

Interstate 10 at Monroe Street

Interchange Improvements

In the City of Indio

Project No. C7-0048

Federal Aid No. STPLN-5956(294)

Updated Foundation Report

Overcrossing [Br No. 56-0897]

Dated May 1, 2023, Updated October 3, 2024

Notice regarding this Report:

This document is provided for reference only.

Although this information represents the latest information available, the County of Riverside Transportation Department does not guarantee the accuracy of this data.



Converse Consultants

Geotechnical Engineering
Environmental & Groundwater Science
Inspection & Testing Services

UPDATED FOUNDATION REPORT (FR) MONROE STREET OVERCROSSING (REPLACE) [BR No 56-0897]

08-RIV I-10-PM 54.74

INTERSTATE 10 AND MONROE STREET INTERCHANGE IMPROVEMENTS

CITY OF INDIO, RIVERSIDE COUNTY, CALIFORNIA

CALTRANS EA No. 08-0K7301

CALTRANS EFIS 0800000368

CONVERSE PROJECT No. 14-81-229-03



Prepared For:

MICHAEL BAKER INTERNATIONAL

3536 Concours, Suite 100

Ontario, CA 91764

Presented By:

CONVERSE CONSULTANTS

2021 Rancho Drive, Suite 1

Redlands, CA 92373

909-796-0544

May 1, 2023

Updated October 3, 2024



Converse Consultants

Geotechnical Engineering, Environmental & Groundwater Science, Inspection & Testing Services

May 1, 2023

Updated October 3, 2024

Mr. Danny Walden, PE
Project Manager
Michael Baker International
3536 Concourses, Suite 100
Ontario, CA 91764

Subject: **UPDATED FOUNDATION REPORT (FR)**
Monroe Street Overcrossing (Replace) [BR No. 56-0897]
08-RIV- I-10-PM 54.74
Interstate 10 and Monroe Street Interchange Improvements
City of Indio, Riverside County, California
Caltrans EA No. 08-OK7301, Caltrans EFIS 0800000368
Converse Project No. 14-81-229-03

Dear Mr. Walden:

Converse Consultants (Converse) is pleased to submit this Updated Foundation Report (FR) for the Monroe Street Overcrossing associated with the Interstate 10 and Monroe Street Interchange Improvements project. This updated report includes the recommendations for the cycle track and addressing the comments received from Caltrans dated July 15, 2022, June 2, 2023, and September 16, 2024, and comments received from Riverside County Transportation Department dated August 24, 2022.

The project is located in the City of Indio, Riverside County, California. The content of this report follows Caltrans guidelines presented in *Foundation Report for Bridges* (Caltrans, 2021). The recommendations provided in this report are based on our field investigation, laboratory testing, engineering analyses and 95% completed project plans (prepared by Parsons) plotted in May 2023. This report was prepared in accordance with our revised proposal dated April 24, 2020, and your subcontract agreement dated April 20, 2021.

We appreciate the opportunity to be of continued service to Michael Baker International (MBI). Should you have any questions, please contact us at 909-474-2847.

CONVERSE CONSULTANTS

Hashmi S. E. Quazi, PhD, PE, GE
Principal Engineer

Dist: 1-Electronic pdf/Addressee
HSQ/RLG/MS/kvg

PROFESSIONAL CERTIFICATION

This report has been prepared by the individuals whose seals and signatures appear herein.

The findings, recommendations, specifications, or professional opinions contained in this report were prepared in accordance with generally accepted professional engineering, engineering geologic principles, and practice in this area of Southern California. There is no warranty, either expressed or implied.



Hashmi S. E. Quazi, PhD, PE, GE
Principal Engineer



Robert L. Gregorek II, PG, CEG
Senior Geologist



TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	PROJECT DESCRIPTION	1
3.0	GEOTECHNICAL INVESTIGATION	3
4.0	LABORATORY TESTING PROGRAM	3
5.0	GEOTECHNICAL CONDITIONS	4
5.1	Regional Geology	4
5.2	Local Geology	4
5.3	Surface Conditions	4
5.4	Subsurface soil	5
6.0	GROUNDWATER	5
7.0	AS-BUILT DATA.....	6
8.0	SCOUR DATA.....	7
9.0	CORROSION EVALUATION	7
10.0	SEISMIC INFORMATION	8
10.1	Ground Motion Hazard.....	8
10.2	Other Seismic Hazards	9
11.0	GEOTECHNICAL RECOMMENDATIONS.....	10
11.1	Pile Foundations	10
11.2	Approach Fills	17
11.3	Pile Drivability	17
12.0	NOTES FOR SPECIFICATIONS.....	17
13.0	NOTES FOR CONSTRUCTION.....	18
14.0	LIMITATIONS.....	19



FIGURES

	Following Page Number
Figure No. 1, <i>Approximate Monroe Street Overcrossing Location Map</i>	1
Figure No. 2, <i>Approximate Boring Locations Map</i>	3
Figure No. 3, <i>Geologic Map</i>	4
Figure No. 4, <i>Design ARS Curve</i>	8

TABLES

	Page Number
Table No. 1, <i>Measured Groundwater Table</i>	6
Table No. 2, <i>Summary of As-Built Foundation Data</i>	7
Table No. 3, <i>Soil Corrosion Test Summary</i>	7
Table No. 4, <i>Recommended Ground Motion Parameters</i>	9
Table No. 5, <i>Foundation Design Data Sheet</i>	11
Table No. 6, <i>Foundation Factored Design Loads</i>	11
Table No. 7, <i>Foundation Design Recommendations</i>	12
Table No. 8, <i>Pile Data Table</i>	13
Table No. 9, <i>L-Pile Input Parameters for Abutment 1</i>	14
Table No. 10, <i>L-Pile Input Parameters for Abutment 3</i>	15
Table No. 11, <i>L-Pile Input Parameters for Bent 2</i>	16
Table No. 12, <i>Groundwater Well Data</i>	19

APPENDICES

Appendix A	<i>Field Exploration</i>
Appendix A-1	<i>LOTBs</i>
Appendix A-2	<i>Hammer Calibration Record</i>
Appendix A-3	<i>Supporting Field Data</i>
Appendix B	<i>Laboratory Testing Program</i>
Appendix C-1	<i>Vs30 Calculations</i>
Appendix C-2	<i>ARS Online Output</i>
Appendix D	<i>Pile Capacity Analyses</i>
Appendix E	<i>Project Plans</i>
Appendix F	<i>Caltrans and Riverside County Comments and Converse Responses</i>



1.0 INTRODUCTION

This report contains geotechnical/geologic information and foundation recommendations for the Monroe Street Overcrossing associated with the improvements to Interstate 10 (I-10) and Monroe Street Overcrossing (Monroe St. OC) in the City of Indio, Riverside County, California. The approximate location of the Monroe St. OC is shown on Figure No. 1, *Approximate Monroe Street Overcrossing Location Map*.

The geotechnical scope of work for preparing this foundation report included the following tasks.

- Geotechnical field exploration with exploratory borings.
- Laboratory testing of representative subsurface soil samples.
- Geotechnical analysis.
- Preparation of this report presenting our findings, conclusions and recommendations.

2.0 PROJECT DESCRIPTION

The California Department of Transportation (Caltrans), in cooperation with the County of Riverside and the City of Indio, proposes to reconstruct and widen Monroe Street at I-10 to improve the operational performance of the Monroe St. OC. Monroe Street is a north-south, 2-lane divided, arterial at the overcrossing, which is located approximately 0.6 miles north of the intersection of US-60 and Monroe Street.

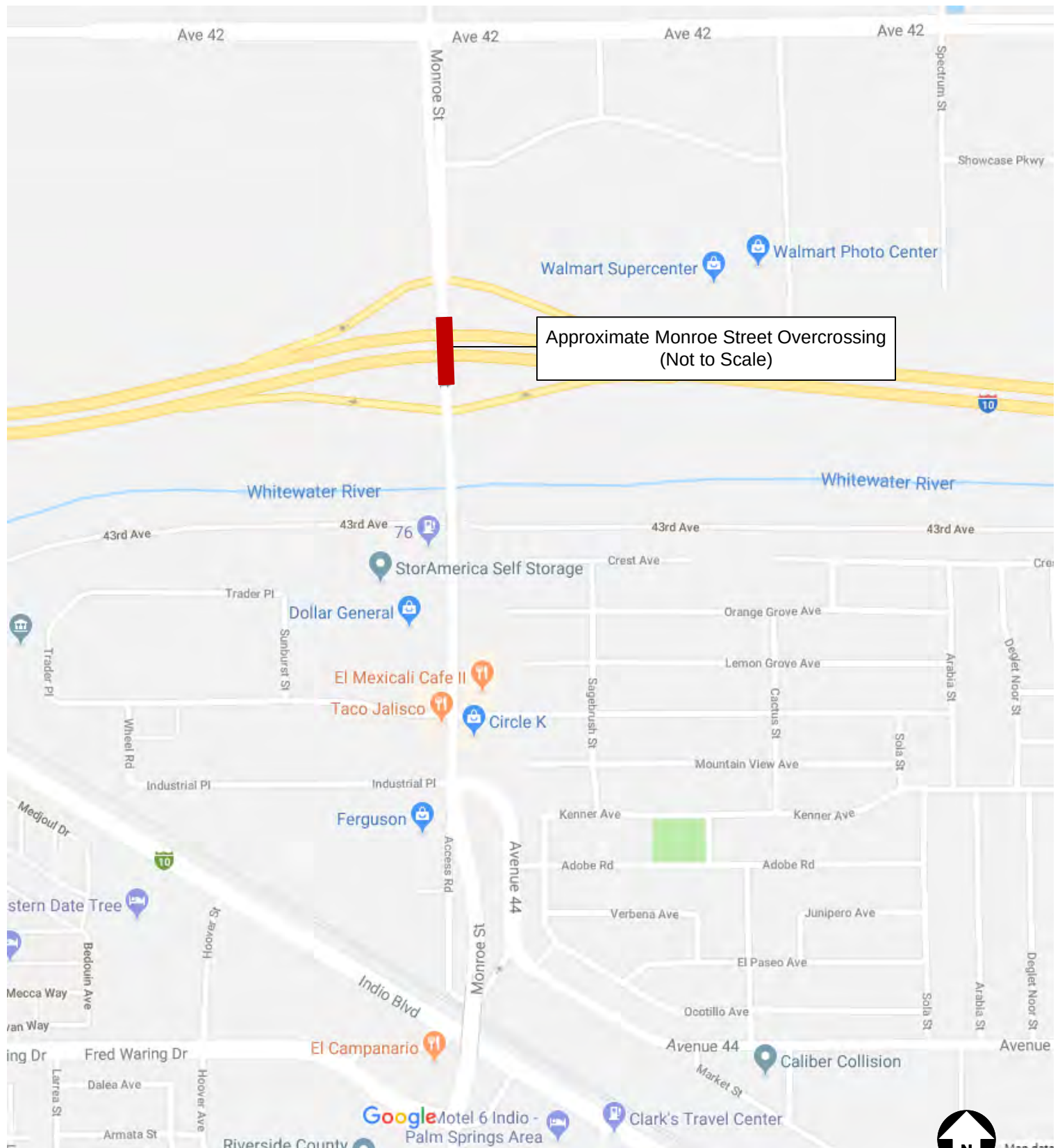
The current I-10/Monroe St. OC configuration is a diamond-type interchange, with signal control at the entrance and exit ramp termini. The project would reconstruct or widen Monroe Street at the interchange, including the existing entrance ramps and exit ramps. As a part of the project, the existing Monroe St. OC, and the adjacent Monroe Street bridge (Channel Bridge) over Coachella Valley Stormwater Channel, also known as Whitewater River, will be replaced with new bridges. The removal of the existing bridges and replacement with new structures are necessary to accommodate the forecast travel demand in the City of Indio for the 2045 design year.

Existing Conditions

Monroe Street, including the approaches of the overcrossing and the entrance and exit ramps to eastbound and westbound I-10, is located on embankments. The I-10 freeway is located approximately at the same level as the surrounding alluvial plain.

The existing bridge with 2 spans is approximately 249 feet long, 47 feet wide, and carries 6 lanes of traffic over I-10. The Channel Bridge (Bridge Number 56C-0083) structure is a 5-span reinforced concrete box girder bridge also constructed in 1972.





Approximate Monroe Street Overcrossing Location Map

Project: Monroe Street Overcrossing
 Interstate 10 and Monroe Street Interchange Improvements
 Location: City of Indio, Riverside County, California
 For: Michael Baker International

Project No.
 14-81-229-03



Converse Consultants

Figure No.

1

The Channel bridge is approximately 490 feet long, and 47 feet wide spanning the full length of the Coachella Valley Stormwater Channel.

Photograph No. 1 illustrates the present Monroe Street OC site conditions.



Photograph No. 1: View of bridge along Monroe Street over I-10 freeway facing north.

Proposed Structure

Based on the General Plan prepared by Parsons dated April 2023, the proposed Monroe Street OC is a two-span structure supported on 2 abutments and a bent. The total length of the bridge is 253 feet with one span being 135 feet and the other being 118 feet long. The deck width is 127'-4", and will accommodate two through lanes in each direction, two left turn lanes, two shared low speed electric vehicle (LSEV) & cycle track, a striped median, and two sidewalks.

The abutments and bent will be supported on driven HP 10x57 steel piles and 3-foot diameter drilled shafts, respectively.

All elevations referenced within this report are based on North American Vertical Datum (NAVD, 88), unless otherwise noted. The elevations of existing structure were based on National Geodetic Vertical Datum (NGVD, 29). The difference between NAVD and NGVD at this location is approximately +2.2 feet (<https://geodesy.noaa.gov/NCAT/>).



3.0 GEOTECHNICAL INVESTIGATION

The geotechnical investigations at the site consisted of the 1972 field exploration conducted for the construction of the existing bridge and the current field exploration conducted by Converse Consultants between November 30 and December 3, 2021.

The 1972 Geotechnical Investigation (Caltrans, 1972) included one 3-inch mud rotary boring and two 2.25-inch cone penetration soundings. These were advanced to depths ranging from 45 feet to 55 feet below existing ground surface, bgs, (approximately Elevation 460 feet to Elevation 450 feet, NGVD 29). The Standard Penetration Test (SPT) was performed at regular intervals to evaluate the engineering properties of the earth materials. The Log of Test Borings (LOTB) of the 1972 investigation is presented in Appendix A.

The Converse field investigation consisted of 6 exploratory borings (A-21-008 through A-21-011, A-21-025 and A-21-026), drilled between November 30 and December 3, 2021. The depth of the borings ranged from 91.5 feet to 121 feet (approximate Elevations 423.6 to 390.3 feet).

The borings were advanced using a standard CME 75 drill rig equipped with 8-inch diameter hollow-stem augers. In general, Standard Penetration Test (SPT) samples and 2.4-inch inside-diameter California Modified samples were taken at 5-foot vertical intervals. The samplers were driven by the successive blows of a 140-lb automatic hammer dropping 30 inches. The hammer energy transfer ratio of the drill rig was 86.2 percent.

A detailed description of the field exploration program, individual boring logs and the LOTB of the current investigation are included in Appendix A.

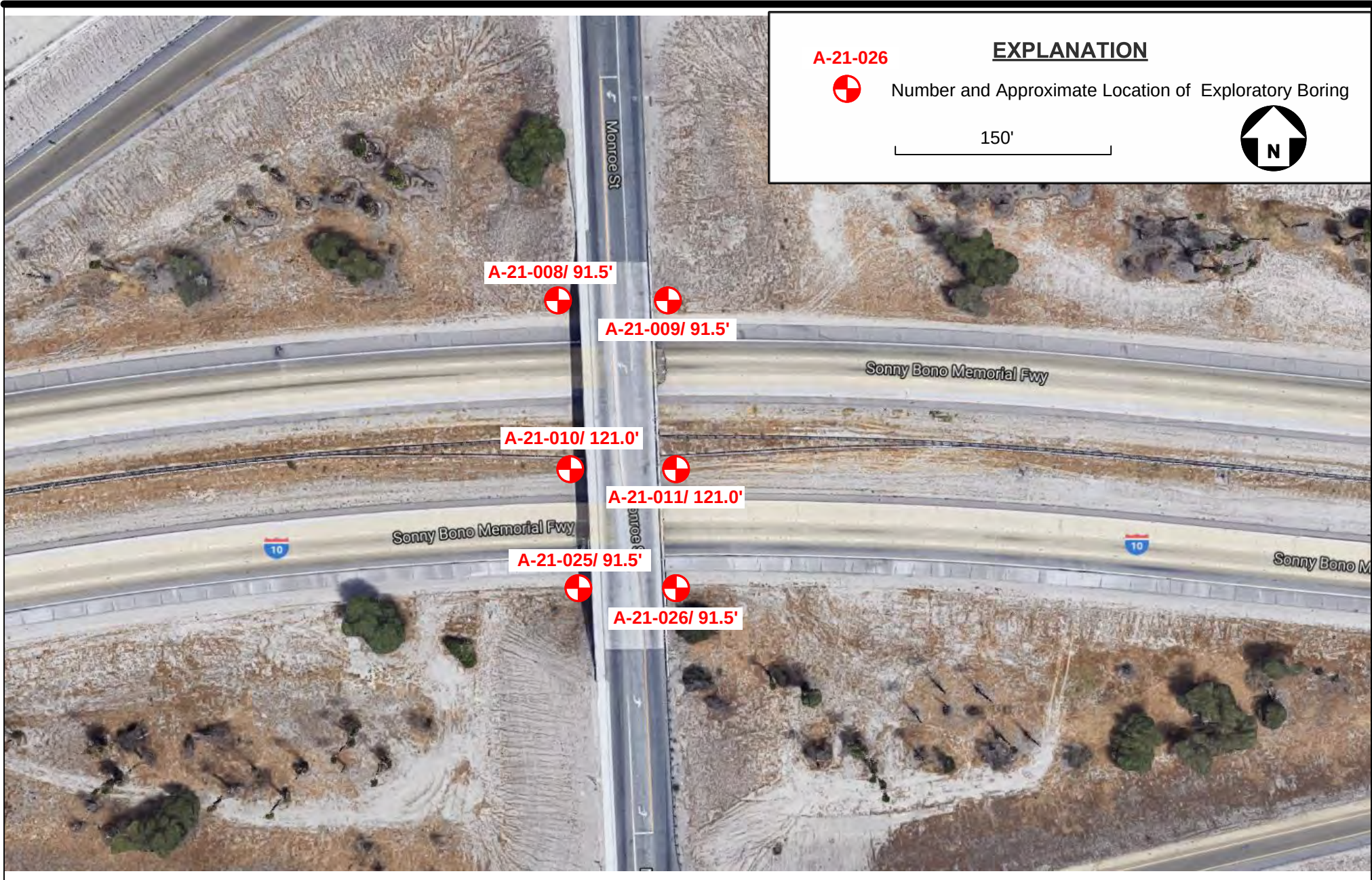
The approximate boring locations are shown in Figure No. 2, *Approximate Boring Locations Map*.

4.0 LABORATORY TESTING PROGRAM

Representative samples of the site soils were tested in the laboratory to aid the soil classification and to evaluate the relevant engineering properties of the site soils. The following is a list of tests performed.

- In-situ moisture content and dry densities (ASTM D2216/2937)
- Expansion Index (ASTM D4829)
- Atterberg Limits (ASTM D4318)
- Soil corrosivity (California Tests 643, 422, and 417)
- Grain size distribution (ASTM D6913)
- Direct shear (ASTM D3080)





Project: Monroe Street Overcrossing
Interstate 10 and Monroe Street Interchange Improvements

Location: City of Indio, Riverside County, California

For: Michael Baker International

Approximate Boring Locations Map

Project No.
14-81-229-03



Converse Consultants

Figure No.

2

- Consolidation (ASTM D2435)
- Unconsolidated Undrained Test (ASTM D2850)

In-situ moisture and dry density data are presented in the individual boring logs and the LOTB in Appendix A. Description of the laboratory test methods and test results are presented in Appendix B, Laboratory Testing Program.

5.0 GEOTECHNICAL CONDITIONS

A general description of the surface and subsurface conditions, various materials and groundwater conditions encountered at each location during our field exploration is discussed below.

5.1 Regional Geology

The project site is located in the Coachella Valley, which is part of the broader Salton Trough within the Colorado Desert geomorphic province of California. The Salton Trough is a northwest-southeast-trending depression that extends from the Gulf of California to the Banning Pass near Palm Springs, California. The Little San Bernardino Mountains and Chocolate Mountains form the northeastern boundary of the Coachella Valley; and the Santa Rosa Mountains form the southwest boundary. Structurally, the Salton Trough is dominated by several northwest-southeast trending faults, the most notable of which are the San Andreas Fault and the San Jacinto Fault.

A thick sequence of predominantly non-marine sedimentary material has been deposited in the Coachella Valley from Miocene time to the present. The mountains surrounding the Coachella Valley are comprised predominantly of Precambrian Metamorphic and Miocene granitic rocks. Local surficial geologic units consist of varying thicknesses of Quaternary eolian sand and alluvial deposits.

5.2 Local Geology

On-site soils consist of Quaternary alluvial deposits. These deposits primarily consist of alluvial sand and clay. Deeper sediments may be part of ancient Lake Cahuilla deposits. These deposits primarily consist of clay with some micaceous silt (Dibblee, 2008).

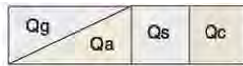
The site and surrounding local geology is shown on Figure No. 3, *Geologic Map*.

5.3 Surface Conditions

The freeway is located on relatively flat natural grade of the surrounding alluvial plain (approximately at Elevation 506 feet). Monroe Street and the ramps are on embankments at this location. The abutment slopes have heights ranging from approximately 27 feet to



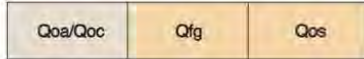
Legend



SURFICIAL SEDIMENTS

Unindurated, undissected alluvial sediments

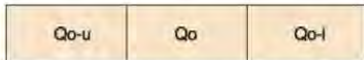
- Qg** Alluvial sand and gravel of major creeks and stream washes
Qa Alluvial sand and gravel of valley areas
Qs Loose fine sand deposited by prevailing winds as dunes or thin cover over **Qa** or **Qoa**
Qc Clay of playa lakes, light gray, generally alkaline, with some micaceous silt



OLDER SURFICIAL SEDIMENTS

Weakly indurated, dissected; age, Pleistocene

- Qoa/Qoc** Older alluvial gravel and sand, gray; includes old lakebeds
Qfg Funglomerate; NE of San Andreas fault clasts mostly brown-gray, poorly bedded; SW of San Andreas fault clasts mostly dark gray, poorly bedded to non-bedded
Qos Older sand deposits



OCOTILLO FORMATION

(Indio Hills Formation of Stotts, 1965) Terrestrial deposits; age, Pleistocene

- Qo-u** (Differentiated locally as upper Toro) Upper unit, boulder-conglomerate, gray
Qo Funglomerate of mostly gray conglomerate, sandstone, silts and tuff, some vertebrate fossil fragments



PALM SPRING FORMATION

(Thousand Palms Formation of Stotts, 1965) Terrestrial sedimentary rocks, weakly to moderately lithified; age, Pliocene and early Pleistocene

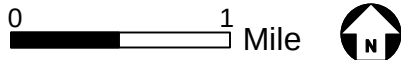
- Tp** Clastic sedimentary deposits, light gray arkosic sandstone with interbedded sandy silts, claystone, and conglomerate, unfossiliferous



MECCA FORMATION

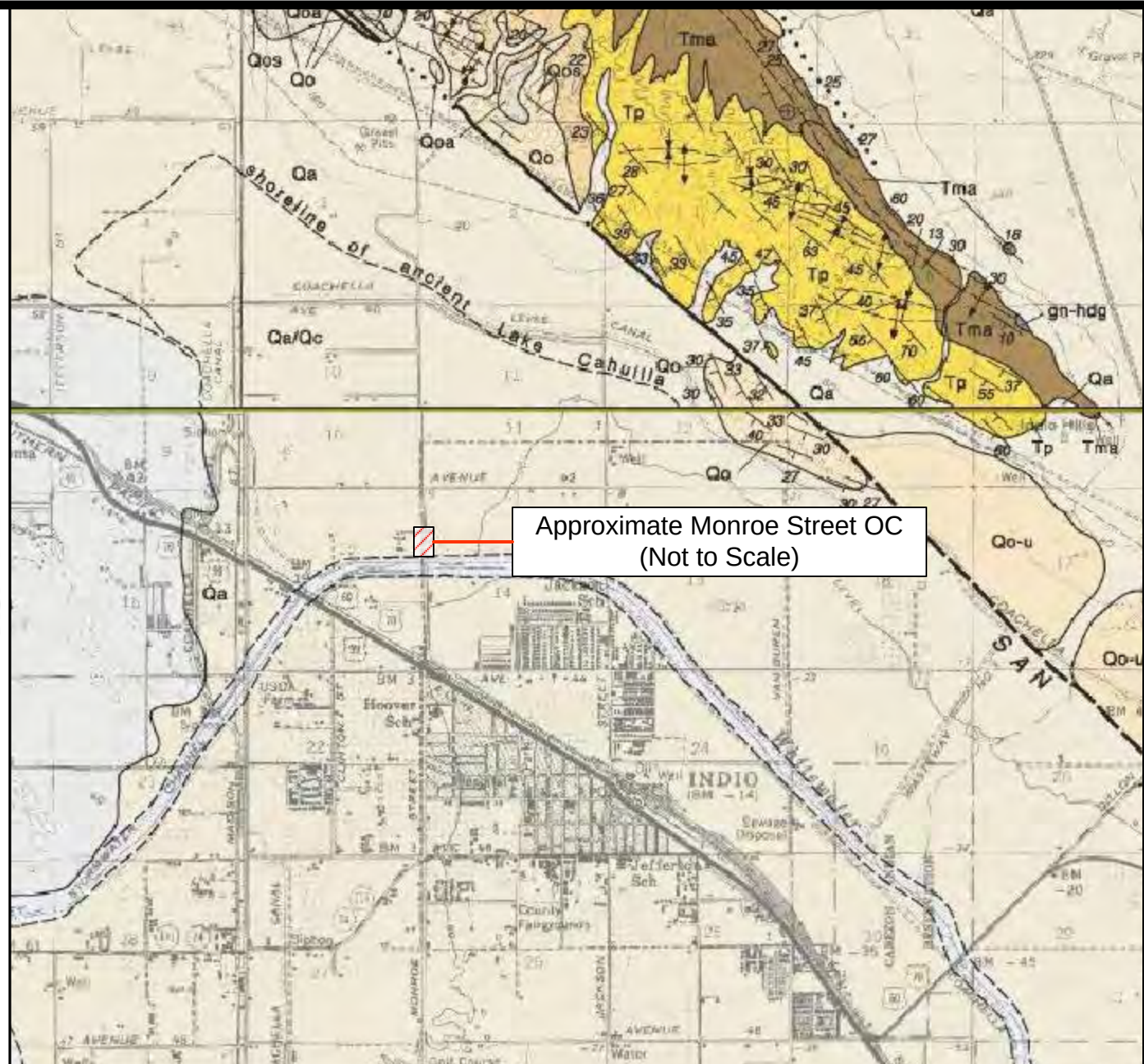
Terrestrial alluvial fan sedimentary rocks, weakly to moderately lithified; age, Miocene-Pliocene

- Tma** Clay, sandstone, and conglomerate containing coarse angular to sub-rounded clasts of granitic and metamorphic debris, reddish to gray and yellow; conformable and unconformable with the overlying Palm Spring Formation.



Map adapted from:

1. Dibblee, T.W., and Minch, J.A., 2008, Geologic map of the Thousand Palms & Lost Horse Mountain 15 minute quadrangles, Riverside County, California: Dibblee Geological Foundation, Dibblee Foundation Map DF-372, scale 1:62,500.
2. Dibblee, T.W., and Minch, J.A., 2008, Geologic map of the Palm Desert & Coachella 15 minute quadrangles, Riverside County, California: Dibblee Geological Foundation, Dibblee Foundation Map DF-373, scale 1:62,500.



Project: Monroe Street Overcrossing
 Interstate 10 and Monroe Street Interchange Improvements
 Location: City of Indio, Riverside County, California
 For: Michael Baker International

Geologic Map

Project No
 14-81-229-03



Converse Consultants

FIGURE

3

30 feet and slope ratios of approximately 1.5:1 (horizontal:vertical) or flatter. Most of the abutment slopes are bare without any vegetation. Some minor erosions are present due to surface runoff.

5.4 Subsurface soil

The 1972 Caltrans investigation, conducted from the natural grade at the site (Elevation 503 feet) indicates the site is underlain by “slightly compact to compact light gray interbedded micaceous very fine to fine sand and laminated clayey silt” to a depth of approximately 43 feet below existing ground surface, bgs (approximate Elevation 460 feet, NGVD 29). Below Elevation 460 feet, the soil is described as “dense light gray micaceous very fine to fine sand with laminated clayey silt” to 57 feet, the maximum depth explored (Elevation 446, NGVD29).

The exploratory borings of 2021 Converse investigation was conducted at current grades of the site ranging from Elevations 510 to 515 feet. The borings indicate that the site is underlain by fill up to a depth of 7.5 feet bgs (corresponding elevation of 507.6 feet). The fill comprised of a mixture of fine to coarse grained, medium dense to very dense sand, with occasional silt and gravel. The fill is underlain by alluvium to the maximum explored depth of 121.0 feet bgs (corresponding to an elevation of 390.5 feet). The alluvium is comprised of a mixture of fine to coarse grained, medium dense to very dense poorly graded sands and silty sands interlayered with stiff to hard sandy silts and occasional sandy clay layers. Medium dense sands were observed predominantly in the top 30 feet of the subsurface soils.

For a detailed description of the subsurface materials encountered in the exploratory borings, see the boring records in Appendix A, Field Exploration.

6.0 GROUNDWATER

Based on the As-built borings presented on LOTB sheet (Caltrans, 1972), groundwater was encountered at approximately 20 feet, bgs (at approximate elevation of 485 feet, NGVD 29). It is not clear from the LOTB whether this was a perched water condition.

In 2021 Converse investigation the groundwater was encountered at elevation of 423 feet (approximately at 88.5 feet bgs). Based on the available information, the groundwater conditions are summarized in the following table.



Table No. 1: Measured Groundwater Table

Location or Borehole No.	Ground Surface Elevation (feet)	Groundwater Table		Date Measured	Notes
		Depth (feet)	Elevation (feet)		
B-2	507.2	20.0	487.2	1967	As-Built Plans (1973)
*Global ID T0606500661	511.5	35.0 to 45.0	476.5 and 466.5	1991 and 1995	7 monitoring wells, approx. 1,200 feet south of the Monroe St. OC over Coachella Valley Stormwater Channel
*Global ID T0606500671	507.5	37.0	470.5	1991	1 well, approx. 2,000 feet southwest and 5 feet higher in elevation than the Monroe Street bridges
*Global ID T10000001757	516.5	60.0 to 79.0	456.5 and 437.5	2003 and 2011	5 monitoring wells, approx. 1.5 miles south and approximately 5 feet higher in elevation than the Monroe Street Bridges
A-21-008	515.1	N/E	N/E	2021	Converse Field Investigation (2021)
A-21-009	514.9	N/E	N/E	2021	
A-21-010	511.5	88.5	423.0	2021	
A-21-011	511.3	87.6	423.7	2021	
A-21-025	510.5	87.3	423.2	2021	
A-21-026	510.1	86.9	423.2	2021	
* The State Water Resources Control Board's GeoTracker Database was accessed in June 2022 (SWRCB, 2022) to establish historic groundwater levels. N/E = Not Encountered					

The elevations of groundwater observed in the current investigation are lower than historical elevations observed at the site and the vicinity. The groundwater elevations may have fluctuated over the years.

Based on the above data, we recommend a Design Groundwater Elevation of 470 feet for Service Limit State analysis and 460 feet for Strength and Extreme Limit State analyses.

7.0 AS-BUILT DATA

The existing Monroe Street OC (Bridge No. 56-0611) is founded on driven concrete piles at all support locations. The pile data for the existing structure is shown in Table No. 2, *Summary of As-Built Foundation Data*.



Table No. 2: Summary of As-Built Foundation Data

Bridge	Support`	Foundation Type	Design Load (Tons)	Approximate Top of Pile Elevation (feet)*	Average As-Built Pile Tip Elevation (feet)*
Monroe St. OC	Abutment 1	17" Circular Driven Concrete Piles	70	525.5	457.2
	Bent 2	17" Circular Driven Concrete Piles	70	504.1	457.2
	Abutment 3	17" Circular Driven Concrete Piles	70	524.4	457.2
Note: * Approximate top of pile and average pile tip elevations shown on As-Built Plans. Elevations are based on NAVD88 datum.					

8.0 SCOUR DATA

The proposed structure does not cross any unlined channels. Therefore, scour is not a design consideration.

9.0 CORROSION EVALUATION

Five representative soil samples were tested to determine minimum electrical resistivity, pH, and chemical content, including soluble sulfate and chloride concentrations. The purpose of these tests was to determine the corrosion potential of site soils when placed in contact with common pipe materials. These tests were performed by AP Engineering and Testing, Inc. (Pomona, CA) in accordance with California Tests 643, 422, 417 and Caltrans geotechnical module for corrosion evaluation (Caltrans 2022). The test results are presented in Appendix B, *Laboratory Testing Program* and summarized in the table below.

Table No. 3: Soil Corrosion Test Summary

Boring	Elevation (feet)	Minimum Resistivity (Ohm-Cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)	Corrosive
A-21-009	514.9-509.9	1,667	8.7	38	326	No
A-21-010	491.5-490.0	4,861	8.8	22	37	No
A-21-010	451.5-450.0	2,126	8.8	46	117	No
A-21-011	481.3-479.8	1,319	8.7	48	115	No
A-21-025	505.5-500.5	2,054	8.8	38	102	No

According to Caltrans corrosion guidelines (Caltrans, 2021), a site to be corrosive to foundation elements if one or more of the following conditions exist.



- Chloride concentration is greater than or equal to 500 parts per million (ppm)
- Sulfate concentration is greater than or equal to 1,500 ppm
- The pH is 5.5 or less.

According to Caltrans guidelines, resistivity is an indicator but not a parameter to define corrosivity for structures.

Based on the test results and Caltrans guidelines, soils are considered non-corrosive. However, Converse does not practice in the area of corrosion consulting. If needed, a qualified corrosion consultant should provide appropriate corrosion mitigation measures for any ferrous metals in contact with the site soils.

10.0 SEISMIC INFORMATION

Seismic information is discussed in the following sections.

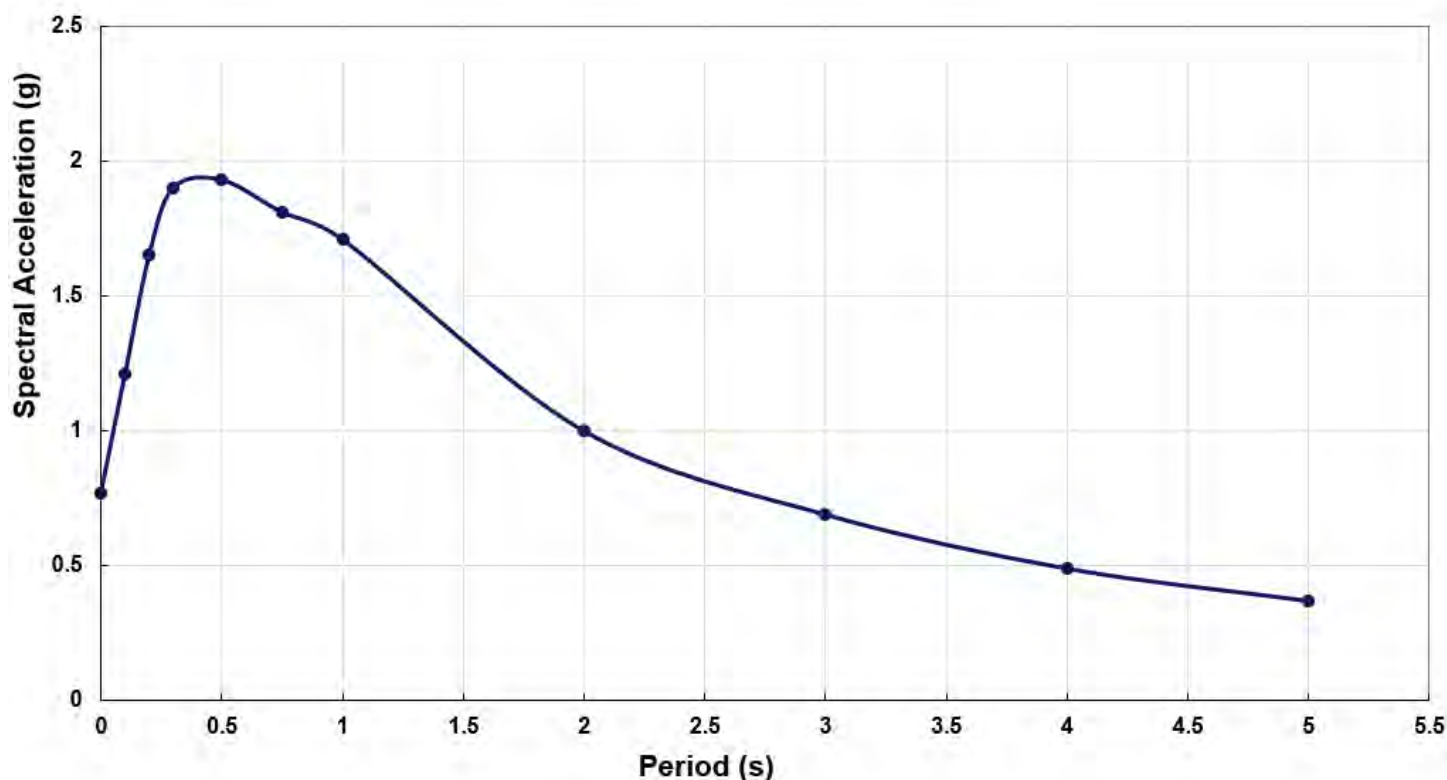
10.1 Ground Motion Hazard

Based on information obtained during the recent site exploration, the time-averaged shear wave velocity (VS30) for the upper 100 feet of soil at the site is estimated to be 886 feet/sec (270 meters/sec). The calculation is attached in Appendix C-1.

The Design Spectrum for the Safety Evaluation Earthquake, as specified in Caltrans Seismic Design Criteria with October 2019 interim revisions, version 2.0 (SDC v2.0) is the probabilistic response spectrum representing the horizontal ground motion at the site with a 5% probability of exceedance in 50 years (return period = 975 years). The USGS's 2014 NSHM is used as the basis to determine the Design Spectrum in the form of the design Acceleration Response Spectrum (ARS).

Caltrans web-based tool ARS Online v3.1.0 was utilized to determine the design ground motion parameters, including the ARS, for the interchange improvement. Ground motion parameters computed using the ARS Online v3.1.0 summarized in *Table 4, Recommended Ground Motion Parameters* and Figure No. 4, *Design ARS Curve*.





Period (s)	Spectral Acceleration (g)
0.1	1.21
0.2	1.65
0.3	1.9
0.5	1.93
0.75	1.81
1	1.71
2	1
3	0.69
4	0.49
5	0.37

1. Latitude = 33.7395; Longitude = -116.234
2. Peak Ground Acceleration (PGA) = 0.77g
3. Shear Wave Velocity (V_{s30}) = 270 m/s
4. Damping = 5%
5. ARS Online Tool V3.0.2 and Caltrans SDC 2.0.
6. Deaggregation analysis: Mean magnitude = 7.39 and mean site to source distance 4.2 km (2.61 miles).

Preliminary Design ARS Curve

Project: Monroe Street Overcrossing
 Interstate 10 and Monroe Street Interchange Improvements
 Location: City of Indio, Riverside County, California
 For: Michael Baker International

Project No.
 14-81-229-03



Converse Consultants

Figure No.

4

Table No. 4: Recommended Ground Motion Parameters

Project	Site Parameters			Design Ground Motion Parameters (Return Period = 975 years)		
	Location		Shear Wave Velocity V_{s30} (m/sec)	Horizontal Peak Ground Acceleration HPGA (g)	Mean Earthquake M (Moment Magnitude)	Mean Site-to- Fault Source Distance R (km)
	Latitude (degrees)	Longitude (degrees)				
I-10 Monroe Interchange Improvement	33.7395	-116.234	270	0.77	7.39	4.21

The design ARS curve is presented in Figure 4, *Design ARS Curve*. ARS online output is presented in Appendix C-2.

According to Sections 6.1 and 6.2.3 of the SDC, v2.0, a site to be classified as “Class S1” if all the following conditions exist. Any soil that does not satisfy the requirements of Class S1 shall be classified as “Class S2.”

- Standard penetration test, $(N_1)_{60} \geq 30$ (Granular soils)
- Undrained shear strength, $s_u > 2000$ psf (Cohesive soils)
- Shear wave velocity, $v_s > 886$ ft/sec
- Not susceptible to liquefaction, lateral spreading, or scour

Based on field investigation, laboratory testing and engineering analyses, no soils are susceptible to liquefaction, lateral spreading, or scour. However, due to low blow counts in a few soil layers, soils at the site are only marginally considered "Class S2".

10.2 Other Seismic Hazards

Other seismic hazards are presented in the following sections.

10.2.1 Surface Fault Rupture Potential

The structure is not located within the Alquist-Priolo Earthquake Fault Zone or 1,000 feet from any Holocene or younger aged fault. Therefore, per Caltrans MTD 20-10, the structures are not considered susceptible to surface fault rupture hazards.

10.2.2 Liquefaction Potential

The design groundwater level at the site is expected to be deeper than 50 feet bgs (corresponding elevation of 460 feet) and the material at those depths are dense silty sands; therefore, liquefaction potential and its effect (i.e., liquefaction-induced settlement, down drag, lateral spreading) does not exist at the site.



10.2.3 Seismic Slope Stability

The project area is located in relatively flat terrain. The slopes near the existing Monroe OC embankments have slope gradients of approximately 2H:1V or flatter and have factors of safety more than 1.1 under design seismic loading. Therefore, we anticipate seismic slope stability will not be an issue at this site.

11.0 GEOTECHNICAL RECOMMENDATIONS

The Geotechnical recommendations are discussed in the following sections.

11.1 Pile Foundations

The 95% plans prepared by Parsons indicate that driven HP 10x57 piles will be used to support the abutments and 36" diameter drilled shafts will be used to support the bent. The geotechnical capacities of driven piles and drilled shafts were evaluated per latest AASHTO LRFD BDS 8th Edition (AASHTO, 2017) and California Amendments, and Caltrans Memo to Designers 3-1, *Deep Foundations*. Pile foundation recommendations and are presented below.

11.1.1 Axial Geotechnical Capacities

The geotechnical capacities for compressive and tensile loading on HP 10x57 piles and drilled shafts were analyzed using the APILE (Ensoft, 2019 version) and SHAFT (Ensoft, 2017 version) software, respectively. The analyses are presented in Appendix D, *Pile Capacity Analyses*. General foundation information including Foundation Design Data Sheet and governing loads provided by Parsons are presented in Table Nos. 4 and 5. Pile design and data are presented in Table Nos. 6 and 7.

The geotechnical capacities of both driven piles and drilled shafts were computed neglecting the end bearing. In the case of HP 10x57 piles, end bearing is considered minor due to the limited cross-sectional area of piles. The end bearing of CIDH piles was neglected as the piles are likely to penetrate into the layers below the groundwater and the wet method could be employed for the shaft construction.



Table No. 5: Foundation Design Data Sheet

Foundation Design Data Sheet							
Support No.	Pile Type	Finished Grade Elevation (ft)	Cut-off Elevation (ft)	Pile Cap Size (ft)		Permissible Settlement Under Service Load (in)	Number of Piles per Support
				B	L		
Abut 1	HP 10x57	529.5	524.42	10	129	1	63
Bent 2	36" CIDH	511.5	503.25	21	21	1	6
Abut 3	HP 10x57	526.5	521.42	8	129	1	53

Table No. 6: Foundation Factored Design Loads

Foundation Factored Design Loads										
Support No.	Service-I Limit State (kips)		Strength/Construction Limit State (Controlling Group, kips)				Extreme Event Limit State (Controlling Group, kips)			
	Total Load Per Support	Permanent Loads Per Support	Compression		Tension		Compression		Tension	
			Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile
Abut 1	5300	4500	7700	190	0	0	4500	140	0	10
Bent 2	2700	2100	3700	700	0	0	3000	1500	0	630
Abut 3	4500	3800	6600	180	0	20	3800	140	0	30



Table No. 7: Foundation Design Recommendations

Foundation Design Recommendations												
Support Location	Pile Type	Cut-off Elevation (ft)	Service-I Limit State Load per Support		Total Permissible Support Settlement (in)	Required Factored Nominal Resistance (Kips)				Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Required Nominal Driving Resistance (kips)
						Strength		Extreme Event				
			Total	Permanent		Comp (Φqs = 0.7)	Tension (Φqs = 0.7)	Comp (Φqs =1.0)	Tension (Φqs =1.0)			
Abut 1	HP 10x57	524.42	5300	4500	1	280	0	140	10	469 (a-I) 486 (a-II) 509 (b-II) 494 (c) 504 (d)	469	280
Bent 2	36" CIDH	503.25	2700	2100	1	1000	0	1500	630	447 (a-I) 426 (a-II) 446 (b-II) 465(c) 475 (d)	426	N/A
Abut 3	HP 10x57	521.42	4500	3800	1	260	30	140	30	471 (a-I) 485 (a-II) 498 (b-I) 498 (b-II) 491 (c) 503 (d)	471	260
Notes: 1. Design tip elevations are controlled by: (a-I) Compression (Strength Limit), (a-II) Compression (Extreme Event), (b-I) Tension (Strength Limit), (b-II) Tension (Extreme Event), (c) Settlement (Service Limit), and (d) Lateral Capacity.; 2. Tip elevations for Lateral Capacity were provided by Structure Design.; 3. The specified tip elevations for HP piles shall not be raised above the design tip elevations for tension, lateral, and tolerable settlement.; 4. The CIDH Specified Tip Elevation shall not be raised.; 5. End bearing was neglected in the computation of pile capacities at all pile support locations.												



Table No. 8: Pile Data Table

Pile Data Table						
Location	Pile Type	Nominal Resistance (Kips)		Design Tip Elevation (ft)	Specified Tip Elevation (ft)	Required Nominal Driving Resistance (kips)
		Compression	Tension			
Abut 1	HP 10x57	280	10	469 (a) 509 (b) 494 (c) 504 (d)	469	280
Bent 2	36" CIDH	1500	630	426 (a) 446 (b) 465(c) 475 (d)	426	N/A
Abut 3	HP 10x57	260	30	471 (a) 498 (b) 491 (c) 503 (d)	471	260
Notes: 1. Design tip elevations are controlled by: (a) Compression, (b) Tension, (c) Settlement (Service Limit), and (d) Lateral Capacity 2. Tip elevations for Lateral Capacity were provided by Structure Design. 3. The specified tip elevations for HP piles shall not be raised above the design tip elevations for tension, lateral, and tolerable settlement. 4. The CIDH Specified Tip Elevation shall not be raised. 5. End bearing was neglected in computation of pile capacities at all pile support locations.						

Since the plans indicate that the piles are spaced more than 3 diameters apart at all support locations, reduction factors were not used to account for the group effect for piles. Since the Shaft group cap is in intimate contact with ground consisting of medium dense to denser soil, and no scour below the shaft cap is anticipated, reduction factors were not used to account for the group effect for shafts.

11.1.2 Pile Lateral Capacity

Pile lateral capacities were analyzed by Structure Design using the following design soil parameters.



Table No. 9: L-Pile Input Parameters for Abutment 1

Location	Boring	Depth (ft)	Top Elevation (ft)	Bottom Elevation (ft)	Layer Thickness (ft)	Soil	Lpile Soil model	N1,60	Effective Unit Weight, γ (pcf)	Friction Angle ϕ ($^\circ$)	Undrained Shear Strength S_u (ksf)	k (pci)	e_{50}	P Multiplier, P_m
Abutment 1	A-21-025 and A-21-026	0-40	530	490	40	Silty Sand	"Sand (Reese)" or "API Sand (O'Neil)"	25	130	36	N/A	130	N/A	(Transverse) $P_m = 1.0$ (Longitudinal) Row 1 = 0.9 Row 2 = 0.6 Row 3 = 0.5
		40-70	490	460	30	Sandy Silt	"Stiff Clay without free water (Reese)" or "Mod. Stiff Clay without free water" ¹	N/A	115	N/A	5	800 static 400 seismic	0.004	
		70-80	460 ²	450	10	Silty Sand	"Sand (Reese)" or "API Sand (O'Neil)"	55	72.6	38	N/A	125	N/A	
		80-95	450	435	15	Sandy Silt	Stiff Clay with free water (Reese)	N/A	52.6	N/A	6	800 static 400 seismic	0.004	
		95-110	435	420	15	Silty Sand	"Sand (Reese)" or "API Sand (O'Neil)"	60	72.6	42	N/A	150	N/A	

Notes:

1. k value, above groundwater level, is to be used for "Mod. Stiff Clay without free water" Method only.
2. The Undrained Shear Strength, S_u , values were primarily obtained from laboratory test results. In case where laboratory data was unavailable, these values were derived from Cone Penetration Test (CPT) C-22-041, conducted during the Whitewater Channel Bridge investigation. See Appendix (A-3) for the CPT location and data.
3. Design Groundwater level at 460 ft Elevation should be used for Lateral analysis for Strength and Extreme limits. If the lateral analysis has to be done for the Service Limit, the groundwater elevation has to be raised to 470 ft and the buoyant unit weights should be considered for all soils below the groundwater level.
4. Longitudinal = parallel to the overcrossing. Transverse = perpendicular to the overcrossing.



Table No. 10: L-Pile Input Parameters for Abutment 3

Support Location	Boring	Depth (ft)	Top Elevation (ft)	Bottom Elevation (ft)	Layer Thickness (ft)	Soil	Lpile Soil model	N _{1,60}	Effective Unit Weight, γ (pcf)	Friction Angle ϕ (°)	Undrained Shear Strength S_u	k (pci)	e_{50}	P Multiplier, P_m
Abutment 3	A-21-008 and A-21-009	0-32	527	495	32	Silty Sand	"Sand (Reese)" or "API Sand (O'Neil)"	25	130	36	N/A	130	N/A	(Transverse) Row 1 = 1.0 Row 2 = 0.85 Row 3 and higher = 0.7 (Longitudinal) $P_m = 1.0$
		32-62	495	465	30	Sandy Silt	"Stiff Clay without free water (Reese)" or "Mod. Stiff Clay without free water" ¹	N/A	115	N/A	5	800 static 400 seismic	0.004	
		62-67	465	460	5	Silty Sand	"Sand (Reese)" or "API Sand (O'Neil)"	50	135	38	N/A	200	N/A	
		67 – 82	460 ²	445	15	Silty Sand	"Sand (Reese)" or "API Sand (O'Neil)"	50	72.6	38	N/A	125	N/A	
		82 – 97	445	430	15	Sandy Silt	Stiff Clay with free water (Reese)	N/A	52.6	N/A	6	800 static 400 seismic	0.004	
		97 – 107	430	420	10	Silty Sand	"Sand (Reese)" or "API Sand (O'Neil)"	60	72.6	42	N/A	150	N/A	

Notes:

1. k value is only to be used for "Mod. Stiff Clay without free water" Method.
2. The Undrained Shear Strength, S_u , values were primarily obtained from laboratory test results. In the case where laboratory data was unavailable, these values were derived from Cone Penetration Test (CPT) C-22-041, conducted during the Whitewater Channel Bridge investigation. See Appendix (A-3) for the CPT location and data.
3. Design Groundwater level at 460 ft Elevation should be used for Lateral analysis for Strength and Extreme limits. If the lateral analysis has to be done for the Service Limit, the groundwater elevation has to be raised to 470 ft and the buoyant unit weights should be considered for all soils below the groundwater level.
4. Longitudinal = parallel to the overcrossing. Transverse = perpendicular to the overcrossing.



Table No. 11: L-Pile Input Parameters for Bent 2

Support Location	Boring	Depth (ft)	Top Elevation (ft)	Bottom Elevation (ft)	Layer Thickness (ft)	Soil	Lpile Soil model	N _{1,60}	Effective Unit Weight, γ (pcf)	Friction Angle ϕ (°)	Undrained Shear Strength S_u (ksf)	k (pci)	e_{50}	P Multiplier, P_m
Bent 2	A-21-010 and A-21-011	0-20	510	490	20	Silty Sand	API Sand (O'Neil)	25	130	36	N/A	130	N/A	(Transverse) Row 1 = 0.67 Row 2 = 0.45 Row 3 and higher = 0.32 (See Note 3) (Longitudinal) Row 1 = 1.0 Row 2 = 0.85
		20-30	490	480	10	Sandy Silt	"Stiff Clay without free water (Reese)" or "Mod. Stiff Clay without free water" ¹	N/A	118	N/A	5	800 static 400 seismic	0.004	
		30-40	480	470	10	Silty Sand	API Sand (O'Neil)	34	130	37	N/A	160	N/A	
		40-50	470	460	10	Sandy Silt	"Stiff Clay without free water (Reese)" or "Mod. Stiff Clay without free water" ¹	N/A	115	N/A	6	800 static 400 seismic	0.004	
		50-70	460 ²	440	20	Sandy Silt	Stiff Clay with free water (Reese)	N/A	52.6	N/A	6	800 static 400 seismic	0.004	
		70-120	440	390	50	Silty Sand	API Sand (O'Neil)	70	72.6	42	N/A	150	N/A	

- Notes:**
- k value, above groundwater level, is to be used for "Mod. Stiff Clay without free water" Method only.
 - The Undrained Shear Strength, S_u , values were primarily obtained from laboratory test results. In the case where laboratory data was unavailable, these values were derived from Cone Penetration Test (CPT) C-22-041, conducted during the Whitewater Channel Bridge investigation. See Appendix (A-3) for the CPT location and data.
 - It was assumed that the lateral analysis for the bent would be performed for the Extreme Limit State only. Therefore, the design parameters in the table were computed for a Design Groundwater Elevation of 460 ft.
 - Longitudinal= parallel to the overcrossing. Transverse = perpendicular to the overcrossing.
 - Shafts in adjacent footings will interact with each other. Therefore, when analyzing for the transverse direction, the two outermost shafts should be considered to be on Rows 1 and 2. All the other shafts should be considered to be on Rows 3 and higher.



The tip elevations evaluated by the Structure Design were incorporated into the Pile Data Table.

We recommend a passive pressure of 230 psf to be used for lateral resistance of the pile caps if necessary.

11.2 Approach Fills

We did not identify areas of potentially surficial loose soils and slope movement within the existing slope face during our field reconnaissance. If additional fill placement is planned, we do not anticipate settlements in excess of ½ inch of engineered fill placed on appropriately prepared subgrade. The settlement is anticipated to occur primarily during fill placement.

We expect engineered fill slopes constructed of local materials will be grossly and surficially stable, if placed at slope ratios of 2H:1V or flatter.

11.3 Pile Drivability

The piles will be driven through interlayered medium dense and dense silty sands and very stiff to hard sandy silts to the underlying dense silty sand layers. The piles foundations of the existing bridge consist of 17-inch driven concrete piles. Considering the above and the absence of relatively thick dense sand layers with cobble or gravel, we are of the opinion that the piles could be driven to the specified tip elevations without inducing excessive stresses on the piles.

12.0 NOTES FOR SPECIFICATIONS

Caltrans Standard Specifications (SSP) Section 19-6.03D; The waiting period for pile installation is recommended to be 30 days and no additional surcharge height is needed. Contractor should provide pile driving submittal record to the Geotechnical Engineer to review.

(SSP) Section 49-1.03; The excavation for the pile shafts at the bent is expected to penetrate into depths below the groundwater table. In addition, relatively thick poorly graded sand layers are expected to be encountered in the excavations for shafts. Caving could occur in such layers if no appropriate mitigation measures are taken. Therefore, appropriate methods should be considered for the excavation and concreting of the shafts.

(SSP) Section 49-2.01C (5); Use of pile set period is allowed as an option instead of longer piling.



(SSP) Section 49-3.02C (1); The shaft construction sequence should be developed to avoid the shaft located within 4 diameters being constructed concurrently or consecutively.

13.0 NOTES FOR CONSTRUCTION

Driven HP Piles

Pile acceptance is to be based on Standard Specifications 49-2.01.

The Nominal Driving Resistances were evaluated using a groundwater table elevation of 460 feet. If the groundwater table at the time of construction is significantly different from the assumed groundwater elevation, the driving resistance could be different. Structure Construction should review the groundwater levels at the time of construction and evaluate whether appropriate changes could be made to the specified driving resistances.

Drilled Shafts

It is anticipated that part of the excavation and concrete placement would occur at depths below the groundwater surface. Therefore, the contractor should consider an appropriate construction method. The elevation of the groundwater observed during the current investigation was approximately 423 feet. However, the 1972 investigation for the existing bridge and groundwater measurements in the water wells in the vicinity indicate groundwater levels in the elevation range of 438 to 485 feet. Since the current investigation was conducted during a relatively long drought, the groundwater elevations observed in the current geotechnical investigation may be lower than historical levels at the site. Therefore, we recommend that the contractor install a piezometer at the site to determine the water level.

Groundwater Recommendation and Monitoring Well

We recommended installing a piezometer during construction to check the groundwater level since the groundwater level has fluctuated significantly over the years. Groundwater level could affect both driving resistance and shaft construction. If the groundwater level at the time of construction is significantly different, tip elevations may need to be verified.

During the current investigation (Converse 2022), a groundwater monitoring well was installed on the northwestern side of the existing Channel Bridge on August 17, 2022. Groundwater is monitored every 4 months up until August 2024. Measured groundwater readings are presented in the following table. Additional groundwater monitoring data following publication of this report will be available with Michael Baker.



Table No. 12: Groundwater Well Data

Date	Depth to Water below ground surface (feet)	*Approximate Elevation	Well Condition	Remarks/Comments
8/17/2022	82.00	427.0	New	Drill 100-foot Monitoring Well
12/02/2022	89.12	419.98	Like New	Partly Cloudy
03/30/2023	88.51	420.6	Like New	Partly Cloudy
*Monitoring well elevation was not precisely surveyed during field investigation.				

14.0 LIMITATIONS

This report is prepared for the project described herein and is intended for use solely by Michael Baker International, Inc., and their authorized agents to assist in the design and construction of the proposed project. Our findings and recommendations were obtained in accordance with generally accepted professional principles practiced in geotechnical engineering. We make no other warranty, either expressed or implied.

Converse Consultants is not responsible or liable for any claims or damages associated with interpretation of available information provided to others (any third party). Site exploration identifies actual soil conditions only at those points where samples are taken, when they are taken. Borings were completed exactly at the foundation locations and is not extrapolated in this case. Actual conditions in areas not sampled may differ. In the event that changes to the project occur, or additional, relevant information about the project is brought to our attention, the recommendations contained in this report may not be valid unless these changes and additional relevant information are reviewed, and the recommendations of this report are modified or verified in writing. In addition, the recommendations can only be finalized by observing actual subsurface conditions revealed during construction. Converse cannot be held responsible for misinterpretation or changes to our recommendations made by others during construction.

Design recommendations given in this report are based on the assumption that the recommendations contained in this report are implemented. Additional consultation may be prudent to interpret Converse's findings for contractors, or to possibly refine these recommendations based upon the review of the actual site conditions encountered during construction. If the scope of the project changes, if project completion is to be delayed, or if the report is to be used for another purpose, this office should be consulted.



15.0 REFERENCES

- AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO), 2017, AASHTO LRFD Bridge Design Specification, 8th Edition, Washington, DC: AASHTO.
- CALIFORNIA STATE WATER RESOURCES CONTROL BOARD (SWRCB), 2021, GeoTracker database (<http://geotracker.waterboards.ca.gov/>), accessed September 2021.
- CALIFORNIA DEPARTMENT OF TRANSPORTATION (Caltrans), 2019, California Amendments to AASHTO LRFD Bridge Design Specifications, 8th Edition, August 2019.
- CALIFORNIA DEPARTMENT OF TRANSPORTATION (Caltrans), 2013, Memo to Designers, 20-10 Fault Rupture, January 2013.
- CALIFORNIA DEPARTMENT OF TRANSPORTATION (Caltrans), 2014, Memo to Designers, 3-1, Deep Foundations, June 2014.
- CALIFORNIA DEPARTMENT OF TRANSPORTATION (Caltrans), 2021, ARS Online, Version 3.0.2, (<https://arsonline.dot.ca.gov/>) accessed in August 2021.
- CALIFORNIA DEPARTMENT OF TRANSPORTATION (Caltrans), 2021, Corrosion Guidelines Version 3.2, dated May 2021.
- CALIFORNIA DEPARTMENT OF TRANSPORTATION (Caltrans), 2022, Caltrans Geotechnical Manual, Corrosion Evaluation Module, dated March 2022.
- CALIFORNIA DEPARTMENT OF TRANSPORTATION (Caltrans), 2021, Foundation Report for Bridges, January 2021.
- CALIFORNIA DEPARTMENT OF TRANSPORTATION (Caltrans), 2021, Caltrans Geotechnical Manual, Soil Correlation, dated March 2021.
- CALIFORNIA DEPARTMENT OF TRANSPORTATION (Caltrans), 2019, Caltrans Geotechnical Manual, Soil and Rock Logging, dated January 2019.
- CALIFORNIA DEPARTMENT OF TRANSPORTATION (Caltrans), 2019, Seismic Design Criteria (SDC), Version 2.0, April 2019.
- CALIFORNIA DEPARTMENT OF TRANSPORTATION (Caltrans), 2023, Standard Specifications, dated 2023.



CALTRANS (FORMERLY CALIFORNIA HIGHWAY TRANSPORTATION AGENCY),
1972, Monroe Street Overcrossing – Bridge No. 56-611, As-Built Plans, Contract
No. 11-037514, Document No. A0002498, signed on August 2, 1972.

DIBBLEE, THOMAS W., 2008, Geologic Map of the Palm Desert & Coachella 15 Minute
Quadrangles, Riverside County, California, Dibblee Geology Center Map #DF-373,
scale 1:62,500, dated 2008.

WILLDAN, 2009 Geotechnical Design Report of I-10/Monroe Street Interchange On-ramp
and Off-ramp Improvement, dated July 2009.



Appendix A

FIELD EXPLORATION



APPENDIX A

FIELD EXPLORATION

Our field investigation included a site reconnaissance of the project limits and a subsurface exploration program consisting of drilling soil borings. During the reconnaissance, the surface conditions were noted, and the borings were marked at locations approved by Danny Walden with Michael Baker International. The approximate boring locations were established in the field by reference to existing streets and other visible features. The locations should be considered accurate only to the degree implied by the method used.

Six exploratory borings were drilled along Monroe St. OC over the I-10 Freeway between November 30, 2021, and December 3, 2021, to investigate the subsurface conditions. Boring information are presented in the following table.

Table No. A-1, Summary of Boring Information

Boring No.	Boring Depth (ft, bgs)		Groundwater Depth (ft, bgs)	Date Completed
	Proposed	Completed		
A-21-008	90.0	91.5	N/E	12/01/2021
A-21-009	90.0	91.5	N/E	12/01/2021
A-21-010	120.0	121.0	88.5	12/02/2021
A-21-011	120.0	121.0	87.6	12/03/2021
A-21-025	90.0	91.5	87.3	11/30/2021
A-21-026	90.0	91.5	86.9	11/30/2021
Note: NE = not encountered.				

For a key to soil symbols and terminology used in the boring records, refer to *Key to Boring Records*. Logs of the exploratory borings are presented in, *Boring Records*. Log of Test Borings (LOTBs) are presented in Appendix A-1.

The borings were advanced using a standard CME 75 drill rig equipped with 8-inch diameter hollow-stem augers. The hammer energy transfer ratio of the drill rig is 86.2 percent (attached in appendix A-2).

Supporting Cone Penetration Test (CPT) data conducted during the nearby Whitewater Channel Bridge investigation are presented in Appendix A-3.

Encountered earth materials were continuously logged by a Converse engineer and visually classified in the field in accordance with the Unified Soil Classification System.



Where appropriate, field descriptions and classifications have been modified to reflect laboratory test results.

Relatively undisturbed samples were obtained using California Modified Samplers (2.4 inches inside diameter and 3 inches outside diameter) lined with thin sample rings. The steel ring sampler was driven into the bottom of the borehole with successive drops of a 140-pound driving weight falling 30 inches. Blow counts at each sample interval are presented on the boring logs. Samples were retained in brass rings (2.4-inches inside diameter and 1 inch in height) and carefully sealed in waterproof plastic containers for shipment to the Converse laboratory. Bulk samples of typical soil types were also obtained.

Standard Penetration Testing (SPT) was performed in accordance with the ASTM Standard D1586 test method using a standard (1.4 inches inside diameter and 2.0 inches outside diameter) split-barrel sampler. The mechanically driven hammer for the SPT sampler was 140 pounds, falling 30 inches for each blow. The recorded blow counts for every 6 inches for a total of 1.5 feet of sampler penetration are shown on the Logs of Borings.

The exact depths at which material changes occur cannot always be established accurately. Unless a more precise depth can be established by other means, changes in material conditions that occur between driven samples are indicated in the log at the top of the next drive sample.

Following the completion of logging and sampling, the borings were backfilled with soil cuttings mixed with cement and compacted by pushing down with an auger using the drill rig weight.

If construction is delayed, the surface may settle over time. We recommend the owner monitor the boring locations and backfill any depressions that might occur or provide protection around the boring locations to prevent trip and fall injuries from occurring near the area of any potential settlement.



GROUP SYMBOLS AND NAMES

Graphic / Symbol	Group Name	Graphic / Symbol	Group Name
	GW Well-graded GRAVEL Well-graded GRAVEL with SAND		CL Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
	GP Poorly graded GRAVEL Poorly graded GRAVEL with SAND		CL-ML SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
	GW-GM Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND		ML SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
	GW-GC Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		OL ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
	GP-GM Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND		OL ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
	GP-GC Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		CH Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
	GM Silty GRAVEL Silty GRAVEL with SAND		MH Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
	GC Clayey GRAVEL Clayey GRAVEL with SAND		OH ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
	GC-GM Silty, Clayey GRAVEL Silty, Clayey GRAVEL with SAND		OH ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY elastic SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
	SW Well-graded SAND Well-graded SAND with GRAVEL		OL/OH ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND
	SP Poorly graded SAND Poorly graded SAND with GRAVEL		Other (see remarks)
	SW-SM Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL		
	SW-SC Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)		
	SP-SM Poorly graded SAND and SILT Poorly graded SAND with SILT and GRAVEL		
	SP-SC Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)		
	SM Silty SAND Silty SAND with GRAVEL		
	SC Clayey SAND Clayey SAND with GRAVEL		
	SC-SM Silty, Clayey SAND Silty, Clayey SAND with GRAVEL		
	PT PEAT		
	COBBLES and BOULDERS		

FIELD AND LABORATORY TESTS

C Consolidation (ASTM D 2435-04)
CL Collapse Potential (ASTM D 5333-03)
CP Compaction Curve (ASTM D 1557)
CR Corrosion, Sulfates, Chlorides (CTM 643-99; CTM 417-06; CTM 422-06)
CU Consolidated Undrained Triaxial (ASTM D 4767-02)
DS Direct Shear (ASTM D 3080-04)
EI Expansion Index (ASTM D 4829-03)
M Moisture Content (ASTM D 2216-05)
OC Organic Content (ASTM D 2974-07)
P Permeability (CTM 220-05)
PA Particle Size Analysis (ASTM D422-63 [2002])
PI Liquid Limit, Plastic Limit, Plasticity Index (AASHTO T 89-02, AASHTO T 90-00)
PL Point Load Index (ASTM D 5731-05)
PM Pressure Meter
PP Pocket Penetrometer
R R-Value (CTM 301-00)
SE Sand Equivalent (CTM 217-99)
SG Specific Gravity (AASHTO T 100-06)
SL Shrinkage Limit (ASTM D 427-04)
SW Swell Potential (ASTM D 4546-03)
TV Pocket Torvane
UC Unconfined Compression - Soil (ASTM D 2166-06) Unconfined Compression - Rock (ASTM D 2938-95)
UU Unconsolidated Undrained Triaxial (ASTM D 2850-03)
UW Unit Weight (ASTM D 4767-04)
VS Vane Shear (AASHTO T 223-96 [2004])

SAMPLER GRAPHIC SYMBOLS

	Standard Penetration Test (SPT)
	Standard California Sampler
	Modified California Sampler
	Shelby Tube
	Piston Sampler
	NX Rock Core
	HQ Rock Core
	Bulk Sample
	Other (see remarks)

DRILLING METHOD SYMBOLS

	Auger Drilling		Mud Rotary Drilling		Dynamic Cone or Hand Driven		Diamond Core
--	----------------	--	---------------------	--	-----------------------------	--	--------------

WATER LEVEL SYMBOLS

	First Water Level Reading (during drilling)
	Static Water Level Reading (short-term)
	Static Water Level Reading (long-term)



Converse Consultants
Geotechnical Engineering & Consulting
Environmental & Groundwater Science
Material Testing & Inspection Services

REPORT TITLE

KEY TO BORING RECORD

DIST 8	COUNTY Riverside	ROUTE I-10	POSTMILE PM R54.2	EA 08-OK7301
------------------	----------------------------	----------------------	-----------------------------	------------------------

PROJECT OR BRIDGE NAME
Monroe Street Overcrossing

BRIDGE NUMBER 56-0897	PREPARED BY Mahmoud Suliman	DATE 12/29/2021	SHEET 1 of 2
---------------------------------	---------------------------------------	---------------------------	------------------------

CONSISTENCY OF COHESIVE SOILS

Descriptor	Unconfined Compressive Strength (tsf)	Pocket Penetrometer (tsf)	Torvane (tsf)	Field Approximation
Very Soft	<0.25	<0.25	<0.12	Easily penetrated several inches by fist
Soft	0.25 - 0.50	0.25 - 0.50	0.12 - 0.25	Easily penetrated several inches by thumb
Medium Stiff	0.50 - 1.0	0.50 - 1.0	0.25 - 0.50	Can be penetrated several inches by thumb with moderate effort
Stiff	1.0 - 2.0	1.0 - 2.0	0.50 - 1.0	Readily indented by thumb but penetrated only with great effort
Very Stiff	2.0 - 4.0	2.0 - 4.0	1.0 - 2.0	Readily indented by thumbnail
Hard	>4.0	>4.0	>2.0	Indented by thumbnail with difficulty

APPARENT DENSITY OF COHESIONLESS SOILS

Descriptor	SPT N_{60} - Value (blows / foot)
Very Loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	>50

MOISTURE

Descriptor	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

PERCENT OF PROPORTION OF SOILS

Descriptor	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

SOIL PARTICLE SIZE

Descriptor	Size
Boulder	> 12 inches
Cobble	3 to 12 inches
Gravel	Coarse Fine
	3/4 inch to 3 inches
	No. 4 Sieve to 3/4 inch
Sand	Coarse Medium Fine
	No. 10 Sieve to No. 4 Sieve
	No. 40 Sieve to No. 10 Sieve
	No. 200 Sieve to No. 40 Sieve
Silt and Clay	Passing No. 200 Sieve

PLASTICITY OF FINE-GRAINED SOILS

Descriptor	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled, and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll, and not much time is required to reach the plastic limit; it cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

CEMENTATION

Descriptor	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

NOTE: This legend sheet provides descriptions and associated criteria for required soil description components only. Refer to Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010), Section 2, for tables of additional soil description components and discussion of soil description and identification.



Converse Consultants

Geotechnical Engineering & Consulting
Environmental & Groundwater Science
Material Testing & Inspection Services

REPORT TITLE**KEY TO BORING RECORD**

DIST 8	COUNTY Riverside	ROUTE I-10	POSTMILE PM R54.2	EA 08-OK7301
------------------	----------------------------	----------------------	-----------------------------	------------------------

PROJECT OR BRIDGE NAME
Monroe Street Overcrossing

BRIDGE NUMBER 56-0897	PREPARED BY Mahmoud Suliman	DATE 12/29/2021	SHEET 2 of 2
---------------------------------	---------------------------------------	---------------------------	------------------------

LOGGED BY Mahmoud Suliman	BEGIN DATE 12/1/2021	COMPLETION DATE 12/1/2021	BOREHOLE LOCATION (Northing/Easting) 2212777.502, 6566529.481	HOLE ID A-21-008
DRILLING CONTRACTOR 2 R drilling	BOREHOLE LOCATION (Station, Offset, Line)			SURFACE ELEVATION 515.1 ft
DRILLING METHOD Hollow Stem Auger	DRILL RIG CME 75			BOREHOLE DIAMETER 8" in
SAMPLER TYPE(S) AND SIZE(S) (ID) Modcal (2.4") and SPT (1.4")	SPT HAMMER TYPE Automatic, Weight = 140 lbs/ Drop = 30"			HAMMER EFFICIENCY, ERI 86.2 %
BOREHOLE BACKFILL AND COMPLETION Soil cuttings mix with cement	GROUNDWATER READING	DURING DRILLING Not Encountered	AFTER DRILLING	TOTAL DEPTH OF BORING 91.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Type	Sample ID	Blows per 6 in.	Blows per foot	Recovery %	RQD %	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks (Other Tests)
514	1		FILL: Poorly-graded SAND (SP): dense, yellowish brown to brown, dry, fine to medium-grained.		B1										CP EI PA
512	2														
	3														
	4														
	5														
510	6		ALLUVIUM: SILTY SAND (SM): medium dense to very dense, yellowish brown, moist, fine to coarse-grained.		D2	10 18 19	37			1	101.8				DS
	7														
508	8				B3										
	9				D4	13 24 39	63			10	100.5				
	10														
506	11		SANDY SILT (ML): hard, yellowish brown, moist, fine to medium-grained sand.		S5	6 8 9	17			6					
	12														
	13														
	14														
	15														
500	16		SANDY SILT (ML): hard, yellowish brown, moist, fine to medium-grained sand.		D6	14 31 38	69			2	106.0				
498	17														
	18														
	19														
496	20														
	21		SANDY SILT (ML): hard, yellowish brown, moist, fine to medium-grained sand.		S7	8 11 15	26			11					
494	22														
	23														
492	24														
	25														
490	26		SANDY CLAY (CL): hard, brown, moist, fine to medium-grained sand.		D8	8 18 27	45			22	99.1				UU
	27														
488	28														
	29														
486	30														

 Converse Consultants Geotechnical Engineering & Consulting Environmental & Groundwater Science Material Testing & Inspection Services	REPORT TITLE BORING RECORD				HOLE ID A-21-008
	DIST 8	COUNTY Riverside	ROUTE I-10	POSTMILE PM R54.2	EA 08-OK7301
	PROJECT OR BRIDGE NAME Monroe Street Overcrossing/ I-10				
	BRIDGE NUMBER 56-0897		PREPARED BY Mahmoud Suliman	DATE 12/29/2021	SHEET 1 of 4

LOGGED BY Mahmoud Suliman 12/1/2021	BEGIN DATE 12/1/2021	COMPLETION DATE 12/1/2021	BOREHOLE LOCATION (Northing/Easting) 2212777.502, 6566529.481	HOLE ID A-21-008
DRILLING CONTRACTOR 2 R drilling	BOREHOLE LOCATION (Station, Offset, Line)			SURFACE ELEVATION 515.1 ft
DRILLING METHOD Hollow Stem Auger	DRILL RIG CME 75			BOREHOLE DIAMETER 8" in
SAMPLER TYPE(S) AND SIZE(S) (ID) Modcal (2.4") and SPT (1.4")	SPT HAMMER TYPE Automatic, Weight = 140 lbs/ Drop = 30"			HAMMER EFFICIENCY, ERI 86.2 %
BOREHOLE BACKFILL AND COMPLETION Soil cuttings mix with cement	GROUNDWATER READING	DURING DRILLING Not Encountered	AFTER DRILLING	TOTAL DEPTH OF BORING 91.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Type	Sample ID	Blows per 6 in.	Blows per foot	Recovery %	RQD %	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks (Other Tests)
484	30		ALLUVIUM: SANDY SILT (ML): hard, yellowish brown, moist, fine to medium-grained sand.	X	S9	11 11 16	27			8					
482	31														
480	32														
478	33														
476	34			X	D10	11 13 16	29			18	94.0				
474	35														
472	36														
470	37														
468	38														
466	39														
464	40			X	S11	7 13 13	26			15					
462	41														
460	42														
458	43														
456	44														
454	45														
452	46														
450	47														
448	48														
446	49														
444	50														
442	51			X	S13	10 15 22	37			8					
440	52														
438	53														
436	54														
434	55														
432	56			X	D14	20 37 44	81			6	98.9				
430	57														
428	58														
426	59														
424	60														

 Converse Consultants Geotechnical Engineering & Consulting Environmental & Groundwater Science Material Testing & Inspection Services				REPORT TITLE BORING RECORD		HOLE ID A-21-008	
				DIST 8	COUNTY Riverside	ROUTE I-10	POSTMILE PM R54.2
				PROJECT OR BRIDGE NAME Monroe Street Overcrossing/ I-10			
BRIDGE NUMBER 56-0897				PREPARED BY Mahmoud Suliman		DATE 12/29/2021	SHEET 2 of 4

LOGGED BY Mahmoud Suliman	BEGIN DATE 12/1/2021	COMPLETION DATE 12/1/2021	BOREHOLE LOCATION (Northing/Easting) 2212777.502, 6566529.481	HOLE ID A-21-008
DRILLING CONTRACTOR 2 R drilling	BOREHOLE LOCATION (Station, Offset, Line)			SURFACE ELEVATION 515.1 ft
DRILLING METHOD Hollow Stem Auger	DRILL RIG CME 75			BOREHOLE DIAMETER 8" in
SAMPLER TYPE(S) AND SIZE(S) (ID) Modcal (2.4") and SPT (1.4")	SPT HAMMER TYPE Automatic, Weight = 140 lbs/ Drop = 30"			HAMMER EFFICIENCY, ERI 86.2 %
BOREHOLE BACKFILL AND COMPLETION Soil cuttings mix with cement	GROUNDWATER READING	DURING DRILLING Not Encountered	AFTER DRILLING	TOTAL DEPTH OF BORING 91.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Type	Sample ID	Blows per 6 in.	Blows per foot	Recovery %	RQD %	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks (Other Tests)
454	60		ALLUVIUM: SILTY SAND (SM): dense, brown to yellowish brown, moist, fine to medium-grained.	X	S15	14 15 23	33			10					
452	61														
450	62		SANDY SILT (ML): hard, grayish brown, fine to medium-grained sand, trace clay.	X	D16	19 21 25	46			27	100.1				
448	63														
446	64			X	S17	10 25 32	57			21					
444	65														
442	66			X	D18	20 21 21	41			26	96.7				
440	67														
438	68			X	S19	24 50-6"	100+			3					
436	69														
434	70		Poorly-graded SAND (SP): very dense, yellowish brown, moist, fine to coarse-grained, trace silt, few gravel up to 0.5" in largest dimension	X	D20	50-6"	100+			2	113.7				
432	71														
430	72														
428	73														
426	74														
90	90														

 Converse Consultants Geotechnical Engineering & Consulting Environmental & Groundwater Science Material Testing & Inspection Services			REPORT TITLE BORING RECORD		HOLE ID A-21-008	
			DIST 8	COUNTY Riverside	ROUTE I-10	POSTMILE PM R54.2
PROJECT OR BRIDGE NAME Monroe Street Overcrossing/ I-10						
BRIDGE NUMBER 56-0897			PREPARED BY Mahmoud Suliman		DATE 12/29/2021	SHEET 3 of 4

LOGGED BY Mahmoud Suliman	BEGIN DATE 12/1/2021	COMPLETION DATE 12/1/2021	BOREHOLE LOCATION (Northing/Easting) 2212777.502, 6566529.481	HOLE ID A-21-008
DRILLING CONTRACTOR 2 R drilling	BOREHOLE LOCATION (Station, Offset, Line)			SURFACE ELEVATION 515.1 ft
DRILLING METHOD Hollow Stem Auger	DRILL RIG CME 75			BOREHOLE DIAMETER 8" in
SAMPLER TYPE(S) AND SIZE(S) (ID) Modal (2.4") and SPT (1.4")	SPT HAMMER TYPE Automatic, Weight = 140 lbs/ Drop = 30"			HAMMER EFFICIENCY, ERI 86.2 %
BOREHOLE BACKFILL AND COMPLETION Soil cuttings mix with cement	GROUNDWATER READING	DURING DRILLING Not Encountered	AFTER DRILLING	TOTAL DEPTH OF BORING 91.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Type	Sample ID	Blows per 6 in.	Blows per foot	Recovery %	RQD %	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks (Other Tests)
424	91		ALLUVIUM: Poorly-graded SAND (SP): very dense, yellowish brown, moist, fine to coarse-grained; trace silt, few gravel up to 0.5" in largest dimension.	X	S21	10 20 20	40			18					
422	93		Bottom of Borehole at 91.5 feet. Boring terminated at planned depth. No groundwater encountered. Borehole backfilled with soil cuttings mixed with cement and compacted by pushing down with an auger using the drill rig weight on 12/1/2021.												
420	95														
418	97														
416	99														
414	101														
412	103														
410	105														
408	107														
406	109														
404	111														
402	113														
400	115														
398	117														
396	119														
120															

 Converse Consultants Geotechnical Engineering & Consulting Environmental & Groundwater Science Material Testing & Inspection Services	REPORT TITLE BORING RECORD				HOLE ID A-21-008
	DIST 8	COUNTY Riverside	ROUTE I-10	POSTMILE PM R54.2	EA 08-OK7301
	PROJECT OR BRIDGE NAME Monroe Street Overcrossing/ I-10				
	BRIDGE NUMBER 56-0897	PREPARED BY Mahmoud Suliman	DATE 12/29/2021	SHEET 4 of 4	

LOGGED BY Mahmoud Suliman	BEGIN DATE 12/1/2021	COMPLETION DATE 12/1/2021	BOREHOLE LOCATION (Northing/Easting) 22127777.752, 6566592.656	HOLE ID A-21-009
DRILLING CONTRACTOR 2 R drilling	BOREHOLE LOCATION (Station, Offset, Line)			SURFACE ELEVATION 514.9 ft
DRILLING METHOD Hollow Stem Auger	DRILL RIG CME 75			BOREHOLE DIAMETER 8" in
SAMPLER TYPE(S) AND SIZE(S) (ID) Modcal (2.4") and SPT (1.4")	SPT HAMMER TYPE Automatic, Weight = 140 lbs/ Drop = 30"			HAMMER EFFICIENCY, ERI 86.2 %
BOREHOLE BACKFILL AND COMPLETION Soil cuttings mix with cement	GROUNDWATER READING	DURING DRILLING Not Encountered	AFTER DRILLING	TOTAL DEPTH OF BORING 91.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Type	Sample ID	Blows per 6 in.	Blows per foot	Recovery %	RQD %	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks (Other Tests)
514	1		FILL: Poorly-graded SAND (SP): very dense, yellowish brown to brown, dry, fine to medium-grained.		B-1										CR
512	3				D2	12 25 27	52			2	105.5				
	4														
510	5														
5.0 ----- El. 509.9'				ALLUVIUM: SILTY SAND (SM): medium dense to dense, yellowish brown, moist, fine to coarse-grained.		D4	8 13 13	26			3	101.0			
508	7		B3												
506	9														
	10														
504	11		S5		3 4 7	11			14						
502	13														
500	15				D6	10 26 26	56			3	103.8				
498	17														
496	19														
20.0 ----- El. 494.9'			SANDY SILT (ML): stiff, yellowish brown, moist, fine to medium-grained sand.		S7	5 8 9	17			16					PI
494	21														
492	23														
	24														
490	25					D8	8 14 19	35			27	87.6			
488	27														
486	29														
30.0 ----- El. 484.9'															

Converse Consultants Geotechnical Engineering & Consulting Environmental & Groundwater Science Material Testing & Inspection Services	REPORT TITLE BORING RECORD				HOLE ID A-21-009
	DIST 8	COUNTY Riverside	ROUTE I-10	POSTMILE PM R54.2	EA 08-OK7301
	PROJECT OR BRIDGE NAME Monroe Street Overcrossing/ I-10				
	BRIDGE NUMBER 56-0897	PREPARED BY Mahmoud Suliman	DATE 12/29/2021	SHEET 1 of 4	

LOGGED BY Mahmoud Suliman	BEGIN DATE 12/1/2021	COMPLETION DATE 12/1/2021	BOREHOLE LOCATION (Northing/Easting) 22127777.752, 6566592.656	HOLE ID A-21-009
DRILLING CONTRACTOR 2 R drilling	BOREHOLE LOCATION (Station, Offset, Line)			SURFACE ELEVATION 514.9 ft
DRILLING METHOD Hollow Stem Auger	DRILL RIG CME 75			BOREHOLE DIAMETER 8" in
SAMPLER TYPE(S) AND SIZE(S) (ID) Modcal (2.4") and SPT (1.4")	SPT HAMMER TYPE Automatic, Weight = 140 lbs/ Drop = 30"			HAMMER EFFICIENCY, ERI 86.2 %
BOREHOLE BACKFILL AND COMPLETION Soil cuttings mix with cement	GROUNDWATER READING	DURING DRILLING Not Encountered	AFTER DRILLING	TOTAL DEPTH OF BORING 91.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Type	Sample ID	Blows per 6 in.	Blows per foot	Recovery %	RQD %	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks (Other Tests)
484	30		ALLUVIUM: SANDY SILT (ML): very stiff, yellowish brown, moist, fine to medium-grained sand. - trace clay	X	S9	11 14 16	30			11					
482	31														
480	32														
478	33														
476	34														
474	35			X	D10	8 9 20	29			29	86.6				
472	36														
470	37														
468	38														
466	39														
464	40			X	S11	9 12 14	26			14					
462	41		SILTY SAND (SM): very dense, brown, moist, fine to coarse-grained.												
460	42														
458	43														
456	44														
454	45			X	D12	12 22 34	56			5					disturbed
452	46														
450	47														
448	48														
446	49														
444	50														
442	51			X	S13	13 16 19	35			8					
440	52														
438	53														
436	54														
434	55														
432	56			X	D14	19 30 45	75			8	92.2				
430	57														
428	58														
426	59														
424	60														
422															

 Converse Consultants Geotechnical Engineering & Consulting Environmental & Groundwater Science Material Testing & Inspection Services				REPORT TITLE BORING RECORD		HOLE ID A-21-009	
				DIST 8	COUNTY Riverside	ROUTE I-10	POSTMILE PM R54.2
				PROJECT OR BRIDGE NAME Monroe Street Overcrossing/ I-10			
				BRIDGE NUMBER 56-0897		PREPARED BY Mahmoud Suliman	DATE 12/29/2021
						SHEET 2 of 4	

LOGGED BY Mahmoud Suliman	BEGIN DATE 12/1/2021	COMPLETION DATE 12/1/2021	BOREHOLE LOCATION (Northing/Easting) 2212777.752, 6566592.656	HOLE ID A-21-009
DRILLING CONTRACTOR 2 R drilling	BOREHOLE LOCATION (Station, Offset, Line)			SURFACE ELEVATION 514.9 ft
DRILLING METHOD Hollow Stem Auger	DRILL RIG CME 75			BOREHOLE DIAMETER 8" in
SAMPLER TYPE(S) AND SIZE(S) (ID) Modcal (2.4") and SPT (1.4")	SPT HAMMER TYPE Automatic, Weight = 140 lbs/ Drop = 30"			HAMMER EFFICIENCY, ERI 86.2 %
BOREHOLE BACKFILL AND COMPLETION Soil cuttings mix with cement	GROUNDWATER READING	DURING DRILLING Not Encountered	AFTER DRILLING	TOTAL DEPTH OF BORING 91.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Type	Sample ID	Blows per 6 in.	Blows per foot	Recovery %	RQD %	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks (Other Tests)
454	60		<u>ALLUVIUM:</u> SILTY SAND (SM): very dense, brown, moist, fine to coarse-grained.	X	S15	12 18 17	35								
452	61														
450	62														
448	63														
446	64														
444	65		65.0												
442	66		SANDY SILT (ML): hard, grayish brown, fine to medium-grained sand, trace clay.	X	D16	21 23 27	50			28	95.0				
440	67														
438	68														
436	69														
434	70														
432	71			X	S17	7 24 40	64			19					
430	72														
428	73														
426	74														
424	75														
422	76			X	D18	19 17 18	35			24	102.9				
420	77														
418	78														
416	79														
414	80		80.0												
412	81		SILTY SAND (SM): very dense, light brown, moist, fine to coarse-grained, few gravel up to 0.5" in largest dimension.	X	S19	31 35 50-6"	85+			11					
410	82														
408	83														
406	84														
404	85														
402	86			X	D20	30 25 50-5"	75+			11	104.5				
400	87														
398	88														
396	89														
394	90		90.0												
			El. 424.9'												

 Converse Consultants Geotechnical Engineering & Consulting Environmental & Groundwater Science Material Testing & Inspection Services	REPORT TITLE BORING RECORD				HOLE ID A-21-009
	DIST 8	COUNTY Riverside	ROUTE I-10	POSTMILE PM R54.2	EA 08-OK7301
	PROJECT OR BRIDGE NAME Monroe Street Overcrossing/ I-10				
	BRIDGE NUMBER 56-0897	PREPARED BY Mahmoud Suliman	DATE 12/29/2021	SHEET 3 of 4	

LOGGED BY Mahmoud Suliman	BEGIN DATE 12/1/2021	COMPLETION DATE 12/1/2021	BOREHOLE LOCATION (Northing/Easting) 22127777.752, 6566592.656	HOLE ID A-21-009
DRILLING CONTRACTOR 2 R drilling	BOREHOLE LOCATION (Station, Offset, Line)			SURFACE ELEVATION 514.9 ft
DRILLING METHOD Hollow Stem Auger	DRILL RIG CME 75			BOREHOLE DIAMETER 8" in
SAMPLER TYPE(S) AND SIZE(S) (ID) Modcal (2.4") and SPT (1.4")	SPT HAMMER TYPE Automatic, Weight = 140 lbs/ Drop = 30"			HAMMER EFFICIENCY, ERI 86.2 %
BOREHOLE BACKFILL AND COMPLETION Soil cuttings mix with cement	GROUNDWATER READING	DURING DRILLING Not Encountered	AFTER DRILLING	TOTAL DEPTH OF BORING 91.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Type	Sample ID	Blows per 6 in.	Blows per foot	Recovery %	RQD %	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks (Other Tests)
424	91		<u>ALLUVIUM:</u> SILTY SAND (SM): very dense, light brown, moist, fine to coarse-grained, few gravel up to 0.5" in largest dimension.		S21	13 16 22	38			24					
422	92		Bottom of Borehole at 91.5 feet.												
420	93		Boring terminated at planned depth.												
418	94		No groundwater encountered.												
416	95		Borehole backfilled with soil cuttings mixed with cement and compacted by pushing down with an auger using the drill rig weight on 12/1/2021.												
414	96														
412	97														
410	98														
408	99														
406	100														
404	101														
402	102														
400	103														
398	104														
396	105														
	106														
	107														
	108														
	109														
	110														
	111														
	112														
	113														
	114														
	115														
	116														
	117														
	118														
	119														
	120														

 Converse Consultants Geotechnical Engineering & Consulting Environmental & Groundwater Science Material Testing & Inspection Services	REPORT TITLE BORING RECORD				HOLE ID A-21-009
	DIST 8	COUNTY Riverside	ROUTE I-10	POSTMILE PM R54.2	EA 08-OK7301
	PROJECT OR BRIDGE NAME Monroe Street Overcrossing/ I-10				
	BRIDGE NUMBER 56-0897	PREPARED BY Mahmoud Suliman		DATE 12/29/2021	SHEET 4 of 4

LOGGED BY Mahmoud Suliman	BEGIN DATE 12/2/2021	COMPLETION DATE 12/2/2021	BOREHOLE LOCATION (Northing/Easting) 2212676.609, 6566541.981	HOLE ID A-21-010
DRILLING CONTRACTOR 2 R drilling	BOREHOLE LOCATION (Station, Offset, Line)			SURFACE ELEVATION 511.5 ft
DRILLING METHOD Hollow Stem Auger	DRILL RIG CME 75			BOREHOLE DIAMETER 8" in
SAMPLER TYPE(S) AND SIZE(S) (ID) Modal (2.4") and SPT (1.4")	SPT HAMMER TYPE Automatic, Weight = 140 lbs/ Drop = 30"			HAMMER EFFICIENCY, ERI 86.2 %
BOREHOLE BACKFILL AND COMPLETION Soil cuttings mix with cement	GROUNDWATER READING	DURING DRILLING 88.5 ft on 12/2/2021	AFTER DRILLING	TOTAL DEPTH OF BORING 121.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Type	Sample ID	Blows per 6 in.	Blows per foot	Recovery %	RQD %	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks (Other Tests)	
510	0		FILL: SILTY SAND (SM): very dense, yellowish brown, moist, fine to medium-grained.		B1	27 50-6"	77+			6	116.9					
	D2															
508																
506	5		ALLUVIUM: Poorly-graded SAND WITH SILT(SP-SM): dense, yellowish brown, moist, fine to medium-grained.		D3	14 24 28	52			14	114.5				PA	
504	6	B4														
502	7															
	8															
500	10		SILTY SAND (SM): medium dense, yellowish brown, moist, fine to medium-grained.		S5	3 7 7	14									
	11															
498	12															
	13															
496	15		SANDY SILT (ML): very stiff, yellowish brown, moist, fine to medium-grained sand.		D6	10 18 22	40			16	101.2				C	
494	16															
	17															
492	18															
490	21				S7	9 13 12	25								CR	
488	22															
	23															
486	24															
484	26				D8	10 18 36	54			8	114.8				DS	
	27															
482	28															
	29															
482	30															

Converse Consultants Geotechnical Engineering & Consulting Environmental & Groundwater Science Material Testing & Inspection Services	REPORT TITLE BORING RECORD				HOLE ID A-21-010
	DIST 8	COUNTY Riverside	ROUTE I-10	POSTMILE PM R54.2	EA 08-OK7301
	PROJECT OR BRIDGE NAME Monroe Street Overcrossing/ I-10				
	BRIDGE NUMBER 56-0897	PREPARED BY Mahmoud Suliman	DATE 12/29/2021	SHEET 1 of 5	

LOGGED BY Mahmoud Suliman	BEGIN DATE 12/2/2021	COMPLETION DATE 12/2/2021	BOREHOLE LOCATION (Northing/Easting) 2212676.609, 6566541.981	HOLE ID A-21-010
DRILLING CONTRACTOR 2 R drilling	BOREHOLE LOCATION (Station, Offset, Line)			SURFACE ELEVATION 511.5 ft
DRILLING METHOD Hollow Stem Auger	DRILL RIG CME 75			BOREHOLE DIAMETER 8" in
SAMPLER TYPE(S) AND SIZE(S) (ID) Modal (2.4") and SPT (1.4")	SPT HAMMER TYPE Automatic, Weight = 140 lbs/ Drop = 30"			HAMMER EFFICIENCY, ERI 86.2 %
BOREHOLE BACKFILL AND COMPLETION Soil cuttings mix with cement	GROUNDWATER READING	DURING DRILLING 88.5 ft on 12/2/2021	AFTER DRILLING	TOTAL DEPTH OF BORING 121.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Type	Sample ID	Blows per 6 in.	Blows per foot	Recovery %	RQD %	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks (Other Tests)
480	30		ALLUVIUM: SANDY SILT (ML): very stiff, yellowish brown, moist, fine to medium-grained sand.	X	S9	8 11 19	30								PA
478	31														
476	32														
474	33														
472	34														
470	35		35.0												
468	36		SILTY SAND (SM): dense to very dense, brown, moist, fine to coarse-grained.	X	D10	15 28 38	66			6					disturbed
466	37														
464	38														
462	39														
460	40														
458	41			X	S11	7 10 17	27								
456	42														
454	43														
452	44														
	45		45.0												
	46		SANDY SILT (ML): very stiff to hard, yellowish brown, moist, fine to medium-grained sand, trace clay.	X	D12	9 20 22	42			6	103.3				
	47														
	48														
	49														
	50														
	51			X	S13	10 17 17	34								
	52														
	53														
	54														
	55														
	56			X	D14	31 50-6"	81+			12	107.0				
	57														
	58														
	59														
	60		60.0												
			El. 476.5'												
			El. 466.5'												
			El. 451.5'												

 Converse Consultants Geotechnical Engineering & Consulting Environmental & Groundwater Science Material Testing & Inspection Services				REPORT TITLE BORING RECORD	HOLE ID A-21-010
DIST 8	COUNTY Riverside	ROUTE I-10	POSTMILE PM R54.2	EA 08-OK7301	
PROJECT OR BRIDGE NAME Monroe Street Overcrossing/ I-10					
BRIDGE NUMBER 56-0897	PREPARED BY Mahmoud Suliman	DATE 12/29/2021	SHEET 2 of 5		

LOGGED BY Mahmoud Suliman 12/2/2021	BEGIN DATE 12/2/2021	COMPLETION DATE 12/2/2021	BOREHOLE LOCATION (Northing/Easting) 2212676.609, 6566541.981	HOLE ID A-21-010
DRILLING CONTRACTOR 2 R drilling	BOREHOLE LOCATION (Station, Offset, Line)			SURFACE ELEVATION 511.5 ft
DRILLING METHOD Hollow Stem Auger	DRILL RIG CME 75			BOREHOLE DIAMETER 8" in
SAMPLER TYPE(S) AND SIZE(S) (ID) Modcal (2.4") and SPT (1.4")	SPT HAMMER TYPE Automatic, Weight = 140 lbs/ Drop = 30"			HAMMER EFFICIENCY, ERI 86.2 %
BOREHOLE BACKFILL AND COMPLETION Soil cuttings mix with cement	GROUNDWATER READING	DURING DRILLING 88.5 ft on 12/2/2021	AFTER DRILLING	TOTAL DEPTH OF BORING 121.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Type	Sample ID	Blows per 6 in.	Blows per foot	Recovery %	RQD %	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks (Other Tests)
60	61		ALLUVIUM: SANDY SILT (ML): hard, yellowish brown, moist, fine to medium-grained sand, trace clay.	X	S15	10 19 19	38								CR
450	62														
448	63														
446	65			⬛	D16	27 50-6"	77+			19	98.3				
444	66														
442	67														PA
	68														
	69														
	70	70.0	SILTY SAND (SM): very dense, yellowish brown to brown, moist, fine to coarse-grained.	X	S17	23 28 16	44								
440	71														
438	72														
	73														
	74														
436	75			⬛	D18	50-6"	50+			2	110.7				
	76														
434	77														
	78														
432	79														
	80			X	S19	23 33 48	81								
430	81														
	82														
428	83														
	84														
	85	85.0	Poorly-graded SAND (SP): very dense, light yellowish brown, moist to wet, fine to coarse-grained.	⬛	D20	50-6"	50+			9	98.8				
426	86														
	87														
424	88														
	89														
422	90	90.0													

 Converse Consultants Geotechnical Engineering & Consulting Environmental & Groundwater Science Material Testing & Inspection Services	REPORT TITLE BORING RECORD				HOLE ID A-21-010
	DIST 8	COUNTY Riverside	ROUTE I-10	POSTMILE PM R54.2	EA 08-OK7301
	PROJECT OR BRIDGE NAME Monroe Street Overcrossing/ I-10				
	BRIDGE NUMBER 56-0897	PREPARED BY Mahmoud Suliman	DATE 12/29/2021	SHEET 3 of 5	

LOGGED BY Mahmoud Suliman 12/2/2021	BEGIN DATE 12/2/2021	COMPLETION DATE 12/2/2021	BOREHOLE LOCATION (Northing/Easting) 2212676.609, 6566541.981	HOLE ID A-21-010
DRILLING CONTRACTOR 2 R drilling	BOREHOLE LOCATION (Station, Offset, Line)			SURFACE ELEVATION 511.5 ft
DRILLING METHOD Hollow Stem Auger	DRILL RIG CME 75			BOREHOLE DIAMETER 8" in
SAMPLER TYPE(S) AND SIZE(S) (ID) Modcal (2.4") and SPT (1.4")	SPT HAMMER TYPE Automatic, Weight = 140 lbs/ Drop = 30"			HAMMER EFFICIENCY, ERI 86.2 %
BOREHOLE BACKFILL AND COMPLETION Soil cuttings mix with cement	GROUNDWATER READING	DURING DRILLING 88.5 ft on 12/2/2021	AFTER DRILLING	TOTAL DEPTH OF BORING 121.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Type	Sample ID	Blows per 6 in.	Blows per foot	Recovery %	RQD %	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks (Other Tests)
90															
420	91		<u>ALLUVIUM:</u> Poorly-graded SAND (SP): very dense, light yellowish brown, moist to wet, fine to coarse-grained.	X	S21	11 19 29	48								
	92														
418	93														
	94														
416	95														
	96			✖	D22	20 50-4"	70+			15	111.4				
414	97														
	98														
412	99														
	100			X	S23	16 50-6"	66+								
410	101														
	102														
408	103														
	104														
406	105		105.0 El. 406.5'												
	106		SILTY SAND (SM): very dense, brown, wet, fine to coarse-grained.	✖	D24	9 34 41	75			19	108.8				
404	107														
	108														
402	109														
	110		110.0 El. 401.5'												
400	111		SANDY SILT (ML): medium stiff, grayish brown to brown, wet, fine to medium-grained sand, trace clay.	X	S25	3 4 5	9								
398	112														
	113														
396	114														
	115		115.0 El. 396.5'												
	116		Poorly-graded SAND With SILT (SP-SM): very dense, light brown, wet, fine to coarse-grained, few gravel up to 0.5" in largest dimension.	✖	D26	18 28 50-6"	78+			7	127.6				
394	117														
	118														
392	119														
120			120.0 El. 391.5'												

 Converse Consultants Geotechnical Engineering & Consulting Environmental & Groundwater Science Material Testing & Inspection Services	REPORT TITLE BORING RECORD				HOLE ID A-21-010
	DIST 8	COUNTY Riverside	ROUTE I-10	POSTMILE PM R54.2	EA 08-OK7301
	PROJECT OR BRIDGE NAME Monroe Street Overcrossing/ I-10				
	BRIDGE NUMBER 56-0897		PREPARED BY Mahmoud Suliman	DATE 12/29/2021	SHEET 4 of 5

