

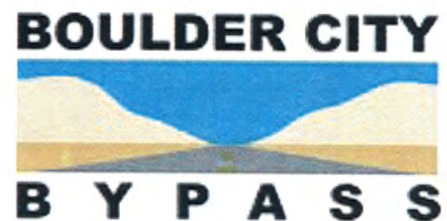
GEOTECHNICAL REPORT
BOULDER CITY BYPASS
PHASE 1

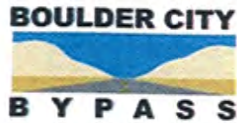
CLARK COUNTY, NEVADA

May 2011



VOLUME 2: GEOTECHNICAL DATA PRESENTATION





DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION
GEOTECHNICAL SECTION


VOLUME 2
GEOTECHNICAL DATA PRESENTATION
BOULDER CITY BYPASS


PHASE 1


May 2011

E.A. No. 73307

CLARK COUNTY, NEVADA

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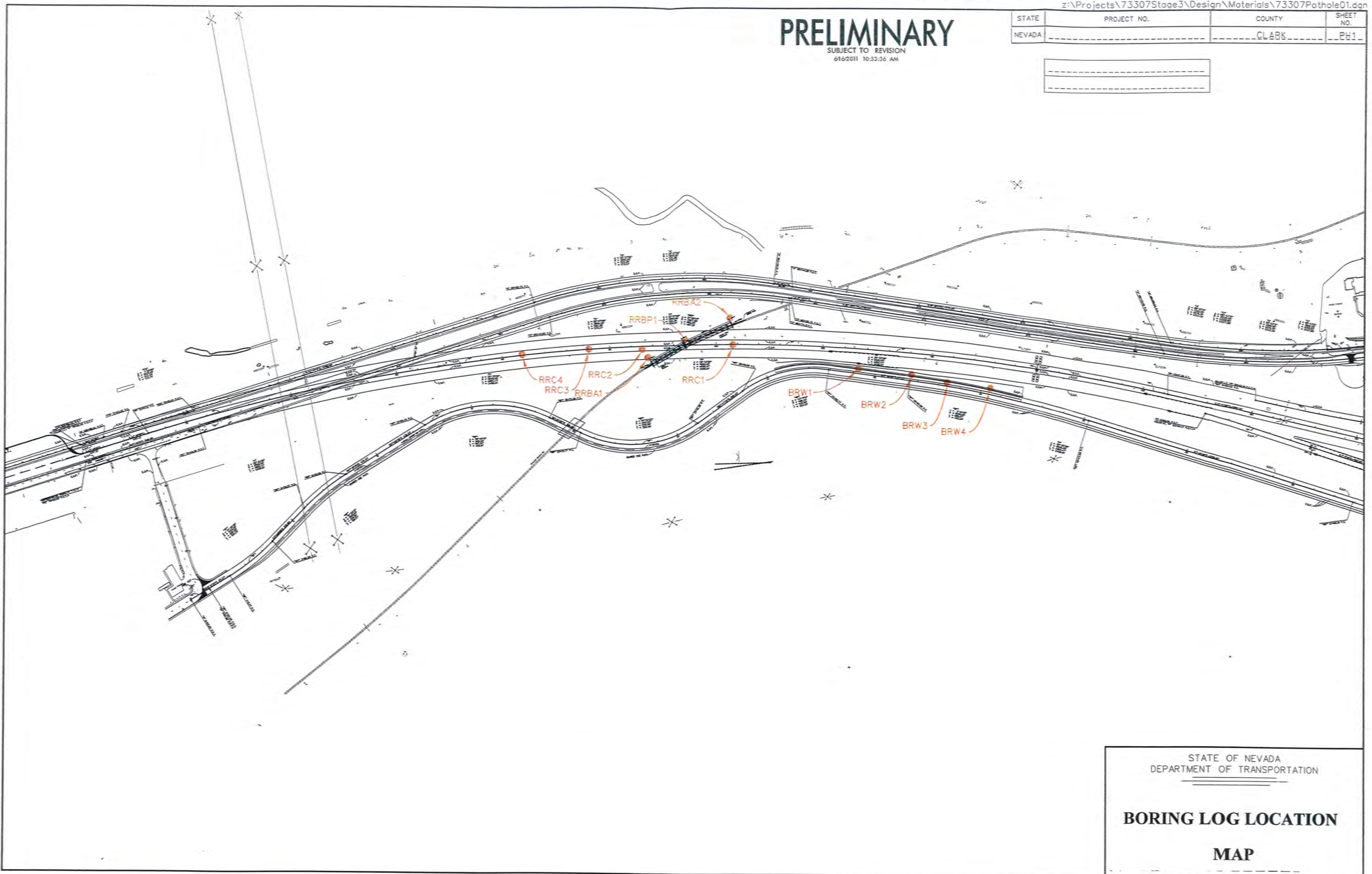
APPENDIX J: TANGENT PILE WALL

APPENDIX A
BORING LOGS

PRELIMINARY

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6/9/2011 10:33:36 AM

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA		CLARK	PH1



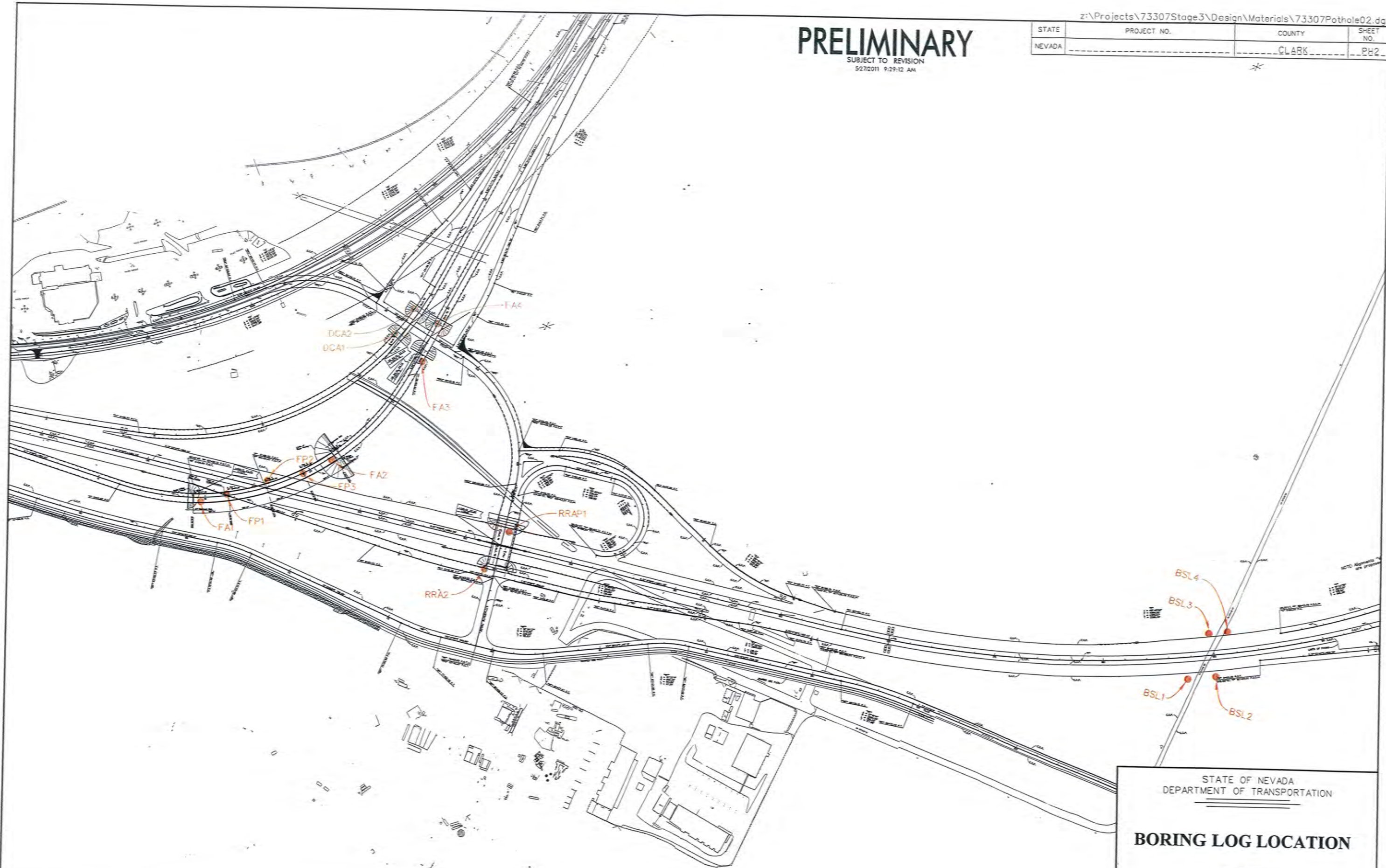
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

BORING LOG LOCATION

MAP

PRELIMINARY
SUBJECT TO REVISION
5/27/2011 9:29:12 AM

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA		CLARK	PH2



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

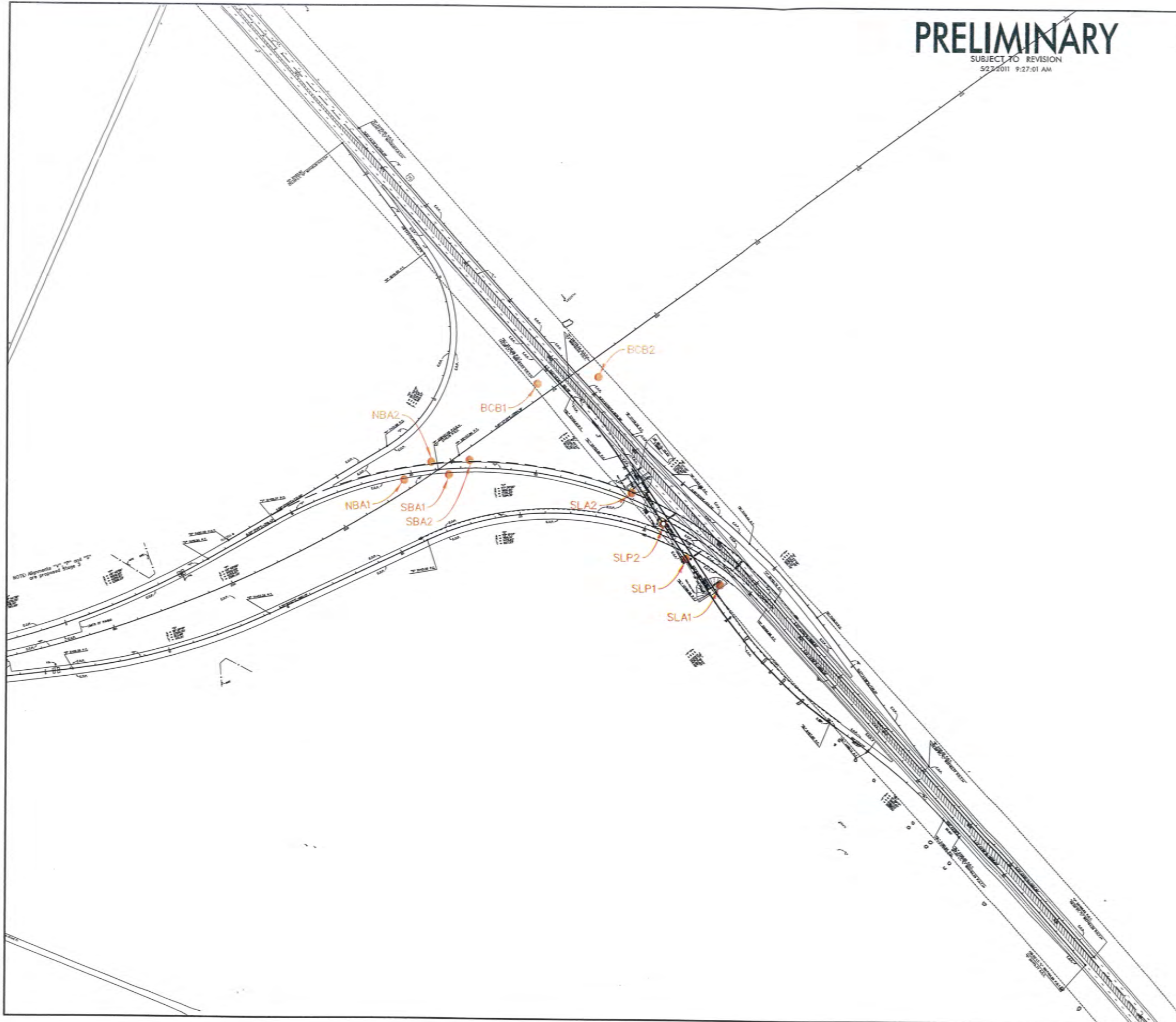
BORING LOG LOCATION

MAP

PRELIMINARY

SUBJECT TO REVISION
5/27/2011 9:27:01 AM

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA		CLARK	PH3



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

BORING LOG LOCATION

MAP

STRUCTURES		BOREHOLES	
		STATION	NAME
I-2868	Abutment 1	"SL" 14+02, 56 feet Right	SLA1
	Pier 1	"SL" 15+65, 0 feet	SLP1
	Pier 2	"SL" 17+29.8, 0 feet	SLP2
	Abutment 2	"SL" 19+02, 38 feet Left	SLA2
I-2869	Abutment 1/ Pier 1	"RR" 108+18, 24 ft. Left	RRAP1
	Abutment 2	"RR" 110+09, 43 ft. Right	RRA2
I-2870N	Abutment 1	"DC" 22+47, 25 ft. Left	DCA1
	Abutment 2	"DC" 24+00, 29 ft. Left	DCA2
I-2870S	Abutment 1	"F" 27+26, 22 ft. Right	FA3
	Abutment 2	"F" 29+14.5, 1.0 ft. Left	FA4
I-2871	Abutment 1	"F" 14+80, 20 ft. Right	FA1
	Pier 1	"F" 16+00, 8 ft. Left	FP1
	Pier 2	"F" 18+00, 30 ft. Left	FP2
	Pier 3	"F" 19+65, 0 feet	FP3
	Abutment 2	"F" 21+09, 12 ft. Right	FA2
H-2972N	Abutment 1	"P" 208+00, 41 feet Left	NBA1
	Abutment 2	"P" 209+30, 41 feet Left	NBA2
H-2972S	Abutment 1	"P" 209+59, 41 feet Right	SBA1
	Abutment 2	"P" 210+59, 41 feet Right	SBA2
G-2872	Abutment 1	"P" 96+75, 51 ft. Right	RRBA1
	Pier 1	"P" 98+54, 25 ft. Left	RRBP1
	Abutment 2	"P" 100+61, 125 ft. Left	RRBA2
Retaining Wall	W. Frontage Road	"P" 106+60, 95 ft. Right	BRW1
	W. Frontage Road	"P" 109+10, 100 ft. Right	BRW2
	W. Frontage Road	"P" 110+80, 120 ft. Right	BRW3
	W. Frontage Road	"P" 112+90, 120 ft. Right	BRW4
Roadway Cut		"P" 100+75, 0 feet	RRC1
		"P" 96+50, 12 ft. Right	RRC2
		"P" 94+00, 30 ft. Right	RRC3
		"P" 90+90, 3 ft. Left	RRC4
I-515/US 95	West Side	"P" 214+55, 52 ft. Left	BCB1
	East Side	"P" 216+68, 66 ft. Right	BCB2
Silverline Drive		≈ "P" 183+80, 100 ft. Right	BSL1
		≈ "P" 185+00, 100 ft. Right	BSL2
		≈ "P" 184+90, 100 ft. Left	BSL3
		≈ "P" 185+70, 100 ft. Left	BSL4

KEY TO BORING LOGS

PARTICLE SIZE LIMITS								
CLAY	SILT	SAND			GRAVEL		COBBLES	BOULDERS
		FINE	MEDIUM	COARSE	FINE	COARSE		
	.002 mm	#200	#40	#10	#4	¼ inch	3 inch	12 inch

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

MOISTURE CONDITION CRITERIA

<u>Description</u>	<u>Criteria</u>
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

<u>Description</u>	<u>Criteria</u>
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* (after Peck, <i>et al.</i> , 1974)			
GRANULAR SOIL		CLAYEY SOIL	
BLOWS/FT	DENSITY	BLOWS/FT	CONSISTENCY
N ₆₀		N ₆₀	
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

* SPT N₆₀-values are only reliable for sands, and should serve only as estimates for other materials such as gravels, silts and clays.

California Modified Sampler field blow counts (N_{CMS} field) for (6 < N_{CMS} field < 50) can be converted to N_{SPT} field by:
 $(N_{CMS \text{ field}})(0.62) = N_{SPT \text{ field}}$

SPT field blow counts (N_{SPT} field) can be converted to N₆₀ by:
 $(N_{SPT \text{ field}})(ETR/60) = N_{60}$

ETR = Energy Transfer Ratio

Field blow counts from 140 lb hammer with 30 inch free fall

TEST ABBREVIATIONS

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

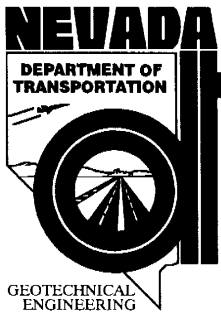
SAMPLER NOTATION

CMS CALIF. MODIFIED SAMPLER ¹
CPT CONE PENETRATION TEST
CS CONTINUOUS SAMPLER ²
PB PITCHER BARREL
RC ROCK CORE ³
SH SHELBY TUBE ⁴
SPT STANDARD PENETRATION TEST ⁵
TP TEST PIT

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

EXAMPLE: (7.5 YR 5/3) BROWN

- 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
- 5- I.D.= 1.375 inch, O.D.= 2.00 inch



START DATE 8/8/06

END DATE 8/9/06

JOB DESCRIPTION Boulder City Bypass - Phase1

LOCATION I 515 @ Railroad Pass

BORING SLA1

E.A. # 73307-1

GROUND ELEV. 2009.10 (ft)

HAMMER DROP SYSTEM Auto., ETR=65%

EXPLORATION LOG

STATION "SL" 14+02

OFFSET 56 ft. Right

ENGINEER Salazar

EQUIPMENT Diedrich D-120, #1627

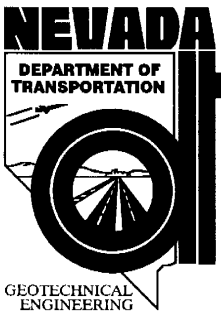
OPERATOR D. White

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 8/9/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2004.1	4.00								<p>SILTY GRAVEL/SILTY SAND (GM/SM) with rock fragments, small cobbles, dry. grayish orange pink (5 YR 7/2) (Alluvium).</p> <p>Bridge I-2868, Abutment 1</p> <p>Drill Rig unit # 1627.</p> <p>6 in. HSA. Auger was advanced to 4.0 feet.</p>	
	5.50	A	SPT	5 12 13	25	73	W, S			
	6.00									
	7.50	B	SPT	5 6 6	12	60	W, S, PI	SP SM	<p>POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) greyish orange pink to pale yellowish brown, dry (Alluvium).</p>	
	8.00									
1999.1	9.50	C	SPT	13 23 36	59	67	W, S, PI	SM	<p>SILTY SAND WITH GRAVEL (SM) grayish orange pink (5 YR 7/2), (Alluvium).</p>	
	11.00	D	SPT	10 16 14	30	57	W, S, PI			
1994.1	12.99	E	SPT	50/2"	50/2"		W, S, PI	SM	<p>SILTY SAND WITH GRAVEL (SM) visual description, grayish orange pink (5 YR 7/2), with gravel, cobbles, and rock fragments (Alluvium).</p>	
	14.25	F	SPT	100/3"	100/3"					
	16.50	G	SPT	95/6"	95/6"					
1989.1	19.00							SM	<p>SILTY SAND WITH GRAVEL (SM) visual description, grayish orange pink (5 YR 7/2), with gravel, cobbles, and rock fragments, slightly cemented (able to break with fingers), dry, (Alluvium).</p>	
	19.40	H	SPT	127/4.8"	127/4.8"		W, S, PI			
1984.1	25.50	I	SPT	12 19 43	62	47		SM		
	29.00									
	29.80	J	SPT	31 100/3.6"	100/3.6"		W, S			



GEOTECHNICAL ENGINEERING

EXPLORATION LOG

START DATE 8/8/06
 END DATE 8/9/06
 JOB DESCRIPTION Boulder City Bypass - Phase1
 LOCATION I 515 @ Railroad Pass
 BORING SLA1
 E.A. # 73307-1
 GROUND ELEV. 2009.10 (ft)
 HAMMER DROP SYSTEM Auto., ETR=65%

STATION "SL" 14+02
 OFFSET 56 ft. Right
 ENGINEER Salazar
 EQUIPMENT Diedrich D-120, #1627
 OPERATOR D. White
 DRILLING METHOD 6" H.S.A.
 BACKFILLED Yes DATE 8/9/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
1974.1	34.00 34.50	K	SPT	72/6"	72/6"			SM	SILTY SAND WITH GRAVEL (SM) visual description, grayish orange pink (5 YR 7/2), with gravel, cobbles, and rock fragments, granitic looking, dry. Same as above.	Drill Rate: 5 feet in 3 minutes.
1969.1	38.98	L	SPT	50/1.8"	50/1.8"					
1964.1	44.98	M	SPT	50/1.9"	50/1.9"					
1959.1	48.98 49.25	N	SPT	100/3"	100/3"					
1954.1	54.98	O	SPT	50/1.7"	50/1.7"					
	58.25 59.00	P	SPT	100/2.4"	100/2.4"					
	60.00									



START DATE 8/30/06

EXPLORATION LOG

SHEET 1 OF 3

END DATE 8/31/06

JOB DESCRIPTION Boulder City Bypass - Phase1

STATION "SL" 15+65

LOCATION I 515 @ Railroad Pass

OFFSET 0 ft.

BORING SLP1

ENGINEER Salazar

E.A. # 73307-1

EQUIPMENT Diedrich D-120, #1627

GROUND ELEV. 2016.00 (ft)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

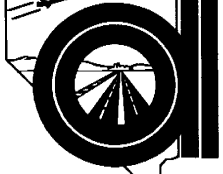
OPERATOR D. White

DRILLING METHOD 6" H.S.A.

HAMMER DROP SYSTEM Auto., ETR=65%

BACKFILLED Yes DATE 8/31/2006

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2011.0	3.50							SW SM	WELL-GRADED SAND WITH SILT(SW-SM) moderate brown (5 YR 4/4), with rock fragments, small cobbles, dry, (Alluvium).	Bridge I-2868, Pier 1 Drill Rig unit # 1627. Auger was advanced to 3.5 feet.
	5.00	A	SPT	4	15	80	W, S, PI			
	5.50			5						
	7.00	B	SPT	5	12	53	W			
2006.0	8.50							SM	SILTY SAND WITH GRAVEL(SM) light brown (5YR 6/4) to pale yellowish brown (10 YR 6/2), with rock fragments, small cobbles, dry.	7.00
	10.00	C	SPT	15	48	67	W, S, PI			
	10.50			27						
2001.0	12.00	D	SPT	19	46	61	W, S, PI	SP SM	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) moderate brown (5 YR 4/4), with rock fragments, small cobbles, dry.	12.00
	12.00			21						
2001.0	13.50							SW SM	WELL-GRADED SAND WITH SILT(SW-SM) moderate brown (5 YR 4/4), with rock fragments, small cobbles, dry.	10.00
	15.00	E	SPT	27	49					
1996.0	18.50	F	SPT	50/1.4"	50/1.4"		W, S	SW SM		
	18.50									
1991.0	23.50	G	SPT	50/2"	50/2"		W, S, PI	SW SM		
	23.50									
1991.0	28.50	H	SPT	50/2.4"	50/2.4"		W, S, PI	SW SM		
	28.70									
										30.00



START DATE 8/30/06

END DATE 8/31/06

JOB DESCRIPTION Boulder City Bypass - Phase 1

LOCATION I 515 @ Railroad Pass

BORING SLP1

E.A. # 73307-1

GROUND ELEV. 2016.00 (ft)

HAMMER DROP SYSTEM Auto., ETR=65%

STATION "SL" 15+65

OFFSET 0 ft.

ENGINEER Salazar

EQUIPMENT Diedrich D-120, #1627

OPERATOR D. White

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 8/31/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT		Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot					
1951.0	65								<p>WELL-GRADED SAND WITH SILT(SW-SM) grayish orange pink (5 YR 7/2), with rock fragments, small cobbles, dry (Possible hydro-thermally altered bedrock?).</p>	
		O	SPT	100/0.18	100/0.18			SW SM		
1946.0	70								<p>End of Boring at 68.62 feet. Backfilled with drill cuttings. Groundwater was not encountered.</p> <p>Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble.</p> <p>Soil/rock descriptions are derived from visual field identifications and laboratory test data.</p> <p>The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.</p>	
		P	SPT	80/1.4"	80/1.4"			68.62		
1941.0	75									
1936.0	80									
1931.0	85									



START DATE 8/28/06

EXPLORATION LOG

END DATE 8/30/06

JOB DESCRIPTION Boulder City Bypass - Phase1

STATION "SL" 17+29.8

LOCATION I 515 @ Railroad Pass

OFFSET 0 ft.

BORING SLP2

ENGINEER Salazar

E.A. # 73307-1

EQUIPMENT Diedrich D-120, #1627

GROUND ELEV. 2022.20 (ft)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

OPERATOR D. White

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 8/30/2006

HAMMER DROP SYSTEM Auto., ETR=65%

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2017.2	3.00							SM	SILTY SAND WITH GRAVEL (SM) moderate brown (5 YR 4/4), with rock fragments, small cobbles, dry, (Alluvium).	Bridge I-2868, Pier 2 Drill Rig unit # 1627. Auger was advanced to 3 feet.
	4.50	A	SPT	4 9 10	19	53	W, Ch			
	5.00	B	SPT	3 5	23	80				
	6.00			18						
2012.2	10.00							SM	SILTY SAND WITH GRAVEL (SM) moderate brown (5 YR 4/4), with rock fragments, small cobbles, dry, (Alluvium).	Bridge I-2868, Pier 2 Drill Rig unit # 1627. Auger was advanced to 3 feet.
	11.50	C	SPT	28 38 64	102	0				
	13.00									
	14.50	D	SPT	33 42 36	78	93	W, S, PI			
2007.2	15.00							GM	SILTY GRAVEL WITH SAND (GM) grayish orange pink (5YR 7/2) to pale yellowish brown (10 YR 6/2), with rock fragments, small cobbles, dry.	Bridge I-2868, Pier 2 Drill Rig unit # 1627. Auger was advanced to 3 feet.
	16.50	E	SPT	34 61 51/3.3"	51/3.3"	73	W, S, PI			
	18.00									
2002.2	19.50	F	SPT	15 36 54	90	87	W, S, PI	SP SM	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) moderate brown (5 YR 4/4), with rock fragments, small cobbles, dry.	Bridge I-2868, Pier 2 Drill Rig unit # 1627. Auger was advanced to 3 feet.
	20.00									
	21.00	G	SPT	31 81	81	60	W, S, PI			
1997.2	25.00							SP SM	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) moderate brown (5 YR 4/4), with rock fragments, small cobbles, dry.	Bridge I-2868, Pier 2 Drill Rig unit # 1627. Auger was advanced to 3 feet.
	26.00	H	SPT	29 88	88		W, S, PI			
	30.00									



START DATE 8/28/06

EXPLORATION LOG

SHEET 2 OF 3

END DATE 8/30/06

JOB DESCRIPTION Boulder City Bypass - Phase1

STATION "SL" 17+29.8

LOCATION I 515 @ Railroad Pass

OFFSET 0 ft.

BORING SLP2

ENGINEER Salazar

E.A. # 73307-1

EQUIPMENT Diedrich D-120, #1627

GROUND ELEV. 2022.20 (ft)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

OPERATOR D. White

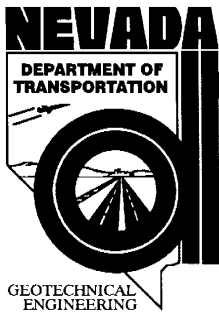
DRILLING METHOD 6" H.S.A.

HAMMER DROP SYSTEM Auto., ETR=65%

BACKFILLED Yes DATE 8/30/2006

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
	31.50	I	SPT	31 48 65	113		W, S, PI		<p>POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) pale brown (5 YR 5/2) to moderate yellowish brown, with rock fragments, angular, small cobbles.</p>	
1987.2	35.00 35.35	J	SPT	50/4.2"	50/4.2"			SP SM		
1982.2	40.00 40.99	K	SPT	50/2"	50/2"					
1977.2	45.00 45.36	L	SPT	150/4.3"	150/4.3"					
1972.2	50.00 50.50	M	SPT	115/6"	115/6"		W, S			
1967.2	55.00 56.50	N	SPT	100/3"	100/3"					
	60.00									

NV_DOT_BCB MARK.GPJ NV_DOT_GDT 6/16/11



EXPLORATION LOG

START DATE 8/28/06

END DATE 8/30/06

JOB DESCRIPTION Boulder City Bypass - Phase1

LOCATION I 515 @ Railroad Pass

BORING SLP2

E.A. # 73307-1

GROUND ELEV. 2022.20 (ft)

HAMMER DROP SYSTEM Auto., ETR=65%

STATION "SL" 17+29.8

OFFSET 0 ft.

ENGINEER Salazar

EQUIPMENT Diedrich D-120, #1627

OPERATOR D. White

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 8/30/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
1957.2	60.20	O	SPT	100/2.4"	100/2.4"					
1957.2	65.00	P	SPT	100/3"	100/3"				65.30	End of Boring at 65.3 feet. Backfilled with auger cuttings. Groundwater was not encountered. Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble. Soil/rock descriptions are derived from visual field identifications and laboratory test data. The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.

NV_DOT_BCB MARK.GPJ NV_DOT.GDT 6/16/11



START DATE 8/22/06

END DATE 8/23/06

JOB DESCRIPTION Boulder City Bypass - Phase1

LOCATION I 515 @ Railroad Pass

BORING SLA2

E.A. # 73307-1

GROUND ELEV. 2028.10 (ft)

HAMMER DROP SYSTEM Auto., ETR=65%

EXPLORATION LOG

STATION "SL" 19+02

OFFSET 38 ft. Left

ENGINEER Salazar

EQUIPMENT Diedrich D-120, #1627

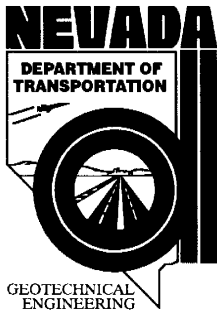
OPERATOR D. White

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 8/23/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2023.1	3.00							SW SM	WELL-GRADED SAND WITH SILT(SW-SM) light brown (5YR 6/4), with rock fragments, small cobbles, dry, (Alluvium).	Bridge I-2868, Abutment 2 Drill Rig unit # 1627. Auger was advanced to 3 feet.
	4.50	A	SPT	8 12 17	29	67	W, S			
	5.00							4.80	WELL-GRADED SAND WITH SILT(SW-SM) light brown (5YR 6/4), with rock fragments, small cobbles, dry, (Alluvium).	
	6.50	B	SPT	10 18 39	57	47	W, S, PI	6.50		
2018.1	8.00							SW SM	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) moderate brown (5 YR 4/4), with rock fragments, small cobbles, dry. Color changes to grayish orange pink (5 YR 7/2) below 16 feet, (Alluvium).	
	9.50	C	SPT	21 40 48	88	67	W, S			
	10									
	11.00									
2013.1	12.50	D	SPT	34 55 98	153	87	W	SP SM		
	13.00									
	14.40	E	SPT	45 88 130/4.8"	130/4.8"		W, S, PI			
	15									
2008.1	16.00							SP SM		
	18.28	F	SPT	100/3.4"	100/3.4"		W, PI			
	18.00									
	19.50	G	SPT	26 39 79	118	80	W, S			
2003.1	20.00							SP SM		
	20.90	H	SPT	63 101/4.8"	101/4.8"					
	25.00									
	26.10	I	SPT	29 42 50/1.2"	50/1.2"		W, S, PI			
	30.00								30.00	



GEOTECHNICAL ENGINEERING

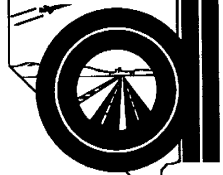
EXPLORATION LOG

START DATE 8/22/06
 END DATE 8/23/06
 JOB DESCRIPTION Boulder City Bypass - Phase1
 LOCATION I 515 @ Railroad Pass
 BORING SLA2
 E.A. # 73307-1
 GROUND ELEV. 2028.10 (ft)
 HAMMER DROP SYSTEM Auto., ETR=65%

STATION "SL" 19+02
 OFFSET 38 ft. Left
 ENGINEER Salazar
 EQUIPMENT Diedrich D-120, #1627
 OPERATOR D. White
 DRILLING METHOD 6" H.S.A.
 BACKFILLED Yes DATE 8/23/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT		Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot					
	30.50	J	SPT	74/6"	74/6"				POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) moderate brown (5 YR 4/4), with rock fragments, small cobbles, dry. Color changes to grayish orange pink (5 YR 7/2) below 16 feet, (Alluvium).	
1993.1	35.00									
	35.53	K	SPT	60	100/0.4"		W, S			
				100/0.4"						
1988.1	40.00									
	40.90	L	SPT	31	100/4.8"		W, PI			
				100/4.8"						
1983.1	45.00							SP SM		
	46.50	M	SPT	16 38 90	128		W, S, PI			
1978.1	50.00									
	50.29	N	SPT	100/3"	100/3"					
1973.1	55.00									
	55.28	O	SPT	100/3.3"	100/3.3"					
									60.00	

NEVADADEPARTMENT OF
TRANSPORTATIONGEOTECHNICAL
ENGINEERING**EXPLORATION LOG**

SHEET 3 OF 3

START DATE 8/22/06END DATE 8/23/06JOB DESCRIPTION Boulder City Bypass - Phase1LOCATION I 515 @ Railroad PassBORING SLA2E.A. # 73307-1GROUND ELEV. 2028.10 (ft)HAMMER DROP SYSTEM Auto., ETR=65%STATION "SL" 19+02OFFSET 38 ft. LeftENGINEER SalazarEQUIPMENT Diedrich D-120, #1627OPERATOR D. WhiteDRILLING METHOD 6" H.S.A.BACKFILLED Yes DATE 8/23/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT		Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch increments	Last 1 foot					
1963.1	65							SP SM 61.00	End of Boring at 61 feet. Backfilled with drill cuttings. Groundwater was not encountered.	
1958.1	70								Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble.	
1953.1	75								Soil/rock descriptions are derived from visual field identifications and laboratory test data.	
1948.1	80								The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.	
1943.1	85									



START DATE 11/15/06

EXPLORATION LOG

SHEET 1 OF 3

END DATE 11/15/06

STATION "RR" 108+18

JOB DESCRIPTION Boulder City Bypass - Phase1

OFFSET 24 ft. Left

LOCATION I 515 @ Railroad Pass

ENGINEER Salazar

BORING RRAP1

EQUIPMENT Diedrich D-120, # 1082

E.A. # 73307-1

OPERATOR D. White

GROUND ELEV. 2190.70 (ft)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

DRILLING METHOD 6" H.S.A.

HAMMER DROP SYSTEM Auto., ETR=79%

BACKFILLED Yes DATE 11/15/2006

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2185.7	1.50							GW	<p>SILTY GRAVEL/SILTY SAND (GM/SM) pale yellowish brown (10 YR 6/2), dry.</p> <p>WEATHERED BEDROCK, moderate brown (5 YR 3/4) and moderate yellowish brown (10 YR 5/4), Andesite/Rhyoite, highly fractured/weathered with some caliche caps on rock fragments, dry.</p> <p>Bridge I-2869: Borehole is between Abutment 1 and Center Pier.</p> <p>Bedrock outcrop at the Center Pier; no borehole at Center Pier location.</p> <p>Drill Rig unit # 1082.</p> <p>Auger was advanced to 1.5 feet.</p> <p>Highly fractured bedrock, iron-stained, smooth drilling.</p> <p>Same as above, but mod. yellowish brown (10 YR 5/4).</p> <p>Sample G: SM.</p> <p>Highly fractured/weathered hydro-thermally</p>	<p>1.00</p>
	2.50	A	SPT	25	140		W, S			
	3.00									
	3.22	B	SPT	50/2.6"	50/2.6"					
	4.50									
	4.87	C	SPT	50/4.4"	50/4.4"		W, PI			
	5.00									
	9.50	D	SPT	50/1.3"	50/1.3"					
	14.50	E	SPT	50/1"	50/1"					
	19.50	F	SPT	50/1"	50/1"		W, PI			
2170.7	20									
2165.7	25	G	SPT	50/1.4"	50/1.4"		W, S			
2155.7	30	H	SPT	50/1"	50/1"		W, S, PI			

NV_DOT_BCB MARK_GPJ NV_DOT_GDT 6/16/11



EXPLORATION LOG

START DATE 11/15/06
 END DATE 11/15/06
 JOB DESCRIPTION Boulder City Bypass - Phase1
 LOCATION I 515 @ Railroad Pass
 BORING RRAP1
 E.A. # 73307-1
 GROUND ELEV. 2190.70 (ft)
 HAMMER DROP SYSTEM Auto., ETR=79%

STATION "RR" 108+18
 OFFSET 24 ft. Left
 ENGINEER Salazar
 EQUIPMENT Diedrich D-120, # 1082
 OPERATOR D. White
 DRILLING METHOD 6" H.S.A.
 BACKFILLED Yes DATE 11/15/2006

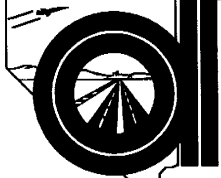
GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2155.7	35	I	SPT	50/1"	50/1"				altered bedrock, yellowish gray (5 Y 5/2), greyish pink (5 R 8/2). Sample H: SC-SM. 34.50 WEATHERED BEDROCK less weathered bedrock, granitic looking , dry. Sample J: SC-SM Sample K: SC-SM	
2150.7	40	J	SPT	50/1"	50/1"		W, S, PI			
2145.7	45	K	SPT	50/1"	50/1"		W, S, PI			
2140.7	50	L	SPT	50/2"	50/2"					
2135.7	55	M	SPT	50/0.6"	50/0.6"				54.50 54.55 End of Boring at 54.55 feet. Backfilled with auger cuttings. Groundwater was not encountered. Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble. Soil/rock descriptions are derived from visual field identifications and laboratory test data.	

NV_DOT_BCB MARK GPJ NV_DOT.GDT 6/16/11

NEVADA

DEPARTMENT OF
TRANSPORTATION



GEOTECHNICAL
ENGINEERING

EXPLORATION LOG

SHEET 3 OF 3

START DATE 11/15/06

END DATE 11/15/06

JOB DESCRIPTION Boulder City Bypass - Phase1

LOCATION I 515 @ Railroad Pass

BORING RRAP1

E.A. # 73307-1

GROUND ELEV. 2190.70 (ft)

HAMMER DROP SYSTEM Auto., ETR=79%

STATION "RR" 108+18

OFFSET 24 ft. Left

ENGINEER Salazar

EQUIPMENT Diedrich D-120, # 1082

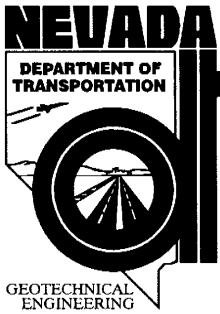
OPERATOR D. White

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 11/15/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2125.7	65								The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.	
2120.7	70									
2115.7	75									
2110.7	80									
2105.7	85									



GEOTECHNICAL ENGINEERING

EXPLORATION LOG

START DATE 1/8/07

END DATE 1/8/07

JOB DESCRIPTION Boulder City Bypass - Phase1

LOCATION I 515 @ Railroad Pass

BORING RRA2

E.A. # 73307-1

GROUND ELEV. 2209.30 (ft)

HAMMER DROP SYSTEM Auto., ETR=65%

STATION "RR" 110+09

OFFSET 43 ft. Right

ENGINEER Bafghi

EQUIPMENT Diedrich D-120, #1627

OPERATOR D. White

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 1/8/2007

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2204.3	1.00			6				GW GM	Colluvial/Alluvial surface deposits WELL- GRADED GRAVEL WITH SILT AND SAND (GW/GM) with rock fragments, small cobbles/boulders, dry. A: light gray B: cobbles up to 1.0 foot in diameter. about 65% gravel, about 20% sand, about 15% fine-grained. C: Same as above. D: A rock fragment blocked the SPT sampler.	Bridge I-2869, Abutment 2 drill rig unit #1627 Drilling Method: HSA, 6 in. dia. 50 psi down pressure Auger was advanced to 1.0 foot.
	2.50	A	SPT	10	16	33				
	3.00			6						
	4.50	B	SPT	5	9	33				
	5.00			4						
	6.50	C	SPT	7	10	33				
				6						
	8.00			4						
	9.50	D	SPT	2	13	33				
				4						
2199.3	10.00			9				SM	SILTY SAND WITH GRAVEL(SM) weathered and decomposed igneous rock (Rhyolite/Andesite), with rock fragments, light gray.	
	11.50	E	SPT	6	47	53				
				21						
2194.3	13.00			26				SM		
	14.50	F	SPT	24	86	87				
	15.25	G	SPT	36	50/3"					
				50						
2189.3	20.00			44				SM		
	21.50	H	SPT	14	34	80				
				13						
2184.3	25.00			21				SM		
	26.50	I	SPT	14	66	67				
				24						
	30.00			42						



START DATE 1/8/07

EXPLORATION LOG

END DATE 1/8/07

JOB DESCRIPTION Boulder City Bypass - Phase1

STATION "RR" 110+09

LOCATION 1515 @ Railroad Pass

OFFSET 43 ft. Right

BORING RRA2

ENGINEER Bafghi

E.A. # 73307-1

EQUIPMENT Diedrich D-120, #1627

GROUND ELEV. 2209.30 (ft)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

OPERATOR D. White

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 1/8/2007

HAMMER DROP SYSTEM Auto., ETR=65%

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
	30.50	J	SPT	66/6"	66/6"	33				
2174.3	35.00	K	SPT	50/2.5"	50/2.5"				35.00 WEATHERED BEDROCK weathered and decomposed igneous rock (Rhyolite/Andesite), with rock fragments, light brown.	Drilling Operation resumed: 01-09-07.
2169.3	40.00	L	SPT	50/1.5"	50/1.5"				K: The auger cuttings are broken rock fragments. Smooth drilling from 40 feet to 60 feet.	Weather: sunny, low = 37, high = 66 degrees. 100 psi downpressure from 35 feet down.
2164.3	45.00	M	SPT	50/1.9"	50/1.9"					
2159.3	50.00	N	SPT	50/1.4"	50/1.4"					
2154.3	55.00	O	SPT	50/2.1"	50/2.1"					
	60.00								60.00	



EXPLORATION LOG

START DATE 1/8/07

END DATE 1/8/07

JOB DESCRIPTION Boulder City Bypass - Phase 1

LOCATION I 515 @ Railroad Pass

BORING RRA2

E.A. # 73307-1

GROUND ELEV 2209.30 (ft)

HAMMER DROP SYSTEM Auto., ETR=65%

STATION "RR" 110+09

OFFSET 43 ft. Right

ENGINEER Bafghi

EQUIPMENT Diedrich D-120, #1627

OPERATOR D. White

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 1/8/2007

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
60.17	60.17	P	SPT	50/2"	50/2"				<p>End of Boring at 60.0 feet. Borehole was backfilled with auger cuttings. Groundwater was not encountered.</p> <p>Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble.</p> <p>Soil/rock descriptions are derived from visual field identifications and laboratory test data.</p> <p>The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.</p>	
2144.3	65									
2139.3	70									
2134.3	75									
2129.3	80									
2124.3	85									



EXPLORATION LOG

START DATE 10/26/06
 END DATE 10/26/06
 JOB DESCRIPTION Boulder City Bypass - Phase1
 LOCATION I 515 @ Railroad Pass
 BORING DCA1
 E.A. # 73307-1
 GROUND ELEV. 2240.40 (ft)
 HAMMER DROP SYSTEM Auto., ETR = 65% & 79%

STATION "DC" 22+47
 OFFSET 25 ft. Left
 ENGINEER Salazar
 EQUIPMENT Diedrich, #1627, #1082
 OPERATOR D. White
 DRILLING METHOD 6" H.S.A.
 BACKFILLED Yes DATE 10/26/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2235.4	3.00							SP SC	POORLY GRADED SAND WITH CLAY AND GRAVEL (SP-SC) , pale red (5 R 6/2), dry, with cobbles and small boulders, some rock fragments (Alluvium).	Bridge I-2870N, Abutment 1 Drill Rig unit # 1627 with ETR=65% was used from depths 0'-13.04'.
	4.50	A	SPT	7 13 26	39	67	W, S, PI			
	5.00							SC SM	SILTY, CLAYEY SAND WITH GRAVEL (SC-SM) , light brown (5 Y 6/4), with cobbles and small boulders, some rock fragments, dry.	Auger was advanced to 3 feet.
	6.50	B	SPT	14 24 34	58	80	W, S, PI			
	8.00									
2230.4	9.50	C	SPT	5 8 17	25	73	W, S, PI	SC	CLAYEY SAND WITH GRAVEL (SC) , yellowish grayish light brown (5 YR 5/6), highly weathered and altered bedrock (Rhyolite), with rock fragments, dry.	Drill Rig unit # 1082 with ETR = 79% was used from depths 13.04'-20.3'. Resumed: 11/14/06.
	10.00									
	11.00	D	SPT	50/0.6"	50/0.6"			SC	WEATHERED BEDROCK , grayish yellow (5 Y 8/4), dry. Auger refusal at 14.5 feet. Coring: 14 to 17.5 feet.	
	13.04	E	SPT	50/0.5"	50/0.5"					
2225.4	14.50								Hydro-thermally altered bedrock (Rhyolite) with gypsum intrusions. Coring: 14 to 17.5 feet: coring rate = 3.5 min./ft. Coring: 17.4 to 20.3 feet: coring rate = 4.5 min./ft. Unconfined Compressive Strength (psi) = 4408, 5013, 5273, 6404. Unit Weight (pcf) = 158.5, 153.9. RQD = 90.7%.	
	17.00	F1	CORE			97	RQD, U, G			
	20.00	F2	CORE							
2220.4	20.00							20.30	End of Boring at 20.3 feet. Backfilled with auger cuttings. Groundwater was not encountered.	
2215.4	25								Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble. Soil/rock descriptions are derived from visual field identifications and laboratory test data. The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.	



START DATE 10/25/06

END DATE 10/25/06

JOB DESCRIPTION Boulder City Bypass - Phase1

LOCATION I 515 @ Railroad Pass

BORING DCA2

E.A. # 73307-1

GROUND ELEV. 2247.20 (ft)

HAMMER DROP SYSTEM Auto., ETR=65%

EXPLORATION LOG

STATION "DC" 24+00

OFFSET 29 ft. Left

ENGINEER Salazar

EQUIPMENT Diedrich D-120, #1627

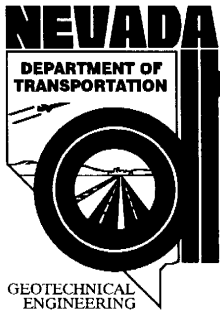
OPERATOR D. White

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 10/25/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2242.2	3.00							SC	CLAYEY SAND AND GRAVEL (SC) pale red (10 R 6/2), dry, with cobbles and small boulders, some rock fragments. Caliche caps on the ground (Alluvium).	Bridge I-2870N, Abutment 2 Drill Rig unit # 1627.
	4.50	A	SPT	10 15 21	36	67	W, S, PI			
	5.20							SC SM	SILTY, CLAYEY SAND WITH GRAVEL (SC) light brown (5 Y 6/4), with cobbles and small boulders, some rock fragments, dry (Alluvium).	Auger was advanced to 3 feet..
	6.70	B	SPT	16 15 37	52	60	W, S, PI			
2237.2	7.20	C1	CORE			40			WEATHERED BEDROCK dark reddish brown (10 R 3/4), Andesite/Rhyoite, highly fractured, dry. Coring C1: at 6.7 feet: coring rate = 4.5 min./ft., recovered 0.2 feet. Coring C2: at 7.2 feet: coring rate = 4.0 min./ft., 4.35 ft. run, recovered 0.2 feet.	
	10	C2	CORE			5				
	11.55									
	12.20	C3	CORE			15				
	15.30	D1	CORE			17				
2232.2	16.70	D2	CORE			36			End of Boring at 16.7 feet. Backfilled with auger cuttings. Groundwater was not encountered. Soil/rock descriptions are derived from visual field identifications and laboratory test data. The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.	
	20									
2227.2	25									



START DATE 10/18/06

END DATE 10/18/06

JOB DESCRIPTION Boulder City Bypass - Phase1

LOCATION I 515 @ Railroad Pass

BORING FA3

E.A. # 73307-1

GROUND ELEV. 2229.50 (ft)

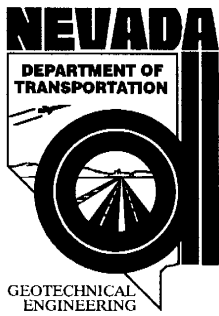
HAMMER DROP SYSTEM Auto., ETR=65%

EXPLORATION LOG

STATION "F" 27+26
 OFFSET 22 ft. Right
 ENGINEER Salazar
 EQUIPMENT Diedrich D-120, #1627
 OPERATOR D. White
 DRILLING METHOD 6" H.S.A.
 BACKFILLED Yes DATE 10/18/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2224.5	3.00							SW SM	<p>WELL- GRADED SAND WITH SILT AND GRAVEL (SW-SM) light brown, dry, with cobbles and small boulders, some rock fragments (Alluvium).</p> <p>5.00</p> <p>SILTY SAND WITH GRAVEL (SM) grayish red (10 R 4/2), weathered/fractured and hydro-thermally altered bedrock (Rhyolite/Andesite).</p> <p>9.00</p> <p>WEATHERED BEDROCK yellowish gray, weathered/fractured and hydro-thermally altered bedrock (Rhyolite/Andesite).</p> <p>12.50</p> <p>BEDROCK Rhyolite/Granite, yellowish gray, slightly weathered-hydrothermally altered.</p> <p>recovery = 95%, RQD = 81%. RQD = 81%. Unit Weight (pcf) = 150.8, 154.4</p> <p>18.65</p> <p>End of Boring at 18.65. Borehole was backfilled with auger cuttings. Groundwater was not encountered.</p> <p>Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble.</p> <p>Soil/rock descriptions are derived from visual field identifications and laboratory test data.</p> <p>The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.</p>	<p>Bridge I-2870S, Abutment 1</p> <p>Drill Rig unit # 1627.</p> <p>Auger was advanced to 3 feet.</p>
	4.50	A	SPT	11	27	87				
	5.00			16						
	6.50	B	SPT	23	63	73				
	8.00			25						
2219.5	9.00	C	SPT	39	85			SM		
	10.00			50/0.18	50/0.18					
2214.5	13.35	E1	CORE			74				
	13.65									
	15	E2	CORE			95				
2209.5	18.65									
	20									
2204.5	25									



START DATE 10/16/06

EXPLORATION LOG

SHEET 1 OF 2

END DATE 10/16/06

JOB DESCRIPTION Boulder City Bypass - Phase 1

STATION "F" 29+14.5

LOCATION I 515 @ Railroad Pass

OFFSET 1.0 ft. Left

BORING FA4

ENGINEER Salazar

E.A. # 73307-1

EQUIPMENT Diedrich D-120, #1627

GROUND ELEV. 2239.80 (ft)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

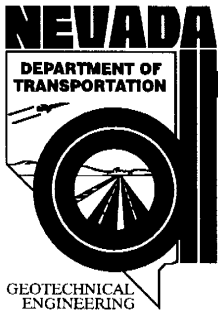
OPERATOR D. White

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 10/16/2006

HAMMER DROP SYSTEM Auto., ETR=65%

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2234.8	2.00							SM	SILTY SAND WITH GRAVEL (SM) light brown, with rock fragments, small cobbles, dry (Alluvium).	Bridge I-2870S, Abutment 2 Drill Rig unit # 1627.
	3.50	A	SPT	19 72	151	86	W, S, PI			
	4.43	B	SPT	26 50/5.2"	50/5.2"	67	W, S, PI			
	5.00									
	6.50	C1 C2	SPT	17 33 41	74		W, S, PI			
2229.8	8.00	D	SPT	15 30 37	67	93	W, S, PI	GM	SILTY GRAVEL WITH SAND (GM) with rock fragments, small cobbles, dry (Alluvium).	6 in. HSA. Auger was advanced to 2 feet. Started: 10:55 am. Weather: Sunny, 65 degrees.
	9.50	E	SPT	57 61 43	104	100	W, S, PI			
	10.25	F1	SPT	31	50/3"		W, PI			
	11.00	F2								
	12.50	G	SPT	23 30 98	128	87	W, S, PI			
2224.8	12.03	H	SPT	50/1.5"	50/1.5"		W, PI	SC	SILTY, CLAYEY SAND WITH GRAVEL(SC) light brown, with rock fragments, dry (Alluvium).	Sand Catcher was used in all SPT.
	14.00	I	SPT	50/0.5"	50/0.5"					
	15.00	J	SPT	50/0.8"	50/0.8"					
	20.00	K	SPT	50/0.8"	50/0.8"		W, PI			
	25.00	L	SPT	50/1.2"	50/1.2"		W, S			
2219.8	20.00							WEATHERED BEDROCK	WEATHERED BEDROCK grayish orange (10 YR 7/4), weathered and hydro-thermally altered bedrock (Rhyolite), with rock fragments.	USCS: SILTY SAND WITH GRAVEL(SM).
	20.00									
2214.8	20.00							WEATHERED BEDROCK	WEATHERED BEDROCK grayish orange (10 YR 7/4), weathered and hydro-thermally altered bedrock (Rhyolite), with rock fragments.	USCS: SILTY SAND WITH GRAVEL(SM).
	25.00									
2219.8	20.00							WEATHERED BEDROCK	WEATHERED BEDROCK grayish orange (10 YR 7/4), weathered and hydro-thermally altered bedrock (Rhyolite), with rock fragments.	USCS: SILTY SAND WITH GRAVEL(SM).
2214.8	25.00							WEATHERED BEDROCK	WEATHERED BEDROCK grayish orange (10 YR 7/4), weathered and hydro-thermally altered bedrock (Rhyolite), with rock fragments.	USCS: SILTY SAND WITH GRAVEL(SM).
	30.00									



START DATE 10/16/06

EXPLORATION LOG

END DATE 10/16/06

JOB DESCRIPTION Boulder City Bypass - Phase1

STATION "F" 29+14.5

LOCATION 1 515 @ Railroad Pass

OFFSET 1.0 ft. Left

BORING FA4

ENGINEER Salazar

E.A. # 73307-1

EQUIPMENT Diedrich D-120, #1627

GROUND ELEV 2239.80 (ft)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

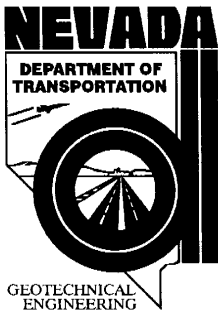
OPERATOR D. White

DRILLING METHOD 6" H.S.A.

HAMMER DROP SYSTEM Auto., ETR=65%

BACKFILLED Yes DATE 10/16/2006

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT		Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot					
	30.12	M	SP1	50/1.4	50/1.4				30.25	WEATHERED BEDROCK , highly fractured Rhyolite/Granite, light brown (5 YR 5/6), hydro-thermally altered.
2204.8	35.09	N	SPT	50/0.8	50/0.8					
	39.00								38.25	Very hard, highly fractured, mottled pale red (5 YR 6/2) and white, hydro-thermally altered bedrock (Rhyolite).
2199.8	40		O1 CORE							RQD = 0.
	40.60									
	41.48		O2 CORE						41.40	End of Boring at 41.4 feet. Borehole was backfilled with auger cuttings. Groundwater was not encountered.
2194.8	45									Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble.
										Soil/rock descriptions are derived from visual field identifications and laboratory test data.
										The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.
2189.8	50									
2184.8	55									



EXPLORATION LOG

START DATE 9/11/06

END DATE 9/13/06

JOB DESCRIPTION Boulder City Bypass - Phase 1

LOCATION I 515 @ Railroad Pass

BORING FA1

E.A. # 73307-1

GROUND ELEV. 2253.80 (ft)

HAMMER DROP SYSTEM Auto., ETR=65%

STATION "F" 14+80

OFFSET 20 ft. Right

ENGINEER Salazar

EQUIPMENT Diedrich D-120, #1627

OPERATOR D. White

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 9/13/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT		Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot					
2248.8	3.50							SW SC	WELL-GRADED SAND WITH CLAY AND GRAVEL (SW-SC) grayish orange pink (10 YR 8/2), dense, dry, with cobbles and small boulders, some rock fragments (Alluvium).	Bridge I-2871, Abutment 1 Drill Rig unit # 1627. Auger was advanced to 3.5 feet.
	5.00	A	SPT	27 33 23	56	73	W, H, PI			
	6.00									
	7.20	B	SPT	30 69 50/0.2'	50/0.2'	92	W, S, PI			
	8.50									
2243.8	8.90	C	SPT	50/0.4'	50/0.4'		W, S	SC	SILTY, CLAYEY SAND WITH GRAVEL (SC) grayish orange pink (10 YR 8/2), highly weathered/fractured and hydro-thermally altered granitic bedrock with veins, with rock fragments with caliche caps, very dense, dry. WEATHERED BEDROCK light olive gray (5 Y 5/2) with light brown (5 YR 5/6) veins and red iron stain, hydro-thermally altered Rhyolite/Andesite with occasional clay seams, very dense, dry.	RQD of all cores = 0
	11.60	D	SPT	50/0.1'	50/0.1'		W, PI			
	13.60	E	CORE	50/0.17'	50/0.17'	0				
	15.17		F1 CORE			53				
2238.8	16.50							SC		
	16.90		F2 CORE			40				
	17.50									
	18.50		F3 CORE			100				
	19.20		G1 CORE				W, PI			
	19.80									
	21.00		G2 CORE			100				
	21.70		G3 CORE			60				
2233.8	22.17							SC		
	22.87		G4 CORE			50				
	23.50									
	24.00		H1 CORE			50				
2228.8	24.25							SC		
	24.59		H2 CORE			34				
	28.60	I	SPT	50/0.1'	50/0.1'		W, S			
	30.00									



START DATE 9/13/06

END DATE 9/25/06

JOB DESCRIPTION Boulder City Bypass - Phase1

LOCATION I 515 @ Railroad Pass

BORING FP1

E.A. # 73307-1

GROUND ELEV. 2244.80 (ft)

HAMMER DROP SYSTEM Auto., ETR=65%

EXPLORATION LOG

STATION "F"16+00

OFFSET 8 ft. Left

ENGINEER Salazar

EQUIPMENT Diedrich D-120, #1627

OPERATOR D. White

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 9/25/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2239.8	2.00							SP SC	POORLY GRADED SAND WITH CLAY AND GRAVEL (SP-SC) light brown (5 YR 6/4) to grayish orange pink (5 YR 7/2), dry, with cobbles and small boulders, some rock fragments (Alluvium), dense.	Bridge I-2871, Pier 1 Drill Rig unit # 1627.
	3.50	A	SPT	19	38	67	W, S, PI			
	4.00			22						
2239.8	5.50	B	SPT	17	79	80	W, S, PI	GP GM	POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM) with rock fragments, small cobbles, dry, pale orange (Alluvium), v. dense.	Auger was advanced to 2 feet.
	5.50			49						
2234.8	9.00							SW SC	WELL- GRADED SAND WITH CLAY AND GRAVEL (SW-SC) orange pink (10 R 8/2), dry, with cobbles and small boulders, some rock fragments, with quartz crystals .	
	10.50	C	SPT	16	50	73	W, S, PI			
	10.50			21						
2229.8	14.00							WEATHERED BEDROCK weathered and partially decomposed igneous rock (Rhyolite/Andesite), with rock fragments, dry, pale orange and white (anhydrite), secondary mineralization of gypsum crystals. Granite looking rock fragments, hydro-thermally altered.		
	14.00	D	SPT	50/2.3"	50/2.3"					
2224.8	18.00							The weathered and decomposed component of the bedrock is classified as SILTY, CLAYEY SAND WITH GRAVEL(SC-SM) in USCS.		
	18.00	E	SPT	100/2.4"	100/2.4"		W, S, PI			
2219.8	24.00							Same as above, but not as many crystals.		
	24.00	F	SPT	50/0.7"	50/0.7"					
2219.8	29.00							Sample from the auger cuttings is classified as SC-SM.		
	29.00	G	SPT	50/1.3"	50/1.3"					
	29.90								Ended augering on 9-13-06. Resumed	



GEOTECHNICAL ENGINEERING

EXPLORATION LOG

START DATE 9/13/06
 END DATE 9/25/06
 JOB DESCRIPTION Boulder City Bypass - Phase1
 LOCATION 1515 @ Railroad Pass
 BORING FP1
 E.A. # 73307-1
 GROUND ELEV. 2244.80 (ft)
 HAMMER DROP SYSTEM Auto., ETR=65%

STATION "F"16+00
 OFFSET 8 ft. Left
 ENGINEER Salazar
 EQUIPMENT Diedrich D-120, #1627
 OPERATOR D. White
 DRILLING METHOD 6" H.S.A.
 BACKFILLED Yes DATE 9/25/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2209.8	31.00	H1	CORE			79	U, RQD	<p>Highly fractured quartz rich Rhyolite contains whitish thin clayey seams. Very hard.</p> <p>Unconfined Compressive Strength (psi) = 329 (?), 3683. Unit Weight (pcf) = 155.1. RQD = 75.2%.</p>	Coring on 9-25-06.	
	31.80	H2	CORE			100				
	32.00									
	34.00	H3	CORE			97				
2209.8	35	H4	CORE			97		36.33		
	36.33									
2204.8	40							<p>End of Boring at 36.33 feet. Borehole was backfilled with drill cuttings. Groundwater was not encountered.</p> <p>Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble.</p> <p>Soil/rock descriptions are derived from visual field identifications and laboratory test data.</p> <p>The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.</p>		
2199.8	45									
2194.8	50									
2189.8	55									



START DATE 9/27/06

EXPLORATION LOG

SHEET 1 OF 2

END DATE 9/27/06

STATION "F" 18+00

JOB DESCRIPTION Boulder City Bypass - Phase 1

OFFSET 30 ft. Left

LOCATION I 515 @ Railroad Pass

ENGINEER Salazar

BORING FP2

EQUIPMENT Diedrich D-120, #1627

E.A. # 73307-1

OPERATOR D. White

GROUND ELEV. 2234.40 (ft)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

DRILLING METHOD 6" H.S.A.

HAMMER DROP SYSTEM Auto., ETR=65%

BACKFILLED Yes DATE 9/27/2006

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2229.4	3.00							SW SC	WELL-GRADED SAND WITH CLAY AND GRAVEL (SW-SC) light brown (5 YR 5/6), dry, with cobbles and small boulders, some rock fragments (Alluvium).	Bridge I-2871, Pier 2 Drill Rig unit # 1627.
	4.50	A	SPT	20 31	89	73	W, S, PI			
	5.00	B1	SPT	36 38	78	73	W, PI	5.00 CLAYEY SAND WITH GRAVEL (SC) weathered and decomposed igneous rock (Rhyolite/Andesite), with rock fragments, dry, grayish orange pink (5 YR 7/2), hydro-thermally altered, very dense.	Auger was advanced to 3.0 feet.	
	6.00	B2		40						
	7.00									
	8.50	C	SPT	18 36 51	87	87	W, S, PI			
2224.4	9.50							SC		
	10.00	D	SPT	18 16 26	42	93	W, S, PI			
	11.00									
2219.4	12.00	E	SPT	50/1.2"	50/1.2"		W, PI	12.00 WEATHERED BEDROCK weathered and decomposed igneous rock (Rhyolite/Andesite), with rock fragments, dry, very light gray with white rock flour silt, sand, and gravel, hydro-thermally altered, very dense.	The weathered and decomposed component of the bedrock is classified as clayey sand (SC).	
	14.50									
	15.10	F	SPT	78 50/1.2"	50/1.2"		W, S, PI			
	18.50									
2214.4	19.77	G	SPT	50/3.2"	50/3.2"					
	20.00									
2209.4	24.50	H	SPT	50/0.8"	50/0.8"					
	29.50	I	SPT	50/1.2"	50/1.2"					
	30.00									

NV_DOT_BCB MARK.GPJ NV_DOT_GDT 6/16/11



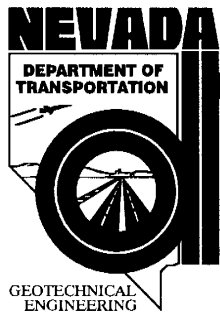
EXPLORATION LOG

START DATE 9/27/06
 END DATE 9/27/06
 JOB DESCRIPTION Boulder City Bypass - Phase1
 LOCATION I 515 @ Railroad Pass
 BORING FP2
 E.A. # 73307-1
 GROUND ELEV. 2234.40 (ft)
 HAMMER DROP SYSTEM Auto., ETR=65%

STATION "F" 18+00
 OFFSET 30 ft. Left
 ENGINEER Salazar
 EQUIPMENT Diedrich D-120, #1627
 OPERATOR D. White
 DRILLING METHOD 6" H.S.A.
 BACKFILLED Yes DATE 9/27/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT		Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot					
2199.4	35 35.62								Same as above, but the color is mottled red, light red, with quartz white in yellow orange.	rockier than above.
			J CORE			100	G, U		BEDROCK Rhyolite/Andesite, light bluish gray (5 B 7/1) and moderate reddish brown (10 R 4/6) to pale reddish brown (10 R 5/4), highly fractured. Less hydro-thermally altered than above. Coring with plain water.	
	38.32								RQD = 94.8%. Unit Weight (pcf) = 155.6, 153.7.	
2194.4	40								End of Boring at 37.9 feet. Borehole was backfilled with drill cuttings. Groundwater was not encountered.	
									Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble.	
2189.4	45								Soil/rock descriptions are derived from visual field identifications and laboratory test data.	
									The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.	
2184.4	50									
2179.4	55									



GEOTECHNICAL ENGINEERING

EXPLORATION LOG

START DATE 10/3/06

END DATE 10/3/06

JOB DESCRIPTION Boulder City Bypass - Phase1

LOCATION I 515 @ Railroad Pass

BORING FP3

E.A. # 73307-1

GROUND ELEV. 2229.30 (ft)

HAMMER DROP SYSTEM Auto., ETR=65%

STATION "F" 19+65

OFFSET 0 ft.

ENGINEER Salazar

EQUIPMENT Diedrich D-120, #1627

OPERATOR D. White

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 10/3/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT		Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot					
2224.3	3.00							SP SC	POORLY GRADED SAND WITH CLAY AND GRAVEL (SP-SC) light brown (5 Y 5/6) and pale yellowish brown (10 YR 6/2), dry, with cobbles and small boulders, some rock fragments (Alluvium).	Bridge I-2871, Pier 3 Drill Rig unit # 1627. Auger was advanced to 3.0 feet.
	4.30	A	SPT	30	50/3.6"	67	W, S, PI			
	4.67	B	SPT	50/2"	50/2"		W, PI			
	5									
2219.3	7.50							SC SM	SILTY, CLAYEY SAND WITH GRAVEL (SC-SM) weathered and decomposed igneous rock (Rhyolite/Andesite), with rock fragments, dry, medium light gray and light bluish gray (5 B 7/11), dry, hydro-thermally altered, very dense.	
	8.50	C	SPT	12	55		W, S			
	9.50									
	10	D	SPT	32	110	93	W, S, PI			
2214.3	11.00							GP GC	GRAVEL WITH CLAY AND SAND (GP-GC) weathered and decomposed igneous rock (Rhyolite/Andesite), with rock fragments, dry, grayish yellow and pinkish color, dry, hydro-thermally altered, very dense.	
	12.50									
	13.80	E	SPT	12	50/3.6"		W, S, PI			
	14.59	F	SPT	50/1.3"	50/1.3"		W, PI			
2209.3	17.50							G GC	BEDROCK Rhyolite/Andesite, pinkish gray (5 YR 8/1), medium bluish gray (5 B 5/1) and dark yellowish orange (10 YR 6/6), highly fractured, contains hydro-thermally altered mineralization (gypsum/anhydrite) in fractures. G cores: RQD = 92% Unconfined Compressive Strength (psi) = 2008, 3787, 4142, 2045, 5784. Unit Weight (pcf) = 154.8, 156.5, 154.1, 156.8. H cores: RQD = 89% to 90% Unconfined Compressive Strength (psi) = 834, 3613. Unit Weight (pcf) = 150.9, 157.6.	
	20.10	G1	CORE			96	RQD, U, G			
	22.50	G2	CORE			100	RQD, U, G			
	25	H	CORE			100	RQD, U, G			
2204.3	27.50								End of Boring at 27.5 feet. Borehole was backfilled with drill cuttings. Groundwater was not encountered.	
	27.70									

Note: Partial increment blow counts may be



EXPLORATION LOG

START DATE 10/3/06

END DATE 10/3/06

JOB DESCRIPTION Boulder City Bypass - Phase1

LOCATION I 515 @ Railroad Pass

BORING FP3

E.A. # 73307-1

GROUND ELEV 2229.30 (ft)

HAMMER DROP SYSTEM Auto., ETR=65%

STATION "F" 19+65

OFFSET 0 ft.

ENGINEER Salazar

EQUIPMENT Diedrich D-120, #1627

OPERATOR D. White

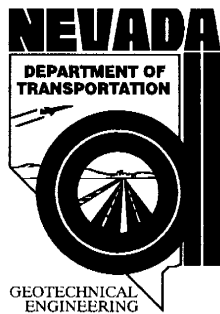
DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 10/3/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2194.3	35								<p>due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble.</p> <p>Soil/rock descriptions are derived from visual field identifications and laboratory test data.</p> <p>The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.</p>	
2189.3	40									
2184.3	45									
2179.3	50									
2174.3	55									

NV_DOT_BCB MARK.GPJ NV_DOT_GDT 6/16/11



GEOTECHNICAL ENGINEERING

EXPLORATION LOG

START DATE 10/4/06

END DATE 10/4/06

JOB DESCRIPTION Boulder City Bypass - Phase1

LOCATION I 515 @ Railroad Pass

BORING FA2

E.A. # 73307-1

GROUND ELEV. 2223.40 (ft)

HAMMER DROP SYSTEM Auto., ETR=65%

STATION "F" 21+09

OFFSET 12 ft. Right

ENGINEER Salazar

EQUIPMENT Diedrich D-120, #1627

OPERATOR D. White

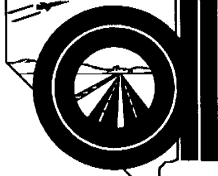
DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 10/4/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT		Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS		
		NO.	TYPE	6 inch Increments	Last 1 foot							
2218.4	4.50	5	A	SPT	28	50/0.35	W, S, PI	SP SC	POORLY GRADED SAND WITH CLAY AND GRAVEL (SP-SC) pale red (10 R 6/2), dry, with cobbles and small boulders, some rock fragments, dense to very dense (Alluvium).	Bridge I-2871, Abutment 2 Drill Rig unit # 1627. Auger was advanced to 4.5 feet.		
	5.35				50/0.35							
	7.50				35	37					27	W, PI
2213.4	9.00	10	B	SPT	20	28	W, S, PI	SW SM	WELL- GRADED SAND WITH SILT AND GRAVEL (SW-SM) pale red (10 R 6/2), dry, with cobbles and small boulders, some rock fragments (Alluvium).			
	9.50				17							
	11.00				10						15	13
	12.00				12.47						D	SPT
2208.4	14.50	15	E	SPT	24	56	W, S, PI	SW SM				
	16.00				24						32	
	19.50				11						41	73
2203.4	21.00	20	F	SPT	14	41	W, S, PI	SM				
	24.50				27							
2198.4	25	25	G	SPT	24	49	W, H, PI	SM	SILTY SAND WITH GRAVEL(SM) moderate to light brown and pale yellowish orange, weathered/fractured and hydro-thermally altered bedrock (Rhyolite/Andesite).	Color changes to grayish yellow (5 Y 8/4) at 29 feet.		
	26.00				22						27	
	29.50				34							

NV_DOT_BCB MARK.GPJ NV_DOT_GDI 6/16/11



EXPLORATION LOG

START DATE 10/4/06

END DATE 10/4/06

JOB DESCRIPTION Boulder City Bypass - Phase 1

LOCATION I 515 @ Railroad Pass

BORING FA2

E.A. # 73307-1

GROUND ELEV. 2223.40 (ft)

HAMMER DROP SYSTEM Auto., ETR=65%

STATION "F" 21+09

OFFSET 12 ft. Right

ENGINEER Salazar

EQUIPMENT Diedrich D-120, #1627

OPERATOR D. White

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 10/4/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT		Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot					
2188.4	30.72	H	SPT	50	50/0.22'		W, S, PI		<p>WEATHERED BEDROCK moderate to light brown and pale yellowish orange, weathered and hydro-thermally altered bedrock (Rhyolite). Rock fragments are covered in rock flour, mottled greenish gray, bluish white and dark yellowish orange (10 YR 6/6).</p> <p>The weathered and decomposed component of the bedrock (sample H) is classified as Poorly Graded Gravel With Silt and Sand (GP-GM).</p>	150 psi down pressure to 34.5 feet.
	34.50	I	SPT	50/0.22'	50/0.22'					
2183.4	39.68	J	SPT	50/0.15'	50/0.15'		W, PI		<p>BEDROCK Very hard, with clay filled fractures (2 inches +/-), grayish mottled green to very pale green. Dense to very dense.</p> <p>Unconfined Compressive Strength (psi) = 1902. Unit Weight (pcf) = 162.3, 164.5. RQD = 92.5%</p>	300 psi down pressure.
	42.60									
2178.4	43.35	K1	CORE			51			<p>End of Boring at 48.35. Borehole was backfilled with auger cuttings. Groundwater was not encountered.</p> <p>Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble.</p> <p>Soil/rock descriptions are derived from visual field identifications and laboratory test data.</p> <p>The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.</p>	500 psi down pressure, Auger refusal.
	48.07	K2	CORE			97	U, RQD, UW, G			
2173.4	50									
2168.4	55									

NV_DOT_BCB MARK.GPJ NV_DOT.GDT 6/16/11



START DATE 3/14/11

EXPLORATION LOG

SHEET 1 OF 4

END DATE 3/15/11

JOB DESCRIPTION Boulder City Bypass - Direct Connect, Northbound

STATION "P" 208+05

LOCATION I 515 @ Railroad Pass, Bridge H-2972N

OFFSET 41 feet Left

BORING NBA1

ENGINEER Margie Boutilier

E.A. # 73307-1

EQUIPMENT Diedrich D-120, #1627

GROUND ELEV. 2056.70 (ft)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

OPERATOR Larracuente

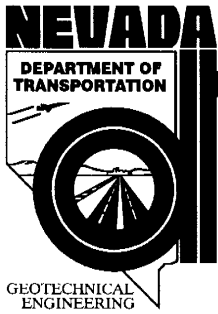
DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 3/15/2011

HAMMER DROP SYSTEM Auto., ETR=72%

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2051.7	1.00							SM	ALLUVIUM: Surface : Rocky; silty sand with gravel and cobbles, occassional boulders, sparsely vegetated (desert brushes Reese Wood), dry. Difficult site access due to small drainage /wash paths Samples B, E, F: SILTY SAND WITH GRAVEL (SM) -- 30% fine to coarse, hard, angular gravel; 55 to 57% fine to coarse sand; 12 to 14 % fines of non- plasticity, light brown, dry, med. dense.	down pressure: 150-200 psi.
	2.50	B	SPT	7	16	67	W, S, PI			
	4.00	C	SPT	9	18	78	W, S, PI			
	5.00			9						
	6.50	E	SPT	10	22	72	W, S, PI			
	8.00	F	SPT	19	35	67	W, S, PI			
	9.50	G	SPT	15	34	78	W, S, PI			
2046.7	10	H	SPT	21	50/1.2"	61	W, S, PI	SW SM	Samples G, H: WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) -- 33 to 45% fine to coarse, hard, angular gravel; 47 to 58% fine to coarse sand; 9% fines of non- plasticity, dry, dense to v. dense, light brown.	
	11.00			40	50/1.2"					
	11.50									
2041.7	13.00	I	SPT	10	22	83	W, S, PI	SW SM	Sample I: SILTY SAND WITH GRAVEL (SM) -- 18% fine to coarse, hard, angular gravel; 67% fine to coarse sand; 15% fines of non- plasticity, light brown, dry, med. dense. Samples J, K, L, M: WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) -- 26 to 36% fine to coarse, hard, angular gravel; 56 to 64% fine to coarse sand; 10% fines of non- plasticity, dry, dense, light brown.	
	14.50	J	SPT	11	24	83	W, S, PI			
	16.00	K	SPT	15	36	89	W, S, PI			
	17.50	L	SPT	15	35	89	W, S, PI			
	19.00	M	SPT	19	41	78	W, S, PI			
	20	N	SPT	11	62	89	W, S, PI			
2036.7	20.50			27				GW GM	Sample N: WELL-GRADED GRAVEL WITH SILT AND SAND (GW-GM) -- 51% fine to coarse, hard, angular gravel; about 43% fine to coarse sand; about 6 % fines of non- plasticity, dry, v. dense, light brown.	
	22.00	O	SPT	16	47	89	W, S, PI			
	23.50	P	SPT	24	76	94	W, S, PI			
	25.00	Q	SPT	22	82	89	W, S, PI			
				34	76	94	W, S, PI			
			23				SW SM	Samples O, P, Q: WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) -- 33 to 40% fine to coarse, hard, angular gravel; 51 to 59% fine to coarse sand; 8% fines of non- plasticity, dry, v. dense, light brown.		
			38	82	89	W, S, PI				
	25.00			44						

NV_DOT_BCB_NBA.GPJ NV_DOT_GDT 6/16/11



START DATE 3/14/11

EXPLORATION LOG

END DATE 3/15/11

JOB DESCRIPTION Boulder City Bypass - Direct Connect, Northbound

STATION "P" 208+05

LOCATION 1 515 @ Railroad Pass, Bridge H-2972N

OFFSET 41 feet Left

BORING NBA1

ENGINEER Margie Boutilier

E.A. # 73307-1

EQUIPMENT Diedrich D-120, #1627

GROUND ELEV. 2056.70 (ft)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

OPERATOR Larracuente

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 3/15/2011

HAMMER DROP SYSTEM Auto., ETR=72%

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2026.7	30.00	R	SPT	24	75	94	W, S, PI	SP SM	27.00 Sample R: POORLY-GRADED SAND WITH SILT AND GRAVEL (SP-SM) -- 40% fine to coarse, hard, angular gravel; 50% fine to coarse sand; 10% fines of non-plasticity, dry, v. dense, light brown.	
	31.50			33						
				42						
2021.7	35.00	S	SPT	29	82	94	W, S, PI	SM	35.00 Sample S: SILTY SAND WITH GRAVEL (SM) -- 31% fine to coarse, hard, angular gravel; 58% fine to coarse sand; 11% fines of non-plasticity, light brown, dry, v. dense.	
	36.50			37						
				45						
2016.7	40.00	T	SPT	27	86	89	W, S, PI	SW SM	40.00 Samples U, V: WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) -- 35 to 40% fine to coarse, hard, angular gravel; 50 to 56% fine to coarse sand; 10% fines of non-plasticity, dry, v. dense, light brown.	
	41.50			36						
				50						
2011.7	45.00	U	SPT	33	50/5.8"		W, S, PI	SW SM		
	46.00			50/5.8"						
	50.00									



GEOTECHNICAL
ENGINEERING

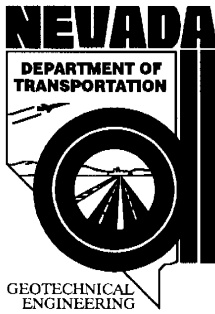
START DATE 3/14/11
 END DATE 3/15/11
 JOB DESCRIPTION Boulder City Bypass - Direct Connect, Northbound
 LOCATION I 515 @ Railroad Pass, Bridge H-2972N
 BORING NBA1
 E.A. # 73307-1
 GROUND ELEV. 2056.70 (ft)
 HAMMER DROP SYSTEM Auto., ETR=72%

EXPLORATION LOG

STATION "P" 208+05
 OFFSET 41 feet Left
 ENGINEER Margie Boutilier
 EQUIPMENT Diedrich D-120, #1627
 OPERATOR Larracuente
 DRILLING METHOD 6" H.S.A.
 BACKFILLED Yes DATE 3/15/2011

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2001.7	51.39	V	SPT	23 32 50/4.7"	50/4.7"		W, S, PI			
2001.7	55.00 55.49	W	SPT	50/5.9"	50/5.9"		S		Visual Classifications (based on auger cuttings): WELL-GRADED GRAVEL WITH SILT AND SAND (GW-GM) -- about 60% fine to coarse, hard, angular gravel; about 30% fine to coarse sand; about 10 % fines non-plasticity, dry, v. dense, light brown.	
1996.7	60.00 60.38	X	SPT	50/4.6"	50/4.6"					
1991.7	65.00 66.00	Y	SPT	50/0.5"	50/0.5"	0				
1986.7	70.00 70.49	Z	SPT	50/2.3"	50/2.3"	0				
	75.00							GW GM		

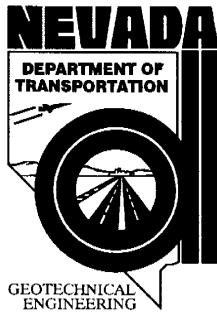


EXPLORATION LOG
 START DATE 3/14/11
 END DATE 3/15/11
 JOB DESCRIPTION Boulder City Bypass - Direct Connect, Northbound
 LOCATION 1515 @ Railroad Pass, Bridge H-2972N
 BORING NBA1
 E.A. # 73307-1
 GROUND ELEV. 2056.70 (ft)
 HAMMER DROP SYSTEM Auto., ETR=72%

STATION "P" 208+05
 OFFSET 41 feet Left
 ENGINEER Margie Boutilier
 EQUIPMENT Diedrich D-120, #1627
 OPERATOR Larracuente
 DRILLING METHOD 6" H.S.A.
 BACKFILLED Yes DATE 3/15/2011

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
	76.26	AA	SPT	50/3"	50/3"	0				
1976.7	80.00 80.20	BB	SPT	50/2.4"	50/2.4"	0		80.20	End of boring at 80.2 feet. Groundwater was not encountered. Sample A: Bulk sample 0 -5 feet: GW-GM. Sample D: Bulk sample 5 to 10 feet: GP-GM. Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble. Soil/rock descriptions are derived from visual field identifications and laboratory test data. The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.	
1971.7	85									
1966.7	90									
1961.7	95									



START DATE 3/15/11
END DATE 3/16/11
JOB DESCRIPTION Boulder City Bypass - Direct Connect, Northbound
LOCATION I 515 @ Railroad Pass, Bridge H-2972N
BORING NBA2
E.A. # 73307-1
GROUND ELEV. 2054.20 (ft)
HAMMER DROP SYSTEM Auto., ETR=72%

EXPLORATION LOG

STATION "P" 209+30
OFFSET 41 feet Left
ENGINEER Margie Boutilier
EQUIPMENT Diedrich D-120, #1627
OPERATOR Larracuent
DRILLING METHOD 6" H.S.A.
BACKFILLED Yes **DATE** 3/16/2011

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2049.2	1.00							SM	ALLUVIUM: Surface : Rocky; silty sand with gravel and cobbles, occasional boulders, sparsely vegetated (desert brushes Reese Wood), dry. Difficult site access due to small drainage /wash paths Samples B, C: SILTY SAND WITH GRAVEL (SM) -- 18% fine to coarse, hard, angular gravel; 65 to 69% fine to coarse sand; 12 to 16 % fines of non- plasticity, light brown, dry, med. dense. Samples E, F, G, H: WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) -- 21 to 28 % fine to coarse, hard, angular gravel; 62 to 67% fine to coarse sand; 9 to 12% fines of non-plasticity, dry, dense to v. dense, light brown.	150-200 psi down pressure.
	2.50	B	SPT	5 4	8	22				
	3.00	C	SPT	4 6	50/5"					
	4.00			50/5"						
2044.2	5.50	E	SPT	11 13	29	67		SW SM		
	7.00	F	SPT	12 20	50	72				
	8.50	G	SPT	14 18	46	67				
	10.00	H	SPT	14 13	31	61				
2039.2	11.00							SM	Samples I, J, K, L, M: SILTY SAND WITH GRAVEL (SM) -- 17 to 26% fine to coarse, hard, angular gravel; 56 to 65% fine to coarse sand; 13 to 18 % fines of non- plasticity, light brown, dry, dense to v. dense.	
	12.50	I	SPT	8 12	27	67				
	14.00	J	SPT	9 12	24	67				
	15.50	K	SPT	8 18	39	72				
2034.2	17.00	L	SPT	31 29	48	72		SP SM	Sample N: POORLY-GRADED SAND WITH SILT AND GRAVEL (SP-SM) -- 37 % fine to coarse, hard, angular gravel; 52% fine to coarse sand; 11% fines of non- plasticity, dry, dense, light brown. Sample O WELL-GRADED GRAVEL WITH SILT AND SAND (GW-GM) -- 50% fine to coarse, hard, angular gravel; 40% fine to coarse sand; 10 % fines non- plasticity, dry, v. dense , light brown. Sample P: SILTY SAND WITH GRAVEL (SM) -- 36% fine to coarse, hard, angular gravel; 48% fine to coarse sand; 16 % fines of non- plasticity, light brown, dry, v. dense.	
	18.50	M	SPT	13 26	44	78				
	20.00	N	SPT	18 22	40	67				
	21.00									
2034.2	21.66	O	SPT	18	50/1.3"			GW GM		
	22.50									
	22.78	P	SPT	50/3.1"	50/3.1"					
	24.00									
2034.2	24.87	Q	SPT	40	50/4.4"			SP	Sample Q: POORLY-GRADED SAND WITH SILT AND GRAVEL (SP-SM) -- 36 % fine to	
				50/4.4"						

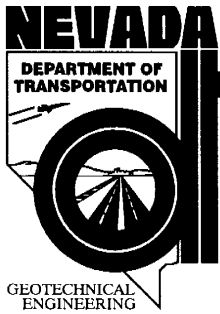


EXPLORATION LOG
 START DATE 3/15/11
 END DATE 3/16/11
 JOB DESCRIPTION Boulder City Bypass - Direct Connect, Northbound
 LOCATION I 515 @ Railroad Pass, Bridge H-2972N
 BORING NBA2
 E.A. # 73307-1
 GROUND ELEV. 2054.20 (ft)
 HAMMER DROP SYSTEM Auto., ETR=72%

STATION "P" 209+30
 OFFSET 41 feet Left
 ENGINEER Margie Boutillier
 EQUIPMENT Diedrich D-120, #1627
 OPERATOR Larracuente
 DRILLING METHOD 6" H.S.A.
 BACKFILLED Yes DATE 3/16/2011

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2024.2	25.50							SM	25.50 coarse, hard, angular gravel; 53% fine to coarse sand; 11% fines of non-plasticity, dry, v. dense, light brown. Samples R, S POORLY-GRADED GRAVEL WITH SILT AND SAND (GP-GM) -- 46% fine to coarse, hard, angular gravel; 42 to 45% fine to coarse sand; 8 to 12 % fines non-plasticity, dry, v. dense, light brown. 28.50 Samples T, U, V, W: WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) -- 22 to 38 % fine to coarse, hard, angular gravel; 54 to 70% fine to coarse sand; 8% fines of non-plasticity, dry, v. dense, light brown.	
	26.27	R	SPT	32 50/2.6"	50/2.6"			GP GM		
	27.00									
	27.79	S	SPT	30 50/3.5"	50/3.5"			GP GM		
	28.50									
	29.44	T	SPT	23 50/5.3"	50/5.3"					
	30.00									
	31.50	U	SPT	27 36 41	77	61				
2019.2	35.00							SW SM		
	36.50	V	SPT	17 32 32	64	61				
2014.2	40.00									
	41.50	W	SPT	16 22 23	45	78				
2009.2	45.00									
	45.35	X	SPT	50/4.2"	50/4.2"			GP GM		
	50.00									



START DATE 3/15/11

END DATE 3/16/11

JOB DESCRIPTION Boulder City Bypass - Direct Connect, Northbound

LOCATION I 515 @ Railroad Pass, Bridge H-2972N

BORING NBA2

E.A. # 73307-1

GROUND ELEV. 2054.20 (ft)

HAMMER DROP SYSTEM Auto., ETR=72%

EXPLORATION LOG

STATION "P" 209+30

OFFSET 41 feet Left

ENGINEER Margie Boutilier

EQUIPMENT Diedrich D-120, #1627

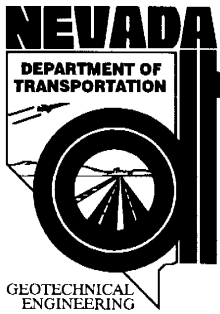
OPERATOR Larracuente

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 3/16/2011

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
1999.2	50.48	Y	SPT	50/5.7"	50/5.7"			SW SM	Samples Y, Z: WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) --24 to 40 % fine to coarse, hard, angular gravel; 50 to 67% fine to coarse sand; 9 to 10% fines of non-plasticity, dry, v. dense, light brown.	
	55.00									
	56.50	Z	SPT	40	84	89				
1994.2	60.00							60.00	Samples BB, DD, EE: POORLY-GRADED SAND WITH SILT AND GRAVEL (SP-SM) --25 to 35% fine to coarse, hard, angular gravel; 55 to 67% fine to coarse sand; 8 to 10% fines of non-plasticity, dry, v. dense, light brown.	
	60.88	AA	SPT	38 50/4.5"	50/4.5"					
1989.2	65.00									
	65.99	BB	SPT	35 50/5.9"	50/5.9"					
1984.2	70.00							SP SM		
	70.43	CC	SPT	50/5.2"	50/5.2"					
	75.00									



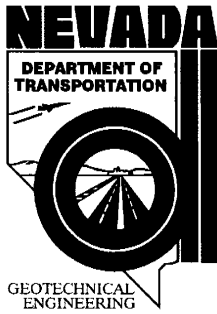
EXPLORATION LOG

START DATE 3/15/11
 END DATE 3/16/11
 JOB DESCRIPTION Boulder City Bypass - Direct Connect, Northbound
 LOCATION I 515 @ Railroad Pass, Bridge H-2972N
 BORING NBA2
 E.A. # 73307-1
 GROUND ELEV. 2054.20 (ft)
 HAMMER DROP SYSTEM Auto., ETR=72%

STATION "P" 209+30
 OFFSET 41 feet Left
 ENGINEER Margie Boutilier
 EQUIPMENT Diedrich D-120, #1627
 OPERATOR Larracuente
 DRILLING METHOD 6" H.S.A.
 BACKFILLED Yes DATE 3/16/2011

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
1974.2	75.93	DD	SPT	24 50/5.2"	50/5.2"					
1974.2	80.00 80.49	EE	SPT	50/5.9"	50/5.9"			80.50	End of boring at 80.5 feet. Sample A: Bulk sample 0 -5 feet: GW-GM. Sample D: Bulk sample 5 to 10 feet: SP-SM. Groundwater was not encountered. Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble. Soil/rock descriptions are derived from visual field identifications and laboratory test data. The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.	
1969.2	85									
1964.2	90									
1959.2	95									

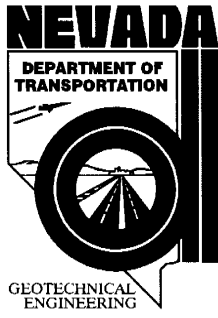


EXPLORATION LOG
 START DATE 3/14/11
 END DATE 3/15/11
 JOB DESCRIPTION Boulder City Bypass - Direct Connect, Southbound
 LOCATION I 515 @ Railroad Pass, Bridge H-2972S
 BORING SBA1
 E.A. # 73307-1
 GROUND ELEV. 2051.40 (ft)
 HAMMER DROP SYSTEM Auto., ETR=87%

STATION "P" 209+59
 OFFSET 41 feet Right
 ENGINEER Abbas Bafghi
 EQUIPMENT Diedrich D-120, #1082
 OPERATOR O. Altamirano
 DRILLING METHOD 6" H.S.A.
 BACKFILLED Yes DATE 3/15/2011

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT		Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot					
2046.4	1.00							SP SM	ALLUVIUM: Surface : Rocky; silty sand with gravel and cobbles, occasional boulders, sparsely vegetated (desert brushes Reese Wood), dry. Difficult site access due to small drainage /wash paths Sample A: POORLY-GRADED SAND WITH SILT AND GRAVEL (SP-SM) -- 19% fine to coarse, hard, angular gravel; 73% fine to coarse sand; 8 % fines of non- plasticity, dry, loose, light brown. Sample B: POORLY-GRADED GRAVEL WITH SILT AND SAND (GP-GM) -- 54% fine to coarse, hard, angular gravel; 37% fine to coarse sand; 9 % fines of non- plasticity, dry, loose, light brown. Sample C: SILTY SAND WITH GRAVEL (SM) -- 41% fine to coarse, hard, angular gravel; 45% fine to coarse sand; 14 % fines of non- plasticity, light brown, dry, dense. Sample D: POORLY-GRADED SAND WITH SILT AND GRAVEL (SP-SM) -- 20% fine to coarse, hard, angular gravel; 67% fine to coarse sand; 13 % fines of non- plasticity, dry, dense, light brown. Sample E: WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) -- 20% fine to coarse, hard, angular gravel; 72% fine to coarse sand; 8 % fines of non- plasticity, dry, med. dense, light brown. Sample F: SILTY SAND WITH GRAVEL (SM) -- 20% fine to coarse, hard, angular gravel; 67% fine to coarse sand; 13 % fines of non- plasticity, light brown, dry, dense. Samples G, I, J: WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) -- 21 to 29% fine to coarse, hard, angular gravel; 58 to 70% fine to coarse sand; 7 to 12 % fines of non- plasticity, dry, dense to v. dense, light brown.	Location: Direct Connect Bridge-Southbound, near US 95 Structure: H2972S Weather: Sunny, High 80 degrees 100 psi down pressure. new SPT shoe is used at 21 feet.
	2.50	A	SPT	10 3	5	67	W, S			
	3.50			2				GP GM		
	5.00	B	SPT	2 2	9		W, S			
	6.00			7				SM		
7.50	C	SPT	18 33	59	80	W, S, PI				
8.50			26							
2041.4	10.00	D	SPT	16 23	41	80	W, S, PI	SP SM		
	11.00			18						
	12.50	E	SPT	10 9	19	80	W, S, PI	SW SM		
13.50			10							
2036.4	15.00	F	SPT	16 19	33	83	W, S, PI	SM		
	16.00			14						
	17.50	G	SPT	15 15	30	77	W, S, PI	SW SM		
	18.50			15						
2031.4	20.00	H	SPT	41 31	51	73	W, S, PI	SW SM		
	21.00			20						
	22.50	I	SPT	11 26	61	87	W, S, PI			
	23.50			35						
	25.00	J	SPT	15 21	48	83	W, S, PI			



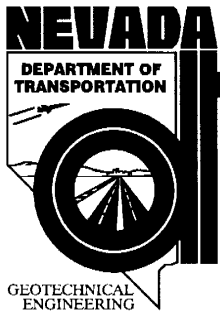
EXPLORATION LOG

START DATE 3/14/11
 END DATE 3/15/11
 JOB DESCRIPTION Boulder City Bypass - Direct Connect, Southbound
 LOCATION 1 515 @ Railroad Pass, Bridge H-2972S
 BORING SBA1
 E.A. # 73307-1
 GROUND ELEV. 2051.40 (ft)
 HAMMER DROP SYSTEM Auto., ETR=87%

STATION "P" 209+59
 OFFSET 41 feet Right
 ENGINEER Abbas Bafghi
 EQUIPMENT Diedrich D-120, #1082
 OPERATOR O. Altamirano
 DRILLING METHOD 6" H.S.A.
 BACKFILLED Yes DATE 3/15/2011

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
1996.4	54.50							SP SM	Samples R, S, T: POORLY-GRADED SAND WITH SILT AND GRAVEL (SP-SM) -- 24 to 43% fine to coarse, hard, angular gravel; 46 to 64% fine to coarse sand; 10 to 11 % fines of non- plasticity, dry, dense to v. dense, light brown.	new SPT shoe is used at 54.5 feet.
	55	R	SPT	37 46	107	87	W, S, PI			
	56.00									
1991.4	59.50							SP SM	Samples R, S, T: POORLY-GRADED SAND WITH SILT AND GRAVEL (SP-SM) -- 24 to 43% fine to coarse, hard, angular gravel; 46 to 64% fine to coarse sand; 10 to 11 % fines of non- plasticity, dry, dense to v. dense, light brown.	new SPT shoe is used at 54.5 feet.
	60	S	SPT	27 52	50/2.6"	77	W, S, PI			
	60.72				50/2.6"					
1986.4	64.50							SP SM	Samples R, S, T: POORLY-GRADED SAND WITH SILT AND GRAVEL (SP-SM) -- 24 to 43% fine to coarse, hard, angular gravel; 46 to 64% fine to coarse sand; 10 to 11 % fines of non- plasticity, dry, dense to v. dense, light brown.	new SPT shoe is used at 54.5 feet.
	65.00	T	SPT	84	84		W, S			
	65									
1981.4	69.50							SP SM	Samples R, S, T: POORLY-GRADED SAND WITH SILT AND GRAVEL (SP-SM) -- 24 to 43% fine to coarse, hard, angular gravel; 46 to 64% fine to coarse sand; 10 to 11 % fines of non- plasticity, dry, dense to v. dense, light brown.	new SPT shoe is used at 54.5 feet.
	70.10	U	SPT	55	50/1.2"		W, S			
	70				50/1.2"					
	74.50									
				51						
										75.00



START DATE 3/14/11

EXPLORATION LOG

END DATE 3/15/11

JOB DESCRIPTION Boulder City Bypass - Direct Connect, Southbound

STATION "P" 209+59

LOCATION I 515 @ Railroad Pass, Bridge H-2972S

OFFSET 41 feet Right

BORING SBA1

ENGINEER Abbas Bafghi

E.A. # 73307-1

EQUIPMENT Diedrich D-120, #1082

GROUND ELEV. 2051.40 (ft)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

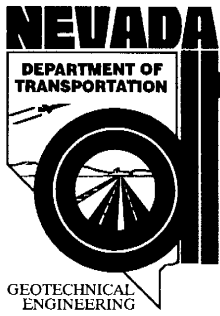
OPERATOR O. Altamirano

DRILLING METHOD 6" H.S.A.

