GEOTECHNICAL INVESTIGATION

STRUCTURE B-1022 EXTENSION
REINFORCED CONCRETE BOX ON U.S.95 OVER CLARKDALE WASH
NYE COUNTY, NEVADA

EA 74065

June 2019

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

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION
GEOTECHNICAL SECTION

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JUNE 2019

EA 74065

Prepared by: ______________________________
Jason Crosby, P.E.
Geotechnical Engineering Specialist

Reviewed by: ______________________________
Kyle Jermstad, P.E.
Principal Geotechnical Engineer

Approved by: ______________________________
Mike Griswold, P.E.
Chief Geotechnical Engineer

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Introduction

The Nevada Department of Transportation (NDOT) is proposing to widen Bridge Structure B-1022 at approximately Mile Post (MP) 87.5 on United States Route 95 (US-95) between Beatty and Goldfield in Nye County, Nevada. US-95 is a two-lane highway that traverses Nevada in a general northwest-southeast direction. The existing Structure B-1022 is a double-barrel reinforced concrete box (RCB) culvert currently 64 feet wide in the transverse direction of the highway. Precast extensions are proposed to be placed on each side of the existing bridge to extend the total width of the culvert to 118 feet. This report presents the findings and recommendations developed from our geotechnical engineering investigation for the proposed RCB extension. The investigation was conducted in accordance with American Association of State Highway and Traffic Administration (AASHTO) and Federal Highway Administration (FHWA) guidelines.

1.1 Project Description

Structure B-1022 is located on US-95 in Nye County, Nevada, approximately 27 miles north of the town of Beatty, Nevada (Mile Post NY87.5). The site consists of an existing double-barrel RCB culvert at the intersection of Clarkdale Wash (also known as Tolicha Wash) and the two-lane highway. We understand that the project consists of extending the existing 20-foot by 7-foot by 64-foot RCB culvert on both sides of the existing road alignment. A 35-foot-long extension will be added to the east side, and a 19-foot-long extension will be added to the west, making the culvert a total width of 118 feet. In addition, wingwalls and associated footings will be constructed on the ends of the new box culverts. The RCB culvert extensions will be precast concrete and the wingwalls and wingwall footings will be cast in place. An NDOT Class 400 rip rap apron will be constructed on the outlet (west) side to prevent scouring. We anticipate structural fill up to 15 feet in depth will be placed adjacent to the RCB and wing walls. The new RCB culverts will likely be connected to the existing culvert by doweling reinforcing bars into the existing structure and covering with cast in place concrete collars. 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 purposes of this investigation were to

- Evaluate the suitability of the project site for the proposed RCB extensions from a geotechnical perspective;
- Assess the engineering characteristics of the subsurface soils; and
- Provide geotechnical recommendations for design and construction of the proposed RCB extensions.

The scope of our geotechnical investigation includes the following:

- A review of published geologic and geotechnical information pertaining to the site vicinity;
- A subsurface investigation consisting of drilling two borings to a maximum depth of 41½ feet below ground surface (bgs) to obtain information to evaluate the subsurface conditions;
- Perform geotechnical laboratory testing on select soil samples collected from the borings;

- Perform engineering analyses to develop geotechnical design criteria and recommendations for the RCB extensions; and
- Preparation of this report.

2. Field Exploration and Laboratory Testing

2.1 Field Exploration

Two borings were drilled on January 29 and 30, 2019 at the approximate locations shown on Figure A-2. Boring B-1 was drilled approximately 21 feet east of the east edge of the existing RCB culvert and was advanced to a maximum depth of 36½ feet below ground surface (bgs). Boring B-2 was located approximately 14 feet west of the west edge of the RCB and was extended to a maximum depth of approximately 41½ feet bgs. The borings were drilled utilizing a truck-mounted Diedrich D-120 (NDOT 1627) drill rig equipped with 6-inch hollow stem augers. 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 advance the sampler 6 inches were recorded for the 18-inch drive, and the cumulative blow count for the bottom 12-inches of drive is presented in the logs of borings. 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 borings were prepared based on the field logging and the results of laboratory testing in general accordance with ASTM D2487. 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. Tests conducted include the following:

- Method of Test Sieve Analysis of Coarse and Fine Aggregate (Nev. T206);
- Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil (AASHTO T265);
- Standard Test Methods for Laboratory Determination of Density (ASTM D7263);
- Method of Test for Determining the Liquid Limit, Plastic Limit, and Plasticity Index of Soil (Nev. T210, T211, and T212);
- Standard Method of Test for Determining Minimum Laboratory Soil Resistivity (AASHTO T288);
- Standard Method of Test for Determining pH of Soil (AASHTO T289);
- Standard Method of Test for Determining Water-Soluble Sulfate Ion Content in Soil (AASHTO T290);
- Standard Method of Test for Determining Water-Soluble Chloride Ion Content in Soil (AASHTO T291);

Geotechnical laboratory test results are presented in Appendix C.

3. Site and Subsurface Conditions

3.1 Site Conditions

At the time of our field study, Clarkdale Wash was dry, and the surface had been graded to a smooth surface free of vegetation in order to provide access for the drill rig and ancillary equipment. The site topography slopes generally to the west at approximately 2 percent in the wash, but several low-lying hills exist to the north and south, creating a small detention basin to the east of US-95. Two hills were observed on the west side of the culvert crossing, forming the boundaries of the approximate 800-foot wide wash. These hills are approximately 25 feet high, generally parallel, and trend in the east-west direction for approximately 1 mile. Approximately 15 feet of embankment fill exists near the existing RCB in the maximum section and tapers down to approximately 3 feet to the north and south. Vegetation is sparse with native brush, and the native surface appeared to be gravelly sand with silt. A corrugated metal pipe (CMP) exists approximately 200 feet north of the RCB and extends through the entire embankment to assist drainage. About 4-to-6 feet of fill exists above the top of the existing RCB. The existing double-barrel RCB culvert appeared to be in overall good structural condition. The Vicinity Map is presented on Figure A-1.

3.2 Subsurface Conditions

3.2.1 General Geology and Faulting

The upper soil profile of the Clarkdale wash is derived from alluvial deposits and includes beach and sand dune deposits. The site is part of the Basin and Range geomorphic province and is located at the eastern edge of the Sarcobatus Flat. The site area is mapped as being comprised of primarily Quaternary alluvium. The nearest active fault with historic movement (last 150 years) is the Owens Valley fault zone, 1872 rupture section located approximately 70 miles to the west. Other active faults nearby include the White Mountains fault zone, located approximately 76 miles to the northwest of the site. The nearest Quaternary fault is the Grapevine Mountains fault, located approximately 9 miles to the west.

3.2.2 Subsurface Materials

The results of our field exploration and laboratory analyses indicate that the soil profile consists of alternating layers of dense to very dense, well-graded and poorly-graded sand (SW-SM and SP-SM) with gravel and silt extending to approximately 34 feet below ground surface (bgs), underlain by dense clayey sand (SC) with gravel extending to the maximum depth explored of 41½ feet bgs. The sand layers contain high percentages of gravel, in some cases almost equal parts sand and gravel. A very dense 5-foot-thick gravel layer was encountered in Boring B-1 from approximately 29 feet to 34 feet bgs.

3.2.3 Groundwater Conditions

Groundwater was not encountered in either of the borings during our exploration. Based on review of published well logs from the general vicinity, it appears that the groundwater table is located much deeper than the depths explored. The groundwater table can be expected to vary in elevation throughout the year, depending upon the amount of precipitation, evaporation, surface runoff, and infiltration. We do not, however, anticipate it to be encountered during construction excavations.

4. Recommendations

4.1 Site Preparation and Earthwork

4.1.1 Site and Subgrade Preparation

Prior to construction, it is recommended that 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 the box culvert and construction of the wing walls. 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 Embankment and Backfill

We anticipate that up to 15 feet of granular backfill and embankment will be placed above the existing surface. The maximum sections will be adjacent to the RCB and wingwalls and will taper out away from the culvert. Embankment and backfill should be placed and compacted according to the Silver Book sections 203 and 207 respectively.

4.1.3 Temporary Excavations

Temporary excavations and shoring should conform to OSHA standards. Based on the subsurface materials encountered in our exploration, the gravelly sand embankment soils can be classified as Type B (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. 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 2:1 (Horizontal: Vertical) and should be overbuilt and trimmed to limits on the staking. Flatter slopes will promote growth and reduce erosion. 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 Foundations

The results of this exploration have shown that the on-site soils are dense to very dense sands and can support the anticipated loads with up to 1.0 inch of total settlement provided the recommendations are followed. To aid in reducing the potential for structural damage due to differential settlement between the existing RCB and the new RCB extensions, we recommend placing a minimum of 4 inches of properly placed and compacted Class C bedding material (2017 NDOT Standard Plans, Drawing R-1.1.6) using a smooth-drum vibratory roller. The soil parameters used for foundation analysis are presented in Table 1. The parameters are based on the subsurface boring and laboratory testing of collected samples.