LOGGED BY Mahmoud Suliman	BEGIN DATE 12/2/2021	COMPLETION DATE 12/2/2021	BOREHOLE LOCATION (Northing/Easting) 2212676.609, 6566541.981	HOLE ID A-21-010
DRILLING CONTRACTOR 2 R drilling	BOREHOLE LOCATION (Station, Offset, Line)			SURFACE ELEVATION 511.5 ft
DRILLING METHOD Hollow Stem Auger	DRILL RIG CME 75			BOREHOLE DIAMETER 8" in
SAMPLER TYPE(S) AND SIZE(S) (ID) Modal (2.4") and SPT (1.4")	SPT HAMMER TYPE Automatic, Weight = 140 lbs/ Drop = 30"			HAMMER EFFICIENCY, ERI 86.2 %
BOREHOLE BACKFILL AND COMPLETION Soil cuttings mix with cement	GROUNDWATER READING	DURING DRILLING 88.5 ft on 12/2/2021	AFTER DRILLING	TOTAL DEPTH OF BORING 121.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Type	Sample ID	Blows per 6 in.	Blows per foot	Recovery %	RQD %	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks (Other Tests)
120	120														
390	121		ALLUVIUM: 121 Poorly-graded SAND With SILT (SP-SM): very dense, light brown, wet, fine to coarse-grained, few gravel up to 0.5" in largest dimension.	X	D27	19 50-6"	69+								
388	122		Bottom of Borehole at 121.0 feet. Boring terminated at planned depth. Groundwater encountered at 88.5 feet bgs. Borehole backfilled with soil cuttings mixed with cement and compacted by pushing down with an auger using the drill rig weight on 12/2/2021.												
386	123														
384	124														
382	125														
380	126														
378	127														
376	128														
374	129														
372	130														
370	131														
368	132														
366	133														
364	134														
362	135														
360	136														
358	137														
356	138														
354	139														
352	140														
350	141														
348	142														
346	143														
344	144														
342	145														
340	146														
338	147														
336	148														
334	149														
332	150														

 Converse Consultants Geotechnical Engineering & Consulting Environmental & Groundwater Science Material Testing & Inspection Services	REPORT TITLE BORING RECORD				HOLE ID A-21-010
	DIST 8	COUNTY Riverside	ROUTE I-10	POSTMILE PM R54.2	EA 08-OK7301
	PROJECT OR BRIDGE NAME Monroe Street Overcrossing/ I-10				
	BRIDGE NUMBER 56-0897	PREPARED BY Mahmoud Suliman	DATE 12/29/2021	SHEET 5 of 5	

LOGGED BY Mahmoud Suliman	BEGIN DATE 12/3/2021	COMPLETION DATE 12/3/2021	BOREHOLE LOCATION (Northing/Easting) 2212678.185, 6566595.682	HOLE ID A-21-011
DRILLING CONTRACTOR 2 R drilling	BOREHOLE LOCATION (Station, Offset, Line)			SURFACE ELEVATION 511.3 ft
DRILLING METHOD Hollow Stem Auger	DRILL RIG CME 75			BOREHOLE DIAMETER 8" in
SAMPLER TYPE(S) AND SIZE(S) (ID) Modcal (2.4") and SPT (1.4")	SPT HAMMER TYPE Automatic, Weight = 140 lbs/ Drop = 30"			HAMMER EFFICIENCY, ERI 86.2 %
BOREHOLE BACKFILL AND COMPLETION Soil cuttings mix with cement	GROUNDWATER READING	DURING DRILLING 87.6 ft on 12/3/2021	AFTER DRILLING	TOTAL DEPTH OF BORING 121.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Type	Sample ID	Blows per 6 in.	Blows per foot	Recovery %	RQD %	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks (Other Tests)
510	1		FILL: SILTY SAND (SM): medium dense, yellowish brown, dry, fine to medium-grained.		B1										
508	2														
506	3														
506	4														
506	5		ALLUVIUM: SILTY SAND (SM): medium dense, yellowish brown, moist, fine to medium-grained.		D2	10 10 13	23			16	101.9				CP
504	6				B3										
504	7				D4	6 9 13	22			4	91.6				
502	8														
500	9				S5	5 9 7	16								
498	10														
498	11														
496	12														
496	13				D6	8 15 20	35			14	92.7				
494	14														
494	15														
492	16														
490	17		SANDY SILT (ML): stiff to hard, yellowish brown, moist, fine to medium-grained sand.		S7	9 9 9	18								UU
488	18														
486	19														
486	20														
486	21		- some clay		D8	11 50-6"	61			5	112.0				
484	22														
484	23														
482	24														
482	25														
482	26														
482	27														
482	28														
482	29														
482	30														

 Converse Consultants Geotechnical Engineering & Consulting Environmental & Groundwater Science Material Testing & Inspection Services	REPORT TITLE BORING RECORD				HOLE ID A-21-011
	DIST 8	COUNTY Riverside	ROUTE I-10	POSTMILE PM R54.2	EA 08-OK7301
	PROJECT OR BRIDGE NAME Monroe Street Overcrossing/ I-10				
	BRIDGE NUMBER 56-0897		PREPARED BY Mahmoud Suliman	DATE 12/29/2021	SHEET 1 of 5

LOGGED BY Mahmoud Suliman	BEGIN DATE 12/3/2021	COMPLETION DATE 12/3/2021	BOREHOLE LOCATION (Northing/Easting) 2212678.185, 6566595.682	HOLE ID A-21-011
DRILLING CONTRACTOR 2 R drilling	BOREHOLE LOCATION (Station, Offset, Line)			SURFACE ELEVATION 511.3 ft
DRILLING METHOD Hollow Stem Auger	DRILL RIG CME 75			BOREHOLE DIAMETER 8" in
SAMPLER TYPE(S) AND SIZE(S) (ID) Modcal (2.4") and SPT (1.4")	SPT HAMMER TYPE Automatic, Weight = 140 lbs/ Drop = 30"			HAMMER EFFICIENCY, ERI 86.2 %
BOREHOLE BACKFILL AND COMPLETION Soil cuttings mix with cement	GROUNDWATER READING	DURING DRILLING 87.6 ft on 12/3/2021	AFTER DRILLING	TOTAL DEPTH OF BORING 121.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Type	Sample ID	Blows per 6 in.	Blows per foot	Recovery %	RQD %	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks (Other Tests)
480	30		<u>ALLUVIUM:</u> SILTY SAND (SM): dense, brown, moist, fine to coarse-grained.	X	S9	7 10 18	28								CR
478	31														
476	32														
474	33														
472	34														
470	35														
468	36			X	D10	15 25 41	66			5	100.6				
466	37														
464	38														
462	39														
460	40		40.0	X	S11	5 10 14	24								PI
458	41		SANDY SILT (ML): very stiff, yellowish brown, moist, fine to medium-grained sand, trace clay.												
456	42														
454	43														
452	44														
450	45			X	D12	11 17 21	38			13	100.0				C
448	46														
446	47														
444	48														
442	49														
440	50		50.0	X	S13	12 15 20	35								
438	51		SILTY SAND (SM): very dense, yellowish brown to brown, moist, fine to coarse-grained.												
436	52														
434	53														
432	54														
430	55		55.0	X	D14	50-6"	50+			5	113.5				
428	56		Poorly-graded SAND WITH SILT (SP-SM): very dense, yellowish brown, moist, fine to medium-grained.												
426	57														
424	58														
422	59														
420	60		60.0												

 Converse Consultants Geotechnical Engineering & Consulting Environmental & Groundwater Science Material Testing & Inspection Services				REPORT TITLE BORING RECORD	HOLE ID A-21-011
				DIST 8	EA 08-OK7301
				COUNTY Riverside	ROUTE I-10
				POSTMILE PM R54.2	
PROJECT OR BRIDGE NAME Monroe Street Overcrossing/ I-10					
BRIDGE NUMBER 56-0897			PREPARED BY Mahmoud Suliman		DATE 12/29/2021
					SHEET 2 of 5

LOGGED BY Mahmoud Suliman	BEGIN DATE 12/3/2021	COMPLETION DATE 12/3/2021	BOREHOLE LOCATION (Northing/Easting) 2212678.185, 6566595.682	HOLE ID A-21-011
DRILLING CONTRACTOR 2 R drilling	BOREHOLE LOCATION (Station, Offset, Line)			SURFACE ELEVATION 511.3 ft
DRILLING METHOD Hollow Stem Auger	DRILL RIG CME 75			BOREHOLE DIAMETER 8" in
SAMPLER TYPE(S) AND SIZE(S) (ID) Modcal (2.4") and SPT (1.4")	SPT HAMMER TYPE Automatic, Weight = 140 lbs/ Drop = 30"			HAMMER EFFICIENCY, ERI 86.2 %
BOREHOLE BACKFILL AND COMPLETION Soil cuttings mix with cement	GROUNDWATER READING	DURING DRILLING 87.6 ft on 12/3/2021	AFTER DRILLING	TOTAL DEPTH OF BORING 121.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Type	Sample ID	Blows per 6 in.	Blows per foot	Recovery %	RQD %	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks (Other Tests)
450	60		<u>ALLUVIUM:</u> Poorly-graded SAND WITH SILT (SP-SM): very dense, yellowish brown, moist, fine to medium-grained.	X	S15	16 18 23	41								
446	65		65.0 El. 446.3'												
446	66		SANDY SILT (ML): very stiff to hard, grayish brown, moist, fine to medium-grained sand.	⬛	D16	30 50-6"	80+			9	107.0				DS
440	71			X	S17	10 15 15	30								
436	75		75.0 El. 436.3'												
436	76		SILTY SAND (SM): very dense, dark brown to grayish brown, moist, fine to medium-grained.	⬛	D18	29 50-6"	79+			24	98.4				
430	80		80.0 El. 431.3'												
430	81		Poorly-graded SAND (SP): very dense, light yellowish brown, moist to wet, fine to coarse-grained, trace silt.	X	S19	24 50-6"	74+								
426	85			⬛	D20	50-5"	50+			8	103.9				
422	89														
90	90		90.0 El. 421.3'												

 Converse Consultants Geotechnical Engineering & Consulting Environmental & Groundwater Science Material Testing & Inspection Services	REPORT TITLE BORING RECORD				HOLE ID A-21-011	
	DIST 8	COUNTY Riverside	ROUTE I-10	POSTMILE PM R54.2	EA 08-OK7301	
	PROJECT OR BRIDGE NAME Monroe Street Overcrossing/ I-10					
	BRIDGE NUMBER 56-0897			PREPARED BY Mahmoud Suliman	DATE 12/29/2021	SHEET 3 of 5

LOGGED BY Mahmoud Suliman 12/3/2021	BEGIN DATE 12/3/2021	COMPLETION DATE 12/3/2021	BOREHOLE LOCATION (Northing/Easting) 2212678.185, 6566595.682	HOLE ID A-21-011
DRILLING CONTRACTOR 2 R drilling	BOREHOLE LOCATION (Station, Offset, Line)			SURFACE ELEVATION 511.3 ft
DRILLING METHOD Hollow Stem Auger	DRILL RIG CME 75			BOREHOLE DIAMETER 8" in
SAMPLER TYPE(S) AND SIZE(S) (ID) Modcal (2.4") and SPT (1.4")	SPT HAMMER TYPE Automatic, Weight = 140 lbs/ Drop = 30"			HAMMER EFFICIENCY, ERI 86.2 %
BOREHOLE BACKFILL AND COMPLETION Soil cuttings mix with cement	GROUNDWATER READING	DURING DRILLING 87.6 ft on 12/3/2021	AFTER DRILLING	TOTAL DEPTH OF BORING 121.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Type	Sample ID	Blows per 6 in.	Blows per foot	Recovery %	RQD %	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks (Other Tests)
420	90		<u>ALLUVIUM:</u> Poorly-graded SAND (SP): very dense, light yellowish brown, moist to wet, fine to coarse-grained, trace silt. - few gravel up to 1" in largest dimension.	X	S21	11 29 41	70								
418	91														
416	92														
414	93														
412	94														
410	95			✖	D22	30 50-4"	80+			5	101.8				
408	96														
406	97														
404	98														
402	99														
400	100			X	S23	18 50-5"	68+								
398	101														
396	102														
394	103														
392	104														
	105														
	105.0		El. 406.3'												
	106		SANDY SILT (ML): hard, grayish brown to brown, moist to wet, fine to medium-grained sand, trace clay.	✖	D24	20 31 50-6"	81+			23	105.1				
	107														
	108														
	109														
	110														
	110.0		El. 401.3'												
	111		SILTY SAND (SM): very dense, brown, moist to wet, fine to coarse-grained.	X	S25	8 25 39	64								
	112														
	113														
	114														
	115														
	115.0		El. 396.3'												
	116		Poorly-graded SAND (SP): very dense, yellowish brown, moist, fine to coarse-grained.	✖	D26	50-4"	50+			9	128.0				
	117														
	118														
	119														
	120		El. 391.3'												

 Converse Consultants Geotechnical Engineering & Consulting Environmental & Groundwater Science Material Testing & Inspection Services				REPORT TITLE BORING RECORD		HOLE ID A-21-011	
				DIST 8	COUNTY Riverside	ROUTE I-10	POSTMILE PM R54.2
PROJECT OR BRIDGE NAME Monroe Street Overcrossing/ I-10							
BRIDGE NUMBER 56-0897				PREPARED BY Mahmoud Suliman		DATE 12/29/2021	SHEET 4 of 5

LOGGED BY Mahmoud Suliman	BEGIN DATE 12/3/2021	COMPLETION DATE 12/3/2021	BOREHOLE LOCATION (Northing/Easting) 2212678.185, 6566595.682	HOLE ID A-21-011
DRILLING CONTRACTOR 2 R drilling	BOREHOLE LOCATION (Station, Offset, Line)			SURFACE ELEVATION 511.3 ft
DRILLING METHOD Hollow Stem Auger	DRILL RIG CME 75			BOREHOLE DIAMETER 8" in
SAMPLER TYPE(S) AND SIZE(S) (ID) Modcal (2.4") and SPT (1.4")	SPT HAMMER TYPE Automatic, Weight = 140 lbs/ Drop = 30"			HAMMER EFFICIENCY, ERI 86.2 %
BOREHOLE BACKFILL AND COMPLETION Soil cuttings mix with cement	GROUNDWATER READING	DURING DRILLING 87.6 ft on 12/3/2021	AFTER DRILLING	TOTAL DEPTH OF BORING 121.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Type	Sample ID	Blows per 6 in.	Blows per foot	Recovery %	RQD %	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks (Other Tests)
120	120		Poorly-graded SAND (SP): very dense, yellowish brown, moist, fine to coarse-grained.	X	S27	24 50-6"	74+								
390	121		Bottom of Borehole at 121.0 feet. Boring terminated at planned depth. Groundwater encountered at 88.5 feet bgs. Borehole backfilled with soil cuttings mixed with cement and compacted by pushing down with an auger using the drill rig weight on 12/2/2021.												
388	123														
386	125														
384	127														
382	129														
380	131														
378	133														
376	135														
374	137														
372	139														
370	141														
368	143														
366	145														
364	147														
362	149														
150															

 Converse Consultants Geotechnical Engineering & Consulting Environmental & Groundwater Science Material Testing & Inspection Services	REPORT TITLE BORING RECORD				HOLE ID A-21-011
	DIST 8	COUNTY Riverside	ROUTE I-10	POSTMILE PM R54.2	EA 08-OK7301
	PROJECT OR BRIDGE NAME Monroe Street Overcrossing/ I-10				
	BRIDGE NUMBER 56-0897	PREPARED BY Mahmoud Suliman	DATE 12/29/2021	SHEET 5 of 5	

LOGGED BY Mahmoud Suliman 11/30/2021	BEGIN DATE 11/30/2021	COMPLETION DATE 11/30/2021	BOREHOLE LOCATION (Northing/Easting) 2212605.548, 6566530.652	HOLE ID A-21-025
DRILLING CONTRACTOR 2 R drilling	BOREHOLE LOCATION (Station, Offset, Line)			SURFACE ELEVATION 510.5 ft
DRILLING METHOD Hollow Stem Auger	DRILL RIG CME 75			BOREHOLE DIAMETER 8" in
SAMPLER TYPE(S) AND SIZE(S) (ID) Modcal (2.4") and SPT (1.4")	SPT HAMMER TYPE Automatic, Weight = 140 lbs/ Drop = 30"			HAMMER EFFICIENCY, ERI 86.2 %
BOREHOLE BACKFILL AND COMPLETION Soil cuttings mix with cement	GROUNDWATER READING	DURING DRILLING 87.3 ft on 11/30/2021	AFTER DRILLING	TOTAL DEPTH OF BORING 91.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Type	Sample ID	Blows per 6 in.	Blows per foot	Recovery %	RQD %	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks (Other Tests)
510	0														
	1		FILL: Poorly-graded SAND with SILT and GRAVEL (SP-SM): dense, yellowish brown to brown, dry, fine to coarse-grained, little gravel up to 2.5" in largest dimension. EL. 509.0'												
	2														
508	3		ALLUVIUM: SILTY SAND (SM): medium dense to dense, yellowish brown, moist, fine to coarse-grained.		B1 D2	13 20 19	39	100		4	108.9				El
	4														
506	5				D4	11 10 10	20	100		3	101.9				
	6														
504	7				B3										CR
	8														
502	9														
	10														
500	11				S5	8 9 10	19	100							
	12														
498	13														
	14														
496	15		- trace caliche												
	16				D6	8 15 24	39	100		14	101.1				DS
494	17														
	18														
492	19														
	20		20.0												
490	21		SANDY SILT (ML): stiff, yellowish brown, moist, fine to medium-grained sand. EL. 490.5'		S7	6 10 13	23	100							
	22														
488	23														
	24														
486	25		25.0												
	26		Poorly-graded SAND WITH SILT (SP-SM): very dense, yellowish brown, moist, fine to coarse-grained EL. 485.5'		D8	18 28 31	59	100		6	98.5				
484	27														
	28														
482	29														
	30		30.0												
	30		EL. 480.5'												

 Converse Consultants Geotechnical Engineering & Consulting Environmental & Groundwater Science Material Testing & Inspection Services				REPORT TITLE BORING RECORD			HOLE ID A-21-025
DIST 8	COUNTY Riverside	ROUTE I-10	POSTMILE PM R54.2	PROJECT OR BRIDGE NAME Monroe Street Overcrossing/ I-10			EA 08-OK7301
BRIDGE NUMBER 56-0897		PREPARED BY Mahmoud Suliman		DATE 12/29/2021	SHEET 1 of 4		

LOGGED BY Mahmoud Suliman	BEGIN DATE 11/30/2021	COMPLETION DATE 11/30/2021	BOREHOLE LOCATION (Northing/Easting) 2212605.548, 6566530.652	HOLE ID A-21-025
DRILLING CONTRACTOR 2 R drilling	BOREHOLE LOCATION (Station, Offset, Line)			SURFACE ELEVATION 510.5 ft
DRILLING METHOD Hollow Stem Auger	DRILL RIG CME 75			BOREHOLE DIAMETER 8" in
SAMPLER TYPE(S) AND SIZE(S) (ID) Modal (2.4") and SPT (1.4")	SPT HAMMER TYPE Automatic, Weight = 140 lbs/ Drop = 30"			HAMMER EFFICIENCY, ERI 86.2 %
BOREHOLE BACKFILL AND COMPLETION Soil cuttings mix with cement	GROUNDWATER READING	DURING DRILLING 87.3 ft on 11/30/2021	AFTER DRILLING	TOTAL DEPTH OF BORING 91.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Type	Sample ID	Blows per 6 in.	Blows per foot	Recovery %	RQD %	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks (Other Tests)
480	30		ALLUVIUM: SANDY SILT (ML): stiff to very stiff, yellowish brown, moist, fine to medium-grained sand.	X	S9	7 10 11	21	100							
478	31														
476	32														
474	33														
472	34														
470	35			X	D9	12 22 31	53	100		19	91.8				
468	36														
466	37														
464	38														
462	39														
460	40		SILTY SAND (SM): very dense, yellowish brown, moist, fine to coarse-grained.	X	S10	10 15 19	34	100							
458	41														
456	42														
454	43														
452	44														
450	45			X	D11	8 14 23	37	100		24	97.2				
448	46														
446	47														
444	48														
442	49														
440	50	50.0	SILTY SAND (SM): very dense, yellowish brown, moist, fine to coarse-grained.	X	S12	18 33 50-5"	83+	97							
438	51														
436	52														
434	53														
432	54														
430	55			X	D13	22 50-6"	77+	66		13	108.2				
428	56														
426	57														
424	58														
422	59														
420	60	60.0													

 Converse Consultants Geotechnical Engineering & Consulting Environmental & Groundwater Science Material Testing & Inspection Services				REPORT TITLE BORING RECORD		HOLE ID A-21-025	
				DIST 8	COUNTY Riverside	ROUTE I-10	POSTMILE PM R54.2
PROJECT OR BRIDGE NAME Monroe Street Overcrossing/ I-10							
BRIDGE NUMBER 56-0897				PREPARED BY Mahmoud Suliman		DATE 12/29/2021	SHEET 2 of 4

LOGGED BY Mahmoud Suliman	BEGIN DATE 11/30/2021	COMPLETION DATE 11/30/2021	BOREHOLE LOCATION (Northing/Easting) 2212605.548, 6566530.652	HOLE ID A-21-025
DRILLING CONTRACTOR 2 R drilling	BOREHOLE LOCATION (Station, Offset, Line)			SURFACE ELEVATION 510.5 ft
DRILLING METHOD Hollow Stem Auger	DRILL RIG CME 75			BOREHOLE DIAMETER 8" in
SAMPLER TYPE(S) AND SIZE(S) (ID) Modal (2.4") and SPT (1.4")	SPT HAMMER TYPE Automatic, Weight = 140 lbs/ Drop = 30"			HAMMER EFFICIENCY, ERI 86.2 %
BOREHOLE BACKFILL AND COMPLETION Soil cuttings mix with cement	GROUNDWATER READING	DURING DRILLING 87.3 ft on 11/30/2021	AFTER DRILLING	TOTAL DEPTH OF BORING 91.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Type	Sample ID	Blows per 6 in.	Blows per foot	Recovery %	RQD %	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks (Other Tests)
450	60		ALLUVIUM: SANDY SILT (ML): stiff to hard, yellowish brown, moist, fine to coarse-grained.	X	S14	7 8 12	20	100							PA
448	61														
446	62														
444	63														
442	64														
440	65			✖	D15	17 50-5"	67+	65		15	106.7				
438	66														
436	67														
434	68														
432	69														
430	70			X	S16	9 12 22	34	100							
428	71														
426	72														
424	73														
422	74														
420	75	75.0	Poorly-graded SAND WITH SILT (SP-SM): very dense, yellowish brown, moist to wet, fine to coarse-grained.	✖	D17	50-6"	50+	33		2	103.4				
418	76														
416	77														
414	78														
412	79														
410	80			X	S18	22 50-6"	72+	66							
408	81														
406	82														
404	83														
402	84														
400	85	85.0	SILTY SAND (SM): very dense, yellowish brown, moist to wet, fine to coarse-grained.	✖	D19	35 50-4"	85+	65		18	106.2				
398	86														
396	87														
394	88														
392	89														
390	90	90.0													

 Converse Consultants Geotechnical Engineering & Consulting Environmental & Groundwater Science Material Testing & Inspection Services				REPORT TITLE BORING RECORD		HOLE ID A-21-025	
				DIST 8	COUNTY Riverside	ROUTE I-10	POSTMILE PM R54.2
PROJECT OR BRIDGE NAME Monroe Street Overcrossing/ I-10							
BRIDGE NUMBER 56-0897				PREPARED BY Mahmoud Suliman		DATE 12/29/2021	SHEET 3 of 4

LOGGED BY Mahmoud Suliman	BEGIN DATE 11/30/2021	COMPLETION DATE 11/30/2021	BOREHOLE LOCATION (Northing/Easting) 2212605.548, 6566530.652	HOLE ID A-21-025
DRILLING CONTRACTOR 2 R drilling	BOREHOLE LOCATION (Station, Offset, Line)			SURFACE ELEVATION 510.5 ft
DRILLING METHOD Hollow Stem Auger	DRILL RIG CME 75			BOREHOLE DIAMETER 8" in
SAMPLER TYPE(S) AND SIZE(S) (ID) Modcal (2.4") and SPT (1.4")	SPT HAMMER TYPE Automatic, Weight = 140 lbs/ Drop = 30"			HAMMER EFFICIENCY, ERI 86.2 %
BOREHOLE BACKFILL AND COMPLETION Soil cuttings mix with cement	GROUNDWATER READING	DURING DRILLING 87.3 ft on 11/30/2021	AFTER DRILLING	TOTAL DEPTH OF BORING 91.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Type	Sample ID	Blows per 6 in.	Blows per foot	Recovery %	RQD %	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks (Other Tests)
420	90		ALLUVIUM: SILTY SAND (SM): very dense, yellowish brown, moist to wet, fine to coarse-grained. El. 419.0' Bottom of Borehole at 91.5 feet. Boring terminated at planned depth. Groundwater encountered at 88.5 feet bgs. Borehole backfilled with soil cuttings mixed with cement and compacted by pushing down with an auger using the drill rig weight on 11/30/2021.	X	S20	10 13 40	53	100							
	91														
	92														
	93														
	94														
	95														
	96														
	97														
	98														
	99														
	100														
	101														
	102														
	103														
	104														
	105														
	106														
	107														
	108														
	109														
	110														
	111														
	112														
	113														
	114														
	115														
	116														
	117														
	118														
	119														
	120														

 Converse Consultants Geotechnical Engineering & Consulting Environmental & Groundwater Science Material Testing & Inspection Services		REPORT TITLE BORING RECORD			HOLE ID A-21-025	
		DIST 8	COUNTY Riverside	ROUTE I-10	POSTMILE PM R54.2	EA 08-OK7301
		PROJECT OR BRIDGE NAME Monroe Street Overcrossing/ I-10				
		BRIDGE NUMBER 56-0897	PREPARED BY Mahmoud Suliman		DATE 12/29/2021	SHEET 4 of 4

LOGGED BY Mahmoud Suliman 11/30/2021	BEGIN DATE 11/30/2021	COMPLETION DATE 11/30/2021	BOREHOLE LOCATION (Northing/Easting) 2212608.388, 6566602.147	HOLE ID A-21-026
DRILLING CONTRACTOR 2 R drilling	BOREHOLE LOCATION (Station, Offset, Line)			SURFACE ELEVATION 510.1 ft
DRILLING METHOD Hollow Stem Auger	DRILL RIG CME 75			BOREHOLE DIAMETER 8" in
SAMPLER TYPE(S) AND SIZE(S) (ID) Modcal (2.4") and SPT (1.4")	SPT HAMMER TYPE Automatic, Weight = 140 lbs/ Drop = 30"			HAMMER EFFICIENCY, ERI 86.2 %
BOREHOLE BACKFILL AND COMPLETION Soil cuttings mix with cement	GROUNDWATER READING	DURING DRILLING 86.9 ft on 11/30/2021	AFTER DRILLING	TOTAL DEPTH OF BORING 91.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Type	Sample ID	Blows per 6 in.	Blows per foot	Recovery %	RQD %	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks (Other Tests)
510	0														
	1		FILL: Poorly-graded SAND with SILT and GRAVEL (SP-SM): medium dense, yellowish brown to El. 508.6' brown, dry, fine to coarse-grained, little gravel up to 2.5" in largest dimension. ALLUVIUM: SILTY SAND (SM): medium dense to dense, yellowish brown, moist, fine to coarse-grained.												
508	2			B1											
	3														
506	4														
	5														
504	6			D2		4 6 7	13			8	105.1				
	7														
502	8			B3											
	9			D4		13 18 22	40			5	96.1				
	10														
500	11			S5		6 10 13	23			4					
	12														
498	13														
496	14														
	15														
494	16			D6		12 20 26	46								DS
	17														
492	18														
	19														
490	20		20.0 El. 490.1'												
	21		SILT (ML): very stiff, yellowish brown, moist, fine to medium-grained sand.	S7		6 11 15	26			22					PA
488	22														
	23														
486	24														
	25		25.0 El. 485.1'												
484	26		SILTY SAND (SM): very dense, yellowish brown, moist, fine to coarse-grained.	D8		17 50-6'	67+			2	96.0				
	27														
482	28														
	29														
30	30		30.0 El. 480.1'												

 Converse Consultants Geotechnical Engineering & Consulting Environmental & Groundwater Science Material Testing & Inspection Services	REPORT TITLE BORING RECORD				HOLE ID A-21-026	
	DIST 8	COUNTY Riverside	ROUTE I-10	POSTMILE PM R54.2	EA 08-OK7301	
	PROJECT OR BRIDGE NAME Monroe Street Overcrossing/ I-10					
	BRIDGE NUMBER 56-0897			PREPARED BY Mahmoud Suliman	DATE 12/29/2021	SHEET 1 of 4

LOGGED BY Mahmoud Suliman 11/30/2021	BEGIN DATE 11/30/2021	COMPLETION DATE 11/30/2021	BOREHOLE LOCATION (Northing/Easting) 2212608.388, 6566602.147	HOLE ID A-21-026
DRILLING CONTRACTOR 2 R drilling	BOREHOLE LOCATION (Station, Offset, Line)			SURFACE ELEVATION 510.1 ft
DRILLING METHOD Hollow Stem Auger	DRILL RIG CME 75			BOREHOLE DIAMETER 8" in
SAMPLER TYPE(S) AND SIZE(S) (ID) Modcal (2.4") and SPT (1.4")	SPT HAMMER TYPE Automatic, Weight = 140 lbs/ Drop = 30"			HAMMER EFFICIENCY, ERI 86.2 %
BOREHOLE BACKFILL AND COMPLETION Soil cuttings mix with cement	GROUNDWATER READING	DURING DRILLING 86.9 ft on 11/30/2021	AFTER DRILLING	TOTAL DEPTH OF BORING 91.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Type	Sample ID	Blows per 6 in.	Blows per foot	Recovery %	RQD %	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks (Other Tests)
480	30		ALLUVIUM: SANDY SILT (ML): stiff, yellowish brown, moist, fine to medium-grained sand, some clay. - more sand content	X	S9	7 8 11	19			34					
478	32														
476	34														
474	36			X	D10	23 39 40	79			2	98.6				
472	38														
470	40			X	S11	9 13 24	37			11					
468	42														
466	44														
464	46			X	D12	19 22 18	40			26	90.0				
462	48														
460	50			X	S13	29 50-6"	79+			2					
458	52														
456	54														
454	56			X	D14	50-6"	50+			3	110.5				
452	58														
450	60														

 Converse Consultants Geotechnical Engineering & Consulting Environmental & Groundwater Science Material Testing & Inspection Services	REPORT TITLE BORING RECORD				HOLE ID A-21-026
	DIST 8	COUNTY Riverside	ROUTE I-10	POSTMILE PM R54.2	EA 08-OK7301
	PROJECT OR BRIDGE NAME Monroe Street Overcrossing/ I-10				
	BRIDGE NUMBER 56-0897	PREPARED BY Mahmoud Suliman	DATE 12/29/2021	SHEET 2 of 4	

LOGGED BY Mahmoud Suliman	BEGIN DATE 11/30/2021	COMPLETION DATE 11/30/2021	BOREHOLE LOCATION (Northing/Easting) 2212608.388, 6566602.147	HOLE ID A-21-026
DRILLING CONTRACTOR 2 R drilling	BOREHOLE LOCATION (Station, Offset, Line)			SURFACE ELEVATION 510.1 ft
DRILLING METHOD Hollow Stem Auger	DRILL RIG CME 75			BOREHOLE DIAMETER 8" in
SAMPLER TYPE(S) AND SIZE(S) (ID) Modal (2.4") and SPT (1.4")	SPT HAMMER TYPE Automatic, Weight = 140 lbs/ Drop = 30"			HAMMER EFFICIENCY, ERI 86.2 %
BOREHOLE BACKFILL AND COMPLETION Soil cuttings mix with cement	GROUNDWATER READING	DURING DRILLING 86.9 ft on 11/30/2021	AFTER DRILLING	TOTAL DEPTH OF BORING 91.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Type	Sample ID	Blows per 6 in.	Blows per foot	Recovery %	RQD %	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks (Other Tests)
450	60		ALLUVIUM: SANDY SILT (ML): stiff to hard, brown, moist, fine to medium-grained sand.	✕	S15	5 6 8	14			27					
448	62														
446	64														
444	66			⬛	D16	50-6"	50+			16	97.1				
442	68														
440	70		70.0												
438	72		SILTY SAND (SM): dense, yellowish brown, moist, fine to coarse-grained.	✕	S16	12 13 13	26			7					
436	74														
434	76			⬛	D18	32 50-2"	82+			2					disturbed
432	78														
430	80			✕	S19	22 50-6"	72+			3					
428	82														
426	84														
424	86			⬛	D20	50-4"	50+			11	117.1				
422	88														
420	90		90.0												
			EL. 440.1'												
			EL. 435.1'												
			EL. 420.1'												

 Converse Consultants Geotechnical Engineering & Consulting Environmental & Groundwater Science Material Testing & Inspection Services	REPORT TITLE BORING RECORD				HOLE ID A-21-026
	DIST 8	COUNTY Riverside	ROUTE I-10	POSTMILE PM R54.2	EA 08-OK7301
	PROJECT OR BRIDGE NAME Monroe Street Overcrossing/ I-10				
	BRIDGE NUMBER 56-0897		PREPARED BY Mahmoud Suliman	DATE 12/29/2021	SHEET 3 of 4

LOGGED BY Mahmoud Suliman	BEGIN DATE 11/30/2021	COMPLETION DATE 11/30/2021	BOREHOLE LOCATION (Northing/Easting) 2212608.388, 6566602.147	HOLE ID A-21-026
DRILLING CONTRACTOR 2 R drilling	BOREHOLE LOCATION (Station, Offset, Line)			SURFACE ELEVATION 510.1 ft
DRILLING METHOD Hollow Stem Auger	DRILL RIG CME 75			BOREHOLE DIAMETER 8" in
SAMPLER TYPE(S) AND SIZE(S) (ID) Modcal (2.4") and SPT (1.4")	SPT HAMMER TYPE Automatic, Weight = 140 lbs/ Drop = 30"			HAMMER EFFICIENCY, ERI 86.2 %
BOREHOLE BACKFILL AND COMPLETION Soil cuttings mix with cement	GROUNDWATER READING	DURING DRILLING 86.9 ft on 11/30/2021	AFTER DRILLING	TOTAL DEPTH OF BORING 91.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Type	Sample ID	Blows per 6 in.	Blows per foot	Recovery %	RQD %	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks (Other Tests)
420	90		Poorly-graded SAND WITH SILT (SP-SM): very dense, yellowish brown, moist to wet, fine 91.5 to coarse-grained El. 418.6'		S21	13 37 50-6"	87+			10					
	91														
418	92		Bottom of Borehole at 91.5 feet. Boring terminated at planned depth. Groundwater encountered at 88.5 feet bgs. Borehole backfilled with soil cuttings mixed with cement and compacted by pushing down with an auger using the drill rig weight on 11/30/2021.												
	93														
	94														
	95														
	96														
	97														
	98														
	99														
	100														
	101														
	102														
	103														
	104														
	105														
	106														
	107														
	108														
	109														
	110														
	111														
	112														
	113														
	114														
	115														
	116														
	117														
	118														
	119														
	120														

 Converse Consultants Geotechnical Engineering & Consulting Environmental & Groundwater Science Material Testing & Inspection Services		REPORT TITLE BORING RECORD			HOLE ID A-21-026	
		DIST 8	COUNTY Riverside	ROUTE I-10	POSTMILE PM R54.2	EA 08-OK7301
		PROJECT OR BRIDGE NAME Monroe Street Overcrossing/ I-10				
		BRIDGE NUMBER 56-0897	PREPARED BY Mahmoud Suliman		DATE 12/29/2021	SHEET 4 of 4

Appendix A-1

LOTBs



NOTES

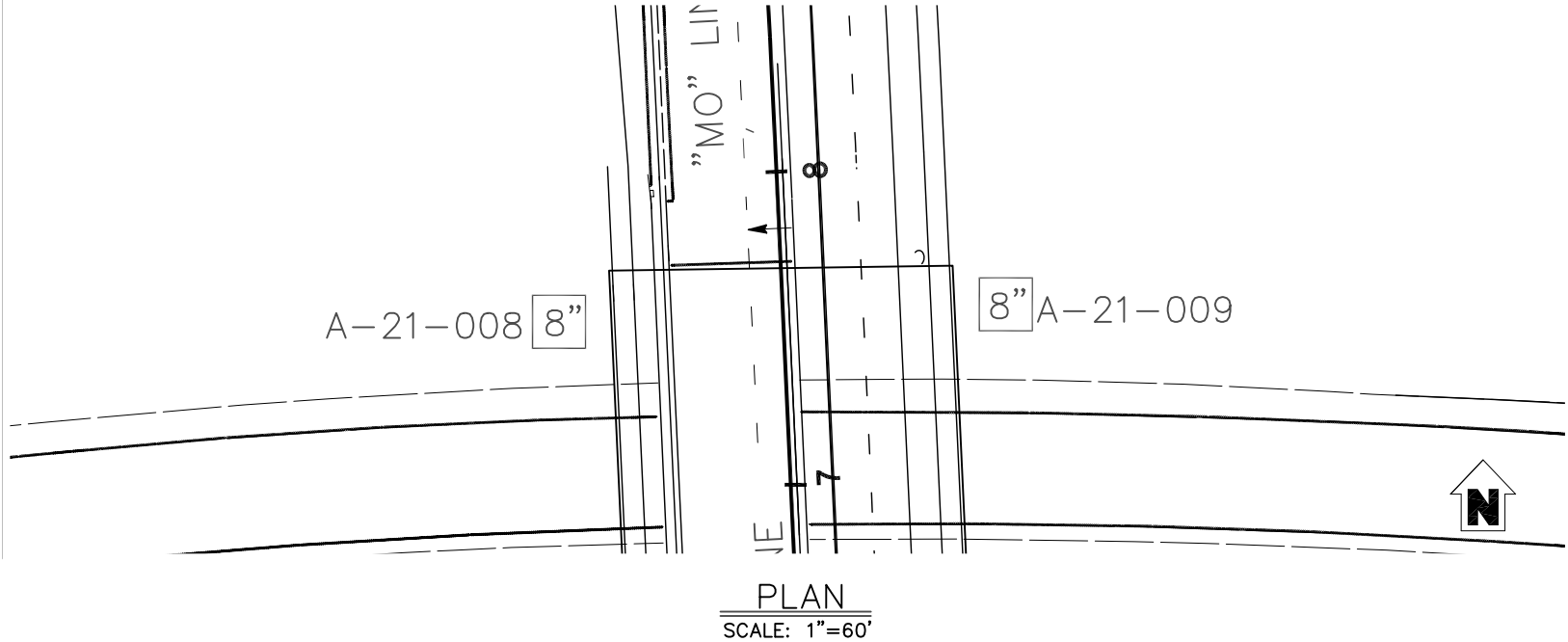
THIS LOTB SHEET (BORING RECORD) WAS PREPARED IN ACCORDANCE WITH CALTRANS SOIL AND ROCK LOGGING. CLASSIFICATION AND PRESENTATION MANUAL (2010.)
1.4" SAMPLES WERE TAKEN USING A STANDARD PENETRATION TEST (SPT) SAMPLER AND 2.4" SAMPLES WERE TAKEN USING A CALIFORNIA MODIFIED SAMPLER. MODIFIED SAMPLER BLOWCOUNTS BY 0.65 TO CONVERT TO EQUIVALENT SPT BLOWCOUNTS. AN AUTOMATIC TRIP HAMMER SYSTEM CONSISTING OF A HAMMER WEIGHT OF 140 LBS FALLING A DISTANCE OF 30" WAS USED TO ADVANCE THE SAMPLERS. FOR SOIL LEGEND, SEE CALTRANS

STANDARD PLANS **A10F** AND **A10G**

GROUNDWATER WAS NOT ENCOUNTERED IN BORINGS: A-21-008 AND A-21-009.

BENCH MARK

NGS BM T 15 ELEVATION -12.04', PER NGS DATA SHEET. ADDED 500.00' TO ELEVATIONS TO AVOID WORKING WITH NEGATIVE ELEVATIONS DURING CONSTRUCTION STAKING (-12.04' + 500.00' = 487.96').
FOUND ALUMINUM DISK, ILLEGIBLE, LOCATED IN THE CITY OF INDIO NEAR THE INTERSECTION OF BLISS AVENUE AND FARGO AVENUE, LOCATED VERTICALLY IN THE EAST FACE OF AN ABANDONED BUILDING, +/- 32.0' NORTHERLY OF THE CENTERLINE OF BLISS AVENUE, +/- 27.0' WESTERLY OF FARGO AVENUE, 1.0' ABOVE THE FINISHED SURFACE OF THE SIDEWALK, AND 3.0' NORTHERLY OF THE SOUTHEASTERLY CORNER OF THE ABANDONED BUILDING.
BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).



DIST	COUNTY	ROUTE	TOTAL PROJECT POST MILES	SHEET No.	TOTAL SHEETS
08	RIV	10	R53.9/R55.5		

06/27/2025
DATE

GEOTECHNICAL PROFESSIONAL

PLANS APPROVAL DATE

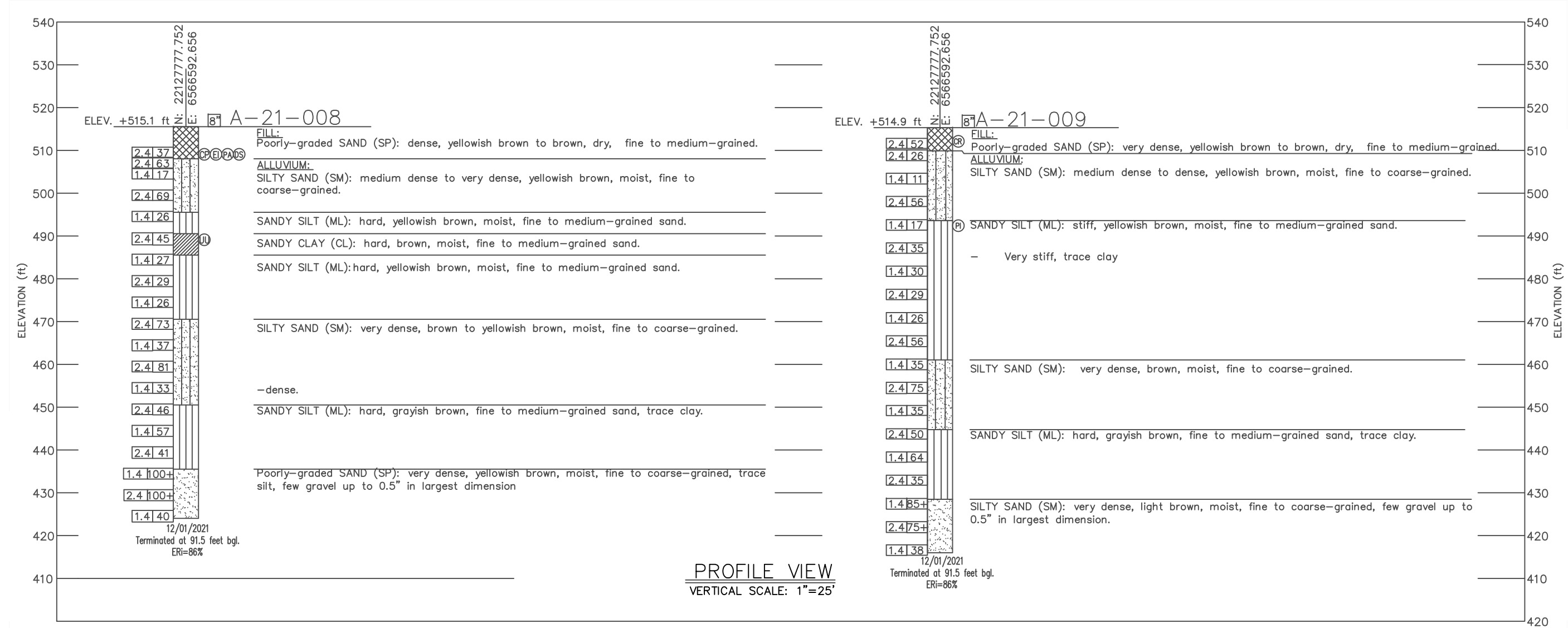
The State of California or its officers or agents shall not be responsible for the accuracy or completeness of scanned copies of this plan sheet.

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT
4080 LEMON STREET
RIVERSIDE, CA 92501

CONVERSE CONSULTANTS
2021 RANCHO DRIVE, SUITE 1
REDLANDS, CA 92373

REGISTERED PROFESSIONAL ENGINEER
HASHMI S.E. QUAZI
No. GE 2517
Exp. 06/2027
STATE OF CALIFORNIA

BOREHOLE LOCATION TABLE		
HOLE ID	ALIGNMENT NAME	STATION & OFFSET
A-21-008	"MO" LINE	47+53, 72.4' LT
A-21-009	"MO" LINE	47+53, 72.6' RT

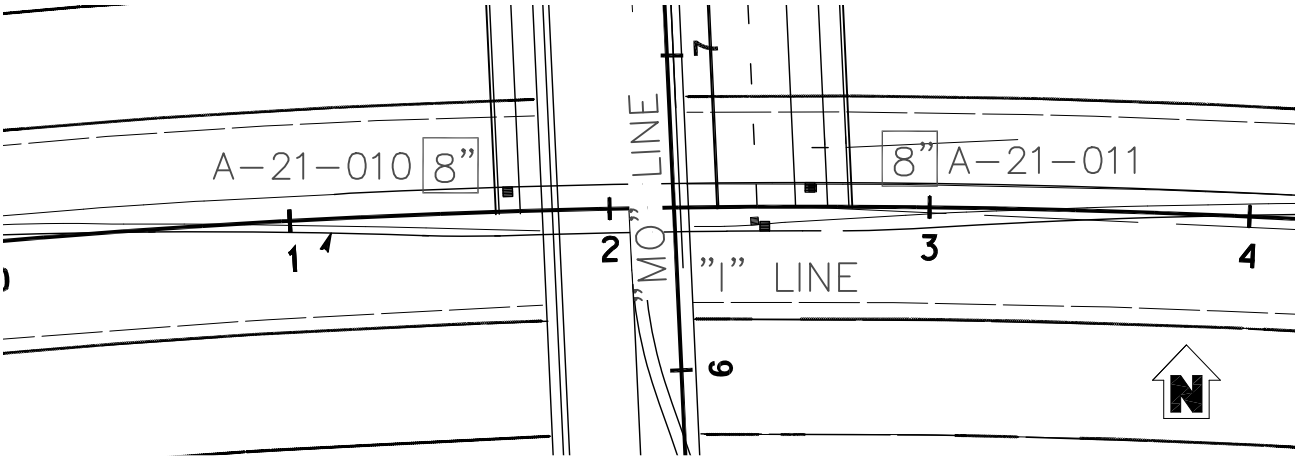


DESIGN OVERSIGHT	DRAWN BY Yadira Guevara Carmona	Mahmoud Suliman FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Casey Weber PROJECT ENGINEER	BRIDGE NO. 56-0897 POST MILES R54.74	MONROE STREET OC (REPLACE) LOG OF TEST BORINGS NO. 1 OF 4
SIGN OFF DATE	CHECKED BY Mahmoud Suliman	DATE 12/01/2021	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS	PROJECT NUMBER & PHASE: 0800003681	CONTRACT NO.: 08-0K7304	DISREGARD PRINTS BEARING EARLIER REVISION DATES
OS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 05/28/2021)						REVISION DATES 06/03/2021 10/02/2021 01/27/2021 06/27/2025 SHEET 44 OF 47

NOTES
THIS LOTB SHEET (BORING RECORD) WAS PREPARED IN ACCORDANCE WITH CALTRANS SOIL AND ROCK LOGGING. CLASSIFICATION AND PRESENTATION MANUAL (2010.)
1.4" SAMPLES WERE TAKEN USING A STANDARD PENETRATION TEST (SPT) SAMPLER AND 2.4" SAMPLES WERE TAKEN USING A CALIFORNIA MODIFIED SAMPLER. MODIFIED SAMPLER BLOWCOUNTS BY 0.65 TO CONVERT TO EQUIVALENT SPT BLOWCOUNTS.
AN AUTOMATIC TRIP HAMMER SYSTEM CONSISTING OF A HAMMER WEIGHT OF 140 LBS FALLING A DISTANCE OF 30" WAS USED TO ADVANCE THE SAMPLERS.
FOR SOIL LEGEND, SEE CALTRANS

STANDARD PLANS  AND 

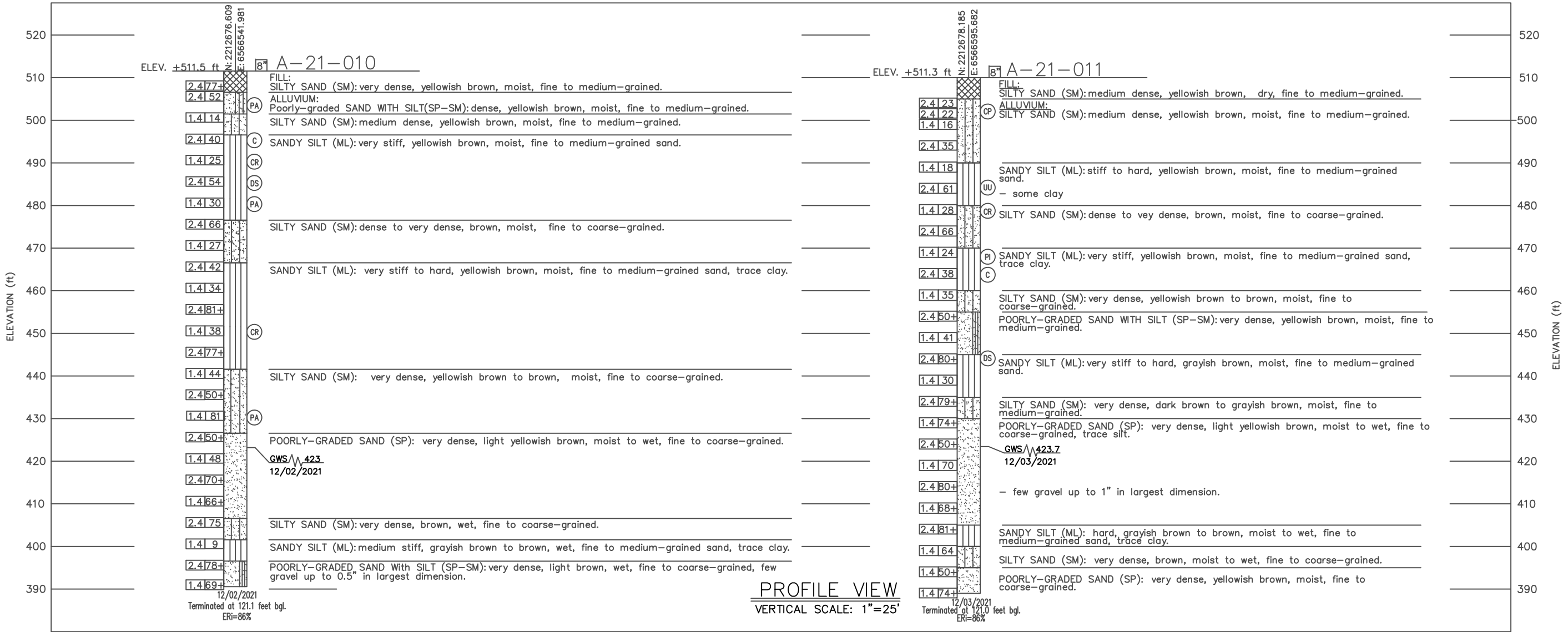
BENCH MARK
NGS BM T 15 ELEVATION -12.04', PER NGS DATA SHEET. ADDED 500.00' TO ELEVATIONS TO AVOID WORKING WITH NEGATIVE ELEVATIONS DURING CONSTRUCTION STAKING (-12.04' + 500.00' = 487.96').
FOUND ALUMINUM DISK, ILLEGIBLE, LOCATED IN THE CITY OF INDIO NEAR THE INTERSECTION OF BLISS AVENUE AND FARGO AVENUE, LOCATED VERTICALLY IN THE EAST FACE OF AN ABANDONED BUILDING, +/- 32.0' NORTHERLY OF THE CENTERLINE OF BLISS AVENUE, +/- 27.0' WESTERLY OF FARGO AVENUE, 1.0' ABOVE THE FINISHED SURFACE OF THE SIDEWALK, AND 3.0' NORTHERLY OF THE SOUTHEASTERLY CORNER OF THE ABANDONED BUILDING.
BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).



PLAN
SCALE: 1"=60'

DIST	COUNTY	ROUTE	TOTAL PROJECT POST MILES	SHEET No.	TOTAL SHEETS
08	RIV	10	R53.9/R55.5		
GEOTECHNICAL PROFESSIONAL			06/27/2025 DATE		
PLANS APPROVAL			DATE		
The State of California or its officers or agents shall not be responsible for the accuracy or completeness of scanned copies of this plan sheet.					
RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT 4080 LEMON STREET RIVERSIDE, CA 92501					
CONVERSE CONSULTANTS 2021 RANCHO DRIVE, SUITE 1 REDLANDS, CA 92373					

BOREHOLE LOCATION TABLE		
HOLE ID	ALIGNMENT NAME	STATION & OFFSET
A-21-010	"MO" LINE	46+63.8', 69' LT
A-21-011	"MO" LINE	46+65.8', 79.4' RT



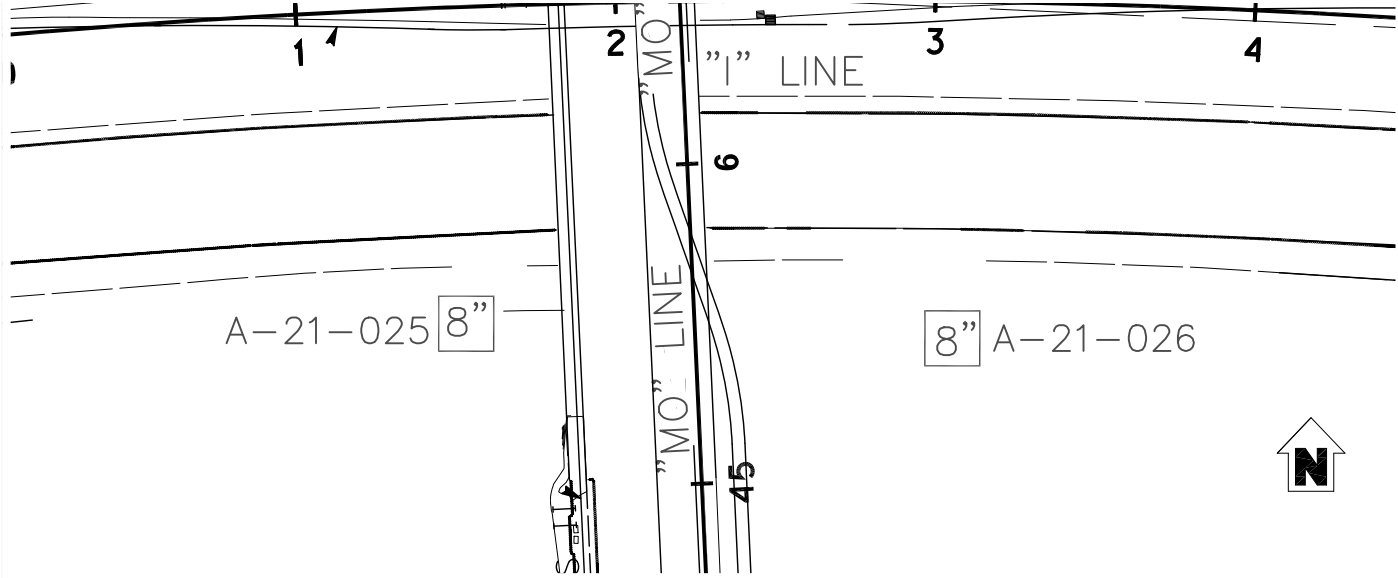
PROFILE VIEW
VERTICAL SCALE: 1"=25'

DESIGN OVERSIGHT	DRAWN BY Yadira Guevara Carmona	MAHMOUD SULIMAN FIELD INVESTIGATION BY	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	CASEY WEBER PROJECT ENGINEER	BRIDGE NO. 56-0897 POST MILES R54.74	MONROE STREET OC (REPLACE) LOG OF TEST BORINGS NO. 2 OF 4			
SIGN OFF DATE	CHECKED BY Mahmoud Suliman	DATE 12/01/2021	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS	PROJECT NUMBER & PHASE: 0800003681	CONTRACT NO.: 08-OK7304	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES 05/03/2021, 10/02/2021, 11/27/2021, 04/21/2025	SHEET 45	OF 47

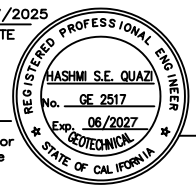
NOTES
THIS LOTB SHEET (BORING RECORD) WAS PREPARED IN ACCORDANCE WITH CALTRANS SOIL AND ROCK LOGGING, CLASSIFICATION AND PRESENTATION MANUAL (2010.)
1.4" SAMPLES WERE TAKEN USING A STANDARD PENETRATION TEST (SPT) SAMPLER AND 2.4" SAMPLES WERE TAKEN USING A CALIFORNIA MODIFIED SAMPLER. MODIFIED SAMPLER BLOWCOUNTS BY 0.65 TO CONVERT TO EQUIVALENT SPT BLOWCOUNTS.
AN AUTOMATIC TRIP HAMMER SYSTEM CONSISTING OF A HAMMER WEIGHT OF 140 LBS FALLING A DISTANCE OF 30" WAS USED TO ADVANCE THE SAMPLERS.
FOR SOIL LEGEND, SEE CALTRANS

STANDARD PLANS  AND 

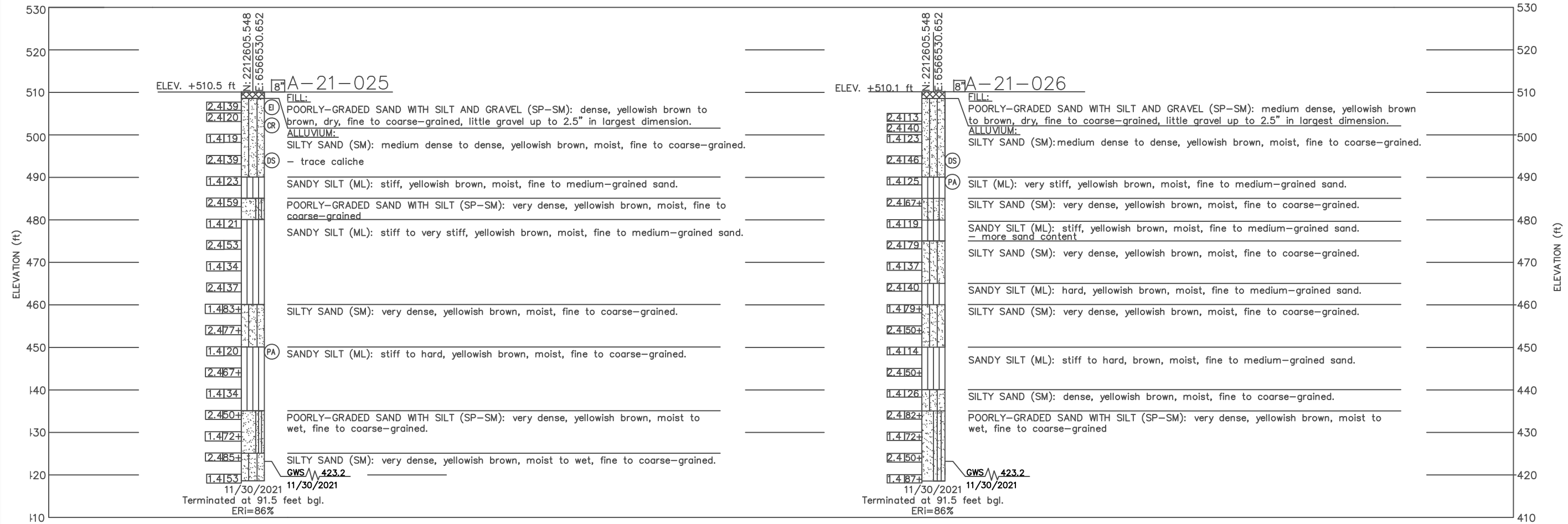
BENCH MARK
NGS BM T 15 ELEVATION -12.04', PER NGS DATA SHEET. ADDED 500.00' TO ELEVATIONS TO AVOID WORKING WITH NEGATIVE ELEVATIONS DURING CONSTRUCTION STAKING (-12.04' + 500.00' = 487.96').
FOUND ALUMINUM DISK, ILLEGIBLE, LOCATED IN THE CITY OF INDIO NEAR THE INTERSECTION OF BLISS AVENUE AND FARGO AVENUE, LOCATED VERTICALLY IN THE EAST FACE OF AN ABANDONED BUILDING, +/- 32.0' NORTHERLY OF THE CENTERLINE OF BLISS AVENUE, +/- 27.0' WESTERLY OF FARGO AVENUE, 1.0' ABOVE THE FINISHED SURFACE OF THE SIDEWALK, AND 3.0' NORTHERLY OF THE SOUTHEASTERLY CORNER OF THE ABANDONED BUILDING.
BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).



PLAN
SCALE: 1"=60'

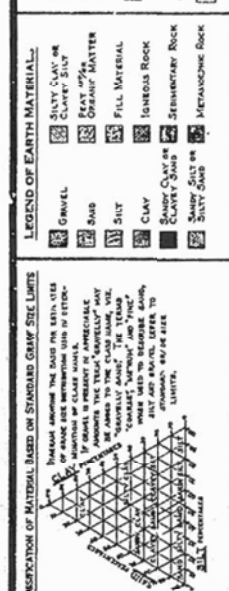
DIST	COUNTY	ROUTE	TOTAL PROJECT POST MILES	SHEET No.	TOTAL SHEETS
08	RIV	10	R53.9/R55.5		
GEO TECHNICAL PROFESSIONAL			06/27/2025 DATE		
PLANS APPROVAL			DATE		
The State of California or its officers or agents shall not be responsible for the accuracy or completeness of scanned copies of this plan sheet.					
RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT 4080 LEMON STREET RIVERSIDE, CA 92501					
CONVERSE CONSULTANTS 2021 RANCHO DRIVE, SUITE 1 REDLANDS, CA 92373					

BOREHOLE LOCATION TABLE		
HOLE ID	ALIGNMENT NAME	STATION & OFFSET
A-21-025	"MO" LINE	45+50', 71.5' LT
A-21-026	"MO" LINE	45+45.5', 80.3' RT



PROFILE VIEW
VERTICAL SCALE: 1"=25'

DESIGN OVERSIGHT	DRAWN BY	Yadira Guevara Carmona	Mahmoud Suliman	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Casey Weber PROJECT ENGINEER	BRIDGE NO. 56-0897 POST MILES R54.74	MONROE STREET OC (REPLACE) LOG OF TEST BORINGS NO. 3 OF 4		
SIGN OFF DATE	CHECKED BY	Mahmoud Suliman	DATE 12/01/2021	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS	PROJECT NUMBER & PHASE: 0800003681	CONTRACT NO.: 08-0K7304	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES 05/03/2021 11/01/2023 09/27/2024 04/27/2024	
GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 05/28/2021)								SHEET 46	OF 47



NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

Flex 50A, P30
2/28/87

'I' LINE

MONROE STREET

B-1

B-2

B-3

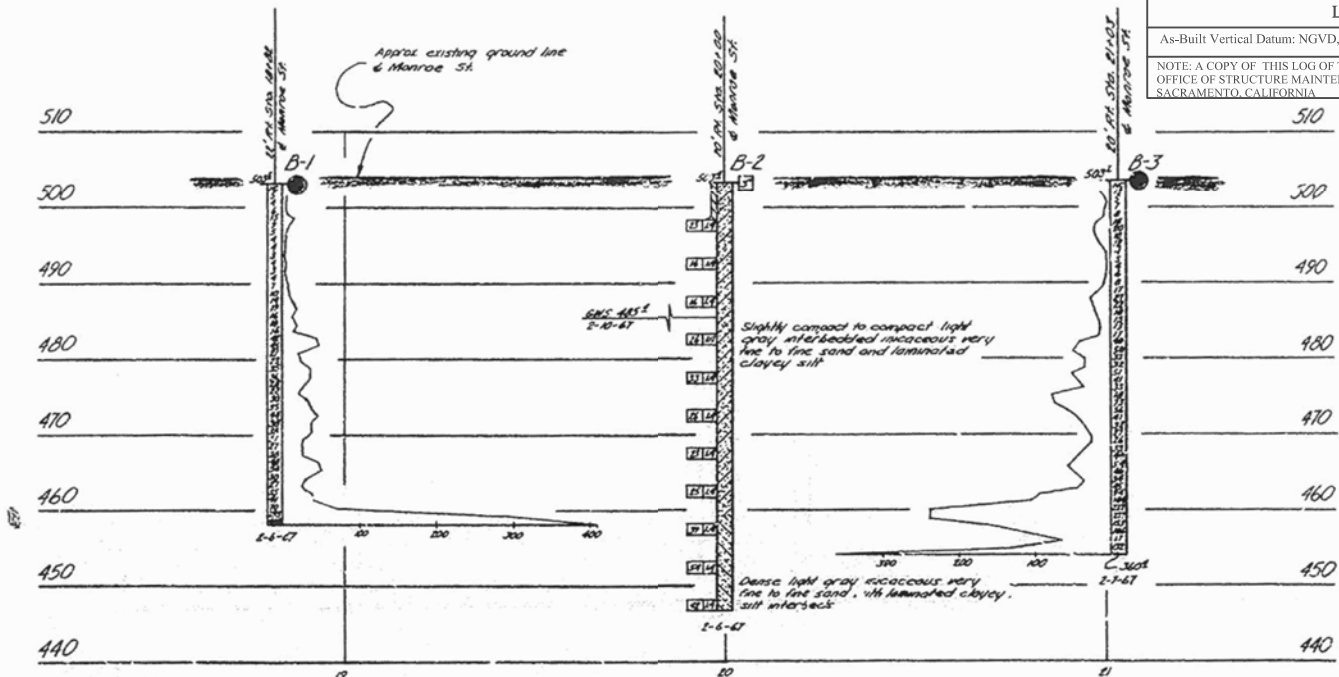
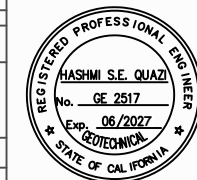
N 57.1 E 250.54L
d 1,000, 157.516

GEOTECH

As-Built Log of
California region
that is this a true
information con

PLAN
Scale: 1" = 20'

 GEOTECHNICAL SERVICES - DIVISION OF ENGINEERING SERVICES					
As-Built Log of Test Borings sheet is considered an informational document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. It does not attest to the accuracy or validity of the information contained in the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.					
DIST.	COUNTY	ROUTE	POST MILES - TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
8	RIV	10	R53.9/R55.5	47	47
				06/26/2025	
REGISTERED ENGINEER - CIVIL				DATe	
MONROE STREET OVER CROSSING/1-10					
LOG OF TEST BORINGS 4 OF 4					
As-Built Vertical Datum: NGVD,29			Datum Conversion: NAVD,88		
NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA				CU: 08 EA: 0K/7304	
				BRIDGE NO. 56-0897	



INFORMATION ON ACTUAL FOUNDATION
CONDITIONS WILL BE ENTERED ON FILE
IN BRIDGE GEOLOGY SECTION

PROFILE

Scale: Vert. $1'' = 10'$
Horiz. $1'' = 20'$

NO AS BUILT CHANGES
F.E.H. 4-20-73

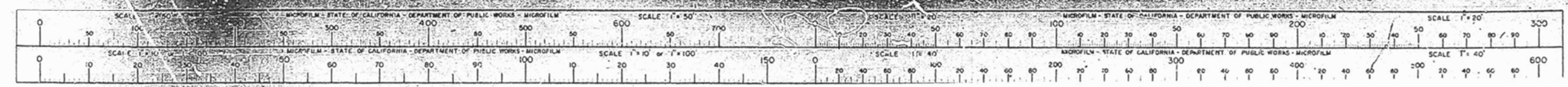
BRIDGE DEPARTMENT
ENGINEERING GEOLOGY SECTION

AS BUILT PLANS
Contract No. 11-037514
Date Completed
Document No. A0002498

STATE OF CALIFORNIA DEPARTMENT OF PUBLIC WORKS DIVISION OF HIGHWAYS		SHEET OF 11 11	
MONROE STREET OVERCROSSING			
LOG OF TEST BORINGS			
SCALE <i>As Noted</i>	BRIDGE <i>56-611</i>	FILE	DRAWING <i>56611-11</i>

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE 2-2-77 SIGNATURE James J. Cantrell TITLE SR R176



Appendix A-2

Hammer Calibration Record



SPT CAL

SPT HAMMER ENERGY MEASUREMENTS

Prepared by;

SPT CAL
5512 Belem Dr
Chino Hills, CA 91709

909-730-2161
bc@sptcal.com

Prepared for;
2R Drilling, Inc
6939 Schaefer Ave Ste D-304
Chino, CA 91710-9100

909-490-0530

Date: 03/12/20

Project Title: 2R Rig 6

Project Description: Rig 6 Ontario

Energy Transfer Ratio = 86.2% at 56.9 blows per minute

Testing was performed on March 12, 2020 in Ontario, California

Hammer Energy Measurements performed in accordance to ASTM D4633 using an approved and calibrated SPT Analyzer from Pile Dynamics, Inc.

PRESENTATION OF SPT ANALYZER TEST DATA

1. Introduction

This report presents the results of SPT Hammer Energy Measurements recorded with an SPT Analyzer from Pile Dynamics carried out on March 12, 2020 in Ontario, California.

2. Field Equipment and Procedures

The drill used is a CME 75. It is referred to at 2R Drilling as Rig 6 or 2R6. It has an attached CME SPT Automatic Hammer.

This CME SPT Automatic Hammer uses a 140 lb. weight dropped 30" on to an anvil above the bore hole. The drill rod connects the anvil to a split spoon type soil sampler inside an 8" o.d. hollow stem auger at the designated sample depth. After a seeding blow the sampler is driven 18". The number of blows required to penetrate the last 12" is referred to as the "N value", which is related to soil strength.

The first recording was taken at 5' below ground surface and then every 5' to final recording at 30'.

3. Instrumentation

An SPT Analyzer from Pile Dynamics was used to record and the process the data. The raw data was stored directly in the SPT Analyzer computer with subsequent analysis in the office with PDA-W and PDIPlot software. The measurements and analysis were conducted in general accordance with ASTM D4945 and ASTM D6066 test standards.

The SPT Analyzer is fully compliant with the minimum digital sampling frequency requirements of ASTM D4633-05 (50 kHz) and EN ISO 22476-3:2005 (100 kHz), as well as with the low pass filter, (cutoff frequency of 5000 Hz instead of 3000 Hz) requirements of ASTM D4633-05. All equipment and analysis also conform to ASTM D6066.

A 2' instrumented section of AWJ rod, with two sets of accelerometers and strain transducers mounted on opposite sides of the drill rod, was placed below the anvil. It measured strain and acceleration of every hammer blow. The SPT Analyzer then calculates the amount of energy transferred to the rod by force and velocity measurements.



4. Observations

The drill rig motor is diesel fueled. The drill and sample equipment looked to be well operated and maintained.

5. Results

Results from the SPT Hammer Energy Measurements are summarized below. It shows the Energy Transfer Ratio (ETR) at each sampling depth. ETR is the ratio of the measured maximum transferred energy to rated energy of the hammer which is the product of the weight of the hammer times the height of the fall. $140 \text{ lb} \times 30'' = 4200 \text{ lb-in} = 0.350 \text{ kip-ft}$.

Energy Transfer Ratio = 86.2% at 56.9 blows per minute

$$N_{60} = (ETR/60)N$$

Depth	ETR%	BPM
5	85.8	58.2
*10	70.5	56.6
15	84.9	56.8
20	86.8	56.2
25	87.7	55.8
30	85.8	58.0
Average	86.2	56.9

*** The sample at 10' had blow counts too low to be included in the average above. The N value at 10' was less than 5. Anything less than 10 is considered too low for an accurate measurement of hammer energy transferred.**

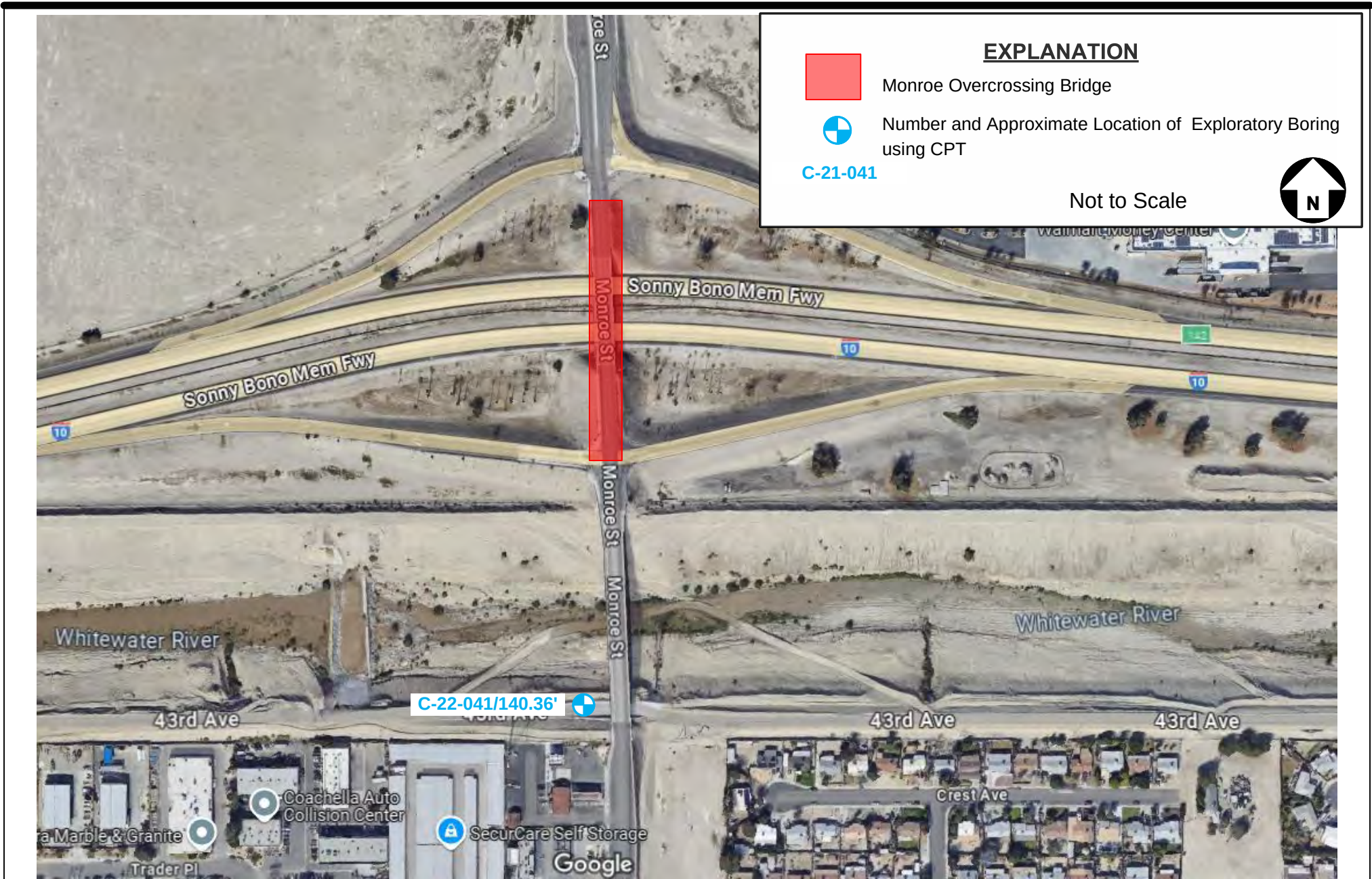
If you have any questions please do not hesitate to call or email. Thank you,

Brian Serl
 Calibration Engineer
SPT CAL
 909-730-2161
bc@sptcal.com

Appendix A-3

Supporting Field Data





Project: Monroe Street Overcrossing
 Location: South of Interstate 10 and Monroe Street Interchange
 City of Indio, Riverside County, California
 For: Michael Baker International

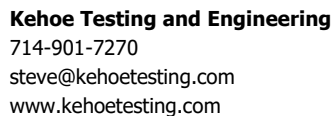
Approximate Cone-Penetration Test Location Map

Project No.
14-81-229-03

Figure No.
A-3 (1)



Converse Consultants



C-22-041
Total depth: 140.36 ft, Date: 1/20/2022



Appendix B

LABORATORY TESTING PROGRAM



APPENDIX B

LABORATORY TESTING PROGRAM

Tests were conducted in our laboratory on representative soil samples for the purpose of classification and evaluation of their physical properties and engineering characteristics. The amount and selection of tests were based on the geotechnical parameters required for this project. Test results are presented herein and on the Boring Records, in Appendix A, *Field Exploration*. The following is a summary of the various laboratory tests conducted for this project.

In-Situ Moisture Content and Dry Density

In-situ dry density and moisture content tests were performed on relatively undisturbed ring samples, in accordance with the ASTM Standard D2216 and ASTM D2937 to aid soils classification and to provide qualitative information on strength and compressibility characteristics of the subsurface soils. For test results, see the Boring Records in Appendix A, *Field Exploration*.

Expansion Index

Two representative bulk soil samples were tested in accordance with ASTM Standard D4829 test method to evaluate the expansion potential of materials encountered at the site. The test results are presented in the following table.

Table No. B-1, Summary of Expansion Index Test Results

Boring No.	Depth (feet)	Soil Description	Expansion Index	Expansion Potential
A-21-008	0-5	Poorly graded Sand (SP)	0	Very Low
A-21-025	1.5-5	Silty Sand (SM)	0	Very Low

Soil Corrosivity

Five representative soil samples were tested by AP Engineering and Testing, Inc. (Pomona, California) in accordance with California Test Method (CTM) 643, 422, and 417, to determine minimum electrical resistivity, pH, and chemical content, including soluble sulfate and chloride concentrations. The purpose of these tests was to determine the corrosion potential of the soils when placed in contact with common pipe materials. The test results are summarized in the table below.



Table No. B-2, Summary of Corrosivity Test Results

Boring No.	Depth (feet)	pH	Soluble Sulfates (CTM 417) (ppm)	Soluble Chlorides (CTM 422) (ppm)	Min. Resistivity (CTM 643) (Ohm-cm)
A-21-009	0-5	8.7	326	38	1,667
A-21-010	20.0-21.5	8.8	37	22	4,861
A-21-010	60.0-61.5	8.8	117	46	2,126
A-21-011	30.0-31.5	8.7	115	48	1,319
A-21-025	5-10	8.8	102	38	2,054

Atterberg Limits

Atterberg Limits tests were performed on two representative samples to assist in the classification of the soils in accordance with the ASTM Standard D4318 test method. The test results are presented in Drawings No. B-1, Atterberg Limits Test Results.

Table No. B-3, Atterberg Limits Test Results

Boring No.	Depth (feet)	Soil Description	Liquid Limit	Plastic Limit	Plasticity Index
A-21-009	20.0-21.5	Non-Plastic Silt (ML)	27	31	NP
A-21-011	40.0-41.5	Low Plasticity Silt (ML)	28	26	2

Grain Size Analysis

To assist in classification of soils, mechanical grain-size analyses were performed on 6 selected samples in general accordance with the ASTM D6913 test method. Grain-size curves are shown in Figure Nos. B-2a and B-2b, *Grain Size Distribution Results* and summarized in the table below.

Table No. B-4, Summary Grain Size Distribution Test Results

Boring No.	Depth (ft)	Soil Classification	% Gravel	% Sand	% Silt	% Clay
A-21-008	0-5	Poorly graded Sand (SP)	10.0	85.7	4.3	
A-21-010	5-10	Poorly graded Sand with Silt (SP-SM)	0.0	93.6	6.4	
A-21-010	30.0-31.5	Sandy Silt (ML)	0.0	18.4	81.6	
A-21-010	80.0-81.5	Silty Sand (SM)	1.0	82.4	16.6	
A-21-025	60.0-61.5	Sandy Silt (ML)	0.0	18.0	82.0	
A-21-026	20.0-21.5	Silt (ML)	0.0	6.9	93.1	



Direct Shear

Five direct shear tests were performed on relatively undisturbed samples in accordance with ASTM Standard 3080. For each test, three samples contained in a brass sampler ring were placed, one at a time, directly into the test apparatus and subjected to a range of normal loads appropriate for the anticipated conditions. The samples were then sheared at a constant strain rate of 0.02. Shear deformation was recorded until a maximum of about 0.25-inch shear displacement was achieved. Ultimate strength was selected from the shear-stress deformation data and plotted to determine the shear strength parameters. The test results, including average sample density and moisture content are shown in Figure Nos. B-3 through B-7, *Direct Shear Test Results*, and summarized in the following table.

Table No. B-5, Summary of Direct Shear Test Results

Boring No.	Depth (feet)	Soil Description	Ultimate Strength Parameters	
			Friction Angle (degrees)	Cohesion (psf)
A-21-008	5.0-6.5	Poorly graded Sand (SP)	29	0
A-21-010	25.0-26.5	Sandy Silt (ML)	29	130
A-21-011	65.0-66.5	Sandy Silt (ML)	31	40
A-21-025	15.0-16.5	Silty Sand (SM)	34	60
A-21-026	15.0-16.5	Silty Sand (SM)	32	150

Consolidation

Two tests were conducted in accordance with ASTM Standard D2435 method. Data obtained from these tests performed on relatively undisturbed ring samples were used to evaluate the settlement characteristics of the on-site soils under load. Preparation for these tests involved trimming the sample, placing it in a 1-inch-high brass ring, and loading it into the test apparatus, which contained porous stones to accommodate drainage during testing. Normal axial loads were applied to one end of the sample through the porous stones, and the resulting deflections were recorded at various time periods. The load was increased after the sample reached a reasonable state of equilibrium. Normal loads were applied at a constant load-increment ratio, successive loads being generally twice the preceding load. For test results, including sample density and initial moisture content, see Drawings No. B-8 and B-9, *Consolidation Test Results*.

Unconsolidated Undrained Test

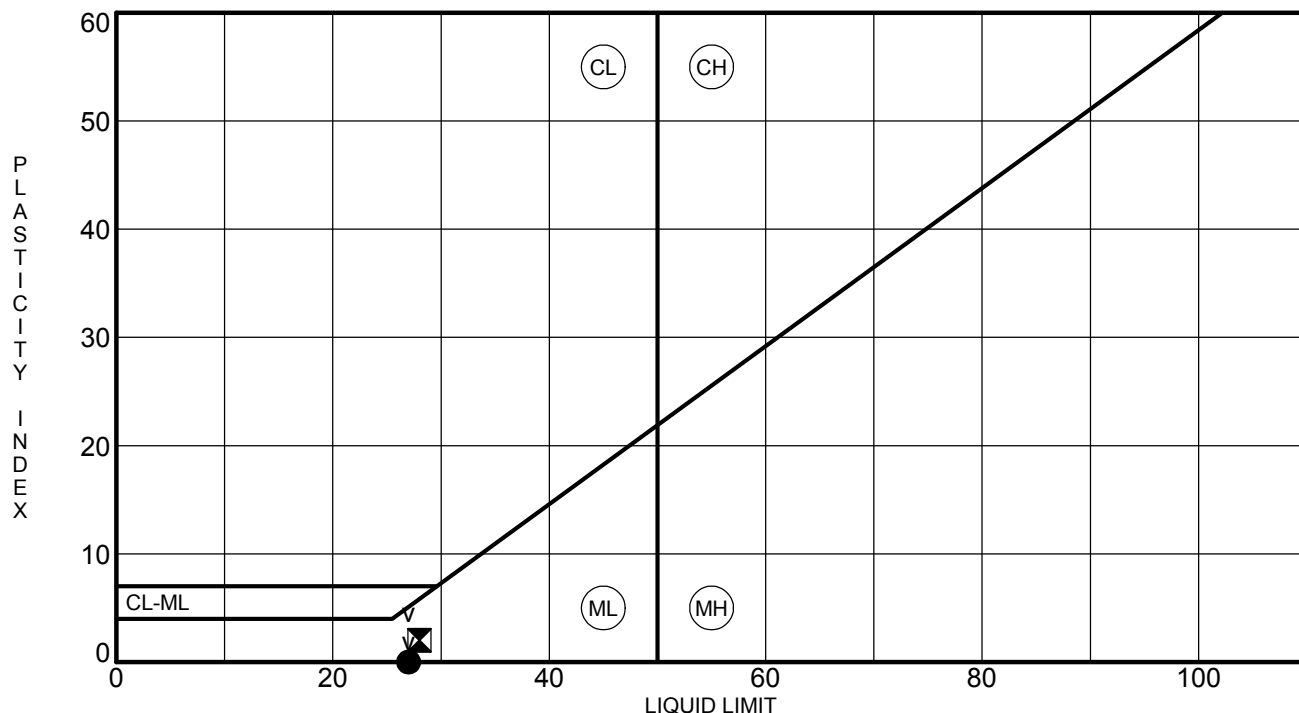
Two representative soil samples were tested by AP Engineering and Testing, Inc. (Pomona, California) in accordance with ASTM Standard D 2850, to determine undrained shear strength for cohesive soil. For test results, see Drawings No. B-10 and B-11 *Unconsolidated Undrained Test Results*.



Sample Storage

Soil samples currently stored in our laboratory will be discarded thirty days after the date of the final report, unless this office receives a specific request to retain the samples for a longer period.





Symbol	Boring No.	Depth (ft)	LL (%)	PL (%)	PI (%)	Description
●	A-21-009	20	27	31	NP	Non Plastic SILT (ML)
⊠	A-21-011	40	28	26	2	Low Plasticity SILT (ML)

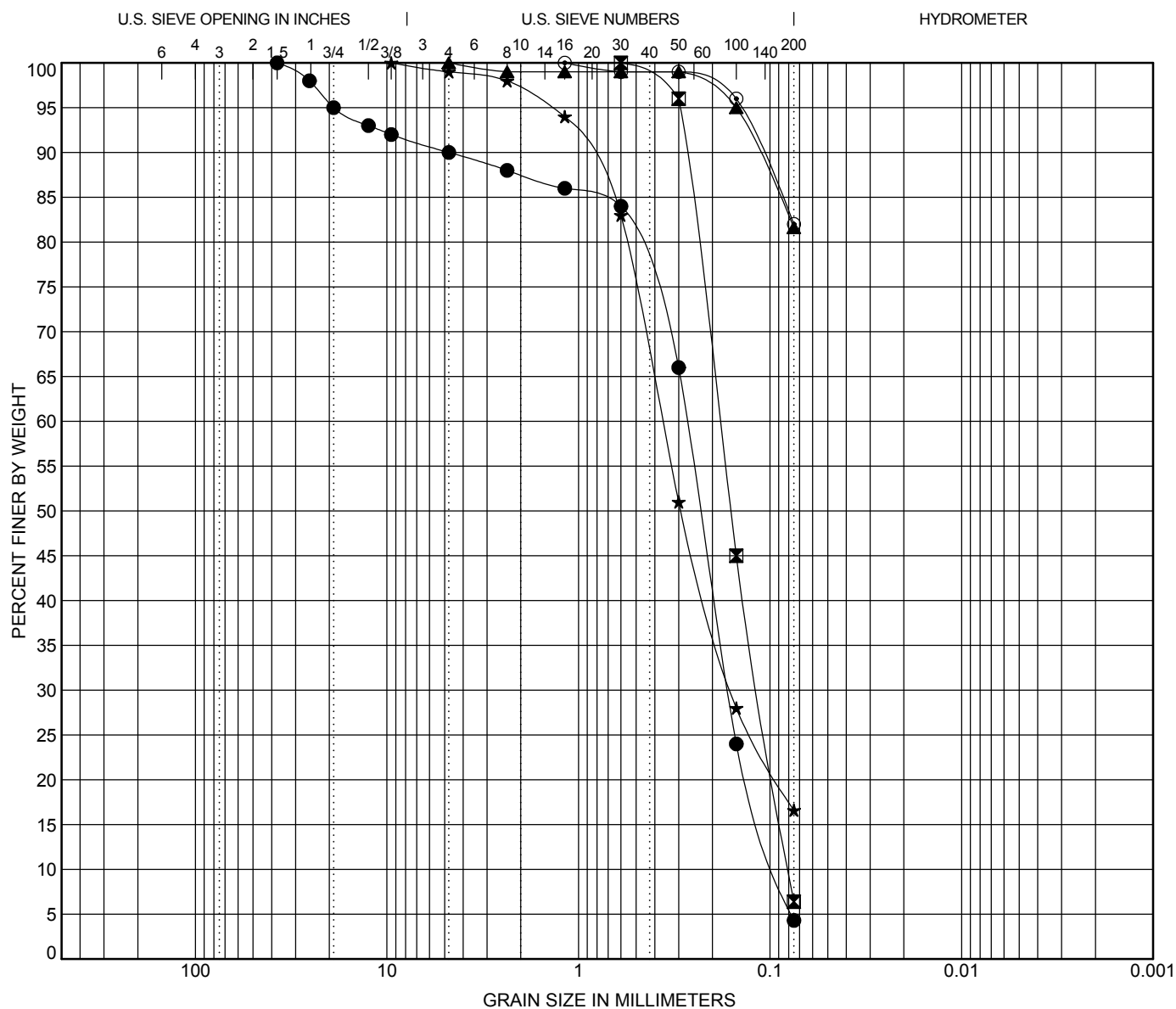
ATTERBERG LIMITS RESULTS



Monroe Street Overcrossing
 Interstate 10 and Monroe Street Interchange Improvements
 City Of Indio, Riverside County, California
 For: Michael Baker International, Inc.

Project No.
 14-81-229-03

Drawing No.
 B-1



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring No.	Depth (ft)	Description				LL	PL	PI	Cc	Cu
● A-21-008	0-5	Poorly-graded SAND (SP)							1.10	2.96
⊠ A-21-010	5-10	Poorly-graded SAND with SILT (SP-SM)							0.89	2.30
▲ A-21-010	30.20-31.5	SANDY SILT TO SANDY CLAY (ML-CL)								
★ A-21-010	80.0-81.5	SILTY SAND								
⊙ A-21-025	60.0-61.5	SANDY SILT (ML)								
Boring No.	Depth (ft)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	
● A-21-008	0-5	37.5	0.272	0.166	0.092	10.0	85.7	4.3		
⊠ A-21-010	5-10	0.6	0.184	0.115	0.08	0.0	93.6	6.4		
▲ A-21-010	30.20-31.5	4.75				0.0	18.4	81.6		
★ A-21-010	80.0-81.5	9.5	0.365	0.159		1.0	82.4	16.6		
⊙ A-21-025	60.0-61.5	1.18				0.0	18.0	82.0		

GRAIN SIZE DISTRIBUTION RESULTS

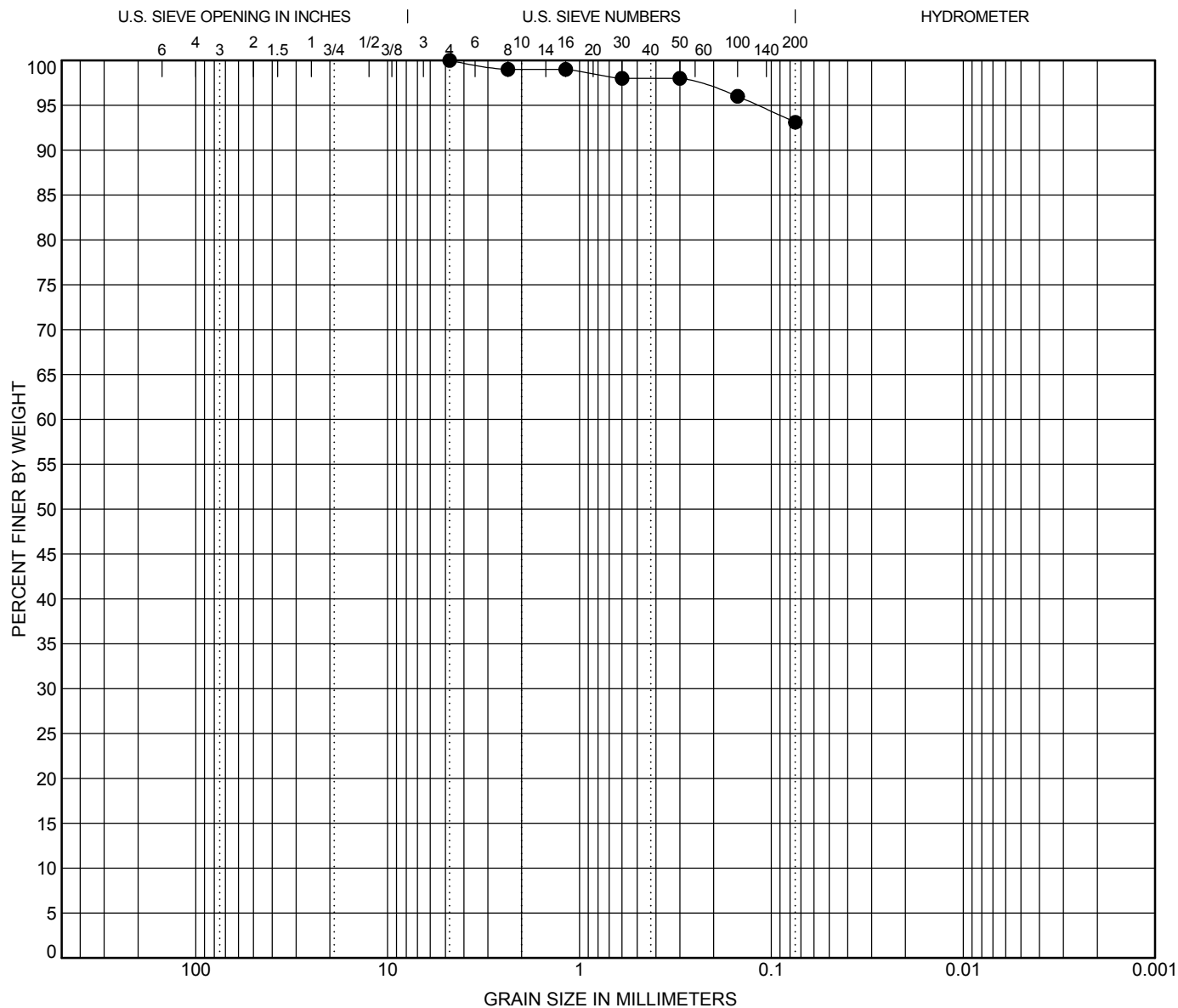


Converse Consultants

Monroe Street Overcrossing
Interstate 10 and Monroe Street Interchange Improvements
City Of Indio, Riverside County, California
For: Michael Baker International, Inc.

Project No.
14-81-229-03

Drawing No.
B-2a



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring No.	Depth (ft)	Description					LL	PL	PI	Cc	Cu
● A-21-026	20.0-21.5	SILT (ML)									
Boring No.	Depth (ft)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● A-21-026	20.0-21.5	4.75				0.0	6.9	93.1			

GRAIN SIZE DISTRIBUTION RESULTS

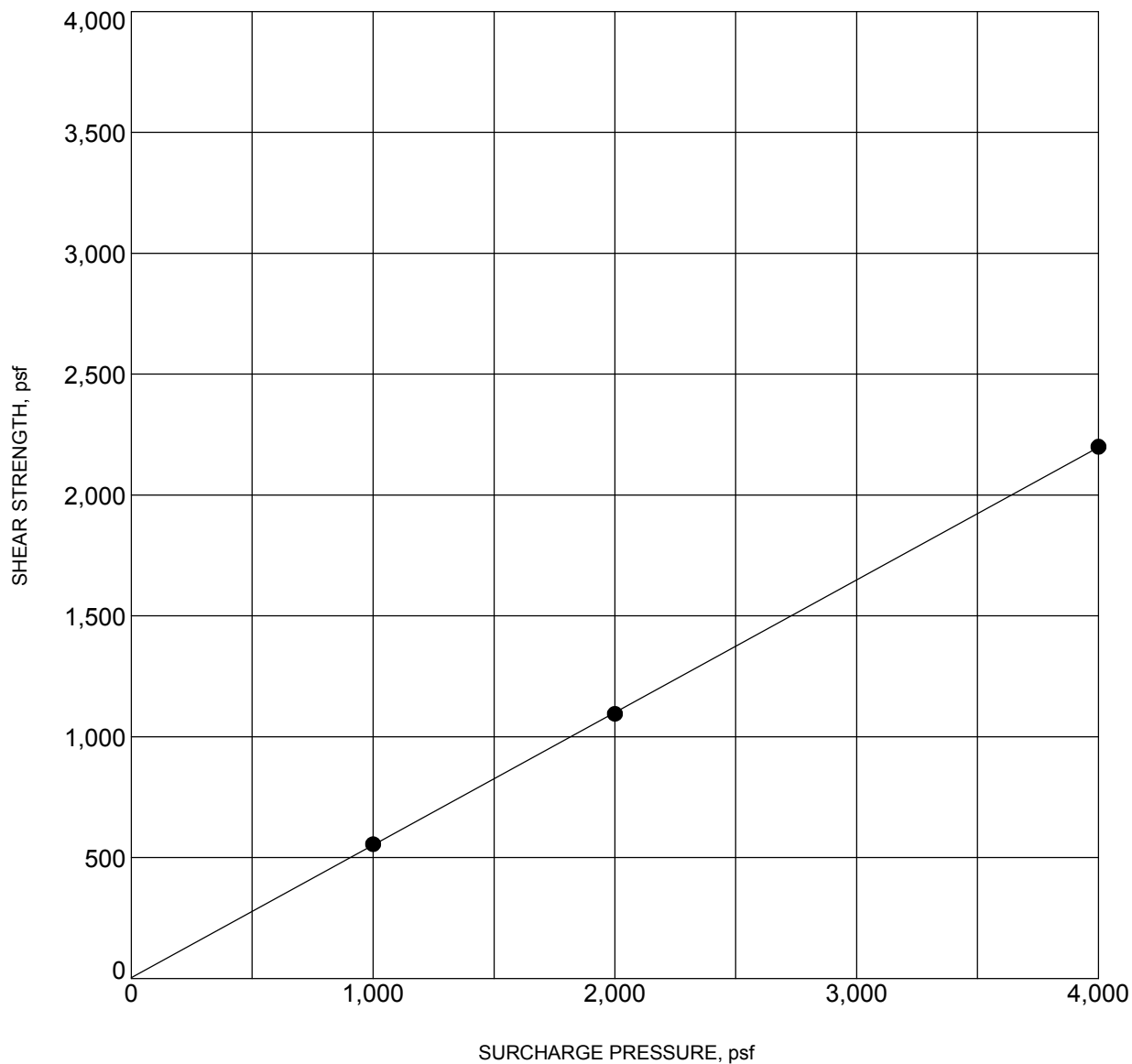


Converse Consultants

Monroe Street Overcrossing
Interstate 10 and Monroe Street Interchange Improvements
City Of Indio, Riverside County, California
For: Michael Baker International, Inc.

Project No.
14-81-229-03

Drawing No.
B-2b



BORING NO.	:	A-21-008	DEPTH (ft)	:	5.0-6.5
DESCRIPTION	:	Poorly graded SAND (SP)			
COHESION (psf)	:	0	FRICTION ANGLE (degrees):	:	29
MOISTURE CONTENT (%)	:	1.0	DRY DENSITY (pcf)	:	101.1

NOTE: Ultimate Strength.

DIRECT SHEAR TEST RESULTS

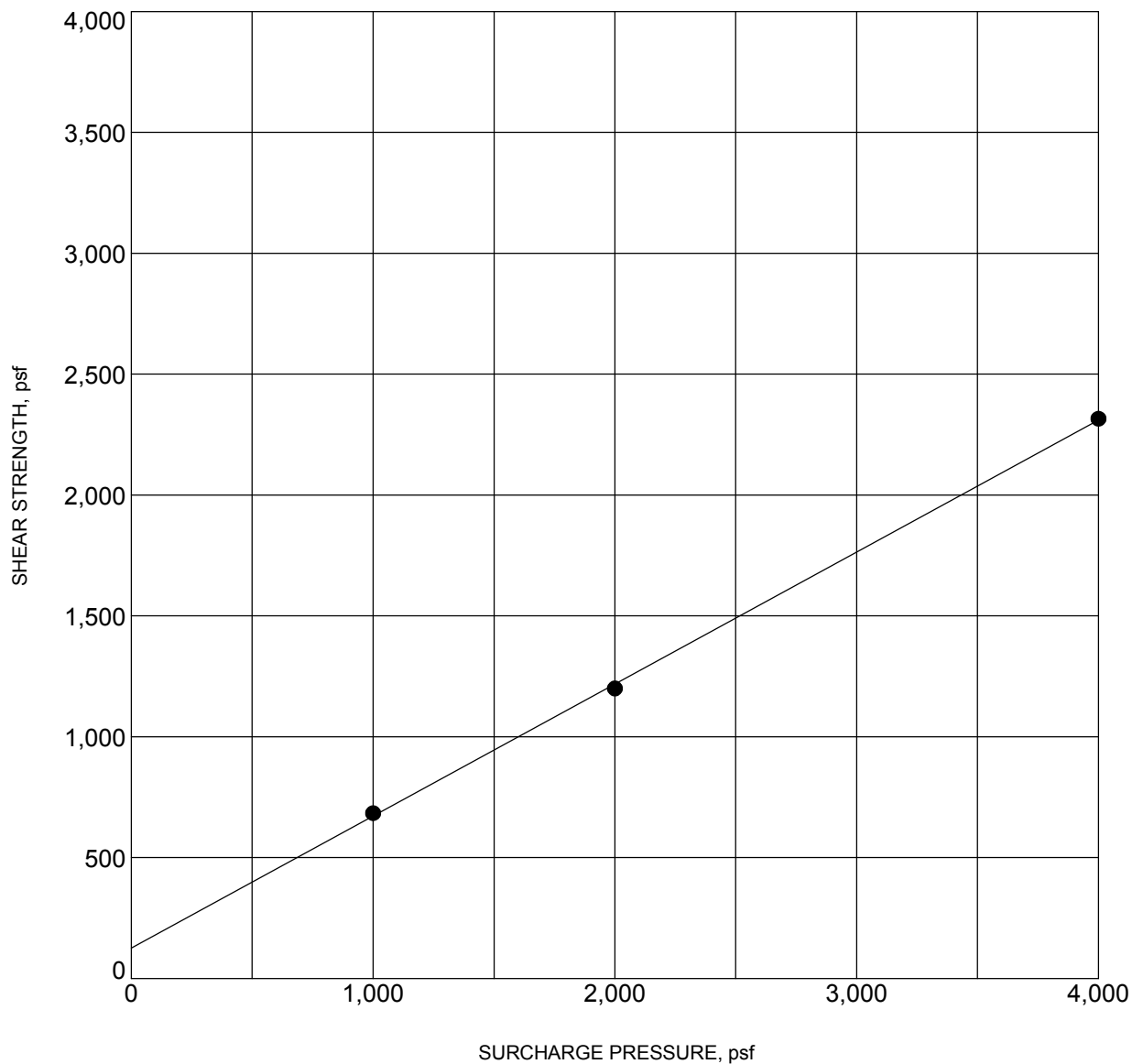


Converse Consultants

Monroe Street Overcrossing
Interstate 10 and Monroe Street Interchange Improvements
City Of Indio, Riverside County, California
For: Michael Baker International, Inc.

Project No.
14-81-229-03

Drawing No.
B3



BORING NO.	:	A-21-010	DEPTH (ft)	:	25.0-26.5
DESCRIPTION	:	SANDY SILT (ML)			
COHESION (psf)	:	130	FRICTION ANGLE (degrees):	:	29
MOISTURE CONTENT (%)	:	107.0	DRY DENSITY (pcf)	:	8.0

NOTE: Ultimate Strength.

