Geotechnical Design Report

I-80 Golconda Summit Interchange (MP HU 32.5 to MP HU 38.8) Truck Climbing Lanes and Parking Project

Project EA: 744429
Project ID: SPI-080-3-(340)

Prepared for
State of Nevada Department of Transportation

January 2023

Jacobs

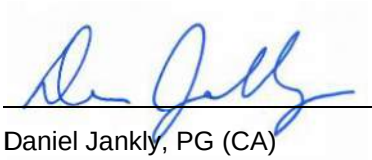
50 W Liberty Street, Suite 205
Reno, NV 89501

This Revised Final Geotechnical Design Report for the I-80 Golconda Summit Interchange Truck Climbing Lanes and Parking Project has been prepared by the following individuals. The undersigned attest to the technical information contained herein and the qualifications of technical specialists providing engineering data upon which recommendations, conclusions, and decisions are based.

01/27/2023

Zachary Jarecki, PE (CA)
Senior Project Engineer

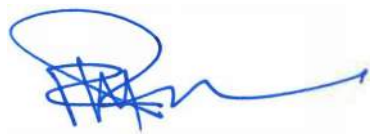
Date



01/27/2023

Daniel Jankly, PG (CA)
Senior Engineering Geologist

Date



01/27/2023

Ravee Raveendra, PE (NV)
Senior Geotechnical Reviewer

Date

Contents

Appendices

Tables

Figures

Acronyms and Abbreviations

50/6"	50 blows for 6 inches
>	greater than
<	less than
AASHTO	American Association of State Highway and Transportation Officials
ASTM	ASTM International
CME	Central Mine Equipment
CRSP	Colorado Rockfall Simulation Program
EB	eastbound
ft/s	foot (feet) per second
GDR	Geotechnical Design Report
GP	poorly graded gravel with sand
GSI	Geological Strength Index
H:V	horizontal to vertical slope ratio
HSA	hollow-stem auger
I-	Interstate Highway
K_h	horizontal seismic acceleration coefficient
ksf	kip(s) per square foot
m_i	Hoek-Brown Constant
ML	silt with sand
MP HU	Milepost Humboldt
NDOT	State of Nevada Department of Transportation
no.	number
pcf	pound(s) per cubic foot
PGA	peak ground acceleration
ppm	part(s) per million
Project	I-80 Golconda Summit Interchange Truck Climbing Lanes and Parking Project
psf	pound(s) per square foot
RCB	reinforced concrete box
ReMi	refraction microtremor
S_1	long-term spectral acceleration
SC	clayey sand with gravel
SM	silty sand with gravel
SPT	standard penetration test
S_s	short-period spectral acceleration
TCL	truck climbing lanes
UCS	Average Unconfined Compressive Strength

USCS	Unified Soil Classification System
USGS	U.S. Geological Survey
WB	westbound

1. Introduction

1.1 Authorization and Project Overview

The Nevada Department of Transportation (NDOT) has authorized Jacobs to design the Interstate Highway 80 Golconda Summit Interchange Truck Climbing Lanes and Parking Project (project) between Milepost Humboldt (MP HU) 32.5 and MP HU 38.8.

NDOT proposes to widen Interstate (I-) 80 eastbound (EB) and westbound (WB) between MP HU 32.5 and MP HU 38.8 to add 12-foot-wide truck climbing lanes (TCL) and 10-foot-wide shoulders. The EB TCL would begin at "LE" Station 990+00 and end at "PE1" Station 435+00; the WB TCL would begin at Station "PW1" 355+00 and end at Station 496+00. The project also includes the following tasks:

- Replacing the existing I-808 structure (reinforced concrete box [RCB] culvert) with a new precast concrete arch structure (I-3331)
- Extending all existing drainage structures/culverts and relocating existing channels and ditches to accommodate the widening
- Providing barriers, guardrails, and attenuators to accommodate roadside safety items
- Reconstructing the Golconda Summit interchange ramps to accommodate the design speed
- Providing truck parking areas on each side of I-80
- Reconstructing the existing approach roads at Golconda Summit to accommodate the truck parking areas and new I-3331 bridge
- Providing illumination for the interchange ramps and truck parking areas
- Extending ancillary items including new trash enclosure, restrooms, new signage, striping, approaches, minor hydraulic work, rumble strips, and slope stabilization typically comprised of seeding and riprap

The TCLs will be added via widening to the outside. The frontage road under I-80 will be widened from one lane to two, requiring the replacement of the existing 14-foot by 14-foot RCB structure with a single precast concrete arch structure.

The majority of the proposed improvements are anticipated to be constructed within existing department rights-of-way, although additional rights-of-way will be required to accommodate the widening and construction work.

As part of the project, Jacobs has prepared this Geotechnical Design Report (GDR). The purpose of this GDR is to document subsurface geotechnical conditions, provide analyses of anticipated site conditions as they pertain to the project described herein, and provide geotechnical design and construction recommendations for the roadway and structures portions of the project.

1.2 Project Location

The project is located in Humboldt County, Nevada. All project improvements are located along I-80 between MP HU 32.5 and MP HU 38.8 within NDOT right-of-way. Figure 1-1 depicts the approximate location of the project alignment.

1.3 Purpose and Scope of Work

The purpose of this GDR is to document subsurface geotechnical conditions, provide analyses of anticipated site conditions as they pertain to the project described herein, and provide geotechnical design and construction recommendations for the roadway and structures portions of the project.

The scope of work included collection and review of pertinent existing geotechnical data; field exploration consisting of the drilling, sampling, and logging of hollow-stem auger (HSA) borings; coring and sampling of rock cores; laboratory testing of selected soil and rock samples; development of geotechnical design recommendations; and preparation of this GDR with findings, conclusions, and recommendations.

This GDR presents geotechnical recommendations for remedial grading, cut-and-fill slope stability, pavement structural sections, and bridge structure foundations.

All elevations referenced in this GDR are based on the North American Vertical Datum of 1988, unless otherwise noted.

1.4 Limitations

This GDR was prepared for the exclusive use of Jacobs design team members and NDOT for specific application to the design and construction of the proposed improvements. It has been prepared in accordance with accepted standards of practice; no other warranty, express or implied, is made.

The recommendations contained in this GDR are based on the data obtained from review of available geological maps and documents, as well as the current subsurface investigation. The soil boring and rock coring logs indicate subsurface conditions only at specific locations and times, and only to the depths penetrated. They do not necessarily reflect variations that may exist between boring locations, or changes that may take place with time and depth. If variations in subsurface conditions from those described in this report are noted during construction, the recommendations presented in this report must be re-evaluated.

If any change in the nature, design, or location of the proposed improvements occurs, the conclusions and recommendations of this GDR should not be considered valid unless such changes are reviewed, and the conclusions of this GDR are modified or verified in writing by Jacobs. Jacobs is not responsible for any claims, damages, or liability associated with the re-interpretation or reuse of the subsurface data in this report by others.

INDEX OF SHEETS

SEE BOOK OF STANDARD PLANS FOR ROAD AND BRIDGE CONSTRUCTION. 2020 EDITION.

DESIGN CRITERIA

2018 AASHTO "A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS"
2009 MUTCD
2011 AASHTO ROADSIDE DESIGN GUIDE
2019 NDOT ROAD DESIGN GUIDE
2020 NDOT STANDARD PLANS FOR ROAD AND BRIDGE CONSTRUCTION
2019 NDOT SIGNALS, LIGHTING, ITS DESIGN GUIDE

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	1

DESIGN DESIGNATION

AADT 2019	8000
AADT 2040	10,400
D	50%
DHV	1153
T(DHV)	45%
V	75 MPH

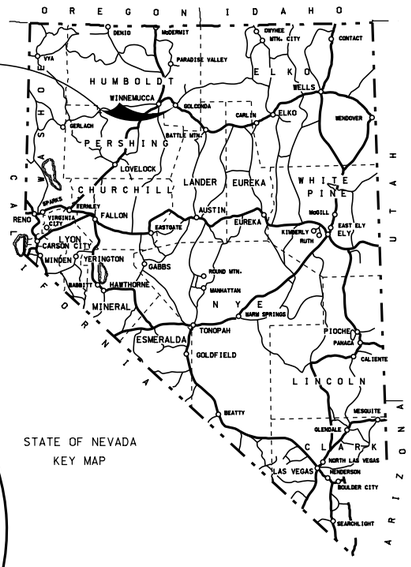
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

CONSTRUCTION PLANS

HUMBOLDT AND LANDER COUNTIES

FROM THE PERSHING/HUMBOLDT COUNTY LINE SOUTHWEST OF WINNEMUCCA VIA WINNEMUCCA AND BATTLE MOUNTAIN TO THE LANDER/EUREKA COUNTY LINE

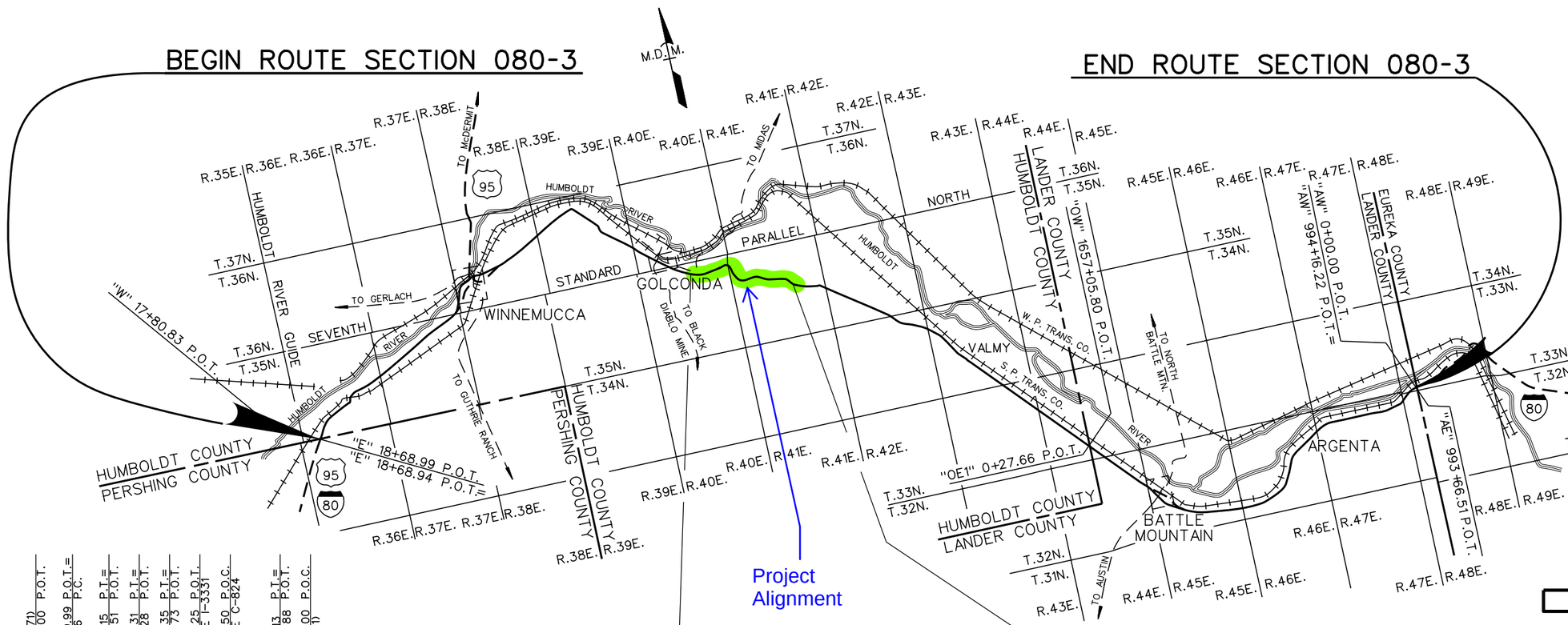
PROJECT NHFP-080-3(071)
HU 32.348 TO HU 38.839



STATE OF NEVADA
KEY MAP

BEGIN ROUTE SECTION 080-3

END ROUTE SECTION 080-3



I-80 Golconda Summit
Geotechnical Design Report
Site Location Map
Figure 1-1

ALIGNMENT BAR
BEGIN PROJECT NHFP-080-3(071)
"LE" 990+00.00 P.O.T. "LW" 990+00.00 P.O.T.

"LE" 1064+42.36 P.O.I.= "LW" 1064+29.99 P.O.I.=
"PE1" 272+03.52 P.C. "PW1" 271+91.16 P.C.

"PW1" 295+96.15 P.I.=
"PW1" 296+77.51 P.O.T.

"PW1" 332+96.31 P.I.=
"PW1" 332+31.28 P.O.T.

"PW1" 388+09.35 P.I.=
"PW1" 388+82.73 P.O.T.

"PE1" 407+70.25 P.O.T. "PW1" 407+70.25 P.O.T.
STRUCTURE T-3331 STRUCTURE T-3331

"PE1" 439+70.00 P.O.C. "PW1" 440+90.50 P.O.C.
STRUCTURE C-824 STRUCTURE C-824

"PE1" 444+03.12 P.I.= "PW1" 501+12.13 P.I.=
"PE1" 444+73.49 P.O.T. "PW1" 501+78.88 P.O.T.

"PE1" 534+95.00 P.O.C. "PW1" 534+95.00 P.O.C.
END PROJECT NHFP-080-3(071)

CONTRACT NO. BACK 1079
BEGIN PROJECT NHFP-080-3(071)
"LE" 990+00.00 P.O.T.

PROJECT NHFP-080-3(071)

WIDEN I-80 TO ADD AN EASTBOUND AND WESTBOUND TRUCK CLIMBING LANES (MP HU 32.5 to MP HU 38.8). RECONSTRUCT I-80 GOLCONDA SUMMIT INTERCHANGE AND ADD TRUCKING PARKING STALLS. REMOVE EXISTING I-808 STRUCTURE AND CONSTRUCT NEW I-3331 STRUCTURE.

LENGTH OF CONSTRUCTION ON EASTBOUND LANES	4.496	MILES
LENGTH OF CONSTRUCTION ON WESTBOUND LANES	2.671	MILES
LENGTH OF ROUTE SECTION	88.354	MILES
AVERAGE LENGTH OF PROJECT	3.584	MILES

TO BE CONTRACTED

"PE1" 534+95.00 P.O.C.
END PROJECT NHFP-080-3(071)
CONTRACT NO. AHEAD 1151

0 1 2 4 6
MILES

PRELIMINARY
SUBJECT TO REVISION
4-NOV-2022

FINAL DESIGN SUBMITTAL

APPROVED MONTH XX, 2022

KRISTINA SWALLOW, P.E., DIRECTOR, DEPT. OF TRANSPORTATION

GOVERNOR STEVE SISOLAK
CHAIRMAN, TRANSPORTATION BOARD

PROFESSIONAL ENGINEER · STATE OF NEVADA
KIM NOKES
Exp: 12/31/23
CIVIL
No. 12866
FINAL DESIGN SUBMITTAL

2. Existing Facilities and Proposed Improvements

2.1 Existing Facilities

Within the project limits, I-80 currently provides two mainline EB lanes with an outside shoulder, two mainline WB lanes with an outside shoulder, and EB and WB truck parking areas at the Golconda Summit. The truck parking areas are accessed via on- and off-ramps and are linked by a frontage road. The frontage road is two lanes but reduces to one lane beneath I-80 within a single 14-foot by 14-foot RCB structure (I-808 structure) located perpendicular to I-80 at approximately “PE1” Station 407+75. The mainline lanes, ramps, and frontage road are situated at, above, and below adjacent existing grades. These grade changes are accommodated via previously constructed embankment fill-and-cut slopes. Fill-and-cut slopes within soils are generally inclined at a 2-horizontal to 1-vertical slope ratio (2H:1V). Existing rock-cut slopes are located adjacent to the EB mainline lanes approximately between “PE1” Station 315+00 and Station 330+00 and adjacent to the WB mainline lanes approximately between “PW1” Station 373+00 and Station 389+00. The EB cut slope is generally inclined at 1H:1V with a 30-foot-wide bench located approximately 40 feet above the slopes toe, with a maximum height of approximately 120 feet. The WB cut slope is generally inclined at 2H:1V with a maximum height of approximately 30 feet.

In addition to the facilities discussed previously, existing improvements along the project alignment include drainage facilities consisting of drainage culverts running perpendicular to the I-80 mainline lanes with outfall areas and open drainage ditches and berms running parallel to the roadways. Underground fiber optic (Lumen) utilities are located within truck parking areas and ramps, and utility lines associated with existing speed detector loops run parallel to the mainline lanes within shoulders.

2.2 Proposed Improvements

NDOT proposes to widen I-80 EB and WB between MP HU 32.5 and MP HU 38.8 to add 12-foot-wide TCLs and 10-foot-wide shoulders. The EB TCL would begin at “LE” Station 990+00 and end at “PE1” Station 435+00; the WB TCL would begin at “PW1” Station 355+00 and end at “PW1” Station 496+00. The project also includes the following tasks:

- Replacing the existing I-808 structure (RCB structure) with a new precast concrete arch structure (I-3331)
- Extending all existing drainage structures/culverts and relocating existing channels and ditches to accommodate the widening
- Providing barriers, guardrails, and attenuators to accommodate roadside safety items
- Reconstructing the Golconda Summit interchange ramps to accommodate the design speed
- Providing truck parking areas on each side of I-80
- Reconstructing the existing approach roads at Golconda Summit to accommodate the truck parking areas and new I-3331 bridge
- Providing illumination for the interchange ramps and truck parking areas
- Extending ancillary items including new trash enclosure, restrooms, new signage, striping, approaches, minor hydraulic work, rumble strips, and slope stabilization typically comprised of seeding and riprap

The TCLs will be added via widening to the outside. To accommodate the widening, fill-and-cut slopes are proposed. Two rock-cut slopes are proposed to push back existing cut slopes. The larger of the two proposed rock-cut slopes, the EB cut slope, will be inclined at 1H:1V with a 25-foot-wide bench located approximately 40 feet above the slope toe. The WB cut slope will be inclined at a 2H:1V slope with no benching. The proposed rock-cut slopes will be adjacent to the EB TCL approximately between “PE1”

Station 315+00 and Station 330+00 and adjacent to the WB TCL approximately between “PW1” Station 373+00 and Station 389+00.

The frontage road under I-80 will be widened from one lane to two, requiring the replacement of the existing 14-foot by 14-foot RCB structure with a single precast concrete arch structure.

New pavements are proposed as part of the widening for the project. The pavement sections for the mainline lanes, shoulders, ramps, frontage road, and truck parking areas have been prescribed by NDOT Materials Division.

3. Pertinent Reports and Investigations

No previous geotechnical reports or investigations were available for the project alignment at the time the GDR was prepared.

Existing regional geologic maps and reference documents were collected and reviewed for this study. The references used to prepare this GDR are listed in Section 13.

4. Physical Setting

4.1 Climate

The following information has been summarized from data available from weather stations throughout Humboldt County, Nevada.

The average annual precipitation is approximately 8.5 inches; the winter, spring, and fall months receive a little less than an inch per month and the summer months approximately 0.2 inch per month. The average annual snowfall is approximately 16.5 inches; January and December receive approximately 5 inches per month, tapering down to approximately 0.4 inch per month in April.

4.2 Topography and Drainage

The project alignment traverses the Edna Mountains. The alignment ascends from an approximate elevation of 4,450 feet at the western end of the improvements, to approximately 4,900 feet at the tall I-80 cut slopes (between “PE1” Station 315+00 and Station 330+00), to 5,160 feet at Golconda Summit, then descends to 4,820 feet by the eastern end of the improvements near “PE1” Station 535+00. Elevations are relative to the National Geodetic Vertical Datum of 1929 and were obtained from U.S. Geological Survey (USGS) topographic maps (USGS 1965a, 1965b).

Cut slopes on the order of 120 feet tall have been constructed previously along EB and WB I-80, generally between “PE1” Station 315+00 and Station 330+00. The WB cut slope in this area will not be impacted by the project. In general, the EB cut slope is up to 120 feet tall, inclined at 1H:1V, and has a 25-to-30-foot-wide bench approximately 30 to 40 feet above the EB lanes. The face of the cut slope is highly irregular because of the variable nature of the bedrock and the effects of weathering. West of these cut slopes, the project alignment is situated on an alluvial fan. East of the cut slopes, the alignment is situated on a relatively small canyon internal to the Edna Mountains. The detailed topography in the alignment area is shown on the boring location maps (Appendix A). As shown on the boring location maps, portions of the alignment outside the large cut slope area are situated on fill embankments. These embankments are generally inclined at 2H:1V or shallower. The faces of some of the fill embankments are somewhat irregular because of abundant cobbles and boulders protruding from the fill material.

West of Golconda Summit, the alignment area drains toward the west-northwest via sheet flow and small drainages toward the Humboldt River. East of Golconda Summit, the alignment drains toward the east via sheet flow and small drainages into Pumpernickel Valley on the east side of the Edna Mountains. Culverts exist where drainages cross the alignment.

4.3 Human-made and Natural Features of Engineering and Construction Significance

The existing EB cut slope between approximate “PE1” Station 315+00 and Station 330+00 (discussed in Section 4.2) is considered to have engineering and construction significance. The EB cut slope will be pushed back to accommodate the proposed widening and will result in a slope with similar geometry. The EB cut slope is discussed in Section 7.2.2.

4.4 Regional Geology

The project alignment is situated in the Basin and Ranges geomorphic province of the western United States. The Basin and Range Province is generally characterized as a series of roughly parallel, northeasterly-trending mountain ranges and basins (valleys). The Basin and Range mountains are primarily composed of Tertiary-aged volcanic rocks overlying Mesozoic-aged granitic rocks and metamorphic rocks. Extensional and normal faulting are the dominant recent structural features in the province.

Formation of the Basin and Range Province commenced during the Miocene Epoch (less than 20 million years ago) and is ongoing. The basins and ranges formed as the continental crust east of the Sierra Nevada stretched in an east–west direction. The crust has broken (has been faulted) into a series of generally north-south-trending valleys and mountain ranges. Over time, the basins or valleys fill with sediment and, in general, drain internally to a central depression (or playa). The playa areas generally fill with water seasonally. Mount Edna, which the project alignment traverses, is one of the “ranges” of the Basin and Ranges province.

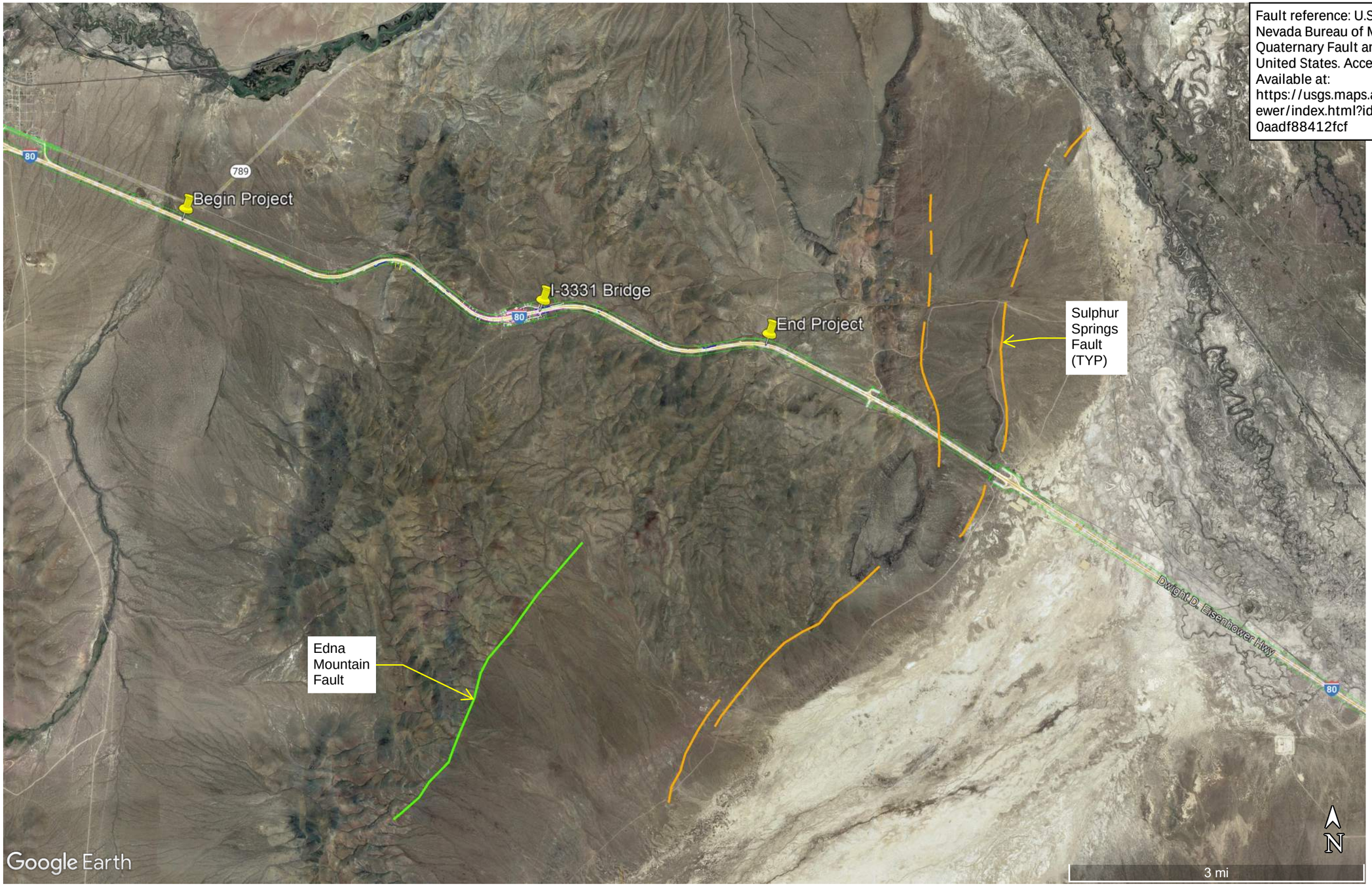
4.5 Geologic Hazards

4.5.1 Landslides

Landslides could be activated from natural events such as earthquakes, rainfall, and erosion; or from manmade activities such as removal of lateral support near the base of unstable hillside areas. No landslides have been mapped across or adjacent to the project alignment (USGS 1974a, 1974b; NMBG 1976) and no evidence of deep-seated landslides or global slope instability has been reported in the I-80/Golconda Summit area. However, evidence of minor rockfalls does exist in the area of the existing cut slopes near “PE1” Station 315+00 to Station 330+00. The EB cut slope and slope stability are discussed in Sections 7.1.1, 7.2.2, 8.2.1 and 8.2.2.

4.5.2 Faulting

Based on the latest U.S. Geological Survey (USGS) and Nevada Bureau of Mines and Geology (NMBG) mapping (USGS and NBMG 2022), there are no known Quaternary-aged faults crossing the alignment where improvements are proposed. The nearest mapped active faults to the alignment are northerly-trending splays of the Sulphur Springs Fault, mapped crossing I-80, approximately 2 miles southeast of the eastern end of the project improvements (“PE1” Station 535+00). The Sulphur Springs Fault is considered a “Latest Quaternary” fault, meaning its last known rupture was less than 15,000 years ago. The northern end of the Enda Mountain fault is mapped approximately 2.3 miles south of the I-808 structure (“PE1” Station 408+00). The Edna Mountain fault is considered a “Late Quaternary” fault, meaning its last known rupture was less than 130,000 years ago. Both of these faults are associated with the active Basin and Ranges tectonics. A number of faults internal to the Mount Edna bedrock units have been mapped in the vicinity of the alignment (USGS 1974a, 1974b; NMBG 1976). These bedrock faults predate the Basin and Ranges tectonics, do not cross Quaternary-aged sediments and thus, are not considered to be active. The location of the project alignment relative to the nearby active faults is shown on Figure 4-1. The potential for ground surface rupture associated with known active faults is considered low for the project.



Fault reference: U.S. Geological Survey and Nevada Bureau of Mines and Geology. 2022. Quaternary Fault and Fold Database of the United States. Accessed June 3, 2022. Available at: https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=5a6038b3a1684561a9b0aadf88412fcf

Figure 4-1
Fault Location Map
Geotechnical Design Report
I-80 Golconda Summit
Humboldt County, Nevada

5. Subsurface Data

This section discusses the current geotechnical data used for the project. Appendix B provides geotechnical exploration data. The soil boring and rock coring logs are presented in Appendix B-1. The drill rig hammer calibration report is presented in Appendix B-2. Appendix A shows the exploration locations on the boring location maps.

5.1 Explorations

The geotechnical explorations for the project consisted of geophysical studies (Section 5.1.2) and 21 geotechnical borings. The explorations were performed by NewFields' (Sparks Nevada office), under subcontract to Jacobs. The HSA and HQ rock core borings were advanced using a Central Mine Equipment (CME)-85 truck-mounted drill rig.

The drill rig used utilized a 140-pound automatic hammer falling freely for 30 inches. A hammer energy efficiency of 86.4% was reported for the CME-85 used on the project. The drill rig calibration report is included in Appendix B-2. Soil samples were generally collected every 5 feet using a standard penetration test (SPT) split-spoon sampler (1.38-inch inside diameter; ASTM International [ASTM] D1586) and Modified California ring sampler (2.50-inch inside diameter; ASTM D3550). The SPT blow counts were primarily used to estimate the soil strength parameters. The blow counts presented on the boring logs (Appendix B-1) are raw field values and have not been corrected for sampler type, overburden pressures, and hammer efficiency. The sampling procedures generally followed SPT and split-barrel soil sampling methods, as outlined in ASTM D1586. Each soil sample collected was described using the Unified Soil Classification System (USCS) in general accordance with ASTM D2487 and D2488.

At three of the boring locations (RC-22-002, -003, and -005), hard rock was encountered before reaching the target depths. HSA drilling was terminated and transitioned to rock core drilling using a double lined core barrel with an HQ diamond core bit. Cores were placed in wooden core boxes and logged using International Society of Rock Mechanics guidelines.

Boring RC-22-004 was redrilled as Boring RC-22-004A, approximately 5 feet to the east of the RC-22-004 location. The boring was redrilled to confirm that the subsurface conditions observed in RC-22-004 were not anomalous.

Table 5-1 presents a summary of the geotechnical borings performed within the project alignment.

Upon completion of sampling activities, the borings were backfilled in compliance with *Nevada Administrative Code* 534.4371.

Appendix A includes boring location maps, while boring logs are included in Appendix B-1, drill rig hammer energy report is provided in Appendix B-2, and photographs of the rock cores are provided in Appendix B-3.

Table 5-1. Summary of Current Exploration Data

Boring No.	Purpose	Boring Type	Station (feet)	Offset (feet)	Latitude	Longitude	Ground Surface Elevation (feet)	Total Depth (feet)
B-22-101	Roadway/Pavement	HSA	"LE" 1000+35.86	44.76 Right	40.93439	-117.45240	4,467.80	16.5
B-22-102	Roadway/Pavement	HSA	"LE" 1044+52.54	28.59 Right	40.92972	-117.43766	4,602.83	11.5
B-22-103	Roadway/Pavement/ Fill Slope Stability	HSA	"PE1" 302+98.49	24.41 Right	40.92834	-117.42019	4,794.55	50.9
B-22-104	Roadway/Pavement	HSA	"PE1" 341+78.14	23.36 Right	40.92643	-117.40772	4,975.71	16.5
B-22-105	Ramp/Pavement	HSA	"PW1" 386+60.69	161.48 Right	40.92048	-117.39364	5,156.00	11.5
B-22-106	Roadway/Pavement	HSA	"PW1" 432.51+20	27.50 Left	40.92254	-117.37760	5,019.97	16.5
B-22-107	Roadway/Pavement	HSA	"PW1" 476+44.49	27.00 Left	40.91717	-117.36340	4,904.57	11.5
B-22-108	Roadway/Pavement	HSA	"PW1" 522+00.38	27.48 Left	40.91709	-117.34754	4,820.92	16.5
B-22-109	WB Parking Area/ Off-Ramp/Pavement	HSA	"PW1" 396+59.77	237.19 Left	40.92204	-117.39060	5,127.77	11.5
B-22-110	WB Parking Area/Pavement	HSA	"PW1" 392+49.54	178.85 Left	40.92167	-117.39202	5,133.76	21.5
B-22-111	WB Parking Area/ On-Ramp/Pavement	HSA	"PW1" 389+10.79	103.96 Left	40.92128	-117.39317	5,145.14	11.4
B-22-112	EB Off-Ramp/Pavement	HSA	"PE1" 392+88.61	143.57 Right	40.92059	-117.39159	5,159.76	11.5
B-22-113	EB Truck Parking Area/Pavement	HSA	"PE1" 395+15.54	199.55 Right	40.92057	-117.39074	5,150.95	21.5
B-22-114	EB Truck Parking Area/ On-Ramp/Pavement	HSA	"PE1" 398+29.71	119.78 Right	40.92095	-117.38969	5,142.71	11.5
RC-22-001	Slope Stability EB Cut	HSA	"PE1" 318+65.07	80.60 Right	40.92930	-117.41483	4,904.48	50.3
RC-22-002/002R[a]	Slope Stability EB Cut	HSA/HQ	"PE1" 322+08.62	80.71 Right	40.92917	-117.41365	4,921.69	50.0
RC-22-003/003R[a]	Slope Stability EB Cut	HSA/HQ	"PE1" 324+60.04	78.85 Right	40.92899	-117.41282	4,933.35	55.0
RC-22-004	Bridge Structure I-3331	HSA	"PW1" 408+08.94	27.17 Right	40.92195	-117.38634	5,100.71	50.9
RC-22-004A	Bridge Structure I-3331	HSA	"PW1" 408+13.94	27.17 Right	40.92196	-117.38633	5,100.71	50.5
RC-22-005/005R[a]	Bridge Structure I-3331	HSA/HQ	"PE1" 407+58.14	57.53 Right	40.92161	-117.38644	5,088.28	49.0/60.0

Table 5-1. Summary of Current Exploration Data

Boring No.	Purpose	Boring Type	Station (feet)	Offset (feet)	Latitude	Longitude	Ground Surface Elevation (feet)	Total Depth (feet)
RC-22-006	Slope Stability WB Cut	HSA	“PW1” 383+59.79	117.11 Left	40.92118	-117.39481	5,162.15	50.4

Notes:

Groundwater was not encountered in any of the borings tabulated.

[a] Boring was switched to rock coring after encountering hard rock and is indicated with an “R” at the end of the boring number.

No. = number

5.1.1 Geologic Reconnaissance Mapping

On April 19 and April 20, 2022, a Jacobs engineering geologist performed geologic reconnaissance along the project corridor. The reconnaissance included cursory geologic mapping of the EB cut area ("PE1" Station 315+00 to Station 330+00) along the existing midslope bench. The results of the reconnaissance have been incorporated accordingly in this report.

5.1.2 Geophysical Studies

Geophysical studies were performed to aid in the characterization of the bedrock at the location of the rock cut adjacent to the EB mainline lanes, the rock cut adjacent to the WB mainline lanes, and the new bridge structure at the frontage road undercrossing. The following sections discuss the testing performed.

5.1.2.1 Refraction Microtremor Surveys

Two refraction microtremor (ReMi) surveys were performed to estimate vertical shear wave velocity profiles in the upper 100 feet. The ReMi surveys were performed at the rock cut adjacent to the EB mainline lanes and at the new bridge location. ReMi survey locations are shown in Appendix A.

The ReMi method provides an effective and efficient means to acquire general, one-dimensional information about large volumes of the subsurface with one equipment setup. This method is used to estimate shear wave velocity profiles and provide site-specific Vs30 soil classification data. ReMi surveys consisted of a 24-channel system with 4.5-Hertz geophones spaced 10 feet apart, for a total line length of 230 feet. Broadband ambient site noise was used as a surface wave energy source, as well as a 10-pound sledgehammer struck against a polyethylene plate. For the active records, the energy source was offset 10 feet from both ends of the survey line. A sampling time and interval of 30 seconds and 2 milliseconds, respectively, was used for each record. A dispersion curve consisting of the lower bound of the spectral energy shear wave velocity versus frequency trend is manually selected from the shear wave plot. An interpreted vertical S-wave profile is then obtained by fitting multiple layers and S-wave velocities to match the selected dispersion curve. The ReMi survey results are presented in Appendix C.

5.1.2.2 Refraction Surveys

Three refraction surveys were performed to obtain seismic P-wave velocities to aid in assessing the rippability of shallow rock. The refraction surveys were performed at the rock cut adjacent to the EB mainline lanes, the rock cut adjacent to the WB mainline lanes, and at the new bridge location. Appendix A shows the Refraction Survey locations.

Refraction surveys were performed using a 24-channel seismograph system with 4.5-Hertz geophones spaced 10 feet apart. Data were acquired midpoint between Geophone 1 and 2 at 30-foot spacings down the line (between phones 4 and 5, 7 and 8, and so on). The energy source consisted of a 10-pound sledgehammer struck against a polyethylene plate. Readings were recorded every 0.125 millisecond for a duration of 0.5 second along each line. Relative elevations between geophones were measured using a tape measure, string line, and line level. Elevations shown on the plots are relative to an elevation of 100 feet taken at Geophone No. 1. Appendix C presents the seismic refraction survey results.

Caution should be used during interpretation of seismic velocity near the ends of the survey lines, as significant background noise can influence the results. Discussion on rippability is provided in Section 8.2.2. The results of the refraction surveys are included in Appendix C.

5.1.3 Exploration Notes

The integrity of the weathered bedrock that exists at the ground surface within the existing cuts and within shallow depths throughout the rest of the project limits was unknown before the current geotechnical investigation. It was anticipated that hard bedrock (that is, HSA refusal) would be encountered at the borings advanced at the existing EB and WB cuts and the bridge location. However, during the

investigation it was noted that the HSA drill rig could advance augers and drive split-spoon samplers within material identified as highly weathered bedrock. As a result, only two of the three borings advanced at the EB cut, none of the borings advanced at the WB cut, and only one of the two borings advanced at the bridge location encountered bedrock hard enough to result in HSA refusal and allow HQ rock coring before reaching target depths.

6. Geotechnical Testing

6.1 In Situ Testing

Blow counts from the SPT sampler and standard California ring sampler were recorded during the explorations. No other in situ testing was performed for the project.

6.2 Laboratory Testing

A laboratory testing program was developed to provide data on relevant engineering properties of the soils and rock along the alignment where improvements are proposed. Selected soil and rock samples were tested for relevant physical and engineering properties. Testing was performed in general accordance with applicable ASTM, American Association of State Highway and Transportation Officials (AASHTO), and NDOT standards. The laboratory results were checked for completeness and reasonableness by Jacobs geotechnical engineers. The tests performed on the soil and rock samples collected during the investigation are summarized in Table 6-1. Appendix D presents the laboratory test results from the current investigation.

Table 6-1. Summary of Laboratory Test Methods

Type of Test	Applicable Test Method	Purpose
Moisture Content and Dry Density	ASTM D2937	In situ soil moisture content and dry density
Sieve Analysis	Nevada T206	Soil classification
Atterberg Limits	Nevada T210 and T211/212	Soil classification
Unconfined Compression Tests of Rock Cores with Elastic Moduli	ASTM D7012, Method D	Rock strength parameter
R-Value	Nevada T115D	Pavement design
Expansion Index	ASTM D4829	Swell potential of soils
Soil pH	AASHTO T298	Soil corrosivity potential
Minimum Electrochemical Resistivity	AASHTO T288	Soil corrosivity potential
Sulfate Content	AASHTO T290	Soil corrosivity potential
Chloride Content	AASHTO T291	Soil corrosivity potential

7. Geotechnical Conditions

7.1 Site Geology

This section summarizes the geologic units mapped along the project alignment and is based on the most recent USGS geologic mapping (1974a, 1974b). As depicted by the topography shown on the boring location maps (Appendix A), much of the project alignment is situated on a fill embankment. The discussion in this section overlooks these fill soils, which are described in Section 7.2 and on the boring logs in Appendix B. The geology along the project alignment is depicted on the boring location maps in Appendix A (the geologic contacts depicted on the boring location maps are based on geologic reconnaissance and the most recent USGS geologic mapping [1974a, 1974b]).

From the western project limits to approximate “PE1” Station 298+00, the project alignment is mapped as being underlain by Quaternary-aged (historic to less than 2-million-year-old) alluvial soils and gravels (unit Qa/Qg on the boring location maps). From “PE1” Station 298+00 to Station 320+00, the alignment is mapped as being underlain by the upper and middle Cambrian (approximately 500 million years old) Preble Formation (USGS 1974a) (unit Cp on the boring location map). The Preble Formation is described as a phyllitic (metamorphosed and altered by low heat and temperature) shale with some interbedded limestone. The unit also contains some quartzite beds and is intensely deformed and has contorted bedding (USGS 1974a).

From “PE1” Station 320+00 to Station 335+00, the alignment is mapped as being underlain by the Upper Permian-aged (approximately 250-million-year-old) Edna Mountain Formation (unit Pem on the boring location map). This unit is described as a calcareous quartzite that is locally conglomeratic.

From “PE1” Station 335+00 to Station 387+00, the alignment is mapped as being underlain by alluvial soil and the Lower Permian- and Pennsylvanian-aged (approximately 300 million years old) Pumpernickel Formation, Chert and Shale – Undivided (unit IPpu on the boring location map). This unit is described as thin-bedded chert and siliceous shale, with minor amounts of greenstone, quartzite, pebble conglomerate and limestone. However, based on Boring RC-22-006, it appears that at least the eastern portion of the subject area is underlain by Pumpernickel Formation—quartzite and limestone (unit PIPpq on the boring location map)—and not chert and shale.

From “PE1” Station 387+00 to the eastern limits of the improvements (“PE1” Station 535+00), the alignment is mapped as being underlain by Quaternary alluvial soil and gravels with the exception of the following areas:

- Between I-80 WB lanes and area to the north, between “PW1” Station 410+00 and Station 415+50): This area is mapped as being underlain by the Pumpernickel Formation—interbedded shale and chert (unit IPpsc on the boring location map) described as siliceous shale and thin-bedded chert.
- Between I-80 EB lanes and the existing access road to the I-808 bridge (“PE1” Station 398+00 to Station 407+50): This area is mapped as being underlain by the Pumpernickel Formation—quartzite and limestone (unit PIPpq on the boring location map).
- WB lanes between “PW1” Station 409+00 and Station 415+00: This area is mapped as being underlain by the Pumpernickel Formation—interbedded shale and chert unit, described as siliceous shale and thin-bedded chert.
- EB lanes from “PE1” Station 416+00 to Station 427+00; EB and WB lanes from “PE1” Station 439+00 to Station 451+00 and “PE1” Station 458+00 to Station 467+00: These areas are mapped as being underlain by the Pumpernickel Formation – interbedded shale and chert unit (described as siliceous shale and thin-bedded chert) and Upper Cretaceous (approximately 70 million years old) granodiorite (unit Kgd on the boring location map), described as medium-grained to porphyritic intrusive rock, commonly altered by silica.

7.1.1 Slope Stability and Landslides

No landslides have been mapped across or adjacent to the project alignment (USGS 1974a, 1974b; NMBG 1976) and no evidence of deep-seated landslides or global slope instability has been reported in the I-80/Golconda Summit area. However, evidence of minor rockfalls does exist in the area of the existing cut slopes near "PE1" Station 315+00 to Station 330+00. The condition of the EB slope (during April 2022) is shown on Figure 7-1. Discussion on the current conditions of the EB cut slope are presented in Section 7.2.2 and design considerations are presented in Section 8.

7.2 Subsurface Conditions

The project generally consists of four main elements for which geotechnical investigations were performed: (1) new roadway pavements for TCLs, mainline shoulders, and Golconda interchange ramps; (2) EB and WB cuts; (3) new bridge structure; and (4) truck parking areas and associated on- and off-ramps. The subsurface conditions for each of these elements are discussed in the following sections.

7.2.1 Roadway Pavements for Truck Climbing Lanes and Shoulders

The subsurface conditions generally consist of varying depths of fill material over native soils. The fill materials consist of medium-dense to dense silty sand with gravel and range in thickness from 0 to 35 feet with an average depth of 5 feet. This fill material was most likely sourced from the existing cuts along the project alignment. The top 10 feet of native soils generally consist of medium dense to very dense silty and clayey sand with gravel with some layers of silty and clayey gravel with sand.

7.2.2 EB and WB Cut Slopes

The investigations for the EB cut ("PE1" Station 315+00 to Station 330+00) were performed within the existing bench located 30 to 40 feet above the roadway surface. The investigation for the WB cut ("PW1" Station 374+00 to Station 387+00) was performed at the top of the existing cut slope. The subsurface conditions generally consist of highly weathered to slightly weathered bedrock throughout. However, the rock type hardness and weathering varied between the EB and WB cuts, and also within the cuts.

The EB cut has a variation in rock type from west to east. The western side of the cut consists of highly to completely weathered phyllitic shale to the depth investigated (50 feet). The phyllitic shale was penetrated by HSA to the full depth. Split-spoon samplers were able to be driven with close to refusal blow counts (50 blows for 6 inches [50/6"]). The middle and eastern end of the EB cut consist of slightly to moderately weathered calcareous quartzite to the depth investigated (50 feet). The calcareous quartzite is significantly stronger than the phyllitic shale and required HQ rock coring within 5 feet of the ground surface. Based on the field investigation and geologic reconnaissance, the proposed EB 1H:1V cut slope with bench will be composed of two distinctly different bedrock types. Phyllitic shale dominates the geology of the western portion of the slope, while the eastern portion is dominated by calcareous quartzite. The contact between the units is irregular but, as shown on the boring location map, appears to extend from the toe of the current slope near "PE1" Station 319+25 to the top of the current slope near "PE1" Station 323+65. The phyllitic shale is anticipated to be completely to highly weathered, moderately to intensely fractured, thinly bedded, and very weak to weak; the phyllitic shale will also have localized (strong to very strong) limestone beds. Bedding attitudes taken along the midslope bench within the phyllitic shale indicate that the beds dip to the south to southwest (into slope) at 10 to 50 degrees. The shale beds are typically highly folded and contorted. The calcareous quartzite is anticipated to be fresh to moderately weathered, slightly to intensely fractured, and medium strong to very strong. Structure within the quartzite also indicates a dominant southerly dip. Figure 7-1 presents representative photographs of the existing EB cut.

The WB cut ("PW1" Station 373+00 to Station 387+00) consists of highly weathered to moderately weathered quartzite and limestone to the full depth investigated (50 feet). The quartzite and limestone were penetrated by HSA to the full depth. Split-spoon samplers were able to be driven with refusal blow counts (50/6"). Based on the field investigation and geologic reconnaissance, the proposed WB 2H:1V cut slope will be composed of moderately to highly weathered, moderately to intensely fractured, and weak to

very strong quartzite and limestone bedrock. Because of the weathered and fractured nature of the rock, some areas will consist of very dense silty to clayey gravels and very dense sands and silty sands with gravels. Other areas may appear as relatively intact, relatively hard, but relatively highly fractured rock.

7.2.3 Bridge Structure

The subgrade conditions generally consist of fill material over bedrock. The fill material consists of loose to medium-dense clayey sand with gravel with a thickness of approximately 12 feet. This fill material was most likely sourced from the existing cuts along the project alignment. The underlying bedrock consists of highly weathered quartzite and limestone to a depth of approximately 50 feet. Within the upper 50 feet the quartzite and limestone were penetrated by HSA to the full depth. Split-spoon samplers were able to be driven at or near refusal blow counts (50/6”). Below 50 feet and to the depth investigated (60 feet), the quartzite and limestone becomes slightly weathered and requires HQ rock coring.

7.2.4 Truck Parking Area and Associated Ramps

The subgrade conditions generally consist of native soils consisting of medium-dense to very dense silty sand with gravel and silty gravel with sand to the depth investigated (21.5 feet). Bedrock is mapped (USGS 1974a, 1974b) between the I-80 EB lanes and the existing access road to the I-808 bridge (“PE1” Station 398+00 to Station 407+50). Based on geologic reconnaissance and nearby borings (RC-22-004 and RC-22-005), the bedrock in this area consists of highly weathered quartzite and limestone that can be penetrated by HSA to 50 feet below ground surface. The bedrock will be variable, similar to the WB cut discussed in Section 7.2.2.

7.3 Water

7.3.1 Surface Water

No permanent standing surface water was observed within the project limits. Temporary surface water may be encountered within culverts and drainage gullies during rainfall events.

7.3.1.1 Scour

Where the alignment is crossed by drainage gullies, they are controlled by engineered culverts. There are no gullies/rivers mapped adjacent to or crossing the I-808 bridge area (USGS 1965a); therefore, river scour is not considered a significant hazard to the project

7.3.1.2 Erosion

In general, the earth units along the project alignment are considered to have moderate potential for erosion. Visual inspection of the manufactured (cut and embankment) slopes presents in the corridor indicates some erosional impacts are present, such as localized erosional gullies and rills and minor rockfalls (at cut slope areas).

7.3.2 Groundwater

Groundwater was not encountered during drilling of any of the current borings (Appendix B-1). In general, the bedrock units in the project area are not considered to have groundwater tables; however, significant amounts of groundwater can materialize in fractures, in/near faulted areas, and perched on less permeable layers.

The Humboldt River is a perennial river, and it is likely that shallow groundwater conditions exist close to the river. However, the west end of the project alignment is the closest to the river and is more than a mile from the river. Based on the available information and proposed improvements, we do not anticipate that groundwater will impact the project.

A design groundwater table deeper than 50 feet is assumed for the project alignment. However, the groundwater table may fluctuate because of seasonal variations, nearby construction, irrigation, and numerous other constructed and natural influences.

7.4 Project Site Seismicity

Based on the results of the geotechnical borings and geophysical testing, Site Class C was assumed for the entire project. The general procedure spectrum specified in Article 3.10.2 of the *AASHTO LRFD Bridge Design Specifications* (AASHTO 2020) can be considered to estimate the ground motion parameters: peak ground acceleration (PGA) and corresponding short-period (S_s) and long-period (S_1) spectral acceleration coefficients. Ground motion parameters were obtained using the USGS seismic design maps website (USGS 2022), which correspond to the values from Figures 3.10.2.1-1, 3.10.2.1-1, and 3.10.2.1-3 of *AASHTO LRFD Bridge Design Specifications* (AASHTO 2020). These parameters were compared to the minimum seismic coefficients for Humboldt County from the *NDOT Structures Manual* (NDOT 2008), Section 12.3.5 and the higher value used for design. The mapped ground motion coefficients were modified by the corresponding site factors presented in Tables 3.10.3.2-1, 3.10.3.2-2, and 3.10.3.2-3. Table 7-1 summarizes the seismic coefficients for the project:

Table 7-1. Seismic Design Coefficients

Seismic Parameter	Value
Mapped Peak Ground Acceleration (PGA) (g)	0.197
Mapped Short-Period Spectral Acceleration (S_s) (g)	0.474
Mapped Long-Period Spectral Acceleration (S_1) (g)	0.15[a]
Site Factor for PGA (F_{pga})	1.2
Site Factor for S_s (F_a)	1.2
Site Factor for S_1 (F_v)	1.65
Design Peak Ground Acceleration (A_s) (g)	0.237
Design Short-Period Spectral Acceleration (S_{ds}) (g)	0.569
Design Long-Period Spectral Acceleration (S_{d1}) (g)	0.248

[a] Controlled by the minimum value for Humboldt County (NDOT 2008)

7.4.1 Ground Rupture

Based on the Quaternary Fault and Fold database (USGS and NBMG 2022) and the geologic map covering the site (USGS 1974a, 1974b; NMBG 1976), no active, or potentially active (Quaternary age) faults are mapped adjacent to or crossing the project alignment.

As shown on Figure 4-1, the nearest Quaternary-aged fault is Sulphur Spring fault, which is mapped approximately 4.25 miles southeast of the I-808 bridge site and approximately 2 miles southeast of the eastern limits of the improvements. Considering the distance to the site, this fault does not pose a ground rupture risk within the project alignment. The potential for ground surface rupture within the project limits associated with known active faults is considered low.

Calcareous Quartzite

Phyllitic Shale
with Limestone

N

200 ft

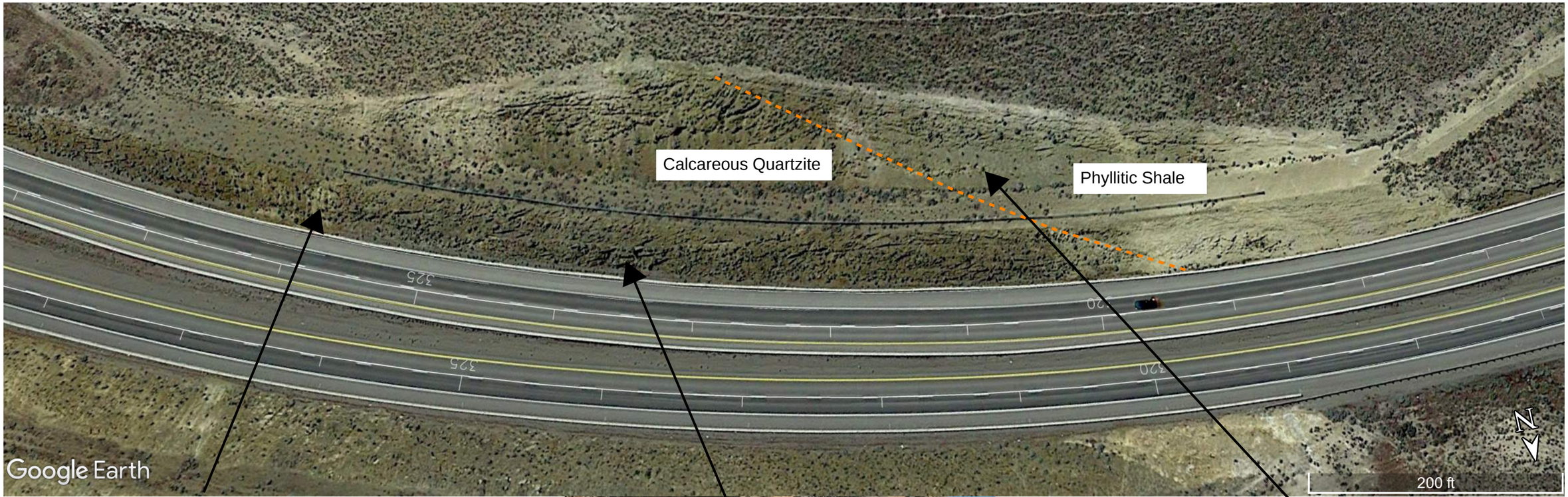
Calcareous Quartzite

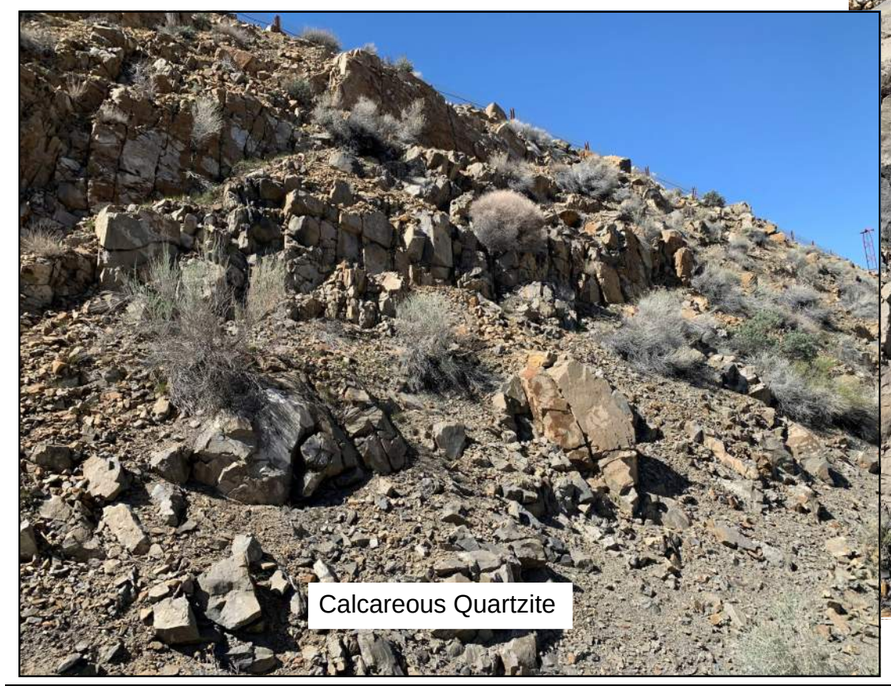
Phyllitic Shale

Limestone within Phyllitic Shale

Figure 7-1a
Cutslope 315 Area Existing Conditions
Geotechnical Design Report
I-80 Golconda Summit
Humboldt County, Nevada

Jacobs





Calcareous Quartzite

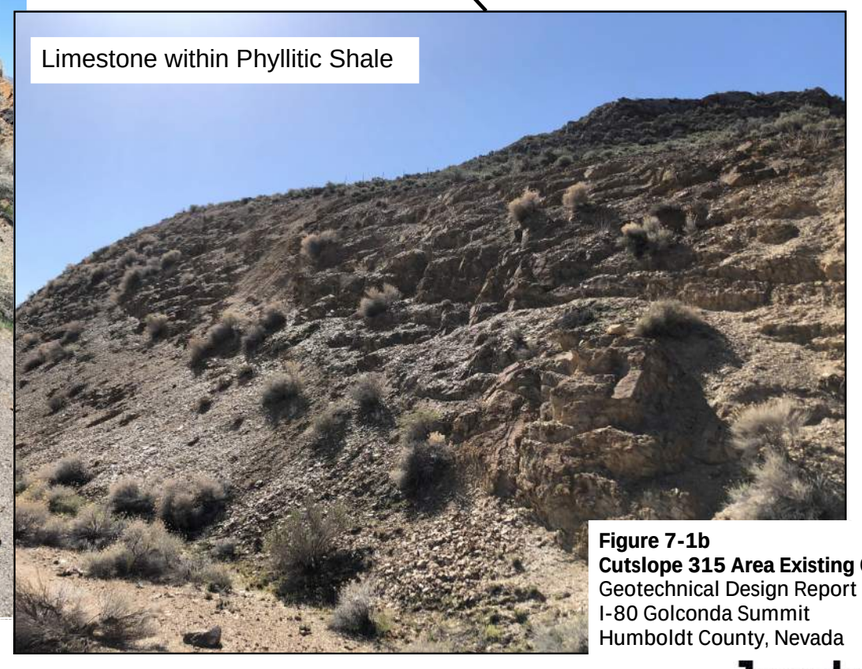


Figure 7-1b
Cutslope 315 Area Existing Conditions
Geotechnical Design Report
I-80 Golconda Summit
Humboldt County, Nevada

Jacobs

8. Geotechnical Design Recommendations

8.1 Dynamic Analysis

8.1.1 Parameter Selection

As discussed in Section 7.4, the design PGA within the project limits is 0.237. One-half of this PGA coefficient (approximately 0.12) is used in the dynamic analyses for the project pertaining to the wingwalls at the undercrossing.

8.1.2 Liquefaction Analysis

When a loose and saturated sand deposit is subjected to seismic loading without substantial dissipation of excess pore water pressure, the deposit may liquefy and lose its shear strength. According to the available geotechnical data, the subsurface soils within the project limits consist primarily of medium-dense to very dense sand and gravel soils with a groundwater table greater than 50 feet below ground surface. Therefore, liquefaction potential for the project limits is considered very low.

8.2 Cuts, Excavations, and Embankments

8.2.1 Slope Stability

Based on a review of the grading plans for the project, three major cut slopes and one major fill slope (embankment slopes) are proposed as part of the improvements. The major slopes are summarized in Table 8-1. As indicated by the proposed cut/fill line shown on the boring location maps, numerous, minor, cut and (sliver) fill slopes are proposed as part of the project. These minor slopes are not considered significant enough to affect the stability of existing slopes. The project's proposed permanent slopes will be constructed at an inclination of 2H:1V and 3H:1V, with the exception of the large EB rock-cut slope, which will be constructed at an inclination of 1H:1V with a 25-foot-wide bench at a height of 40 feet.

The global stability of the major permanent slopes was evaluated using SLIDE2 Modeler (Version 9.009) computer software (Rocscience 2020). The modified Bishop's Method was used to compute the static and pseudo-static factor of safety for the critical failure surfaces. In the stability analyses, a traffic surcharge load of 250 pounds per square foot (psf) was applied where roadway exists at the top of the slope. The ultimate shear strengths were used in the static and pseudostatic analyses in areas underlain by soil. Peak shear strengths were considered for the analysis in areas underlain by bedrock. In the pseudostatic analyses, a seismic force was applied to the soil/rock mass based on a horizontal seismic acceleration coefficient (K_h) equal to 0.12, corresponding to one-half of the PGA coefficient (refer to Section 7.4). The computed factors of safety for the static and pseudostatic cases were greater than 1.3 and 1.1, respectively. Therefore, the proposed major cut-and-fill slopes are considered globally stable for static and seismic loading conditions. Major cut-and-fill slope parameters are provided in Table 8-1. Soil and bedrock strength parameters used in the slope stability analysis are summarized in Table 8-2.

Table 8-1. Major Cut and Fill Slopes

Slope No.	I-80 Direction	Approximate Station Limits (begin-end)	Proposed Maximum Slope Height/Inclination (H:V)	Cross Section No.	Explorations	Anticipated Geologic Conditions	Conclusions and Recommendations
CS315	Eastbound	"PE1" Station 315+00 to 330+00	120 feet/1:1 with Bench	CS320+25 and CS323+25	RC-22-001, 002 and 003	Phyllitic shale with limestone and calcareous quartzite bedrock. Variable rock types with variable hardness, from very weak to very strong. Fracturing to vary from intensely to slightly fractured.	Globally stable as designed at 1H:1V with 25-foot-wide bench. Challenging excavation should be anticipated, (Section 8.2.2). Rockfall hazard mitigation includes upper catchment area, lower catchment area, rockfall fencing, and concrete barrier. Recommend full time geologic monitoring during excavation, by the NDOT geotechnical consultant of record. Manual scaling of the slope face to dislodge any hazardous loose clasts may be required.
FS331	Eastbound	"PE1" Station 330+20 to 382+70	20.5 feet/2:1 and 21 feet/2:1	FS362 and FS379	B-22-104	Medium-dense to very dense Silty and clayey sand with gravel, silty sand, and clayey gravel with sand.	Globally stable as designed at 2H:1V.
CCS373	Westbound	"PW1" Station 373+00 to 387+00	31 feet/2:1	CS377+00	RC-22-006	Quartzite with limestone bedrock. Moderately to highly weathered, moderately to intensely fractured, and very weak to strong. Some areas will consist of very dense silty to clayey gravels; and very dense sands and silty sands with gravels. Other areas may appear as relatively intact, relatively hard, but relatively highly fractured rock.	Globally stable as designed at 2H:1V. Local areas may consist of hard rock (Section 8.2.2).
CS417	Eastbound	"PE1" Station 416+85 to 421+40	33 feet/3:1	CS419+43	-	Assumed to be interbedded siliceous shale and thin bedded chert. Variable hardness from very weak to strong. Fracturing to vary from intensely to slightly fractured. Some areas may consist of very dense silty to clayey gravels; and very dense sands and silty sands with gravels. Other areas may appear as relatively intact, but relatively highly fractured rock.	Existing slope is approximately 3H:1V. Analysis indicates that proposed cut slope is globally stable as designed at 3H:1V.

Table 8-2. Summary of Soil Strength Parameters for Slope Stability Analysis

Soil/Rock Unit	Rock/Soil Type	Unit Weight (pcf)	Internal Shear Strength (degrees)	Cohesion (psf)	UCS (psf)	GSI	m_i
New Fill	Silty/Clayey Sand with Gravel	125	34	50	--	--	--
Existing Fill	Silty/Clayey Sand with Gravel	125	32	100	--	--	--
Phyllitic 59,Shale	Highly Weathered Bedrock (cross bedding)	130	37	400	--	--	--
	Highly Weathered Bedrock (along bedding)	130	32	100	--	--	--
Calcareous Quartzite	Moderately Weathered Bedrock	150	Generalized Hoek-Brown		1,728,000	45	20
Quartzite, Limestone, and Tuff	Highly Weathered bedrock	140	34	50	--	--	--
Limestone	Highly Weathered Bedrock	140	40	100	--	--	--
Fault Zones	--	--	34	0	--	--	--

GSI = Geological Strength Index

m_i = Hoek-Brown Constant

pcf = pound(s) per cubic foot

psf = pound(s) per square foot

UCS = Average Unconfined Compressive Strength

The assumed strength parameters for the new fill, existing fill, phyllitic shale, and quartzite, limestone, and tuff are based on the density, gradation, and classification of recovered soil samples, and highly weathered bedrock samples recovered as soil, as they compare to established strength correlations for soils (FHWA 2016). The strength parameters for the calcareous quartzite were established based on the results of unconfined compression testing on rock core specimens. The unconfined compressive strength data was used to develop strength parameters for the rock mass using the Hoek-Brown methodology, as described in *AASHTO LRFD Bridge Design Specification* (2020) Section 10.4.6.4. The geological strength index was estimated using Figure 10.4.6.4-1 based on the geologic structure and surface quality of the rock. The constant (m_i) was selected in accordance with Table 10.4.6.4-1 for Quartzite. A disturbance factor (D) of 1.0 was used to account for anticipated rock cut disturbance. The anticipated conditions to be encountered are presented in Table 8-1.

8.2.2 Rockfall Evaluation and Recommendations

The proposed CS315 geometry is similar to the existing slope; however, the proposed designs allow for roughly 20 feet of toe of slope catchment area behind the edge of shoulder concrete barrier—to allow for potential rockfalls. Based on the project's *Preliminary Design Field Study Report* (NDOT 2022), NDOT indicated as follows: "District did not indicate they frequently needed to remove rocks from the benches" and that "The existing 1:1 slope appears to be stable, with minimal rock fall." There is no knowledge of past rockfall issues along the existing EB cut. The proposed maximum cut height is similar to the existing maximum height, and the addition of the 20-foot-wide rockfall catchment area at the shoulder will decrease the I-80 mainline rockfall hazard at the cut area.

In general, the CS315 critical profile, from top to bottom, consists of a roughly 80-foot-tall, 1:1 slope, a 25-foot-wide upper catchment area, a roughly 40-foot-tall 1:1 slope, and a lower 20-foot-wide catchment area. The catchment areas are gently inclined into slope. Because of the variable nature of the bedrock, excavation of the cut slope will likely not yield a smooth 1H:1V slope face. Similar to the slope face of the existing cut (Figure 7-1), irregularities should be expected.

As shown on the project plan set, the following rockfall protection measures are being implemented for the EB Cut (CS315):

- A 25-foot-wide midslope bench (upper catchment area), gently inclined into slope; the bench will be 30 to 40 feet above the proposed slope toe.
- Special upper catchment area fence, 6-foot tall with approximately 2-inch mesh (No. 6 galvanized steel) placed near the outside edge of the midslope bench. Details of the rock fall debris fence are included in Appendix E.
- A 20-foot setback (lower catchment area) from toe of slope (at road grade) to the edge of the I-80 shoulder. This rockfall area catchment zone will be gently inclined toward the slope's toe.
- A 3-foot-tall concrete traffic barrier at the edge of shoulder.

Evaluation of these rockfall protection measures was performed using the Colorado Rockfall Simulation Program (CRSP) Version 4.0. Based on the CRSP analysis, rocks are not projected to pass either the upper catchment area rockfall fence or the lower catchment area barrier. In addition, the project design features generally satisfy the 1963 Ritchie rockfall catch ditch criteria (Ritchie, 1963).

During excavation, a geologist with experience in rockfall evaluation should be retained to map and observe the cut full time. The geologist would be on-site to identify unanticipated geologic conditions that may pose an immediate hazard and to identify any large bedrock blocks that could pose a future rockfall hazard. An evaluation of the cut should be performed regularly to ensure no rock fragments that pose a rockfall hazard are present. Precarious rock fragments that remain after completion of the cut may require removal using manual scaling or other special techniques.

8.2.3 Rippability

As discussed in Section 5.1.3.2, refraction surveys were conducted at the EB cut (CS315, along the existing midslope bench), WB cut (CS377, at the top of the existing cut slope), and bridge location (south of I-80) to assess the rippability of the bedrock encountered at these locations. Appendix A shows the refraction survey line locations on the boring location maps and results are presented in Appendix C. In general, rock is considered to be rippable with using a Caterpillar D9 equipped with a multi or single shank ripper when the measured P-wave velocities are less than 6,000 feet per second (ft/s), marginally rippable between 6,000 and 8,000 ft/s, and non-rippable which will require blasting or other nonconventional methods (such as saw-cutting and hammering, nonexplosive pyrotechnics, expansive-viscous chemical agents, pressurized foams) from 8,000 ft/s and up. P-wave velocities are only a general indicator of rock rippability. Other rock mass characteristics, such as bedding features, rock strength, and joint characteristics may affect rippability.

For CS315, it is estimated that the Preble Formation phyllitic shale unit will be rippable using conventional excavation methods. However, the limestone beds internal to this unit will likely require nonconventional techniques. For planning purposes, it is assumed that 25% of the area mapped as Preble Formation (unit Cp on the boring location maps) will be limestone and require nonconventional techniques. For the areas mapped as Calcareous Quartz (unit Pem on the boring location maps), the rippability of the material will be highly dependent on the fracture density of the rock. Large intact blocks of quartzite will be extremely difficult to rip, while moderately to highly fractured zones may be rippable to some degree. For planning purposes at CS315, it is estimated that 50% of the area mapped as Calcareous Quartz (unit Pem on the boring location maps) will require nonconventional techniques. Based on laboratory testing within the Calcareous Quartz, the unconfined compressive strengths vary from approximately 9,600 to 21,700 pounds per square inch. Unconfined compressive strength test results of rock are included in Appendix D.

For EB cut (CS417), it is estimated that most of the bedrock in this area will be rippable using conventional techniques. It is anticipated that 20 to 30% of the material may be intact corestones that would require additional effort, such as pneumatic hammering.

For the WB cut (CS377), it is estimated that most of the bedrock in this area will be rippable using conventional techniques. It is anticipated that 15% of the material may be intact corestones that would require additional effort, such as pneumatic hammering.

Considering the proposed improvements and anticipated subsurface conditions, rippability is not anticipated to be a concern at the bridge location, although cobble- and boulder-sized intact bedrock fragments may be encountered.

8.2.4 Grading Factors

8.2.4.1 Soil

Earthwork will be required as part of the proposed improvements. Estimates of shrinkage and bulkage grading factors are provided for earthwork quantity calculations. Shrinkage and bulkage occur when a material is excavated and replaced at a density substantially different from its original density. For planning and estimating purposes, soil removal and compacted replacement shrinkage factors of 5 to 10% can be assumed for granular sandy soils. For truck-hauling purposes, a bulking factor of 10 to 15% for granular sandy soils can be assumed.

8.2.4.2 Bedrock

Excavation of bedrock will be required as part of the proposed improvements at the EB and WB cuts. A bulking factor of 20 to 30% should be assumed if the rock is rippable and excavated using conventional techniques. For rock that is not rippable and requires nonconventional techniques to excavate, a bulking factor of 50% or more should be assumed because of the increased size (diameter) of rock debris generated.

8.2.5 Embankments

The new roadway embankments for the project are primarily sliver fills that will tie into the adjacent, existing embankment slopes. These new embankment fills range from 4H:1V to 2H:1V in inclination and will be placed on existing artificial fill soils and native soils. Before placement of compacted embankment fill on existing slopes, the existing ground or embankment slopes will be prepared in accordance with NDOT Standard Specification Section 203. Cut material can be compacted along with the new embankment material. This benching of new material into existing material will promote bonding of the materials. Where new pavement sections will be supported on new or existing embankment fill, a nonwoven geotextile (Class 1) should be used, as discussed in Section 8.8.

Fill-induced settlement of less than 1 inch is anticipated for the new roadway sliver fills. The majority of settlement is from granular soils and is anticipated to occur during construction.

All slopes will be subject to surficial erosion. Significant slopes may be protected from surface runoff by means of top-of-slope compacted earth berms or concrete interceptor drains. Where practical, slopes should be landscaped with a suitable plant material requiring minimal cultivation and irrigation water to thrive.

8.3 Bridge Structure

The proposed bridge will be a prefabricated structure consisting of the CONTECH Construction Products proprietary Concrete Arch System, or equivalent. The following sections were prepared with recommendations specific to the CONTECH Concrete Arch System. CONTECH engineers are responsible for the precast concrete arch design and Jacobs engineers are responsible for the design of

the cast-in-place stem walls, wingwalls, headwalls, and footings. However, the recommendations can be used by others to develop equivalent culvert systems for use on the project.

The CONTECH Concrete Arch System is a combination of precast concrete arch elements, with cast-in-place concrete stem walls, wingwalls, headwalls, and footings. For this application, the arch system will consist of one elliptical arch with a span of approximately 42 feet and a length of approximately 176 feet. Because of its size, the 176-foot-long precast arch element would be shipped in 6-foot-long segments. During assembly of the arch element, the 6-foot-long arch segments would be joined at a seam that would be backfilled with cast-in-place concrete. The footings will be founded on native, highly weathered bedrock. Once the precast arch elements are assembled on the cast-in-place footings, the entire structure would be overfilled to the specified elevations. Fill placement and compaction above the Concrete Arch System should be performed in accordance with the manufacturer's specifications.

Appendix E presents the General Plan, Bridge Plan, and Profile and Cross-sections for this structure.

8.3.1 Engineering Parameters

The laboratory test results were used to develop the engineering properties of the subsurface materials. In addition to laboratory tests, SPT blow counts from the test boring were used to estimate equivalent friction angles for granular soils based on established correlations in the literature (FHWA 2017).

The generalized soil profiles and the material properties used for engineering analyses are presented in Table 8-3.

Table 8-3. Bridge Generalized Subsurface Soil Profile and Design Strength Parameters

Geologic Unit	Elevation of Layer[a,b] (± feet)	Soil Type	Average Corrected[c] SPT N-Values (blows per foot)	Total Unit Weight (pcf)	Cohesion[d] (psf)	Friction Angled (degree)[e]
Fill	5,100 – 5,088	SC/SM	30	120	200	34
Highly Weathered Quartzite, Limestone, and Tuff	5,088 – 5,039	GC/SC/SM	>100	125	0	36
Slightly Weathered Quartzite and Limestone	<5,039	Bedrock	--	--	--	--

[a] Bottom of footing elevations for the proposed bridge structure are between 5,073.50 and 5,074.25 feet. Wingwall footing elevations range from 5,089.00 to 5,075.00 feet.

[b] Groundwater elevation for design is at or below 5,039.00 feet.

[c] SPT blow counts are corrected for overburden and efficiency.

[d] Cohesion based on established strength correlations for soils (FHWA 2017).

[e] Friction angle based on established strength correlations for soils (FHWA 2017).

> = greater than
< = less than
GC = clayey gravel with sand
SC = clayey sand
SM = silty sand

8.3.2 Settlement

The footings will be supported by highly weathered bedrock. Because of the granular nature of the weathered bedrock and weak cementation, all settlement is anticipated to be from elastic compression and will occur during the construction of the bridge. It is anticipated that settlement of the footings will be

less than 1.0 inch with differential settlement less than 0.1 inch over the 42-foot arch span, which is less than the maximum allowable horizontal distortion of 1/200 for the arch span.

8.3.3 Foundation Recommendations

Based on the subsurface information obtained from the geotechnical investigation, the site consists of fill material over highly weathered bedrock. The footing elevation will be located within the highly weathered bedrock. Therefore, the bridge structure can be supported on spread footings.

8.3.3.1 Bearing Resistance and Footing Widths

The structure will be founded within highly weathered quartzite, limestone, and tuff bedrock. During the geotechnical investigation, this material was recovered as dense to very dense silty and clayey sand with gravel.

The footing design for the proposed bridge structure and retaining walls was checked to verify that it meets the Load and Resistance Factor Design (LRFD) requirement for settlement (for Service Limit State) and bearing resistance (for Strength and Extreme Event Limit States), in accordance with AASHTO LRFD (2020). Footing dimensions used in design were based on the plans provided in Appendix E. The service permissible net contact stress, strength factored gross nominal bearing resistance, and extreme event gross nominal bearing resistance for the foundations are provided in Table 8-4.

Table 8-4. Spread Footing Data (Bridge Structure and Retaining Walls)

Structure	Design Wall Height (feet)	Design Footing Width (feet)[a]	Effective Footing Width (feet) Service/Strength/ Extreme	Service Limit State Permissible Net Contact Stress (ksf)	Strength Factored Gross Nominal Bearing Resistance (ksf)	Extreme Event Factored Gross Nominal Bearing Resistance (ksf)[b]
Trash Enclosures	--	4.0	3.36/2.61/2.45	4.0	9.3	20
Concrete Arch Bridge/Stem Wall	12’-2” to 13’-11”	17.0	12.0/13.6/--[b]	5.0	37	--
Wingwall	8.0	5.0	3.8/3.6/3.4	4.0	16	28
Wingwall	12.0	7.5	5.9/5.7/5.3	4.0	18	32
Wingwall	14.0	7.5	5.1/4.8/4.4	4.0	17	30
Wingwall	18.0	10.0	7.5/5.3/6.5	4.0	20	40
Wingwall	20.0	13.0	11.2/10.7/10.0	4.0	26	47
Wingwall	24.0	14.0	11.0/10.3/9.6	4.0	26	46
Wingwall	26.0	15.5	12.3/11.6/10.7	4.0	26	47
Wingwall	28.0	18.0	15.8/15.0/14.2	4.0	28	50

[a] Footing widths and effective footing widths provided by the structural engineer.

[b] Extreme limit state not applicable to concrete arch bridge foundation that do not cross an active fault according to AASHTO LRFD Section 3.10.

ksf = kip(s) per square foot

8.3.3.2 Coefficient of Friction

Based on the ultimate friction factors for dissimilar materials presented in Table 5-15 (FHWA 2002), a friction factor of 0.55 can be assumed for mass concrete (cast-in-place) on clean gravel, gravel-sand mixtures, or coarse sand, according to Section 5.4. Resistance factors for the Service, Strength, and

Extreme Limit States are 1.0, 0.80, and 1.0, respectively, according to AASHTO Table 10.5.5.2.2-1 (AASHTO 2020).

