundwater (ft. amsl): 1630.68

VOLUME OF WATER IN WELL (4" casing)		Depth of Water in Well (ft)		Conversion Factor		Volume (gal)
	=		X	0.653	=	

FREE PRODUCT:

☐ Floating Product: Thickness ______ Color ______
☐ Sheen

Time	Temperature ^0C	pH	Conductivity	Turbidity	Remark(s)
11:40	24.77	7.61	0.893	735	
11:45	24.57	7.38	0.753	556	
11:50	24.59	7.38	0.751	560	

Instrument Used: Horiba Water Checker U10

Notes:

A.C.C.E.S. Inc. 2336 S Sepulveda Blvd, Los Angeles, CA 90064

WATER WELL PURGE AND SAMPLE DATA SHEET

JOB NAME MOBIL BALDWIN DATE 6/30/22

Well ID: MW-2

TOC Elevation (feet): 1642.41

Well Depth (feet): 30

Field Supervisor(s):

Technician(s): ERIC Jorge

BEFORE PURGE:

Depth to Groundwater (feet): 11.24

Elevation of Groundwater (ft. amsl): 1631.17

VOLUME OF WATER IN WELL (4" casing)	=	Depth of Water in Well (ft)	X	Conversion Factor	=	Volume (gal)
	=		X	0.653	=	

FREE PRODUCT:

☐ Floating Product: Thickness ______ Color ______
☐ Sheen

Time	Temperature ^0C	pH	Conductivity	Turbidity	Remark(s)
9:50	24.75	7.94	1.96	0.0	
9:55	24.47	7.75	1.94	0.0	
10:00	23.87	7.74	1.98	0.0	

Instrument Used: Horiba Water Checker U10

Notes:

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WATER WELL PURGE AND SAMPLE DATA SHEET

JOB NAME MOBIL BALDWIN DATE 6/30/22

Well ID: MW-3

TOC Elevation (feet): 1643.09

Well Depth (feet): 32 (28.22)

Field Supervisor(s):

Technician(s): Eric Jorge

BEFORE PURGE:

Depth to Groundwater (feet): 11.63

Elevation of Groundwater (ft. amsl): 1631.46

VOLUME OF WATER IN WELL (4" casing)	=	Depth of Water in Well (ft)	X	Conversion Factor	=	Volume (gal)
	=		X	0.653	=	

FREE PRODUCT:

☐ Floating Product: Thickness ______ Color ______
☐ Sheen

Time	Temperature ^0C	pH	Conductivity	Turbidity	Remark(s)
10:25	25.58	8.02	0.689	341	
10:30	24.49	7.94	0.682	460	
10:35	24.14	7.89	0.720	572	

Instrument Used: Horiba Water Checker U10

Notes:
Number in parenthesis in WELL DEPTH is bottom of well measured in 2007

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WATER WELL PURGE AND SAMPLE DATA SHEET

JOB NAME MOBIL BALDWIN DATE 6/30/22

Well ID: MW-4

TOC Elevation (feet): 1640.99

Well Depth (feet): 32 (30.05)

Field Supervisor(s): ______

Technician(s): ERIC Jorge

BEFORE PURGE:

Depth to Groundwater (feet): 10.32

Elevation of Groundwater (ft. amsl): 1630.67

VOLUME OF WATER IN WELL (4" casing)	=	**Depth of Water in Well (ft)**	X	**Conversion Factor**	=	**Volume (gal)**
	=		X	**0.653**	=	

FREE PRODUCT:

☐ Floating Product: Thickness ______ Color ______
☐ Sheen

Time	Temperature ^0C	pH	Conductivity	Turbidity	Remark(s)
11:00	25.90	7.51	2.45	300	
11:05	25.00	7.55	2.45	328	
11:10	24.26	7.56	2.48	310	