DIRECT SHEAR TEST RESULTS

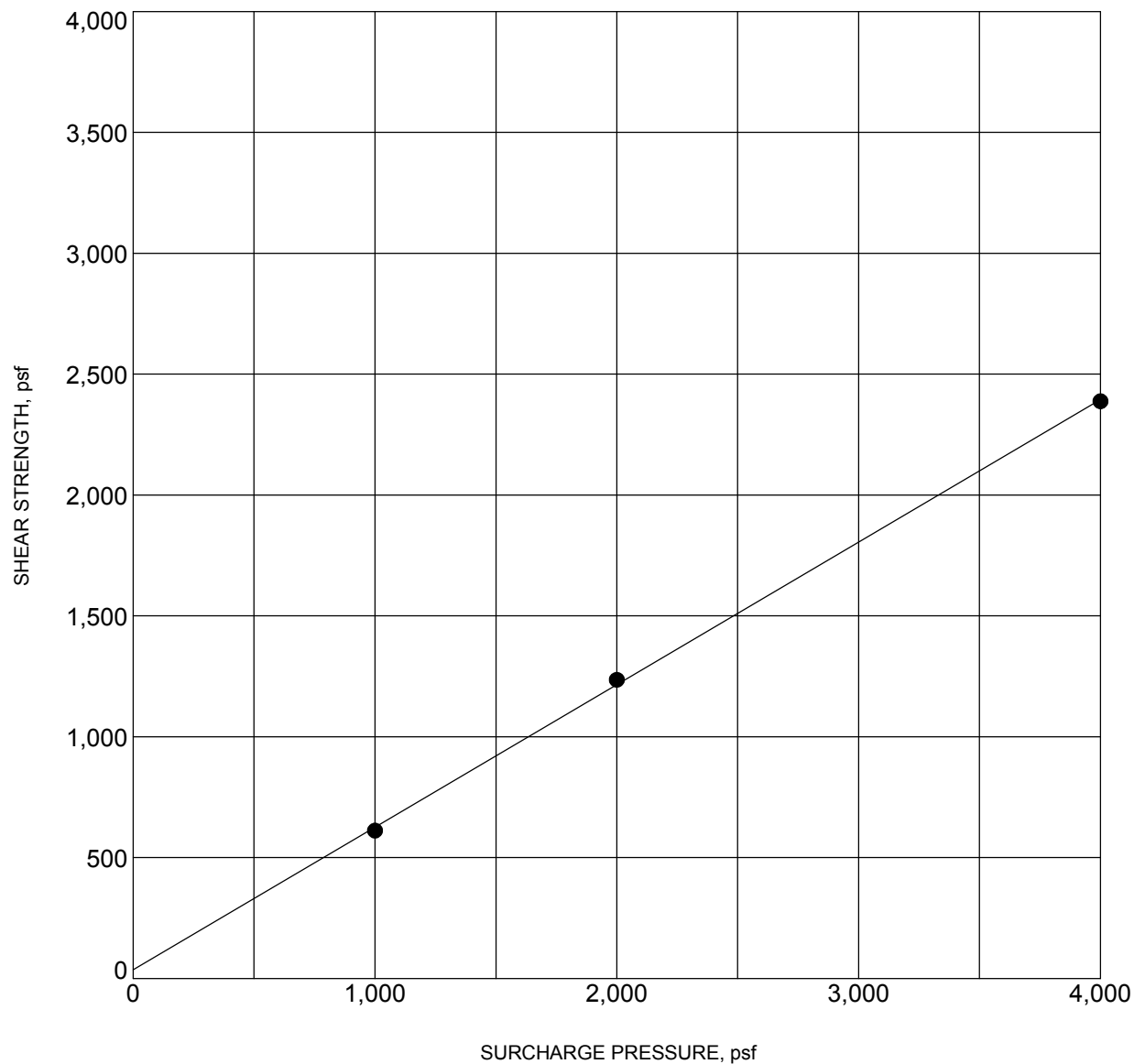


Converse Consultants

Monroe Street Overcrossing
Interstate 10 and Monroe Street Interchange Improvements
City Of Indio, Riverside County, California
For: Michael Baker International, Inc.

Project No.
14-81-229-03

Drawing No.
B-4



BORING NO.	: A-21-011	DEPTH (ft)	: 65.0-66.5
DESCRIPTION	: SANDY SILT (ML)		
COHESION (psf)	: 40	FRICTION ANGLE (degrees):	31
MOISTURE CONTENT (%)	: 9.0	DRY DENSITY (pcf)	: 107.0

NOTE: Ultimate Strength.

DIRECT SHEAR TEST RESULTS

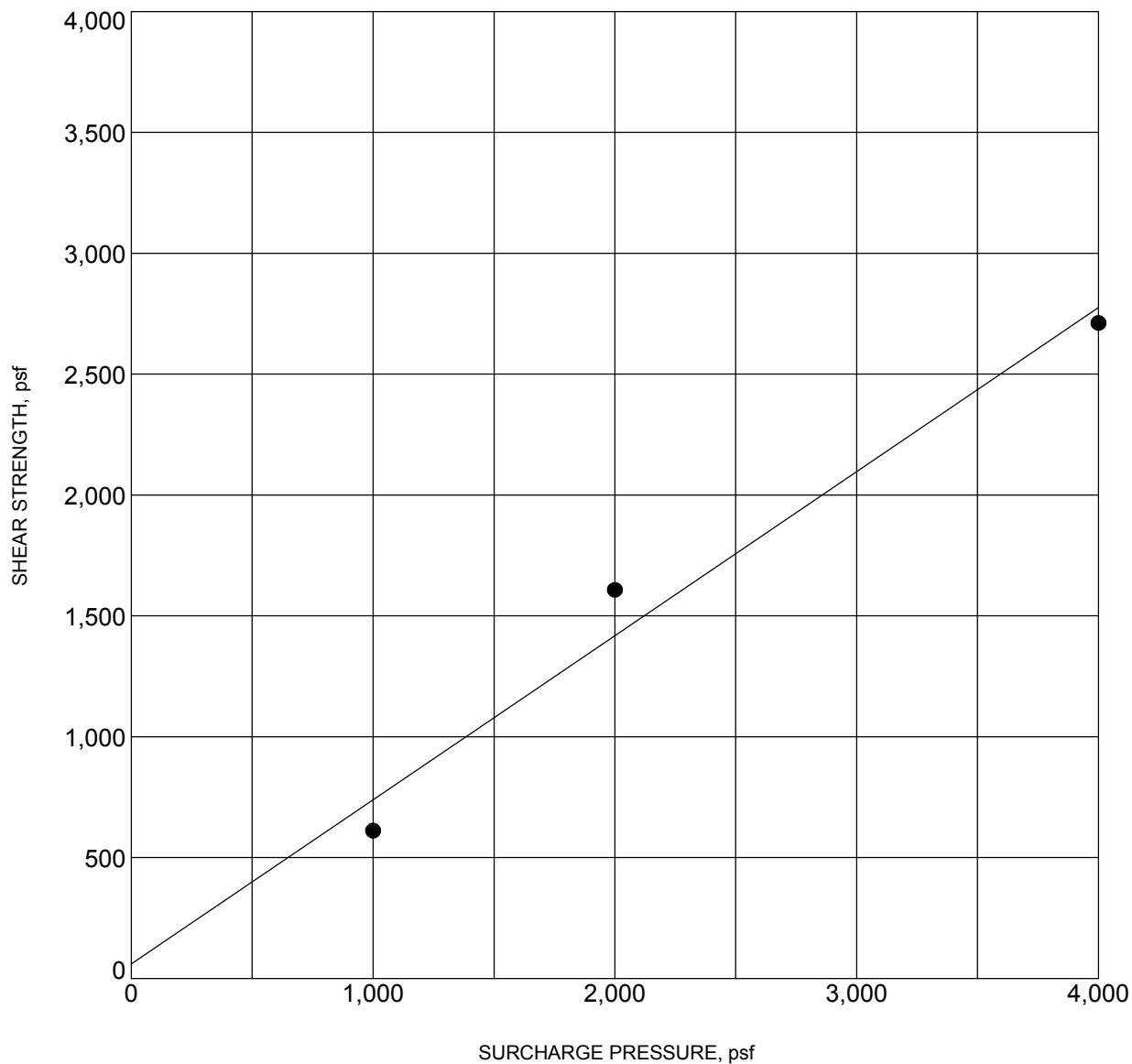


Converse Consultants

Monroe Street Overcrossing
Interstate 10 and Monroe Street Interchange Improvements
City Of Indio, Riverside County, California
For: Michael Baker International, Inc.

Project No.
14-81-229-03

Drawing No.
B-5



BORING NO.	:	A-21-025	DEPTH (ft)	:	15.0-16.5
DESCRIPTION	:	SILTY SAND (SM)			
COHESION (psf)	:	60	FRICTION ANGLE (degrees):	:	34
MOISTURE CONTENT (%)	:	11.0	DRY DENSITY (pcf)	:	108.9

NOTE: Ultimate Strength.

DIRECT SHEAR TEST RESULTS

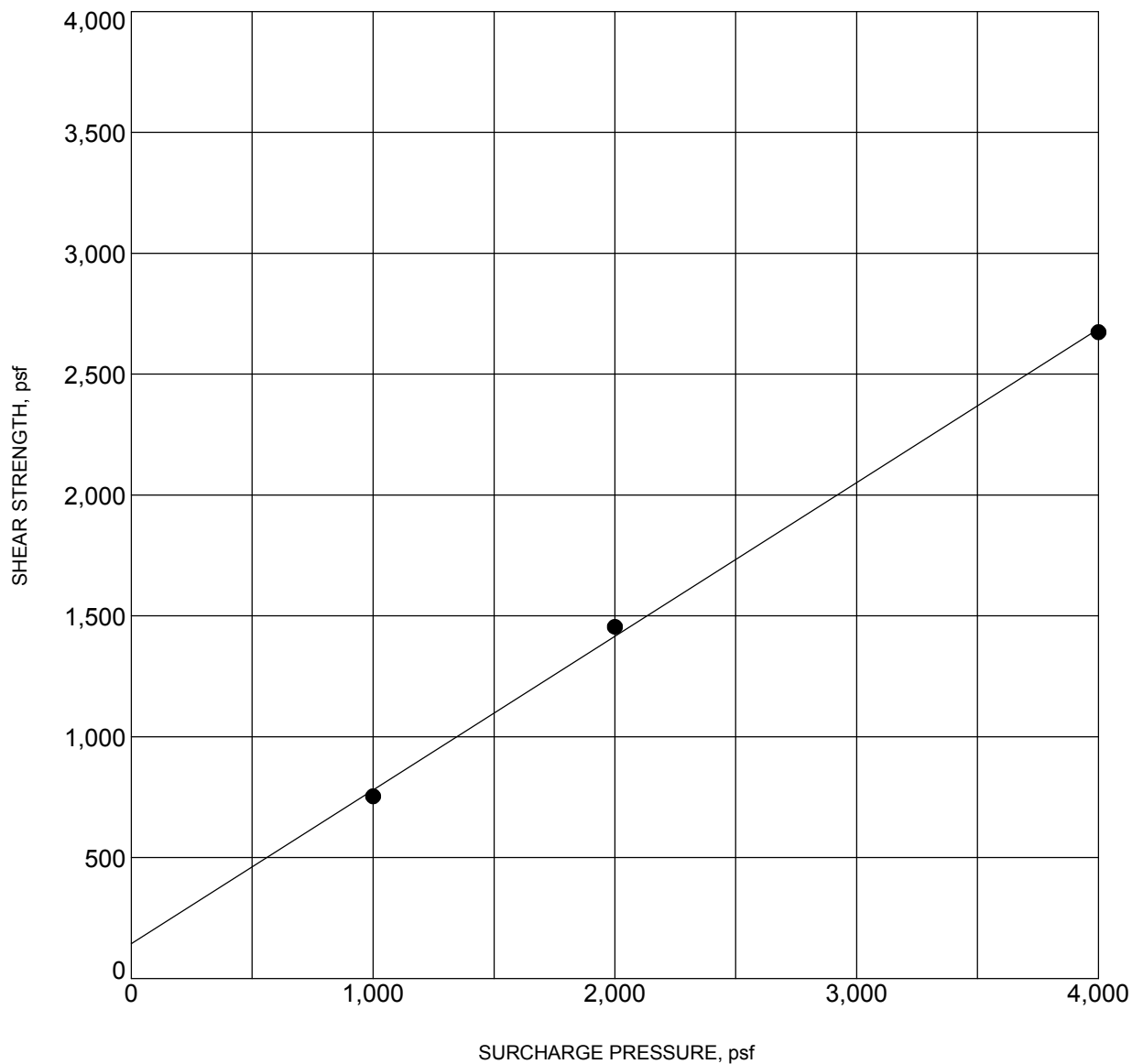


Converse Consultants

Monroe Street Overcrossing
 Interstate 10 and Monroe Street Interchange Improvements
 City Of Indio, Riverside County, California
 For: Michael Baker International, Inc.

Project No.
14-81-229-03

Drawing No.
B-6



BORING NO.	: A-21-026	DEPTH (ft)	: 15.0-16.5
DESCRIPTION	: SILTY SAND (SM)		
COHESION (psf)	: 150	FRICTION ANGLE (degrees):	32
MOISTURE CONTENT (%)	: 8.3	DRY DENSITY (pcf)	: 121.0

NOTE: Ultimate Strength.

DIRECT SHEAR TEST RESULTS

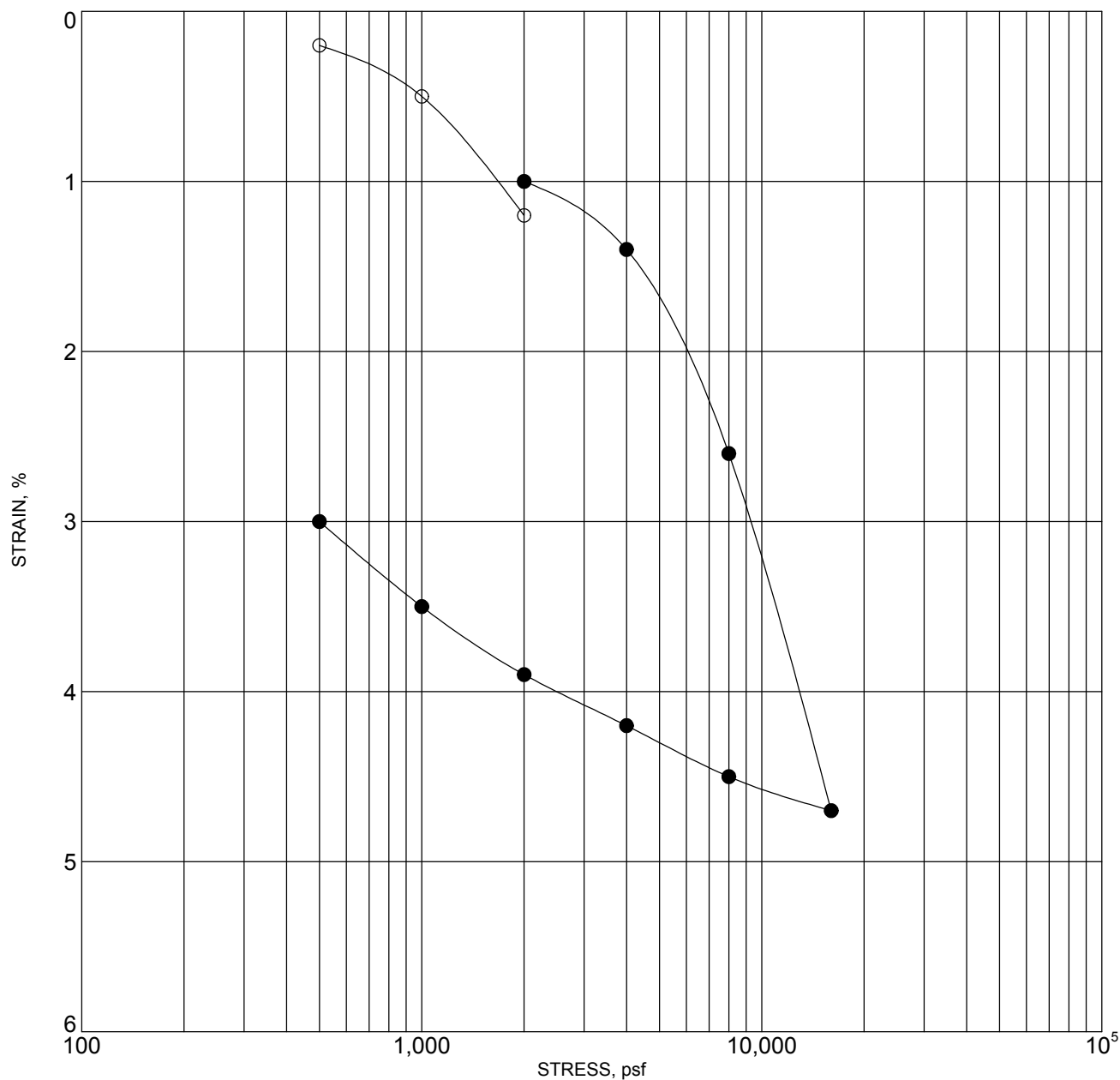


Converse Consultants

Monroe Street Overcrossing
Interstate 10 and Monroe Street Interchange Improvements
City Of Indio, Riverside County, California
For: Michael Baker International, Inc.

Project No.
14-81-229-03

Drawing No.
B-7



BORING NO. : A-21-010		DEPTH (ft) : 15.0-16.5	
DESCRIPTION : SANDY SILT (ML)			
MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL 16	101	67	0.630

NOTE: SOLID CIRCLES INDICATE READINGS AFTER ADDITION OF WATER

CONSOLIDATION TEST RESULTS

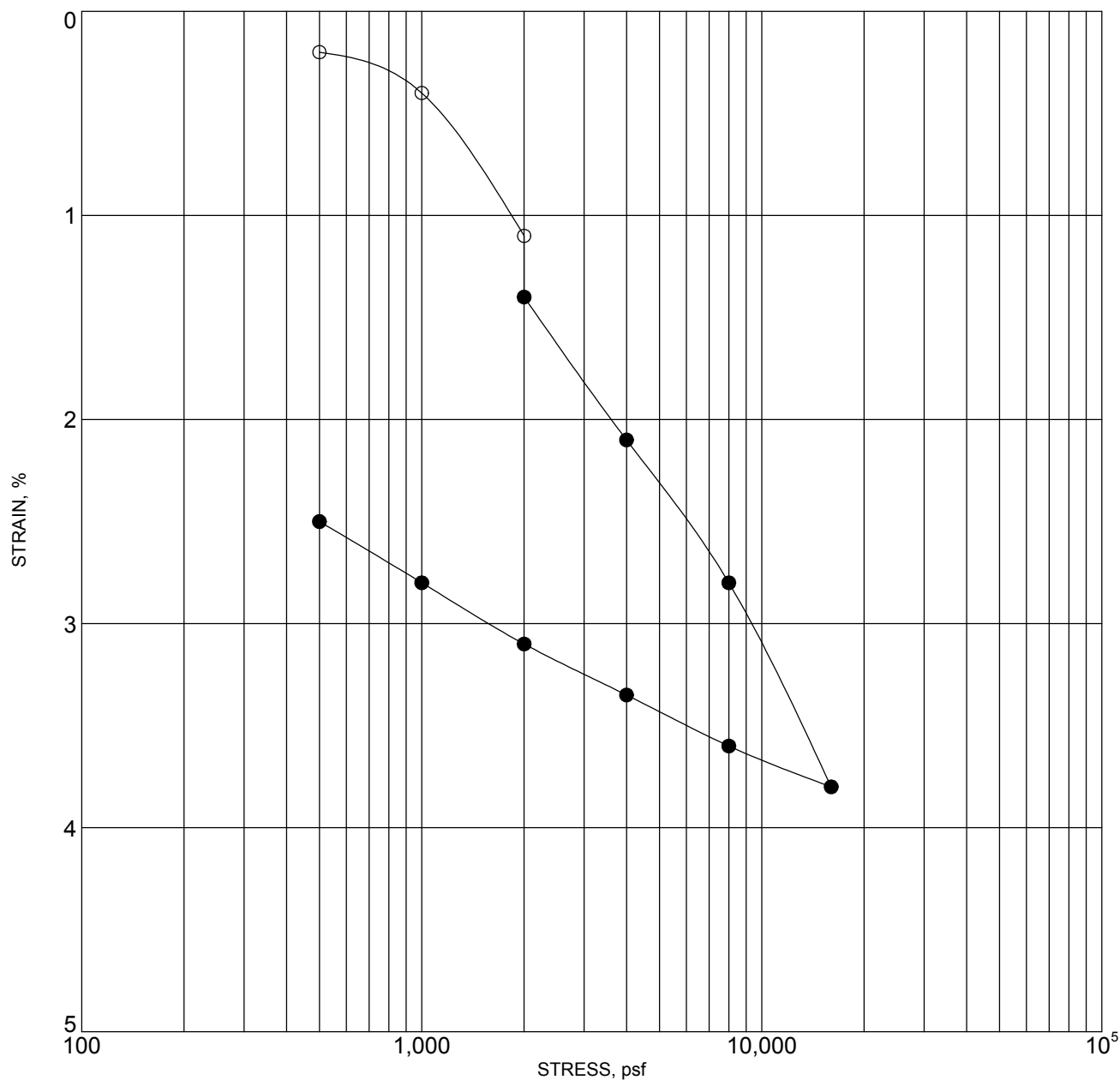


Converse Consultants

Monroe Street Overcrossing
Interstate 10 and Monroe Street Interchange Improvements
City Of Indio, Riverside County, California
For: Michael Baker International, Inc.

Project No.
14-81-229-03

Drawing No.
B-8



BORING NO. : A-21-011		DEPTH (ft) : 45.0-46.5	
DESCRIPTION : SANDY SILT (ML)			
MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL 13	100	53	0.646

NOTE: SOLID CIRCLES INDICATE READINGS AFTER ADDITION OF WATER

CONSOLIDATION TEST RESULTS

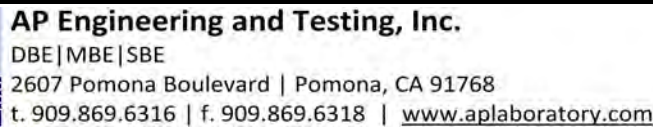


Converse Consultants

Monroe Street Overcrossing
Interstate 10 and Monroe Street Interchange Improvements
City Of Indio, Riverside County, California
For: Michael Baker International, Inc.

Project No.
14-81-229-03

Drawing No.
B-9

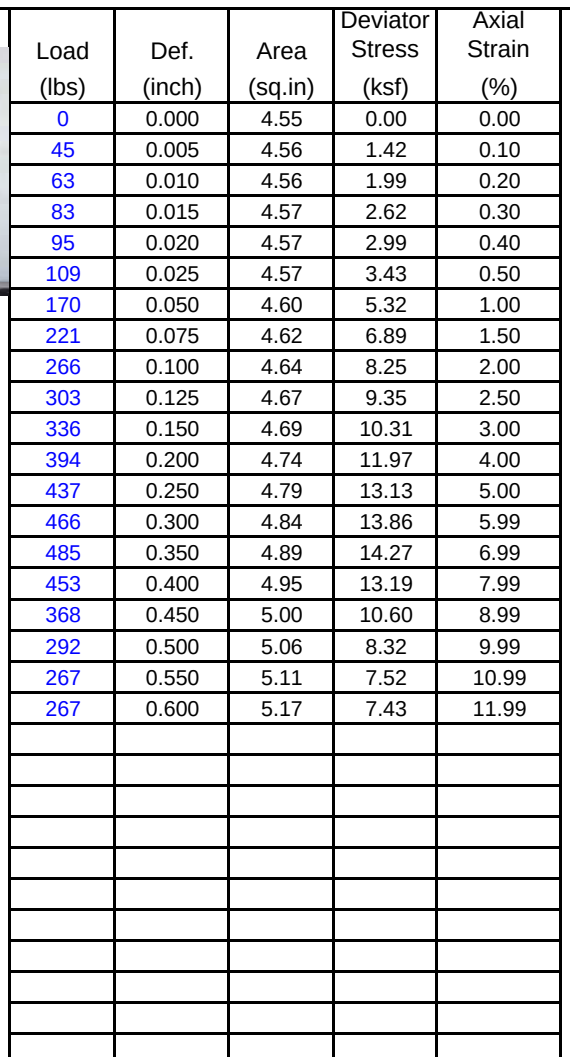


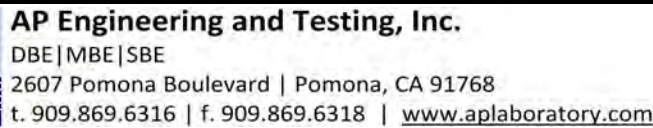
Client Name:	Converse Consultants		
Project Name:	I-10 Monroe		
Project No.:	14-81-229-03		
Boring No.:	A-21-008		
Sample No.:	-	Depth (feet):	25
Soil Description	Clay		

Sample Type: Mod. Cal.

Wet Unit Weight (pcf):	<u>118.6</u>
Dry Unit Weight (pcf):	<u>98.4</u>
Moisture Content (%):	<u>20.6</u>
Void Ratio for $G_s=2.7$:	<u>0.71</u>
% Saturation:	<u>78.0</u>

Cell Pressure (ksf):	3.00
Back Pressure (ksf):	0.0
Tested Total Confining Pressure (ksf):	3.00
Shear Rate (%/min):	0.3
Maximum Deviator Stress (ksf):	14.27
Ultimate Deviator Stress (ksf):	7.43
Ultimate Undrained Shear Strength (ksf):	3.72
Axial Strain @ Maximum Stress (%)	6.99



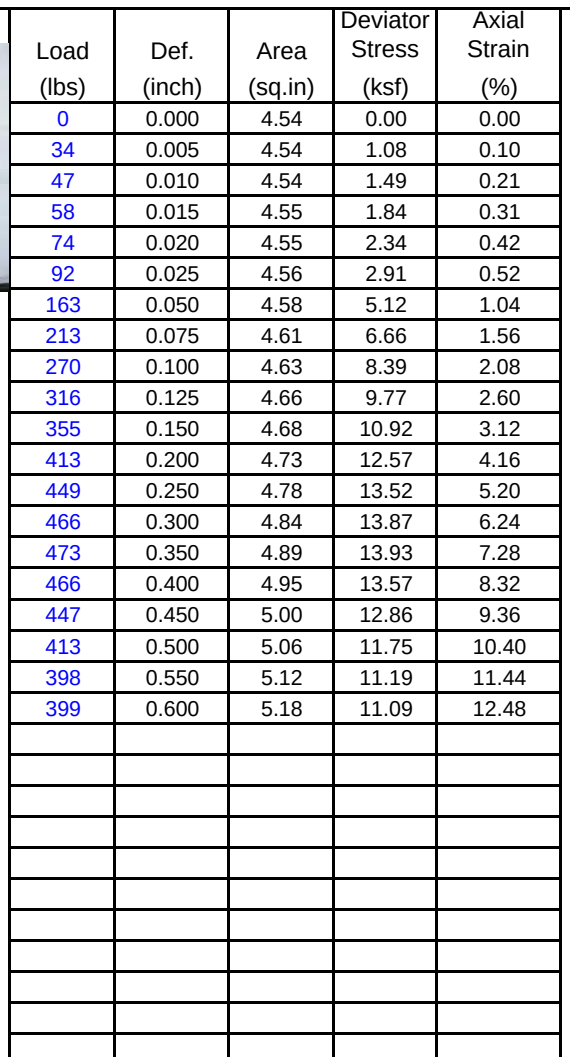


Client Name:	Converse Consultants		
Project Name:	I-10 Monroe		
Project No.:	14-81-229-03		
Boring No.:	A-21-011		
Sample No.:	-	Depth (feet):	25
Soil Description	Sandy Clay		

Sample Type: Mod. Cal.

Wet Unit Weight (pcf):	<u>118.1</u>
Dry Unit Weight (pcf):	<u>104.5</u>
Moisture Content (%):	<u>13.0</u>
Void Ratio for $G_s=2.7$:	<u>0.61</u>
% Saturation:	<u>57.4</u>

Cell Pressure (ksf):	3.00
Back Pressure (ksf):	0.0
Tested Total Confining Pressure (ksf):	3.00
Shear Rate (%/min):	0.3
Maximum Deviator Stress (ksf):	13.93
Ultimate Deviator Stress (ksf):	11.09
Ultimate Undrained Shear Strength (ksf):	5.54
Axial Strain @ Maximum Stress (%)	7.28



Appendix C-1

VS30 CALCULATIONS





CONVERSE CONSULTANTS

Project Name: **I-10/ Monroe OC Bridge**
 Project Number: 14-81-229-03
 Caltrans EA: 08-OK7301

Date : 4/26/22
 Time : 2:02 PM

SHEAR WAVE VELOCITY EVALUATION USING EMPIRICAL CORRELATIONS

μ (kPa)	μ (pcf)	Water depth (ft)	Cumulative Depth (ft)	Layer Thickness D (ft)	N60	ASF	γ_t (pcf)	σ	σ_{vo} (pcf)	σ_{vo} (kPa)	V_s (m/s)	V_s (ft/sec)	D/Vs
0	0	0	2.5	2.5	29.7	1	130	325	325	15.554	123.0	403.507	0.0062
0	0	0	7.5	5	38.9	1	130	650	975	46.661	168.5	552.7686	0.009
0	0	0	12.5	5	70.2	1	135	675	1650	78.965	217.9	714.5996	0.007
0	0	0	17.5	5	40.7	1	135	675	2325	111.27	208.0	682.1312	0.0073
0	0	0	22.5	5	45.7	1	125	625	2950	141.18	242.7	796.0868	0.0063
0	0	0	27.5	5	44.5	1	125	625	3575	171.09	256.9	842.7547	0.0059
0	0	0	32.5	5	31.1	1	125	625	4200	201	254.5	834.9119	0.006
0	0	0	37.5	5	42.9	1	125	625	4825	230.91	281.1	921.8675	0.0054
0	0	0	42.5	5	78.2	1	125	625	5450	260.82	323.6	1061.509	0.0047
0	0	0	47.5	5	61	1	135	675	6125	293.13	285.2	935.5008	0.0053
0	0	0	52.5	5	86.8	1	135	675	6800	325.43	316.8	1039.251	0.0048
0	0	0	57.5	5	54.4	1	135	675	7475	357.74	290.8	953.8987	0.0052
0	0	0	62.5	5	49.3	1	135	675	8150	390.04	290.0	951.2725	0.0053
0	0	0	67.5	5	94	1	125	625	8775	419.95	388.9	1275.565	0.0039
0	0	0	72.5	5	43.9	1	125	625	9400	449.86	349.3	1145.649	0.0044
0	0	0	77.5	5	100	1	128	640	10040	480.49	410.3	1345.818	0.0037
0	0	0	82.5	5	100	1	135	675	10715	512.79	363.4	1192.016	0.0042
0	0	0	87.5	5	65.9	1	135	675	11390	545.1	334.9	1098.318	0.0046
0	0	0	100	12.5	40	1	132	1650	13040	624.06	308.0	1010.117	0.0124

Boring Number : **A-21-008**

Total	0.111679
Vs30	895.4224 ft/sec
	273.1038 m/s

Cohesionless Soil Layers

Sands

$$V_s = 30 (ASF) (N_{60})^{0.23} (\sigma'_{vo})^{0.23}$$

Where, ASF = 1.0 for Quaternary or 0.9 for Holocene and 1.17 for Pleistocene.

Cohesive Soil Layers

$$V_s = 26 (ASF) (N_{60})^{0.17} (\sigma'_{vo})^{0.32}$$

Here, ASF = Dimensionless Age Scaling Factor for geologic age of the soil deposit (=1.0 for Quaternary or 0.88 for Holocene, and 1.12 for Pleistocene, if known).

$$V_{s30} \left(\frac{\text{feet}}{\text{sec}} \right) = \frac{100 \text{ feet}}{\left(\frac{D_1}{V_{s1}} \right) + \left(\frac{D_2}{V_{s2}} \right) + \dots + \left(\frac{D_i}{V_{si}} \right) + \dots + \left(\frac{D_N}{V_{sN}} \right)}$$

Caltrans Geotechnical Manual



CONVERSE CONSULTANTS

Project Name: **I-10/ Monroe OC Bridge**
 Project Number: 14-81-229-03
 Caltrans EA: 08-OK7301

Date : 4/26/22
 Time : 1:16 PM

SHEAR WAVE VELOCITY EVALUATION USING EMPIRICAL CORRELATIONS

μ (kPa)	μ (pcf)	Water depth (ft)	Cumulative Depth (ft)	Layer Thickness D (ft)	N60	ASF	γt (pcf)	σ	σvo (pcf)	σvo (kPa)	Vs (m/s)	Vs (ft/sec)	D/Vs	
0	0	0	2.5	2.5	61.8	1	125	312.5	312.5	14.9555	144.3		473.289	0.00528
0	0	0	7.5	5	44.6	1	130	650	962.5	46.063	173.4		568.739	0.00879
0	0	0	12.5	5	19.6	1	130	650	1612.5	77.1705	161.6		530.063	0.00943
0	0	0	17.5	5	40.7	1	125	625	2237.5	107.081		217.8	714.475	0.007
0	0	0	22.5	5	39.1	1	125	625	2862.5	136.993		234.1	767.821	0.00651
0	0	0	27.5	5	54.8	1	125	625	3487.5	166.904		264.1	866.221	0.00577
0	0	0	32.5	5	49.5	1	125	625	4112.5	196.815		273.6	897.488	0.00557
0	0	0	37.5	5	70.9	1	135	675	4787.5	229.119	279.0		915.077	0.00546
0	0	0	42.5	5	44.5	1	130	650	5437.5	260.226	258.1		846.542	0.00591
0	0	0	47.5	5	45	1	125	625	6062.5	290.137		304.8	999.83	0.005
0	0	0	52.5	5	56	1	125	625	6687.5	320.048		326.5	1070.8	0.00467
0	0	0	57.5	5	86.7	1	125	625	7312.5	349.959		361.8	1186.85	0.00421
0	0	0	62.5	5	62.6	1	125	625	7937.5	379.87		351.5	1152.78	0.00434
0	0	0	67.5	5	82.4	1	125	625	8562.5	409.781		377.3	1237.57	0.00404
0	0	0	72.5	5	72.5	1	135	675	9237.5	442.085	326.2		1069.89	0.00467
0	0	0	77.5	5	53.6	1	135	675	9912.5	474.389	309.3		1014.41	0.00493
0	0	0	82.5	5	133.5	1	135	675	10587.5	506.693	387.3		1270.42	0.00394
0	0	0	87.5	5	53.6	1	135	675	11262.5	538.997	318.5		1044.64	0.00479
0.957153025	20	4	92.5	5	79.1	1	135	675	11937.5	571.301	352.0		1154.62	0.00433
4.12772242	86.25	11.5	100	7.5	75	1	135	1012.5	12950	619.757	350.7		1150.31	0.00652

Boring Number : **A-21-010**

$\sum D/V_s =$	0.11117
V _{s30} =	899.559 ft/sec
	274.366 m/s

Cohesionless Soil Layers

Sands

$$V_s = 30 (ASF) (N_{60})^{0.23} (\sigma'_{vo})^{0.23}$$

Where, ASF = 1.0 for Quaternary or 0.9 for Holocene and 1.17 for Pleistocene.

Caltrans Geotechnical Manual

Cohesive Soil Layers

$$V_s = 26 (ASF) (N_{60})^{0.17} (\sigma'_{vo})^{0.32}$$

Here, ASF = Dimensionless Age Scaling Factor for geologic age of the soil deposit (=1.0 for Quaternary or 0.88 for Holocene, and 1.12 for Pleistocene, if known).

$$V_{s30} \left(\frac{\text{feet}}{\text{sec}} \right) = \frac{100 \text{ feet}}{\left(\frac{D_1}{V_{s1}} \right) + \left(\frac{D_2}{V_{s2}} \right) + \dots + \left(\frac{D_i}{V_{si}} \right) + \dots + \left(\frac{D_N}{V_{sN}} \right)}$$



CONVERSE CONSULTANTS

Project Name: **I-10/ Monroe OC Bridge**
 Project Number: 14-81-229-03
 Caltrans EA: 08-OK7301

Date : 4/26/22
 Time : 1:51 PM

SHEAR WAVE VELOCITY EVALUATION USING EMPIRICAL CORRELATIONS

μ (kPa)	μ (pcf)	Water depth (ft)	Cumulative Depth (ft)	Layer Thickness D (ft)	N60	ASF	γ_t (pcf)	σ	σ_{vo} (pcf)	σ_{vo} (kPa)	V_s (m/s)	V_s (ft/sec)	D/Vs
0	0	0	2.5	2.5	10.4	1	130	325	325	15.554	96.6	316.982	0.0079
0	0	0	7.5	5	34.3	1	135	675	1000	47.858	164.7	540.134	0.0093
0	0	0	12.5	5	32.3	1	130	650	1650	78.965	182.2	597.753	0.0084
0	0	0	17.5	5	41.9	1	130	650	2300	110.07	208.8	685	0.0073
0	0	0	22.5	5	40.7	1	125	625	2925	139.98	237.3	778.436	0.0064
0	0	0	27.5	5	62.8	1	135	675	3600	172.29	254.1	833.421	0.006
0	0	0	32.5	5	29.8	1	125	625	4225	202.2	253.2	830.449	0.006
0	0	0	37.5	5	84.6	1	135	675	4900	234.5	292.1	958.129	0.0052
0	0	0	42.5	5	61	1	135	675	5575	266.81	279.1	915.474	0.0055
0	0	0	47.5	5	42.9	1	128	640	6215	297.44	304.8	999.656	0.005
0	0	0	52.5	5	100	1	135	675	6890	329.74	328.3	1076.9	0.0046
0	0	0	57.5	5	53.6	1	135	675	7565	362.04	290.6	953.274	0.0052
0	0	0	62.5	5	23.1	1	125	625	8190	391.95	299.7	982.871	0.0051
0	0	0	67.5	5	53.6	1	125	625	8815	421.87	354.0	1161.08	0.0043
0	0	0	72.5	5	42.9	1	130	650	9465	452.97	290.7	953.579	0.0052
0	0	0	77.5	5	87.9	1	135	675	10140	485.28	348.4	1142.59	0.0044
0	0	0	82.5	5	100	1	135	675	10815	517.58	364.2	1194.57	0.0042
0	0	0	87.5	5	53.6	1	135	675	11490	549.88	320.0	1049.46	0.0048
0	0	0	100	12.5	100	1	135	1687.5	13178	630.64	381.1	1250.1	0.01

Boring Number : **A-21-026**

Cohesionless Soil Layers

Sands

$$V_s = 30 (ASF) (N_{60})^{0.23} (\sigma'_{vo})^{0.23}$$

Where, ASF =1.0 for Quaternary or 0.9 for Holocene and 1.17 for Pleistocene.

Cohesive Soil Layers

$$V_s = 26 (ASF) (N_{60})^{0.17} (\sigma'_{vo})^{0.32}$$

Here, ASF = Dimensionless Age Scaling Factor for geologic age of the soil deposit (=1.0 for Quaternary or 0.88 for Holocene, and 1.12 for Pleistocene, if known).

Total	0.11478
Vs30	871.208 ft/sec
	265.719 m/s

Caltrans Geotechnical Manual

$$V_{s30} \left(\frac{\text{feet}}{\text{sec}} \right) = \frac{100 \text{ feet}}{\left(\frac{D_1}{V_{s1}} \right) + \left(\frac{D_2}{V_{s2}} \right) + \dots + \left(\frac{D_i}{V_{si}} \right) + \dots + \left(\frac{D_N}{V_{sN}} \right)}$$

Appendix C-2

ARS ONLINE OUTPUT





ARS Online V3.1.0

Using the tool: Specify latitude and longitude in decimal degrees in the input boxes below. Alternatively, **Google Maps** can be used to find the site location. Specify the time-averaged shear-wave velocity in the upper 30m (Vs30) in the input box. After submitting the data, the USGS 2014 hazard data for a 975-year return period will be reported along with adjustment factors required by Caltrans Seismic Design Criteria (SDC) V2.0.

Latitude: **Longitude:** **Vs30 (m/s):**

Caltrans Design Spectrum (5% damping)

Period(s)	Sa ₂₀₁₄ (g)	Basin ₂₀₁₄	Near Fault Amp	Design Sa ₂₀₁₄ (g)
PGA	0.77	1	1	0.77
0.10	1.21	1	1	1.21
0.20	1.65	1	1	1.65
0.30	1.9	1	1	1.9
0.50	1.93	1	1	1.93
0.75	1.63	1.01	1.1	1.81
1.0	1.4	1.02	1.2	1.71
2.0	0.79	1.06	1.2	1
3.0	0.53	1.08	1.2	0.69
4.0	0.38	1.09	1.2	0.49
5.0	0.28	1.09	1.2	0.37

Copy table

Deaggregation (based on 2014 hazard)

Mean moment magnitude (for PGA) 7.39

Mean site-source distance, km (for Sa at 1s) 4.2

Option: recalculate Near Fault amplification with user specified distance

Site-source distance, km:

Appendix D

PILE CAPACITY ANALYSES



=====

APILE for Windows, Version 2019.9.11

Serial Number : 138583644

A Program for Analyzing the Axial Capacity
and Short-term Settlement of Driven Piles
under Axial Loading.
(c) Copyright ENSOFT, Inc., 1987-2019
All Rights Reserved

=====

This program is licensed to :

Converse Consultants
Monrovia, CA

Path to file locations : N:\2014\14-81-229 Monroe
Interchange\03\Final\Report\Monroe OC\Pile Analyses\Apile\Final\
Name of input data file : Abutment 1 - I10 Monroe Service Limit -470.ap9d
Name of output file : Abutment 1 - I10 Monroe Service Limit -470.ap9o
Name of plot output file : Abutment 1 - I10 Monroe Service Limit -470.ap9p

Time and Date of Analysis

Date: March 18, 2023 Time: 11:42:55

1

* INPUT INFORMATION *

I10 Monroe Abutment 1 - Strength Limit - GW elev.470

DESIGNER :

JOB NUMBER :

METHOD FOR UNIT LOAD TRANSFERS :

- FHWA (Federal Highway Administration)
Unfactored Unit Side Friction and Unit Side Resistance are used.

COMPUTATION METHOD(S) FOR PILE CAPACITY :

- FHWA (Federal Highway Administration)
- USACE (U.S. Army Corps of Engineers)
Critical Depth Method for Sand:
10 to 20 Pile Diameter based on the Density

- Revised Lambda
- API RP 2A (American Petroleum Institute)

TYPE OF LOADING :
- COMPRESSION

PILE TYPE :

H-Pile/Steel Pile

DATA FOR AXIAL STIFFNESS :

- MODULUS OF ELASTICITY = 0.290E+08 PSI
- CROSS SECTION AREA = 16.70 IN2

NONCIRCULAR PILE PROPERTIES :

- TOTAL PILE LENGTH, TL = 25.00 FT.
- BATTER ANGLE = 0.00 DEG
- PILE STICKUP LENGTH, PSL = 0.00 FT.
- ZERO FRICTION LENGTH, ZFL = 0.00 FT.
- PERIMETER OF PILE = 40.00 IN.
- TIP AREA OF PILE = 16.70 IN2
- INCREMENT OF PILE LENGTH
USED IN COMPUTATION = 1.00 FT.

SOIL INFORMATIONS :

Nq			LATERAL	EFFECTIVE	FRICTION	BEARING	Nq
FACTOR	DEPTH	SOIL	EARTH	UNIT	ANGLE	CAPACITY	FACTOR
ARMY C.	FT.	TYPE	PRESSURE	WEIGHT	DEGREES	FACTOR	FHWA
				LB/FT^3			
56.00**	0.00	SAND	0.80*	130.00	36.00	42.00**	77.60**
56.00**	34.00	SAND	0.80*	130.00	36.00	42.00**	77.60**
1.00**	34.00	CLAY	0.80*	115.00	0.00	8.00**	4.80**
1.00**	54.00	CLAY	0.80*	115.00	0.00	8.00**	4.80**
1.00**	54.00	CLAY	0.80*	52.60	0.00	8.00**	4.80**
1.00**	64.00	CLAY	0.80*	52.60	0.00	8.00**	4.80**
68.00**	64.00	SAND	0.80*	72.60	38.00	46.00**	110.40**
68.00**	74.00	SAND	0.80*	72.60	38.00	46.00**	110.40**
1.00**	74.00	CLAY	0.80*	52.60	0.00	8.00**	4.80**

	89.00	CLAY	0.80*	52.60	0.00	8.00**	4.80**
1.00**							
	89.00	SAND	0.80*	72.60	42.00	50.00**	244.00**
132.80**							
	104.00	SAND	0.80*	72.60	42.00	50.00**	244.00**
132.80**							
	104.00	SAND	0.80*	72.60	38.00	46.00**	110.40**
68.00**							
	99.00	SAND	0.80*	72.60	38.00	46.00**	110.40**
68.00**							

* VALUE ASSUMED BY THE PROGRAM

** VALUE ESTIMATED BY THE PROGRAM BASED ON FRICTION ANGLE

MAXIMUM UNIT FRICTION KSF	MAXIMUM UNIT BEARING KSF	UNDISTURB SHEAR STRENGTH KSF	REMOLDED SHEAR STRENGTH KSF	BLOW COUNT	UNIT SKIN FRICTION KSF	UNIT END BEARING KSF
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.28E+01	0.10E+08*	5.00	0.00	0.00	0.00	0.00
0.28E+01	0.10E+08*	5.00	0.00	0.00	0.00	0.00
0.28E+01	0.10E+08*	5.00	0.00	0.00	0.00	0.00
0.28E+01	0.10E+08*	5.00	0.00	0.00	0.00	0.00
0.28E+01	0.10E+08*	5.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.30E+01	0.10E+08*	6.00	0.00	0.00	0.00	0.00
0.30E+01	0.10E+08*	6.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00

* MAXIMUM UNIT FRICTION AND/OR MAXIMUM UNIT BEARING WERE SET TO BE 0.10E+08 BECAUSE THE USER DOES NOT PLAN TO LIMIT THE COMPUTED DATA.

DEPTH FT.	LRFD FACTOR ON UNIT FRICTION	LRFD FACTOR ON UNIT BEARING
0.00	1.000	1.000
34.00	1.000	1.000
34.00	1.000	1.000
54.00	1.000	1.000
54.00	1.000	1.000
64.00	1.000	1.000
64.00	1.000	1.000
74.00	1.000	1.000
74.00	1.000	1.000
89.00	1.000	1.000
89.00	1.000	1.000
104.00	1.000	1.000
104.00	1.000	1.000
99.00	1.000	1.000

 * COMPUTATION RESULT *

 * FED. HWY. METHOD *

PILE PENETRATION FT.	SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	0.3	0.3
1.00	0.1	0.7	0.8
2.00	0.4	1.6	2.1
3.00	1.0	2.4	3.4
4.00	1.8	3.2	5.0
5.00	2.8	4.1	6.8
6.00	4.0	4.9	8.9
7.00	5.4	5.7	11.1
8.00	7.1	6.5	13.6
9.00	9.0	7.3	16.3
10.00	11.1	8.1	19.2
11.00	13.4	8.9	22.4
12.00	16.0	9.7	25.7
13.00	18.8	10.5	29.3
14.00	21.8	11.4	33.1
15.00	25.0	12.2	37.2
16.00	28.4	13.0	41.4
17.00	32.1	13.8	45.9
18.00	36.0	14.6	50.6
19.00	40.1	15.4	55.5
20.00	44.5	16.2	60.7
21.00	49.0	16.9	65.9
22.00	53.8	17.3	71.1
23.00	58.8	17.6	76.3
24.00	64.0	17.6	81.6
25.00	69.5	17.6	87.0

 * ARMY CORPS METHOD *

PILE PENETRATION FT.	SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	0.3	0.3
1.00	0.2	0.8	0.9
2.00	0.7	1.7	2.4
3.00	1.5	2.5	4.0
4.00	2.7	3.4	6.0
5.00	4.1	4.2	8.4
6.00	6.0	5.1	11.0
7.00	8.1	5.9	14.0
8.00	10.6	6.8	17.4
9.00	13.4	7.6	21.0

10.00	16.6	8.4	25.0
11.00	20.1	9.3	29.4
12.00	23.9	10.1	34.0
13.00	28.0	11.0	39.0
14.00	32.5	11.8	44.3
15.00	37.3	12.7	50.0
16.00	42.5	13.5	56.0
17.00	48.0	14.3	62.3
18.00	53.8	14.9	68.6
19.00	59.9	15.2	75.1
20.00	66.4	15.2	81.6
21.00	73.2	15.2	88.4
22.00	80.2	15.2	95.4
23.00	87.2	15.2	102.4
24.00	94.3	15.2	109.5
25.00	101.3	15.2	116.5

 * LAMBDA 2 METHOD *

PILE PENETRATION FT.	SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	0.3	0.3
1.00	0.2	0.6	0.8
2.00	0.6	1.3	1.9
3.00	1.3	1.9	3.2
4.00	2.0	2.5	4.6
5.00	2.9	3.2	6.1
6.00	3.9	3.8	7.7
7.00	5.0	4.4	9.4
8.00	6.2	5.1	11.2
9.00	7.4	5.7	13.1
10.00	8.6	6.3	14.9
11.00	9.9	7.0	16.9
12.00	11.2	7.6	18.8
13.00	12.6	8.2	20.8
14.00	13.9	8.9	22.8
15.00	15.3	9.5	24.8
16.00	16.8	10.1	26.9
17.00	19.0	10.8	29.7
18.00	21.3	11.4	32.7
19.00	23.7	12.0	35.7
20.00	26.2	12.7	38.9
21.00	28.9	13.3	42.2
22.00	31.7	13.9	45.7
23.00	34.7	14.6	49.3
24.00	37.8	15.2	53.0
25.00	41.0	15.8	56.8

 * API RP-2A (2010) *

PILE PENETRATION	SKIN FRICTION	END BEARING	ULTIMATE CAPACITY
---------------------	------------------	----------------	----------------------

FT.	KIP	KIP	KIP
0.00	0.0	0.3	0.3
1.00	0.1	0.6	0.7
2.00	0.4	1.3	1.7
3.00	0.9	1.9	2.8
4.00	1.7	2.5	4.2
5.00	2.6	3.2	5.8
6.00	3.7	3.8	7.5
7.00	5.1	4.4	9.5
8.00	6.7	5.1	11.7
9.00	8.4	5.7	14.1
10.00	10.4	6.3	16.7
11.00	12.6	7.0	19.6
12.00	15.0	7.6	22.6
13.00	17.6	8.2	25.8
14.00	20.4	8.9	29.3
15.00	23.4	9.5	32.9
16.00	26.7	10.1	36.8
17.00	30.1	10.8	40.9
18.00	33.7	11.4	45.1
19.00	37.6	12.0	49.6
20.00	41.7	12.7	54.3
21.00	45.9	13.3	59.2
22.00	50.4	13.9	64.3
23.00	55.1	14.6	69.7
24.00	60.0	15.2	75.2
25.00	65.1	15.8	80.9

NOTES:

- AN ASTERISK IS PLACED IN THE END-BEARING COLUMN
IF THE TIP RESISTANCE IS CONTROLLED BY THE FRICTION
OF SOIL PLUG INSIDE AN OPEN-ENDED PIPE PILE.

 * COMPUTE LOAD-DISTRIBUTION AND LOAD-SETTLEMENT *
 * CURVES FOR AXIAL LOADING *

T-Z CURVE NO.	NO. OF POINTS	DEPTH TO CURVE FT.	LOAD TRANSFER PSI	PILE MOVEMENT IN.
1	10	0.4167E-01	0.0000E+00	0.0000E+00
			0.5788E-02	0.2037E-01
			0.9646E-02	0.3947E-01
			0.1447E-01	0.7257E-01
			0.1736E-01	0.1019E+00
			0.1929E-01	0.1273E+00
			0.1929E-01	0.2546E+00
			0.1929E-01	0.3820E+00
			0.1929E-01	0.6366E+00
			0.1929E-01	0.2546E+01
2	10	0.1700E+02	0.0000E+00	0.0000E+00
			0.2361E+01	0.2037E-01
			0.3936E+01	0.3947E-01
			0.5904E+01	0.7257E-01

3	10	0.3396E+02	0.7084E+01	0.1019E+00
			0.7871E+01	0.1273E+00
			0.7871E+01	0.2546E+00
			0.7871E+01	0.3820E+00
			0.7871E+01	0.6366E+00
			0.7871E+01	0.2546E+01
			0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
4	10	0.3404E+02	0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1158E+02	0.2546E+00
			0.1158E+02	0.3820E+00
			0.1158E+02	0.6366E+00
			0.1158E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
5	10	0.4400E+02	0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1042E+02	0.2546E+00
			0.1042E+02	0.3820E+00
			0.1042E+02	0.6366E+00
			0.1042E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
6	10	0.5396E+02	0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1042E+02	0.2546E+00
			0.1042E+02	0.3820E+00
			0.1042E+02	0.6366E+00
			0.1042E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
7	10	0.5404E+02	0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1042E+02	0.2546E+00
			0.1042E+02	0.3820E+00
			0.1042E+02	0.6366E+00
			0.1042E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01

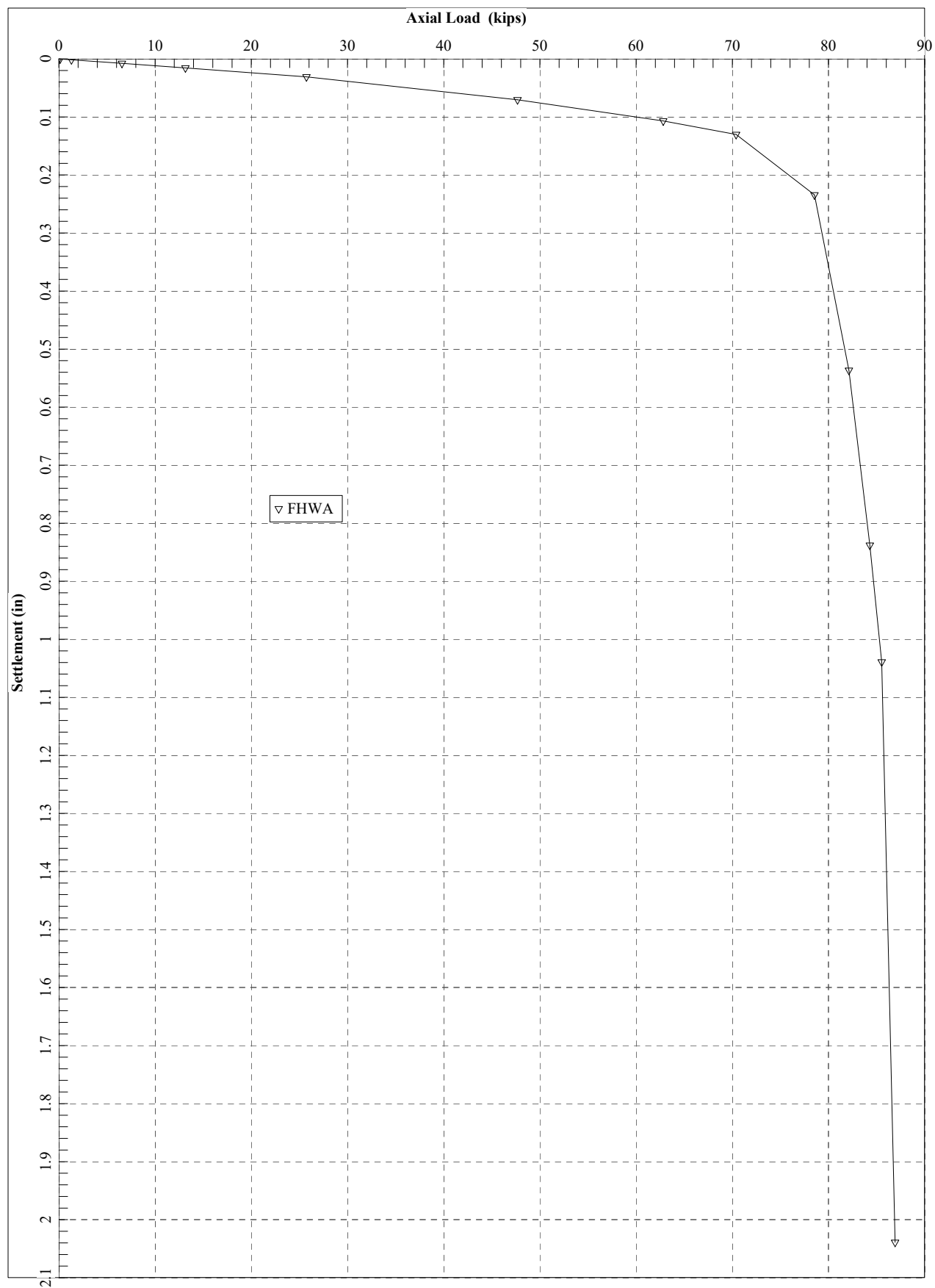
8	10	0.5900E+02	0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
			0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1042E+02	0.2546E+00
			0.1042E+02	0.3820E+00
			0.1042E+02	0.6366E+00
			0.1042E+02	0.2546E+01
9	10	0.6396E+02	0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
			0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1042E+02	0.2546E+00
			0.1042E+02	0.3820E+00
			0.1042E+02	0.6366E+00
			0.1042E+02	0.2546E+01
10	10	0.6404E+02	0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
			0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1158E+02	0.2546E+00
			0.1158E+02	0.3820E+00
			0.1158E+02	0.6366E+00
			0.1158E+02	0.2546E+01
11	10	0.6900E+02	0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
			0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1158E+02	0.2546E+00
			0.1158E+02	0.3820E+00
			0.1158E+02	0.6366E+00
			0.1158E+02	0.2546E+01
12	10	0.7396E+02	0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
			0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1158E+02	0.2546E+00
			0.1158E+02	0.3820E+00
			0.1158E+02	0.6366E+00
			0.1158E+02	0.2546E+01
13	10	0.7404E+02	0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
			0.1042E+02	0.1019E+00

14	10	0.8150E+02	0.1158E+02	0.1273E+00
			0.1042E+02	0.2546E+00
			0.1042E+02	0.3820E+00
			0.1042E+02	0.6366E+00
			0.1042E+02	0.2546E+01
15	10	0.8896E+02	0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
			0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1042E+02	0.2546E+00
			0.1042E+02	0.3820E+00
			0.1042E+02	0.6366E+00
			0.1042E+02	0.2546E+01
16	10	0.8904E+02	0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
			0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1158E+02	0.2546E+00
			0.1158E+02	0.3820E+00
			0.1158E+02	0.6366E+00
			0.1158E+02	0.2546E+01
17	10	0.9650E+02	0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
			0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1158E+02	0.2546E+00
			0.1158E+02	0.3820E+00
			0.1158E+02	0.6366E+00
			0.1158E+02	0.2546E+01
18	10	0.1040E+03	0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
			0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1158E+02	0.2546E+00
			0.1158E+02	0.3820E+00
			0.1158E+02	0.6366E+00
			0.1158E+02	0.2546E+01

TIP LOAD KIP	TIP MOVEMENT IN.
0.0000E+00	0.0000E+00
0.1099E+01	0.6366E-02
0.2198E+01	0.1273E-01
0.4395E+01	0.2546E-01
0.8791E+01	0.1655E+00
0.1319E+02	0.5348E+00
0.1582E+02	0.9295E+00
0.1758E+02	0.1273E+01
0.1758E+02	0.1910E+01
0.1758E+02	0.2546E+01

LOAD VERSUS SETTLEMENT CURVE

TOP LOAD KIP	TOP MOVEMENT IN.	TIP LOAD KIP	TIP MOVEMENT IN.
0.1311E+00	0.1559E-03	0.1726E-01	0.1000E-03
0.1311E+01	0.1559E-02	0.1726E+00	0.1000E-02
0.6556E+01	0.7797E-02	0.8630E+00	0.5000E-02
0.1316E+02	0.1561E-01	0.1726E+01	0.1000E-01
0.2574E+02	0.3107E-01	0.3452E+01	0.2000E-01
0.4768E+02	0.7040E-01	0.5165E+01	0.5000E-01
0.6282E+02	0.1069E+00	0.6107E+01	0.8000E-01
0.7039E+02	0.1302E+00	0.6734E+01	0.1000E+00
0.7854E+02	0.2343E+00	0.9201E+01	0.2000E+00
0.8212E+02	0.5365E+00	0.1277E+02	0.5000E+00
0.8430E+02	0.8379E+00	0.1496E+02	0.8000E+00
0.8553E+02	0.1039E+01	0.1618E+02	0.1000E+01
0.8692E+02	0.2039E+01	0.1758E+02	0.2000E+01



=====

APILE for Windows, Version 2019.9.11

Serial Number : 138583644

A Program for Analyzing the Axial Capacity
and Short-term Settlement of Driven Piles
under Axial Loading.
(c) Copyright ENSOFT, Inc., 1987-2019
All Rights Reserved

=====

This program is licensed to :

Converse Consultants
Monrovia, CA

Path to file locations : N:\2014\14-81-229 Monroe
Interchange\03\Final\Report\Monroe OC\Pile Analyses\Apile\Final\
Name of input data file : Abutment 1 - I10 Monroe Strength Limit -460.ap9d
Name of output file : Abutment 1 - I10 Monroe Strength Limit -460.ap9o
Name of plot output file : Abutment 1 - I10 Monroe Strength Limit -460.ap9p

Time and Date of Analysis

Date: March 18, 2023 Time: 11:18:51

1

* INPUT INFORMATION *

I10 Monroe Abutment 1 - Strength Limit - GW elev.460

DESIGNER : MS

JOB NUMBER : 14-81-229-03

METHOD FOR UNIT LOAD TRANSFERS :

- FHWA (Federal Highway Administration)
Unfactored Unit Side Friction and Unit Side Resistance are used.

COMPUTATION METHOD(S) FOR PILE CAPACITY :

- FHWA (Federal Highway Administration)
- USACE (U.S. Army Corps of Engineers)
Critical Depth Method for Sand:
10 to 20 Pile Diameter based on the Density

- Revised Lambda
- API RP 2A (American Petroleum Institute)

TYPE OF LOADING :
- COMPRESSION

PILE TYPE :

H-Pile/Steel Pile

DATA FOR AXIAL STIFFNESS :

- MODULUS OF ELASTICITY = 0.290E+08 PSI
- CROSS SECTION AREA = 16.70 IN2

NONCIRCULAR PILE PROPERTIES :

- TOTAL PILE LENGTH, TL = 60.00 FT.
- BATTER ANGLE = 0.00 DEG
- PILE STICKUP LENGTH, PSL = 0.00 FT.
- ZERO FRICTION LENGTH, ZFL = 0.00 FT.
- PERIMETER OF PILE = 40.00 IN.
- TIP AREA OF PILE = 16.70 IN2
- INCREMENT OF PILE LENGTH
USED IN COMPUTATION = 1.00 FT.

SOIL INFORMATIONS :

Nq			LATERAL	EFFECTIVE	FRICTION	BEARING	Nq
FACTOR	DEPTH	SOIL	EARTH	UNIT	ANGLE	CAPACITY	FACTOR
ARMY C.	FT.	TYPE	PRESSURE	WEIGHT	DEGREES	FACTOR	FHWA
				LB/FT^3			
56.00**	0.00	SAND	0.80*	130.00	36.00	42.00**	77.60**
56.00**	34.00	SAND	0.80*	130.00	36.00	42.00**	77.60**
1.00**	34.00	CLAY	0.80*	115.00	0.00	8.00**	4.80**
1.00**	64.00	CLAY	0.80*	115.00	0.00	8.00**	4.80**
68.00**	64.00	SAND	0.80*	72.60	38.00	46.00**	110.40**
68.00**	74.00	SAND	0.80*	72.60	38.00	46.00**	110.40**
1.00**	74.00	CLAY	0.80*	52.60	0.00	8.00**	4.80**
1.00**	89.00	CLAY	0.80*	52.60	0.00	8.00**	4.80**
132.80**	89.00	SAND	0.80*	72.60	42.00	50.00**	244.00**

132.80**	104.00	SAND	0.80*	72.60	42.00	50.00**	244.00**
68.00**	104.00	SAND	0.80*	72.60	38.00	46.00**	110.40**
68.00**	99.00	SAND	0.80*	72.60	38.00	46.00**	110.40**

* VALUE ASSUMED BY THE PROGRAM

** VALUE ESTIMATED BY THE PROGRAM BASED ON FRICTION ANGLE

MAXIMUM UNIT FRICTION KSF	MAXIMUM UNIT BEARING KSF	UNDISTURB SHEAR STRENGTH KSF	REMOLDED SHEAR STRENGTH KSF	BLOW COUNT	UNIT SKIN FRICTION KSF	UNIT END BEARING KSF
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.30E+01	0.10E+08*	5.00	0.00	0.00	0.00	0.00
0.30E+01	0.10E+08*	5.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.30E+01	0.10E+08*	6.00	0.00	0.00	0.00	0.00
0.30E+01	0.10E+08*	6.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00

* MAXIMUM UNIT FRICTION AND/OR MAXIMUM UNIT BEARING
WERE SET TO BE 0.10E+08 BECAUSE THE USER DOES NOT
PLAN TO LIMIT THE COMPUTED DATA.

DEPTH FT.	LRFD FACTOR ON UNIT FRICTION	LRFD FACTOR ON UNIT BEARING
0.00	1.000	1.000
34.00	1.000	1.000
34.00	1.000	1.000
64.00	1.000	1.000
64.00	1.000	1.000
74.00	1.000	1.000
74.00	1.000	1.000
89.00	1.000	1.000
89.00	1.000	1.000
104.00	1.000	1.000
104.00	1.000	1.000
99.00	1.000	1.000

* COMPUTATION RESULT *

 * FED. HWY. METHOD *

PILE PENETRATION FT.	SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	0.3	0.3
1.00	0.1	0.7	0.8
2.00	0.4	1.6	2.1
3.00	1.0	2.4	3.4
4.00	1.8	3.2	5.0
5.00	2.8	4.1	6.8
6.00	4.0	4.9	8.9
7.00	5.4	5.7	11.1
8.00	7.1	6.5	13.6
9.00	9.0	7.3	16.3
10.00	11.1	8.1	19.2
11.00	13.4	8.9	22.4
12.00	16.0	9.7	25.7
13.00	18.8	10.5	29.3
14.00	21.8	11.4	33.1
15.00	25.0	12.2	37.2
16.00	28.4	13.0	41.4
17.00	32.1	13.8	45.9
18.00	36.0	14.6	50.6
19.00	40.1	15.4	55.5
20.00	44.5	16.2	60.7
21.00	49.0	16.9	65.9
22.00	53.8	17.3	71.1
23.00	58.8	17.6	76.3
24.00	64.0	17.6	81.6
25.00	69.5	17.6	87.0
26.00	75.1	17.6	92.7
27.00	81.0	17.6	98.6
28.00	87.1	17.6	104.7
29.00	93.5	17.6	111.0
30.00	100.0	17.6	117.6
31.00	106.8	17.6	124.4
32.00	113.8	17.6	131.4
33.00	121.0	15.3	136.3
34.00	128.5	11.4	139.9
35.00	137.8	7.5	145.3
36.00	147.8	5.2	153.1
37.00	157.8	5.2	163.1
38.00	167.8	5.2	173.1
39.00	177.8	5.2	183.1
40.00	187.8	5.2	193.1
41.00	197.8	5.2	203.1
42.00	207.8	5.2	213.1
43.00	217.8	5.2	223.1
44.00	227.8	5.2	233.1
45.00	237.8	5.2	243.1
46.00	247.8	5.2	253.1
47.00	257.8	5.2	263.1
48.00	267.8	5.2	273.1
49.00	277.8	5.2	283.1
50.00	287.8	5.2	293.1
51.00	297.8	5.2	303.1
52.00	307.8	5.2	313.1
53.00	317.8	5.2	323.1

54.00	327.8	5.2	333.1
55.00	337.8	5.2	343.1
56.00	347.8	5.2	353.1
57.00	357.8	5.2	363.1
58.00	367.8	5.2	373.1
59.00	377.8	5.2	383.1
60.00	387.8	5.2	393.1

 * ARMY CORPS METHOD *

PILE PENETRATION FT.	SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	0.3	0.3
1.00	0.2	0.8	0.9
2.00	0.7	1.7	2.4
3.00	1.5	2.5	4.0
4.00	2.7	3.4	6.0
5.00	4.1	4.2	8.4
6.00	6.0	5.1	11.0
7.00	8.1	5.9	14.0
8.00	10.6	6.8	17.4
9.00	13.4	7.6	21.0
10.00	16.6	8.4	25.0
11.00	20.1	9.3	29.4
12.00	23.9	10.1	34.0
13.00	28.0	11.0	39.0
14.00	32.5	11.8	44.3
15.00	37.3	12.7	50.0
16.00	42.5	13.5	56.0
17.00	48.0	14.3	62.3
18.00	53.8	14.9	68.6
19.00	59.9	15.2	75.1
20.00	66.4	15.2	81.6
21.00	73.2	15.2	88.4
22.00	80.2	15.2	95.4
23.00	87.2	15.2	102.4
24.00	94.3	15.2	109.5
25.00	101.3	15.2	116.5
26.00	108.4	15.2	123.6
27.00	115.4	15.2	130.6
28.00	122.5	15.2	137.7
29.00	129.5	15.2	144.7
30.00	136.5	15.2	151.7
31.00	143.6	15.2	158.8
32.00	150.6	15.2	165.8
33.00	157.7	13.3	171.0
34.00	164.7	10.2	174.9
35.00	172.4	7.1	179.5
36.00	180.7	5.2	186.0
37.00	189.1	5.2	194.3
38.00	197.4	5.2	202.6
39.00	205.7	5.2	211.0
40.00	214.1	5.2	219.3
41.00	222.4	5.2	227.6
42.00	230.7	5.2	236.0
43.00	239.1	5.2	244.3

44.00	247.4	5.2	252.6
45.00	255.7	5.2	261.0
46.00	264.1	5.2	269.3
47.00	272.4	5.2	277.6
48.00	280.7	5.2	286.0
49.00	289.1	5.2	294.3
50.00	297.4	5.2	302.6
51.00	305.7	5.2	311.0
52.00	314.1	5.2	319.3
53.00	322.4	5.2	327.6
54.00	330.7	5.2	336.0
55.00	339.1	5.2	344.3
56.00	347.4	5.2	352.6
57.00	355.7	5.2	361.0
58.00	364.1	5.2	369.3
59.00	372.4	5.2	377.6
60.00	380.7	5.2	386.0

 * LAMBDA 2 METHOD *

PILE PENETRATION FT.	SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	0.3	0.3
1.00	0.2	0.6	0.8
2.00	0.6	1.3	1.9
3.00	1.3	1.9	3.2
4.00	2.0	2.5	4.6
5.00	2.9	3.2	6.1
6.00	3.9	3.8	7.7
7.00	5.0	4.4	9.4
8.00	6.2	5.1	11.2
9.00	7.4	5.7	13.1
10.00	8.6	6.3	14.9
11.00	9.9	7.0	16.9
12.00	11.2	7.6	18.8
13.00	12.6	8.2	20.8
14.00	13.9	8.9	22.8
15.00	15.3	9.5	24.8
16.00	16.8	10.1	26.9
17.00	19.0	10.8	29.7
18.00	21.3	11.4	32.7
19.00	23.7	12.0	35.7
20.00	26.2	12.7	38.9
21.00	28.9	13.3	42.2
22.00	31.7	13.9	45.7
23.00	34.7	14.6	49.3
24.00	37.8	15.2	53.0
25.00	41.0	15.8	56.8
26.00	44.3	16.5	60.8
27.00	47.8	17.1	64.9
28.00	51.4	17.7	69.2
29.00	55.2	18.4	73.5
30.00	59.0	19.0	78.0
31.00	63.0	19.6	82.7
32.00	67.2	20.3	87.4
33.00	71.4	17.8	89.3

34.00	75.8	13.1	88.9
35.00	82.6	8.2	90.8
36.00	89.4	5.2	94.6
37.00	96.3	5.2	101.5
38.00	103.2	5.2	108.4
39.00	110.1	5.2	115.4
40.00	117.2	5.2	122.4
41.00	124.2	5.2	129.5
42.00	131.4	5.2	136.6
43.00	138.6	5.2	143.8
44.00	145.8	5.2	151.0
45.00	153.1	5.2	158.3
46.00	160.4	5.2	165.7
47.00	167.8	5.2	173.1
48.00	175.3	5.2	180.5
49.00	182.8	5.2	188.0
50.00	190.4	5.2	195.6
51.00	198.0	5.2	203.2
52.00	205.6	5.2	210.9
53.00	213.4	5.2	218.6
54.00	221.1	5.2	226.4
55.00	229.0	5.2	234.2
56.00	236.9	5.2	242.1
57.00	244.8	5.2	250.0
58.00	252.8	5.2	258.0
59.00	260.8	5.2	266.0
60.00	268.9	5.2	274.1

 * API RP-2A (2010) *

PILE PENETRATION FT.	SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	0.3	0.3
1.00	0.1	0.6	0.7
2.00	0.4	1.3	1.7
3.00	0.9	1.9	2.8
4.00	1.7	2.5	4.2
5.00	2.6	3.2	5.8
6.00	3.7	3.8	7.5
7.00	5.1	4.4	9.5
8.00	6.7	5.1	11.7
9.00	8.4	5.7	14.1
10.00	10.4	6.3	16.7
11.00	12.6	7.0	19.6
12.00	15.0	7.6	22.6
13.00	17.6	8.2	25.8
14.00	20.4	8.9	29.3
15.00	23.4	9.5	32.9
16.00	26.7	10.1	36.8
17.00	30.1	10.8	40.9
18.00	33.7	11.4	45.1
19.00	37.6	12.0	49.6
20.00	41.7	12.7	54.3
21.00	45.9	13.3	59.2
22.00	50.4	13.9	64.3
23.00	55.1	14.6	69.7

24.00	60.0	15.2	75.2
25.00	65.1	15.8	80.9
26.00	70.4	16.5	86.9
27.00	75.9	17.1	93.0
28.00	81.7	17.7	99.4
29.00	87.6	18.4	106.0
30.00	93.7	19.0	112.7
31.00	100.1	19.6	119.7
32.00	106.6	20.3	126.9
33.00	113.4	17.8	131.2
34.00	120.3	13.1	133.4
35.00	127.9	8.2	136.1
36.00	136.0	5.2	141.2
37.00	144.2	5.2	149.4
38.00	152.5	5.2	157.7
39.00	160.8	5.2	166.0
40.00	169.2	5.2	174.4
41.00	177.6	5.2	182.9
42.00	186.2	5.2	191.4
43.00	194.9	5.2	200.1
44.00	203.6	5.2	208.8
45.00	212.4	5.2	217.7
46.00	221.4	5.2	226.6
47.00	230.4	5.2	235.6
48.00	239.5	5.2	244.7
49.00	248.7	5.2	253.9
50.00	258.0	5.2	263.2
51.00	267.4	5.2	272.6
52.00	276.8	5.2	282.0
53.00	286.3	5.2	291.6
54.00	296.0	5.2	301.2
55.00	305.7	5.2	310.9
56.00	315.4	5.2	320.7
57.00	325.3	5.2	330.5
58.00	335.3	5.2	340.5
59.00	345.3	5.2	350.5
60.00	355.3	5.2	360.5

NOTES:

- AN ASTERISK IS PLACED IN THE END-BEARING COLUMN IF THE TIP RESISTANCE IS CONTROLLED BY THE FRICTION OF SOIL PLUG INSIDE AN OPEN-ENDED PIPE PILE.

 * COMPUTE LOAD-DISTRIBUTION AND LOAD-SETTLEMENT *
 * CURVES FOR AXIAL LOADING *

T-Z CURVE NO.	NO. OF POINTS	DEPTH TO CURVE FT.	LOAD TRANSFER PSI	PILE MOVEMENT IN.
1	10	0.4167E-01	0.0000E+00 0.5788E-02 0.9646E-02 0.1447E-01 0.1736E-01	0.0000E+00 0.2037E-01 0.3947E-01 0.7257E-01 0.1019E+00

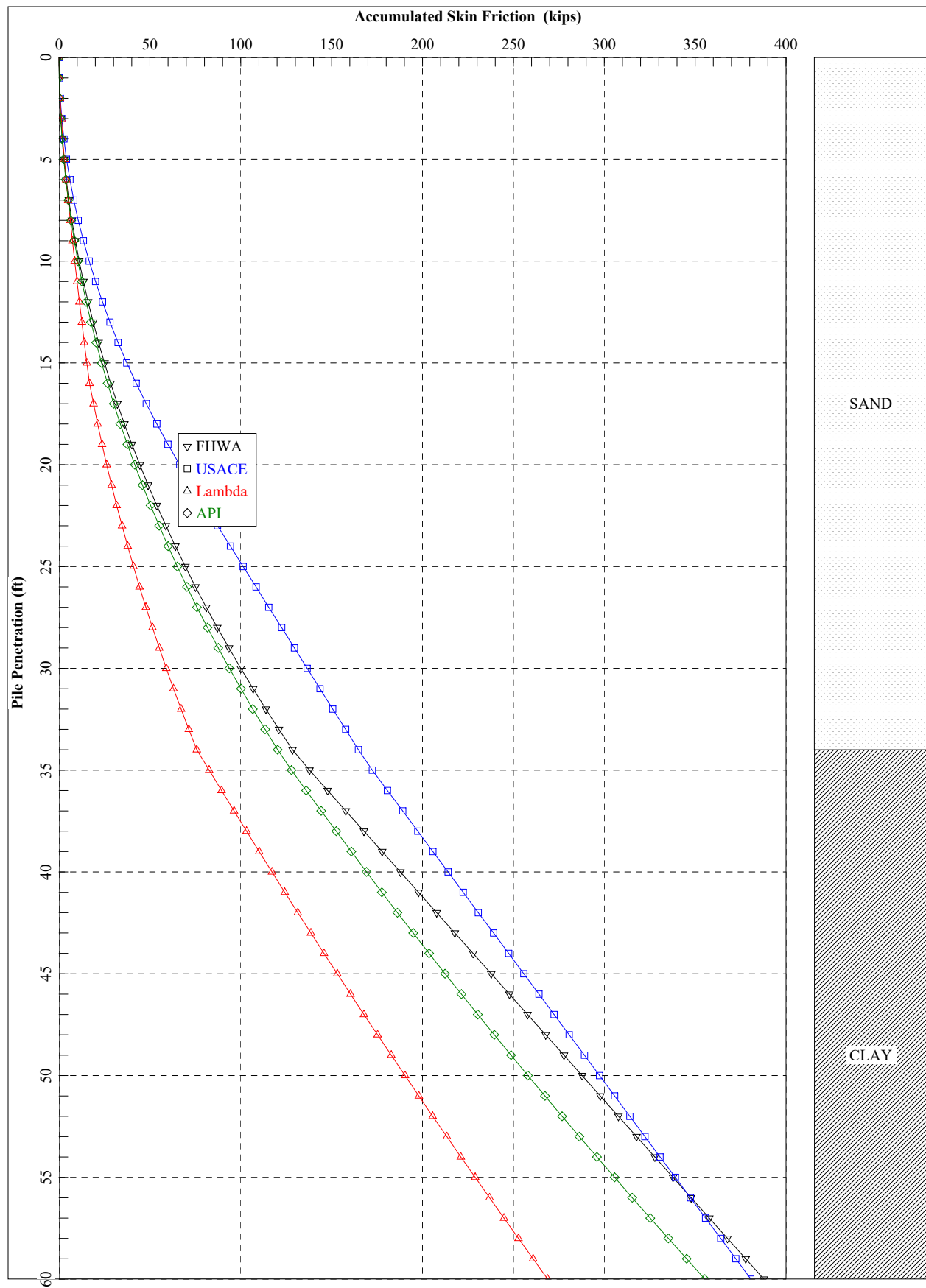
2	10	0.1700E+02	0.1929E-01	0.1273E+00
			0.1929E-01	0.2546E+00
			0.1929E-01	0.3820E+00
			0.1929E-01	0.6366E+00
			0.1929E-01	0.2546E+01
			0.0000E+00	0.0000E+00
			0.2361E+01	0.2037E-01
			0.3936E+01	0.3947E-01
			0.5904E+01	0.7257E-01
			0.7084E+01	0.1019E+00
			0.7871E+01	0.1273E+00
			0.7871E+01	0.2546E+00
			0.7871E+01	0.3820E+00
			0.7871E+01	0.6366E+00
			0.7871E+01	0.2546E+01
3	10	0.3396E+02	0.0000E+00	0.0000E+00
			0.4717E+01	0.2037E-01
			0.7862E+01	0.3947E-01
			0.1179E+02	0.7257E-01
			0.1415E+02	0.1019E+00
			0.1572E+02	0.1273E+00
			0.1572E+02	0.2546E+00
			0.1572E+02	0.3820E+00
			0.1572E+02	0.6366E+00
			0.1572E+02	0.2546E+01
4	10	0.3404E+02	0.0000E+00	0.0000E+00
			0.4787E+01	0.2037E-01
			0.7978E+01	0.3947E-01
			0.1197E+02	0.7257E-01
			0.1436E+02	0.1019E+00
			0.1596E+02	0.1273E+00
			0.1436E+02	0.2546E+00
			0.1436E+02	0.3820E+00
			0.1436E+02	0.6366E+00
			0.1436E+02	0.2546E+01
5	10	0.4900E+02	0.0000E+00	0.0000E+00
			0.6250E+01	0.2037E-01
			0.1042E+02	0.3947E-01
			0.1562E+02	0.7257E-01
			0.1875E+02	0.1019E+00
			0.2083E+02	0.1273E+00
			0.1875E+02	0.2546E+00
			0.1875E+02	0.3820E+00
			0.1875E+02	0.6366E+00
			0.1875E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.6250E+01	0.2037E-01
			0.1042E+02	0.3947E-01
			0.1562E+02	0.7257E-01
			0.1875E+02	0.1019E+00
6	10	0.6396E+02	0.2083E+02	0.1273E+00
			0.1875E+02	0.2546E+00
			0.1875E+02	0.3820E+00
			0.1875E+02	0.6366E+00
			0.1875E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.6250E+01	0.2037E-01
			0.1042E+02	0.3947E-01
			0.1562E+02	0.7257E-01
			0.1875E+02	0.1019E+00
7	10	0.6404E+02	0.2083E+02	0.1273E+00
			0.1875E+02	0.2546E+00
			0.1875E+02	0.3820E+00
			0.1875E+02	0.6366E+00
			0.1875E+02	0.2546E+01

8	10	0.6900E+02	0.0000E+00	0.0000E+00
			0.6250E+01	0.2037E-01
			0.1042E+02	0.3947E-01
			0.1562E+02	0.7257E-01
			0.1875E+02	0.1019E+00
			0.2083E+02	0.1273E+00
			0.2083E+02	0.2546E+00
			0.2083E+02	0.3820E+00
			0.2083E+02	0.6366E+00
			0.2083E+02	0.2546E+01
9	10	0.7396E+02	0.0000E+00	0.0000E+00
			0.6250E+01	0.2037E-01
			0.1042E+02	0.3947E-01
			0.1562E+02	0.7257E-01
			0.1875E+02	0.1019E+00
			0.2083E+02	0.1273E+00
			0.2083E+02	0.2546E+00
			0.2083E+02	0.3820E+00
			0.2083E+02	0.6366E+00
			0.2083E+02	0.2546E+01
10	10	0.7404E+02	0.0000E+00	0.0000E+00
			0.6250E+01	0.2037E-01
			0.1042E+02	0.3947E-01
			0.1562E+02	0.7257E-01
			0.1875E+02	0.1019E+00
			0.2083E+02	0.1273E+00
			0.2083E+02	0.2546E+00
			0.2083E+02	0.3820E+00
			0.2083E+02	0.6366E+00
			0.2083E+02	0.2546E+01
11	10	0.8150E+02	0.0000E+00	0.0000E+00
			0.6250E+01	0.2037E-01
			0.1042E+02	0.3947E-01
			0.1562E+02	0.7257E-01
			0.1875E+02	0.1019E+00
			0.2083E+02	0.1273E+00
			0.1875E+02	0.2546E+00
			0.1875E+02	0.3820E+00
			0.1875E+02	0.6366E+00
			0.1875E+02	0.2546E+01
12	10	0.8896E+02	0.0000E+00	0.0000E+00
			0.6250E+01	0.2037E-01
			0.1042E+02	0.3947E-01
			0.1562E+02	0.7257E-01
			0.1875E+02	0.1019E+00
			0.2083E+02	0.1273E+00
			0.1875E+02	0.2546E+00
			0.1875E+02	0.3820E+00
			0.1875E+02	0.6366E+00
			0.1875E+02	0.2546E+01

			0.1875E+02	0.2546E+00
			0.1875E+02	0.3820E+00
			0.1875E+02	0.6366E+00
			0.1875E+02	0.2546E+01
13	10	0.8904E+02		
			0.0000E+00	0.0000E+00
			0.6250E+01	0.2037E-01
			0.1042E+02	0.3947E-01
			0.1562E+02	0.7257E-01
			0.1875E+02	0.1019E+00
			0.2083E+02	0.1273E+00
			0.2083E+02	0.2546E+00
			0.2083E+02	0.3820E+00
			0.2083E+02	0.6366E+00
			0.2083E+02	0.2546E+01
14	10	0.9650E+02		
			0.0000E+00	0.0000E+00
			0.6250E+01	0.2037E-01
			0.1042E+02	0.3947E-01
			0.1562E+02	0.7257E-01
			0.1875E+02	0.1019E+00
			0.2083E+02	0.1273E+00
			0.2083E+02	0.2546E+00
			0.2083E+02	0.3820E+00
			0.2083E+02	0.6366E+00
			0.2083E+02	0.2546E+01
15	10	0.1040E+03		
			0.0000E+00	0.0000E+00
			0.6250E+01	0.2037E-01
			0.1042E+02	0.3947E-01
			0.1562E+02	0.7257E-01
			0.1875E+02	0.1019E+00
			0.2083E+02	0.1273E+00
			0.2083E+02	0.2546E+00
			0.2083E+02	0.3820E+00
			0.2083E+02	0.6366E+00
			0.2083E+02	0.2546E+01
TIP	LOAD	TIP		
	KIP	MOVEMENT		
		IN.		
0.0000E+00		0.0000E+00		
0.3262E+00		0.6366E-02		
0.6523E+00		0.1273E-01		
0.1305E+01		0.2546E-01		
0.2609E+01		0.1655E+00		
0.3914E+01		0.5348E+00		
0.4697E+01		0.9295E+00		
0.5219E+01		0.1273E+01		
0.5219E+01		0.1910E+01		
0.5219E+01		0.2546E+01		

LOAD VERSUS SETTLEMENT CURVE

TOP LOAD KIP	TOP MOVEMENT IN.	TIP LOAD KIP	TIP MOVEMENT IN.
0.1448E+01	0.1151E-02	0.5124E-02	0.1000E-03
0.1462E+02	0.1156E-01	0.5124E-01	0.1000E-02
0.7100E+02	0.5782E-01	0.2562E+00	0.5000E-02
0.1271E+03	0.1091E+00	0.5124E+00	0.1000E-01
0.2045E+03	0.1896E+00	0.1025E+01	0.2000E-01
0.3097E+03	0.3297E+00	0.1533E+01	0.5000E-01
0.3597E+03	0.4188E+00	0.1813E+01	0.8000E-01
0.3765E+03	0.4604E+00	0.1999E+01	0.1000E+00
0.3706E+03	0.5559E+00	0.2731E+01	0.2000E+00
0.3655E+03	0.8497E+00	0.3791E+01	0.5000E+00
0.3662E+03	0.1151E+01	0.4440E+01	0.8000E+00
0.3666E+03	0.1351E+01	0.4804E+01	0.1000E+01
0.3670E+03	0.2352E+01	0.5219E+01	0.2000E+01



=====

APILE for Windows, Version 2019.9.11

Serial Number : 138583644

A Program for Analyzing the Axial Capacity
and Short-term Settlement of Driven Piles
under Axial Loading.
(c) Copyright ENSOFT, Inc., 1987-2019
All Rights Reserved

=====

This program is licensed to :

Converse Consultants
Monrovia, CA

Path to file locations : N:\2014\14-81-229 Monroe
Interchange\03\Final\Report\Monroe OC\Pile Analyses\Apile\Final\
Name of input data file : Abutment 1 - I10 Monroe Extreme Limit- Tension
-460.ap9d
Name of output file : Abutment 1 - I10 Monroe Extreme Limit- Tension
-460.ap9o
Name of plot output file : Abutment 1 - I10 Monroe Extreme Limit- Tension
-460.ap9p

Time and Date of Analysis

Date: March 18, 2023 Time: 11:36:03

1

* INPUT INFORMATION *

I10 Monroe Abutment 1 - Strength Limit - GW elev.460

DESIGNER : MS

JOB NUMBER : 14-81-229-03

METHOD FOR UNIT LOAD TRANSFERS :

- FHWA (Federal Highway Administration)
Unfactored Unit Side Friction and Unit Side Resistance are used.

COMPUTATION METHOD(S) FOR PILE CAPACITY :

- FHWA (Federal Highway Administration)

- USACE (U.S. Army Corps of Engineers)
Critical Depth Method for Sand:
10 to 20 Pile Diameter based on the Density
- Revised Lambda
- API RP 2A (American Petroleum Institute)

TYPE OF LOADING :

- TENSION
REDUCTION FACTOR FOR TENSION LOADING = 0.60

PILE TYPE :

H-Pile/Steel Pile

DATA FOR AXIAL STIFFNESS :

- MODULUS OF ELASTICITY = 0.290E+08 PSI
- CROSS SECTION AREA = 16.70 IN2

NONCIRCULAR PILE PROPERTIES :

- TOTAL PILE LENGTH, TL = 60.00 FT.
- BATTER ANGLE = 0.00 DEG
- PILE STICKUP LENGTH, PSL = 0.00 FT.
- ZERO FRICTION LENGTH, ZFL = 0.00 FT.
- PERIMETER OF PILE = 40.00 IN.
- TIP AREA OF PILE = 16.70 IN2
- INCREMENT OF PILE LENGTH
USED IN COMPUTATION = 1.00 FT.

SOIL INFORMATIONS :

Nq			LATERAL	EFFECTIVE	FRICTION	BEARING	Nq
FACTOR	DEPTH	SOIL	EARTH	UNIT	ANGLE	CAPACITY	FACTOR
ARMY C.	FT.	TYPE	PRESSURE	WEIGHT	DEGREES	FACTOR	FHWA
				LB/FT^3			
56.00**	0.00	SAND	0.80*	130.00	36.00	42.00**	77.60**
56.00**	34.00	SAND	0.80*	130.00	36.00	42.00**	77.60**
1.00**	34.00	CLAY	0.80*	115.00	0.00	8.00**	4.80**
1.00**	64.00	CLAY	0.80*	115.00	0.00	8.00**	4.80**
68.00**	64.00	SAND	0.80*	72.60	38.00	46.00**	110.40**
68.00**	74.00	SAND	0.80*	72.60	38.00	46.00**	110.40**
1.00**	74.00	CLAY	0.80*	52.60	0.00	8.00**	4.80**

	89.00	CLAY	0.80*	52.60	0.00	8.00**	4.80**
1.00**							
	89.00	SAND	0.80*	72.60	42.00	50.00**	244.00**
132.80**							
	104.00	SAND	0.80*	72.60	42.00	50.00**	244.00**
132.80**							
	104.00	SAND	0.80*	72.60	38.00	46.00**	110.40**
68.00**							
	99.00	SAND	0.80*	72.60	38.00	46.00**	110.40**
68.00**							

* VALUE ASSUMED BY THE PROGRAM

** VALUE ESTIMATED BY THE PROGRAM BASED ON FRICTION ANGLE

MAXIMUM UNIT FRICTION KSF	MAXIMUM UNIT BEARING KSF	UNDISTURB SHEAR STRENGTH KSF	REMOLDED SHEAR STRENGTH KSF	BLOW COUNT	UNIT SKIN FRICTION KSF	UNIT END BEARING KSF
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.30E+01	0.10E+08*	5.00	0.00	0.00	0.00	0.00
0.30E+01	0.10E+08*	5.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.30E+01	0.10E+08*	6.00	0.00	0.00	0.00	0.00
0.30E+01	0.10E+08*	6.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00

* MAXIMUM UNIT FRICTION AND/OR MAXIMUM UNIT BEARING WERE SET TO BE 0.10E+08 BECAUSE THE USER DOES NOT PLAN TO LIMIT THE COMPUTED DATA.

DEPTH FT.	LRFD FACTOR ON UNIT FRICTION	LRFD FACTOR ON UNIT BEARING
0.00	1.000	1.000
34.00	1.000	1.000
34.00	1.000	1.000
64.00	1.000	1.000
64.00	1.000	1.000
74.00	1.000	1.000
74.00	1.000	1.000
89.00	1.000	1.000
89.00	1.000	1.000
104.00	1.000	1.000
104.00	1.000	1.000
99.00	1.000	1.000

* COMPUTATION RESULT *

 * FED. HWY. METHOD *

PILE PENETRATION FT.	SKIN FRICTION KIP	SELF WEIGHT KIP	ULTIMATE CAPACITY KIP
0.00	0.0	0.0	0.0
1.00	0.1	0.1	0.1
2.00	0.3	0.1	0.4
3.00	0.6	0.2	0.8
4.00	1.1	0.2	1.3
5.00	1.7	0.3	2.0
6.00	2.4	0.3	2.7
7.00	3.3	0.4	3.7
8.00	4.3	0.5	4.7
9.00	5.4	0.5	5.9
10.00	6.7	0.6	7.2
11.00	8.1	0.6	8.7
12.00	9.6	0.7	10.3
13.00	11.3	0.7	12.0
14.00	13.1	0.8	13.9
15.00	15.0	0.9	15.9
16.00	17.1	0.9	18.0
17.00	19.3	1.0	20.2
18.00	21.6	1.0	22.6
19.00	24.1	1.1	25.1
20.00	26.7	1.1	27.8
21.00	29.4	1.2	30.6
22.00	32.3	1.3	33.5
23.00	35.3	1.3	36.6
24.00	38.4	1.4	39.8
25.00	41.7	1.4	43.1
26.00	45.1	1.5	46.6
27.00	48.6	1.5	50.1
28.00	52.3	1.6	53.9
29.00	56.1	1.6	57.7
30.00	60.0	1.7	61.7
31.00	64.1	1.8	65.8
32.00	68.3	1.8	70.1
33.00	72.6	1.9	74.5
34.00	77.1	1.9	79.0
35.00	82.7	2.0	84.7
36.00	89.4	2.0	91.5
37.00	96.1	2.1	98.2
38.00	102.8	2.2	105.0
39.00	109.5	2.2	111.8
40.00	116.3	2.3	118.5
41.00	123.0	2.3	125.3
42.00	129.7	2.4	132.1
43.00	136.4	2.4	138.8
44.00	143.1	2.5	145.6
45.00	149.8	2.6	152.4
46.00	156.5	2.6	159.1
47.00	163.2	2.7	165.9
48.00	170.0	2.7	172.7
49.00	176.7	2.8	179.4

50.00	183.4	2.8	186.2
51.00	190.1	2.9	193.0
52.00	196.8	3.0	199.8
53.00	203.5	3.0	206.5
54.00	210.2	3.1	213.3
55.00	216.9	3.1	220.1
56.00	223.6	3.2	226.8
57.00	230.4	3.2	233.6
58.00	237.1	3.3	240.4
59.00	243.8	3.4	247.1
60.00	250.5	3.4	253.9

 * ARMY CORPS METHOD *

PILE PENETRATION FT.	SKIN FRICTION KIP	SELF WEIGHT KIP	ULTIMATE CAPACITY KIP
0.00	0.0	0.0	0.0
1.00	0.0	0.1	0.1
2.00	0.2	0.1	0.3
3.00	0.4	0.2	0.6
4.00	0.8	0.2	1.0
5.00	1.2	0.3	1.5
6.00	1.7	0.3	2.1
7.00	2.3	0.4	2.7
8.00	3.1	0.5	3.5
9.00	3.9	0.5	4.4
10.00	4.8	0.6	5.3
11.00	5.8	0.6	6.4
12.00	6.9	0.7	7.6
13.00	8.1	0.7	8.8
14.00	9.4	0.8	10.2
15.00	10.8	0.9	11.6
16.00	12.2	0.9	13.1
17.00	13.8	1.0	14.8
18.00	15.5	1.0	16.5
19.00	17.3	1.1	18.3
20.00	19.1	1.1	20.3
21.00	21.1	1.2	22.3
22.00	23.1	1.3	24.3
23.00	25.1	1.3	26.4
24.00	27.2	1.4	28.5
25.00	29.2	1.4	30.6
26.00	31.2	1.5	32.7
27.00	33.2	1.5	34.8
28.00	35.3	1.6	36.9
29.00	37.3	1.6	38.9
30.00	39.3	1.7	41.0
31.00	41.4	1.8	43.1
32.00	43.4	1.8	45.2
33.00	45.4	1.9	47.3
34.00	47.4	1.9	49.4
35.00	51.0	2.0	52.9
36.00	56.0	2.0	58.0
37.00	61.0	2.1	63.1
38.00	66.0	2.2	68.1
39.00	71.0	2.2	73.2

40.00	76.0	2.3	78.2
41.00	81.0	2.3	83.3
42.00	86.0	2.4	88.3
43.00	91.0	2.4	93.4
44.00	96.0	2.5	98.5
45.00	101.0	2.6	103.5
46.00	106.0	2.6	108.6
47.00	111.0	2.7	113.6
48.00	116.0	2.7	118.7
49.00	121.0	2.8	123.7
50.00	126.0	2.8	128.8
51.00	131.0	2.9	133.9
52.00	136.0	3.0	138.9
53.00	141.0	3.0	144.0
54.00	146.0	3.1	149.0
55.00	151.0	3.1	154.1
56.00	156.0	3.2	159.1
57.00	161.0	3.2	164.2
58.00	166.0	3.3	169.3
59.00	171.0	3.4	174.3
60.00	176.0	3.4	179.4

* LAMBDA 2 METHOD *

PILE PENETRATION FT.	SKIN FRICTION KIP	SELF WEIGHT KIP	ULTIMATE CAPACITY KIP
0.00	0.0	0.0	0.0
1.00	0.1	0.1	0.2
2.00	0.4	0.1	0.5
3.00	0.8	0.2	0.9
4.00	1.2	0.2	1.5
5.00	1.8	0.3	2.0
6.00	2.4	0.3	2.7
7.00	3.0	0.4	3.4
8.00	3.7	0.5	4.1
9.00	4.4	0.5	4.9
10.00	5.2	0.6	5.7
11.00	5.9	0.6	6.6
12.00	6.7	0.7	7.4
13.00	7.5	0.7	8.3
14.00	8.4	0.8	9.1
15.00	9.2	0.9	10.0
16.00	10.1	0.9	11.0
17.00	11.4	1.0	12.3
18.00	12.8	1.0	13.8
19.00	14.2	1.1	15.3
20.00	15.7	1.1	16.9
21.00	17.4	1.2	18.5
22.00	19.0	1.3	20.3
23.00	20.8	1.3	22.1
24.00	22.7	1.4	24.0
25.00	24.6	1.4	26.0
26.00	26.6	1.5	28.1
27.00	28.7	1.5	30.2
28.00	30.9	1.6	32.4
29.00	33.1	1.6	34.7

30.00	35.4	1.7	37.1
31.00	37.8	1.8	39.6
32.00	40.3	1.8	42.1
33.00	42.9	1.9	44.7
34.00	31.7	1.9	33.6
35.00	39.0	2.0	41.0
36.00	43.4	2.0	45.5
37.00	46.1	2.1	48.2
38.00	47.6	2.2	49.8
39.00	48.6	2.2	50.8
40.00	49.1	2.3	51.4
41.00	49.5	2.3	51.8
42.00	49.7	2.4	52.1
43.00	49.8	2.4	52.3
44.00	49.9	2.5	52.4
45.00	49.9	2.6	52.5
46.00	50.0	2.6	52.6
47.00	50.0	2.7	52.6
48.00	50.0	2.7	52.7
49.00	50.0	2.8	52.8
50.00	50.0	2.8	52.8
51.00	50.0	2.9	52.9
52.00	50.0	3.0	53.0
53.00	50.0	3.0	53.0
54.00	50.0	3.1	53.1
55.00	50.0	3.1	53.1
56.00	50.0	3.2	53.2
57.00	50.0	3.2	53.2
58.00	50.0	3.3	53.3
59.00	50.0	3.4	53.4
60.00	50.0	3.4	53.4

* API RP-2A (2010) *

PILE PENETRATION FT.	SKIN FRICTION KIP	SELF WEIGHT KIP	ULTIMATE CAPACITY KIP
0.00	0.0	0.0	0.0
1.00	0.1	0.1	0.1
2.00	0.2	0.1	0.4
3.00	0.6	0.2	0.7
4.00	1.0	0.2	1.2
5.00	1.6	0.3	1.8
6.00	2.2	0.3	2.6
7.00	3.1	0.4	3.5
8.00	4.0	0.5	4.5
9.00	5.1	0.5	5.6
10.00	6.2	0.6	6.8
11.00	7.6	0.6	8.2
12.00	9.0	0.7	9.7
13.00	10.6	0.7	11.3
14.00	12.2	0.8	13.0
15.00	14.1	0.9	14.9
16.00	16.0	0.9	16.9
17.00	18.1	1.0	19.0
18.00	20.2	1.0	21.3
19.00	22.6	1.1	23.6

20.00	25.0	1.1	26.1
21.00	27.6	1.2	28.8
22.00	30.2	1.3	31.5
23.00	33.1	1.3	34.4
24.00	36.0	1.4	37.4
25.00	39.1	1.4	40.5
26.00	42.2	1.5	43.7
27.00	45.6	1.5	47.1
28.00	49.0	1.6	50.6
29.00	52.6	1.6	54.2
30.00	56.2	1.7	57.9
31.00	60.1	1.8	61.8
32.00	64.0	1.8	65.8
33.00	68.1	1.9	69.9
34.00	72.2	1.9	74.1
35.00	76.7	2.0	78.7
36.00	81.6	2.0	83.7
37.00	86.5	2.1	88.6
38.00	91.5	2.2	93.6
39.00	96.5	2.2	98.7
40.00	101.5	2.3	103.8
41.00	106.6	2.3	108.9
42.00	111.7	2.4	114.1
43.00	116.9	2.4	119.4
44.00	122.2	2.5	124.7
45.00	127.5	2.6	130.0
46.00	132.8	2.6	135.4
47.00	138.2	2.7	140.9
48.00	143.7	2.7	146.4
49.00	149.2	2.8	152.0
50.00	154.8	2.8	157.6
51.00	160.4	2.9	163.3
52.00	166.1	3.0	169.0
53.00	171.8	3.0	174.8
54.00	177.6	3.1	180.6
55.00	183.4	3.1	186.5
56.00	189.3	3.2	192.4
57.00	195.2	3.2	198.4
58.00	201.2	3.3	204.4
59.00	207.2	3.4	210.5
60.00	213.2	3.4	216.6

NOTES:

- AN ASTERISK IS PLACED IN THE END-BEARING COLUMN IF THE TIP RESISTANCE IS CONTROLLED BY THE FRICTION OF SOIL PLUG INSIDE AN OPEN-ENDED PIPE PILE.
- A NEGATIVE SELF-WEIGHT VALUE IS DUE TO THE BOUYANCY EFFECT.