8.3.3.3 Lateral Earth Pressures

Structures that can deflect into or away from backfill should be designed assuming passive and active earth pressure conditions, respectively. Structures that are rigid and do not deflect should be designed assuming the at-rest earth pressure condition. Assuming that the backfill consists of dense compacted sand or sand/gravel mixtures, the culvert structure must have the ability to move away from the backfill 0.1% of its height to mobilize active lateral earth pressures and move into the backfill 1% of its height to mobilize passive lateral earth pressures, according to AASHTO Table C3.11.1-1 (AASHTO 2020). Whether the proposed arch system is considered a flexible or rigid structure is unclear; therefore, recommendations are provided for all static earth pressure conditions. Table 8-5 summarizes the lateral earth pressure conditions. The values in the table assume that the backfill material is free draining and, therefore, do not include hydrostatic pressures. Additionally, the backfill material is assumed to have a moist unit weight of 135 pcf and an internal friction angle of 34 degrees.

Table 8-5. Lateral Earth Pressures

Condition	Earth Pressure Coefficient	Equivalent Fluid Pressure (Drained Condition) (psf per foot)
Active	0.25	34
Passive	7.34	990
At-rest	0.44	60
Seismic	0.08	11

Active, passive, and at-rest earth pressures have triangular distributions with the largest load occurring at the base of the arches. The seismic lateral earth pressure (where applicable) has a triangular distribution with the largest load occurring at the bottom of structures, similar to the active earth pressure. To account for the lateral active earth pressure resulting from traffic surcharge loading, a design value of 80 psf is recommended. To account for the lateral at-rest earth pressure resulting from traffic surcharge loading, a design value of 120 psf is recommended. This load has a rectangular distribution along the height of the arches. The values provided in Table 8-5 are nominal values and appropriate resistance factors should be applied to the passive earth pressure for lateral sliding resistance. Due to sloping conditions in front of the proposed wingwalls, the passive earth pressure in front of the footing should be ignored for lateral sliding resistance. Passive earth pressures can be used for shear key design.

Proper drainage should be designed and constructed behind the proposed arch system and wing walls to allow for drained conditions throughout the backfill soil and to prevent excessive hydrostatic pressure.

8.3.3.4 Wing Walls and Spandrel Walls (Headwalls)

Wing walls and headwalls will be cast-in-place concrete structures. The wingwalls will be supported on spread footings and the headwalls will be supported by the concrete arch structure. Lateral earth pressures presented in Section 8.3.3.4 are applicable to wingwall and headwall design.

8.4 Culvert Foundations

No drainage structure improvements that require geotechnical evaluation are included in the project limits. Improvements consist of extensions to existing culverts. The existing culverts consist of 48-, 36-, 30-, and 24-inch corrugated metal pipes, and one 6-foot by 4-foot RCB. All culverts will be extended in kind. Therefore, recommendations for design and construction of culvert structures are not provided in this GDR.

8.5 Minor Structure Foundations

A trash enclosure and two restroom structures are proposed for each of the truck parking areas. The trash enclosures have a footprint of approximately 11 feet by 21 feet and consist of a 6-foot-tall masonry block wall founded on spread footings enclosing a concrete slab on grade. Loading from the walls and slab is anticipated to be relatively minimal. The structure will be founded within native silty and clayey sand with gravel. The bearing resistances for this structure is provided in Table 8-4. The resistance factor at the Service Limit State is 1.0.

The restrooms are proposed to consist of prefabricated buildings with a footprint of approximately 14 feet by 12 feet. An underground vault is located approximately 4½ feet beneath the restroom buildings and will bear on native or alluvial soils. Excavations for the restroom vaults may be difficult and gravels and oversized cobbles and/or possible boulders may be encountered. The trash enclosure plans are included in Appendix E.

8.6 Expansion Potential

Expansive soils are characterized by their ability to undergo significant volume changes (shrink or swell) because of variations in moisture content even without an increase in external loads. Changes in soil moisture content can result from precipitation, landscape irrigation, utility leakage, perched groundwater, drought, or other factors, and may result in unacceptable settlement or heave of structures or concrete slabs supported on grade.

The project alignment is underlain predominantly by granular (nonexpansive) soils, and expansive soils are not anticipated to be a concern to the project.

8.7 Corrosion

Selected soil samples collected during the current investigation were tested for minimum soil resistivity, soil pH, water soluble sulfate content, and chloride content using the procedures described in AASHTO T288, T298, T290, and T291, respectively. Table 8-6 summarizes the results of the available corrosion test data. The laboratory test results are included in Appendix D. *Corrosion/Degradation of Soil Reinforcements for Mechanically Stabilized Earth Walls and Reinforced Soil Slopes* (FHWA 2009), defines a “mildly corrosive” environment as being a site where the soil has a sulfate content greater than 200 parts per million (ppm), a chloride content greater than 100 ppm, a pH between 5 and 10, or a resistivity value greater than 3,000 ohm-centimeters.

Table 8-6. Summary of Corrosion Test Results

Station[a] (feet)	Offset[a] (feet)	Boring Designation	Sample Depth (feet)	Soil Type (USCS)	Minimum Resistivity (ohm-centimeters)	pH	Sulfate Content (ppm)	Chloride Content (ppm)
“PE1” 1000+35.86	44.76 Right	B-22-101	0-5.0	GC - Native	1,610	8.33	40.7	36.4
“PE1” 302+98.49	24.41 Right	B-22-103	0-5.0	SM - Fill	10,960	8.80	11.5	24.9
“PE1” 341+78.14	23.36 Right	B-22-104	0-5.0	SM - Fill	1,740	8.39	22.3	35.3
“PW1” 522+00.38	27.48 Left	B-22-108	0-5.0	SC - Native	320	7.92	1,162.0	102.7
“PW1” 396+59.77	237.19 Left	B-22-109	0-5.0	SM - Native	290	8.60	666.3	257.6
“PE1” 398+29.71	119.78 Right	B-22-114	0-5.0	ML - Native	130	8.10	1,342.6	403.6

Table 8-6. Summary of Corrosion Test Results

Station[a] (feet)	Offset[a] (feet)	Boring Designation	Sample Depth (feet)	Soil Type (USCS)	Minimum Resistivity (ohm-centimeters)	pH	Sulfate Content (ppm)	Chloride Content (ppm)
"PE1" 318+65.07	80.60 Right	RC-22-001	20-25.0	Phyllitic Shale (SC)	4,560	7.62	15.0	7.1
"PW1" 408+08.94	27.17 Right	RC-22-004	0-5.0	SC - Fill	320	7.98	606.6	75.6
"PE1" 407+58.14	57.53 Right	RC-22-005	7.5-9	Quartzite/Limestone (GP)	4,020	8.49	7.3	4.5

GP = Poorly graded gravel with sand
ML = Silt with sand

Based on the *Corrosion/Degradation of Soil Reinforcements for Mechanically Stabilized Earth Walls and Reinforced Soil Slopes* (FHWA 2009) and available corrosion test data, the on-site materials within the project limits are considered at a minimum "mildly corrosive" to structural elements. A corrosion engineer should review the test results to determine whether corrosion protection for metal and concrete elements should be incorporated into the design.

8.8 Structural Pavement Design

The project consists of new pavement structural sections for the proposed TCLs and shoulders, EB and WB on- and off-ramps, truck parking areas, and frontage road. The only exceptions are for the few locations where existing pavement structural sections are at an alignment and profile that will remain unchanged along the frontage road. It should be noted that a mill and overlay of the existing I-80 lanes and WB chain-off area was deemed unnecessary and is therefore not included in the project scope.

8.8.1 R-value

Six R-value tests were performed on representative samples throughout the project limits. Table 8-7 provides a summary of the test results.

Table 8-7. R-value Test Results

Boring ID	Depth (feet)	Material	R-value	Comments
RC-22-001	0 to 5	Native - Clayey Sand with Gravel	31	Sample taken within material that will be excavated from EB rock cut
RC-22-001	15 to 20	Highly-Completely Weathered Phyllitic Shale	27	Sample taken within material that will be excavated from EB rock cut
B-22-102	0 to 5	Fill – Silty Sand with Gravel	67	Sample taken along mainline within embankment fill
B-22-108	0 to 5	Native – Clayey Sand with Gravel	48	Sample taken along mainline within native soil
B-22-109	0 to 5	Native – Silty Sand with Gravel	64	Sample taken within WB truck parking area within native soil
B-22-112	0 to 5	Native – Silty Sand	69	Sample taken within EB truck parking area within native soil

The testing results indicate moderate-to-high R-values for all materials sampled; however, a fairly wide range exists. The design of the pavement structural sections should consider this range along with the source of the pavement subgrade material (in situ native, existing fill, or excavated native).

8.8.2 Pavement Structural Sections

The pavement structural sections for the project were prescribed by the Assistant Chief Materials Engineer of the NDOT Materials Division, in an email dated February 1, 2022. Table 8-8 presents a summary of the NDOT Materials Section prescribed pavement structural sections for the project. Where new pavement sections will be supported on new or existing embankment fill, a nonwoven geotextile (Class 1) should be placed on prepared subgrade directly underneath the aggregate base of pavement structural sections. The geotextile should be placed on prepared subgrade directly underneath the aggregate base. The geotextile utilized shall meet the requirements of Section 731.03.02 of the NDOT Standard Specifications for Road and Bridge Construction (NDOT, 2014). Geotextiles should be placed in accordance with NDOT Standard Specification Section 203.

Table 8-8. Pavement Structural Sections

Roadway Segment	Pavement Structural Section
New EB and WB TCL and Shoulders	1-inch Plantmix Bituminous Open-Graded (0.375-inch) Surface 11-inch Plantmix Bituminous Surface (Type 2C) 8-inch Aggregate Base (Type 1 Class B)
New EB and WB TCLs – 12-inch Cold Milled (3-inch) Overlap with Existing Lanes	1-inch Plantmix Bituminous Open-Graded (0.375-inch) Surface 3-inch Plantmix Bituminous Surface (Type 2C)
Existing I-80 EB and WB Lanes – Cold Milled (1-inch)	1-inch Plantmix Bituminous Open-Graded (0.375-inch) Surface
New EB and WB On- and Off-Ramps	5-inch Plantmix Bituminous Surface (Type 2C) 8-inch Aggregate Base (Type 1 Class B)
New Frontage Road	4-inch Plantmix Bituminous Surface (Type 2C) 8-inch Aggregate Base (Type 1 Class B)
Existing Frontage Road to be Maintained – Cold Milled (2-inch)	2-inch Plantmix Bituminous Surface (Type 2C)
New EB and WB Truck Parking Areas	Seal Coat 3-inch Plantmix Bituminous Surface (Type 2C) 8-inch Aggregate Base (Type 1 Class B)

8.9 Site Preparation

Site preparation will be performed in accordance NDOT Standard Specifications. Site preparation for the proposed widening will include the removal of surface vegetation, organic soil, and any trash or debris, as needed, in the areas where improvements will be located. Oversized, loose, soft, or wet material also should be removed and replaced with competent backfill. Removed detrimental material should not be used as structure backfill and should be disposed of offsite. Existing utilities, drainage structures, and other existing structures also may need to be removed or protected before construction.

8.10 Temporary Cuts

All temporary excavations should be performed in accordance with the state and federal safety requirements. Shoring within the NDOT right-of-way, if required, may be designed in accordance with AASHTO standards. It is the responsibility of the contractor to provide stable excavation for the temporary cuts within the project limits.

8.11 Earthwork

Earthwork should be performed in accordance with NDOT Standard Specifications. Measures to control the impact of surface water on the stability of temporary excavations will be employed and will remain the sole responsibility of the contractor.

Backfill soil surrounding and above footings, behind walls, and beneath footings should be placed and compacted in accordance with NDOT Standard Plans and Specifications. If unsuitable material is encountered during construction (soft material, organic material, construction debris, or oversized material), the material will be overexcavated until it is completely removed or the subgrade is firm and unyielding, whichever is greater. Generally, the lateral extent of the overexcavation should be equal to the depth of the overexcavation. Granular Backfill should meet the requirements of NDOT Standard Specifications. The overexcavation backfill should be placed in thin, loose lifts; moisture-conditioned, as necessary, to near-optimum moisture content; and compacted to a minimum 95% relative compaction according to NDOT Standard Specifications.

In accordance with NDOT Standard Specifications, native on-site material may be used for placement as compacted roadway and embankment fill; however, it should be free of organic material, debris, and oversized material according to NDOT Standard Specifications. In accordance with NDOT Standard Specification 203.03.14, the maximum rock size permitted in embankment fills is 3-feet diameter. Oversized material should be placed in accordance with NDOT Standard Specifications. To facilitate future trenching, oversized material should not be placed within the range of foundation excavations, future utilities, or underground construction unless specifically approved by the geotechnical engineer.

The new roadway embankments for the project are primarily sliver fills that will tie into the adjacent, existing embankment slopes. Before placement of compacted embankment fill on existing slopes, prepare the existing ground or embankment according to NDOT Standard Specification Section 203. Where new pavement sections will be supported on new or existing embankment fill, a nonwoven geotextile (Class 1) should be used, as discussed in Section 8.8. Embankment fill should be placed in thin, loose lifts; moisture-conditioned, as necessary, to near-optimum moisture content; and compacted to a minimum 90% relative compaction according to NDOT Standard Specifications.

9. References

American Association of State Highway and Transportation Officials (AASHTO). 2020. *LRFD Bridge Design Specifications, 9th Edition.*

American Association of State Highway and Transportation Officials (AASHTO). 2015. *Load and Resistance Factor Design (LRFD) Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals*. 1st Edition.

Colorado Department of Transportation (CDOT). 2000. Colorado Rockfall Simulation Program, Version 4.0. Report No. CDOT-SYMB-CGS-99-1. March.

Federal Highway Administration (FHWA). 2001. *Rockfall Catchment Area Design Guide*. Report No. FHWA-OR-RD-02-04m. December.

Federal Highway Administration (FHWA). 2002. Geotechnical Engineering Circular No. 6. *Shallow Foundations*. FHWA Report No. FHWA-SA-02-054 https://www.fhwa.dot.gov/engineering/geotech/pubs/010943.pdf September.

Federal Highway Administration (FHWA). 2009. *Corrosion/Degradation of Soil Reinforcements for Mechanically Stabilized Earth Walls and Reinforced Soil Slopes,* Publication No. FHWA-NHI-09-087, National Highway Institute, dated November 2009.

Federal Highway Administration (FHWA). 2016. National Highway Institute (NHI) Courses No. 132021 and 132022. *Design and Construction of Driven Pile Foundations – Volume 1*. FHWA NHI-16-009. https://www.fhwa.dot.gov/engineering/geotech/pubs/gec12/nhi16009_v1.pdf July.

Federal Highway Administration (FHWA). 2017. National Highway Institute (NHI) Course No. 132031, Geotechnical Engineering Circular No. 5. *Geotechnical Site Characterization*. FHWA NHI-16-072. https://www.fhwa.dot.gov/engineering/geotech/pubs/nhi16072.pdf April.

Naval Facilities Engineering Systems Command (NAVFAC). 1986, *Foundations & Earth Structures Design Manual 7.02*, dated September 1986.

Nevada Bureau of Mines and Geology (NMBG). 1976. Geologic Map of North-Central Nevada. Map 50. 1:250,000 scale.

Nevada Department of Transportation (NDOT). 2008. *Structures Manual*, dated September 2008, with revisions through 2019.

Nevada Department of Transportation (NDOT). 2014. *Standard Specifications for Road and Bridge Construction*, dated 2014.

Nevada Department of Transportation (NDOT). 2022. *I-80 Golconda Summit Preliminary Design Field Study Report. I-80 MP HU 32.5 to MP HU 38.8, Humboldt County Nevada*. Project: SPI-080-3-(340). Dated February 25.

Ritchie, A. M., 1963. “Evaluation of Rockfall and Its Control.” Federal Highway Research Record, No.17, pp. 13-28.

Rocscience. 2020. SLIDE2 Modeler Version 9.009 Computer Software.

U.S. Geological Survey (USGS). 1965a. Topographic Map of the Golconda Quadrangle, Nevada. 1:24,000 scale. Photo revised in 1981.

U.S. Geological Survey (USGS). 1965b. Topographic Map of the Iron Point Quadrangle, Nevada. 1:24,000 scale. Photo revised in 1981.

U.S. Geological Survey (USGS). 1974a. Geologic Map of the Golconda Quadrangle, Nevada. Map No GQ-1174. 1:24,000 scale.

U.S. Geological Survey (USGS). 1974b. Geologic Map of the Iron Point Quadrangle, Nevada. Map No GQ-1175. 1:24,000 scale.

U.S. Geological Survey (USGS). 2022. USGS seismic design maps website. Available at: https://earthquake.usgs.gov/ws/designmaps/aashto-2009.html.

U.S. Geological Survey (USGS) and Nevada Bureau of Mines and Geology (NMBG). 2022. Quaternary Fault and Fold Database of the United States. Accessed June 3, 2022. Available at: U.S. Quaternary Faults (arcgis.com)

Appendix A
Boring and Geophysical Survey Line Location Maps with Geologic Mapping

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	GT1

PRELIMINARY
SUBJECT TO REVISION
16-SEP-2022

LEGEND

L3 APPROXIMATE LOCATION OF SEISMIC REFRACTION SURVEY WITH DESIGNATION

APPROXIMATE LOCATION OF GEOTECHNICAL BORING, WITH DESIGNATION

GENERALIZED GEOLOGIC CONTACT

CS323+25 SLOPE STABILITY CROSS SECTION

UNITS

Af - Artificial fill soil or disturbed ground
Qa/Qg - Alluvial soils and gravels
Kgd - Granodiorite
Pem - Enda Mt. formation, calcareous quartzite, locally conglomeratic
Pumpernickel Formation:
PIPpq - Quartzite with limestone
IPpsc - Interbedded shale and chert
IPpu - Chert and shale, undivided
Cp - Preble Formation, phyllitic shale with limestone

Geology based on geologic reconnaissance performed in April, 2022, data from the depicted subsurface data, and USGS 1974a and 1974b. See Geotechnical Design Report (GDR) for full references. This map set should not be utilized without reading the accompanying Geotechnical Design Report.

T. 35 N. R. 40 E.
SEC. 2
SEC. 3

EX LUMEN FO PROTECT IN PLACE
Qa/Qg
Af
Qa/Qg
E.O.P.
"LW"
"LE"
I-80 WB
I-80 EB
990
995
1000
CUT
FILL
CUT/FILL LINE
B-22-101
R/W
BEGIN PROJECT NHFP-080-3(071)
"LE" 990+00.00 P.O.T.
"LE" 990+00.00 P.O.T.
MP 32.463
MATCH EXISTING
MATCHLINE "LE" 1004+00.00
SEE SHEET GT2

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

BORING LOCATION PLAN

W7Y46100_gt102.dgn

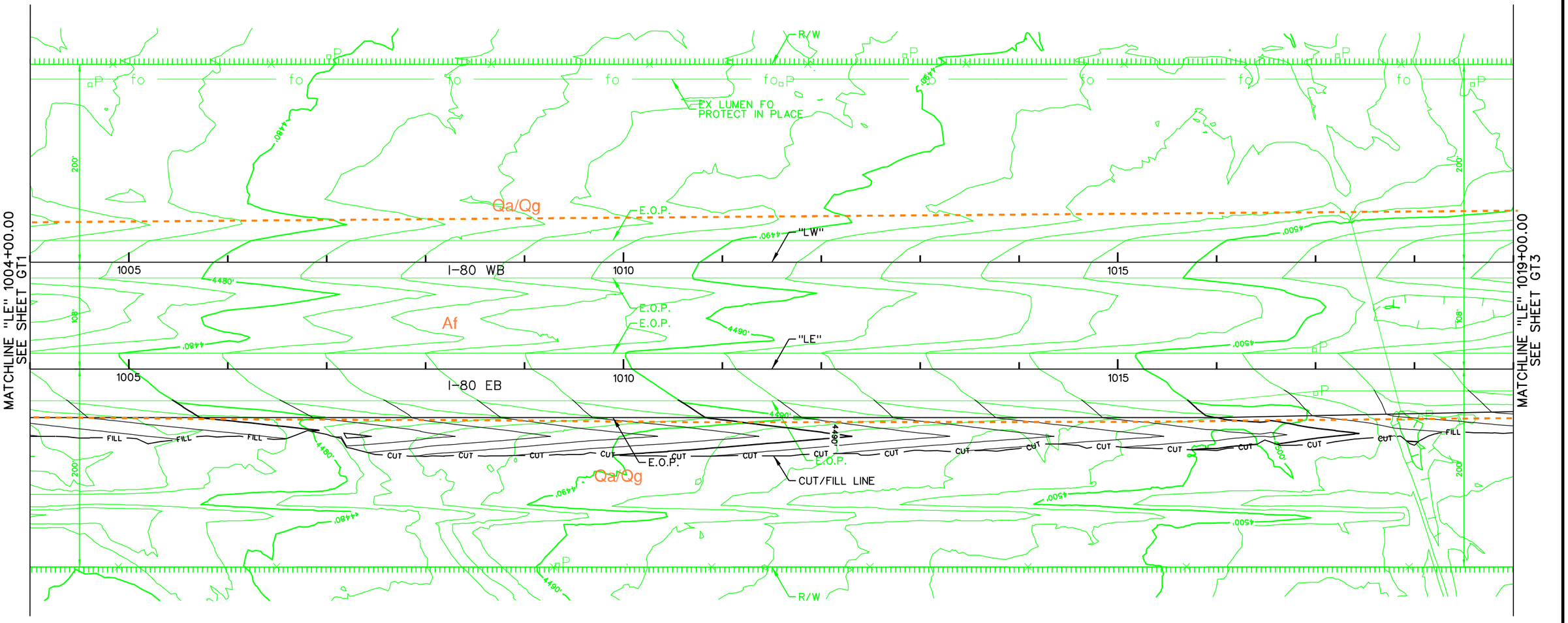
PRELIMINARY

SUBJECT TO REVISION

16-SEP-2022

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	GT2

T. 35 N., R. 40 E.



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

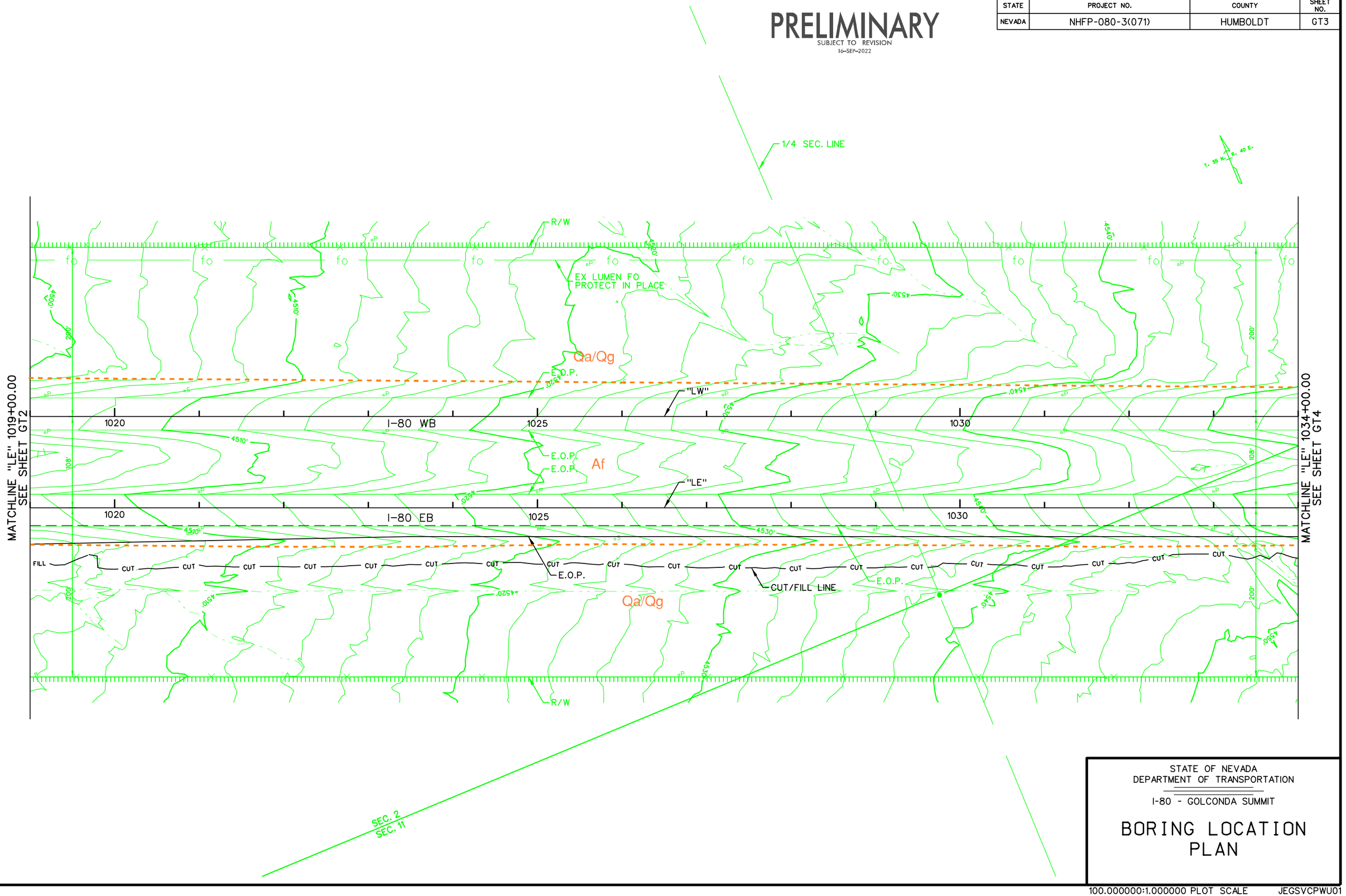
BORING LOCATION PLAN

100.000000:1.000000 PLOT SCALE JEGSVCPWU01

W7Y46100_gt103.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	GT3

PRELIMINARY
SUBJECT TO REVISION
16-SEP-2022



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

BORING LOCATION PLAN

100.000000:1.000000 PLOT SCALE JEGSVCPWU01

W7Y46100_gt104.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	GT4

PRELIMINARY
SUBJECT TO REVISION
16-SEP-2022

T. 35 N. R. 40 E.

SEC. 2
SEC. 11

MATCHLINE "LE" 1034+00.00
SEE SHEET GT3

MATCHLINE "LE" 1049+00.00
SEE SHEET GT5

R/W

EX LUMEN FO
PROTECT IN PLACE

Qa/Qg

E.O.P.

"LW"

"LE"

1035

I-80 WB

1040

1045

I-80 EB

E.O.P.

E.O.P.

Af

Qa/Qg

CUT/FILL LINE

B-22-102

E.O.P.

R/W

4550'
4560'
4570'
4580'
4590'
4600'

200'

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

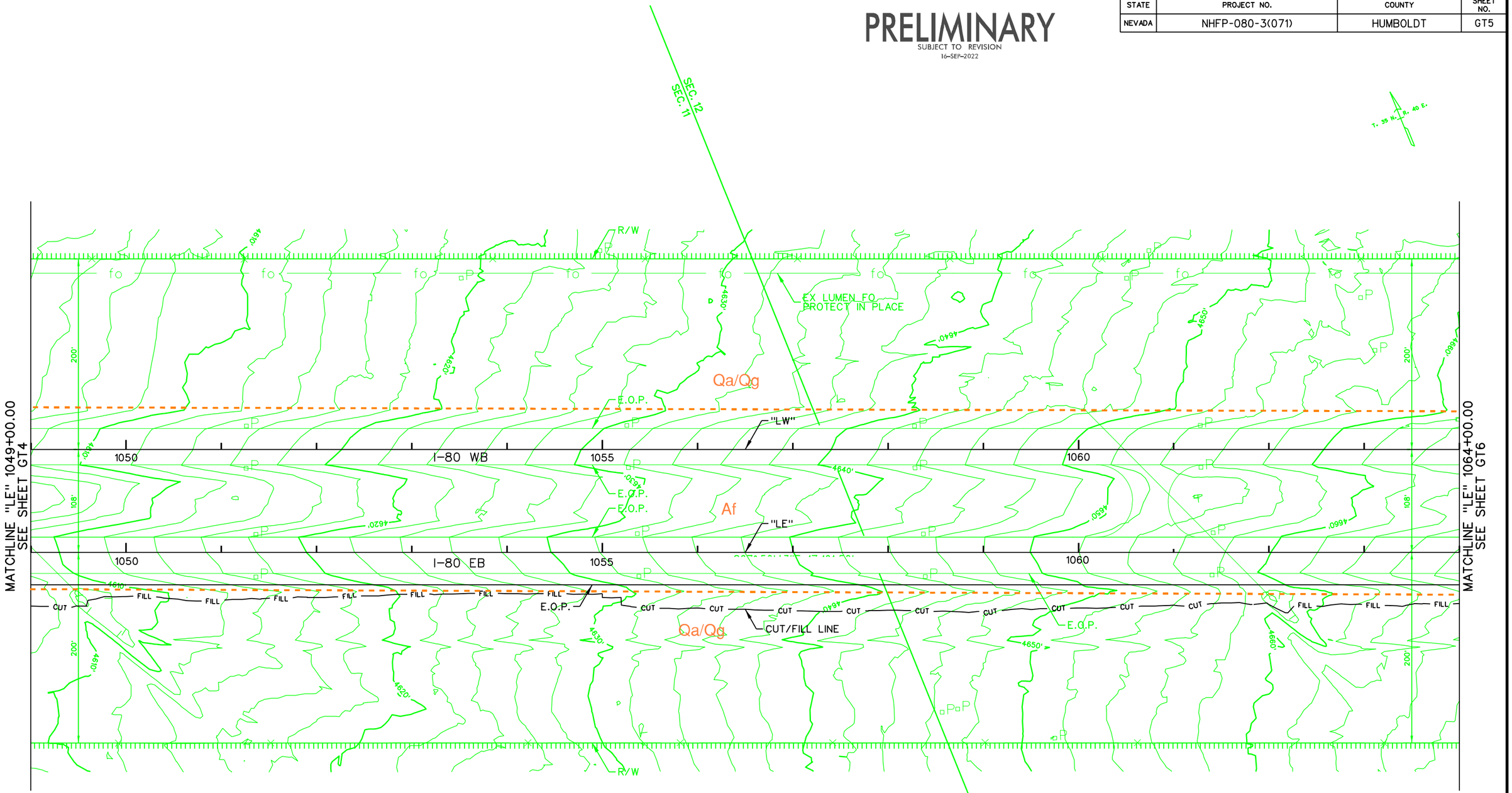
BORING LOCATION PLAN

100.000000:1.000000 PLOT SCALE JEGSVCPWU01

W7Y46100_gt105.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	GT5

PRELIMINARY
SUBJECT TO REVISION
16-SEP-2022



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

BORING LOCATION PLAN

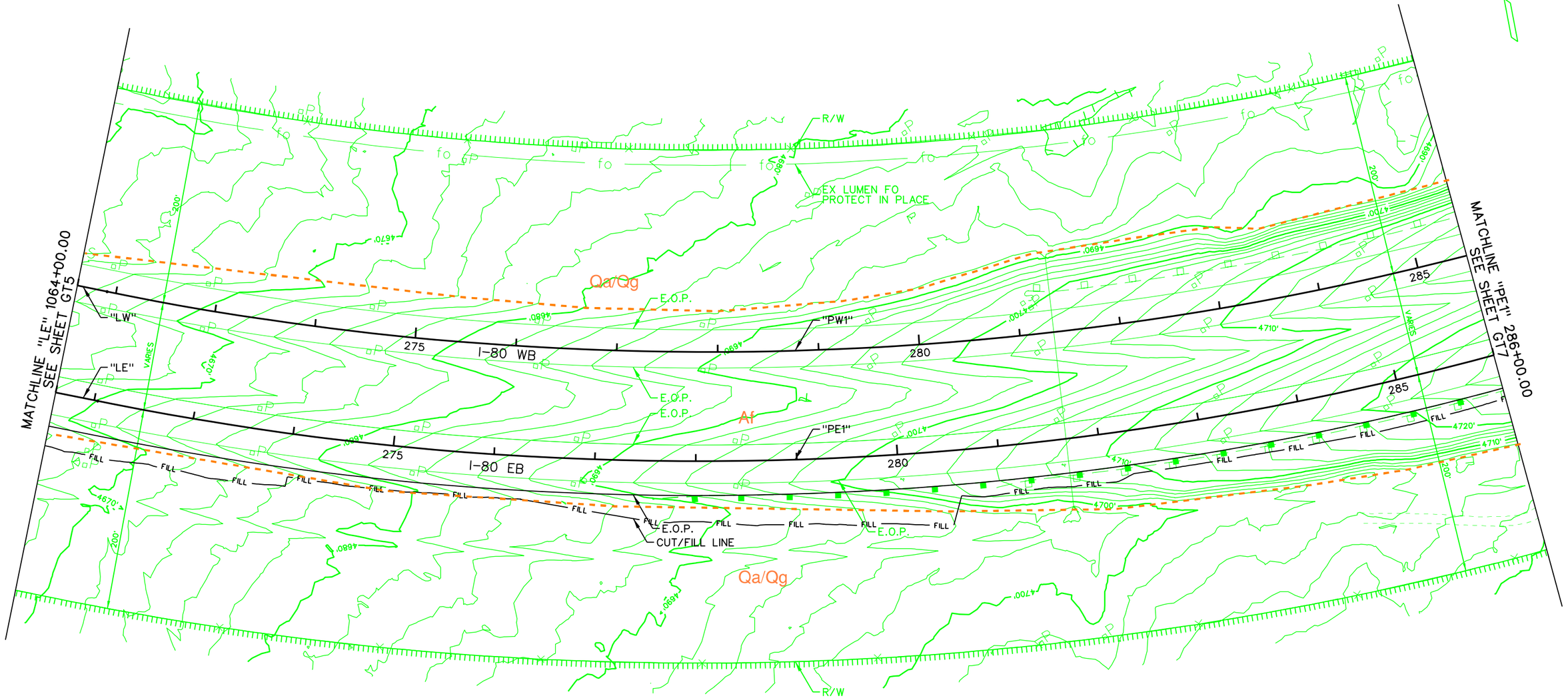
100.000000:1.000000 PLOT SCALE JEGSVCPWU01

W7Y46100_gt106.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	GT6

PRELIMINARY
SUBJECT TO REVISION
16-SEP-2022

T. 35 N. SEC. 12 R. 40 E.



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

BORING LOCATION PLAN

100.000000:1.000000 PLOT SCALE JEGSVCPWU01

W7Y46100_gt107.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	GT7

PRELIMINARY
SUBJECT TO REVISION
16-SEP-2022

T. 35 N., R. 40 E., SEC. 12

MATCHLINE "PE1" 286+00.00
SEE SHEET GT6

MATCHLINE "PE1" 300+00.00
SEE SHEET GT8

I-80 WB

I-80 EB

"PW1"

"PE1"

290

295

E.O.P.

FILL

CUT/FILL LINE

R/W

EX. LUMEN FO
PROTECT IN PLACE

Qa/Qg

Cp

Af

1/4 SEC. LINE

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

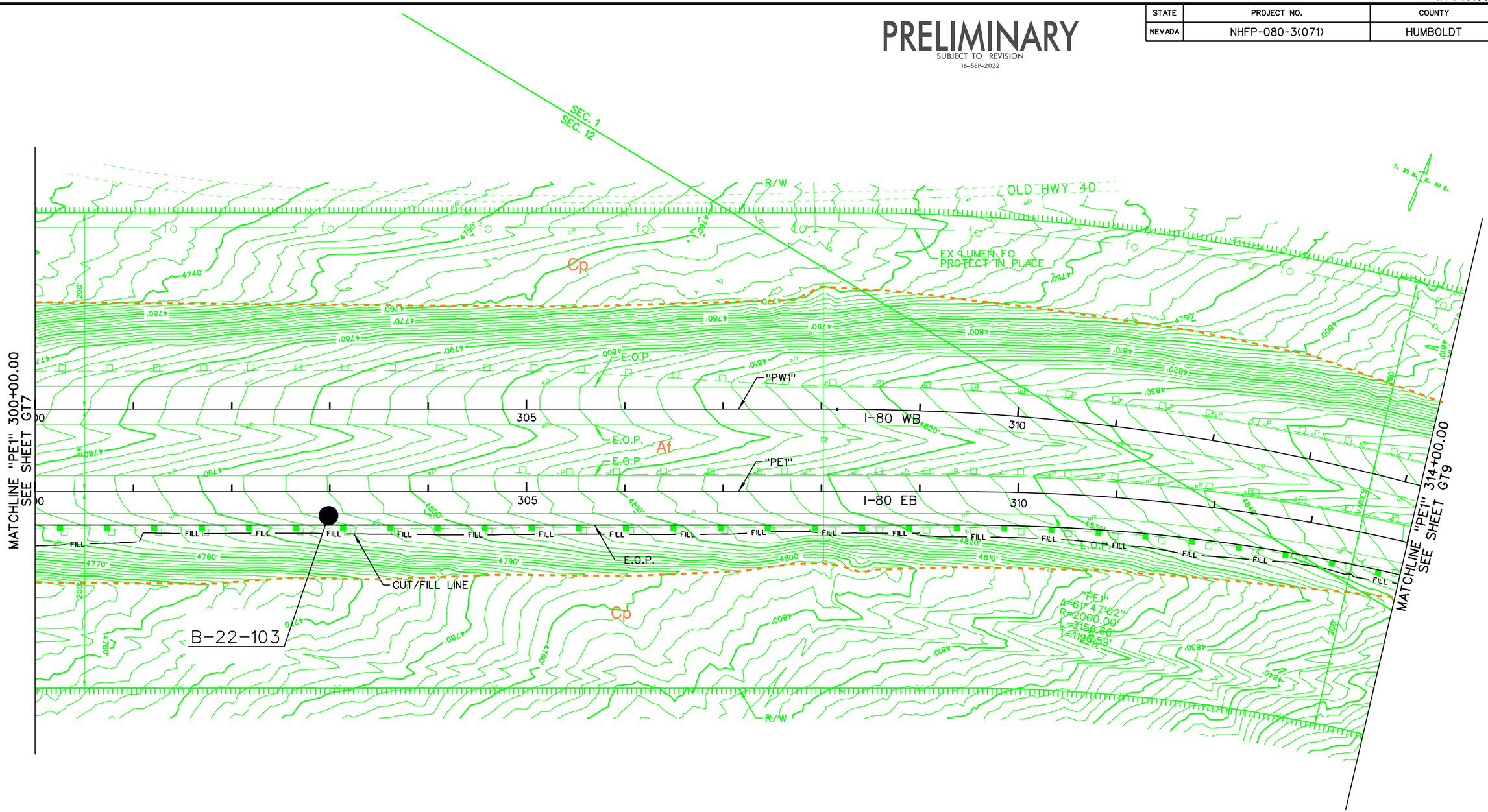
BORING LOCATION PLAN

100.000000:1.000000 PLOT SCALE JEGSVCPWU01

W7Y46100_gt108.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	GT8

PRELIMINARY
SUBJECT TO REVISION
16-SEP-2022



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

BORING LOCATION PLAN

100.000000:1.000000 PLOT SCALE JEGSVCPWU01

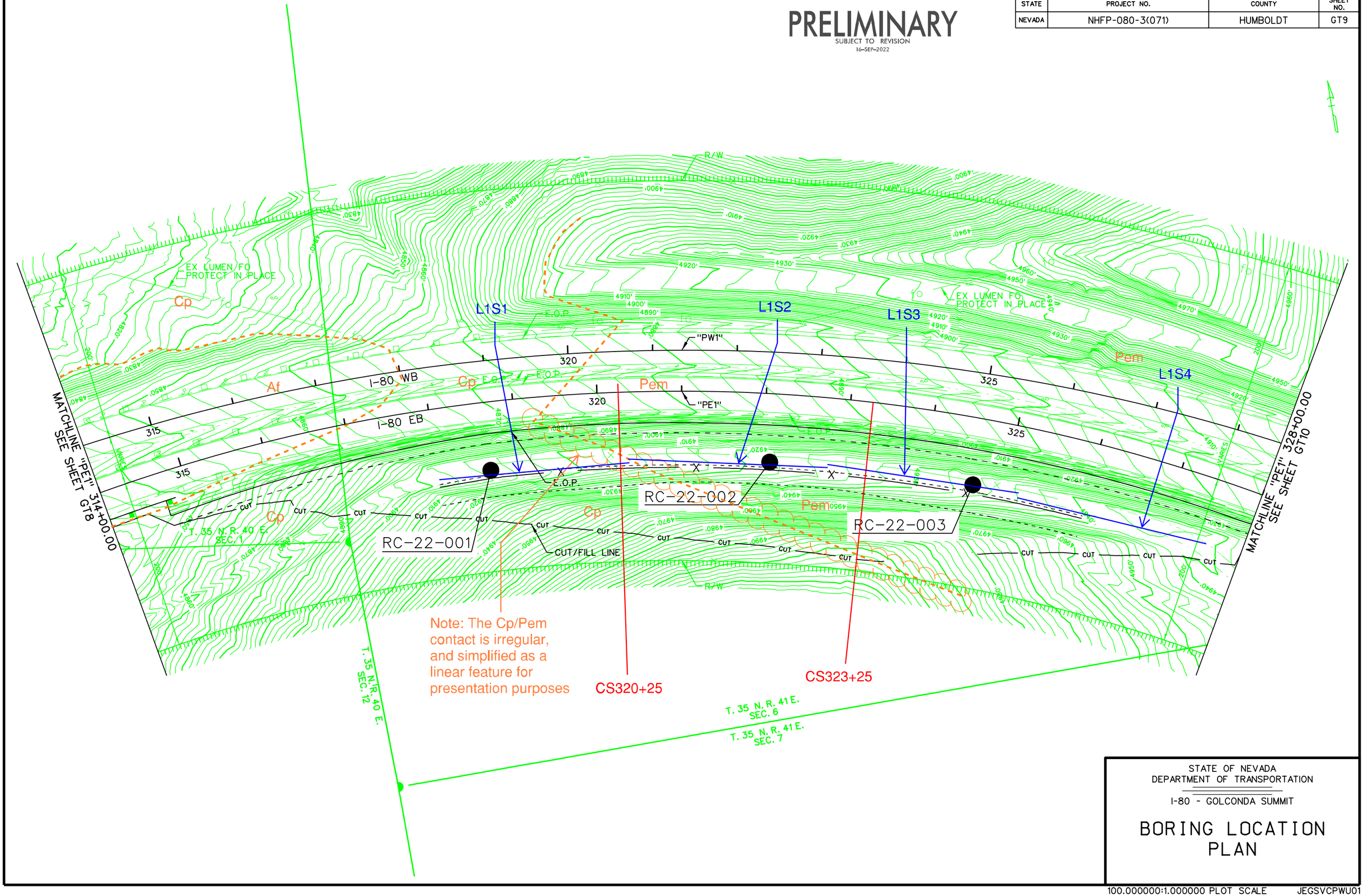
W7Y46100_gt109.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	GT9

PRELIMINARY

SUBJECT TO REVISION

16-SEP-2022



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

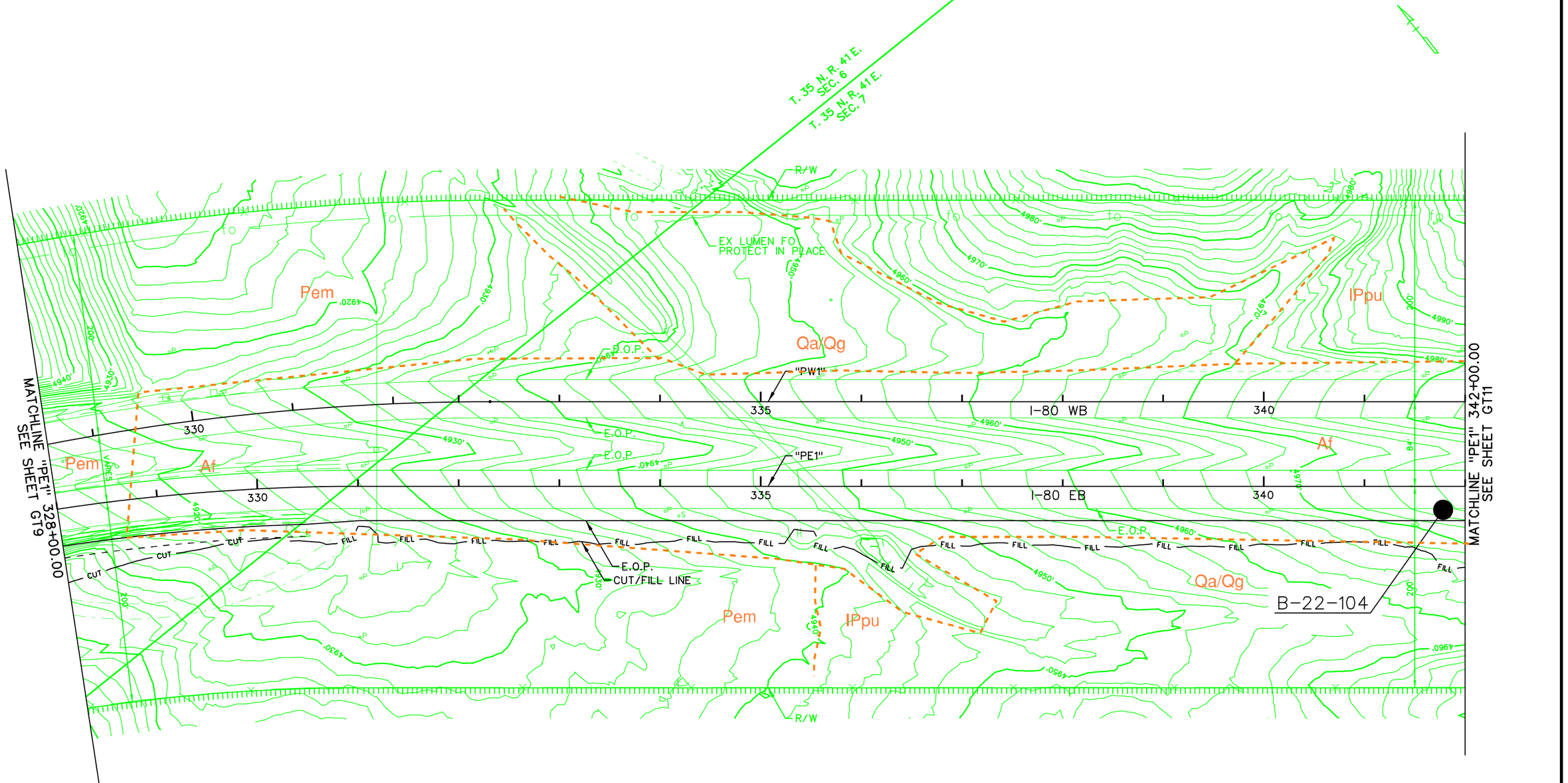
BORING LOCATION PLAN

100.000000:1.000000 PLOT SCALE JEGSVCPWU01

W7Y46100_gt110.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	GT10

PRELIMINARY
SUBJECT TO REVISION
16-SEP-2022



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

BORING LOCATION PLAN

100.000000:1.000000 PLOT SCALE JEGSVCPWU01

W7Y46100_gt111.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	GT11

PRELIMINARY
SUBJECT TO REVISION
16-SEP-2022

T. 35 N., R. 41 E.

MATCHLINE "PE1" 342+00.00
SEE SHEET GT10

MATCHLINE "PE1" 357+00.00
SEE SHEET GT12

R/W
EX LUMEN FO
PROTECT IN PLACE
IPpu
E.O.P.
"PW1"
CUT/FILL LINE
CUT
Af
345
I-80 WB
350
355
I-80 EB
"PE1"
FILL
Qa/Qg
1/4 SEC. LINE

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

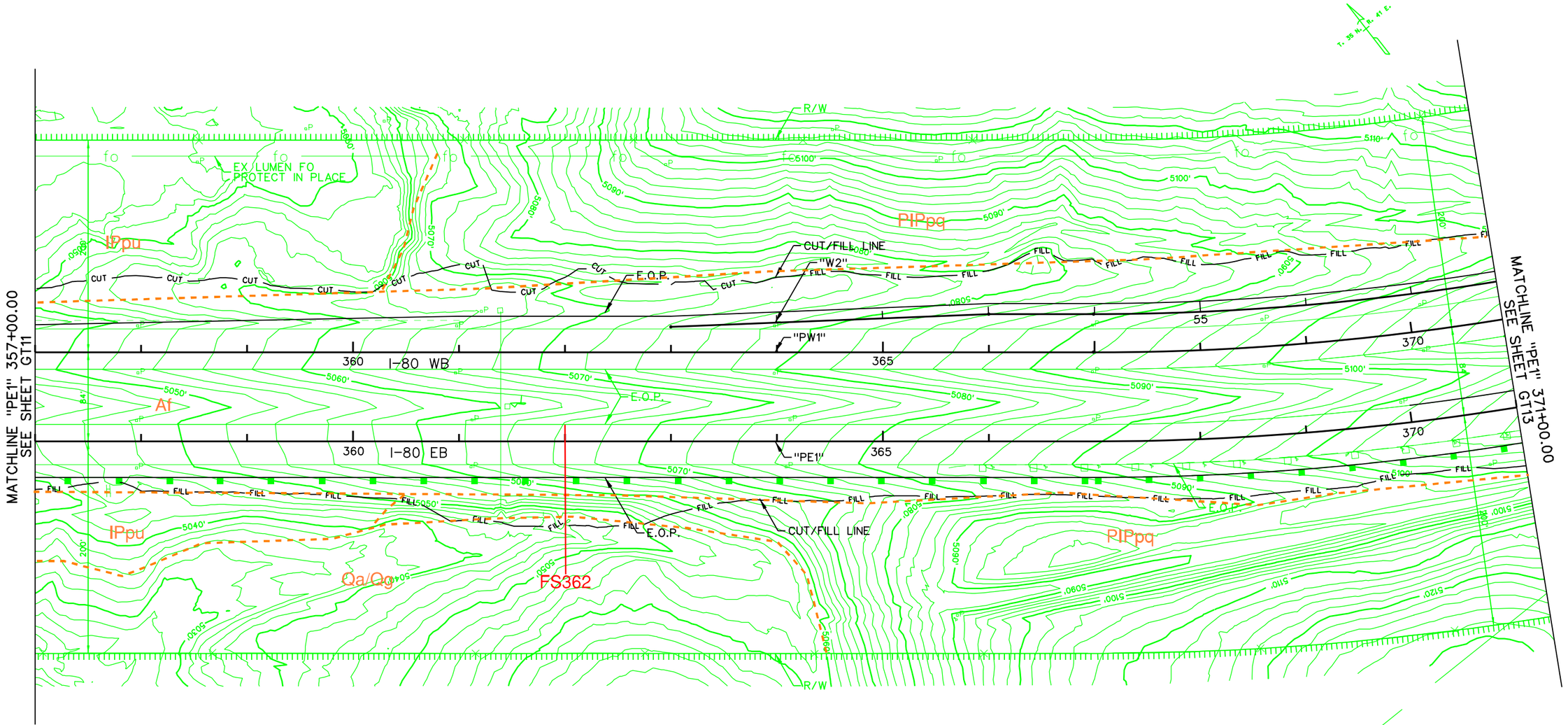
BORING LOCATION PLAN

100.000000:1.000000 PLOT SCALE JEGSVCPWU01

W7Y46100_gt112.dgn

PRELIMINARY
SUBJECT TO REVISION
16-SEP-2022

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	GT12



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

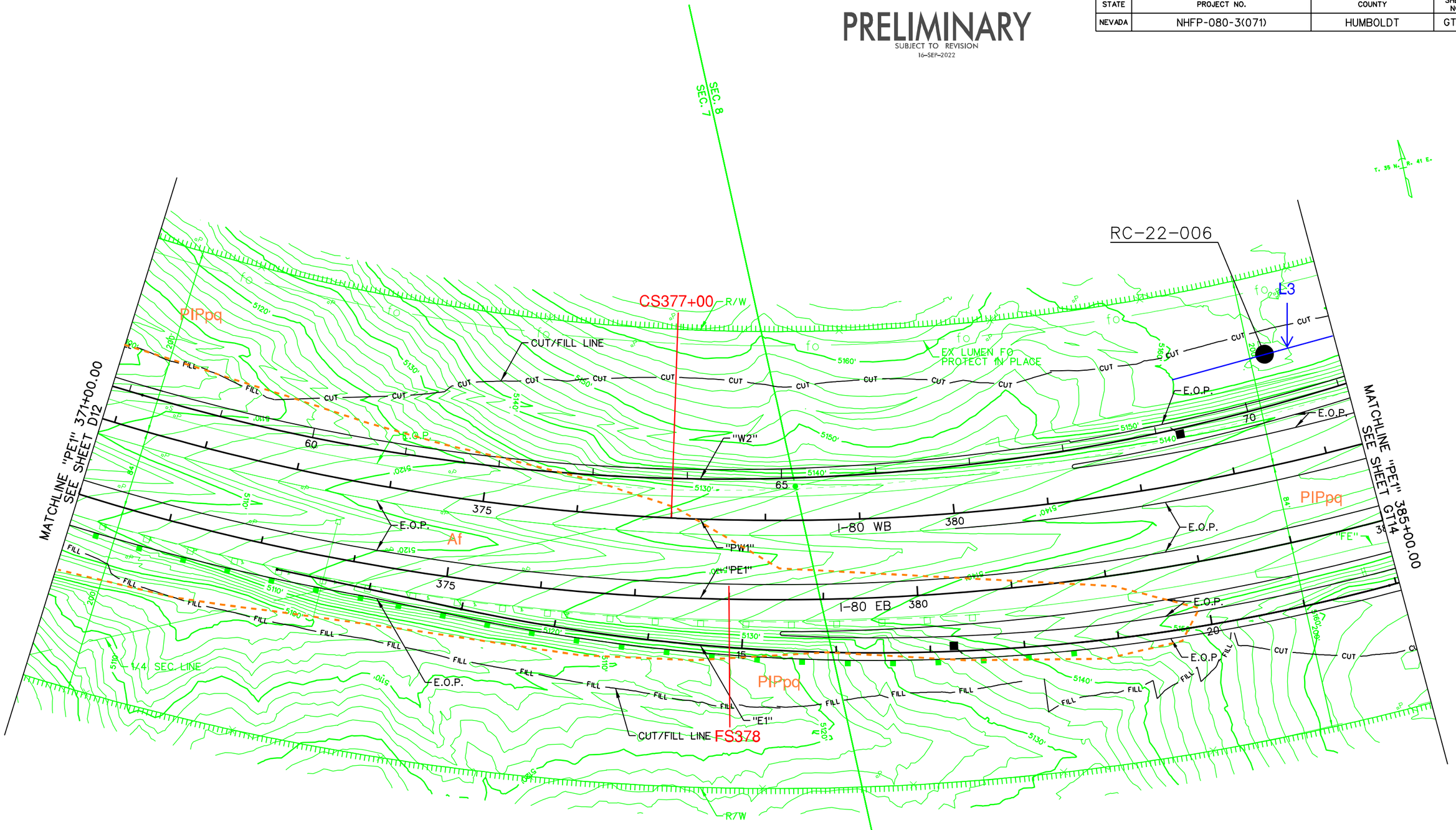
BORING LOCATION PLAN

100.000000:1.000000 PLOT SCALE JEGSVCPWU01

W7Y46100_gt113.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	GT13

PRELIMINARY
SUBJECT TO REVISION
16-SEP-2022



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

BORING LOCATION PLAN

100.000000:1.000000 PLOT SCALE JEGSVCPWU01

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	GT14

PRELIMINARY
SUBJECT TO REVISION
16-SEP-2022

MATCHLINE "PE1" 385+00.00
SEE SHEET GT13

MATCHLINE "PE1" 399+00.00
SEE SHEET GT15

B-22-105
B-22-109
B-22-110
B-22-111
B-22-112
B-22-113
B-22-114

I-80 WB
I-80 EB

PIPpg
Qa/Qg

"E1"
"E2"
"FR"
"PE1"
"PW1"
"W1"
"W2"

CUT/FILL LINE
E.O.P.
R/W
EX LUMEN FO
1/4 SEC. LINE

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

BORING LOCATION PLAN

W7Y46100_gt115.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	GT15

PRELIMINARY

SUBJECT TO REVISION
16-SEP-2022

MATCHLINE "PE1" 399+00.00
SEE SHEET GT14

MATCHLINE "PE1" 414+00.00
SEE SHEET GT16

I-80 WB

I-80 EB

N77° 57'13"E 2,777.65'

N77° 57'13"E 2,709.73'

"W1"

"PW1"

"PE1"

"E2"

"FW"

EX LUMEN FO

RC-22-004A

RC-22-004

RC-22-005

CUT/FILL LINE

E.O.P.

Qa/Qg

Af

IPpsc

IR 80-HU 36.39
I-80E E&W

L2

1/4 SEC. LINE

R/W

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

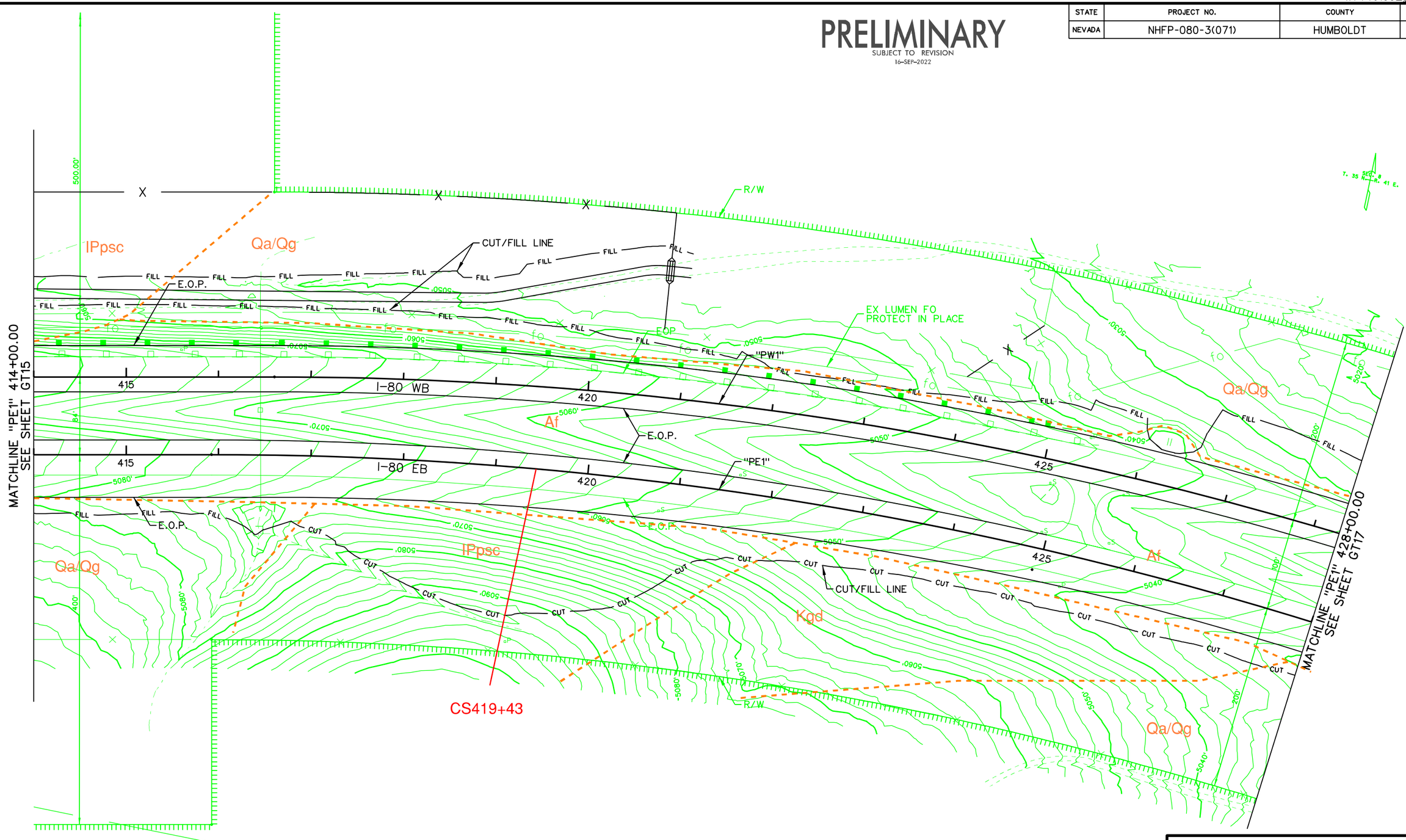
BORING LOCATION PLAN

100.000000:1.000000 PLOT SCALE JEGSVCPWU01

W7Y46100_gt116.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	GT16

PRELIMINARY
SUBJECT TO REVISION
16-SEP-2022



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

BORING LOCATION PLAN

100.000000:1.000000 PLOT SCALE JEGSVCPWU01

W7Y46100_gt117.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	GT17

PRELIMINARY
SUBJECT TO REVISION
16-SEP-2022

T. 35 N. R. 41 E.

MATCHLINE "PE1" 428+00.00
SEE SHEET GT16

MATCHLINE "PE1" 442+00.00
SEE SHEET GT18

EX LUMEN FO
PROTECT IN PLACE

B-22-106

CUT/FILL LINE

E.O.P.

R/W

I-80 WB

I-80 EB

"PW1"

"PE1"

IR 80-HU 37.00
C-824

Qa/Qg

Af

1/4 SEC. LINE

SEC. 9
SEC. 8

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

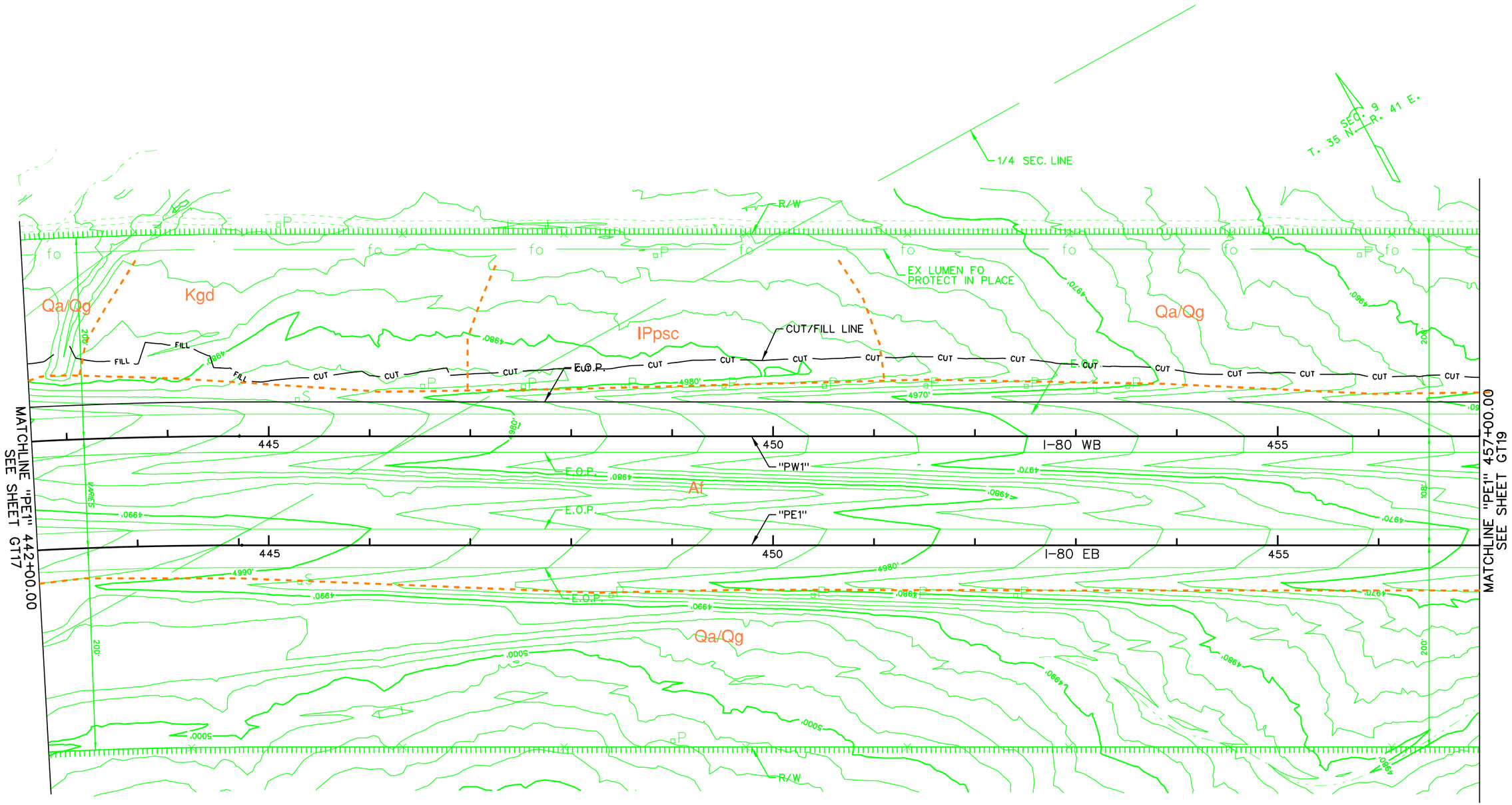
BORING LOCATION PLAN

100.000000:1.000000 PLOT SCALE JEGSVCPWU01

W7Y46100_gt118.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	GT18

PRELIMINARY
SUBJECT TO REVISION
16-SEP-2022



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

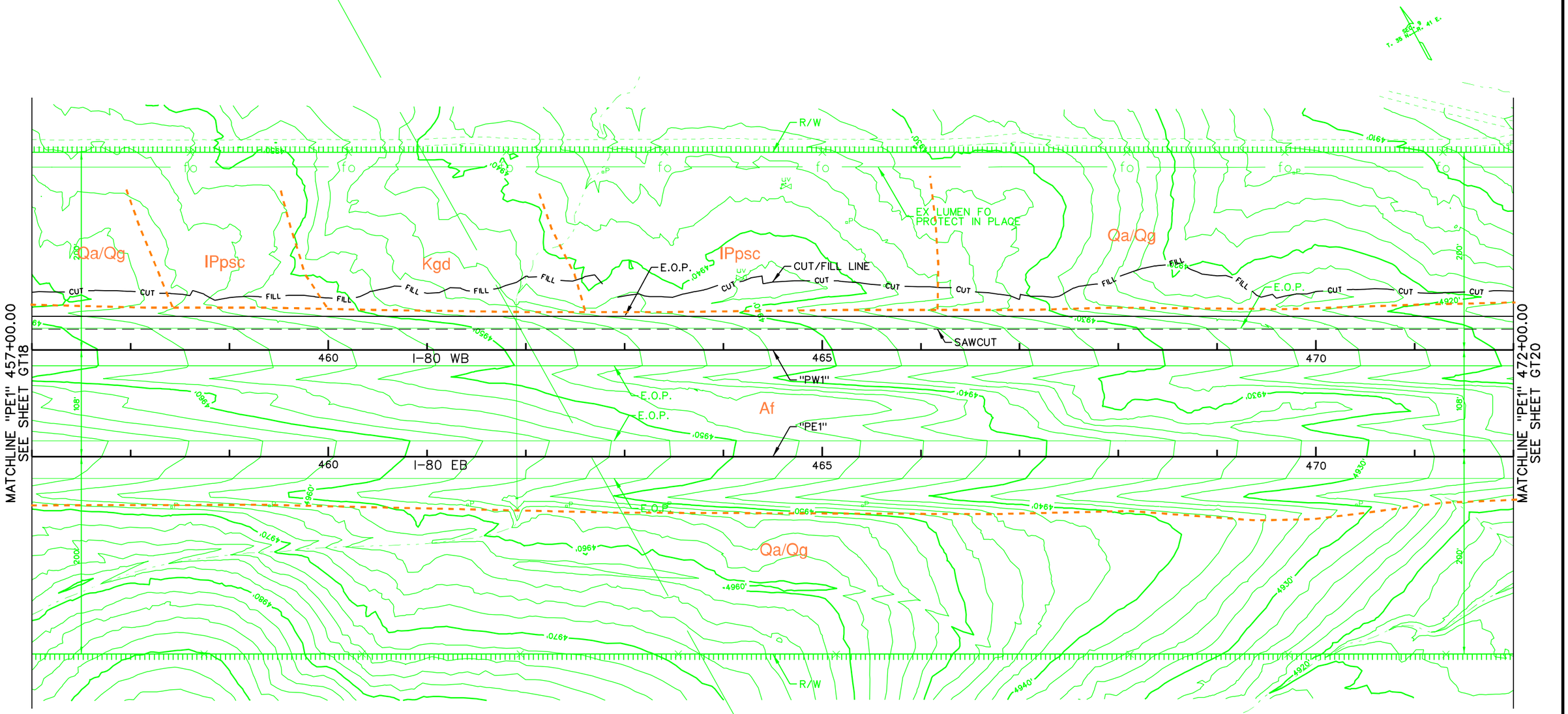
BORING LOCATION PLAN

100.000000:1.000000 PLOT SCALE JEGSVCPWU01

W7Y46100_gt119.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	GT19

PRELIMINARY
SUBJECT TO REVISION
16-SEP-2022



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

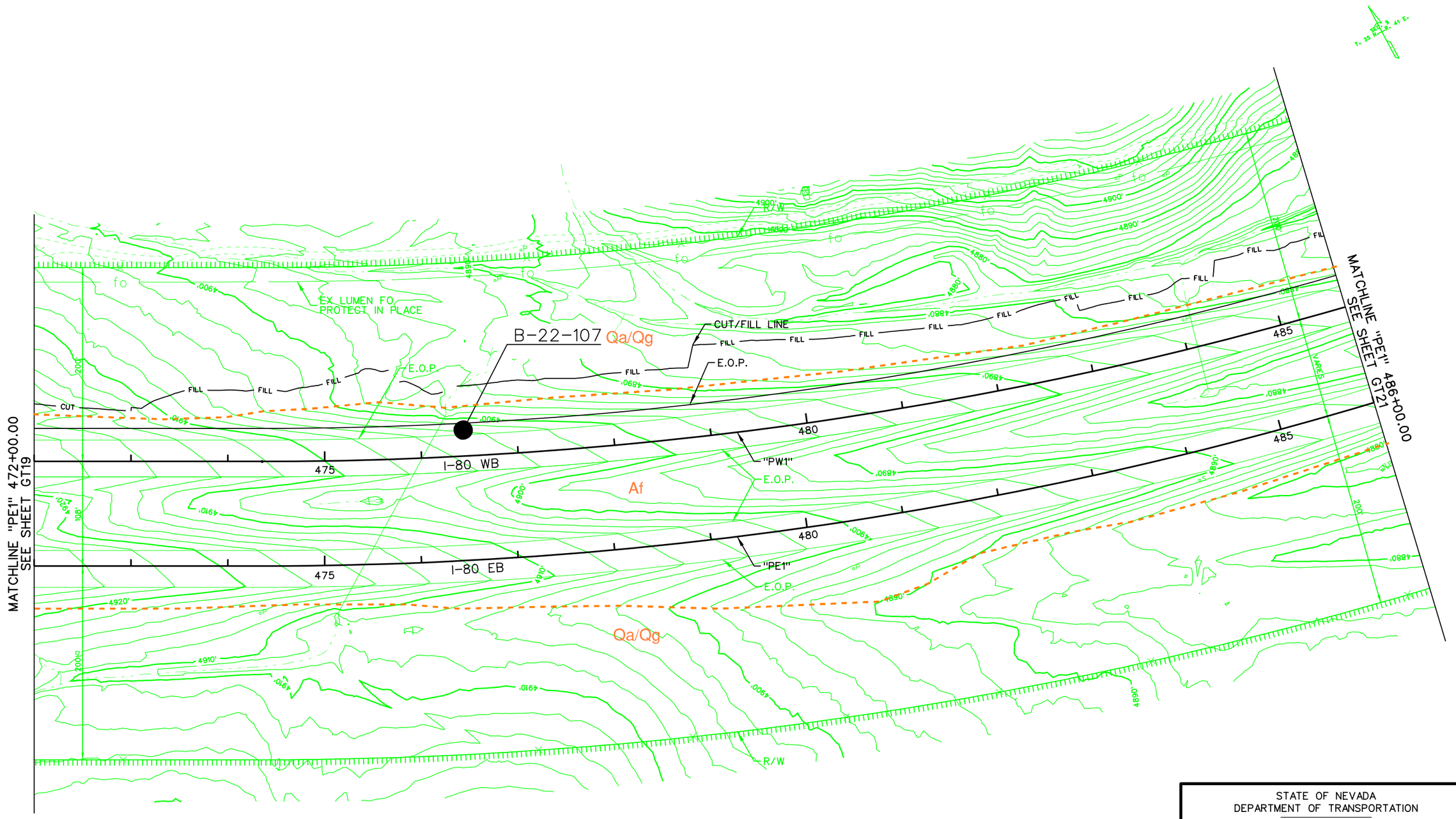
BORING LOCATION PLAN

100.000000:1.000000 PLOT SCALE JEGSVCPWU01

W7Y46100_gt120.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	GT20

PRELIMINARY
SUBJECT TO REVISION
16-SEP-2022



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

BORING LOCATION PLAN

100.000000:1.000000 PLOT SCALE JEGSVCPWU01

W7Y46100_gt121.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	GT21

PRELIMINARY
SUBJECT TO REVISION
16-SEP-2022

T. 35 N. R. 41 E.

MATCHLINE "PE1" 486+00.00
SEE SHEET GT20

MATCHLINE "PE1" 500+00.00
SEE SHEET GT22

I-80 WB

I-80 EB

"PE1"

"PW1"

CUT/FILL LINE

FILL

CUT

E.O.P.

