GEOTECHNICAL INVESTIGATION

I-80 EASTBOUND WIDENING FROM MCCARRAN BOULEVARD TO KEYSTONE AVENUE, PHASE 2B, RENO, NEVADA

EA 74191

OCTOBER 2023

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

STATE OF NEVADA

DEPARTMENT OF TRANSPORTATION

MATERIALS DIVISION

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Prepared by: _____

Jonathan Lehman-Svoboda, P.E.
Principal Geotechnical Engineer

Reviewed by: _____

Mike Griswold, P.E.
Chief Geotechnical Engineer

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1. Introduction

The Nevada Department of Transportation (NDOT) plans to widen eastbound US Interstate Highway 80 (I-80) in Reno, Nevada between McCarran Boulevard and Keystone Avenue to accommodate the addition of an auxiliary lane under project 74191 Phase 2B. The project scope includes widening Bridge Structure H-1162E on I-80 over Stoker Avenue, the construction of retaining structures separating the eastbound and westbound I-80, and soundwalls.

This report presents the findings and recommendations developed from our geotechnical engineering investigation for the proposed improvements. The investigation was conducted in accordance with American Association of State Highway and Traffic Administration (AASHTO) and Federal Highway Administration (FHWA) guidelines, 2020 (AASHTO 2020).

1.1 Project Description

The project consists of adding an auxiliary lane by widening the highway from two lanes to three lanes to improve traffic movement in the eastbound direction. The scope includes widening to the inside (north) of the existing Bridge H-1162E that spans over Stoker Avenue. The existing piers and abutments on both structures are supported on spread footings. To support the widening, two columns will be added on both the west and east sides, Piers 1 and 2 respectively. The piers will be supported on spread footings bearing on native soils. The existing spread footing abutments will be extended, bearing on new embankment fill, and new wingwalls will be constructed.

To facilitate the widening, a median retaining wall is proposed between eastbound and westbound I-80. The median retaining wall is a cast-in-place (CIP) cantilever retaining wall with an integral continuous slope barrier rail. Soundwalls supported on spread footings are proposed at the top of the embankment on both sides of the highway within the project limits.

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

1.2 Purpose and Scope of Work

The purpose of this investigation was to evaluate the suitability of the project site from a geotechnical perspective. The main objectives of the investigation were to characterize the subsurface materials, assess the appropriate engineering characteristics of the subsurface soils, perform engineering analyses, develop geotechnical recommendations for design and construction, and document our findings and recommendations in this report.

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 60 feet below ground surface (bgs) to obtain information to evaluate the subsurface conditions;
- Perform geotechnical laboratory testing on select soil samples collected from the boring;
- Perform engineering analyses to develop geotechnical design criteria and recommendations for the proposed project; and

- Preparation of this report.

1.3 Other Reports and Investigations

Additional explorations and laboratory testing have been completed by NDOT and by others as part of previous design phases for the I-80 Widening Project. Two borings were completed by NDOT during the initial design phase and three additional borings were completed during the I-80 westbound bridge widening phase. This report incorporates the applicable information collected from the previous studies of the H-1162 Eastbound and Westbound Bridge projects. These reports are listed in the References section of this report. Boring logs from previous explorations are presented in Appendix C.

2. Field Exploration and Laboratory Testing

2.1 Field Exploration

The exploration performed by NDOT included one boring drilled on May 11th and 12th, 2021 at the approximate location shown on Figure A-2. The boring was advanced using a 6-inch hollow stem auger to a depth of approximately 60 feet below ground surface utilizing a truck-mounted Diedrich D-120 (NDOT 1627) drill rig. Samples were collected using Standard Penetration Test 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 6-inches were recorded for the 18-inch drive and are presented in the boring logs. The blow counts presented in the logs are uncorrected and are shown as they were recorded in the field. Normalizing the blow counts for use in analysis was performed utilizing corrections for sampler type, rod length, auger diameter, hammer efficiency, and overburden stress. 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.

Logs of the boring were prepared based on the field logging and the results of laboratory testing in general accordance with ASTM D2487. The stratification lines shown on the exploration logs represent the approximate boundary between soil types even though the actual transition may be more gradual. Care should be taken in interpolating between and beyond exploration points due to the heterogeneity of natural soil deposits. The boring logs and key are presented in Appendix B.

2.2 Geotechnical Laboratory Testing

Laboratory testing was conducted on select soil samples recovered during the field exploration. Geotechnical laboratory test results are summarized and presented in Appendix D. Tests conducted include the following:

- Method of Test Sieve Analysis of Coarse and Fine Aggregate (Nev. T206);
- Standard Method of Test for Laboratory Determination of Moisture Content of Soils (AASHTO T265);
- Method of Test for Determining the Liquid Limit, Plastic Limit, and Plasticity Index of Soil (Nev. T210, T211, and T212).

3. Site and Subsurface Conditions

3.1 Site Conditions

The site is located along the I-80 corridor between McCarran Boulevard and Keystone Avenue in Reno, Nevada. The existing Stoker Avenue underpass consists of two structures, H-1162E and H-1162W. The edge-to-edge distance between the eastbound bridge and westbound bridge is about 25 feet. Stoker Avenue runs in a generally north/south direction and slopes to the south at approximately 3 percent within the project area. Average clearance between the bottom of bridge structures and the Stoker grade is about 14 feet. From the bridge abutments, the surface slopes down to Stoker Avenue at an approximate 2H:1V (Horizontal:Vertical) grade. Concrete slope paving covers the surface from the abutments to the sidewalks adjacent to Stoker Avenue. Adjacent the slope paving, exposed embankment fills consist primarily of granular soils. Surface runoff and drainage generally flow south towards the Truckee River.

3.2 Subsurface Conditions

3.2.1 General Geology and Faulting

The project site is located in the western portion of the Basin and Range geomorphic province. The project site is mapped as primarily Quaternary alluvium (Qa). The alluvium includes beach and sand dune deposits and sandy gravel deposits.

There are no active faults mapped crossing the project site. The nearest active faults (activity within the last 15,000 years) are the Mount Rose Fault, approximately 1.6 miles to the southeast, and the Peavine Peak Fault Zone, approximately 5.7 miles to the northwest. Slip rates of the two faults are on the order of 1 to 5 mm/year (Sawyer, 2003). Although there is no record of significant recent (within the last 150 years) earthquakes associated with these faults, the Mount Rose Fault Zone is predicted capable of generating a M7 earthquake (dePolo, 1997).

3.2.2 Subsurface Materials

The results of our field exploration and laboratory analyses indicate the soil profile generally consists of about 7 inches of asphalt concrete underlain by 5 inches of aggregate base underlain by very dense, poorly graded GRAVEL (GP-GC) with varying amounts of sand and clay extending to the maximum depth explored of 60.5 feet bgs.

Thin, intermittent, very hard clayey sand and cobble layers were encountered throughout the profile. Drilling was difficult in the granular soils from depths of about 25 to 45 feet.

Previous explorations in the area generally indicate near surface granular soils with varying amounts of non-plastic and plastic fines. Boulders were also identified in embankment soils.

3.2.3 Groundwater Conditions

Groundwater was not encountered in the boring for this project and we do not anticipate that it will affect the construction or performance of the new structure. According to nearby well log data from the Nevada Division of Water Resources, groundwater was encountered at approximately 65 feet bgs in a well located

about 400 feet south of the project. Groundwater depths and soil moisture may change over time due to seasonal fluctuations, regional pumping, and other contributing factors.

4. Recommendations

We understand that the proposed bridge piers, bridge abutments, soundwalls, and median retaining walls will be supported on shallow foundations. Based on the results of this exploration, the site is suitable for the proposed improvements. Provided herein are the recommendations for use in design and construction of shallow foundations.

4.1 Site Preparation and Earthwork

4.1.1 Site and Subgrade Preparation

Prior to construction, it is recommended that any unsuitable soils and vegetation be removed from below areas which will ultimately support structural loads. Unsuitable soils consist of topsoil, organic soils, undocumented fill, disturbed native soils, and any other deleterious material. General site preparation should follow procedures outlined in the 2014 Edition of the Nevada Department of Transportation Standard Specifications for Road and Bridge Construction (Silver Book), Section 201. The removal of any existing structures or obstructions should follow Silver Book Section 202. Any soft or loose areas at the base of excavations should be stabilized prior to the placement of structural fill. After excavations we recommend compacting the exposed subgrade to not less than 90% of the maximum density as determined by Test Method No. Nev. T108 in accordance with Silver Book Section 206.03.01. Upon completion of subgrade preparation, granular backfill should be placed as described below.

4.1.2 Backfill and Embankment

Embankment and backfill should be properly placed and compacted according to the Silver Book sections 203 and 207 respectively. Based on the materials encountered in this exploration, most native soils generated from the widening excavations are anticipated to be suitable for reuse as backfill or embankment. The excavated material encountered in the slope, sidewalk and roadbed sections such as concrete, asphaltic concrete or deleterious substances may not be used for embankment borrow and this material should be disposed of off-site.

Borrow and Selected Borrow shall meet the specifications presented in Silver Book Section 704.03.12 and 704.03.13 respectively.

4.1.3 Excavations

Excavations should be possible using conventional equipment in the dense to very dense granular soils. Occasional cobble layers were encountered and may require ripping or other means to aid in excavation. Borings TH-50 and TH-51 performed for Contract 1230 indicate the presence of boulders within the fill. It is anticipated that oversized material, such as boulders, will be encountered in the excavations associated with the project improvements and may require the use of rock hammer attachments or other non-conventional excavation techniques.

Temporary excavations and shoring should conform to OSHA standards. Based on the subsurface materials encountered in our exploration, the on-site clayey, sandy gravels can be classified as Type C (OSHA 1926). Vertical excavations should not exceed 4 vertical feet. Excavations greater than 4 vertical feet should be sloped in accordance with OSHA 1926 or shored. Temporary slope surfaces should be

moistened to minimize sloughing and raveling. Protection of workers and adjacent structures, shoring design, and the stability of all temporary slopes are the sole responsibility of the contractor.

4.1.4 Cut and Fill Slopes

Permanent fill slopes should have a maximum slope of 2H:1V and should be overbuilt and trimmed to limits on the staking. Slopes should be constructed in accordance to Silver Book 203.03.06. All slopes should be stabilized from wind and rain erosion in accordance with Silver Book Section 211.

4.2 Bridge Widening

Table 1 describes the bridge demands and effective shallow foundation dimensions for Bridge H-1162E for which NDOT has provided geotechnical design recommendations. Widened foundations will bear at the same elevation as the existing foundations. The depth of bearing is on the order of 5 feet for both abutments and 8 to 9 feet for both piers.

Table 1: Bridge Demands and Effective Shallow Foundation Dimensions

Shallow Foundation Support Location	Factored Service Limit State Bearing Demand, ksf	Factored Strength Limit State Bearing Demand, ksf	Factored Extreme Limit State Bearing Demand, ksf
Abutments 1 and 2	4.8 (3 feet by 22 feet)	7.14 (3 feet by 22 feet)	5.44 (3 feet by 22 feet)
Piers 1 and 2	5.7 (8 feet by 18 feet)	8.2 (8 feet by 17 feet)	14.2 (6.8 feet by 8 feet)

Note: Effective dimensions for each limit state are provided following the associate demands in parentheses.

4.2.1 Shallow Foundations

Shallow footings founded on the native soils or engineered fill are planned to support both the new columns and the abutments. The results of this exploration indicate that the soils are capable of supporting the anticipated loads provided the recommendations are followed.

4.2.1.1 Shallow Foundation Bearing Resistance

Each new column and abutment of the widened Bridge H-1162E will be supported on shallow footings bearing on the native granular soils. Table 2 summarizes the calculated shallow foundation resistances for the effective foundation sizes.

The shear resistance between the foundation and the supporting soil is taken as the friction coefficient multiplied by the total load at the interface. A nominal sliding resistance of 0.67V is recommended for the soils described above, where V is the total vertical force. The shear resistance should be factored by 0.8 for the Strength Limit State.

Table 2: Summary of Shallow Foundation Resistances

Support Location	Factored Service Limit State Bearing Resistance (ksf)	Strength Limit State Factored Bearing Resistance (ksf) (ϕ_b=0.45)	Extreme Limit State Factored Bearing Resistance (ksf) (ϕ_b=1)
Abutments	4.8	7.2	16
Piers	5.7	13.5	30

4.2.1.2 Shallow Foundation Settlement

Based on the dense granular soils encountered in the exploration, it is anticipated that the total settlement will be less than 0.5-inch and the differential settlement will be on the order of half of the total settlement. These settlement calculations were based on the anticipated loading conditions and utilizing the elastic methods. The maximum total settlement given is based on immediate settlement calculations.

4.2.1.3 Global Stability

Global stability analyses of the bridge abutments were conducted using SLIDE2 v.9.019, a two-dimensional limit equilibrium analysis program by Rocscience. Design parameters were estimated via the Mohr-Coulomb failure criterion. A seismic coefficient of 0.25g was used in the pseudo static analysis, based on one half of the PGA, as recommended for design. The results of the global stability analysis indicate that the embankments meet the required factors of safety as designed.

4.2.2 Earth Pressure

The lateral pressures imposed on a retaining structure depend on its ability to resist rotation (or movement) and its rigidity. Retaining walls that are free to slightly rotate develop an active lateral soil pressure, and walls that are not permitted to rotate laterally develop an at-rest lateral earth pressure. Resistance to lateral loads on foundations may be achieved by frictional resistance between the foundations and underlying soils and by passive earth pressures of backfills placed against the sides of foundations. Walls may be designed using the total lateral force as the given equivalent fluid pressures multiplied by the height of the walls. The total force is applied at one-third the wall height.

The table below provides recommended static and seismic design parameters for level backfill for NDOT granular backfill. The lateral earth pressure coefficients were calculated using Rankine theory. The soil parameters used were for the granular backfill material and included a friction angle of 34 degrees, a cohesion of 0 psf, and a moist unit weight of 125 pcf. The lateral earth pressure coefficients were calculated using the Mononobe-Okabe method with the horizontal seismic acceleration coefficient of 0.25g, or one-half of the peak ground acceleration (PGA) for the site of 0.5g.

Table 3: Static and Seismic Lateral Earth Coefficients and Equivalent Fluid Pressures for Stoker Bridge Widening

Lateral Earth Pressure Coefficients for Level Backfill	Lateral Earth Pressure Coefficient	Equivalent Fluid Pressure (pcf)
Active Condition Ka	0.28	35
At-Rest Condition Ko	0.44	55
Passive Condition Kp	3.54	443
Seismic Active Coefficient, Kae	0.45	56

4.3 Median Retaining Wall and Soundwalls

Cast-in-place (CIP) cantilever retaining walls with an integral continuous slope barrier rail is proposed at the median, retaining the westbound I-80 embankment. Soundwalls are proposed along both the north and south limits of the westbound and eastbound limits of I-80 respectively. The soundwalls are proposed to bear on spread footings in embankment fill.

Presented below are the parameters for use in design. The material properties were conservatively assigned based on review of previous explorations; observations of the exposed embankment soil; and information presented on the NDOT Standard Plans for Road and Bridge Construction, 2020.

Table 4: Design Parameters for I-80 Median Retaining Walls and Soundwalls

Parameter	Value
Internal Angle of Friction, Phi (degrees)	32
Unit Weight (pcf)	120
Cohesion (psf)	0
Equivalent Active Fluid Pressure (pcf)	36
Equivalent Passive Fluid Pressure (pcf)	390
Seismic Active Coefficient, Kae	0.48
Seismic Active Force, Pae (pcf)	58
Coefficient of Friction Between CIP Concrete and Soil	0.625
Coefficient of Friction Between Precast Concrete and Soil	0.5
Service Limit Bearing Resistance (psf)	4,000

Note: The passive and shear resistances should be factored in accordance with AASHTO 2020 Article 10.6.3.4-1

4.4 Seismic Design

4.4.1 Seismic Design Criteria

The seismic design criteria for the bridge site (39.5268°N, 119.8379°W) were developed utilizing the USGS seismic hazards tool in accordance with AASHTO 2020, considering the site location, and the subsurface information obtained from our geotechnical investigation. In addition, minimum seismic criteria for use in

design are listed by county in the NDOT Structures Manual. Peak ground acceleration (PGA) and both the short period (S_s) and long period (S_1) spectral acceleration coefficients were provided in the manual, but the remaining site factors were computed using the tables and equations found in AASHTO 2020, Articles 3.10.3.2 and 3.10.4. Both the USGS Mapped values and the NDOT structures manual values are presented below. The greater value should supersede.

Table 5: Seismic Design Parameters

Parameter	USGS Mapped Value	NDOT Structures Manual Values
Site Class	C	C
Peak ground acceleration (PGA)	0.481 g	0.5 g
Short Period Spectral Acceleration Coefficient (S_S)	1.155 g	1.25 g
Long Period Spectral Acceleration Coefficient (S_1)	0.42 g	0.5 g
Peak ground acceleration coefficient (F_{PGA})	1.0	1.0
Site coefficient (F_a)	1.0	1.0
Site coefficient (F_v)	1.38	1.30
Mapped MCE peak ground acceleration (A_S)	0.481 g	0.5 g
Design Spectral Acceleration for short period (S_{DS})	1.155 g	1.25 g
Design Spectral Acceleration for 1 sec period (S_{D1})	0.58 g	0.65 g

4.4.2 Liquefaction

Liquefaction potential was assessed as part of this investigation. Liquefaction is the loss of stability and intergranular strength in water-saturated soil due to the increase of pore pressures during a dynamic event such as an earthquake. The potential for liquefaction is based upon several factors, such as the grain size distribution, relative density, overburden pressures of the soil, and the magnitude and duration of the seismic event. The site is categorized as a Seismic Zone 4 because the on-site acceleration coefficient S_{D1} is 0.65 (AASHTO 2020 Article 3.10.6). However, based on the density of the soil and the absence of groundwater within the depths explored, liquefaction potential is considered negligible.

