SAN BERNARDINO COUNTY
DEPARTMENT OF PUBLIC WORKS
SPECIAL DISTRICTS

ADDENDUM NO. 1

TO THE BIDDING REQUIREMENTS, CONTRACT DOCUMENTS, GENERAL CONDITIONS, SPECIAL CONDITIONS, AND TECHNICAL SPECIFICATIONS FOR THE

Arrow Route Sewer Main Project

PROJECT NO.: 30.30.0191

March 19, 2025

The Contract Documents for the above referenced project are hereby amended in the following manner and the following manner only:

All provisions of this Addendum No. 1 are hereby incorporated into the Contract Documents, and Bidders shall account for all provisions pursuant to this Addendum No. 1 in submitting their bid proposals. **Each Bidder shall include a dated and signed copy of this Addendum with their sealed bid proposal**.

1. SECTION H- GEOTECHNICAL REPORT

Contractors are advised to include Section H – Geotechnical Report into the Arrow Route Sewer Main Project bidding documents as enclosed herein.

2. SECTION A- BIDDING REQUIREMENTS

Contractors are advised of the following change as it appears within Section A., Bidding Requirements, Advertisement for Bid of the Specifications

A. Replace page AB-2 with the signed page enclosed herein.

3. SECTION A- INSTRUCTIONS TO BIDDERS

Contractors are advised of the following change as it appears within Section A., Bidding Requirements, Instruction to Bidders of the Specifications

A. Contractors are advised under No. 3 – "Submitting The Bid Proposal", Section C – Opening of Bids section of the bid package issued February 2025 shall be replaced with the following:

- Opening of Bids: Bids will be publicly opened in person and/or via virtual link at the Department's Administrative Office, 222 W. Hospitality Lane, 2nd Floor, San Bernardino, California, 92415. Due to the Covid-19 pandemic and to ensure compliance with social distancing requirements, the bid opening will also be conducted virtually via Microsoft Teams. Bids (both paper and ePro) shall be opened and read aloud at the place and time set in the Advertisement for Bids.

Microsoft Teams Need help?
Join the meeting now
http://tiny.cc/Arrowroutebidopening
Meeting ID: 253 671 174 878
Passcode: Gj385Gr3

4. BIDDER QUESTIONS

Question 1: Can you provide the attendees list for the mandatory job walk that occurred on March 11, 2025?
Response: Enclosed within this addendum is the sign-in sheet of who attended the mandatory pre-bid meeting.

Enclosures:

- Section H- GEOTECHNICAL REPORT
- Section A - Page AB-2
- Arrow Route Sewer Main Project, Mandatory Pre-Bid Meeting Sign-In Sheet, March 11, 2025

The above items modify the formal bid documents in the manner prescribed and in that manner only. All other contract items will remain as originally intended. Contractor will sign/date this addendum and submit with their bid as acknowledgement of receiving and complying with this addendum.

ISSUE DATE: March 19, 2025

Date Acknowledged by Bidder: _____

By: _____
Digitally signed by Vladimir Reyes
DN: C=US, E=vreyes@dpw.sbcounty.gov, O=San Bernardino County Department of Public Works, OU=Special Districts, CN=Vladimir Reyes
Date: 2025.03.19 13:46:27-07'00'

Vladimir Reyes, Project Manager
Department of Public Works - Special Districts
Project Management Division

By: _____

Bidders Company Name

_____

Bidders Signature

contract. All bonds are to be secured from a surety that meets all of the State of California bonding requirements, as defined in Code of Civil Procedure Section 995.120, and is admitted by the State of California.

Pursuant to Public Contract Code Section 22300, the successful bidder may substitute certain securities for funds withheld by the Department to ensure its performance under the Contract.

The County shall award the Contract for the Project to the lowest responsible bidder as determined pursuant to Public Contract Code Section 20103.8(b). The lowest bid shall be the lowest total of the bid prices on the base contract and those additive or deductive items that are specifically identified in the bid solicitation herein, as being used for the purpose of determining the lowest bid price. The responsible bidder who submits the lowest bid for the Project as determined by this section shall be awarded the contract, if it is awarded. This does not preclude the County from adding to or deducting from the contract any of the additive items after the lowest responsible bidder has been determined. The County reserves the right to reject any or all bids, to waive technical errors, discrepancies or informalities of a bid not affected by law, if to do so seems to best serve the public interest.

For information contact **Vladimir Reyes at (909) 386-8846 or email (VReyes@dpw.sbcounty.gov).**

By order of the Board of Supervisors for San Bernardino County, California.

Digitally signed by Vladimir Reyes
DN: C=US, E=vreyes@dpw.sbcounty.gov, O=San Bernardino County Department of Public Works, OU=Special Districts, CN=Vladimir Reyes
Date: 2025.03.19 13:46:48-07'00'

Vladimir Reyes, Project Manager
Department of Public Works - Special Districts

Published in the: San Bernardino County Electronic Procurement Network (ePro)

www.SBCounty.gov

SAN BERNARDINO COUNTY

SECTION H

GEOTECHNICAL REPORT

ARROW ROUTE SEWER MAIN PROJECT

FOR

SAN BERNARDINO COUNTY
FONTANA, CALIFORNIA

PROJECT NO.: 30.30.0191

ARAGÓN GEOTECHNICAL, INC.
Consultants in the Earth & Material Sciences

LIMITED GEOTECHNICAL INVESTIGATION
ARROW ROUTE SEWER MAIN PROJECT
FONTANA, SAN BERNARDINO COUNTY, CALIFORNIA

FOR:
TKE ENGINEERING, INC.
2305 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507

PROJECT NO. 5104-SF
DECEMBER 23, 2024

16801 Van Buren Blvd., Bldg. B
Riverside, CA 92504
Tel: 951.776.0345 ● **Fax:** 951.776.0395
www.aragongeo.com

ARAGÓN GEOTECHNICAL, INC.
Consultants in the Earth & Material Sciences

December 23, 2024
Project No. 5104-SF

TKE Engineering, Inc.
2305 Chicago Avenue
Riverside, California 92507

Attention: Ms. Jeannette Barlow

Subject: Limited Geotechnical Investigation Report
Arrow Route Sewer Main Project
Fontana, San Bernardino County, California.

Ms. Barlow:

In accordance with our proposal dated May 21, 2024, Aragón Geotechnical Inc. (AGI) has completed preliminary geotechnical and geological assessments for the above-referenced project. The attached report presents in detail the findings, opinions, and recommendations developed as a result of surface inspections, subsurface exploration and field tests, laboratory testing, and qualitative analyses. Our scope excluded infiltration feasibility studies, environmental research, and materials testing for contaminants in soil, groundwater, or air at the site. Although not expected, AGI invites requests for infiltration-related testing if required for a WQMP.

Seventeen exploratory borings were drilled near the project endpoints and at intermediate points spaced roughly 600 to 900 feet apart. Terminal boring depths were fixed by permit limitations to 19.5 feet or less. Four borings situated toward road shoulders encountered thin undocumented fills, but fill is not expected at pipeline trench alignments. Native soils comprised fine-grained silty sand deposited by wind, and much coarser-grained sandy and gravelly alluvium with infrequent cobbles. We did not observe boulder-bearing beds. Groundwater was not encountered in any of the soil borings.

Natural geological hazard risks are very low or absent, even from strong ground motion. Although Fontana is close to or even crossed by multiple active earthquake faults, the Arrow Route project avoids known surface traces and is not at risk from ground rupture. Alignment soils below the future mains are medium dense to very dense. Thus, related seismic ground deformation potentials from liquefaction, excessive settlement, and gross instability or landsliding also pose very low or zero threat.

16801 Van Buren Blvd., Bldg. B
Riverside, CA 92504
Tel: 951.776.0345 ● **Fax:** 951.776.0395
www.aragongeo.com

Findings indicate the alignment does not have major impediments for construction of buried sewer pipelines at or above the maximum-proposed depth of ~19 feet. The project should not require special foundation-zone preparations for soft or spongy ground. Our conclusion is that Fontana Standard Plan Nos. 2002, 2003, and 2009 will be suitable for specifications needed to build PVC mains and regular concrete manholes throughout the project. All local soils minus cobble-size rocks larger than 6 inches should be reusable in regular trench backfill. We believe oversize rocks will not be common.

In addition to guidance for suitable trench slopes and shoring types, we have included preliminary recommended design values for shoring loads, excavation backfills, concrete mix designs, pavement sections, and construction observation. It is recommended that 100% plan and profile drawings be reviewed by AGI prior to bid and construction.

Thank you very much for selecting AGI as an engineering team member. We welcome questions and requests for advice. Please contact us at our Riverside office by phone or the convenience of email.

Very truly yours,
Aragón Geotechnical Inc.

Mark G. Doerschlag, CEG 1752
Engineering Geologist

C. Fernando Aragón, P.E., M.S.
Geotechnical Engineer, G.E. No. 2994

MGD/CFA:mma

Distribution: (4) Addressee

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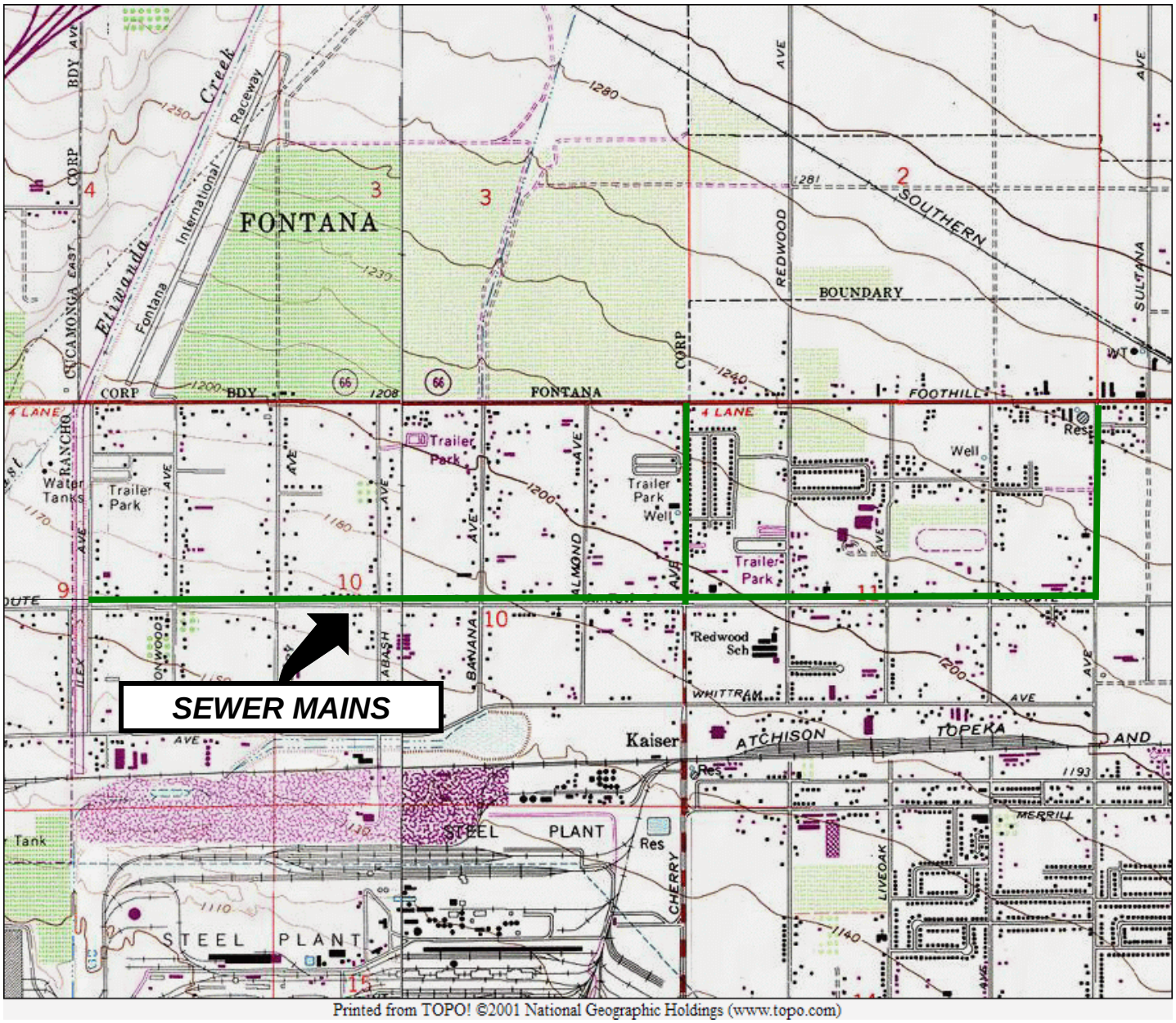
LIMITED GEOTECHNICAL INVESTIGATION
ARROW ROUTE SEWER MAIN PROJECT
FONTANA, SAN BERNARDINO COUNTY, CALIFORNIA

1.0 INTRODUCTION

Aragón Geotechnical, Inc. (AGI) has completed preliminary soils characterization studies and geological hazard evaluations for proposed new trunk sewer mains in segments of Arrow Route, Beech Avenue, and Cherry Avenue. The City of Fontana-managed project would be inside an unincorporated "island" within the Fontana sphere of influence that currently is reliant upon septic systems for wastewater treatment. Previous incarnations of the sewer project have been proposed by San Bernardino County. The downstream end of the Arrow Route mainline will connect to a existing regional collector pipeline near Arrow Route at Ilex Street. Construction will pass next to residential, commercial, and industrial properties along a total project length of about 18,100 feet. No above-grade buildings are proposed. Situs per the Public Lands Survey System places the project in the N½ of Sections 9, 10, and 11, Township 1 South, Range 6 West (San Bernardino Baseline and Meridian). The accompanying Site Location Map (Figure 1) depicts the sewer segments on excerpts of early 1980's 1:24,000-scale topographic quadrangle maps. Although out-of-date with respect to more-recent urbanization of Fontana and the adaptive reuse of older industrial sites, the selected map editions have better depictions of ground slope, drainage patterns and historical off-street land improvements.

Construction is slated to include what AGI has learned will be SDR-26 PVC plastic gravity mains ranging from 8 inches to 15 inches in diameter. Invert depth below grade will range from about 8 to 19 feet. Manholes will be situated every few hundred feet. Paved roads will require restoration of asphalt surfacing. Where older pavements occur along Arrow Route and Beech Avenue, options exist for (1) Patch paving of the sewer line trench only; or (2) Patching plus partial-width or full-lane-width milling of pavement lateral to the trench to accommodate an overlay layer; or (3) Full-depth street reconstruction. Any of these options may be suitable depending in part on future capital improvement schedules and budgets. We understand that widening of two-lane Arrow Route is not being contemplated at this time. Cherry Avenue features new pavement and other street improvements. It will probably receive only patching over a vertical trench.

The primary objectives of our limited investigation were to determine soils characteristics below and beside the future buried mains and precast concrete manholes, evaluate the alignments for certain geological hazard risks, check for groundwater, and provide



0 2000 4000 FT.

N

Reference: U. S. Geological Survey 7½-Minute Series Topographic Maps, Fontana Quadrangle (1980) and Guasti Quadrangle (1981).

AGI

SITE LOCATION MAP

ARROW ROUTE SEWER MAIN PROJECT, FONTANA, CALIF.

PROJECT NO. 5104-SF	DATE: 12/23/24	**FIGURE 1**

preliminary pipe-zone preparation, trench backfill, and street reconstruction recommendations. Geological assessments focused on risks posed by active earthquake faults, strong ground motion, liquefaction or other secondary seismic hazards, and groundwater. These were evaluated using published resources and site-specific qualitative analyses based on field findings. However, environmental research, Phase I or Phase II environmental site assessments, well construction, or contaminant testing of air, soil, or groundwater found along the sewer alignments were beyond the scope of this geotechnical investigation.

2.0 FIELD INVESTIGATION AND LABORATORY TESTING

Subsurface geotechnical site characterization comprising 17 exploratory soil borings was completed by AGI on October 24 and 25, 2024. Most exploration borings were placed lateral to street centerlines and TKE-plotted pipe alignments. The small offsets would be deemed insignificant to extrapolations of conditions to the future trench excavations. AGI staff delineated Arrow Route work areas and managed traffic advisories with signs and an electronic arrowboard. Professional traffic control services were engaged to allow drilling exactly at the sewer alignment in the No. 1 lane of southbound Cherry Avenue. AGI-selected drill sites were cleared of utility interference issues by notification to the 811 DigAlert service in advance of AGI's work. As-drilled soil boring locations and depths were sufficient in our opinion to obtain data concerning (1) Soil material classifications, water contents, in-place densities, and settlement potentials in light of local geological interpretations; (2) Presence or absence of groundwater; (3) Continuity of layers or units across the project area; and (4) Unit geological origins and interpreted influences on pipe or manhole materials and support.

The soil borings were drilled with a truck-mounted hollow-stem auger rig capable of driving and retrieving soil sample barrels. In consideration of San Bernardino County permit limitations, borehole termination depths were fixed at 19.5 feet or less. None of the borings were halted by machine refusal. Bedrock was not encountered. One proposed boring in Beech Avenue near Foothill Boulevard was deleted from our expected scope after deciding a safe exploration site was unavailable due to buried utilities. Each boring passed through soils that were amenable to drive-tube sampling, performed at 5-foot depth increments. At shallow depths where future open-cut excavation stability would be the main item of concern, relatively undisturbed soil samples were recovered by driving a 3.0-inch-diameter "California modified" split-barrel sampler lined with brass rings. Other disturbed-soil

samples were based on Standard Penetration Test (SPT) methods that utilized an unlined 2.0-inch O.D. split-barrel spoon. All sampler driving was done using rods and a mechanically actuated automatic 140-pound hammer free-falling 30 inches. Five bulk samples of auger cuttings representative of shallow native materials were bagged. All geotechnical samples were brought to AGI's Riverside laboratory for assigned soils testing.

Drill cuttings and each discrete sample were visually/manually examined, classified according to the Unified Soil Classification System, and evaluated for relative density, constituent grain sizes, visible macro-porosity, plasticity, and evidence for groundwater. Continuous logs of the subsurface conditions encountered were recorded by a senior Engineering Geologist, and the results are presented on the Field Boring Logs in Appendix A. The approximate locations of the borehole explorations are illustrated on TKE-authored but AGI-modified 60% plan and profile drawings placed at the back of this report.

"Undisturbed" samples were tested for dry density, water content, and selectively for shear strength. Direct shear testing was not attempted on soils with high gravel content. Bulk soil samples were evaluated for index and engineering properties such as compaction criteria, particle gradation, sand equivalent value, and corrosivity characteristics. Laboratory test standard descriptions and the test results are presented in Appendix B.

3.0 SEWER ALIGNMENT GEOTECHNICAL CONDITIONS

3.1 Previous Site Uses

AGI's scope included limited historical research to ascertain changes to surficial conditions through time, and address known or possible geotechnical impacts to project design or construction. Digitized historical aerial photographs archived at the U.C. Santa Barbara Geospatial Collections were downloaded and interpreted for evidence of past structures, land use, and for geological assessments of active faulting potential and geomorphic history. Newer monoscopic imagery was reviewed in the Google Earth Pro web application. Finally, the on-line version of the U.S. Geological Survey Historical Map Collection was accessed for digital scans of topographic quadrangle sheets pre-dating the base map image used for Figure 1. Reviewed historical sources are listed under "References" at the end of this report.

The oldest photos we located were dated March, 1933. The project-area street grid was already well-established north of the mainline railroads passing through Fontana and west of Citrus Avenue. Arrow Route was a paved 2-lane thoroughfare. The surrounding area comprised 5- to 20-acre agricultural parcels with homes, barns, and outbuildings. Land uses seemed to be predominantly tree nut orchards. We did not interpret signs of significant cut or fill grading along any project street alignment.

By 1959 further divisions of the agricultural parcels had reduced most lot sizes to 5 acres or less near the studied project streets. Little agriculture use remained. Arrow Route featured rows of eucalyptus trees along the northern and southern shoulders. Cherry Avenue had changed from a dirt farm road in 1933 to a 4-lane boulevard. Beech Avenue was paved. The local water district had built a large steel reservoir at the southwestern corner of Beech Avenue and Foothill Boulevard. Buried water lines in Beech Avenue that prevented AGI from drilling near the reservoir site were likely already built in 1959 (pipe location accuracy was viewed by us as suspect).

The last 60 years has seen slow but near-continuous infill development of the unincorporated community parcels around the Arrow Route project. These developments have resulted in piecemeal widening and street improvement installations such as curbs and sidewalks along short stretches of Arrow Route. Almost all of the eucalyptus trees visible in 1959 pictures have disappeared. Older (original?) pavements still characterize the two primary traffic lanes, however. Older pavements in Arrow Route and in Beech Avenue are in subjectively fair to very poor condition. Cherry Avenue, reconstructed just 10 years ago, exhibits zero pavement distress and would be considered in excellent condition.

3.2 Subsurface Conditions

Fill was encountered in four borings to depths ranging from about 1 to 4½ feet. Fill soils were interpreted to be limited to road shoulder areas where most of AGI's exploration borings were situated. The fill soils were logged as silty sand materials grossly similar to local native soils. We judged that probabilities for encountering fill other than utility line backfills at the sewer pipe alignments will be very low.

The majority of drilled explorations penetrated about 3 to 5 feet of distinctively fine-grained and poorly graded silty sand starting at the surface or below minor fills. Sampler penetration resistance was low and relative densities were categorized as loose. Soil moisture was generally described as damp or slightly moist. Enough moisture was present to help maintain sample integrity and avoid running ground conditions around open boreholes, however. Fine sand in several explorations probably had been mechanically "churned" or homogenized by burrowing fauna.

Below the fine sand horizons, much coarser-grained and less silty mixtures of medium dense to very dense sand and gravel with sporadic cobble-size rocks were the predominant materials. Gravel particles were usually hard and strong. Estimated proportions of silty fines usually stayed under 15 percent. We interpreted that the deposits were crudely stratified. Most layers were easy to drill, although infrequent zones of coarse gravel and cobbles slowed AGI's drilling progress. Soil gradations slowly and progressively coarsened upgradient from west to east, consistent with regional correlation to an alluvial fan sedimentary environment. Section 5.2 (Local Geologic Conditions) and the drill logs in Appendix A contain considerable additional descriptions and interpretations of soil conditions and origins in the project area.

3.3 Groundwater

None of AGI's explorations encountered groundwater. Soil samples lacked iron oxide staining or limonitic spots that can be evidence for transient or seasonal soil saturation. AGI also found no evidence for present-day or historical occurrences of rising water such as springs, seeps, or clustered phreatophytic vegetation.

Checks of State Department of Water Resources groundwater monitoring well hydrographs for western Fontana indicated unconfined permanent groundwater is more than 450 feet deep in the project area. The adjudicated basin is managed for extraction and aquifer replenishment to slow and eventually halt decades of basin overdraft. Under current and predicted future conditions, we judge that groundwater should remain below the 450-foot depth. Groundwater should not influence sewer main design or construction. Future fluctuations in unconfined water elevations should be expected, though.

4.0 ENGINEERING GEOLOGIC ANALYSES

4.1 Regional Geologic Setting

Southwestern San Bernardino County lies within the Peninsular Ranges Physiographic Province, one of 11 continental provinces recognized in California. The physiographic provinces are topographic-geologic groupings of convenience based primarily on landforms, characteristic lithologies, and late Cenozoic structural and geomorphic history. The Peninsular Ranges encompass southwestern California west of the Imperial-Coachella Valley trough and south of the escarpments of the San Gabriel and San Bernardino Mountains. Most of the province lies outside of California, where it comprises much of the Baja California Peninsula. The province is characterized by youthful, steeply sloped, northwest-trending elongated ranges and intervening valleys.

Structurally, the Peninsular Ranges province in California is composed of a number of relatively stable, elongated crustal blocks bounded by active faults of the San Andreas transform system. Tectonic deformations and large earthquakes are mostly limited to the block margins. Exceptions are most notable approaching the Los Angeles Basin, where compressive stress gives rise to increasing degrees of vertical offset along the transform faults and a change in deformation style that includes young folds and active thrust ramps. Fontana is located near the northern edge of the Perris tectonic block, the longest sides of which are bounded by the San Jacinto fault zone to the northeast and the Elsinore and Chino fault systems to the southwest. The northern Perris Block loses some internal coherency due to tectonic collision with the San Gabriel Mountains, and features several northeast-trending faults that are mostly buried by deep alluvium.

The Peninsular Ranges structural blocks are dominated by the presence of intrusive granitic rock types similar to those in the Sierra Nevada, although the province additionally contains a diverse array of metamorphic, sedimentary, and extrusive volcanic rocks. In general, the metamorphic rocks represent the highly altered host rocks for the episodic emplacement of Mesozoic-age granitic masses of varying composition. Parts of the province include thick sequences of younger marine and non-marine clastic sedimentary rocks of Mesozoic and Tertiary age, ranging from

claystones to conglomerate. Pre-Quaternary sedimentary rocks are conspicuously absent from most of the Perris Block, however, which is dominated by crystalline granitic-rock classifications.

4.2 Local Geologic Conditions

Between the Transverse Ranges mountain front and the Jurupa Mountains, the City of Fontana and its neighboring communities have been developed across several coalescing alluvial fans. The project area is near the distal edge of the Lytle Creek fan. The Lytle Creek watershed features plutonic and metamorphic rock types that are represented in the bedded deposits encountered in soil borings. Morton and Miller (2006) assign late Pleistocene to late Holocene ages for younger fan alluvium (unit Qyf_5) mapped across the majority of Fontana. Some evidence suggests a slightly older alluvial sequence (Qyf_1) approaches the ground surface east of Cherry Avenue. The older materials tend to have higher relative densities, visually distinctive well-packed granular textures, and some weathered gravel particles. Our interpretation is that most alluvium located east of (very roughly) AGI's boring at Station 98+30 and deeper than 10 to 15 feet is representative of the older unit.

Large areas of Ontario, Fontana, Colton, and Rialto feature fine-grained surficial sandy soils at least a few feet deep. Their loose, low-unit-weight and typically massive fine-grained character with minimal pedogenic soil development is consistent with eolian (wind-deposited) sediments. Around Colton and Bloomington, these deposits transition into actual dune landforms. Wind-laid sand sheets with occasional relict dark brown topsoils were logged in 11 out of 17 project exploration borings.

The maximum depth of alluvium in the project area is not known with certainty, but has been inferred to be at least 850 feet based on the completion depth of municipal wells northeast and northwest of Arrow Route. Buried bedrock relief towards the San Gabriel Mountains is not well understood. Limited data indicate that some areas have in excess of 2,000 feet of sediment. Granitic bedrock consisting of heterogeneous quartz diorite and tonalite, punctuated with large inclusions of pre-intrusive marble and schist, rises to the surface about 3.5 miles south of Arrow Route.

4.3 Slope Stability

The pipeline alignments are in a physiographic valley floor. The flat terrain is incapable of presenting threats from gross instability of slopes. Western Fontana is also very far from bluffs or mountain slopes that could present landslide runout danger. We judge landslide and rockfall risks to be zero.

4.4 Flooding

All project areas are accorded a status of flood zone X, or outside of delineated "100-year" or 1% annual chance flood zones (FEMA, 2008). One low area spanning a few hundred feet east and west of the intersection of Banana Avenue and Arrow Route has reduced flood risk due to a protective levee farther up the fan surface. The intersection does feature a concrete Arizona crossing. Buried pipelines normally have little risk from flooding as long as erosion is avoided. We think that flood risks with the noted surface protection and burial depths exceeding 10 feet should be near zero.

4.5 Fault Rupture & Ground Motion Hazards

Fontana is near multiple high-hazard active earthquake faults. Active faults present several potential risks to structures and people. Hazards associated with active faults include strong earthquake ground shaking, soil densification and liquefaction, mass wasting (landsliding), and surface rupture along active fault traces.

Ground Rupture Hazard. Surface rupture presents a primary or direct potential hazard to structures built across an active fault trace. Per official maps delineating State of California Earthquake Fault Zones and San Bernardino County Fault Hazard Management zones, the proposed sewer mains will not cross any zones of mandatory investigation for ground rupture hazards. AGI's aerial photographic interpretations did not suggest visible lineaments or manifestations of fault topography related to active fault traces in the project vicinity. The project will remain northwest of the so-called "Fontana trend". This is an active earthquake source that lacks official recognition of surface fault-line traces but seems to be related to subtle topographic irregularities detectable on many north-south Fontana streets. We judge that chances for direct surface fault rupture affecting the project are very low.

Strong Motion Potential. Fontana has elevated risks from strong earthquake ground motions. The Fontana seismic trend has been a prolific source of historical micro-earthquakes, but has not produced an event larger than M_L3.8 in the last 20 years. San Bernardino County assigns a maximum considered earthquake potential of M_W6.5, consistent with rupture length–magnitude relationships for California strike-slip faults.

Current and future probabilistic risk models for the Fontana area fundamentally assign the highest seismic risks from large characteristic seismic events along the better-known San Jacinto and San Andreas fault lines. These major faults span very long distances and have historically produced damaging earthquakes. Using the Cherry Avenue – Arrow Route intersection as a reasonable mid-project analysis reference point, the mode-magnitude event for peak ground acceleration at a 2% in 50-year exceedance risk is a multi-segment M_w7.9 earthquake on the San Jacinto fault (U.S. Geological Survey, 2024c; dynamic conterminous U.S. 2014 model). A building code-based estimate of the maximum site-modified peak ground acceleration for the same 2,475-year exposure period is 0.81g. This is a high value. Except in cases of permanent ground deformation, however, earthquake risks for buried utility infrastructure are usually very low. Strong motion should not impact the Arrow Route sewer mains.

Induced Flooding. We can categorically rule out tsunami and seiche hazards. The project site is inland and not adjacent to lakes or open reservoirs. Both Cherry Avenue and Beech Avenue sewer main segments will pass close to above-grade steel water tanks. Surface flooding is possible should either tank experience rupture. However, the limited volumes of available floodwater, deep pipeline burials, and the presence of non-erosive pavements should prevent loss of soil cover over pipelines.

Liquefaction. The San Bernardino County General Plan safety element does not classify the project alignments has having liquefaction potential. Proposed mains will not be within State-delineated “Zones of Required Investigation” for either liquefaction potential or landsliding (California Department of Conservation, 2024b). Our investigation findings are that the project area has very limited liquefaction-susceptible material and zero liquefaction opportunity. Permanent groundwater is

very deep. Also, the alluvial fan environment is not favorable for shallow and continuous impermeable layers (aquicludes) that could promote perched-water horizons. The construction alignments thus *pass* screening criteria used to differentiate areas with liquefaction hazard from those that have minimal hazard (California Department of Conservation, 2008). Related permanent ground deformation phenomena such as ground fissuring, ejection of pressurized sand-water mixtures from shallow liquefied layers (sand boils), flow slides, and lateral spreading have also been ruled out as hazards.

Subsidence. Surface settlements from dynamic volumetric changes due to earthquake should not materially affect pipeline integrity or design slope, in our opinion. Well-ordered grain packing and relative densities of medium dense and higher (measured or equivalent SPT N-values >10) occurs in coarse-grained fan alluvium located at and below pipeline invert elevations. There should be minimal propensity for settlement. Structural resilience for dynamic differential movement of sewers should be unneeded for any selected pipeline material.

Landslides. Section 4.3 notes that the project spans gently sloped distal portions of an alluvial fan and is far from rocky mountain slopes. Earthquake-induced hazards from slope instability or tumbling rocks should be zero.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 General

Based on the results of our field explorations, laboratory tests, engineering analyses, and judgment, it is our professional opinion that the Arrow Route Sewer Main project is feasible from a geotechnical perspective and will not require special design for unexpected risks. We did not identify any location with needs for foundation-zone ground improvement due to extremely weak, soft or spongy soils. Our findings are that high-water conditions are absent. Ordinary Southern California construction means and methods for underground utility lines including replacement of excavation spoils as regular trench backfill should be sufficient.

5.2 Manhole Base Design & Pipe Zone Construction

City of Fontana Standard Plan Nos. 2002 and 2003 can be used without modification for the proposed project. Manhole bases may be cast in place utilizing 560-C-3250 concrete. Natural alluvium free of loose or disturbed soils is recommended for base support. Minor slough should be scooped out or may be mechanically compacted in the floor of the excavation with small equipment.

City of Fontana Standard Plan No. 2009 will be adequate for installation of SDR-26 PVC pipe, in our opinion. AGI recommends that crushed rock (½-inch maximum gradation conforming with Standard Specifications for Public Works Construction "Greenbook" §217-1.2 and Table 200-1.2.1(A)) be moistened and densified in foundation and bedding zones using vibratory, impact, or manual tools (e.g., shovel slicing). Void filling adequacy in haunch zones should be inspected. The bedding zone backfill must extend at least 12 inches over the pipe crown. The City standard identifies a requirement for at least 8 inches of crushed rock lateral to pipe springlines. Trench widths must thus be at least 24 inches for 8-inch-diameter PVC pipe and will range up to an estimated 36 inches bucket width for 15-inch mains.

5.3 Pavements

Pavement penetrations will be needed along the entire set of project segments. Original Arrow Route and Beech Avenue pavements are very old and experiencing aggregate polishing and raveling. Crack distress frequency is severe, although neither street is noticeably rutted or potholed except for Beech Avenue close to Foothill Boulevard.

AGI soil borings avoided original Arrow Route pavements entirely so information concerning the oldest project surfacing is unavailable. We did encounter newer pavements along widened Arrow Route segments. Measured HMA surfaces ranged from 4 to 7½ inches thick. Aggregate base layers were absent in all but two cases. The single exploration in Beech Avenue (Sta 23+20) found 3 inches of asphalt resting on native soil. Structural sections are shown on the soil boring logs.

Reconstructed Cherry Avenue between Arrow Route and Foothill Boulevard is far newer. A boring at Sta 21+30 found 4½ inches of HMA over 6½ inches of imported

base material. The street at a future manhole at Sta 32+16 featured 5-5/8 inches of asphalt over 6 inches of possibly cement-treated base material. We think the actual design section can be obtained by request from San Bernardino County and copied.

The simplest and perhaps most economical option for pavement restoration is "like-for-like" patch paving that matches the existing structural sections. In cases of missing aggregate base courses and "thin" asphalt sections, this approach may result in a sub-optimal design for busier roads with truck traffic. We are unaware of San Bernardino County standard details for minimum trench restoration sections. The option (or County Transportation Department requirement) to provide a mill-and-fill pavement transition zone lateral to trench excavations should be discussed between the prime consultant and Public Works reviewers.

Trenches longitudinal to the direction of travel may incur a need for full-lane-width grind and overlay. This action will improve ride quality and lengthen the service life of the repaired lane. Consideration could be given to full-depth reconstruction of the Arrow Route and Beech Avenue lanes containing the sewer line as a partial solution to adding decades of service life to these streets. Both roads receive a surprising amount of traffic, including cars, commercial delivery trucks, and tractor-trailers serving several local industrial businesses.

The following table presents an *example* structural section for hot-mix asphalt pavement if a full-depth 1-lane or 2-lane reconstructions of Arrow Route or Beech Avenue were contemplated. This may be helpful for budget purposes. Preliminary guidance has been based upon Caltrans design methods and a 20-year pavement lifetime. Duty cycles are based on an assumed traffic index of 9.0, equivalent maximum single-axle loads of 13,000 pounds, and an estimated minimum R-value of 60 for subgrade soils that we have correlated to known and tested materials collected elsewhere around Fontana. The prime design consultant should check with the County Transportation Department for final designations of traffic indexes applicable to any reconstructed street segment, and check with AGI for possible other combinations of base layers and HMA surfacing that will meet the design objective.

Preliminary Example Asphalt Pavement Design

Pavement End Use	Traffic Index	R-Value	A.C. Thickness	Base Thickness
Arterial Street with 4-Axle+ Truck Passage	9.0	60	0.4'	0.7'

AGI recommends subgrades be processed and compacted to a minimum of 95 percent of the laboratory maximum dry density determined by ASTM D1557-12 to depths of at least 12 inches. Base course should meet materials specifications for Caltrans Class 2 aggregate base material or better, and should be placed and fully compacted in lifts no greater than 6 inches thick to a minimum dry density of 95 percent of the laboratory maximum dry density per the ASTM D1557-12 standard.

Owners, designers, and general contractors should be aware that Class 2 base material may be composed of virgin natural stone ("crushed aggregate base" or CAB), or *reclaimed materials* such as crushed concrete and pulverized asphalt (crushed miscellaneous base, CMB). Reclaimed base has been the source of unsatisfactory pavement performance at multiple Southern California projects due to unintended contamination with reactive aluminum metal fragments. Surface distress manifests as permanent raised pavement "bumps" or "pimples". It is not clear at this time that the problem is limited to only certain suppliers, or whether local suppliers can provide warranties for delivered product. We recommend a warranty. The most conservative option is to specify only "CAB" for flexible pavement base courses, in our opinion.

5.4 Temporary Excavations

AGI expects the preferred installation option for sewer lines will be vertical trenches to the maximum anticipated depth of around 19 feet, considering the limited setbacks to parallel wet and dry utilities that must remain in service. Protective trench shoring should be specified for all vertical cuts deeper than 4 feet in the nominally non-cohesive sands found in Fontana. All shoring systems must include full sheeting for protection from raveling sand and gravel. Passive trench shields (i.e., trench boxes with gaps to the excavation sidewalls) are preliminarily judged *not suitable*. Passive shielding protects workers but allows sidewall movement. Tight sheeting is

recommended to prevent ground loss from the looser conditions of the shallow-zone eolian sand layer west of Cherry Avenue, but more critically because of the unknown geometries and soil densities of the backfill prisms in parallel utility trenches. Caving may pose difficulties for contractors intent on pulling trench boxes through a slot cut if progressive cut-and-backfill utility installations are used.