R/W

EX LUMEN FO
PROTECT IN PLACE

Qa/Qg

Af

SEC. 9

SEC. 10

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

BORING LOCATION PLAN

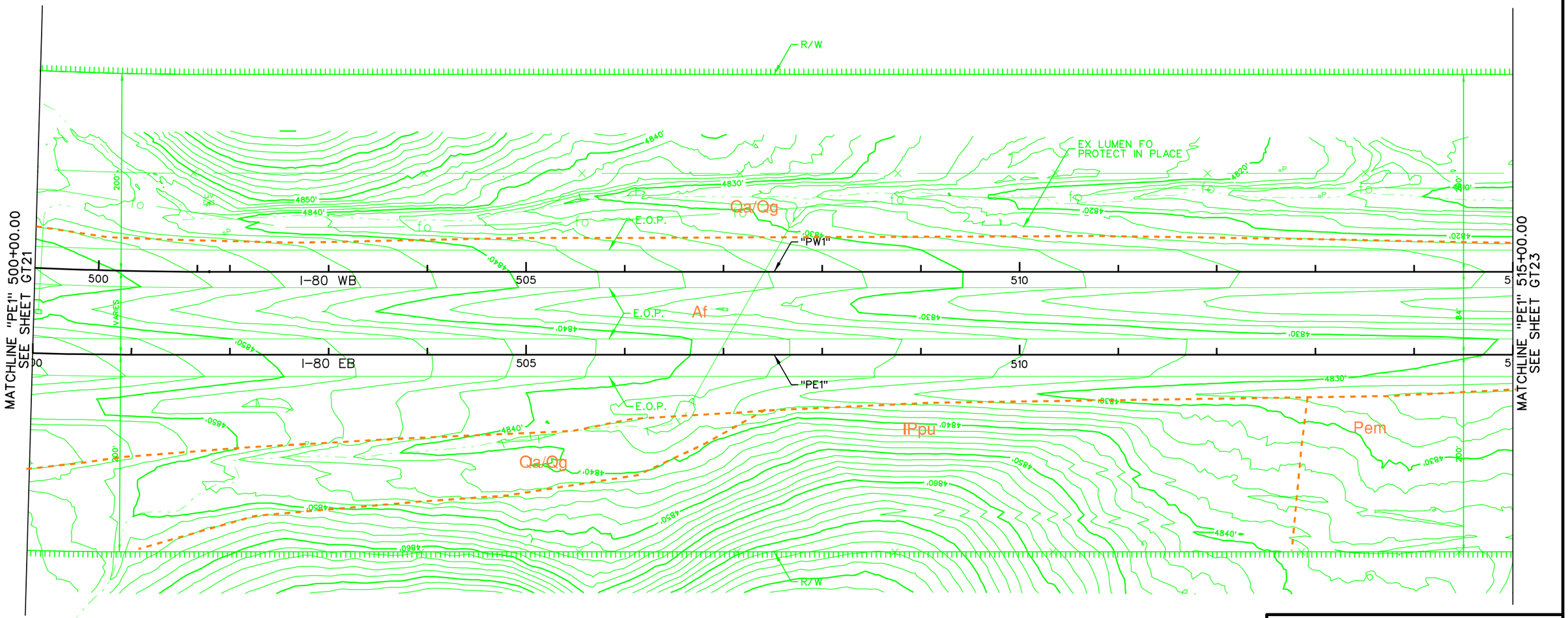
100.000000:1.000000 PLOT SCALE JEGSVCPWU01

W7Y46100_gt122.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	GT22

PRELIMINARY
SUBJECT TO REVISION
16-SEP-2022

T. 35 N., R. 41 E., SEC. 10



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

BORING LOCATION PLAN

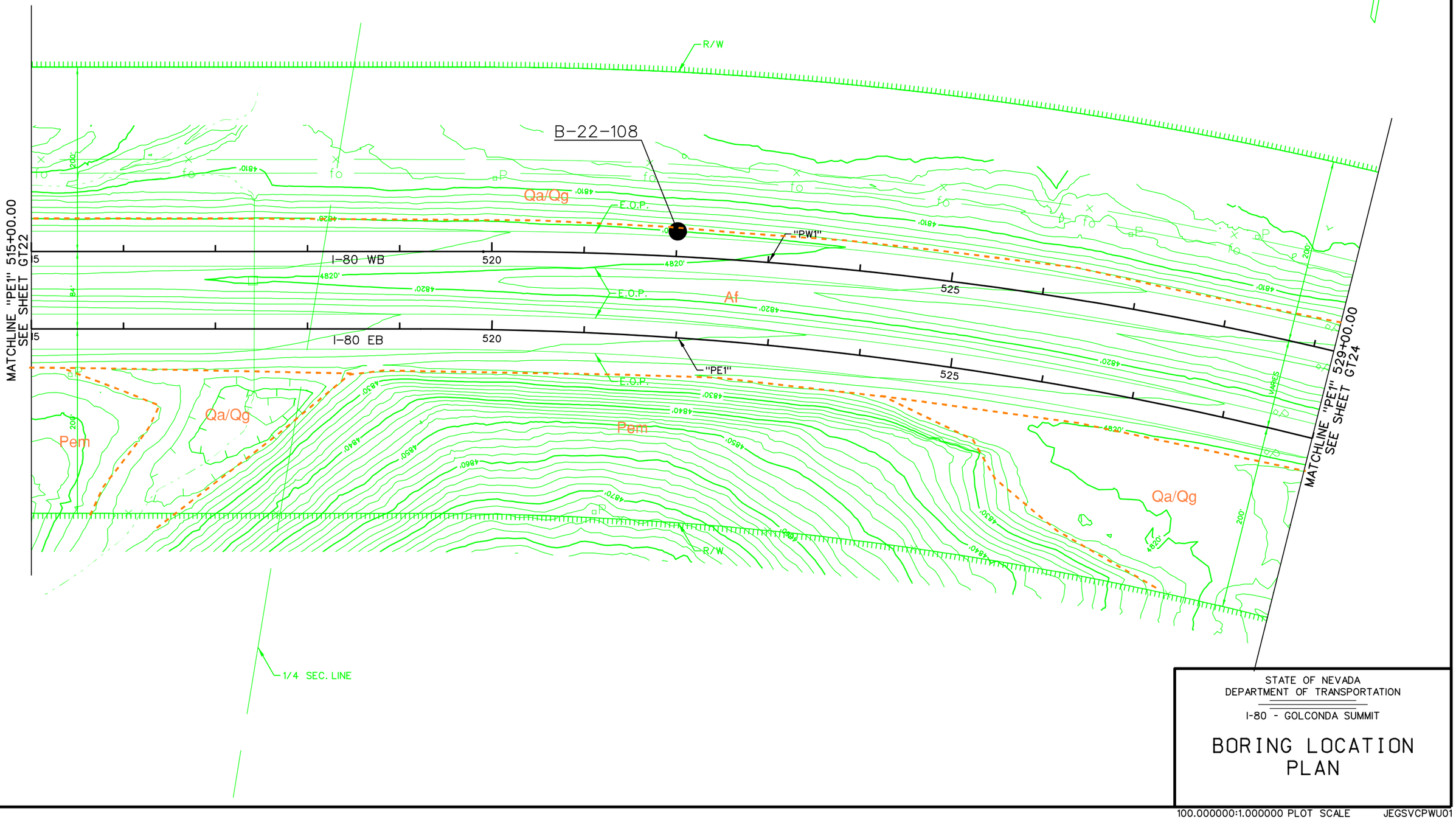
100.000000:1.000000 PLOT SCALE JEGSVCPWU01

W7Y46100_gt123.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	GT23

PRELIMINARY
SUBJECT TO REVISION
16-SEP-2022

T. 35 N. R. 41 E. SEC. 10



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

BORING LOCATION PLAN

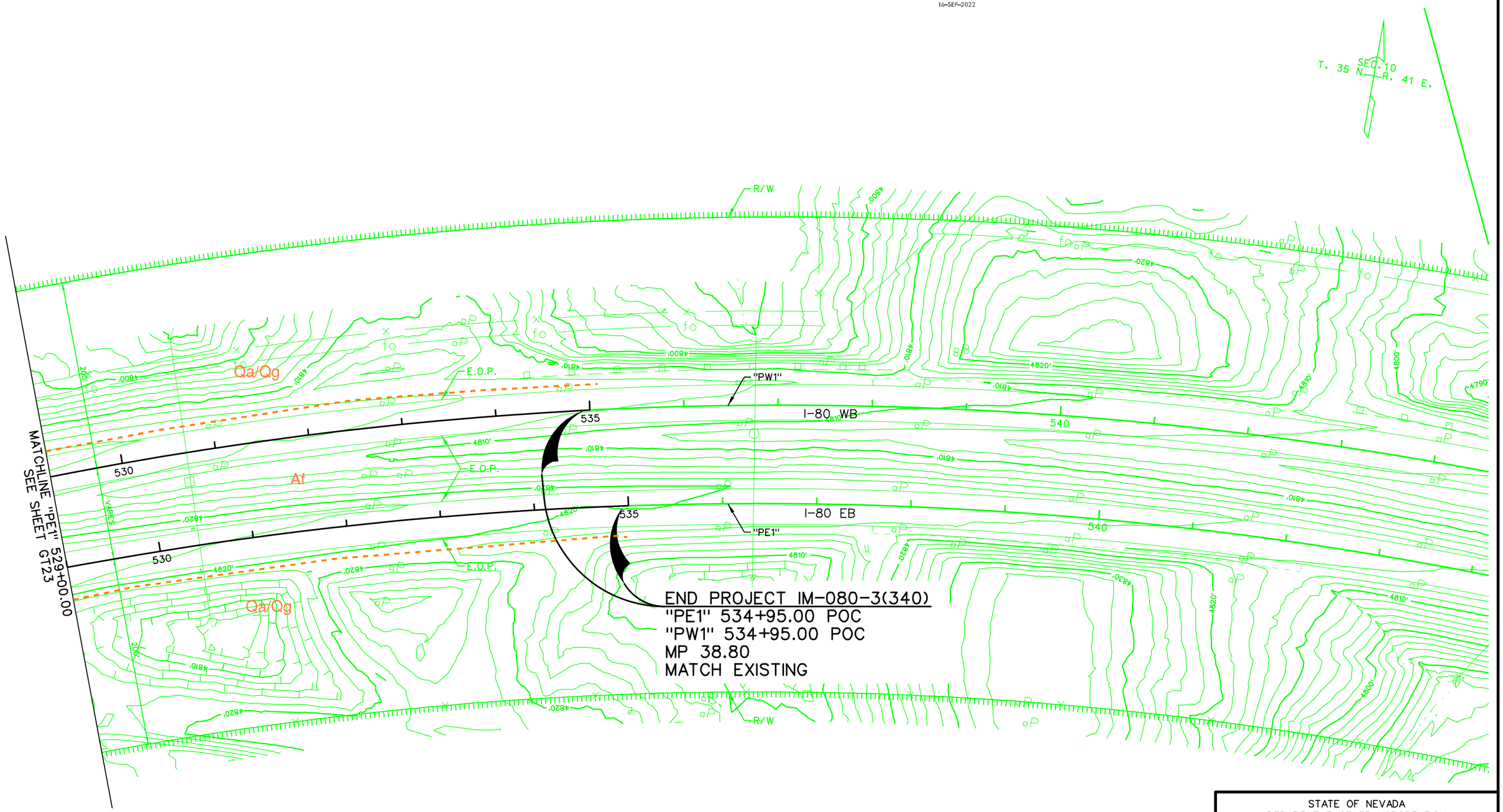
100.000000:1.000000 PLOT SCALE JEGSVCPWU01

W7Y46100_gt124.dgn

PRELIMINARY
SUBJECT TO REVISION
16-SEP-2022

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	GT24

T. 35 N. SEC. 10 R. 41 E.



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

BORING LOCATION PLAN

100.000000:1.000000 PLOT SCALE JEGSVCPWU01

Appendix B
Geotechnical Exploration Data

B-1
Soil Boring and Rock Coring Logs

NewFields

UNIFIED SOIL CLASSIFICATION SYSTEM

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

COARSE-GRAINED SOILS (more than 50% of material is larger than No. 200 sieve size.)			
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	Clean Gravels (Less than 5% fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
	Gravels with fines (More than 12% fines)	GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size	Clean Sands (Less than 5% fines)	SW	Well-graded sands, gravelly sands, little or no fines
		SP	Poorly graded sands, gravelly sands, little or no fines
	Sands with fines (More than 12% fines)	SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS (50% or more of material is smaller than No. 200 sieve size.)			
SILTS AND CLAYS Liquid limit less than 50%		ML	Inorganic silts and very fine sands, rock flour, silty of clayey fine sands or clayey silts with slight plasticity
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL	Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS Liquid limit 50% or greater		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS		PT	Peat and other highly organic soils

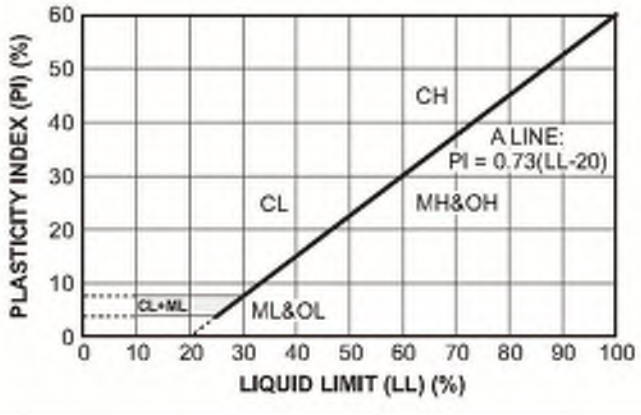
LABORATORY CLASSIFICATION CRITERIA

GW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
GP	Not meeting all gradation requirements for GW	
GM	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
GC	Atterberg limits above "A" line with P.I. greater than 7	
SW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
SP	Not meeting all gradation requirements for SW	
SM	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in shaded zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols.
SC	Atterberg limits above "A" line with P.I. greater than 7	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent ..... GW, GP, SW, SP
More than 12 percent ..... GM, GC, SM, SC
5 to 12 percent ..... Borderline cases requiring dual symbols

PLASTICITY CHART



BORING KEY

NewFields

Symbol Description

Soil Samplers


Standard Penetration Test
(1 3/8 in. dia. ASTM D1586)


Modified California Sampler
(2.5 in. dia. ASTM D3550)


Undisturbed Thin Wall Shelby Tube

Groundwater Symbols


Water Encountered During Drilling


Water Encountered After Drilling

NFWE — No Free Water Encountered

Moisture Condition

Dry	Absence of moisture; dusty; dry to touch
Moist	Damp but no visible water
Wet	Visible free water; usually below water table

Plasticity

None	A 1⁄8-in. (3-mm) thread cannot be rolled at any water content	PI = 0
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit	1 < PI < 10
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit	10 < PI < 20
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be refolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.	20 < PI < 40

Particle Size Reference

Component	Particle Size Range
Boulders	12”
Cobbles	12” – 3”
Gravels	
Coarse	3” – ¾”
Fine	¾” – No. 4 (4.75mm)
Sand	
Coarse	No. 4 (4.75mm) – No. 10 (2mm)
Medium	No. 10 (2mm) – No. 40 (0.42mm)
Fine	No. 40 (0.42mm) – No. 200 (0.075mm)
Silt & Clay	< No. 200

Apparent Density of Coarse-Grained Soils

Apparent Density	SPT (# blows/ft)	Mod. Cal. Sampler
Very Loose	< 4	< 6
Loose	4 - 10	6 - 15
Medium Dense	10 - 30	15 - 45
Dense	30-50	45 - 75
Very Dense	> 50	> 75

Consistency of Fine-Grained Soils

Consistency	SPT (# blows/ft)	Mod. Cal. Sampler
Very Soft	< 2	< 3
Soft	2 - 4	3 - 6
Medium Stiff	4 - 8	6 - 12
Stiff	8 - 15	12 - 23
Very Stiff	15 - 30	23 - 45
Hard	> 30	> 45

Angularity of Coarse-Grained Particles

Angular	Particles have sharp edges and relatively plane sides with unpolished surfaces
Sub-Angular	Edges more rounded
Sub-Rounded	Particles have nearly plane sides but have well-rounded corners and edges
Rounded	Particles have smooth, curved sides and no edges

Cementation

Weak	Crumbles with little finger pressure
Moderate	Crumbles with considerable finger pressure
Strong	Will not break with finger pressure

CORE LOG – KEY TO SYMBOLS

Discontinuity Types	
Symbol	**Discontinuity Type**
C	Contact
J	Joint
B	Bedding Plane
F	Fault
S	Shear Zone
V	Vein
FO	Foliation
M	Mechanical

Grain Size	
Description	**Particle Size**
Coarse	> 0.20 in
Medium	0.04 - 0.20 in
Fine	0.004 - 0.04 in
Aphanitic	< 0.004 in

Type of Infilling	
Symbol	**Infill Type**
Ca	Calcite
CH	Chlorite
Cl	Clay
Fe	Iron Oxide
G	Gouge
Mi	Mica
Mn	Manganese
No	None
Py	Pyrite
Qt	Quartz
St	Silt
Sd	Sand
Gy	Gypsum
Ep	Epidote

$$RQD = \frac{\sum(Length\ of\ intact\ pieces \geq 4\ inches) * 100}{Total\ length\ of\ core\ run}$$

Bedding / Foliation / Flow Structure	
Description	**Field Identification**
Massive	> 10 feet
Very Thickly Bedded	3 feet - 10 feet
Thickly Bedded	1 foot - 3 feet
Moderately Bedded	4 inches - 1 foot
Thinly Bedded	1inch - 4 inches
Very Thinly Bedded	3/8 inch - 1 inch
Laminated	< 3/8 inch

Discontinuity Surface Roughness		
Symbol	**Description**	**Field Identification**
VR	Very Rough	Near vertical ridges are evident
R	Rough	Some ridge; surface abrasive
SR	Slightly Rough	Asperities on surface can be felt
S	Smooth	Appears and feel smooth
SS	Slickensided	Smooth surface with striations/polishing visible

Discontinuity Spacing		
Symbol	**Description**	**Field Identification**
UF	Unfractured	No fractures such as stick rock
VW	Very Wide	Facture spacing greater than 10 feet
W	Wide	Fracture spacing between 3 and 10 feet
MC	Moderately Close	Fracture spacing between 1 and 3 feet
C	Close	Fracture spacing between 2 inches and 1 foot
VC	Very Close	Fracture spacing less than 2 inches

Aperature Size			
Symbol	**Description**	**Field Identification**	
VT	Very Tight	< 0.1 mm	"Closed Features"
T	Tight	0.1 - 0.25 mm	
PO	Partly Open	0.25 - 0.5 mm	
O	Open	0.5 - 2.5 mm	"Gapped Features"
MO	Moderately Open	2.5 - 10 mm	
W	Wide	> 10 mm	
VW	Very Wide	1 - 10 cm	"Open Features"
EW	Extremely Wide	10 - 100 cm	
C	Cavernous	> 1 m	

	Degree of Weathering	
Symbol	**Weathering Grade**	**Description**
F	Fresh	No visible sign of rock material weathering; perhaps slight discoloration on major discontinuity surfaces
SW	Slightly Weathered	Discoloration indicates weathering of rock material and discontinuity surfaces. All of the rock material may be discolored by weathering and may be somewhat weaker externally than in its fresh condition
MW	Moderately Weathered	Less than half of the rock material is decomposed and/or disintegrated to a soil. Fresh or discolored rock is present either as a continuous framework or as corestones
HW	Highly Weathered	More than half of the rock materials is decomposed and/or disintegrated to a soil. Fresh or discolored rock is present as a discontinuous framework or as corestones
CW	Completely Weathered	All rock material is decomposed and/or disintegrated to soil. The original mass structure is still largely intact
RS	Residual Soil	All rock material has been weathered to a soil. The mass structure and material fabrics are destroyed. There is a large change in volume, but the soil has not been significantly transported

Soil and Rock Hardness Grading Scale			
Grade	**Description**	**Field Identification**	**Approximate Range of Uniaxial Compressive Strength (MPa)**
S1	Very Soft Clay	Easily penetrated several inches by fist	< 0.025
S2	Soft Clay	Easily penetrated several inches by thumb	0.025 - 0.05
S3	Firm Clay	Can be penetrated several inches by thumb with moderate effort	0.05 - 0.10
S4	Stiff Clay	Readily indented by thumbnail but penetrated only with great effort	0.10 - 0.25
S5	Very Stiff Clay	Readily indented by thumbnail	0.25 - 0.50
S6	Hard Clay	Indented with difficulty by thumbnail	> 0.50
R0	Extremely Weak Rock	Indented with thumbnail	0.25 - 1.0
R1	Very Weak Rock	Crumbles under firm blows with point of geological hammer, can be peeled by a pocket knife	1.0 - 5.0
R2	Weak Rock	Can be peeled by a pocket knife with difficulty, shallow indentations made by firm blow with point of geological hammer	5.0 - 25.0
R3	Medium Strong Rock	Cannot be scraped or peeled with a pocket knife, specimen can be fractured with single firm blow of geological hammer	25.0 - 50.0
R4	Strong Rock	Specimen requires more than one blow of geological hammer to fracture	50.0 - 100.0
R5	Very Strong Rock	Specimen requires many blows of geological hammer to fracture	100.0 - 250.0
R6	Extremely Strong Rock	Specimen can only be chipped with geological hammer	> 250.0

Fracture Spacing		
Symbol	**Description**	**Field Identification**
UF	Unfractured	Fracture spacing greater than 6 feet
SF	Slightly Fractured	Fracture spacing between 2 to 6 feet
MF	Moderately Fractured	Fracture spacing between 8 inches to 2 feet
HF	Highly Fractured	Fracture spacing between 2 to 8 inches
IF	Intensely Fractured	Fracture spacing less than 2 inches

B-22-101

NewFields

CLIENT Nevada DOT
PROJECT NAME I-80 - Golconda Summit
PROJECT NUMBER 475.0499.000
PROJECT LOCATION Humboldt County, Nevada
DATE STARTED 4/11/22 **COMPLETED** 4/11/22
GROUND ELEVATION 4467.80 ft **HOLE SIZE** 8-in
DRILLING CONTRACTOR Cascade Drilling, CME-85
COORDINATES ():
DRILLING METHOD Hollow Stem Auger
LATITUDE 40.93439 **LONGITUDE** -117.45240
LOGGED BY R. Berg **CHECKED BY** J. Ruzicka
DEPTH TO WATER (FT BGS) no free water encountered
NOTES Autohammer, 30-inch drop, ERi=77.8%

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (N VALUE)	RECOVERY (INCHES)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	% GRAVEL	% SAND	% FINES	REMARKS
	0		Surface Conditions: Clear Ground										
			6" Aggregate Base										bulk sample 0.5-5'
			FILL: Silty Sand with Gravel/Silty Gravel with Sand (SM-GM), brown, slightly moist, very loose to loose, nonplastic, fine sand, fine and coarse subrounded gravel up to 2.5" dia.										Drilling Rate 0' to 2.5' < 1 min
4465				SPT	7-2-2 (4)	16							
			Clayey Gravel with Sand (GC), brown, slightly moist, loose, low plasticity, fine to coarse sand, fine and coarse gravel										Drilling Rate 2.5' to 5' < 1 min
	5												
			Silty Sand with Gravel (SM), brown slightly moist, loose, nonplastic with low plasticity lenses, fine to coarse sand, fine and coarse subangular to subrounded gravel, reaction to HCl	MC	4-4-5 (9)	16	14.1			25	39	36	dry density = 98.2 pcf
4460				SPT	3-3-4 (7)	18							Drilling Rate 5' to 7.5' 2 min
	10												Drilling Rate 7.5' to 10' 3 min
			medium dense	MC	8-22-13 (35)	18							
4455													Drilling Rate 10' to 15' 1 min
	15												
			dense	SPT	14-16-20 (36)	18							

Bottom of Hole = 16.5'
Boring Terminated at Planned Depth
Groundwater Not Encountered
Borehole Backfilled with Bentonite Chips

NewFields

CLIENT Nevada DOT
PROJECT NAME I-80 - Golconda Summit
PROJECT NUMBER 475.0499.000
PROJECT LOCATION Humboldt County, Nevada
DATE STARTED 4/11/22 **COMPLETED** 4/11/22
GROUND ELEVATION 4602.83 ft **HOLE SIZE** 8-in
DRILLING CONTRACTOR Cascade Drilling, CME-85
COORDINATES ():
DRILLING METHOD Hollow Stem Auger
LATITUDE 40.92972 **LONGITUDE** -117.43766
LOGGED BY R. Berg **CHECKED BY** J. Ruzicka
DEPTH TO WATER (FT BGS) no free water encountered
NOTES Autohammer, 30-inch drop, ERi=77.8%

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (N VALUE)	RECOVERY (INCHES)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	% GRAVEL	% SAND	% FINES	REMARKS
	0		Surface Conditions: Clear Ground										
			6" Aggregate Base										
4600			**FILL: Silty Sand with Gravel (SM)**, black to brown, slightly moist, medium dense, nonplastic, fine to coarse sand, fine and coarse gravel up to 1.5" dia.	SPT	3-6-12 (18)	4				43	44	13	Drilling Rate 0' to 2.5' < 1 min bulk sample 0.5-5' Drilling Rate 2.5' to 5' < 1 min
	5			MC	12-15-15 (30)	18	2.0						dry density = 118.9 pcf Drilling Rate 5' to 7.5' < 1 min
4595			**Silty Sand with Gravel (SM)**, brown, slightly moist, dense, nonplastic, fine to coarse sand, fine and coarse subangular gravel up to 2.5" dia.	SPT	6-19-20 (39)	18				32	53	15	Drilling Rate 7.5' to 10' < 1 min
	10		medium dense	MC	17-20-20 (40)	13							

Bottom of Hole = 11.5'
Boring Terminated at Planned Depth
Groundwater Not Encountered
Borehole Backfilled with Bentonite Chips

NewFields

CLIENT Nevada DOT
PROJECT NAME I-80 - Golconda Summit
PROJECT NUMBER 475.0499.000
PROJECT LOCATION Humboldt County, Nevada
DATE STARTED 4/11/22 **COMPLETED** 4/11/22
GROUND ELEVATION 4794.55 ft **HOLE SIZE** 8-in
DRILLING CONTRACTOR Cascade Drilling, CME-85
COORDINATES ():
DRILLING METHOD Hollow Stem Auger
LATITUDE 40.92834 **LONGITUDE** -117.42019
LOGGED BY R. Berg **CHECKED BY** J. Ruzicka
DEPTH TO WATER (FT BGS) no free water encountered
NOTES Autohammer, 30-inch drop, ERi=77.8%

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (N VALUE)	RECOVERY (INCHES)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	% GRAVEL	% SAND	% FINES	REMARKS
	0		Surface Conditions: Clear Ground										
			6" Aggregate Base										
			FILL: Silty Sand with Gravel (SM), brown, moist, medium dense, nonplastic, fine to coarse sand, fine and coarse angular gravel, cobbles and boulders, asphalt debris										Drilling Rate 0' to 2.5' < 1 min
				SPT	3-12-13 (25)	15				29	54	17	bulk sample 0.5-5'
4790	5												Drilling Rate 2.5' to 5' 2 min
			dense	MC	21-24-24 (48)	15	10.6						dry density = 96.6 pcf
													Drilling Rate 5' to 7.5' 2 min
			FILL: Poorly Graded Gravel with Silt and Sand (GP-GM), brown, slightly moist, medium dense, nonplastic, fine to coarse sand, fine and coarse angular gravel, cobbles and boulders	SPT	12-11-15 (26)	12				56	32	12	rock in shoe
4785	10												Drilling Rate 7.5' to 10' < 1 min
			light brown, dense	MC	45-35-22 (57)	12	8.3						dry density = 112.9 pcf
													Drilling Rate 10' to 15' 3 min
4780	15												
			based on cuttings, decreasing sand, medium dense	SPT	49-4-8/0in	0							hard drilling 17-17.5'
													Drilling Rate 15' to 20' 3 min
4775	20												rods plunging 19-19.5'
			dense	MC	40-30-11 (41)	0							
													Drilling Rate 20' to 25' 4 min
4770	25												
			LIMESTONE, medium strong, highly weathered, based on cuttings logged as **Poorly graded Gravel (GP)**, slightly moist, very dense, fine and coarse subanguar angular gravel	SPT	50/3in	0							Drilling Rate 25' to 30' 7 min
4765	30												
				SPT	33-50/5in	6							rock in shoe
													Drilling Rate 30' to 35' 9 min
4760	35												

(Continued Next Page)

NewFields

CLIENT Nevada DOT **PROJECT NAME** I-80 - Golconda Summit

PROJECT NUMBER 475.0499.000 **PROJECT LOCATION** Humboldt County, Nevada

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (N VALUE)	RECOVERY (INCHES)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	% GRAVEL	% SAND	% FINES	REMARKS
	35		**LIMESTONE**, medium strong, highly weathered, based on cuttings logged as **Poorly graded Gravel (GP)**, slightly moist, very dense, fine and coarse subanguar angular gravel *(continued)*	MC	70/5in	2							rock in shoe
4755	40		**SHALE/LIMESTONE**, extremely weak, highly to completely weathered, recovered as silty sand, yellow tan, dry, nonplastic, fine sand, reaction to HCl, layered	SPT	50/5in	5							Drilling Rate 35' to 40' 4 min
4750	45		**PHYLLITIC SHALE**, extremely weak, highly weathered, recovered as silty sand, yellow to blue, dry, nonplastic, fine sand, layered	MC	42-70/4in	10							Drilling Rate 40' to 45' 5 min
4745	50			SPT	20-50/5in	11							Drilling Rate 45' to 50' 1 min

Bottom of Hole = 50.9'
Boring Terminated at Planned Depth
Groundwater Not Encountered
Borehole Backfilled with Bentonite Chips

NewFields

B-22-104
PAGE 1 OF 1

CLIENT Nevada DOT
PROJECT NAME I-80 - Golconda Summit
PROJECT NUMBER 475.0499.000
PROJECT LOCATION Humboldt County, Nevada
DATE STARTED 4/12/22 **COMPLETED** 4/12/22
GROUND ELEVATION 4975.71 ft **HOLE SIZE** 8-in
DRILLING CONTRACTOR Cascade Drilling, CME-85
COORDINATES ():
DRILLING METHOD Hollow Stem Auger
LATITUDE 40.92643 **LONGITUDE** -117.40772
LOGGED BY R. Berg **CHECKED BY** J. Ruzicka
DEPTH TO WATER (FT BGS) no free water encountered
NOTES Autohammer, 30-inch drop, ERi=77.8%

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (N VALUE)	RECOVERY (INCHES)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	% GRAVEL	% SAND	% FINES	REMARKS
			Surface Conditions: Clear Ground										
4975	0		**6" Aggregate Base**										bulk sample 0.5-5' Drilling Rate 0' to 2.5' < 1 min
			FILL: Silty Sand with Gravel (SM), dark brown, moist, nonplastic, fine to coarse sand, fine and coarse rounded to subrounded gravel up to 2.5" dia., asphalt debris	SPT	7-7-13 (20)	14							Drilling Rate 2.5' to 5' < 1 min
	5												
4970			fine gravel	MC	9-7-13 (20)	18	13.7			20	42	38	dry density = 100.8 pcf
													Drilling Rate 5' to 7.5' < 1 min
			Clayey Sand with Gravel (SC), dark brown, slightly moist, very dense, low plasticity, fine sand, fine subangular gravel up to 3/8" dia.	SPT	17-50/5in	9							Drilling Rate 7.5' to 10' < 1 min
	10												
4965			**Silty Sand (SM)**, tan yellow, dry, very dense, nonplastic, fine sand	MC	17-35-49 (84)	18							Drilling Rate 10' to 15' 1 min
	15		**Clayey Gravel with Sand (GC)**, brown, slightly moist, dense, low plasticity, fine to coarse sand, fine subangular to subrounded gravel										
4960				SPT	17-17-20 (37)	14							

Bottom of Hole = 16.5'
Boring Terminated at Planned Depth
Groundwater Not Encountered
Borehole Backfilled with Bentonite Chips

B-22-105

NewFields

CLIENT Nevada DOT
PROJECT NAME I-80 - Golconda Summit
PROJECT NUMBER 475.0499.000
PROJECT LOCATION Humboldt County, Nevada
DATE STARTED 4/12/22 **COMPLETED** 4/12/22
GROUND ELEVATION 5156.00 ft **HOLE SIZE** 8-in
DRILLING CONTRACTOR Cascade Drilling, CME-85
COORDINATES ():
DRILLING METHOD Hollow Stem Auger
LATITUDE 40.92048 **LONGITUDE** -117.39364
LOGGED BY R. Berg **CHECKED BY** J. Ruzicka
DEPTH TO WATER (FT BGS) no free water encountered
NOTES Autohammer, 30-inch drop, ERi=77.8%

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (N VALUE)	RECOVERY (INCHES)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	% GRAVEL	% SAND	% FINES	REMARKS
	0		Surface Conditions: Light Grasses										
5155			**Topsoil (SM)**, moist, low plasticity, fine sand, roots										
			Silty Sand with Gravel (SM), slightly moist, dense, nonplastic, fine to coarse sand, fine subangular gravel up to 3/8" dia., cemented, reaction to HCl										bulk sample 0-5' Drilling Rate 0' to 2.5' < 1 min
				SPT	3-16-20 (36)	12							Drilling Rate 2.5' to 5' < 1 min
	5												
5150			very dense	MC	18-28-53 (81)	18				21	58	21	Drilling Rate 5' to 7.5' < 1 min
			medium dense, decreasing gravel content, subangular to subrounded	SPT	12-11-10 (21)	8							Drilling Rate 7.5' to 10' < 1 min
	10												
5145			increased gravel content	MC	17-14-17 (31)	14							

Bottom of Hole = 11.5'
Boring Terminated at Planned Depth
Groundwater Not Encountered
Borehole Backfilled with Bentonite Chips

B-22-106

NewFields

CLIENT Nevada DOT
PROJECT NAME I-80 - Golconda Summit
PROJECT NUMBER 475.0499.000
PROJECT LOCATION Humboldt County, Nevada
DATE STARTED 4/12/22 **COMPLETED** 4/12/22
GROUND ELEVATION 5019.97 ft **HOLE SIZE** 8-in
DRILLING CONTRACTOR Cascade Drilling, CME-85
COORDINATES ():
DRILLING METHOD Hollow Stem Auger
LATITUDE 40.92254 **LONGITUDE** -117.37760
LOGGED BY R. Berg **CHECKED BY** J. Ruzicka
DEPTH TO WATER (FT BGS) no free water encountered
NOTES Autohammer, 30-inch drop, ERi=77.8%

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (N VALUE)	RECOVERY (INCHES)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	% GRAVEL	% SAND	% FINES	REMARKS
	0		Surface Conditions: Clear Ground										
			6" Aggregate Base										
			FILL: Silty Sand with Gravel (SM), light brown, slightly moist, medium dense, nonplastic, fine to coarse sand, fine and coarse angular gravel up to 2" dia.	SPT	7-9-7 (16)	14				39	46	15	Drilling Rate 0' to 2.5' < 1 min bulk sample 0.5-5' Drilling Rate 2.5' to 5' 1 min
5015	5		**Clayey Gravel with Sand (GC)**, brown, slightly moist, medium dense, low plasticity, fine to coarse sand, fine and coarse subangular gravel up to 2.5" dia.	MC	8-20-18 (38)	15		30	10	56	24	20	Drilling Rate 5' to 7.5' < 1 min
				SPT	6-13-13 (26)	13							rock in shoe Drilling Rate 7.5' to 10' 1 min
5010	10		**Silty Sand (SM)**, light brown, slightly moist, fine sand, very dense, nonplastic, fine sand, reaction to HCl	MC	11-14-14 (28)	15							Drilling Rate 10' to 15' 4 min
5005	15		**Silt with Sand (ML)**, dark brown, slightly moist, very stiff, nonplastic, fine sand	SPT	6-10-10 (20)	13							harder drilling

Bottom of Hole = 16.5'
Boring Terminated at Planned Depth
Groundwater Not Encountered
Borehole Backfilled with Bentonite Chips

NewFields

CLIENT Nevada DOT
PROJECT NAME I-80 - Golconda Summit
PROJECT NUMBER 475.0499.000
PROJECT LOCATION Humboldt County, Nevada
DATE STARTED 4/12/22 **COMPLETED** 4/12/22
GROUND ELEVATION 4904.57 ft **HOLE SIZE** 8-in
DRILLING CONTRACTOR Cascade Drilling, CME-85
COORDINATES ():
DRILLING METHOD Hollow Stem Auger
LATITUDE 40.91717 **LONGITUDE** -117.36340
LOGGED BY R. Berg **CHECKED BY** J. Ruzicka
DEPTH TO WATER (FT BGS) no free water encountered
NOTES Autohammer, 30-inch drop, ERi=77.8%

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (N VALUE)	RECOVERY (INCHES)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	% GRAVEL	% SAND	% FINES	REMARKS
	0		Surface Conditions: Clear Ground										
			6" Aggregate Base										
			FILL: Poorly graded Gravel with Clay and Sand (GP-GC), light brown, slightly moist, medium dense, low plasticity, fine to coarse sand, fine and coarse angular gravel up to dia. 2.5"	MC	3-15-13 (28)	15	6.3			50	39	11	Drilling Rate 0' to 2.5' < 1 min bulk sample 0.5-5' Drilling Rate 2.5' to 5' < 1 min
4900	5			SPT	4-15-14 (29)	12							Drilling Rate 5' to 7.5' < 1 min
			Silty gravel with Sand (GM), brown to orange, dry, medium dense, nonplastic, fine sand, coarse angular gravel	MC	14-15-15 (30)	6							rock in shoe Drilling Rate 7.5' to 10' 2 min
4895	10		**Clayey Gravel with Sand (GC)**, brown, slightly moist, medium dense, low plasticity, fine to coarse sand, fine and coarse angular to subangular gravel	SPT	7-10-10 (20)	16							

Bottom of Hole = 11.5'
Boring Terminated at Planned Depth
Groundwater Not Encountered
Borehole Backfilled with Bentonite Chips

NewFields

CLIENT Nevada DOT
PROJECT NAME I-80 - Golconda Summit
PROJECT NUMBER 475.0499.000
PROJECT LOCATION Humboldt County, Nevada
DATE STARTED 4/12/22 **COMPLETED** 4/12/22
GROUND ELEVATION 4820.92 ft **HOLE SIZE** 8-in
DRILLING CONTRACTOR Cascade Drilling, CME-85
COORDINATES ():
DRILLING METHOD Hollow Stem Auger
LATITUDE 40.91709 **LONGITUDE** -117.34754
LOGGED BY R. Berg **CHECKED BY** J. Ruzicka
DEPTH TO WATER (FT BGS) no free water encountered
NOTES Autohammer, 30-inch drop, ERi=77.8%

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (N VALUE)	RECOVERY (INCHES)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	% GRAVEL	% SAND	% FINES	REMARKS
	0		Surface Conditions: Clear Ground										
4820			**6" Aggregate Base**										
			Silty, Clayey Sand with Gravel (SC-SM), light brown, slightly moist, medium dense, low plasticity, fine to coarse sand, fine angular gravel										Drilling Rate 0' to 2.5' < 1 min
				SPT	9-13-10 (23)	16	5.5	24	7	24	43	33	bulk sample 0.5-5'
	5												Drilling Rate 2.5' to 5' < 1 min
4815			very dense	MC	20-48-47 (95)	12							rock in shoe Drilling Rate 5' to 7.5' < 1 min
			dense, increased gravel	SPT	16-20-19 (39)	11							Drilling Rate 7.5' to 10' < 1 min
	10												
4810			medium dense, decreased gravel	MC	10-10-17 (27)	15							Drilling Rate 10' to 15' < 1 min
	15												
4805			with cemented nodules	SPT	10-13-13 (26)	10							

Bottom of Hole = 16.5'
Boring Terminated at Planned Depth
Groundwater Not Encountered
Borehole Backfilled with Bentonite Chips

B-22-109

NewFields

CLIENT Nevada DOT
PROJECT NAME I-80 - Golconda Summit
PROJECT NUMBER 475.0499.000
PROJECT LOCATION Humboldt County, Nevada
DATE STARTED 4/13/22 **COMPLETED** 4/13/22
GROUND ELEVATION 5127.77 ft **HOLE SIZE** 8-in
DRILLING CONTRACTOR Cascade Drilling, CME-85
COORDINATES ():
DRILLING METHOD Hollow Stem Auger
LATITUDE 40.92204 **LONGITUDE** -117.39060
LOGGED BY R. Berg **CHECKED BY** J. Ruzicka
DEPTH TO WATER (FT BGS) no free water encountered
NOTES Autohammer, 30-inch drop, ERi=77.8%

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (N VALUE)	RECOVERY (INCHES)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	% GRAVEL	% SAND	% FINES	REMARKS
	0		Surface Conditions: Light Grasses										
			Topsoil (SM), organics and rootlets										
			Silty Sand with Gravel (SM), dark brown, slightly moist, medium dense, nonplastic, fine sand, fine gravel										bulk sample 0-5' Drilling Rate 0' to 2.5' < 1 min
5125				SPT	5-11-8 (19)	13				30	31	39	
	5												Drilling Rate 2.5' to 5' < 1 min
			Silty Sand (SM), light brown, moist, very dense, nonplastic, fine sand, fine subangular gravel, cemented	MC	19-24-38 (62)	18	10.1						dry density = 107.9 pcf Drilling Rate 5' to 7.5' 1 min
5120			dense, increased sand	SPT	8-18-17 (35)	14							Drilling Rate 7.5' to 10' 1 min
	10		medium dense, angular to subangular gravel	MC	11-19-14 (33)	5							

Bottom of Hole = 11.5'
Boring Terminated at Planned Depth
Groundwater Not Encountered
Borehole Backfilled with Bentonite Chips

NewFields

B-22-110
PAGE 1 OF 1

CLIENT Nevada DOT
PROJECT NAME I-80 - Golconda Summit
PROJECT NUMBER 475.0499.000
PROJECT LOCATION Humboldt County, Nevada
DATE STARTED 4/13/22 **COMPLETED** 4/13/22
GROUND ELEVATION 5133.76 ft **HOLE SIZE** 8-in
DRILLING CONTRACTOR Cascade Drilling, CME-85
COORDINATES ():
DRILLING METHOD Hollow Stem Auger
LATITUDE 40.92167 **LONGITUDE** -117.39202
LOGGED BY R. Berg **CHECKED BY** J. Ruzicka
DEPTH TO WATER (FT BGS) no free water encountered
NOTES Autohammer, 30-inch drop, ERi=77.8%

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (N VALUE)	RECOVERY (INCHES)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	% GRAVEL	% SAND	% FINES	REMARKS
	0		Surface Conditions: Grasses										
			Topsoil (SM), with rootlets										bulk sample 0-5'
			Silty Gravel with Sand (GM), light brown, slightly moist, dense, nonplastic, fine to coarse sand, fine and coarse subangular gravel up to 2" dia.										Drilling Rate 0' to 2.5' < 1 min
5130				SPT	8-23-22 (45)	18							Drilling Rate 2.5' to 5' < 1 min
	5		**Silty Sand (SM)**, tan to light brown, slightly moist, very dense, nonplastic, fine to coarse sand, fine subrounded gravel, cemented, reaction to HCl	MC	11-29-42 (71)	18							Drilling Rate 5' to 7.5' < 1 min
				SPT	10-28-29 (57)	13				8	54	38	Drilling Rate 7.5' to 10' < 1 min
5125													
	10		dense	MC	17-23-27 (50)	18							
			Silty Gravel with Sand (GM), light brown, slightly moist, very dense, nonplastic, fine to coarse sand, fine subangular gravel up to 3/8" dia.										Drilling Rate 10' to 15' 2 min
5120													
	15			SPT	17-26-25 (51)	15							harder drilling Drilling Rate 15' to 20' 7 min
5115													
	20		**Clayey Gravel with Sand (GC)**, brown, dense, low plasticity, fine to coarse sand, fine and coarse gravel up to 2" dia.	MC	25-20-22 (42)	18							

Bottom of Hole = 21.5'
Boring Terminated at Planned Depth
Groundwater Not Encountered
Borehole Backfilled with Bentonite Chips

NewFields

B-22-111

CLIENT Nevada DOT
PROJECT NAME I-80 - Golconda Summit
PROJECT NUMBER 475.0499.000
PROJECT LOCATION Humboldt County, Nevada
DATE STARTED 4/13/22 **COMPLETED** 4/13/22
GROUND ELEVATION 5145.14 ft **HOLE SIZE** 8-in
DRILLING CONTRACTOR Cascade Drilling, CME-85
COORDINATES ():
DRILLING METHOD Hollow Stem Auger
LATITUDE 40.92128 **LONGITUDE** -117.39317
LOGGED BY R. Berg **CHECKED BY** J. Ruzicka
DEPTH TO WATER (FT BGS) no free water encountered
NOTES Autohammer, 30-inch drop, ERi=77.8%

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (N VALUE)	RECOVERY (INCHES)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	% GRAVEL	% SAND	% FINES	REMARKS
5145	0		Surface Conditions: Light Grasses										
			Topsoil (SM), slightly moist, with rootlets										
			Sandy Silt (ML), light brown, slightly moist, very stiff, nonplastic, fine to coarse sand, fine gravel										bulk sample 0-5' Drilling Rate 0' to 2.5' < 1 min
				SPT	5-7-13 (20)	18	7.0			9	37	54	Drilling Rate 2.5' to 5' < 1 min
5140	5		fine subangular gravel	MC	3-12-8 (20)	18							Drilling Rate 5' to 7.5' < 1 min
			hard	SPT	9-22-22 (44)	17							Drilling Rate 7.5' to 10' 1 min
5135	10		**Silty Gravel with Sand (GM)**, light brown, slightly moist, very dense, nonplastic, fine to coarse sand, fine and coarse angular gravel up to 2.5" dia.	MC	32-40-50/5in	18							
			Bottom of Hole = 11.4' Boring Terminated at Planned Depth Groundwater Not Encountered Borehole Backfilled with Bentonite Chips										

B-22-112

NewFields

CLIENT Nevada DOT
PROJECT NAME I-80 - Golconda Summit
PROJECT NUMBER 475.0499.000
PROJECT LOCATION Humboldt County, Nevada
DATE STARTED 4/12/22 **COMPLETED** 4/12/22
GROUND ELEVATION 5159.76 ft **HOLE SIZE** 8-in
DRILLING CONTRACTOR Cascade Drilling, CME-85
COORDINATES ():
DRILLING METHOD Hollow Stem Auger
LATITUDE 40.92059 **LONGITUDE** -117.39159
LOGGED BY R. Berg **CHECKED BY** J. Ruzicka
DEPTH TO WATER (FT BGS) no free water encountered
NOTES Autohammer, 30-inch drop, ERi=77.8%

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (N VALUE)	RECOVERY (INCHES)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	% GRAVEL	% SAND	% FINES	REMARKS
	0		Surface Conditions: Light Grasses										
			Silty Sand (SM), brown, slightly moist, medium dense, nonplastic, fine to coarse sand, fine gravel										bulk sample 0-5' Drilling Rate 0' to 2.5' < 1 min
				SPT	7-6-6 (12)	18				9	42	49	Drilling Rate 2.5' to 5' < 1 min
5155	5		light brown, fine gravel up to 2" dia., cemented	MC	8-11-17 (28)	18							Drilling Rate 5' to 7.5' < 1 min
			very dense, decreased coarse gravel, no cementation	SPT	22-50/5in	10							Drilling Rate 7.5' to 10' < 1 min
5150	10		dense, increased coarse gravel	MC	18-21-34 (55)	18							

Bottom of Hole = 11.5'
Boring Terminated at Planned Depth
Groundwater Not Encountered
Borehole Backfilled with Bentonite Chips

B-22-113

NewFields

CLIENT Nevada DOT
PROJECT NAME I-80 - Golconda Summit
PROJECT NUMBER 475.0499.000
PROJECT LOCATION Humboldt County, Nevada
DATE STARTED 4/12/22 **COMPLETED** 4/12/22
GROUND ELEVATION 5150.95 ft **HOLE SIZE** 8-in
DRILLING CONTRACTOR Cascade Drilling, CME-85
COORDINATES ():
DRILLING METHOD Hollow Stem Auger
LATITUDE 40.92057 **LONGITUDE** -117.39074
LOGGED BY R. Berg **CHECKED BY** J. Ruzicka
DEPTH TO WATER (FT BGS) no free water encountered
NOTES Autohammer, 30-inch drop, ERi=77.8%

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (N VALUE)	RECOVERY (INCHES)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	% GRAVEL	% SAND	% FINES	REMARKS
	0		Surface Conditions: Light Grasses										
5150			**Poorly Graded Sand with Gravel and Silt (SP)**, brown, slightly moist, medium dense, nonplastic, fine to coarse sand, fine subrounded gravel up to 1/2" dia.										bulk sample 0-5' Drilling Rate 0' to 2.5' < 1 min
				SPT	6-6-9 (15)	18							Drilling Rate 2.5' to 5' < 1 min
	5		**Silty Sand with Gravel (SM)**, brown, moist, dense, nonplastic, fine to coarse sand, fine gravel, cemented, reaction to HCl										
5145				MC	12-24-26 (50)	18	14.7			30	58	12	dry density = 102.4 pcf
													Drilling Rate 5' to 7.5' 1 min
				SPT	7-14-17 (31)	15							Drilling Rate 7.5' to 10' < 1 min
	10												
5140			medium dense	MC	8-11-16 (27)	12							
													Drilling Rate 10' to 15' < 1 min
	15												
5135			**Clayey Sand with Gravel (SC)**, brown, slightly moist, medium dense, low plasticity, fine to coarse sand, fine subrounded to subangular gravel	SPT	7-7-18 (25)	18				18	61	21	
													Drilling Rate 15' to 20' 4 min
	20		**Silty Sand with Gravel (SM)**, light brown, slightly moist, medium dense, nonplastic, fine to coarse sand, fine and coarse angular gravel up to 2.5" dia.										
5130				MC	17-17-13 (30)	14							

Bottom of Hole = 21.5'
Boring Terminated at Planned Depth
Groundwater Not Encountered
Borehole Backfilled with Bentonite Chips

B-22-114

NewFields

CLIENT Nevada DOT
PROJECT NAME I-80 - Golconda Summit
PROJECT NUMBER 475.0499.000
PROJECT LOCATION Humboldt County, Nevada
DATE STARTED 4/12/22 **COMPLETED** 4/12/22
GROUND ELEVATION 5142.71 ft **HOLE SIZE** 8-in
DRILLING CONTRACTOR Cascade Drilling, CME-85
COORDINATES ():
DRILLING METHOD Hollow Stem Auger
LATITUDE 40.92095 **LONGITUDE** -117.38969
LOGGED BY R. Berg **CHECKED BY** J. Ruzicka
DEPTH TO WATER (FT BGS) no free water encountered
NOTES Autohammer, 30-inch drop, ERi=77.8%

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (N VALUE)	RECOVERY (INCHES)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	% GRAVEL	% SAND	% FINES	REMARKS
	0		Surface Conditions: Clear Ground										
5140			**Sandy Silt (ML)**, brown, slightly moist, stiff, nonplastic, fine sand, fine gravel										bulk sample 0-5' Drilling Rate 0' to 2.5' < 1 min
				SPT	4-5-5 (10)	16				13	32	55	Drilling Rate 2.5' to 5' < 1 min
	5		very stiff, cemented, reaction to HCl	MC	11-13-16 (29)	18	8.4						dry density = 101.2 pcf Drilling Rate 5' to 7.5' < 1 min
5135			hard, with gravel to 3/8" dia.	SPT	10-15-20 (35)	18							Drilling Rate 7.5' to 10' < 1 min
	10		with gravel to 1.5" dia.	MC	18-21-30 (51)	18							

Bottom of Hole = 11.5'
Boring Terminated at Planned Depth
Groundwater Not Encountered
Borehole Backfilled with Bentonite Chips

NewFields

CLIENT Nevada DOT
PROJECT NAME I-80 - Golconda Summit
PROJECT NUMBER 475.0499.000
PROJECT LOCATION Humboldt County, Nevada
DATE STARTED 4/14/22 **COMPLETED** 4/14/22
GROUND ELEVATION 4904.48 ft **HOLE SIZE** 8-in
DRILLING CONTRACTOR Cascade Drilling, CME-85
COORDINATES ():
DRILLING METHOD Hollow Stem Auger
LATITUDE 40.92930 **LONGITUDE** -117.41483
LOGGED BY R. Berg **CHECKED BY** J. Ruzicka
DEPTH TO WATER (FT BGS) no free water encountered
NOTES Autohammer, 30-inch drop, ERi=77.8%

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (N VALUE)	RECOVERY (INCHES)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	% GRAVEL	% SAND	% FINES	REMARKS
	0		Surface Conditions: Clear Ground										
4900	5		**Clayey Sand (SC)**, orange to brown, dry, very dense, low plasticity, fine to coarse sand, fine angular gravel, likely decomposed	SPT	33-50/5in	11		29	11	8	49	43	bulk sample 0-5' Drilling Rate 0' to 2.5' < 1 min; Drilling Rate 2.5' to 5' < 1 min
			PHYLLITIC SHALE, weak, highly to completely weathered, recovered as silt with sand, yellow, dry, hard, nonplastic	MC	9-70	12							Drilling Rate 5' to 7.5' < 1 min
4895	10		**PHYLLITIC SHALE**, weak, highly to completely weathered, recovered as sandy clay to clayey sand, dry, low plasticity, fine sand	SPT	17-50	12							Drilling Rate 7.5' to 10' < 1 min
			with coarse quartzite gravel	MC	45-70/4in	10							Drilling Rate 10' to 15' 2 min
4890	15		**PHYLLITIC SHALE**, weak, highly to completely weathered, recovered as clayey sand, orange and white, dry, low plasticity, fine sand	SPT	22-50/5in	11							
				GB						4	48	48	Drilling Rate 15' to 20' 3 min
4885	20		highly weathered, slightly oxidized	MC	13-70	12							
				GB									Drilling Rate 20' to 25' 3 min
4880	25		**PHYLLITIC SHALE**, weak, highly to completely weathered, recovered as silt with sand, yellow, dry, nonplastic, fine sand	SPT	24-44-50/3in	15							
				GB									Drilling Rate 25' to 30' 2 min
4875	30			MC	15-50	12							
				GB									Drilling Rate 30' to 35' 3 min
4870	35												

(Continued Next Page)

NewFields

CLIENT Nevada DOT **PROJECT NAME** I-80 - Golconda Summit

PROJECT NUMBER 475.0499.000 **PROJECT LOCATION** Humboldt County, Nevada

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (N VALUE)	RECOVERY (INCHES)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	% GRAVEL	% SAND	% FINES	REMARKS
	35		**PHYLLITIC SHALE**, weak, highly to completely weathered, recovered as sandy clay to clayey sand, white-yellow, dry, low plasticity, fine sand	SPT	18-50/5in	11							
				GB									Drilling Rate 35' to 40' 5 min
4865	40		with oxidized lenses containing manganese oxide stringers	MC	44-70	12							
				GB									Drilling Rate 40' to 45' 5 min
4860	45		**PHYLLITIC SHALE**, weak, highly to completely weathered, recovered as clayey sand, orange to white, dry, nonplastic with slightly plastic lenses, fine sand, with fine oxidized gravel lenses	SPT	26-44-50/4in	16							
				GB									Drilling Rate 45' to 50' 5 min
4855	50			MC	50/4in	3							hammer bouncing, rock in shoe

Bottom of Hole = 50.3'
Boring Terminated at Planned Depth
Groundwater Not Encountered
Borehole Backfilled with Bentonite Chips

NewFields

RC-22-002

CLIENT Nevada DOT
PROJECT NAME I-80 - Golconda Summit
PROJECT NUMBER 475.0499.000
PROJECT LOCATION Humboldt County, Nevada
DATE STARTED 4/19/22 **COMPLETED** 4/22/22
GROUND ELEVATION 4921.69 ft **HOLE SIZE** 8-in/4-in
DRILLING CONTRACTOR Cascade Drilling, CME-85
COORDINATES ():
DRILLING METHOD Hollow Stem Auger
LATITUDE 40.92917 **LONGITUDE** -117.41365
LOGGED BY R. Berg **CHECKED BY** J. Ruzicka
DEPTH TO WATER (FT BGS)
NOTES Autohammer, 30-inch drop, ERi=86.4%

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (N VALUE)	RECOVERY (INCHES)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	% GRAVEL	% SAND	% FINES	REMARKS
	0		Surface Conditions: Clear Ground										
4920			**CALCAREOUS QUARTZITE**, weak, highly to completely weathered, recovered as silty gravel with sand, light brown, dry, very dense, nonplastic, fine to coarse sand, fine and coarse mechanically fractured subangular to angular gravel to 2.5" dia	SPT	17-50/0in	4							Drilling Rate 0' to 2.5' 9 min Drilling Rate 2.5' to 4.5' 8 min
			Practical refusal encountered, switched to HQ core at 4.5', see log RC-22-002_R for rock log										

NewFields

CLIENT Nevada DOT
PROJECT NAME 1-80 - Golconda Summit
PROJECT NUMBER 475.0499.000
PROJECT LOCATION Humboldt County, Nevada
DATE STARTED 4/19/22 **COMPLETED** 4/22/22
GROUND ELEVATION 4921.69 ft **HOLE SIZE** 4-in
DRILLING CONTRACTOR Cascade Drilling, CME-85
COORDINATES ():
DRILLING METHOD HQ Core
LATITUDE 40.92917 **LONGITUDE** -117.41365
LOGGED BY R.Berg **CHECKED BY** J. Ruzicka
DEPTH TO WATER (FT BGS) no free water encountered
NOTES

ELEVATION (ft)	DEPTH (ft)	RUN NO.	RUN LENGTH	REC (%)	RQD (%)	WEATHERING	HARDNESS	GRAPHIC LOG	MATERIAL DESCRIPTION	DRILLING RATE (MIN)	WATER LEVEL	DISCONTINUITY LOG TYPE	DIP	SPACING	APERTURE	ROUGHNESS	INFILL
	0								Surface details:								
4920									Refer to Soil log for 0 - 4.5'								
	5	1	1.5	94	0	SW	R3		**CALCAREOUS QUARTZITE**, light brown, coarse to medium grained, slightly weathered, medium strong to strong, moderately to intensely fractured, reaction to HCl	5							
4915		2	0.5	100	83	SW	R4										
		3	0.5	100	83	SW	R4			2		J	45	MC	T	SR	Ca
		4	1	92	0	SW	R4		intensely fractured 7.0 to 8.0 feet, manganese oxide stringers								
		5	2	100	100	MW	R5		8.0 to 12.5 feet Unconfined Compressive Strength = 110 MPa			J	60	MC	T	SR	Ca
	10								moderately fractured 8.0 to 10.0 feet								
		6	1.5	44	0	SW	R5		intensely fractured 10.0 to 11.5 feet	13							
4910												J	10	C	O	SR	Ca
		7	1	92	92	SW	R5		moderately fractured 11.5 to 12.5 feet			J	0	C	T	SR	Ca
		8	2.83	99	93	SW	R3		moderately fractured 12.5 to 15.3 feet			J	45	C	T	SR	Ca
												J	45	C	T	SR	Ca
	15											V	45	C	T	C	Ca
		9	0.5	100	0	SW	R3		intensely fractured 15.3 to 15.8 feet	14		V	45	MC	T	SR	Ca
4905		10	0.92	100	100	SW	R3										
		11	0.75	67	0	MW	R3		intensely fractured 16.8 to 25.5 feet								
		12	2.5	100	0	SW	R3					J	45	MC	T	SR	Ca
	20									10							
4900		13	2	100	46	SW	R4			14							
		14	2.5	90	0	MW	R3										
	25									20							
		15	2.75	100	97	SW	R4		25.5 to 27.0 feet Unconfined Compressive Strength = 94 MPa			J	45	C	T	SR	Ca
4895												V	45	C	T	SR	Ca
									moderately fractured 25.5 to 30.3 feet			V	0	C	T	SR	Ca
												J	45	C	T	SR	Ca
		16	3.08	100	100	SW	R4					V	30	C	T	C	Ca
	30									8		V	30	C	T	C	Ca
												J	45	C	O	SR	Ca
												J	45	C	O	SR	Ca
		17	1.17	57	0	SW	R4		intensely fractured 30.3 to 32.8 feet								
4890																	
		18	1.25	100	0	SW	R3			6							
		19	0.75	100	100	SW	R3		moderately fractured 32.8 to 37.0 feet			J	45	MC	T	SR	Ca
	35	20	3.5	95	29	SW	R4					J	45	C	T	SR	Ca

(Continued Next Page)

NewFields

CLIENT Nevada DOT **PROJECT NAME** 1-80 - Golconda Summit

PROJECT NUMBER 475.0499.000 **PROJECT LOCATION** Humboldt County, Nevada

ELEVATION (ft)	DEPTH (ft)	RUN NO.	RUN LENGTH	REC (%)	RQD (%)	WEATHERING	HARDNESS	GRAPHIC LOG	MATERIAL DESCRIPTION	DRILLING RATE (MIN)	WATER LEVEL	DISCONTINUITY LOG TYPE	DIP	SPACING	APERTURE	ROUGHNESS	INFILL
	35																
4885		20	3.5	95	29	SW	R4		**CALCAREOUS QUARTZITE**, light brown, coarse to medium grained, slightly weathered, medium strong to strong, moderately to intensely fractured, reaction to HCl *(continued)*	17		J	60	C	T	SR	No
												J	90	C	T	SR	Cl
		21	1.5	100	89	SW	R4		37.0 to 38.5 feet Unconfined Compressive Strength = 67 MPa	6		J	30	C	T	SR	Cl
												V	45	C	T	SR	Ca
		22	0.5	100	0	MW	R3		moderately fractured 37.0 to 38.5			V	45	C	T	SR	Ca
	40	23	1.5	100	0	MW	R3		intensely fractured 38.5 to 40.5 feet	20							
4880		24	1.5	100	94	SW	R4		40.5 to 42.0 feet Unconfined Compressive Strength = 79 MPa	15							
		25	1.5	100	0	MW	R3		moderately fractured 40.5 to 42.0 feet intensely fractured 42.0 to 50.0 feet								
		26	1	83	0	SW	R3										
	45									9		J	75	VC	-	SR	No
4875		27	2.5	100	57	MW	R3					J	45	VC	T	SR	Cl
		28	3	97	22	MW	R3			11		J	45	VC	T	SR	Cl
												J	45	VC	T	SR	Cl
												J	45	VC	T	SR	Cl
												J	45	VC	T	SR	Cl
	50											J	30	VC	T	SR	Cl

Bottom of Hole = 50.0'
Boring Terminated at Planned Depth
Borehole Backfilled with Bentonites Chips

NewFields

CLIENT Nevada DOT
PROJECT NAME I-80 - Golconda Summit
PROJECT NUMBER 475.0499.000
PROJECT LOCATION Humboldt County, Nevada
DATE STARTED 4/22/22 **COMPLETED** 4/23/22
GROUND ELEVATION 4933.35 ft **HOLE SIZE** 8-in/4-in
DRILLING CONTRACTOR Cascade Drilling, CME-85
COORDINATES ():
DRILLING METHOD Hollow Stem Auger
LATITUDE 40.92899 **LONGITUDE** -117.41282
LOGGED BY R. Berg **CHECKED BY** J. Ruzicka
DEPTH TO WATER (FT BGS)
NOTES Autohammer, 30-inch drop, ERi=86.4%

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (N VALUE)	RECOVERY (INCHES)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	% GRAVEL	% SAND	% FINES	REMARKS
	0		Surface Conditions: Clear Ground										
4930			**Silty Sand with Gravel (SM)**, tan brown, slightly moist, nonplastic, fine to coarse sand, fine angular gravel to 3/8" dia.										Drilling Rate 0' to 2.5' 2 min
			Silty Gravel with Sand (GM), light brown, dry, very dense, low plasticity, fine to coarse sand, fine and coarse gravel to 3" dia.	SPT	8-50/5in	6							rig chatter, hard drilling at 3.5'
			Practical refusal encountered, switched to HQ core at 4', see log RC-22-003_R for rock log										Drilling Rate 2.5' to 4' 15 min

NewFields

CLIENT Nevada DOT
PROJECT NAME 1-80 - Golconda Summit
PROJECT NUMBER 475.0499.000
PROJECT LOCATION Humboldt County, Nevada
DATE STARTED 4/22/22 **COMPLETED** 4/23/22
GROUND ELEVATION 4933.35 ft **HOLE SIZE** 4-in
DRILLING CONTRACTOR Cascade Drilling, CME-85
COORDINATES ():
DRILLING METHOD HQ Core
LATITUDE 40.92899 **LONGITUDE** -117.41282
LOGGED BY R.Berg **CHECKED BY** J. Ruzicka
DEPTH TO WATER (FT BGS) no free water encountered
NOTES

ELEVATION (ft)	DEPTH (ft)	RUN NO.	RUN LENGTH	REC (%)	RQD (%)	WEATHERING	HARDNESS	GRAPHIC LOG	MATERIAL DESCRIPTION	DRILLING RATE (MIN)	WATER LEVEL	DISCONTINUITY LOG TYPE	DIP	SPACING	APERTURE	ROUGHNESS	INFILL
	0								Surface details:								
									Refer to Soil log for 0 - 4'								
4930																	
	5	1	1	100	0	HW	R4		**CALCAREOUS QUARTZITE**, light grey to brown, fine grained, slightly to moderately weathered, medium strong to strong, moderately to intensely fractured, reaction to HCl, with calcium carbonate infill			J	45	C	O	SR	No
		2	1.5	100	50	HW	R4			13		J	45	C	O	SR	Cl
		3	0.5	100	0	HW	R4		moderately fractured 5 to 6.5 feet			J	90	C	O	SR	Cl
4925		4	2	96	33	SW	R5		intensely fractured 6.5 to 7 feet 7.0 to 12.0 feet Unconfined Compressive Strength = 132 MPa			J	45	VC	O	SR	Roots
	10								unfractured 7 to 7.5 feet			J	45	VC	O	SR	Roots
		5	3	100	100	SW	R5		intensely fractured 7.5 to 9.0 feet dark grey to brown slightly fractured 9.0 to 33.0 feet	16		J	45	MC	O	SR	Ca
												J	0	VC	O	SR	Cl
4920												J	0	VC	O	R	No
		6	4	100	65	SW	R4			17		J	0	VC	O	R	No
	15											J	45	VC	O	R	Fe
		7	1.75	100	100	SW	R4			15		J	45	C	O	R	Ca
4915																	
	20											J	30	C	O	SR	Ca
		8	5	100	98	SW	R4			26							
4910																	
												V	45	C	C	-	Ca
	25																
		9	5	97	93	SW	R4			37		J	45	VC	O	SR	Ca
												J	45	VC	C	-	Ca
												J	45	C	O	SR	Ca
4905												J	45	C	O	SR	Ca,C
									27.8 to 33.0 feet Unconfined Compressive Strength = 120 MPa			J	90	VC	O	SR	Ca
	30								roots noted in fractures			J	45	VC	O	SR	Ca
		10	5.25	95	78	MW	R5			23		J	45	VC	O	SR	Ca
												J	45	VC	O	SR	No
												J	45	VC	O	SR	No
4900												V	45	VC	O	SR	Ca
												V	45	VC	O	R	No
		11	2	92	25	MW	R3		**TUFF**, highly altered, tan to light brown with green layering, aphanitic, moderately weathered, medium strong, moderately to intensely fractured, with clast inclusions and			J	45	VC	O	SR	No
	35											J	45	VC	C	SR	Ca

(Continued Next Page)

NewFields

CLIENT Nevada DOT **PROJECT NAME** 1-80 - Golconda Summit

PROJECT NUMBER 475.0499.000 **PROJECT LOCATION** Humboldt County, Nevada

ELEVATION (ft)	DEPTH (ft)	RUN NO.	RUN LENGTH	REC (%)	RQD (%)	WEATHERING	HARDNESS	GRAPHIC LOG	MATERIAL DESCRIPTION	DRILLING RATE (MIN)	WATER LEVEL	DISCONTINUITY LOG TYPE	DIP	SPACING	APERTURE	ROUGHNESS	INFILL
	35								secondary mineralization of iron and pyrite	27		J	45	VC	O	SR	Ca
		12	3	100	83	MW	R5		**CALCAREOUS QUARTZITE**, grey, fine grained, slightly to moderately weathered, medium strong to strong, slightly fractured, reaction to HCl			J	45	VC	O	SR	Ca
												J	45	VC	O	SR	Ca
												J	45	VC	C	SR	No
4895												J	45	VC	O	SR	Ca,Ox
									35.0 to 38.0 feet Unconfined Compressive Strength = 144 MPa			J	45	VC	O	SR	Ca
	40											J	30	VC	O	SR	Ca
												J	30	VC	O	SR	Ca
		13	5	95	95	SW	R5			34		J	30	VC	O	SR	Ca
												V	45	VC	O	SR	Ca
												V	45	VC	O	SR	Ca
												V	45	VC	O	SR	Ca
									42.0 to 45.0 feet Unconfined Compressive Strength = 150 MPa			J	30	VC	O	SR	No
4890												J	45	VC	O	SR	Ca
		14	2	100	100	SW	R5					V	45	VC	C	-	Ca
	45											V	45	VC	C	-	Ca
										30		V	45	VC	C	-	Ca
		15	2	75	33	MW	R3		**SANDSTONE**, fine grained, moderately weathered, medium strong, moderately to intensely fractured, with calcium carbonate inclusions			V	15	VC	C	-	Ca
												V	45	VC	C	-	Ca
4885									Drilling return fluids indicate material highly to completely weathered, cuttings observed as dominately yellow fine sandy silt to silty sand.								
		16	3	0	0	CW	R0			11							
	50																
		17	5	0	0	CW	R0			25							
4880																	
	55																

Bottom of Hole = 55.0'
Boring Terminated at Planned Depth
Borehole Backfilled with Bentonites Chips

NewFields

CLIENT Nevada DOT
PROJECT NAME I-80 - Golconda Summit
PROJECT NUMBER 475.0499.000
PROJECT LOCATION Humboldt County, Nevada
DATE STARTED 4/13/22 **COMPLETED** 4/13/22
GROUND ELEVATION 5100.71 ft **HOLE SIZE** 8-in
DRILLING CONTRACTOR Cascade Drilling, CME-85
COORDINATES ():
DRILLING METHOD Hollow Stem Auger
LATITUDE 40.92195 **LONGITUDE** -117.38634
LOGGED BY R. Berg **CHECKED BY** J. Ruzicka
DEPTH TO WATER (FT BGS) no free water encountered
NOTES Autohammer, 30-inch drop, ERi=77.8%

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (N VALUE)	RECOVERY (INCHES)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	% GRAVEL	% SAND	% FINES	REMARKS
	0		Surface Conditions: Clear Ground										
5100			**6" Aggregate Base**										
			FILL: Clayey Sand with Gravel (SC), dark brown, slightly moist, loose, low plasticity, fine to coarse sand, fine and coarse subrounded gravel to 2" dia.										Drilling Rate 0' to 2.5' < 1 min
				SPT	4-3-2 (5)	4							Drilling Rate 2.5' to 5' < 1 min
	5												
5095			medium plasticity, medium dense	MC	6-5-10 (15)	16	10.4	36	19	33	40	27	dry density = 94.9 pcf
													Drilling Rate 5' to 7.5' 1 min
				SPT	3-6-10 (16)	12				19	44	37	Drilling Rate 7.5' to 10' < 1 min
	10												
5090			increased sand content	MC	3-8-16 (24)	14							rock in shoe
			QUARTZITE AND LIMESTONE, very weak, completely to highly weathered, recovered as silty gravel with sand, light brown to tan brown, slightly moist, nonplastic, fine to coarse sand, fine and coarse subrounded gravel, reaction to HCl										Drilling Rate 10' to 15' 4 min
	15			SPT	20-50/5in	11							
5085													Drilling Rate 15' to 20' 6 min hard drilling at 18'
	20												
5080			**QUARTZITE AND LIMESTONE**, very weak, highly weathered, recovered as silty gravel with sand, light brown, slightly moist, nonplastic, fine to coarse sand, fine and coarse angular gravel, reaction to HCl	MC	16-70/5in	5							rock in shoe
													Drilling Rate 20' to 25' 6 min
	25												
5075			**QUARTZITE AND LIMESTONE**, weak, highly to moderately weathered, recovered as poorly graded gravel with sand and silt, grey, slightly moist, nonplastic, fine sand, coarse gravel to 3"	SPT	50/3in	0							hammer bouncing
													Drilling Rate 25' to 30' 10 min
	30												
5070				SPT	32-48-48 (96)	14				59	31	10	
													Drilling Rate 30' to 35' 9 min
	35												

(Continued Next Page)

NewFields

CLIENT Nevada DOT **PROJECT NAME** I-80 - Golconda Summit

PROJECT NUMBER 475.0499.000 **PROJECT LOCATION** Humboldt County, Nevada

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (N VALUE)	RECOVERY (INCHES)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	% GRAVEL	% SAND	% FINES	REMARKS
5065	35		**QUARTZITE AND LIMESTONE**, weak, highly to moderately weathered, recovered as poorly graded gravel with sand and silt, grey, slightly moist, nonplastic, fine sand, coarse gravel to 3" *(continued)*	MC	10-8-16 (24)	3							rock in shoe
													Drilling Rate 35' to 40' 6 min
	40												
5060				SPT	7-6-14 (20)	0							
			QUARTZITE AND LIMESTONE, weak, highly weathered, recovered as clayey gravel with sand, slightly moist, low plasticity, fine to coarse sand, fine and coarse gravel, reaction to HCl	MC	10-18-24 (42)	7							Drilling Rate 40' to 45' 3 min
	45												
5055				MC	7-24-40 (64)	0							
													Drilling Rate 45' to 50' 4 min
	50												
5050			highly to completely weathered	MC	25-70/5in	11							

Bottom of Hole = 50.9'
Boring Terminated at Planned Depth
Groundwater Not Encountered
Borehole Backfilled with Bentonite Chips

NewFields

CLIENT Nevada DOT
PROJECT NAME I-80 - Golconda Summit
PROJECT NUMBER 475.0499.000
PROJECT LOCATION Humboldt County, Nevada
DATE STARTED 4/18/22 **COMPLETED** 4/18/22
GROUND ELEVATION 5100.71 ft **HOLE SIZE** 8-in
DRILLING CONTRACTOR Cascade Drilling, CME-85
COORDINATES ():
DRILLING METHOD Hollow Stem Auger
LATITUDE 40.92196 **LONGITUDE** -117.38633
LOGGED BY R. Berg **CHECKED BY** J. Ruzicka
DEPTH TO WATER (FT BGS) no free water encountered
NOTES Autohammer, 30-inch drop, ERi=86.4%

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (N VALUE)	RECOVERY (INCHES)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	% GRAVEL	% SAND	% FINES	REMARKS
	0		Surface Conditions: Clear Ground										
5100			**6" Aggregate Base**										
			FILL: Clayey Gravel with Sand (GC), brown, slightly moist, loose, low plasticity, fine to coarse sand, fine gravel	GB									Drilling Rate 0' to 2.5' < 1 min
				SPT	4-3-2 (5)	18							
													Drilling Rate 2.5' to 5' < 1 min
	5			GB									
5095			very dense, fine and coarse subangular to subrounded gravel to 2.5" dia.	MC	15-23-23 (46)	14							Drilling Rate 5' to 7.5' < 1 min
			increased sand content, medium dense	SPT	10-12-16 (28)	12							Drilling Rate 7.5' to 10' < 1 min
	10												
5090			very dense	MC	15-38-35 (73)	12							Drilling Rate 10' to 15' 2 min
			QUARTZITE AND LIMESTONE, very weak, highly weathered, recovered as silty gravel with sand, light grey to brown, slightly moist, nonplastic, fine to coarse sand, fine angular to subangular gravel to 3/8", reaction to HCl, slight cementation										
	15												
5085				SPT	20-45-36 (81)	12							Drilling Rate 15' to 20' 3 min
				GB									
	20												
5080			fine and coarse gravel	MC	33-70/5in	5							Drilling Rate 20' to 25' < 1 min
	25												
5075			**QUARTZITE AND LIMESTONE**, weak, highly weathered, recovered as silty gravel with sand, light grey, slightly moist, nonplastic, weakly cemented, oxidized matrix material	MC	7-14-20 (34)	12							Drilling Rate 25' to 30' < 1 min
	30												
5070				SPT	5-9-13 (22)	10							Drilling Rate 30' to 35' 3 min
				GB									
	35												

(Continued Next Page)

NewFields

CLIENT Nevada DOT **PROJECT NAME** I-80 - Golconda Summit

PROJECT NUMBER 475.0499.000 **PROJECT LOCATION** Humboldt County, Nevada

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (N VALUE)	RECOVERY (INCHES)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	% GRAVEL	% SAND	% FINES	REMARKS
5065	35		**QUARTZITE AND LIMESTONE**, weak, highly weathered, recovered as silty gravel with sand, light grey, slightly moist, nonplastic, weakly cemented, oxidized matrix material *(continued)*	MC	70/4in	0							
				GB									Drilling Rate 35' to 40' 5 min
	40												
5060			fine and coarse subrounded gravel to 1.5" dia.	SPT	7-7-10 (17)	7							
													Drilling Rate 40' to 45' 7 min
	45												
5055			fine and coarse subangular to angular gravel to 2.5" dia.	MC	16-70/5in	10							
													Hole terminated at 3:45pm
	50												
			QUARTZITE AND LIMESTONE, very weak, highly weathered, recovered as poorly graded gravel with sand and silt, brown, slightly moist, nonplastic, fine angular gravel to 3/8"	SPT	50	5							

Bottom of Hole = 50.5'
Boring Terminated at Planned Depth
Groundwater Not Encountered
Borehole Backfilled with Bentonite Chips

NewFields

CLIENT Nevada DOT
PROJECT NAME I-80 - Golconda Summit
PROJECT NUMBER 475.0499.000
PROJECT LOCATION Humboldt County, Nevada
DATE STARTED 4/15/22 **COMPLETED** 4/18/22
GROUND ELEVATION 5088.28 ft **HOLE SIZE** 8-in/4-in
DRILLING CONTRACTOR Cascade Drilling, CME-85
COORDINATES ():
DRILLING METHOD Hollow Stem Auger
LATITUDE 40.92161 **LONGITUDE** -117.38644
LOGGED BY R. Berg **CHECKED BY** J. Ruzicka
DEPTH TO WATER (FT BGS) no free water encountered
NOTES Autohammer, 30-inch drop, ERi=77.8%

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (N VALUE)	RECOVERY (INCHES)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	% GRAVEL	% SAND	% FINES	REMARKS
	0		Surface Conditions: Clear Ground										
			FILL: Clayey Gravel with Sand (GC), brown, slightly moist to moist, low plasticity, fine to coarse sand, fine gravel										
			Clayey Sand with Gravel (SC), brown, slightly moist, very dense, high plasticity, fine to coarse sand, fine and coarse angular to subangular gravel to 2.5"	GB									Drilling Rate 0' to 2.5' < 1 min
5085				SPT	3-6-11 (17)	16		54	31	26	42	32	Drilling Rate 2.5' to 5' < 1 min
	5			GB						29	35	36	
				MC	18-37-22 (59)	12							Drilling Rate 5' to 7.5' 1 min
5080			**QUARTZITE AND LIMESTONE**, weak, highly weathered, recovered as poorly graded gravel with sand and silt, light brown to white, dry, nonplastic, fine to coarse sand, fine subrounded and subangular gravel to 3/8"	SPT	15-20-22 (42)	14							Drilling Rate 7.5' to 10' 1 min
	10			MC	53-70/4in	8							
5075			**QUARTZITE AND LIMESTONE**, medium strong, moderately weathered, recovered as poorly graded gravel with sand and silt, brown, slightly moist, fine to coarse sand, fine and coarse subangular gravel to 2" dia.	GB						60	32	8	Drilling Rate 10' to 15' 4 min
	15		**TUFF**, very weak, completely weathered, recovered as clayey gravel with sand, brown to light brown, slightly moist, low plasticity, fine to coarse sand, fine and coarse subrounded gravel, reaction to HCl, slight cementation	SPT	10-20-50/5in	17							Drilling Rate 15' to 20' 3 min
5070													
	20		**QUARTZITE AND LIMESTONE**, very weak, highly weathered with completely weathered clasts, recovered as silty gravel with sand, light brown, slightly moist, nonplastic, fine to coarse sand, fine subangular gravel to 3/8" dia, oxidized	MC	70/4in	0							
5065				GB									Drilling Rate 20' to 25' 3 min
	25			SPT	17-37-36 (73)	14	3.9						
5060													Drilling Rate 25' to 30' 3 min
	30			MC	29-70/5in	9							
5055													Drilling Rate 30' to 35' 4 min
	35												

(Continued Next Page)

NewFields

CLIENT Nevada DOT **PROJECT NAME** I-80 - Golconda Summit

PROJECT NUMBER 475.0499.000 **PROJECT LOCATION** Humboldt County, Nevada

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (N VALUE)	RECOVERY (INCHES)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	% GRAVEL	% SAND	% FINES	REMARKS
	35		**QUARTZITE AND LIMESTONE**, very weak, highly weathered, recovered as clayey sand with gravel, brown, slightly moist, low plasticity, fine to coarse sand, fine subrounded to subangular gravel with 3/8"	SPT	50/5in	5							
5050				GB						30	37	33	Drilling Rate 35' to 40' 3 min
	40			MC	44-70/1in	7							
5045													Drilling Rate 40' to 45' 7 min
	45		**QUARTZITE AND LIMESTONE**, very weak, highly to completely weathered, recovered as clayey gravel with sand, brown, slightly moist, low plasticity, fine to coarse sand, fine and coarse subangular to subrounded gravel	SPT	40-38-50/1in	12							
5040				GB									Drilling Rate 45' to 49' 15 min
			Practical refusal encountered, switched to HQ core at 49', see log RC-22-005_R for rock log										

NewFields

CLIENT Nevada DOT
PROJECT NAME 1-80 - Golconda Summit
PROJECT NUMBER 475.0499.000
PROJECT LOCATION Humboldt County, Nevada
DATE STARTED 4/15/22 **COMPLETED** 4/18/22
GROUND ELEVATION 5088.28 ft **HOLE SIZE** 4-in
DRILLING CONTRACTOR Cascade Drilling, CME-85
COORDINATES ():
DRILLING METHOD HQ Core
LATITUDE 40.92161 **LONGITUDE** -117.38644
LOGGED BY R.Berg **CHECKED BY** J. Ruzicka
DEPTH TO WATER (FT BGS) no free water encountered
NOTES

ELEVATION (ft)	DEPTH (ft)	RUN NO.	RUN LENGTH	REC (%)	RQD (%)	WEATHERING	HARDNESS	GRAPHIC LOG	MATERIAL DESCRIPTION	DRILLING RATE (MIN)	WATER LEVEL	DISCONTINUITY LOG: TYPE	DIP	SPACING	APERTURE	ROUGHNESS	INFILL
	0								Surface details: Refer to Soil log for 0 - 49 feet								
5085	5																
5080	10																
5075	15																
5070	20																
5065	25																
5060	30																
5055	35																

NF-GEOTECH ROCK CORE LOG - GINT STD US LAB.GDT - 9/22/22 13:03 - S:\PROJECTS\0499.000_I-80 GOLCONDA_TRUCKCLIMBINGLANES\03-LOGS\GINT\ROCK_LOGS\I-80 GOLCONDA SUMMIT ROCK LOGS_REV1.GPJ

(Continued Next Page)

NewFields

CLIENT Nevada DOT **PROJECT NAME** 1-80 - Golconda Summit

PROJECT NUMBER 475.0499.000 **PROJECT LOCATION** Humboldt County, Nevada

ELEVATION (ft)	DEPTH (ft)	RUN NO.	RUN LENGTH	REC (%)	RQD (%)	WEATHERING	HARDNESS	GRAPHIC LOG	MATERIAL DESCRIPTION	DRILLING RATE (MIN)	WATER LEVEL	DISCONTINUITY LOG: TYPE	DIP	SPACING	APERTURE	ROUGHNESS	INFILL
	35								Refer to Soil log for 0 - 49 feet *(continued)*								
5050																	
	40																
5045																	
	45																
5040																	
	50	2	1.2	42	42	SW	R3		**QUARTZITE AND LIMESTONE**, brown white and green, slightly weathered, medium strong, reaction to HCl	3							
5035		3	4.8	3	0	CW	R1		**QUARTZITE AND LIMESTONE**, brown, very weak to weak, highly to completely weathered, recovered as clayey gravel with sand, slightly moist, low plasticity, fine to coarse sand, fine and coarse subangular to subrounded gravel	3							
	55																
5030		4	5	0	0	CW	R1			2							
	60								Bottom of Hole = 60.0' Boring Terminated at Planned Depth Borehole Backfilled with Bentonites Chips								

NewFields

CLIENT Nevada DOT
PROJECT NAME I-80 - Golconda Summit
PROJECT NUMBER 475.0499.000
PROJECT LOCATION Humboldt County, Nevada
DATE STARTED 4/14/22 **COMPLETED** 4/14/22
GROUND ELEVATION 5162.15 ft **HOLE SIZE** 8-in
DRILLING CONTRACTOR Cascade Drilling, CME-85
COORDINATES ():
DRILLING METHOD Hollow Stem Auger
LATITUDE 40.92118 **LONGITUDE** -117.39481
LOGGED BY R. Berg **CHECKED BY** J. Ruzicka
DEPTH TO WATER (FT BGS) no free water encountered
NOTES Autohammer, 30-inch drop, ERi=77.8%

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (N VALUE)	RECOVERY (INCHES)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	% GRAVEL	% SAND	% FINES	REMARKS
	0		Surface Conditions: Grasses										
5160			**Silty Sand (SM)**, brown, dry, low plasticity, fine sand, rootlets, dessication cracking at surface										Drilling Rate 0' to 2.5' < 1 min
			Silty Gravel with Sand (GM), light brown, dry to slightly moist, dense, nonplastic, fine to coarse sand, fine and angular gravel to 2.5" dia., reaction to HCl	SPT	18-12-19 (31)	13				35	33	32	
	5												Drilling Rate 2.5' to 5' < 1 min
5155			**QUARTZITE AND LIMESTONE**, very weak, highly to completely weathered, recovered as silty gravel with sand, light brown, dry, nonplastic, fine to coarse sand, fine and coarse subangular gravel	MC	32-45-49 (94)	17							Drilling Rate 5' to 7.5' < 1 min
				SPT	13-21-48 (69)	12	5.3			48	37	15	Drilling Rate 7.5' to 10' < 1 min
	10		weak	MC	16-40-70/4in	16							
5150													Drilling Rate 10' to 15' 3 min
	15		**QUARTZITE AND LIMESTONE**, weak, highly weathered, recovered as clayey gravel with sand, brown to dark brown, slightly moist, low plasticity, fine and coarse sand, fine and coarse angular gravel	SPT	16-44-50/5in	17							
5145													Drilling Rate 15' to 20' 1 min
			QUARTZITE AND LIMESTONE, very weak, highly weathered, cuttings logged as poorly graded gravel, olive grey, dry, fine sand, coarse gravel										
	20			MC	25-70/4in	0							hammer bouncing
5140													Drilling Rate 20' to 25' 5 min
	25												
			QUARTZITE AND LIMESTONE, weak, highly weathered, recovered as clayey gravel with sand, light brown, dry, nonplastic, fine sand, fine gravel to 3/8" dia.	SPT	21-50/1in	5							hammer bouncing, rock in shoe
5135													Drilling Rate 25' to 30' 3 min
	30												
			QUARTZITE AND LIMESTONE, weak, highly to moderately weathered, recovered as poorly graded gravel with sand and silt, reddish brown, dry, fine to coarse sand, fine and coarse angular gravel to 3" dia.	MC	70/4in	4							rock in shoe
5130													Drilling Rate 30' to 35' 4 min
	35												

(Continued Next Page)

NewFields

CLIENT Nevada DOT **PROJECT NAME** I-80 - Golconda Summit

PROJECT NUMBER 475.0499.000 **PROJECT LOCATION** Humboldt County, Nevada

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (N VALUE)	RECOVERY (INCHES)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	% GRAVEL	% SAND	% FINES	REMARKS
	35		**QUARTZITE AND LIMESTONE**, weak, highly to moderately weathered, recovered as poorly graded gravel with sand and silt, reddish brown, dry, fine to coarse sand, fine and coarse angular gravel to 3" dia. *(continued)*	SPT	50/5in	0							hammer bouncing
5125													Drilling Rate 35' to 40' 6 min
	40		**QUARTZITE AND LIMESTONE**, weak, highly weathered, recovered as poorly graded gravel with sand, light brown, dry, fine sand, fine and coarse gravel	MC	38-70/0in	4							hammer bouncing
5120													Drilling Rate 40' to 45' 6 min
	45			SPT	50/5in	5							hammer bouncing
5115													Drilling Rate 45' to 50' 6 min
	50			MC	70/5in	5							hammer bouncing

Bottom of Hole = 50.4'
Boring Terminated at Planned Depth
Groundwater Not Encountered
Borehole Backfilled with Bentonite Chips

B-2
Drill Rig Hammer Calibration Report

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;

Cascade Drilling
7773 W Seldon Ln,
Peoria, AZ 85345
Phone: (623) 935-0124

Date: 02/26/22

Project Title: Cascade Peoria
P.O. Number: 897387
AH1D Auto Hammer

Testing was performed on February 26, 2022 in Peoria, AZ

Energy Transfer Ratio = 86.4 @ 48.5 blows per minute

Hammer Energy Measurements performed per ASTM D4633 using an approved and calibrated SPT Analyzer from Pile Dynamics, Inc. meeting the criteria of ASTM D4633-05 and per the process defined in ASTM D4633-05, The process and equipment requirements followed per ASTM D4633-05 meet the criteria of ASTM D4633-16.

