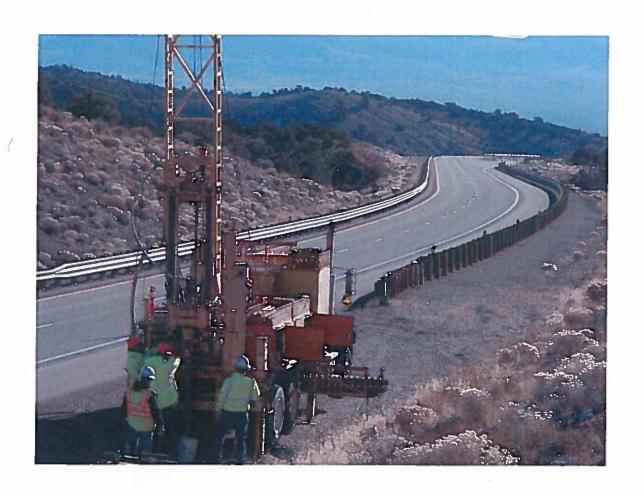
GEOTECHNICAL INVESTIGATION

I-80 PEQUOP SUMMIT ANIMAL OVERCROSSING ELKO COUNTY, NEVADA





STATE OF NEVADA DEPARTMENT OF TRANSPORTATION MATERIALS DIVISION GEOTECHNICAL SECTION

GEOTECHNICAL INVESTIGATION REPORT I-80 PEQUOP SUMMIT ANIMAL OVERCROSSING

August 31, 2015

EA #73606 ELKO COUNTY, NEVADA

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1.0 INTRODUCTION

Presented herein is the Nevada Department of Transportation (NDOT) Geotechnical Investigation for the proposed wildlife overcrossing structures on I-80 EB and WB near Pequop Summit in Elko County, Nevada. A Preliminary Design Field Study (PDFS) held on November 13, 2014 identified the area under consideration as being in the vicinity of milepost 97, east of Pequop Summit and about 1/4 mile west of exit 376, Pequop. The project location is presented below in Appendix A.

The objective of this investigation is to determine general soil and groundwater conditions at the proposed project site. This report also provides geotechnical design recommendations for the construction of the structures proposed for this project. The scope of this report consists primarily of geotechnical exploration, analysis and recommendations for both design and construction. The investigation includes reviews of published geologic maps and preliminary design information, subsurface field exploration and soil sampling, laboratory testing, Refraction Microtremor Surveys (ReMi), and geotechnical engineering analysis. Results of our reviews field exploration and testing programs form the basis for the conclusions and recommendations presented in this report.

2.0 PROJECT DESCRIPTION

The project site is located east of the city of Wells in Elko County in the Pequop Mountains. I-80 runs roughly east/west in the area of the proposed structures. Preliminary plans indicate prefabricated arch structures under consideration. Overcrossings are planned to be located in adjacent segments of a divided highway, EB and WB I-80 in existing road cuts in the vicinity of Elko MP 97. I-80 consists of five asphalt paved travel lanes with two eastbound travel lanes and three westbound travel lanes that includes a truck passing lane.

3.0 SITE CONDITIONS

3.1 Surficial Geology

According to available references (Geology of Elko County, Nevada, Bulletin 101; Nevada Bureau of Mines, and Geology, Robert R. Coats 1987), the project site is located within the Diamond Peak and Chainman Formation, which is part of the Carbonate and Detrital Sequences within and on the margin of the Orogenic Belt. Conglomerate, sandstone, shale and minor limestone make up this formation. The road cut in which the animal overcrossings are to be located is made up of these native rocks. Argillite, a clayey mudstone intermediary between shale and slate appears to be the primary rock type within the project area. Argillite is a slightly metamorphic or highly compacted sedimentary rock that, unlike shale, is bound by silica, but does not demonstrate the true slaty cleavage. The area of the proposed structures lies at an elevation of between about 6400 feet to 6500 feet and slopes fairly steeply downward to the south and less steeply downward to the east.

TABLE OF CONTENTS

1.0 INTRODUCTION	. 1
2.0 PROJECT DESCRIPTION	
3.0 SITE CONDITIONS	1
3.1 SURFICIAL GEOLOGY	1
4.0 SITE INVESTIGATION	2
4.1 DRILLING	2
5.0 LABORATORY TESTING	
6.0 DISCUSSION	
6.1 SITE GEOLOGY AND SUBSURFACE SOIL/BEDROCK CONDITIONS	
7.0 GEOLOGIC HAZARDS	3
7.1 FAULTING AND SITE SEISMICITY	3
8.0 RECOMMENDATIONS	4
8.1 EARTHWORK 8.2 FOUNDATIONS 8.3 MECHANICALLY STABILIZED EARTH WALLS 8.4 SETTLEMENT 8.5 SEISMIC DESIGN PARAMETERS	4 5 5
9.0 REFERENCES	6

APPENDICES

APPENDIX A: BORING LOCATION MAP, EXPLORATION LOG KEY, EXPLORATION LOG SHEETS
APPENDIX B: LABORATORY TEST DATA, SUMMARY OF RESULTS, PARTICLE SIZE DISTRIBUTION REPORTS
APPENDIX C: GEOPHYSICAL LOCATION MAP, GEOPHYSICAL TEST DATA

4.0 SITE INVESTIGATION

4.1 Drilling

Site specific geotechnical information was gathered for the wildlife overcrossing. Subsurface information was gathered during November of 2014. The borings were drilled using a Deidrich D120, drill rig number 1627 equipped with an internal anvil automatic hammer utilizing hollow stem auger drilling methods. The NDOT engineer logged the subsurface conditions encountered during the field investigation. Soils were classified according to the United Soil Classification System (USCS) as described in the American Society of Testing and Materials (ASTM) D 2487. A brief key to the USCS is included in Appendix B on the Key to Boring Logs sheet. The borings were backfilled with cuttings and grouted upon completion.

Boring depths ranged from 15.2 to 25.3 feet. One boring was done on each shoulder in a staggered spacing in the area proposed for the structures. Augured samples of subgrade native and embankment fill soils were obtained from each boring. Driven samples were obtained using a Standard Penetration Test (SPT ASTM D 1586) split spoon sampler. Soil samples were obtained by driving the sampler 18 inches (unless otherwise noted) into the bottom of the boring using a 30-inch drop of an automatic hammer weight of 140 pounds. The blows per foot (Blow Count) are presented on the boring logs indicating the sampler drive resistance (N-Value), an indication of the apparent density of the site soils. Blow counts have not been corrected for rod length, hammer type, etc. Bulk samples were obtained by collecting auger spoils. The energy transfer from the automatic hammer into the drill rig string was calibrated at 74% for unit #1627. (SPT calibration was dome by Gregg Drilling and Testing, Inc. in 2013.) Soils were classified according to the United Soil Classification System (USCS). Boring Logs and Line Sampling Data are included in Appendix A. A location map has been provided for these borings. Test Results from the borings are included in Appendix B.

Locations of the borings were obtained using handheld resource grade Global Positioning System (GPS). Elevations were obtained using survey methods from local survey markers. The locations and elevations of the borings should be considered accurate only to the degree implied by the methods used.

4.2 Geophysical Survey

ReMi geophysical surveys were conducted by an NDOT Engineer along each of the four shoulders. ReMi data was obtained at each location using cables with 12 geophones spaced 20 feet apart. Broad ambient noise was used as a surface wave (S-wave) energy source and sledgehammer hits on an aluminum plate was used as a deep wave (P-wave) energy source. Data collected from the field was sent to Optim Software and Data Solutions for analysis. Locations of the geophysical surveys and the survey results are presented in Appendix C and discussed in the 'Discussion' section of this report.

5.0 LABORATORY TESTING

Selected samples were tested at the NDOT headquarters laboratory facilities. Laboratory test results can be found in Appendix B.

The laboratory testing program consisted of:

Natural Moisture Content (AASHTO T-265)
Particle Size Gradations (AASHTO T-87 & T-27)
Atterberg Limits (AASHTO T-89 & T-90)
Resistance Value (R-Value, Nev. T-115)

6.0 DISCUSSION

6.1 Site Geology and Subsurface Soil/Bedrock Conditions

Native soils are generally classified as dense silty sands, frequently intermingled with clayey and gravely sands. Below the roadbed subgrade, which appears to have been formed from processed native materials, native soils appear to be weak bedrock. It should be noted that the degree of weathering and the depth of bedrock varies across the project area. Refusal on bedrock was encountered on virtually every sample attempted even though drilling made good progress with little difficulty.

6.2 Soil Moisture and Groundwater Conditions

Soils varied in moisture during sampling. All borings were dry near the surface and dry conditions continued to from 5 feet below the surface (PQ1) to full depth explored, 25 feet (PQ3). Drilling was accomplished in November without recent rainfall. Ground water was encountered in half of the borings drilled during the subsurface investigation for this structure. Groundwater depth when encountered varied from 8.5 to 12 feet below ground surface. However the groundwater elevation will fluctuate depending on the time of year and precipitation amounts. In addition, the bedrock may direct flows in unanticipated ways due to rock fissures.

7.0 GEOLOGIC HAZARDS

7.1 Faulting and Site Seismicity

No mapped faults trend through the project area. The nearest fault presented on the referenced geologic map is a north-south trending fault about 8 miles west of the wildlife crossing along the base of the western edge of the Pequop Range. Another small northwest-southeast trending fault lies at the base of the eastern edge of the Pequop Range and terminates about 5 miles south of the wildlife crossing.

7.2 Liquefaction

Liquefaction is a nearly complete loss of soil shear strength that can occur during an earthquake as cyclic stresses generate excessive pore pressure between the soil grains and

the higher the ground acceleration or the longer the duration of shaking, the more likely liquefaction is to occur. This phenomenon is generally limited to unconsolidated sands (up to 35% non-plastic fines) lying below the ground water table. Due to the presence of shallow bedrock, the potential for liquefaction is negligible.

8.0 RECOMMENDATIONS

8.1 Earthwork

All excavation shall be performed in accordance with NDOT <u>2014 Standard Specifications for Road and Bridge Construction</u>. All permanent embankment slopes should be constructed to lie at a maximum of 2:1 (horiz:vert) slope.

The contractor shall be responsible for all necessary shoring for any excavation and/or construction. All shoring must be in compliance with the Code of Federal Regulations 29 CFR part 1926. For excavations less than 20 feet deep, the roadbed subgrade should be considered OSHA Type C for temporary excavation purposes with an allowed OSHA maximum allowable slope of 1.5 H:1V. For stable native bedrock, the maximum allowable slope is 90 degrees (vertical). The contractor should monitor the existing paved roadway adjacent to excavations for deflection or damage to the structural section of the roadway.

It should be noted that shallow bedrock is likely to be encountered during excavation activities.

Variable site conditions always include the possibility of encountering very soft soils, boulders or other adverse conditions in native ground that were not identified in this investigation.

8.2 Foundations

Shallow spread footings are recommended for the proposed structures. Provided that foundation grade soils are prepared in accordance with NDOT standards and specifications, spread footings for retaining walls placed within embankment fill can be designed for a factored bearing capacity of 4,000 pound per square foot (psf). Spread footings for the arch structures and retaining walls placed on native soil and/or bedrock can be designed for a factored bearing resistance of 10,000 psf (strength limit state). This bearing pressure may be increased by one third for total loading conditions, including wind and seismic forces. The weight of the foundation which extends below grade and backfill may be neglected when computing dead loads. The frost depth in the project area is three feet.

Lateral loads, such as wind or seismic, may be resisted by passive soil pressure and friction on the bottom of the footing. A friction factor of 0.40 may be utilized for sliding resistance at the base of the spread footing. Design values for passive equivalent fluid pressures is 300 psf per foot of depth. Both the passive pressure and sliding resistance can be assumed to act concurrently. In designing for passive pressure, the soil above the

footing should not be included unless confined by a concrete slab, or pavement. Design values are based on spread footings bearing on either native granular soils or structural fill, and backfilled with structural fill. The base of all excavations should be dry and free of loose materials at the time of concrete placement. Loose, wet, soft, frozen or disturbed soils encountered at the foundation subgrade should be removed to expose suitable soils and the resulting excavation shall be backfilled with compacted granular fill.

