# GEOTECHNICAL REPORT

## SR 160 CABLE BARRIER INSTALLATION
## MILEPOST CL 21.89 TO NY 0.97

## PAHRUMP, NEVADA

## AUGUST 2010


NEVADA DOT
GEOTECHNICAL ENGINEERING

**MATERIALS DIVISION**

**STATE OF NEVADA**

**DEPARTMENT OF TRANSPORTATION**

**MATERIALS DIVISION**

**GEOTECHNICAL SECTION**

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# SR 160 CABLE BARRIER INSTALLATION
# MILEPOST CL 21.89 TO NY 0.97
# PAHRUMP, NEVADA
# AUGUST 2010

**E.A. 73587**

**CLARK COUNTY/NYE COUNTY, NEVADA**


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# APPENDICES

# INTRODUCTION

## General

This geotechnical summary has been produced for the traffic cable barrier installation project to be constructed on SR 160 between Mileposts Clark 21.89 and Nye 0.97, between Mountain Springs and Pahrump, Nevada. The purpose of this summary is to provide information regarding the subsurface soil and groundwater conditions along the project alignment. Specific recommendations concerning the design parameters and constructability of the cable barrier foundation elements are also provided. A site specific geotechnical investigation was conducted specifically for the traffic cable barrier project.

## Other Reports and Investigations

Original construction of this section of SR 160 as a two lane highway (existing westbound lanes) was constructed in 1954 under NDOT Contract 890. Existing eastbound lanes, widening of westbound lanes, and other improvements were constructed under NDOT Contracts 2785 (1996) and 2883 (1998), making SR 160 a four lane divided highway separated by a 56 foot wide median.

# PROJECT DESCRIPTION

The Nevada Department of Transportation has determined that a traffic cable barrier is to be constructed along the center median of SR 160 between Mileposts CL 21.89 and NY 0.97, stations "X2" 1140+67 and "P" 374+58 respectively. Approximately 22 miles of traffic cable barrier will be constructed in 19 discreet segments. The center median slopes throughout the project are scheduled to be flattened to a 6:1 (H:V) slope geometry using NDOT Borrow Material.

# LOCAL GEOLOGY [1]

The majority of the project alignment is located in the Pahrump Valley. The eastern segment of the project alignment from Station is located in the foothills of the Spring Mountains. According to available geologic references the portion of the project site located within the Pahrump Valley

is founded on Quaternary aged alluvium consisting of coarse, gravelly deposits spread by sporadic sheet floods on wide slopes bordering high ranges and bouldery deposits in alluvial fans built up by ephemeral streams that flow from narrow canyons. Granular deposits grade down to sands and silts in valley bottoms. Gravel firmly cemented with calcium carbonate (caliche) is widely exposed in bluffs along major washes that traverse the alluviated slopes bordering high ranges. This gravel consists chiefly of limestone and dolomite fragments, and the carbonate cement was dissolved either from the fragments or from the parent bedrock in the range. Available geologic references also indicate that the eastern portion of the project that climbs out of the Pahrump Valley into the Spring Mountains is founded mainly on Quaternary alluvium with small sections of the project alignment founded on the Bird Spring, Kaibab, Toroweap and Moenkipi Formations.

## FIELD INVESTIGATION

A geotechnical field investigation was conducted June 7th through June 10th, 2010. The subsurface soil conditions were explored by drilling twelve boreholes, identified as CBP1 through CBP12. Boring locations were selected at various proposed cable barrier rail end terminals, determined from preliminary drawings provided by NDOT Roadway Design. Boring Location Map sheets depicting approximate boring locations are included in Appendix A. A Key to Boring Logs and details of borings shown in Exploration Logs can be found in Appendix B. Boring elevations provided on the logs were determined by aerial mapping collected approximately 6 years ago. Surface elevations are accurate to approximately 2 feet according to NDOT Roadway Design.

Logs of the subsurface conditions, as encountered during the field investigation, were recorded by NDOT Geotechnical Engineering staff. All soil samples were examined and identified in the field in accordance with ASTM D2488. Additional soil classification was subsequently performed on soil samples using the Unified Soil Classification System (USCS) in accordance with ASTM D2487 upon completion of laboratory testing. Where soil tests are not listed in the appropriate column of the Exploration Logs, the USCS symbols and terminology are based solely on visual-manual identification (ASTM D2488) rather than laboratory classification.

Drilling was performed using an NDOT Diedrich D-120 drill rig (Drill Rig Unit #1627) equipped with an automatic hammer. Hollow Stem Continuous Flight Augering (HSA) methods were used to explore all borings. Representative bulk soil samples were obtained from auger cuttings at depths indicated on the Exploration Logs. Drive samples were obtained using both a Standard Penetration Testing (SPT, ASTM D1586) sampler and a California Modified (CMS) sampler at locations noted on the Exploration Logs. The drive samples were advanced using a 140-pound hammer with a drop of 30 inches. The energy transfer from the automatic hammer into the drill string is 72% (SPT energy calibration by Gregg Drilling and Testing, Inc., June 11, 2009) with an approximate energy correction factor of 1.2. Sampler driving resistance (N-value), expressed as blows per one foot of penetration, is presented on the Exploration Logs at the respective depth. The N-value is an indication of the apparent density of coarse-grained soils and the consistency of fine-grained soils. The blow counts presented on the Exploration Logs have not been corrected for hammer efficiency, overburden pressure, rod length, etc.

## LABORATORY ANALYSES

Soil samples were tested at the NDOT Materials and Testing Laboratory in Carson City, Nevada. Soils were classified using the Unified Soil Classification System (USCS) in accordance with ASTM D 2487.

Particle size gradations through No. 200 sieve (NV T 206), Atterberg Limits (AASHTO T 89 and T 90), Resistance Value (R-value, NV T 115), Natural Moisture Content (AASHTO T 265), Unit Weight, Direct Shear (AASHTO T 236), Chlorides (AASHTO T 291 A), Sulfates (AASHTO T 290 B), pH (AASHTO T 289), and Resistivity (AASHTO T 288) tests were completed to assist in sample identification, classification, and evaluation.

Individual laboratory test results for soil samples can be found in Appendix C of this report.

## DISCUSSION AND RECOMMENDATIONS

### Subsurface Conditions

Existing roadway cuts and embankment fill are generally shallow along the cable barrier rail project alignment with most of the project alignment located close to original ground, with intermittent transitions from cuts to fills along the project alignment. Existing roadway embankment fills of approximately up to 10 feet can be expected along the cable barrier project alignment. Existing roadway embankment can be generally classified as dense to very dense silty and clayey sands and gravels with varying amounts of cobbles. Roadway cuts of approximately up to 10 feet exist along the project alignment. Native material in cut sections and below fills can be generally classified as very dense silty and clayey sands and gravels with varying amounts of cobbles, boulders, and caliche.

Based on project files for referenced previous NDOT contracts and laboratory testing for this project, Resistance Values (R-values) of the top 10 feet of native ground range from 50 to 88. The R-value test is used by NDOT to measure subgrade strength and expansion potential, and is used in the design of flexible pavements.

Based on project files for referenced previous NDOT contracts and laboratory testing for this project, chemical analyses indicate that native soils range from noncorrosive to corrosive intermittently along the project alignment. Chemical analyses results performed on samples of native soils obtained from the recent field investigation are included in Appendix C.

Sample B from boring CBP1 was the only relatively undisturbed sample successfully collected during the recent field investigation. Direct shear test results for sample B1 from boring CBP1 indicate a residual angle of internal friction of 30 degrees and cohesion equal to 1.23 psi. This sample is not representative of the granular material found in all other borings during the recent field investigation and in past field investigations. An angle of internal friction on 34 degrees and cohesion equal to zero is recommended for use in foundation design for this project.

**Groundwater**

No ground water was encountered in any of the borings drilled along this project alignment during the subsurface investigation. Groundwater level is estimated to be at 2810 feet above sea level in the Pahrump Valley. [2]

**Frost Depth**

Assume a frost depth of 1 foot for foundation design. [3]

**Excavations** [4]

Native materials underlying the project site can generally be classified as OSHA Class B soils defined as granular cohesionless soils including: angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam. OSHA limits excavation cut slopes in Class B soils to 1H:1V. These limits and soil classifications may change based on the soil conditions exposed during construction. The working area in the median of SR 160 may require the contractor to shore foundation excavations to avoid interfering with the existing roadway pavement. Static and dynamic surcharges should be kept a minimum horizontal distance equal to 50% of the total excavations depth from shored excavation walls. Otherwise, these surcharges shall be accounted for in shoring designs. All excavation work shall conform in accordance with NDOT's 2001 Edition of Standard Specifications for Road and Bridge Construction and current OSHA Excavation Standards.

**Constructability**

Cobbles, boulders, bedrock, and caliche may be encountered during cable barrier rail installation. The contractor should consider the effect that cobbles, boulders, bedrock, and caliche might have on construction operations. Such effects may include, but not be limited to, longer drilling times, more difficult drilling conditions, etc. Specialized equipment or techniques may also be required. The contractor should note that drilled shafts or anchor block foundations must conform to the requirements presented in Section's 502 and 509 of NDOT's 2001 Edition of Standard Specifications for Road and Bridge Construction.

## REFERENCES


1. Longwell, C.R., Pampeyan, E.H., and Bower, Ben, *Geology and Mineral Deposits of Clark County, Nevada*, Bulletin 62, Nevada Bureau of Mines prepared cooperatively by the U.S. Geological Survey. Mackey School of Mines, University of Nevada–Reno, 1965.
2. U.S. Geological Survey, Water Resources Data, Nevada, Water Year 2001. Report NV-01-1, 2002, page 492.
3. Barker, R.M., Duncan, J.M., Rojiani, K.B., Ooi, P.S.K., Tan, C.K., and Kim, S.G., *Manuals for the Design of Bridge Foundations*, Transportation Research Board National Research Council, Washington D.C., December 1991. National Cooperative Highway Research Program Report 343, page 7.
4. OSHA, 29 CFR, Part 1926, Subpart P.
5. NDOT, Contract 890 As-built Construction Plans, 1954.
6. NDOT, Contract 2785 As-built Construction Plans and project files, 1996.
7. NDOT, Contract 2883 As-built Construction Plans and project files, 1998.
8. NDOT, *Geotechnical Policies and Procedures Manual*, 2005.
9. NDOT, *Standard Specifications for Road and Bridge Construction*, 2001.

# APPENDIX A : FIGURES

Location Map

Boring Location Map

Supporting Photographs

## Location Map


PROJECT LIMITS

| STATE | PROJECT NO. | COUNTY | SHEET NO. |
|---|---|---|---|
| NEVADA | SI-0160(023) | CLARK | 1 |

-LEGEND-

⊕ – APPROXIMATE BORING LOCATION

T.22S. R.58E. SEC. 19

T.22S. R.57E. SEC. 24

SCATTERED BRUSH

R/W

200'

E.O.P.

"XE2"

"XE2" 1154+49.54 PC

"XE2"
Δ = 2°17'31"
R = 10000.00'
L = 400.02'
T = 200.04'

SR 160-CL 22.18
B-2222

"XE2" 1158+48.13 P.O.T.

"XE2" 1158+49.56 P.T.=

1/4 Sec. Line

N87°35'57"W 1550.34'

N85°18'26"W 1483.43'

1150

1155

1160

SR 160

CABLE BARRIER RAIL

CBP1

+22.00
24.0' LT.

N85°18'26"W 3264.56'

"X2"

M.P. CL 22

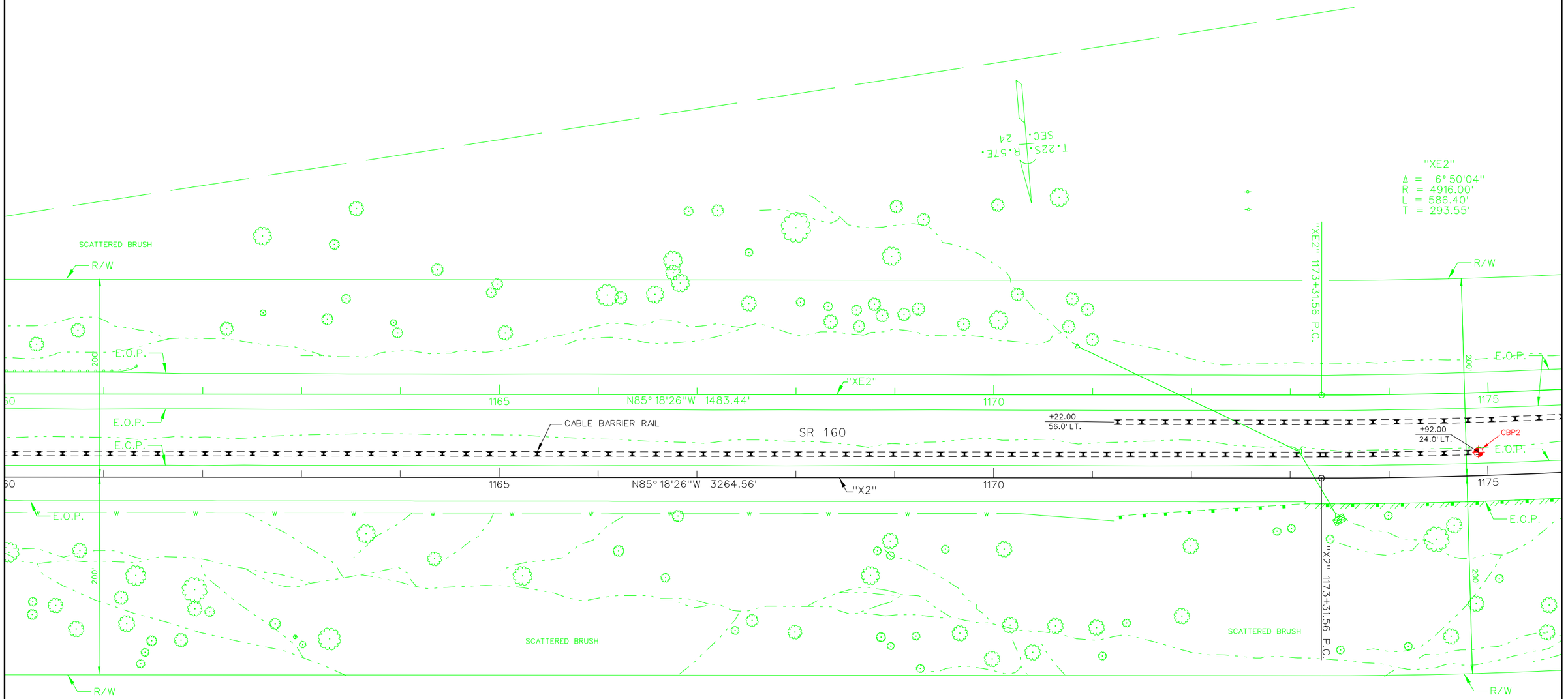
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

# SR 160 PROJECT
# CABLE BARRIER
# BORING LOCATION MAP

| STATE | PROJECT NO. | COUNTY | SHEET NO. |
|---|---|---|---|
| NEVADA | SI-0160(023) | CLARK | 2 |

-LEGEND-

⊕ – APPROXIMATE BORING LOCATION




STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

# SR 160 PROJECT CABLE BARRIER BORING LOCATION MAP

| STATE | PROJECT NO. | COUNTY | SHEET NO. |
|---|---|---|---|
| NEVADA | SI-0160(023) | CLARK | 3 |

-LEGEND-

⊕ – APPROXIMATE BORING LOCATION

T.22S. R.57E. SEC. 24

SR 160-CL 23.14
M-2223

"XE2"
Δ = 12°09'19"
R = 4916.00'
L = 1042.93'
T = 523.43'

"X2"
Δ= 12°09'19"
R=5000.00'
L=1060.75'
T=532.37'

"XE2" 1203+22.81 P.C.

"X2" 1203+22.81 P.C.

R/W

E.O.P.

SCATTERED BRUSH

1190 1195 1200

"XE2"

S87°51'30"W 2394.83'

SR 160

+96.00
25.0' LT.

CBP3

+66.00
56.0' LT.

"X2"

CABLE BARRIER RAIL

36" ABANDON PIPE

M.P. CL 23

200'

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

# SR 160 PROJECT
# CABLE BARRIER
# BORING LOCATION MAP

| STATE | PROJECT NO. | COUNTY | SHEET NO. |
|---|---|---|---|
| NEVADA | SI-0160(023) | CLARK | 4 |

-LEGEND-

– APPROXIMATE BORING LOCATION

T. 22S. R. 57E.

SEC. 22 SEC. 23

SCATTERED BRUSH

R/W

E.O.P.

200'

"XE2"

1265

S61° 08'12"W 9642.59'

1270

1275

CABLE BARRIER RAIL

SR 160

CBP4

+00.00
25.0' LT.

+00.00
25.0' LT.

"X2"

LOVELL CANYON RD.

SCATTERED BRUSH

SCATTERED BRUSH

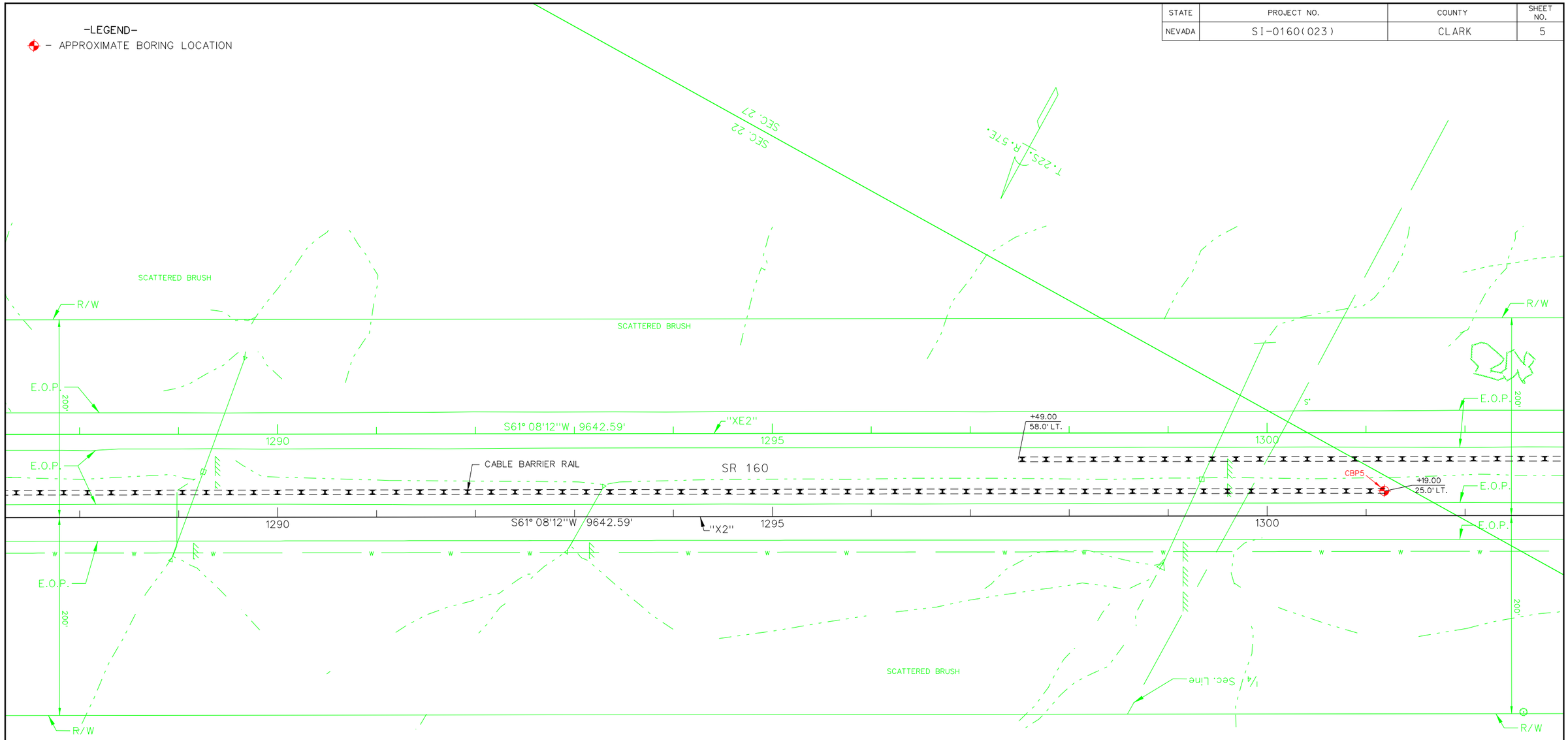
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

# SR 160 PROJECT
# CABLE BARRIER
# BORING LOCATION MAP

| STATE | PROJECT NO. | COUNTY | SHEET NO. |
|---|---|---|---|
| NEVADA | SI-0160(023) | CLARK | 5 |

-LEGEND-

⊕ – APPROXIMATE BORING LOCATION



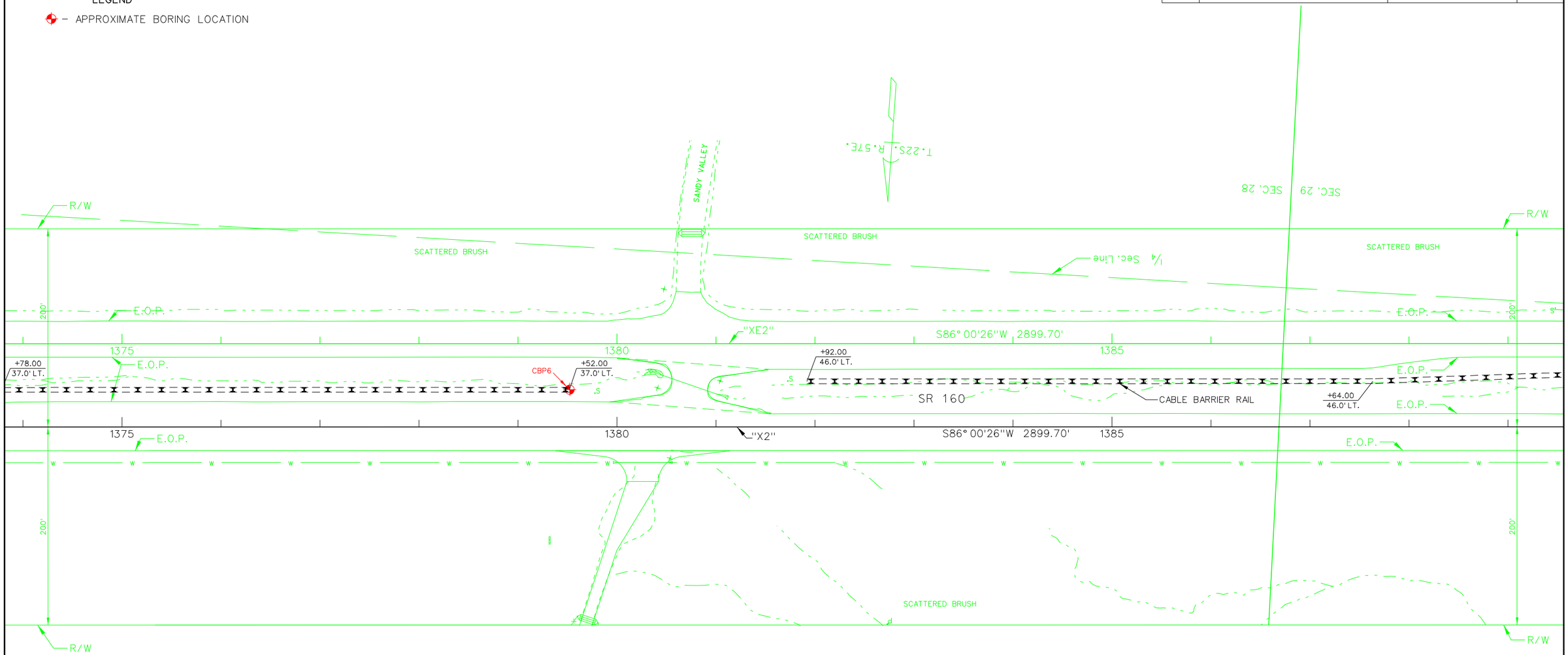

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

# SR 160 PROJECT
# CABLE BARRIER
# BORING LOCATION MAP

| STATE | PROJECT NO. | COUNTY | SHEET NO. |
|---|---|---|---|
| NEVADA | SI-0160(023) | CLARK | 6 |

-LEGEND-

⊕ – APPROXIMATE BORING LOCATION



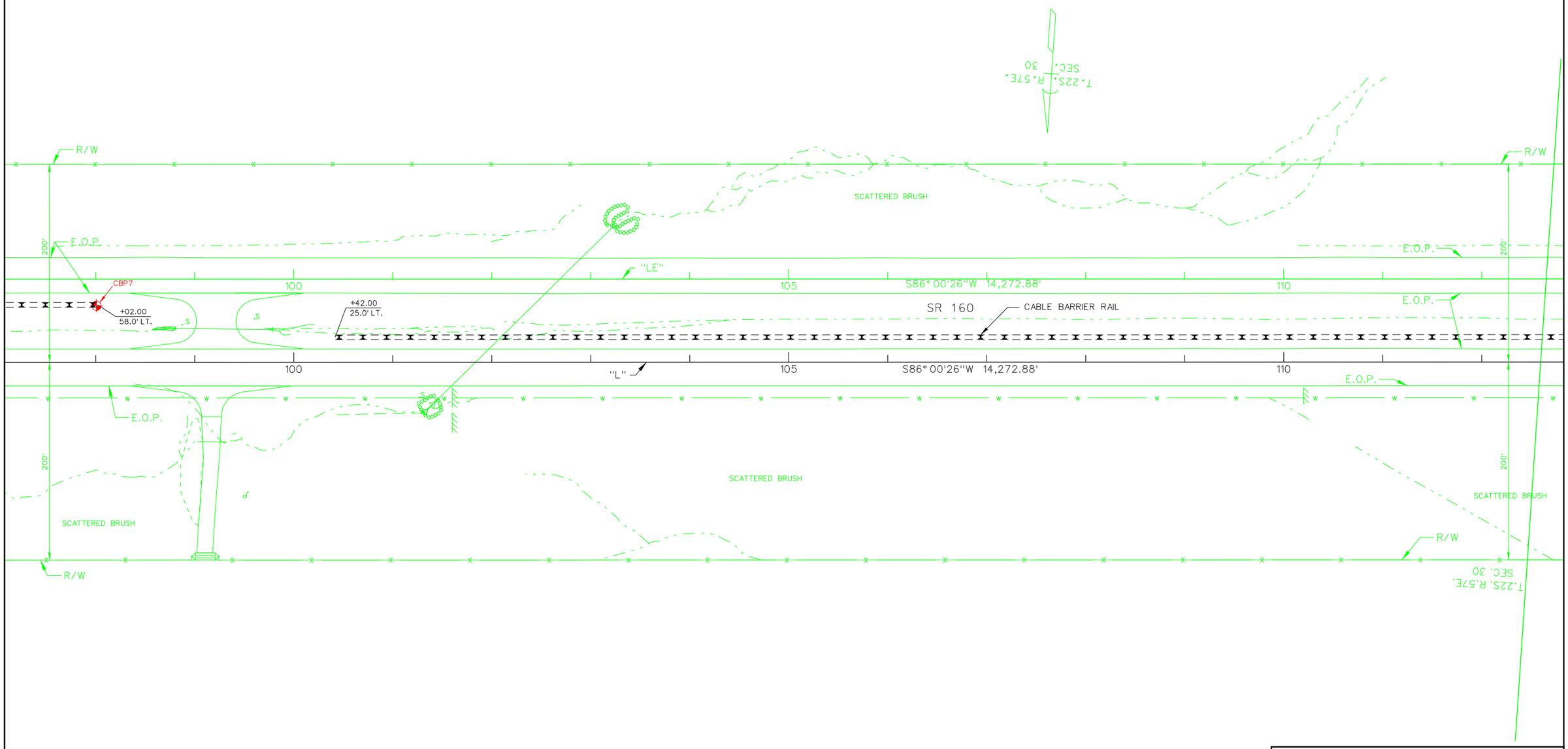

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

# SR 160 PROJECT CABLE BARRIER BORING LOCATION MAP

| STATE | PROJECT NO. | COUNTY | SHEET NO. |
|---|---|---|---|
| NEVADA | SI-0160(023) | CLARK | 7 |

-LEGEND-

– APPROXIMATE BORING LOCATION




STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

# SR 160 PROJECT CABLE BARRIER BORING LOCATION MAP

| STATE | PROJECT NO. | COUNTY | SHEET NO. |
|---|---|---|---|
| NEVADA | SI-0160(023) | CLARK | 8 |

-LEGEND-
- APPROXIMATE BORING LOCATION

SCATTERED BRUSH
R/W
E.O.P.
"LE" 188+54.52 P.T.
1/4 Sec. Line
T.22S. R.56E. SEC. 26
SCATTERED BRUSH
R/W
E.O.P.
200'
185
E.O.P.
"LE"
190
N53° 37'42"W 32,267.06'
195
CABLE BARRIER RAIL
SR 160
CBP8
+03.00
25.0' LT.
E.O.P.
200'
185
E.O.P.
190
"L"
N53° 37'42"W 32,267.06'
195
E.O.P.
SCATTERED BRUSH
M.P. CL 30
"L" 188+54.52 P.O.T.
"L" 187+95.34 P.T.=
EARTHEN BERM
1/4 Sec. Line
200'
SCATTERED BRUSH
EARTHEN BERM
SCATTERED BRUSH
SCATTERED BRUSH
R/W
R/W

| "L" | "LE" |
|---|---|
| Δ = 40° 21'52" | Δ = 40° 21'52" |
| R = 5000.00' | R = 5084.00' |
| L = 3522.46' | L = 3581.64' |
| T = 1837.88' | T = 1868.76' |