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 February 26, 2022 in Las Vegas, NV

2. Field Equipment and Procedures

The drill used was a CME 85. It has a serial number of 323536. The operator was Sop of Cascade Drilling.

This Auto Hammer was loose and suspended with a cable. It has a serial number of AH1D. It uses a 140 lb. weight dropped 30” on to an anvil above the bore hole. AWJ 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 2.5’ below ground surface and then every 2.5’ to final recording at 12.5’.

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 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 lb x 30" = 4200 lb-in = 0.350 kip-ft.

6. Recommendations

Recalibration of the auto hammer is recommended annually. Recalibration is also recommended for change of operator, engine modifications and repair, hydraulic system modifications and repair, auto hammer adjustments and repair and anything else that may affect speed, function and weight of the auto-hammer

Energy Transfer Ratio = 86.4 @ 48.5 blows per minute

Depth	ETR%	BPM
2.5	85.1	49.5
5	86.7	48.8
7.5	85.8	48.6
10	86.9	49.3
12.5	87.7	46.2
Average	86.4	48.5

N60=(ETR/60)N

The reported average value is a weighted average based on the number of blows at each sample interval.

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

B-3
Rock Core Photographs


I-80 Golconda
47S 0499.000
RC-22-002
Box 1
Depth: 4.5-20'
Runs: 1,2,3,4,5
4/21/22


RL-22-007
Box #2
Runs 6, 7, 8, 9
20'-33.9'
4/22/22


RC-22-002
I-80 Golconda 475 overpass
Box #3
33.5' - 48'
Runs 10, 11, 12, 13, 14, 15 Dry
4/22/22


48'
8'
50'0"
RC-22-002
I-80 Golconda 475.04
Box #4
48' - 50'
Run 1 Sp partial
4/22/22


I-80 Golconda
RC-22-003
4'-17'9"
Box #1
Runs 1, 2, 3, 4
4/22/22


I-80 Golconda
475.0499.000
Box #2
RL-22-003
27'9"-33'0"
Runs 6,7,8
I-80 Golconda
475.0499.000
4'-17'9"
Box #1
Runs 1,2,3,4
4/22/22


I-80 Colorado
475.0499.000
Box #3
RC-22-003
33'0" - 55'0"
Runs 8, 9, 10, 11, 12
NR NR


50'
55'
60'
I-80
Boring RC-22-005
5/18/22
Box: 1
Runs: 3
Depth: 45-60'

Appendix C
Geophysical Survey Data

August 31, 2022
NewFields Project No. 475.0499.000

Jacobs
260 Michelson Drive, Suite 500
Irvine, California 92612

Attention: **Mr. Ravee Raveendra, P.E.**
Principal, Geotechnical Engineer

Re: **Geophysical Survey Results, Rev. 1**
I-80 Golconda Summit Truck Climbing Lanes Project
Humboldt County, Nevada

This revised memo presents the results of the geophysical surveys performed for the I-80 Golconda Summit, Truck Climbing Lanes Project in Humboldt County, Nevada.

1. GEOPHYSICAL SURVEYS

Geophysical surveys consisting of refraction microtremor (ReMi), and seismic refraction were performed at three locations along the project alignment; Line 1 and 3 within areas of cut slopes and Line 2 within the area of the proposed bridge structure. Seismic refraction was performed at all three survey locations, while ReMi was only performed along Lines 1 and 2. The approximate locations of the surveys are shown on the site plans in Attachment A as provided to us by Jacobs.

Data acquisition for the surveys was performed by NewFields staff with the data interpretation being performed by Dr. Satish Pullammanappallil of SUBTERRASEIS. The following sections present details regarding the data collections and analysis for the two different geophysical surveys.

1.1. Refraction Microtremor (ReMi) Surveys

The ReMi method provides an effective and efficient means to acquire general, one-dimensional, information about large volumes of the subsurface with one equipment setup. This method is used to estimate shear wave velocity profiles and provide site-specific Vs_{30} soil classification data. ReMi surveys consisted of a 24-channel system with 4.5 Hz geophones spaced 10 feet apart, for a total line length of 230 feet. Broadband ambient site noise was used as a surface wave energy

source, as well as a ten-pound sledgehammer struck against a polyethylene plate. For the active records, the energy source was offset 10 ft from both ends of the survey line. A sampling time and interval of 30 seconds and 2 milliseconds, respectively, was used for each record.

A dispersion curve consisting of the lower bound of the spectral energy shear wave velocity versus frequency trend is manually selected from the shear wave plot. An interpreted vertical S- wave profile is then obtained by fitting multiple layers and S-wave velocities to match the selected dispersion curve. The ReMi survey results are presented in Attachment B.

1.2. Seismic Refraction Surveys

Refraction surveys were performed to obtain seismic P-wave velocities to aid in assessing the rippability of shallow rock. Refraction surveys were performed using a 24-channel seismograph system with 4.5 Hz geophones spaced 10 feet apart. Data was acquired midpoint between Geophone 1 and 2 at 30-foot spacings down the line (i.e., between phones 4 and 5, 7 and 8, etc.). The energy source consisted of a ten-pound sledgehammer struck against a polyethylene plate. Readings were recorded every 0.125 milliseconds for a duration of 0.5 seconds along each line. Relative elevations between geophones were measured using a tape measure, string line and a line level. Elevations shown on the plots are relative to an elevation of 100-feet taken at Geophone No. 1.

The seismic refraction survey results are presented in Attachment C.

2. LIMITATIONS

The information contained in this memo is based on non-intrusive geophysical testing at the locations indicated on the site plans. It is possible that variation in the subsurface conditions may exist between the locations surveyed. This memo has been prepared solely for the use of Jacobs and their client for design of the I-80 Golconda Summit Truck Climbing Lanes project. Our services were performed using generally accepted geotechnical engineering practice common to the area at the time of this report. No other warranties, either expressed or implied, are included or intended.

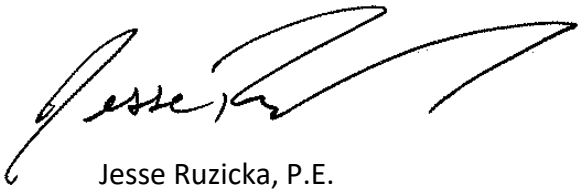
If you have any questions or require additional information, please contact the undersigned.

Sincerely,

NewFields Mining Design & Technical Services

Henry Walsh, E.I.
Engineer Intern

Reviewed by:



Jesse Ruzicka, P.E.
Senior Engineer

HW/JR/ng

LIST OF ATTACHMENTS: Attachment A – Site Plans
Attachment B – ReMi Survey Results
Attachment C – Seismic Refraction Results

Addressee: Electronic

S:\Projects\0499.000_I-80 Golconda_TruckClimbingLanes\01-Doc\Geophysical_Survey_Memo\Rev1\Memo\Geophysical_Survey_Memo_Rev1.docx

NewFields

ATTACHMENT A

Site Plans

W7Y46100_gt109.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	SPI-080-3(340)	HUMBOLDT	GT9

PRELIMINARY
SUBJECT TO REVISION
4-JUN-2022

Geophysics Line 1 Segment 1
Geophysics Line 1 Segment 2
Geophysics Line 1 Segment 3
Geophysics Line 1 Segment 4
Geophone 1
Geophone 24
Geophone 1
Geophone 24
Geophone 1
Geophone 24

MATCHLINE "PE1" 314+00.00 SEE SHEET GT8

MATCHLINE "PE1" 328+00.00 SEE SHEET GT10

I-80 WB
I-80 EB
E.O.P.
"PW1"
R/W
EX LUMEN FO PROTECT IN PLACE
CUT/FILL LINE
CUT
FILL

RC-22-001
N=15378794.05
E=2948164.28

RC-22-002
N=15378751.01
E=2948490.75

RC-22-003
N=15378686.25
E=2948723.14

T. 35 N. R. 40 E. SEC. 1
T. 35 N. R. 40 E. SEC. 12
T. 35 N. R. 41 E. SEC. 6
T. 35 N. R. 41 E. SEC. 7

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

BORING LOCATION PLAN

100.000000:1.000000 PLOT SCALE JEGSVCPWU01

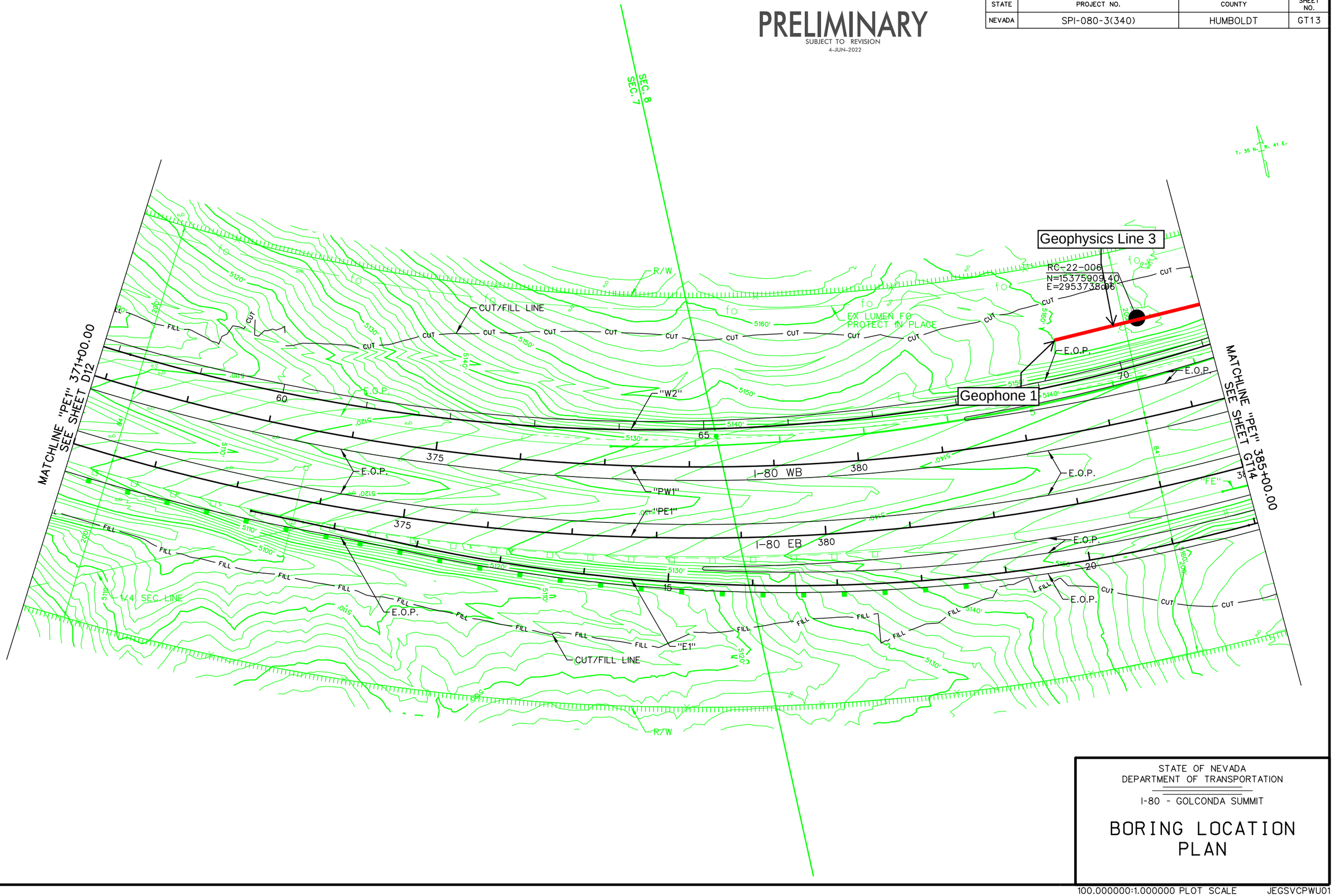
W7Y46100_gt113.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	SPI-080-3(340)	HUMBOLDT	GT13

PRELIMINARY

SUBJECT TO REVISION

4-JUN-2022



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

BORING LOCATION PLAN

100.000000:1.000000 PLOT SCALE JEGSVCPWU01

W7Y46100_gt114.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	SPI-080-3(340)	HUMBOLDT	GT14

PRELIMINARY
SUBJECT TO REVISION
4-JUN-2022

Geophysics Line 3

Geophone 24

B-22-111
N=15375952.11
E=2954192.15

B-22-110
N=15376096.14
E=2954508.15

B-22-110
N=15376238.96
E=2954897.75

B-22-105
N=15375658.63
E=2954065.02

B-22-112
N=15375706.97
E=2954631.75

B-22-113
N=15375699.59
E=2954865.38

B-22-114
N=15375843.17
E=2955155.98

CUT/FILL LINE

EX LUMEN FO

1/4 SEC. LINE

R/W

E.O.P.

"W1"

"W2"

"PW1"

"PE1"

"E1"

"E2"

"FR"

I-80 WB

I-80 EB

SAWCUT

CUT

FILL

MATCHLINE "PE1" 385+00.00
SEE SHEET GT13

MATCHLINE "PE1" 399+00.00
SEE SHEET GT15

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

BORING LOCATION PLAN

100.000000:1.000000 PLOT SCALE JEGSVCPWU01

W7Y46100_gt115.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	SPI-080-3(340)	HUMBOLDT	GT15

PRELIMINARY
SUBJECT TO REVISION
4-JUN-2022

MATCHLINE "PE1" 399+00.00
SEE SHEET GT14

MATCHLINE "PE1" 414+00.00
SEE SHEET GT16

I-80 WB

I-80 EB

"W1"

"FW"

"PW1"

"PE1"

"E2"

E.O.P.

CUT/FILL LINE

EX LUMEN FO

RC-22-004
N=15376220.26
E=2956076.79

RC-22-005
N=15376097.81
E=2956050.98

Geophone 1

Geophysics Line 2

Geophone 24

IR 80-HU 36.39
I-80B E&W

1/4 SEC. LINE

R/W

T. 35 N., R. 41 E.
SEC. 8

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

BORING LOCATION PLAN

100.000000:1.000000 PLOT SCALE JEGSVCPWU01

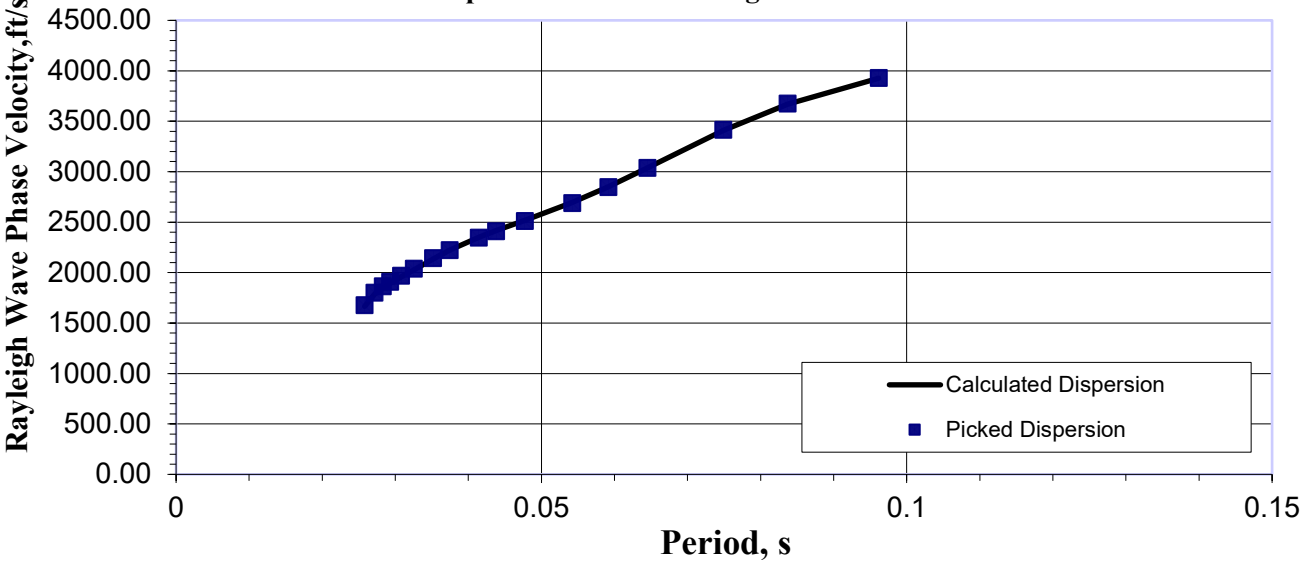
NewFields

ATTACHMENT B

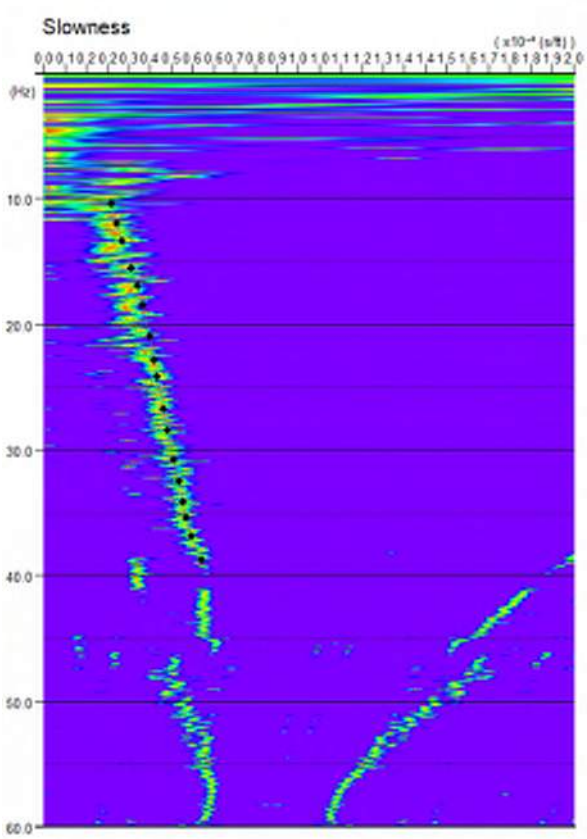
ReMi Survey Results

Line 1, Segment 1

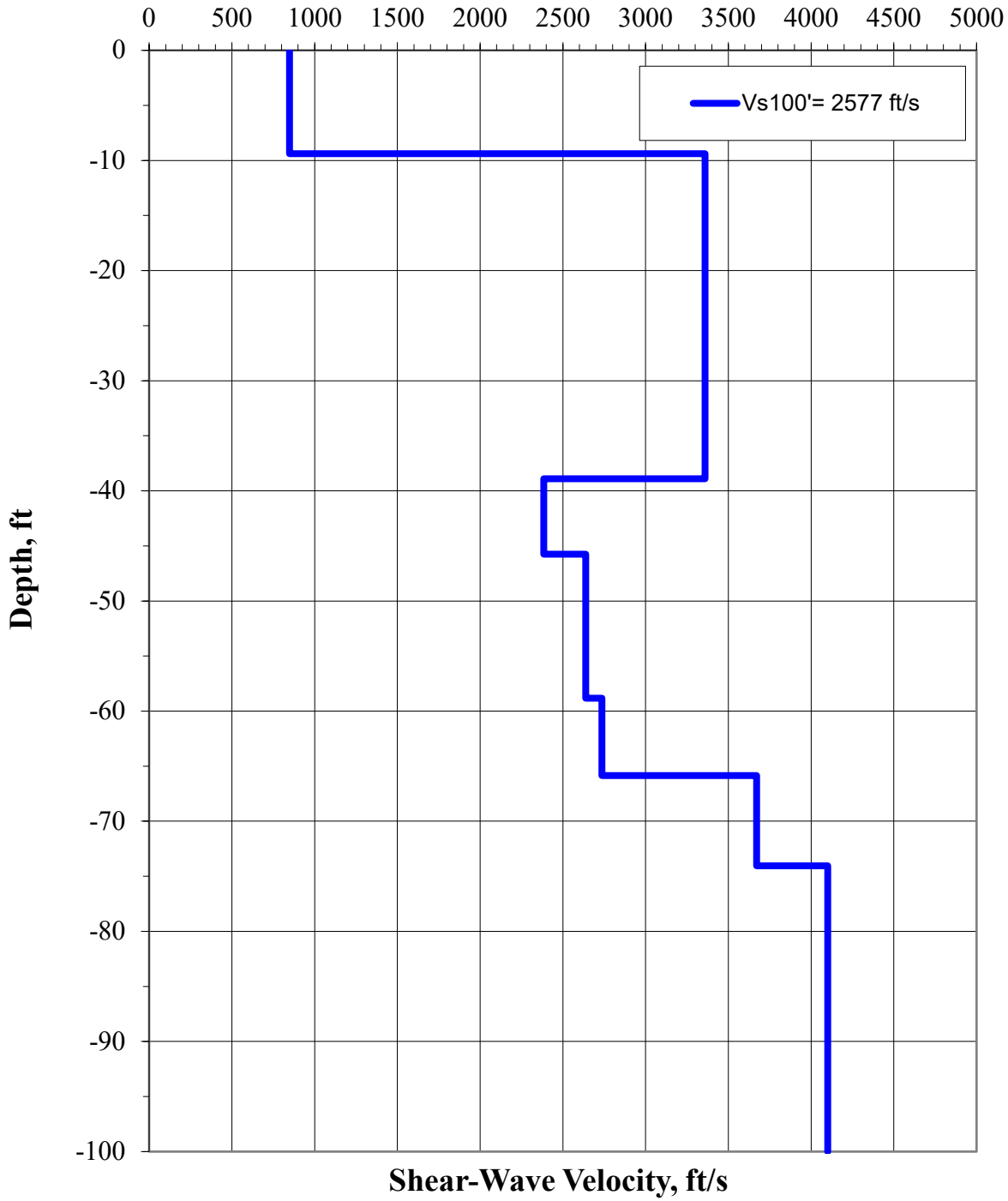
Dispersion Curve Showing Picks and Fit



Frequency-Slowness Image with Dispersion Modeling Picks

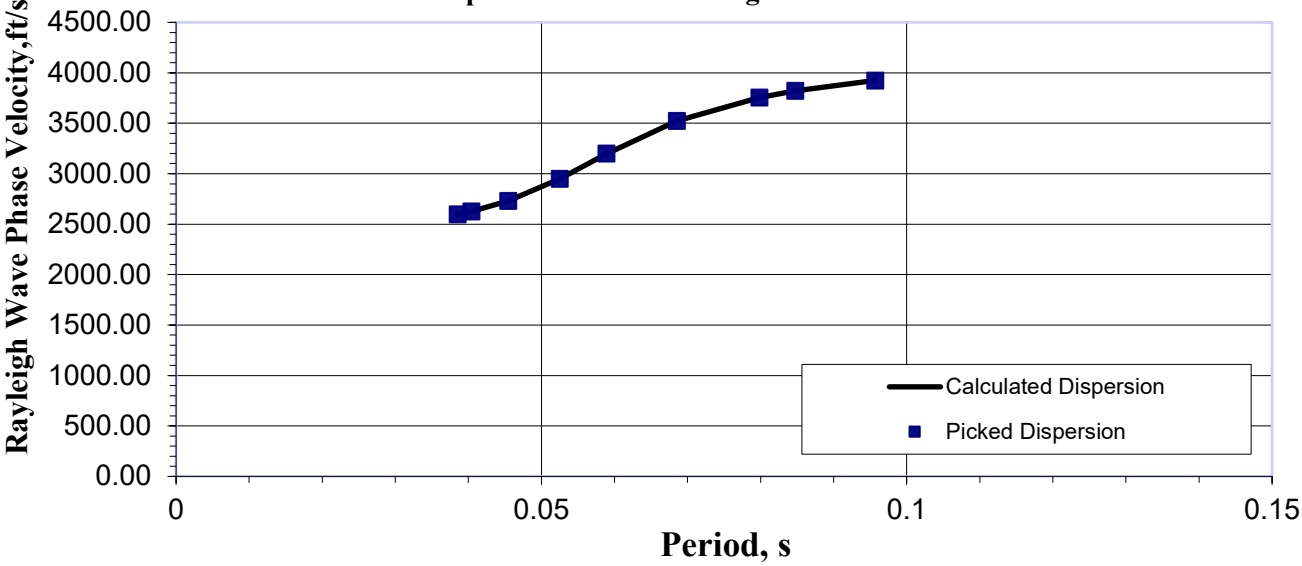


Line 1, Segment 1: Vs Model

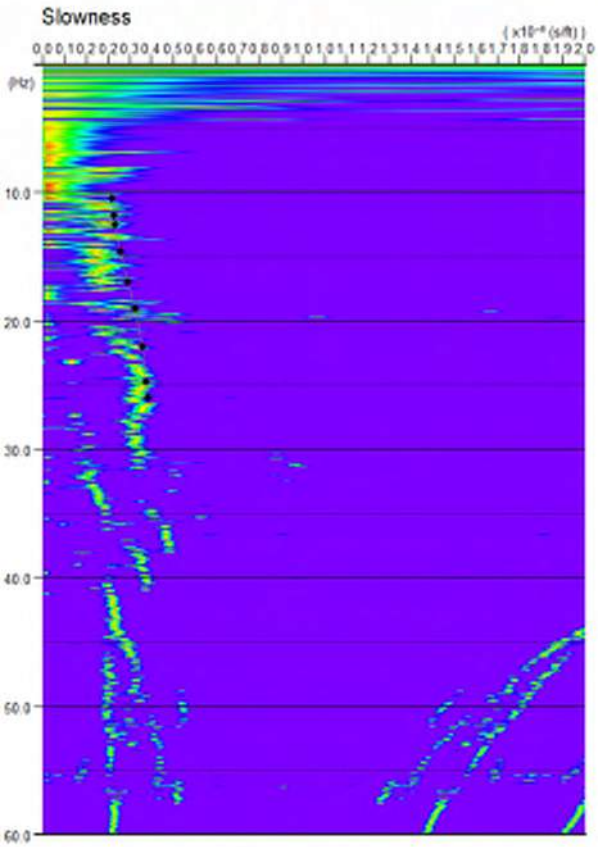


Line 1, Segment 2

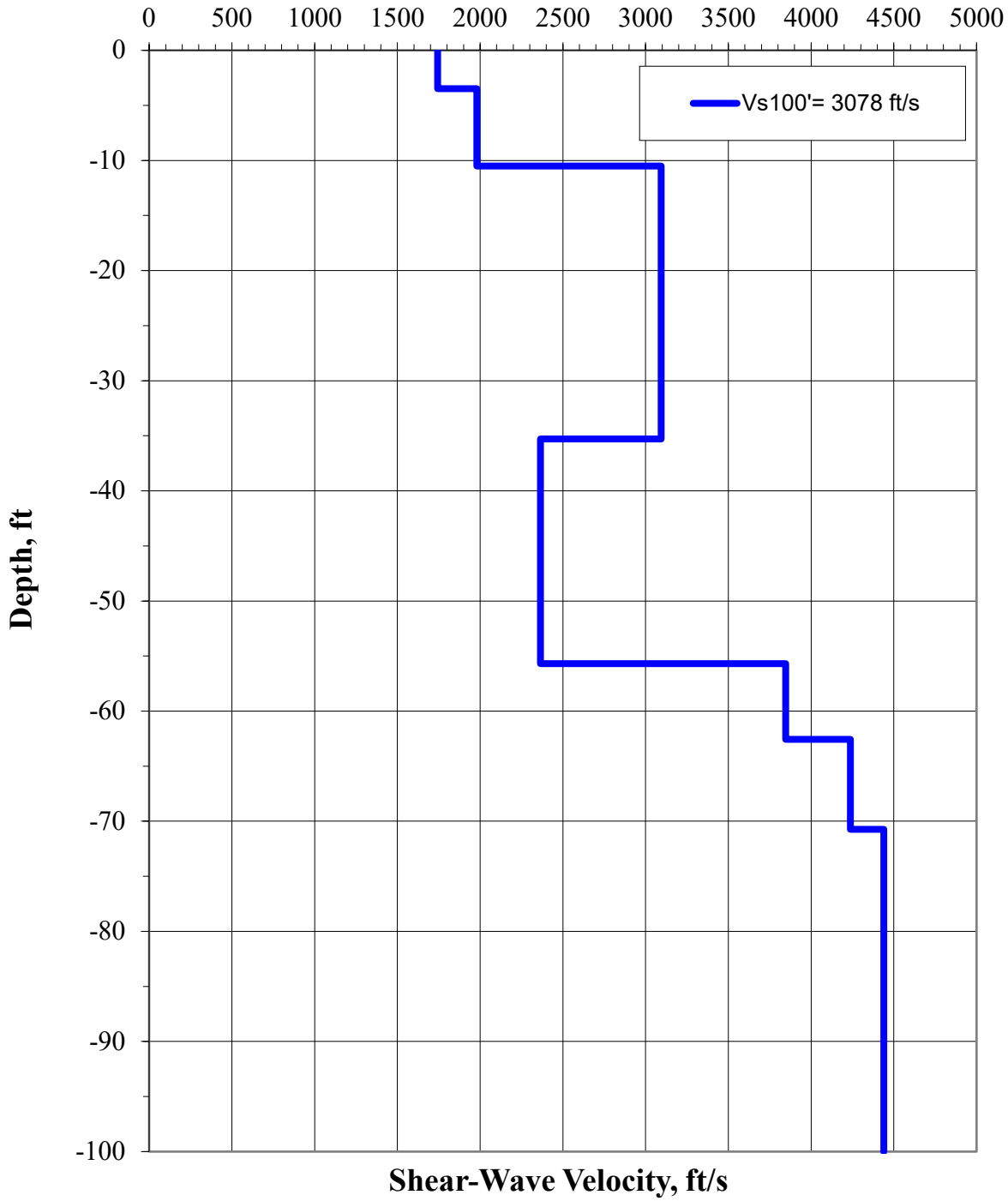
Dispersion Curve Showing Picks and Fit



Frequency-Slowness Image with Dispersion Modeling Picks

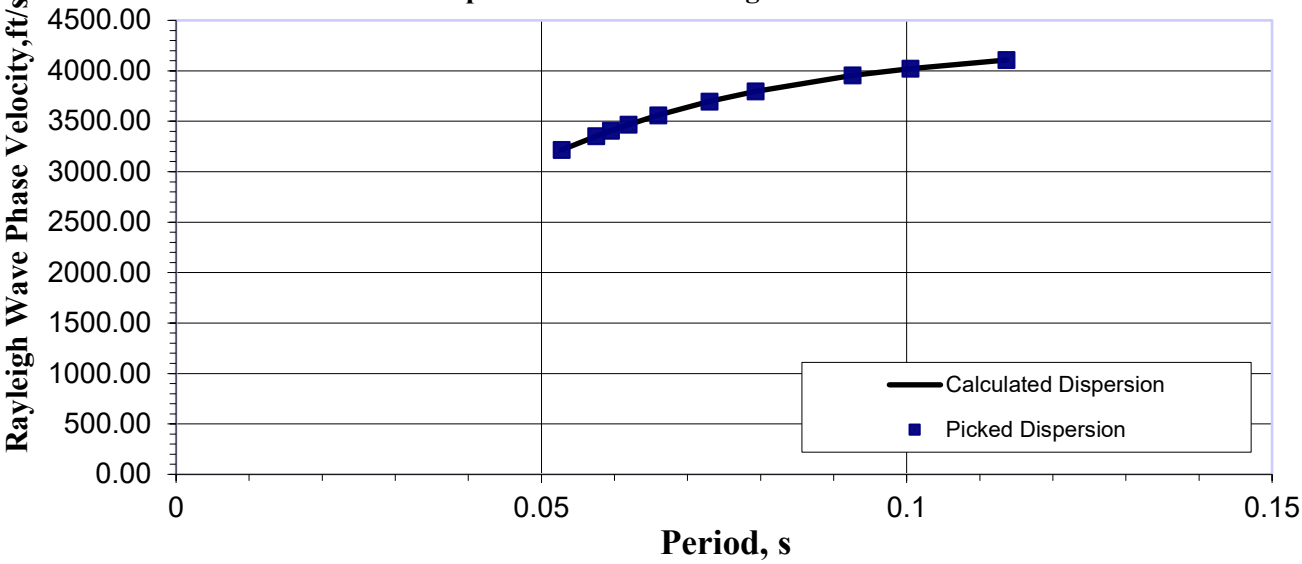


Line 1, Segment 2: Vs Model

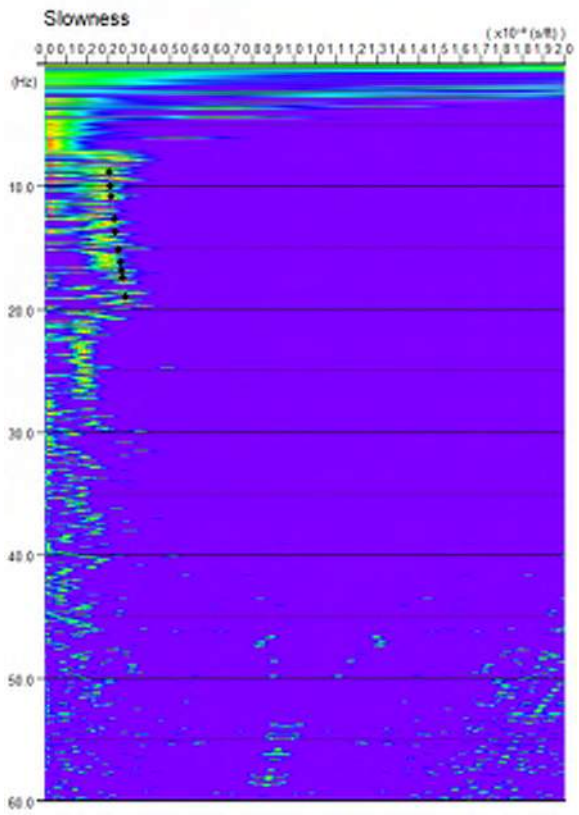


Line 1, Segment 3

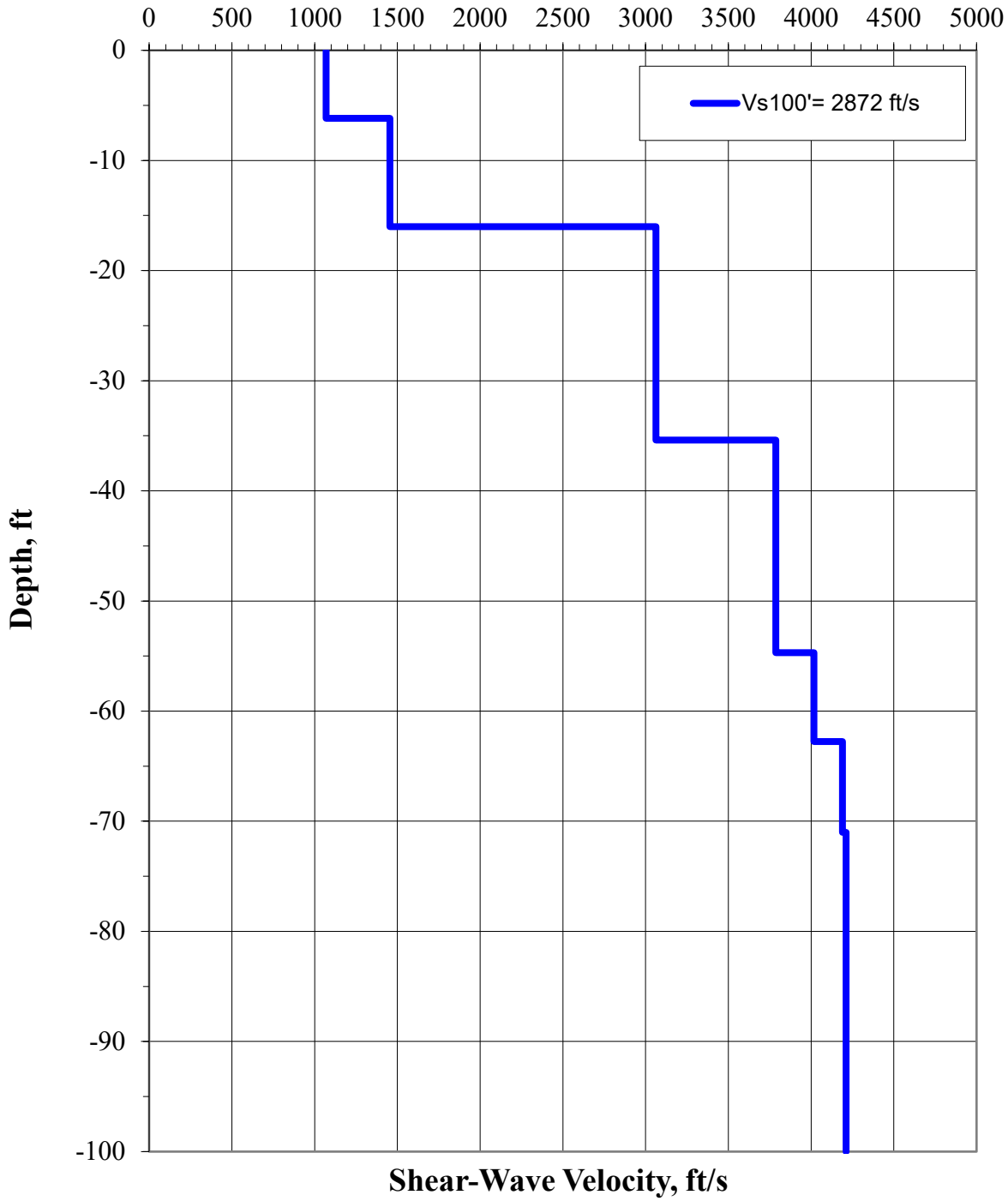
Dispersion Curve Showing Picks and Fit



Frequency-Slowness Image with Dispersion Modeling Picks

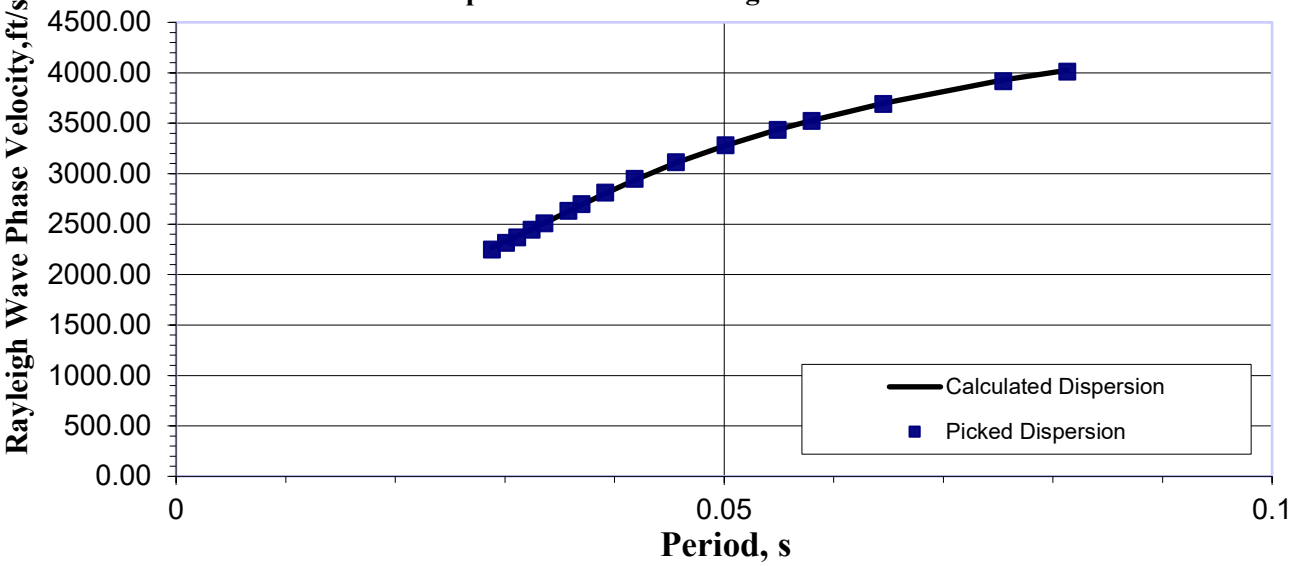


Line 1, Segment 3: Vs Model

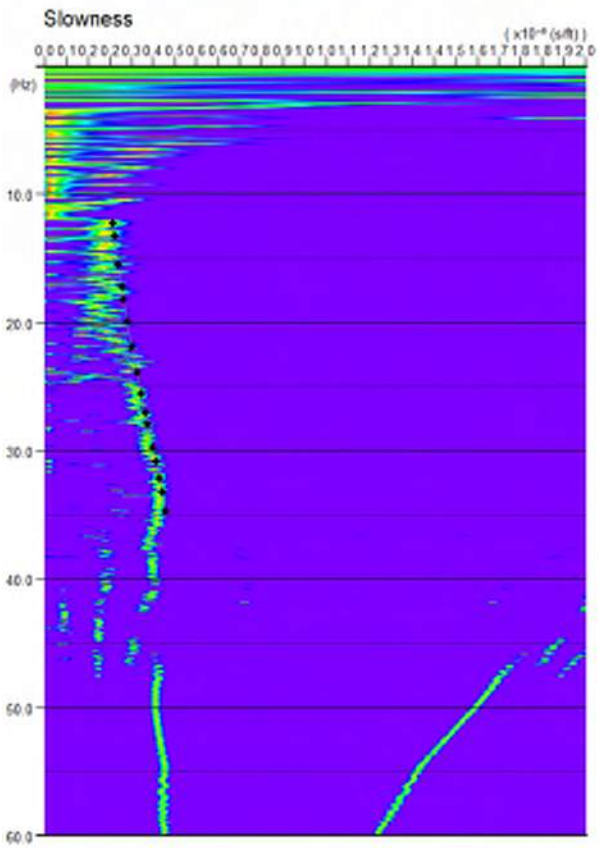


Line 1, Segment 4

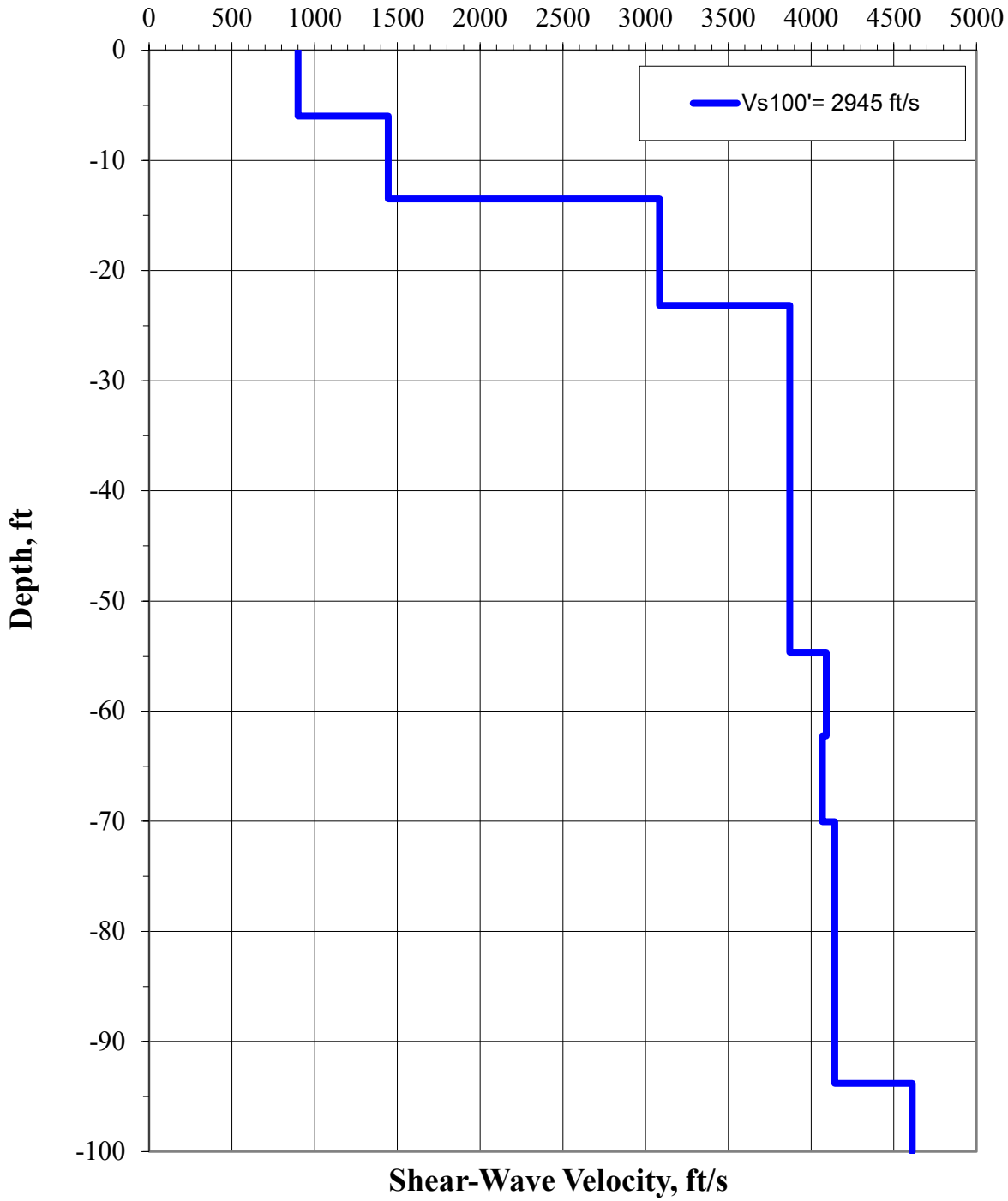
Dispersion Curve Showing Picks and Fit



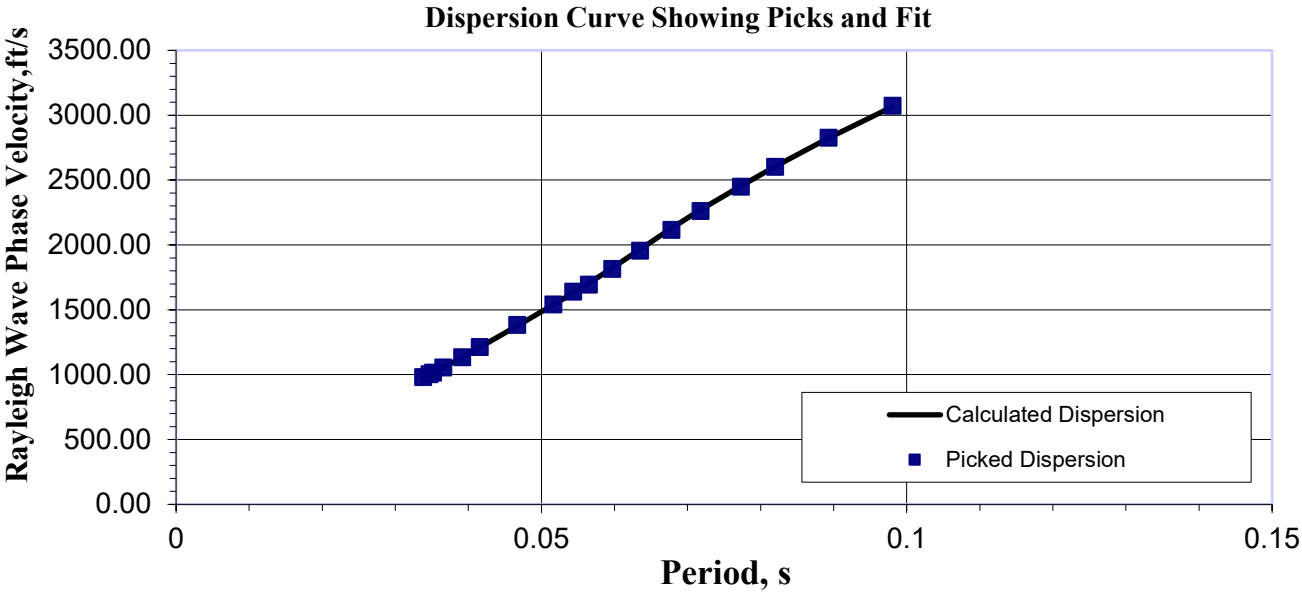
Frequency-Slowness Image with Dispersion Modeling Picks



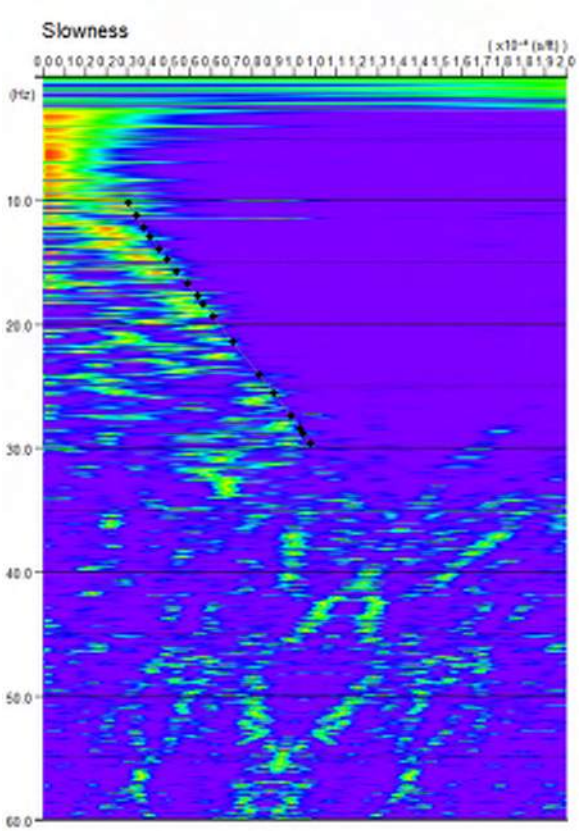
Line 1, Segment 4: Vs Model



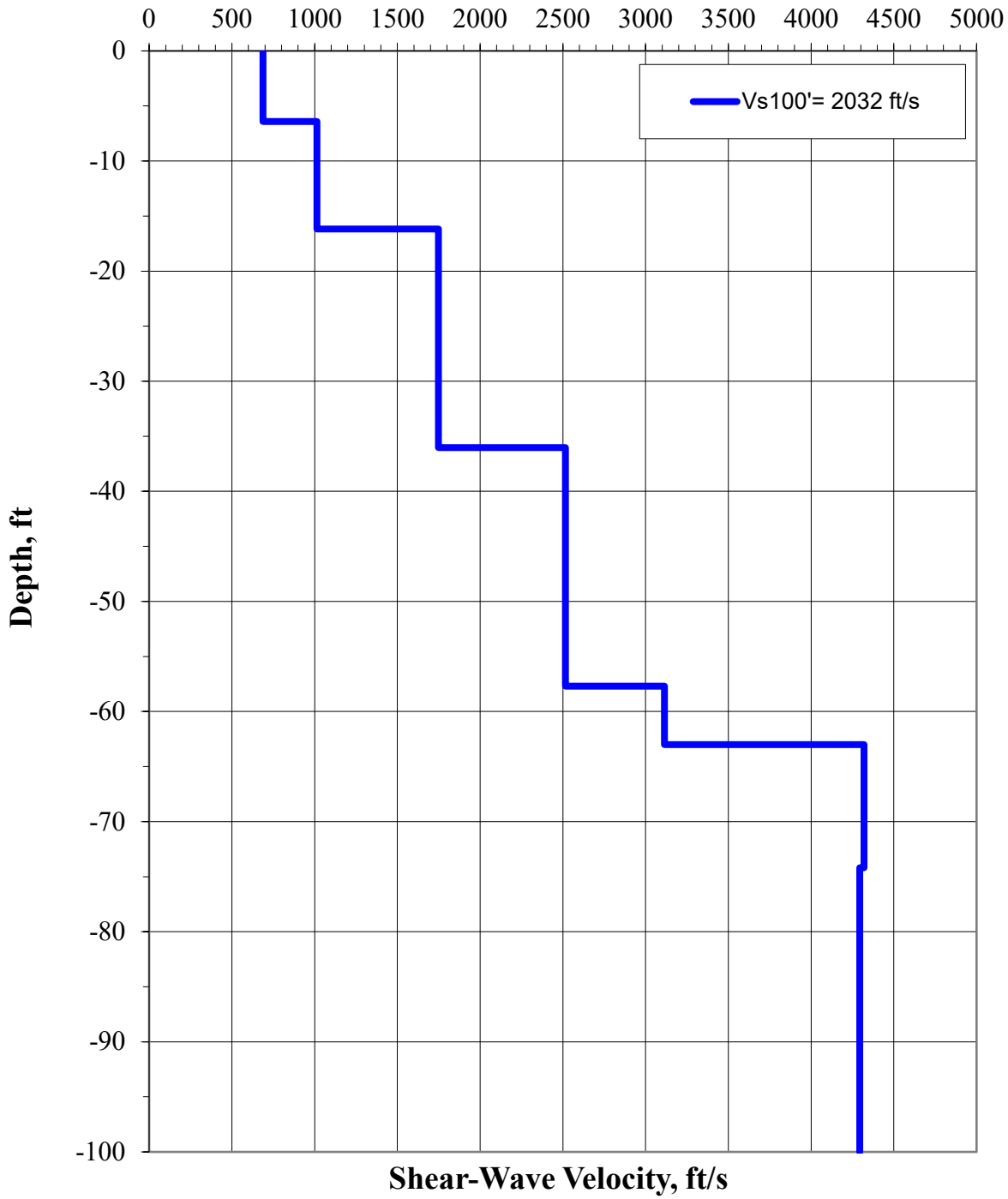
Line 3



Frequency-Slowness Image with Dispersion Modeling Picks



Line 3: Vs Model

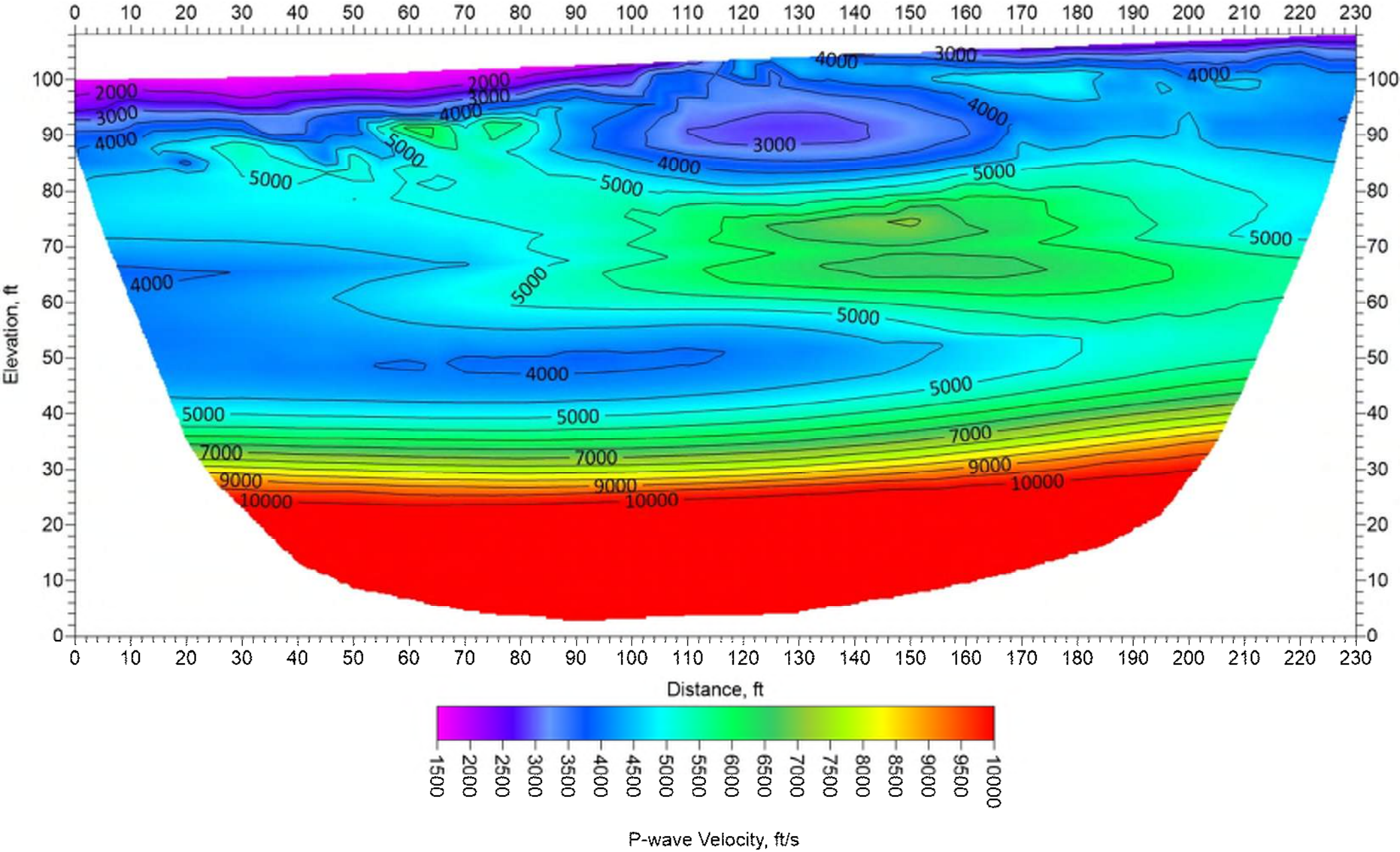


NewFields

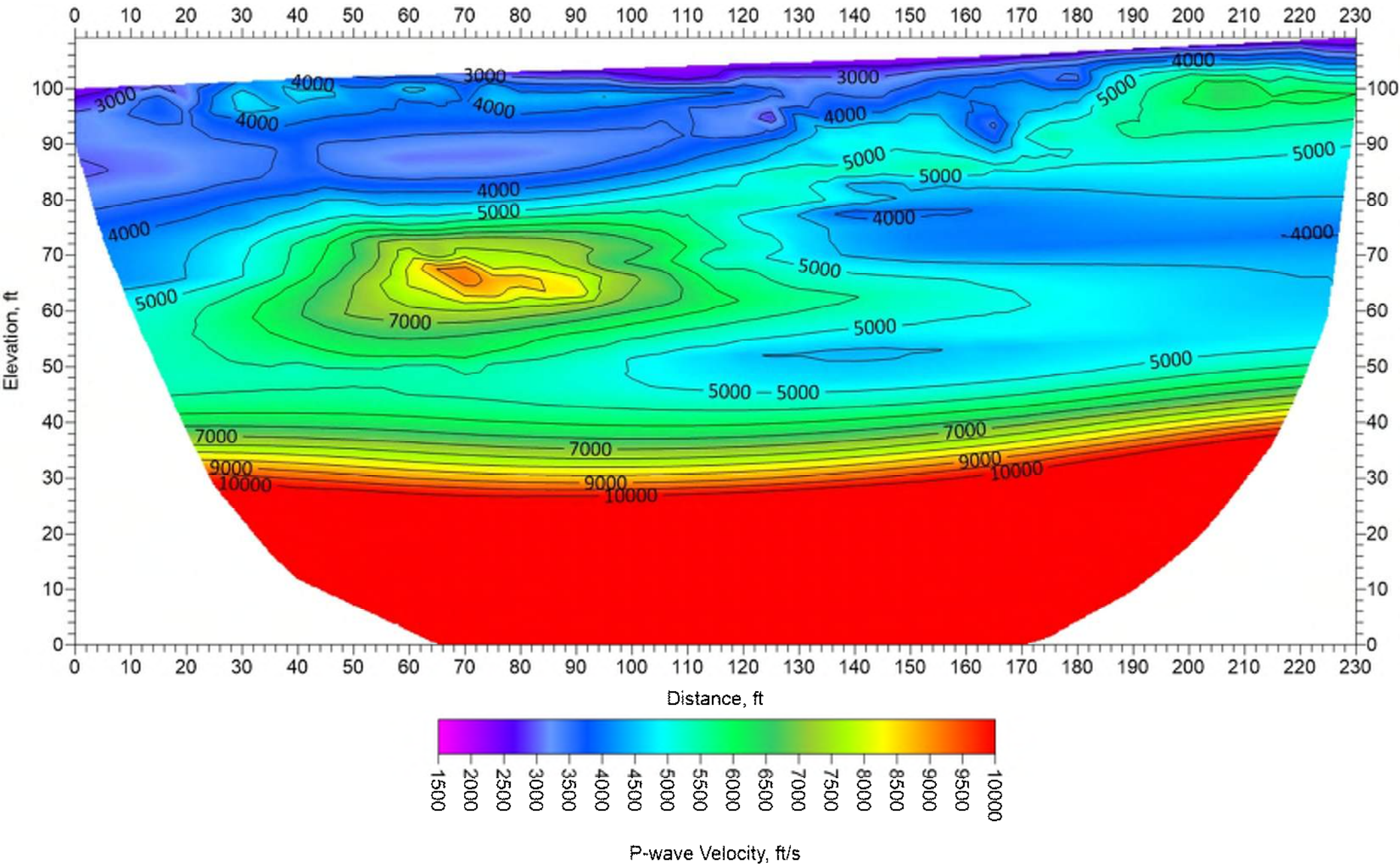
ATTACHMENT C

Seismic Refraction Survey Results

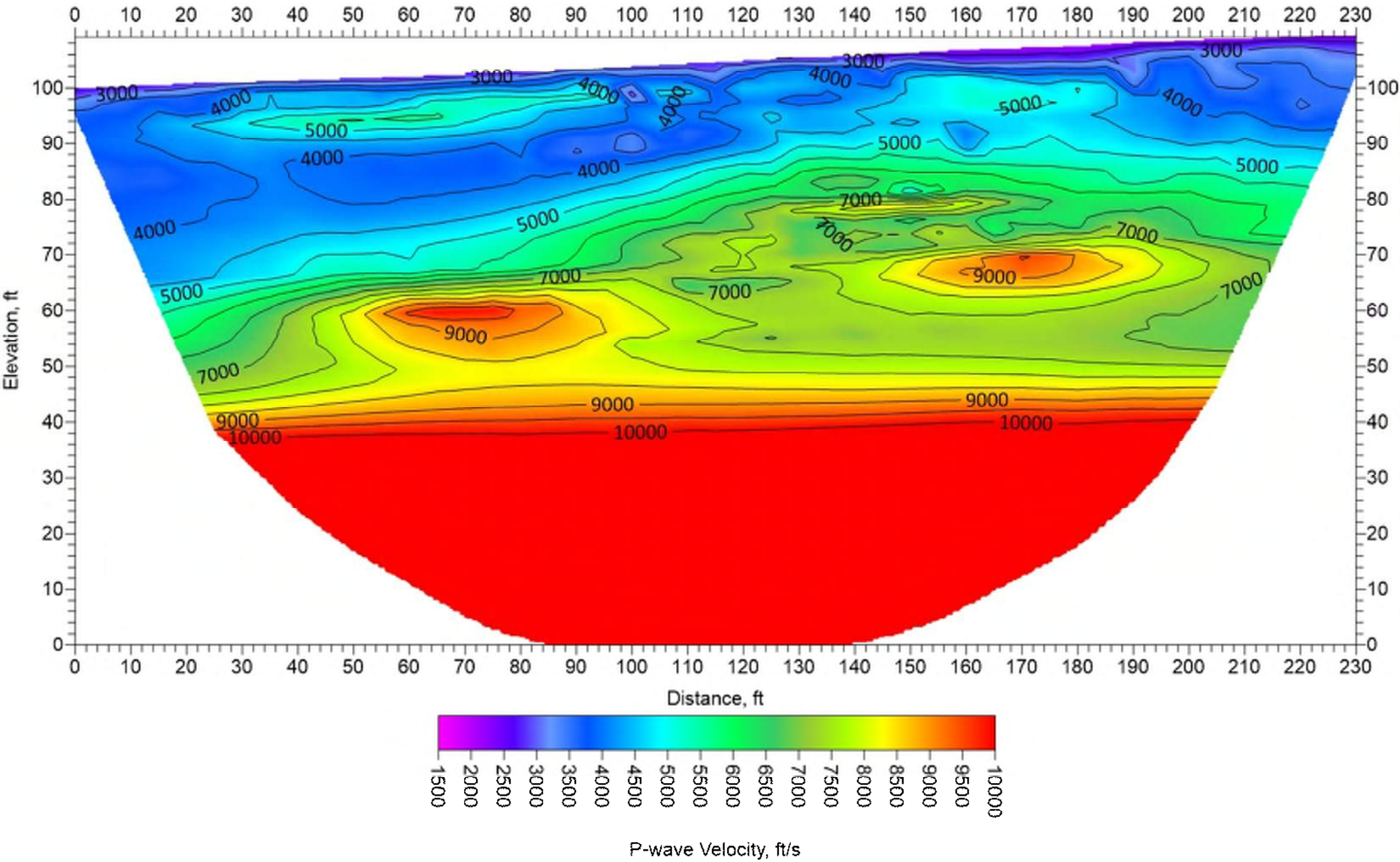
Seismic Refraction - Line 1 Segment 1



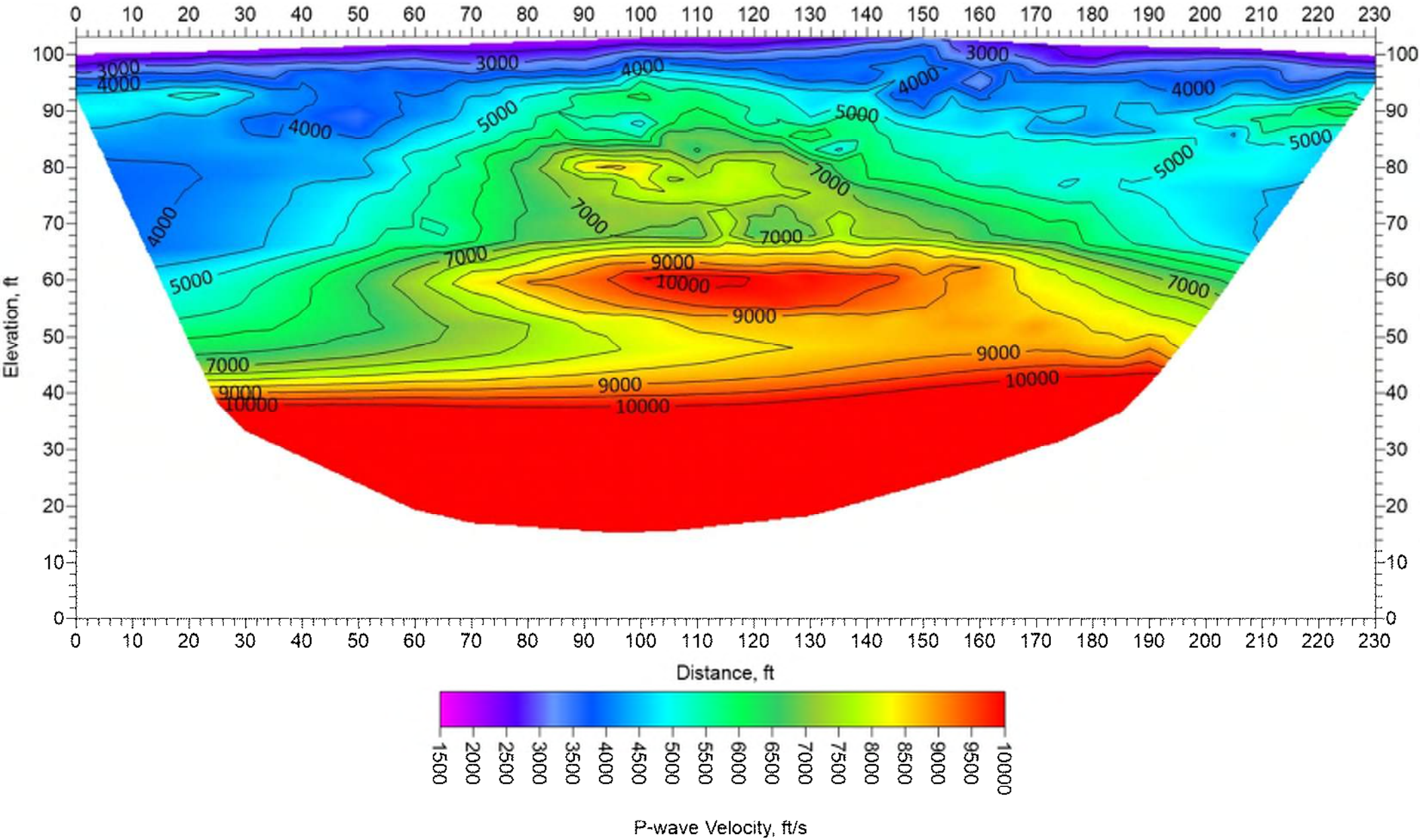
Seismic Refraction - Line 1 Segment 2



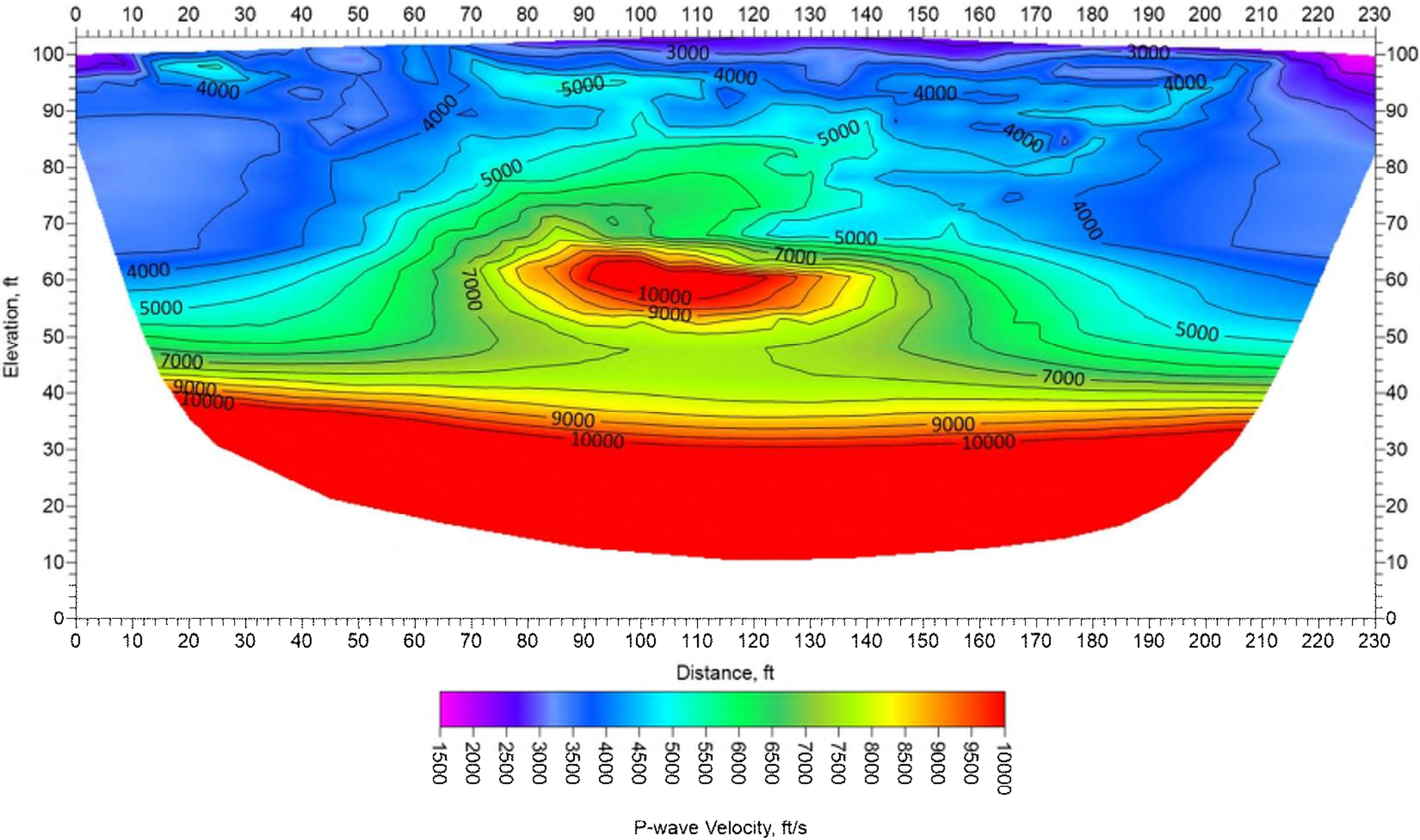
Seismic Refraction - Line 1 Segment 3



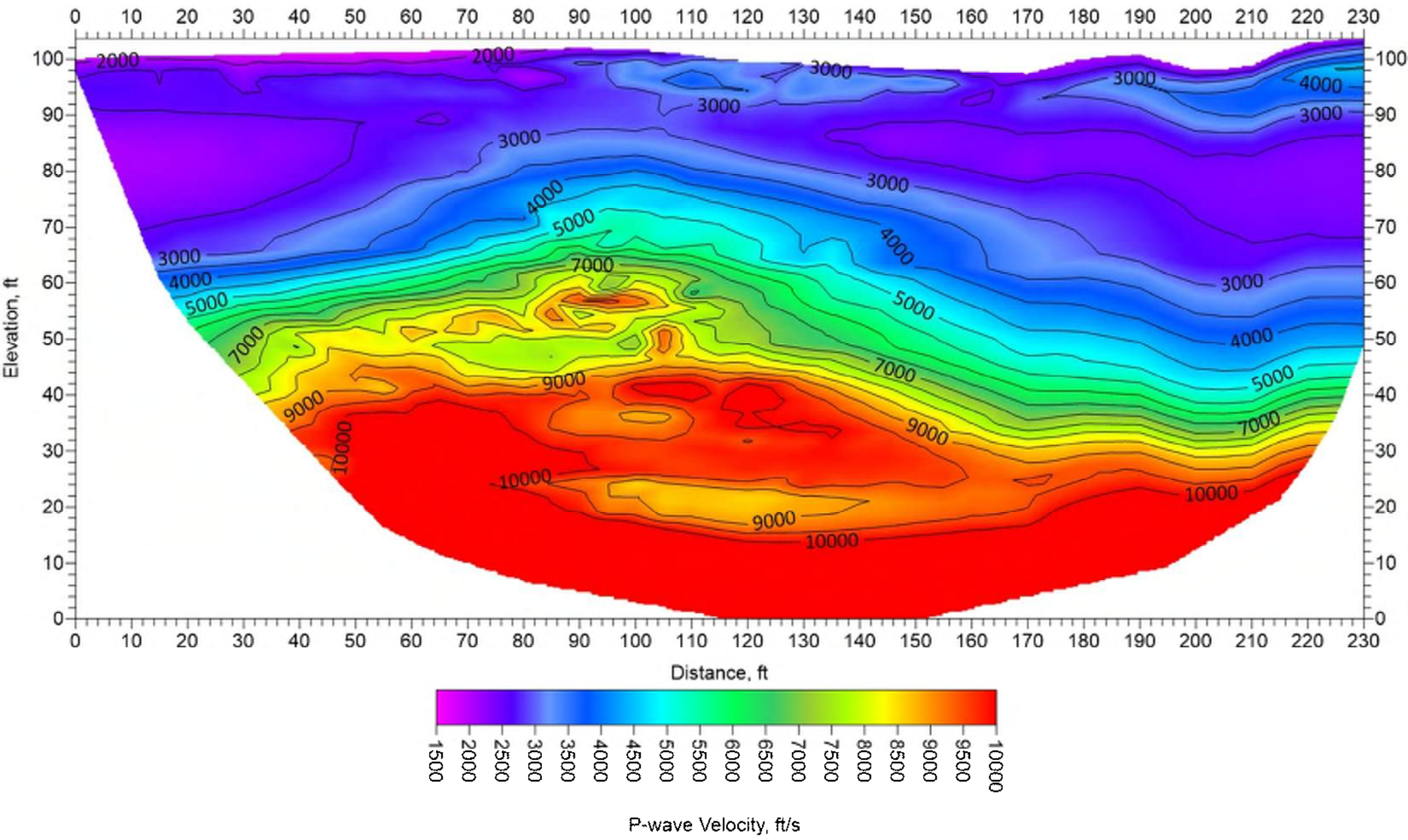
Seismic Refraction - Line 1 Segment 4



Seismic Refraction - Line 2



Seismic Refraction - Line 3



Appendix D
Laboratory Test Results

NewFields

MOISTURE CONTENT
(ASTM D 2216 / ASTM D 4643)
LABORATORY WORKSHEET

NF Form #15

Client:	Jacobs	**Location:**	See Below
Project Title:	I-80 Golconda Summit	**Elevation:**	See Below
Project Number:	475.0499.000	**Test Date:**	5/11/2022
Project Engineer:	Jesse Ruzicka	**Tested By:**	ZM
Field Sample ID:	See Below	**Checked By:**	JW