8.3 Mechanically Stabilized Earth Walls

The in-place soil parameters for MSE walls are as follows: Cohesion, c = 0 psf Soil Friction Angle $(\phi) = 35^{\circ}$ Soil Unit Weight $(\gamma d) = 125$ pounds per cubic foot (pcf)

8.4 Settlement

The estimated settlement of the structure abutments is less than 0.5 inches under the anticipated loading due to the type of construction to be performed founded on existing native bedrock. The removal of the embankment soil necessary for the construction of the existing interstate was greater than the planned surcharge loading on the native ground. Differential settlement between similarly loaded, adjacent footings are also estimated to be less than 0.5 inches provided they are founded on similar materials (e.g., all on engineered fill, native soil, or rock).

8.5 Seismic Design Parameters

An Optim Software and Data Solutions representative performed interpretations of the data collected at each ReMi survey line using the most current SeisOpt ReMi software. The average shear wave velocity is presented by the 1-dimensional shear wave velocity profiles located in the Appendix. These plots depict variations in shear wave velocity profiles to a depth of 100 feet. The average shear wave velocity for the upper 100 feet of the soil profile (V_s100') is used to determine the Site Class Definitions as defined by Table 3.10.3.1-1 of AASHTO LRFD Bridge Design Specifications. The average shear wave velocity for the south shoulder of eastbound I-80 is 1798 feet per second (ft/s) and for the north shoulder of eastbound I-80 is 1680 (ft/s). The average shear wave velocity for the south shoulder of westbound I-80 is 2159 feet per second (ft/s) and for the north shoulder of westbound I-80 is 2159 feet per second (ft/s) and for the north shoulder of westbound I-80 is 2123 (ft/s). These values, in conjunction with our field exploration, indicate the area is Site Class C (Soil Rock). Based on the NDOT Bridge Manual for Elko County, the Peak Ground Acceleration is 0.15g with a Short-Period Acceleration Coefficient (S_s) of 0.40 and a Long-Period Spectral Acceleration Coefficient (S_d) of 0.15.

9.0 REFERENCES

Geology of Elko County, Nevada, Bulletin 101; Nevada Bureau of Mines, and Geology, Robert R. Coats, 1987.

Quaternary Faults in Nevada, Nevada Bureau of Mines and Geology, Craig M. De Polo, 2008

AASHTO LRFD Bridge Design Specifications, 5th Edition, 2010.

<u>Standard Specifications for Road and Bridge Construction</u>, State of Nevada Department of Transportation, 2014.

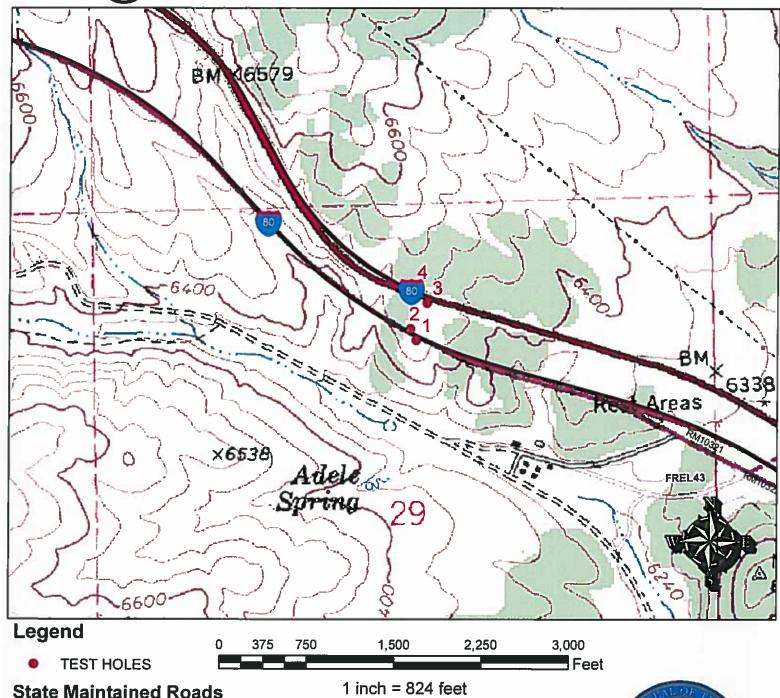
Appendix A

Location Maps

Exploration Log Key

Exploration Log Sheets

I-80 @ PEQUOP - ANIMAL CROSSING



State Maintained Roads

SYSTEM

IR - Interstate

SR - State Route

US - US Route

Image

RGB

Red: Band_1

Green: Band_2

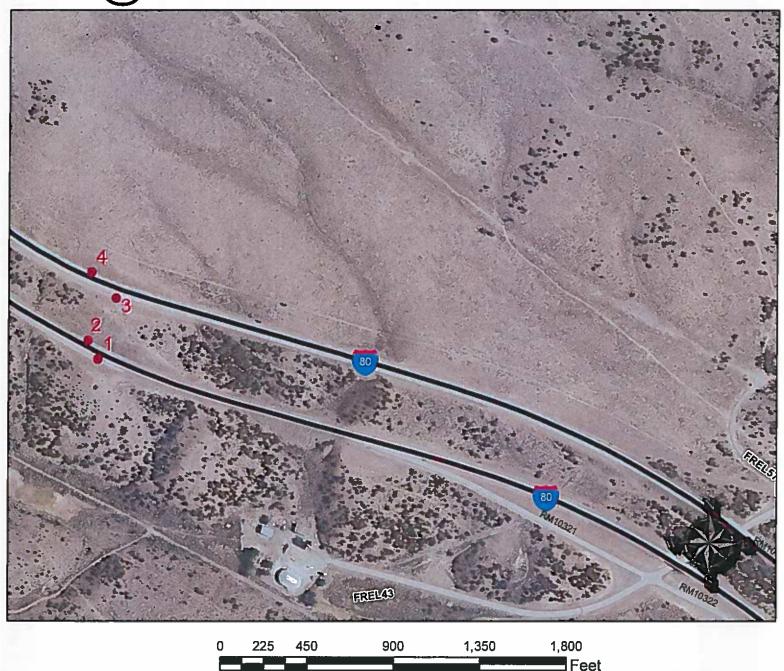
Blue: Band_3



THIS MAP IS FOR DISPLAY PURPOSES ONLY. MAP COMPILED WITH DATA FROM THE TRIMBLE GEO XT HANDHELD GPS UNIT. THET DATA IS NOT SURVEY GRADE. **NOT ALL FEATURES PORTRAYED DUE TO** SCALE.



I-80 @ PEQUOP - ANIMAL CROSSING



1 inch = 500 feet

Legend

TEST HOLES

State Maintained Roads SYSTEM

SISIEWI

----- !R - Interstate

SR - State Route

US - US Route

THIS MAP IS FOR DISPLAY PURPOSES ONLY.
MAP COMPILED WITH DATA FROM THE
TRIMBLE GEO XT HANDHELD GPS UNIT.
THET DATA IS NOT SURVEY GRADE.
NOT ALL FEATURES PORTRAYED DUE TO
SCALE.





KEY TO EXPLORATION LOGS

	PARTICLE SIZE LIMITS								
CLAY	SILT		SAND		GR	AVEL	COBBLES	BOULDERS	
		FINE	MEDIUM	COARSE	FINE	COARSE			
.002	2 mm #:	200 #	40 #1	LO #	4 % i	nch 3 i	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 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
СН	Inorganic clays of high plasticity, fat clays
OH	Organic clays of medium to high plasticity
PT	Peat and other highly organic soils

MOISTURE CONDITION CRITERIA

SOIL CEMENTATION CRITERIA

			
Description	<u>Criteria</u>	<u>Description</u>	<u>Criteria</u>
Dry	Absence of moisture, dusty,	Weak	Crumbles or breaks with handling or little
	dry to touch.		finger pressure.
Moist	Damp, no visible free water.	Moderate	Crumbles or breaks with considerable
Wet	Visible free water, usually below		finger pressure.
	groundwater table.	Strong	Won't break or crumble w/finger pressure
∇	Groundwater Elevation Symbols		

	STANDARD PENETRATION	CLASSIFIC	ATION'
	GRANULAR SOIL	C	LAYEY 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
	tration Test (N) 140 lb hammer l on 2 inch O.D. z 1.4 inch I.D. sampler.	31 - 60 OVER 60	HARD VERY HARD

Field Blow counts on California Modified Sampler (Ncms) can be converted to Nept field by:

(NCMS field)(0.62) = NSPT field

Hammer can be converted to Standard SPT N60 by: Rig #1627: (NSPT field)(1.2) =N60 Rig #1082: (NSPT field)[1.45] =N60

Blow counts from Automatic

TEST ABBREVIATIONS

PERMEABILITY

CD CONSOLIDATED DRAINED OC ORGANIC CONTENT CH CHEMICAL (CORROSIVENESS) CONSOLIDATION PI PLASTICITY INDEX CM COMPACTION CU CONSOLIDATED UNDRAINED RQD ROCK QUALITY DESIGNATION DISPERSIVE SOILS RV R-VALUE DS DIRECT SHEAR **SIEVE ANALYSIS** 8 E **EXPANSIVE SOIL** SL SHRINKAGE LIMIT SPECIFIC GRAVITY **UNCONFINED COMPRESSION** G U UU UNCONSOLIDATED UNDRAINED Ħ HYDROMETER HC HYDRO-COLLAPSE UW UNIT WEIGHT

MOISTURE CONTENT

SOIL COLOR DESIGNATIONS ARE FROM THE MUNSELL SOIL/ROCK COLOR

1- I.D.= 2.421 inch

TP

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

SPT STANDARD PENETRATION TEST

3- NXB I.D.= 1.875 inch

SAMPLER NOTATION

CMS CALIF. MODIFIED SAMPLER

CPT CONE PENETRATION TEST

CS CONTINUOUS SAMPLER²

PB PITCHER BARREL

RC ROCK CORE3

SH SHELBY TUBE

TEST PIT

4- I.D.= 2.875 inch

CHARTS.

EXAMPLE: [7.5 YR 5/3] BROWN Revised August 2010

NEVADA	START DATE	11/4/14	EXPLO	RATIO	N LOG			Sł
DEPARTMENT OF TRANSPORTATION	END DATE	11/4/14				STATION	OE 107	7+33
IRANSPORTATION	JOB DEŞÇRIPT	ION Pequop Animal Overc	rossing Su	ımmit		OFFSET	30 R	
	LOCATION	I-80 Elko County				ENGINEER	Callagi	han
	BORING	PQ1				EQUIPMENT	Dietrich	n D-120
	E.A.#	73606-1	GROUN	IDWATER	LEVEL	OPERATOR	Altamir	апо
	GROUND ELEV	0400 00 (8)	DATE E	DEPTH ft	ELEV. ft	DRILLING METHOD	auger	
GEOTECHNICAL ENGINEERING	HAMMER DROP		11/4/14	8.50	6412.4	BACKFILLED	Yes	_ DATE _
L CANG	NET BLOWCOLL	17						

SHEET 1 OF 1

GEOTECI ENGINI	GROUND ELEV_0420.90 (II) HAMMER DROP SYSTEM_safety							[11/4/14 8.50 6412.4 METHOD auger BACKFILLED Yes DA	TE 11/5/14
ELEV.	DEPTH (ft)	SA NO.	MPLE TYPE	BLOW 0 6 Inch Increment	Last	Percent Percent	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
, wy	-				1,1001.	NELUY U		SM		10' off EOP 100lb downpressure drilling not han despite inability to sample effectively with spt
6415.9 -	5.90			refusal				ML	4.50 5.00 moist orangy brown silt	
	-			refusal				SM	, , , , , , , , , , , , , , , , , , , ,	bulk samples taken every fiv feet
	7.33	B	SPI	renusal	refusal	50		J		
Ž	<u>7</u> 9.00								9.00	
6410.9		C	SPI	relusal	retusal	67			wet brown clayey sand	
0410.5										
	11.33	D	SPT	refusal	refusal	133				
	13.99	_						SC		
			SPI	-refusal-	retusal	0-			-	
6405.9	15,00	_							15.17	
0405.5			SPI	refusal-	rerusal	•			19.17	
	_					!			İ	
	_									
	.									
6400.9	-20									
	.									
	.									
	_									
6395.9	-25									
	.								į	
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	.									
	.									
					,					