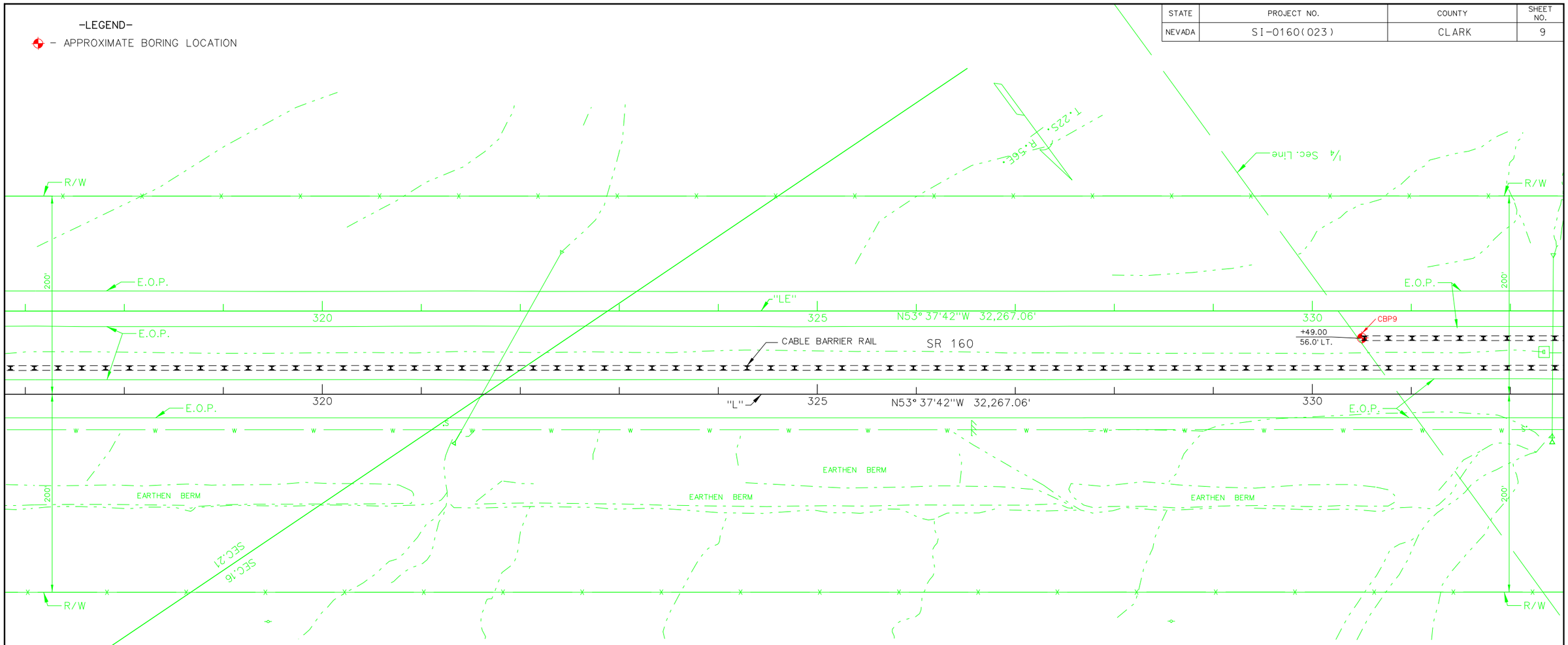
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

# SR 160 PROJECT
# CABLE BARRIER
# BORING LOCATION MAP

| STATE | PROJECT NO. | COUNTY | SHEET NO. |
|---|---|---|---|
| NEVADA | SI-0160(023) | CLARK | 9 |

-LEGEND-

⊕ – APPROXIMATE BORING LOCATION



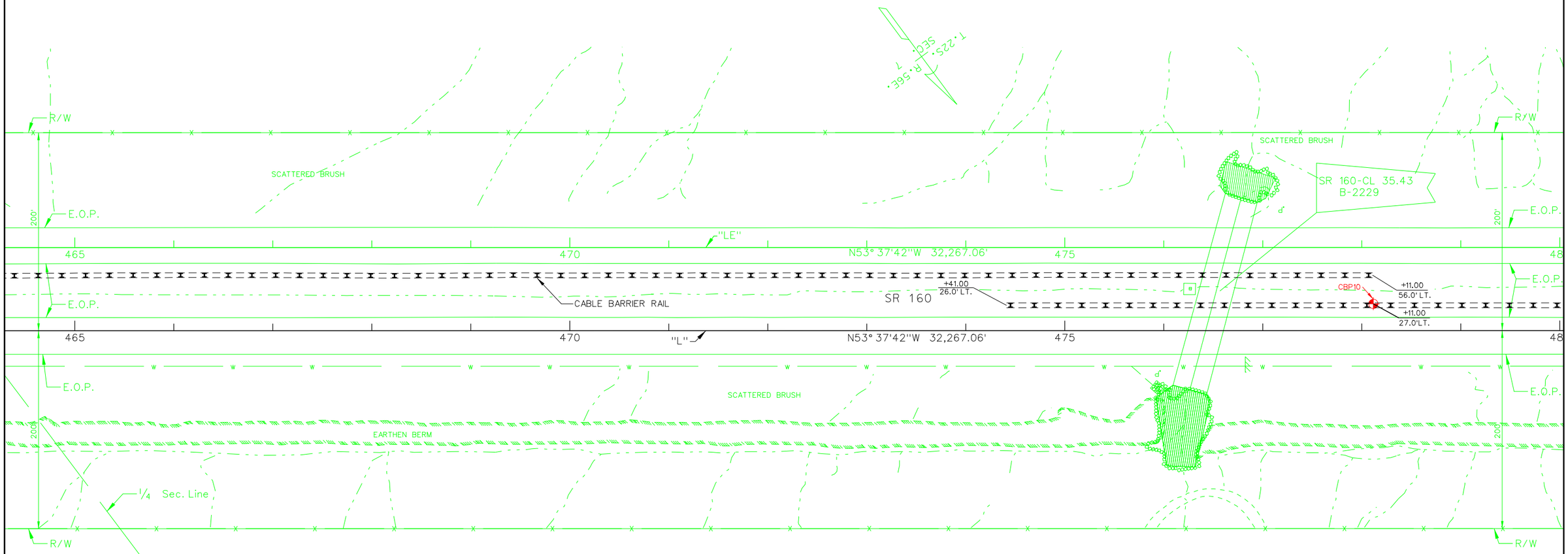

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

# SR 160 PROJECT
# CABLE BARRIER
# BORING LOCATION MAP

| STATE | PROJECT NO. | COUNTY | SHEET NO. |
|---|---|---|---|
| NEVADA | SI-0160(023) | CLARK | 10 |

-LEGEND-

⊕ – APPROXIMATE BORING LOCATION



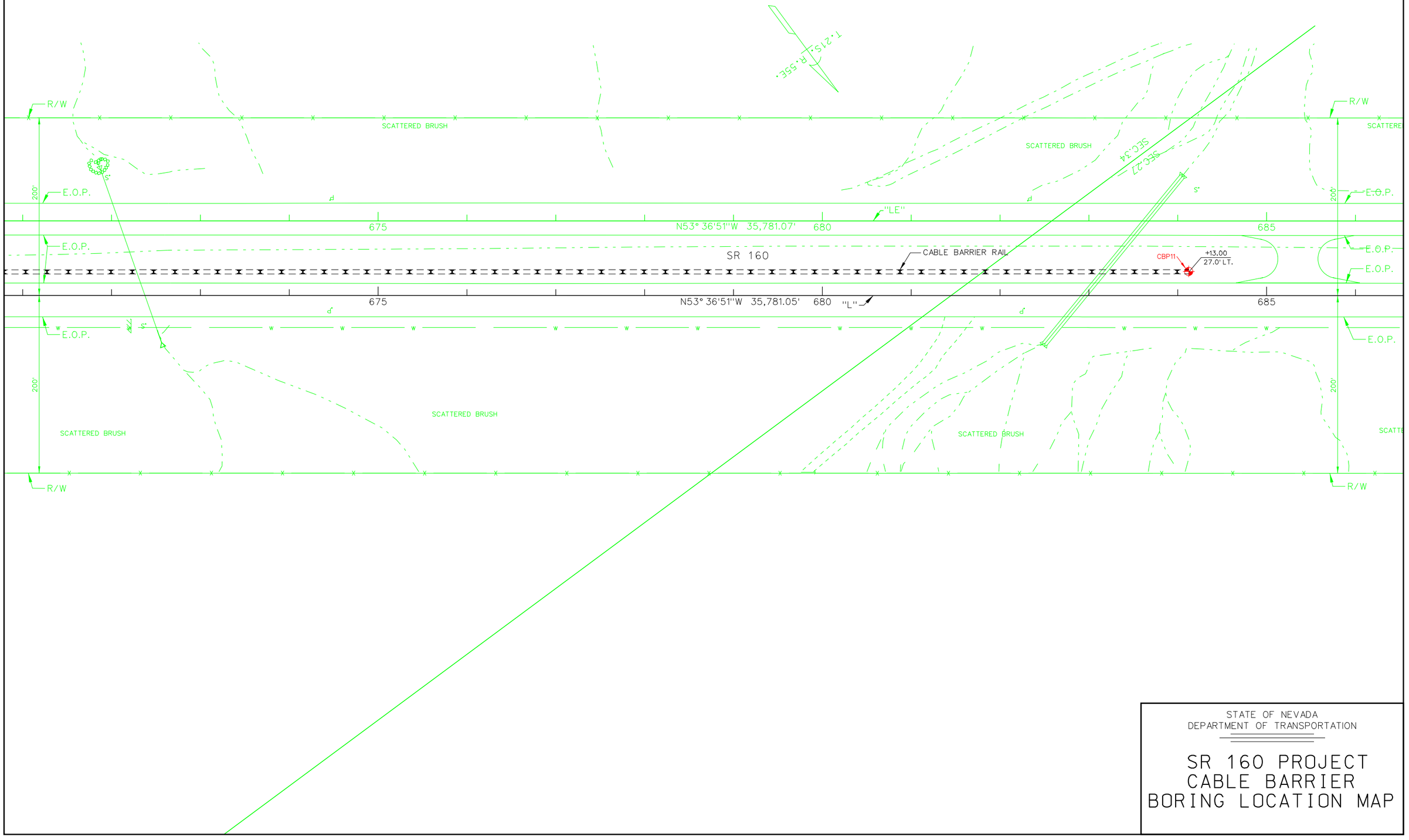

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

# SR 160 PROJECT CABLE BARRIER BORING LOCATION MAP

| STATE | PROJECT NO. | COUNTY | SHEET NO. |
|---|---|---|---|
| NEVADA | SI-0160(023) | CLARK | 11 |

-LEGEND-

⊕ – APPROXIMATE BORING LOCATION



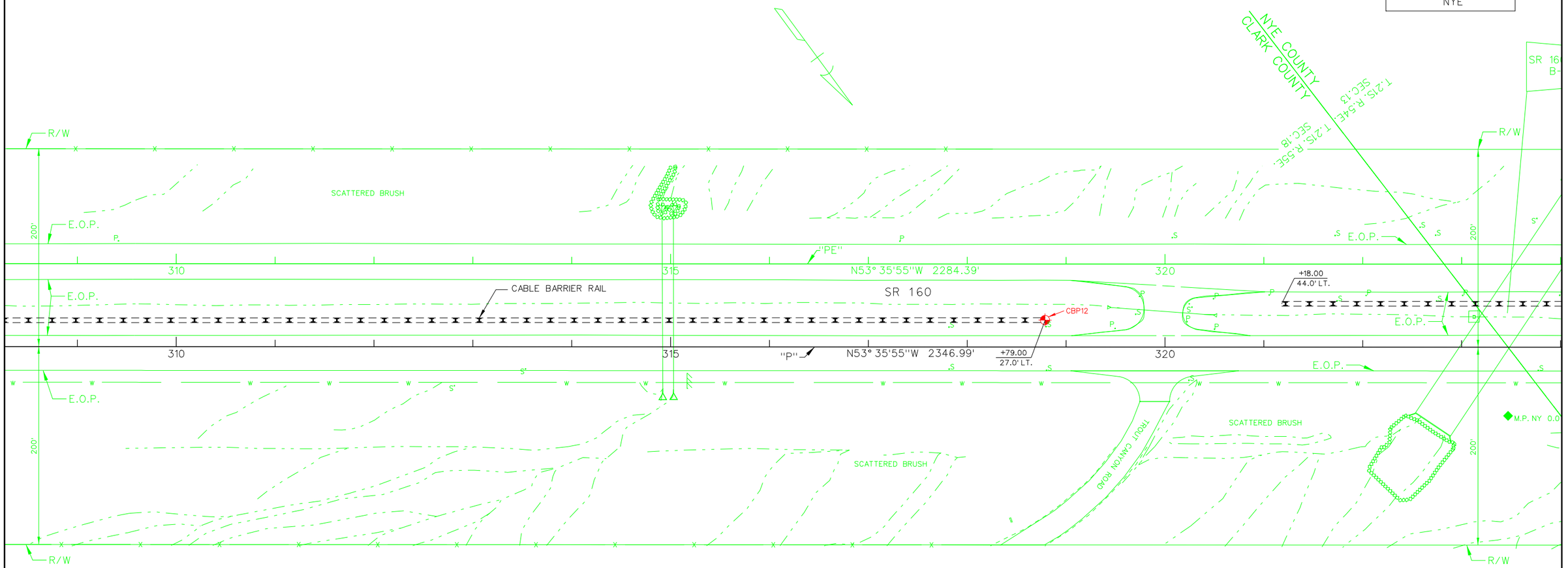

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

# SR 160 PROJECT CABLE BARRIER BORING LOCATION MAP

| STATE | PROJECT NO. | COUNTY | SHEET NO. |
|---|---|---|---|
| NEVADA | SI-0160(023) | CLARK | 12 |
| | | NYE | |

-LEGEND-

◈ – APPROXIMATE BORING LOCATION




STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

# SR 160 PROJECT
# CABLE BARRIER
# BORING LOCATION MAP

# Supporting Photographs


Beginning of project at station “X2” 1140+67 looking east towards Mountain Springs.


Beginning of project at station “X2” 1140+67 at CBP1 looking west along project alignment.


CBP1, SPT Sample A, 2.5’-4.0’ depth.


CBP1, SPT Sample C, 7.5’-8.0’ depth.


CBP1, SPT Sample D, 10.0’-11.5’ depth.


CBP1, SPT Sample E, 12.5’-14.0’ depth.

# Supporting Photographs


CBP1, SPT Sample F, 15.0’-16.5’ depth.


At station “X2” 1170 looking west near CBP2. Note cut on left and fill on right.


Drilling at CBP2.


Cut on left at CBP2.


CBP2, SPT Sample A, 0.5’-1.85’ depth.


CBP2, SPT Sample B, 2.5’-2.85’ depth.

# Supporting Photographs


CBP3, SPT Sample A, 2.5'-4.0' depth.


CBP3, CMS Sample B, 5.0'-5.6' depth.


CBP3, SPT Sample C, 7.5'-9.0' depth.


CBP3, SPT Sample E, 12.5'-12.9' depth.


CBP3, CMS Sample F, 15.0'-16.5' depth.


CBP1, SPT Sample G, 16.5'-17.5' depth.

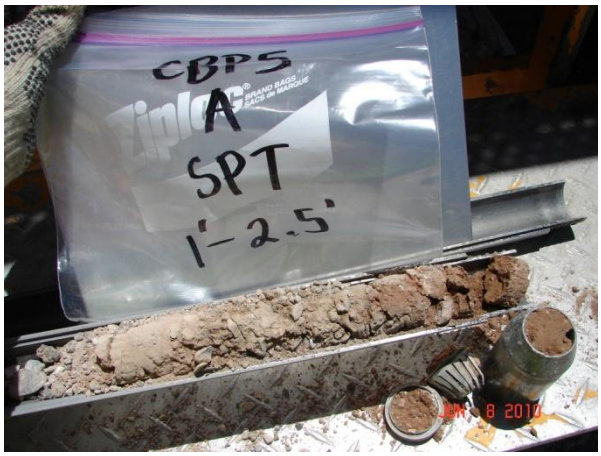
# Supporting Photographs


At station “X2” 1262+00 at CBP4 looking west.


CBP4, SPT Sample A, 2.0’-2.9’ depth.


CBP4, SPT Sample B, 5.0’-6.5’ depth.


CBP4, SPT Sample D, 15.0’-16.5’ depth.




CBP5, SPT Sample A, 1.0’-2.5’ depth.


CBP5, SPT Sample B, 5.0’-6.4’ depth.

# Supporting Photographs


CBP5, SPT Sample C, 7.5’-9.0’ depth.


CBP5, SPT Sample D, 10.0’-11.5’ depth.


CBP5, SPT Sample E, 15.0’-15.4’ depth.

At station “X2” 1301+19 at CBP5 looking north.

Cuttings at CBP5.


CBP6, SPT Sample A, 5.0’-6.5’ depth.

# Supporting Photographs


CBP6, SPT Sample B, 10.0’-11.3’ depth.

At station “X2” 1379+52 at CBP6 looking west.


CBP7, SPT Sample A, 2.5’-2.95’ depth.


CBP7, SPT Sample B, 5.0’-6.5’ depth.

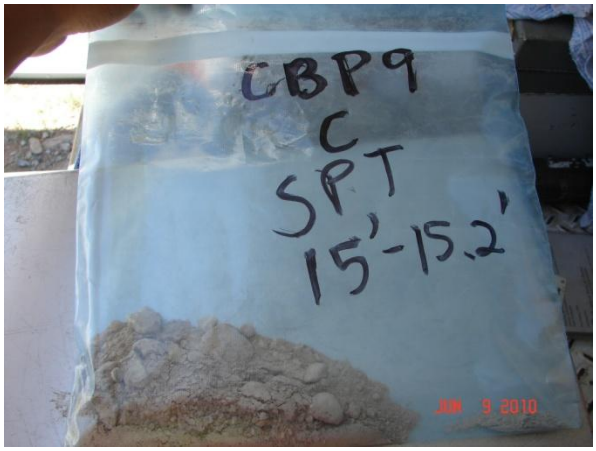

CBP8, SPT Sample A, 2.5’-3.0’ depth.


CBP8, SPT Sample B, 5.0’-6.5’ depth.

# Supporting Photographs


CBP8, SPT Sample C, 10.0'-11.5' depth.


Cuttings at CBP8.




CBP9, SPT Sample C, 15.0'-15.2' depth.


Cuttings at CBP9.


CBP10, SPT Sample A, 5.0'-6.5' depth.


CBP10, SPT Sample B, 7.5'-9.0' depth.

# Supporting Photographs

Drilling at CBP10.


CBP10, SPT Sample C, 10.0'-11.5' depth.


CBP10, SPT Sample D, 12.5'-14.0' depth.


CBP10, SPT Sample E, 15.0'-16.5' depth.


CBP11, SPT Sample B, 5.0'-6.0' depth.


CBP11, SPT Sample E, 15.0'-16.1' depth.

# Supporting Photographs


At station “P” 318+79 at CPB12 looking west towards the end of project.


CBP12, SPT Sample B, 5.0’-6.5’ depth.

# APPENDIX B: SUBSURFACE EXPLORATION DATA

Key to Boring Logs

Exploration Logs

# KEY TO BORING LOGS

| PARTICLE SIZE LIMITS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| CLAY | SILT | SAND | | | GRAVEL | | COBBLES | BOULDERS |
| | | FINE | MEDIUM | COARSE | FINE | COARSE | | |
| .002 mm | | #200 | #40 | #10 | #4 | ¾ inch | 3 inch | 12 inch |

| USCS GROUP | TYPICAL SOIL DESCRIPTION |
|---|---|
| GW | Well graded gravels, gravel-sand mixtures, little or no fines |
| GP | Poorly graded gravels, gravel-sand mixtures, little or no fines |
| GC | Clayey gravels, poorly graded gravel-sand-clay mixtures |
| SW | Well graded sands, gravelly sands, little or no fines |
| SP | Poorly graded sands, gravelly sands, little or no fines |
| SM | Silty sands, poorly graded sand-silt mixtures |
| SC | Clayey sands, poorly graded sand-clay mixtures |
| ML | Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity |
| CL | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays |
| OL | Organic silts and organic silt-clays of low plasticity |
| 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 |
| PT | Peat and other highly organic soils |

**MOISTURE CONDITION CRITERIA**

| Description | Criteria |
|---|---|
| Dry | Absence of moisture, dusty, dry to touch. |
| Moist | Damp, no visible free water. |
| Wet | Visible free water, usually below groundwater table. |
| ∇ ▼ | Groundwater Elevation Symbols |

**SOIL CEMENTATION CRITERIA**

| Description | Criteria |
|---|---|
| Weak | Crumbles or breaks with handling or little finger pressure. |
| Moderate | Crumbles or breaks with considerable finger pressure. |
| Strong | Won't break or crumble w/finger pressure |

| STANDARD PENETRATION CLASSIFICATION* | | | |
|---|---|---|---|
| GRANULAR SOIL | | CLAYEY SOIL | |
| BLOWS/FT | DENSITY | BLOWS/FT | CONSISTENCY |
| 0 - 4 | VERY LOOSE | 0 - 1 | VERY SOFT |
| 5 – 10 | LOOSE | 2 - 4 | SOFT |
| 11 - 30 | MEDIUM DENSE | 5 - 8 | MEDIUM STIFF |
| 31 - 50 | DENSE | 9 - 15 | STIFF |
| OVER 50 | VERY DENSE | 16 - 30 | VERY STIFF |
| | | 31 - 60 | HARD |
| | | OVER 60 | VERY HARD |

*Standard Penetration Test (N) 140 lb hammer 30 inch free fall on 2 inch O.D. x 1.4 inch I.D. sampler.

Field Blow counts on California Modified Sampler ($N_{CMS}$) can be converted to $N_{SPT\ field}$ by:

$(N_{CMS\ field})(0.62) = N_{SPT\ field}$

Blow counts from Automatic Hammer can be converted to Standard SPT $N_{60}$ by:

Rig #1627: $(N_{SPT\ field})(1.2) = N_{60}$

Rig #1082: $(N_{SPT\ field})(1.45) = N_{60}$

**TEST ABBREVIATIONS**

| | | | |
|---|---|---|---|
| CD | CONSOLIDATED DRAINED | O | ORGANIC CONTENT |
| CH | CHEMICAL (CORROSIVENESS) | OC | CONSOLIDATION |
| CM | COMPACTION | PI | PLASTICITY INDEX |
| CU | CONSOLIDATED UNDRAINED | RQD | ROCK QUALITY DESIGNATION |
| D | DISPERSIVE SOILS | RV | R-VALUE |
| DS | DIRECT SHEAR | S | SIEVE ANALYSIS |
| E | EXPANSIVE SOIL | SL | SHRINKAGE LIMIT |
| G | SPECIFIC GRAVITY | U | UNCONFINED COMPRESSION |
| H | HYDROMETER | UU | UNCONSOLIDATED UNDRAINED |
| HC | HYDRO-COLLAPSE | UW | UNIT WEIGHT |
| K | PERMEABILITY | W | MOISTURE CONTENT |

SOIL COLOR DESIGNATIONS ARE FROM THE MUNSELL SOIL/ROCK COLOR CHARTS.

EXAMPLE: (7.5 YR 5/3) BROWN

**SAMPLER NOTATION**

| | |
|---|---|
| CMS | CALIF. MODIFIED SAMPLER[1] |
| CPT | CONE PENETRATION TEST |
| CS | CONTINUOUS SAMPLER[2] |
| PB | PITCHER BARREL |
| RC | ROCK CORE[3] |
| SH | SHELBY TUBE[4] |
| SPT | STANDARD PENETRATION TEST |
| TP | TEST PIT |

1- I.D.= 2.421 inch

2- I.D.=3.228 inch with tube; 3.50 inch w/o tube

3- NXB I.D.= 1.875 inch

4- I.D.= 2.875 inch

Revised August 2010

# EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING



START DATE 6/7/10
END DATE 6/7/10
JOB DESCRIPTION SR160 Cable Barrier Rail
LOCATION SR160 MP CL21.89 to NY0.97
BORING CBP1
E.A. # 73587-1
GROUND ELEV. 5140 +/- (ft)
HAMMER DROP SYSTEM Automatic

| GROUNDWATER LEVEL | | |
|---|---|---|
| DATE | DEPTH ft | ELEV. ft |
| N/A | N/A | 0.0 |
| | | |

STATION "X2" 1150+22
OFFSET 24' LT
ENGINEER Ablahani
EQUIPMENT Diedrich D120, Rig #1627
OPERATOR Ford
DRILLING METHOD 6" Hollow Stem Auger
BACKFILLED Yes DATE 6/7/2010

| ELEV. (ft) | DEPTH (ft) | SAMPLE NO. | SAMPLE TYPE | BLOW COUNT 6 inch Increments | BLOW COUNT Last 1 foot | Percent Recov'd | LAB TESTS | USCS Group | MATERIAL DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | **Silty Sand with Gravel** medium dense, dry to moist, (10 YR 6/2) pale yellowish brown. | Start: 10:00am<br>Finish: 11:45am<br>Sunny and hot.<br><br>100 psi down pressure entire depth.<br>Easy drilling. |
| | 2.50 | | | | | | | SM | | |
| | | A | SPT | 7<br>7<br>10 | 17 | 100 | S, PI, W | | | Approx. 5' of fill. |
| | 4.00 | | | | | | | | | |
| | 5.00 | | | | | | | | 5.00 | |
| 5134.6 | 5 | | | | | | | | **Sandy Silt** stiff, dry to moist, (10YR 6/2) pale yellowish brown. | |
| | | B | CMS | 10<br>9<br>8 | 17 | 100 | S, PI, W, DS | ML | | |
| | 6.50 | | | | | | | | | |
| | | | | | | | | | 7.00 | |
| | 7.50 | | | | | | | | **Silty Sand with Gravel** medium dense to very dense, dry to moist, (10 YR 6/2) pale yellowish brown to brown. | |
| | | C | SPT | 4<br>7<br>5 | 12 | 85 | S, PI, W | | | 5'-10' Bulk 1. |
| | 9.00 | | | | | | | | | |
| | 10.00 | | | | | | | | | |
| 5129.6 | 10 | | | | | | | | | |
| | | D | SPT | 11<br>12<br>10 | 22 | 80 | S, PI, W | | | |
| | 11.50 | | | | | | | | | |
| | | E | SPT | 7<br>7<br>5 | 12 | 80 | S, PI, W | SM | | |
| | 13.00 | | | | | | | | | |
| | 15.00 | | | | | | | | | |
| 5124.6 | 15 | | | | | | | | | |
| | | F | SPT | 53<br>37<br>27 | 64 | 80 | S, PI, W | | | F: Fractured rock at 15.4'-15.6' in sampler. |
| | 16.50 | | | | | | | | 16.50 | |
| | | | | | | | | | **B.O.H.**<br><br>No groundwater encountered.<br><br>Backfilled with cuttings after drilling. | |

NV_DOT CBP.GPJ NV_DOT.GDT 7/28/10

# EXPLORATION LOG



NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

START DATE 6/9/10
END DATE 6/9/10
JOB DESCRIPTION SR160 Cable Barrier Rail
LOCATION SR160 MP CL21.89 to NY0.97
BORING CBP10
E.A. # 73587-1
GROUND ELEV. 3338 +/- (ft)
HAMMER DROP SYSTEM Automatic

| GROUNDWATER LEVEL | | |
|---|---|---|
| DATE | DEPTH ft | ELEV. ft |
| N/A | N/A | 0.0 |
| | | |

STATION "L" 478+11
OFFSET 27' LT
ENGINEER Ablahani
EQUIPMENT Diedrich D120, Rig #1627
OPERATOR White
DRILLING METHOD 6" Hollow Stem Auger
BACKFILLED Yes DATE 6/9/2010

| ELEV. (ft) | DEPTH (ft) | SAMPLE NO. | SAMPLE TYPE | BLOW COUNT 6 inch Increments | BLOW COUNT Last 1 foot | Percent Recov'd | LAB TESTS | USCS Group | MATERIAL DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | **Silty Clayey Gravel with Sand and Cobbles** very dense, dry to moist, (10 YR 5/4) moderate yellowish brown. Mostly cobbles 0-5'. | Start: 2:15pm Finish: 3:30pm Sunny, breezy and hot. Approx. OG, no cut/fill. 100 psi down pressure entire depth. |
| 3332.9 | 5.00 | | | | | | | | | |
| | 5 | A | SPT | 9<br>23<br>48 | 71 | 80 | S, PI, W | | | 5'-10' Bulk 1. |
| | 6.50 | | | | | | | | | |
| | 7.50 | | | | | | | GC<br>GM | | |
| | | B | SPT | 15<br>25<br>26 | 51 | 85 | S, PI, W | | | |
| | 9.00 | | | | | | | | | |
| 3327.9 | 10.00<br>10 | | | | | | | | | |
| | | C | SPT | 30<br>30<br>37 | 67 | 100 | S, PI, W | | | C: Fractured cobble in sampler shoe and at 10.4'-10.7' in sampler. |
| | 11.50 | | | | | | | | | |
| | 12.50 | | | | | | | | | |
| | | D | SPT | 18<br>38<br>53 | 91 | 95 | S, PI, W | | | |
| | 14.00 | | | | | | | | | |
| | | | | | | | | | 14.50 | |
| 3322.9 | 15.00<br>15 | | | | | | | | **Poorly graded Gravel with Silty Clayey Sand** very dense, dry, yellowish brown. | |
| | | E | SPT | 18<br>33<br>56 | 89 | 80 | S, PI, W | GP<br>GC | | |
| | 16.50 | | | | | | | | 16.50 | |
| | | | | | | | | | **B.O.H.** No groundwater encountered. Backfilled with cuttings after drilling. | |

NV_DOT_CBP.GPJ NV_DOT.GDT 7/28/10

# EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING



START DATE 6/10/10
END DATE 6/10/10
JOB DESCRIPTION SR160 Cable Barrier Rail
LOCATION SR160 MP CL21.89 to NY0.97
BORING CBP11
E.A. # 73587-1
GROUND ELEV. 3430 +/- (ft)
HAMMER DROP SYSTEM Automatic

| GROUNDWATER LEVEL | | |
|---|---|---|
| DATE | DEPTH ft | ELEV. ft |
| N/A | N/A | 0.0 |
| | | |

STATION "L" 684+13
OFFSET 27' LT
ENGINEER Ablahani
EQUIPMENT Diedrich D120, Rig #1627
OPERATOR White
DRILLING METHOD 6" Hollow Stem Auger
BACKFILLED Yes DATE 6/10/2010

| ELEV. (ft) | DEPTH (ft) | SAMPLE NO. | SAMPLE TYPE | BLOW COUNT 6 inch Increments | BLOW COUNT Last 1 foot | Percent Recov'd | LAB TESTS | USCS Group | MATERIAL DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | **Well-graded Gravel with Silty Clay, Sand and Cobbles** very dense, dry, yellowish brown. | Start: 8:45am<br>Finish: 10:00am<br>Sunny and hot. |
| | 2.50 | | | | | | | GW GC | | Approx. OG, <1' cut. |
| | | A | SPT | 15<br>23<br>36 | 59 | 80 | S, PI, W | | | 100 psi down pressure unless noted otherwise. |
| | 4.00 | | | | | | | | | |
| | 5.00 | | | | | | | | 4.50 | |
| 3425.3 | 5 | | | | | | | | **Poorly graded Gravel with Silt, Sand, and Cobbles** very dense, dry, yellowish brown. | |
| | | B | SPT | 31<br>68/0.5' | 68/0.5' | 90 | S, PI, W | | | 5'-10' Bulk 1. |
| | 6.00 | | | | | | | | | |
| | 7.50 | | | | | | | | | |
| | 7.80 | C | SPT | 25/0.1' | 25/0.1' | 0 | | | | C: Refusal, 10 blows with no progress. |
| | | | | | | | | GP GM | | 7.5'-10' hard drilling, increased down pressure to 500psi. Possible boulder? |
| 3420.3 | 10 10.00 | | | | | | | | | |
| | | D | SPT | 46<br>55<br>50/0.35' | 50/0.35' | 90 | S, W | | | |
| | 11.35 | | | | | | | | | |
| | | | | | | | | | 13.00 | |
| | | | | | | | | | **Silty Gravel with Sand and Cobbles** very dense, dry, yellowish brown. | |
| | | | | | | | | GM | | |
| 3415.3 | 15 15.00 | | | | | | | | | |
| | | E | SPT | 32<br>22/0.1' | 22/0.1' | 100 | S, W | | | E: Refusal, 10 blows with no progress. |
| | 16.10 | | | | | | | | 16.10 | |
| | | | | | | | | | **B.O.H.**<br>No groundwater encountered.<br>Backfilled with cuttings after drilling. | |