Shoring design by a registered professional engineer is encouraged for excavations shallower than 20 feet, and is required for deeper cuts. AGI recommends active trench wall support to help minimize risks of backfill topples or utility service interruptions. Active support could include regular beam and plate styles or one of the newer slide rail or sheet-and-brace systems. Alignment conditions may be less favorable to slide rail systems given the fairly high relative density of local alluvium and proportions of coarse gravel, especially east of Cherry Avenue. Contractors should rely on their own experience and/or field testing before committing to a shoring approach. Vibration monitoring would be advised during slide rail driving.

We recommend the use of a rectangular distribution of earth pressure for temporary braced shoring. For an unsaturated level grade supported by the shoring, the maximum earth pressure would be 35H (in psf) where H is the height (in feet) of the shored cut face. Excessive raveling or caving tendencies are not anticipated beyond ~15 feet in depth or where equivalent N-values exceed 30, but are judged probable in loose eolian sand and certain younger alluvial subunits shallower than 15 feet.

The design of shoring should also include surcharge loading effects of existing structures and anticipated traffic including construction equipment when loading is within a distance from the shoring equal to the depth of excavation. A recommended minimum uniform lateral pressure of 100 pounds per square foot in the upper ten feet of retained trench walls should be incorporated in the design when normal traffic is permitted within 10 feet of the shoring.

Manhole structure excavations could be partly sloped and partly shored. It could be simpler to build the entire stack inside a of braced and sheeted rectangular hole. AGI recommends that all temporary slopes employed for Arrow Route Sewer Main project excavations be inclined no steeper than 1½:1 per Cal-OSHA allowable limits for Type

C soils. The exposed earth materials in the excavation side slopes should be observed and verified as suitable by a qualified person. Surcharge loading should be avoided within 4 feet of the top of all unbraced vertical or sloped cuts, or inside of a line drawn at 45 degrees from the toe of the excavation, whichever is greater. Contractors are ultimately responsible for verifying that slope height, slope inclination, excavation depths, and shoring design are in compliance with Cal-OSHA safety regulations (Title 8, Section 1540-1543 et seq.), or successor regulations.

5.5 Trench Backfill

All soil-backfilled pipeline trenches should be backfilled in lifts and mechanically compacted to at least 90 percent of the laboratory maximum dry density. Regular compacted trench soils shall be considered to start 12 inches over the pipe crown. Trenches in the public street right-of-way should conform with any applicable San Bernardino County specifications. The latest edition of the Standard Specifications for Public Works Construction "Greenbook" may be specified in lieu of missing local standards. Greenbook specifications in §306-1.3 would be recommended for classification of oversize particles. Rocks up to 6 inches in diameter should be acceptable in regular trench backfill as long as they are fully surrounded by compacted soil matrix. AGI recommends backfill compaction to no less than 95 percent for 12 inches below all vehicle pavement subgrades. Utility purveyors may also specify a greater degree or depth of compaction in streets than either AGI or County minima. Flooded or jetted backfill is not recommended. Density testing is recommended to confirm the adequacy of compaction efforts.

Non-select import soils for trench backfill, if needed, should consist of a USCS granular soil classification with very low expansion potential and be free of deleterious organic matter and large rocks. The borrow site and import soils must be reviewed and accepted by the Geotechnical Engineer prior to use.

All mechanically compacted backfill soils should be uniformly moisture-conditioned by adding water, drying back, mixing, and blending as needed to achieve the laboratory-determined optimum water content or higher, and placed in loose lifts having thicknesses commensurate with the type of compaction equipment used, but generally no greater than 6 to 8 inches (rollers) or 16-18 inches (compaction wheels

on large excavators. *Fill water contents below the recommended minimum water content shall constitute a basis for non-acceptance of the fill irrespective of measured relative compaction, and at the discretion of the Geotechnical Engineer, may require the fill be reworked to produce uniform water contents at or over the desired 100% of optimum moisture.*

5.6 Earthwork Volume Adjustments

We assume that County trench repair standards will allow native-soil backfill up to the elevation of soil subgrades below pavement structural sections. The backfill prism will have higher average bulk density than the *in situ* eolian and alluvial soil deposits. Export volumes should be less than total pipe zone volume as some spoils will need to be retained to balance shrinkage in regular backfill. Data gathered for this investigation suggest overall native-soil shrinkage could be on the order of 12 to 15 percent if natural materials are placed as compacted backfill at a mean relative compaction of 92 to 95 percent. Shrinkage should be higher west of Cherry Avenue and lowest proceeding north on Cherry Avenue toward Foothill Boulevard.

5.7 Soil Corrosivity

Chemical analyses were performed to provide a general evaluation of the corrosivity of the alignment soils. Tests included soluble sulfates, soluble chlorides, pH, and minimum saturated resistivity. Test samples were composed of soil blends that will be similar to future backfill around features such as precast concrete manhole stacks.

Findings indicated the slightly alkaline (pH range: 7.1 to 7.9) alignment soils should not be highly aggressive to Portland cement binder. Analytic tests reported soluble sulfate contents from 0.0081 weight percent up to 0.0568 weight percent. Chloride contents did not exceed 44 parts per million.

The measured sulfate concentrations indicate that normal Type I-II cement should be suitable for concrete mix designs utilized for this project (manhole bases and precast rings, surface collars, or other pipeline appurtenances), based on American Concrete Institute (ACI) 318 Table 4.3.1 and an exposure category S0. Type V cement may optionally be used for any project concrete mix, and would be mandatory for soil

sulfate concentrations exceeding 0.20 weight percent. It is recommended that all concrete exposed to on-site soil materials be selected, batched, and placed in accordance with the latest Greenbook and ACI technical recommendations.

5.8 Construction Observation

The preliminary design and installation recommendations presented in this report are based on the assumption that the Arrow Route Sewer Project pipelines will bear on and be surrounded by competent native fan alluvium (exclusive of bedding materials). It is recommended that compacted backfill placements above the bedding zone be performed under engineering observation and testing by AGI personnel. Continuous fill observation and testing will generally be required for deep trenches. AGI staff will not enter trenches for test purposes unless worker protection is provided or the trench is under 5 feet deep. AGI services would exclude direction of the contractor's means and methods, field supervision of the contractor's workmen, or assumption of any responsibility for jobsite safety.

Where compaction of less than the specified relative compaction is determined, additional compaction effort, with adjustment of the water content as necessary, should be made until the minimum specified compaction is obtained. Density tests in trench backfill should be performed at no less than AGI-recommended minimum frequencies of at least one test per 300 lineal feet of pipe per 2-foot backfill depth increment, and should be randomly staggered as the backfill rises toward finish surfaces. Field density tests should conform with the ASTM D6938-08 (nuclear gauge) test standard, or alternatively with the ASTM D1556-07 standard (sand cone method).

5.9 Investigation Limitations

The present findings and recommendations are based on the results of the field exploration combined with interpolations of soil conditions between a limited number of subsurface excavations. The nature and extent of variations beyond or between the explorations may not become evident until construction. If conditions encountered during construction vary significantly from those indicated by this report, then additional geotechnical tests, analyses, and recommendations could be required from this office. Because this report has also incorporated assumed design characteristics

or construction methods of the proposed sewer lines where specific information was not available, plan reviews by this firm are recommended prior to construction in order to evaluate the new facilities from a geotechnical viewpoint and allow modifications to the preliminary recommendations developed to date.

We recommend that the project engineer incorporate this report and subsequent plan review reports into the overall project specification by title and date references on final drawings. Lastly, a pre-construction meeting with City and/or San Bernardino County agency officials, the underground contractor, and civil engineer is strongly encouraged to present, explain, and clarify geotechnical concerns, uncertainties, and recommendations for the installations.

6.0 CLOSURE

This report was prepared for the use of TKE Engineering, Inc., the City of Fontana, and design professionals engaged in creating PS&E documents solely for the listed project. All consulting services provided in connection with the preceding report were prepared in accordance with generally accepted professional engineering principles and Southern California practice in the fields of soil mechanics, foundation engineering, and engineering geology, as well as the general requirements of San Bernardino County and the City of Fontana in effect at the time of report issuance. We make no other warranty, either expressed or implied. We cannot guarantee acceptance of our report by regulating authorities without needs for additional services.

AGI appreciates the opportunity to help engineer the City's proposed project. We welcome questions. Please contact the undersigned at our Riverside office at (951) 776-0345, or through the links at our website at www.aragongeo.com for further consultations and guidance.

Respectfully submitted,
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Attachments: Appendices A and B

Distribution: (4) Addressee

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U.S. Geological Survey, 2024c, Unified Hazard Tool: Internet URL https://earthquake.usgs.gov/hazards/interactive/

AERIAL PHOTOGRAPHS

U.C. Santa Barbara Geospatial Collections

Date Flown	Flight Number	Scale	Frame Numbers
3-20-33	C-2550	1:15,840	Line 2, #148
10-15-59	AXL-1959	1:20,000	Line 15W, #13
1-27-89	WAC-89CA	1:31,680	Line 41, #113

APPENDIX A

A P P E N D I X A

SITE EXPLORATION EXHIBITS & SUBSURFACE EXPLORATION LOGS

The Alignment Exploration Exhibits (Plates 1 to 17 at the back of this report) were prepared based upon information supplied by the client, or others, along with Aragón Geotechnical's field measurements and observations. Field exploration locations illustrated on the plan and profile sheets were derived from taped or paced measurements and estimations of distance to key cultural features plotted on the drawings. Hole locations should be considered approximate. Small lateral offsets from proposed pipe centerlines were required to avoid utilities and full street closures. The selected boring locations were deemed sufficient in number and depth by AGI for characterizing the possible range of subsurface conditions occurring along the alignments.

The Field Boring Logs on the following pages schematically depict and describe the subsurface (soil and groundwater) conditions encountered at the specific exploration locations on the date that the explorations were performed. Unit descriptions reflect predominant soil types; actual variability may be much greater. Unit boundaries may be approximate or gradational. Text information often incorporates the field investigator's interpretations of geologic history, origin, diagenesis, and unit identifiers such as formation name or time-stratigraphic group. Additionally, soil conditions between recovered samples are based in part on judgment. Therefore, the logs contain both factual and interpretive information. Subsurface conditions may differ between exploration locations. The subsurface conditions may also change at the exploration locations over the passage of time.

The investigation scope and field operations were conducted in general accordance with the procedures recommended by the American Society for Testing and Materials (ASTM) standard D420-98 entitled "Site Characterization for Engineering Design and Construction Purposes" and/or other relevant specifications. Soil samples were preserved and transported to AGI's Riverside laboratory in general accordance with the procedures recommended by ASTM standard D4220 entitled "Standard Practices for Preserving and Transporting Soil Samples". Brief descriptions of the sampling and testing procedures are presented below:

Ring-Lined Barrel Sampling – ASTM D3550-01

In this procedure, a thick-walled barrel sampler constructed to receive thin-wall liners (either a stack of 1-inch-high brass rings or 6-inch stainless steel tubes for environmental testing) is used to collect soil samples for classification and laboratory tests. Samples were normally attempted at fixed depths of 3 feet and 8 feet in all 17 hollow-stem auger borings. The drilling rig was equipped with a 140-pound mechanically actuated automatic driving hammer operated to fall 30 inches, acting on rods. A 12-inch-long sample barrel fitted with 2.50-inch-diameter rings and tubes plus a waste barrel extension was subsequently driven a distance of 18 inches or to practical refusal (considered to be $\geq$50 blows for 6 inches). The raw blow counts for each 6-inch increment of penetration (or fraction thereof) were

recorded and are shown on the Field Boring Logs. An asterisk (*) marks refusal within the initial 6-inch seating interval. The hammer weight of 140 pounds and fall of 30 inches allow rough correlations to be made (via conversion factors that normally range from 0.60 to 0.65 in Southern California practice) to uncorrected Standard Penetration Test N-values, and thus approximate descriptions of consistency or relative density could be derived. The method provides relatively undisturbed samples that fit directly into laboratory test instruments without additional handling and disturbance.

Standard Penetration Tests – ASTM D1586-11

In every borehole, limited Standard Penetration Tests were performed to recover disturbed samples suitable for classification, and to provide baseline data for liquefaction susceptibility, settlement estimates, and relative density near proposed PVC pipe inverts. A split-barrel sampler with a 2.0-inch outside diameter is driven by successive blows of a 140-pound hammer with a vertical fall of 30 inches, for a distance of 18 inches at the desired depth. The drill rig used for this investigation was equipped with an automatic trip hammer acting on drilling rods. The total number of blows required to drive the sampler the last 12 inches of the 18-inch sample interval is defined as the Standard Penetration Resistance, or "N-value". Penetration resistance counts for each 6-inch interval and the raw, uncorrected N-value for each test are shown on the Field Boring Logs. Drive efficiencies for automatic hammers are higher than older rope-and-cathead systems, which are disappearing from practice. Where practical refusal was encountered within a 6-inch interval, defined as penetration resistance $\geq$ 50 blows per 6 inches, the raw blow count was recorded for the noted fractional interval; an asterisk (*) marks refusal within the initial 6-inch seating interval. The N-value represents an index of the relative density for granular soils or comparative consistency for cohesive soils.

Bulk Sample

A relatively large volume of soil is collected with a shovel or trowel. The sample is transported to the materials laboratory in a sealed plastic bag or bucket.

Classification of Samples

Bulk auger cuttings and discrete soil samples were visually-manually classified based on texture and plasticity, utilizing the procedures outlined in the ASTM D2487-11 standard. The assignment of a group name to each of the collected samples was performed according to the Unified Soil Classification System (ASTM D2488-09). The plasticity reported on field logs refers to soil behavior at field moisture content unless noted otherwise. Site material classifications are reported on the Field Boring Logs.

FIELD LOG OF BORING, STA 11+00

Sheet 1 of 1

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

Date(s) Drilled:	**10/24/24**	Logged By:	**M. Doerschlag**
Drilled By:	**GP Drilling**	Total Depth:	**15.0 Ft.**
Rig Make/Model:	**Mobile B-61**	Hammer Type:	**Automatic trip**
Drilling Method:	**Hollow-Stem Auger**	Hammer Weight/Drop:	**140 Lb./30 In.**
Hole Diameter:	**8 In.**	Surface Elevation:	**± 1,158 Ft. AMSL per plans**

Comments: Drilled on E/B side of Arrow Route ROW in unpaved shoulder.

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK / DRIVE / TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
0				SM	Silty Sand: Brown; loose; slightly moist; fine-grained, massive. Interpreted as wind-deposited sand sheet. [Eolian sand]				BULK: MAX, SIEVE, SE, SULFATE, CHLORIDE, pH, RESISTIVITY
	1155	RING 4 4 5 (9)		SM	Silty Sand: Light brown; loose becoming medium dense below roughly 7 feet; slightly moist; fine to coarse grained immature sand plus traces of gravel to 2" across. Crudely stratified deposits with low cohesion. Easy to drill. [Fan alluvium]	108.8	7.4		SHEAR
5					} Very gravelly zone with clasts to 3"+, judged loose.				
	1150	RING 5 8 13 (21)		SM	← Silty sand with around 10% gravel, stratified, and with some very fine sand at 9 feet. Gravel ranges to ¾" diameter.	112.7	5.3		SHEAR
10									
	1145	RING 7 10 15 (25)		SW-SM	← Gravelly sand, slightly moist, ~20% fine to coarse gravel. Silt proportions under 10%, Appears massive.	120.6	6.9		
15									

Bottom of boring at 15.0 ft.
No groundwater encountered.
Boring backfilled with compacted soil cuttings.

FIELD LOG OF BORING, STA 18+75

Sheet 1 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

Date(s) Drilled:	**10/25/24**	Logged By:	**M. Doerschlag**
Drilled By:	**GP Drilling**	Total Depth:	**19.5 Ft.**
Rig Make/Model:	**Mobile B-61**	Hammer Type:	**Automatic trip**
Drilling Method:	**Hollow-Stem Auger**	Hammer Weight/Drop:	**140 Lb./30 In.**
Hole Diameter:	**8 In.**	Surface Elevation:	**± 1,161 Ft. AMSL per plans**

Comments: Drilled on E/B side of Arrow Route ROW in paved shoulder.

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK / DRIVE / TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
0	1160			SM	Asphaltic Concrete Pavement: 4" thick, no ABM layer.				
					Silty Sand: Brown; loose; slightly moist; fine-grained with only traces of medium sand and zero gravel; massive. [Eolian sand]				
		RING 7 17 32 (49)		SM	← Silty sand, as above, not visibly porous.	110.9	9.5		
5	1155			SM	Silty Sand: Brown; medium dense; slightly moist; traces of fine to coarse gravel up to about 2" across. Overall appearance of reworked blow sand with small proportions of fan gravel. Easy to drill. [Fan alluvium]				
		RING 4 6 13 (18)		SM	← Silty sand, becomes mostly fine to medium grained and moist. Trace of gravel.	110.1	9.4		
10	1150			SW-SM	Gravelly Sand: Grayish brown and brown; dense; slightly moist; estimated 10% fines in mostly well-graded and stratified deposits containing 15-20% fine to coarse subrounded gravel. Gravel proportions rise slowly with depth. Easy to drill. [Fan alluvium]				
		SPT 11 17 17 N=34		SP-SM					
15									

Continued on next sheet.

FIELD LOG OF BORING, STA 18+75

Sheet 2 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK	SAMPLE INTERVALS: DRIVE	SAMPLE INTERVALS: TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
15	1145			SPT -- -- --		SW-SM SW-SM	Gravelly Sand: Grayish brown and brown; dense; slightly moist; estimated 10% fines in mostly well-graded and stratified deposits containing >25% fine to coarse subrounded gravel. Gravel proportions rise slowly with depth. Easy to drill. [Fan alluvium] ← Gravelly sand, now estimated 40% hard gravel, well-packed textures.				

Bottom of boring at 19.5 ft.
No groundwater encountered.
Boring backfilled with compacted soil cuttings and patched.

FIELD LOG OF BORING, STA 28+80

Sheet 1 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

Date(s) Drilled:	**10/25/24**	Logged By:	**M. Doerschlag**
Drilled By:	**GP Drilling**	Total Depth:	**19.5 Ft.**
Rig Make/Model:	**Mobile B-61**	Hammer Type:	**Automatic trip**
Drilling Method:	**Hollow-Stem Auger**	Hammer Weight/Drop:	**140 Lb./30 In.**
Hole Diameter:	**8 In.**	Surface Elevation:	**± 1,163 Ft. AMSL per plans**

Comments: Drilled on E/B side of Arrow Route ROW in paved shoulder.

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK / DRIVE / TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
0				SM	Asphaltic Concrete Pavement: 5" thick, no ABM layer.				
					Silty Sand: Dark brown; loose; slightly moist; fine-grained with only traces of medium sand and zero gravel; massive. [Eolian sand/topsoil]				
	1160	RING 6 7 10 (17)		SM	Silty Sand: Brown; medium dense; slightly moist; appears to average about 15% silt and ~10-15% fine to coarse gravel up to about 2½" across. Interpreted as reworked blow sand with fan gravel. Easy to drill. [Fan alluvium]	104.7	4.3		SHEAR
5									
				SP-SM	Gravelly Sand: Grayish brown; medium dense; slightly moist; estimated 10% fines and about 15-20% medium to coarse subrounded gravel (gap-graded deposits). Low cohesion and easy to drill. [Fan alluvium]				
	1155	RING 9 12 18 (30)		SP-SM		120.4	3.6		SHEAR
10					← With rare small cobbles to ~4" diameter.				
	1150	SPT 26 17 19 N=36		SW-SM	← Gravelly sand, becomes dense and well-graded. Hard gravel clasts. Gradational contact				
15									

Continued on next sheet.

FIELD LOG OF BORING, STA 28+80

Sheet 2 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK	SAMPLE INTERVALS: DRIVE	SAMPLE INTERVALS: TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
15						GW-GM	Gravelly Sand: Brown; mostly medium dense; slightly moist to moist. Features gritty immature sand matrix, and may be >60% hard subrounded gravel. Low cohesion. Easy to drill. [Fan alluvium]				
	1145			SPT 15 9 7 N=16		GW-GM, SP	← Bedded gravelly sand and clean sand, layers 4"-5" thick.				

Bottom of boring at 19.5 ft.
No groundwater encountered.
Boring backfilled with compacted soil cuttings and patched.

FIELD LOG OF BORING, STA 37+70

Sheet 1 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

Date(s) Drilled:	**10/25/24**	Logged By:	**M. Doerschlag**
Drilled By:	**GP Drilling**	Total Depth:	**19.5 Ft.**
Rig Make/Model:	**Mobile B-61**	Hammer Type:	**Automatic trip**
Drilling Method:	**Hollow-Stem Auger**	Hammer Weight/Drop:	**140 Lb./30 In.**
Hole Diameter:	**8 In.**	Surface Elevation:	**± 1,166 Ft. AMSL per plans**

Comments: Drilled on E/B side of Arrow Route ROW in paved shoulder.

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK / DRIVE / TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
0	1165			SM	Asphaltic Concrete Pavement: 6" thick.				
					Aggregate Base Material: Very cohesive, may be cemented (CTB). 5" thick.				
		RING 13 17 21 (38)		SM	Silty Sand: Brown; medium dense; dry to slightly moist; estimated 15-20% silt fines; massive; weak effective cohesion. Contains traces of matrix-supported gravel with clasts ranging up to 3" across but usually near 1"-1½". Interpreted as reworked blow sand with fan gravel. Easy to drill. [Fan alluvium]	Dist.	1.6		
5	1160								
		RING 9 13 16 (29)		SM	← Gravelly sand with silt, becomes yellowish brown and slightly moist, with hard clasts up to 3" across.	121.0	3.7		
10	1155			SW-SM	Gravelly Sand: Grayish brown; dense near top; slightly moist; estimated 10% fines and about 40% fine to coarse subrounded gravel. Gritty immature sand. Low cohesion and easy to drill. [Fan alluvium]				
		SPT 8 16 20 N=36		SW-SM	← Well-graded gravelly sand as above.				
15									

Continued on next sheet.

FIELD LOG OF BORING, STA 37+70

Sheet 2 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK / DRIVE / TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
15	1150	SPT 11 12 13 N=25		SW-SM	Gravelly Sand: Grayish brown; dense; slightly moist. Features gritty immature sand and up to 40% matrix-supported gravel averaging 1-1½" diameter. Low cohesion. Easy to drill. [Fan alluvium]				
				SW-SM	← Well-graded gravelly sand, medium dense, near-equal sand & gravel proportions.				

Bottom of boring at 19.5 ft.
No groundwater encountered.
Boring backfilled with compacted soil cuttings and patched.

FIELD LOG OF BORING, STA 48+60

Sheet 1 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

Date(s) Drilled:	**10/25/24**	Logged By:	**M. Doerschlag**
Drilled By:	**GP Drilling**	Total Depth:	**19.0 Ft.**
Rig Make/Model:	**Mobile B-61**	Hammer Type:	**Automatic trip**
Drilling Method:	**Hollow-Stem Auger**	Hammer Weight/Drop:	**140 Lb./30 In.**
Hole Diameter:	**8 In.**	Surface Elevation:	**± 1,170 Ft. AMSL per plans**

Comments: Drilled on E/B side of Arrow Route ROW in unpaved shoulder.

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK / DRIVE / TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
0	1170			SM	Silty Sand: Grayish brown disturbed layer. [Fill]				
				SM	Silty Sand: Dark brown; loose; slightly moist; fine-grained. Includes traces of gravel near base of unit. Heavily bioturbated. [Eolian sand/topsoil]				BULK:MAX, SIEVE, SE, SULFATE, CHLORIDE, pH, RESISTIVITY
		RING 5 6 6 (12)		SM	← Silty sand, heavily burrowed.	90.3	6.6		
5	1165			SM	Gravelly Sand with Silt: Brown; medium dense; slightly moist; estimated 20% fine to coarse subrounded gravel. Interpreted as mixed or reworked blow sand and fan gravel. Easy to drill. [Fan alluvium]				
		RING 20 24 31 (53)			← 3½" rock wedged in shoe.	N/R	N/R		
10	1160			GW-GM	Sandy Gravel: Grayish brown; very dense; slightly moist; fine to coarse sand matrix with under 10% fines interstitial to hard and strong gravel clasts. Low cohesion. Remains easy to drill with light rig bounce. [Fan alluvium]				
		SPT 14 21 30 N=51		GW-GM	← Well-graded sandy gravel as above.				
15	1155								

Continued on next sheet.

FIELD LOG OF BORING, STA 48+60

Sheet 2 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK	SAMPLE INTERVALS: DRIVE	SAMPLE INTERVALS: TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
15	1155					GW-GM	Sandy Gravel: Grayish brown; very dense; slightly moist; fine to coarse sand matrix with under 10% fines interstitial to hard and strong gravel clasts. Low cohesion. Remains easy to drill with light rig bounce. [Fan alluvium]				
				SPT 11 50/4"		GW-GM	← Well-graded sandy gravel, faint thin bedding. Cohesionless.				

Bottom of boring at 19.0 ft.
No groundwater encountered.
Boring backfilled with compacted soil cuttings.

FIELD LOG OF BORING, STA 58+00

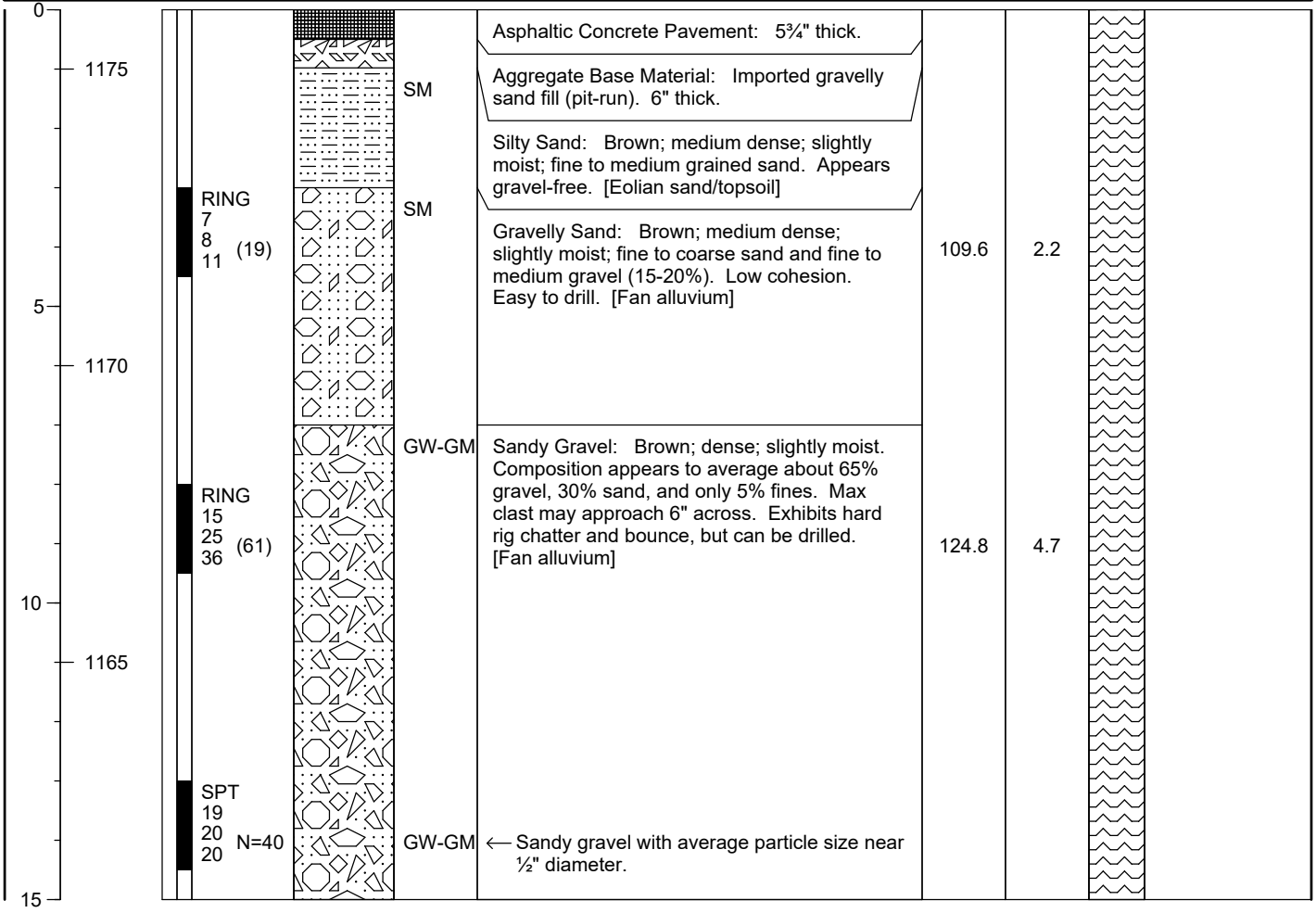
Sheet 1 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

Date(s) Drilled:	**10/25/24**	Logged By:	**M. Doerschlag**
Drilled By:	**GP Drilling**	Total Depth:	**19.5 Ft.**
Rig Make/Model:	**Mobile B-61**	Hammer Type:	**Automatic trip**
Drilling Method:	**Hollow-Stem Auger**	Hammer Weight/Drop:	**140 Lb./30 In.**
Hole Diameter:	**8 In.**	Surface Elevation:	**± 1,176 Ft. AMSL per plans**

Comments: Drilled on E/B side of Arrow Route ROW in paved shoulder.



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FIELD LOG OF BORING, STA 58+00

Sheet 2 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK / DRIVE / TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
15	1160	SPT 12 15 6 N=21		GW-GM	Sandy Gravel: Brown to brownish gray; dense; slightly moist. Gravel averaging under 1" diameter but deposits can include cobbles. Less bounce below 15 feet. Low or no cohesion. [Fan alluvium]				
				SW-SM	← Gravelly sand, becomes medium dense, faint bedding. Cohesionless.				

Bottom of boring at 19.5 ft.
No groundwater encountered.
Boring backfilled with compacted soil cuttings and patched.

FIELD LOG OF BORING, STA 68+40

Sheet 1 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

Date(s) Drilled:	**10/25/24**	Logged By:	**M. Doerschlag**
Drilled By:	**GP Drilling**	Total Depth:	**19.5 Ft.**
Rig Make/Model:	**Mobile B-61**	Hammer Type:	**Automatic trip**
Drilling Method:	**Hollow-Stem Auger**	Hammer Weight/Drop:	**140 Lb./30 In.**
Hole Diameter:	**8 In.**	Surface Elevation:	**± 1,181 Ft. AMSL per plans**

Comments: Drilled on E/B side of Arrow Route ROW in unpaved shoulder.

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS (BULK / DRIVE / TYPE, "N" or (Blows/ft.))	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
0	1180			SM	Silty Sand: Brown; rocky imported soil. [Fill]				
				GW-GM	Sandy Gravel: Brown; medium dense; slightly moist; fine to coarse sand and fine to medium gravel Low cohesion. Easy to drill. [Fan alluvium]				
		RING 14 19 25 (44)				131.6	1.9		
5	1175				← With coarse gravel and small cobbles.				
				SM	Silty Sand: Yellowish brown; medium dense; moist to very moist; very fine to fine grained. Massive and not visibly porous; non-plastic. Estimated lower contact. [Eolian sand sheet]				
		RING 12 9 7 (16)				112.2	15.8		
10	1170			GW-GM	Sandy Gravel: Brown and grayish brown; dense; slightly moist to moist; fine to coarse grained sand and gravel. Maximum clast size of ~3"-4". Easy to drill. [Fan alluvium]				
		SPT 13 20 20 N=40		GW-GM	← Sandy gravel, featuring some weathered schist and plutonic clasts.				
15									

Continued on next sheet.

FIELD LOG OF BORING, STA 68+40

Sheet 2 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK / DRIVE / TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
15	1165	SPT 11 7 13 N=20		GW-GM	Sandy Gravel: Brown and grayish brown; dense; slightly moist to moist; fine to coarse grained sand and gravel. Some smaller metamorphic and granitic clasts are weathered. Maximum clast size of ~3"-4". Easy to drill. [Fan alluvium]				
				GW-GM, SM	← Sandy gravel, plus a 10" layer of very moist, yellowish brown, very silty fine eolian sand.				

Bottom of boring at 19.5 ft.
No groundwater encountered.
Boring backfilled with compacted soil cuttings.

FIELD LOG OF BORING, STA 78+10

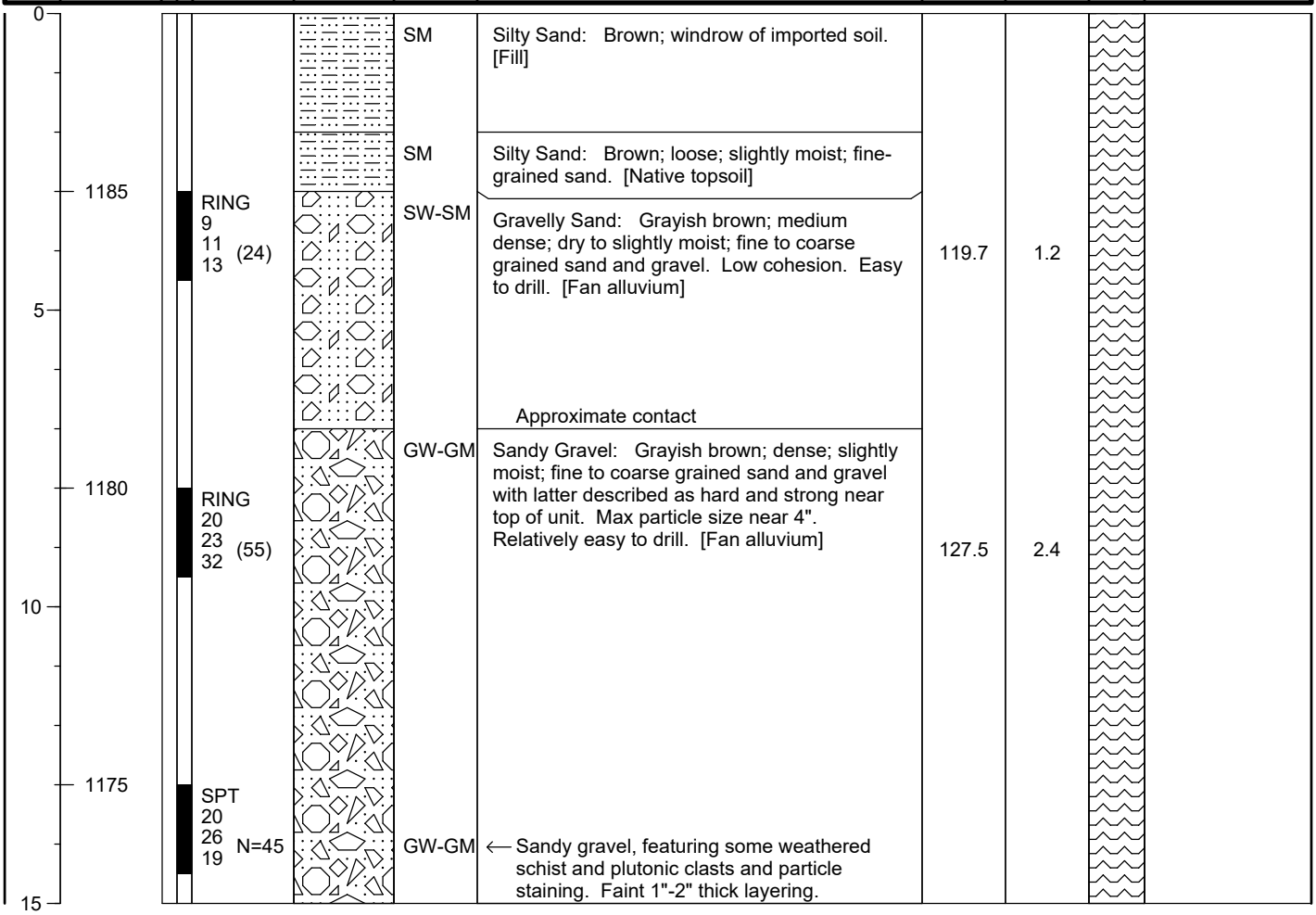
Sheet 1 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

Date(s) Drilled:	**10/25/24**	Logged By:	**M. Doerschlag**
Drilled By:	**GP Drilling**	Total Depth:	**19.5 Ft.**
Rig Make/Model:	**Mobile B-61**	Hammer Type:	**Automatic trip**
Drilling Method:	**Hollow-Stem Auger**	Hammer Weight/Drop:	**140 Lb./30 In.**
Hole Diameter:	**8 In.**	Surface Elevation:	**± 1,188 Ft. AMSL per plans**

Comments: Drilled on E/B side of Arrow Route ROW in elevated (filled) unpaved shoulder.



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FIELD LOG OF BORING, STA 78+10

Sheet 2 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK / DRIVE / TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
15				GW-GM	Sandy Gravel: Grayish brown; dense to very dense; slightly moist; fine to coarse grained sand and gravel in indistinct beds. Some metamorphic and granitic clasts are weathered and weak. Maximum clast size of ~3"-4". Easy to drill. [Fan alluvium]				
	1170	SPT 27 31 61 N=92		GW-GM	← Sandy gravel, very dense, indistinctly bedded and with some weathered particles, mostly fine-grained gravel.				

Bottom of boring at 19.5 ft.
No groundwater encountered.
Boring backfilled with compacted soil cuttings.