Table 1 Foundation Soil Parameters

Parameter	Recommended Value
Unit weight, γ_t (pcf)	125
Cohesion, c (psf)	0
Internal friction angle, φ (degrees)	35
Minimum embedment depth for frost protection (inches)	18
Minimum strip footing width (inches)	24
Minimum spot footing width (inches)	36

4.2.1 Bearing Resistance

The on-site soils were found to be medium dense to very dense and capable of supporting the proposed culvert and wingwall loads on shallow foundations provided the recommendations are followed. The following table lists the calculated bearing resistances in accordance with AASHTO LRFD procedures.

Table 2 Bearing Resistance

Service Limit	Factored Strength Limit	Nominal Strength Limit
4,100 psf	17,000 psf	38,000 psf

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 in Table 1, where V is the total vertical force.

Both the passive and shear resistance should be factored by 0.5 and 0.8 respectively for the Strength Limit State. Resistance factors of 1.0 should be used for the Service Limit and Extreme Limit States.

Factored and Nominal Strength Limits provided above were calculated according to AASHTO LRFD design criteria outlined in Articles 10.5 and 10.6 of the 2017 Edition.

4.2.2 Settlement

Spread footings founded on the native gravelly sands may be proportioned for a service limit bearing resistance of 4,100 pounds per square foot (psf). Based upon these loads, we anticipate up to 1 inch of total settlement on this site. This settlement will be differential across the RCB extensions because the existing RCB has already experienced immediate settlement. If 1 inch of differential settlement is not tolerable, we recommend limiting the structural loads to 2,200 psf for a total and differential settlement of 1/2 inch. The new settlement will occur within the footprint of the new culvert and fill area and will taper out towards the limits of the fill placement. These settlement calculations were based upon the anticipated loading conditions and utilizing the empirical Hough Method in accordance with the AASHTO LRFD procedures outlined in Article 10.6.2.4. The maximum total settlement given is based upon immediate settlement calculations. Long-term consolidation settlement will be negligible in the gravelly sand layers.

4.3 Retaining Walls

The RCB walls should be designed to resist drained at-rest pressures, and the wingwalls may be evaluated utilizing drained active pressures. We anticipate that the wall backfill will have a maximum slope of 2:1 (Horizontal: Vertical), but coefficients have also been provided for level backfill walls. The walls may be designed using the total lateral force as the given equivalent fluid pressures multiplied by the height of the wall. The total force is applied at one-third the wall height. The recommended lateral earth pressure coefficients and associated equivalent fluid pressures for the foundation and backfill soils are provided in Table 3:

Table 3 Lateral Earth Pressure Coefficients and Equivalent Fluid Pressures

Static Lateral Earth Coefficients	Lateral Earth Pressure Coefficient	Equivalent Fluid Pressure (PCF)
Active Condition K_a with Level Backfill	0.27	34
Active Condition K_a with 2:1 Sloped Backfill	0.38	48
At-Rest Condition Ko	0.43	53
Passive Condition Kp	3.69	461

Resistance factors for permanent cantilever retaining walls such as the wingwalls on this project should be designed using a sliding resistance factor of 1.0 and a bearing resistance factor of 0.55 for the Strength Limit State.

4.4 Corrosion

Soil corrosivity analysis is important for estimating and mitigating the deterioration of buried ferrous metals and concrete. We performed corrosion testing on representative samples from the surface of the existing embankment and at boring B-1 at a depth of 2.5 feet bgs as an indicator of the corrosive properties of the soil. Test results are summarized below in Table 3 and presented in Appendix C.

Table 4 Soil Corrosion Results

Sample No.	Depth (ft.)	pH	Minimum Resistivity (ohm-cm)	Water Soluble Sulfates (ppm)	Water Soluble Chlorides (ppm)
B-1	2.5	8.3	5,269	4	20
Embankment	0	8.7	2,335	54	81

According to ACI 318, water soluble sulfates less than 1,000 parts per million is considered “not applicable.” A water-soluble chloride content of less than 500 ppm is generally non-corrosive to reinforced concrete. Based upon our laboratory tests, corrosivity potential in the on-site soils is low.

The provided corrosion test results are only an indicator of potential soil corrosivity for the sample tested at the selected depth interval. It is possible that corrosion potential can vary by sample location and depth.

4.5 Seismic Design

The subject site is located at latitude/longitude coordinates of 37.21136°N and 116.9646°W. The seismic design criteria for the site were developed utilizing the USGS seismic hazards tool in accordance with

AASHTO 2017, considering the site location, and the subsurface information obtained from our geotechnical investigation. Minimum seismic parameters for use in design are listed by county in the NDOT Structures Manual and supersede the USGS mapped values presented below.

Table 5 Seismic Design Criteria

Parameter	USGS Mapped Value	NDOT Structures Manual Value
Site Class	D	D
Peak ground acceleration (PGA)	0.21 g	0.35 g
Mapped horizontal response spectral response at short period (S_S)	0.51 g	0.80 g
Mapped horizontal response spectral response at 1sec period (S_1)	0.188 g	0.30 g
Peak ground acceleration coefficient (F_{PGA})	1.38	1.15
Site coefficient (Fa)	1.392	1.18
Site coefficient (F_V)	2.05	1.80
Mapped MCE peak ground acceleration (A_S)	0.29 g	0.40 g
Design Spectral Acceleration for short period (S_{DS})	0.71 g	0.94 g
Design Spectral Acceleration for 1 sec period (S_{D1})	0.385 g	0.54 g

5. 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. 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.

6. References

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

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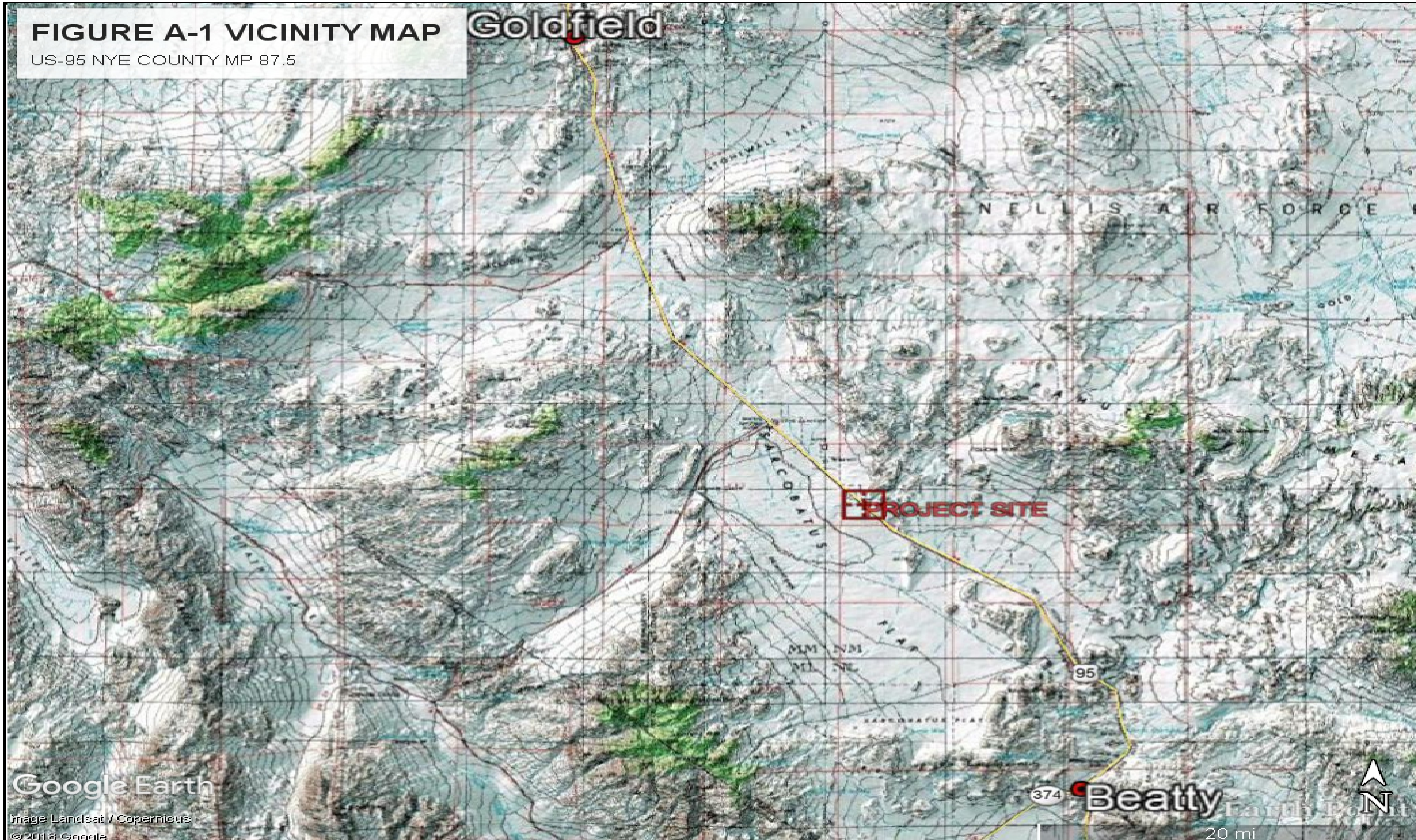
U.S. Geologic Survey, http://earthquake.usgs.gov/ws/designmaps/aashto-2009.json/ . Accessed May 23, 2019.