Instrument Used: Horiba Water Checker U10

Notes:
Number in parenthesis in WELL DEPTH is bottom of well measured in 2007

A.C.C.E.S. Inc. 2336 S Sepulveda Blvd, Los Angeles, CA 90064

WATER WELL PURGE AND SAMPLE DATA SHEET

JOB NAME MOBIL BALDWIN DATE 6/30/22

Well ID: MW-5

TOC Elevation (feet): 1639.63

Well Depth (feet): 32 (29.84)

Field Supervisor(s):

Technician(s): ERIC Jorge

BEFORE PURGE:

Depth to Groundwater (feet): —— Well buried under compacted dirt

Elevation of Groundwater (ft. amsl):

VOLUME OF WATER IN WELL (4" casing)		Depth of Water in Well (ft)		Conversion Factor		Volume (gal)
	=		X	0.653	=	

FREE PRODUCT:

☐ Floating Product: Thickness Color
☐ Sheen

Time	Temperature °C	pH	Conductivity	Turbidity	Remark(s)

Instrument Used: Horiba Water Checker U10

Notes:
Number in parenthesis in WELL DEPTH is bottom of well measured in 2007

A.C.C.E.S. Inc. 2336 S Sepulveda Blvd, Los Angeles, CA 90064

WATER WELL PURGE AND SAMPLE DATA SHEET

JOB NAME MOBIL BALDWIN DATE 6/30/22

Well ID: MW-6

TOC Elevation (feet): 1639.09

Well Depth (feet): 32 (29.00)

Field Supervisor(s):

Technician(s): ERIC Jorge

BEFORE PURGE:

Depth to Groundwater (feet): 9.17

Elevation of Groundwater (ft. amsl): 1629.92

VOLUME OF WATER IN WELL (4" casing)		Depth of Water in Well (ft)		Conversion Factor		Volume (gal)
	=		X	0.653	=	

FREE PRODUCT:

☐ Floating Product: Thickness ______ Color ______
☐ Sheen

Time	Temperature ^0C	pH	Conductivity	Turbidity	Remark(s)
9:15	25.53	7.24	1.55	270	
9:20	25.10	7.22	1.63	534	
9:25	24.81	7.27	1.66	502	

Instrument Used: Horiba Water Checker U10

Notes:
Number in parenthesis in WELL DEPTH is bottom of well measured in 2007

A.C.C.E.S. Inc. 2336 S Sepulveda Blvd, Los Angeles, CA 90064

WATER WELL PURGE AND SAMPLE DATA SHEET

JOB NAME MOBIL BALDWIN DATE 6/30/22

Well ID: MW-7

TOC Elevation (feet): 1637.31

Well Depth (feet): 35 (27.94)

Field Supervisor(s):

Technician(s): ERIC Jorge

BEFORE PURGE:

Depth to Groundwater (feet): —— destroyed by road expansion

Elevation of Groundwater (ft. amsl):

VOLUME OF WATER IN WELL (4" casing)	=	Depth of Water in Well (ft)	X	Conversion Factor	=	Volume (gal)
	=		X	0.653	=	

FREE PRODUCT:

☐ Floating Product: Thickness ______ Color ______
☐ Sheen

Time	Temperature ^0C	pH	Conductivity	Turbidity	Remark(s)

Instrument Used: Horiba Water Checker U10

Notes:
Number in parenthesis in WELL DEPTH is bottom of well measured in 2007

A.C.C.E.S. Inc. 2336 S Sepulveda Blvd, Los Angeles, CA 90064

WATER WELL PURGE AND SAMPLE DATA SHEET

JOB NAME MOBIL BALDWIN DATE 6/30/22

Well ID: MW-8

TOC Elevation (feet): 1639.89

Well Depth (feet): 26 (24.92)

Field Supervisor(s):

Technician(s): Greg Jorge

BEFORE PURGE:

Depth to Groundwater (feet): ~~9~~ 9.12

Elevation of Groundwater (ft. amsl): 1630.77

VOLUME OF WATER IN WELL (4" casing)	=	Depth of Water in Well (ft)	X	Conversion Factor	=	Volume (gal)
	=		X	0.653	=	