Drying Conditions: 60 deg C / **110 deg C** Method: **Oven (O)** / Microwave (M) / Hot Plate (H)

Sample No.		22-087-14	22-087-16	22-087-26	22-087-28	
Location		B-22-108	B-22-107	B-22-111	RC-22-006	
Depth		0-5'	0-5'	2.5-4'	7.5-9'	
Soil Description						
(USCS)						
Trial No.		**1**	**2**	**3**	**4**	**5**
Tare No.						
Tare + Wet Soil	**A**	877.4	1079.6	998.4	854.6	
Tare + Dry Soil	**B**	838.4	1023.5	941.6	818.3	
Tare	**C**	131.8	133.3	133.5	133.2	
Wt. of Water	**D= A-B**	39	56.1	56.8	36.3	
Dry Soil, Ws	**E= B-C**	706.6	890.2	808.1	685.1	
Moisture Content, (%)	**(D/E) x100**	**5.5%**	**6.3%**	**7.0%**	**5.3%**	

Sample No.						
Location						
Depth						
Soil Description						
(USCS)						
Trial No.		**6**	**7**	**8**	**9**	**10**
Tare No.						
Tare + Wet Soil	**A**					
Tare + Dry Soil	**B**					
Tare	**C**					
Wt. of Water	**D= A-B**					
Dry Soil, Ws	**E= B-C**					
Moisture Content, (%)	**(D/E) x100**					

Remarks:

NewFields **NATURAL DENSITY (ASTM 2937)** NF Form #16

LABORATORY WORKSHEET

Client:	Jacobs	**Location:**	See Below
Project Title:	I-80 Golconda Summit	**Elevation:**	See Below
Project Number:	475.0499.000	**Test Date:**	5/11/2022
Project Engineer:	Jesse Ruzicka	**Tested By:**	QH
Field Sample ID:	See Below	**Checked By:**	JW
Laboratory Sample ID:	22-087		

Drying Conditions: 60 deg C / **110 deg C** Method: **Oven (O)** / Microwave (M)

Trail No.		1	2	3	4	5
Sample No.		22-087-01	22-087-03	22-087-06	22-087-07	22-087-08
Location		B-22-101	B-22-102	B-22-103	B-22-103	B-22-104
Depth		5-6.5'	6-6.5'	5-6.5'	10-11.5'	5-6.5'
Soil Description						
(USCS)						
Soil + Liner Wt., g.	**A**	1001.7	1118.6	1016.3	1136.5	1075.7
Liner Wt., g.	**B**	248.6	234.8	255.5	258.1	236.1
Soil Wt., g.	**C= A-B**	753.1	883.8	760.8	878.4	839.6
Liner Length, in.	**D_1**	5.997	6.012	5.987	5.992	6.012
Sample Length, in.	**D_2**	5.637	6.012	5.987	5.992	6.012
Liner Diameter, in.	**E**	2.405	2.425	2.402	2.412	2.432
Liner Area, in^2	**$F= (E^2/4)*pi$**	4.54	4.62	4.53	4.57	4.65
Sample Volume, in^3	**$G= D_2*F$**	25.61	27.77	27.13	27.38	27.93
Sample Wet Density, pcf	**H= (C/G)*3.81**	112.0	121.3	106.8	122.2	114.5
Sample Dry Density, pcf	**H/(1+(N/100))**	98.2	118.9	96.6	112.9	100.8
Tare No.						
Tare + Wet Soil	**I**	886.8	883	892.5	1009.8	971.3
Tare + Dry Soil	**J**	794.0	868.3	819.7	942.5	870.3
Tare	**K**	134.1	134	132.2	132.2	131.7
Wt. of Water	**L= I-J**	92.8	14.7	72.8	67.3	101.0
Dry Soil, Ws	**M=-J-K**	659.9	734.3	687.5	810.3	738.6
Moisture Content, (%)	**N= (L/M) x100**	14.1%	2.0%	10.6%	8.3%	13.7%

Remarks:

NewFields **NATURAL DENSITY (ASTM 2937)** NF Form #16

LABORATORY WORKSHEET

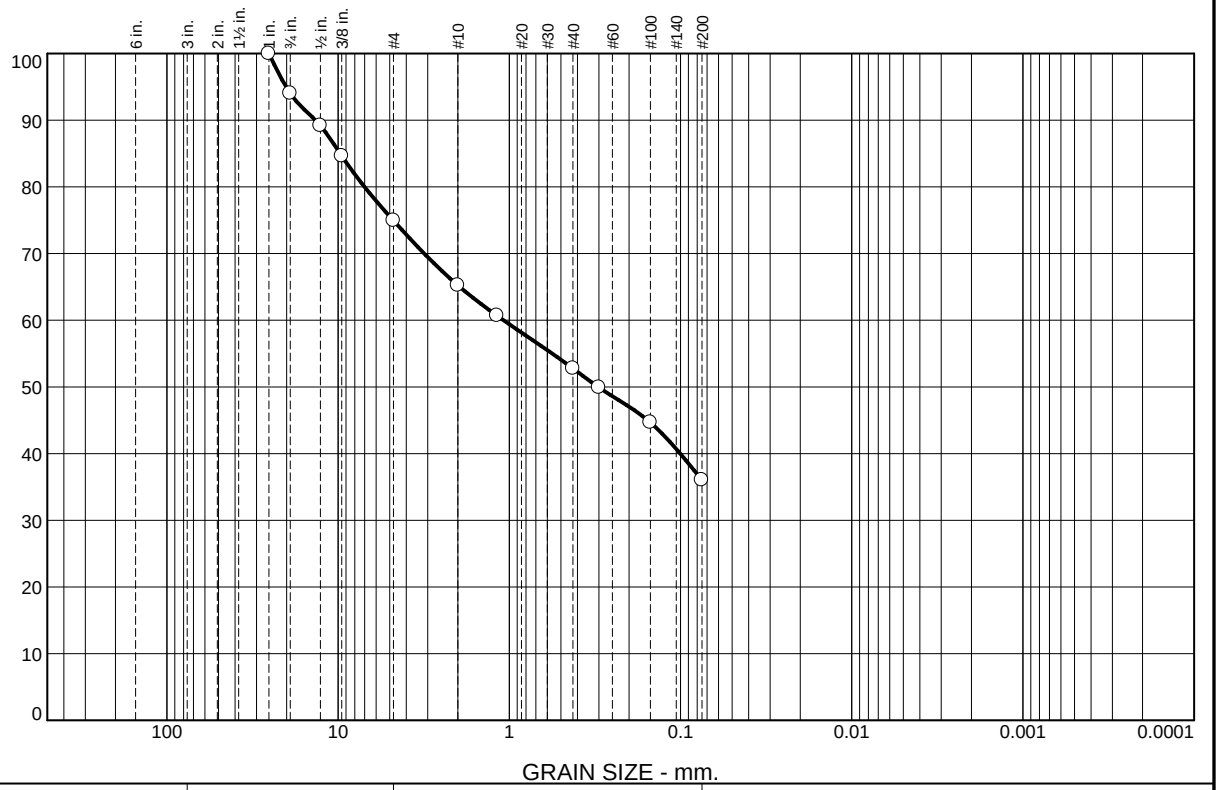
Client:	Jacobs	**Location:**	See Below
Project Title:	I-80 Golconda Summit	**Elevation:**	See Below
Project Number:	475.0499.000	**Test Date:**	5/11/2022
Project Engineer:	Jesse Ruzicka	**Tested By:**	QH
Field Sample ID:	See Below	**Checked By:**	JW
Laboratory Sample ID:	22-087		

Drying Conditions: 60 deg C / 110 deg C Method: Oven (O) / Microwave (M)

Trail No.		6	7	8	9	10
Sample No.		22-087-09	22-087-13	22-087-20	22-087-25	22-087-35
Location		B-22-113	B-22-114	RC-22-004	B-22-109	RC-22-005
Depth		5-6.5'	5-6.5'	5-6.5'	5-6.5'	25-26.5'
Soil Description						**
(USCS)						
Soil + Liner Wt., g.	**A**	1088.8	1041.2	1011.4	1112.0	
Liner Wt., g.	**B**	231.6	252.0	251.2	254.8	
Soil Wt., g.	**C= A-B**	857.2	789.2	760.2	857.2	
Liner Length, in.	**D_1**	6.012	5.992	6.009	5.988	
Sample Length, in.	**D_2**	6.012	5.992	6.009	5.988	
Liner Diameter, in.	**E**	2.427	2.414	2.420	2.418	
Liner Area, in^2	**$F= (D_2^2/4)*pi$**	4.63	4.58	4.60	4.59	
Sample Volume, in^3	**$G= D_2*F$**	27.81	27.42	27.64	27.50	
Sample Wet Density, pcf	**H= (C/G)*3.81**	117.4	109.6	104.8	118.8	
Sample Dry Density, pcf	**H/(1+(N/100))**	102.4	101.2	94.9	107.9	
Tare No.						
Tare + Wet Soil	**I**	987.4	921.2	891.2	988.1	929.2
Tare + Dry Soil	**J**	877.9	860.4	819.8	909.9	899.7
Tare	**K**	131.8	132.4	131.2	133.2	133.8
Wt. of Water	**L= I-J**	109.5	60.8	71.4	78.2	29.5
Dry Soil, Ws	**M=-J-K**	746.1	728.0	688.6	776.7	765.9
Moisture Content, (%)	**N= (L/M) x100**	14.7%	8.4%	10.4%	10.1%	3.9%

Remarks: ** Bagged sample. Unable to perform natural density.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.0	19.1	9.7	12.4	16.8	36.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	94.0		
.5	89.2		
.375	84.6		
#4	74.9		
#10	65.2		
#16	60.7		
#40	52.8		
#50	49.9		
#100	44.7		
#200	36.0		

* (no specification provided)

Soil Description

Dark brown

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{90}= 13.5669 D_{85}= 9.7326 D_{60}= 1.0805
D_{50}= 0.3032 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Location: B-22-101
Sample Number: 22-087-01 **Depth:** 5-6.5' **Date:** 5/11/2022

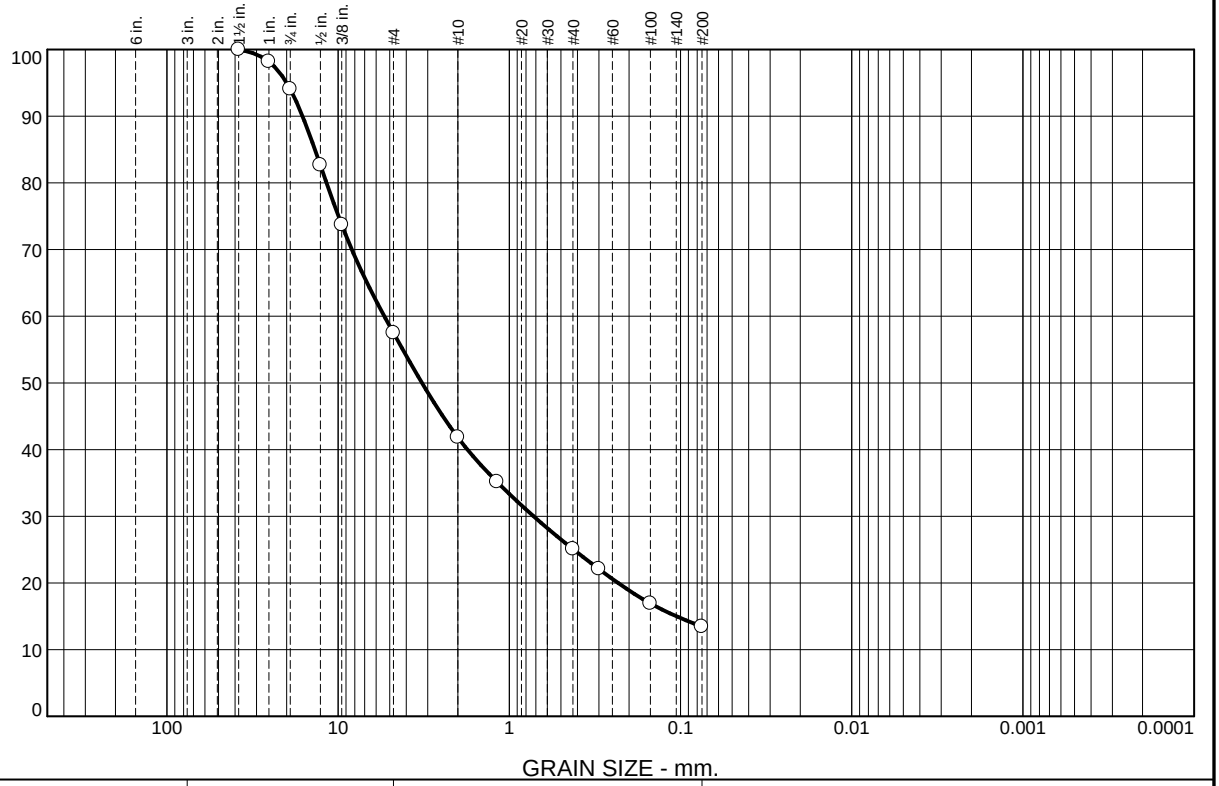
NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-01

Tested By: ZM/AR **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.9	36.6	15.7	16.7	11.7	13.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5"	100.0		
1"	98.2		
.75"	94.1		
.5"	82.7		
.375"	73.7		
#4	57.5		
#10	41.8		
#16	35.2		
#40	25.1		
#50	22.1		
#100	16.9		
#200	13.4		

* (no specification provided)

Soil Description

Dark brown

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{90}= 16.1493 D_{85}= 13.6702 D_{60}= 5.3721
D_{50}= 3.2406 D_{30}= 0.7216 D_{15}= 0.1055
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Location: B-22-102
Sample Number: 22-087-02 **Depth:** 0-5' **Date:** 5/11/2022

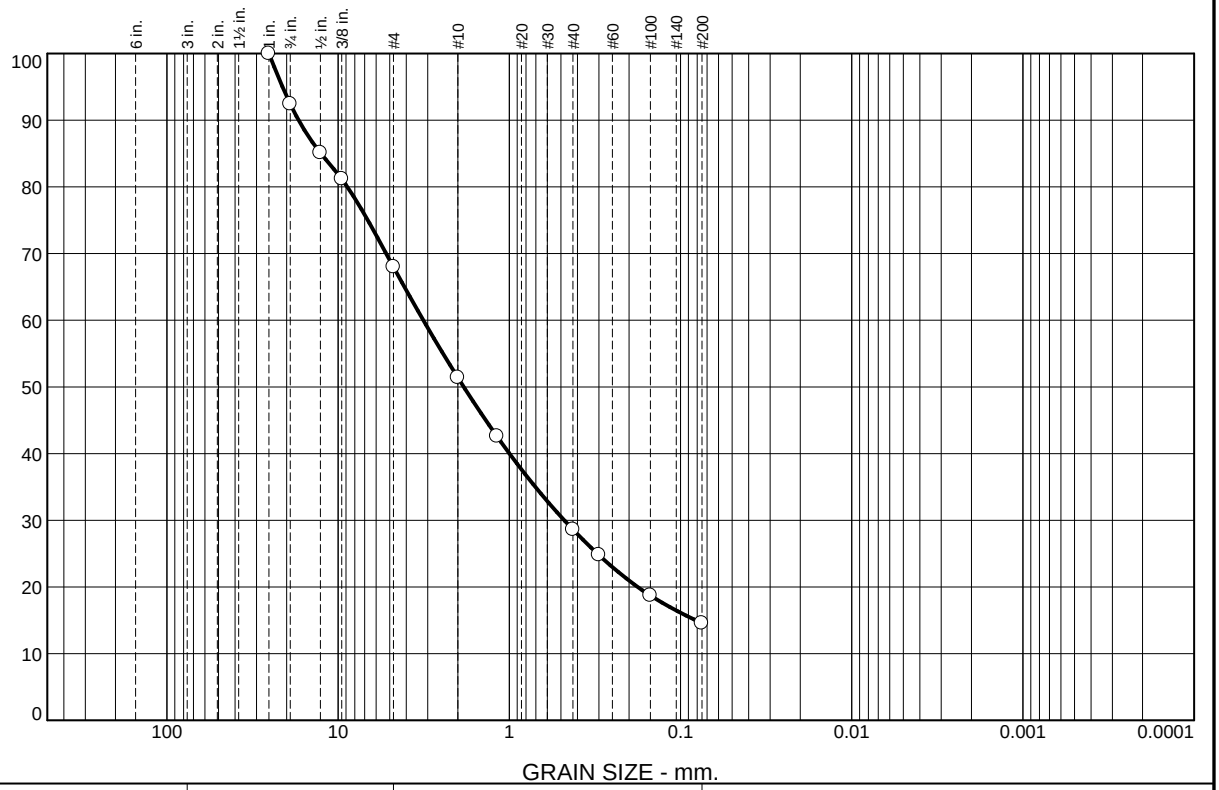
NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-02

Tested By: ZM/AR **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	7.6	24.4	16.6	22.8	14.1	14.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
.75"	92.4		
.5"	85.1		
.375"	81.2		
#4	68.0		
#10	51.4		
#16	42.6		
#40	28.6		
#50	24.8		
#100	18.7		
#200	14.5		

* (no specification provided)

Soil Description

Brown

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{90}= 17.0311 D_{85}= 12.5983 D_{60}= 3.1829
D_{50}= 1.8464 D_{30}= 0.4777 D_{15}= 0.0816
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Location: B-22-102
Sample Number: 22-087-04 **Depth:** 7.5-9' **Date:** 5/11/2022

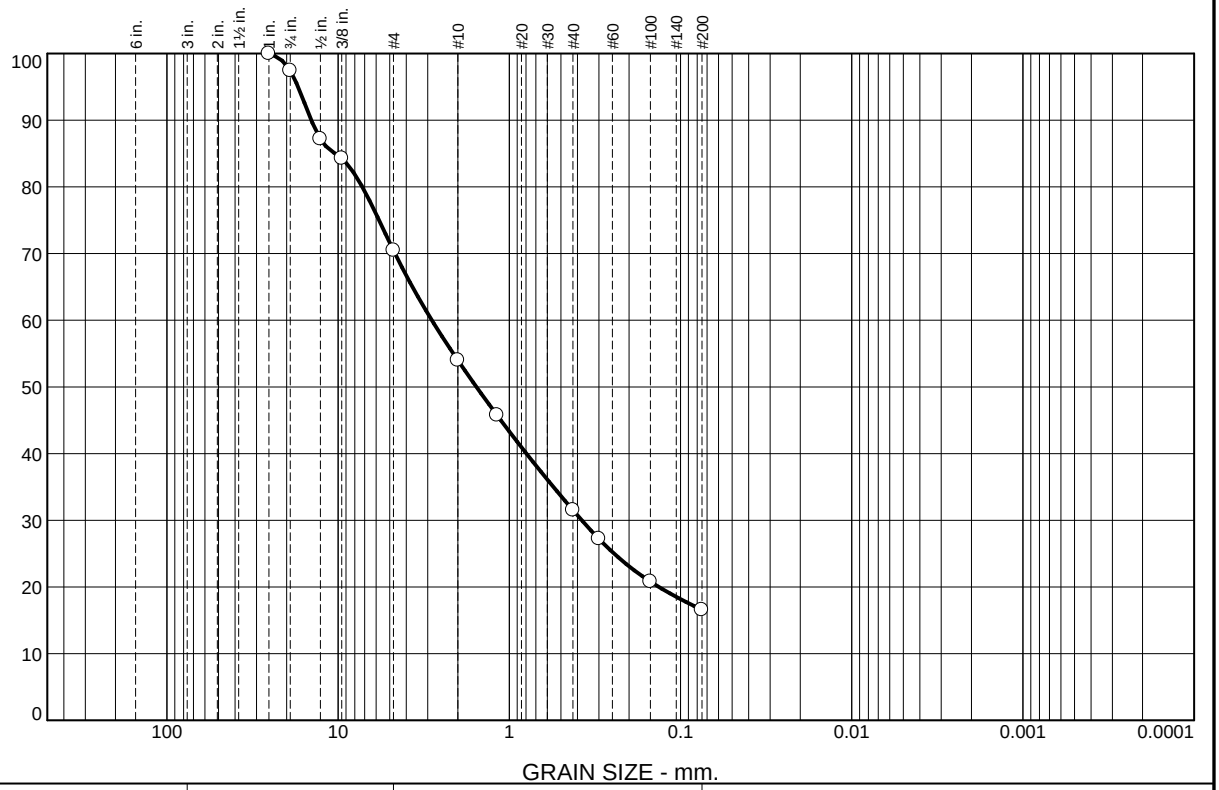
NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-04

Tested By: AR/ZM **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.6	26.9	16.5	22.5	14.9	16.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	97.4		
.5	87.2		
.375	84.3		
#4	70.5		
#10	54.0		
#16	45.8		
#40	31.5		
#50	27.2		
#100	20.8		
#200	16.6		

* (no specification provided)

Soil Description

Brown

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{90}= 14.3515 D_{85}= 10.3976 D_{60}= 2.8372
D_{50}= 1.5574 D_{30}= 0.3774 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Location: B-22-103
Sample Number: 22-087-05 **Depth:** 2.5-4' **Date:** 5/11/2022

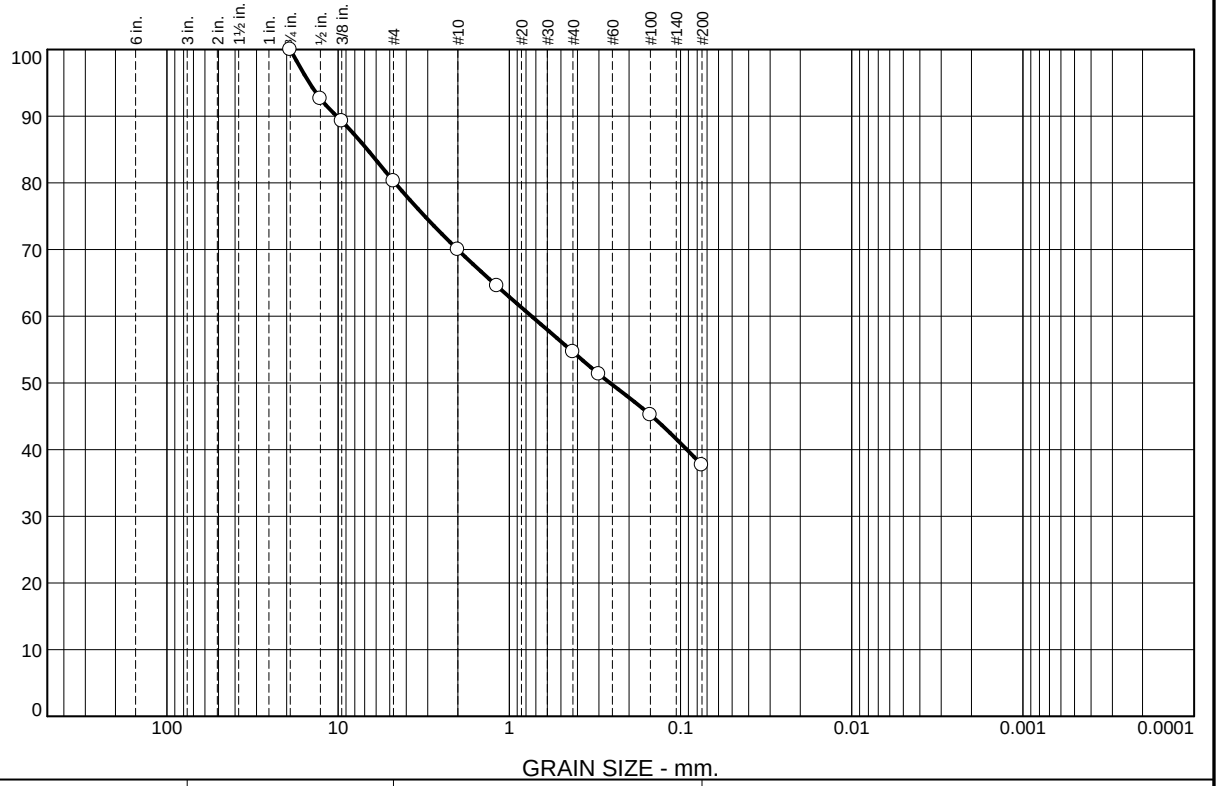
NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-05

Tested By: ZM/AR **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	19.7	10.3	15.4	16.9	37.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	92.6		
.375	89.3		
#4	80.3		
#10	70.0		
#16	64.5		
#40	54.6		
#50	51.3		
#100	45.2		
#200	37.7		

* (no specification provided)

Soil Description

Brown

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{90}= 10.1765 D_{85}= 6.7510 D_{60}= 0.7411
D_{50}= 0.2585 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Location: B-22-104
Sample Number: 22-087-08 **Depth:** 5-6.5' **Date:** 5/11/2022

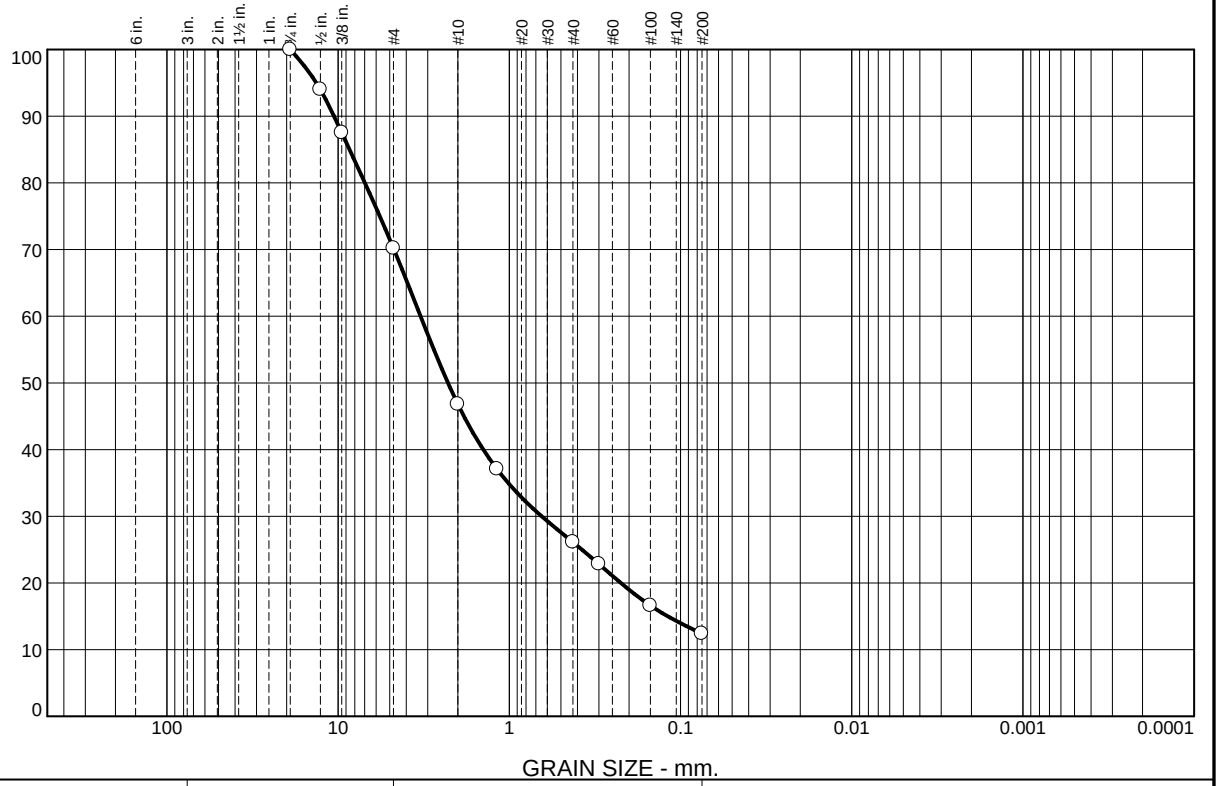
NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-08

Tested By: ZM/AR **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	29.8	23.4	20.7	13.7	12.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	94.0		
.375	87.5		
#4	70.2		
#10	46.8		
#16	37.1		
#40	26.1		
#50	22.8		
#100	16.6		
#200	12.4		

* (no specification provided)

Soil Description

Brown

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{90}= 10.5656 D_{85}= 8.5748 D_{60}= 3.3033
D_{50}= 2.2840 D_{30}= 0.6472 D_{15}= 0.1188
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Location: B-22-113
Sample Number: 22-087-09 **Depth:** 5-6.5' **Date:** 5/11/2022

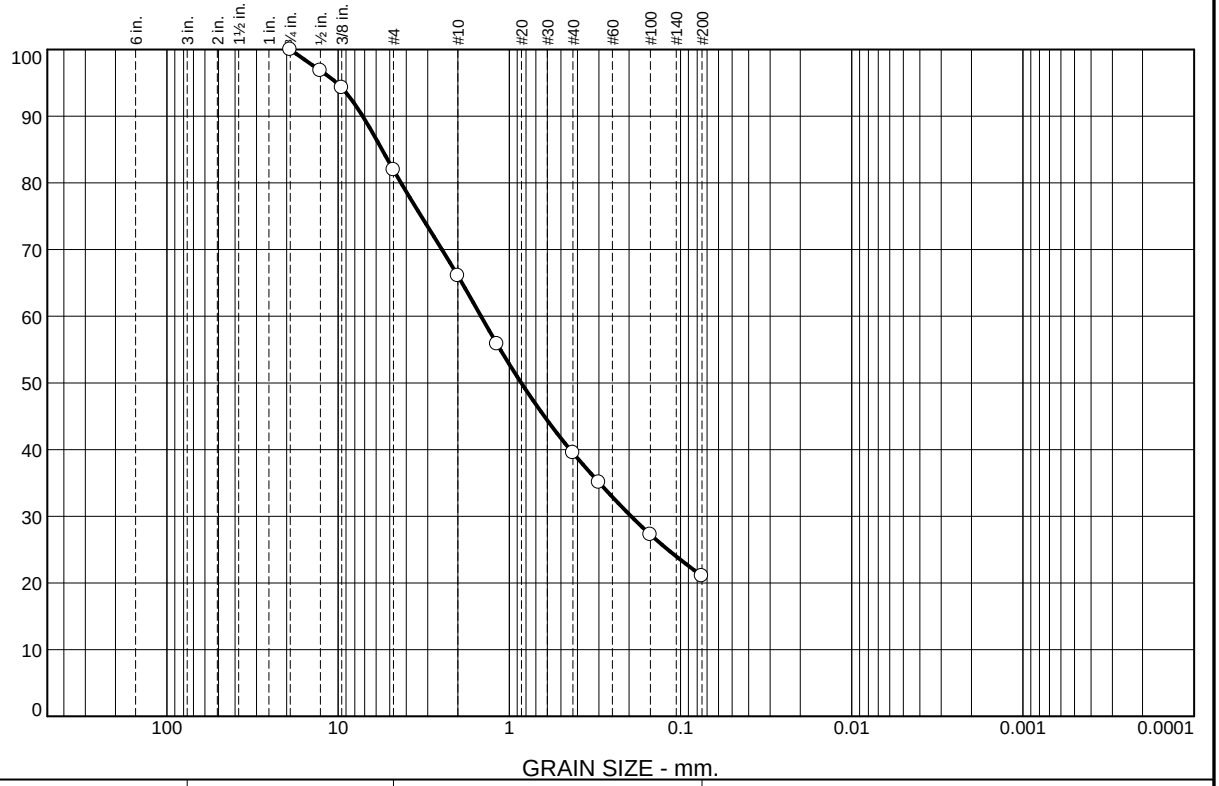
NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-09

Tested By: ZM **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	18.1	15.8	26.6	18.5	21.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	96.8		
.375	94.3		
#4	81.9		
#10	66.1		
#16	55.8		
#40	39.5		
#50	35.1		
#100	27.2		
#200	21.0		

* (no specification provided)

Soil Description

Brown

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{90}= 7.1834 D_{85}= 5.5419 D_{60}= 1.4639
D_{50}= 0.8514 D_{30}= 0.1945 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Location: B-22-113
Sample Number: 22-087-10 **Depth:** 15-16.5' **Date:** 5/11/2022

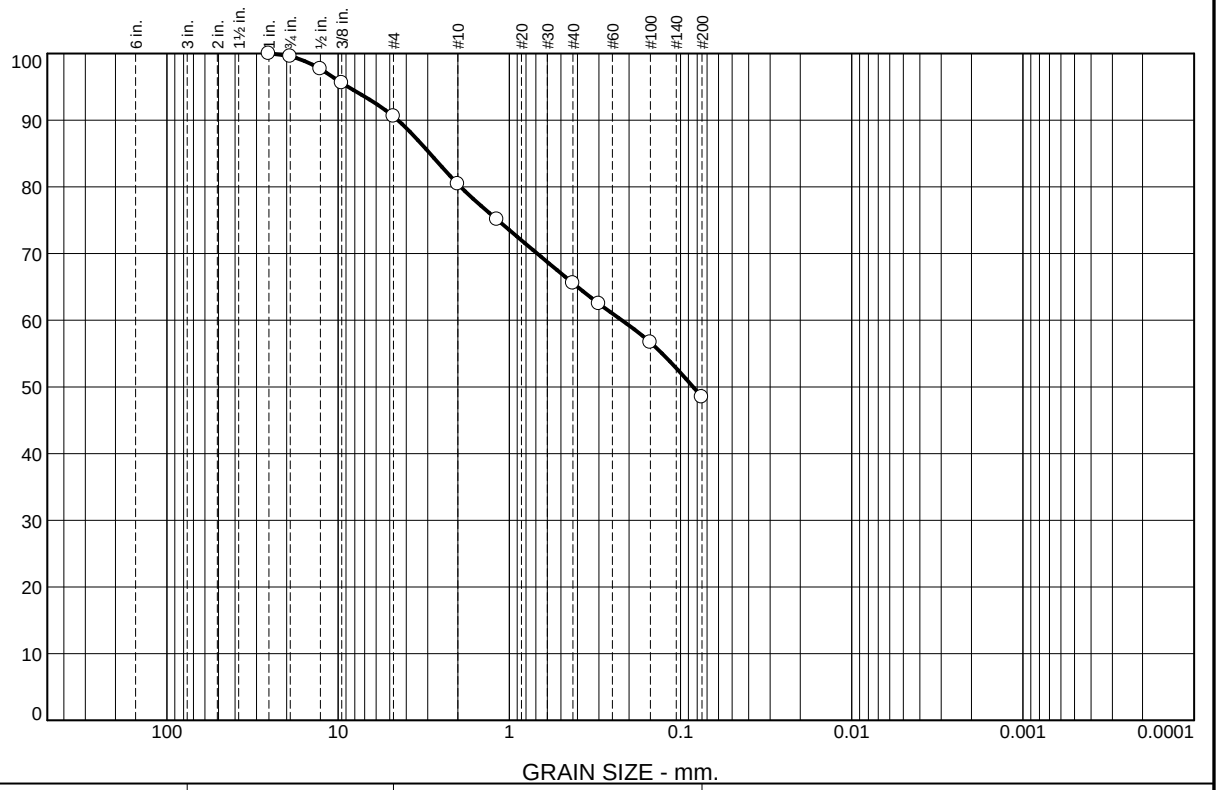
NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-10

Tested By: ZM/EG **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.4	9.0	10.2	14.8	17.1	48.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	99.6		
.5	97.7		
.375	95.6		
#4	90.6		
#10	80.4		
#16	75.1		
#40	65.6		
#50	62.5		
#100	56.7		
#200	48.5		

* (no specification provided)

Soil Description

Brown

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{90}= 4.4765 D_{85}= 2.9089 D_{60}= 0.2200
D_{50}= 0.0845 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Location: B-22-112
Sample Number: 22-087-11 **Depth:** 0-5' **Date:** 5/11/2022

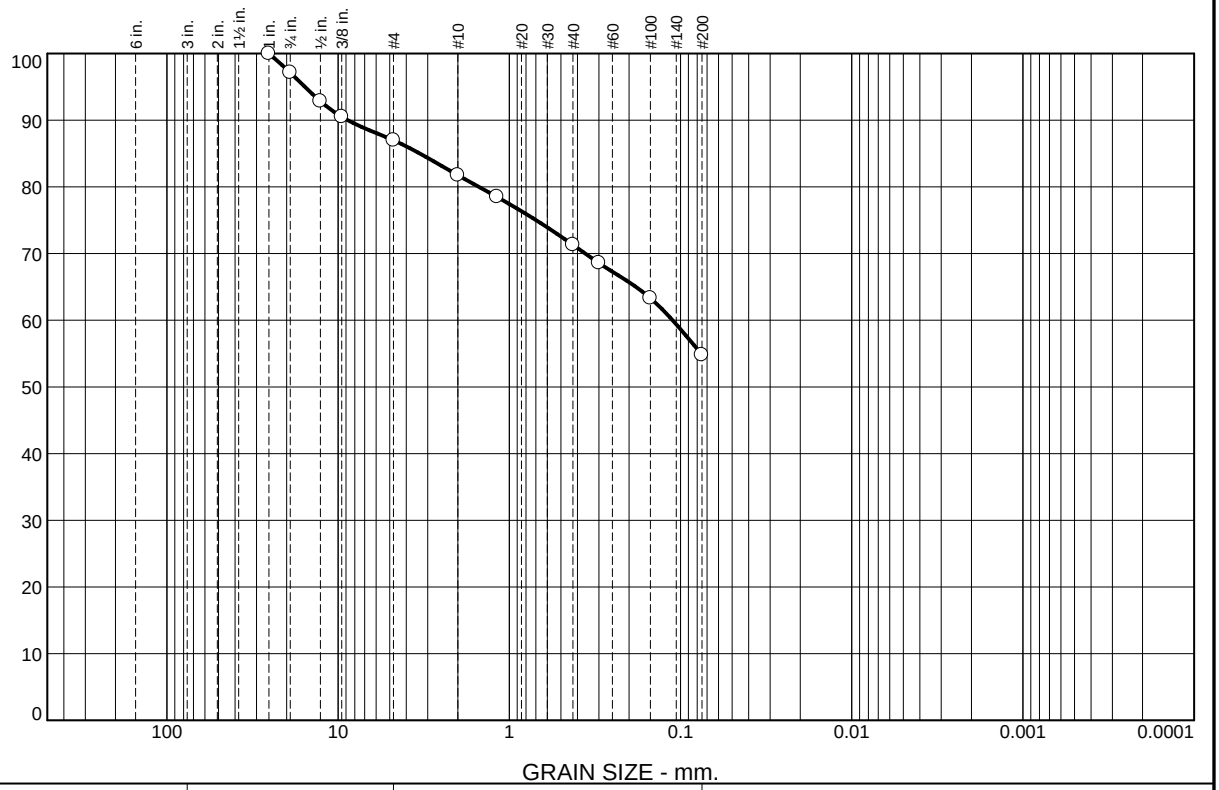
NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-11

Tested By: ZM/EG **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.9	10.1	5.2	10.5	16.5	54.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	97.1		
.5	92.8		
.375	90.5		
#4	87.0		
#10	81.8		
#16	78.5		
#40	71.3		
#50	68.6		
#100	63.3		
#200	54.8		

* (no specification provided)

Soil Description

Light brown

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{90}= 8.7769 D_{85}= 3.3352 D_{60}= 0.1114
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Location: B-22-114
Sample Number: 22-087-12 **Depth:** 2.5-4' **Date:** 5/11/2022

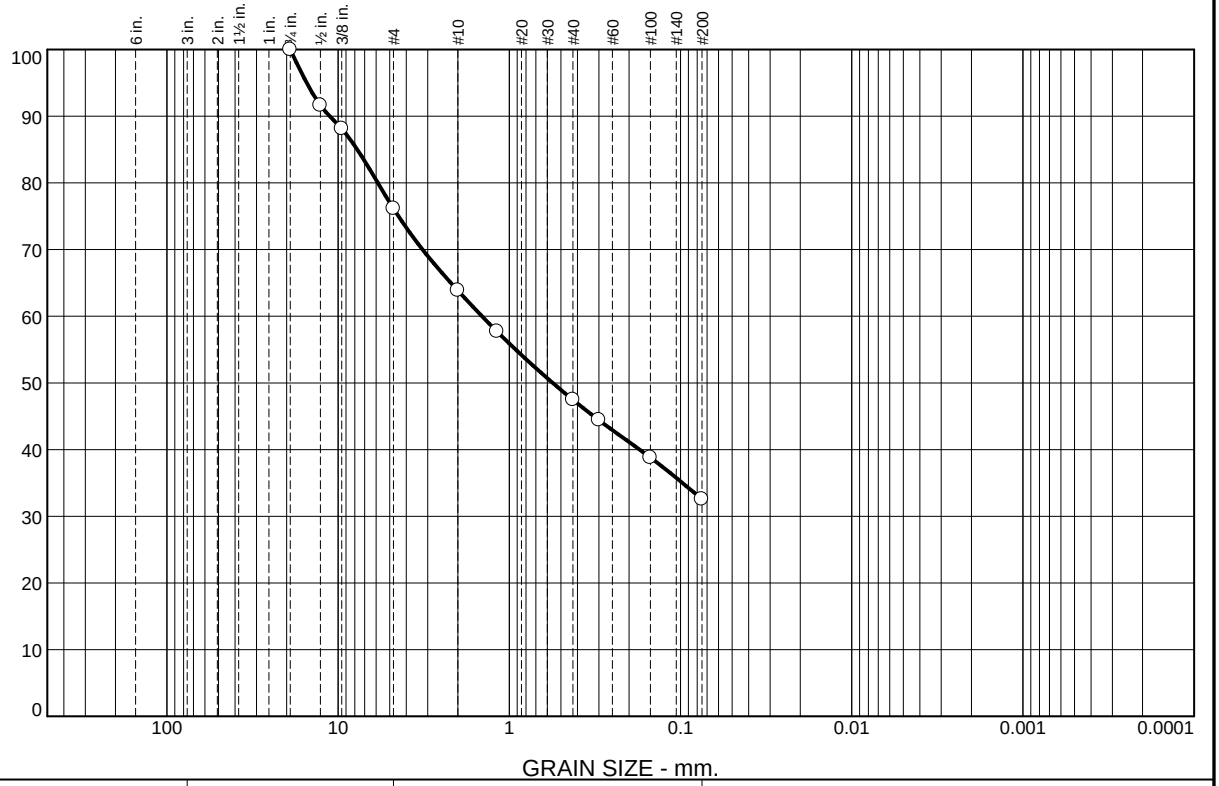
NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-12

Tested By: ZM/EG **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	23.9	12.2	16.4	14.9	32.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	91.6		
.375	88.1		
#4	76.1		
#10	63.9		
#16	57.7		
#40	47.5		
#50	44.4		
#100	38.8		
#200	32.6		

* (no specification provided)

Soil Description

Brown silty, clayey sand with gravel

Atterberg Limits

PL= 17 LL= 24 PI= 7

Coefficients

D_{90}= 11.1934 D_{85}= 7.7223 D_{60}= 1.4446
D_{50}= 0.5575 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SC-SM AASHTO= A-2-4(0)

Remarks

Location: B-22-108
Sample Number: 22-087-15 **Depth:** 2.5-4' **Date:** 5/11/2022

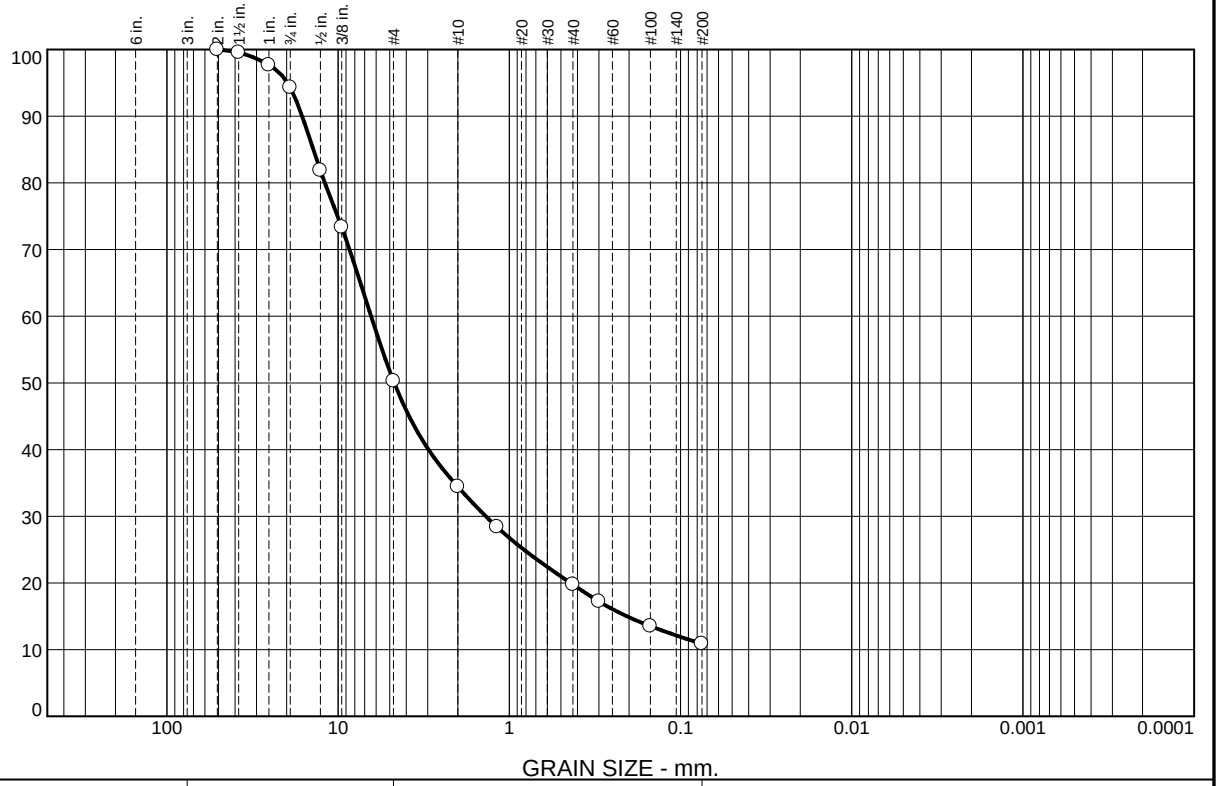
NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-15

Tested By: ZM **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.7	44.0	15.9	14.6	8.9	10.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2"	100.0		
1.5"	99.5		
1"	97.7		
.75"	94.3		
.5"	81.9		
.375"	73.3		
#4	50.3		
#10	34.4		
#16	28.4		
#40	19.8		
#50	17.2		
#100	13.5		
#200	10.9		

* (no specification provided)

Soil Description

Dark brown

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{90}= 16.2236 D_{85}= 13.9596 D_{60}= 6.4163
D_{50}= 4.7023 D_{30}= 1.3730 D_{15}= 0.2058
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Location: B-22-107
Sample Number: 22-087-16 **Depth:** 0-5' **Date:** 5/11/2022

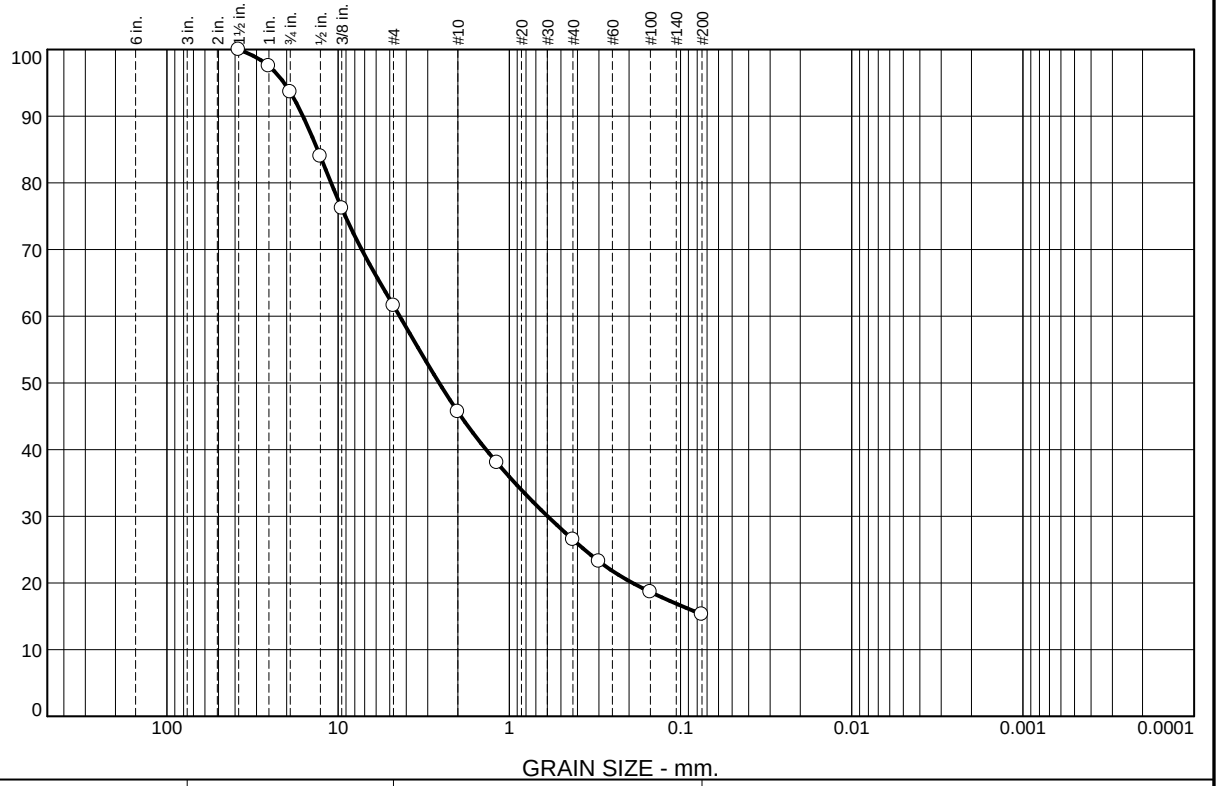
NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-16

Tested By: ZM/QH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.4	32.0	15.9	19.2	11.2	15.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	97.5		
.75	93.6		
.5	84.0		
.375	76.2		
#4	61.6		
#10	45.7		
#16	38.0		
#40	26.5		
#50	23.2		
#100	18.6		
#200	15.3		

* (no specification provided)

Soil Description

Dark brown

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{90}= 16.0512 D_{85}= 13.1880 D_{60}= 4.3701
D_{50}= 2.5725 D_{30}= 0.5969 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Location: B-22-106
Sample Number: 22-087-17 **Depth:** 0-5' **Date:** 5/11/2022

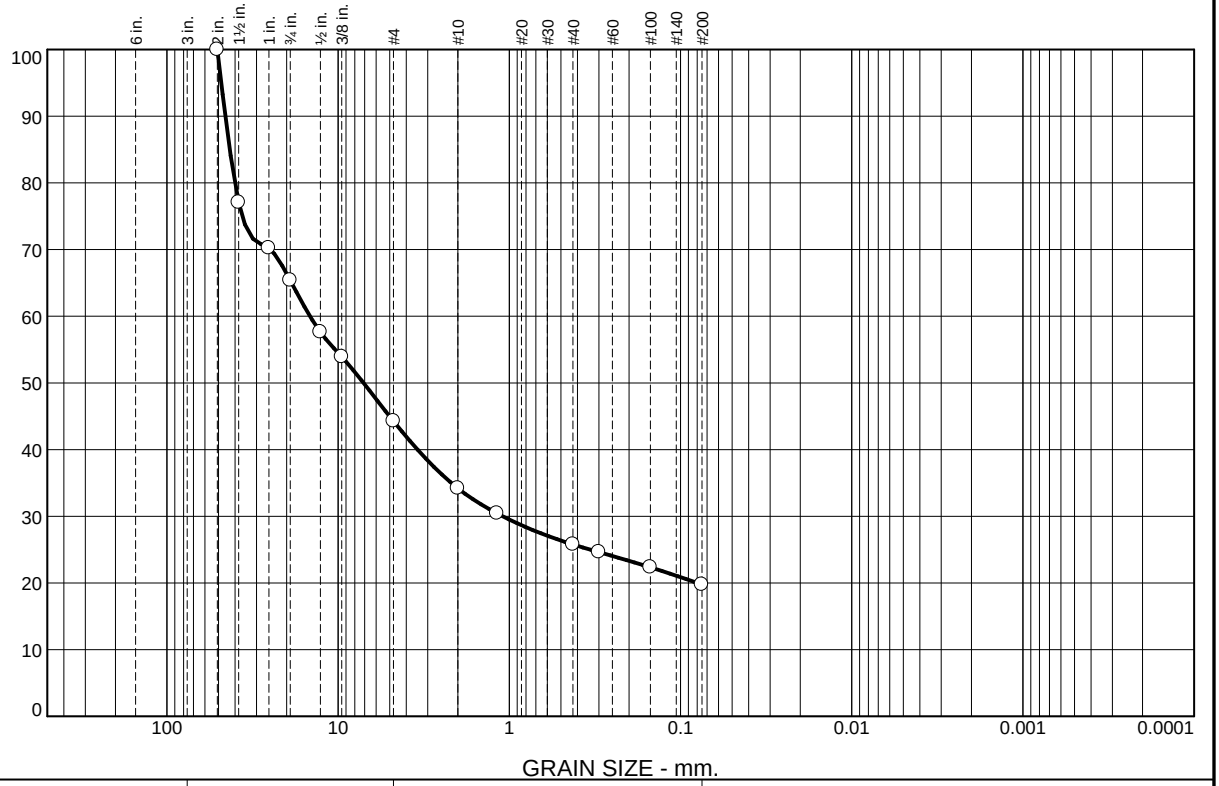
NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-17

Tested By: EG/QH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	34.6	21.1	10.1	8.4	6.0	19.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2"	100.0		
1.5"	77.1		
1"	70.2		
.75"	65.4		
.5"	57.6		
.375"	53.9		
#4	44.3		
#10	34.2		
#16	30.4		
#40	25.8		
#50	24.6		
#100	22.3		
#200	19.8		

* (no specification provided)

Soil Description

Brown clayey gravel with sand

Atterberg Limits

PL= 20 LL= 30 PI= 10

Coefficients

D_{90}= 45.5610 D_{85}= 42.9232 D_{60}= 14.6001
D_{50}= 7.1053 D_{30}= 1.0941 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= GC AASHTO= A-2-4(0)

Remarks

Location: B-22-106
Sample Number: 22-087-18 **Depth:** 5-6.5' **Date:** 5/12/2022

NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-18

Tested By: QH **Checked By:** JW

Particle Size Distribution Report

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	1.1	19.5	13.2	23.1	21.6	21.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	98.9		
.5	93.0		
.375	90.5		
#4	79.4		
#10	66.2		
#16	58.3		
#40	43.1		
#50	38.5		
#100	29.9		
#200	21.5		

* (no specification provided)

Soil Description

Brown

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{90}= 9.0675 D_{85}= 6.4828 D_{60}= 1.3213
D_{50}= 0.6868 D_{30}= 0.1515 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Location: B-22-105
Sample Number: 22-087-19 **Depth:** 5-6.5' **Date:** 5/12/2022

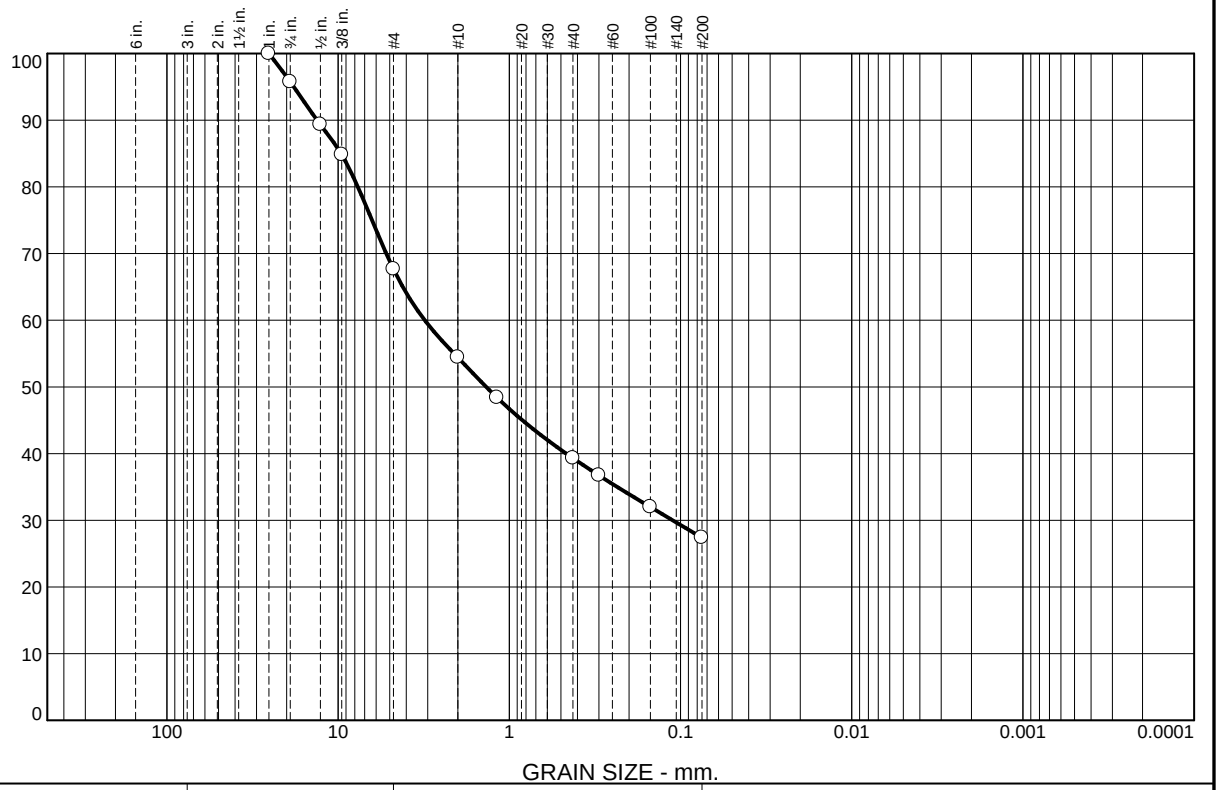
NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-19

Tested By: QH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.2	28.1	13.3	15.1	11.9	27.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	95.8		
.5	89.3		
.375	84.8		
#4	67.7		
#10	54.4		
#16	48.4		
#40	39.3		
#50	36.7		
#100	32.0		
#200	27.4		

* (no specification provided)

Soil Description

Brown clayey sand with gravel

Atterberg Limits

PL= 17 LL= 36 PI= 19

Coefficients

D_{90}= 13.2748 D_{85}= 9.6108 D_{60}= 3.1224
D_{50}= 1.3649 D_{30}= 0.1113 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-2-6(1)

Remarks

Location: RC-22-004
Sample Number: 22-087-20 **Depth:** 5-6.5' **Date:** 5/12/2022

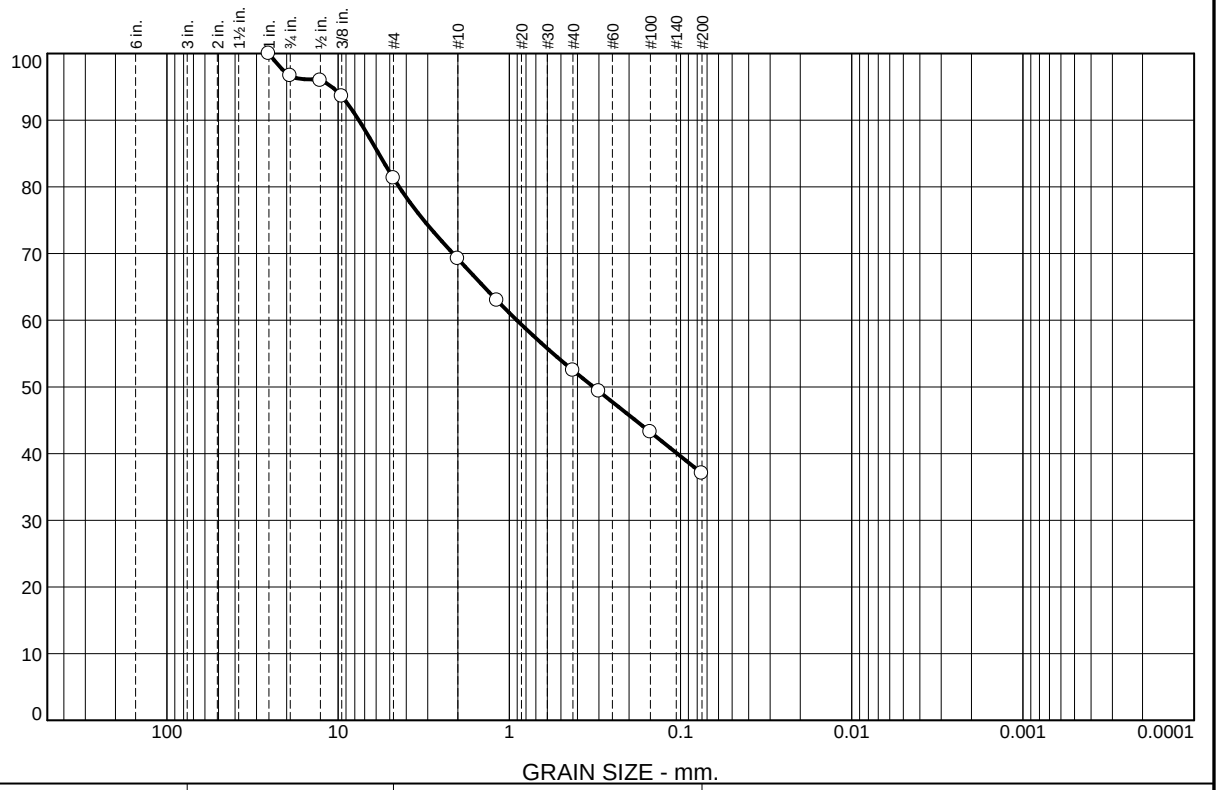
NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-20

Tested By: QH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.3	15.4	12.1	16.7	15.5	37.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	96.7		
.5	96.0		
.375	93.6		
#4	81.3		
#10	69.2		
#16	63.0		
#40	52.5		
#50	49.4		
#100	43.2		
#200	37.0		

* (no specification provided)

Soil Description

Brown

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{90}= 7.5584 D_{85}= 5.7912 D_{60}= 0.9032
D_{50}= 0.3227 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Location: RC-22-004
Sample Number: 22-087-21 **Depth:** 7.5-9' **Date:** 5/12/2022

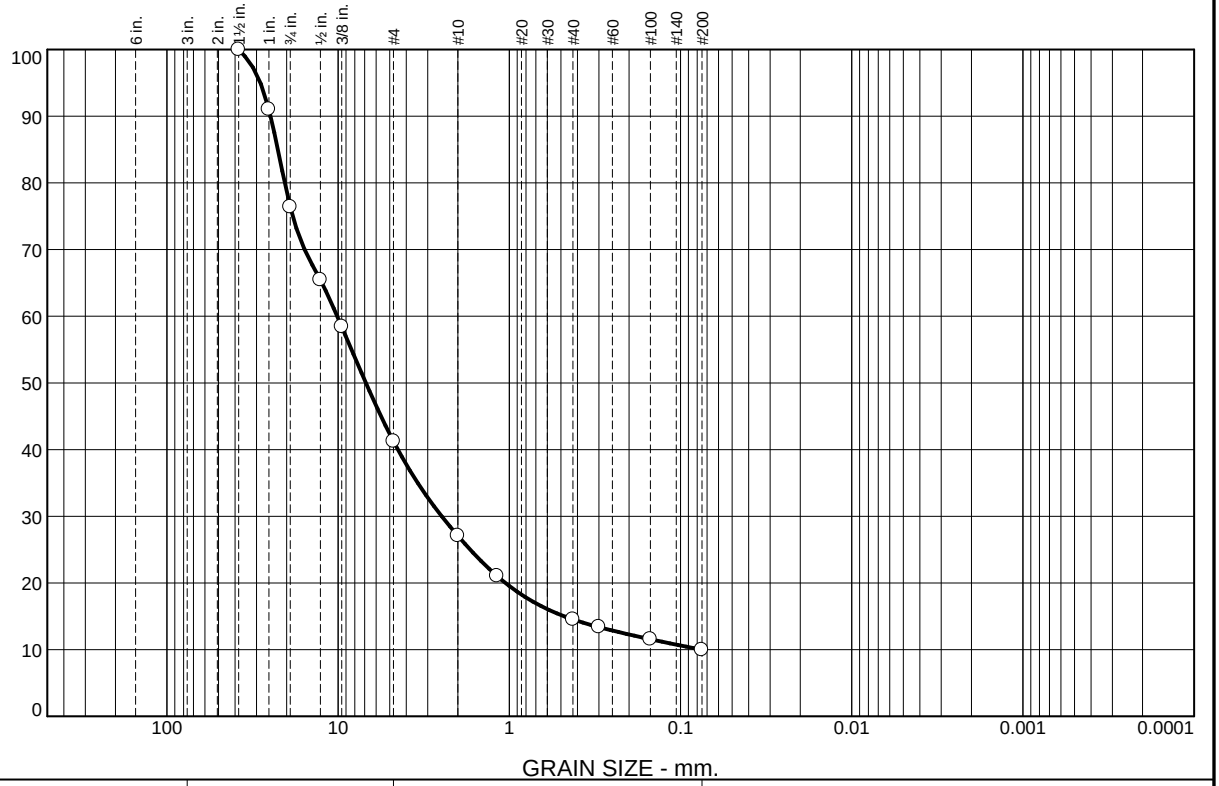
NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-21

Tested By: QH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	23.6	35.2	14.1	12.6	4.5	10.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5"	100.0		
1"	91.0		
.75"	76.4		
.5"	65.4		
.375"	58.4		
#4	41.2		
#10	27.1		
#16	21.0		
#40	14.5		
#50	13.4		
#100	11.6		
#200	10.0		

* (no specification provided)

Soil Description

Brown

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{90}= 24.8303 D_{85}= 22.5063 D_{60}= 10.1208
D_{50}= 6.8814 D_{30}= 2.4845 D_{15}= 0.4789
D_{10}= 0.0762 C_u= 132.90 C_c= 8.01

Classification

USCS= AASHTO=

Remarks

Location: RC-22-004
Sample Number: 22-087-22 **Depth:** 30' **Date:** 5/12/2022

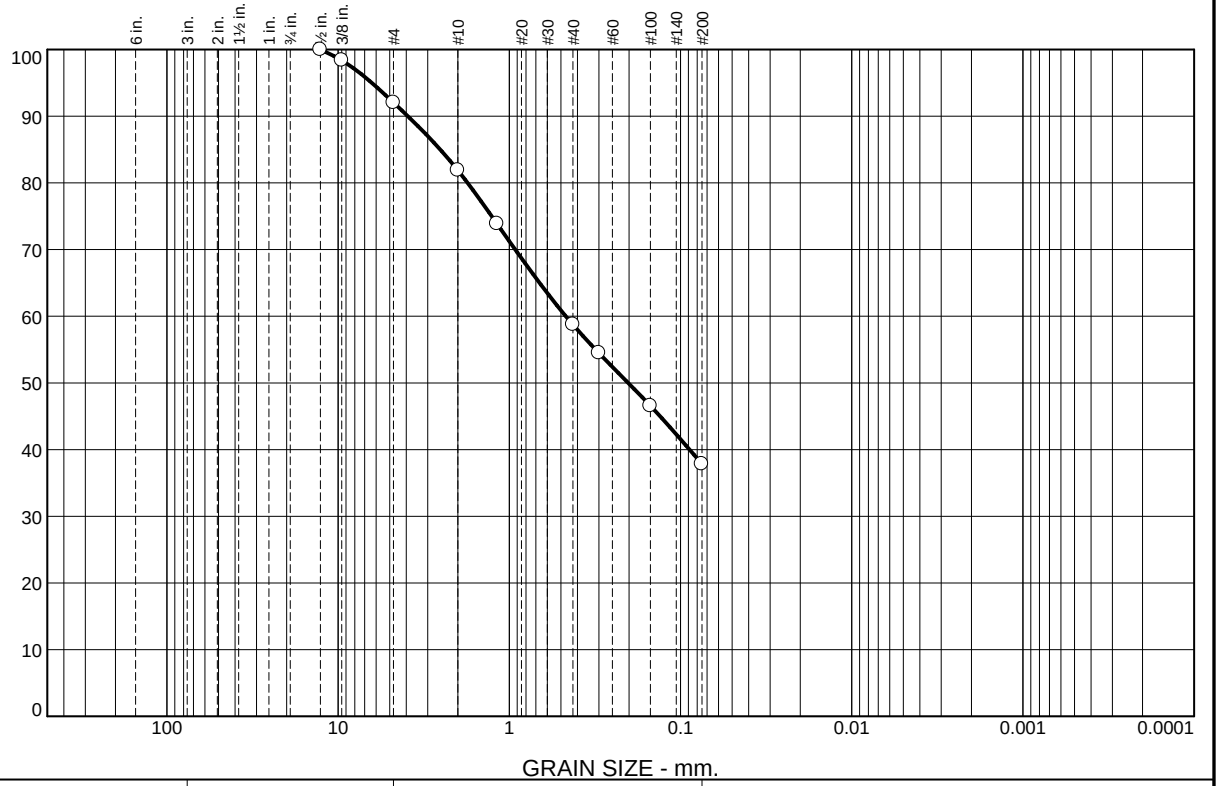
NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-22

Tested By: QH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	8.0	10.1	23.2	20.9	37.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5	100.0		
.375	98.4		
#4	92.0		
#10	81.9		
#16	73.9		
#40	58.7		
#50	54.5		
#100	46.6		
#200	37.8		

* (no specification provided)

Soil Description

Brown

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{90}= 3.9170 D_{85}= 2.5341 D_{60}= 0.4678
D_{50}= 0.2021 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Location: B-22-110
Sample Number: 22-087-23 **Depth:** 7.5-9' **Date:** 5/12/2022

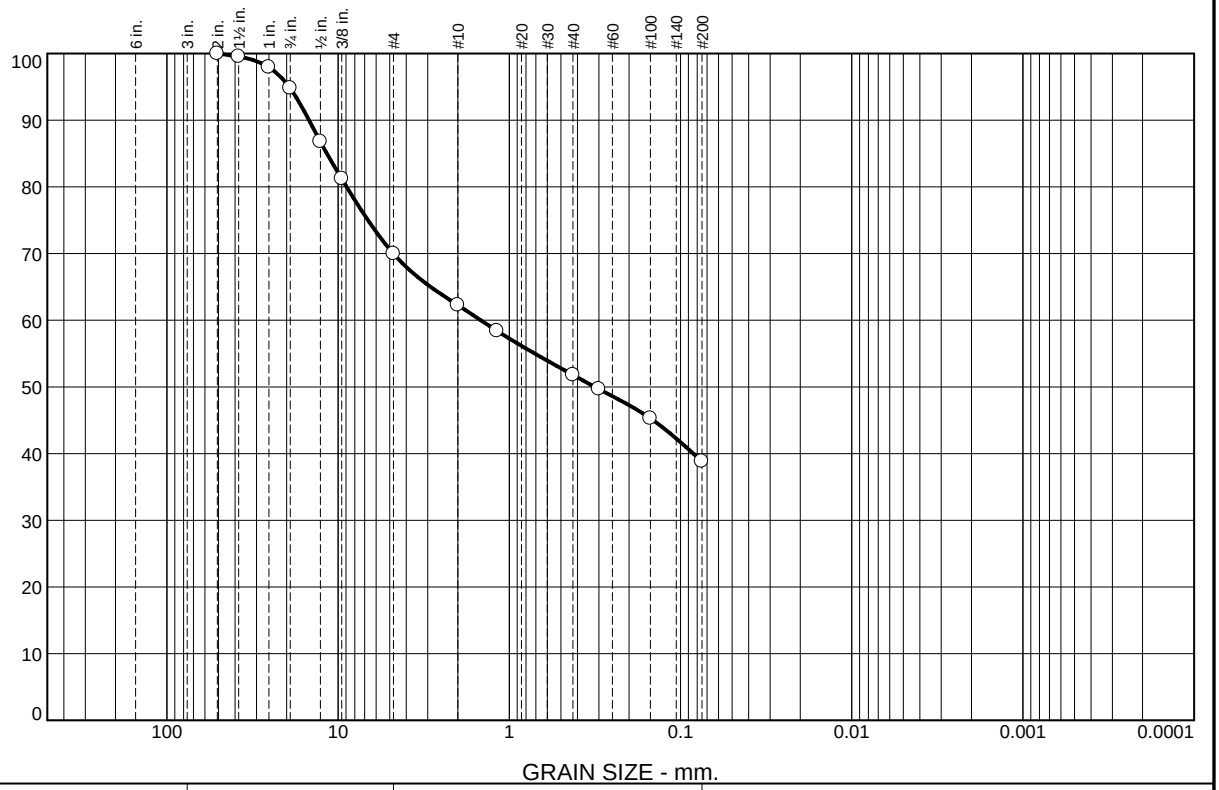
NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-23

