

# GEOTECHNICAL DATA REPORT

## US-50 NEVADA/UTAH BORDER RADIO TOWER WHITE PINE COUNTY, NEVADA

JULY 2021



| NEVADA DEPARTMENT OF TRANSPORTATION | MATERIALS DIVISION |  
| GEOTECHNICAL SECTION | 1263 S STEWART ST, CARSON CITY, NEVADA 89712 |

**STATE OF NEVADA**  
**DEPARTMENT OF TRANSPORTATION**  
**MATERIALS DIVISION**  
**GEOTECHNICAL SECTION**

**GEOTECHNICAL DATA REPORT**

**US-50 NEVADA/UTAH BORDER RADIO TOWER**

**WHITE PINE COUNTY, NEVADA**

**AUGUST 2021**

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# Introduction

## 1.1 Project Description

An 80-foot tall radio tower and associated hut is planned to be constructed by the Nevada Department of Transportation (NDOT) near the Nevada and Utah state border on U.S. Highway 50 (US 50) in White Pine County, Nevada. This geotechnical data report presents the information obtained from our geotechnical exploration for the proposed tower.

The project Vicinity Map and Exploration Map are shown in Appendix A on Figures A-1 and A-2, respectively.

## 1.2 Purpose and Scope of Work

The purpose of this investigation is to provide subsurface data for the project site from a geotechnical perspective for the proposed tower foundation. We are providing this data for the design by others. The main objectives of the investigation were to characterize the subsurface materials and document our findings in this report. The investigation was conducted in accordance with American Association of State Highway and Traffic Administration (AASHTO) and Federal Highway Administration (FHWA) guidelines.

The scope of our geotechnical investigation includes the following:

- A review of published geologic and geotechnical information pertaining to the site vicinity;
- A field exploration consisting of drilling one boring to a maximum depth of approximately 50 feet below ground surface (bgs) to obtain information about the subsurface conditions for the proposed tower foundation in the geotechnical data report;
- Performing geotechnical laboratory testing on select soil samples collected from the borings; and
- Preparation of this report.

## **2. Field Exploration and Laboratory Testing**

### **2.1 Field Exploration**

One boring was drilled on June 30, 2021 at the approximate location shown on the Exploration Map to a maximum depth of 51.5 feet bgs. The boring was drilled utilizing a truck-mounted Diedrich D-120 drill rig equipped with six-inch diameter hollow stem augers. Samples were collected using Standard Penetration Test (SPT) samplers driven by an automatic hammer with a weight of 140 pounds and a drop of 30 inches.

The number of blows required to drive the sampler were recorded for each 6-inch interval of the 18-inch drive. The cumulative blow count for the bottom 12 inches of drive is presented in the boring logs. The blow counts presented in the logs are uncorrected and are shown as they were recorded in the field. Both the samples and drill cuttings were visually classified in the field based on the Unified Soil Classification System (USCS) in general accordance with ASTM D2488.

The subsurface conditions encountered are summarized in Section 3.2. Logs of the boring were prepared based on the field logging and the results of laboratory testing in general accordance with ASTM D2487. The boring logs are presented in Appendix B.

### **2.2 Geotechnical Laboratory Testing**

Laboratory testing was conducted on select soil samples recovered during the field exploration. Tests conducted include the following:

- Method of Test Sieve Analysis of Coarse and Fine Aggregate (Nev. T206);
- Method of Test for Determining the Liquid Limit, Plastic Limit, and Plasticity Index of Soil (Nev. T210, T211, and T212);

Geotechnical laboratory test results are presented in Appendix C.

## **3. Site and Subsurface Conditions**

### **3.1 Site Conditions**

The site is located near the Nevada/Utah State border on US 50 approximately 63.4 miles southeast of Ely, Nevada. The proposed location is on the north side of US 50 and is vegetated with sparse sagebrush. The surface was relatively level with little topsoil and had a general downward slope to the east at about 2 percent. The surrounding properties are largely undeveloped, but a chain-link fenced communication enclosure exists about 180 feet to the northeast, the state line about 160 feet to the east, the Border Inn Casino and parking lot on the south side of US 50 and a construction material storage facility about 0.2 miles to the northwest. An overhead power line exists about 160 feet to the north and runs parallel to US 50.

### **3.2 Subsurface Conditions**

#### **3.2.1 General Geology and Faulting**

The site is located within the Basin and Range geomorphic province, in the Great Basin south of the Snake Range. The site area is mapped as being comprised of Quaternary alluvium. The nearest active fault with historic movement (last 150 years) is the Snake Valley Fault fault zone, located approximately 2 miles to the north. Other active faults nearby include the Sacramento Pass fault zone located approximately 5 miles to the northwest.

#### **3.2.2 Subsurface Materials**

The results of our field exploration and laboratory analyses indicate a soil profile of less than an inch of organic topsoil underlain by layers of loose to very dense silty, clayey SAND (SC-SM) extending to the maximum depth explored of 51.5 feet bgs. The upper five feet of sand appeared to be loose and became more dense with depth.

#### **3.2.3 Groundwater Conditions**

Groundwater was not encountered during our exploration. Based on adjacent well logs, groundwater is anticipated to be around 50 feet bgs.

## 4. References

American Association of State Highway and Transportation Officials (AASHTO), 2017, "LRFD Bridge Design Specifications, 8th Edition"

Kakata, K. John, et al, 1982, "Quaternary Fault Map of the Basin and Range and Rio Grande Rift Provinces, Western United States, Department of the Interior United States Geological Survey"

Loehr, Erik, et al, 2016, "FHWA NHI-16-072 Geotechnical Site Characterization"

Mayne, W. Paul, et al, 2002, "FHWA-NHI-01-031 Subsurface Investigation Manual"

Nevada Department of Transportation (NDOT), 2008, "Structures Manual"

Sabatini, P.J., et al, 2002, "FHWA-IF-02-034 Evaluation of Soil and Rock Properties"

Stewart, John H., and Carlson, John E., 1978, "Geologic map of Nevada, Nevada Bureau of Mines and Geology, scale 1:500,00."

U.S. Geologic Survey, October 8, 2019, U.S. Seismic Design Maps,  
<https://earthquake.usgs.gov/ws/designmaps/>

## 5. Limitations

This report has been prepared by NDOT Geotechnical Section under the supervision of those whose signatures appear herein. The interpretation of data, findings, and recommendations presented in this report were developed from our geotechnical investigation.

If the proposed project is modified or relocated, or if the subsurface conditions found during construction differ from those described in this report, NDOT Geotechnical Section should be contacted immediately to assess the new information or changed conditions and determine if our recommendations need revision.