HAMMER DROP SYSTEM Auto., ETR=87%

BACKFILLED Yes DATE 3/15/2011

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
	75.26	V	SPT	70/3"	70/3"		W, S, PI	GP GM	Sample W: POORLY-GRADED GRAVEL WITH SILT AND SAND (GP-GM) -- 45% fine to coarse, hard, angular gravel; 43% fine to coarse sand; 12 % fines of non- plasticity, dry, v. dense , light brown.	
1971.4	80 80.50	W	SPT	92 135	135		W, S, PI			
	85								End of boring at 80.5 feet. Groundwater was not encountered. Bulk samples from ground surface to the depth of 10 feet are classified as GP and GP-GM. Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble. Soil/rock descriptions are derived from visual field identifications and laboratory test data. The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.	drilling operation was ended at 1:00 pm.
1966.4										
1961.4	90									
1956.4	95									



START DATE 3/15/11

EXPLORATION LOG

END DATE 3/16/11

JOB DESCRIPTION Boulder City Bypass - Direct Connect, Southbound

STATION "P" 210+59

LOCATION I 515 @ Railroad Pass, Bridge H-2972S

OFFSET 41 feet Right

BORING SBA2

ENGINEER Abbas Bafghi

E.A. # 73307-1

EQUIPMENT Diedrich D-120, #1082

GROUND ELEV. 2050.50 (ft)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

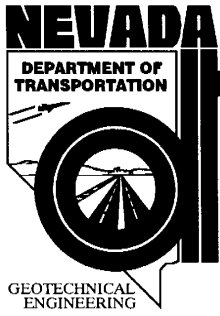
OPERATOR O. Altamirano

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 3/16/2011

HAMMER DROP SYSTEM Auto., ETR=87%

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2045.5	1.00							SP SM	<p>ALLUVIUM: Surface : Rocky; silty sand with gravel and cobbles, occassional boulders, sparsely vegetated (desert brushes Reese Wood), dry. Difficult site access due to small drainage /wash paths</p> <p>Samples A, B, D, E: POORLY-GRADED SAND WITH SILT AND GRAVEL AND WITH COBBLES (SP-SM) -- 22 to 38 % fine to coarse, hard, angular gravel; 51 to 67% fine to coarse sand; 10 to 12 % fines of non- plasticity, dry, med.dense to dense, light brown.</p> <p>Drill rig chatters at 3 feet and at 6 feet due to presence of cobbles/cemented soil (caliche).</p>	<p>Location: Direct Connect Bridge-Southbound, near US 95</p> <p>Structure: H2972S</p> <p>Weather: Sunny, High 82 degrees</p>
	2.50	A	SPT	5 8 14	22	73	W, S, PI			
	3.50									
	5.00	B	SPT	8 10 10	20	80	W, S, PI			
	6.00									
2040.5	7.50	C	SPT	3 6 9	15	63	W, S, PI	SW SM	<p>Sample D: 24 blows was due to blockage of sampler by a rock fragment.</p> <p>Auger cuttings are mainly rock fragments of gravel size.</p>	<p>100 psi down pressure.</p>
	8.50									
	10.00	D	SPT	10 11 24	35	80	W, S, PI			
	11.00									
	12.50	E	SPT	8 15 15	30	77	W, S, PI			
2035.5	13.50							SW SM	<p>Samples F, G, H, I: WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) -- 26 to 40% fine to coarse, hard, angular gravel; 54 to 66% fine to coarse sand; 7 to 10 % fines of non- plasticity, dry, med. dense, light brown.</p>	
	15.00	F	SPT	7 9 8	17	60	W, S, PI			
	16.00									
	17.50	G	SPT	7 8 8	16	73	W, S, PI			
	18.50									
2030.5	20.00	H	SPT	8 10 12	22	70	W, S, PI	SW SM	<p>Samples J, K: SILTY SAND WITH GRAVEL (SM) -- 17% fine to coarse, hard, angular gravel; 66 to 70% fine to coarse sand; 13 to 17 % fines of non- plasticity, light brown, dry, v. dense.</p>	
	21.00									
	22.50	I	SPT	5 8 17	25	67	W, S			
	23.50									
	25.00	J	SPT	16 20 39	59	73	W, S, PI			

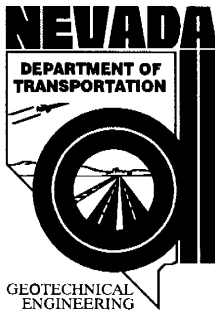


EXPLORATION LOG
 START DATE 3/15/11
 END DATE 3/16/11
 JOB DESCRIPTION Boulder City Bypass - Direct Connect, Southbound
 LOCATION I 515 @ Railroad Pass, Bridge H-2972S
 BORING SBA2
 E.A. # 73307-1
 GROUND ELEV. 2050.50 (ft)
 HAMMER DROP SYSTEM Auto., ETR=87%

STATION "P" 210+59
 OFFSET 41 feet Right
 ENGINEER Abbas Bafghi
 EQUIPMENT Diedrich D-120, #1082
 OPERATOR O. Altamirano
 DRILLING METHOD 6" H.S.A.
 BACKFILLED Yes DATE 3/16/2011

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT		Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot					
	26.00							SM	Trace of gypsum in sample K.	
	26.45	K	SPT	100/5.4"	100/5.4"		W, S, PI			
	28.50							SM	Samples L, M, N, O, P, Q, R: WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) -- 20 to 38% fine to coarse, hard, angular gravel; 54 to 71% fine to coarse sand; 8 to 11 % fines of non- plasticity, dry, v. dense, light brown. Sample Q: strong cementation (caliche). Sample R: Trace of gypsum.	Depth 30 feet: Drilling resumed at 8:00 am on 3/16/2011.
2020.5	30.00	L	SPT	19 34 22	56	80	W, S, PI			
	34.50									
2015.5	35	M	SPT	17 29 30	59	77	W, S, PI			
	36.00									
	39.50									
2010.5	40	N	SPT	22 22 29	51	73	W, S, PI			
	41.00									
	44.50									
2005.5	45	O	SPT	18 23 36	59	78	W, S, PI			
	46.00							SW SM		
	49.50									
				17						



EXPLORATION LOG
 START DATE 3/15/11
 END DATE 3/16/11
 JOB DESCRIPTION Boulder City Bypass - Direct Connect, Southbound
 LOCATION I 515 @ Railroad Pass, Bridge H-2972S
 BORING SBA2
 E.A. # 73307-1
 GROUND ELEV. 2050.50 (ft)
 HAMMER DROP SYSTEM Auto., ETR=87%

STATION "P" 210+59
 OFFSET 41 feet Right
 ENGINEER Abbas Bafghi
 EQUIPMENT Diedrich D-120, #1082
 OPERATOR O. Altamirano
 DRILLING METHOD 6" H.S.A.
 BACKFILLED Yes DATE 3/16/2011

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
1995.5	51.00	P	SPT	19	43	73	W, S, PI			
	54.50									
	55	Q	SPT	38	120	92	W, S, PI			
1990.5	56.00			53						
	59.50									
	60	R	SPT	26	72	87	W, S, PI			
1985.5	61.00			34				SM	64.00 Sample S : SILTY SAND WITH GRAVEL (SM) -- 36% fine to coarse, hard, angular gravel; 51% fine to coarse sand; 13 % fines of non- plasticity, light brown, dry, v. dense. 66.00	
	64.50									
	65	S	SPT	31	79	80	W, S, PI			
1980.5	66.00			41				GP GM	Samples T, U: (Visual Classification): POORLY-GRADED GRAVEL WITH SILT AND SAND (GP-GM) -- about 60% fine to coarse, hard, angular gravel; about 30% fine to coarse sand; about 10 % fines of non- plasticity, dry, v. dense , light brown. Drill rig chatters within this depth. samples T and U: high blow counts are due to presence of gravel/cemented soils (caliche).	
	69.50									
	70.00	T	SPT	107	107		W, PI			
	74.50	U	SPT	100/2.1"	100/2.1"		W			



EXPLORATION LOG

START DATE 3/15/11

END DATE 3/16/11

JOB DESCRIPTION Boulder City Bypass - Direct Connect, Southbound

LOCATION I 515 @ Railroad Pass, Bridge H-2972S

BORING SBA2

E.A. # 73307-1

GROUND ELEV. 2050.50 (ft)

HAMMER DROP SYSTEM Auto., ETR=87%

STATION "P" 210+59

OFFSET 41 feet Right

ENGINEER Abbas Bafghi

EQUIPMENT Diedrich D-120, #1082

OPERATOR O. Altamirano

DRILLING METHOD 6" H.S.A.

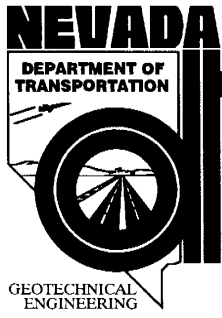
BACKFILLED Yes DATE 3/16/2011

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
1970.5	80								77.30	End of boring at 77.3 feet. Groundwater was not encountered. Bulk sample 0 -5 feet: SP-SM. Bulk sample 5 to 10 feet: GP-GM. Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble. Soil/rock descriptions are derived from visual field identifications and laboratory test data. The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.
1965.5	85									
1960.5	90									
1955.5	95									

Borehole RRBA1 Location





START DATE 3/16/11

EXPLORATION LOG

END DATE 4/4/11

JOB DESCRIPTION Boulder City Bypass - Railroad Bridge

STATION "P" 96+75

LOCATION I 515 @ Railroad Pass, Bridge G-2872

OFFSET 51 feet Right

BORING RRBA1

ENGINEER Abbas Bafghi

E.A. # 73307-1

EQUIPMENT Diedrich D-120, #1082

GROUND ELEV. 2384.80 (ft)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

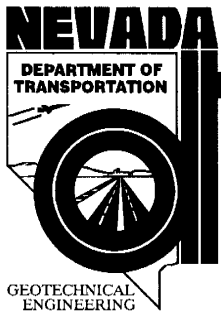
OPERATOR O. Altamirano

DRILLING METHOD 6" H.S.A

HAMMER DROP SYSTEM Auto., ETR = 87%

BACKFILLED Yes DATE 4/04/2011

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT		Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot					
2379.8	5.00								<p>ALLUVIUM: Alluvial deposits of River Mountains formation.</p> <p>Ground surface : silty-sand-gravel-cobbles, occasional boulders, sparsely vegetated (desert brushes Reese Wood), dry. Borehole location is approximately 8 feet above the railroad track. The railroad bridge foundations are approximately 40 feet below this ground surface.</p> <p>Drill rig chatters, hard drilling, presence of cobbles/cemented soils/breccia.</p> <p>5.00 Sample A: POORLY-GRADED GRAVEL WITH SILT AND SAND (GP-GM)-- 50% fine to coarse, hard, angular gravel; 40% fine to coarse sand; 10 % fines non- plasticity, dry, v. dense , light brown.</p> <p>10.00 Sample B: recovery = 4 inches; not enough sample for soil classification. Auger Cuttings: GP-GM (visual classification)</p> <p>20.00 Sample D: WELL-GRADED GRAVEL WITH SILT AND SAND (GW-GM)-- 57% fine to coarse, hard, angular gravel; about 33% fine to coarse sand; about 10 % fines of non- plasticity, dry, med. dense , light brown.</p>	<p>Borehole location was chosen based on site access condition.</p> <p>started: 3 pm.</p> <p>Rig unit #1082.</p> <p>6 inch H.S.A.</p> <p>300 psi down pressure to depth of 20 feet.</p> <p>New Tri-Wing drill bit is used at 13 feet.</p> <p>down-pressure: 100-150 psi from 20 feet down.</p>
	5.90	A	SPT	12	56/4.75"	57	W, S, PI	GP GM		
2374.8	10.00									
	10.33	B	SPT	100/4"	100/4"		W, S, PI			
2369.8	15.00									
	15.00	C	SPT	20/1"	20/1"		W, PI			
2364.8	20.00									
	20.00			5						
	21.50	D	SPT	8	18	53	W, S, PI	GW GM		
	25.00			10						



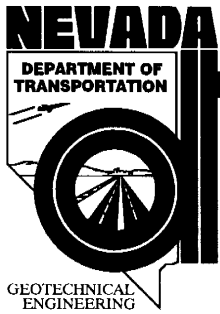
EXPLORATION LOG
 START DATE 3/16/11
 END DATE 4/4/11
 JOB DESCRIPTION Boulder City Bypass - Railroad Bridge
 LOCATION I 515 @ Railroad Pass, Bridge G-2872
 BORING RRBA1
 E.A. # 73307-1
 GROUND ELEV. 2384.80 (ft)
 HAMMER DROP SYSTEM Auto., ETR = 87%

STATION "P" 96+75
 OFFSET 51 feet Right
 ENGINEER Abbas Bafghi
 EQUIPMENT Diedrich D-120, #1082
 OPERATOR O. Altamirano
 DRILLING METHOD 6" H.S.A
 BACKFILLED Yes DATE 4/04/2011

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT		Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot					
2354.8	26.50	E	SPT	31 45 60	105	87	W, S, PI	SP SM	Sample E: POORLY-GRADED SAND WITH SILT AND GRAVEL (SP-SM) -- 41% fine to coarse, hard, angular gravel; 47% fine to coarse sand; 12% fines of non-plasticity, dry, v. dense, light brown.	
	30.00									
2349.8	30.80	F	SPT	35 50/3.5"	50/3.5"		W, S, PI	SM	Sample F: SILTY SAND WITH GRAVEL (SM) -- 31% fine to coarse, hard, angular gravel; 52% fine to coarse sand; 17% fines of medium plasticity (LL = 43, PL = 33), light brown, dry, v. dense.	
	35.00									
2344.8	36.06	G	SPT	14 44	30/0.75"		W, S, PI	GP GM	Samples G, H: POORLY-GRADED GRAVEL WITH SILT AND SAND (GP-GM) -- 50 to 52% fine to coarse, hard, angular gravel; 37 to 38% fine to coarse sand; 11 to 12% fines low to medium plasticity (LL = 39 to 45, PL = 31 to 32), dry, v. dense, light brown.	
	40.00									
2339.8	41.50	H	SPT	24 35 35	70	78	W, S, PI	GP GM		End of the day at 41 feet. resumed drilling at 9:00 am on 04/04/11.
	45.00									
	45.43	I	SPT	70/5"	70/5"		W, S			
	50.00									

NV_DOT_BCB_RRB_GPJ_NV_DOT_GDT_6/16/11



START DATE 3/16/11

EXPLORATION LOG

END DATE 4/4/11

JOB DESCRIPTION Boulder City Bypass - Railroad Bridge

STATION "P" 96+75

LOCATION I 515 @ Railroad Pass, Bridge G-2872

OFFSET 51 feet Right

BORING RRBA1

ENGINEER Abbas Bafghi

E.A. # 73307-1

EQUIPMENT Diedrich D-120, #1082

GROUND ELEV. 2384.80 (ft)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

OPERATOR O. Altamirano

DRILLING METHOD 6" H.S.A

HAMMER DROP SYSTEM Auto., ETR = 87%

BACKFILLED Yes DATE 4/04/2011

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2329.8	50.31	J	SPT	50/3.75"	50/3.75"		W, S	SM	Sample J: SILTY SAND WITH GRAVEL (SM) -- 40% fine to coarse, hard, angular gravel; 45% fine to coarse sand; 15% fines of non-plasticity, light brown, dry, v. dense.	
	52.00									
2324.8	55.00	K	SPT	50/4.75"	50/4.75"		W, S	GM	Sample K: SILTY GRAVEL WITH SAND (GM) -- 53% fine to coarse, hard, angular gravel; 27% fine to coarse sand; 20% fines of non-plasticity, dry, v. dense, light brown.	
	55.40									
2324.8	60.00	L	SPT	34 49	50/5"	93	W, S	SM	Samples L, M: SILTY SAND WITH GRAVEL (SM) -- 35 to 41% fine to coarse, hard, angular gravel; 44 to 47% fine to coarse sand; 12 to 21% fines of non-plastic, light brown, dry, v. dense.	
	61.42									
2319.8	65.00	M	SPT	54 83			W, S, PI	SM		
	66.00									
2314.8	70.00	N	SPT	31 59	50/3.5"		W, S, PI	GP GM	Sample N: POORLY-GRADED GRAVEL WITH SILT AND SAND (GP-GM) -- 50% fine to coarse, hard, angular gravel; 41% fine to coarse sand; 9% fines of non to low plasticity (LL = 25, PL = 22), dry, v. dense, light brown.	
	71.30									
	75.00									



EXPLORATION LOG

START DATE 3/16/11

END DATE 4/4/11

JOB DESCRIPTION Boulder City Bypass - Railroad Bridge

LOCATION I 515 @ Railroad Pass, Bridge G-2872

BORING RRBA1

E.A. # 73307-1

GROUND ELEV. 2384.80 (ft)

HAMMER DROP SYSTEM Auto., ETR = 87%

STATION "P" 96+75

OFFSET 51 feet Right

ENGINEER Abbas Bafghi

EQUIPMENT Diedrich D-120, #1082

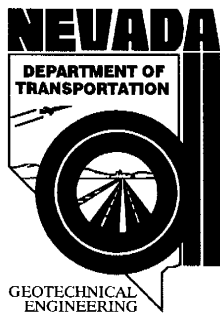
OPERATOR O. Altamirano

DRILLING METHOD 6" H.S.A

BACKFILLED Yes DATE 4/04/2011

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT		Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot					
75.83	80	O	SPT	54	70/4"		W, S	SP SM	Sample O: POORLY-GRADED SAND WITH SILT AND GRAVEL (SP-SM) -- 39% fine to coarse, hard, angular gravel; 50% fine to coarse sand; 11% fines of non-plasticity, dry, v. dense, light brown.	New Tri-Wing drill bit is used at 13 feet.
2304.8	80.10	P	SPT	50/1.25"	50/1.25"					
2299.8	85								End of boring at 80.1 feet. Groundwater was not encountered. Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble. Soil/rock descriptions are derived from visual field identifications and laboratory test data. The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.	Drilling was terminated at 80 feet at 3:30 pm.
2294.8	90									
2289.8	95									



GEOTECHNICAL ENGINEERING

START DATE 3/16/11

END DATE 4/4/11

JOB DESCRIPTION Boulder City Bypass - Railroad Bridge

LOCATION I 515 @ Railroad Pass, Bridge G-2872

BORING RRBP1

E.A. # 73307-1

GROUND ELEV. 2376.70 (ft)

HAMMER DROP SYSTEM Auto., ETR = 72%

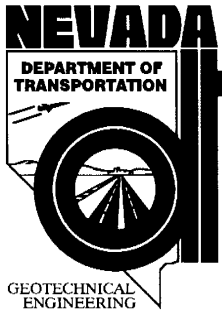
EXPLORATION LOG

STATION "P" 98+54
 OFFSET 25 feet Right
 ENGINEER Margie Boutilier
 EQUIPMENT Diedrich D-120, #1627
 OPERATOR Larracuente
 DRILLING METHOD 6" H.S.A
 BACKFILLED Yes DATE 4/04/2011

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT		Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot					
2371.7	5.00	A	SPT	39	50/1.2"		W, S, PI		<p>ALLUVIUM: Alluvial deposits of River Mountains formation.</p> <p>Ground surface : silty-sand-gravel-cobbles, occassional boulders, sparsely vegetated (desert brushes Reese Wood), dry.</p> <p>Borehole location is approximately at the same elevation as the railroad track.</p> <p>5.00 The railroad bridge foundations are approximately 30 feet below this ground surface.</p> <p>Drill rig chatters, hard drilling, presence of cobbles/cemented soils/breccia.</p> <p>Sample A: POORLY-GRADED SAND WITH SILT AND GRAVEL (SP-SM) -- 30 % fine to coarse, hard, angular gravel; 58% fine to coarse sand; 12% fines of non- plasticity, dry, v. dense, light brown.</p>	<p>Borehole location was chosen based on site access condition. 200 psi down pressure.</p>
	5.60									
2366.7	10.00	B	SPT	18	51		W, S, PI		<p>Sample B : SILTY SAND WITH GRAVEL (SM) -- 35% fine to coarse, hard, angular gravel; 52% fine to coarse sand; 13% fines of non- plasticity (LL = 36, PL = NP), light brown, dry, v. dense.</p>	
	11.50			19						
2361.7	15.00	C	SPT	50/3.6"	50/3.6"		W	SM		
	15.30									
2356.7	20.00	D	SPT	50/3.6"	50/3.6"		W, S		<p>Sample D POORLY-GRADED GRAVEL WITH SILT AND SAND (GP-GM)-- 53% fine to coarse, hard, angular gravel; 37% fine to coarse sand; 10% fines of non-plasticity, dry, v. dense , light brown.</p>	
	20.30									
2351.7	25.00	E	SPT	50/1.3"	50/1.3"	0				
	25.30									
	30.00									

NV_DOT_BCB_RRB.GPJ NV_DOT_GDT 6/16/11



START DATE 3/16/11

EXPLORATION LOG

SHEET 2 OF 3

END DATE 4/4/11

JOB DESCRIPTION Boulder City Bypass - Railroad Bridge

STATION "P" 98+54

LOCATION I 515 @ Railroad Pass, Bridge G-2872

OFFSET 25 feet Right

BORING RRBP1

ENGINEER Margie Boutilier

E.A. # 73307-1

EQUIPMENT Diedrich D-120, #1627

GROUND ELEV. 2376.70 (ft)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

OPERATOR Larracuente

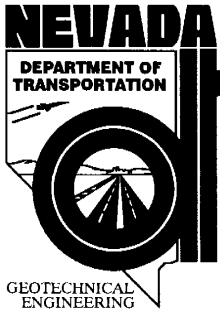
DRILLING METHOD 6" H.S.A

HAMMER DROP SYSTEM Auto., ETR = 72%

BACKFILLED Yes DATE 4/04/2011

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT		LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS		
		NO.	TYPE	6 inch Increments	Last 1 foot					Percent Recov'd	
2341.7	35.99	F	SPT	50/1.3	50/1.3	0	GP GM				
2341.7	35.99	H	SPT	50/1.4	50/1.4	0					
2336.7	48.99	I	SPT	50/1.5	50/1.5	0					
2331.7	45.00	J	SPT	50/4.4	50/4.4	W, S				45.00	<p>On 4/4/2011, the backfilled borehole was re-drilled to the depth of 40 feet and drilling continued.</p> <p>Samples J, L, M, N, O : SILTY SAND WITH GRAVEL (SM) -- 30 to 38% fine to coarse, hard, angular gravel; 43 to 51% fine to coarse sand; 13 to 20% fines of non to low plasticity (LL = 23, PL = 20), light brown, dry, v. dense.</p>
2326.7	50.00	K	SPT	50/2.5	50/2.5	0					
2321.7	55.00	L	SPT	50/5.4	50/5.4	W, S					
	60.00										

NV_DOT_BCB_RRB_GPJ_NV_DOT_GDT_6/16/11



EXPLORATION LOG

START DATE 3/16/11

END DATE 4/4/11

JOB DESCRIPTION Boulder City Bypass - Railroad Bridge

LOCATION 1515 @ Railroad Pass, Bridge G-2872

BORING RRBP1

E.A. # 73307-1

GROUND ELEV. 2376.70 (ft)

HAMMER DROP SYSTEM Auto., ETR = 72%

STATION "P" 98+54

OFFSET 25 feet Right

ENGINEER Margie Boutilier

EQUIPMENT Diedrich D-120, #1627

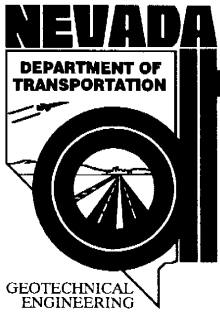
OPERATOR Larracuente

DRILLING METHOD 6" H.S.A

BACKFILLED Yes DATE 4/04/2011

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2311.7	60.36	M	SPT	50/4.3"	50/4.3"		W, S	SM	<p>Drilling chatters at 62 feet. Down pressure was reduced to 100 psi.</p> <p>At 65 feet: drill string was pull out. The drill bit was sheared off. A new bit was used.</p>	
2306.7	70.00 70.32	N	SPT	50/3.8"	50/3.8"		W, S			
2301.7	75.00 76.35	O	SPT	32 44 50/4.2"	50/4.2"	87	W, S, PI			
2296.7	80.00 80.80	P	SPT	43 50/3.6"	50/3.6"		W, S, PI	SC	<p>80.00</p> <p>80.80</p> <p>Sample P : CLAYEY SAND WITH GRAVEL (SC) -- 34% fine to coarse, hard, angular gravel; 46% fine to coarse sand; 20% fines of low plasticity (LL = 33, PL = 21), light brown, dry, v. dense.</p> <p>End of boring at 80.8 feet.</p> <p>Groundwater was not encountered.</p> <p>Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble.</p> <p>Soil/rock descriptions are derived from visual field identifications and laboratory test data.</p> <p>The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.</p>	
2291.7	85									



EXPLORATION LOG

START DATE 4/5/11
 END DATE 4/6/11
 JOB DESCRIPTION Boulder City Bypass - Railroad Bridge
 LOCATION 1515 @ Railroad Pass, Bridge G-2872
 BORING RRBA2
 E.A. # 73307-1
 GROUND ELEV. 2381.20 (ft)
 HAMMER DROP SYSTEM Auto., ETR = 87%

STATION "P" 100+61
 OFFSET 125 feet Right
 ENGINEER Abbas Bafghi
 EQUIPMENT Diedrich D-120, #1082
 OPERATOR O. Altamirano
 DRILLING METHOD 6" H.S.A
 BACKFILLED Yes DATE 4/06/2011

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2376.2	5.00								<p>ALLUVIUM: Alluvial deposits of River Mountains formation. Ground surface : silty-sand-gravel-cobbles, occasional boulders, sparsely vegetated (desert brushes Reese Wood), dry. Borehole location is approximately 8 feet above the railroad track. The railroad bridge foundations will be approximately 40 feet below this ground surface.</p> <p>Drill rig chatters, hard drilling, presence of cobbles/cemented soils/breccia.</p>	<p>Borehole location was chosen based on site access condition and overhead power line and underground utilities. Tri-Wing bit.</p>
	6.50	A	SPT	30 17 17	34	73	W, S, PI	5.00		
2371.2	10.00	B	SPT	50/1.5"	50/1.5"		W, S, PI			<p>depth 5 to 10 feet: 9 minutes drilling time.</p>
2366.2	15.00									
	16.50	C	SPT	29 45 43	88	73	W, S, PI			<p>depth 10 to 15 feet: 4 minutes drilling time.</p>
2361.2	20.00									
	20.45	D	SPT	50/2.25"	50/2.25"		W, S	GW GM		<p>depth 15 to 20 feet: 6 minutes drilling time.</p> <p>Due to lack of augering advancement at 20 feet, drilling was terminated at 4:00 pm. A new borehole location was chosen 5 feet to the south of the original borehole location. At this new location, no</p>
	25.00									



GEOTECHNICAL ENGINEERING

EXPLORATION LOG

START DATE 4/5/11
 END DATE 4/6/11
 JOB DESCRIPTION Boulder City Bypass - Railroad Bridge
 LOCATION I 515 @ Railroad Pass, Bridge G-2872
 BORING RRBA2
 E.A. # 73307-1
 GROUND ELEV. 2381.20 (ft)
 HAMMER DROP SYSTEM Auto., ETR = 87%

STATION "P" 100+61
 OFFSET 125 feet Right
 ENGINEER Abbas Bafghi
 EQUIPMENT Diedrich D-120, #1082
 OPERATOR O. Altamirano
 DRILLING METHOD 6" H.S.A
 BACKFILLED Yes DATE 4/06/2011

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
	25.20	E	SPT	50/2.5"	50/2.5"					sampling was taken in upper 20 feet of depth. Drilling was resumed at 8:00 am on 4/6/2011. depth 20 to 25 feet: 2 minutes drilling time.
2351.2	30.00									
	31.50	F	SPT	34 46 40	86		W, S, PI			depth 25 to 30 feet: 3 minutes drilling time.
2346.2	35.00									
	35.44	G	SPT	70/5.25"	70/5.25"		W, S, PI		Sample G : SILTY SAND WITH GRAVEL (SM) -- 29% fine to coarse, hard, angular gravel; 58% fine to coarse sand; 13% fines of non- plasticity, light brown, dry, v. dense.	depth 30 to 35 feet: 3 minutes drilling time.
2341.2	40.00									
	40.90	H	SPT	50/1.3"	50/1.3"		W, S	SM		depth 35 to 40 feet: 3 minutes drilling time.
2336.2	45.00									
	46.20	I	SPT	21 51 50/2"	50/2"	80	W, S, PI		Sample I : CLAYEY SAND WITH GRAVEL (SM) -- 24% fine to coarse, hard, angular gravel; 48% fine to coarse sand; 28% fines of low plasticity (LL = 38, PL = 19), light brown, dry, v. dense.	depth 40 to 45 feet: 2 minutes drilling time.
	50.00							SC		

NV_DOT_BCB_RRB_GPJ_NV_DOT_GDT_6/16/11



EXPLORATION LOG SHEET 3 OF 4

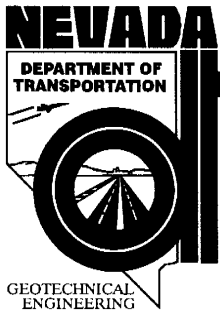
START DATE 4/5/11
 END DATE 4/6/11
 JOB DESCRIPTION Boulder City Bypass - Railroad Bridge
 LOCATION I 515 @ Railroad Pass, Bridge G-2872
 BORING RRBA2
 E.A. # 73307-1
 GROUND ELEV. 2381.20 (ft)
 HAMMER DROP SYSTEM Auto., ETR = 87%

STATION "P" 100+61
 OFFSET 125 feet Right
 ENGINEER Abbas Bafghi
 EQUIPMENT Diedrich D-120, #1082
 OPERATOR O. Altamirano
 DRILLING METHOD 6" H.S.A
 BACKFILLED Yes DATE 4/06/2011

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT		Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot					
2326.2	55.04	J	SPT	50/0.25"	50/0.25"		W, S, PI	SM	Samples L, M : SILTY SAND WITH GRAVEL (SM) -- 22 to 27% fine to coarse, hard, angular gravel; 55 to 65% fine to coarse sand; 13 to 18% fines of non-plasticity, light brown, dry, v. dense.	depth 45 to 50 feet: 2.5 minutes drilling time.
2326.2	56	K	SPT	60/0.5"	60/0.5"		W, S, PI			depth 50 to 55 feet: 2 minutes drilling time.
2321.2	60.00 60.35	L	SPT	70/4.25"	70/4.25"					depth 55 to 60 feet: 2 minutes drilling time.
2316.2	65.00 65.33	M	SPT	50/4"	50/4"		W, S			depth 60 to 65 feet: 2 minutes drilling time.
2311.2	70.00 70.25	N	SPT	50/3"	50/3"					depth 65 to 70 feet: 2 minutes drilling time.
	75.00									

NV_DOT_BCB_RRB_GPJ_NV_DOT_GDT_6/16/11



START DATE 4/5/11

EXPLORATION LOG

SHEET 4 OF 4

END DATE 4/6/11

JOB DESCRIPTION Boulder City Bypass - Railroad Bridge

STATION "P" 100+61

LOCATION I 515 @ Railroad Pass, Bridge G-2872

OFFSET 125 feet Right

BORING RRBA2

ENGINEER Abbas Bafghi

E.A. # 73307-1

EQUIPMENT Diedrich D-120, #1082

GROUND ELEV. 2381.20 (ft)

OPERATOR O. Altamirano

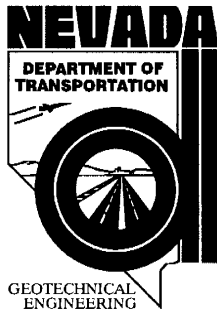
GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

DRILLING METHOD 6" H.S.A

HAMMER DROP SYSTEM Auto., ETR = 87%

BACKFILLED Yes DATE 4/06/2011

ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	TYPE	BLOW COUNT		Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
				6 inch Increments	Last 1 foot					
2301.2	76.20	O	SPT	91 110	100/2.5"	80	W, S, PI	SP SM	Sample O: POORLY-GRADED SAND WITH SILT AND GRAVEL (SP-SM) -- 18 % fine to coarse, hard, angular gravel; 70% fine to coarse sand; 12% fines of non- plasticity, dry, v. dense, light brown.	depth 70 to 75 feet: 2.5 minutes drilling time.
	80.00									
2291.2	81.20	P	SPT	58 43	100/2.25"	67	W, S	GP GM	Sample P: POORLY-GRADED GRAVEL WITH SILT AND SAND (GP-GM) -- 47% fine to coarse, hard, angular gravel; 42% fine to coarse sand; 11% fines of non-plasticity, dry, v. dense, light brown. End of boring at 81.2 feet. Groundwater was not encountered. Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble. Soil/rock descriptions are derived from visual field identifications and laboratory test data. The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.	Drilling was terminated at 2:15 pm.
	85									
2286.2	95									



EXPLORATION LOG

START DATE 11/2/09

END DATE 11/2/09

JOB DESCRIPTION Boulder City Bypass - Phase 1

LOCATION I 515 @ Railroad Pass, Retaining Wall

BORING BRW1

E.A. # 73307-1

GROUND ELEV. 2356.12 (ft)

HAMMER DROP SYSTEM Auto., ETR=72%

STATION "P"106+60

OFFSET 95 feet Right

ENGINEER Abbas Bafghi

EQUIPMENT Diedrich D-120, #1627

OPERATOR D. White

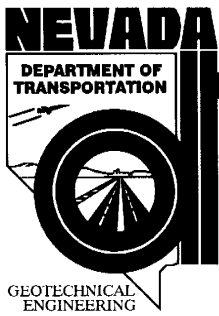
DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 11/2/2009

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2351.1	0.00	1	AUGER				RV, S, PI	GP GM	<p>PROBABLE FILL:</p> <p>Ground surface has no vegetation and is composed of sand, gravels/cobbles, and fines. This is the probable fill materials, approximately 5 feet, that was pushed here during the re-grading of the upper sloping ground. Ground surface is dry. Ground is sloping to East.</p> <p>Advanced auger to 5.0 feet. Drill rig chatters.</p> <p>Auger Cuttings 0 to 5 ft. (BULK 1): POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM) 72% fine to coarse, hard, angular gravel; 18% fine to coarse, hard, angular sand; 10% fines; light brown color (5 YR 5/6), dry.</p> <p>Occasional drill chatter.</p>	<p>Retaining Wall Location</p> <p>Started: 9:00 am</p> <p>Weather: Sunny (67-80 degrees)</p> <p>NDOT Rig Unit # 1627</p>
	5.00									
2346.1	6.50	A	SPT	32			S	SW SM	<p>ALLUVIUM:</p> <p>Sample A: WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) -- 43% fine to coarse, hard, angular gravel; 45% fine to coarse, hard, angular sand; 12% fines; light brown color (5 YR 5/6), dry. Sampler shoe was plugged by a gravel fragment.</p> <p>Auger Cuttings 5 to 10 ft. (BULK 2): POORLY GRADED GRAVEL WITH SILTY CLAY AND SAND (GP-GC) 75% fine to coarse, hard, angular gravel; 18% fine to coarse, hard, angular sand; 7% fines with LL = 25 and PL = 21; light brown color (5 YR 5/6), dry.</p> <p>Occasional drill chatter.</p>	<p>150 psi down pressure</p>
	10.00			48	108	80				
2346.1	11.50	B	SPT	60			S	GW GM	<p>Sample B: WELL-GRADED GRAVEL WITH SILT AND SAND (GP-GM) 46% fine to coarse, hard, angular gravel; 42% fine to coarse, hard, angular sand; 12% fines of non-plastic; light brown (5 YR 5/6), dry.</p>	<p>Sample B: new sampler shoe</p>
	15.00			15	56					

NV_DOT_BCB_BRW.GPJ NV_DOT_GDT_6/16/11



EXPLORATION LOG

START DATE 11/2/09
 END DATE 11/2/09
 JOB DESCRIPTION Boulder City Bypass - Phase 1
 LOCATION I 515 @ Railroad Pass, Retaining Wall
 BORING BRW1
 E.A. # 73307-1
 GROUND ELEV. 2356.12 (ft)
 HAMMER DROP SYSTEM Auto., ETR=72%

STATION "P"106+60
 OFFSET 95 feet Right
 ENGINEER Abbas Bafghi
 EQUIPMENT Diedrich D-120, #1627
 OPERATOR D. White
 DRILLING METHOD 6" H.S.A.
 BACKFILLED Yes DATE 11/2/2009

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2336.1	16.50	C	SPT	9 15 18	33	67	S	SW SM	Sample C: WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) --29% fine to coarse, hard, angular gravel; 64% fine to coarse, hard, angular sand; 7% fines of non-plastic; light brown color (5 YR 5/6), dry.	
	20.00	D	SPT	44 36 69	105	80	S			
	21.50	E	SPT	23 40	50/1.5"	93				
2331.1	25.00			50/1.5"				SW SM	Sample D: WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) 42% fine to coarse, hard, angular gravel; 49% fine to coarse, hard, angular sand; 10% fines of non-plastic; light brown color (5 YR 5/6), dry.	
	26.13									
	30.00								Sample E: LL = 25, PL = 20. Not enough sample for gradations. Sampler is hitting on gravel/cobble.	



GEOTECHNICAL ENGINEERING

EXPLORATION LOG

START DATE 11/2/09

END DATE 11/2/09

JOB DESCRIPTION Boulder City Bypass - Phase 1

LOCATION I 515 @ Railroad Pass, Retaining Wall

BORING BRW1

E.A. # 73307-1

GROUND ELEV. 2356.12 (ft)

HAMMER DROP SYSTEM Auto., ETR=72%

STATION "P"106+60

OFFSET 95 feet Right

ENGINEER Abbas Baghi

EQUIPMENT Diedrich D-120, #1627

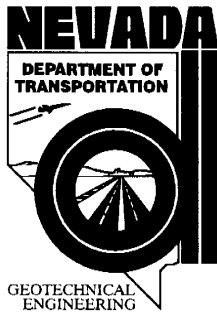
OPERATOR D. White

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 11/2/2009

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
	30.92	F	SPT	25 50/5.0"	50/5.0"		S	GW GM	<p>Sample F: WELL-GRADED GRAVEL WITH SILT AND SAND (GW-GM) 49% fine to coarse, hard, angular gravel; 42% fine to coarse, hard, angular sand; 9% fines of non-plastic; light brown color (5 YR 5/6), dry. Sampler is hitting on gravel/cobble.</p> <p>Drill rig chatters (0.5"/5 minutes), very hard drilling, strong cementation (Caliche).</p>	A new auger head is used.
									33.00	
2321.1	35								<p>End of Boring at 33 feet. Backfilled with auger cuttings. Groundwater was not encountered.</p> <p>Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer, cobble or boulder.</p> <p>Soil/rock descriptions are derived from visual field identifications and laboratory test data.</p> <p>The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.</p>	Drilling was terminated at 3:00 pm.
2316.1	40									



START DATE 11/3/09

EXPLORATION LOG

SHEET 1 OF 2

END DATE 11/3/09

JOB DESCRIPTION Boulder City Bypass - Phase 1

STATION "P"109+10

LOCATION I 515 @ Railroad Pass, Retaining Wall

OFFSET 100 feet Right

BORING BRW2

ENGINEER Abbas Bafghi

E.A. # 73307-1

EQUIPMENT Diedrich D-120, #1627

GROUND ELEV. 2338.60 (ft)

OPERATOR D. White

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

DRILLING METHOD 6" H.S.A.

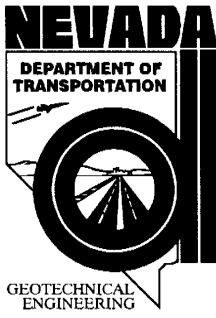
BACKFILLED Yes DATE 11/3/2009

HAMMER DROP SYSTEM Auto., ETR=72%

GEOTECHNICAL ENGINEERING

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2333.6	0.00								<p>PROBABLE FILL: Approximately 3 feet of fill; ground surface is composed of gravels/cobbles, sand, and fines, dry.</p> <p>Advanced auger to 5.0 feet.</p> <p>ALLUVIUM:</p> <p>Auger Cuttings 0 to 5 ft. (BULK 1) POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM) 58% fine to coarse, hard, angular gravel; 31% fine to coarse, hard, angular sand; 11% fines with LL = 23 and PL = 21; light brown color (5 YR 5/6), dry.</p> <p>Drill rig chatters.</p>	<p>Retaining Wall Location</p> <p>Started: 8:00 am</p> <p>Weather: Sunny (67 to 82 degrees)</p> <p>NDOT Rig Unit # 1627</p> <p>New pilot bit (center head)</p> <p>New SPT shoe for sample A</p>
	5.00	1	AUGER				RV, S, PI	GP GM		
2333.6	5.33	A	SPT	50/4"	R		S		<p>Sample A: SPT bouncing on cobble/boulder; only 4 inches of recovery.</p> <p>Sample A: SILTY GRAVEL WITH SAND (GM) 58% fine to coarse, hard, angular gravel; 31% fine to coarse, hard, angular sand; 11% fines.</p> <p>Sample A is composed of rock fragments in the matrix of fines.</p> <p>Auger Cuttings 5 to 10 ft. (BULK 2) POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM) 72% fine to coarse, hard, angular gravel; 21% fine to coarse, hard, angular sand; 7% fines with LL = 23 and PL = 20; light brown color (5 YR 5/6), dry.</p> <p>Most of the auger cuttings are fractured gravel size rock fragments with some subangular cobbles.</p> <p>Drill rig chatters.</p>	<p>100 psi down pressure</p> <p>Drilling Terminated at: 10:10 am due to lack of advancement.</p>
	10.00	2	AUGER				RV, S, PI	GM		

NV_DOT_BCB_BRW.GPJ_NV_DOT_GDT_6/16/11



EXPLORATION LOG

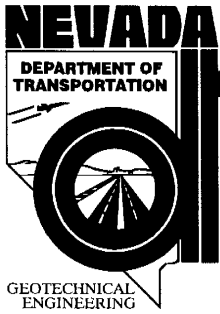
START DATE 11/3/09
 END DATE 11/3/09
 JOB DESCRIPTION Boulder City Bypass - Phase 1
 LOCATION I 515 @ Railroad Pass, Retaining Wall
 BORING BRW2
 E.A. # 73307-1
 GROUND ELEV. 2338.60 (ft)
 HAMMER DROP SYSTEM Auto., ETR=72%

STATION "P"109+10
 OFFSET 100 feet Right
 ENGINEER Abbas Bafghi
 EQUIPMENT Diedrich D-120, #1627
 OPERATOR D. White
 DRILLING METHOD 6" H.S.A.
 BACKFILLED Yes DATE 11/3/2009

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2323.6	11.50	B	SPT	18	36	80		GP GM	Advanced auger to 14.75 feet. Sample B: LL = 22, PL = non. Drill rig chatters.	New SPT shoe for sample B Easier drilling from 10 to 13.5 feet.
				17						
				19						
2323.6	15							End of Boring at 14.75 feet. Backfilled with auger cuttings. Groundwater was not encountered. Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble. Soil/rock descriptions are derived from visual field identifications and laboratory test data. The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.		

NV_DOT_BCB BRW GPJ NV_DOT_GDT 6/16/11



START DATE 11/3/09

END DATE 11/3/09

JOB DESCRIPTION Boulder City Bypass - Phase 1

LOCATION I 515 @ Railroad Pass, Retaining Wall

BORING BRW3

E.A. # 73307-1

GROUND ELEV. 2336.50 (ft)

HAMMER DROP SYSTEM Auto., ETR=72%

EXPLORATION LOG

STATION "P"110+80

OFFSET 120 feet Right

ENGINEER Abbas Baghi

EQUIPMENT Diedrich D-120, #1627

OPERATOR D. White

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 11/3/2009

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS								
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd												
2331.5	0.00	1	AUGER				RV, S, PI	SP SM	<p>ALLUVIUM:</p> <p>Ground surface has no vegetation. It is composed of mostly sand and gravels. sloping East to West.</p> <p>Advanced auger to 5.0 feet. Occasional drill chatter.</p> <p>Auger Cuttings 0 to 5 feet (BULK 1) POORLY-GRADED SAND WITH SILT AND GRAVEL (SP-SM) 35% fine to coarse, hard, angular gravel; 55% fine to coarse, hard, angular sand; 10 % fines with LL=20 and PL=18; light brown color (5 YR 5/6), dry.</p> <p>Occasional drill chatter.</p>	<p>Retaining Wall Location</p> <p>Started: 10:52 am</p> <p>Weather: Sunny 75 degrees</p> <p>NDOT Rig Unit #1627</p> <p>6 in. O.D. HSA</p>								
	5.00																	
	6.50										A	SPT	38	82	87	S	<p>Sample A: WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) 41 % fine to coarse, hard, angular gravel; 47% fine to coarse, hard, angular sand; 12% fines of non-plastic; light brown color (5 YR 5/6), dry.</p>	100 psi down pressure
	10.00										2	AUGER				RV, S, PI	SW SM	<p>Auger Cuttings 5 to 10 feet (BULK 2) WELL-GRADED GRAVEL WITH SAND (GM) 58% fine to coarse, hard, angular gravel; 37% fine to coarse, hard, angular sand; 5% fines with LL=21 and PL=20; light brown color (5 YR 5/6), dry.</p> <p>Occasional drill chatter.</p>
11.00	B	SPT	12	55	75	PI	<p>Sample B: 20 blows per first 3.0 inches then it hit gravel/cobble. LL = 24, PL = 23.</p>											
2326.5	15.00							SW SM										

NV_DOT_BCB_BRW_GPJ_NV_DOT_GDT_6/16/11



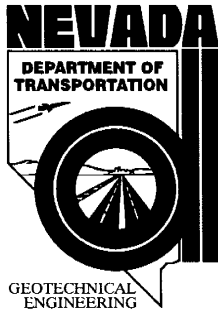
EXPLORATION LOG

START DATE 11/3/09
 END DATE 11/3/09
 JOB DESCRIPTION Boulder City Bypass - Phase 1
 LOCATION I 515 @ Railroad Pass, Retaining Wall
 BORING BRW3
 E.A. # 73307-1
 GROUND ELEV. 2336.50 (ft)
 HAMMER DROP SYSTEM Auto., ETR=72%

STATION "P"110+80
 OFFSET 120 feet Right
 ENGINEER Abbas Bafghi
 EQUIPMENT Diedrich D-120, #1627
 OPERATOR D. White
 DRILLING METHOD 6" H.S.A.
 BACKFILLED Yes DATE 11/3/2009

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS	
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd					
2316.5	16.50	C	SPT	23	54	73	PI	SW SM	Sample C: LL = 22, PL = non. Recovery length = 1.1 feet.		
	20.00			31							23
	20.73			41							40/2.75"
25.00	13			SW SM	Sample E: Recovery = 1.0 feet. LL = 20, PL = non.						
26.50	E	SPT	10			39	67				
30.00			29								

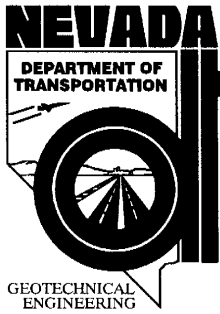


EXPLORATION LOG
 START DATE 11/3/09
 END DATE 11/3/09
 JOB DESCRIPTION Boulder City Bypass - Phase 1
 LOCATION I 515 @ Railroad Pass, Retaining Wall
 BORING BRW3
 E.A. # 73307-1
 GROUND ELEV. 2336.50 (ft)
 HAMMER DROP SYSTEM Auto., ETR=72%

STATION "P"110+80
 OFFSET 120 feet Right
 ENGINEER Abbas Bafghi
 EQUIPMENT Diedrich D-120, #1627
 OPERATOR D. White
 DRILLING METHOD 6" H.S.A.
 BACKFILLED Yes DATE 11/3/2009

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT		Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot					
2301.5	31.50	F	SPT	23	115		S, PI	SW SM	Sample F WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) 32% fine to coarse, hard, angular gravel; 59% fine to coarse, hard, angular sand; 9 % fines of non-plastic with LL = 20; light brown color (5 YR 5/6), dry.	Drill rig chatters occasionally.
				50						
2301.5	35.00	G	SPT	46	50/3.25"		S	SW SM	Sample G WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) 34% fine to coarse, hard, angular gravel; 57% fine to coarse, hard, angular sand; 9 % fines of non-plastic; light brown color (5 YR 5/6), dry.	Drill rig chatters occasionally.
				50/3.25"						
2296.5	40.00	H	SPT	57	113	80	S	SW SM	Sample H WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) 44% fine to coarse, hard, angular gravel; 49% fine to coarse, hard, angular sand; 7% fines of non-plastic; light brown color (5 YR 5/6), dry.	Drill rig chatters occasionally.
				54						
2296.5	41.50							SW SM		
	45.00									



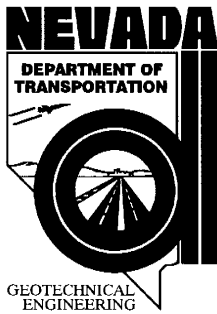
EXPLORATION LOG

START DATE 11/3/09
 END DATE 11/3/09
 JOB DESCRIPTION Boulder City Bypass - Phase 1
 LOCATION 1515 @ Railroad Pass, Retaining Wall
 BORING BRW3
 E.A. # 73307-1
 GROUND ELEV. 2336.50 (ft)
 HAMMER DROP SYSTEM Auto., ETR=72%

STATION "P"110+80
 OFFSET 120 feet Right
 ENGINEER Abbas Bafghi
 EQUIPMENT Diedrich D-120, #1627
 OPERATOR D. White
 DRILLING METHOD 6" H.S.A.
 BACKFILLED Yes DATE 11/3/2009

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2286.5	46.15	I	SPT	28 51	50/1.75"		S	SP SM	Sample I: POORLY-GRADED SAND WITH SILT AND GRAVEL (SP-SM) 45% fine to coarse, hard, angular gravel; 46% fine to coarse, hard, angular sand; 9 % fines of non-plastic; light brown color (5 YR 5/6), dry. Drill rig chatters occasionally.	Drilling Ended: 3:45 pm
	50.00									
2281.5	50.73	J	SPT	32	50/2.75"		S	SP SM	Sample J: Recovery = 2.75 inches. Sampler is bouncing on cobble. 9% fines. End of Boring at 50.5 feet. Backfilled with auger cuttings. Groundwater was not encountered. Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble. Soil/rock descriptions are derived from visual field identifications and laboratory test data. The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.	
	55									



GEOTECHNICAL ENGINEERING

EXPLORATION LOG

START DATE 11/4/09

END DATE 11/4/09

JOB DESCRIPTION Boulder City Bypass - Phase 1

LOCATION I 515 @ Railroad Pass, Retaining Wall

BORING BRW4

E.A. # 73307-1

GROUND ELEV. 2325.30 (ft)

HAMMER DROP SYSTEM Auto., ETR=72%

STATION "P"112+90

OFFSET 120 feet Right

ENGINEER Abbas Bafghi

EQUIPMENT Diedrich D-120, #1627

OPERATOR D. White

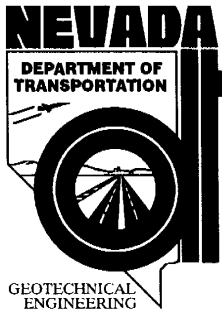
DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 11/4/2009

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
	0.00								Ground surface is flat, covered with some Reese Wood vegetation, sand/ gravels/cobbles and some fines. Ground surface is dry.	Retaining Wall Location
		1	AUGER				RV, S, PI	GP GM	Advanced auger to 5.0 feet. Occasional drill chatter.	
									ALLUVIUM:	
									Auger Cuttings; 0 to 5 ft. (BULK 1): POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM) 71% fine to coarse, hard, angular gravel; 22% fine to coarse, hard, angular sand; 7% fines of non-plastic with LL = 24; light brown color (5 YR 5/6), dry.	Started: 8:30 am Weather: Sunny (67-82 degrees)
									Auger cuttings has some hard subangular cobbles.	NDOT Rig Unit #: 1627
2320.3	5.00			12						
		A	SPT	18	35	67	S		Sample A: WELL-GRADED GRAVEL WITH SILT AND SAND (GW-GM) 49% fine to coarse, hard, angular gravel; 44% fine to coarse, hard, angular sand; 7% fines of non-plastic; light brown color (5 YR 5/6), dry.	150 psi down pressure
	6.50			17						
		2	AUGER				RV, S, PI	GW GM	Auger Cuttings; 5 to 10 ft. (BULK 2): POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM) 67% fine to coarse, hard, angular gravel; 23% fine to coarse, hard, angular sand; 9% fines of non-plastic with LL = 23; light brown color (5 YR 5/6), dry.	
									Auger cuttings had some hard, subangular cobbles. Occasional boulders. Drill rig chatters occasionally	
2315.3	10.00			19						
		B	SPT	21	71	73	S		Sample B: WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) 47% fine to coarse, hard, angular gravel; 45% fine to coarse, hard, angular sand; 8% fines of non-plastic; light brown color (5 YR 5/6), dry.	
	11.50			50						
									Auger cuttings has some hard subangular cobbles.	
									Drill rig chatters occasionally.	
	15.00							GW GM		

NV_DOT_BCB_BRWGPJ_NV_DOT_GDT_6/16/11



START DATE 11/4/09

EXPLORATION LOG

SHEET 2 OF 4

END DATE 11/4/09

STATION "P"112+90

JOB DESCRIPTION Boulder City Bypass - Phase 1

OFFSET 120 feet Right

LOCATION I 515 @ Railroad Pass, Retaining Wall

ENGINEER Abbas Bafghi

BORING BRW4

EQUIPMENT Diedrich D-120, #1627

E.A. # 73307-1

OPERATOR D. White

GROUND ELEV. 2325.30 (ft)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

DRILLING METHOD 6" H.S.A.

HAMMER DROP SYSTEM Auto., ETR=72%

BACKFILLED Yes DATE 11/4/2009

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2305.3	16.50	C	SPT	13	65	73	S	SW SM	Sample C: WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) 45% fine to coarse, hard, angular gravel; 48% fine to coarse, hard, angular sand; 7% fines of non-plastic; light brown color (5 YR 5/6), dry. Auger cuttings has some hard subangular cobbles. Occasional boulders. Drill rig chatters occasionally.	
				23						
				42						
2305.3	20.00	D	SPT	16	58	80		SW SM	Sample D: LL = 20, PL = non. Recovery length = 1.2 feet. Not enough for gradations. Auger cuttings had some hard, subangular gravels and cobbles.	
				30						
				28						
2300.3	25.00	E	SPT	50/3.0"	50/3.0"			SW SM	Sample E: SPT is bouncing on cobble. Recovery = 0.6 feet. LL = 18, PL = non. Auger cuttings has some hard subangular gravel/cobbles.	
				25.25						
				30.00						

NV_DOT_BCB BRW.GPJ NV_DOT_GDT 6/16/11



START DATE 11/4/09

END DATE 11/4/09

JOB DESCRIPTION Boulder City Bypass - Phase 1

LOCATION I 515 @ Railroad Pass, Retaining Wall

BORING BRW4

E.A. # 73307-1

GROUND ELEV. 2325.30 (ft)

HAMMER DROP SYSTEM Auto., ETR=72%

EXPLORATION LOG

STATION "P"112+90

OFFSET 120 feet Right

ENGINEER Abbas Bafghi

EQUIPMENT Diedrich D-120, #1627

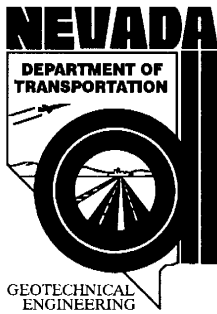
OPERATOR D. White

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 11/4/2009

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT		Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot					
2290.3	30.98	F	SPT	20 60/5.75"	60/5.75"		S	SW	Sample F: SPT bouncing on cobble/boulder. Sample F: WELL-GRADED SAND WITH GRAVEL AND COBBLES (SW) --36% fine to coarse, hard, angular gravel; 60% fine to coarse, hard, angular sand; 4% fines of non-plastic; light brown color (5 YR 5/6), dry. Auger cuttings has some hard subangular cobbles. Drill rig chatters occasionally.	
	35.00									
2285.3	35.96	G	SPT	24 50/5.5"	50/5.5"			GM	Sample G: Silty gravel/Silty Sand (GM/SM), Visual Classification. Auger Cuttings - Visual Classification: GRAVEL/SAND WITH SILT (GM/SM) --light brown (5 YR 5/6), fractured gravels up to 1.0 inch in diameter. Drill rig chatters occasionally.	
	40.00									
2285.3	40.17	H	SPT	35/2.0"	35/2.0"			GM	Sample H: SPT bouncing on cobble/boulder (no advancement). LL = 22, PL = non.	
	45.00									



GEOTECHNICAL ENGINEERING

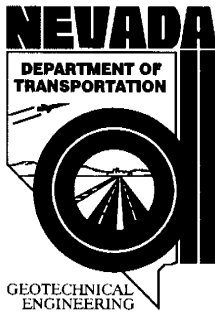
EXPLORATION LOG

START DATE 11/4/09
 END DATE 11/4/09
 JOB DESCRIPTION Boulder City Bypass - Phase 1
 LOCATION I 515 @ Railroad Pass, Retaining Wall
 BORING BRW4
 E.A. # 73307-1
 GROUND ELEV. 2325.30 (ft)
 HAMMER DROP SYSTEM Auto., ETR=72%

STATION "P"112+90
 OFFSET 120 feet Right
 ENGINEER Abbas Bafghi
 EQUIPMENT Diedrich D-120, #1627
 OPERATOR D. White
 DRILLING METHOD 6" H.S.A.
 BACKFILLED Yes DATE 11/4/2009

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	TYPE	BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
				6 inch Increments	Last 1 foot	Percent Recov'd				
		1	SPT	20/0"	20/0"					
2275.3	50.08	J	SPT	20/1.0"	20/1.0"			GM	<p>Sample J: Sampler is bouncing on cobble/boulder with no advancement.</p> <p>Auger cuttings has some hard subangular cobble.</p>	
									<p>End of Boring at 50 feet. Backfilled with auger cuttings. Groundwater was not encountered.</p> <p>Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble.</p> <p>Soil/rock descriptions are derived from visual field identifications and laboratory test data.</p> <p>The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.</p>	
2270.3	55									



START DATE 1/10/07

EXPLORATION LOG

END DATE 1/16/07

JOB DESCRIPTION Boulder City Bypass-Phase 1

STATION "P"100+75

LOCATION I 515 @ Railroad Pass, Roadway Cut

OFFSET 0 ft.

BORING RRC1

ENGINEER Abbas Bafghi

E.A. # 73307-1

EQUIPMENT Diedrich D-120, #1627

GROUND ELEV. 2371.79 (ft)

OPERATOR D. White

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

DRILLING METHOD 6" H.S.A./Rotary Wash

BACKFILLED Yes DATE 1/16/2007

HAMMER DROP SYSTEM Auto., ETR=65%

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT		Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot					
	0.00								<p>ALLUVIUM:</p> <p>Ground surface is dry, covered with scattered desert brushes (Reese Wood vegetation) and scattered coarse gravels/cobbles. Ground surface is sloping to West.</p> <p>Auger Cuttings 0 to 5 feet (RV1) sample: SILTY GRAVEL WITH SAND (GM) 52% fine to coarse, hard, angular gravel; 29% fine to coarse, hard, angular sand; 12% fines of non-plastic with LL=24; light brown color (5 YR 5/6), dry.</p> <p>Drill rig chatters occasionally.</p>	<p>Location: Roadway Cut</p> <p>drill rig unit #1627</p> <p>weather: cloudy low=22 degrees high=51 degrees</p> <p>Drilling started 8:30 am.</p>
2366.8	5.00	A	SPT	12 47	50/1.3"		RV, S, PI, Ch	GM	<p>Sample A: POORLY GRADED SAND WITH SILT, GRAVEL, AND COBBLES (SP-SM) 41% fine to coarse, hard, angular gravel; 46% fine to coarse, hard, angular sand; 13% fines of non-plastic</p>	
	6.10				50/1.3"			SP SM	<p>Auger cuttings 5 to 10 ft. (RV2) sample: POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM) 69% fine to coarse, hard, angular gravel; 19% fine to coarse, hard, angular sand; 8% fines of non-plastic with LL=25; light brown color (5 YR 5/6), dry.</p> <p>Drill rig chatters.</p>	
2361.8	10.00	B	SPT	50/1.1"	50/1.1"				<p>Auger Cuttings 10 to 15 feet (RV3) sample: SILTY GRAVEL WITH SAND (GM) 55% fine to coarse, hard, angular gravel; 32% fine to coarse, hard, angular sand; 13 % fines with LL=30 and PL=24; light brown color (5 YR 5/6), dry.</p> <p>Drill rig chatters occasionally.</p> <p>Occasional cemented materials (caliche)</p>	<p>down pressure = 100 psi</p>

NV_DOT BCB RRC GP J NV_DOT.GDT 6/16/11



START DATE 1/10/07

END DATE 1/16/07

JOB DESCRIPTION Boulder City Bypass-Phase 1

LOCATION I 515 @ Railroad Pass, Roadway Cut

BORING RRC1

E.A. # 73307-1

GROUND ELEV. 2371.79 (ft)

HAMMER DROP SYSTEM Auto., ETR=65%

EXPLORATION LOG

STATION "P"100+75

OFFSET 0 ft.

ENGINEER Abbas Bafghi

EQUIPMENT Diedrich D-120, #1627

OPERATOR D. White

DRILLING METHOD 6" H.S.A./Rotary Wash

BACKFILLED Yes DATE 1/16/2007

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT		Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot					
2356.8	15.00	C	SPT	50/2.8"	50/2.8"		RV, S, PI, Ch	GM	Sample B: SPT bouncing on cobble/boulder.	
	15.23									
2351.8	20.00	D	SPT	50/3.3"	50/3.3"		RV, S, PI, Ch	GP GM	Auger Cuttings 15 to 20 ft. and 20 to 25 ft. (RV4, RV5) samples: POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM) 58 to 60% fine to coarse, hard, angular gravel; 29 to 30% fine to coarse, hard, angular sand; 11% fines with LL=28 to 30 and PL= 24; light brown color (5 YR 5/6), dry. Drill rig chatters.	
	20.28									
2351.8	20.00						W, S		Sample D: POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) 36% fine to coarse, hard, angular gravel; 53% fine to coarse, hard, angular sand; 11% fines of non-plastic.	
	20.28									
			RVAUGER				RV, S, PI, Ch	SP SM	Sample D: SPT bouncing on cobble/boulder.	



START DATE 1/10/07

END DATE 1/16/07

JOB DESCRIPTION Boulder City Bypass-Phase 1

LOCATION I 515 @ Railroad Pass, Roadway Cut

BORING RRC1

E.A. # 73307-1

GROUND ELEV. 2371.79 (ft)

HAMMER DROP SYSTEM Auto., ETR=65%

EXPLORATION LOG

STATION "P"100+75

OFFSET 0 ft.

ENGINEER Abbas Bafghi

EQUIPMENT Diedrich D-120, #1627

OPERATOR D. White

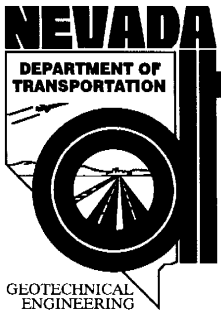
DRILLING METHOD 6" H.S.A./Rotary Wash

BACKFILLED Yes DATE 1/16/2007

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT		Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot					
2346.8	25.00 25.03	E	SPT	60/0.3"	60/0.3"				25.00	Sample E: SPT bouncing on cobble/boulder. Auger Cuttings 25 to 30 ft. (RV6) sample: POORLY GRADED GRAVEL WITH SILTY CLAY AND SAND (GP-GC) 65% fine to coarse, hard, angular gravel; 21% fine to coarse, hard, angular sand; 8% fines with LL = 28 nad PL = 22; light brown color (5 YR 5/6), dry. Occasional drill chatter.
	29.00							GP GC	29.00	
2341.8	30.00									Auger Refusal at 29.0 feet. Coring: from 29.0 feet to 37.5 feet RC1 (29'-32'): core recovery = 40%, RQD = 0 29 to 30 feet: drilling rate = 7.0 min./ft. 30 to 31 feet: drilling rate = 5.25 min./ft. 31 to 32 feet: drilling rate = 9.0 min./ft.
	32.00								32.00	Coring started on 1-17-07. Coring with plain water. 29 feet to 30 feet: down pressure = 150 psi water pressure = 50 psi 30 feet to 31 feet: down pressure = 250 psi water pressure = 50 psi
	32.75								32.75	RC2 (32'-32.75'): drilling rate = 4.0 min./0.75 ft., No bedrock was found in this coring process. Recovered coring material is highly angular sand and gravel size rock fragments.
	33.00							GP GM		
										31 feet to 32 feet: down pressure = 350 psi water pressure = 50 psi
										RC3 (33'-34.8'): 33 to 34 feet: drilling rate = 4.5 min./ft. 34 to 34.8 feet: drilling rate = 3.5 min./0.8 ft.
2336.8	34.80								34.80	Same as above. 34.8 feet to 35.8 feet: down pressure = 100 psi water pressure

NV_DOT_BCB_RRC_GPJ_NV_DOT_GDT_6/16/11



GEOTECHNICAL ENGINEERING

EXPLORATION LOG

START DATE 1/10/07

END DATE 1/16/07

JOB DESCRIPTION Boulder City Bypass-Phase 1

LOCATION I 515 @ Railroad Pass, Roadway Cut

BORING RRC1

E.A. # 73307-1

GROUND ELEV. 2371.79 (ft)

HAMMER DROP SYSTEM Auto., ETR=65%

STATION "P"100+75

OFFSET 0 ft.

ENGINEER Abbas Bafghi

EQUIPMENT Diedrich D-120, #1627

OPERATOR D. White

DRILLING METHOD 6" H.S.A./Rotary Wash

BACKFILLED Yes DATE 1/16/2007

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
	37.50		RC4CORE						RC4 (34.8'-37.5'): 34.8 to 35.8 feet: drilling rate = 3.0 min./ft. 35.8 to 36.8 feet: drilling rate = 4.5 min./ft. 36.8 to 37.5 feet: drilling rate = 2.5 min./0.8 ft.	= 50 psi 35.8 feet to 36.8 feet: down pressure = 250 psi water pressure = 50 psi
	37.50								Same as above.	
									End of Boring at 37.5 feet. Backfilled with drill cuttings. Groundwater was not encountered.	
									Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble.	36.8 feet to 37.5 feet: down pressure = 300 psi water pressure = 50 psi
									Soil/rock descriptions are derived from visual field identifications and laboratory test data.	
2331.8	40								The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.	
2326.8	45									



GEOTECHNICAL
ENGINEERING

START DATE 1/17/07
 END DATE 1/29/07
 JOB DESCRIPTION Boulder City Bypass-Phase 1
 LOCATION I 515 @ Railroad Pass, Roadway Cut
 BORING RRC2
 E.A. # 73307-1
 GROUND ELEV. 2387.12 (ft)
 HAMMER DROP SYSTEM Auto., ETR=65%

EXPLORATION LOG

STATION "P"96+50
 OFFSET 12 feet Right
 ENGINEER Abbas Bafghi
 EQUIPMENT Diedrich D-120, #1627
 OPERATOR D. White
 DRILLING METHOD 6" H.S.A.
 BACKFILLED Yes DATE 01/29/2007

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT		Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot					
2387.1	0.00								<p>ALLUVIUM:</p> <p>Ground surface is covered with scattered desert brushes (Reese Wood vegetation), rock fragments of gravel and cobble sizes with occasional boulders, sub-angular, strong cementation "caliche", non to weak reaction with HCL, dry.</p> <p>Auger Cuttings 0 to 4 feet (RV1) sample: SILTY GRAVEL WITH SAND (GM) 47% fine to coarse, hard, angular gravel; 29% fine to coarse, hard, angular sand; 20 % fines with LL=29 and PL=23; light brown color (5 YR 5/6), dry.</p> <p>Drill rig chatters occasionally.</p>	<p>Roadway cut Location</p> <p>drill rig unit #1627</p> <p>Auger was advanced to 4 feet.</p> <p>New pilot bit was used.</p> <p>weather: Sunny low=22 degrees high=51 degrees</p>
	4.00									
	4.23	A	SPT	50/2.8"	50/2.8"	214				
2382.1	5								<p>Auger Cuttings 4 to 9 feet (RV2) sample: SILTY SAND WITH GRAVEL (SM) 34% fine to coarse, hard, angular gravel; 46% fine to coarse, hard, angular sand; 20 % fines of low plasticity with LL=34 and PL=26; light brown color (5 YR 5/6), dry.</p> <p>Drill rig chatters occasionally.</p>	
	9.00									
2377.1	9.12	B	SPT	50/1.4"	50/1.4"	71			Sample B: SPT bouncing on cobble/boulder.	
	10								<p>Auger Cuttings 9 to 14 ft. (RV3) sample: POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM) 60% fine to coarse, hard, angular gravel; 30% fine to coarse, hard, angular sand; 10% fines of low plasticity with LL=31 and PL=25; light brown color (5 YR 5/6), dry.</p> <p>Drill rig chatters.</p>	

NV_DOT BCB RRC.GPJ NV_DOT.GDT 6/16/11



EXPLORATION LOG

START DATE 1/17/07

END DATE 1/29/07

JOB DESCRIPTION Boulder City Bypass-Phase 1

LOCATION 1515 @ Railroad Pass, Roadway Cut

BORING RRC2

E.A. # 73307-1

GROUND ELEV. 2387.12 (ft)

HAMMER DROP SYSTEM Auto., ETR=65%

STATION "P"96+50

OFFSET 12 feet Right

ENGINEER Abbas Bafghi

EQUIPMENT Diedrich D-120, #1627

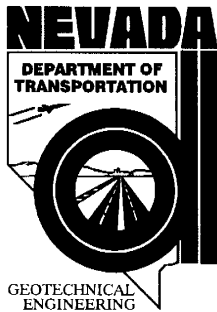
OPERATOR D. White

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 01/29/2007

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
	14.00									
	14.28	C	SPT	50/3.2"	50/3.2"	94			14.00	Sample C: SPT bouncing on cobble/boulder.
2372.1	15						RV, S, Pl, Ch			Down Pressure= 300 to 400 psi.
			RVAUGER							Drill rig chatters under 400 psi down-pressure.
	19.00									Sample D: SPT bouncing on cobble/boulder.
	19.23	D	SPT	50/2.7"	50/2.7"	93		SM		
2367.1	20						RV, S, Pl, Ch			
			RVAUGER							
	24.00								24.00	



GEOTECHNICAL ENGINEERING

EXPLORATION LOG

START DATE 1/17/07

END DATE 1/29/07

JOB DESCRIPTION Boulder City Bypass-Phase 1

LOCATION I 515 @ Railroad Pass, Roadway Cut

BORING RRC2

E.A. # 73307-1

GROUND ELEV. 2387.12 (ft)

HAMMER DROP SYSTEM Auto., ETR=65%

STATION "P"96+50

OFFSET 12 feet Right

ENGINEER Abbas Bafghi

EQUIPMENT Diedrich D-120, #1627

OPERATOR D. White

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 01/29/2007

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2362.1	24.23	E	SPT	50/2.8"	50/2.8"	89		GM	Sample E: SPT bouncing on cobble/boulder. Auger Cuttings 24 to 29 ft. (RV6) sample: SILTY GRAVEL WITH SAND (GM) 42% fine to coarse, hard, angular gravel; 42% fine to coarse, hard, angular sand; 16 % fines of medium plasticity with LL=43 and PL=30; light brown color (5 YR 5/6), dry. Drill rig chatters occasionally.	Drilling was stopped at 4:00 pm. Drilling was delayed for 13 days (due to drilling re-schedule). Resumed drilling: 01/29/07
	29.00									
2357.1	29.42	F	SPT	50/5"	50/5"	100	W, S	GW GM	Sample F: SPT bouncing on cobble/boulder. Sample F: WELL- GRADED GRAVEL WITH SILT AND SAND (GW-GM) 44% fine to coarse, hard, angular gravel; 44% fine to coarse, hard, angular sand; 12% fines; light brown color (5 YR 5/6), dry. Auger Cuttings 29 to 34 ft. (RV7) sample: SILTY GRAVEL WITH SAND AND COBBLES (GM) 46% fine to coarse, hard, angular gravel; 40% fine to coarse, hard, angular sand; 14 % fines of medium plasticity with LL=48 and PL=31; light brown color (5 YR 5/6), dry. Drill rig chatters occasionally.	Down Pressure=100 psi from 28 feet.
	34.00									
2352.1	34.31	G	SPT	50/3.7"	50/3.7"	100	W, S	GM	Sample G: SPT bouncing on cobble/boulder. Sample G: SILTY SAND WITH GRAVEL AND COBBLES (SM) 34% fine to coarse, hard, angular gravel; 48% fine to coarse, hard, angular sand; 18 % fines. Drill rig chatters.	
	35.00									



GEOTECHNICAL
ENGINEERING

START DATE 1/17/07

END DATE 1/29/07

JOB DESCRIPTION Boulder City Bypass-Phase 1

LOCATION I 515 @ Railroad Pass, Roadway Cut

BORING RRC2

E.A. # 73307-1

GROUND ELEV. 2387.12 (ft)

HAMMER DROP SYSTEM Auto., ETR=65%

EXPLORATION LOG

STATION "P"96+50

OFFSET 12 feet Right

ENGINEER Abbas Bafghi

EQUIPMENT Diedrich D-120, #1627

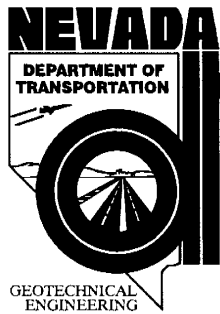
OPERATOR D. White

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 01/29/2007

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT		Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot					
2347.1	39.00		RVAUGER				RV, S, PI, Ch	SM	Auger Cuttings from 34 to 39 ft. (RV8) samples: POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM) 51% fine to coarse, hard, angular gravel; 40% fine to coarse, hard, angular sand; 9% fines of medium plasticity with LL= 50 and PL=29; light brown color (5 YR 5/6), dry.	
	39.25	H	SPT	50/3"	50/3"	100	W, S			
2342.1	40		RVAUGER				RV, S, PI, Ch	GW	Sample H: WELL-GRADED GRAVEL WITH SAND (GW) 54% fine to coarse, hard, angular gravel; 44% fine to coarse, hard, angular sand; 2% fines. Auger cuttings from 39 to 44 ft. (RV9) samples: POORLY GRADED GRAVEL WITH SILT, SAND, AND COBBLES (GP-GM) 48% fine to coarse, hard, angular gravel; 43% fine to coarse, hard, angular sand; 9% fines of medium plasticity with LL= 49 and PL=30; light brown color (5 YR 5/6), dry.	
	44.00									
2342.1	45.15	I	SPT	39 56	50/1.8"	87	W, S, PI		Sample I: SILTY SAND WITH GRAVEL (SM) 43% fine to coarse, hard, angular gravel; 43% fine to coarse, hard, angular sand; 14 % fines of medium plasticity with LL=39 and PL=27. Auger Cuttings from 44 to 49 ft. (RV10) sample: POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM) 50% fine to coarse, hard, angular gravel; 39% fine to coarse, hard, angular sand; 11% fines of medium plasticity with LL= 48 and PL=30; light brown color (5 YR 5/6), dry.	
	45.15				50/1.8"			SM		
			RVAUGER				RV, S, PI, Ch			



START DATE 1/17/07

EXPLORATION LOG

SHEET 5 OF 5

END DATE 1/29/07

JOB DESCRIPTION Boulder City Bypass-Phase 1

STATION "P"96+50

LOCATION I 515 @ Railroad Pass, Roadway Cut

OFFSET 12 feet Right

BORING RRC2

ENGINEER Abbas Bafghi

E.A. # 73307-1

EQUIPMENT Diedrich D-120, #1627

GROUND ELEV. 2387.12 (ft)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

OPERATOR D. White

DRILLING METHOD 6" H.S.A.

HAMMER DROP SYSTEM Auto., ETR=65%

BACKFILLED Yes DATE 01/29/2007

GEOTECHNICAL ENGINEERING

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2337.1	49.00							GC	<p>Sample J: CLAYEY GRAVEL WITH SAND (GC) 44% fine to coarse, hard, angular gravel; 41% fine to coarse, hard, angular sand; 15% fines of low plasticity with LL = 30 and PL = 22; light brown color (5 YR 5/6), dry.</p> <p>Occasional drill chatter.</p>	<p>Drilling was stopped at 3:00 pm.</p>
	50	J	SPT	49	223	89	W, S, PI			
	50.50			84						
2332.1	51.50			139					<p>End of Boring at 51.5 feet.</p> <p>Backfilled with drill cuttings.</p> <p>Groundwater was not encountered.</p> <p>Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble.</p> <p>Soil/rock descriptions are derived from visual field identifications and laboratory test data.</p> <p>The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.</p>	
	55									



START DATE 1/30/07

END DATE 1/31/07

JOB DESCRIPTION Boulder City Bypass-Phase 1

LOCATION I 515 @ Railroad Pass, Roadway Cut

BORING RRC3

E.A. # 73307-1

GROUND ELEV. 2388.98 (ft)

HAMMER DROP SYSTEM Auto., ETR=65%

EXPLORATION LOG

STATION "P"94+00

OFFSET 30 feet Right

ENGINEER Abbas Bafghi

EQUIPMENT Diedrich D-120, #1627

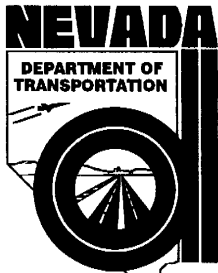
OPERATOR D. White/O. Altamirano

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 01/31/2007

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
	0.00								<p>ALLUVIUM: Ground surface is flat, rock fragments of gravel and cobble sizes with occasional boulders, sub-angular, strong cementation "caliche", non to weak reaction with HCL, dry. Ground surface slopes gently toward West at about 30 feet from the borehole.</p> <p>Auger Cuttings; 0 to 4.5 ft. (RV1): POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM) 60% fine to coarse, hard, angular gravel; 28% fine to coarse, hard, angular sand; 12% fines of low plasticity with LL=31 and PL=25; light brown color (5 YR 5/6), dry.</p> <p>Drill rig chatters.</p>	<p>Location: Roadway Cut</p> <p>weather: Cloudy, low=46 degrees high=56 degrees</p> <p>drill rig unit #1627</p> <p>Auger was advanced to 4.5 feet.</p>
	4.50								<p>Sample A: SILTY SAND WITH GRAVEL (SM) 41% fine to coarse, hard, angular gravel; 42% fine to coarse, hard, angular sand; 17 % fines of medium plasticity with LL=67 to 36 and PL= 51; light brown color (5 YR 5/6), dry.</p> <p>Auger Cuttings 4.5 to 9.5 feet (RV 2): SILTY GRAVEL WITH SAND AND COBBLES (GM) 46% fine to coarse, hard, angular gravel; 40% fine to coarse, hard, angular sand; 14 % fines of medium plasticity with LL=47 and PL=34.</p> <p>Drill rig chatters occasionally.</p>	<p>Difficult drilling is due to presence of rocks. 300 psi down pressure</p>
2384.0	5	A	SPT	26 42 55	97	83	W, S, PI			
	6.00									



GEOTECHNICAL ENGINEERING

EXPLORATION LOG

START DATE 1/30/07

END DATE 1/31/07

JOB DESCRIPTION Boulder City Bypass-Phase 1

LOCATION I 515 @ Railroad Pass, Roadway Cut

BORING RRC3

E.A. # 73307-1

GROUND ELEV. 2388.98 (ft)

HAMMER DROP SYSTEM Auto., ETR=65%

STATION "P"94+00

OFFSET 30 feet Right

ENGINEER Abbas Bafghi

EQUIPMENT Diedrich D-120, #1627

OPERATOR D. White/O. Altamirano

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 01/31/2007

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2379.0	9.50							GP GM	<p>Sample B: POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM) 59% fine to coarse, hard, angular gravel; 31% fine to coarse, hard, angular sand; 10% fines of medium plasticity with LL=40 and PL=28; light brown color (5 YR 5/6), dry.</p> <p>Auger Cuttings: 9.5 to 14.5 ft. (RV 3) : POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM) 60% fine to coarse, hard, angular gravel; 28% fine to coarse, hard, angular sand; 12% fines of medium plasticity with LL=61 and PL=42; light brown color (5 YR 5/6), dry.</p> <p>Drill rig chatters.</p>	<p>150 psi down pressure from 6 to 9.5 feet.</p> <p>300 psi down pressure from 10 to 10.5 feet.</p>
	10	B	SPT	30	50/1"	92	W, S, PI			
	10.58			47						
2374.0	14.50			50/1"				GW GC	<p>Sample C: WELL- GRADED GRAVEL WITH CLAY AND SAND (GP-GC) 50% fine to coarse, hard, angular gravel; 42% fine to coarse, hard, angular sand; 8% fines with LL = 35 nad PL = 23; light brown color (5 YR 5/6), dry.</p> <p>Auger Cuttings 14.5 to 19.5 feet (RV 4): SILTY GRAVEL WITH SAND (GM) 47% fine to coarse, hard, angular gravel; 40% fine to coarse, hard, angular sand; 13 % fines of medium plasticity with LL= 58 and PL= 38; light brown color (5 YR 5/6), dry.</p> <p>Drill rig chatters occasionally.</p>	
	15	C	SPT	20			W, S, PI			
	16.00			32	81	89				
				49						



START DATE 1/30/07

EXPLORATION LOG

SHEET 3 OF 6

END DATE 1/31/07

JOB DESCRIPTION Boulder City Bypass-Phase 1

STATION "P"94+00

LOCATION I 515 @ Railroad Pass, Roadway Cut

OFFSET 30 feet Right

BORING RRC3

ENGINEER Abbas Bafghi

E.A. # 73307-1

EQUIPMENT Diedrich D-120, #1627

GROUND ELEV. 2388.98 (ft)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

OPERATOR D. White/O. Altamirano

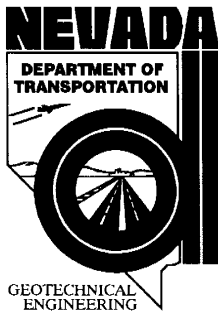
DRILLING METHOD 6" H.S.A.

HAMMER DROP SYSTEM Auto., ETR=65%

BACKFILLED Yes DATE 01/31/2007

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2369.0	19.50								<p>19.50</p> <p>Sample D: WELL-GRADED SAND WITH CLAY AND GRAVEL (SW-SC) 31% fine to coarse, hard, angular gravel; 62% fine to coarse, hard, angular sand; 7% fines with LL = 35 and PL = 23; light brown color (5 YR 5/6), dry.</p> <p>Sample D: SPT hitting gravel.</p> <p>Auger Cuttings 19.5 to 24.5 feet (RV 5): SILTY GRAVEL WITH SAND (GM) 47% fine to coarse, hard, angular gravel; 39% fine to coarse, hard, angular sand; 14 % fines of medium plasticity with LL= 53 and PL= 37; light brown color (5 YR 5/6), dry.</p>	
	20	D	SPT	26	50/4"	60	W, S	SW SC		
	20.33			50/4"						
2364.0	24.50								<p>24.50</p> <p>Sample E: WELL-GRADED SAND WITH GRAVEL (SW) 49% fine to coarse, hard, angular gravel; 50% fine to coarse, hard, angular sand; 1% fines</p> <p>Sample E: SPT hitting gravel.</p>	
	25	E	SPT	22	50/4"	80	W, S			
	25.33			50/4"						

NV_DOT_BCB.RRC.GPJ_NV_DOT.GDT_6/16/11



GEOTECHNICAL ENGINEERING

EXPLORATION LOG

START DATE 1/30/07

END DATE 1/31/07

JOB DESCRIPTION Boulder City Bypass-Phase 1

LOCATION I 515 @ Railroad Pass, Roadway Cut

BORING RRC3

E.A. # 73307-1

GROUND ELEV. 2388.98 (ft)

HAMMER DROP SYSTEM Auto., ETR=65%

STATION "P"94+00

OFFSET 30 feet Right

ENGINEER Abbas Bafghi

EQUIPMENT Diedrich D-120, #1627

OPERATOR D. White/O. Altamirano

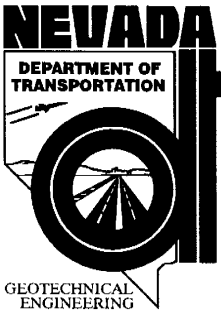
DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 01/31/2007

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
29.50			RVAUGER				RV, S, PI, Ch	SW	Auger Cuttings; 24.5 to 34.5 ft. (RV6, RV7) : --POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM) 51% to 59% fine to coarse, hard, angular gravel; 31% to 38% fine to coarse, hard, angular sand; 10% to 11% fines of low plasticity with LL=46 to 50 and PL= 37 to 41; light brown color (5 YR 5/6), dry. Drill rig chatters.	Drilling was stopped at 4:30 pm at 29.5 feet.
29.67	F	SPT	50/2"	50/2"	100		Sample F: SPT bouncing on cobble/boulder			
2359.0	30		RVAUGER				RV, S, PI, Ch	SW	Sample G: WELL- GRADED SAND WITH CLAY AND GRAVEL (SW-SC) 31% fine to coarse, hard, angular gravel; 62% fine to coarse, hard, angular sand; 7% fines with LL = 35 nad PL = 23; light brown color (5 YR 5/6), dry. Drill rig chatters.	Drilling was resumed from 29.5 feet of depth at 8:00 am on 1/31/07.
34.50										
2354.0	35	G	SPT	24 55 95	150	83	W, S, PI			
	36.00									

NV_DOT_BCB.RRC.GPJ NV_DOT.GDT 6/16/11

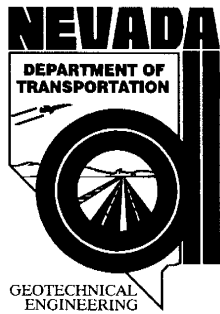


EXPLORATION LOG
 START DATE 1/30/07
 END DATE 1/31/07
 JOB DESCRIPTION Boulder City Bypass-Phase 1
 LOCATION I 515 @ Railroad Pass, Roadway Cut
 BORING RRC3
 E.A. # 73307-1
 GROUND ELEV. 2388.98 (ft)
 HAMMER DROP SYSTEM Auto., ETR=65%

STATION "P"94+00
 OFFSET 30 feet Right
 ENGINEER Abbas Bafghi
 EQUIPMENT Diedrich D-120, #1627
 OPERATOR D. White/O. Altamirano
 DRILLING METHOD 6" H.S.A.
 BACKFILLED Yes DATE 01/31/2007

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2349.0	39.50		RVAUGER				RV, S, PI, Ch	SW SC	Auger Cuttings; 34.5 to 39.5 ft. (RV8): POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM) 51 to 75% fine to coarse, hard, angular gravel; 18 to 38% fine to coarse, hard, angular sand; 6 to 11% fines of medium plasticity with LL=38 to 50 and PL=26 to 41; light brown color (5 YR 5/6), dry.	
	40	H	SPT	67	205	89	W, S, PI		Sample H: SILTY SAND WITH GRAVEL (SM) 39% fine to coarse, hard, angular gravel; 47% fine to coarse, hard, angular sand; 14 % fines of low plasticity with LL=23 to 36 and PL= 20; light brown color (5 YR 5/6), dry.	
	41.00			120					Auger Cuttings; 39.5 to 44.5 ft. (RV9): POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM) 51 to 75% fine to coarse, hard, angular gravel; 18 to 38% fine to coarse, hard, angular sand; 6 to 11% fines of medium plasticity with LL=38 to 50 and PL=26 to 41; light brown color (5 YR 5/6), dry.	Drill rig chatters.
2349.0	44.50		RVAUGER				RV, S, PI, Ch	SM		
				25					Sample I: SPT hitting gravel.	



GEOTECHNICAL ENGINEERING

EXPLORATION LOG

START DATE 1/30/07

END DATE 1/31/07

JOB DESCRIPTION Boulder City Bypass-Phase 1

LOCATION I 515 @ Railroad Pass, Roadway Cut

BORING RRC3

E.A. # 73307-1

GROUND ELEV. 2388.98 (ft)

HAMMER DROP SYSTEM Auto., ETR=65%

STATION "P"94+00

OFFSET 30 feet Right

ENGINEER Abbas Bafghi

EQUIPMENT Diedrich D-120, #1627

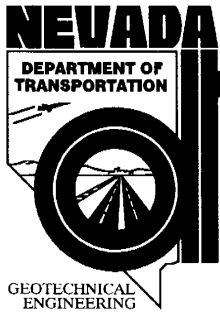
OPERATOR D. White/O. Altamirano

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 01/31/2007

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
	45.46	I	SPT	163/5.5"	63/5.5"	87	W, S, PI	GC GM	<p>Sample I: SILTY, CLAYEY GRAVEL WITH SAND (GC-GM) 48% fine to coarse, hard, angular gravel; 39% fine to coarse, hard, angular sand; 13% fines with LL = 28 and PL = 22; light brown color (5 YR 5/6), dry.</p> <p>Auger Cuttings; 44.5 to 48.0 ft. (RV10): POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM) 51 to 75% fine to coarse, hard, angular gravel; 18 to 38% fine to coarse, hard, angular sand; 6 to 11% fines of medium plasticity with LL=38 to 50 and PL=26 to 41; light brown color (5 YR 5/6), dry.</p> <p>Sample J: SPT bouncing on cobble/boulder</p>	
			RVAUGER				RV, S, PI, Ch			
	48.00									
	48.30	J	SPT	75/3.5"	75/3.5"	57			48.30	Auger bit broke at 48 feet.
2339.0	50								<p>End of Boring at 48.3 feet. Backfilled with drill cuttings. Groundwater was not encountered.</p> <p>Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble.</p> <p>Soil/rock descriptions are derived from visual field identifications and laboratory test data.</p> <p>The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.</p>	Therefore, drilling was terminated.



GEOTECHNICAL ENGINEERING

EXPLORATION LOG

START DATE 2/5/07

END DATE 2/6/07

JOB DESCRIPTION Boulder City Bypass-Phase 1

LOCATION 1515 @ Railroad Pass, Roadway Cut

BORING RRC4

E.A. # 73307-1

GROUND ELEV. 2383.72 (ft)

HAMMER DROP SYSTEM Auto., ETR=65%

STATION "P"90+90

OFFSET 3 feet Left

ENGINEER Abbas Bagghi

EQUIPMENT Diedrich D-120, #1627

OPERATOR D. White

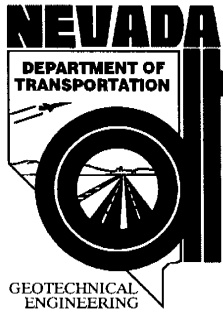
DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 2/06/2007

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
	0.00								<p>ALLUVIUM: Ground surface is flat, rock fragments of gravel and cobbles with occasional boulders, sub-angular, dry. Ground surface slopes gently toward West at ~ 50 feet from the borehole location.</p> <p>Drill rig chatters.</p> <p>Auger cutting samples from 0 to 4.0 ft. (RV1): POORLY GRADED GRAVEL WITH CLAY AND SAND (GP-GC)-- 85% fine to coarse, hard, angular gravel; 9% fine to coarse, hard, angular sand; 6% fines of low plasticity with LL=27 and PL=21; light brown color (5 YR 5/6), dry.</p>	<p>Location: Roadway Cut</p> <p>drill rig unit #1627</p> <p>Auger was advanced to 4.0 feet.</p> <p>50 psi down pressure.</p> <p>weather: sunny</p>
	4.00								4.00	
2378.7	5	A	SPT	55 69 86	155	89	W, S, PI		<p>Sample A: POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM)-- 51% fine to coarse, hard, angular gravel; 38% fine to coarse, hard, angular sand; 11% fines of low plasticity with LL=27 and PL=26; light brown color (5 YR 5/6), dry.</p>	
	5.50									
	9.00									
	9.00								9.00	
2373.7	10	B	SPT	11 21 27	48	78	W, S, PI		<p>Sample B, Sample C: WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM)-- 31 to 38% fine to coarse, hard, angular gravel; 55 to 63% fine to coarse, hard, angular sand; 6 to 8 % fines of non- plasticity with LL=21 to 23; light brown color (5 YR 5/6), dry.</p>	
	10.50									

NV_DOT_BCB_RRC_GPJ_NV_DOT.GDT 6/16/11



EXPLORATION LOG

START DATE 2/5/07

END DATE 2/6/07

JOB DESCRIPTION Boulder City Bypass-Phase 1

LOCATION I 515 @ Railroad Pass, Roadway Cut

BORING RRC4

E.A. # 73307-1

GROUND ELEV. 2383.72 (ft)

HAMMER DROP SYSTEM Auto., ETR=65%

STATION "P"90+90

OFFSET 3 feet Left

ENGINEER Abbas Bafghi

EQUIPMENT Diedrich D-120, #1627

OPERATOR D. White

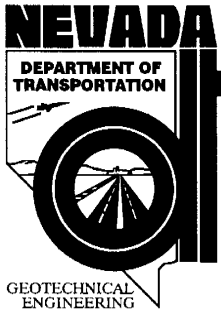
DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 2/06/2007

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2368.7	14.00		RVAUGER				RV, S, PI, Ch	SW SM	Auger cutting samples from 9 to 19 ft. (RV3,RV4): POORLY GRADED GRAVEL WITH CLAY AND SAND (GP-GC) --52 to 74% fine to coarse, hard, angular gravel; 20 to 38% fine to coarse, hard, angular sand; 6 to 10% fines of low plasticity with LL=27 to 28 and PL=21 to 25; light brown color (5 YR 5/6), dry.	
	15	C	SPT	25	52	83	W, S, PI			
	15.50			27						
2363.7	19.00		RVAUGER				RV, S, PI, Ch	SP SM	Sample D: POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) 33% fine to coarse, hard, angular gravel; 56% fine to coarse, hard, angular sand; 12% fines of low plasticity with LL=23 and PL=21; light brown color (5 YR 5/6), dry.	Drilling was stopped at 19.0 ft. at 3:30 pm. Drilling was resumed at 19.0 ft. of depth at 8:05 am on 2/6/07.
	20	D	SPT	46	174	83	W, S, PI			
	20.50			128						
	24.00		RVAUGER				RV, S, PI, Ch		Auger cutting samples from 19 to 24.0 ft. (RV5): POORLY GRADED GRAVEL WITH CLAY AND SAND (GP-GC) -- 76% fine to coarse, hard, angular gravel; 20% fine to coarse, hard, angular sand; 5% fines of low plasticity with LL=28 and PL=22; light brown color (5 YR 5/6), dry.	