NV_DOT CBP.GPJ NV_DOT.GDT 7/28/10

# EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING



START DATE 6/10/10
END DATE 6/10/10
JOB DESCRIPTION SR160 Cable Barrier Rail
LOCATION SR160 MP CL21.89 to NY0.97
BORING CBP12
E.A. # 73587-1
GROUND ELEV. 3193 +/- (ft)
HAMMER DROP SYSTEM Automatic

| GROUNDWATER LEVEL | | |
|---|---|---|
| DATE | DEPTH ft | ELEV. ft |
| N/A | N/A | 0.0 |
| | | |

STATION "P" 318+79
OFFSET 27' LT
ENGINEER Ablahani
EQUIPMENT Diedrich D120, Rig #1627
OPERATOR White
DRILLING METHOD 6" Hollow Stem Auger
BACKFILLED Yes DATE 6/10/2010

| ELEV. (ft) | DEPTH (ft) | SAMPLE NO. | SAMPLE TYPE | BLOW COUNT 6 inch Increments | BLOW COUNT Last 1 foot | Percent Recov'd | LAB TESTS | USCS Group | MATERIAL DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.00 | | | | | | | | **Clayey Gravel with Sand and Cobbles** very dense, dry, yellowish brown. | Start: 10:30am Finish: 11:30am Sunny and hot. |
| | | A | SPT | 19<br>23<br>55 | 78 | 80 | S, PI, W | GC | | Approx. OG, <1' fill. |
| | 2.50 | | | | | | | | | 100 psi down pressure entire depth. |
| | | | | | | | | | 4.00 | |
| | | | | | | | | | **Silty Clayey Gravel with Sand and Cobbles** very dense, dry, yellowish brown. | |
| 3187.8 | 5.00 | | | | | | | | | |
| | 5 | B | SPT | 24<br>35<br>46 | 81 | 80 | S, PI, W | GC<br>GM | | 5'-10' Bulk 1. |
| | 6.50 | | | | | | | | | |
| | | | | | | | | | 8.00 | |
| | | | | | | | | | **Silty Clayey Sand with Gravel and Cobbles** very dense, dry, yellowish brown. | |
| 3182.8 | 10.00 | | | | | | | | | |
| | 10 | C | SPT | 75/0.5' | 75/0.5' | 100 | PI, W | SC<br>SM | | |
| | 10.50 | | | | | | | | | |
| | | | | | | | | | 12.00 | |
| | | | | | | | | | **Silty Clayey Gravel with Sand and Cobbles** very dense, dry, yellowish brown. | |
| | | | | | | | | GC<br>GM | | |
| 3177.8 | 15.00 | | | | | | | | | |
| | 15 | D | SPT | 28<br>50/0.3' | 50/0.3' | 90 | S, PI, W | | | |
| | 15.80 | | | | | | | | 15.80 | |
| | | | | | | | | | **B.O.H.** | |
| | | | | | | | | | No groundwater encountered. | |
| | | | | | | | | | Backfilled with cuttings after drilling. | |

NV_DOT CBP.GPJ NV_DOT.GDT 7/28/10

# EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING



START DATE 6/7/10
END DATE 6/7/10
JOB DESCRIPTION SR160 Cable Barrier Rail
LOCATION SR160 MP CL21.89 to NY0.97
BORING CBP2
E.A. # 73587-1
GROUND ELEV. 5022 +/- (ft)
HAMMER DROP SYSTEM Automatic

| GROUNDWATER LEVEL | | |
|---|---|---|
| DATE | DEPTH ft | ELEV. ft |
| N/A | N/A | 0.0 |
| | | |

STATION "X2" 1174+92
OFFSET 24' LT
ENGINEER Ablahani
EQUIPMENT Diedrich D120, Rig #1627
OPERATOR White
DRILLING METHOD 6" Hollow Stem Auger
BACKFILLED Yes DATE 6/7/2010

| ELEV. (ft) | DEPTH (ft) | SAMPLE NO. | SAMPLE TYPE | BLOW COUNT 6 inch Increments | BLOW COUNT Last 1 foot | Percent Recov'd | LAB TESTS | USCS Group | MATERIAL DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.50 | | | | | | | GP GM | **Poorly graded Gravel with Silt, Sand, and Cobbles** very dense, dry, (10 YR 6/2) pale yellowish brown, with cobbles. | Start: 12:30pm<br>Finish: 3:00pm<br>Sunny and hot.<br>Approx. OG, no cut/fill.<br>100 psi down pressure unless noted otherwise.<br>0-4' grinding/ slow drilling. |
| | | A | SPT | 13<br>19 | 50/0.35' | 75 | S, PI, W | | | |
| | 1.85 | | | 50/0.35' | | | | | | |
| | 2.50 | | | | | | | | | |
| | 2.85 | B | SPT | 50/0.35' | 50/0.35' | 170 | S, W | | | |
| | | | | | | | | | 4.00 | |
| 5017.3 | 5 | | | | | | | SM | **Silty Sand with Gravel and Cobbles/Boulders** very dense, dry, (10 YR 6/2) pale yellowish brown. | A: Fractured rock in sampler shoe. Refusal possibly due to cobble. |
| | 5.50 | | | | | | | | | |
| | 5.80 | C | SPT | 35/0.3' | 35/0.3' | 100 | PI, W | | | B: 0.3' Slough in sample.<br>4'-5.5', 400 psi down pressure. Hard drilling, possibly boulder.<br>C: Refusal, 10 blows with no progress. Fractured rock in shoe.<br>5'-10' Bulk 1.<br>5.5'-13', 100 psi down pressure. Hard drilling, possibly cobbles/boulders. |
| | | | | | | | | | | |
| | 10.00 | | | | | | | | | |
| 5012.3 | 10 | | | | | | | | | |
| | 10.30 | D | SPT | 13/0.3' | 13/0.3' | 100 | S, W | | | D: Refusal, 10 blows with no progress. Rod not plumb, out about 10 degrees. |
| | | | | | | | | | 13.00 | |
| | | | | | | | | | **B.O.H.**<br><br>No groundwater encountered.<br><br>Backfilled with cuttings after drilling. | At 13' increased down pressure to 400 psi, could not penetrate, possibly caliche. |
| 5007.3 | 15 | | | | | | | | | |

NV_DOT CBP.GPJ NV_DOT.GDT 7/28/10

# EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING



START DATE 6/8/10
END DATE 6/8/10
JOB DESCRIPTION SR160 Cable Barrier Rail
LOCATION SR160 MP CL21.89 to NY0.97
BORING CBP3
E.A. # 73587-1
GROUND ELEV. 4946 +/- (ft)
HAMMER DROP SYSTEM Automatic

| GROUNDWATER LEVEL | | |
|---|---|---|
| DATE | DEPTH ft | ELEV. ft |
| N/A | N/A | 0.0 |
| | | |

STATION "X2" 1192+96
OFFSET 25' LT
ENGINEER Ablahani
EQUIPMENT Diedrich D120, Rig #1627
OPERATOR Ford
DRILLING METHOD 6" Hollow Stem Auger
BACKFILLED Yes DATE 6/8/2010

| ELEV. (ft) | DEPTH (ft) | SAMPLE NO. | SAMPLE TYPE | BLOW COUNT 6 inch Increments | BLOW COUNT Last 1 foot | Percent Recov'd | LAB TESTS | USCS Group | MATERIAL DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | **Silty Sand with Gravel** dense, dry to moist, (10 YR 5/4) moderate yellowish brown. | Start: 8:30am<br>Finish: 10:20am<br>Partly cloudy and hot. |
| | 2.50 | | | | | | | **SM** | | 100 psi down pressure unless noted otherwise. |
| | | A | SPT | 10<br>9<br>14 | 23 | 85 | S, PI, W | | | Approx. 4.5' fill. |
| | 4.00 | | | | | | | | | |
| | 5.00 | | | | | | | | 4.50 | |
| 4941.1 | 5 | | | | | | | | **Poorly graded Gravel with Silt and Sand** very dense, dry to moist, (10 YR 5/4) moderate yellowish brown. | |
| | 5.60 | B | CMS | 29 | 17/0.1' | 115 | S, PI, W | | | B: Refusal, 10 blows with no progress. |
| | | | | 17/0.1' | | | | **GP GM** | | 5'-10' Bulk 1. |
| | 7.50 | | | | | | | | 7.00 | |
| | | | | | | | | | **Silty Clayey Sand with Gravel** very dense, moist, (10 YR 8/2) very pale orange. | |
| | | C | SPT | 11<br>14<br>36 | 50 | 100 | S, PI, W | | | 7'-8.5' 200 psi down pressure. |
| | 9.00 | | | | | | | | | |
| | 10.00 | | | | | | | | | |
| 4936.1 | 10 | | | | | | | | | |
| | 10.40 | D | CMS | 50/0.4' | 50/0.4' | 100 | S, PI, W | **SC SM** | | |
| | 12.50 | | | | | | | | | |
| | 12.90 | E | SPT | 50/0.4' | 50/0.4' | 100 | S, W | | | |
| | | | | | | | | | 14.00 | |
| | | | | | | | | | **Poorly graded Sand with Silty Clay and Gravel** very dense, moist, (10 YR 5/4) moderate yellowish brown. | |
| | 15.00 | | | | | | | | | |
| 4931.1 | 15 | | | | | | | **SP SC** | | |
| | | F | CMS | 24<br>32<br>48 | 80 | 100 | S, PI, W | | | |
| | 16.50 | | | | | | | | 16.50 | |
| | | G | SPT | 21<br>50/0.5' | 50/0.5' | 100 | S, PI, W | **SC SM** | **Silty Clayey Sand with Gravel** very dense, moist, (10 YR 5/4) moderate yellowish brown. | G: Refusal on cobble. Fractured rock in sampler shoe. |
| | 17.50 | | | | | | | | 17.50 | |
| | | | | | | | | | **B.O.H.**<br>No groundwater encountered.<br>Backfilled with cuttings after drilling. | |

NV_DOT CBP.GPJ NV_DOT.GDT 7/28/10

# EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING



START DATE 6/8/10
END DATE 6/8/10
JOB DESCRIPTION SR160 Cable Barrier Rail
LOCATION SR160 MP CL21.89 to NY0.97
BORING CBP4
E.A. # 73587-1
GROUND ELEV. 4669 +/- (ft)
HAMMER DROP SYSTEM Automatic

| GROUNDWATER LEVEL | | |
|---|---|---|
| DATE | DEPTH ft | ELEV. ft |
| N/A | N/A | 0.0 |
| | | |

STATION "X2" 1262+00
OFFSET 25' LT
ENGINEER Ablahani
EQUIPMENT Diedrich D120, Rig #1627
OPERATOR White
DRILLING METHOD 6" Hollow Stem Auger
BACKFILLED Yes DATE 6/8/2010

| ELEV. (ft) | DEPTH (ft) | SAMPLE NO. | SAMPLE TYPE | BLOW COUNT 6 inch Increments | BLOW COUNT Last 1 foot | Percent Recov'd | LAB TESTS | USCS Group | MATERIAL DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | **Silty Clayey Sand with Gravel and Cobbles** very dense, dry to moist, (10 YR 5/4) moderate yellowish brown. | Start: 11:00am<br>Finish: 12:15pm<br>Mostly sunny and hot.<br>Approx. <1' cut.<br>100 psi down pressure entire depth. |
| | 2.00 | | | | | | | SC SM | | |
| | 2.90 | A | SPT | 14<br>50/0.4' | 50/0.4' | 110 | S, PI, W | | | 0-4' mostly cobbles.<br>A: Fractured rock in sampler shoe. Refusal possibly due to cobble. |
| | | | | | | | | | 4.00 | |
| | 5.00 | | | | | | | | **Well-graded Sand with Silt and Gravel** very dense, dry to moist, (10 YR 5/4) moderate yellowish brown. | |
| 4663.5 | 5 | | | | | | | | | |
| | | B | SPT | 24<br>45<br>43 | 88 | 100 | S, PI, W | SW SM | | 5'-10' Bulk 1. |
| | 6.50 | | | | | | | | | |
| | | | | | | | | | 8.00 | |
| | | | | | | | | | **Silty Sand with Gravel** very dense, dry to moist, (10 YR 5/4) moderate yellowish brown. | |
| | 10.00 | | | | | | | | | |
| 4658.5 | 10 | | | | | | | SM | | |
| | 10.50 | C | SPT | 54/0.5' | 54/0.5' | 100 | S, W | | | |
| | | | | | | | | | 12.00 | |
| | | | | | | | | | **Poorly graded Gravel with Silt and Sand** very dense, dry to moist, (10 YR 5/4) moderate yellowish brown. | |
| | 15.00 | | | | | | | SP SM | | |
| 4653.5 | 15 | | | | | | | | | |
| | | D | SPT | 33<br>40<br>59 | 99 | 100 | S, PI, W | | | |
| | 16.50 | | | | | | | | 16.50 | |
| | | | | | | | | | **B.O.H.**<br><br>No groundwater encountered.<br><br>Backfilled with cuttings after drilling. | |

NV_DOT_CBP.GPJ NV_DOT.GDT 7/28/10

# EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING



START DATE 6/8/10
END DATE 6/8/10
JOB DESCRIPTION SR160 Cable Barrier Rail
LOCATION SR160 MP CL21.89 to NY0.97
BORING CBP5
E.A. # 73587-1
GROUND ELEV. 4558 +/- (ft)
HAMMER DROP SYSTEM Automatic

| GROUNDWATER LEVEL | | |
|---|---|---|
| DATE | DEPTH ft | ELEV. ft |
| N/A | N/A | 0.0 |
| | | |

STATION "X2" 1301+19
OFFSET 25' LT
ENGINEER Ablahani
EQUIPMENT Diedrich D120, Rig #1627
OPERATOR Ford
DRILLING METHOD 6" Hollow Stem Auger
BACKFILLED Yes DATE 6/8/2010

| ELEV. (ft) | DEPTH (ft) | SAMPLE NO. | SAMPLE TYPE | BLOW COUNT 6 inch Increments | BLOW COUNT Last 1 foot | Percent Recov'd | LAB TESTS | USCS Group | MATERIAL DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.00 | | | | | | | | **Silty Clayey Sand with Gravel** dense to very dense, dry to moist, (5 YR 4/4) moderate brown. | Start: 12:40pm<br>Finish: 2:00pm<br>Mostly sunny and hot. |
| | 2.50 | A | SPT | 12<br>14<br>11 | 25 | 85 | S, PI, W | | | Approx. OG, <1' fill. |
| | 5.00 | | | | | | | **SC**<br>**SM** | | 100 psi down pressure entire depth. |
| 4553.2 | 5 | | | | | | | | | |
| | 6.40 | B | SPT | 9<br>11<br>50/.4 | 50/.4 | 100 | S, PI, W | | | B: Refusal, possibly due to cobble. |
| | 7.50 | | | | | | | | 7.00 | |
| | 9.00 | C | SPT | 33<br>43<br>53 | 96 | 105 | S, PI, W | **GC**<br>**GM** | **Silty Clayey Gravel with Sand** very dense, dry to moist, reddish brown. | 5'-10' Bulk 1. |
| | 10.00 | | | | | | | | 9.50 | |
| 4548.2 | 10 | | | | | | | | | |
| | 11.50 | D | SPT | 26<br>30<br>49 | 79 | 105 | S, PI, W | **SC**<br>**SM** | **Silty Clayey Sand with Gravel** very dense, dry to moist, reddish brown. | |
| | 15.00 | | | | | | | | 12.00 | |
| 4543.2 | 15 | | | | | | | **GC**<br>**GM** | **Silty Clayey Gravel with Sand** very dense, dry to moist, reddish brown. | |
| | 15.40 | E | SPT | 50/0.4' | 50/0.4' | 100 | S, W | | 15.40 | E: Refusal possibly due to cobble/boulder. |
| | | | | | | | | | **B.O.H.**<br>No groundwater encountered.<br>Backfilled with cuttings after drilling. | |

NV_DOT CBP.GPJ NV_DOT.GDT 7/28/10

# EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING



START DATE 6/8/10
END DATE 6/8/10
JOB DESCRIPTION SR160 Cable Barrier Rail
LOCATION SR160 MP CL21.89 to NY0.97
BORING CBP6
E.A. # 73587-1
GROUND ELEV. 4287 +/- (ft)
HAMMER DROP SYSTEM Automatic

| GROUNDWATER LEVEL | | |
|---|---|---|
| DATE | DEPTH ft | ELEV. ft |
| N/A | N/A | 0.0 |
| | | |

STATION "X2" 1379+52
OFFSET 37' LT
ENGINEER Ablahani
EQUIPMENT Diedrich D120, Rig #1627
OPERATOR Ford
DRILLING METHOD 6" Hollow Stem Auger
BACKFILLED Yes DATE 6/8/2010

| ELEV. (ft) | DEPTH (ft) | SAMPLE NO. | SAMPLE TYPE | BLOW COUNT 6 inch Increments | BLOW COUNT Last 1 foot | Percent Recov'd | LAB TESTS | USCS Group | MATERIAL DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | **Poorly graded Sand with Silt, Gravel, and Cobbles** very dense, dry, yellowish brown. | Start: 2:30pm<br>Finish: 3:30pm<br>Sunny, breezy and hot.<br><br>Approx. OG, <1' cut.<br><br>100 psi down pressure entire depth. |
| 4281.8 | 5 5.00 | | | | | | | | | |
| | | A | SPT | 23<br>36<br>53 | 89 | 95 | S, PI, W | | | 5'-10' Bulk 1. |
| | 6.50 | | | | | | | | | |
| | | | | | | | | **SP**<br>**SM** | | |
| 4276.8 | 10 10.00 | | | | | | | | | |
| | | B | SPT | 16<br>37<br>56 | 93 | 85 | S, PI, W | | | |
| | 11.30 | | | | | | | | | |
| 4271.8 | 15 15.00 | | | | | | | | | |
| | 15.40 | C | SPT | 50/0.4' | 50/0.4' | 100 | S, W | | 15.40 | C: Refusal possibly due to cobble. |
| | | | | | | | | | **B.O.H.**<br><br>No groundwater encountered.<br><br>Backfilled with cuttings after drilling. | |

NV_DOT CBP.GPJ NV_DOT.GDT 7/28/10

# EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING



START DATE 6/9/10
END DATE 6/9/10
JOB DESCRIPTION SR160 Cable Barrier Rail
LOCATION SR160 MP CL21.89 to NY0.97
BORING CBP7
E.A. # 73587-1
GROUND ELEV. 3978 +/- (ft)
HAMMER DROP SYSTEM Automatic

| GROUNDWATER LEVEL | | |
|---|---|---|
| DATE | DEPTH ft | ELEV. ft |
| N/A | N/A | 0.0 |
| | | |

STATION "L" 98+02
OFFSET 58' LT
ENGINEER Ablahani
EQUIPMENT Diedrich D120, Rig #1627
OPERATOR White
DRILLING METHOD 6" Hollow Stem Auger
BACKFILLED Yes DATE 6/9/2010

| ELEV. (ft) | DEPTH (ft) | SAMPLE NO. | SAMPLE TYPE | BLOW COUNT 6 inch Increments | BLOW COUNT Last 1 foot | Percent Recov'd | LAB TESTS | USCS Group | MATERIAL DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | **Poorly graded Sand with Silty Clay, Gravel and Cobbles** very dense, dry to moist, (10YR 5/4) moderate yellowish brown. | Start: 8:30am<br>Finish: 9:40am<br>Sunny, breezy and hot. |
| | 2.50 | | | | | | | SP SC | | 100 psi down pressure entire depth. |
| | 2.95 | A | SPT | 25/0.45' | 25/0.45' | 110 | PI, W | | | Easy drilling. |
| | | | | | | | | | | Approx. 4' fill. |
| | | | | | | | | | 4.00 | |
| | 5.00 | | | | | | | | **Poorly graded Gravel with Silt, Sand and Cobbles** very dense, dry to moist, (10YR 5/4) moderate yellowish brown. | |
| 3972.5 | 5 | | | | | | | | | |
| | | B | SPT | 20<br>33<br>48 | 81 | 100 | S, PI, W | GP GM | | 5'-10' Bulk 1. |
| | 6.50 | | | | | | | | | |
| | 7.50 | | | | | | | | | |
| | 7.70 | C | SPT | 20/0.2' | 20/0.2' | 50 | | | | C: Refusal, 10 blows with no progress. |
| | | | | | | | | | 8.00 | |
| | | | | | | | | | **Poorly graded Sand with Silt, Gravel and Cobbles** very dense, dry to moist, (10YR 5/4) moderate yellowish brown. | |
| | 10.00 | | | | | | | | | |
| 3967.5 | 10 | | | | | | | | | |
| | 10.35 | D | SPT | 50/0.35' | 50/0.35' | 115 | S, W | | | |
| | | | | | | | | SP SM | | |
| | 15.00 | | | | | | | | | |
| 3962.5 | 15 | | | | | | | | | |
| | 15.30 | E | SPT | 31/0.3' | 31/0.3' | 35 | | | 15.30 | E: Refusal, fractured rock chunks in sample. |
| | | | | | | | | | **B.O.H.** | |
| | | | | | | | | | No groundwater encountered. | |
| | | | | | | | | | Backfilled with cuttings after drilling. | |

NV_DOT CBP.GPJ NV_DOT.GDT 7/28/10

# EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING



START DATE 6/9/10
END DATE 6/9/10
JOB DESCRIPTION SR160 Cable Barrier Rail
LOCATION SR160 MP CL21.89 to NY0.97
BORING CBP8
E.A. # 73587-1
GROUND ELEV. 3780 +/- (ft)
HAMMER DROP SYSTEM Automatic

| GROUNDWATER LEVEL | | |
|---|---|---|
| DATE | DEPTH ft | ELEV. ft |
| N/A | N/A | 0.0 |
| | | |

STATION "L" 198+03
OFFSET 25' LT
ENGINEER Ablahani
EQUIPMENT Diedrich D120, Rig #1627
OPERATOR White
DRILLING METHOD 6" Hollow Stem Auger
BACKFILLED Yes DATE 6/9/2010

| ELEV. (ft) | DEPTH (ft) | SAMPLE NO. | SAMPLE TYPE | BLOW COUNT 6 inch Increments | BLOW COUNT Last 1 foot | Percent Recov'd | LAB TESTS | USCS Group | MATERIAL DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | **Silty Clayey Gravel with Sand and Cobbles** very dense, dry, (10 YR 5/4) moderate yellowish brown. | Start: 10:30am<br>Finish: 11:30am<br>Sunny, breezy and hot.<br>100 psi down pressure entire depth. |
| | | | | | | | | **GC GM** | | |
| | 2.50 | | | | | | | | | Approx. 3' fill. |
| | 3.00 | A | SPT | 62/0.5' | 62/0.5' | 120 | S, PI, W | | 3.00 | |
| | | | | | | | | | **Silty Gravel with Sand and Caliche** very dense, dry, (10 YR 5/4) moderate yellowish brown. | 3'-7' chunks of moderately to strongly cemented caliche in cuttings. |
| | 5.00 | | | | | | | | | |
| 3775.4 | 5 | | | | | | | **GM** | | |
| | | B | SPT | 15<br>20<br>22 | 42 | 95 | S, PI, W | | | B: 1" thick strongly cemented caliche in sampler shoe. |
| | 6.50 | | | | | | | | | |
| | | | | | | | | | 7.00 | |
| | | | | | | | | | **Well-graded Sand with Silt, Gravel and Cobbles** very dense, dry, (10 YR 5/4) moderate yellowish brown. | 5'-10' Bulk 1. |
| | | | | | | | | **SW SM** | | |
| | 10.00 | | | | | | | | | |
| 3770.4 | 10 | | | | | | | | | |
| | | C | SPT | 45<br>54<br>37 | 91 | 80 | S, PI, W | | | C:10.8'-11.1' fractured cobble in sampler. |
| | 11.50 | | | | | | | | | |
| | | | | | | | | | 12.00 | |
| | | | | | | | | | **Silty Gravel with Sand and Cobbles** very dense, dry, (10 YR 5/4) moderate yellowish brown. | |
| | | | | | | | | **GM** | | |
| | 15.00 | | | | | | | | | |
| 3765.4 | 15 | | | | | | | | | |
| | 15.40 | D | SPT | 50/0.4' | 50/0.4' | 100 | S, W | | 15.40 | |
| | | | | | | | | | **B.O.H.**<br><br>No groundwater encountered.<br><br>Backfilled with cuttings after drilling. | |

NV_DOT CBP.GPJ NV_DOT.GDT 7/28/10

# EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING



START DATE 6/9/10
END DATE 6/9/10
JOB DESCRIPTION SR160 Cable Barrier Rail
LOCATION SR160 MP CL21.89 to NY0.97
BORING CBP9
E.A. # 73587-1
GROUND ELEV. 3586 +/- (ft)
HAMMER DROP SYSTEM Automatic

| GROUNDWATER LEVEL | | |
|---|---|---|
| DATE | DEPTH ft | ELEV. ft |
| N/A | N/A | 0.0 |
| | | |

STATION "L" 330+49
OFFSET 56' LT
ENGINEER Ablahani
EQUIPMENT Diedrich D120, Rig #1627
OPERATOR White
DRILLING METHOD 6" Hollow Stem Auger
BACKFILLED Yes DATE 6/9/2010

| ELEV. (ft) | DEPTH (ft) | SAMPLE NO. | SAMPLE TYPE | BLOW COUNT 6 inch Increments | BLOW COUNT Last 1 foot | Percent Recov'd | LAB TESTS | USCS Group | MATERIAL DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | GC | **Clayey Gravel with Sand and Cobbles** very dense, dry, yellowish brown. | Start: 12:15pm<br>Finish: 1:15pm<br>Sunny, breezy and hot.<br><br>Approx. OG, <1' fill.<br><br>100 psi down pressure entire depth.<br>Easy drilling. |
| 3581.1 | 5 5.00 | A | SPT | 50/0.4' | 50/0.4' | 100 | S, PI, W | | | 5'-10' Bulk 1. |
| | 5.40 | | | | | | | | 9.00 | |
| | | | | | | | | SM | **Silty Sand** very dense, dry, pale yellowish brown. | |
| 3576.1 | 10 10.00<br>10.10 | B | SPT | 19/0.1' | 19/0.1' | 100 | PI, W | | | B: Refusal, 10 blows with no progress.<br>Possibly caliche? |
| 3571.1 | 15 15.00<br>15.15 | C | SPT | 33/0.15' | 33/0.15' | 100 | S, W | | 15.20 | C: Refusal, 10 blows with no progress.<br>Possibly caliche? |
| | | | | | | | | | **B.O.H.**<br><br>No groundwater encountered.<br><br>Backfilled with cuttings after drilling. | |

NV_DOT CBP.GPJ NV_DOT.GDT 7/28/10

# APPENDIX C: LABORATORY TEST RESULTS

Summary of Results

Particle Size Distribution Reports

Chemical Analysis Table

Direct Shear Test Report

# SUMMARY OF RESULTS
# N.D.O.T. GEOTECHNICAL SECTION

**EA/Cont #** 73587 **Job Description** SR 160 Cable Barrier Rail

**Boring No.** CBP 1 **Elevation (ft)** 5140 +/- **Station** "X" 1150 + 22 **Date** 06/07/2010

| SAMPLE NO. | SAMPLE DEPTH (ft) | SAMP-LER TYPE | N BLOWS per ft. | SOIL GROUP | W% | DRY UW pcf | % PASS #200 | LL % | PL % | PI % | STRENGTH TEST | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | TEST TYPE | Φ deg. | C psi | Φ deg. | C psi | |
| | | | | | | | | | | | | Peak | | Residual | | |
| A | 2.5 - 4.0 | SPT | 17 | SM | 9.3 | | 25.5 | 23 | NP | NP | | | | | | |
| B1 | 5.3 - 5.8 | CMS | 17 | ML | 21.0 | 79.9 | 81.1 | 26 | 24 | 2 | DS | 33 | 1.1 | 30 | 1.2 | |
| B2 | 5.8 - 6.5 | CMS | | ML | 18.8 | | 70.1 | 24 | 22 | 2 | | | | | | |
| C | 7.5 - 9.0 | SPT | 12 | SM | 8.7 | | 23.9 | 21 | NP | NP | | | | | | |
| D | 10.0 - 11.5 | SPT | 22 | SM | 4.4 | | 13.1 | 18 | NP | NP | | | | | | |
| E | 12.5 - 14.0 | SPT | 12 | SM | 10.1 | | 27.0 | 18 | NP | NP | | | | | | |
| F | 15.0 - 16.5 | SPT | 64 | SM | 2.9 | | 14.8 | 16 | NP | NP | | | | | | |
| BULK 1 | 5.0 - 10.0 | | | SM | | | 34.8 | 21 | NP | NP | | | | | | Ch, RV = 80 |
| | | | | | | | | | | | | | | | | |
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CMS = California Modified Sampler 2.42" ID
SPT = Standard Penetration 1.38" ID
CS = Continuous Sample 3.23" ID
RC = Rock Core
PB = Pitcher Barrel
CSS = Calif. Split Spoon 2.42" ID
CPT = Cone Penetration Test
TP = Test Pit
P = Pushed, not driven
R = Refusal
Sh = Shelby Tube 2.87" ID

U = Unconfined Compressive
UU = Unconsolidated Undrained
CD = Consolidated Drained
CU = Consolidated Undrained
DS = Direct Shear
Φ = Friction
C = Cohesion
N = No. of blows per ft., sampler

N = Field SPT N = $(N_{css})(0.62)$

H = Hydrometer
S = Sieve
G = Specific Gravity
PI = Plasticity Index
LL = Liquid Limit
PL = Plastic Limit
NP = Non-Plastic
OC = Consolidation
Ch = Chemical
RV = R - Value
MD = Moisture Density

CM = Compaction
E = Swell/Pressure on Expansive Soils
SL = Shrinkage Limit
UW= Unit Weight
W = Moisture Content
K = Permeability
O = Organic Content
D = Dispersive
RQD = Rock Quality Designation
X = X-Ray Defraction
HCpot = Hydro-Collapse Potential