DEPARTMENT OF TRANSPORTATION

START DATE

11/4/14

11/4/14

JOB DESCRIPTION Pequop Animal Overcrossing Summit

I-80 Elko County LOCATION

PQ2 **BORING**

E.A. #

END DATE

73606-1

6418.30 (ft)

EXPLORATION LOG

GROUNDWATER LEVEL

DATE | DEPTH ft | ELEV. ft |

STATION

OE 106+43

OFFSET

28 L Callaghan

ENGINEER EQUIPMENT

Dietrich D-120 Altamirano

SHEET 1 OF 2

OPERATOR DRILLING METHOD

ELEV.	DEPTH		MPLE	BLOW 0	OUNT	Percent	LAB TESTS	USCS	MATERIAL DESCRIPTION	REMARKS
(ft)	(ft)	NO	TYPE	6 inch Increment	s 1 foot	Recov'd		Group	dry grey silty gravelly sand	appears to be grinding soft bedrock not hard drilling
6413.3 -	5 5.00 5 5.29			refusal				SM		
6408.3 -	9.00 9.33	C	SPT	refusal refusal	refusal	50				
6403.3	13.00 13.92 15.00 15.67		SPT	31 refusal 48 refusal	refusal refusal	73		GP GM	dry grey silty sandy gravel	
6398.3	- - 20.00		SPT	21 30 38	68	116		SC SM	moist orangy brown silty clayey sand	
5393.3	25.00 255.33	Н	SPT	refusal	refusal	300			25.33	

NEVADA	START DATE	11/5/14		EXPLORATION LOG		SHEET 1 OF
DEPARTMENT OF TRANSPORTATION	END DATE JOB DESCRIPT LOCATION	11/5/14 IONPequop Animal Ove I-80 Elko County	ercro	ossing Summit	STATION OFFSET ENGINEER	OW 110+48 36 R Callaghan
GEOTECHNICAL ENGINEERING	BORING E.A. # GROUND ELEV. HAMMER DROF	PQ3 73606-1 6452.50 (ft) system_safety	<u> </u>	GROUNDWATER LEVEL DATE DEPTH ft ELEV. ft dry 0.0	EQUIPMENT OPERATOR DRILLING METHOD BACKFILLED	Dietrich D-120 Altamirano auger Yes DATE 11/5/14
ELEV. DEPTH SAMF	VDE 6 inch L	NT Percent LAB TESTS G	ISCS Froup	MATERIAL D	ESCRIPTION	REMARKS

GROUND ELEV 6452.50 (ft) GEOTECHNICAL HAMMER DROP SYSTEM Safety								dry 0.0 BACKFILLED Yes DATE 11/5/14	
ELEV. (ft)	DEPTH (ft)		MPLE TYPE		Last	Percent Recovid	LAB TESTS	USCS Group	MATERIAL DESCRIPTION REMARKS
	- 5.00							SC SM	dry orange and gray silty clayey sand not hard drilli bulk samples every five fee
6447.5 -	5 5.42	Α	SPT	refusal	refusal	80			
	7.00	_B_	SPT	refusal-	refusal	100			
	-							CL	
	9.00	$\overline{}$	SPT	19	refusal	100		-	
6442.5	-10			<u>refusal</u>					moist orangy brown silty clayey sand
	11.00 11.42	D	SPT	refusal	refusal	100		SC	
	- 13.00							SM	
		E	SPT	11 43	refusal	106			14.00
6437.5	14.33 15.00	_		_refusal_ _refusal_					dry gray silty clayey sand
		F	SPI	_reiusai_	renusal	50			
ļ	17.00	-e-	8PT	-refusal-	refusal	-0-			
6432.5	- <u>19.09</u> 20	-H-	SPT	-refusal-	refusul	0		SC SM	
0432.5	31.99		CDT	=refusal=	rofilesi				
				1010001	010001				
-	23.00	J	SPT	refusal	refusal	*			
6427.5	25.00	к	SPT	refusal	refusal	_ 0- -			25.08
-	,								
+									
-						-			

NEVADA	START DATE	11/5/14	EXPLORATION LO	OG
DEPARTMENT OF TRANSPORTATION	END DATE JOB DESCRIPTI LOCATION	11/5/14 ON Pequop Animal Overcr I-80 Elko County	ossing Summit	STATION OFFSET ENGINEER
	BORING	PQ4		EQUIPMENT
	E.A. #	73606-1	GROUNDWATER LEVE	EL OPERATOR
	GROUND ELEV.	6464.20 (ft)	DATE DEPTH ft ELE	—— METHOD
GEOTECHNICAL ENGINEERING SAMPI	HAMMER DROP			BACKFILLED

OKATION LOG		SHEET 1 OF 1				
ummit	STATION OFFSET	OW 108+76 48 L				
	ENGINEER	Callaghan				
	EQUIPMENT	Dietrich D-120				
NDWATER LEVEL	OPERATOR	Altamirano				
DEPTH ft ELEV. ft	DRILLING METHOD	auger				
12.00 6452.2	BACKFILLED	Yes DATE 11/5/14				
·						

ELEV.	DEPTH (ft)		MPLE TYPE	BLOW Control of the BLOW C	Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
(.,)	-			IIM GINGILIA					dry gray orange silty clayey sand	not hard drillin bulk samples taken every fiv feet
	-							SC SM		
6459.2 -	5.00									
	5.67	Α	SPT	42 refusal	refusal	150				
	7.00		007			440			7.00	
	7.42	В	SPT	refusal	refusal	140			dry flaky gray silty clayey sand with gravel	
	9.00	_	255				<u> </u>	SC		
6454.2 -	9.50 — 10	C	SPT	refusal	retusali	50		SM		
	11.00	П	CDT	refusal	refueal	50			11.00	
Ź				_ne(usai_				SC SM	wet orangy brown silty clayey sand with gravel	
	13.99	E	SPT	refusal	refusal	-0			13.00	
	-			, , , , ,					wet black silty clayey sand	
6449.2	_1:15:99	F	SPT	=refusai=	refusat	=0=				
	-									
	17.99	G	SPT	refusai	refusal	0				
	-		İ							
	19.08	=H=	SPT	-refusul-	refusel	-0-		SC SM		
6444.2	-20									
	-									
	22.00 22.25		SPI	_refusa!	retusal	133				
	-									
	-									
6439.2	246.00	J	SPT	refosal	refusel	-0-	=		25.08	
	.									
	-									
	.									
}	-									

Appendix B

Laboratory Test Data Summary of Results Particle Size Distribution Reports

Date Reported:	12/5/14		1311	- O11111				
Lab No.:		- RV-192-14						
	-	V-192-14	Ioh F	Description:	PEOLIOP AN	IMAL CROSSING	: I_80	
E.A.:	73606	_	100 F	escription:	regoor An	IMAL CROSSING	1-00	
Date Rec'd	11/10/14	- IDANIO		C4-4:	OE~107+33		Route I-80	
Samplers:	ALTAMI	RANO,		Station		Т.		
RIGSBY, DRAG				Location fro		Lt	Rt. <u>35'</u>	
Sample No.:	PQ1-A			County:	ELKO	- 64 - 853		1000
Sample Type	5 ·		50.5	0.1	Depth (ft)	Boring Description	0	PSI
RV ■	Sub [·	DC 🗆	Other □	-	· · ·		
Vegetation:	None =	Trees 🗆	Shrubs 🗆		2		2	
	Brushy L	Grassy 🗆			- 4	Auger Cu	_	
Cut Section	_				6		6	
Taken Through Oil		Taken on Shoul	der 🗅		8		8	
Gravel Depth (in)		Oil Depth (in)		_	10		10	
Remarks:					_ 12		12	
<u> </u>					- 14		14	
_= 0					_ 16		16	
Submitted By:					18		18	
Title:					_ 20		20	
Jac.		1						
	Sieve Size	% Passing			Liquid Limit	20		
**	3"				Plastic Index	6		
	2"				Specific Gravity			
	1.5"				Resistance Value			
	1"	100			Cover	Stabilometer	Expansion Pressu	re
	3/4"	95			Thickness			
	1/2"	84						
1	3/8"	78			Sand	Equivalent _		
24	No. 4	63			Natur	al Moisture, %		
	No. 10	48			Resist	tivity _		
	No. 16	41			pH Fa	ector _		
	No. 40	32			AASI	TO Classification	A-1-b	
	No. 50	30						
	No. 100	27						
VIII	No. 200	24						
	30							
Remarks:								
				- (23) - (24)		35.90		

Lab No.: E.A.:	S14-06, R 73606	KY-1/3-14	I_L f	Description:	- DEOLIOD A	NIMAL CDOSSIN	CIO
Date Rec'd	11/10/14	-	JOD L	bescription:	requor A	NIMAL CROSSIN	G 1-80
Samplers:	ALTAMI	_ IDANO		Station	OE~107+33		Route I-80
RIGSBY, DRAG		ikano,		Location from		Lt.	Rt. 35'
Sample No.:	PQ1-B			County:	ELKO	Ll	- Kt. <u>33</u>
Sample Type	1015			County.	Depth (ft)	Boring Description	
RV ■	Sub □	☐ Chem ☐	DC 🗆	Other [boring bescription	0
Vegetation:			ubs 🗆	Other -	2		2
1 05014110111		Grassy 🗆			4		4
Cut Section	21113119	Fill Section		**	- 6		6
l'aken Through Oi		Taken on Shoulder			8	Auger C	- 1
Gravel Depth (in)		Oil Depth (in)			10		10
Remarks:				-	12		12
		_			14		14
		-			16		16
Submitted By:					18		18
Title:					20		20
				· · ·	- '		'
							
	Sieve Size	% Passing			Liquid Limit	20	
	3"				Plastic Index	6	-
	2"				Specific Gravi	ty	•
	1.5"				Resistance Va	ue 53	-
	1"				Cover	Stabilometer	Expansion Press
	3/4"	100			Thickne	SS	
	1/2"	96					
	3/8"	91			San	d Equivalent	
	No. 4	76			Nat	ural Moisture, %	
	No. 10	57			Res	istivity	
	No. 16	47			pН	Factor	
	No. 40	35			AA	SHTO Classification	A-2-4(0)
	No. 50	32					
	No. 100	28					
	No. 200	26					
demarks:							
Comains.							
Comarks.							

NDOT 027, Rev. 05-01

Date Reported:	12/5/14	•							
Lab No.:	S14-06, R	V-194-14							
E.A.:	73606	•	Job Description	on: PEQUO	OP ANIM	AL CROSSING	G 1-80		
Date Rec'd	11/10/14	-							
Samplers:	ALTAMI	RANO,	Station	OE~107	7+33		Route	I-80	
RIGSBY, DRAC		-	Locatio	on from CL (ft)	L	t	Rt.	35'	
Sample No.:	PQ1-C		County	: ELKO					
Sample Type				Depth (fl)		Boring Description			P
RV ■	Sub □	Chem □	DC D Oth	<u>ier □</u> 0-	· -			0	
Vegetation:	None	Trees Shr	ubs 🗆	2-	-			2	
	Brushy 🗆	Grassy		4-	· -			4	
Cut Section		Fill Section		6-	-			6	
Faken Through Oil	□	Taken on Shoulder		8-	-			8	
Gravel Depth (in)		Oil Depth (in)		10-	-			10	
Remarks:		·		12-	-	Auger Cu	ttings	12	
S _m ,				14-	-			14	
STATE OF THE STATE				16-	-			16	
Submitted By:				18-	-			18	
Title:				20-	-[20	
·							<u></u>	<u></u>	
	Sieve Size	% Passing		Liquid Li		20			
	3"			Plastic In		6			
	2"			Specific (=				
	1.5"			Resistanc	e Value	66			
	1"			Cover		Stabilometer	Expa	ansion Pres	sure
	3/4"	100		Thi	ckness		-		
	1/2"	98							
37-1	3/8"	93			Sand Equ	•			
	No. 4	78				Aoisture, %			
	No. 10	57			Resistivit	-			
L .	No. 16	46			pH Facto	-			
	No. 40	33			AASHTO	O Classification _	A-1-b		
	No. 50	30							
	No. 100	27							
	No. 200	25							
kemarks:									
_									_