FIELD LOG OF BORING, STA 89+50

Sheet 1 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

Date(s) Drilled:	**10/24/24**	Logged By:	**M. Doerschlag**
Drilled By:	**GP Drilling**	Total Depth:	**19.5 Ft.**
Rig Make/Model:	**Mobile B-61**	Hammer Type:	**Automatic trip**
Drilling Method:	**Hollow-Stem Auger**	Hammer Weight/Drop:	**140 Lb./30 In.**
Hole Diameter:	**8 In.**	Surface Elevation:	**± 1,195 Ft. AMSL per plans**

Comments: Drilled on E/B side of Arrow Route ROW in paved shoulder.

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK / DRIVE / TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
0	1195			SM	Asphaltic Concrete Pavement: 5" thick, no ABM layer.				BULK: MAX, SIEVE, SE, SULFATE, CHLORIDE, pH, RESISTIVITY
					Silty Sand: Brown; loose; slightly moist; fine-grained sand; massive; not visibly porous; slight effective cohesion. Sharp lower contact. [Eolian sand]				
		RING 3 13 16 (29)		SM	Gravelly Sand with Silt: Brown; medium dense; slightly moist; fine to coarse grained sand and gravel (30-35%) with maximum particle size of ~3". Low cohesion. Easy to drill. [Fan alluvium]	126.6	4.4		
5	1190								
				SW-SM	Gravelly Sand: Light brown and grayish brown; medium dense; slightly moist; fine to coarse grained sand and subrounded gravel, silt proportions near 10%. Hard and strong clasts range to at least 5" diameter but are mostly <2", with well-packed textures. Stratified. Relatively easy to drill. [Fan alluvium]	118.8	2.0		
		RING 12 16 24 (40)							
10	1185								
		SPT 10 50/6"		SW-SM	← Gravelly sand, as above but becomes very dense.				
15	1180								

Continued on next sheet.

FIELD LOG OF BORING, STA 89+50

Sheet 2 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK / DRIVE / TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
15	1180	SPT 26 27 32 N=59		SW-SM	Gravelly Sand: Light brown and grayish brown; very dense; slightly moist; fine to coarse grained sand and subangular gravel, silt proportions under 10% and decreasing with depth. Clasts are hard, strong, and may reach 5" diameter but are mostly <2", with well-packed textures. Stratified. Relatively easy to drill. [Fan alluvium]				
				SW-SM	← Gravelly sand, as above.				

Bottom of boring at 19.5 ft.
No groundwater encountered.
Boring backfilled with compacted soil cuttings and patched.

FIELD LOG OF BORING, STA 98+30

Sheet 1 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

Date(s) Drilled:	**10/24/24**	Logged By:	**M. Doerschlag**
Drilled By:	**GP Drilling**	Total Depth:	**19.5 Ft.**
Rig Make/Model:	**Mobile B-61**	Hammer Type:	**Automatic trip**
Drilling Method:	**Hollow-Stem Auger**	Hammer Weight/Drop:	**140 Lb./30 In.**
Hole Diameter:	**8 In.**	Surface Elevation:	**± 1,201 Ft. AMSL per plans**

Comments: Drilled on E/B side of Arrow Route ROW in paved shoulder.

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK / DRIVE / TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
0	1200			SM	Asphaltic Concrete Pavement: 6½" thick, no ABM layer.				BULK: MAX, SIEVE, SE, SULFATE, CHLORIDE, pH, RESISTIVITY
					Silty Sand: Brown; loose; slightly moist; fine-grained sand with traces of fine gravel (from bioturbation into deeper units); massive; slight effective cohesion. Sharp lower contact. [Eolian sand]				
		RING 4 5 6 (11)		SM	← Silty sand, as above, not visibly porous.	113.2	3.7		
5	1195			SM	Gravelly Sand with Silt: Brown; medium dense; slightly moist; fine to coarse grained sand and gravel. Clasts subrounded and hard. Low cohesion. Easy to drill. [Fan alluvium]				
		RING 11 15 23 (38)		SW-SM	Gravelly Sand: Light brown and brown; dense to very dense; slightly moist; fine to coarse grained immature gritty sand and subrounded gravel, silt proportions near 10%. Hard and strong clasts range to about 2½" diameter, with well-packed textures. Stratified. Relatively easy to drill. [Fan alluvium]	114.6	2.0		
10	1190								
		SPT 16 24 31 N=55		SW-SM	← Gravelly sand, as above but becomes very dense.				
15									

Continued on next sheet.

FIELD LOG OF BORING, STA 98+30

Sheet 2 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK / DRIVE / TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
15	1185	SPT 18 20 21 N=41		SW-SM	Gravelly Sand: Light brown and brown; dense to very dense; slightly moist; fine to coarse grained immature gritty sand and subrounded gravel, silt proportions near 10%. Hard and strong clasts usually remain under 2½" diameter, with well-packed textures. Stratified. Relatively easy to drill. [Fan alluvium]				
				SW-SM	← Gravelly sand, dense. Contains moderately weathered Pelona schist clasts.				

Bottom of boring at 19.5 ft.
No groundwater encountered.
Boring backfilled with compacted soil cuttings and patched.

FIELD LOG OF BORING, STA 109+25

Sheet 1 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

Date(s) Drilled:	**10/24/24**	Logged By:	**M. Doerschlag**
Drilled By:	**GP Drilling**	Total Depth:	**18.5 Ft.**
Rig Make/Model:	**Mobile B-61**	Hammer Type:	**Automatic trip**
Drilling Method:	**Hollow-Stem Auger**	Hammer Weight/Drop:	**140 Lb./30 In.**
Hole Diameter:	**8 In.**	Surface Elevation:	**± 1,209 Ft. AMSL per plans**

Comments: Drilled on E/B side of Arrow Route ROW in unpaved shoulder.

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK / DRIVE / TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
0				SM	Silty Sand: Yellowish brown; loose; dry to slightly moist; fine to coarse grained sand with about 15% gravel; may be strongly bioturbated. Sharp lower contact. [Fill?]				
	1205	RING 5 6 7 (13)		SM	← Silty sand with few rocks to 3" across.	109.8	2.9		SHEAR
5				SM	Silty Sand: Yellowish brown; loose to medium dense; moist; very fine-grained sand and possibly 30-35% silt; massive and not visibly porous in samples. Slight effective cohesion. Easy to drill. [Eolian sand]				
	1200	RING 5 7 12 (19)		SM	Silty Sand with Gravel: Brown; medium dense; moist; fine to coarse grained sand and fine to medium gravel, silt proportions near 15%. Well-packed textures and seems massive. Easy to drill. [Fan alluvium]	113.0	13.9		SHEAR
10									
	1195	SPT *50/5"		GW-GM	Sandy Gravel: Brown; very dense; moist; fine to coarse grained sand and gravel. Occasional small cobble up to 5" diameter. Under 10% fines. Hard clasts. Rig bounce and chatter, difficult to drill. [Fan alluvium]				
15									

Continued on next sheet.

FIELD LOG OF BORING, STA 109+25

Sheet 2 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK / DRIVE / TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
15		SPT *50/6"		GW-GM	Sandy Gravel: Brown; very dense; moist; fine to coarse grained sand and subrounded gravel and occasional small cobble up to 5" diameter. Under 10% fines. Hard and strong clasts. Difficult drilling with rig bounce and chatter. [Fan alluvium] ← Sandy gravel, poor recovery.				

Bottom of boring at 18.5 ft.
No groundwater encountered.
Boring backfilled with compacted soil cuttings.

FIELD LOG OF BORING, STA 120+40

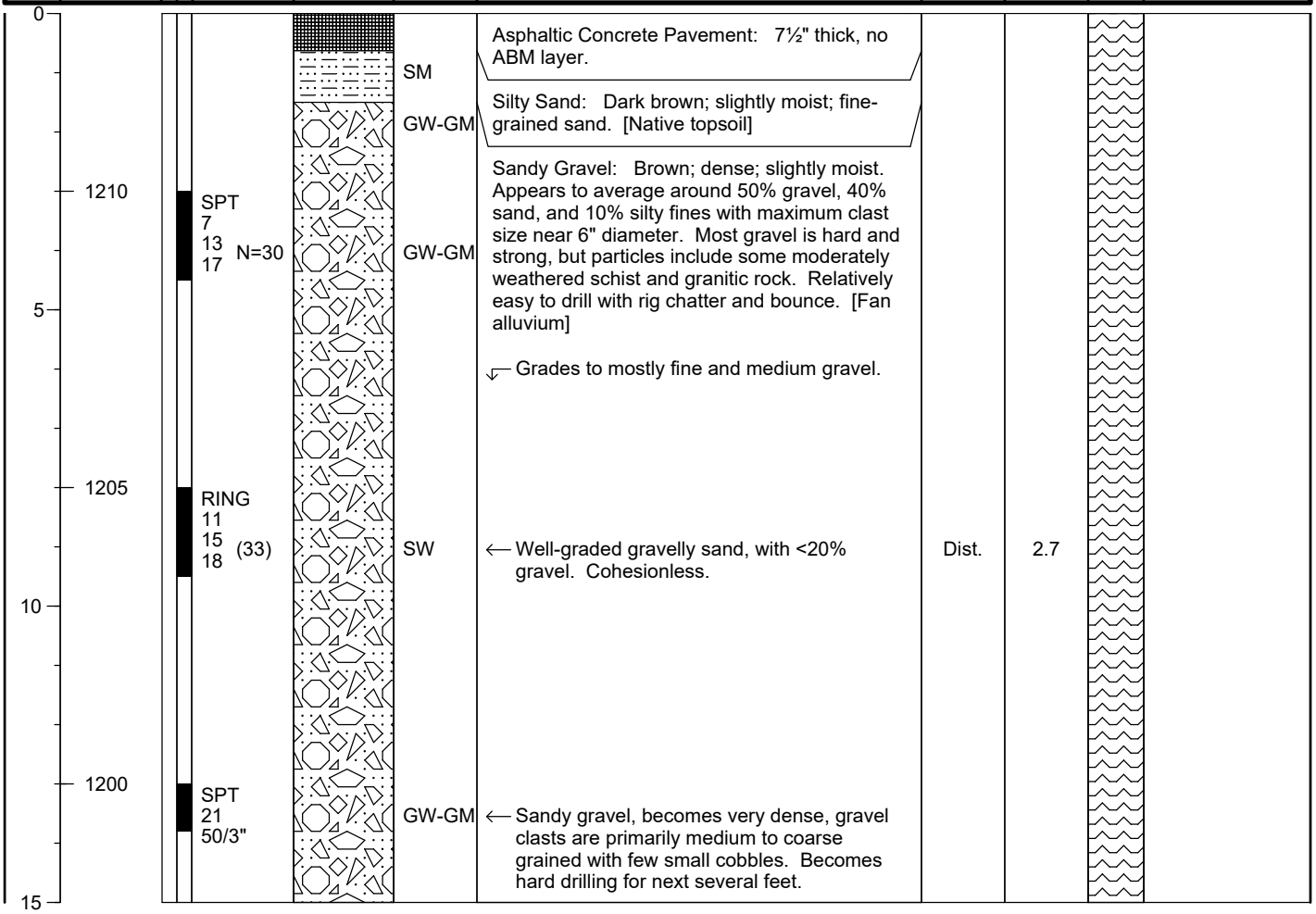
Sheet 1 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

Date(s) Drilled:	**10/24/24**	Logged By:	**M. Doerschlag**
Drilled By:	**GP Drilling**	Total Depth:	**19.5 Ft.**
Rig Make/Model:	**Mobile B-61**	Hammer Type:	**Automatic trip**
Drilling Method:	**Hollow-Stem Auger**	Hammer Weight/Drop:	**140 Lb./30 In.**
Hole Diameter:	**8 In.**	Surface Elevation:	**± 1,213 Ft. AMSL per plans**

Comments: Drilled on E/B side of Arrow Route ROW in paved shoulder.



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FIELD LOG OF BORING, STA 120+40

Sheet 2 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK / DRIVE / TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
15				GW-GM	Sandy Gravel: Brown; dense to very dense; slightly moist. Composed mostly of medium to coarse gravel with maximum clast size near 6" diameter. Difficult drilling with heavy rig chatter and bounce. [Fan alluvium]				
	1195	SPT 18 14 16 N=30		SP-SM	← Gravelly fine to medium sand, dense, bedded, some 1"-2" stones (gap-graded).				

Bottom of boring at 19.5 ft.
No groundwater encountered.
Boring backfilled with compacted soil cuttings and patched.

FIELD LOG OF BORING, STA 131+40

Sheet 1 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

Date(s) Drilled:	**10/24/24**	Logged By:	**M. Doerschlag**
Drilled By:	**GP Drilling**	Total Depth:	**19.0 Ft.**
Rig Make/Model:	**Mobile B-61**	Hammer Type:	**Automatic trip**
Drilling Method:	**Hollow-Stem Auger**	Hammer Weight/Drop:	**140 Lb./30 In.**
Hole Diameter:	**8 In.**	Surface Elevation:	**± 1,220 Ft. AMSL per plans**

Comments: Drilled on E/B side of Arrow Route ROW in unpaved shoulder.

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK / DRIVE / TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
0	1220			SM	Silty Sand: Dark brown; loose; slightly moist; fine-grained sand with rare fine gravel; massive. Probably intensely bioturbated. [Eolian sand/topsoil]				BULK: MAX, SIEVE, SE, SULFATE, CHLORIDE, pH, RESISTIVITY
		SPT 8 9 15 N=24		SM	Gravelly Sand with Silt: Brown; medium dense; slightly moist; fine to coarse grained sand and fine to medium gravel (est. 25%) with maximum particle size of ~3". About 15% silt and with low cohesion. Easy to drill. [Fan alluvium]				
5	1215								
				SW-SM	Gravelly Sand: Brown; dense; slightly moist; fine to coarse grained sand and subrounded gravel, silt proportions near 10%. Hard and strong clasts. Sand proportions decrease with depth. Relatively easy to drill. [Fan alluvium]				
		SPT 10 15 18 N=33							
10	1210								
				GW-GM	Sandy Gravel: Brown; apparently medium dense; slightly moist. Comprises ~60% gravel and 30% sand, clasts tending to mostly fine to medium grained. Easy to drill. [Fan alluvium]				
		SPT 6 9 10 N=19							
15	1205								

Continued on next sheet.

FIELD LOG OF BORING, STA 131+40

Sheet 2 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK / DRIVE / TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
15	1205			GW-GM	Sandy Gravel: Brown; medium dense to very dense; slightly moist. Comprises ~60% gravel and 30% sand, although interpreted as much sandier from 16 to 18 feet. Easy to drill to 18 feet. [Fan alluvium]				
		SPT 33 50/6"		GW-GM	← Sandy gravel, very dense, mixed Lytle Creek clasts averaging at least 2" across.				

Bottom of boring at 19.0 ft.
No groundwater encountered.
Boring backfilled with compacted soil cuttings.

FIELD LOG OF BORING, STA 139+30

Sheet 1 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

Date(s) Drilled:	**10/24/24**	Logged By:	**M. Doerschlag**
Drilled By:	**GP Drilling**	Total Depth:	**19.5 Ft.**
Rig Make/Model:	**Mobile B-61**	Hammer Type:	**Automatic trip**
Drilling Method:	**Hollow-Stem Auger**	Hammer Weight/Drop:	**140 Lb./30 In.**
Hole Diameter:	**8 In.**	Surface Elevation:	**± 1,226 Ft. AMSL per plans**

Comments: Drilled on E/B side of Arrow Route ROW in unpaved parkway strip.

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK / DRIVE / TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
0	1225			SM	Gravelly Sand with Silt: Parkway fill capped with landscape rock.				
				SM	Silty Sand: Brown; loose; slightly moist; fine to medium grained sand. [Eolian sand/topsoil]				
		RING 9 11 17 (28)		SM	Gravelly Sand with Silt: Brown; medium dense; slightly moist to dry; fine to coarse grained sand and gravel with maximum particle size of ~3". Appears bioturbated in sample. Easy to drill. [Fan alluvium]	114.5	2.3		
5	1220			GW-GM	Sandy Gravel: Brown; dense to very dense; slightly moist; fine to coarse grained sand and subrounded gravel, silt proportions near 10%. Hard and strong clasts. May include cobbles to 5" diameter. Difficult drilling with heavy rig chatter and bounce. [Fan alluvium]				
		SPT 15 27 30 N=59		GW-GM	← Sandy gravel, as above.				
10	1215				↙ Cobbly below 12 feet (basal lag).				
		SPT 21 30 35 N=65		SW-SM	Gravelly Sand: Grayish brown; very dense; slightly moist. Comprises ~35% gravel and 55% sand. Gravel clasts primarily fine to medium grained. Not difficult to drill. [Fan alluvium]				
15									

Continued on next sheet.

FIELD LOG OF BORING, STA 139+30

Sheet 2 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK	SAMPLE INTERVALS: DRIVE	SAMPLE INTERVALS: TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
15	1210			SPT 17 25 61 N=86		SW-SM	Gravelly Sand: Grayish brown; very dense; slightly moist. Comprises ~35% gravel and 55% sand. Gravel clasts tending to mostly fine to medium grained. Not difficult to drill. [Fan alluvium]				
						SW-SM	← Sandy gravel, as above, particles up to >2" across.				

Bottom of boring at 19.5 ft.
No groundwater encountered.
Boring backfilled with compacted soil cuttings.

FIELD LOG OF BORING, STA 23+20 (Beech)

Sheet 1 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

Date(s) Drilled:	**10/24/24**	Logged By:	**M. Doerschlag**
Drilled By:	**GP Drilling**	Total Depth:	**18.5 Ft.**
Rig Make/Model:	**Mobile B-61**	Hammer Type:	**Automatic trip**
Drilling Method:	**Hollow-Stem Auger**	Hammer Weight/Drop:	**140 Lb./30 In.**
Hole Diameter:	**8 In.**	Surface Elevation:	**± 1,246 Ft. AMSL per plans**

Comments: Drilled on N/B side of Beech Avenue ROW in paved street.

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS (BULK / DRIVE / TYPE, "N" or (Blows/ft.))	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
0	1245			SM	Asphaltic Concrete Pavement: 3" thick, no ABM layer.				
		RING 3 3 5 (8)			Silty Sand: Brown; loose; dry; primarily fine to medium grained sand but also with about 15% medium to coarse gravel up to 3" diameter (gap-graded). Easy drilling. [Fan alluvium]	N/R	N/R		
5	1240								
		RING 31 50/6"		SM	Gravelly Sand with Silt: Brown; dense to very dense; slightly moist to dry; fine to coarse grained sand and gravel with maximum particle size of ~3". Easy to drill. [Fan alluvium]	N/R	N/R		
10	1235								
		SPT 17 17 39 N=56		GW-GM	Sandy Gravel: Brown; very dense; dry; fine to coarse grained sand and subrounded gravel. Hard and strong clasts. [Fan alluvium]				
15									

Continued on next sheet.

FIELD LOG OF BORING, STA 23+20 (Beech)

Sheet 2 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK / DRIVE / TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
15	1230	SPT *50/6"		GW-GM	Sandy Gravel: Brown; very dense; dry; fine to coarse grained sand and subrounded gravel, silt proportions near 10%. Hard and strong clasts. Moderate-effort drilling with rig chatter and bounce. [Fan alluvium]				
				GW-GM	← Shattered medium to coarse clasts.				

Bottom of boring at 18.5 ft.
No groundwater encountered.
Boring backfilled with compacted soil cuttings and patched.

FIELD LOG OF BORING, STA 21+30 (Cherry)

Sheet 1 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

Date(s) Drilled:	**10/25/24**	Logged By:	**M. Doerschlag**
Drilled By:	**GP Drilling**	Total Depth:	**19.0 Ft.**
Rig Make/Model:	**Mobile B-61**	Hammer Type:	**Automatic trip**
Drilling Method:	**Hollow-Stem Auger**	Hammer Weight/Drop:	**140 Lb./30 In.**
Hole Diameter:	**8 In.**	Surface Elevation:	**± 1,210 Ft. AMSL per plans**

Comments: Drilled within S/B #1 lane of Cherry Avenue ROW on pipeline axis.

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK / DRIVE / TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
0	1210				Asphaltic Concrete Pavement: 4¾" thick.				
				SM	Aggregate Base Material: 6½" of imported base. Not noticeably cemented.				
		RING 6 6 10 (16)			Silty Sand: Brown; loose; slightly moist; primarily fine-grained sand with only traces of medium or coarse grains; massive. [Eolian sand/topsoil]	124.8	1.4		
5	1205			SM	Gravelly Sand with Silt: Brown; dense; slightly moist to dry; fine to coarse grained sand and gravel (latter about 30%). Well-packed texture with hard and strong clasts to 3" or so. Easy to drill. [Fan alluvium]				
				GW-GM	Sandy Gravel: Grayish brown; very dense; slightly moist; fine to coarse grained sand and subrounded gravel. Maximum particle size appears to be near 4". Low 5%-8% fines. Hard and strong clasts. Not hard drilling. [Fan alluvium]				
		RING 19 26 38 (64)				131.9	1.7		
10	1200								
		SPT 18 32 50/4"		GW-GM	← Sandy gravel, as described above.				
15	1195								

Continued on next sheet.

FIELD LOG OF BORING, STA 21+30 (Cherry)

Sheet 2 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK / DRIVE / TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
15	1195	SPT 38 50/4"		GW-GM	Sandy Gravel: Grayish brown; very dense; slightly moist; fine to coarse grained sand and subrounded gravel. Maximum particle size appears to be near 4". Low 5%-8% fines. Hard and strong clasts. Not hard drilling. [Fan alluvium]				
				GW-GM	⟵ Sandy gravel, as above.				

Bottom of boring at 19.0 ft.
No groundwater encountered.
Boring backfilled with compacted soil cuttings and patched.

FIELD LOG OF BORING, STA 32+16 (Cherry)

Sheet 1 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

Date(s) Drilled:	**10/25/24**	Logged By:	**M. Doerschlag**
Drilled By:	**GP Drilling**	Total Depth:	**19.0 Ft.**
Rig Make/Model:	**Mobile B-61**	Hammer Type:	**Automatic trip**
Drilling Method:	**Hollow-Stem Auger**	Hammer Weight/Drop:	**140 Lb./30 In.**
Hole Diameter:	**8 In.**	Surface Elevation:	**± 1,226 Ft. AMSL per plans**

Comments: Drilled within S/B #1 lane of Cherry Avenue ROW on pipeline axis.

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK / DRIVE / TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
0	1225			SM	Asphaltic Concrete Pavement: 5-5/8" thick. Aggregate Base Material: 6" of imported base. May consist of CTB (very cohesive). Silty Sand: Brown; loose; slightly moist; fine-grained; massive. [Eolian sand/topsoil]				BULK: MAX, SIEVE, SE, SULFATE, CHLORIDE, pH, RESISTIVITY
		RING 17 16 18 (34)		SM	Gravelly Sand with Silt: Brown; medium dense; slightly moist; fine to coarse grained sand and gravel with estimated 15% silty fines. Hard and strong clasts to 3" or so. Easy to drill. [Fan alluvium]	123.7	2.3		
5	1220			GW-GM	Sandy Gravel: Brown; medium dense; slightly moist; fine to coarse grained sand and subrounded gravel. Maximum particle size appears to be near 5", although most gravel is under 2" diameter. Low 5%-8% fines. Hard and strong clasts. Not hard drilling. [Fan alluvium]				
		RING 13 18 25 (43)				130.2	2.9		
10	1215								
		SPT 18 25 33 N=58		GW-GM	← Sandy gravel, as above.				
15									

Continued on next sheet.

FIELD LOG OF BORING, STA 32+16 (Cherry)

Sheet 2 of 2

Project: ***ARROW ROUTE SEWER IMPROVEMENTS***

Location: ***FONTANA, SAN BERNARDINO COUNTY, CALIF.***

DEPTH (ft.)	ELEVATION (MSL DATUM)	SAMPLE INTERVALS: BULK / DRIVE / TYPE, "N" or (Blows/ft.)	GRAPHIC LOG	USCS	GEOTECHNICAL DESCRIPTION	DRY DENSITY (pcf)	WATER CONTENT (%)	WELL COMPLETION	OTHER TESTS
15	1210	SPT 38 50/4"		GW-GM	Sandy Gravel: Brown; medium dense; slightly moist; fine to coarse grained sand and subrounded gravel. Maximum particle size roughly 5", although most gravel is under 2" diameter. Low 5%-8% fines. Hard and strong clasts. Not hard drilling. [Fan alluvium]				
				GW-GM	← Sandy gravel, as above.				

Bottom of boring at 19.0 ft.
No groundwater encountered.
Boring backfilled with compacted soil cuttings and patched.

APPENDIX B

A P P E N D I X B

LABORATORY TESTING

Water Content - Dry Density Determinations – ASTM D2216-10

The dry unit weight and field moisture content were determined for each of the recovered California-modified barrel samples. The moisture-density information provides a gross indication of soil consistency and can assist in delineating local variations. The information can also be used to correlate soils and define units between individual exploration locations along the project alignments, as well as with units found on other sites within the upper Chino Basin watershed area.

Measured dry densities ranged from approximately 90.3 to 131.9 pounds per cubic foot. Water contents in ring samples ranged from 1.2 to 15.8 percent of dry unit weight. Sample locations and the corresponding test results are illustrated on the Field Boring Logs.

Modified Effort Compaction Tests – ASTM D1557-12

Five bulk soil samples of auger spoils were collected from the upper 8 feet of selected borings. These blended soils would constitute the majority of future trench backfill. Maximum dry densities and optimum water contents were determined per the Method A and Method C procedures in the noted ASTM standard. For Method A, compaction energy is imparted by 25 blows of a 10-pound hammer falling 18 inches on each of 5 soil layers in a 1/30 cubic foot cylinder. For Method C applied to gravelly soils, 56 blows of the same 10-pound hammer are applied to each of 5 soil layers in a 1/13.333-cubic-foot cylinder. Soil samples were prepared at varying moisture contents to create curves for each soil type illustrating achieved dry density as a function of water content. The test results are listed below and shown graphically on pages B-5 through B-9. Results are rock-corrected.

Maximum Density - Optimum Water Content Determinations

Soil Description	Location	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
Silty Sand (SM) [Eolian sand + alluvium blend]	Sta 11+00 @ 0 - 8 ft.	130.7	6.8
Gravelly Sand with silt fines (SM) [Eolian sand + alluvium blend]	Sta 48+60 @ 0 - 8 ft.	137.3	6.0
Gravelly Sand with silt fines (SM) [Eolian sand + alluvium blend]	Sta 89+50 @ 0 - 8 ft.	138.0	6.0
Gravelly Sand with silt fines (SM) [Eolian sand + alluvium blend]	Sta 131+40 @ 0 - 8 ft.	128.7	5.7
Gravelly Sand with silt fines (SM) [Eolian sand + alluvium blend]	Sta 32+16 @ 1 - 8 ft. (Cherry Ave.)	134.5	5.7

Shear Strength Tests – ASTM D3080-11

Direct shear tests were performed on native soils recovered with drive samplers from depths of 3 feet and 8 feet, or roughly the depth span of future trench excavations. The relatively undisturbed test samples were initially saturated, consolidated and drained of excess moisture, and tested in a direct shear machine of the strain control type. Test samples were extruded from standard one-inch-high brass rings. Samples were tested at increasing normal loads to determine the Mohr-Coulomb shear strength parameters illustrated on pages B-10 through B-15. Peak and ultimate shear strength values are illustrated on the plots.

Particle Size (Gradation) Analyses – ASTM D422-63

Quantitative determinations were made of the distribution of coarse-grained particle sizes and fines proportions in blended samples recovered from roughly street grade to 8 feet deep. Gradation analyses help verify preliminary field classifications of total fines content and materials suitability for certain engineering purposes. Aliquots of bulk samples were passed through mechanically actuated sieves to separate coarse-grained (sand/gravel) particles into size classes. Percent passing and percent retained for the sieve analyses are illustrated on the accompanying charts on pages B-16 through B-20.

Sand Equivalent Tests – ASTM D2419-09

Natural soils expected to compose excavated trench spoils were evaluated for relative measures of silt and clay content. The suitability of materials for use as select bedding material capable of being jetted around wet or dry utilities is commonly based on meeting a minimum sand equivalent value. Soil samples were placed in graduated cylinders with a volume of flocculating solution. Agitation and irrigation through a siphon device force the soil fines into suspension. After a prescribed sedimentation period, the heights of flocculated fines and sand are determined. The following table summarizes results.

Sand Equivalent Test Results

Soil Description	Location	Sand Equivalent
Silty Sand (SM) [Eolian sand + alluvium blend]	Sta 11+00 @ 0 - 8 ft.	47
Gravelly Sand with silt fines (SM) [Eolian sand + alluvium blend]	Sta 48+60 @ 0 - 8 ft.	21
Gravelly Sand with silt fines (SM) [Eolian sand + alluvium blend]	Sta 89+50 @ 0 - 8 ft.	28
Gravelly Sand with silt fines (SM) [Eolian sand + alluvium blend]	Sta 131+40 @ 0 - 8 ft.	49
Gravelly Sand with silt fines (SM) [Eolian sand + alluvium blend]	Sta 32+16 @ 1 - 8 ft. (Cherry Ave.)	36

Soil Corrosivity

Soil samples representative of materials we expect to be in contact with concrete or ferrous metals were tested in the laboratories of Project X Corrosion Engineers, Murrieta, California, to determine the tabulated data on the next page. The submitted soil samples were tested in general accordance with ASTM Standard Methods listed at the top of the table. Soluble-species quantitative determinations were based on 1:3 water-to-soil extracts.

Soil Analysis Lab Results

Client: Aragon Geotechnical, Inc.
Job Name: Arrow Route TKE
Client Job Number: 5104-SF
Project X Job Number: S241119A
November 21, 2024

	Method	ASTM D4327		ASTM D4327		ASTM G187		ASTM G51
Bore# / Description	**Depth**	**Sulfates** SO_4^{2-}		**Chlorides** Cl^-		**Resistivity** As Rec'd | Minimum		**pH**
	(ft)	**(mg/kg)**	**(wt%)**	**(mg/kg)**	**(wt%)**	**(Ω-cm)**	**(Ω-cm)**	
24-2439 STA 11+00	0-8	80.9	0.0081	21.9	0.0022	>737,000	12,060	7.9
24-2448 STA 48+60	0-8	550.3	0.0550	14.8	0.0015	>737,000	1,072	7.1
24-2457 STA 89+50	0.5-8	567.9	0.0568	43.6	0.0044	>737,000	15,410	7.3
24-2463 STA 131+40	0-8	493.3	0.0493	41.5	0.0041	>737,000	18,760	7.4
24-2469 STA 32+16	1-8	464.0	0.0464	27.2	0.0027	>737,000	9,380	7.5

Cations and Anions, except Sulfide and Bicarbonate, tested with Ion Chromatography
mg/kg = milligrams per kilogram (parts per million) of dry soil weight
ND = 0 = Not Detected | NT = Not Tested | Unk = Unknown
Chemical Analysis performed on 1:3 Soil-To-Water extract
PPM = mg/kg (soil) = mg/L (Liquid)

Note: Sometimes a bad sulfate hit is a contaminated spot. Typical fertilizers are Potassium chloride, ammonium sulfate or ammonium sulfate nitrate (ASN). So this is another reason why testing full corrosion series is good because we then have the data to see if those other ingredients are present meaning the soil sample is just fertilizer-contaminated soil. This can happen often when the soil samples collected are simply surface scoops. This is why it's best to dig in a foot, throw away the top and test the deeper stuff. Dairy farms are also notorious for these items.

If one sample pops up much more corrosive than all others, we would recommend collecting more samples surrounding the problem sample location to determine if the peak is isolated to it. This allows us to conclude it was a contaminated sample and able to declare it an outlier.

Try out our new online forms: SOIL CORROSIVITY & THERMAL RESISTIVITY LAB REQUEST FORM & IN-SITU WENNER 4 PIN QUOTE REQUEST FORM

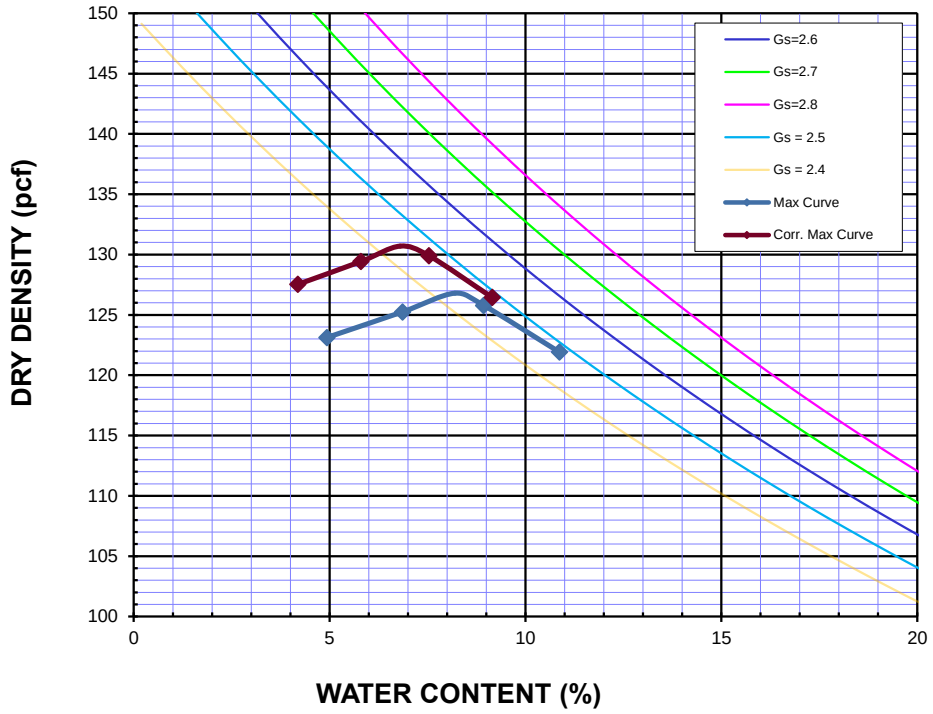
ARAGÓN GEOTECHNICAL, INC.
16801 Van Buren Blvd.
Riverside, California 92504
(951) 776-0345

Maximum Density Test

Client:	TKE Engineering, Inc. 2305 Chicago Avenue Riverside, CA 92507	**Project Name:**	Arrow Route Fontana, CA.
Project No.:	5104-SF	**Report Date:**	December 20, 2024
Sampled By:	Mark Doerschlag	**Lab ID No.:**	24-2439
Date of Sampling:	October 24, 2024		

Information provided by Technician				
	X	Performed at Laboratory	X	Moist Preparation
		Performed at Jobsite		Dry Preparation

Tested By:	Cesar Lopez	**Date Tested:**	November 4, 2024	
Sample Location:	Arrow Route Sta. 11+00	**Source:**	-	**Depth/Elev:** 0 - 8'
Sample Description:	Silty Sand with Some Gravel (SM). [Eolian & alluvium blend]			



A	METHOD USED (A,B or C)
#4	SIEVE NUMBER
Mechanical	TYPE OF RAMMER
0.9%	AS REC'D MOISTURE
16.4%	PERCENT RETAINED
2.50	ASSUMED SPECIFIC GRAVITY
126.8	**MAXIMUM DENSITY [PCF]**
8.2	**OPTIMUM MOISTURE [%]**
130.7	**CORRECTED MAXIMUM DENSITY [PCF]**
6.8	**CORRECTED OPTIMUM MOISTURE [%]**

Remarks: No modifications made to test method, followed exact test procedure.

.

AASHTO/ASTM/CTM Standards Used:	Unless noted, material was sampled in accordance with AASHTO T2/ASTM D75/CTM 125. Sample tested in accordance with ASTM D2216, D1557 & D4718.

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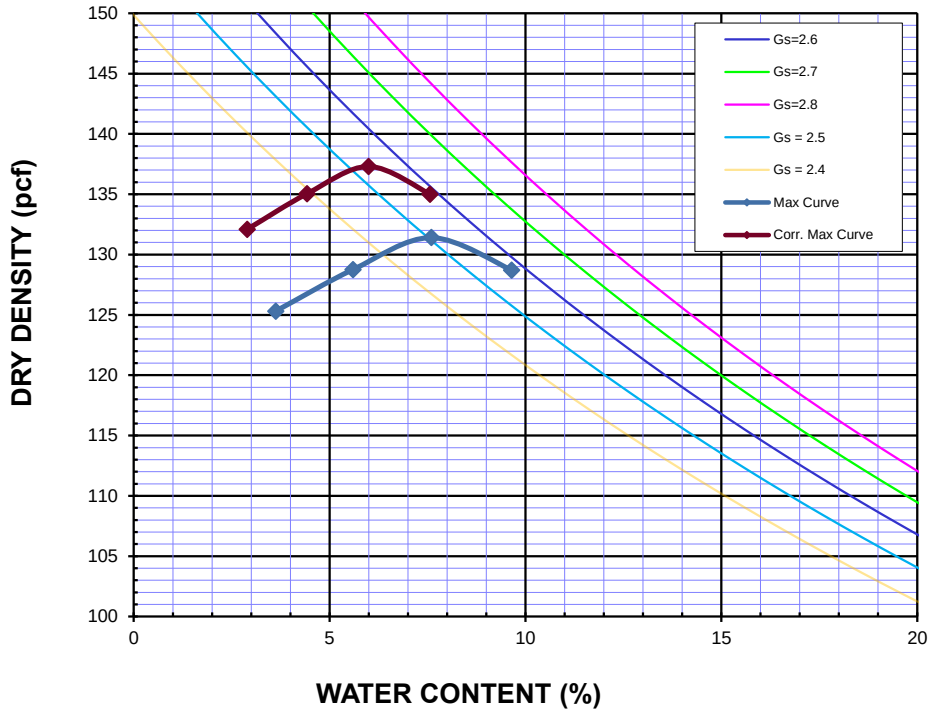
Maximum Density Test

Client:	TKE Engineering, Inc. 2305 Chicago Avenue Riverside, CA 92507	**Project Name:**	Arrow Route Fontana, CA.
Project No.:	5104-SF	**Report Date:**	December 20, 2024
Sampled By:	Mark Doerschlag	**Lab ID No.:**	24-2448
Date of Sampling:	October 25, 2024		

Information provided by Technician				
	X	Performed at Laboratory	X	Moist Preparation
		Performed at Jobsite		Dry Preparation

Tested By:	Cesar Lopez	**Date Tested:**	November 5, 2024	
Sample Location:	Arrow Route Sta. 48+60	**Source:**	-	**Depth/Elev:** 0 - 8'
Sample Description:	Gravelly Sand with Silt (SM) [Eolian & alluvium blend]			



A	METHOD USED (A,B or C)
#4	SIEVE NUMBER
Mechanical	TYPE OF RAMMER
1.6%	AS REC'D MOISTURE
22.6%	PERCENT RETAINED
2.60	ASSUMED SPECIFIC GRAVITY
131.4	**MAXIMUM DENSITY [PCF]**
7.6	**OPTIMUM MOISTURE [%]**
137.3	**CORRECTED MAXIMUM DENSITY [PCF]**
6.0	**CORRECTED OPTIMUM MOISTURE [%]**

Remarks: No modifications made to test method, followed exact test procedure.