FREE PRODUCT:

☐ Floating Product: Thickness ________ Color ________
☐ Sheen

Time	Temperature °C	pH	Conductivity	Turbidity	Remark(s)
8:45	25.22	6.76	2.58	255	
8:50	24.58	6.85	2.58	271	
8:55	24.25	6.91	2.59	268	

Instrument Used: Horiba Water Checker U10

Notes:
Number in parenthesis in WELL DEPTH is bottom of well measured in 2007

A.C.C.E.S. Inc. 2336 S Sepulveda Blvd, Los Angeles, CA 90064

WATER WELL PURGE AND SAMPLE DATA SHEET

JOB NAME MOBIL BALDWIN DATE 6/30/22

Well ID: MW-9

TOC Elevation (feet): 1640.79

Well Depth (feet): 25

Field Supervisor(s):

Technician(s): Eric Jorge

BEFORE PURGE:

Depth to Groundwater (feet): ~~[illegible]~~ 9.98

Elevation of Groundwater (ft. amsl): 1630.81

VOLUME OF WATER IN WELL (4" casing)	=	Depth of Water in Well (ft)	X	Conversion Factor	=	Volume (gal)
	=		X	0.653	=	

FREE PRODUCT:

☐ Floating Product: Thickness ______ Color ______
☐ Sheen

Time	Temperature °C	pH	Conductivity	Turbidity	Remark(s)
1:10	26.06	7.42	1.50	459	
1:15	25.18	7.28	1.49	1000	
1:20	25.23	7.27	1.47	1000	

Instrument Used: Horiba Water Checker U10

Notes:

A.C.C.E.S. Inc. 2336 S Sepulveda Blvd, Los Angeles, CA 90064

WATER WELL PURGE AND SAMPLE DATA SHEET

JOB NAME MOBIL BALDWIN DATE 6/30/22

Well ID: MW-10

TOC Elevation (feet): 1642.27

Well Depth (feet): 25

Field Supervisor(s): ______

Technician(s): Eric Jorge

BEFORE PURGE:

Depth to Groundwater (feet): 11.30

Elevation of Groundwater (ft. amsl): 1630.97

VOLUME OF WATER IN WELL (4" casing)	=	Depth of Water in Well (ft)	X	Conversion Factor	=	Volume (gal)
	=		X	0.653	=	

FREE PRODUCT:

☐ Floating Product: Thickness ______ Color ______
☐ Sheen

Time	Temperature °C	pH	Conductivity	Turbidity	Remark(s)
	24.97	7.48	0.872	428	
	24.54	7.53	0.912	0.0	
	24.21	7.49	1.08	0.0	

Instrument Used: Horiba Water Checker U10

Notes:

A.C.C.E.S. Inc. 2336 S Sepulveda Blvd, Los Angeles, CA 90064

WATER WELL PURGE AND SAMPLE DATA SHEET

JOB NAME MOBIL BALDWIN DATE 6/30/22

Well ID: MW-11

TOC Elevation (feet): 1641.17

Well Depth (feet): 20

Field Supervisor(s):

Technician(s): ERic Jorge

BEFORE PURGE:

Depth to Groundwater (feet): 10.42

Elevation of Groundwater (ft. amsl): 1630.75

VOLUME OF WATER IN WELL (4" casing)	=	Depth of Water in Well (ft)	X	Conversion Factor	=	Volume (gal)
	=		X	0.653	=	

FREE PRODUCT:

☐ Floating Product: Thickness ______ Color ______

☐ Sheen

Time	Temperature °C	pH	Conductivity	Turbidity	Remark(s)
12:45	25.90	7.64	2.22	540	
12:50	25.64	7.73	2.22	0.0	
12:55	25.66	7.67	2.23	0.0	

Instrument Used: Horiba Water Checker U10

Notes:

A.C.C.E.S. INC. – 2336 S. Sepulveda Blvd, Los Angeles, CA 90064
310-822-3800

APPENDIX G

NO. 63069 -1

NON-HAZARDOUS WASTE DATA FORM

TO BE COMPLETED BY GENERATOR

		GENERATING SITE
NAME	Mobil Baldwin	Mobil Baldwin
ADDRESS	21020 Cajalco Road	21020 Cajalco Road
CITY, STATE, ZIP	Perris, CA 92370	Perris, CA 92370

PHONE NO. ( ) SITE CONTACT PROFILE NO.