# Appendix A

## Figures





1263 South Stewart Street  
 Carson City, Nevada 89712  
 Phone: (775) 888-7440  
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**Figure A-1 Vicinity Map**

Location: NV-UT Border, US 50  
 Project Name: Communication Tower  
 EA Number: 9100



**Legend**

-  3 Legged Tower - 39° 3'26.59"N , 114° 2'58.15"W
-  Boring TH-1

200 ft



3 Legged Tower - 39° 3'26.59"N , 114° 2'58.15"W

Boring TH-1

6



1263 South Stewart Street  
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**Figure A-2 Exploration Map**

Location: NV/UT Border, US 50  
Project Name: Communication Tower  
EA Number: 9100

Appendix B  
Logs of Borings

# 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   |
| CS         | Claystone/Siltstone  |
| 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. |

### 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                    |



Groundwater Elevation Symbols

| 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.

Blow counts on Calif. Modified Sampler (Ncms) can be converted to N<sub>SPT</sub> by:  
 $(Ncms)(0.62) = N_{SPT}$

Automatic Hammer Energy:  
 Rig # 1627: 82.5%  
 Rig # 1082: 84%

| TEST ABBREVIATIONS   | SAMPLER NOTATION   |
|--|--|
| CD CONSOLIDATED DRAINED<br>CH CHEMICAL (CORROSIVENESS)<br>CM COMPACTION<br>CU CONSOLIDATED UNDRAINED<br>D DISPERSIVE SOILS<br>DS DIRECT SHEAR<br>E EXPANSIVE SOIL<br>G SPECIFIC GRAVITY<br>H HYDROMETER<br>HC HYDRO-COLLAPSE<br>K PERMEABILITY | CMS CALIF. MODIFIED SAMPLER <sup>1</sup><br>CPT CONE PENETRATION TEST<br>CS CONTINUOUS SAMPLER <sup>2</sup><br>CSS CALIFORNIA SPLIT SPOON<br>P PUSHED (NOT DRIVEN)<br>PB PITCHER BARREL<br>RC ROCK CORE <sup>3</sup><br>SH SHELBY TUBE <sup>4</sup><br>SPT STANDARD PENETRATION TEST<br>TP TEST PIT<br>1- I.D.= 2.421 inch<br>2- I.D.=3.228 inch with tube; 3.50 inch w/o tube<br>3- NXB I.D.= 1.875 inch<br>4- I.D.= 2.875 inch |
| SOIL COLOR DESIGNATIONS ARE FROM THE MUNSELL SOIL COLOR CHART.<br>EXAMPLE: <u>(7.5 YR 5/3) BROWN</u>   |  |



Materials Division  
Geotechnical Section  
1263 S. Stewart St  
Carson City, NV 89712

START DATE 6/30/21  
END DATE 6/30/21  
PROJECT NV UT Border Tower on US 50  
LOCATION Nevada/Utah Border, US Highway 50  
E.A. # 9100  
BORING TH-1  
GROUND ELEV. ft 5130.0  
TOTAL DEPTH ft 51.5

**BORING LOG**

LATITUDE 39.0575  
LONGITUDE -114.04944  
ENGINEER J. Crosby  
OPERATOR T. Sawin  
DRILL RIG Diedrich D-120  
METHOD Hollow Stem Auger  
HAMMER Automatic  
BACKFILLED Yes DATE 6/30/21

| GROUNDWATER LEVEL |      |          |          |
|-------------------|------|----------|----------|
| DATE              | TIME | DEPTH ft | ELEV. ft |
|                   |      |          |          |
|                   |      |          |          |

| ELEV. (ft) | DEPTH (ft) | SAMPLE NO. | TYPE | BLOWS / 6"     | Uncorrected N Value | Recovery (%) | MOISTURE CONTENT (%) | % PASSING NO.4 | % PASSING NO.200 | LIQUID LIMIT | PLASTICITY INDEX | GRAPHIC LOG | MATERIAL DESCRIPTION  |
|------------|------------|------------|------|----------------|---------------------|--------------|----------------------|----------------|------------------|--------------|------------------|-------------|---|
| 5129.0     | 1          |            |      | 4              |                     |              |                      |                |                  |              |                  | SM          | 1" Topsoil, silty, sandy, organic, light brown.   |
| 5128.0     | 2          | 1          | ▲    | 3<br>4         | 7                   | 67           |                      | 89             | 29               | 24           | 6                | SM          | Silty, clayey SAND (SC-SM), fine-grained sand, low plasticity, little subangular gravel, dry, loose, light tan.     |
| 5127.0     | 3          | 2          | ▲    | 3<br>3         | 5                   | 53           | 4                    | 74             | 21               | 20           | 4                | SC-SM       |   |
| 5126.0     | 4          |            |      | 2              |                     |              |                      |                |                  |              |                  |             |   |
| 5125.0     | 5          | 3          | ▲    | 5<br>8<br>8    | 16                  | 80           |                      | 91             | 8                | 17           | NP               |             | Fines content decreases, becomes non-plastic  |
| 5124.0     | 6          |            |      |                |                     |              |                      |                |                  |              |                  |             |   |
| 5123.0     | 7          |            |      |                |                     |              |                      |                |                  |              |                  |             |   |
| 5122.0     | 8          | 4          | ▲    | 11<br>18<br>36 | 54                  | 87           |                      | 72             | 24               | 23           | 11               | SC          | Clayey SAND with gravel (SC), fine-grained, clayey, very dense, dry, light brown.                                   |
| 5121.0     | 9          |            |      |                |                     |              |                      |                |                  |              |                  |             |   |
| 5120.0     | 10         | 5          | ▲    | 14<br>20<br>30 | 50                  | 93           |                      | 93             | 25               | 22           | 7                |             | Silty, clayey SAND (SC-SM), fine-grained sand, low plasticity, few subangular gravel, very dense, dry, light brown. |
| 5119.0     | 11         |            |      |                |                     |              |                      |                |                  |              |                  |             |   |
| 5118.0     | 12         |            |      |                |                     |              |                      |                |                  |              |                  |             |   |
| 5117.0     | 13         |            |      |                |                     |              |                      |                |                  |              |                  |             |   |
| 5116.0     | 14         |            |      |                |                     |              |                      |                |                  |              |                  |             | Fines content increases, gravel content decreases   |
| 5115.0     | 15         |            |      |                |                     |              |                      |                |                  |              |                  |             |   |
| 5114.0     | 16         | 6          | ▲    | 4<br>5<br>5    | 10                  | 93           |                      | 100            | 48               | 21           | 7                | SC-SM       |   |
| 5113.0     | 17         |            |      |                |                     |              |                      |                |                  |              |                  |             |   |
| 5112.0     | 18         |            |      |                |                     |              |                      |                |                  |              |                  |             |   |
| 5111.0     | 19         |            |      |                |                     |              |                      |                |                  |              |                  |             |   |
| 5110.0     | 20         |            |      |                |                     |              |                      |                |                  |              |                  |             |   |
| 5109.0     | 21         | 7          | ▲    | 7<br>10<br>13  | 23                  | 100          | 6                    | 96             | 40               | 22           | 7                |             | Trace gravel, medium dense  |
| 5108.0     | 22         |            |      |                |                     |              |                      |                |                  |              |                  |             |   |
| 5107.0     | 23         |            |      |                |                     |              |                      |                |                  |              |                  |             | Clayey SAND (SC), fine grained, medium plasticity, dense, moist, light brown.                                       |
| 5106.0     | 24         |            |      |                |                     |              |                      |                |                  |              |                  |             |   |
| 5105.0     | 25         |            |      |                |                     |              |                      |                |                  |              |                  |             |   |
| 5104.0     | 26         | 8          | ▲    | 11<br>19<br>23 | 42                  | 100          |                      | 99             | 45               | 29           | 15               | SC          |   |
| 5103.0     | 27         |            |      |                |                     |              |                      |                |                  |              |                  |             |   |
| 5102.0     | 28         |            |      |                |                     |              |                      |                |                  |              |                  |             |   |
| 5101.0     | 29         |            |      |                |                     |              |                      |                |                  |              |                  | CL/SC       |   |