5. References

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

American Concrete Institute (ACI) 2013, ACI 318-95 “Building Code Requirements for Structural Concrete”

dePolo, C.M., Anderson, J.G., dePolo, D.M., and Price, J.G., 1997, Earthquake occurrence in the Reno-Carson City urban corridor: Seismological Research Letters, v. 68, p. 401-412.

Division of Water Resources, June 23, 2021, Nevada Hydrology Data, http://water.nv.gov/mapping.aspx

FHWA-NHI-11-032, 2012, “LRFD Seismic Analysis and Design of Transportation Geotechnical Features and Structural Foundations” February 2012

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), Contract 1230, H-1162E & H1162W Boring Logs and Location

Nevada Department of Transportation (NDOT), Contract 3206, Log of Test Borings from Report by Black Eagle Consulting, Inc. August 15, 2000

Nevada Department of Transportation (NDOT), 2008, “Structures Manual”

Nevada Department of Transportation (NDOT), 2019, “Structures Manual Revision”

Nevada Department of Transportation (NDOT), 2014, “Standard Specifications for Road and Bridge Construction”

Nevada Department of Transportation (NDOT), 2020, “Standard Plans for Road and Bridge Construction”

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

Sawyer, T.L., compiler, 1999, Fault number 1647, Mount Rose fault zone, in Quaternary fault and fold database of the United States: U.S. Geological Survey website, https://earthquakes.usgs.gov/hazards/qfaults, accessed 09/07/2023

Sawyer, T.L., compiler, 2003, Fault number 1644, Peavine Peak fault zone, in Quaternary fault and fold database of the United States: U.S. Geological Survey website, https://earthquakes.usgs.gov/hazards/qfaults, accessed 09/07/2023

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, June 23, 2021, U.S. Seismic Design Maps, https://earthquake.usgs.gov/ws/designmaps/aashto-2009.json?latitude=36.282618&longitude=-115.026149&siteClass=C&title=I-15%20Phase3%20

U.S. Geological Survey and Nevada Bureau of Mines and Geology, Quaternary fault and fold database for the United States, accessed April 13, 2023, at: https://www.usgs.gov/natural-hazards/earthquake-hazards/faults.

6. Limitations

This report has been prepared by Nevada Department of Transportation (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.

Variations from the conditions portrayed in the explorations often occur which are sometimes sufficient to require modifications in the design. The recommendations provided in this report apply only to the proposed improvements described herein. 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 additional recommendations are required.

Appendix A
Figures

NEVADA DOT

1263 South Stewart Street

Carson City, Nevada 89712

Phone: (775) 888-7440

Fax: (775) 888-7201

Figure A-1 Vicinity Map

Location: Reno, NV

Project Name: I-80 Stoker Ave. Widening

EA Number: 74191

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

Figure A-2 Exploration Map

Location: Reno, NV

Project Name: I-80 Stoker Avenue Widening

EA Number: 74191

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 (N_{CMS}) can be converted to N_{SPT} by:

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

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

TEST ABBREVIATIONS

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

SOIL COLOR DESIGNATIONS ARE FROM THE MUNSELL SOIL COLOR CHART.
EXAMPLE: (7.5 YR 5/3) BROWN

SAMPLER NOTATION

CMS CALIF. MODIFIED SAMPLER[1]
CPT CONE PENETRATION TEST
CS CONTINUOUS SAMPLER[2]
CSS CALIFORNIA SPLIT SPOON
P PUSHED (NOT DRIVEN)
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 June 2018

BORING LOG

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

START DATE	5/11/21	LATITUDE	39.5268
END DATE	5/12/21	LONGITUDE	-119.8379
PROJECT	I-80 Stoker Ave. Widening	ENGINEER	J. Crosby
LOCATION	Reno, NV	OPERATOR	O. Altimirano
E.A. #	74191	DRILL RIG	Diedrich D-120 (1627)
BORING	B-1	METHOD	6" HSA
GROUND ELEV. ft	4602.0	HAMMER	Automatic
TOTAL DEPTH ft	61.5	BACKFILLED	Yes DATE 5/12/21

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.200	LIQUID LIMIT	PLASTICITY INDEX	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
4601.0	1										FILL	FILL: Asphaltic Concrete 7", Aggregate base course 5".	
											CL	Sandy lean CLAY (CL), low plasticity, stiff, moist, gray.	
4600.0	2	1		17 26 31	57	53		13				Poorly graded GRAVEL with clay and sand (GP-GC), subangular gravel, low plasticity clay, very dense, moist, medium to dark brown.	
4599.0	3												
4598.0	4	2		26 33 44	77	93	6	11	23	4			
4597.0	5												
4596.0	6	3		23 40 50/6"		93		12	23	4			
4595.0	7												
4594.0	8	4		41 60/6" 50/3"	0	93		7	23	4			
4593.0	9												
4592.0	10												
4591.0	11	5		50 50/3.5"		53		14			GP-GC		
4590.0	12												
4589.0	13												
4588.0	14												
4587.0	15												
4586.0	16	6		41 50/4.5"		53		11					
4585.0	17												
4584.0	18												
4583.0	19												18.5-19.0 Hard drilling-grinding on rock.
4582.0	20												
4581.0	21	7		14 42 50/4.5"		93	12	20	27	6		Sillty, clayey GRAVEL with sand (GC-GM), Subangular gravel, low plasticity clay, very dense, moist, dark brown.	
4580.0	22										GC-GM		
4579.0	23												
4578.0	24												23.5-25 Grinding on rock, cobble and
											GP-GC	Poorly graded GRAVELwith silty clay and sand (GP-GC), Subangular gravel, hard cobble layer, low	

Standard Penetration Test

FILL

USCS Low Plasticity Clay

USCS Poorly-graded Gravel with Clay

USCS Silty Clayey Gravel

USCS Silty Sand

USCS Silty Gravel

BORING LOG

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

START DATE	5/11/21
END DATE	5/12/21
PROJECT	I-80 Stoker Ave. Widening
LOCATION	Reno, NV
E.A. #	74191
BORING	B-1
GROUND ELEV. ft	4602.0
TOTAL DEPTH ft	61.5

GROUNDWATER LEVEL			
DATE	TIME	DEPTH ft	ELEV. ft

LATITUDE	39.5268
LONGITUDE	-119.8379
ENGINEER	J. Crosby
OPERATOR	O. Altimirano
DRILL RIG	Diedrich D-120 (1627)
METHOD	6" HSA
HAMMER	Automatic
BACKFILLED	Yes DATE 5/12/21

ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	TYPE	BLOWS / 6"	Uncorrected N Value	Recovery (%)	MOISTURE CONTENT (%)	% PASSING NO.200	LIQUID LIMIT	PLASTICITY INDEX	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
4576.0	26	8	SPT	49 49 50/4"		100		15	28	20	GC-GM	plasticity, difficult to drill, very dense, moist, dark brown. Silty, clayey GRAVEL with sand (GC-GM), Subangular, low plasticity, very dense, moist, dark brown.	boulder layer.
4575.0	27												26.5-26.9 Rig Chatter, rough granular material.
4574.0	28												
4573.0	29												
4572.0	30												
4571.0	31	9	SPT	46 50/4"		53		15			GP-GC	Poorly graded GRAVEL with clay and sand (GP-GC), subangular gravel, low plasticity, very hard cobble layer difficult to drill, moist, dark brown.	
4570.0	32											Silty clayey GRAVEL with sand (GC-GM), Subangular, low plasticity, very dense (very difficult drilling from 35' to 36') moist, dark brown.	
4569.0	33												
4568.0	34												
4567.0	35												
4566.0	36	10	SPT	50/5"		47		16					Rock bit grinding on cobble.
4565.0	37												
4564.0	38												37.5-40 Very Hard Drilling.
4563.0	39												
4562.0	40												
4561.0	41	11	SPT	57 50/4.5"		87		17	26	6	GC-GM		
4560.0	42												
4559.0	43												
4558.0	44												
4557.0	45												
4556.0	46	12	SPT	50/3.5"		47		20					
4555.0	47												
4554.0	48												
4553.0	49												

Standard Penetration Test | FILL | USCS Low Plasticity Clay | USCS Poorly-graded Gravel with Clay | USCS Silty Clayey Gravel | USCS Silty Sand | USCS Silty Gravel

BORING LOG

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

START DATE 5/11/21
END DATE 5/12/21
PROJECT I-80 Stoker Ave. Widening
LOCATION Reno, NV
E.A. # 74191
BORING B-1
GROUND ELEV. ft 4602.0
TOTAL DEPTH ft 61.5

GROUNDWATER LEVEL			
DATE	TIME	DEPTH ft	ELEV. ft

LATITUDE 39.5268
LONGITUDE -119.8379
ENGINEER J. Crosby
OPERATOR O. Altimirano
DRILL RIG Diedrich D-120 (1627)
METHOD 6" HSA
HAMMER Automatic
BACKFILLED Yes DATE 5/12/21

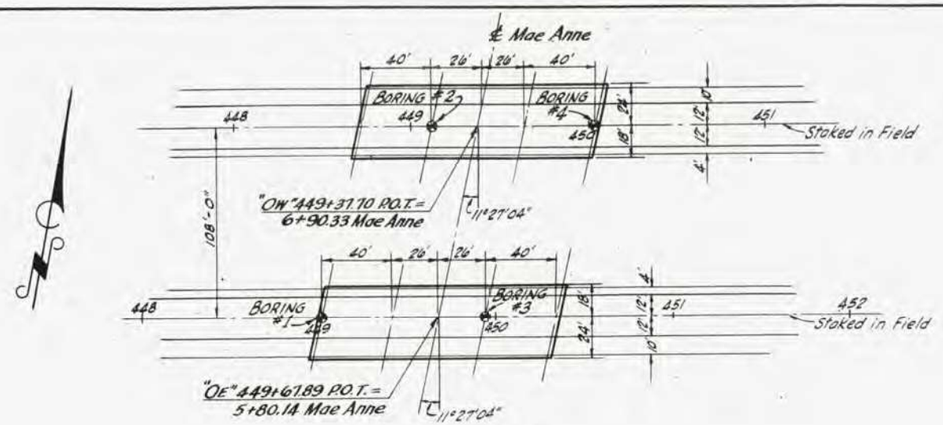
ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	TYPE	BLOWS / 6"	Uncorrected N Value	Recovery (%)	MOISTURE CONTENT (%)	% PASSING NO.200	LIQUID LIMIT	PLASTICITY INDEX	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
4551.0	51	13	SPT	19 41 50/3.5"		87		30	28	4	SM	Silty SAND (SM), few subangular gravel, very dense, moist, reddish to dark brown.	
4550.0	52												
4549.0	53										GM	Silty GRAVEL with sand (GM): Subangular gravel, very dense, moist, dark brown.	
4548.0	54												
4547.0	55										SM	Silty SAND with gravel (SM): medium coarse sand, very dense, moist, reddish to dark brown.	
4546.0	56	14	SPT	57 50/3"		53		13			GM	Silty GRAVEL with sand (GM): Subangular with alternating sand layers, very dense, moist, dark brown.	
4545.0	57												
4544.0	58												
4543.0	59												
4542.0	60												
4541.0	61	15	SPT	80/5"		53	8	14					
4540.0	62											Boring terminated at 61.5 feet. Groundwater was not encountered	
4539.0	63												
4538.0	64												
4537.0	65												
4536.0	66												
4535.0	67												
4534.0	68												
4533.0	69												
4532.0	70												
4531.0	71												
4530.0	72												
4529.0	73												
4528.0	74												

Standard Penetration Test
FILL
USCS Low Plasticity Clay
USCS Poorly-graded Gravel with Clay
USCS Silty Clayey Gravel
USCS Silty Sand
USCS Silty Gravel

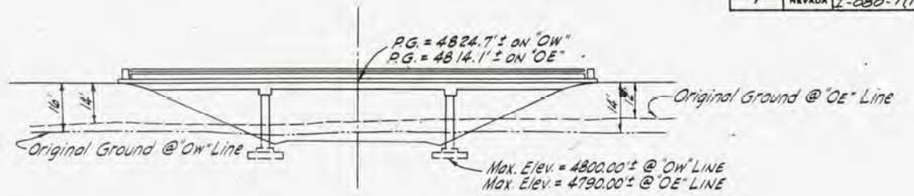
Appendix C
Previous Explorations

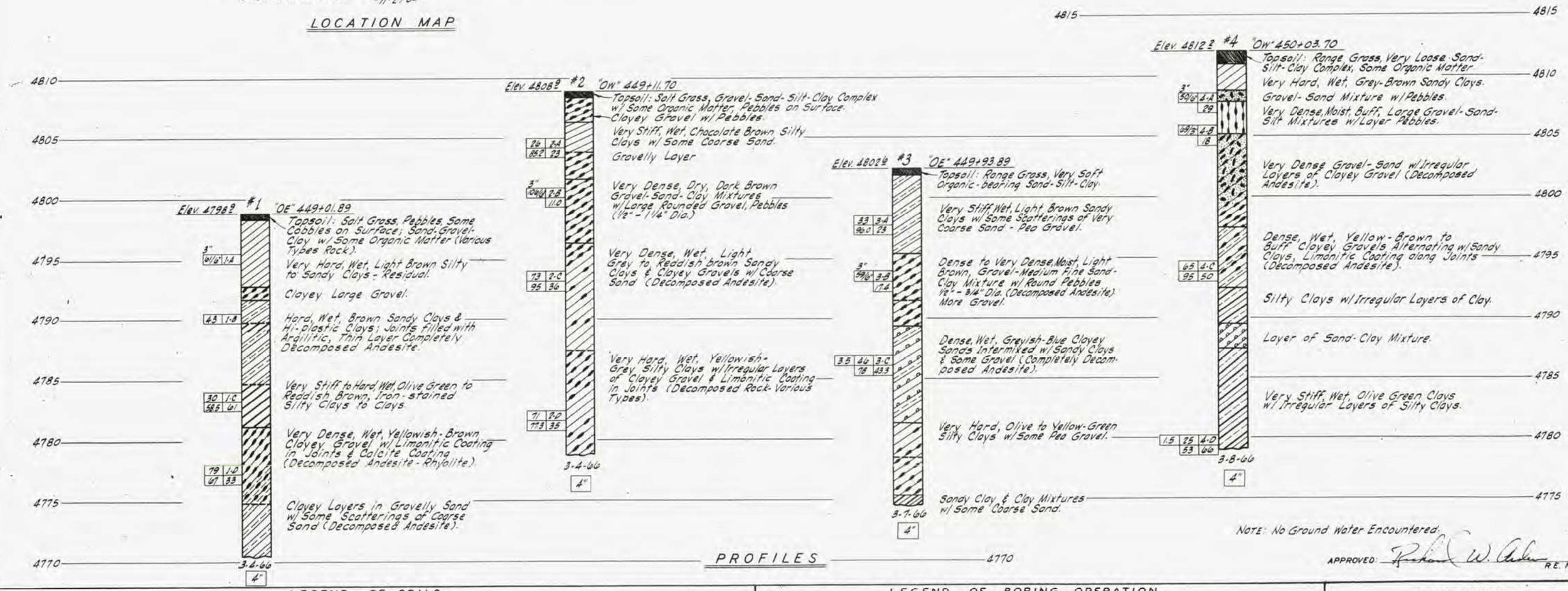
FED. ROAD REG. NO.	STATE	PROJECT NO.	COUNTY	CONTROL SECTION	STATE ROUTE	SHEET NO.	TOTAL SHEETS
7	NEVADA	I-080-1(19)7	WASHOE	31-082		63	

5-9A



LOCATION MAP





PROFILES

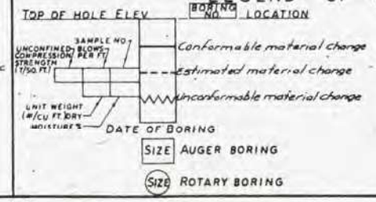
NOTE: No Ground Water Encountered.