CONTAINERS: No. 1 2 GALLONS 110 WEIGHT

TYPE: [X] TANK TRUCK [ ] DUMP TRUCK [ ] DRUMS [ ] CARTONS [ ] OTHER

WASTE DESCRIPTION Non-Hazardous Water GENERATING PROCESS

	COMPONENTS OF WASTE	PPM	%		COMPONENTS OF WASTE	PPM	%
1.	Water		99-100%	4.			
2.	TPH		<1%	5.	Nieto & Sons PO# April 2022		
3.				6.			

PROPERTIES pH 7 [ ] SOLID [X] LIQUID [ ] SLUDGE [ ] SLURRY [ ] OTHER

HANDLING INSTRUCTIONS: Wear Appropriate Protective Clothing

THE GENERATOR CERTIFIES THAT THE WASTE AS DESCRIBED IS 100% NON-HAZARDOUS.

Dave Nieto fol Generator

TYPED OR PRINTED FULL NAME & SIGNATURE

04/18/22

DATE

TRANSPORTER

NAME NIETO AND SONS TRUCKING, INC.

EPA I.D. NO.

ADDRESS 1281 BREA CANYON ROAD

SERVICE ORDER NO.

CITY, STATE, ZIP BREA, CALIFORNIA 92821

PICK UP DATE 04/18/22

PHONE NO. (714) 990-6855

Jesus Garcia

TYPED OR PRINTED FULL NAME & SIGNATURE

04/18/22

DATE

TRUCK, UNIT, I.D. NO. 256

TSD FACILITY

NAME World Oil Recycling

EPA I.D. NO. CAT080013352

DISPOSAL METHOD

ADDRESS 2000 N. Alameda Street

[ ] LANDFILL [X] RECYCLER

CITY, STATE, ZIP Compton, CA 90222

PHONE NO. (310) 537-7100

Daniel Pool

TYPED OR PRINTED FULL NAME & SIGNATURE

04/10/22

DATE

GEN	OLD/NEW	L A	TONS	
TRANS		S B		
C/Q		RT/CD	HWDF NONE	

For 2nd Semi-Annual 2021
(4th Qtr 2021)

DISCREPANCY

APPENDIX J

FEMA Flood Insurance Rate Map

NOTES TO USERS

p is for use in administering the National Flood Insurance Program. It t necessarily identify all areas subject to flooding, particularly from local sources of small size. The **community map repository** should be d for possible updated or additional flood hazard information.

n more detailed information in areas where **Base Flood Elevations** nd/or **floodways** have been determined, users are encouraged to consult d Profiles and Floodway Data and/or Summary of Stillwater Elevations ontained within the Flood Insurance Study (FIS) report that accompanies M. Users should be aware that BFEs shown on the FIRM represent whole-foot elevations. These BFEs are intended for flood insurance urposes only and should not be used as the sole source of flood n information. Accordingly, flood elevation data presented in the FIS should be utilized in conjunction with the FIRM for purposes of tion and/or floodplain management.

l **Base Flood Elevations** shown on this map apply only landward of h American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should e that coastal flood elevations are also provided in the Summary of r Elevations tables in the Flood Insurance Study report for this jurisdiction. ns shown in the Summary of Stillwater Elevations tables should be used for tion and/or floodplain management purposes when they are higher than ations shown on this FIRM.