*** = Average of subsamples**

# SUMMARY OF RESULTS
# N.D.O.T. GEOTECHNICAL SECTION

**EA/Cont #** 73587 **Job Description** SR 160 Cable Barrier Rail

**Boring No.** CBP 2 **Elevation (ft)** 5022 +/- **Station** "X2" 1174 + 92 **Date** 06/07/2010

| SAMPLE NO. | SAMPLE DEPTH (ft) | SAMP-LER TYPE | N BLOWS per ft. | SOIL GROUP | W% | DRY UW pcf | % PASS #200 | LL % | PL % | PI % | STRENGTH TEST | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | TEST TYPE | Φ deg. | C psi | Φ deg. | C psi | |
| | | | | | | | | | | | | Peak | | Residual | | |
| A | 0.5 - 1.9 | SPT | R | GP-GM | 1.8 | | 10.7 | 19 | 18 | 1 | | | | | | |
| B | 2.5 - 2.9 | SPT | R | | 2.7 | | 19.0 | | | | | | | | | |
| C | 5.5 - 5.8 | SPT | R | | 3.1 | | | 18 | 15 | 3 | | | | | | |
| D | 10.0 - 10.3 | SPT | R | | 2.1 | | 29.3 | | | | | | | | | |
| BULK 1 | 5.0 - 10.0 | | | SM | | | 21.0 | 18 | 15 | 3 | | | | | | RV = 75 |
| | | | | | | | | | | | | | | | | |
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CMS = California Modified Sampler 2.42" ID
SPT = Standard Penetration 1.38" ID
CS = Continuous Sample 3.23" ID
RC = Rock Core
PB = Pitcher Barrel
CSS = Calif. Split Spoon 2.42" ID
CPT = Cone Penetration Test
TP = Test Pit
P = Pushed, not driven
R = Refusal
Sh = Shelby Tube 2.87" ID

U = Unconfined Compressive
UU = Unconsolidated Undrained
CD = Consolidated Drained
CU = Consolidated Undrained
DS = Direct Shear
Φ = Friction
C = Cohesion
N = No. of blows per ft., sampler

N = Field SPT $N = (N_{css})(0.62)$

H = Hydrometer
S = Sieve
G = Specific Gravity
PI = Plasticity Index
LL = Liquid Limit
PL = Plastic Limit
NP = Non-Plastic
OC = Consolidation
Ch = Chemical
RV = R - Value
MD = Moisture Density

CM = Compaction
E = Swell/Pressure on Expansive Soils
SL = Shrinkage Limit
UW= Unit Weight
W = Moisture Content
K = Permeability
O = Organic Content
D = Dispersive
RQD = Rock Quality Designation
X = X-Ray Defraction
HCpot = Hydro-Collapse Potential

*** = Average of subsamples**

# SUMMARY OF RESULTS
# N.D.O.T. GEOTECHNICAL SECTION

**EA/Cont #** 73587 **Job Description** SR 160 Cable Barrier Rail

**Boring No.** CBP 3 **Elevation (ft)** 4946 +/- **Station** "X2" 1192 + 96 **Date** 06/08/2010

| SAMPLE NO. | SAMPLE DEPTH (ft) | SAMP-LER TYPE | N BLOWS per ft. | SOIL GROUP | W% | DRY UW pcf | % PASS #200 | LL % | PL % | PI % | STRENGTH TEST | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | TEST TYPE | Φ deg. | C psi | Φ deg. | C psi | |
| | | | | | | | | | | | | Peak | | Residual | | |
| A | 2.5 - 4.0 | SPT | 23 | SM | 5.1 | | 17.2 | 19 | 18 | 1 | | | | | | |
| B | 5.0 - 5.6 | CMS | R | GP-GM | 3.5 | | 10.3 | 22 | 19 | 3 | | | | | | |
| C | 7.5 - 9.0 | SPT | 50 | SC-SM | 11.2 | | 37.0 | 29 | 22 | 7 | | | | | | |
| D | 10.0 - 10.4 | CMS | R | SC-SM | 5.9 | | 25.7 | 22 | 17 | 5 | | | | | | |
| E | 12.5 - 12.9 | SPT | R | | 3.7 | | 20.8 | | | | | | | | | |
| F | 15.0 - 16.5 | CMS | 80 | SP-SC | 3.8 | | 11.5 | 21 | 16 | 5 | | | | | | |
| G | 16.5 - 17.5 | SPT | R | SC-SM | 4.7 | | 14.2 | 24 | 17 | 7 | | | | | | |
| BULK 1 | 5.0 - 10.0 | | | GC-GM | | | 15.4 | 20 | 15 | 5 | | | | | | RV = 65 |
| | | | | | | | | | | | | | | | | |
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CMS = California Modified Sampler 2.42" ID
SPT = Standard Penetration 1.38" ID
CS = Continuous Sample 3.23" ID
RC = Rock Core
PB = Pitcher Barrel
CSS = Calif. Split Spoon 2.42" ID
CPT = Cone Penetration Test
TP = Test Pit
P = Pushed, not driven
R = Refusal
Sh = Shelby Tube 2.87" ID

U = Unconfined Compressive
UU = Unconsolidated Undrained
CD = Consolidated Drained
CU = Consolidated Undrained
DS = Direct Shear
Φ = Friction
C = Cohesion
N = No. of blows per ft., sampler

N = Field SPT $N = (N_{css})(0.62)$

H = Hydrometer
S = Sieve
G = Specific Gravity
PI = Plasticity Index
LL = Liquid Limit
PL = Plastic Limit
NP = Non-Plastic
OC = Consolidation
Ch = Chemical
RV = R - Value
MD = Moisture Density

CM = Compaction
E = Swell/Pressure on Expansive Soils
SL = Shrinkage Limit
UW= Unit Weight
W = Moisture Content
K = Permeability
O = Organic Content
D = Dispersive
RQD = Rock Quality Designation
X = X-Ray Defraction
HCpot = Hydro-Collapse Potential

*** = Average of subsamples**

# SUMMARY OF RESULTS
# N.D.O.T. GEOTECHNICAL SECTION

**EA/Cont #** 73587 **Job Description** SR 160 Cable Barrier Rail

**Boring No.** CBP 4 **Elevation (ft)** 4669 +/- **Station** "X2" 1262 + 00 **Date** 06/08/2010

| SAMPLE NO. | SAMPLE DEPTH (ft) | SAMP-LER TYPE | N BLOWS per ft. | SOIL GROUP | W% | DRY UW pcf | % PASS #200 | LL % | PL % | PI % | STRENGTH TEST | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | TEST TYPE | Φ deg. | C psi | Φ deg. | C psi | |
| | | | | | | | | | | | | Peak | | Residual | | |
| A | 2.0 - 2.9 | SPT | R | SC-SM | 6.8 | | 18.2 | 25 | 20 | 5 | | | | | | |
| B | 5.0 - 6.5 | SPT | 88 | SW-SM | 2.7 | | 8.9 | 15 | NP | NP | | | | | | |
| C | 10.0 - 10.5 | SPT | R | | 2.7 | | 14.0 | | | | | | | | | |
| D | 15.0 - 16.5 | SPT | 99 | SP-SM | 3.2 | | 11.5 | 16 | 14 | 2 | | | | | | |
| BULK 1 | 5.0 - 10.0 | | | GP-GM | | | 9.4 | 19 | 17 | 2 | | | | | | RV = 77 |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
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CMS = California Modified Sampler 2.42" ID
SPT = Standard Penetration 1.38" ID
CS = Continuous Sample 3.23" ID
RC = Rock Core
PB = Pitcher Barrel
CSS = Calif. Split Spoon 2.42" ID
CPT = Cone Penetration Test
TP = Test Pit
P = Pushed, not driven
R = Refusal
Sh = Shelby Tube 2.87" ID

U = Unconfined Compressive
UU = Unconsolidated Undrained
CD = Consolidated Drained
CU = Consolidated Undrained
DS = Direct Shear
Φ = Friction
C = Cohesion
N = No. of blows per ft., sampler

N = Field SPT $N = (N_{css})(0.62)$

H = Hydrometer
S = Sieve
G = Specific Gravity
PI = Plasticity Index
LL = Liquid Limit
PL = Plastic Limit
NP = Non-Plastic
OC = Consolidation
Ch = Chemical
RV = R - Value
MD = Moisture Density

CM = Compaction
E = Swell/Pressure on Expansive Soils
SL = Shrinkage Limit
UW= Unit Weight
W = Moisture Content
K = Permeability
O = Organic Content
D = Dispersive
RQD = Rock Quality Designation
X = X-Ray Defraction
HCpot = Hydro-Collapse Potential

*** = Average of subsamples**

# SUMMARY OF RESULTS
# N.D.O.T. GEOTECHNICAL SECTION

**EA/Cont #** 73587 **Job Description** SR 160 Cable Barrier Rail

**Boring No.** CBP 5 **Elevation (ft)** 4558 +/- **Station** "X2" 1301 + 19 **Date** 06/08/2010

| SAMPLE NO. | SAMPLE DEPTH (ft) | SAMP-LER TYPE | N BLOWS per ft. | SOIL GROUP | W% | DRY UW pcf | % PASS #200 | LL % | PL % | PI % | STRENGTH TEST | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | TEST TYPE | Φ deg. | C psi | Φ deg. | C psi | |
| | | | | | | | | | | | | Peak | | Residual | | |
| A | 1.0 - 2.5 | SPT | 25 | SC-SM | 4.9 | | 27.8 | 24 | 18 | 6 | | | | | | |
| B | 5.0 - 6.5 | SPT | R | SC-SM | 13.0 | | 36.6 | 28 | 22 | 6 | | | | | | |
| C | 7.5 - 9.0 | SPT | 96 | GC-GM | 5.6 | | 26.3 | 21 | 16 | 5 | | | | | | |
| D | 10.0 - 11.5 | SPT | 79 | SC-SM | 7.1 | | 30.8 | 26 | 21 | 5 | | | | | | |
| E | 15.0 - 15.4 | SPT | R | | 3.1 | | 14.6 | | | | | | | | | |
| BULK 1 | 5.0 - 10.0 | | | GC | | | 28.8 | 25 | 17 | 8 | | | | | | Ch, RV = 53 |
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CMS = California Modified Sampler 2.42" ID
SPT = Standard Penetration 1.38" ID
CS = Continuous Sample 3.23" ID
RC = Rock Core
PB = Pitcher Barrel
CSS = Calif. Split Spoon 2.42" ID
CPT = Cone Penetration Test
TP = Test Pit
P = Pushed, not driven
R = Refusal
Sh = Shelby Tube 2.87" ID

U = Unconfined Compressive
UU = Unconsolidated Undrained
CD = Consolidated Drained
CU = Consolidated Undrained
DS = Direct Shear
Φ = Friction
C = Cohesion
N = No. of blows per ft., sampler

N = Field SPT N = $(N_{css})(0.62)$

H = Hydrometer
S = Sieve
G = Specific Gravity
PI = Plasticity Index
LL = Liquid Limit
PL = Plastic Limit
NP = Non-Plastic
OC = Consolidation
Ch = Chemical
RV = R - Value
MD = Moisture Density

CM = Compaction
E = Swell/Pressure on Expansive Soils
SL = Shrinkage Limit
UW= Unit Weight
W = Moisture Content
K = Permeability
O = Organic Content
D = Dispersive
RQD = Rock Quality Designation
X = X-Ray Defraction
HCpot = Hydro-Collapse Potential

*** = Average of subsamples**

# SUMMARY OF RESULTS
# N.D.O.T. GEOTECHNICAL SECTION

**EA/Cont #** 73587 **Job Description** SR 160 Cable Barrier Rail

**Boring No.** CBP 6 **Elevation (ft)** 4287 +/- **Station** "X2" 1379 + 52 **Date** 06/08/2010

| SAMPLE NO. | SAMPLE DEPTH (ft) | SAMP-LER TYPE | N BLOWS per ft. | SOIL GROUP | W% | DRY UW pcf | % PASS #200 | LL % | PL % | PI % | STRENGTH TEST | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | TEST TYPE | Φ deg. | C psi | Φ deg. | C psi | |
| | | | | | | | | | | | | Peak | | Residual | | |
| A | 5.0 - 6.5 | SPT | 89 | SP-SM | 3.6 | | 9.7 | 19 | 16 | 3 | | | | | | |
| B | 10.0 - 11.5 | SPT | 93 | SP-SM | 3.2 | | 8.0 | 15 | NP | NP | | | | | | |
| C | 15.0 - 15.4 | SPT | R | | 2.2 | | 12.7 | | | | | | | | | |
| BULK 1 | 5.0 - 10.0 | | | GP-GM | | | 8.7 | 19 | 16 | 3 | | | | | | RV = 81 |
| | | | | | | | | | | | | | | | | |
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CMS = California Modified Sampler 2.42" ID
SPT = Standard Penetration 1.38" ID
CS = Continuous Sample 3.23" ID
RC = Rock Core
PB = Pitcher Barrel
CSS = Calif. Split Spoon 2.42" ID
CPT = Cone Penetration Test
TP = Test Pit
P = Pushed, not driven
R = Refusal
Sh = Shelby Tube 2.87" ID

U = Unconfined Compressive
UU = Unconsolidated Undrained
CD = Consolidated Drained
CU = Consolidated Undrained
DS = Direct Shear
Φ = Friction
C = Cohesion
N = No. of blows per ft., sampler

N = Field SPT N = $(N_{css})(0.62)$

H = Hydrometer
S = Sieve
G = Specific Gravity
PI = Plasticity Index
LL = Liquid Limit
PL = Plastic Limit
NP = Non-Plastic
OC = Consolidation
Ch = Chemical
RV = R - Value
MD = Moisture Density

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E = Swell/Pressure on Expansive Soils
SL = Shrinkage Limit
UW= Unit Weight
W = Moisture Content
K = Permeability
O = Organic Content
D = Dispersive
RQD = Rock Quality Designation
X = X-Ray Defraction
HCpot = Hydro-Collapse Potential

*** = Average of subsamples**

# SUMMARY OF RESULTS
# N.D.O.T. GEOTECHNICAL SECTION

**EA/Cont #** 73587 **Job Description** SR 160 Cable Barrier Rail

**Boring No.** CBP 7 **Elevation (ft)** 3978 +/- **Station** "L" 98 + 02 **Date** 06/09/2010

| SAMPLE NO. | SAMPLE DEPTH (ft) | SAMP-LER TYPE | N BLOWS per ft. | SOIL GROUP | W% | DRY UW pcf | % PASS #200 | LL % | PL % | PI % | STRENGTH TEST | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | TEST TYPE | Φ deg. | C psi | Φ deg. | C psi | |
| | | | | | | | | | | | | Peak | | Residual | | |
| A | 2.0 - 3.0 | SPT | R | | 7.3 | | | 25 | 19 | 6 | | | | | | |
| B | 5.0 - 6.5 | SPT | 81 | GP-GM | 3.0 | | 10.9 | 23 | 21 | 2 | | | | | | |
| C | 7.5 - 7.7 | SPT | R | | | | | | | | | | | | | 0.1' recovered, no tests |
| D | 10.0 - 10.4 | SPT | R | | 1.9 | | 11.0 | | | | | | | | | |
| E | 15.0 - 15.3 | SPT | R | | | | | | | | | | | | | 0.1' recovered, no tests |
| BULK 1 | 5.0 - 10.0 | | | GP-GC | | | 10.6 | 22 | 16 | 6 | | | | | | RV = 75 |
| | | | | | | | | | | | | | | | | |
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CMS = California Modified Sampler 2.42" ID
SPT = Standard Penetration 1.38" ID
CS = Continuous Sample 3.23" ID
RC = Rock Core
PB = Pitcher Barrel
CSS = Calif. Split Spoon 2.42" ID
CPT = Cone Penetration Test
TP = Test Pit
P = Pushed, not driven
R = Refusal
Sh = Shelby Tube 2.87" ID

U = Unconfined Compressive
UU = Unconsolidated Undrained
CD = Consolidated Drained
CU = Consolidated Undrained
DS = Direct Shear
Φ = Friction
C = Cohesion
N = No. of blows per ft., sampler

N = Field SPT N = $(N_{css})(0.62)$

H = Hydrometer
S = Sieve
G = Specific Gravity
PI = Plasticity Index
LL = Liquid Limit
PL = Plastic Limit
NP = Non-Plastic
OC = Consolidation
Ch = Chemical
RV = R - Value
MD = Moisture Density

CM = Compaction
E = Swell/Pressure on Expansive Soils
SL = Shrinkage Limit
UW= Unit Weight
W = Moisture Content
K = Permeability
O = Organic Content
D = Dispersive
RQD = Rock Quality Designation
X = X-Ray Defraction
HCpot = Hydro-Collapse Potential

*** = Average of subsamples**

# SUMMARY OF RESULTS
# N.D.O.T. GEOTECHNICAL SECTION

**EA/Cont #** 73587 **Job Description** SR 160 Cable Barrier Rail

**Boring No.** CBP 8 **Elevation (ft)** 3780 +/- **Station** "L" 198 + 03 **Date** 06/09/2010

| SAMPLE NO. | SAMPLE DEPTH (ft) | SAMP-LER TYPE | N BLOWS per ft. | SOIL GROUP | W% | DRY UW pcf | % PASS #200 | LL % | PL % | PI % | STRENGTH TEST | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | TEST TYPE | Φ deg. | C psi | Φ deg. | C psi | |
| | | | | | | | | | | | | Peak | | Residual | | |
| A | 2.5 - 3.0 | SPT | R | GC-GM | 8.5 | | 19.7 | 28 | 22 | 6 | | | | | | |
| B | 5.0 - 6.5 | SPT | 42 | GM | 6.3 | | 12.9 | 46 | 32 | 14 | | | | | | |
| C | 10.0 - 11.5 | SPT | 91 | SW-SM | 1.5 | | 9.5 | 15 | 14 | 1 | | | | | | |
| D | 15.0 - 15.4 | SPT | R | | 1.9 | | 15.4 | | | | | | | | | |
| BULK 1 | 5.0 - 10.0 | | | GM | | | 14.5 | 44 | 29 | 15 | | | | | | RV = 68 |
| | | | | | | | | | | | | | | | | |
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CMS = California Modified Sampler 2.42" ID
SPT = Standard Penetration 1.38" ID
CS = Continuous Sample 3.23" ID
RC = Rock Core
PB = Pitcher Barrel
CSS = Calif. Split Spoon 2.42" ID
CPT = Cone Penetration Test
TP = Test Pit
P = Pushed, not driven
R = Refusal
Sh = Shelby Tube 2.87" ID

U = Unconfined Compressive
UU = Unconsolidated Undrained
CD = Consolidated Drained
CU = Consolidated Undrained
DS = Direct Shear
Φ = Fri Φ = Friction
C = Cohesion
N = No. of blows per ft., sampler

N = Field SPT N = $(N_{css})(0.62)$

H = Hydrometer
S = Sieve
G = Specific Gravity
PI = Plasticity Index
LL = Liquid Limit
PL = Plastic Limit
NP = Non-Plastic
OC = Consolidation
Ch = Chemical
RV = R - Value
MD = Moisture Density

CM = Compaction
E = Swell/Pressure on Expansive Soils
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D = Dispersive
RQD = Rock Quality Designation
X = X-Ray Defraction
HCpot = Hydro-Collapse Potential

*** = Average of subsamples**

# SUMMARY OF RESULTS
# N.D.O.T. GEOTECHNICAL SECTION

**EA/Cont #** 73587 **Job Description** SR 160 Cable Barrier Rail.

**Boring No.** CBP 9 **Elevation (ft)** 3586 +/- **Station** "L" 330 + 49 **Date** 06/09/2010

| SAMPLE NO. | SAMPLE DEPTH (ft) | SAMP-LER TYPE | N BLOWS per ft. | SOIL GROUP | W% | DRY UW pcf | % PASS #200 | LL % | PL % | PI % | STRENGTH TEST | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | TEST TYPE | Φ deg. | C psi | Φ deg. | C psi | |
| | | | | | | | | | | | | Peak | | Residual | | |
| A | 5.0 - 5.4 | SPT | R | GC | 3.2 | | 18.9 | 34 | 22 | 12 | | | | | | |
| B | 10.0 - 10.1 | SPT | R | | 1.8 | | | 18 | NP | NP | | | | | | |
| C | 15.0 - 15.2 | SPT | R | | 0.8 | | 23.9 | | | | | | | | | |
| BULK 1 | 5.0 - 10.0 | | | GC-GM | | | 17.4 | 25 | 18 | 7 | | | | | | Ch, RV = 50 |
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CMS = California Modified Sampler 2.42" ID
SPT = Standard Penetration 1.38" ID
CS = Continuous Sample 3.23" ID
RC = Rock Core
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CSS = Calif. Split Spoon 2.42" ID
CPT = Cone Penetration Test
TP = Test Pit
P = Pushed, not driven
R = Refusal
Sh = Shelby Tube 2.87" ID

U = Unconfined Compressive
UU = Unconsolidated Undrained
CD = Consolidated Drained
CU = Consolidated Undrained
DS = Direct Shear
Φ = Friction
C = Cohesion
N = No. of blows per ft., sampler

N = Field SPT N = $(N_{css})(0.62)$

H = Hydrometer
S = Sieve
G = Specific Gravity
PI = Plasticity Index
LL = Liquid Limit
PL = Plastic Limit
NP = Non-Plastic
OC = Consolidation
Ch = Chemical
RV = R - Value
MD = Moisture Density

CM = Compaction
E = Swell/Pressure on Expansive Soils
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RQD = Rock Quality Designation
X = X-Ray Defraction
HCpot = Hydro-Collapse Potential

*** = Average of subsamples**

# SUMMARY OF RESULTS
# N.D.O.T. GEOTECHNICAL SECTION

**EA/Cont #** 73587 **Job Description** SR 160 Cable Barrier Rail

**Boring No.** CBP 10 **Elevation (ft)** 3338 +/- **Station** "L" 478 + 11 **Date** 06/09/2010

| SAMPLE NO. | SAMPLE DEPTH (ft) | SAMP-LER TYPE | N BLOWS per ft. | SOIL GROUP | W% | DRY UW pcf | % PASS #200 | LL % | PL % | PI % | STRENGTH TEST | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | TEST TYPE | Φ deg. | C psi | Φ deg. | C psi | |
| | | | | | | | | | | | | Peak | | Residual | | |
| A | 5.0 - 6.5 | SPT | 71 | GC-GM | 4.5 | | 24.3 | 21 | 16 | 5 | | | | | | |
| B | 7.5 - 9.0 | SPT | 51 | GC-GM | 3.7 | | 14.1 | 23 | 17 | 6 | | | | | | |
| C | 10.0 - 11.5 | SPT | 67 | GC-GM | 4.0 | | 18.8 | 20 | 15 | 5 | | | | | | |
| D | 12.5 - 14.0 | SPT | 91 | GC-GM | 3.9 | | 14.1 | 19 | 15 | 4 | | | | | | |
| E | 15.0 - 16.5 | SPT | 89 | GP-GC | 3.1 | | 11.7 | 21 | 15 | 6 | | | | | | |
| BULK 1 | 5.0 - 10.0 | | | GP-GC | | | 10.3 | 21 | 16 | 5 | | | | | | RV = 74 |
| | | | | | | | | | | | | | | | | |
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CMS = California Modified Sampler 2.42" ID
SPT = Standard Penetration 1.38" ID
CS = Continuous Sample 3.23" ID
RC = Rock Core
PB = Pitcher Barrel
CSS = Calif. Split Spoon 2.42" ID
CPT = Cone Penetration Test
TP = Test Pit
P = Pushed, not driven
R = Refusal
Sh = Shelby Tube 2.87" ID

U = Unconfined Compressive
UU = Unconsolidated Undrained
CD = Consolidated Drained
CU = Consolidated Undrained
DS = Direct Shear
Φ = Friction
C = Cohesion
N = No. of blows per ft., sampler

N = Field SPT $N = (N_{css})(0.62)$

H = Hydrometer
S = Sieve
G = Specific Gravity
PI = Plasticity Index
LL = Liquid Limit
PL = Plastic Limit
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Ch = Chemical
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CM = Compaction
E = Swell/Pressure on Expansive Soils
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RQD = Rock Quality Designation
X = X-Ray Defraction
HCpot = Hydro-Collapse Potential

*** = Average of subsamples**

# SUMMARY OF RESULTS
# N.D.O.T. GEOTECHNICAL SECTION

**EA/Cont #** 73587 **Job Description** SR 160 Cable Barrier Rail

**Boring No.** CBP 11 **Elevation (ft)** 3430 +/- **Station** "L" 684 + 13 **Date** 06/10/2010

| SAMPLE NO. | SAMPLE DEPTH (ft) | SAMP-LER TYPE | N BLOWS per ft. | SOIL GROUP | W% | DRY UW pcf | % PASS #200 | LL % | PL % | PI % | STRENGTH TEST | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | TEST TYPE | Φ deg. | C psi | Φ deg. | C psi | |
| | | | | | | | | | | | | Peak | | Residual | | |
| A | 2.5 - 4.0 | SPT | 59 | GW-GC | 1.8 | | 6.8 | 20 | 14 | 6 | | | | | | |
| B | 5.0 - 6.0 | SPT | R | GP-GM | 1.7 | | 8.0 | 16 | 14 | 2 | | | | | | |
| C | 7.5 - 7.6 | SPT | R | | | | | | | | | | | | | no recovery |
| D | 10.0 - 11.4 | SPT | R | | 2.0 | | 10.8 | | | | | | | | | |
| E | 15.0 - 16.1 | SPT | R | | 2.3 | | 13.4 | | | | | | | | | |
| BULK 1 | 5.0 - 10.0 | | | GP-GC | | | 5.8 | 21 | 15 | 6 | | | | | | RV = 84 |
| | | | | | | | | | | | | | | | | |
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CMS = California Modified Sampler 2.42" ID
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CS = Continuous Sample 3.23" ID
RC = Rock Core
PB = Pitcher Barrel
CSS = Calif. Split Spoon 2.42" ID
CPT = Cone Penetration Test
TP = Test Pit
P = Pushed, not driven
R = Refusal
Sh = Shelby Tube 2.87" ID

U = Unconfined Compressive
UU = Unconsolidated Undrained
CD = Consolidated Drained
CU = Consolidated Undrained
DS = Direct Shear
Φ = Friction
C = Cohesion
N = No. of blows per ft., sampler

N = Field SPT N = $(N_{css})(0.62)$

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RV = R - Value
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HCpot = Hydro-Collapse Potential

*** = Average of subsamples**

# SUMMARY OF RESULTS
# N.D.O.T. GEOTECHNICAL SECTION

**EA/Cont #** 73587 **Job Description** SR 160 Cable Barrier Rail

**Boring No.** CBP 12 **Elevation (ft)** 3193 +/- **Station** "P" 318 + 79 **Date** 06/10/2010

| SAMPLE NO. | SAMPLE DEPTH (ft) | SAMP-LER TYPE | N BLOWS per ft. | SOIL GROUP | W% | DRY UW pcf | % PASS #200 | LL % | PL % | PI % | STRENGTH TEST | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | TEST TYPE | Φ deg. | C psi | Φ deg. | C psi | |
| | | | | | | | | | | | | Peak | | Residual | | |
| A | 1.0 - 2.5 | SPT | 78 | GC | 3.6 | | 26.1 | 30 | 20 | 10 | | | | | | |
| B | 5.0 - 6.5 | SPT | 81 | GC-GM | 2.5 | | 13.6 | 23 | 17 | 6 | | | | | | |
| C | 10.0 - 10.5 | SPT | R | | 3.0 | | | 19 | 15 | 4 | | | | | | |
| D | 15.0 - 15.8 | SPT | R | GC-GM | 2.4 | | 14.0 | 22 | 15 | 7 | | | | | | |
| BULK 1 | 5.0 - 10.0 | | | GW | | | 4.6 | 25 | 17 | 8 | | | | | | RV = 83 |
| | | | | | | | | | | | | | | | | |
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CMS = California Modified Sampler 2.42" ID
SPT = Standard Penetration 1.38" ID
CS = Continuous Sample 3.23" ID
RC = Rock Core
PB = Pitcher Barrel
CSS = Calif. Split Spoon 2.42" ID
CPT = Cone Penetration Test
TP = Test Pit
P = Pushed, not driven
R = Refusal
Sh = Shelby Tube 2.87" ID

U = Unconfined Compressive
UU = Unconsolidated Undrained
CD = Consolidated Drained
CU = Consolidated Undrained
DS = Direct Shear
Φ = Friction
C = Cohesion
N = No. of blows per ft., sampler

N = Field SPT N = $(N_{css})(0.62)$

H = Hydrometer
S = Sieve
G = Specific Gravity
PI = Plasticity Index
LL = Liquid Limit
PL = Plastic Limit
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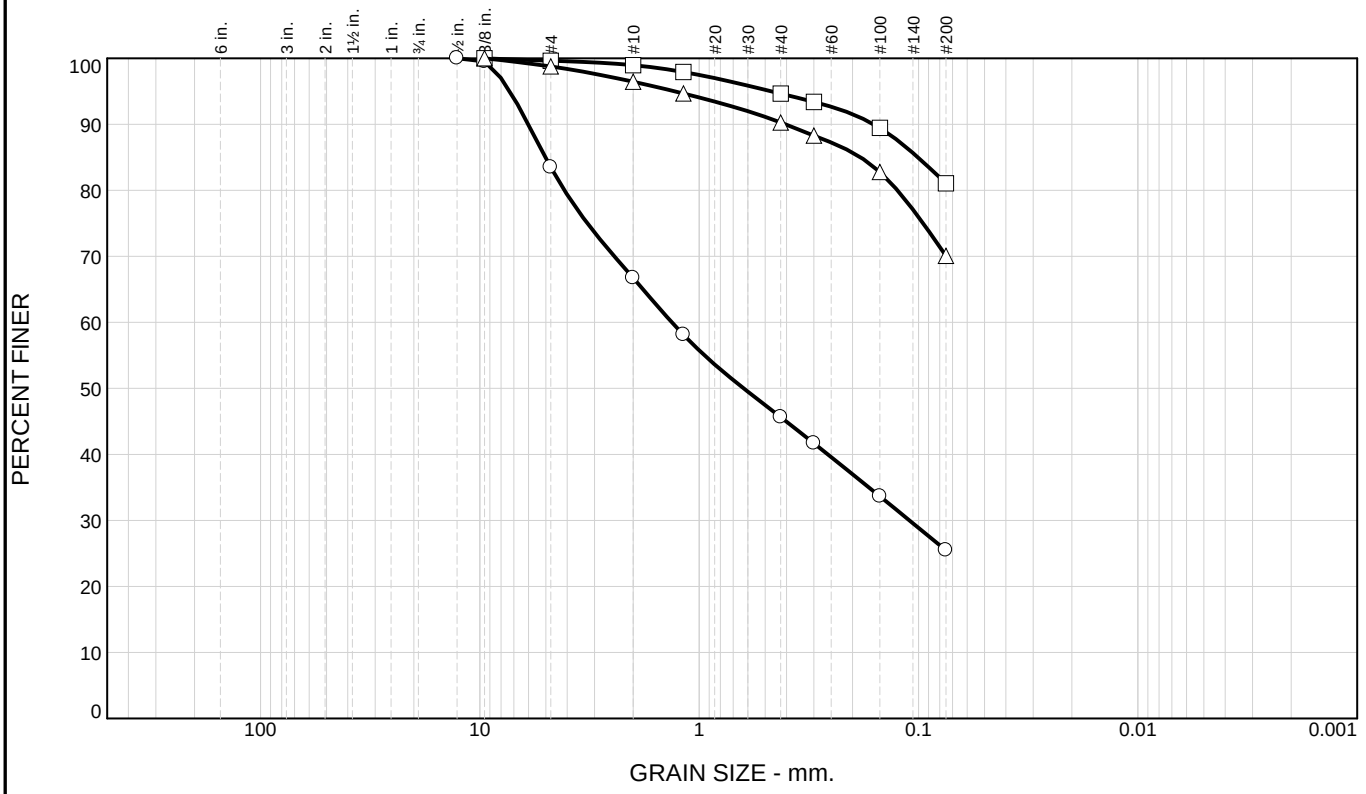
OC = Consolidation
Ch = Chemical
RV = R - Value
MD = Moisture Density