 * COMPUTE LOAD-DISTRIBUTION AND LOAD-SETTLEMENT *
 * CURVES FOR AXIAL LOADING *

T-Z CURVE NO. OF DEPTH TO CURVE LOAD TRANSFER PILE MOVEMENT

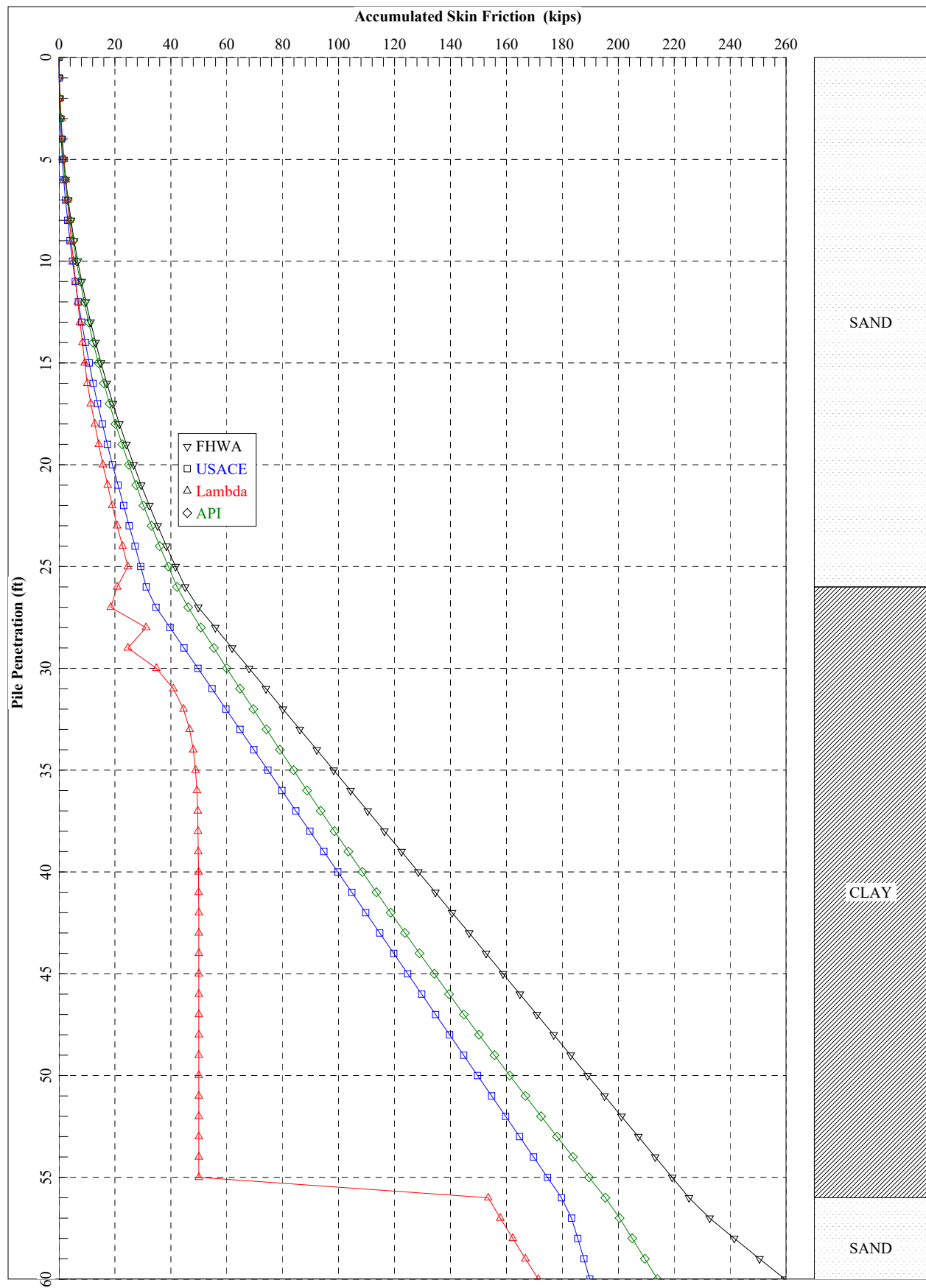
NO.	POINTS	FT.	PSI	IN.
1	10	0.4167E-01	0.0000E+00	0.0000E+00
			0.3473E-02	0.2037E-01
			0.5788E-02	0.3947E-01
			0.8682E-02	0.7257E-01
			0.1042E-01	0.1019E+00
			0.1158E-01	0.1273E+00
			0.1158E-01	0.2546E+00
			0.1158E-01	0.3820E+00
			0.1158E-01	0.6366E+00
			0.1158E-01	0.2546E+01
2	10	0.1700E+02	0.0000E+00	0.0000E+00
			0.1417E+01	0.2037E-01
			0.2361E+01	0.3947E-01
			0.3542E+01	0.7257E-01
			0.4251E+01	0.1019E+00
			0.4723E+01	0.1273E+00
			0.4723E+01	0.2546E+00
			0.4723E+01	0.3820E+00
			0.4723E+01	0.6366E+00
			0.4723E+01	0.2546E+01
3	10	0.3396E+02	0.0000E+00	0.0000E+00
			0.2830E+01	0.2037E-01
			0.4717E+01	0.3947E-01
			0.7076E+01	0.7257E-01
			0.8491E+01	0.1019E+00
			0.9434E+01	0.1273E+00
			0.9434E+01	0.2546E+00
			0.9434E+01	0.3820E+00
			0.9434E+01	0.6366E+00
			0.9434E+01	0.2546E+01
4	10	0.3404E+02	0.0000E+00	0.0000E+00
			0.2890E+01	0.2037E-01
			0.4817E+01	0.3947E-01
			0.7226E+01	0.7257E-01
			0.8671E+01	0.1019E+00
			0.9635E+01	0.1273E+00
			0.8671E+01	0.2546E+00
			0.8671E+01	0.3820E+00
			0.8671E+01	0.6366E+00
			0.8671E+01	0.2546E+01
5	10	0.4900E+02	0.0000E+00	0.0000E+00
			0.4195E+01	0.2037E-01
			0.6991E+01	0.3947E-01
			0.1049E+02	0.7257E-01
			0.1258E+02	0.1019E+00
			0.1398E+02	0.1273E+00
			0.1258E+02	0.2546E+00
			0.1258E+02	0.3820E+00
			0.1258E+02	0.6366E+00
			0.1258E+02	0.2546E+01
6	10	0.6396E+02	0.0000E+00	0.0000E+00
			0.4195E+01	0.2037E-01
			0.6991E+01	0.3947E-01

7	10	0.6404E+02	0.1049E+02	0.7257E-01
			0.1258E+02	0.1019E+00
			0.1398E+02	0.1273E+00
			0.1258E+02	0.2546E+00
			0.1258E+02	0.3820E+00
			0.1258E+02	0.6366E+00
			0.1258E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.4195E+01	0.2037E-01
			0.6991E+01	0.3947E-01
8	10	0.6900E+02	0.1049E+02	0.7257E-01
			0.1258E+02	0.1019E+00
			0.1398E+02	0.1273E+00
			0.1398E+02	0.2546E+00
			0.1398E+02	0.3820E+00
			0.1398E+02	0.6366E+00
			0.1398E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.4195E+01	0.2037E-01
			0.6991E+01	0.3947E-01
9	10	0.7396E+02	0.1049E+02	0.7257E-01
			0.1258E+02	0.1019E+00
			0.1398E+02	0.1273E+00
			0.1398E+02	0.2546E+00
			0.1398E+02	0.3820E+00
			0.1398E+02	0.6366E+00
			0.1398E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.4195E+01	0.2037E-01
			0.6991E+01	0.3947E-01
10	10	0.7404E+02	0.1049E+02	0.7257E-01
			0.1258E+02	0.1019E+00
			0.1398E+02	0.1273E+00
			0.1398E+02	0.2546E+00
			0.1398E+02	0.3820E+00
			0.1398E+02	0.6366E+00
			0.1398E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.4195E+01	0.2037E-01
			0.6991E+01	0.3947E-01
11	10	0.8150E+02	0.1049E+02	0.7257E-01
			0.1258E+02	0.1019E+00
			0.1398E+02	0.1273E+00
			0.1258E+02	0.2546E+00
			0.1258E+02	0.3820E+00
			0.1258E+02	0.6366E+00
			0.1258E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.4195E+01	0.2037E-01
			0.6991E+01	0.3947E-01

12	10	0.8896E+02	0.1258E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.4195E+01	0.2037E-01
			0.6991E+01	0.3947E-01
			0.1049E+02	0.7257E-01
			0.1258E+02	0.1019E+00
			0.1398E+02	0.1273E+00
			0.1258E+02	0.2546E+00
			0.1258E+02	0.3820E+00
			0.1258E+02	0.6366E+00
			0.1258E+02	0.2546E+01
13	10	0.8904E+02	0.0000E+00	0.0000E+00
			0.4195E+01	0.2037E-01
			0.6991E+01	0.3947E-01
			0.1049E+02	0.7257E-01
			0.1258E+02	0.1019E+00
			0.1398E+02	0.1273E+00
			0.1398E+02	0.2546E+00
			0.1398E+02	0.3820E+00
			0.1398E+02	0.6366E+00
			0.1398E+02	0.2546E+01
14	10	0.9650E+02	0.0000E+00	0.0000E+00
			0.4195E+01	0.2037E-01
			0.6991E+01	0.3947E-01
			0.1049E+02	0.7257E-01
			0.1258E+02	0.1019E+00
			0.1398E+02	0.1273E+00
			0.1398E+02	0.2546E+00
			0.1398E+02	0.3820E+00
			0.1398E+02	0.6366E+00
			0.1398E+02	0.2546E+01
15	10	0.1040E+03	0.0000E+00	0.0000E+00
			0.4195E+01	0.2037E-01
			0.6991E+01	0.3947E-01
			0.1049E+02	0.7257E-01
			0.1258E+02	0.1019E+00
			0.1398E+02	0.1273E+00
			0.1398E+02	0.2546E+00
			0.1398E+02	0.3820E+00
			0.1398E+02	0.6366E+00
			0.1398E+02	0.2546E+01
TIP	LOAD	TIP		
	KIP	MOVEMENT		
		IN.		
0.0000E+00		0.0000E+00		
0.2131E+00		0.6366E-02		
0.4262E+00		0.1273E-01		
0.8524E+00		0.2546E-01		
0.1705E+01		0.1655E+00		
0.2557E+01		0.5348E+00		
0.3069E+01		0.9295E+00		
0.3410E+01		0.1273E+01		
0.3410E+01		0.1910E+01		
0.3410E+01		0.2546E+01		

LOAD VERSUS SETTLEMENT CURVE

TOP LOAD KIP	TOP MOVEMENT IN.	TIP LOAD KIP	TIP MOVEMENT IN.
0.6905E+00	0.6551E-03	0.3347E-02	0.1000E-03
0.6905E+01	0.6551E-02	0.3347E-01	0.1000E-02
0.3486E+02	0.3308E-01	0.1674E+00	0.5000E-02
0.6596E+02	0.6478E-01	0.3347E+00	0.1000E-01
0.1135E+03	0.1184E+00	0.6695E+00	0.2000E-01
0.1888E+03	0.2234E+00	0.1002E+01	0.5000E-01
0.2279E+03	0.2975E+00	0.1184E+01	0.8000E-01
0.2423E+03	0.3353E+00	0.1306E+01	0.1000E+00
0.2402E+03	0.4344E+00	0.1784E+01	0.2000E+00
0.2359E+03	0.7292E+00	0.2477E+01	0.5000E+00
0.2363E+03	0.1030E+01	0.2901E+01	0.8000E+00
0.2365E+03	0.1230E+01	0.3139E+01	0.1000E+01
0.2368E+03	0.2231E+01	0.3410E+01	0.2000E+01



=====

APILE for Windows, Version 2019.9.11

Serial Number : 138583644

A Program for Analyzing the Axial Capacity
and Short-term Settlement of Driven Piles
under Axial Loading.
(c) Copyright ENSOFT, Inc., 1987-2019
All Rights Reserved

=====

This program is licensed to :

Converse Consultants
Monrovia, CA

Path to file locations : N:\2014\14-81-229 Monroe
Interchange\03\Final\Report\Monroe OC\Pile Analyses\Apile\Final\
Name of input data file : Abutment 3 - I10 Monroe Service Limit
-470-03-18-2023.ap9d
Name of output file : Abutment 3 - I10 Monroe Service Limit
-470-03-18-2023.ap9o
Name of plot output file : Abutment 3 - I10 Monroe Service Limit
-470-03-18-2023.ap9p

Time and Date of Analysis

Date: March 20, 2023 Time: 07:44:42

1

* INPUT INFORMATION *

I10 Monroe Abutment 1 - Strength Limit - GW elev.470

DESIGNER :

JOB NUMBER :

METHOD FOR UNIT LOAD TRANSFERS :

- FHWA (Federal Highway Administration)
Unfactored Unit Side Friction and Unit Side Resistance are used.

COMPUTATION METHOD(S) FOR PILE CAPACITY :

- FHWA (Federal Highway Administration)

- USACE (U.S. Army Corps of Engineers)
Critical Depth Method for Sand:
10 to 20 Pile Diameter based on the Density
- Revised Lambda
- API RP 2A (American Petroleum Institute)

TYPE OF LOADING :
- COMPRESSION

PILE TYPE :
H-Pile/Steel Pile

DATA FOR AXIAL STIFFNESS :

- MODULUS OF ELASTICITY = 0.290E+08 PSI
- CROSS SECTION AREA = 16.70 IN2

NONCIRCULAR PILE PROPERTIES :

- TOTAL PILE LENGTH, TL = 25.00 FT.
- BATTER ANGLE = 0.00 DEG
- PILE STICKUP LENGTH, PSL = 0.00 FT.
- ZERO FRICTION LENGTH, ZFL = 0.00 FT.
- PERIMETER OF PILE = 40.00 IN.
- TIP AREA OF PILE = 16.70 IN2
- INCREMENT OF PILE LENGTH
USED IN COMPUTATION = 1.00 FT.

SOIL INFORMATIONS :

Nq			LATERAL	EFFECTIVE	FRICTION	BEARING	Nq
FACTOR	DEPTH	SOIL	EARTH	UNIT	ANGLE	CAPACITY	FACTOR
ARMY C.	FT.	TYPE	PRESSURE	WEIGHT	DEGREES	FACTOR	FHWA
				LB/FT^3			
56.00**	0.00	SAND	0.80*	130.00	36.00	42.00**	77.60**
56.00**	26.00	SAND	0.80*	130.00	36.00	42.00**	77.60**
1.00**	26.00	CLAY	0.80*	115.00	0.00	8.00**	4.80**
1.00**	56.00	CLAY	0.80*	115.00	0.00	8.00**	4.80**
68.00**	56.00	SAND	0.80*	135.00	38.00	46.00**	110.40**
68.00**	61.00	SAND	0.80*	135.00	38.00	46.00**	110.40**
68.00**	61.00	SAND	0.80*	72.60	38.00	46.00**	110.40**
68.00**	76.00	SAND	0.80*	72.60	38.00	46.00**	110.40**

68.00**	76.00	CLAY	0.80*	52.60	0.00	8.00**	4.80**
1.00**	91.00	CLAY	0.80*	52.60	0.00	8.00**	4.80**
1.00**	91.00	SAND	0.80*	72.60	42.00	50.00**	244.00**
132.80**	101.00	SAND	0.80*	72.60	42.00	50.00**	244.00**
132.80**							

* VALUE ASSUMED BY THE PROGRAM

** VALUE ESTIMATED BY THE PROGRAM BASED ON FRICTION ANGLE

MAXIMUM UNIT FRICTION KSF	MAXIMUM UNIT BEARING KSF	UNDISTURB SHEAR STRENGTH KSF	REMOLDED SHEAR STRENGTH KSF	BLOW COUNT	UNIT SKIN FRICTION KSF	UNIT END BEARING KSF
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.30E+01	0.10E+08*	5.00	0.00	0.00	0.00	0.00
0.30E+01	0.10E+08*	5.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.30E+01	0.10E+08*	6.00	0.00	0.00	0.00	0.00
0.30E+01	0.10E+08*	6.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00

* MAXIMUM UNIT FRICTION AND/OR MAXIMUM UNIT BEARING WERE SET TO BE 0.10E+08 BECAUSE THE USER DOES NOT PLAN TO LIMIT THE COMPUTED DATA.

DEPTH FT.	LRFD FACTOR ON UNIT FRICTION	LRFD FACTOR ON UNIT BEARING
0.00	1.000	1.000
26.00	1.000	1.000
26.00	1.000	1.000
56.00	1.000	1.000
56.00	1.000	1.000
61.00	1.000	1.000
61.00	1.000	1.000
76.00	1.000	1.000
76.00	1.000	1.000
91.00	1.000	1.000
91.00	1.000	1.000
101.00	1.000	1.000

* COMPUTATION RESULT *

 * FED. HWY. METHOD *

PILE PENETRATION FT.	SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	0.3	0.3
1.00	0.1	0.7	0.8
2.00	0.4	1.6	2.1
3.00	1.0	2.4	3.4
4.00	1.8	3.2	5.0
5.00	2.8	4.1	6.8
6.00	4.0	4.9	8.9
7.00	5.4	5.7	11.1
8.00	7.1	6.5	13.6
9.00	9.0	7.3	16.3
10.00	11.1	8.1	19.2
11.00	13.4	8.9	22.4
12.00	16.0	9.7	25.7
13.00	18.8	10.5	29.3
14.00	21.8	11.4	33.1
15.00	25.0	12.2	37.2
16.00	28.4	13.0	41.4
17.00	32.1	13.8	45.9
18.00	36.0	14.6	50.6
19.00	40.1	15.4	55.5
20.00	44.5	16.2	60.7
21.00	49.0	16.9	65.9
22.00	53.8	17.3	71.1
23.00	58.8	17.6	76.3
24.00	64.0	17.6	81.6
25.00	69.5	15.3	84.7

 * ARMY CORPS METHOD *

PILE PENETRATION FT.	SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	0.3	0.3
1.00	0.2	0.8	0.9
2.00	0.7	1.7	2.4
3.00	1.5	2.5	4.0
4.00	2.7	3.4	6.0
5.00	4.1	4.2	8.4
6.00	6.0	5.1	11.0
7.00	8.1	5.9	14.0
8.00	10.6	6.8	17.4
9.00	13.4	7.6	21.0
10.00	16.6	8.4	25.0
11.00	20.1	9.3	29.4
12.00	23.9	10.1	34.0
13.00	28.0	11.0	39.0
14.00	32.5	11.8	44.3

15.00	37.3	12.7	50.0
16.00	42.5	13.5	56.0
17.00	48.0	14.3	62.3
18.00	53.8	14.9	68.6
19.00	59.9	15.2	75.1
20.00	66.4	15.2	81.6
21.00	73.2	15.2	88.4
22.00	80.2	15.2	95.4
23.00	87.2	15.2	102.4
24.00	94.3	15.2	109.5
25.00	101.3	13.3	114.7

* LAMBDA 2 METHOD *

PILE PENETRATION FT.	SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	0.3	0.3
1.00	0.2	0.6	0.8
2.00	0.6	1.3	1.9
3.00	1.3	1.9	3.2
4.00	2.0	2.5	4.6
5.00	2.9	3.2	6.1
6.00	3.9	3.8	7.7
7.00	5.0	4.4	9.4
8.00	6.2	5.1	11.2
9.00	7.4	5.7	13.1
10.00	8.6	6.3	14.9
11.00	9.9	7.0	16.9
12.00	11.2	7.6	18.8
13.00	12.6	8.2	20.8
14.00	13.9	8.9	22.8
15.00	15.3	9.5	24.8
16.00	16.8	10.1	26.9
17.00	19.0	10.8	29.7
18.00	21.3	11.4	32.7
19.00	23.7	12.0	35.7
20.00	26.2	12.7	38.9
21.00	28.9	13.3	42.2
22.00	31.7	13.9	45.7
23.00	34.7	14.6	49.3
24.00	37.8	15.2	53.0
25.00	41.0	13.7	54.7

* API RP-2A (2010) *

PILE PENETRATION FT.	SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	0.3	0.3
1.00	0.1	0.6	0.7
2.00	0.4	1.3	1.7
3.00	0.9	1.9	2.8

4.00	1.7	2.5	4.2
5.00	2.6	3.2	5.8
6.00	3.7	3.8	7.5
7.00	5.1	4.4	9.5
8.00	6.7	5.1	11.7
9.00	8.4	5.7	14.1
10.00	10.4	6.3	16.7
11.00	12.6	7.0	19.6
12.00	15.0	7.6	22.6
13.00	17.6	8.2	25.8
14.00	20.4	8.9	29.3
15.00	23.4	9.5	32.9
16.00	26.7	10.1	36.8
17.00	30.1	10.8	40.9
18.00	33.7	11.4	45.1
19.00	37.6	12.0	49.6
20.00	41.7	12.7	54.3
21.00	45.9	13.3	59.2
22.00	50.4	13.9	64.3
23.00	55.1	14.6	69.7
24.00	60.0	15.2	75.2
25.00	65.1	13.7	78.8

NOTES:

- AN ASTERISK IS PLACED IN THE END-BEARING COLUMN
IF THE TIP RESISTANCE IS CONTROLLED BY THE FRICTION
OF SOIL PLUG INSIDE AN OPEN-ENDED PIPE PILE.

* COMPUTE LOAD-DISTRIBUTION AND LOAD-SETTLEMENT *
* CURVES FOR AXIAL LOADING *

T-Z CURVE NO.	NO. OF POINTS	DEPTH TO CURVE FT.	LOAD TRANSFER PSI	PILE MOVEMENT IN.
1	10	0.4167E-01		
			0.0000E+00	0.0000E+00
			0.5788E-02	0.2037E-01
			0.9646E-02	0.3947E-01
			0.1447E-01	0.7257E-01
			0.1736E-01	0.1019E+00
			0.1929E-01	0.1273E+00
			0.1929E-01	0.2546E+00
			0.1929E-01	0.3820E+00
			0.1929E-01	0.6366E+00
2	10	0.1300E+02	0.1929E-01	0.2546E+01
			0.0000E+00	0.0000E+00
			0.1806E+01	0.2037E-01
			0.3010E+01	0.3947E-01
			0.4515E+01	0.7257E-01
			0.5417E+01	0.1019E+00
			0.6019E+01	0.1273E+00
			0.6019E+01	0.2546E+00
			0.6019E+01	0.3820E+00
			0.6019E+01	0.6366E+00

3	10	0.2596E+02	0.6019E+01	0.2546E+01
			0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
			0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1158E+02	0.2546E+00
			0.1158E+02	0.3820E+00
			0.1158E+02	0.6366E+00
4	10	0.2604E+02	0.1158E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
			0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1042E+02	0.2546E+00
			0.1042E+02	0.3820E+00
			0.1042E+02	0.6366E+00
5	10	0.4100E+02	0.1042E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
			0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1042E+02	0.2546E+00
			0.1042E+02	0.3820E+00
			0.1042E+02	0.6366E+00
6	10	0.5596E+02	0.1042E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
			0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1042E+02	0.2546E+00
			0.1042E+02	0.3820E+00
			0.1042E+02	0.6366E+00
7	10	0.5604E+02	0.1042E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
			0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1158E+02	0.2546E+00
			0.1158E+02	0.3820E+00
			0.1158E+02	0.6366E+00
8	10	0.5850E+02	0.1158E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01

9	10	0.6096E+02	0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1158E+02	0.2546E+00
			0.1158E+02	0.3820E+00
			0.1158E+02	0.6366E+00
			0.1158E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
10	10	0.6104E+02	0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1158E+02	0.2546E+00
			0.1158E+02	0.3820E+00
			0.1158E+02	0.6366E+00
			0.1158E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
11	10	0.6850E+02	0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1158E+02	0.2546E+00
			0.1158E+02	0.3820E+00
			0.1158E+02	0.6366E+00
			0.1158E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
12	10	0.7596E+02	0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1158E+02	0.2546E+00
			0.1158E+02	0.3820E+00
			0.1158E+02	0.6366E+00
			0.1158E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
13	10	0.7604E+02	0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1042E+02	0.2546E+00
			0.1042E+02	0.3820E+00
			0.1042E+02	0.6366E+00
			0.1042E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01

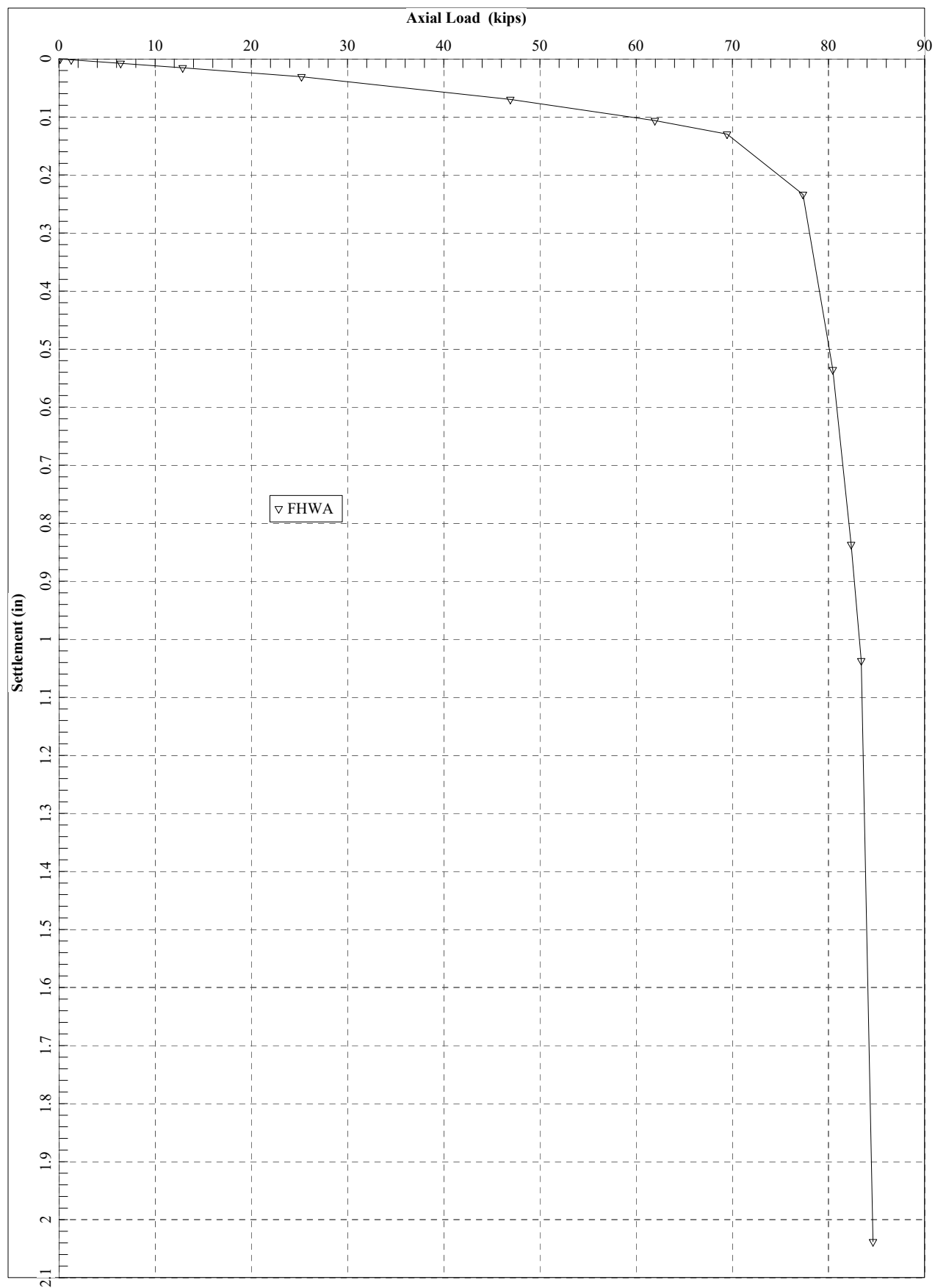
14	10	0.8350E+02	0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
			0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1042E+02	0.2546E+00
			0.1042E+02	0.3820E+00
			0.1042E+02	0.6366E+00
			0.1042E+02	0.2546E+01
15	10	0.9096E+02	0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
			0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1042E+02	0.2546E+00
			0.1042E+02	0.3820E+00
			0.1042E+02	0.6366E+00
			0.1042E+02	0.2546E+01
16	10	0.9104E+02	0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
			0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1158E+02	0.2546E+00
			0.1158E+02	0.3820E+00
			0.1158E+02	0.6366E+00
			0.1158E+02	0.2546E+01
17	10	0.9600E+02	0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
			0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1158E+02	0.2546E+00
			0.1158E+02	0.3820E+00
			0.1158E+02	0.6366E+00
			0.1158E+02	0.2546E+01
18	10	0.1010E+03	0.0000E+00	0.0000E+00
			0.3473E+01	0.2037E-01
			0.5788E+01	0.3947E-01
			0.8682E+01	0.7257E-01
			0.1042E+02	0.1019E+00
			0.1158E+02	0.1273E+00
			0.1158E+02	0.2546E+00
			0.1158E+02	0.3820E+00
			0.1158E+02	0.6366E+00
			0.1158E+02	0.2546E+01

TIP LOAD TIP MOVEMENT
KIP IN.

0.0000E+00	0.0000E+00
0.9552E+00	0.6366E-02
0.1910E+01	0.1273E-01
0.3821E+01	0.2546E-01
0.7642E+01	0.1655E+00
0.1146E+02	0.5348E+00
0.1376E+02	0.9295E+00
0.1528E+02	0.1273E+01
0.1528E+02	0.1910E+01
0.1528E+02	0.2546E+01

LOAD VERSUS SETTLEMENT CURVE

TOP LOAD KIP	TOP MOVEMENT IN.	TIP LOAD KIP	TIP MOVEMENT IN.
0.1284E+00	0.1544E-03	0.1500E-01	0.1000E-03
0.1284E+01	0.1544E-02	0.1500E+00	0.1000E-02
0.6420E+01	0.7720E-02	0.7502E+00	0.5000E-02
0.1288E+02	0.1545E-01	0.1500E+01	0.1000E-01
0.2522E+02	0.3077E-01	0.3001E+01	0.2000E-01
0.4693E+02	0.6996E-01	0.4490E+01	0.5000E-01
0.6196E+02	0.1064E+00	0.5309E+01	0.8000E-01
0.6946E+02	0.1296E+00	0.5854E+01	0.1000E+00
0.7734E+02	0.2336E+00	0.7999E+01	0.2000E+00
0.8045E+02	0.5355E+00	0.1110E+02	0.5000E+00
0.8235E+02	0.8367E+00	0.1300E+02	0.8000E+00
0.8341E+02	0.1037E+01	0.1407E+02	0.1000E+01
0.8463E+02	0.2038E+01	0.1528E+02	0.2000E+01



=====

APILE for Windows, Version 2019.9.11

Serial Number : 138583644

A Program for Analyzing the Axial Capacity
and Short-term Settlement of Driven Piles
under Axial Loading.
(c) Copyright ENSOFT, Inc., 1987-2019
All Rights Reserved

=====

This program is licensed to :

Converse Consultants
Monrovia, CA

Path to file locations : N:\2014\14-81-229 Monroe
Interchange\03\Final\Report\Monroe OC\Pile Analyses\Apile\Final\
Name of input data file : Abutment 3 - I10 Monroe Strength and Extreme
Limits -460-03-18-2023.ap9d
Name of output file : Abutment 3 - I10 Monroe Strength and Extreme
Limits -460-03-18-2023.ap9o
Name of plot output file : Abutment 3 - I10 Monroe Strength and Extreme
Limits -460-03-18-2023.ap9p

Time and Date of Analysis

Date: March 20, 2023 Time: 07:38:56

1

* INPUT INFORMATION *

I10 Monroe Abutment 1 - Strength Limit - GW elev.460

DESIGNER :

JOB NUMBER :

METHOD FOR UNIT LOAD TRANSFERS :

- FHWA (Federal Highway Administration)
Unfactored Unit Side Friction and Unit Side Resistance are used.

COMPUTATION METHOD(S) FOR PILE CAPACITY :

- FHWA (Federal Highway Administration)

- USACE (U.S. Army Corps of Engineers)
Critical Depth Method for Sand:
10 to 20 Pile Diameter based on the Density
- Revised Lambda
- API RP 2A (American Petroleum Institute)

TYPE OF LOADING :
- COMPRESSION

PILE TYPE :
H-Pile/Steel Pile

DATA FOR AXIAL STIFFNESS :

- MODULUS OF ELASTICITY = 0.290E+08 PSI
- CROSS SECTION AREA = 16.70 IN2

NONCIRCULAR PILE PROPERTIES :

- TOTAL PILE LENGTH, TL = 60.00 FT.
- BATTER ANGLE = 0.00 DEG
- PILE STICKUP LENGTH, PSL = 0.00 FT.
- ZERO FRICTION LENGTH, ZFL = 0.00 FT.
- PERIMETER OF PILE = 40.00 IN.
- TIP AREA OF PILE = 16.70 IN2
- INCREMENT OF PILE LENGTH
USED IN COMPUTATION = 1.00 FT.

SOIL INFORMATIONS :

Nq			LATERAL	EFFECTIVE	FRICTION	BEARING	Nq
FACTOR	DEPTH	SOIL	EARTH	UNIT	ANGLE	CAPACITY	FACTOR
ARMY C.	FT.	TYPE	PRESSURE	WEIGHT	DEGREES	FACTOR	FHWA
				LB/FT^3			
56.00**	0.00	SAND	0.80*	130.00	36.00	42.00**	77.60**
56.00**	26.00	SAND	0.80*	130.00	36.00	42.00**	77.60**
1.00**	26.00	CLAY	0.80*	115.00	0.00	8.00**	4.80**
1.00**	56.00	CLAY	0.80*	115.00	0.00	8.00**	4.80**
68.00**	56.00	SAND	0.80*	135.00	38.00	46.00**	110.40**
68.00**	61.00	SAND	0.80*	135.00	38.00	46.00**	110.40**
68.00**	61.00	SAND	0.80*	72.60	38.00	46.00**	110.40**
68.00**	76.00	SAND	0.80*	72.60	38.00	46.00**	110.40**

68.00**	76.00	CLAY	0.80*	52.60	0.00	8.00**	4.80**
1.00**	91.00	CLAY	0.80*	52.60	0.00	8.00**	4.80**
1.00**	91.00	SAND	0.80*	72.60	42.00	50.00**	244.00**
132.80**	101.00	SAND	0.80*	72.60	42.00	50.00**	244.00**
132.80**							

* VALUE ASSUMED BY THE PROGRAM

** VALUE ESTIMATED BY THE PROGRAM BASED ON FRICTION ANGLE

MAXIMUM UNIT FRICTION KSF	MAXIMUM UNIT BEARING KSF	UNDISTURB SHEAR STRENGTH KSF	REMOLDED SHEAR STRENGTH KSF	BLOW COUNT	UNIT SKIN FRICTION KSF	UNIT END BEARING KSF
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.30E+01	0.10E+08*	5.00	0.00	0.00	0.00	0.00
0.30E+01	0.10E+08*	5.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.30E+01	0.10E+08*	6.00	0.00	0.00	0.00	0.00
0.30E+01	0.10E+08*	6.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00

* MAXIMUM UNIT FRICTION AND/OR MAXIMUM UNIT BEARING WERE SET TO BE 0.10E+08 BECAUSE THE USER DOES NOT PLAN TO LIMIT THE COMPUTED DATA.

DEPTH FT.	LRFD FACTOR ON UNIT FRICTION	LRFD FACTOR ON UNIT BEARING
0.00	1.000	1.000
26.00	1.000	1.000
26.00	1.000	1.000
56.00	1.000	1.000
56.00	1.000	1.000
61.00	1.000	1.000
61.00	1.000	1.000
76.00	1.000	1.000
76.00	1.000	1.000
91.00	1.000	1.000
91.00	1.000	1.000
101.00	1.000	1.000

* COMPUTATION RESULT *

 * FED. HWY. METHOD *

PILE PENETRATION FT.	SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	0.3	0.3
1.00	0.1	0.7	0.8
2.00	0.4	1.6	2.1
3.00	1.0	2.4	3.4
4.00	1.8	3.2	5.0
5.00	2.8	4.1	6.8
6.00	4.0	4.9	8.9
7.00	5.4	5.7	11.1
8.00	7.1	6.5	13.6
9.00	9.0	7.3	16.3
10.00	11.1	8.1	19.2
11.00	13.4	8.9	22.4
12.00	16.0	9.7	25.7
13.00	18.8	10.5	29.3
14.00	21.8	11.4	33.1
15.00	25.0	12.2	37.2
16.00	28.4	13.0	41.4
17.00	32.1	13.8	45.9
18.00	36.0	14.6	50.6
19.00	40.1	15.4	55.5
20.00	44.5	16.2	60.7
21.00	49.0	16.9	65.9
22.00	53.8	17.3	71.1
23.00	58.8	17.6	76.3
24.00	64.0	17.6	81.6
25.00	69.5	15.3	84.7
26.00	75.1	11.4	86.5
27.00	83.1	7.5	90.6
28.00	93.1	5.2	98.3
29.00	103.1	5.2	108.3
30.00	113.1	5.2	118.3
31.00	123.1	5.2	128.3
32.00	133.1	5.2	138.3
33.00	143.1	5.2	148.3
34.00	153.1	5.2	158.3
35.00	163.1	5.2	168.3
36.00	173.1	5.2	178.3
37.00	183.1	5.2	188.3
38.00	193.1	5.2	198.3
39.00	203.1	5.2	208.3
40.00	213.1	5.2	218.3
41.00	223.1	5.2	228.3
42.00	233.1	5.2	238.3
43.00	243.1	5.2	248.3
44.00	253.1	5.2	258.3
45.00	263.1	5.2	268.3
46.00	273.1	5.2	278.3
47.00	283.1	5.2	288.3
48.00	293.1	5.2	298.3
49.00	303.1	5.2	308.3
50.00	313.1	5.2	318.3

51.00	323.1	5.2	328.3
52.00	333.1	5.2	338.3
53.00	343.1	5.2	348.3
54.00	353.1	5.2	358.3
55.00	363.1	9.6	372.7
56.00	373.1	17.1	390.2
57.00	385.4	24.5	409.9
58.00	400.0	29.0	429.0
59.00	415.0	29.0	443.9
60.00	430.2	29.0	459.1

 * ARMY CORPS METHOD *

PILE PENETRATION FT.	SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	0.3	0.3
1.00	0.2	0.8	0.9
2.00	0.7	1.7	2.4
3.00	1.5	2.5	4.0
4.00	2.7	3.4	6.0
5.00	4.1	4.2	8.4
6.00	6.0	5.1	11.0
7.00	8.1	5.9	14.0
8.00	10.6	6.8	17.4
9.00	13.4	7.6	21.0
10.00	16.6	8.4	25.0
11.00	20.1	9.3	29.4
12.00	23.9	10.1	34.0
13.00	28.0	11.0	39.0
14.00	32.5	11.8	44.3
15.00	37.3	12.7	50.0
16.00	42.5	13.5	56.0
17.00	48.0	14.3	62.3
18.00	53.8	14.9	68.6
19.00	59.9	15.2	75.1
20.00	66.4	15.2	81.6
21.00	73.2	15.2	88.4
22.00	80.2	15.2	95.4
23.00	87.2	15.2	102.4
24.00	94.3	15.2	109.5
25.00	101.3	13.3	114.7
26.00	108.4	10.2	118.6
27.00	116.1	7.1	123.1
28.00	124.4	5.2	129.6
29.00	132.7	5.2	137.9
30.00	141.1	5.2	146.3
31.00	149.4	5.2	154.6
32.00	157.7	5.2	162.9
33.00	166.1	5.2	171.3
34.00	174.4	5.2	179.6
35.00	182.7	5.2	187.9
36.00	191.1	5.2	196.3
37.00	199.4	5.2	204.6
38.00	207.7	5.2	212.9
39.00	216.1	5.2	221.3
40.00	224.4	5.2	229.6

41.00	232.7	5.2	237.9
42.00	241.1	5.2	246.3
43.00	249.4	5.2	254.6
44.00	257.7	5.2	262.9
45.00	266.1	5.2	271.3
46.00	274.4	5.2	279.6
47.00	282.7	5.2	287.9
48.00	291.1	5.2	296.3
49.00	299.4	5.2	304.6
50.00	307.7	5.2	312.9
51.00	316.1	5.2	321.3
52.00	324.4	5.2	329.6
53.00	332.7	5.2	337.9
54.00	341.1	5.2	346.3
55.00	349.4	8.3	357.7
56.00	357.7	13.5	371.2
57.00	365.7	18.7	384.3
58.00	373.2	21.8	395.0
59.00	380.7	21.8	402.5
60.00	388.3	21.8	410.0

 * LAMBDA 2 METHOD *

PILE PENETRATION FT.	SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	0.3	0.3
1.00	0.2	0.6	0.8
2.00	0.6	1.3	1.9
3.00	1.3	1.9	3.2
4.00	2.0	2.5	4.6
5.00	2.9	3.2	6.1
6.00	3.9	3.8	7.7
7.00	5.0	4.4	9.4
8.00	6.2	5.1	11.2
9.00	7.4	5.7	13.1
10.00	8.6	6.3	14.9
11.00	9.9	7.0	16.9
12.00	11.2	7.6	18.8
13.00	12.6	8.2	20.8
14.00	13.9	8.9	22.8
15.00	15.3	9.5	24.8
16.00	16.8	10.1	26.9
17.00	19.0	10.8	29.7
18.00	21.3	11.4	32.7
19.00	23.7	12.0	35.7
20.00	26.2	12.7	38.9
21.00	28.9	13.3	42.2
22.00	31.7	13.9	45.7
23.00	34.7	14.6	49.3
24.00	37.8	15.2	53.0
25.00	41.0	13.7	54.7
26.00	44.3	10.6	54.9
27.00	50.6	7.3	57.9
28.00	56.9	5.2	62.2
29.00	63.3	5.2	68.5
30.00	69.7	5.2	75.0

31.00	76.2	5.2	81.5
32.00	82.8	5.2	88.0
33.00	89.4	5.2	94.6
34.00	96.0	5.2	101.2
35.00	102.7	5.2	107.9
36.00	109.5	5.2	114.7
37.00	116.3	5.2	121.5
38.00	123.1	5.2	128.4
39.00	130.0	5.2	135.3
40.00	137.0	5.2	142.2
41.00	144.0	5.2	149.3
42.00	151.1	5.2	156.3
43.00	158.2	5.2	163.5
44.00	165.4	5.2	170.6
45.00	172.7	5.2	177.9
46.00	180.0	5.2	185.2
47.00	187.3	5.2	192.5
48.00	194.7	5.2	199.9
49.00	202.1	5.2	207.4
50.00	209.7	5.2	214.9
51.00	217.2	5.2	222.4
52.00	224.8	5.2	230.0
53.00	232.5	5.2	237.7
54.00	240.2	5.2	245.4
55.00	248.0	9.2	257.2
56.00	255.8	15.9	271.8
57.00	263.1	22.7	285.7
58.00	270.4	26.7	297.1
59.00	278.0	26.7	304.6
60.00	285.6	26.7	312.3

* API RP-2A (2010) *

PILE PENETRATION FT.	SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	0.3	0.3
1.00	0.1	0.6	0.7
2.00	0.4	1.3	1.7
3.00	0.9	1.9	2.8
4.00	1.7	2.5	4.2
5.00	2.6	3.2	5.8
6.00	3.7	3.8	7.5
7.00	5.1	4.4	9.5
8.00	6.7	5.1	11.7
9.00	8.4	5.7	14.1
10.00	10.4	6.3	16.7
11.00	12.6	7.0	19.6
12.00	15.0	7.6	22.6
13.00	17.6	8.2	25.8
14.00	20.4	8.9	29.3
15.00	23.4	9.5	32.9
16.00	26.7	10.1	36.8
17.00	30.1	10.8	40.9
18.00	33.7	11.4	45.1
19.00	37.6	12.0	49.6
20.00	41.7	12.7	54.3

21.00	45.9	13.3	59.2
22.00	50.4	13.9	64.3
23.00	55.1	14.6	69.7
24.00	60.0	15.2	75.2
25.00	65.1	13.7	78.8
26.00	70.4	10.6	81.0
27.00	76.9	7.3	84.2
28.00	84.6	5.2	89.8
29.00	92.3	5.2	97.5
30.00	100.1	5.2	105.3
31.00	107.9	5.2	113.1
32.00	115.8	5.2	121.0
33.00	123.7	5.2	128.9
34.00	131.7	5.2	136.9
35.00	139.8	5.2	145.0
36.00	147.9	5.2	153.1
37.00	156.0	5.2	161.2
38.00	164.2	5.2	169.5
39.00	172.5	5.2	177.7
40.00	180.8	5.2	186.0
41.00	189.2	5.2	194.4
42.00	197.6	5.2	202.9
43.00	206.2	5.2	211.4
44.00	214.9	5.2	220.1
45.00	223.6	5.2	228.8
46.00	232.4	5.2	237.7
47.00	241.4	5.2	246.6
48.00	250.4	5.2	255.6
49.00	259.5	5.2	264.7
50.00	268.7	5.2	273.9
51.00	277.9	5.2	283.2
52.00	287.3	5.2	292.5
53.00	296.8	5.2	302.0
54.00	306.3	5.2	311.5
55.00	315.9	9.2	325.1
56.00	325.6	15.9	341.6
57.00	334.2	22.7	356.9
58.00	341.7	26.7	368.3
59.00	349.1	26.7	375.8
60.00	356.6	26.7	383.3

NOTES:

- AN ASTERISK IS PLACED IN THE END-BEARING COLUMN IF THE TIP RESISTANCE IS CONTROLLED BY THE FRICTION OF SOIL PLUG INSIDE AN OPEN-ENDED PIPE PILE.

 * COMPUTE LOAD-DISTRIBUTION AND LOAD-SETTLEMENT *
 * CURVES FOR AXIAL LOADING *

T-Z CURVE NO.	NO. OF POINTS	DEPTH TO CURVE FT.	LOAD TRANSFER PSI	PILE MOVEMENT IN.
1	10	0.4167E-01	0.0000E+00 0.5788E-02	0.0000E+00 0.2037E-01

2	10	0.1300E+02	0.9646E-02	0.3947E-01
			0.1447E-01	0.7257E-01
			0.1736E-01	0.1019E+00
			0.1929E-01	0.1273E+00
			0.1929E-01	0.2546E+00
			0.1929E-01	0.3820E+00
			0.1929E-01	0.6366E+00
			0.1929E-01	0.2546E+01
			0.0000E+00	0.0000E+00
			0.1806E+01	0.2037E-01
3	10	0.2596E+02	0.3010E+01	0.3947E-01
			0.4515E+01	0.7257E-01
			0.5417E+01	0.1019E+00
			0.6019E+01	0.1273E+00
			0.6019E+01	0.2546E+00
			0.6019E+01	0.3820E+00
			0.6019E+01	0.6366E+00
			0.6019E+01	0.2546E+01
			0.0000E+00	0.0000E+00
			0.3606E+01	0.2037E-01
4	10	0.2604E+02	0.6010E+01	0.3947E-01
			0.9015E+01	0.7257E-01
			0.1082E+02	0.1019E+00
			0.1202E+02	0.1273E+00
			0.1202E+02	0.2546E+00
			0.1202E+02	0.3820E+00
			0.1202E+02	0.6366E+00
			0.1202E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.3722E+01	0.2037E-01
5	10	0.4100E+02	0.6203E+01	0.3947E-01
			0.9304E+01	0.7257E-01
			0.1116E+02	0.1019E+00
			0.1241E+02	0.1273E+00
			0.1116E+02	0.2546E+00
			0.1116E+02	0.3820E+00
			0.1116E+02	0.6366E+00
			0.1116E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.6250E+01	0.2037E-01
6	10	0.5596E+02	0.1042E+02	0.3947E-01
			0.1562E+02	0.7257E-01
			0.1875E+02	0.1019E+00
			0.2083E+02	0.1273E+00
			0.1875E+02	0.2546E+00
			0.1875E+02	0.3820E+00
			0.1875E+02	0.6366E+00
			0.1875E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.6302E+01	0.2037E-01
			0.1050E+02	0.3947E-01
			0.1575E+02	0.7257E-01
			0.1891E+02	0.1019E+00
			0.2101E+02	0.1273E+00
			0.1891E+02	0.2546E+00
			0.1891E+02	0.3820E+00

7	10	0.5604E+02	0.1891E+02	0.6366E+00
			0.1891E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.6419E+01	0.2037E-01
			0.1070E+02	0.3947E-01
			0.1605E+02	0.7257E-01
			0.1926E+02	0.1019E+00
			0.2140E+02	0.1273E+00
			0.2140E+02	0.2546E+00
			0.2140E+02	0.3820E+00
8	10	0.5850E+02	0.2140E+02	0.6366E+00
			0.2140E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.9330E+01	0.2037E-01
			0.1555E+02	0.3947E-01
			0.2333E+02	0.7257E-01
			0.2799E+02	0.1019E+00
			0.3110E+02	0.1273E+00
			0.3110E+02	0.2546E+00
			0.3110E+02	0.3820E+00
9	10	0.6096E+02	0.3110E+02	0.6366E+00
			0.3110E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.9594E+01	0.2037E-01
			0.1599E+02	0.3947E-01
			0.2398E+02	0.7257E-01
			0.2878E+02	0.1019E+00
			0.3198E+02	0.1273E+00
			0.3198E+02	0.2546E+00
			0.3198E+02	0.3820E+00
10	10	0.6104E+02	0.3198E+02	0.6366E+00
			0.3198E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.9594E+01	0.2037E-01
			0.1599E+02	0.3947E-01
			0.2398E+02	0.7257E-01
			0.2878E+02	0.1019E+00
			0.3198E+02	0.1273E+00
			0.3198E+02	0.2546E+00
			0.3198E+02	0.3820E+00
11	10	0.6850E+02	0.3198E+02	0.6366E+00
			0.3198E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.9594E+01	0.2037E-01
			0.1599E+02	0.3947E-01
			0.2398E+02	0.7257E-01
			0.2878E+02	0.1019E+00
			0.3198E+02	0.1273E+00
			0.3198E+02	0.2546E+00
			0.3198E+02	0.3820E+00
12	10	0.7596E+02	0.3198E+02	0.6366E+00
			0.3198E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.9594E+01	0.2037E-01
			0.1599E+02	0.3947E-01

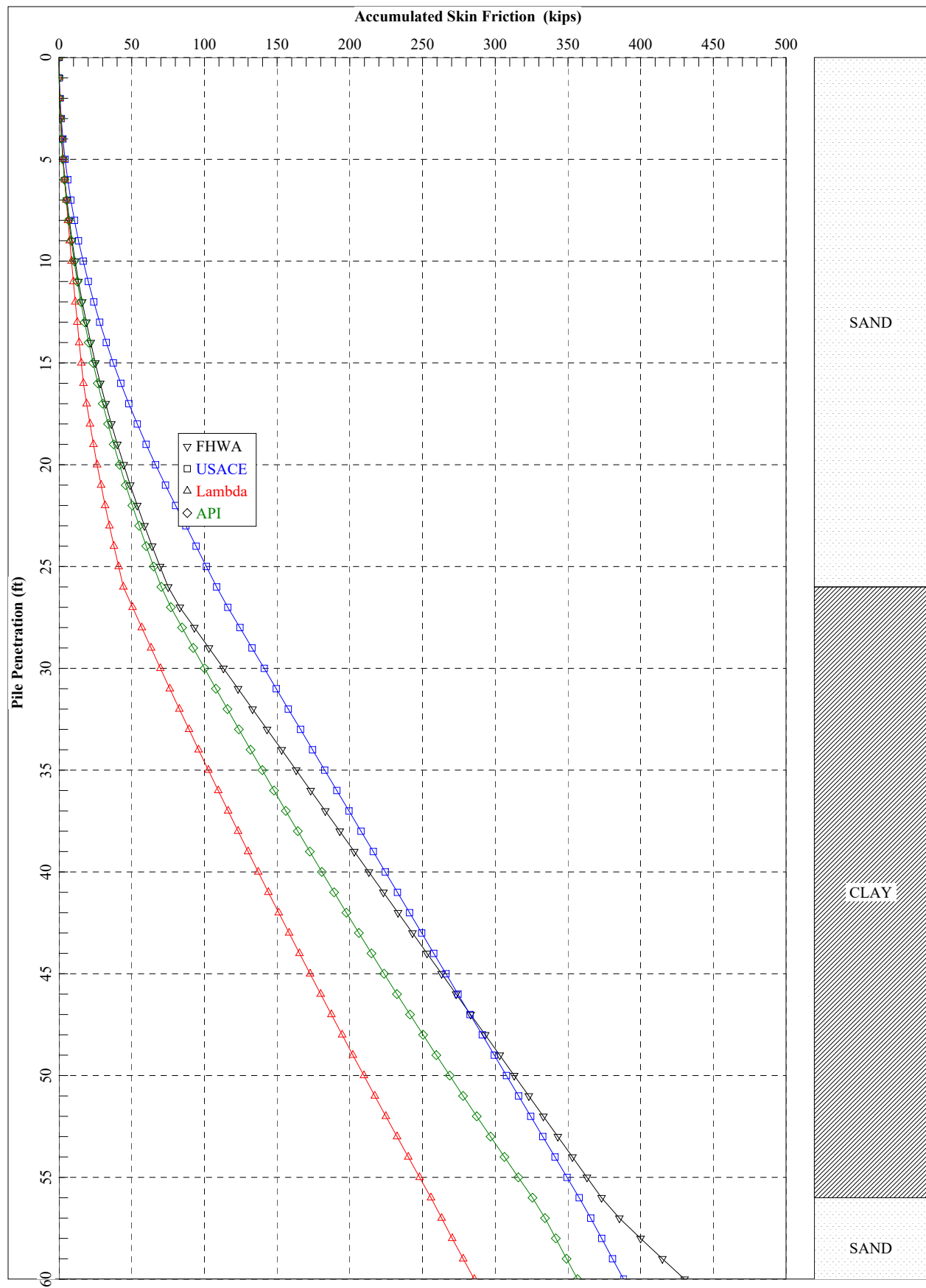
13	10	0.7604E+02	0.2398E+02	0.7257E-01
			0.2878E+02	0.1019E+00
			0.3198E+02	0.1273E+00
			0.3198E+02	0.2546E+00
			0.3198E+02	0.3820E+00
			0.3198E+02	0.6366E+00
			0.3198E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.9594E+01	0.2037E-01
			0.1599E+02	0.3947E-01
			0.2398E+02	0.7257E-01
			0.2878E+02	0.1019E+00
			0.3198E+02	0.1273E+00
			0.2878E+02	0.2546E+00
14	10	0.8350E+02	0.2878E+02	0.3820E+00
			0.2878E+02	0.6366E+00
			0.2878E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.9594E+01	0.2037E-01
			0.1599E+02	0.3947E-01
			0.2398E+02	0.7257E-01
			0.2878E+02	0.1019E+00
			0.3198E+02	0.1273E+00
			0.2878E+02	0.2546E+00
			0.2878E+02	0.3820E+00
			0.2878E+02	0.6366E+00
			0.2878E+02	0.2546E+01
15	10	0.9096E+02	0.0000E+00	0.0000E+00
			0.9594E+01	0.2037E-01
			0.1599E+02	0.3947E-01
			0.2398E+02	0.7257E-01
			0.2878E+02	0.1019E+00
			0.3198E+02	0.1273E+00
			0.2878E+02	0.2546E+00
			0.2878E+02	0.3820E+00
			0.2878E+02	0.6366E+00
			0.2878E+02	0.2546E+01
16	10	0.9104E+02	0.0000E+00	0.0000E+00
			0.9594E+01	0.2037E-01
			0.1599E+02	0.3947E-01
			0.2398E+02	0.7257E-01
			0.2878E+02	0.1019E+00
			0.3198E+02	0.1273E+00
			0.3198E+02	0.2546E+00
			0.3198E+02	0.3820E+00
			0.3198E+02	0.6366E+00
			0.3198E+02	0.2546E+01
17	10	0.9600E+02	0.0000E+00	0.0000E+00
			0.9594E+01	0.2037E-01
			0.1599E+02	0.3947E-01
			0.2398E+02	0.7257E-01
			0.2878E+02	0.1019E+00
			0.3198E+02	0.1273E+00
			0.3198E+02	0.2546E+00
			0.3198E+02	0.3820E+00
			0.3198E+02	0.6366E+00
			0.3198E+02	0.6366E+00

18	10	0.1010E+03	0.3198E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.9594E+01	0.2037E-01
			0.1599E+02	0.3947E-01
			0.2398E+02	0.7257E-01
			0.2878E+02	0.1019E+00
			0.3198E+02	0.1273E+00
			0.3198E+02	0.2546E+00
			0.3198E+02	0.3820E+00
			0.3198E+02	0.6366E+00
			0.3198E+02	0.2546E+01

TIP LOAD KIP	TIP MOVEMENT IN.
0.0000E+00	0.0000E+00
0.1810E+01	0.6366E-02
0.3620E+01	0.1273E-01
0.7240E+01	0.2546E-01
0.1448E+02	0.1655E+00
0.2172E+02	0.5348E+00
0.2606E+02	0.9295E+00
0.2896E+02	0.1273E+01
0.2896E+02	0.1910E+01
0.2896E+02	0.2546E+01

LOAD VERSUS SETTLEMENT CURVE

TOP LOAD KIP	TOP MOVEMENT IN.	TIP LOAD KIP	TIP MOVEMENT IN.
0.1908E+01	0.1484E-02	0.2843E-01	0.1000E-03
0.1939E+02	0.1498E-01	0.2843E+00	0.1000E-02
0.9165E+02	0.7398E-01	0.1422E+01	0.5000E-02
0.1598E+03	0.1365E+00	0.2843E+01	0.1000E-01
0.2489E+03	0.2312E+00	0.5686E+01	0.2000E-01
0.3609E+03	0.3828E+00	0.8508E+01	0.5000E-01
0.4072E+03	0.4715E+00	0.1006E+02	0.8000E-01
0.4218E+03	0.5124E+00	0.1109E+02	0.1000E+00
0.4187E+03	0.6138E+00	0.1516E+02	0.2000E+00
0.4211E+03	0.9181E+00	0.2104E+02	0.5000E+00
0.4247E+03	0.1223E+01	0.2464E+02	0.8000E+00
0.4267E+03	0.1426E+01	0.2666E+02	0.1000E+01
0.4290E+03	0.2430E+01	0.2896E+02	0.2000E+01



=====

APILE for Windows, Version 2019.9.11

Serial Number : 138583644

A Program for Analyzing the Axial Capacity
and Short-term Settlement of Driven Piles
under Axial Loading.
(c) Copyright ENSOFT, Inc., 1987-2019
All Rights Reserved

=====

This program is licensed to :

Converse Consultants
Monrovia, CA

Path to file locations : N:\2014\14-81-229 Monroe
Interchange\03\Final\Report\Monroe OC\Pile Analyses\Apile\Final\
Name of input data file : Abutment 3 - I10 Monroe Strength and Extreme
Limits- Tension -460-03-18-2023.ap9d
Name of output file : Abutment 3 - I10 Monroe Strength and Extreme
Limits- Tension -460-03-18-2023.ap9o
Name of plot output file : Abutment 3 - I10 Monroe Strength and Extreme
Limits- Tension -460-03-18-2023.ap9p

Time and Date of Analysis

Date: March 20, 2023 Time: 07:39:37

1

* INPUT INFORMATION *

I10 Monroe Abutment 1 - Strength Limit - GW elev.460

DESIGNER :

JOB NUMBER :

METHOD FOR UNIT LOAD TRANSFERS :

- FHWA (Federal Highway Administration)
Unfactored Unit Side Friction and Unit Side Resistance are used.

COMPUTATION METHOD(S) FOR PILE CAPACITY :

- FHWA (Federal Highway Administration)

- USACE (U.S. Army Corps of Engineers)
Critical Depth Method for Sand:
10 to 20 Pile Diameter based on the Density
- Revised Lambda
- API RP 2A (American Petroleum Institute)

TYPE OF LOADING :

- TENSION
REDUCTION FACTOR FOR TENSION LOADING = 0.60

PILE TYPE :

H-Pile/Steel Pile

DATA FOR AXIAL STIFFNESS :

- MODULUS OF ELASTICITY = 0.290E+08 PSI
- CROSS SECTION AREA = 16.70 IN2

NONCIRCULAR PILE PROPERTIES :

- TOTAL PILE LENGTH, TL = 60.00 FT.
- BATTER ANGLE = 0.00 DEG
- PILE STICKUP LENGTH, PSL = 0.00 FT.
- ZERO FRICTION LENGTH, ZFL = 0.00 FT.
- PERIMETER OF PILE = 40.00 IN.
- TIP AREA OF PILE = 16.70 IN2
- INCREMENT OF PILE LENGTH
USED IN COMPUTATION = 1.00 FT.

SOIL INFORMATIONS :

Nq			LATERAL	EFFECTIVE	FRICTION	BEARING	Nq
FACTOR	DEPTH	SOIL	EARTH	UNIT	ANGLE	CAPACITY	FACTOR
ARMY C.	FT.	TYPE	PRESSURE	WEIGHT	DEGREES	FACTOR	FHWA
				LB/FT^3			
56.00**	0.00	SAND	0.80*	130.00	36.00	42.00**	77.60**
56.00**	26.00	SAND	0.80*	130.00	36.00	42.00**	77.60**
1.00**	26.00	CLAY	0.80*	115.00	0.00	8.00**	4.80**
1.00**	56.00	CLAY	0.80*	115.00	0.00	8.00**	4.80**
68.00**	56.00	SAND	0.80*	135.00	38.00	46.00**	110.40**
68.00**	61.00	SAND	0.80*	135.00	38.00	46.00**	110.40**
68.00**	61.00	SAND	0.80*	72.60	38.00	46.00**	110.40**

68.00**	76.00	SAND	0.80*	72.60	38.00	46.00**	110.40**
1.00**	76.00	CLAY	0.80*	52.60	0.00	8.00**	4.80**
1.00**	91.00	CLAY	0.80*	52.60	0.00	8.00**	4.80**
132.80**	91.00	SAND	0.80*	72.60	42.00	50.00**	244.00**
132.80**	101.00	SAND	0.80*	72.60	42.00	50.00**	244.00**

* VALUE ASSUMED BY THE PROGRAM

** VALUE ESTIMATED BY THE PROGRAM BASED ON FRICTION ANGLE

MAXIMUM UNIT FRICTION KSF	MAXIMUM UNIT BEARING KSF	UNDISTURB SHEAR STRENGTH KSF	REMOLDED SHEAR STRENGTH KSF	BLOW COUNT	UNIT SKIN FRICTION KSF	UNIT END BEARING KSF
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.30E+01	0.10E+08*	5.00	0.00	0.00	0.00	0.00
0.30E+01	0.10E+08*	5.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.30E+01	0.10E+08*	6.00	0.00	0.00	0.00	0.00
0.30E+01	0.10E+08*	6.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00
0.10E+08*	0.10E+08*	0.00	0.00	0.00	0.00	0.00

* MAXIMUM UNIT FRICTION AND/OR MAXIMUM UNIT BEARING WERE SET TO BE 0.10E+08 BECAUSE THE USER DOES NOT PLAN TO LIMIT THE COMPUTED DATA.

DEPTH FT.	LRFD FACTOR ON UNIT FRICTION	LRFD FACTOR ON UNIT BEARING
0.00	1.000	1.000
26.00	1.000	1.000
26.00	1.000	1.000
56.00	1.000	1.000
56.00	1.000	1.000
61.00	1.000	1.000
61.00	1.000	1.000
76.00	1.000	1.000
76.00	1.000	1.000
91.00	1.000	1.000
91.00	1.000	1.000
101.00	1.000	1.000

 * FED. HWY. METHOD *

PILE PENETRATION FT.	SKIN FRICTION KIP	SELF WEIGHT KIP	ULTIMATE CAPACITY KIP
0.00	0.0	0.0	0.0
1.00	0.1	0.1	0.1
2.00	0.3	0.1	0.4
3.00	0.6	0.2	0.8
4.00	1.1	0.2	1.3
5.00	1.7	0.3	2.0
6.00	2.4	0.3	2.7
7.00	3.3	0.4	3.7
8.00	4.3	0.5	4.7
9.00	5.4	0.5	5.9
10.00	6.7	0.6	7.2
11.00	8.1	0.6	8.7
12.00	9.6	0.7	10.3
13.00	11.3	0.7	12.0
14.00	13.1	0.8	13.9
15.00	15.0	0.9	15.9
16.00	17.1	0.9	18.0
17.00	19.3	1.0	20.2
18.00	21.6	1.0	22.6
19.00	24.1	1.1	25.1
20.00	26.7	1.1	27.8
21.00	29.4	1.2	30.6
22.00	32.3	1.3	33.5
23.00	35.3	1.3	36.6
24.00	38.4	1.4	39.8
25.00	41.7	1.4	43.1
26.00	45.1	1.5	46.6
27.00	49.8	1.5	51.4
28.00	55.9	1.6	57.5
29.00	61.9	1.6	63.6
30.00	68.0	1.7	69.7
31.00	74.0	1.8	75.8
32.00	80.1	1.8	81.9
33.00	86.1	1.9	88.0
34.00	92.2	1.9	94.1
35.00	98.2	2.0	100.2
36.00	104.3	2.0	106.3
37.00	110.4	2.1	112.5
38.00	116.4	2.2	118.6
39.00	122.5	2.2	124.7
40.00	128.5	2.3	130.8
41.00	134.6	2.3	136.9
42.00	140.6	2.4	143.0
43.00	146.7	2.4	149.1
44.00	152.7	2.5	155.2
45.00	158.8	2.6	161.3
46.00	164.8	2.6	167.4
47.00	170.9	2.7	173.5
48.00	176.9	2.7	179.7
49.00	183.0	2.8	185.8

50.00	189.0	2.8	191.9
51.00	195.1	2.9	198.0
52.00	201.1	3.0	204.1
53.00	207.2	3.0	210.2
54.00	213.2	3.1	216.3
55.00	219.3	3.1	222.4
56.00	225.3	3.2	228.5
57.00	232.7	3.2	236.0
58.00	241.5	3.3	244.8
59.00	250.5	3.4	253.8
60.00	259.6	3.4	263.0

 * ARMY CORPS METHOD *

PILE PENETRATION FT.	SKIN FRICTION KIP	SELF WEIGHT KIP	ULTIMATE CAPACITY KIP
0.00	0.0	0.0	0.0
1.00	0.0	0.1	0.1
2.00	0.2	0.1	0.3
3.00	0.4	0.2	0.6
4.00	0.8	0.2	1.0
5.00	1.2	0.3	1.5
6.00	1.7	0.3	2.1
7.00	2.3	0.4	2.7
8.00	3.1	0.5	3.5
9.00	3.9	0.5	4.4
10.00	4.8	0.6	5.3
11.00	5.8	0.6	6.4
12.00	6.9	0.7	7.6
13.00	8.1	0.7	8.8
14.00	9.4	0.8	10.2
15.00	10.8	0.9	11.6
16.00	12.2	0.9	13.1
17.00	13.8	1.0	14.8
18.00	15.5	1.0	16.5
19.00	17.3	1.1	18.3
20.00	19.1	1.1	20.3
21.00	21.1	1.2	22.3
22.00	23.1	1.3	24.3
23.00	25.1	1.3	26.4
24.00	27.2	1.4	28.5
25.00	29.2	1.4	30.6
26.00	31.2	1.5	32.7
27.00	34.7	1.5	36.3
28.00	39.7	1.6	41.3
29.00	44.7	1.6	46.4
30.00	49.7	1.7	51.4
31.00	54.7	1.8	56.5
32.00	59.7	1.8	61.5
33.00	64.7	1.9	66.6
34.00	69.7	1.9	71.7
35.00	74.7	2.0	76.7
36.00	79.7	2.0	81.8
37.00	84.7	2.1	86.8
38.00	89.7	2.2	91.9
39.00	94.7	2.2	96.9

40.00	99.7	2.3	102.0
41.00	104.7	2.3	107.1
42.00	109.7	2.4	112.1
43.00	114.7	2.4	117.2
44.00	119.7	2.5	122.2
45.00	124.7	2.6	127.3
46.00	129.7	2.6	132.3
47.00	134.7	2.7	137.4
48.00	139.7	2.7	142.5
49.00	144.7	2.8	147.5
50.00	149.7	2.8	152.6
51.00	154.7	2.9	157.6
52.00	159.7	3.0	162.7
53.00	164.7	3.0	167.7
54.00	169.7	3.1	172.8
55.00	174.7	3.1	177.9
56.00	179.7	3.2	182.9
57.00	183.3	3.2	186.5
58.00	185.5	3.3	188.8
59.00	187.7	3.4	191.0
60.00	189.8	3.4	193.2

* LAMBDA 2 METHOD *

PILE PENETRATION FT.	SKIN FRICTION KIP	SELF WEIGHT KIP	ULTIMATE CAPACITY KIP
0.00	0.0	0.0	0.0
1.00	0.1	0.1	0.2
2.00	0.4	0.1	0.5
3.00	0.8	0.2	0.9
4.00	1.2	0.2	1.5
5.00	1.8	0.3	2.0
6.00	2.4	0.3	2.7
7.00	3.0	0.4	3.4
8.00	3.7	0.5	4.1
9.00	4.4	0.5	4.9
10.00	5.2	0.6	5.7
11.00	5.9	0.6	6.6
12.00	6.7	0.7	7.4
13.00	7.5	0.7	8.3
14.00	8.4	0.8	9.1
15.00	9.2	0.9	10.0
16.00	10.1	0.9	11.0
17.00	11.4	1.0	12.3
18.00	12.8	1.0	13.8
19.00	14.2	1.1	15.3
20.00	15.7	1.1	16.9
21.00	17.4	1.2	18.5
22.00	19.0	1.3	20.3
23.00	20.8	1.3	22.1
24.00	22.7	1.4	24.0
25.00	24.6	1.4	26.0
26.00	20.8	1.5	22.2
27.00	18.5	1.5	20.0
28.00	31.1	1.6	32.7
29.00	24.6	1.6	26.3

30.00	34.8	1.7	36.5
31.00	40.9	1.8	42.6
32.00	44.5	1.8	46.3
33.00	46.7	1.9	48.6
34.00	48.0	1.9	50.0
35.00	48.8	2.0	50.8
36.00	49.3	2.0	51.3
37.00	49.6	2.1	51.7
38.00	49.7	2.2	51.9
39.00	49.8	2.2	52.1
40.00	49.9	2.3	52.2
41.00	49.9	2.3	52.3
42.00	50.0	2.4	52.4
43.00	50.0	2.4	52.4
44.00	50.0	2.5	52.5
45.00	50.0	2.6	52.5
46.00	50.0	2.6	52.6
47.00	50.0	2.7	52.7
48.00	50.0	2.7	52.7
49.00	50.0	2.8	52.8
50.00	50.0	2.8	52.8
51.00	50.0	2.9	52.9
52.00	50.0	3.0	53.0
53.00	50.0	3.0	53.0
54.00	50.0	3.1	53.1
55.00	50.0	3.1	53.1
56.00	153.5	3.2	156.7
57.00	157.8	3.2	161.1
58.00	162.3	3.3	165.6
59.00	166.8	3.4	170.1
60.00	171.4	3.4	174.8

* API RP-2A (2010) *

PILE PENETRATION FT.	SKIN FRICTION KIP	SELF WEIGHT KIP	ULTIMATE CAPACITY KIP
0.00	0.0	0.0	0.0
1.00	0.1	0.1	0.1
2.00	0.2	0.1	0.4
3.00	0.6	0.2	0.7
4.00	1.0	0.2	1.2
5.00	1.6	0.3	1.8
6.00	2.2	0.3	2.6
7.00	3.1	0.4	3.5
8.00	4.0	0.5	4.5
9.00	5.1	0.5	5.6
10.00	6.2	0.6	6.8
11.00	7.6	0.6	8.2
12.00	9.0	0.7	9.7
13.00	10.6	0.7	11.3
14.00	12.2	0.8	13.0
15.00	14.1	0.9	14.9
16.00	16.0	0.9	16.9
17.00	18.1	1.0	19.0
18.00	20.2	1.0	21.3
19.00	22.6	1.1	23.6

20.00	25.0	1.1	26.1
21.00	27.6	1.2	28.8
22.00	30.2	1.3	31.5
23.00	33.1	1.3	34.4
24.00	36.0	1.4	37.4
25.00	39.1	1.4	40.5
26.00	42.2	1.5	43.7
27.00	46.2	1.5	47.7
28.00	50.7	1.6	52.3
29.00	55.4	1.6	57.0
30.00	60.0	1.7	61.7
31.00	64.7	1.8	66.5
32.00	69.5	1.8	71.3
33.00	74.2	1.9	76.1
34.00	79.0	1.9	81.0
35.00	83.9	2.0	85.8
36.00	88.7	2.0	90.8
37.00	93.6	2.1	95.7
38.00	98.5	2.2	100.7
39.00	103.5	2.2	105.7
40.00	108.5	2.3	110.7
41.00	113.5	2.3	115.8
42.00	118.6	2.4	121.0
43.00	123.7	2.4	126.2
44.00	128.9	2.5	131.4
45.00	134.2	2.6	136.7
46.00	139.5	2.6	142.1
47.00	144.8	2.7	147.5
48.00	150.2	2.7	153.0
49.00	155.7	2.8	158.5
50.00	161.2	2.8	164.0
51.00	166.8	2.9	169.7
52.00	172.4	3.0	175.3
53.00	178.1	3.0	181.1
54.00	183.8	3.1	186.8
55.00	189.5	3.1	192.7
56.00	195.4	3.2	198.5
57.00	200.5	3.2	203.8
58.00	205.0	3.3	208.3
59.00	209.5	3.4	212.8
60.00	214.0	3.4	217.4

NOTES:

- AN ASTERISK IS PLACED IN THE END-BEARING COLUMN IF THE TIP RESISTANCE IS CONTROLLED BY THE FRICTION OF SOIL PLUG INSIDE AN OPEN-ENDED PIPE PILE.
- A NEGATIVE SELF-WEIGHT VALUE IS DUE TO THE BOUYANCY EFFECT.

```

*****
*   COMPUTE LOAD-DISTRIBUTION AND LOAD-SETTLEMENT   *
*   CURVES FOR AXIAL LOADING                         *
*****

```

T-Z CURVE NO. OF DEPTH TO CURVE LOAD TRANSFER PILE MOVEMENT

NO.	POINTS	FT.	PSI	IN.
1	10	0.4167E-01	0.0000E+00	0.0000E+00
			0.3473E-02	0.2037E-01
			0.5788E-02	0.3947E-01
			0.8682E-02	0.7257E-01
			0.1042E-01	0.1019E+00
			0.1158E-01	0.1273E+00
			0.1158E-01	0.2546E+00
			0.1158E-01	0.3820E+00
			0.1158E-01	0.6366E+00
			0.1158E-01	0.2546E+01
2	10	0.1300E+02	0.0000E+00	0.0000E+00
			0.1083E+01	0.2037E-01
			0.1806E+01	0.3947E-01
			0.2709E+01	0.7257E-01
			0.3250E+01	0.1019E+00
			0.3612E+01	0.1273E+00
			0.3612E+01	0.2546E+00
			0.3612E+01	0.3820E+00
			0.3612E+01	0.6366E+00
			0.3612E+01	0.2546E+01
3	10	0.2596E+02	0.0000E+00	0.0000E+00
			0.2163E+01	0.2037E-01
			0.3606E+01	0.3947E-01
			0.5409E+01	0.7257E-01
			0.6490E+01	0.1019E+00
			0.7212E+01	0.1273E+00
			0.7212E+01	0.2546E+00
			0.7212E+01	0.3820E+00
			0.7212E+01	0.6366E+00
			0.7212E+01	0.2546E+01
4	10	0.2604E+02	0.0000E+00	0.0000E+00
			0.2234E+01	0.2037E-01
			0.3724E+01	0.3947E-01
			0.5586E+01	0.7257E-01
			0.6703E+01	0.1019E+00
			0.7448E+01	0.1273E+00
			0.6703E+01	0.2546E+00
			0.6703E+01	0.3820E+00
			0.6703E+01	0.6366E+00
			0.6703E+01	0.2546E+01
5	10	0.4100E+02	0.0000E+00	0.0000E+00
			0.3782E+01	0.2037E-01
			0.6304E+01	0.3947E-01
			0.9456E+01	0.7257E-01
			0.1135E+02	0.1019E+00
			0.1261E+02	0.1273E+00
			0.1135E+02	0.2546E+00
			0.1135E+02	0.3820E+00
			0.1135E+02	0.6366E+00
			0.1135E+02	0.2546E+01
6	10	0.5596E+02	0.0000E+00	0.0000E+00
			0.3782E+01	0.2037E-01
			0.6304E+01	0.3947E-01

7	10	0.5604E+02	0.9456E+01	0.7257E-01
			0.1135E+02	0.1019E+00
			0.1261E+02	0.1273E+00
			0.1135E+02	0.2546E+00
			0.1135E+02	0.3820E+00
			0.1135E+02	0.6366E+00
			0.1135E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.3852E+01	0.2037E-01
			0.6419E+01	0.3947E-01
8	10	0.5850E+02	0.9629E+01	0.7257E-01
			0.1155E+02	0.1019E+00
			0.1284E+02	0.1273E+00
			0.1284E+02	0.2546E+00
			0.1284E+02	0.3820E+00
			0.1284E+02	0.6366E+00
			0.1284E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.5598E+01	0.2037E-01
			0.9330E+01	0.3947E-01
9	10	0.6096E+02	0.1400E+02	0.7257E-01
			0.1679E+02	0.1019E+00
			0.1866E+02	0.1273E+00
			0.1866E+02	0.2546E+00
			0.1866E+02	0.3820E+00
			0.1866E+02	0.6366E+00
			0.1866E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.5756E+01	0.2037E-01
			0.9594E+01	0.3947E-01
10	10	0.6104E+02	0.1439E+02	0.7257E-01
			0.1727E+02	0.1019E+00
			0.1919E+02	0.1273E+00
			0.1919E+02	0.2546E+00
			0.1919E+02	0.3820E+00
			0.1919E+02	0.6366E+00
			0.1919E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.5756E+01	0.2037E-01
			0.9594E+01	0.3947E-01
11	10	0.6850E+02	0.1439E+02	0.7257E-01
			0.1727E+02	0.1019E+00
			0.1919E+02	0.1273E+00
			0.1919E+02	0.2546E+00
			0.1919E+02	0.3820E+00
			0.1919E+02	0.6366E+00
			0.1919E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.5756E+01	0.2037E-01
			0.9594E+01	0.3947E-01

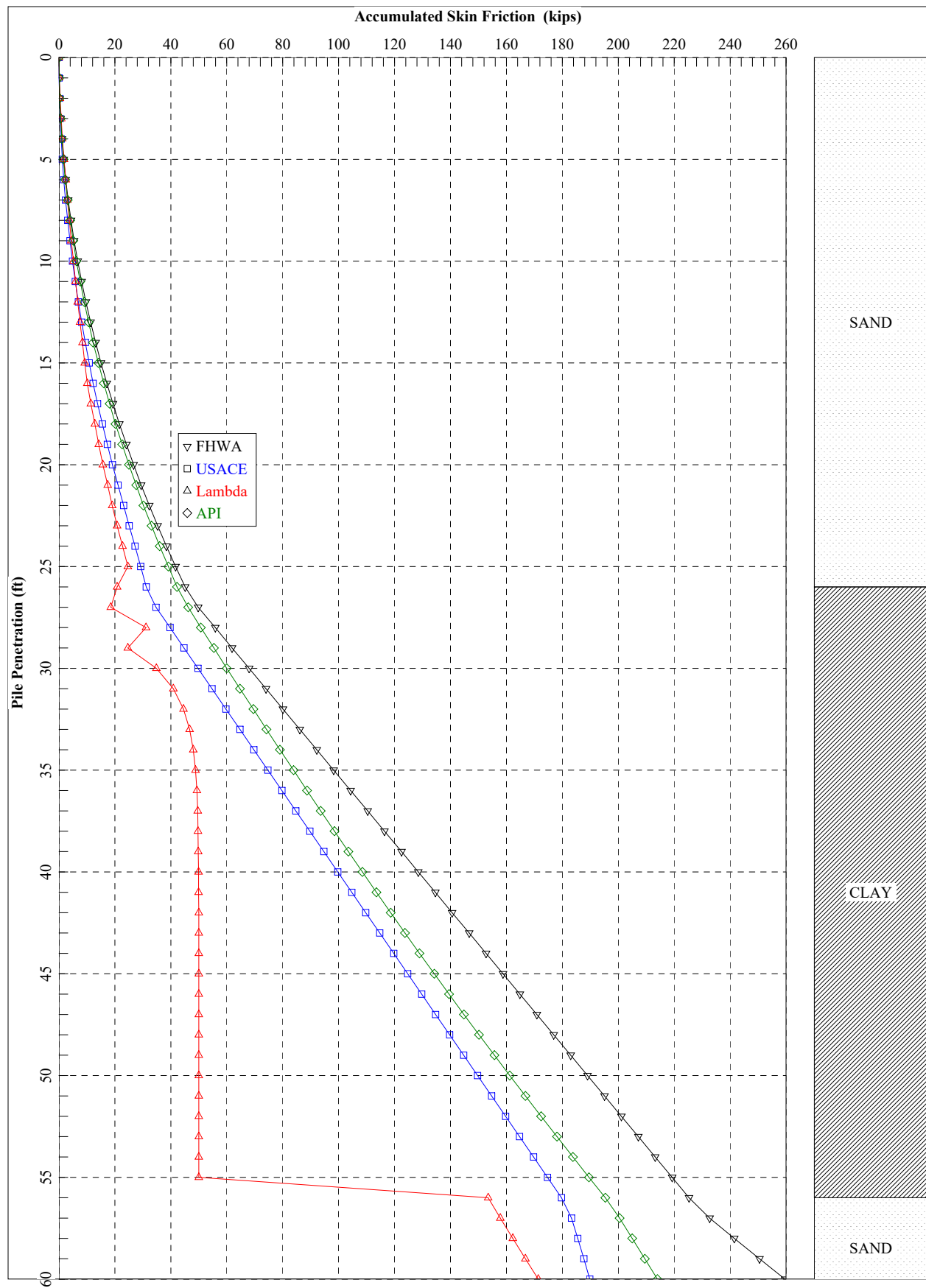
12	10	0.7596E+02	0.1919E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.5756E+01	0.2037E-01
			0.9594E+01	0.3947E-01
			0.1439E+02	0.7257E-01
			0.1727E+02	0.1019E+00
			0.1919E+02	0.1273E+00
			0.1919E+02	0.2546E+00
			0.1919E+02	0.3820E+00
			0.1919E+02	0.6366E+00
13	10	0.7604E+02	0.1919E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.5756E+01	0.2037E-01
			0.9594E+01	0.3947E-01
			0.1439E+02	0.7257E-01
			0.1727E+02	0.1019E+00
			0.1919E+02	0.1273E+00
			0.1727E+02	0.2546E+00
			0.1727E+02	0.3820E+00
			0.1727E+02	0.6366E+00
14	10	0.8350E+02	0.1727E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.5756E+01	0.2037E-01
			0.9594E+01	0.3947E-01
			0.1439E+02	0.7257E-01
			0.1727E+02	0.1019E+00
			0.1919E+02	0.1273E+00
			0.1727E+02	0.2546E+00
			0.1727E+02	0.3820E+00
			0.1727E+02	0.6366E+00
15	10	0.9096E+02	0.1727E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.5756E+01	0.2037E-01
			0.9594E+01	0.3947E-01
			0.1439E+02	0.7257E-01
			0.1727E+02	0.1019E+00
			0.1919E+02	0.1273E+00
			0.1727E+02	0.2546E+00
			0.1727E+02	0.3820E+00
			0.1727E+02	0.6366E+00
16	10	0.9104E+02	0.1727E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.5756E+01	0.2037E-01
			0.9594E+01	0.3947E-01
			0.1439E+02	0.7257E-01
			0.1727E+02	0.1019E+00
			0.1919E+02	0.1273E+00
			0.1919E+02	0.2546E+00
			0.1919E+02	0.3820E+00
			0.1919E+02	0.6366E+00
17	10	0.9600E+02	0.1919E+02	0.2546E+01
			0.0000E+00	0.0000E+00
			0.5756E+01	0.2037E-01
			0.9594E+01	0.3947E-01
			0.1439E+02	0.7257E-01

			0.1727E+02	0.1019E+00
			0.1919E+02	0.1273E+00
			0.1919E+02	0.2546E+00
			0.1919E+02	0.3820E+00
			0.1919E+02	0.6366E+00
			0.1919E+02	0.2546E+01
18	10	0.1010E+03	0.0000E+00	0.0000E+00
			0.5756E+01	0.2037E-01
			0.9594E+01	0.3947E-01
			0.1439E+02	0.7257E-01
			0.1727E+02	0.1019E+00
			0.1919E+02	0.1273E+00
			0.1919E+02	0.2546E+00
			0.1919E+02	0.3820E+00
			0.1919E+02	0.6366E+00
			0.1919E+02	0.2546E+01

TIP LOAD KIP	TIP MOVEMENT IN.
0.0000E+00	0.0000E+00
0.2136E+00	0.6366E-02
0.4271E+00	0.1273E-01
0.8542E+00	0.2546E-01
0.1708E+01	0.1655E+00
0.2563E+01	0.5348E+00
0.3075E+01	0.9295E+00
0.3417E+01	0.1273E+01
0.3417E+01	0.1910E+01
0.3417E+01	0.2546E+01

LOAD VERSUS SETTLEMENT CURVE *****

TOP LOAD KIP	TOP MOVEMENT IN.	TIP LOAD KIP	TIP MOVEMENT IN.
0.7381E+00	0.6865E-03	0.3354E-02	0.1000E-03
0.7381E+01	0.6865E-02	0.3354E-01	0.1000E-02
0.3724E+02	0.3467E-01	0.1677E+00	0.5000E-02
0.7029E+02	0.6773E-01	0.3354E+00	0.1000E-01
0.1201E+03	0.1230E+00	0.6709E+00	0.2000E-01
0.1981E+03	0.2302E+00	0.1004E+01	0.5000E-01
0.2372E+03	0.3043E+00	0.1187E+01	0.8000E-01
0.2501E+03	0.3408E+00	0.1309E+01	0.1000E+00
0.2466E+03	0.4402E+00	0.1788E+01	0.2000E+00
0.2439E+03	0.7371E+00	0.2482E+01	0.5000E+00
0.2443E+03	0.1038E+01	0.2907E+01	0.8000E+00
0.2445E+03	0.1238E+01	0.3145E+01	0.1000E+01
0.2448E+03	0.2239E+01	0.3417E+01	0.2000E+01



=====

SHAFT for Windows, Version 2017.8.11

Serial Number : 138585132

VERTICALLY LOADED DRILLED SHAFT ANALYSIS
(c) Copyright ENSOFT, Inc., 1987-2017
All Rights Reserved

=====

Path to file locations : N:\2014\14-81-229 Monroe
Interchange\03\Final\Report\Monroe OC\Pile Analyses\Shaft\Final\
Name of input data file : Bent2 Service Limit - GW 470 -03-18-2023.sf8d
Name of output file : Bent2 Service Limit - GW 470 -03-18-2023.sf8o
Name of plot output file : Bent2 Service Limit - GW 470 -03-18-2023.sf8p
Name of runtime file : Bent2 Service Limit - GW 470 -03-18-2023.sf8r

Time and Date of Analysis

Date: March 20, 2023 Time: 10:49:17

I-10 Monroe - Bent 2- Service Limit - GW 470 - 03/18/2023

PROPOSED DEPTH = 35.0 FT

NUMBER OF LAYERS = 6

WATER TABLE DEPTH = 33.0 FT.

SOIL INFORMATION

LAYER NO 1----SAND

AT THE TOP

SIDE FRICTION PROCEDURE, BETA METHOD	
SKIN FRICTION COEFFICIENT- BETA	= 0.120E+01 (*)
INTERNAL FRICTION ANGLE, DEG.	= 0.360E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.130E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.000E+00

AT THE BOTTOM

SIDE FRICTION PROCEDURE, BETA METHOD	
SKIN FRICTION COEFFICIENT- BETA	= 0.101E+01 (*)
INTERNAL FRICTION ANGLE, DEG.	= 0.360E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.130E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.130E+02
LRFD RESISTANCE FACTOR (SIDE FRICTION)	= 0.100E+01
LRFD RESISTANCE FACTOR (TIP RESISTANCE)	= 0.100E+01

LAYER NO 2----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA	= 0.450E+00
END BEARING COEFFICIENT-Nc	= 0.900E+01 (*)
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.500E+04
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.118E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.130E+02

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA	= 0.450E+00
END BEARING COEFFICIENT-Nc	= 0.900E+01 (*)
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.500E+04
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.118E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.230E+02

LRFD RESISTANCE FACTOR (SIDE FRICTION)	= 0.100E+01
LRFD RESISTANCE FACTOR (TIP RESISTANCE)	= 0.100E+01

LAYER NO 3----SAND

AT THE TOP

SIDE FRICTION PROCEDURE, BETA METHOD	
SKIN FRICTION COEFFICIENT- BETA	= 0.853E+00 (*)
INTERNAL FRICTION ANGLE, DEG.	= 0.370E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.130E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.230E+02

AT THE BOTTOM

SIDE FRICTION PROCEDURE, BETA METHOD	
SKIN FRICTION COEFFICIENT- BETA	= 0.724E+00 (*)
INTERNAL FRICTION ANGLE, DEG.	= 0.370E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.130E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.330E+02

LRFD RESISTANCE FACTOR (SIDE FRICTION)	= 0.100E+01
LRFD RESISTANCE FACTOR (TIP RESISTANCE)	= 0.100E+01

LAYER NO 4----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA	= 0.500E+00	
END BEARING COEFFICIENT-Nc	= 0.900E+01	(*)
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.500E+04	
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00	
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03	
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11	
DEPTH, FT	= 0.330E+02	

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA	= 0.500E+00	
END BEARING COEFFICIENT-Nc	= 0.900E+01	(*)
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.500E+04	
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00	
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03	
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11	
DEPTH, FT	= 0.430E+02	

LRFD RESISTANCE FACTOR (SIDE FRICTION)	= 0.100E+01
LRFD RESISTANCE FACTOR (TIP RESISTANCE)	= 0.100E+01

LAYER NO 5----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA	= 0.500E+00	
END BEARING COEFFICIENT-Nc	= 0.900E+01	(*)
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.500E+04	
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00	
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03	
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11	
DEPTH, FT	= 0.430E+02	

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA	= 0.500E+00	
END BEARING COEFFICIENT-Nc	= 0.900E+01	(*)
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.500E+04	
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00	
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03	
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11	
DEPTH, FT	= 0.630E+02	

LRFD RESISTANCE FACTOR (SIDE FRICTION)	= 0.100E+01
LRFD RESISTANCE FACTOR (TIP RESISTANCE)	= 0.100E+01

LAYER NO 6----SAND

AT THE TOP

SIDE FRICTION PROCEDURE, BETA METHOD	
SKIN FRICTION COEFFICIENT- BETA	= 0.428E+00 (*)
INTERNAL FRICTION ANGLE, DEG.	= 0.420E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.135E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.630E+02

AT THE BOTTOM

SIDE FRICTION PROCEDURE, BETA METHOD	
SKIN FRICTION COEFFICIENT- BETA	= 0.250E+00 (*)
INTERNAL FRICTION ANGLE, DEG.	= 0.420E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.135E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.113E+03
LRFD RESISTANCE FACTOR (SIDE FRICTION)	= 0.100E+01
LRFD RESISTANCE FACTOR (TIP RESISTANCE)	= 0.100E+01

(*) ESTIMATED BY THE PROGRAM BASED ON OTHER PARAMETERS

INPUT DRILLED SHAFT INFORMATION

MINIMUM SHAFT DIAMETER	=	3.000	FT.
MAXIMUM SHAFT DIAMETER	=	3.000	FT.
RATIO BASE/SHAFT DIAMETER	=	0.000	FT.
ANGLE OF BELL	=	0.000	DEG.
IGNORED TOP PORTION	=	0.000	FT.
IGNORED BOTTOM PORTION	=	5.000	FT.
ELASTIC MODULUS, Ec	=	0.300E+07	LB/SQ IN

COMPUTATION RESULTS

- CASE ANALYZED	:	1
VARIATION LENGTH	:	1
VARIATION DIAMETER	:	1

DRILLED SHAFT INFORMATION

DIAMETER OF STEM = 3.000 FT.
 DIAMETER OF BASE = 3.000 FT.
 END OF STEM TO BASE = 0.000 FT.
 ANGLE OF BELL = 0.000 DEG.
 IGNORED TOP PORTION = 0.000 FT.
 IGNORED BOTTOM PORTION = 5.000 FT.
 AREA OF ONE PERCENT STEEL = 10.180 SQ.IN.
 ELASTIC MODULUS, E_c = 0.300E+07 LB/SQ IN
 VOLUME OF UNDERREAM = 0.000 CU.YDS.
 SHAFT LENGTH = 35.000 FT.

PREDICTED RESULTS

QS = ULTIMATE SIDE RESISTANCE;
 QB = ULTIMATE BASE RESISTANCE;
 WT = WEIGHT OF DRILLED SHAFT (UPLIFT CAPACITY ONLY);
 QU = TOTAL ULTIMATE RESISTANCE;
 LRFD QS = TOTAL SIDE FRICTION USING LRFD RESISTANCE FACTOR
 TO THE ULTIMATE SIDE RESISTANCE;
 LRFD QB = TOTAL BASE BEARING USING LRFD RESISTANCE FACTOR
 TO THE ULTIMATE BASE RESISTANCE
 LRFD QU = TOTAL CAPACITY WITH LRFD RESISTANCE FACTOR.

LENGTH (FT)	VOLUME (CU.YDS)	QS (TONS)	QB (TONS)	QU (TONS)	LRFD QS (TONS)	LRFD QB (TONS)	LRFD QU (TONS)
6.0	1.57	0.37	0.00	0.37	0.37	0.00	0.37
7.0	1.83	1.47	0.00	1.47	1.47	0.00	1.47
8.0	2.09	3.31	0.00	3.31	3.31	0.00	3.31
9.0	2.36	5.88	0.00	5.88	5.88	0.00	5.88
10.0	2.62	9.19	0.00	9.19	9.19	0.00	9.19
11.0	2.88	13.13	0.00	13.13	13.13	0.00	13.13
12.0	3.14	17.68	0.00	17.68	17.68	0.00	17.68
13.0	3.40	22.81	0.00	22.81	22.81	0.00	22.81
14.0	3.67	28.52	0.00	28.52	28.52	0.00	28.52
15.0	3.93	34.76	0.00	34.76	34.76	0.00	34.76
16.0	4.19	41.53	0.00	41.53	41.53	0.00	41.53
17.0	4.45	48.81	0.00	48.81	48.81	0.00	48.81
18.0	4.71	56.57	0.00	56.57	56.57	0.00	56.57
19.0	4.97	67.17	0.00	67.17	67.17	0.00	67.17
20.0	5.24	77.78	0.00	77.78	77.78	0.00	77.78
21.0	5.50	88.38	0.00	88.38	88.38	0.00	88.38
22.0	5.76	98.98	0.00	98.98	98.98	0.00	98.98
23.0	6.02	109.59	0.00	109.59	109.59	0.00	109.59
24.0	6.28	120.19	0.00	120.19	120.19	0.00	120.19
25.0	6.55	130.80	0.00	130.80	130.80	0.00	130.80
26.0	6.81	141.40	0.00	141.40	141.40	0.00	141.40
27.0	7.07	152.01	0.00	152.01	152.01	0.00	152.01
28.0	7.33	162.61	0.00	162.61	162.61	0.00	162.61
29.0	7.59	174.21	0.00	174.21	174.21	0.00	174.21
30.0	7.85	186.13	0.00	186.13	186.13	0.00	186.13
31.0	8.12	198.35	0.00	198.35	198.35	0.00	198.35
32.0	8.38	210.86	0.00	210.86	210.86	0.00	210.86
33.0	8.64	223.66	0.00	223.66	223.66	0.00	223.66
34.0	8.90	236.72	0.00	236.72	236.72	0.00	236.72
35.0	9.16	250.03	0.00	250.03	250.03	0.00	250.03

AXIAL LOAD VS SETTLEMENT CURVES

RESULT FROM TREND (AVERAGED) LINE

TOP LOAD TON	TOP MOVEMENT IN.	TIP LOAD TON	TIP MOVEMENT IN.
0.2989E-01	0.1541E-04	0.3437E-10	0.1000E-04
0.1494E+00	0.7705E-04	0.1718E-09	0.5000E-04
0.2989E+00	0.1541E-03	0.3437E-09	0.1000E-03
0.1503E+02	0.7718E-02	0.1718E-07	0.5000E-02
0.2255E+02	0.1158E-01	0.2577E-07	0.7500E-02
0.3007E+02	0.1544E-01	0.3437E-07	0.1000E-01
0.7517E+02	0.3859E-01	0.8591E-07	0.2500E-01
0.1267E+03	0.7324E-01	0.1718E-06	0.5000E-01
0.1636E+03	0.1052E+00	0.2577E-06	0.7500E-01
0.1897E+03	0.1352E+00	0.3437E-06	0.1000E+00
0.2277E+03	0.2928E+00	0.8523E-06	0.2500E+00
0.2279E+03	0.5430E+00	0.1604E-05	0.5000E+00
0.2236E+03	0.6672E+00	0.1844E-05	0.6250E+00
0.2195E+03	0.9415E+00	0.2262E-05	0.9000E+00
0.2191E+03	0.1841E+01	0.3588E-05	0.1800E+01

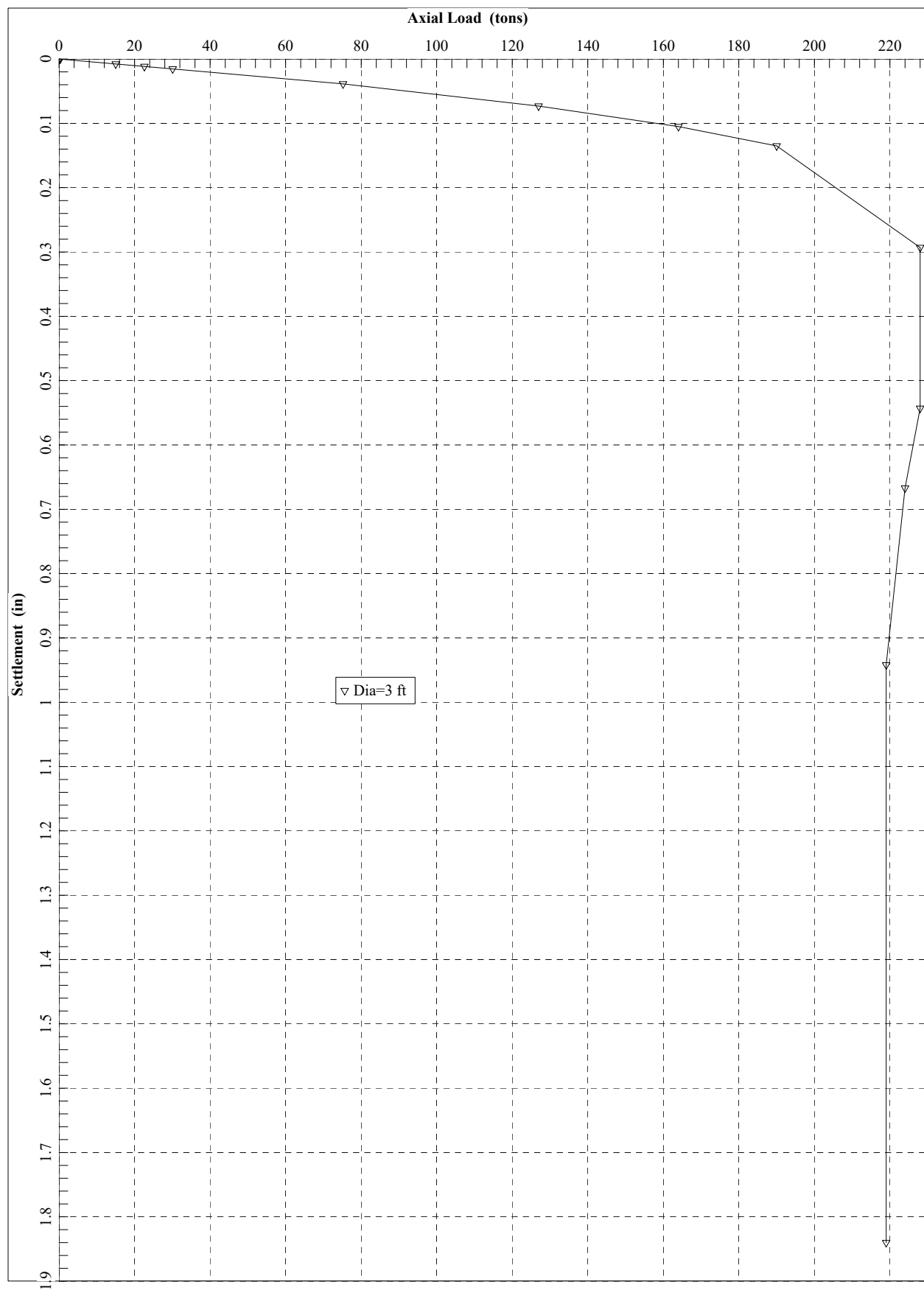
RESULT FROM UPPER-BOUND LINE

TOP LOAD TON	TOP MOVEMENT IN.	TIP LOAD TON	TIP MOVEMENT IN.
0.4319E-01	0.1773E-04	0.4909E-10	0.1000E-04
0.2160E+00	0.8865E-04	0.2455E-09	0.5000E-04
0.4319E+00	0.1773E-03	0.4909E-09	0.1000E-03
0.2178E+02	0.8892E-02	0.2455E-07	0.5000E-02
0.3267E+02	0.1334E-01	0.3682E-07	0.7500E-02
0.4356E+02	0.1779E-01	0.4909E-07	0.1000E-01
0.1088E+03	0.4446E-01	0.1227E-06	0.2500E-01
0.1713E+03	0.8133E-01	0.2455E-06	0.5000E-01
0.2067E+03	0.1134E+00	0.3682E-06	0.7500E-01
0.2229E+03	0.1417E+00	0.4909E-06	0.1000E+00
0.2443E+03	0.2959E+00	0.1200E-05	0.2500E+00
0.2400E+03	0.5452E+00	0.2219E-05	0.5000E+00
0.2364E+03	0.6696E+00	0.2443E-05	0.6250E+00
0.2340E+03	0.9442E+00	0.2686E-05	0.9000E+00
0.2340E+03	0.1844E+01	0.3818E-05	0.1800E+01

RESULT FROM LOWER-BOUND LINE

TOP LOAD TON	TOP MOVEMENT IN.	TIP LOAD TON	TIP MOVEMENT IN.
0.1767E-01	0.1324E-04	0.1964E-10	0.1000E-04
0.8836E-01	0.6622E-04	0.9819E-10	0.5000E-04
0.1767E+00	0.1324E-03	0.1964E-09	0.1000E-03
0.8867E+01	0.6626E-02	0.9819E-08	0.5000E-02
0.1330E+02	0.9940E-02	0.1473E-07	0.7500E-02
0.1774E+02	0.1325E-01	0.1964E-07	0.1000E-01
0.4435E+02	0.3313E-01	0.4909E-07	0.2500E-01
0.8299E+02	0.6527E-01	0.9819E-07	0.5000E-01
0.1163E+03	0.9647E-01	0.1473E-06	0.7500E-01
0.1433E+03	0.1265E+00	0.1964E-06	0.1000E+00

0.2111E+03	0.2896E+00	0.5047E-06	0.2500E+00
0.2136E+03	0.5404E+00	0.9897E-06	0.5000E+00
0.2084E+03	0.6645E+00	0.1244E-05	0.6250E+00
0.2050E+03	0.9389E+00	0.1838E-05	0.9000E+00
0.2042E+03	0.1839E+01	0.3358E-05	0.1800E+01



=====

SHAFT for Windows, Version 2017.8.11

Serial Number : 138585132

VERTICALLY LOADED DRILLED SHAFT ANALYSIS
(c) Copyright ENSOFT, Inc., 1987-2017
All Rights Reserved

=====

Path to file locations : N:\2014\14-81-229 Monroe
Interchange\03\Final\Report\Monroe OC\Pile Analyses\Shaft\Final\
Name of input data file : Bent2 Strength and Extreme Limits - GW 460
-03-18-2023.sf8d
Name of output file : Bent2 Strength and Extreme Limits - GW 460
-03-18-2023.sf8o
Name of plot output file : Bent2 Strength and Extreme Limits - GW 460
-03-18-2023.sf8p
Name of runtime file : Bent2 Strength and Extreme Limits - GW 460
-03-18-2023.sf8r

Time and Date of Analysis

Date: March 20, 2023 Time: 10:32:25

I-10 Monroe - Bent 2- Strength and Extreme Limits - GW 460 - 03/18/2023

PROPOSED DEPTH = 90.0 FT

NUMBER OF LAYERS = 6

WATER TABLE DEPTH = 43.0 FT.