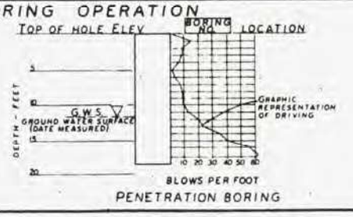
APPROVED: Robert W. Crabb R.E. No. 1643

LEGEND OF SOILS

- Well-graded gravels or gravel-sand mixtures, little or no fines
- Poorly graded gravels or gravel-sand mixtures, little or no fines
- Silty gravel-sand-silt mixtures
- Clayey gravels, gravel-sand-clay mixtures
- Well-graded sands or gravelly sands, little or no fines
- Poorly graded sands or gravelly sands, little or no fines
- Silty sands, sand-silt mixtures
- Clayey sands, sand-clay mixtures
- Inorganic silts and very fine sands, silty or clayey fine sands or clayey silts
- Sandy clays, silty clays, lean clays
- Organic silts and organic silty clays of low plasticity
- Inorganic silts, micaceous or diatomaceous fine sand or silty soils
- Inorganic clays of high plasticity, fat clays
- Organic clays of medium to high plasticity, organic silts
- Peat and other highly organic soils
- Fill material

LEGEND OF BORING OPERATION





STATE OF NEVADA
DEPARTMENT OF HIGHWAYS

MAE ANNE GRADE SEPARATION
H-767E & H-767W

LOG OF TEST BORINGS

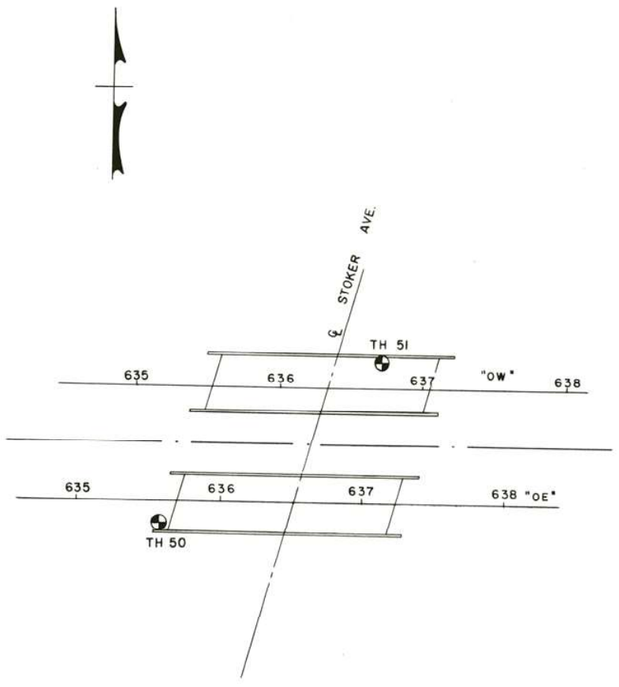
SPROUT ENGINEERS, INC.
950 INDUSTRIAL WAY
SPARKS, NEVADA

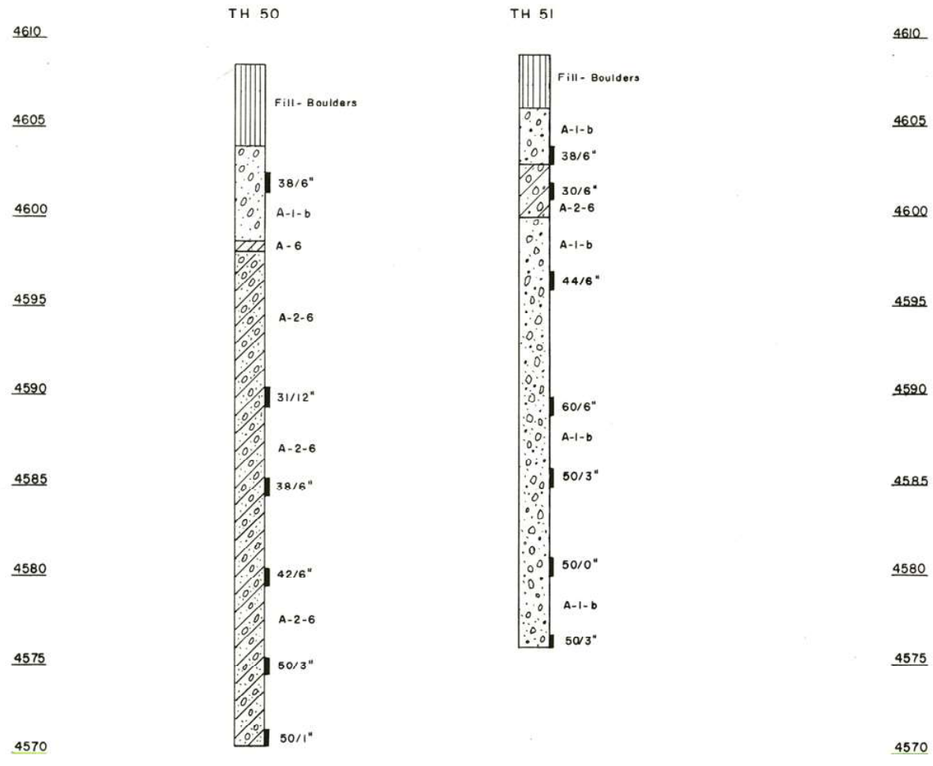
APRIL 11, 1966
W-1068-F
JWH/LH

PLATE 2

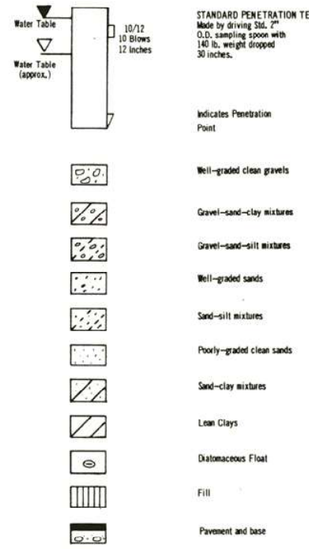
FED. ROAD REG. NO.	STATE	PROJECT NO.	COUNTY	CONTROL SECTION	STATE ROUTE	SHEET NO.	TOTAL SHEETS
7	NEVADA	I-080-1(19)7	WASHOE	31-082		82	

S28





BOTH HOLES DRY



STATE OF NEVADA
DEPARTMENT OF HIGHWAYS

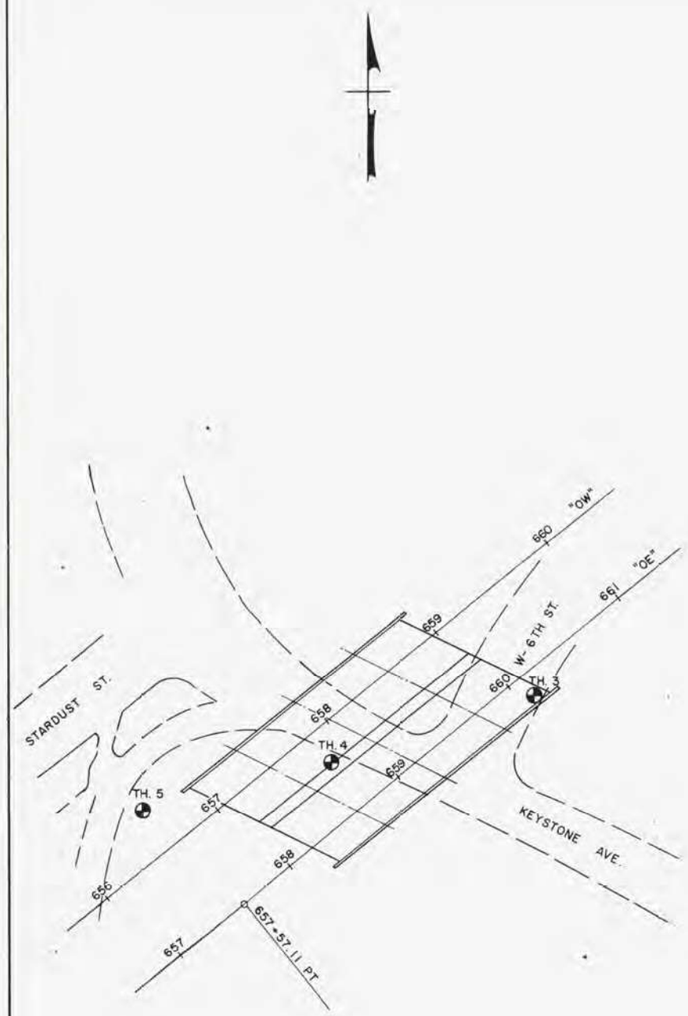
H-1162E & H-1162W

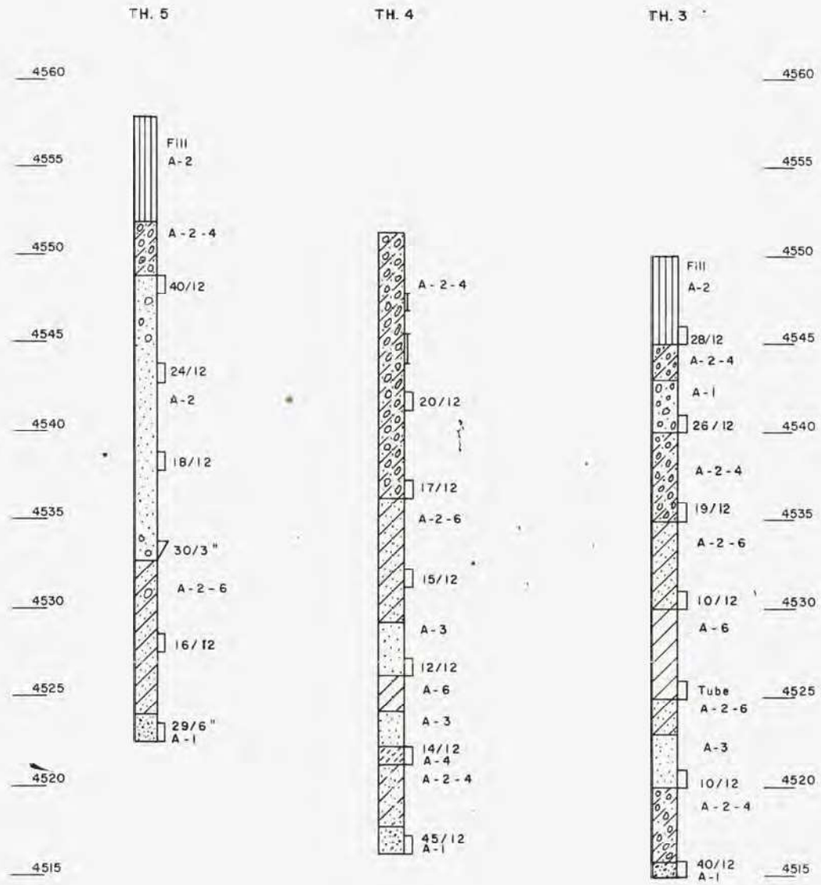
BORING LOGS & LOCATION

NEVADA ENGINEERING CONSULTANTS, INC.—CARSON CITY, NEVADA
KEN R. WHITE CONSULTING ENGINEERS, INC.—DENVER, COLORADO

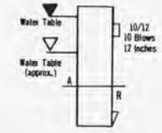
FED. ROAD REG. NO.	STATE	PROJECT NO.	COUNTY	CONTROL SECTION	STATE ROUTE	SHEET NO.	TOTAL SHEETS
7	NEVADA	I-080-1(18)7	WASHOE	31-0 82		95	

S41





ALL HOLES DRY



STANDARD PENETRATION TEST
Made by driving Std. 2"
O.D. sampling spoon with
140 lb. weight dropped
30 inches.

Auger Change to Rotary

Indicates Penetration Point

Well-graded clean gravels

Gravel-sand-clay mixtures

Gravel-sand-silt mixtures

Well-graded sands

Sand-silt mixtures

Poorly-graded clean sands

Sand-clay mixtures

Lean Clays

Diatomaceous Float

Fill

Pavement and base

LEGEND

STATE OF NEVADA
DEPARTMENT OF HIGHWAYS

I-987E & I-987W

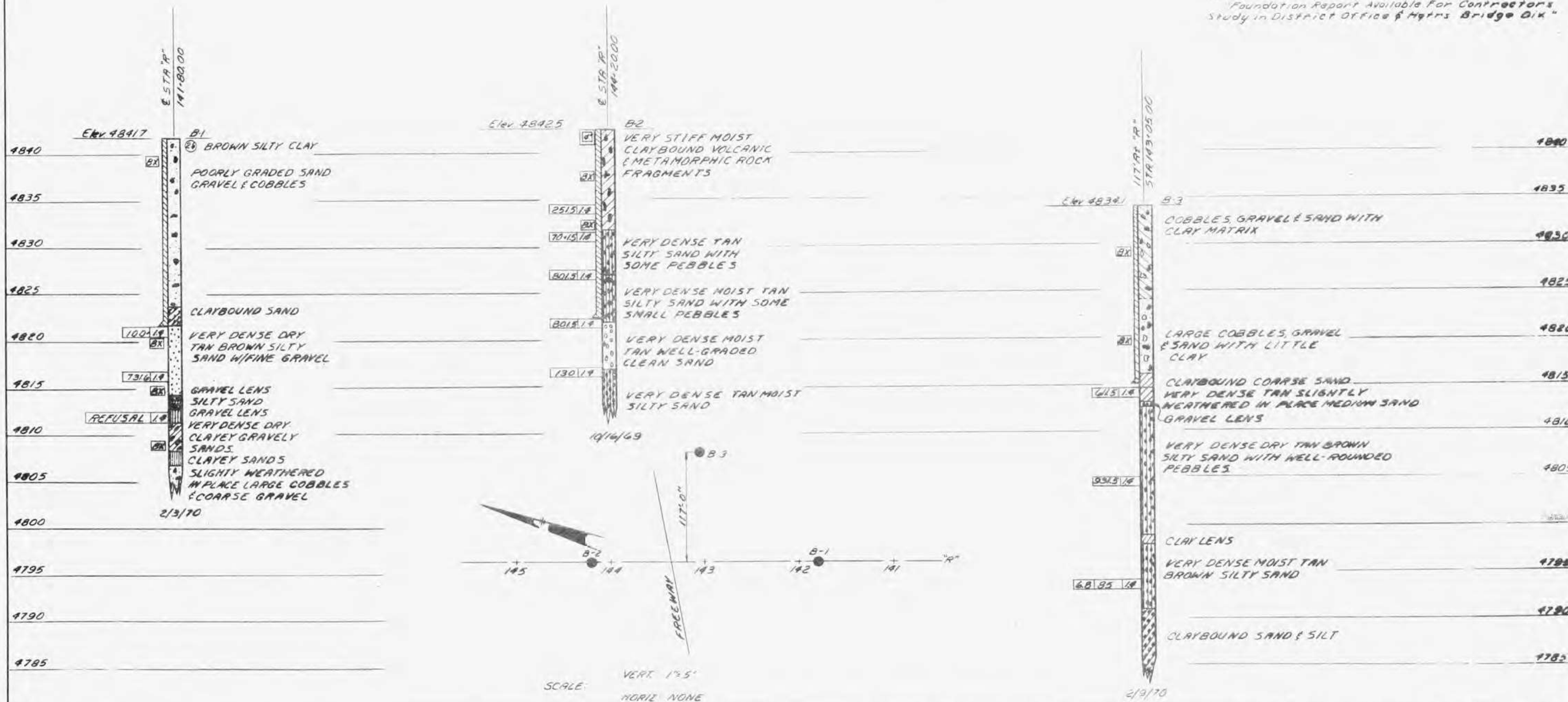
BORING LOGS & LOCATION

NEVADA ENGINEERING CONSULTANTS, INC.—CARSON CITY, NEVADA
KEN R. WHITE CONSULTING ENGINEERS, INC.—DENVER, COLORADO

FED. RD. REG. NO.	STATE	PROJECT NO.	MILEPOST	SHEET NO.
9	NEVADA	1-080-1(83)10	WASHOE	B-24

W. Mc.-24

NOTE:
"Foundation Report Available For Contractors Study in District Office & Hqtrs Bridge Div."



Elev 4841.7
B1
℄ STA "R" 141+80.00
BROWN SILTY CLAY
POORLY GRADED SAND GRAVEL & COBBLES
CLAYBOUND SAND
VERY DENSE DRY TAN BROWN SILTY SAND W/FINE GRAVEL
GRAVEL LENS
SILTY SAND
GRAVEL LENS
VERY DENSE DRY CLAYEY GRAVELY SANDS
CLAYEY SANDS
SLIGHTY WEATHERED IN PLACE LARGE COBBLES & COARSE GRAVEL
REFUSAL
2/3/70
Elev 4842.5
B2
℄ STA "R" 144+20.00
VERY STIFF MOIST CLAYBOUND VOLCANIC & METAMORPHIC ROCK FRAGMENTS
VERY DENSE TAN SILTY SAND WITH SOME PEBBLES
VERY DENSE MOIST TAN SILTY SAND WITH SOME SMALL PEBBLES
VERY DENSE MOIST TAN WELL-GRADED CLEAN SAND
VERY DENSE TAN MOIST SILTY SAND
10/16/69
Elev 4834.1
B3
117' Rt "R" STA 143+05.00
COBBLES, GRAVEL & SAND WITH CLAY MATRIX
LARGE COBBLES, GRAVEL & SAND WITH LITTLE CLAY
CLAYBOUND COARSE SAND
VERY DENSE TAN SLIGHTLY WEATHERED IN PLACE MEDIUM SAND
GRAVEL LENS
VERY DENSE DRY TAN BROWN SILTY SAND WITH WELL-ROUNDED PEBBLES
CLAY LENS
VERY DENSE MOIST TAN BROWN SILTY SAND
CLAYBOUND SAND & SILT
2/9/70
4840
4835
4830
4825
4820
4815
4810
4805
4800
4795
4790
4785
B-2
B-1
B3
117.0'
145
144
143
142
141
"R"
FREEWAY
SCALE: VERT. 1"=5' HORIZ. NONE

SOIL CONSISTENCY CLASSIFICATION

CONSISTENCY		* BLOWS PER. FT.
GRANULAR	COHESIVE	
Very Loose	Very Soft	0 to 5
Loose	Soft	5 to 10
Slightly Compact	Stiff	10 to 20
Compact	Very Stiff	20 to 35
Dense	Hard	35 to 70
Very Dense	Very Hard	70

*(Standard Penetration Test) Blows Per Ft. (140 LB. Hammer, 30" Free-Fall Blow using a 2" O.D. x 1-3/8" I.D. Sampler).