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

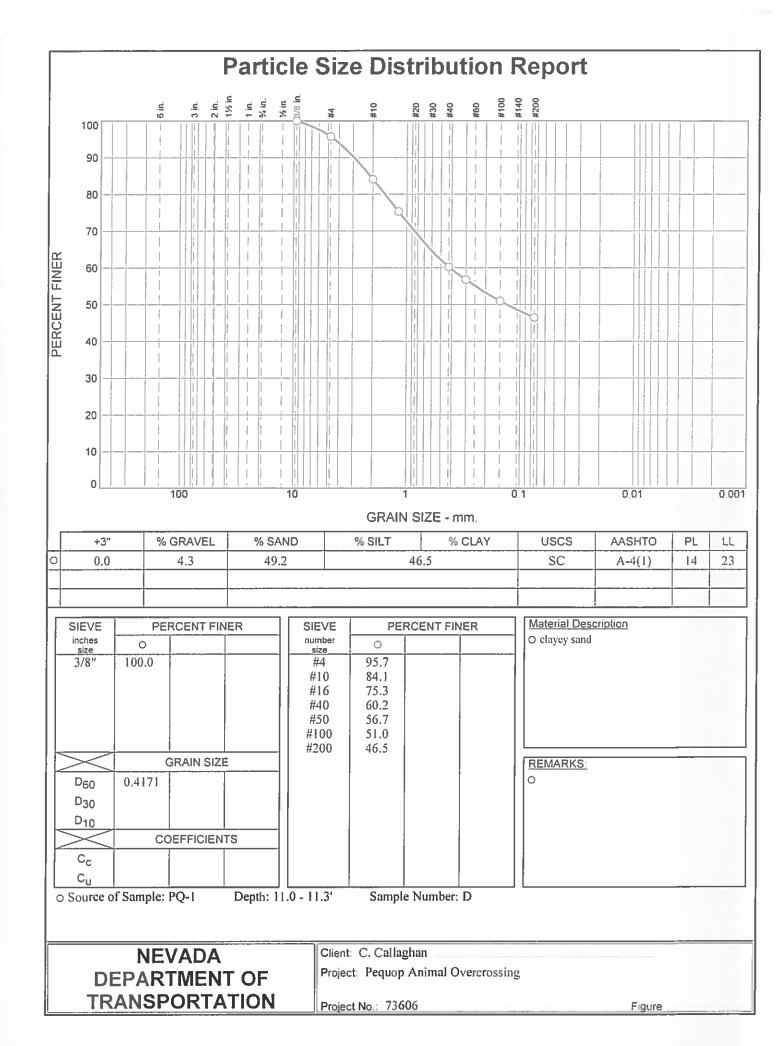
73606 EA/Cont#

Job Description Pequop Animal Overcrossing

PQ-1 Boring No.

Boring No.	o. PQ-1				Elevation (ft)		6420.9				Staf	Station "OE" 107+33, 30' Rt.	07+33, 30'	퐚	Date	1/12/2015	
SAMPLE	SAMPLE DEPTH (ft)	SAMP- LER TYPE	BLOWS per ft.	SOIL	%M	DRY UW pcf	% PASS #200	% "	김 %	PI %	TEST 4	STRENGTH TEST		eg. psi		COMMENTS	
۵	11.0 - 11.3	SPT		sc	11.5		46.5	23	41	o o							T
													i				
													1				Π
																	Τ
	i																
	i															:	Π
																	1
																	Π
												 					ļ
											\vdash						
CMS = Califon	CMS = California Modified Sampler 2.42" ID	Q	U = Unconfin	U = Unconfined Compressive	VG		-	H = Hydrometer	neter		CM =	CM = Compaction			:		Ī
SPT = Standa	SPT = Standard Penetration 1,38" 1D		UU = Unconst	UU = Unconsolidated Undrained	ined			S = Sieve			Ш ≅	E = Swell/Pressure on Expansive Soils	Expansive So	ils			
RC = Rock Core	read Semple S.E.S. are		CU = Consolio	CU = Consolidated District CU = Consolidated Undrained	X		**	G = Specific Gravity Di = Diselicity Index	ic Gravity		= TS	SL = Shrinkage Limit					
PB = Pitcher Barrel	Запе		DS = Direct Shear	hear	3		_	LL = Liquid Limit	Limit		2 3	VV = Mosture Content					
CSS = Calif. S	CSS = Calif. Split Spoon 2.42" ID		Φ = Friction					PL = Plastic Limit	Limit		Κ¤P	K = Permeability					
CPT = Cone F	CPT = Cone Penetration Test		C = Cohesion				~	NP = Non-Plastic	Plastic.		0 = 0	O = Organic Content					
TP = Test Pil	1		N = No. of blo	N = No. of blows per ft., sampler	npler		_	OC = Consolidation	olidation		0 = 0	D = Dispersive					
P = Pushed, not driven	ot driven						-	Ch = Chemical	ical		ROD	ROD = Rock Quality Designation	esignation				
R = Refusal			N = Field SPT		$N = (N_{cre})(0.62)$	62)		RV = R - Value	alue		×	X = X-Ray Defraction					
Sn = Sne by Tube Z B/- ID	ube Z B/ I ID						_	MD = Moisture Density	ure Densit	≱:	HCpo	HCpot = Hydro-Collapse Potential	se Potential				

* = Average of subsamples



Lab No.: E.A.:	S14-06, F		lob [Description:	PEQUOP AN	IMAL	CDOSSING	1.90	
Date Rec'd	11/10/14	-	300 L	bescription.	TEQUOI AII	HAIME	CROSSING	1-00	
	ALTAM	LD A NO		Station	OE~106+43			Douts 190	
Samplers: RIGSBY, DRAG		ikano,		Location fro		Lt.	28'	Route 1-80	
Sample No.:	PQ2-A			County:	ELKO	LI		Rt	
	T QZ-A			County.		Davis	Description		P
Sample Type RV	Sub 🗆	☐ Chem □	DC 🗆	Other 🗆	Depth (ft)	Domi	Description		<u> </u>
Vegetation:	None =		rubs 🗆	Other =	2			-	2
egetation.		Grassy 🗆	1003 —		4		Auger Cut		1
Cut Section	Diasily —	Fill Section			- 6		rager car		5
Taken Through Oi		Taken on Shoulder			8				3
Gravel Depth (in)	. –	Oil Depth (in)			10			10	- 1
Remarks:				-	12			12	- 1
			· · · · ·		14			14	
					16			16	
Submitted By:					18			18	
Title:					20			20	
					· '				'
	Sieve Size	% Passing			Liquid Limit		18		
	3"				Plastic Index		5		
	2"				Specific Gravity				
	1.5"				Resistance Value	•	6		
	1"				Cover	S	tabilometer	Expansion P	ressure
	3/4"	100			Thickness				
	1/2"	93							
	3/8"	85			Sand	Equivale	ent		
	No. 4	69			Natur	al Moist	ure, %		
	No. 10	50			Resist	tivity			
	No. 16	41			pH Fa	ctor	_		
	No. 40	29			AASH	TO Cla	ssification	A-1-b	
	No. 50	27							
	No. 100	23							
	No. 200	21							
Remarks:									

Date Reported:	12/5/14	_								
Lab No.:	S14-06, R	V-196-14			_					
E.A.:	73606	_	Job D	Description:	PEQUOP	ANIM	AL CROSSIN	IG I-80		
Date Rec'd	11/10/14									
Samplers:	ALTAMI	RANO,		Station	OE~106+	43		_ Route		
RIGSBY, DRAC	300			Location fro	om CL (ft)	L	t28†	Rt.		
Sample No.:	PQ2-B			County:	ELKO					
Sample Type					Depth (ft)		Boring Description		PSI	i
RV 🔳	Sub □	l Chem □	DC 🗆	Other 🗆	0				0	
Vegetation:	None =	Trees	Shrubs 🗆		2				2	
	Brushy \square	Grassy			_ 4[4	
Cut Section		Fill Section]		6				6	
Taken Through Oil		Taken on Should	er 🗆		8		Auger (Cuttings	8	
Gravel Depth (in)		Oil Depth (in)		_	10					
Remarks:					_ 12				12	
War and a second					_ 14				14	
1-5					_ 16				16	
Submitted By:					_ 18				18	
Title:					20				20	
										_
		1 30								
4	Sieve Size	% Passing			Liquid Limi		18	_		
·	3"				Plastic Inde		6	_		
	2"				Specific Gra	-		_		
80	1.5"				Resistance '	Value	6	_		
	1"				Cover		Stabilometer	Expa	ansion Pressure	
	3/4"	100			Thick	iness				
	1/2"	95								
	3/8"	90				Sand Equ				
or the second	No. 4	77					loisture, %			
	No. 10	56				Resistivit	*			
M.F	No. 16	47			•	H Facto				
	No. 40	35			F	AASHTO	O Classification	A-2-4(0)		
Marina .	No. 50	33								
II.,	No. 100	29								
	No. 200	26								
Remarks:	· -									_
										—
3										_
									2	-

Date Reported: Lab No.:	12/5/14 S14-06, R	V-197-14	t-b D	Description:	- PEOUO	D A NIIA	4 A I - <i>A</i>	CROSSING	C 1 90		
E.A.: Date Rec'd	73606 11/10/14	-	JOD L	escription:	reguoi	r Amin	IAL	CKOSSIN	J 1-00		
Samplers:	ALTAMI	RANO.		Station	OE~106-	+43			Route	1-80	
RIGSBY, DRAG				Location fro	4		⊥t.	28'	-		
Sample No.:	PQ2-C			County:	ELKO				-		
Sample Type:				·	Depth (ft)		Boring	Description			PSI
RV ■	Sub □	Chem □	DC 🗆	Other \Box	0					0	
Vegetation:	None	Trees 🗆	Shrubs 🗆		2					2	
	Brushy 🗆	Grassy 🗖			4					4	
Cut Section		Fill Section [6					6	
Taken Through Oil		Taken on Should	der 🗆		8					8	
Gravel Depth (in)		Oil Depth (in)			10					10-	
Remarks:					12					12	
9					14			Auger Ci	uttings	14	
340					16					16	
Submitted By:					18					18	
Title:					20					20	
W											
100	Sieve Size	% Passing			Liquid Lin		_	19			
	3"				Plastic Ind	ex		6			
1	2"				Specific G	_					
	1.5"				Resistance	Value	_	12			
	1"				Cover		St	tabilometer	Exţ	pansion Pres	sure
	3/4"	100			Thic	kness					
	1/2"	95									
	3/8"	90				Sand Eq	•				
	No. 4	74				Natural		ure, %			
	No. 10	59				Resistiv	-				
	No. 16	51				pH Facto					
	No. 40	41				AASHT	O Cla	ssification	A-2-4(0)		
	No. 50	39									
	No. 100	34									
	No. 200	31									
Remarks:											
										_	
	-	-									
				010111011	W X	- 0	3070				

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

EA/Cont#

Job Description Pequop Animal Overcrossing

73606

Boring No.

PQ-2

Elevation (ft) 6418.3

Station "OE" 106+43, 28' It.