.

AASHTO/ASTM/CTM Standards Used:	Unless noted, material was sampled in accordance with AASHTO T2/ASTM D75/CTM 125. Sample tested in accordance with ASTM D2216, D1557 & D4718.

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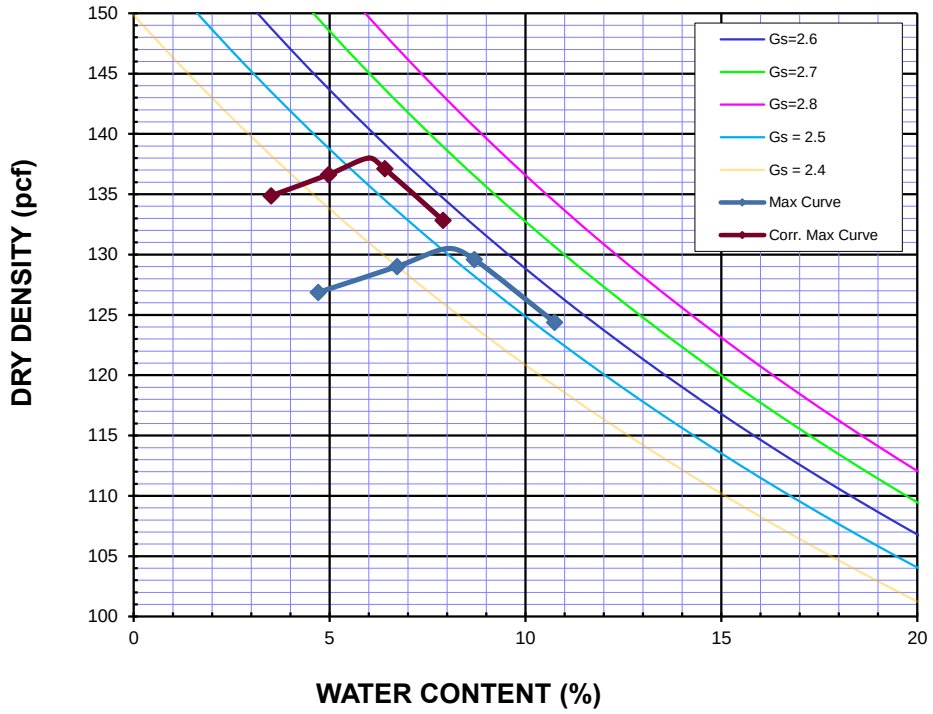
Maximum Density Test

Client:	TKE Engineering, Inc. 2305 Chicago Avenue Riverside, CA 92507	**Project Name:**	Arrow Route Fontana, CA.
Project No.:	5104-SF	**Report Date:**	December 20, 2024
Sampled By:	Mark Doerschlag	**Lab ID No.:**	24-2457
Date of Sampling:	October 24, 2024		

Information provided by Technician				
	X	Performed at Laboratory	X	Moist Preparation
		Performed at Jobsite		Dry Preparation

Tested By:	Cesar Lopez	**Date Tested:**	November 8, 2024	
Sample Location:	Arrow Route Sta. 89+50	**Source:**	-	**Depth/Elev:** 0.5 - 8'
Sample Description:	Gravelly Sand with Silt (SM). [Eolian & alluvium blend]			



A	METHOD USED (A,B or C)
#4	SIEVE NUMBER
Mechanical	TYPE OF RAMMER
0.7%	AS REC'D MOISTURE
27.2%	PERCENT RETAINED
2.60	ASSUMED SPECIFIC GRAVITY
130.5	**MAXIMUM DENSITY [PCF]**
8.0	**OPTIMUM MOISTURE [%]**
138.0	**CORRECTED MAXIMUM DENSITY [PCF]**
6.0	**CORRECTED OPTIMUM MOISTURE [%]**

Remarks: No modifications made to test method, followed exact test procedure.

.

AASHTO/ASTM/CTM Standards Used:	Unless noted, material was sampled in accordance with AASHTO T2/ASTM D75/CTM 125. Sample tested in accordance with ASTM D2216, D1557 & D4718.

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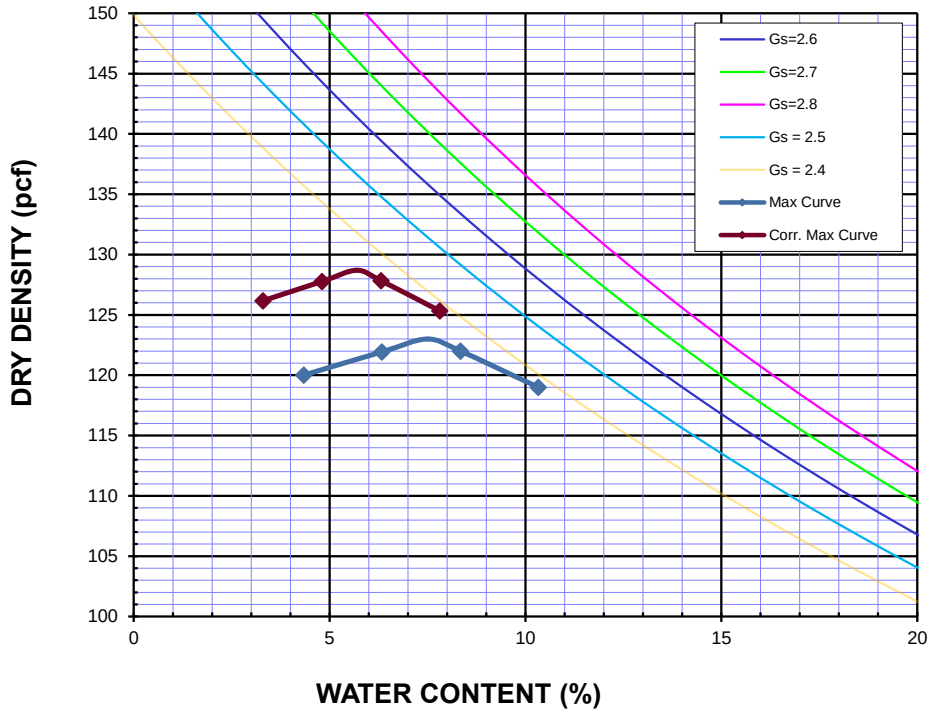
Maximum Density Test

Client:	TKE Engineering, Inc. 2305 Chicago Avenue Riverside, CA 92507	**Project Name:**	Arrow Route Fontana, CA.
Project No.:	5104-SF	**Report Date:**	December 20, 2024
Sampled By:	Mark Doerschlag	**Lab ID No.:**	24-2463
Date of Sampling:	October 24, 2024		

Information provided by Technician				
	X	Performed at Laboratory	X	Moist Preparation
		Performed at Jobsite		Dry Preparation

Tested By:	Cesar Lopez	**Date Tested:**	November 14, 2024	
Sample Location:	Arrow Route Sta. 131+40	**Source:**	-	**Depth/Elev:** 0 - 8'
Sample Description:	Gravelly Sand with Silt (SM). [Eolian & alluvium blend]			



A	METHOD USED (A,B or C)
#4	SIEVE NUMBER
Mechanical	TYPE OF RAMMER
0.3%	AS REC'D MOISTURE
24.6%	PERCENT RETAINED
2.40	ASSUMED SPECIFIC GRAVITY
123.0	**MAXIMUM DENSITY [PCF]**
7.5	**OPTIMUM MOISTURE [%]**
128.7	**CORRECTED MAXIMUM DENSITY [PCF]**
5.7	**CORRECTED OPTIMUM MOISTURE [%]**

Remarks: No modifications made to test method, followed exact test procedure.

.

AASHTO/ASTM/CTM Standards Used:	Unless noted, material was sampled in accordance with AASHTO T2/ASTM D75/CTM 125. Sample tested in accordance with ASTM D2216, D1557 & D4718.

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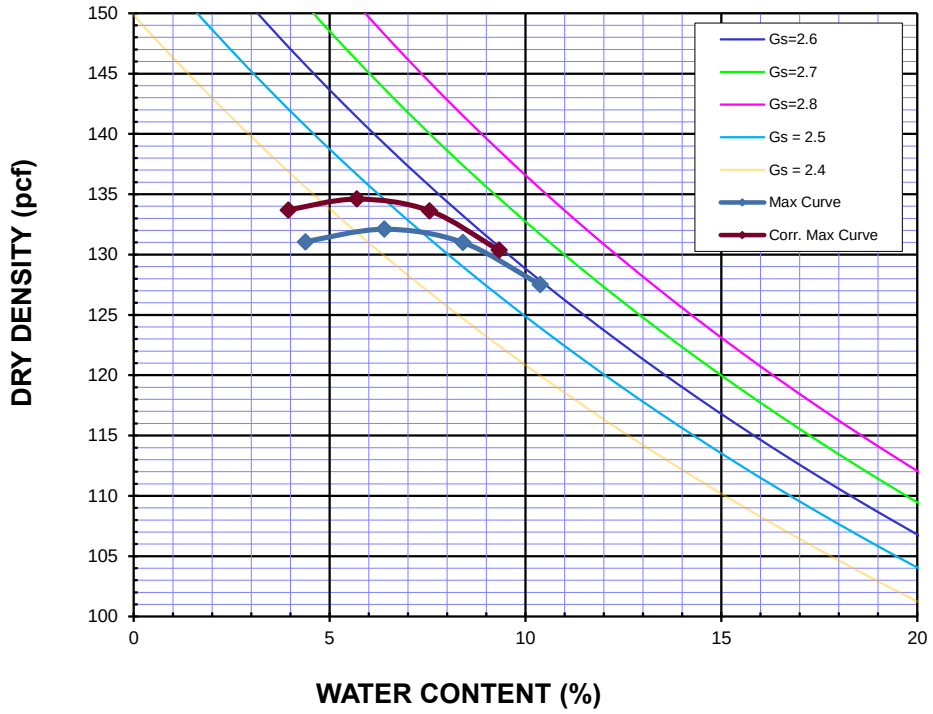
16801 Van Buren Blvd.
Riverside, California 92504
(951) 776-0345

Maximum Density Test

Client:	TKE Engineering, Inc. 2305 Chicago Avenue Riverside, CA 92507	**Project Name:**	Arrow Route Fontana, CA.
Project No.:	5104-SF	**Report Date:**	December 20, 2024
Sampled By:	Mark Doerschlag	**Lab ID No.:**	24-2469
Date of Sampling:	October 25, 2024		

Information provided by Technician				
	X	Performed at Laboratory	X	Moist Preparation
		Performed at Jobsite		Dry Preparation

Tested By:	Cesar Lopez	**Date Tested:**	November 15, 2024	
Sample Location:	Cherry Sta. 32+16	**Source:**	-	**Depth/Elev:** 1 - 8'
Sample Description:	Gravelly Sand with Silt (SM). [Eolian & alluvium blend]			



C	METHOD USED (A,B or C)
#4	SIEVE NUMBER
Mechanical	TYPE OF RAMMER
0.4%	AS REC'D MOISTURE
10.2%	PERCENT RETAINED
2.60	ASSUMED SPECIFIC GRAVITY
132.1	**MAXIMUM DENSITY [PCF]**
6.4	**OPTIMUM MOISTURE [%]**
134.6	**CORRECTED MAXIMUM DENSITY [PCF]**
5.7	**CORRECTED OPTIMUM MOISTURE [%]**

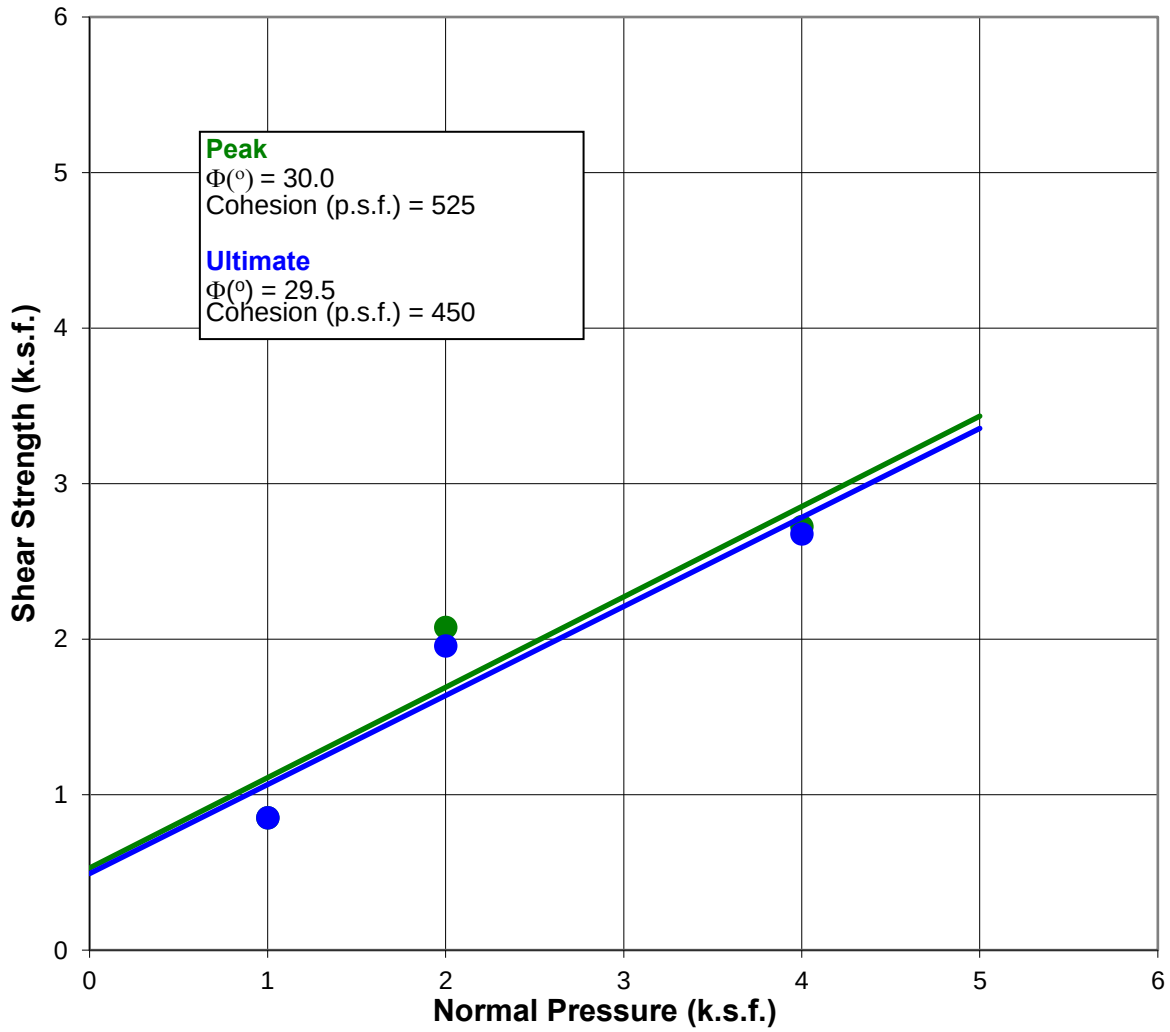
Remarks: No modifications made to test method, followed exact test procedure.

AASHTO/ASTM/CTM Standards Used:	Unless noted, material was sampled in accordance with AASHTO T2/ASTM D75/CTM 125. Sample tested in accordance with ASTM D2216, D1557 & D4718.

ARAGÓN GEOTECHNICAL, INC.
16801 Van Buren Blvd., Bldg. B
Riverside, California 92504
951-776-0345

Direct Shear Test Diagram

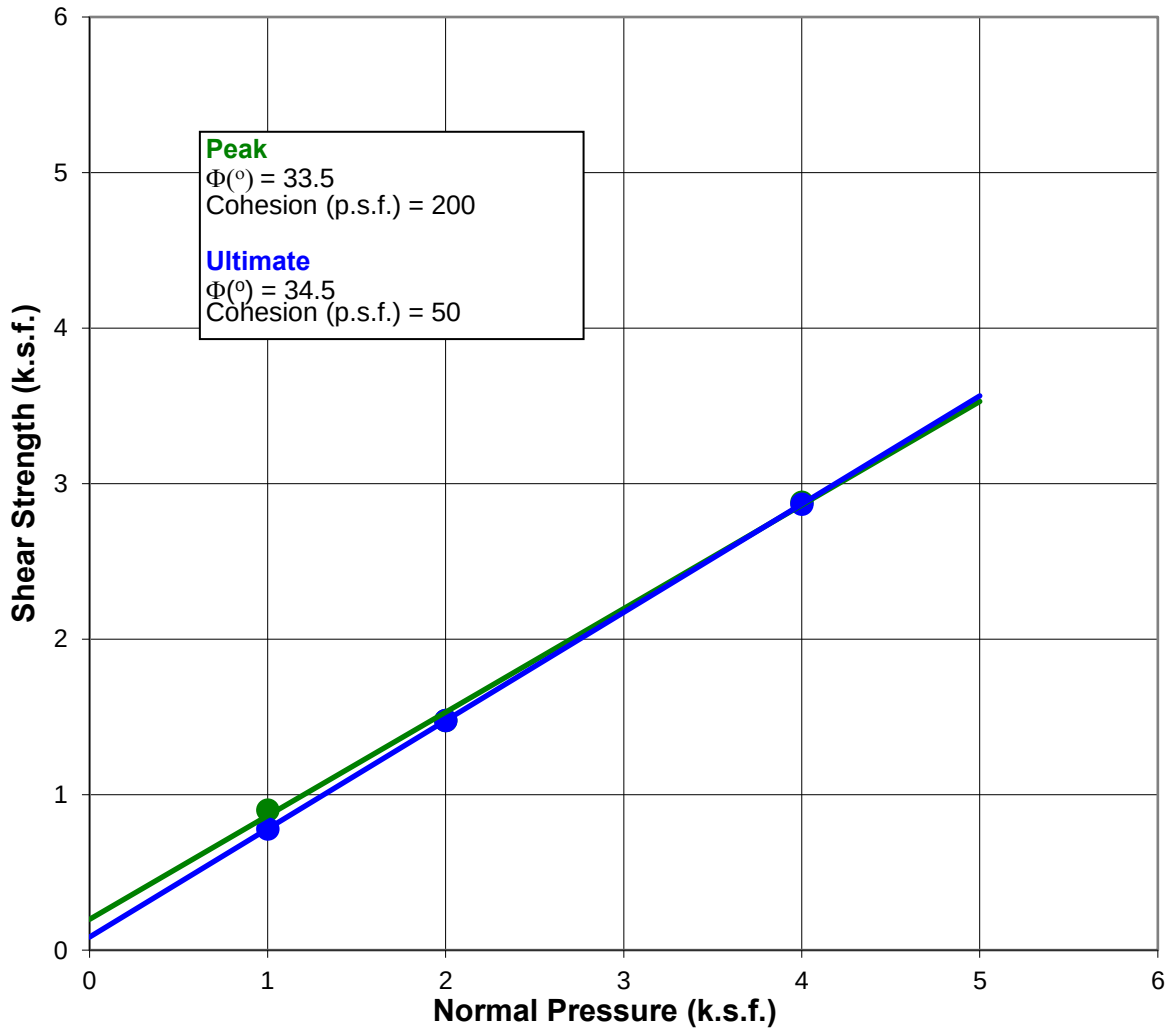
Project Name:	Arrow Route		
Project Number:	5104-SF	Tested by:	Cesar Lopez
Sample Location:	Sta. 11+00	Date Tested:	November 13, 2024
Sampled by:	Mark Doerschlag	Depth (ft):	3'
Date Sampled:	October 24, 2024	Lab I.D. No.:	24-2436
Test Condition:	"Undisturbed", Consolidated, Drained.		
Sample Description:	Silty Sand (SM), trace of gravel. [Fan alluvium]		



ARAGÓN GEOTECHNICAL, INC.
16801 Van Buren Blvd., Bldg. B
Riverside, California 92504
951-776-0345

Direct Shear Test Diagram

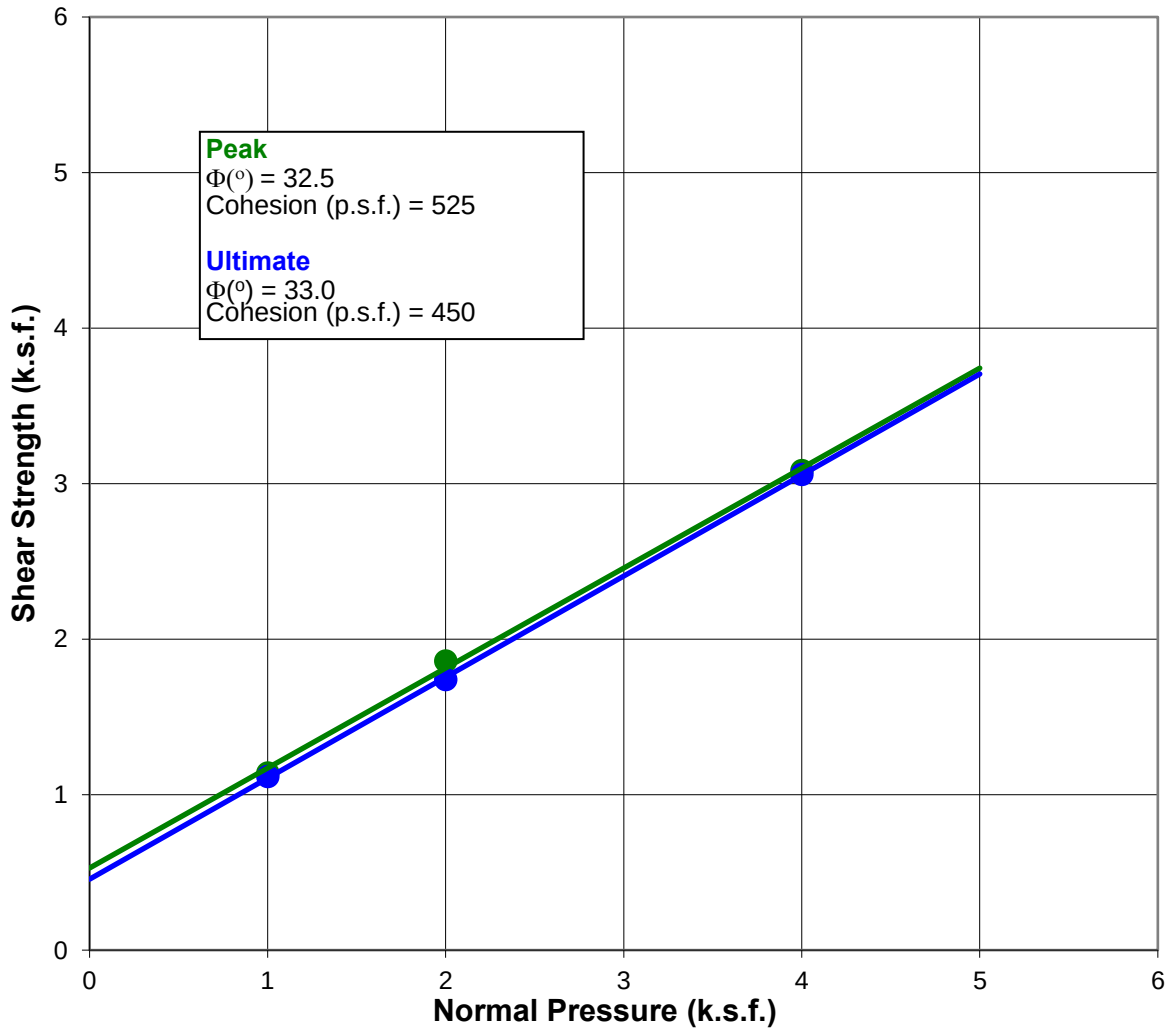
Project Name:	Arrow Route		
Project Number:	5104-SF	Tested by:	Cesar Lopez
Sample Location:	Sta. 11+00	Date Tested:	November 14, 2024
Sampled by:	Mark Doerschlag	Depth (ft):	8'
Date Sampled:	October 24, 2024	Lab I.D. No.:	24-2437
Test Condition:	"Undisturbed", Consolidated, Drained.		
Sample Description:	Silty Sand with Gravel (SM). [Fan alluvium]		



ARAGÓN GEOTECHNICAL, INC.
16801 Van Buren Blvd., Bldg. B
Riverside, California 92504
951-776-0345

Direct Shear Test Diagram

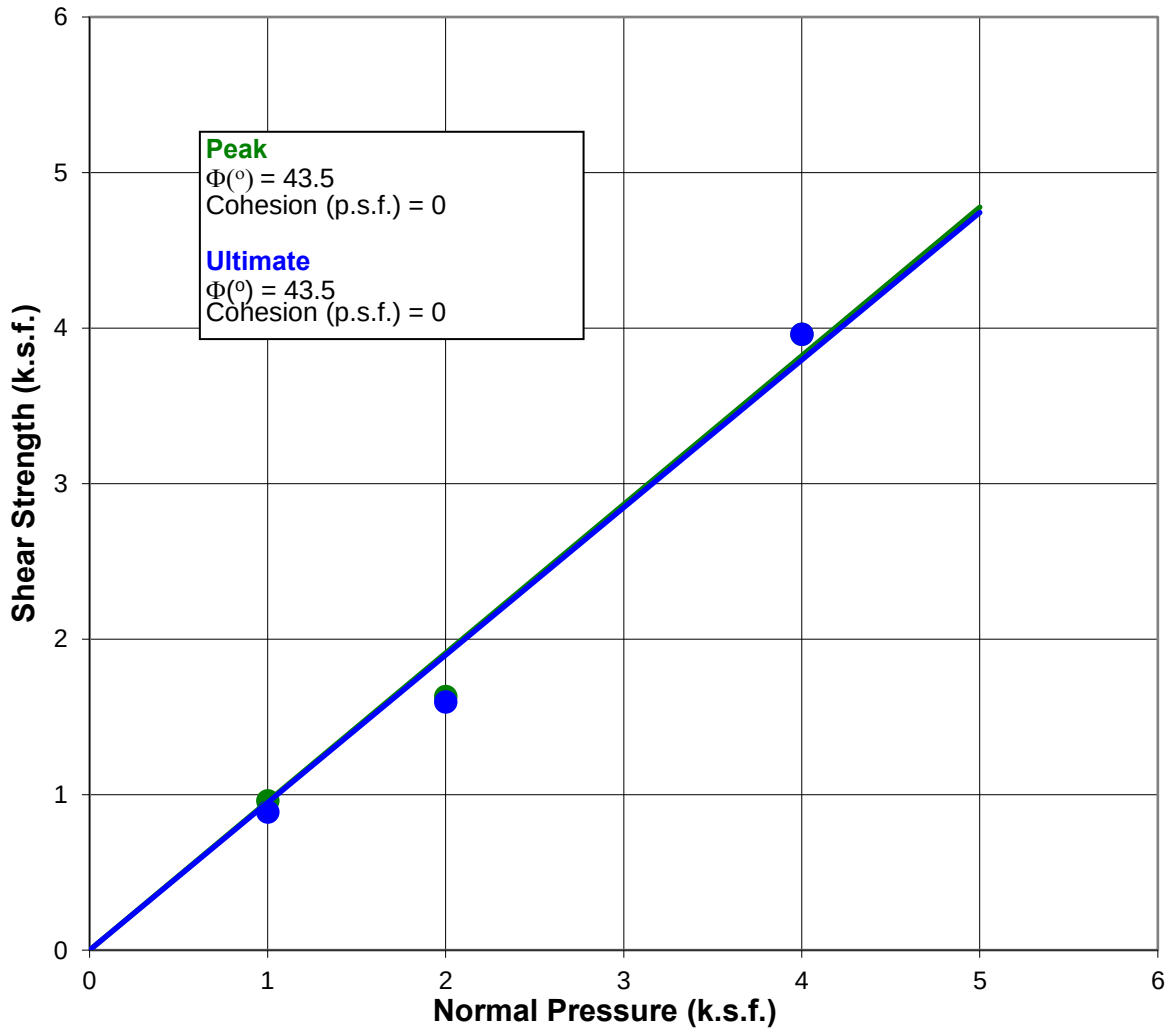
Project Name:	Arrow Route		
Project Number:	5104-SF	Tested by:	Cesar Lopez
Sample Location:	Sta. 28+80	Date Tested:	November 15, 2024
Sampled by:	Mark Doerschlag	Depth (ft):	3'
Date Sampled:	October 24, 2024	Lab I.D. No.:	24-2442
Test Condition:	"Undisturbed", Consolidated, Drained.		
Sample Description:	Silty Sand (SM), with some gravel. [Fan alluvium]		



ARAGÓN GEOTECHNICAL, INC.
16801 Van Buren Blvd., Bldg. B
Riverside, California 92504
951-776-0345

Direct Shear Test Diagram

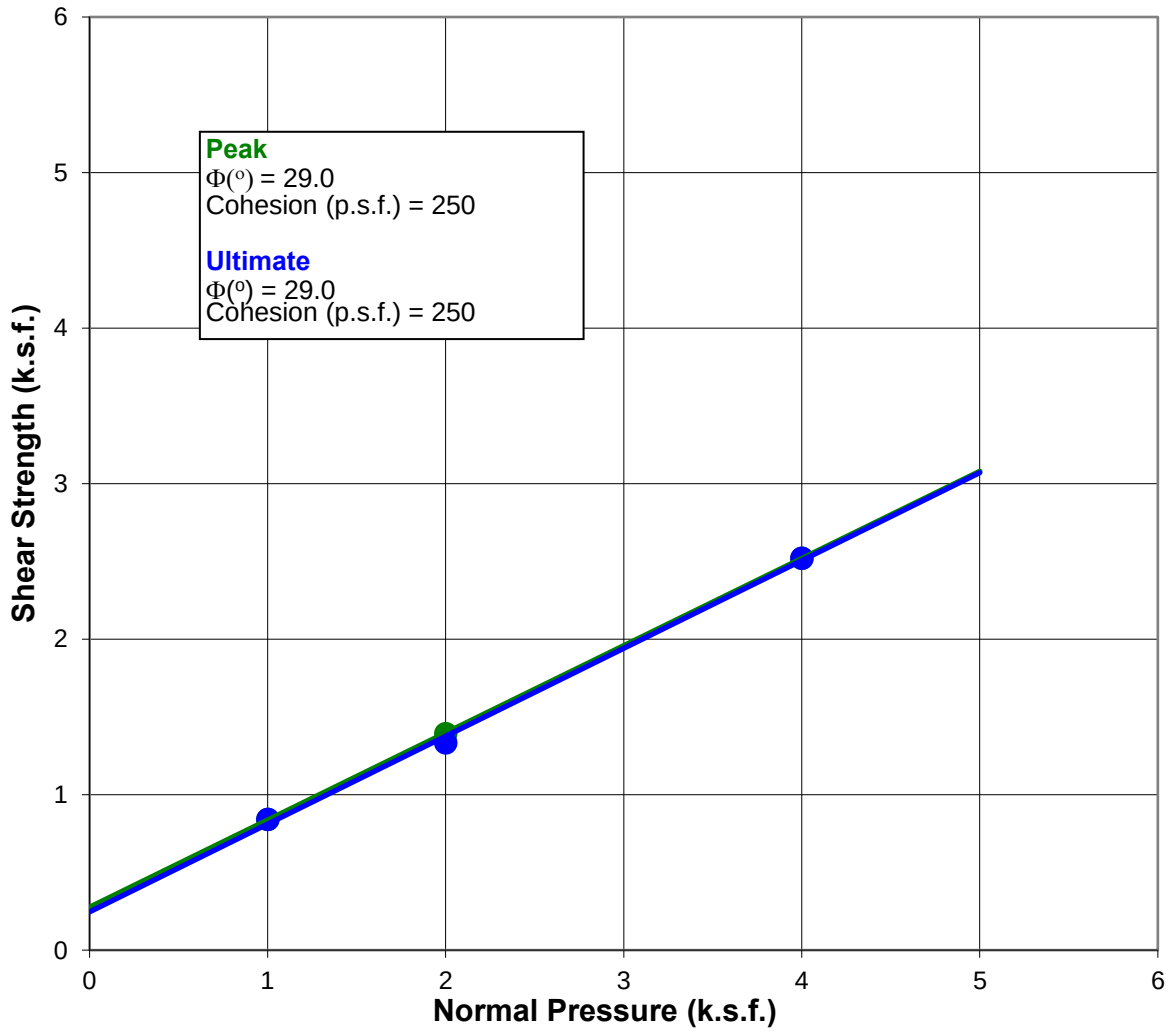
Project Name:	Arrow Route		
Project Number:	5104-SF	Tested by:	Cesar Lopez
Sample Location:	Sta. 28+80	Date Tested:	November 18, 2024
Sampled by:	Mark Doerschlag	Depth (ft):	8'
Date Sampled:	October 24, 2024	Lab I.D. No.:	24-2443
Test Condition:	"Undisturbed", Consolidated, Drained.		
Sample Description:	Gravelly Sand (SP-SM), gap-graded. [Fan alluvium]		



ARAGÓN GEOTECHNICAL, INC.
16801 Van Buren Blvd., Bldg. B
Riverside, California 92504
951-776-0345

Direct Shear Test Diagram

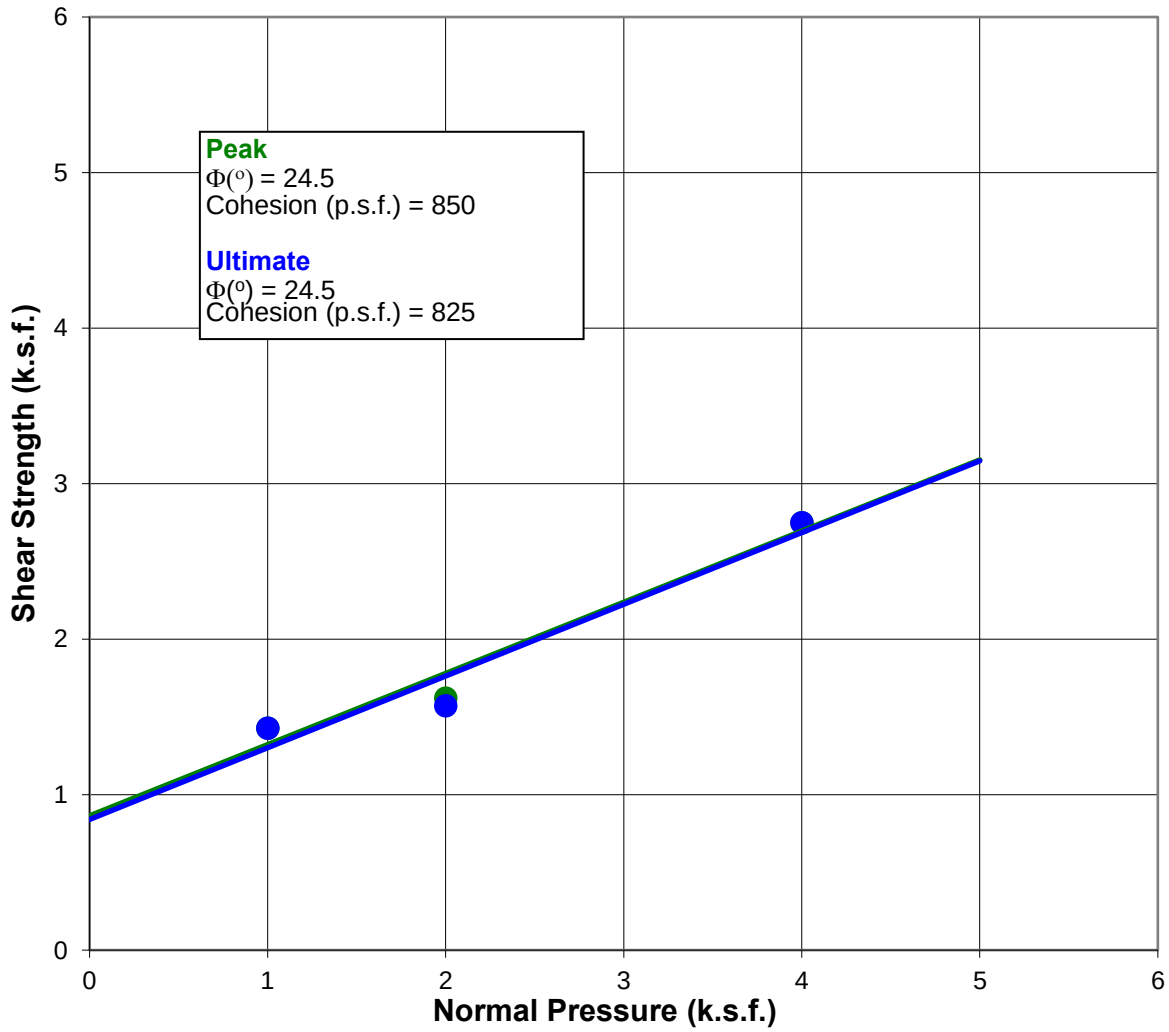
Project Name:	Arrow Route		
Project Number:	5104-SF	Tested by:	Cesar Lopez
Sample Location:	Sta. 109+25	Date Tested:	November 18, 2024
Sampled by:	Mark Doerschlag	Depth (ft):	3'
Date Sampled:	October 24, 2024	Lab I.D. No.:	24-2460
Test Condition:	"Undisturbed", Consolidated, Drained.		
Sample Description:	Silty Sand (SM), trace of gravel. [Possible fill]		