SOIL INFORMATION

LAYER NO 1----SAND

AT THE TOP

SIDE FRICTION PROCEDURE, BETA METHOD	
SKIN FRICTION COEFFICIENT- BETA	= 0.120E+01 (*)
INTERNAL FRICTION ANGLE, DEG.	= 0.360E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.130E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11

DEPTH, FT	= 0.000E+00	
AT THE BOTTOM		
SIDE FRICTION PROCEDURE, BETA METHOD		
SKIN FRICTION COEFFICIENT- BETA	= 0.101E+01	(*)
INTERNAL FRICTION ANGLE, DEG.	= 0.360E+02	
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00	
SOIL UNIT WEIGHT, LB/CU FT	= 0.130E+03	
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11	
DEPTH, FT	= 0.130E+02	
LRFD RESISTANCE FACTOR (SIDE FRICTION)	= 0.100E+01	
LRFD RESISTANCE FACTOR (TIP RESISTANCE)	= 0.100E+01	
LAYER NO 2----CLAY		
AT THE TOP		
STRENGTH REDUCTION FACTOR-ALPHA	= 0.450E+00	
END BEARING COEFFICIENT-Nc	= 0.900E+01	(*)
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.500E+04	
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00	
SOIL UNIT WEIGHT, LB/CU FT	= 0.118E+03	
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11	
DEPTH, FT	= 0.130E+02	
AT THE BOTTOM		
STRENGTH REDUCTION FACTOR-ALPHA	= 0.450E+00	
END BEARING COEFFICIENT-Nc	= 0.900E+01	(*)
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.500E+04	
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00	
SOIL UNIT WEIGHT, LB/CU FT	= 0.118E+03	
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11	
DEPTH, FT	= 0.230E+02	
LRFD RESISTANCE FACTOR (SIDE FRICTION)	= 0.100E+01	
LRFD RESISTANCE FACTOR (TIP RESISTANCE)	= 0.100E+01	
LAYER NO 3----SAND		
AT THE TOP		
SIDE FRICTION PROCEDURE, BETA METHOD		
SKIN FRICTION COEFFICIENT- BETA	= 0.853E+00	(*)
INTERNAL FRICTION ANGLE, DEG.	= 0.370E+02	
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00	
SOIL UNIT WEIGHT, LB/CU FT	= 0.130E+03	
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11	
DEPTH, FT	= 0.230E+02	
AT THE BOTTOM		
SIDE FRICTION PROCEDURE, BETA METHOD		
SKIN FRICTION COEFFICIENT- BETA	= 0.724E+00	(*)
INTERNAL FRICTION ANGLE, DEG.	= 0.370E+02	

BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.130E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.330E+02
LRFD RESISTANCE FACTOR (SIDE FRICTION)	= 0.100E+01
LRFD RESISTANCE FACTOR (TIP RESISTANCE)	= 0.100E+01

LAYER NO 4----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA	= 0.500E+00	
END BEARING COEFFICIENT-Nc	= 0.900E+01	(*)
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.500E+04	
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00	
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03	
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11	
DEPTH, FT	= 0.330E+02	

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA	= 0.500E+00	
END BEARING COEFFICIENT-Nc	= 0.900E+01	(*)
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.500E+04	
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00	
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03	
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11	
DEPTH, FT	= 0.430E+02	

LRFD RESISTANCE FACTOR (SIDE FRICTION)	= 0.100E+01
LRFD RESISTANCE FACTOR (TIP RESISTANCE)	= 0.100E+01

LAYER NO 5----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA	= 0.500E+00	
END BEARING COEFFICIENT-Nc	= 0.900E+01	(*)
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.500E+04	
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00	
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03	
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11	
DEPTH, FT	= 0.430E+02	

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA	= 0.500E+00	
END BEARING COEFFICIENT-Nc	= 0.900E+01	(*)
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.500E+04	
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00	
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03	
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11	
DEPTH, FT	= 0.630E+02	

LRFD RESISTANCE FACTOR (SIDE FRICTION)	= 0.100E+01
LRFD RESISTANCE FACTOR (TIP RESISTANCE)	= 0.100E+01

LAYER NO 6----SAND

AT THE TOP

SIDE FRICTION PROCEDURE, BETA METHOD	
SKIN FRICTION COEFFICIENT- BETA	= 0.428E+00 (*)
INTERNAL FRICTION ANGLE, DEG.	= 0.420E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.135E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.630E+02

AT THE BOTTOM

SIDE FRICTION PROCEDURE, BETA METHOD	
SKIN FRICTION COEFFICIENT- BETA	= 0.250E+00 (*)
INTERNAL FRICTION ANGLE, DEG.	= 0.420E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.135E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.113E+03
LRFD RESISTANCE FACTOR (SIDE FRICTION)	= 0.100E+01
LRFD RESISTANCE FACTOR (TIP RESISTANCE)	= 0.100E+01

(*) ESTIMATED BY THE PROGRAM BASED ON OTHER PARAMETERS

INPUT DRILLED SHAFT INFORMATION

MINIMUM SHAFT DIAMETER	=	3.000	FT.
MAXIMUM SHAFT DIAMETER	=	3.000	FT.
RATIO BASE/SHAFT DIAMETER	=	0.000	FT.
ANGLE OF BELL	=	0.000	DEG.
IGNORED TOP PORTION	=	0.000	FT.
IGNORED BOTTOM PORTION	=	5.000	FT.
ELASTIC MODULUS, Ec	=	0.300E+07	LB/SQ IN

COMPUTATION RESULTS

- CASE ANALYZED	:	1
VARIATION LENGTH	:	1
VARIATION DIAMETER	:	1

DRILLED SHAFT INFORMATION

DIAMETER OF STEM = 3.000 FT.
 DIAMETER OF BASE = 3.000 FT.
 END OF STEM TO BASE = 0.000 FT.
 ANGLE OF BELL = 0.000 DEG.
 IGNORED TOP PORTION = 0.000 FT.
 IGNORED BOTTOM PORTION = 5.000 FT.
 AREA OF ONE PERCENT STEEL = 10.180 SQ.IN.
 ELASTIC MODULUS, E_c = 0.300E+07 LB/SQ IN
 VOLUME OF UNDERREAM = 0.000 CU.YDS.
 SHAFT LENGTH = 90.000 FT.

PREDICTED RESULTS

QS = ULTIMATE SIDE RESISTANCE;
 QB = ULTIMATE BASE RESISTANCE;
 WT = WEIGHT OF DRILLED SHAFT (UPLIFT CAPACITY ONLY);
 QU = TOTAL ULTIMATE RESISTANCE;
 LRFD QS = TOTAL SIDE FRICTION USING LRFD RESISTANCE FACTOR
 TO THE ULTIMATE SIDE RESISTANCE;
 LRFD QB = TOTAL BASE BEARING USING LRFD RESISTANCE FACTOR
 TO THE ULTIMATE BASE RESISTANCE
 LRFD QU = TOTAL CAPACITY WITH LRFD RESISTANCE FACTOR.

LENGTH (FT)	VOLUME (CU.YDS)	QS (TONS)	QB (TONS)	QU (TONS)	LRFD QS (TONS)	LRFD QB (TONS)	LRFD QU (TONS)
6.0	1.57	0.37	38.85	39.22	0.37	38.85	39.22
7.0	1.83	1.47	42.62	44.09	1.47	42.62	44.09
8.0	2.09	3.31	68.94	72.24	3.31	68.94	72.24
9.0	2.36	5.88	97.67	103.55	5.88	97.67	103.55
10.0	2.62	9.19	128.71	137.89	9.19	128.71	137.89
11.0	2.88	13.13	149.06	162.19	13.13	149.06	162.19
12.0	3.14	17.68	159.06	176.74	17.68	159.06	176.74
13.0	3.40	22.81	159.06	181.88	22.81	159.06	181.88
14.0	3.67	28.52	159.06	187.58	28.52	159.06	187.58
15.0	3.93	34.76	159.06	193.83	34.76	159.06	193.83
16.0	4.19	41.53	159.06	200.60	41.53	159.06	200.60
17.0	4.45	48.81	159.06	207.87	48.81	159.06	207.87
18.0	4.71	56.57	147.88	204.44	56.57	147.88	204.44
19.0	4.97	67.17	136.03	203.20	67.17	136.03	203.20
20.0	5.24	77.78	123.66	201.44	77.78	123.66	201.44
21.0	5.50	88.38	117.30	205.67	88.38	117.30	205.67
22.0	5.76	98.98	116.53	215.51	98.98	116.53	215.51
23.0	6.02	109.59	120.96	230.55	109.59	120.96	230.55
24.0	6.28	120.19	125.39	245.58	120.19	125.39	245.58
25.0	6.55	130.80	128.88	259.68	130.80	128.88	259.68
26.0	6.81	141.40	131.30	272.70	141.40	131.30	272.70
27.0	7.07	152.01	132.50	284.51	152.01	132.50	284.51
28.0	7.33	162.61	138.46	301.06	162.61	138.46	301.06
29.0	7.59	174.21	144.80	319.01	174.21	144.80	319.01
30.0	7.85	186.13	151.93	338.06	186.13	151.93	338.06
31.0	8.12	198.35	156.69	355.03	198.35	156.69	355.03
32.0	8.38	210.86	159.06	369.93	210.86	159.06	369.93
33.0	8.64	223.66	159.06	382.72	223.66	159.06	382.72
34.0	8.90	236.72	159.06	395.78	236.72	159.06	395.78

35.0	9.16	250.03	159.06	409.10	250.03	159.06	409.10
36.0	9.43	263.59	159.06	422.66	263.59	159.06	422.66
37.0	9.69	277.39	159.06	436.45	277.39	159.06	436.45
38.0	9.95	291.41	159.06	450.47	291.41	159.06	450.47
39.0	10.21	303.19	159.06	462.25	303.19	159.06	462.25
40.0	10.47	314.97	159.06	474.03	314.97	159.06	474.03
41.0	10.74	326.75	159.06	485.82	326.75	159.06	485.82
42.0	11.00	338.54	159.06	497.60	338.54	159.06	497.60
43.0	11.26	350.32	159.06	509.38	350.32	159.06	509.38
44.0	11.52	362.10	159.06	521.16	362.10	159.06	521.16
45.0	11.78	373.88	159.06	532.95	373.88	159.06	532.95
46.0	12.04	385.67	159.06	544.73	385.67	159.06	544.73
47.0	12.31	397.45	159.06	556.51	397.45	159.06	556.51
48.0	12.57	409.23	159.06	568.29	409.23	159.06	568.29
49.0	12.83	421.01	159.06	580.08	421.01	159.06	580.08
50.0	13.09	432.80	159.06	591.86	432.80	159.06	591.86
51.0	13.35	444.58	159.06	603.64	444.58	159.06	603.64
52.0	13.62	456.36	159.06	615.42	456.36	159.06	615.42
53.0	13.88	468.14	159.06	627.21	468.14	159.06	627.21
54.0	14.14	479.93	159.06	638.99	479.93	159.06	638.99
55.0	14.40	491.71	159.06	650.77	491.71	159.06	650.77
56.0	14.66	503.49	159.06	662.55	503.49	159.06	662.55
57.0	14.92	515.27	159.06	674.34	515.27	159.06	674.34
58.0	15.19	527.06	170.31	697.37	527.06	170.31	697.37
59.0	15.45	538.84	183.16	722.00	538.84	183.16	722.00
60.0	15.71	550.62	197.62	748.24	550.62	197.62	748.24
61.0	15.97	562.40	207.26	769.67	562.40	207.26	769.67
62.0	16.23	574.18	212.08	786.27	574.18	212.08	786.27
63.0	16.50	585.97	212.08	798.05	585.97	212.08	798.05
64.0	16.76	597.75	212.08	809.83	597.75	212.08	809.83
65.0	17.02	609.53	212.08	821.62	609.53	212.08	821.62
66.0	17.28	621.31	212.08	833.40	621.31	212.08	833.40
67.0	17.54	633.10	212.08	845.18	633.10	212.08	845.18
68.0	17.80	644.88	212.08	856.96	644.88	212.08	856.96
69.0	18.07	657.55	212.08	869.64	657.55	212.08	869.64
70.0	18.33	670.12	212.08	882.20	670.12	212.08	882.20
71.0	18.59	682.56	212.08	894.65	682.56	212.08	894.65
72.0	18.85	694.89	212.08	906.97	694.89	212.08	906.97
73.0	19.11	707.09	212.08	919.17	707.09	212.08	919.17
74.0	19.38	719.16	212.08	931.25	719.16	212.08	931.25
75.0	19.64	731.11	212.08	943.19	731.11	212.08	943.19
76.0	19.90	742.91	212.08	955.00	742.91	212.08	955.00
77.0	20.16	754.58	212.08	966.67	754.58	212.08	966.67
78.0	20.42	766.11	212.08	978.19	766.11	212.08	978.19
79.0	20.68	777.49	212.08	989.57	777.49	212.08	989.57
80.0	20.95	788.72	212.08	1000.80	788.72	212.08	1000.80
81.0	21.21	799.79	212.08	1011.88	799.79	212.08	1011.88
82.0	21.47	810.71	212.08	1022.80	810.71	212.08	1022.80
83.0	21.73	821.48	212.08	1033.56	821.48	212.08	1033.56
84.0	21.99	832.07	212.08	1044.16	832.07	212.08	1044.16
85.0	22.26	842.50	212.08	1054.59	842.50	212.08	1054.59
86.0	22.52	852.76	212.08	1064.85	852.76	212.08	1064.85
87.0	22.78	862.84	212.08	1074.93	862.84	212.08	1074.93
88.0	23.04	872.75	212.08	1084.84	872.75	212.08	1084.84
89.0	23.30	882.48	212.08	1094.56	882.48	212.08	1094.56
90.0	23.57	892.02	212.08	1104.10	892.02	212.08	1104.10

AXIAL LOAD VS SETTLEMENT CURVES

RESULT FROM TREND (AVERAGED) LINE

TOP LOAD TON	TOP MOVEMENT IN.	TIP LOAD TON	TIP MOVEMENT IN.
0.2505E+00	0.8629E-04	0.2062E-02	0.1000E-04
0.1252E+01	0.4314E-03	0.1031E-01	0.5000E-04
0.2506E+01	0.8630E-03	0.2062E-01	0.1000E-03
0.1280E+03	0.4382E-01	0.1031E+01	0.5000E-02
0.1891E+03	0.6542E-01	0.1546E+01	0.7500E-02
0.2426E+03	0.8582E-01	0.2062E+01	0.1000E-01
0.4689E+03	0.1847E+00	0.5155E+01	0.2500E-01
0.6392E+03	0.2851E+00	0.1031E+02	0.5000E-01
0.7339E+03	0.3573E+00	0.1546E+02	0.7500E-01
0.7787E+03	0.4068E+00	0.2062E+02	0.1000E+00
0.8839E+03	0.6218E+00	0.5114E+02	0.2500E+00
0.9075E+03	0.8992E+00	0.9626E+02	0.5000E+00
0.9046E+03	0.1027E+01	0.1106E+03	0.6250E+00
0.9279E+03	0.1319E+01	0.1357E+03	0.9000E+00
0.1006E+04	0.2275E+01	0.2153E+03	0.1800E+01

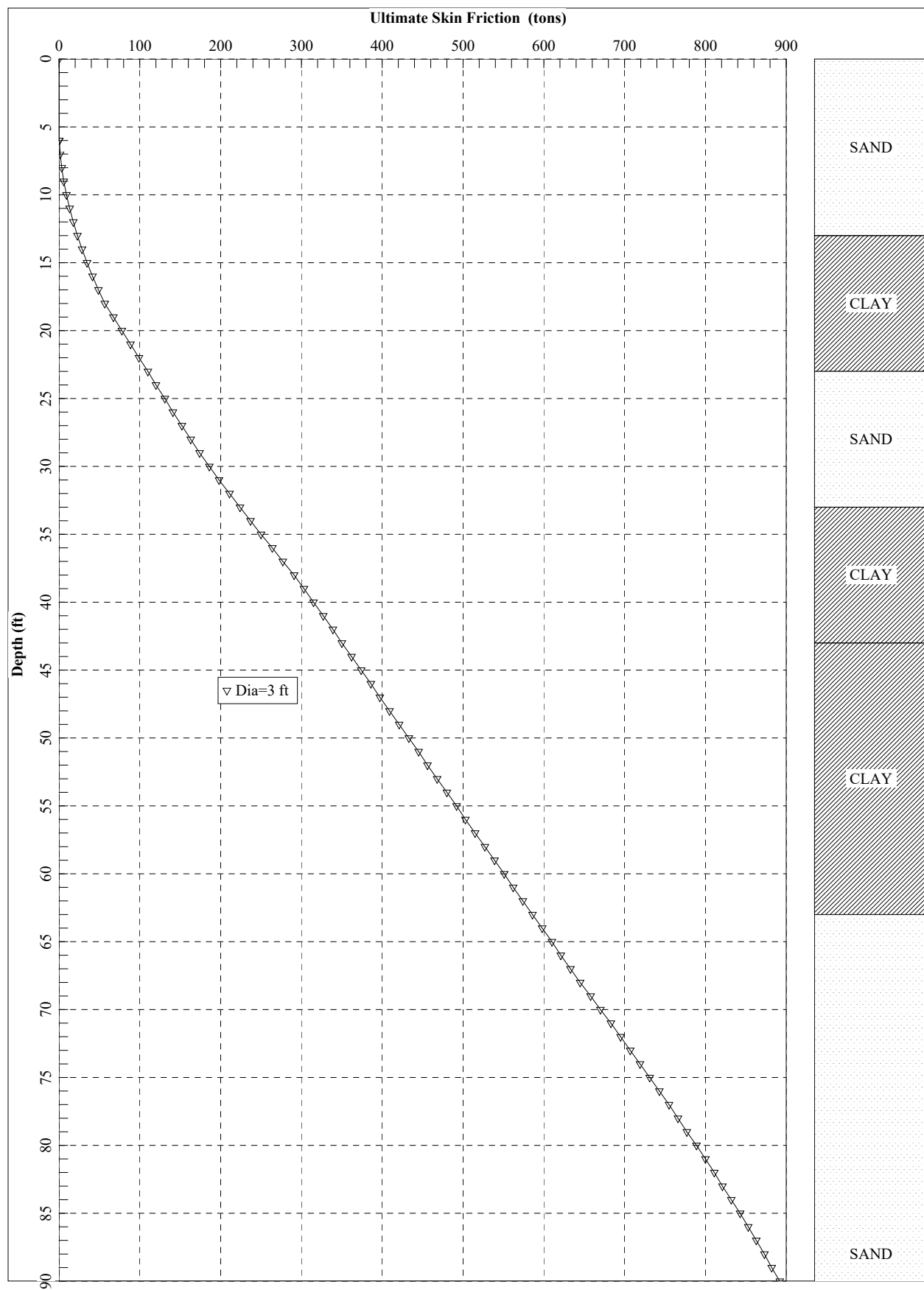
RESULT FROM UPPER-BOUND LINE

TOP LOAD TON	TOP MOVEMENT IN.	TIP LOAD TON	TIP MOVEMENT IN.
0.4703E+00	0.1432E-03	0.2946E-02	0.1000E-04
0.2351E+01	0.7160E-03	0.1473E-01	0.5000E-04
0.4754E+01	0.1440E-02	0.2946E-01	0.1000E-03
0.2361E+03	0.7259E-01	0.1473E+01	0.5000E-02
0.3264E+03	0.1049E+00	0.2209E+01	0.7500E-02
0.4042E+03	0.1347E+00	0.2946E+01	0.1000E-01
0.6386E+03	0.2485E+00	0.7364E+01	0.2500E-01
0.7760E+03	0.3450E+00	0.1473E+02	0.5000E-01
0.8490E+03	0.4119E+00	0.2209E+02	0.7500E-01
0.8871E+03	0.4599E+00	0.2946E+02	0.1000E+00
0.9581E+03	0.6589E+00	0.7199E+02	0.2500E+00
0.9912E+03	0.9428E+00	0.1331E+03	0.5000E+00
0.9954E+03	0.1074E+01	0.1466E+03	0.6250E+00
0.1009E+04	0.1359E+01	0.1612E+03	0.9000E+00
0.1077E+04	0.2307E+01	0.2291E+03	0.1800E+01

RESULT FROM LOWER-BOUND LINE

TOP LOAD TON	TOP MOVEMENT IN.	TIP LOAD TON	TIP MOVEMENT IN.
0.1112E+00	0.4708E-04	0.1178E-02	0.1000E-04
0.5559E+00	0.2354E-03	0.5891E-02	0.5000E-04
0.1112E+01	0.4708E-03	0.1178E-01	0.1000E-03
0.5632E+02	0.2373E-01	0.5891E+00	0.5000E-02
0.8448E+02	0.3560E-01	0.8837E+00	0.7500E-02
0.1126E+03	0.4746E-01	0.1178E+01	0.1000E-01
0.2651E+03	0.1156E+00	0.2946E+01	0.2500E-01
0.4454E+03	0.2089E+00	0.5891E+01	0.5000E-01
0.5657E+03	0.2840E+00	0.8837E+01	0.7500E-01
0.6413E+03	0.3430E+00	0.1178E+02	0.1000E+00
0.8078E+03	0.5842E+00	0.3028E+02	0.2500E+00
0.8139E+03	0.8517E+00	0.5938E+02	0.5000E+00

0.8132E+03	0.9810E+00	0.7464E+02	0.6250E+00
0.8463E+03	0.1280E+01	0.1103E+03	0.9000E+00
0.9348E+03	0.2243E+01	0.2015E+03	0.1800E+01



=====

SHAFT for Windows, Version 2017.8.11

Serial Number : 138585132

VERTICALLY LOADED DRILLED SHAFT ANALYSIS
(c) Copyright ENSOFT, Inc., 1987-2017
All Rights Reserved

=====

Path to file locations : N:\2014\14-81-229 Monroe
Interchange\03\Final\Report\Monroe OC\Pile Analyses\Shaft\Final\
Name of input data file : Bent2 Extreme Limits - Tension- GW 460
-03-18-2023.sf8d
Name of output file : Bent2 Extreme Limits - Tension- GW 460
-03-18-2023.sf8o
Name of plot output file : Bent2 Extreme Limits - Tension- GW 460
-03-18-2023.sf8p
Name of runtime file : Bent2 Extreme Limits - Tension- GW 460
-03-18-2023.sf8r

Time and Date of Analysis

Date: March 18, 2023 Time: 15:55:12

I-10 Monroe - Bent 2- Extreme Limit- Tension - GW 460 - 03/18/2023

PROPOSED DEPTH = 80.0 FT

REDUCTION FACTOR APPLIED FOR UPLIFT FRICTION = 0.600

NUMBER OF LAYERS = 6

WATER TABLE DEPTH = 43.0 FT.

SOIL INFORMATION

LAYER NO 1----SAND

AT THE TOP

SIDE FRICTION PROCEDURE, BETA METHOD
SKIN FRICTION COEFFICIENT- BETA

= 0.120E+01 (*)

INTERNAL FRICTION ANGLE, DEG.	= 0.360E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.130E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.000E+00

AT THE BOTTOM

SIDE FRICTION PROCEDURE, BETA METHOD	
SKIN FRICTION COEFFICIENT- BETA	= 0.101E+01 (*)
INTERNAL FRICTION ANGLE, DEG.	= 0.360E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.130E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.130E+02

LRFD RESISTANCE FACTOR (SIDE FRICTION)	= 0.100E+01
LRFD RESISTANCE FACTOR (TIP RESISTANCE)	= 0.100E+01

LAYER NO 2----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA	= 0.450E+00
END BEARING COEFFICIENT-Nc	= 0.900E+01 (*)
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.500E+04
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.118E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.130E+02

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA	= 0.450E+00
END BEARING COEFFICIENT-Nc	= 0.900E+01 (*)
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.500E+04
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.118E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.230E+02

LRFD RESISTANCE FACTOR (SIDE FRICTION)	= 0.100E+01
LRFD RESISTANCE FACTOR (TIP RESISTANCE)	= 0.100E+01

LAYER NO 3----SAND

AT THE TOP

SIDE FRICTION PROCEDURE, BETA METHOD	
SKIN FRICTION COEFFICIENT- BETA	= 0.853E+00 (*)
INTERNAL FRICTION ANGLE, DEG.	= 0.370E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.130E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.230E+02

AT THE BOTTOM

SIDE FRICTION PROCEDURE, BETA METHOD		
SKIN FRICTION COEFFICIENT- BETA	= 0.724E+00	(*)
INTERNAL FRICTION ANGLE, DEG.	= 0.370E+02	
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00	
SOIL UNIT WEIGHT, LB/CU FT	= 0.130E+03	
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11	
DEPTH, FT	= 0.330E+02	
LRFD RESISTANCE FACTOR (SIDE FRICTION)	= 0.100E+01	
LRFD RESISTANCE FACTOR (TIP RESISTANCE)	= 0.100E+01	

LAYER NO 4----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA	= 0.500E+00	
END BEARING COEFFICIENT-Nc	= 0.900E+01	(*)
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.500E+04	
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00	
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03	
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11	
DEPTH, FT	= 0.330E+02	

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA	= 0.500E+00	
END BEARING COEFFICIENT-Nc	= 0.900E+01	(*)
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.500E+04	
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00	
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03	
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11	
DEPTH, FT	= 0.430E+02	

LRFD RESISTANCE FACTOR (SIDE FRICTION)	= 0.100E+01
LRFD RESISTANCE FACTOR (TIP RESISTANCE)	= 0.100E+01

LAYER NO 5----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA	= 0.500E+00	
END BEARING COEFFICIENT-Nc	= 0.900E+01	(*)
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.500E+04	
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00	
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03	
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11	
DEPTH, FT	= 0.430E+02	

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA	= 0.500E+00	
END BEARING COEFFICIENT-Nc	= 0.900E+01	(*)
UNDRAINED SHEAR STRENGTH, LB/SQ FT	= 0.500E+04	
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00	
SOIL UNIT WEIGHT, LB/CU FT	= 0.115E+03	

MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.630E+02

LRFD RESISTANCE FACTOR (SIDE FRICTION)	= 0.100E+01
LRFD RESISTANCE FACTOR (TIP RESISTANCE)	= 0.100E+01

LAYER NO 6----SAND

AT THE TOP

SIDE FRICTION PROCEDURE, BETA METHOD	
SKIN FRICTION COEFFICIENT- BETA	= 0.428E+00 (*)
INTERNAL FRICTION ANGLE, DEG.	= 0.420E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.135E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.630E+02

AT THE BOTTOM

SIDE FRICTION PROCEDURE, BETA METHOD	
SKIN FRICTION COEFFICIENT- BETA	= 0.250E+00 (*)
INTERNAL FRICTION ANGLE, DEG.	= 0.420E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST	= 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT	= 0.135E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT	= 0.100E+11
DEPTH, FT	= 0.113E+03

LRFD RESISTANCE FACTOR (SIDE FRICTION)	= 0.100E+01
LRFD RESISTANCE FACTOR (TIP RESISTANCE)	= 0.100E+01

(*) ESTIMATED BY THE PROGRAM BASED ON OTHER PARAMETERS

INPUT DRILLED SHAFT INFORMATION

MINIMUM SHAFT DIAMETER	=	3.000	FT.
MAXIMUM SHAFT DIAMETER	=	3.000	FT.
RATIO BASE/SHAFT DIAMETER	=	0.000	FT.
ANGLE OF BELL	=	0.000	DEG.
IGNORED TOP PORTION	=	0.000	FT.
IGNORED BOTTOM PORTION	=	3.000	FT.
ELASTIC MODULUS, Ec	=	0.300E+07	LB/SQ IN

COMPUTATION RESULTS

- CASE ANALYZED : 1

VARIATION LENGTH : 1
VARIATION DIAMETER : 1

DRILLED SHAFT INFORMATION

DIAMETER OF STEM = 3.000 FT.
DIAMETER OF BASE = 3.000 FT.
END OF STEM TO BASE = 0.000 FT.
ANGLE OF BELL = 0.000 DEG.
IGNORED TOP PORTION = 0.000 FT.
IGNORED BOTTOM PORTION = 3.000 FT.
AREA OF ONE PERCENT STEEL = 10.180 SQ.IN.
ELASTIC MODULUS, E_c = 0.300E+07 LB/SQ IN
VOLUME OF UNDERREAM = 0.000 CU.YDS.
SHAFT LENGTH = 80.000 FT.

PREDICTED RESULTS

QS = ULTIMATE SIDE RESISTANCE;
QB = ULTIMATE BASE RESISTANCE;
WT = WEIGHT OF DRILLED SHAFT (UPLIFT CAPACITY ONLY);
QU = TOTAL ULTIMATE RESISTANCE;
LRFD QS = TOTAL SIDE FRICTION USING LRFD RESISTANCE FACTOR
TO THE ULTIMATE SIDE RESISTANCE;
LRFD QB = TOTAL BASE BEARING USING LRFD RESISTANCE FACTOR
TO THE ULTIMATE BASE RESISTANCE
LRFD QU = TOTAL CAPACITY WITH LRFD RESISTANCE FACTOR.

LENGTH (FT)	VOLUME (CU.YDS)	QS (TONS)	WT (TONS)	QU (TONS)	LRFD QS (TONS)	WT (TONS)	LRFD QU (TONS)
4.0	1.05	0.22	2.12	2.34	0.22	2.12	2.34
5.0	1.31	0.88	2.65	3.53	0.88	2.65	3.53
6.0	1.57	1.99	3.18	5.17	1.99	3.18	5.17
7.0	1.83	3.53	3.71	7.24	3.53	3.71	7.24
8.0	2.09	5.51	4.24	9.75	5.51	4.24	9.75
9.0	2.36	7.88	4.77	12.65	7.88	4.77	12.65
10.0	2.62	10.61	5.30	15.91	10.61	5.30	15.91
11.0	2.88	13.69	5.83	19.52	13.69	5.83	19.52
12.0	3.14	17.11	6.36	23.47	17.11	6.36	23.47
13.0	3.40	20.86	6.89	27.75	20.86	6.89	27.75
14.0	3.67	24.92	7.42	32.34	24.92	7.42	32.34
15.0	3.93	29.28	7.95	37.24	29.28	7.95	37.24
16.0	4.19	33.94	8.48	42.42	33.94	8.48	42.42
17.0	4.45	40.30	9.01	49.32	40.30	9.01	49.32
18.0	4.71	46.67	9.54	56.21	46.67	9.54	56.21
19.0	4.97	53.03	10.07	63.10	53.03	10.07	63.10
20.0	5.24	59.39	10.60	69.99	59.39	10.60	69.99
21.0	5.50	65.75	11.13	76.89	65.75	11.13	76.89
22.0	5.76	72.12	11.66	83.78	72.12	11.66	83.78
23.0	6.02	78.48	12.19	90.67	78.48	12.19	90.67
24.0	6.28	84.84	12.73	97.57	84.84	12.73	97.57
25.0	6.55	91.20	13.26	104.46	91.20	13.26	104.46
26.0	6.81	97.57	13.79	111.35	97.57	13.79	111.35
27.0	7.07	104.53	14.32	118.84	104.53	14.32	118.84
28.0	7.33	111.68	14.85	126.52	111.68	14.85	126.52

29.0	7.59	119.01	15.38	134.39	119.01	15.38	134.39
30.0	7.85	126.52	15.91	142.42	126.52	15.91	142.42
31.0	8.12	134.19	16.44	150.63	134.19	16.44	150.63
32.0	8.38	142.03	16.97	159.00	142.03	16.97	159.00
33.0	8.64	150.02	17.50	167.52	150.02	17.50	167.52
34.0	8.90	158.16	18.03	176.18	158.16	18.03	176.18
35.0	9.16	166.43	18.56	184.99	166.43	18.56	184.99
36.0	9.43	174.84	19.09	193.93	174.84	19.09	193.93
37.0	9.69	181.91	19.62	201.53	181.91	19.62	201.53
38.0	9.95	188.98	20.15	209.13	188.98	20.15	209.13
39.0	10.21	196.05	20.68	216.73	196.05	20.68	216.73
40.0	10.47	203.12	21.21	224.33	203.12	21.21	224.33
41.0	10.74	210.19	21.74	231.93	210.19	21.74	231.93
42.0	11.00	217.26	22.27	239.53	217.26	22.27	239.53
43.0	11.26	224.33	22.80	247.13	224.33	22.80	247.13
44.0	11.52	231.40	23.11	254.51	231.40	23.11	254.51
45.0	11.78	238.47	23.42	261.89	238.47	23.42	261.89
46.0	12.04	245.54	23.73	269.27	245.54	23.73	269.27
47.0	12.31	252.61	24.04	276.65	252.61	24.04	276.65
48.0	12.57	259.68	24.35	284.02	259.68	24.35	284.02
49.0	12.83	266.75	24.66	291.40	266.75	24.66	291.40
50.0	13.09	273.82	24.97	298.78	273.82	24.97	298.78
51.0	13.35	280.89	25.28	306.16	280.89	25.28	306.16
52.0	13.62	287.96	25.59	313.54	287.96	25.59	313.54
53.0	13.88	295.02	25.90	320.92	295.02	25.90	320.92
54.0	14.14	302.09	26.21	328.30	302.09	26.21	328.30
55.0	14.40	309.16	26.52	335.68	309.16	26.52	335.68
56.0	14.66	316.23	26.82	343.06	316.23	26.82	343.06
57.0	14.92	323.30	27.13	350.44	323.30	27.13	350.44
58.0	15.19	330.37	27.44	357.82	330.37	27.44	357.82
59.0	15.45	337.44	27.75	365.20	337.44	27.75	365.20
60.0	15.71	344.51	28.06	372.57	344.51	28.06	372.57
61.0	15.97	351.58	28.37	379.95	351.58	28.37	379.95
62.0	16.23	358.65	28.68	387.33	358.65	28.68	387.33
63.0	16.50	365.72	28.99	394.71	365.72	28.99	394.71
64.0	16.76	372.79	29.30	402.09	372.79	29.30	402.09
65.0	17.02	379.86	29.61	409.47	379.86	29.61	409.47
66.0	17.28	386.93	29.92	416.85	386.93	29.92	416.85
67.0	17.54	394.53	30.23	424.76	394.53	30.23	424.76
68.0	17.80	402.07	30.54	432.61	402.07	30.54	432.61
69.0	18.07	409.54	30.85	440.39	409.54	30.85	440.39
70.0	18.33	416.93	31.16	448.09	416.93	31.16	448.09
71.0	18.59	424.25	31.47	455.72	424.25	31.47	455.72
72.0	18.85	431.50	31.78	463.28	431.50	31.78	463.28
73.0	19.11	438.66	32.09	470.75	438.66	32.09	470.75
74.0	19.38	445.75	32.40	478.15	445.75	32.40	478.15
75.0	19.64	452.75	32.71	485.46	452.75	32.71	485.46
76.0	19.90	459.66	33.02	492.68	459.66	33.02	492.68
77.0	20.16	466.49	33.33	499.82	466.49	33.33	499.82
78.0	20.42	473.23	33.64	506.87	473.23	33.64	506.87
79.0	20.68	479.88	33.95	513.82	479.88	33.95	513.82
80.0	20.95	486.43	34.26	520.69	486.43	34.26	520.69

AXIAL LOAD VS SETTLEMENT CURVES

RESULT FROM TREND (AVERAGED) LINE

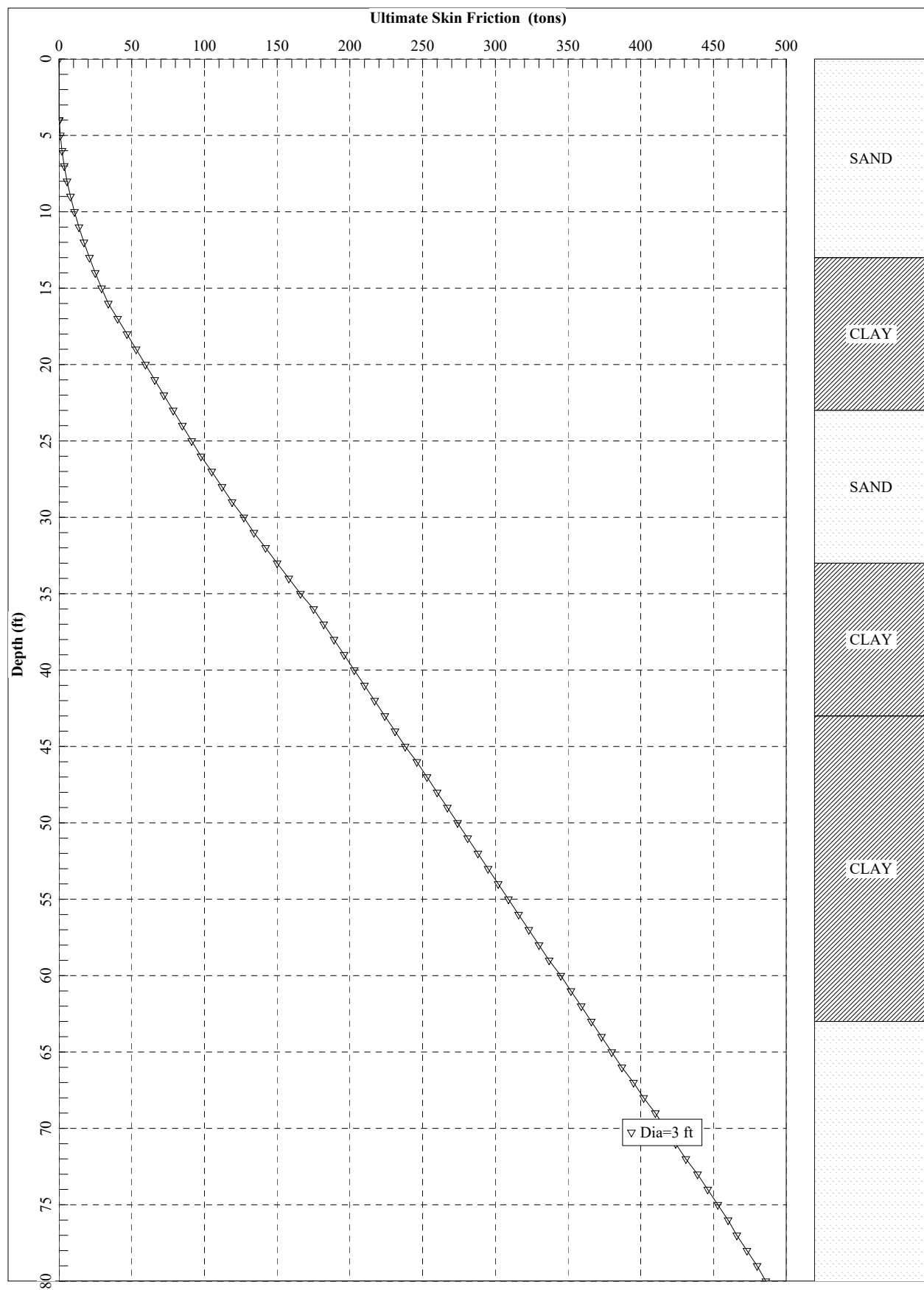
TOP LOAD TON	TOP MOVEMENT IN.	TIP LOAD TON	TIP MOVEMENT IN.
0.9126E-01	0.3783E-04	0.3331E-03	0.1000E-04
0.4563E+00	0.1892E-03	0.1665E-02	0.5000E-04
0.9126E+00	0.3783E-03	0.3331E-02	0.1000E-03
0.4616E+02	0.1904E-01	0.1665E+00	0.5000E-02
0.6925E+02	0.2857E-01	0.2498E+00	0.7500E-02
0.9234E+02	0.3809E-01	0.3331E+00	0.1000E-01
0.2102E+03	0.9187E-01	0.8326E+00	0.2500E-01
0.3122E+03	0.1536E+00	0.1665E+01	0.5000E-01
0.3752E+03	0.2041E+00	0.2498E+01	0.7500E-01
0.4094E+03	0.2438E+00	0.3331E+01	0.1000E+00
0.4633E+03	0.4185E+00	0.8260E+01	0.2500E+00
0.4619E+03	0.6712E+00	0.1555E+02	0.5000E+00
0.4513E+03	0.7935E+00	0.1787E+02	0.6250E+00
0.4490E+03	0.1069E+01	0.2192E+02	0.9000E+00
0.4613E+03	0.1976E+01	0.3477E+02	0.1800E+01

RESULT FROM UPPER-BOUND LINE

TOP LOAD TON	TOP MOVEMENT IN.	TIP LOAD TON	TIP MOVEMENT IN.
0.1518E+00	0.5402E-04	0.4758E-03	0.1000E-04
0.7592E+00	0.2701E-03	0.2379E-02	0.5000E-04
0.1518E+01	0.5402E-03	0.4758E-02	0.1000E-03
0.7718E+02	0.2730E-01	0.2379E+00	0.5000E-02
0.1158E+03	0.4096E-01	0.3568E+00	0.7500E-02
0.1536E+03	0.5455E-01	0.4758E+00	0.1000E-01
0.3106E+03	0.1236E+00	0.1189E+01	0.2500E-01
0.4022E+03	0.1863E+00	0.2379E+01	0.5000E-01
0.4449E+03	0.2312E+00	0.3568E+01	0.7500E-01
0.4660E+03	0.2661E+00	0.4758E+01	0.1000E+00
0.4971E+03	0.4320E+00	0.1163E+02	0.2500E+00
0.4932E+03	0.6839E+00	0.2151E+02	0.5000E+00
0.4861E+03	0.8071E+00	0.2368E+02	0.6250E+00
0.4849E+03	0.1082E+01	0.2604E+02	0.9000E+00
0.4959E+03	0.1989E+01	0.3700E+02	0.1800E+01

RESULT FROM LOWER-BOUND LINE

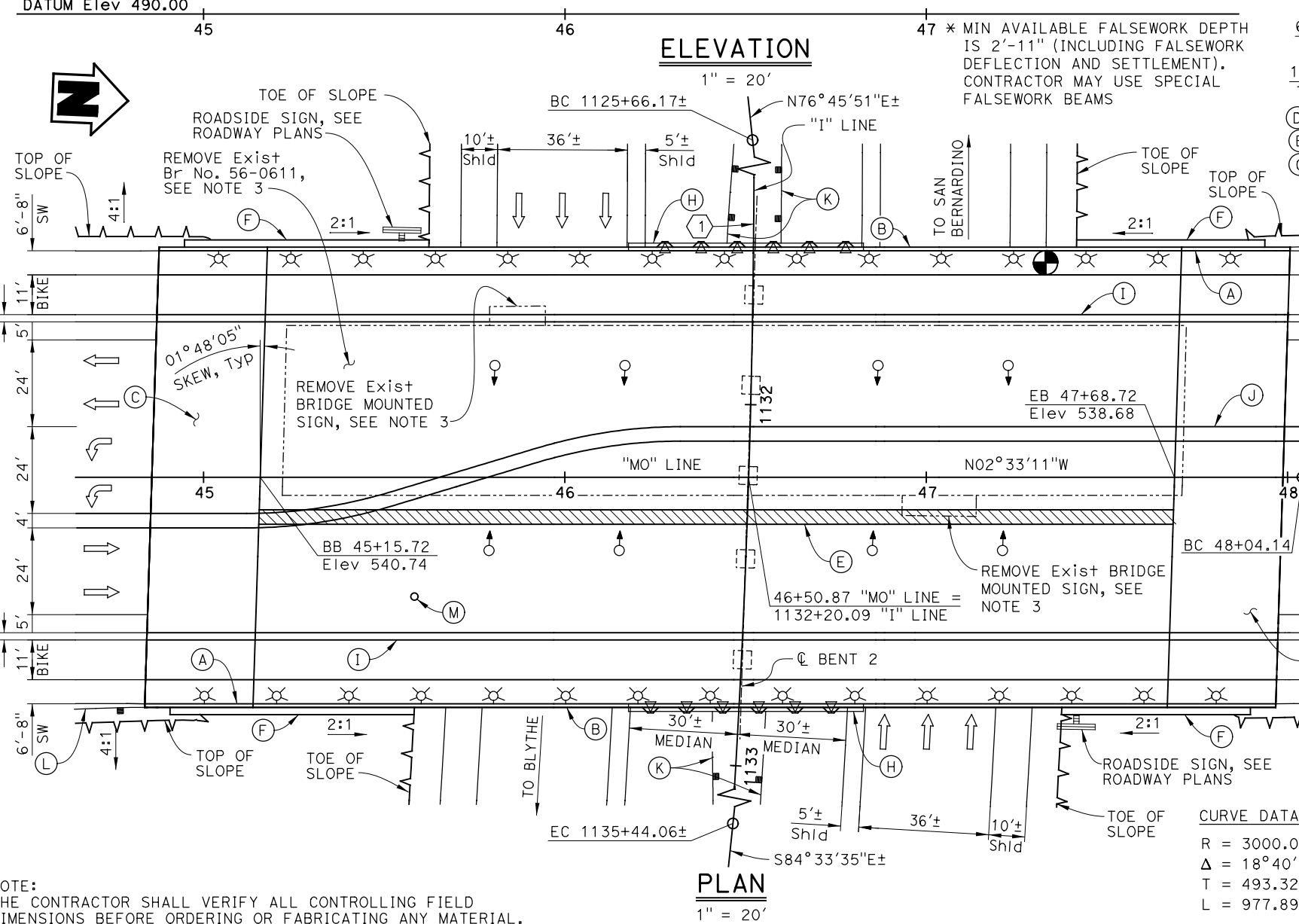
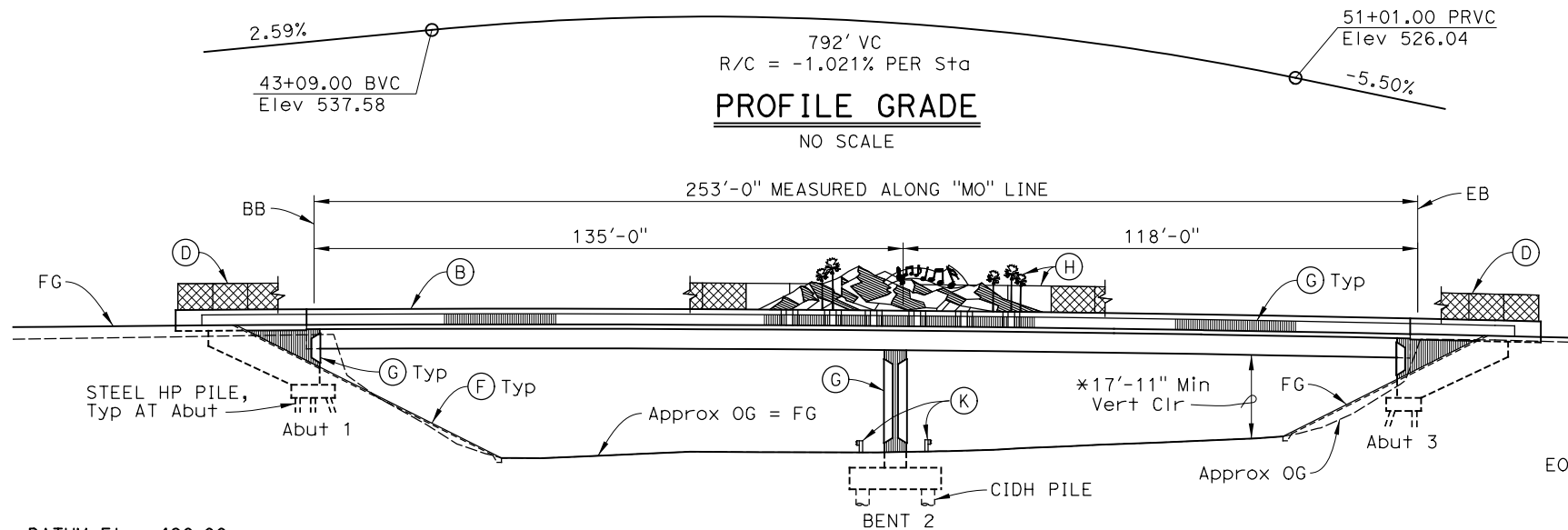
TOP LOAD TON	TOP MOVEMENT IN.	TIP LOAD TON	TIP MOVEMENT IN.
0.4619E-01	0.2493E-04	0.1903E-03	0.1000E-04
0.2309E+00	0.1246E-03	0.9516E-03	0.5000E-04
0.4619E+00	0.2493E-03	0.1903E-02	0.1000E-03
0.2325E+02	0.1250E-01	0.9516E-01	0.5000E-02
0.3488E+02	0.1876E-01	0.1427E+00	0.7500E-02
0.4651E+02	0.2501E-01	0.1903E+00	0.1000E-01
0.1146E+03	0.6230E-01	0.4758E+00	0.2500E-01
0.2057E+03	0.1181E+00	0.9516E+00	0.5000E-01
0.2753E+03	0.1681E+00	0.1427E+01	0.7500E-01
0.3240E+03	0.2114E+00	0.1903E+01	0.1000E+00
0.4293E+03	0.4050E+00	0.4891E+01	0.2500E+00
0.4229E+03	0.6561E+00	0.9592E+01	0.5000E+00
0.4128E+03	0.7784E+00	0.1206E+02	0.6250E+00
0.4132E+03	0.1055E+01	0.1781E+02	0.9000E+00
0.4267E+03	0.1964E+01	0.3254E+02	0.1800E+01



Appendix E

PROJECT PLANS

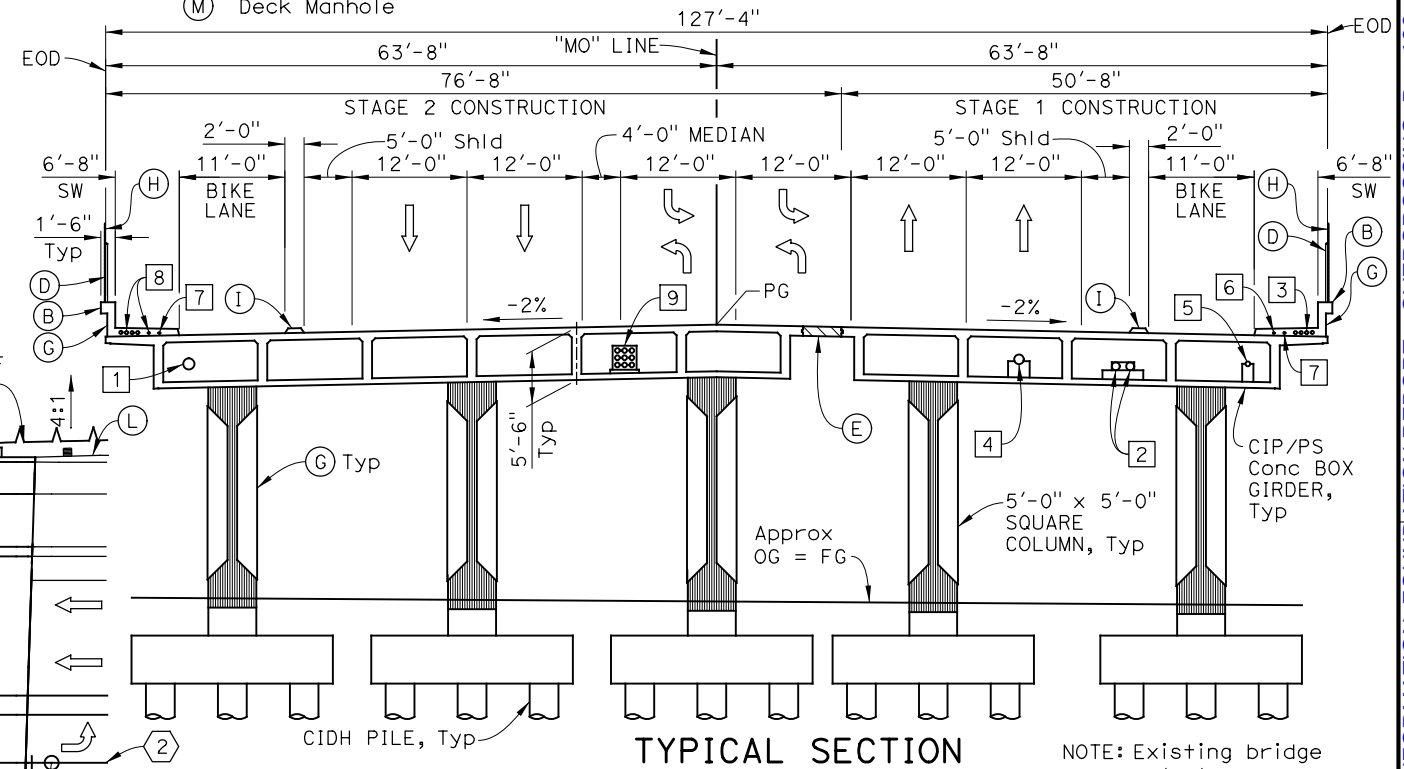




NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

NOTES:

- (A) Paint "MONROE STREET OC"
"Br No. 56-0897", Year Constructed
- (B) Concrete Barrier (Type 732SW Mod)
- (C) Structure Approach Type N (30)
- (D) Chain Link Railing (Type 7)
- (E) Closure Pour (4'-0")
- (F) Slope Paving (Fractured Rock Cobble)
- (G) Concrete Surface Texture
- (H) Decorative Metal Sign &
Chain Link Railing (Type 7 Mod)
- (I) Raised Island
- (J) Striped Median, see ROADWAY PLANS
- (K) STBB, see ROADWAY PLANS
- (L) MGS, see ROADWAY PLANS
- (M) Deck Manhole



NOTES:

1. For "GENERAL NOTES", "INDEX TO PLANS", and "QUANTITIES", see "INDEX TO PLANS" sheet.
2. For "PILE DATA TABLE", see "FOUNDATION PLAN".
3. For bridge removal details, see "BRIDGE REMOVAL PLAN" sheet.
4. Existing utilities must be protected in place or relocated during construction, unless otherwise noted. See ROADWAY PLANS for utility details not shown.

LEGEND:

- Existing Structure
- Closure Pour
- Point of Min Vert Clr
- Direction of Traffic
- Recessed Light Fixture,
see ROADWAY PLANS
- Sign Lighting,
see ROADWAY PLANS
- Soffit Luminaire,
see ROADWAY PLANS

UTILITIES (SEE NOTE 4):

- 1 Future Utility Opening
- 2 2-6" Gas (SCG)
- 3 4-4" Telecom (Caltrans)
- 4 12" Water (IWA)
- 5 3" Irrigation (Caltrans)
- 6 2" Sprinkler Control (Caltrans)
- 7 2" Lighting (Caltrans)
- 8 4-3" & 1-2" Electrical (Caltrans)
- 9 9-6" Electrical (IID)

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
8	Riv	10	R53.9/R55.5		
REGISTERED CIVIL ENGINEER			1/23/26 DATE		
PLANS APPROVAL DATE			REGISTERED PROFESSIONAL ENGINEER No. 84296 Exp. 09-30-27 CIVIL STATE OF CALIFORNIA		
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT 4080 LEMON STREET RIVERSIDE, CA 92501					
PARSONS 2201 DUPONT DRIVE, SUITE 200 IRVINE, CA 92612					

DESIGN OVERSIGHT	DESIGN	BY M. Principe	CHECKED G. Douglass	SEISMIC ANALYSIS	BY M. Principe	CHECKED G. Douglass	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	BRIDGE No. 56-0897	MONROE STREET OC (REPLACE)					
SIGN OFF DATE	DETAILS	BY S. Weight	CHECKED G. Douglass	LAYOUT	BY M. Principe	CHECKED G. Douglass	Casey Weber PROJECT ENGINEER	POST MILE R54.74	GENERAL PLAN					
	QUANTITIES	BY M. Principe	CHECKED A. Botani	SPECIFICATIONS	BY G. Douglass	PLANS AND SPECS COMPARED C. Weber								
STRUCTURES DESIGN GENERAL PLAN SHEET (ENGLISH) (REVISION 2/8/2022)							DATE PLOTTED => 1/14/2026 FILE => 56-0897-a-gp01	TIME PLOTTED => 4:07:16 PM USERNAME => p002118F	PROJECT NUMBER & PHASE: 0800003681	COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES 08/23/21 03/16/25 08/11/25 01/23/26	SHEET 1	OF 47

GENERAL NOTES
LOAD AND RESISTANCE FACTOR DESIGN

DESIGN:
AASHTO LRFD Bridge Design Specifications, 8th Edition
with California Amendments, preface dated April 2019

Caltrans Standard Plans and Specifications, 2025 edition

Structural Technical Policies as of January 2023

DEAD LOAD:
Includes 35 psf For Future Wearing Surface

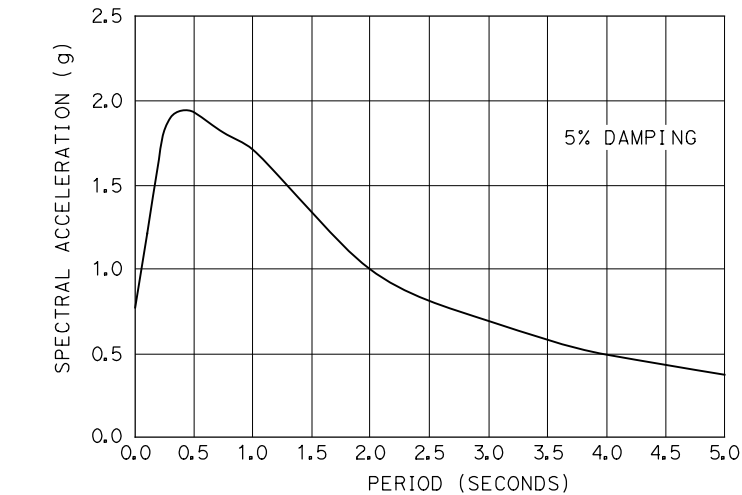
UTILITIES:
Future Utility = 120 lbs/ft
2-6" Gas = 240 lbs/ft
1-12" Water = 170 lbs/ft
1-3" Irrigation = 30 lbs/ft
9-6" Electrical = 125 lbs/ft

LIVE LOADING:
HL-93 and Permit Design Loading

SOIL DESIGN PARAMETERS:
Friction Angle (ϕ) = 34°
Unit Weight (γ) = 120 pcf

SEISMIC DESIGN:
Caltrans Seismic Design Criteria (SDC),
Version 2.0, dated April 2019
Project Specific Seismic Design Criteria (PSDC)

SEISMIC LOADING:
Soil Profile: Initial Vs30 = 886 ft/sec
Moment Magnitude: 7.39
Peak Ground Acceleration: PGA = 0.77g



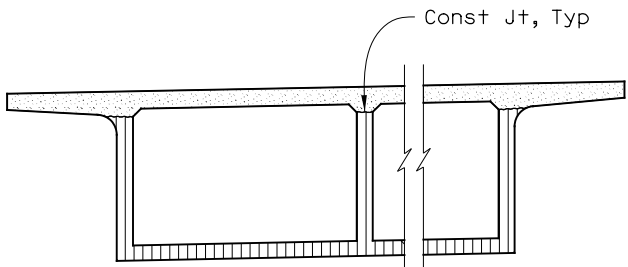
REINFORCED CONCRETE:
 f_y = 60 ksi
 f'_c = 3.6 ksi (unless otherwise noted)

PRESTRESSED CONCRETE:
See "PRESTRESSING NOTES" on "GIRDER LAYOUT - STAGE 1"
and "GIRDER LAYOUT - STAGE 2" sheets.

STRUCTURAL STEEL:
HP Steel Piles: f_y = 50 ksi
HSS: f_y = 46 ksi
All other steel shapes: f_y = 36 ksi
Plates: f_y = 36 ksi
Bolts: f_u = 58 ksi

INDEX TO PLANS

SHEET No.	TITLE
1.	GENERAL PLAN
2.	INDEX TO PLANS
3.	STAGE CONSTRUCTION
4.	DECK CONTOURS
5.	FOUNDATION PLAN
6.	BRIDGE REMOVAL PLAN
7.	ABUTMENT 1 LAYOUT
8.	ABUTMENT 3 LAYOUT
9.	ABUTMENT FOOTING PLAN
10.	ABUTMENT DETAILS No. 1
11.	ABUTMENT DETAILS No. 2
12.	ABUTMENT DETAILS No. 3
13.	BENT LAYOUT - STAGE 1
14.	BENT LAYOUT - STAGE 2
15.	BENT DETAILS No. 1
16.	BENT DETAILS No. 2
17.	TYPICAL SECTION - STAGE 1
18.	TYPICAL SECTION - STAGE 2
19.	GIRDER LAYOUT - STAGE 1
20.	GIRDER LAYOUT - STAGE 2
21.	GIRDER DETAILS
22.	GIRDER REINFORCEMENT - STAGE 1
23.	GIRDER REINFORCEMENT - STAGE 2
24.	JOINT ARMOR FOR PEDESTRIAN WALKWAYS
25.	STRUCTURE APPROACH DETAILS
26.	WATER LINE DETAILS
27.	ELECTRICAL LINE DETAILS
28.	GAS LINE DETAILS No. 1
29.	GAS LINE DETAILS No. 2
30.	GAS LINE DETAILS No. 3
31.	SLOPE PAVING - FULL SLOPE
32.	SLOPE PAVING LAYOUT
33.	ARCHITECTURAL DETAILS No. 1
34.	ARCHITECTURAL DETAILS No. 2
35.	ARCHITECTURAL DETAILS No. 3
36.	ARCHITECTURAL DETAILS No. 4
37.	ARCHITECTURAL DETAILS No. 5
38.	ARCHITECTURAL DETAILS No. 6
39.	ARCHITECTURAL DETAILS No. 7
40.	ARCHITECTURAL DETAILS No. 8
41.	ARCHITECTURAL DETAILS No. 9
42.	ARCHITECTURAL DETAILS No. 10
43.	ARCHITECTURAL DETAILS No. 11
44.	LOG OF TEST BORINGS No. 1 OF 4
45.	LOG OF TEST BORINGS No. 2 OF 4
46.	LOG OF TEST BORINGS No. 3 OF 4
47.	LOG OF TEST BORINGS No. 4 OF 4

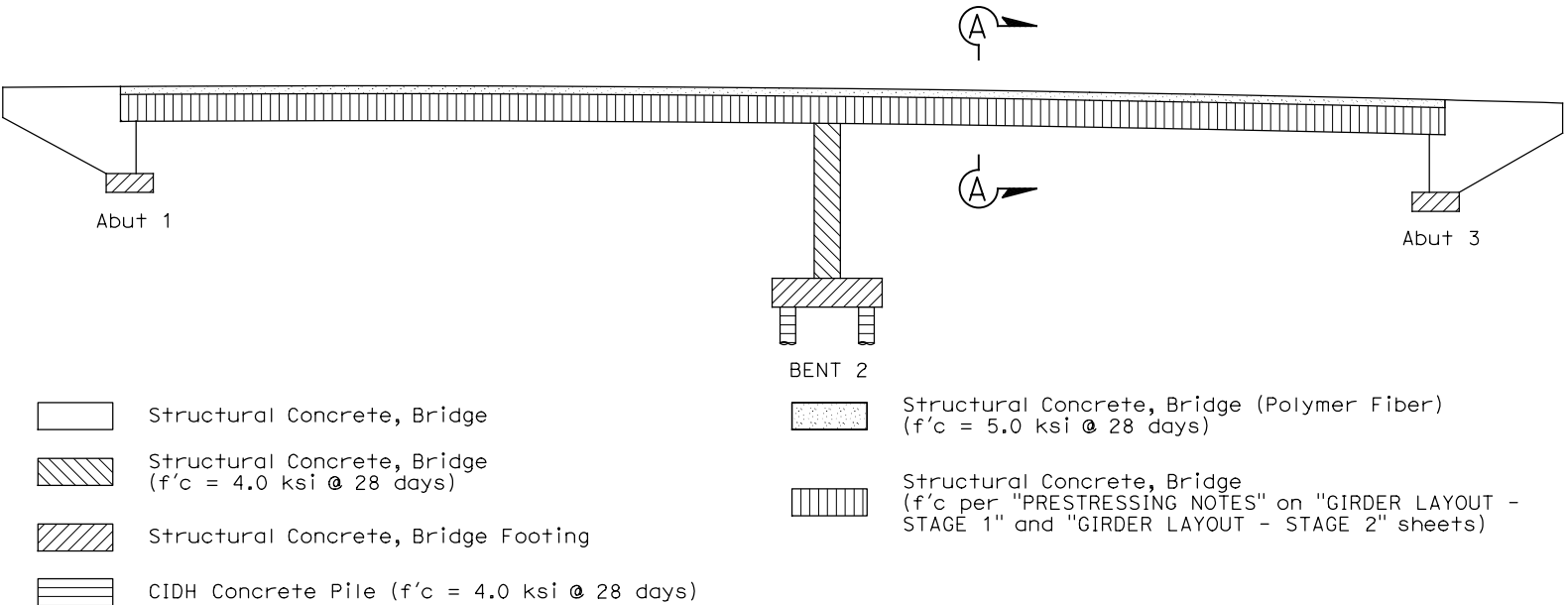


SECTION A-A
NO SCALE

QUANTITIES

STRUCTURE EXCAVATION (BRIDGE)	1,848	CY
STRUCTURE BACKFILL (BRIDGE)	999	CY
3" SUPPLY LINE (BRIDGE)	307	LF
FURNISH STEEL PILING (HP 10x57)	6,318	LF
DRIVE STEEL PILE (HP 10x57)	116	EA
36" CAST-IN-DRILLED-HOLE CONCRETE PILING	2,318	LF
PRESTRESSING CAST-IN-PLACE CONCRETE	1	LS
STRUCTURAL CONCRETE, BRIDGE FOOTING	668	CY
STRUCTURAL CONCRETE, BRIDGE	1,784	CY
STRUCTURAL CONCRETE, BRIDGE (POLYMER FIBER)	978	CY
STRUCTURAL CONCRETE, APPROACH SLAB (TYPE N)	356	CY
CONCRETE SURFACE TEXTURE (FRACTURED RIB)	2,015	SQFT
JOINT SEAL (MR 2")	254	LF
BAR REINFORCING STEEL (BRIDGE)	1,083,590	LB
BAR REINFORCING STEEL (GALVANIZED)	741	LB
HEADED BAR REINFORCEMENT	544	EA
BRIDGE REMOVAL	1	LS
14" WELDED STEEL PIPE CASING (BRIDGE)	80	LF
SLOPE PAVING (FRACTURED ROCK COBBLE)	128	CY
MINOR CONCRETE (RAISED ISLAND)	20	CY
MISCELLANEOUS METAL (BRIDGE)	24,683	LB
PREPARE AND STAIN CONCRETE	44,444	SQFT
CHAIN LINK RAILING (TYPE 7)	490	LF
CHAIN LINK RAILING (TYPE 7 MODIFIED)	136	LF
CONCRETE BARRIER (TYPE 732SW MODIFIED)	626	LF

UTILITY OPENING TABLE			
UTILITY	CASING SIZE	END DIAPHRAGM OPENING	BENT CAP OPENING
1 Future Utility	14"ø	2'-0" W x 1'-10" H	2'-0" W x 1'-10" H
2 2-6" Gas (SCG)	2-10"ø	4'-2" W x 1'-7" H	3'-2" W x 1'-3" H
4 12" Water (IWA)	18"ø	2'-10" W x 2'-2" H	22"ø
5 3" Irrigation (Caltrans)	6"ø	14"ø	8"ø
9 9-6" Electrical (IID)	N/A	2'-0" W x 2'-0" H	2'-2" W x 2'-2" H



CONCRETE STRENGTH AND TYPE LIMITS
NO SCALE

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
8	Riv	10	R53.9/R55.5		

Melvin Principe
REGISTERED CIVIL ENGINEER

1/23/26
DATE

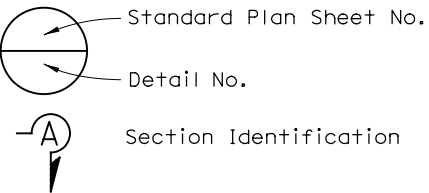
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS
SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR
COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT
4080 LEMON STREET
RIVERSIDE, CA 92501

PARSONS
2201 DUPONT DRIVE, SUITE 200
IRVINE, CA 92612

PLAN SYMBOLS



NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

DESIGN OVERSIGHT		DESIGN BY M. Principe		CHECKED G. Douglass		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		Casey Weber		BRIDGE No.		MONROE STREET OC (REPLACE) INDEX TO PLANS																									
		DETAILS BY S. Weight		CHECKED G. Douglass				PROJECT ENGINEER		56-0897																											
SIGN OFF DATE		QUANTITIES BY M. Principe		CHECKED A. Botani						POST MILE																											
										R54.74																											
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)				DATE PLOTTED => 1/20/2026 FILE => 56-0897-a-1tp		TIME PLOTTED => 4:16:22 PM USERNAME => p002118f		ORIGINAL SCALE IN INCHES FOR REDUCED PLANS		0		1		2		3		PROJECT NUMBER & PHASE: 0800003681				COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304				DISREGARD PRINTS BEARING EARLIER REVISION DATES				REVISION DATES 08/23/24 03/16/25 08/11/25 01/23/26				SHEET 2		OF 47	

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
8	Riv	10	R53.9/R55.5		

Melvin Principe

REGISTERED CIVIL ENGINEER

1/23/26
DATE

PLANS APPROVAL DATE

NO. 84296

EXP. 09-30-27

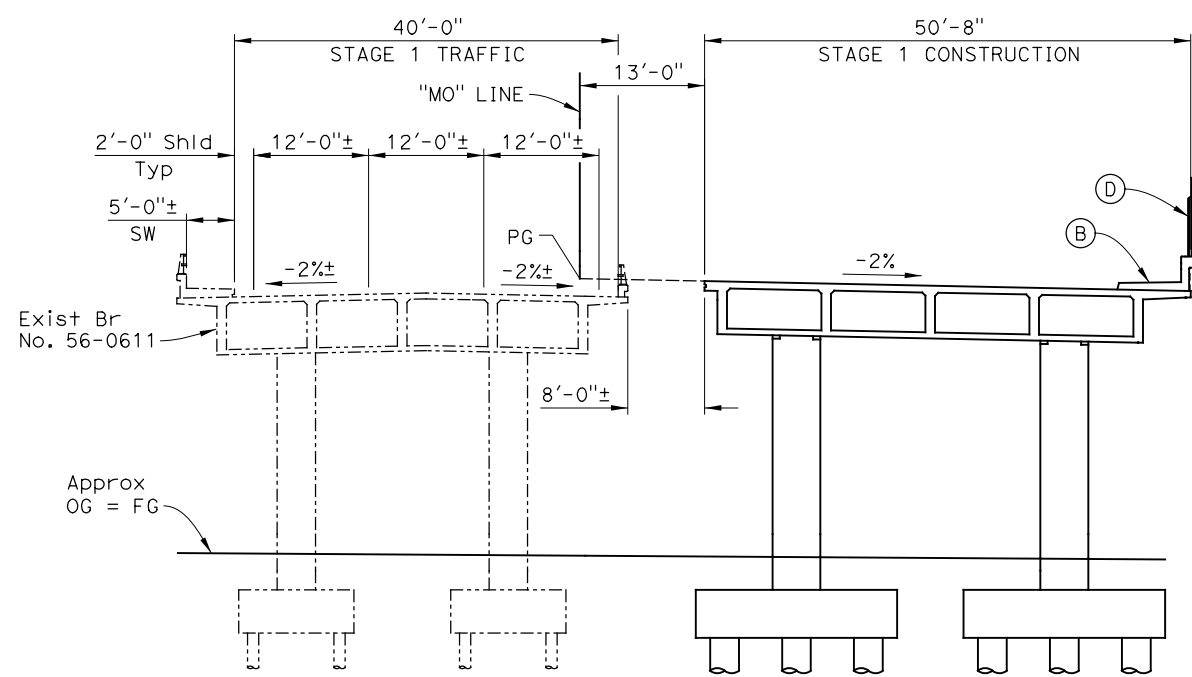
CIVIL

STATE OF CALIFORNIA

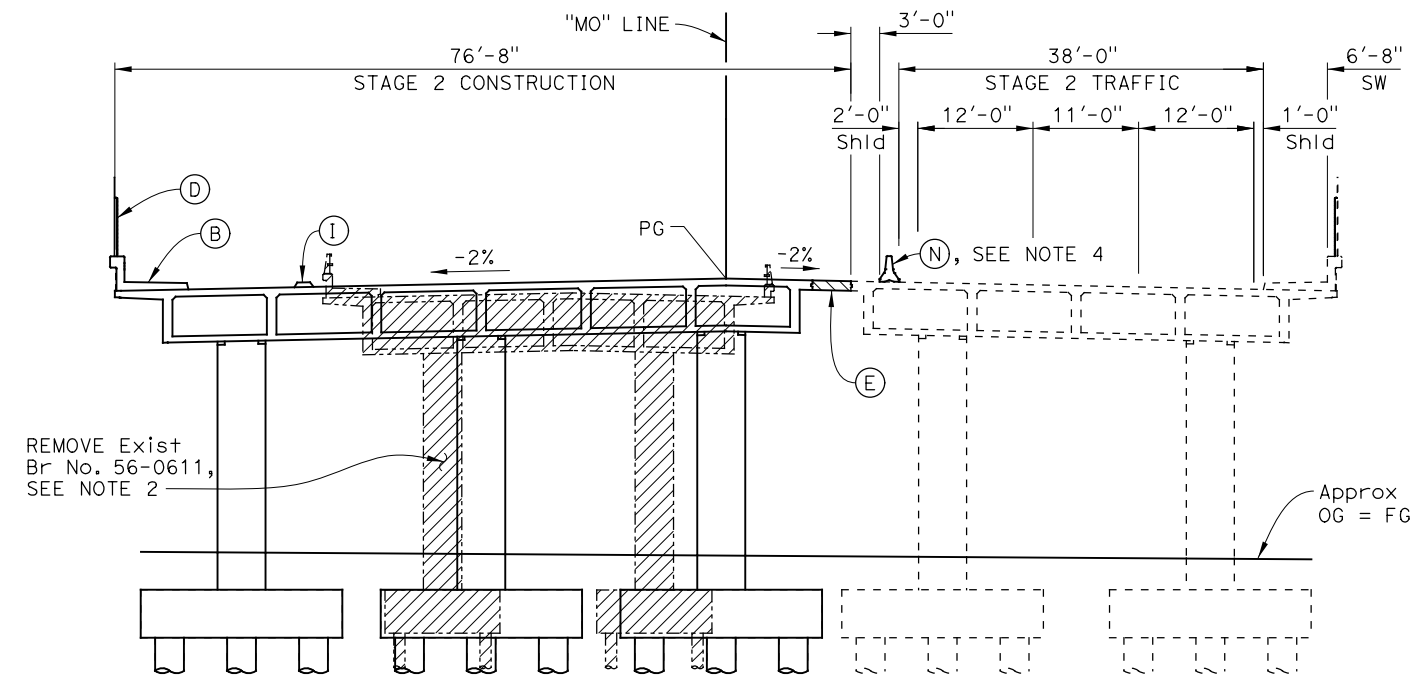
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS
SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR
COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT
4080 LEMON STREET
RIVERSIDE, CA 92501

PARSONS
2201 DUPONT DRIVE, SUITE 200
IRVINE, CA 92612



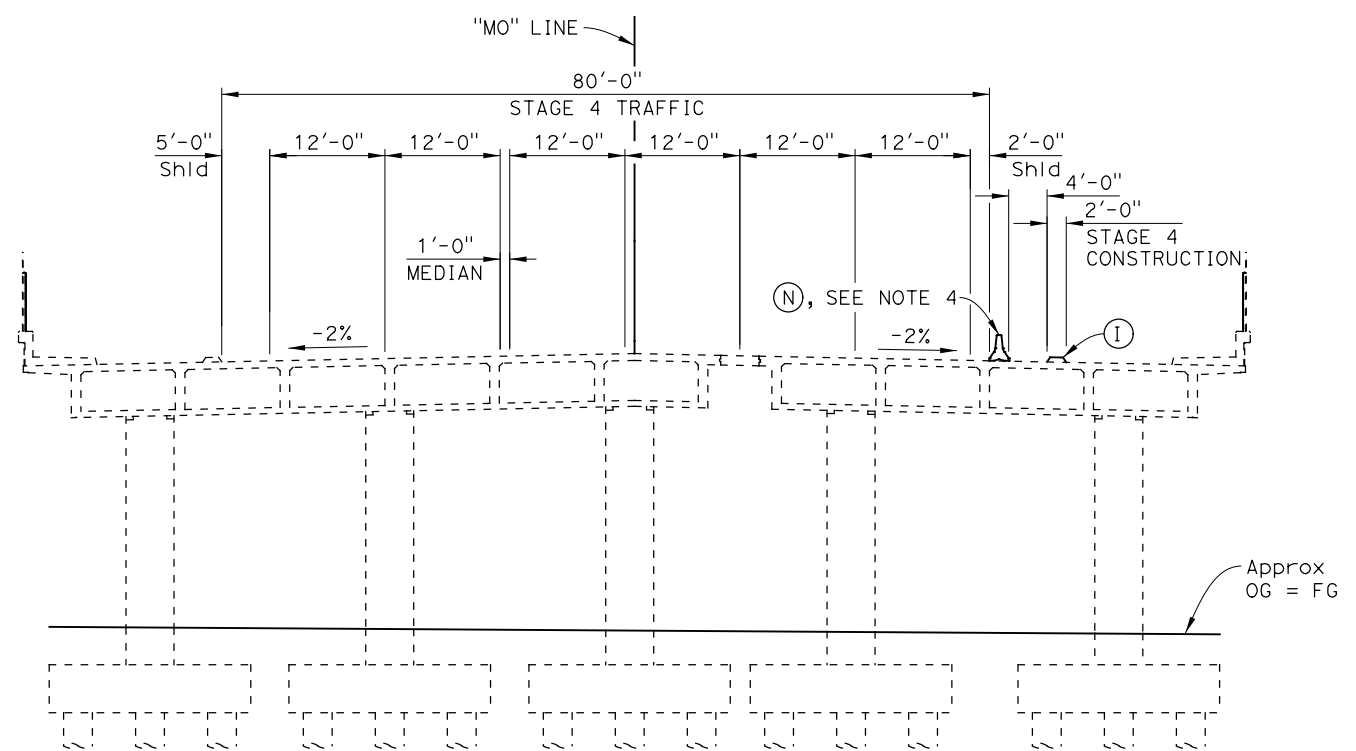
TYPICAL SECTION (STAGE 1)
1" = 10'



TYPICAL SECTION (STAGE 2)
1" = 10'

- NOTES:
- (B) Concrete Barrier (Type 732SW Mod)
 - (D) Chain Link Railing (Type 7)
 - (E) Closure Pour (4'-0")
 - (I) Raised Island
 - (N) Temporary Railing (Type K), see ROADWAY PLANS
1. Concrete surface texture not shown for clarity.
2. For bridge removal details, see "BRIDGE REMOVAL PLAN" sheet.
3. For additional stage construction information, see ROADWAY PLANS.
4. For additional temporary railing details, see Standard Plan T3A.

- LEGEND:
- Existing Structure
 - Bridge Removal
 - Closure Pour

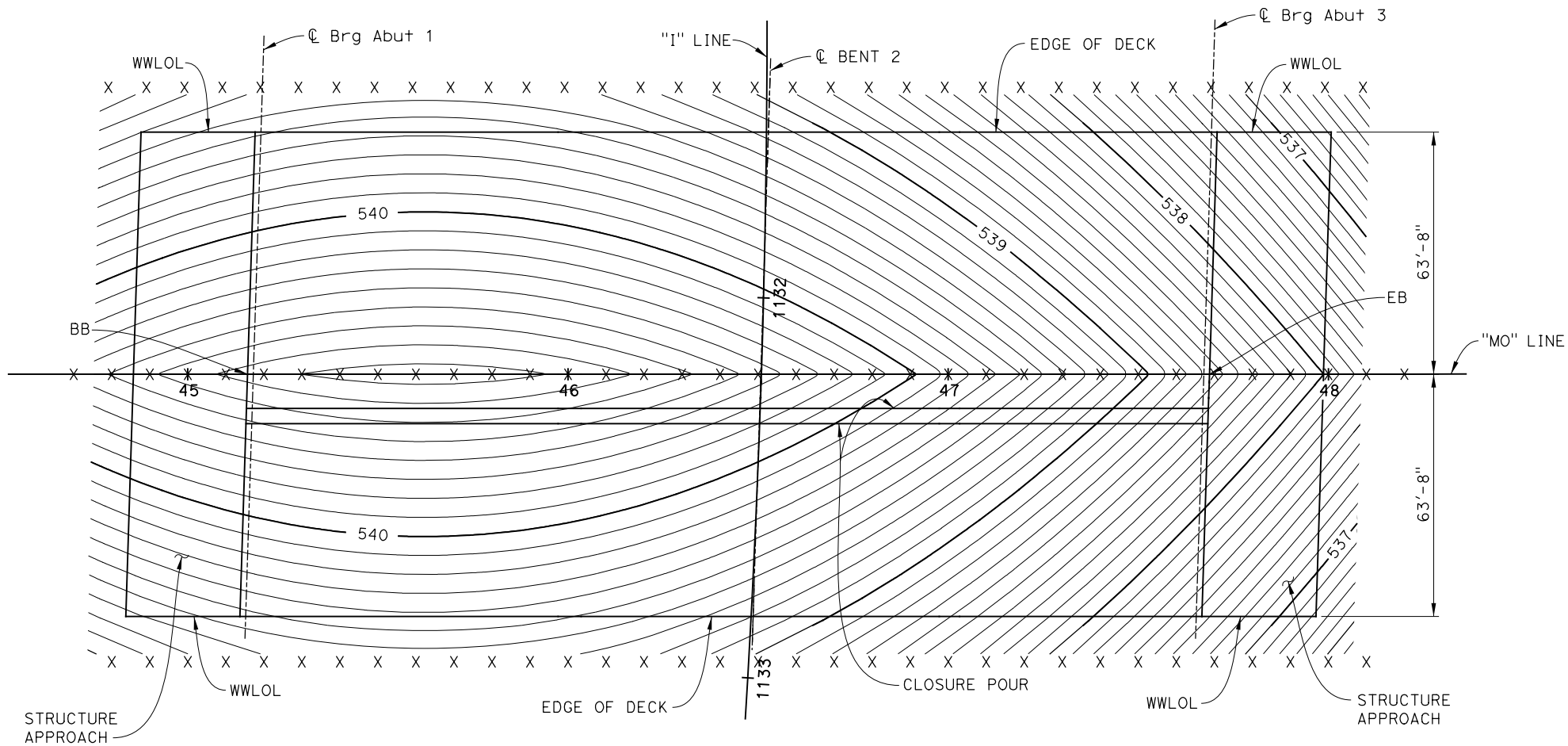


TYPICAL SECTION (STAGE 4)
1" = 10'

NOTE: No bridge construction in Stage 3.

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

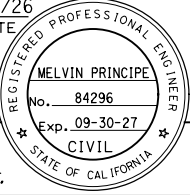
DESIGN OVERSIGHT	DESIGN	BY	M. Principe	CHECKED	G. Douglass	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Casey Weber PROJECT ENGINEER	BRIDGE No.	MONROE STREET OC (REPLACE)									
	DETAILS	BY	S. Weight	CHECKED	G. Douglass			56-0897	STAGE CONSTRUCTION									
	QUANTITIES	BY	M. Principe	CHECKED	A. Botani			POST MILE	R54.74									
SIGN OFF DATE																		
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)	DATE PLOTTED => 1/14/2026		TIME PLOTTED => 4:07:38 PM		ORIGINAL SCALE		PROJECT NUMBER & PHASE: 0800003681		COUNTY/ROUTE: Riv/10		DISREGARD PRINTS BEARING		REVISION DATES		SHEET		OF	
	FILE => 56-0897-b-stgconst		USERNAME => p002118f		IN INCHES FOR REDUCED PLANS				CONTRACT No.: 08-OK7304		EARLIER REVISION DATES		08/23/24 03/16/25 08/11/25 01/23/26		3		47	



PLAN
1" = 20'

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

		DESIGN		BY M. Principe	CHECKED G. Douglass	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Casey Weber PROJECT ENGINEER		BRIDGE No. 56-0897	MONROE STREET OC (REPLACE)												
DESIGN OVERSIGHT		DETAILS		BY S. Weight	CHECKED G. Douglass		POST MILE R54.74	DECK CONTOURS														
SIGN OFF DATE		QUANTITIES		BY M. Principe	CHECKED A. Botani																	
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)		DATE PLOTTED => 1/14/2026 FILE => 56-0897-d-dc01.dgn					TIME PLOTTED => 4:07:50 PM USERNAME => p002118f				ORIGINAL SCALE IN INCHES FOR REDUCED PLANS		01									
											PROJECT NUMBER & PHASE: 0800003681		COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304		DISREGARD PRINTS BEARING EARLIER REVISION DATES		REVISION DATES		SHEET		OF	
															08/23/24 03/16/25 08/11/25 01/23/26		4		47			

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
8	Riv	10	R53.9/R55.5		
<i>Melvin Principe</i> REGISTERED CIVIL ENGINEER			1/23/26 DATE		
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT 4080 LEMON STREET RIVERSIDE, CA 92501					
PARSONS 2201 DUPONT DRIVE, SUITE 200 IRVINE, CA 92612					

- NOTES:
- Contours do not include camber or falsework settlement.
 - Contour interval is 0.1'.
- LEGEND:
- X - 10' intervals along "MO" Line

PILE DATA TABLE						
LOCATION	PILE TYPE	NOMINAL RESISTANCE (KIPS)		DESIGN TIP ELEVATION (FT)	SPECIFIED TIP ELEVATION (FT)	NOMINAL DRIVING RESISTANCE (KIPS)
		COMPRESSION	TENSION			
Abut 1	HP 10x57	280	10	469(a); 509(b); 494(c); 504(d)	469	280
BENT 2	36" CIDH	1500	630	426(a); 446(b); 465(c); 475(d)	426	N/A
Abut 3	HP 10x57	260	30	471(a); 498(b); 491(c); 503(d)	471	260

- NOTES:
- Design tip elevations are controlled by: (a) Compression, (b) Tension, (c) Settlement, and (d) Lateral Load.
 - The Specified Tip Elevation at abutments must not be raised above the design tip elevation for tension, settlement, or lateral load.
 - The Specified Tip Elevation at Bent 2 must not be raised.

BENCHMARK				
BENCHMARK	NORTHING	EASTING	Elev (ft)	DESCRIPTION
13	2211758.322	6567690.745	512.56 *	Set 3/8" rebar with plastic cap "RIV CO TRANS", flush in 4"x4" aerial target, located on levee road southerly side of Coachella Valley Stormwater Channel, 1030±' easterly of Monroe Street Bridge over channel
206	2214317.553	6561216.577	529.09 *	FD. 1" IP with tag "RIV CO SUR" down 0.8', accept as NW corver of Section 15 and intersection of centerline Avenue 42 & Madison Street

SURVEY CONTROL:
Horizontal control for this survey is based on the North American Datum of 1983 (NAD83) and the California Coordinate System (CCS83), Zone 6, 2010.00 Epoch.
Vertical control is based on the North American Vertical Datum of 1988 (NAVD88).
* Added 500.00' to all elevations to avoid working with negative elevations.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
8	Riv	10	R53.9/R55.5		

Melvin Principe
REGISTERED CIVIL ENGINEER
1/23/26
DATE

MELVIN PRINCIPLE
No. 84296
Exp. 09-30-27
CIVIL
STATE OF CALIFORNIA

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

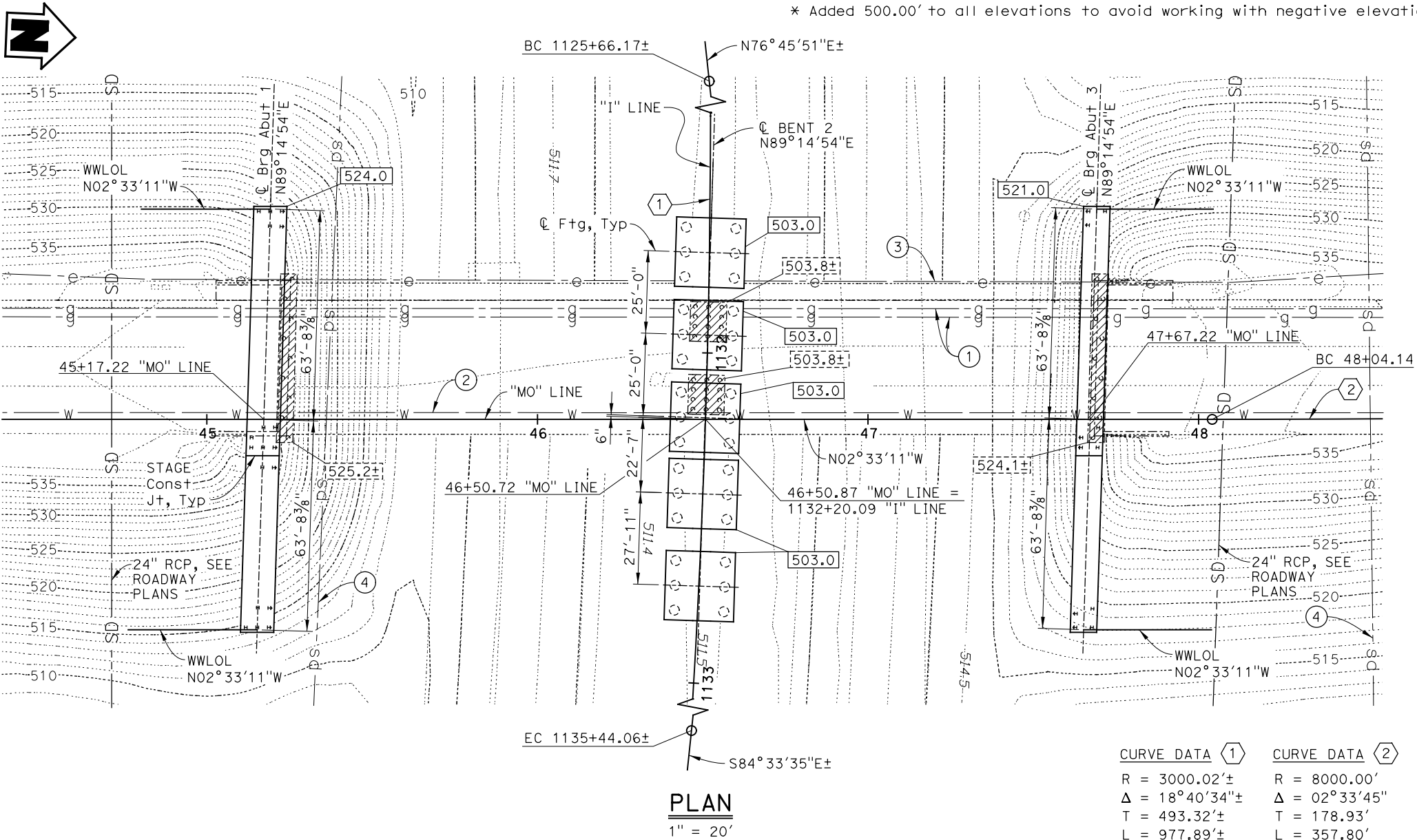
RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT
4080 LEMON STREET
RIVERSIDE, CA 92501

PARSONS
2201 DUPONT DRIVE, SUITE 200
IRVINE, CA 92612

- NOTES:
- Contours shown represent approximate existing ground.
 - The types and locations of all utilities are provided for information only and must be protected in place or relocated during construction, unless otherwise noted. The Contractor must verify all existing utilities and notify Utility Agencies prior to any removal, relocation or new construction. See ROADWAY PLANS for utility details not shown.
 - All piles not shown.
 - Existing foundation elevations shown have been adjusted from the as-built datum to the NAVD88 datum by +2.2 feet.

- LEGEND:
- Bridge Removal
 - Bottom of Footing Elevation
 - Bottom of Existing Footing Elevation
 - Existing Structure
 - Vertical Steel HP Pile
 - Battered Steel HP Pile
 - CIDH Concrete Pile
 - Existing Vertical Concrete Pile

- EXISTING UTILITIES (SEE NOTE 2):
- 6" Gas (SCG) (relocate in structure)
 - 12" Water (IWA) (relocate in structure)
 - Sprinkler Control (Caltrans) (relocate in structure)
 - 24" CMP (to be removed)



NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

		SCALE: AS SHOWN		VERT.DATUM NAVD88		HORZ.DATUM NAD83		DESIGN BY M. Principe		CHECKED G. Douglass		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		Casey Weber PROJECT ENGINEER		BRIDGE No.		MONROE STREET OC (REPLACE)																	
DESIGN OVERSIGHT		PHOTOGRAMMETRY AS OF: 01/05/18		ALIGNMENT TIES: 03/27/18		DETAILS BY S. Weight		CHECKED G. Douglass		56-0897						POST MILE																			
SIGN OFF DATE		SURVEYED BY J. Morris		DRAFTED BY K. Vinson		QUANTITIES BY M. Principe		CHECKED A. Botani		R54.74						FOUNDATION PLAN																			
		FIELD CHECKED BY G. Ness		CHECKED BY P. Hillmer																															
STRUCTURES FOUNDATION PLAN SHEET (ENGLISH) (REVISION 8/16/2021)		DATE PLOTTED => 1/14/2026 FILE => 56-0897-e-fdp101										TIME PLOTTED => 4:08:02 PM USERNAME => p002118f										PROJECT NUMBER & PHASE: 0800003681		COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304		DISREGARD PRINTS BEARING EARLIER REVISION DATES		REVISION DATES				SHEET		OF	
												0 1 2 3																08/25/24 03/16/25 08/11/25 01/23/26				5		47	

Dist

COUNTY

ROUTE

POST MILES
TOTAL PROJECT

SHEET
NO.

TOTAL
SHEETS

8

Riv

10

R53.9/R55.5

Melvin Principe

REGISTERED CIVIL ENGINEER

1/23/26

DATE

REGISTERED PROFESSIONAL ENGINEER

MELVIN PRINCIPLE

No. 84296

Exp. 09-30-27

CIVIL

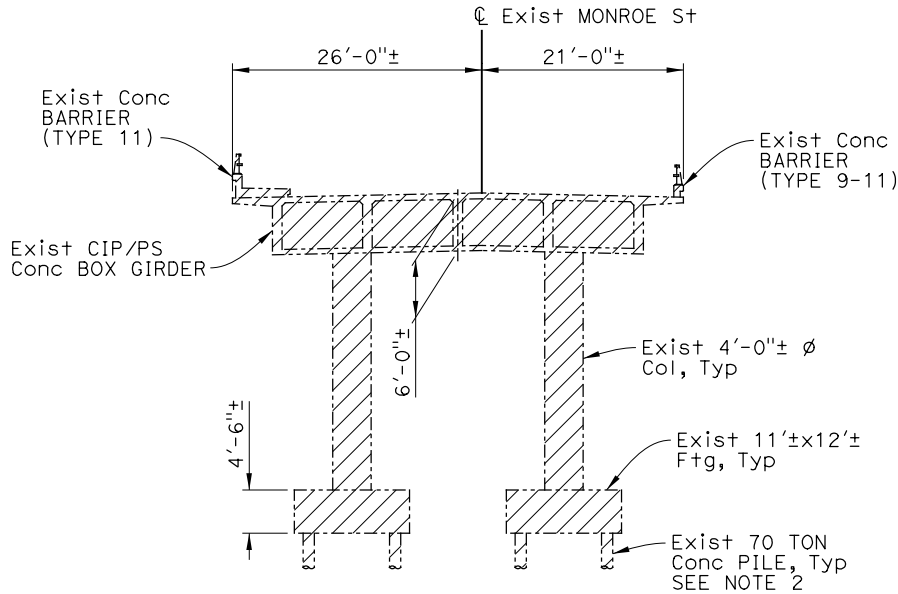
STATE OF CALIFORNIA

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS
SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR
COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

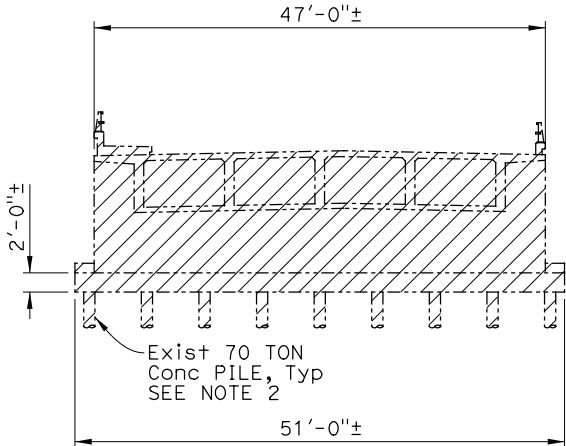
RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT
4080 LEMON STREET
RIVERSIDE, CA 92501

PARSONS
2201 DUPONT DRIVE, SUITE 200
IRVINE, CA 92612



TYPICAL SECTION
1" = 10'

NOTE: Exist bridge mounted signs not shown.

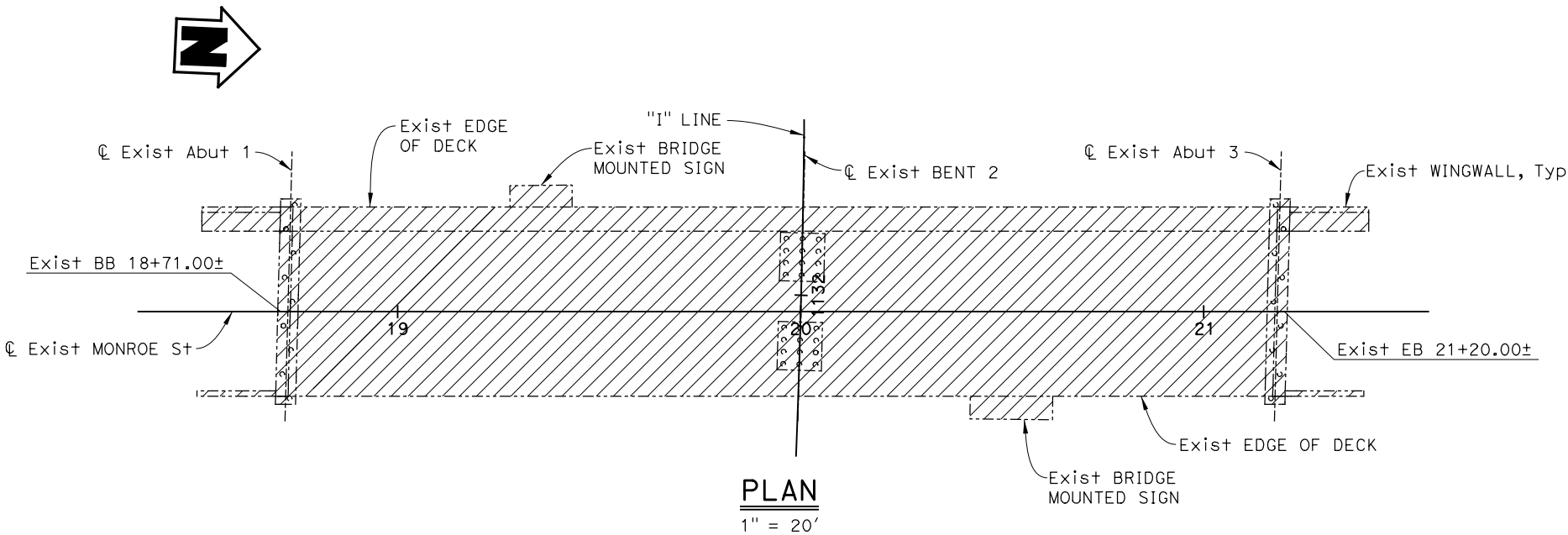


ABUTMENT ELEVATION
1" = 10'

NOTE: Exist Abut 1 shown, Exist Abut 3 similar.

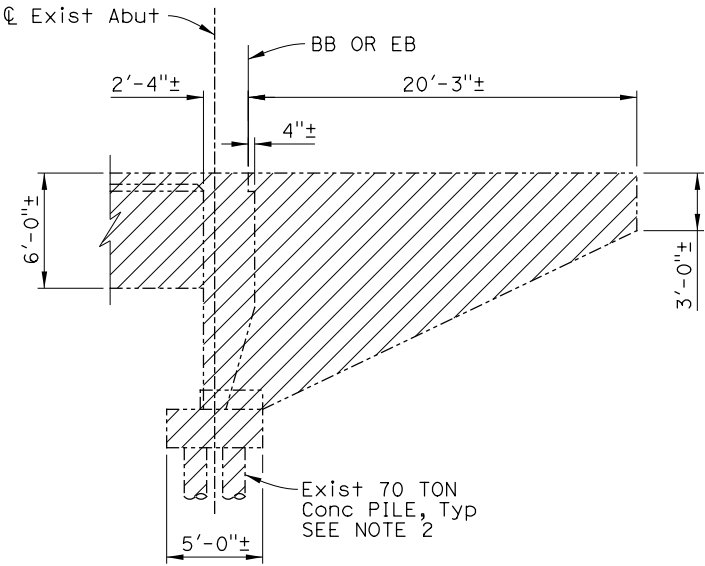
- NOTES:
- For dimensions, details and information not shown, see As-Built plans.
 - Remove existing piles 3'-0" Min below bottom of proposed footings.