Date

1/12/2015

Г			П	П	Т	Τ	Т	Т			T	Т	1	1				
	COMMENTS																	
17	သ <u>is</u>	nal																
ST	de de	Residual													ansive Soils			
STRENGTH TEST	o isi	×												lion	ssure on Exp	e Limit	ight	Content
STRE	de de	Peak												CM = Compaction	E = Swell/Pressure on Expansive Soils	SL = Shrinkage Limit	UW= Unit Weight	W = Moisture Content K = Permeability
	TEST TYPE													°	ш	S	- :	> ¥
	₫%	:	2	dN P	9											Į,		
	로 %	:	17	₽	13									отетег	ē	G = Specific Gravity	PI = Plasticity Index	stic Limit
	3%		19	15	19									H = Hydrometer	S = Sieve	G = Spe	PI = Plas	LL = Liquid Limit PL = Plastic Limit
%	PASS #200		5'2	7.5	37.3				ļ	ļ								
DRY	Dof Dof					ļ												
	%M		2.4	1.6	7.7									ve	ined		D ₀	
	SOIL		GP-GM	SW-SM	SC-SM									1 Compressi	idaled Undra	ited Drained	ited Undrain	100
z	BLOWS per ft.													U = Unconfined Compressive	UU = Unconsolidated Undrained	CD = Consolidated Drained	CU = Consolidated Undrained	Do = Direct on Φ = Friction
SAMP-	LER		SPT	SPT	SPT									Q				
SAMPLE	DEPTH (ft)		13.0 - 13.7	15.0 - 15.7	20.0 - 20.7									CMS = California Modified Sampter 2.42" ID	SPT = Standard Penetralion 1,38" ID	CS = Continuous Sample 3.23" ID	STR.	CSS = Calif. Split Spoon 2,42" ID
	SAMPLE NO.		ш	ш	Ŋ									CMS = Califora	SPT = Standar	CS = Continuo	PR = Pitcher Barrel	CSS = Calif. S

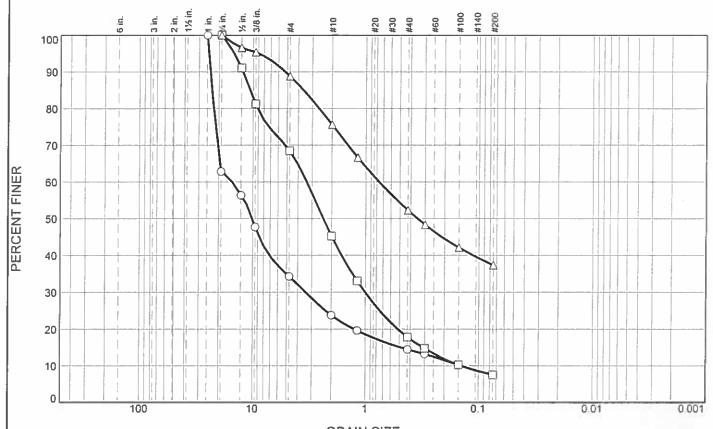
CMS = California Modified Sampler 2.42" ID	U = Unconfined Compressive	a
SPT = Standard Penetration 1,38" ID	UU = Unconsolidated Undrained	pau
CS = Continuous Sample 3.23" ID	CD = Consolidated Drained	
RC = Rock Core	CU ≈ Consolidated Undrained	מ
PB = Pitcher Barrel	DS = Direct Shear	
CSS = Calif. Split Spoon 2.42" ID	Φ = Friction	
CPT = Cone Penetration Test	C = Cohesion	
TP = Test Pit	N = No. of blows per ft., sampler	pler
P = Pushed, not driven		
R = Refusal	N = Field SPT N	N = N
Sh = Shelby Tube 2.87" ID		

S = Sieve	E = Swell/Pressure on Expansive So
G = Specific Gravity	SL = Shrinkage Limit
PI = Plasticity Index	UW= Unit Weight
LL = Liquid Limit	W = Moisture Content
PL = Plastic Limit	K = Permeability
NP = Non-Plastic	O = Organic Content
OC = Consolidation	D = Dispersive
Ch = Chemical	RQD = Rock Quality Designation
RV = R - Value	X = X-Ray Defraction
MD = Moisture Density	HCpol = Hydro-Collapse Potential

* = Average of subsamples

 $N = (N_{cos})(0.62)$





GRAIN	SIZE	-	mm.	
	_			

		+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
C	7	0.0	65.7	26.8	7	.5	GP-GM	A-1-a	17	19
	7	0.0	31.5	61.0	7.	7.5		A-1-a	NP	15
2	7	0.0	11.2	51.5	37		SC-SM	A-4(0)	13	19

3/4" 1/2" 3/8"	62.9 56.4 47.7	100.0 91.1 81.3	100.0 96.6 95.3
	(SRAIN SIZE	
D ₆₀	15.1551	3.3387	0.7647
D ₃₀	3.3850	1.0031	
D ₁₀	0.1417		
	CC	DEFFICIEN	TS
C _c	5.33	2.12	
Cu	106.92	23.44	

0

100.0

PERCENT FINER

SIEVE	PE	RCENT FIN	/ER
number size	0		Δ
#4 #10 #16 #40 #50 #100 #200	34.3 23.8 19.6 14.5 13.2 10.2 7.5	68.5 45.2 33.1 17.9 14.8 10.3 7.5	88.8 75.6 66.7 52.3 48.3 42.1 37.3

M	late	<u>erial</u>	De:	scrij	otio	n

- O poorly graded gravel with silt and sand
- □ well-graded sand with silt and gravel
- △ silty, clayey sand

REMARKS:

Δ

3/8"	47.7	81.3	95.3
>	(SRAIN SIZE	=
D ₆₀	15.1551	3.3387	0.7647
D ₃₀	3.3850	1.0031	
D ₁₀	0.1417	0.1425	
$\geq \leq$	CC	EFFICIEN	TS
Сс	5.33	2.12	·
C _c	106.92	23.44	

O Source of Sample: PQ-2 ☐ Source of Sample: PQ-2

△ Source of Sample: PQ-2

SIEVE

inches

size

Depth: 13.0 - 13.7' Depth: 15.0 - 15.7'

Depth: 20.0 - 20.7'

Sample Number: E Sample Number: F

Sample Number: G

NEVADA DEPARTMENT OF TRANSPORTATION Client: C. Callaghan

Project: Pequop Animal Overcrossing

Project No.: 73606

Figure

Date Reported: Lab No.: E.A.:	73606	- V-198-14 -	J dol	Description:	PEQUOP A	NIMAL CROSSING	G 1-80	
Date Rec'd Samplers:	11/10/14 ALTAMI	- DANO		Station	OW~110+48	Ω	Route 1-80	
RIGSBY, DRAG		KANO,	-	Location from		Lt.	Rt. 36'	
Sample No.:	PQ3-A		-	County:	ELKO	Lt	. Kt. <u>50</u>	_
Sample Type	- 2				Depth (ft)	Boring Description		PSI
RV ■	Sub □	l Chem □	DC 🗆	Other [0	
Vegetation:	None =	Trees	Shrubs		2		2-	-
	Brushy 🗆	Grassy 🗆			4	Auger Cı	uttings 4-	-
Cut Section		Fill Section			6		6-	-
Taken Through Oi		Taken on Shoul	der 🗖		8		8-	-
Gravel Depth (in)		Oil Depth (in)		_	10		10-	-
Remarks:					12		12	-
			· -		_ 14		14-	-
					16		16	-
Submitted By:					_ 18		18	-
Title:					_ 20		20	-
Remarks:	Sieve Size 3" 2" 1.5" 1" 3/4" 1/2" No. 4 No. 10 No. 16 No. 40 No. 50 No. 100 No. 200	100 98 95 82 62 54 44 42 38 34			Nat Res pH	lue 11 Stabilometer	Expansion Pre	essure
			12					

Date Reported:	12/5/14									
Lab No.:	S14-06, R	V-199-14			- PEOUG	TO A DITE.	ALL CROSCINI	C 1 00		
E.A.:	73606		Job L	Description:	PEQUO	PANII	IAL CROSSING	0 1-90		
Date Rec'd	11/10/14	Dano			OW 110				1.00	
Samplers:	ALTAMI	RANU,		Station	OW~110			Route		
RIGSBY, DRAG				Location fro		L		- Rt.	36'	
Sample No.:	PQ3-B			County:	ELKO					1263
Sample Type:	a		ъс П	0.1	Depth (ft)	1	Boring Description			PS1
RV ■	Sub 🗆		DC 🗆	Other 🗀	_				0	
egetation:			rubs 🗆		2				2	
0 1 C 11 =	Brushy 🗀	Grassy 🗆			_ 4				4	
Cut Section		Fill Section			6		A		6	
Taken Through Oil		Taken on Shoulde			8	1	Auger C	uttings	8	
Gravel Depth (in)		Oil Depth (in)		-	10				10	
Remarks:					- 12				12	
2) [- 14				14	
Out with J Day					- 16				16	
Submitted By:					- 18				18	
Title:					_ 20	l			20	
389 File 55										
II Ç	Sieve Size	% Passing			Liquid Lin	nit	20			
	3"	70 1 d35111g			Plastic Inde		6			
	2"				Specific G					
No.	1.5"				Resistance		17			
	1"				Cover	value	Stabilometer	Eve	ansion Press	CITTO
	3/4"	100				kness	Stautionicter	Exp	anston ries:	surc
	1/2"	99			Tine	KIICSS				
	3/8"	96				Sand Fa	uivalent			
	No. 4	86					Moisture, %			
	No. 10	71				Resistivi				
	No. 16	61				pH Facto	-			
	No. 40	47				-	O Classification	A-2-4(0)		
	No. 50	44				MASHI	O Classification	71-2-4(0)		
·	No. 100	39								
elev .	No. 200	35								
	110.200									
Remarks:										
-										
		515		200		20.002				
1/2		-								

Date Reported:	12/5/14									
i ab No.:	S14-06, R	V-200-14			_					
£.A.:	73606		Job E	Description:	PEQUO	P ANIM	AL CROSSING	G 1-80		
Date Rec'd	11/10/14	•								
Samplers:	ALTAMI	RANO,		Station	OW~110	+48		Route I	-80	
RIGSBY, DRAG	200			Location fro	m CL (ft)	Lt	t.	Rt.	36'	
Sample No.:	PQ3-C			County:	ELKO					
Sample Type					Depth (ft)	1	Boring Description			PS1
RV 🔳	Sub 🗀	Chem □	DC 🗆	Other 🗆	0				0	
Vegetation:	None	Trees □ S	hrubs 🗆		2				2	
	Brushy 🗆	Grassy			4				4	
Cut Section		Fill Section			6				6	
Taken Through Oil		Taken on Shoulde	r 🗆		8				8	
Gravel Depth (in)		Oil Depth (in)		_	10				10	
Remarks:					12		Auger Cu	uttings	12	
1000					14				14	
202		<u></u>			16				16	
Submitted By:					18				18	
Title:					20				20	
P. C.										
	Sieve Size	% Passing			Liquid Lim	nit	22			
	3"				Plastic Inde	ex	8			
	2"				Specific Gr	ravity				
	1.5"				Resistance	Value	22			
	1"				Cover		Stabilometer	Expar	nsion Press	sure
	3/4"	100			Thiel	kness				
	1/2"	99								
	3/8"	97				Sand Equ	iivalent			
	No. 4	85				Natural M	loisture, %			
	No. 10	68				Resistivit	у			
	No. 16	61			1	pH Factor	r			
50 sm	No. 40	52				AASHTC	Classification	A-4(0)		
201	No. 50	50								
	No. 100	47								
	No. 200	44								
Remarks:										
D										

NDOT 027, Rev. 05-01

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

EA/Cont#

Job Description Pequop Animal Overcrossing

73606

Boring No.

PQ-3

6452.5 Elevation (ft)

Station "OW" 110+48, 36' Rt.