Tested By: QH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.2	24.8	7.7	10.5	13.0	38.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2"	100.0		
1.5"	99.5		
1"	97.9		
.75"	94.8		
.5"	86.8		
.375"	81.2		
#4	70.0		
#10	62.3		
#16	58.4		
#40	51.8		
#50	49.7		
#100	45.3		
#200	38.8		

* (no specification provided)

Soil Description

Brown

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{90}= 14.7939 D_{85}= 11.6310 D_{60}= 1.4696
D_{50}= 0.3169 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Location: B-22-109
Sample Number: 22-087-24 **Depth:** 0-5' **Date:** 5/12/2022

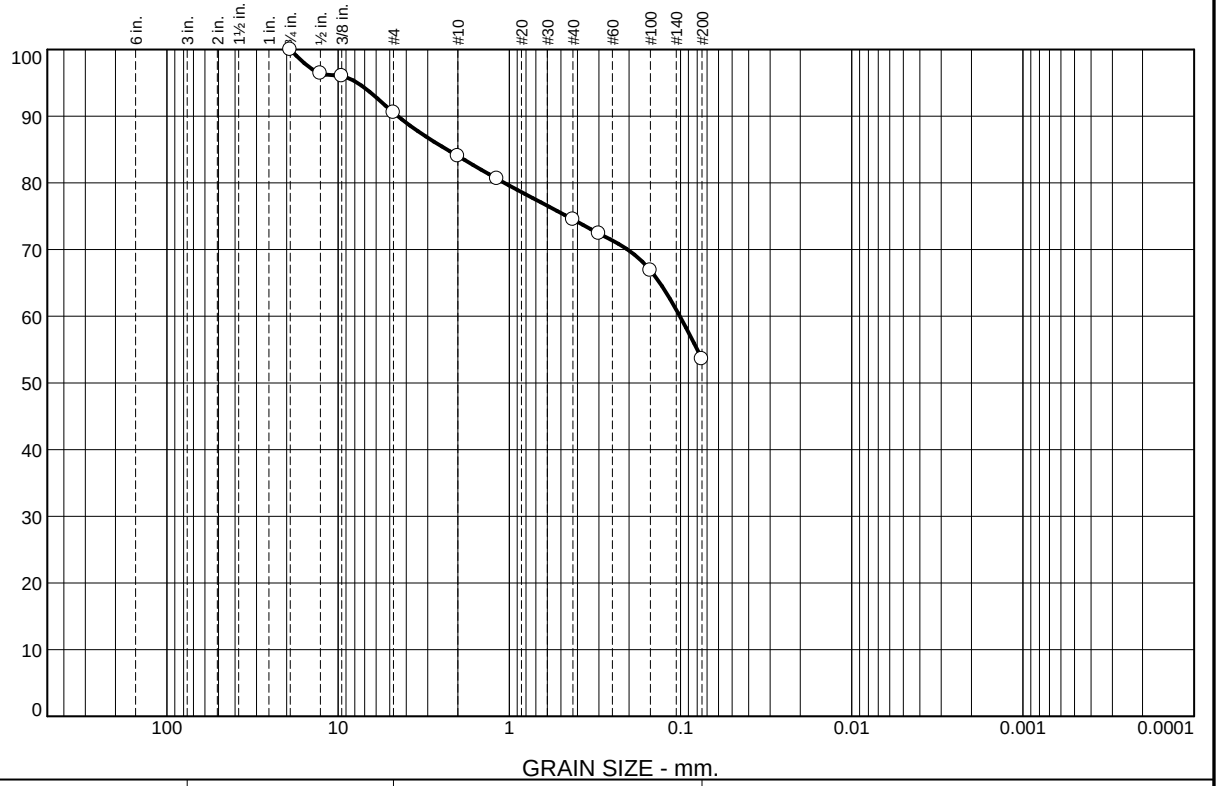
NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-24

Tested By: QH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	9.5	6.5	9.5	20.9	53.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	96.4		
.375	96.0		
#4	90.5		
#10	84.0		
#16	80.6		
#40	74.5		
#50	72.4		
#100	66.9		
#200	53.6		

* (no specification provided)

Soil Description

Brown

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{90}= 4.4809 D_{85}= 2.3156 D_{60}= 0.1010
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Location: B-22-111
Sample Number: 22-087-26 **Depth:** 2.5-4' **Date:** 5/12/2022

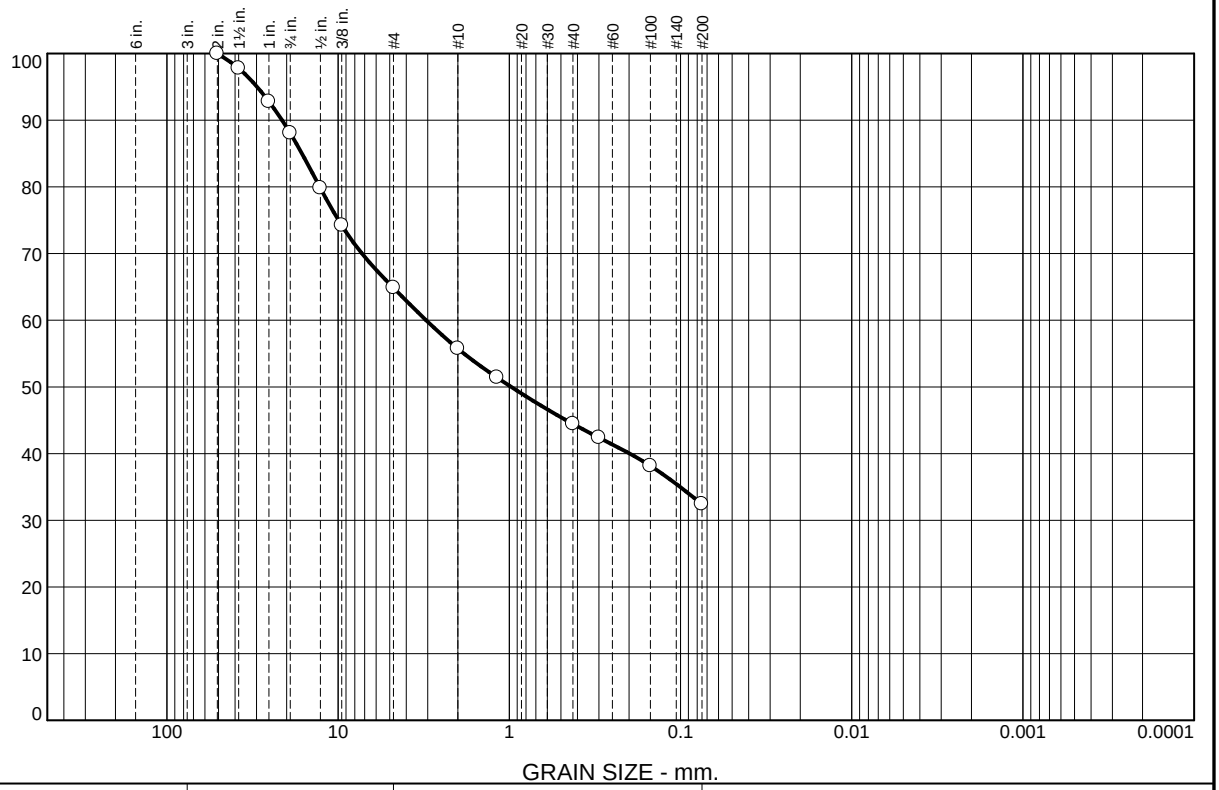
NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-26

Tested By: QH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	11.9	23.2	9.2	11.2	12.1	32.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2"	100.0		
1.5"	97.8		
1"	92.8		
.75"	88.1		
.5"	79.8		
.375"	74.2		
#4	64.9		
#10	55.7		
#16	51.4		
#40	44.5		
#50	42.4		
#100	38.2		
#200	32.4		

* (no specification provided)

Soil Description

Brown

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{90}= 21.2620 D_{85}= 16.2786 D_{60}= 3.0646
D_{50}= 0.9750 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Location: RC-22-006
Sample Number: 22-087-27 **Depth:** 0-5' **Date:** 5/12/2022

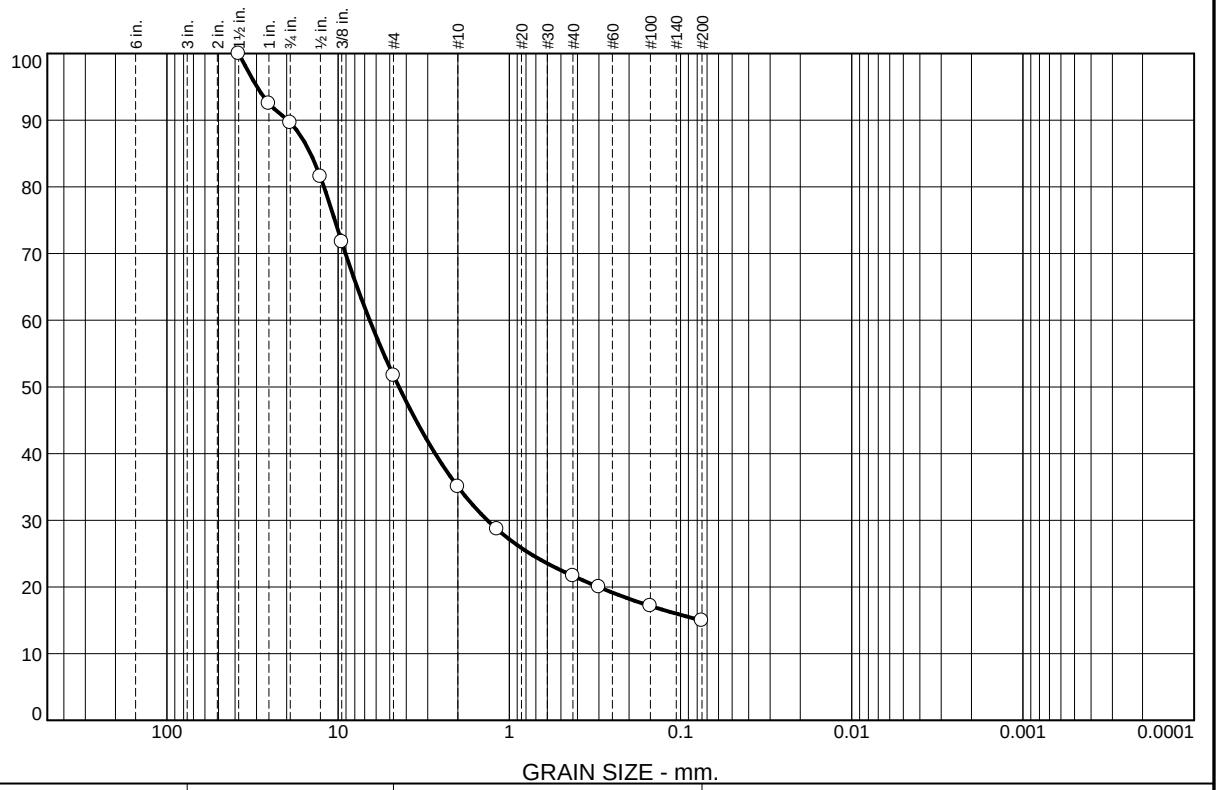
NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-27

Tested By: QH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	10.4	37.9	16.7	13.3	6.7	15.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5"	100.0		
1"	92.5		
.75"	89.6		
.5"	81.5		
.375"	71.7		
#4	51.7		
#10	35.0		
#16	28.7		
#40	21.7		
#50	20.0		
#100	17.1		
#200	15.0		

* (no specification provided)

Soil Description

Brown

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{90}= 19.6887 D_{85}= 14.4863 D_{60}= 6.5400
D_{50}= 4.4159 D_{30}= 1.3435 D_{15}= 0.0759
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Location: RC-22-006
Sample Number: 22-087-28 **Depth:** 7.5-9' **Date:** 5/12/2022

NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-28

Tested By: QH **Checked By:** JW

Particle Size Distribution Report

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	1.1	6.4	7.2	16.0	26.3	43.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2"	100.0		
1.5"	99.8		
1"	99.3		
.75"	98.9		
.5"	97.5		
.375"	95.8		
#4	92.5		
#10	85.3		
#16	80.0		
#40	69.3		
#50	64.8		
#100	52.3		
#200	43.0		

* (no specification provided)

Soil Description

Brown clayey sand

Atterberg Limits

PL= 18 LL= 29 PI= 11

Coefficients

D_{90}= 3.3432 D_{85}= 1.9437 D_{60}= 0.2280
D_{50}= 0.1296 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(1)

Remarks

Location: RC-22-001
Sample Number: 22-087-29 **Depth:** 0-5' **Date:** 5/12/2022

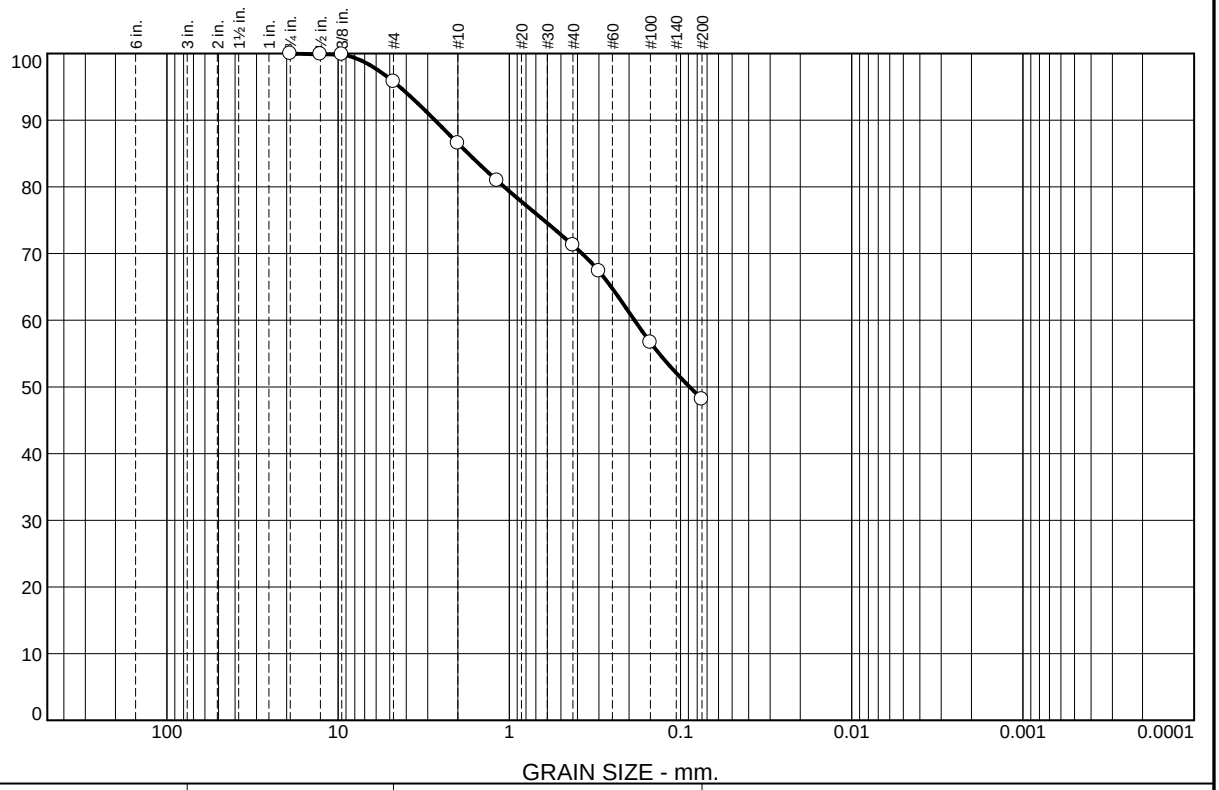
NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-29

Tested By: QH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.2	9.2	15.3	23.1	48.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	99.9		
.375	99.9		
#4	95.8		
#10	86.6		
#16	81.0		
#40	71.3		
#50	67.4		
#100	56.7		
#200	48.2		

* (no specification provided)

Soil Description

Brown

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{90}= 2.7208 D_{85}= 1.7367 D_{60}= 0.1858
D_{50}= 0.0886 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Location: RC-22-001
Sample Number: 22-087-30 **Depth:** 15-20' **Date:** 5/12/2022

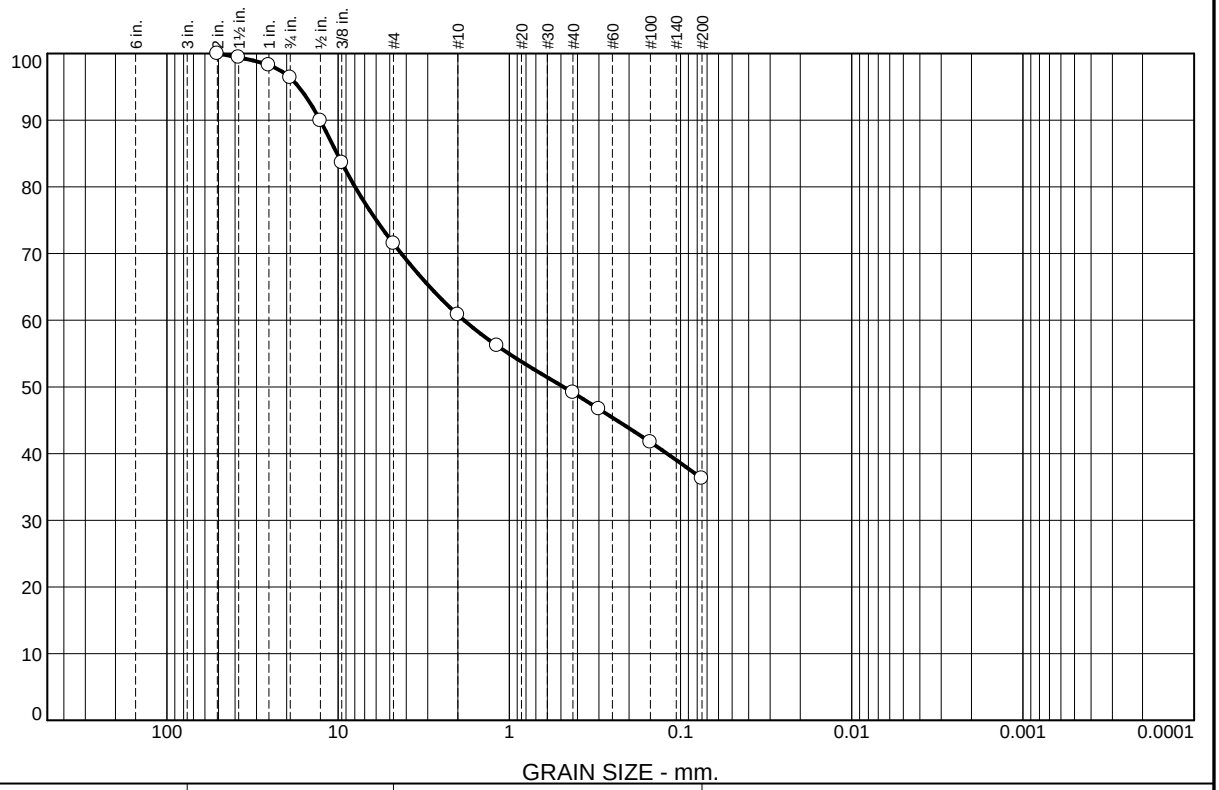
NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-30

Tested By: QH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.6	24.9	10.7	11.7	12.8	36.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2"	100.0		
1.5"	99.4		
1"	98.3		
.75"	96.4		
.5"	89.9		
.375"	83.6		
#4	71.5		
#10	60.8		
#16	56.2		
#40	49.1		
#50	46.7		
#100	41.7		
#200	36.3		

* (no specification provided)

Soil Description

Brown

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{90}= 12.7464 D_{85}= 10.1484 D_{60}= 1.8401
D_{50}= 0.4828 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Location: RC-22-005
Sample Number: 22-087-31 **Depth:** 1-5' **Date:** 5/12/2022

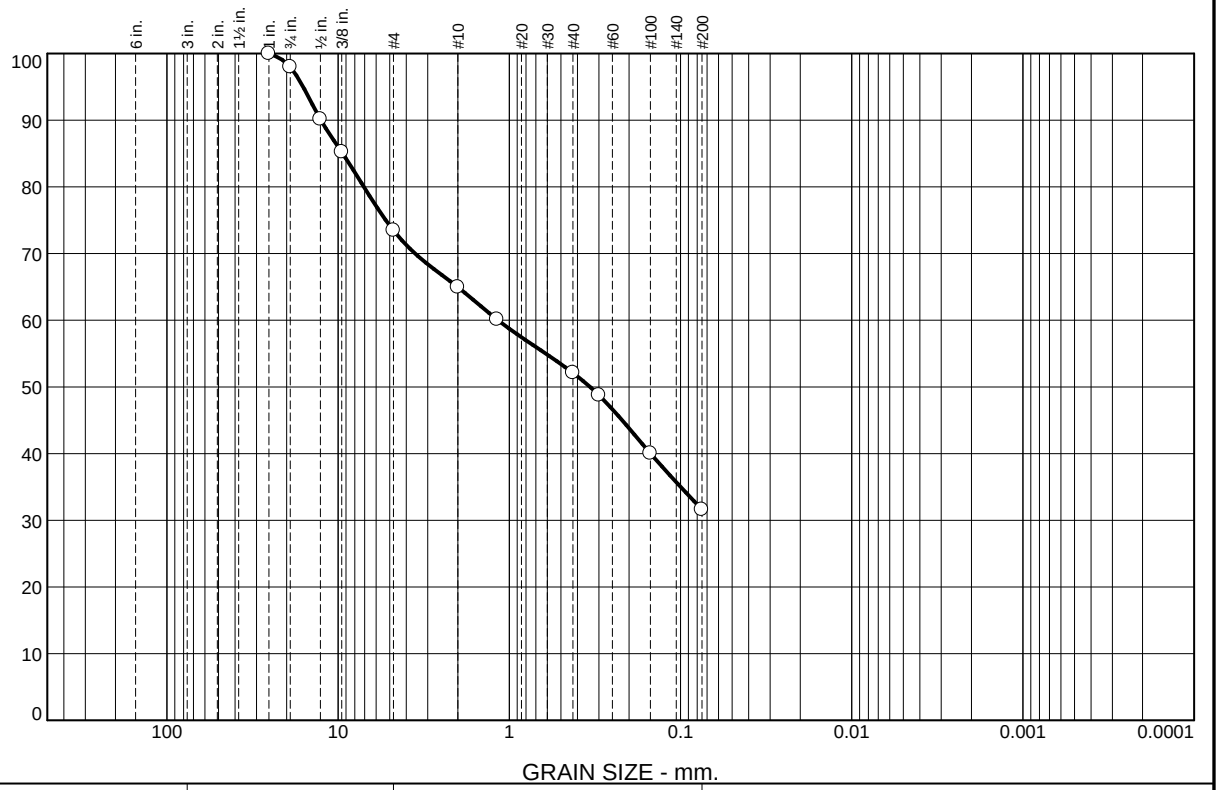
NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-31

Tested By: QH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.0	24.5	8.5	12.9	20.5	31.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
.75"	98.0		
.5"	90.1		
.375"	85.2		
#4	73.5		
#10	65.0		
#16	60.1		
#40	52.1		
#50	48.8		
#100	40.0		
#200	31.6		

* (no specification provided)

Soil Description

Brown clayey sand with gravel

Atterberg Limits

PL= 23 LL= 54 PI= 31

Coefficients

D_{90}= 12.6049 D_{85}= 9.4008 D_{60}= 1.1636
D_{50}= 0.3379 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-2-7(4)

Remarks

Location: RC-22-005
Sample Number: 22-087-32 **Depth:** 2.5-4' **Date:** 5/12/2022

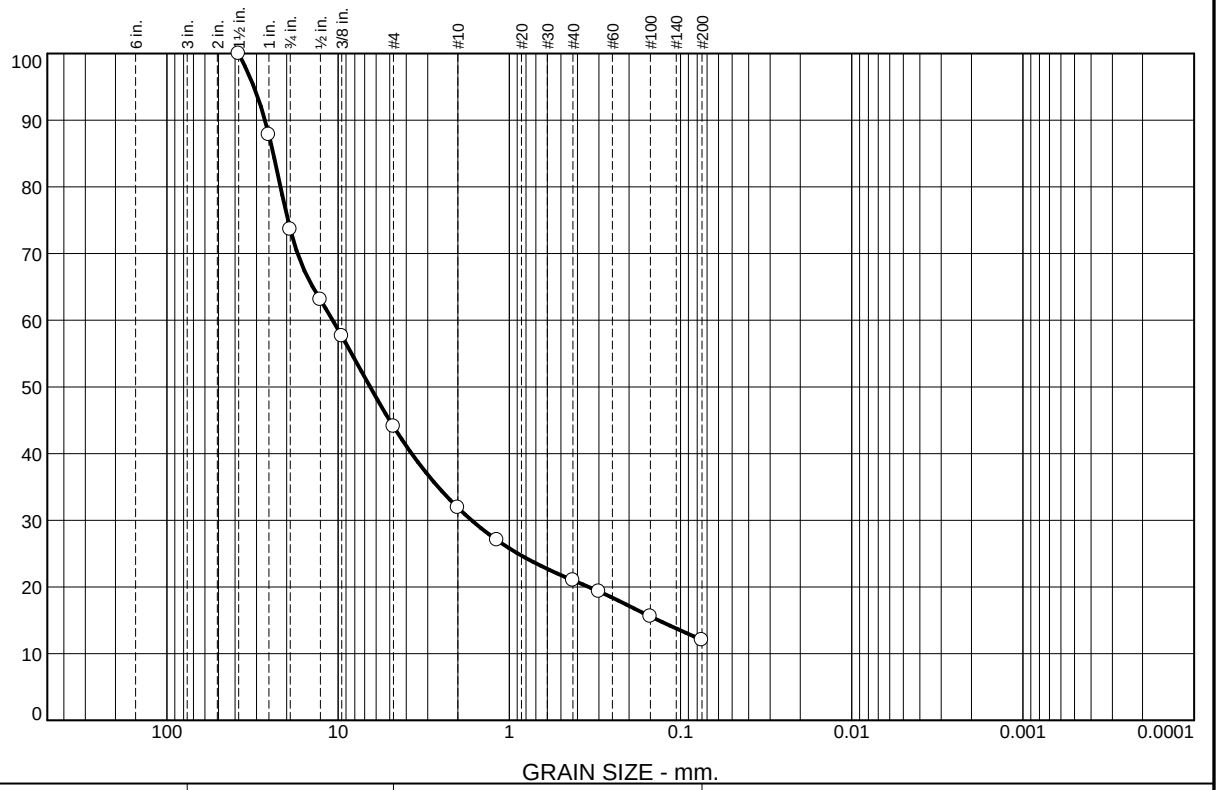
NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-32

Tested By: QH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	26.4	29.5	12.2	10.9	9.0	12.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5"	100.0		
1"	87.8		
.75"	73.6		
.5"	63.1		
.375"	57.6		
#4	44.1		
#10	31.9		
#16	27.0		
#40	21.0		
#50	19.3		
#100	15.6		
#200	12.0		

* (no specification provided)

Soil Description

Brown

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{90}= 26.7510 D_{85}= 23.9390 D_{60}= 10.7623
D_{50}= 6.4987 D_{30}= 1.6621 D_{15}= 0.1346
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Location: B-22-103
Sample Number: 22-087-33 **Depth:** 7.5-9' **Date:** 5/12/2022

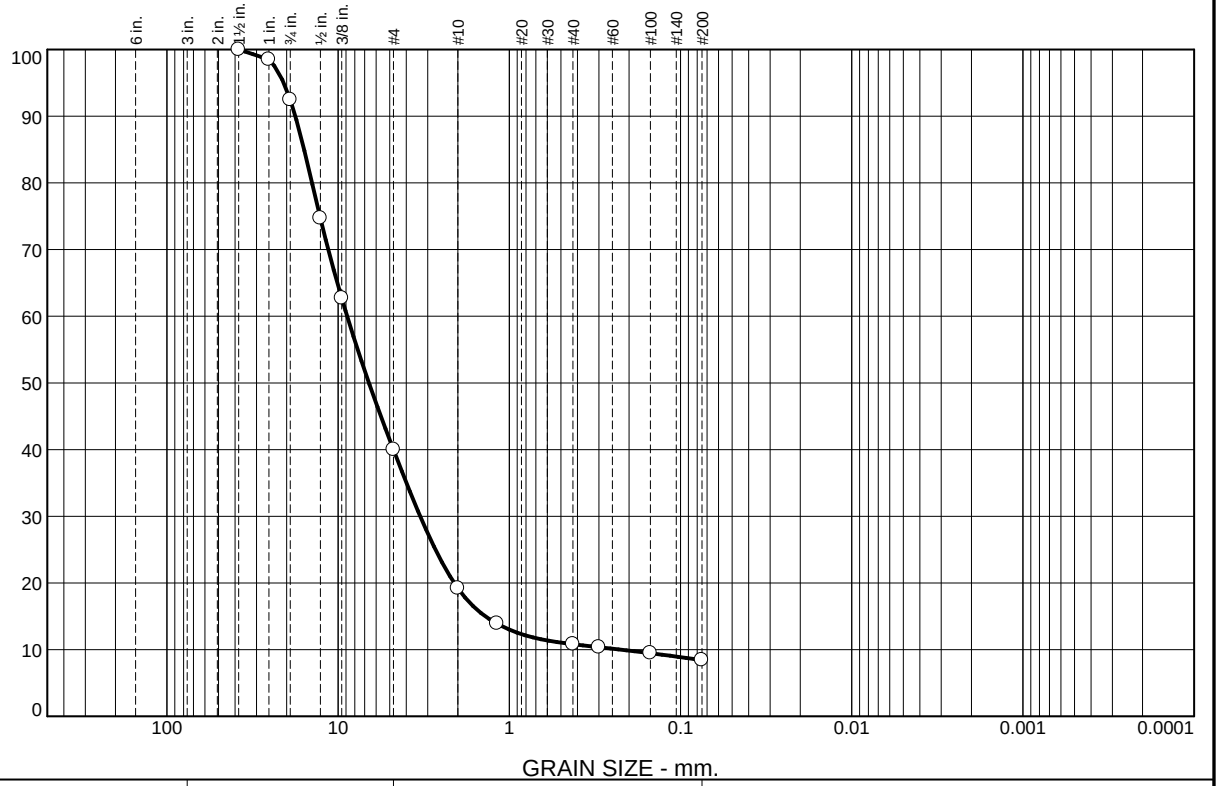
NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-33

Tested By: QH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	7.5	52.5	20.8	8.4	2.4	8.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5"	100.0		
1"	98.5		
.75"	92.5		
.5"	74.7		
.375"	62.7		
#4	40.0		
#10	19.2		
#16	13.9		
#40	10.8		
#50	10.4		
#100	9.5		
#200	8.4		

* (no specification provided)

Soil Description

Brown

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{90}= 17.7852 D_{85}= 15.8122 D_{60}= 8.8552
D_{50}= 6.6061 D_{30}= 3.3195 D_{15}= 1.3808
D_{10}= 0.2250 C_u= 39.35 C_c= 5.53

Classification

USCS= AASHTO=

Remarks

Location: RC-22-005
Sample Number: 22-087-34 **Depth:** 10-15' **Date:** 5/12/2022

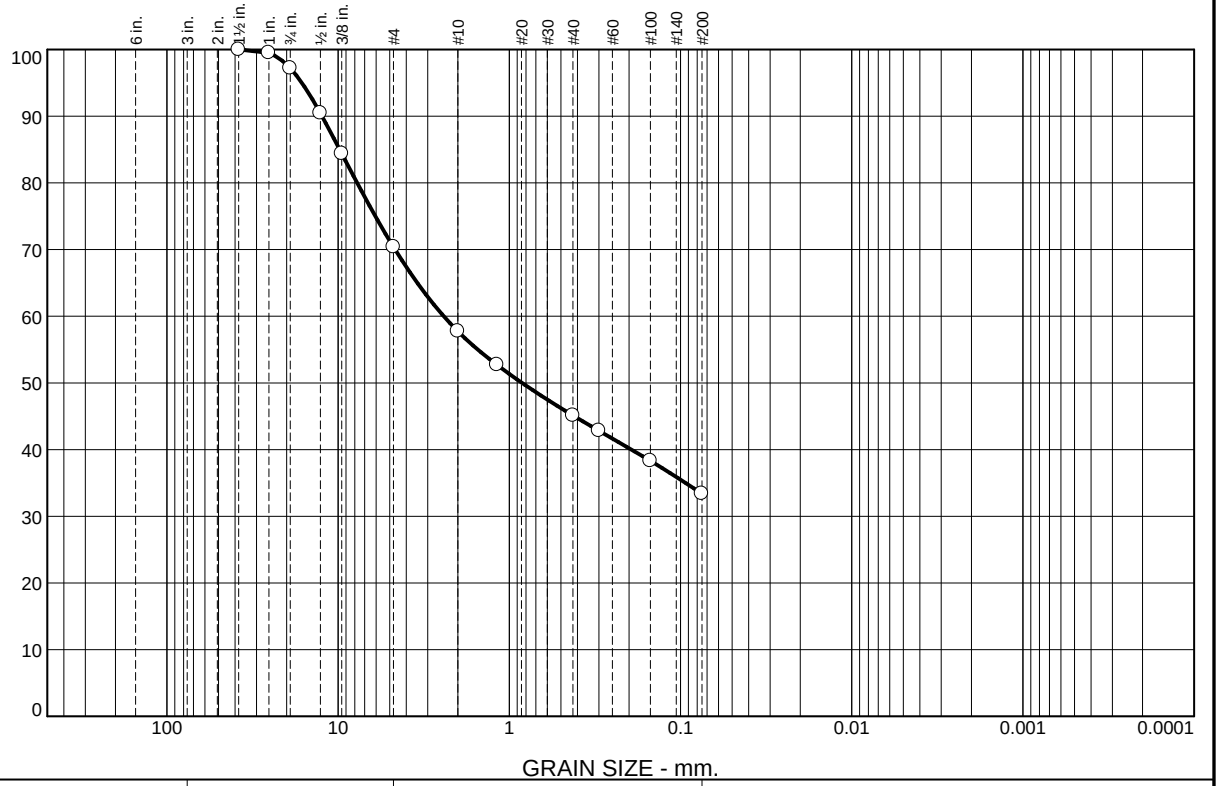
NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-34

Tested By: QH **Checked By:** JW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.8	26.8	12.7	12.6	11.7	33.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5"	100.0		
1"	99.5		
.75"	97.2		
.5"	90.4		
.375"	84.4		
#4	70.4		
#10	57.7		
#16	52.7		
#40	45.1		
#50	42.8		
#100	38.3		
#200	33.4		

* (no specification provided)

Soil Description

Brown

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{90}= 12.4213 D_{85}= 9.7946 D_{60}= 2.4178
D_{50}= 0.8422 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Location: RC-22-005
Sample Number: 22-087-36 **Depth:** 35-40' **Date:** 5/12/2022

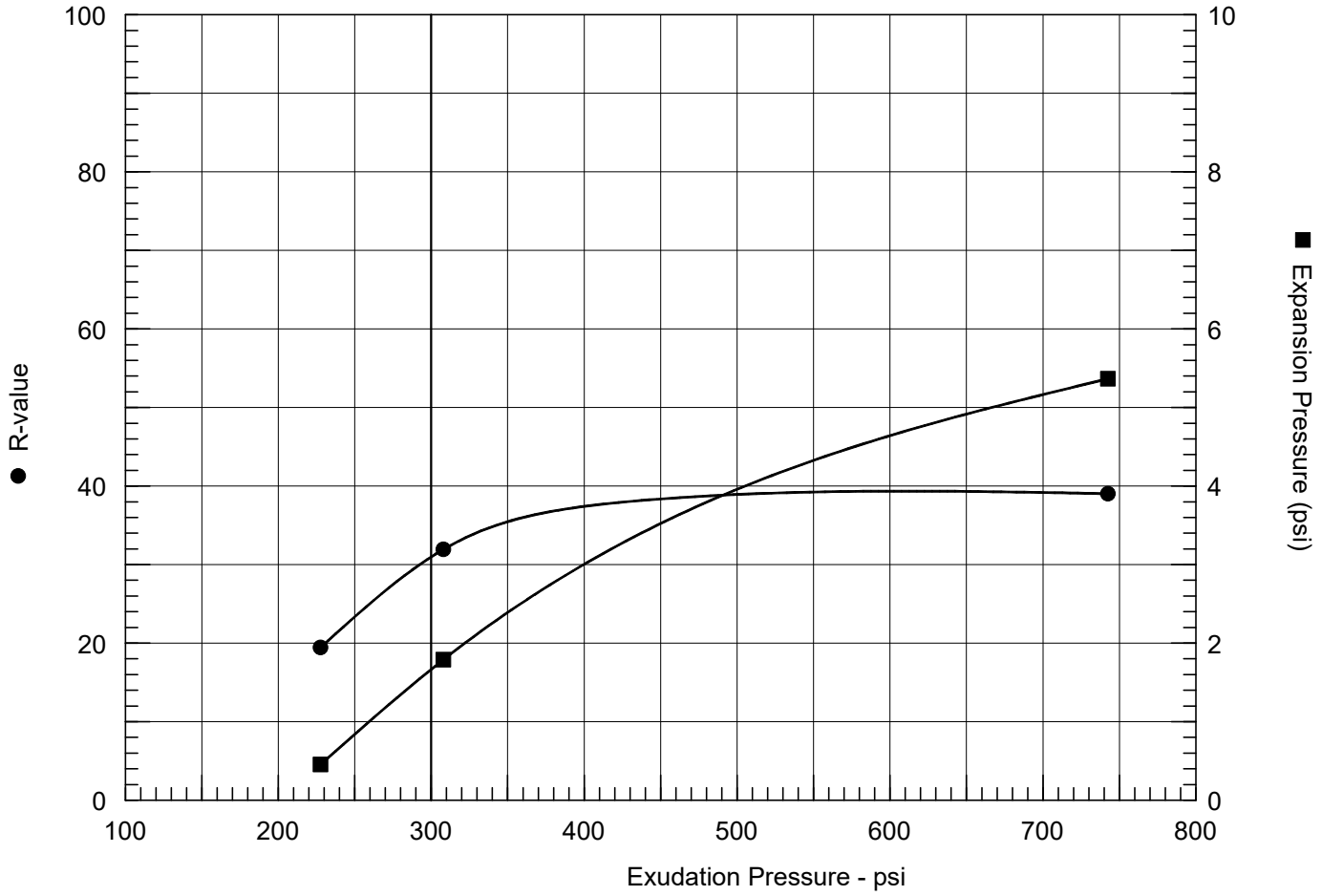
NewFields

Client: Jacobs
Project: I-80 Golconda Summit

Project No: 475.0499.000 **Figure** 22-087-36

Tested By: QH **Checked By:** JW

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - Nevada Test Method T115

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	100	128.2	12.9	0.45	112	2.50	228	19	19
2	175	129.3	11.9	1.79	88	2.50	308	32	32
3	200	130.5	10.9	5.37	77	2.50	742	39	39

Test Results	Material Description
R-value at 300 psi exudation pressure = 31 **Exp. pressure at 300 psi exudation pressure =** 1.67 psi	Brown clayey sand

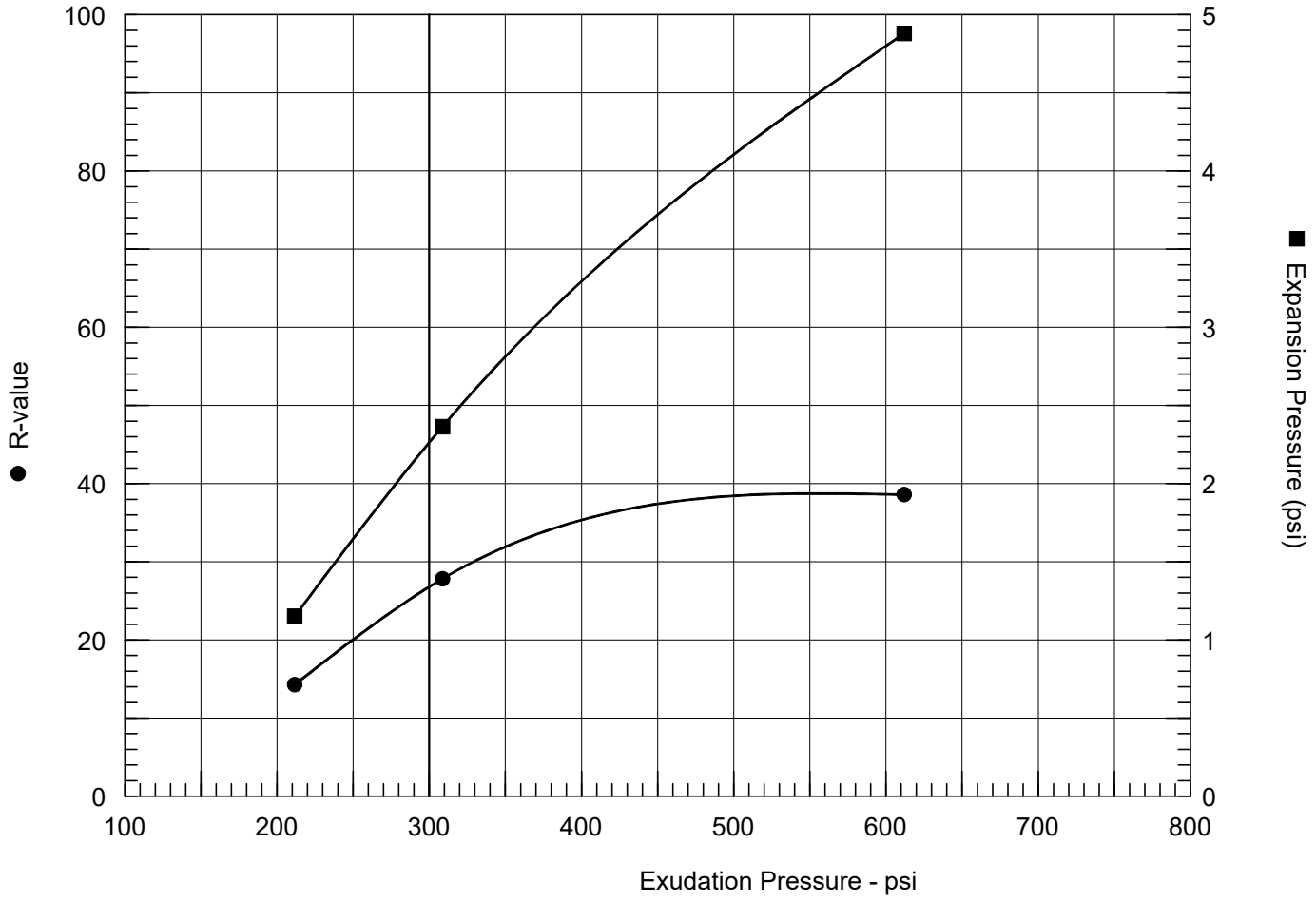
Project No.: 1541
Project: I-80 GOLCONDA PROJECT, 475-0499-000
Location: RC-22-001
Sample Number: 36448 **Depth:** 0-5'
Date: 5/27/2022

Tested by: A. DIXON
Checked by: M. PONTONI
Remarks:

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

PLATE _____

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - Nevada Test Method T115

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	200	130.1	11.4	2.36	96	2.50	309	28	28
2	200	131.8	10.0	4.88	79	2.50	612	39	39
3	125	128.9	12.3	1.15	123	2.50	212	14	14

Test Results	Material Description
R-value at 300 psi exudation pressure = 27 **Exp. pressure at 300 psi exudation pressure =** 2.26 psi	Brown clayey sand or silty sand

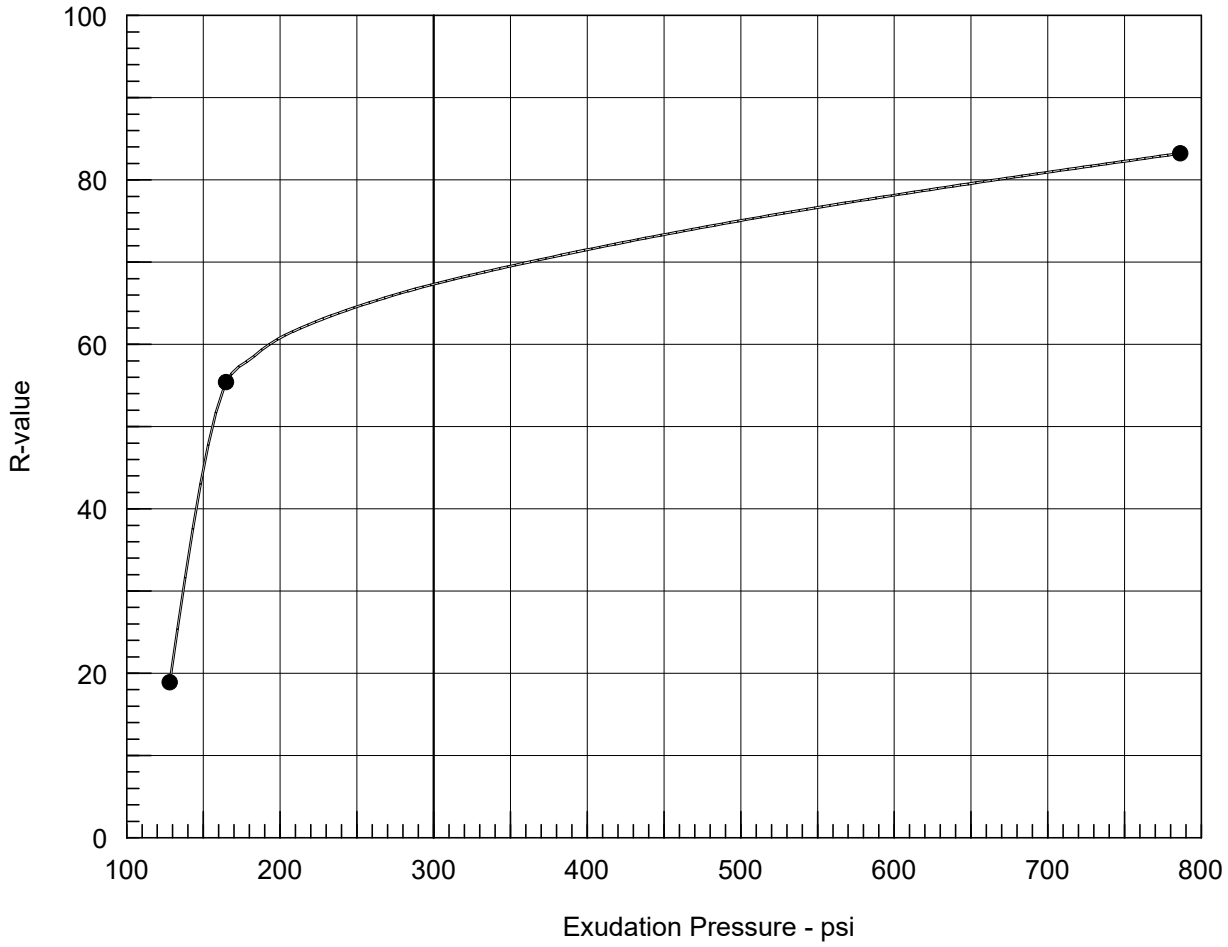
Project No.: 1541
Project: I-80 GOLCONDA PROJECT, 475-0499-000
Location: RC-22-001
Sample Number: 36448 **Depth:** 15'-20'
Date: 5/27/2022

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

Tested by: A. DIXON
Checked by: M. PONTONI
Remarks:

PLATE _____

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - Nevada Test Method T115

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	100	131.5	9.1	0.00	114	2.50	128	19	19
2	150	133.4	8.4	0.00	54	2.50	165	55	55
3	200	134.4	7.6	0.00	15	2.50	786	83	83

Test Results	Material Description
R-value at 300 psi exudation pressure = 67	Dark brown clayey sand with gravel or silty sand with gravel

Project No.: 1541

Project: I-80 GOLCONDA PROJECT, 475-0499-000

Location: B-22-102

Sample Number: 36448 **Depth:** 0-5'

Date: 5/27/2022

Tested by: A. DIXON

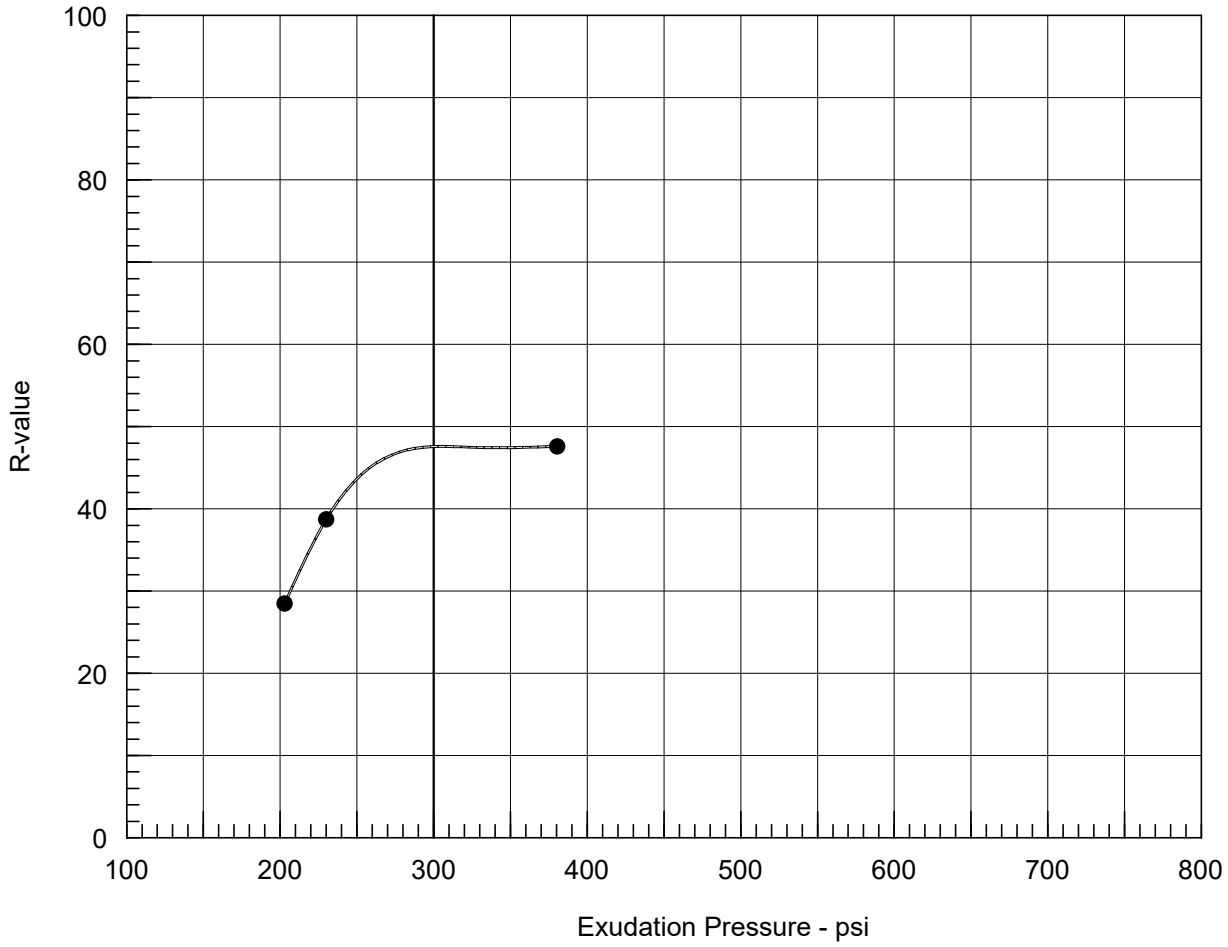
Checked by: M. PONTONI

Remarks:

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

PLATE _____

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - Nevada Test Method T115

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	100	130.2	9.3	0.00	90	2.40	203	31	28
2	200	132.3	8.3	0.00	62	2.50	380	48	48
3	150	131.6	8.8	0.00	76	2.50	230	39	39

Test Results	Material Description
R-value at 300 psi exudation pressure = 48	

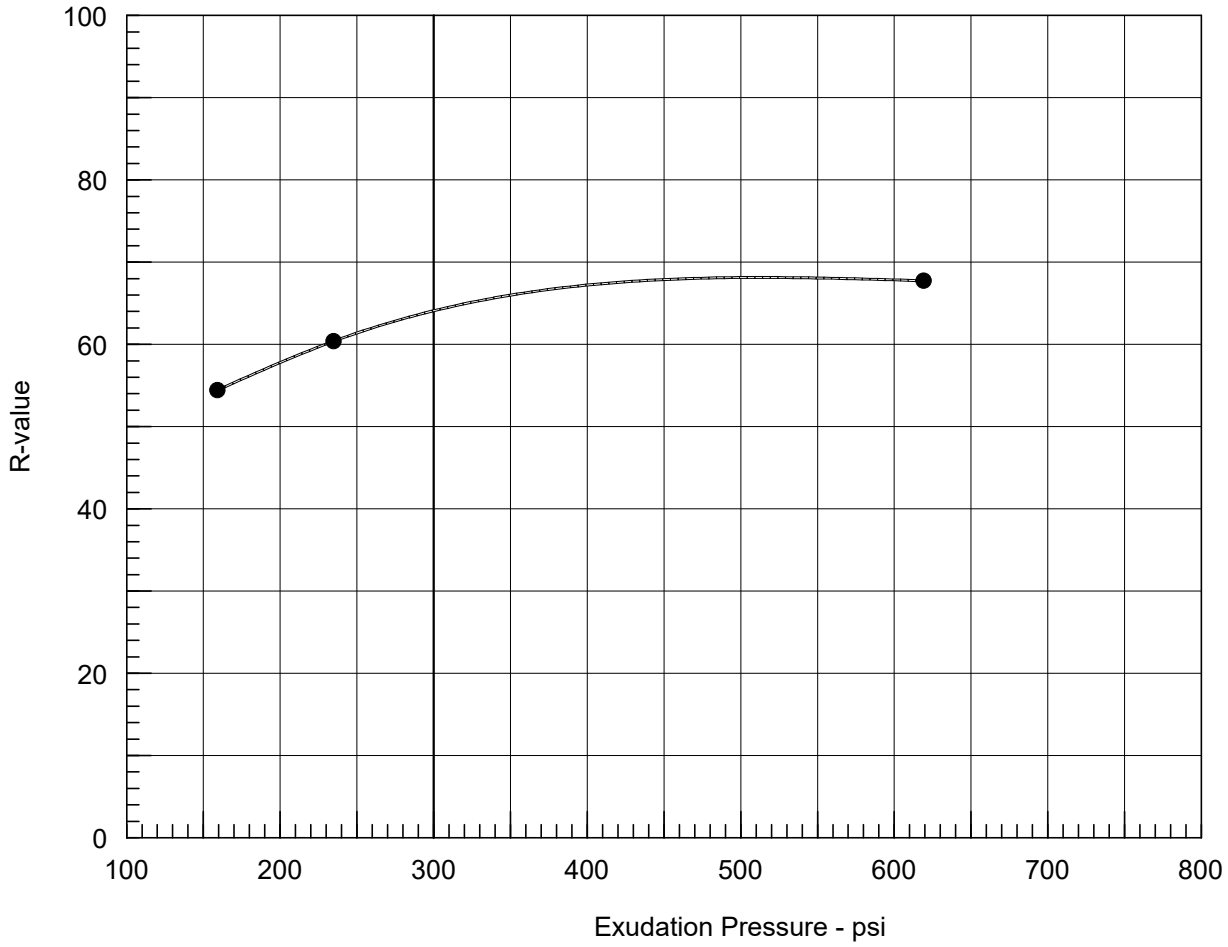
Project No.: 1541
Project: I-80 GOLCONDA PROJECT, 475-0499-000
Location: B-22-108
Sample Number: 36448 **Depth:** 0-5'
Date: 5/27/2022

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

Tested by: A. DIXON
Checked by: M. PONTONI
Remarks:

PLATE _____

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - Nevada Test Method T115

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	200	120.3	12.8	0.00	47	2.50	159	54	54
2	200	122.3	11.9	0.00	30	2.50	619	68	68
3	200	122.2	12.2	0.00	39	2.50	235	60	60

Test Results	Material Description
R-value at 300 psi exudation pressure = 64	Brown clayey sand with gravel or silty sand with gravel

Project No.: 1541

Project: I-80 GOLCONDA PROJECT, 475-0499-000

Location: B-22-109

Sample Number: 36448 **Depth:** 0-5'

Date: 5/27/2022

Tested by: A. DIXON

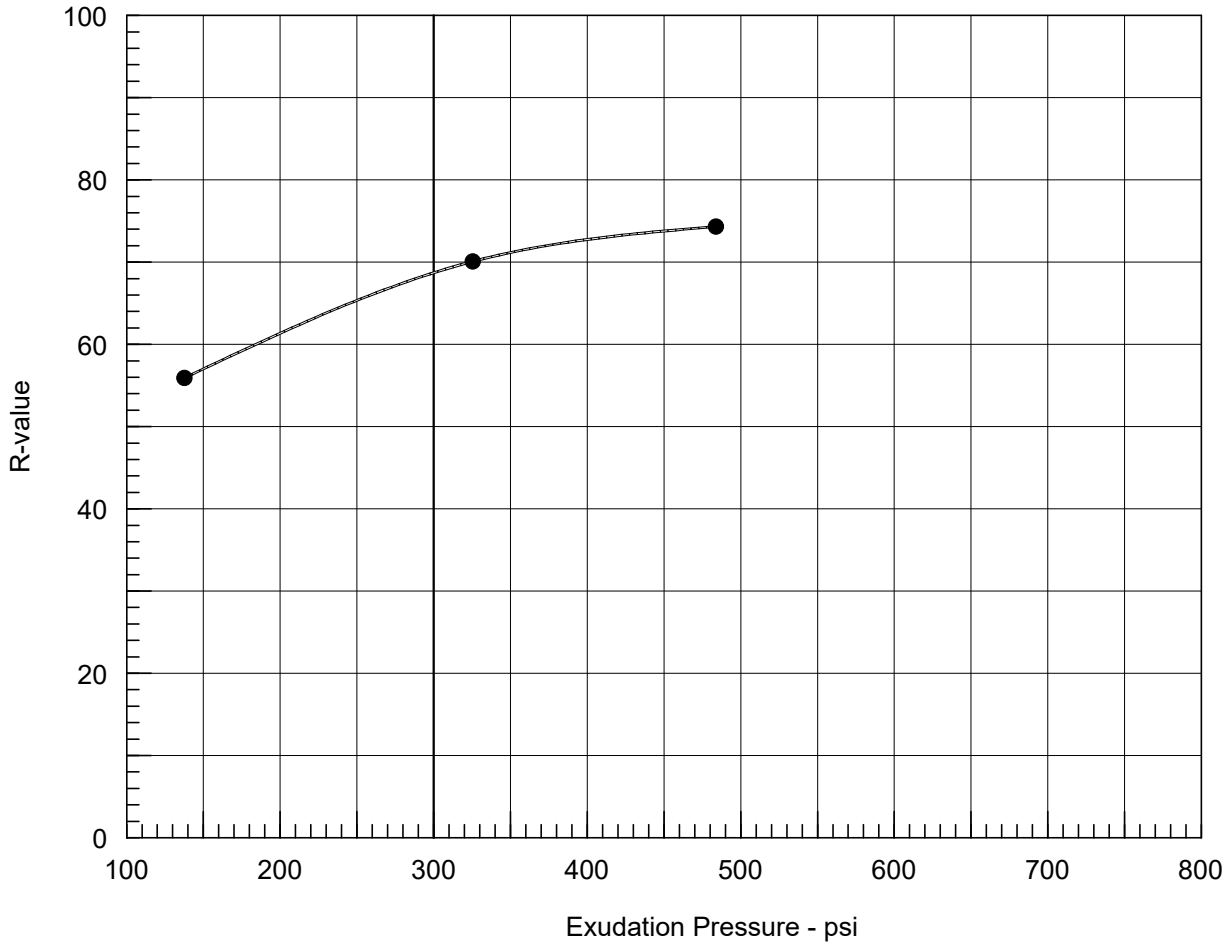
Checked by: M. PONTONI

Remarks:

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

PLATE _____

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - Nevada Test Method T115

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	200	112.1	17.4	0.00	43	2.50	138	56	56
2	200	113.4	16.0	0.00	29	2.50	325	70	70
3	200	111.8	15.3	0.00	26	2.55	484	74	74

Test Results	Material Description
R-value at 300 psi exudation pressure = 69	Brown clayey sand or silty sand

Project No.: 1541
Project: I-80 GOLCONDA PROJECT, 475-0499-000
Location: B-22-112
Sample Number: 36448 **Depth:** 0-5'
Date: 5/27/2022

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

Tested by: A. DIXON
Checked by: M. PONTONI
Remarks:

PLATE _____

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

EXPANSION INDEX OF SOILS

(ASTM D4829 - 21)

Project Name:	I-80 GOLCONDA PROJECT, 475-0499-000	Project No.:	1541
Client:	NEWFIELDS	Laboratory No:	36448
Source:	RC-22-001 15'-20'	Date Tested:	5/24/2022
Date Sampled/Cast:	5/20/2022	Tested By:	M. PONTONI

SPECIMEN PREPARATION

Oven or Air Dried	Oven Dried	% Retained on #4 Sieve:	96%
Wet Weight (g):	122.5	Specific Gravity:	2.75 (ESTIMATED)
Dry Weight (g):	114.2	Unit Weight Water (pcf):	62.4
Moisture Content:	7.3%	Weight of Ring (g):	199.76

COMPACTION RESULTS

Compacted Weight (g):	436.7	Compacted Weight (lb):	0.963
Moist Unit Weight (pcf):	132.1	Dry Unit Weight (pcf):	123.1

EXPANSION RESULTS

Initial Dial Reading (in.):	0.000	Final Dial Reading (in.):	0.032

CALCULATIONS

$S = (w * G_s * \alpha_d) / (G_s * \alpha_w) - \alpha_d$

$EI = (D_1-D_2)/H_1 * 1000$

w = moisture content

G_s = specific gravity

α_w = unit weight of water (pcf)

α_d = dry unit weight (pcf)

ΔH = Change in Height

H_1 = Initial Height

D_1 = Initial dial reading

D_2 = final dial reading

S_{meas} = determined percent of saturation

EI_{50} = estimate of the expansion index

S: 50.9%

EI: 32

CLASSIFICATION TABLE

Expansion Index	0 -20	21 - 50	51 - 90	91 - 130	> 130
Potential Expansion	Very Low	Low	Medium	High	Very High

ADVANCED TERRA TESTING

Unconfined Compressive Strength
ASTM D7012 Method D

CLIENT	Newfields	BORING NO.	RC-22-002-R
JOB NO.	2347-022	DEPTH	8.0-12.5
PROJECT	I-80 Golconda Summit	SAMPLE NO.	--
PROJECT NO.	475.0499.000	DATE SAMPLED	--
LOCATION	Nevada, USA	ROCK TYPE	--
DATE TESTED	06/14/22		
TECHNICIAN	HN		

Test Parameters

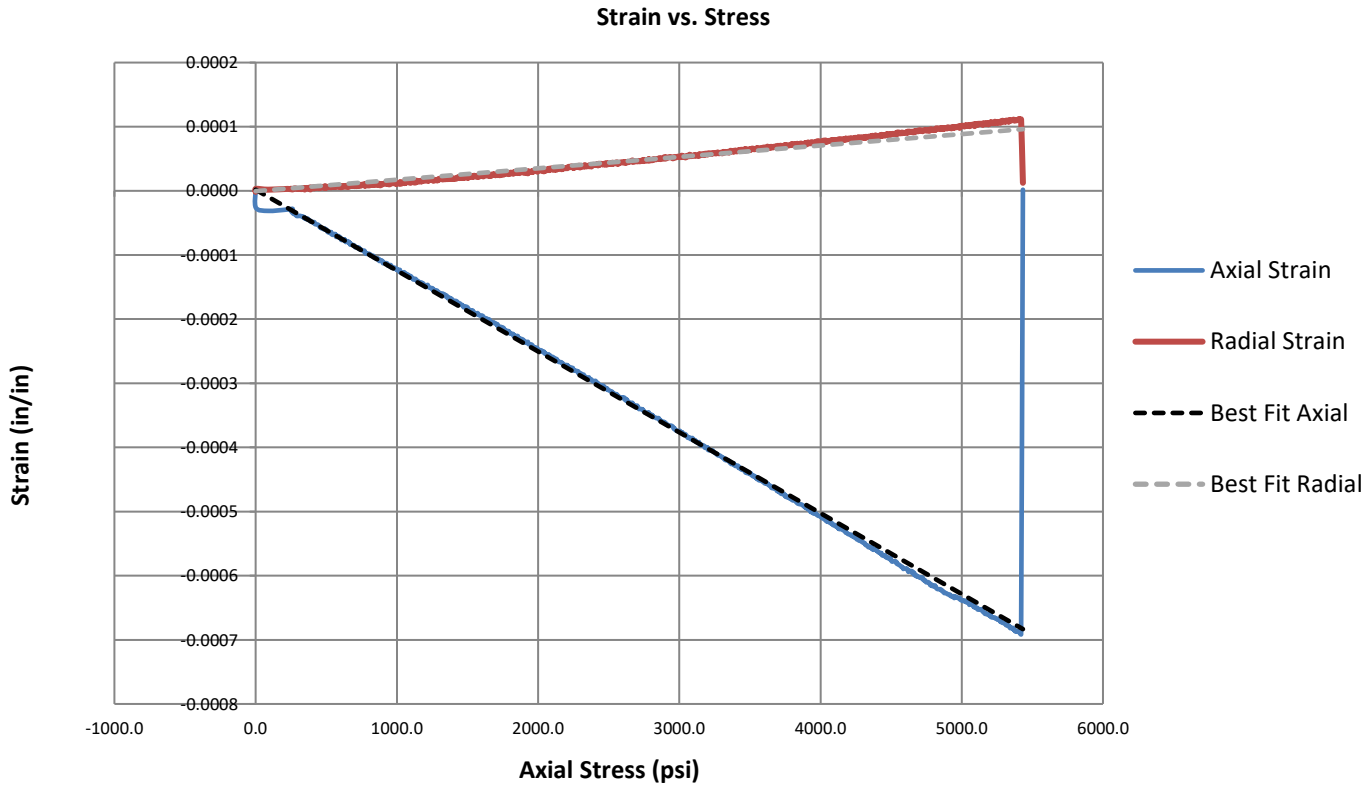
Load Rate (lb/min):	3000
Load Rate (N/min):	13345
Raw Data Files:	1.txt, 0

Density Data

Mass of Rock (g):	919.6	Initial Wet Density (pcf):	156.7
Initial Diameter (in):	2.388	Initial Wet Density (kg/m³):	2509
Initial Height (in):	4.993		

Test Results

Peak Load (lbs):	71538	Failure Type:	Fracture / Shear
Compressive Strength (psi):	15973	Height to Diameter Ratio:	2.09:1
Compressive Strength (MPa):	110	Poisson's Ratio:	0.141
		Young's Modulus (psi):	7.93 x10^6



NOTES:

Data entry by:	HN	Date:	06/14/22
Checked by:	DL	Date:	06/15/22
File name:	2347022__RockTx ASTM 7012 B and D_0.xlsm		

ADVANCED TERRA TESTING

Unconfined Compressive Strength
ASTM D7012 Method D

CLIENT	Newfields	BORING NO.	RC-22-002-R
JOB NO.	2347-022	DEPTH	8.0-12.5
PROJECT	I-80 Golconda Summit	SAMPLE NO.	--
PROJECT NO.	475.0499.000	DATE SAMPLED	--
LOCATION	Nevada, USA	ROCK TYPE	--
DATE TESTED	06/14/22		
TECHNICIAN	HN		

Before Test

NOTES

Picture File: 1.JPG
File name: 2347022__RockTx ASTM 7012 B and D_0.xlsm

ADVANCED TERRA TESTING

Unconfined Compressive Strength
ASTM D7012 Method D

CLIENT	Newfields	BORING NO.	RC-22-002-R
JOB NO.	2347-022	DEPTH	8.0-12.5
PROJECT	I-80 Golconda Summit	SAMPLE NO.	--
PROJECT NO.	475.0499.000	DATE SAMPLED	--
LOCATION	Nevada, USA	ROCK TYPE	--
DATE TESTED	06/14/22		
TECHNICIAN	HN		

After Test

NOTES

Picture File: 1a.JPG
File name: 2347022__RockTx ASTM 7012 B and D_0.xlsm

ADVANCED TERRA TESTING

Unconfined Compressive Strength
ASTM D7012 Method D

CLIENT	Newfields	BORING NO.	RC-22-003-R
JOB NO.	2347-022	DEPTH	35.0-38.0
PROJECT	I-80 Golconda Summit	SAMPLE NO.	--
PROJECT NO.	475.0499.000	DATE SAMPLED	--
LOCATION	Nevada, USA	ROCK TYPE	--
DATE TESTED	06/15/22		
TECHNICIAN	HN		

Test Parameters

Load Rate (lb/min):	3000
Load Rate (N/min):	13345

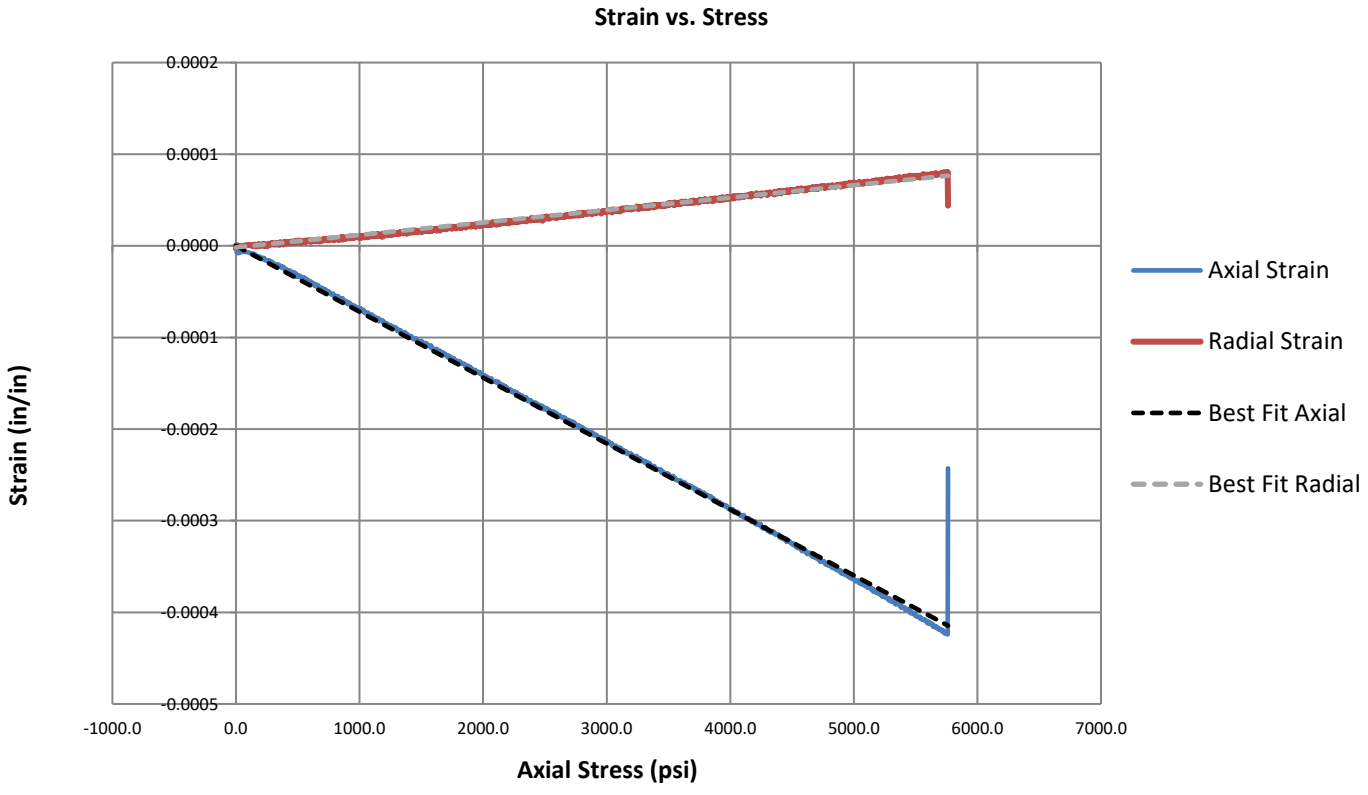
Raw Data Files: 7.txt, 0

Density Data

Mass of Rock (g):	974.1	Initial Wet Density (pcf):	167.7
Initial Diameter (in):	2.384	Initial Wet Density (kg/m³):	2687
Initial Height (in):	4.956		

Test Results

Peak Load (lbs):	93093	Failure Type:	Fracture / Shear
Compressive Strength (psi):	20855	Height to Diameter Ratio:	2.08:1
Compressive Strength (MPa):	144	Poisson's Ratio:	0.189
		Young's Modulus (psi):	13.90 x10^6



NOTES:

Data entry by:	HN	Date: 06/15/22
Checked by:	DL	Date: 06/15/22
File name:	2347022__RockTx ASTM 7012 B and D_6.xlsm	

ADVANCED TERRA TESTING

Unconfined Compressive Strength
ASTM D7012 Method D

CLIENT	Newfields	BORING NO.	RC-22-003-R
JOB NO.	2347-022	DEPTH	35.0-38.0
PROJECT	I-80 Golconda Summit	SAMPLE NO.	--
PROJECT NO.	475.0499.000	DATE SAMPLED	--
LOCATION	Nevada, USA	ROCK TYPE	--
DATE TESTED	06/15/22		
TECHNICIAN	HN		

Before Test

NOTES

Picture File: 7.JPG
File name: 2347022__RockTx ASTM 7012 B and D_6.xlsm

ADVANCED TERRA TESTING

Unconfined Compressive Strength
ASTM D7012 Method D

CLIENT	Newfields	BORING NO.	RC-22-003-R
JOB NO.	2347-022	DEPTH	35.0-38.0
PROJECT	I-80 Golconda Summit	SAMPLE NO.	--
PROJECT NO.	475.0499.000	DATE SAMPLED	--
LOCATION	Nevada, USA	ROCK TYPE	--
DATE TESTED	06/15/22		
TECHNICIAN	HN		

After Test

NOTES

Picture File: 7a.JPG
File name: 2347022__RockTx ASTM 7012 B and D_6.xlsm

ADVANCED TERRA TESTING

Unconfined Compressive Strength
ASTM D7012 Method D

CLIENT	Newfields	BORING NO.	RC-22-003-R
JOB NO.	2347-022	DEPTH	42.0-45.0
PROJECT	I-80 Golconda Summit	SAMPLE NO.	--
PROJECT NO.	475.0499.000	DATE SAMPLED	--
LOCATION	Nevada, USA	ROCK TYPE	--
DATE TESTED	06/15/22		
TECHNICIAN	HN		

Test Parameters

Load Rate (lb/min):	3000
Load Rate (N/min):	13345

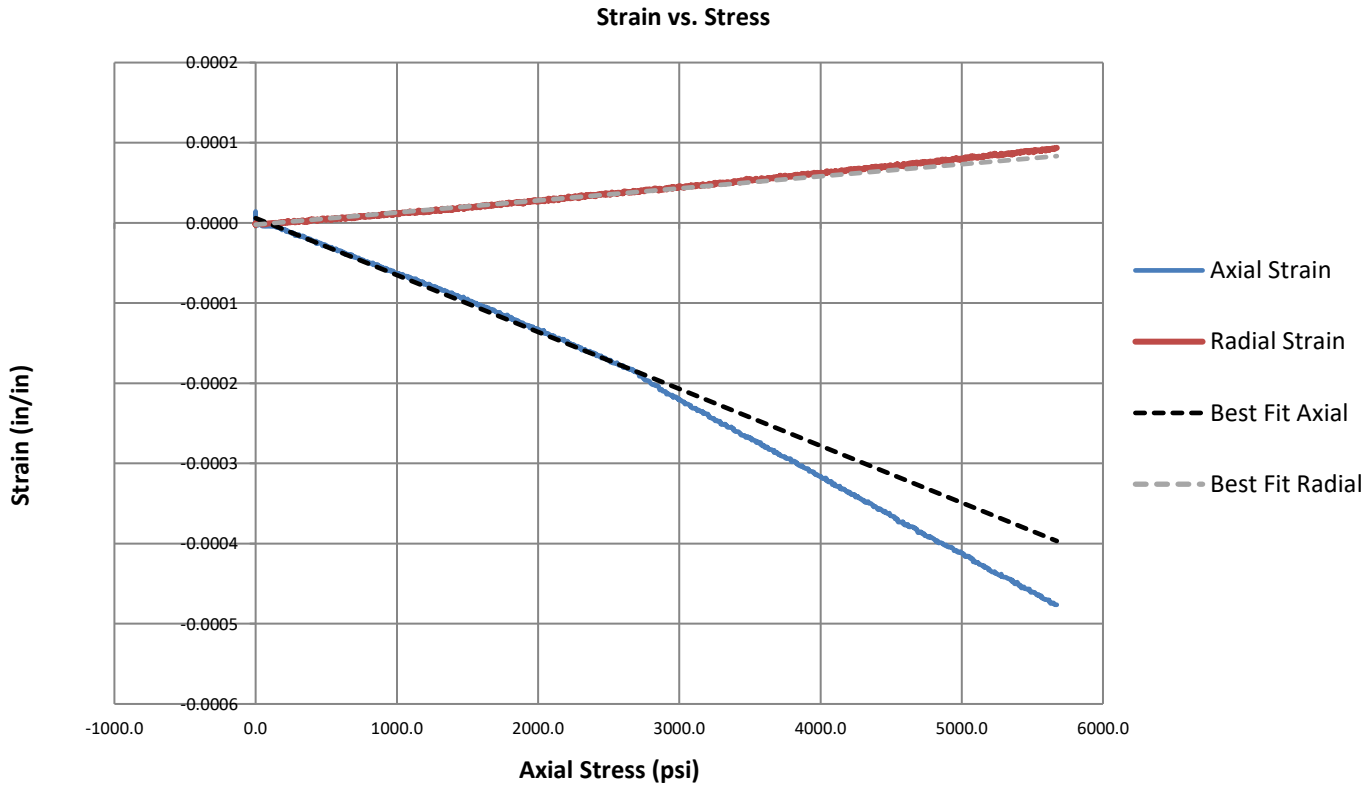
Raw Data Files: 8.txt, 0

Density Data

Mass of Rock (g):	1003.7	Initial Wet Density (pcf):	167.2
Initial Diameter (in):	2.386	Initial Wet Density (kg/m³):	2678
Initial Height (in):	5.116		