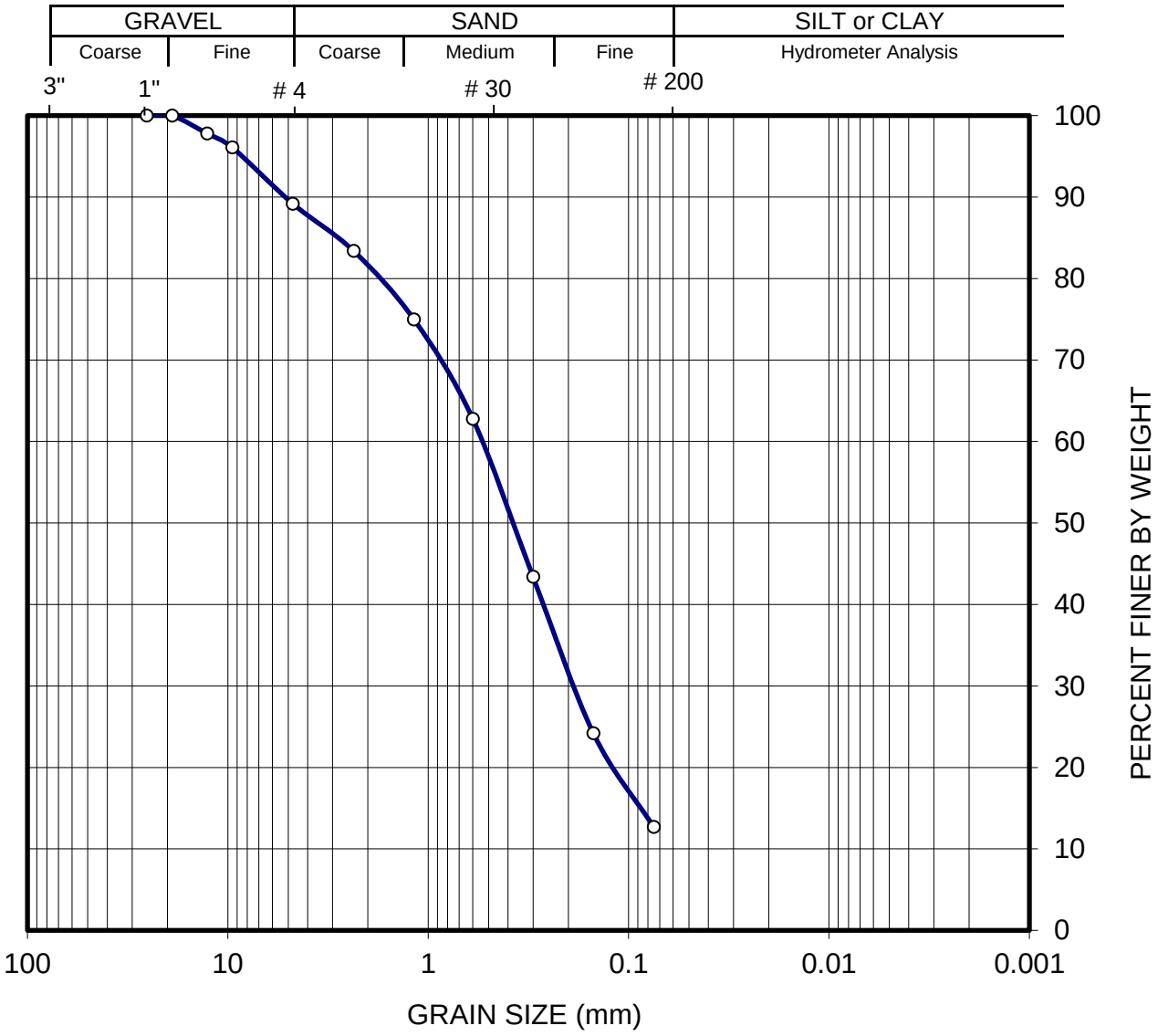


ARAGÓN GEOTECHNICAL, INC.
16801 Van Buren Blvd., Bldg. B
Riverside, California 92504
951-776-0345

Direct Shear Test Diagram

Project Name:	Arrow Route		
Project Number:	5104-SF	Tested by:	Cesar Lopez
Sample Location:	Sta. 109+25	Date Tested:	November 20, 2024
Sampled by:	Mark Doerschlag	Depth (ft):	8'
Date Sampled:	October 24, 2024	Lab I.D. No.:	24-2461
Test Condition:	"Undisturbed", Consolidated, Drained.		
Sample Description:	Silty Sand wit h Gravel (SM). [Fan alluvium]		



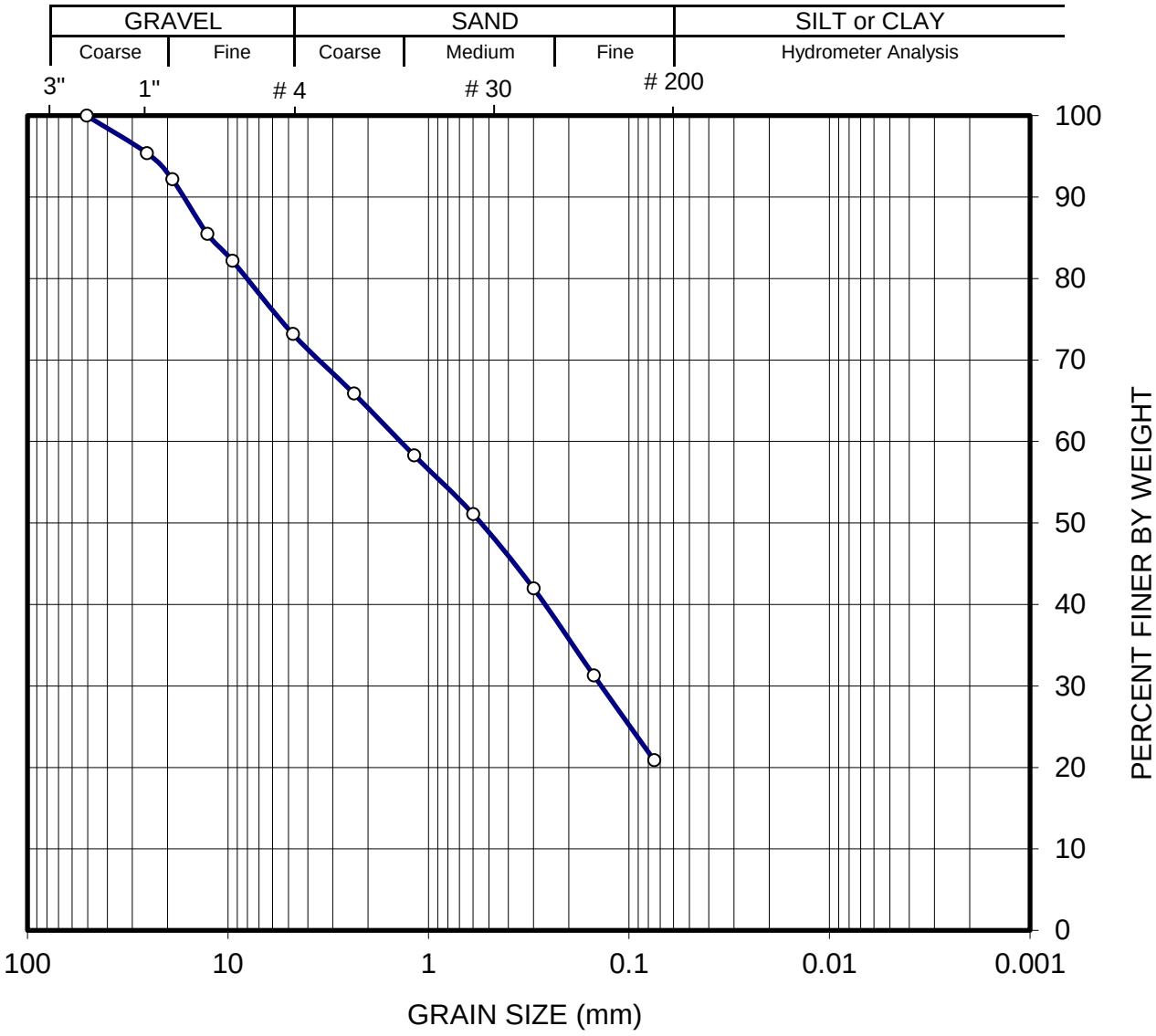


Boring: Arrow Route Sta. 11+00	Sample I.D.: 24-2439	
Gravel (%): 10.8	Sand (%): 76.5	Fines (%): 12.7
Sample Description: Silty Sand with Gravel (SM).		

GRAIN SIZE DISTRIBUTION CURVE

ARROW ROUTE, SEWER MAIN PROJECT, FONTANA, CA.

PROJECT NO. 5104-SF	DATE: 12/23/24	**PAGE B-16**

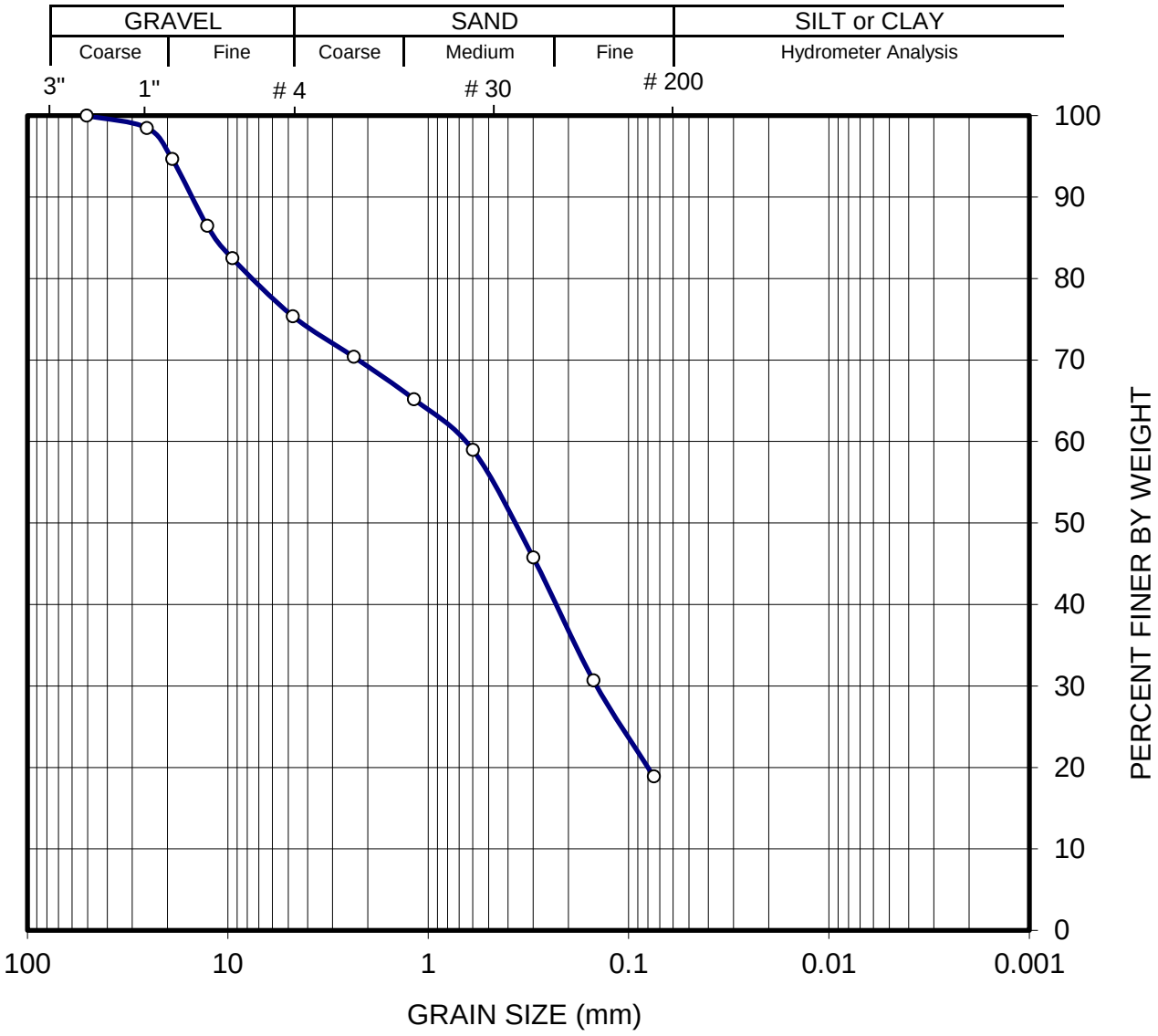


Boring: Arrow Route Sta. 48+60	Sample I.D.: 24-2448	
Gravel (%): 26.8	Sand (%): 52.3	Fines (%): 20.9
Sample Description: Gravelly Sand with Silt (SM).		

GRAIN SIZE DISTRIBUTION CURVE

ARROW ROUTE, SEWER MAIN PROJECT, FONTANA, CA.

PROJECT NO. 5104-SF | DATE: 12/23/24 | **PAGE B-17**

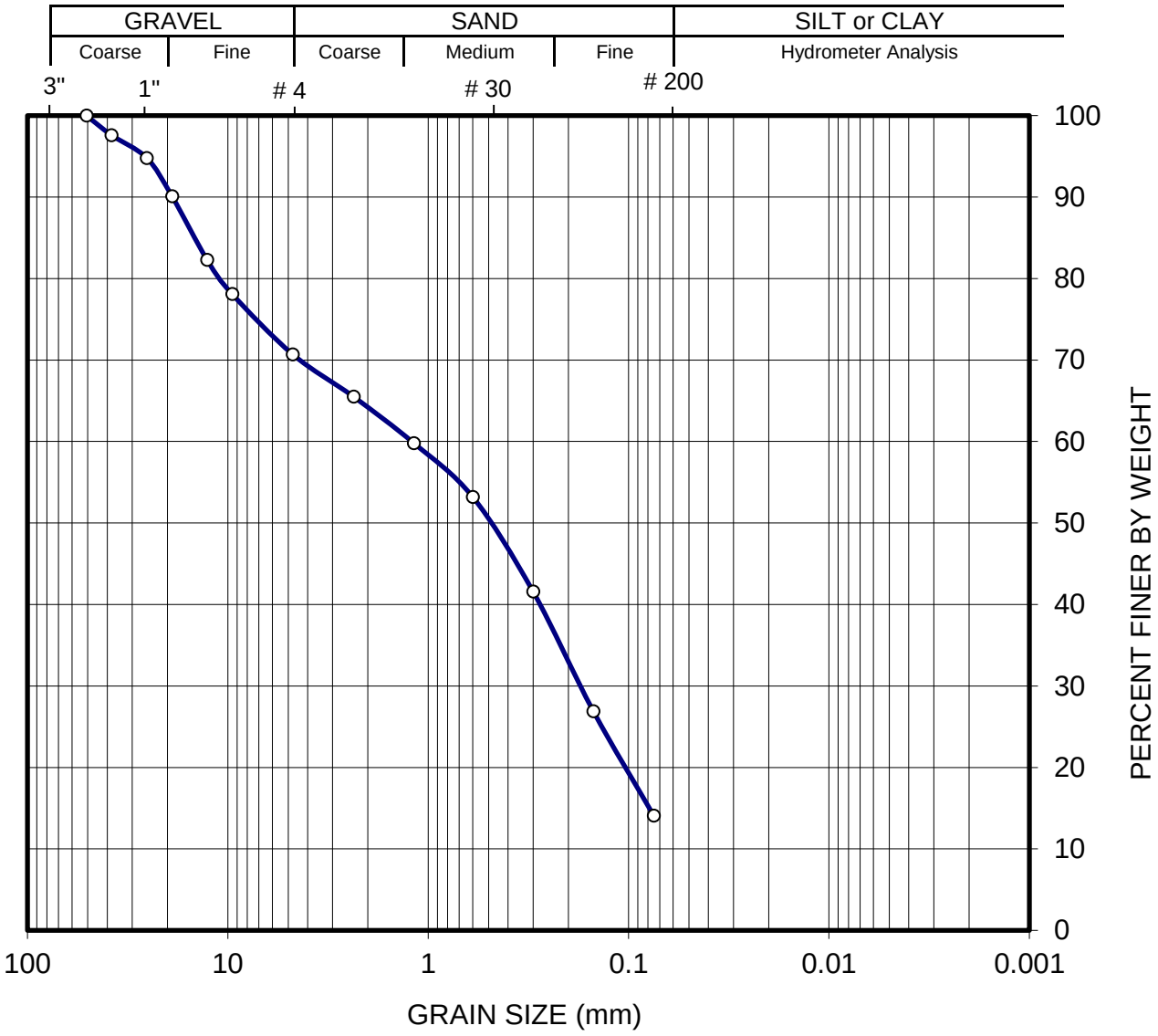


Boring: Arrow Route Sta. 89+50	Sample I.D.: 24-2457	
Gravel (%): 24.6	Sand (%): 56.5	Fines (%): 18.9
Sample Description: Gravelly Sand with Silt (SM).		

GRAIN SIZE DISTRIBUTION CURVE

ARROW ROUTE, SEWER MAIN PROJECT, FONTANA, CA.

PROJECT NO. 5104-SF | DATE: 12/23/24 | **PAGE B-18**

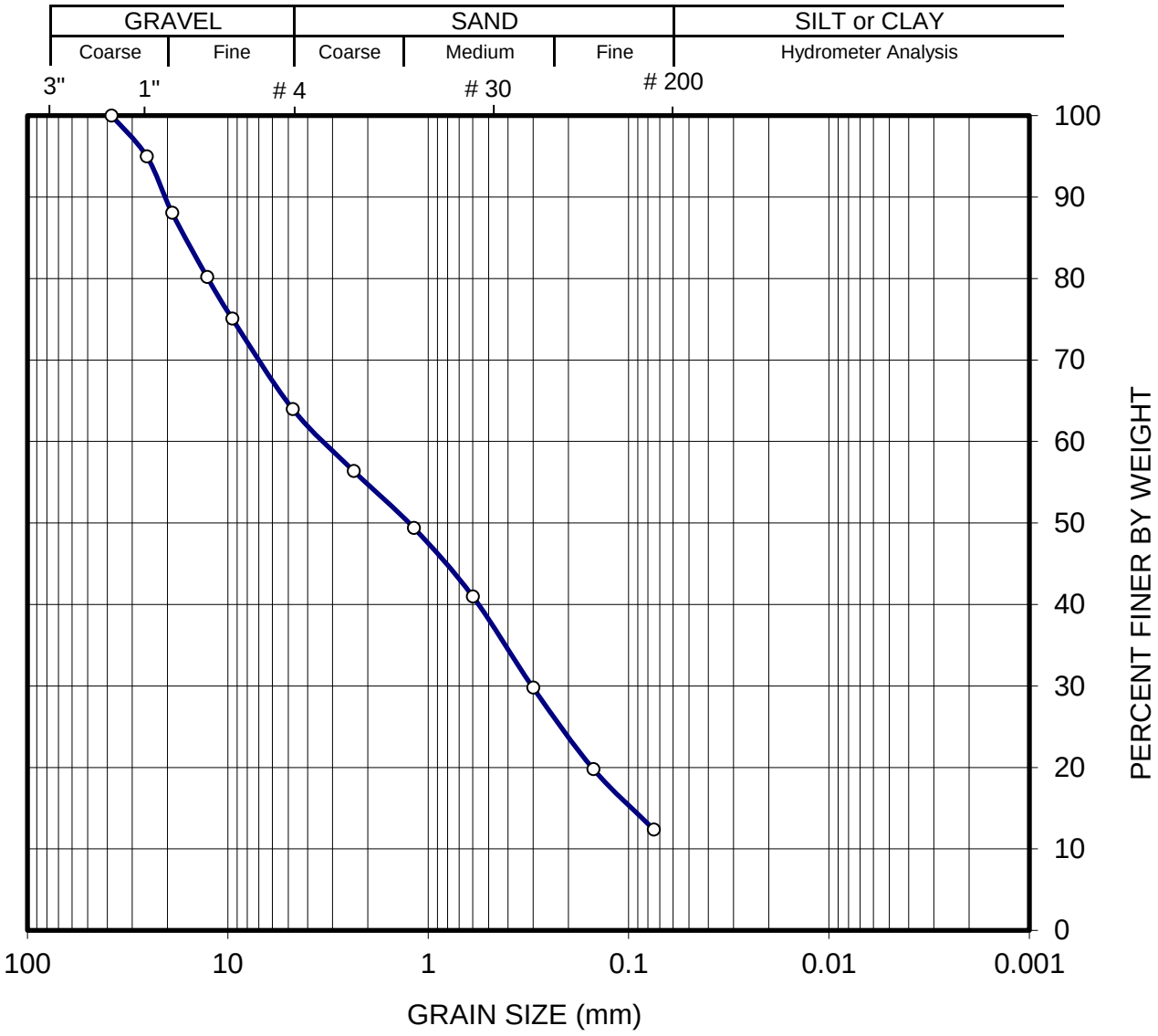


Boring: Arrow Route Sta. 131+40	Sample I.D.: 24-2457	
Gravel (%): 29.3	Sand (%): 56.6	Fines (%): 14.1
Sample Description: Gravelly Sand with Silt (SM).		

GRAIN SIZE DISTRIBUTION CURVE

ARROW ROUTE, SEWER MAIN PROJECT, FONTANA, CA.

PROJECT NO. 5104-SF | DATE: 12/23/24 | **PAGE B-19**

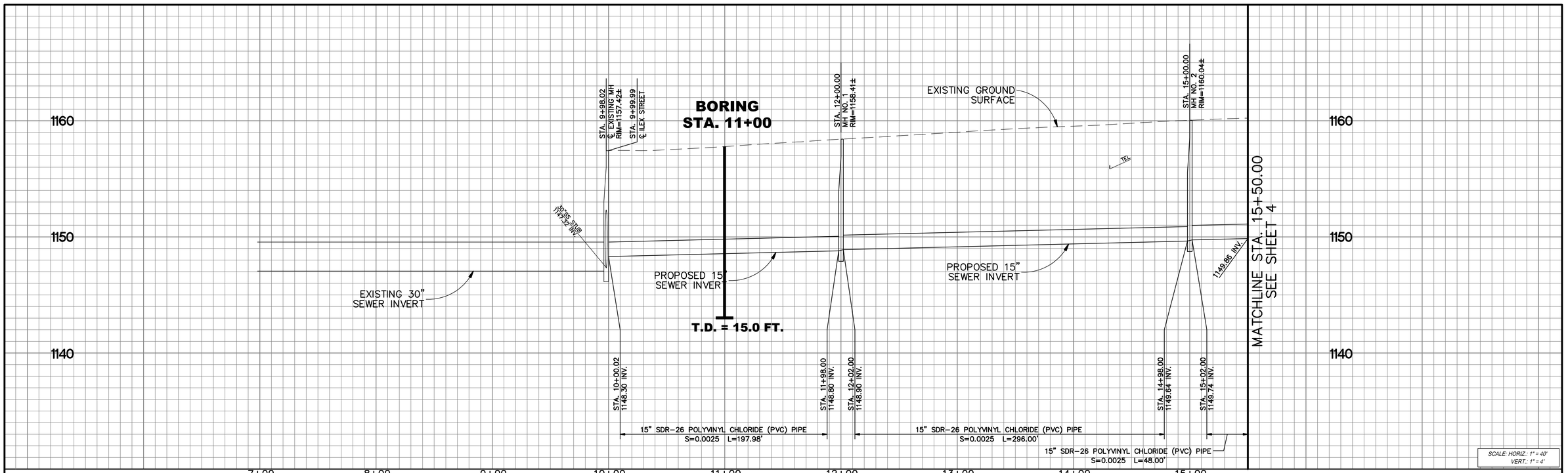


Boring: Cherry Sta. 32+16	Sample I.D.: 24-2469	
Gravel (%): 36.0	Sand (%): 51.6	Fines (%): 12.4
Sample Description: Gravelly Sand with Silt (SM).		

GRAIN SIZE DISTRIBUTION CURVE

ARROW ROUTE, SEWER MAIN PROJECT, FONTANA, CA.

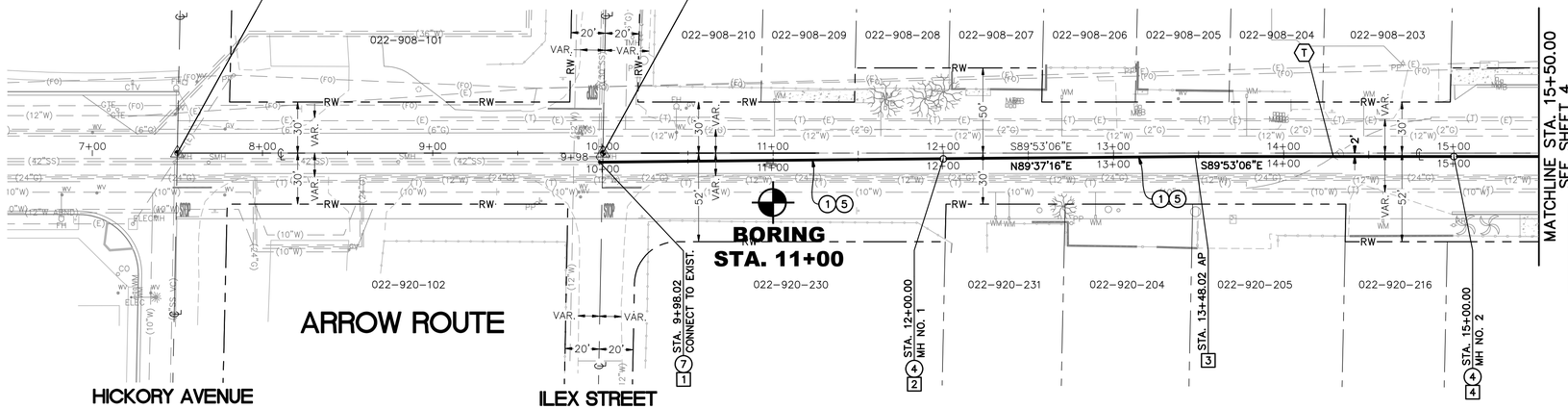
PROJECT NO. 5104-SF	DATE: 12/23/24	**PAGE B-20**



TGT. NO. 1
STA. 7+49.95
ARROW ROUTE ℄/
HICKORY AVENUE ℄
FD. NOTHING
N: 2345889.91
E: 6178682.36

STA. 9+99.99
ARROW ROUTE ℄/
ILEX AVENUE ℄
FD. 1 IN IP NAIL-TAG SAN
BERNARDINO COUNTY SURVEY
ELEV.=1157.56'

TARGET 2
STA. 20+84.72
ARROW ROUTE ℄/
COTTONWOOD AVENUE ℄
FD. NOTHING
N: 2345887.23
E: 6180017.14



ALIGNMENT EXPLORATION EXHIBIT

ARROW ROUTE SEWER MAIN PROJECT, FONTANA, CA.

PROJECT NO. 5104-SF	DATE: 12/23/24	PLATE NO. 1

SEWER IMPROVEMENT CONSTRUCTION NOTES:

(1) CONSTRUCT 15" SDR-26 POLYVINYL CHLORIDE SEWER PER CITY OF FONTANA STANDARD PLAN NO. 2009.
(4) CONSTRUCT 4' MANHOLE PER CITY OF FONTANA STANDARD PLAN NO. 2000 AND 2001.
(5) CONSTRUCT TRENCH REPAIR PER COUNTY OF SAN BERNARDINO STANDARD DETAIL 1 ON SHEET 2.
(7) RECONSTRUCT EXISTING MANHOLE BASE PER DETAIL 2 SHEET 2.

COORDINATE TABLE		
#	NORTHING	EASTING
1	2345884.41	6740732.63
2	2345885.73	6179132.39
3	2345886.71	6179280.40
4	2345886.40	6179432.38

SURVEY CONTROL TABLE:				
TGT No.	NORTHING	EASTING	BEARING	DISTANCE
1	2345889.91	6178682.36	S89°53'06"E	1334.78'
2	2345887.23	6180017.14		

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 INCH = 40 FEET

Underground Service Alert

SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A PERMIT TO EXCAVATE WILL BE VALID FOR YOUR DIG ALERT I.D. NUMBER CALL UNDERGROUND SERVICE ALERT TOLL FREE 1-800-227-2600 TWO WORKING DAYS BEFORE YOU DIG

REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

REGISTERED PROFESSIONAL ENGINEER TERRY M. RENNER No.69984 Exp.9-30-24 CIVIL STATE OF CALIFORNIA

TKE ENGINEERING
TKE ENGINEERING, INC.
2305 CHICAGO AVENUE
RIVERSIDE, CA 92507
(951) 680-0440
FAX (951) 680-0490
9-30-24
TERRY M. RENNER R.C.E. No. 69984

SEWER IMPROVEMENTS
ARROW ROUTE
ILEX STREET TO BEECH AVENUE

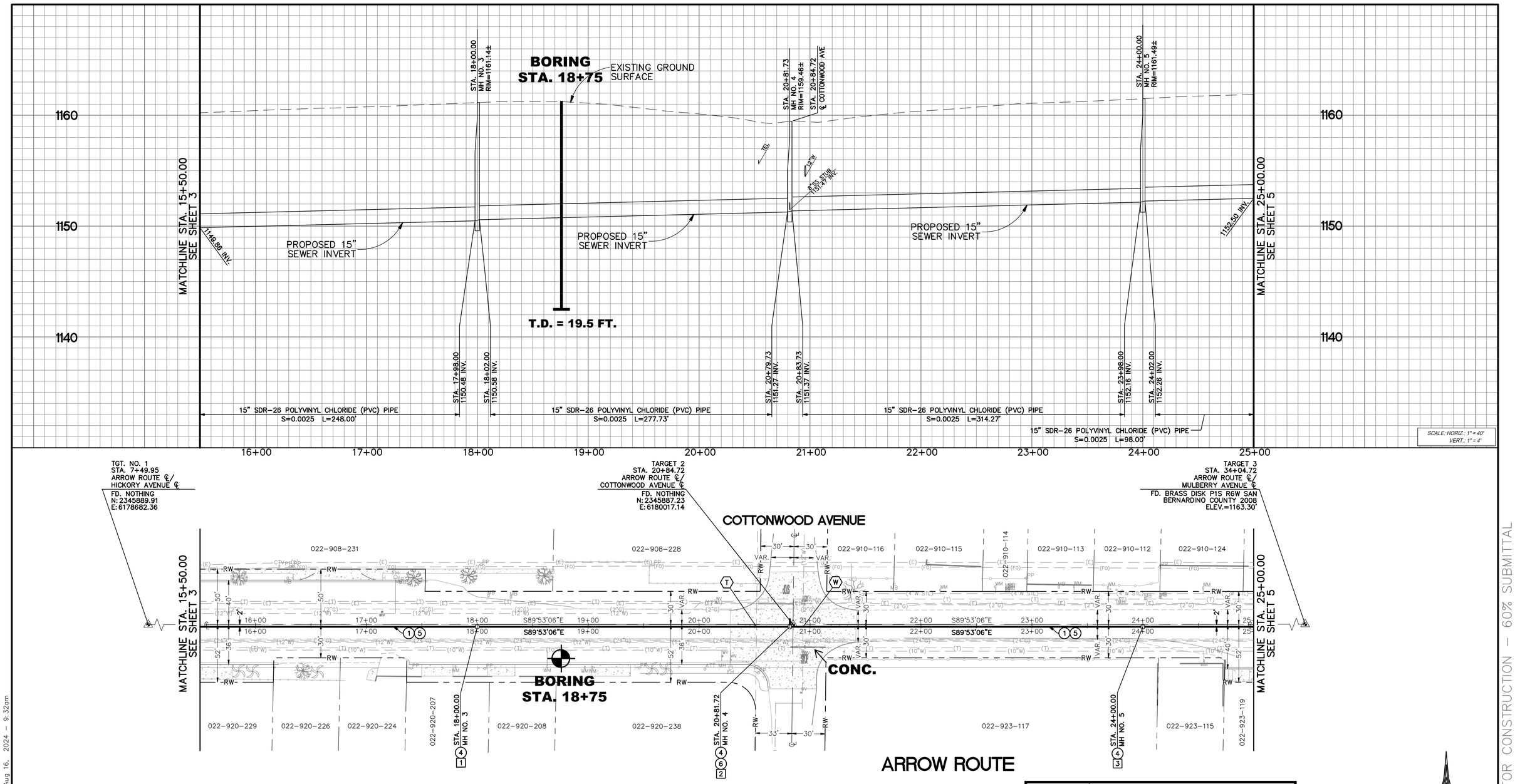
SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH CONDITIONS AND STANDARDS IN EFFECT.

CITY OF FONTANA, CALIFORNIA
SEWER IMPROVEMENT PLANS

DRAWN BY: JBR	ARROW ROUTE SEWER MAIN PROJECT	SCALE: AS SHOWN
DESIGNED BY: TMR	PLAN/PROFILE SHEET	DATE: JULY 2024
CHECKED BY: TMR	STA 9+98.02 TO STA 15+50.00	DRAWING NO.: 3 / 22
APPROVED BY: CITY ENGINEER	DATE: R.C.E. No. 62296	6273

PRELIMINARY NOT FOR CONSTRUCTION - 60% SUBMITTAL

S:\CADD\101-118 Arrow Sewer\Plan Set\101-118_03SS.dwg Aug 16, 2024 - 9:28am



SEWER IMPROVEMENT CONSTRUCTION NOTES:

1. CONSTRUCT 15" SDR-26 POLYVINYL CHLORIDE SEWER PER CITY OF FONTANA STANDARD PLAN NO. 2009.
4. CONSTRUCT 4' MANHOLE PER CITY OF FONTANA STANDARD PLAN NO. 2000 AND 2001.
5. CONSTRUCT TRENCH REPAIR PER COUNTY OF SAN BERNARDINO STANDARD DETAIL 1 ON SHEET 2.
6. CONSTRUCT 5 FEET LONG STUB OUT OF 8" SDR-26 POLYVINYL CHLORIDE SEWER WITH WATERTIGHT BULKHEAD AT PIPE END.

COORDINATE TABLE		
#	NORTHING	EASTING
1	2345885.80	6179732.38
2	2345885.23	6180014.11
3	2345884.60	6180332.38

SURVEY CONTROL TABLE:				
TGT No.	NORTHING	EASTING	BEARING	DISTANCE
1	2345889.91	6178682.36		
2	2345887.23	6180017.14	S89°53'06"E	1334.78'
3	2345884.51	6181337.13	S89°52'55"E	1320.00'

ALIGNMENT EXPLORATION EXHIBIT

ARROW ROUTE SEWER MAIN PROJECT, FONTANA, CA.

PROJECT NO. 5104-SF | DATE: 12/23/24 | PLATE NO. 2

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 INCH = 40 FEET

N

Underground Service Alert

SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A PERMIT TO EXCAVATE WILL BE VALID FOR YOUR DIG ALERT I.D. NUMBER CALL UNDERGROUND SERVICE ALERT TOLL FREE 1-800-227-2600 TWO WORKING DAYS BEFORE YOU DIG

REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

REGISTERED PROFESSIONAL ENGINEER TERRY M. RENNER No.69984 Exp.9-30-24 CIVIL STATE OF CALIFORNIA

TKE ENGINEERING, INC.
2305 CHICAGO AVENUE
RIVERSIDE, CA 92507
(951) 680-0440
FAX (951) 680-0490

9-30-24
TERRY M. RENNER R.C.E. No. 69984

SEWER IMPROVEMENTS ARROW ROUTE ILEX STREET TO BEECH AVENUE

SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH CONDITIONS AND STANDARDS IN EFFECT.