NV_DOT_BCB RRC.GPJ NV_DOT_GDI 6/16/11



START DATE 2/5/07

EXPLORATION LOG

SHEET 3 OF 5

END DATE 2/6/07

JOB DESCRIPTION Boulder City Bypass-Phase 1

STATION "P"90+90

LOCATION I 515 @ Railroad Pass, Roadway Cut

OFFSET 3 feet Left

BORING RRC4

ENGINEER Abbas Bafghi

E.A. # 73307-1

EQUIPMENT Diedrich D-120, #1627

GROUND ELEV. 2383.72 (ft)

OPERATOR D. White

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 2/06/2007

HAMMER DROP SYSTEM Auto., ETR=65%

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS						
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd										
2358.7	25	E	SPT	24	109	83	W, S, PI	SW SM	<p>Sample E: WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) -- 40% fine to coarse, hard, angular gravel; 51% fine to coarse, hard, angular sand; 9% fines of non-plasticity with LL=20; light brown color (5 YR 5/6), dry.</p> <p>Auger cutting samples from 24 to 34 ft. (RV6, RV7): POORLY GRADED GRAVEL WITH SILTY CLAY AND SAND (GP-GC)--52 to 60% fine to coarse, hard, angular gravel; 31 to 38% fine to coarse, hard, angular sand; 9 to 10% fines of low plasticity with LL=26 to 27 to 28 and PL=21; light brown color (5 YR 5/6), dry.</p>							
	25.50			54												
	29.00			55												
	29.42	F	SPT	100/5"	100/5"	80										
2353.7	30	RVAUGER					RV, S, PI, Ch	SW SM								
	34.00										G	SPT	100/2.8"	100/2.8"	178	W, S, PI
	34.23															
2348.7	35								<p>Sample G: SILTY, CLAYEY SAND WITH GRAVEL (SC-SM) 20% fine to coarse, hard, angular gravel; 57% fine to coarse, hard, angular sand; 23 % fines of low plasticity with LL=29 and plastic limit = 22; light brown color (5 YR 5/6), dry.</p>							

NV_DOT_BCB RRC.GPJ NV_DOT.GDT 6/16/11



START DATE 2/5/07

END DATE 2/6/07

JOB DESCRIPTION Boulder City Bypass-Phase 1

LOCATION I 515 @ Railroad Pass, Roadway Cut

BORING RRC4

E.A. # 73307-1

GROUND ELEV. 2383.72 (ft)

HAMMER DROP SYSTEM Auto., ETR=65%

EXPLORATION LOG

STATION "P"90+90

OFFSET 3 feet Left

ENGINEER Abbas Bafghi

EQUIPMENT Diedrich D-120, #1627

OPERATOR D. White

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 2/06/2007

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
			RVAUGER				RV, S, PI, Ch	SC SM	Auger cutting samples from 34 to 39 ft. (RV8): POORLY GRADED GRAVEL WITH SILTY CLAY, SAND, AND COBBLES (GP-GC) -- 50% fine to coarse, hard, angular gravel; 41% fine to coarse, hard, angular sand; 9% fines of low plasticity with LL=25 and PL=20; light brown color (5 YR 5/6), dry.	
	39.00									
	39.21	H	SPT	100/2.5"	100/2.5"	400	W, S, PI		Sample H: CLAYEY SAND WITH GRAVEL (SC) 10% fine to coarse, hard, angular gravel; 66% fine to coarse, hard, angular sand; 24 % fines of low plasticity with LL=30 and plastic limit = 22; light brown color (5 YR 5/6), dry.	
2343.7	40		RVAUGER				RV, S, PI, Ch	SC	Auger cutting samples from 39 to 44 ft. (RV9): POORLY GRADED GRAVEL WITH SILTY CLAY, SAND, AND COBBLES (GP-GC) -- 60% fine to coarse, hard, angular gravel; 31% fine to coarse, hard, angular sand; 9% fines of low plasticity with LL=26 and PL=21; light brown color (5 YR 5/6), dry.	
	44.00									
	44.33	I	SPT	100/4"	100/4"	225	W, S, PI		Sample I: SILTY, CLAYEY SAND WITH GRAVEL (SC-SM) 17% fine to coarse, hard, angular gravel; 57% fine to coarse, hard, angular sand; 26 % fines of low plasticity with LL=24 and plastic limit = 17; light brown color (5 YR 5/6), dry.	
2338.7	45		RVAUGER				RV, S, PI, Ch	SC SM	Auger cutting samples from 34 to 39 ft. (RV10): WELL- GRADED GRAVEL WITH SAND, AND COBBLES (GW) -- 71% fine to coarse, hard, angular gravel; 21% fine to coarse, hard, angular sand; 5% fines of low plasticity with LL=26 and PL=21; light brown color (5 YR 5/6), dry.	



EXPLORATION LOG

START DATE 2/5/07

END DATE 2/6/07

JOB DESCRIPTION Boulder City Bypass-Phase 1

LOCATION I 515 @ Railroad Pass, Roadway Cut

BORING RRC4

E. A. # 73307-1

GROUND ELEV. 2383.72 (ft)

HAMMER DROP SYSTEM Auto., ETR=65%

STATION "P"90+90

OFFSET 3 feet Left

ENGINEER Abbas Bafghi

EQUIPMENT Diedrich D-120, #1627

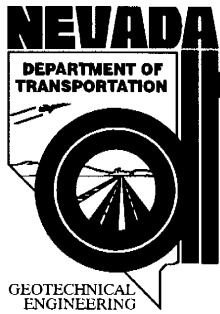
OPERATOR D. White

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 2/06/2007

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2333.7	49.00								49.00	
	50	J	SPT	25	156	78	W, S, PI	SM	Sample J: SILTY SAND WITH GRAVEL (SM) 39% fine to coarse, hard, angular gravel; 40% fine to coarse, hard, angular sand; 21 % fines of low plasticity with LL=19 and plastic limit = 18; light brown color (5 YR 5/6), dry.	Drilling was stopped at 4:00 pm.
	50.50			129					50.50	
									End of Boring at 50.5 feet. Backfilled with drill cuttings. Groundwater was not encountered.	
									Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble.	
									Soil/rock descriptions are derived from visual field identifications and laboratory test data.	
									The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.	
2328.7	55									



START DATE 12/20/05

END DATE 12/20/05

JOB DESCRIPTION Boulder City Bypass-Phase 1

LOCATION I 515 @ Railroad Pass, I515-US 95 Interchange

BORING BCB1

E.A. # 73307-1

GROUND ELEV. 2049.20 (ft)

HAMMER DROP SYSTEM Auto., ETR=79%

EXPLORATION LOG

STATION "P"214+55

OFFSET 52 ft. Left

ENGINEER Mark Salazar

EQUIPMENT Diedrich D-120, #1082

OPERATOR K. Marshall

DRILLING METHOD Rotary Wash

BACKFILLED DATE

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2044.2	0.00							SW SM	ALLUVIUM: Sample A: WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) -- 45% fine to coarse, hard, angular gravel; 47% fine to coarse sand; 9 % fines of non- plasticity. Sample B: Same as above but with moderate brown volcanic gravel fragments, med. dense, minor organic roots, caliche covered gravel. Drill rig chatters.	Location: I-515/US 95 Interchange. started: 9:15 am. Drilling with bentonite mud and a 4.5 in. Tricone bit.
	2.00									
	3.50	A	SPT	8 7 7	14	100	W, S			
	5.00									
2039.2	6.50	B	SPT	5 8 9	17	100	W, PI	GM	7.00 Sample C: Visual Description SILTY GRAVEL/SILTY SAND AND COBBLES (GM/SM) very dense, yellowish brown. Drill rig chatters some but mostly smooth to 12 feet.	300 psi down pressure.
	10.00									
	10.63	C	SPT	39	50/1.5"					
	12.00									
2034.2	12.50	D	SPT	125/6"	125/6"		W, H	GM	Sample D: SILTY GRAVEL WITH SAND (GM) -- 44% fine to coarse, hard, angular gravel; 42% fine to coarse sand; 14 % fines of non- plasticity. Sample E (Visual Description): some reddish color, more angular and broken gravel fragments.	
	15.00									
	15.50	E	SPT	80/6"	80/6"					
	20.00									
2029.2	20.50	F	SPT	200/6"	200/6"		W, H	SM	20.00 Samples F and G: SILTY SAND WITH GRAVEL (SM) -- 22% to 33% fine to coarse, hard, angular gravel; 54 to 58% fine to coarse sand; 13 to 20 % fines of non- plasticity.	
	25.00									
	25.50	G	SPT	300/6"	300/6"		W, S			
	30.00									

NV_DOT_BCB_BCB_CPJ_NV_DOT_GDT_6/16/11



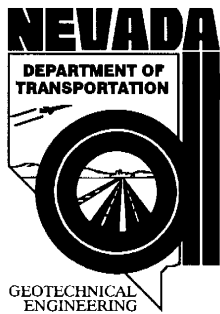
EXPLORATION LOG

START DATE 12/20/05
 END DATE 12/20/05
 JOB DESCRIPTION Boulder City Bypass-Phase 1
 LOCATION I 515 @ Railroad Pass, I515-US 95 Interchange
 BORING BCB1
 E.A. # 73307-1
 GROUND ELEV. 2049.20 (ft)
 HAMMER DROP SYSTEM Auto., ETR=79%

STATION "P"214+55
 OFFSET 52 ft. Left
 ENGINEER Mark Salazar
 EQUIPMENT Diedrich D-120, #1082
 OPERATOR K. Marshall
 DRILLING METHOD Rotary Wash
 BACKFILLED _____ DATE _____

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2014.2	35.00 35.42	H	SPT	350/5"	350/5"		W, S	SM	Sample H: SILTY SAND WITH GRAVEL (SM) -- 30% fine to coarse, hard, angular gravel; 56% fine to coarse sand; 14 % fines of non-plasticity. Sample I (Visual Description) : same as above Sample J (Visual Description): same as above	
2009.2	40									
2004.2	45.00 45.33	I	SPT	300/4"	300/4"					
1999.2	50									
1994.2	55.00 55.32	J	SPT	200/3.8"	200/3.8"					



START DATE 12/20/05

EXPLORATION LOG

SHEET 3 OF 3

END DATE 12/20/05

JOB DESCRIPTION Boulder City Bypass-Phase 1

STATION "P"214+55

LOCATION I 515 @ Railroad Pass, I515-US 95 Interchange

OFFSET 52 ft. Left

BORING BCB1

ENGINEER Mark Salazar

E.A. # 73307-1

EQUIPMENT Diedrich D-120, #1082

GROUND ELEV. 2049.20 (ft)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

OPERATOR K. Marshall

DRILLING METHOD Rotary Wash

HAMMER DROP SYSTEM Auto., ETR=79%

BACKFILLED _____ DATE _____

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
1984.2	65.00								63.50 Sample K: Visual Description SILTY SAND/ GRAVEL SAND (GM/SM) very dense, moist, yellowish brown, with 2 inches of whitish plastic (LL = 58, PL = 39, PI = 19) inclusion.	lost 1/3 of the mud tank circulation.
	66.50	K	SPT	8 24 31	55	100	W, PI			
									69.00	300 psi down pressure.
1979.2	70.00 70.29									500 psi down pressure.
1974.2	75							SM		
1969.2	80.00 80.29								80.20	End of Boring at 80.2 feet.
										Groundwater was not encountered.
										UTM Coordinate: N 3980697.51 E 689222681
										Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble.
										Soil/rock descriptions are derived from visual field identifications and laboratory test data.
										The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.
1964.2	85									



START DATE 12/21/05

END DATE 12/22/05

JOB DESCRIPTION Boulder City Bypass-Phase 1

LOCATION I 515 @ Railroad Pass, I515-US 95 Interchange

BORING BCB2

E.A. # 73307-1

GROUND ELEV. 2042.30 (ft)

HAMMER DROP SYSTEM Auto., ETR=79%

EXPLORATION LOG

STATION "P"216+68

OFFSET 66 ft. Right

ENGINEER Mark Salazar

EQUIPMENT Diedrich D-120, #1082

OPERATOR K. Marshall

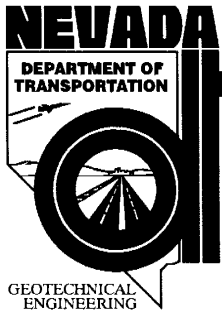
DRILLING METHOD Rotary Wash

BACKFILLED _____ DATE _____

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2037.3	0.00							SM	ALLUVIUM: Sample A: <U>> SILTY SAND WITH GRAVEL (SM) -- 25% fine to coarse, hard, angular gravel; 50% fine to coarse sand; 25 % fines of non- plasticity, medium dense, light brown 5YR 4/4.	Location: I-515/US 95 Interchange. Drilling with bentonite mud and a 4.5 in. Tricone bit.
	5.00	A	SPT	5	14	100	W, S			
	6.50			6						
2032.3	8.00			10				SP SM	Sample B: LL = 42, PL = 27. Sample C: <U>> POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) -- 30% fine to coarse, hard, angular gravel; 59% fine to coarse sand; 11 % fines of low plasticity (LL = 27, PL = 24), dense.	
	9.50	B	SPT	13	31	100	W, PI			
	10.00			18						
	11.50	C	SPT	30	61	100	W, S, PI			
2027.3	15.00							SM		
	15.50	D	SPT	167/6"	167/6"					
2022.3	20.00							SM	Sample E: SILTY SAND WITH GRAVEL (SM) -- 32% fine to coarse, hard, angular gravel; 50% fine to coarse sand; 18 % fines of non- plasticity.	hole/mud tank seal got broke. lost the mud in the tank. hole/mud tank connection was re-sealed.
	20.50	E	SPT	295/6"	295/6"		W, PI			
2017.3	25									
	30.00									

NV_DOT_BCB_BCB.GPJ NV_DOT_GDT 6/16/11



START DATE 12/21/05

EXPLORATION LOG

SHEET 2 OF 3

END DATE 12/22/05

STATION "P"216+68

JOB DESCRIPTION Boulder City Bypass-Phase 1

OFFSET 66 ft. Right

LOCATION I 515 @ Railroad Pass, I515-US 95 Interchange

ENGINEER Mark Salazar

BORING BCB2

EQUIPMENT Diedrich D-120, #1082

E.A. # 73307-1

OPERATOR K. Marshall

GROUND ELEV. 2042.30 (ft)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

DRILLING METHOD Rotary Wash

HAMMER DROP SYSTEM Auto., ETR=79%

BACKFILLED _____ DATE _____

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT		Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS	
		NO.	TYPE	6 inch Increments	Last 1 foot						
2077.3	30.48	F	SPT	400/5.8"	400/5.8"		W, S		<p>Sample F: SILTY SAND WITH GRAVEL (SM) -- 20% fine to coarse, hard, angular gravel; 63% fine to coarse, hard, angular sand; 17 % fines of non-plasticity, dry</p>		
2002.3	40.00 40.36	G	SPT	100/4.3"	100/4.3"						<p>Sample G (Visual Description) : same as above</p> <p>450 psi down pressure.</p>
1997.3	45							SM			
1992.3	50.00 50.35	H	SPT	100/4.2"	100/4.2"				<p>Sample H (Visual Description): same as above</p>		
1987.3	55										
	60.00										

NV_DOT_BCB BCB GPJ NV_DOT_GDT_6/16/11



START DATE 12/21/05

END DATE 12/22/05

JOB DESCRIPTION Boulder City Bypass-Phase 1

LOCATION I 515 @ Railroad Pass, I515-US 95 Interchange

BORING BCB2

E.A. # 73307-1

GROUND ELEV. 2042.30 (ft)

HAMMER DROP SYSTEM Auto., ETR=79%

EXPLORATION LOG

STATION "P"216+68

OFFSET 66 ft. Right

ENGINEER Mark Salazar

EQUIPMENT Diedrich D-120, #1082

OPERATOR K. Marshall

DRILLING METHOD Rotary Wash

BACKFILLED _____ DATE _____

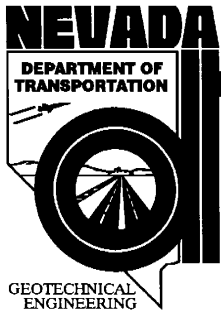
GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS	
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd					
1977.3	60.35	I	SPT	100/4.2"	100/4.2"		W, S		Sample I: SILTY SAND WITH GRAVEL (SM) -- 20% fine to coarse, hard, angular gravel; 64% fine to coarse, hard, angular sand; 16 % fines of non- plasticity, dry Sample J (Visual Description): same as above Sample K (Visual Description): same as above	resumed at 8:40 am on 12/22/2005.	
1972.3	70.00 70.15	J	SPT	100/2.2"	100/2.2"			SM			
1967.3	75										
1962.3	80.00 80.27	K	SPT	100/3.2"	100/3.2"				80.30	End of Boring at 80.3 feet. Groundwater was not encountered. Note: Partial increment blow counts may be due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a caliche layer or cobble. Soil/rock descriptions are derived from visual field identifications and laboratory test data. The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.	Hole was flushed with clean water.
1957.3	85										

NV_DOT BCB BCB.GPJ NV_DOT.GDT 6/16/11



Silverline Drive Borehole Locations



EXPLORATION LOG

START DATE 1/10/06
 END DATE 1/12/06
 JOB DESCRIPTION Boulder City Bypass - Phase 1
 LOCATION I 515 @ Railroad Pass: Silverline Drive
 BORING BSL1
 E.A. # 73307-1
 GROUND ELEV. 2097.46 (ft)
 HAMMER DROP SYSTEM Auto., ETR=79%

STATION "P" 183+80
 OFFSET 100 feet Right
 ENGINEER Abbas Bafghi
 EQUIPMENT Diedrich D-120, #1082
 OPERATOR K. Marshall
 DRILLING METHOD Rotary Wash
 BACKFILLED Yes DATE 1/12/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

GEOTECHNICAL ENGINEERING

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT		Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot					
2092.5	2.00								Ground surface is composed of gravels/cobbles/rock fragments and scattered brushes, dry. Very hard drilling. Drill rig chatters. rock cuttings, water return gray with some reddish rock fragments (rhyolite?). Ground is sloping North to South. 2.00 Sample A: WELL-GRADED GRAVEL WITH SAND (GW) rock fragments of gravel size with mixture of sand/silt, (Alluvium/Colluvium). visually classified. Sample B: Gravel size rock fragments, grayish, very hard. Sample C: No recovery, presence of cobble/boulder	Location: UTM 5D ground surface is sloping N to S. Started: 9:00 am Rig #1082 weather: sunny, about 50 degrees. Rotary wash using bentonite slurry. Type of bit: 4.5 inch tricone. No sand catcher was used in the SPT sampler. 300 psi down pressure
		A	SPT	11	55		W, S, Pl, RV, Ch			
	3.50			16	39					
	4.20	B	SPT	48	50/2.5"		S, Pl, RV, Ch			
	5.00			50/2.5"						
5.27	C	CMS	100/3.25"	100/3.25"	0	S, Pl, RV, Ch	GW			
2087.5	10.00								Drill rig chatters. Rate of penetration = 5.5 inches/minutes. Bedrock contact at 8 feet. FRACTURED BEDROCK (FB) undifferentiated volcanic rocks including granite porphyry, rhyolite, and other intrusive rocks ranging from basaltic to rhyolitic. Cretaceous and Tertiary age formation of Black Hills. Discontinuity Spacing = very closely jointed bedrock. Joint spacing is as close as 0.1 inch, non-filling, gray color. 11.50 Installed core barrel at 11.5 feet. RC1 (11.5'-14') : rate of coring from 12 feet to 14 feet = 2.5 feet/6 minutes. RQD could not be determined because the cores were highly fractured during coring. 14.00 RC2 (14'-15.5'): 1.5 feet/2.3 minutes. core barrel got plugged at depth of 15.5 feet. RQD cannot be determined because the cores are highly fractured.	Wireline coring, Christensen Double Tube core barrel. NX core size, 1.875" I.D.
	10.33	D	CMS	100/4.0"	100/4.0"		W, S, Pl, RV, Ch			
	12.00									
	14.00					100	S, Pl, RV, Ch			
			RC1CORE							
			RC2CORE							



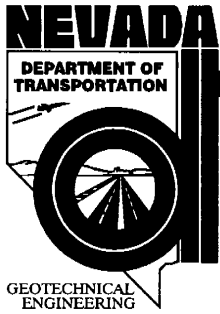
EXPLORATION LOG

START DATE 1/10/06
 END DATE 1/12/06
 JOB DESCRIPTION Boulder City Bypass - Phase 1
 LOCATION I 515 @ Railroad Pass: Silverline Drive
 BORING BSL1
 E.A. # 73307-1
 GROUND ELEV. 2097.46 (ft)
 HAMMER DROP SYSTEM Auto., ETR=79%

STATION "P" 183+80
 OFFSET 100 feet Right
 ENGINEER Abbas Bafghi
 EQUIPMENT Diedrich D-120, #1082
 OPERATOR K. Marshall
 DRILLING METHOD Rotary Wash
 BACKFILLED Yes DATE 1/12/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2077.5	15.50								15.50 RC3 (15.5'-17.25'): 0.50 feet/0.75 minutes.	
			RC3CORE							
	17.25								17.25 RC4 (17.25'-19.5'): 1.0 foot/1.0 minute. core barrel got plugged at depth 19.5 feet.	
			RC4CORE			48				
	19.50								19.50 RC5 (19.5'-21.9'): rate 2.0 feet/2.5 minutes.	
2077.5	20									
			RC5CORE			55				
	21.90		SPT		50/2.0"				21.90	
	22.25				50/2.0"					Resumed on 01-11-06 at 8:05 am. The borehole cuttings caved in overnight to depth of 13.0 feet.
			RC6CORE			61			RC6 (22.5'-25.25'): rate 7.5 inches/ minute.	
2072.5	25									
	25.25								25.25 RC7 (25.25'-27.0'): No recovery.	
			RC7CORE			0				
	27.00								27.00	
	27.27		SPT		50/3.25"	50/3.25"				A new core bit was used from 27.75 feet (Run 8) down.
	27.75									
			RC8CORE			76			RC8 (27.75'-29.5'): 16.0 inches of recovery.	
	29.50								29.50	



START DATE 1/10/06

END DATE 1/12/06

JOB DESCRIPTION Boulder City Bypass - Phase 1

LOCATION I 515 @ Railroad Pass: Silverline Drive

BORING BSL1

E.A. # 73307-1

GROUND ELEV. 2097.46 (ft)

HAMMER DROP SYSTEM Auto., ETR=79%

EXPLORATION LOG

STATION "P" 183+80

OFFSET 100 feet Right

ENGINEER Abbas Bafghi

EQUIPMENT Diedrich D-120, #1082

OPERATOR K. Marshall

DRILLING METHOD Rotary Wash

BACKFILLED Yes DATE 1/12/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
	33.50		RC9CORE			62			RC9 (29.5'-33.5'): rate: 10.5 inches/minute. FRACTURED BEDROCK (FB) (continued): undifferentiated volcanic rocks including granite porphyry, rhyolite, and other intrusive rocks ranging from basaltic to rhyolitic. Cretaceous and Tertiary age formation of Black Hills.	
2062.5	35									
2057.5	40.00 40.23		SPT	100/2.8"	100/2.8"				New batch of bentonite drilling mud is made, because hole is caving in and sloughing. Hole caved in to 10 feet during the drilling rods withdrawal. Could not lower the sampler in the hole below 10 feet of depth. Drilling operation was terminated at this depth.	rate of augering = 10.5 inches/minute under 400 psi. Nearby Mining Representative-Karl says, "There is a fiber optic line in this vicinity. Hydraulic hammer was tried to excavate the bedrock to install the fiber optic line but did not work. Explosive was used to break the bedrock to pass through the humps of the bedrock. Rocks are highly abrasive."

NV_DOT BCB BSL.GPJ NV_DOT.GDT 6/16/11



GEOTECHNICAL ENGINEERING

EXPLORATION LOG

START DATE 1/10/06

END DATE 1/12/06

JOB DESCRIPTION Boulder City Bypass - Phase 1

LOCATION I 515 @ Railroad Pass: Silverline Drive

BORING BSL1

E.A. # 73307-1

GROUND ELEV. 2097.46 (ft)

HAMMER DROP SYSTEM Auto., ETR=79%

STATION "P" 183+80

OFFSET 100 feet Right

ENGINEER Abbas Bafghi

EQUIPMENT Diedrich D-120, #1082

OPERATOR K. Marshall

DRILLING METHOD Rotary Wash

BACKFILLED Yes DATE 1/12/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2047.5	50								50.00	
2042.5	55								<p>End of Boring at 50.0 feet. Backfilled with drill cuttings.</p> <p>Groundwater level could not be observed or measured in the borehole because of the usage of wet drilling method.</p> <p>All obtained samples were classified visually.</p> <p>Note: Partial increment blow counts may be due to the jammed sampler shoe by gravel pieces, or the sampler is hitting a caliche layer or a cobble.</p> <p>Note: The station and the offset are measured off the roadway alignment plan sheet. The elevation is measured by hand-held GPS. These measurements are approximate.</p> <p>GPS: Latitude: 35°57'27.672"N Longitude: 114°54'32.657"W Elevation: 2097.46'</p>	



START DATE 1/24/06

END DATE 1/25/06

JOB DESCRIPTION Boulder City Bypass - Phase 1

LOCATION I 515 @ Railroad Pass: Silverline Drive

BORING BSL2

E.A. # 73307-1

GROUND ELEV. 2096.45 (ft)

HAMMER DROP SYSTEM Auto., ETR=79%

EXPLORATION LOG

STATION "P" 185+00

OFFSET 100 feet Right

ENGINEER Abbas Bafghi

EQUIPMENT Diedrich D-120, #1082

OPERATOR K. Marshall

DRILLING METHOD Rotary Wash

BACKFILLED Yes DATE 1/25/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS	
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd					
2091.5	1.00							GW	Ground surface is composed of gravels/cobbles/rock fragments and scattered brushes, dry. rock cuttings, water return gray. Ground is sloping North to South. Sample A: WELL-GRADED GRAVEL WITH SAND (GW) rock fragments of gravel size with mixture of sand/silt, dry, (Alluvium/colluvium). A: light brown, about 20% fine, about 30% gravel, the rest is rock fragments. Recovery length = 1.33 feet. B: gray, about 80% gravel, fines < 10%. Recovery length = 1.08 feet. C: gray gravels from fracturing boulders and cobbles. Recovery length = 0.917 feet. Drill rig chattered from 7 feet down. 6 inch/1.25 minutes drilling under 300 psi down pressure.	Location: UTM5B ground surface is sloping N to S. Started: 9:00 am. Rig # 1082 weather: sunny, cold. Rotary wash using bentonite slurry. Type of bit: 4.5 inch tricone. sand catcher was used in the SPT sampler.	
				11							
		A	SPT	11	26	90					
	2.50			15							
	3.00										
	4.00	B	SPT	73	90	100					
	4.50										
5.50	C	SPT	27	50/0.5"	92						
			42								
			50/0.5"								
	7.00							7.00	Drill rig chattered from 7 feet down. 6 inch/1.25 minutes drilling under 300 psi down pressure.		
	7.46	D	SPT	100/5.5"	100/5.5"				7.46	Bedrock contact at 7 feet.	
										Install core barrel at 8.0 feet.	300 psi down pressure
	9.50								9.50	FRACTURED BEDROCK (FB) undifferentiated volcanic rocks including granite porphyry, rhyolite, and other intrusive rocks ranging from basaltic to rhyolitic. Cretaceous and Tertiary age formation of Black Hills. Discontinuity Spacing = very closely jointed bedrock. Joint spacing is as close as 1/10 inch, non-filling, gray. No sign of decompositions, just highly fractured.	Wireline coring, Christensen Double Tube core barrel.
2086.5	8.69	E	SPT	50/2.0"	50/2.0"						
										RC1 (9.5'-14.5'): rate of coring = 1 foot/minute.	
						50				RQD could not be determined because the core was washed away during coring.	NX core size, 1.875" I.D.
	14.67								14.00	RC2 (14'-15.5'): No recovery. The core was washed out of the core barrel during coring.	
2081.5	15.50								15.50	RC3 (15.5'-17.25'): 2.0 feet/1.75 minutes. RQD cannot be determined because the cores were highly fractured.	
	16.00										
	17.00					0					
									17.25		
						33					
	19.50								19.50	RC4 (19.5'-21.90'): 1.3 feet/1.0 minute.	



START DATE 1/24/06

END DATE 1/25/06

JOB DESCRIPTION Boulder City Bypass - Phase 1

LOCATION I 515 @ Railroad Pass: Silverline Drive

BORING BSL2

E.A. # 73307-1

GROUND ELEV. 2096.45 (ft)

HAMMER DROP SYSTEM Auto., ETR=79%

EXPLORATION LOG

STATION "P" 185+00

OFFSET 100 feet Right

ENGINEER Abbas Bafghi

EQUIPMENT Diedrich D-120, #1082

OPERATOR K. Marshall

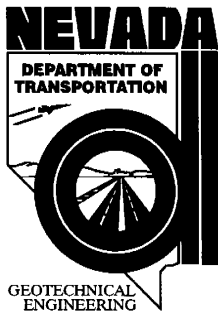
DRILLING METHOD Rotary Wash

BACKFILLED Yes DATE 1/25/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2071.5	22.25	RC4	CORE			0			RQD could not be determined because the cores were highly fractured.	used smaller tricone bit (2.75 in.) from 20 feet down.
	22.75									
	22.95	SPT		100/2"	100/2"				RC5 (21.9'-25.25'): 1.0 foot/1.0 minute. RQD could not be determined because the cores were highly fractured.	
	23.25									
	25	RC5	CORE			55				
	26.00									
	27.00									
	29.50	RC6	CORE			64			RC6 (26'-29.5'): rate 2.0 feet/2.5 minutes. RQD could not be determined because the cores were highly fractured.	
	30.00	RC7	CORE			0			RC7: (29.5'-30'): core barrel got plugged; coring stopped.	
	32.00	RC8	CORE			100			RC8: (30.0'-32.0'): RQD could not be determined because the cores were highly fractured.	
	33.75	RC9	CORE						RC9 (32.0'-33.75'): rate 1.75 feet/2.0 minute.	
2066.5	35	RC10	CORE			100			RC10 (33.75'-35.5'): rate 8.0 inches/0.5 minute.	
	35.50									
	36	RC11	CORE			31			RC11 (35.5'-38.75'): rate 1.0 foot /3/4 a minute. RQD could not be determined because the cores were highly fractured, with some reddish slough.	
	38.75									
39.75										

NV_DOT_BCB_BSL_GPJ_NV_DOT_GDT_6/16/11



EXPLORATION LOG

START DATE 1/24/06

END DATE 1/25/06

JOB DESCRIPTION Boulder City Bypass - Phase 1

LOCATION I 515 @ Railroad Pass: Silverline Drive

BORING BSL2

E.A. # 73307-1

GROUND ELEV. 2096.45 (ft)

HAMMER DROP SYSTEM Auto., ETR=79%

STATION "P" 185+00

OFFSET 100 feet Right

ENGINEER Abbas Bafghi

EQUIPMENT Diedrich D-120, #1082

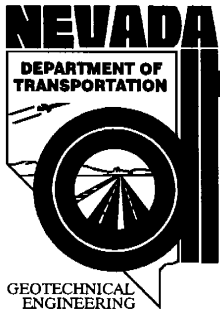
OPERATOR K. Marshall

DRILLING METHOD Rotary Wash

BACKFILLED Yes DATE 1/25/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
	41.50	RC1	CORE			0			RC12 (39.75'-41.5'): RQD could not be determined because the cores were highly fractured.	"There is a fiber optic line in this vicinity. Hydraulic hammer was tried to excavate the bedrock to instal the fiber optic line but did not work. Explosive was used to break the bedrock to pass through the humps of the bedrock. Rocks are highly abrasive" (Mining Representative-Karl)
	43.50	RC1	CORE			79			RC13 (41.50-43.50'): rate 2.0 foot /1.30 minutes. RQD could not be determined because the cores were highly fractured.	
2051.5	45								End of Boring at 43.5 feet. Backfilled with drill cuttings. Groundwater level could not be observed or measured in the borehole because of the usage of wet drilling method. All obtained samples were classified visually. Note: Partial increment blow counts may be due to the jammed sampler shoe by gravel pieces, or the sampler is hitting a caliche layer or a cobble. Note: The station and the offset are measured off the roadway alignment plan sheet. The elevation is measured by hand-held GPS. These measurements are approximate. GPS: Latitude: 35°57'26.924"N Longitude: 114°54'34.597"W Elevation: 2096.45'	
2046.5	50									
2041.5	55									



GEOTECHNICAL ENGINEERING

START DATE 1/26/06

END DATE 1/26/06

JOB DESCRIPTION Boulder City Bypass - Phase 1

LOCATION I 515 @ Railroad Pass: Silverline Drive

BORING BSL3

E.A. # 73307-1

GROUND ELEV. 2106.26 (ft)

HAMMER DROP SYSTEM Auto., ETR=79%

EXPLORATION LOG

STATION "P" 184+90

OFFSET 100 feet Left

ENGINEER Abbas Bafghi

EQUIPMENT Diedrich D-120, #1082

OPERATOR K. Marshall

DRILLING METHOD 6 in. HSA

BACKFILLED Yes DATE 1/26/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2101.3	1.00							GW	Ground is covered with cobbles/boulders, very rocky, dry, very hard drilling. 1.00 WELL-GRADED GRAVEL WITH SAND (GW) rock fragments of gravel size with mixture of sand/silt, dry, light brown, (Alluvium). Sample A: rock fragments with sand/silt. Recovery length = 1.167 feet. Sample B: SPT shoe was plugged by a piece of rock fragment. Recovery length = 0.67 feet. Sample C: more fines, less rock fragments. Recovery length = 1.08 feet.	Location: UTM5A started: 7:30 am stopped: 10:15 am weather: sunny and cool. Rig #1082 Automatic Hammer broke at 8:20, fixed by 8:50. sand catcher was used in SPT sampler. Drilling was terminated at 10:15 am due to lack of advancement. Inner bit ("fish tail") got broken due to hard drilling in bedrock.
		A	SPT	9	30	78				
	2.50			13						
		B	SPT	7	15	44				
	4.00			9						
		C	SPT	12	32	72				
	5.50			19						
		D	SPT	14	80					
	7.00			60						
	7.13	E	SPT	100/1.5"	100/1.5"					
7.50										
7.89	F	SPT	100/2.25"	100/2.25"						
2096.3	10							6.50 Drill rig chattered from 7.5 feet down, no penetration. Bedrock contact at 7.5 feet.		
2091.3	15							8.50 FRACTURED BEDROCK undifferentiated volcanic rocks including granite porphyry, rhyolite, and other intrusive rocks ranging from basaltic to rhyolitic. Cretaceous and Tertiary age formation of Black Hills. Discontinuity Spacing = very closely jointed bedrock. highly fractured, no signs of decomposition, non-filling, gray. Sample E: looks like bedrock material, fractured rock fragments, pulverized during SPT driving. Recovery length = 0.42 feet. SPT bouncing on rock. Sample F: Recovery length = 2 inches of slough. no SPT penetration. SPT bouncing on rock. End of Boring at 7.5 feet. Drilling was terminated due to lack of HSA advancement, very hard drilling in bedrock. Backfilled with drill cuttings. Groundwater was not encountered. All obtained samples were classified visually. The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders. Note: The station and the offset are measured off the roadway alignment plan sheet. The elevation is measured by hand-held GPS. These measurements are approximate.		



EXPLORATION LOG

START DATE 1/26/06

END DATE 1/26/06

JOB DESCRIPTION Boulder City Bypass - Phase 1

LOCATION I 515 @ Railroad Pass: Silverline Drive

BORING BSL3

E.A. # 73307-1

GROUND ELEV. 2106.26 (ft)

HAMMER DROP SYSTEM Auto., ETR=79%

STATION "P" 184+90

OFFSET 100 feet Left

ENGINEER Abbas Bafghi

EQUIPMENT Diedrich D-120, #1082

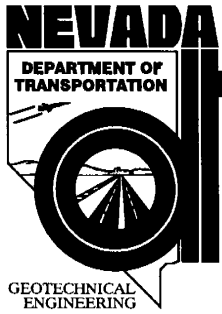
OPERATOR K. Marshall

DRILLING METHOD 6 in. HSA

BACKFILLED Yes DATE 1/26/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2081.3	25								GPS: Latitude: 35°57'27.702"N Longitude: 114°54'32.661"W Elevation: 2106.26	
2076.3	30									
2071.3	35									



START DATE 1/26/06

END DATE 1/26/06

JOB DESCRIPTION Boulder City Bypass - Phase 1

LOCATION I 515 @ Railroad Pass: Silverline Drive

BORING BSL4

E.A. # 73307-1

GROUND ELEV. 2103.13 (ft)

HAMMER DROP SYSTEM Auto., ETR=79%

EXPLORATION LOG

STATION "P" 185+70

OFFSET 100 feet left

ENGINEER Abbas Bafghi

EQUIPMENT Diedrich D-120, #1082

OPERATOR K. Marshall

DRILLING METHOD 6 in. HSA

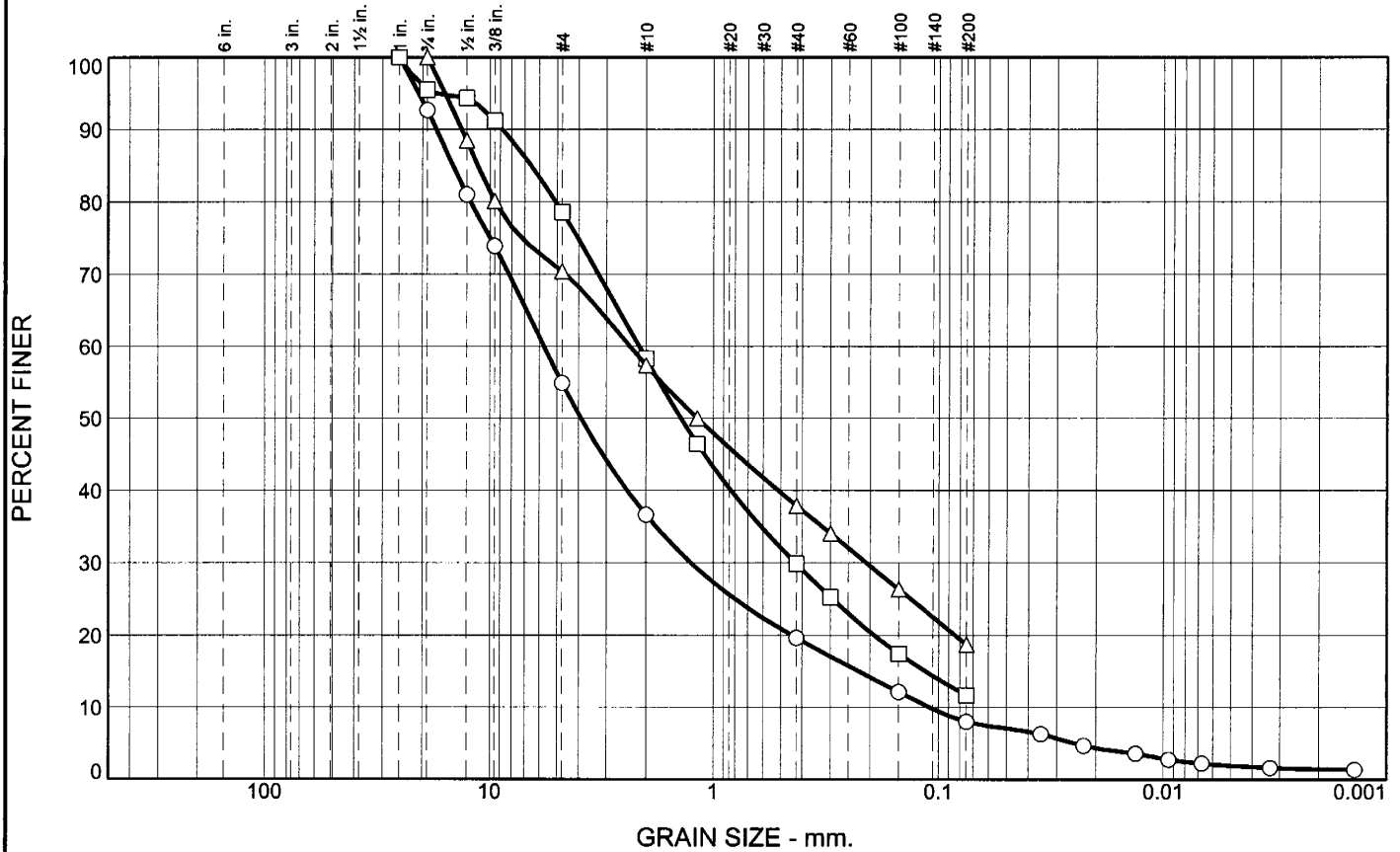
BACKFILLED Yes DATE 1/26/2006

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

ELEV. (ft)	DEPTH (ft)	SAMPLE		BLOW COUNT			LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd				
2098.1	1.00							GW	Ground is covered with cobbles/boulders, very rocky, dry, very hard drilling Sample A: WELL-GRADED GRAVEL WITH SAND (GW) rock fragments of gravel size with mixture of sand/silt, dry, light brown, (Alluvium). Sample A: mainly rock fragments with some sand/silt. Sample B: mainly rock fragments with some sand/silt. Sample C: SPT shoe was plugged by a piece of rock fragment. Sample E: Gray rock fragments with pulverized rocks.	Location: UTM5C started: 10:30. Rig #1082 presence of the boulder made the drill rod to go out of plumb.
		A	SPT	6	22					
	2.50			11						
		B	SPT	17	45					
	4.00			24						
		C	SPT	21	65					
	5.50			35						
		D	SPT	20	41					
	7.00			22						
	7.43	E	SPT	19	100/2.0"					
2093.1	8.50							GW	Drill rig chattered from 7.5 feet down, no penetration. Bedrock contact at 7.5 feet.	Drilling was terminated at 12:07 pm. Hammer cable broke, no further SPT was possible.
	8.83	F	SPT	38	17/0.5"	17/0.5"				
2088.1	10							GW	FRACTURED BEDROCK undifferentiated volcanic rocks including granite porphyry, rhyolite, and other intrusive rocks ranging from basaltic to rhyolitic. Cretaceous and Tertiary age formation of Black Hills. Discontinuity Spacing = very closely jointed bedrock. highly fractured, no signs of decomposition, gray. End of Boring at 7.5 feet. Backfilled with drill cuttings. Groundwater was not encountered. All obtained samples were classified visually. The drill rig chattered frequently during the augering process, which may indicate the presence of strongly cemented sand and gravel (breccia/caliche), cobbles or boulders.	Note: The station and the offset are measured off the roadway alignment plan sheet. The elevation is measured by hand-held GPS. These measurements are approximate. GPS: Latitude: 35°57'26.794"N Longitude: 114°54'32.724"W Elevation: 2103.13'
	15									

APPENDIX B
SOIL CLASSIFICATION TEST RESULTS

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	45.1	46.9	6.1	1.9	SW-SM			
□	0.0	21.4	66.9	11.7		SP-SM	A-1-b	NP	24
△	0.0	29.6	51.7	18.7		SM	A-1-b	NP	24

SIEVE inches size	PERCENT FINER		
	○	□	△
1	100.0	100.0	
3/4	92.7	95.5	100.0
1/2	81.0	94.3	88.5
3/8	73.9	91.2	80.1
GRAIN SIZE			
D ₆₀	5.7279	2.1507	2.3612
D ₃₀	1.2591	0.4298	0.2085
D ₁₀	0.1092		
COEFFICIENTS			
C _c	2.54		
C _u	52.47		

SIEVE number size	PERCENT FINER		
	○	□	△
#4	54.9	78.6	70.4
#10	36.6	58.3	57.4
#16		46.4	50.0
#40	19.7	29.8	37.9
#50		25.3	34.0
#100	12.2	17.5	26.3
#200	8.0	11.7	18.7

Material Description

- well-graded sand with silt and gravel
- poorly graded sand with silt and gravel
- △ silty sand with gravel

REMARKS:

○

□

△

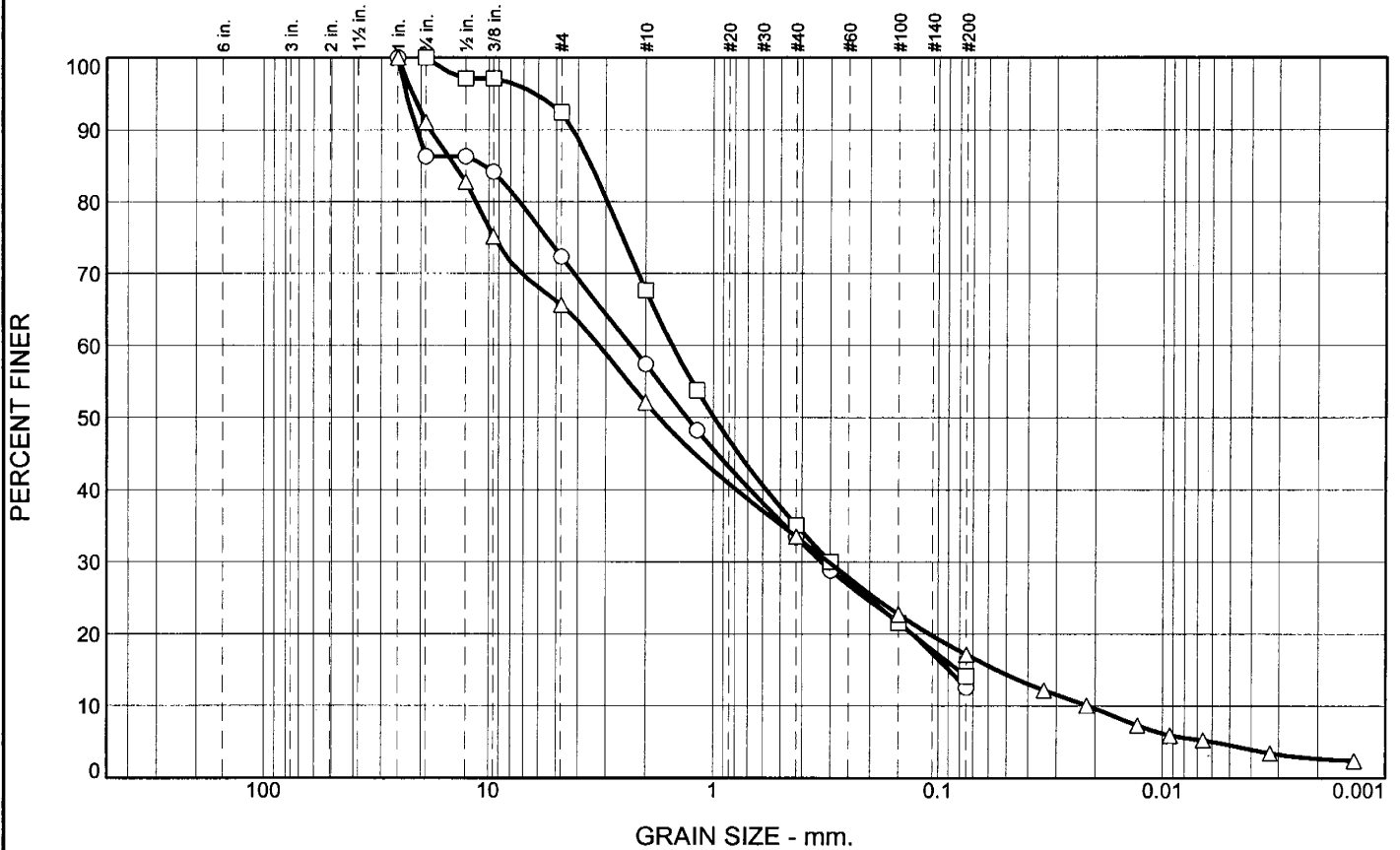
○ Source of Sample: SLA1 Depth: 4.0 - 5.5' Sample Number: A
 □ Source of Sample: SLA1 Depth: 6.0 - 7.5' Sample Number: B
 △ Source of Sample: SLA1 Depth: 8.0 - 9.5' Sample Number: C

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Client: Abbas Bafghi
 Project: Boulder City Bypass - US 93/US 95 Intersection
 Project No.: FL-02-06

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	27.7	59.8	12.5		SM	A-1-b	NP	21
□	0.0	7.6	78.2	14.2		SM	A-1-b	NP	19
△	0.0	34.4	48.4	12.6	4.6	SM			

SIEVE inches size	PERCENT FINER		
	○	□	△
1	100.0		100.0
3/4	86.3	100.0	91.0
1/2	86.3	97.1	82.8
3/8	84.2	97.1	75.1
GRAIN SIZE			
D ₆₀	2.3220	1.5240	3.2147
D ₃₀	0.3295	0.3000	0.3058
D ₁₀			0.0215
COEFFICIENTS			
C _c			1.35
C _u			149.68

SIEVE number size	PERCENT FINER		
	○	□	△
#4	72.3	92.4	65.6
#10	57.4	67.7	52.1
#16	48.2	53.8	
#40	33.5	35.1	33.5
#50	28.8	30.0	
#100	21.6	21.6	22.7
#200	12.5	14.2	17.2

Material Description

○ silty sand with gravel

□ silty sand

△ silty sand with gravel

REMARKS:

○

□

△

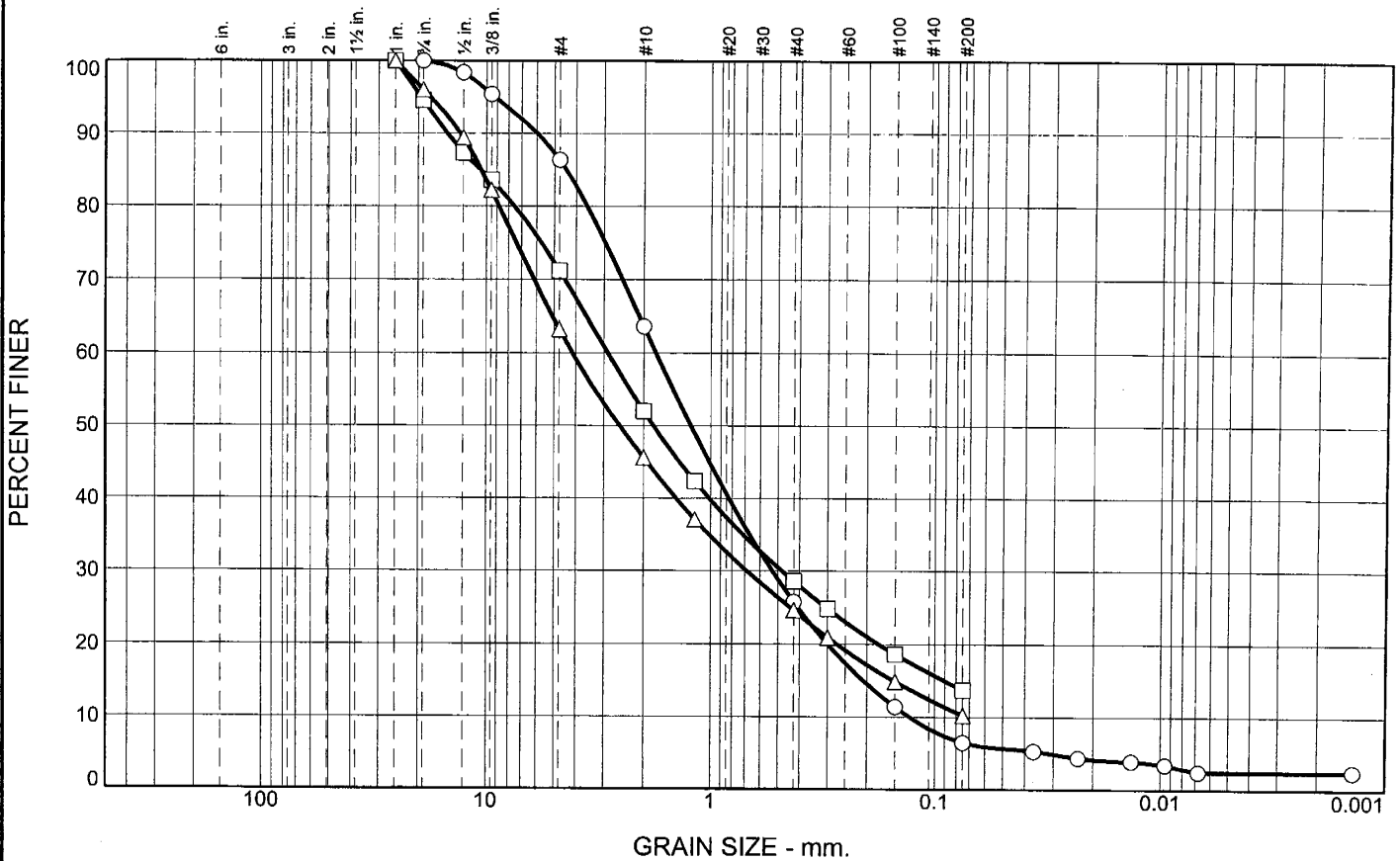
○ Source of Sample: SLA1 Depth: 10.0 - 11.5' Sample Number: D
 □ Source of Sample: SLA1 Depth: 12.0 - 12.18' Sample Number: E
 △ Source of Sample: SLA1 Depth: 29.0 - 29.8' Sample Number: J

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 Project No.: FL-02-06

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	13.7	79.8	4.0	2.5	SW-SM	A-1-b	NP	19
□	0.0	28.8	57.5	13.7		SM	A-1-b	NP	23
△	0.0	36.8	53.0	10.2		SP-SM	A-1-a	NP	23

SIEVE inches size	PERCENT FINER		
	○	□	△
1"	100.0	100.0	100.0
¾"	100.0	94.5	96.0
½"	98.4	87.3	89.4
3/8"	95.4	83.6	82.2
GRAIN SIZE			
D60	1.7652	2.8833	4.1491
D30	0.5283	0.4788	0.6855
D10	0.1291		
COEFFICIENTS			
C _c	1.22		
C _u	13.67		

SIEVE number size	PERCENT FINER		
	○	□	△
#4	86.3	71.2	63.2
#10	63.6	52.0	45.6
#16		42.4	37.1
#40	25.8	28.6	24.6
#50		24.8	20.9
#100	11.4	18.6	14.9
#200	6.5	13.7	10.2

Material Description

○ well-graded sand with silt

□ silty sand with gravel

△ poorly graded sand with silt and gravel

REMARKS:

○

□

△

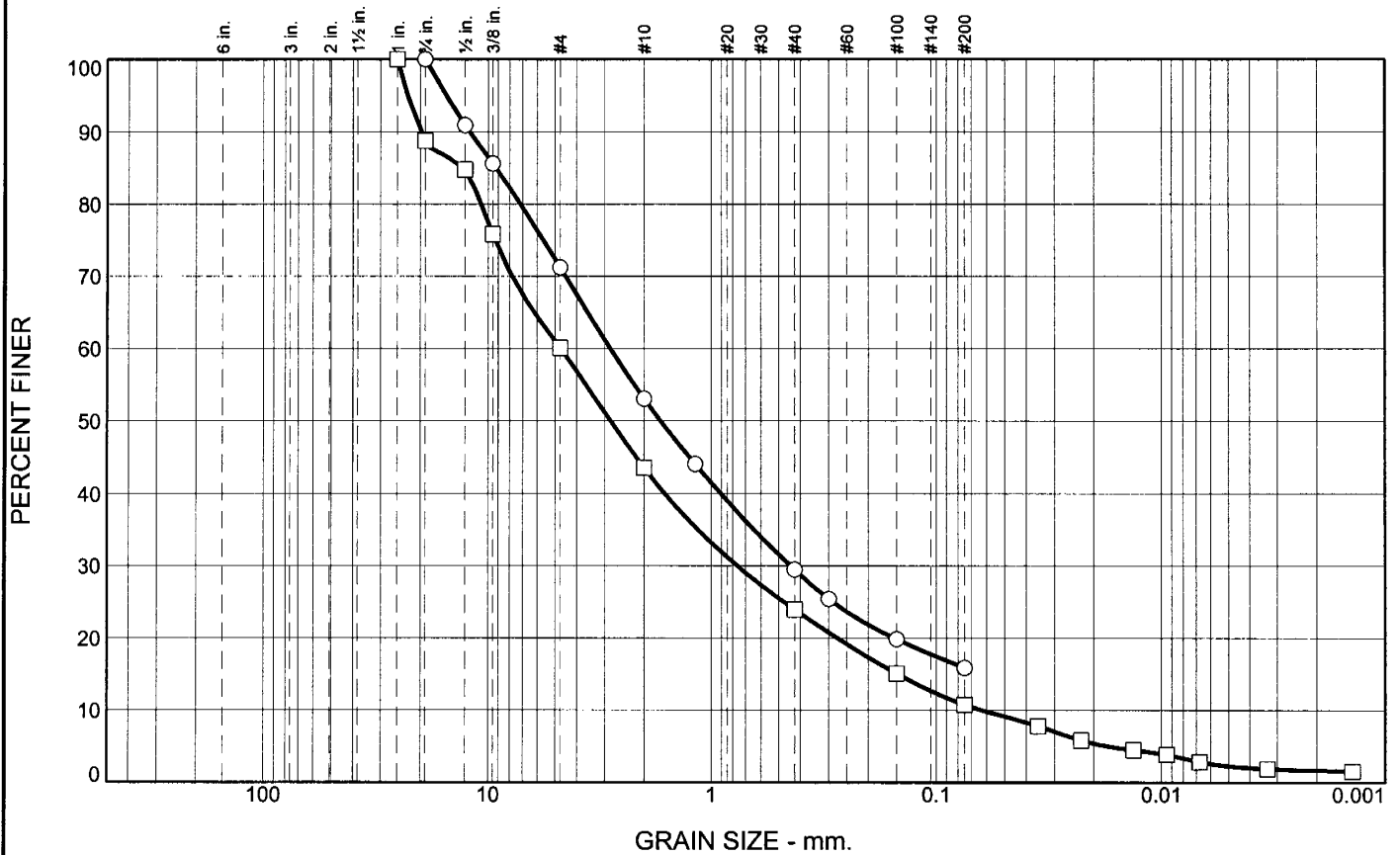
○ Source of Sample: SLP1 Depth: 3.5-5.0 Sample Number: A
 □ Source of Sample: SLP1 Depth: 8.5-10.0 Sample Number: C
 △ Source of Sample: SLP1 Depth: 10.5-12.0 Sample Number: D

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 Project No.: FL-02-06

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	28.8	55.3	15.9		SM			
□	0.0	39.9	49.4	8.4	2.3	SW-SM	A-1-a	20	23

SIEVE inches size	PERCENT FINER	
	○	□
1"		100.0
3/4"	100.0	88.8
1/2"	90.9	84.8
3/8"	85.6	75.8
GRAIN SIZE		
D ₆₀	2.8322	4.7296
D ₃₀	0.4422	0.7638
D ₁₀		0.0631
COEFFICIENTS		
C _c		1.96
C _u		74.98

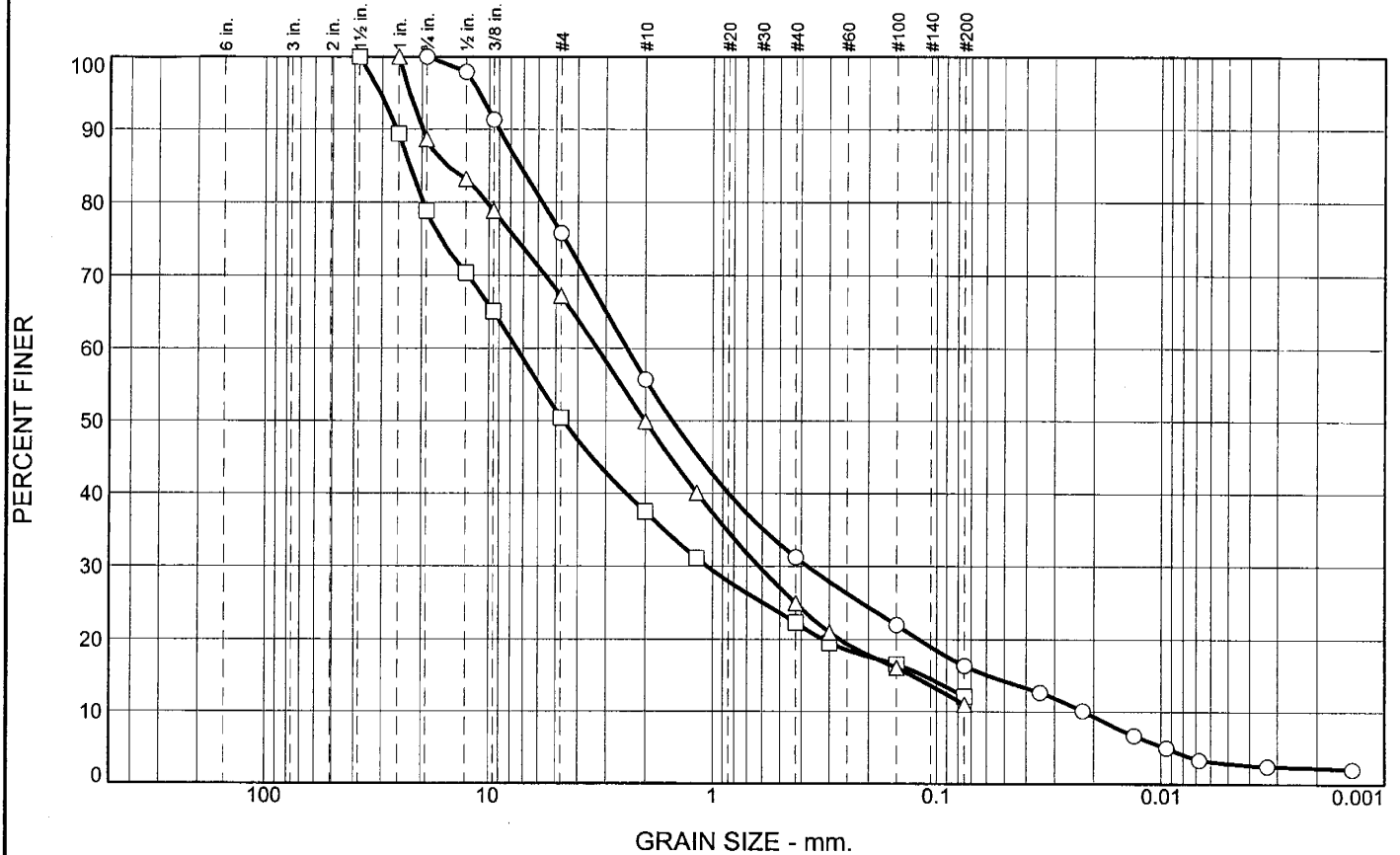
SIEVE number size	PERCENT FINER	
	○	□
#4	71.2	60.1
#10	53.0	43.6
#16	44.1	
#40	29.5	24.0
#50	25.4	
#100	19.8	15.1
#200	15.9	10.7

Material Description
 ○ silty sand with gravel
 □ well-graded sand with silt and gravel

REMARKS:
 ○
 □

○ Source of Sample: SLP1 Depth: 18.5-18.67 Sample Number: F
 □ Source of Sample: SLP1 Depth: 53.5-55.0 Sample Number: M

Particle Size Distribution Report

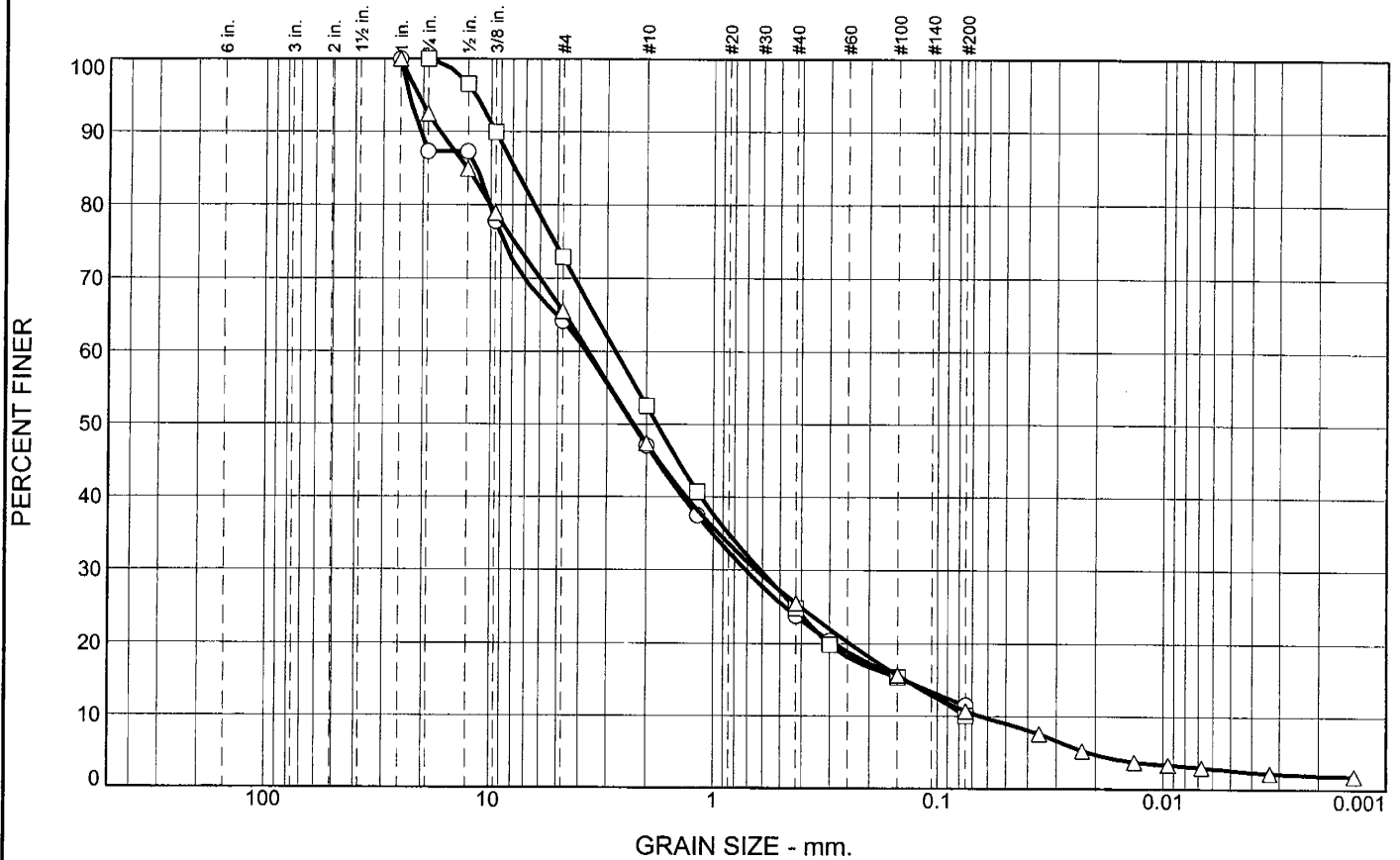


	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	24.2	59.5	13.4	2.9	SM	A-1-b	26	29
□	0.0	49.6	38.3	12.1		GM	A-1-a	25	29
△	0.0	32.8	56.2	11.0		SP-SM	A-1-a	NP	22

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER			Material Description
	○	□	△		○	□	△	
1-1/2"		100.0		#4	75.8	50.4	67.2	○ silty sand with gravel □ silty gravel with sand △ poorly graded sand with silt and gravel
1"		89.4	100.0	#10	55.7	37.5	49.9	
3/4"	100.0	78.9	88.6	#16	31.2	22.3	25.0	
1/2"	97.9	70.4	83.2	#40	22.0	16.6	16.1	
3/8"	91.3	65.1	78.9	#50	16.3	12.1	11.0	
GRAIN SIZE								
D ₆₀	2.4201	7.4790	3.2761					
D ₃₀	0.3762	1.0583	0.6179					
D ₁₀	0.0220							
COEFFICIENTS								
C _c	2.65							
C _u	109.80							

○ Source of Sample: SLP2	Depth: 13.0-14.5	Sample Number: D
□ Source of Sample: SLP2	Depth: 15.0-16.28	Sample Number: E
△ Source of Sample: SLP2	Depth: 18.0-19.5	Sample Number: F

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	35.8	52.7		11.5	SP-SM	A-1-a	NP	23
□	0.0	27.1	62.8		10.1	SP-SM	A-1-b	NP	21
△	0.0	34.4	54.9	8.1	2.6	SW-SM	A-1-a	NP	21

SIEVE inches size	PERCENT FINER		
	○	□	△
1"	100.0	100.0	100.0
3/4"	87.3	100.0	92.5
1/2"	87.3	96.6	84.9
3/8"	77.8	90.0	78.9
GRAIN SIZE			
D ₆₀	3.7222	2.7466	3.6340
D ₃₀	0.7115	0.6093	0.6358
D ₁₀			0.0642
COEFFICIENTS			
C _c			1.73
C _u			56.59

SIEVE number size	PERCENT FINER		
	○	□	△
#4	64.2	72.9	65.6
#10	47.1	52.6	47.4
#16	37.5	40.7	
#40	23.8	24.8	25.5
#50	20.4	19.8	
#100	15.4	15.4	15.7
#200	11.5	10.1	10.7

Material Description

○ poorly graded sand with silt and gravel

□ poorly graded sand with silt and gravel

△ poorly graded sand with silt and gravel

REMARKS:

○

□

△

○ Source of Sample: SLP2 Depth: 20.0-21.0 Sample Number: G

□ Source of Sample: SLP2 Depth: 25.0-26.0 Sample Number: H

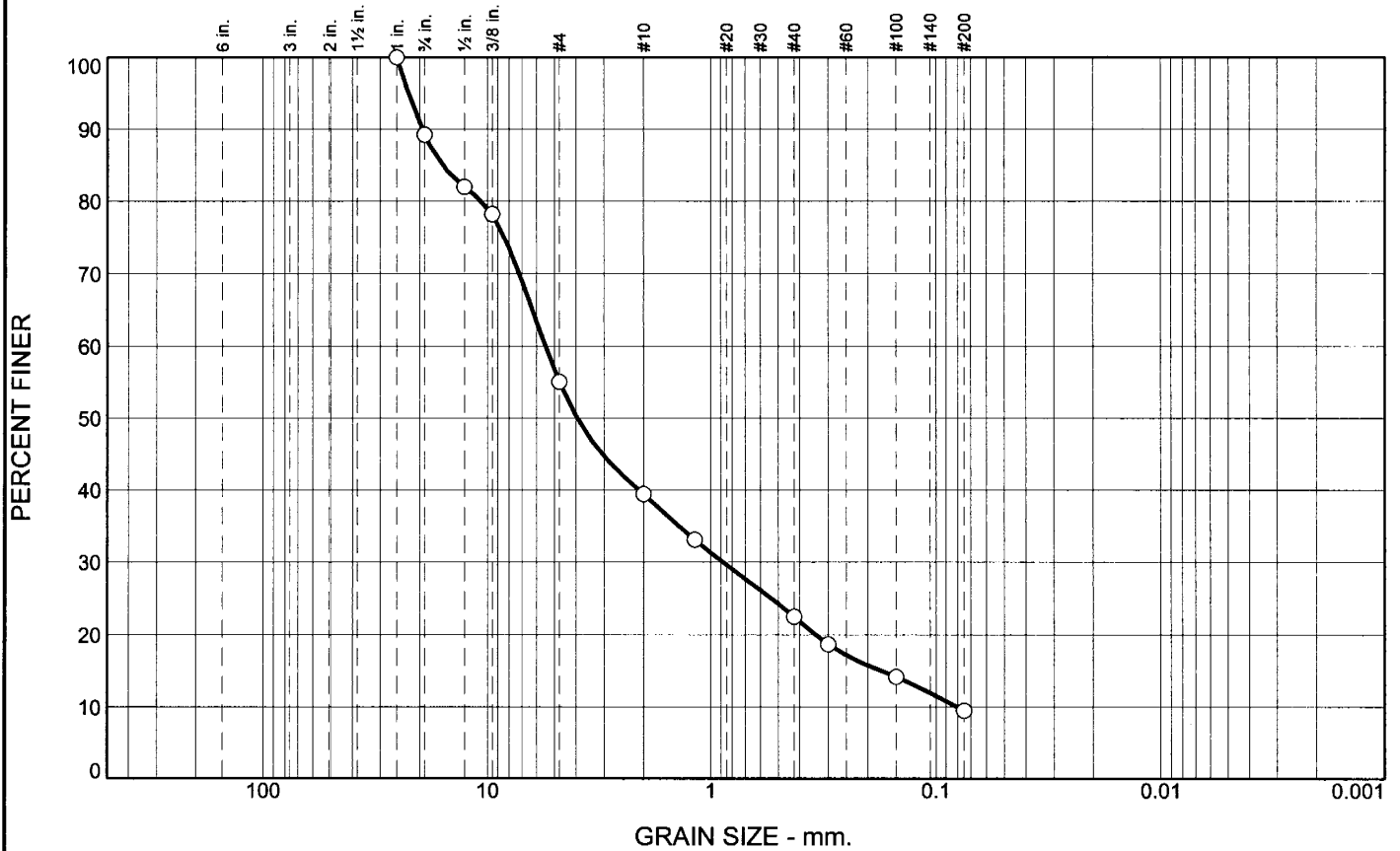
△ Source of Sample: SLP2 Depth: 30.0-31.5 Sample Number: I

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Client: Abbas Bafghi
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 Project No.: FL-02-06

Figure

Particle Size Distribution Report

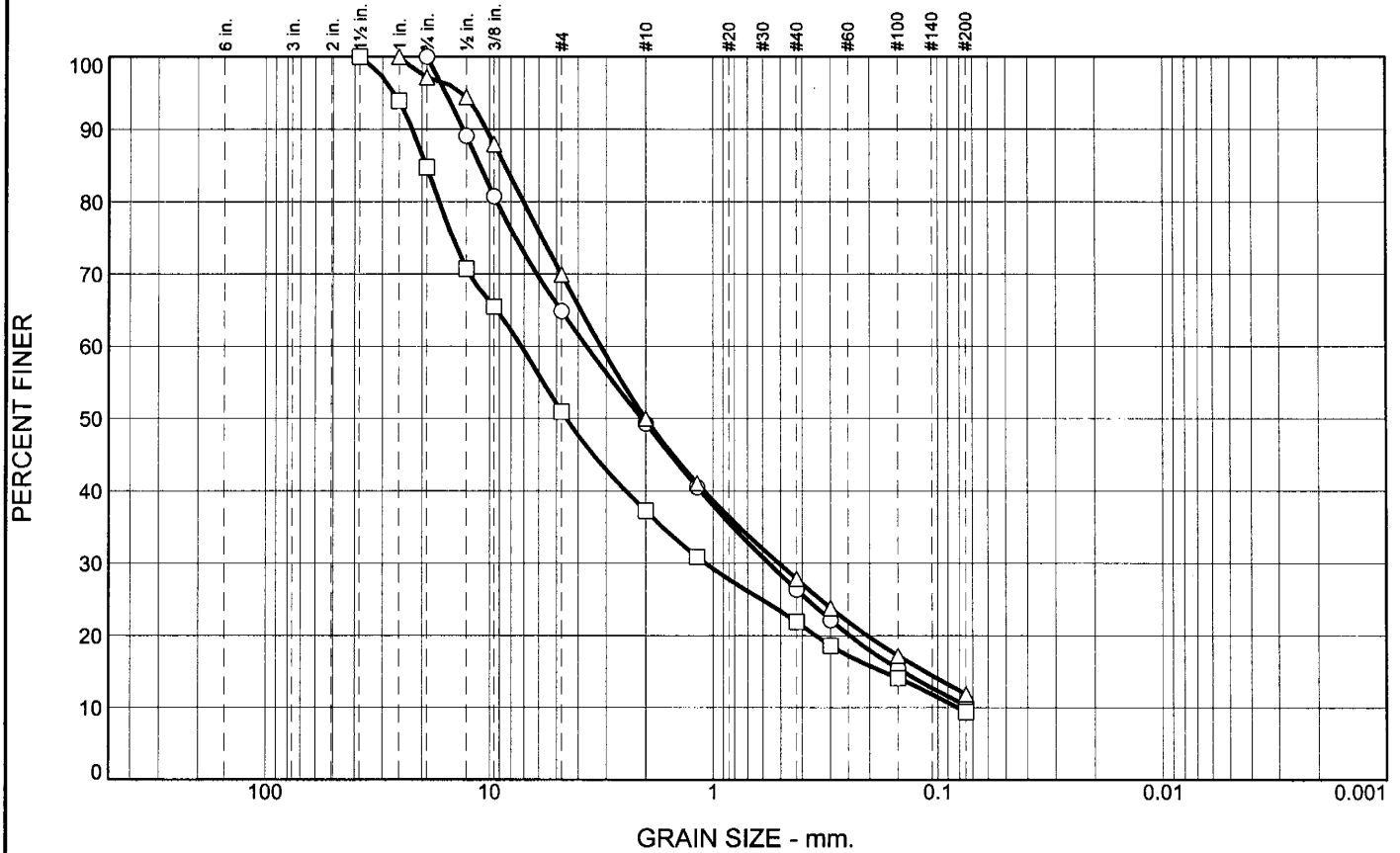


	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	44.9	45.6	9.5		SP-SM			

SIEVE	PERCENT FINER			SIEVE	PERCENT FINER			<u>Material Description</u> ○ poorly graded sand with silt and gravel
inches size	○			number size	○			
1"	100.0			#4	55.1			<u>REMARKS:</u> ○
3/4"	89.2			#10	39.4			
1/2"	82.0			#16	33.1			
3/8"	78.2			#40	22.5			
GRAIN SIZE				#50	18.7			
D60	5.4838			#100	14.1			
D30	0.8818			#200	9.5			
D10	0.0806							
COEFFICIENTS								
C _c	1.76							
C _u	68.06							

○ Source of Sample: SLP2 Depth: 50.0-50.5 Sample Number: M

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	35.2	54.5	10.3		SP-SM	A-1-a	NP	19
□	0.0	49.1	41.5	9.4		GP-GM			
△	0.0	30.1	58.1	11.8		SP-SM	A-1-a	NP	20

SIEVE inches size	PERCENT FINER		
	○	□	△
1-1/2		100.0	
1		93.9	100.0
3/4	100.0	84.8	97.1
1/2	89.1	70.7	94.4
3/8	80.8	65.5	87.9
GRAIN SIZE			
D ₆₀	3.6807	7.1937	3.1728
D ₃₀	0.5625	1.0799	0.5078
D ₁₀		0.0819	
COEFFICIENTS			
C _c		1.98	
C _u		87.87	

SIEVE number size	PERCENT FINER		
	○	□	△
#4	64.8	50.9	69.9
#10	49.3	37.3	50.0
#16	40.5	30.9	41.1
#40	26.4	21.9	27.9
#50	22.1	18.6	23.8
#100	15.4	14.1	17.2
#200	10.3	9.4	11.8

Material Description	
○	poorly graded sand with silt and gravel
□	poorly graded gravel with silt and sand
△	poorly graded sand with silt and gravel

REMARKS:

○

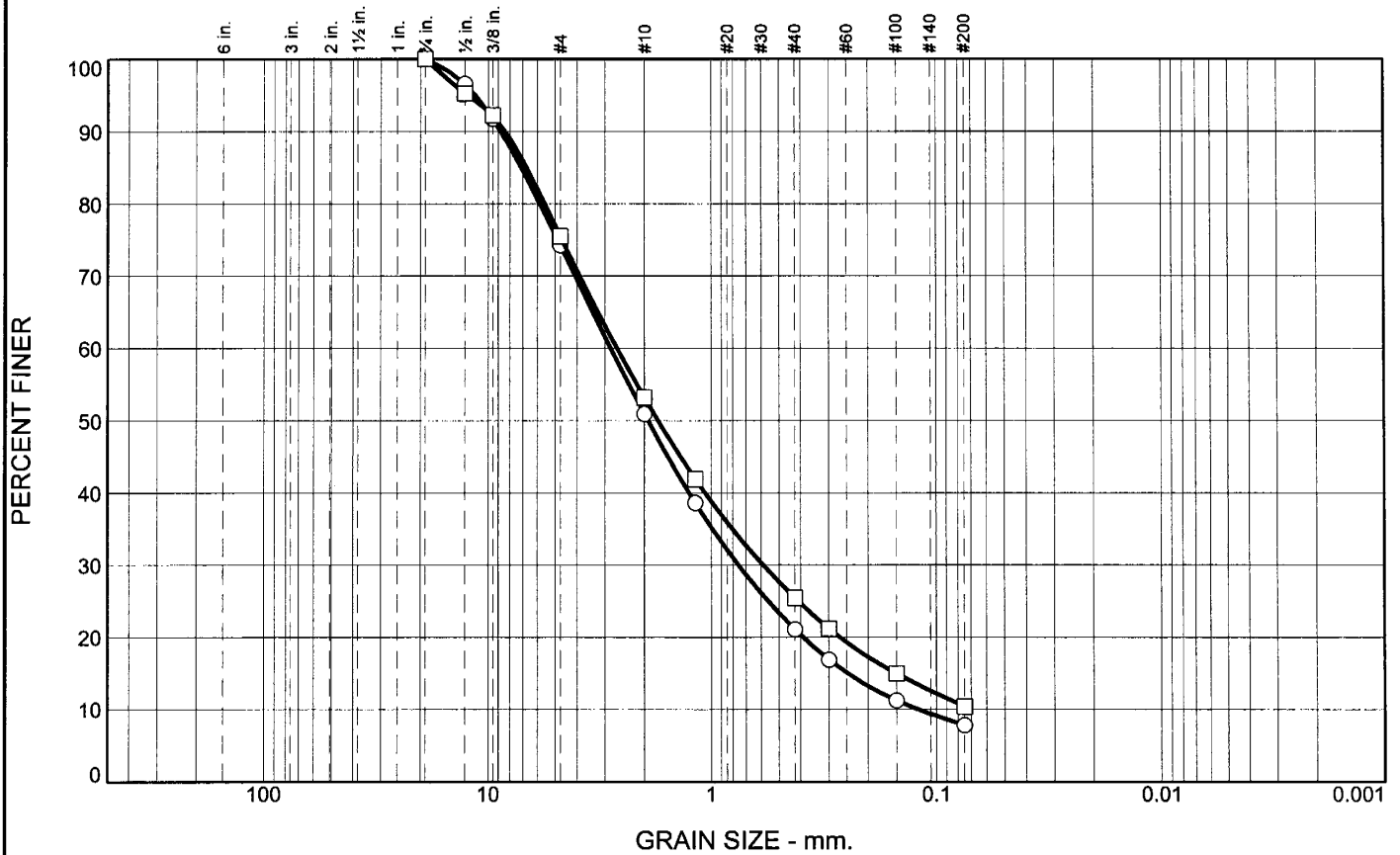
□

△

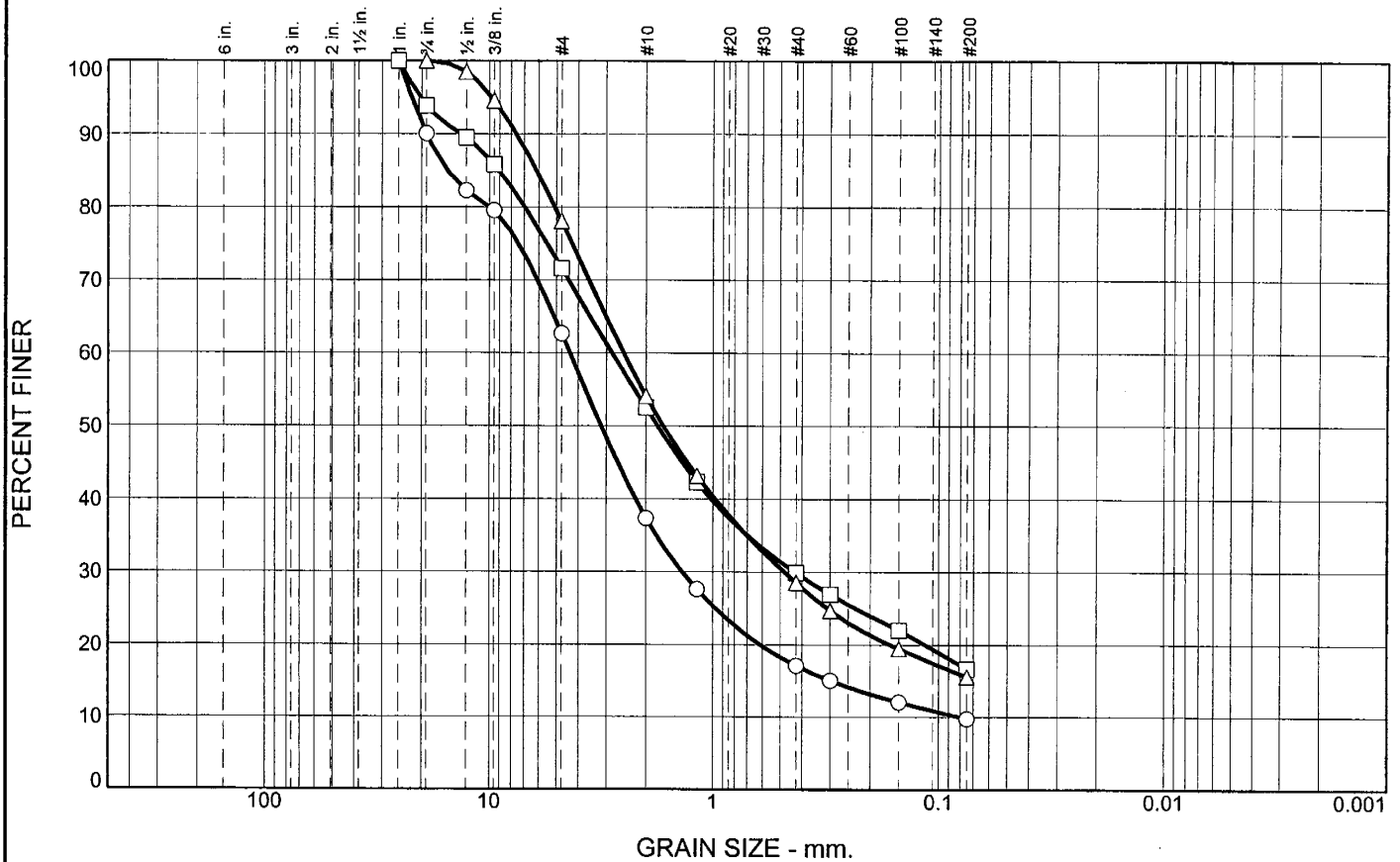
○ Source of Sample: SLA2 Depth: 13.0 - 14.4' Sample Number: E
 □ Source of Sample: SLA2 Depth: 18.0 - 19.5' Sample Number: G
 △ Source of Sample: SLA2 Depth: 25.0 - 26.1' Sample Number: I

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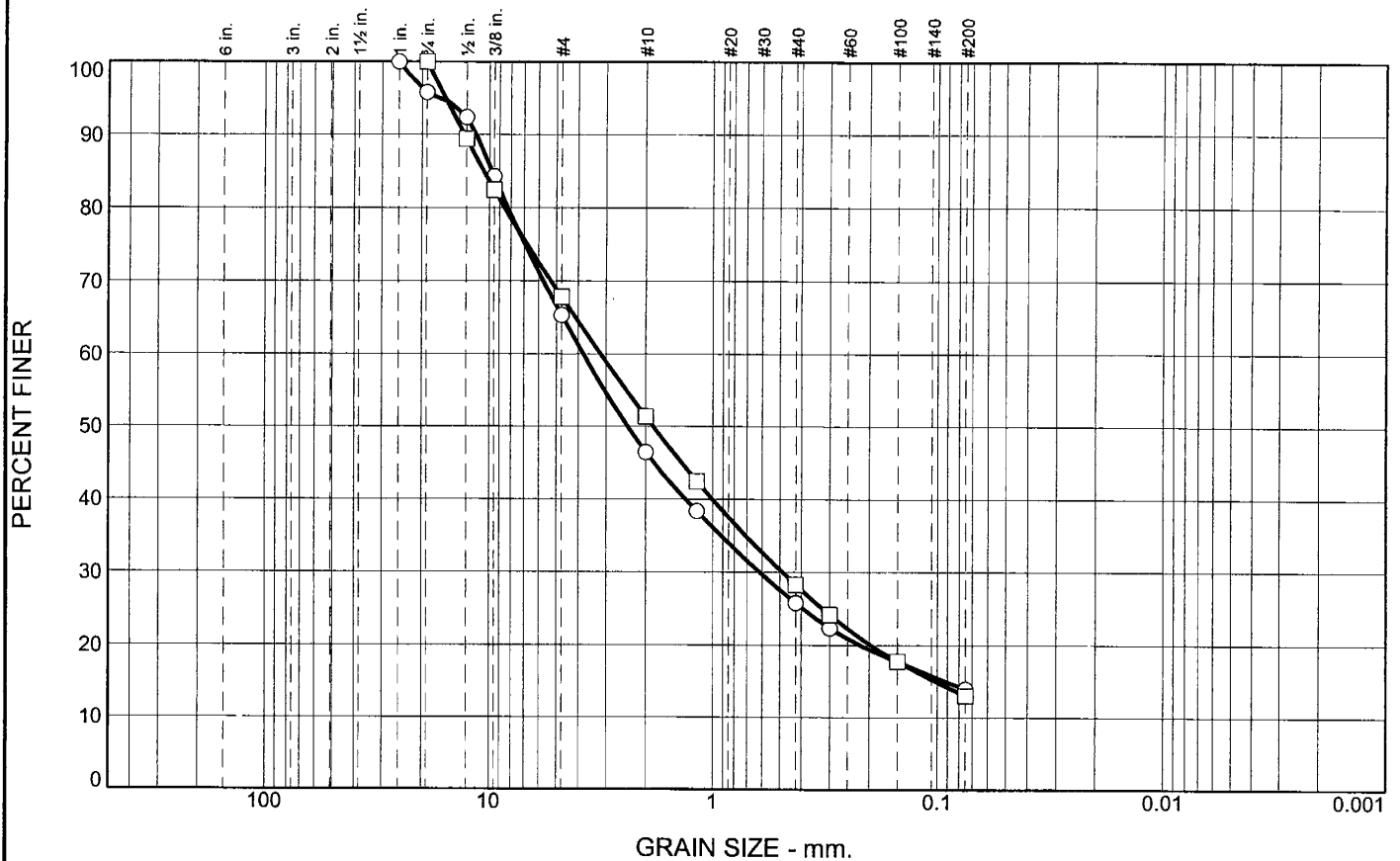
Particle Size Distribution Report



Particle Size Distribution Report



Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	34.7	51.4	13.9		SC	A-2-4(0)	21	30
□	0.0	32.2	54.8	13.0		SC-SM	A-1-b	22	26

SIEVE inches size	PERCENT FINER	
	○	□
1"	100.0	
3/4"	95.8	100.0
1/2"	92.4	89.4
3/8"	84.3	82.5
GRAIN SIZE		
D ₆₀	3.8058	3.1849
D ₃₀	0.6141	0.4856
D ₁₀		
COEFFICIENTS		
C _c		
C _u		

SIEVE number size	PERCENT FINER	
	○	□
#4	65.3	67.8
#10	46.5	51.3
#16	38.4	42.5
#40	25.8	28.3
#50	22.4	24.2
#100	17.8	17.8
#200	13.9	13.0

Material Description

○ clayey sand with gravel

□ silty, clayey sand with gravel

REMARKS:

○

□

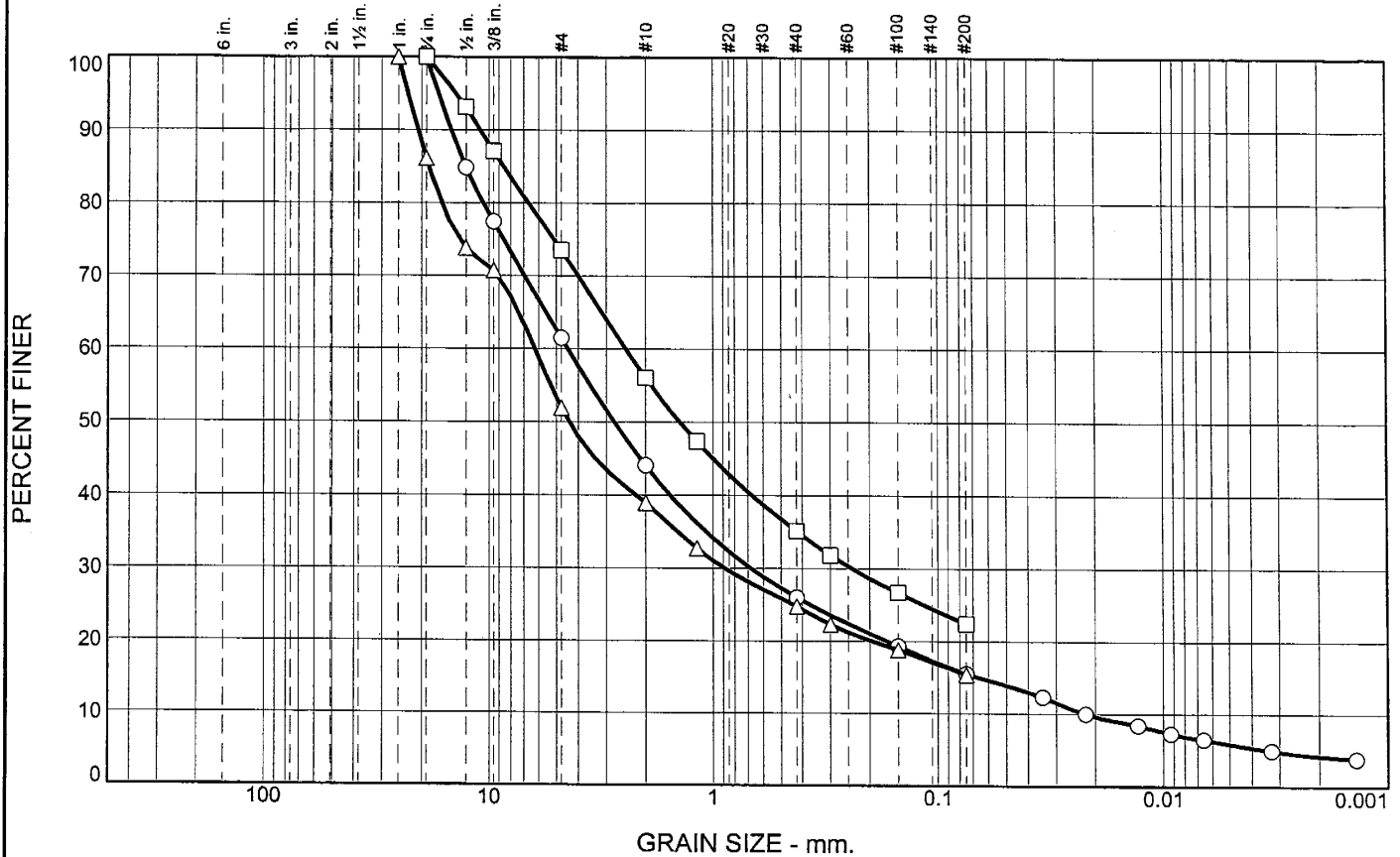
○ Source of Sample: DCA2 Depth: 3.0-4.5 Sample Number: A
 □ Source of Sample: DCA2 Depth: 5.2-6.7 Sample Number: B

**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: Abbas Bafghi
 Project: Boulder City Bypass - US 93/US 95 Intersection
 Project No.: FL-02-06

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	38.5	46.0	9.6	5.9	SM	A-2-7(0)	34	49
□	0.0	26.4	51.2	22.4		SM	A-2-7(1)	34	54
△	0.0	48.1	36.5	15.4		GM	A-2-7(0)	27	43

SIEVE inches size	PERCENT FINER		
	○	□	△
1"			100.0
3/4"	100.0	100.0	86.1
1/2"	84.9	93.1	73.9
3/8"	77.5	87.1	70.8
GRAIN SIZE			
D ₆₀	4.4469	2.4546	6.2312
D ₃₀	0.6766	0.2397	0.8843
D ₁₀	0.0222		
COEFFICIENTS			
C _c	4.63		
C _u	200.13		

SIEVE number size	PERCENT FINER		
	○	□	△
#4	61.5	73.6	51.9
#10	44.1	56.0	39.0
#16		47.4	32.7
#40	26.0	35.1	24.8
#50		31.8	22.3
#100	19.3	26.7	18.8
#200	15.5	22.4	15.4

Material Description

○ silty sand with gravel

□ silty sand with gravel

△ silty gravel with sand

REMARKS:

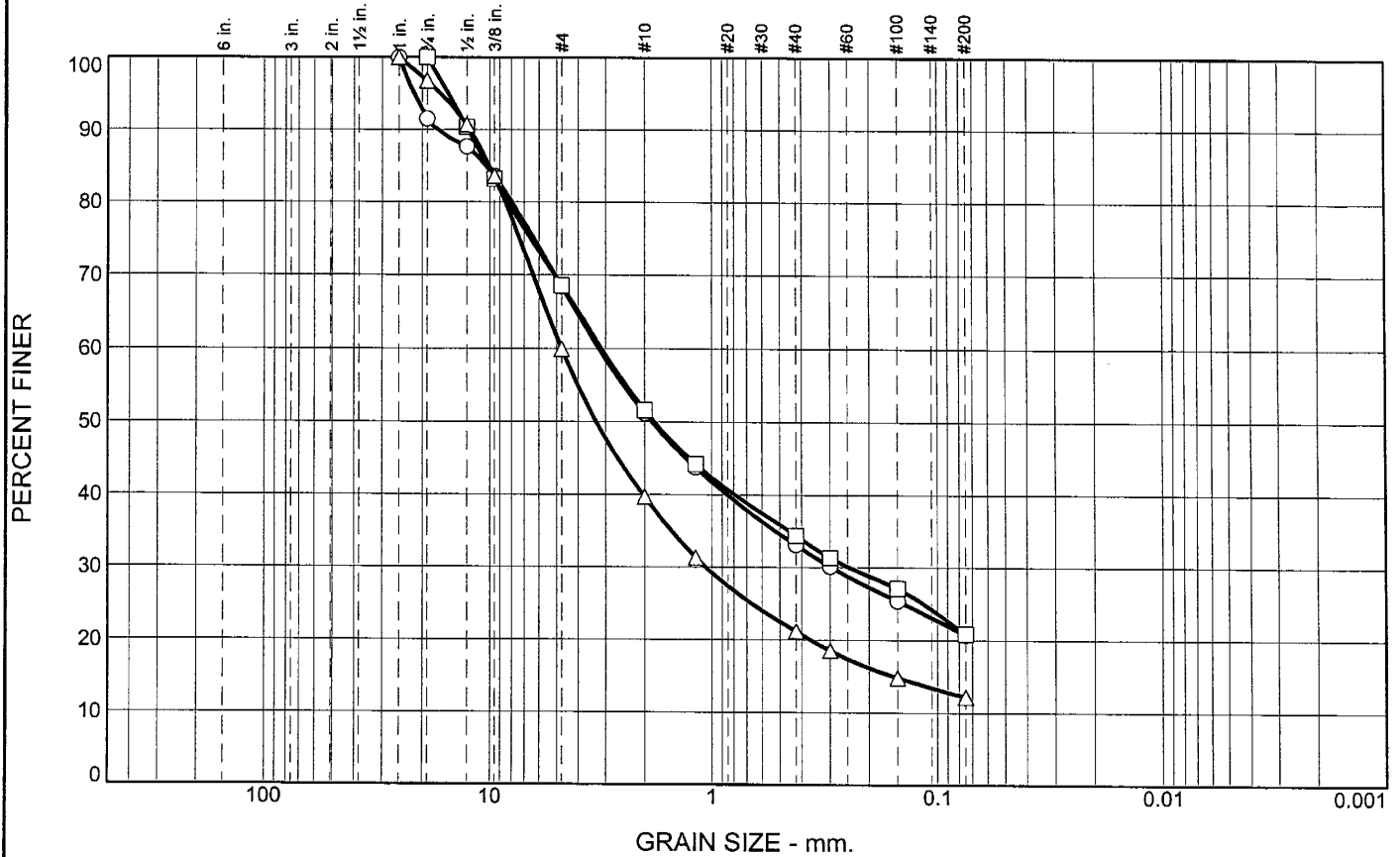
○

□

△

○ Source of Sample: FA4 Depth: 2.0-3.5 Sample Number: A
 □ Source of Sample: FA4 Depth: 3.5-5.0 Sample Number: B
 △ Source of Sample: FA4 Depth: 5.0-6.0 Sample Number: C1