R. M. OXOBY | W. Alan Odell, Chief Bridge Engineer | William ..., Engineering Geologist

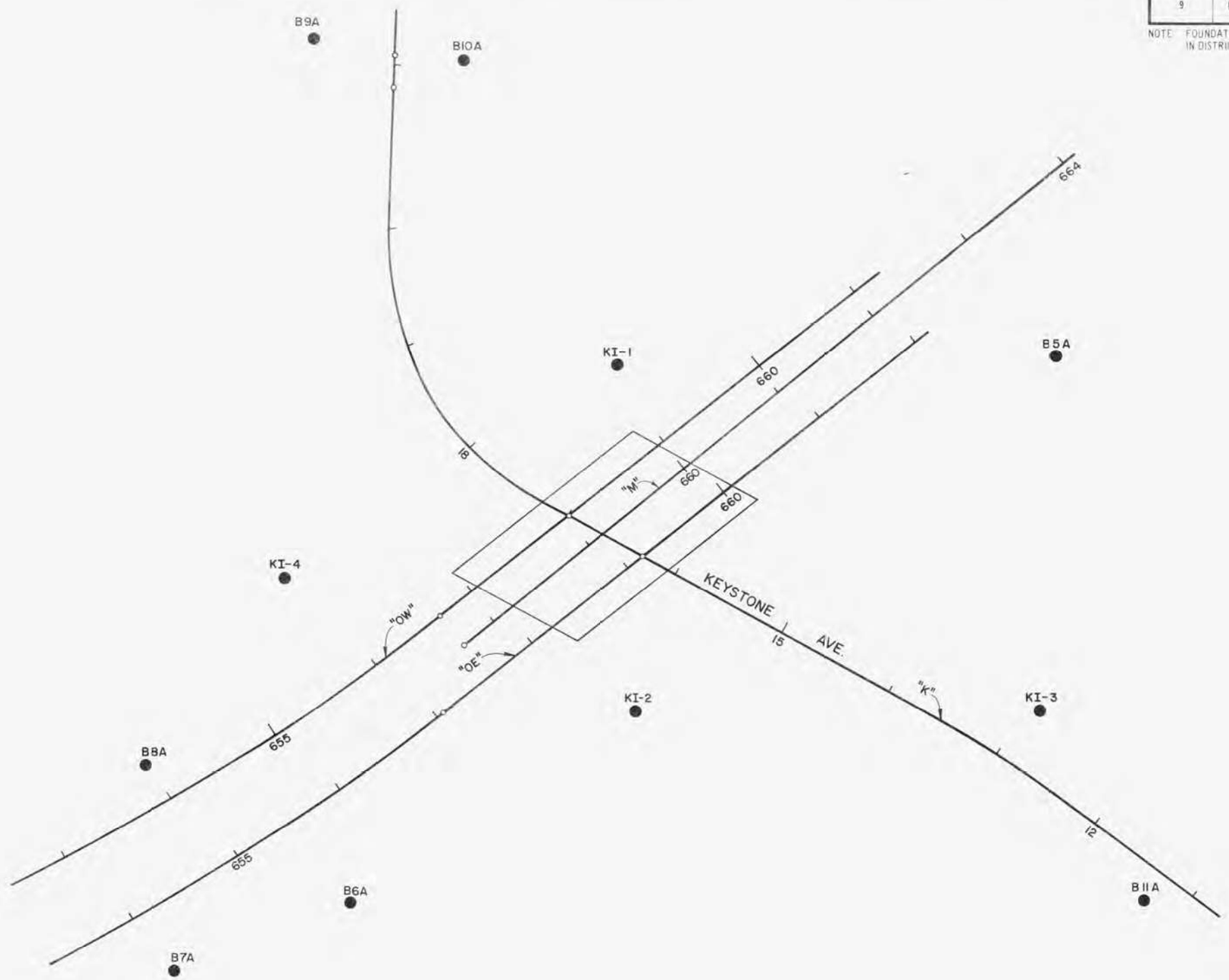
NEVADA HIGHWAY DEPARTMENT
STRUCTURAL DESIGN DIVISION

LOG OF TEST BORINGS
I-1301
RING ROAD INTERCHANGE
WASHOE COUNTY NEVADA

DWG. NO.

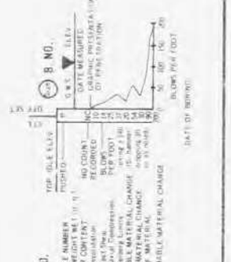
FED. RD. REG. NO.	STATE	PROJECT NO.	COUNTY	SHEET NO.
9	NEVADA	IR-080-1(106)12	WASHOE	BL-1

NOTE: FOUNDATION REPORT AVAILABLE FOR CONTRACTORS STUDY IN DISTRICT OFFICE AND MATERIALS & TESTING DIVISION



PENETRATION BORING

ROTARY BORING



PLAN OF (ANY BORING) ● ◉ 2" CONE PENETROMETER

ROTARY BORING WET ☐ RADIOACTIVE BORING DRY ▣ DIAMOND CORE BORING ◇ TEST PIT [ ]

BIT SIZE O.D. ID
CASING SIZE O.D. ID

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
11-24	MEDIUM DENSE	5-8	MEDIUM STIFF
25-50	DENSE	9-15	STIFF
OVER 50	VERY DENSE	16-30	VERY STIFF
		31-60	HARD
		OVER 60	VERY HARD

STANDARD PENETRATION TEST
No. OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. ON 2 IN. O.D. I.D. SAMPLER

THE UNIFIED SOIL CLASSIFICATION SYSTEM

MAJ. DIV.	LETTER SYM	DESCRIPTION
COARSE GRAINED MATERIAL — GRAVEL AND GRAVELLY SOIL	GW	WELL-GRADED GRAVEL OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	GP	POORLY-GRADED GRAVEL OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	GM	SILTY GRAVEL, GRAVEL-SAND-SILT MIXTURES
	GC	CLAYEY GRAVEL, GRAVEL-SAND-CLAY MIXTURES
SAND AND SANDY SOIL	SW	WELL-GRADED SAND OR GRAVELLY SAND, LITTLE OR NO FINES
	SP	POORLY-GRADED SAND OR GRAVELLY SAND, LITTLE OR NO FINES
	SM	SILTY SAND, SAND-SILT MIXTURES
	SC	CLAYEY SAND, SAND-CLAY MIXTURES
FINE GRAINED MATERIAL — SILTS AND CLAYS LL < 50	ML	INORGANIC SILT AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
	CL	INORGANIC CLAY OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAY, SANDY CLAY, SILTY CLAY, LEAN CLAY
	OL	ORGANIC SILT AND ORGANIC SILTY CLAY OF LOW PLASTICITY
SILTS AND CLAYS LL > 50	MH	INORGANIC SILT, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOIL, ELASTIC SILT
	CH	INORGANIC CLAY OF HIGH PLASTICITY, FAT CLAY
	OH	ORGANIC CLAY OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILT
	PT	PEAT AND OTHER HIGHLY ORGANIC SOILS
	CE	CALICHE

NEVADA DEPARTMENT OF TRANSPORTATION
MATERIALS AND TESTING DIVISION
Geotechnical Section

KEYSTONE AVENUE INTERCHANGE

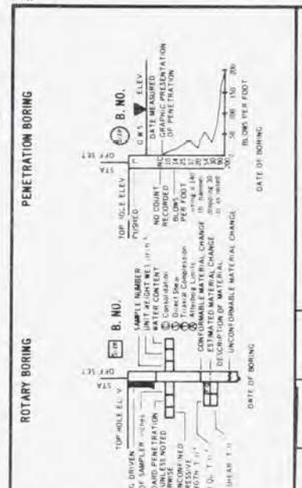
LOG OF TEST BORINGS

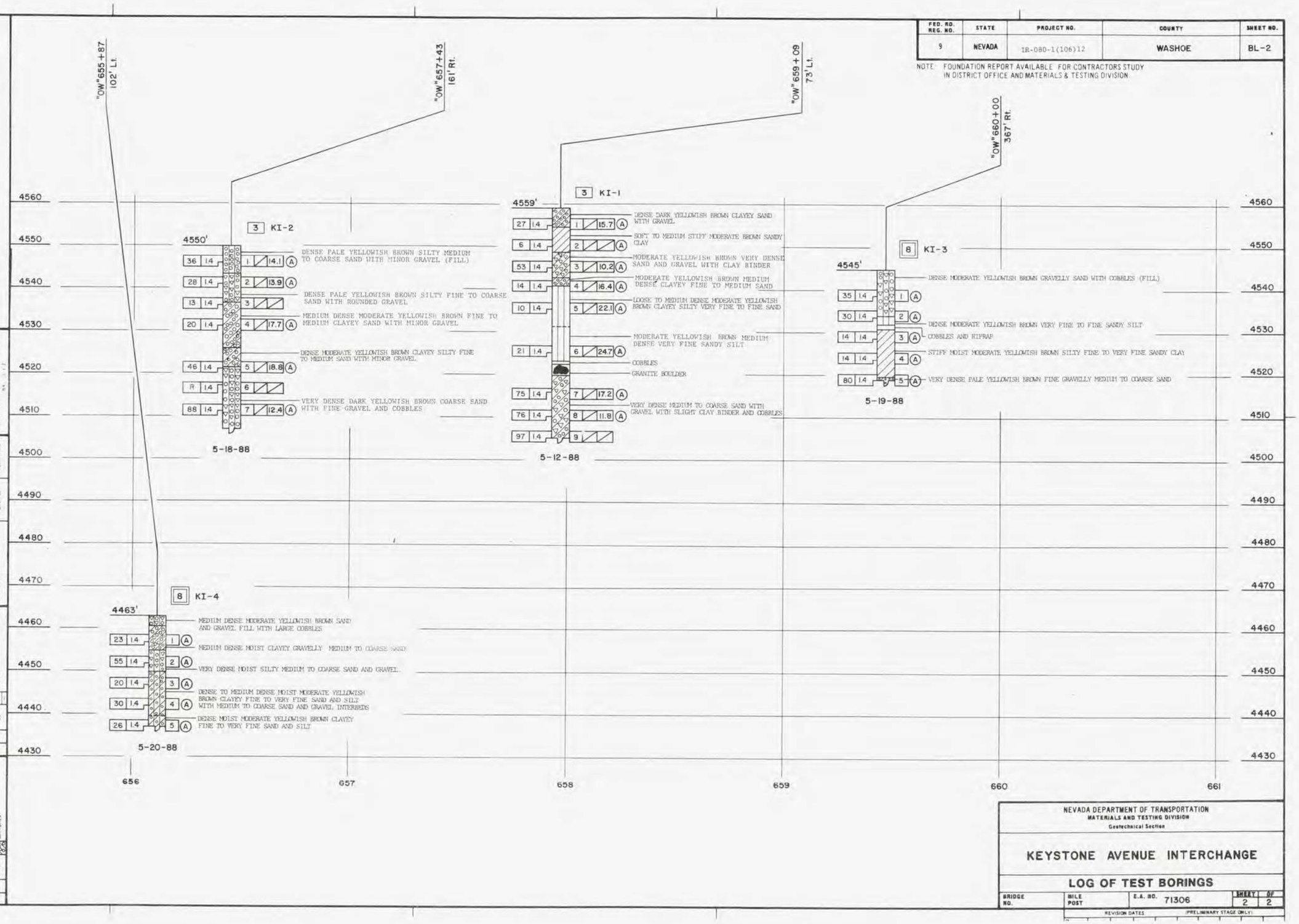
BRIDGE NO.	MILE POST	E.A. NO. 71306	SHEET	OF
			1	4

REVISION DATES (PRELIMINARY STAGE ONLY)

FED. RD. REG. NO.	STATE	PROJECT NO.	COUNTY	SHEET NO.
9	NEVADA	IR-080-1(106)12	WASHOE	BL-2

NOTE: FOUNDATION REPORT AVAILABLE FOR CONTRACTORS STUDY IN DISTRICT OFFICE AND MATERIALS & TESTING DIVISION.





NEVADA DEPARTMENT OF TRANSPORTATION
MATERIALS AND TESTING DIVISION
Geotechnical Section

KEYSTONE AVENUE INTERCHANGE

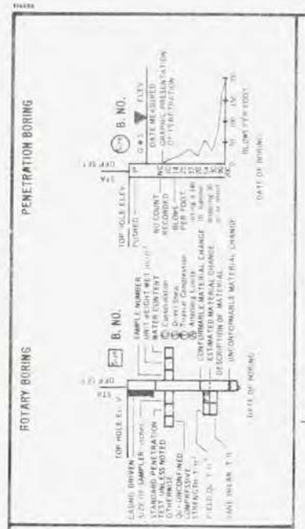
LOG OF TEST BORINGS

BRIDGE NO.	MILE POST	E.A. NO. 71306	SHEET	OF
			2	2

REVISION DATES (PRELIMINARY STAGE ONLY):

FED. RD. REG. NO.	STATE	PROJECT NO.	COUNTY	SHEET NO.
9	NEVADA	IR-080-1(106)12	WASHOE	BL-3

NOTE: FOUNDATION REPORT AVAILABLE FOR CONTRACTORS STUDY IN DISTRICT OFFICE AND MATERIALS & TESTING DIVISION



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

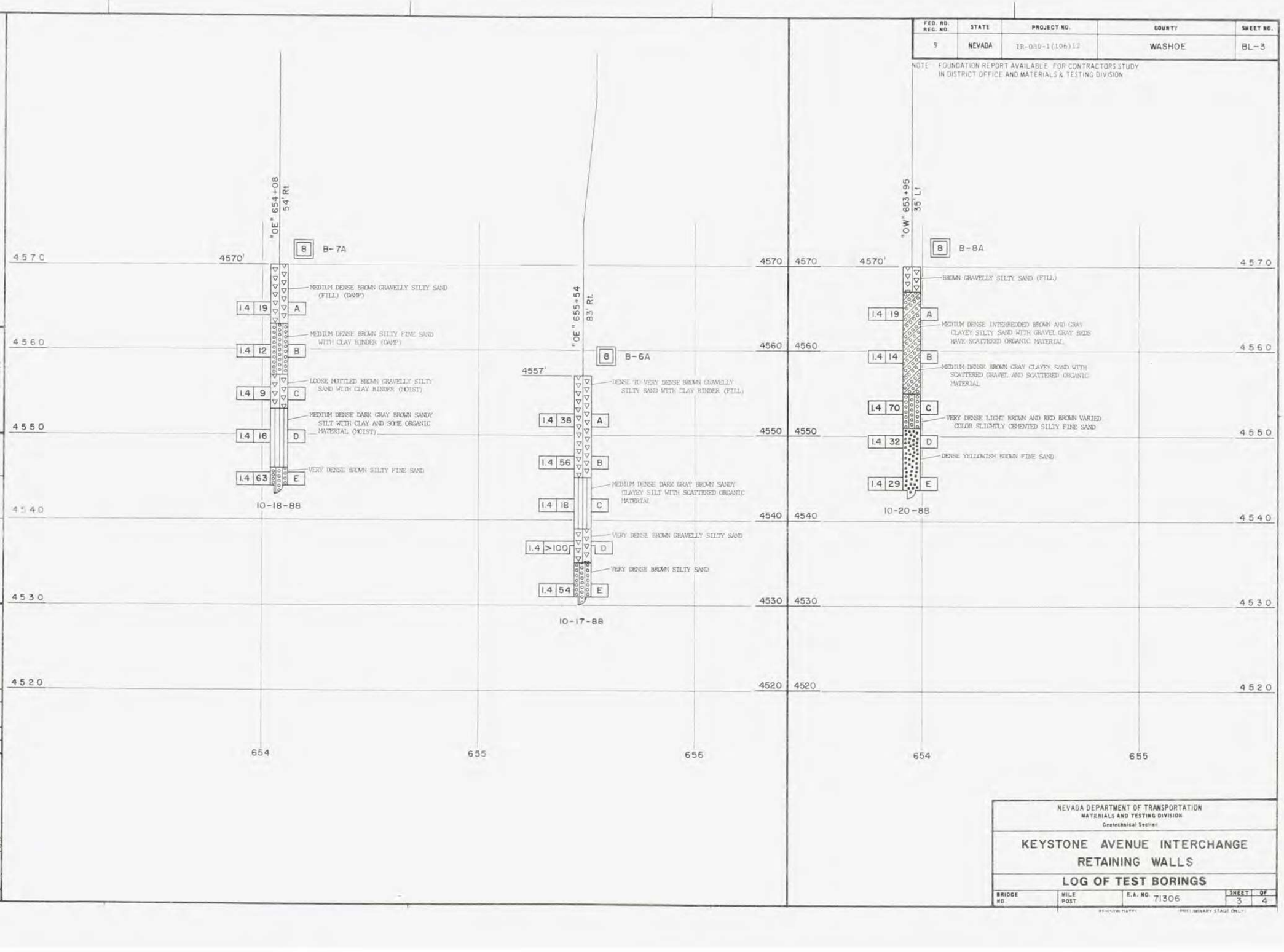
* STANDARD PENETRATION TEST (SPT) IN BLOWS NUMBER OF BLOWS (N) OF 140 LB. FALLING 30 IN. ON 2 IN. O.D. SPLIT SPOON SAMPLER