CITY OF FONTANA, CALIFORNIA
SEWER IMPROVEMENT PLANS

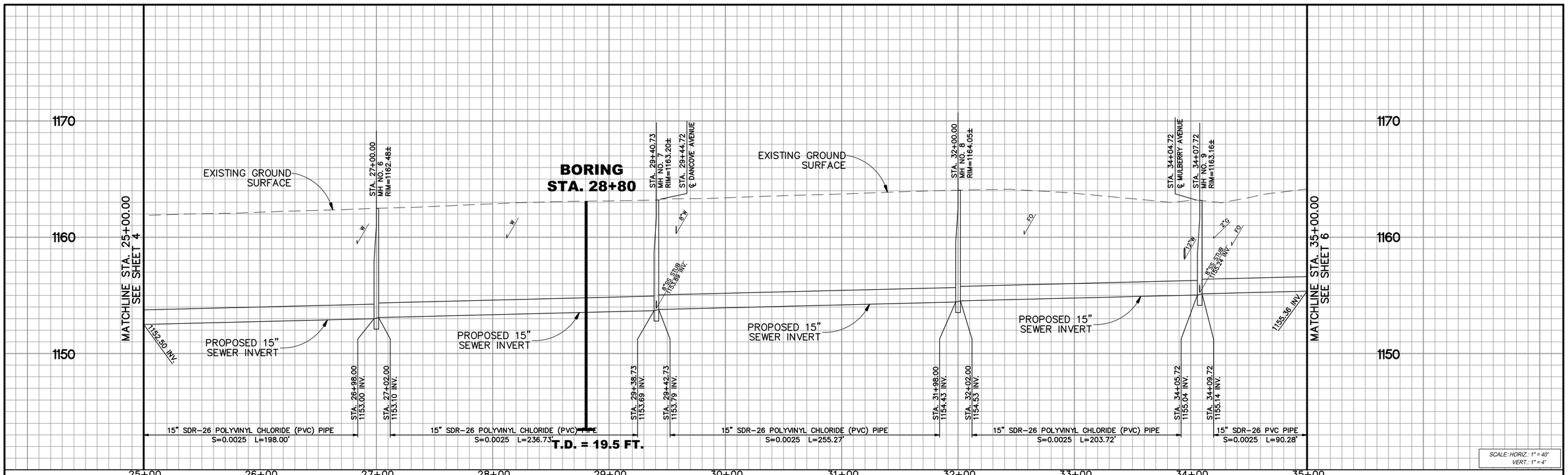
ARROW ROUTE SEWER MAIN PROJECT
PLAN/PROFILE SHEET
STA 15+50 TO STA 25+00

DRAWN BY: JBR
DESIGNED BY: TMR
CHECKED BY: TMR
APPROVED BY: DATE:
CITY ENGINEER R.C.E. No. 62296

SCALE: AS SHOWN
DATE: JULY 2024
DRAWING NO.: 4
6273 22

PRELIMINARY NOT FOR CONSTRUCTION – 60% SUBMITTAL

S:\CADD\101-118 Arrow Sewer\Plan Set\101-118_04SS.dwg Aug 16, 2024 - 9:32am



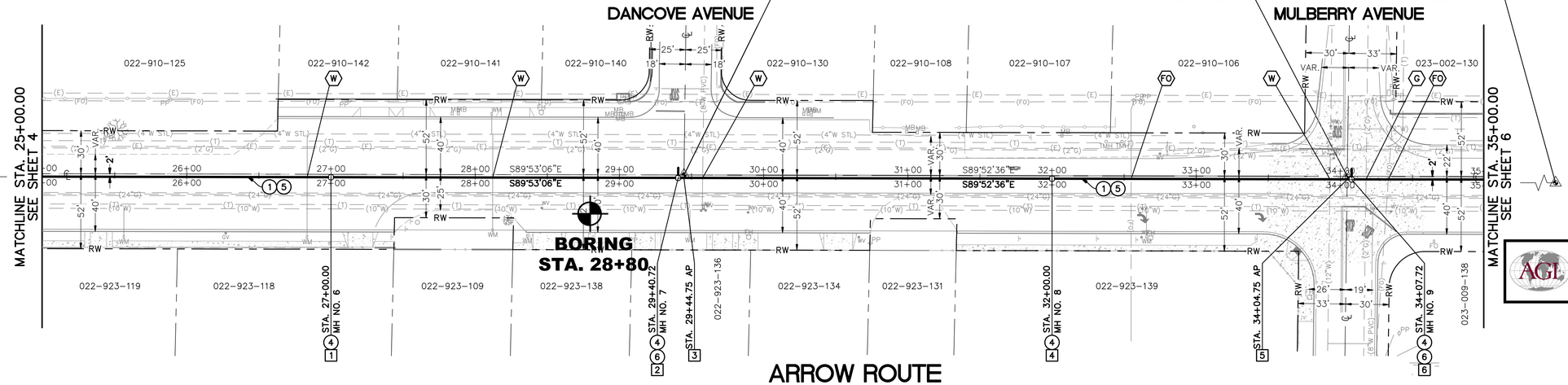
SCALE: HORIZ.: 1" = 40'
VERT.: 1" = 4'

TARGET 2
STA. 20+84.72
ARROW ROUTE ℄/
COTTONWOOD AVENUE ℄
FD. NOTHING
N: 2345887.23
E: 6180017.14

STA. 29+44.72
ARROW ROUTE ℄/
DANCOVE AVENUE ℄
FD. 1 IN IP NAIL-TAG SAN
BERNARDINO COUNTY SURVEY
ELEV.=1163.34'

TARGET 3
STA. 34+04.72
ARROW ROUTE ℄/
MULBERRY AVENUE ℄
FD. BRASS DISK P1S R6W SAN
BERNARDINO COUNTY 2008
ELEV.=1163.30'

TARGET 4
STA. 47+24.86
ARROW ROUTE ℄/
CALABASH AVENUE ℄
FD. 1 IN IP NAIL-TAG SAN
BERNARDINO COUNTY SURVEY
ELEV.=1163.30'



SEWER IMPROVEMENT CONSTRUCTION NOTES:

1. CONSTRUCT 15" SDR-26 POLYVINYL CHLORIDE SEWER PER CITY OF FONTANA STANDARD PLAN NO. 2009.
4. CONSTRUCT 4' MANHOLE PER CITY OF FONTANA STANDARD PLAN NO. 2000 AND 2001.
5. CONSTRUCT TRENCH REPAIR PER COUNTY OF SAN BERNARDINO STANDARD DETAIL 1 ON SHEET 2.
6. CONSTRUCT 5 FEET LONG STUB OUT OF 8" SDR-26 POLYVINYL CHLORIDE SEWER WITH WATERTIGHT BULKHEAD AT PIPE END.

COORDINATE TABLE		
#	NORTHING	EASTING
1	2345883.99	6180632.38
2	2345883.51	6180873.10
3	2345883.50	6180877.13
4	2345882.95	6181132.38
5	2345882.51	6181337.13
6	2345882.50	6181340.10

SURVEY CONTROL TABLE:				
TGT No.	NORTHING	EASTING	BEARING	DISTANCE
2	2345887.23	6180017.14	S89°52'55"E	1320.00'
3	2345884.51	6181337.13	S89°53'11"E	1320.14'
4	2345881.90	6182657.27		

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 INCH = 40 FEET

N

ALIGNMENT EXPLORATION EXHIBIT
ARROW ROUTE SEWER MAIN PROJECT, FONTANA, CA.
PROJECT NO. 5104-SF | DATE: 12/23/24 | PLATE NO. 3

Underground Service Alert
SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A PERMIT TO EXCAVATE WILL BE VALID FOR YOUR DIG ALERT I.D. NUMBER CALL UNDERGROUND SERVICE ALERT TOLL FREE 1-800-227-2600 TWO WORKING DAYS BEFORE YOU DIG

REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

REGISTERED PROFESSIONAL ENGINEER
TERRY M. RENNER
No.69984
Exp.9-30-24
CIVIL
STATE OF CALIFORNIA

TKE ENGINEERING
TKE ENGINEERING, INC.
2305 CHICAGO AVENUE
RIVERSIDE, CA 92507
(951) 680-0440
FAX (951) 680-0490
9-30-24
TERRY M. RENNER R.C.E. No. 69984

SEWER IMPROVEMENTS
ARROW ROUTE
ILEX STREET TO
BEECH AVENUE

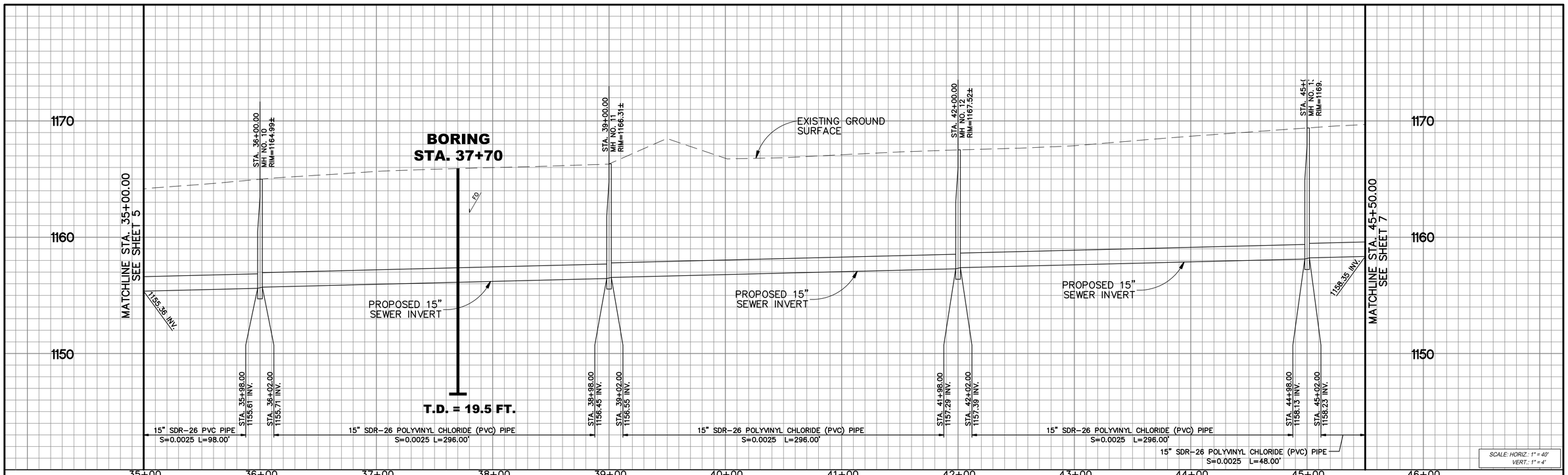
SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH CONDITIONS AND STANDARDS IN EFFECT.

CITY OF FONTANA, CALIFORNIA
SEWER IMPROVEMENT PLANS

DRAWN BY: JBR	ARROW ROUTE SEWER MAIN PROJECT PLAN/PROFILE SHEET STA 25+00 TO STA 35+00	SCALE: AS SHOWN
DESIGNED BY: TMR		DATE: JULY 2024
CHECKED BY: TMR	APPROVED BY: DATE: CITY ENGINEER R.C.E. No. 62296	DRAWING NO.: 5 / 22
		6273

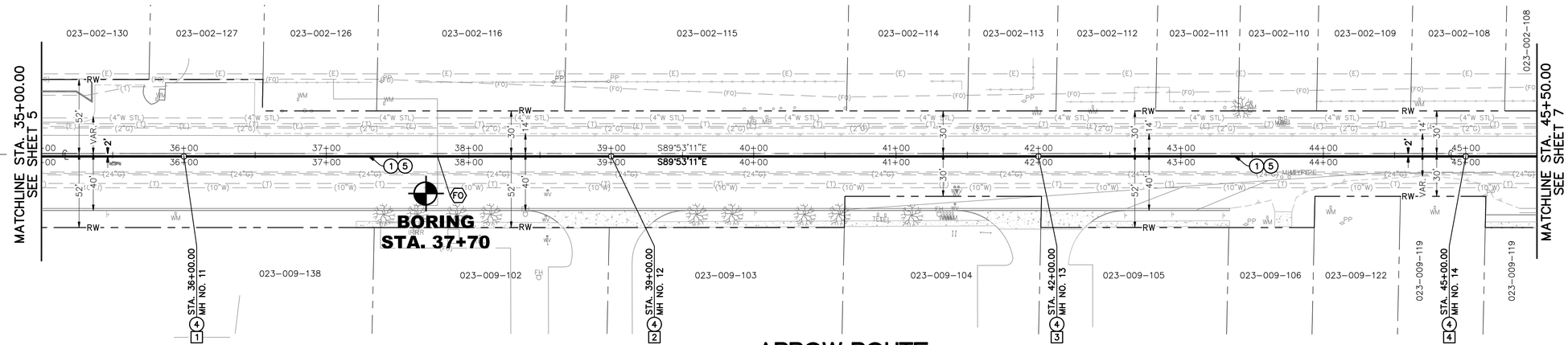
PRELIMINARY NOT FOR CONSTRUCTION - 60% SUBMITTAL

S:\CADD\101-118 Arrow Sewer\Plan Set\101-118_05SS.dwg Aug 16, 2024 - 9:35am



TARGET 3
STA. 34+04.72
ARROW ROUTE ℄/
MULBERRY AVENUE ℄
FD. BRASS DISK P1S R6W SAN
BERNARDINO COUNTY 2008
ELEV.=1163.30'

TARGET 4
STA. 47+24.86
ARROW ROUTE ℄/
CALABASH AVENUE ℄
FD. 1 IN IP NAIL-TAG SAN
BERNARDINO COUNTY SURVEY
ELEV.=1163.30'



ARROW ROUTE

SEWER IMPROVEMENT CONSTRUCTION NOTES:

(1) CONSTRUCT 15" SDR-26 POLYVINYL CHLORIDE SEWER PER CITY OF FONTANA STANDARD PLAN NO. 2009.
(4) CONSTRUCT 4' MANHOLE PER CITY OF FONTANA STANDARD PLAN NO. 2000 AND 2001.
(5) CONSTRUCT TRENCH REPAIR PER COUNTY OF SAN BERNARDINO STANDARD DETAIL 1 ON SHEET 2.
(6) CONSTRUCT 5 FEET LONG STUB OUT OF 8" SDR-26 POLYVINYL CHLORIDE SEWER WITH WATERTIGHT BULKHEAD AT PIPE END.

COORDINATE TABLE		
#	NORTHING	EASTING
1	2345882.12	6181532.38
2	2345881.53	6181832.38
3	2345880.94	6182132.38
4	2345880.34	6182432.38

SURVEY CONTROL TABLE:				
TGT No.	NORTHING	EASTING	BEARING	DISTANCE
3	2345884.51	6181337.13	S89°53'11"E	1320.14'
4	2345881.90	6182657.27		

ALIGNMENT EXPLORATION EXHIBIT
ARROW ROUTE SEWER MAIN PROJECT, FONTANA, CA.
PROJECT NO. 5104-SF | DATE: 12/23/24 | PLATE NO. 4

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 INCH = 40 FEET

N

Underground Service Alert
SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A PERMIT TO EXCAVATE WILL BE VALID FOR YOUR DIG ALERT I.D. NUMBER CALL UNDERGROUND SERVICE ALERT TOLL FREE 1-800-227-2600 TWO WORKING DAYS BEFORE YOU DIG

REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

REGISTERED PROFESSIONAL ENGINEER TERRY M. RENNER No.69984 Exp.9-30-24 CIVIL STATE OF CALIFORNIA

TKE ENGINEERING, INC.
2305 CHICAGO AVENUE
RIVERSIDE, CA 92507
(951) 680-0440
FAX (951) 680-0490
9-30-24
TERRY M. RENNER R.C.E. No. 69984

SEWER IMPROVEMENTS
ARROW ROUTE
ILEX STREET TO
BEECH AVENUE

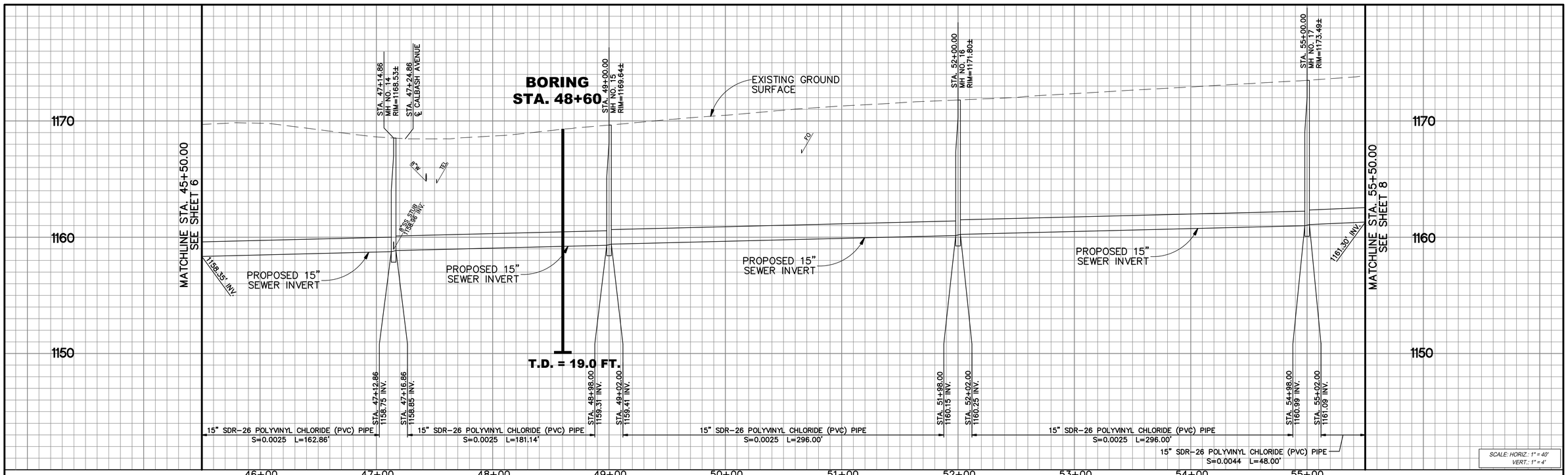
SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH CONDITIONS AND STANDARDS IN EFFECT.

CITY OF FONTANA, CALIFORNIA
SEWER IMPROVEMENT PLANS

DRAWN BY: JBR	ARROW ROUTE SEWER MAIN PROJECT PLAN/PROFILE SHEET STA 35+00 TO STA 45+50	SCALE: AS SHOWN
DESIGNED BY: TMR		DATE: JULY 2024
CHECKED BY: TMR	APPROVED BY: DATE: CITY ENGINEER R.C.E. No. 62296	DRAWING NO.: 6 / 22
		6273

S:\CADD\101-118 Arrow Sewer\Plan Set\101-118_06SS.dwg Aug 15, 2024 - 7:35pm

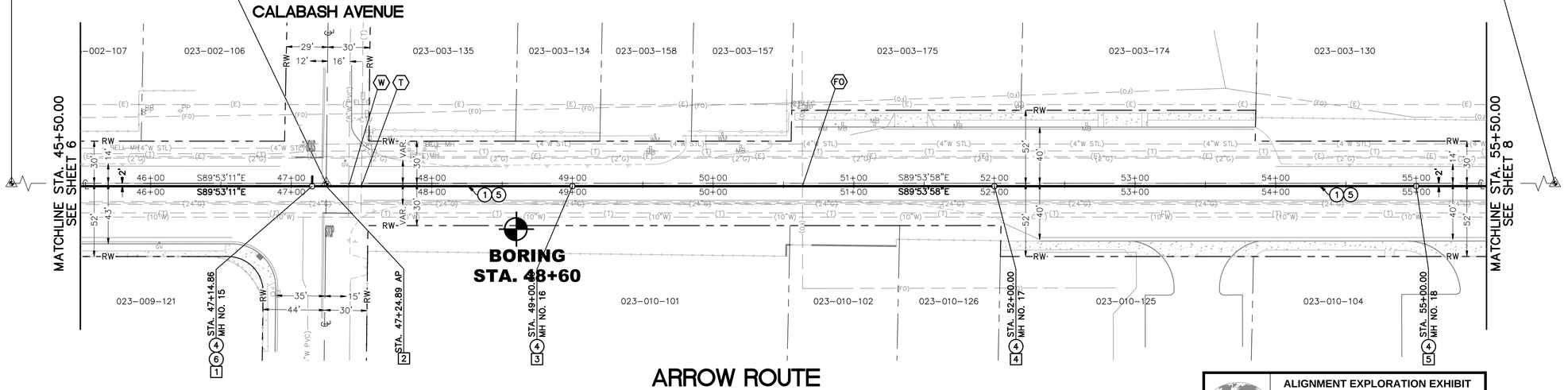
PRELIMINARY NOT FOR CONSTRUCTION - 60% SUBMITTAL



TARGET 3
STA. 34+04.72
ARROW ROUTE ℄/
MULBERRY AVENUE ℄
FD. BRASS DISK P1S R6W SAN BERNARDINO COUNTY 2008
ELEV.=1163.30'

TARGET 4
STA. 47+24.86
ARROW ROUTE ℄/
CALABASH AVENUE ℄
FD. 1 IN IP NAIL–TAG SAN BERNARDINO COUNTY SURVEY
ELEV.=1163.30'

TARGET 5
STA. 60+44.72
ARROW ROUTE ℄/
BANANA AVENUE ℄
FD. TIE NAIL–TAG SAN BERNARDINO COUNTY SURVEY
ELEV.=1174.75'



SEWER IMPROVEMENT CONSTRUCTION NOTES:

1. CONSTRUCT 15" SDR–26 POLYVINYL CHLORIDE SEWER PER CITY OF FONTANA STANDARD PLAN NO. 2009.
4. CONSTRUCT 4' MANHOLE PER CITY OF FONTANA STANDARD PLAN NO. 2000 AND 2001.
5. CONSTRUCT TRENCH REPAIR PER COUNTY OF SAN BERNARDINO STANDARD DETAIL 1 ON SHEET 2.
6. CONSTRUCT 5 FEET LONG STUB OUT OF 8" SDR–26 POLYVINYL CHLORIDE SEWER WITH WATERTIGHT BULKHEAD AT PIPE END.

COORDINATE TABLE		
#	NORTHING	EASTING
1	2345879.92	6182647.24
2	2345879.90	6182657.26
3	2345879.59	6182832.38
4	2345879.06	6183132.38
5	2345878.54	6183432.38

SURVEY CONTROL TABLE:				
TGT No.	NORTHING	EASTING	BEARING	DISTANCE
3	2345884.51	6181337.13	S89°53'11"E	1320.14'
4	2345881.90	6182657.27	S89°53'58"E	1319.85'
5	2345879.58	6183977.12		

ALIGNMENT EXPLORATION EXHIBIT
ARROW ROUTE SEWER MAIN PROJECT, FONTANA, CA.
PROJECT NO. 5104-SF | DATE: 12/23/24 | PLATE NO. 5

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 INCH = 40 FEET

N

Underground Service Alert
SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A PERMIT TO EXCAVATE WILL BE VALID FOR YOUR DIG ALERT I.D. NUMBER CALL UNDERGROUND SERVICE ALERT TOLL FREE 1–800–227–2600 TWO WORKING DAYS BEFORE YOU DIG

REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

REGISTERED PROFESSIONAL ENGINEER TERRY M. RENNER No.69984 Exp.9–30–24 CIVIL STATE OF CALIFORNIA

TKE ENGINEERING, INC.
2305 CHICAGO AVENUE
RIVERSIDE, CA 92507
(951) 680–0440
FAX (951) 680–0490
9–30–24
TERRY M. RENNER R.C.E. No. 69984

SEWER IMPROVEMENTS
ARROW ROUTE
ILEX STREET TO
BEECH AVENUE

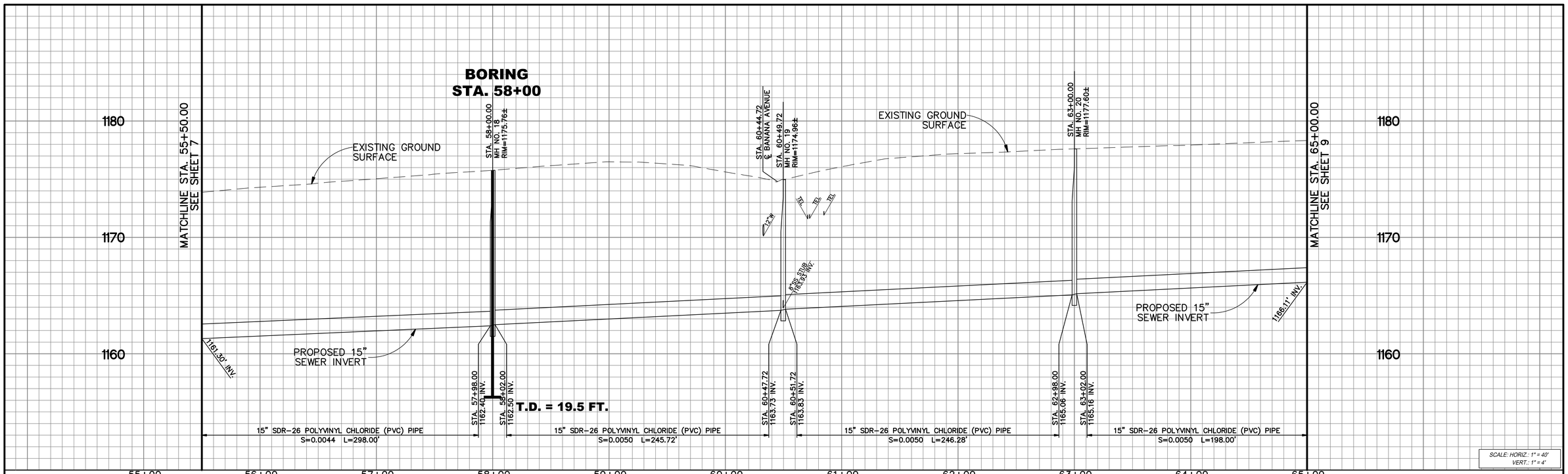
SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH CONDITIONS AND STANDARDS IN EFFECT.

CITY OF FONTANA, CALIFORNIA
SEWER IMPROVEMENT PLANS

DRAWN BY: JBR	ARROW ROUTE SEWER MAIN PROJECT PLAN/PROFILE SHEET STA 45+50 TO STA 55+50	SCALE: AS SHOWN
DESIGNED BY: TMR		DATE: JULY 2024
CHECKED BY: TMR	APPROVED BY: DATE: CITY ENGINEER R.C.E. No. 62296	DRAWING NO.: 7 / 22
		6273

PRELIMINARY NOT FOR CONSTRUCTION – 60% SUBMITTAL

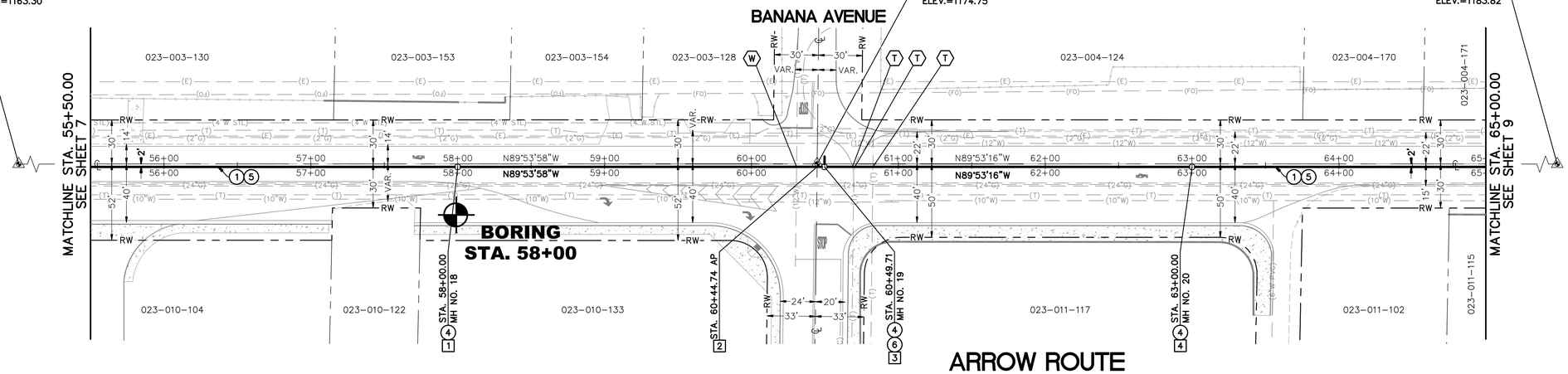
S:\CADD\101-118 Arrow Sewer\Plan Set\101-118_07SS.dwg Aug 16, 2024 - 8:30am



TARGET 4
STA. 47+24.86
ARROW ROUTE ℄/
CALABASH AVENUE ℄
FD. 1 IN IP NAIL–TAG SAN BERNARDINO COUNTY SURVEY ELEV.=1163.30'

TARGET 5
STA. 60+44.72
ARROW ROUTE ℄/
BANANA AVENUE ℄
FD. TIE NAIL–TAG SAN BERNARDINO COUNTY SURVEY ELEV.=1174.75'

TARGET 6
STA. 73+64.86
ARROW ROUTE ℄/
ALMOND AVENUE ℄
FD. 1 IN IP NAIL–TAG SAN BERNARDINO COUNTY SURVEY ELEV.=1183.82'



ARROW ROUTE

SEWER IMPROVEMENT CONSTRUCTION NOTES:

(1) CONSTRUCT 15" SDR–26 POLYVINYL CHLORIDE SEWER PER CITY OF FONTANA STANDARD PLAN NO. 2009.
(4) CONSTRUCT 4' MANHOLE PER CITY OF FONTANA STANDARD PLAN NO. 2000 AND 2001.
(5) CONSTRUCT TRENCH REPAIR PER COUNTY OF SAN BERNARDINO STANDARD DETAIL 1 ON SHEET 2.
(6) CONSTRUCT 5 FEET LONG STUB OUT OF 8" SDR–26 POLYVINYL CHLORIDE SEWER WITH WATERTIGHT BULKHEAD AT PIPE END.

COORDINATE TABLE		
#	NORTHING	EASTING
1	2345878.01	6183732.38
2	2345877.58	6183977.12
3	2345877.57	6183982.09
4	2345877.08	6184232.38

SURVEY CONTROL TABLE:				
TGT No.	NORTHING	EASTING	BEARING	DISTANCE
4	2345881.90	6182657.27		
5	2345879.58	6183977.12	S89°53'58"E	1319.85'
6	2345876.99	6185297.26	S89°53'16"E	1320.14'

ALIGNMENT EXPLORATION EXHIBIT
ARROW ROUTE SEWER MAIN PROJECT, FONTANA, CA.
PROJECT NO. 5104-SF | DATE: 12/23/24 | PLATE NO. 6

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 INCH = 40 FEET

N

Underground Service Alert
SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A PERMIT TO EXCAVATE WILL BE VALID
FOR YOUR DIG ALERT I.D. NUMBER CALL UNDERGROUND SERVICE ALERT
TOLL FREE 1–800–227–2600
TWO WORKING DAYS BEFORE YOU DIG

REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

REGISTERED PROFESSIONAL ENGINEER TERRY M. RENNER No.69984 Exp.9-30-24 CIVIL STATE OF CALIFORNIA
9-30-24
TERRY M. RENNER R.C.E. No. 69984

TKE ENGINEERING
TKE ENGINEERING, INC.
2305 CHICAGO AVENUE
RIVERSIDE, CA 92507
(951) 680-0440
FAX (951) 680-0490

SEWER IMPROVEMENTS
ARROW ROUTE
ILEX STREET TO
BEECH AVENUE

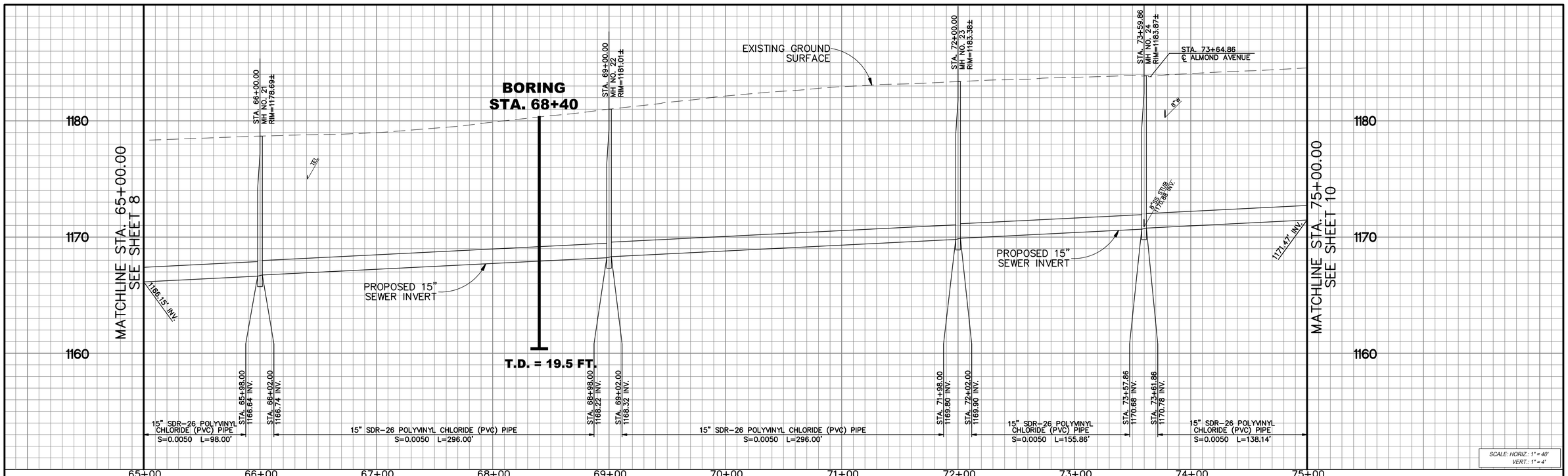
SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH CONDITIONS AND STANDARDS IN EFFECT.

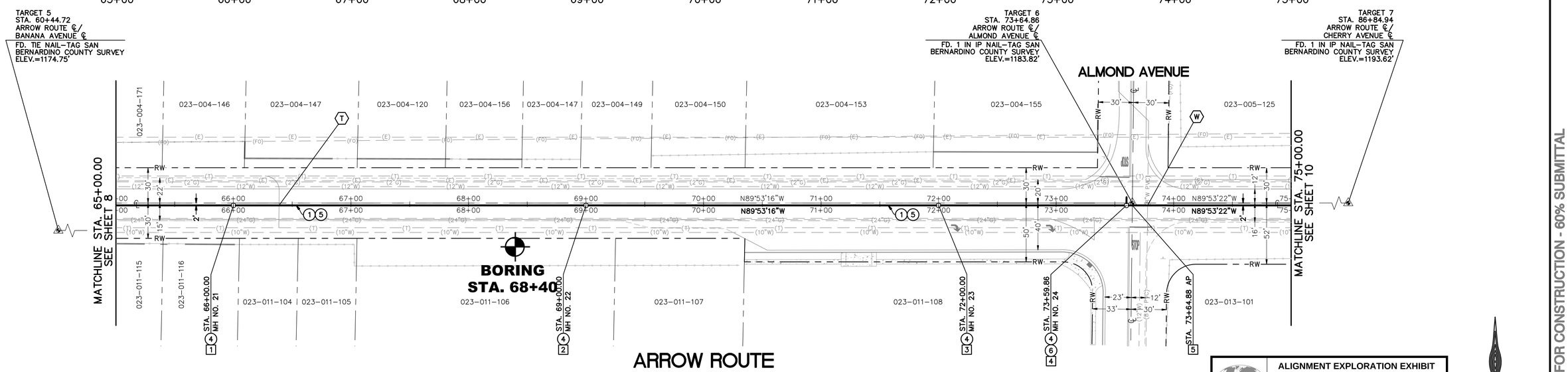
CITY OF FONTANA, CALIFORNIA
SEWER IMPROVEMENT PLANS

DRAWN BY: JBR	ARROW ROUTE SEWER MAIN PROJECT PLAN/PROFILE SHEET STA 55+50 TO STA 65+00	SCALE: AS SHOWN
DESIGNED BY: TMR		DATE: JULY 2024
CHECKED BY: TMR	APPROVED BY: DATE: CITY ENGINEER R.C.E. No. 62296	DRAWING NO.: 6273 8/22

PRELIMINARY NOT FOR CONSTRUCTION - 60% SUBMITTAL

S:\CADD\101-118 Arrow Sewer\Plan Set\101-118_08SS.dwg Aug 16, 2024 - 10:30am





SEWER IMPROVEMENT CONSTRUCTION NOTES:

1. CONSTRUCT 15" SDR-26 POLYVINYL CHLORIDE SEWER PER CITY OF FONTANA STANDARD PLAN NO. 2009.
4. CONSTRUCT 4' MANHOLE PER CITY OF FONTANA STANDARD PLAN NO. 2000 AND 2001.
5. CONSTRUCT TRENCH REPAIR PER COUNTY OF SAN BERNARDINO STANDARD DETAIL 1 ON SHEET 2.
6. CONSTRUCT 5 FEET LONG STUB OUT OF 8" SDR-26 POLYVINYL CHLORIDE SEWER WITH WATERTIGHT BULKHEAD AT PIPE END.

COORDINATE TABLE		
#	NORTHING	EASTING
1	2345876.49	6184532.37
2	2345875.90	6184832.37
3	2345875.31	6185132.37
4	2345875.00	6185292.23
5	2345874.99	6185297.25

SURVEY CONTROL TABLE:				
TGT No.	NORTHING	EASTING	BEARING	DISTANCE
5	2345879.58	6183977.12		
6	2345876.99	6185297.26	S89°53'16"E	1320.14'
7	2345874.44	6186617.33	S89°53'22"E	1320.08'

ALIGNMENT EXPLORATION EXHIBIT
ARROW ROUTE SEWER MAIN PROJECT, FONTANA, CA.
PROJECT NO. 5104-SF | DATE: 12/23/24 | PLATE NO. 7

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 INCH = 40 FEET

Underground Service Alert
SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A PERMIT TO EXCAVATE WILL BE VALID
FOR YOUR DIG ALERT I.D. NUMBER CALL UNDERGROUND SERVICE ALERT
TOLL FREE 1-800-227-2600
TWO WORKING DAYS BEFORE YOU DIG

REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

REGISTERED PROFESSIONAL ENGINEER TERRY M. RENNER No.69984 Exp.9-30-24 CIVIL STATE OF CALIFORNIA

TKE ENGINEERING
TKE ENGINEERING, INC.
2305 CHICAGO AVENUE
RIVERSIDE, CA 92507
(951) 680-0440
FAX (951) 680-0490
9-30-24
TERRY M. RENNER R.C.E. No. 69984

SEWER IMPROVEMENTS ARROW ROUTE ILEX STREET TO BEECH AVENUE

SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH CONDITIONS AND STANDARDS IN EFFECT.