ies of the **floodways** were computed at cross sections and interpolated cross sections. The floodways were based on hydraulic considerations ard to requirements of the National Flood Insurance Program. Floodway nd other pertinent floodway data are provided in the Flood Insurance port for this jurisdiction.

areas not in Special Flood Hazard Areas may be protected by **flood structures**. Refer to Section 2.4 "Flood Protection Measures" of the surance Study report for information on flood control structures for this on.

jection used in the preparation of this map was Universal Transverse r (UTM) zone 11. The **horizontal datum** was NAD 83, GRS80 spheroid. ces in datum, spheroid, projection or UTM zones used in the production of or adjacent jurisdictions may result in slight positional differences in map across jurisdiction boundaries. These differences do not affect the y of this FIRM.

evations on this map are referenced to the North American Vertical Datum . These flood elevations must be compared to structure and ground ns referenced to the same **vertical datum**. For information regarding ion between the National Geodetic Vertical Datum of 1929 and the merican Vertical Datum of 1988, visit the National Geodetic Survey at http://www.ngs.noaa.gov or contact the National Geodetic Survey at wing address:

ormation Services
N/NGS12
Geodetic Survey
, #9202
st-West Highway
pring, Maryland 20910-3282
3-3242

in current elevation, description, and/or location information for **bench** shown on this map, please contact the Information Services Branch National Geodetic Survey at **(301) 713-3242**, or visit its website at w.ngs.noaa.gov.

ap information shown on this FIRM was derived from U.S. Geological Digital Orthophoto Quadrangles produced at a scale of 1:12,000 from aphy dated 1994 or later.

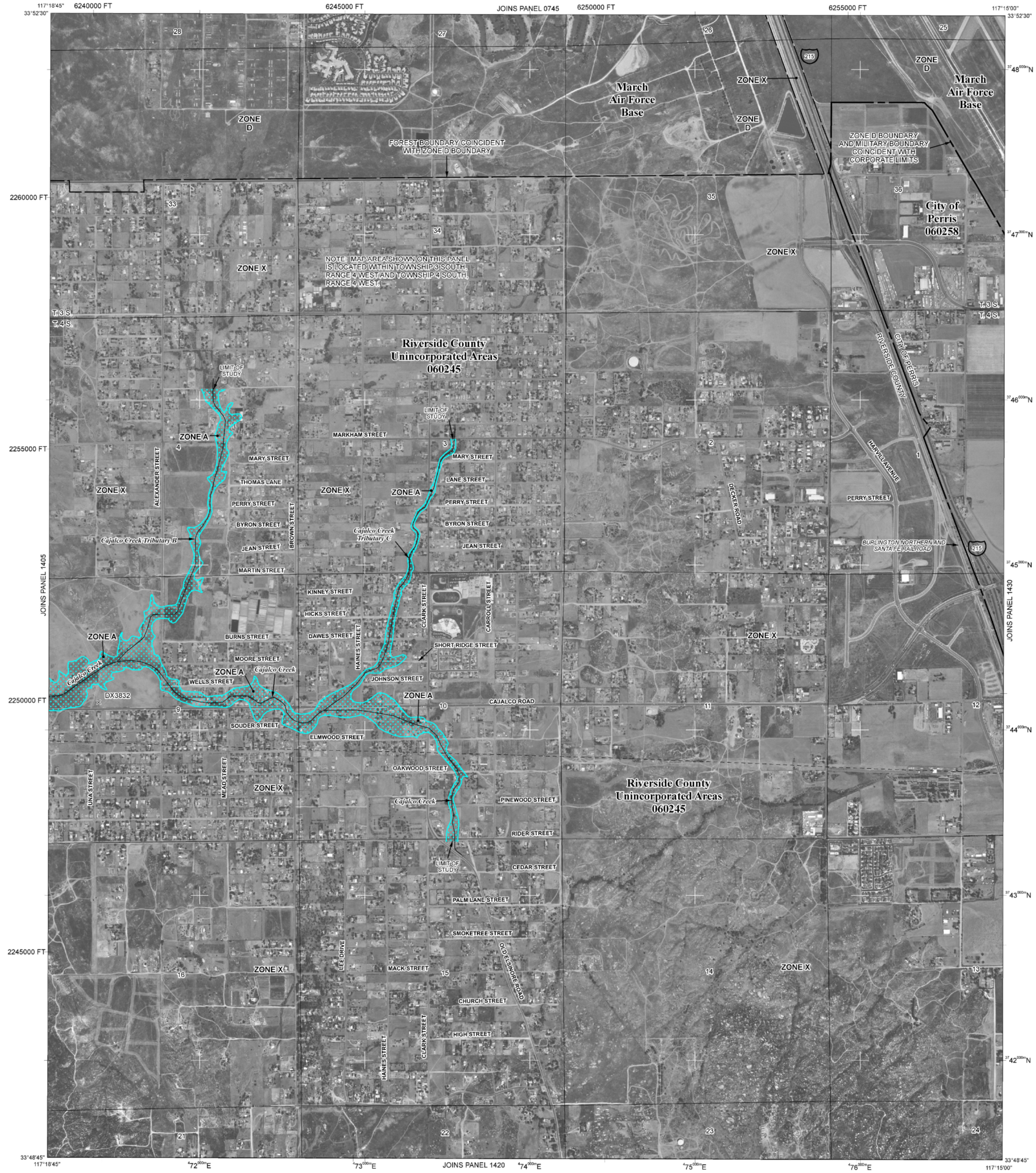
ap may reflect more detailed and up-to-date **stream channel rations** than those shown on the previous FIRM for this jurisdiction. The ns and floodways that were transferred from the previous FIRM may have justed to conform to these new stream channel configurations. As a result, d Profiles and Floodway Data in the Flood Insurance Study Report (which authoritative hydraulic data) may reflect stream channel distances that m what is shown on this map.