THE UNIFIED SOIL CLASSIFICATION SYSTEM

MAJ. DIV.	LETTER SYM	DESCRIPTION
GRAVEL AND GRAVELLY SOIL	GW	WELL-GRADED GRAVEL OR GRAVEL-SAND MIXTURES LITTLE OR NO FINES
	GP	POORLY-GRADED GRAVEL OR GRAVEL-SAND MIXTURES LITTLE OR NO FINES
	GM	SILTY GRAVEL, GRAVEL-SAND-SILT MIXTURES
	GC	CLAYEY GRAVEL, GRAVEL-SAND-CLAY MIXTURES
SAND AND SANDY SOIL	SW	WELL-GRADED SAND OR GRAVELLY SAND, LITTLE OR NO FINES
	SP	POORLY-GRADED SAND OR GRAVELLY SAND, LITTLE OR NO FINES
	SM	SILTY SAND, SAND-SILT MIXTURES
	SC	CLAYEY SAND, SAND-CLAY MIXTURES
SILTS AND CLAYS LL < 50	ML	INORGANIC SILT AND VERY FINE SAND, ROCK FLOUR, SILTY OR CLAYEY FINE SAND OR CLAYEY SILT WITH SLIGHT PLASTICITY
	CL	INORGANIC CLAY OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAY, SANDY CLAY, SILTY CLAY, LEAN CLAY
	OL	ORGANIC SILT AND ORGANIC SILTY-CLAY OF LOW PLASTICITY
SILTS AND CLAYS LL > 50	MH	INORGANIC SILT, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS ELASTIC SILT
	CH	INORGANIC CLAY OF HIGH PLASTICITY, FAT CLAY
	OH	ORGANIC CLAY OF MEDIUM TO HIGH PLASTICITY (ORGANIC SILT)
HIGHLY ORGANIC SOILS	PT	PEAT AND OTHER HIGHLY ORGANIC SOILS
	CE	CALICHE

FINE GRAINED MATERIAL

COARSE GRAINED MATERIAL



NEVADA DEPARTMENT OF TRANSPORTATION
MATERIALS AND TESTING DIVISION
Geotechnical Section

KEYSTONE AVENUE INTERCHANGE RETAINING WALLS

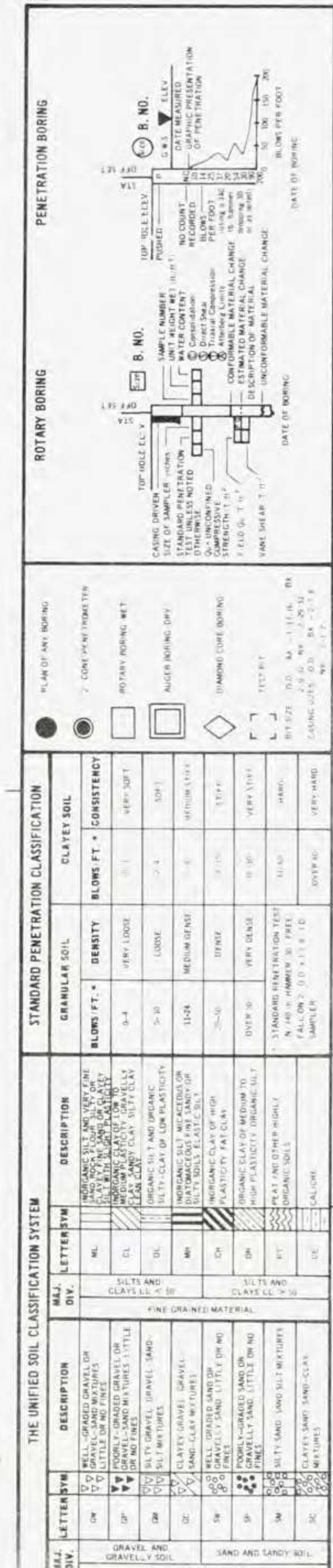
LOG OF TEST BORINGS

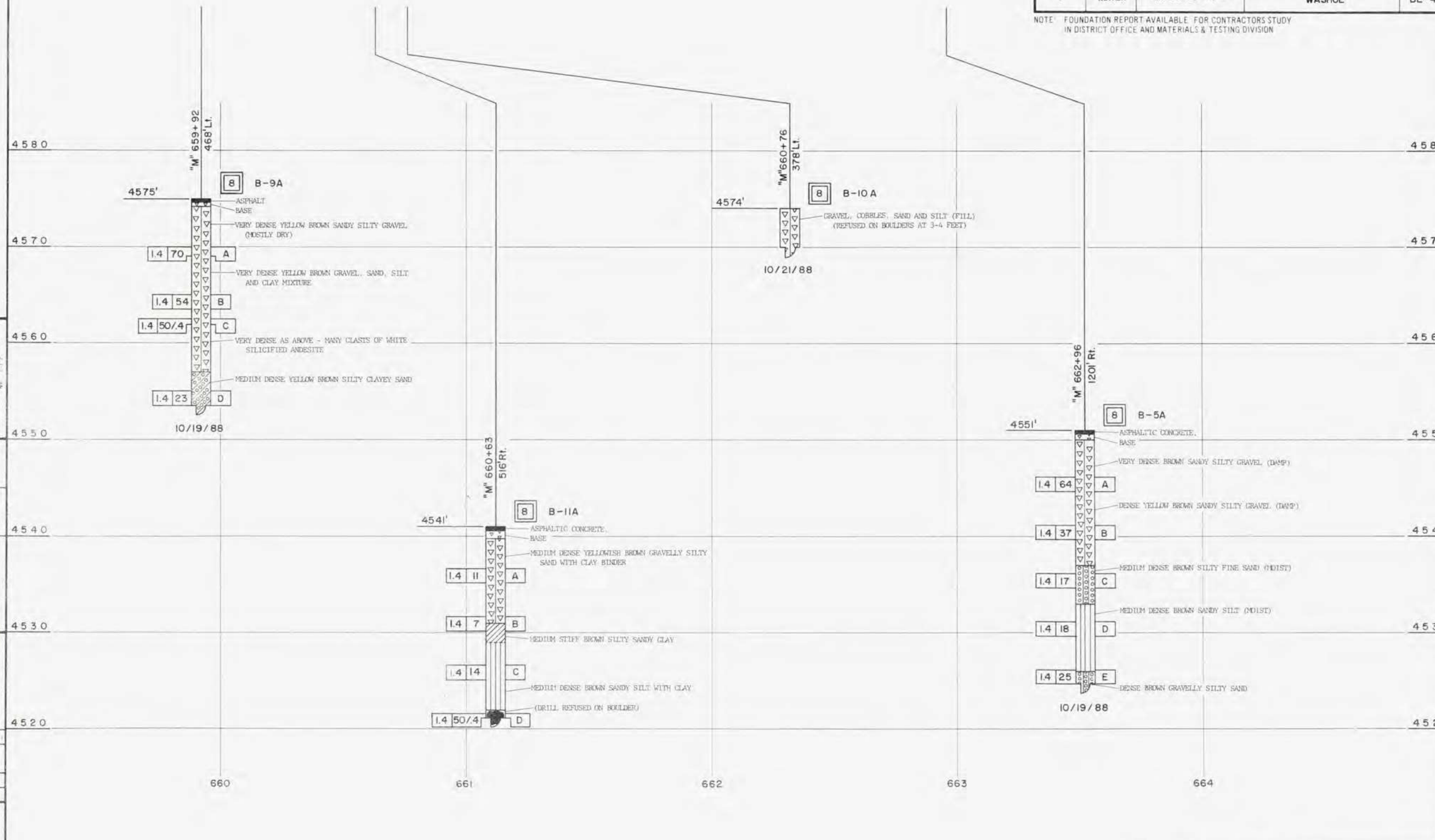
BRIDGE NO.	MILE POST	E.A. NO. 71306	SHEET	OF
			3	4

REVISION DATES — PRELIMINARY STAGE ONLY

FED. RD. REG. NO.	STATE	PROJECT NO.	COUNTY	SHEET NO.
9	NEVADA	IR-080-1(106)12	WASHOE	BL-4

NOTE: FOUNDATION REPORT AVAILABLE FOR CONTRACTORS STUDY IN DISTRICT OFFICE AND MATERIALS & TESTING DIVISION





NEVADA DEPARTMENT OF TRANSPORTATION
MATERIALS AND TESTING DIVISION
Geotechnical Section

KEYSTONE AVENUE INTERCHANGE
RETAINING WALLS
LOG OF TEST BORINGS

BRIDGE NO.	MILE POST	E.A. NO. 71306	SHEET 4	OF 4

REVISION DATE: (PRELIMINARY STAGE ONLY)

FED RD. REG. NO.	STATE	PROJECT NO.	COUNTY	SHEET NO.
9	NEVADA	IMD-IM-080-1(147) SPI-080-X058)	WASHOE	B-15A

METRIC NDOT

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED, ALL STATIONS ARE IN METERS.

KEY TO BORING LOGS

PARTICLE SIZE LIMITS								
CLAY	SILT	SAND			GRAVEL		COBBLES	BOULDERS
		FINE	MEDIUM	COARSE	FINE	COARSE		
0.002 mm		•200	•40	•10	•4	19 mm	75 mm	300 mm

UCSC GROUP	TYPICAL SOIL DESCRIPTION
GW	Well graded gravels, gravel-sand mixtures, little or no fines
GP	Poorly graded gravels, gravel-sand mixtures, litte or no fines
GM	Silty gravels, poorly graded gravel-sand-silt mixtures
GC	Cloyey gravels, poorly graded gravel-sand-cloy mixtures
SW	Well graded sands, grovelly sonds, little or no fines
SP	Poorly graded sands, gravelly sands, little or no fines
SM	Silty sands, poorly graded sand-silt mixtures
SC	Clayely sonds, poorly graded sand-clay mixtures
ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity
CL	Inorganic cloys of low to medium plasticity, grovelly clays, sondy cloys, silty cloys, leon cloys
OL	Organic silts and organic silt-clays of low plasticity
MH	Inorganic silts, micaceous or diatomoceous fine sandy or silty soils, elastic silts
CH	Inorganic cloys of high plasticity, fat clays
OH	Organic clays of medium to high ploticity
CE	Caliche
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 toble
▽ ▽	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 with finger pressure

STANDARD PENETRATION CLASSIFICATION *

GRANULAR SOIL		CLAYEY SOIL	
BLOWS / 0.3 m	DENSITY	BLOWS / 0.3 m	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
0.D. 63.5 kg hammer
760 mm free fall on 50.8 mm
0.D. x 35 mm I.D. sampler

Bow counts on Calif. Modified Sampler (N_{CMS}) can be converted to N_{SPT} by:
$(N_{CMS})\ (0.62) = N_{SPT}$

Bow counts form Automotic or Safety Hammer can be converted to Standard SPT N_{60} by:
$(N_{Automatic})\ (1.25) = N_{60}$
$(N_{Safety})\ (1.17) = N_{60}$

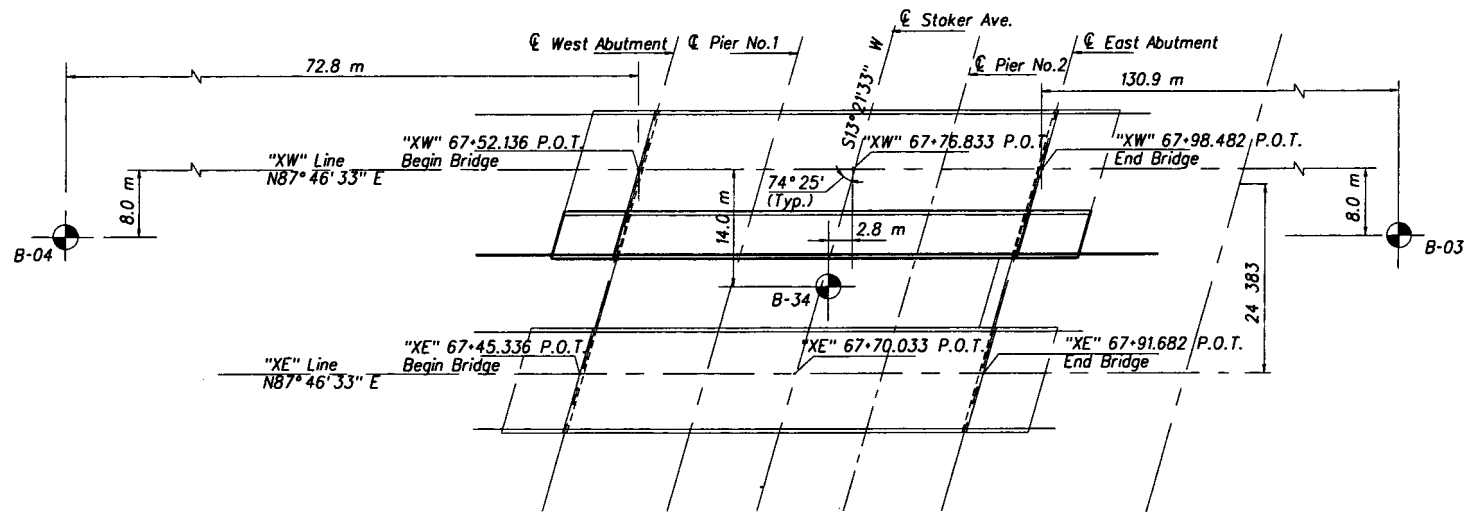
TEST ABBREVIATIONS

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	SV	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	PERMEABILTY	W	MOISTURE CONTENT

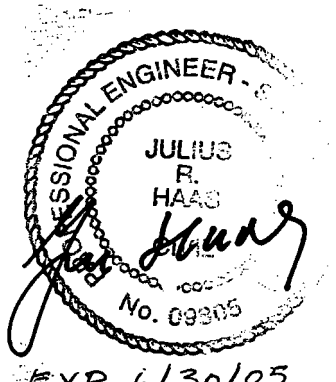
SOIL COLOR DESIGNATIONS ARE FROM THE MUNSELL SOIL COLOR CHART.
EXAMPLE: (7.5 YR 5/3) BROWN

SAMPLER NOTATION

CMS	CALIF. MODIFIED SAMPLER①
CPT	CONE PENETRATION
CS	CONTINUOUS SAMPLER②
CSS	CALIFORNIA SPLIT SPOON①
P	PUSHED (NOT DRIVEN)
PB	PITCHER BARRREL
RC	ROCK CORE③
SH	SHELBY TUBE④
SPT	STANDARD PENETRATION TEST
TP	TEST PIT
①	I.D. = 61.5 mm
②	I.D. = 82 mm with tube I.D. = 88.9 mm w/o tube
③	NXW
④	I.D. = 73 mm



BORING LOCATION



3/29/04

EXP. 6/30/05

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

LOG OF TEST BORINGS

H-1162 W

LOUIS BERGER & ASSOCIATES, INC.
LAS VEGAS, NEVADA

DESIGNED BY	J.H.T.
DRAWN BY	J.D.J.
CHECKED BY	J.H.T.
REVIEWED BY	J.H.

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FED RD. REG. NO.	STATE	PROJECT NO.	COUNTY	SHEET NO.
9	NEVADA	BRD-IM-080-1(147) SPI-080-1(058)	WASHOE	B-15B

METRIC NDOT

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED, ALL STATIONS ARE IN METERS.

EXPLORATION LOG — SHEET 1 OF 1

START DATE 2/15/00
END DATE 2/15/00
JOB DESCRIPTION I-80 Truck Lane
LOCATION Reno, Nevada
BORING B-03
E.A. # 0212-01-1
GROUND ELEV. 1400.56 (m)
HAMMER DROP SYSTEM Cathead

GROUNDWATER LEVEL

DATE	DEPTH m	ELEV. m

STATION 67+27.5
OFFSET 8.1 RT
ENGINEER JRO
EQUIPMENT CME 55
OPERATOR A. Andresen
DRILLING METHOD 6" Hollow Stem Auger
BACKFILLED Yes DATE 2/15/2000

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.00			4					POORLY GRADED SAND with GRAVEL (Fill) dark brown, very moist to moist, very dense, with estimated 5% non-plastic fines, 55-65% fine to coarse sand, 30-40% fine to coarse, subangular gravel to +25mm in diameter. Coarse gravel and cobbles at 0.3 to 0.76 meters (base of fill).	
	0.15	3A	SPT	9 50/75	50/75	80		SP		
	0.38									
	0.76	Bulk	AC						0.76	
1399.56	1	3B	SPT	9 21 26	47	83		SC	CLAYEY SAND brown, moist, dense, with estimated 25-30% low plastic fines, 60-65% fine to coarse sand, 10% fine to coarse, angular gravel to +19mm in diameter.	
	1.22									
	1.37								1.37	
	1.52								SILTY, CLAYEY SAND brown, moist, medium dense, with estimated 15-20% low plastic fines, 65-70% fine to coarse sand, 15% fine to coarse, angular gravel to +19mm in diameter. Unit grades to Poorly Graded Sand with Silt.	
		3C	SPT	5 9 9	18	100		SC SM		
1398.56	1.98 2								2.13	
	2.29								CLAYEY SAND brown, moist, dense, with 35% low plasticity fines, 57% fine to coarse sand, 8% fine to coarse, angular to subangular gravel to +9.5mm in diameter.	
		3D	SPT	7 11 32	43	100	MC, SV, PI			
	2.74							SC		
1397.56	3 3.05									
		3E	SPT	12 20 25	45	100				
	3.51								3.51	
1396.56	4									

NV_DOT_021201.GPJ NV_DOT.GDT 3/13/01

EXPLORATION LOG — SHEET 1 OF 1

START DATE 2/15/00
END DATE 2/15/00
JOB DESCRIPTION I-80 Truck Lane
LOCATION Reno, Nevada
BORING B-04
E.A. # 0212-01-1
GROUND ELEV. 1408.18 (m)
HAMMER DROP SYSTEM Cathead

GROUNDWATER LEVEL

DATE	DEPTH m	ELEV. m

STATION 64+77.5
OFFSET 8.1 RT
ENGINEER JRO
EQUIPMENT CME 55
OPERATOR A. Andresen
DRILLING METHOD 6" Hollow Stem Auger
BACKFILLED Yes DATE 2/15/2000

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.00			7					WELL GRADED SAND with SILT and GRAVEL (Fill) dark brown, very moist, medium dense, with 8% non-plastic fines, 59% fine to coarse fines, 34% fine to coarse, subangular gravel to +25mm in diameter.	
		4A	SPT	10 16	26	100	MC, SV, PI			
	0.46									
	0.76									
	0.81	4B	SPT	50/50	50/50	0		SW SM	Coarse gravel and cobbles at 0.76 to 1.22 meters.	
1407.18	1									
	1.22									
	1.52									
	1.75	4C	SPT	20 50/75	50/75	100			1.77 Coarse gravel and cobbles at 1.68 to 1.77 meters.	
1406.18	2								POORLY GRADED SAND brown, slightly moist to moist, dense to very dense, with estimated <5% non-plastic fines, 85-95% fine to coarse sand, 0-10% fine, angular to subangular gravel to +9.5mm in diameter.	
	2.29									
		4D	SPT	13 18 30	48	100		SP		
	2.74									
1405.18	3 3.05									
	3.20	4E	SPT	40	40	100			3.20	
1404.18	4								Coarse gravel and cobbles(?) at 3.2 meters.	