Particle Size Distribution Report

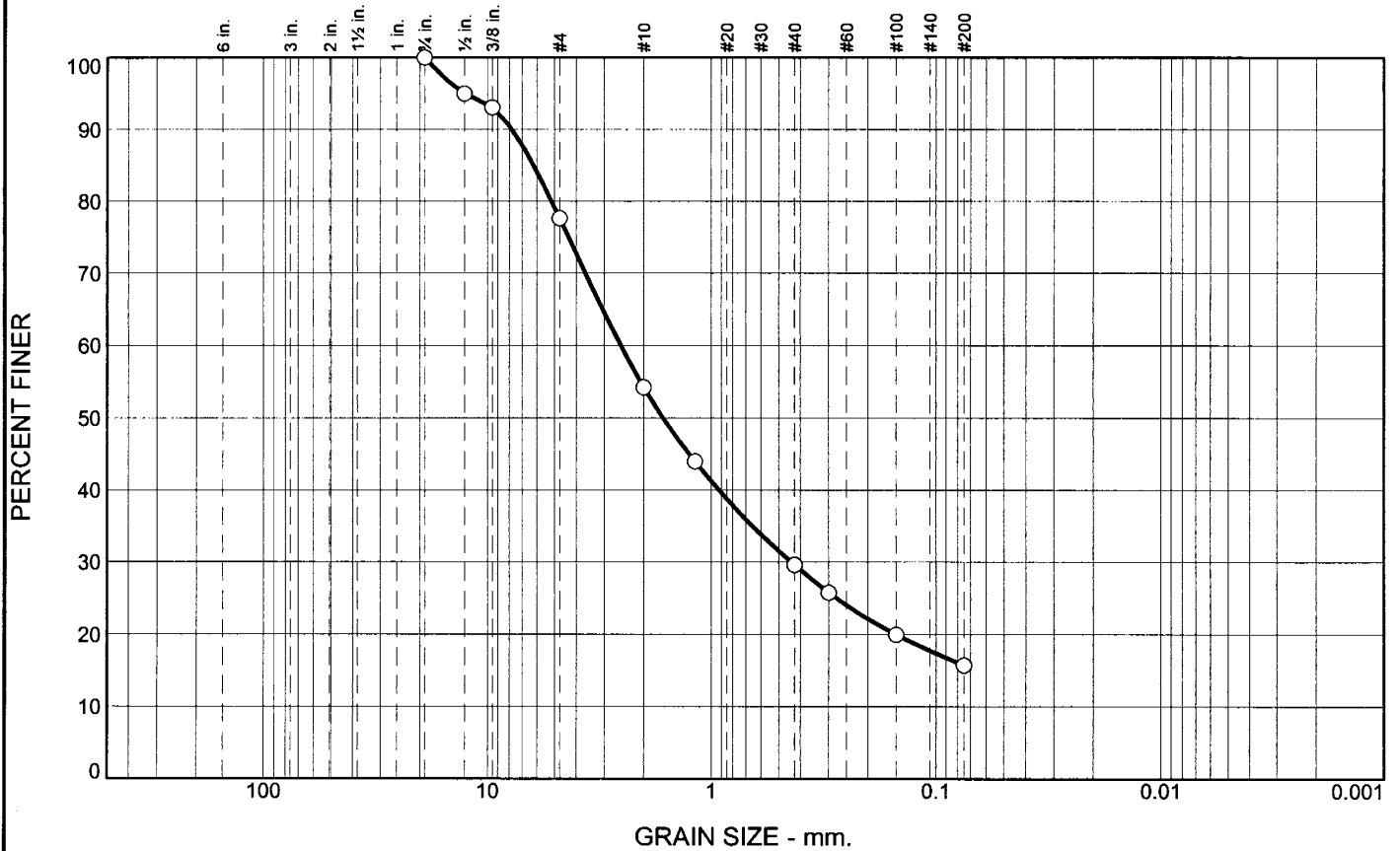


	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	31.6	47.7	20.7		SC	A-2-7(0)	23	41
□	0.0	31.4	47.7	20.9		SC	A-2-6(0)	21	35
△	0.0	40.1	47.7	12.2		SC-SM	A-2-4(0)	22	29

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER			Material Description
	○	□	△		○	□	△	
1"	100.0		100.0	#4	68.4	68.6	59.9	○ clayey sand with gravel □ clayey sand with gravel △ silty, clayey sand with gravel
3/4"	91.5	100.0	96.8	#10	51.2	51.6	39.7	
1/2"	87.7	90.4	90.7	#16	43.8	44.2	31.3	
3/8"	83.6	83.2	83.6	#40	33.1	34.4	21.2	
GRAIN SIZE				#50	30.1	31.3	18.5	REMARKS: ○ □ △
D ₆₀	3.2193	3.1259	4.7598	#100	25.4	27.1	14.8	
D ₃₀	0.2948	0.2459	1.0657	#200	20.7	20.9	12.2	
D ₁₀								
COEFFICIENTS								
C _c								
C _u								

○ Source of Sample: FA4 Depth: 6.5-8.0 Sample Number: D
 □ Source of Sample: FA4 Depth: 8.0-9.5 Sample Number: E
 △ Source of Sample: FA4 Depth: 11.0-12.5 Sample Number: G

Particle Size Distribution Report

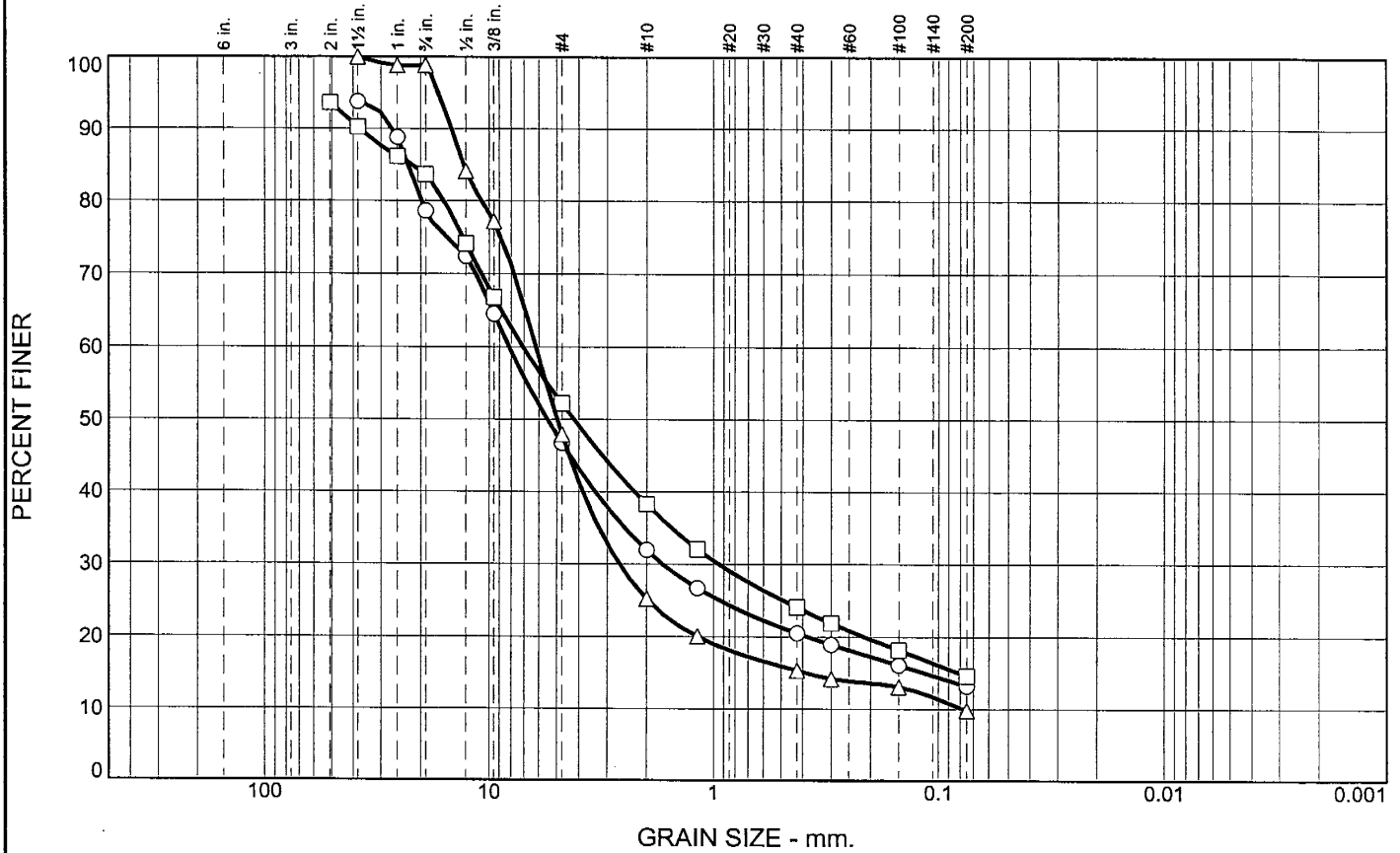


	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	22.4	61.9	15.7		SM			

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER			Material Description ○ silty sand with gravel
3/4"	○			#4	○			
1/2"	100.0			#10	77.6			
3/8"	95.0			#16	54.2			
	93.0			#40	44.0			
GRAIN SIZE				#50	29.6			
				#60	25.8			
				#100	20.0			
				#200	15.7			
COEFFICIENTS								

○ Source of Sample: FA4 Depth: 25.0-25.1 Sample Number: L

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○			33.6		13.2	GM	A-2-7(0)	31	45
□			37.6		14.6	GM	A-2-7(0)	29	44
△	0.0	52.1	38.1		9.8	GP-GC	A-2-6(0)	24	39

SIEVE inches size	PERCENT FINER		
	○	□	△
2"		93.6	
1-1/2"	93.8	90.2	100.0
1"	88.8	86.1	98.8
3/4"	78.6	83.6	98.8
1/2"	72.4	74.2	84.1
3/8"	64.5	66.8	77.2
GRAIN SIZE			
D ₆₀	8.1494	7.0461	6.1815
D ₃₀	1.6887	0.9446	2.6408
D ₁₀			0.0775
COEFFICIENTS			
C _c			14.55
C _u			79.74

SIEVE number size	PERCENT FINER		
	○	□	△
#4	46.8	52.2	47.9
#10	31.9	38.3	25.2
#16	26.7	32.1	20.1
#40	20.5	24.1	15.3
#50	18.9	21.9	14.2
#100	16.1	18.2	13.1
#200	13.2	14.6	9.8

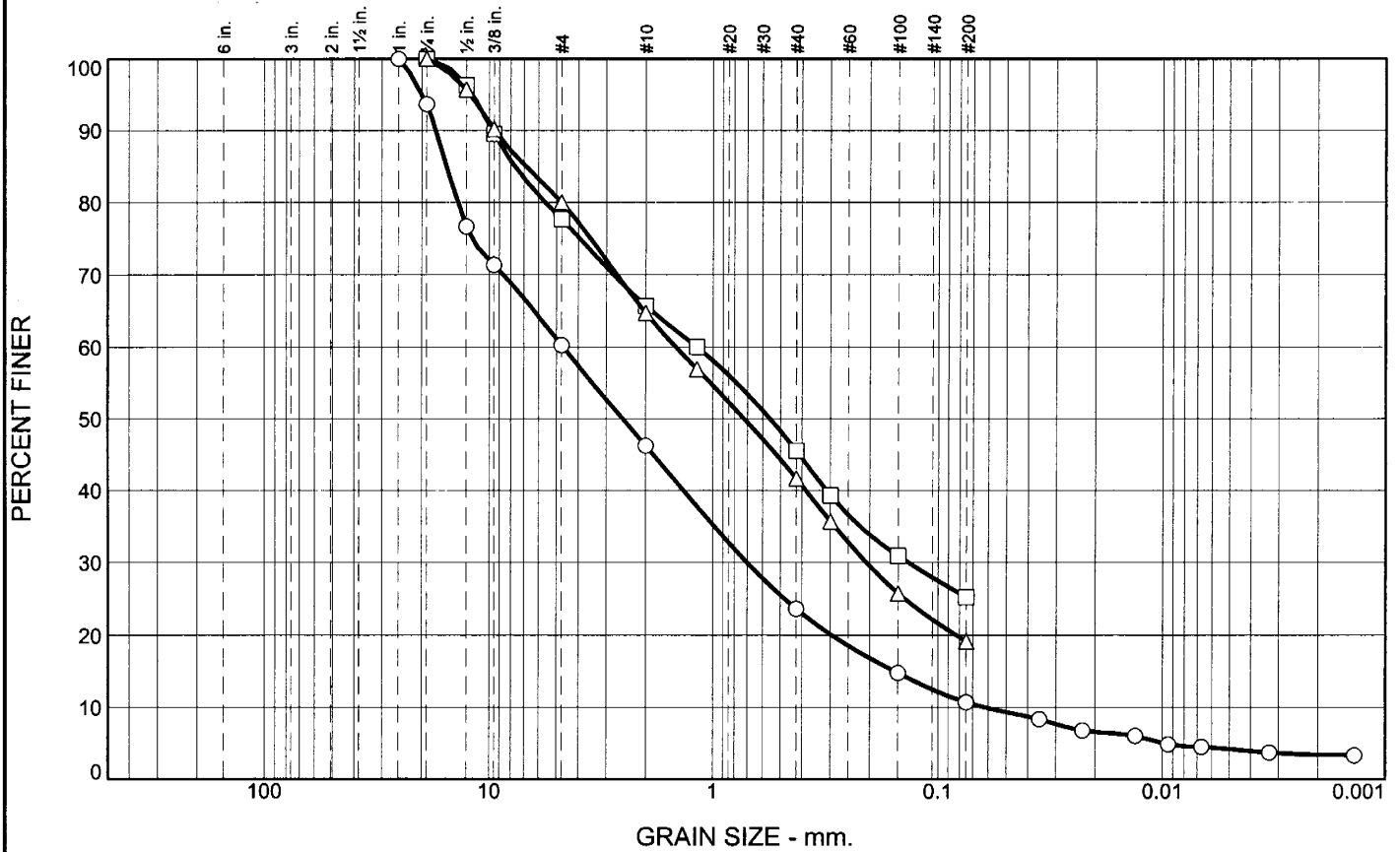
Material Description	
○	silty gravel with sand
□	silty gravel with sand
△	poorly graded gravel with clay and sand

REMARKS:	
○	
□	
△	

○ Source of Sample: FA4 Depth: 0.0-5.0 Sample Number: RV-1
 □ Source of Sample: FA4 Depth: 5.0-10.0 Sample Number: RV-2
 △ Source of Sample: FA4 Depth: 10.0-15.0 Sample Number: RV-3

NEVADA DEPARTMENT OF TRANSPORTATION	Client: Abbas Bafghi Project: Boulder City Bypass - US 93/US 95 Intersection Project No.: FL-02-06
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Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	39.8	49.5	6.5	4.2	SW-SC	A-2-4(0)	21	30
□	0.0	22.3	52.4		25.3	SC	A-2-6(0)	20	32
△	0.0	20.0	60.9		19.1	SC			

SIEVE inches size	PERCENT FINER		
	○	□	△
1"	100.0		
3/4"	93.7	100.0	100.0
1/2"	76.7	96.3	95.7
3/8"	71.4	89.5	90.1
GRAIN SIZE			
D ₆₀	4.6858	1.1832	1.4705
D ₃₀	0.7020	0.1353	0.2076
D ₁₀	0.0619		
COEFFICIENTS			
C _c	1.70		
C _u	75.68		

SIEVE number size	PERCENT FINER		
	○	□	△
#4	60.2	77.7	80.0
#10	46.2	65.7	64.7
#16		60.0	56.9
#40	23.6	45.5	41.7
#50		39.3	35.7
#100	14.8	30.9	25.8
#200	10.7	25.3	19.1

Material Description
○ well-graded sand with clay and gravel
□ clayey sand with gravel
△ clayey sand with gravel

REMARKS:
○
□
△

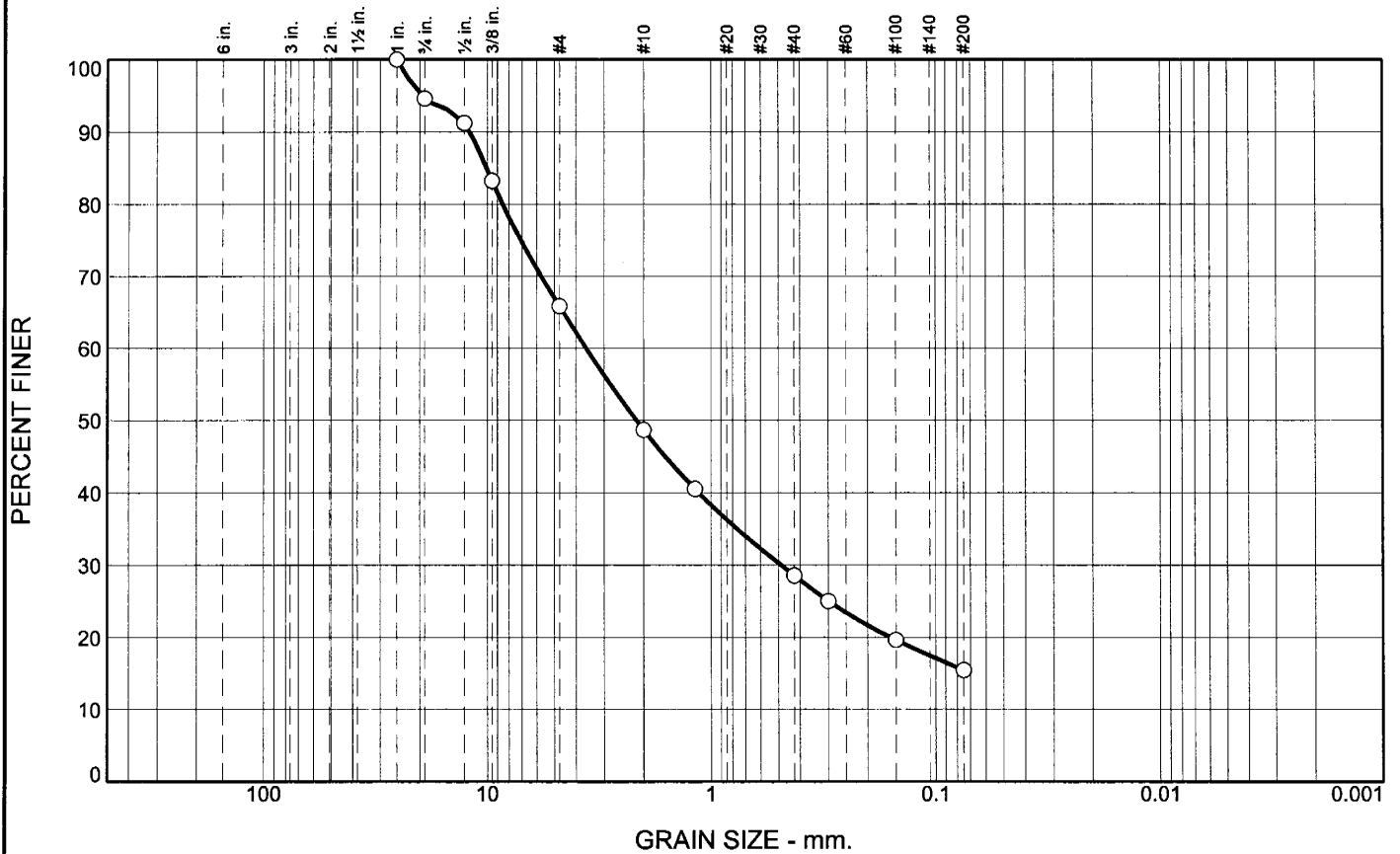
○ Source of Sample: FA1 Depth: 3.5-5.0 Sample Number: A
 □ Source of Sample: FA1 Depth: 6.0-7.2 Sample Number: B
 △ Source of Sample: FA1 Depth: 8.5-8.91 Sample Number: C

**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: Abbas Bafghi
 Project: Boulder City Bypass - US 93/US 95 Intersection
 Project No.: FL-02-06

Figure

Particle Size Distribution Report

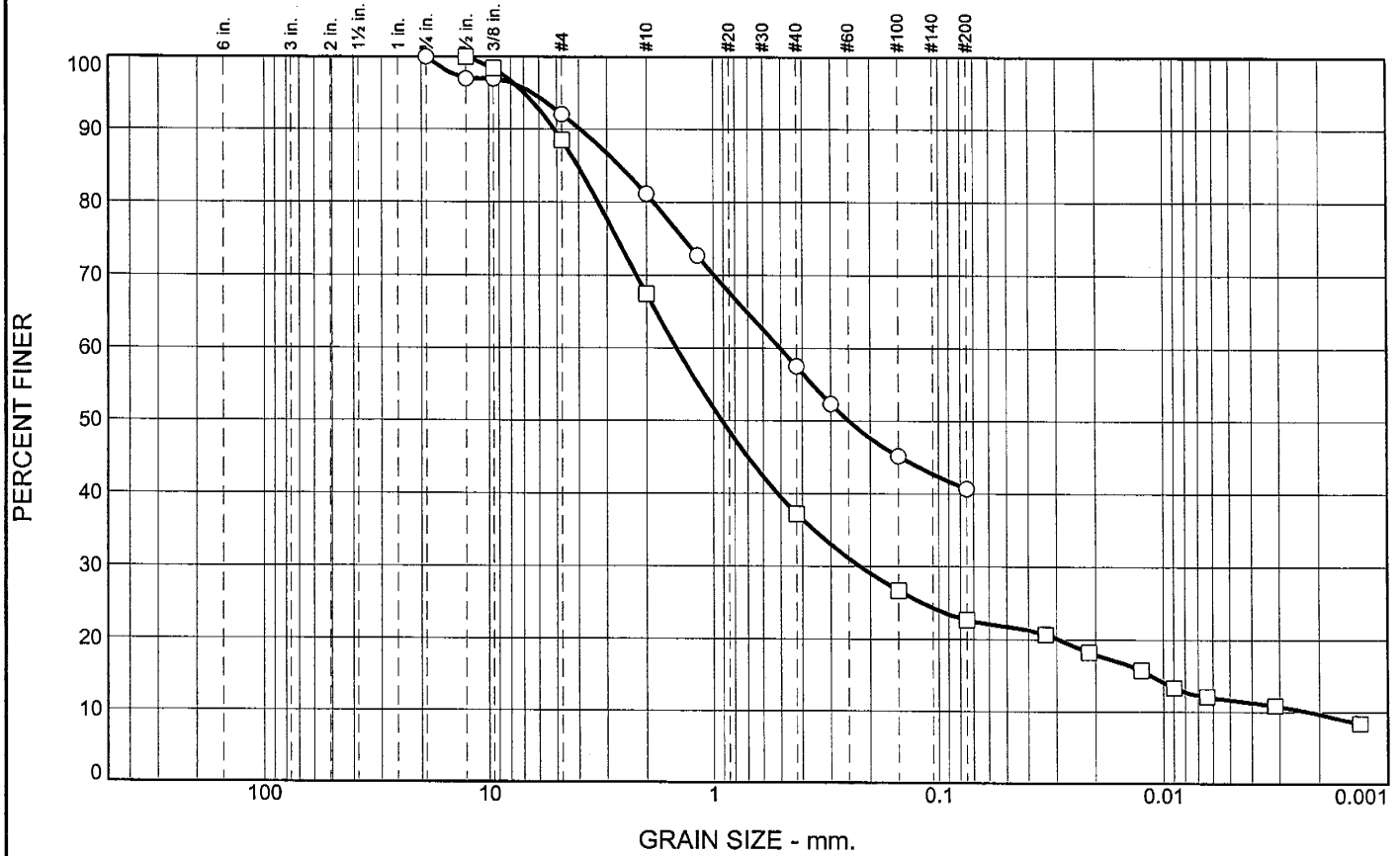


	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	34.2	50.4	15.4		SM			

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER			Material Description	
1"	○	100.0		#4	○	65.8		○ silty sand with gravel	
3/4"		94.6		#10		48.7			
1/2"		91.2		#16		40.5			
3/8"		83.3		#40		28.6			
GRAIN SIZE				#50		25.0			
D ₆₀				#100		19.6			
D ₃₀				#200		15.4			
D ₁₀									
COEFFICIENTS									
C _c									
C _u									
									REMARKS: ○

○ Source of Sample: FA1 Depth: 28.5-28.6 Sample Number: I

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	7.9	51.4	40.7		SC	A-4(0)	17	25
□	0.0	11.5	65.8	11.1	11.6	SC-SM	A-1-b	19	24

SIEVE inches size	PERCENT FINER	
	○	□
3/4"	100.0	
1/2"	97.0	100.0
3/8"	97.0	98.4
GRAIN SIZE		
D ₆₀	0.5015	1.4667
D ₃₀		0.2222
D ₁₀		0.0022
COEFFICIENTS		
C _c		15.19
C _u		662.05

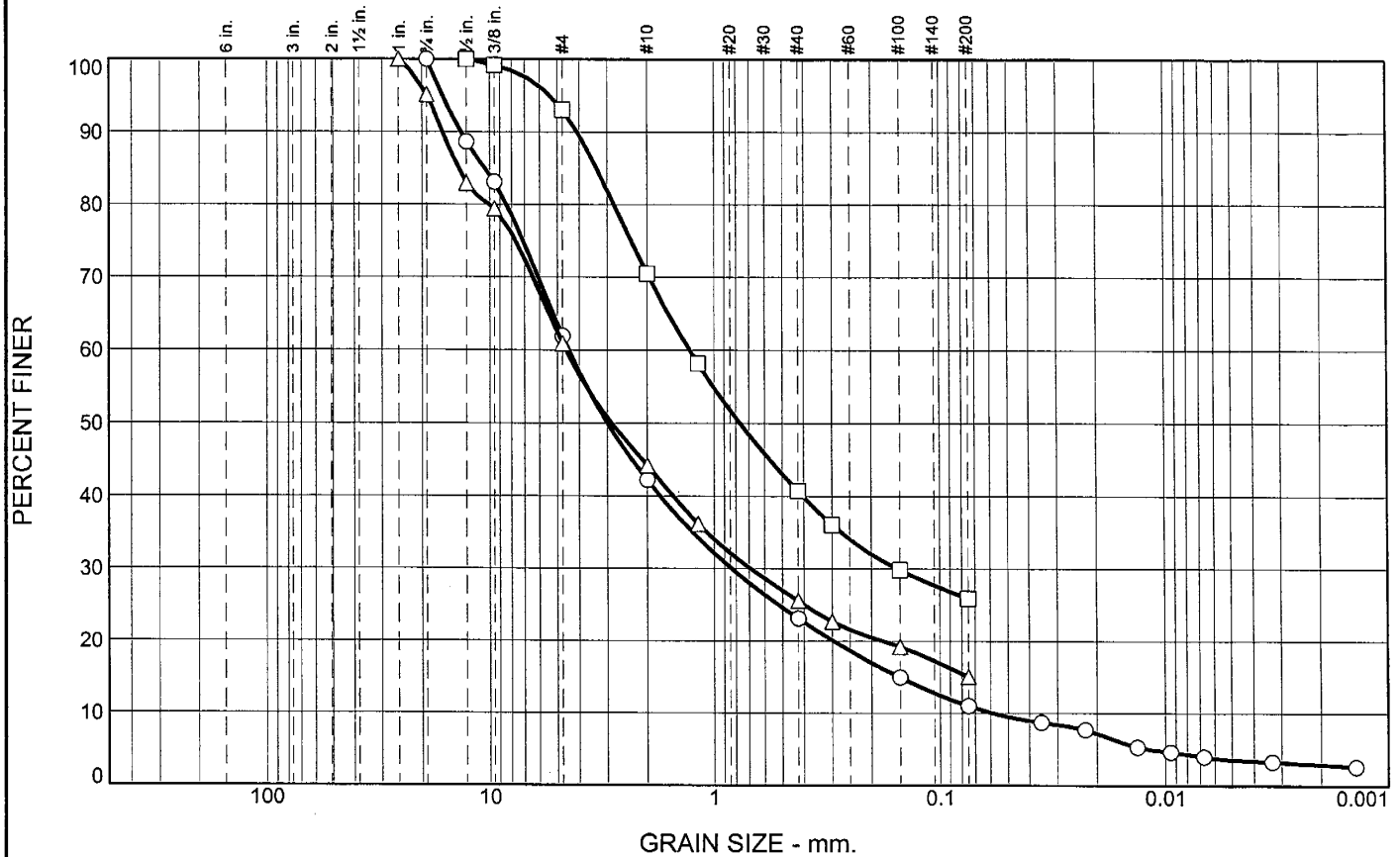
SIEVE number size	PERCENT FINER	
	○	□
#4	92.1	88.5
#10	81.2	67.4
#16	72.7	
#40	57.5	37.2
#50	52.3	
#100	45.2	26.7
#200	40.7	22.7

Material Description
 clayey sand
 silty, clayey sand

REMARKS:

○ Source of Sample: FP1 Depth: 19.0-19.21 Sample Number: E
 □ Source of Sample: FP1 Depth: 14.0-24.0 Sample Number: BULK

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	38.1	50.9	7.4	3.6	SW-SC	A-2-4(0)	19	26
□	0.0	6.9	67.2	25.9		SC	A-2-7(1)	23	42
△	0.0	39.1	45.8	15.1		SC	A-2-6(0)	20	36

SIEVE inches size	PERCENT FINER		
	○	□	△
1"			100.0
3/4"	100.0		95.1
1/2"	88.7	100.0	82.9
3/8"	83.1	99.1	79.4
GRAIN SIZE			
D ₆₀	4.4576	1.2874	4.5960
D ₃₀	0.8362	0.1531	0.6880
D ₁₀	0.0581		
COEFFICIENTS			
C _c	2.70		
C _u	76.75		

SIEVE number size	PERCENT FINER		
	○	□	△
#4	61.9	93.1	60.9
#10	42.2	70.5	44.2
#16		58.2	36.2
#40	23.1	40.7	25.6
#50		36.1	22.7
#100	14.9	29.9	19.2
#200	11.0	25.9	15.1

Material Description

- well-graded sand with clay and gravel
- clayey sand
- △ clayey sand with gravel

REMARKS:

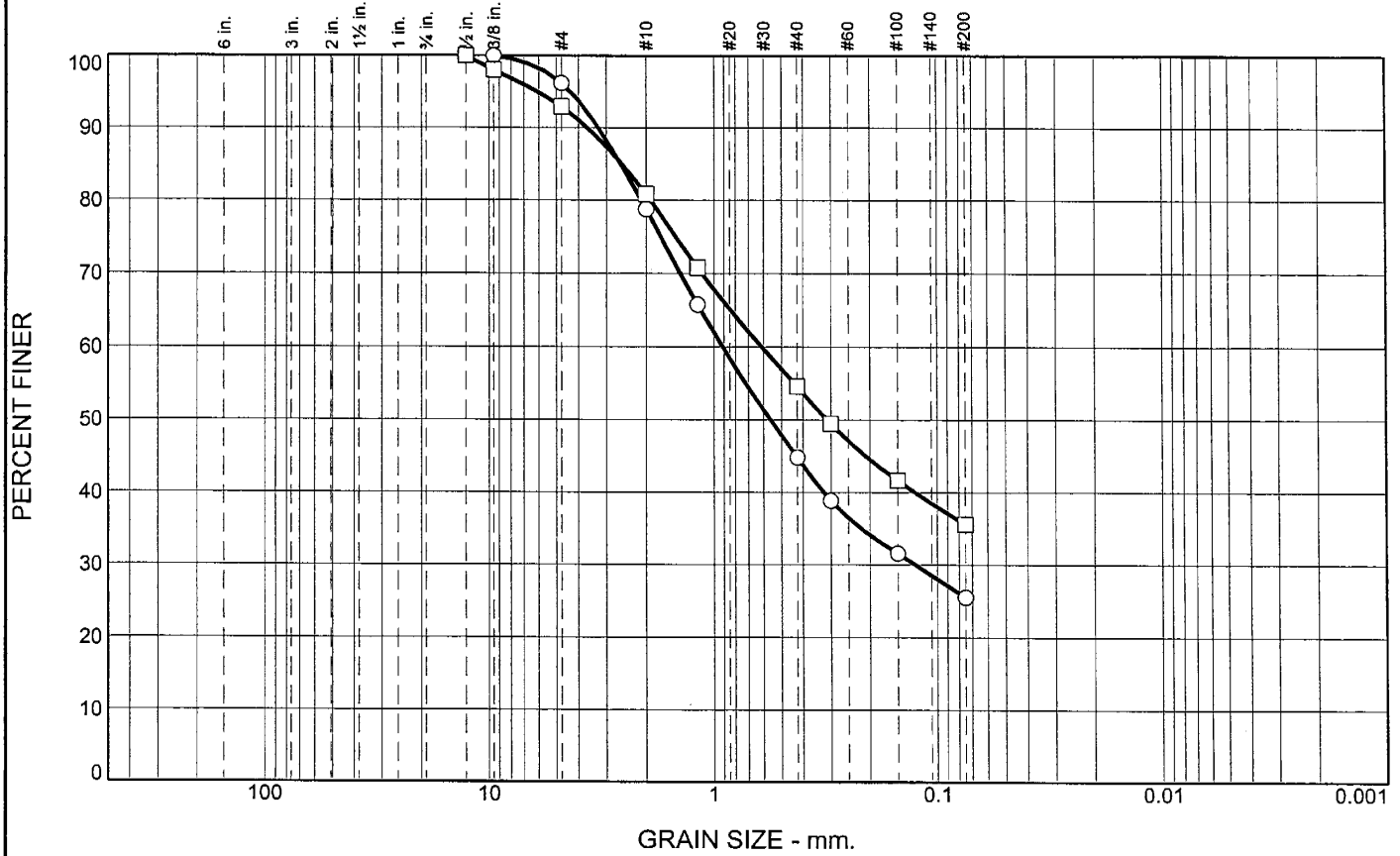
○

□

△

○ Source of Sample: FP2 Depth: 3.0-4.5 Sample Number: A
 □ Source of Sample: FP2 Depth: 5.0-6.0 Sample Number: B2
 △ Source of Sample: FP2 Depth: 7.0-8.5 Sample Number: C

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	3.8	70.6	25.6		SC	A-2-6(0)	18	29
□	0.0	7.1	57.3	35.6		SC	A-6(1)	14	26

SIEVE inches size	PERCENT FINER	
	○	□
1/2"	100.0	100.0
3/8"	100.0	98.0
GRAIN SIZE		
D ₆₀	0.9136	0.6103
D ₃₀	0.1244	
D ₁₀		
COEFFICIENTS		
C _c		
C _u		

SIEVE number size	PERCENT FINER	
	○	□
#4	96.2	92.9
#10	78.8	80.8
#16	65.8	70.8
#40	44.8	54.6
#50	38.9	49.5
#100	31.6	41.7
#200	25.6	35.6

Material Description

○ clayey sand

□ clayey sand

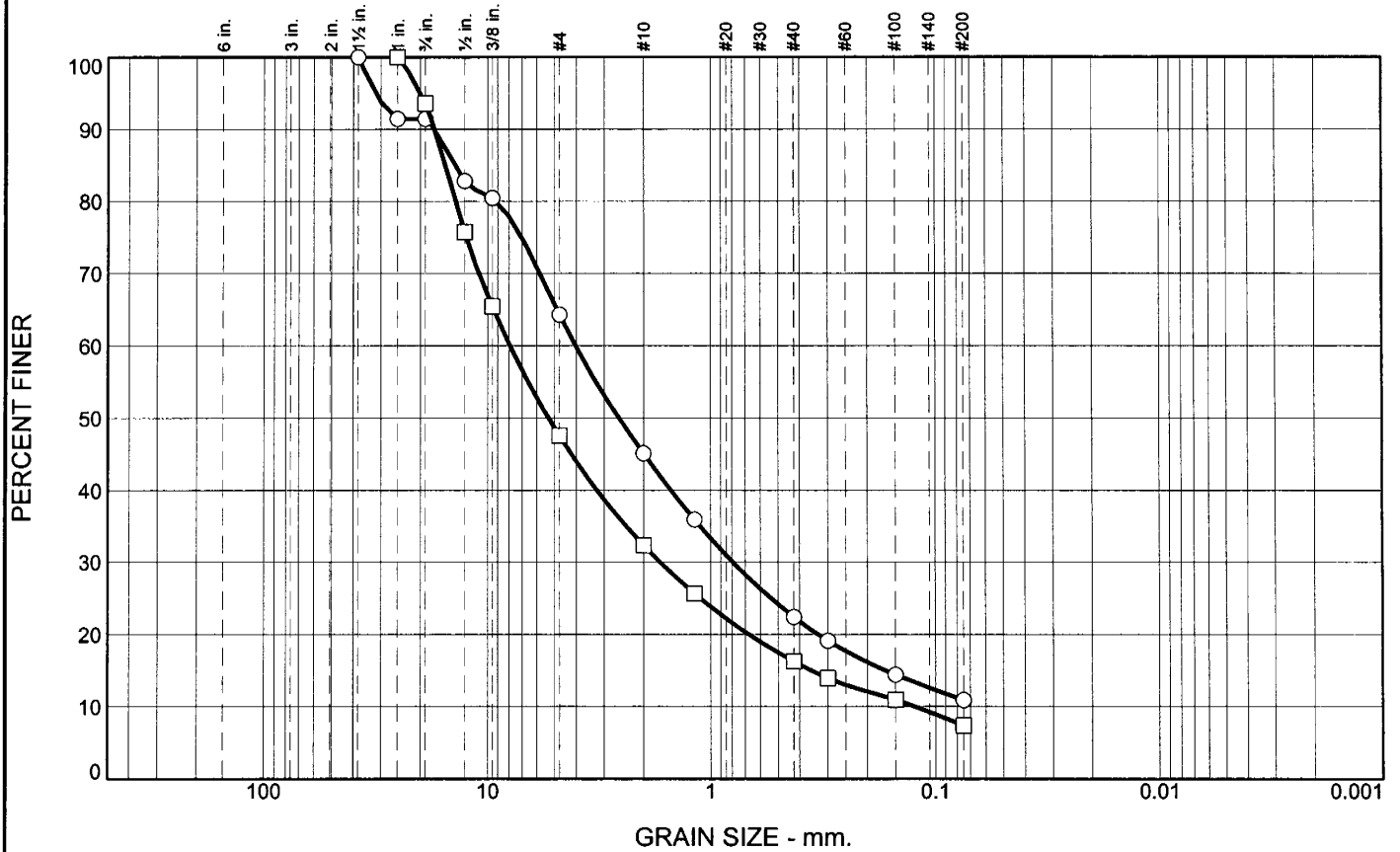
REMARKS:

○

□

○ Source of Sample: FP2 Depth: 9.5-11.0 Sample Number: D
 □ Source of Sample: FP2 Depth: 14.5-15.1 Sample Number: F

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	35.7	53.4	10.9		SP-SC	A-2-4(0)	20	27
□	0.0	52.4	40.2	7.4		GP-GM			

SIEVE inches size	PERCENT FINER	
	○	□
1-1/2"	100.0	
1"	91.4	100.0
3/4"	91.4	93.6
1/2"	82.8	75.7
3/8"	80.4	65.4
GRAIN SIZE		
D60	4.0320	7.9260
D30	0.7949	1.6860
D10		0.1230
COEFFICIENTS		
Cc		2.92
Cu		64.44

SIEVE number size	PERCENT FINER	
	○	□
#4	64.3	47.6
#10	45.1	32.3
#16	35.9	25.6
#40	22.4	16.2
#50	19.1	13.9
#100	14.4	10.9
#200	10.9	7.4

Material Description

○ poorly graded sand with clay and gravel

□ poorly graded gravel with silt and sand

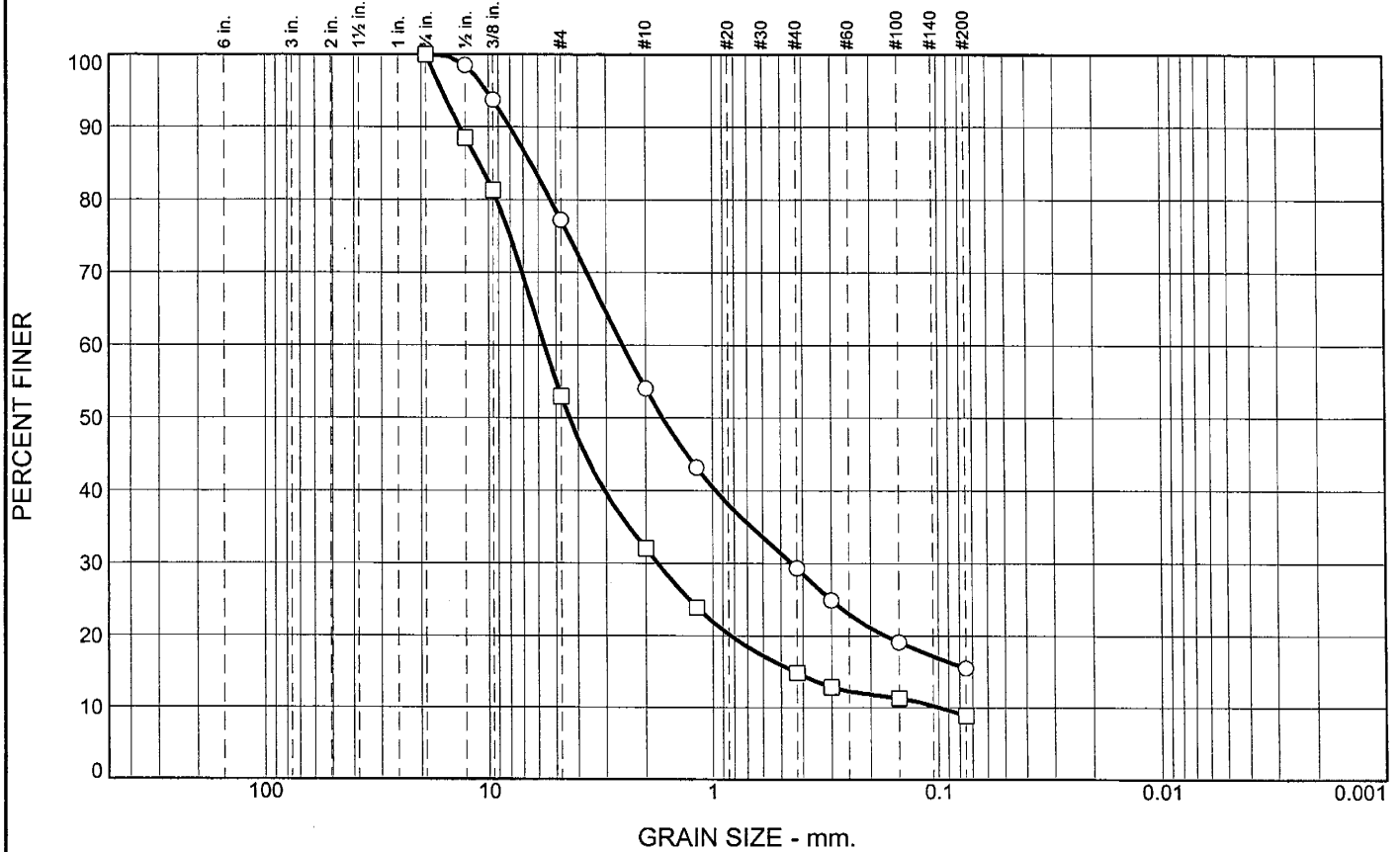
REMARKS:

○

□

○ Source of Sample: FP3 Depth: 3.0-4.3 Sample Number: A
 □ Source of Sample: FP3 Depth: 7.5-8.5 Sample Number: C

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	22.7	61.8	15.5		SC-SM	A-1-b	18	24
□	0.0	47.1	44.1	8.8		GP-GC	A-1-a	17	21

SIEVE inches size	PERCENT FINER	
	○	□
3/4"	100.0	100.0
1/2"	98.5	88.5
3/8"	93.7	81.3
GRAIN SIZE		
D60	2.5288	5.6394
D30	0.4460	1.7661
D10		0.0989
COEFFICIENTS		
C _c		5.59
C _u		57.00

SIEVE number size	PERCENT FINER	
	○	□
#4	77.3	52.9
#10	54.0	32.1
#16	43.2	23.9
#40	29.4	14.8
#50	24.9	12.8
#100	19.1	11.3
#200	15.5	8.8

Material Description

○ silty, clayey sand with gravel

□ poorly graded gravel with silty clay and sand

REMARKS:

○

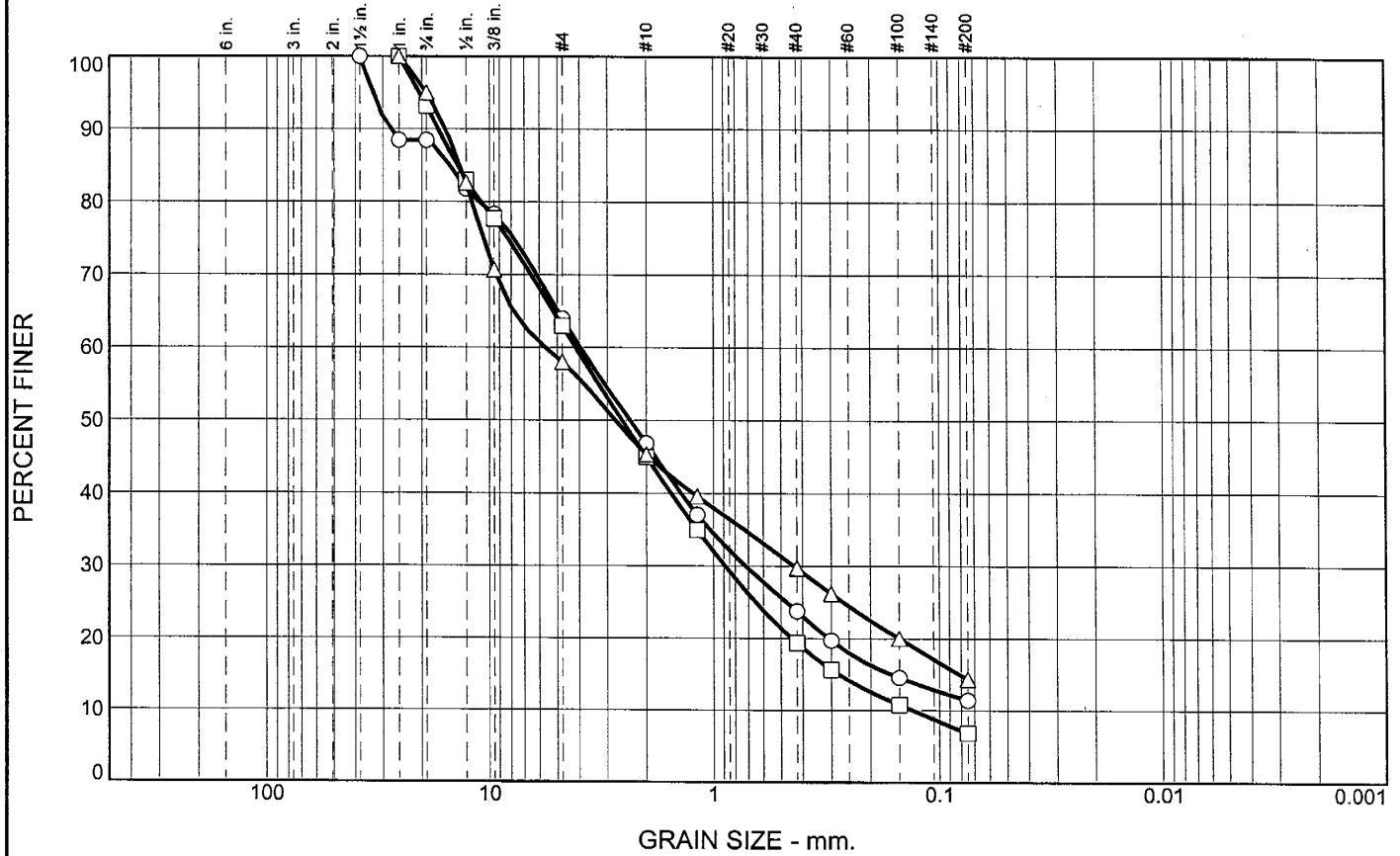
□

○ Source of Sample: FP3 Depth: 9.5-11.0 Sample Number: D
 □ Source of Sample: FP3 Depth: 12.5-13.81 Sample Number: E

**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: Abbas Bafghi
 Project: Boulder City Bypass - US 93/US 95 Intersection
 Project No.: FL-02-06 Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	36.0	52.6	11.4		SP-SC	A-2-6(0)	18	32
□	0.0	37.0	56.2	6.8		SW-SM	A-1-a	NP	18
△	0.0	42.0	43.7	14.3					

SIEVE inches size	PERCENT FINER		
	○	□	△
1-1/2"	100.0		
1"	88.5	100.0	100.0
3/4"	88.5	93.2	95.0
1/2"	81.8	83.0	82.6
3/8"	78.4	77.7	70.7
GRAIN SIZE			
D60	3.9577	4.1510	5.6413
D30	0.7165	0.8860	0.4343
D10		0.1311	
COEFFICIENTS			
C _c		1.44	
C _u		31.65	

SIEVE number size	PERCENT FINER		
	○	□	△
#4	64.0	63.0	58.0
#10	46.8	45.0	45.3
#16	37.1	35.0	39.6
#40	23.8	19.4	29.8
#50	19.7	15.7	26.2
#100	14.6	10.8	20.1
#200	11.4	6.8	14.3

Material Description	
○	poorly graded sand with clay and gravel
□	well-graded sand with silt and gravel
△	

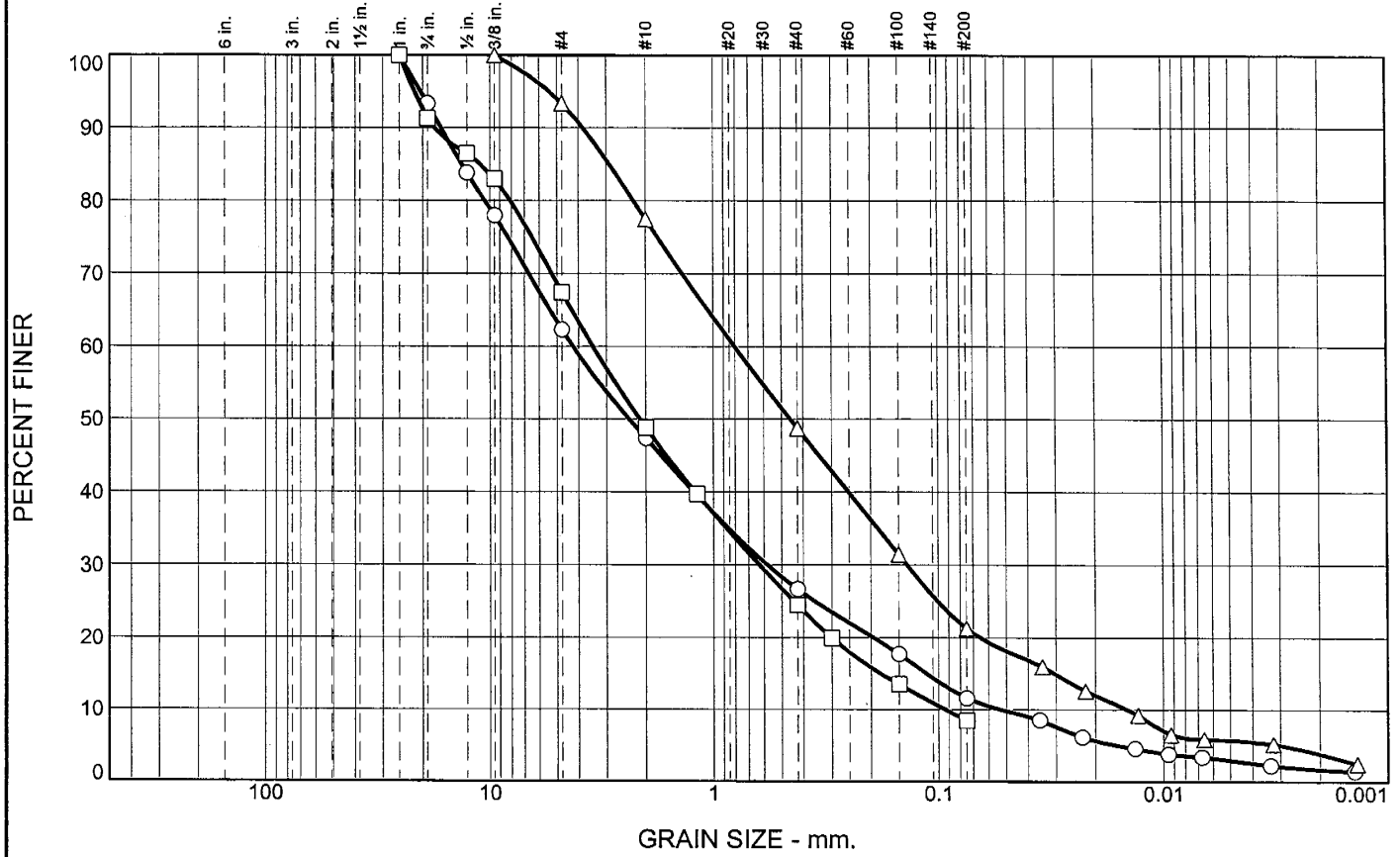
REMARKS:	
○	
□	
△	

○ Source of Sample: FA2 Depth: 4.5-5.35 Sample Number: A
 □ Source of Sample: FA2 Depth: 9.5-11.0 Sample Number: C
 △ Source of Sample: FA2 Depth: 12.0-12.47 Sample Number: D

**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: Abbas Bafghi
 Project: Boulder City Bypass - US 93/US 95 Intersection
 Project No.: FL-02-06 Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	37.7	50.7	8.6	3.0	SW-SM	A-1-a	NP	18
□	0.0	32.6	58.9	8.5		SW-SM	A-1-a	NP	18
△	0.0	6.6	72.1	15.5	5.8	SM	A-1-b	NP	25

SIEVE inches size	PERCENT FINER		
	○	□	△
1"	100.0	100.0	
3/4"	93.3	91.3	
1/2"	83.8	86.5	
3/8"	78.0	83.0	100.0
GRAIN SIZE			
D ₆₀	4.2434	3.4524	0.8036
D ₃₀	0.5772	0.6258	0.1373
D ₁₀	0.0529	0.0932	0.0144
COEFFICIENTS			
C _c	1.48	1.22	1.63
C _u	80.16	37.03	55.91

SIEVE number size	PERCENT FINER		
	○	□	△
#4	62.3	67.4	93.4
#10	47.4	48.8	77.5
#16		39.7	
#40	26.7	24.5	48.8
#50		19.9	
#100	17.7	13.5	31.5
#200	11.6	8.5	21.3

Material Description

○ well-graded sand with silt and gravel

□ well-graded sand with silt and gravel

△ silty sand

REMARKS:

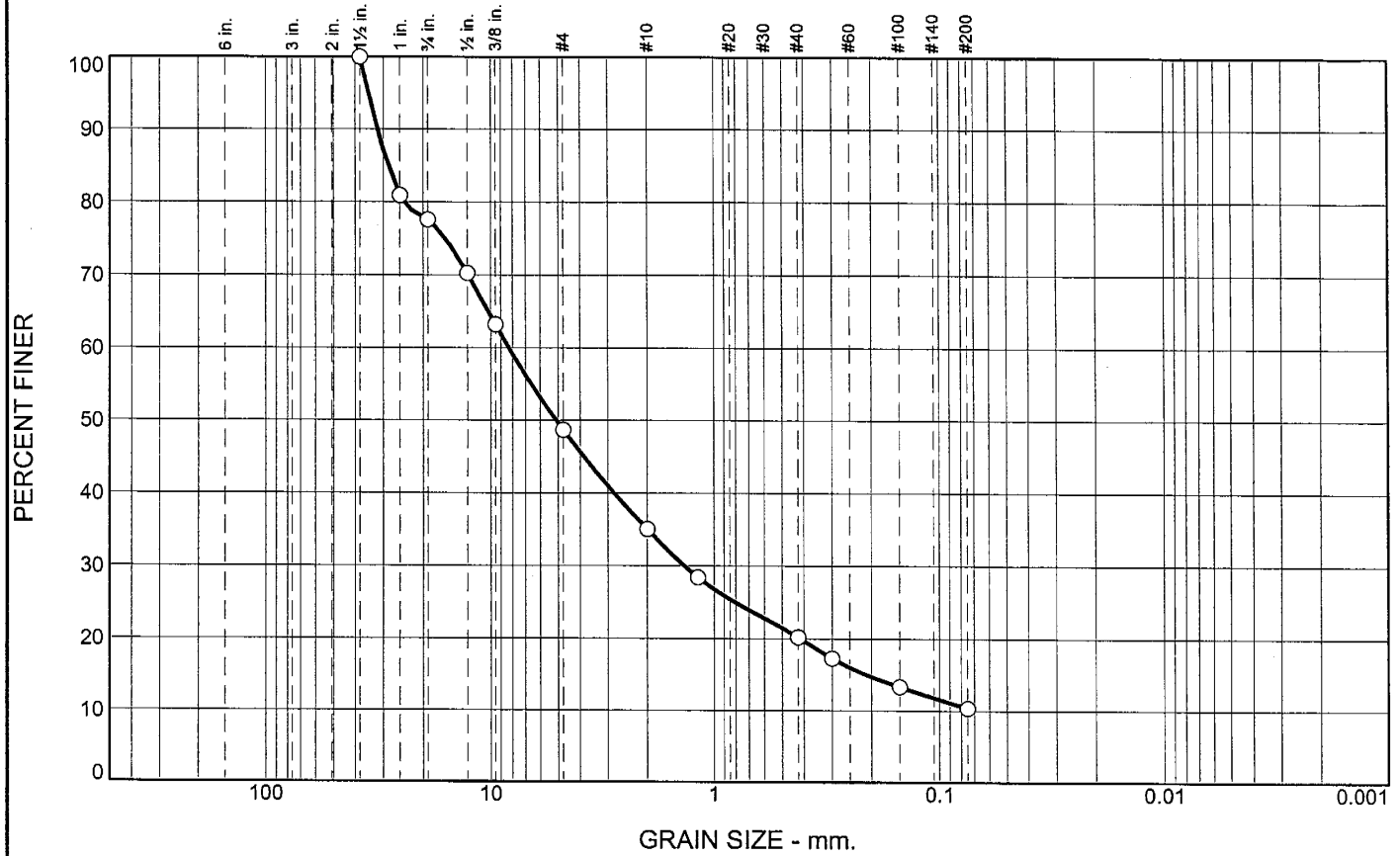
○

□

△

○ Source of Sample: FA2 Depth: 14.5-16.0 Sample Number: E
 □ Source of Sample: FA2 Depth: 19.5-21.0 Sample Number: F
 △ Source of Sample: FA2 Depth: 24.5-26.0 Sample Number: G

Particle Size Distribution Report



+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0.0	51.3	38.4	10.3		GP-GM	A-1-a	NP	17

SIEVE inches size	PERCENT FINER		
	○		
1-1/2"	100.0		
1"	80.9		
3/4"	77.6		
1/2"	70.3		
3/8"	63.2		
GRAIN SIZE			
D ₆₀	8.2891		
D ₃₀	1.3563		
D ₁₀			
COEFFICIENTS			
C _c			
C _u			

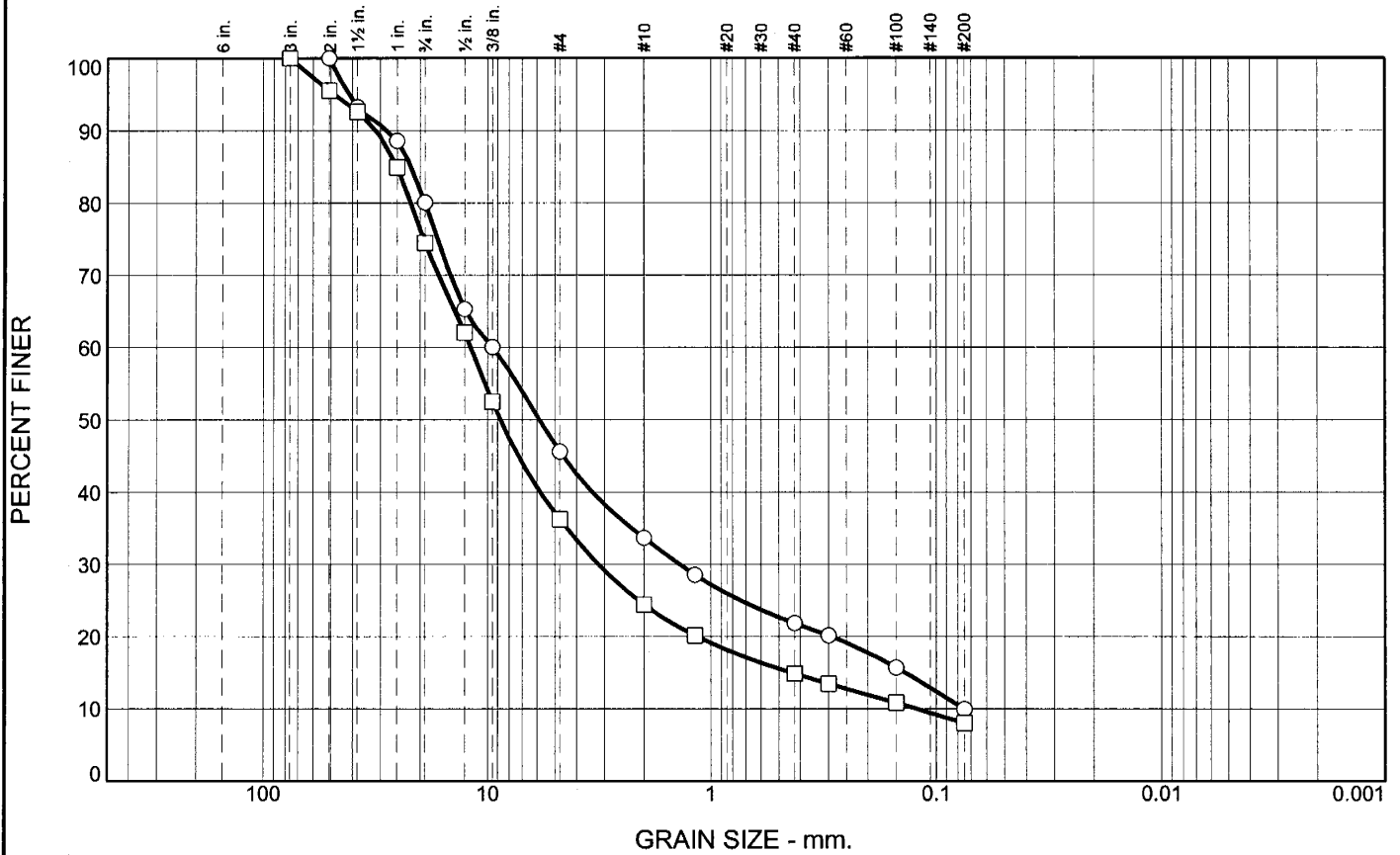
SIEVE number size	PERCENT FINER		
	○		
#4	48.7		
#10	35.1		
#16	28.4		
#40	20.2		
#50	17.3		
#100	13.3		
#200	10.3		

Material Description
○ poorly graded gravel with silt and sand

REMARKS:
○

○ Source of Sample: FA2 Depth: 29.5-30.72 Sample Number: H

Particle Size Distribution Report

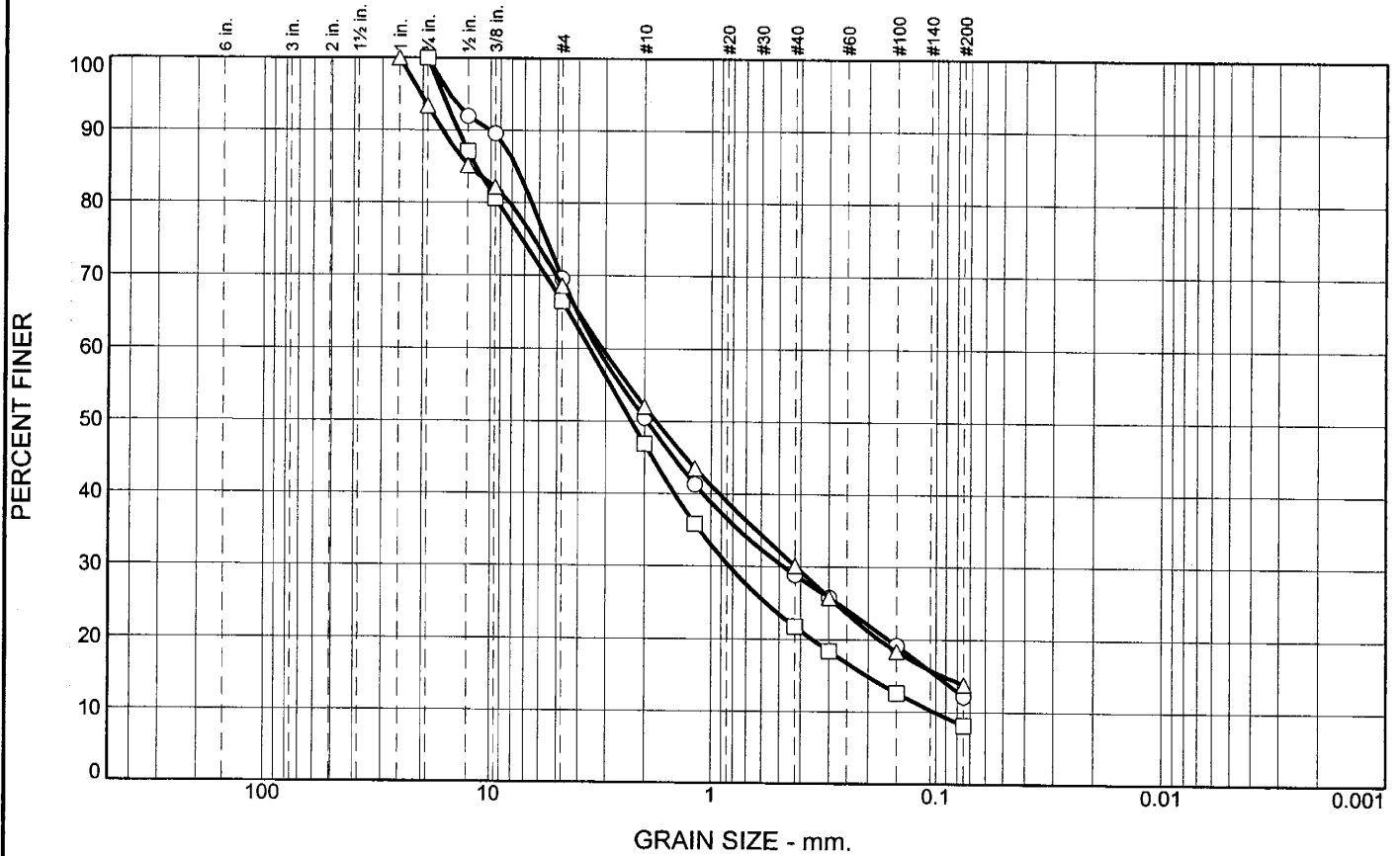


	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	54.4	35.7	9.9		GW-GM	A-1-a	NP	19
□	0.0	63.7	28.3	8.0		GP-GM	A-1-a	23	24

SIEVE inches size	PERCENT FINER		SIEVE number size	PERCENT FINER		Material Description ○ well-graded gravel with silt and sand □ poorly graded gravel with silt and sand
	○	□		○	□	
3"		100.0	#4	45.6	36.3	
2"	100.0	95.5	#10	33.7	24.5	
1.5"	93.2	92.6	#16	28.6	20.2	
1"	88.6	85.0	#40	21.9	14.9	
3/4"	80.1	74.5	#50	20.2	13.5	
1/2"	65.3	62.1	#100	15.7	10.8	
3/8"	60.0	52.5	#200	9.9	8.0	
GRAIN SIZE						
D60	9.5096	11.9217				
D30	1.3794	3.1815				
D10	0.0756	0.1220				
COEFFICIENTS						
C _c	2.65	6.96				
C _u	125.86	97.75				

○ Source of Sample: NBA 1 Depth: 0.0 - 5.0' Sample Number: BULK 1 - Sample A
 □ Source of Sample: NBA 1 Depth: 5.0 - 10.0' Sample Number: BULK 2 - Sample D

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	30.4	57.4	12.2		SM	A-1-a	NP	20
□	0.0	33.5	58.3	8.2		SW-SM	A-1-a	NP	22
△	0.0	31.4	54.8	13.8		SM	A-1-b	NP	27

SIEVE inches size	PERCENT FINER		
	○	□	△
1"			100.0
3/4"	100.0	100.0	93.4
1/2"	91.9	87.1	85.1
3/8"	89.5	80.6	82.2
GRAIN SIZE			
D60	3.2878	3.5439	3.1124
D30	0.4777	0.8314	0.4215
D10		0.1011	
COEFFICIENTS			
C _c		1.93	
C _u		35.06	

SIEVE number size	PERCENT FINER		
	○	□	△
#4	69.6	66.5	68.6
#10	50.5	46.9	52.1
#16	41.3	35.8	43.6
#40	28.9	21.7	30.1
#50	25.8	18.4	25.8
#100	19.2	12.6	18.4
#200	12.2	8.2	13.8

Material Description
○ silty sand with gravel
□ well-graded sand with silt and gravel
△ silty sand with gravel

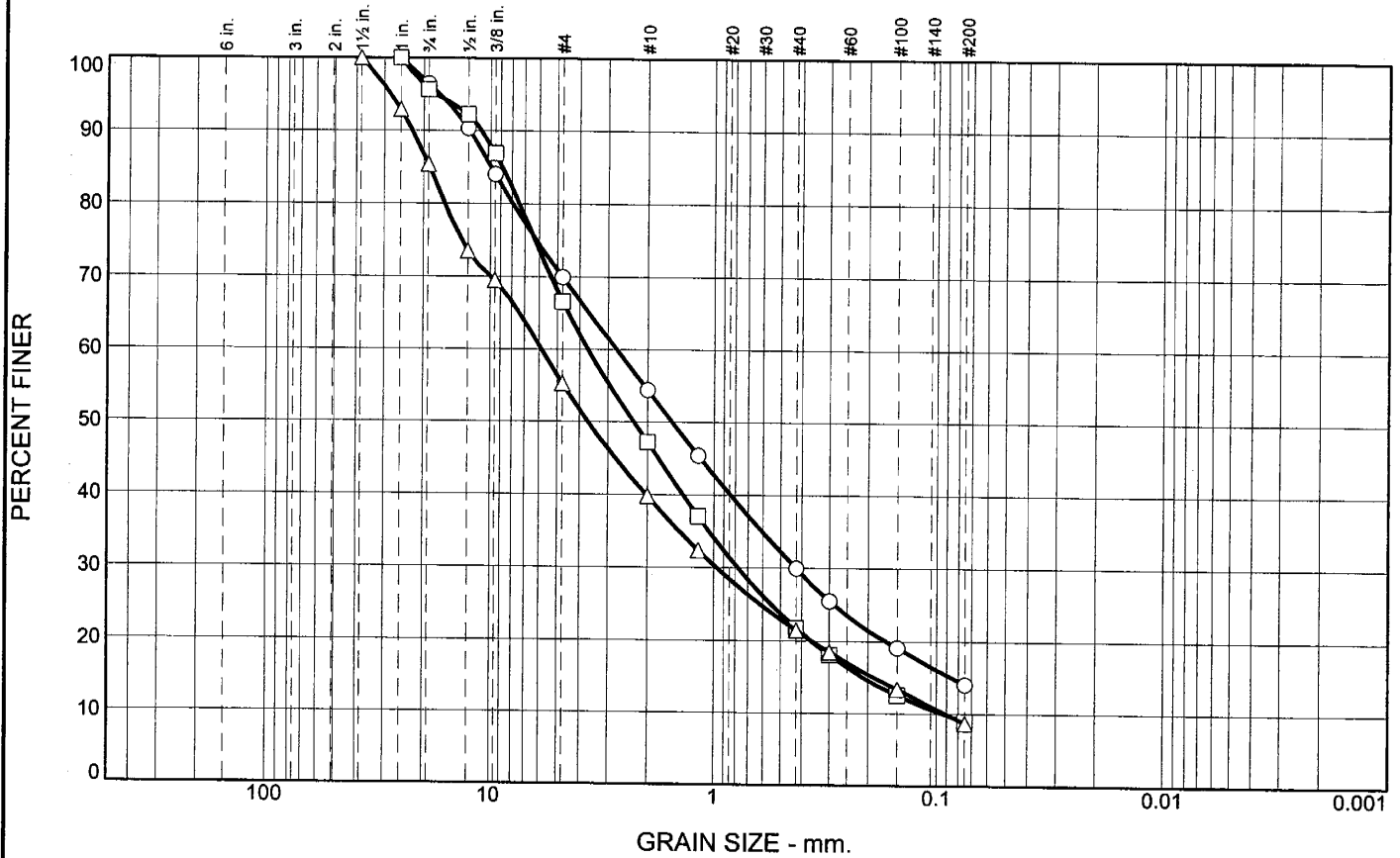
REMARKS:
○
□
△

- Source of Sample: NBA 1 Depth: 1.0 - 2.5' Sample Number: B
- Source of Sample: NBA 1 Depth: 2.5 - 4.0' Sample Number: C
- △ Source of Sample: NBA 1 Depth: 5.0 - 6.5' Sample Number: E

**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: A. Bafghi
Project: Boulder City Bypass
Project No.: EA 73307, FL-3-11

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	30.0	56.0		14.0	SM	A-1-b	NP	26
□	0.0	33.4	57.6		9.0	SW-SM	A-1-a	NP	23
△	0.0	44.7	46.6		8.7	SW-SM	A-1-a	NP	21

SIEVE inches size	PERCENT FINER		
	○	□	△
1.5"			100.0
1"	100.0	100.0	92.9
3/4"	96.4	95.6	85.4
1/2"	90.3	92.3	73.5
3/8"	84.0	86.9	69.5
GRAIN SIZE			
D ₆₀	2.7471	3.6790	5.8597
D ₃₀	0.4258	0.7772	0.9710
D ₁₀		0.0936	0.0911
COEFFICIENTS			
C _c		1.75	1.77
C _u		39.31	64.32

SIEVE number size	PERCENT FINER		
	○	□	△
#4	70.0	66.6	55.3
#10	54.4	47.2	39.8
#16	45.4	37.1	32.4
#40	30.0	21.8	21.5
#50	25.5	18.1	18.5
#100	19.1	12.5	13.4
#200	14.0	9.0	8.7

Material Description

- silty sand with gravel
- well-graded sand with silt and gravel
- △ well-graded sand with silt and gravel

REMARKS:

○

□

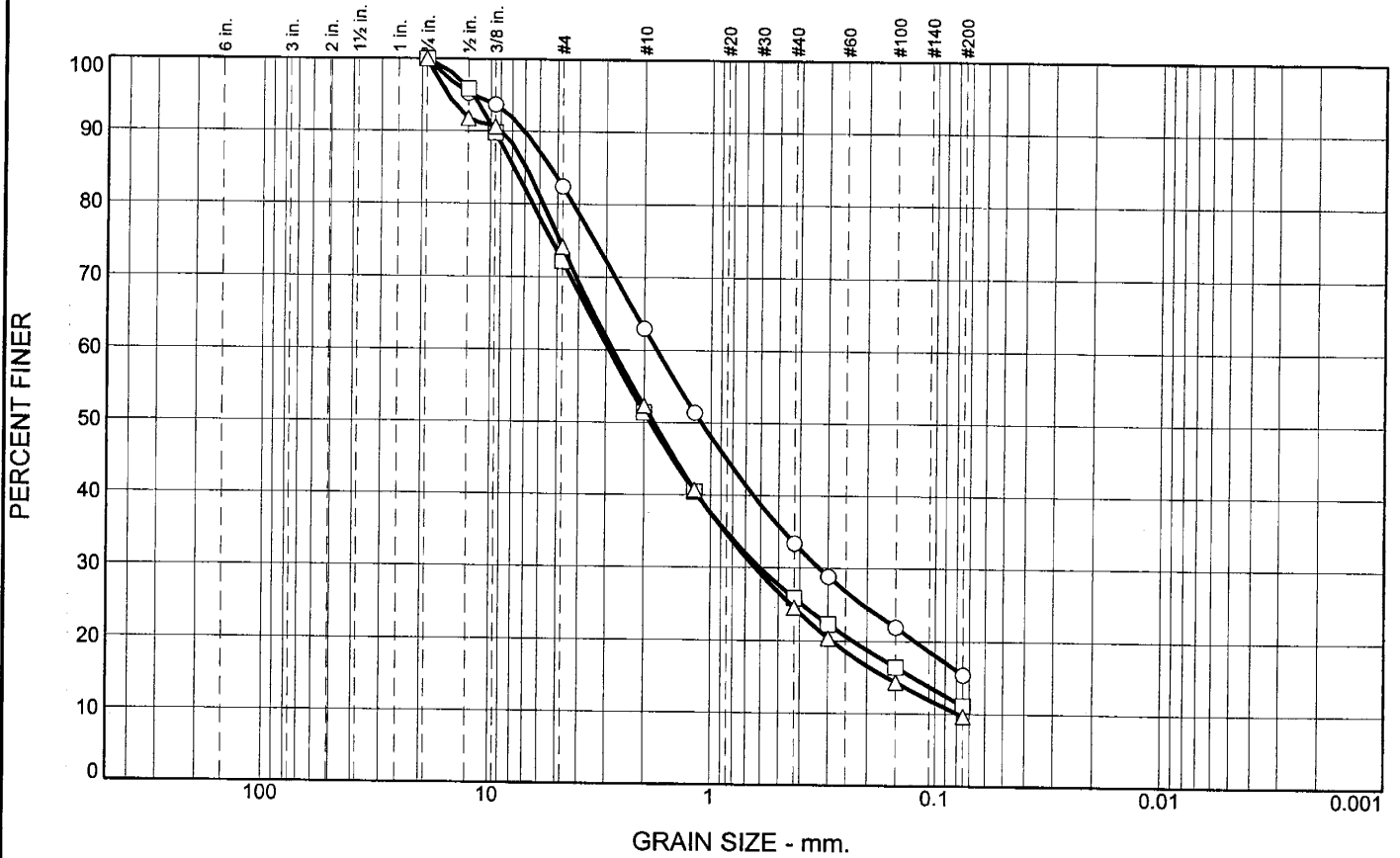
△

○ Source of Sample: NBA 1 Depth: 6.5 - 8.0' Sample Number: F
 □ Source of Sample: NBA 1 Depth: 8.0 - 9.5' Sample Number: G
 △ Source of Sample: NBA 1 Depth: 10.0 - 11.1' Sample Number: H

**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: A. Bafghi
 Project: Boulder City Bypass
 Project No.: EA 73307, FL-3-11

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	17.6	67.0		15.4	SM	A-1-b	NP	21
□	0.0	27.8	61.1		11.1	SP-SM	A-1-b	NP	23
△	0.0	25.9	64.4		9.7	SW-SM	A-1-b	NP	19

SIEVE inches size	PERCENT FINER		
	○	□	△
3/4"	100.0	100.0	100.0
1/2"	95.3	95.9	91.7
3/8"	93.7	89.8	90.7
GRAIN SIZE			
D60	1.7539	2.8983	2.7768
D30	0.3302	0.6028	0.6343
D10			0.0787
COEFFICIENTS			
C _c			1.84
C _u			35.26

SIEVE number size	PERCENT FINER		
	○	□	△
#4	82.4	72.2	74.1
#10	63.0	51.4	52.3
#16	51.4	40.5	40.7
#40	33.4	25.8	24.5
#50	28.8	22.3	20.4
#100	21.9	16.5	14.3
#200	15.4	11.1	9.7

Material Description

○ silty sand with gravel

□ poorly graded sand with silt and gravel

△ well-graded sand with silt and gravel

REMARKS:

○

□

△

○ Source of Sample: NBA 1 Depth: 11.5 - 13.0' Sample Number: I

□ Source of Sample: NBA 1 Depth: 13.0 - 14.5' Sample Number: J

△ Source of Sample: NBA 1 Depth: 14.5 - 16.0' Sample Number: K

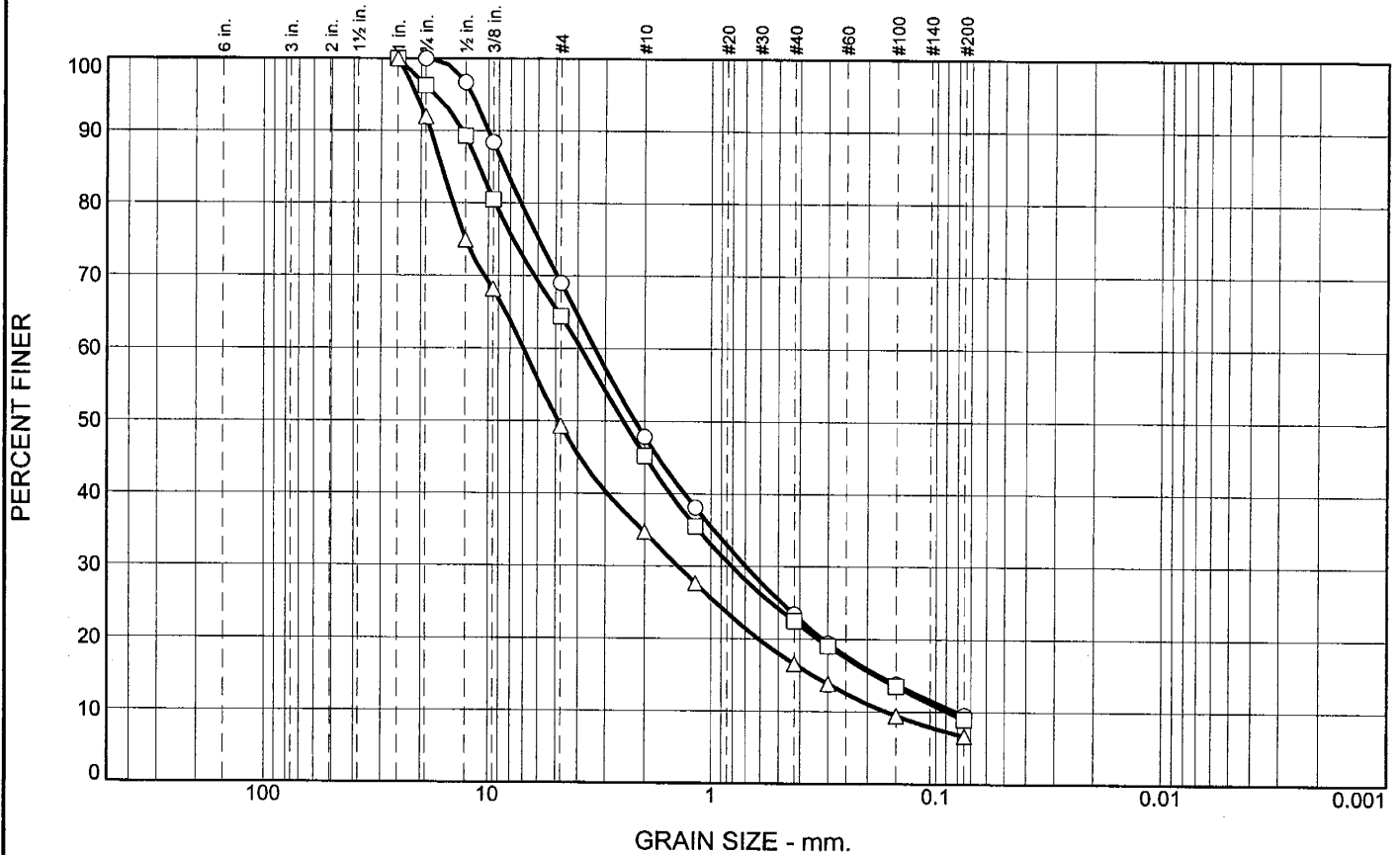
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TRANSPORTATION**

Client: A. Bafghi
Project: Boulder City Bypass

Project No.: EA 73307, FL-3-11

Figure

Particle Size Distribution Report



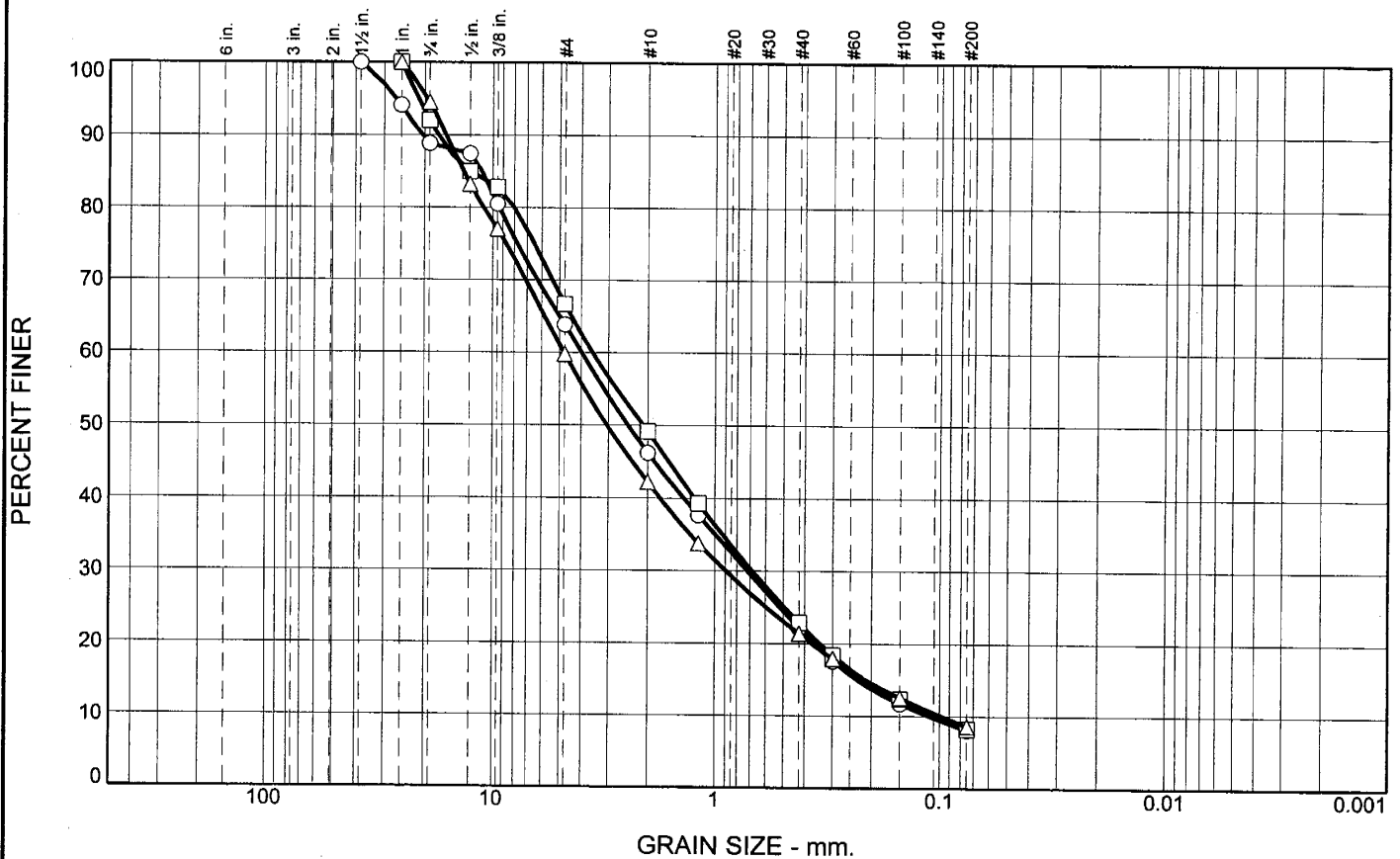
	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	31.0	59.5		9.5	SW-SM	A-1-a	NP	18
□	0.0	35.6	55.5		8.9	SW-SM	A-1-a	NP	18
△	0.0	50.7	42.6		6.7	GW-GM	A-1-a	NP	19

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER			Material Description
	○	□	△		○	□	△	
1"		100.0	100.0	#4	69.0	64.4	49.3	○ well-graded sand with silt and gravel □ well-graded sand with silt and gravel △ well-graded gravel with silt and sand
3/4"	100.0	96.3	92.0	#10	47.9	45.2	34.7	
1/2"	96.7	89.3	74.9	#16	38.1	35.5	27.6	
3/8"	88.4	80.5	68.2	#40	23.4	22.5	16.6	
				#50	19.4	19.0	13.8	
				#100	13.8	13.5	9.5	
				#200	9.5	8.9	6.7	
GRAIN SIZE								
D ₆₀	3.3507	3.8779	6.9601					
D ₃₀	0.6960	0.8086	1.4120					
D ₁₀	0.0811	0.0886	0.1662					
COEFFICIENTS								
C _c	1.78	1.90	1.72					
C _u	41.30	43.76	41.88					

○ Source of Sample: NBA 1 Depth: 16.0 - 17.5' Sample Number: L
 □ Source of Sample: NBA 1 Depth: 17.5 - 19.0' Sample Number: M
 △ Source of Sample: NBA 1 Depth: 19.0 - 20.5' Sample Number: N

NEVADA DEPARTMENT OF TRANSPORTATION	Client: A. Bafghi Project: Boulder City Bypass Project No.: EA 73307, FL-3-11
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Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	36.2	55.7		8.1	SW-SM	A-1-a	NP	18
□	0.0	33.3	58.5		8.2	SW-SM	A-1-a	NP	20
△	0.0	40.2	51.2		8.6	SW-SM	A-1-a	NP	19

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER			Material Description
	○	□	△		○	□	△	
1.5"	100.0			#4	63.8	66.7	59.8	○ well-graded sand with silt and gravel □ well-graded sand with silt and gravel △ well-graded sand with silt and gravel
1"	94.1	100.0	100.0	#10	46.2	49.2	42.2	
3/4"	88.8	92.0	94.5	#16	37.7	39.3	33.8	
1/2"	87.4	85.0	83.2	#40	22.1	22.9	21.4	
3/8"	80.5	82.8	77.1	#50	17.6	18.4	17.9	
				#100	11.7	12.4	12.5	
GRAIN SIZE				#200	8.1	8.2	8.6	REMARKS: ○ □ △
D60	3.9822	3.5554	4.7934					
D30	0.7200	0.6845	0.8972					
D10	0.1106	0.1025	0.0975					
COEFFICIENTS								
C _c	1.18	1.29	1.72					
C _u	36.00	34.67	49.17					

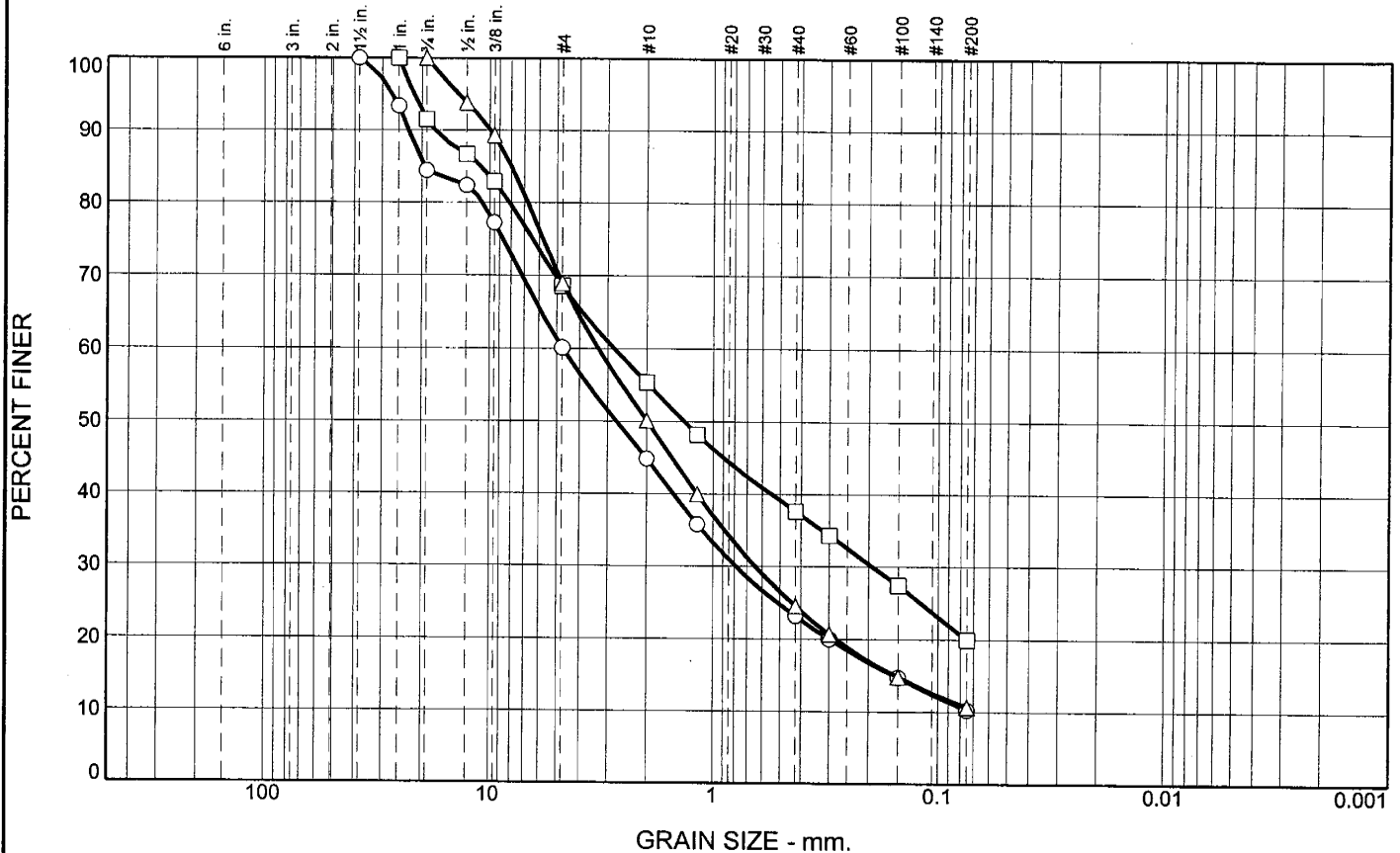
○ Source of Sample: NBA 1 Depth: 20.5 - 22.0' Sample Number: O
 □ Source of Sample: NBA 1 Depth: 22.0 - 23.5' Sample Number: P
 △ Source of Sample: NBA 1 Depth: 23.5 - 25.0' Sample Number: Q

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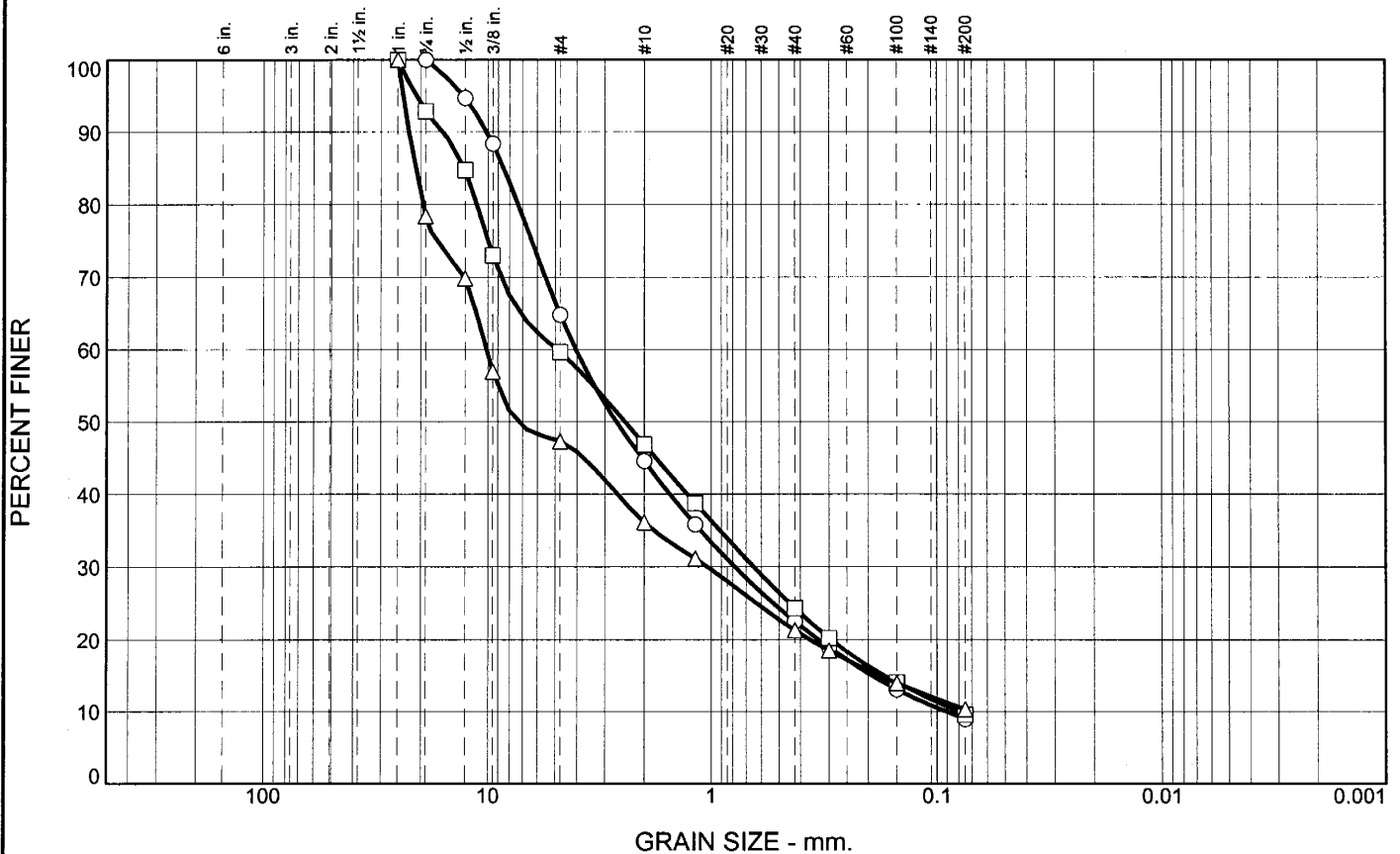
Client: A. Bafghi
 Project: Boulder City Bypass
 Project No.: EA 73307, FL-3-11