SMART SOIL LOG NV UT BORDER TOWER.GPJ NDOT SMART LOG 2018.10.10.GDT 8/3/21

Standard Penetration Test  
 USCS Silty Clayey Sand  
 USCS Clayey Sand  
 USCS Borderline CL/SC  
 USCS Well-graded Gravel



**START DATE** 6/30/21  
**END DATE** 6/30/21  
**PROJECT** NV UT Border Tower on US 50  
**LOCATION** Nevada/Utah Border, US Highway 50  
**E.A. #** 9100  
**BORING** TH-1  
**GROUND ELEV. ft** 5130.0  
**TOTAL DEPTH ft** 51.5

**BORING LOG**

**LATITUDE** 39.0575  
**LONGITUDE** -114.04944  
**ENGINEER** J. Crosby  
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**DRILL RIG** Diedrich D-120  
**METHOD** Hollow Stem Auger  
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**BACKFILLED** Yes **DATE** 6/30/21

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| GROUNDWATER LEVEL |      |          |          |
|-------------------|------|----------|----------|
| DATE              | TIME | DEPTH ft | ELEV. ft |
|                   |      |          |          |
|                   |      |          |          |

| ELEV. (ft) | DEPTH (ft) | SAMPLE NO. | TYPE | BLOWS / 6"     | Uncorrected N Value | Recovery (%) | MOISTURE CONTENT (%) | % PASSING NO.4 | % PASSING NO.200 | LIQUID LIMIT | PLASTICITY INDEX | GRAPHIC LOG | MATERIAL DESCRIPTION   |
|------------|------------|------------|------|----------------|---------------------|--------------|----------------------|----------------|------------------|--------------|------------------|-------------|--|
| 5099.0     | 31         | 9          | ▲    | 15<br>20<br>20 | 40                  | 100          |                      | 99             | 51               | 30           | 13               |             | Sandy lean CLAY (CL/SC), low plasticity, fine grained sand, hard, dry, light brown.  |
| 5098.0     | 32         |            |      |                |                     |              |                      |                |                  |              |                  |             |  |
| 5097.0     | 33         |            |      |                |                     |              |                      |                |                  |              |                  |             |  |
| 5096.0     | 34         |            |      |                |                     |              |                      |                |                  |              |                  |             |  |
| 5095.0     | 35         | 10         | ▲    | 10<br>15<br>20 | 35                  | 100          |                      | 48             | 4                | 16           | NP               |             | Well-graded sandy GRAVEL (GW), subangular, dense, dry, light brown.  |
| 5094.0     | 36         |            |      |                |                     |              |                      |                |                  |              |                  |             |  |
| 5093.0     | 37         |            |      |                |                     |              |                      |                |                  |              |                  |             |  |
| 5092.0     | 38         |            |      |                |                     |              |                      |                |                  |              |                  |             |  |
| 5091.0     | 39         |            |      |                |                     |              |                      |                |                  |              |                  |             |  |
| 5090.0     | 40         | 11         | ▲    | 6<br>8<br>6    | 14                  | 100          | 12                   | 99             | 44               | 21           | 5                |             | Silty, clayey SAND (SC-SM): fine grained sand, more gravel content with depth, medium dense to dense, moist, medium brown. |
| 5089.0     | 41         |            |      |                |                     |              |                      |                |                  |              |                  |             |  |
| 5088.0     | 42         |            |      |                |                     |              |                      |                |                  |              |                  |             |  |
| 5087.0     | 43         |            |      |                |                     |              |                      |                |                  |              |                  |             |  |
| 5086.0     | 44         |            |      |                |                     |              |                      |                |                  |              |                  |             |  |
| 5085.0     | 45         | 12         | ▲    | 9<br>19<br>26  | 45                  | 100          |                      | 96             | 16               | 15           | NP               |             |  |
| 5084.0     | 46         |            |      |                |                     |              |                      |                |                  |              |                  |             |  |
| 5083.0     | 47         |            |      |                |                     |              |                      |                |                  |              |                  |             |  |
| 5082.0     | 48         |            |      |                |                     |              |                      |                |                  |              |                  |             |  |
| 5081.0     | 49         |            |      |                |                     |              |                      |                |                  |              |                  |             |  |
| 5080.0     | 50         | 13         | ▲    | 9<br>15<br>20  | 35                  | 100          |                      | 81             | 23               | 22           | 9                |             |  |
| 5079.0     | 51         |            |      |                |                     |              |                      |                |                  |              |                  |             |  |
| 5078.0     | 52         |            |      |                |                     |              |                      |                |                  |              |                  |             | Boring terminated at 51.5 feet. Groundwater was not encountered.   |
| 5077.0     | 53         |            |      |                |                     |              |                      |                |                  |              |                  |             |  |
| 5076.0     | 54         |            |      |                |                     |              |                      |                |                  |              |                  |             |  |
| 5075.0     | 55         |            |      |                |                     |              |                      |                |                  |              |                  |             |  |
| 5074.0     | 56         |            |      |                |                     |              |                      |                |                  |              |                  |             |  |
| 5073.0     | 57         |            |      |                |                     |              |                      |                |                  |              |                  |             |  |
| 5072.0     | 58         |            |      |                |                     |              |                      |                |                  |              |                  |             |  |
| 5071.0     | 59         |            |      |                |                     |              |                      |                |                  |              |                  |             |  |

SMART SOIL LOG NV UT BORDER TOWER.GPJ NDOT SMART LOG 2018.10.10.GDT 8/3/21

Standard Penetration Test  
 USCS Silty Clayey Sand  
 USCS Clayey Sand  
 USCS Borderline CL/SC  
 USCS Well-graded Gravel