Date

1/12/2015

	_												 -
8)		COMMENTS									:		
		ပ	psi	lual									
χĒ	ST	0	deg.	Residual									
	STRENGTH TEST	ပ	psi	¥									ction
	STRE	0	deg.	Peak									CM = Compaction
		TEST	TYPE _										٥
		颪	%		9	=	4	9					
		٦	%		15	14	14	15					rometer
		=======================================	%		21	25	18	21					H = Hydrometer
	%	PASS	#200		27.0	53.9	30.4	44.9	}		ı		
	DRY	NO.	bcį										
		%M			4.7	8.8	4.7	10.6					. 9,
		SOIL	GROUP		SC-SM	CL	SC-SM	SC-SM					d Compressi
			per ft.		:								U = Unconfined Compressive
	SAMP-	LER	YPE		SPT	SPT	SPT	SPT					QI .
	SAMPLE	DEPTH	(E)		5.0 - 5.3	6'6 - 0'6	11.0 - 11.4	13.0 - 14.4					CMS = California Modified Sampler 2.42" ID
		SAMPLE	S S		4	C	O	Е					CMS = Califon

SPT = Standard Penetration 1.38* ID CS = Continuous Sample 3.23" ID

UU = Unconsolidated Undrained

CU = Consolidated Undrained CD = Consolidated Drained

DS = Direct Shear

C = Cohesion

Φ = Friction

RC = Rock Core

CSS = Calif. Split Spoon 2.42" ID PB = Pitcher Barrel

CPT = Cone Penetration Test TP = Test Pil

Sh = Shelby Tube 2.87" ID

P = Pushed, not driven

R = Refusal

 $N = (N_{24})(0.62)$ N = No of blows per fl., sampler N = Field SPT

G = Specific Gravity PI = Plasticily Index OC ≈ Consolidation NP = Non-Plastic PL = Plastic Limit LL = Liquid Limit

W = Moisture Content

O = Organic Content

K = Permeability

E = Swell/Pressure on Expansive Soils

SL = Shrinkage Limit

UW= Unit Weight

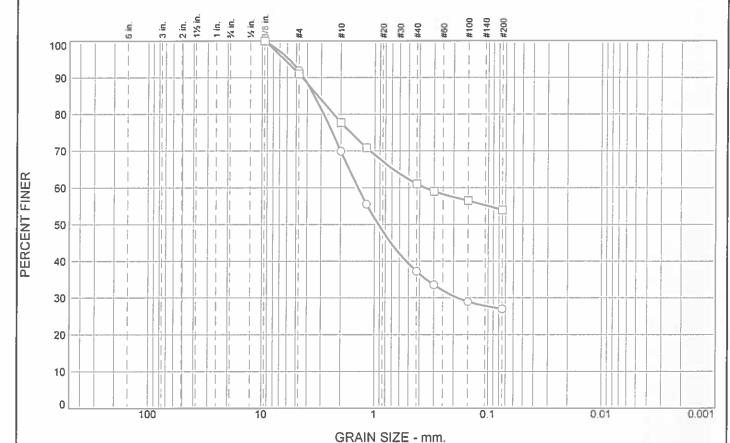
D = Dispersive Ch = Chemical RV = R - Value MD = Moisture Density

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	1 0.0	8.1	64.9	27.0		SC-SM	A-2-4(0)	15	21
	1	9.0	37.1	53	i i i	CL	A-6(3)	14	25
Γ									

SIEVE	PEI	IER					
inches size	0	0					
3/8"	100.0	100.0					
	1						
		GRAIN SIZE					
D ₆₀	1.4031	0.3611					
D ₃₀	0.1847						
D ₁₀							
	COEFFICIENTS						
C _c							
C _c							
- C	C.C Last 1	DO 3	Daniel Z				

SIEVE	PERCENT FINER							
number size	0							
#4	91.9	91.0						
#10	69.9	77.7						
#16	55.6	70.9						
#40	37.3	61.0						
#50	33.6	59.0						
#100	29.0	56.5						
#200	27.0	53.9						
l								
5 31	0 1 3	Terres la mese. A						

□ sandy lean clay	
REMARKS:	

Material Description
O silty, clayey sand

○ Source of Sample: PQ-3□ Source of Sample: PQ-3

Depth: 5.0 - 5.3' Depth: 9.0 - 9.9' Sample Number: A Sample Number: C

NEVADA

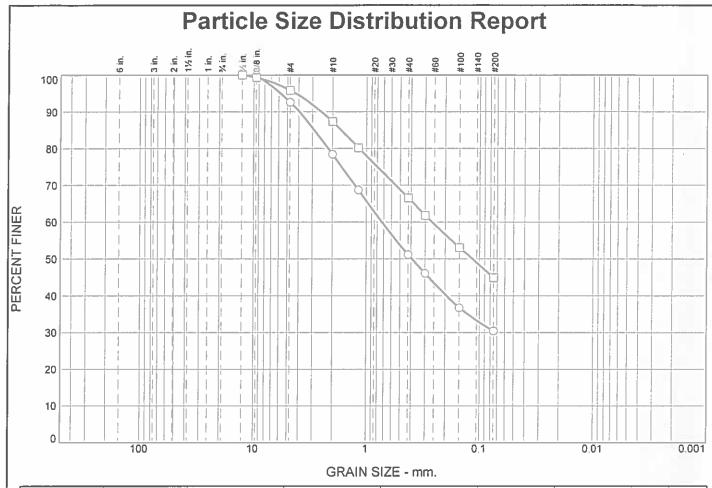
DEPARTMENT OF TRANSPORTATION

Client: C. Callaghan

Project: Pequop Animal Overcrossing

Project No.: 73606

Figure



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	7.4	62.2	30	.4	SC-SM	A-2-4(0)	14	18
	0.0	4.2	50.9	44	.9	SC-SM	A-4(0)	15	21

SIEVE	PE	RCENT FIN	NER							
inches size	0									
1/2"		100.0								
3/8"	100.0	99.3								
		_								
		SRAIN SIZE	=							
D ₆₀	0.7278	0.2620	=							
D ₆₀										
1										
D ₃₀	0.7278									
D ₃₀	0.7278	0.2620								
D ₃₀	0.7278	0.2620								

	SIEVE	PEI	PERCENT FIN					
	number size	0						
	#4	92.6	95.8					
	#10	78.4	87.3					
	#16	68.7	80.2					
	#40	51.2	66.6					
	#50	46.1	61.8					
	#100	36.8	53.1					
	#200	30.4	44.9					
			i					
	İ							
- 1								
ı		!						

REMARKS:
0

Material Description
O silty, clayey sand

☐ silty, clayey sand

○ Source of Sample: PQ-3□ Source of Sample: PQ-3

Depth: 11.0 - 11.4' Depth: 13.0 - 14.4' Sample Number: D Sample Number: E

NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: C. Callaghan

Project: Pequop Animal Overcrossing

Project No.: 73606

Figure

Date Reported:	12/5/14	_								
Lab No.:	S14-06, R	V-201-14			_					
E.A.:	73606		Job [Description:	PEQUOP	ANIMA	L CROSSING	G I-80		
Date Rec'd	11/10/14									
Samplers:	ALTAMI	RANO,		Station	OW~108+	76		Route 1	-80	
RIGSBY, DRAC	300			Location fro	om CL (ft)	Lt.	48'	Rt.		
Sample No.:	PQ4-A			County:	ELKO					
Sample Type:					Depth (ft)	Во	oring Description			PSI
RV 🗖	Sub □	l Chem □	DC □	Other □	0				0	
Vegetation:	None	Trees □ S	hrubs 🗆		2				2	
	Brushy 🗆	Grassy 🗖			4		Auger Ci	uttings	4	
Cut Section		Fill Section			6				6	
Taken Through Oil		Taken on Shoulde	r 🗆		8				8	
Gravel Depth (in)		Oil Depth (in)		_	10				10	
Remarks:					12				12	
- 18					_ 14				14	
					16				16	
Submitted By:					18				18	
Title:					20				20	
Bess to										
224										
	Sieve Size	% Passing			Liquid Limit	t .	23			
	3"				Plastic Index		10			
	2"				Specific Gra	vity				
	1.5"	_			Resistance V	/alue	18			
81	1"	100			Cover		Stabilometer	Expa	nsion Pressu	are
W R	3/4"	96			Thickr	ness		_		
elow.	1/2"	87								
10	3/8"	76			Sa	and Equiv	/alent			
	No. 4	63			N	iatural Mo	oisture, %			
	No. 10	51				esistivity				
	No. 16	46			=	H Factor				
	No. 40	38			A	ASHTO	Classification	A-2-4(0)		
oc .	No. 50_	36								
	No. 100	32								
	No. 200	29								
Remarks:										
42										
10										

NDOT 027, Rev. 05-01

Date Reported:	12/5/14	_								
Lab No.:	S14-06, R	V-202-14			_					
E.A.:	73606	_	Job I	Description:	PEQUOP A	ANIMA	L CROSSIN	G I-80		
Date Rec'd	11/10/14	_								
Samplers:	ALTAMI	RANO,	_	Station	OW~108+7	76		Route	I-80	
RIGSBY, DRAG	300			Location fro	om CL (ft)	Lt.	481	Rt.		
Sample No.:	PQ4-B			County:	ELKO					
Sample Type					Depth (ft)	В	oring Description			PSI
RV 🗖	Sub □	Chem 🗆	DC 🗆	Other 🗆	1 0				0	
Vegetation:	None	Trees	Shrubs \square		2				2	
_	Brushy 🗆	Grassy			4				4	
Cut Section		Fill Section			6				6	
Taken Through Oil	. 🗀	Taken on Shoul	der 🗆		8		Auger C	Cuttings	8	
Gravel Depth (in)		Oil Depth (in)		_	10	<u></u>			10	
Remarks:					12				12	
6					14				14	
T. W.					16				16	
Submitted By:	·				18				18	
Title:					20				20	
USA.	11/				·				ľ	
., 12										
	Sieve Size	% Passing			Liquid Limit		23			
	3"				Plastic Index	,	8	_		
	2"				Specific Grav	vity		_		
	1.5"				Resistance V		13	_		
	1"				Cover	•	Stabilometer	– Expa	insion Pressi	ure
	3/4"				Thickn	iess				
	1/2"					•				
11.5	3/8"	100			Sa	and Equiv	valent			
	No. 4	92				_	oisture, %			
	No. 10	78				esistivity				
	No. 16	69				l Factor				
Šv.	No. 40	57			=		Classification	A-4(1)		
Mary.	No. 50	54							-	
	No. 100	51								
	No. 200	49								
22 55										
Remarks:										
2.								S PARCASON S		
			10 100 1							-

NDOT 027, Rev 05-01

LINE SAMPLING DATA

Date Reported:	12/5/14	-								
Lab No.:	S14-06, R	V-203-14			_					
E.A.:	73606	_	Job D	Description:	PEQUOI	PANIM	AL CROSSIN	G I-80		
Date Rec'd	11/10/14	-								
Samplers:	<u>ALTAMI</u>	RANO,		Station	OW~108			Route		
RIGSBY, DRAG				Location fro		Li	t. <u>48'</u>	_ Rt.		
Sample No.:	PQ4-C	<u></u>		County:	ELKO					
Sample Type:					Depth (ft)		Boring Description			PSI
RV ■	Sub □	Chem 🗆	DC 🗆	Other 🗆	0				0	
Vegetation:	None	Trees □ S	Shrubs 🗆		2				2	
	Brushy 🗆	Grassy 🗆			_ 4				4	
Cut Section		Fill Section	l		6				6	
Taken Through Oil		Taken on Should	er 🗆		8				8	
Gravel Depth (in)		Oil Depth (in)			10				10	
Remarks:					12				12	
					14		Auger C	uttings	14	
20					16				16	
Submitted By:					18				18	
Title:					20				20	
	Щ									
							··			
33	Sieve Size	% Passing			Liquid Lim	it	23	_		
85	3"				Plastic Inde	ex	10	_		
	2"				Specific Gr	ravity				
	1.5"				Resistance	Value	22			
	1"				Cover		Stabilometer	- Exp	ansion Press	sure
	3/4"	100			Thicl	kness				
THE STATE OF THE S	1/2"	99						•		
	3/8"	97				Sand Equ	iivalent			
	No. 4	90				-	loisture, %			
	No. 10	76			1	Resistivit	у			
	No. 16	68			1	pH Factor	r			
	No. 40	57			-	_	Classification	A-4(1)		
05	No. 50	53								
	No. 100	47								
0):	No. 200	43								
113										
Remarks:										
	-2014-01					191		10000		
							107	10.000000	- 8	

NDOT 027, Rev. 05-01

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

EA/Cont #

73606

Job Description Pequop Animal Overcrossing

Boring No.

PQ-4

Elevation (ft) 6463.0

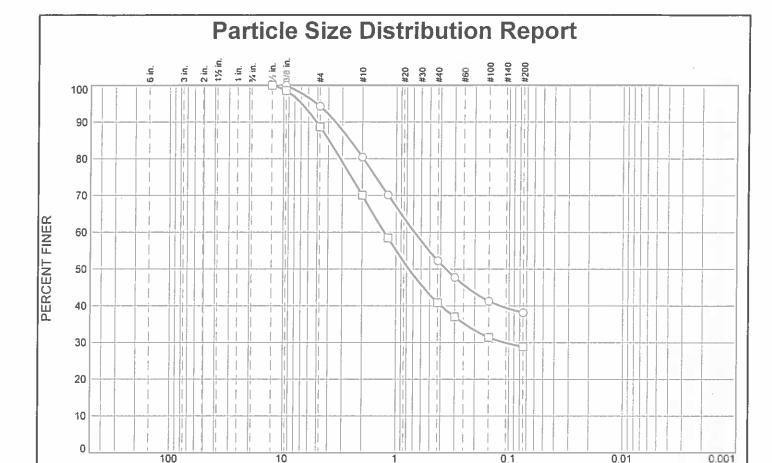
Station "OW" 108+76, 48' Lt.