- LEGEND:
- Existing Structure
 - Bridge Removal



PLAN
1" = 20'

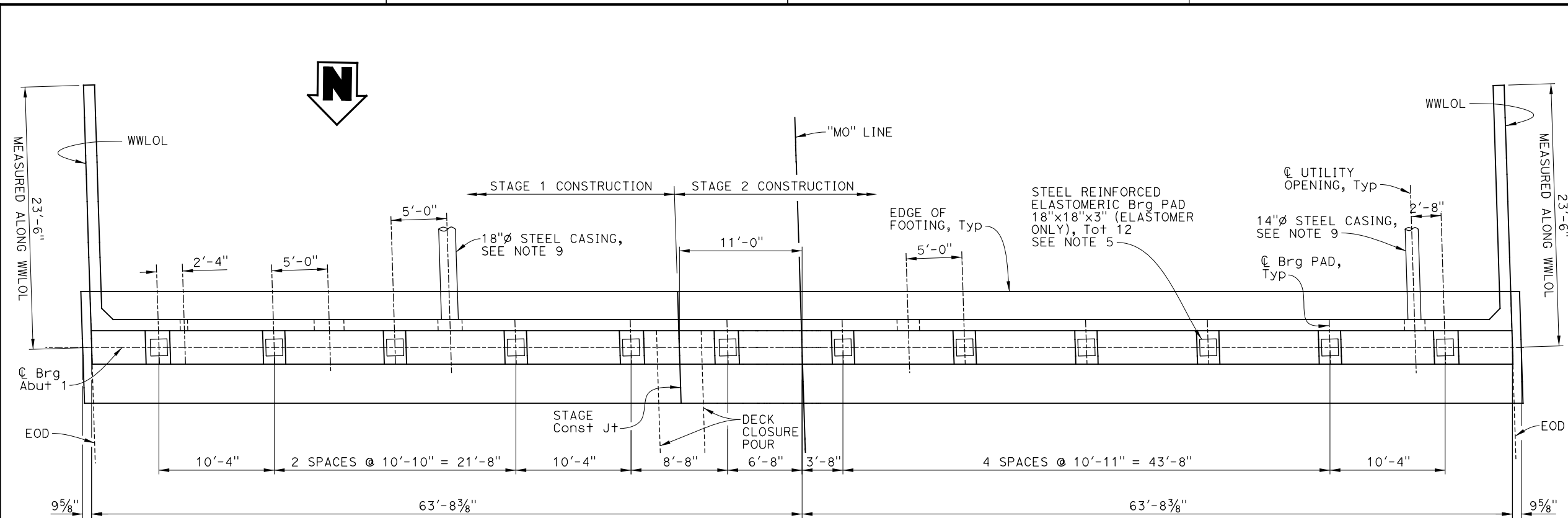
NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.



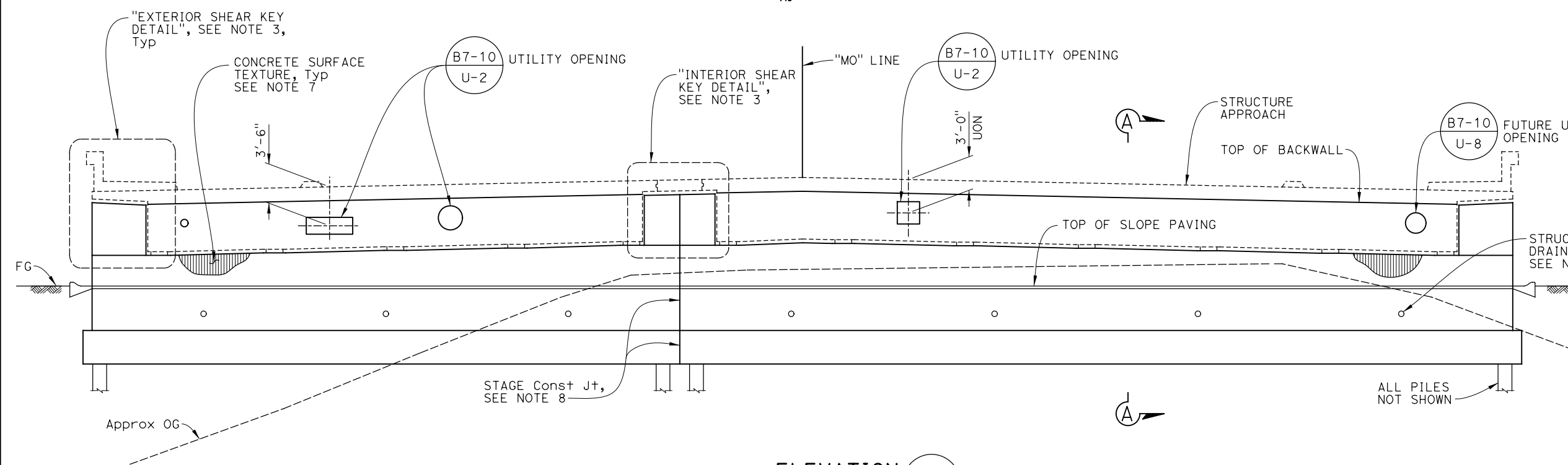
WINGWALL ELEVATION
1" = 5'

NOTE: Exist Abut 3 right shown, all others similar.

				DESIGN BY M. Principe CHECKED G. Douglass		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		BRIDGE No. 56-0897		MONROE STREET OC (REPLACE)																											
DESIGN OVERSIGHT				DETAILS BY S. Weight CHECKED G. Douglass				Casey Weber PROJECT ENGINEER								POST MILE R54.74																					
SIGN OFF DATE				QUANTITIES BY M. Principe CHECKED A. Botani																																	
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)				DATE PLOTTED => 1/14/2026 FILE => 56-0897-e-rem01		TIME PLOTTED => 4:08:11 PM USERNAME => p002118f		ORIGINAL SCALE IN INCHES FOR REDUCED PLANS		0		1		2		3		PROJECT NUMBER & PHASE: 0800003681				COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304				DISREGARD PRINTS BEARING EARLIER REVISION DATES				REVISION DATES 08/23/24 03/16/25 08/11/25 01/23/26				SHEET 6		OF 47	



PLAN
3/16" = 1'-0"



ELEVATION
3/16" = 1'-0"

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
8	Riv	10	R53.9/R55.5		

Melvin Principe 1/23/26
REGISTERED CIVIL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER
No. 84296
Exp. 09-30-27
CIVIL
STATE OF CALIFORNIA

PLANS APPROVAL DATE

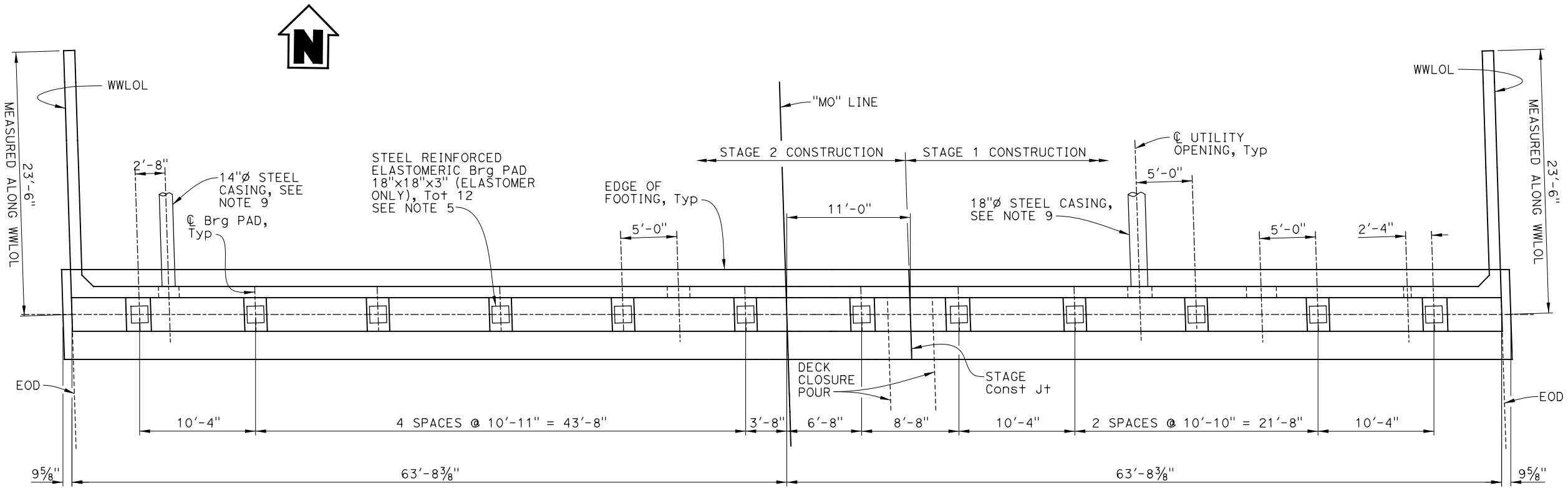
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT
4080 LEMON STREET
RIVERSIDE, CA 92501

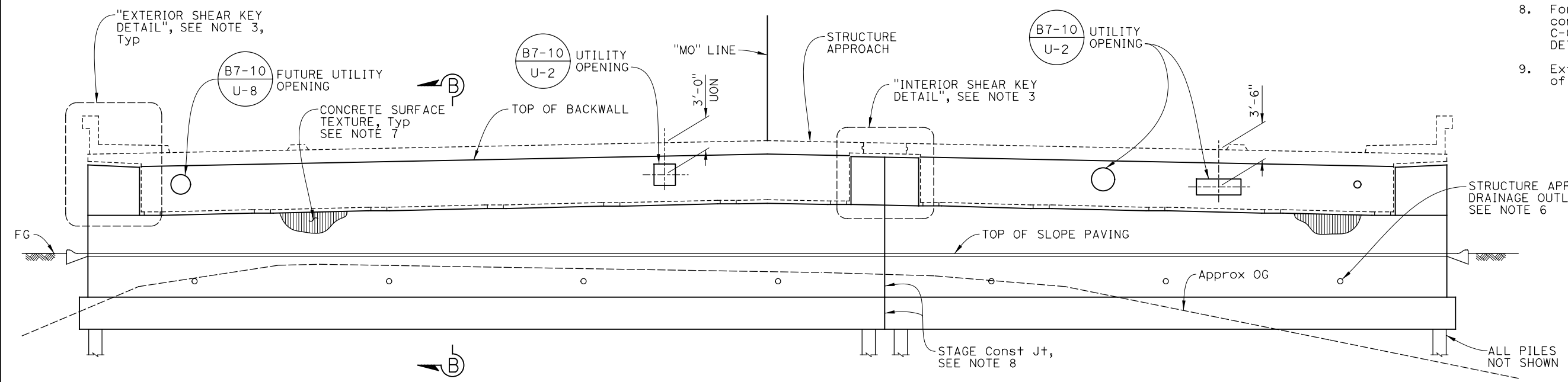
PARSONS
2201 DUPONT DRIVE, SUITE 200
IRVINE, CA 92612

- NOTES:
- For footing and pile layout, see "ABUTMENT FOOTING PLAN" sheet.
 - For "SECTION A-A", see "ABUTMENT DETAILS No. 1" sheet.
 - For "EXTERIOR SHEAR KEY DETAIL" and "INTERIOR SHEAR KEY DETAIL", see "ABUTMENT DETAILS No. 2" sheet.
 - For utility opening information, see "UTILITY OPENING TABLE" on "INDEX TO PLANS" sheet.
 - For "BEARING PAD DETAIL", see "ABUTMENT DETAILS No. 3" sheet.
 - For drainage details, see "STRUCTURE APPROACH DETAILS" sheet.
 - For concrete surface texture details, see "ARCHITECTURAL DETAILS No. 3" sheet.
 - For stage construction joint connection details, see "SECTION C-C" and "SECTION F-F" on "ABUTMENT DETAILS No. 2" sheet.
 - Extend steel casing 5'-0" beyond end of structure approach.

DESIGN OVERSIGHT	BY M. Principe	CHECKED G. Douglass	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Casey Weber PROJECT ENGINEER	BRIDGE No.	MONROE STREET OC (REPLACE)									
					56-0897										
					POST MILE										
SIGN OFF DATE	BY S. Weight	CHECKED G. Douglass	0	1	2	3	PROJECT NUMBER & PHASE: 0800003681	COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES				SHEET 7	OF 47
QUANTITIES	BY M. Principe	CHECKED A. Botani								08/23/24	03/16/25	08/11/25	01/23/26		
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)			DATE PLOTTED => 1/14/2026 FILE => 56-0897-f-g01.1001			TIME PLOTTED => 4:36:02 PM USERNAME => p002118F			ORIGINAL SCALE IN INCHES FOR REDUCED PLANS						



PLAN
3/16" = 1'-0"



ELEVATION
3/16" = 1'-0"

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
8	Riv	10	R53.9/R55.5		

Melvin Principe 1/23/26
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS
SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR
COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT
4080 LEMON STREET
RIVERSIDE, CA 92501

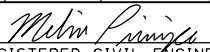
PARSONS
2201 DUPONT DRIVE, SUITE 200
IRVINE, CA 92612

- NOTES:
- For footing and pile layout, see "ABUTMENT FOOTING PLAN" sheet.
 - For "SECTION B-B", see "ABUTMENT DETAILS No. 1" sheet.
 - For "EXTERIOR SHEAR KEY DETAIL" and "INTERIOR SHEAR KEY DETAIL", see "ABUTMENT DETAILS No. 2" sheet.
 - For utility opening information, see "UTILITY OPENING TABLE" on "INDEX TO PLANS" sheet.
 - For "BEARING PAD DETAIL", see "ABUTMENT DETAILS No. 3" sheet.
 - For drainage details, see "STRUCTURE APPROACH DETAILS" sheet.
 - For concrete surface texture details, see "ARCHITECTURAL DETAILS No. 3" sheet.
 - For stage construction joint connection details, see "SECTION C-C" and "SECTION F-F" on "ABUTMENT DETAILS No. 2" sheet.
 - Extend steel casing 5'-0" beyond end of structure approach.

DESIGN OVERSIGHT		DESIGN BY M. Principe		CHECKED G. Douglass		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		BRIDGE No.		MONROE STREET OC (REPLACE) ABUTMENT 3 LAYOUT																					
		DETAILS BY S. Weight		CHECKED G. Douglass				56-0897																							
SIGN OFF DATE		QUANTITIES BY M. Principe		CHECKED A. Botani				R54.74																							
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)		DATE PLOTTED => 1/14/2026 FILE => 56-0897-f-a01_1o02		TIME PLOTTED => 4:08:29 PM USERNAME => p002118f		ORIGINAL SCALE IN INCHES FOR REDUCED PLANS		0		1		2		3		PROJECT NUMBER & PHASE: 0800003681		COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304		DISREGARD PRINTS BEARING EARLIER REVISION DATES		REVISION DATES		SHEET		OF					
																				08/23/24		03/16/25		08/11/25		01/23/26		8		47	

SUPPLEMENTAL PROJECT INFORMATION, FOUNDATION REPORT - OVERCROSSING, Pg. 206 of 257

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
8	Riv	10	R53.9/R55.5		


REGISTERED CIVIL ENGINEER

1/23/26
DATE

REGISTERED PROFESSIONAL ENGINEER

MELVIN PRINCIPLE

No. 84296

Exp. 09-30-27

CIVIL

STATE OF CALIFORNIA

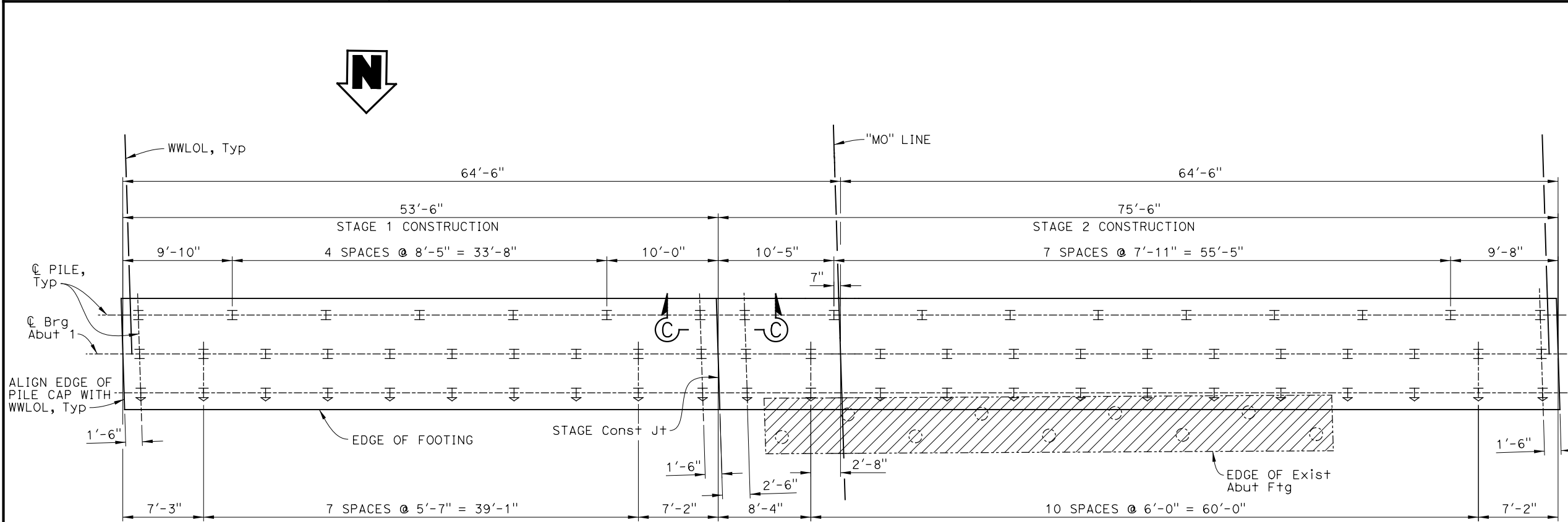
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS
SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR
COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

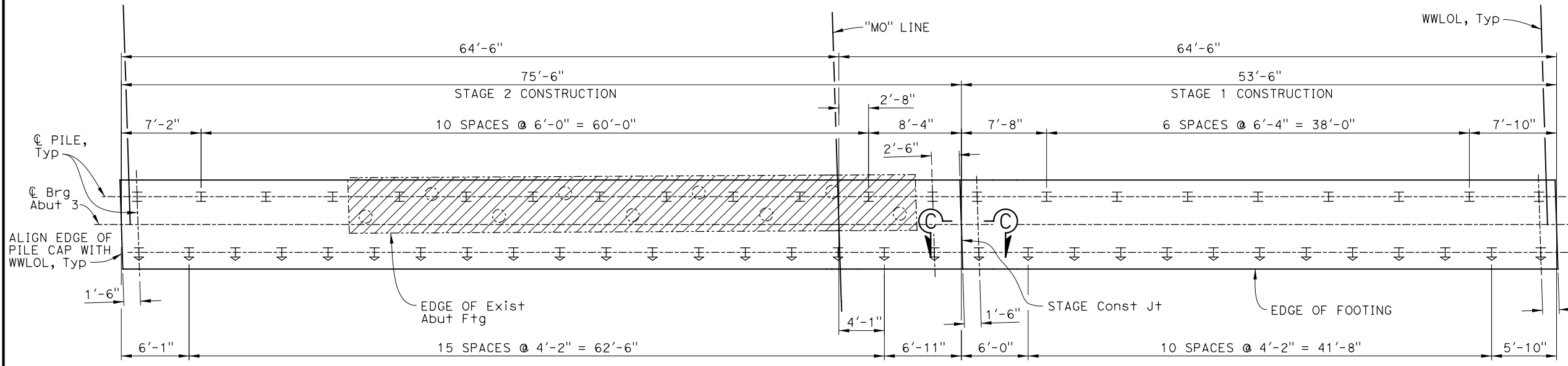
RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT
4080 LEMON STREET
RIVERSIDE, CA 92501

PARSONS
2201 DUPONT DRIVE, SUITE 200
IRVINE, CA 92612

- NOTES:
- Pile locations may be adjusted to avoid conflict with existing piles as directed by the Engineer.
 - Location of existing piles and foundations are approximate.
 - Piles must be oriented as shown.
 - For "SECTION C-C", see "ABUTMENT DETAILS No. 2" sheet.
- LEGEND:
- Existing Structure
 -  Bridge Removal
 -  Vertical Steel HP Pile
 -  1:3 Battered Steel HP Pile
 -  Existing Vertical Concrete Pile



FOOTING PLAN - ABUTMENT 1
 $\frac{3}{16}" = 1'-0"$



FOOTING PLAN - ABUTMENT 3
 $\frac{3}{16}" = 1'-0"$

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

DESIGN OVERSIGHT		BY M. Principe		CHECKED G. Douglass		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		BRIDGE No.		MONROE STREET OC (REPLACE) ABUTMENT FOOTING PLAN									
								56-0897											
								R54.74											
SIGN OFF DATE		DETAILS BY S. Weight		CHECKED G. Douglass		Casey Weber PROJECT ENGINEER													
		QUANTITIES BY M. Principe		CHECKED A. Botani															
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)		DATE PLOTTED => 1/14/2026		TIME PLOTTED => 4:08:39 PM		ORIGINAL SCALE		PROJECT NUMBER & PHASE: 0800003681		COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304		DISREGARD PRINTS BEARING EARLIER REVISION DATES		REVISION DATES		SHEET		OF	
		FILE => 56-0897-T-G01-1003		USERNAME => p002118F		IN INCHES FOR REDUCED PLANS								08/25/24		03/16/25		08/17/25	

SUPPLEMENTAL PROJECT INFORMATION, FOUNDATION REPORT - OVERCROSSING, Pg. 207 of 257

LEGEND:
—|— Headed reinforcement

- NOTES:
- For drainage details, see "STRUCTURE APPROACH DETAILS" sheet.
 - For "a" dimension, see Standard Plan B6-21.
 - For additional reinforcement at shear keys, see "ABUTMENT DETAILS No. 2" sheet.
 - For concrete surface texture details, see "ARCHITECTURAL DETAILS No. 3" sheet.
 - Place backwall after prestressing is complete.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
8	Riv	10	R53.9/R55.5		

Melvin Principe

REGISTERED CIVIL ENGINEER

1/23/26

DATE

REGISTERED PROFESSIONAL ENGINEER

MELVIN PRINCIPLE

No. 84296

Exp. 09-30-27

CIVIL

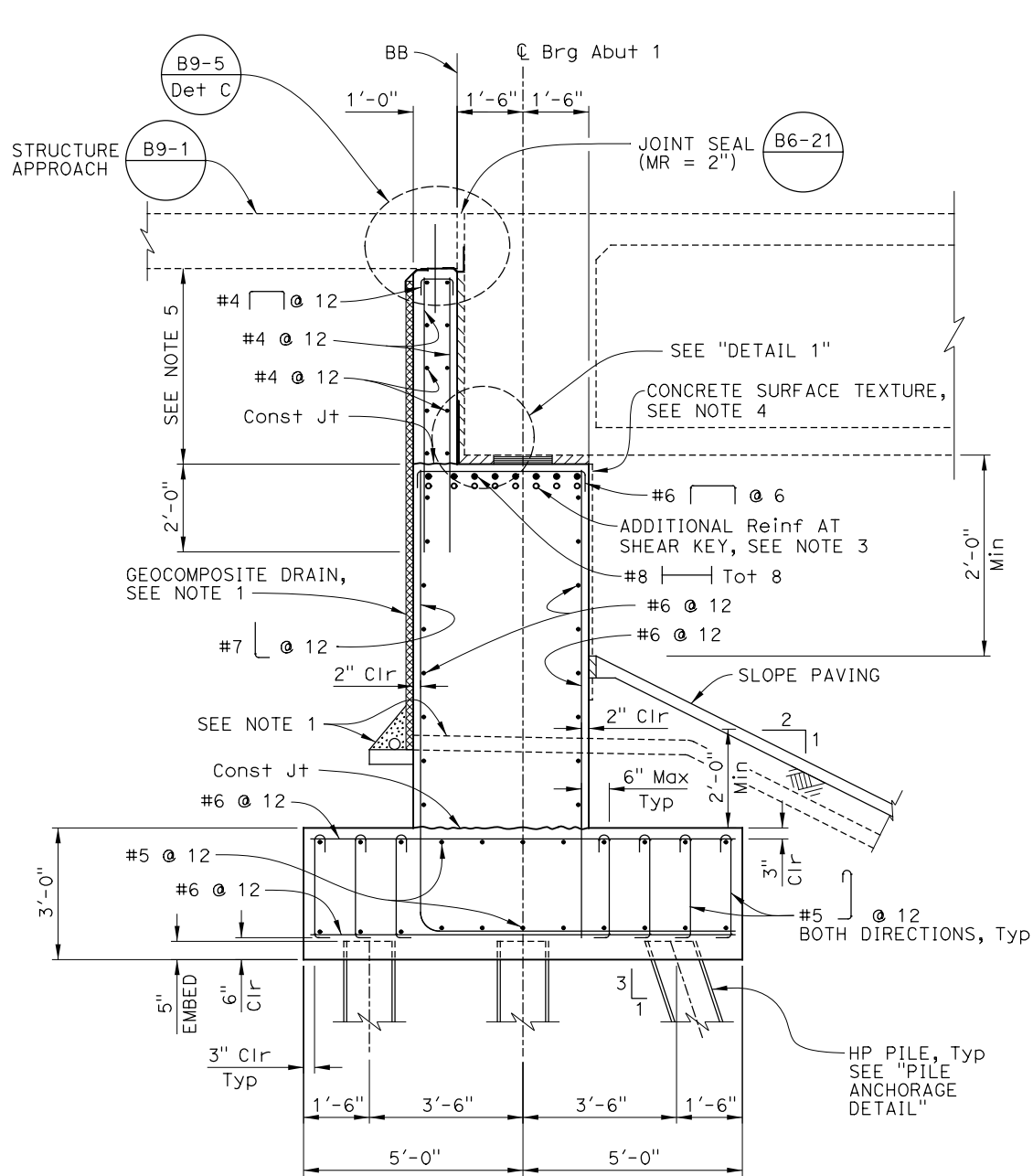
STATE OF CALIFORNIA

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

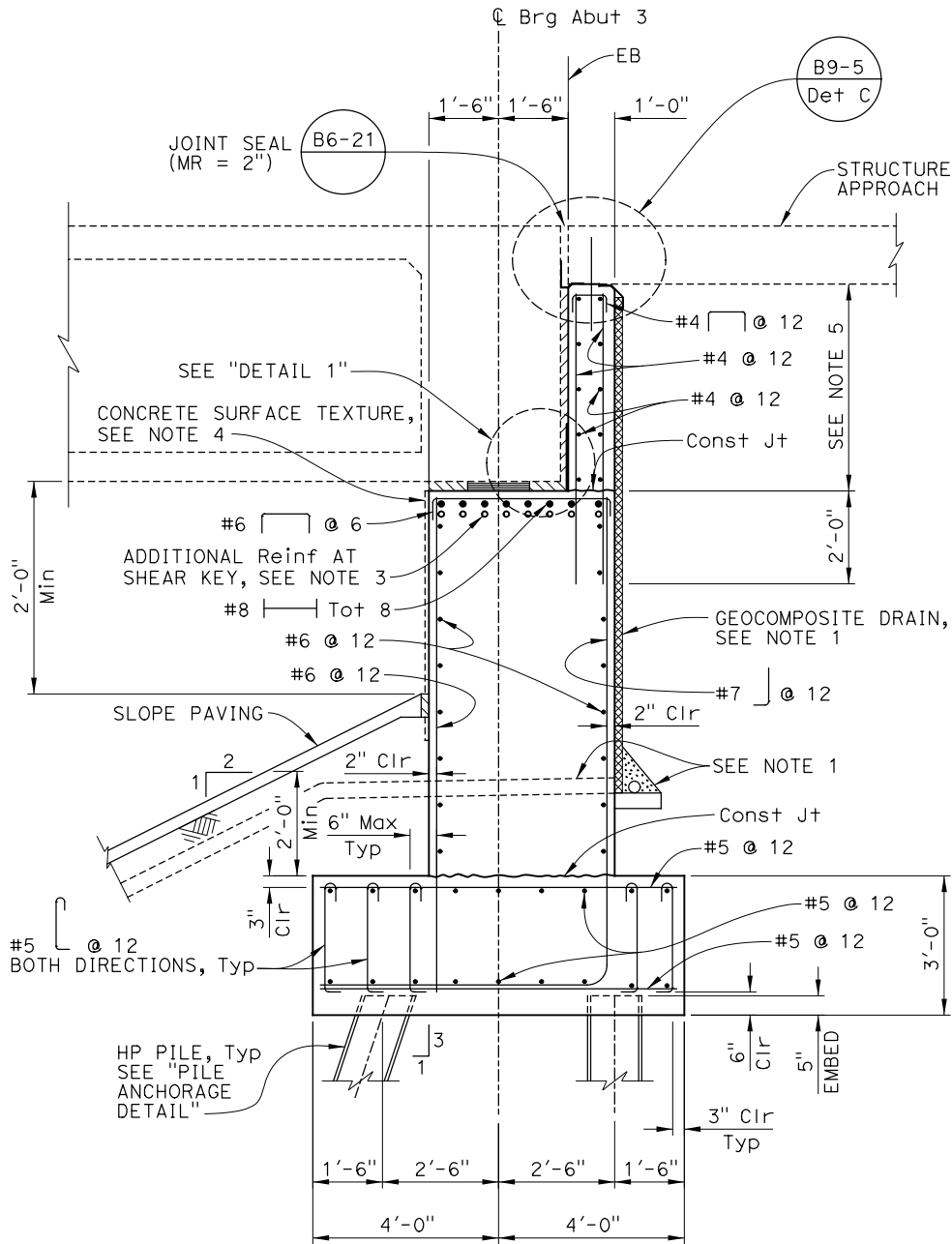
RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT
4080 LEMON STREET
RIVERSIDE, CA 92501

PARSONS
2201 DUPONT DRIVE, SUITE 200
IRVINE, CA 92612

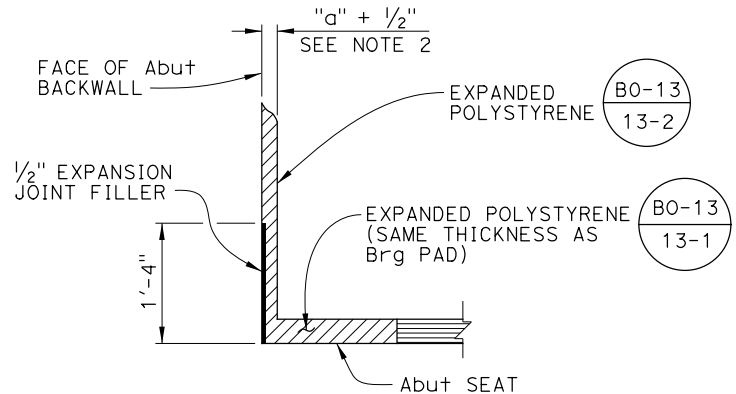


SECTION A-A
1/2" = 1'-0"

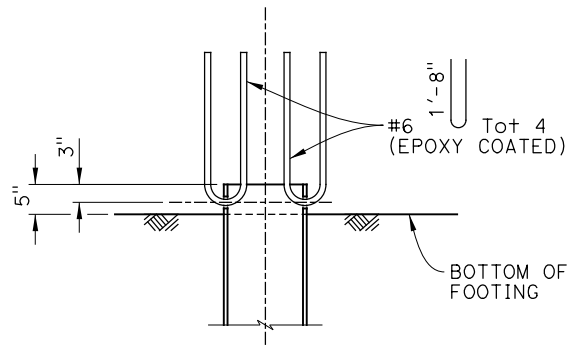
NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.



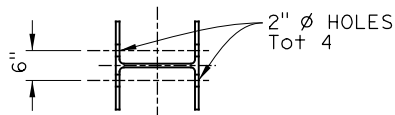
SECTION B-B
1/2" = 1'-0"



DETAIL 1
NO SCALE



ELEVATION



PLAN

PILE ANCHORAGE DETAIL
NO SCALE

DESIGN OVERSIGHT	DESIGN BY M. Principe	CHECKED G. Douglass	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	CASEY WEBER PROJECT ENGINEER	BRIDGE No. 56-0897 POST MILE R54.74	MONROE STREET OC (REPLACE) ABUTMENT DETAILS No. 1
SIGN OFF DATE	DETAILS BY S. Weight	CHECKED G. Douglass				
	QUANTITIES BY M. Principe	CHECKED A. Botani				

STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)

DATE PLOTTED => 1/14/2026 TIME PLOTTED => 4:08:48 PM ORIGINAL SCALE IN INCHES FOR REDUCED PLANS

FILE => 56-0897-T-001d101 USERNAME => p002118f

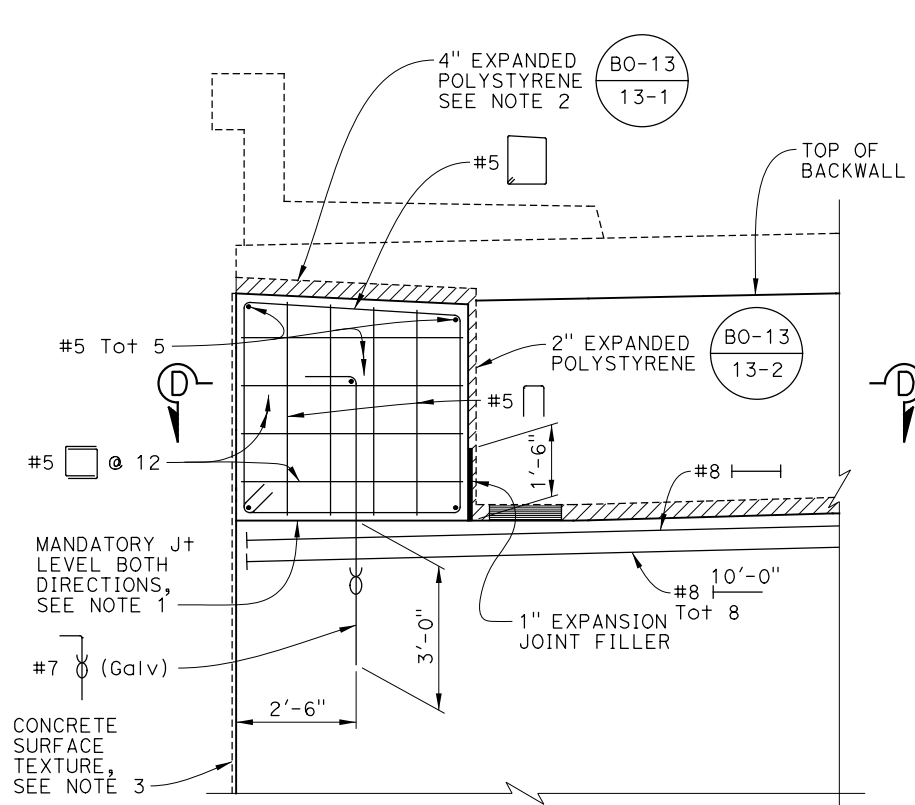
PROJECT NUMBER & PHASE: 0800003681

COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES

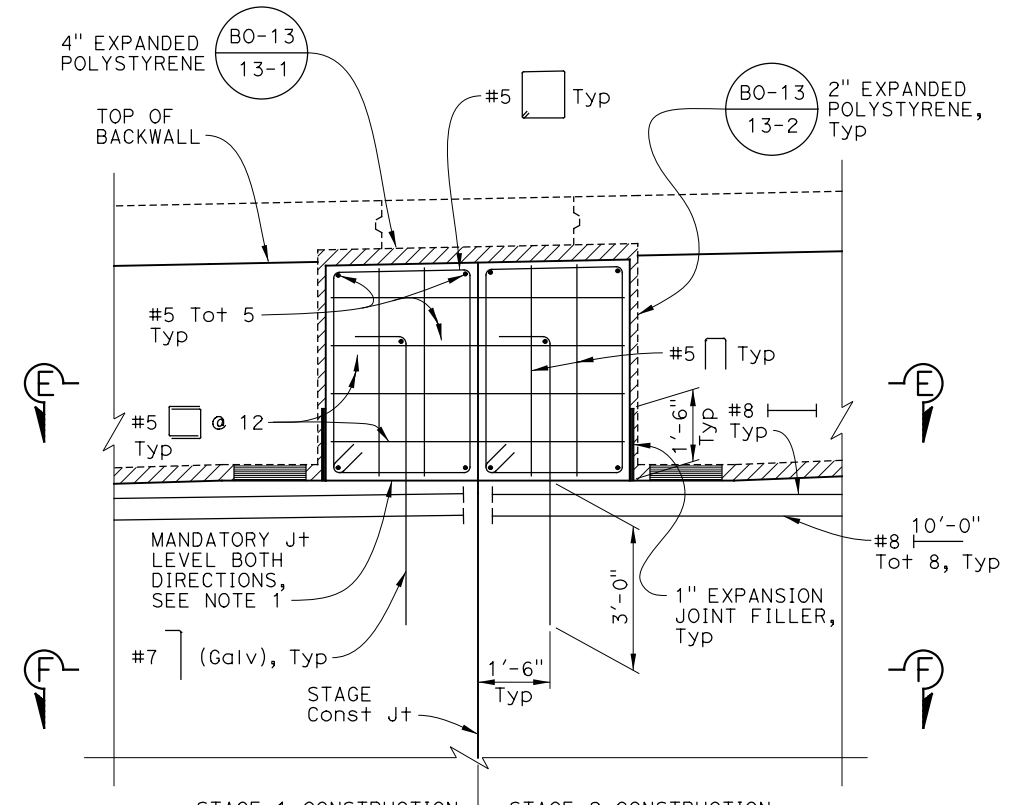
SHEET 10 OF 47



EXTERIOR SHEAR KEY DETAIL

1/2" = 1'-0"

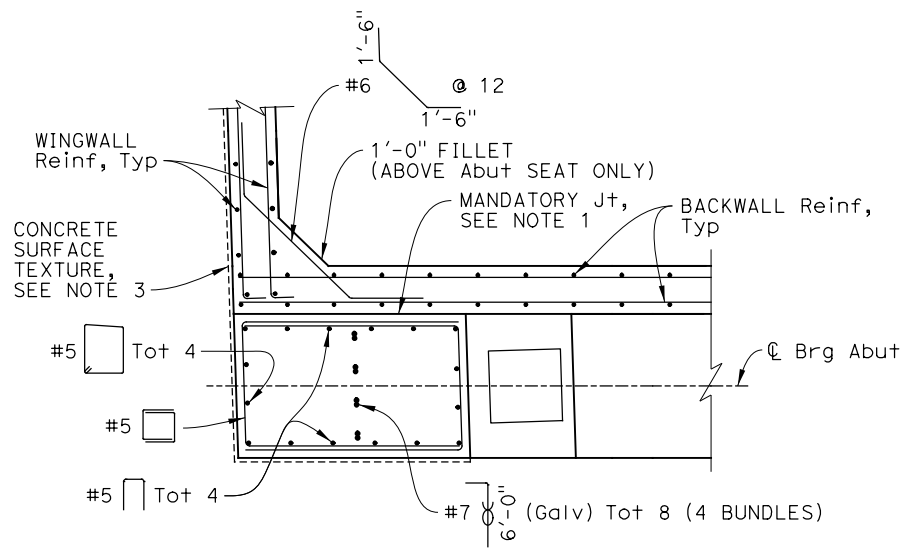
NOTE: Abut 1 right exterior shear key shown, all others similar.



INTERIOR SHEAR KEY DETAIL

1/2" = 1'-0"

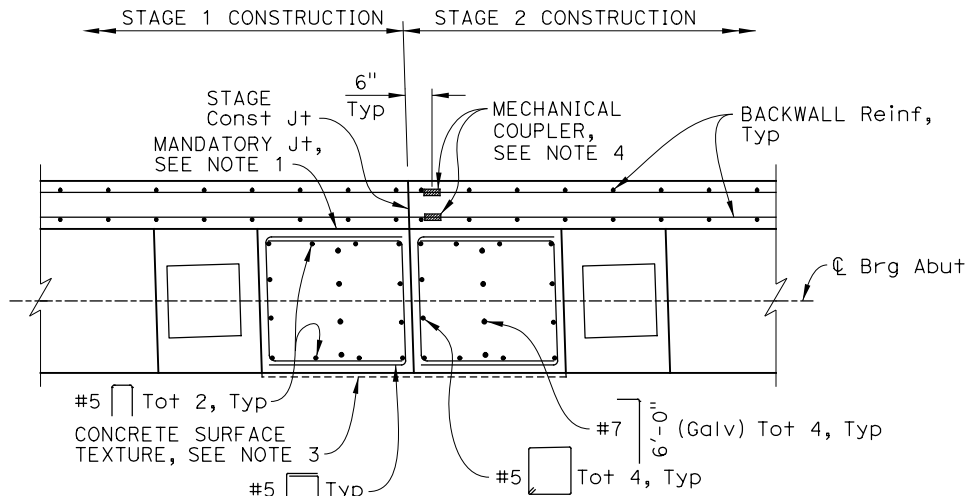
NOTE: Abut 1 interior shear key shown, Abut 3 interior shear key similar.



SECTION D-D

1/2" = 1'-0"

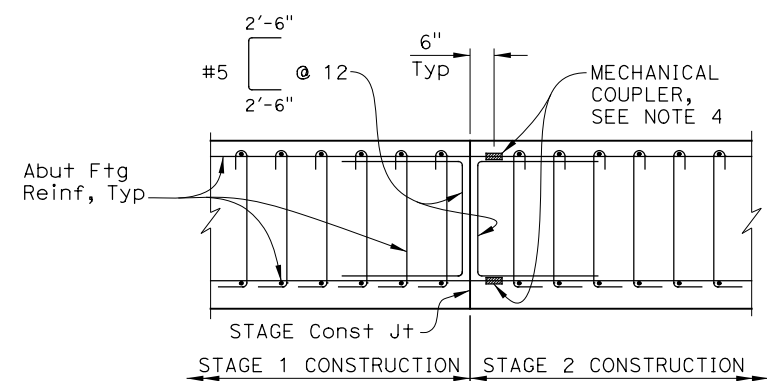
NOTE: THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.



SECTION E-E

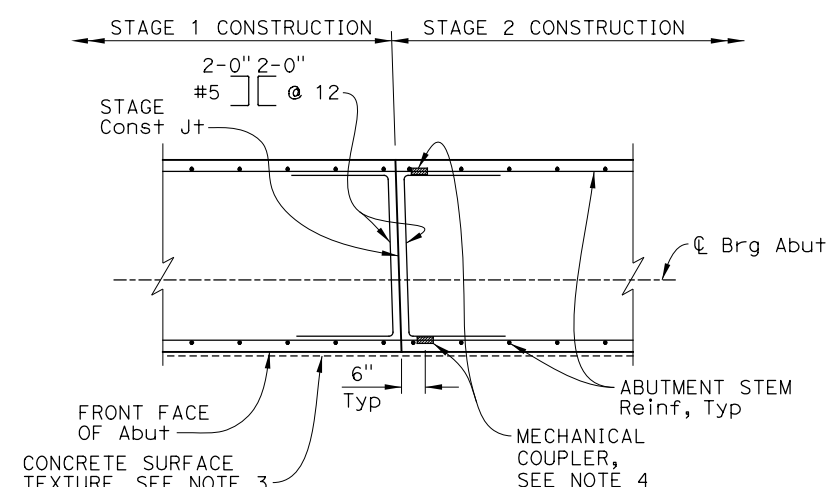
1/2" = 1'-0"

- NOTES:
- Mandatory joint must be smooth finished and lined with 15 pound construction paper.
 - Outer 6" of expanded polystyrene to be removed after construction.
 - For concrete surface texture details, see "ARCHITECTURAL DETAILS No. 3" sheet.
 - Provide staggered mechanical couplers at stage construction joint for abutment footing, backwall, and stem reinforcement during Stage 1 construction.
 - For location of "SECTION C-C", see "ABUTMENT FOOTING PLAN" sheet.



SECTION C-C

1/2" = 1'-0"



SECTION F-F

1/2" = 1'-0"

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
8	Riv	10	R53.9/R55.5		

Melvin Principe

REGISTERED CIVIL ENGINEER

1/23/26

DATE

REGISTERED PROFESSIONAL ENGINEER

MELVIN PRINCIPLE

No. 84296

Exp. 09-30-27

CIVIL

STATE OF CALIFORNIA

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT

4080 LEMON STREET

RIVERSIDE, CA 92501

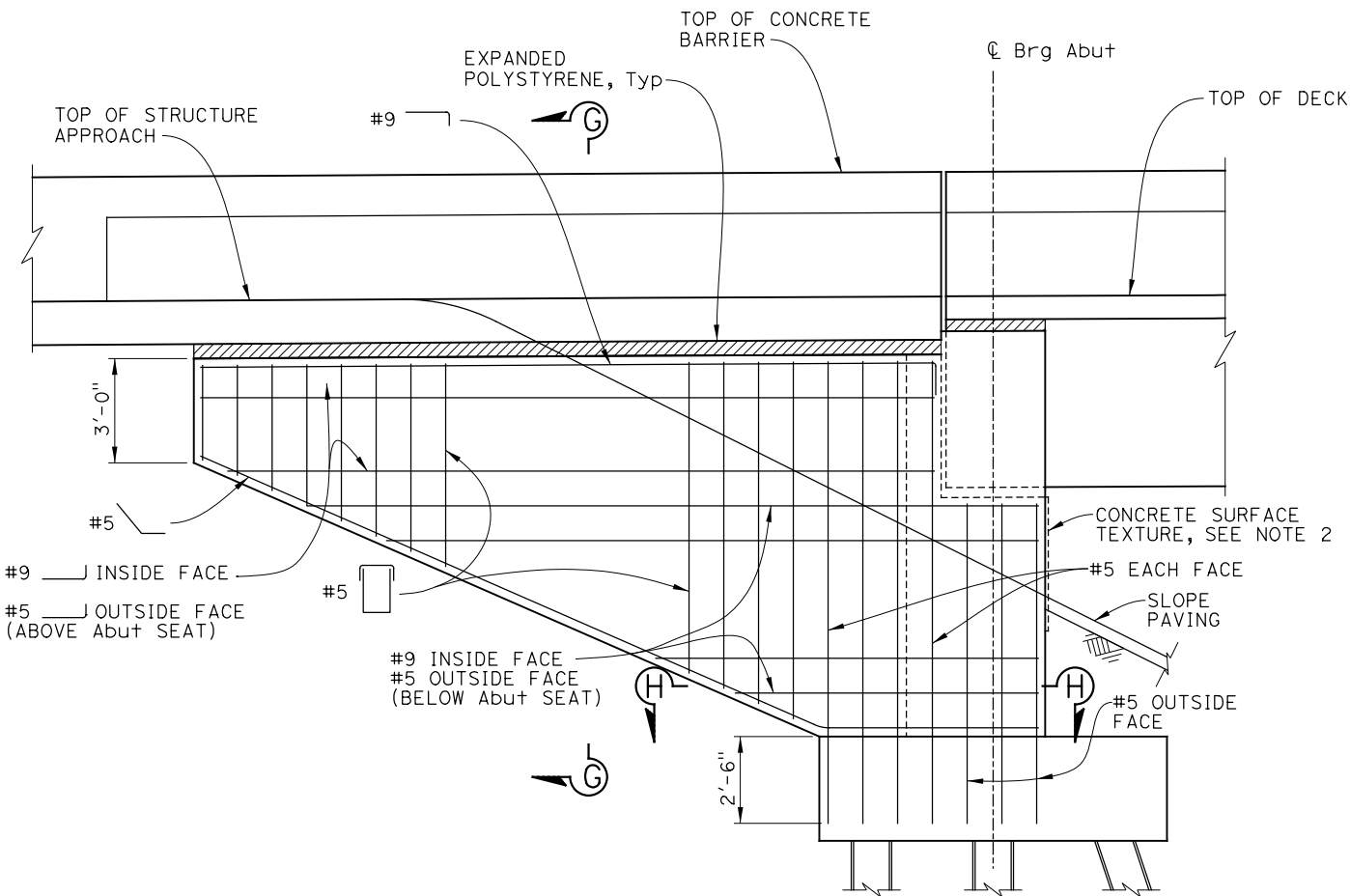
PARSONS

2201 DUPONT DRIVE, SUITE 200

IRVINE, CA 92612

- LEGEND:
- Bundled bars
 - Headed reinforcement

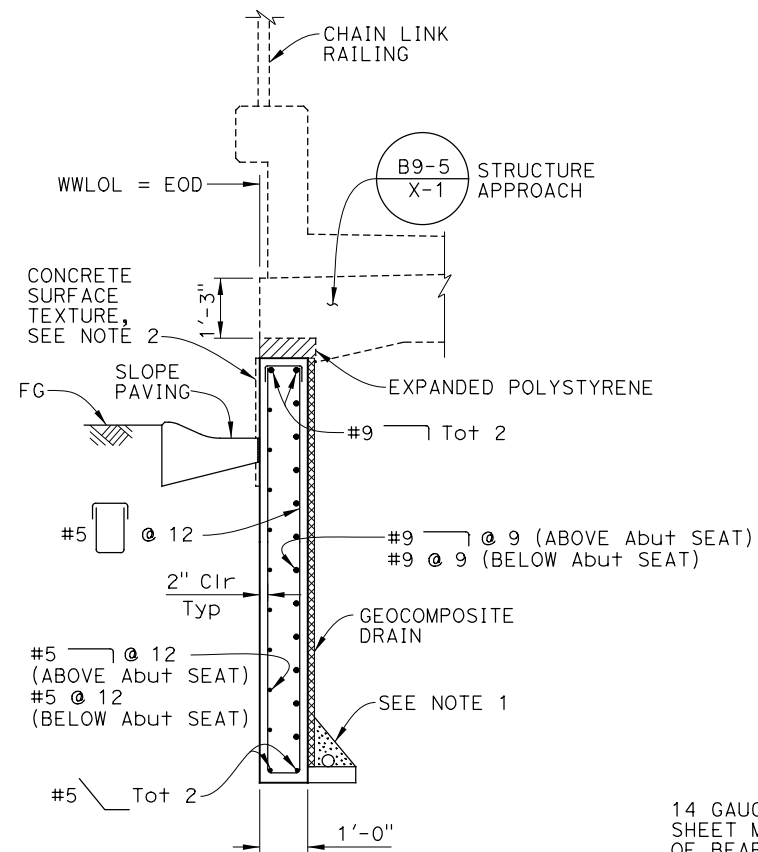
DESIGN OVERSIGHT	SIGN OFF DATE	DESIGN	BY M. Principe	CHECKED G. Douglass	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Casey Weber PROJECT ENGINEER	BRIDGE No.	MONROE STREET OC (REPLACE) ABUTMENT DETAILS No. 2									
		DETAILS	BY S. Weight	CHECKED G. Douglass			56-0897										
		QUANTITIES	BY M. Principe	CHECKED A. Botani			R54.74										
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)		DATE PLOTTED => 1/14/2026 FILE => 56-0897-f-g01d+02		TIME PLOTTED => 4:08:58 PM USERNAME => p002118f		ORIGINAL SCALE IN INCHES FOR REDUCED PLANS		PROJECT NUMBER & PHASE: 0800003681		COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304		DISREGARD PRINTS BEARING EARLIER REVISION DATES		REVISION DATES		SHEET	OF
												08/23/24 03/10/25 08/11/25 01/23/26		11		47	



WINGWALL ELEVATION

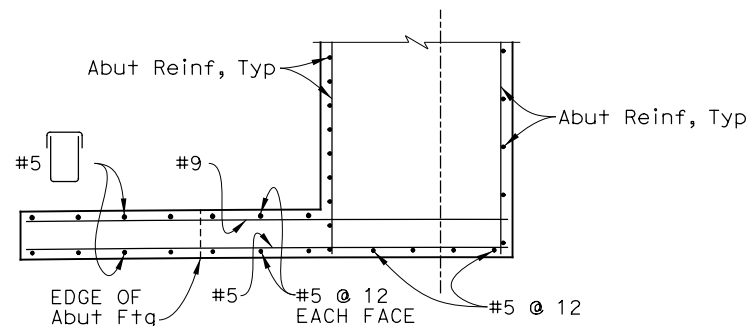
3/8" = 1'-0"

NOTES: All reinforcement not shown.
Chain link railing not shown.
Abut 1 right wingwall shown,
all others similar.



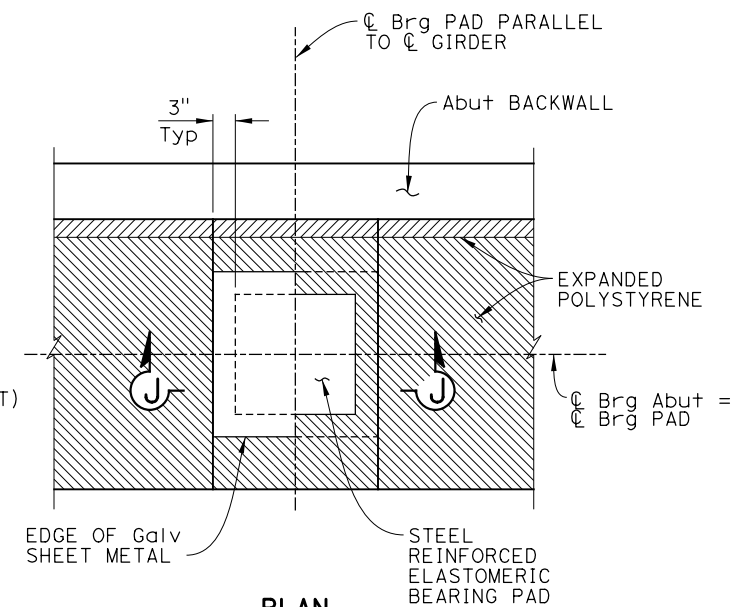
SECTION G-G

1/2" = 1'-0"



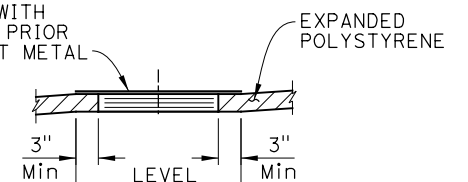
SECTION H-H

1/2" = 1'-0"



PLAN

14 GAUGE (0.075") Galv
SHEET METAL, COAT TOP
OF BEARING PAD WITH
SILICONE GREASE PRIOR
TO PLACING SHEET METAL



SECTION J-J

BEARING PAD DETAIL

NO SCALE

NOTES:

1. For drainage details, see "STRUCTURE APPROACH DETAILS" sheet.
2. For concrete surface texture details, see "ARCHITECTURAL DETAILS No. 3" sheet.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
8	Riv	10	R53.9/R55.5		

Melvin Principe

REGISTERED CIVIL ENGINEER

1/23/26
DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS
SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR
COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT
4080 LEMON STREET
RIVERSIDE, CA 92501

PARSONS
2201 DUPONT DRIVE, SUITE 200
IRVINE, CA 92612

REGISTERED PROFESSIONAL ENGINEER

MELVIN PRINCIPLE

No. 84296

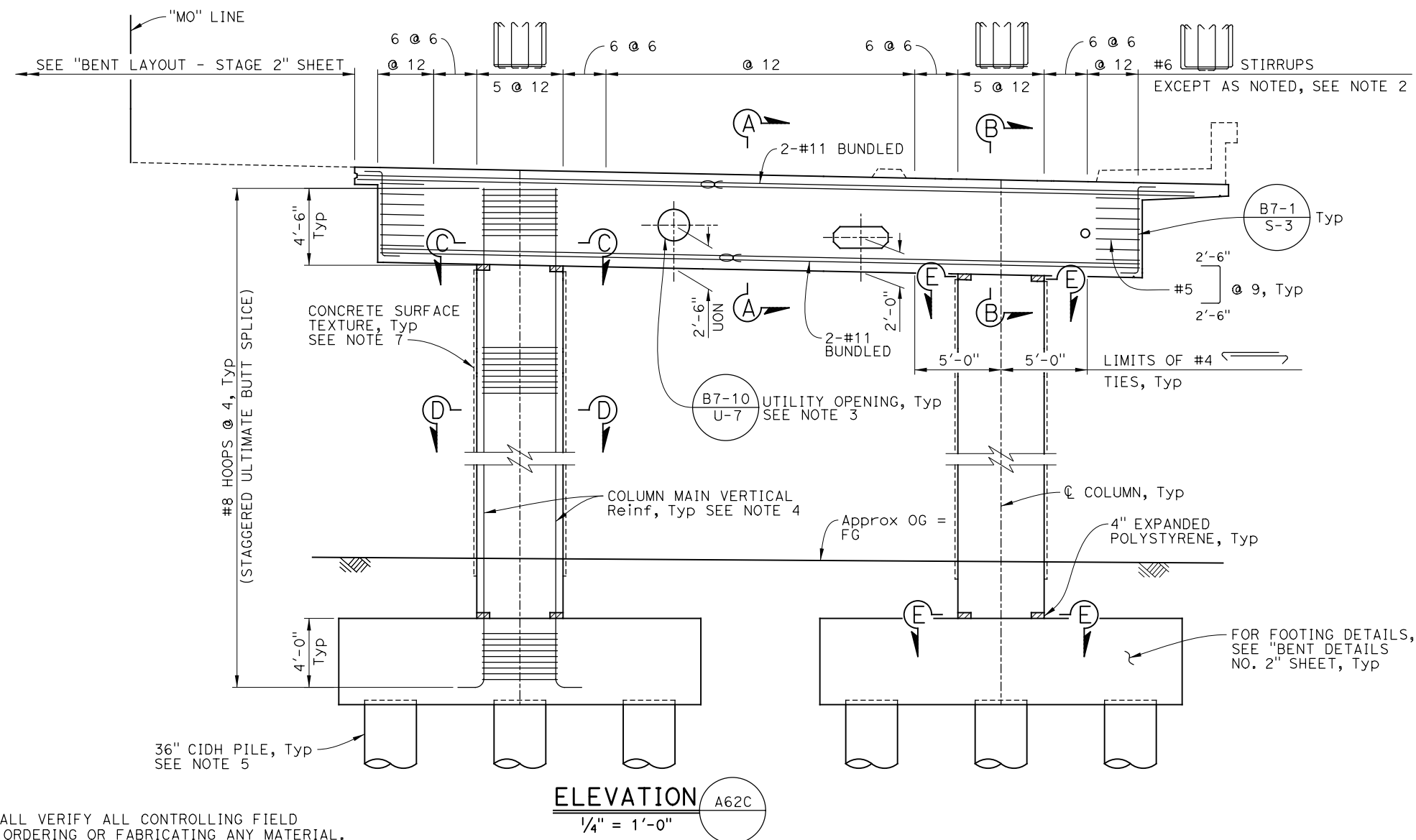
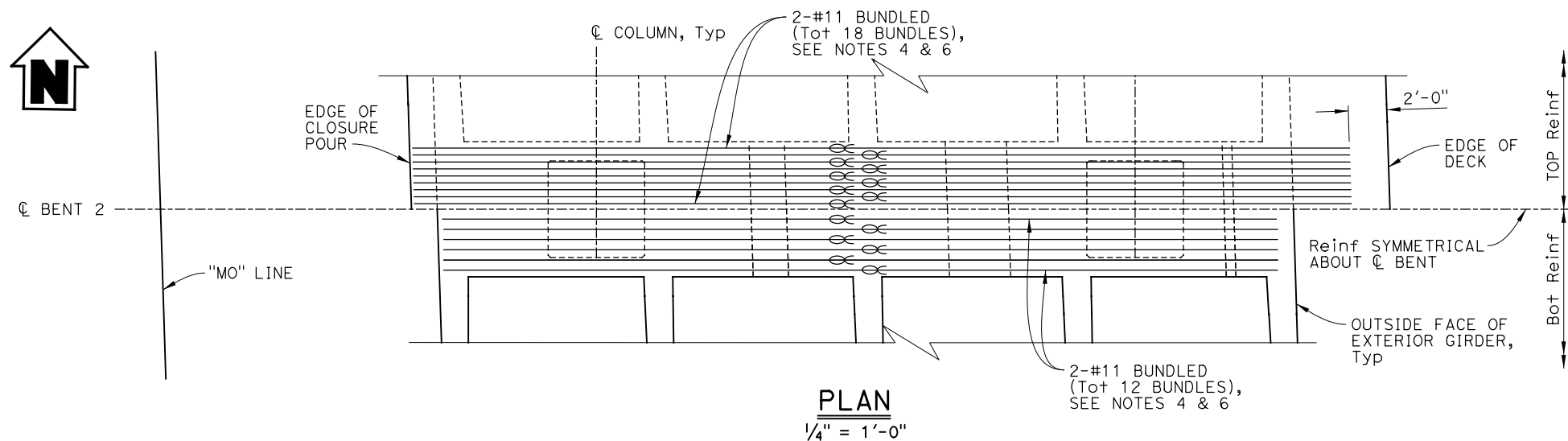
Exp. 09-30-27

CIVIL

STATE OF CALIFORNIA

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

DESIGN OVERSIGHT	DESIGN BY M. Principe	CHECKED G. Douglass	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	CASEY WEBER PROJECT ENGINEER	BRIDGE No. 56-0897	MONROE STREET OC (REPLACE)					
SIGN OFF DATE	DETAILS BY S. Weight	CHECKED G. Douglass			POST MILE R54.74	ABUTMENT DETAILS No. 3					
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)	QUANTITIES BY M. Principe	CHECKED A. Botani	DATE PLOTTED => 1/14/2026 FILE => 56-0897-T-G01d+03	TIME PLOTTED => 4:09:08 PM USERNAME => p002118f	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS	PROJECT NUMBER & PHASE: 0800003681	COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES 08/23/24 03/16/25 08/11/25 01/23/26	SHEET 12	OF 47



NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
8	Riv	10	R53.9/R55.5		

1/23/26
DATE

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS
SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR
COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT
4080 LEMON STREET
RIVERSIDE, CA 92501

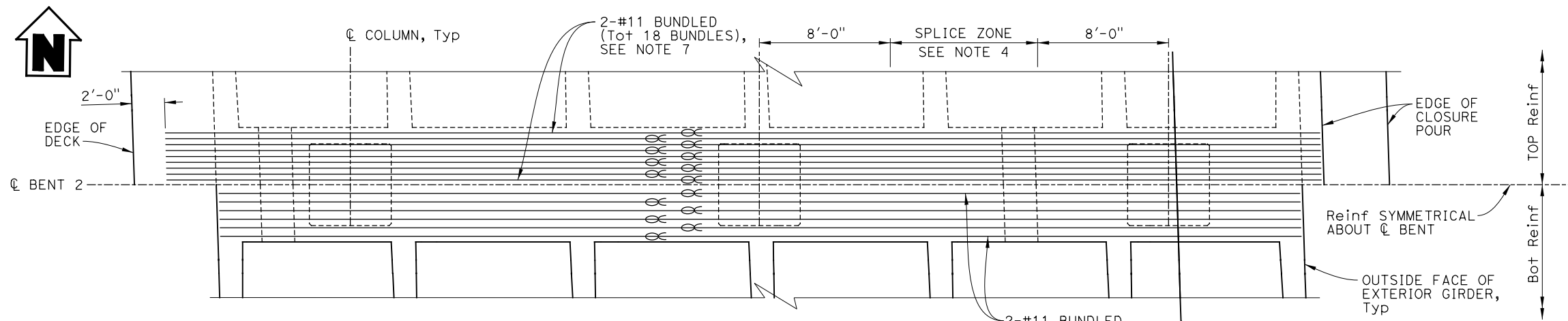
PARSONS
2201 DUPONT DRIVE, SUITE 200
IRVINE, CA 92612

- NOTES:
- For "SECTION A-A" thru "SECTION E-E", see "BENT DETAILS No. 1" sheet
 - Place stirrups parallel to CL Girder and space along CL Bent.
 - For utility opening information, see "UTILITY OPENING TABLE" on "INDEX TO PLANS" sheet.
 - No splices allowed in column main vertical reinforcement and bent cap main reinforcement.
 - For CIDH pile details, see "BENT DETAILS No. 2" sheet.
 - Extend bottom bent cap main reinforcement to the outside face of exterior girder. Extend top bent cap reinforcement into the overhang as shown.
 - For concrete surface texture details, see "ARCHITECTURAL DETAILS No. 2" sheet.

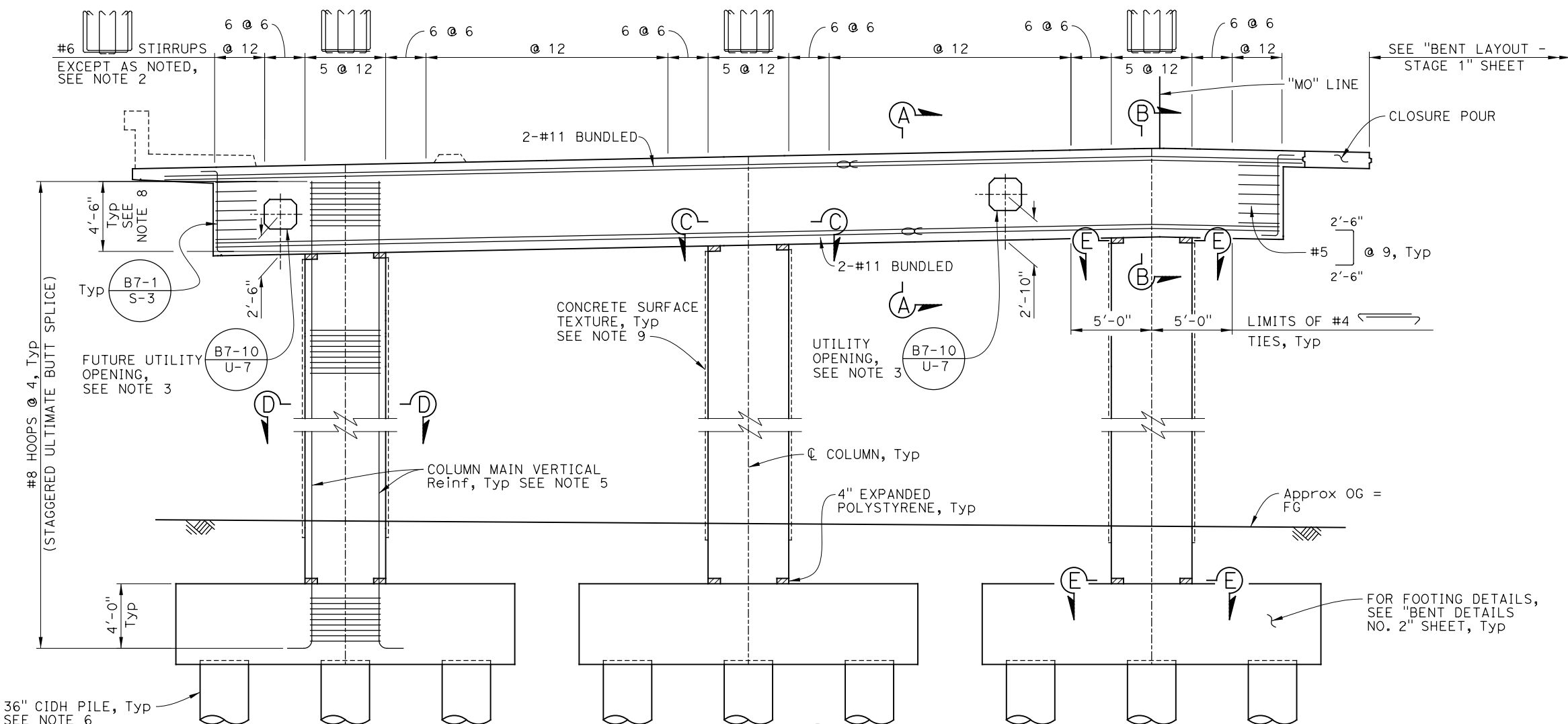
LEGEND:

∞ Bundled bars

DESIGN OVERSIGHT	SIGN OFF DATE	DESIGN	BY M. Principe	CHECKED G. Douglass	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Casey Weber PROJECT ENGINEER	BRIDGE No.	MONROE STREET OC (REPLACE) BENT LAYOUT - STAGE 1							
		DETAILS	BY S. Weight	CHECKED G. Douglass			56-0897								
		QUANTITIES	BY M. Principe	CHECKED A. Botani			R54.74								
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)		DATE PLOTTED => 1/20/2026 FILE => 56-0897-n-b02-1001		TIME PLOTTED => 2:32:15 PM USERNAME => p002118F		ORIGINAL SCALE IN INCHES FOR REDUCED PLANS		COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304		DISREGARD PRINTS BEARING EARLIER REVISION DATES		REVISION DATES		SHEET	OF
						PROJECT NUMBER & PHASE: 0800003681				08/23/24 03/16/25 08/11/25 01/23/26		13		47	



PLAN
1/4" = 1'-0"



ELEVATION
1/4" = 1'-0"

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
8	Riv	10	R53.9/R55.5		

Melvin Principe 1/23/26
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS
SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR
COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT
4080 LEMON STREET
RIVERSIDE, CA 92501

PARSONS
2201 DUPONT DRIVE, SUITE 200
IRVINE, CA 92612

NOTES:

- For "SECTION A-A" thru "SECTION E-E", see "BENT DETAILS No. 1" sheet
- Place stirrups parallel to CL Girder and space along CL Bent.
- For utility opening information, see "UTILITY OPENING TABLE" on "INDEX TO PLANS" sheet.
- Bent cap top and bottom main reinforcement must be "Service" spliced within zones shown or as directed by the Engineer. Splices must be staggered at 2'-0" minimum and alternated.
- No splices allowed in column main vertical reinforcement.
- For CIDH pile details, see "BENT DETAILS No. 2" sheet.
- Extend bottom bent cap main reinforcement to the outside face of exterior girder. Extend top bent cap reinforcement into the overhang as shown.
- At middle column where column main vertical reinforcement interferes with prestressing, hook reinforcement as high as possible to clear prestress ducts or as directed by the Engineer.
- For concrete surface texture details, see "ARCHITECTURAL DETAILS No. 2" sheet.

LEGEND:

∞ Bundled bars

DESIGN OVERSIGHT SIGN OFF DATE	DESIGN BY M. Principe CHECKED G. Douglass DETAILS BY S. Weight CHECKED G. Douglass QUANTITIES BY M. Principe CHECKED A. Botani	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Casey Weber PROJECT ENGINEER	BRIDGE No.	MONROE STREET OC (REPLACE) BENT LAYOUT - STAGE 2					
				56-0897						
				POST MILE R54.74						
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)	DATE PLOTTED => 1/20/2026 FILE => 56-0897-n-b02-1a02	TIME PLOTTED => 2:32:24 PM USERNAME => p002118F	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS	0123456789	PROJECT NUMBER & PHASE: 0800003681	COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES 08/25/24 03/16/25 08/11/25 01/23/26	SHEET 14	OF 47

Dist

COUNTY

ROUTE

POST MILES
TOTAL PROJECT

SHEET
NO.

TOTAL
SHEETS

8

Riv

10

R53.9/R55.5

Melvin Principe

REGISTERED CIVIL ENGINEER

1/23/26

DATE

REGISTERED PROFESSIONAL ENGINEER

MELVIN PRINCIPLE

No. 84296

Exp. 09-30-27

CIVIL

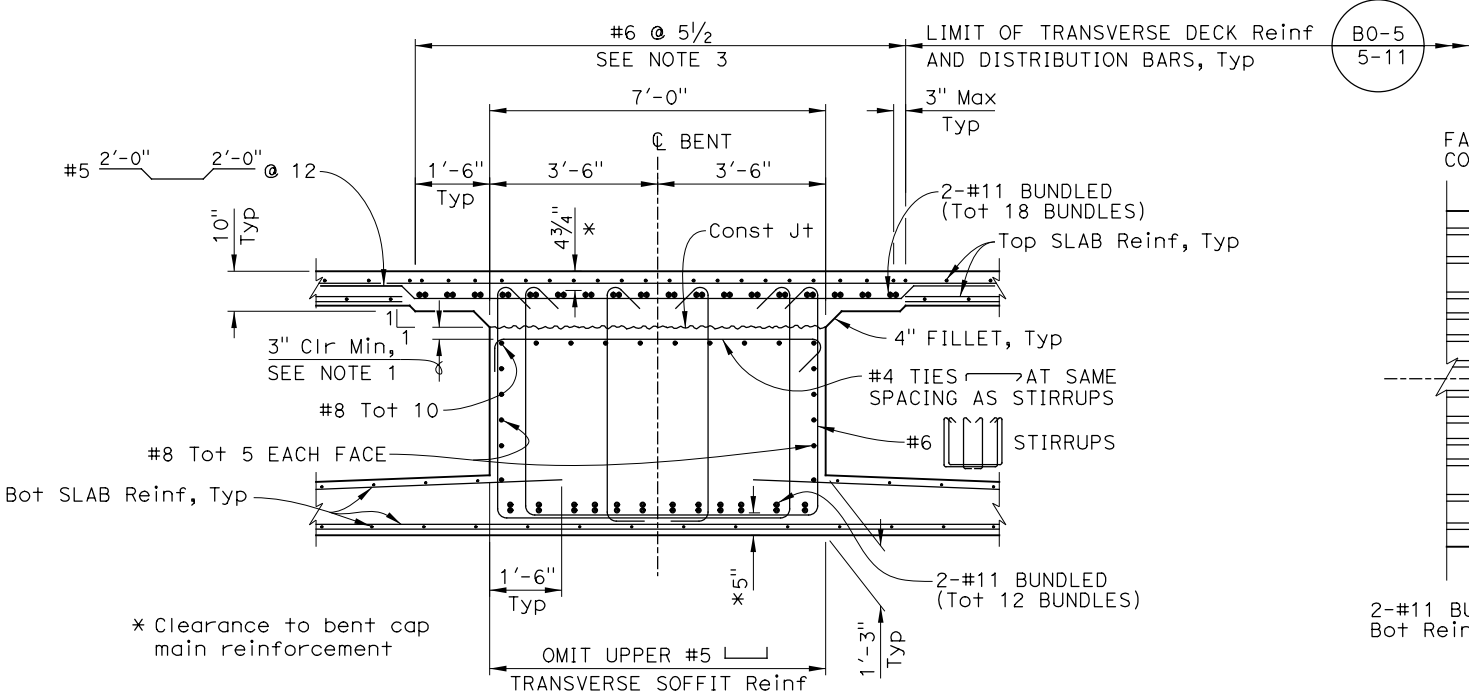
STATE OF CALIFORNIA

PLANS APPROVAL DATE

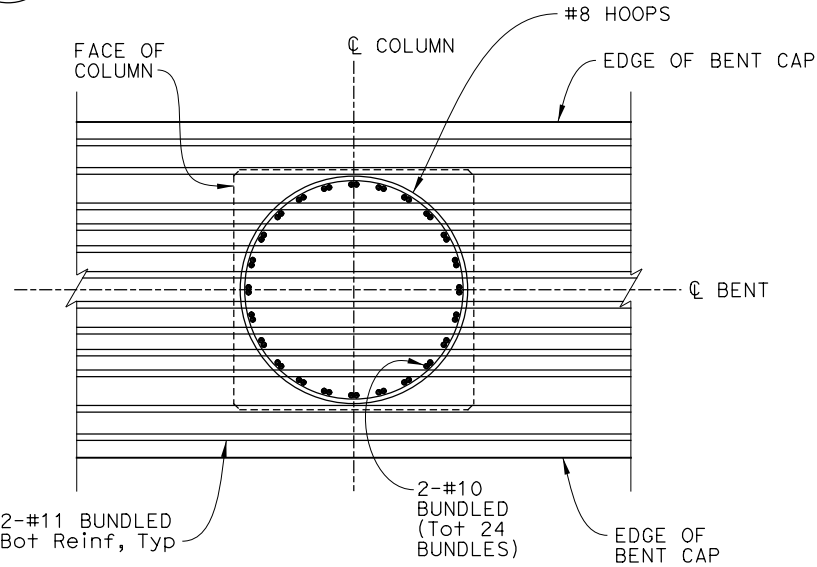
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS
SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR
COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT
4080 LEMON STREET
RIVERSIDE, CA 92501

PARSONS
2201 DUPONT DRIVE, SUITE 200
IRVINE, CA 92612

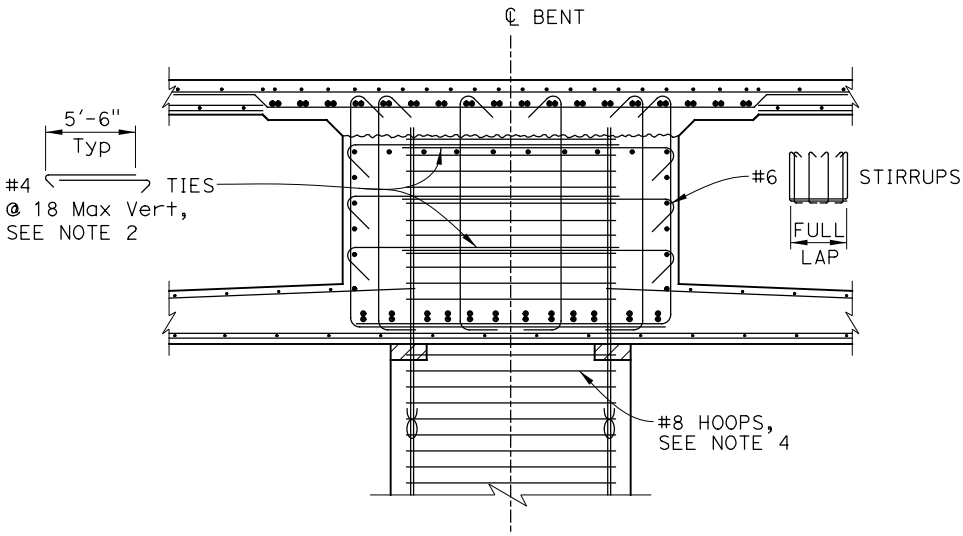


SECTION A-A
1/2" = 1'-0"



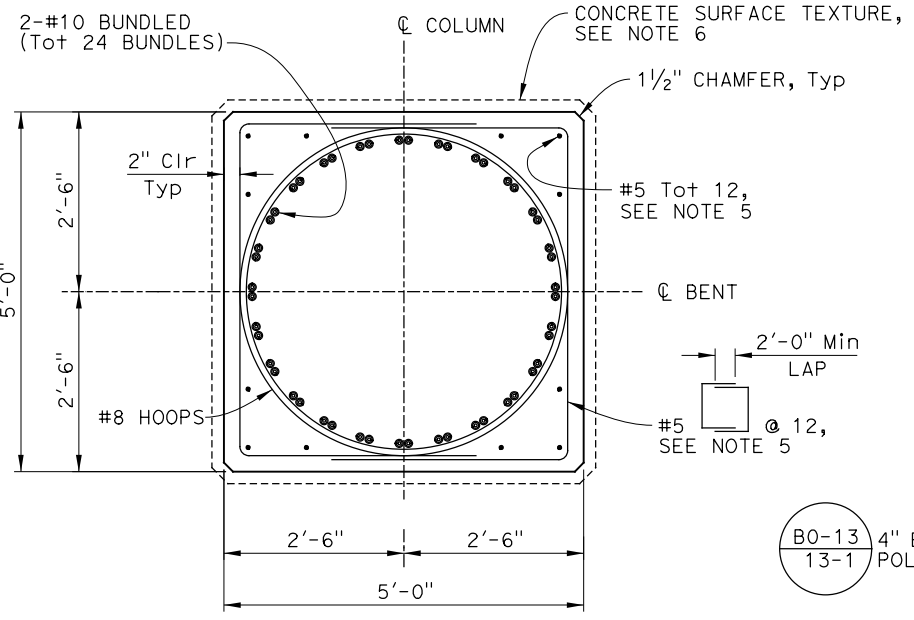
SECTION C-C
1/2" = 1'-0"

NOTE: For information not shown, see "SECTION A-A" and "SECTION D-D".

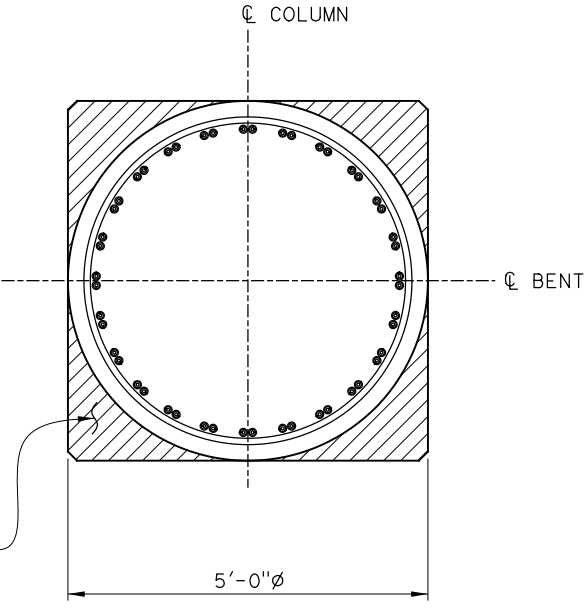


SECTION B-B
1/2" = 1'-0"

NOTE: For information not shown, see "SECTION A-A".



SECTION D-D
3/4" = 1'-0"



SECTION E-E
3/4" = 1'-0"

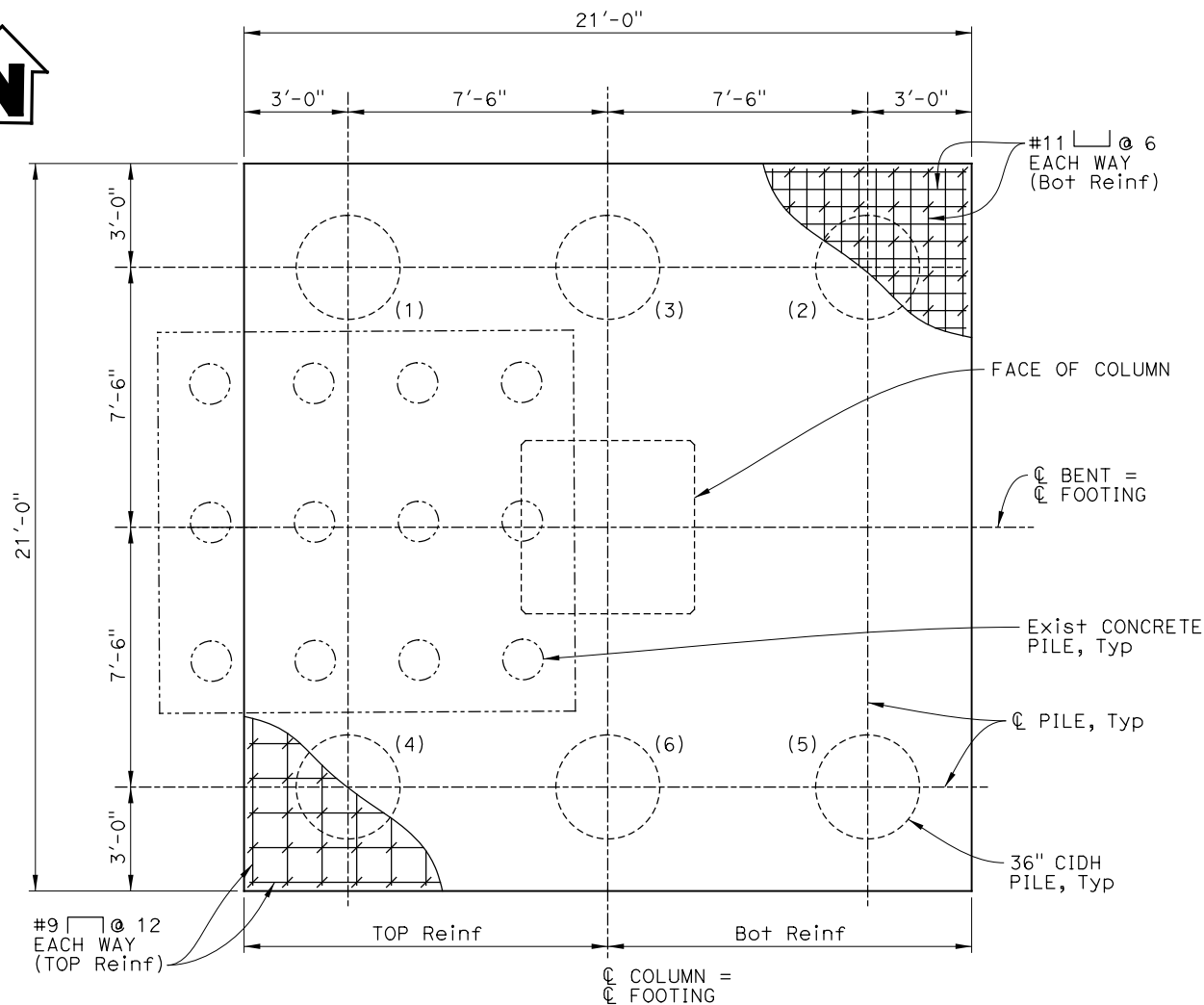
NOTE: For information not shown, see "SECTION D-D".

- NOTES:
- Construction reinforcement and ties may be lowered to clear prestress ducts as directed by the Engineer.
 - For limits of horizontal cross ties, see "BENT LAYOUT - STAGE 1" and "BENT LAYOUT - STAGE 2" sheets.
 - Extend reinforcement thru closure pour and to edge of deck. Provide 3'-0" Min lap within closure pour.
 - Hoops may be adjusted to clear bent cap and soffit reinforcement as directed by the Engineer. Total number of hoops must remain unchanged.
 - Terminate reinforcement 3" below bottom of bent cap and 3" above top of footing. Laps must be staggered.
 - For concrete surface texture details, see "ARCHITECTURAL DETAILS No. 2" sheet.

LEGEND:
∞ Bundled bars

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

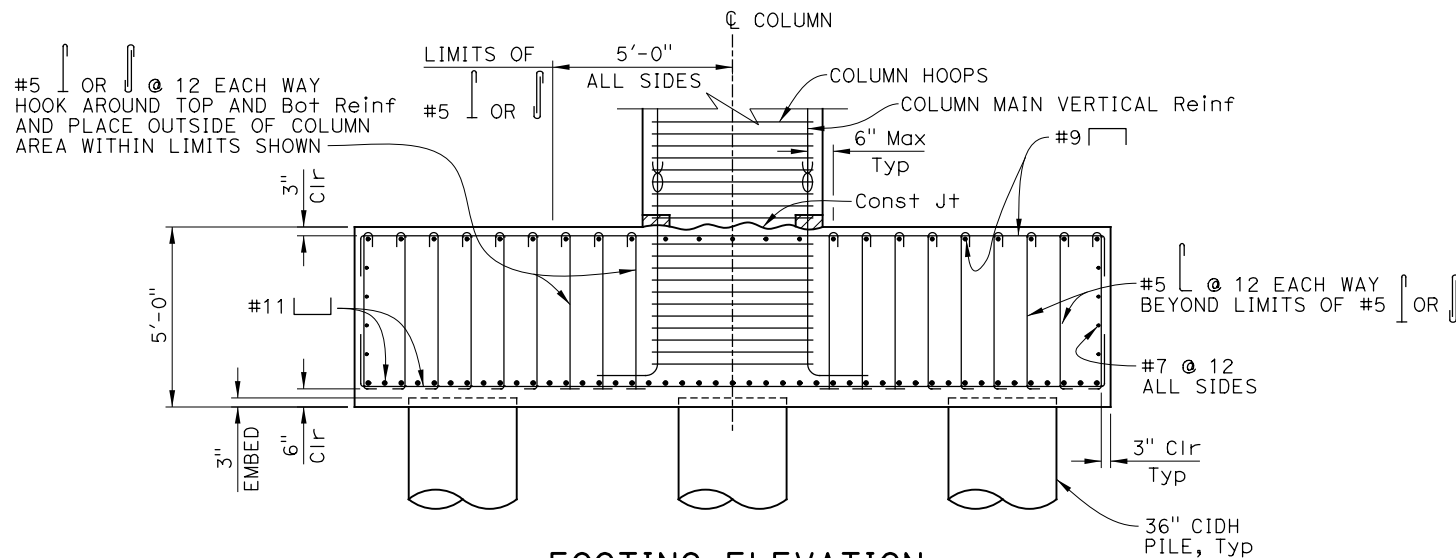
		DESIGN BY M. Principe CHECKED G. Douglass		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		BRIDGE No. 56-0897		MONROE STREET OC (REPLACE)																									
DESIGN OVERSIGHT		DETAILS BY S. Weight CHECKED G. Douglass				PROJECT ENGINEER																											
SIGN OFF DATE		QUANTITIES BY M. Principe CHECKED A. Botani				R54.74		BENT DETAILS No. 1																									
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)				DATE PLOTTED => 1/14/2026 FILE => 56-0897-n-b02d101				TIME PLOTTED => 4:09:35 PM USERNAME => p002118f				ORIGINAL SCALE IN INCHES FOR REDUCED PLANS				PROJECT NUMBER & PHASE: 0800003681		COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304		DISREGARD PRINTS BEARING EARLIER REVISION DATES		REVISION DATES		SHEET		OF							
												0		1		2		3				08/23/24		03/16/25		08/11/25		01/23/26		15		47	



FOOTING PLAN

$\frac{3}{8}'' = 1'-0''$

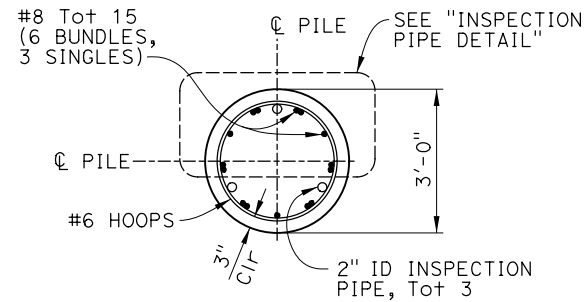
NOTE:
Stage 2 right column shown,
all others similar.



FOOTING ELEVATION

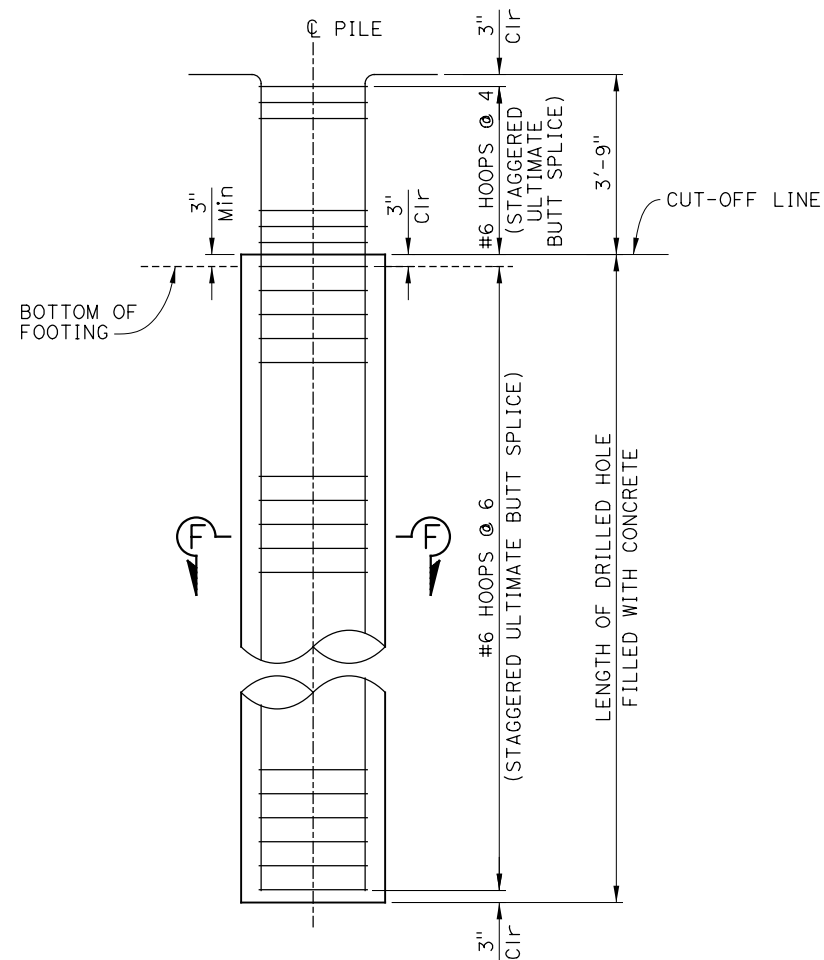
$\frac{3}{8}'' = 1'-0''$

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.



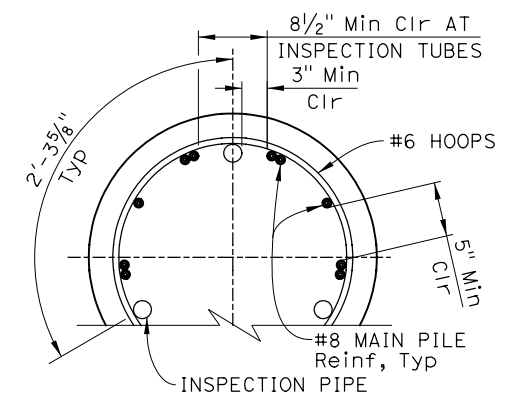
SECTION F-F

$\frac{1}{2}'' = 1'-0''$



36" CIDH PILE DETAIL

$\frac{1}{2}'' = 1'-0''$



INSPECTION PIPE DETAIL

$1'' = 1'-0''$

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
8	Riv	10	R53.9/R55.5		
REGISTERED CIVIL ENGINEER			DATE	1/23/26	
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT 4080 LEMON STREET RIVERSIDE, CA 92501					
PARSONS 2201 DUPONT DRIVE, SUITE 200 IRVINE, CA 92612					

Melvin Principe

REGISTERED PROFESSIONAL ENGINEER

No. 84296

Exp. 09-30-27

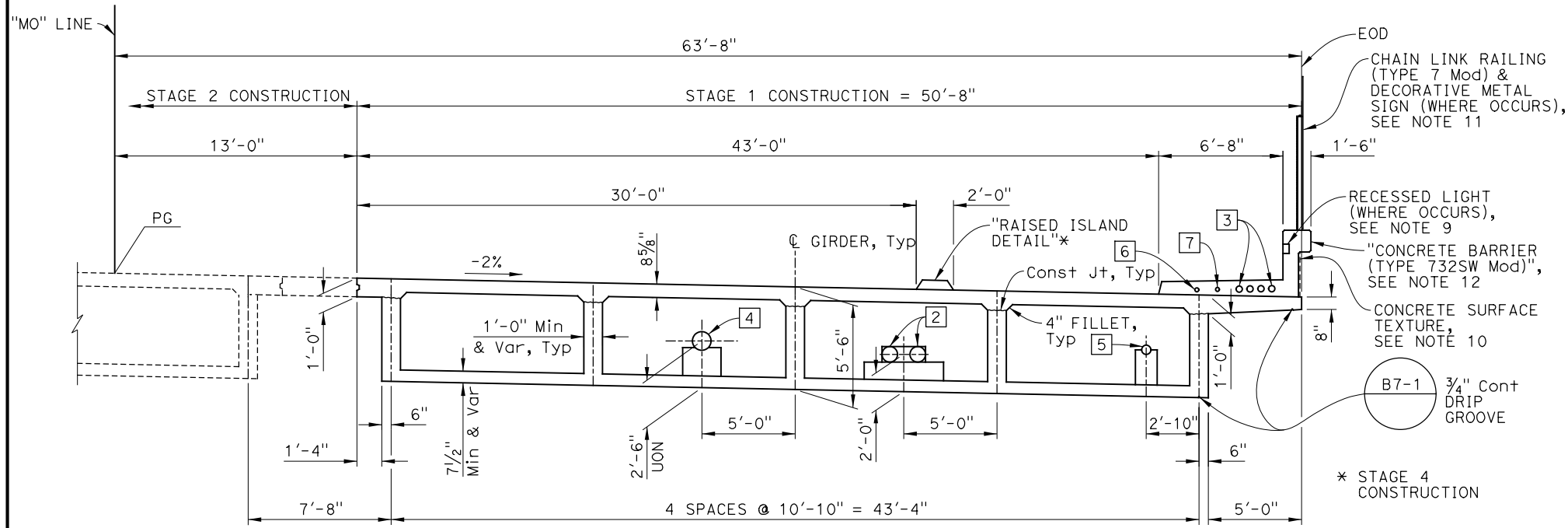
CIVIL

STATE OF CALIFORNIA

LEGEND:

- Bundled bars
- Existing Structure
- Pile Installation Sequence

DESIGN OVERSIGHT	DESIGN BY M. Principe	CHECKED G. Douglass	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	BRIDGE No. 56-0897	MONROE STREET OC (REPLACE)	
SIGN OFF DATE	DETAILS BY S. Weight	CHECKED G. Douglass	Casey Weber PROJECT ENGINEER	POST MILE R54.74	BENT DETAILS No. 2	
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)	QUANTITIES BY M. Principe	CHECKED A. Botani	PROJECT NUMBER & PHASE: 0800003681	COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES 08/23/24 03/16/25 08/11/25 01/23/26
DATE PLOTTED => 1/14/2026 FILE => 56-0897-n-b02d102	TIME PLOTTED => 4:09:45 PM USERNAME => p002118f	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS	0 1 2 3	SHEET 16	OF 47	



TYPICAL SECTION

1/4" = 1'-0"

LEGEND:

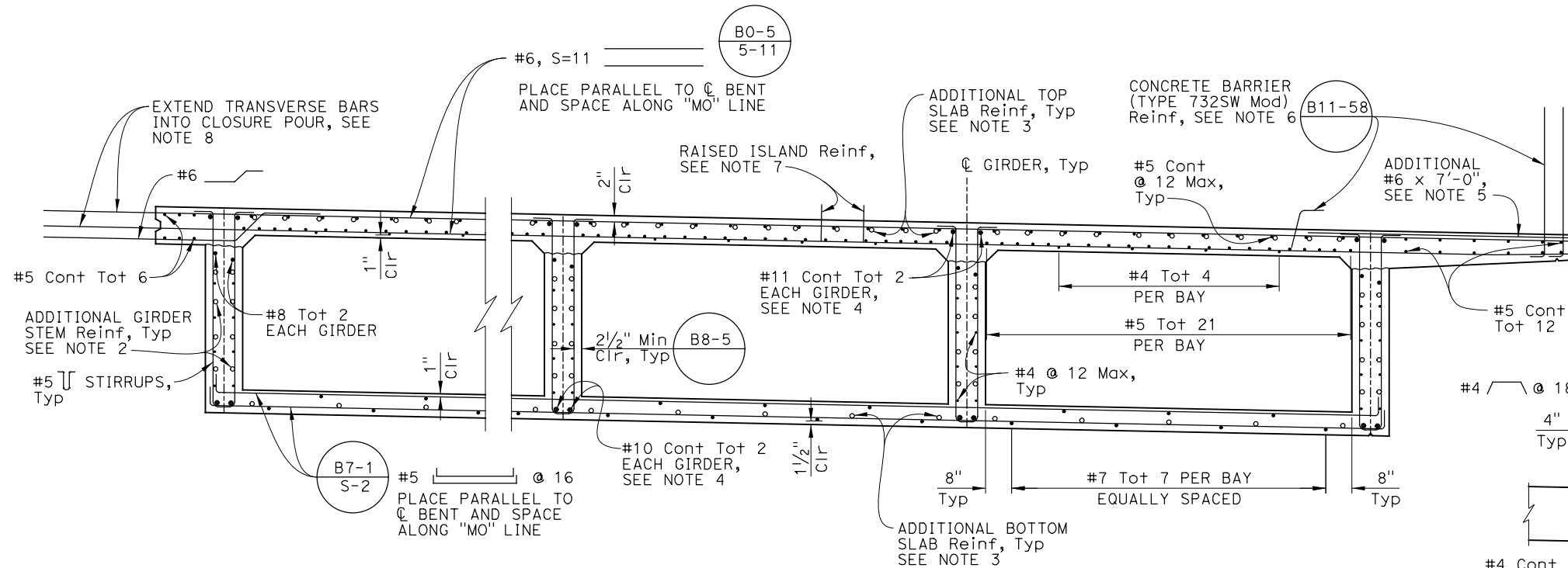
- Additional slab and girder reinforcement
- Continuous slab and girder reinforcement

UTILITIES:

- 2-6" Gas (SCG)
- 4-4" Telecom (Caltrans)
- 12" Water (IWA)
- 3" Irrigation (Caltrans) per Standard Plan B14-4 and B14-5
- 2" Sprinkler Control (Caltrans)
- 2" Lighting (Caltrans)

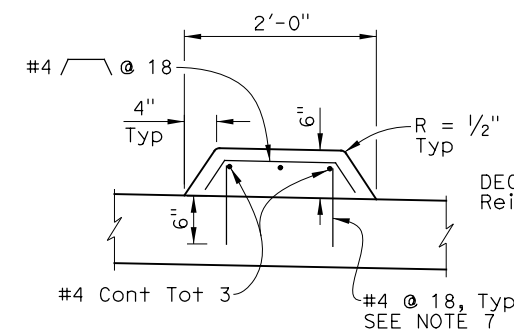
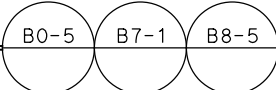
NOTES:

- For stirrup placement and prestressing information, see "GIRDER LAYOUT - STAGE 1" sheet.
- For additional girder stem reinforcement, see "GIRDER DETAILS" sheet.
- For additional slab reinforcement, see "GIRDER REINFORCEMENT - STAGE 1" sheet.
- #10 & #11 continuous reinforcement in top and bottom slab must be "Service" spliced. No splices allowed within 20'-0" of C Bent. Splices must be staggered at 2'-0" minimum.
- Additional #6 reinforcement must be placed for a minimum distance of 5'-0" at BB and EB. Bundle with each alternating top transverse bar.
- Concrete barrier reinforcement must be in place prior to deck placement.
- Stage 4 raised island reinforcement may be embedded into deck with #4 drill and bond dowels in 6" deep hole.
- For "CLOSURE POUR DETAIL", see "TYPICAL SECTION - STAGE 2" sheet.
- For recessed light locations, see "ARCHITECTURAL DETAILS No. 1" sheet. For pull box and conduit locations, see ROADWAY PLANS.
- For concrete surface texture details, see "ARCHITECTURAL DETAILS No. 2" sheet.
- For Chain Link Railing (Type 7 Mod) and decorative metal sign details, see "ARCHITECTURAL DETAILS No. 4" thru "ARCHITECTURAL DETAILS No. 11" sheets.
- For concrete barrier reinforcement near deck joint and other details not shown, see Standard Plan B11-58 and B11-59.