Test Results

Peak Load (lbs):	97170	Failure Type:	Fracture / Shear
Compressive Strength (psi):	21732	Height to Diameter Ratio:	2.14:1
Compressive Strength (MPa):	150	Poisson's Ratio:	0.212
		Young's Modulus (psi):	14.09 x10^6



NOTES:

Data entry by:	HN	Date:	06/15/22
Checked by:	DL	Date:	06/15/22
File name:	2347022__RockTx ASTM 7012 B and D_7.xlsm		

ADVANCED TERRA TESTING

Unconfined Compressive Strength
ASTM D7012 Method D

CLIENT	Newfields	BORING NO.	RC-22-003-R
JOB NO.	2347-022	DEPTH	42.0-45.0
PROJECT	I-80 Golconda Summit	SAMPLE NO.	--
PROJECT NO.	475.0499.000	DATE SAMPLED	--
LOCATION	Nevada, USA	ROCK TYPE	--
DATE TESTED	06/15/22		
TECHNICIAN	HN		

Before Test

NOTES

Picture File: 8.JPG
File name: 2347022__RockTx ASTM 7012 B and D_7.xlsm

ADVANCED TERRA TESTING

Unconfined Compressive Strength
ASTM D7012 Method D

CLIENT	Newfields	BORING NO.	RC-22-003-R
JOB NO.	2347-022	DEPTH	42.0-45.0
PROJECT	I-80 Golconda Summit	SAMPLE NO.	--
PROJECT NO.	475.0499.000	DATE SAMPLED	--
LOCATION	Nevada, USA	ROCK TYPE	--
DATE TESTED	06/15/22		
TECHNICIAN	HN		

After Test

NOTES

Picture File: 8a.JPG
File name: 2347022__RockTx ASTM 7012 B and D_7.xlsm

Unconfined Compressive Strength
ASTM D7012 Method D

CLIENT	Newfields	BORING NO.	RC-22-002-R
JOB NO.	2347-022	DEPTH	25.5-27.0
PROJECT	I-80 Golconda Summit	SAMPLE NO.	--
PROJECT NO.	475.0499.000	DATE SAMPLED	--
LOCATION	Nevada, USA	ROCK TYPE	--
DATE TESTED	06/14/22		
TECHNICIAN	HN		

Test Parameters

Load Rate (lb/min):	3000
Load Rate (N/min):	13345

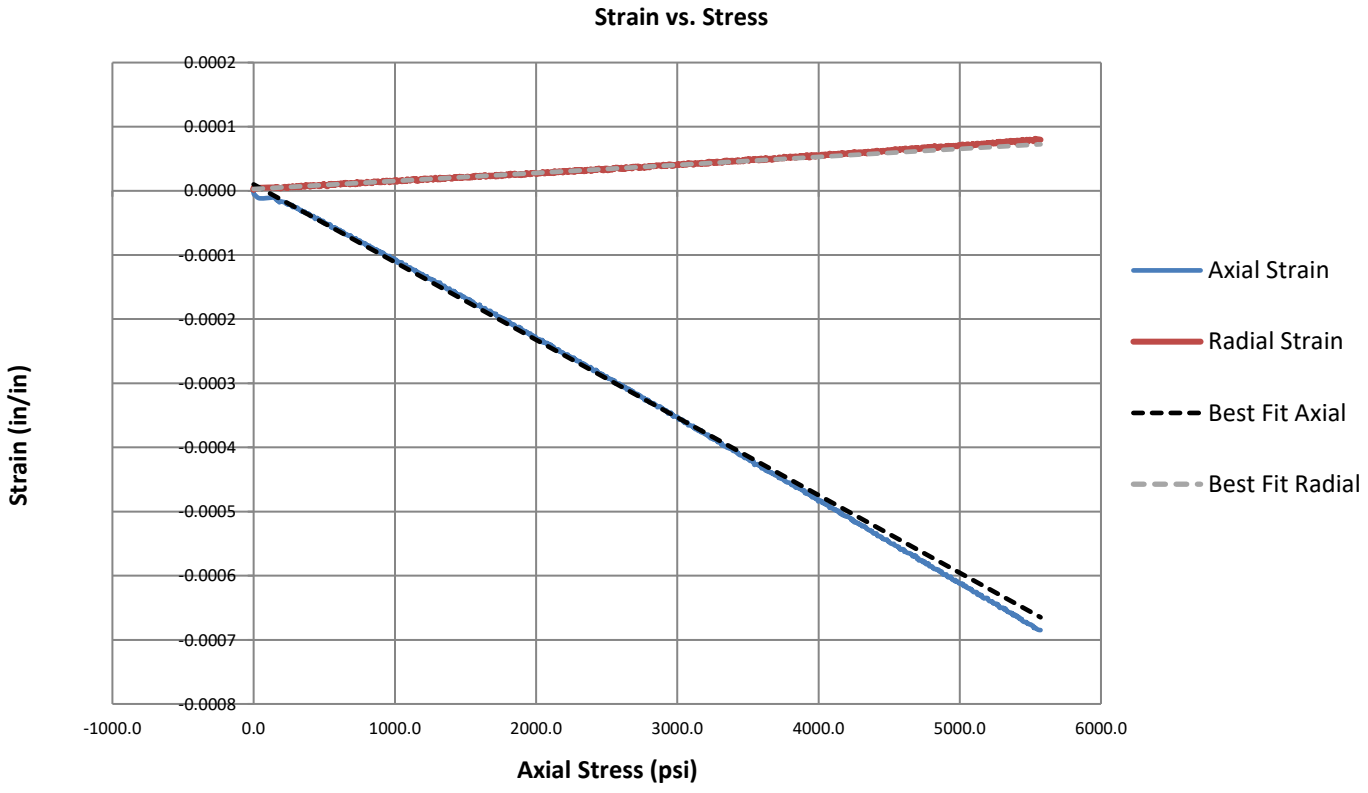
Raw Data Files: 2.txt, 0

Density Data

Mass of Rock (g):	928.8	Initial Wet Density (pcf):	154.8
Initial Diameter (in):	2.392	Initial Wet Density (kg/m³):	2480
Initial Height (in):	5.086		

Test Results

Peak Load (lbs):	61088	Failure Type:	Fracture / Shear
Compressive Strength (psi):	13594	Height to Diameter Ratio:	2.13:1
Compressive Strength (MPa):	94	Poisson's Ratio:	0.103
		Young's Modulus (psi):	8.26 x10^6



NOTES:

Data entry by:	HN	Date:	06/14/22
Checked by:	DL	Date:	06/15/22
File name:	2347022__RockTx ASTM 7012 B and D_1.xlsm		

ADVANCED TERRA TESTING

Unconfined Compressive Strength
ASTM D7012 Method D

CLIENT	Newfields	BORING NO.	RC-22-002-R
JOB NO.	2347-022	DEPTH	25.5-27.0
PROJECT	I-80 Golconda Summit	SAMPLE NO.	--
PROJECT NO.	475.0499.000	DATE SAMPLED	--
LOCATION	Nevada, USA	ROCK TYPE	--
DATE TESTED	06/14/22		
TECHNICIAN	HN		

Before Test

NOTES

Picture File: 2.JPG
File name: 2347022__RockTx ASTM 7012 B and D_1.xlsm

ADVANCED TERRA TESTING

Unconfined Compressive Strength
ASTM D7012 Method D

CLIENT	Newfields	BORING NO.	RC-22-002-R
JOB NO.	2347-022	DEPTH	25.5-27.0
PROJECT	I-80 Golconda Summit	SAMPLE NO.	--
PROJECT NO.	475.0499.000	DATE SAMPLED	--
LOCATION	Nevada, USA	ROCK TYPE	--
DATE TESTED	06/14/22		
TECHNICIAN	HN		

After Test

NOTES

Picture File: 2a.JPG
File name: 2347022__RockTx ASTM 7012 B and D_1.xlsm

ADVANCED TERRA TESTING

Unconfined Compressive Strength
ASTM D7012 Method D

CLIENT	Newfields	BORING NO.	RC-22-002-R
JOB NO.	2347-022	DEPTH	37.0-38.5
PROJECT	I-80 Golconda Summit	SAMPLE NO.	--
PROJECT NO.	475.0499.000	DATE SAMPLED	--
LOCATION	Nevada, USA	ROCK TYPE	--
DATE TESTED	06/14/22		
TECHNICIAN	HN		

Test Parameters

Load Rate (lb/min):	3000
Load Rate (N/min):	13345

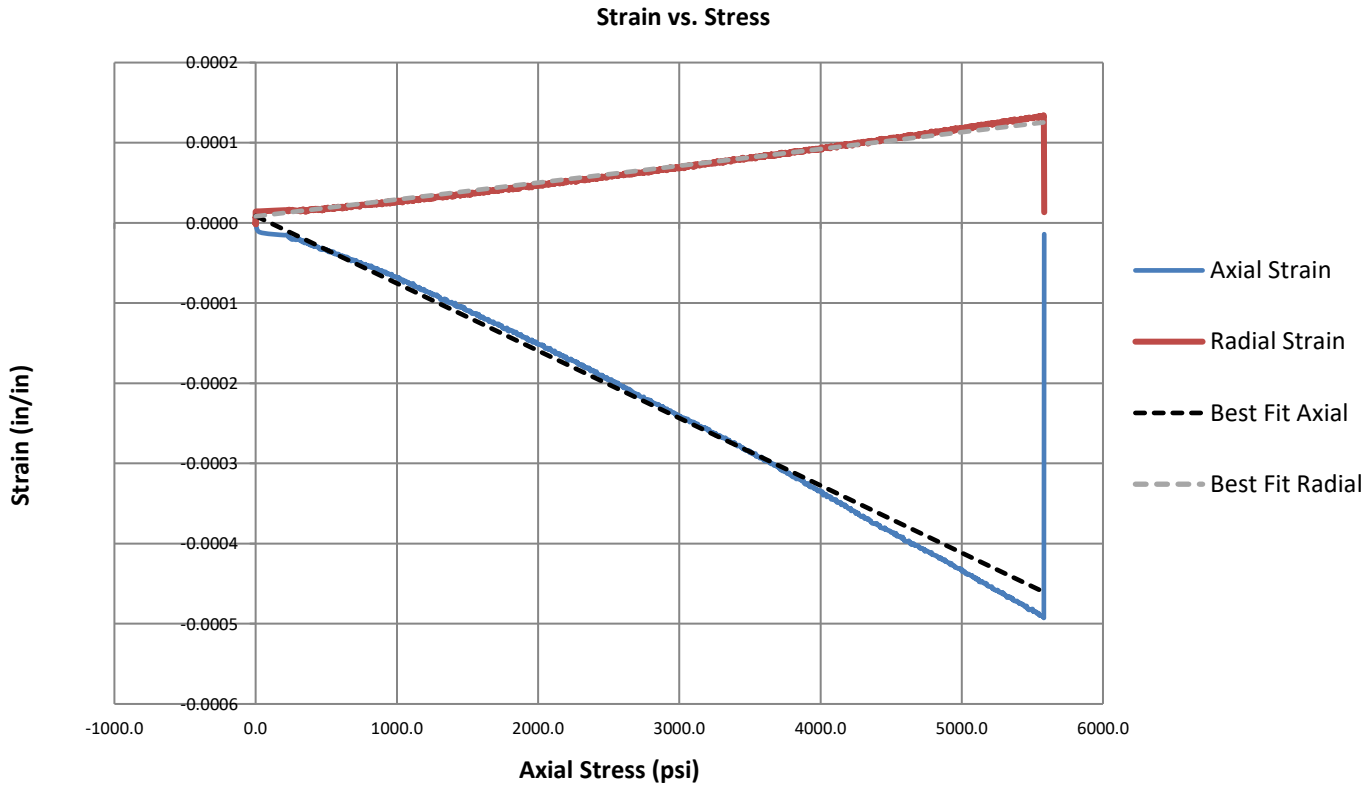
Raw Data Files: 3.txt, 0

Density Data

Mass of Rock (g):	887.8	Initial Wet Density (pcf):	154.2
Initial Diameter (in):	2.392	Initial Wet Density (kg/m³):	2469
Initial Height (in):	4.882		

Test Results

Peak Load (lbs):	43582	Failure Type:	Fracture / Bedding
Compressive Strength (psi):	9698	Height to Diameter Ratio:	2.04:1
Compressive Strength (MPa):	67	Poisson's Ratio:	0.250
		Young's Modulus (psi):	11.90 x10^6



NOTES:

Data entry by:	HN	Date:	06/14/22
Checked by:	DL	Date:	06/15/22
File name:	2347022__RockTx ASTM 7012 B and D_2.xlsm		

ADVANCED TERRA TESTING

Unconfined Compressive Strength
ASTM D7012 Method D

CLIENT	Newfields	BORING NO.	RC-22-002-R
JOB NO.	2347-022	DEPTH	37.0-38.5
PROJECT	I-80 Golconda Summit	SAMPLE NO.	--
PROJECT NO.	475.0499.000	DATE SAMPLED	--
LOCATION	Nevada, USA	ROCK TYPE	--
DATE TESTED	06/14/22		
TECHNICIAN	HN		

Before Test

NOTES

Picture File: 3.JPG
File name: 2347022__RockTx ASTM 7012 B and D_2.xlsm

ADVANCED TERRA TESTING

Unconfined Compressive Strength
ASTM D7012 Method D

CLIENT	Newfields	BORING NO.	RC-22-002-R
JOB NO.	2347-022	DEPTH	37.0-38.5
PROJECT	I-80 Golconda Summit	SAMPLE NO.	--
PROJECT NO.	475.0499.000	DATE SAMPLED	--
LOCATION	Nevada, USA	ROCK TYPE	--
DATE TESTED	06/14/22		
TECHNICIAN	HN		

After Test

NOTES

Picture File: 3a.JPG
File name: 2347022__RockTx ASTM 7012 B and D_2.xlsm

ADVANCED TERRA TESTING

Unconfined Compressive Strength
ASTM D7012 Method D

CLIENT	Newfields	BORING NO.	RC-22-002-R
JOB NO.	2347-022	DEPTH	40.5-42.0
PROJECT	I-80 Golconda Summit	SAMPLE NO.	--
PROJECT NO.	475.0499.000	DATE SAMPLED	--
LOCATION	Nevada, USA	ROCK TYPE	--
DATE TESTED	06/14/22		
TECHNICIAN	HN		

Test Parameters

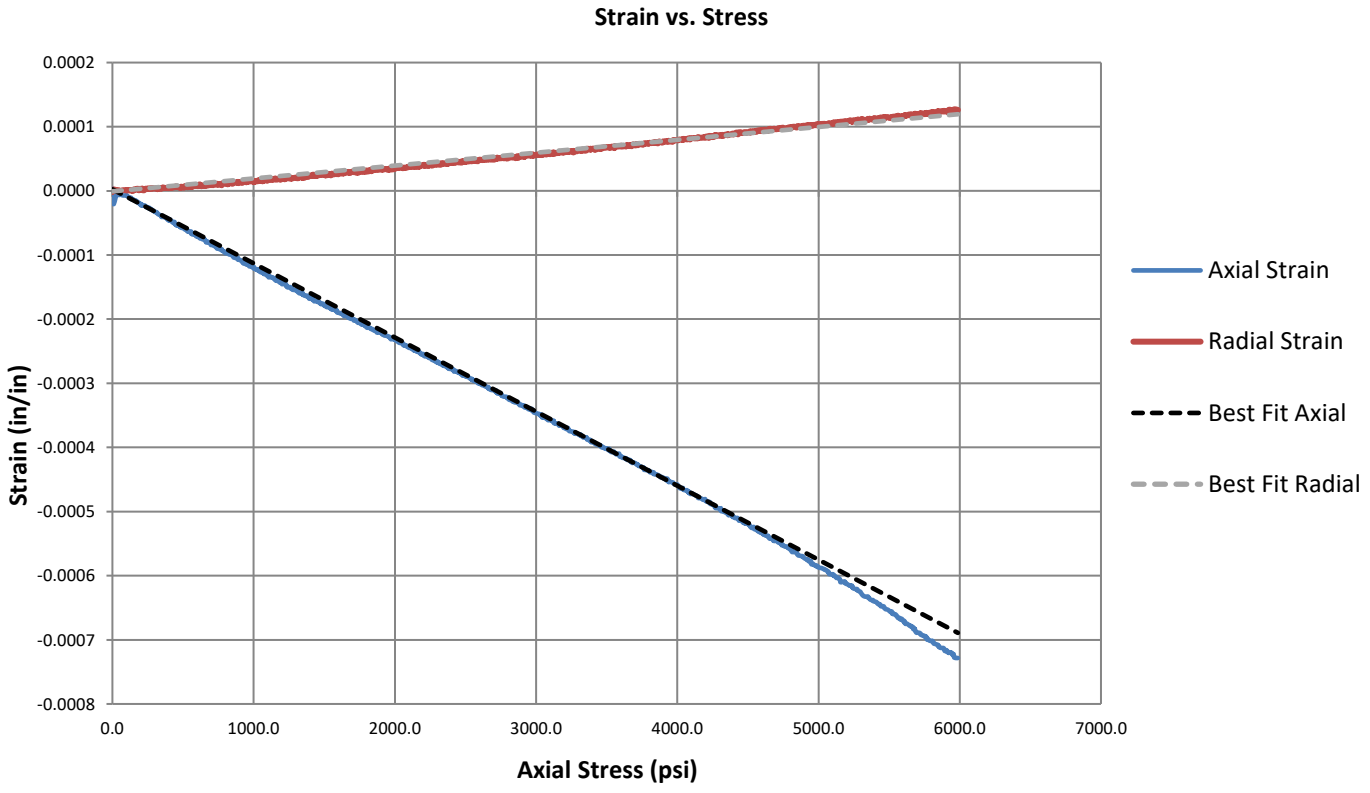
Load Rate (lb/min):	3000
Load Rate (N/min):	13345
Raw Data Files:	4.txt, 0

Density Data

Mass of Rock (g):	913.3	Initial Wet Density (pcf):	153.6
Initial Diameter (in):	2.379	Initial Wet Density (kg/m³):	2461
Initial Height (in):	5.095		

Test Results

Peak Load (lbs):	51036	Failure Type:	Fracture / Bedding
Compressive Strength (psi):	11481	Height to Diameter Ratio:	2.14:1
Compressive Strength (MPa):	79	Poisson's Ratio:	0.174
		Young's Modulus (psi):	8.66 x10^6



NOTES:

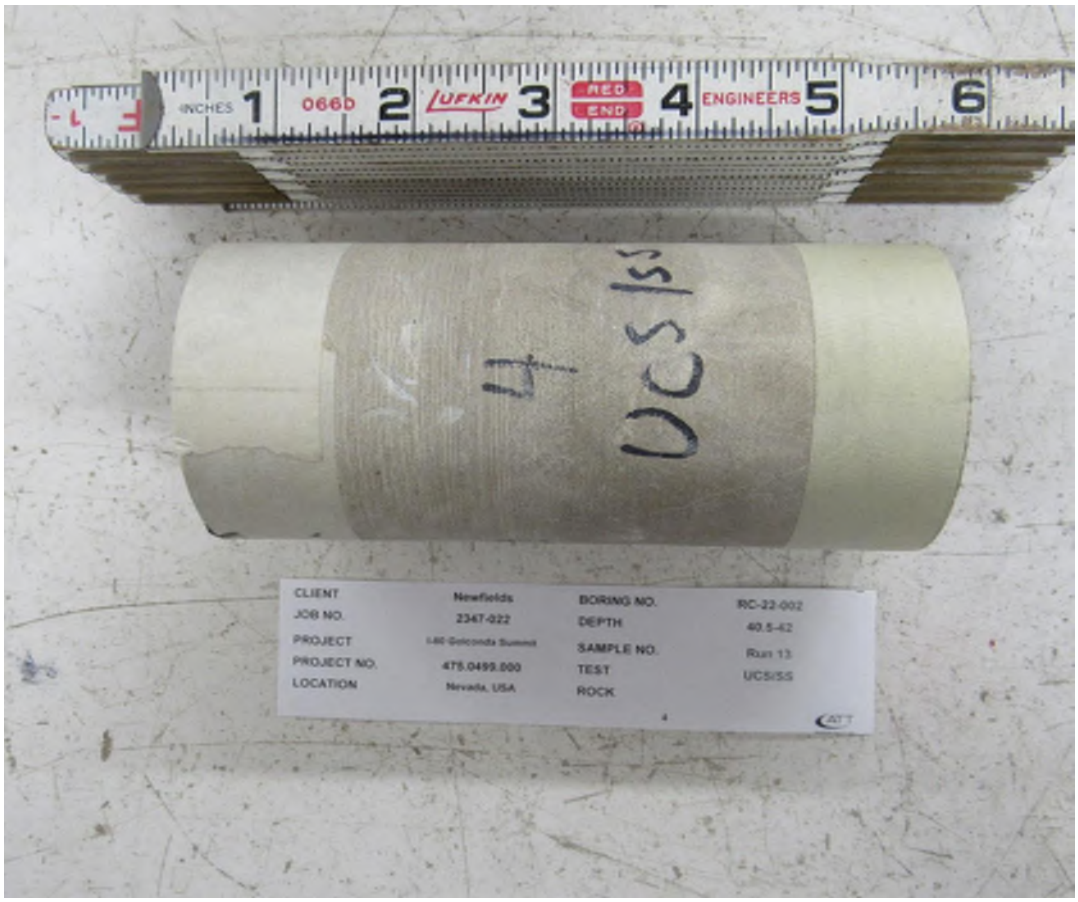
Data entry by:	HN	Date: 06/14/22
Checked by:	DL	Date: 06/15/22
File name:	2347022__RockTx ASTM 7012 B and D_3.xlsm	

ADVANCED TERRA TESTING

Unconfined Compressive Strength
ASTM D7012 Method D

CLIENT	Newfields	BORING NO.	RC-22-002-R
JOB NO.	2347-022	DEPTH	40.5-42.0
PROJECT	I-80 Golconda Summit	SAMPLE NO.	--
PROJECT NO.	475.0499.000	DATE SAMPLED	--
LOCATION	Nevada, USA	ROCK TYPE	--
DATE TESTED	06/14/22		
TECHNICIAN	HN		

Before Test



NOTES

Picture File: 4.JPG
File name: 2347022__RockTx ASTM 7012 B and D_3.xlsm

ADVANCED TERRA TESTING

Unconfined Compressive Strength
ASTM D7012 Method D

CLIENT	Newfields	BORING NO.	RC-22-002-R
JOB NO.	2347-022	DEPTH	40.5-42.0
PROJECT	I-80 Golconda Summit	SAMPLE NO.	--
PROJECT NO.	475.0499.000	DATE SAMPLED	--
LOCATION	Nevada, USA	ROCK TYPE	--
DATE TESTED	06/14/22		
TECHNICIAN	HN		

After Test

NOTES

Picture File: 4a.JPG
File name: 2347022__RockTx ASTM 7012 B and D_3.xlsm

ADVANCED TERRA TESTING

Unconfined Compressive Strength
ASTM D7012 Method D

CLIENT	Newfields	BORING NO.	RC-22-003-R
JOB NO.	2347-022	DEPTH	7.0-12.0
PROJECT	I-80 Golconda Summit	SAMPLE NO.	--
PROJECT NO.	475.0499.000	DATE SAMPLED	--
LOCATION	Nevada, USA	ROCK TYPE	--
DATE TESTED	06/15/22		
TECHNICIAN	HN		

Test Parameters

Load Rate (lb/min):	3000
Load Rate (N/min):	13345

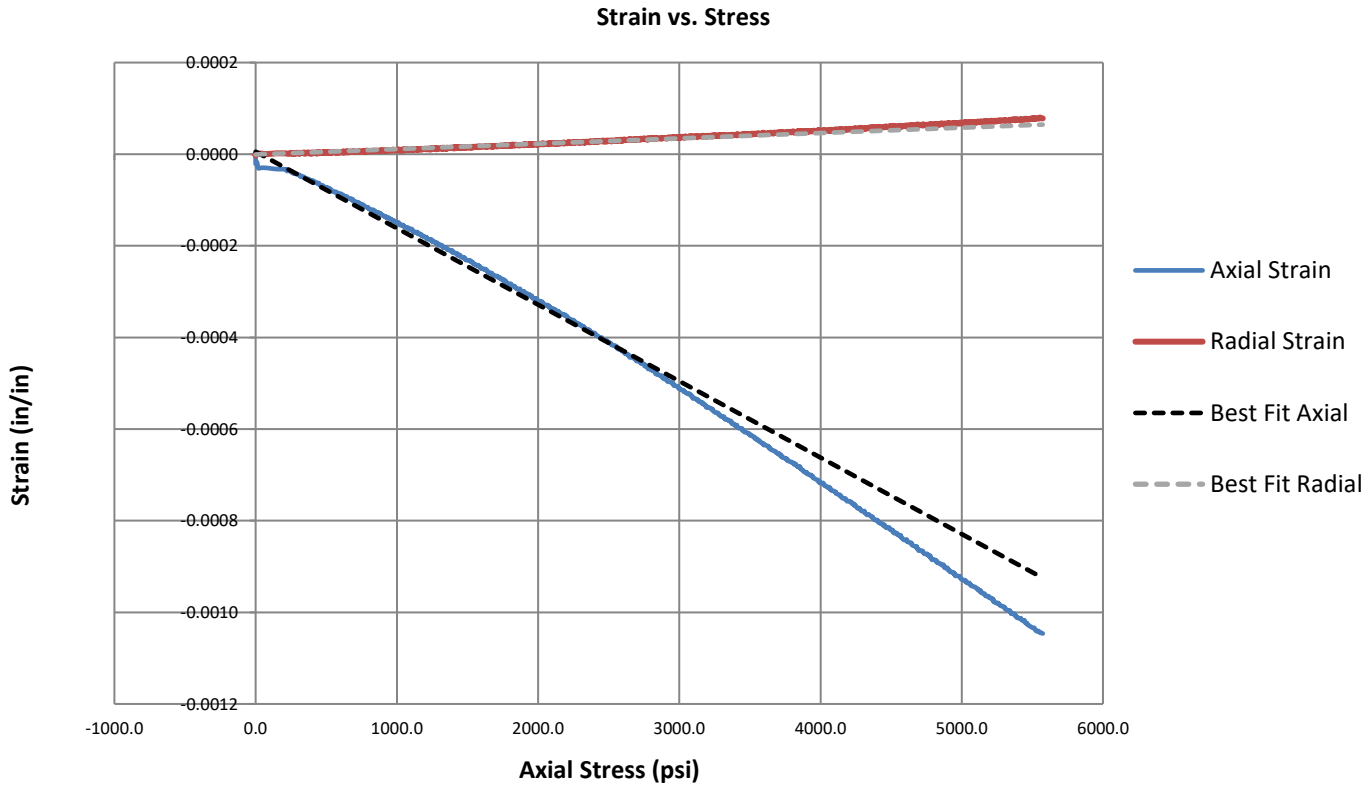
Raw Data Files: 5.txt, 0

Density Data

Mass of Rock (g):	903.2	Initial Wet Density (pcf):	158.4
Initial Diameter (in):	2.386	Initial Wet Density (kg/m³):	2537
Initial Height (in):	4.859		

Test Results

Peak Load (lbs):	85726	Failure Type:	Fracture / Bedding
Compressive Strength (psi):	19173	Height to Diameter Ratio:	2.04:1
Compressive Strength (MPa):	132	Poisson's Ratio:	0.070
		Young's Modulus (psi):	5.99 x10^6



NOTES:

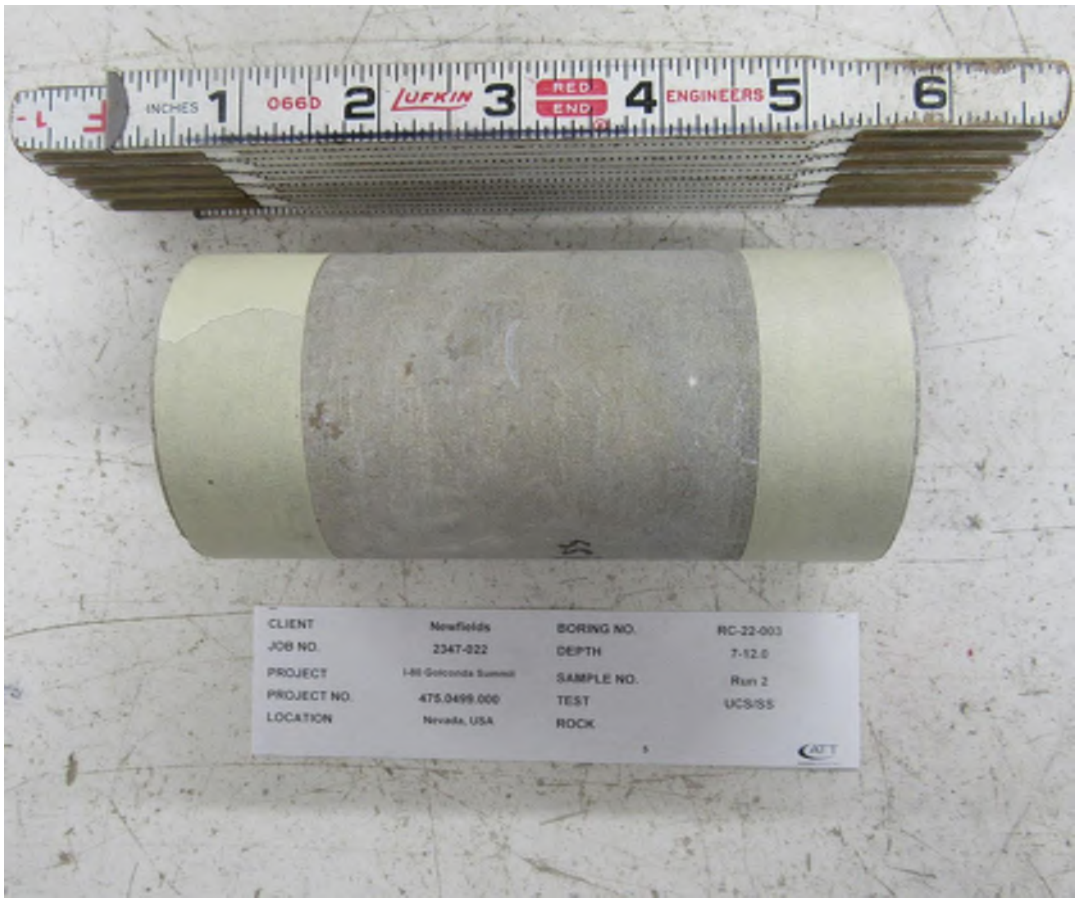
Data entry by:	HN	Date:	06/15/22
Checked by:	DL	Date:	06/15/22
File name:	2347022__RockTx ASTM 7012 B and D_4.xlsm		

ADVANCED TERRA TESTING

Unconfined Compressive Strength
ASTM D7012 Method D

CLIENT	Newfields	BORING NO.	RC-22-003-R
JOB NO.	2347-022	DEPTH	7.0-12.0
PROJECT	I-80 Golconda Summit	SAMPLE NO.	--
PROJECT NO.	475.0499.000	DATE SAMPLED	--
LOCATION	Nevada, USA	ROCK TYPE	--
DATE TESTED	06/15/22		
TECHNICIAN	HN		

Before Test



NOTES

Picture File: 5.JPG
File name: 2347022__RockTx ASTM 7012 B and D_4.xlsm

ADVANCED TERRA TESTING

Unconfined Compressive Strength
ASTM D7012 Method D

CLIENT	Newfields	BORING NO.	RC-22-003-R
JOB NO.	2347-022	DEPTH	7.0-12.0
PROJECT	I-80 Golconda Summit	SAMPLE NO.	--
PROJECT NO.	475.0499.000	DATE SAMPLED	--
LOCATION	Nevada, USA	ROCK TYPE	--
DATE TESTED	06/15/22		
TECHNICIAN	HN		

After Test

NOTES

Picture File: 5a.JPG
File name: 2347022__RockTx ASTM 7012 B and D_4.xlsm

ADVANCED TERRA TESTING

Unconfined Compressive Strength
ASTM D7012 Method D

CLIENT	Newfields	BORING NO.	RC-22-003-R
JOB NO.	2347-022	DEPTH	27.8-33.0
PROJECT	I-80 Golconda Summit	SAMPLE NO.	--
PROJECT NO.	475.0499.000	DATE SAMPLED	--
LOCATION	Nevada, USA	ROCK TYPE	--
DATE TESTED	06/15/22		
TECHNICIAN	HN		

Test Parameters

Load Rate (lb/min):	3000
Load Rate (N/min):	13345

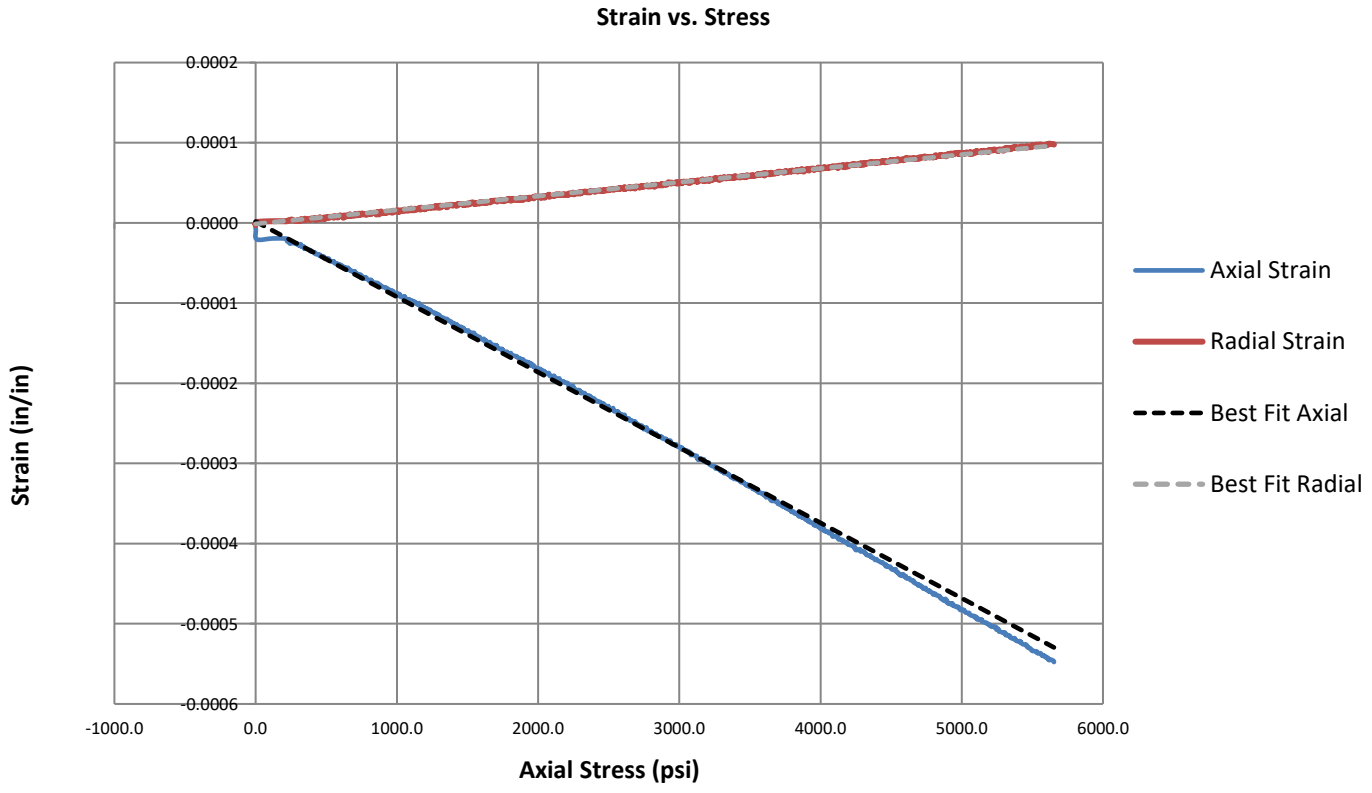
Raw Data Files: 6.txt, 0

Density Data

Mass of Rock (g):	1004.2	Initial Wet Density (pcf):	163.1
Initial Diameter (in):	2.387	Initial Wet Density (kg/m³):	2613
Initial Height (in):	5.241		

Test Results

Peak Load (lbs):	77614	Failure Type:	Fracture / Shear
Compressive Strength (psi):	17344	Height to Diameter Ratio:	2.20:1
Compressive Strength (MPa):	120	Poisson's Ratio:	0.184
		Young's Modulus (psi):	10.64 x10^6



NOTES:

Data entry by:	HN	Date:	06/15/22
Checked by:	DL	Date:	06/15/22
File name:	2347022__RockTx ASTM 7012 B and D_5.xlsm		

ADVANCED TERRA TESTING

Unconfined Compressive Strength
ASTM D7012 Method D

CLIENT	Newfields	BORING NO.	RC-22-003-R
JOB NO.	2347-022	DEPTH	27.8-33.0
PROJECT	I-80 Golconda Summit	SAMPLE NO.	--
PROJECT NO.	475.0499.000	DATE SAMPLED	--
LOCATION	Nevada, USA	ROCK TYPE	--
DATE TESTED	06/15/22		
TECHNICIAN	HN		

Before Test

NOTES

Picture File: 6.JPG
File name: 2347022__RockTx ASTM 7012 B and D_5.xlsm

ADVANCED TERRA TESTING

Unconfined Compressive Strength
ASTM D7012 Method D

CLIENT	Newfields	BORING NO.	RC-22-003-R
JOB NO.	2347-022	DEPTH	27.8-33.0
PROJECT	I-80 Golconda Summit	SAMPLE NO.	--
PROJECT NO.	475.0499.000	DATE SAMPLED	--
LOCATION	Nevada, USA	ROCK TYPE	--
DATE TESTED	06/15/22		
TECHNICIAN	HN		

After Test

NOTES

Picture File: 6a.JPG
File name: 2347022__RockTx ASTM 7012 B and D_5.xlsm

NewFields

Chemical Testing Results

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 05/18/2022
Date Submitted 05/12/2022

To: Kerry Magner
Newfields MDTS
2227 N. 5th St.
Elko, NV 89801

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 475.0499.000 Site ID : B-22-101 0-5.
Thank you for your business.

* For future reference to this analysis please use SUN # 87355-181706.

EVALUATION FOR SOIL CORROSION

Soil pH	8.33	
Minimum Resistivity	1.61 ohm-cm (x1000)	
Chloride	36.4 ppm	00.00364 %
Sulfate	40.7ppm	00.00407 %
Redox Potential	No Test	
Sulfides	No Test	

METHODS
pH AASHTO T289, Min.Resistivity AASHTO T288 Mod.(Sm.Cell)
Sulfate AASHTO T290, Chloride AASHTO T291
Redox Potential ASTM G-200, Sulfides AWWA C105/A25.5

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 05/18/2022
Date Submitted 05/12/2022

To: Kerry Magner
Newfields MDTS
2227 N. 5th St.
Elko, NV 89801

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 475.0499.000 Site ID : B-22-103 0-5.
Thank you for your business.

* For future reference to this analysis please use SUN # 87355-181707.

EVALUATION FOR SOIL CORROSION

Soil pH	8.80		
Minimum Resistivity	10.96 ohm-cm (x1000)		
Chloride	24.9 ppm	00.00249	%
Sulfate	11.5ppm	00.00115	%
Redox Potential	No Test		
Sulfides	No Test		

METHODS
pH AASHTO T289, Min.Resistivity AASHTO T288 ~~Mod. (Sm Cell)~~ Large Cell (Gravel) ZA
Sulfate AASHTO T290, Chloride AASHTO T291
Redox Potential ASTM G-200, Sulfides AWWA C105/A25.5

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 05/18/2022
Date Submitted 05/12/2022

To: Kerry Magner
Newfields MDTS
2227 N. 5th St.
Elko, NV 89801

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 475.0499.000 Site ID : B-22-104 0-5.
Thank you for your business.

* For future reference to this analysis please use SUN # 87355-181708.

EVALUATION FOR SOIL CORROSION

Soil pH	8.39	
Minimum Resistivity	1.74 ohm-cm (x1000)	
Chloride	35.3 ppm	00.00353 %
Sulfate	22.3ppm	00.00223 %
Redox Potential	No Test	
Sulfides	No Test	

METHODS
pH AASHTO T289, Min.Resistivity AASHTO T288 Mod.(Sm.Cell)
Sulfate AASHTO T290, Chloride AASHTO T291
Redox Potential ASTM G-200, Sulfides AWWA C105/A25.5

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 05/18/2022
Date Submitted 05/12/2022

To: Kerry Magner
Newfields MDTS
2227 N. 5th St.
Elko, NV 89801

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 475.0499.000 Site ID : B-22-114 0-5.
Thank you for your business.

* For future reference to this analysis please use SUN # 87355-181709.

EVALUATION FOR SOIL CORROSION

Soil pH	8.10	
Minimum Resistivity	0.13 ohm-cm (x1000)	
Chloride	403.6 ppm	00.04036 %
Sulfate	1342.6ppm	00.13426 %
Redox Potential	No Test	
Sulfides	No Test	

METHODS
pH AASHTO T289, Min.Resistivity AASHTO T288 Mod.(Sm.Cell)
Sulfate AASHTO T290, Chloride AASHTO T291
Redox Potential ASTM G-200, Sulfides AWWA C105/A25.5

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 05/18/2022
Date Submitted 05/12/2022

To: Kerry Magner
Newfields MDTS
2227 N. 5th St.
Elko, NV 89801

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 475.0499.000 Site ID : B-22-108 0-5.
Thank you for your business.

* For future reference to this analysis please use SUN # 87355-181710.

EVALUATION FOR SOIL CORROSION

Soil pH	7.92	
Minimum Resistivity	0.32 ohm-cm (x1000)	
Chloride	102.7 ppm	00.01027 %
Sulfate	1162.0ppm	00.11620 %
Redox Potential	No Test	
Sulfides	No Test	

METHODS
pH AASHTO T289, Min.Resistivity AASHTO T288 Mod.(Sm.Cell)
Sulfate AASHTO T290, Chloride AASHTO T291
Redox Potential ASTM G-200, Sulfides AWWA C105/A25.5

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 05/18/2022
Date Submitted 05/12/2022

To: Kerry Magner
Newfields MDTS
2227 N. 5th St.
Elko, NV 89801

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 475.0499.000 Site ID : RC-22-004 0-5.
Thank you for your business.

* For future reference to this analysis please use SUN # 87355-181711.

EVALUATION FOR SOIL CORROSION

Soil pH	7.98	
Minimum Resistivity	0.32 ohm-cm (x1000)	
Chloride	75.6 ppm	00.00756 %
Sulfate	606.6ppm	00.06066 %
Redox Potential	No Test	
Sulfides	No Test	

METHODS
pH AASHTO T289, Min.Resistivity AASHTO T288 Mod.(Sm.Cell)
Sulfate AASHTO T290, Chloride AASHTO T291
Redox Potential ASTM G-200, Sulfides AWWA C105/A25.5

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 05/18/2022
Date Submitted 05/12/2022

To: Kerry Magner
Newfields MDTS
2227 N. 5th St.
Elko, NV 89801

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 475.0499.000 Site ID : B-22-109 0-5.
Thank you for your business.

* For future reference to this analysis please use SUN # 87355-181712.

EVALUATION FOR SOIL CORROSION

Soil pH	8.60	
Minimum Resistivity	0.29 ohm-cm (x1000)	
Chloride	257.6 ppm	00.02576 %
Sulfate	666.3ppm	00.06663 %
Redox Potential	No Test	
Sulfides	No Test	

METHODS
pH AASHTO T289, Min.Resistivity AASHTO T288 Mod.(Sm.Cell)
Sulfate AASHTO T290, Chloride AASHTO T291
Redox Potential ASTM G-200, Sulfides AWWA C105/A25.5

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 05/18/2022
Date Submitted 05/12/2022

To: Kerry Magner
Newfields MDTS
2227 N. 5th St.
Elko, NV 89801

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 475.0499.000 Site ID : RC-22-001 20-25.
Thank you for your business.

* For future reference to this analysis please use SUN # 87355-181713.

EVALUATION FOR SOIL CORROSION

Soil pH	7.62	
Minimum Resistivity	4.56 ohm-cm (x1000)	
Chloride	7.1 ppm	00.00071 %
Sulfate	15.0ppm	00.00150 %
Redox Potential	No Test	
Sulfides	No Test	

METHODS
pH AASHTO T289, Min.Resistivity AASHTO T288 Mod.(Sm.Cell)
Sulfate AASHTO T290, Chloride AASHTO T291
Redox Potential ASTM G-200, Sulfides AWWA C105/A25.5

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 05/18/2022
Date Submitted 05/12/2022

To: Kerry Magner
Newfields MDTS
2227 N. 5th St.
Elko, NV 89801

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 475.0499.000 Site ID : RC-22-005 7.5-9.
Thank you for your business.

* For future reference to this analysis please use SUN # 87355-181714.

EVALUATION FOR SOIL CORROSION

Soil pH	8.49	
Minimum Resistivity	4.02 ohm-cm (x1000)	
Chloride	4.5 ppm	00.00045 %
Sulfate	7.3ppm	00.00073 %
Redox Potential	No Test	
Sulfides	No Test	

METHODS
pH AASHTO T289, Min.Resistivity AASHTO T288 Mod.(Sm.Cell)
Sulfate AASHTO T290, Chloride AASHTO T291
Redox Potential ASTM G-200, Sulfides AWWA C105/A25.5

SUNLAND ANALYTICAL LAB
11419 Sunrise Gold Cr., Ste.10
Rancho Cordova, CA 95742
(916)852-8557

INVOICE

Inv.No. 107355

Newfields MDTS
2227 N. 5th St.
Elko, NV 89801

Date 05/18/2022
Terms: NET 30, 30+ 15%

Customer P.O.#
Requestor: Magner

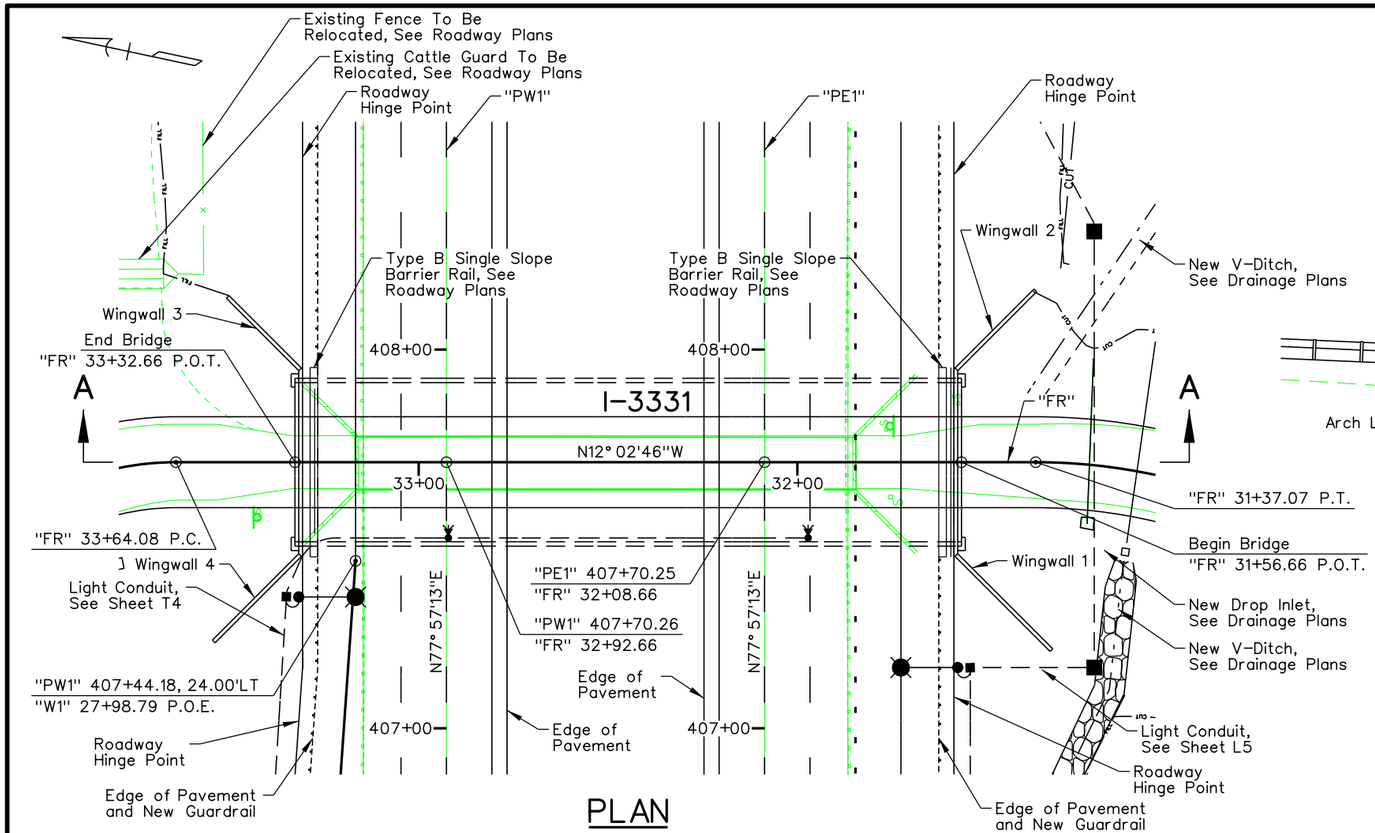
ATTENTION ACCOUNTS PAYABLE

* Please indicate Invo.# on remittance

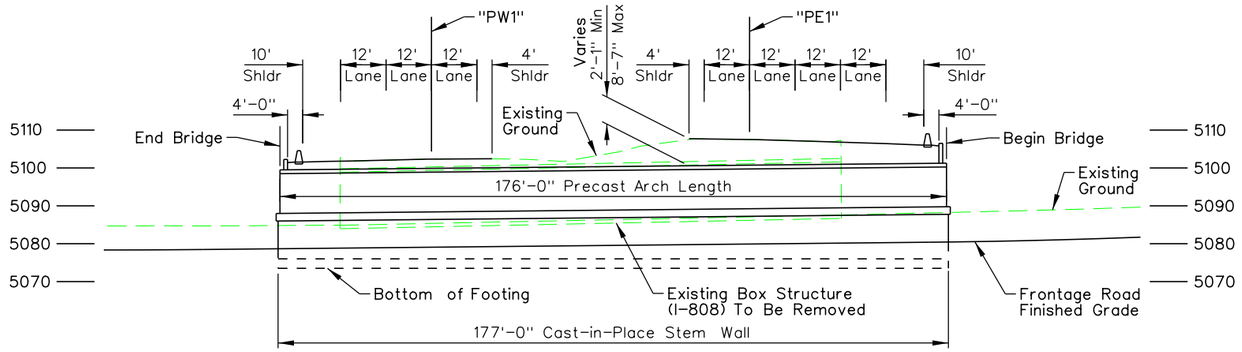
SUN NOS.	SAMPLE LOCATION		ANALYSIS	PRICE
181706	475.0499.000	B-22-101 0-5	CTP.1-AASHTO	144.00
181707	475.0499.000	B-22-103 0-5	CTP.1-AASHTO	144.00
181708	475.0499.000	B-22-104 0-5	CTP.1-AASHTO	144.00
181709	475.0499.000	B-22-114 0-5	CTP.1-AASHTO	144.00
181710	475.0499.000	B-22-108 0-5	CTP.1-AASHTO	144.00
181711	475.0499.000	RC-22-004 0-5	CTP.1-AASHTO	144.00
181712	475.0499.000	B-22-109 0-5	CTP.1-AASHTO	144.00
181713	475.0499.000	RC-22-001 20-25	CTP.1-AASHTO	144.00
181714	475.0499.000	RC-22-005 7.5-9	CTP.1-AASHTO	144.00
		********* Total *********		1296.00

Appendix E
Bridge Structure, Trash Enclosure, and Rock Fall Debris Fence Plans

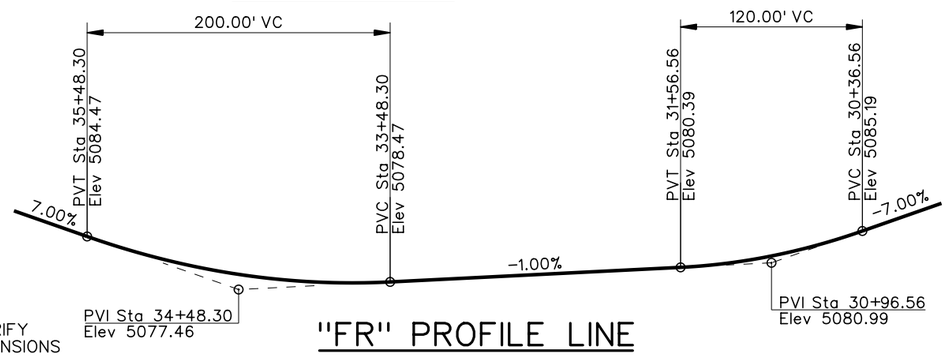
STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	B1



PLAN



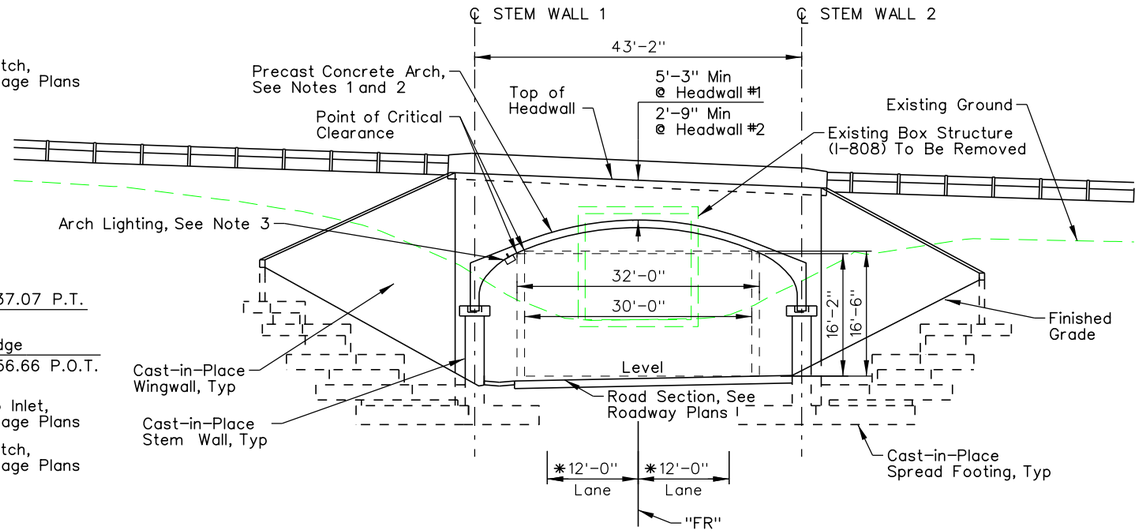
SECTION A-A



"FR" PROFILE LINE

NOTE:

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



* DIMENSIONS MEASURED PERPENDICULAR TO "FR" LINE

ELEVATION

(LOOKING AHEAD ON "FR" LINE, CABLE RAILING NOT SHOWN FOR CLARITY)

NOTES:

1. PRECAST CONCRETE ARCH SHALL BE 42'-0" CLEAR HORIZONTALLY BETWEEN INSIDE FACES OF ARCH LEGS. OVERALL RISE (FROM BOTTOM OF ARCH LEG TO HIGHEST INSIDE SURFACE OF ARCH) SHALL BE 11'-0".
2. APPLY LIQUID MEMBRANE WATERPROOFING PER NDOT STANDARD SPECIFICATION SECTION 646.02.05 TO ENTIRE TOP SURFACE OF PRECAST CONCRETE ARCH AND BACK SIDE OF STEM WALLS PRIOR TO PLACING FILL MATERIAL. SPRAY-ON MEMBRANE SHALL OVERLAP ONTO THE BOTTOM 6" OF ADJACENT HEADWALL INTERFACES, SEE SHEETS B4 AND B5.
3. SEE SHEET L17 FOR LIGHTING DETAILS. REFER TO SPECIAL PROVISIONS FOR FIELD ATTACHMENT OF LIGHTING CONDUIT TO PRECAST ARCH SEGMENTS.

INDEX OF SHEETS

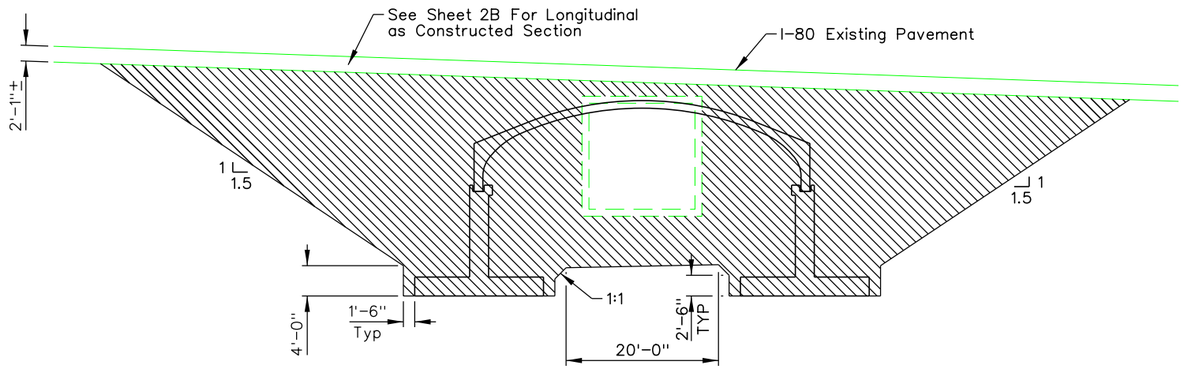
PROFESSIONAL ENGINEER - STATE OF NEVADA
ROBERT D. COOMES
Exp: 12/31/24
CIVIL
No. 22700

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

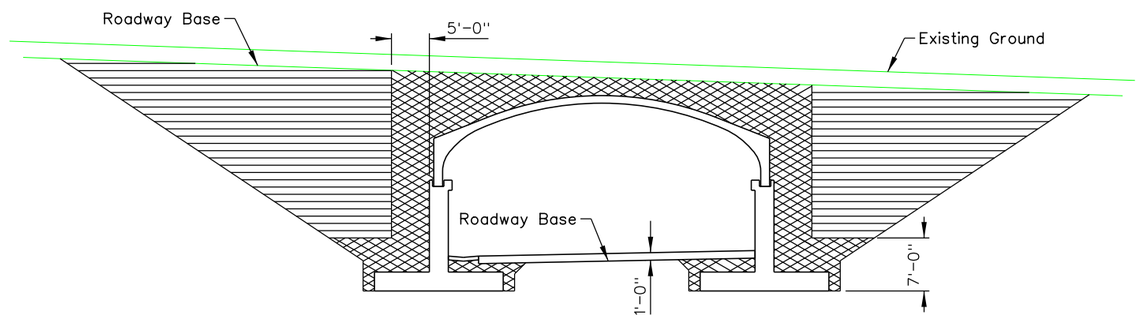
IR 80-HU 36.39 GOLCONDA SUMMIT INTERCHANGE

I-3331

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	B2



STRUCTURE EXCAVATION LIMITS



BACKFILL/EMBANKMENT LIMITS

GENERAL NOTES

1. UNDERCROSSING STRUCTURE SHALL BE A PREFABRICATED CONCRETE ARCH APPROVED BY NDOT. SEE SECTION 502 IN THE SPECIAL PROVISIONS FOR MANUFACTURER PRE-QUALIFICATIONS. CAST-IN-PLACE CONCRETE CONSTRUCTION SHALL BE USED FOR THE ABUTMENT STEM WALLS AND FOOTINGS AS SHOWN IN THESE PLANS.
2. CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF THE UNDERCROSSING PRECAST ARCH SUPERSTRUCTURE. THE DESIGN SHALL CONFORM TO THESE PLANS, PROJECT SPECIFICATIONS AND PROJECT GEOTECHNICAL REPORT.
3. TEMPORARY SHORING MAY BE REQUIRED FOR STAGED CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE DESIGN AND DETAILS FOR TEMPORARY SHORING. SURCHARGE LOAD FROM ADJACENT STRUCTURES SHALL BE CONSIDERED IN THE SHORING DESIGN. TEMPORARY SHORING SHALL PROVIDE POSITIVE MEANS TO PREVENT SETTLEMENT/DEFLECTION OF STRUCTURES AND ROADWAYS LOCATED ADJACENT TO THE EXCAVATION.
4. DESIGN SPECIFICATIONS: "AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS", 8TH EDITION WITH 2019 INTERIM REVISIONS. NDOT "STRUCTURES MANUAL", 2008 WITH REVISIONS THROUGH 2019.
5. CONSTRUCTION SPECIFICATIONS: STATE OF NEVADA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, 2014", EXCEPT AS NOTED BELOW AND IN THE SPECIAL PROVISIONS FOR THIS CONTRACT.
6. LIVE LOAD: AASHTO HL-93 LOADING. OVERLOAD DESIGN BASED ON "CALIFORNIA STANDARD PERMIT DESIGN VEHICLES" (MAXIMUM ALLOWABLE OVERLOAD P13 TRUCK WITH 48 KIP TANDEM AXLES).
7. SEISMIC LOADING: DESIGN PEAK GROUND ACCELERATION COEFFICIENT PGA = 0.237, DESIGN SPECTRAL ACCELERATION COEFFICIENT AT SHORT PERIODS Sds = 0.569, DESIGN SPECTRAL ACCELERATION COEFFICIENT AT 1-SECOND PERIOD Sd1 = 0.248, AND SITE CLASS C. SEISMIC EFFECTS ARE ONLY CONSIDERED FOR THE DESIGN OF THE WINGWALLS, BUT NEED NOT BE CONSIDERED FOR THE ARCH, HEADWALLS, OR STEM WALLS AS PER AASHTO LRFD SECTION 3.10.
8. CONCRETE: ALL CAST-IN-PLACE CONCRETE SHALL BE CLASS AA MODIFIED (MAJOR) WITH A MINIMUM COMPRESSIVE STRENGTH f'c = 4000 PSI @ 28 DAYS.
9. REINFORCING STEEL: ALL REINFORCING STEEL TO BE EXPOXY-COATED ASTM A706 GRADE 60. DIMENSIONS RELATING TO BAR SPACING ARE CENTER TO CENTER. BENDING DIMENSIONS ARE FROM OUT TO OUT OF THE BARS. THE FIRST DIGIT OF THE MARK IS THE BAR SIZE. THE NEXT TWO NUMBERS INDICATE THE FEET PORTION OF THE BAR LENGTH AND THE LAST NUMBER(S) ARE THE INCHES PORTION OF THE OVERALL BAR LENGTH. THE LENGTH OF BAR SIZES FOUR (4) AND FIVE (5), WHEN CONSIDERED BY THE BRIDGE ENGINEER AS BARS TO CONTROL TEMPERATURE, SHRINKAGE AND DISTRIBUTION STRESSES, MAY BE ADJUSTED BY THE CONTRACTOR UPON APPROVAL OF THE ENGINEER. BAR MARKS ENDING WITH THE LETTER "E" INDICATE THE BAR SHALL HAVE AN EPOXY COATING.
10. PAINT VERTICAL PRECAST ARCH FACES, ARCH SOFFIT, STEM WALL CAPS, STEM WALLS, WINGWALLS, AND HEADWALLS. COLOR OF THE PAINT SHALL BE DUNN EDWARDS DE 6194, "NATURAL BRIDGE". STEM WALLS AND WINGWALLS SHALL BE PAINTED TO 1'-0" BELOW THE GROUND LINE. SEE SHEET LD201 FOR PAINTING LIMITS.
11. FOUNDATIONS: SEE SHEET B6 FOR WINGWALL FOOTING BEARING RESISTANCE AND SHEET B7 FOR STEM WALL FOOTING BEARING RESISTANCE.
12. BACKFILL SHALL NOT BE PLACED UNTIL ARCH UNITS ARE SECURED IN PLACE AND HAVE BEEN WATERPROOFED. BACKFILL SHALL BE BROUGHT UP IN EVEN LIFTS IN A SEQUENCE SUCH THAT THE DIFFERENCE IN LEVEL OF BACKFILL ON BOTH SIDES OF THE ARCH DOES NOT EXCEED 2 FT.
13. THE GEOTECHNICAL REPORT WAS PREPARED BY JACOBS ENGINEERING GROUP, INC. TITLED "REVISED FINAL GEOTECHNICAL DESIGN REPORT I-80 GOLCONDA SUMMIT INTERCHANGE (MP HU 32.5 TO MP HU 38.8) TRUCK CLIMBING LANES AND PARKING PROJECT" DATED JANUARY 2023.
14. CONSTRUCTION TYPE CODE: X224.

NOTE:

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

LEGEND:

- STRUCTURE EXCAVATION
- GRANULAR BACKFILL
- ROADWAY EMBANKMENT

QUANTITIES

ITEM NO.	ITEM	UNIT	QUANTITY
202 0255	REMOVAL OF REINFORCED CONCRETE BOX CULVERT	EACH	1.0
206 0110	STRUCTURE EXCAVATION	CUYD	15394.5
207 0110	GRANULAR BACKFILL	CUYD	6206.4
212 0045	PAINTING	SQYD	1858.3
502 0700	CONCRETE ARCH BRIDGE	LINFT	176
502 0950	CLASS AA CONCRETE, MODIFIED (MAJOR)	CUYD	1305.31
505 0120	REINFORCING STEEL (EPOXY COATED)	POUND	280530
506 0820	PEDESTRIAN RAIL, TYPE X	LINFT	229
646 0180	LIQUID MEMBRANE	SQYD	1688.0

NOTES:

1. SEE NDOT STANDARD PLAN SHEET EB-4 FOR STRUCTURE EXCAVATION AND BACKFILL NOTES.
2. NO DIRECT PAYMENT FOR TEMPORARY SHORING.

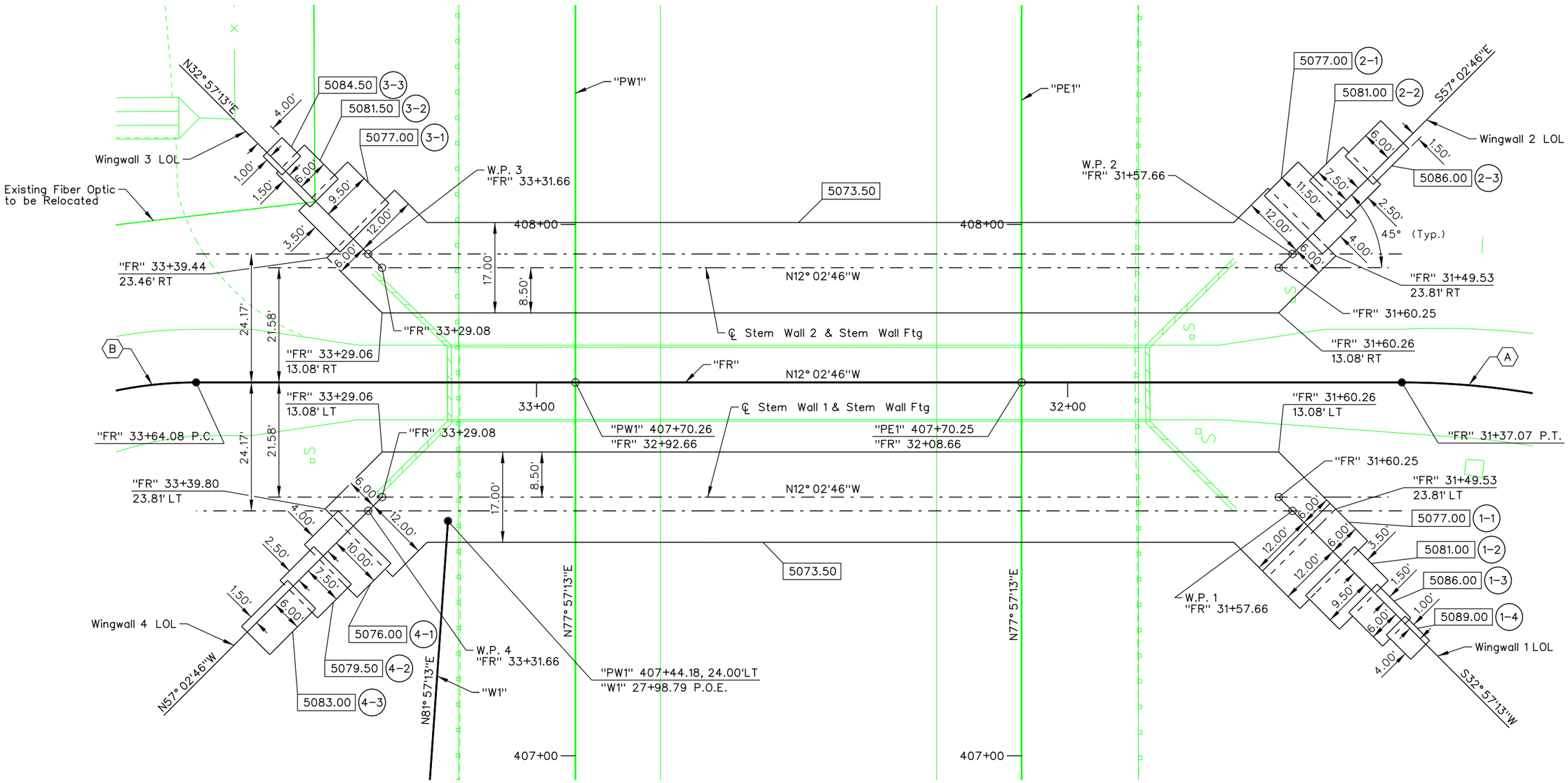
PROFESSIONAL ENGINEER - STATE OF NEVADA
ROBERT D. COOMES
Exp: 12/31/24
CIVIL
No. 22700

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

GENERAL NOTES, EXCAVATION/BACKFILL PAY LIMITS, AND QUANTITIES

I-3331

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	B3



GEOMETRICS

(A) "FR" LINE
△ = 90.00°
R = 150.00'
L = 235.62'
T = 150.00'

(B) "FR" LINE
△ = 65.00°
R = 75.00'
L = 85.08'
T = 47.78'

LEGEND:

XXXX.XX — DENOTES BOTTOM OF FOOTING ELEVATION

(X-Y) — DENOTES WINGWALL FOOTING IDENTIFIER

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

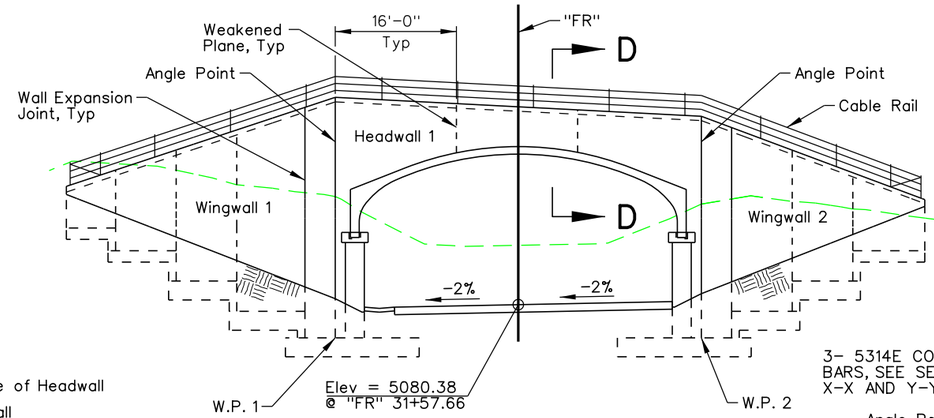
PROFESSIONAL ENGINEER - STATE OF NEVADA
ROBERT D. COOMES
Exp: 12/31/24
CIVIL
No. 22700

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

GEOMETRICS

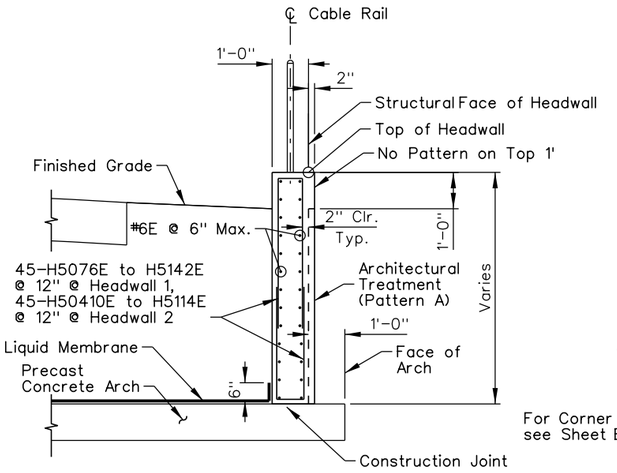
I-3331

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	B4



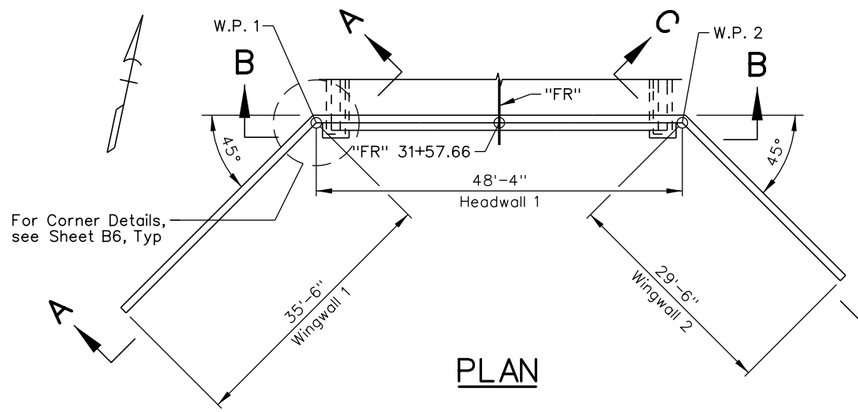
DEVELOPED ELEVATION

(LOOKING AHEAD ON "FR" LINE)

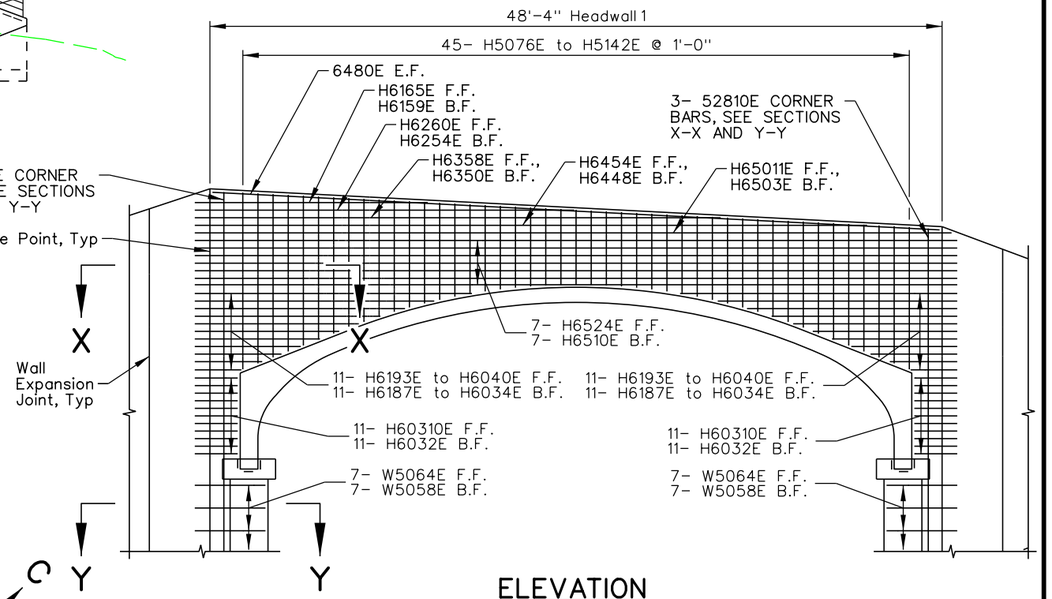


SECTION D-D

(TYPICAL HEADWALL)

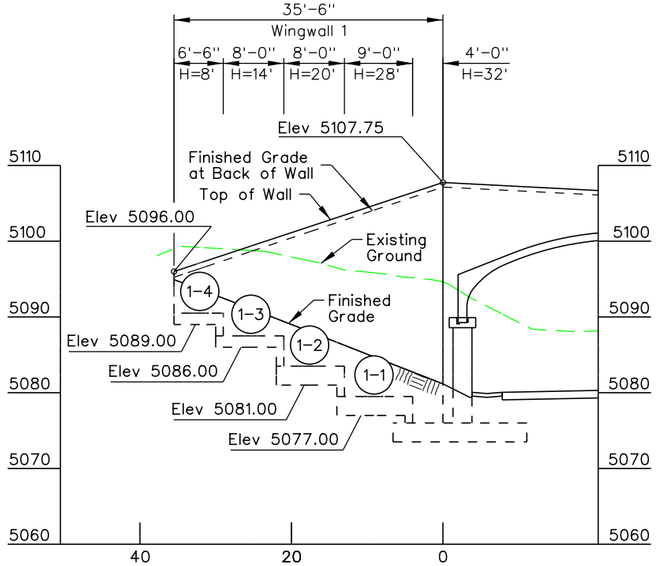


PLAN

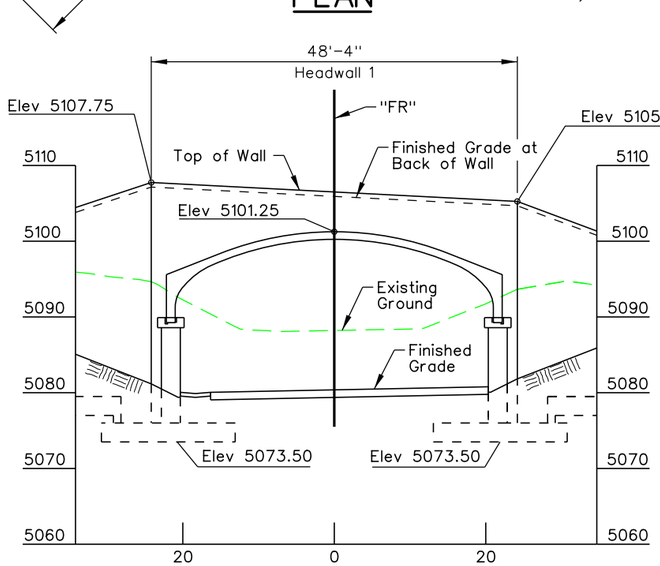


ELEVATION

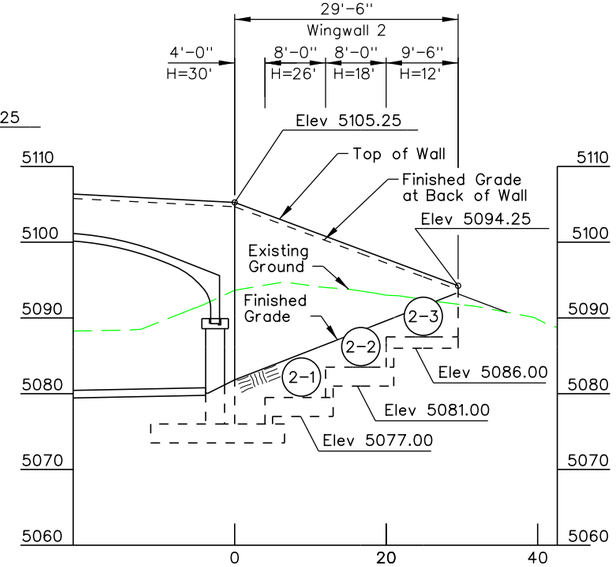
HEADWALL REINFORCEMENT



SECTION A-A



SECTION B-B



SECTION C-C

NOTES:

1. FOR "WINGWALL TYPICAL SECTION", SEE SHEET B6.
2. FOR "FOOTING STEP DETAIL" AND "WALL EXPANSION JOINT WITH WATERSTOP", SEE SHEET B8.
3. FOR "CABLE RAIL DETAILS", SEE SHEET B9.
4. FOR WINGWALL AND HEADWALL AESTHETIC TREATMENT, SEE SHEET LD101.
5. FOR "SECTION X-X" AND SECTION Y-Y", SEE SHEET B6.