Figure

Particle Size Distribution Report



Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	35.2	55.8		9.0	SW-SM	A-1-a	NP	19
□	0.0	40.4	50.0		9.6	SW-SM	A-1-a	NP	24
△	0.0	52.7	37.0		10.3	GW-GM			

SIEVE inches size	PERCENT FINER		
	○	□	△
1"		100.0	100.0
¾"	100.0	92.9	78.4
½"	94.7	84.7	69.8
3/8"	88.4	73.0	57.0
GRAIN SIZE			
D ₆₀	4.0484	4.9112	10.1788
D ₃₀	0.7847	0.6454	1.0379
D ₁₀	0.0909	0.0805	
COEFFICIENTS			
C _c	1.67	1.05	
C _u	44.55	61.04	

SIEVE number size	PERCENT FINER		
	○	□	△
#4	64.8	59.6	47.3
#10	44.6	46.9	36.1
#16	35.8	38.8	31.2
#40	22.5	24.4	21.3
#50	18.9	20.2	18.5
#100	13.1	14.0	13.9
#200	9.0	9.6	10.3

Material Description	
○	well-graded sand with silt and gravel
□	well-graded sand with silt and gravel
△	well-graded gravel with silt and sand

REMARKS:

○

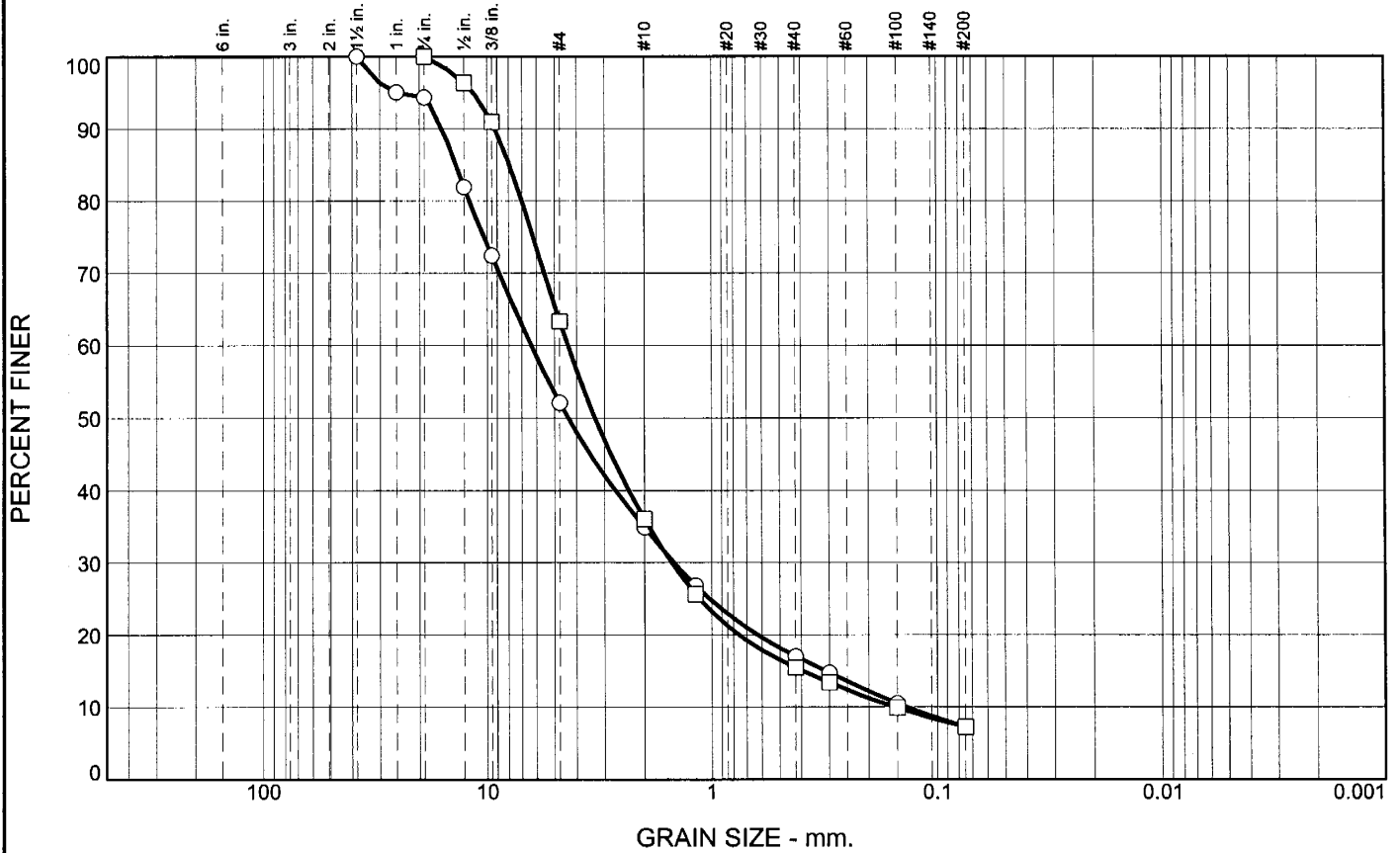
□

△

○ Source of Sample: NBA 1 Depth: 45.0 - 46.0' Sample Number: U
 □ Source of Sample: NBA 1 Depth: 50.0 - 51.4' Sample Number: V
 △ Source of Sample: NBA 1 Depth: 55.0 - 55.5' Sample Number: W

NEVADA DEPARTMENT OF TRANSPORTATION	Client: A. Bafghi Project: Boulder City Bypass Project No.: EA 73307, FL-3-11
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Particle Size Distribution Report



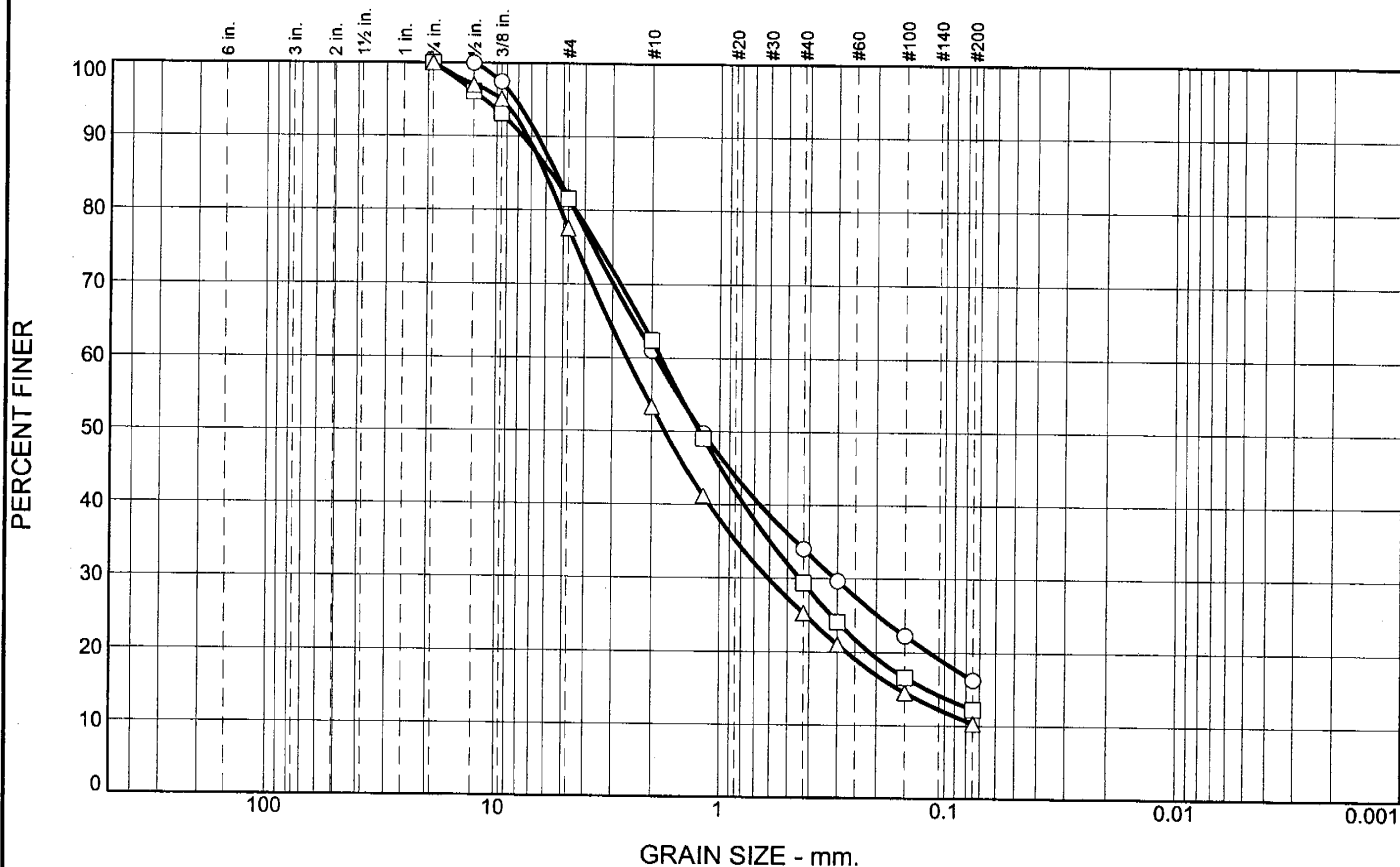
	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	47.9	44.9	7.2		GW-GM	A-1-a	NP	23
□	0.0	36.7	56.0	7.3		SP-SM	A-1-a	NP	24

SIEVE inches size	PERCENT FINER		SIEVE number size	PERCENT FINER		Material Description ○ well-graded gravel with silt and sand □ poorly graded sand with silt and gravel
	○	□		○	□	
1.5"	100.0		#4	52.1	63.3	
1"	95.0		#10	34.9	36.1	
3/4"	94.3	100.0	#16	26.9	25.7	
1/2"	81.9	96.4	#40	17.0	15.4	
3/8"	72.4	91.0	#50	14.7	13.4	
GRAIN SIZE			#100	10.5	9.9	
D60	6.3475	4.3771	#200	7.2	7.3	
D30	1.4697	1.5085				
D10	0.1367	0.1552				
COEFFICIENTS						
C _c	2.49	3.35				
C _u	46.45	28.20				

○ Source of Sample: NBA 2 Depth: 0.0 - 5.0' Sample Number: BULK 1 - Sample A
 □ Source of Sample: NBA 2 Depth: 5.0 - 10.0' Sample Number: BULK 2 - Sample D

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	18.4	65.3		16.3	SM	A-1-b	21	24
□	0.0	18.5	69.2		12.3	SM	A-1-b	NP	27
△	0.0	22.4	67.3		10.3	SP-SM	A-1-b	NP	26

SIEVE inches size	PERCENT FINER		
	○	□	△
3/4"		100.0	100.0
1/2"	100.0	96.1	97.0
3/8"	97.5	93.1	95.1
GRAIN SIZE			
D60	1.9144	1.8195	2.5806
D30	0.3084	0.4420	0.6063
D10			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
	○	□	△
#4	81.6	81.5	77.6
#10	61.0	62.4	53.4
#16	49.7	49.0	41.2
#40	34.0	29.4	25.3
#50	29.7	24.1	21.1
#100	22.3	16.6	14.5
#200	16.3	12.3	10.3

Material Description

○ silty sand with gravel

□ silty sand with gravel

△ poorly graded sand with silt and gravel

REMARKS:

○

□

△

○ Source of Sample: NBA 2 Depth: 1.0 - 2.5' Sample Number: B

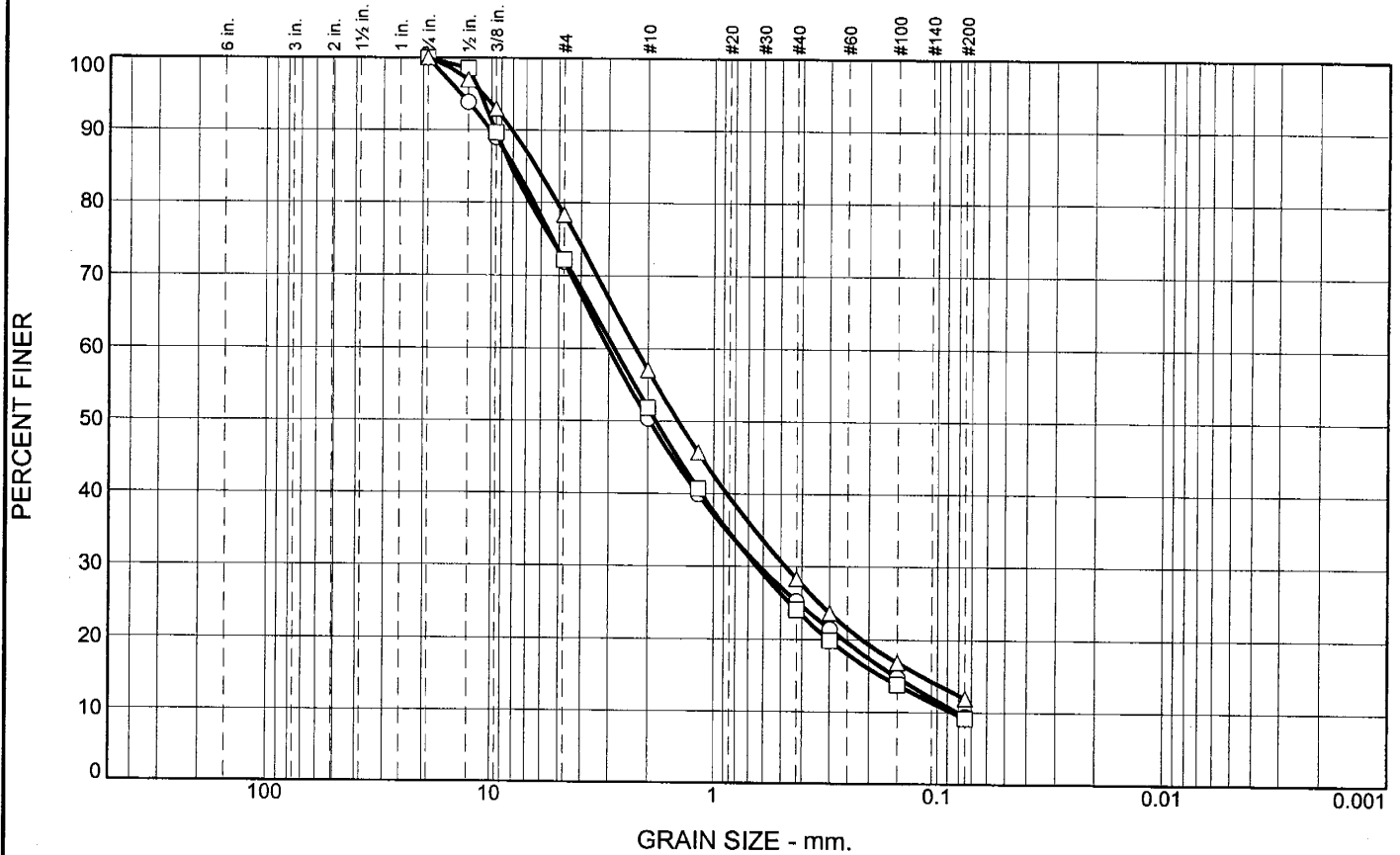
□ Source of Sample: NBA 2 Depth: 2.5 - 4.0' Sample Number: C

△ Source of Sample: NBA 2 Depth: 4.0 - 5.5' Sample Number: E

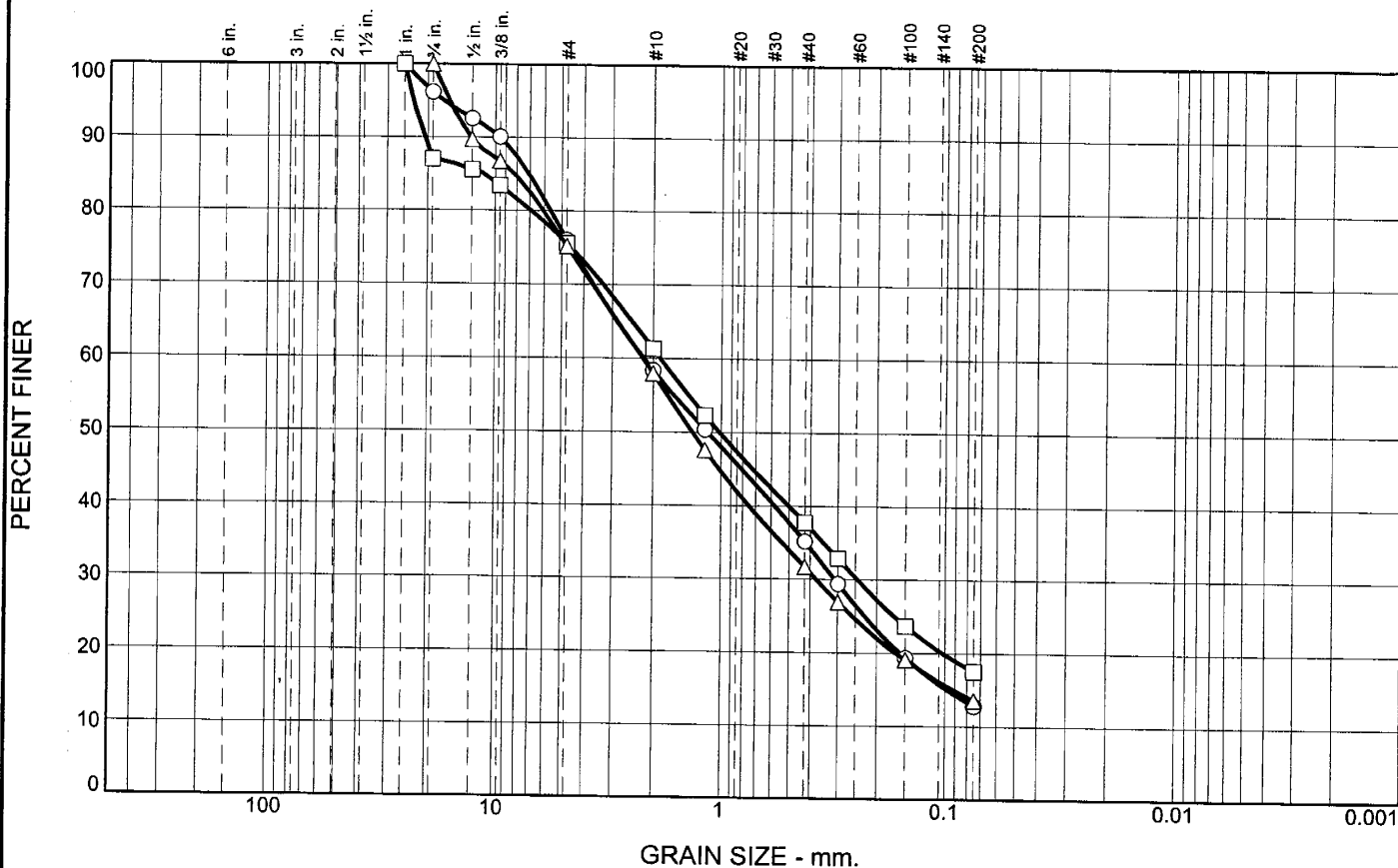
**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: A. Bafghi
Project: Boulder City Bypass
Project No.: EA 73307, FL-3-11

Particle Size Distribution Report



Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	24.0	63.2	12.8		SM	A-1-b	NP	29
□	0.0	24.4	58.1	17.5		SM	A-1-b	NP	23
△	0.0	24.8	61.6	13.6		SM	A-1-b	NP	21

SIEVE inches size	PERCENT FINER		
	○	□	△
1"	100.0	100.0	100.0
3/4"	96.2	87.0	100.0
1/2"	92.6	85.6	89.7
3/8"	90.1	83.4	86.8
GRAIN SIZE			
D60	2.1974	1.8605	2.2133
D30	0.3108	0.2453	0.3764
D10			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
	○	□	△
#4	76.0	75.6	75.2
#10	58.4	61.3	58.0
#16	50.4	52.3	47.6
#40	35.2	37.8	31.7
#50	29.4	32.9	26.9
#100	19.3	23.7	19.1
#200	12.8	17.5	13.6

Material Description

○ silty sand with gravel

□ silty sand with gravel

△ silty sand with gravel

REMARKS:

○

□

△

○ Source of Sample: NBA 2 Depth: 11.0 - 12.5' Sample Number: I

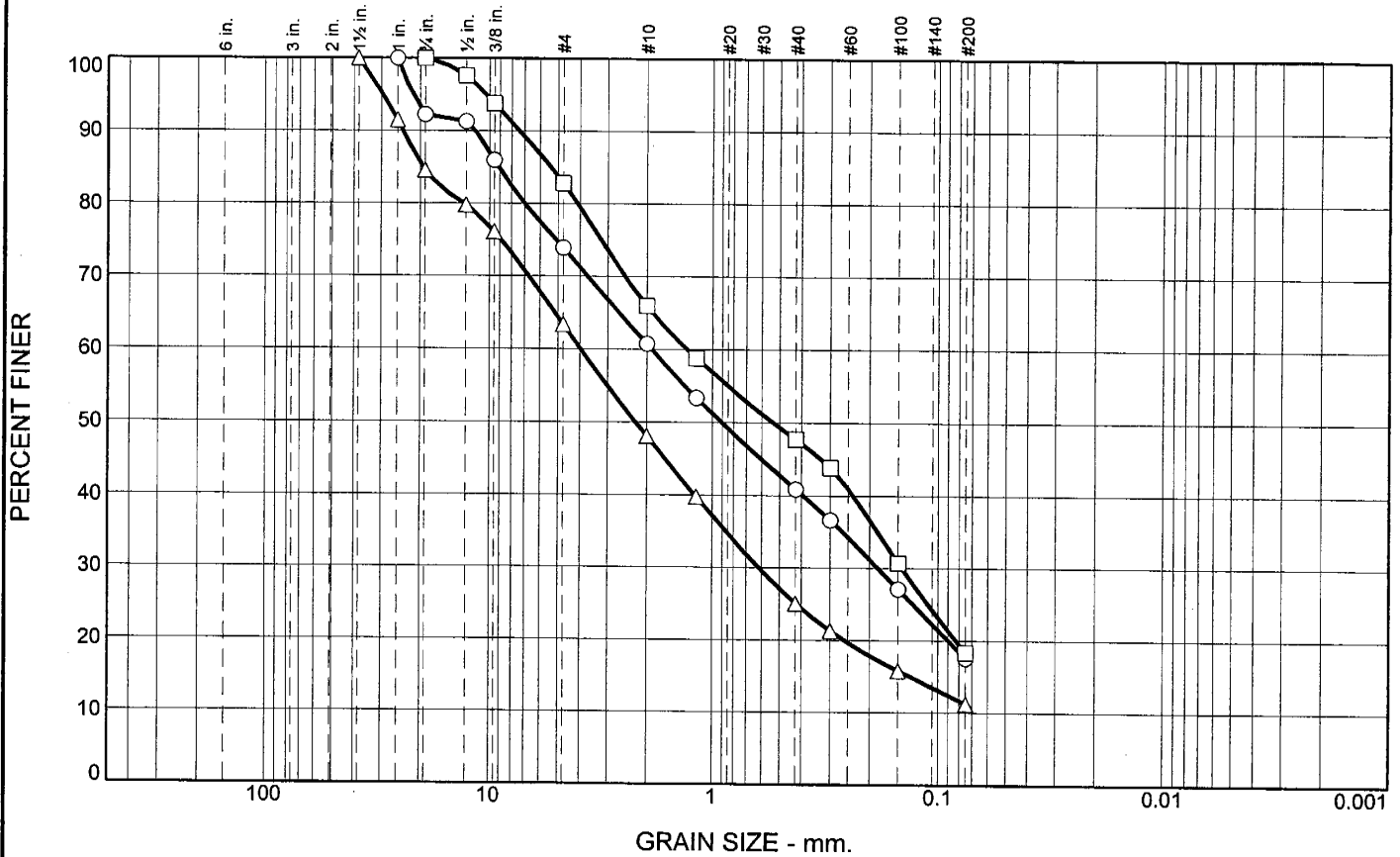
□ Source of Sample: NBA 2 Depth: 12.5 - 14.0' Sample Number: J

△ Source of Sample: NBA 2 Depth: 14.0 - 15.5' Sample Number: K

**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: A. Bafghi
Project: Boulder City Bypass
Project No.: EA 73307, FL-3-11

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	26.1	56.3	17.6		SM	A-1-b	NP	23
□	0.0	17.2	64.5	18.3		SM	A-1-b	NP	22
△	0.0	36.6	52.2	11.2		SP-SM	A-1-a	NP	19

SIEVE inches size	PERCENT FINER		
	○	□	△
1.5"			100.0
1"	100.0		91.5
3/4"	92.2	100.0	84.6
1/2"	91.3	97.6	79.8
3/8"	86.0	93.8	76.1
GRAIN SIZE			
D60	1.9040	1.3025	3.9704
D30	0.1838	0.1446	0.6162
D10			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
	○	□	△
#4	73.9	82.8	63.4
#10	60.7	65.9	48.1
#16	53.4	58.8	39.8
#40	40.9	47.7	25.1
#50	36.6	43.9	21.3
#100	27.1	30.7	15.8
#200	17.6	18.3	11.2

Material Description
○ silty sand with gravel
□ silty sand with gravel
△ poorly graded sand with silt and gravel

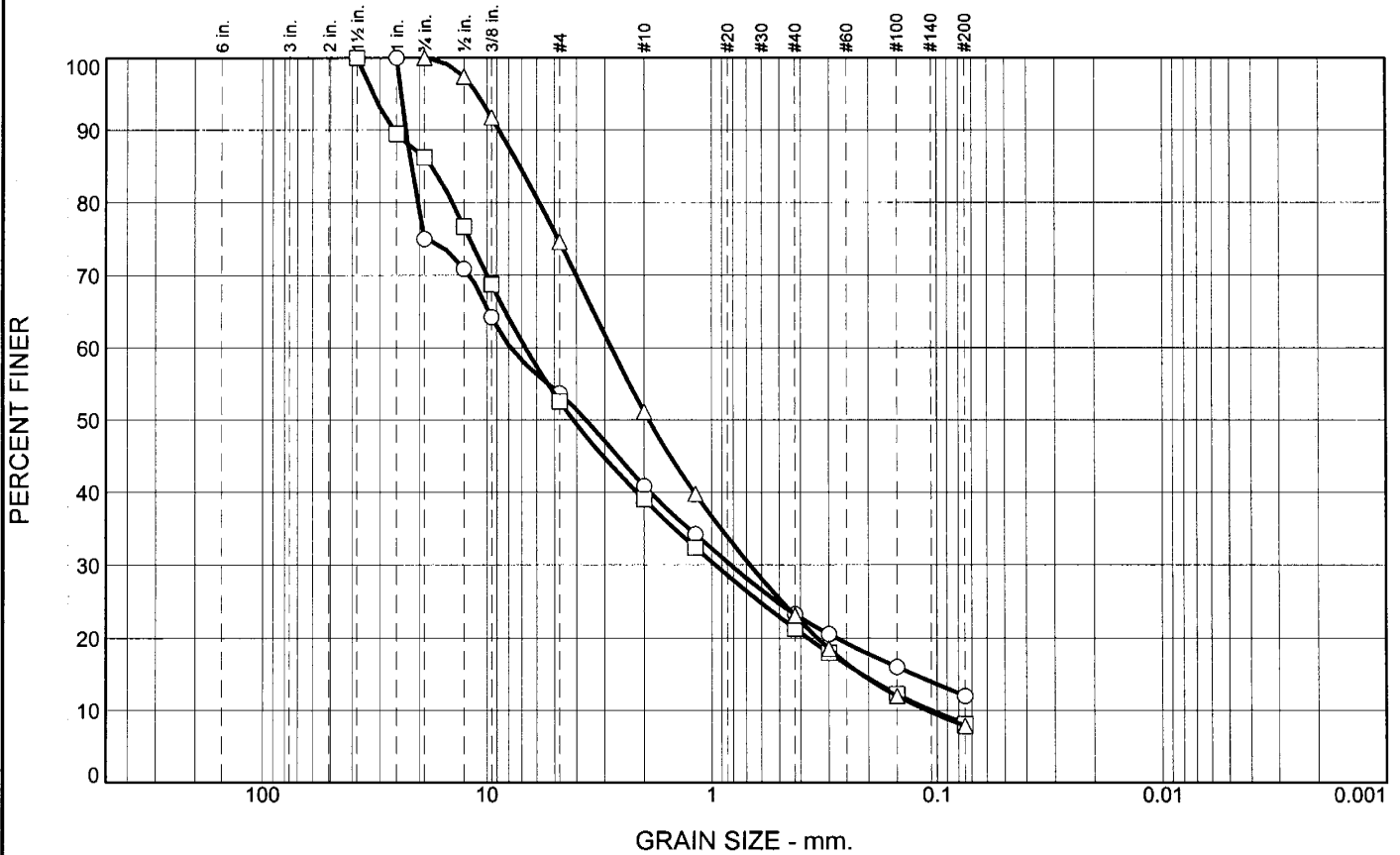
REMARKS:
○
□
△

○ Source of Sample: NBA 2 Depth: 15.5 - 17.0' Sample Number: L
 □ Source of Sample: NBA 2 Depth: 17.0 - 18.5' Sample Number: M
 △ Source of Sample: NBA 2 Depth: 18.5 - 20.0' Sample Number: N

**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: A. Bafghi
 Project: Boulder City Bypass
 Project No.: EA 73307, FL-3-11

Particle Size Distribution Report



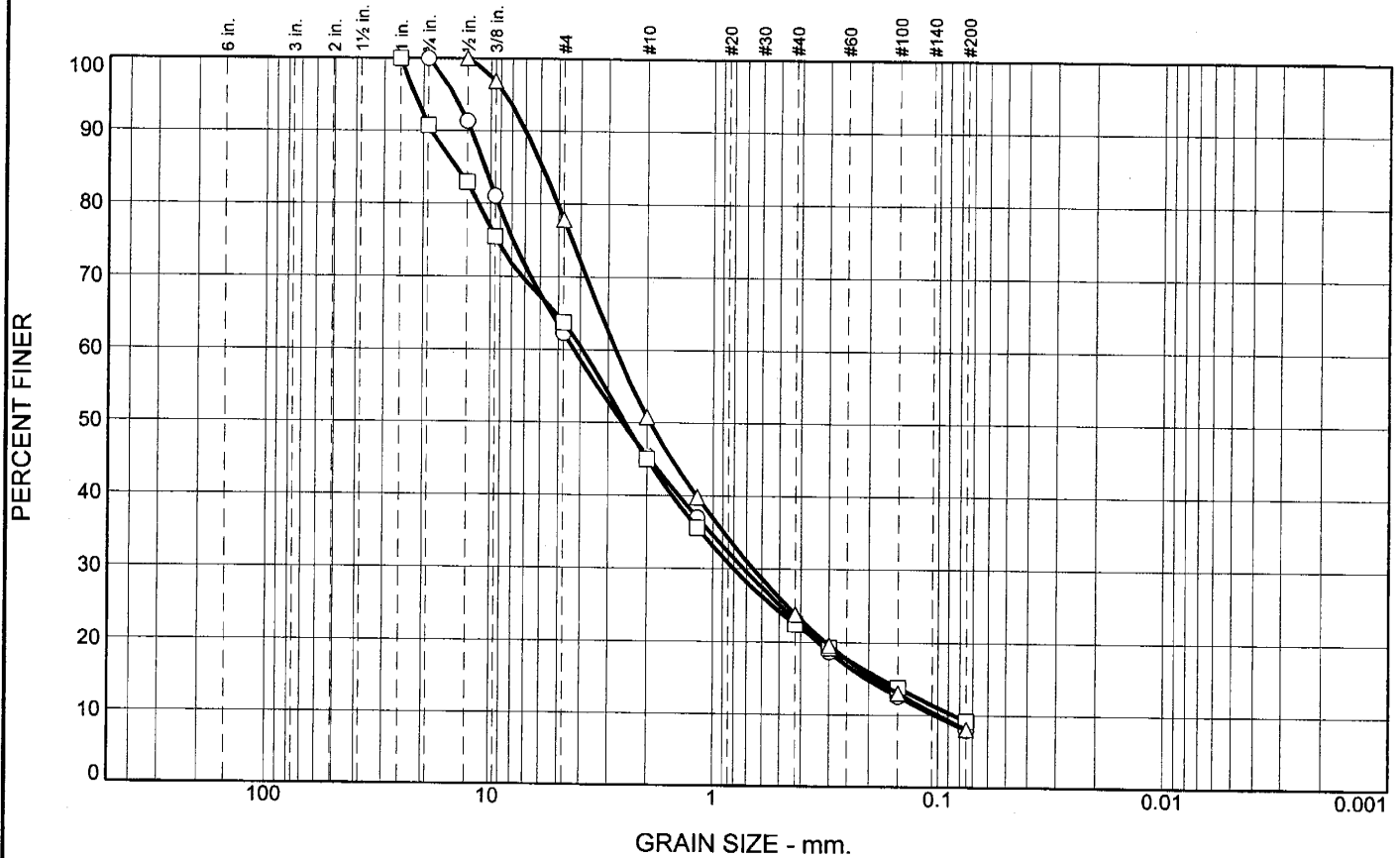
	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	46.3	41.7		12.0	GP-GM	A-1-a	NP	19
□	0.0	47.4	44.5		8.1	GP-GM			
△	0.0	25.4	66.7		7.9	SW-SM	A-1-b	NP	16

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER			Material Description
	○	□	△		○	□	△	
1.5"		100.0		#4	53.7	52.6	74.6	○ poorly graded gravel with silt and sand
1"	100.0	89.5		#10	40.9	39.1	51.1	□ poorly graded gravel with silt and sand
3/4"	75.0	86.2	100.0	#16	34.2	32.4	39.8	
1/2"	70.9	76.7	97.4	#40	23.3	21.3	23.1	△ well-graded sand with silt and gravel
3/8"	64.2	68.7	91.8	#50	20.5	18.0	18.5	
GRAIN SIZE				#100	16.0	12.2	12.0	
D ₆₀				#200	12.0	8.1	7.9	
D ₃₀								
D ₁₀								
COEFFICIENTS								
C _c								
C _u								

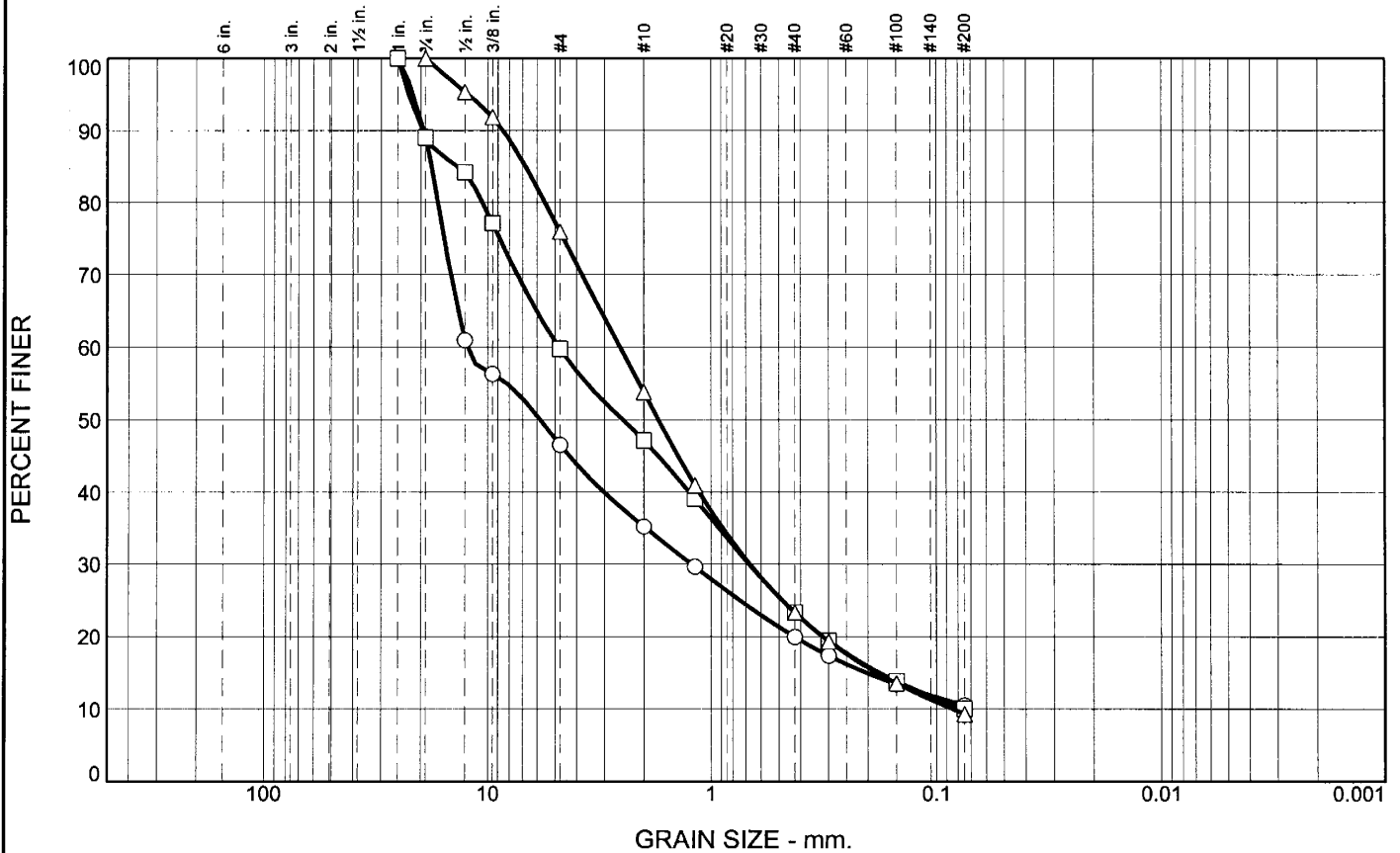
○ Source of Sample: NBA 2 Depth: 25.5 - 27.0' Sample Number: R
 □ Source of Sample: NBA 2 Depth: 27.0 - 28.5' Sample Number: S
 △ Source of Sample: NBA 2 Depth: 28.5 - 30.0' Sample Number: T

NEVADA DEPARTMENT OF TRANSPORTATION	Client: A. Bafghi Project: Boulder City Bypass Project No.: EA 73307, FL-3-11
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Particle Size Distribution Report



Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	53.5	36.0	10.5		GP-GM			
□	0.0	40.3	49.7	10.0		SW-SM			
△	0.0	24.1	66.6	9.3		SW-SM	A-1-b	NP	19

SIEVE inches size	PERCENT FINER		
	○	□	△
1"	100.0	100.0	
3/4"	89.2	89.0	100.0
1/2"	61.0	84.2	95.3
3/8"	56.3	77.1	91.9
GRAIN SIZE			
D ₆₀	12.3973	4.8131	2.5559
D ₃₀	1.2188	0.6765	0.6712
D ₁₀			0.0849
COEFFICIENTS			
C _c			2.08
C _u			30.10

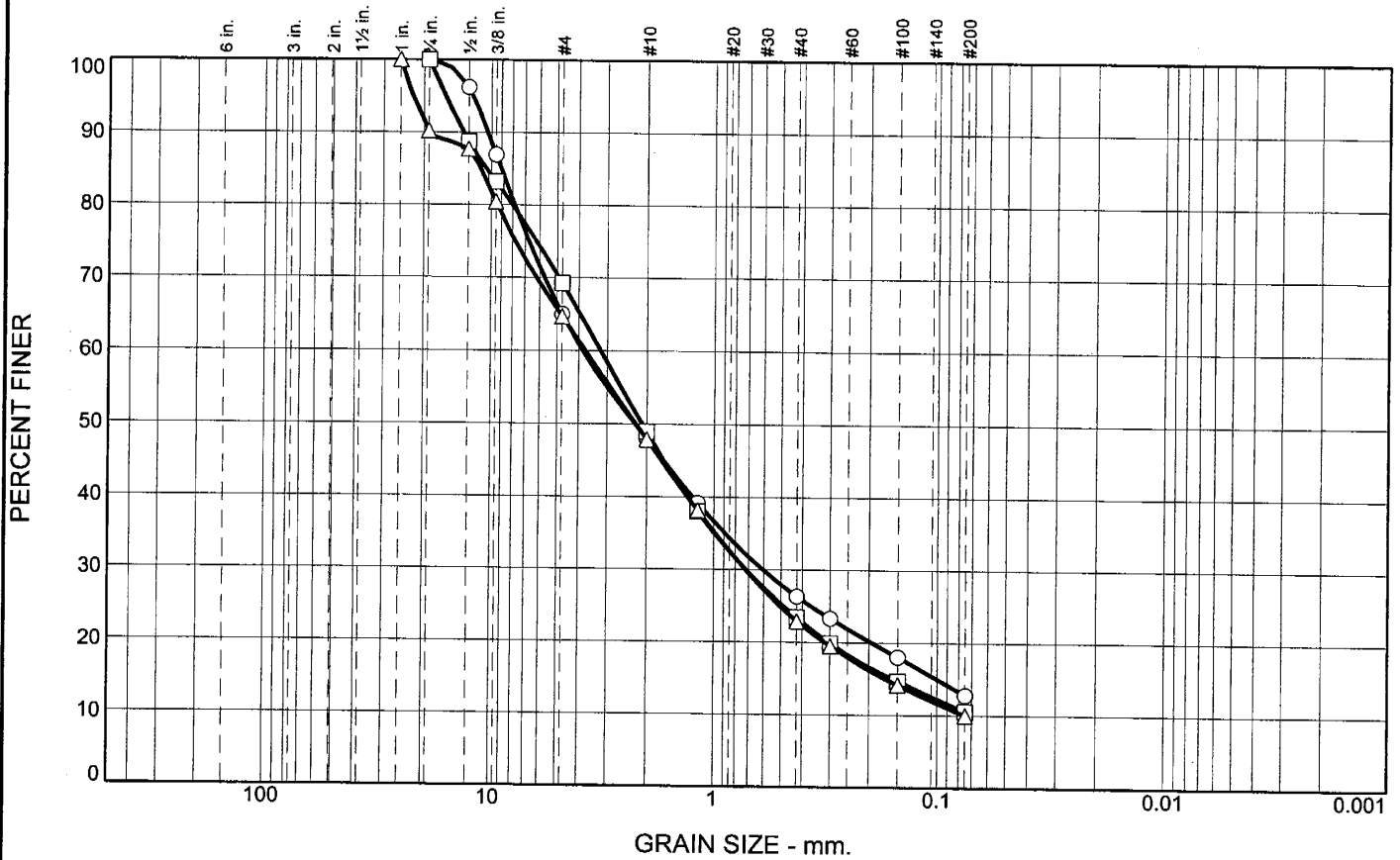
SIEVE number size	PERCENT FINER		
	○	□	△
#4	46.5	59.7	75.9
#10	35.3	47.1	53.8
#16	29.7	39.1	41.0
#40	19.9	23.3	23.3
#50	17.4	19.4	19.3
#100	13.4	13.8	13.5
#200	10.5	10.0	9.3

Material Description	
○	poorly graded gravel with silt and sand
□	well-graded sand with silt and gravel
△	well-graded sand with silt and gravel

REMARKS:	
○	
□	
△	

○ Source of Sample: NBA 2 Depth: 45.0 - 45.4' Sample Number: X
 □ Source of Sample: NBA 2 Depth: 50.0 - 50.5' Sample Number: Y
 △ Source of Sample: NBA 2 Depth: 55.0 - 56.5' Sample Number: Z

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	35.0	52.2	12.8		SM	A-1-a	NP	20
□	0.0	30.7	58.8	10.5		SP-SM	A-1-a	18	21
△	0.0	35.3	54.7	10.0		SP-SM	A-1-a	NP	19

SIEVE inches size	PERCENT FINER		
	○	□	△
1"			100.0
3/4"	100.0	100.0	90.2
1/2"	96.2	88.7	87.7
3/8"	86.9	83.2	80.4
GRAIN SIZE			
D ₆₀	3.8440	3.1962	3.7357
D ₃₀	0.6024	0.7183	0.7220
D ₁₀			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
	○	□	△
#4	65.0	69.3	64.7
#10	48.0	48.9	47.9
#16	39.2	38.0	38.2
#40	26.3	23.4	22.9
#50	23.3	19.9	19.5
#100	18.0	14.7	14.1
#200	12.8	10.5	10.0

Material Description

- silty sand with gravel
- poorly graded sand with silt and gravel
- △ poorly graded sand with silt and gravel

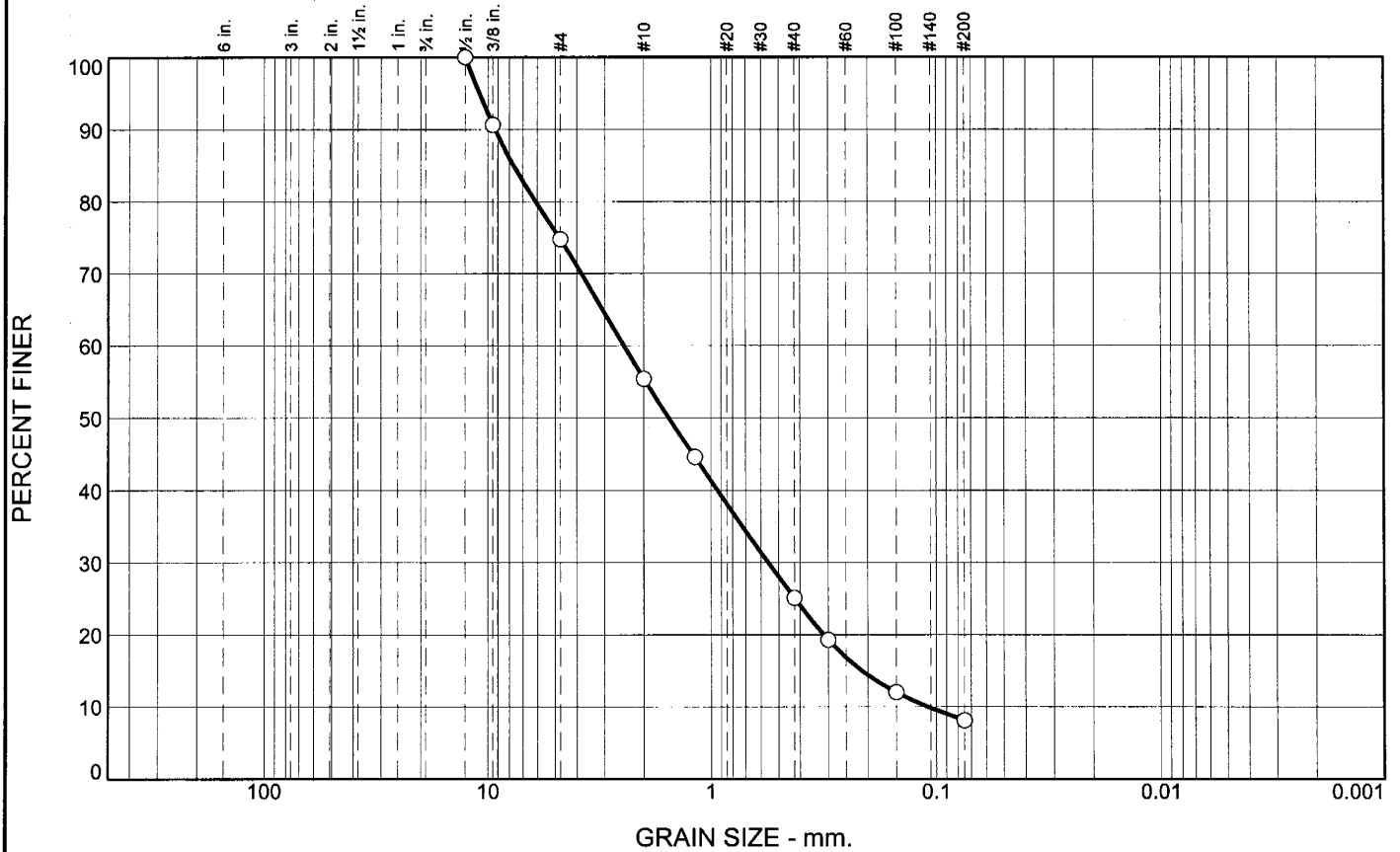
REMARKS:

○ Source of Sample: NBA 2 Depth: 60.0 - 60.9' Sample Number: AA
 □ Source of Sample: NBA 2 Depth: 65.0 - 66.0' Sample Number: BB
 △ Source of Sample: NBA 2 Depth: 75.0 - 75.9' Sample Number: DD

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Client: A. Bafghi
 Project: Boulder City Bypass
 Project No.: EA 73307, FL-3-11

Particle Size Distribution Report

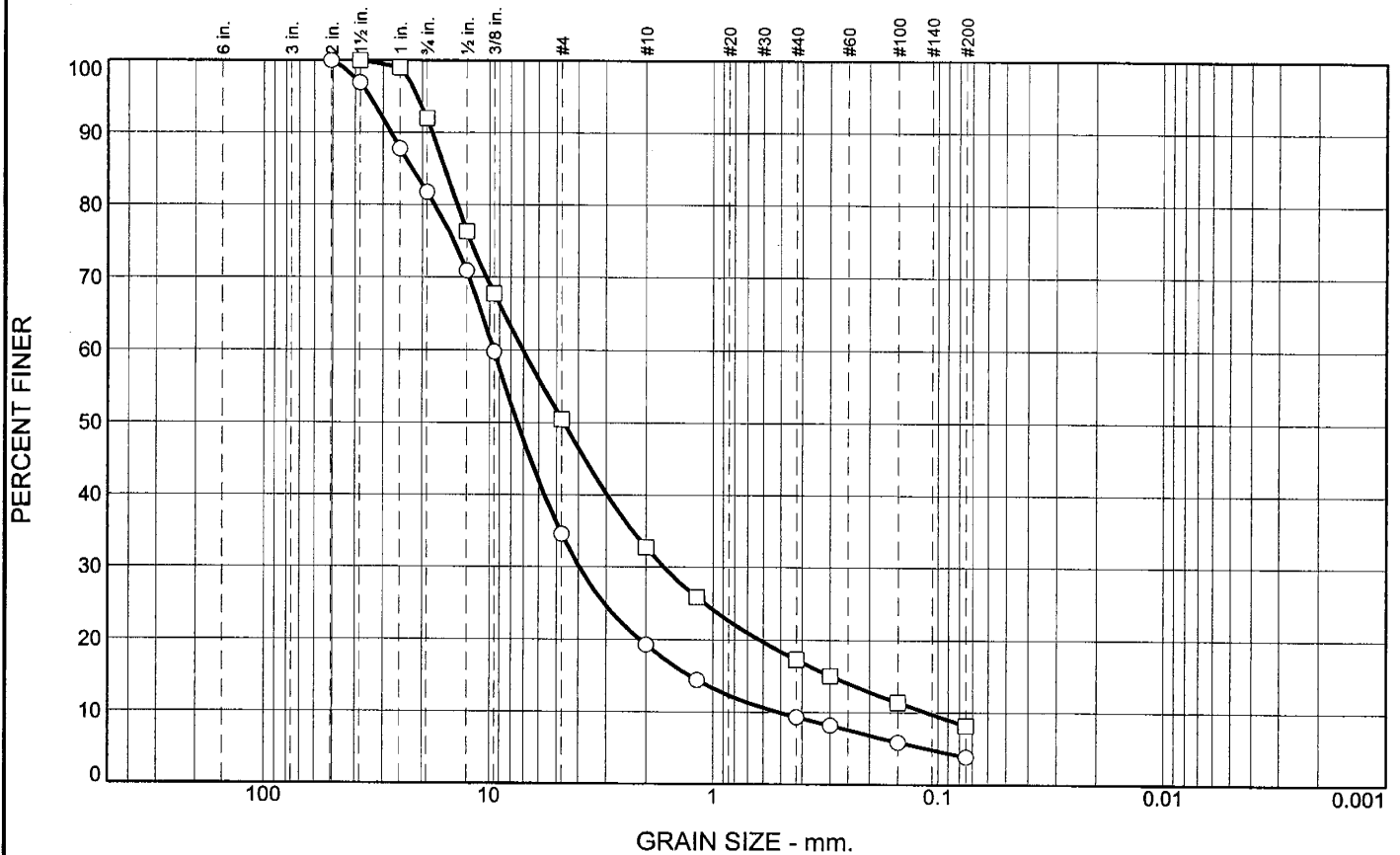


	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	25.2	66.7	8.1		SP-SM			

SIEVE	PERCENT FINER			SIEVE	PERCENT FINER			Material Description
inches size	○			number size	○			○ poorly graded sand with silt and gravel
1/2"	100.0			#4	74.8			REMARKS: ○
3/8"	90.7			#10	55.4			
GRAIN SIZE				#16	44.6			
				#40	25.1			
				#50	19.3			
				#100	12.0			
				#200	8.1			
COEFFICIENTS								
C _c	1.15							
C _u	22.63							

○ Source of Sample: NBA 2 Depth: 80.0 - 80.5' Sample Number: EE

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	65.4	30.7		3.9	GP	A-1-a	NP	19
□	0.0	49.5	42.3		8.2	GP-GM	A-1-a	22	23

SIEVE inches size	PERCENT FINER	
	○	□
2"	100.0	
1.5"	96.9	100.0
1"	87.8	99.0
3/4"	81.8	92.0
1/2"	70.9	76.3
3/8"	59.8	67.8
GRAIN SIZE		
D ₆₀	9.5789	7.0481
D ₃₀	3.9639	1.6637
D ₁₀	0.5120	0.1113
COEFFICIENTS		
C _c	3.20	3.53
C _u	18.71	63.35

SIEVE number size	PERCENT FINER	
	○	□
#4	34.6	50.5
#10	19.3	32.7
#16	14.4	25.9
#40	9.3	17.3
#50	8.2	15.1
#100	5.9	11.4
#200	3.9	8.2

Material Description

○ poorly graded gravel with sand

□ poorly graded gravel with silt and sand

REMARKS:

○

□

○ Source of Sample: SBA 1 Depth: 0.0 - 5.0' Sample Number: BULK 1

□ Source of Sample: SBA 1 Depth: 5.0 - 10.0' Sample Number: BULK 2

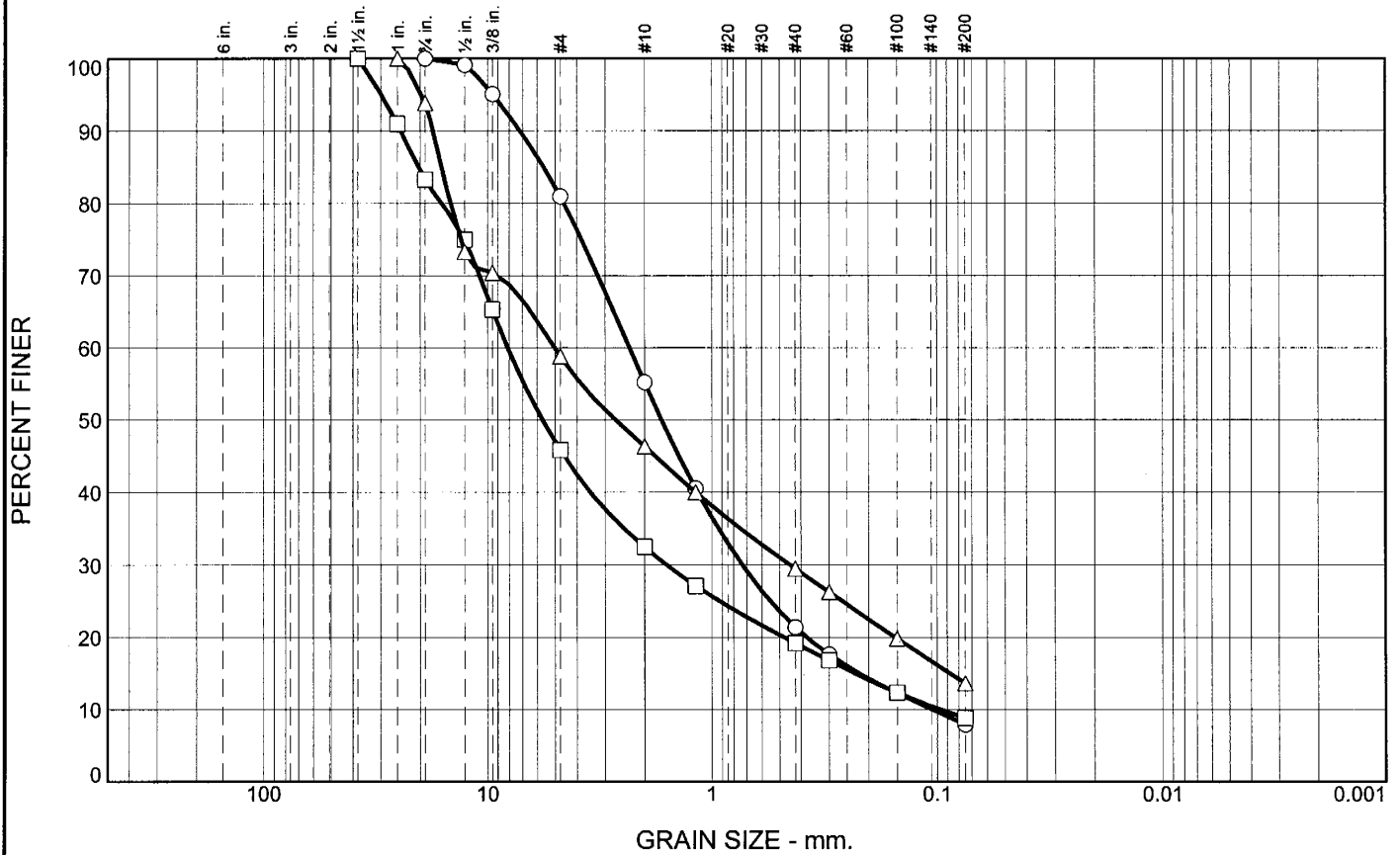
**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: A. Bafghi
Project: Boulder City Bypass

Project No.: EA 73307, FL-3-11

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	19.0	73.1	7.9		SP-SM			
□	0.0	54.2	37.0	8.8		GP-GM			
△	0.0	41.2	45.2	13.6		SM	A-1-a	NP	24

SIEVE inches size	PERCENT FINER		
	○	□	△
1.5"		100.0	
1"		91.0	100.0
3/4"	100.0	83.3	93.9
1/2"	99.1	75.0	73.3
3/8"	95.1	65.3	70.4
GRAIN SIZE			
D ₆₀	2.3361	8.1359	5.0383
D ₃₀	0.7317	1.5862	0.4479
D ₁₀	0.1050	0.0962	
COEFFICIENTS			
C _c	2.18	3.21	
C _u	22.24	84.58	

SIEVE number size	PERCENT FINER		
	○	□	△
#4	81.0	45.8	58.8
#10	55.2	32.5	46.3
#16	40.5	27.1	40.0
#40	21.4	19.2	29.5
#50	17.6	16.8	26.3
#100	12.3	12.3	19.8
#200	7.9	8.8	13.6

Material Description
○ poorly graded sand with silt and gravel
□ poorly graded gravel with silt and sand
△ silty sand with gravel

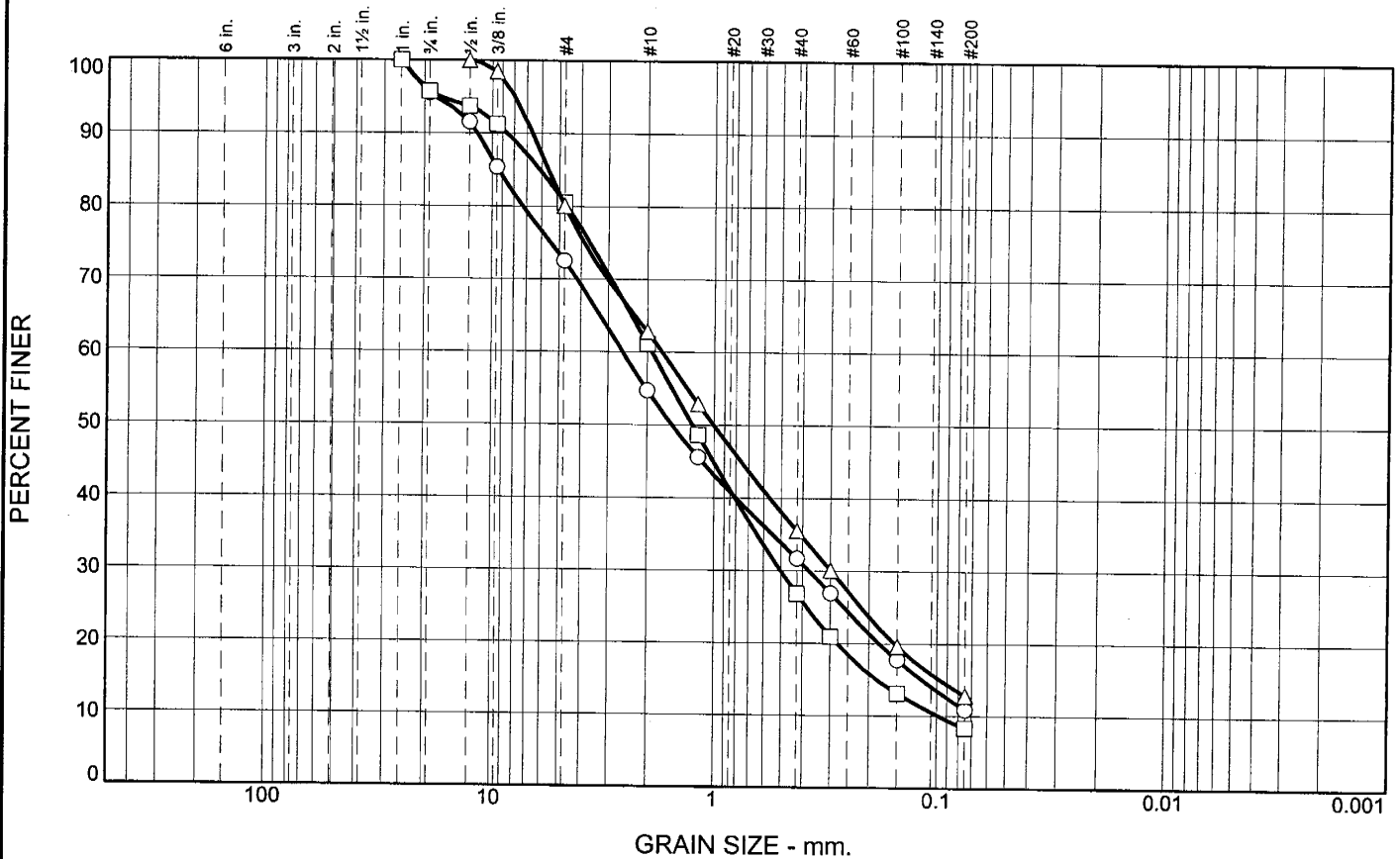
REMARKS:
○
□
△

○ Source of Sample: SBA 1 Depth: 1.0 - 2.5' Sample Number: A
 □ Source of Sample: SBA 1 Depth: 3.5 - 5.0' Sample Number: B
 △ Source of Sample: SBA 1 Depth: 6.0 - 7.5' Sample Number: C

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 Project: Boulder City Bypass
 Project No.: EA 73307, FL-3-11

Particle Size Distribution Report

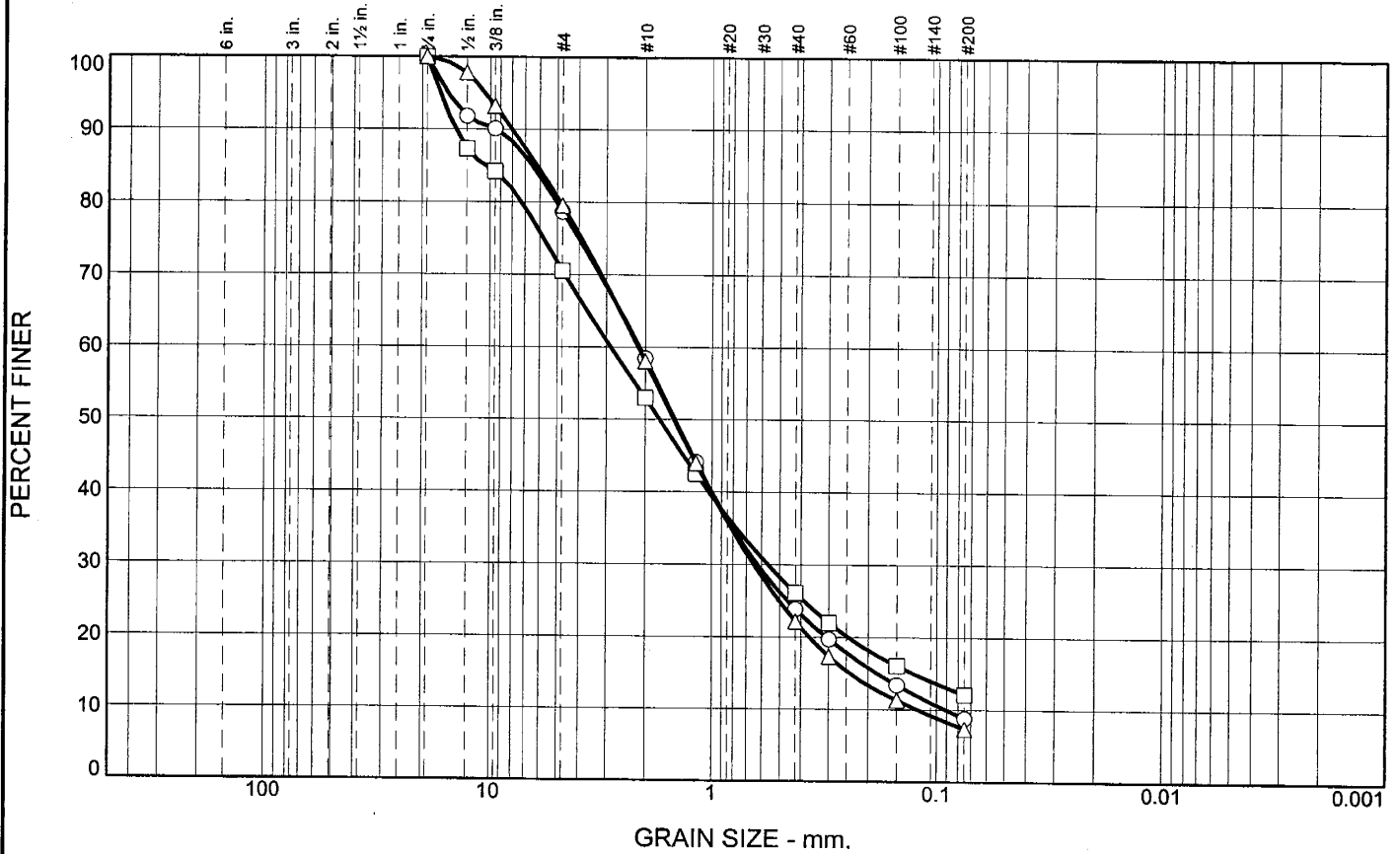


	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	27.4	61.7	10.9		SP-SM	A-1-b	NP	20
□	0.0	19.5	72.2	8.3		SW-SM	A-1-b	NP	21
△	0.0	19.9	67.3	12.8		SM	A-1-b	NP	23

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER			Material Description
	○	□	△		○	□	△	
1"	100.0	100.0		#4	72.6	80.5	80.1	○ poorly graded sand with silt and gravel
3/4"	95.5	95.7		#10	54.7	61.1	62.8	
1/2"	91.6	93.7	100.0	#16	45.6	48.6	52.9	□ well-graded sand with silt and gravel
3/8"	85.4	91.2	98.4	#40	31.7	26.9	35.6	
				#50	27.0	21.0	30.1	△ silty sand with gravel
				#100	17.7	13.1	19.6	
				#200	10.9	8.3	12.8	
GRAIN SIZE								
D ₆₀	2.5853	1.9081	1.7175					
D ₃₀	0.3736	0.5010	0.2977					
D ₁₀		0.0980						
COEFFICIENTS								
C _c		1.34						
C _u		19.48						
REMARKS:								
○								
□								
△								

○ Source of Sample: SBA 1 Depth: 8.5 - 10.0' Sample Number: D
 □ Source of Sample: SBA 1 Depth: 11.0 - 12.5' Sample Number: E
 △ Source of Sample: SBA 1 Depth: 13.5 - 15.0' Sample Number: F

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	21.3	69.9	8.8		SW-SM	A-1-b	NP	20
□	0.0	29.4	58.5	12.1		SM	A-1-b	NP	23
△	0.0	20.5	72.1	7.4		SW-SM	A-1-b	NP	22

SIEVE inches size	PERCENT FINER		
	○	□	△
3/4"	100.0	100.0	100.0
1/2"	91.8	87.3	97.8
3/8"	90.1	84.2	93.2
GRAIN SIZE			
D60	2.1210	2.8642	2.1495
D30	0.6243	0.5620	0.6489
D10	0.0908		0.1213
COEFFICIENTS			
C _c	2.02		1.61
C _u	23.36		17.71

SIEVE number size	PERCENT FINER		
	○	□	△
#4	78.7	70.6	79.5
#10	58.5	53.0	58.1
#16	44.1	42.5	44.0
#40	23.9	26.1	22.2
#50	19.7	22.0	17.3
#100	13.4	16.1	11.3
#200	8.8	12.1	7.4

Material Description
○ well-graded sand with silt and gravel
□ silty sand with gravel
△ well-graded sand with silt and gravel

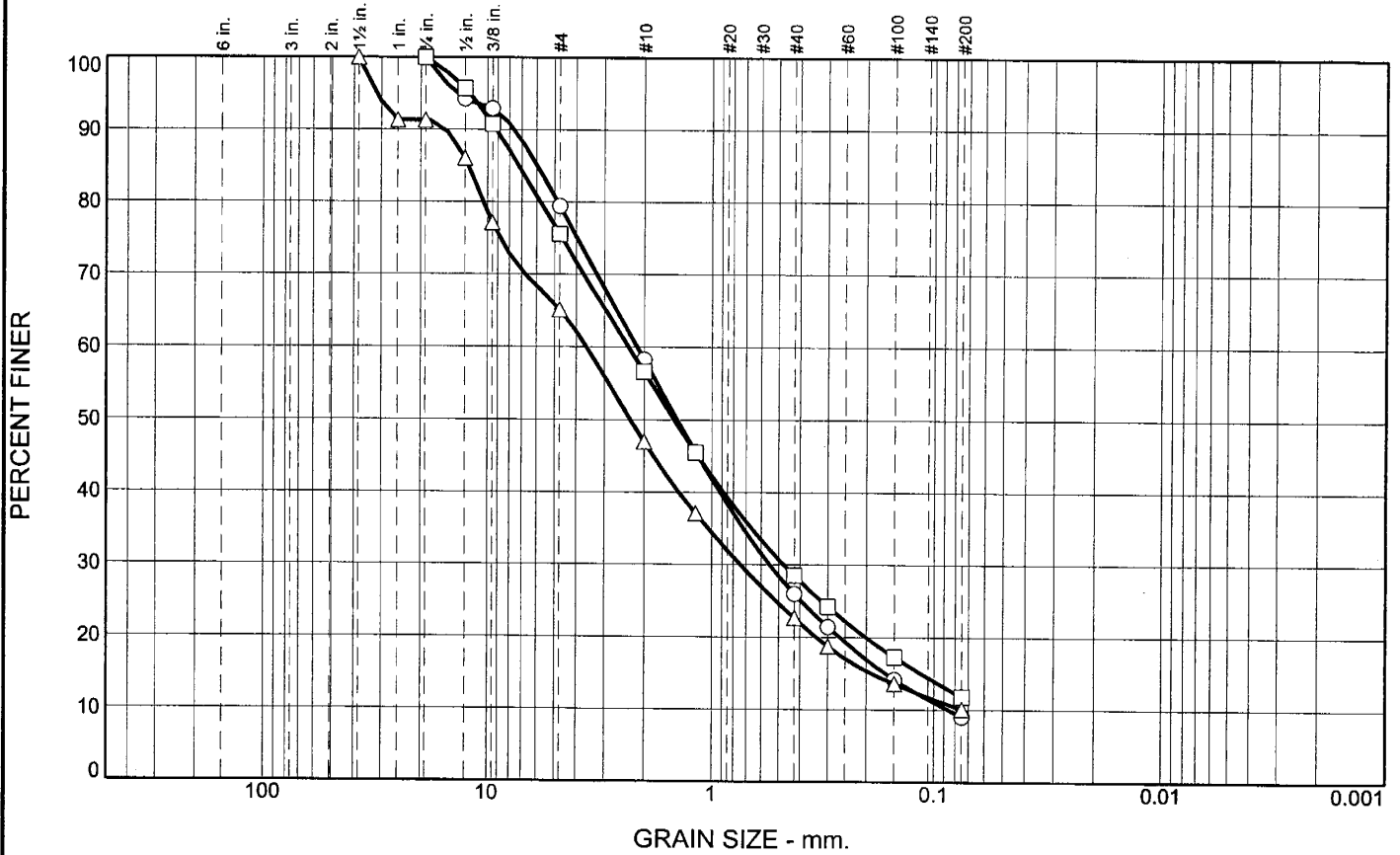
REMARKS:
○
□
△

- Source of Sample: SBA 1 Depth: 16.0 - 17.5' Sample Number: G
- Source of Sample: SBA 1 Depth: 18.5 - 20.0' Sample Number: H
- △ Source of Sample: SBA 1 Depth: 21.0 - 22.5' Sample Number: I

**NEVADA
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Client: A. Bafghi
Project: Boulder City Bypass
Project No.: EA 73307, FL-3-11

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	20.6	70.3		9.1	SW-SM	A-1-b	NP	19
□	0.0	24.5	63.7		11.8	SP-SM	A-1-b	NP	17
△	0.0	34.9	55.0		10.1	SP-SM	A-1-a	NP	19

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER			Material Description
	○	□	△		○	□	△	
1.5"			100.0	#4	79.4	75.5	65.1	○ well-graded sand with silt and gravel
1"			91.3	#10	58.3	56.6	47.0	
3/4"	100.0	100.0	91.3	#16	45.6	45.5	37.1	□ poorly graded sand with silt and gravel
1/2"	94.2	95.7	86.1	#40	26.0	28.5	22.7	△ poorly graded sand with silt and gravel
3/8"	92.9	90.8	77.1	#50	21.5	24.2	18.7	
				#100	14.2	17.3	13.6	
				#200	9.1	11.8	10.1	
GRAIN SIZE								
D60	2.1458	2.3391	3.6001					
D30	0.5479	0.4732	0.7433					
D10	0.0859							
COEFFICIENTS								
C _c	1.63							
C _u	24.99							

REMARKS:

○

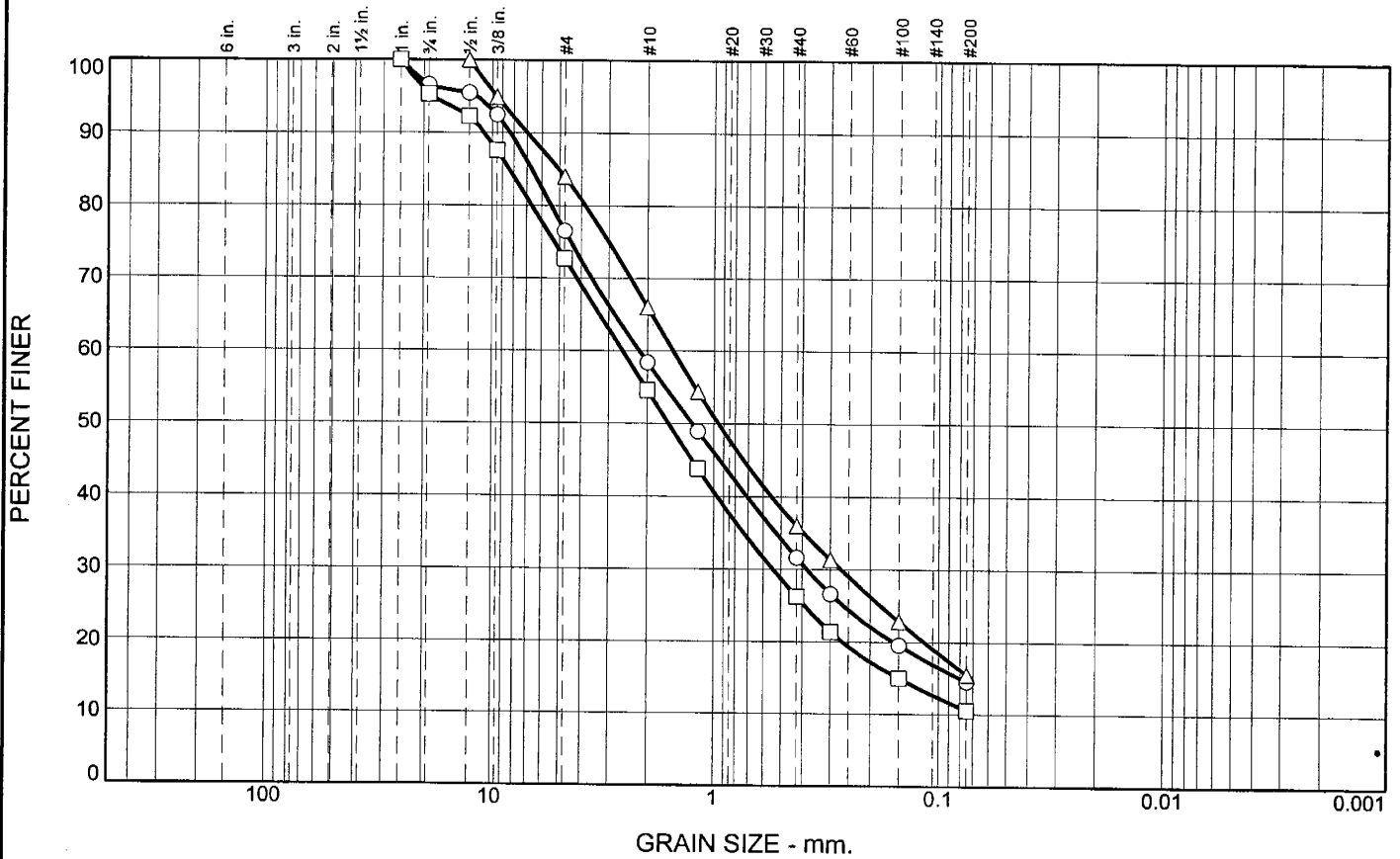
□

△

- Source of Sample: SBA 1 Depth: 23.5 - 25.0' Sample Number: J
- Source of Sample: SBA 1 Depth: 26.0 - 27.5' Sample Number: K
- △ Source of Sample: SBA 1 Depth: 28.5 - 30.0' Sample Number: L

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	23.5	62.0		14.5	SM	A-1-b	NP	18
□	0.0	27.3	62.2		10.5	SP-SM	A-1-b	NP	20
△	0.0	16.0	68.5		15.5	SM	A-1-b	NP	23

SIEVE inches size	PERCENT FINER		
	○	□	△
1"	100.0	100.0	
3/4"	96.6	95.3	
1/2"	95.5	92.3	100.0
3/8"	92.5	87.6	94.9
GRAIN SIZE			
D ₆₀	2.1798	2.5949	1.5284
D ₃₀	0.3812	0.5410	0.2698
D ₁₀			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
	○	□	△
#4	76.5	72.7	84.0
#10	58.4	54.6	66.1
#16	49.0	43.8	54.4
#40	31.7	26.3	36.0
#50	26.6	21.4	31.4
#100	19.5	15.0	22.9
#200	14.5	10.5	15.5

Material Description
○ silty sand with gravel
□ poorly graded sand with silt and gravel
△ silty sand with gravel

REMARKS:
○
□
△

○ Source of Sample: SBA 1 Depth: 31.0 - 32.5' Sample Number: M
 □ Source of Sample: SBA 1 Depth: 34.5 - 36.0' Sample Number: N
 △ Source of Sample: SBA 1 Depth: 39.5 - 41.0' Sample Number: O

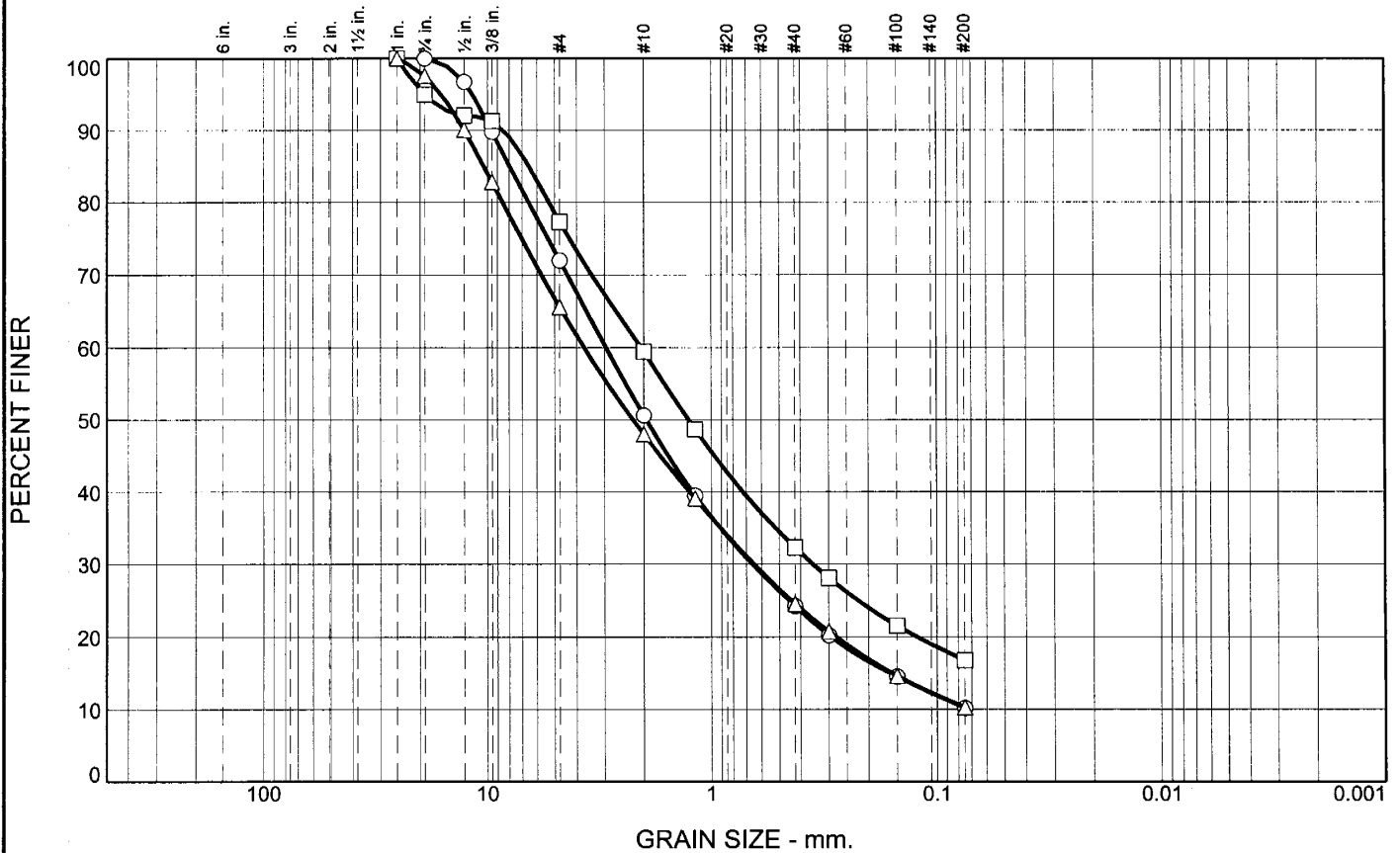
**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: A. Bafghi
Project: Boulder City Bypass

Project No.: EA 73307, FL-3-11

Figure

Particle Size Distribution Report

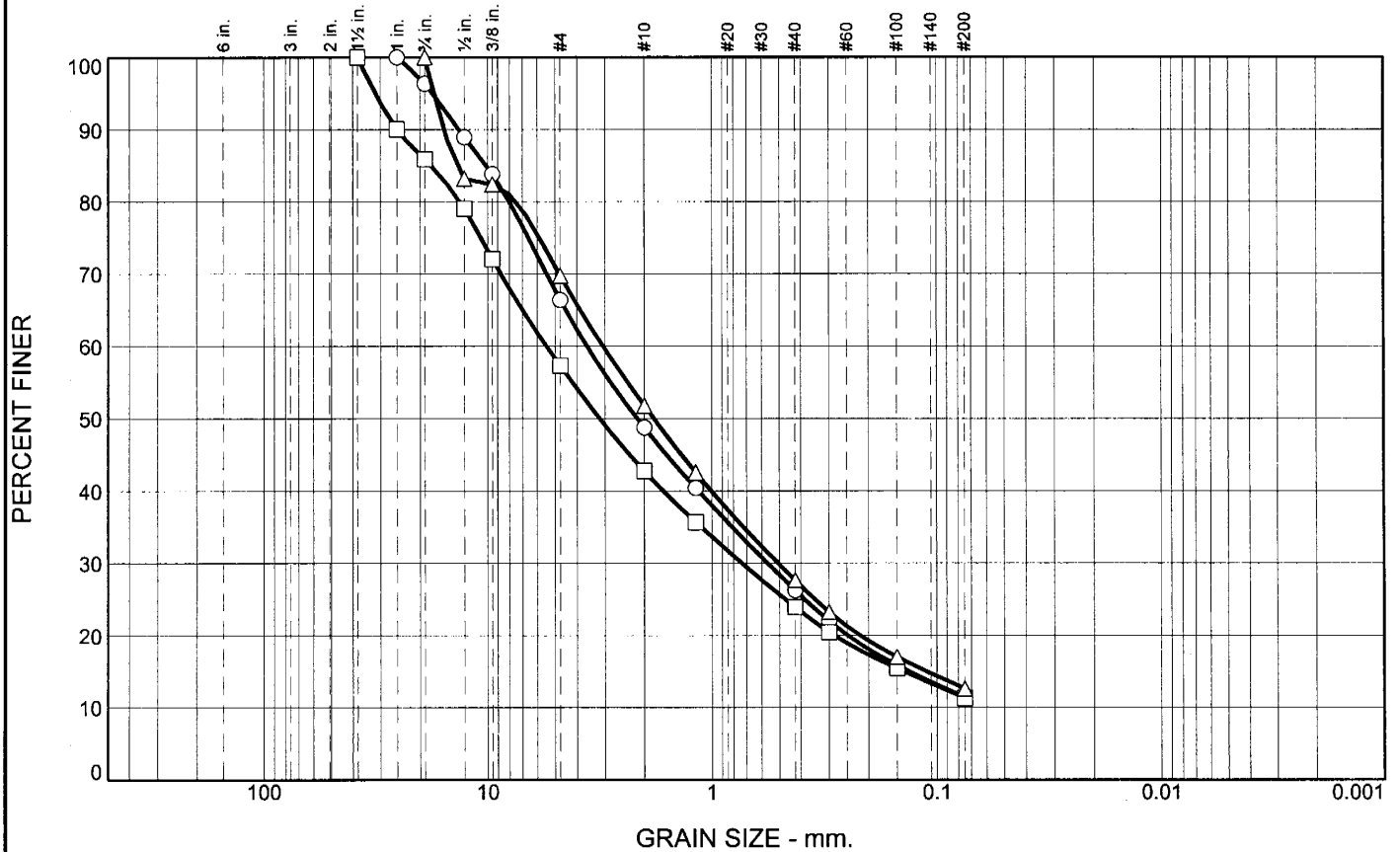


	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	28.0	61.8		10.2	SP-SM	A-1-b	NP	19
□	0.0	22.7	60.5		16.8	SM			
△	0.0	34.4	55.3		10.3	SP-SM	A-1-a	NP	19

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER			Material Description
	○	□	△		○	□	△	
1"		100.0	100.0	#4	72.0	77.3	65.6	○ poorly graded sand with silt and gravel
3/4"	100.0	95.0	97.6	#10	50.6	59.4	48.0	□ silty sand with gravel
1/2"	96.7	92.1	90.0	#16	39.5	48.7	39.1	△ poorly graded sand with silt and gravel
3/8"	89.8	91.3	82.8	#40	24.2	32.3	24.6	
				#50	20.2	28.1	20.7	
				#100	14.5	21.5	14.6	
				#200	10.2	16.8	10.3	
GRAIN SIZE								
D60	2.9512	2.0594	3.6983					
D30	0.6580	0.3534	0.6474					
D10								
COEFFICIENTS								
C _c								
C _u								
REMARKS:								
○								
□								
△								

○ Source of Sample: SBA 1 Depth: 44.5 - 46.0' Sample Number: P
 □ Source of Sample: SBA 1 Depth: 49.5 - 49.7' Sample Number: Q
 △ Source of Sample: SBA 1 Depth: 54.5 - 56.0' Sample Number: R

Particle Size Distribution Report



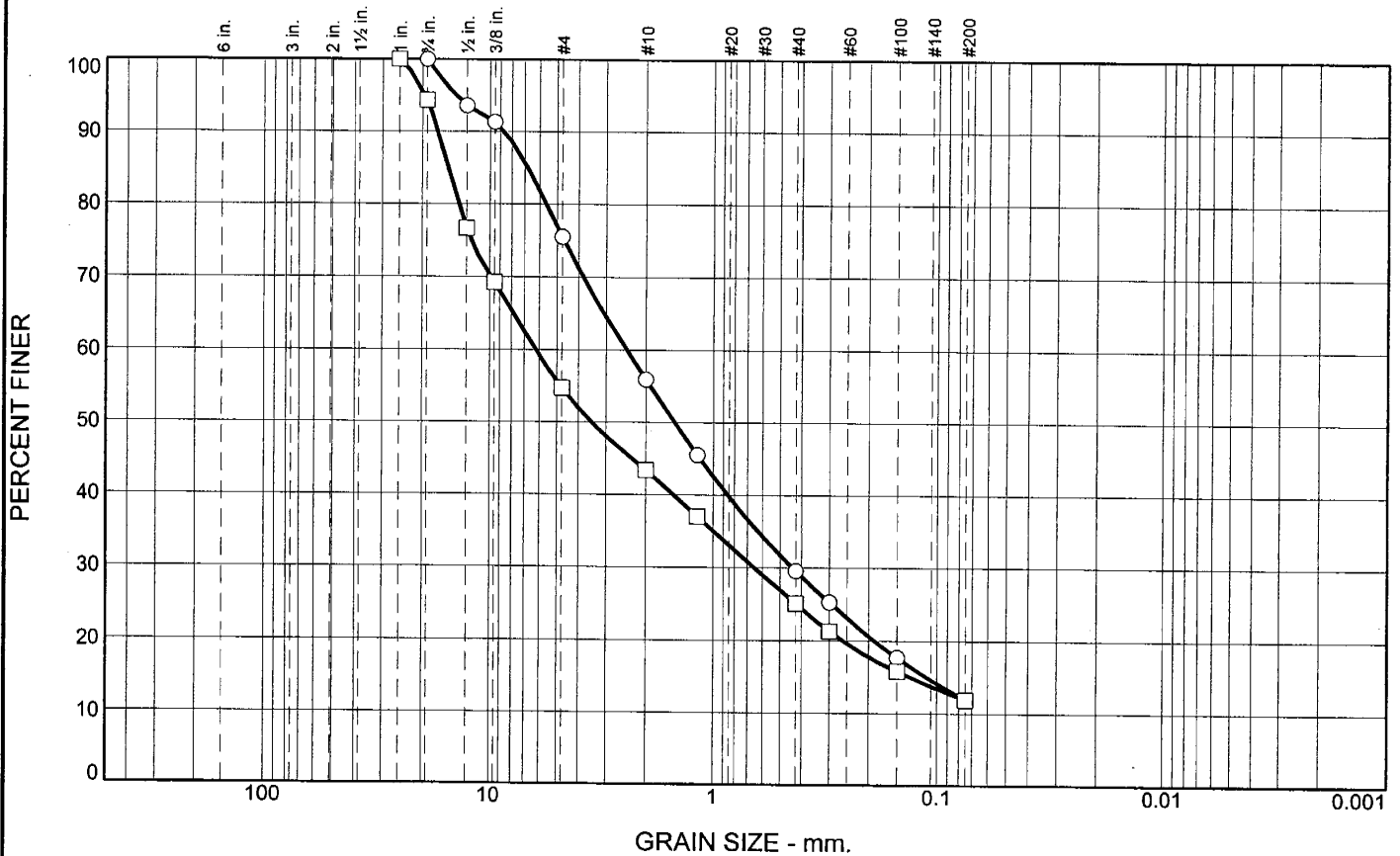
	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	33.6	55.0	11.4		SP-SM	A-1-a	20	22
□	0.0	42.7	46.0	11.3		SP-SM			
△	0.0	30.3	57.1	12.6		SM			

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER			Material Description
	○	□	△		○	□	△	
1.5"		100.0		#4	66.4	57.3	69.7	○ poorly graded sand with silt and gravel
1"	100.0	90.0		#10	48.8	42.8	51.8	
3/4"	96.3	85.9	100.0	#16	40.4	35.7	42.6	□ poorly graded sand with silt and gravel
1/2"	89.0	79.0	83.2	#40	26.3	23.9	27.6	
3/8"	83.9	72.1	82.4	#50	22.0	20.4	23.2	△ silty sand with gravel
				#100	15.9	15.4	17.0	
				#200	11.4	11.3	12.6	
GRAIN SIZE								
D60	3.6187	5.4720	3.0655					
D30	0.5636	0.7343	0.5060					
D10								
COEFFICIENTS								
C _c								
C _u								

○ Source of Sample: SBA 1 Depth: 59.5 - 61.2' Sample Number: S
 □ Source of Sample: SBA 1 Depth: 64.5 - 65.0' Sample Number: T
 △ Source of Sample: SBA 1 Depth: 69.5 - 70.1' Sample Number: U

NEVADA DEPARTMENT OF TRANSPORTATION	Client: A. Bafghi Project: Boulder City Bypass Project No.: EA 73307, FL-3-11
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Particle Size Distribution Report

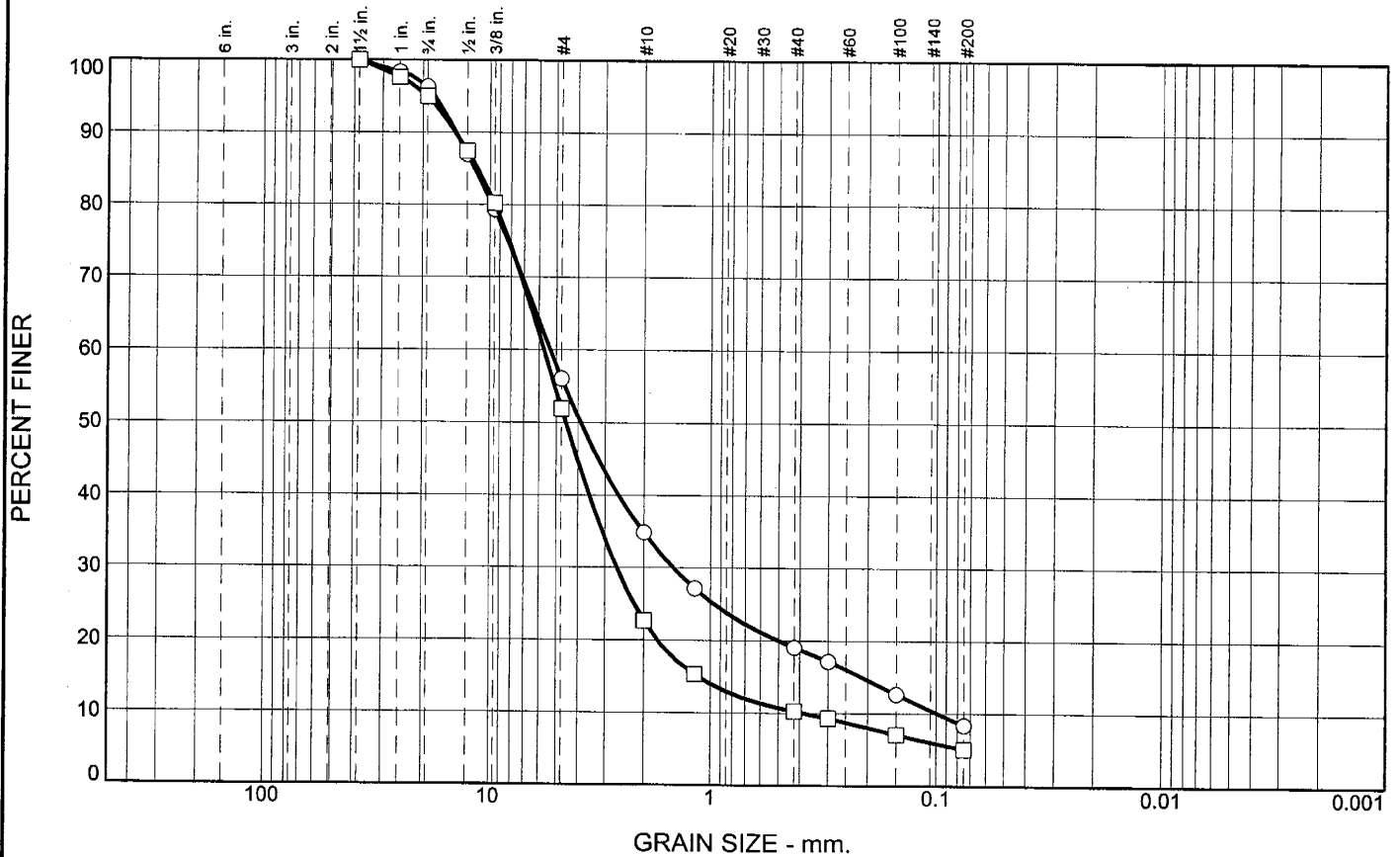


	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	24.4	63.7		11.9	SP-SM	A-1-b	NP	20
□	0.0	45.3	42.8		11.9	GP-GM	A-1-a	21	24