PART TYPICAL SECTION

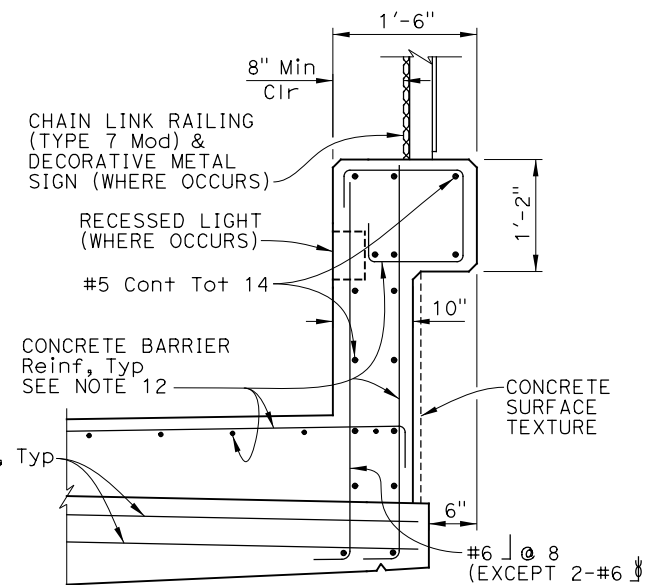
1/2" = 1'-0"



RAISED ISLAND DETAIL

1" = 1'-0"

NOTE: All reinforcement not shown.

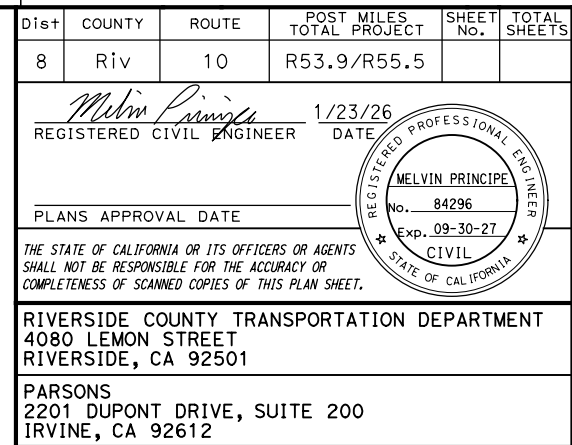


CONCRETE BARRIER (TYPE 732SW MOD)

1" = 1'-0"

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

DESIGN OVERSIGHT	SIGN OFF DATE	DESIGN	BY M. Principe	CHECKED G. Douglass	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Casey Weber PROJECT ENGINEER	BRIDGE No.	MONROE STREET OC (REPLACE) TYPICAL SECTION - STAGE 1											
		DETAILS	BY S. Weight	CHECKED G. Douglass			56-0897												
		QUANTITIES	BY M. Principe	CHECKED A. Botani			POST MILE												
							R54.74												
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)		DATE PLOTTED => 1/20/2026 FILE => 56-0897-K-T601		TIME PLOTTED => 4:16:32 PM USERNAME => p002118F		ORIGINAL SCALE IN INCHES FOR REDUCED PLANS		PROJECT NUMBER & PHASE: 0800003681		COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304		DISREGARD PRINTS BEARING EARLIER REVISION DATES		REVISION DATES 08/23/21 03/16/25 08/11/25 01/23/26		SHEET 17		OF 47	



P_{jack}	= <u>10,350</u> kips
Anchor Set	= <u>$\frac{3}{8}$</u> in
Friction curvature coefficient, μ	= <u>0.15</u> (1/rad)
Friction wobble coefficient, K	= <u>0.0002</u> (1/ft)
Assumed long term losses	= <u>20</u> (ksi)
Total number of girders	= <u>5</u>

Concrete: $f'_c = \underline{5,000}$ psi @ 28 days
 $f'_{ci} = \underline{3,500}$ psi @ time of stressing

One end stressing must be performed from Abut 1.

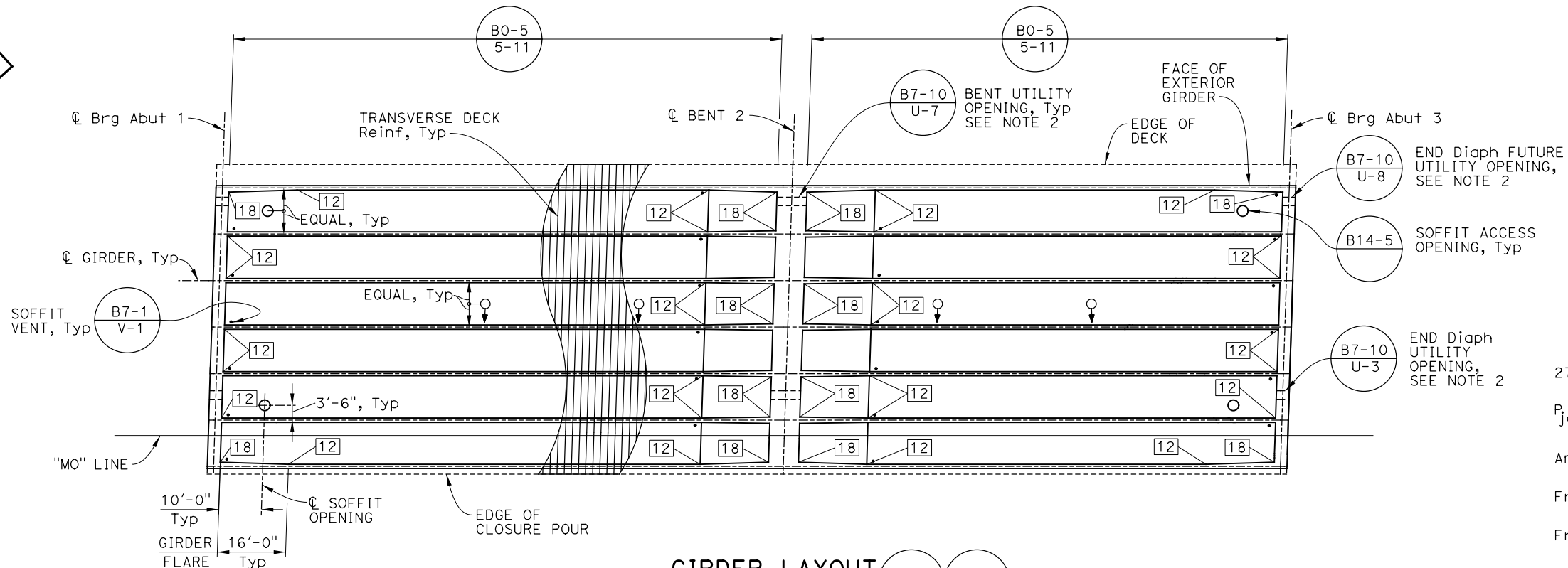
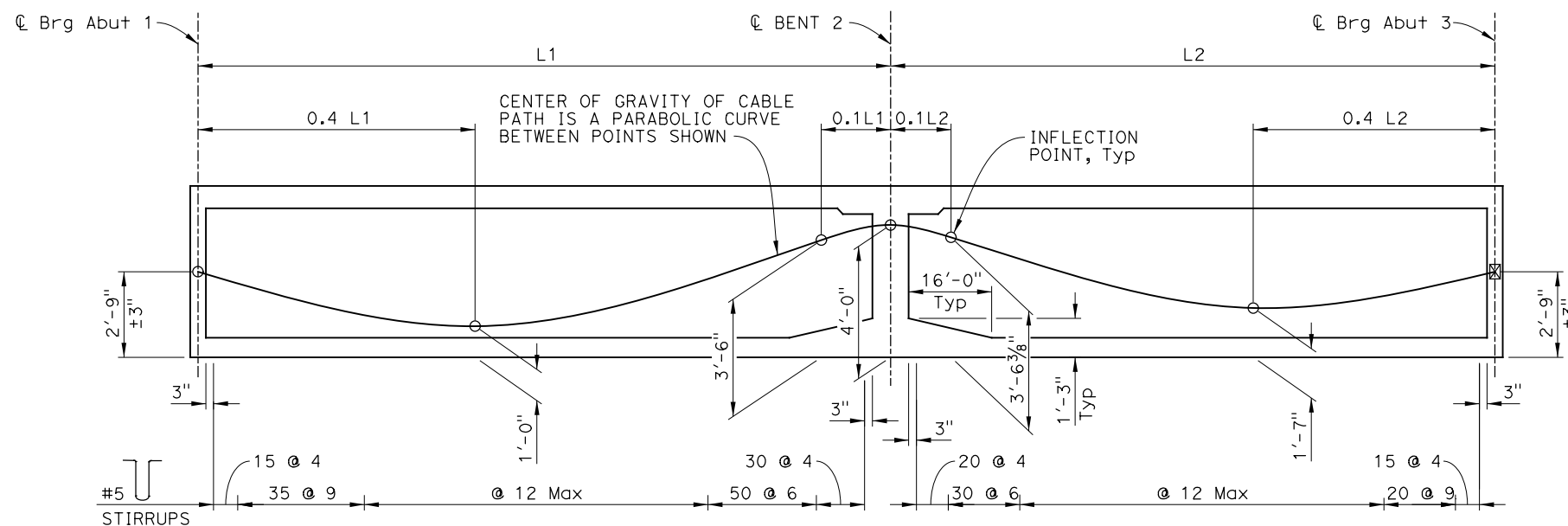
1. For "CAMBER DIAGRAM - STAGE 1", see "GIRDER DETAILS" sheet.
2. For "GRATED SOFFIT OPENING DETAIL", see "GIRDER DETAILS" sheet.
3. For utility opening information, see "UTILITY OPENING TABLE" on "INDEX TO PLANS" sheet.
4. Deck manhole to be located over Air/Vac valve assembly for water line. Location may be adjusted as directed by the Engineer.

☒ XX Girder stem width in inches, see $\frac{B7-1}{S-3}$
☒ Theoretical point of no movement
☒ Soffit Luminaire, see ROADWAY PLANS



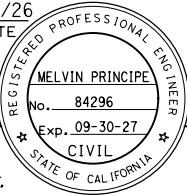
DESIGN OVERSIGHT SIGN OFF DATE				DESIGN	BY M. Principe	CHECKED G. Douglass	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Casey Weber PROJECT ENGINEER		BRIDGE No.	MONROE STREET OC (REPLACE)												
				DETAILS	BY S. Weight	CHECKED G. Douglass				56-0897													
				QUANTITIES	BY M. Principe	CHECKED A. Botani				POST MILE	GIRDER LAYOUT - STAGE 1												
										R54.74													
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)				DATE PLOTTED => 1/20/2026 FILE => 56-0897-1-g_1e01		TIME PLOTTED => 2:33:12 PM USERNAME => p002118f		ORIGINAL SCALE IN INCHES FOR REDUCED PLANS		0 1 2 3		PROJECT NUMBER & PHASE: 0800003681		COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-0K7304		DISREGARD PRINTS BEARING EARLIER REVISION DATES		REVISION DATES 08/25/24 03/04/25 08/11/25 01/23/26		SHEET 19		OF 47	

SUPPLEMENTAL PROJECT INFORMATION, FOUNDATION REPORT – OVERCROSSING, Pg. 217 of 257


$$\frac{1}{16}'' = 1'-0''$$


NO SCALE

DESIGN OVERSIGHT SIGN OFF DATE		DESIGN		BY M. Principe	CHECKED G. Douglass	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		BRIDGE No.		MONROE STREET OC (REPLACE)																					
		DETAILS		BY S. Weight	CHECKED G. Douglass			56-0897																							
		QUANTITIES		BY M. Principe	CHECKED A. Botani			PROJECT ENGINEER		POST MILE		GIRDER LAYOUT - STAGE 2																			
										R54.74																					
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)						DATE PLOTTED => 1/20/2026 FILE => 56-0897-1-g.1002				TIME PLOTTED => 2:33:21 PM USERNAME => p002118F				ORIGINAL SCALE IN INCHES FOR REDUCED PLANS				PROJECT NUMBER & PHASE: 0800003681		COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304		DISREGARD PRINTS BEARING EARLIER REVISION DATES		REVISION DATES 08/23/24 03/10/25 08/21/25 01/23/26				SHEET 20		OF 47	

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
8	Riv	10	R53.9/R55.5		
<u>Melvin Prince</u> REGISTERED CIVIL ENGINEER			1/23/26 DATE		
PLANS APPROVAL DATE _____					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT 4080 LEMON STREET RIVERSIDE, CA 92501					
PARSONS 2201 DUPONT DRIVE, SUITE 200 IRVINE, CA 92612					

270 KSI Low Relaxation Strand:

$$P_{jack} = \underline{14,300} \text{ kips}$$

Anchor Set = $\frac{3}{8}$ in

Friction curvature coefficient, μ = 0.15 (1/rad)

Friction wobble coefficient, K = 0.0002 (1/ft)

Assumed long term losses = 20 (ksi)

Total number of girders = 7

The final force ratio (larger divided by smaller) must not exceed the ratio of 10 to 9.

Concrete: $f'_c = \underline{5,000}$ psi @ 28 days

$$f'_{ci} = \underline{3,500} \text{ psi @ time of stressing}$$

Contractor must submit elongation calculations based on initial stress at $\lambda = 0.896$ times jacking stress.

One end stressing must be performed from Abut 1.

NOTES:

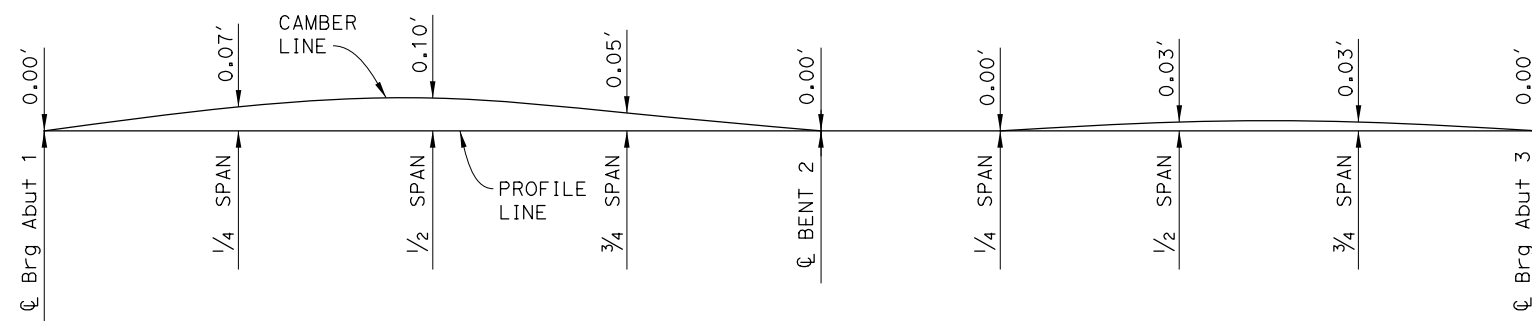
1. For "CAMBER DIAGRAM - STAGE 2", see "GIRDER DETAILS" sheet.
2. For utility opening information, see "UTILITY OPENING TABLE" on "INDEX TO PLANS" sheet.

LEGEND:

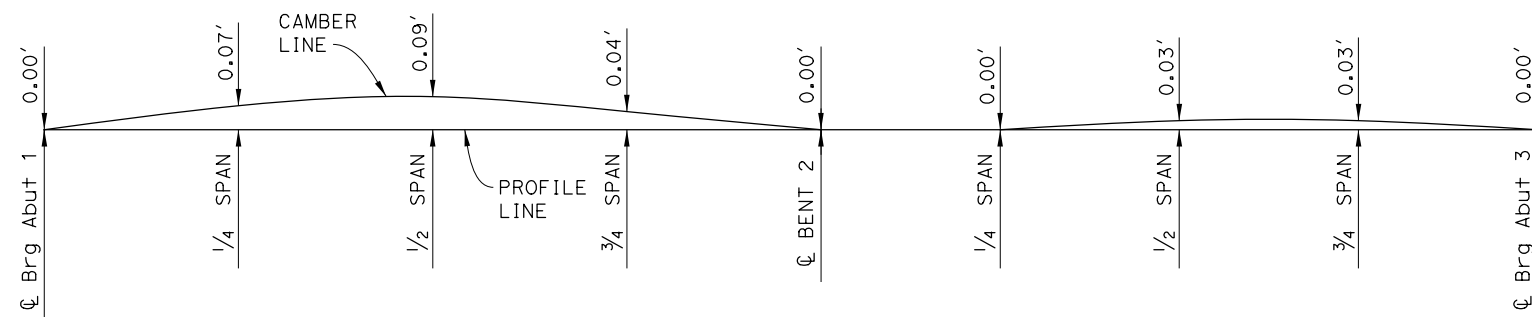
— Girder stem width in inches, see $\left(\frac{B7-1}{S-3} \right)$

☒ Theoretical point of no movement

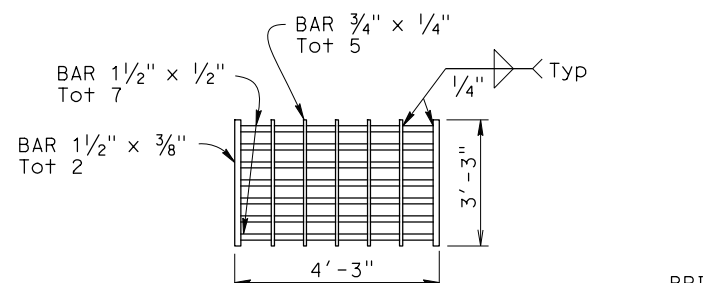
←○ Soffit Luminaire, see ROADWAY PLANS



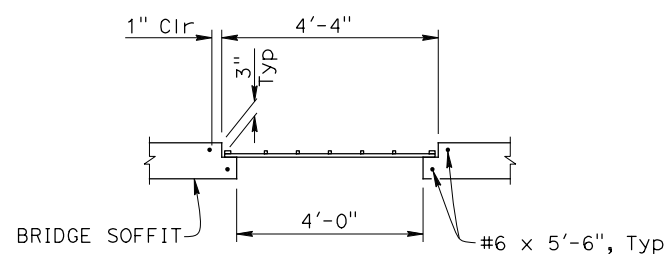
CAMBER DIAGRAM - STAGE 1
NO SCALE



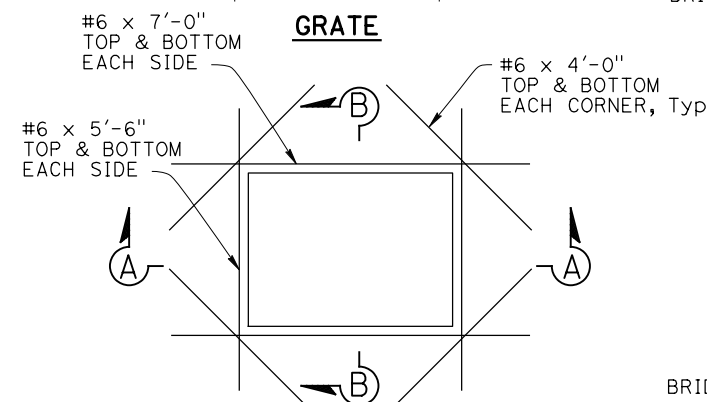
CAMBER DIAGRAM - STAGE 2



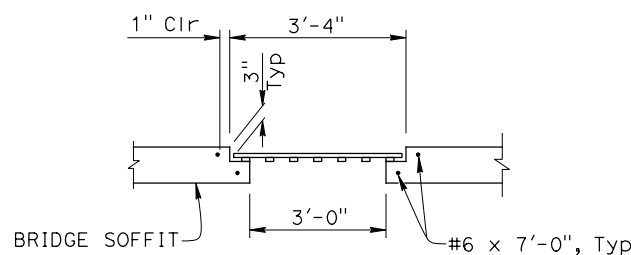
GRATE



SECTION A-A

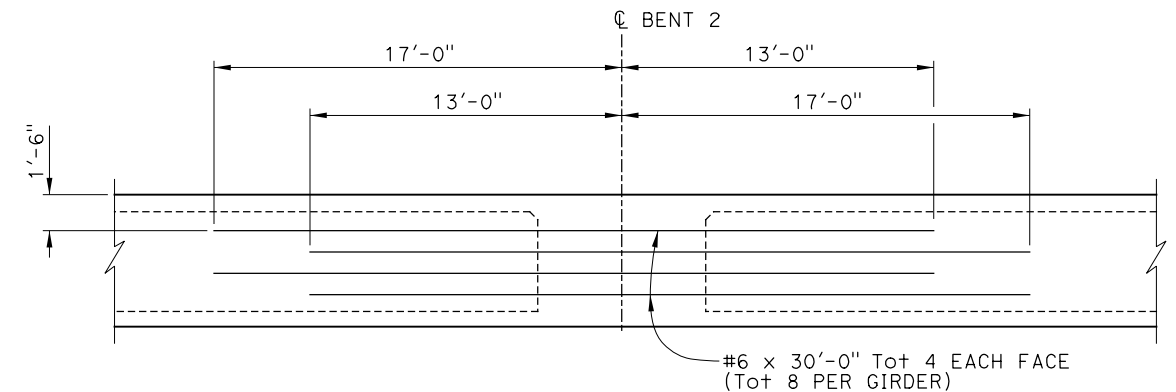


SOFFIT PLAN

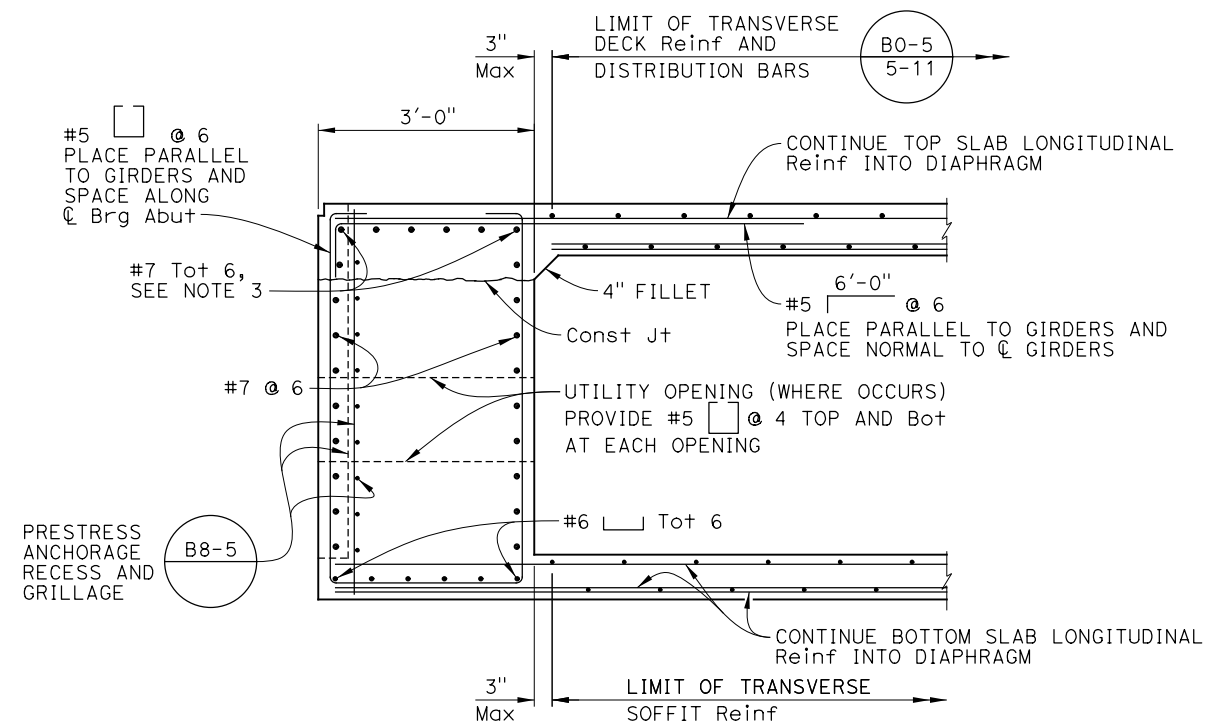


SECTION B-B

GRATED SOFFIT OPENING DETAIL



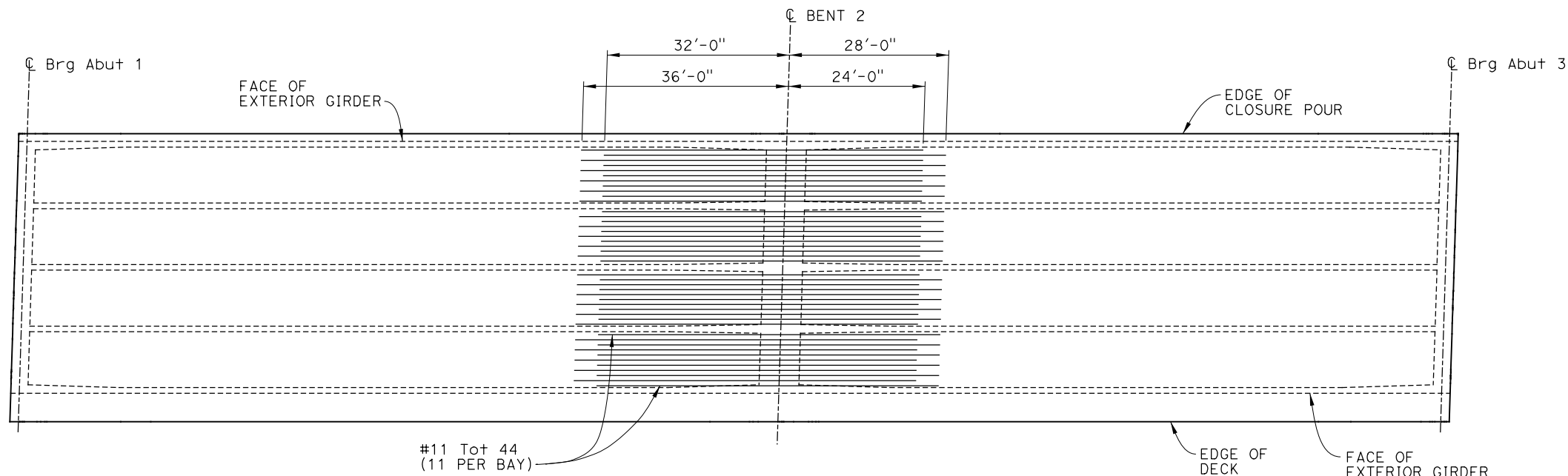
ADDITIONAL GIRDER
STEM REINFORCEMENT



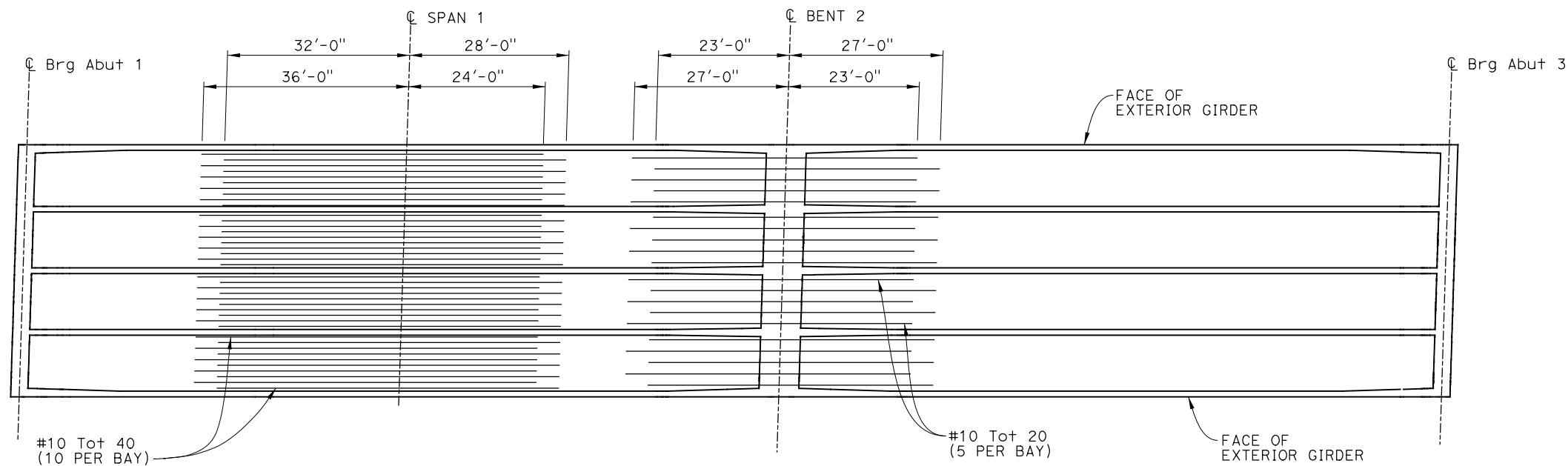
END DIAPHRAGM DETAIL
 $\frac{3}{4}" = 1'-0"$

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

DESIGN OVERSIGHT		DESIGN	BY M. Principe	CHECKED G. Douglass	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Casey Weber PROJECT ENGINEER	BRIDGE No.	MONROE STREET OC (REPLACE)													
		DETAILS	BY S. Weight	CHECKED G. Douglass			56-0897														
		QUANTITIES	BY M. Principe	CHECKED A. Botani			POST MILE														
SIGN OFF DATE							R54.74	GIRDER DETAILS													
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)		DATE PLOTTED => 1/14/2026 FILE => 56-0897-1-gd+01		TIME PLOTTED => 4:37:03 PM USERNAME => p002118F		ORIGINAL SCALE IN INCHES FOR REDUCED PLANS		0123		PROJECT NUMBER & PHASE: 0800003681		COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-0K7304		DISREGARD PRINTS BEARING EARLIER REVISION DATES		REVISION DATES 08/23/24 03/10/25 08/11/25 01/23/26		SHEET 21		OF 47	



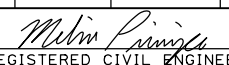
ADDITIONAL TOP SLAB REINFORCEMENT
NO SCALE



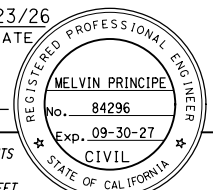
ADDITIONAL BOTTOM SLAB REINFORCEMENT
NO SCALE

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
8	Riv	10	R53.9/R55.5		


REGISTERED CIVIL ENGINEER

1/23/26
DATE



PLANS APPROVAL DATE

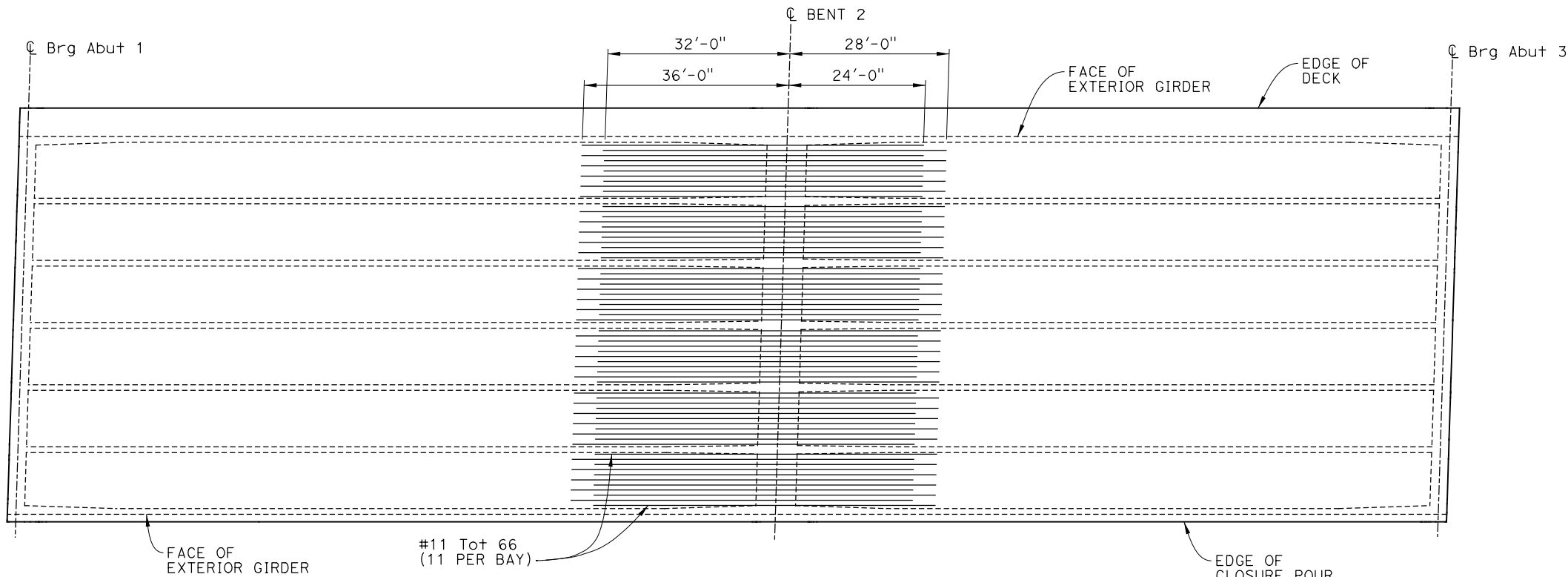
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS
SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR
COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT
4080 LEMON STREET
RIVERSIDE, CA 92501

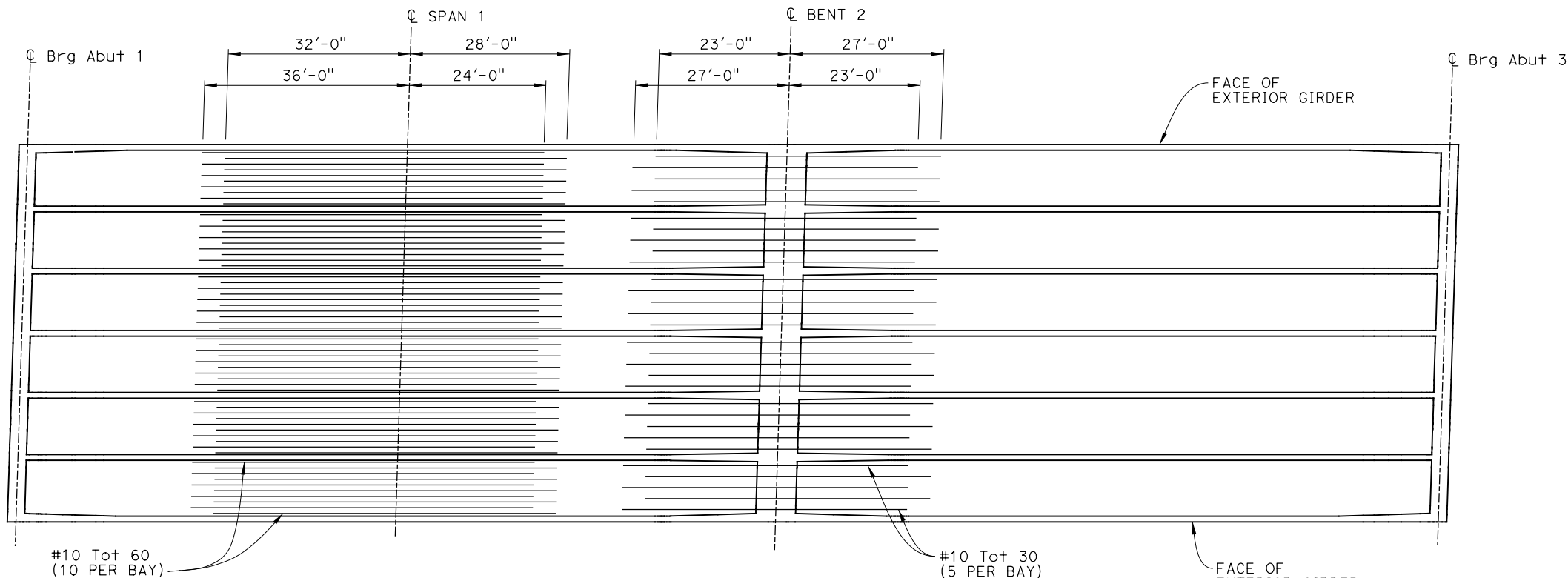
PARSONS
2201 DUPONT DRIVE, SUITE 200
IRVINE, CA 92612

- NOTES:
1. No splices allowed in additional reinforcement.
 2. Additional reinforcement must be equally spaced within each bay.

DESIGN OVERSIGHT	SIGN OFF DATE	DESIGN	BY M. Principe	CHECKED G. Douglass	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Casey Weber PROJECT ENGINEER	BRIDGE No.	MONROE STREET OC (REPLACE)												
		DETAILS	BY S. Weight	CHECKED G. Douglass			56-0897													
		QUANTITIES	BY M. Principe	CHECKED A. Botani			POST MILE R54.74		GIRDER REINFORCEMENT - STAGE 1											
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)		DATE PLOTTED => 1/14/2026 FILE => 56-0897-o-gir_rf01		TIME PLOTTED => 4:37:15 PM USERNAME => p002118f		ORIGINAL SCALE IN INCHES FOR REDUCED PLANS		0		1	2	3	PROJECT NUMBER & PHASE: 0800003681	COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES				SHEET
												08/23/24 03/16/25 08/11/25 01/23/26				22	47			



ADDITIONAL TOP SLAB REINFORCEMENT
NO SCALE



ADDITIONAL BOTTOM SLAB REINFORCEMENT
NO SCALE

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
8	Riv	10	R53.9/R55.5		

Melvin Principe
REGISTERED CIVIL ENGINEER

1/23/26
DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER

MELVIN PRINCIPLE

No. 84296

Exp. 09-30-27

CIVIL

STATE OF CALIFORNIA

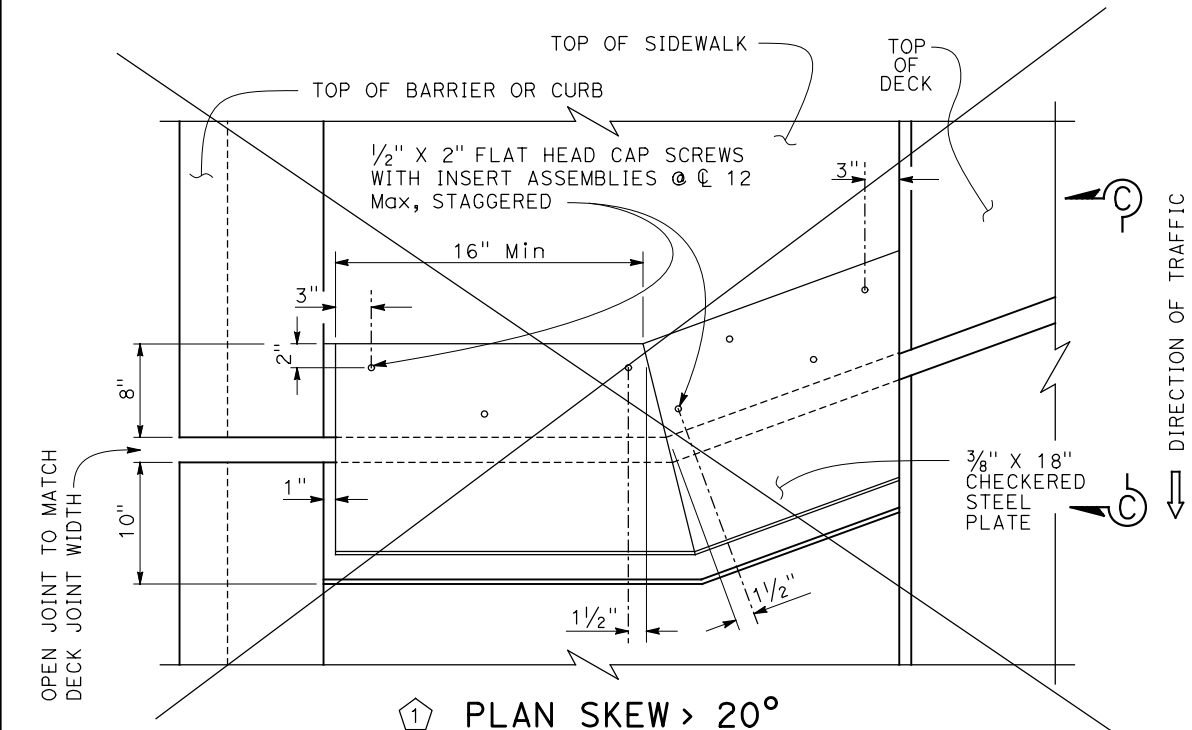
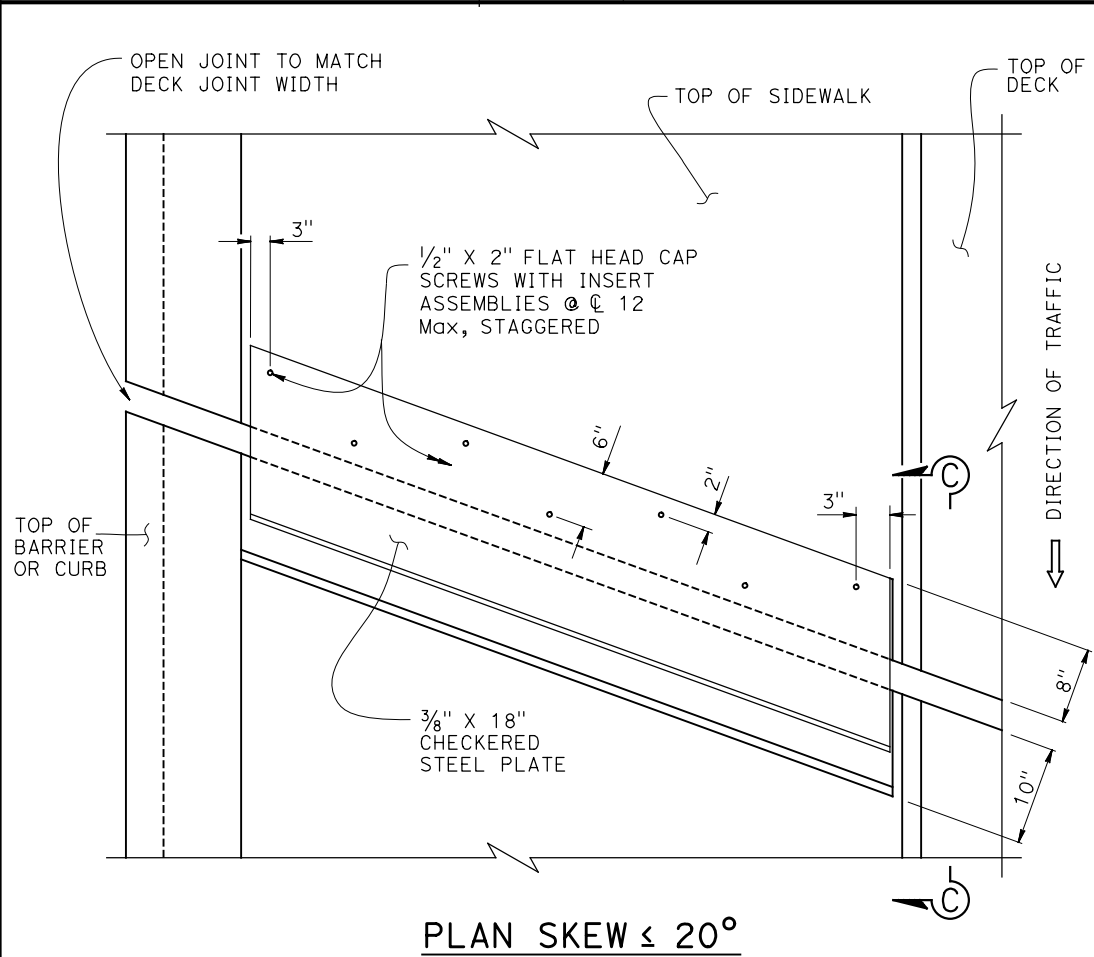
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS
SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR
COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT
4080 LEMON STREET
RIVERSIDE, CA 92501

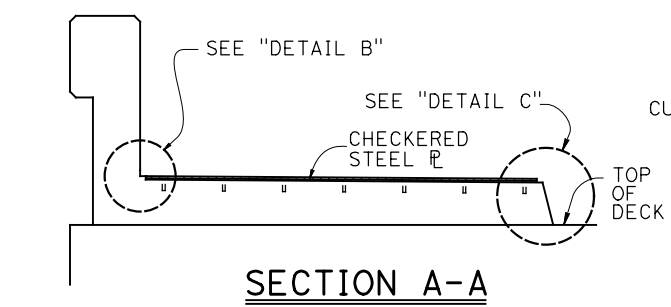
PARSONS
2201 DUPONT DRIVE, SUITE 200
IRVINE, CA 92612

- NOTES:
1. No splices allowed in additional reinforcement.
 2. Additional reinforcement must be equally spaced within each bay.

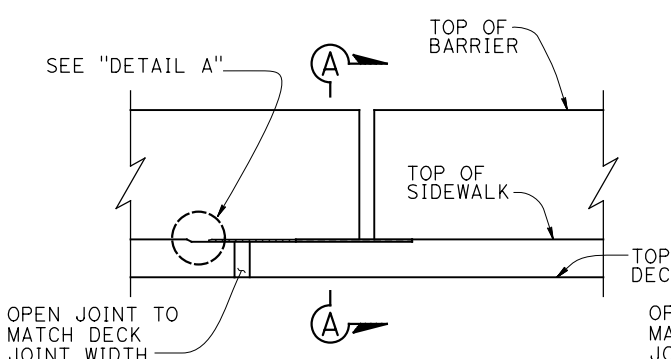
DESIGN OVERSIGHT			DESIGN	BY M. Principe	CHECKED G. Douglass	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Casey Weber PROJECT ENGINEER	BRIDGE No.	MONROE STREET OC (REPLACE) GIRDER REINFORCEMENT - STAGE 2																
			DETAILS	BY S. Weight	CHECKED G. Douglass			56-0897																	
			QUANTITIES	BY M. Principe	CHECKED A. Botani			POST MILE R54.74																	
SIGN OFF DATE				DATE PLOTTED => 1/14/2026		TIME PLOTTED => 4:37:25 PM		ORIGINAL SCALE		COUNTY/ROUTE: Riv/10		DISREGARD PRINTS BEARING EARLIER REVISION DATES		REVISION DATES		SHEET		OF							
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)				FILE => 56-0897-o-gir_rf02		USERNAME => p002118f		IN INCHES FOR REDUCED PLANS		PROJECT NUMBER & PHASE: 0800003681		CONTRACT No.: 08-OK7304		08/23/24		03/16/25		08/11/25		01/23/26		23		47	
								0																	



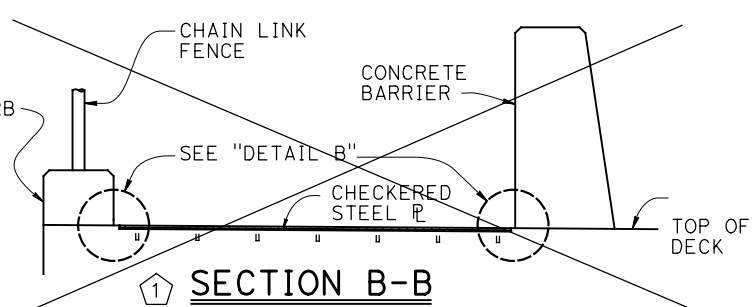
NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.



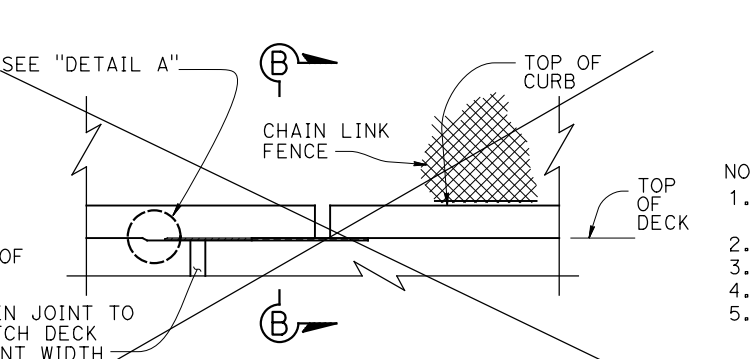
SECTION A-A



ELEVATION

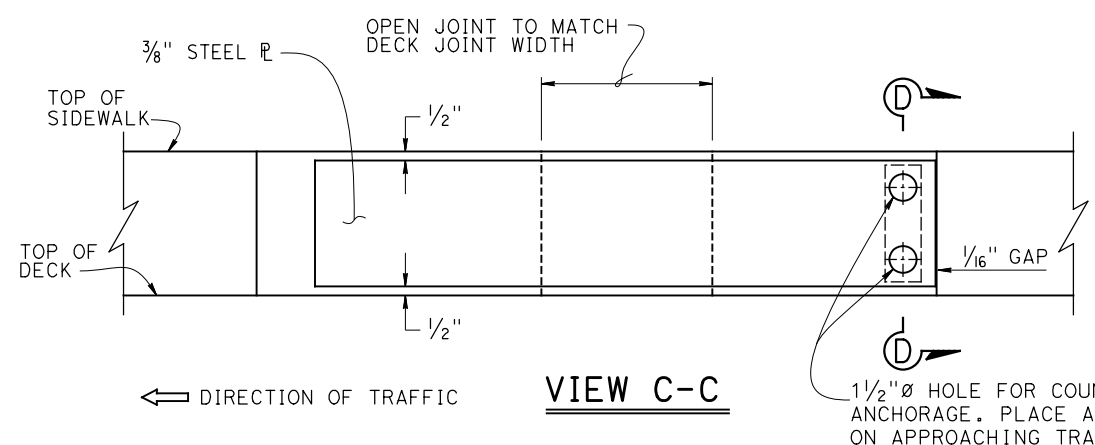


SECTION B-B

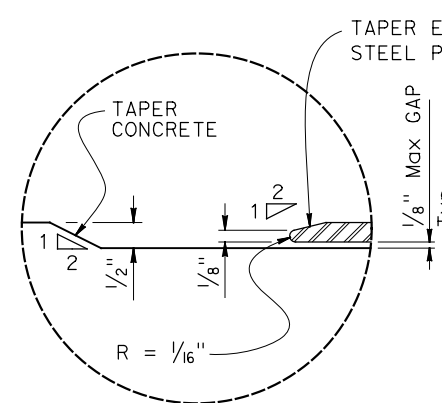


ELEVATION

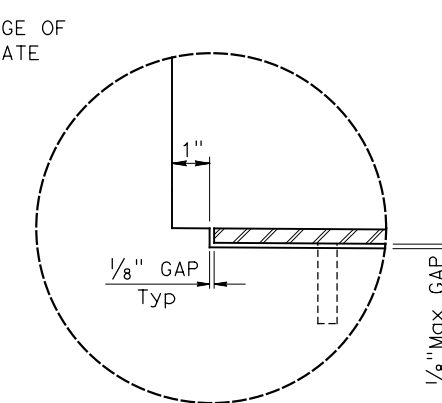
NOTE: Barrier not shown
for clarity



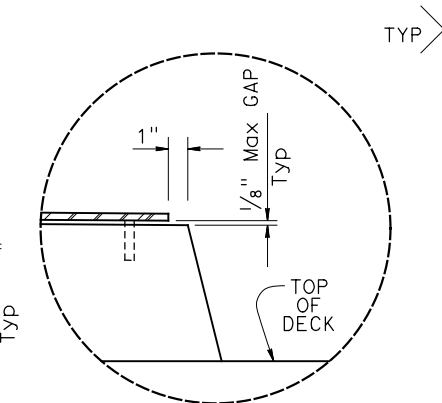
VIEW C-C



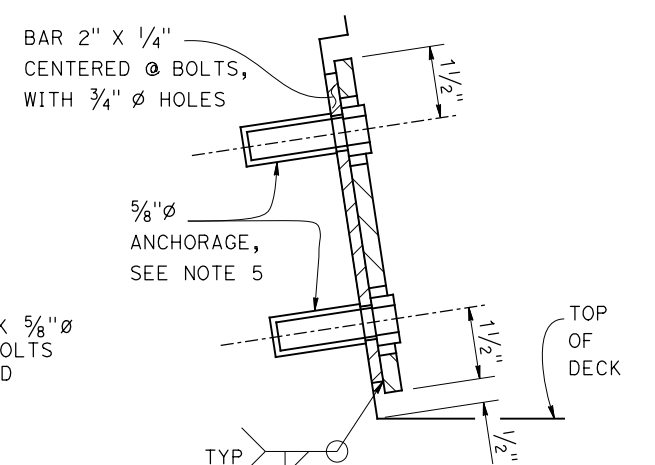
DETAIL A



DETAIL B



DETAIL C



SECTION D-D

- NOTES:
1. Utility openings and expansion joints not shown for clarity
 2. Recess concrete 1/2" for plates
 3. Plates to be galvanized
 4. Architectural treatment not shown
 5. Insert assembly or expansion anchorage for 5/8" x 1 3/4" bolts. Use installation bolts extended 1/2" minimum past nut and coat with bond breaker. After concrete has cured, remove installation bolts, install HS bolts

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
8	Riv	10	R53.9/R55.5		

Melvin Principe 1/23/26
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

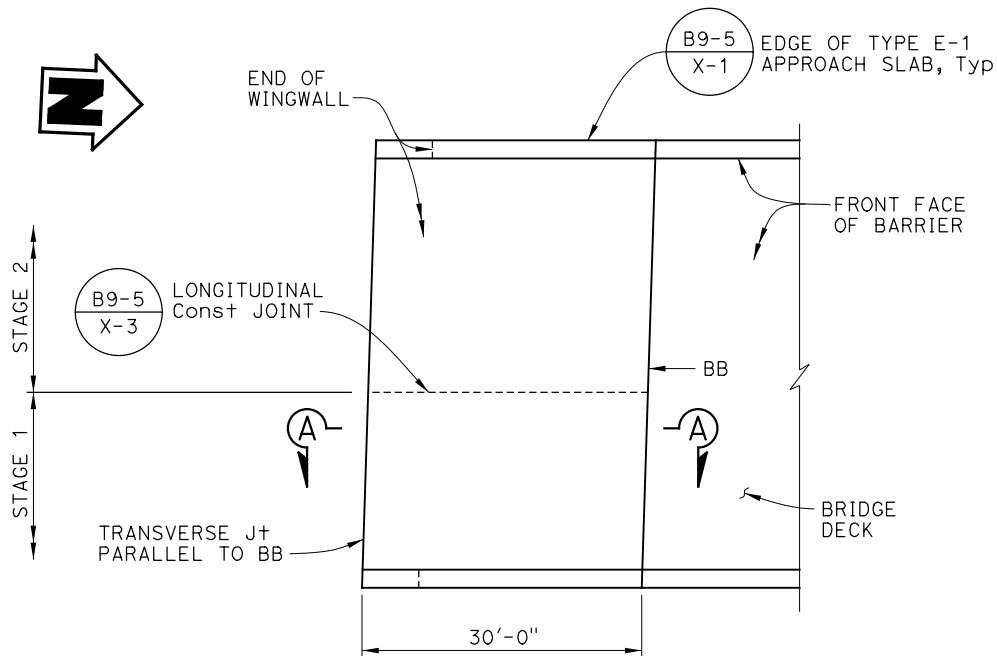
The Registered Civil Engineer for the project is responsible for the selection and proper application of the component design and any modifications shown.

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT
4080 LEMON STREET
RIVERSIDE, CA 92501

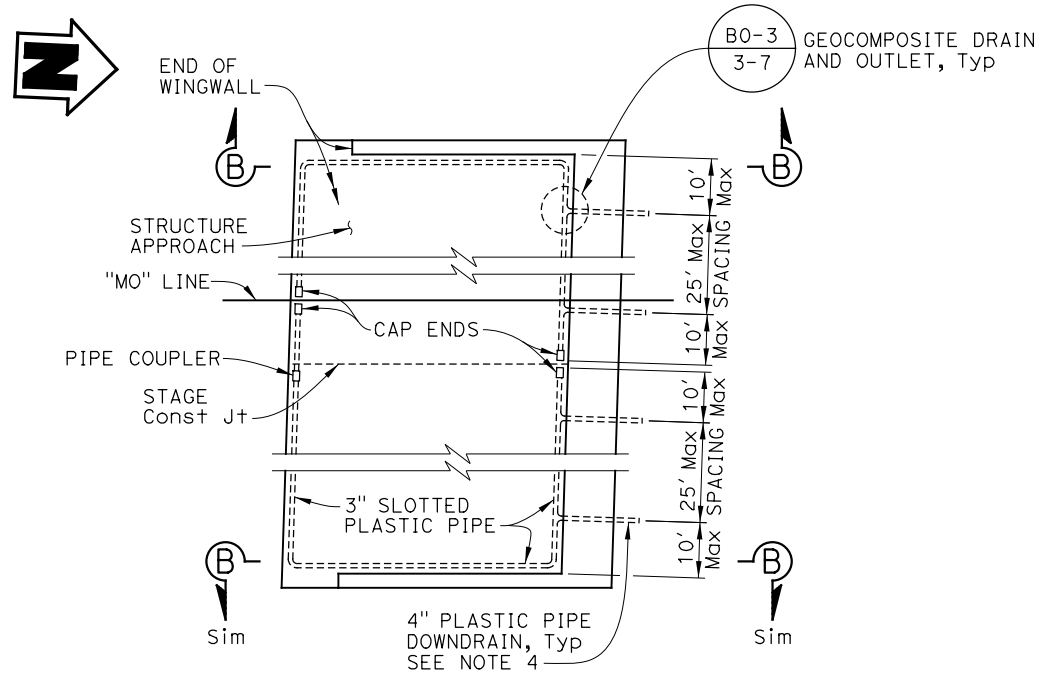
PARSONS
2201 DUPONT DRIVE, SUITE 200
IRVINE, CA 92612

REGISTERED PROFESSIONAL ENGINEER
No. 84296
Exp. 09-30-27
CIVIL
STATE OF CALIFORNIA

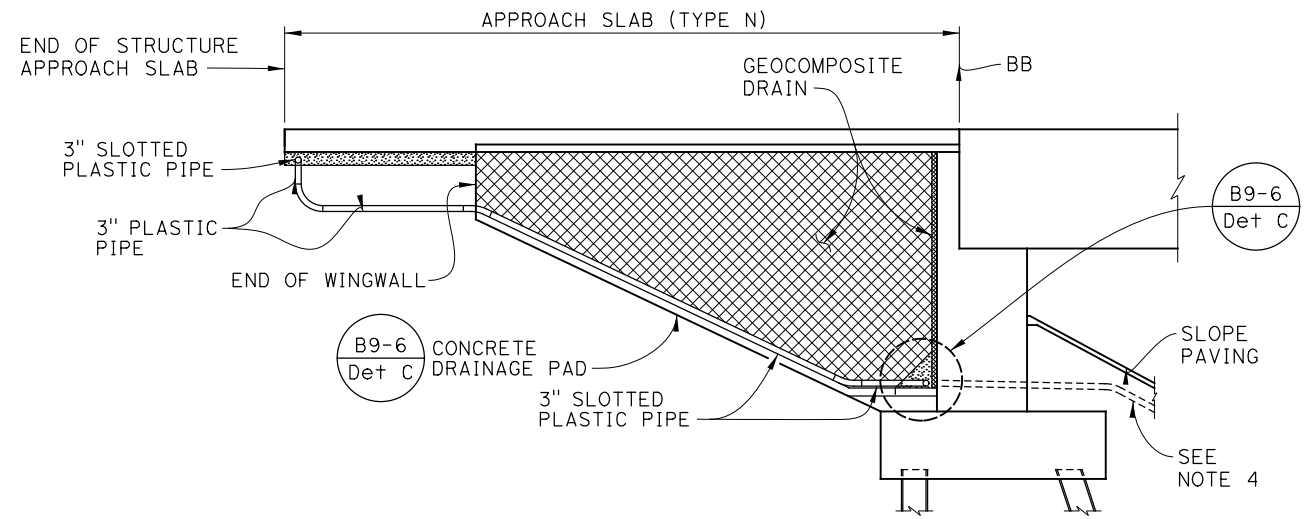
REVISED BRIDGE STANDARD DETAILS			MODIFICATION SHOWN:		STATE OF CALIFORNIA		DIVISION OF ENGINEERING SERVICES		BRIDGE No. 56-0897		MONROE STREET OC (REPLACE)	
x98-050			October 2018		Does Not Apply		DEPARTMENT OF TRANSPORTATION		R54.74		JOINT ARMOR FOR PEDESTRIAN WALKWAYS	
FILE NO.			APPROVAL DATE		FILE => 56-0897-p-japw		ORIGINAL SCALE IN INCHES FOR REDUCED PLANS		PROJECT NUMBER & PHASE: 0800003681		COUNTY/ROUTE: Riv/10	
					USERNAME => p002118F		TIME PLOTTED => 4:37:36 PM		DATE PLOTTED => 1/14/2026		CONTRACT No.: 08-OK7304	
											DISREGARD PRINTS BEARING EARLIER REVISION DATES	
											REVISION DATES	
											SHEET 24 OF 47	



PLAN - STRUCTURE



PLAN - DRAINAGE



SECTION B-B

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
8	Riv	10	R53.9/R55.5		

Melvin Principe 1/23/26
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS
SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR
COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT
4080 LEMON STREET
RIVERSIDE, CA 92501

PARSONS
2201 DUPONT DRIVE, SUITE 200
IRVINE, CA 92612

REGISTERED PROFESSIONAL ENGINEER
No. 84296
Exp. 09-30-27
CIVIL
STATE OF CALIFORNIA

- NOTES:
1. Abutment 1 shown, Abutment 3 similar.
 2. For "SECTION A-A", see Standard Plan B9-1.
 3. All bends in plastic pipe must have 3'-0" minimum radius. Plastic pipe used for bends is not required to be slotted.
 4. For downdrain details, see "SLOPE PAVING - FULL SLOPE" sheet.

NO SCALE

DESIGN OVERSIGHT	DESIGN	BY	M. Principe	CHECKED	G. Douglass	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Casey Weber PROJECT ENGINEER	BRIDGE No.	MONROE STREET OC (REPLACE)								
		DETAILS	BY	S. Weight	CHECKED			G. Douglass	56-0897	STRUCTURE APPROACH DETAILS							
		QUANTITIES	BY	M. Principe	CHECKED			A. Botani	R54.74								
SIGN OFF DATE	DATE PLOTTED => 1/14/2026		TIME PLOTTED => 4:37:48 PM		ORIGINAL SCALE		PROJECT NUMBER & PHASE: 0800003681		COUNTY/ROUTE: Riv/10		DISREGARD PRINTS BEARING		REVISION DATES		SHEET	OF	
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)		FILE => 56-0897-q-sad+01		USERNAME => p002118f		IN INCHES FOR REDUCED PLANS				CONTRACT No.: 08-OK7304		EARLIER REVISION DATES		08/23/24 03/16/25 08/11/25 01/23/26		25	47

SUPPLEMENTAL PROJECT INFORMATION, FOUNDATION REPORT - OVERCROSSING, Pg. 223 of 257

Dist

COUNTY

ROUTE

POST MILES
TOTAL PROJECT

SHEET
NO.

TOTAL
SHEETS

8

Riv

10

R53.9/R55.5

Melvin Principe

REGISTERED CIVIL ENGINEER

1/23/26

DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS
SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR
COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER

MELVIN PRINCIPLE

No. 84296

Exp. 09-30-27

CIVIL

STATE OF CALIFORNIA

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT

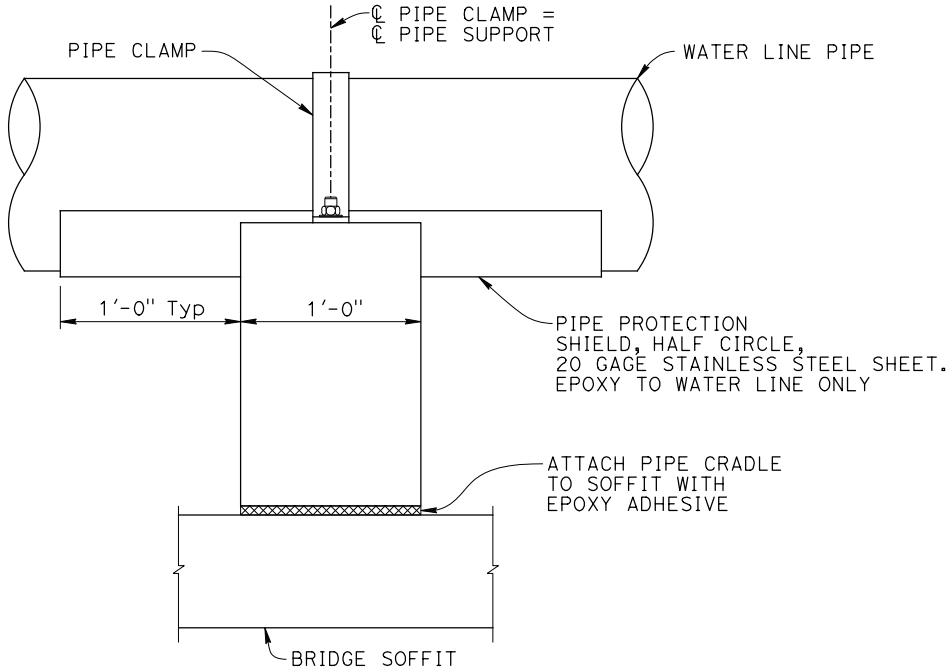
4080 LEMON STREET

RIVERSIDE, CA 92501

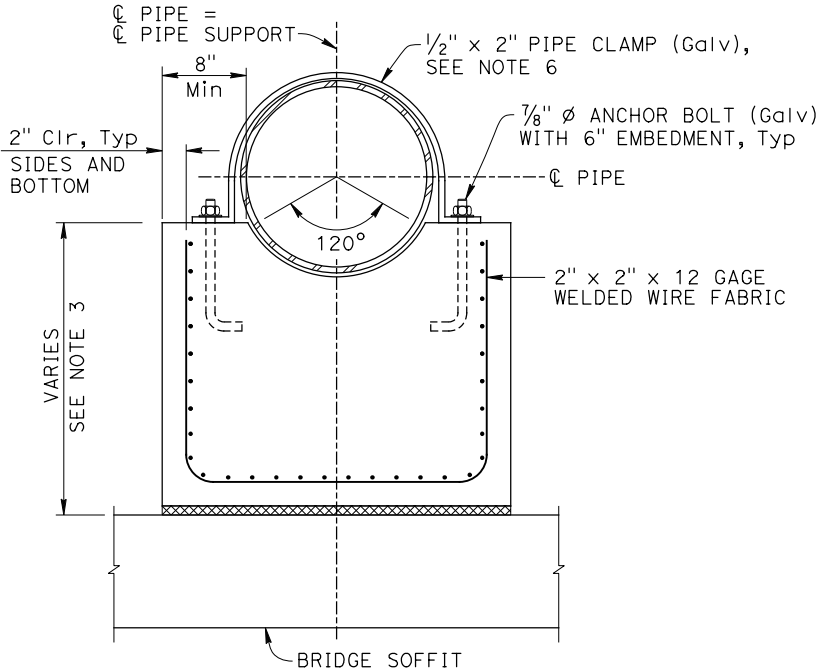
PARSONS

2201 DUPONT DRIVE, SUITE 200

IRVINE, CA 92612



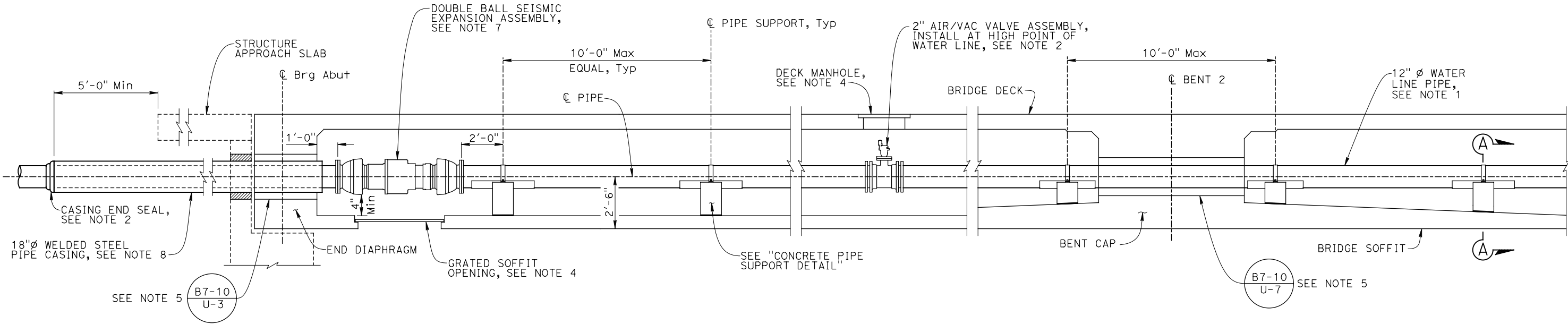
ELEVATION



SECTION A-A

CONCRETE PIPE SUPPORT DETAIL

- NOTES:
- Water line must be installed parallel to bridge deck.
 - For continuation of water line at abutments, air/vac valve assembly, casing insulators, casing end seal, and other details or information not shown, see IWA RELOCATION PLANS.
 - Vertical dimensions of concrete pipe supports vary with the thickness of the bottom slab of the concrete box girder. For dimensions, see "TYPICAL SECTION - STAGE 1" and "GIRDER LAYOUT - STAGE 1" sheets.
 - For locations of soffit access openings and deck manhole, see "GIRDER LAYOUT - STAGE 1" sheet.
 - For utility opening information, see "UTILITY OPENING TABLE" on "INDEX TO PLANS" sheet.
 - Water line must be tightly clamped at the two pipe supports nearest the center of bridge. At all other pipe supports, the pipe clamp must be shimmed with steel washer plates to provide 1/4" clearance between water line and pipe clamp to allow for expansion in both directions.
 - The seismic expansion assembly must be capable of providing for 16" of movement in both the longitudinal (along the pipe) and transverse directions (across the pipe).
 - Casing insulators must be installed within 1'-6" of all bell ends of water line and within 1'-0" of both ends of casing pipe. Casing insulators must also be installed every 6'-6" on center or Manufacturer recommendation, whichever is less.



PIPE SUPPORT INSTALLATION
NEAREST ABUTMENT AND BENT CAP

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

NO SCALE

DESIGN OVERSIGHT		DESIGN BY M. Principe CHECKED G. Douglass		DETAILS BY S. Weight CHECKED G. Douglass		QUANTITIES BY M. Principe CHECKED A. Botani		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		Casey Weber PROJECT ENGINEER		BRIDGE No.		MONROE STREET OC (REPLACE)																																																					
												56-0897																																																							
												SIGN OFF DATE										POST MILE		WATER LINE DETAILS																																											
										R54.74																																																									
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)				DATE PLOTTED => 1/20/2026 FILE => 56-0897-r-uldet01.dgn				TIME PLOTTED => 2:33:31 PM USERNAME => p002118f				ORIGINAL SCALE IN INCHES FOR REDUCED PLANS				0				1				2				3				PROJECT NUMBER & PHASE: 0800003681				COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304				DISREGARD PRINTS BEARING EARLIER REVISION DATES				01/23/26																26				47			

Dist

COUNTY

ROUTE

POST MILES
TOTAL PROJECT

SHEET
No.

TOTAL
SHEETS

8

Riv

10

R53.9/R55.5

Melvin Principe

REGISTERED CIVIL ENGINEER

1/23/26

DATE

REGISTERED PROFESSIONAL ENGINEER

MELVIN PRINCIPLE

No. 84296

Exp. 09-30-27

CIVIL

STATE OF CALIFORNIA

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS
SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR
COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT

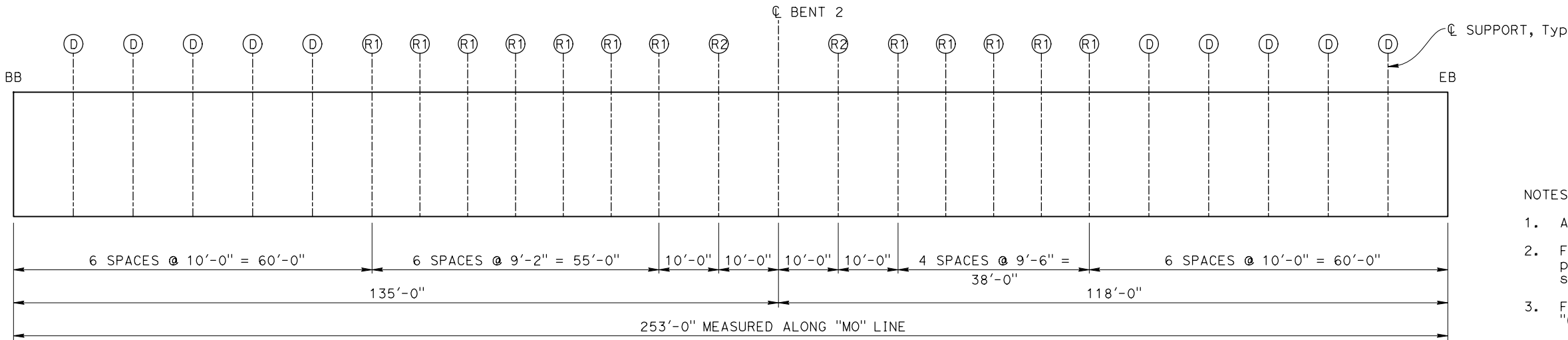
4080 LEMON STREET

RIVERSIDE, CA 92501

PARSONS

2201 DUPONT DRIVE, SUITE 200

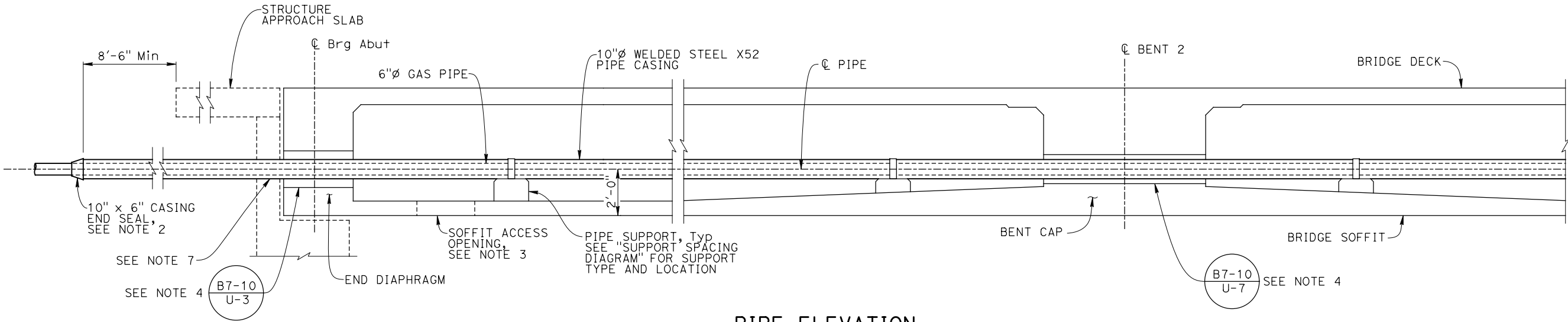
IRVINE, CA 92612



SUPPORT SPACING DIAGRAM

R1 & R2 = RESTRAINING TYPE SUPPORT, SEE NOTE 5
D = DISPLACEMENT TYPE SUPPORT, SEE NOTE 6

- NOTES:
- All work on this sheet to be installed by Others.
 - For continuation of gas line at abutments, vent pipe, and other details or information not shown, see SCG RELOCATION PLANS.
 - For location of soffit access openings, see "GIRDER LAYOUT - STAGE 1" sheet.
 - For utility opening information, see "UTILITY OPENING TABLE" on "INDEX TO PLANS" sheet.
 - For "LATERAL RESTRAINING TYPE R1 & R2 SUPPORT", see "GAS LINE DETAILS No. 2" sheet.
 - For "LATERAL DISPLACEMENT TYPE D SUPPORT", see "GAS LINE DETAILS No. 3" sheet.
 - At abutment backwall, cast casing in place after tightly wrapping with two layers of #15 building paper, or fiberglass reinforced plastic (FRP) sleeve.

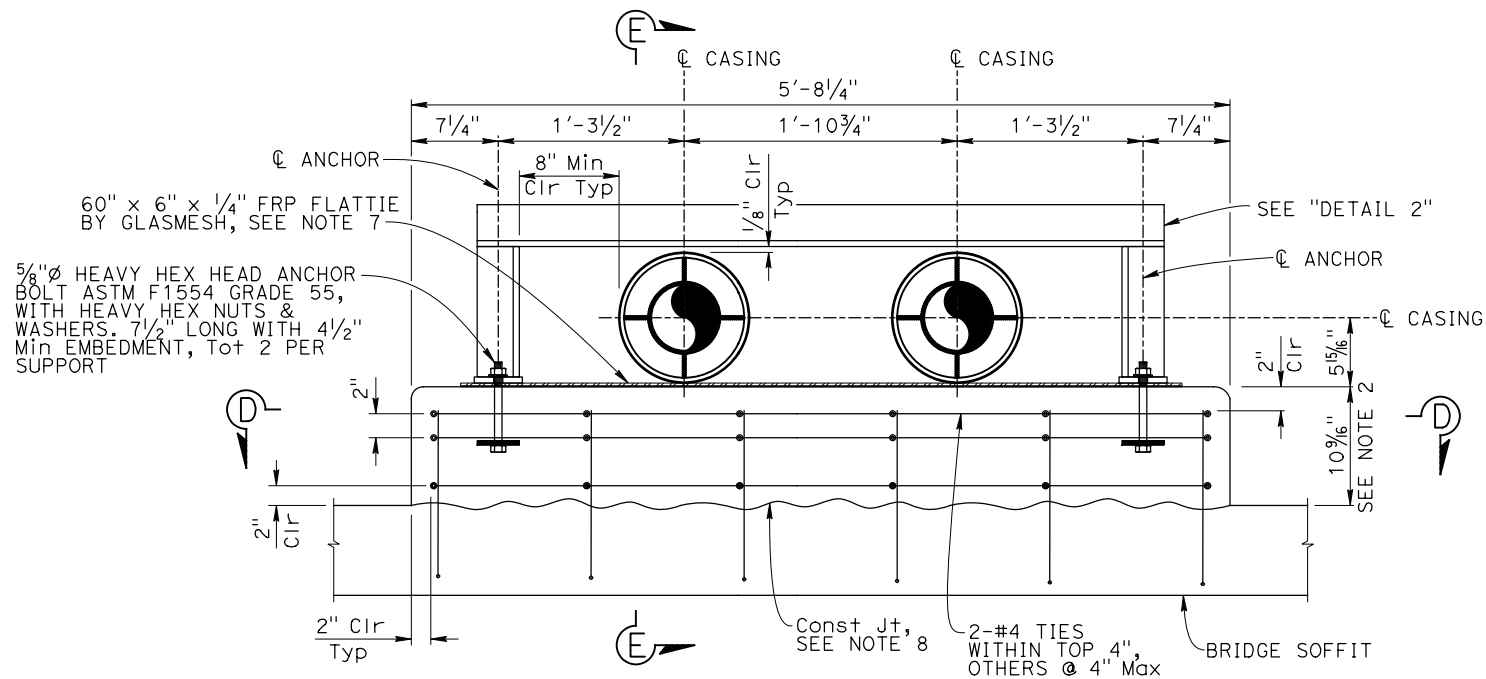


PIPE ELEVATION

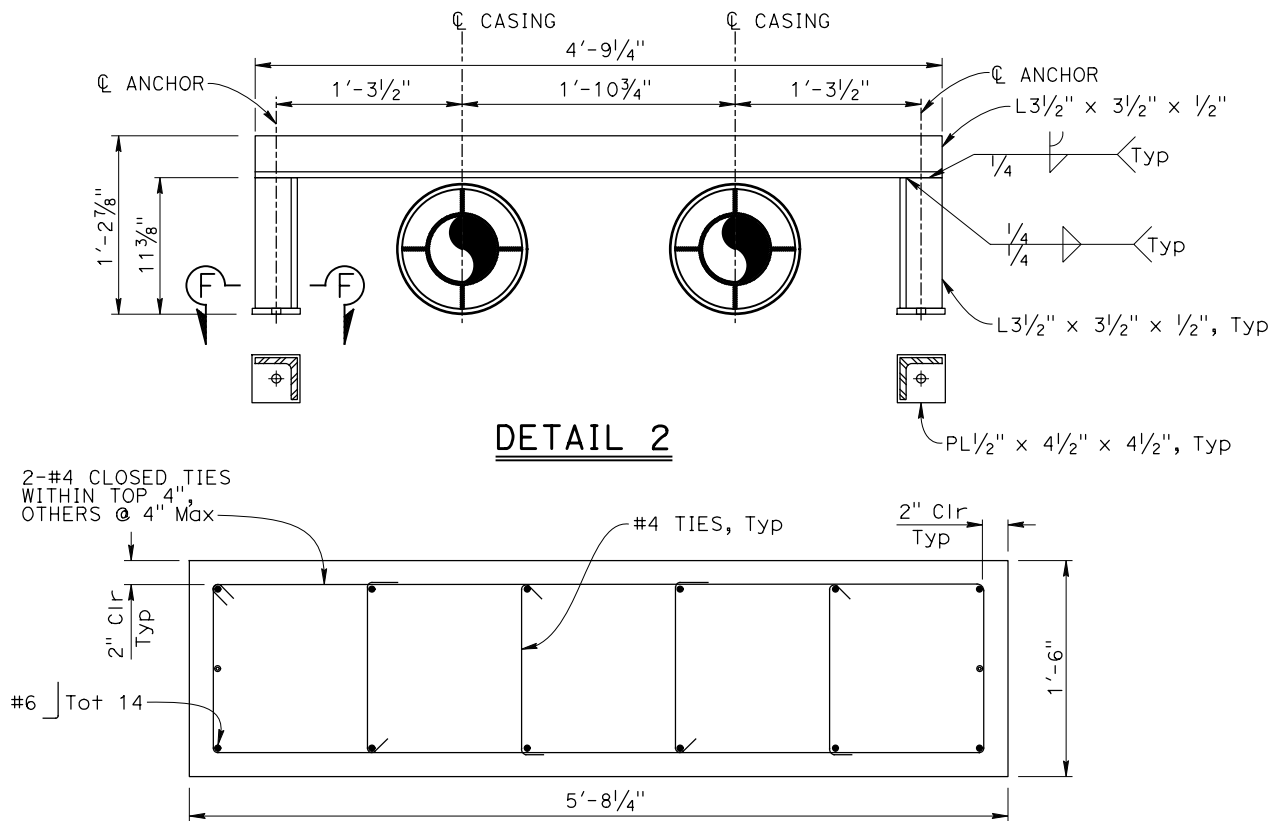
NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

NO SCALE

DESIGN OVERSIGHT		DESIGN BY M. Principe CHECKED G. Douglass		DETAILS BY S. Weight CHECKED G. Douglass		QUANTITIES BY M. Principe CHECKED A. Botani		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		Casey Weber PROJECT ENGINEER		BRIDGE No.		MONROE STREET OC (REPLACE) GAS LINE DETAILS No. 1																																																															
												56-0897																																																																	
												POST MILE																																																																	
SIGN OFF DATE												R54.74																																																																	
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)										DATE PLOTTED => 1/20/2026 FILE => 56-0897-r-uldet03.dgn				TIME PLOTTED => 2:33:54 PM USERNAME => p002118f				ORIGINAL SCALE IN INCHES FOR REDUCED PLANS				0				1				2				3				PROJECT NUMBER & PHASE: 0800003681								COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304				DISREGARD PRINTS BEARING EARLIER REVISION DATES				01/23/26																28				47			



LATERAL DISPLACEMENT
TYPE "D" SUPPORT

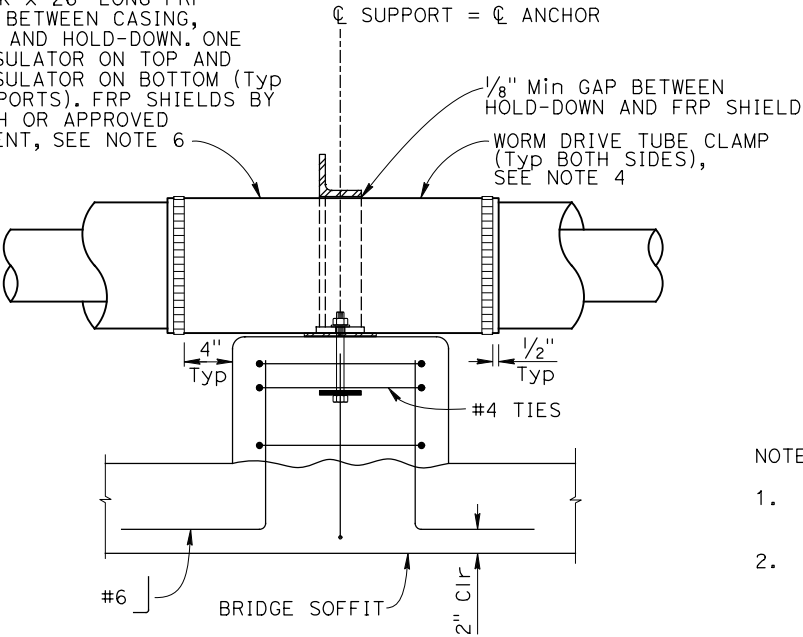


SECTION D-D

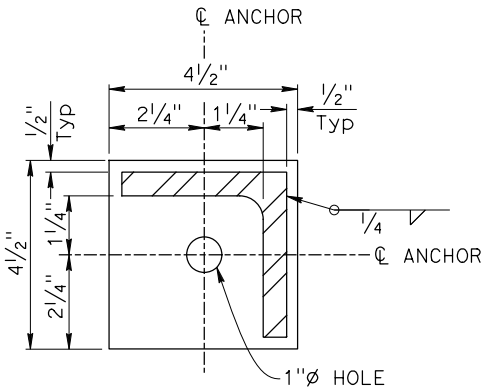
NOTE: Anchor bolts not shown for clarity.

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

3/16" THICK x 26" LONG FRP
SHIELDS BETWEEN CASING,
SUPPORT AND HOLD-DOWN. ONE
180° INSULATOR ON TOP AND
180° INSULATOR ON BOTTOM (Typ
ALL SUPPORTS). FRP SHIELDS BY
GLASMESH OR APPROVED
EQUIVALENT, SEE NOTE 6



SECTION E-E



SECTION F-F

- NOTES:
- All work on this sheet to be installed by Others.
 - Vertical dimension of supports vary with the thickness of the bottom slab of the concrete box girder. For dimensions, see "TYPICAL SECTION - STAGE 1" and "GIRDER LAYOUT - STAGE 1" sheets. Dimensions must be verified prior to fabrication.
 - All pipeline support components and hardware, including nuts and bolts, must be galvanized or stainless steel.
 - Stainless steel worm drive tube clamp to be installed on both sides of FRP shields. McMaster Carr Stock #5322K68 or equivalent. Limit maximum torque to 30 in-lbs.
 - Pipeline is not to follow the flared girder of the bridge, but is to remain straight. Horizontal position of supports to follow pipe rather than girder.
 - Seal the space between the inside surface of the FRP shield and coated steel pipe by using 3M Epoxy Adhesive 2216 or polyethylene tape per Gas Standard 186.0100. Roughen the surfaces with coarse emery cloth. Do not grit blast. Seal of the FRP shield is not necessary for polyurethane coated steel pipe.
 - Seal the space between FRP flattie and concrete surface with epoxy seam sealer by Glasmesh or approved equivalent. Apply epoxy per Manufacturer recommendation.
 - Construction joint must be intentionally roughened to an approximate amplitude of 1/4". Surface of joint must be cleaned and clear of laitance prior to placing pedestal concrete.
 - Concrete must have a minimum compressive strength f'c = 5,000 psi on or before 28 days of the concrete being poured/placed.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
8	Riv	10	R53.9/R55.5		

Melvin Principe 1/23/26
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

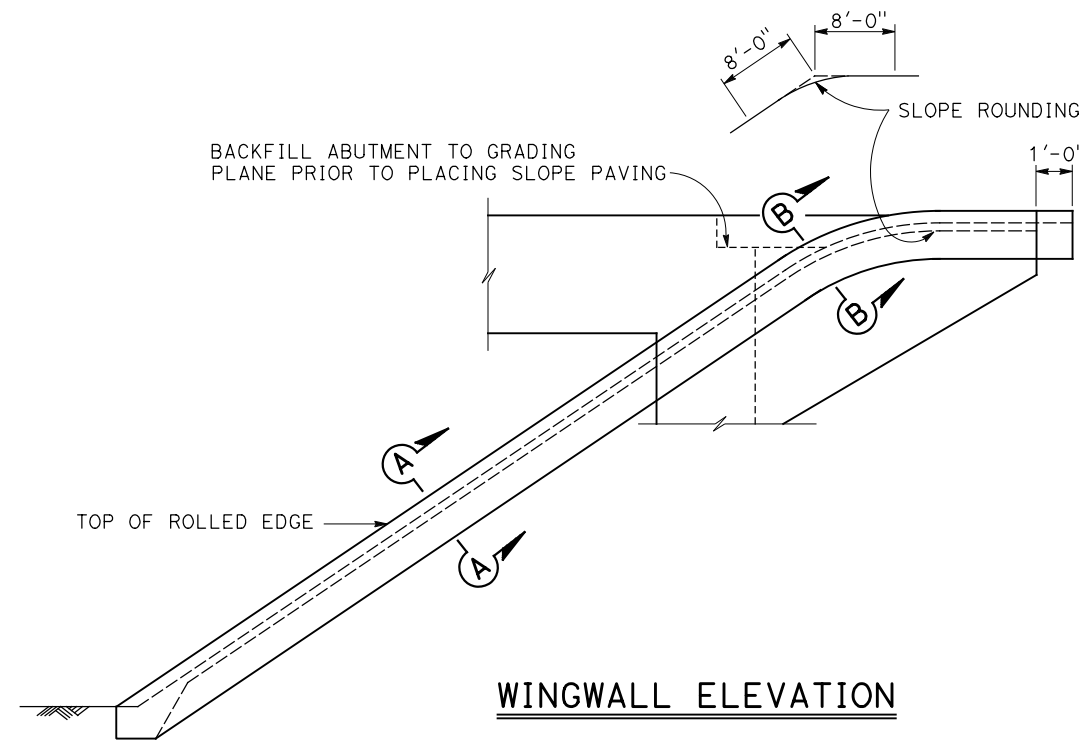
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS
SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR
COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT
4080 LEMON STREET
RIVERSIDE, CA 92501

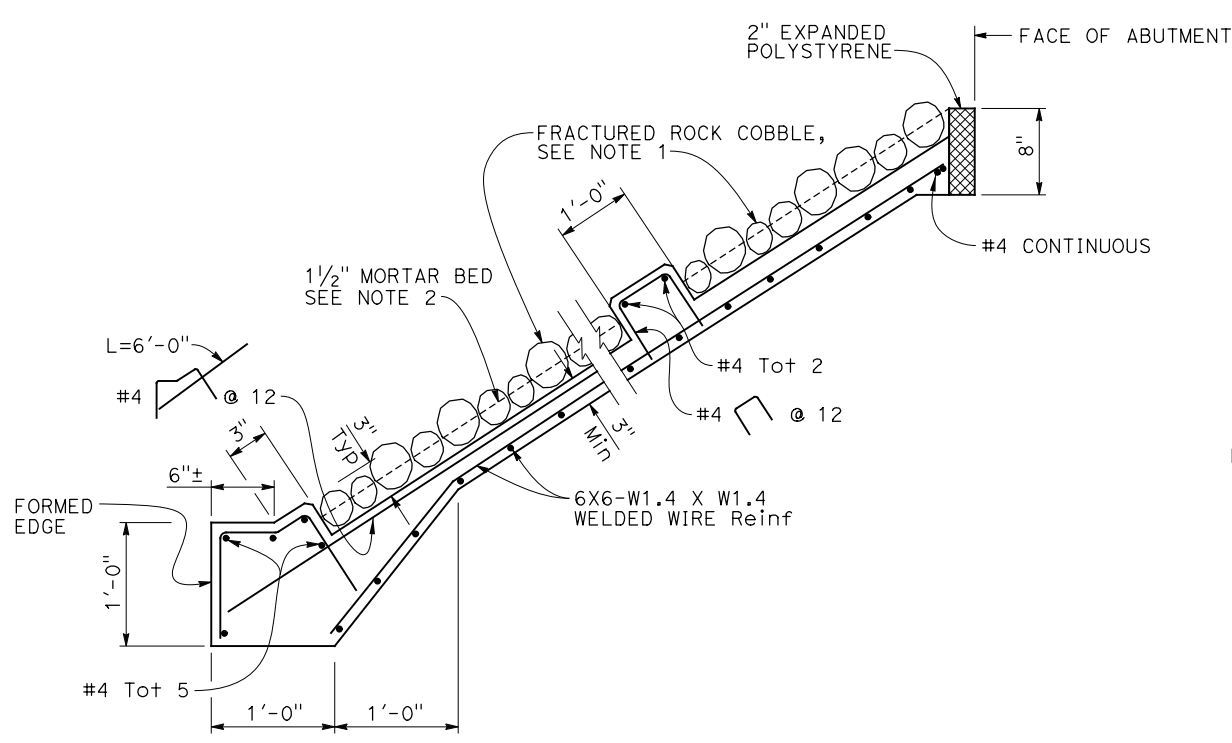
PARSONS
2201 DUPONT DRIVE, SUITE 200
IRVINE, CA 92612

REGISTERED PROFESSIONAL ENGINEER
No. 84296
Exp. 09-30-27
CIVIL
STATE OF CALIFORNIA

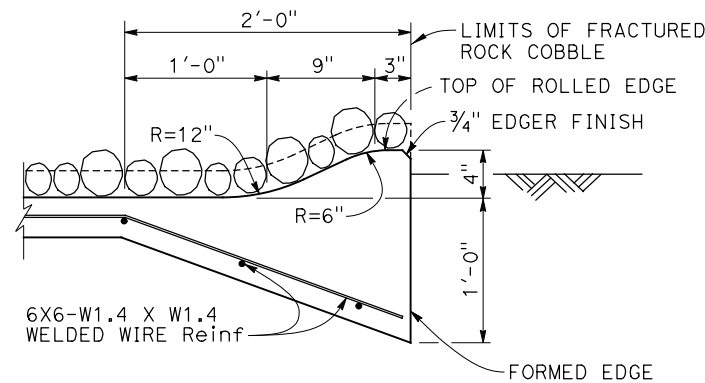
DESIGN OVERSIGHT		DESIGN		BY	M. Principe	CHECKED	G. Douglass	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Casey Weber		BRIDGE No.	MONROE STREET OC (REPLACE)																					
SIGN OFF DATE		DETAILS		BY	S. Weight	CHECKED	G. Douglass		PROJECT ENGINEER		56-0897	POST MILE	GAS LINE DETAILS No. 3																				
		QUANTITIES		BY	M. Principe	CHECKED	A. Botani				R54.74																						
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)		DATE PLOTTED => 1/20/2026 FILE => 56-0897-r-uldet05.dgn				TIME PLOTTED => 2:34:16 PM USERNAME => p002118f		ORIGINAL SCALE IN INCHES FOR REDUCED PLANS		0		1		2		3		PROJECT NUMBER & PHASE: 0800003681		COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304		DISREGARD PRINTS BEARING EARLIER REVISION DATES		01/23/26						SHEET		OF	
																								30		47							



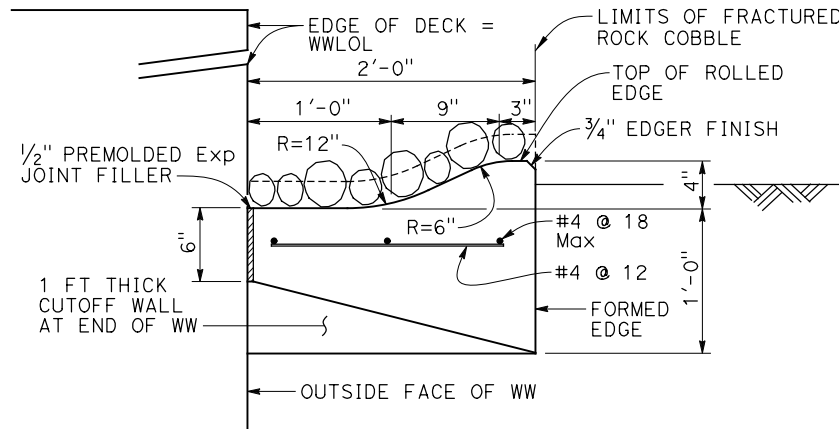
WINGWALL ELEVATION



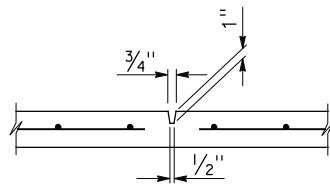
TYPICAL SECTION - CONCRETE PAVING



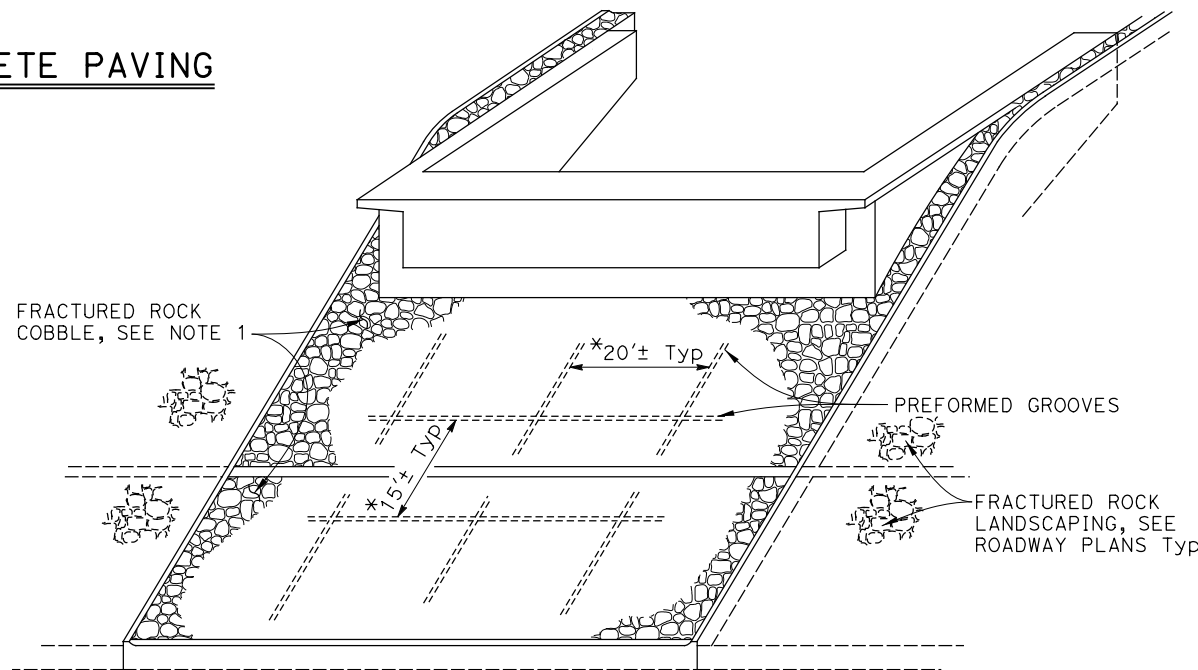
SECTION A-A



SECTION B-B

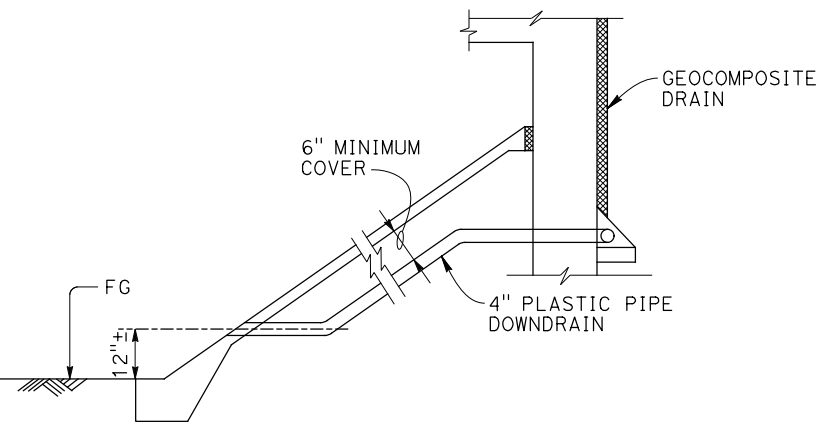


PREFORMED GROOVE



PICTORIAL VIEW OF TYPICAL INSTALLATION

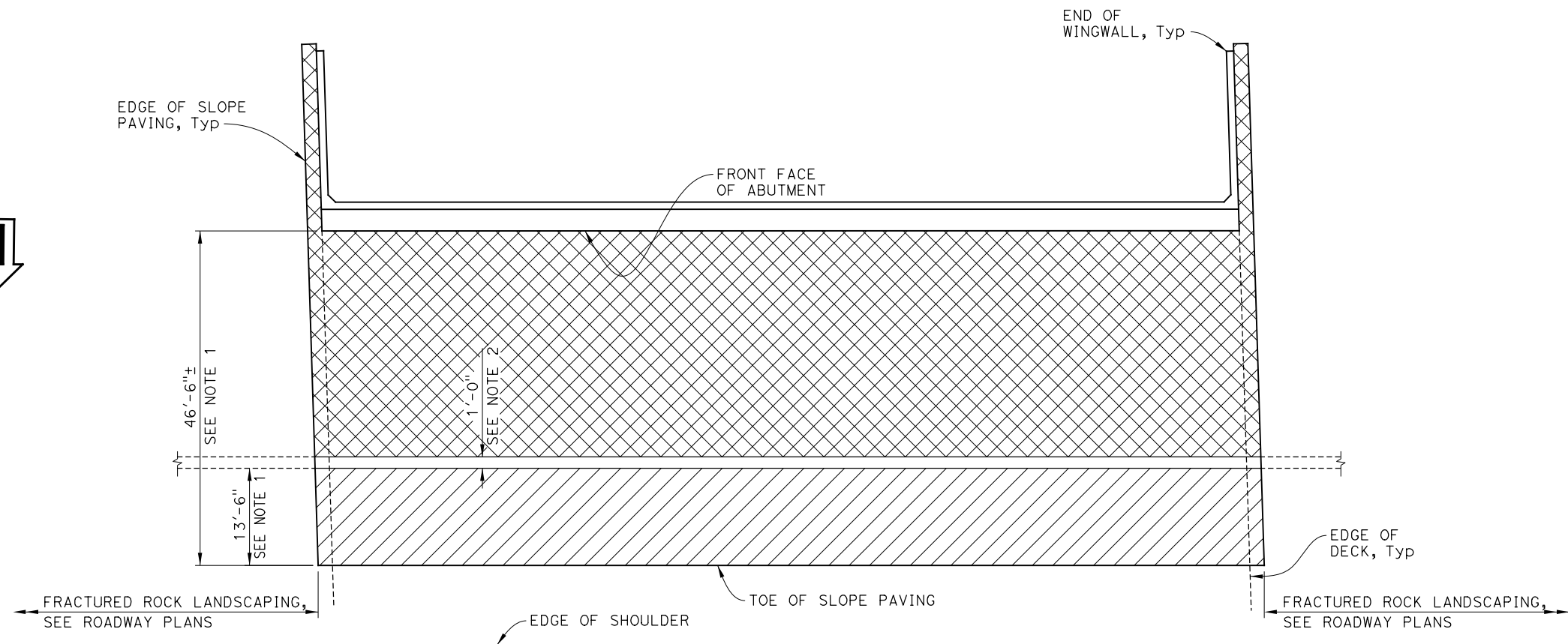
- NOTES:
- For slope paving layout and fractured rock placement, see "SLOPE PAVING LAYOUT" sheet.
 - Fractured rock cobble must be placed to minimize mortar exposure to the top surface and be well seated to ensure good contact with underlying concrete.