te limits shown on this map are based on the best data available at the publication. Because changes due to annexations or de-annexations may curred after this map was published, map users should contact appropriate ity officials to verify current corporate limit locations.

refer to the separately printed **Map Index** for an overview map of the showing the layout of map panels; community map repository addresses; sting of Communities table containing National Flood Insurance Program r each community as well as a listing of the panels on which each ity is located.

the **FEMA Map Service Center** at 1-800-358-9616 for information on products associated with this FIRM. Available products may include ly issued Letters of Map Change, a Flood Insurance Study report, and/or ersions of this map. The FEMA Map Service Center may also be reached t 1-800-358-9620 and its website at http://msc.fema.gov.

ve **questions about this map** or questions concerning the National Flood e Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or FEMA website at http://www.fema.gov.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUND BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that chance of being equaled or exceeded in any given year. The Special Flood Hazard Ar area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazar Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the wate elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Ba Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain) depths determined. For areas of alluvial fan flooding, veloc determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annu flood by a flood control system that was subsequently decertified. indicates that the former flood control system is being restored t protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Fede protection system under construction; no Base Flood E determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Ba Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Ba Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be of encroachment so that the 1% annual chance flood can be carried without substantial in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance f average depths of less than 1 foot or with drainage areas l 1 square mile; and areas protected by levees from 1% annual char

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Are

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zo boundary dividing Special Flood Hazard Areas of diffe Flood Elevations, flood depths or flood velocities.
~~ 513 ~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; in feet*

* Referenced to the North American Vertical Datum of 1988

A —— A	Cross section line
23 - - - - 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North An Datum of 1983 (NAD 83), Western Hemisphere
2476000mN	1000-meter Universal Transverse Mercator grid values, z 11N
600000 FT	5000-foot grid ticks: California State Plane coordinate system, zone VI (FIPSZONE 0406), Lambert Conformal C projection
DX5510 ×	Bench mark (see explanation in Notes to Users section FIRM panel)
● M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
August 28, 2008

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Commu Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insu agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1410G

FIRM
FLOOD INSURANCE RATE

RIVERSIDE COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 1410 OF 3805
(SEE MAP INDEX FOR FIRM PANEL LA

CONTAINS:

COMMUNITY	NUMBER	PANEL
PERRIS, CITY OF	060258	1410
RIVERSIDE COUNTY	060245	1410

Notice to User: The **Map Number** shown below used when placing map orders; the **Communit** shown above should be used on insurance applicat subject community.