SIEVE inches size	PERCENT FINER		SIEVE number size	PERCENT FINER		Material Description
	○	□		○	□	
1"		100.0	#4	75.6	54.7	○ poorly graded sand with silt and gravel □ poorly graded gravel with silt and sand
3/4"	100.0	94.3	#10	56.0	43.4	
1/2"	93.6	76.7	#16	45.5	37.0	REMARKS: ○ □
3/8"	91.3	69.3	#40	29.6	25.1	
GRAIN SIZE						
D60	2.4288	6.2097	#50	25.3	21.3	
D30	0.4383	0.6511	#100	17.7	15.8	
D10			#200	11.9	11.9	
COEFFICIENTS						
C _c						
C _u						

○ Source of Sample: SBA 1 Depth: 74.5 - 75.2' Sample Number: V
 □ Source of Sample: SBA 1 Depth: 79.5 - 80.5' Sample Number: W

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	44.0	47.6		8.4	SP-SM	A-1-a	NP	20
□	0.0	48.1	46.8		5.1	GP-GM	A-1-a	NP	19

SIEVE inches size	PERCENT FINER	
	○	□
1.5"	100.0	100.0
1"	98.3	97.6
3/4"	96.3	95.0
1/2"	87.0	87.4
3/8"	79.3	80.2
GRAIN SIZE		
D60	5.3500	5.7035
D30	1.4713	2.6477
D10	0.0983	0.3884
COEFFICIENTS		
C _c	4.12	3.16
C _u	54.42	14.68

SIEVE number size	PERCENT FINER	
	○	□
#4	56.0	51.9
#10	34.9	22.7
#16	27.2	15.3
#40	19.1	10.2
#50	17.2	9.3
#100	12.6	7.1
#200	8.4	5.1

Material Description

○ poorly graded sand with silt and gravel

□ poorly graded gravel with silt and sand

REMARKS:

○

□

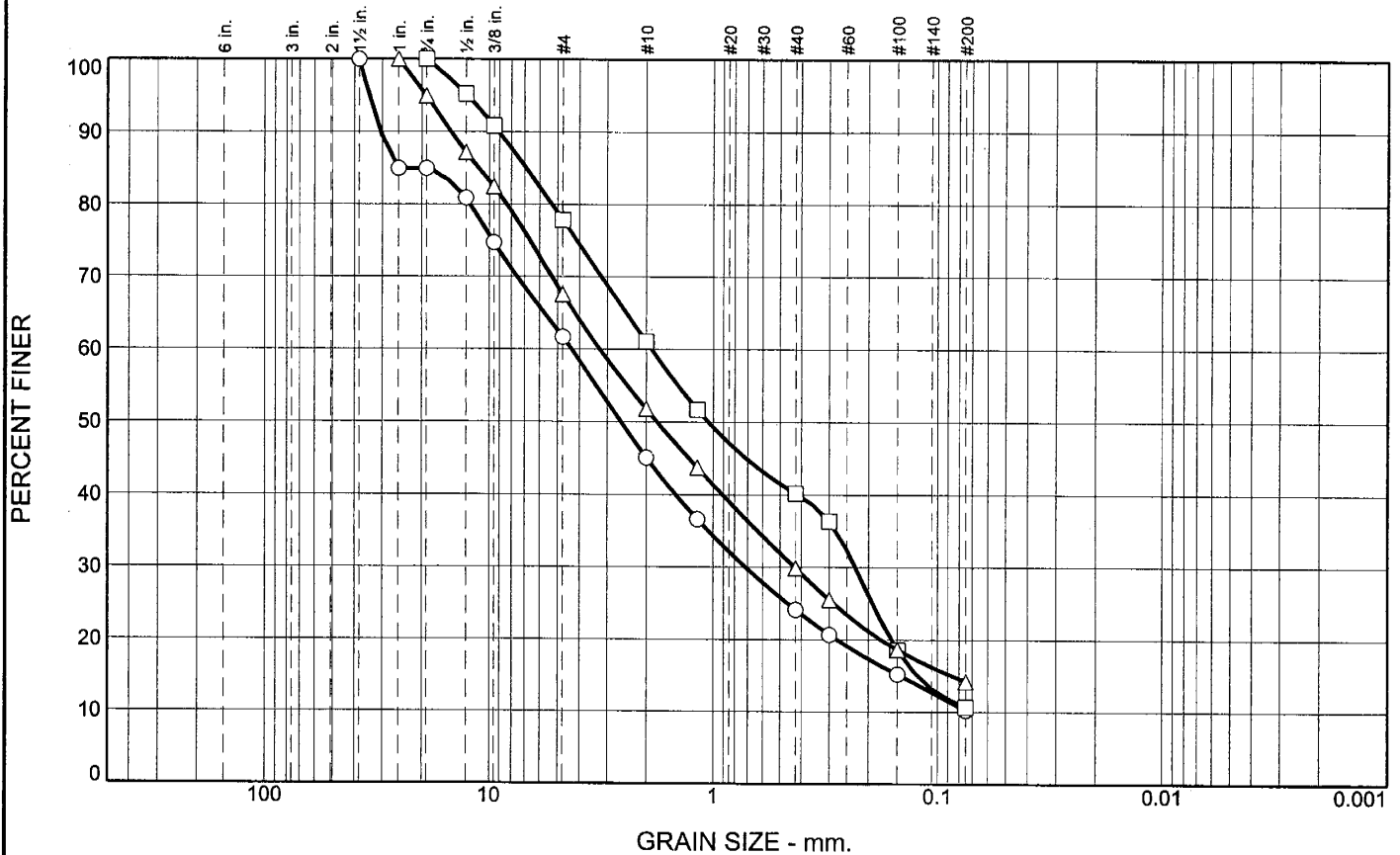
○ Source of Sample: SBA 2 Depth: 0.0 - 5.0' Sample Number: BULK 1

□ Source of Sample: SBA 2 Depth: 5.0 - 10.0' Sample Number: BULK 2

**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: A. Bafghi
Project: Boulder City Bypass
Project No.: EA 73307, FL-3-11

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	38.4	51.4		10.2	SP-SM	A-1-a	NP	19
□	0.0	22.1	67.2		10.7	SP-SM	A-1-b	NP	17
△	0.0	32.4	53.4		14.2	SM	A-1-b	NP	28

SIEVE inches size	PERCENT FINER		
	○	□	△
1.5"	100.0		100.0
1"	85.0		100.0
3/4"	85.0	100.0	94.9
1/2"	80.9	95.2	87.1
3/8"	74.7	90.8	82.5
GRAIN SIZE			
D60	4.3516	1.8936	3.2458
D30	0.7142	0.2286	0.4282
D10			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
	○	□	△
#4	61.6	77.9	67.6
#10	45.1	61.0	51.8
#16	36.6	51.7	43.7
#40	24.2	40.2	29.9
#50	20.7	36.4	25.6
#100	15.2	18.6	18.6
#200	10.2	10.7	14.2

Material Description
○ poorly graded sand with silt and gravel
□ poorly graded sand with silt and gravel
△ silty sand with gravel

REMARKS:
○
□
△

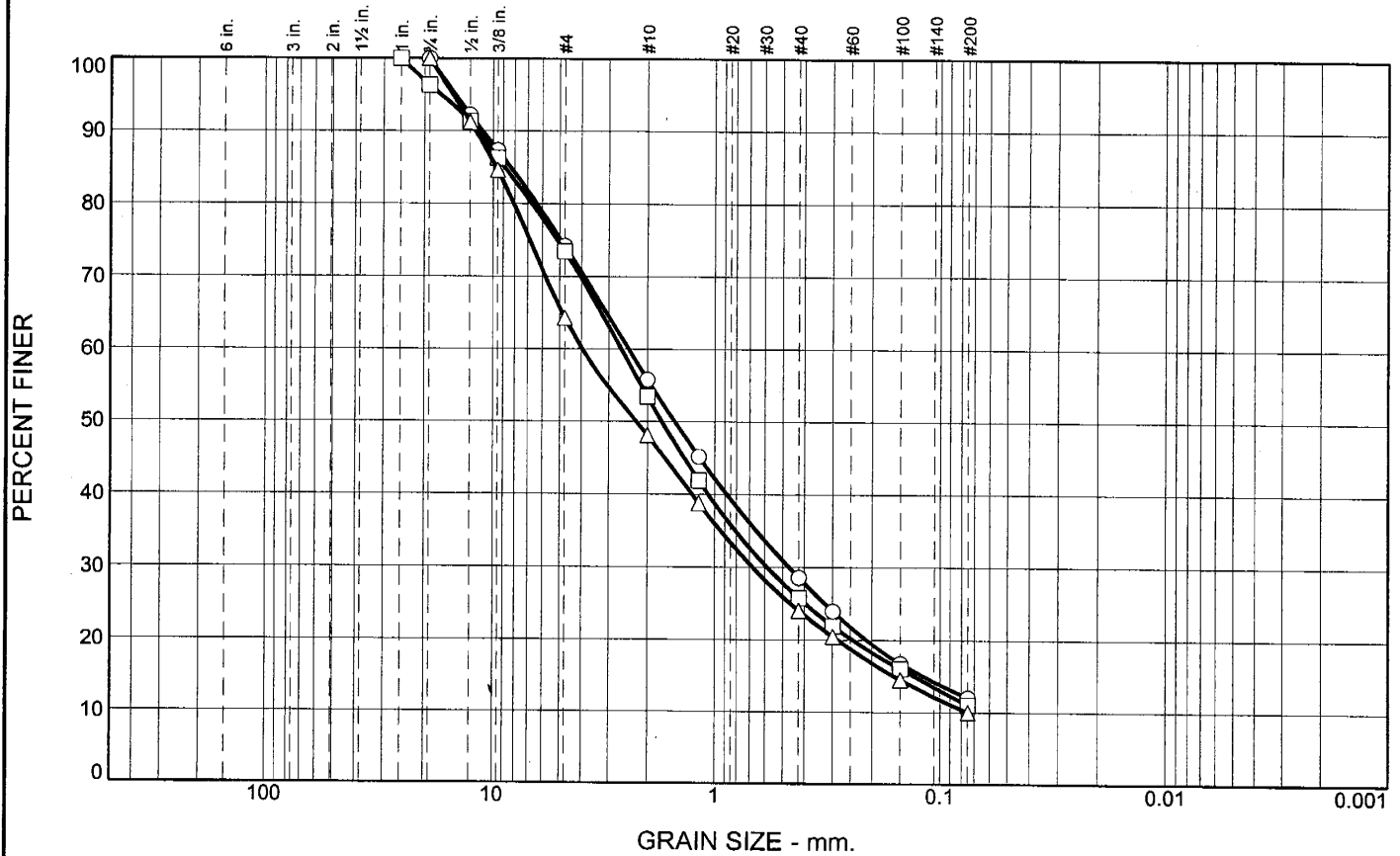
○ Source of Sample: SBA 2 Depth: 1.0 - 2.5' Sample Number: A
 □ Source of Sample: SBA 2 Depth: 3.5 - 5.0' Sample Number: B
 △ Source of Sample: SBA 2 Depth: 6.0 - 7.5' Sample Number: C

**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: A. Bafghi
 Project: Boulder City Bypass
 Project No.: EA 73307, FL-3-11

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	25.8	62.2		12.0	SP-SM	A-1-b	NP	24
□	0.0	26.5	62.5		11.0	SP-SM	A-1-b	NP	21
△	0.0	35.7	54.3		10.0	SW-SM	A-1-a	NP	20

SIEVE inches size	PERCENT FINER		
	○	□	△
1"		100.0	
3/4"	100.0	96.3	100.0
1/2"	92.2	91.3	91.2
3/8"	87.3	86.3	84.7
GRAIN SIZE			
D ₆₀	2.4381	2.6315	3.9627
D ₃₀	0.4675	0.5844	0.6781
D ₁₀			0.0751
COEFFICIENTS			
C _c			1.54
C _u			52.75

SIEVE number size	PERCENT FINER		
	○	□	△
#4	74.2	73.5	64.3
#10	55.8	53.4	48.1
#16	45.2	41.9	38.8
#40	28.6	25.8	24.1
#50	24.0	21.9	20.5
#100	16.8	16.0	14.5
#200	12.0	11.0	10.0

Material Description

○ poorly graded sand with silt and gravel

□ poorly graded sand with silt and gravel

△ well-graded sand with silt and gravel

REMARKS:

○

□

△

- Source of Sample: SBA 2 Depth: 8.5 - 10.0' Sample Number: D
- Source of Sample: SBA 2 Depth: 11.0 - 12.5' Sample Number: E
- △ Source of Sample: SBA 2 Depth: 13.5 - 15.0' Sample Number: F

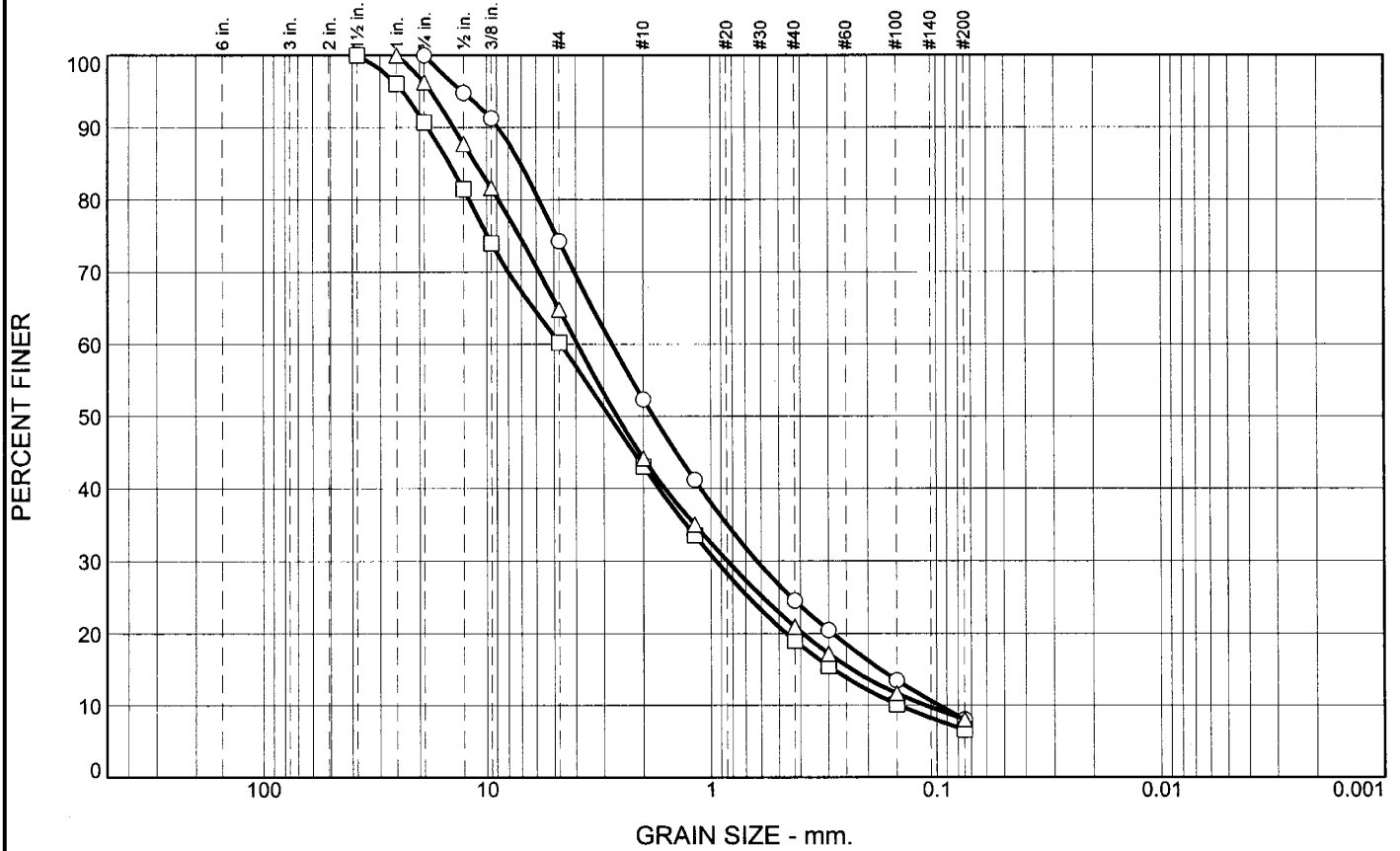
**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: A. Bafghi
Project: Boulder City Bypass

Project No.: EA 73307, FL-3-11

Figure

Particle Size Distribution Report

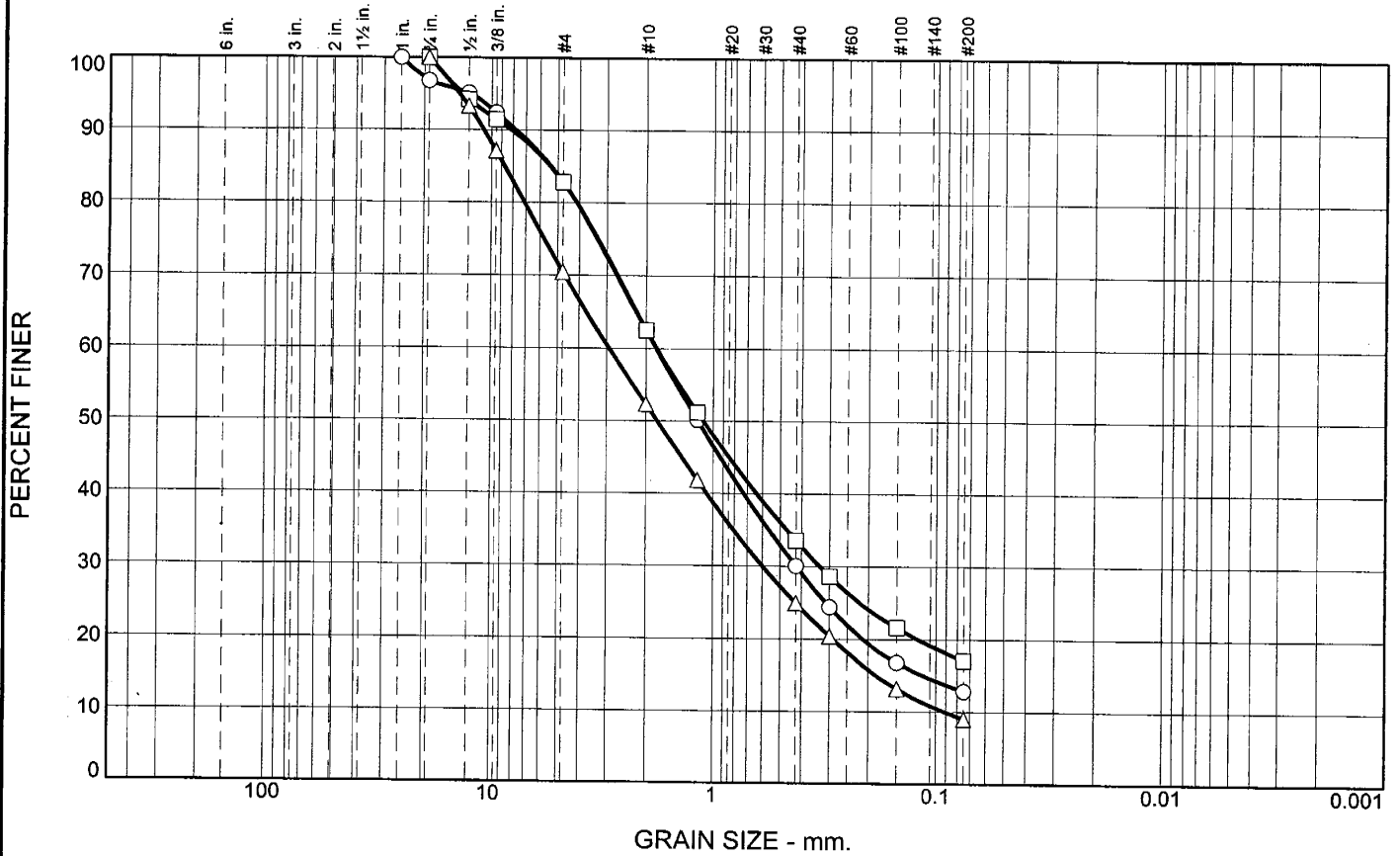


	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	25.7	66.3		8.0	SW-SM	A-1-b	NP	18
□	0.0	39.8	53.6		6.6	SW-SM		NP	
△	0.0	35.2	56.8		8.0	SW-SM		NP	

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER			Material Description
	○	□	△		○	□	△	
1.5"		100.0		#4	74.3	60.2	64.8	○ well-graded sand with silt and gravel
1"		96.1	100.0	#10	52.3	43.0	44.1	□ well-graded sand with silt and gravel
3/4"	100.0	90.7	96.3	#16	41.2	33.6	35.0	△ well-graded sand with silt and gravel
1/2"	94.8	81.5	87.7	#40	24.6	19.0	20.9	
3/8"	91.3	74.0	81.6	#50	20.5	15.4	17.2	
				#100	13.5	10.1	11.6	
				#200	8.0	6.6	8.0	
GRAIN SIZE								
D ₆₀	2.7627	4.6970	3.9389					
D ₃₀	0.6242	0.9489	0.8446					
D ₁₀	0.0977	0.1469	0.1124					
COEFFICIENTS								
C _c	1.44	1.31	1.61					
C _u	28.28	31.98	35.03					
REMARKS:								
○								
□								
△								

○ Source of Sample: SBA 2 Depth: 16.0 - 17.5' Sample Number: G
 □ Source of Sample: SBA 2 Depth: 18.5 - 20.0' Sample Number: H
 △ Source of Sample: SBA 2 Depth: 21.0 - 22.5' Sample Number: I

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	17.1	70.0	12.9		SM	A-1-b	NP	23
□	0.0	17.2	65.8	17.0		SM	A-1-b	NP	23
△	0.0	29.5	61.5	9.0		SW-SM	A-1-b	NP	22

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER			Material Description
	○	□	△		○	□	△	
1"	100.0			#4	82.9	82.8	70.5	○ silty sand with gravel □ silty sand with gravel △ well-graded sand with silt and gravel
3/4"	96.8	100.0	100.0	#10	62.5	62.5	52.3	
1/2"	95.1	94.2	93.3	#16	50.1	51.2	41.9	
3/8"	92.4	91.4	87.1	#40	30.1	33.6	24.9	
				#50	24.4	28.6	20.4	
				#100	16.8	21.6	13.2	
				#200	12.9	17.0	9.0	
GRAIN SIZE								
D60	1.8039	1.7971	2.9256					
D30	0.4233	0.3326	0.5969					
D10			0.0908					
COEFFICIENTS								
C _c			1.34					
C _u			32.23					

REMARKS:

○

□

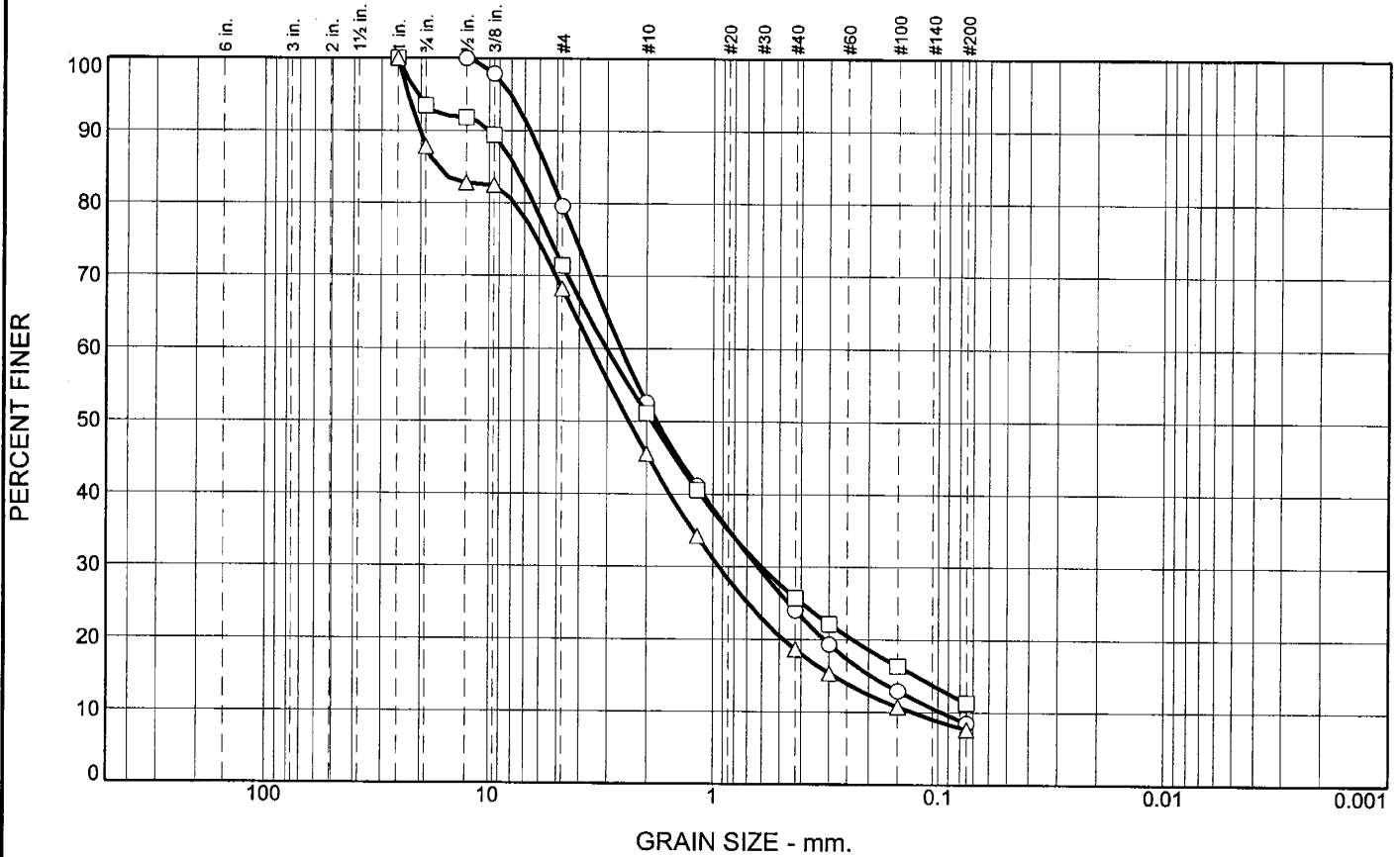
△

○ Source of Sample: SBA 2 Depth: 23.5 - 25.0' Sample Number: J

□ Source of Sample: SBA 2 Depth: 26.0 - 27.5' Sample Number: K

△ Source of Sample: SBA 2 Depth: 28.5 - 30.0' Sample Number: L

Particle Size Distribution Report

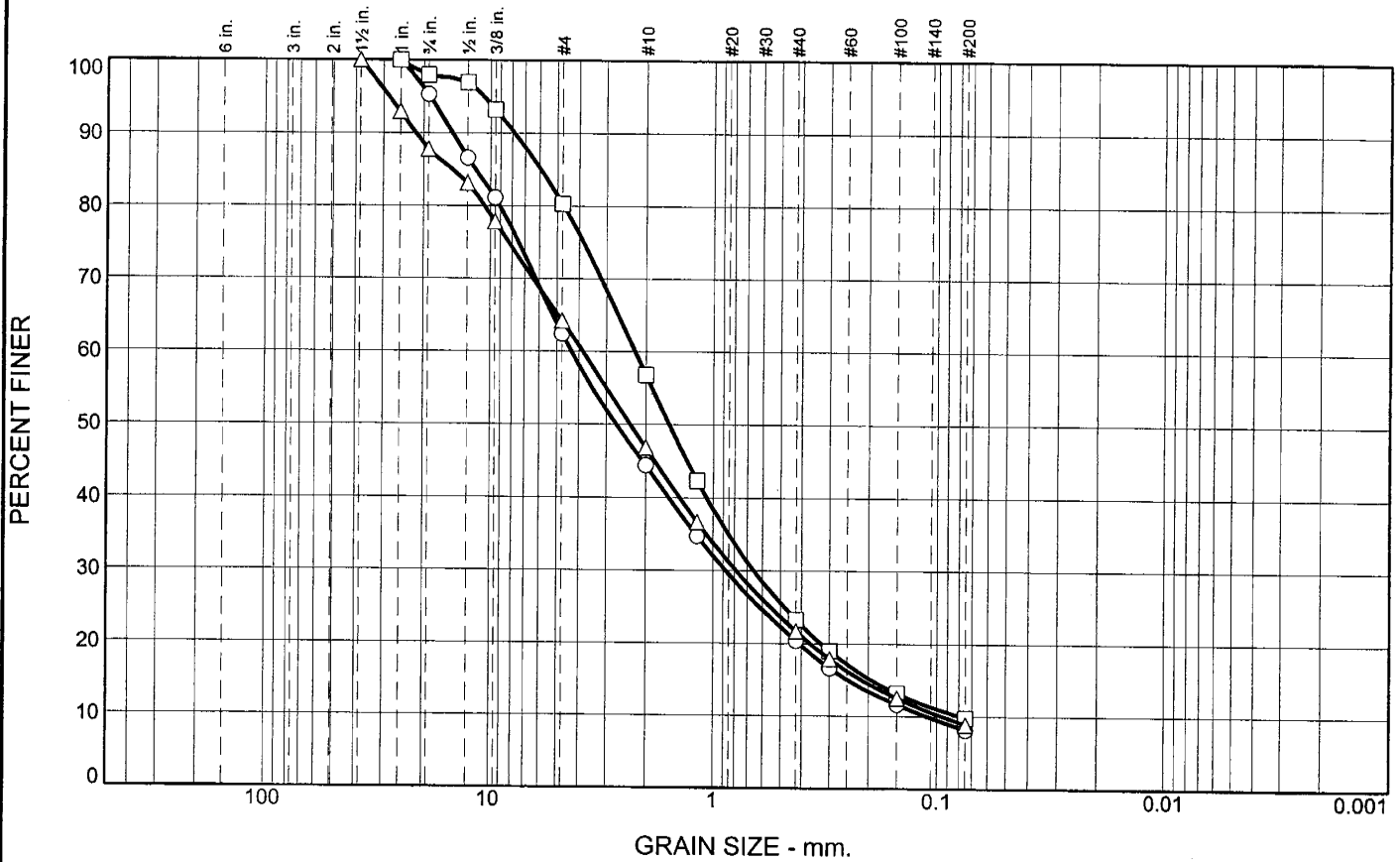


	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	20.4	71.1	8.5		SW-SM	A-1-b	NP	19
□	0.0	28.6	60.1	11.3		SP-SM	A-1-b	NP	19
△	0.0	31.8	60.6	7.6		SW-SM	A-1-a	NP	19

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER			Material Description
	○	□	△		○	□	△	
1"		100.0	100.0	#4	79.6	71.4	68.2	○ well-graded sand with silt and gravel □ poorly graded sand with silt and gravel △ well-graded sand with silt and gravel
3/4"		93.5	87.8	#10	52.6	51.1	45.6	
1/2"	100.0	91.9	82.8	#16	41.2	40.6	34.2	
3/8"	97.9	89.4	82.5	#40	24.0	25.7	18.6	
				#50	19.3	22.1	15.3	
				#100	12.9	16.4	10.7	
				#200	8.5	11.3	7.6	
GRAIN SIZE								
D ₆₀	2.6006	3.0166	3.5154					
D ₃₀	0.6262	0.6020	0.9403					
D ₁₀	0.0961		0.1295					
COEFFICIENTS								
C _c	1.57		1.94					
C _u	27.07		27.15					

○ Source of Sample: SBA 2 Depth: 34.5 - 36.0' Sample Number: M
 □ Source of Sample: SBA 2 Depth: 39.5 - 41.0' Sample Number: N
 △ Source of Sample: SBA 2 Depth: 44.5 - 46.0' Sample Number: O

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	37.6	54.3		8.1	SW-SM	A-1-a	NP	20
□	0.0	19.7	70.5		9.8	SW-SM	A-1-b	NP	26
△	0.0	35.8	55.3		8.9	SW-SM	A-1-a	NP	21

SIEVE inches size	PERCENT FINER		
	○	□	△
1.5"			100.0
1"	100.0	100.0	92.9
3/4"	95.3	97.9	87.8
1/2"	86.6	96.9	83.2
3/8"	81.1	93.2	77.9
GRAIN SIZE			
D60	4.3261	2.2348	3.8430
D30	0.8783	0.6551	0.7870
D10	0.1103	0.0794	0.0948
COEFFICIENTS			
Cc	1.62	2.42	1.70
Cu	39.22	28.16	40.54

SIEVE number size	PERCENT FINER		
	○	□	△
#4	62.4	80.3	64.2
#10	44.4	56.8	46.8
#16	34.8	42.3	36.7
#40	20.4	23.3	21.7
#50	16.6	19.0	17.9
#100	11.6	13.2	12.5
#200	8.1	9.8	8.9

Material Description

- well-graded sand with silt and gravel
- well-graded sand with silt and gravel
- △ well-graded sand with silt and gravel

REMARKS:

-
-
- △

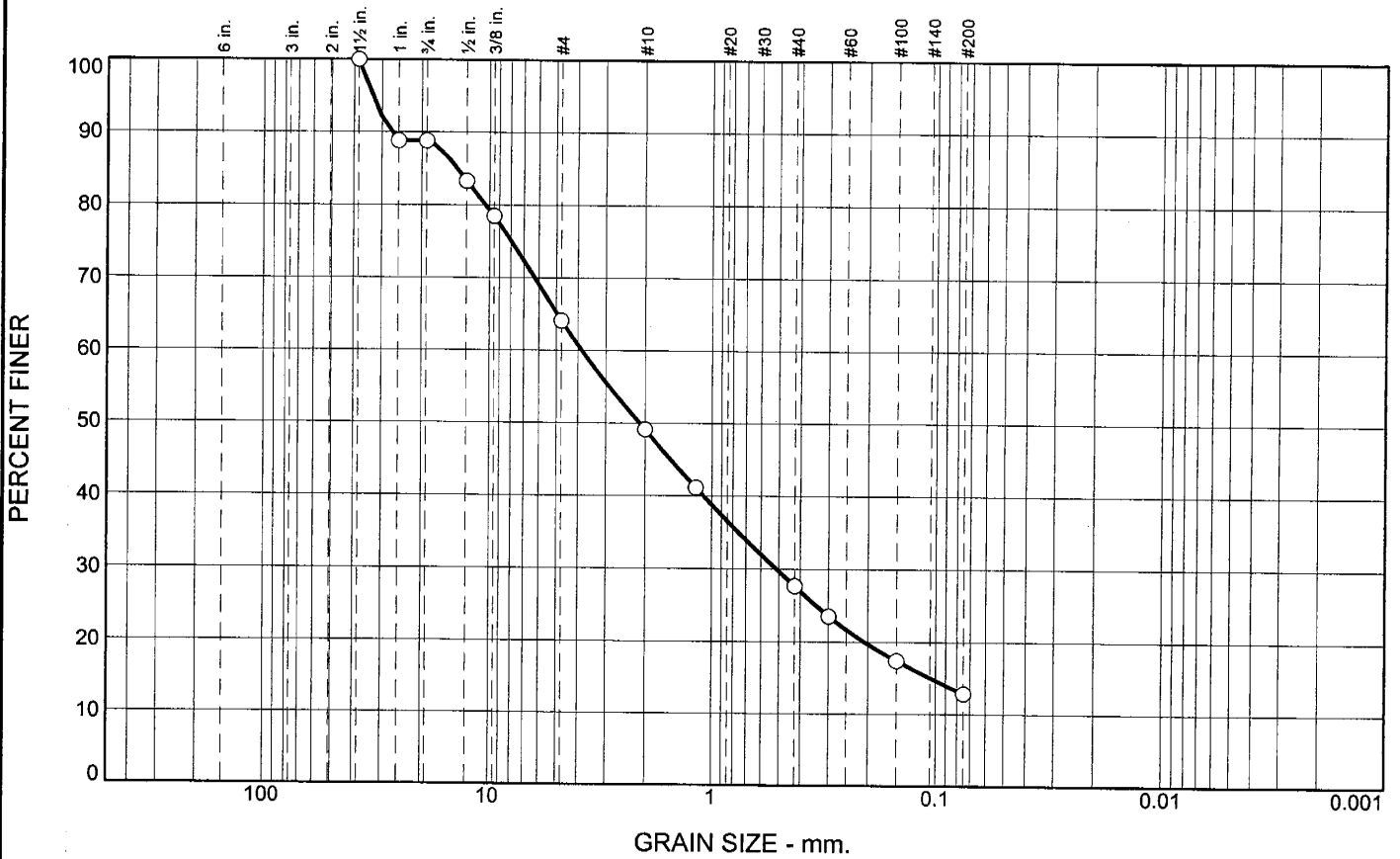
○ Source of Sample: SBA 2 Depth: 49.5 - 51.0' Sample Number: P
 □ Source of Sample: SBA 2 Depth: 54.5 - 56.0' Sample Number: Q
 △ Source of Sample: SBA 2 Depth: 59.5 - 61.0' Sample Number: R

NEVADA
 DEPARTMENT OF
 TRANSPORTATION

Client: A. Bafghi
 Project: Boulder City Bypass
 Project No.: EA 73307, FL-3-11

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	35.9	51.3	12.8		SM	A-1-a	NP	20

SIEVE inches size	PERCENT FINER		
	○		
1.5"	100.0		
1"	88.8		
3/4"	88.8		
1/2"	83.3		
3/8"	78.5		
GRAIN SIZE			
D60	3.8502		
D30	0.5113		
D10			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
	○		
#4	64.1		
#10	49.1		
#16	41.2		
#40	27.7		
#50	23.6		
#100	17.4		
#200	12.8		

Material Description
○ silty sand with gravel

REMARKS:
○

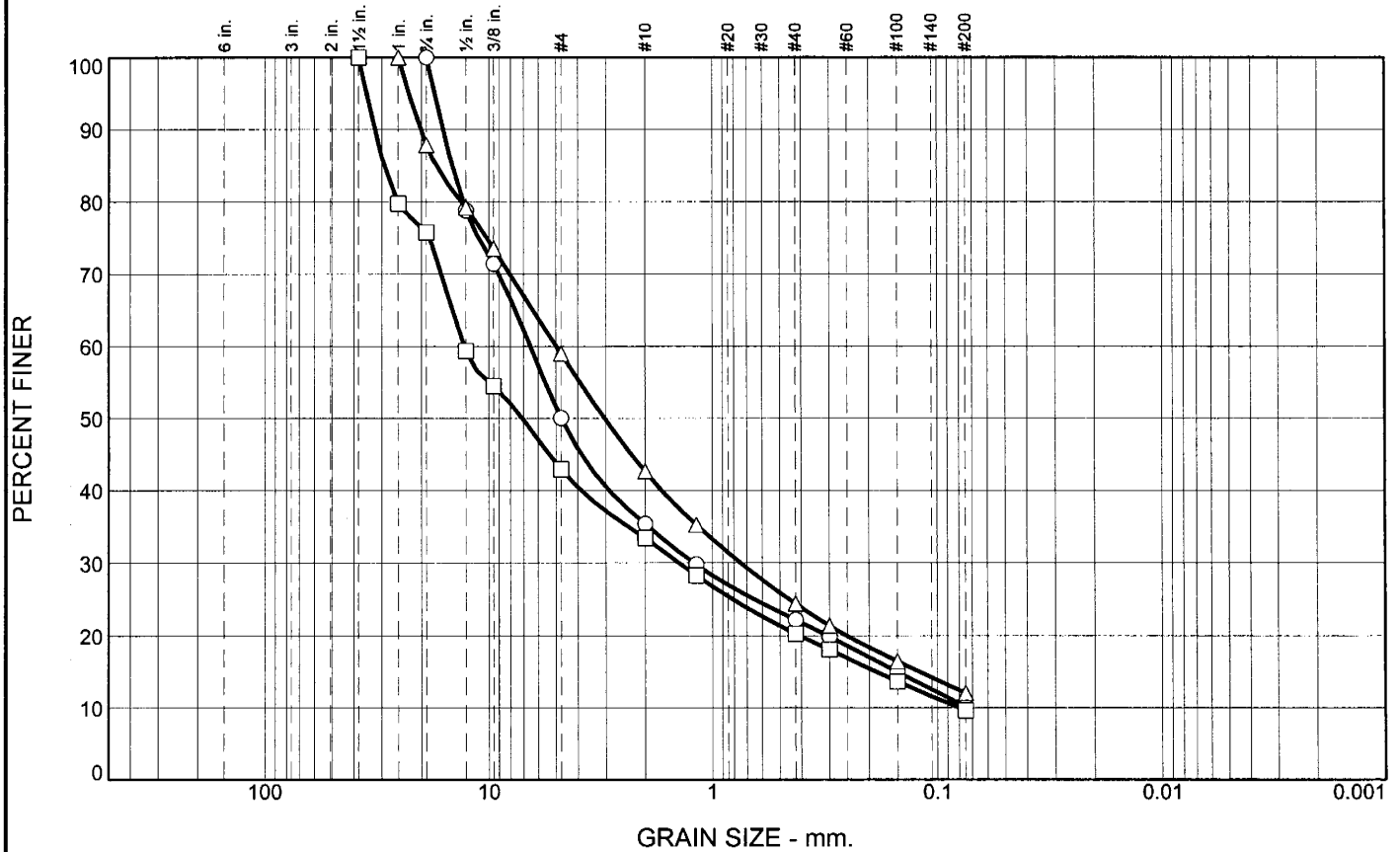
○ Source of Sample: SBA 2 Depth: 64.5 - 66.0' Sample Number: S

**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: A. Bafghi
Project: Boulder City Bypass
Project No.: EA 73307, FL-3-11

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	50.0	39.9		10.1	GP-GM	A-1-a	NP	24
□	0.0	57.1	33.3		9.6	GW-GM	A-1-a	24	26
△	0.0	41.0	47.0		12.0	SP-SM	A-1-a	21	23

SIEVE inches size	PERCENT FINER		
	○	□	△
1.5"		100.0	
1"		79.7	100.0
3/4"	100.0	75.8	87.8
1/2"	78.8	59.3	79.2
3/8"	71.5	54.5	73.6
GRAIN SIZE			
D ₆₀	6.5172	12.9626	4.9919
D ₃₀	1.2067	1.4078	0.7462
D ₁₀		0.0802	
COEFFICIENTS			
C _c		1.91	
C _u		161.63	

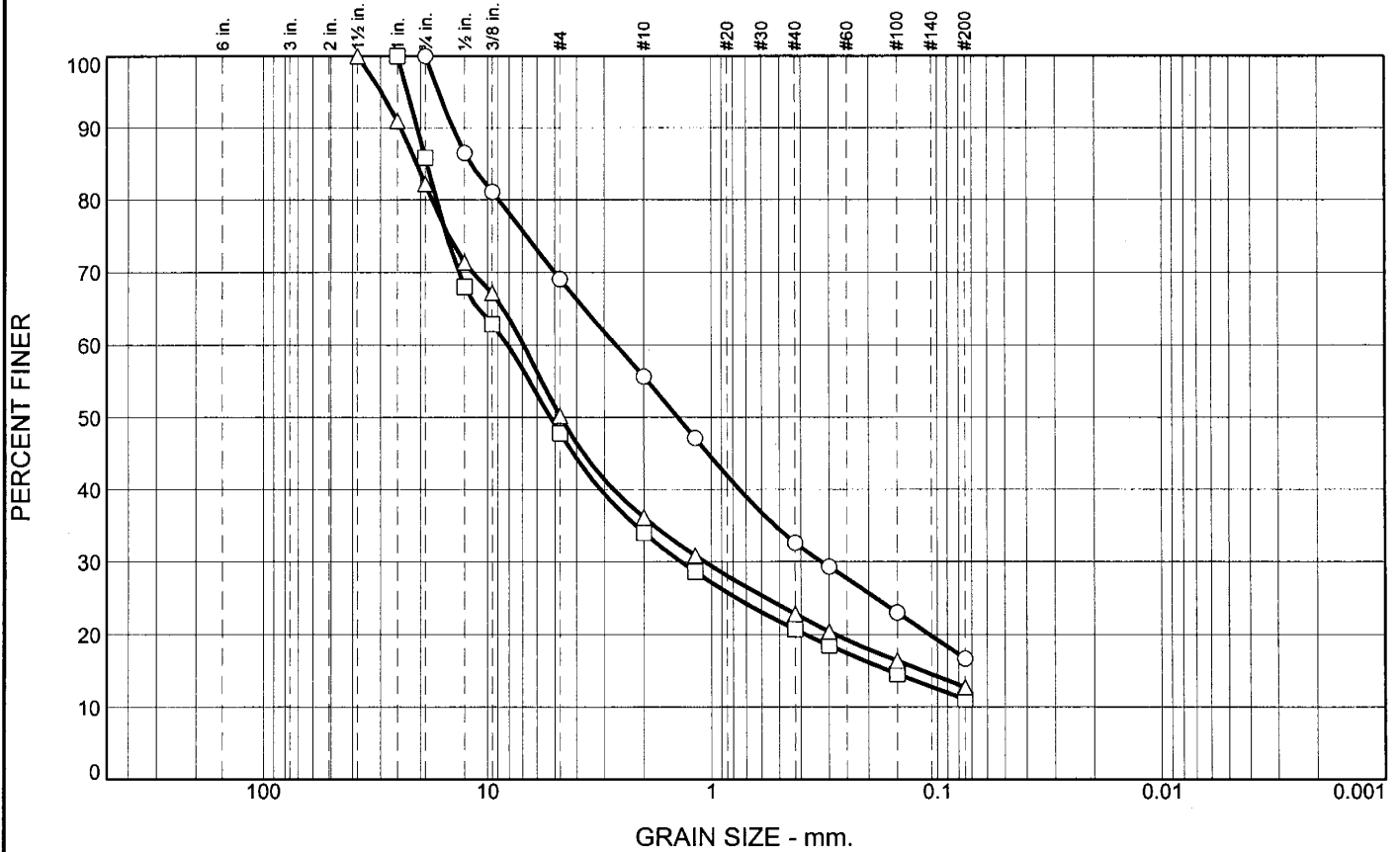
SIEVE number size	PERCENT FINER		
	○	□	△
#4	50.0	42.9	59.0
#10	35.4	33.4	42.6
#16	29.8	28.3	35.3
#40	22.2	20.3	24.4
#50	19.8	18.1	21.4
#100	15.0	13.6	16.5
#200	10.1	9.6	12.0

Material Description
○ poorly graded gravel with silt and sand
□ well-graded gravel with silt and sand
△ poorly graded sand with silt and gravel

REMARKS:
○
□
△

○ Source of Sample: RRBA 1 Depth: 5.0 - 5.9' Sample Number: A
 □ Source of Sample: RRBA 1 Depth: 20.0 - 21.5' Sample Number: D
 △ Source of Sample: RRBA 1 Depth: 25.0 - 26.5' Sample Number: E

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	30.9	52.4		16.7	SM	A-2-5(0)	33	43
□	0.0	52.2	36.7		11.1	GP-GM	A-2-4(0)	31	39
△	0.0	49.8	37.5		12.7	GM	A-2-7(0)	32	45

SIEVE inches size	PERCENT FINER		
	○	□	△
1.5"			100.0
1"		100.0	91.0
3/4"	100.0	85.8	82.2
1/2"	86.5	68.1	71.4
3/8"	81.1	62.9	67.2
GRAIN SIZE			
D ₆₀	2.6561	8.1075	6.8916
D ₃₀	0.3232	1.3683	1.0720
D ₁₀			
COEFFICIENTS			
C _c			
C _u			

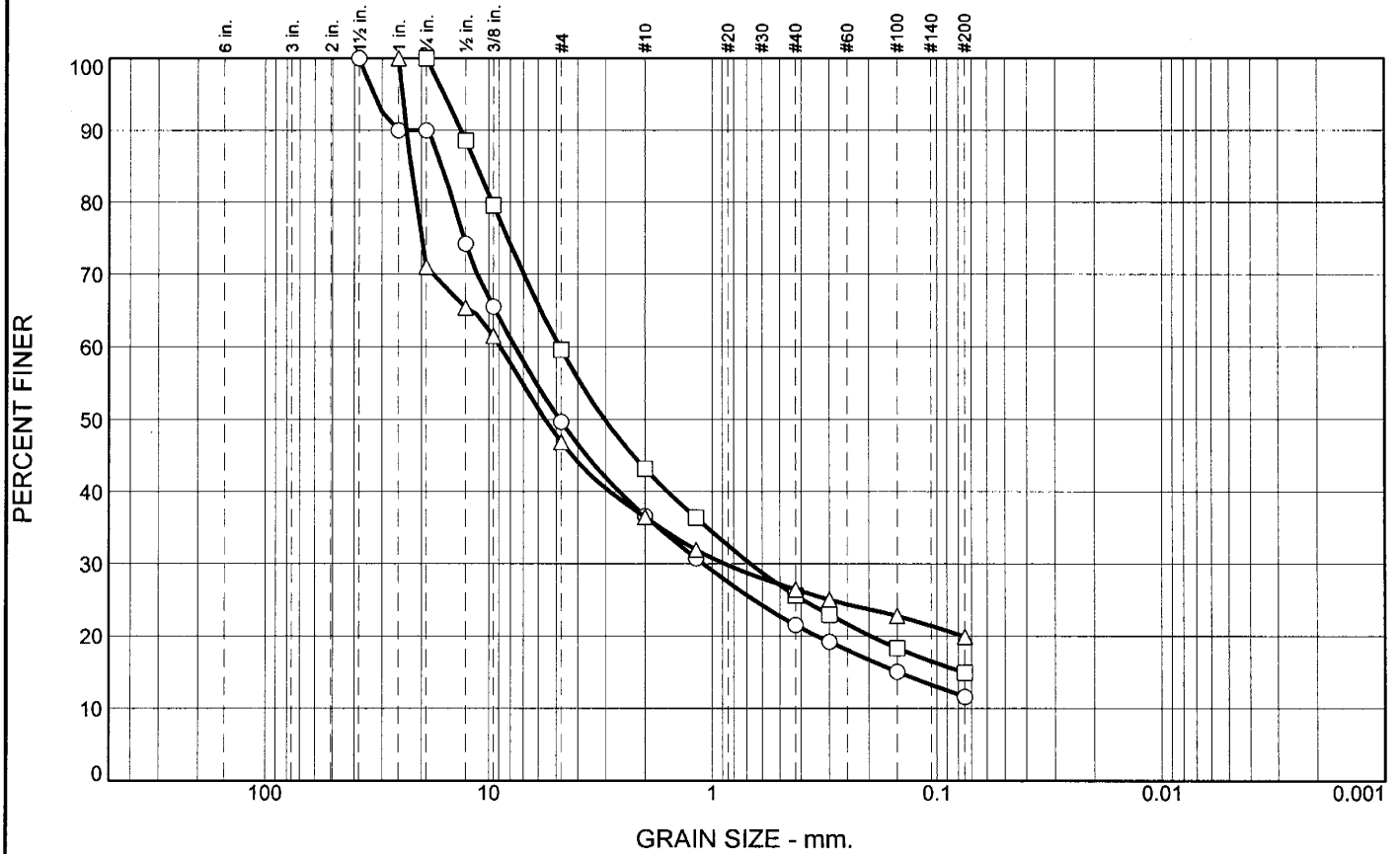
SIEVE number size	PERCENT FINER		
	○	□	△
#4	69.1	47.8	50.2
#10	55.7	34.0	36.2
#16	47.2	28.6	30.8
#40	32.6	20.7	22.8
#50	29.3	18.5	20.4
#100	23.0	14.6	16.4
#200	16.7	11.1	12.7

Material Description
○ silty sand with gravel
□ poorly graded gravel with silt and sand
△ silty gravel with sand

REMARKS:
○
□
△

○ Source of Sample: RRBA 1 Depth: 30.0 - 30.8' Sample Number: F
 □ Source of Sample: RRBA 1 Depth: 35.0 - 36.06' Sample Number: G
 △ Source of Sample: RRBA 1 Depth: 40.0 - 41.5' Sample Number: H

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	50.4	38.0		11.6	GP-GM			
□	0.0	40.4	44.7		14.9	SM			
△	0.0	53.1	27.0		19.9	GM			

SIEVE inches size	PERCENT FINER		
	○	□	△
1.5"	100.0		
1"	90.0		100.0
3/4"	90.0	100.0	71.0
1/2"	74.2	88.6	65.4
3/8"	65.5	79.6	61.5
GRAIN SIZE			
D ₆₀	7.6159	4.8319	8.8783
D ₃₀	1.0948	0.6732	0.8804
D ₁₀			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
	○	□	△
#4	49.6	59.6	46.9
#10	36.7	43.2	36.5
#16	30.8	36.4	32.0
#40	21.5	25.6	26.5
#50	19.2	23.0	25.0
#100	15.1	18.3	22.8
#200	11.6	14.9	19.9

Material Description
○ poorly graded gravel with silt and sand
□ silty sand with gravel
△ silty gravel with sand

REMARKS:
○
□
△

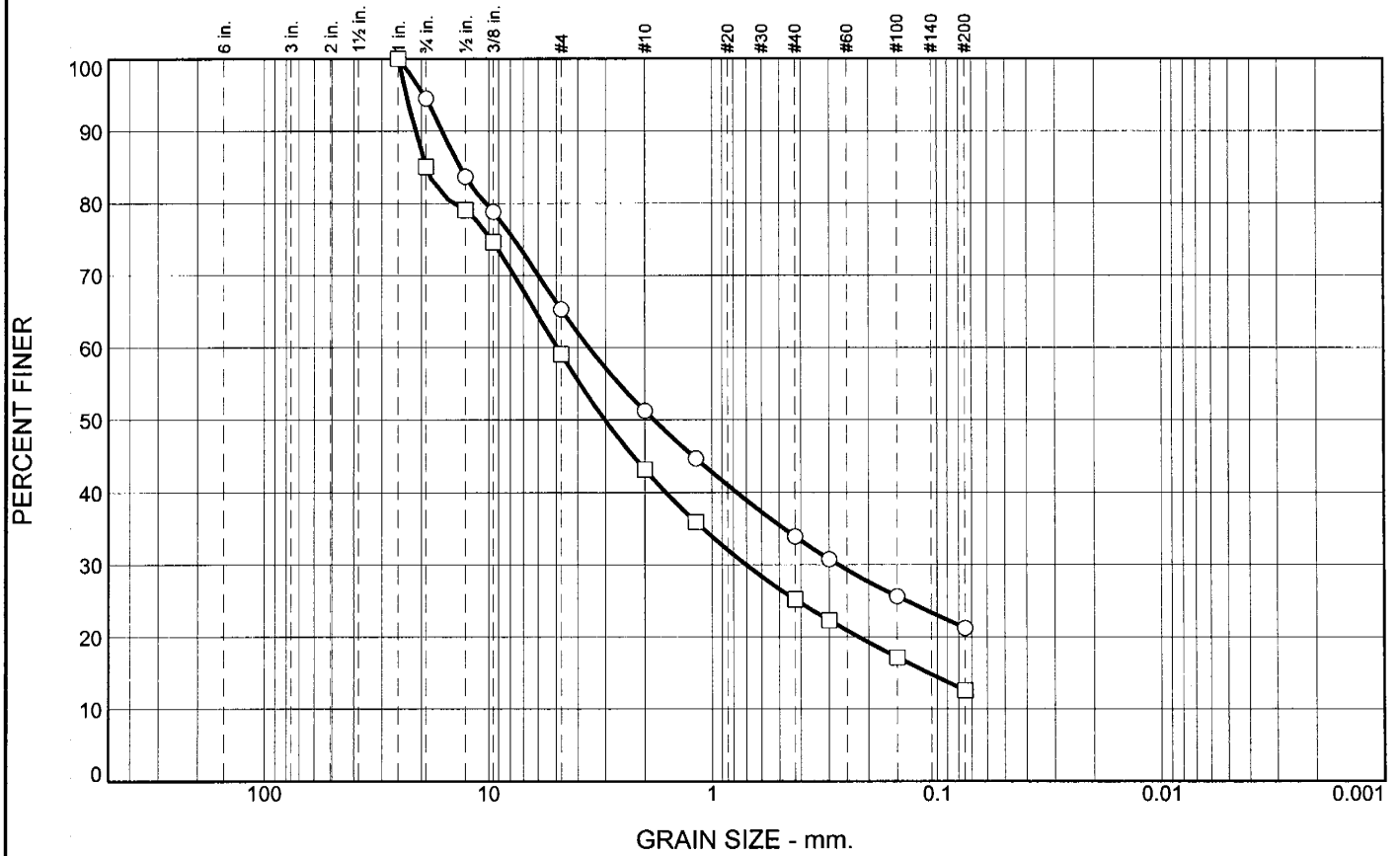
○ Source of Sample: RRBA 1 Depth: 45.0 - 45.5' Sample Number: I
 □ Source of Sample: RRBA 1 Depth: 50.0 - 50.5' Sample Number: J
 △ Source of Sample: RRBA 1 Depth: 55.0 - 55.5' Sample Number: K

**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: A. Bafghi
 Project: Boulder City Bypass
 Project No.: EA 73307, FL-3-11

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	34.7	44.1	21.2		SM			
□	0.0	40.9	46.6	12.5		SM	A-1-a	20	21

SIEVE inches size	PERCENT FINER		SIEVE number size	PERCENT FINER		Material Description
	○	□		○	□	
1"	100.0	100.0	#4	65.3	59.1	○ silty sand with gravel
3/4"	94.5	85.1	#10	51.2	43.2	
1/2"	83.7	79.1	#16	44.7	35.9	□ silty sand with gravel
3/8"	78.8	74.6	#40	33.9	25.2	
GRAIN SIZE						
D ₆₀	3.5657	4.9574	#50	30.8	22.3	
D ₃₀	0.2737	0.7036	#100	25.6	17.2	
D ₁₀			#200	21.2	12.5	
COEFFICIENTS						
C _c						
C _u						

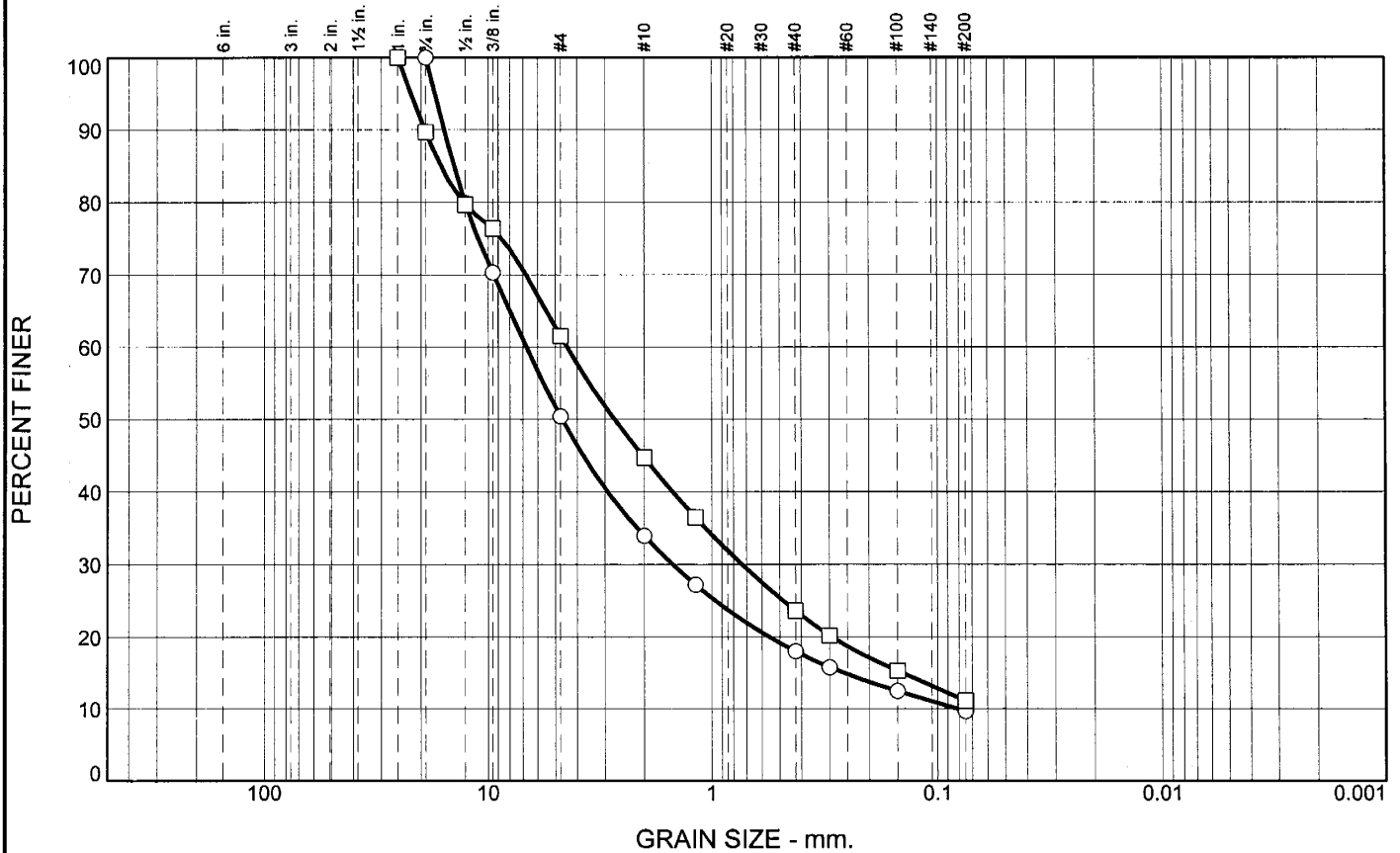
REMARKS:

○

□

○ Source of Sample: RRBA 1 Depth: 60.0 - 60.5' Sample Number: L
 □ Source of Sample: RRBA 1 Depth: 65.0 - 65.5' Sample Number: M

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	49.6	40.8	9.6		GP-GM	A-1-a	22	25
□	0.0	38.5	50.4	11.1		SP-SM			

SIEVE inches size	PERCENT FINER	
	○	□
1"		100.0
3/4"	100.0	89.7
1/2"	79.9	79.7
3/8"	70.3	76.4
GRAIN SIZE		
D ₆₀	6.7473	4.4510
D ₃₀	1.4915	0.7319
D ₁₀	0.0821	
COEFFICIENTS		
C _c	4.02	
C _u	82.20	

SIEVE number size	PERCENT FINER	
	○	□
#4	50.4	61.5
#10	34.0	44.7
#16	27.2	36.5
#40	18.0	23.6
#50	15.7	20.2
#100	12.5	15.3
#200	9.6	11.1

Material Description

○ poorly graded gravel with silt and sand

□ poorly graded sand with silt and gravel

REMARKS:

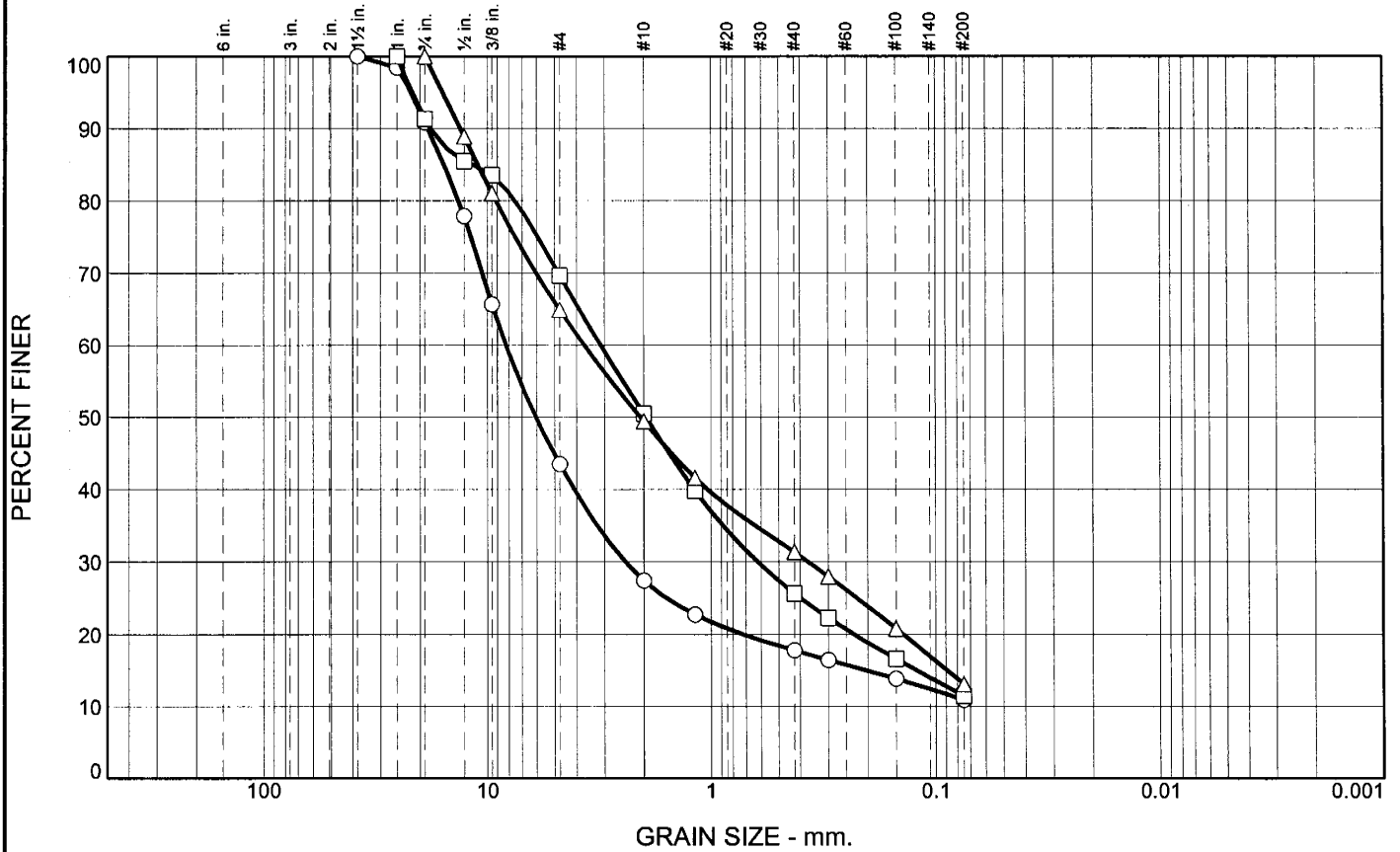
○

□

○ Source of Sample: RRBA 1 Depth: 70.0 - 70.5' Sample Number: N

□ Source of Sample: RRBA 1 Depth: 75.0 - 75.5' Sample Number: O

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	56.5	32.6	10.9		GP-GC	A-2-4(0)	21	29
□	0.0	30.3	58.2	11.5		SP-SM	A-1-a	NP	23
△	0.0	35.1	51.8	13.1		SM	A-1-b	NP	36

SIEVE inches size	PERCENT FINER		
	○	□	△
1.5"	100.0		
1"	98.4	100.0	
3/4"	90.8	91.3	100.0
1/2"	77.9	85.5	88.9
3/8"	65.7	83.6	81.0
GRAIN SIZE			
D60	8.2383	3.1145	3.6890
D30	2.4156	0.6198	0.3680
D10			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
	○	□	△
#4	43.5	69.7	64.9
#10	27.4	50.5	49.4
#16	22.7	39.8	41.6
#40	17.8	25.7	31.4
#50	16.4	22.3	28.0
#100	13.8	16.6	20.8
#200	10.9	11.5	13.1

Material Description

○ poorly graded gravel with clay and sand

□ poorly graded sand with silt and gravel

△ silty sand with gravel

REMARKS:

○

□

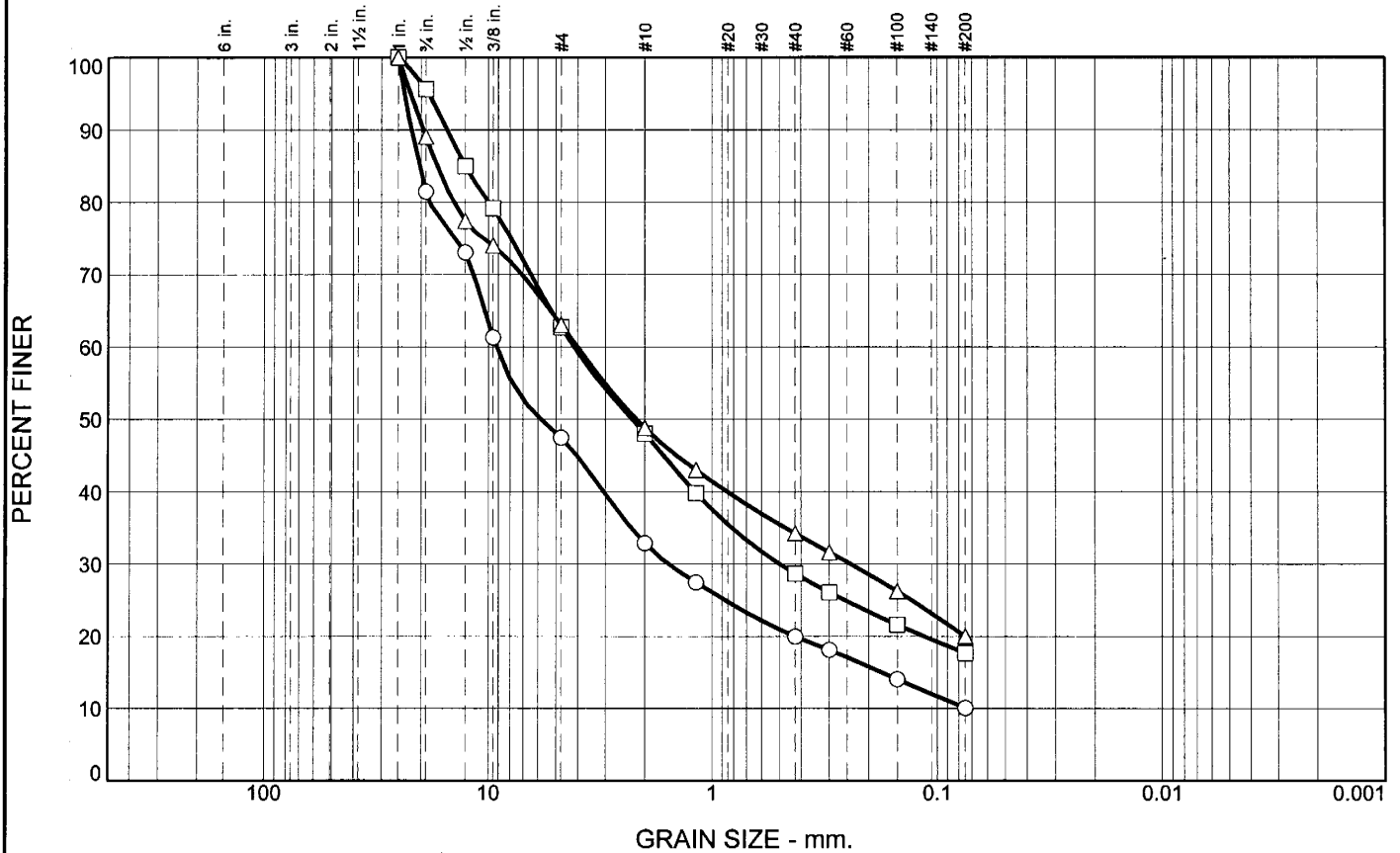
△

○ Source of Sample: RRBP 1 Depth: 32.0 - 35.0' Sample Number: BULK 1

□ Source of Sample: RRBP 1 Depth: 5.0 - 5.6' Sample Number: A

△ Source of Sample: RRBP 1 Depth: 10.0 - 11.5' Sample Number: B

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	52.6	37.3	10.1		GP-GM			
□	0.0	37.3	45.1	17.6		SM			
△	0.0	36.9	43.1	20.0		SM			

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER			Material Description
	○	□	△		○	□	△	
1"	100.0	100.0	100.0	#4	47.4	62.7	63.1	○ poorly graded gravel with silt and sand
3/4"	81.5	95.7	89.1	#10	32.9	48.0	48.8	□ silty sand with gravel
1/2"	73.1	85.0	77.4	#16	27.5	39.9	43.0	△ silty sand with gravel
3/8"	61.3	79.2	74.0	#40	20.0	28.7	34.3	
				#50	18.1	26.1	31.6	
				#100	14.0	21.6	26.3	
				#200	10.1	17.6	20.0	
GRAIN SIZE								
D ₆₀	9.2047	4.1697	4.0161					
D ₃₀	1.5606	0.4967	0.2405					
D ₁₀								
COEFFICIENTS								
C _c								
C _u								

REMARKS:

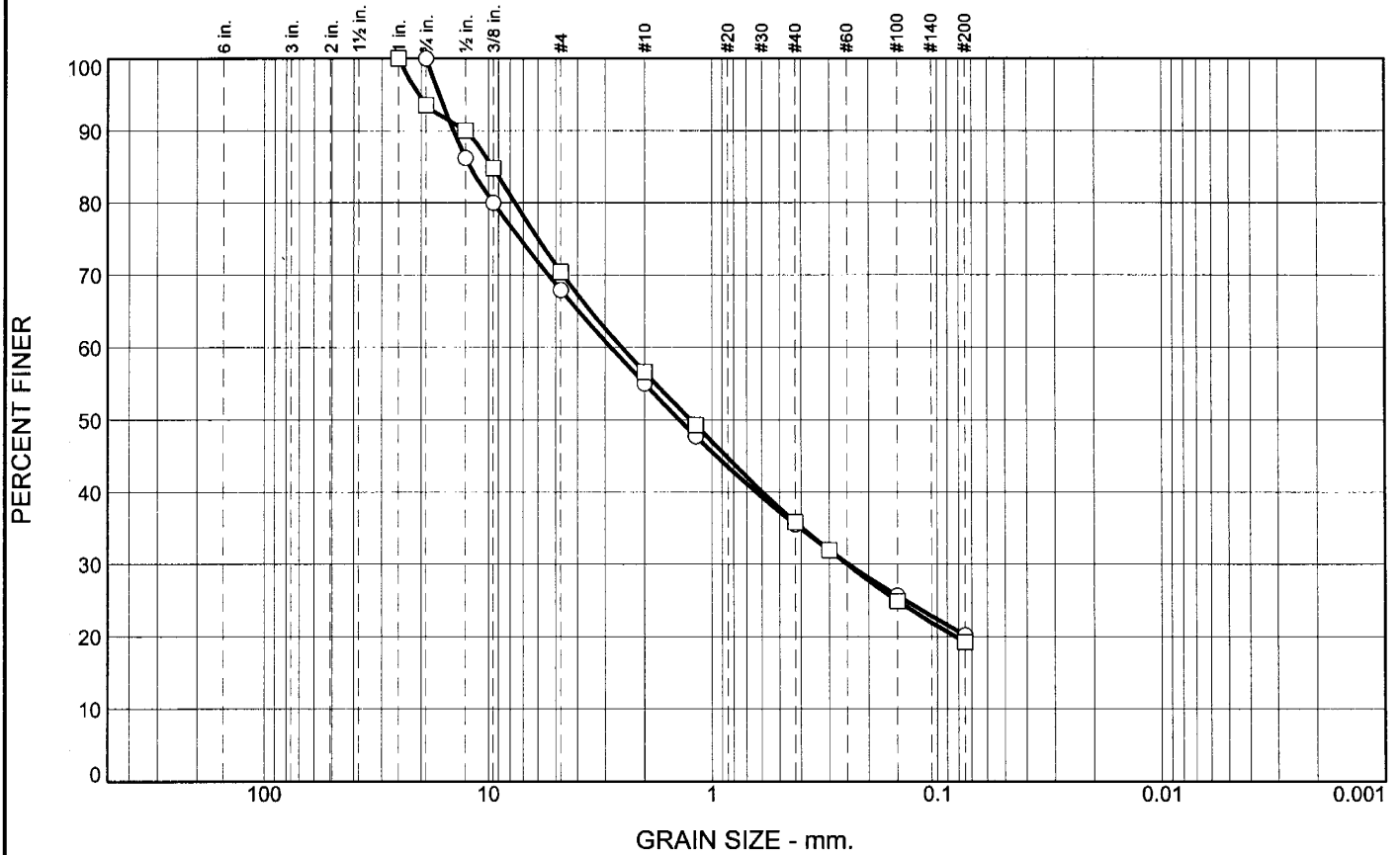
○

□

△

○ Source of Sample: RRBP 1 Depth: 20.0 - 20.3' Sample Number: D
 □ Source of Sample: RRBP 1 Depth: 45.0 - 45.4' Sample Number: J
 △ Source of Sample: RRBP 1 Depth: 50.0 - 50.5' Sample Number: L

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	32.1	47.7	20.2		SM			
□	0.0	29.6	51.2	19.2		SM			

SIEVE inches size	PERCENT FINER	
	○	□
1"		100.0
3/4"	100.0	93.6
1/2"	86.2	90.0
3/8"	80.0	84.8
GRAIN SIZE		
D60	2.8288	2.5280
D30	0.2461	0.2505
D10		
COEFFICIENTS		
Cc		
Cu		

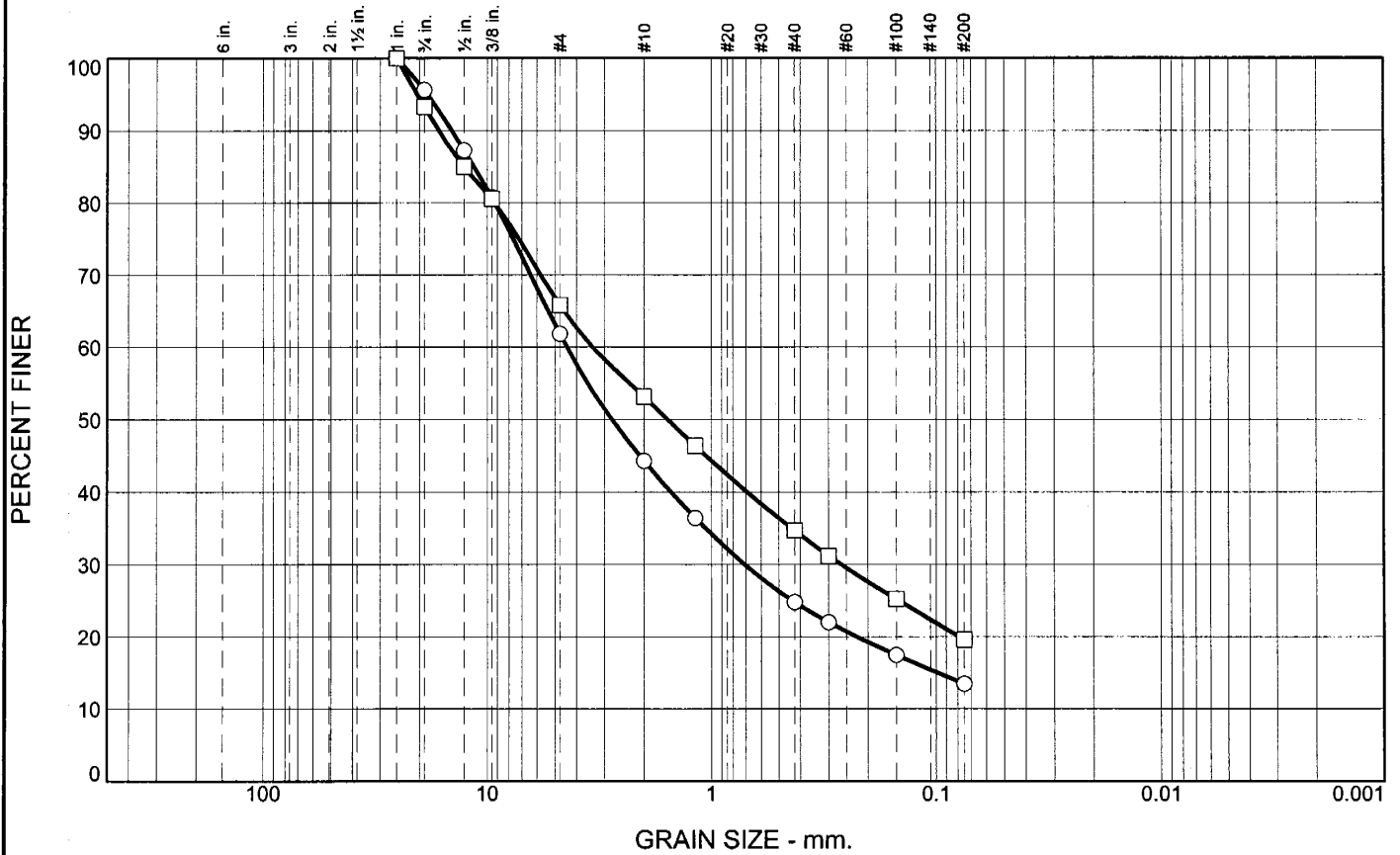
SIEVE number size	PERCENT FINER	
	○	□
#4	67.9	70.4
#10	55.0	56.6
#16	47.7	49.3
#40	35.5	35.8
#50	31.9	31.9
#100	25.6	24.9
#200	20.2	19.2

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

REMARKS:
 ○
 □

○ Source of Sample: RRBP 1 Depth: 60.0 - 60.4' Sample Number: M
 □ Source of Sample: RRBP 1 Depth: 70.0 - 70.3' Sample Number: N

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	38.2	48.4	13.4		SM	A-1-a	20	23
□	0.0	34.2	46.2	19.6		SC	A-2-6(0)	21	33

SIEVE inches size	PERCENT FINER	
	○	□
1"	100.0	100.0
3/4"	95.6	93.3
1/2"	87.3	85.0
3/8"	80.8	80.6
GRAIN SIZE		
D ₆₀	4.4213	3.3799
D ₃₀	0.7078	0.2634
D ₁₀		
COEFFICIENTS		
C _c		
C _u		

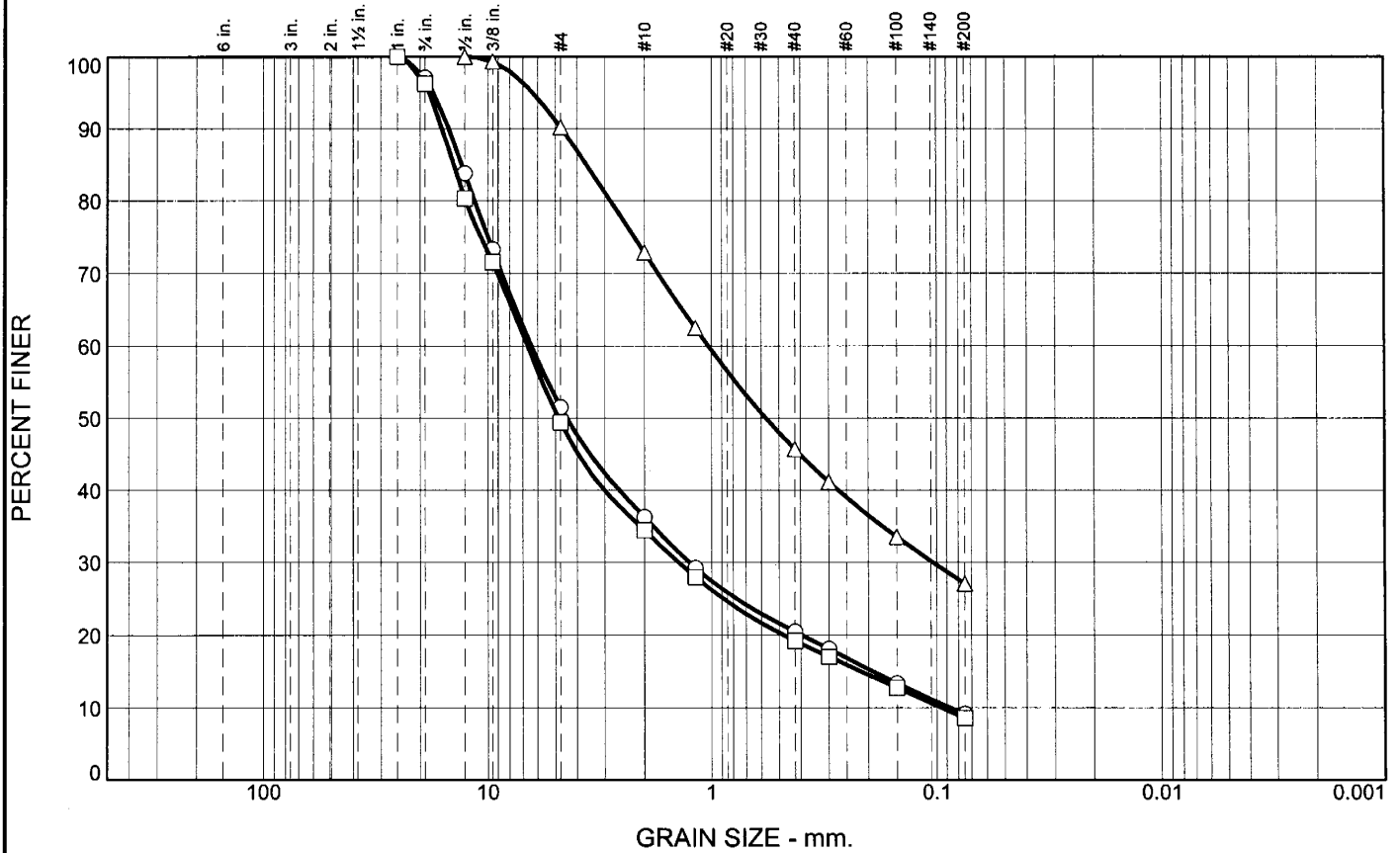
SIEVE number size	PERCENT FINER	
	○	□
#4	61.8	65.8
#10	44.3	53.1
#16	36.5	46.4
#40	24.8	34.7
#50	22.0	31.2
#100	17.5	25.2
#200	13.4	19.6

Material Description
 silty sand with gravel
 clayey sand with gravel

REMARKS:

○ Source of Sample: RRBP 1 Depth: 75.0 - 76.4' Sample Number: O
 □ Source of Sample: RRBP 1 Depth: 80.0 - 80.8' Sample Number: P

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	48.4	42.5	9.1		GW-GM	A-1-a	NP	24
□	0.0	50.6	40.8	8.6		GP-GM	A-1-a	NP	26
△	0.0	9.8	63.1	27.1					

SIEVE inches size	PERCENT FINER		
	○	□	△
1"	100.0	100.0	
3/4"	97.1	96.2	
1/2"	83.8	80.3	100.0
3/8"	73.3	71.6	99.3
GRAIN SIZE			
D60	6.4120	6.6695	1.0321
D30	1.2557	1.4054	0.1036
D10	0.0871	0.0955	
COEFFICIENTS			
C _c	2.82	3.10	
C _u	73.64	69.84	

SIEVE number size	PERCENT FINER		
	○	□	△
#4	51.6	49.4	90.2
#10	36.3	34.4	72.9
#16	29.2	27.9	62.5
#40	20.5	19.2	45.7
#50	18.1	17.0	41.2
#100	13.3	12.7	33.5
#200	9.1	8.6	27.1

Material Description
○ well-graded gravel with silt and sand
□ poorly graded gravel with silt and sand
△

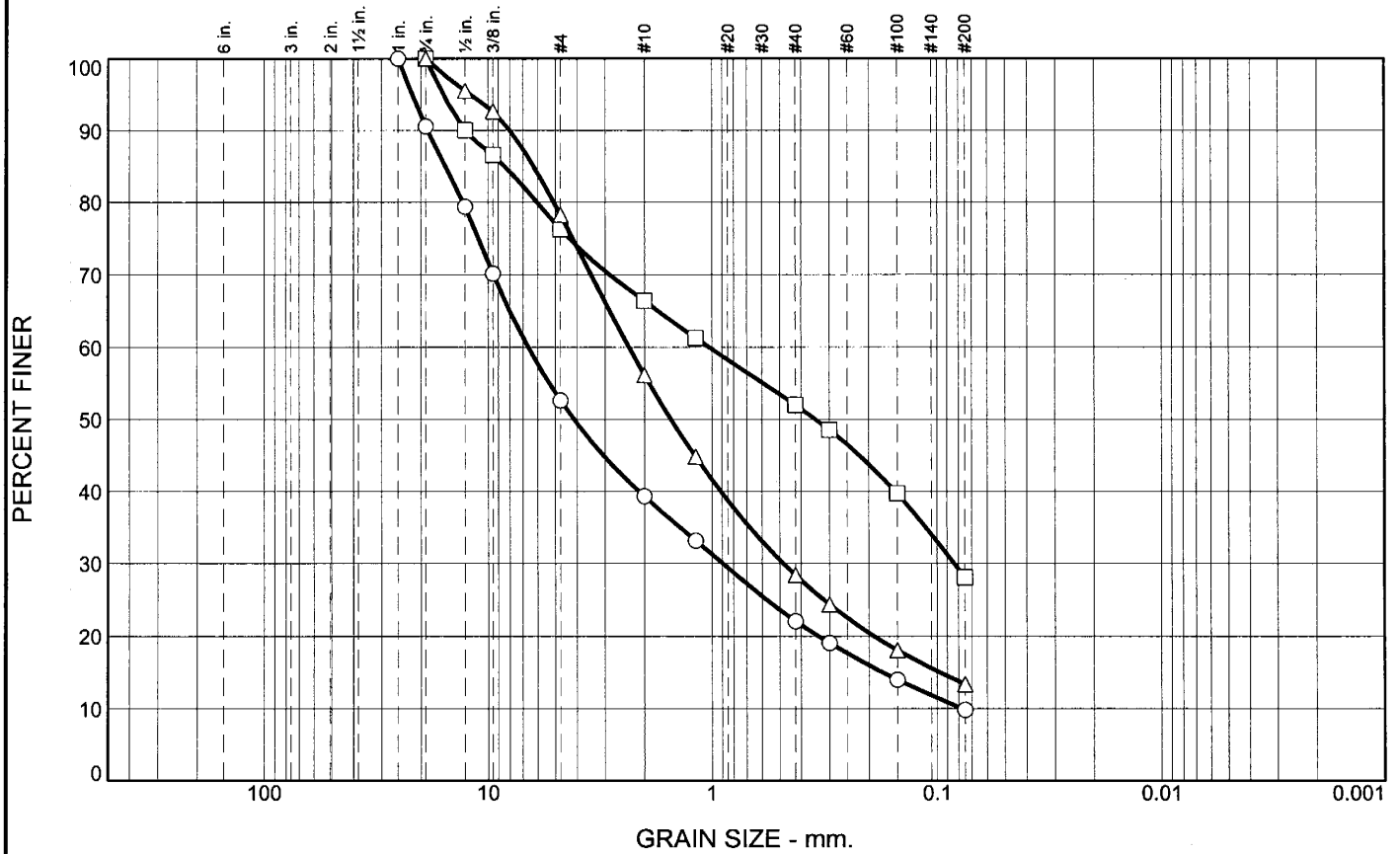
REMARKS:
○
□
△

○ Source of Sample: RRBA-2 Depth: 5.0 - 6.5' Sample Number: A
 □ Source of Sample: RRBA-2 Depth: 15.0 - 15.5' Sample Number: C
 △ Source of Sample: RRBA-2 Depth: 20.0 - 20.5' Sample Number: D

**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: A. Bafghi
 Project: Boulder City Bypass
 Project No.: EA 73307, FL-3-11
Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	47.4	42.8	9.8		GW-GM	A-1-a	NP	20
□	0.0	23.7	48.2	28.1		SC	A-2-6(1)	19	38
△	0.0	21.8	64.8	13.4		SM			

SIEVE inches size	PERCENT FINER		
	○	□	△
1"	100.0		
3/4"	90.6	100.0	100.0
1/2"	79.4	90.1	95.5
3/8"	70.2	86.6	92.7
GRAIN SIZE			
D ₆₀	6.6255	1.0305	2.3447
D ₃₀	0.8953	0.0836	0.4813
D ₁₀	0.0772		
COEFFICIENTS			
C _c	1.57		
C _u	85.83		

SIEVE number size	PERCENT FINER		
	○	□	△
#4	52.6	76.3	78.2
#10	39.3	66.4	56.1
#16	33.2	61.3	44.8
#40	22.1	52.0	28.4
#50	19.1	48.6	24.4
#100	14.0	39.7	18.1
#200	9.8	28.1	13.4

Material Description
○ well-graded gravel with silt and sand
□ clayey sand with gravel
△ silty sand with gravel

REMARKS:

○

□

△

○ Source of Sample: RRBA-2 Depth: 30.0 - 31.5' Sample Number: F
 □ Source of Sample: RRBA-2 Depth: 45.0 - 46.0' Sample Number: I
 △ Source of Sample: RRBA-2 Depth: 60.0 - 60.5' Sample Number: L

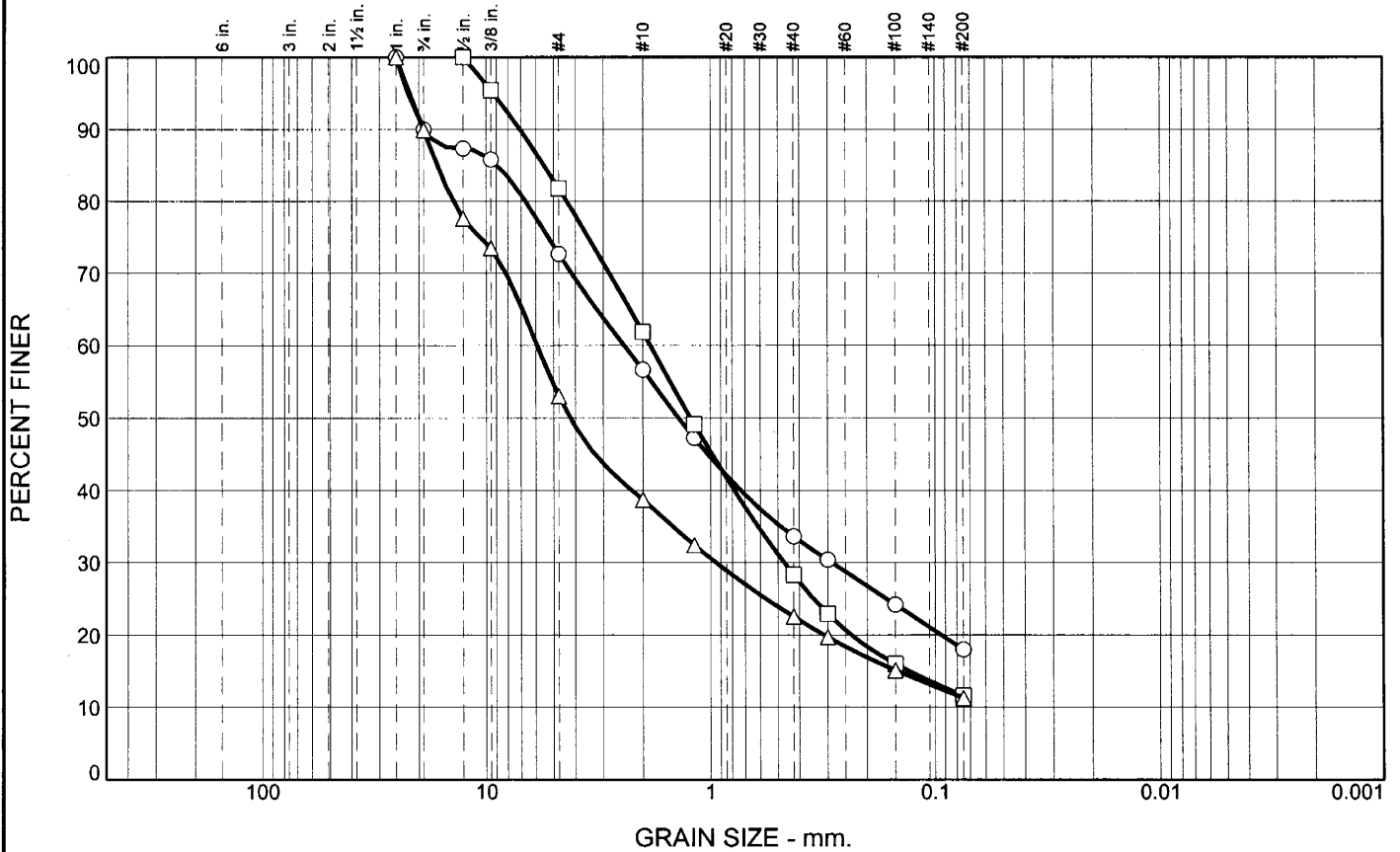
**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: A. Bafghi
 Project: Boulder City Bypass