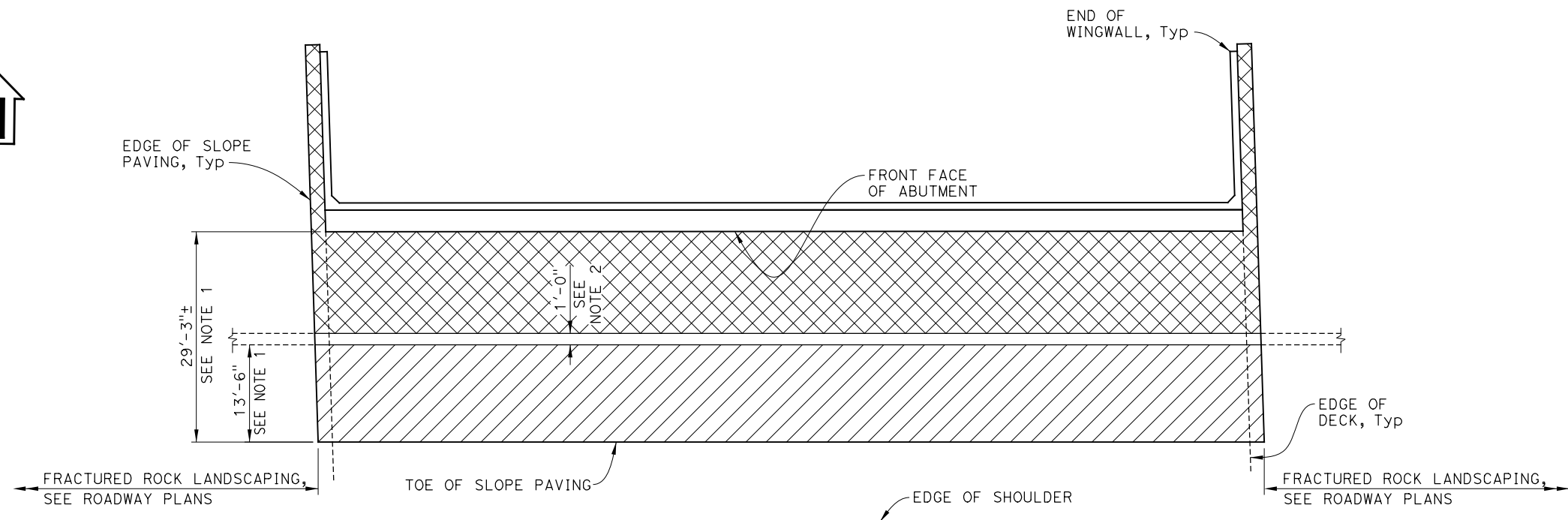
DRAINAGE DETAILS

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

DESIGN OVERSIGHT		DESIGN	BY M. Principe	CHECKED G. Douglass	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		BRIDGE No. 56-0897	MONROE STREET OC (REPLACE)	
SIGN OFF DATE		DETAILS	BY S. Weight	CHECKED G. Douglass	Casey Weber PROJECT ENGINEER		POST MILE R54.74	SLOPE PAVING - FULL SLOPE	
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)		QUANTITIES	BY M. Principe	CHECKED A. Botani	PROJECT NUMBER & PHASE: 0800003681		COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304	REVISION DATES	SHEET OF
DATE PLOTTED => 1/14/2026 FILE => 56-0897-s-slpav		TIME PLOTTED => 4:42:40 PM USERNAME => p002118f		ORIGINAL SCALE IN INCHES FOR REDUCED PLANS		DISREGARD PRINTS BEARING EARLIER REVISION DATES		08/23/24 03/16/25 08/11/25 01/23/26	31 47



PLAN - ABUTMENT 1 SLOPE PAVING



PLAN - ABUTMENT 3 SLOPE PAVING

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
8	Riv	10	R53.9/R55.5		

Melvin Principe

REGISTERED CIVIL ENGINEER

1/23/26
DATE

REGISTERED PROFESSIONAL ENGINEER

No. 84296

Exp. 09-30-27

CIVIL

STATE OF CALIFORNIA

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS
SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR
COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT
4080 LEMON STREET
RIVERSIDE, CA 92501

PARSONS
2201 DUPONT DRIVE, SUITE 200
IRVINE, CA 92612

- NOTES:
- Dimensions shown are measured along slope and approximate. Dimensions may be adjusted based on the final grading and as directed by the Engineer.
 - Align 1'-0" band on slope paving with 1'-0" band on landscaping both sides.

LEGEND:

2" to 4" Fractured Rock
Miner's Gold (Light Rock)

2" to 4" Fractured Rock
La Cresta (Dark Rock)

NO SCALE

DESIGN OVERSIGHT	BY M. Principe	CHECKED G. Douglass	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Casey Weber PROJECT ENGINEER	BRIDGE No.	MONROE STREET OC (REPLACE) SLOPE PAVING LAYOUT
		DETAILS BY S. Weight			CHECKED G. Douglass	
SIGN OFF DATE	QUANTITIES BY M. Principe	CHECKED A. Botani			R54.74	

STRUCTURES DESIGN DETAIL SHEET
(ENGLISH) (REVISION 8/16/2021)

DATE PLOTTED => 1/14/2026
FILE => 56-0897-s-slpav02

TIME PLOTTED => 4:42:53 PM
USERNAME => p002118f

ORIGINAL SCALE
IN INCHES FOR
REDUCED PLANS

0 1 2 3

PROJECT NUMBER & PHASE: 0800003681

COUNTY/ROUTE: Riv/10
CONTRACT No.: 08-OK7304

DISREGARD PRINTS BEARING
EARLIER REVISION DATES

REVISION DATES
11/10/25 08/25/24 03/20/25 08/11/25

SHEET
32

OF
47

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
8	Riv	10	R53.9/R55.5		

Melvin Principe

REGISTERED CIVIL ENGINEER

1/23/26
DATE

REGISTERED PROFESSIONAL ENGINEER

MELVIN PRINCIPLE

No. 84296

Exp. 09-30-27

CIVIL

STATE OF CALIFORNIA

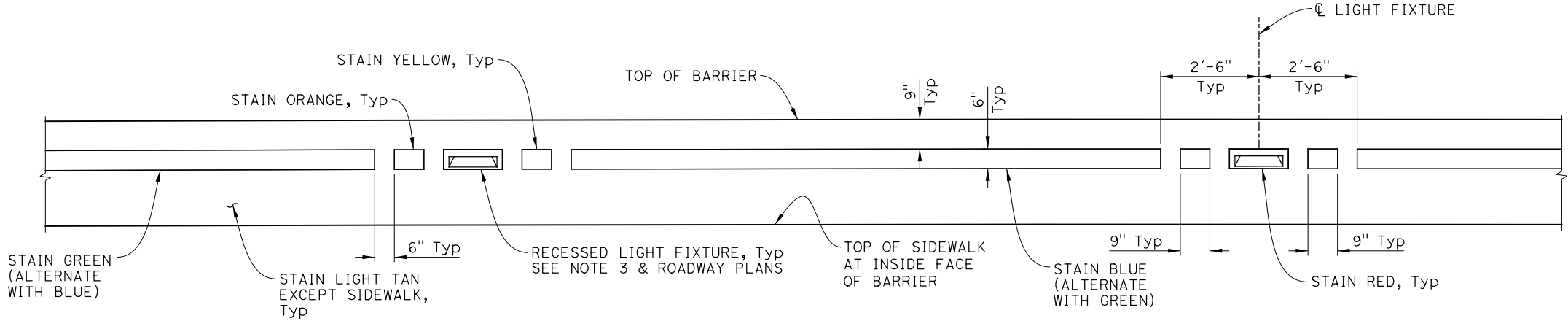
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS
SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR
COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT
4080 LEMON STREET
RIVERSIDE, CA 92501

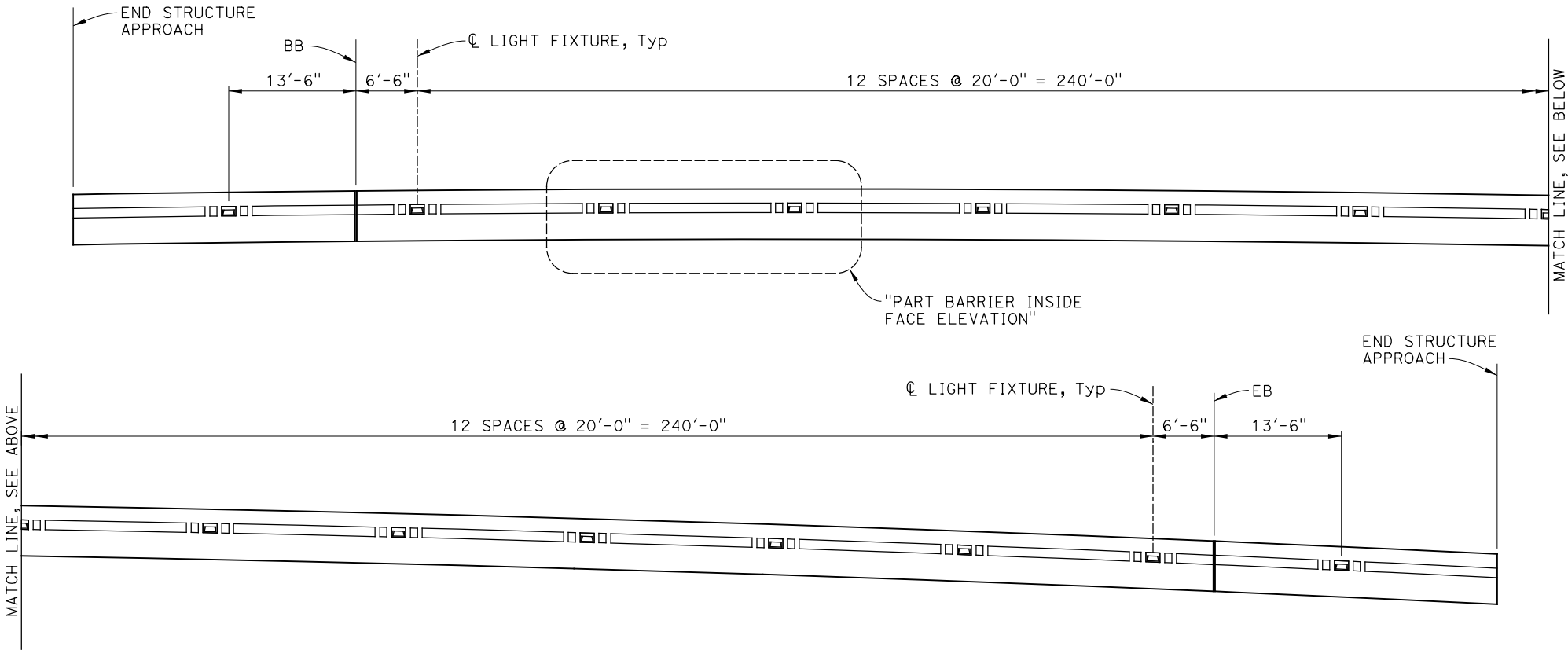
PARSONS
2201 DUPONT DRIVE, SUITE 200
IRVINE, CA 92612

- NOTES:
- Dimensions measured along edge of deck.
 - Chain link railing and decorative metal sign not shown for clarity.
 - For additional barrier reinforcement at recessed light fixture, see "CONCRETE BARRIER (TYPE 732SW MOD)" on "TYPICAL SECTION - STAGE 1" sheet.



PART BARRIER INSIDE FACE ELEVATION

NOTE: West edge of deck barrier shown,
east edge of deck barrier mirrored.



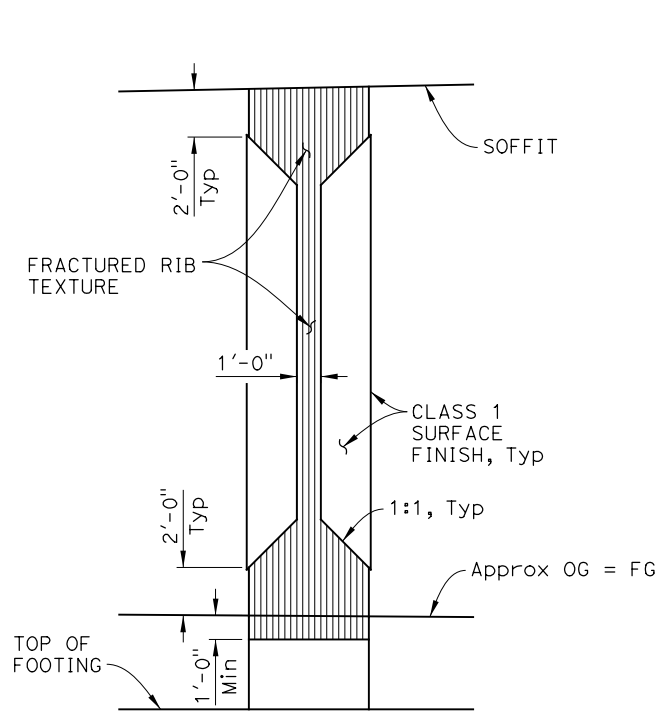
BARRIER INSIDE FACE ELEVATION

NOTE: West edge of deck barrier shown,
east edge of deck barrier mirrored.

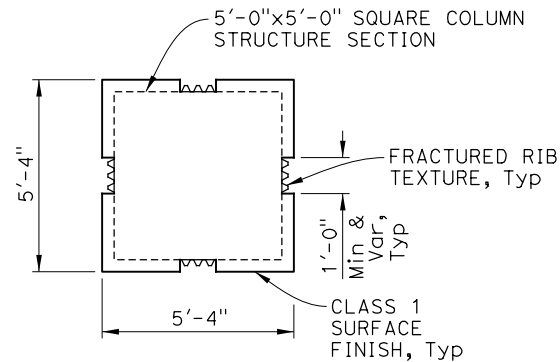
NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

NO SCALE

		DESIGN BY M. Principe		CHECKED G. Douglass		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		Casey Weber		BRIDGE No.		MONROE STREET OC (REPLACE)																															
DESIGN OVERSIGHT		DETAILS BY S. Weight		CHECKED G. Douglass				PROJECT ENGINEER		56-0897																																	
SIGN OFF DATE		QUANTITIES BY M. Principe		CHECKED A. Botani						POST MILE		R54.74																															
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)		DATE PLOTTED => 1/14/2026 FILE => 56-0897-U-Grd01				TIME PLOTTED => 4:43:05 PM USERNAME => p002118f				ORIGINAL SCALE IN INCHES FOR REDUCED PLANS		0		1		2		3		PROJECT NUMBER & PHASE: 0800003681				COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304				DISREGARD PRINTS BEARING EARLIER REVISION DATES				REVISION DATES				SHEET		OF					
																								08/23/24				03/16/25				08/11/25				01/23/26				33		47	

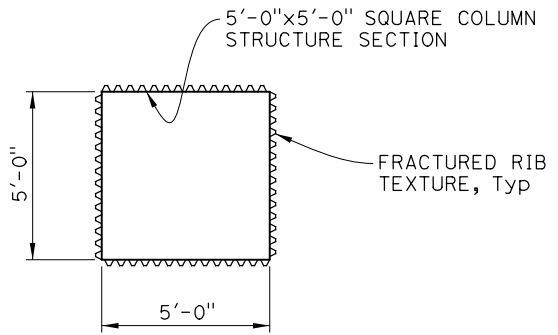


COLUMN TREATMENT DETAIL



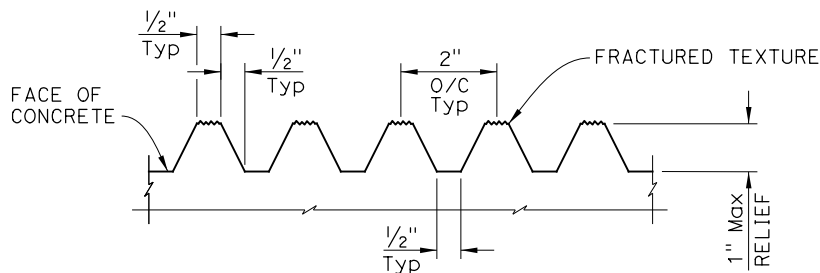
SECTION B-B

NOTE: Exterior column shown, all other columns similar.

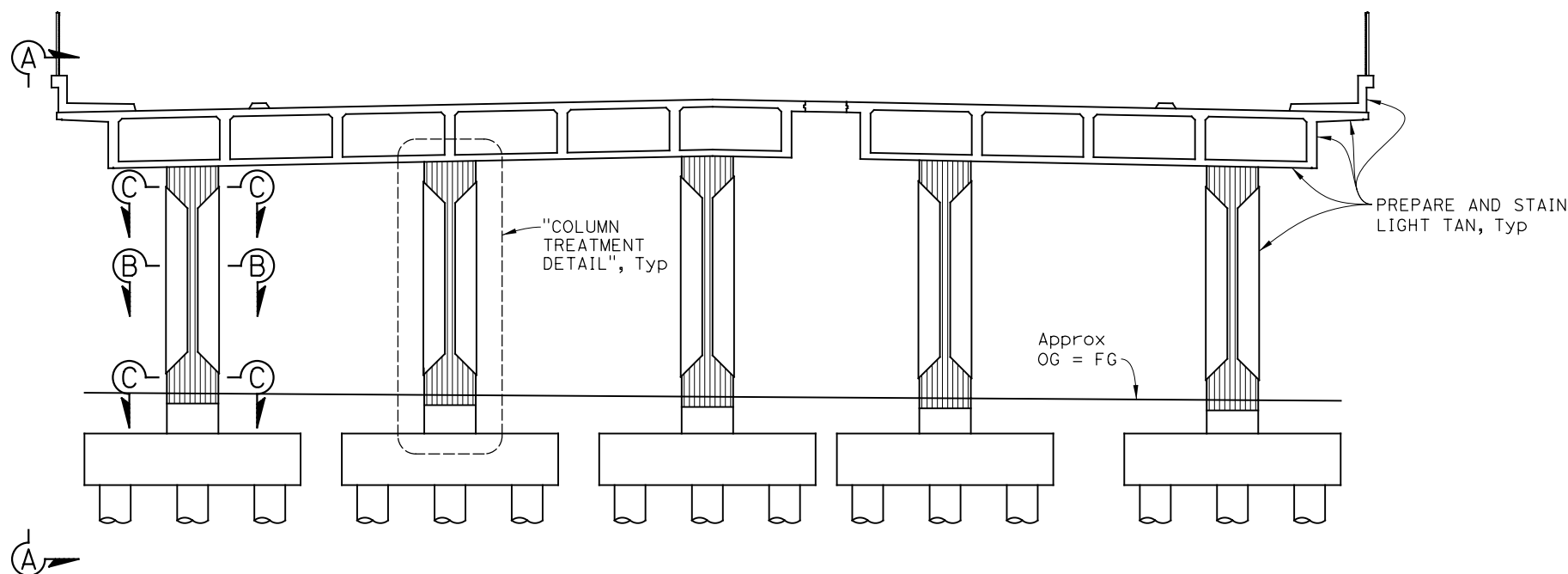


SECTION C-C

NOTE: Exterior column shown, all other columns similar.

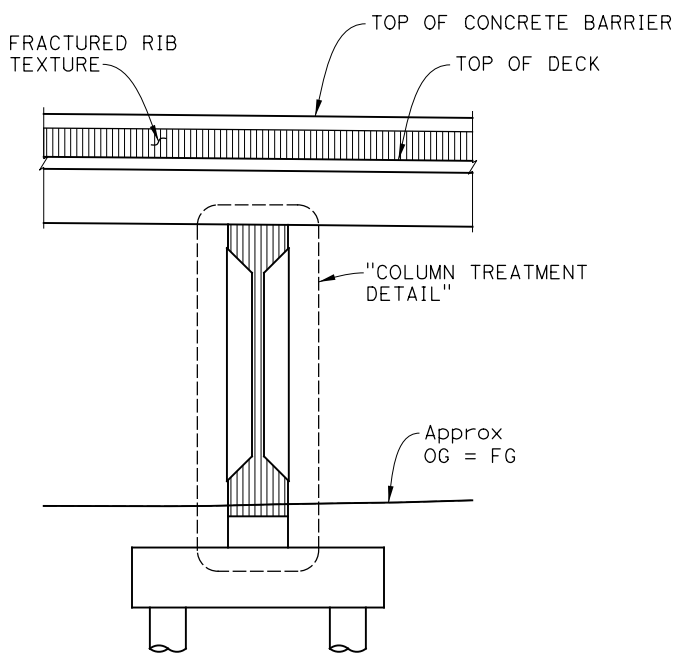


FRACTURED RIB TEXTURE



COLUMN ELEVATION

NOTE: North elevation shown, south elevation similar.



VIEW A-A

NOTES: East view shown, west view similar. Chain link railing, decorative metal sign, and barrier extensions not shown for clarity.

NOTE: THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

NO SCALE

				DESIGN BY M. Principe CHECKED G. Douglass		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		BRIDGE No. 56-0897		MONROE STREET OC (REPLACE)																	
DESIGN OVERSIGHT		DETAILS BY S. Weight CHECKED G. Douglass		Casey Weber PROJECT ENGINEER				POST MILE																			
SIGN OFF DATE		QUANTITIES BY M. Principe CHECKED A. Botani						R54.74		ARCHITECTURAL DETAILS No. 2																	
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)		DATE PLOTTED => 1/14/2026 FILE => 56-0897-U-Grd02		TIME PLOTTED => 4:43:14 PM USERNAME => p002118f		ORIGINAL SCALE IN INCHES FOR REDUCED PLANS		0						1		2		3		PROJECT NUMBER & PHASE: 0800003681		COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304		DISREGARD PRINTS BEARING EARLIER REVISION DATES		REVISION DATES 08/23/24 03/16/25 08/11/25 01/23/26	

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
8	Riv	10	R53.9/R55.5		

Melvin Principe

REGISTERED CIVIL ENGINEER

1/23/26
DATE

REGISTERED PROFESSIONAL ENGINEER

MELVIN PRINCIPLE

No. 84296

Exp. 09-30-27

CIVIL

STATE OF CALIFORNIA

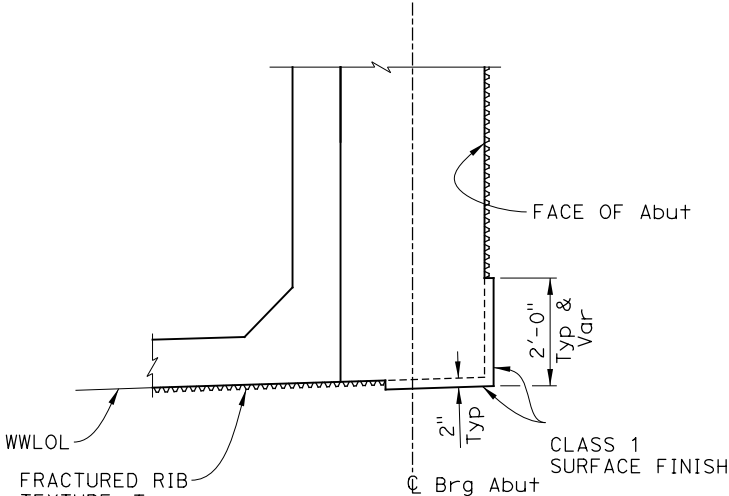
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS
SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR
COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

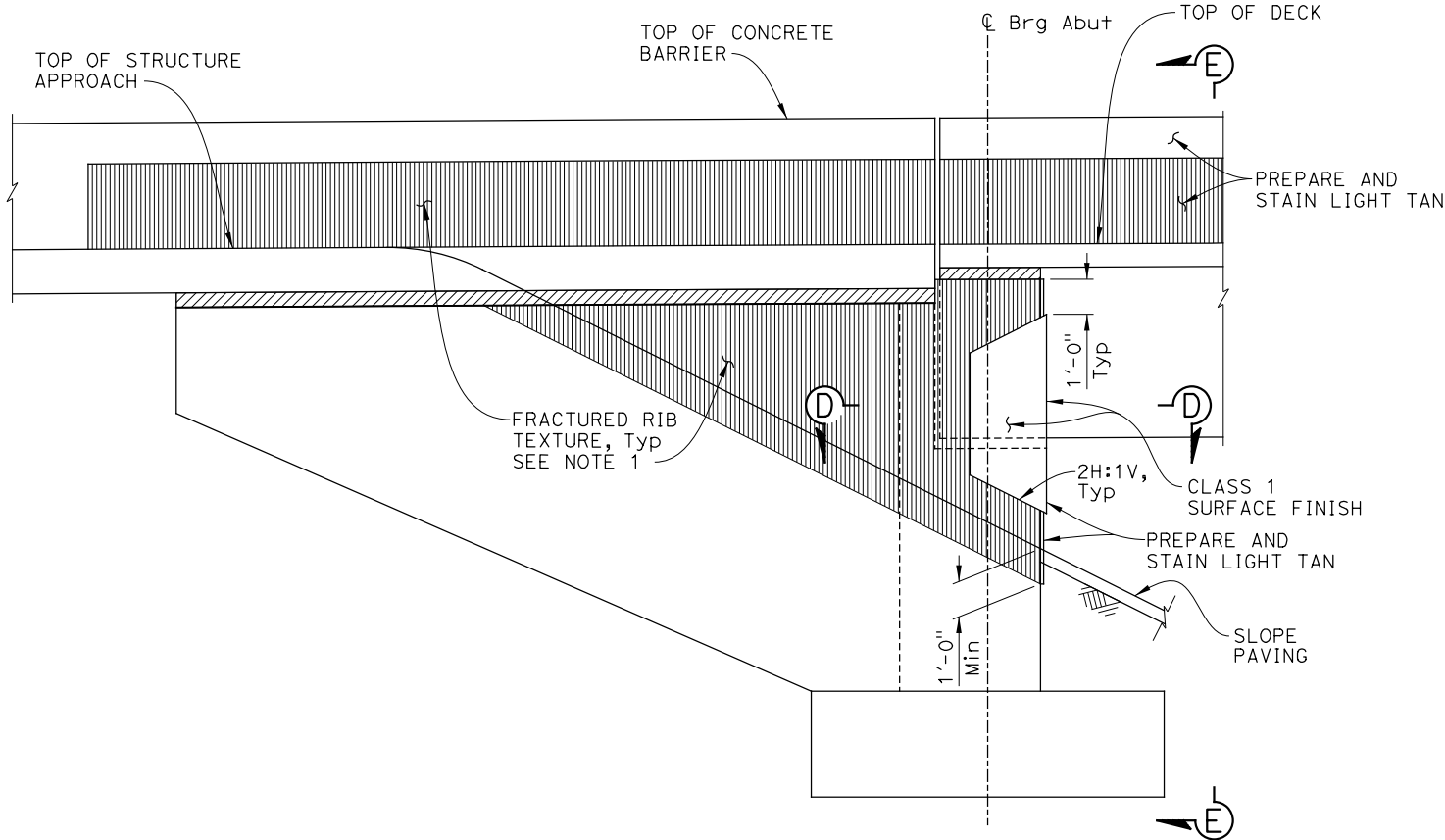
RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT
4080 LEMON STREET
RIVERSIDE, CA 92501

PARSONS
2201 DUPONT DRIVE, SUITE 200
IRVINE, CA 92612

- NOTE:
- For "FRACTURED RIB TEXTURE", see "ARCHITECTURAL DETAILS No. 2" sheet.



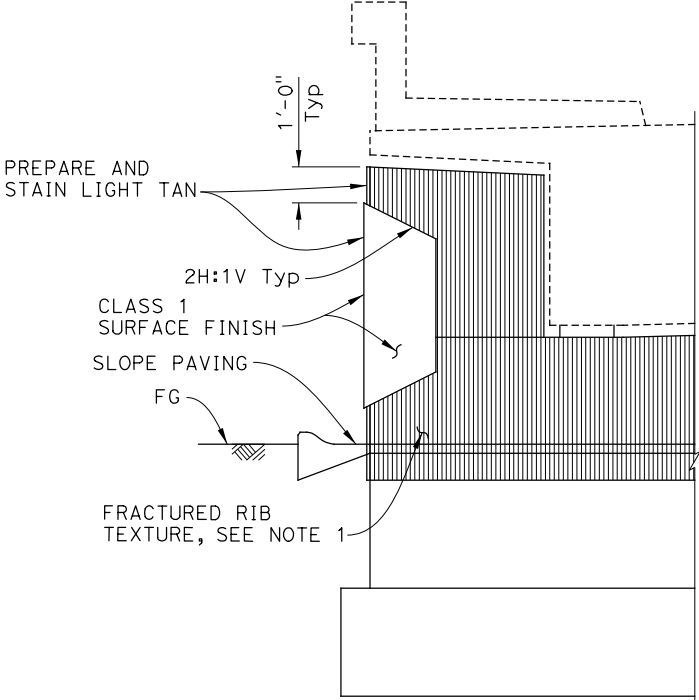
SECTION D-D



WINGWALL ELEVATION

NOTES: Abut 1 right wingwall shown, all others similar. Chain link railing not shown for clarity.

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.



VIEW E-E

NO SCALE

		DESIGN		BY M. Principe	CHECKED G. Douglass	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Casey Weber PROJECT ENGINEER		BRIDGE No. 56-0897	MONROE STREET OC (REPLACE)										
DESIGN OVERSIGHT		DETAILS		BY S. Weight	CHECKED G. Douglass		POST MILE	ARCHITECTURAL DETAILS No. 3												
SIGN OFF DATE		QUANTITIES		BY M. Principe	CHECKED A. Botani		R54.74													
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)		DATE PLOTTED => 1/14/2026 FILE => 56-0897-U-ard+03			TIME PLOTTED => 4:43:24 PM USERNAME => p002118f			ORIGINAL SCALE IN INCHES FOR REDUCED PLANS			PROJECT NUMBER & PHASE: 0800003681		COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304		DISREGARD PRINTS BEARING EARLIER REVISION DATES		REVISION DATES 08/23/24 03/16/25 08/11/25 01/23/26		SHEET 35	OF 47

POWDER COATING TABLE	
COMPONENT	COLOR
Mtn R, Mtn Accent R, Mtn Ridge Corrugation, Post HSS, Back Support Angle, and Palm Trunk Accent R	Mahogany Brown
Palm Trunk R and Palm Skirt R	Sand Gray
Palm Frond R and Palm Frond Support HSS	Medium Green
Music Note R No. 1 & 6	Orange
Music Note R No. 2	Red
Music Note R No. 3	Blue
Music Note R No. 4	Green
Music Note R No. 5	Yellow
Wind Line R, Backing R, and Upper Post HSS at Wind Line	Silver

NOTES:

1. Dimensions measured along edge of deck.
2. For "FRACTURED RIB TEXTURE", see "ARCHITECTURAL DETAILS No. 2" sheet.
3. For post layout at decorative metal sign, barrier extension details, and post anchorage details, see "ARCHITECTURAL DETAILS No. 5" sheet.
4. For Typical Sections and "STEEL PLATE DETAIL", see "ARCHITECTURAL DETAILS No. 6" sheet.
5. For "PALM TREE & MTN DETAIL", see "ARCHITECTURAL DETAILS No. 7" sheet.
6. For "MUSIC NOTE DETAIL", see "ARCHITECTURAL DETAILS No. 8" sheet.
7. For "DECORATIVE METAL SIGN GRID", see "ARCHITECTURAL DETAILS No. 9" and "ARCHITECTURAL DETAILS No. 10" sheets.
8. All steel must be galvanized after fabrication and powder coated after assembly. For colors, see "POWDER COATING TABLE".
9. Mountain plate can be spliced at three locations max. No splices allowed within 1'-0" of posts.
10. Welds for connecting sign to support members can be shop or field welded.
11. For chain link railing fabric and details not shown, see Standard Plan B11-52.

Dist

COUNTY

ROUTE

POST MILES
TOTAL PROJECT

SHEET
NO.

TOTAL
SHEETS

8

Riv

10

R53.9/R55.5

Melvin Principe

REGISTERED CIVIL ENGINEER

1/23/26

DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS
SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR
COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT

4080 LEMON STREET

RIVERSIDE, CA 92501

PARSONS

2201 DUPONT DRIVE, SUITE 200

IRVINE, CA 92612

REGISTERED PROFESSIONAL ENGINEER

MELVIN PRINCIPLE

No. 84296

Exp. 09-30-27

CIVIL

STATE OF CALIFORNIA

LEGEND:

LLH Long Leg Horizontal

(X) Music Note R No.

DECORATIVE METAL SIGN ELEVATION

NOTES: East edge of deck shown, west edge of deck similar.

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

NO SCALE

DESIGN OVERSIGHT	DESIGN	BY	M. Principe	CHECKED	G. Douglass	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	BRIDGE No. 56-0897 POST MILE R54.74	MONROE STREET OC (REPLACE) ARCHITECTURAL DETAILS No. 4					
		BY	S. Weight	CHECKED	G. Douglass								
SIGN OFF DATE		BY	M. Principe	CHECKED	A. Botani	Casey Weber PROJECT ENGINEER							
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)	DATE PLOTTED => 1/14/2026 FILE => 56-0897-u-ard+04	TIME PLOTTED => 4:43:33 PM USERNAME => p002118f	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS	0	1	2	3	PROJECT NUMBER & PHASE: 0800003681	COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES	SHEET 36	OF 47

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
8	Riv	10	R53.9/R55.5		

Melvin Principe

REGISTERED CIVIL ENGINEER

1/23/26

DATE

REGISTERED PROFESSIONAL ENGINEER

MELVIN PRINCIPLE

No. 84296

Exp. 09-30-27

CIVIL

STATE OF CALIFORNIA

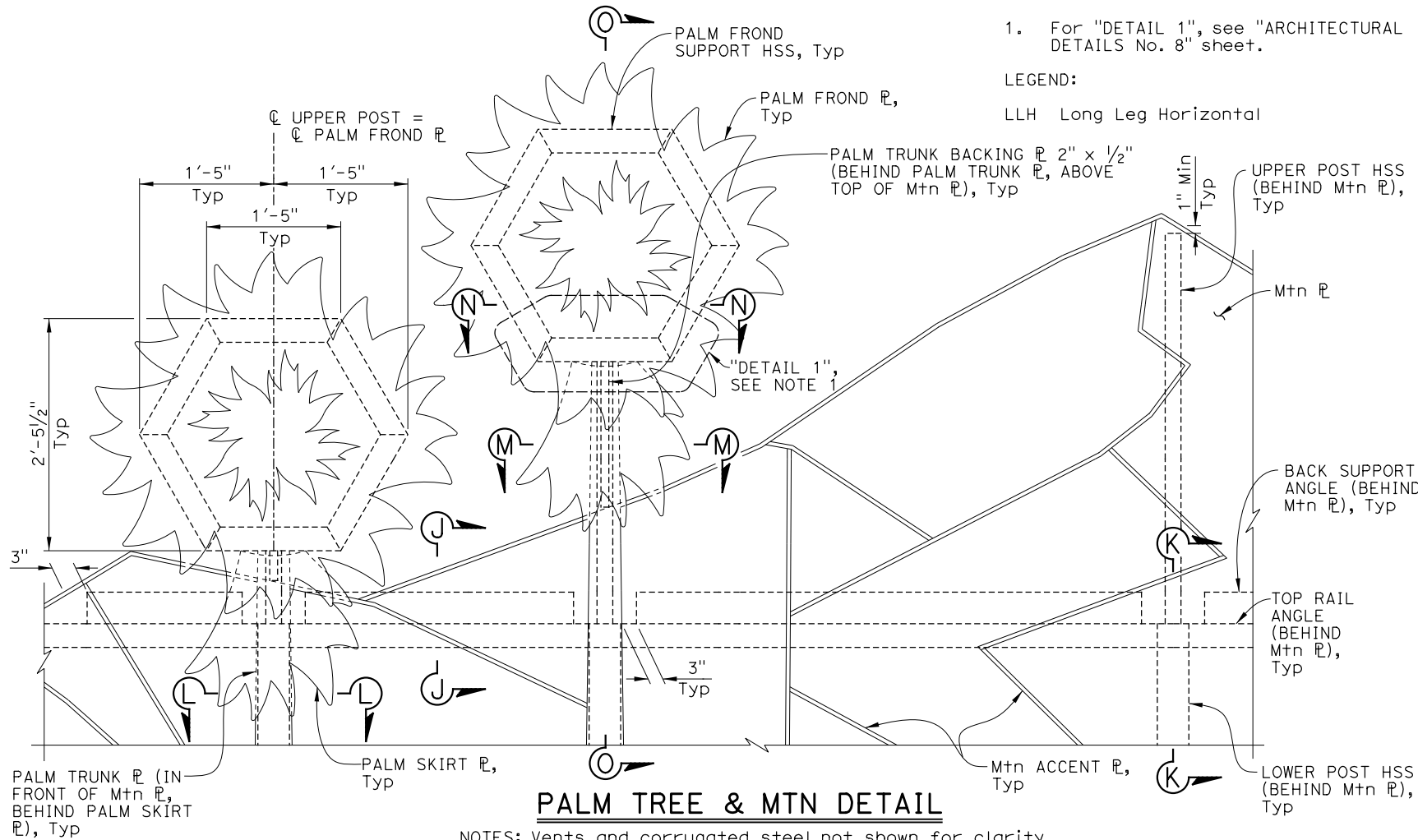
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT
4080 LEMON STREET
RIVERSIDE, CA 92501

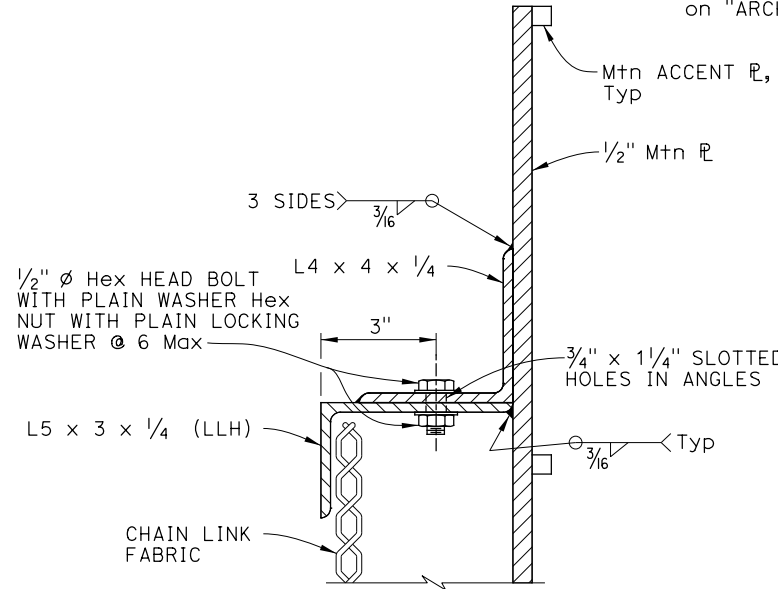
PARSONS
2201 DUPONT DRIVE, SUITE 200
IRVINE, CA 92612

NOTES:
1. For "DETAIL 1", see "ARCHITECTURAL DETAILS No. 8" sheet.
LEGEND:
LLH Long Leg Horizontal

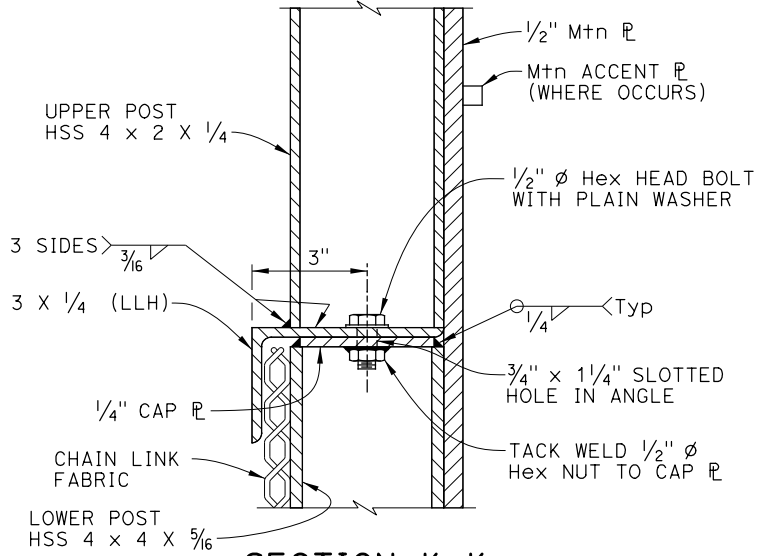


PALM TREE & MTN DETAIL

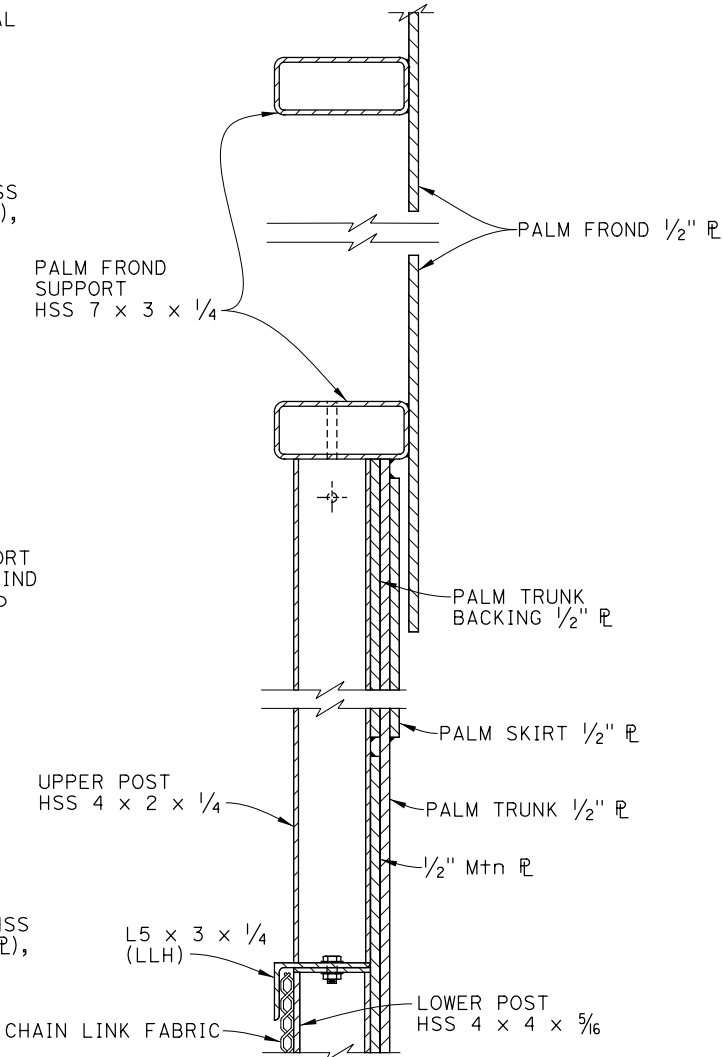
NOTES: Vents and corrugated steel not shown for clarity. For information not shown, see "STEEL PLATE DETAIL" on "ARCHITECTURAL DETAILS No. 6" sheet.



SECTION J-J

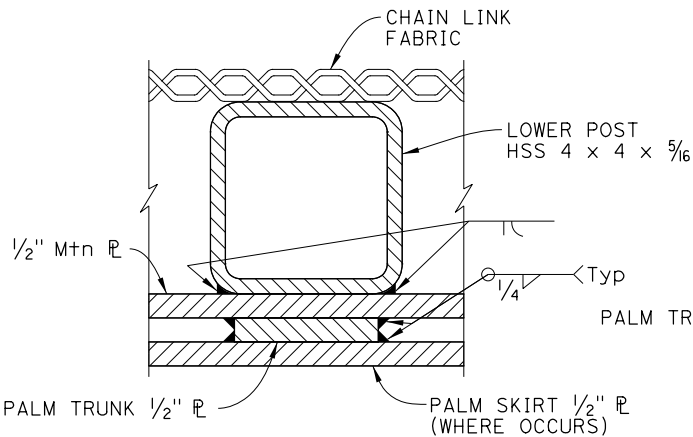


SECTION K-K

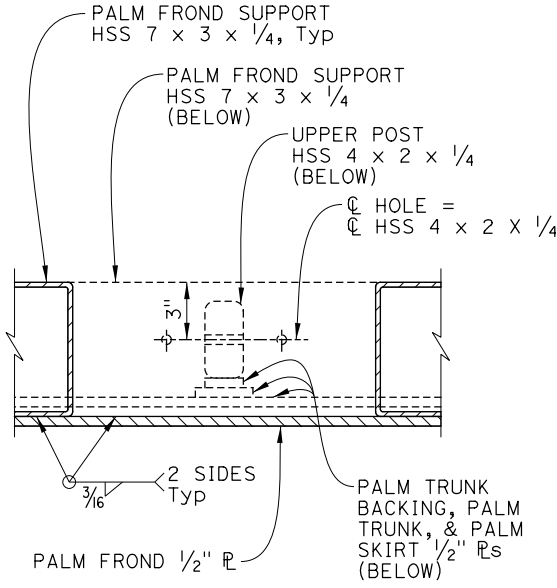


SECTION O-O

NOTE: For information not shown, see "SECTION J-J" thru "SECTION N-N" and "DETAIL 1" on "ARCHITECTURAL DETAILS No. 8" sheet.

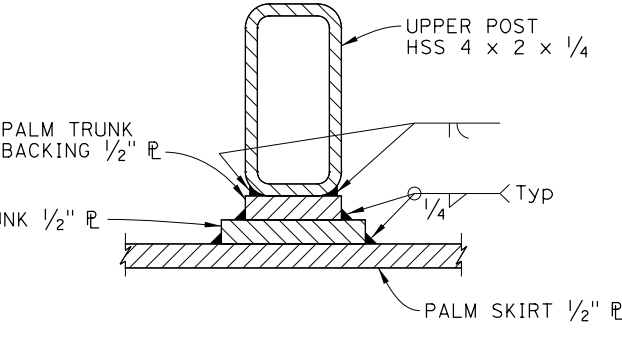


SECTION L-L



SECTION N-N

NOTE: For information not shown, see "SECTION M-M" and "DETAIL 1" on "ARCHITECTURAL DETAILS No. 8" sheet.



SECTION M-M

NOTE: For information not shown, see "SECTION L-L".

NO SCALE

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

DESIGN OVERSIGHT		DESIGN BY M. Principe CHECKED G. Douglass DETAILS BY S. Weight CHECKED G. Douglass QUANTITIES BY M. Principe CHECKED A. Botani		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION				Casey Weber		BRIDGE No.		MONROE STREET OC (REPLACE)																																											
								PROJECT ENGINEER		56-0897																																													
								SIGN OFF DATE								POST MILE		ARCHITECTURAL DETAILS No. 7																																					
																R54.74																																							
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)				DATE PLOTTED => 1/14/2026 FILE => 56-0897-U-07.dwg				TIME PLOTTED => 4:44:03 PM USERNAME => p002118F				ORIGINAL SCALE IN INCHES FOR REDUCED PLANS				0				1				2				3				PROJECT NUMBER & PHASE: 0800003681				COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304				DISREGARD PRINTS BEARING EARLIER REVISION DATES				REVISION DATES				SHEET		OF					
																																				08/23/24				03/16/25				08/11/25				01/23/26				39		47	

Dist

COUNTY

ROUTE

POST MILES
TOTAL PROJECT

SHEET
NO.

TOTAL
SHEETS

8

Riv

10

R53.9/R55.5

Melvin Principe

REGISTERED CIVIL ENGINEER

1/23/26

DATE

REGISTERED PROFESSIONAL ENGINEER

MELVIN PRINCIPLE

No. 84296

Exp. 09-30-27

CIVIL

STATE OF CALIFORNIA

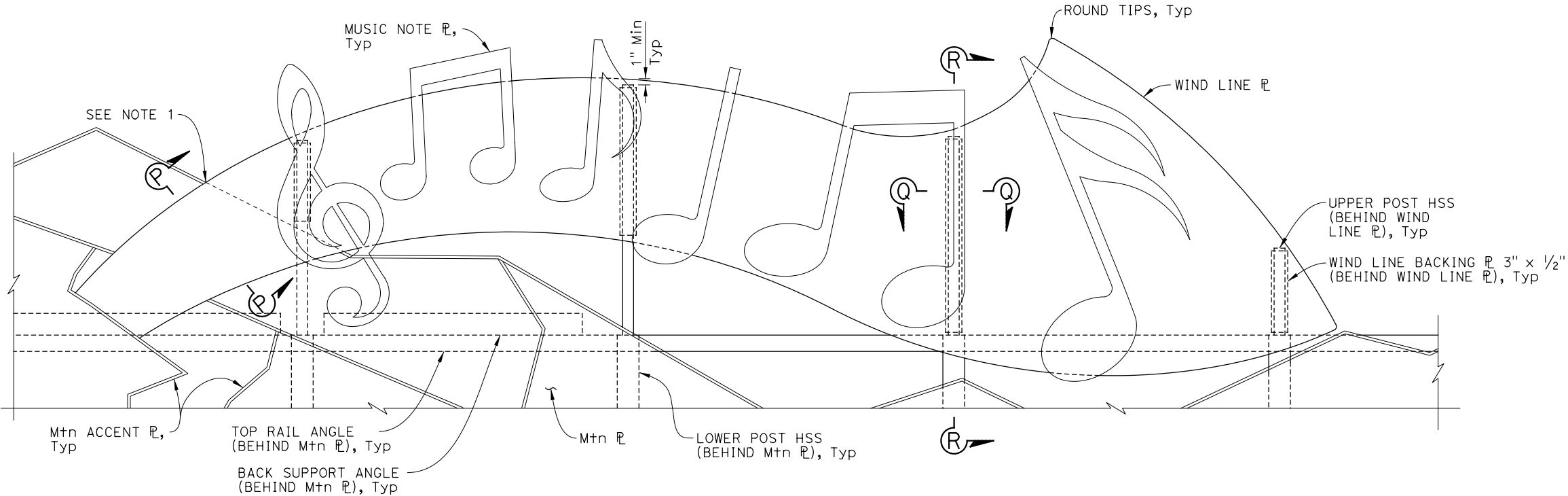
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS
SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR
COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT
4080 LEMON STREET
RIVERSIDE, CA 92501

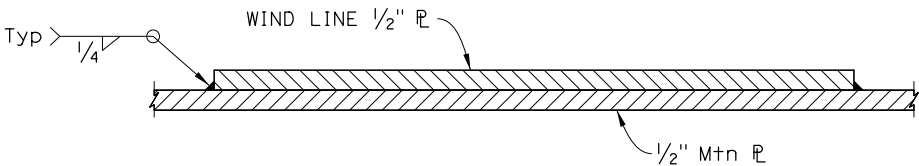
PARSONS
2201 DUPONT DRIVE, SUITE 200
IRVINE, CA 92612

- NOTES:
1. Terminate Mtn Accent plate at Wind Line plate.
 2. For location of "DETAIL 1", see "PALM TREE & MTN DETAIL" on "ARCHITECTURAL DETAILS No. 7" sheet.
- LEGEND:
- LLH Long Leg Horizontal

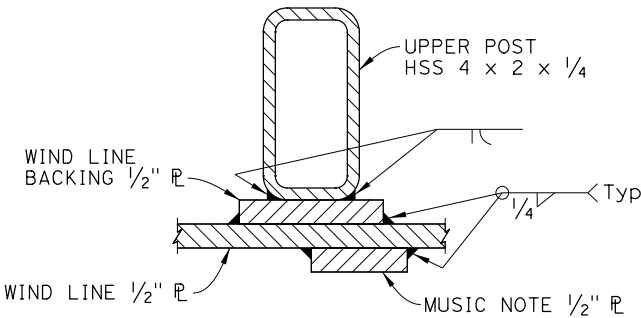


MUSIC NOTE DETAIL

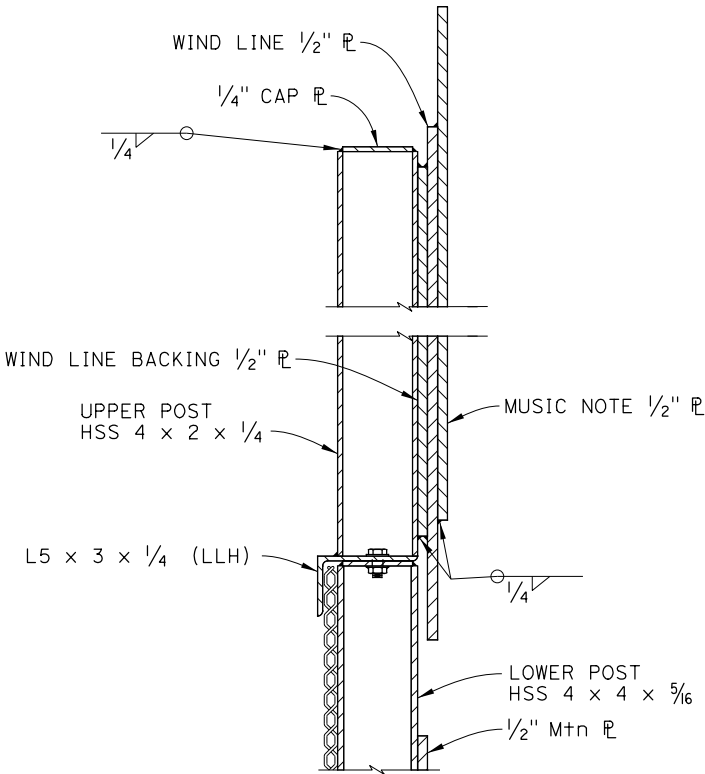
NOTES: Vents, corrugated steel, and chain link fabric not shown for clarity.
For information not shown, see "STEEL PLATE DETAIL" on "ARCHITECTURAL DETAILS No. 6" sheet and "PALM TREE & MTN DETAIL" on "ARCHITECTURAL DETAILS No. 7" sheet.



SECTION P-P

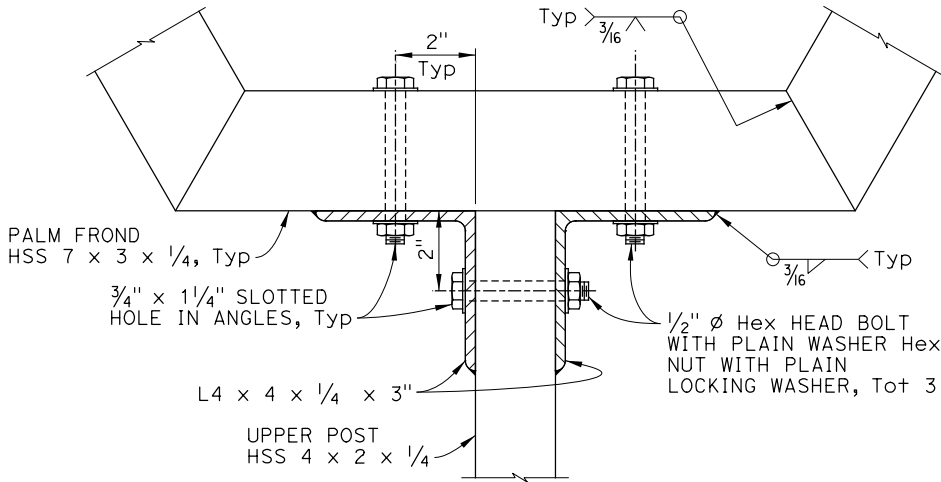


SECTION Q-Q



SECTION R-R

NOTE: For information not shown, see "SECTION Q-Q" and "SECTION K-K" on "ARCHITECTURAL DETAILS No. 7" sheet.



DETAIL 1

NOTE: Palm Frond, Palm Trunk, Palm Skirt, and Backing plates not shown for clarity.

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

NO SCALE

DESIGN OVERSIGHT		DESIGN	BY	M. Principe	CHECKED	G. Douglass	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Casey Weber PROJECT ENGINEER	BRIDGE No.	56-0897	MONROE STREET OC (REPLACE)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
		DETAILS	BY	S. Weight	CHECKED	G. Douglass			POST MILE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
		QUANTITIES	BY	M. Principe	CHECKED	A. Botani			R54.74			ARCHITECTURAL DETAILS No. 8																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
SIGN OFF DATE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)													DATE PLOTTED => 1/14/2026 FILE => 56-0897-u-ard+08		TIME PLOTTED => 4:49:13 PM USERNAME => p002118f		ORIGINAL SCALE IN INCHES FOR REDUCED PLANS		0		1		2		3		PROJECT NUMBER & PHASE: 0800003681		COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304		DISREGARD PRINTS BEARING EARLIER REVISION DATES		REVISION DATES		SHEET		OF																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
8	Riv	10	R53.9/R55.5		

Melvin Principe
REGISTERED CIVIL ENGINEER

1/23/26
DATE

REGISTERED PROFESSIONAL ENGINEER

MELVIN PRINCIPLE

No. 84296

Exp. 09-30-27

CIVIL

STATE OF CALIFORNIA

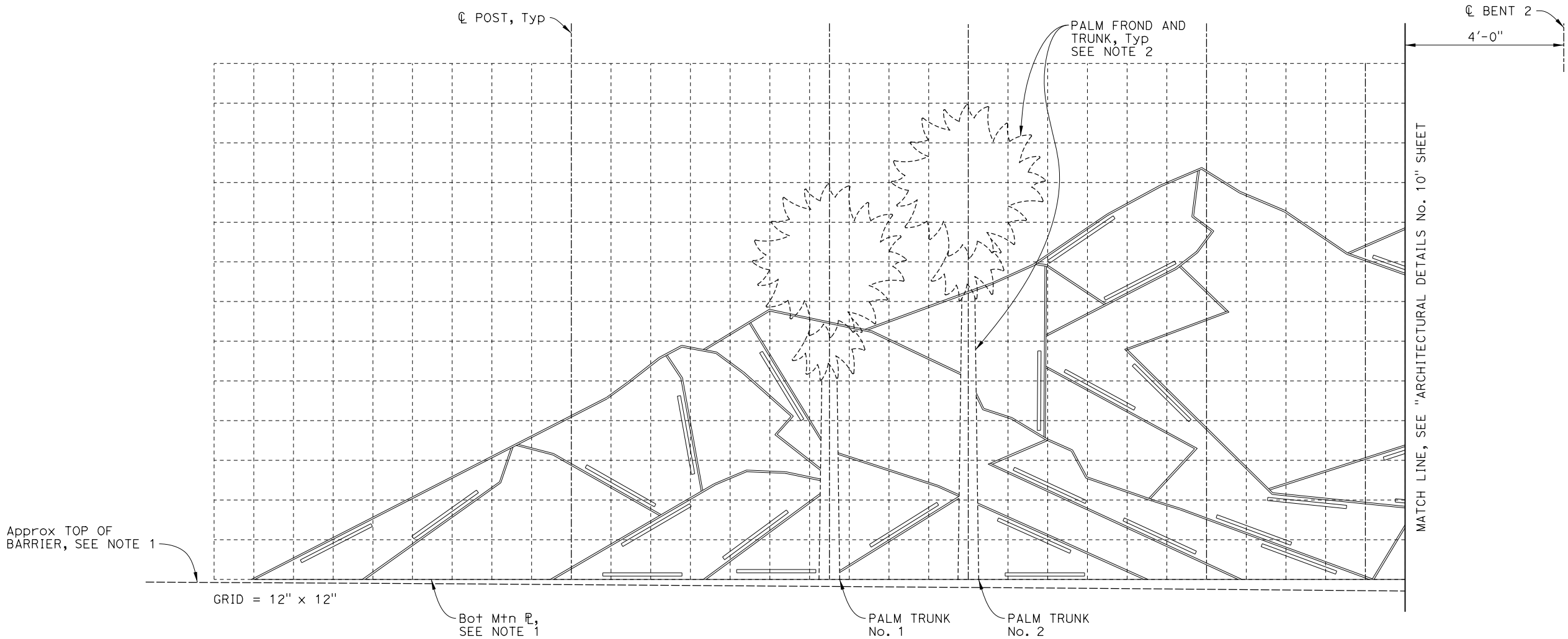
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS
SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR
COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT
4080 LEMON STREET
RIVERSIDE, CA 92501

PARSONS
2201 DUPONT DRIVE, SUITE 200
IRVINE, CA 92612

- NOTES:
- Bottom of sign must be placed 1" Min Clr above top of barrier. Reference line provided for information only and must be verified before installing sign.
 - For palm tree grids, see "ARCHITECTURAL DETAILS No. 11" sheet.



DECORATIVE METAL SIGN GRID

NOTE: East edge of deck shown,
west edge of deck mirrored.

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

NO SCALE

DESIGN OVERSIGHT			DESIGN	BY M. Principe	CHECKED G. Douglass	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Casey Weber PROJECT ENGINEER	BRIDGE No.	MONROE STREET OC (REPLACE)													
			DETAILS	BY S. Weight	CHECKED G. Douglass			56-0897														
			QUANTITIES	BY M. Principe	CHECKED A. Botani			POST MILE R54.74														
SIGN OFF DATE				DATE PLOTTED => 1/14/2026		TIME PLOTTED => 4:49:23 PM		ORIGINAL SCALE IN INCHES FOR REDUCED PLANS		PROJECT NUMBER & PHASE: 0800003681		COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304		DISREGARD PRINTS BEARING EARLIER REVISION DATES		REVISION DATES		SHEET	OF			
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)				FILE => 56-0897-U-0r-d+09		USERNAME => p002118f		0		1		2		3		08/23/24		03/16/25	08/11/25	01/23/26	41	47

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
8	Riv	10	R53.9/R55.5		

Melvin Principe1/23/26REGISTERED CIVIL ENGINEERDATE

REGISTERED PROFESSIONAL ENGINEER
No. 84296
Exp. 09-30-27
CIVIL
STATE OF CALIFORNIA

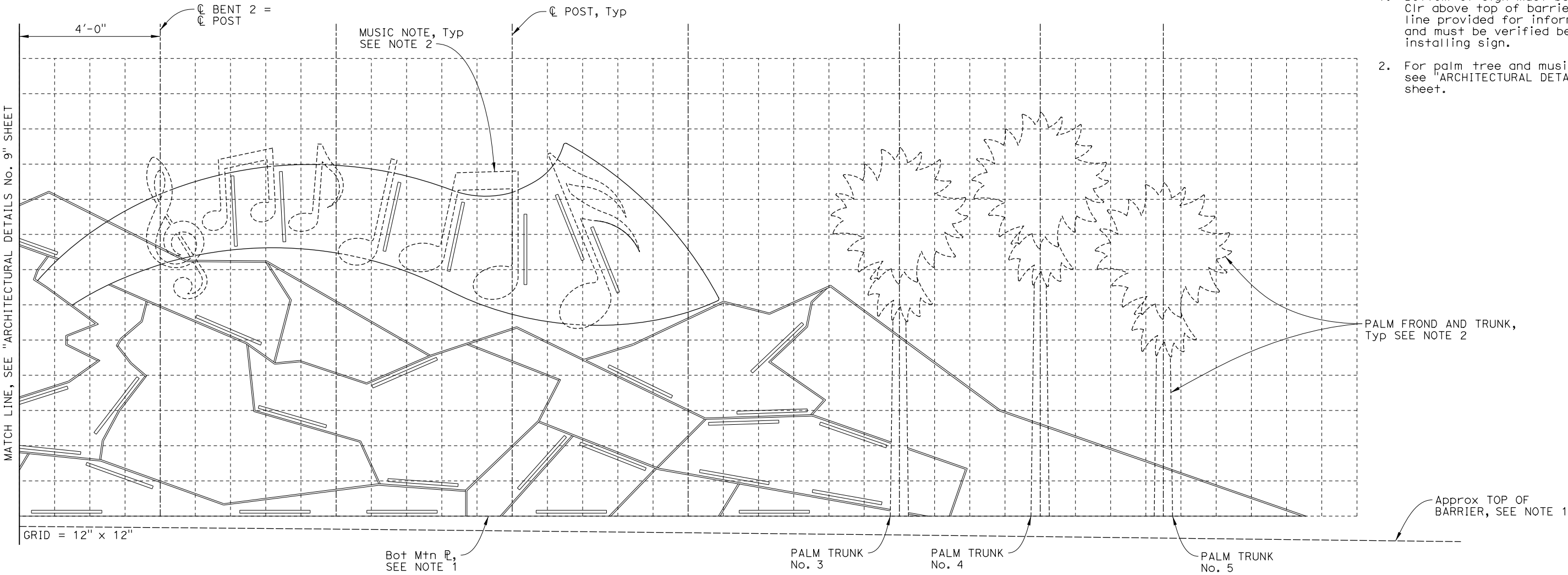
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS
SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR
COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT
4080 LEMON STREET
RIVERSIDE, CA 92501

PARSONS
2201 DUPONT DRIVE, SUITE 200
IRVINE, CA 92612

- NOTE:
- Bottom of sign must be placed 1" Min Clr above top of barrier. Reference line provided for information only and must be verified before installing sign.
 - For palm tree and music note grids, see "ARCHITECTURAL DETAILS No. 11" sheet.



DECORATIVE METAL SIGN GRID

NOTE: East edge of deck shown,
west edge of deck mirrored.

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

NO SCALE

DESIGN OVERSIGHT		DESIGN BY M. Principe CHECKED G. Douglass		DETAILS BY S. Weight CHECKED G. Douglass		QUANTITIES BY M. Principe CHECKED A. Botani		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		Casey Weber PROJECT ENGINEER		BRIDGE No.		MONROE STREET OC (REPLACE)																													
												56-0897																															
												SIGN OFF DATE										R54.74		ARCHITECTURAL DETAILS No. 10																			
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)				DATE PLOTTED => 1/14/2026 FILE => 56-0897-u-ard+10				TIME PLOTTED => 4:49:34 PM USERNAME => p002118f				ORIGINAL SCALE IN INCHES FOR REDUCED PLANS				0		1		2		3		PROJECT NUMBER & PHASE: 0800003681				COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304				DISREGARD PRINTS BEARING EARLIER REVISION DATES				REVISION DATES				SHEET		OF	
																												08/23/24				03/16/25		08/11/25		01/23/26		42		47			

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
8	Riv	10	R53.9/R55.5		

Melvin Principe

REGISTERED CIVIL ENGINEER

1/23/26
DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS
SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR
COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER

MELVIN PRINCIPLE

No. 84296

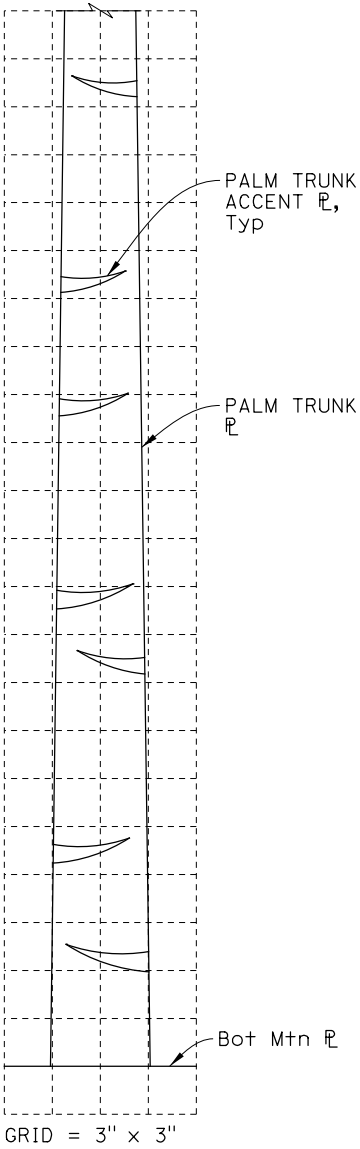
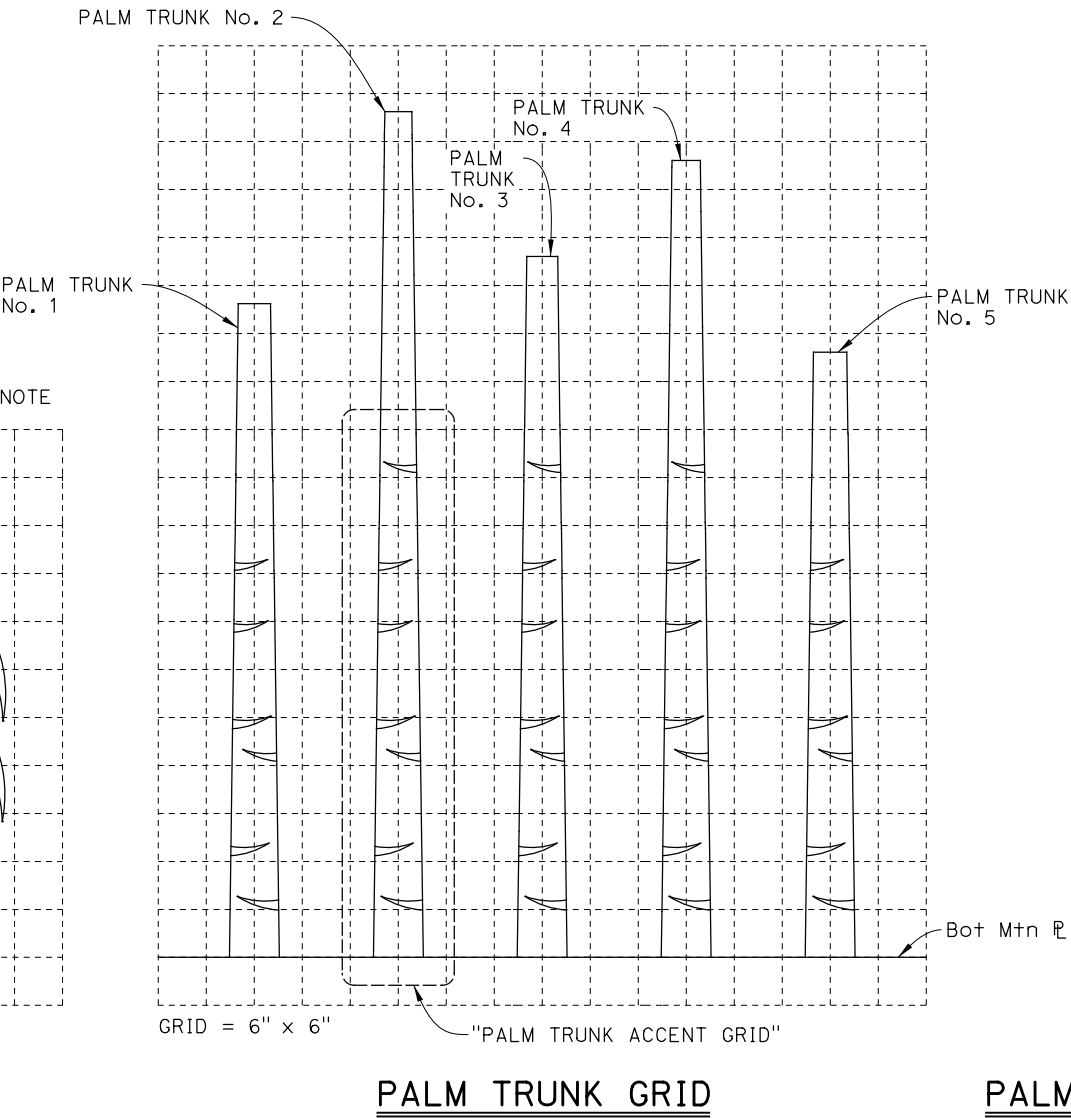
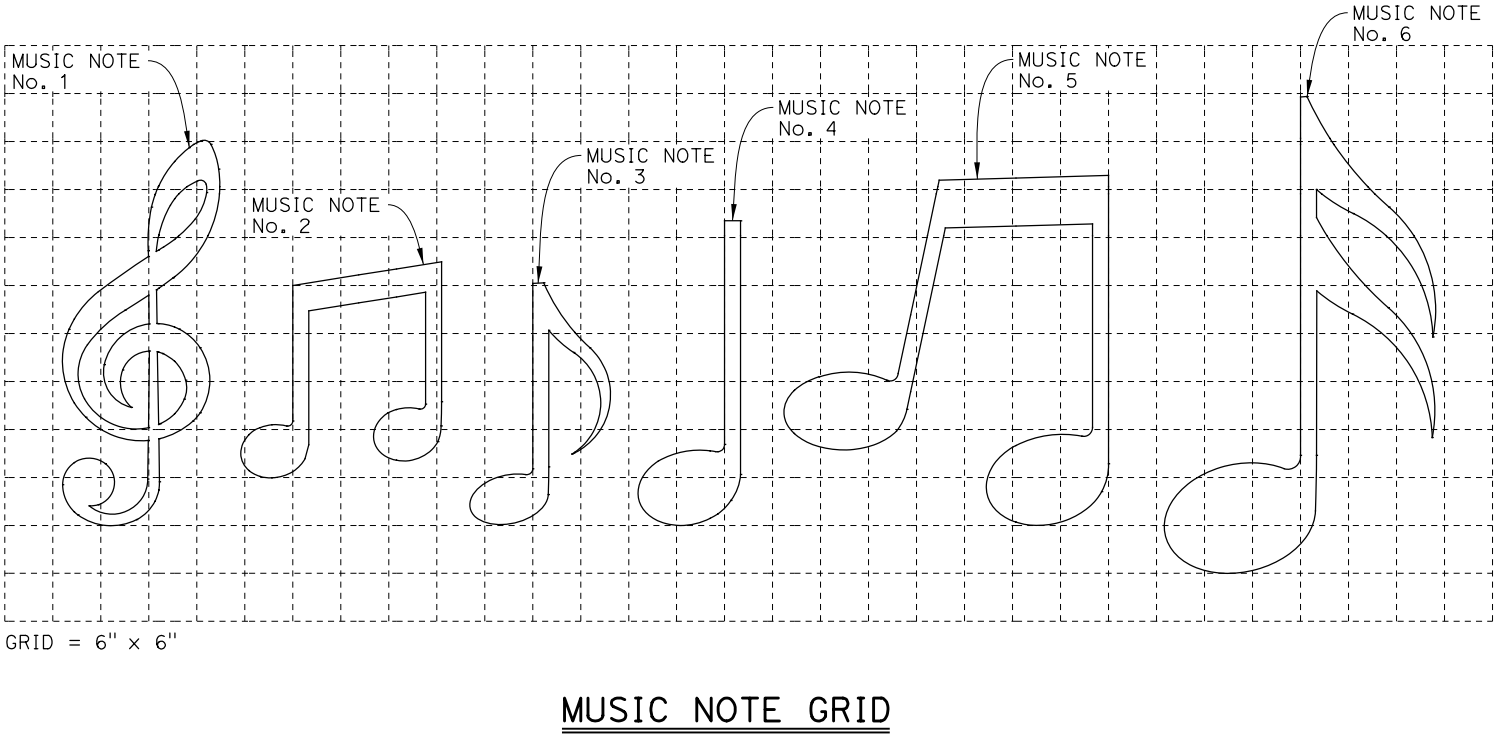
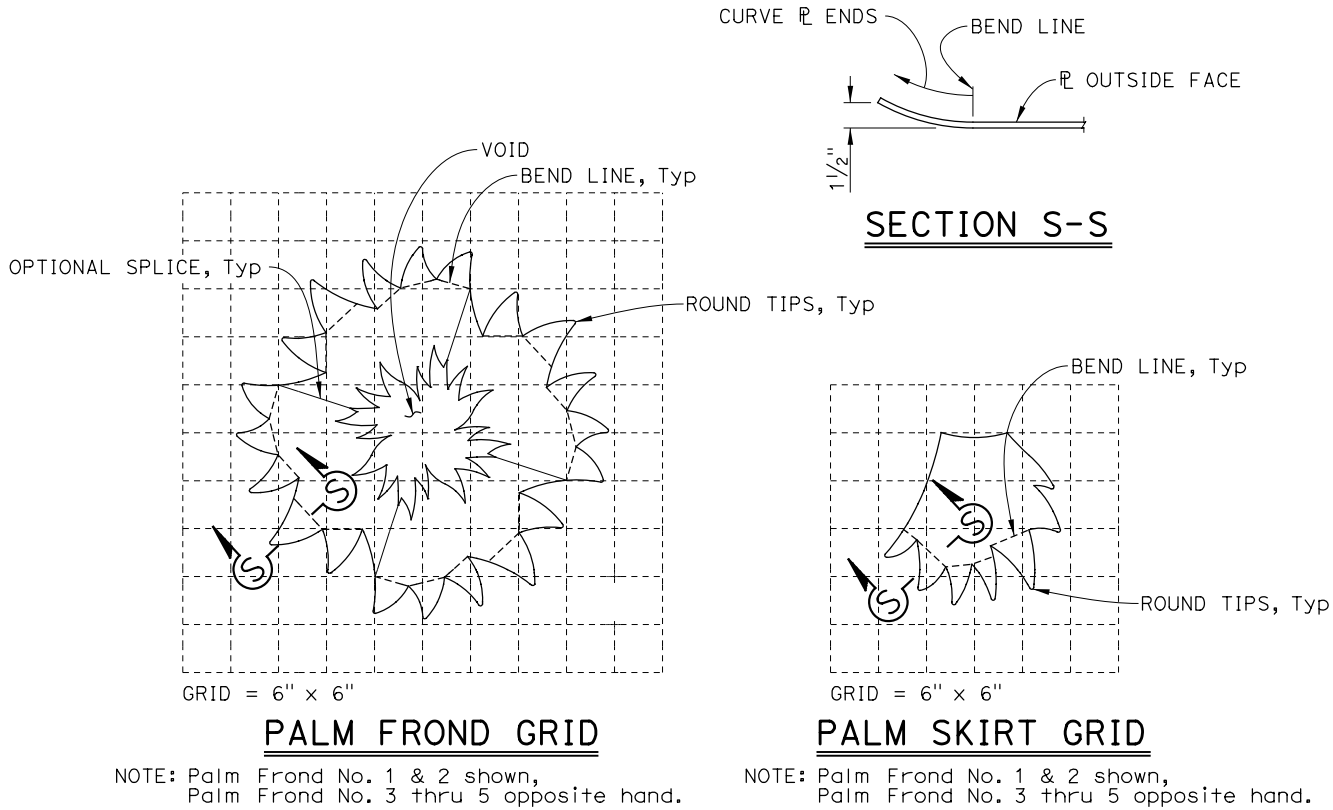
Exp. 09-30-27

CIVIL

STATE OF CALIFORNIA

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT
4080 LEMON STREET
RIVERSIDE, CA 92501

PARSONS
2201 DUPONT DRIVE, SUITE 200
IRVINE, CA 92612



NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD
DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

NO SCALE

DESIGN OVERSIGHT		DESIGN		BY	M. Principe	CHECKED	G. Douglass	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Casey Weber PROJECT ENGINEER	BRIDGE No.		MONROE STREET OC (REPLACE)																																							
		DETAILS		BY	S. Weight	CHECKED	G. Douglass			56-0897		ARCHITECTURAL DETAILS No. 11																																							
		SIGN OFF DATE		QUOTITIES		BY	M. Principe			CHECKED	A. Botani	R54.74																																							
STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REVISION 8/16/2021)								DATE PLOTTED => 1/14/2026 FILE => 56-0897-u-ard+11				TIME PLOTTED => 4:49:45 PM USERNAME => p002118f				ORIGINAL SCALE IN INCHES FOR REDUCED PLANS				0		1		2		3		PROJECT NUMBER & PHASE: 0800003681				COUNTY/ROUTE: Riv/10 CONTRACT No.: 08-OK7304				DISREGARD PRINTS BEARING EARLIER REVISION DATES				REVISION DATES				SHEET		OF					
																																08/23/24				03/16/25				08/11/25				01/23/26				43		47	

Appendix F

CALTRANS AND RIVERSIDE COUNTY COMMENTS AND CONVERSE RESPONSES



Office of Special Funded Projects Comment & Response Form

(Revised 08/2011)

General Project Information (OSFP Liaison to complete)		Review Phase (OSFP Liaison to complete)		Reviewer Information (Reviewer Liaison to complete)	
Dist:	08	☐ PSR/PDS (Review No.)		Reviewer Name:	Parameswaran Ariram
Proj ID (Phase):	0800000368	☐ APS/PSR (Review No.)		Functional Unit:	59-3658
Project Name:	Monroe Street OC	☐ APS/PR (Review No. 1)		Cost Center:	
OSFP Liaison:	Lily Sun	☐ Type Selection		Phone Number:	562-665-4686
Phone:	(916) 227-8915	☒ 65% PS&E Unchecked Details		e-mail:	Ram.Parames@dot.ca.gov
E-mail:	Lily.sun@dot.ca.gov	☐ PS&E (Review No.)		Date of Review:	7/15/2022
		☐ Construction		Structure Name*:	
		☐ Other:		Br No*:	
(*Use if necessary to when comment sheets are by individual structure)					
Consultant Information (to be filled in by Consultant)					
Consultant Structure Lead (First and Last Name)		Structure Consultant Firm		Response Date	
Mahmoud Suliman		Converse Consultants		4/6/2023	
		Phone Number		E-mail	
		626-899-5306		msuliman@converseconsultants.com	

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
1	FR	Page iv	Appendix A-3 need to be removed	Removed.	
2	FR	Page 7, Section 9	Please also add Caltrans geotechnical module for corrosion evaluation (March 2022) as another reference	Added Caltrans geotechnical module for corrosion evaluation as another reference.	
3	FR	Page 18, Section 15	Please check all the references and update if applicable to the latest ones as needed. Please also add Caltrans geotechnical module for corrosion evaluation (March 2022) as another reference	Revised and updated all references to the latest version.	
4	FR	Page 18, Section 15	Year 2019?	Updated.	
5	FR	Key to boring record	To be consistent with other documents, please use the new bridge number 56-0897	Key to boring record was revised to comply with the comment.	
6	FR	Boring record	To be consistent with other documents, please use the new bridge number 56-0897	Boring record was revised to comply with the comment.	
7	FR	Appendix A-3	The sheet is already included in the LOTB, please remove	Removed.	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓ = Comment Resolved
(for Reviewer's use)

Submittal Data (Reviewer to complete)Project ID: 0000002050

Reviewer

Str Name*: Prefumo Cr Bike Br

Date of Review:

Functional Unit:

Br No*: 49-0261Z

*=if applicable

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
8	FR	Page B-3, Appendix B	Please check the cohesion value with lab test data, lab test data shows 0 cohesion	Revised cohesion value.	
9					
10					
11					
12					
13					
14					

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)

P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓ = Comment Resolved
(for Reviewer's use)

REVIEW COMMENTS



Riverside County Transportation Dept.
Capital Project Development
Engineering Division
3525 14th Street
Riverside, CA 92501
(951) 955-6800

Submittal: I-10 / Monroe Street Interchange (65%)
Discipline: Geotechnical
Reviewer: Curt Scheyhing, Group Delta
Date of Review: 08/24/2022
Response By: Mahmoud Suliman, Converse
Date of Response: 04/06/2023

PN: _____
Caltrans EA No.: N/A
Description: Geotech Review of 65% Submittal

Comment No.	Page/ Sheet No.	COMMENT	RESPONSE	Designer Will Incorporate		Incorporation Verified
				YES	NO	Initials
FOUNDATION REPORT (FR), MONROE STREET OC (REPLACE) (BR 56-0897) CONVERSE CONSULTANTS, June 24, 2022						
1	Table 4 p. 10	Per MTD 3-1 in Table 5 the structural factored strength loads (before dividing by resistance factors) are typically used.	The table was revised to address the comment.	Y		
2	Table 5 p. 11	Per MTD 3-1 Footnote 1 of Pile Data Table (PDT) does not need to distinguish between strength and extreme tension / compression demands, as is shown on the PDT in the project plans, consider making it consistent with plans in the FR.	The Pile Data Table was modified to address the comment.	Y		
3	Sec. 11.1.2 Table 8	At Bent footings, the P-Y curve model (API sand) is not consistent with cohesion in certain layers. API sand model cannot be modeled as c-phi, please clarify. C-phi (cemented silt) p-y curves are generally not recommended for routine use per LPILE manual. Please revisit parameters.	The parameters were revised.	Y		
4	Sec. 11.1.2 Tables 6, 7 & 8	Effective (buoyant) unit weight needs to be used below design groundwater in LPILE.	The tables were revised to indicate the effective unit weights above and below the Design Groundwater Level.	Y		
5	Sec. 11.2 Tables 7, 8, 9 & 10	Per 10.7.2.4 and Table 10.7.2.4-1 of California Amendments to AASHTO p-multipliers are required for lateral capacity analysis based on center to center spacing versus pile diameter and whether one or multiple rows of piles are present. Different p-multipliers would apply in transverse versus longitudinal loading direction at the bent and abutments. Please recommend appropriate p-multipliers for use in the lateral capacity analysis.	The report was revised to provide P-multipliers.	Y		

REVIEW COMMENTS



Riverside County Transportation Dept.
Capital Project Development
Engineering Division
3525 14th Street
Riverside, CA 92501
(951) 955-6800

Submittal: I-10 / Monroe Street Interchange (65%)
Discipline: Geotechnical
Reviewer: Curt Scheyhing, Group Delta
Date of Review: 08/24/2022
Response By: Mahmoud Suliman, Converse
Date of Response: 04/06/2023

PN: _____
Caltrans EA No.: N/A
Description: Geotech Review of 65% Submittal

Comment No.	Page/ Sheet No.	COMMENT	RESPONSE	Designer Will Incorporate		Incorporation Verified
				YES	NO	Initials
6	Sec. 13.0	Notes for Construction, driven HP: Stopping driving at 1.5 times nominal resistance is in conflict with standard specifications 49-2.01C(5) Driving "Except for piles to be load tested and sheet piles, drive piles to at least the nominal driving resistance and the specified tip elevation shown." If compression refusal (defined as 1/8" per blow in Std. Spec) is reached then you can stop and cut off if tension, lateral, settlement tips are met. It does not seem warranted to deviate from standard specs when we are only saving a maximum of the last 5 feet of driving.	The report was revised to comply with Caltrans specifications.	Y		

Reviewer's Concurrence to Responses _____ Date: _____

REVIEW COMMENTS



Riverside County Transportation Dept.
Capital Project Development
Engineering Division
3525 14th Street
Riverside, CA 92501
(951) 955-6800

Submittal: I-10 / Monroe Street Interchange (65%)
Discipline: Geotechnical
Reviewer: Curt Scheyhing, Group Delta
Date of Review: 08/24/2022
Response By: Mahmoud Suliman, Converse
Date of Response: 04/06/2023

PN: _____
Caltrans EA No.: N/A
Description: Geotech Review of 65% Submittal

Comment No.	Page/ Sheet No.	COMMENT	RESPONSE	Designer Will Incorporate		Incorporation Verified
				YES	NO	Initials
7	General	In the past Caltrans has recommended ignoring skin friction in the bottom 1 diameter of wet-constructed CIDH. This can sometimes save the need for costly mitigation in the event of anomalies occurring near the tip, may be cheap insurance.	The skin friction at the bottom for a length of about One diameter is neglected for shafts where significant tip resistance is expected since in such cases, the stress transfer in this zone is questionable. In this project, shafts were designed without a tip resistance and therefore a significant development of tip resistance is not expected. We are not aware of a Caltrans requirement for neglecting the skin friction at the bottom for a length of one diameter, for shafts constructed with the wet method. The quality control procedures in Caltrans Specifications still require the bottom of the hole be clean and the slurry does not contain any significant amount of drill cuttings. Caltrans requires neglecting the skin resistance in bottom 2 feet in shafts as the tubes for GGL and CSL extend only to a point 1 foot above the bottom. In our original and current analyses, we have neglected the skin friction in the bottom 3 feet as a conservative measure. However, such a measure is not necessary for the bent shafts in this project.	Y		
PLANS - MONROE STREET OC (REPLACE), 65% UNCHECKED DETAILS SUBMITTAL 06/29/22, NOT FOR CONSTRUCTION PARSONS						

Reviewer's Concurrence to Responses _____ Date: _____

REVIEW COMMENTS



Riverside County Transportation Dept.
Capital Project Development
Engineering Division
3525 14th Street
Riverside, CA 92501
(951) 955-6800

Submittal: I-10 / Monroe Street Interchange (65%)
Discipline: Geotechnical
Reviewer: Curt Scheyhing, Group Delta
Date of Review: 08/24/2022
Response By: Mahmoud Suliman, Converse
Date of Response: 04/06/2023

PN: _____
Caltrans EA No.: N/A
Description: Geotech Review of 65% Submittal

Comment No.	Page/ Sheet No.	COMMENT	RESPONSE	Designer Will Incorporate		Incorporation Verified
				YES	NO	Initials
1	Sheet No. 2 ITP	Zero period spectral acceleration in ARS curve plot seems too high, should match PGA of 0.77g.				
2	Sheet Nos. 31-33	LOTB: a) where groundwater was encountered suggest showing GW elevation and date as symbol on stick log per 5.2.3.4 b) and Fig. 5-3 of CT Logging Manual and LOTB legend of 2018 Standard Plan A10F, notes are used when water not encountered. b) north arrows on LOTB do not match project plans d) For A-10 and 11 station/offset referenced to "I" line, per logging manual all borings should reference to the main structure "MO" line.	LOTB sheets were revised to comply with Caltrans Logging Manual and LOTB legend of 2018 and comment.	Y		

Reviewer's Concurrence to Responses _____ Date: _____

Office of Special Funded Projects Comment & Response Form

(Revised 08/2011)

General Project Information (OSFP Liaison to complete)		Review Phase (OSFP Liaison to complete)		Reviewer Information (Reviewer Liaison to complete)	
Dist:	08-0K730	☐	PSR/PDS (Review No.)	Reviewer Name:	
Proj ID (Phase):	08 0000 0368	☐	APS/PSR (Review No.)	Functional Unit:	OGDS
Project Name:	I-10/Monroe Interchange Improvement Project	☐	APS/PR (Review No. 1)	Cost Center:	
OSFP Liaison:	Colm McKenna	☐	Type Selection	Phone Number:	562-665-4686
Phone:	916-639-5871	☐	65% PS&E Unchecked Details	e-mail:	
E-mail:	Colm.McKenna@dot.ca.gov	☒	PS&E (Review No.1)	Date of Review:	6/15/23
		☐	Construction	Structure Name*:	Monroe Street OC
		☐	Other:	Br No*:	56-0897
(*Use if necessary to when comment sheets are by individual structure)					
Consultant Information (to be filled in by Consultant)					
Consultant Structure Lead (First and Last Name)	Structure Consultant Firm	Phone Number	E-mail	Response Date	
Mahmoud Suliman	Converse Consultants	626-899-5306	msuliman@converseconsultants.com	11/10/2023	

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
1	FR		Notes for specification should be starting with the specification number(s) and sub section(s) as applicable. It should be brief, concise, and explicitly describing the additional information to be added. No need to repeat all applicable standard specifications. only include the ones that need additional information to be added. This will help the spec writer to incorporate the intended additional information to the project plans and specifications. If need additional clarifications on this, do not hesitate to call us (OGDS - 562-665-4686) to discuss on the notes for specifications format.	Revised Notes for Specifications starting with the spec number and per comment recommendation.	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓ = Comment Resolved
(for Reviewer's use)

Office of Special Funded Projects Comment & Response Form

(Revised 08/2011)

General Project Information (OSFP Liaison to complete)		Review Phase (OSFP Liaison to complete)		Reviewer Information (Reviewer Liaison to complete)	
Dist:	08-0K7301	☐	PSR/PDS (Review No.)	Reviewer Name:	various
Proj ID (Phase):	0800000368	☐	APS/PSR (Review No. 1)	Functional Unit:	various
Project Name:	interstate 10 and Monroe Street Interchange Improvements	☐	APS/PR (Review No.)	Cost Center:	
OSFP Liaison:	Colm McKenna	☐	Type Selection	Phone Number:	(916) 227-8885
		☐	65% PS&E Unchecked Details	e-mail:	various
E-mail:	<u>Colm.McKenna@dot.ca.gov</u>	☒	PS&E (Review No. 2)	Date of Review:	12/12/2023
		☐	Construction	Structure Name*:	MONROE STREET OVERCROSSING (REPLACE)
		☐	Other:	Br No*:	56-0897
(*Use if necessary to when comment sheets are by individual structure)					
Consultant Information (to be filled in by Consultant)					
Consultant Structure Lead (First and Last Name)	Structure Consultant Firm	Phone Number	E-mail	Response Date	
Mahmoud Suliman	Converse Consultants	951-264-3286	msuliman@converseconsultants.com	12/21/2023	

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
53	PFR	section12.0	Per FR 12.0, relatively thick poorly graded sand layers are expected to be encountered in the excavations for shafts. Caving could occur in such layers . Also, high ground water Groundwater level could affect construction of shaft. Any Specific method considered for constructing CIDH pile?	Based on the subsurface condition encountered during our field investigation, the contractor must select the means and methods to install the CIDH piles.	
54	PFR	Pg.7	PFR pg. 9.0, is the site soils corrosive? If it is will Any mitigation measures be recommended for this project.	Based on the lab results and Caltrans Corrosion Guidelines, site soils are not corrosive.	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓ = Comment Resolved
(for Reviewer's use)

Submittal Data (Reviewer to complete)

Project ID: 08-00000368

Reviewer: Various

Str Name*: Monreo St OC-Replace

Date of Review: 12/12/2023

Functional Unit: 3573

Br No*: 56-0897

*=if applicable

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
56	PFR/Plan	3 of 3/6.0	Groundwater depth affects liquefaction assessment and foundation design. Per FFR 6.0, design groundwater is about +423 ft, 83 feet below I-10 freeway grade. Per FFR Table No-8, pile tip elev is +426ft at bent 2. Groundwater level could affect both driving resistance and shaft construction. verify the tip elev.	Groundwater was considered. Tip elevations were calculated based on Groundwater at 470ft for Service limit and 460ft for Strength and Extreme limit.	
			OGDS Comments		
68	FR	26 of 234	<i>The excavation for the pile shafts.....</i> Can you add corresponding SSP Number here as well. Is it difficult pile installation 49-1.03?	Revised and provided corresponding SSP 49-1.03.	
69	FR	27 of 234 para 2	<i>The nominal resistances of drilled shafts.....</i> Can you add corresponding SSP Number here. If this paragraph is not relevant for this section you can update/ remove because it seems similar to the first paragraph in Notes For Construction.	Removed paragraph as it is more related to construction considerations.	
70	FR	27 of 234 para 3	<i>We recommended installing a piezometer</i> Can you add corresponding SSP Number here as well. or update in the Notes for Construction Section if it is relevant for that section.	Removed paragraph and included in construction section, as it is only a recommendation not a requirement.	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)

P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓ = Comment Resolved
(for Reviewer's use)

Office of Special Funded Projects Comment & Response Form

(Revised 08/2011)

General Project Information (OSFP Liaison to complete)		Review Phase (OSFP Liaison to complete)		Reviewer Information (Reviewer Liaison to complete)	
Dist:	08	☐ PSR/PDS (Review No.)		Reviewer Name:	Shadi Dweab
Proj ID (Phase):	0800000368	☐ APS/PSR (Review No.)		Functional Unit:	3658
Project Name:	Interstate 10 and Monroe Street Interchange Improvements	☐ APS/PR (Review No.)		Cost Center:	
OSFP Liaison:	Homa Iranienjadian	☐ Type Selection		Phone Number:	213-215-2248
Phone No.:	916-268-8312	☐ 65% PS&E Unchecked Details		e-mail:	Shadi.dweab@dot.ca.gov
E-mail:	Homa.iraninejadian@dot.ca.gov	☒ PS&E (Review No. 4)		Date of Review:	
		☐ Construction		Structure Name*:	Monroe Street Bridge Overcrossing (Replace)
		☐ Other:		Br No*:	56-0897
				(*Use if necessary to when comment sheets are by individual structure)	
Consultant Information (to be filled in by Consultant)					
Consultant Structure Lead (First and Last Name)		Structure Consultant Firm		Phone Number	E-mail
Hashmi Quazi		Converse Consultants		909-474-2847	hquazi@converseconsultants.com
				Response Date	10/03/2024

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
1	FR	Pg. 16	Use ARS 3.1.0	Used ARS 3.10 and attached output. No changes in values.	
2	FR	Pg. 21	should be divided by the strength factor " 0.7"	Revised	
3	FR	Pg. 21	Same as previous comment.	Revised	
4	FR	Pg. 21	Same as previous comment.	Revised	
5	FR	Pg. 21	B-I	Revised	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓ = Comment Resolved
(for Reviewer's use)

Submittal Data (Reviewer to complete)Project ID: 08-00000368Reviewer: **Shadi Dweab**

Str Name*: Monreo St OC-Replace

Date of Review:

Functional Unit: 3658

Br No*: 56-0897

*=if applicable

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
6	FR	Pg. 24	It seems very high for sandy silt. No tests support this value has been found. I recommend using the long-term parameters.	Values were derived from the CPT test (C-22-041) conducted on the Whitewater Channel Bridge investigation. The lowest cone tip resistance within this depth was 50 tsf. Results in undrained shear strength of 2.5 tsf ~ 5.0 ksf. CPT is attached in the report (Appendix A-3).	
7	FR	Pg. 24	Same as previous comment.	Values were derived from the CPT test (C-22-041) conducted on the Whitewater Channel Bridge investigation. The lowest cone tip resistance within this depth was 60 tsf. Results in undrained shear strength of 3.0 tsf ~ 6.0 ksf. CPT is attached in the report (Appendix A-3).	
8	FR	Pg. 25	Same as previous comment.	Values were derived from the CPT test (C-22-041) conducted on the Whitewater Channel Bridge investigation. The lowest cone tip resistance within this depth was 50 tsf. Results in undrained shear strength of 2.5 tsf ~ 5.0 ksf. CPT is attached in the report (Appendix A-3).	
9	FR	Pg. 25	Same as previous comment.	Values were derived from the CPT test (C-22-041) conducted on the Whitewater Channel Bridge investigation. The lowest cone tip resistance within this depth was 60 tsf. Results in undrained shear strength of 3.0 tsf ~ 6.0 ksf. CPT is attached in the report (Appendix A-3).	
10	FR	Pg. 25	Same as previous comment.	Values were derived from the CPT test (C-22-041) conducted on the Whitewater Channel Bridge investigation. The lowest cone tip resistance within this depth was 60 tsf. Results in undrained shear strength of 3.0 tsf ~ 6.0 ksf. CPT is attached in the report (Appendix A-3).	
11	FR	Pg. 63	Hard. Fine grained consistency if derived from SPT, it should be based on N60. Applicable to all LOTBs.	Consistency checked and revised on all Boring Records and LOTBs.	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)

P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓ = Comment Resolved
(for Reviewer's use)

Submittal Data (Reviewer to complete)Project ID: 08-00000368Reviewer: **Shadi Dweab**

Str Name*: Monreo St OC-Replace

Date of Review:

Functional Unit: 3658

Br No*: 56-0897

*=if applicable

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
12	FR	Pg. 63	Very dense. The apparent density should be based on the N60. Applicable to all	Apparent density checked and revised on all Boring Records and LOTBs.	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓ = Comment Resolved
(for Reviewer's use)

Office of Special Funded Projects Comment & Response Form

(Revised 08/2011)

General Project Information (OSFP Liaison to complete)		Review Phase (OSFP Liaison to complete)		Reviewer Information (Reviewer Liaison to complete)	
Dist:	08	☐	PSR/PDS (Review No.)	Reviewer Name:	Shadi Dweab
Proj ID (Phase):	0800000368	☐	APS/PSR (Review No.)	Functional Unit:	3658
EA:	08-OK730	☐	APS/PR (Review No.)	Cost Center:	
Project Name:	Interstate 10 and Monroe Street Interchange Improvements	☐	Type Selection	Phone Number:	213-215-2248
OSFP Liaison:	Homa Iranienjadian	☐	65% PS&E Unchecked Details	e-mail:	Shadi.dweab@dot.ca/gov
Phone:	(916) 268-8312	☒	PS&E (Review No. 5)	Date of Review:	
E-mail:	homa.iraninejadian@dot.ca.gov	☐	Construction	Structure Name*:	Monroe Street Bridge Overcrossing (Replace)
		☒	Other; FR	Br No*:	56-0897
				(*Use if necessary to when comment sheets are by individual structure)	
Consultant Information (to be filled in by Consultant)					
Consultant Structure Lead (First and Last Name)		Structure Consultant Firm		Phone Number	E-mail
Hashmi Quazi		Converse Consultants		909-474-2847	hquazi@converseconsultants.com
				Response Date	05/09/2025

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses
1	FR	12- table-7	Undrained shear strength of 5 ksf was assigned to three layers that were considered as clay, while the LOTB shows the majority are sandy silt. The UU Triaxial tests done on two clay samples shows undrained shear strength of 3.72 ksf and 5.54 ksf. We believe the 5 ksf undrained shear strength for sandy silt is very high and lead to underestimating of the pile length/diameter.	<u>1. Upper Cohesive Layer with 5 ksf Design Shear Strength</u> An undrained strength of 5 ksf was used for a cohesive soil layer observed in the approximate elevation range of 460 to 490 feet at the abutments and elevation range of 480 to 490 feet at the Bent. This value was assigned based on a number of properties observed in the boreholes drilled for the proposed structure and a CPT sounding located south of the site, near the 43rd Street and Monroe Street intersection.

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓ = Comment Resolved
(for Reviewer's use)

Submittal Data (Reviewer to complete)Project ID: 0800000368

Reviewer:

Str Name*: Monroe Street Overcrossing (Replace)

Date of Review:

Functional Unit:

Br No*: 56-0897

*=if applicable

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses
			We recommend redesigning the piles for a maximum of 2 ksf for the undrained shear strength of the sandy silt/ sandy clay.	Gradation tests performed on this layer material show that the layer is predominantly fine grained with more than 80 percent fines contents. In situ moisture contents obtained from samples range from 5 to 22 percent but mostly in the range of 12 to 22 percent, indicating that this layer consists mostly of fine grained materials. Two Unconsolidated Undrained shear strength (UU) tests performed on samples of this layer indicated shear strengths of 7 and 7.2 ksf. UU tests provide a shear strength lower than the in situ shear strength expected in the ground due to expansion of the sample prior to testing and the lack of the confinement that exists in the subsurface. If consolidated undrained (CU) tests have been performed with in situ confinement values, they would have provided higher shear strengths. The CPT sounding shows a sleeve friction of about 4.5 ksf, which represents the interface friction between the sleeve and the remolded material (due to the passing of the cone through the material). The interface friction between a steel sleeve and remolded soil is lower than the shear strength of undisturbed soil. Therefore, the shear strength of intact material is likely to be higher than 4.5 ksf. Therefore, we are of the opinion that the use of 5 ksf is reasonable for the layer. <u>2. Lower Cohesive Layer with 6 ksf Design Shear Strength</u> This layer occurs in the approximate elevation ranges of 430 to 450 at abutments and 440 to 470 at the bent. This layer has blow counts (SPT and Modified Cal Sampler) much higher than those observed in the upper cohesive layer. The average sleeve friction of the CPT, observed in this layer, is in excess of 8 ksf. Gradation and in situ moisture contents show similar values to those obtained for the upper layer.

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)

P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓ = Comment Resolved
(for Reviewer's use)

*=if applicable