Appendix C  
Laboratory Test Results



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

EAI/Cont # 9100

Job Description NV/UT Border Tower

Boring No. TH-1

Elevation (ft) 5130

Station

Date 7/1/2021

| SAMPLE NO. | SAMPLE DEPTH (ft) | SAMPLER TYPE | N BLOWS per ft. | SOIL GROUP | W%   | DRY UW pcf | % PASS #200 | LL % | PL % | PI % | TEST TYPE | STRENGTH TEST |       |        |       | COMMENTS |
|------------|-------------------|--------------|-----------------|------------|------|------------|-------------|------|------|------|-----------|---------------|-------|--------|-------|----------|
|            |                   |              |                 |            |      |            |             |      |      |      |           | φ deg.        | C psi | φ deg. | C psi |          |
|            |                   |              |                 |            |      |            |             |      |      |      |           |               |       |        |       |          |
| 1          | 1.0               | SPT          |                 | SC-SM      |      |            | 29.1        | 24   | 18   | 6    |           |               |       |        |       |          |
| 2          | 2.5               | SPT          |                 | SC-SM      | 4.0  |            | 20.9        | 20   | 16   | 4    |           |               |       |        |       |          |
| 3          | 5.0               | SPT          |                 | SW-SM      |      |            | 8.4         | 17   | NP   | NP   |           |               |       |        |       |          |
| 4          | 7.5               | SPT          |                 | SC         |      |            | 23.6        | 23   | 12   | 11   |           |               |       |        |       |          |
| 5          | 10.0              | SPT          |                 | SC-SM      |      |            | 25.0        | 22   | 15   | 7    |           |               |       |        |       |          |
| 6          | 15.0              | SPT          |                 | SC-SM      |      |            | 48.0        | 21   | 14   | 7    |           |               |       |        |       |          |
| 7          | 20.0              | SPT          |                 | SC-SM      | 6.0  |            | 40.2        | 22   | 15   | 7    |           |               |       |        |       |          |
| 8          | 25.0              | SPT          |                 | SC         |      |            | 45.3        | 29   | 14   | 15   |           |               |       |        |       |          |
| 9          | 30.0              | SPT          |                 | CL         |      |            | 51.4        | 30   | 17   | 13   |           |               |       |        |       |          |
| 10         | 35.0              | SPT          |                 | GW         |      |            | 3.6         | 16   | NP   | NP   |           |               |       |        |       |          |
| 11         | 40.0              | SPT          |                 | SC-SM      | 11.7 |            | 44.2        | 21   | 16   | 5    |           |               |       |        |       |          |
| 12         | 45.0              | SPT          |                 | SM         |      |            | 15.5        | 15   | NP   | NP   |           |               |       |        |       |          |

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<sub>60s</sub>)(0.62)

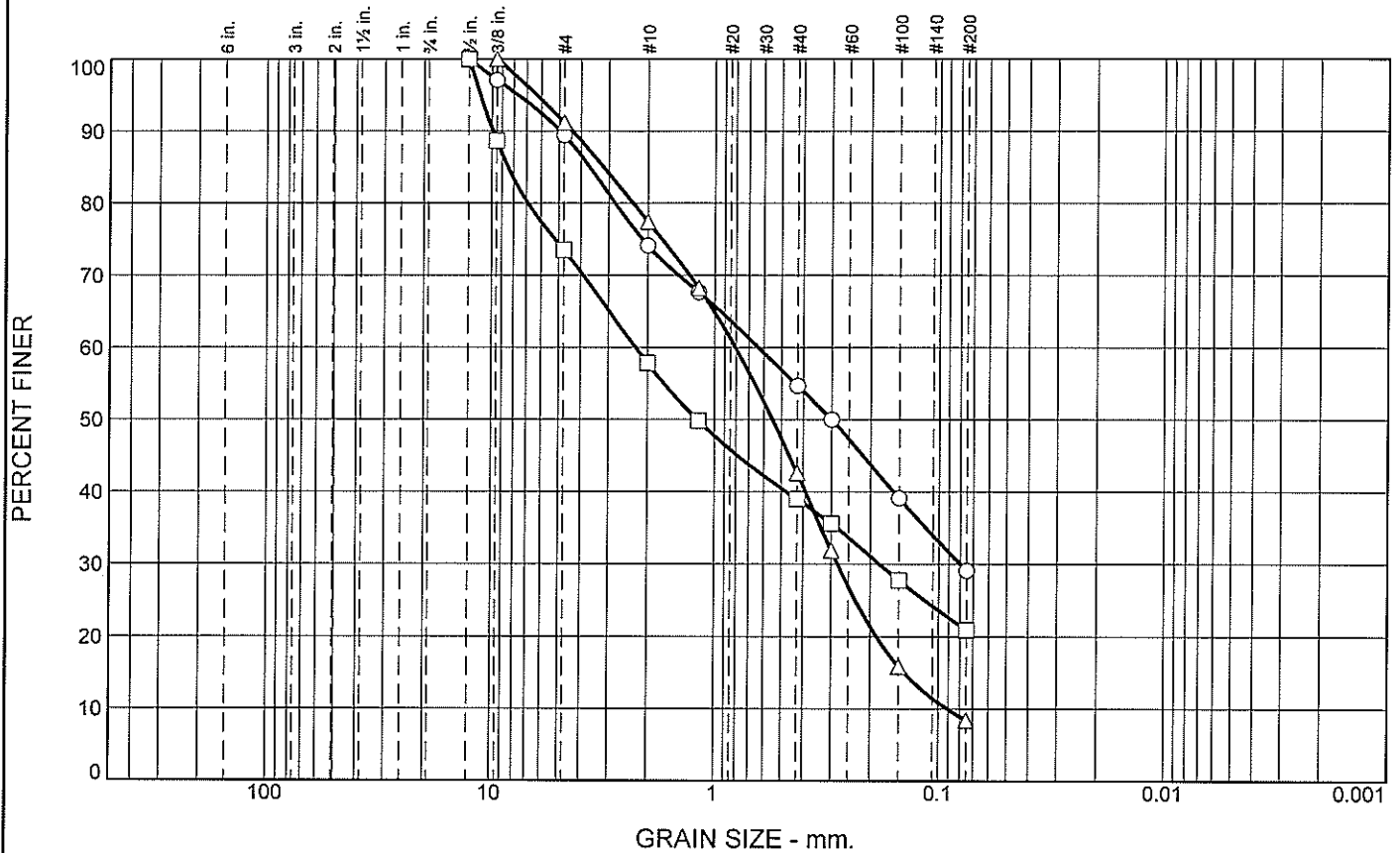
H = Hydrometer  
 S = Sieve  
 G = Specific Gravity  
 PI = Plasticity Index  
 LL = Liquid Limit  
 PL = Plastic Limit  
 NP = Non-Plastic  
 OC = Consolidation  
 CH = Chemical  
 RV = R - Value  
 MD = Moisture Density