CM = Compaction
E = Swell/Pressure on Expansive Soils
SL = Shrinkage Limit
UW= Unit Weight
W = Moisture Content
K = Permeability
O = Organic Content
D = Dispersive
RQD = Rock Quality Designation
X = X-Ray Defraction
HCpot = Hydro-Collapse Potential

*** = Average of subsamples**

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 16.5 | 58.0 | 25.5 | | SM | A-2-4(0) | NP | 23 |
| □ | 0.0 | 0.4 | 18.5 | 81.1 | | ML | A-4(1) | 24 | 26 |
| △ | 0.0 | 1.2 | 28.7 | 70.1 | | ML | A-4(0) | 22 | 24 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1/2" | 100.0 | | |
| 3/8" | 99.5 | 100.0 | 100.0 |

| GRAIN SIZE | | | |
|---|---|---|---|
| $D_{60}$ | 1.3329 | | |
| $D_{30}$ | 0.1099 | | |
| $D_{10}$ | | | |
| **COEFFICIENTS** | | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 83.5 | 99.6 | 98.8 |
| #10 | 66.7 | 99.0 | 96.5 |
| #16 | 58.1 | 97.9 | 94.7 |
| #40 | 45.7 | 94.7 | 90.3 |
| #50 | 41.7 | 93.4 | 88.3 |
| #100 | 33.7 | 89.5 | 82.8 |
| #200 | 25.5 | 81.1 | 70.1 |

Material Description
○ silty sand with gravel
□ silt with sand
△ sandy silt

REMARKS:
○
□
△

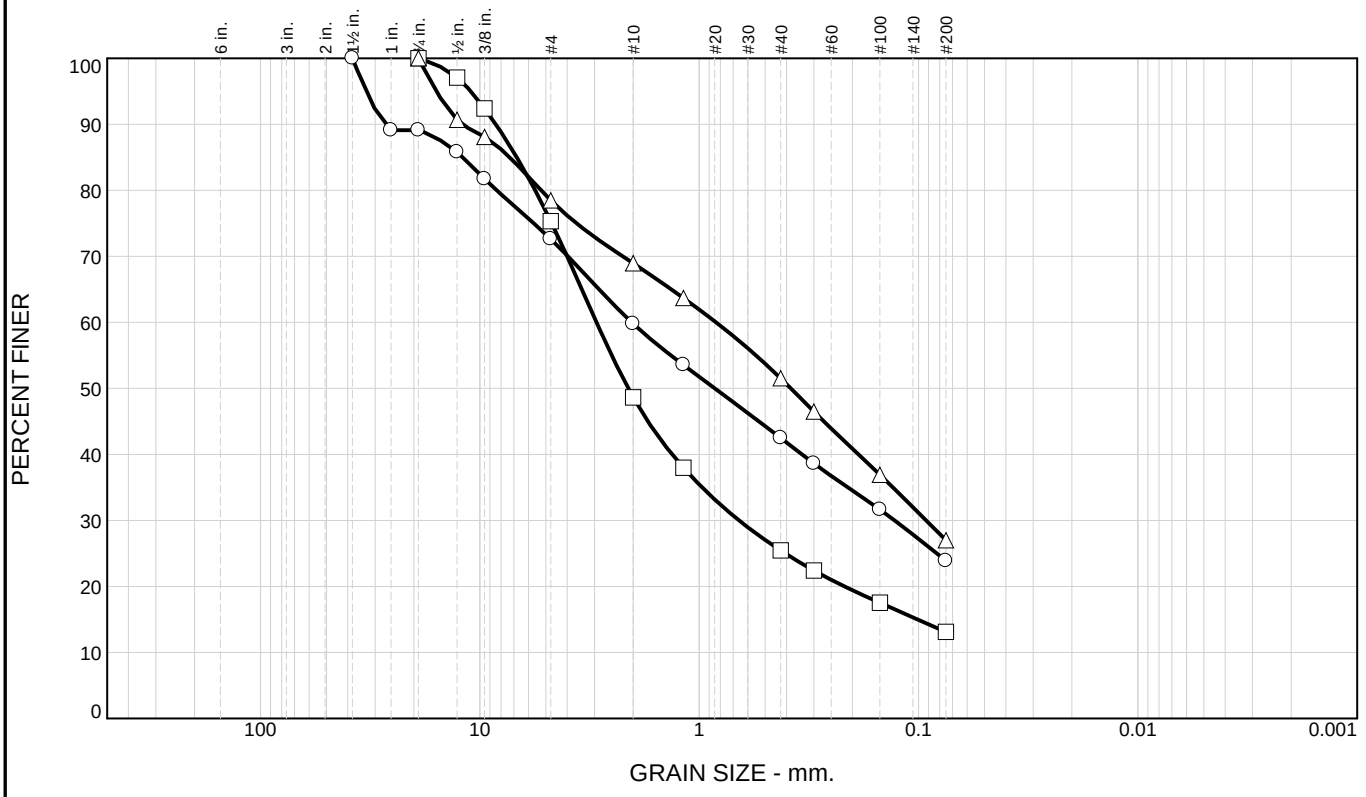
○ Source of Sample: CBP1 Depth: 2.5 - 4.0' Sample Number: A
□ Source of Sample: CBP1 Depth: 5.3 - 5.8' Sample Number: B1
△ Source of Sample: CBP1 Depth: 5.8 - 6.5' Sample Number: B2

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: SR 160 Cable Barrier Rail
Project No.: EA 73587, FL-6-10

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 27.4 | 48.7 | 23.9 | | SM | A-1-b | NP | 21 |
| □ | 0.0 | 24.7 | 62.2 | 13.1 | | SM | A-1-a | NP | 18 |
| △ | 0.0 | 21.5 | 51.5 | 27.0 | | SM | A-2-4(0) | NP | 18 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1.5" | 100.0 | | |
| 1" | 89.1 | | |
| 3/4" | 89.1 | 100.0 | 100.0 |
| 1/2" | 85.8 | 97.1 | 90.7 |
| 3/8" | 81.7 | 92.4 | 88.1 |
| GRAIN SIZE | | | |
| $D_{60}$ | 2.0323 | 2.9409 | 0.8372 |
| $D_{30}$ | 0.1286 | 0.6584 | 0.0923 |
| $D_{10}$ | | | |
| COEFFICIENTS | | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 72.6 | 75.3 | 78.5 |
| #10 | 59.8 | 48.6 | 69.0 |
| #16 | 53.5 | 38.0 | 63.7 |
| #40 | 42.5 | 25.5 | 51.5 |
| #50 | 38.6 | 22.4 | 46.5 |
| #100 | 31.6 | 17.5 | 36.9 |
| #200 | 23.9 | 13.1 | 27.0 |

Material Description
○ silty sand with gravel
□ silty sand with gravel
△ silty sand with gravel

REMARKS:
○
□
△

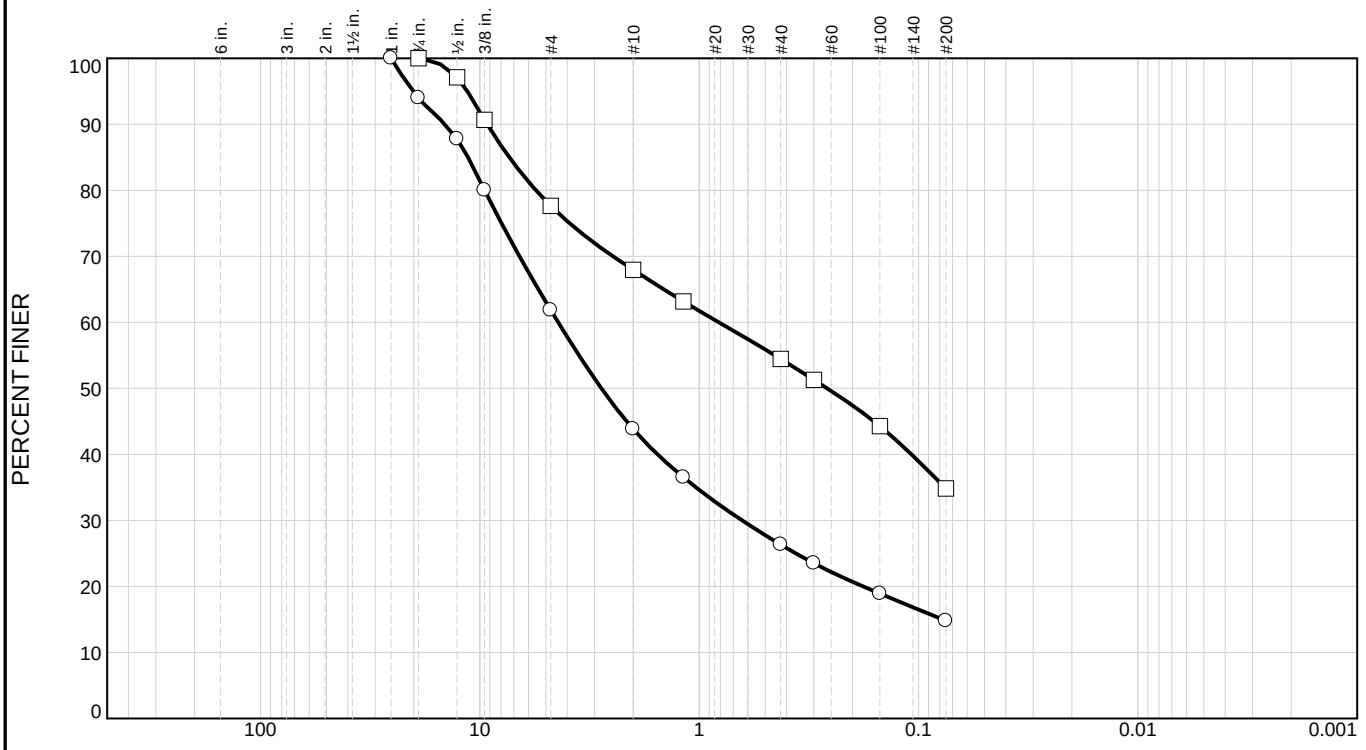
○ Source of Sample: CBP1 Depth: 7.5 - 9.0' Sample Number: C
□ Source of Sample: CBP1 Depth: 10.0 - 11.5' Sample Number: D
△ Source of Sample: CBP1 Depth: 12.5 - 14.0' Sample Number: E

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: SR 160 Cable Barrier Rail
Project No.: EA 73587, FL-6-10

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 38.1 | 47.1 | 14.8 | | SM | A-1-a | NP | 16 |
| □ | 0.0 | 22.4 | 42.8 | 34.8 | | SM | A-2-4(0) | 20 | 21 |
| | | | | | | | | | |

| SIEVE inches size | ○ | □ |
|---|---|---|
| 1" | 100.0 | |
| 3/4" | 94.0 | 100.0 |
| 1/2" | 87.8 | 97.1 |
| 3/8" | 80.0 | 90.7 |
| **GRAIN SIZE** | | |
| $D_{60}$ | 4.3932 | 0.8132 |
| $D_{30}$ | 0.6374 | |
| $D_{10}$ | | |
| **COEFFICIENTS** | | |
| $C_c$ | | |
| $C_u$ | | |

| SIEVE number size | ○ | □ |
|---|---|---|
| #4 | 61.9 | 77.6 |
| #10 | 43.8 | 68.0 |
| #16 | 36.5 | 63.2 |
| #40 | 26.3 | 54.5 |
| #50 | 23.5 | 51.3 |
| #100 | 18.9 | 44.3 |
| #200 | 14.8 | 34.8 |

Material Description

○ silty sand with gravel

□ silty sand with gravel

REMARKS:

○

□

○ Source of Sample: CBP1 Depth: 15.0 - 16.5' Sample Number: F

□ Source of Sample: CBP1 Depth: 5.0 - 10.0' Sample Number: BULK 1

**NEVADA DEPARTMENT OF TRANSPORTATION**

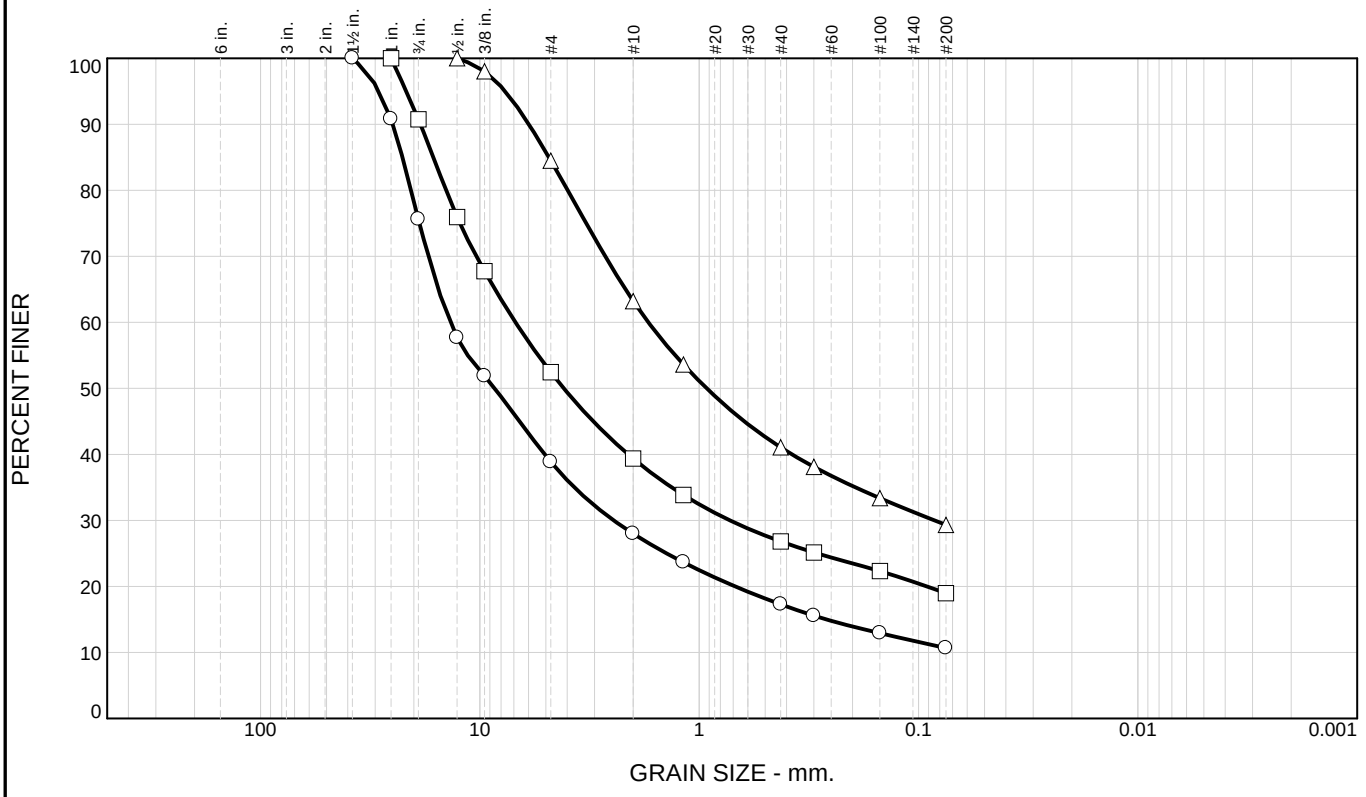
Client: A. Ablahani

Project: SR 160 Cable Barrier Rail

Project No.: EA 73587, FL-6-10

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 61.1 | 28.2 | 10.7 | | GP-GM | A-1-a | 18 | 19 |
| □ | 0.0 | 47.5 | 33.5 | 19.0 | | | | | |
| △ | 0.0 | 15.5 | 55.2 | 29.3 | | | | | |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1.5" | 100.0 | | |
| 1" | 90.8 | 100.0 | |
| 3/4" | 75.6 | 90.8 | |
| 1/2" | 57.7 | 76.0 | 100.0 |
| 3/8" | 51.9 | 67.7 | 98.0 |
| GRAIN SIZE | | | |
| $D_{60}$ | 13.6526 | 6.8815 | 1.7065 |
| $D_{30}$ | 2.4563 | 0.7237 | 0.0845 |
| $D_{10}$ | | | |
| COEFFICIENTS | | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 38.9 | 52.5 | 84.5 |
| #10 | 28.0 | 39.4 | 63.2 |
| #16 | 23.7 | 33.9 | 53.6 |
| #40 | 17.3 | 26.8 | 41.1 |
| #50 | 15.6 | 25.1 | 38.1 |
| #100 | 12.9 | 22.3 | 33.4 |
| #200 | 10.7 | 19.0 | 29.3 |

Material Description
○ poorly graded gravel with silt and sand

□ SIEVE ONLY

△ SIEVE ONLY

REMARKS:
○

□

△

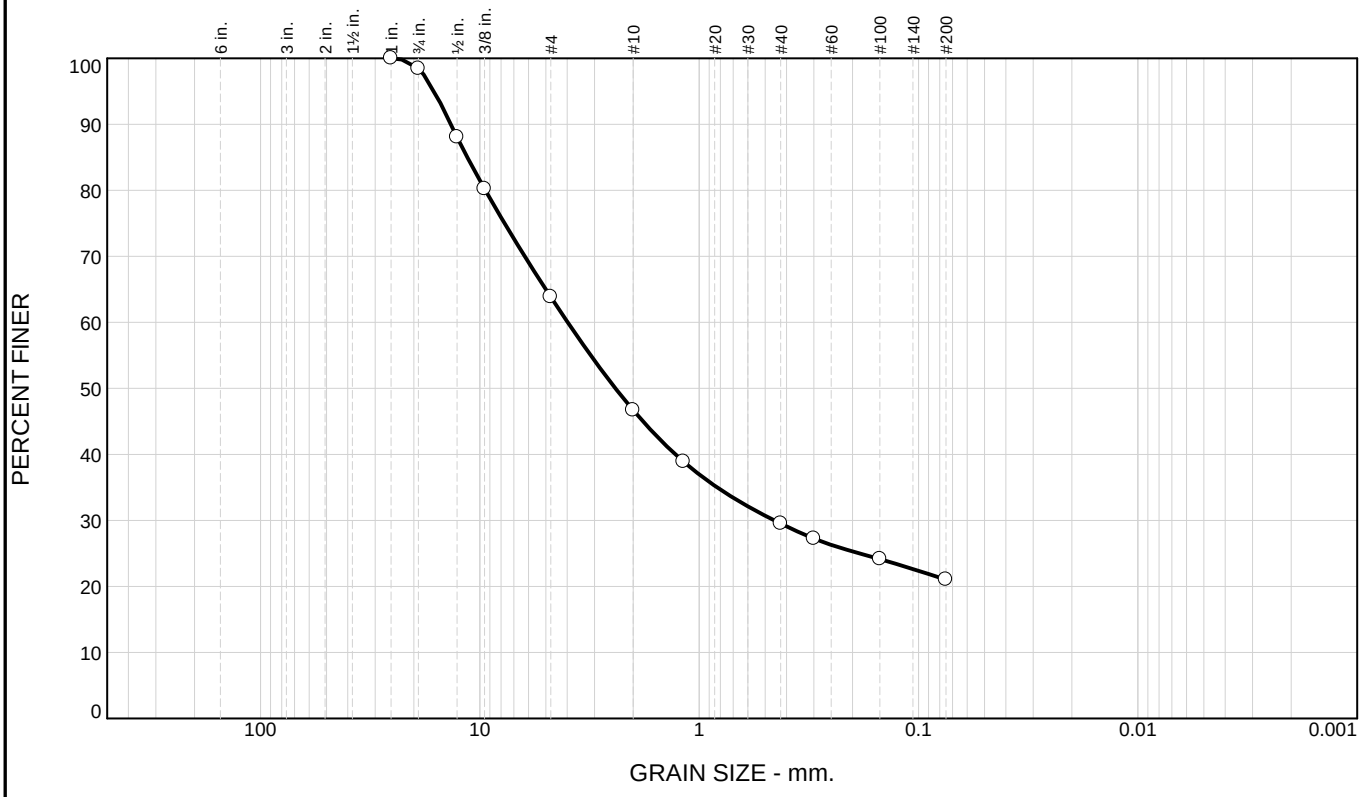
○ Source of Sample: CBP2 Depth: 0.5 - 1.85' Sample Number: A
□ Source of Sample: CBP2 Depth: 2.5 - 2.85' Sample Number: B
△ Source of Sample: CBP2 Depth: 10.0 - 10.3' Sample Number: D

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: SR 160 Cable Barrier Rail
Project No.: EA 73587, FL-6-10

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 36.2 | 42.8 | 21.0 | | SM | A-1-b | 15 | 18 |
| | | | | | | | | | |
| | | | | | | | | | |

| SIEVE inches size | PERCENT FINER ○ | | |
|---|---|---|---|
| 1" | 100.0 | | |
| 3/4" | 98.5 | | |
| 1/2" | 88.0 | | |
| 3/8" | 80.2 | | |
| | GRAIN SIZE | | |
| $D_{60}$ | 3.9763 | | |
| $D_{30}$ | 0.4539 | | |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | | |
|---|---|---|---|
| #4 | 63.8 | | |
| #10 | 46.7 | | |
| #16 | 38.9 | | |
| #40 | 29.5 | | |
| #50 | 27.2 | | |
| #100 | 24.1 | | |
| #200 | 21.0 | | |

Material Description
○ silty sand with gravel

REMARKS:
○

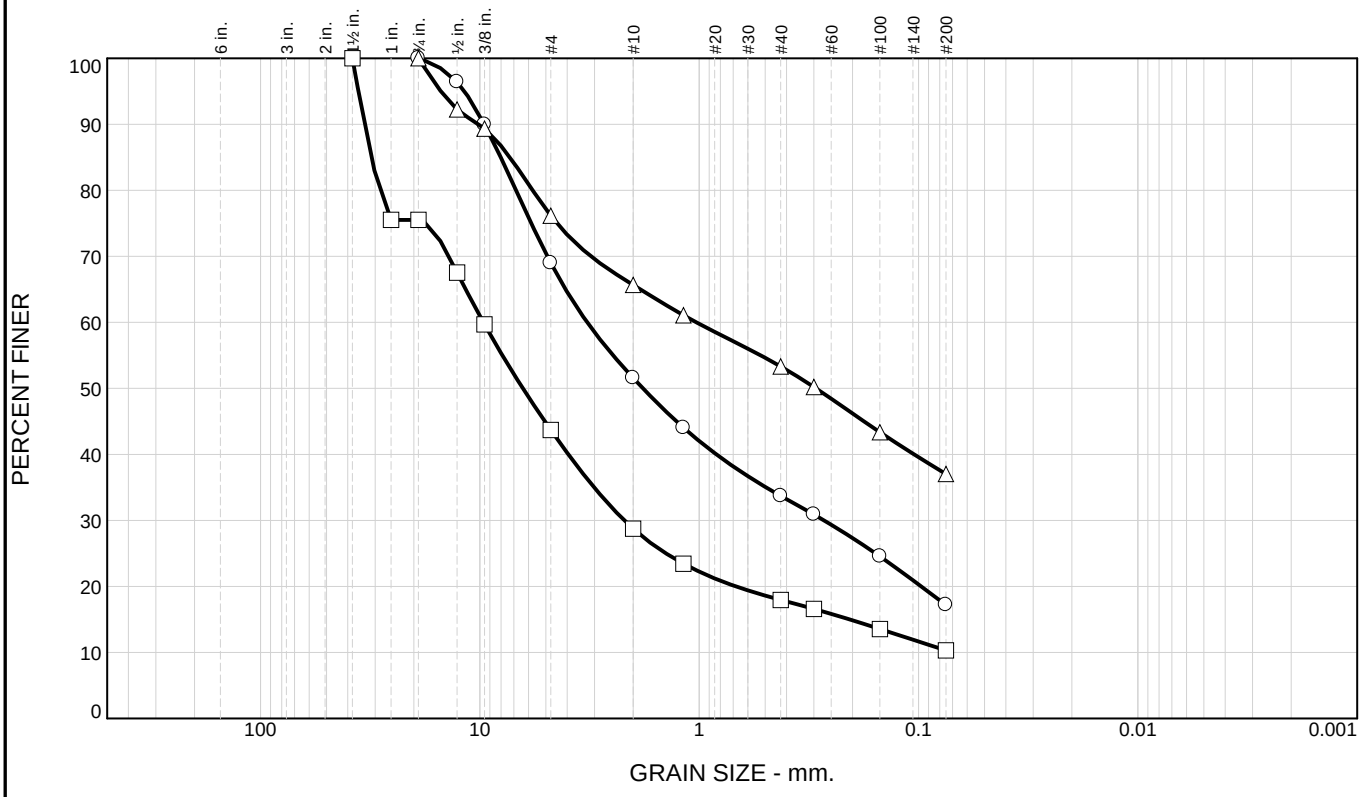
○ Source of Sample: CBP2 Depth: 5.0 - 10.0' Sample Number: BULK 1

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: SR 160 Cable Barrier Rail
Project No.: EA 73587, FL-6-10

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 31.0 | 51.8 | 17.2 | | SM | A-1-b | 18 | 19 |
| □ | 0.0 | 56.3 | 33.4 | 10.3 | | GP-GM | A-1-a | 19 | 22 |
| △ | 0.0 | 23.8 | 39.2 | 37.0 | | SC-SM | A-4(0) | 22 | 29 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1.5" | | 100.0 | |
| 1" | | 75.5 | |
| 3/4" | 100.0 | 75.5 | 100.0 |
| 1/2" | 96.4 | 67.5 | 92.2 |
| 3/8" | 89.9 | 59.7 | 89.3 |
| | GRAIN SIZE | | |
| $D_{60}$ | 3.2426 | 9.6385 | 1.0297 |
| $D_{30}$ | 0.2695 | 2.1955 | |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 69.0 | 43.7 | 76.2 |
| #10 | 51.6 | 28.7 | 65.7 |
| #16 | 44.0 | 23.4 | 61.1 |
| #40 | 33.7 | 18.0 | 53.3 |
| #50 | 30.9 | 16.6 | 50.2 |
| #100 | 24.6 | 13.6 | 43.4 |
| #200 | 17.2 | 10.3 | 37.0 |

Material Description

○ silty sand with gravel

□ poorly graded gravel with silt and sand

△ silty, clayey sand with gravel

REMARKS:

○

□

△

○ Source of Sample: CBP3 Depth: 2.5 - 4.0' Sample Number: A

□ Source of Sample: CBP3 Depth: 5.0 - 5.6' Sample Number: B

△ Source of Sample: CBP3 Depth: 7.5 - 9.0' Sample Number: C

**NEVADA DEPARTMENT OF TRANSPORTATION**

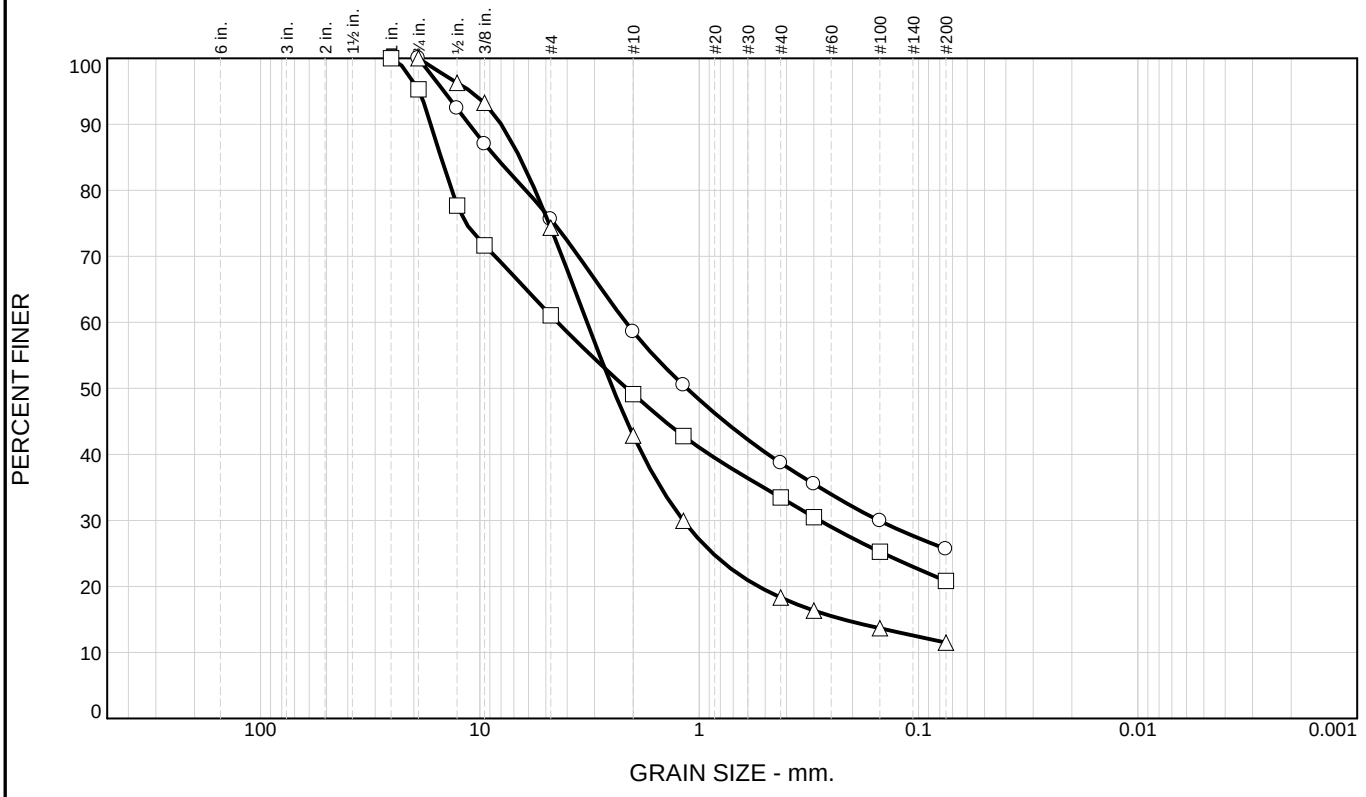
Client: A. Ablahani

Project: SR 160 Cable Barrier Rail

Project No.: EA 73587, FL-6-10

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 24.4 | 49.9 | 25.7 | | SC-SM | A-2-4(0) | 17 | 22 |
| □ | 0.0 | 38.9 | 40.3 | 20.8 | | | | | |
| △ | 0.0 | 25.7 | 62.8 | 11.5 | | SP-SC | A-1-a | 16 | 21 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1" | | 100.0 | |
| 3/4" | 100.0 | 95.3 | 100.0 |
| 1/2" | 92.4 | 77.7 | 96.3 |
| 3/8" | 87.0 | 71.7 | 93.3 |
| | GRAIN SIZE | | |
| $D_{60}$ | 2.1603 | 4.4224 | 3.2454 |
| $D_{30}$ | 0.1518 | 0.2826 | 1.1836 |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 75.6 | 61.1 | 74.3 |
| #10 | 58.6 | 49.1 | 42.9 |
| #16 | 50.5 | 42.8 | 29.9 |
| #40 | 38.7 | 33.5 | 18.3 |
| #50 | 35.5 | 30.5 | 16.3 |
| #100 | 29.9 | 25.3 | 13.7 |
| #200 | 25.7 | 20.8 | 11.5 |