NV_DOT_021201.GPJ NV_DOT.GDT 3/13/01

Geotechnical Investigation by:
Black Eagle Consulting, Inc.
Geotechnical & Construction Services
1345 Capital Boulevard., Suite A
Reno, Nevada 89502-7140
August, 15, 2000

PROFESSIONAL ENGINEER — JULIUS R. HAAS — No. 9857 — 3/29/04
EXP. 6/30/05

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

LOG OF
TEST BORINGS

H-1162 W

LOUIS BERGER & ASSOCIATES, INC.
LAS VEGAS, NEVADA

DESIGNED BY J.H.T.
DRAWN BY J.O.J.
CHECKED BY J.H.T.
REVIEWED BY J.H.

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FED RD. REG. NO.	STATE	PROJECT NO.	COUNTY	SHEET NO.
9	NEVADA	IMD-IM-080-1(147) SPI-080-1(058)	WASHOE	B-15C

METRIC NDOT

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED, ALL STATIONS ARE IN METERS.

EXPLORATION LOG — SHEET 1 OF 2

START DATE 2/27/00
END DATE 2/27/00
JOB DESCRIPTION I-80 Truck Lane
LOCATION Reno, Nevada
BORING B-34
E.A.# 0212-01-1
GROUND ELEV. 1408.18 (m)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL

DATE	DEPTH m	ELEV. m

STATION Stoker Ave. (NorthBnd)
OFFSET 1.0 RT (approx.)
ENGINEER SDB
EQUIPMENT BK-81
OPERATOR S. Larson
DRILLING METHOD 6" Hollow Stem Auger
BACKFILLED Yes DATE 2/27/2000

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.24							GW-GC	0.24 ASPHALT CONCRETE	
	0.49	34A	MC	37 50/76	50/76	67	SV, PI		0.43 WELL-GRADED GRAVEL with SILTY CLAY and SAND FILL, moist, dark brown, very dense, with 8% low plasticity fines, 30% fine to coarse sand, and 62% fine to coarse gravel.	
	0.76									
1407.18	1 1.22	34B	MC	28 45 47	92	100	SV, PI	GW GC	WELL-GRADED GRAVEL with CLAY and SAND, moist, brown, very dense, with 9% low plasticity fines, 38% fine to coarse sand, and 53% fine to coarse subrounded to subangular gravel.	
	1.52									
	1.80	34C	MC	26 50/127	50/127	100	SV, PI			
1406.18	2									
	2.29								2.13	
	2.59	34D	MC	13 50/150	50/150	100	SV, PI	CL	GRAVELLY LEAN CLAY with SAND, moist, dark brown, hard, with estimated 50% medium plasticity fines, 20% fine to medium sand, and 30% fine to coarse rounded to subrounded gravel.	
1405.18	3 3.05								2.59	
	3.25	34E	MC	42 50/51	50/51	100	SV, PI	SC SM	SILTY, CLAYEY SAND with GRAVEL, moist, dark brown, very dense, with 18-23% low plasticity fines, 45-49% fine to coarse sand, and 32-33% fine to coarse subrounded gravel.	
	3.81									
	3.96	34F	MC	50/150	50/150	67	SV, PI			
1404.18	4								4.27	
	4.57	34G	MC	50/13	50/13		SV, PI	SC	CLAYEY SAND with GRAVEL, moist, dark brown, very dense, with 32% low to medium plasticity fines, 50% fine to coarse sand, and 18% fine to coarse gravel.	
1403.18	5								5.33	
	5.33									
	5.49	34H	MC	47/150	47/150	100	SV, PI	GC GM	SILTY, CLAYEY GRAVEL with SAND, moist, dark brown, very dense, with 13% low plasticity fines, 39% fine to coarse sand, and 48% fine to coarse gravel.	
1402.18	6 6.10								6.10	
	6.40	34I	MC	407/89	407/89	29	SV, PI	SC	CLAYEY SAND with GRAVEL, moist, dark brown, very dense, with 24% low plasticity fines, 48% fine to coarse sand, and 28% fine to coarse gravel.	
1401.18	7									
	7.62									
	7.88	34J	MC	33/64	33/64	0	SV, PI			
1400.18	8									
1399.18	9 9.14								9.14	
	9.30	34K	MC	50/150	50/150	33	SV, PI	SC	SILTY, CLAYEY SAND with GRAVEL, moist, dark brown, very dense, with 14% low plasticity fines, 44% fine to coarse sand, and 42% fine to coarse gravel.	

NV_DOT 021201.GPJ NV_DOT.GDT 3/13/01

EXPLORATION LOG — SHEET 2 OF 2

START DATE 2/27/00
END DATE 2/27/00
JOB DESCRIPTION I-80 Truck Lane
LOCATION Reno, Nevada
BORING B-34
E.A.# 0212-01-1
GROUND ELEV. 1408.18 (m)
HAMMER DROP SYSTEM Automatic

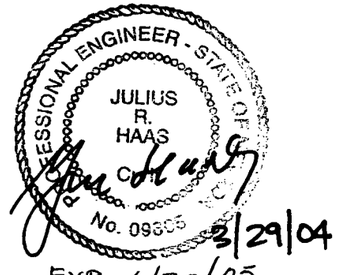
GROUNDWATER LEVEL

DATE	DEPTH m	ELEV. m

STATION Stoker Ave. (NorthBnd)
OFFSET 1.0 RT (approx.)
ENGINEER SDB
EQUIPMENT BK-81
OPERATOR S. Larson
DRILLING METHOD 6" Hollow Stem Auger
BACKFILLED Yes DATE 2/27/2000

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
								SM		
	10.67								10.67	
	10.74	34L	MC	50/76	50/76	100	SV, PI		CLAYEY SAND with GRAVEL, moist, dark brown, very dense, with 23-24% medium plasticity fines, 50-51% fine to coarse sand, and 21-25% fine to coarse gravel.	
1397.18	11									
1396.18	12 12.19									
	12.29	34M	MC	50/102	50/102	75	SV, PI			
								SC		
1395.18	13									
	13.72									
	13.86	34N	MC	50/140	50/140	54	SV, PI			
1394.18	14									
									14.33	
									SILTY SAND, moist, brown, dense, with 24% non-plastic fines, 74% fine to coarse sand, and 2% fine gravel.	
1393.18	15							SM		
	15.24									
	15.38	34O	MC	28 50/140	50/140	54	SV, PI			
									15.54	
1392.18	16								CLAYEY SAND with GRAVEL, moist, dark brown, very dense, with 15% medium plasticity fines, 50% fine to coarse sand, and 36% fine to coarse gravel.	
	16.76									
	16.92	34P	MC	50/150	50/150	100	SV, PI	SC		
1391.18	17									
1390.18	18									
	18.29								18.29	
	18.52	34Q	SS	27 50/76	50/76	100	SV, PI			
1389.18	19									

NV_DOT 021201.GPJ NV_DOT.GDT 3/13/01



Geotechnical Investigation by:
Black Eagle Consulting, Inc.
Geotechnical & Construction Services
1345 Capital Boulevard., Suite A
Reno, Nevada 89502-7140
August, 15, 2000

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

LOG OF TEST BORINGS

H-1162 W

LOUIS BERGER & ASSOCIATES, INC.
LAS VEGAS, NEVADA

DESIGNED BY J.H.T.
DRAWN BY J.D.J.
CHECKED BY J.H.T.
REVIEWED BY J.H.

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FED RD. REG. NO.	STATE	PROJECT NO.	COUNTY	SHEET NO.
9	NEVADA	BMD-IM-080-1(147) SPI-080-1(058)	WASHOE	B-33A

METRIC NDOT

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KEY TO BORING LOGS

PARTICLE SIZE LIMITS

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OVER 50	VERY DENSE	16-30	VERY STIFF
		31-60	HARD
		OVER 60	VERY HARD

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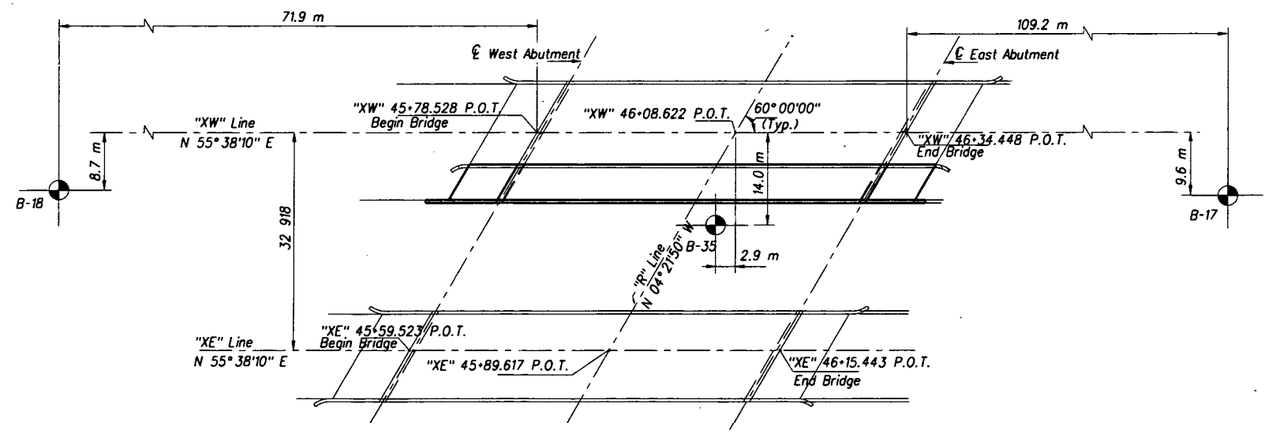
SH	SHELBY TUBE ④
SPT	STANDARD PENETRATION TEST
TP	TEST PIT
①	I.D. = 61.5 mm
②	I.D. = 82 mm with tube I.D. = 88.9 mm w/o tube
③	NXW
④	I.D. = 73 mm



BORING LOCATIONS

PROFESSIONAL ENGINEER
JULIUS H. HAAS
No. 09235
3/29/04
EXP. 6/30/05

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

LOG OF
TEST BORINGS

I-1301 W

LOUIS BERGER & ASSOCIATES, INC.
LAS VEGAS, NEVADA

DESIGNED BY	J.H.T.
DRAWN BY	J.D.J.
CHECKED BY	J.H.T.
REVIEWED BY	J.H.

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FED RD. REG. NO.	STATE	PROJECT NO.	COUNTY	SHEET NO.
9	NEVADA	BMD-IM-080-1(147) SPI-080-1(058)	WASHOE	B-338

METRIC NDOT

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED, ALL STATIONS ARE IN METERS.

EXPLORATION LOG — SHEET 1 OF 1

START DATE 2/17/00
END DATE 2/17/00
JOB DESCRIPTION I-80 Truck Lane
LOCATION Reno, Nevada
BORING B-17
E.A. # 0212-01-1
GROUND ELEV. 1469.14 (m)
HAMMER DROP SYSTEM Cathead

STATION 45+13.5
OFFSET 9.6 RT
ENGINEER JRO
EQUIPMENT CME 55
OPERATOR A. Andresen
DRILLING METHOD 6" Hollow Stem Auger
BACKFILLED Yes DATE 2/17/2000

GROUNDWATER LEVEL

DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.00									
		17A	SPT	7 14 20	34	100		SP	POORLY GRADED SAND dark brown to brown, moist, dense, with estimated 5% non-plastic fines, 85% fine to coarse sand, 10% fine to coarse, subangular gravel to +37.5mm in diameter.	
	0.46									
									0.61 SILTY SAND with GRAVEL dark brown, moist, very dense, with 17% non-plastic fines, 68% fine to coarse sand, 15% fine to coarse, subangular gravel to +19mm in diameter.	
	0.76							SM		
1468.14	1 1.04	17B	SPT	10 50/125	50/125	91	MC, SV, PI		1.07 POORLY GRADED SAND with SILT and GRAVEL dark brown to brown, moist, very dense, with estimated 5-10% non-plastic to low plastic fines, 65-70% fine to coarse sand, 25% fine to coarse, angular to subangular gravel to	
	1.52							SP SM	1.46 +37.5mm in diameter.	
		17C	SPT	7 11 12	23	17		SC	CLAYEY SAND brown, moist, medium dense, with estimated 40% low to medium plastic fines, 50% fine to coarse sand, 10% fine, angular to subangular gravel to +9.5mm in diameter.	
1467.14	1.98 2								2.13	Auger Refusal at 2.13 meters.
1466.14	3									
1465.14	4									

NV 001 021201.GPJ NV_001.GDT 3/13/01

EXPLORATION LOG — SHEET 1 OF 1

START DATE 2/17/00
END DATE 2/17/00
JOB DESCRIPTION I-80 Truck Lane
LOCATION Reno, Nevada
BORING B-18
E.A. # 0212-01-1
GROUND ELEV. 1472.18 (m)
HAMMER DROP SYSTEM Cathead

STATION 42+76.5
OFFSET 8.7 RT
ENGINEER JRO
EQUIPMENT CME 55
OPERATOR A. Andresen
DRILLING METHOD 6" Hollow Stem Auger
BACKFILLED Yes DATE 2/17/2000

GROUNDWATER LEVEL

DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.00							SP SM	POORLY GRADED SAND with SILT dark brown, very moist, medium dense, with	
		18A	SPT	4 8 11	19	83			estimated 5-10% non-plastic to slightly plastic fines, 80-85% fine to coarse sand, 10% fine to coarse, angular to subangular gravel to +25mm	
	0.46								0.24 in diameter.	
								SC SM	SANDSTONE BEDROCK of the Hunter Creek formation, brown, moist, medium dense, with the soil index properties of a Silty, Clayey Sand with Gravel with estimated 20-25% low plastic	
	0.76								0.76 fines, 50-55% fine to coarse sand, 25% fine to coarse, angular to subangular gravel to +25mm	
	0.98	18B	SPT	11 50/62.5	50/62.5	82			in diameter.	
1471.18	1								SANDSTONE BEDROCK of the Hunter Creek formation, brown, moist, very dense, with the soil index properties of a Silty, Clayey Sand with Gravel with estimated 20-25% low plastic fines, 40-45% fine to coarse sand, 35% fine to coarse, angular to subangular gravel to +25mm in	
	1.52							SC SM	1.52 diameter.	
		18C	SPT	12 32 46	78	100			SANDSTONE BEDROCK of the Hunter Creek formation, brown, moist, very dense, with the soil index estimated 5% non-plastic to slightly plastic fines, 90% fine to medium sand, 5% fine, angular to subangular gravel to +9.5mm in diameter.	
	1.98							SP		
1470.18	2								2.13	
	2.29								SANDSTONE BEDROCK of the Hunter Creek formation, brown, moist, dense, with the soil index properties of a Silty, Clayey Sand, with estimated 15-25% low plastic fines, 75-85% fine to medium sand.	
		18D	SPT	8 15 29	44	100		SC SM		
	2.74								2.90	
1469.18	3 3.05								CLAYSTONE BEDROCK of the Hunter Creek formation, brown, moist, hard, with the soil index properties of a Lean Clay with Sand with 74% medium plastic fines, 26% fine to medium sand. Very minor fine gravel.	
		18E	SPT	7 12 25	37	100	MC, SV, PI	CL		
	3.51								3.51	
1468.18	4									

NV 001 021201.GPJ NV_001.GDT 3/13/01

Geotechnical Investigation by:
Block Eagle Consulting, Inc.
Geotechnical & Construction Services
1345 Capital Boulevard., Suite A
Reno, Nevada 89502-7140
August, 15, 2000

3/29/04
EXP. 6/30/05

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

LOG OF
TEST BORINGS

I-1301 W

LOUIS BERGER & ASSOCIATES, INC.
LAS VEGAS, NEVADA

DESIGNED BY	J.H.T.
DRAWN BY	J.D.J.
CHECKED BY	J.H.T.
REVIEWED BY	J.H.

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FED RD. REG. NO.	STATE	PROJECT NO.	COUNTY	SHEET NO.
9	NEVADA	IMD-IM-080-1(147) SPI-080-1(058)	WASHOE	B-33C

METRIC NDOT

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED, ALL STATIONS ARE IN METERS.