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: Nye County, NV

Project Name: Structure B-1022 Extension

EA Number: 74065

FIGURE A-2 EXPLORATION MAP

US-95 NYE COUNTY MP 87.5

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

Figure A-2 Exploration Map

Location: Nye County, NV

Project Name: Structure B-1022 Extension

EA Number: 74065

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

NEVADA DOT — SAFE AND CONNECTED

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

START DATE	1/29/19	STATION	37.21,-116.96
END DATE	1/29/19	OFFSET	
PROJECT	Structure B-1022 RCB extension, US 95	ENGINEER	Jason Crosby
LOCATION	MP NY87.5, Nye County	OPERATOR	E. Grayson
E.A. #	74065	DRILL RIG	Diedrich D-120 (1627)
BORING	B-1	METHOD	6" Hollow Stem Auger
GROUND ELEV. ft	4126.0	HAMMER	Automatic
TOTAL DEPTH ft	36.5	BACKFILLED	Yes DATE 1/30/19

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	REMARKS
4125.0	1												**POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM),** fine-to coarse-grained sand, fine-to coarse-subangular gravel, medium dense, light brown, dry.	Bulk Sample BK-1 collected from auger cuttings at 0-2.5 foot depth.
4124.0	2											SP-SM		
4123.0	3	1-1	SPT	8 8 11	19	60	1	56	9	NP	NP			
4122.0	4													
4121.0	5												**WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM),** fine-to coarse-grained sand, fine-to coarse-subangular gravel, dense, light brown, dry.	Drill bit sheared off at 5.0 feet. Had to terminate hole and move the boring 2 feet to the north. Drilled down to 5 feet below ground surface (BGS) and took sample.
4120.0	6	1-2	SPT	10 15 20	35	80	3	59	9	NP	NP	SW-SM		
4119.0	7												**POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM),** fine-to coarse-grained sand, fine-to coarse-subangular gravel, medium dense, light brown, dry.	
4118.0	8	1-3	SPT	9 8 12	20	80	3	55	6	NP	NP	SP-SM		
4117.0	9												**WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM),** fine-to coarse-grained sand, fine-to coarse-subangular gravel, very dense, light brown, dry.	
4116.0	10													
4115.0	11	1-4	SPT	13 23 36	59	87	3	67	9	NP	NP			
4114.0	12													
4113.0	13													
4112.0	14											SW-SM		
4111.0	15													
4110.0	16	1-5	SPT	28 45 45	90	93	5	70	9	NP	NP			
4109.0	17													
4108.0	18													
4107.0	19												**POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM),** fine-to coarse-grained sand, fine-to coarse-subangular gravel, very dense, light brown, dry.	
4106.0	20													
4105.0	21	1-6	SPT	27 36 31	67	93	5	70	12	19	1			
4104.0	22											SP-SM		
4103.0	23													
4102.0	24													

Standard Penetration Test

USCS Poorly-graded Sand with Silt

USCS Well-graded Sand with Silt

USCS Poorly-graded Gravel with Clay

USCS Clayey Sand

NEVADA DOT SAFE AND CONNECTED

BORING LOG

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

START DATE	1/29/19	STATION	37.21,-116.96
END DATE	1/29/19	OFFSET	
PROJECT	Structure B-1022 RCB extension, US 95	ENGINEER	Jason Crosby
LOCATION	MP NY87.5, Nye County	OPERATOR	E. Grayson
E.A. #	74065	DRILL RIG	Diedrich D-120 (1627)
BORING	B-1	METHOD	6" Hollow Stem Auger
GROUND ELEV. ft	4126.0	HAMMER	Automatic
TOTAL DEPTH ft	36.5	BACKFILLED	Yes DATE 1/30/19

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	REMARKS
4100.0	26	1-7	SPT	22 41 50/4"		93	5	65	10	20	3	SP-SM	**POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM),** fine-to coarse-grained sand, fine-to coarse-subangular gravel, very dense, light brown, dry.	
4099.0	27													
4098.0	28													
4097.0	29											GP-GC	**POORLY GRADED GRAVEL WITH SILTY CLAY AND SAND (GP-GC)**, coarse-grained sand, coarse subangular gravel, very dense, brown, dry.	
4096.0	30													
4095.0	31	1-8	SPT	22 47 37	84	83	4	49	11	20	7			
4094.0	32													
4093.0	33													
4092.0	34											SC	**CLAYEY SAND WITH GRAVEL (SC)**, fine-to coarse-grained sand, fine-to coarse gravel, very dense, dark brown, moist.	
4091.0	35													
4090.0	36	1-9	SPT	22 32 32	64	100	6	82	14	18	10			
4089.0	37												Boring terminated at 36.5 feet BGS. Groundwater not encountered.	
4088.0	38													
4087.0	39													
4086.0	40													
4085.0	41													
4084.0	42													
4083.0	43													
4082.0	44													
4081.0	45													
4080.0	46													
4079.0	47													
4078.0	48													
4077.0	49													

Standard Penetration Test

USCS Poorly-graded Sand with Silt

USCS Well-graded Sand with Silt

USCS Poorly-graded Gravel with Clay

USCS Clayey Sand

BORING LOG

NEVADA DOT SAFE AND CONNECTED
Materials Division
Geotechnical Section
1263 S. Stewart St
Carson City, NV 89712

START DATE	1/30/19	STATION	37.21, -116.96
END DATE	1/30/19	OFFSET	
PROJECT	Structure B-1022 RCB extension, US 95	ENGINEER	Jason Crosby
LOCATION	MP NY87.5, Nye County	OPERATOR	E. Grayson
E.A. #	74065	DRILL RIG	Diedrich D-120 (1627)
BORING	B-2	METHOD	6" Hollow Stem Auger
GROUND ELEV. ft	4126.0	HAMMER	Automatic
TOTAL DEPTH ft	41.5	BACKFILLED	Yes DATE 1/30/19

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
	0											SP-SM	**POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM),** fine-to coarse-grained sand, fine-to coarse-subangular gravel, medium dense, light brown, dry.
4125.0	1												
4124.0	2												
4123.0	3	2-1	SPT	7 9 12	21	67	3	58	11	NP	NP		
4122.0	4											SM	**SILTY SAND WITH GRAVEL (SM),** fine-to coarse-grained sand, fine-to coarse-subangular gravel, dense, light brown, dry.
4121.0	5												
4120.0	6	2-2	SPT	15 26 16	42	67	3	75	14	NP	NP		
4119.0	7											SM	**SILTY SAND (SM),** trace gravel, fine-to coarse-grained sand, fine-subangular gravel, medium dense to very dense, light brown, dry.
4118.0	8	2-3	SPT	9 11 12	23	80	4	94	19	NP	NP		
4117.0	9												
4116.0	10												
4115.0	11	2-4	SPT	50/4"		33	4	87	16	NP	NP		
4114.0	12												
4113.0	13											SW-SM	**WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM),** fine-to coarse-grained sand, fine-to coarse-subangular gravel, very dense, brown, dry.
4112.0	14												
4111.0	15												
4110.0	16	2-5	SPT	17 32 50/4.5"		87	5	60	8	NP	NP		
4109.0	17												
4108.0	18												
4107.0	19											SP-SM	**POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM),** fine-to coarse-grained sand, fine-to coarse-subangular gravel, dense, brown, dry.
4106.0	20												
4105.0	21	2-6	SPT	11 17 17	34	87	6	59	10	NP	NP		
4104.0	22											SW-SM	**WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM),** fine-to coarse-grained sand, fine-to coarse-subangular gravel, very dense, brown, dry to moist.
4103.0	23												
4102.0	24												

Standard Penetration Test

USCS Poorly-graded Sand with Silt

USCS Silty Sand

USCS Well-graded Sand with Silt

USCS Clayey Sand

BORING LOG

NEVADA DOT SAFE AND CONNECTED

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

START DATE	1/30/19	STATION	37.21, -116.96
END DATE	1/30/19	OFFSET	
PROJECT	Structure B-1022 RCB extension, US 95	ENGINEER	Jason Crosby
LOCATION	MP NY87.5, Nye County	OPERATOR	E. Grayson
E.A. #	74065	DRILL RIG	Diedrich D-120 (1627)
BORING	B-2	METHOD	6" Hollow Stem Auger
GROUND ELEV. ft	4126.0	HAMMER	Automatic
TOTAL DEPTH ft	41.5	BACKFILLED	Yes DATE 1/30/19

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
4100.0	26	2-7		21 50/2.5"		40	5	60	9	NP	NP	SW-SM	**WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM),** fine-to coarse-grained sand, fine-to coarse-subangular gravel, very dense, brown, dry to moist.
4099.0	27												
4098.0	28												
4097.0	29												
4096.0	30												
4095.0	31	2-8		29 27 36	63	80	4	57	9	NP	NP		
4094.0	32												
4093.0	33												
4092.0	34											SC	**CLAYEY SAND WITH GRAVEL (SC),** fine-grained sand, fine gravel, dense, moist, dark brown.
4091.0	35												
4090.0	36	2-9		12 15 19	34	100	11	81	22	31	14		
4089.0	37												
4088.0	38												
4087.0	39												
4086.0	40												
4085.0	41	2-10		14 16 20	36	100	14	76	24	30	9		
4084.0	42												Boring terminated at 41.5 feet BGS. Groundwater not encountered.
4083.0	43												
4082.0	44												
4081.0	45												
4080.0	46												
4079.0	47												
4078.0	48												
4077.0	49												