Material Description
○ silty, clayey sand with gravel

□ SIEVE ONLY

△ poorly graded sand with siltyclay and gravel

REMARKS:
○

□

△

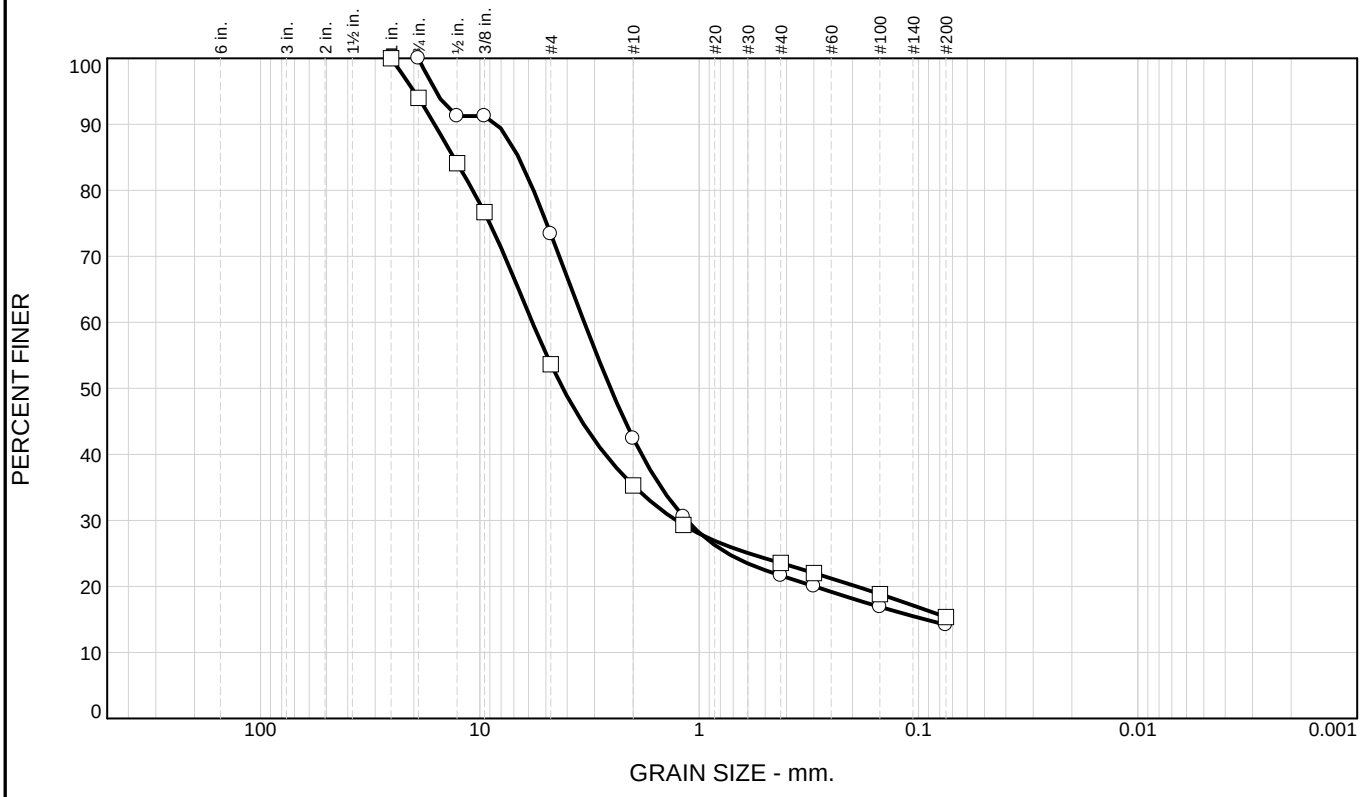
○ Source of Sample: CBP3 Depth: 10.0 - 10.4' Sample Number: D
□ Source of Sample: CBP3 Depth: 12.5 - 12.9' Sample Number: E
△ Source of Sample: CBP3 Depth: 15.0 - 16.5' Sample Number: F

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: SR 160 Cable Barrier Rail
Project No.: EA 73587, FL-6-10

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 26.6 | 59.2 | 14.2 | | SC-SM | A-2-4(0) | 17 | 24 |
| □ | 0.0 | 46.3 | 38.3 | 15.4 | | GC-GM | A-1-a | 15 | 20 |
| | | | | | | | | | |

| SIEVE inches size | ○ | □ |
|---|---|---|
| 1" | | 100.0 |
| 3/4" | 100.0 | 94.0 |
| 1/2" | 91.2 | 84.1 |
| 3/8" | 91.2 | 76.7 |
| **GRAIN SIZE** | | |
| $D_{60}$ | 3.3433 | 5.7656 |
| $D_{30}$ | 1.1400 | 1.2731 |
| $D_{10}$ | | |
| **COEFFICIENTS** | | |
| $C_c$ | | |
| $C_u$ | | |

| SIEVE number size | ○ | □ |
|---|---|---|
| #4 | 73.4 | 53.7 |
| #10 | 42.4 | 35.3 |
| #16 | 30.5 | 29.3 |
| #40 | 21.7 | 23.6 |
| #50 | 20.0 | 22.0 |
| #100 | 16.9 | 18.8 |
| #200 | 14.2 | 15.4 |

Material Description

○ silty, clayey sand with gravel

□ silty clayey gravel with sand

REMARKS:

○

□

○ Source of Sample: CBP3 Depth: 16.5 - 17.5' Sample Number: G

□ Source of Sample: CBP3 Depth: 5.0 - 10.0' Sample Number: BULK 1

**NEVADA DEPARTMENT OF TRANSPORTATION**

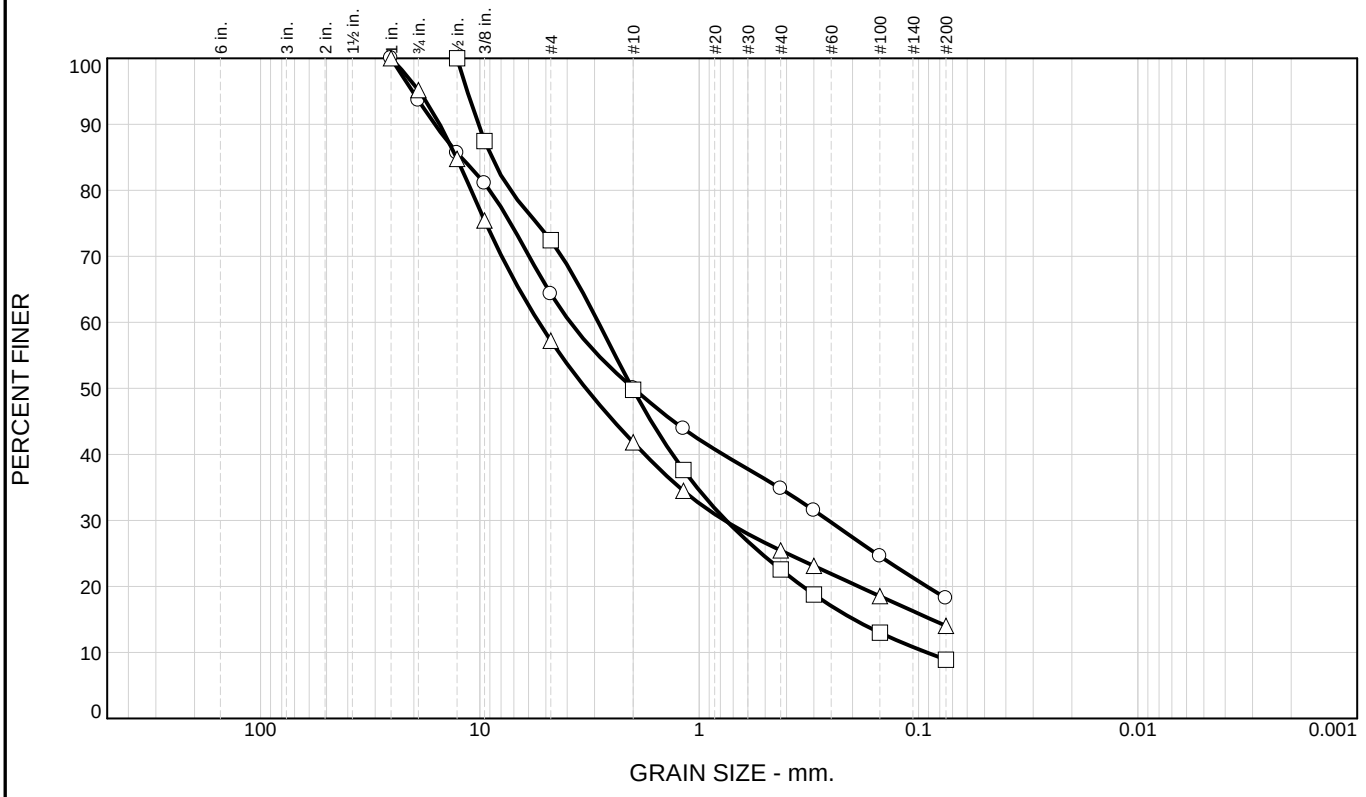
Client: A. Ablahani

Project: SR 160 Cable Barrier Rail

Project No.: EA 73587, FL-6-10

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 35.7 | 46.1 | 18.2 | | SC-SM | A-1-b | 20 | 25 |
| □ | 0.0 | 27.6 | 63.5 | 8.9 | | SW-SM | A-1-a | NP | 15 |
| △ | 0.0 | 42.8 | 43.2 | 14.0 | | | | | |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1" | 100.0 | | 100.0 |
| 3/4" | 93.6 | | 95.2 |
| 1/2" | 85.7 | 100.0 | 84.8 |
| 3/8" | 81.1 | 87.5 | 75.4 |
| GRAIN SIZE | | | |
| $D_{60}$ | 3.8728 | 2.8827 | 5.3852 |
| $D_{30}$ | 0.2576 | 0.7540 | 0.7666 |
| $D_{10}$ | | 0.0916 | |
| COEFFICIENTS | | | |
| $C_c$ | | 2.15 | |
| $C_u$ | | 31.47 | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 64.3 | 72.4 | 57.2 |
| #10 | 50.0 | 49.8 | 41.8 |
| #16 | 43.9 | 37.6 | 34.5 |
| #40 | 34.8 | 22.6 | 25.5 |
| #50 | 31.5 | 18.8 | 23.1 |
| #100 | 24.6 | 13.0 | 18.5 |
| #200 | 18.2 | 8.9 | 14.0 |

Material Description

○ silty, clayey sand with gravel

□ well-graded sand with silt and gravel

△ SIEVE ONLY

REMARKS:

○

□

△

○ Source of Sample: CBP4 Depth: 2.0 - 2.9' Sample Number: A

□ Source of Sample: CBP4 Depth: 5.0 - 6.5' Sample Number: B

△ Source of Sample: CBP4 Depth: 10.0 - 10.5' Sample Number: C

**NEVADA DEPARTMENT OF TRANSPORTATION**

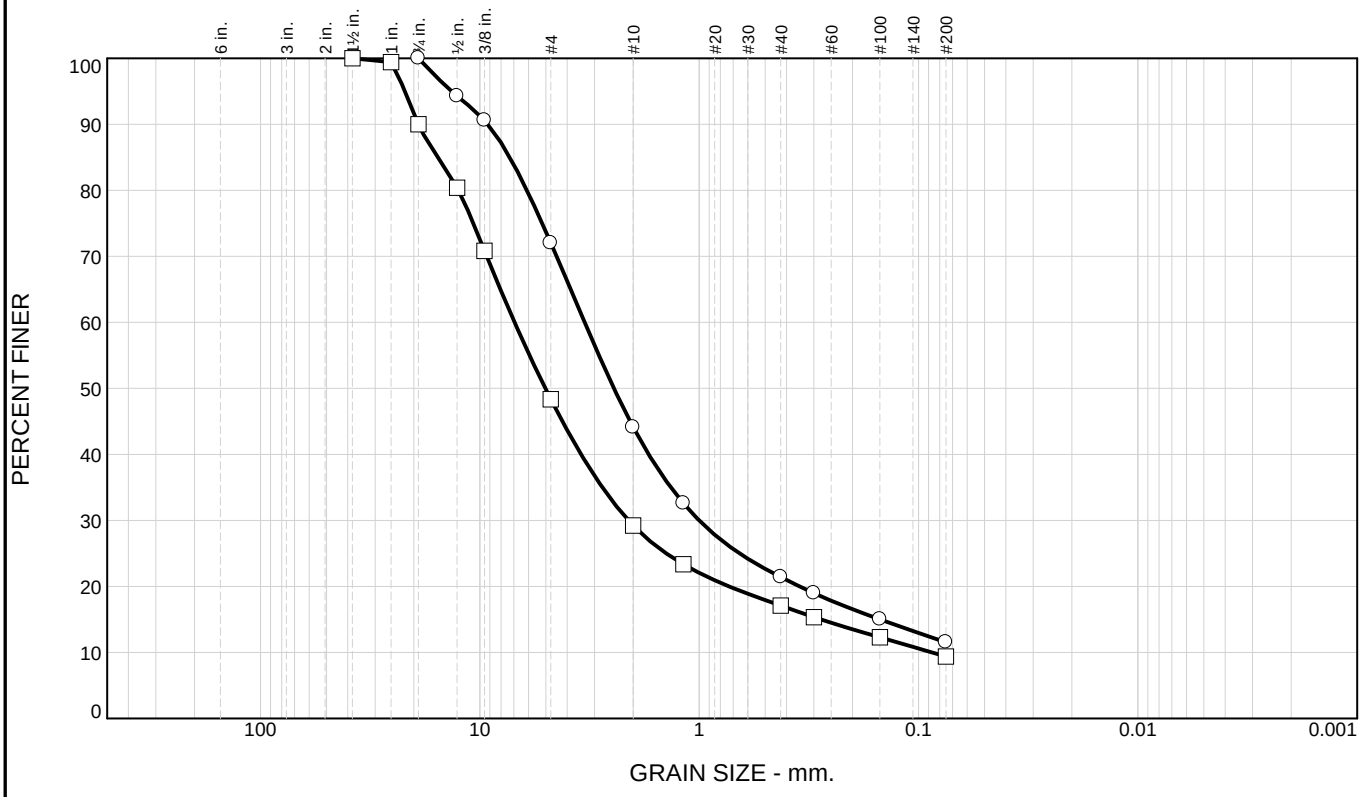
Client: A. Ablahani

Project: SR 160 Cable Barrier Rail

Project No.: EA 73587, FL-6-10

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 28.0 | 60.5 | 11.5 | | SP-SM | A-1-a | 14 | 16 |
| □ | 0.0 | 51.6 | 39.0 | 9.4 | | GP-GM | A-1-a | 17 | 19 |
| | | | | | | | | | |

| SIEVE inches size | ○ | □ |
|---|---|---|
| | PERCENT FINER | |
| 1.5" | | 100.0 |
| 1" | | 99.4 |
| 3/4" | 100.0 | 90.0 |
| 1/2" | 94.3 | 80.4 |
| 3/8" | 90.6 | 70.8 |
| | GRAIN SIZE | |
| $D_{60}$ | 3.3289 | 6.9462 |
| $D_{30}$ | 1.0007 | 2.1030 |
| $D_{10}$ | | 0.0867 |
| | COEFFICIENTS | |
| $C_c$ | | 7.34 |
| $C_u$ | | 80.10 |

| SIEVE number size | ○ | □ |
|---|---|---|
| | PERCENT FINER | |
| #4 | 72.0 | 48.4 |
| #10 | 44.1 | 29.2 |
| #16 | 32.6 | 23.4 |
| #40 | 21.4 | 17.1 |
| #50 | 19.0 | 15.3 |
| #100 | 15.0 | 12.3 |
| #200 | 11.5 | 9.4 |

Material Description

○ poorly graded sand with silt and gravel

□ poorly graded gravel with silt and sand

REMARKS:

○

□

○ Source of Sample: CBP4 Depth: 15.0 - 16.5' Sample Number: D

□ Source of Sample: CBP4 Depth: 5.0 - 10.0' Sample Number: BULK 1

**NEVADA DEPARTMENT OF TRANSPORTATION**

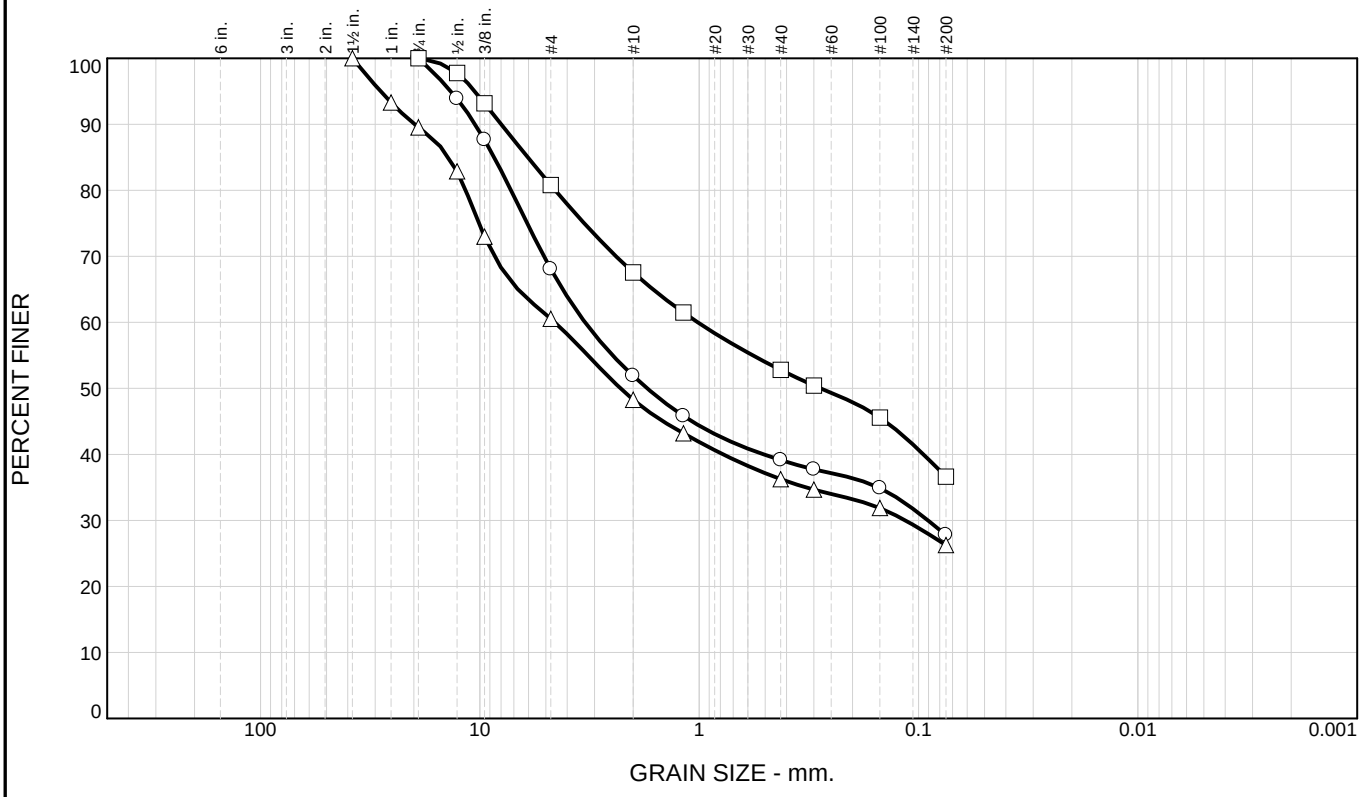
Client: A. Ablahani

Project: SR 160 Cable Barrier Rail

Project No.: EA 73587, FL-6-10

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 31.9 | 40.3 | 27.8 | | SC-SM | A-2-4(0) | 18 | 24 |
| □ | 0.0 | 19.2 | 44.2 | 36.6 | | SC-SM | A-4(0) | 22 | 28 |
| △ | 0.0 | 39.5 | 34.2 | 26.3 | | GC-GM | A-2-4(0) | 16 | 21 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1.5" | | | 100.0 |
| 1" | | | 93.3 |
| 3/4" | 100.0 | 100.0 | 89.5 |
| 1/2" | 93.9 | 97.8 | 82.9 |
| 3/8" | 87.7 | 93.2 | 73.0 |
| GRAIN SIZE | | | |
| $D_{60}$ | 3.3161 | 1.0145 | 4.5535 |
| $D_{30}$ | 0.0905 | | 0.1146 |
| $D_{10}$ | | | |
| COEFFICIENTS | | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 68.1 | 80.8 | 60.5 |
| #10 | 51.9 | 67.6 | 48.3 |
| #16 | 45.8 | 61.5 | 43.2 |
| #40 | 39.2 | 52.8 | 36.3 |
| #50 | 37.7 | 50.4 | 34.7 |
| #100 | 34.9 | 45.6 | 31.9 |
| #200 | 27.8 | 36.6 | 26.3 |

Material Description
○ silty, clayey sand with gravel
□ silty, clayey sand with gravel
△ silty clayey gravel with sand

REMARKS:
○
□
△

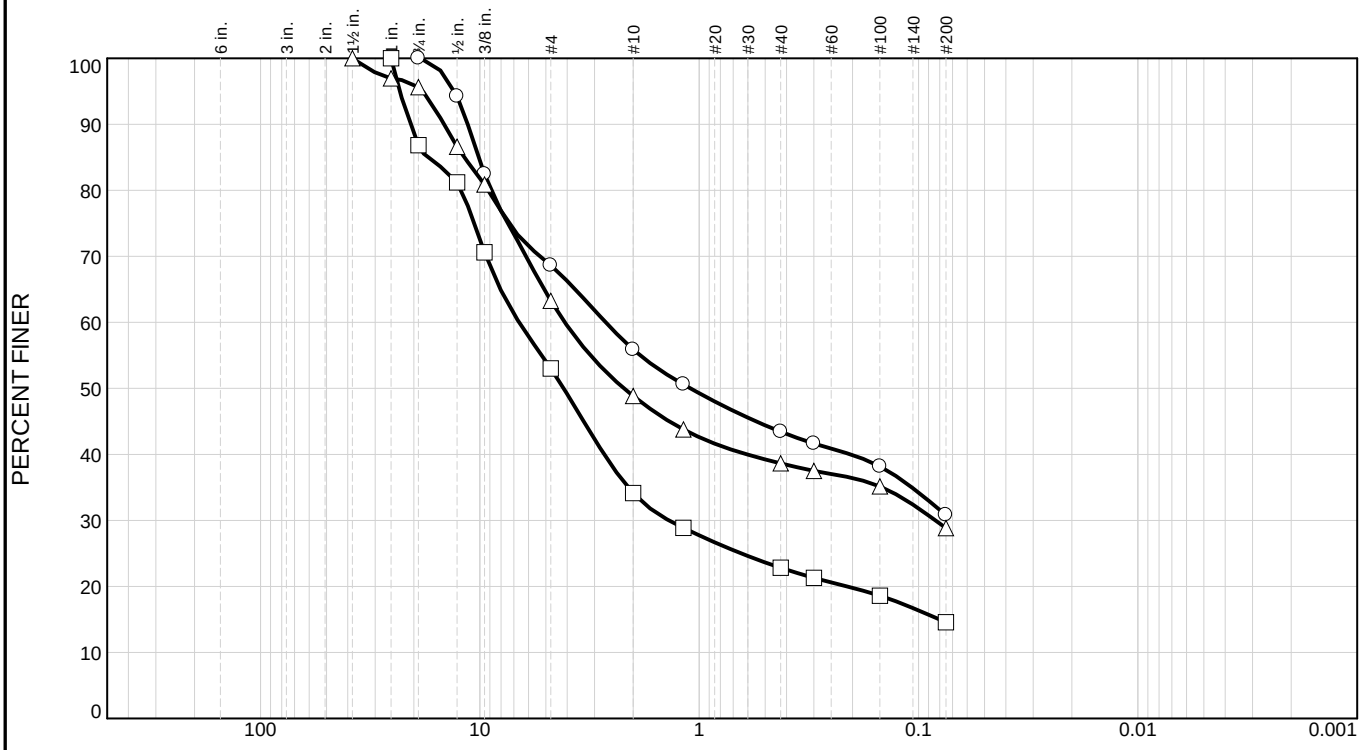
○ Source of Sample: CBP5 Depth: 1.0 - 2.5' Sample Number: A
□ Source of Sample: CBP5 Depth: 5.0 - 6.5' Sample Number: B
△ Source of Sample: CBP5 Depth: 7.5 - 9.0' Sample Number: C

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: SR 160 Cable Barrier Rail
Project No.: EA 73587, FL-6-10

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 31.4 | 37.8 | 30.8 | | SC-SM | A-2-4(0) | 21 | 26 |
| □ | 0.0 | 47.0 | 38.4 | 14.6 | | | | | |
| △ | 0.0 | 36.7 | 34.5 | 28.8 | | GC | A-2-4(0) | 17 | 25 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1.5" | | | 100.0 |
| 1" | | 100.0 | 97.0 |
| 3/4" | 100.0 | 86.8 | 95.6 |
| 1/2" | 94.3 | 81.2 | 86.6 |
| 3/8" | 82.4 | 70.6 | 80.9 |
| | GRAIN SIZE | | |
| $D_{60}$ | 2.6695 | 6.6294 | 4.1039 |
| $D_{30}$ | | 1.3770 | 0.0837 |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 68.6 | 53.0 | 63.3 |
| #10 | 55.9 | 34.1 | 48.8 |
| #16 | 50.6 | 28.9 | 43.8 |
| #40 | 43.4 | 22.8 | 38.6 |
| #50 | 41.6 | 21.3 | 37.5 |
| #100 | 38.2 | 18.6 | 35.1 |
| #200 | 30.8 | 14.6 | 28.8 |

Material Description
○ silty, clayey sand with gravel

□ SIEVE ONLY

△ clayey gravel with sand

REMARKS:
○

□

△

○ Source of Sample: CBP5 Depth: 10.0 - 11.5' Sample Number: D

□ Source of Sample: CBP5 Depth: 15.0 - 15.4' Sample Number: E

△ Source of Sample: CBP5 Depth: 5.0 - 10.0' Sample Number: BULK 1

**NEVADA DEPARTMENT OF TRANSPORTATION**

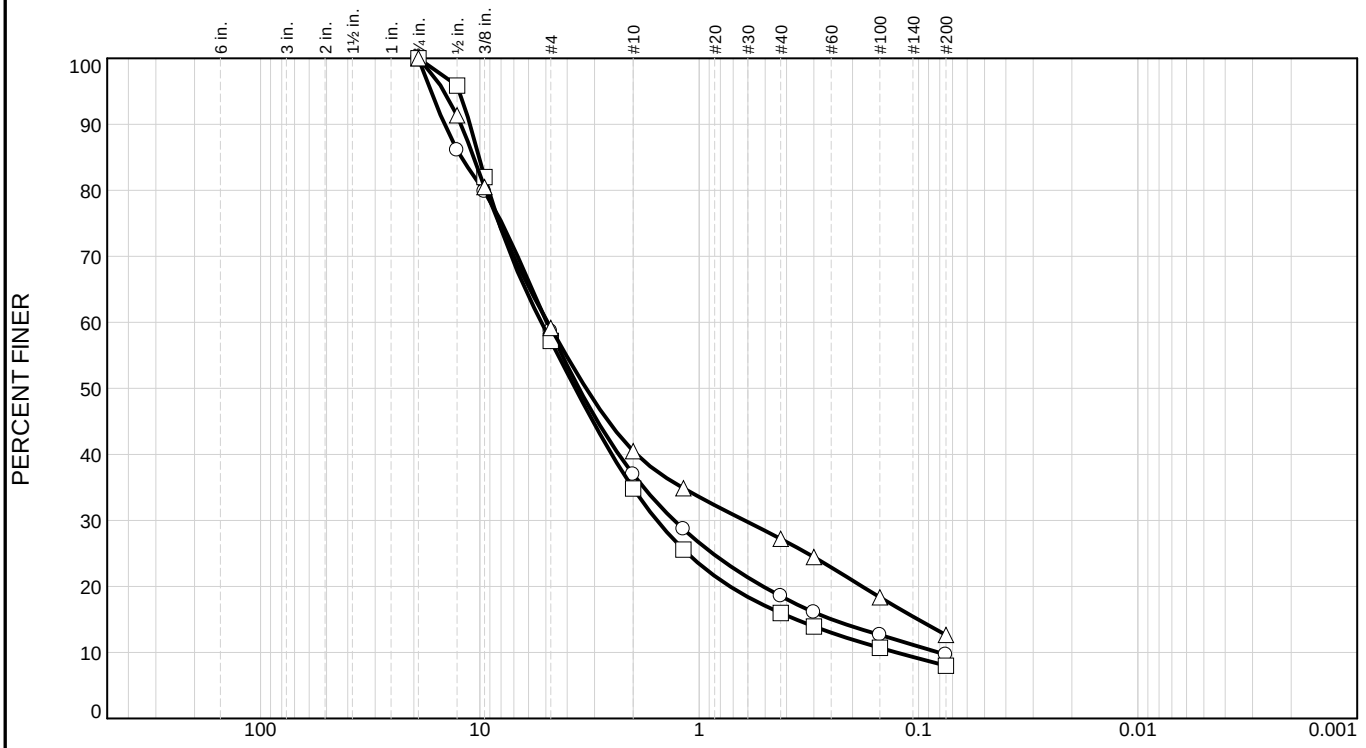
Client: A. Ablahani

Project: SR 160 Cable Barrier Rail

Project No.: EA 73587, FL-6-10

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 41.4 | 48.9 | 9.7 | | SP-SM | A-1-a | 16 | 19 |
| □ | 0.0 | 42.8 | 49.2 | 8.0 | | SP-SM | A-1-a | NP | 15 |
| △ | 0.0 | 40.8 | 46.5 | 12.7 | | | | | |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 3/4" | 100.0 | 100.0 | 100.0 |
| 1/2" | 86.1 | 95.9 | 91.4 |
| 3/8" | 79.8 | 82.0 | 80.5 |
| | GRAIN SIZE | | |
| $D_{60}$ | 4.9577 | 5.2461 | 4.9068 |
| $D_{30}$ | 1.3021 | 1.5606 | 0.6203 |
| $D_{10}$ | 0.0810 | 0.1261 | |
| | COEFFICIENTS | | |
| $C_c$ | 4.22 | 3.68 | |
| $C_u$ | 61.17 | 41.61 | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 58.6 | 57.2 | 59.2 |
| #10 | 37.0 | 34.8 | 40.5 |
| #16 | 28.7 | 25.6 | 34.9 |
| #40 | 18.5 | 16.0 | 27.2 |
| #50 | 16.1 | 13.9 | 24.5 |
| #100 | 12.7 | 10.7 | 18.4 |
| #200 | 9.7 | 8.0 | 12.7 |