CITY OF FONTANA, CALIFORNIA
SEWER IMPROVEMENT PLANS
ARROW ROUTE SEWER MAIN PROJECT
PLAN/PROFILE SHEET
STA 65+00 TO STA 75+00

DRAWN BY: JBR
DESIGNED BY: TMR
CHECKED BY: TMR
APPROVED BY: DATE:
CITY ENGINEER R.C.E. No. 62296
SCALE: AS SHOWN
DATE: JULY 2024
DRAWING NO.: 6273
9 / 22

PRELIMINARY NOT FOR CONSTRUCTION - 60% SUBMITTAL

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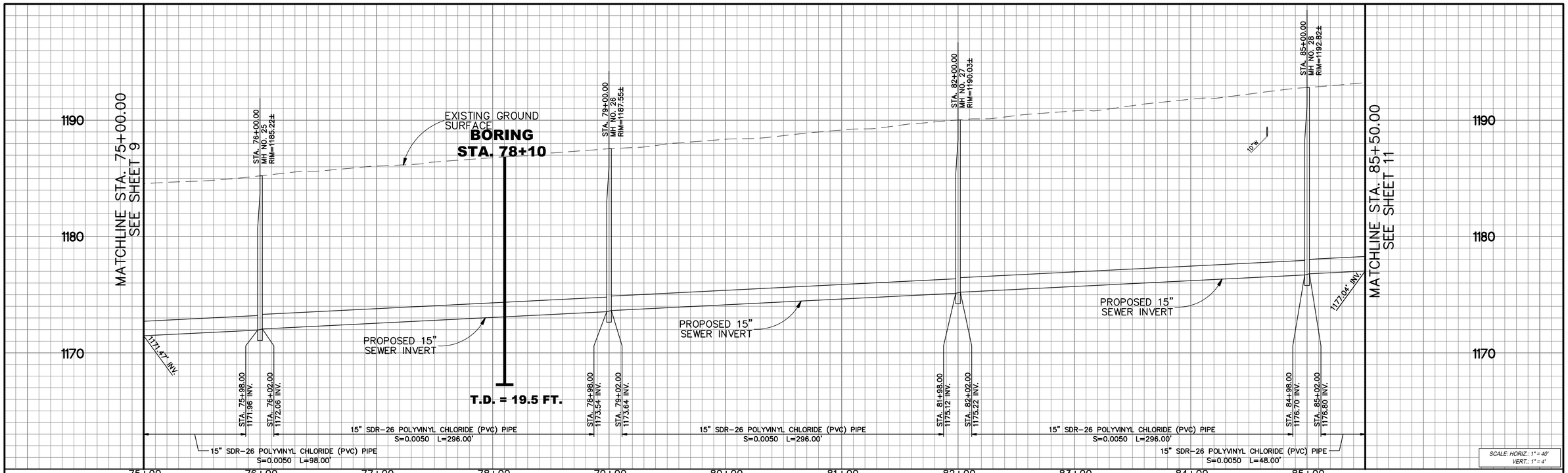

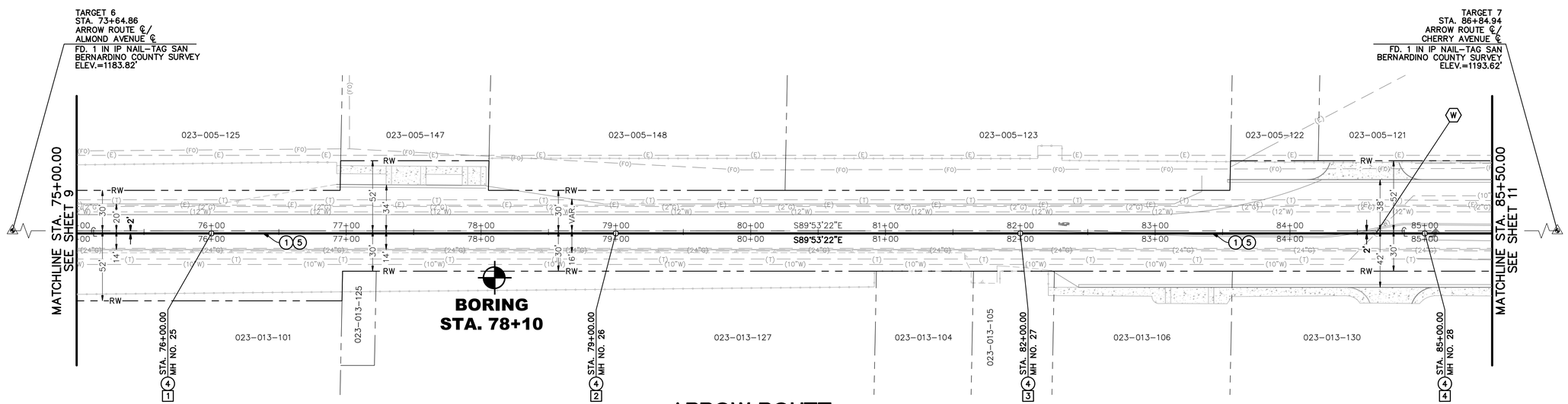

ARROW ROUTE

SEWER IMPROVEMENT CONSTRUCTION NOTES:

(1) CONSTRUCT 15" SDR–26 POLYVINYL CHLORIDE SEWER PER CITY OF FONTANA STANDARD PLAN NO. 2009.

(4) CONSTRUCT 4' MANHOLE PER CITY OF FONTANA STANDARD PLAN NO. 2000 AND 2001.

(5) CONSTRUCT TRENCH REPAIR PER COUNTY OF SAN BERNARDINO STANDARD DETAIL 1 ON SHEET 2.

COORDINATE TABLE		
#	NORTHING	EASTING
1	2345874.54	6185532.37
2	2345873.96	6185832.37
3	2345873.38	6186132.37
4	2345872.80	6186432.37

SURVEY CONTROL TABLE:				
TGT No.	NORTHING	EASTING	BEARING	DISTANCE
6	2345876.99	6185297.26	S89°53'22"E	1320.08'
7	2345874.44	6186617.33		

ALIGNMENT EXPLORATION EXHIBIT

ARROW ROUTE SEWER MAIN PROJECT, FONTANA, CA.

PROJECT NO. 5104-SF | DATE: 12/23/24 | PLATE NO. 8

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 INCH = 40 FEET

Underground Service Alert

SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A PERMIT TO EXCAVATE WILL BE VALID FOR YOUR DIG ALERT I.D. NUMBER CALL UNDERGROUND SERVICE ALERT TOLL FREE 1–800–227–2600 TWO WORKING DAYS BEFORE YOU DIG

REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

REGISTERED PROFESSIONAL ENGINEER TERRY M. RENNER No.69984 Exp.9–30–24 CIVIL STATE OF CALIFORNIA

TKE ENGINEERING, INC.
2305 CHICAGO AVENUE
RIVERSIDE, CA 92507
(951) 680–0440
FAX (951) 680–0490

9–30–24
TERRY M. RENNER R.C.E. No. 69984

SEWER IMPROVEMENTS ARROW ROUTE ILEX STREET TO BEECH AVENUE

SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH CONDITIONS AND STANDARDS IN EFFECT.

CITY OF FONTANA, CALIFORNIA

SEWER IMPROVEMENT PLANS

DRAWN BY: JBR	ARROW ROUTE SEWER MAIN PROJECT PLAN/PROFILE SHEET STA 75+00 TO STA 85+50	SCALE: AS SHOWN
DESIGNED BY: TMR		DATE: JULY 2024
CHECKED BY: TMR	APPROVED BY: DATE: CITY ENGINEER R.C.E. No. 62296	DRAWING NO.: 10 / 22
		6273

PRELIMINARY NOT FOR CONSTRUCTION – 60% SUBMITTAL

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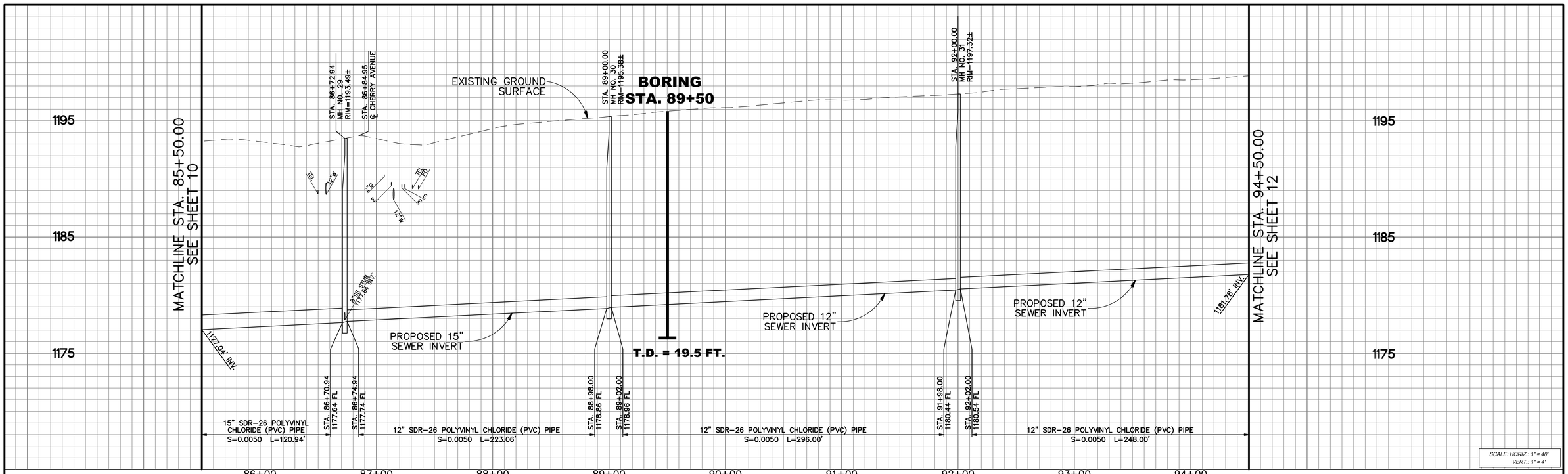


SCALE: HORIZ.: 1" = 40'
VERT.: 1" = 4'

TARGET 6
STA. 73+64.86
ARROW ROUTE ℄/
ALMOND AVENUE ℄
FD. 1 IN IP NAIL-TAG SAN BERNARDINO COUNTY SURVEY
ELEV.=1183.82'

TARGET 7
STA. 86+84.94
ARROW ROUTE ℄/
CHERRY AVENUE ℄
FD. 1 IN IP NAIL-TAG SAN BERNARDINO COUNTY SURVEY
ELEV.=1193.62'

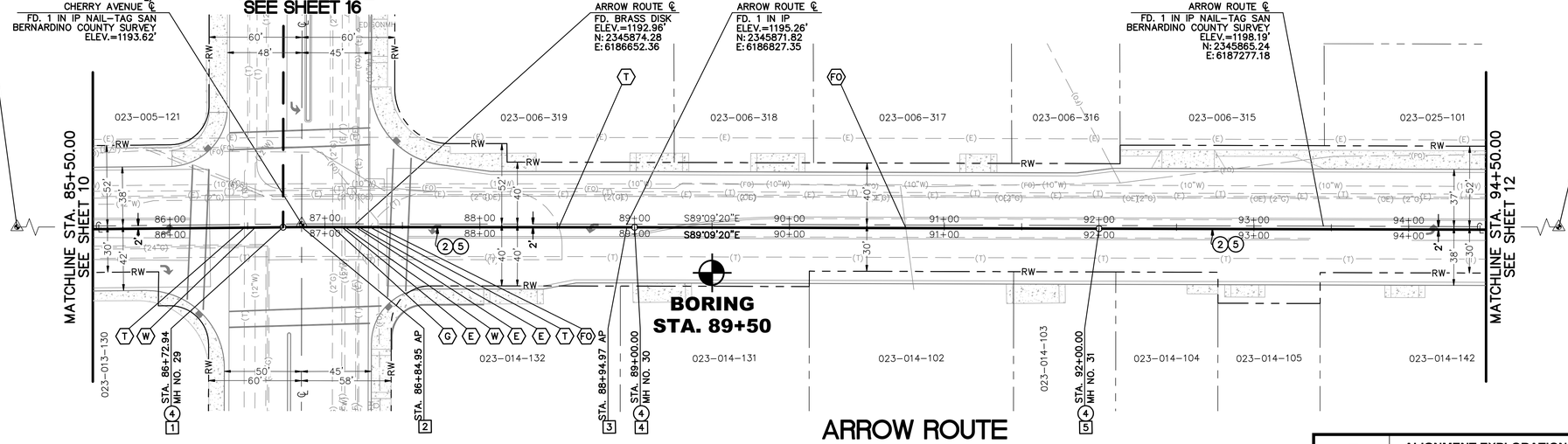
CHERRY AVENUE
SEE SHEET 16

STA. 87+19.96
ARROW ROUTE ℄
FD. BRASS DISK
ELEV.=1192.96'
N: 2345874.28
E: 6186652.36

STA. 88+94.97
ARROW ROUTE ℄
FD. 1 IN IP
ELEV.=1195.26'
N: 2345871.82
E: 6186827.35

STA. 93+44.84
ARROW ROUTE ℄
FD. 1 IN IP NAIL-TAG SAN BERNARDINO COUNTY SURVEY
ELEV.=1198.19'
N: 2345865.24
E: 6187277.18

TARGET 8
STA. 100+04.87
ARROW ROUTE ℄/
REDWOOD AVENUE ℄
FD. 1 IN IP NAIL-TAG SAN BERNARDINO COUNTY SURVEY
ELEV.=1203.10'



SEWER IMPROVEMENT CONSTRUCTION NOTES:

1. CONSTRUCT 15" SDR-26 POLYVINYL CHLORIDE SEWER PER CITY OF FONTANA STANDARD PLAN NO. 2009.
2. CONSTRUCT 12" SDR-26 POLYVINYL CHLORIDE SEWER PER CITY OF FONTANA STANDARD PLAN NO. 2009.
3. CONSTRUCT 8" SDR-26 POLYVINYL CHLORIDE SEWER PER CITY OF FONTANA STANDARD PLAN NO. 2009.
4. CONSTRUCT 4' MANHOLE PER CITY OF FONTANA STANDARD PLAN NO. 2000 AND 2001.
5. CONSTRUCT TRENCH REPAIR PER COUNTY OF SAN BERNARDINO STANDARD DETAIL 1 ON SHEET 2.

COORDINATE TABLE		
#	NORTHING	EASTING
1	2345872.47	6186605.31
2	2345872.44	6186617.32
3	2345869.82	6186827.33
4	2345869.75	6186832.35
5	2345865.33	6187132.32

SURVEY CONTROL TABLE:				
TGT No.	NORTHING	EASTING	BEARING	DISTANCE
6	2345876.99	6185297.26		
7	2345874.44	6186617.33	S89°53'22"E	1320.08'
8	2345855.59	6187937.13	N89°10'54"W	1319.93'

ALIGNMENT EXPLORATION EXHIBIT

ARROW ROUTE SEWER MAIN PROJECT, FONTANA, CA.

PROJECT NO. 5104-SF	DATE: 12/23/24	PLATE NO. 9

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 INCH = 40 FEET

Underground Service Alert

SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A PERMIT TO EXCAVATE WILL BE VALID FOR YOUR DIG ALERT I.D. NUMBER CALL UNDERGROUND SERVICE ALERT TOLL FREE 1-800-227-2600 TWO WORKING DAYS BEFORE YOU DIG

REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

REGISTERED PROFESSIONAL ENGINEER
TERRY M. RENNER
No.69984
Exp.9-30-24
CIVIL
STATE OF CALIFORNIA

TKE ENGINEERING
TKE ENGINEERING, INC.
2305 CHICAGO AVENUE
RIVERSIDE, CA 92507
(951) 680-0440
FAX (951) 680-0490

9-30-24
TERRY M. RENNER R.C.E. No. 69984

SEWER IMPROVEMENTS
ARROW ROUTE
ILEX STREET TO BEECH AVENUE

SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH CONDITIONS AND STANDARDS IN EFFECT.

CITY OF FONTANA, CALIFORNIA
SEWER IMPROVEMENT PLANS

DRAWN BY: JBR
DESIGNED BY: TMR
CHECKED BY: TMR

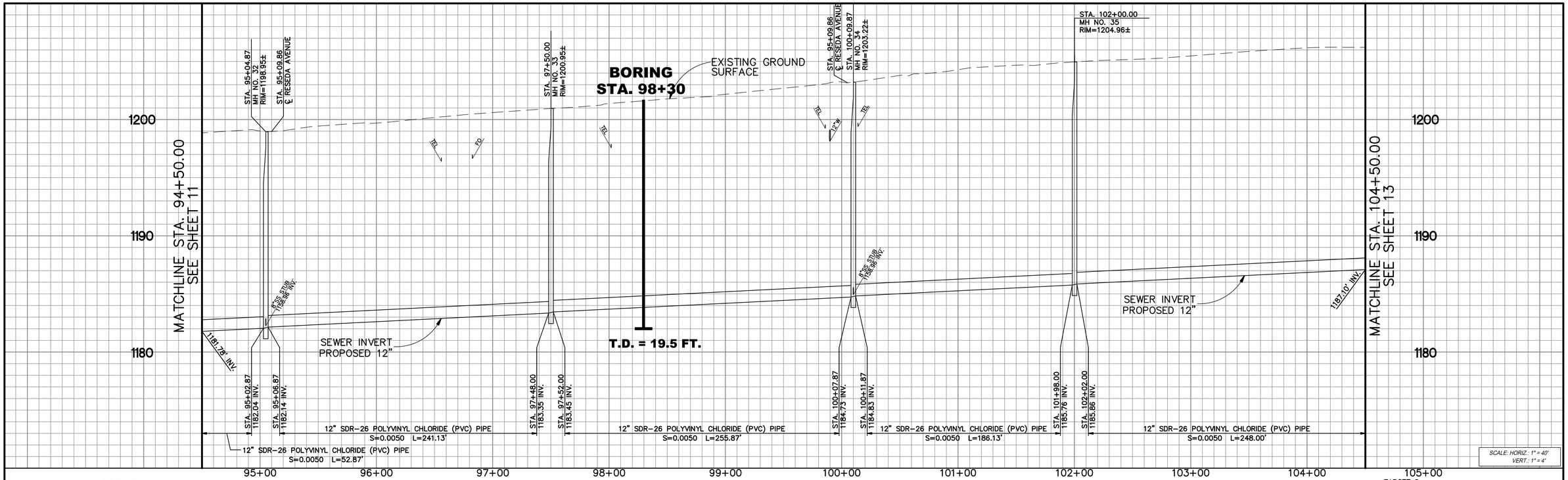
ARROW ROUTE SEWER MAIN PROJECT
PLAN/PROFILE SHEET
STA 85+50 TO STA 94+50

APPROVED BY: DATE:
CITY ENGINEER R.C.E. No. 62296

SCALE: AS SHOWN
DATE: JULY 2024
DRAWING NO.: 11
6273 22

S:\CADD\101-118 Arrow Sewer\Plan Set\101-118_11SS.dwg Aug 16, 2024 - 10:43am

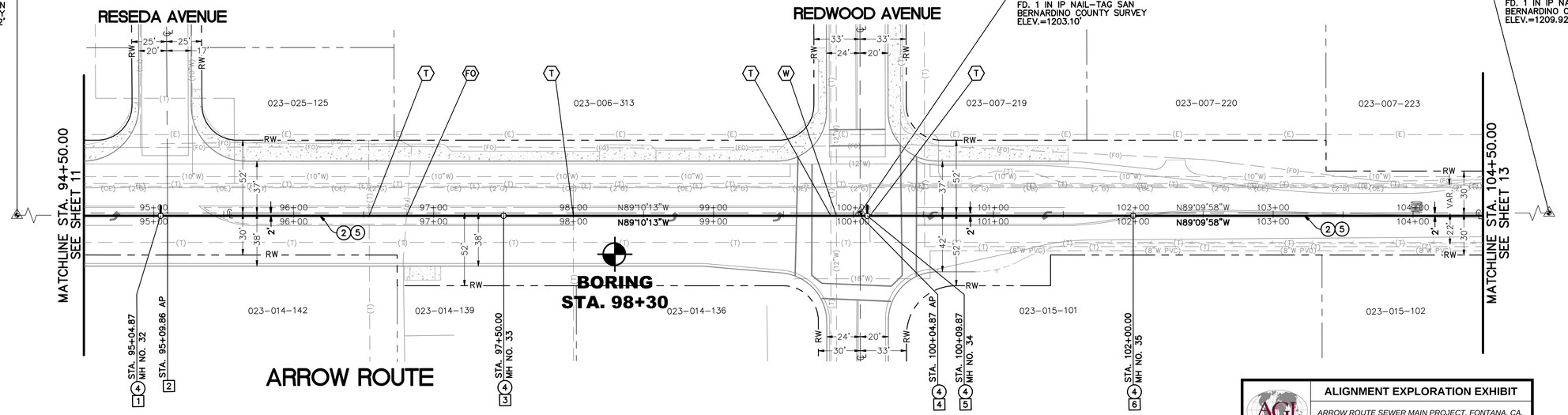
PRELIMINARY NOT FOR CONSTRUCTION - 60% SUBMITTAL



TARGET 7
STA. 86+84.94
ARROW ROUTE ℄/
CHERRY AVENUE ℄
FD. 1 IN IP NAIL-TAG SAN BERNARDINO COUNTY SURVEY
ELEV.=1193.62'

TARGET 8
STA. 100+04.87
ARROW ROUTE ℄/
REDWOOD AVENUE ℄
FD. 1 IN IP NAIL-TAG SAN BERNARDINO COUNTY SURVEY
ELEV.=1203.10'

TARGET 9
STA. 113+24.76
ARROW ROUTE ℄/
LIVE OAK AVENUE ℄
FD. 1 IN IP NAIL-TAG SAN BERNARDINO COUNTY SURVEY
ELEV.=1209.92'



SEWER IMPROVEMENT CONSTRUCTION NOTES:

(2) CONSTRUCT 12" SDR-26 POLYVINYL CHLORIDE SEWER PER CITY OF FONTANA STANDARD PLAN NO. 2009.

(3) CONSTRUCT 8" SDR-26 POLYVINYL CHLORIDE SEWER PER CITY OF FONTANA STANDARD PLAN NO. 2009.

(4) CONSTRUCT 4' MANHOLE PER CITY OF FONTANA STANDARD PLAN NO. 2000 AND 2001.

(5) CONSTRUCT TRENCH REPAIR PER COUNTY OF SAN BERNARDINO STANDARD DETAIL 1 ON SHEET 2.

COORDINATE TABLE		
#	NORTHING	EASTING
1	2345860.83	6187437.16
2	2345860.76	6187442.15
3	2345857.28	6187682.26
4	2345853.59	6187937.10
5	2345853.52	6187942.10
6	2345850.75	6188132.22

SURVEY CONTROL TABLE:				
TGT No.	NORTHING	EASTING	BEARING	DISTANCE
7	2345874.44	6186617.33		
8	2345855.59	6187937.13	N89°10'54"W	1319.93'
9	2345836.38	6189256.89	N89°09'58"W	1319.90'

ALIGNMENT EXPLORATION EXHIBIT

ARROW ROUTE SEWER MAIN PROJECT, FONTANA, CA.

PROJECT NO. 5104-SF | DATE: 12/23/24 | PLATE NO. 10

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 INCH = 40 FEET

Underground Service Alert

SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A PERMIT TO EXCAVATE WILL BE VALID FOR YOUR DIG ALERT I.D. NUMBER CALL UNDERGROUND SERVICE ALERT TOLL FREE 1-800-227-2600 TWO WORKING DAYS BEFORE YOU DIG

REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

REGISTERED PROFESSIONAL ENGINEER
TERRY M. RENNER
No.69984
Exp.9-30-24
CIVIL
STATE OF CALIFORNIA

TKE ENGINEERING

TKE ENGINEERING, INC.
2305 CHICAGO AVENUE
RIVERSIDE, CA 92507
(951) 680-0440
FAX (951) 680-0490

9-30-24
TERRY M. RENNER R.C.E. No. 69984

SEWER IMPROVEMENTS ARROW ROUTE ILEX STREET TO BEECH AVENUE

SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH CONDITIONS AND STANDARDS IN EFFECT.

CITY OF FONTANA, CALIFORNIA

SEWER IMPROVEMENT PLANS

DRAWN BY: JBR
DESIGNED BY: TMR
CHECKED BY: TMR

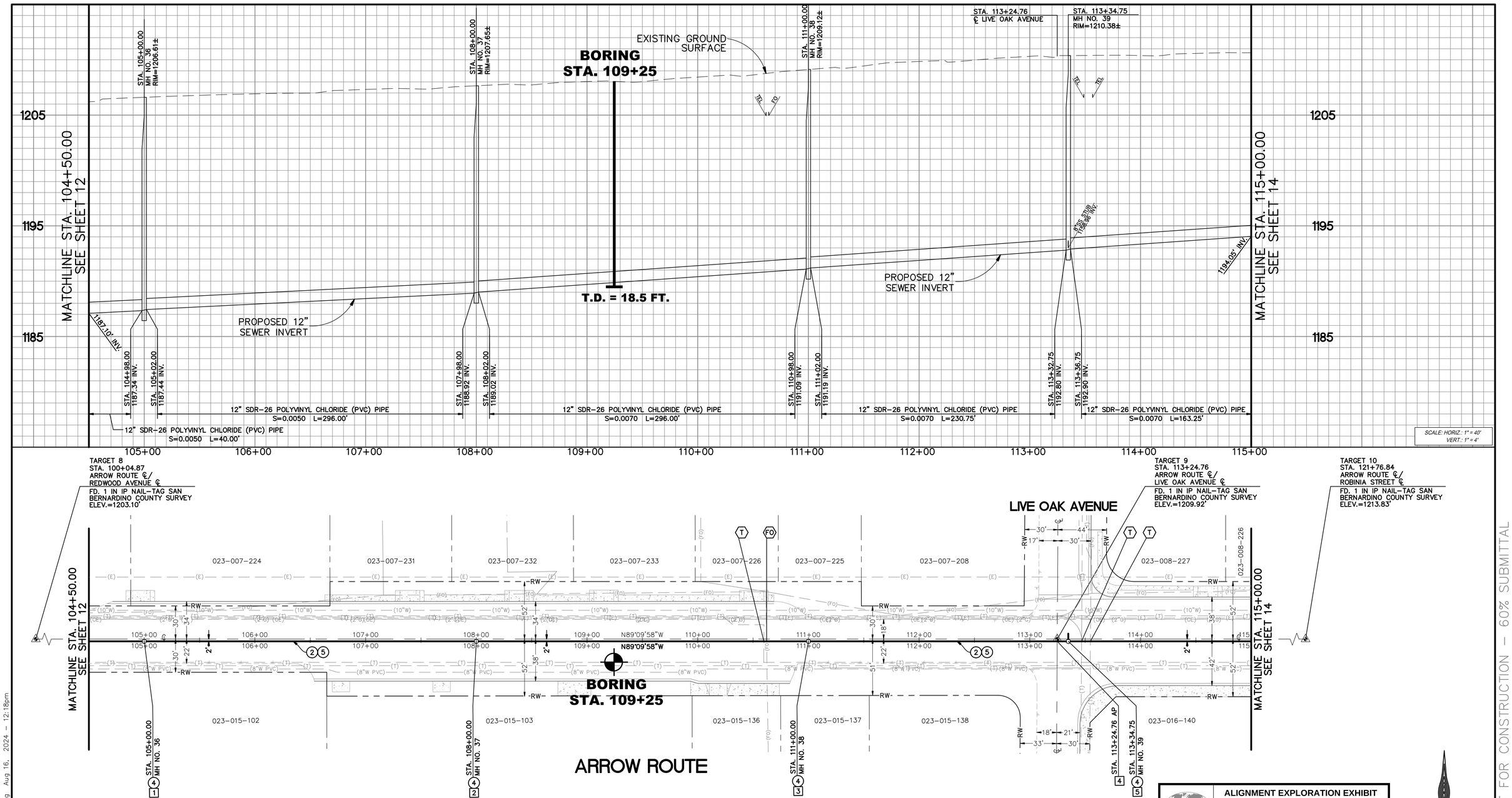
ARROW ROUTE SEWER MAIN PROJECT
PLAN/PROFILE SHEET
STA 94+50 TO STA 104+50

APPROVED BY: DATE:
CITY ENGINEER R.C.E. No. 62296

SCALE: AS SHOWN
DATE: JULY 2024
DRAWING NO.: 6273
12 / 22

S:\CADD\101-118 Arrow Sewer\Plan Set\101-118_12SS.dwg Aug 16, 2024 - 11:53am

PRELIMINARY NOT FOR CONSTRUCTION - 60% SUBMITTAL



SEWER IMPROVEMENT CONSTRUCTION NOTES:

(2) CONSTRUCT 12" SDR-26 POLYVINYL CHLORIDE SEWER PER CITY OF FONTANA STANDARD PLAN NO. 2009.

(3) CONSTRUCT 8" SDR-26 POLYVINYL CHLORIDE SEWER PER CITY OF FONTANA STANDARD PLAN NO. 2009.

(4) CONSTRUCT 4' MANHOLE PER CITY OF FONTANA STANDARD PLAN NO. 2000 AND 2001.

(5) CONSTRUCT TRENCH REPAIR PER COUNTY OF SAN BERNARDINO STANDARD DETAIL 1 ON SHEET 2.

COORDINATE TABLE		
#	NORTHING	EASTING
1	2345846.39	6188432.18
2	2345842.02	6188732.15
3	2345837.65	6189032.12
4	2345834.38	6189256.86
5	2345834.23	6189266.84

SURVEY CONTROL TABLE:				
TGT No.	NORTHING	EASTING	BEARING	DISTANCE
8	2345855.59	6187937.13		
9	2345836.38	6189256.89	N89°09'58"W	1319.90'
10	2345823.92	6190108.88	S89°09'44"E	852.08'

ALIGNMENT EXPLORATION EXHIBIT

ARROW ROUTE SEWER MAIN PROJECT, FONTANA, CA.

PROJECT NO. 5104-SF | DATE: 12/23/24 | PLATE NO. 11

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 INCH = 40 FEET

N

Underground Service Alert

SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A PERMIT TO EXCAVATE WILL BE VALID FOR YOUR DIG ALERT I.D. NUMBER CALL UNDERGROUND SERVICE ALERT TOLL FREE 1-800-227-2600 TWO WORKING DAYS BEFORE YOU DIG

REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

REGISTERED PROFESSIONAL ENGINEER TERRY M. RENNER No.69984 Exp.9-30-24 CIVIL STATE OF CALIFORNIA

TKE ENGINEERING
TKE ENGINEERING, INC.
2305 CHICAGO AVENUE
RIVERSIDE, CA 92507
(951) 680-0440
FAX (951) 680-0490

9-30-24
TERRY M. RENNER R.C.E. No. 69984

SEWER IMPROVEMENTS ARROW ROUTE ILEX STREET TO BEECH AVENUE

SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH CONDITIONS AND STANDARDS IN EFFECT.

CITY OF FONTANA, CALIFORNIA

SEWER IMPROVEMENT PLANS

DRAWN BY: JBR
DESIGNED BY: TMR
CHECKED BY: TMR

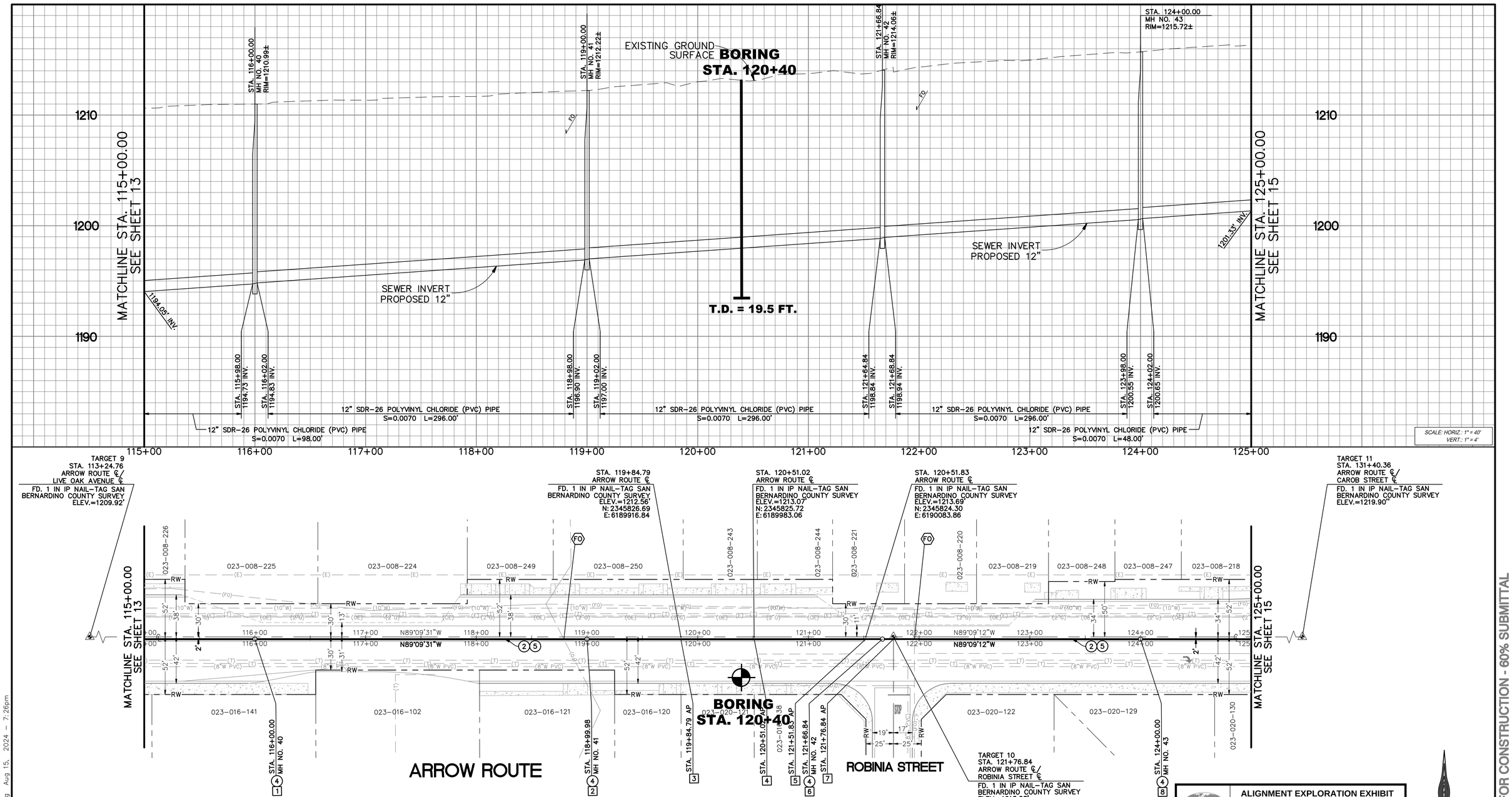
ARROW ROUTE SEWER MAIN PROJECT
PLAN/PROFILE SHEET
STA 104+50 TO STA 115+00

APPROVED BY: DATE:
CITY ENGINEER R.C.E. No. 62296

SCALE: AS SHOWN
DATE: JULY 2024
DRAWING NO.: 13
6273 22

S:\CADD\101-118 Arrow Sewer\Plan Set\101-118_13SS.dwg Aug 16, 2024 - 12:18pm

PRELIMINARY NOT FOR CONSTRUCTION - 60% SUBMITTAL



SEWER IMPROVEMENT CONSTRUCTION NOTES:

(2) CONSTRUCT 12" SDR–26 POLYVINYL CHLORIDE SEWER PER CITY OF FONTANA STANDARD PLAN NO. 2009.

(3) CONSTRUCT 8" SDR–26 POLYVINYL CHLORIDE SEWER PER CITY OF FONTANA STANDARD PLAN NO. 2009.

(4) CONSTRUCT 4' MANHOLE PER CITY OF FONTANA STANDARD PLAN NO. 2000 AND 2001.

(5) CONSTRUCT TRENCH REPAIR PER COUNTY OF SAN BERNARDINO STANDARD DETAIL 1 ON SHEET 2.

COORDINATE TABLE

#	NORTHING	EASTING
1	2345830.34	6189532.07
2	2345825.93	6189832.01
3	2345824.69	6189916.81
4	2345823.72	6189983.03
5	2345822.30	6190083.83
6	2345822.07	6190098.84
7	2345821.92	6190108.85
8	2345818.63	6190331.98

SURVEY CONTROL TABLE:

TGT No.	NORTHING	EASTING	BEARING	DISTANCE
9	2345836.38	6189256.89	S89°09'44"E	852.08'
10	2345823.92	6190108.88	S89°09'19"E	963.52'
11	2345809.72	6191072.29		

ALIGNMENT EXPLORATION EXHIBIT

ARROW ROUTE SEWER MAIN PROJECT, FONTANA, CA.