Standard Penetration Test

USCS Poorly-graded Sand with Silt

USCS Silty Sand

USCS Well-graded Sand with Silt

USCS Clayey Sand

Appendix C

Laboratory Test Results

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

EA/Cont # 74065 **Job Description** Structure B-1022

Boring No. #1 **Elevation (ft)** 4126.00 **Station** **Date** 1/29/2019

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMPLER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	STRENGTH TEST: TEST TYPE	Peak: Φ deg.	Peak: C psi	Residual: Φ deg.	Residual: C psi	COMMENTS
BK-1	0.0 - 5.0	Bulk		GW-GM			5.3	20	NP	NP						Ch
BK-Emb.	0.0 - 1.0	Bulk		SP-SM			8.4	20	NP	NP						Ch
1-1	2.5 - 4.0	SPT	19	SP-SM	1.0		9.0	22	NP	NP						
1-2	5.0 - 6.5	SPT	35	SW-SM	3.0		9.2	22	NP	NP						
1-3	7.5 - 9.0	SPT	20	SP-SM	2.7		6.4	20	NP	NP						
1-4	10.0 - 11.5	SPT	59	SW-SM	3.2		9.3	20	NP	NP						
1-5	15.0 - 16.5	SPT	90	SW-SM	4.8		9.4	21	NP	NP						
1-6	20.0 - 21.5	SPT	67	SP-SM	4.6		11.7	20	19	1						
1-7	25.0 - 26.5	SPT	R	SP-SM	4.5		10.1	23	20	3						
1-8	30.0 - 31.5	SPT	84	GP-GC	4.2		10.8	27	20	7						
1-9	35.0 - 36.5	SPT	64	SC	6.1		13.5	28	18	10						

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

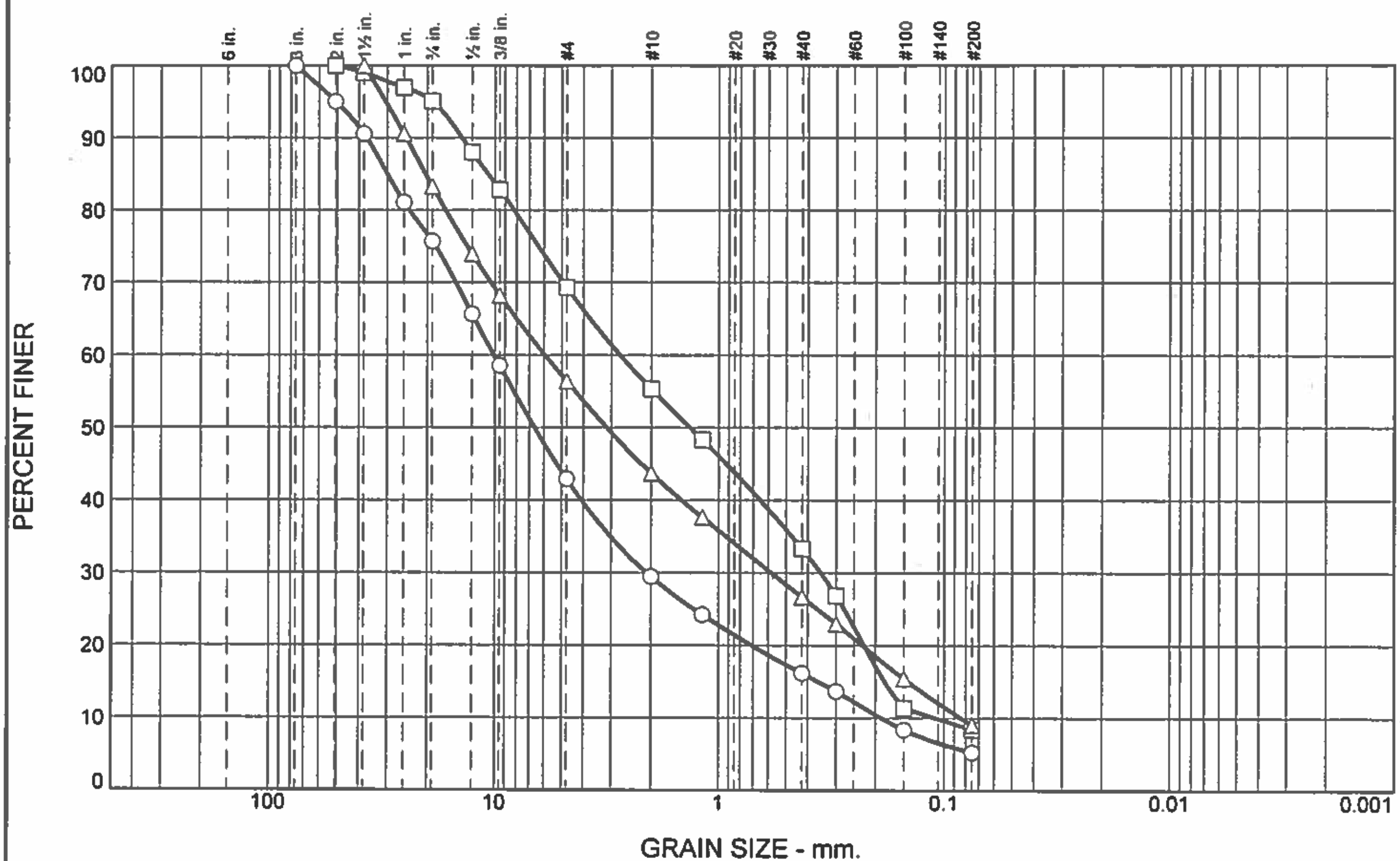
N = Field SPT $N = (N_{cal})(0.62)$

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

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	57.1	37.6	5.3		GW-GM	A-1-a	NP	20
□	0.0	30.7	60.9	8.4		SP-SM	A-1-b	NP	20
△	0.0	43.6	47.4	9.0		SP-SM	A-1-a	NP	22

SIEVE inches size	PERCENT FINER ○	□	△
3"	100.0		
2"	95.0	100.0	
1.5"	90.6	99.0	100.0
1"	81.1	96.9	90.6
3/4"	75.7	95.1	83.3
1/2"	65.7	88.0	74.0
3/8"	58.5	82.8	68.2
	GRAIN SIZE		
D_{60}	10.1192	2.7481	5.9484
D_{30}	2.0891	0.3505	0.5799
D_{10}	0.1881	0.1086	0.0838
	COEFFICIENTS		
C_c	2.29	0.41	0.67
C_u	53.79	25.31	71.02

SIEVE number size	PERCENT FINER ○	□	△
#4	42.9	69.3	56.4
#10	29.5	55.3	43.7
#16	24.2	48.3	37.7
#40	16.2	33.4	26.7
#50	13.7	26.9	23.0
#100	8.4	11.4	15.4
#200	5.3	8.4	9.0