Material Description
○ poorly graded sand with silt and gravel

□ poorly graded sand with silt and gravel

△ SIEVE ONLY

REMARKS:
○

□

△

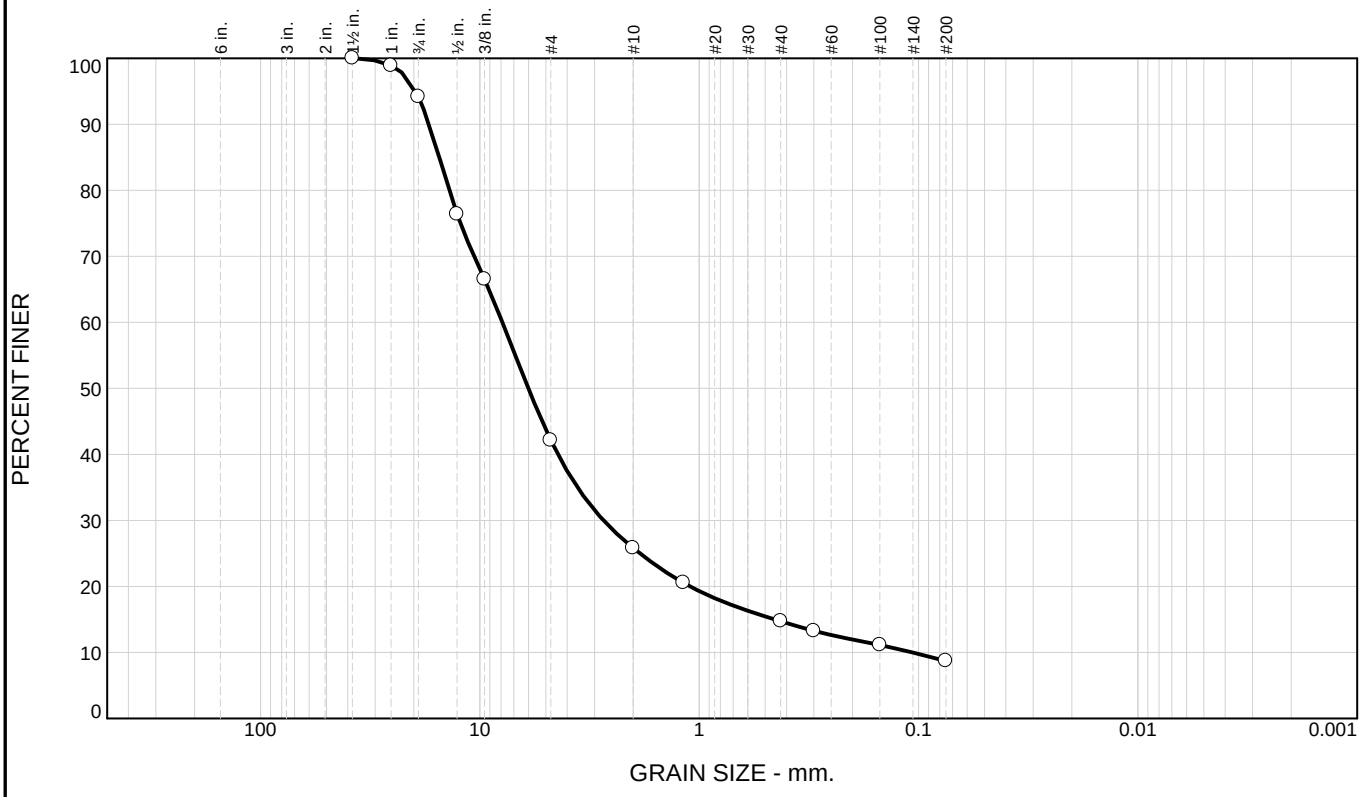
○ Source of Sample: CBP6 Depth: 5.0 - 6.5' Sample Number: A
□ Source of Sample: CBP6 Depth: 10.0 - 11.5' Sample Number: B
△ Source of Sample: CBP6 Depth: 15.0 - 15.4' Sample Number: C

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: SR 160 Cable Barrier Rail
Project No.: EA 73587, FL-6-10

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 57.9 | 33.4 | 8.7 | | GP-GM | A-1-a | 16 | 19 |
| | | | | | | | | | |
| | | | | | | | | | |

| SIEVE inches size | PERCENT FINER ○ | | |
|---|---|---|---|
| 1.5" | 100.0 | | |
| 1" | 98.9 | | |
| 3/4" | 94.2 | | |
| 1/2" | 76.4 | | |
| 3/8" | 66.5 | | |
| | GRAIN SIZE | | |
| $D_{60}$ | 7.8964 | | |
| $D_{30}$ | 2.7333 | | |
| $D_{10}$ | 0.1068 | | |
| | COEFFICIENTS | | |
| $C_c$ | 8.86 | | |
| $C_u$ | 73.94 | | |

| SIEVE number size | PERCENT FINER ○ | | |
|---|---|---|---|
| #4 | 42.1 | | |
| #10 | 25.8 | | |
| #16 | 20.5 | | |
| #40 | 14.7 | | |
| #50 | 13.3 | | |
| #100 | 11.1 | | |
| #200 | 8.7 | | |

Material Description

○ poorly graded gravel with silt and sand

REMARKS:

○

○ Source of Sample: CBP6 Depth: 5.0 - 10.0' Sample Number: BULK 1

**NEVADA DEPARTMENT OF TRANSPORTATION**

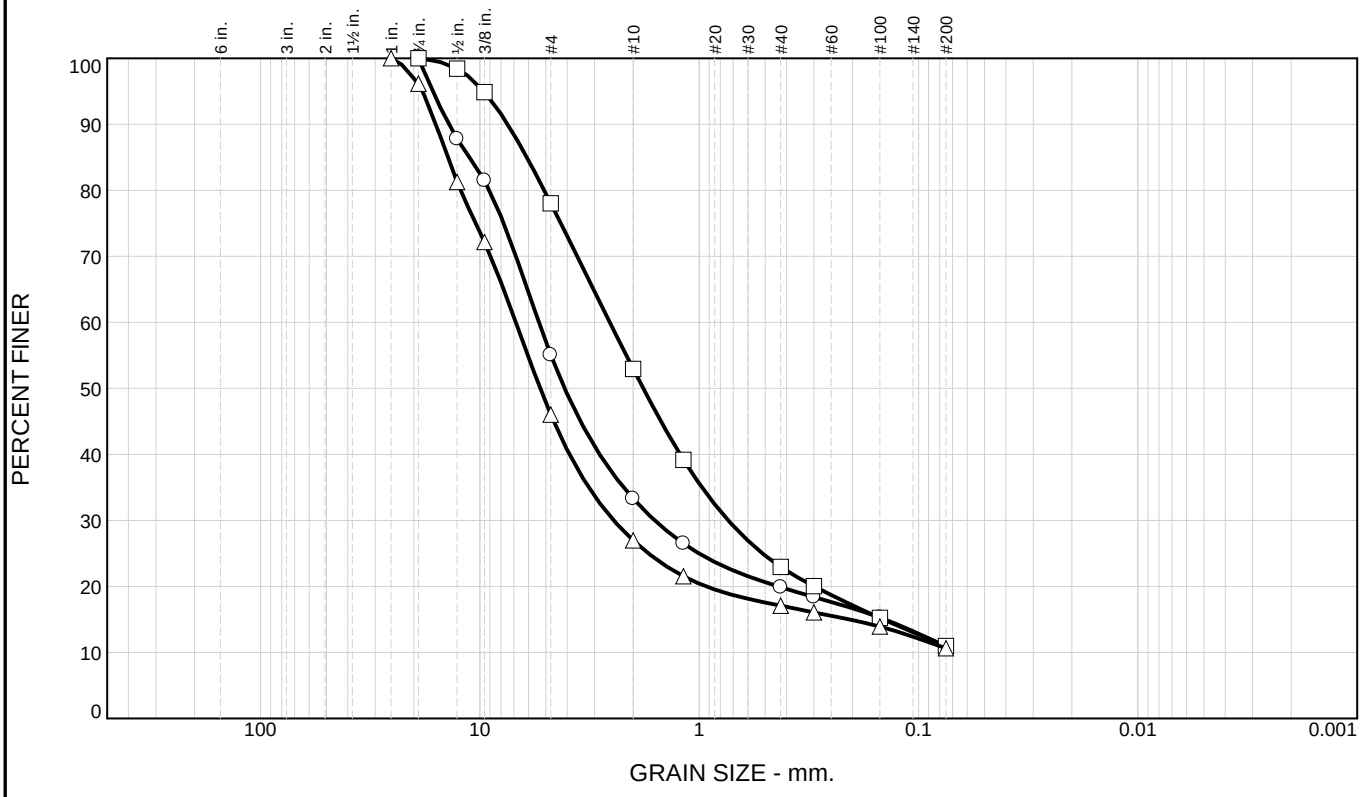
Client: A. Ablahani

Project: SR 160 Cable Barrier Rail

Project No.: EA 73587, FL-6-10

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 44.9 | 44.2 | 10.9 | | GP-GM | A-1-a | 21 | 23 |
| □ | 0.0 | 22.0 | 67.0 | 11.0 | | | | | |
| △ | 0.0 | 54.0 | 35.4 | 10.6 | | GP-GC | A-1-a | 16 | 22 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1" | | | 100.0 |
| 3/4" | 100.0 | 100.0 | 96.2 |
| 1/2" | 87.8 | 98.4 | 81.3 |
| 3/8" | 81.5 | 94.9 | 72.2 |
| | GRAIN SIZE | | |
| $D_{60}$ | 5.3831 | 2.5567 | 6.8562 |
| $D_{30}$ | 1.5964 | 0.7369 | 2.4557 |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 55.1 | 78.0 | 46.0 |
| #10 | 33.3 | 53.0 | 27.0 |
| #16 | 26.5 | 39.2 | 21.5 |
| #40 | 19.9 | 23.0 | 17.1 |
| #50 | 18.4 | 20.0 | 16.1 |
| #100 | 15.3 | 15.2 | 13.9 |
| #200 | 10.9 | 11.0 | 10.6 |

Material Description

○ poorly graded gravel with silt and sand

□ SIEVE ONLY

△ poorly graded gravel with siltyclay and sand

REMARKS:

○

□

△

○ Source of Sample: CBP7 Depth: 5.0 - 6.5' Sample Number: B

□ Source of Sample: CBP7 Depth: 10.0 - 10.35' Sample Number: D

△ Source of Sample: CBP7 Depth: 5.0 - 10.0' Sample Number: BULK 1

**NEVADA DEPARTMENT OF TRANSPORTATION**

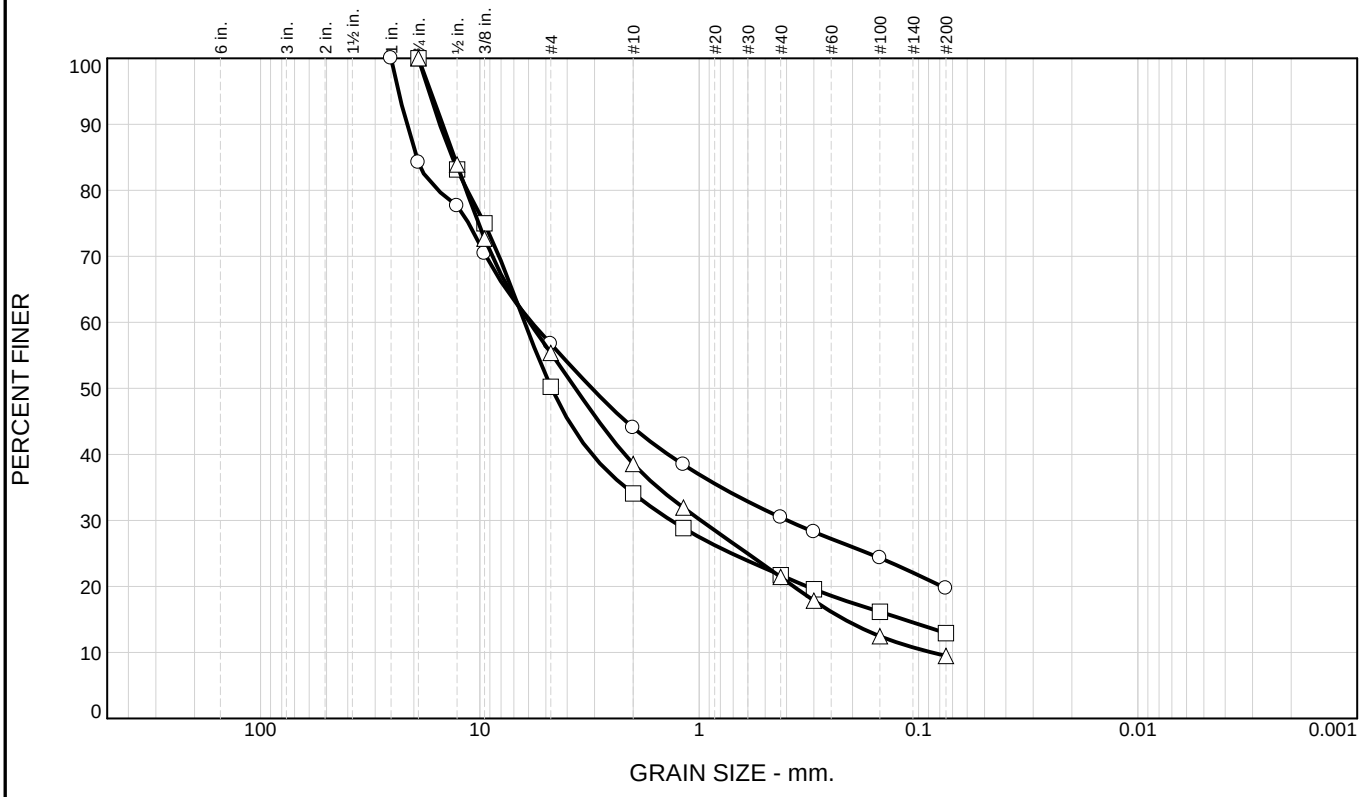
Client: A. Ablahani

Project: SR 160 Cable Barrier Rail

Project No.: EA 73587, FL-6-10

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 43.3 | 37.0 | 19.7 | | GC-GM | A-1-b | 22 | 28 |
| □ | 0.0 | 49.8 | 37.3 | 12.9 | | GM | A-2-7(0) | 32 | 46 |
| △ | 0.0 | 44.6 | 45.9 | 9.5 | | SW-SM | A-1-a | 14 | 15 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1" | 100.0 | | |
| 3/4" | 84.2 | 100.0 | 100.0 |
| 1/2" | 77.7 | 83.2 | 83.9 |
| 3/8" | 70.4 | 75.0 | 72.7 |
| | GRAIN SIZE | | |
| $D_{60}$ | 5.8046 | 6.2549 | 5.9419 |
| $D_{30}$ | 0.3969 | 1.3433 | 0.9829 |
| $D_{10}$ | | | 0.0868 |
| | COEFFICIENTS | | |
| $C_c$ | | | 1.87 |
| $C_u$ | | | 68.42 |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 56.7 | 50.2 | 55.4 |
| #10 | 44.0 | 34.1 | 38.6 |
| #16 | 38.4 | 28.8 | 31.9 |
| #40 | 30.4 | 21.7 | 21.4 |
| #50 | 28.3 | 19.6 | 17.9 |
| #100 | 24.3 | 16.2 | 12.4 |
| #200 | 19.7 | 12.9 | 9.5 |

Material Description

○ silty clayey gravel with sand

□ silty gravel with sand

△ well-graded sand with silt and gravel

REMARKS:

○

□

△

○ Source of Sample: CBP8 Depth: 2.5 - 3.0' Sample Number: A

□ Source of Sample: CBP8 Depth: 5.0 - 6.5' Sample Number: B

△ Source of Sample: CBP8 Depth: 10.0 - 11.5' Sample Number: C

**NEVADA DEPARTMENT OF TRANSPORTATION**

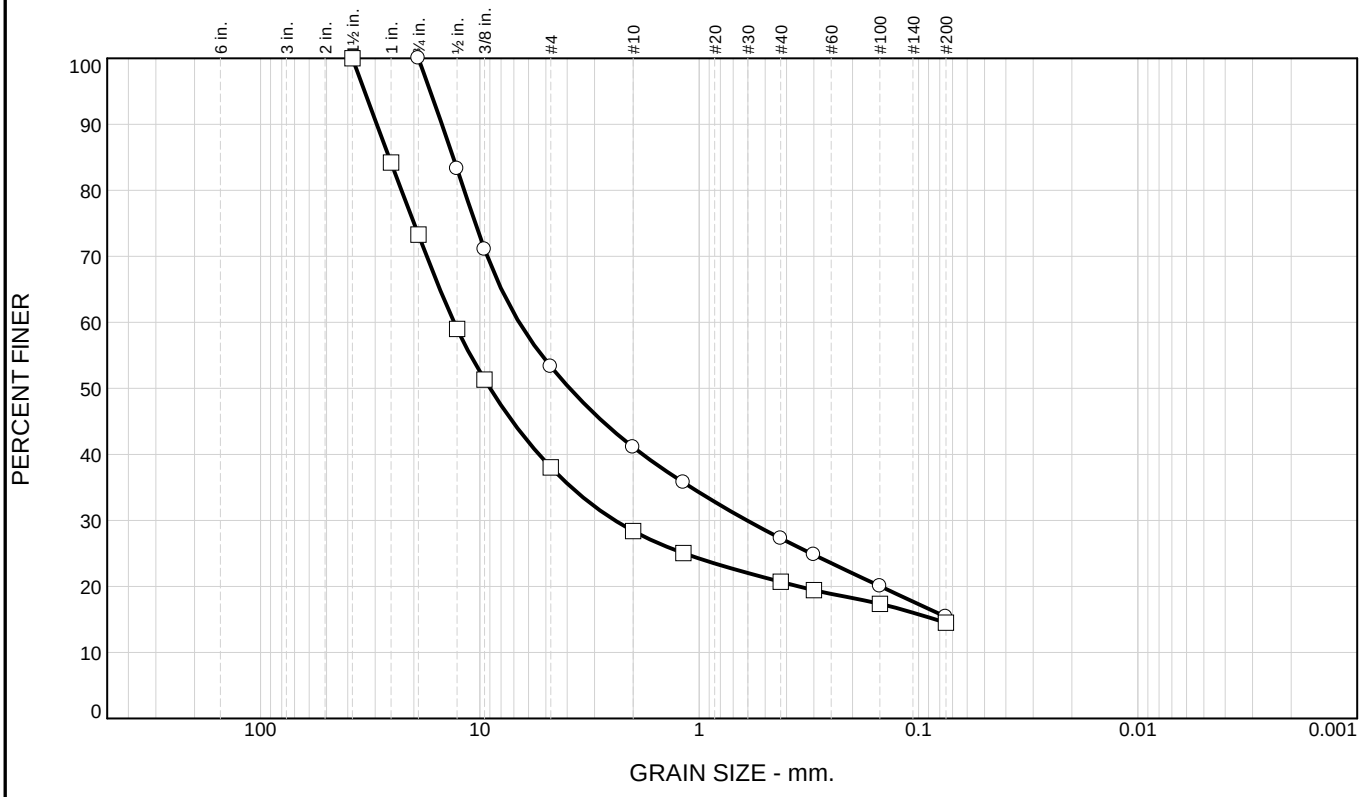
Client: A. Ablahani

Project: SR 160 Cable Barrier Rail

Project No.: EA 73587, FL-6-10

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 46.7 | 37.9 | 15.4 | | | | | |
| □ | 0.0 | 62.0 | 23.5 | 14.5 | | GM | A-2-7(0) | 29 | 44 |
| | | | | | | | | | |

| SIEVE inches size | ○ | □ |
|---|---|---|
| 1.5" | | 100.0 |
| 1" | | 84.2 |
| 3/4" | 100.0 | 73.3 |
| 1/2" | 83.3 | 59.0 |
| 3/8" | 71.1 | 51.3 |
| GRAIN SIZE | | |
| $D_{60}$ | 6.6247 | 13.1133 |
| $D_{30}$ | 0.6055 | 2.4233 |
| $D_{10}$ | | |
| COEFFICIENTS | | |
| $C_c$ | | |
| $C_u$ | | |

| SIEVE number size | ○ | □ |
|---|---|---|
| #4 | 53.3 | 38.0 |
| #10 | 41.1 | 28.4 |
| #16 | 35.7 | 25.1 |
| #40 | 27.3 | 20.7 |
| #50 | 24.8 | 19.4 |
| #100 | 20.0 | 17.4 |
| #200 | 15.4 | 14.5 |

Material Description
○ SIEVE ONLY

□ silty gravel with sand

REMARKS:
○

□

○ Source of Sample: CBP8 Depth: 15.0 - 15.4' Sample Number: D

□ Source of Sample: CBP8 Depth: 5.0 - 10.0' Sample Number: BULK 1

**NEVADA DEPARTMENT OF TRANSPORTATION**

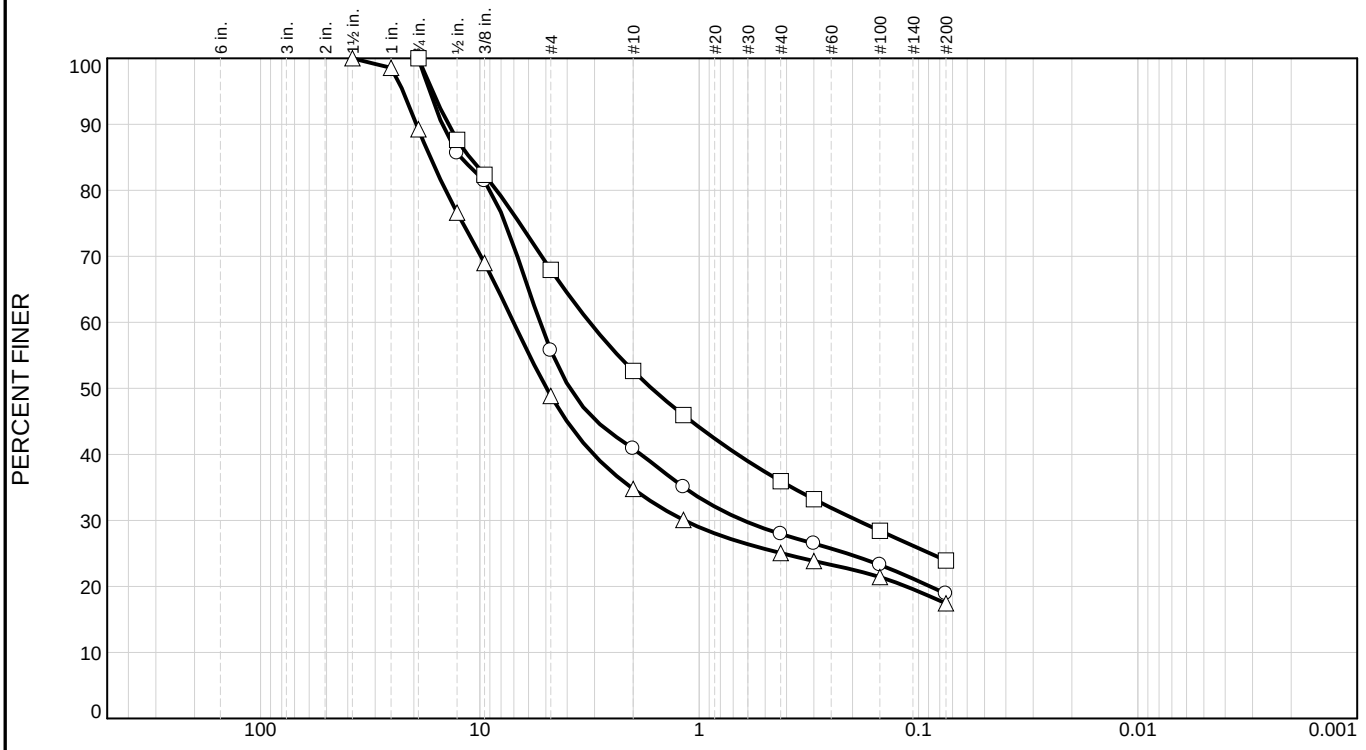
Client: A. Ablahani

Project: SR 160 Cable Barrier Rail

Project No.: EA 73587, FL-6-10

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 44.3 | 36.8 | 18.9 | | GC | A-2-6(0) | 22 | 34 |
| □ | 0.0 | 32.1 | 44.0 | 23.9 | | | | | |
| △ | 0.0 | 51.1 | 31.5 | 17.4 | | GC-GM | A-2-4(0) | 18 | 25 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1.5" | | | 100.0 |
| 1" | | | 98.6 |
| 3/4" | 100.0 | 100.0 | 89.3 |
| 1/2" | 85.6 | 87.6 | 76.6 |
| 3/8" | 81.4 | 82.4 | 69.0 |
| | GRAIN SIZE | | |
| $D_{60}$ | 5.3207 | 3.1577 | 7.0214 |
| $D_{30}$ | 0.6290 | 0.1898 | 1.1679 |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 55.7 | 67.9 | 48.9 |
| #10 | 40.9 | 52.6 | 34.8 |
| #16 | 35.1 | 46.0 | 30.1 |
| #40 | 27.9 | 35.9 | 25.1 |
| #50 | 26.5 | 33.2 | 23.9 |
| #100 | 23.3 | 28.4 | 21.4 |
| #200 | 18.9 | 23.9 | 17.4 |

Material Description
○ clayey gravel with sand

□ SIEVE ONLY

△ silty clayey gravel with sand

REMARKS:
○

□

△

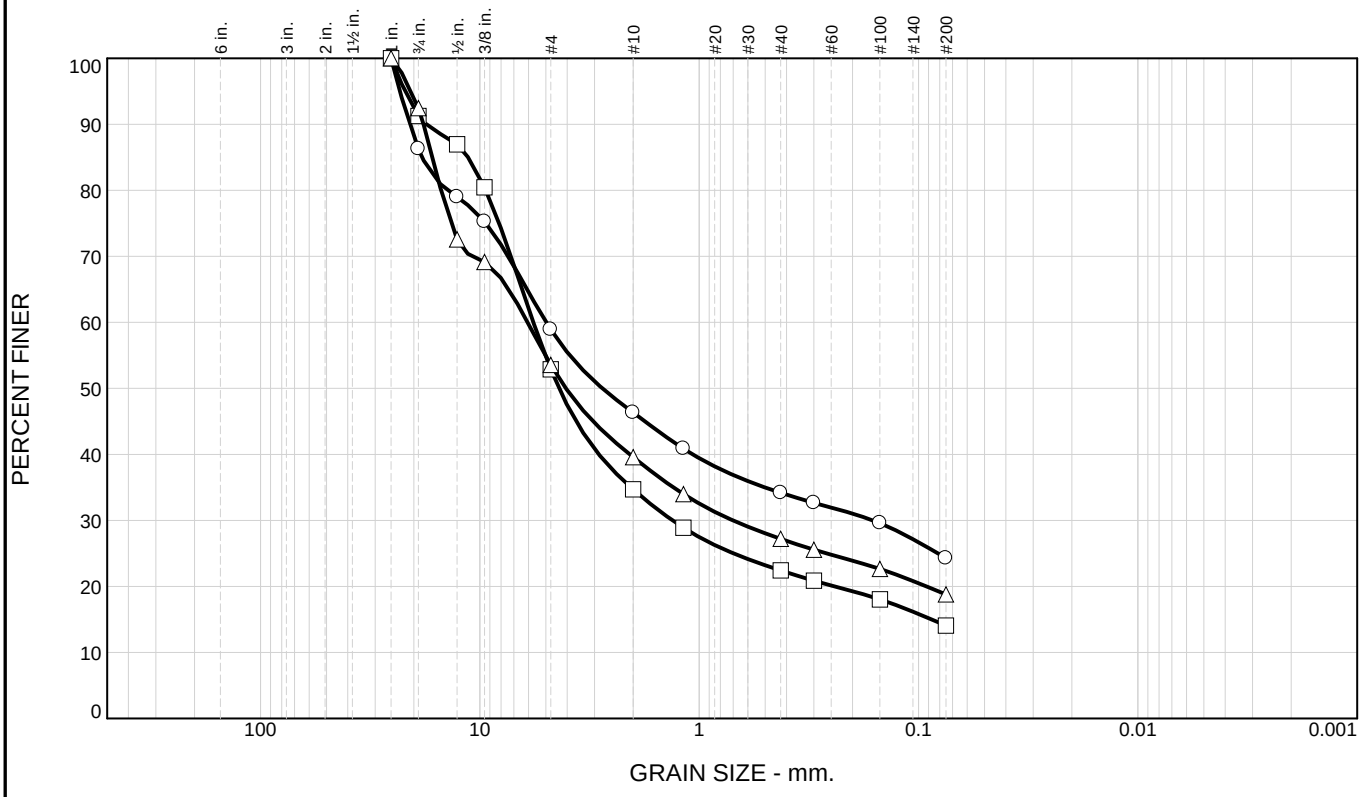
○ Source of Sample: CBP9 Depth: 5.0 - 5.4' Sample Number: A
□ Source of Sample: CBP9 Depth: 15.0 - 15.15' Sample Number: C
△ Source of Sample: CBP9 Depth: 5.0 - 10.0' Sample Number: BULK 1

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: SR 160 Cable Barrier Rail
Project No.: EA 73587, FL-6-10

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 41.1 | 34.6 | 24.3 | | GC-GM | A-1-b | 16 | 21 |
| □ | 0.0 | 47.1 | 38.8 | 14.1 | | GC-GM | A-1-a | 17 | 23 |
| △ | 0.0 | 46.4 | 34.8 | 18.8 | | GC-GM | A-1-b | 15 | 20 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1" | 100.0 | 100.0 | 100.0 |
| 3/4" | 86.3 | 91.3 | 92.4 |
| 1/2" | 79.0 | 87.0 | 72.6 |
| 3/8" | 75.3 | 80.5 | 69.1 |
| GRAIN SIZE | | | |
| $D_{60}$ | 4.9825 | 5.7043 | 6.0571 |
| $D_{30}$ | 0.1611 | 1.3240 | 0.7011 |
| $D_{10}$ | | | |
| COEFFICIENTS | | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 58.9 | 52.9 | 53.6 |
| #10 | 46.3 | 34.7 | 39.6 |
| #16 | 40.9 | 28.9 | 34.0 |
| #40 | 34.2 | 22.4 | 27.2 |
| #50 | 32.7 | 20.9 | 25.6 |
| #100 | 29.6 | 18.0 | 22.7 |
| #200 | 24.3 | 14.1 | 18.8 |

Material Description
○ silty clayey gravel with sand
□ silty clayey gravel with sand
△ silty clayey gravel with sand