EXPLORATION LOG — SHEET 1 OF 2

START DATE 2/26/00
END DATE 2/26/00
JOB DESCRIPTION I-80 Truck Lane
LOCATION Reno, Nevada
BORING B-35
E.A. # 0212-01-1
GROUND ELEV. 1466.09 (m)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL

DATE	DEPTH m	ELEV. m

STATION W. McCarran (NorthBnd)
OFFSET 4.0 RT (approx)
ENGINEER JRO
EQUIPMENT BK-81
OPERATOR S. Larson
DRILLING METHOD 6" Hollow Stem Auger
BACKFILLED Yes DATE 2/26/2000

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.00								0.15 ASPHALT CONCRETE PAVEMENT	
	0.15								ROADWAY BASE MATERIAL	
	0.46								0.46	
	0.76							SC	SANDSTONE BEDROCK of the Hunter Creek formation, brown, moist, very dense, with the soil index properties of a Clayey Sand with Gravel with 17% medium plastic fines, 44% fine to coarse sand, 39% fine to coarse, subangular	
1465.09	1 1.01	35A	SPT	11 50/100	50/100	100	SV, PI			
	1.37								gravel to +25mm in diameter.	
	1.52								SANDSTONE BEDROCK of the Hunter Creek formation, brown, moist, very dense, with the soil index properties of a Clayey Sand with 21% medium plastic fines, 78% fine to coarse sand,	
1464.09	2 1.96	35B	SPT	12 28 50/125	50/125	100	SV, PI	SC		
	2.13								and trace fine gravel to +5mm in diameter.	
	2.29								SANDSTONE BEDROCK of the Hunter Creek formation, brown, very moist, very dense, with the soil index properties of a Silty Sand with 28% slightly plastic fines, 72% fine to coarse	
	2.74	35C	SPT	14 29 45	74	100	SV, PI	SM		
1463.09	3 3.05								sand, and trace, fine gravel to +5mm in diameter.	
	2.90								SANDSTONE BEDROCK of the Hunter Creek formation, brown, moist to very moist, very dense, with the soil index properties of a Silty Sand with 18% non-plastic fines, 80% fine to coarse sand, and trace fine gravel to +5mm in diameter.	
	3.45	35D	MC	29 49 50/100	50/100	100	SV, PI			
	3.81							SM		
1462.09	4 4.23	35E	SPT	11 42 50/113	50/113	100	SV, PI			
	4.42								SANDSTONE BEDROCK of the Hunter Creek formation, brown, moist, very dense, with the soil index properties of a Poorly Graded Sand with Silt with 11% non-plastic fines, 84% fine to coarse sand, 5% fine, subangular gravel to +9.5mm in diameter.	
	4.57							SP SM		
1461.09	5 5.02	35F	SPT	19 32 50/138	50/138	100	SV, PI			
	5.18								SANDSTONE BEDROCK of the Hunter Creek formation, brown, very moist, very dense, with the soil index properties of a Silty Sand with 38% non-plastic fines, 60% fine to coarse sand,	
	5.33							SM		
	5.79	35G	SPT	15 34 37	71	100	SV, PI		and trace fine gravel to +9.5mm in diameter.	
1460.09	6 6.10								SANDSTONE BEDROCK of the Hunter Creek formation, brown, very moist, very dense, with the soil index properties of a Silty Sand with 27% non-plastic fines, 73% fine to coarse sand.	
	5.94									
	6.55	35H	SPT	16 28 34	62	100	SV, PI	SM		
	7.01								SANDSTONE BEDROCK of the Hunter Creek formation, brown, moist, very dense, with the soil index properties of a Well Graded Sand with Silt with 10% non-plastic fines, 86% fine to coarse sand, and trace fine gravel to +5mm in diameter.	
1459.09	7 7.62									
	8.08	35I	SPT	17 25 38	63	100	SV, PI	SW SM		
1458.09	8									
	8.84								SANDSTONE BEDROCK of the Hunter Creek formation, brown, moist, very dense, with the soil index properties of a Poorly Graded Sand with Silt with approximately 10% non-plastic fines, 90% fine to coarse sand, and trace fine gravel to +5mm in diameter.	
	9.14									
1457.09	9 9.40	35J	MC	29 52/100	52/100	80	SV, PI			

NV DOT 0212011.GPJ NV_DOT.GDT 3/13/01

EXPLORATION LOG — SHEET 2 OF 2

START DATE 2/26/00
END DATE 2/26/00
JOB DESCRIPTION I-80 Truck Lane
LOCATION Reno, Nevada
BORING B-35
E.A. # 0212-01-1
GROUND ELEV. 1466.09 (m)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL

DATE	DEPTH m	ELEV. m

STATION W. McCarran (NorthBnd)
OFFSET 4.0 RT (approx)
ENGINEER JRO
EQUIPMENT BK-81
OPERATOR S. Larson
DRILLING METHOD 6" Hollow Stem Auger
BACKFILLED Yes DATE 2/26/2000

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.67							SP SM		Water added to auger to aid drilling action.
1455.09	11 11.13	35K	SPT	16 24 38	62	89	SV, PI			
	11.89								SILTSTONE BEDROCK of the Hunter Creek formation, dark brown, very moist, hard, with the soil index properties of a Sandy Lean Clay with 55% medium plastic fines, 45% fine to medium sand.	
1454.09	12 12.19									
	12.65	35L	SPT	6 19 28	47	100	SV, PI	CL		
1453.09	13									
	13.11								SANDSTONE BEDROCK of the Hunter Creek formation, dark brown, moist to very moist, very dense, with the soil index properties of a Poorly graded Sand with estimated 5% non-plastic fines, 85-90% fine to coarse sand, 5-10% fine, subangular gravel to +12.5mm in diameter.	
	13.72							SP		
1452.09	13.98 14	35M	MC	33 51/113	51/113	100	SV, PI			
	14.78								SANDSTONE BEDROCK of the Hunter Creek formation, brown, very moist, very dense, with the soil index properties of a Well Graded Sand with Silt with 10% non-plastic fines, 85% fine to coarse sand, 5% fine, subangular gravel to +5mm in diameter. Unit contains thinly interbedded Silty Sand.	
1451.09	15 15.24									
	15.69	35N	SPT	22 42 50/138	50/138	97	SV, PI	SW SM		
1450.09	16									
	16.46								SANDSTONE BEDROCK of the Hunter Creek formation, brown, slightly moist, very dense, with the soil index properties of a Poorly Graded Sand with estimated <5% non-plastic fines, 95-100% fine to medium sand. Unit contains thinly interbedded Silty Sand.	
	16.76							SP		
1449.09	17 17.22	35O	SPT	20 35 42	77	89	SV, PI			
	17.68								SANDSTONE BEDROCK of the Hunter Creek formation, light grey to white, moist, medium dense to dense, with the soil index properties of a Poorly Graded Sand with estimated 100%	
1448.09	18 18.29							SP		
	18.44								medium to coarse sand.	
	18.69	35P	SPT	14 45 50/100	50/100	88	SV, PI	SM		
	18.68								SANDSTONE BEDROCK of the Hunter Creek formation, brown, very moist, very dense, with the soil index properties of a Silty Sand with 25% non-plastic fines, 73% fine to coarse sand, and trace fine gravel to +5mm in diameter.	
1447.09	19									

NV DOT 0212011.GPJ NV_DOT.GDT 3/13/01

PROFESSIONAL ENGINEER — JULIUS P. HAAS — No. 9880 — 3/29/04
EXP. 6/30/05

Geotechnical Investigation by:
Black Eagle Consulting, Inc.
Geotechnical & Construction Services
1345 Capital Boulevard., Suite A
Reno, Nevada 89502-7140
August, 15, 2000

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

LOG OF TEST BORINGS

I-1301 W

LOUIS BERGER & ASSOCIATES, INC.
LAS VEGAS, NEVADA

DESIGNED BY J.H.T.
DRAWN BY J.D.J.
CHECKED BY J.H.T.
REVIEWED BY J.H.

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Appendix D
Laboratory Test Results

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

EA/Cont # 74191 **Job Description** I-80 Over Stoker Ave.Eastbound Widening

Boring No. B-1 **Elevation (ft)** 4602 **Station** **Date** 6/1/2021

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. (Peak)	C psi (Peak)	Φ deg. (Residual)	C psi (Residual)	
1	1.5	SPT					12.6									
2	3.0	SPT		SP-SC	6.0		11.3	23	19	4						
3	5.0	SPT		GP-GC			11.9	23	19	4						
4	7.5	SPT		GP-GC			7.2	23	19	4						
5	10.0	SPT					14.3									
6	15.0	SPT					11.1									
7	20.0	SPT		GC-GM	11.5		20.0	27	21	6						
8	25.0	SPT		SC			15.4	28	20	8						
9	30.0	SPT					14.9									
10	35.0	SPT					16.1									
11	40.0	SPT		SC-SM			17.4	26	20	6						
12	45.0	SPT					20.4									

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 # 74191 **Job Description** I-80 Over Stoker Ave.Eastbound Widening

Boring No. B-1 **Elevation (ft)** 4602 **Station** **Date** 6/1/2021

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		
13	50.0	SPT		SM			30.4	28	24	4						
14	55.0	SPT					12.6									
15	60.0	SPT			8.3		13.5									

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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N = No. of blows per ft., sampler

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

H = Hydrometer
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PI = Plasticity Index
LL = Liquid Limit
PL = Plastic Limit
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OC = Consolidation
Ch = Chemical
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E = Swell/Pressure on Expansive Soils
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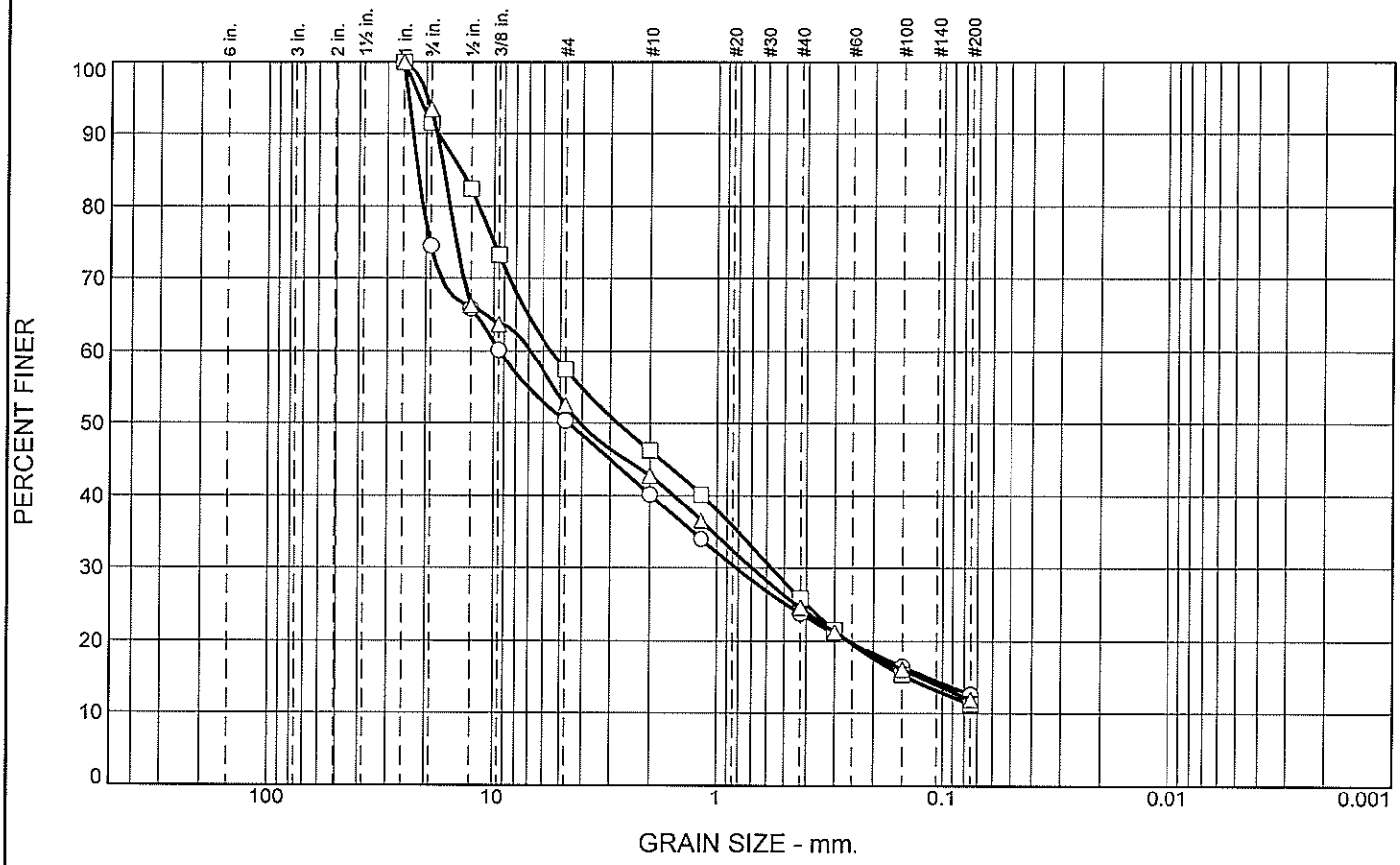
UW= Unit Weight
W = Moisture Content
K = Permeability
O = Organic Content
D = Dispersive
RQD = Rock Quality Designation
X = X-Ray Defraction
HCpot = Hydro-Collapse Potential

*** = Average of subsamples**

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	49.7	37.7	12.6					
□	0.0	42.6	46.1	11.3		SP-SC	A-1-a	19	23
△	0.0	47.6	40.5	11.9		GP-GC	A-1-a	19	23

SIEVE inches size	PERCENT FINER ○	□	△
1"	100.0	100.0	100.0
3/4"	74.5	91.5	93.3
1/2"	65.8	82.4	66.3
3/8"	60.2	73.2	63.7
	GRAIN SIZE		
D_{60}	9.4569	5.5243	6.8478
D_{30}	0.8205	0.5701	0.6955
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	50.3	57.4	52.4
#10	40.2	46.2	42.8
#16	34.0	40.1	36.5
#40	23.8	25.9	24.6
#50	21.1	21.5	21.3
#100	16.4	15.3	16.0
#200	12.6	11.3	11.9

Material Description

○

□ poorly graded sand with siltyclay and gravel

△ poorly graded gravel with siltyclay and sand

REMARKS:

○

□

△

○ Source of Sample: B-1 Depth: 1.5' Sample Number: 1

□ Source of Sample: B-1 Depth: 3.0' Sample Number: 2

△ Source of Sample: B-1 Depth: 5.0' Sample Number: 3

NEVADA DEPARTMENT OF TRANSPORTATION

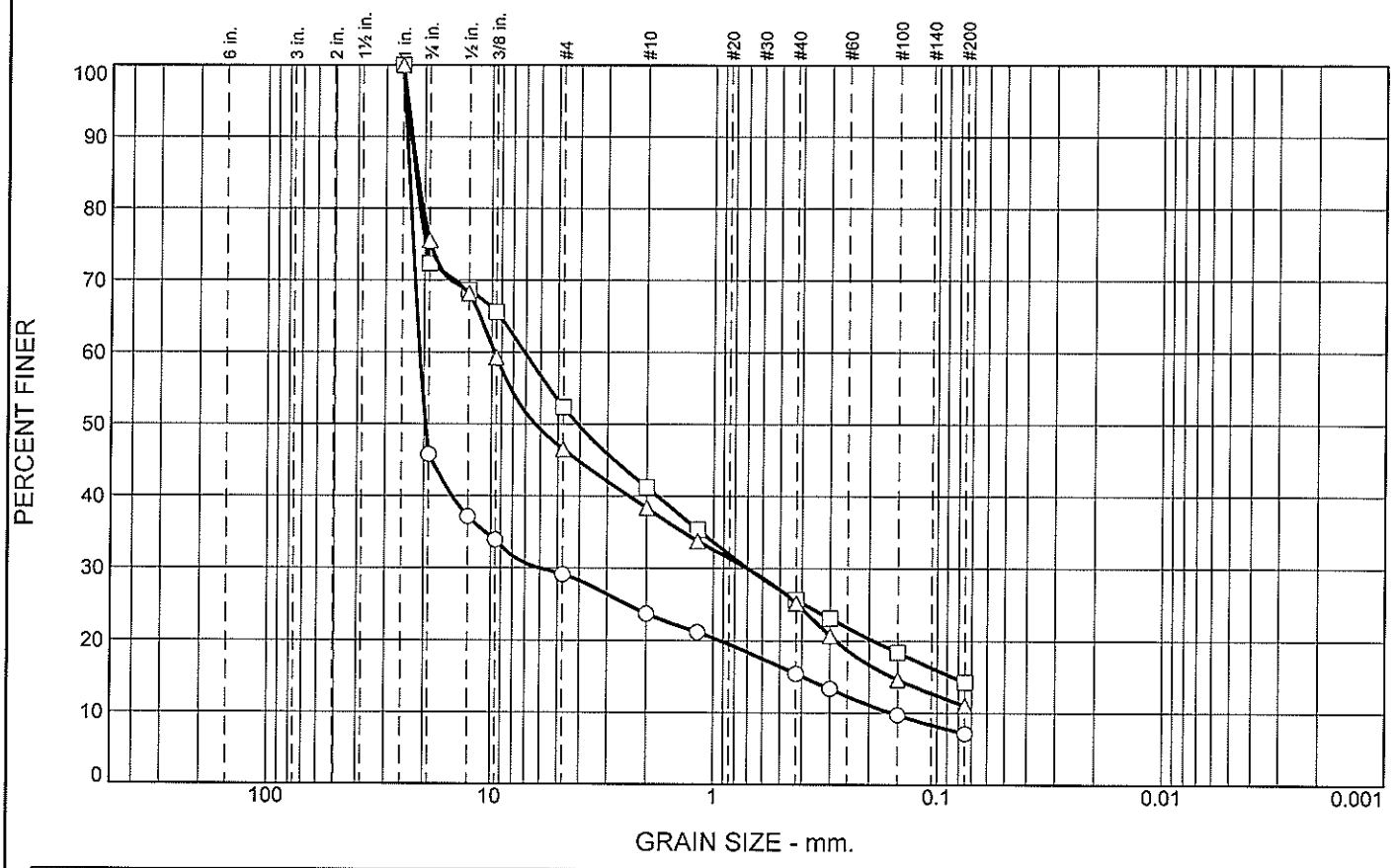
Client: J. Crosby

Project: I-80 Over Stoker Ave.Eastbound Widening

Project No.: EA 74191

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	70.8	22.0	7.2		GP-GC	A-1-a	19	23
□	0.0	47.6	38.1	14.3					
△	0.0	53.5	35.4	11.1					