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 Diffraction  
 HCpot = Hydro-Collapse Potential

\* = Average of subsamples



# Particle Size Distribution Report



|   | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS  | AASHTO   | PL | LL |
|---|-----|----------|--------|--------|--------|-------|----------|----|----|
| ○ | 0.0 | 10.6     | 60.3   | 29.1   |        | SC-SM | A-2-4(0) | 18 | 24 |
| □ | 0.0 | 26.5     | 52.6   | 20.9   |        | SC-SM | A-1-b    | 16 | 20 |
| △ | 0.0 | 8.8      | 82.8   | 8.4    |        | SW-SM | A-1-b    | NP | 17 |

| SIEVE<br>inches<br>size | PERCENT FINER |        |        |
|-------------------------|---------------|--------|--------|
|                         | ○             | □      | △      |
| 1/2"                    | 100.0         | 100.0  |        |
| 3/8"                    | 97.1          | 88.6   | 100.0  |
| GRAIN SIZE              |               |        |        |
| D <sub>60</sub>         | 0.6357        | 2.2623 | 0.8067 |
| D <sub>30</sub>         | 0.0799        | 0.1822 | 0.2808 |
| D <sub>10</sub>         |               |        | 0.0907 |
| COEFFICIENTS            |               |        |        |
| C <sub>c</sub>          |               |        | 1.08   |
| C <sub>u</sub>          |               |        | 8.89   |

| SIEVE<br>number<br>size | PERCENT FINER |      |      |
|-------------------------|---------------|------|------|
|                         | ○             | □    | △    |
| #4                      | 89.4          | 73.5 | 91.2 |
| #10                     | 74.1          | 57.8 | 77.4 |
| #16                     | 67.6          | 49.8 | 68.2 |
| #40                     | 54.7          | 39.0 | 42.6 |
| #50                     | 50.0          | 35.6 | 31.9 |
| #100                    | 39.1          | 27.8 | 15.9 |
| #200                    | 29.1          | 20.9 | 8.4  |

**Material Description**

○ silty, clayey sand

□ silty, clayey sand with gravel

△ well-graded sand with silt

**REMARKS:**

○

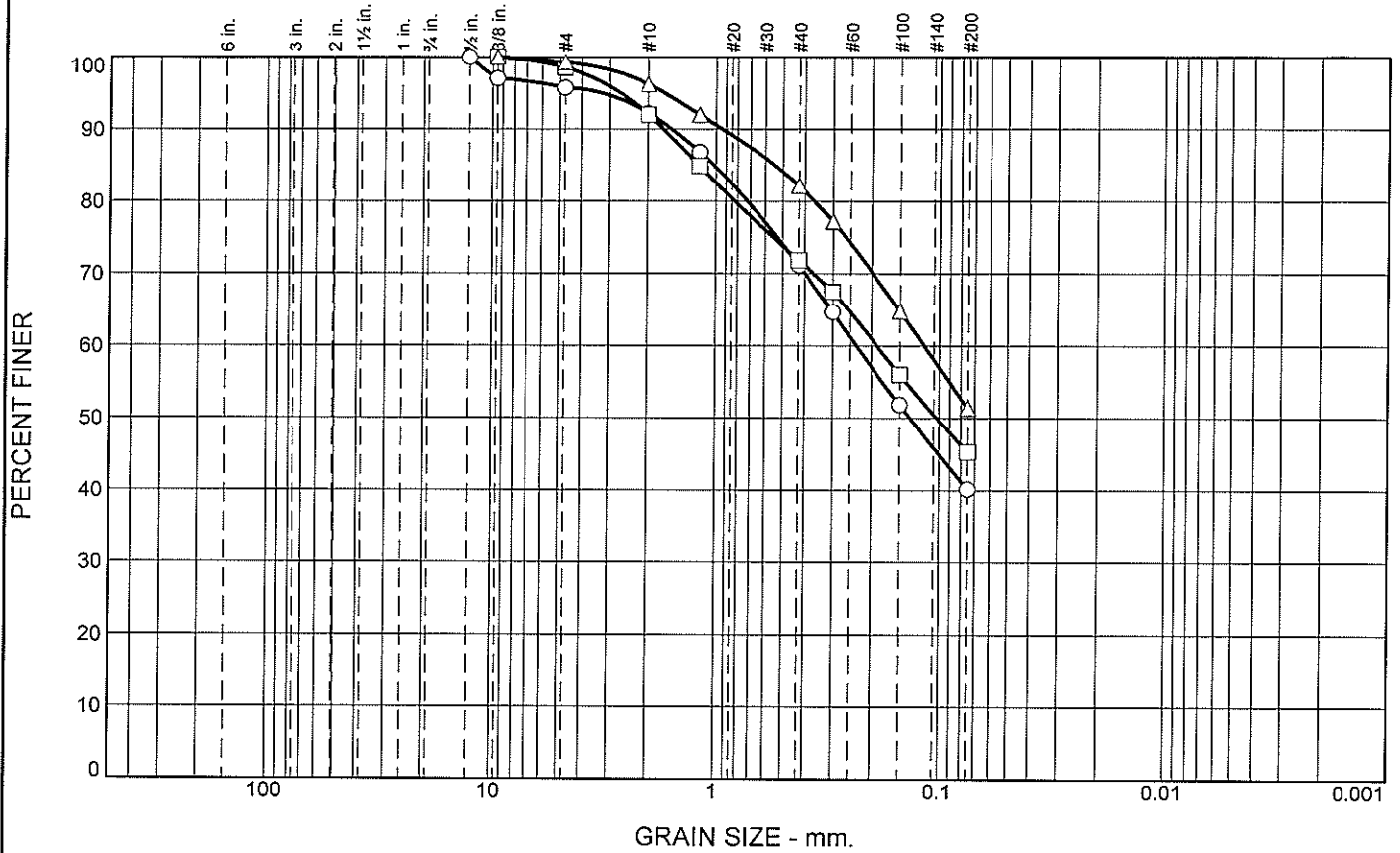
□

△

○ Source of Sample: TH-1      Depth: 1.0'      Sample Number: 1  
 □ Source of Sample: TH-1      Depth: 2.5'      Sample Number: 2  
 △ Source of Sample: TH-1      Depth: 5.0'      Sample Number: 3