NOTE:

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

LEGEND:

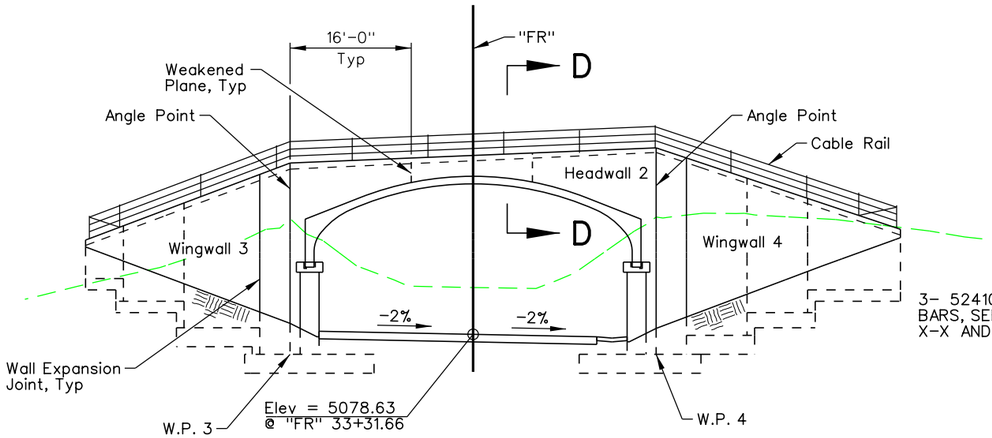
(X-Y) DENOTES WINGWALL FOOTING IDENTIFIER

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

HEADWALL AND WINGWALL DETAILS SHEET 1 OF 4

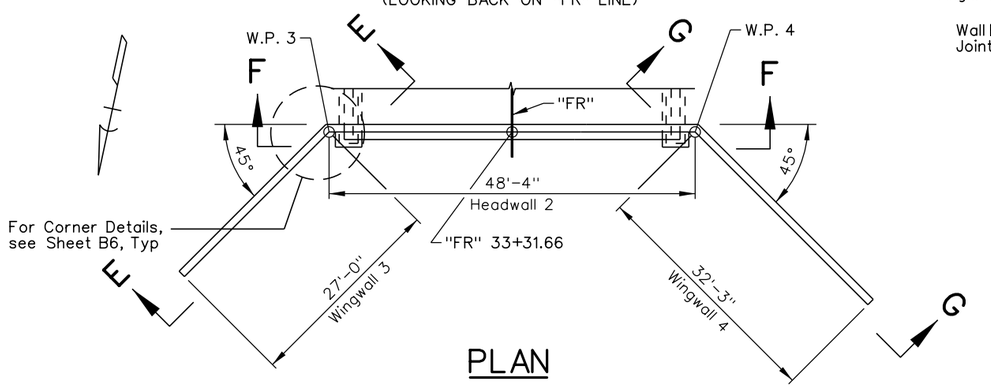
I-3331

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	B5

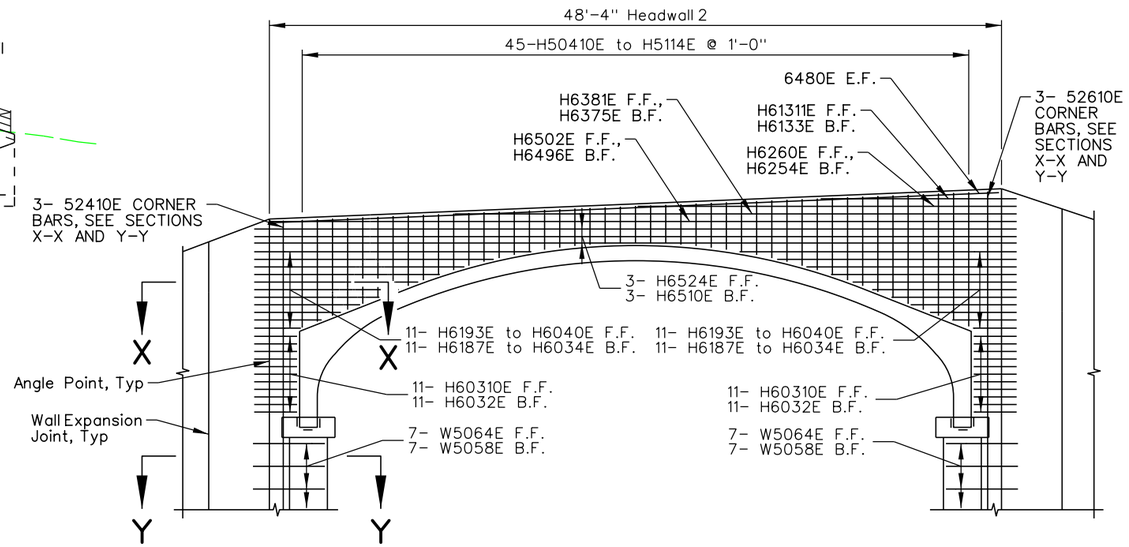


DEVELOPED ELEVATION

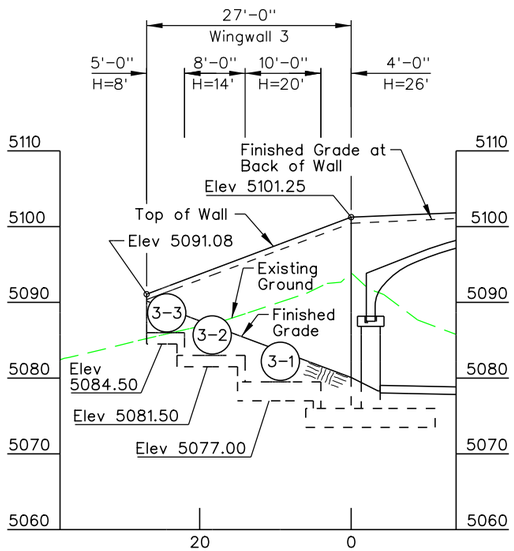
(LOOKING BACK ON "FR" LINE)



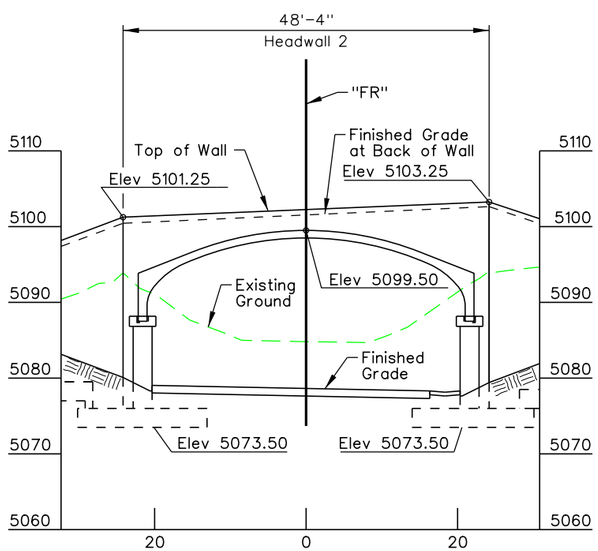
PLAN



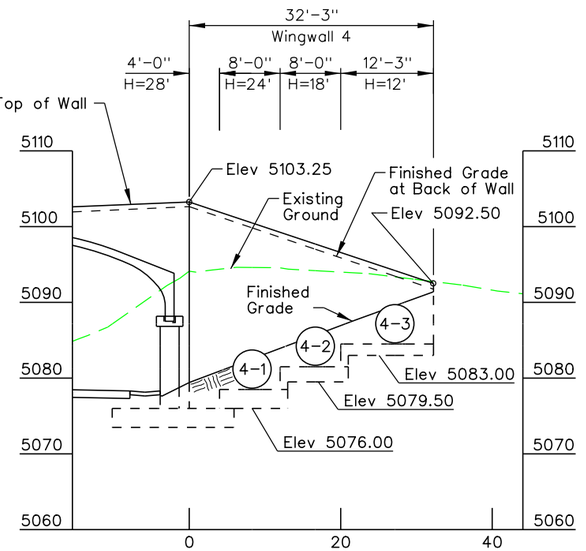
ELEVATION
HEADWALL REINFORCEMENT



SECTION E-E



SECTION F-F



SECTION G-G

NOTES:

1. FOR "WINGWALL TYPICAL SECTION", SEE SHEET B6.
2. FOR "SECTION D-D", SEE SHEET B4.
3. FOR "FOOTING STEP DETAIL" AND "WALL EXPANSION JOINT WITH WATERSTOP", SEE SHEET B9.
4. FOR "CABLE RAIL DETAILS", SEE SHEET B10.
5. FOR WINGWALL AND HEADWALL AESTHETIC TREATMENT, SEE SHEET LD101.
6. FOR "SECTION X-X" AND "SECTION Y-Y", SEE SHEET B6.

NOTE:

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

LEGEND:

(X-Y) DENOTES WINGWALL FOOTING IDENTIFIER

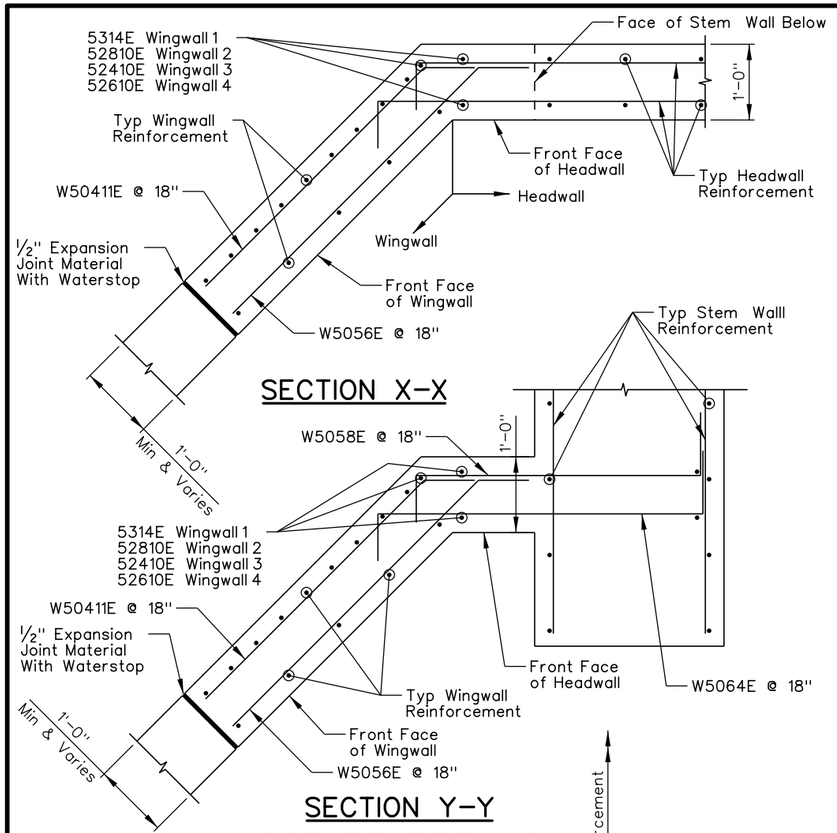
PROFESSIONAL ENGINEER · STATE OF NEVADA
ROBERT D. COOMES
Exp: 12/31/24
CIVIL
No. 22700

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

HEADWALL AND WINGWALL DETAILS
SHEET 2 OF 4

I-3331

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	B6



SECTION X-X

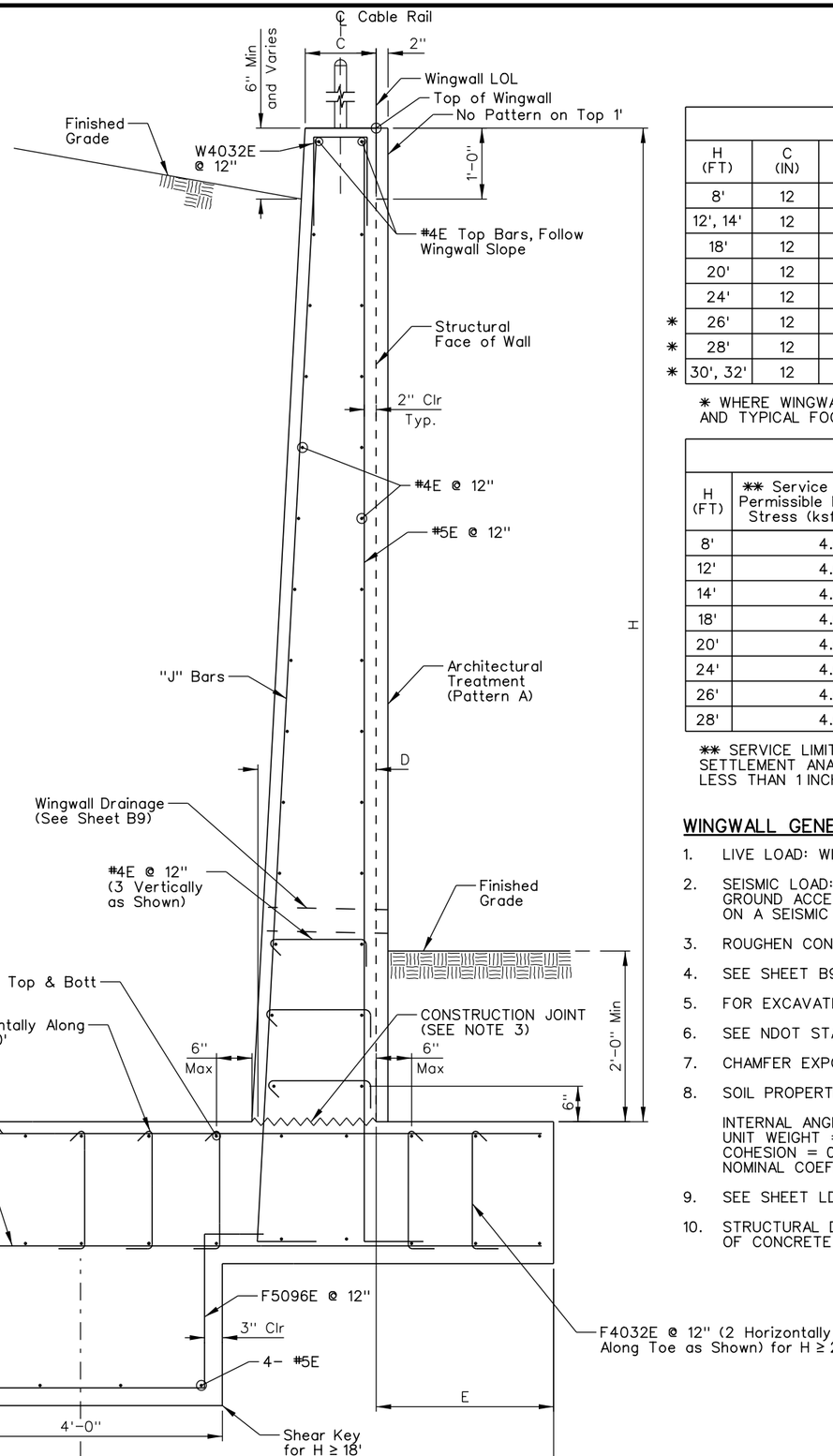
SECTION Y-Y

CORNER DETAILS

FOOTING CORNER REINFORCEMENT PLAN

NOTE:

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



WINGWALL TYPICAL SECTION

WINGWALL DATA TABLE

	H (FT)	C (IN)	D (IN)	J (SIZE)	J (SPACING)	K (SIZE)	K (SPACING)	E (FT)	F (FT)	G (FT)
	8'	12	16	#5	12	#5	12	1.0	5.0	1.5
	12', 14'	12	19	#5	6	#5	6	1.5	7.5	1.5
	18'	12	21	#7	6	#6	6	2.5	10.0	2.0
	20'	12	22	#8	6	#7	6	3.5	13.0	2.5
	24'	12	26	#10	6	#9	6	4.0	14.0	2.5
*	26'	12	33	#10	6	#10	6	4.0	15.5	2.5
*	28'	12	33	#10	6	#10	6	6.0	18.0	2.5
*	30', 32'	12	42	#10	6	–	–	–	–	–

* WHERE WINGWALL BEARS ON STEM WALL FOOTING, SEE SHEET B8 FOR FOOTING THICKNESS AND TYPICAL FOOTING REINFORCEMENT.

WINGWALL FOOTING BEARING RESISTANCE

H (FT)	** Service Limit State Permissible Net Contact Stress (ksf) (φ = 1.0)	Strength Limit State Factored Gross Nominal Bearing Resistance (ksf) (φ = 0.55)	Extreme Event Limit State Factored Gross Nominal Bearing Resistance (ksf) (φ = 1.0)
8'	4.0	16.0	28.0
12'	4.0	18.0	32.0
14'	4.0	17.0	30.0
18'	4.0	20.0	40.0
20'	4.0	26.0	47.0
24'	4.0	26.0	46.0
26'	4.0	26.0	47.0
28'	4.0	28.0	50.0

** SERVICE LIMIT BEARING RESISTANCE VALUES REPRESENT THE LOAD USED IN THE SETTLEMENT ANALYSIS MODELS. SETTLEMENT USING SUCH LOAD IS ESTIMATED TO BE LESS THAN 1 INCH. REFER TO GEOTECHNICAL REPORT FOR ANALYSIS.

WINGWALL GENERAL NOTES:

1. LIVE LOAD: WINGWALLS NOT DESIGNED FOR LIVE LOAD SURCHARGE PRESSURE.
2. SEISMIC LOAD: DESIGN BASED ON AASHTO RESPONSE SPECTRA FOR SITE CLASS C. DESIGN PEAK GROUND ACCELERATION COEFFICIENT = 0.237, Sds = 0.569, Sd1 = 0.248. WALL DESIGN IS BASED ON A SEISMIC ACCELERATION EQUAL TO 1/2 OF THE DESIGN PGA = 0.12.
3. ROUGHEN CONSTRUCTION JOINT SURFACE TO 1/4 INCH AMPLITUDE.
4. SEE SHEET B9 FOR DRAINAGE, FOOTING STEP, WALL OFFSET, AND JOINT DETAILS.
5. FOR EXCAVATION AND BACKFILL LIMITS SEE NDOT STANDARD PLAN SHEET EB-4.
6. SEE NDOT STANDARD SPECIFICATION SECTION 207 FOR BACKFILL COMPACTION REQUIREMENTS.
7. CHAMFER EXPOSED CORNERS 1" AS PER PROJECT AESTHETIC DETAILS.
8. SOIL PROPERTIES:

   INTERNAL ANGLE OF FRICTION = 34 DEGREES
   UNIT WEIGHT = 135 PCF
   COHESION = 0 PSF
   NOMINAL COEFFICIENT OF FRICTION BETWEEN CONCRETE FOOTING AND FOUNDATION SOIL = 0.55
9. SEE SHEET LD101 FOR WALL AESTHETIC TREATMENT.
10. STRUCTURAL DESIGN CONSIDERS A STEM ARCHITECTURAL TREATMENT OF THICKNESS UP TO 2" OF CONCRETE (25 PSF).

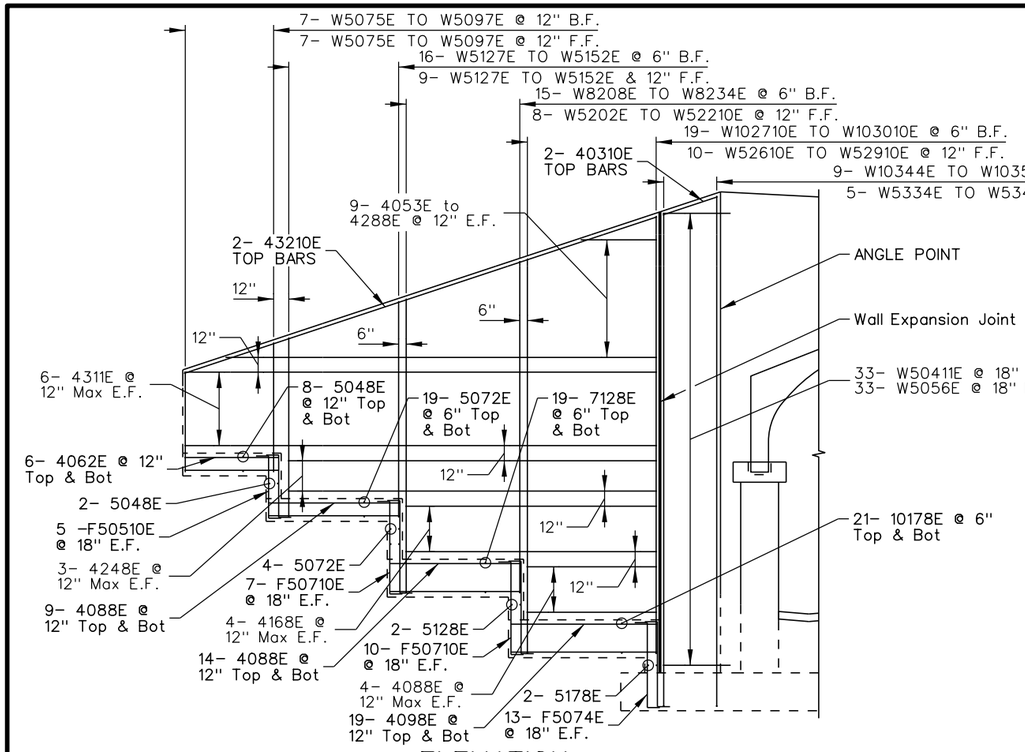
PROFESSIONAL ENGINEER - STATE OF NEVADA
ROBERT D. COOMES
Exp: 12/31/24
CIVIL
No. 22700

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

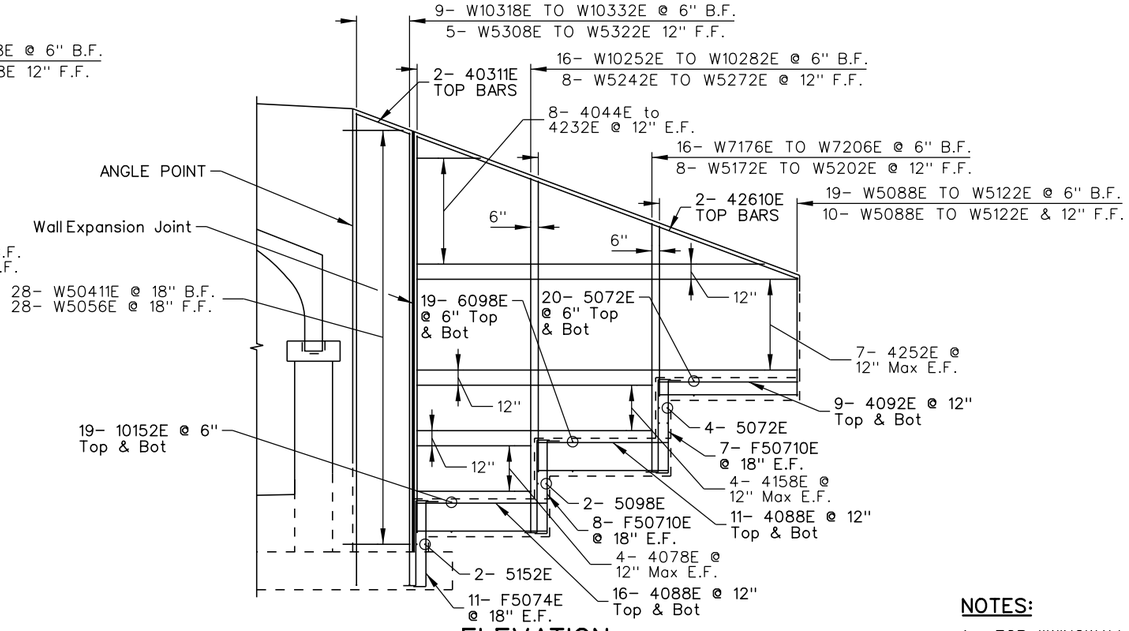
HEADWALL AND WINGWALL DETAILS SHEET 3 OF 4

I-3331

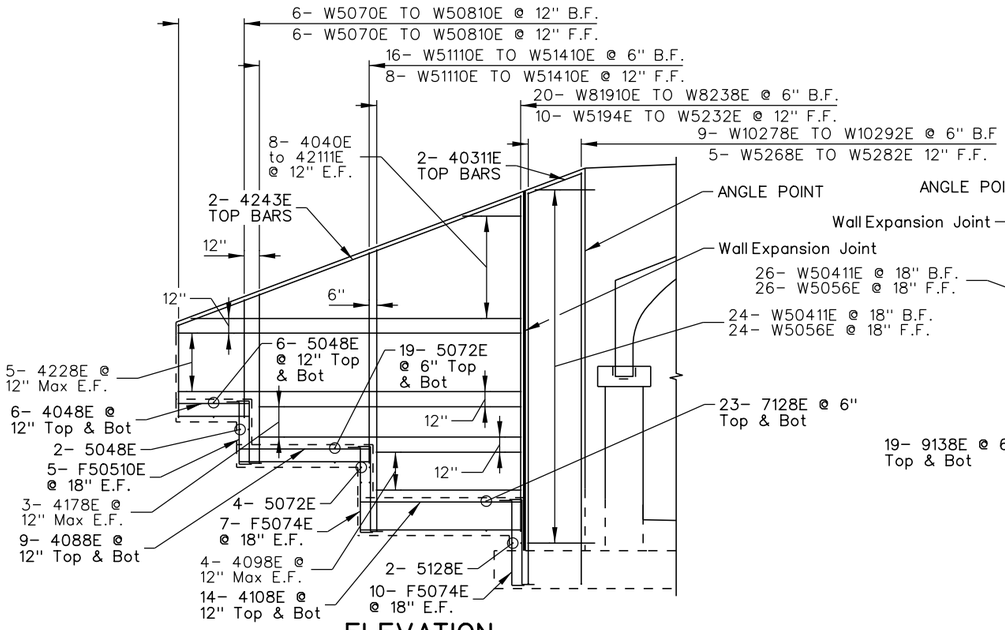
STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	B7



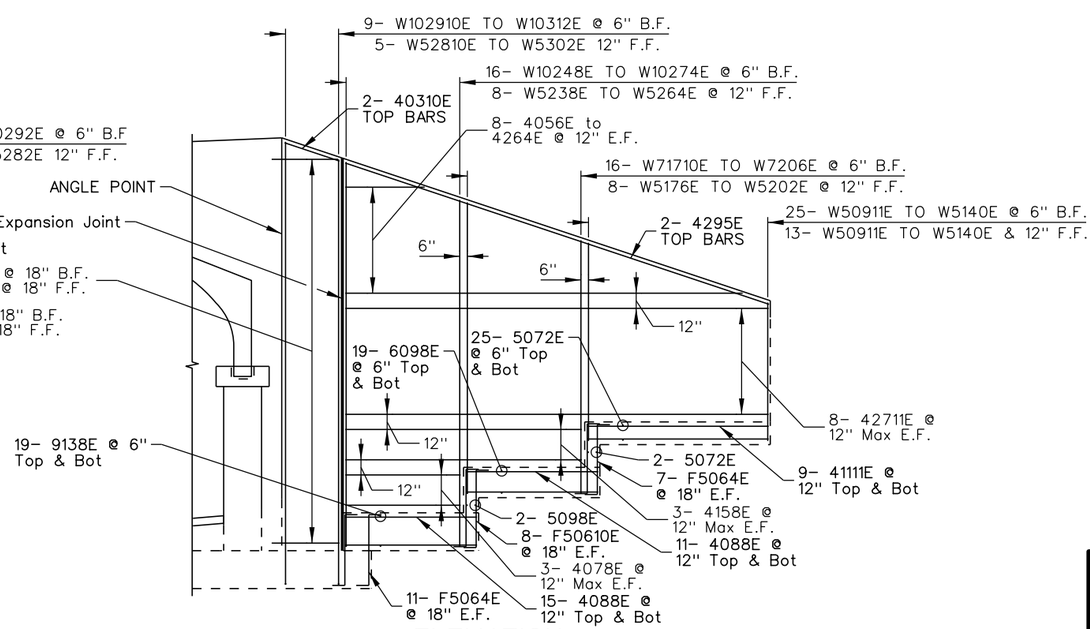
ELEVATION
WINGWALL 1 REINFORCEMENT



ELEVATION
WINGWALL 2 REINFORCEMENT



ELEVATION
WINGWALL 3 REINFORCEMENT



ELEVATION
WINGWALL 4 REINFORCEMENT

NOTES:

1. FOR "WINGWALL TYPICAL SECTION", SEE SHEET B6.
2. FOR "FOOTING STEP DETAIL" AND "WALL EXPANSION JOINT WITH WATERSTOP", SEE SHEET B9.
3. WINGWALL CAP BARS (W4032E @ 12) NOT SHOWN FOR CLARITY.
4. FOOTING KEY AND FOOTING KEY REINFORCING NOT SHOWN FOR CLARITY.
5. FOOTING AND STEMWALL SHEAR STIRRUPS NOT SHOWN FOR CLARITY.

NOTE:

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

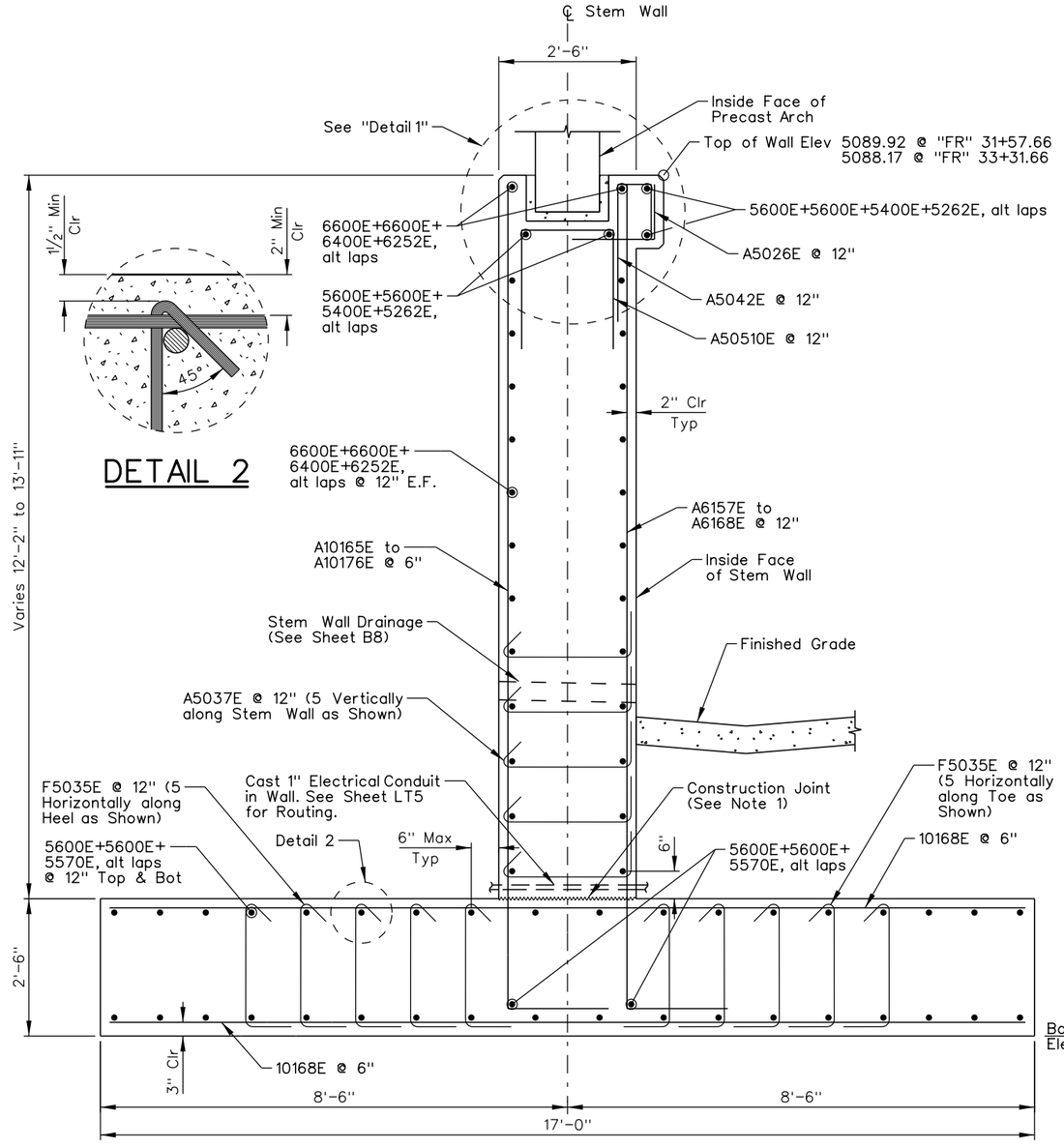
PROFESSIONAL ENGINEER - STATE OF NEVADA
ROBERT D. COOMES
Exp: 12/31/24
CIVIL
No. 22700

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

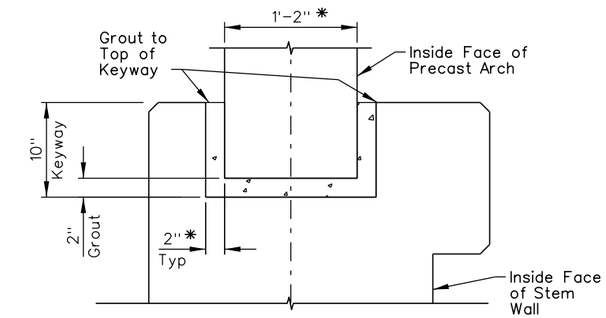
HEADWALL AND WINGWALL DETAILS
SHEET 4 OF 4

I-3331

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	B8



DETAIL 2



NOTE: FILL ENTIRE KEYWAY INCLUDING VOID BETWEEN BOTTOM OF KEYWAY AND BOTTOM OF PRECAST ARCH LEG WITH NON-SHRINK GROUT.

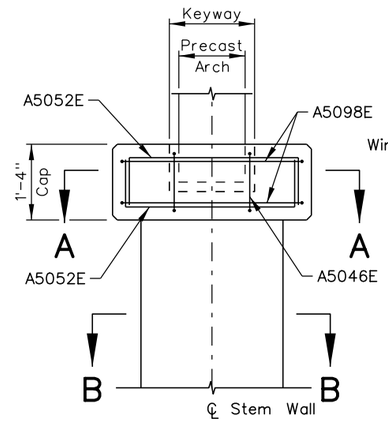
* ASSUMED DIMENSION. ACTUAL DIMENSION MAY VARY PER MANUFACTURER'S DESIGN DETAILS.

DETAIL 1

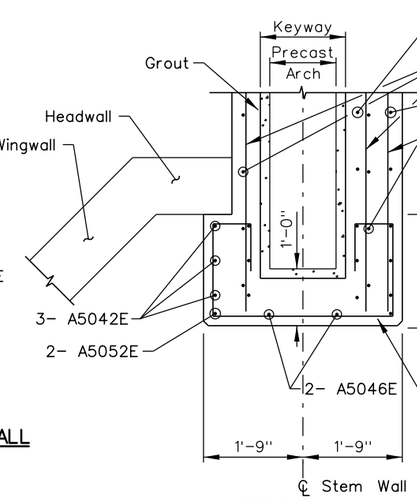
NOTES:

1. ROUGHEN CONSTRUCTION JOINT SURFACE TO ¼" INCH AMPLITUDE.
2. SEE SHEET B9 FOR DRAINAGE AND JOINT DETAILS.
3. FOR EXCAVATION AND BACKFILL LIMITS SEE SHEET B2.
4. SEE NDOT STANDARD SPECIFICATION SECTION 207 FOR BACKFILL COMPACTION REQUIREMENTS.
5. CHAMFER EXPOSED CORNERS TO 1" AS PER SHEET LD101.
6. SOIL PROPERTIES:

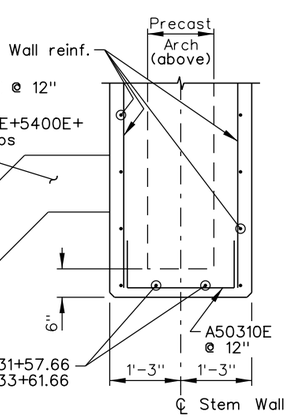
   INTERNAL ANGLE OF FRICTION = 34 DEGREES
   UNIT WEIGHT = 135 PCF
   COHESION = 0 PSF
   NOMINAL COEFFICIENT OF FRICTION BETWEEN CONCRETE FOOTING AND FOUNDATION SOIL = 0.55
7. ASSUMED PRECAST ARCH UNFACTORED LOADS FOR SUBSTRUCTURE DESIGN ARE FOR A PRE-ENGINEERED SYSTEM WITH A 42'-0" SPAN AND 11'-0" RISE, AS SHOWN IN "REACTION DIAGRAM." CONTRACTOR SHALL SUPPLY REACTIONS FOR VERIFICATION OF SUBSTRUCTURE DESIGN PRIOR TO ARCH FABRICATION.
8. FOR REINFORCEMENT AT ENDS OF STEM WALL FOOTING CORNERS, SEE "FOOTING CORNER REINFORCEMENT PLAN" ON SHEET B6.



ELEVATION AT ENDS OF STEM WALL



SECTION A-A



SECTION B-B

TYPICAL STEM WALL END DETAILS

	Soil Cover at Top of Arch	
	2'-0"	9'-0"
Vertical load, per leg, R_v (Self Weight), DC	5.10 klf	5.10 klf
Vertical load, per leg, R_v (Self Weight + Earth Cover), DC+EV	19.50 klf	40.60 klf
Vertical load, per leg, R_v (Self Weight + Earth Cover + Live Load), DC+EV+LL	26.20 [27.40] klf	44.60 [45.10] klf
Horizontal load, per leg, R_h (Self Weight), DC	2.70 klf	2.70 klf
Horizontal load, per leg, R_h (Self Weight + Earth Cover), DC+EH	6.60 klf	17.10 klf
Horizontal load, per leg, R_h (Self Weight + Earth Cover + Live Load), DC+EH+LL	11.70 [12.00] klf	19.60 [19.70] klf

ASSUMED UNFACTORED ARCH REACTIONS

NOTE: LIVE LOAD (LL) REACTIONS (WITHOUT IMPACT) ARE GIVEN FOR HL-93 LOADING. VALUES IN BRACKETS [] CORRESPOND TO P-13 LOADING.

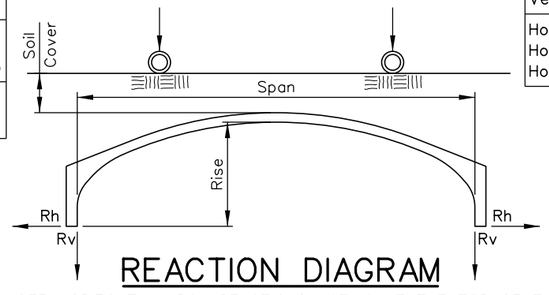
TYPICAL SECTION

STEM WALL FOOTING BEARING RESISTANCE		
Soil Type	Service Limit State Permissible Net Contact Stress (ksf) (φ = 1.0)	Strength Limit State Factored Gross Nominal Bearing Resistance (ksf) (φ = 0.45)
HIGHLY WEATHERED BEDROCK	*5.0	37.0

* SERVICE LIMIT BEARING RESISTANCE VALUES REPRESENT THE LOAD USED IN THE SETTLEMENT ANALYSIS MODELS. SETTLEMENT USING SUCH LOAD IS ESTIMATED TO BE LESS THAN 1 INCH. REFER TO GEOTECHNICAL REPORT FOR ANALYSIS.

NOTE:

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



REACTION DIAGRAM

NOTE: HORIZONTAL ARCH REACTIONS ACTING AT THE TOP OF THE STEM WALL INCLUDE EFFECT OF LATERAL EARTH PRESSURE ABOVE BOTTOM OF ARCH LEG.

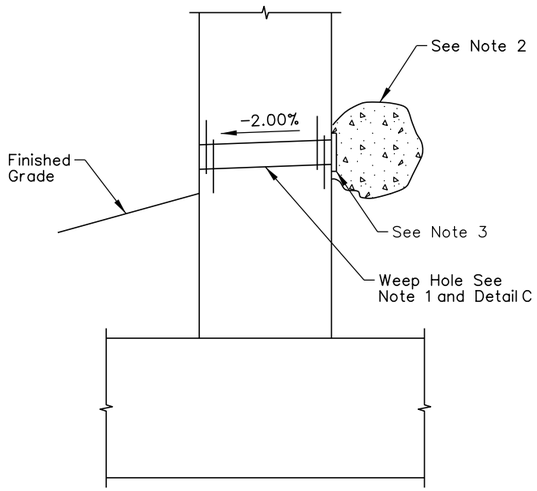
PROFESSIONAL ENGINEER · STATE OF NEVADA
ROBERT D. COOMES
Exp: 12/31/24
CIVIL
No. 22700

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

STEM WALL AND FOOTING DETAILS

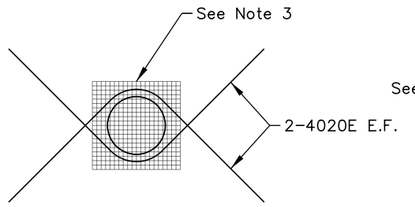
I-3331

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	B9

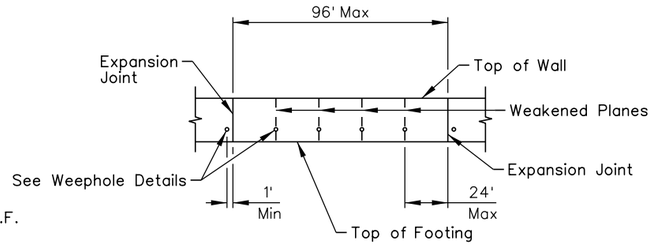


WEEP HOLE DETAIL

(AT WINGWALLS AND STEM WALLS)

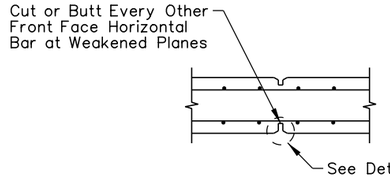


DETAIL C

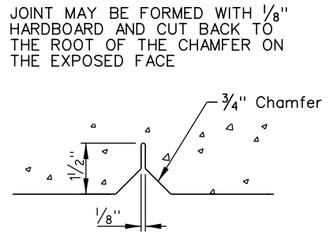


WALL EXPANSION JOINTS AND WEAKENED PLANES

(AT WINGWALLS AND STEM WALLS)



SECTION

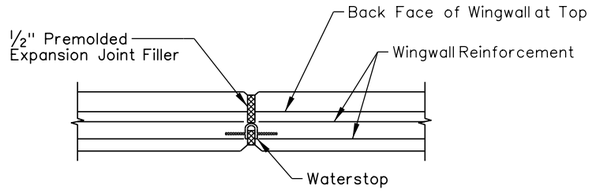


DETAIL A

WEAKENED PLANES

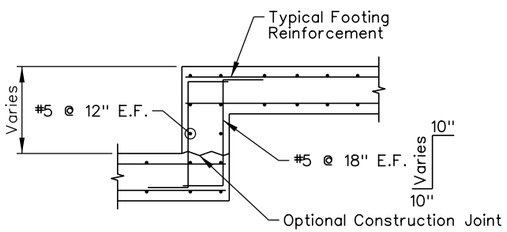
NOTES:

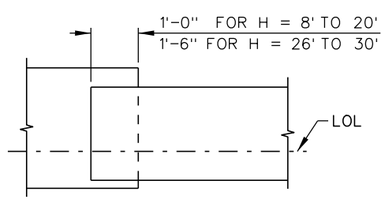
1. 4-INCH DIA. DRAINS AT 25-FEET MAXIMUM CENTER TO CENTER. EXPOSED DRAINS SHALL BE LOCATED 3-INCHES ± ABOVE FINISH GRADE.
2. 2 CUBIC FEET OF TYPE 2 DRAINING BACKFILL ENCAPSULATED IN A GEOTEXTILE FABRIC SECURELY TIED. GEOTEXTILE SHALL MEET THE FOLLOWING:
   A. MEET AT LEAST CLASS 1 STRENGTH REQUIREMENT PER AASHTO M288 TEST METHOD.
   B. HAVE AN AOS NOT GREATER THAN U.S. SIEVE No. 40.
   C. HAVE A PERMITTIVITY OF AT LEAST 0.5 Sec^{-1}.
3. 6-INCH SQUARE ALUMINUM OR GALVANIZED STEEL WIRE MESH HARDWARE CLOTH, 4 OPENINGS PER INCH AND MINIMUM WIRE DIAMETER 0.03-INCHES.



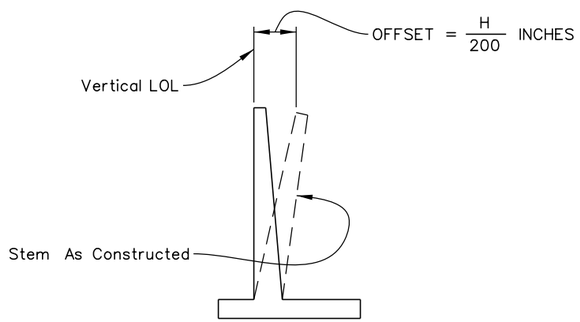
PLAN OF WALL WITH EXPANSION JOINT AND WATERSTOP

(WINGWALL SHOWN, STEM WALL SIMILAR)

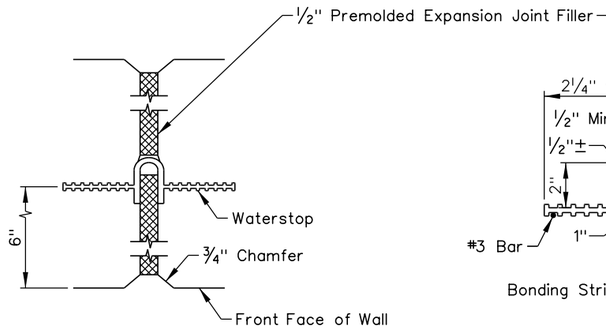




FOOTING STEP DETAIL

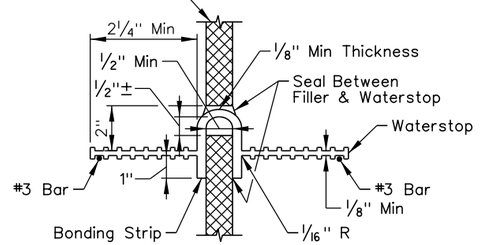


WALL OFFSET FOR WINGWALLS



WALL EXPANSION JOINT WITH WATERSTOP

(AT WINGWALLS AND STEM WALLS)



WATERSTOP

NOTE:

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

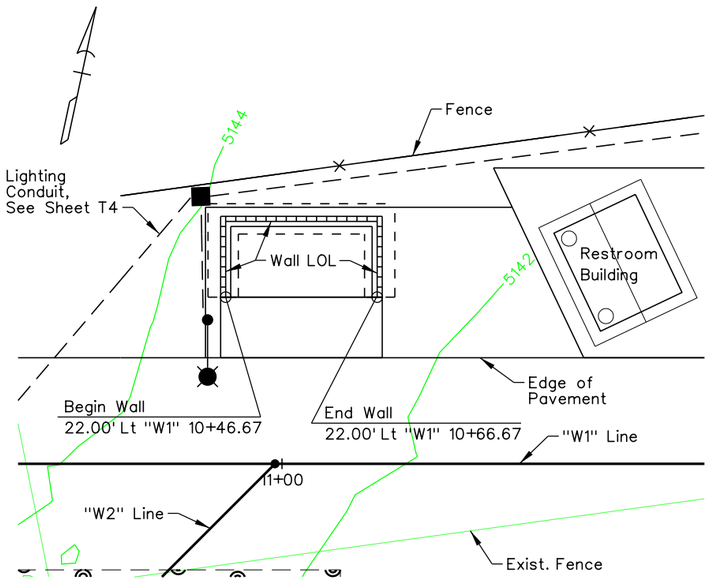
PROFESSIONAL ENGINEER - STATE OF NEVADA
ROBERT D. COOMES
Exp: 12/31/24
CIVIL
No. 22700

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

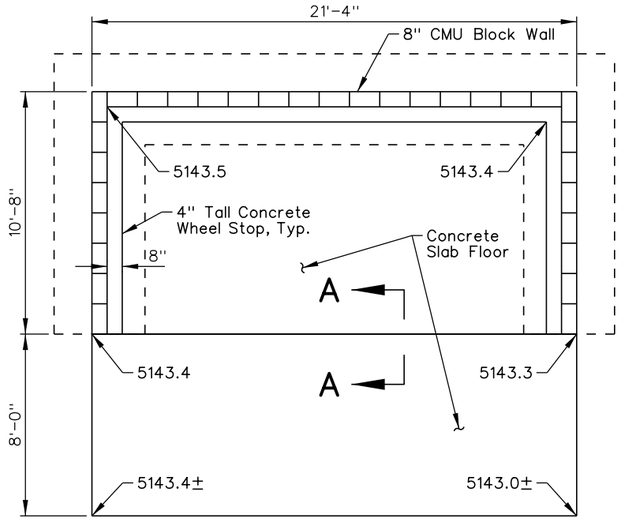
MISCELLANEOUS WALL AND FOOTING DETAILS

I-3331

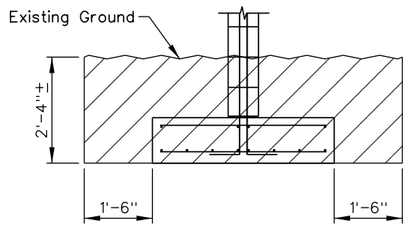
STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	SD1



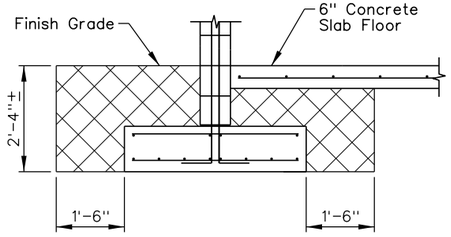
LOCATION PLAN



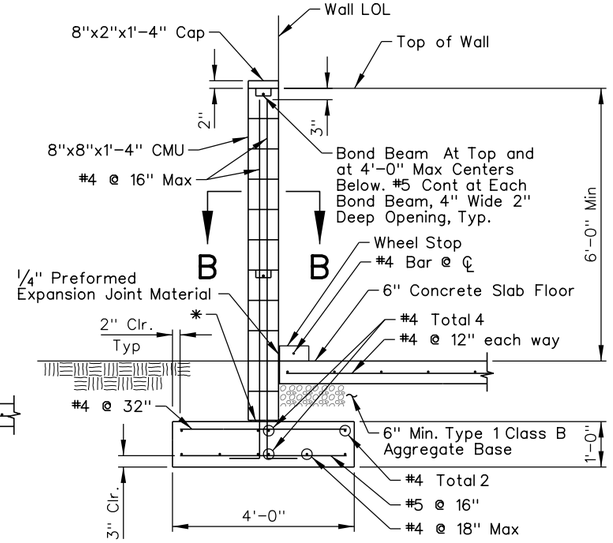
ENCLOSURE PLAN



STRUCTURE EXCAVATION

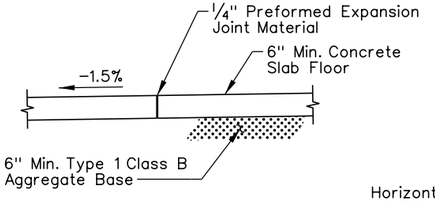


GRANULAR BACKFILL

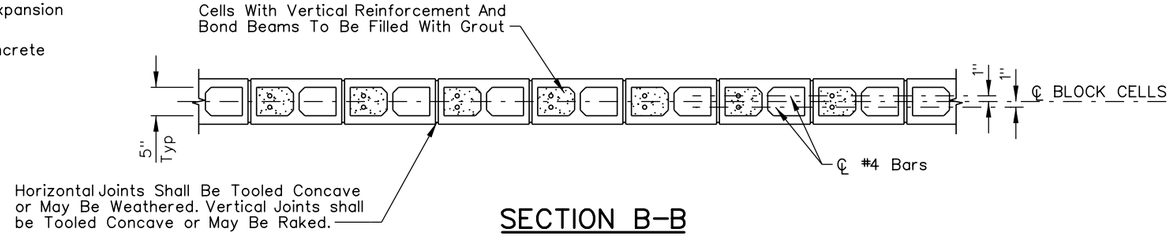


TYPICAL SECTION

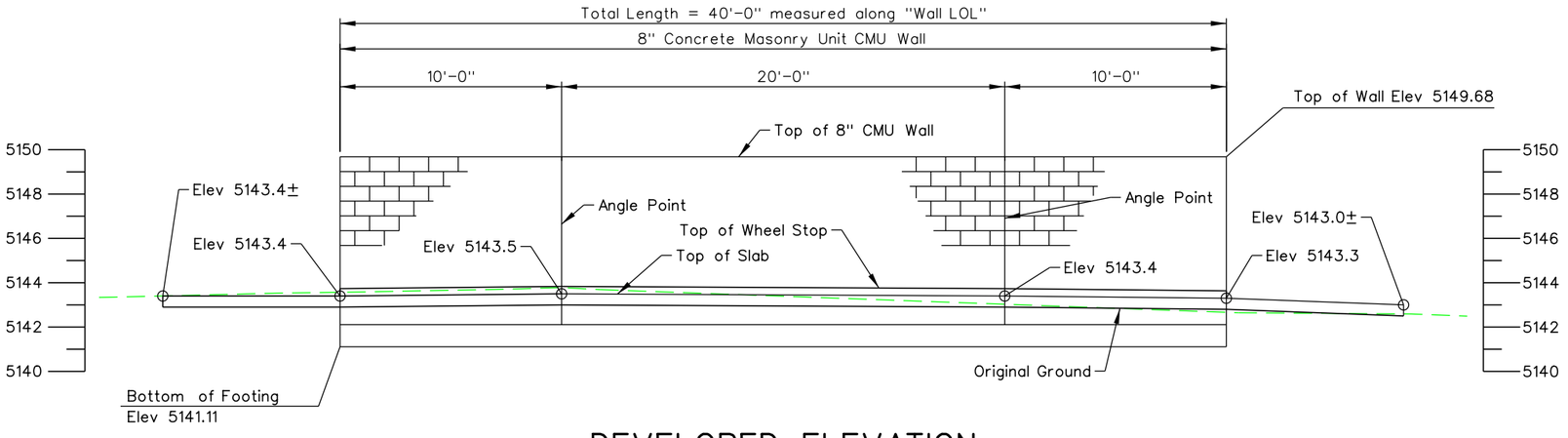
* Full Mortar Bed at Bottom of Wall



SECTION A–A



SECTION B–B



DEVELOPED ELEVATION

NOTE:

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

GENERAL NOTES

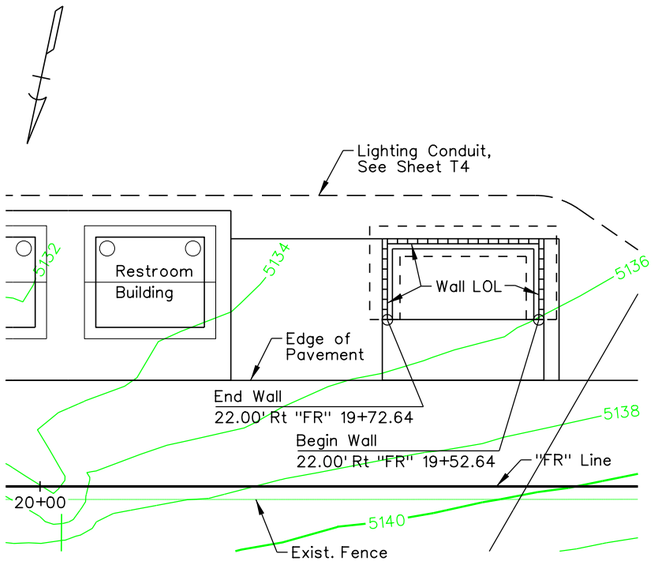
1. DESIGN SPECIFICATIONS: "AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS", 8TH EDITION, WITH 2019 INTERIM REVISIONS. INTERNATIONAL BUILDING CODE (2012). BUILDING CODE REQUIREMENT FOR MASONRY STRUCTURES (TMS 402-13/ACI 530-13/ASCE 5-13).
2. CONSTRUCTION SPECIFICATIONS: STATE OF NEVADA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION," 2014, EXCEPT AS NOTED BELOW AND IN THE SPECIAL PROVISIONS OF THIS CONTRACT.
3. CONCRETE: REINFORCED CONCRETE FOOTING SHALL BE CLASS AA MODIFIED (MINOR) WITH A 28-DAY COMPRESSIVE STRENGTH OF 4,000 PSI.
4. MASONRY: F'M = 1,500 PSI, FS = 24.0 KSI, N = 26.
5. REINFORCING STEEL: ASTM A615 GRADE 60 OR A706.
6. DESIGN WIND LOAD: 35 PSF.
7. SEISMIC LOAD: ACCELERATION COEFFICIENT 0.24G.
8. CONCRETE FOOTING BEARING RESISTANCE:
   SERVICE LIMIT STATE PERMISSIBLE NET CONTACT STRESS = 4.0 KSF
   STRENGTH FACTORED GROSS NOMINAL BEARING RESISTANCE = 9.3 KSF
   EXTREME EVENT FACTORED GROSS NOMINAL BEARING RESISTANCE = 20.0 KSF
9. WALL AESTHETICS: BLOCKS SHALL BE INTEGRAL COLOR TO MATCH BASALITE "SANDSTONE". THE FIRST COURSE BELOW THE MORTAR CAP SHALL BE SMOOTH FACE BLOCK, THE 2 COURSES BELOW SHALL BE SPLIT FACE BLOCK, AND ALL OTHER COURSES SHALL BE SMOOTH FACE BLOCK.
10. THE MASONARY RETAINING WALL AREA IS MEASURED FROM THE TOP OF FOOTING.

PROFESSIONAL ENGINEER · STATE OF NEVADA
ROBERT D. COOMES
Exp: 12/31/24
CIVIL
No. 22700

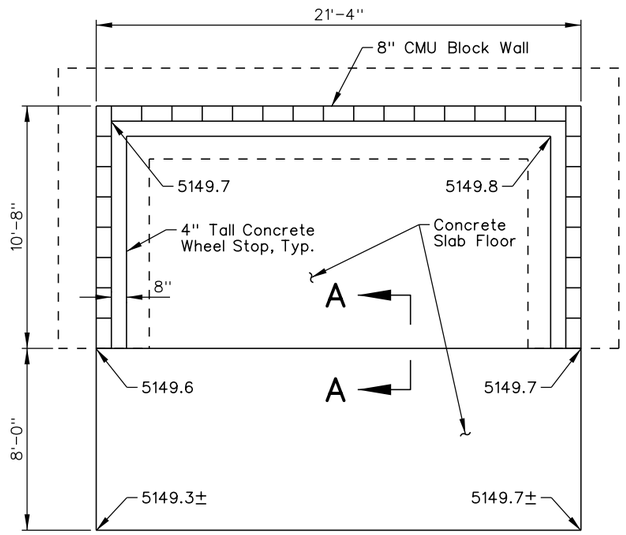
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

SPECIAL DETAILS TRASH ENCLOSURE No. 1

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	SD2



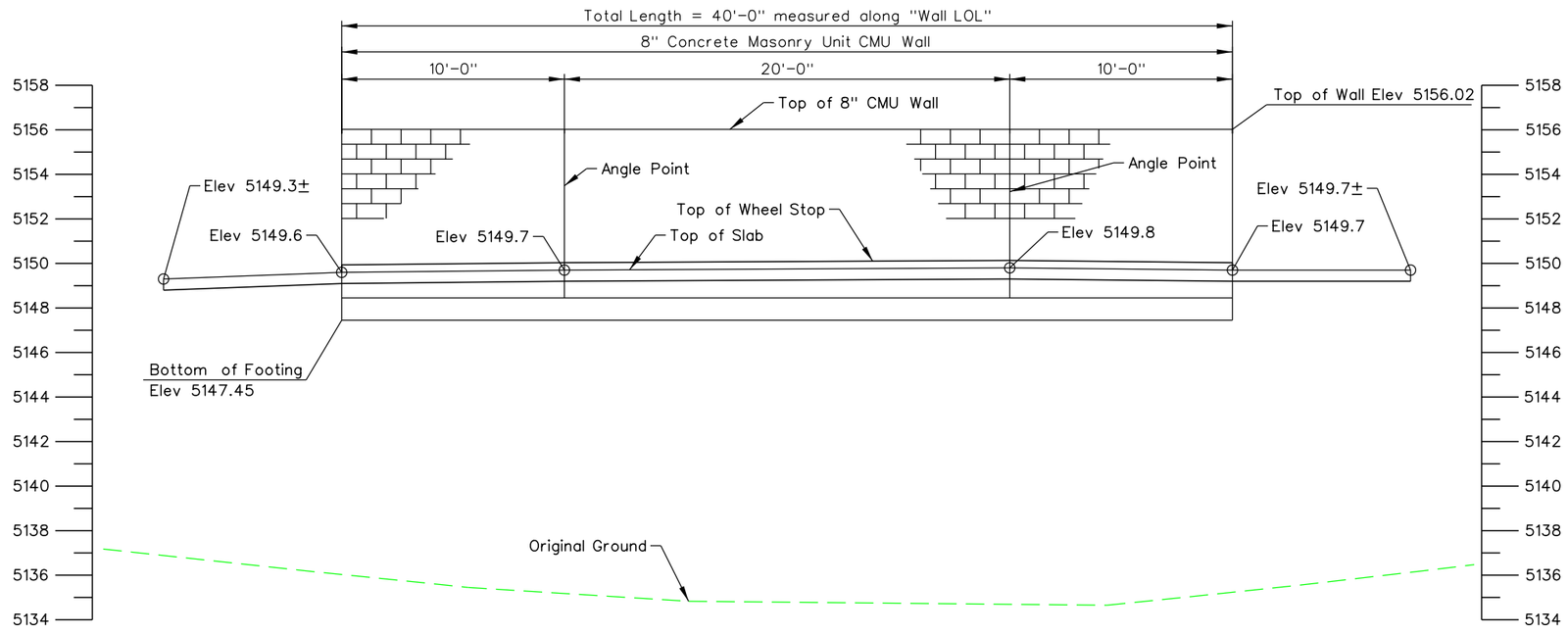
LOCATION PLAN



ENCLOSURE PLAN

GENERAL NOTES

1. SEE SHEET SD1 FOR WALL TYPICAL SECTION, SECTION A–A, SECTION B–B, AND LIMITS OF STRUCTURE EXCAVATION AND GRANULAR BACKFILL.
2. DESIGN SPECIFICATIONS: "AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS", 8TH EDITION, WITH 2019 INTERIM REVISIONS. INTERNATIONAL BUILDING CODE (2012). BUILDING CODE REQUIREMENT FOR MASONRY STRUCTURES (TMS 402-13/ACI 530-13/ASCE 5-13).
3. CONSTRUCTION SPECIFICATIONS: STATE OF NEVADA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION," 2014, EXCEPT AS NOTED BELOW AND IN THE SPECIAL PROVISIONS OF THIS CONTRACT.
4. CONCRETE: REINFORCED CONCRETE FOOTING SHALL BE CLASS AA MODIFIED (MINOR) WITH A 28-DAY COMPRESSIVE STRENGTH OF 4,000 PSI.
5. MASONRY: F'M = 1,500 PSI, FS = 24.0 KSI, N = 26.
6. REINFORCING STEEL: ASTM A615 GRADE 60 OR A706.
7. DESIGN WIND LOAD: 35 PSF.
8. SEISMIC LOAD: ACCELERATION COEFFICIENT 0.24G.
9. CONCRETE FOOTING BEARING RESISTANCE:
   SERVICE LIMIT STATE PERMISSIBLE NET CONTACT STRESS = 4.0 KSF
   STRENGTH FACTORED GROSS NOMINAL BEARING RESISTANCE = 9.3 KSF
   EXTREME EVENT FACTORED GROSS NOMINAL BEARING RESISTANCE = 20.0 KSF
10. WALL AESTHETICS: BLOCKS SHALL BE INTEGRAL COLOR TO MATCH BASALITE "SANDSTONE". THE FIRST COURSE BELOW THE MORTAR CAP SHALL BE SMOOTH FACE BLOCK, THE 2 COURSES BELOW SHALL BE SPLIT FACE BLOCK, AND ALL OTHER COURSES SHALL BE SMOOTH FACE BLOCK.
11. THE MASONRY RETAINING WALL AREA MEASURED FROM THE TOP OF FOOTING.



DEVELOPED ELEVATION

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

PROFESSIONAL ENGINEER · STATE OF NEVADA
ROBERT D. COOMES
Exp: 12/31/24
CIVIL
No. 22700

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

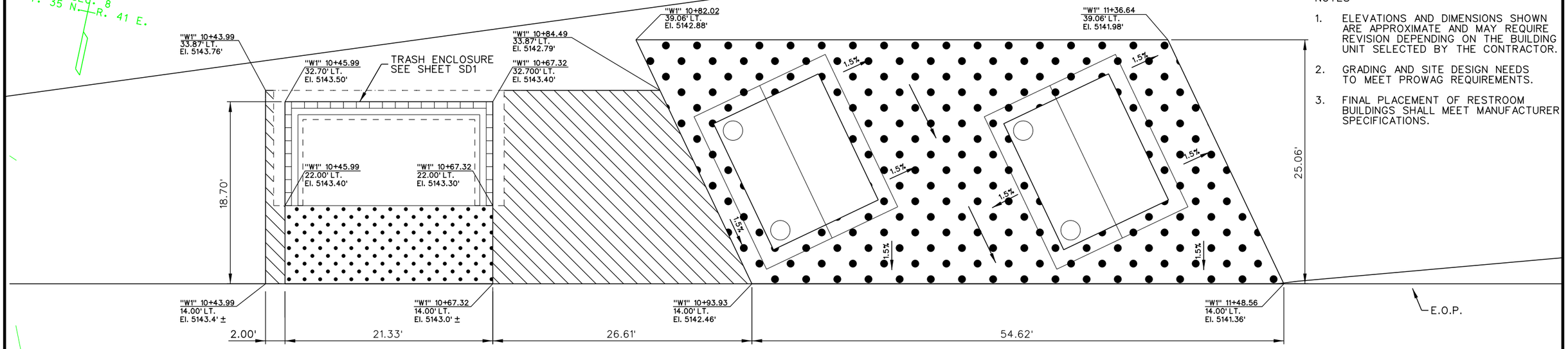
SPECIAL DETAILS
TRASH ENCLOSURE No. 2

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	SD3

T. 35 N. SEC. 8 R. 41 E.

NOTES:

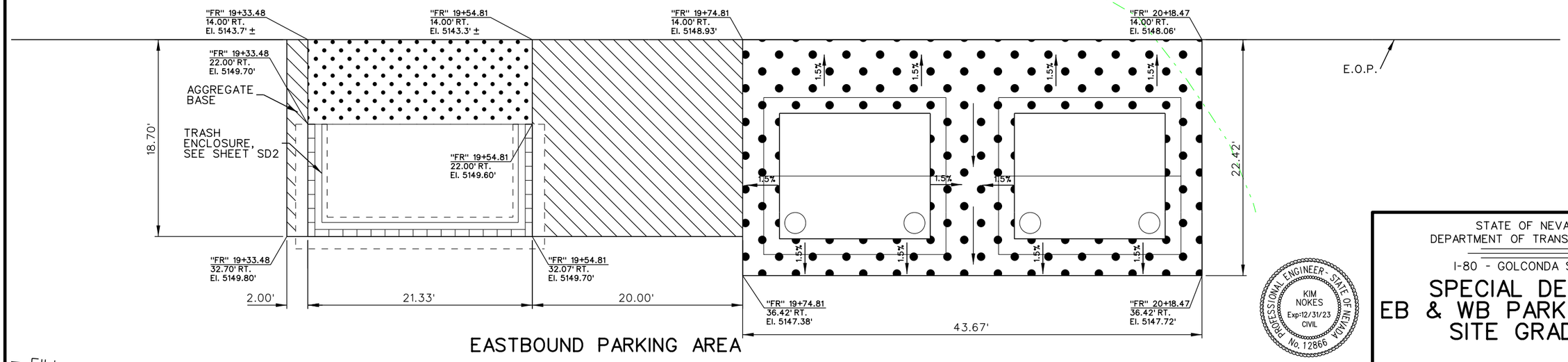
1. ELEVATIONS AND DIMENSIONS SHOWN ARE APPROXIMATE AND MAY REQUIRE REVISION DEPENDING ON THE BUILDING UNIT SELECTED BY THE CONTRACTOR.
2. GRADING AND SITE DESIGN NEEDS TO MEET PROWAG REQUIREMENTS.
3. FINAL PLACEMENT OF RESTROOM BUILDINGS SHALL MEET MANUFACTURER SPECIFICATIONS.



WESTBOUND PARKING AREA

– LEGEND –

- CLASS AA CONCRETE SIDEWALK (4–INCH)
- CLASS AA CONCRETE DRIVEWAY (6–INCH)
- TYPE 1 CLASS B AGGREGATE BASE (SEE SUMMARY SHEETS)



EASTBOUND PARKING AREA

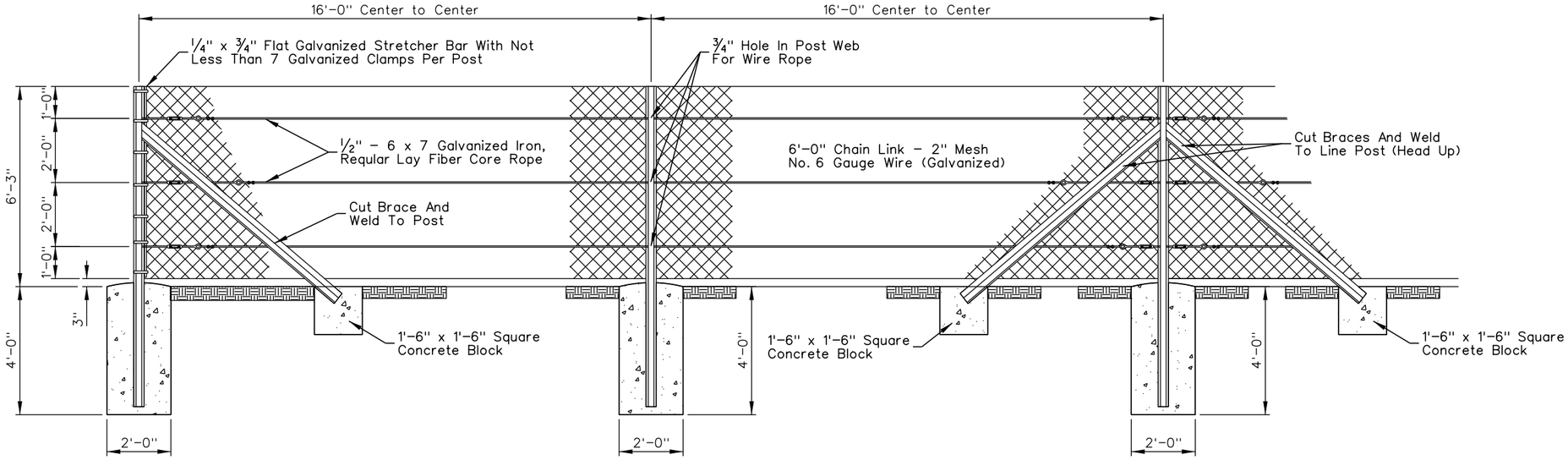
PROFESSIONAL ENGINEER · STATE OF NEVADA
KIM NOKES
Exp:12/31/23
CIVIL
No. 12866

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

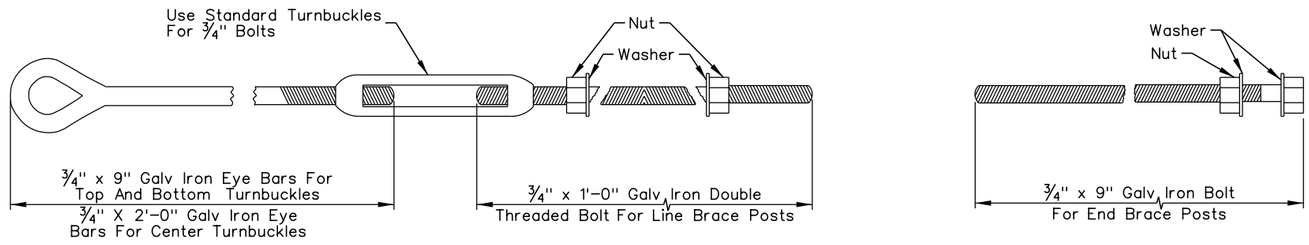
I-80 - GOLCONDA SUMMIT

SPECIAL DETAILS EB & WB PARKING AREA SITE GRADING

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHFP-080-3(071)	HUMBOLDT	SD4



END POST LINE POST LINE BRACE



ROCK FALL PROTECTION
DEBRIS FENCE

GENERAL NOTES:

1. ALL POSTS AND BRACES SHALL BE 50 POUND CRANE RAIL - 10' LONG.
2. INSTALL LINE BRACES AT INTERVALS NOT EXCEEDING 275'.
3. ALL POSTS SHALL BE AT 16' CENTERS.
4. POSTS AND BRACES TO BE SET IN CLASS AA CONCRETE AS SHOWN, EXCEPT IN ROCK THEY MAY BE GROUTED IN DRILL HOLE.
5. 2 GALVANIZED CROSBY CLIPS OR EQUAL AND 1 GALVANIZED WIRE ROPE THIMBLE SHALL BE USED TO ATTACH WIRE ROPE AND EYE BAR.
6. CUT GROOVE IN FLANGE OF BRACES FOR WIRE ROPE AND EYE BAR.
7. SECURE MESH TO LINE POSTS WITH 7 WIRE TIES PER POST, AND TO EACH WIRE ROPE WITH 1 WIRE TIE PER EVERY 2'.
8. NATINA FINISH SHALL BE APPLIED TO ALL FENCE ELEMENTS, SEE LANDSCAPE SHEET L109.

PROFESSIONAL ENGINEER - STATE OF NEVADA
ROBERT D. COOMES
Exp:12/31/22
CIVIL
No. 22700

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

I-80 - GOLCONDA SUMMIT

ROCK FALL PROTECTION DEBRIS FENCE