Date

1/12/2015

		-		Т	Т	T	T	Т	T	Т.	$\overline{}$	Т	Т	7
	COMMENTS													
-	O igo	Residual												- <u>s</u>
FEST	ф <u>Б</u>	Res												expansive So
STRENGTH TEST	deg. psi	Peak												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-Cotlapse Potential
	TEST TYPE d													CM SL SL W W CW K K K K
Н	≣ %		9	7										ity
	군 %		4	15										H = Hydrometer S = Sieve G = Specific Gravity P1 = Plasticity Index LL = Liquid Limit PL = Plastic Limit NP = Non-Plastic OC = Consolidation Ch = Chemical RV = R - Value MD = Moisture Density
	∃%	386	20	22										H = Hydrometer S = Sieve G = Specific Gra P1 = Plasticity Indi LL = Liquid Limil PL = Plastic Limil NP = Non-Plastic OC = Consolidatic Ch = Chemical RV = R - Vatue MD = Moisture De
%	PASS #200		38.2	28.9	İ									
DRY	gť 🤶					l.		i			ł			(2)
	%		5.5	2.2										we sined ed ed mpler npler N = (N _{ext.})(0.62)
	SOIL		SC-SM	SC-SM										d Compressivitidated Undrained ated Undrained ated Undrainee ear
z	BLOWS per ft.													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 = (
SAMP-	LER TYPE		SPT	SPT										
SAMPLE	DEPTH (ft)		5.0 - 6.0	7.0-7.6										CMS = Cationnia 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. Spil Spoon 2,42" ID CPT = Cone Penetration Test TP = Test Pit P = Pushed, not driven R = Refusal Shelby Tube 2,87" ID
	SAMPLE NO.		∢	В										CMS = California Modified Sar SPT = Standard Penetration 1 CS = Continuous Sample 3.23 RC = Rock Core PB = Pitcher Barrel CSS = Calli, Spiti Spoon 2.42* CPT = Cone Penetration Test TP = Test Pit P = Pushed, not driven R = Refusal Sh = Shelby Tube 2.87* ID

* = Average of subsamples



GRAIN SIZE - mm.

	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	5.7	56.1	38	3.2	SC-SM	A-4(0)	14	20
	0.0	11.3	59.8	28	3.9	SC-SM	A-2-4(0)	15	22

SIEVE	PEI	RCENT FIN	IER
inches size	0	0	
1/2"		100.0	
3/8"	100.0	98.5	
		CDAIN CIZE	-
		GRAIN SIZE	
D ₆₀	0.6857	1.2696	=
D ₆₀			=
1		1.2696	
D ₃₀	0.6857	1.2696	
D ₃₀	0.6857	1.2696 0.1091	

	SIEVE	PEI	IER					
	number size	0						
	#4	94.3	88.7					
	#10	80.4	70.0					
	#16	70.2	58.5					
	#40	52.3	40.9					
	#50	47.7	37.0					
	#100	41.3	31.4					
	#200	38.2	28.9					
Į								
۸	0 60' Sample Number A							

REMARKS:	
O REMARKS:	
0	

Material Description o silty, clayey sand

silty, clayey sand

O Source of Sample: PQ-4

Depth: 5.0 - 6.0'

Sample Number: A Sample Number: B

☐ Source of Sample: PQ-4

Depth: 7.0 - 7.6'

Client: C. Callaghan

NEVADA DEPARTMENT OF TRANSPORTATION

Project: Pequop Animal Overcrossing

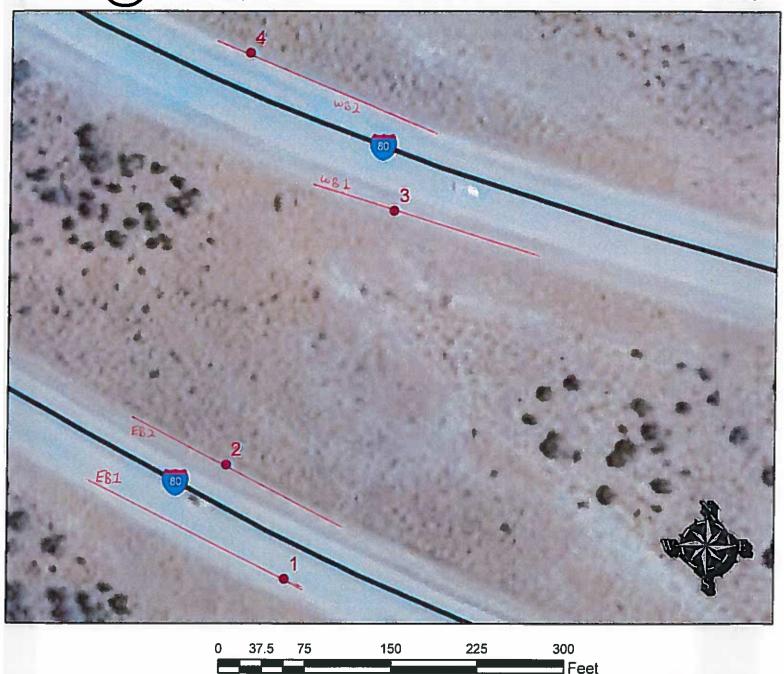
Project No.: 73606

Figure

Appendix C

Geophysical Testing Location Map Geophysical Test Data

I-80 @ PEQUOP - ANIMAL CROSSING



1 inch = 83 feet

Legend

TEST HOLES WITH REMILINES

State Maintained Roads

SYSTEM

IR - Interstate

SR - State Route

US - US Route

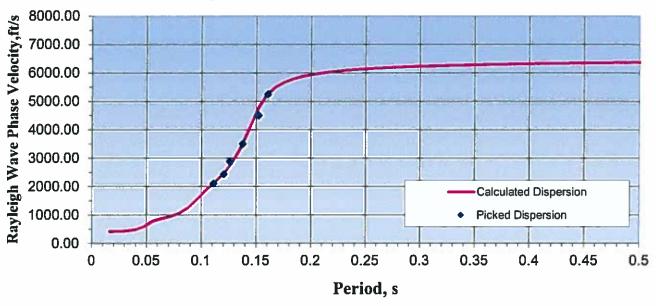
THIS MAP IS FOR DISPLAY PURPOSES ONLY, MAP COMPILED WITH DATA FROM THE TRIMBLE GEO XT HANDHELD GPS UNIT, THET DATA IS NOT SURVEY GRADE, NOT ALL FEATURES PORTRAYED DUE TO SCALE.