# Particle Size Distribution Report



|   | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS  | AASHTO | PL | LL |
|---|-----|----------|--------|--------|--------|-------|--------|----|----|
| ○ | 0.0 | 4.3      | 55.5   | 40.2   |        | SC-SM | A-4(0) | 15 | 22 |
| □ | 0.0 | 1.5      | 53.2   | 45.3   |        | SC    | A-6(3) | 14 | 29 |
| △ | 0.0 | 0.7      | 47.9   | 51.4   |        | CL    | A-6(3) | 17 | 30 |

| SIEVE<br>inches<br>size | PERCENT FINER |        |        |
|-------------------------|---------------|--------|--------|
|                         | ○             | □      | △      |
| 1/2"                    | 100.0         |        |        |
| 3/8"                    | 97.0          | 100.0  | 100.0  |
| GRAIN SIZE              |               |        |        |
| D <sub>60</sub>         | 0.2343        | 0.1890 | 0.1170 |
| D <sub>30</sub>         |               |        |        |
| D <sub>10</sub>         |               |        |        |
| COEFFICIENTS            |               |        |        |
| C <sub>c</sub>          |               |        |        |
| C <sub>u</sub>          |               |        |        |

| SIEVE<br>number<br>size | PERCENT FINER |      |      |
|-------------------------|---------------|------|------|
|                         | ○             | □    | △    |
| #4                      | 95.7          | 98.5 | 99.3 |
| #10                     | 92.2          | 92.0 | 96.2 |
| #16                     | 86.8          | 84.9 | 91.9 |
| #40                     | 71.2          | 71.9 | 82.2 |
| #50                     | 64.7          | 67.5 | 77.2 |
| #100                    | 51.9          | 56.0 | 64.8 |
| #200                    | 40.2          | 45.3 | 51.4 |

**Material Description**

○ silty, clayey sand

□ clayey sand

△ sandy lean clay

**REMARKS:**

○

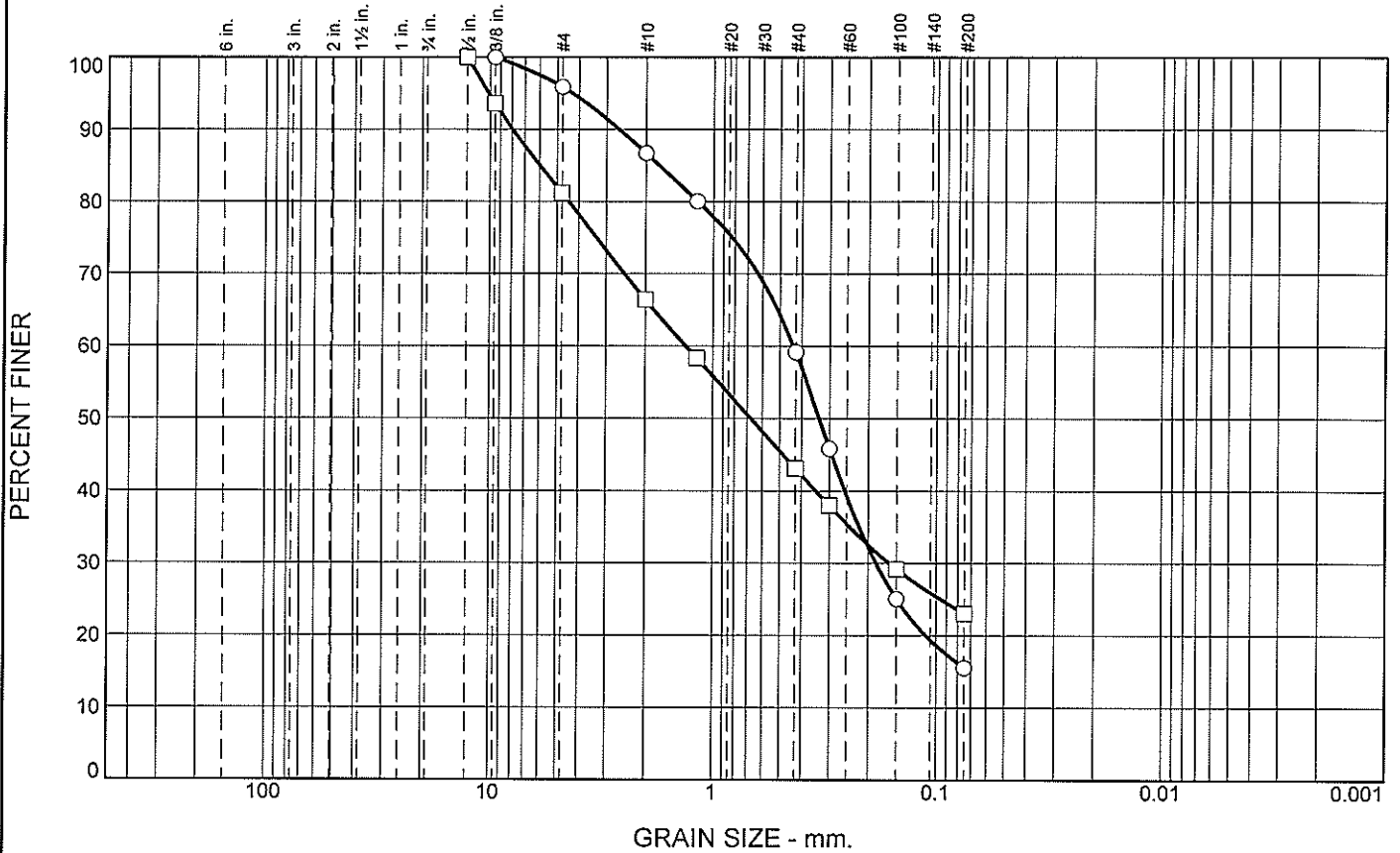
□

△

○ Source of Sample: TH-1      Depth: 20.0'      Sample Number: 7  
 □ Source of Sample: TH-1      Depth: 25.0'      Sample Number: 8  
 △ Source of Sample: TH-1      Depth: 30.0'      Sample Number: 9



# Particle Size Distribution Report



|   | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO   | PL | LL |
|---|-----|----------|--------|--------|--------|------|----------|----|----|
| ○ | 0.0 | 4.2      | 80.3   | 15.5   |        | SM   | A-2-4(0) | NP | 15 |
| □ | 0.0 | 18.8     | 58.1   | 23.1   |        | SC   | A-2-4(0) | 13 | 22 |

| SIEVE<br>inches<br>size | PERCENT FINER |        |
|-------------------------|---------------|--------|
|                         | ○             | □      |
| 1/2"                    | 100.0         | 100.0  |
| 3/8"                    | 100.0         | 93.6   |
| GRAIN SIZE              |               |        |
| D <sub>60</sub>         | 0.4358        | 1.3199 |
| D <sub>30</sub>         | 0.1847        | 0.1614 |
| D <sub>10</sub>         |               |        |
| COEFFICIENTS            |               |        |
| C <sub>c</sub>          |               |        |
| C <sub>u</sub>          |               |        |

| SIEVE<br>number<br>size | PERCENT FINER |      |
|-------------------------|---------------|------|
|                         | ○             | □    |
| #4                      | 95.8          | 81.2 |
| #10                     | 86.7          | 66.4 |
| #16                     | 80.1          | 58.3 |
| #40                     | 59.1          | 43.1 |
| #50                     | 45.8          | 38.0 |
| #100                    | 25.1          | 29.2 |
| #200                    | 15.5          | 23.1 |