<u>Material Description</u>

○ well-graded gravel with silt and sand

□ poorly graded sand with silt and gravel

△ poorly graded sand with silt and gravel

<u>REMARKS:</u>

○

□

△

○ Source of Sample: #1 Depth: 0.0' - 5.0' Sample Number: BK-1

□ Source of Sample: #1 Depth: 0.0' - 1.0' Sample Number: BK-Embank

△ Source of Sample: #1 Depth: 2.5' - 4.0' Sample Number: 1-1

NEVADA DEPARTMENT OF TRANSPORTATION

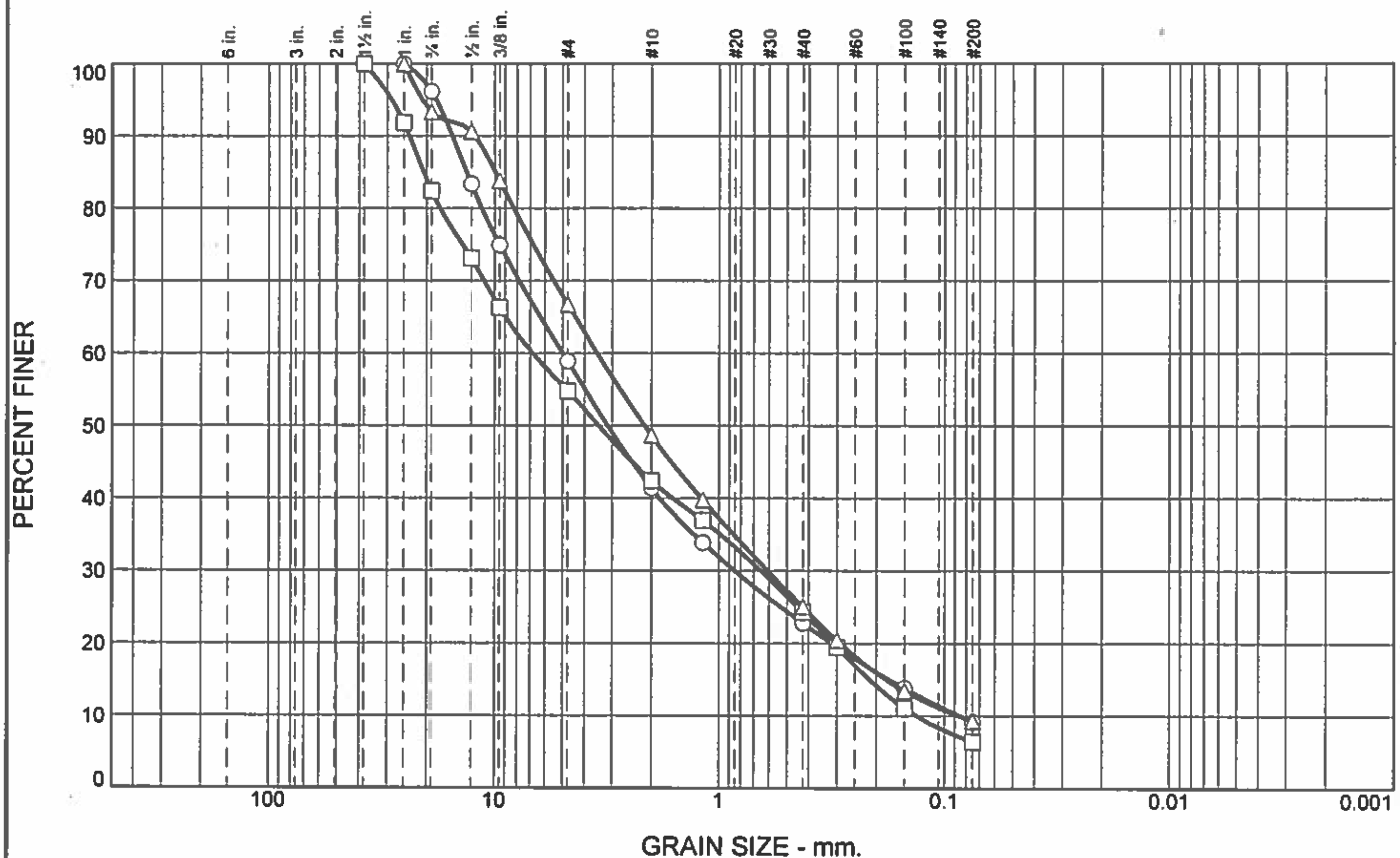
Client: J. Crosby

Project: Structure B-1022

Project No.: EA 74065

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	41.1	49.7	9.2		SW-SM	A-1-a	NP	22
□	0.0	45.2	48.4	6.4		SP-SM	A-1-a	NP	20
△	0.0	33.2	57.5	9.3		SW-SM	A-1-a	NP	20

SIEVE inches size	PERCENT FINER ○	□	△
1.5"		100.0	
1"	100.0	91.8	100.0
3/4"	96.2	82.4	93.3
1/2"	83.4	73.1	90.6
3/8"	75.0	66.3	83.8
	GRAIN SIZE		
D_{60}	5.0009	6.8030	3.5035
D_{30}	0.8495	0.6504	0.6071
D_{10}	0.0854	0.1326	0.0861
	COEFFICIENTS		
C_c	1.69	0.47	1.22
C_u	58.53	51.31	40.69

SIEVE number size	PERCENT FINER ○	□	△
#4	58.9	54.8	66.8
#10	41.4	42.4	48.7
#16	33.9	36.9	39.8
#40	22.8	24.3	25.1
#50	19.5	19.5	20.4
#100	13.8	11.1	13.4
#200	9.2	6.4	9.3

Material Description

○ well-graded sand with silt and gravel

□ poorly graded sand with silt and gravel

△ well-graded sand with silt and gravel

REMARKS:

○

□

△

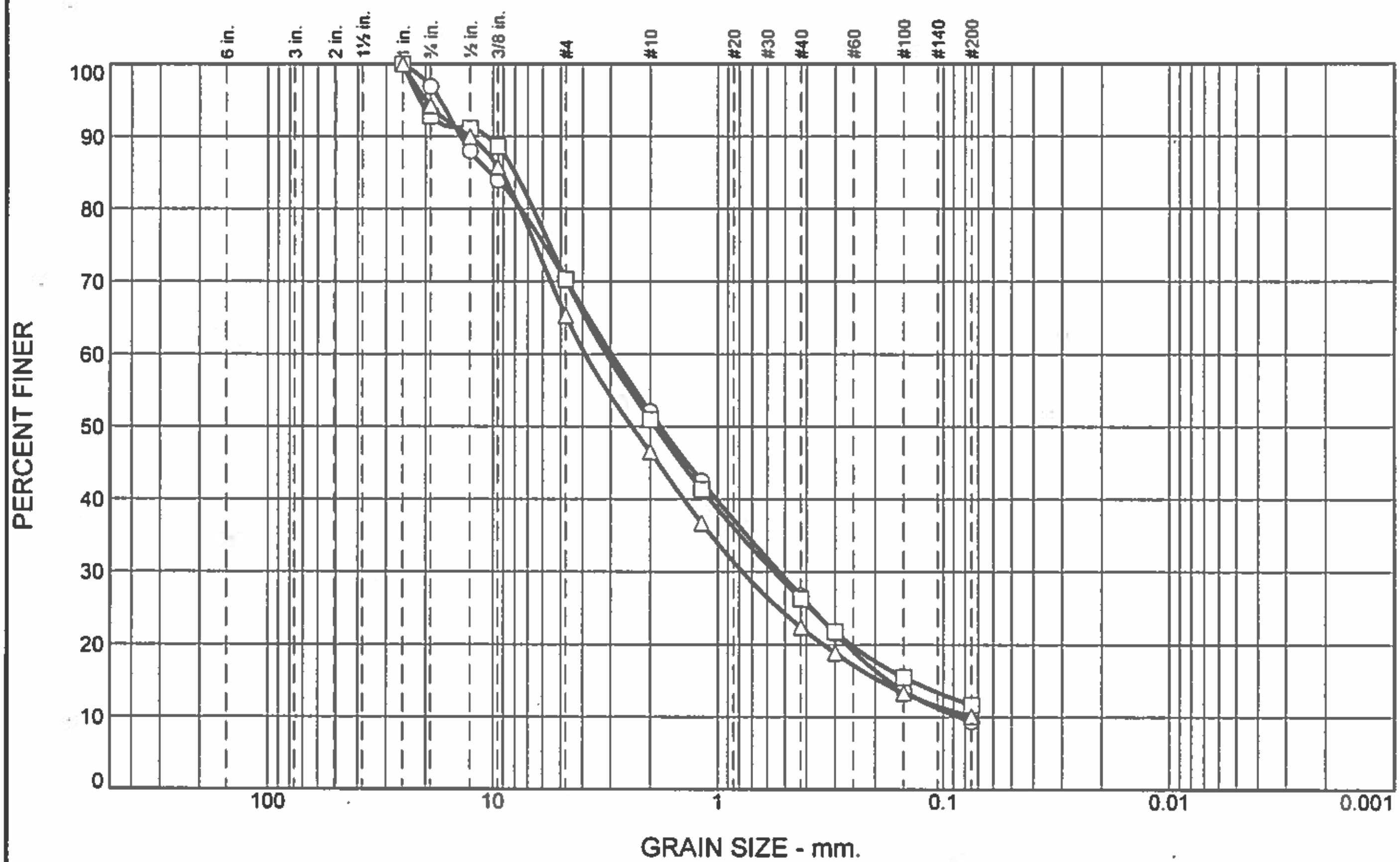
○ Source of Sample: #1 Depth: 5.0' - 6.5' Sample Number: 1-2

□ Source of Sample: #1 Depth: 7.5' - 9.0' Sample Number: 1-3

△ Source of Sample: #1 Depth: 10.0' - 11.5' Sample Number: 1-4

NEVADA DEPARTMENT OF TRANSPORTATION	Client: J. Crosby Project: Structure B-1022 Project No.: EA 74065 Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	29.8	60.8	9.4		SW-SM	A-1-b	NP	21
□	0.0	29.7	58.6	11.7		SP-SM	A-1-b	19	20
△	0.0	34.7	55.2	10.1		SP-SM	A-1-a	20	23

SIEVE inches size	PERCENT FINER ○	□	△
1"	100.0	100.0	100.0
3/4"	96.9	92.8	94.2
1/2"	88.0	91.1	90.0
3/8"	84.0	88.6	85.8
GRAIN SIZE			
D_{60}	2.9659	3.1341	3.8943
D_{30}	0.5278	0.5568	0.7745
D_{10}	0.0846		
COEFFICIENTS			
C_c	1.11		
C_u	35.06		

SIEVE number size	PERCENT FINER ○	□	△
#4	70.2	70.3	65.3
#10	52.1	51.0	46.6
#16	42.5	41.4	36.7
#40	26.7	26.3	22.4
#50	21.5	21.8	18.9
#100	13.7	15.5	13.3
#200	9.4	11.7	10.1

Material Description

○ well-graded sand with silt and gravel

□ poorly graded sand with silt and gravel

△ poorly graded sand with silt and gravel

REMARKS:

○

□

△

○ Source of Sample: #1 Depth: 15.0' - 16.5' Sample Number: 1-5

□ Source of Sample: #1 Depth: 20.0' - 21.5' Sample Number: 1-6

△ Source of Sample: #1 Depth: 25.0' - 26.5' Sample Number: 1-7

NEVADA DEPARTMENT OF TRANSPORTATION

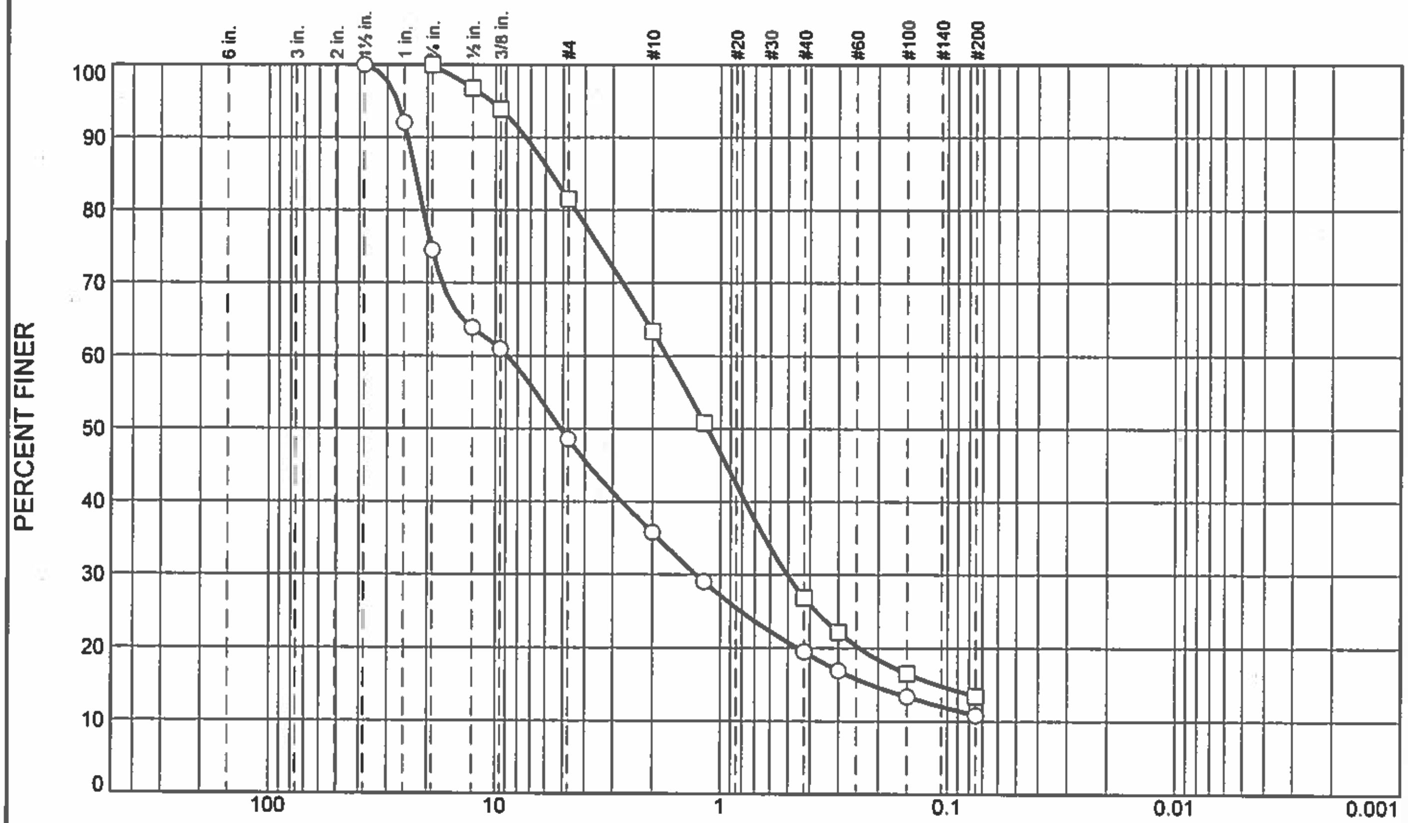
Client: J. Crosby

Project: Structure B-1022

Project No.: EA 74065

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	51.4	37.8	10.8		GP-GC	A-2-4(0)	20	27
□	0.0	18.5	68.0	13.5		SC	A-2-4(0)	18	28

SIEVE inches size	PERCENT FINER ○	□	
1.5"	100.0		
1"	92.0		
3/4"	74.5	100.0	
1/2"	63.9	96.8	
3/8"	60.9	93.9	
	GRAIN SIZE		
D_{60}	8.8756	1.7257	
D_{30}	1.2784	0.5032	
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	
#4	48.6	81.5	
#10	35.8	63.3	
#16	29.0	50.8	
#40	19.5	26.9	
#50	16.9	22.2	
#100	13.4	16.5	
#200	10.8	13.5	

Material Description

○ poorly graded gravel with siltyclay and sand

□ clayey sand with gravel

REMARKS:

○

□

○ Source of Sample: #1 Depth: 30.0' - 31.5' Sample Number: 1-8

□ Source of Sample: #1 Depth: 35.0' - 36.5' Sample Number: 1-9

NEVADA DEPARTMENT OF TRANSPORTATION

Client: J. Crosby

Project: Structure B-1022

Project No.: EA 74065

Figure

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

CHEMICAL ANALYSIS

EA No.: 74065

Project: Structure B-1022

Sample ID	Date Tested	Chlorides ppm AASHTO T 291 A	Sulfates ppm AASHTO T 290 B	pH AASHTO T 289	Resistivity ohm - cm AASHTO T 288
BK-1	2/20/19	20	4	8.3	5,269
BK Embank	2/20/19	81	54	8.7	2,335

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

EA/Cont # 74065 **Job Description** Structure B-1022

Boring No. #2 **Elevation (ft)** 4126.00 **Station** **Date** 1/30/2019

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMPLER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	STRENGTH TEST: TEST TYPE	Peak: Φ deg.	Peak: C psi	Residual: Φ deg.	Residual: C psi	COMMENTS
BK-2	0.0 - 5.0	Bulk														
2-1	2.5 - 4.0	SPT	21	SP-SM	2.8		11.1	18	NP	NP						
2-2	5.0 - 6.5	SPT	42	SM	2.5		13.7	18	NP	NP						
2-3	7.5 - 9.0	SPT	23	SM	4.3		18.5	19	NP	NP						
2-4	10.0 - 11.5	SPT	R		3.9		16.4									
2-5	15.0 - 16.5	SPT	82	SW-SM	4.5		7.9	17	NP	NP						
2-6	20.0 - 21.5	SPT	34	SP-SM	5.7		9.6	21	NP	NP						
2-7	25.0 - 26.5	SPT	R	SW-SM	5.1		8.9	19	NP	NP						
2-8	30.0 - 31.5	SPT	63	SW-SM	4.0		9.2	20	NP	NP						
2-9	35.0 - 36.5	SPT	34	SC	11.2		21.9	31	17	14						
2-10	40.0 - 41.5	SPT	36	SC	14.4		23.6	30	21	9						