Project No.: EA 73307, FL-3-11

Figure

Particle Size Distribution Report

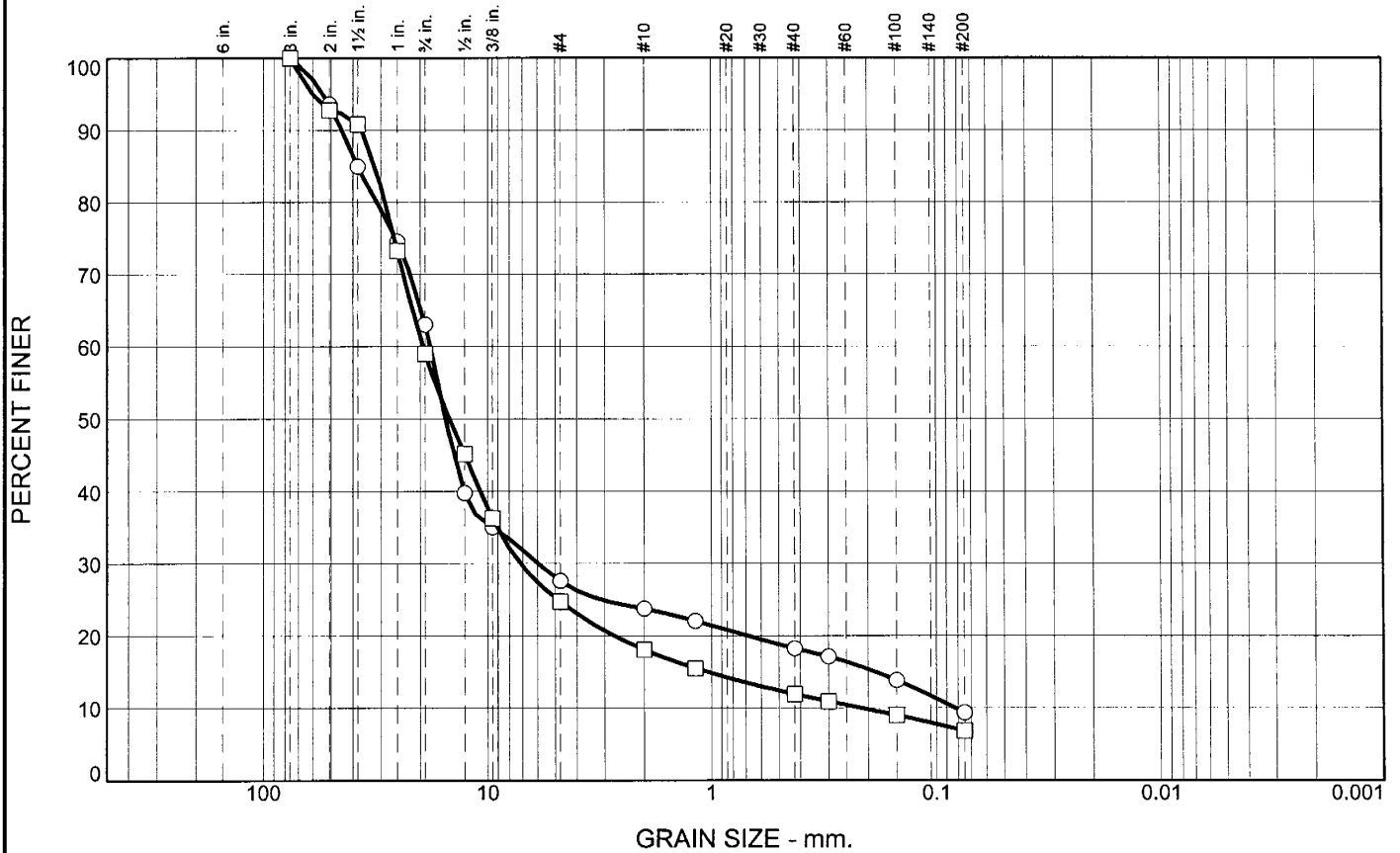


	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	27.3	54.7	18.0		SM			
□	0.0	18.2	70.3	11.5		SP-SM	A-1-b	22	23
△	0.0	47.0	41.8	11.2		GP-GM			

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER			Material Description
	○	□	△		○	□	△	
1"	100.0		100.0	#4	72.7	81.8	53.0	○ silty sand with gravel □ poorly graded sand with silt and gravel △ poorly graded gravel with silt and sand
3/4"	90.0		89.9	#10	56.6	61.9	38.8	
1/2"	87.4	100.0	77.6	#16	47.3	49.2	32.4	
3/8"	85.9	95.4	73.5	#40	33.6	28.3	22.5	
				#50	30.4	22.9	19.7	
				#100	24.2	16.0	15.1	
				#200	18.0	11.5	11.2	
	GRAIN SIZE							REMARKS: ○ □ △
D60	2.4186	1.8514	5.9265					
D30	0.2869	0.4678	0.9449					
D10								
	COEFFICIENTS							
C _c								
C _u								

○ Source of Sample: RRBA-2 Depth: 65.0 - 65.3' Sample Number: M
 □ Source of Sample: RRBA-2 Depth: 75.0 - 76.2' Sample Number: O
 △ Source of Sample: RRBA-2 Depth: 80.0 - 81.2' Sample Number: P

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	72.4	18.3	9.3		GP-GM	A-1-a	NP	21
□	0.0	75.3	17.9	6.8		GP-GC	A-1-a	21	25

SIEVE inches size	PERCENT FINER	
	○	□
3"	100.0	100.0
2"	93.6	92.8
1 1/2"	85.0	90.8
1"	74.5	73.3
3/4"	63.0	59.0
1/2"	39.8	45.2
3/8"	35.1	36.3
GRAIN SIZE		
D60	18.0837	19.4996
D30	5.9559	7.1496
D10	0.0826	0.2156
COEFFICIENTS		
C _c	23.76	12.16
C _u	219.04	90.45

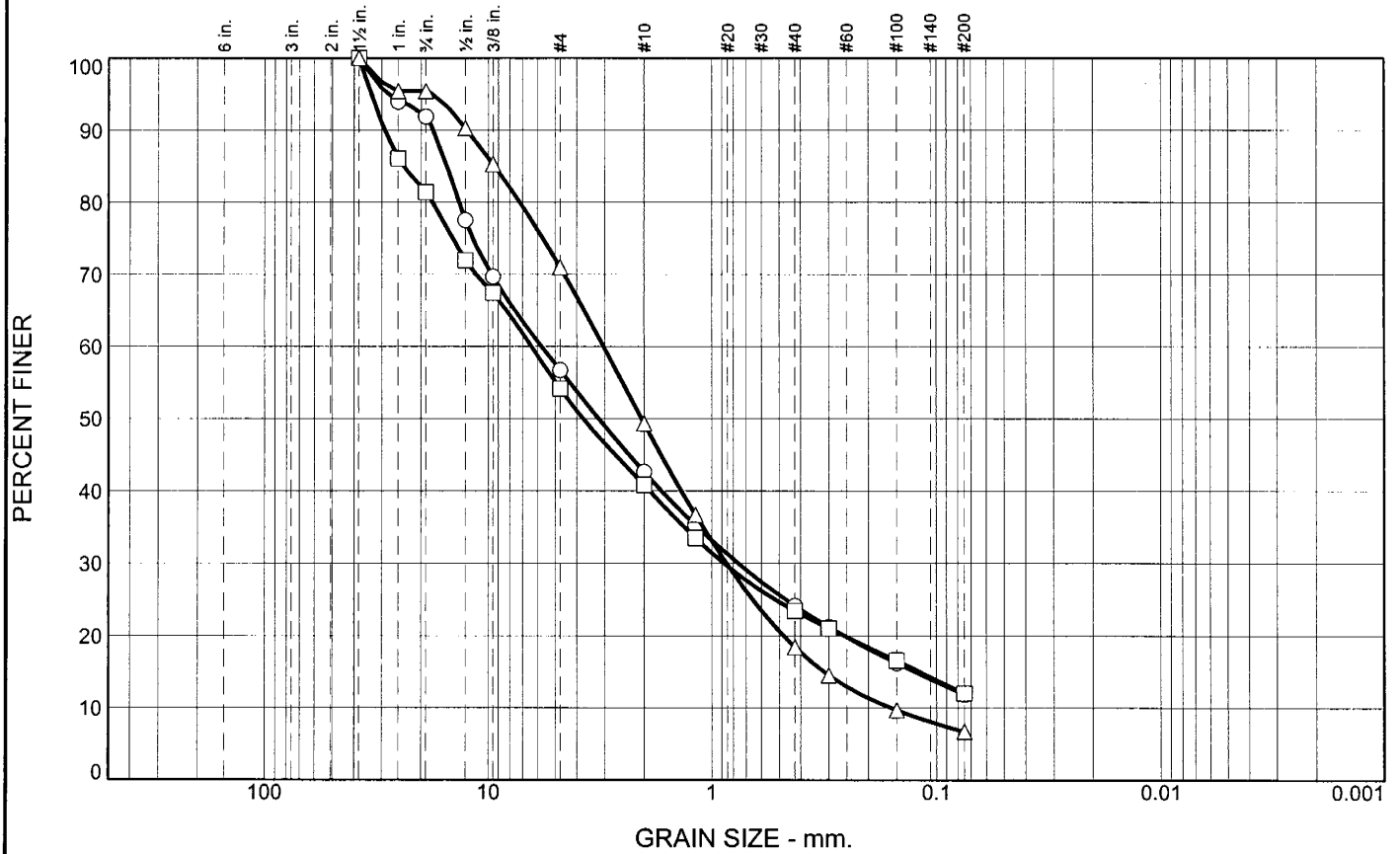
SIEVE number size	PERCENT FINER	
	○	□
#4	27.6	24.7
#10	23.7	18.0
#16	22.0	15.5
#40	18.2	11.9
#50	17.1	10.9
#100	13.8	9.0
#200	9.3	6.8

Material Description
 ○ poorly graded gravel with silt and sand
 □ poorly graded gravel with siltyclay and sand

REMARKS:
 ○
 □

○ Source of Sample: BRW 1 Depth: 0.0 - 5.0' Sample Number: RV1
 □ Source of Sample: BRW 1 Depth: 5.0 - 10.0' Sample Number: RV2

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	43.3	44.9	11.8		SW-SM			
□	0.0	45.9	42.1	12.0		GW-GM			
△	0.0	29.0	64.3	6.7		SW-SM			

SIEVE inches size	PERCENT FINER		
	○	□	△
1 1/2"	100.0	100.0	100.0
1"	93.9	86.1	95.4
3/4"	91.9	81.5	95.4
1/2"	77.6	72.0	90.3
3/8"	69.7	67.4	85.3
GRAIN SIZE			
D60	5.7691	6.3838	3.0348
D30	0.7589	0.8781	0.8571
D10			0.1593
COEFFICIENTS			
C _c			1.52
C _u			19.06

SIEVE number size	PERCENT FINER		
	○	□	△
#4	56.7	54.1	71.0
#10	42.6	40.8	49.3
#16	35.3	33.5	36.7
#40	24.2	23.4	18.4
#50	21.2	21.0	14.5
#100	16.2	16.6	9.7
#200	11.8	12.0	6.7

Material Description
 ○ well-graded sand with silt and gravel
 □ will-graded gravel with silt and sand
 △ well-graded sand with silt and gravel

REMARKS:
 ○
 □
 △

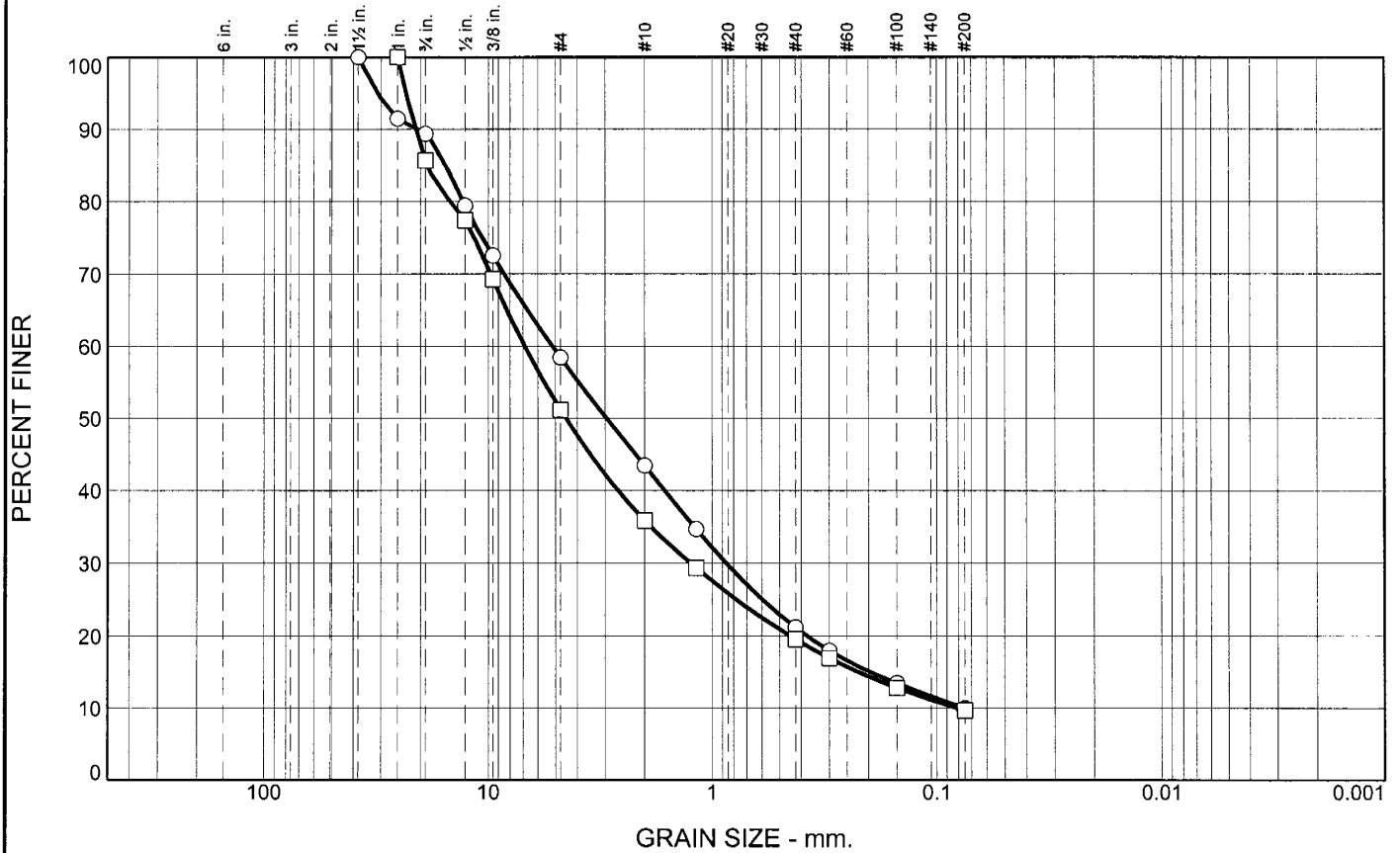
○ Source of Sample: BRW 1 Depth: 5.0 - 6.5' Sample Number: A
 □ Source of Sample: BRW 1 Depth: 10.0 - 11.5' Sample Number: B
 △ Source of Sample: BRW 1 Depth: 15.0 - 16.5' Sample Number: C

**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: A. Bafghi
 Project: Boulder City Retaining Walls
 Project No.: EA 73307, FL-8-09

Figure

Particle Size Distribution Report

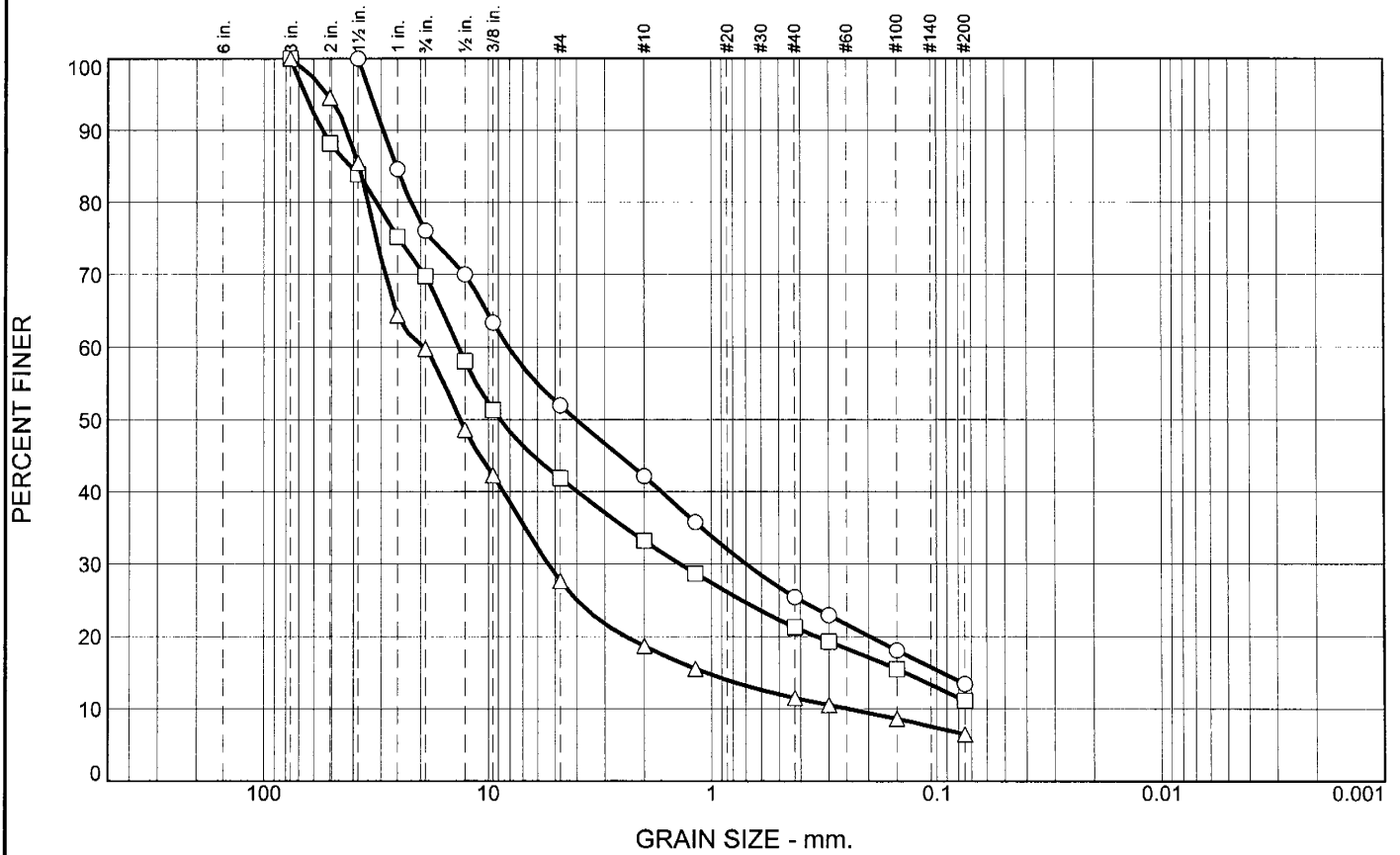


	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	41.6	48.5	9.9		SW-SM			
□	0.0	48.8	41.6	9.6		GW-GM			

SIEVE inches size	PERCENT FINER		SIEVE number size	PERCENT FINER		Material Description ○ well-graded sand with silt and gravel □ will-graded gravel with silt and sand
	○	□		○	□	
1 1/2"	100.0		#4	58.4	51.2	
1"	91.5	100.0	#10	43.5	35.9	
3/4"	89.3	85.7	#16	34.7	29.4	
1/2"	79.4	77.4	#40	21.2	19.6	
3/8"	72.5	69.3	#50	17.9	16.9	
GRAIN SIZE			#100	13.4	12.8	
D ₆₀	5.1707	6.8730	#200	9.9	9.6	
D ₃₀	0.8645	1.2488				
D ₁₀	0.0759	0.0817				
COEFFICIENTS						
C _c	1.90	2.78				
C _u	68.12	84.16				

○ Source of Sample: BRW 1 Depth: 20.0 - 21.5' Sample Number: D
 □ Source of Sample: BRW 1 Depth: 30.0 - 31.5' Sample Number: F

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	48.0	38.6	13.4		GM			
□	0.0	58.1	30.8	11.1		GP-GM	A-1-a	21	23
△	0.0	72.4	21.1	6.5		GP-GM	A-1-a	20	23

SIEVE inches size	PERCENT FINER		
	○	□	△
3"		100.0	100.0
2"		88.2	94.6
1 1/2"	100.0	83.9	85.5
1"	84.6	75.2	64.4
3/4"	76.1	69.8	59.8
1/2"	70.0	58.1	48.6
3/8"	63.4	51.3	42.3
GRAIN SIZE			
D ₆₀	8.1365	13.5740	19.3375
D ₃₀	0.7000	1.3796	5.3865
D ₁₀			0.2461
COEFFICIENTS			
C _c			6.10
C _u			78.58

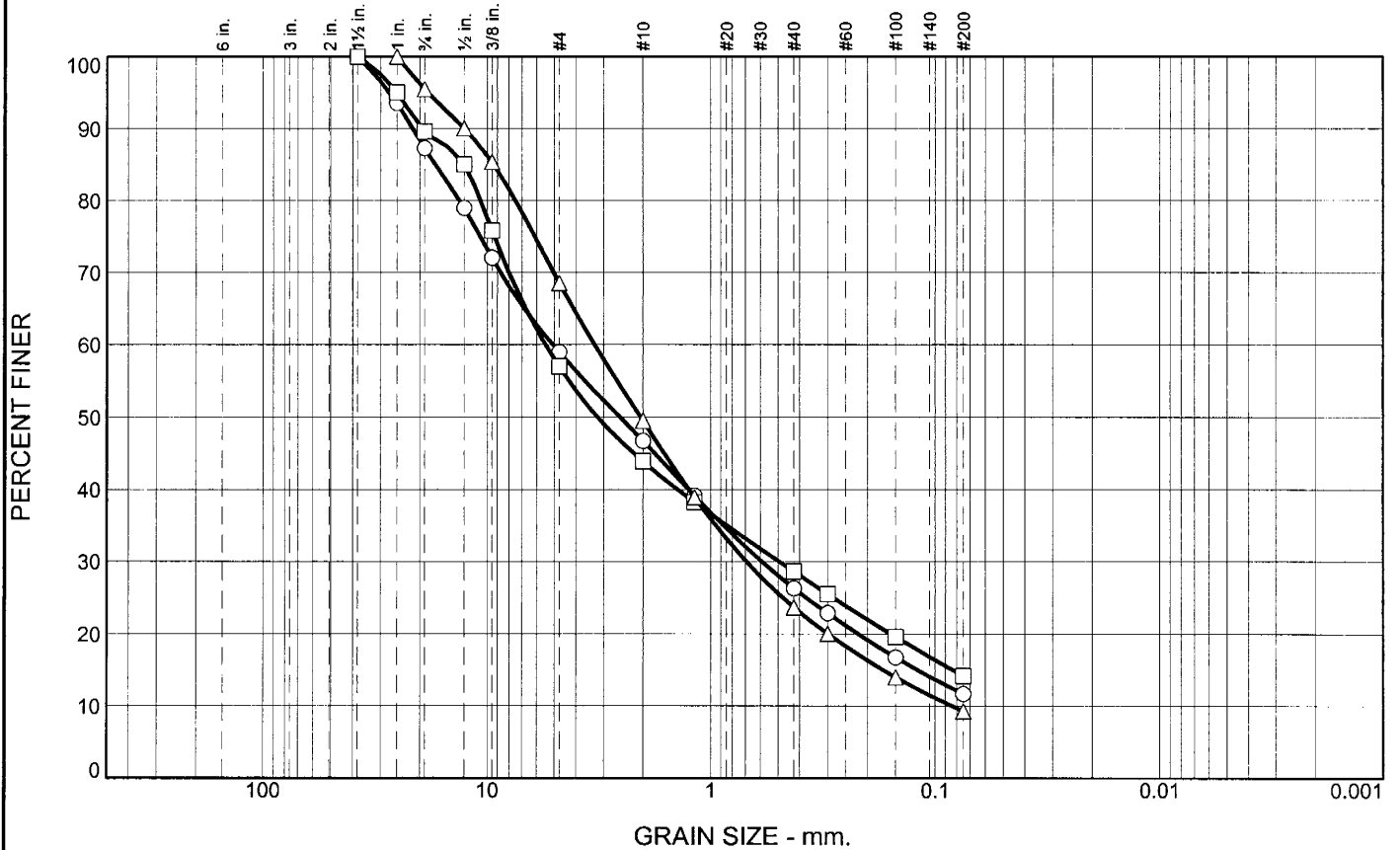
SIEVE number size	PERCENT FINER		
	○	□	△
#4	52.0	41.9	27.6
#10	42.1	33.2	18.7
#16	35.8	28.7	15.5
#40	25.4	21.3	11.5
#50	22.9	19.3	10.5
#100	18.1	15.5	8.6
#200	13.4	11.1	6.5

Material Description	
○	silty gravel with sand
□	poorly graded gravel with silt and sand
△	poorly graded gravel with silt and sand

REMARKS:
○
□
△

○ Source of Sample: BRW 2 Depth: 5.0 - 5.3' Sample Number: A
 □ Source of Sample: BRW 2 Depth: 0.0 - 5.0' Sample Number: RV1
 △ Source of Sample: BRW 2 Depth: 5.0 - 10.0' Sample Number: RV2

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	41.0	47.3	11.7		SW-SM			
□	0.0	43.1	42.7	14.2		GM			
△	0.0	31.5	59.2	9.3		SW-SM	A-1-a	NP	20

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER			Material Description
	○	□	△		○	□	△	
1 1/2"	100.0	100.0		#4	59.0	56.9	68.5	○ well-graded sand with silt and gravel
1"	93.5	95.0	100.0	#10	46.7	43.9	49.5	
3/4"	87.3	89.6	95.5	#16	39.2	38.3	38.9	□ silty gravel with sand
1/2"	78.9	85.0	90.0	#40	26.3	28.6	23.7	
3/8"	72.0	75.8	85.4	#50	22.9	25.5	20.1	△ well-graded sand with silt and gravel
GRAIN SIZE				#100	16.7	19.6	14.0	
COEFFICIENTS				#200	11.7	14.2	9.3	
D ₆₀	5.0788	5.4768	3.2926					
D ₃₀	0.5897	0.4932	0.6908					
D ₁₀			0.0841					
C _c			1.72					
C _u			39.15					

○ Source of Sample: BRW 3 Depth: 5.0 - 6.5' Sample Number: A
 □ Source of Sample: BRW 3 Depth: 20.0 - 21.5' Sample Number: D
 △ Source of Sample: BRW 3 Depth: 30.0 - 31.5' Sample Number: F

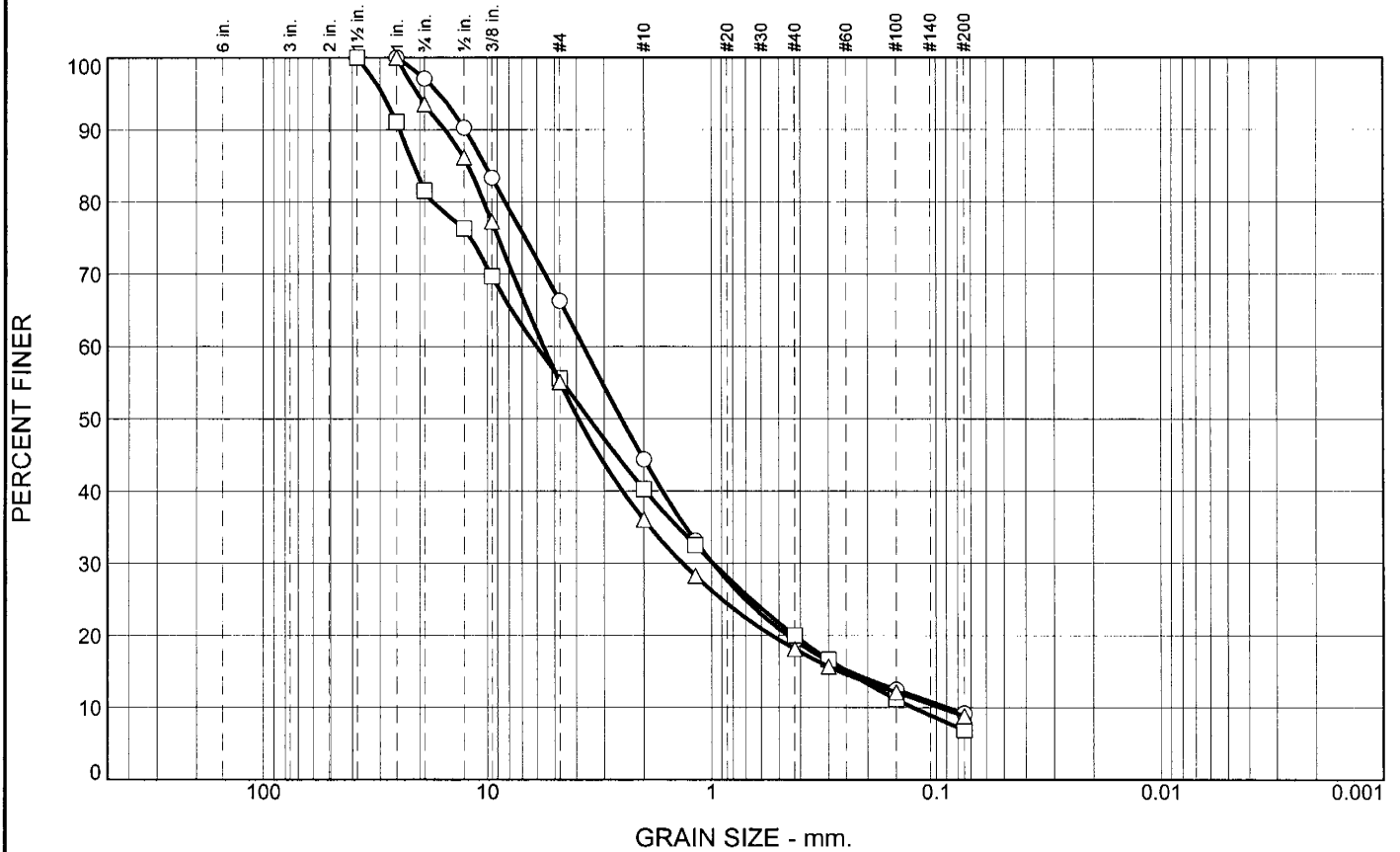
REMARKS:

○

□

△

Particle Size Distribution Report



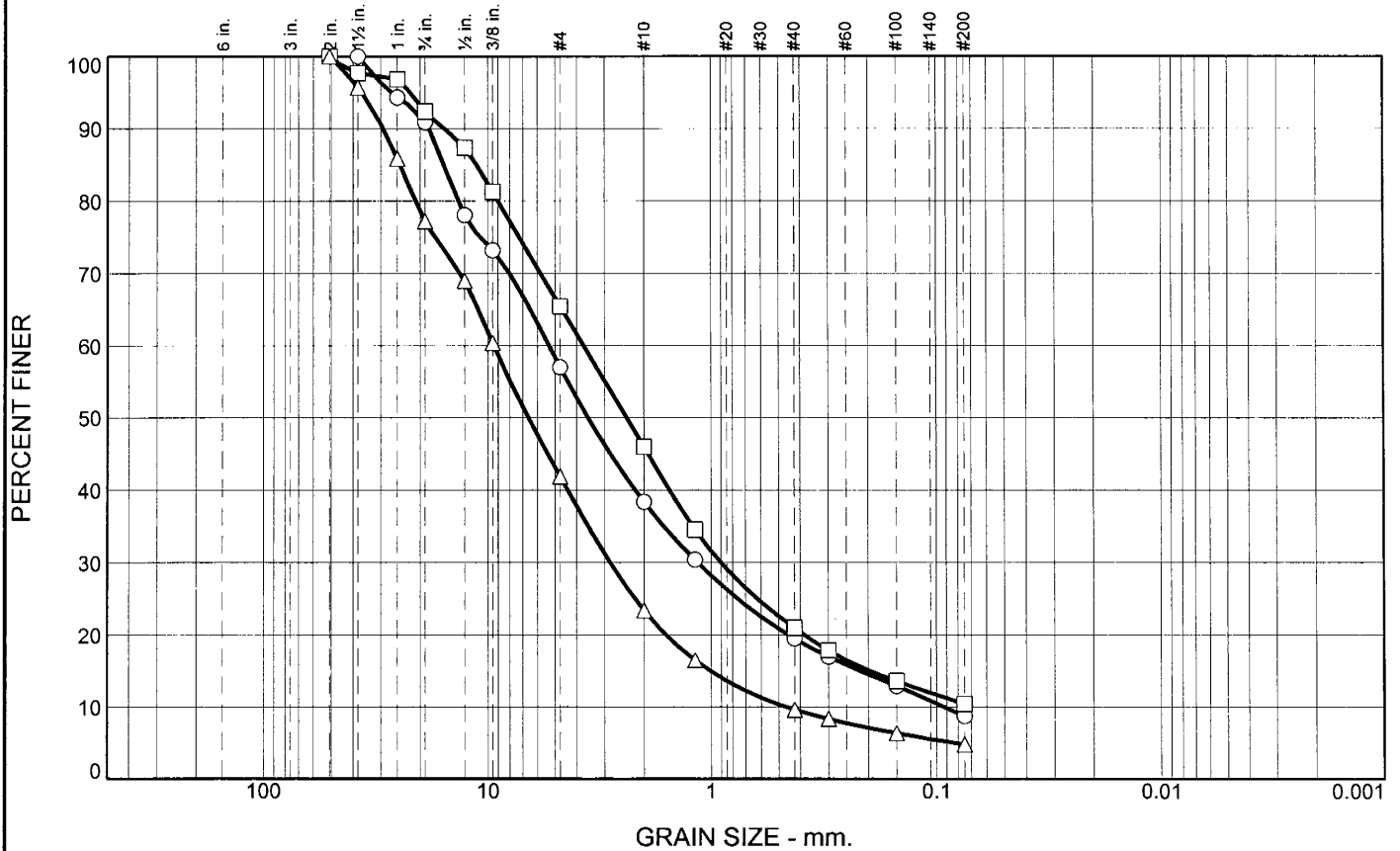
	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	33.7	57.1		9.2	SW-SM			
□	0.0	44.4	48.7		6.9	SW-SM			
△	0.0	44.9	46.3		8.8	SP-SM			

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER			Material Description
	○	□	△		○	□	△	
1 1/2"		100.0		#4	66.3	55.6	55.1	○ well-graded sand with silt and gravel □ well-graded sand with silt and gravel △ poorly-graded sand with silt and gravel
1"	100.0	91.1	100.0	#10	44.4	40.3	36.1	
3/4"	97.1	81.6	93.5	#16	33.1	32.5	28.3	
1/2"	90.3	76.3	86.2	#40	19.3	20.0	18.1	
3/8"	83.4	69.7	77.3	#50	16.4	16.6	15.7	
				#100	12.5	11.1	12.1	
				#200	9.2	6.9	8.8	
GRAIN SIZE								
D ₆₀	3.7144	6.0390	5.6180					
D ₃₀	0.9876	0.9808	1.3463					
D ₁₀	0.0893	0.1264	0.0961					
COEFFICIENTS								
C _c	2.94	1.26	3.36					
C _u	41.61	47.79	58.49					

○ Source of Sample: BRW 3 Depth: 35.0 - 36.5' Sample Number: G
 □ Source of Sample: BRW 3 Depth: 40.0 - 41.5' Sample Number: H
 △ Source of Sample: BRW 3 Depth: 45.0 - 46.5' Sample Number: I

NEVADA DEPARTMENT OF TRANSPORTATION	Client: A. Bafghi Project: Boulder City Retaining Walls Project No.: EA 73307, FL-8-09
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Particle Size Distribution Report

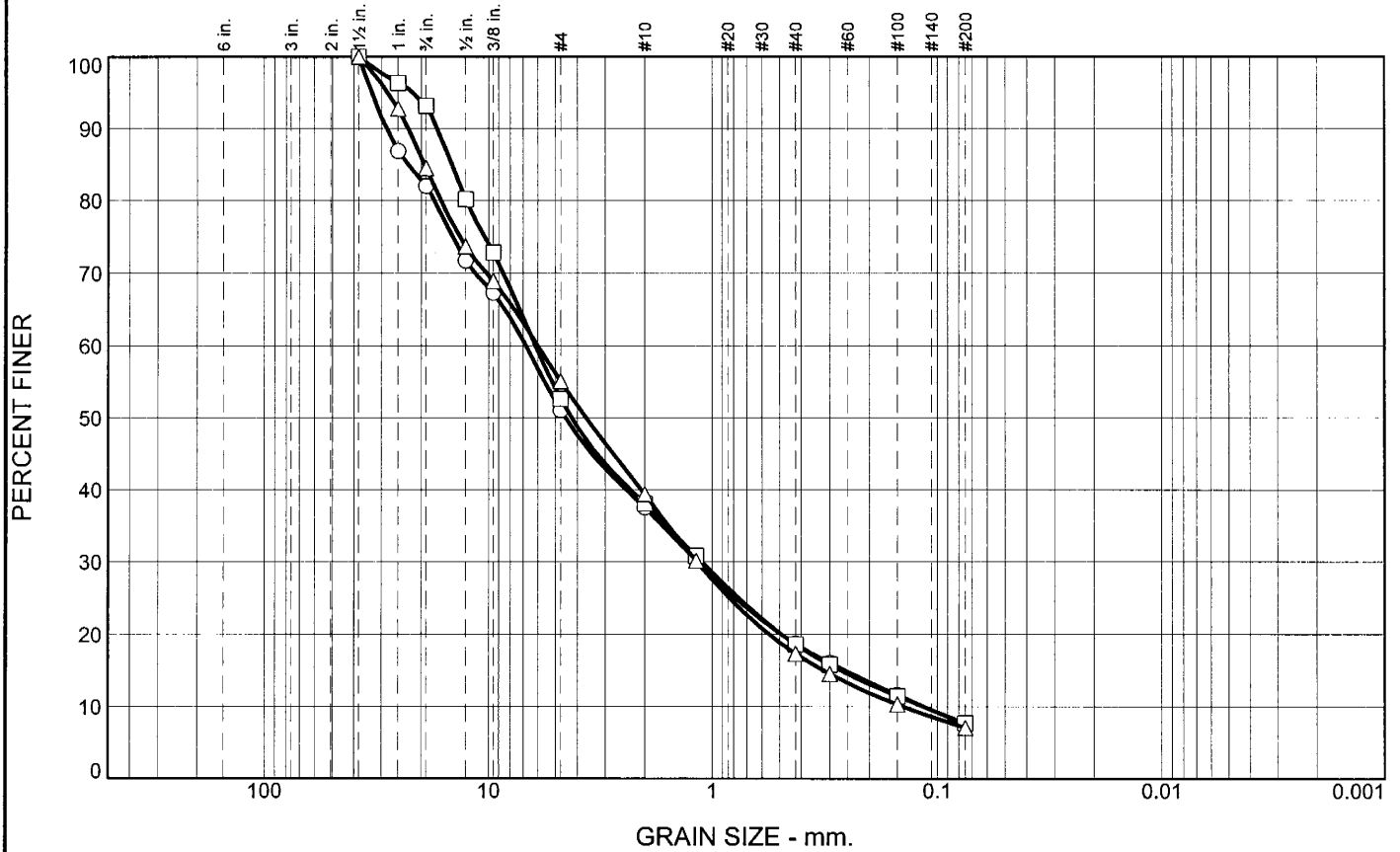


	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	43.0	48.3	8.7		SW-SM			
□	0.0	34.5	55.1	10.4		SP-SM	A-1-a	18	20
△	0.0	58.1	37.1	4.8		GW	A-1-a	20	21

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER			Material Description ○ well-graded sand with silt and gravel □ poorly graded sand with silt and gravel △ well-graded gravel with sand
	○	□	△		○	□	△	
2"		100.0	100.0					
1 1/2"	100.0	97.7	95.7	#4	57.0	65.5	41.9	
1"	94.3	96.8	85.9	#10	38.4	46.0	23.4	
3/4"	90.9	92.3	77.2	#16	30.4	34.6	16.5	
1/2"	78.1	87.3	69.0	#40	19.5	21.0	9.6	
3/8"	73.2	81.3	60.4	#50	17.0	17.8	8.3	
				#100	12.9	13.6	6.4	
				#200	8.7	10.4	4.8	
GRAIN SIZE								
D ₆₀	5.3260	3.7235	9.4111					
D ₃₀	1.1453	0.9021	2.8299					
D ₁₀	0.0924		0.4635					
COEFFICIENTS								
C _c	2.67		1.84					
C _u	57.64		20.30					
REMARKS:								
○								
□								
△								

○ Source of Sample: BRW 3 Depth: 50.0 - 51.5' Sample Number: J
 □ Source of Sample: BRW 3 Depth: 0.0 - 5.0' Sample Number: RV1
 △ Source of Sample: BRW 3 Depth: 5.0 - 10.0' Sample Number: RV2

Particle Size Distribution Report

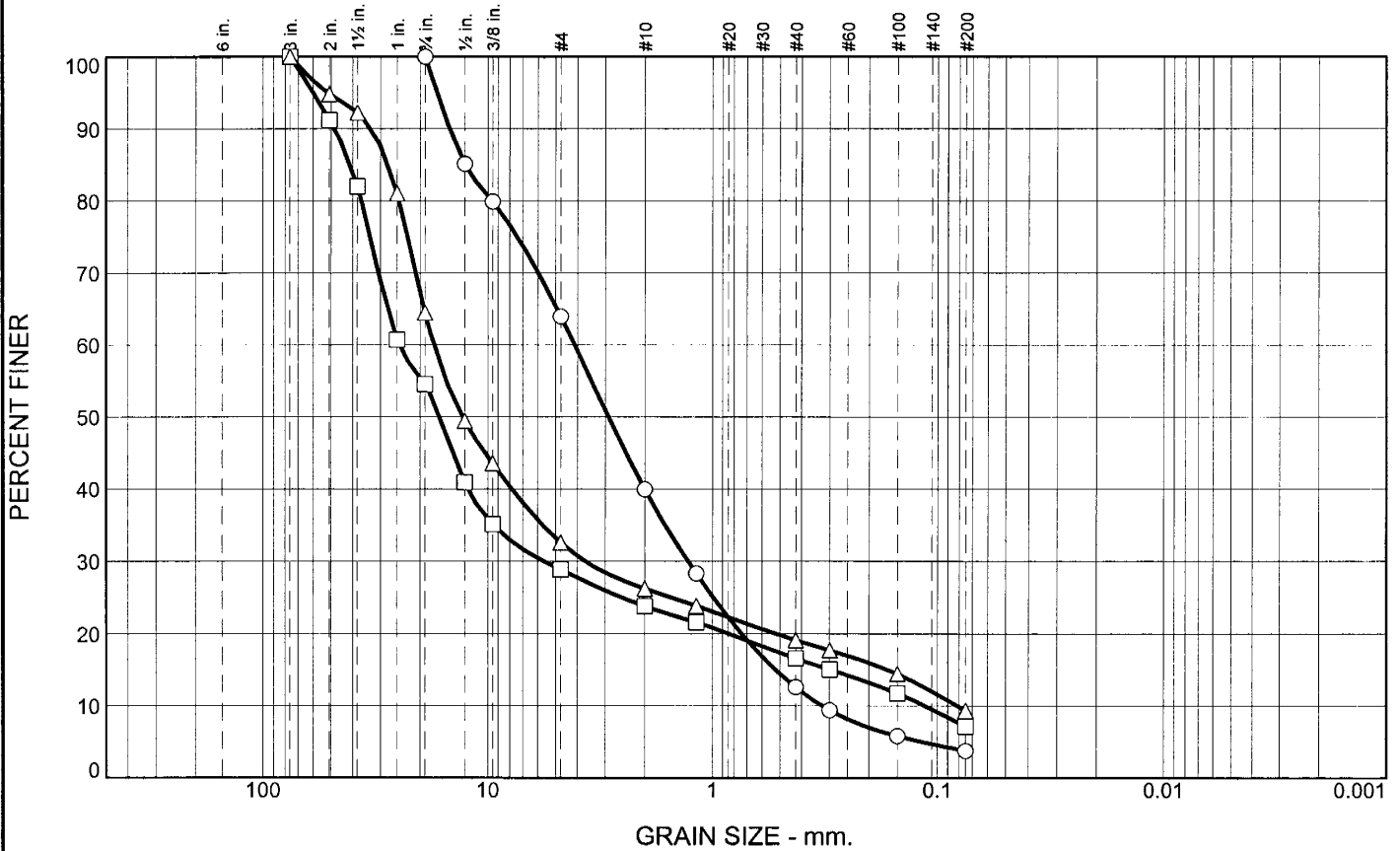


	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	49.0	43.5	7.5		GW-GM			
□	0.0	47.4	44.9	7.7		GW-GM			
△	0.0	44.9	48.0	7.1		SW-SM			

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER			Material Description
	○	□	△		○	□	△	
1 1/2"	100.0	100.0	100.0	#4	51.0	52.6	55.1	○ well-graded gravel with silt and sand □ well-graded gravel with silt and sand △ well-graded sand with silt and gravel
1"	86.9	96.3	92.7	#10	37.5	38.1	39.4	
3/4"	82.0	93.1	84.5	#16	30.2	30.8	30.1	
1/2"	71.7	80.2	73.6	#40	18.7	18.6	17.3	
3/8"	67.3	72.8	68.9	#50	16.0	15.8	14.5	
				#100	11.6	11.4	10.3	
				#200	7.5	7.7	7.1	
GRAIN SIZE								REMARKS:
D ₆₀	6.7971	6.1591	6.0072					
D ₃₀	1.1609	1.1138	1.1703					
D ₁₀	0.1146	0.1152	0.1417					
COEFFICIENTS								
C _c	1.73	1.75	1.61					
C _u	59.31	53.49	42.40					

○ Source of Sample: BRW 4 Depth: 5.0 - 6.5' Sample Number: A
 □ Source of Sample: BRW 4 Depth: 10.0 - 11.5' Sample Number: B
 △ Source of Sample: BRW 4 Depth: 15.0 - 16.5' Sample Number: C

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	36.0	60.2		3.8	SW			
□	0.0	71.1	21.8		7.1	GP-GM	A-1-a	NP	24
△	0.0	67.4	23.3		9.3	GP-GM	A-1-a	NP	23

SIEVE inches size	PERCENT FINER		
	○	□	△
3"		100.0	100.0
2"		91.2	94.8
1 1/2"		82.0	92.2
1"		60.7	81.0
3/4"	100.0	54.5	64.5
1/2"	85.1	40.9	49.4
3/8"	79.9	35.2	43.6
GRAIN SIZE			
D60	4.1212	24.8596	17.3959
D30	1.2820	5.6116	3.6695
D10	0.3244	0.1133	0.0815
COEFFICIENTS			
C _c	1.23	11.18	9.49
C _u	12.71	219.39	213.38

SIEVE number size	PERCENT FINER		
	○	□	△
#4	64.0	28.9	32.6
#10	40.0	23.8	26.3
#16	28.3	21.6	23.9
#40	12.6	16.6	19.1
#50	9.4	15.0	17.7
#100	5.8	11.7	14.4
#200	3.8	7.1	9.3

Material Description
○ well-graded sand with gravel
□ poorly graded gravel with silt and sand
△ poorly graded gravel with silt and sand

REMARKS:
○
□
△

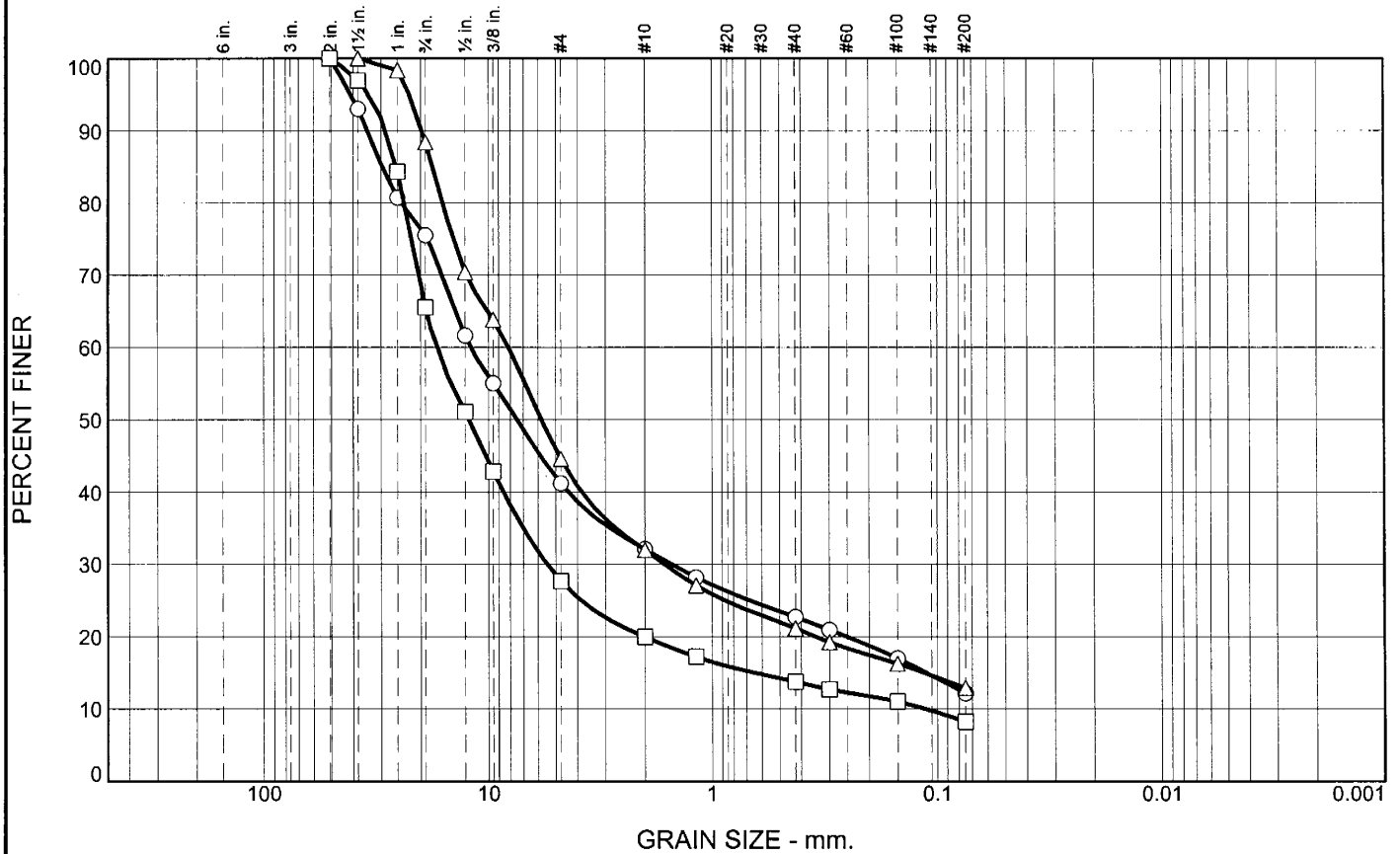
○ Source of Sample: BRW 4 Depth: 30.0 - 31.5' Sample Number: F
 □ Source of Sample: BRW 4 Depth: 0.0 - 5.0' Sample Number: RV1
 △ Source of Sample: BRW 4 Depth: 5.0 - 10.0' Sample Number: RV2

**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: A. Bafghi
 Project: Boulder City Retaining Walls
 Project No.: EA 73307, FL-8-09

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	58.8	29.1		12.1	GM	A-1-a	NP	24
□	0.0	72.3	19.5		8.2	GP-GM	A-1-a	NP	25
△	0.0	55.4	31.7		12.9	GM	A-1-a	24	30

SIEVE inches size	PERCENT FINER		
	○	□	△
2"	100.0	100.0	
1-1/2"	93.0	96.9	100.0
1"	80.8	84.3	98.4
3/4"	75.5	65.5	88.4
1/2"	61.6	51.1	70.4
3/8"	55.0	42.8	63.8
GRAIN SIZE			
D ₆₀	12.0039	17.0079	8.1559
D ₃₀	1.5173	5.4595	1.6345
D ₁₀		0.1130	
COEFFICIENTS			
C _c		15.52	
C _u		150.57	

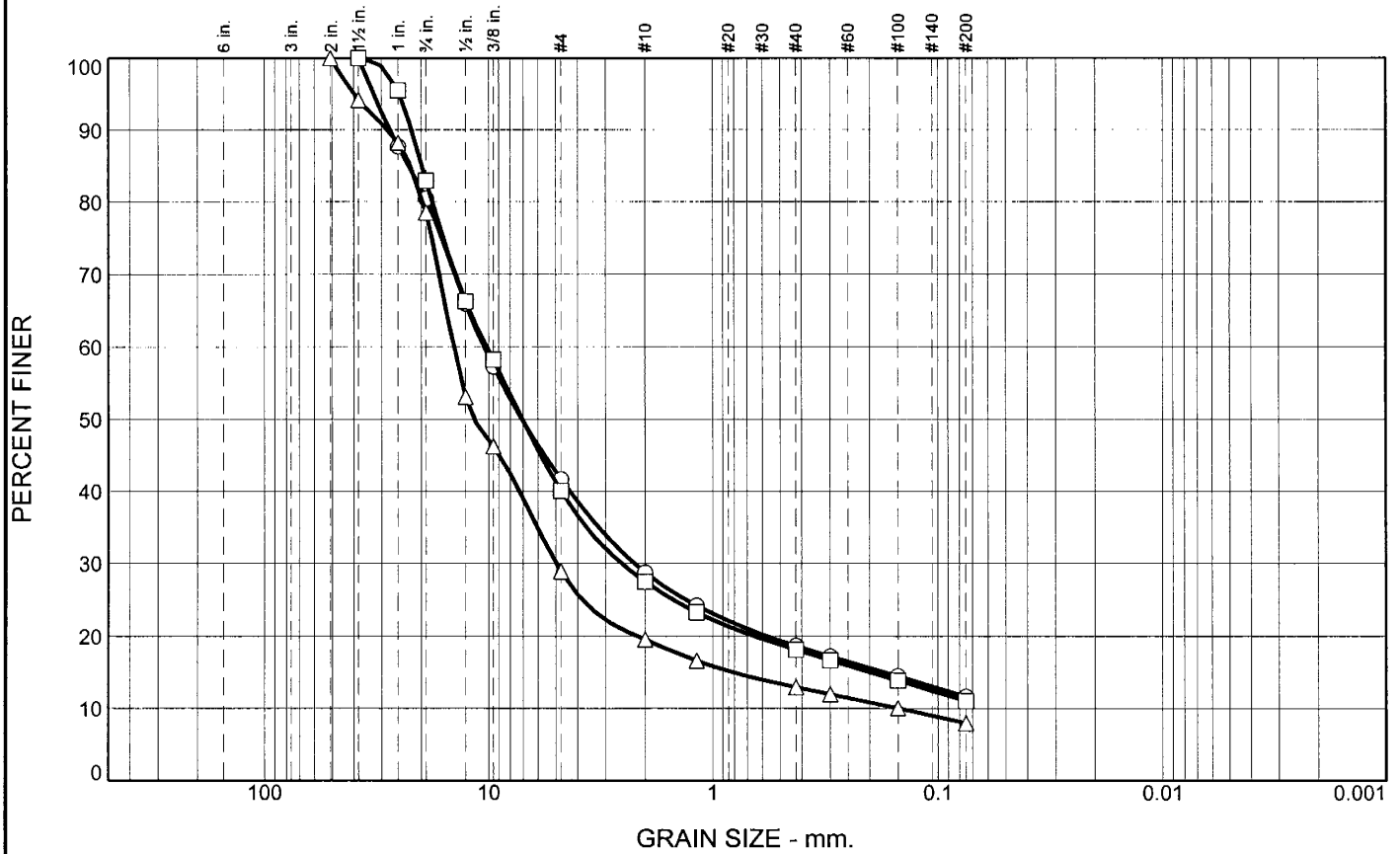
SIEVE number size	PERCENT FINER		
	○	□	△
#4	41.2	27.7	44.6
#10	32.1	19.9	32.0
#16	28.2	17.2	27.1
#40	22.7	13.7	21.1
#50	20.9	12.7	19.2
#100	17.0	11.0	16.2
#200	12.1	8.2	12.9

Material Description
○ silty gravel with sand
□ poorly graded gravel with silt and sand
△ silty gravel with sand

REMARKS:
○
□
△

○ Source of Sample: RRC1 Depth: 0-5 Sample Number: RV1
 □ Source of Sample: RRC1 Depth: 5-10 Sample Number: RV2
 △ Source of Sample: RRC1 Depth: 10-15 Sample Number: RV3

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	58.3	30.1	11.6		GP-GM	A-1-a	24	30
□	0.0	60.0	29.0	11.0		GP-GM	A-1-a	24	28
△	0.0	71.1	20.9	8.0		GP-GC	A-1-a	22	28

SIEVE inches size	PERCENT FINER		
	○	□	△
2"			100.0
1-1/2"	100.0	100.0	94.2
1"	87.7	95.5	88.2
3/4"	80.5	82.9	78.5
1/2"	66.0	66.3	53.1
3/8"	57.3	58.2	46.2
GRAIN SIZE			
D ₆₀	10.4962	10.1820	14.3828
D ₃₀	2.2302	2.5464	4.9824
D ₁₀			0.1477
COEFFICIENTS			
C _c			11.68
C _u			97.36

SIEVE number size	PERCENT FINER		
	○	□	△
#4	41.7	40.0	28.9
#10	28.8	27.5	19.5
#16	24.2	23.3	16.6
#40	18.7	18.1	12.9
#50	17.2	16.6	12.0
#100	14.5	13.9	10.0
#200	11.6	11.0	8.0

Material Description
 ○ poorly graded gravel with silt and sand
 □ poorly graded gravel with silt and sand
 △ poorly graded gravel with siltyclay and sand

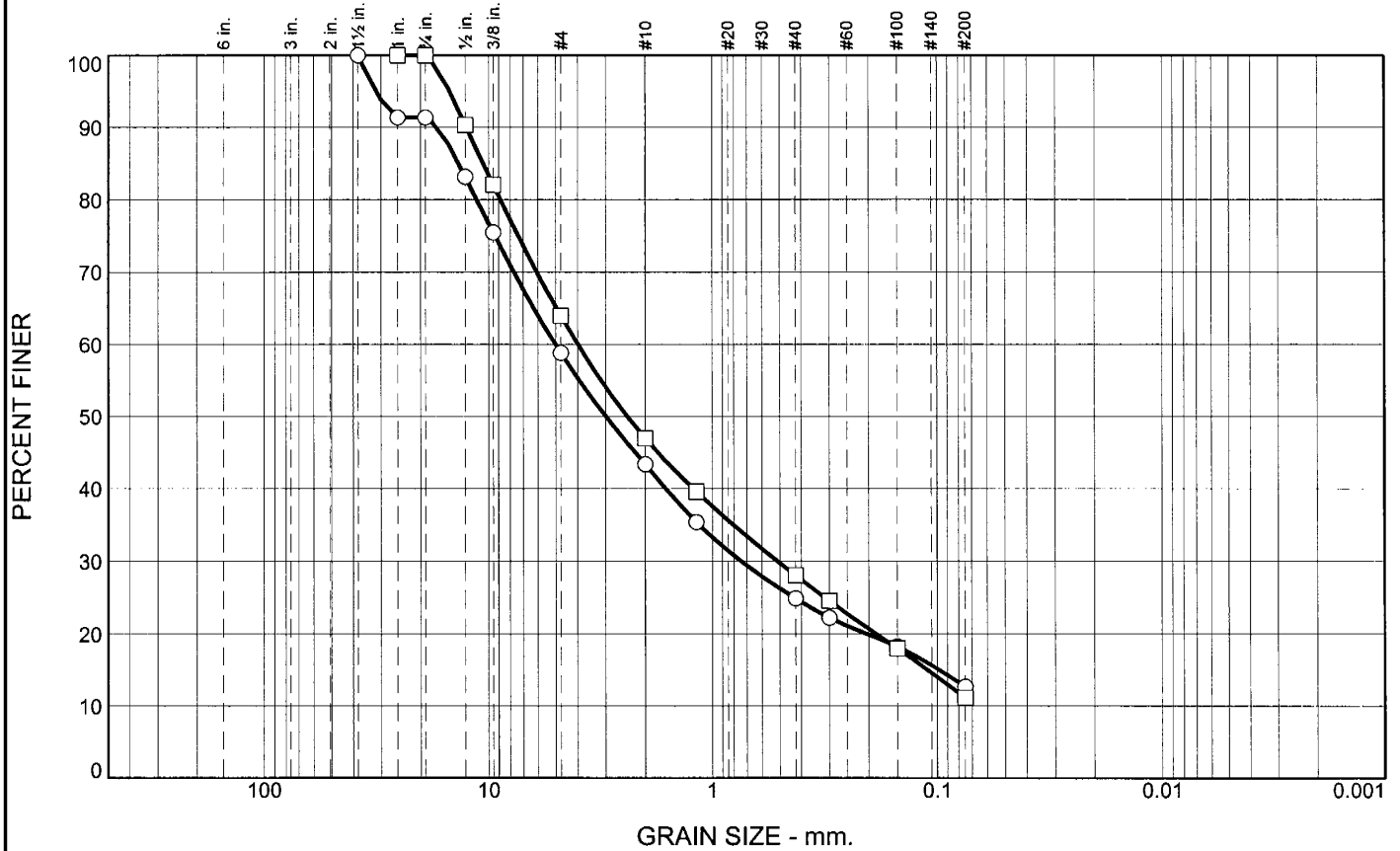
REMARKS:
 ○
 □
 △

○ Source of Sample: RRC1 Depth: 15-20 Sample Number: RV4
 □ Source of Sample: RRC1 Depth: 20-25 Sample Number: RV5
 △ Source of Sample: RRC1 Depth: 25-30 Sample Number: RV6

**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: Abbas Bafghi
 Project: Boulder City Bypass - US 93/US 95 Intersection
 Project No.: FL-02-06
 Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	41.2	46.1		12.7	SP-SM			
□	0.0	36.0	52.8		11.2	SP-SM			

SIEVE inches size	PERCENT FINER	
	○	□
1-1/2"	100.0	
1"	91.4	100.0
3/4"	91.4	100.0
1/2"	83.2	90.3
3/8"	75.5	82.1
GRAIN SIZE		
D ₆₀	5.0278	3.9903
D ₃₀	0.7430	0.5107
D ₁₀		
COEFFICIENTS		
C _c		
C _u		

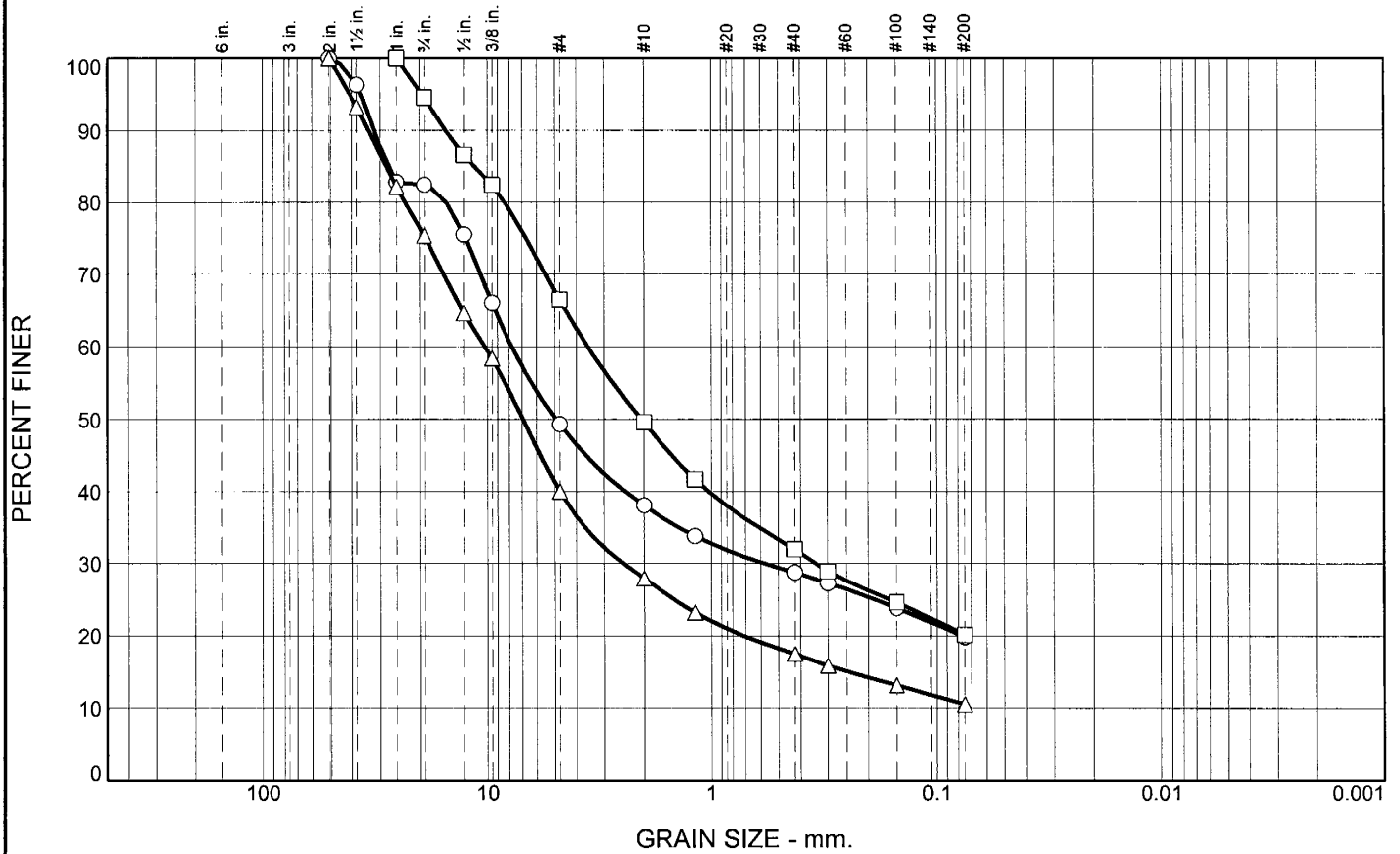
SIEVE number size	PERCENT FINER	
	○	□
#4	58.8	64.0
#10	43.4	47.0
#16	35.4	39.6
#40	24.9	28.1
#50	22.2	24.5
#100	18.2	18.0
#200	12.7	11.2

Material Description
 ○ poorly graded sand with silt and gravel
 □ poorly graded sand with silt and gravel

REMARKS:
 ○
 □

○ Source of Sample: RRC1 Depth: 5-6.1 Sample Number: A
 □ Source of Sample: RRC1 Depth: 20-20.5 Sample Number: D

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	50.7	29.4		19.9	GM	A-1-b	23	29
□	0.0	33.5	46.3		20.2	SM	A-2-4(0)	26	34
△	0.0	60.0	29.5		10.5	GP-GM	A-1-a	25	31

SIEVE inches size	PERCENT FINER		
	○	□	△
2"	100.0		100.0
1-1/2"	96.3		93.3
1"	82.9	100.0	82.2
3/4"	82.4	94.5	75.4
1/2"	75.5	86.6	64.6
3/8"	66.0	82.5	58.4
GRAIN SIZE			
D ₆₀	7.7786	3.5478	10.2482
D ₃₀	0.5703	0.3400	2.4580
D ₁₀			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
	○	□	△
#4	49.3	66.5	40.0
#10	38.1	49.6	28.0
#16	33.8	41.7	23.2
#40	28.8	32.0	17.5
#50	27.3	29.0	15.9
#100	23.9	24.6	13.2
#200	19.9	20.2	10.5

Material Description
○ silty gravel with sand
□ silty sand with gravel
△ poorly graded gravel with silt and sand

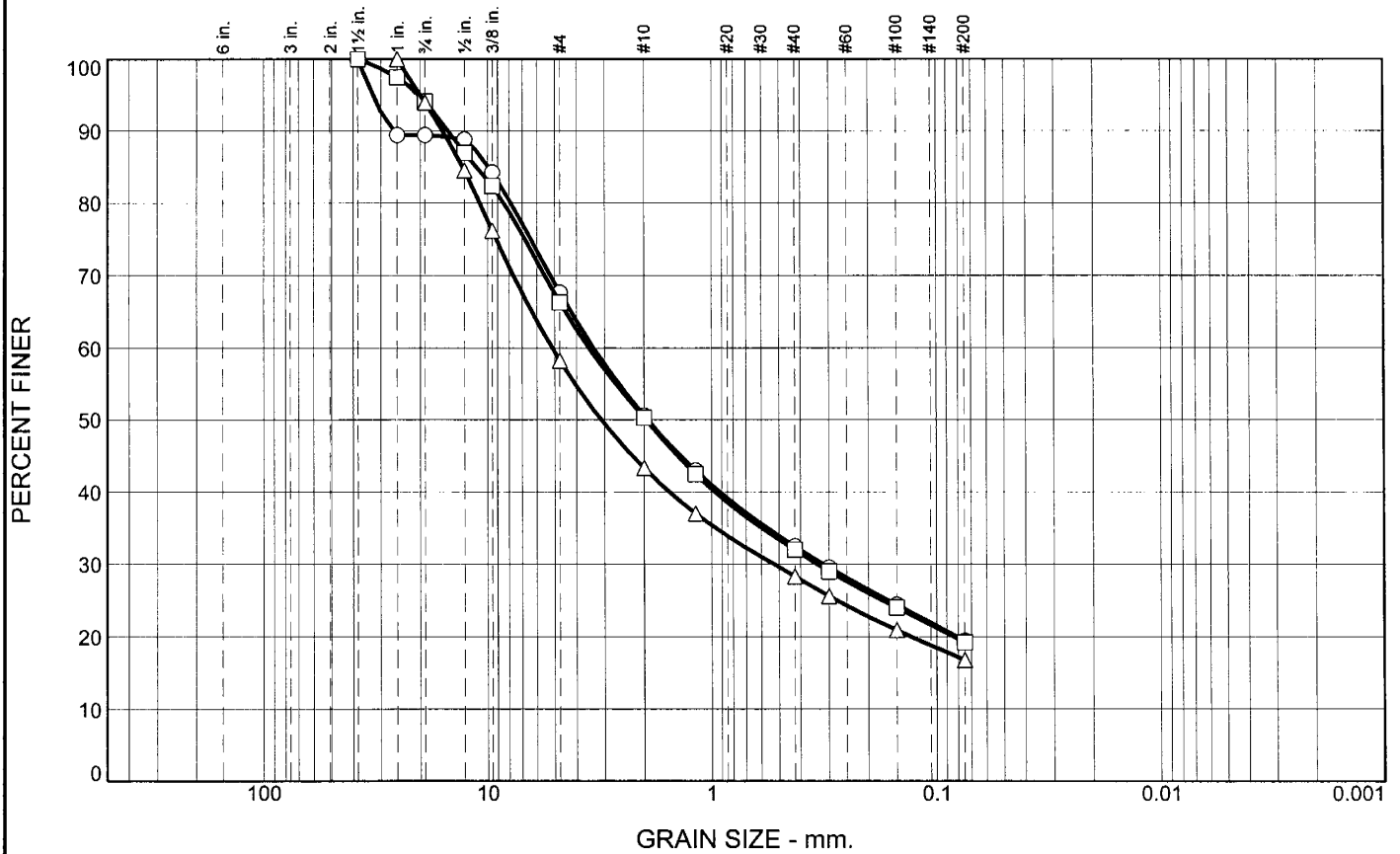
REMARKS:
○
□
△

○ Source of Sample: RRC2 Depth: 0-4 Sample Number: RV1
 □ Source of Sample: RRC2 Depth: 4-9 Sample Number: RV2
 △ Source of Sample: RRC2 Depth: 9-14 Sample Number: RV3

**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: Abbas Bafghi
 Project: Boulder City Bypass - US 93/US 95 Intersection
 Project No.: FL-02-06 Figure

Particle Size Distribution Report



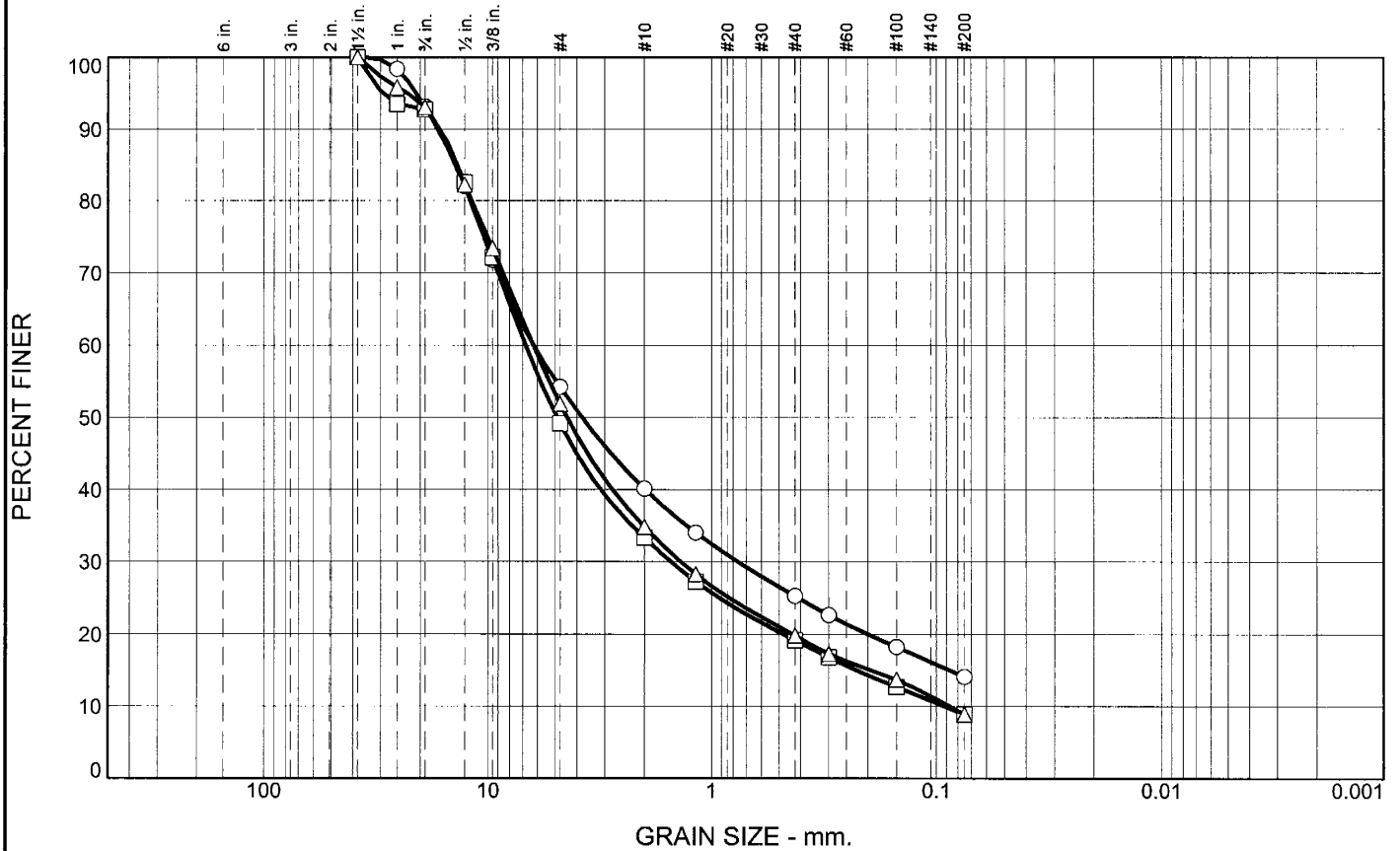
	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	32.3	48.3	19.4		SM	A-2-4(0)	27	34
□	0.0	33.7	47.1	19.2		SM	A-2-4(0)	28	36
△	0.0	41.7	41.5	16.8		GM	A-2-7(0)	30	43

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER			Material Description
	○	□	△		○	□	△	
1-1/2"	100.0	100.0		#4	67.7	66.3	58.3	○ silty sand with gravel □ silty sand with gravel △ silty gravel with sand
1"	89.4	97.4	100.0	#10	50.6	50.3	43.3	
3/4"	89.4	94.1	93.9	#16	43.0	42.4	37.0	
1/2"	88.8	87.0	84.5	#40	32.5	32.0	28.3	
3/8"	84.3	82.4	76.2	#50	29.6	29.0	25.6	
				#100	24.4	24.0	20.9	
				#200	19.4	19.2	16.8	
GRAIN SIZE								REMARKS:
D ₆₀	3.3541	3.5253	5.1368					
D ₃₀	0.3167	0.3384	0.5262					
D ₁₀								
COEFFICIENTS								
C _c								
C _u								

○ Source of Sample: RRC2 Depth: 14-19 Sample Number: RV4
 □ Source of Sample: RRC2 Depth: 19-24 Sample Number: RV5
 △ Source of Sample: RRC2 Depth: 24-29 Sample Number: RV6

NEVADA DEPARTMENT OF TRANSPORTATION	Client: Abbas Bafghi Project: Boulder City Bypass - US 93/US 95 Intersection Project No.: FL-02-06
--	--

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	45.8	40.1	14.1		GM	A-2-7(0)	31	48
□	0.0	50.8	40.3	8.9		GP-GM	A-2-7(0)	29	50
△	0.0	48.1	43.0	8.9		GP-GM	A-2-7(0)	30	49

SIEVE inches size	PERCENT FINER		
	○	□	△
1-1/2"	100.0	100.0	100.0
1"	98.4	93.5	95.8
3/4"	93.2	92.7	93.0
1/2"	82.0	82.5	82.2
3/8"	71.8	72.2	73.4
GRAIN SIZE			
D ₆₀	6.2423	6.7661	6.2557
D ₃₀	0.7618	1.5220	1.3769
D ₁₀		0.0923	0.0871
COEFFICIENTS			
C _c		3.71	3.48
C _u		73.30	71.86

SIEVE number size	PERCENT FINER		
	○	□	△
#4	54.2	49.2	51.9
#10	40.1	33.3	34.9
#16	34.1	27.3	28.3
#40	25.3	19.2	19.8
#50	22.7	16.8	17.3
#100	18.2	12.7	13.7
#200	14.1	8.9	8.9

Material Description

○ silty gravel with sand

□ poorly graded gravel with silt and sand

△ poorly graded gravel with silt and sand

REMARKS:

○

□

△

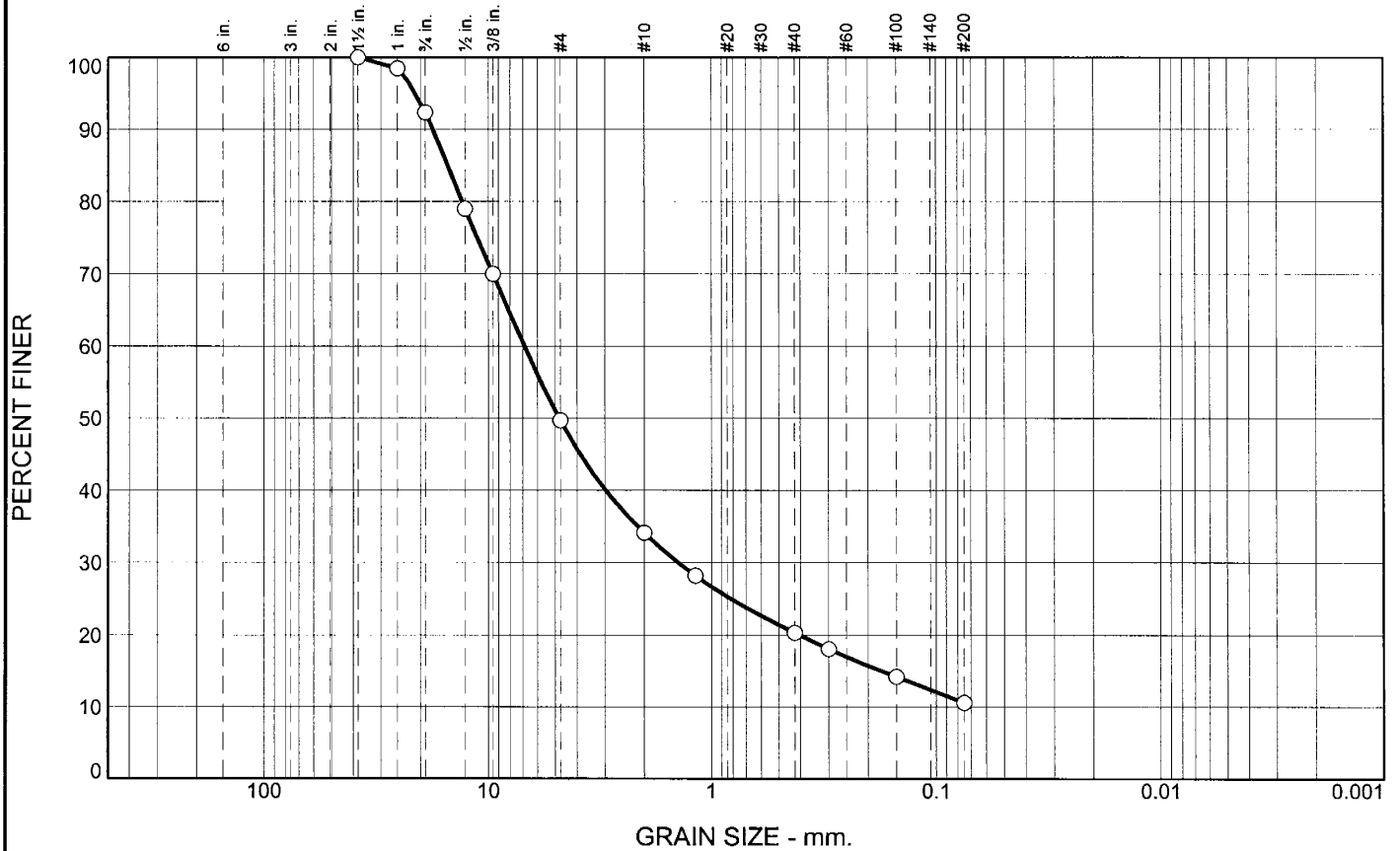
○ Source of Sample: RRC2 Depth: 29-34 Sample Number: RV7
 □ Source of Sample: RRC2 Depth: 34-39 Sample Number: RV8
 △ Source of Sample: RRC2 Depth: 39-44 Sample Number: RV9

**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: Abbas Bafghi
 Project: Boulder City Bypass - US 93/US 95 Intersection
 Project No.: FL-02-06

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	50.3	39.1	10.6		GP-GM	A-2-7(0)	30	48

SIEVE inches size	PERCENT FINER		
	○		
1-1/2"	100.0		
1"	98.4		
3/4"	92.3		
1/2"	79.0		
3/8"	70.0		
GRAIN SIZE			
D60	6.8776		
D30	1.4087		
D10			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
	○		
#4	49.7		
#10	34.1		
#16	28.2		
#40	20.3		
#50	18.0		
#100	14.2		
#200	10.6		

Material Description
○ poorly graded gravel with silt and sand

REMARKS:
○

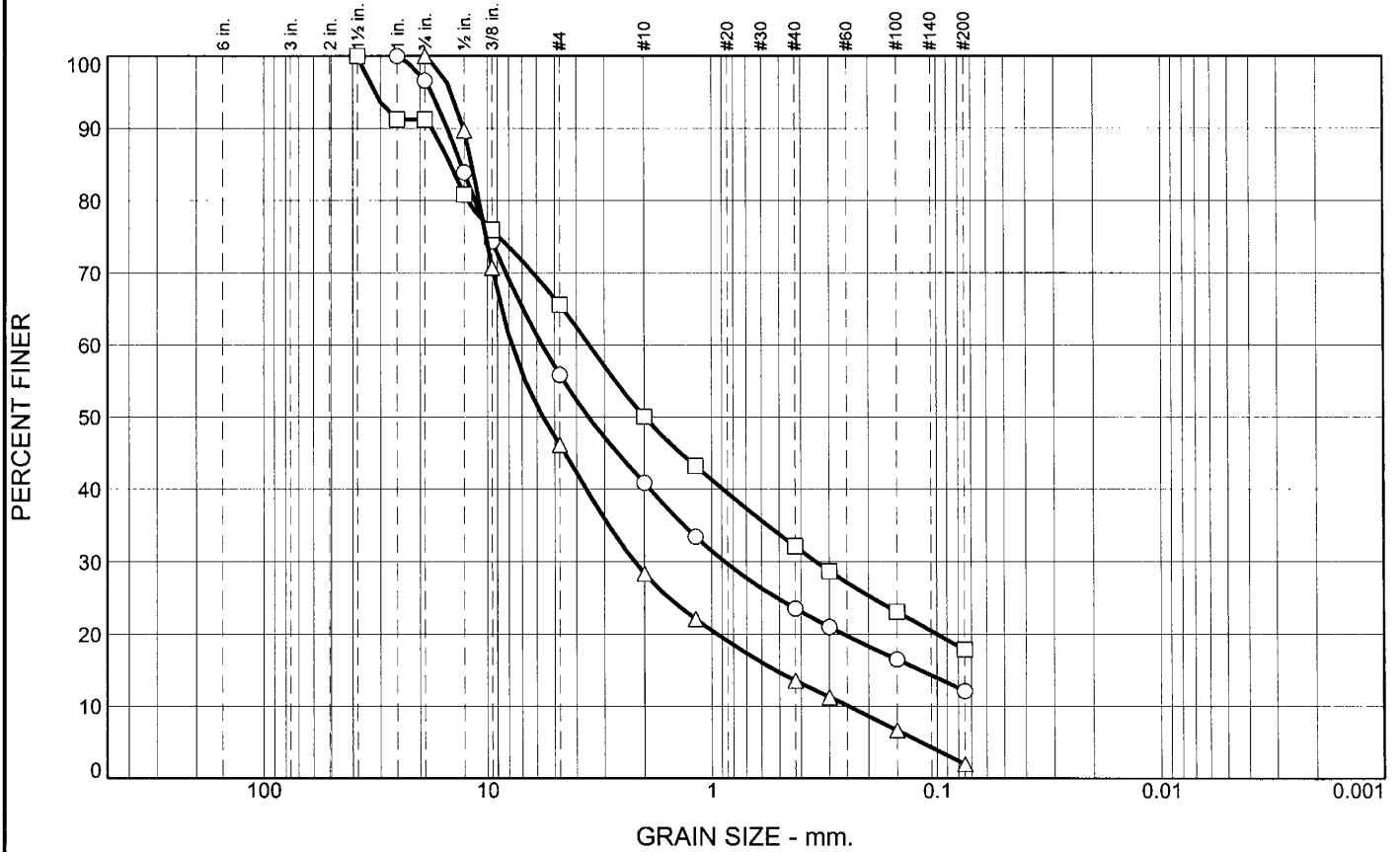
○ Source of Sample: RRC2 Depth: 44-49 Sample Number: RV10

**NEVADA
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TRANSPORTATION**

Client: Abbas Bafghi
Project: Boulder City Bypass - US 93/US 95 Intersection
Project No.: FL-02-06

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	44.2	43.7	12.1		GW-GM			
□	0.0	34.4	47.8	17.8		SM			
△	0.0	53.9	44.1	2.0		GW			

SIEVE inches size	PERCENT FINER		
	○	□	△
1-1/2"		100.0	
1"	100.0	91.2	
3/4"	96.6	91.2	100.0
1/2"	83.9	80.8	89.7
3/8"	74.4	76.0	70.7
GRAIN SIZE			
D60	5.6884	3.5026	7.7542
D30	0.8765	0.3439	2.2109
D10			0.2458
COEFFICIENTS			
C _c			2.56
C _u			31.54

SIEVE number size	PERCENT FINER		
	○	□	△
#4	55.8	65.6	46.1
#10	40.9	50.0	28.4
#16	33.5	43.2	22.1
#40	23.5	32.1	13.5
#50	21.0	28.7	11.3
#100	16.5	23.1	6.7
#200	12.1	17.8	2.0

Material Description

○ well-graded gravel with silt and sand

□ silty sand with gravel

△ well-graded gravel with sand

REMARKS:

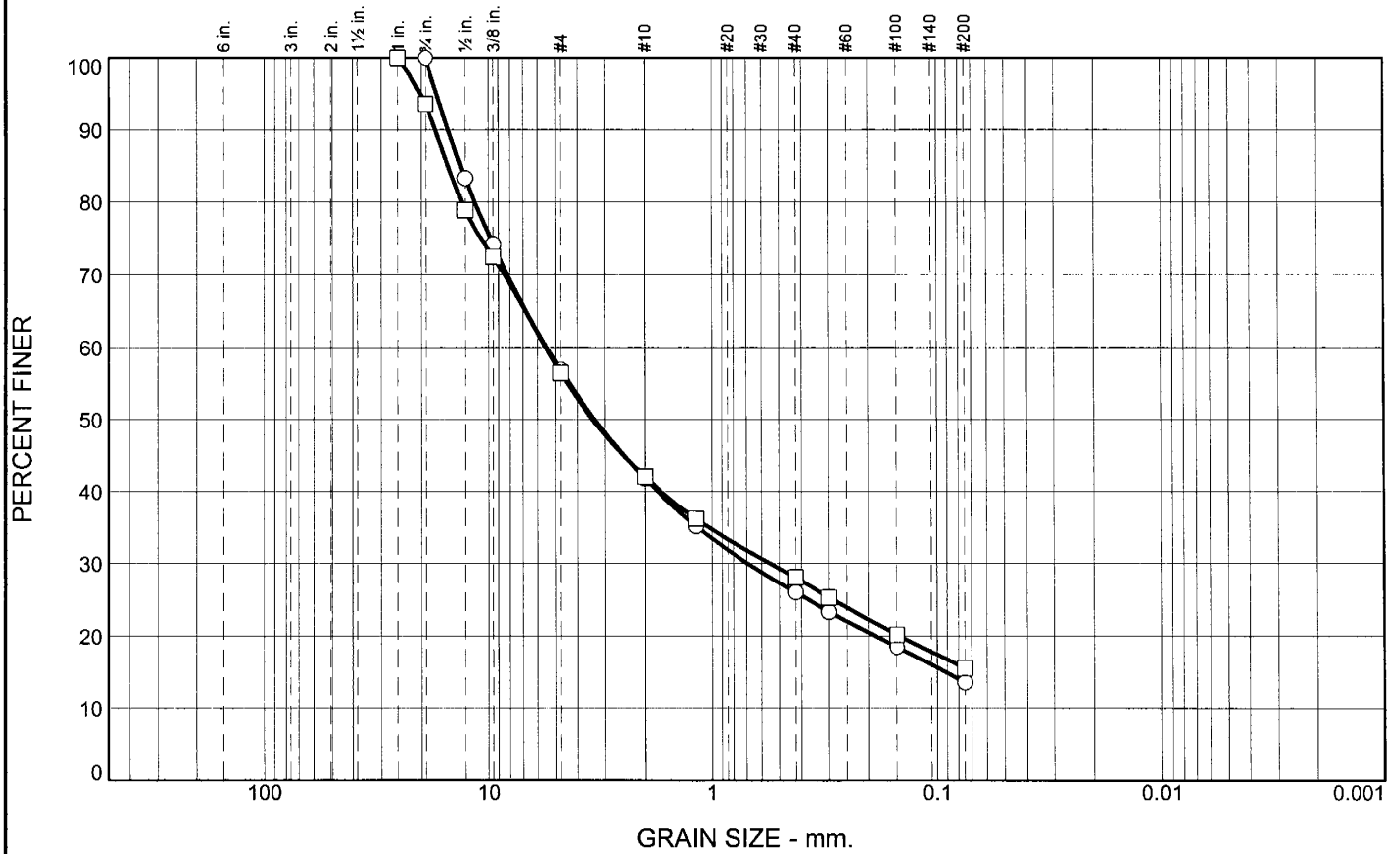
○

□

△

○ Source of Sample: RRC2 Depth: 29-29.5 Sample Number: F
 □ Source of Sample: RRC2 Depth: 34-34.5 Sample Number: G
 △ Source of Sample: RRC2 Depth: 39-39.3 Sample Number: H

Particle Size Distribution Report

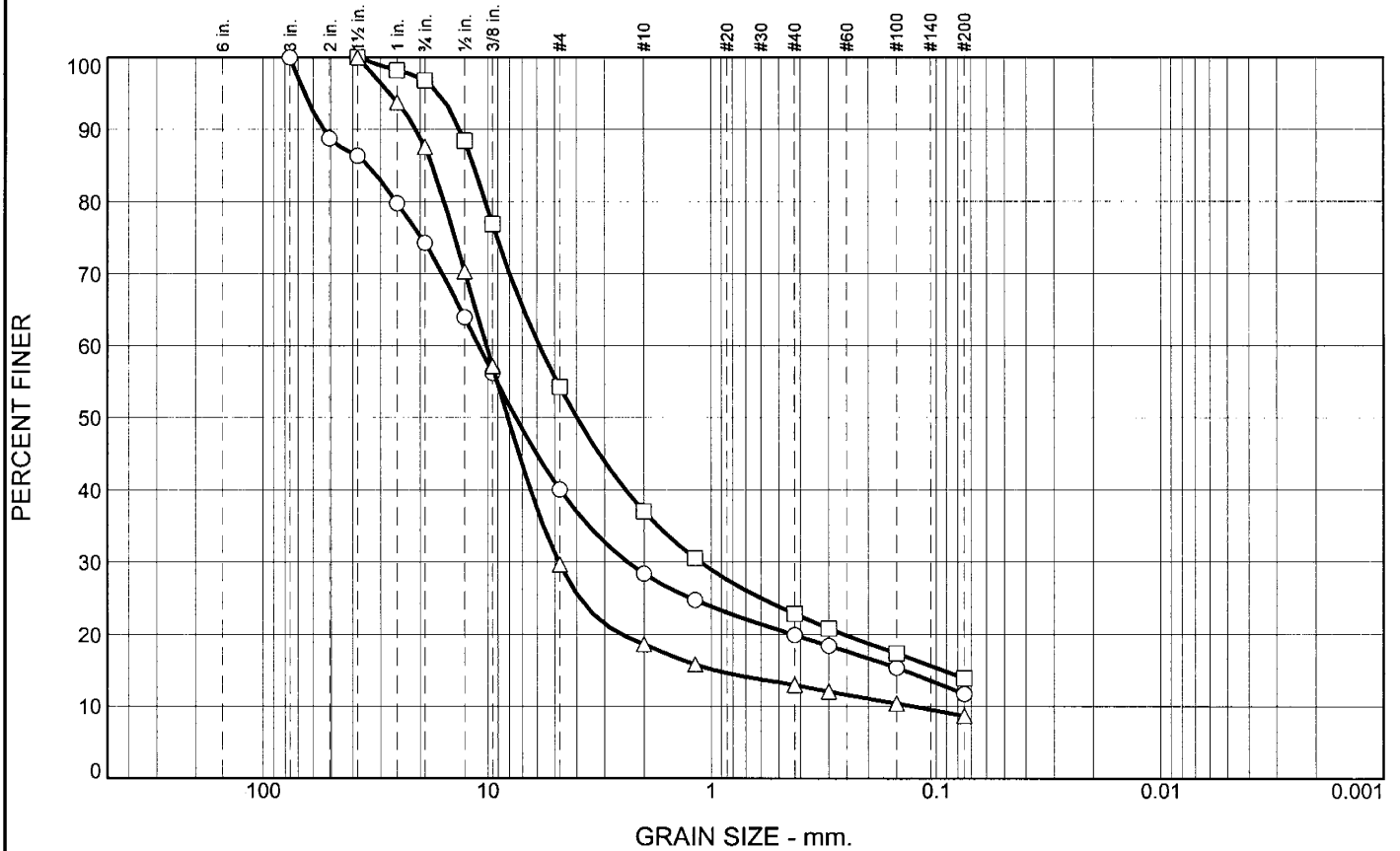


	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	43.1	43.3	13.6		SM	A-2-6(0)	27	39
□	0.0	43.5	41.0	15.5		GC	A-2-4(0)	22	30

SIEVE inches size	PERCENT FINER		SIEVE number size	PERCENT FINER		<u>Material Description</u> ○ silty sand with gravel □ clayey gravel with sand
	○	□		○	□	
1"		100.0	#4	56.9	56.5	<u>REMARKS:</u> ○ □
3/4"	100.0	93.6	#10	41.8	42.0	
1/2"	83.3	78.9	#16	35.2	36.2	
3/8"	74.2	72.5	#40	26.0	28.1	
GRAIN SIZE			#50	23.3	25.3	
D60	5.4843	5.5396	#100	18.5	20.2	
D30	0.6914	0.5484	#200	13.6	15.5	
D10			COEFFICIENTS			
Cc						
Cu						

○ Source of Sample: RRC2 Depth: 44-45 Sample Number: I
 □ Source of Sample: RRC2 Depth: 49-51.5 Sample Number: J