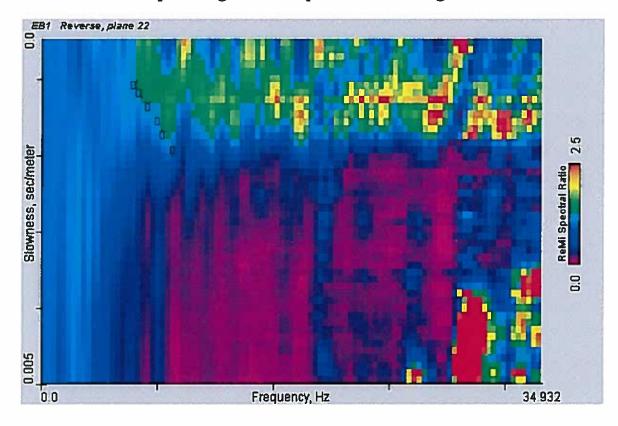


EB1: Supportive Illustration

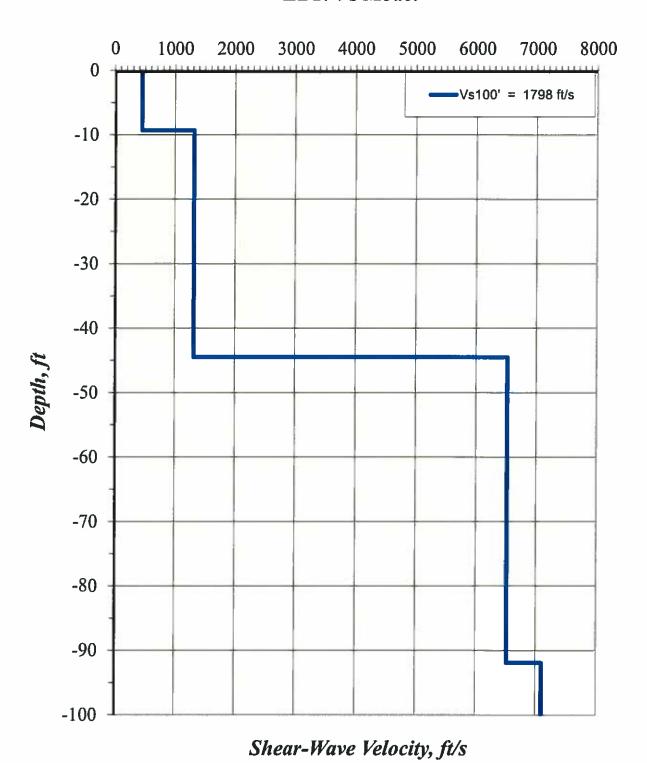
Dispersion Curve Showing Picks and Fit

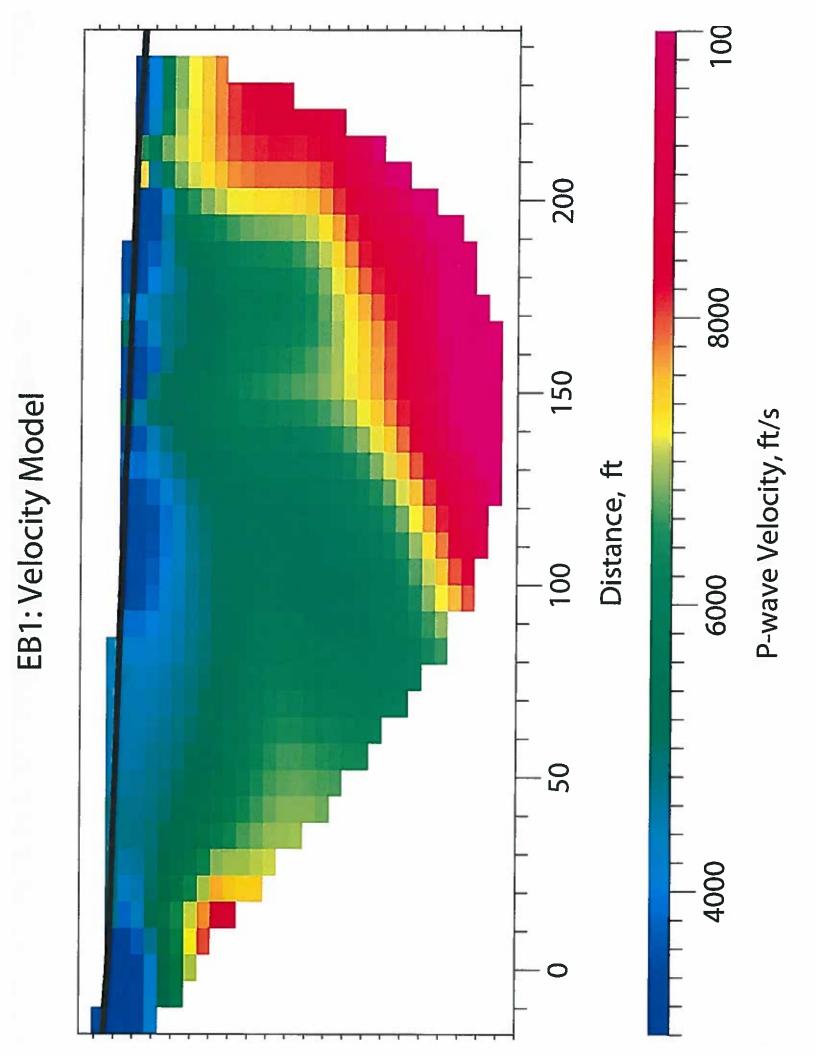


p-f Image with Dispersion Modeling Picks

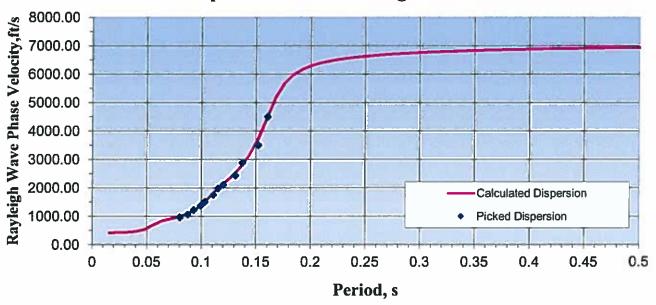


EB1: Vs Model

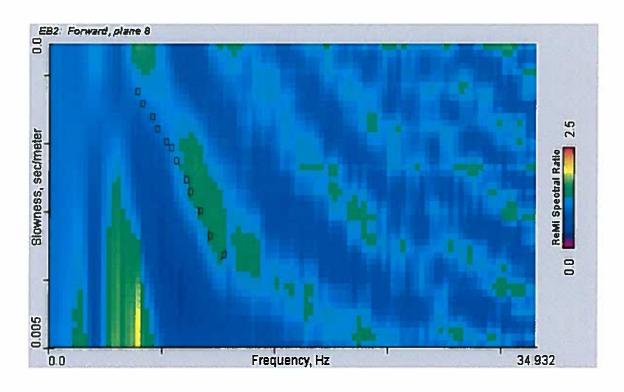




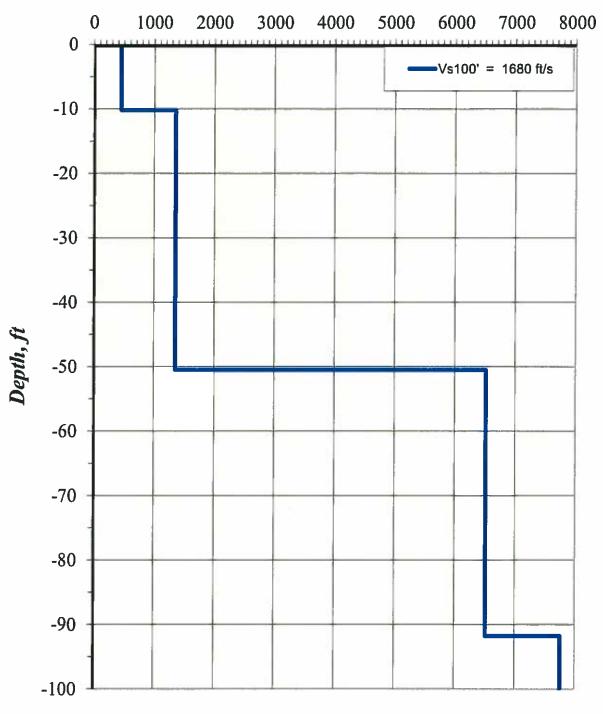
EB2: Supportive Illustration
Dispersion Curve Showing Picks and Fit



p-f Image with Dispersion Modeling Picks



EB2: Vs Model

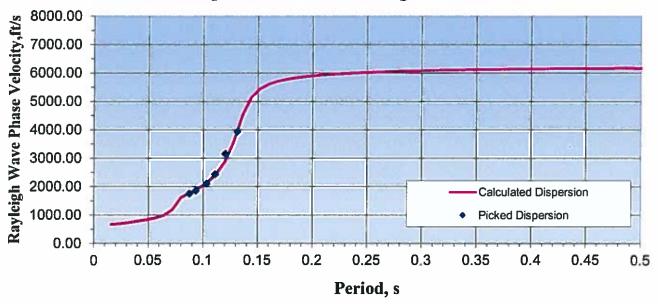


Shear-Wave Velocity, ft/s

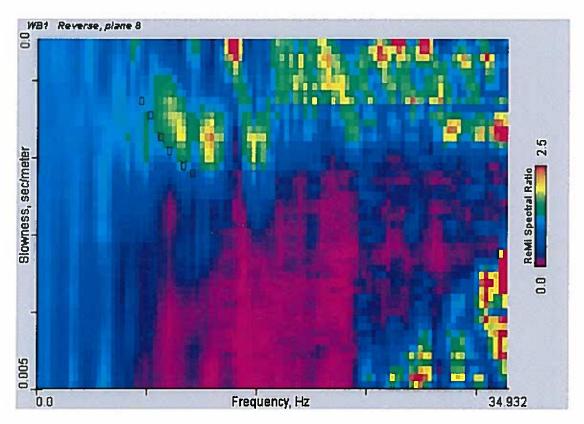
EB2: Velocity Model P-wave Velocity, ft/s Distance, ft

WB1: Supportive Illustration

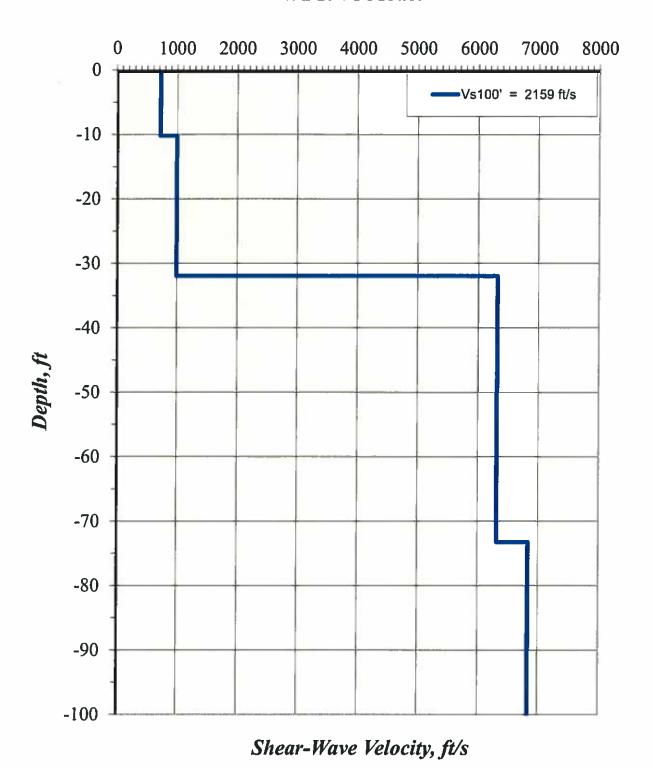
Dispersion Curve Showing Picks and Fit



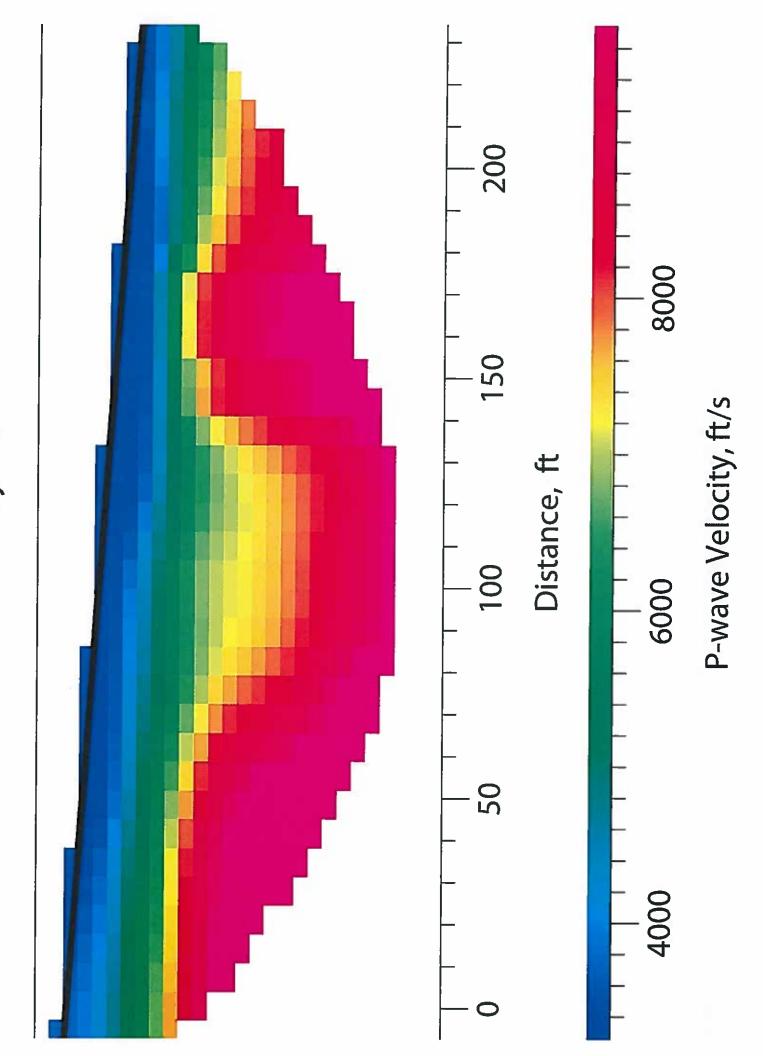
p-f Image with Dispersion Modeling Picks



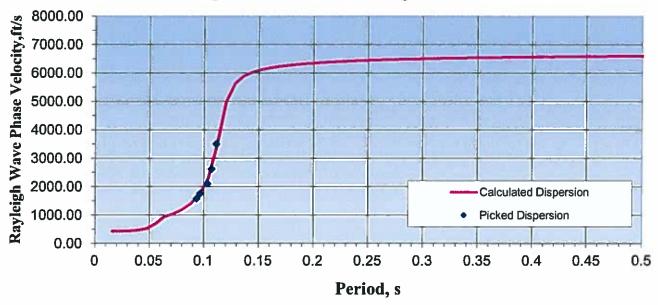
WB1: Vs Model



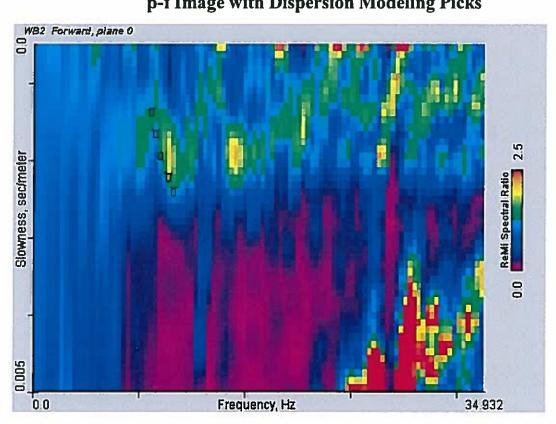
WB1: Velocity Model



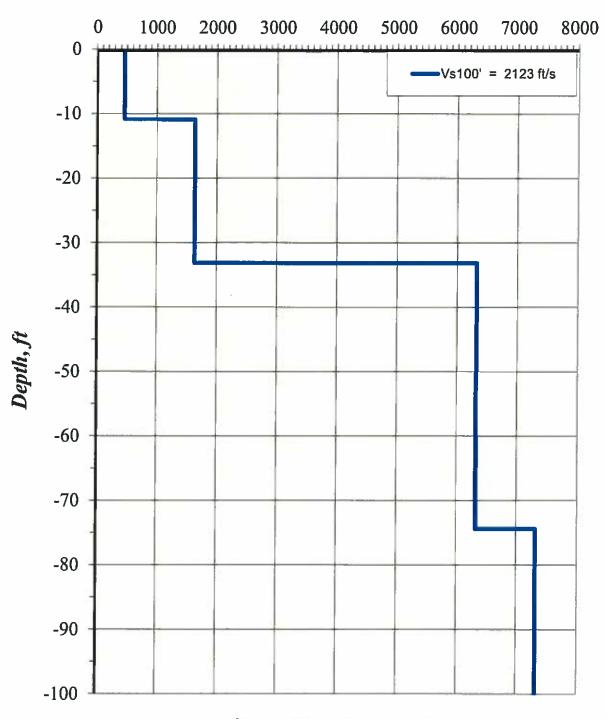
WB2: Supportive Illustration **Dispersion Curve Showing Picks and Fit**



p-f Image with Dispersion Modeling Picks



WB2: Vs Model



Shear-Wave Velocity, ft/s

WB2: Velocity Model