MAP NU
06065C

EFFECTIVE
AUGUST 28

Federal Emergency Management

APPENDIX K

Low Water Crossing Repair Narrative

Project: Cajalco Sewer Improvement Project

RE: SEWER LINE ALIGNMENT ALTERNATIVE COSTS

Alignment Option 1: Cajalco Road Arizona Crossing Proposed Repair Section:

The proposed repair to accommodate sewer main installation would consist of cutting a 9' section through the reinforced concrete pavement. The purpose of the 9' trench is to allow for an extra two (2) feet of concrete pavement to be removed which would include leaving a minimum of 1' of exposed and cleaned #4 rebar to splice to. This 9' section would be perpendicular to the road and a 8' section parallel to the road. Similarly, the 9' x 8' section would also extend to 6" below the existing dual 28" arch CMPs to allow for removal and replacement of these pipes after the sewer line is installed. The existing section below the reinforced concrete pavement contains 1-sack slurry above the pipe that would have to be removed and replaced after the sewer line is installed. The remaining portion of the trench would only need to be 5' to accommodate the sewer pipe. This accounts for removal and replacement of existing slurry within this remaining 92' segment of the Arizona crossing.

APPENDIX L

Engineer’s Opinion of Probable Construction Cost

Eastern Municipal Water District
Mead Valley Trunk Sewer
Engineer's Opinion of Probable Construction Cost
Preliminary Design
January 2022

Item	Quantity	Unit	Article	Unit Price	Extension
1	1	LS	Mobilization, Bonds, Permits, Cleanup, and Demobilization	$289,000	$289,000
2	1	LS	Excavation Support Systems	$250,000	$250,000
3	1	LS	Traffic Control	$200,000	$200,000
4	1	LS	Temporary Erosion Control/Storm Water Pollution Prevention Plan (SWPPP)	$50,000	$50,000
5	1	LS	Pothole Utilities	$50,000	$50,000
6	1	LS	Dewatering	$200,000	$200,000
7	1	LS	Cajalco Lift Station decommissioning	$100,000	$100,000
8	1	LS	Brown Street low water crossing repair	$50,000	$50,000
9	1	LS	Rock Excavation Allowance	$200,000	$200,000
10	8,561	LF	Construct new 12-Inch PVC Sewer	$350	$2,996,350
11	1,335	LF	Construct new 10-Inch PVC Sewer	$320	$427,200
12	2,426	LF	Construct new 8-inch PVC Sewer	$290	$703,540
13	31	EA	Construct new 4' dia MH	$15,000	$465,000
				Subtotal	$5,981,090
				Contingency, 30%	$1,794,327
				Total	**$7,775,417**
				10% Escalation	**$8,552,959**

The planning level opinions of construction cost presented herein represents Ardurra's judgment as a design-professional and is supplied for the general guidance of the District. Since Ardurra has no control over the cost of labor and material (particularly related to recent inflationary spikes and supply chain issues), or over competitive bidding or market conditions, Ardurra does not guarantee the accuracy of such opinions as compared to contractor bids or actual cost. This opinion of cost does not include estimates for other project elements including, but not limited to, design, inspection, construction management, District administration, environmental compliance, and right of way acquisition.