**Material Description**

○ silty sand

□ clayey sand with gravel

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**REMARKS:**

○

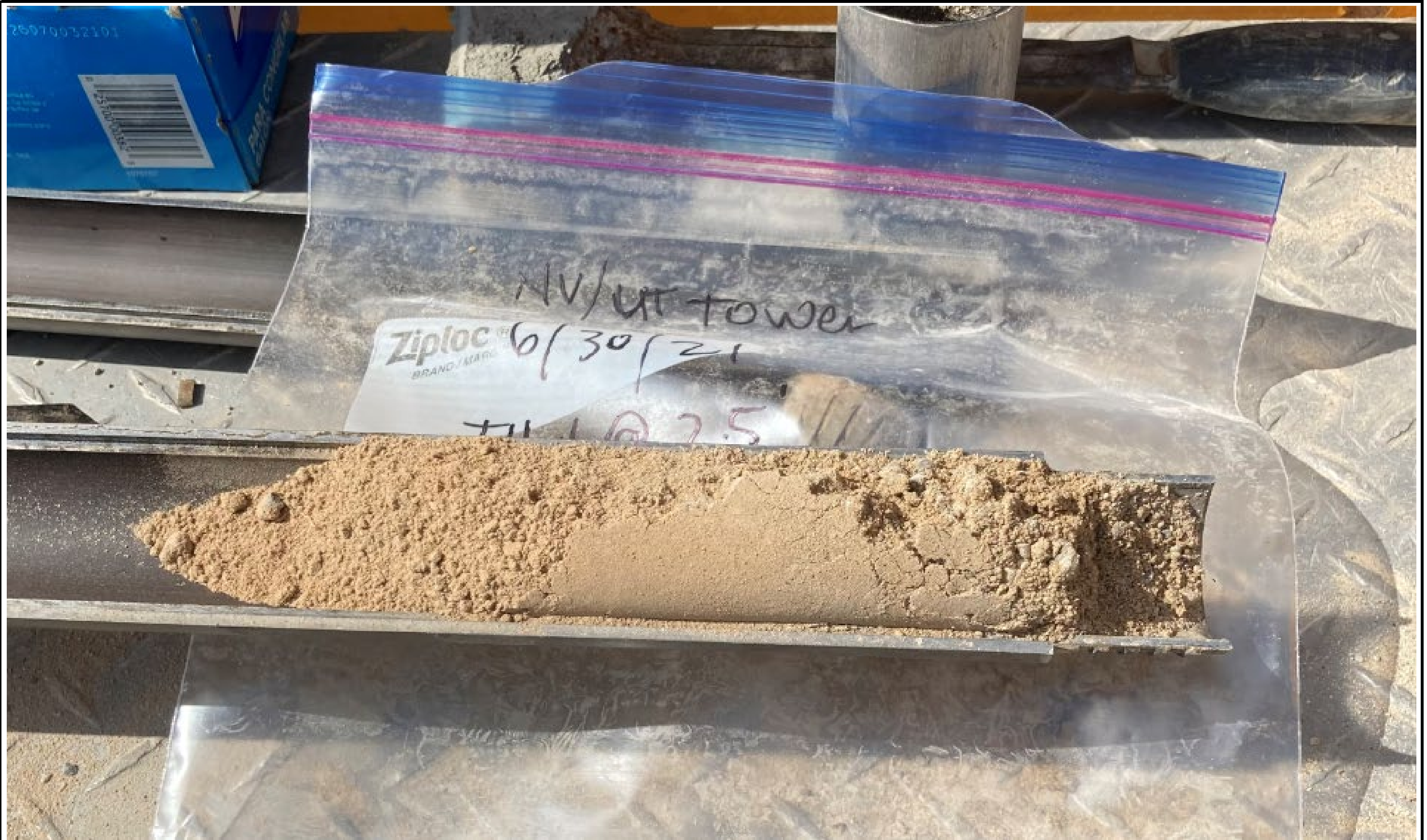
□

○ Source of Sample: TH-1      Depth: 45.0'      Sample Number: 12  
 □ Source of Sample: TH-1      Depth: 50.0'      Sample Number: 13