SIEVE inches size	PERCENT FINER ○	□	△
1"	100.0	100.0	100.0
3/4"	45.8	72.4	75.5
1/2"	37.1	68.6	68.2
3/8"	33.9	65.6	59.3
GRAIN SIZE			
D_{60}	20.9837	7.0986	9.7329
D_{30}	6.0043	0.6969	0.7021
D_{10}	0.1591		
COEFFICIENTS			
C_c	10.80		
C_u	131.90		

SIEVE number size	PERCENT FINER ○	□	△
#4	29.2	52.4	46.5
#10	23.7	41.2	38.4
#16	21.2	35.4	33.8
#40	15.5	25.7	25.2
#50	13.4	23.1	20.7
#100	9.7	18.4	14.7
#200	7.2	14.3	11.1

Material Description

○ poorly graded gravel with siltyclay and sand

□

△

REMARKS:

○

□

△

○ Source of Sample: B-1 Depth: 7.5' Sample Number: 4

□ Source of Sample: B-1 Depth: 10.0' Sample Number: 5

△ Source of Sample: B-1 Depth: 15.0' Sample Number: 6

NEVADA DEPARTMENT OF TRANSPORTATION

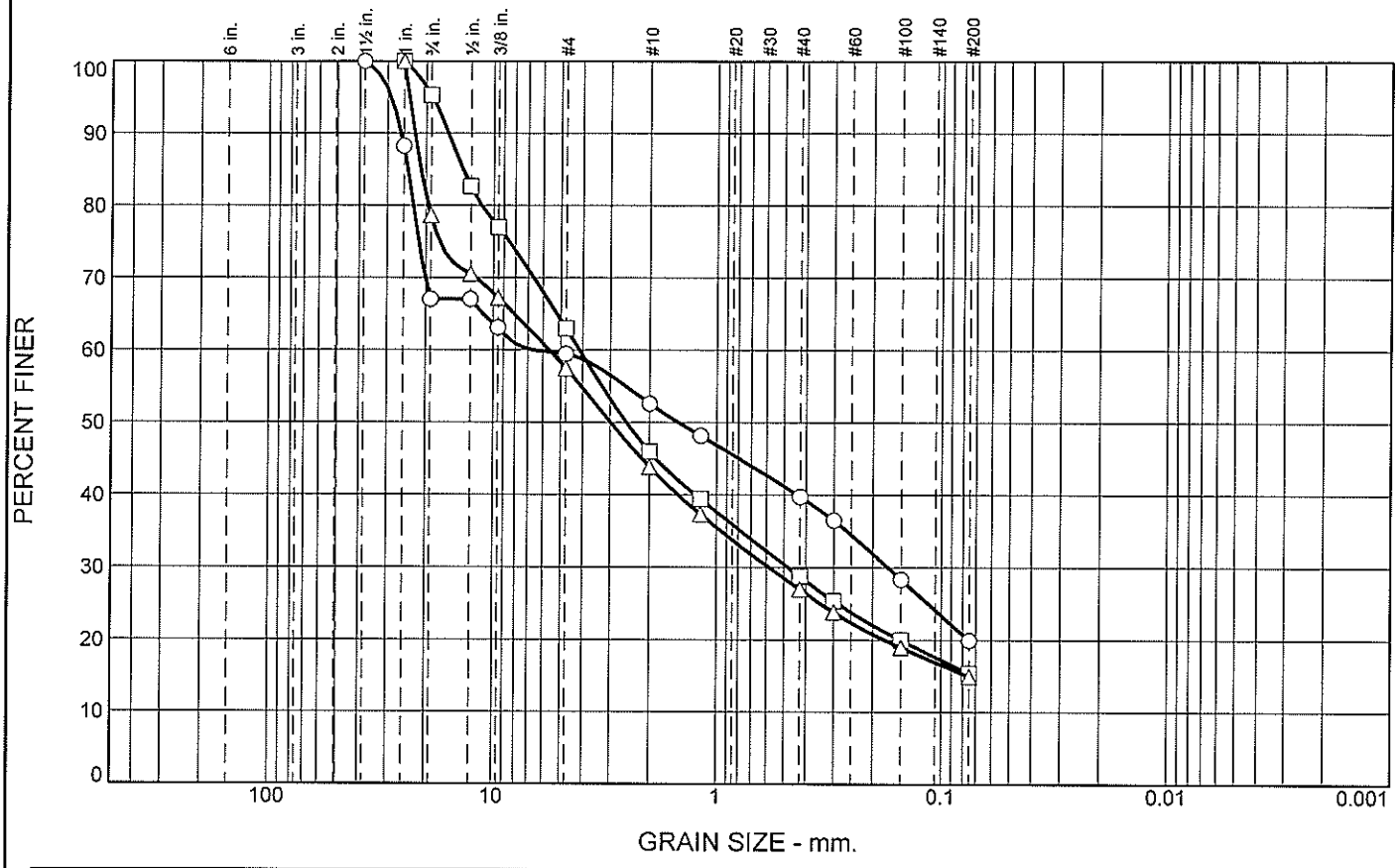
Client: J. Crosby

Project: I-80 Over Stoker Ave.Eastbound Widening

Project No.: EA 74191

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	40.5	39.5	20.0		GC-GM	A-1-b	21	27
□	0.0	37.0	47.6	15.4		SC	A-2-4(0)	20	28
△	0.0	42.5	42.6	14.9					

SIEVE inches size	PERCENT FINER ○	□	△
1.5"	100.0		
1"	88.3	100.0	100.0
3/4"	67.0	95.3	78.7
1/2"	67.0	82.6	70.5
3/8"	63.1	77.0	67.2
	GRAIN SIZE		
D_{60}	6.6820	4.1367	5.6311
D_{30}	0.1714	0.4788	0.5811
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	59.5	63.0	57.5
#10	52.6	46.0	43.9
#16	48.2	39.4	37.3
#40	39.8	28.8	27.0
#50	36.5	25.4	23.8
#100	28.4	20.0	19.0
#200	20.0	15.4	14.9

Material Description

○ silty clayey gravel with sand

□ clayey sand with gravel

△

REMARKS:

○

□

△

○ Source of Sample: B-1 Depth: 20.0' Sample Number: 7

□ Source of Sample: B-1 Depth: 25.0' Sample Number: 8

△ Source of Sample: B-1 Depth: 30.0' Sample Number: 9

NEVADA DEPARTMENT OF TRANSPORTATION

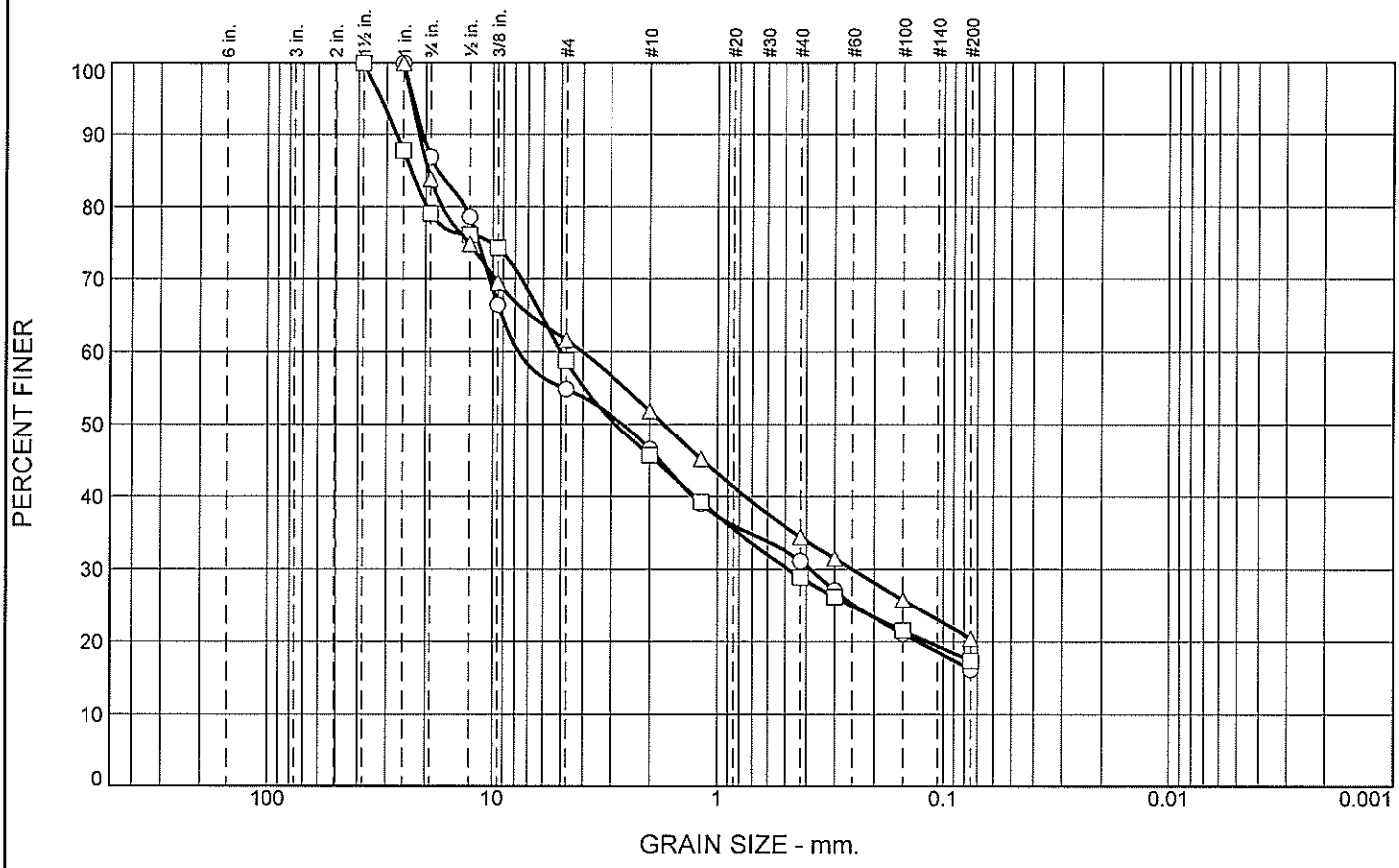
Client: J. Crosby

Project: I-80 Over Stoker Ave.Eastbound Widening

Project No.: EA 74191

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	45.1	38.8	16.1					
□	0.0	41.3	41.3	17.4		SC-SM	A-1-b	20	26
△	0.0	38.4	41.2	20.4					

SIEVE inches size	PERCENT FINER ○	□	△
1.5"		100.0	
1"	100.0	87.7	100.0
3/4"	86.9	79.1	83.9
1/2"	78.7	76.2	74.9
3/8"	66.4	74.4	69.5
GRAIN SIZE			
D_{60}	7.7046	5.0111	4.0315
D_{30}	0.3824	0.4814	0.2494
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	54.9	58.7	61.6
#10	46.5	45.7	51.8
#16	39.0	39.3	45.2
#40	31.2	28.9	34.4
#50	27.1	26.2	31.5
#100	21.1	21.5	25.8
#200	16.1	17.4	20.4

Material Description

○

□ silty, clayey sand with gravel

△

REMARKS:

○

□

△

○ Source of Sample: B-1 Depth: 35.0' Sample Number: 10

□ Source of Sample: B-1 Depth: 40.0' Sample Number: 11

△ Source of Sample: B-1 Depth: 45.0' Sample Number: 12

NEVADA DEPARTMENT OF TRANSPORTATION

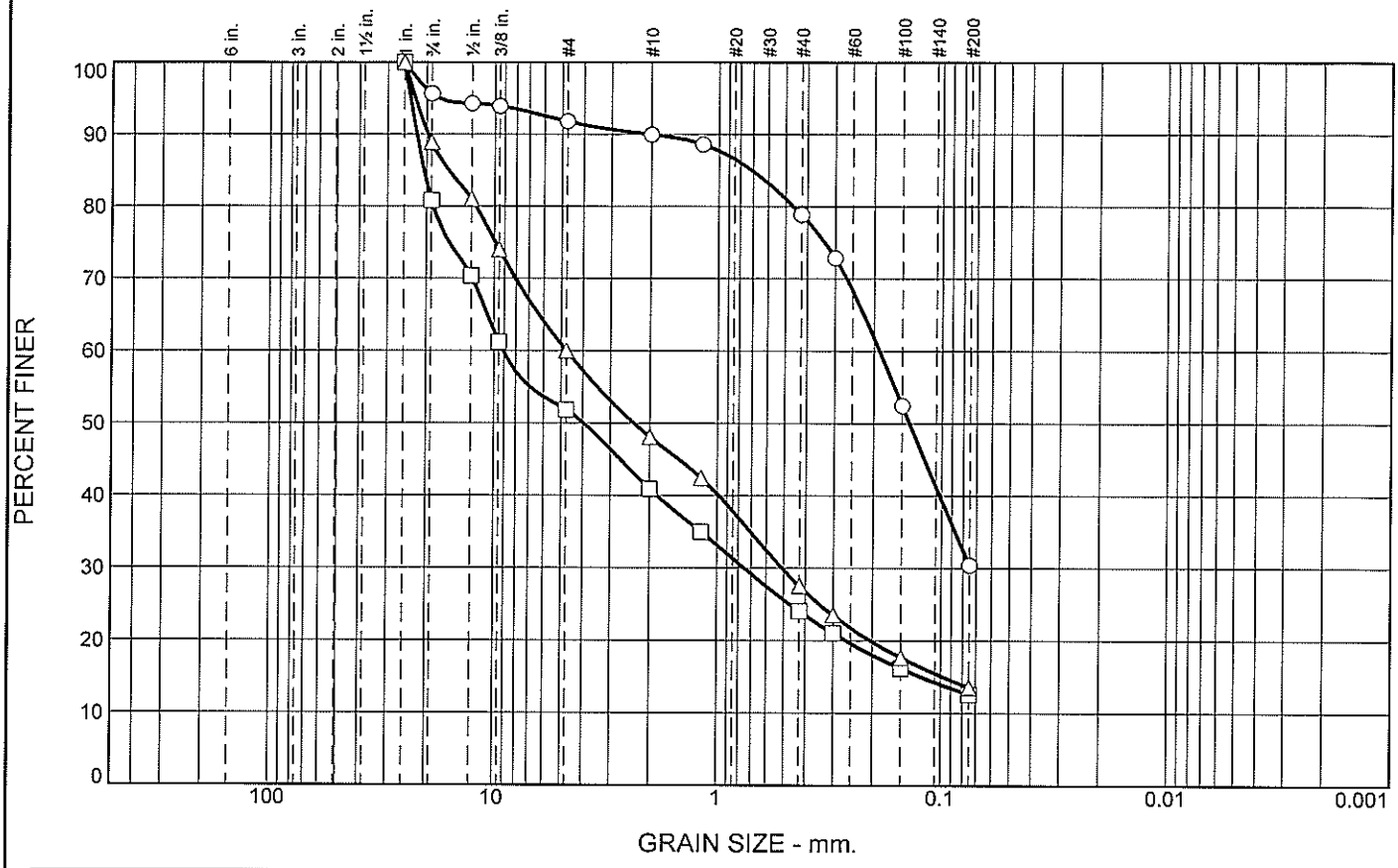
Client: J. Crosby

Project: I-80 Over Stoker Ave.Eastbound Widening

Project No.: EA 74191

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	8.2	61.4	30.4		SM	A-2-4(0)	24	28
□	0.0	48.2	39.2	12.6					
△	0.0	40.0	46.5	13.5					

SIEVE inches size	PERCENT FINER ○	□	△
1"	100.0	100.0	100.0
3/4"	95.6	80.8	88.8
1/2"	94.3	70.4	81.0
3/8"	93.9	61.2	74.0
GRAIN SIZE			
D_{60}	0.1892	9.1163	4.7500
D_{30}		0.7530	0.5084
D_{10}			
COEFFICIENTS			
C_C			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	91.8	51.8	60.0
#10	90.0	40.9	48.1
#16	88.6	35.0	42.4
#40	78.8	24.1	27.5
#50	72.9	21.0	23.5
#100	52.4	16.2	17.7
#200	30.4	12.6	13.5

Material Description
○ silty sand
□
△

REMARKS:
○
□
△

○ Source of Sample: B-1 Depth: 50.0' Sample Number: 13
□ Source of Sample: B-1 Depth: 55.0' Sample Number: 14
△ Source of Sample: B-1 Depth: 60.0' Sample Number: 15

NEVADA DEPARTMENT OF TRANSPORTATION

Client: J. Crosby
Project: I-80 Over Stoker Ave.Eastbound Widening
Project No.: EA 74191
Figure

NEVADA DEPARTMENT OF TRANSPORTATION

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