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

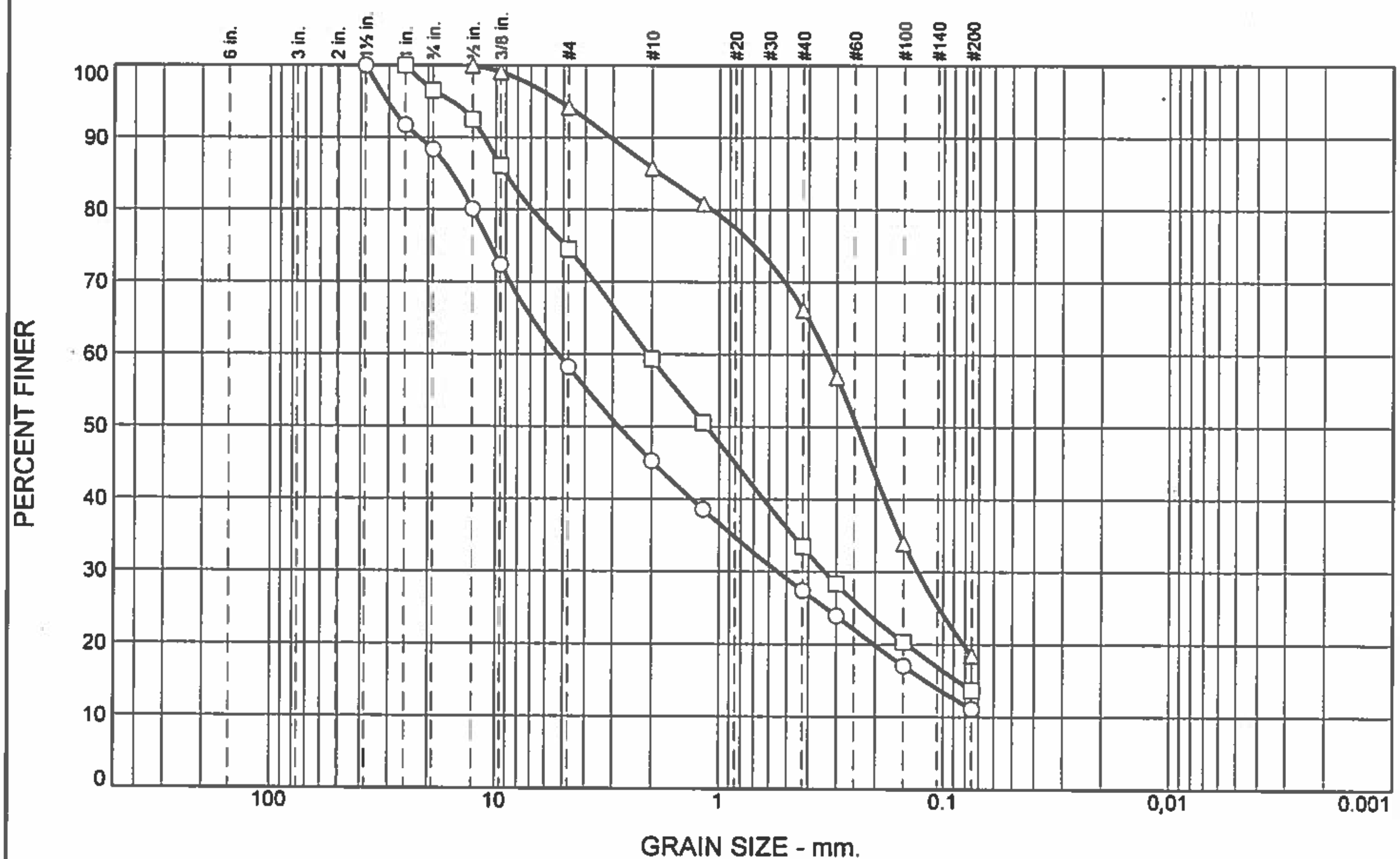
N = Field SPT N = $(N_{css})(0.62)$

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**

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	41.8	47.1	11.1		SP-SM	A-1-a	NP	18
□	0.0	25.5	60.8	13.7		SM	A-1-b	NP	18
△	0.0	5.8	75.7	18.5		SM	A-2-4(0)	NP	19

SIEVE inches size	PERCENT FINER ○	□	△
1.5"	100.0		
1"	91.7	100.0	
3/4"	88.4	96.5	
1/2"	80.1	92.5	100.0
3/8"	72.4	86.1	99.1
	GRAIN SIZE		
D_{60}	5.2640	2.0720	0.3336
D_{30}	0.5477	0.3377	0.1296
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	58.2	74.5	94.2
#10	45.3	59.4	85.8
#16	38.6	50.6	80.9
#40	27.4	33.5	66.2
#50	23.9	28.3	56.9
#100	17.0	20.4	34.0
#200	11.1	13.7	18.5

Material Description

○ poorly graded sand with silt and gravel

□ silty sand with gravel

△ silty sand

REMARKS:

○

□

△

○ Source of Sample: #2 Depth: 2.5' - 4.0' Sample Number: 2-1

□ Source of Sample: #2 Depth: 5.0' - 6.5' Sample Number: 2-2

△ Source of Sample: #2 Depth: 7.5' - 9.0' Sample Number: 2-3

NEVADA DEPARTMENT OF TRANSPORTATION

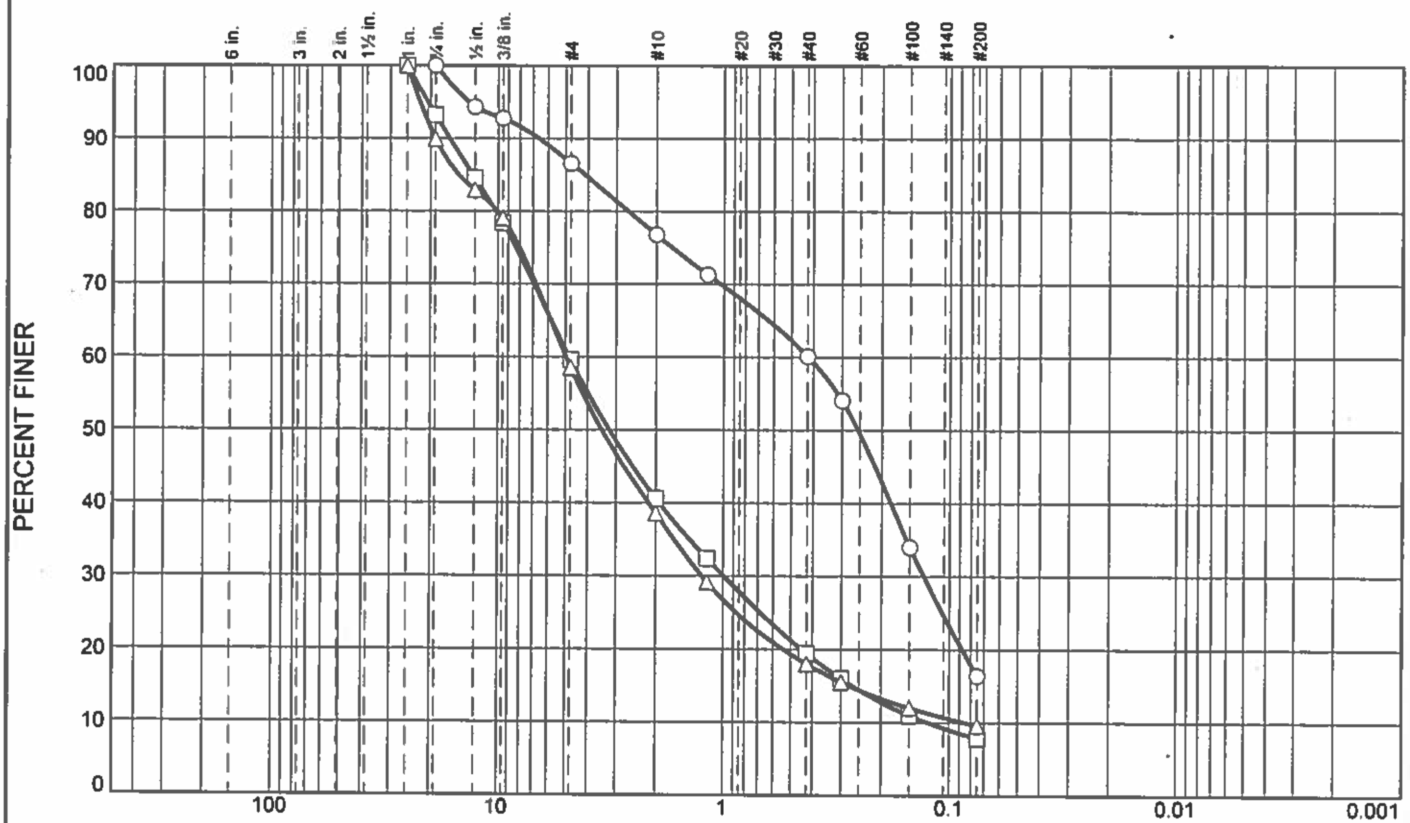
Client: J. Crosby

Project: Structure B-1022

Project No.: EA 74065

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	13.4	70.2	16.4					
□	0.0	40.4	51.7	7.9		SW-SM	A-1-a	NP	17
△	0.0	41.5	48.9	9.6		SP-SM	A-1-a	NP	21

SIEVE inches size	PERCENT FINER ○	□	△
1"		100.0	100.0
3/4"	100.0	93.2	89.9
1/2"	94.3	84.6	82.9
3/8"	92.7	78.4	79.1
	GRAIN SIZE		
D_{60}	0.4217	4.8242	4.9795
D_{30}	0.1301	0.9916	1.2405
D_{10}		0.1242	0.0848
	COEFFICIENTS		
C_c		1.64	3.64
C_u		38.83	58.71

SIEVE number size	PERCENT FINER ○	□	△
#4	86.6	59.6	58.5
#10	76.8	40.6	38.6
#16	71.3	32.4	29.2
#40	60.1	19.4	18.0
#50	54.1	16.0	15.5
#100	34.0	11.0	12.0
#200	16.4	7.9	9.6

Material Description

○

□ well-graded sand with silt and gravel

△ poorly graded sand with silt and gravel

REMARKS:

○

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△

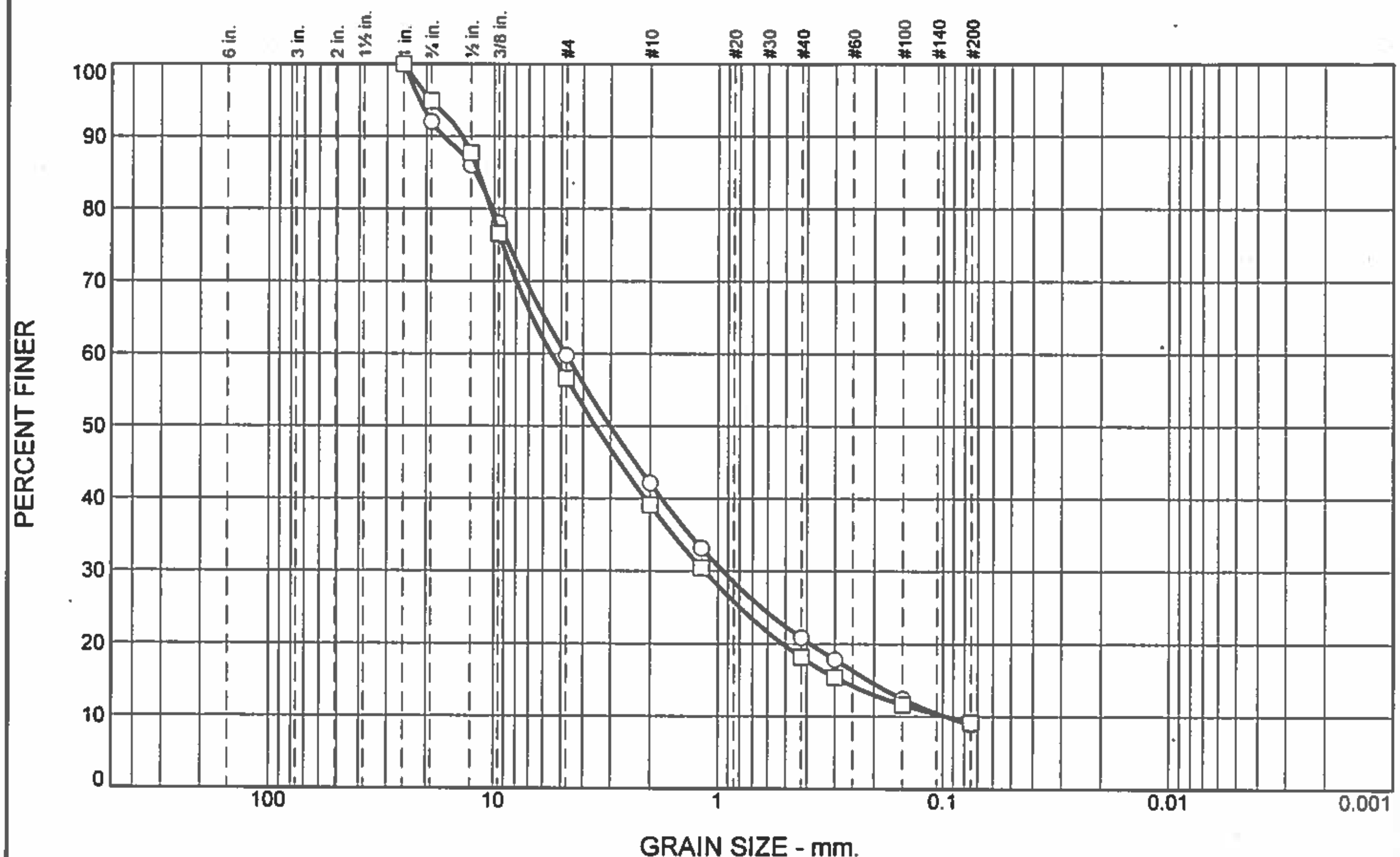
○ Source of Sample: #2 Depth: 10.0' - 11.5' Sample Number: 2-4

□ Source of Sample: #2 Depth: 15.0' - 16.5' Sample Number: 2-5

△ Source of Sample: #2 Depth: 20.0' - 21.5' Sample Number: 2-6

NEVADA DEPARTMENT OF TRANSPORTATION	Client: J. Crosby Project: Structure B-1022 Project No.: EA 74065 Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	40.2	50.9	8.9		SW-SM	A-1-a	NP	19
□	0.0	43.5	47.3	9.2		SW-SM	A-1-a	NP	20

SIEVE inches size	PERCENT FINER ○	PERCENT FINER □	
1"	100.0	100.0	
3/4"	92.0	94.9	
1/2"	86.0	87.7	
3/8"	78.0	76.6	
	GRAIN SIZE		
D_{60}	4.7993	5.5185	
D_{30}	0.9485	1.1440	
D_{10}	0.0964	0.0964	
	COEFFICIENTS		
C_c	1.94	2.46	
C_u	49.80	57.26	

SIEVE number size	PERCENT FINER ○	PERCENT FINER □	
#4	59.8	56.5	
#10	42.1	39.1	
#16	33.2	30.5	
#40	20.9	18.2	
#50	17.9	15.4	
#100	12.4	11.6	
#200	8.9	9.2	

Material Description

○ well-graded sand with silt and gravel

□ well-graded sand with silt and gravel

REMARKS:

○

□

○ Source of Sample: #2 Depth: 25.0' - 26.5' Sample Number: 2-7

□ Source of Sample: #2 Depth: 30.0' - 31.5' Sample Number: 2-8

NEVADA DEPARTMENT OF TRANSPORTATION

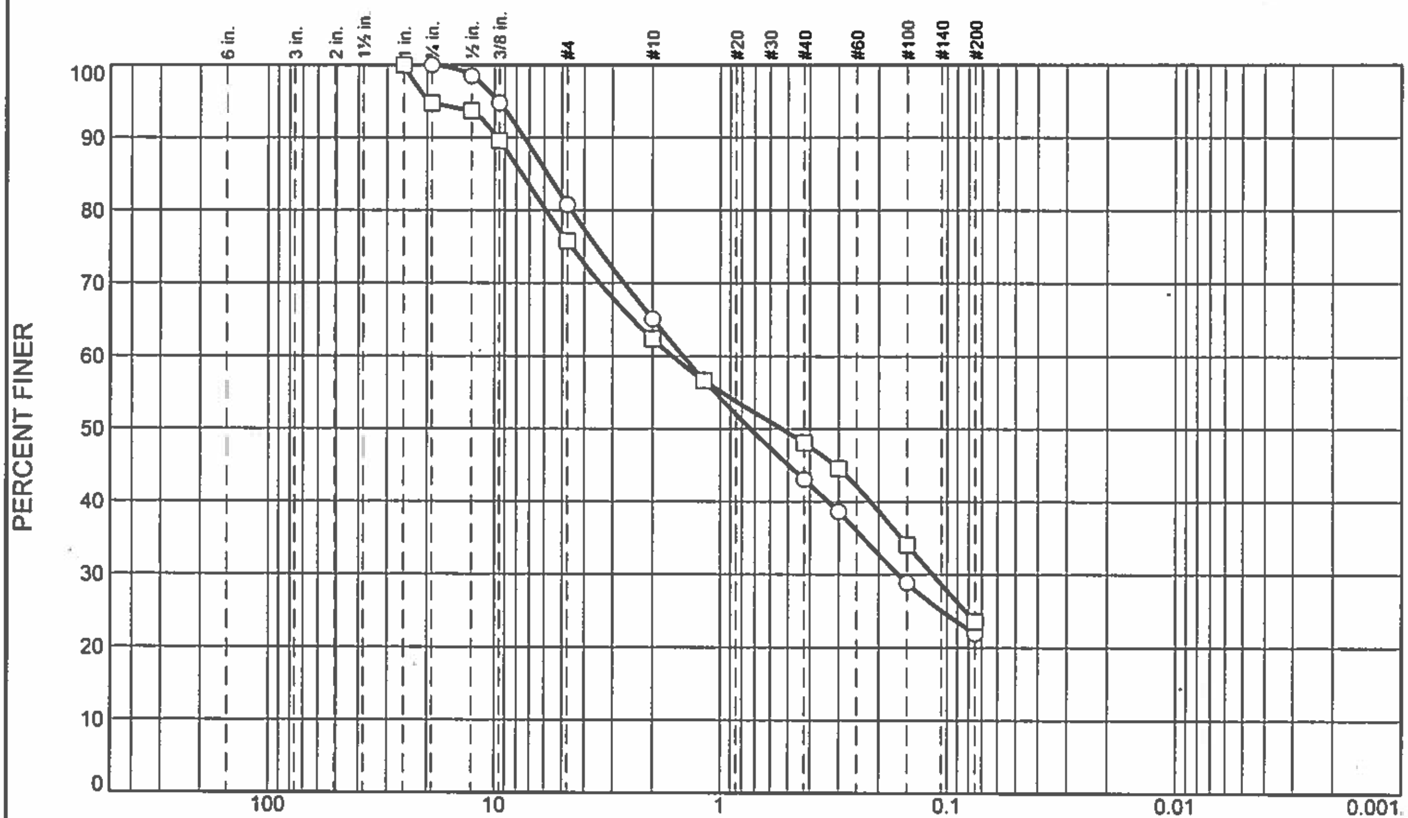
Client: J. Crosby

Project: Structure B-1022

Project No.: EA 74065

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	19.2	58.9	21.9		SC	A-2-6(0)	17	31
□	0.0	24.2	52.2	23.6		SC	A-2-4(0)	21	30

SIEVE inches size	PERCENT FINER ○	□	
1"		100.0	
3/4"	100.0	94.7	
1/2"	98.5	93.7	
3/8"	94.8	89.6	
	GRAIN SIZE		
D_{60}	1.4601	1.6326	
D_{30}	0.1638	0.1154	
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	
#4	80.8	75.8	
#10	65.1	62.4	
#16	56.7	56.7	
#40	43.1	48.1	
#50	38.6	44.6	
#100	28.9	34.1	
#200	21.9	23.6	

Material Description

○ clayey sand with gravel

□ clayey sand with gravel

REMARKS:

○

□

○ Source of Sample: #2 Depth: 35.0' - 36.5' Sample Number: 2-9

□ Source of Sample: #2 Depth: 40.0' - 41.5' Sample Number: 2-10

NEVADA DEPARTMENT OF TRANSPORTATION

Client: J. Crosby

Project: Structure B-1022

Project No.: EA 74065

Figure

NEVADA DEPARTMENT OF TRANSPORTATION

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