REMARKS:
○
□
△

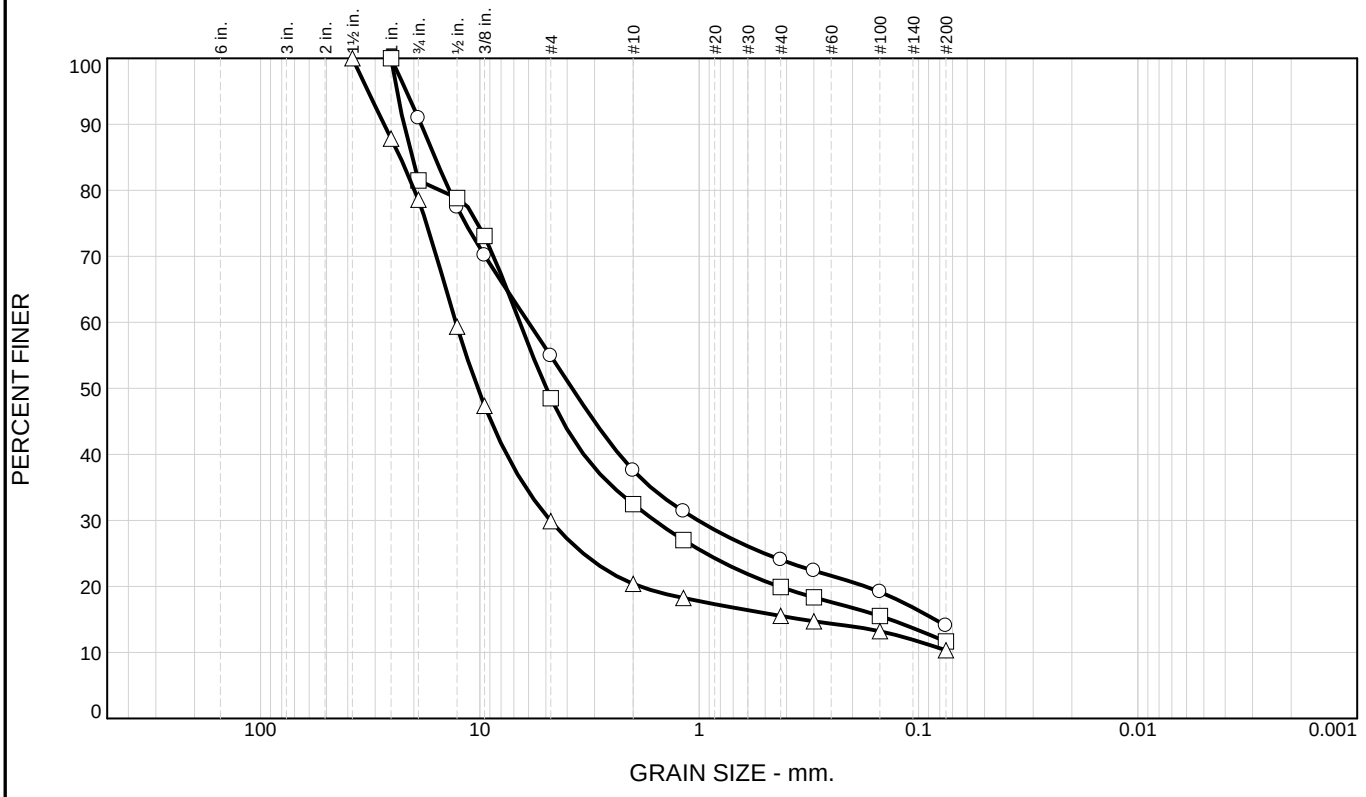
○ Source of Sample: CBP10 Depth: 5.0 - 6.5' Sample Number: A
□ Source of Sample: CBP10 Depth: 7.5 - 9.0' Sample Number: B
△ Source of Sample: CBP10 Depth: 10.0 - 11.5' Sample Number: C

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: SR 160 Cable Barrier Rail
Project No.: EA 73587, FL-6-10

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 45.1 | 40.8 | 14.1 | | GC-GM | A-1-a | 15 | 19 |
| □ | 0.0 | 51.5 | 36.8 | 11.7 | | GP-GC | A-1-a | 15 | 21 |
| △ | 0.0 | 70.1 | 19.6 | 10.3 | | GP-GC | A-1-a | 16 | 21 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1.5" | | | 100.0 |
| 1" | 100.0 | 100.0 | 87.8 |
| 3/4" | 90.9 | 81.5 | 78.6 |
| 1/2" | 77.4 | 78.8 | 59.4 |
| 3/8" | 70.1 | 73.1 | 47.4 |
| GRAIN SIZE | | | |
| $D_{60}$ | 6.0061 | 6.5799 | 12.8739 |
| $D_{30}$ | 1.0111 | 1.5985 | 4.7803 |
| $D_{10}$ | | | |
| COEFFICIENTS | | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 54.9 | 48.5 | 29.9 |
| #10 | 37.6 | 32.5 | 20.4 |
| #16 | 31.4 | 27.0 | 18.3 |
| #40 | 24.0 | 19.9 | 15.5 |
| #50 | 22.4 | 18.3 | 14.7 |
| #100 | 19.2 | 15.5 | 13.2 |
| #200 | 14.1 | 11.7 | 10.3 |

Material Description

○ silty clayey gravel with sand

□ poorly graded gravel with siltyclay and sand

△ poorly graded gravel with siltyclay and sand

REMARKS:

○

□

△

○ Source of Sample: CBP10 Depth: 12.5 - 14.0' Sample Number: D

□ Source of Sample: CBP10 Depth: 15.0 - 16.5' Sample Number: E

△ Source of Sample: CBP10 Depth: 5.0 - 10.0' Sample Number: BULK 1

**NEVADA DEPARTMENT OF TRANSPORTATION**

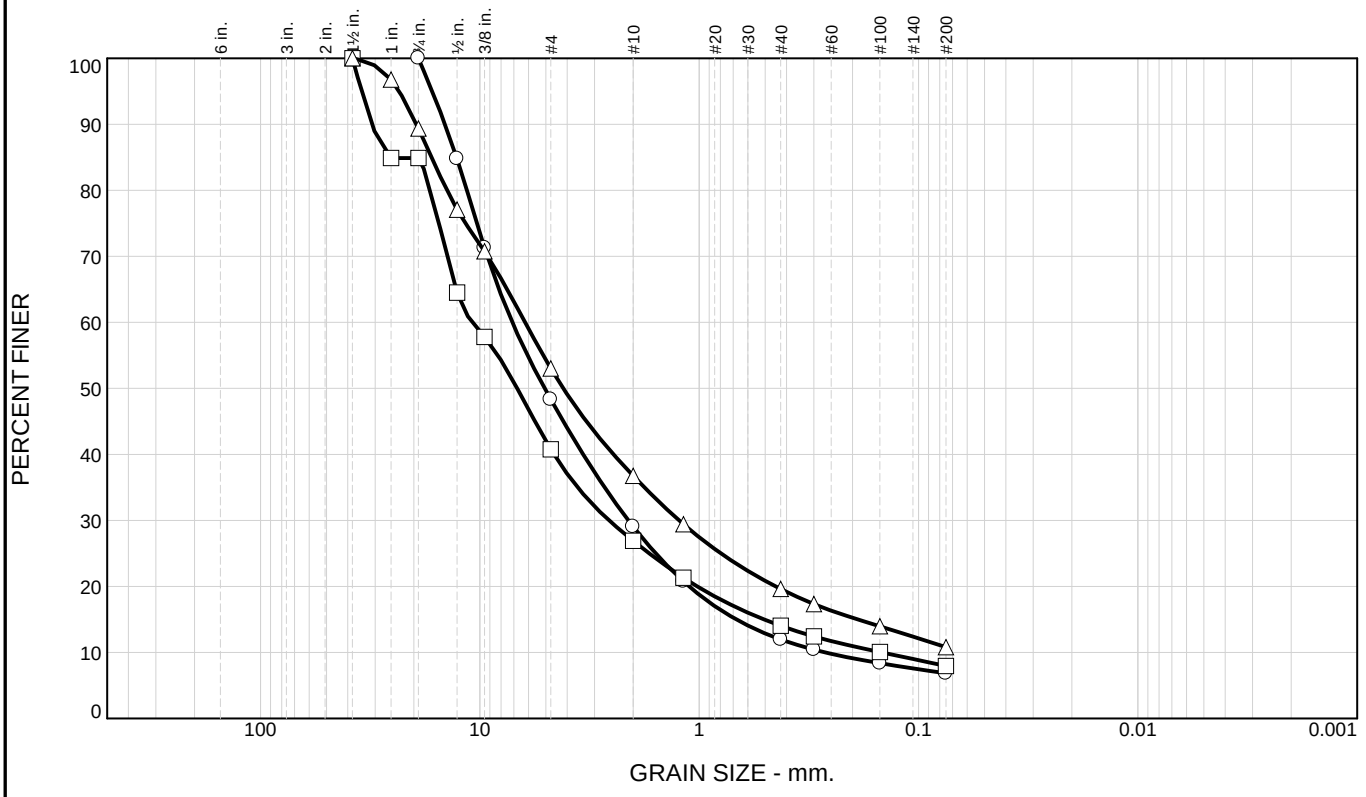
Client: A. Ablahani

Project: SR 160 Cable Barrier Rail

Project No.: EA 73587, FL-6-10

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 51.7 | 41.5 | 6.8 | | GW-GC | A-1-a | 14 | 20 |
| □ | 0.0 | 59.2 | 32.8 | 8.0 | | GP-GM | A-1-a | 14 | 16 |
| △ | 0.0 | 47.0 | 42.2 | 10.8 | | | | | |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1.5" | | 100.0 | 100.0 |
| 1" | | 84.9 | 96.8 |
| 3/4" | 100.0 | 84.9 | 89.4 |
| 1/2" | 84.8 | 64.5 | 77.1 |
| 3/8" | 71.3 | 57.8 | 70.8 |
| | GRAIN SIZE | | |
| $D_{60}$ | 7.1192 | 10.8660 | 6.2204 |
| $D_{30}$ | 2.1047 | 2.5774 | 1.2359 |
| $D_{10}$ | 0.2662 | 0.1467 | |
| | COEFFICIENTS | | |
| $C_c$ | 2.34 | 4.17 | |
| $C_u$ | 26.74 | 74.08 | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 48.3 | 40.8 | 53.0 |
| #10 | 29.1 | 26.9 | 36.8 |
| #16 | 20.8 | 21.3 | 29.4 |
| #40 | 12.0 | 14.0 | 19.6 |
| #50 | 10.4 | 12.4 | 17.3 |
| #100 | 8.4 | 10.1 | 14.0 |
| #200 | 6.8 | 8.0 | 10.8 |

Material Description
○ well-graded gravel with siltyclay and sand

□ poorly graded gravel with silt and sand

△ SIEVE ONLY

REMARKS:
○

□

△

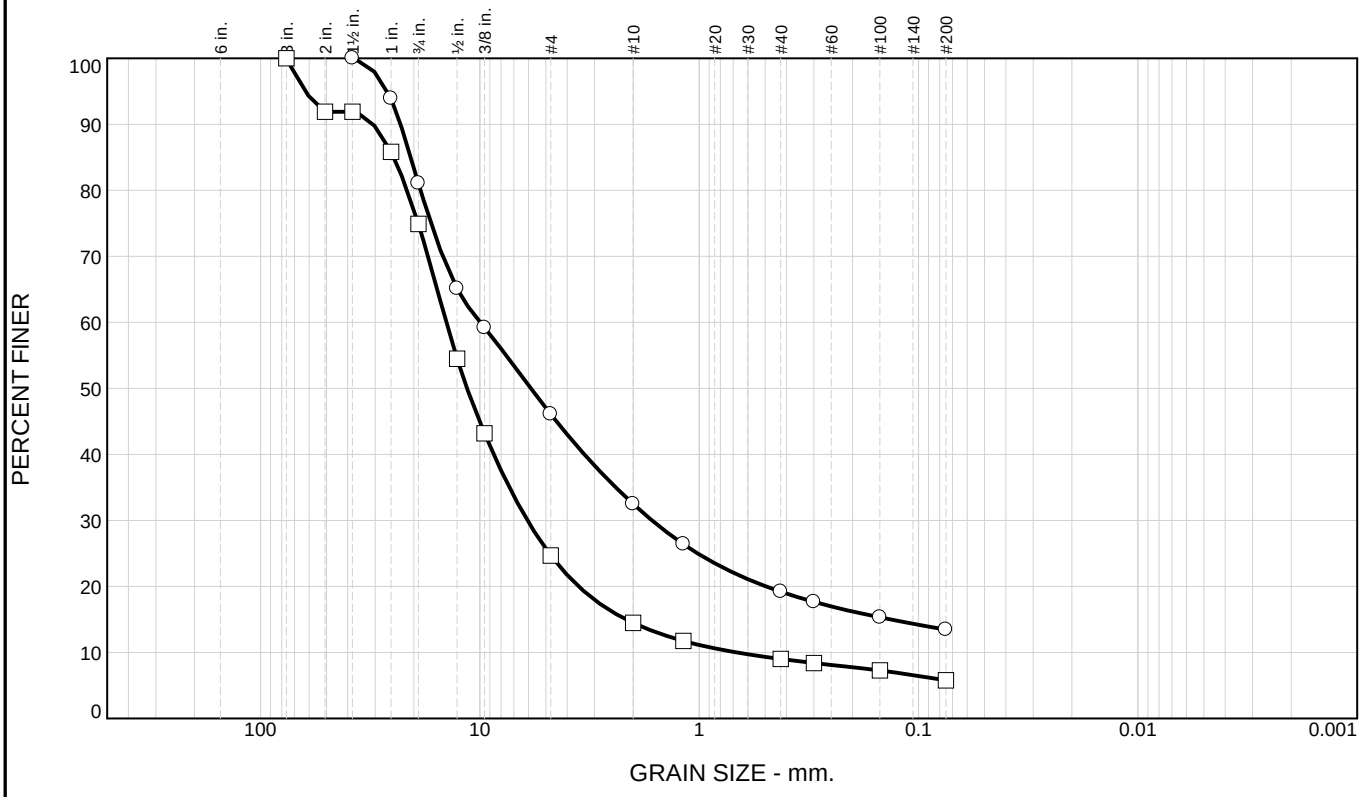
○ Source of Sample: CBP11 Depth: 2.5 - 4.0' Sample Number: A
□ Source of Sample: CBP11 Depth: 5.0 - 6.0' Sample Number: B
△ Source of Sample: CBP11 Depth: 10.0 - 11.35' Sample Number: D

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: SR 160 Cable Barrier Rail
Project No.: EA 73587, FL-6-10

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 53.9 | 32.7 | 13.4 | | | | | |
| □ | 0.0 | 75.3 | 18.9 | 5.8 | | GP-GC | A-1-a | 15 | 21 |
| | | | | | | | | | |

| SIEVE inches size | ○ PERCENT FINER | □ PERCENT FINER |
|---|---|---|
| 3" | | 100.0 |
| 2" | | 91.9 |
| 1.5" | 100.0 | 91.9 |
| 1" | 93.9 | 85.8 |
| 3/4" | 81.1 | 74.9 |
| 1/2" | 65.1 | 54.5 |
| 3/8" | 59.2 | 43.2 |
| **GRAIN SIZE** | | |
| $D_{60}$ | 9.9712 | 14.2142 |
| $D_{30}$ | 1.6408 | 6.0721 |
| $D_{10}$ | | 0.6767 |
| **COEFFICIENTS** | | |
| $C_c$ | | 3.83 |
| $C_u$ | | 21.00 |

| SIEVE number size | ○ PERCENT FINER | □ PERCENT FINER |
|---|---|---|
| #4 | 46.1 | 24.7 |
| #10 | 32.5 | 14.5 |
| #16 | 26.4 | 11.7 |
| #40 | 19.2 | 9.0 |
| #50 | 17.7 | 8.4 |
| #100 | 15.3 | 7.3 |
| #200 | 13.4 | 5.8 |

Material Description
○ SIEVE ONLY

□ poorly graded gravel with siltyclay and sand

REMARKS:
○

□

○ Source of Sample: CBP11 Depth: 15.0 - 16.1' Sample Number: E

□ Source of Sample: CBP11 Depth: 5.0 - 10.0' Sample Number: BULK 1

**NEVADA DEPARTMENT OF TRANSPORTATION**

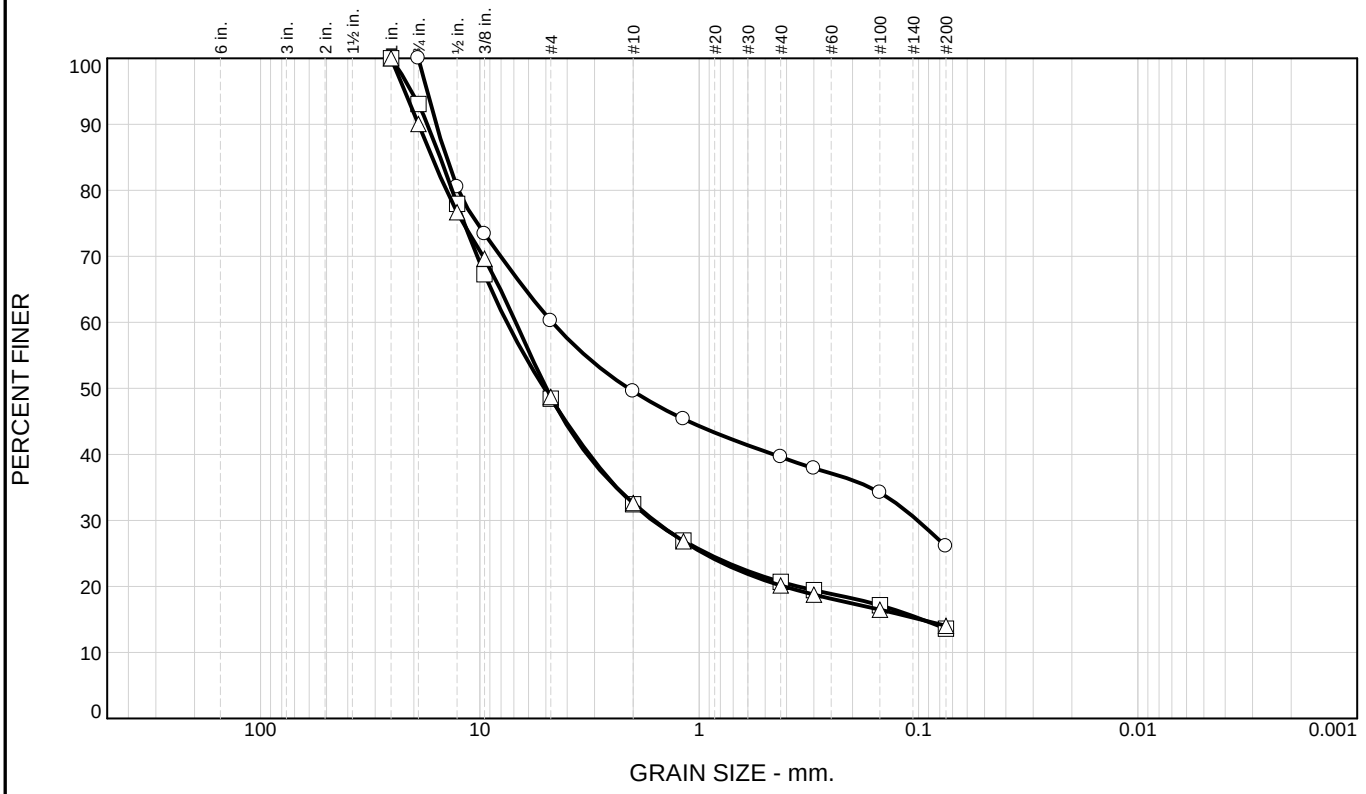
Client: A. Ablahani

Project: SR 160 Cable Barrier Rail

Project No.: EA 73587, FL-6-10

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 39.8 | 34.1 | 26.1 | | GC | A-2-4(0) | 20 | 30 |
| □ | 0.0 | 51.6 | 34.8 | 13.6 | | GC-GM | A-1-a | 17 | 23 |
| △ | 0.0 | 51.3 | 34.7 | 14.0 | | GC-GM | A-2-4(0) | 15 | 22 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1" | | 100.0 | 100.0 |
| 3/4" | 100.0 | 93.1 | 90.0 |
| 1/2" | 80.5 | 78.0 | 76.7 |
| 3/8" | 73.4 | 67.3 | 69.7 |
| | GRAIN SIZE | | |
| $D_{60}$ | 4.6809 | 7.5367 | 6.8621 |
| $D_{30}$ | 0.1010 | 1.6324 | 1.6060 |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 60.2 | 48.4 | 48.7 |
| #10 | 49.6 | 32.4 | 32.6 |
| #16 | 45.4 | 26.9 | 26.8 |
| #40 | 39.6 | 20.7 | 20.1 |
| #50 | 37.9 | 19.4 | 18.8 |
| #100 | 34.2 | 17.1 | 16.5 |
| #200 | 26.1 | 13.6 | 14.0 |

Material Description
○ clayey gravel with sand
□ silty clayey gravel with sand
△ silty clayey gravel with sand

REMARKS:
○
□
△

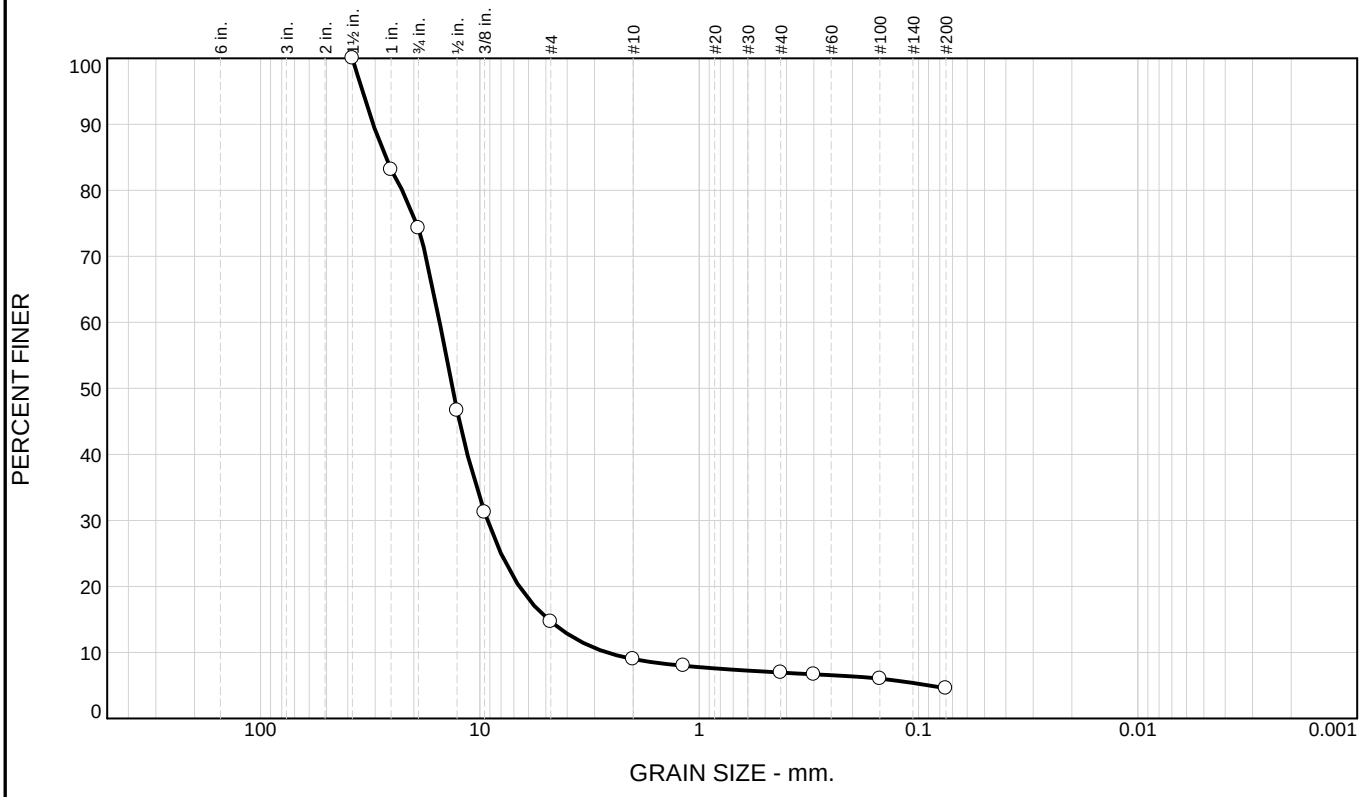
○ Source of Sample: CBP12 Depth: 1.0 - 2.5' Sample Number: A
□ Source of Sample: CBP12 Depth: 5.0 - 6.5' Sample Number: B
△ Source of Sample: CBP12 Depth: 15.0 - 15.8' Sample Number: D

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: SR 160 Cable Barrier Rail
Project No.: EA 73587, FL-6-10

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 85.3 | 10.1 | 4.6 | | GW | A-2-4(0) | 17 | 25 |
| | | | | | | | | | |
| | | | | | | | | | |

| SIEVE inches size | PERCENT FINER ○ | | |
|---|---|---|---|
| 1.5" | 100.0 | | |
| 1" | 83.1 | | |
| 3/4" | 74.3 | | |
| 1/2" | 46.6 | | |
| 3/8" | 31.2 | | |
| | GRAIN SIZE | | |
| $D_{60}$ | 15.2414 | | |
| $D_{30}$ | 9.2438 | | |
| $D_{10}$ | 2.6384 | | |
| | COEFFICIENTS | | |
| $C_c$ | 2.12 | | |
| $C_u$ | 5.78 | | |

| SIEVE number size | PERCENT FINER ○ | | |
|---|---|---|---|
| #4 | 14.7 | | |
| #10 | 9.0 | | |
| #16 | 8.0 | | |
| #40 | 7.0 | | |
| #50 | 6.7 | | |
| #100 | 6.0 | | |
| #200 | 4.6 | | |

Material Description
○ well-graded gravel

REMARKS:
○

○ Source of Sample: CBP12 Depth: 5.0 - 10.0' Sample Number: BULK 1

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: SR 160 Cable Barrier Rail
Project No.: EA 73587, FL-6-10

Figure

**NEVADA DEPARTMENT OF TRANSPORTATION**
**GEOTECHNICAL SECTION**

## CHEMICAL ANALYSIS

E.A. No. 73587

PROJECT SR 160 Cable Barrier Rail

BORING # CBP 1, 5, 9

| Sample No. | Chlorides * ppm AASHTO T 291 A | Sulfates * ppm AASHTO T 290 B | pH AASHTO T 289 | Resistivity ohm - cm AASHTO T 288 |
|---|---|---|---|---|
| 1 BULK 1 | 40 | 0 | 8.2 | 4,636 |
| 5 BULK 1 | 40 | 0 | 8.2 | 3,802 |
| 9 BULK 1 | 130 | 313 | 8.5 | 1,334 |
| | | | | |
| | | | | |
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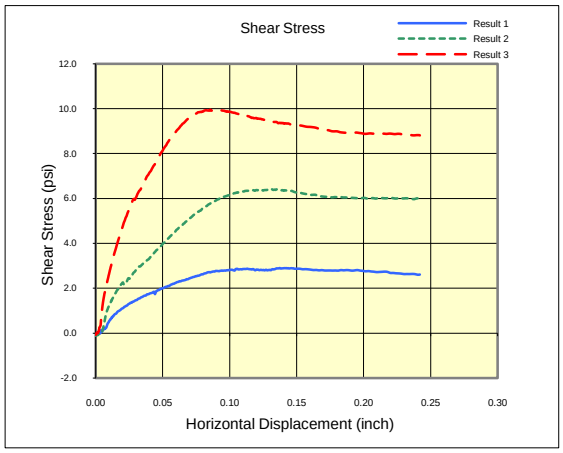
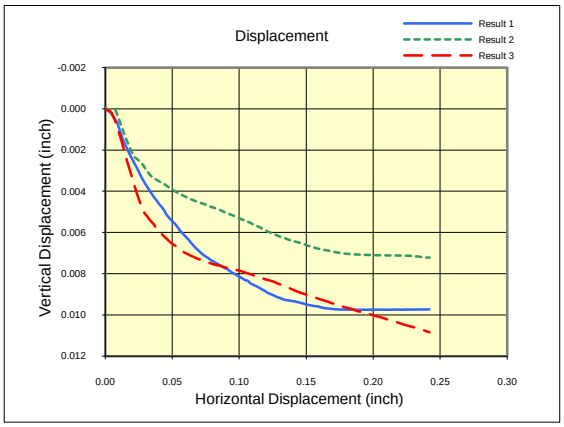
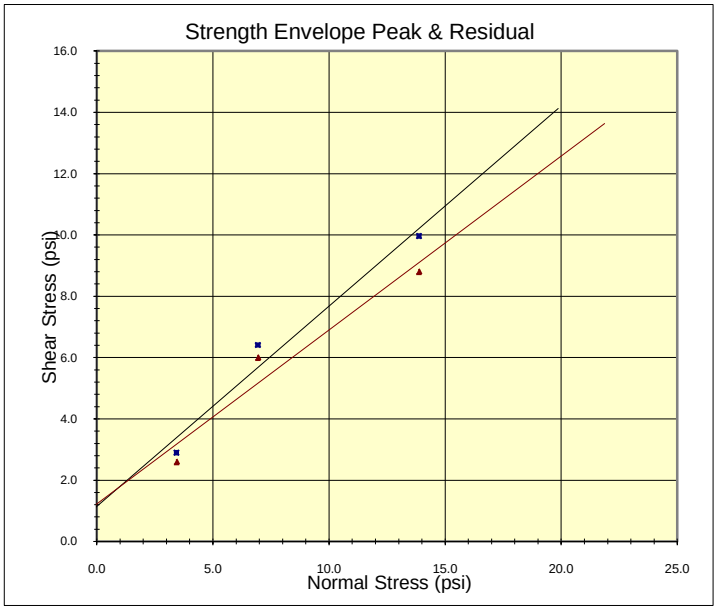
# DIRECT SHEAR TEST REPORT




## Strength Parameters

| | Peak | | Residual |
|---|---|---|---|
| Friction Angle = | 33 | degrees | 30 |
| Cohesion = | 1.14 | psi | 1.23 |

Project: FL-6-10 Boring: CBP-1 Sample: B1

| | Result 1 | Result 2 | Result 3 |
|---|---|---|---|
| Specimen: | a | b | c |
| Date Tested | 06/28/2010 | 06/28/2010 | 06/28/2010 |
| Diameter (inch): | 2.42 | 2.42 | 2.42 |
| Height (inch): | 1.00 | 1.00 | 1.00 |
| Depth (ft): | 5.80 | 5.80 | 5.80 |
| Moisture (%) | 23.2 | 22.0 | 17.8 |
| Dry Unit Wt (pcf) | 79.1 | 78.8 | 81.9 |
| SHEAR | | | |
| Displacement Rate($^{in}/_{min}$) | 0.0055 | 0.0054 | 0.0057 |
| Normal Stress (psi) | 3.43 | 6.94 | 13.87 |
| **Peak** Shear Stress(psi) | 2.90 | 6.41 | 9.96 |
| **Residual** Shear Stress(psi) | 2.6 | 6.0 | 8.8 |
| Residual Point Picked @(in) | 0.242 | 0.242 | 0.242 |
| Time @ Peak Failure (min) | 25.0 | 23.9 | 15.5 |

## Specimen Comments

a Pale Yellowish brown silt with sand shear @ 500 psf

b Pale Yellowish brown silt with sand shear @ 1000 psf

c Pale Yellowish brown silt with sand shear @ 2000 psf

Geotechnical Section

NEVADA DOT