PROJECT NO. 5104-SF | DATE: 12/23/24 | PLATE NO. 12

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 INCH = 40 FEET

Underground Service Alert

SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A PERMIT TO EXCAVATE WILL BE VALID FOR YOUR DIG ALERT I.D. NUMBER CALL UNDERGROUND SERVICE ALERT TOLL FREE 1–800–227–2600 TWO WORKING DAYS BEFORE YOU DIG

REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

REGISTERED PROFESSIONAL ENGINEER
TERRY M. RENNER
No.69984
Exp.9-30-24
CIVIL
STATE OF CALIFORNIA

TKE ENGINEERING
TKE ENGINEERING, INC.
2305 CHICAGO AVENUE
RIVERSIDE, CA 92507
(951) 680-0440
FAX (951) 680-0490

9-30-24
TERRY M. RENNER R.C.E. No. 69984

SEWER IMPROVEMENTS
ARROW ROUTE
ILEX STREET TO BEECH AVENUE

SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH CONDITIONS AND STANDARDS IN EFFECT.

CITY OF FONTANA, CALIFORNIA
SEWER IMPROVEMENT PLANS

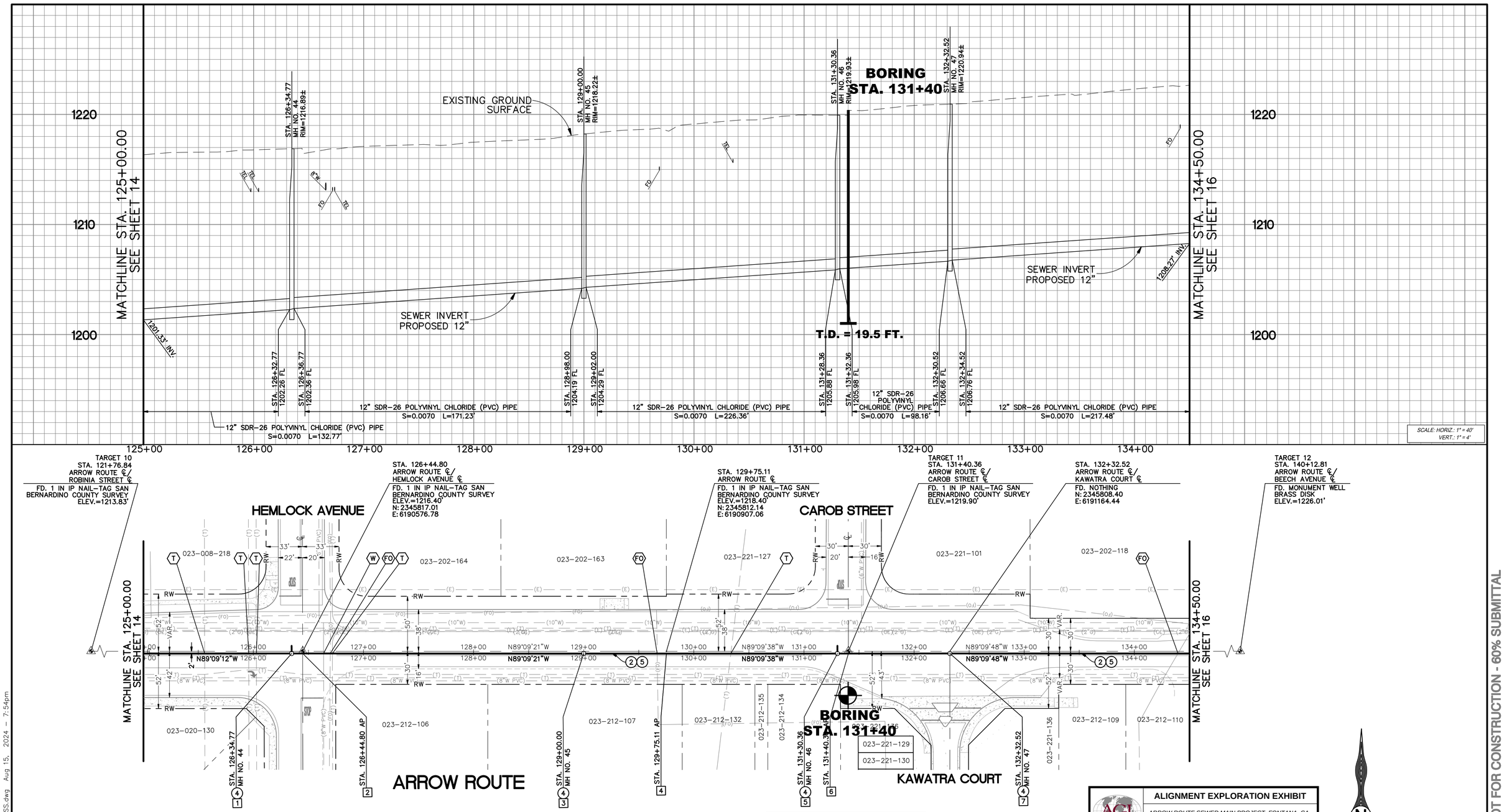
ARROW ROUTE SEWER MAIN PROJECT
PLAN/PROFILE SHEET
STA 115+00 TO STA 125+00

DRAWN BY: JBR
DESIGNED BY: TMR
CHECKED BY: TMR
APPROVED BY: DATE:
CITY ENGINEER R.C.E. No. 62296

SCALE: AS SHOWN
DATE: JULY 2024
DRAWING NO: 14
6273 22

PRELIMINARY NOT FOR CONSTRUCTION - 60% SUBMITTAL

S:\CADD\101-118 Arrow Sewer\Plan Set\101-118_14SS.dwg Aug 15, 2024 - 7:26pm



SEWER IMPROVEMENT CONSTRUCTION NOTES:

(2) CONSTRUCT 12" SDR-26 POLYVINYL CHLORIDE SEWER PER CITY OF FONTANA STANDARD PLAN NO. 2009.

(3) CONSTRUCT 8" SDR-26 POLYVINYL CHLORIDE SEWER PER CITY OF FONTANA STANDARD PLAN NO. 2009.

(4) CONSTRUCT 4' MANHOLE PER CITY OF FONTANA STANDARD PLAN NO. 2000 AND 2001.

(5) CONSTRUCT TRENCH REPAIR PER COUNTY OF SAN BERNARDINO STANDARD DETAIL 1 ON SHEET 2.

COORDINATE TABLE		
#	NORTHING	EASTING
1	2345815.16	6190566.72
2	2345815.01	6190576.75
3	2345811.25	6190831.93
4	2345810.14	6190907.03
5	2345807.87	6191062.26
6	2345807.72	6191072.26
7	2345806.38	6191164.41

SURVEY CONTROL TABLE:				
TGT No.	NORTHING	EASTING	BEARING	DISTANCE
10	2345823.92	6190108.88	S89°09'19"E	963.52'
11	2345809.72	6191072.29	S89°09'48"E	872.45'
12	2345796.98	6191944.64		

ALIGNMENT EXPLORATION EXHIBIT

ARROW ROUTE SEWER MAIN PROJECT, FONTANA, CA.

PROJECT NO. 5104-SF | DATE: 12/23/24 | PLATE NO. 13

N

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)

1 INCH = 40 FEET

Underground Service Alert

SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A PERMIT TO EXCAVATE WILL BE VALID FOR YOUR DIG ALERT I.D. NUMBER CALL UNDERGROUND SERVICE ALERT TOLL FREE 1-800-227-2600 TWO WORKING DAYS BEFORE YOU DIG

REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

REGISTERED PROFESSIONAL ENGINEER
TERRY M. RENNER
No.69984
Exp. 9-30-24
CIVIL
STATE OF CALIFORNIA

TKE ENGINEERING
TKE ENGINEERING, INC.
2305 CHICAGO AVENUE
RIVERSIDE, CA 92507
(951) 680-0440 FAX (951) 680-0490

9-30-24
TERRY M. RENNER R.C.E. No. 69984

SEWER IMPROVEMENTS ARROW ROUTE ILEX STREET TO BEECH AVENUE

SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH CONDITIONS AND STANDARDS IN EFFECT.

CITY OF FONTANA, CALIFORNIA

SEWER IMPROVEMENT PLANS

ARROW ROUTE SEWER MAIN PROJECT
PLAN/PROFILE SHEET
STA 125+00 TO STA 134+50

DRAWN BY: JBR
DESIGNED BY: TMR
CHECKED BY: TMR
APPROVED BY: DATE:
CITY ENGINEER R.C.E. No. 62296

SCALE: AS SHOWN
DATE: JULY 2024
DRAWING NO.: 15
6273 22

PRELIMINARY NOT FOR CONSTRUCTION - 60% SUBMITTAL

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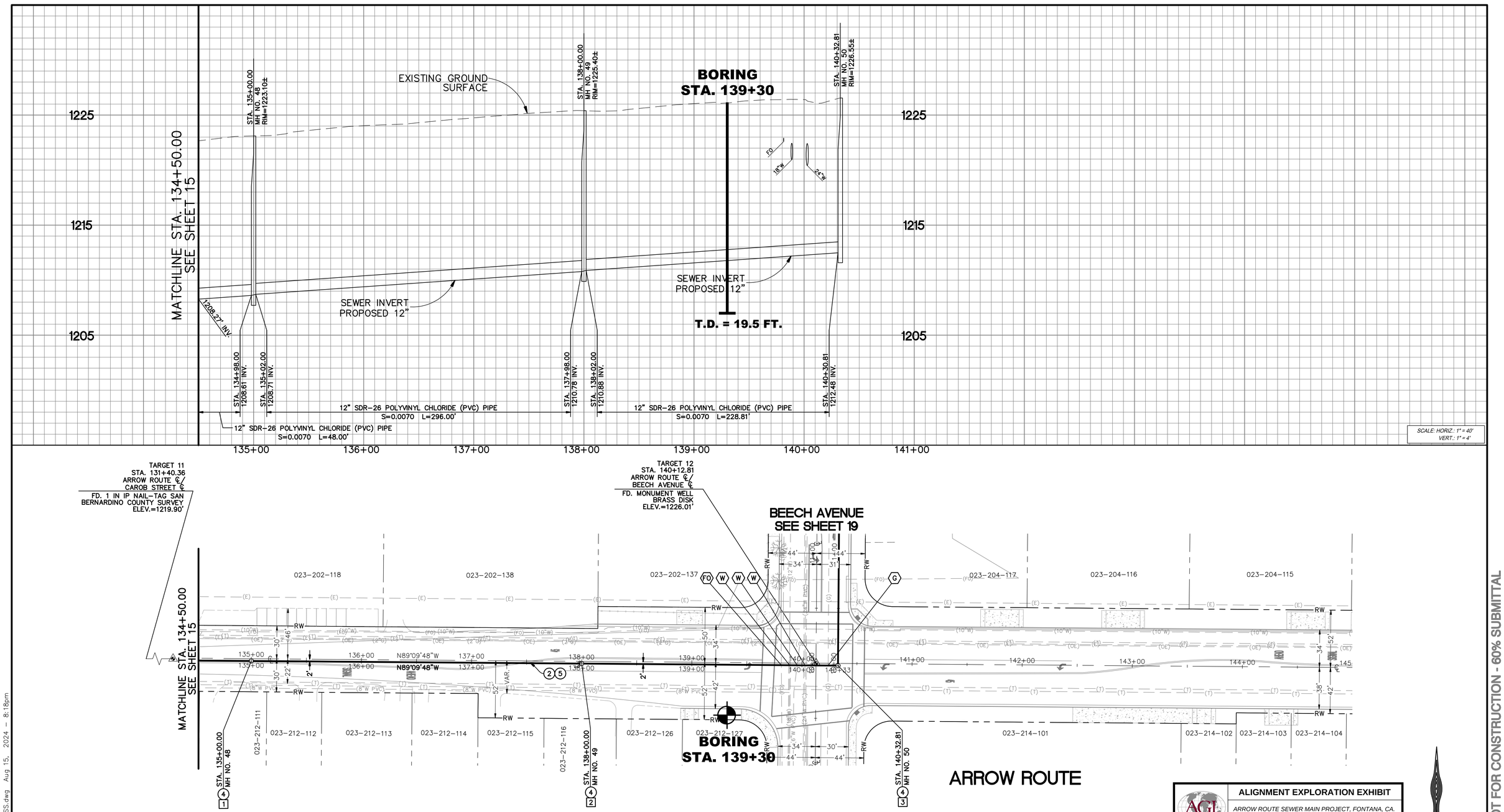

TARGET 11
STA. 131+40.36
ARROW ROUTE ℄/
CAROB STREET ℄
FD. 1 IN IP NAIL–TAG SAN BERNARDINO COUNTY SURVEY
ELEV.=1219.90'

TARGET 12
STA. 140+12.81
ARROW ROUTE ℄/
BEECH AVENUE ℄
FD. MONUMENT WELL BRASS DISK
ELEV.=1226.01'

ARROW ROUTE

SEWER IMPROVEMENT CONSTRUCTION NOTES:

(2) CONSTRUCT 12" SDR–26 POLYVINYL CHLORIDE SEWER PER CITY OF FONTANA STANDARD PLAN NO. 2009.
(3) CONSTRUCT 8" SDR–26 POLYVINYL CHLORIDE SEWER PER CITY OF FONTANA STANDARD PLAN NO. 2009.
(4) CONSTRUCT 4' MANHOLE PER CITY OF FONTANA STANDARD PLAN NO. 2000 AND 2001.
(5) CONSTRUCT TRENCH REPAIR PER COUNTY OF SAN BERNARDINO STANDARD DETAIL 1 ON SHEET 2.

COORDINATE TABLE		
#	NORTHING	EASTING
1	2345815.16	6190566.72
2	2345815.01	6190576.75
3	2345811.25	6190831.93

SURVEY CONTROL TABLE:				
TGT No.	NORTHING	EASTING	BEARING	DISTANCE
11	2345809.72	6191072.29	S89°09'48"E	872.45'
12	2345796.98	6191944.64		

ALIGNMENT EXPLORATION EXHIBIT
ARROW ROUTE SEWER MAIN PROJECT, FONTANA, CA.
PROJECT NO. 5104-SF | DATE: 12/23/24 | PLATE NO. 14

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 INCH = 40 FEET

Underground Service Alert
SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A PERMIT TO EXCAVATE WILL BE VALID FOR YOUR DIG ALERT I.D. NUMBER CALL UNDERGROUND SERVICE ALERT TOLL FREE 1–800–227–2600 TWO WORKING DAYS BEFORE YOU DIG

REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

REGISTERED PROFESSIONAL ENGINEER TERRY M. RENNER No.69984 Exp.9-30-24 CIVIL STATE OF CALIFORNIA

TKE ENGINEERING, INC.
2305 CHICAGO AVENUE
RIVERSIDE, CA 92507
(951) 680-0440
FAX (951) 680-0490

9-30-24
TERRY M. RENNER R.C.E. No. 69984

SEWER IMPROVEMENTS
ARROW ROUTE
ILEX STREET TO
BEECH AVENUE

SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH CONDITIONS AND STANDARDS IN EFFECT.

CITY OF FONTANA, CALIFORNIA
SEWER IMPROVEMENT PLANS

DRAWN BY: JBR
DESIGNED BY: TMR
CHECKED BY: TMR
APPROVED BY: DATE:
CITY ENGINEER R.C.E. No. 62296

ARROW ROUTE SEWER MAIN PROJECT
PLAN/PROFILE SHEET
STA 134+50 TO STA 140+32.81

SCALE: AS SHOWN
DATE: JULY 2024
DRAWING NO.: 16
6273 22

PRELIMINARY NOT FOR CONSTRUCTION - 60% SUBMITTAL

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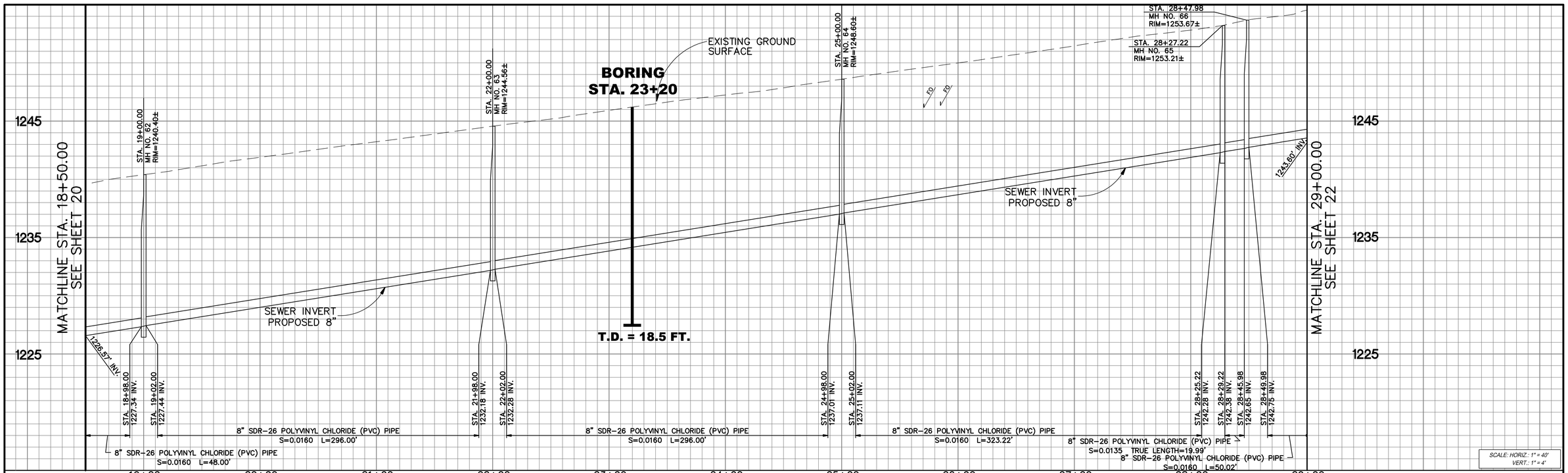
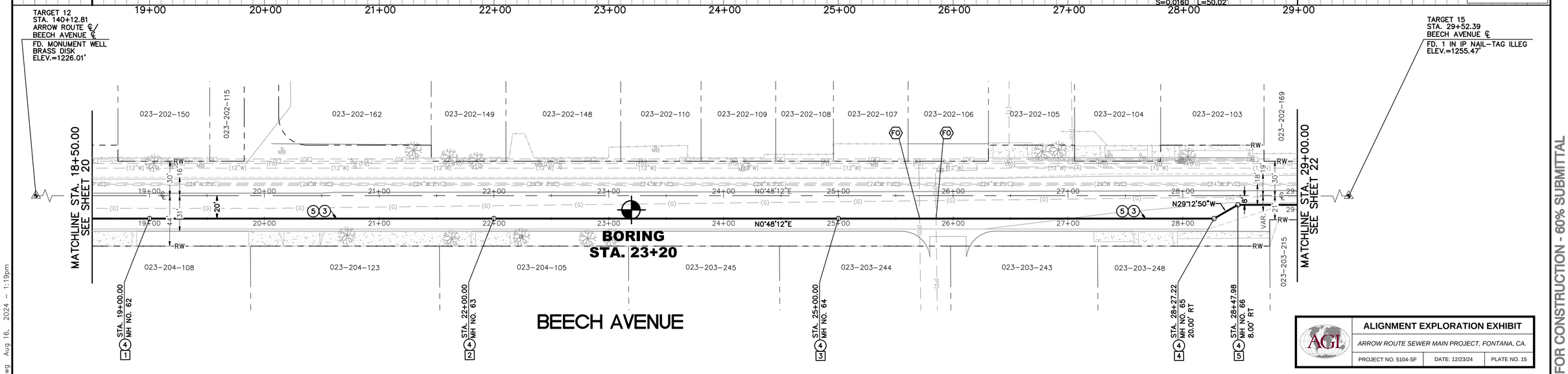




SEWER IMPROVEMENT CONSTRUCTION NOTES:

(3) CONSTRUCT 8" SDR-26 POLYVINYL CHLORIDE SEWER PER CITY OF FONTANA STANDARD PLAN NO. 2009.

(4) CONSTRUCT 4' MANHOLE PER CITY OF FONTANA STANDARD PLAN NO. 2000 AND 2001.

(5) CONSTRUCT TRENCH REPAIR PER COUNTY OF SAN BERNARDINO STANDARD DETAIL 1 ON SHEET 2.

(6) CONSTRUCT 5 FEET LONG STUB OUT OF 8" SDR-26 POLYVINYL CHLORIDE SEWER WITH WATERTIGHT BULKHEAD AT PIPE END.

COORDINATE TABLE		
#	NORTHING	EASTING
1	2346696.5992	6191977.2612
2	2346996.5697	6191981.4679
3	2347296.5402	6191985.6746
4	2347623.7282	6191990.2631
5	2347644.6644	6191978.5555

SURVEY CONTROL TABLE:				
TGT No.	NORTHING	EASTING	BEARING	DISTANCE
12	2345796.98	6191944.64	N00°48'12"E	1952.39'
15	2347749.18	6191972.02		

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 INCH = 40 FEET

ALIGNMENT EXPLORATION EXHIBIT
ARROW ROUTE SEWER MAIN PROJECT, FONTANA, CA.
PROJECT NO. 5104-SF | DATE: 12/23/24 | PLATE NO. 15

Underground Service Alert
SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A PERMIT TO EXCAVATE WILL BE VALID FOR YOUR DIG ALERT I.D. NUMBER CALL UNDERGROUND SERVICE ALERT TOLL FREE 1-800-227-2600 TWO WORKING DAYS BEFORE YOU DIG

REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

REGISTERED PROFESSIONAL ENGINEER TERRY M. RENNER No.69984 Exp.9-30-24 CIVIL STATE OF CALIFORNIA

TKE ENGINEERING, INC.
2305 CHICAGO AVENUE
RIVERSIDE, CA 92507
(951) 680-0440
FAX (951) 680-0490

9-30-24
TERRY M. RENNER R.C.E. No. 69984

SEWER IMPROVEMENTS BEECH AVENUE ARROW ROUTE TO FOOTHILL BOULEVARD

SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH CONDITIONS AND STANDARDS IN EFFECT.

CITY OF FONTANA, CALIFORNIA
SEWER IMPROVEMENT PLANS

DRAWN BY: JBR
DESIGNED BY: TMR
CHECKED BY: TMR

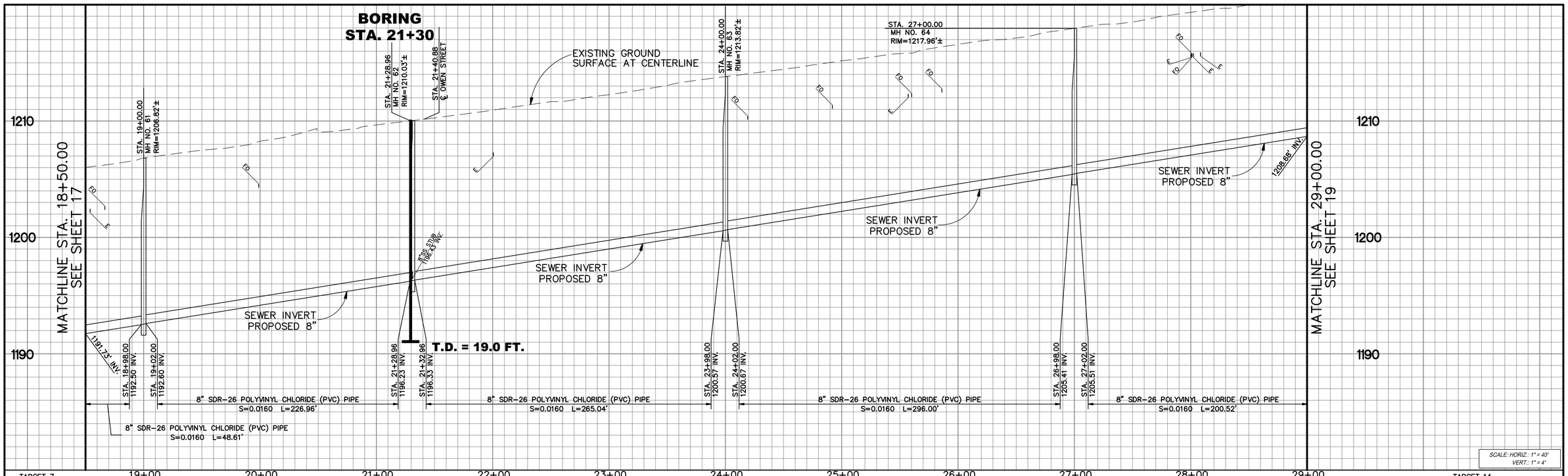
ARROW ROUTE SEWER MAIN PROJECT
BEECH AVENUE PLAN/PROFILE SHEET
STA 18+50 TO STA 29+00

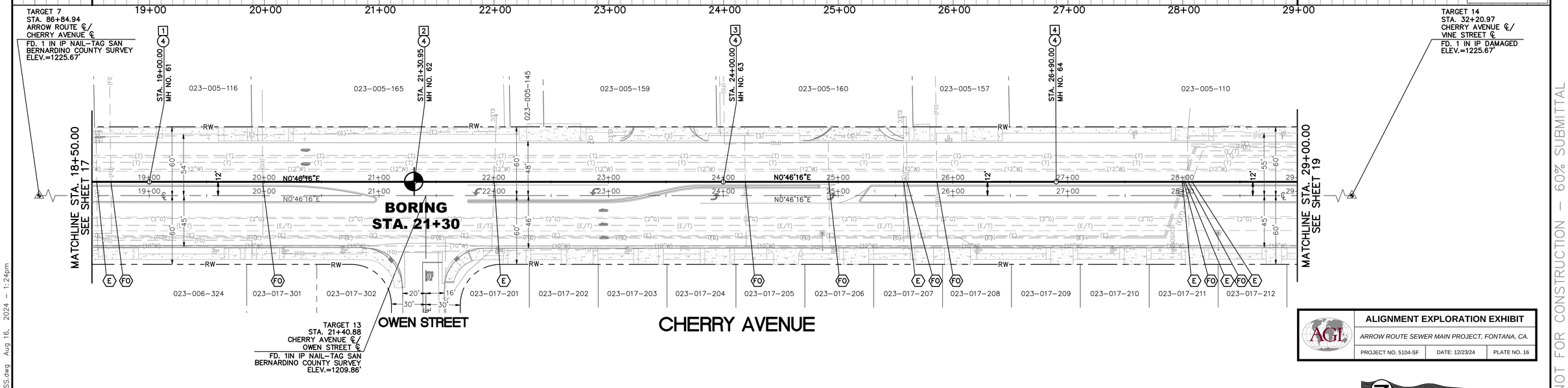
APPROVED BY: DATE:
CITY ENGINEER R.C.E. No. 62296

SCALE: AS SHOWN
DATE: JULY 2024
DRAWING NO.: 21
6273 22

PRELIMINARY NOT FOR CONSTRUCTION - 60% SUBMITTAL

S:\CADD\101-118 Arrow Sewer\Plan Set\101-118_21SS.dwg Aug 16, 2024 - 1:19pm





SEWER IMPROVEMENT CONSTRUCTION NOTES:

(3) CONSTRUCT 8" SDR-26 POLYVINYL CHLORIDE SEWER PER CITY OF FONTANA STANDARD PLAN NO. 2009.

(4) CONSTRUCT 4' MANHOLE PER CITY OF FONTANA STANDARD PLAN NO. 2000 AND 2001.

(5) CONSTRUCT TRENCH REPAIR PER COUNTY OF SAN BERNARDINO STANDARD DETAIL 1 ON SHEET 2.

COORDINATE TABLE		
#	NORTHING	EASTING
1	2346774.45	6186617.44
2	2347005.38	6186620.55
3	2347274.40	6186624.17
4	2347564.37	6186628.08

SURVEY CONTROL TABLE:				
TGT No.	NORTHING	EASTING	BEARING	DISTANCE
7	2345874.44	6186617.33	N0°46'16"E	1140.88'
13	2347015.22	6186632.69	N0°46'16"E	1080.09'
14	2348095.21	6186647.30		

ALIGNMENT EXPLORATION EXHIBIT

ARROW ROUTE SEWER MAIN PROJECT, FONTANA, CA.

PROJECT NO. 5104-SF | DATE: 12/23/24 | PLATE NO. 16

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 INCH = 40 FEET

Underground Service Alert

SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A PERMIT TO EXCAVATE WILL BE VALID FOR YOUR DIG ALERT I.D. NUMBER CALL UNDERGROUND SERVICE ALERT TOLL FREE 1-800-227-2600 TWO WORKING DAYS BEFORE YOU DIG

REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

REGISTERED PROFESSIONAL ENGINEER TERRY M. RENNER No.69984 Exp.9-30-24 CIVIL STATE OF CALIFORNIA

TKE ENGINEERING

TKE ENGINEERING, INC.
2305 CHICAGO AVENUE
RIVERSIDE, CA 92507
(951) 680-0440
FAX (951) 680-0490

9-30-24
TERRY M. RENNER R.C.E. No. 69984

SEWER IMPROVEMENTS CHERRY AVENUE ARROW ROUTE TO FOOTHILL BOULEVARD

SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH CONDITIONS AND STANDARDS IN EFFECT.

CITY OF FONTANA, CALIFORNIA
SEWER IMPROVEMENT PLANS

DRAWN BY: JBR
DESIGNED BY: TMR
CHECKED BY: TMR

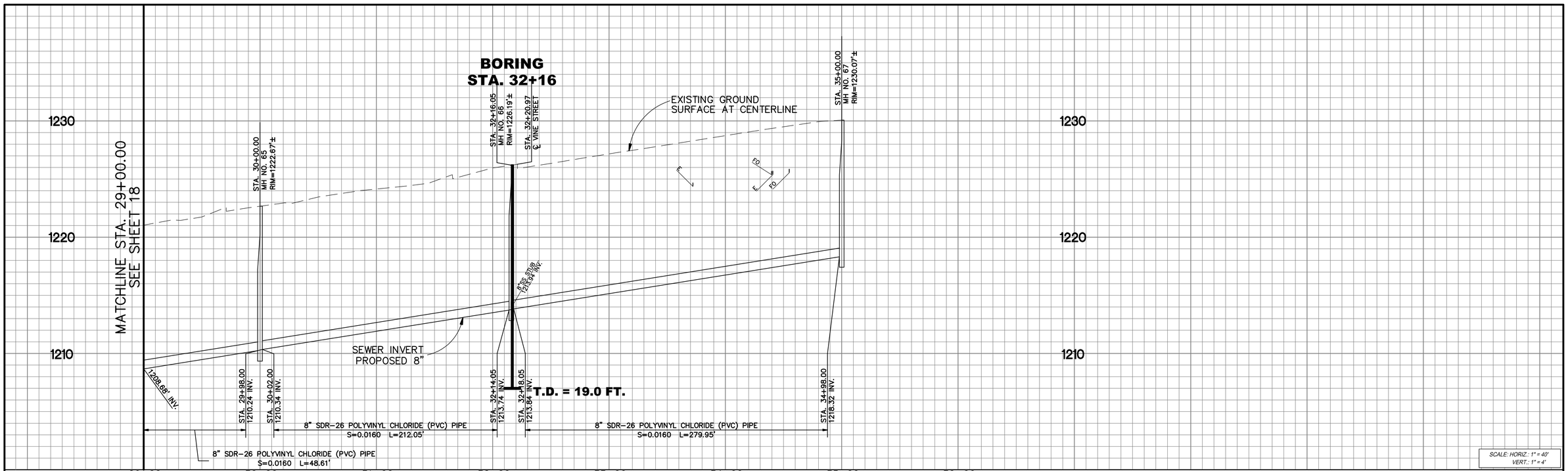
ARROW ROUTE SEWER MAIN PROJECT
CHERRY AVENUE PLAN/PROFILE SHEET
STA 18+50 TO STA 29+00

APPROVED BY: DATE:
CITY ENGINEER R.C.E. No. 62296

SCALE: AS SHOWN
DATE: JULY 2024
DRAWING NO.: 18
6273 22

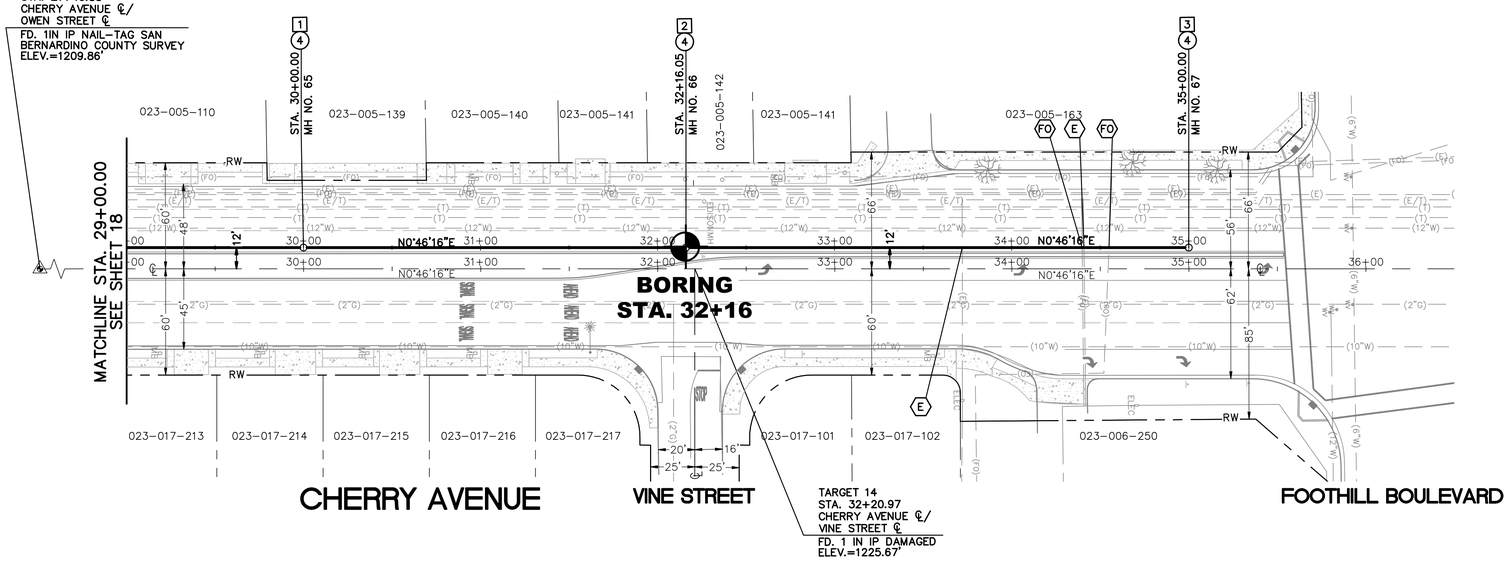
S:\CADD\101-118 Arrow Sewer\Plan Set\101-118_18SS.dwg Aug 16, 2024 - 1:24pm

PRELIMINARY NOT FOR CONSTRUCTION - 60% SUBMITTAL



SCALE: HORIZ.: 1" = 40'
VERT.: 1" = 4'

TARGET 13
STA. 21+40.88
CHERRY AVENUE ℄/
OWEN STREET ℄
FD. 1IN IP NAIL-TAG SAN
BERNARDINO COUNTY SURVEY
ELEV.=1209.86'



SEWER IMPROVEMENT CONSTRUCTION NOTES:

(3) CONSTRUCT 8" SDR-26 POLYVINYL CHLORIDE SEWER PER CITY OF FONTANA STANDARD PLAN NO. 2009.

(4) CONSTRUCT 4' MANHOLE PER CITY OF FONTANA STANDARD PLAN NO. 2000 AND 2001.

(5) CONSTRUCT TRENCH REPAIR PER COUNTY OF SAN BERNARDINO STANDARD DETAIL 1 ON SHEET 2.

COORDINATE TABLE		
#	NORTHING	EASTING
1	2347874.35	6186632.25
2	2348090.37	6186635.15
3	2348374.30	6186638.98

SURVEY CONTROL TABLE:				
TGT No.	NORTHING	EASTING	BEARING	DISTANCE
13	2347015.22	6186632.69	N0°46'16"E	1080.09'
14	2348095.21	6186647.30		

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 INCH = 40 FEET

ALIGNMENT EXPLORATION EXHIBIT
ARROW ROUTE SEWER MAIN PROJECT, FONTANA, CA.
PROJECT NO. 5104-SF | DATE: 12/23/24 | PLATE NO. 17

Underground Service Alert
SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A PERMIT TO EXCAVATE WILL BE VALID FOR YOUR DIG ALERT I.D. NUMBER CALL UNDERGROUND SERVICE ALERT TOLL FREE 1-800-227-2600 TWO WORKING DAYS BEFORE YOU DIG

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9-30-24
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SEWER IMPROVEMENTS CHERRY AVENUE ARROW ROUTE TO FOOTHILL BOULEVARD

SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH CONDITIONS AND STANDARDS IN EFFECT.

CITY OF FONTANA, CALIFORNIA
SEWER IMPROVEMENT PLANS

ARROW ROUTE SEWER MAIN PROJECT
CHERRY AVENUE PLAN/PROFILE SHEET
STA 29+00 TO STA 35+02

DRAWN BY: JBR
DESIGNED BY: TMR
CHECKED BY: TMR
APPROVED BY: CITY ENGINEER
DATE: R.C.E. No. 62296
SCALE: AS SHOWN
DATE: JULY 2024
DRAWING NO.: 6273
19 / 22

S:\CADD\101-118 Arrow Sewer\Plan Set\101-118_19SS.dwg Aug 16, 2024 - 1:31pm

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