Appendix D  
Sample Photographs



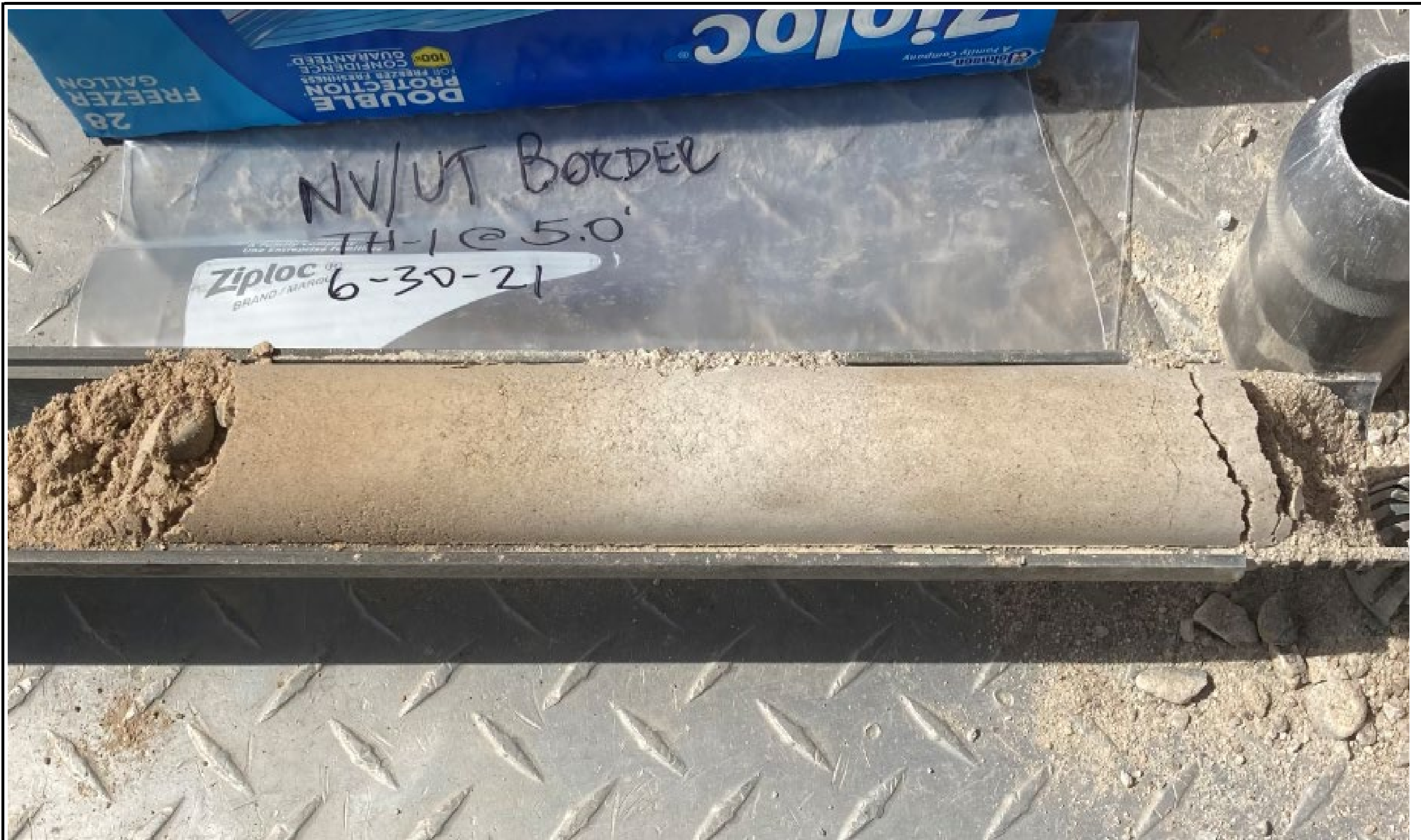




1263 South Stewart Street  
Carson City, Nevada 89712  
Phone: (775) 888-7440  
Fax: (775) 888-7201

**Figure D-2 Sample TH-1 @ 2.5'**

Location: White Pine County, NV  
Project Name: NV UT Border Tower  
EA Number: NA



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Carson City, Nevada 89712  
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Fax: (775) 888-7201

**Figure D-3 Sample TH-1 @ 5.0'**  
Location: White Pine County, NV  
Project Name: NV UT Border Tower  
EA Number: NA



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Carson City, Nevada 89712  
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Fax: (775) 888-7201

**Figure D-4 Sample TH-1 @ 7.5'**

Location: White Pine County, NV  
Project Name: NV UT Border Tower  
EA Number: NA

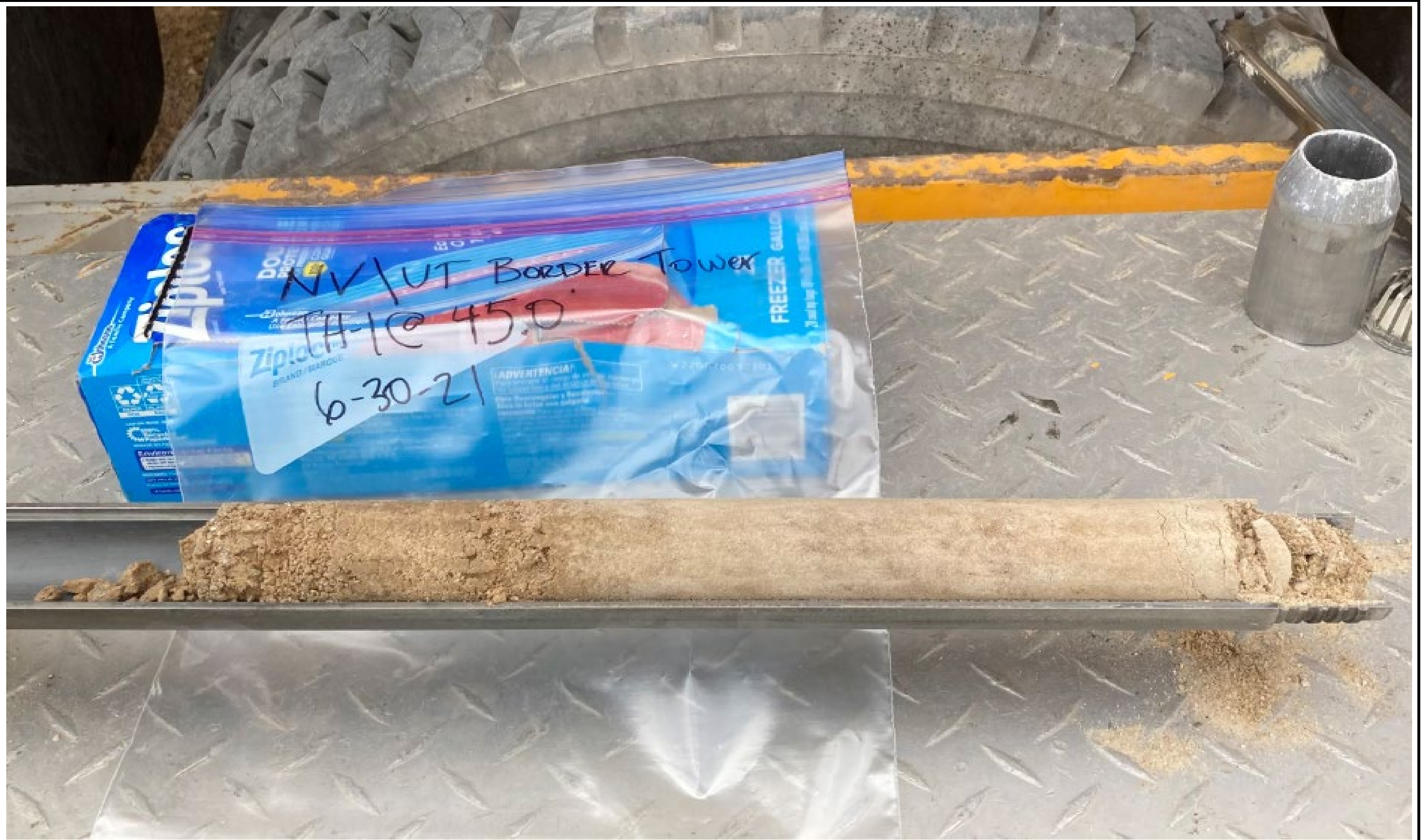






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Phone: (775) 888-7440  
Fax: (775) 888-7201

**Figure D-7 Sample TH-1 @ 30'**  
Location: White Pine County, NV  
Project Name: NV UT Border Tower  
EA Number: NA



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Carson City, Nevada 89712  
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Fax: (775) 888-7201

**Figure D-8 Sample TH-1 @ 45**

Location: White Pine County, NV  
Project Name: NV UT Border Tower  
EA Number: NA



**NEVADA DEPARTMENT OF TRANSPORTATION**

Materials Division

Geotechnical Section

1263 Stewart St, Carson City, NV 89712