APPENDIX M

Project Schedule

Eastern Municipal Water District
Mead Valley Cajalco Sewer Project
Project Schedule

ID	Task Name	Duration	Start	Finish	Predecessors
1	**Preliminary Design**	**171 days**	**Tue 8/16/22**	**Tue 4/11/23**	
2	Draft Preliminary Design Submitt	0 days	Fri 1/27/23	Fri 1/27/23	
3	Preliminary Design Roll Out Workshop	1 day	Tue 2/7/23	Tue 2/7/23	2
4	Draft Pothole Plan	1 wk	Wed 2/8/23	Tue 2/14/23	2
5	**EMWD Review of Pothole Map**	**2 wks**	**Wed 2/22/23**	**Tue 3/7/23**	**4**
6	Final Pothole Plan	1 wk	Wed 3/8/23	Tue 3/14/23	5
7	Pothole ROW Permit	1 mon	Wed 3/15/23	Tue 4/11/23	6
8	Potholing	1 mon	Wed 4/12/23	Tue 5/9/23	7
9	Final Draft Preliminary Design Report	7 wks	Wed 2/8/23	Tue 3/28/23	3
10	**CEQA Compliance**	**200 days**	**Fri 1/27/23**	**Thu 11/2/23**	
11	IS/MND	10 mons	Fri 1/27/23	Thu 11/2/23	2
12	**Final Design**	**160 days**	**Wed 3/29/23**	**Tue 11/7/23**	
13	60% Submittal	6 wks	Wed 3/29/23	Tue 5/9/23	9
14	**EMWD Review**	**15 days**	**Wed 5/10/23**	**Tue 5/30/23**	13
15	90% Submittal	6 wks	Wed 5/31/23	Tue 7/11/23	14,8
16	**EMWD Review**	**15 days**	**Wed 7/12/23**	**Tue 8/1/23**	15
17	100% Submittal	4 wks	Wed 8/2/23	Tue 8/29/23	16
18	**EMWD Review**	**15 days**	**Wed 8/30/23**	**Tue 9/19/23**	17
19	Final Submittal	4 wks	Wed 9/20/23	Tue 10/17/23	18
20	NPDES Discharge Permit	9 mons	Wed 3/29/23	Tue 12/5/23	9
21	County of Riverside ROW Permit	3 mons	Wed 7/12/23	Tue 10/3/23	15
22	**EMWD Spec Review**	**15 days**	**Wed 10/18/23**	**Tue 11/7/23**	**19**
23	**Bid Phase**	**50 days**	**Wed 11/8/23**	**Wed 1/17/24**	
24	Advertisement/Bidding	5 wks	Wed 11/8/23	Tue 12/12/23	22
25	E&O Committee Meeting	0 days	Wed 1/3/24	Wed 1/3/24	
26	EMWD Board Approval	0 days	Wed 1/17/24	Wed 1/17/24	
27	Contractor Insurance/Contract	1 mon	Wed 12/13/23	Tue 1/9/24	26
28	**Construction**	**445 days**	**Wed 1/3/24**	**Tue 9/16/25**	
29	Submittals	1 mon	Wed 1/3/24	Tue 1/30/24	25,11
30	Procurement	1 mon	Wed 1/31/24	Tue 2/27/24	29
31	ROW Permit	1 mon	Wed 1/3/24	Tue 1/30/24	25
32	Mobilization	1 mon	Wed 2/28/24	Tue 3/26/24	30
33	Sewer Installation, Carpinus Drive to Barton Street	15 wks	Wed 3/27/24	Tue 7/9/24	32
34	Sewer Installation Barton Street to Brown Street	26 wks	Wed 7/10/24	Tue 1/7/25	33
35	Sewer Installation, Brown Street to Day Street	28 wks	Wed 1/8/25	Tue 7/22/25	34
36	Clark Street Lift Station Decommissioning	1 mon	Wed 7/23/25	Tue 8/19/25	35
37	Punchlist/Demobilization	4 wks	Wed 8/20/25	Tue 9/16/25	36
38	Construction Complete/Acceptar	0 days	Tue 9/16/25	Tue 9/16/25	37