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	59.9	28.4	11.7		GP-GM	A-1-a	25	31
□	0.0	45.7	40.4	13.9		GM	A-2-7(0)	34	47
△	0.0	70.3	21.0	8.7		GP-GM	A-2-7(0)	42	61

SIEVE inches size	PERCENT FINER		
	○	□	△
3"	100.0		
2"	88.8		
1 1/2"	86.4	100.0	100.0
1"	79.8	98.2	93.8
3/4"	74.3	96.8	87.6
1/2"	64.0	88.4	70.4
3/8"	56.2	76.9	57.2
GRAIN SIZE			
D ₆₀	10.9712	5.8545	10.1338
D ₃₀	2.3641	1.1191	4.8044
D ₁₀			0.1265
COEFFICIENTS			
C _c			18.01
C _u			80.12

SIEVE number size	PERCENT FINER		
	○	□	△
#4	40.1	54.3	29.7
#10	28.4	37.1	18.6
#16	24.8	30.5	15.8
#40	19.9	22.9	13.0
#50	18.4	20.8	12.0
#100	15.4	17.3	10.4
#200	11.7	13.9	8.7

Material Description

○ poorly graded gravel with silt and sand

□ silty gravel with sand

△ poorly graded gravel with silt and sand

REMARKS:

○

□

△

○ Source of Sample: RRC3 Depth: 0-4.5 Sample Number: RV1

□ Source of Sample: RRC3 Depth: 4.5-9.5 Sample Number: RV2

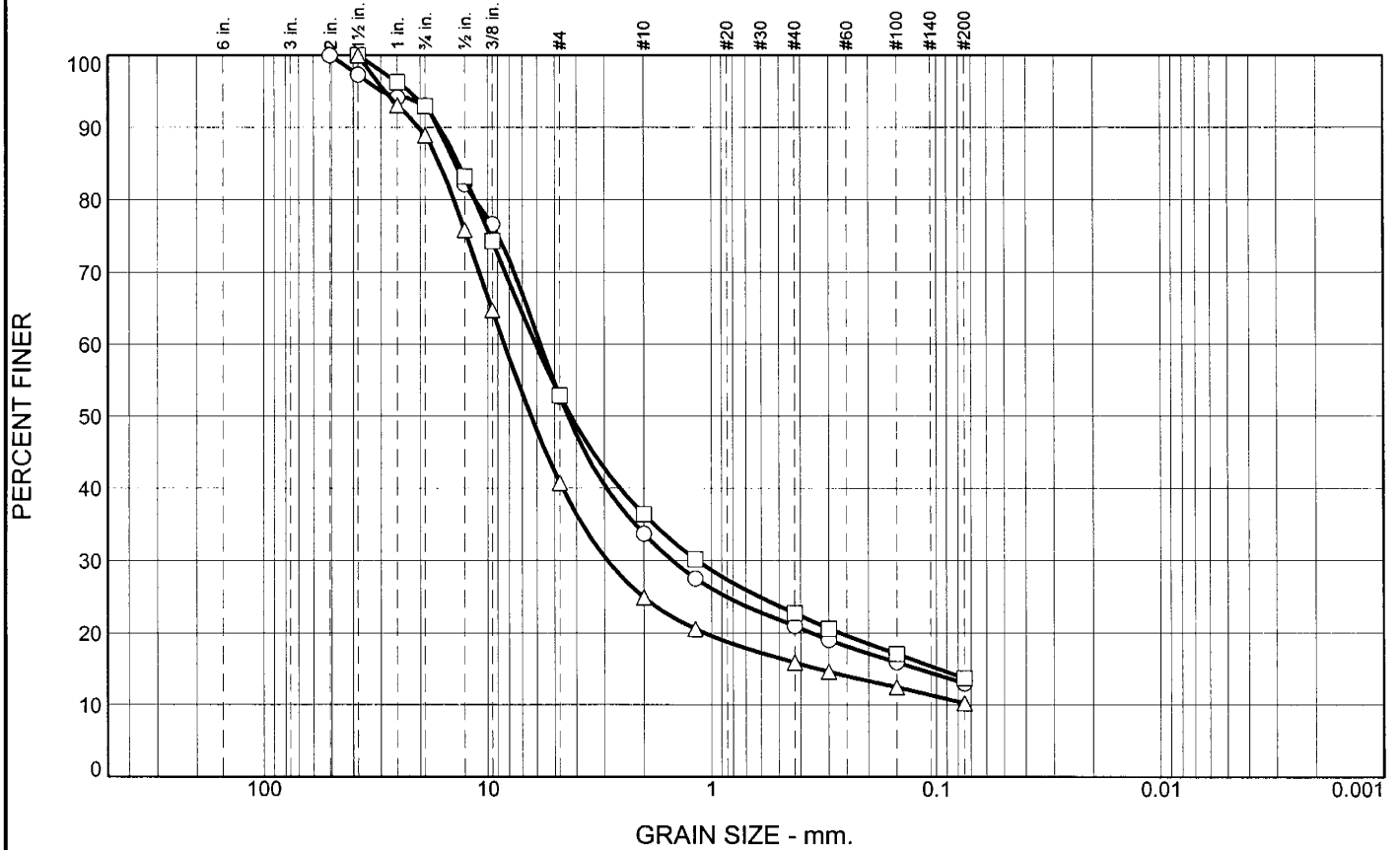
△ Source of Sample: RRC3 Depth: 9.5-14.5 Sample Number: RV3

**NEVADA
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TRANSPORTATION**

Client: Abbas Bafghi
 Project: Boulder City Bypass - US 93/US 95 Intersection
 Project No.: FL-02-06

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	47.4	39.6		13.0	GM	A-2-7(0)	38	58
□	0.0	47.1	39.2		13.7	GM	A-2-7(0)	37	53
△	0.0	59.3	30.5		10.2	GP-GM	A-2-5(0)	41	50

SIEVE inches size	PERCENT FINER		
	○	□	△
2"	100.0		
1-1/2"	97.3	100.0	100.0
1"	94.1	96.3	93.1
3/4"	93.0	92.9	88.9
1/2"	82.2	83.2	75.9
3/8"	76.6	74.3	64.7
GRAIN SIZE			
D ₆₀	5.8007	6.0892	8.4193
D ₃₀	1.4945	1.1548	2.9113
D ₁₀			
COEFFICIENTS			
C _c			
C _u			

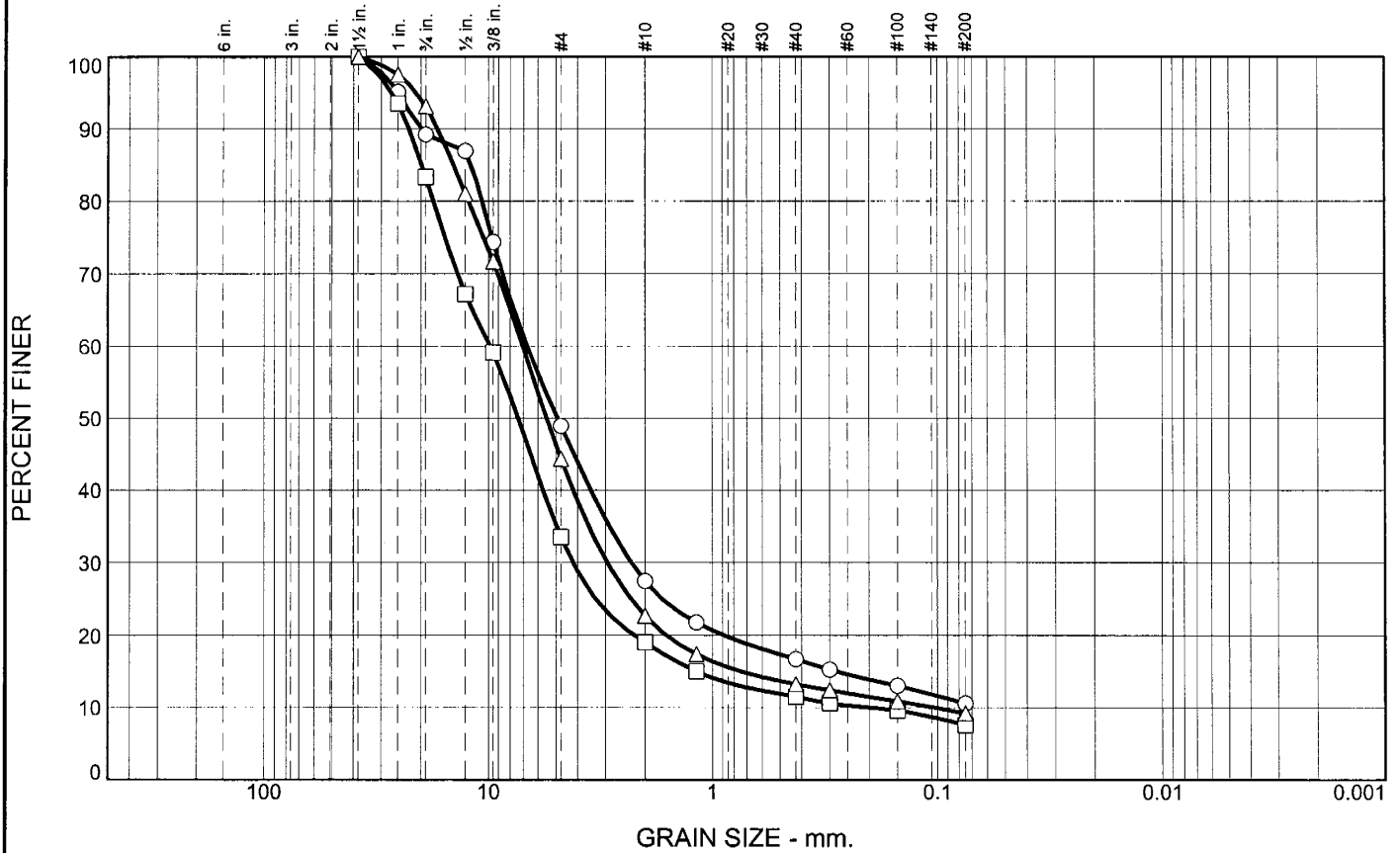
SIEVE number size	PERCENT FINER		
	○	□	△
#4	52.6	52.9	40.7
#10	33.7	36.4	24.9
#16	27.5	30.2	20.5
#40	21.0	22.7	15.9
#50	19.0	20.6	14.6
#100	15.9	17.1	12.5
#200	13.0	13.7	10.2

Material Description
○ silty gravel with sand
□ silty gravel with sand
△ poorly graded gravel with silt and sand

REMARKS:
○
□
△

○ Source of Sample: RRC3 Depth: 14.5-19.5 Sample Number: RV4
 □ Source of Sample: RRC3 Depth: 19.5-24.5 Sample Number: RV5
 △ Source of Sample: RRC3 Depth: 24.5-29.5 Sample Number: RV6

Particle Size Distribution Report



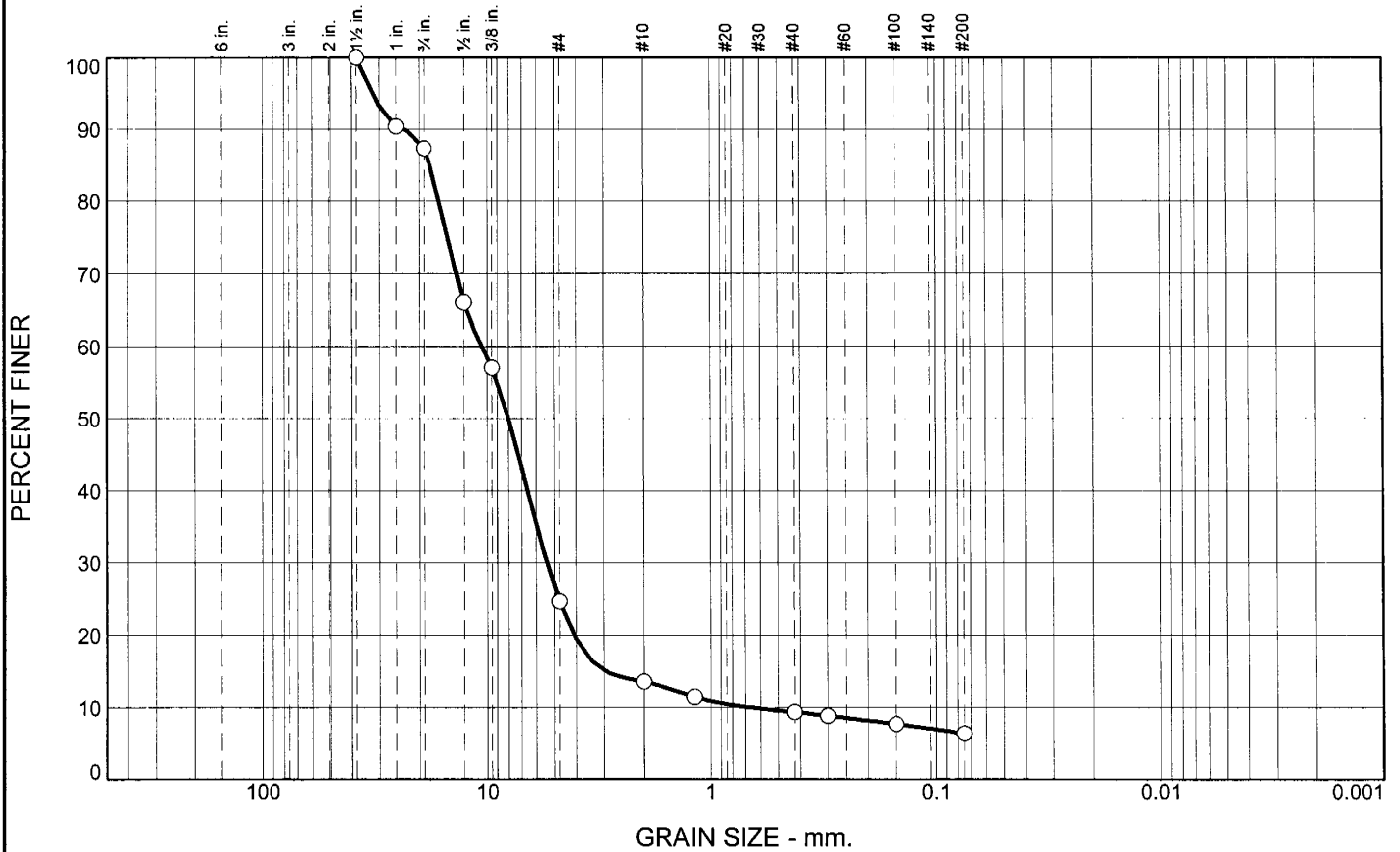
	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	51.1	38.3	10.6		GP-GM	A-2-5(0)	37	46
□	0.0	66.5	25.9	7.6		GP-GM	A-2-7(0)	31	46
△	0.0	55.7	35.1	9.2		GP-GM	A-2-6(0)	26	38

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER			Material Description
	○	□	△		○	□	△	
1-1/2"	100.0	100.0	100.0	#4	48.9	33.5	44.3	○ poorly graded gravel with silt and sand □ poorly graded gravel with silt and sand △ poorly graded gravel with silt and sand
1"	95.1	93.5	97.5	#10	27.5	19.0	22.7	
3/4"	89.2	83.3	93.1	#16	21.8	15.0	17.4	
1/2"	86.9	67.2	81.0	#40	16.7	11.5	13.3	
3/8"	74.4	59.1	71.7	#50	15.2	10.6	12.4	
				#100	13.0	9.6	10.9	
				#200	10.6	7.6	9.2	
GRAIN SIZE								REMARKS:
D ₆₀	6.7296	9.8252	7.0338					
D ₃₀	2.2994	4.2010	2.9404					
D ₁₀		0.1960	0.1034					
COEFFICIENTS								
C _c		9.16	11.89					
C _u		50.13	68.03					

○ Source of Sample: RRC3 Depth: 29.5-34.5 Sample Number: RV7
 □ Source of Sample: RRC3 Depth: 34.5-39.5 Sample Number: RV8
 △ Source of Sample: RRC3 Depth: 39.5-44.5 Sample Number: RV9

NEVADA DEPARTMENT OF TRANSPORTATION	Client: Abbas Bafghi Project: Boulder City Bypass - US 93/US 95 Intersection Project No.: FL-02-06	Figure
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Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	75.4	18.2	6.4		GP-GM	A-2-7(0)	31	43

SIEVE inches size	PERCENT FINER	
	○	
1-1/2"	100.0	
1"	90.4	
3/4"	87.3	
1/2"	66.1	
3/8"	57.0	
GRAIN SIZE		
D ₆₀	10.5568	
D ₃₀	5.3873	
D ₁₀	0.6651	
COEFFICIENTS		
C _c	4.13	
C _u	15.87	

SIEVE number size	PERCENT FINER	
	○	
#4	24.6	
#10	13.6	
#16	11.4	
#40	9.4	
#50	8.8	
#100	7.7	
#200	6.4	

Material Description
○ poorly graded gravel with silt and sand

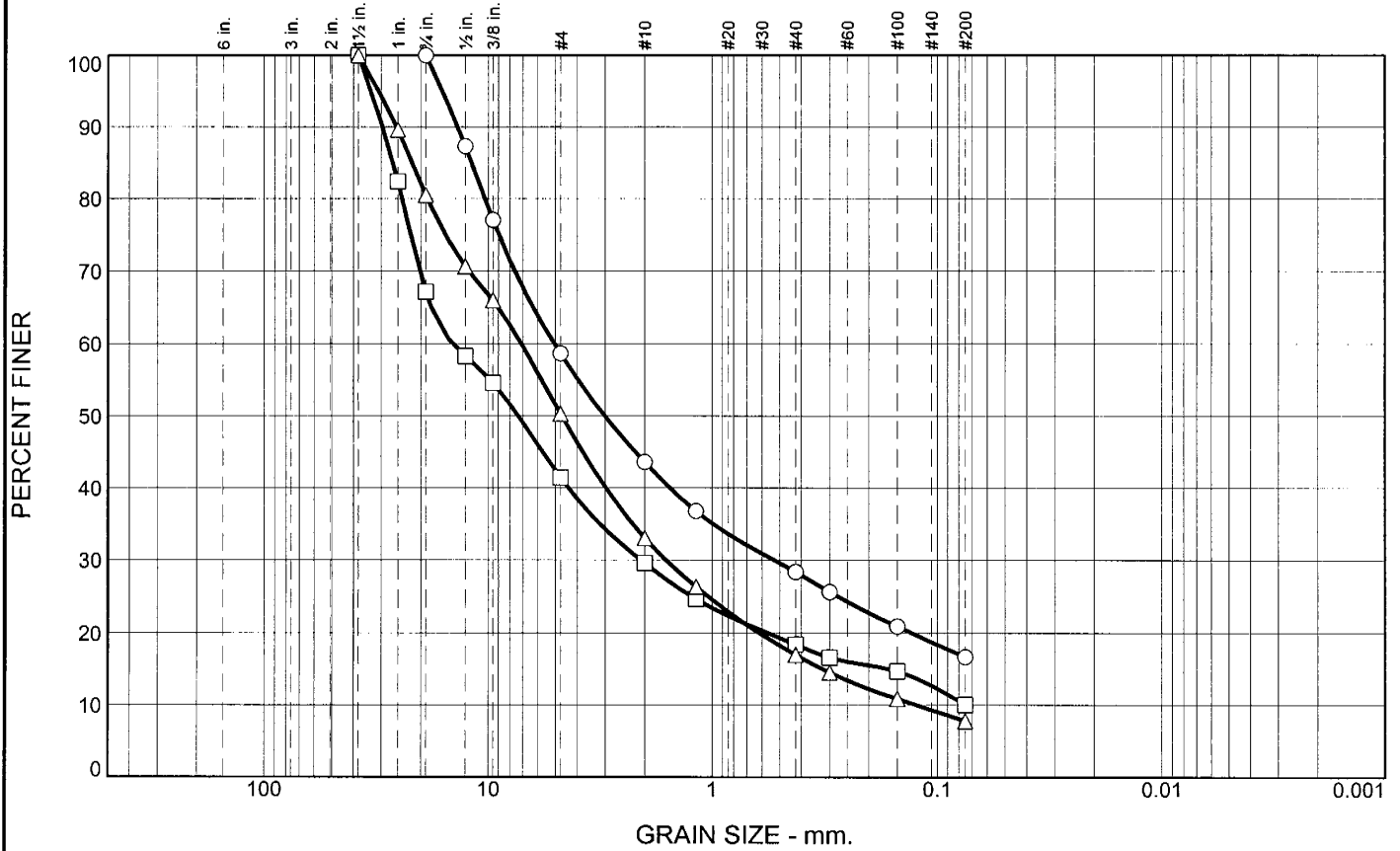
REMARKS:
○

○ Source of Sample: RRC3 Depth: 44.5-48 Sample Number: RV10

**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: Abbas Bafghi
Project: Boulder City Bypass - US 93/US 95 Intersection
Project No.: FL-02-06 Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	41.4	41.9	16.7		SM	A-2-7(0)	51	67
□	0.0	58.5	31.5	10.0		GP-GM	A-2-6(0)	28	40
△	0.0	49.7	42.5	7.8		GW-GC	A-2-6(0)	23	35

SIEVE inches size	PERCENT FINER		
	○	□	△
1-1/2"		100.0	100.0
1"		82.4	89.6
3/4"	100.0	67.2	80.5
1/2"	87.3	58.3	70.7
3/8"	77.1	54.6	66.0
GRAIN SIZE			
D ₆₀	5.0613	14.5220	7.1027
D ₃₀	0.5267	2.0823	1.6078
D ₁₀			0.1235
COEFFICIENTS			
C _c			2.95
C _u			57.51

SIEVE number size	PERCENT FINER		
	○	□	△
#4	58.6	41.5	50.3
#10	43.6	29.6	33.1
#16	36.8	24.7	26.3
#40	28.4	18.4	17.0
#50	25.7	16.6	14.5
#100	20.9	14.7	10.9
#200	16.7	10.0	7.8

Material Description

○ silty sand with gravel

□ poorly graded gravel with silt and sand

△ well-graded gravel with clay and sand

REMARKS:

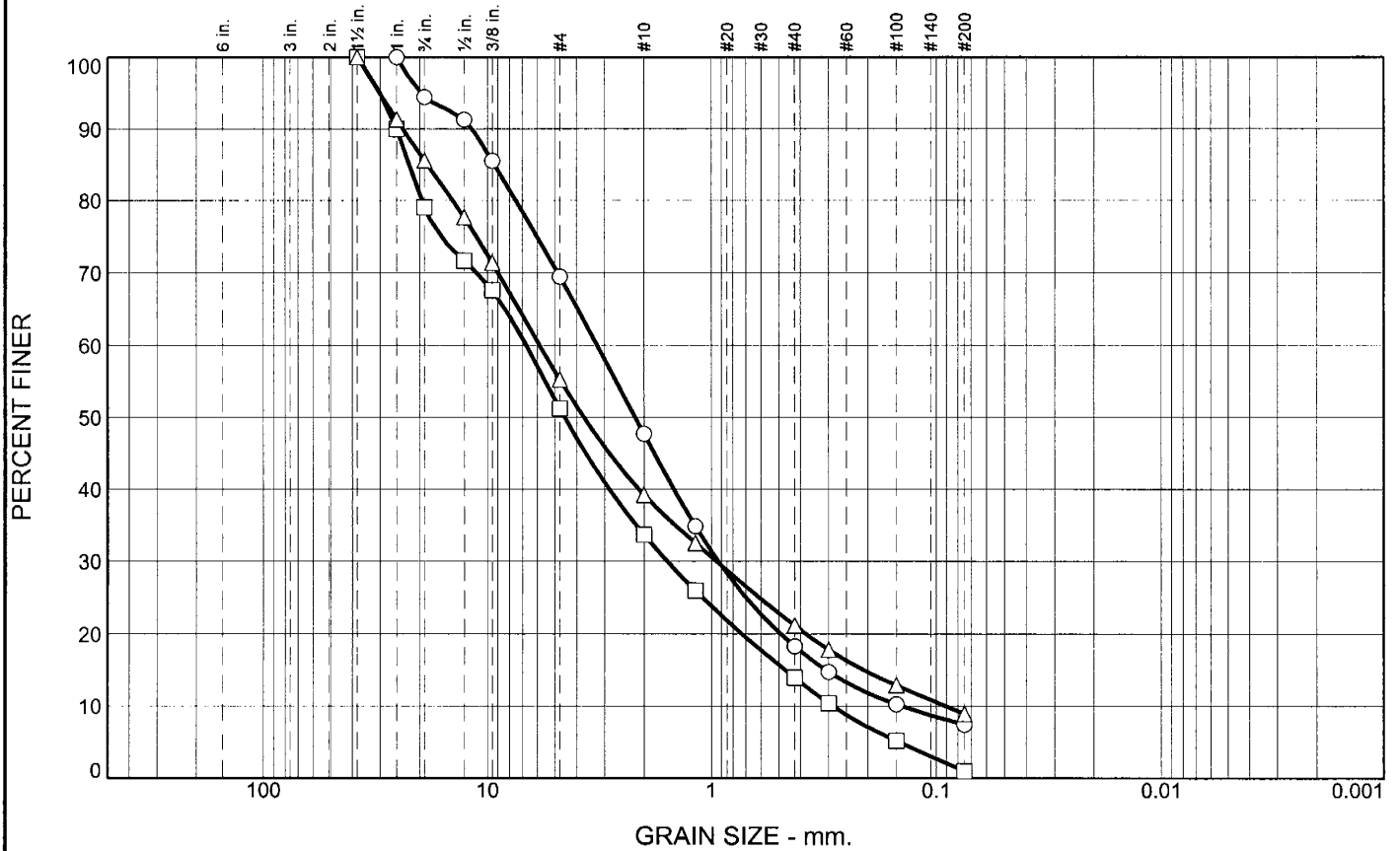
○

□

△

○ Source of Sample: RRC3 Depth: 4.5-6.0 Sample Number: A
 □ Source of Sample: RRC3 Depth: 9.5-10.5 Sample Number: B
 △ Source of Sample: RRC3 Depth: 14.5-16 Sample Number: C

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	30.5	62.1		7.4	SW-SC			
□	0.0	48.8	50.2		1.0	SW			
△	0.0	44.7	46.3		9.0	SW-SC	A-2-4(0)	22	30

SIEVE inches size	PERCENT FINER		
	○	□	△
1-1/2"		100.0	100.0
1"	100.0	90.0	91.3
3/4"	94.4	79.1	85.6
1/2"	91.3	71.7	77.7
3/8"	85.5	67.6	71.4
GRAIN SIZE			
D ₆₀	3.2330	6.7215	5.8525
D ₃₀	0.9297	1.5740	0.9468
D ₁₀	0.1417	0.2876	0.0905
COEFFICIENTS			
C _c	1.89	1.28	1.69
C _u	22.81	23.37	64.66

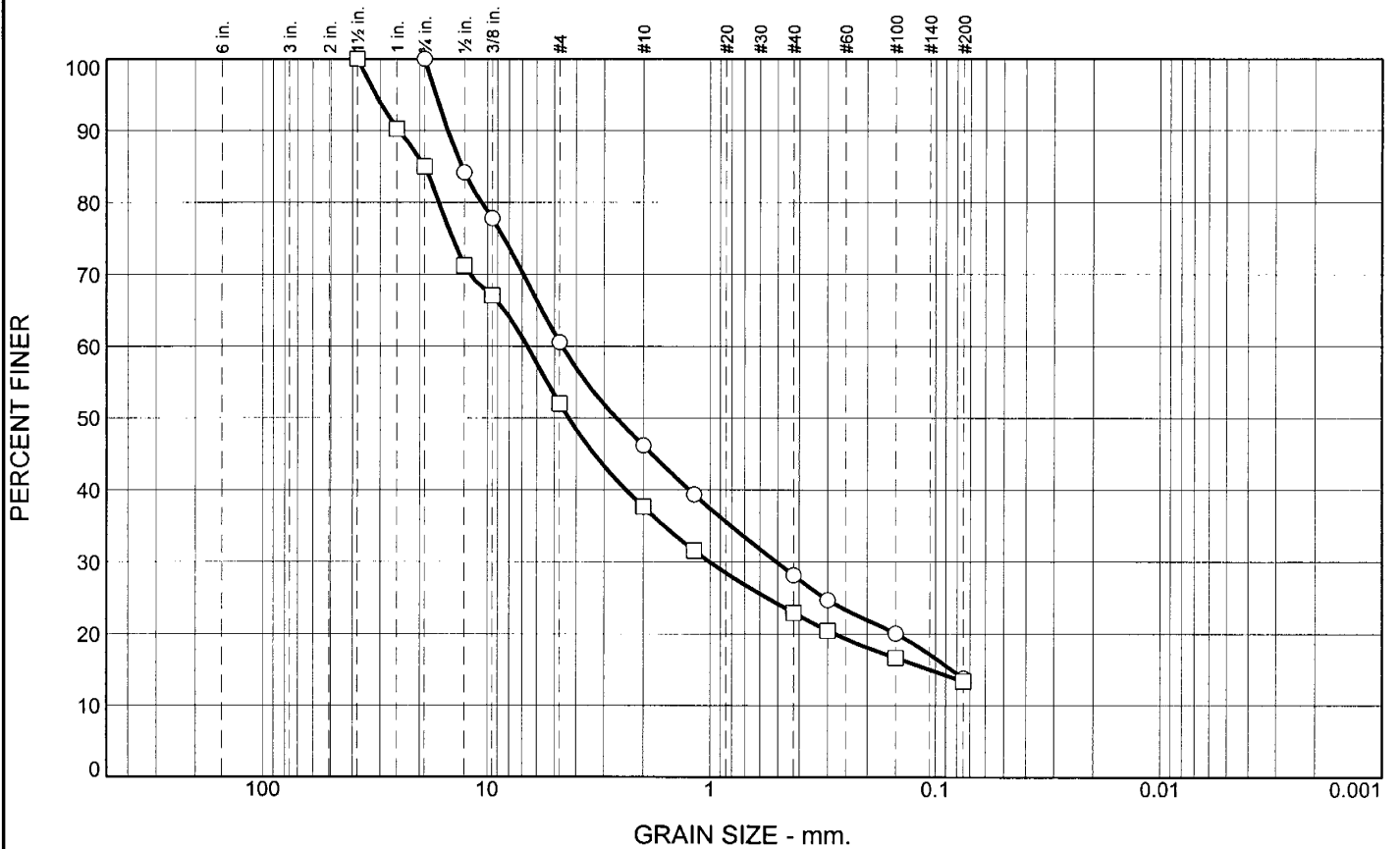
SIEVE number size	PERCENT FINER		
	○	□	△
#4	69.5	51.2	55.3
#10	47.7	33.7	39.2
#16	34.9	26.0	32.6
#40	18.3	14.0	21.2
#50	14.7	10.4	17.8
#100	10.3	5.2	12.9
#200	7.4	1.0	9.0

Material Description
 ○ well-graded sand with clay and gravel
 □ well-graded sand
 △ well-graded sand with clay and gravel

REMARKS:
 ○
 □
 △

○ Source of Sample: RRC3 Depth: 19.5-20.3 Sample Number: D
 □ Source of Sample: RRC3 Depth: 24.5-25.3 Sample Number: E
 △ Source of Sample: RRC3 Depth: 34.5-36 Sample Number: G

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	39.4	46.8		13.8	SM	A-1-a	20	23
□	0.0	48.0	38.6		13.4	GC-GM	A-1-a	22	28

SIEVE inches size	PERCENT FINER	
	○	□
1-1/2"		100.0
1"		90.2
3/4"	100.0	85.0
1/2"	84.1	71.3
3/8"	77.8	67.1
GRAIN SIZE		
D60	4.6316	6.6201
D30	0.5050	1.0047
D10		
COEFFICIENTS		
C _c		
C _u		

SIEVE number size	PERCENT FINER	
	○	□
#4	60.6	52.0
#10	46.2	37.7
#16	39.4	31.6
#40	28.2	23.0
#50	24.7	20.5
#100	20.1	16.7
#200	13.8	13.4

Material Description

○ silty sand with gravel

□ silty, clayey gravel with sand

REMARKS:

○

□

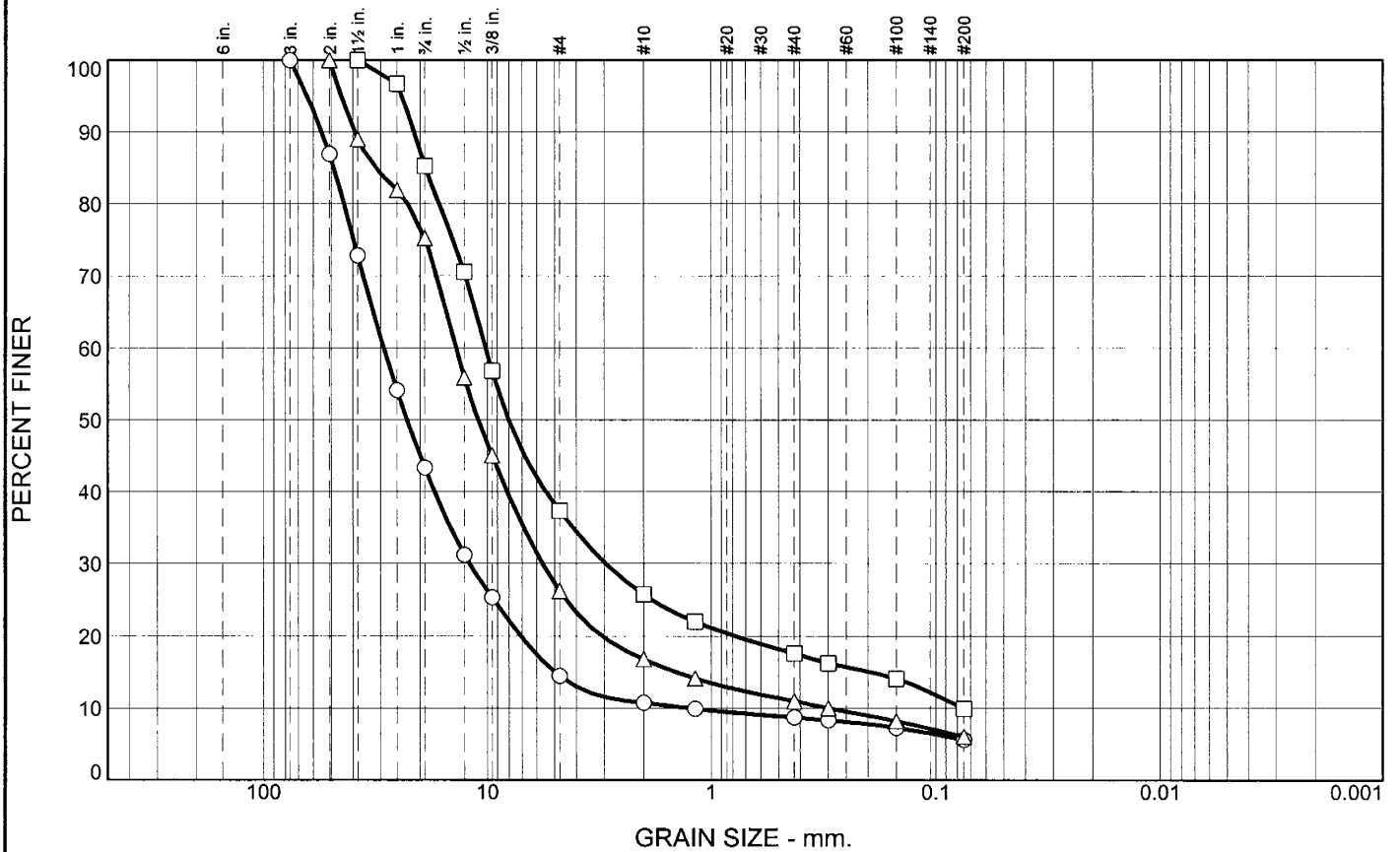
○ Source of Sample: RRC3 Depth: 39.5-41 Sample Number: H
 □ Source of Sample: RRC3 Depth: 44.5-45.5 Sample Number: I

**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: Abbas Bafghi
 Project: Boulder City Bypass - US 93/US 95 Intersection
 Project No.: FL-02-06

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	85.5	8.9		5.6	GP-GC	A-1-a	21	27
□	0.0	62.7	27.4		9.9	GP-GM	A-1-a	25	30
△	0.0	73.8	20.2		6.0	GP-GM	A-1-a	25	28

SIEVE inches size	PERCENT FINER		
	○	□	△
3"	100.0		
2"	86.9		100.0
1 1/2"	72.8	100.0	89.0
1"	54.2	96.7	81.9
3/4"	43.3	85.2	75.2
1/2"	31.2	70.5	55.9
3/8"	25.3	56.8	45.0
GRAIN SIZE			
D ₆₀	29.1134	10.1863	13.8287
D ₃₀	12.0505	2.9478	5.6603
D ₁₀	1.2460	0.0760	0.2987
COEFFICIENTS			
C _c	4.00	11.22	7.76
C _u	23.37	134.02	46.29

SIEVE number size	PERCENT FINER		
	○	□	△
#4	14.5	37.3	26.2
#10	10.7	25.7	16.8
#16	9.9	22.0	14.1
#40	8.7	17.6	11.0
#50	8.3	16.2	10.0
#100	7.3	14.1	8.2
#200	5.6	9.9	6.0

Material Description

○ poorly graded gravel with siltyclay

□ poorly graded gravel with silt and sand

△ poorly graded gravel with silt and sand

REMARKS:

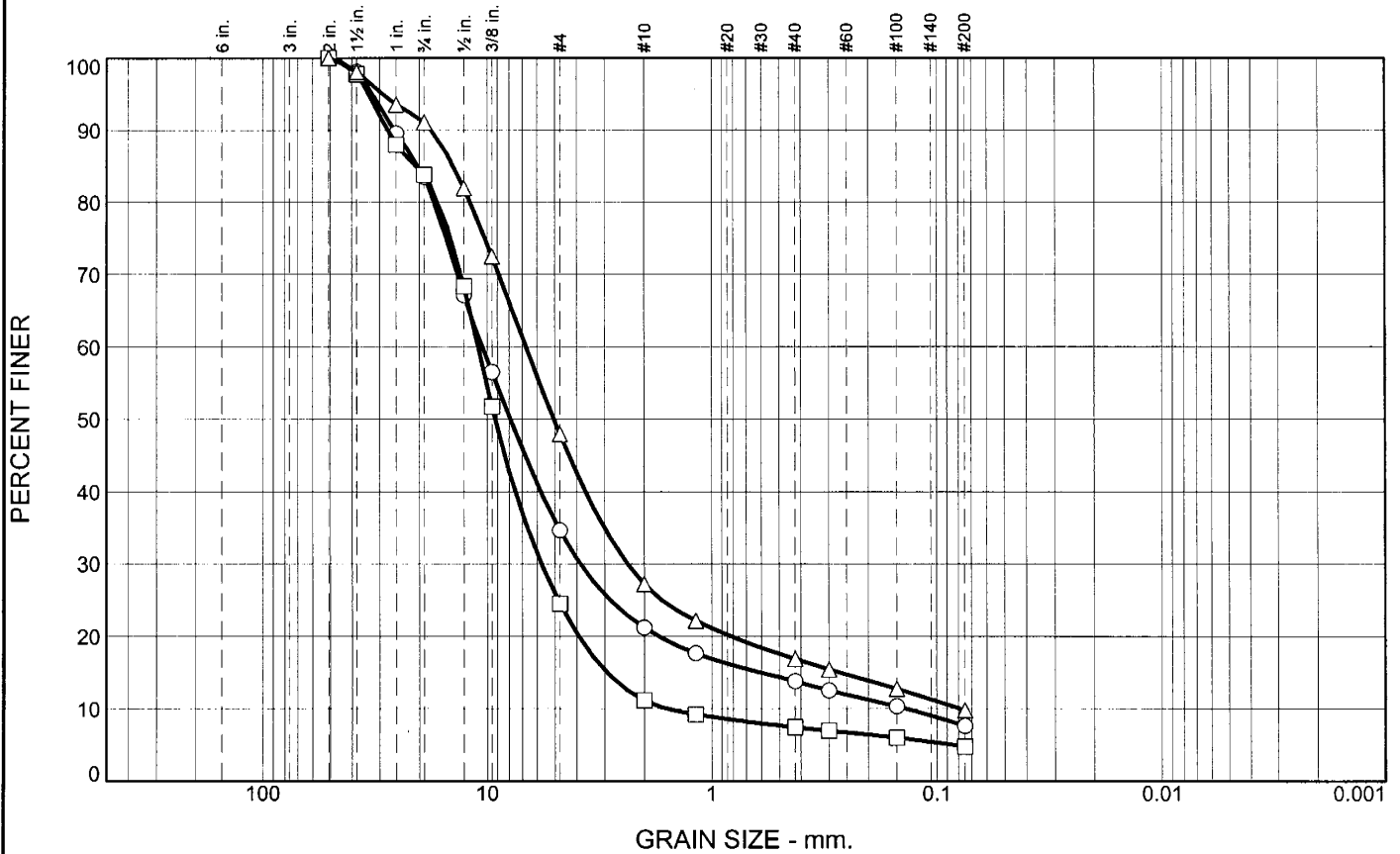
○

□

△

○ Source of Sample: RRC4 Depth: 0-4 Sample Number: RV1
 □ Source of Sample: RRC4 Depth: 4-9 Sample Number: RV2
 △ Source of Sample: RRC4 Depth: 9-14 Sample Number: RV3

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	65.3	27.0	7.7		GP-GM	A-1-a	23	27
□	0.0	75.5	19.7	4.8		GW	A-1-a	22	28
△	0.0	52.0	38.2	9.8		GP-GC	A-1-a	21	27

SIEVE inches size	PERCENT FINER		
	○	□	△
2"	100.0	100.0	100.0
1-1/2"	98.1	97.8	98.1
1"	89.6	88.0	93.6
3/4"	83.5	83.8	91.1
1/2"	67.1	68.4	82.0
3/8"	56.5	51.8	72.5
GRAIN SIZE			
D ₆₀	10.5262	10.9767	6.7280
D ₃₀	3.8495	5.7418	2.3692
D ₁₀	0.1363	1.5792	0.0788
COEFFICIENTS			
C _c	10.33	1.90	10.59
C _u	77.25	6.95	85.42

SIEVE number size	PERCENT FINER		
	○	□	△
#4	34.7	24.5	48.0
#10	21.2	11.2	27.2
#16	17.7	9.2	22.2
#40	13.8	7.5	16.9
#50	12.5	7.0	15.4
#100	10.3	6.0	12.8
#200	7.7	4.8	9.8

Material Description

○ poorly graded gravel with silt and sand

□ well-graded gravel with sand

△ poorly graded gravel with silty clay and sand

REMARKS:

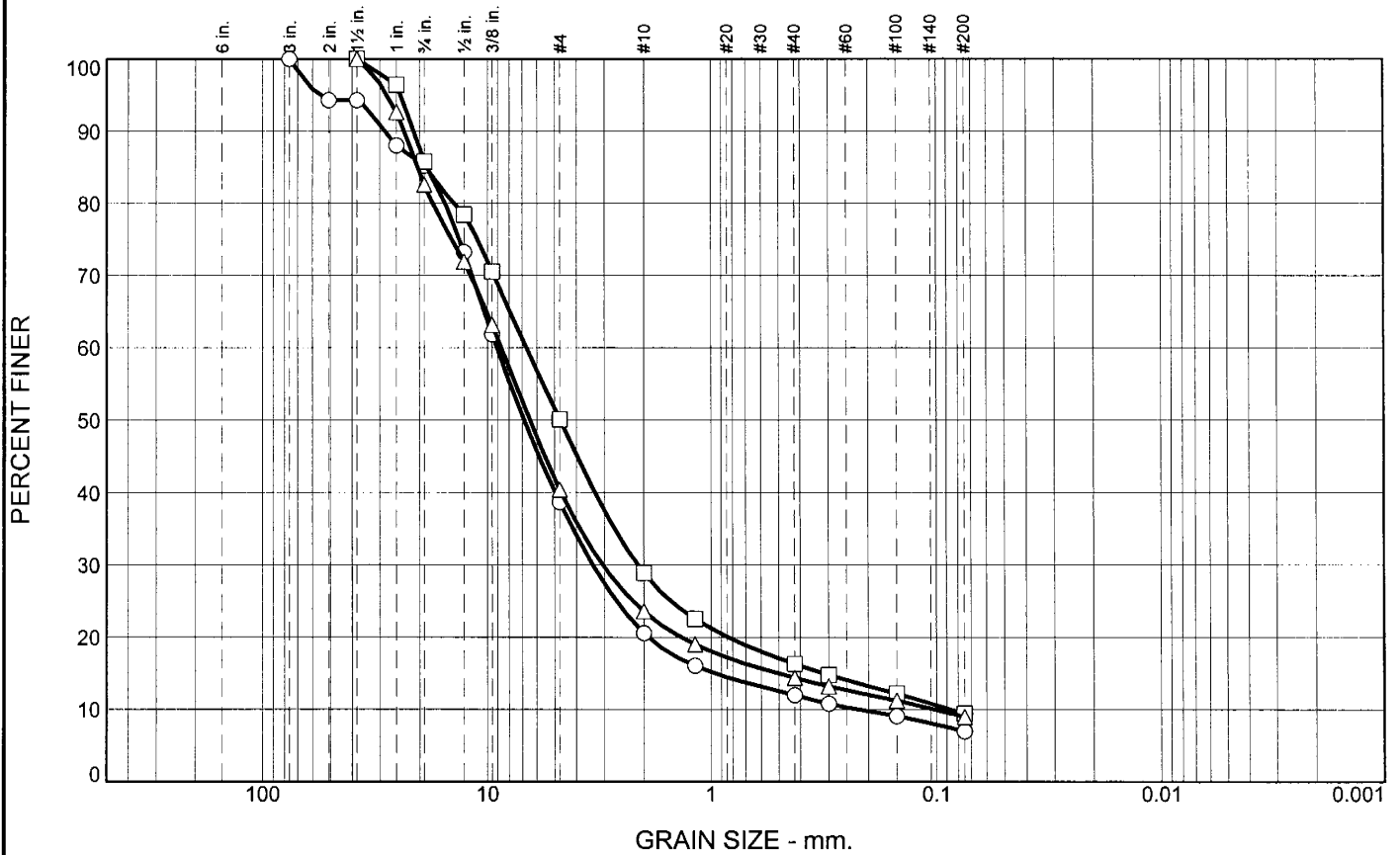
○

□

△

○ Source of Sample: RRC4 Depth: 14-19 Sample Number: RV4
 □ Source of Sample: RRC4 Depth: 19-24 Sample Number: RV5
 △ Source of Sample: RRC4 Depth: 24-29 Sample Number: RV6

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	61.3	31.7	7.0		GP-GC	A-1-a	21	25
□	0.0	49.9	40.7	9.4		GP-GC	A-1-a	20	25
△	0.0	59.6	31.4	9.0		GP-GC	A-1-a	21	26

SIEVE inches size	PERCENT FINER		
	○	□	△
3"	100.0		
2"	94.3		
1 1/2"	94.3	100.0	100.0
1"	88.0	96.4	92.6
3/4"	85.2	85.8	82.6
1/2"	73.2	78.4	71.9
3/8"	61.8	70.5	63.1
GRAIN SIZE			
D ₆₀	9.0809	6.7004	8.6730
D ₃₀	3.3767	2.1295	3.0514
D ₁₀	0.2225	0.0865	0.1018
COEFFICIENTS			
C _c	5.64	7.83	10.54
C _u	40.81	77.48	85.17

SIEVE number size	PERCENT FINER		
	○	□	△
#4	38.7	50.1	40.4
#10	20.6	28.9	23.6
#16	16.1	22.6	19.0
#40	12.0	16.3	14.4
#50	10.8	14.8	13.2
#100	9.1	12.2	11.2
#200	7.0	9.4	9.0

Material Description

○ poorly graded gravel with siltyclay and sand

□ poorly graded gravel with siltyclay and sand

△ poorly graded gravel with siltyclay and sand

REMARKS:

○

□

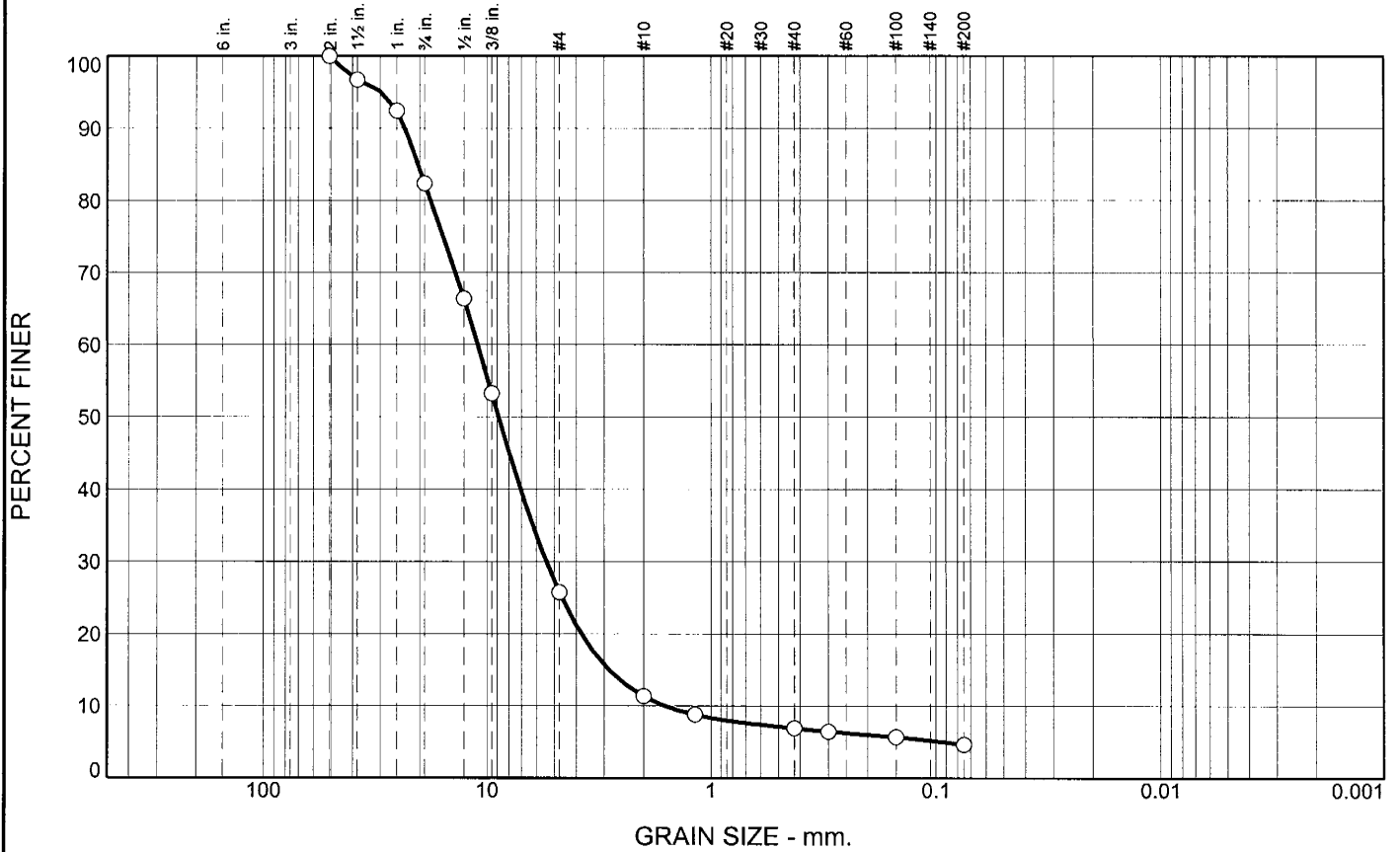
△

○ Source of Sample: RRC4 Depth: 29-34 Sample Number: RV7

□ Source of Sample: RRC4 Depth: 34-39 Sample Number: RV8

△ Source of Sample: RRC4 Depth: 39-44 Sample Number: RV9

Particle Size Distribution Report



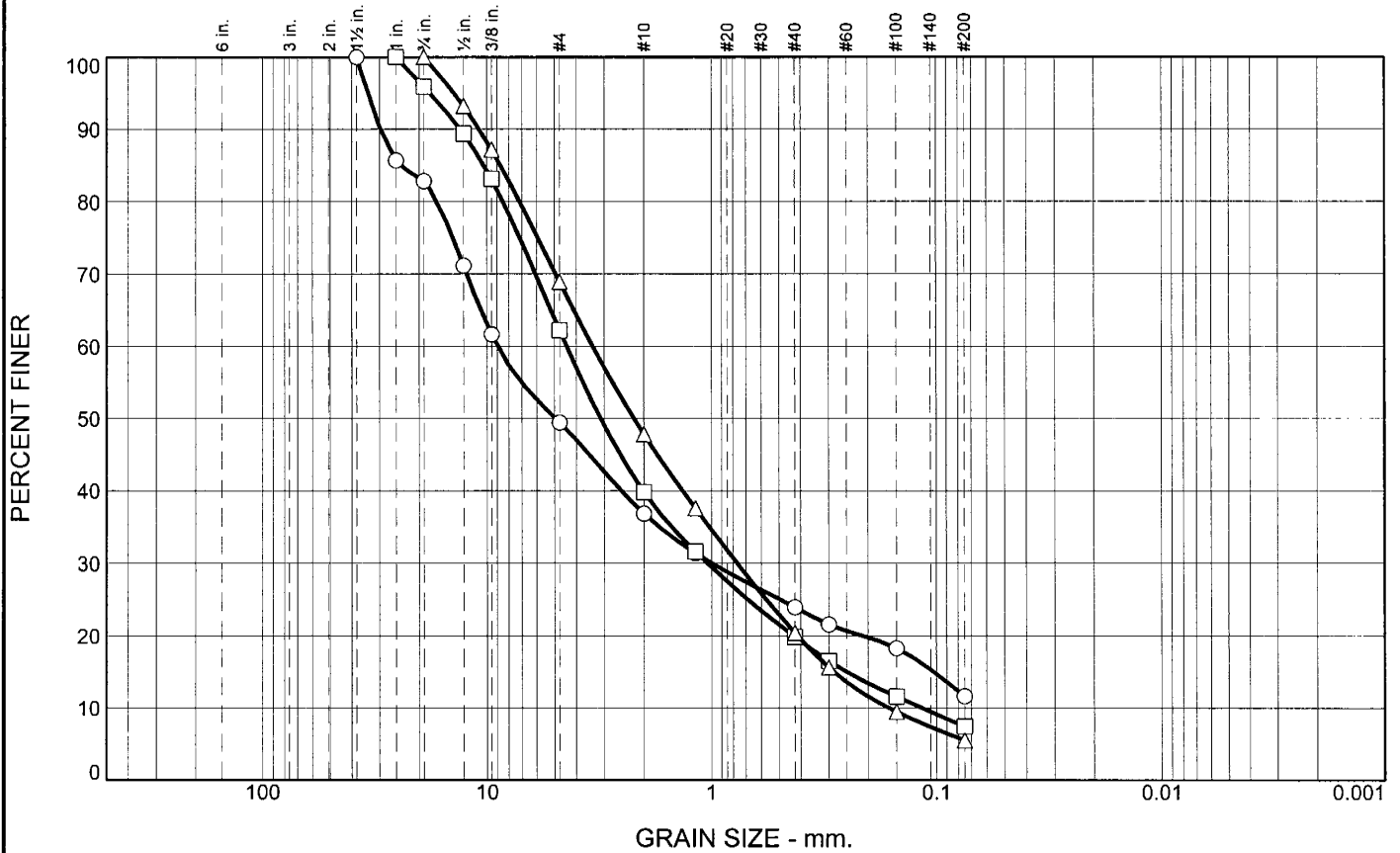
	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	74.2	21.1	4.7		GW	A-1-a	21	26

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER			Material Description ○ well-graded gravel with sand
2"	○	100.0		#4	○	25.8		
1-1/2"		96.7		#10		11.3		
1"		92.4		#16		8.8		
3/4"		82.4		#40		6.9		
1/2"		66.4		#50		6.5		
3/8"		53.2		#100		5.7		
GRAIN SIZE				#200		4.7		
D ₆₀						11.0116		
D ₃₀						5.4232		
D ₁₀						1.6086		
COEFFICIENTS								
C _c						1.66		
C _u						6.85		

REMARKS:
○

○ Source of Sample: RRC4 Depth: 44-49 Sample Number: RV10

Particle Size Distribution Report

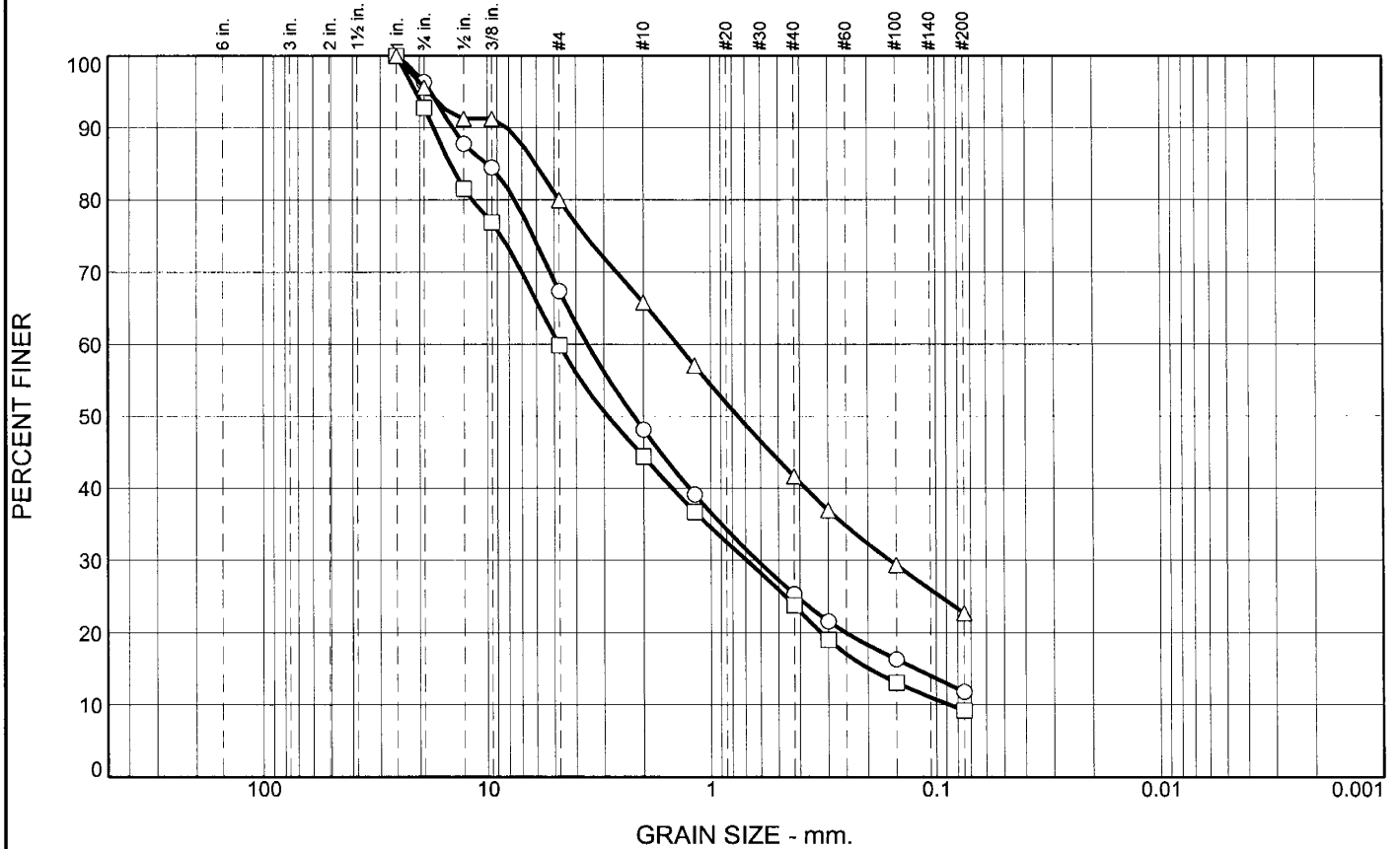


	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	50.6	37.8	11.6		GP-GM	A-1-a	26	27
□	0.0	37.8	54.7	7.5		SW-SM	A-1-a	NP	23
△	0.0	31.1	63.4	5.5		SW-SM	A-1-a	NP	21

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER			<u>Material Description</u> ○ poorly graded gravel with silt and sand □ well-graded sand with silt and gravel △ well-graded sand with silt and gravel
	○	□	△		○	□	△	
1-1/2"	100.0			#4	49.4	62.2	68.9	<u>REMARKS:</u> ○ □ △
1"	85.7	100.0		#10	36.9	39.8	47.8	
3/4"	82.8	95.8	100.0	#16	31.4	31.6	37.6	
1/2"	71.2	89.3	93.2	#40	24.0	19.9	20.4	
3/8"	61.6	83.1	87.2	#50	21.6	16.5	15.6	
GRAIN SIZE				#100	18.3	11.6	9.5	
D ₆₀	8.9582	4.4196	3.3767	#200	11.6	7.5	5.5	
D ₃₀	0.9951	1.0414	0.7676					
D ₁₀		0.1155	0.1622					
COEFFICIENTS								
C _c		2.13	1.08					
C _u		38.27	20.82					

○ Source of Sample: RRC4 Depth: 4-5.5 Sample Number: A
 □ Source of Sample: RRC4 Depth: 9-10.5 Sample Number: B
 △ Source of Sample: RRC4 Depth: 14-15.5 Sample Number: C

Particle Size Distribution Report

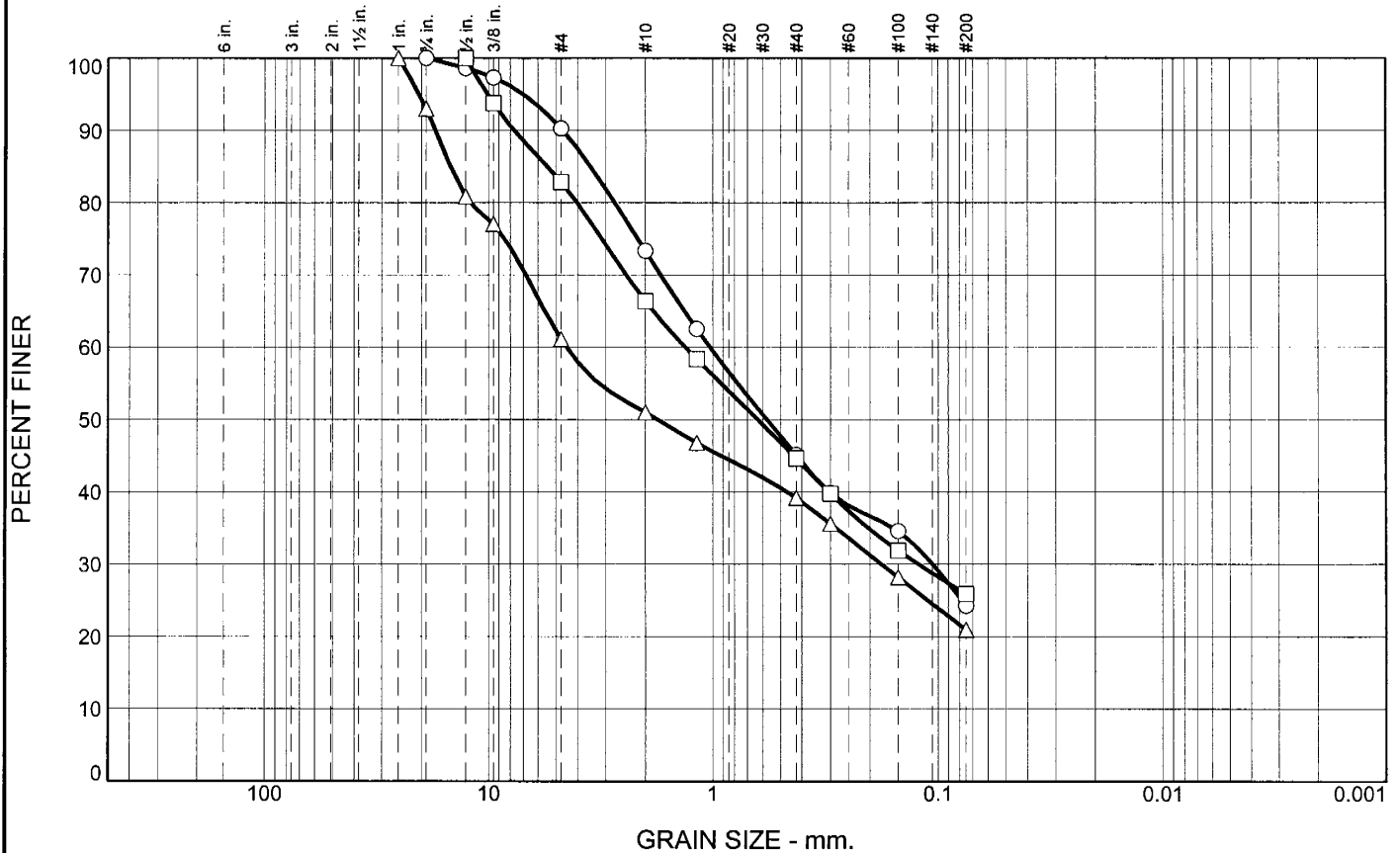


	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	32.6	55.6	11.8		SP-SM	A-1-a	21	23
□	0.0	40.2	50.6	9.2		SW-SM	A-1-a	NP	20
△	0.0	20.0	57.3	22.7		SC-SM	A-2-4(0)	22	29

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER			Material Description
	○	□	△		○	□	△	
1"	100.0	100.0	100.0	#4	67.4	59.8	80.0	○ poorly graded sand with silt and gravel □ well-graded sand with silt and gravel △ silty, clayey sand with gravel
3/4"	96.3	92.8	95.6	#10	48.1	44.4	65.8	
1/2"	87.8	81.6	91.2	#16	39.1	36.7	57.0	
3/8"	84.5	76.9	91.2	#40	25.3	23.8	41.6	
				#50	21.6	19.0	36.9	
				#100	16.3	13.1	29.4	
				#200	11.8	9.2	22.7	
GRAIN SIZE								REMARKS: ○ □ △
D ₆₀	3.5510	4.7814	1.4078					
D ₃₀	0.6211	0.6929	0.1601					
D ₁₀		0.0874						
COEFFICIENTS								
C _c		1.15						
C _u		54.74						

○ Source of Sample: RRC4 Depth: 19-20.5 Sample Number: D
 □ Source of Sample: RRC4 Depth: 24-25.5 Sample Number: E
 △ Source of Sample: RRC4 Depth: 34-34.3 Sample Number: G

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	9.8	65.9	24.3		SC	A-2-4(0)	22	30
□	0.0	17.1	57.0	25.9		SC-SM	A-2-4(0)	17	24
△	0.0	38.9	40.1	21.0		SM	A-1-b	18	19

SIEVE inches size	PERCENT FINER		
	○	□	△
1"			100.0
¾"	100.0		93.0
½"	98.6	100.0	80.9
3/8"	97.3	93.7	77.1
GRAIN SIZE			
D60	1.0298	1.3261	4.5065
D30	0.1052	0.1219	0.1775
D10			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
	○	□	△
#4	90.2	82.9	61.1
#10	73.3	66.4	51.0
#16	62.5	58.4	46.8
#40	45.1	44.7	39.2
#50	39.9	39.8	35.6
#100	34.6	31.9	28.2
#200	24.3	25.9	21.0

Material Description

- clayey sand
- silty, clayey sand with gravel
- △ silty sand with gravel

REMARKS:

○

□

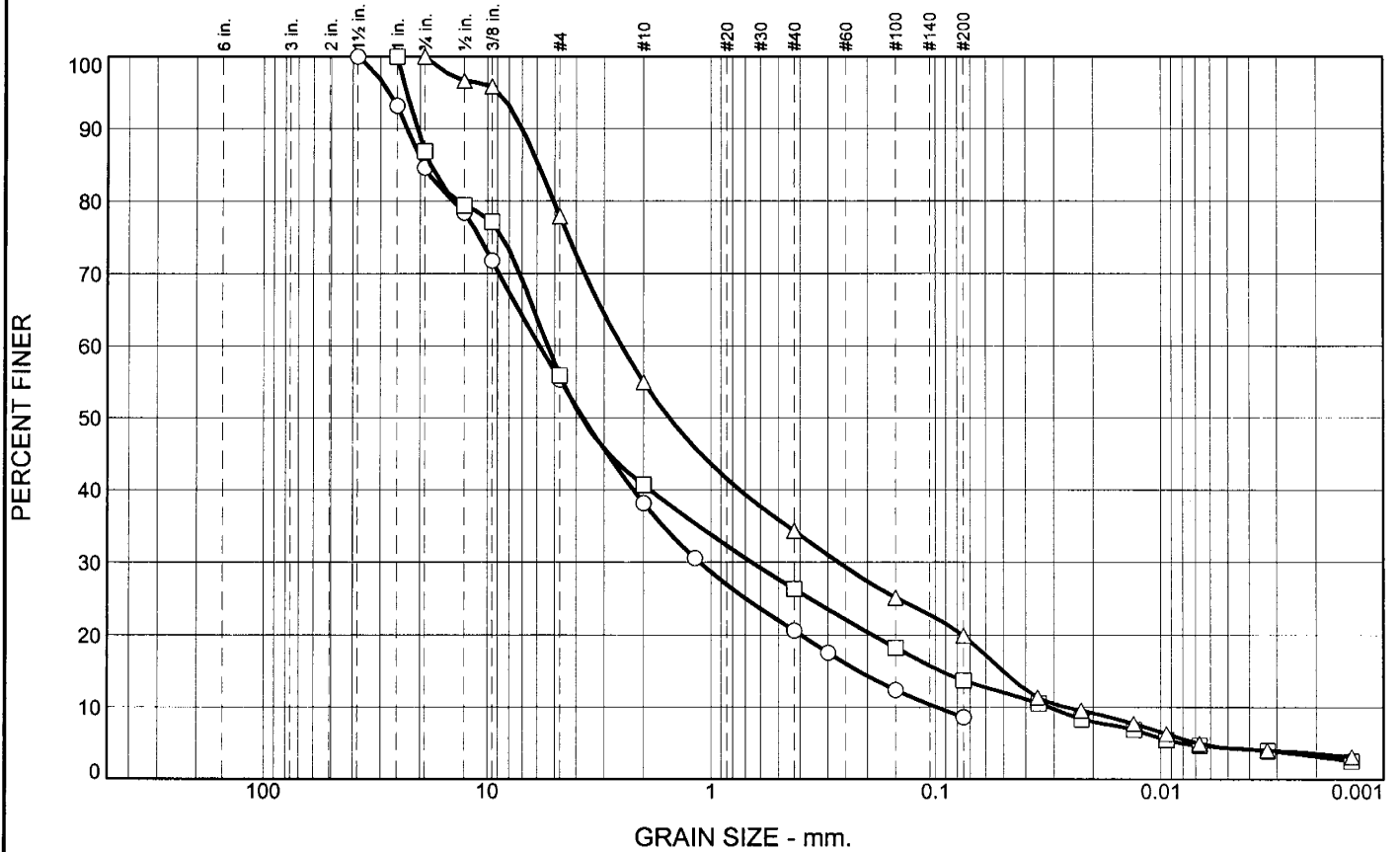
△

○ Source of Sample: RRC4 Depth: 39-39.3 Sample Number: H
 □ Source of Sample: RRC4 Depth: 44-44.3 Sample Number: I
 △ Source of Sample: RRC4 Depth: 49-50.5 Sample Number: J

**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: Abbas Bafghi
 Project: Boulder City Bypass - US 93/US 95 Intersection
 Project No.: FL-02-06

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	44.7	46.7	8.6		SW-SM			
□	0.0	44.1	42.2	9.3	4.4	GM			
△	0.0	22.1	58.0	15.6	4.3	SM			

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER		
	○	□	△		○	□	△
1.5	100.0			#4	55.3	55.9	77.9
1	93.1	100.0		#10	38.2	40.7	55.0
3/4	84.6	86.9	100.0	#16	30.6		
1/2	78.4	79.4	96.6	#40	20.6	26.3	34.3
3/8	71.8	77.2	95.8	#50	17.5		
				#100	12.4	18.2	25.2
				#200	8.6	13.7	19.9

GRAIN SIZE			
D ₆₀	5.8471	5.3807	2.5098
D ₃₀	1.1253	0.6545	0.2692
D ₁₀	0.0988	0.0315	0.0266

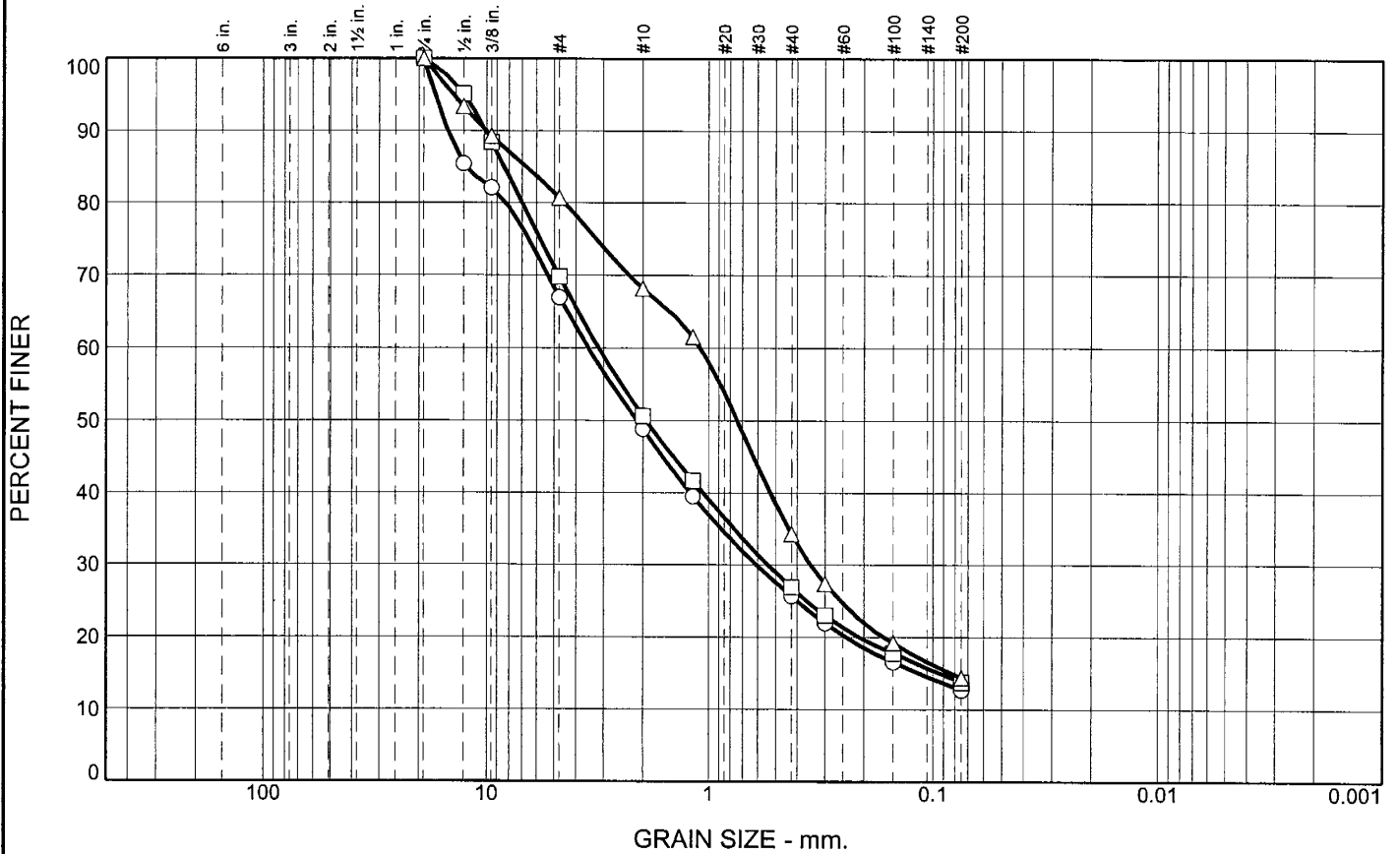
COEFFICIENTS			
C _c	2.19	2.53	1.08
C _u	59.20	170.86	94.23

Material Description	
○	Well-graded sand with silt and gravel
□	Silty gravel with sand
△	Silty sand with gravel

REMARKS:	
○	
□	
△	

○ Source of Sample: BCB1 Depth: 2.0-3.5' Sample Number: A
 □ Source of Sample: BCB1 Depth: 12.0-12.5' Sample Number: D
 △ Source of Sample: BCB1 Depth: 20.0-20.5' Sample Number: F

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	33.0	54.3		12.7	SM			
□	0.0	30.2	56.0		13.8	SM			
△	0.0	19.3	66.3		14.4	SM			

SIEVE inches size	PERCENT FINER		
	○	□	△
3/4	100.0	100.0	100.0
1/2	85.5	95.1	93.4
3/8	82.1	88.4	89.3
GRAIN SIZE			
D ₆₀	3.5152	3.1593	1.0915
D ₃₀	0.6068	0.5398	0.3475
D ₁₀			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
	○	□	△
#4	67.0	69.8	80.7
#10	48.9	50.7	68.2
#16	39.5	41.7	61.5
#40	25.7	26.9	34.3
#50	21.9	23.0	27.4
#100	16.6	17.8	19.2
#200	12.7	13.8	14.4

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

REMARKS:

○

□

△

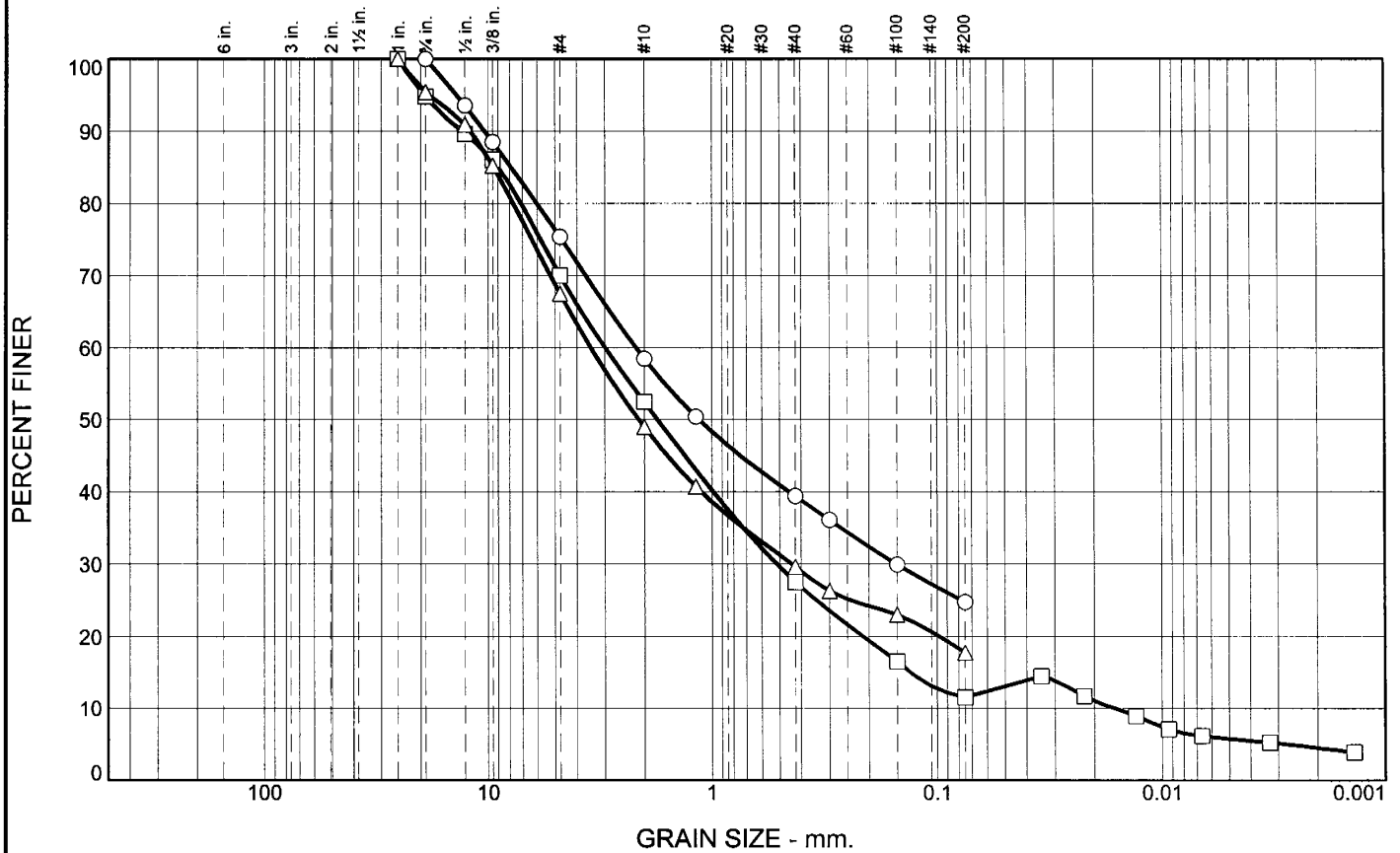
○ Source of Sample: BCB1 Depth: 25.0-25.5' Sample Number: G
 □ Source of Sample: BCB1 Depth: 35.0-35.45' Sample Number: H
 △ Source of Sample: BCB1 Depth: 70.0-70.3' Sample Number: L

**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: Mark Salazar
 Project: Boulder City Bypass - US 93/US 95 Intersection
 Project No.: FL-02-06

Figure

Particle Size Distribution Report

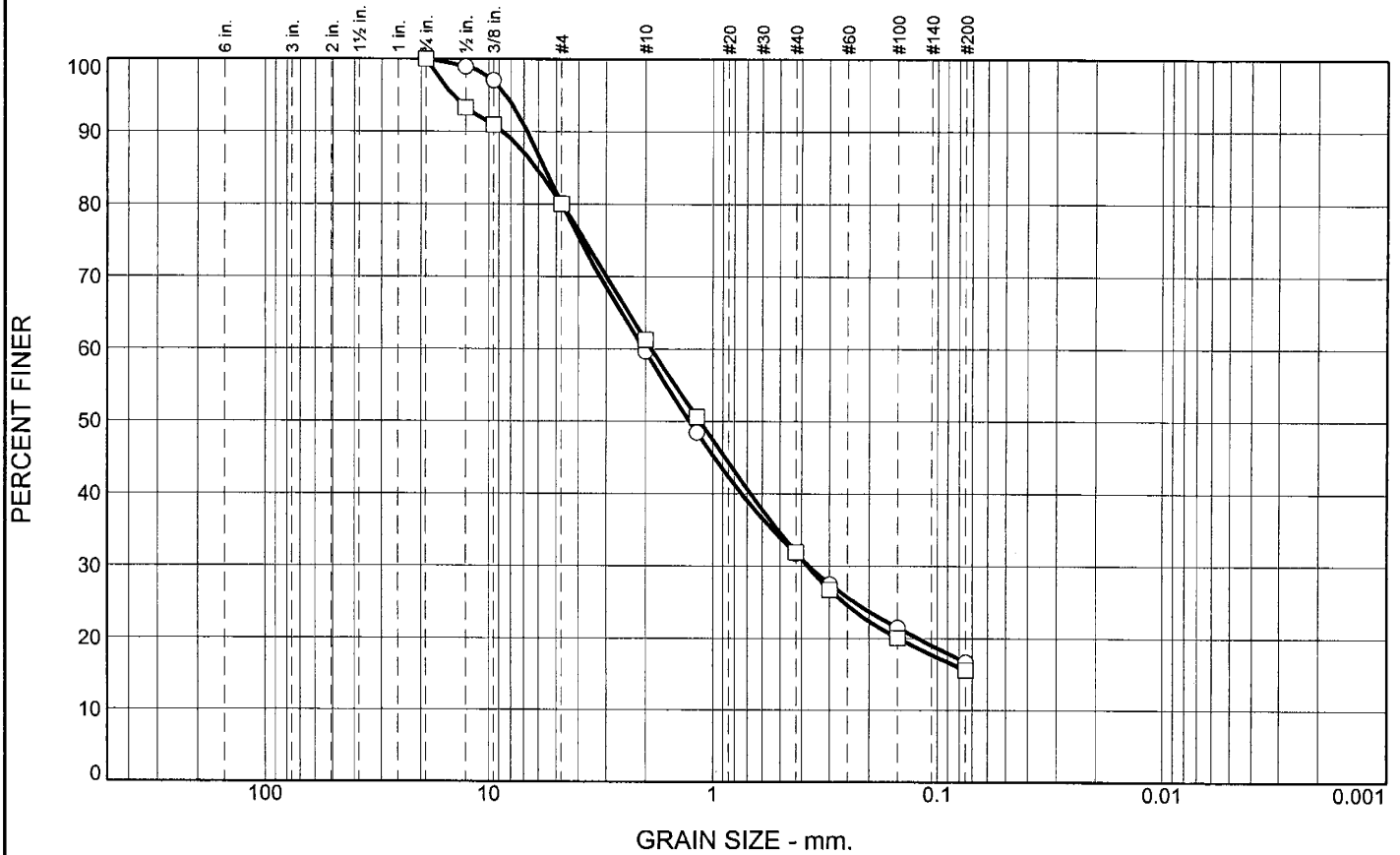


	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	24.6	50.6	24.8		SM			
□	0.0	29.9	58.6	5.7	5.8	SP-SM	A-1-b	24	27
△	0.0	32.5	49.7	17.8		SM			

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER			Material Description
	○	□	△		○	□	△	
1		100.0	100.0	#4	75.4	70.1	67.5	○ Silty sand with gravel □ Poorly graded sand with silt and gravel △ Silty sand and gravel
3/4	100.0	94.8	95.4	#10	58.5	52.4	48.9	
1/2	93.5	89.7	90.9	#16	50.4		40.7	
3/8	88.5	86.1	85.3	#40	39.4	27.5	29.6	
				#50	36.1		26.3	
				#100	29.9	16.5	23.0	
				#200	24.8	11.5	17.8	
GRAIN SIZE								
D ₆₀	2.1790	2.9902	3.4606					
D ₃₀	0.1511	0.5140	0.4406					
D ₁₀		0.0162						
COEFFICIENTS								
C _c		5.44						
C _u		184.02						
REMARKS:								
○								
□								
△								

○ Source of Sample: BCB2 Depth: 5.0-6.5' Sample Number: A
 □ Source of Sample: BCB2 Depth: 10.0-11.5' Sample Number: C
 △ Source of Sample: BCB2 Depth: 20.0-20.5' Sample Number: E

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	19.9	63.4	16.7		SM			
□	0.0	20.0	64.4	15.6		SM			

SIEVE inches size	PERCENT FINER	
	○	□
3/4	100.0	100.0
1/2	98.9	93.3
3/8	97.1	91.0
GRAIN SIZE		
D60	2.0337	1.8855
D30	0.3704	0.3763
D10		
COEFFICIENTS		
C _c		
C _u		

SIEVE number size	PERCENT FINER	
	○	□
#4	80.1	80.0
#10	59.6	61.2
#16	48.5	50.6
#40	31.8	31.9
#50	27.5	26.7
#100	21.5	20.1
#200	16.7	15.6

Material Description
 ○ Silty sand with gravel
 □ Silty sand with gravel

REMARKS:
 ○
 □

○ Source of Sample: BCB2 Depth: 30.0-30.5' Sample Number: F
 □ Source of Sample: BCB2 Depth: 60.0-60.35' Sample Number: I

**NEVADA
DEPARTMENT OF
TRANSPORTATION**

Client: Mark Salazar
 Project: Boulder City Bypass - US 93/US 95 Intersection
 Project No.: FL-02-06

Figure

**NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION**

R Value Results

E.A. No. 73307

PROJECT Boulder City Bypass

BORING # FA4, FP1, NBA1, NBA2, SBA1, SBA2, RRBP1, BRW1
BRW2, BRW3, BRW4, RRC1, RRC2, RRC3, RRC4

Sample No.	R Value
FA4 RV1	69
FA4 RV2	59
FA4 RV3	70
FP1 BULK	67
NBA1 BULK 1	80
NBA1 BULK 2	77
NBA2 BULK 1	78
NBA2 BULK 2	69
SBA1 BULK 1	80
SBA1 BULK 2	75
SBA2 BULK 1	74
SBA2 BULK 2	79
RRBP1 BULK 1	66
BRW1 RV1	73
BRW1 RV2	77
BRW2 RV1	77
BRW2 RV2	83
BRW3 RV1	79
BRW3 RV2	81
BRW4 RV1	77
BRW4 RV2	77
RRC1 RV1	81
RRC1 RV2	85
RRC1 RV3	74
RRC1 RV4	84
RRC1 RV5	83
RRC1 RV6	81
RRC2 RV1	65
RRC2 RV2	75
RRC2 RV3	81
RRC2 RV4	74

Sample No.	R Value
RRC2 RV5	72
RRC2 RV6	70
RRC2 RV7	70
RRC2 RV8	61
RRC2 RV9	74
RRC2 RV10	62
RRC3 RV1	66
RRC3 RV2	69
RRC3 RV3	73
RRC3 RV4	*52
RRC3 RV5	72
RRC3 RV6	76
RRC3 RV7	77
RRC3 RV8	75
RRC3 RV9	75
RRC3 RV10	80
RRC4 RV1	81
RRC4 RV2	81
RRC4 RV3	81
RRC4 RV4	83
RRC4 RV5	79
RRC4 RV6	77
RRC4 RV7	80
RRC4 RV8	82
RRC4 RV9	81
RRC4 RV10	75

* Result is questionable

APPENDIX C
SUMMARY OF TEST RESULTS

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

EA/Cont # 73307 Job Description Boulder City Bypass Phase 1, Structure I-2868 Station "SL" 14+02, 56' Rt. Date 08/09/2006
 Boring No. SLA1 Elevation (ft) 2009.1

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP. LER TYPE	N BLOWS per ft.	SOIL GROUP	W% DRY	UW pcf	PASS #200 %	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS	
												φ deg.	C psi	φ deg.	C psi		
												Peak	Residual				
A	4.0 - 5.5	SPT	25		2.2		8.0										
B	6.0 - 7.5	SPT	12	SP-SM	2.2		11.7	24	NP	NP							
C	8.0 - 9.5	SPT	59	SM	2.0		18.7	24	NP	NP							
D	10.0 - 11.5	SPT	30	SM	2.0		12.5	21	NP	NP							
E	12.0 - 12.18	SPT	R	SM	1.9		14.2	19	NP	NP							Visual Only
F	14.0 - 14.26	SPT	R														Visual Only
G	16.0 - 16.5	SPT	R														Visual Only
H	19.0 - 19.4	SPT	R		1.4			19	17	2							Visual Only
I	24.0 - 25.5	SPT	62														Visual Only
J	29.0 - 29.8	SPT	R		2.0		17.2										Visual Only
K	34.0 - 34.5	SPT	R														Visual Only
L	34.0 - 34.15	SPT	R														Visual Only

CMS = California Modified Sampler 2.40" 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_{25s})(0.62)
 H = Hydrometer
 S = Sieve
 G = Specific Gravity
 PI = Plasticity Index
 LL = Liquid Limit
 PL = Plastic Limit
 NP = Non-Plastic
 OC = Consolidation
 Ch = Chemical
 RV = R - Value
 MD = Moisture Density
 CM = Compaction
 E = Swell/Pressure on Expansive Soils
 SL = Shrinkage Limit
 UW = Unit Weight
 W = Moisture Content
 K = Permeability
 O = Organic Content
 D = Dispersive
 RQD = Rock Quality Designation
 X = X-Ray Diffraction
 HCpot = Hydro-Collapse Potential

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Bypass Phase 1, Structure I-2868

Station "SL" 14+02, 56' Rt.

Boring No. SLA1

Elevation (ft) 2009.1

Date 08/09/2006

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W% W _p	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												φ deg.	C psi	φ deg.	C psi	
												Peak	Residual			
M	44.0 - 44.16	SPT	R												Visual Only	
N	49.0 - 49.26	SPT	R												Visual Only	
O	54.0 - 54.14	SPT	R												Visual Only	
P	59.0 - 59.2	SPT	R												Visual Only	
Q	64.0 - 64.11	SPT	R												Visual Only	

CMS = California Modified Sampler 2.40" 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_{60s})(0.62)

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

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

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Bypass, I-2868, Pier 1

Station "SL" 14+75, Center

Boring No. SLP1

Elevation (ft) 2016.0

Date

08/31/2006

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												φ deg.	C psi	φ deg.	C psi	
												Peak	Residual			
A	3.5 - 5.0	SPT	15	SW-SM	3.6		6.5	19	NP	NP						
B	5.5 - 7.0	SPT	12		2.7										pH = 8.1, Resist. = 939 ohm-cm	
C	8.5 - 10.0	SPT	48	SM	2.8		13.7	23	NP	NP						
D	10.5 - 12.0	SPT	46	SP-SM	2.3		10.2	23	NP	NP						
E	13.5 - 14.5	SPT	R												Visual Only	
F	18.5 - 18.64	SPT	R		1.7		15.9									
G	23.5 - 23.67	SPT	R		1.2			18	17	1						
H	28.5 - 28.7	SPT	R		3.0			20	18	2						
I	33.5 - 33.68	SPT	R												Visual Only	
J	38.5 - 38.56	SPT	R												Visual Only	
K	43.5 - 43.56	SPT	R												Visual Only	
L	48.5 - 48.88	SPT	R		2.0			19	18	2					Visual Only	

CMS = California Modified Sampler 2.40" 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_{cor})/(0.62)
 H = Hydrometer
 S = Sieve
 G = Specific Gravity
 PI = Plasticity Index
 LL = Liquid Limit
 PL = Plastic Limit
 NP = Non-Plastic
 OC = Consolidation
 Ch = Chemical
 RV = R - Value
 MD = Moisture Density
 CM = Compaction
 E = Swell/Pressure on Expansive Soils
 SL = Shrinkage Limit
 UW = Unit Weight
 W = Moisture Content
 K = Permeability
 O = Organic Content
 D = Dispersive
 RQD = Rock Quality Designation
 X = X-Ray Diffraction
 HCpot = Hydro-Collapse Potential

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Bypass, I-2868, Pier 1

Station "SL" 14+75, Center

Boring No. SLP1

Elevation (ft) 2016.0

Date

08/31/2006

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP. LER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												φ deg.	C psi	φ deg.	C psi	
Peak		Residual														
M	53.5 - 55.0	SPT	150	SW-SM	1.9		10.7	23	20	3						
N	58.5 - 59.15	SPT	R		1.9			20	NP	NP						
O	63.5 - 63.68	SPT	R													Visual Only
P	68.5 - 68.62	SPT	R													No Recovery

CMS = California Modified Sampler 2.40" 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_{cor})(0.62)

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

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

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Bypass, I-2868, Pier 2

Boulder City Bypass, I-2868, Pier 2

Boring No. SLP2

Elevation (ft) 2022.2

Station "SL" 17+29.8, Center

Date 08/30/2006

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												φ deg.	C psi	φ deg.	C psi	
												Peak	Residual			
A	3.0 - 4.5	SPT	19		8.1										pH = 8.8, Resist. = 6173 ohm-cm	
B	5.0 - 6.5	SPT	23												Visual Only	
C	10.0 - 11.5	SPT	102												Visual Only	
D	13.0 - 14.5	SPT	78	SM	12.5		16.3	29	26	3						
E	15.0 - 16.28	SPT	R	GM	10.9		12.1	29	25	4						
F	18.0 - 19.5	SPT	90	SP-SM	10.6		11.0	22	NP	NP						
G	20.0 - 21.0	SPT	R	SP-SM	10.4		11.5	23	NP	NP					Visual Only	
H	25.0 - 26.0	SPT	R	SP-SM	10.4		10.1	21	NP	NP						
I	30 - 31.5	SPT	113	SP-SM	9.8		10.7	21	NP	NP						
J	35.0 - 35.38	SPT	R												Visual Only	
K	40.0 - 40.18	SPT	R												Visual Only	
L	45.0 - 45.36	SPT	R												Visual Only	

CMS = California Modified Sampler 2.40" 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_{60s})(0.62)

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

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

* = Average of subsamples

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

EA/Cont # 73307 Job Description Boulder City Bypass, I-2868, Pier 2 Station "SL" 17+29.8, Center Date 08/30/2006
 Boring No. SLP2 Elevation (ft) 2022.2

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W% %	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS	
												φ deg.	C psi	φ deg.	C psi		
M	50.0 - 50.5	SPT	R		10.2		9.5					Peak					
N	55.0 - 55.75	SPT	R									Residual				Visual Only	
O	60.0 - 60.2	SPT	R													Visual Only	
P	65.0 - 65.25	SPT	R													Visual Only	

CMS = California Modified Sampler 2.40" ID U = Unconfined Compressive H = Hydrometer
 SPT = Standard Penetration 1.38" ID UU = Unconsolidated Undrained S = Sieve
 CS = Continuous Sample 3.23" ID CD = Consolidated Drained G = Specific Gravity
 RC = Rock Core CU = Consolidated Undrained PI = Plasticity Index
 PB = Pitcher Barrel DS = Direct Shear LL = Liquid Limit
 CSS = Calif. Split Spoon 2.42" ID φ = Friction PL = Plastic Limit
 CPT = Cone Penetration Test C = Cohesion NP = Non-Plastic
 TP = Test Pit N = No. of blows per ft., sampler OC = Consolidation
 P = Pushed, not driven N = Field SPT Ch = Chemical
 R = Refusal N = (N_{60s})(0.62) RV = R - Value
 Sh = Shelby Tube 2.87" ID MD = Moisture Density

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

* = Average of subsamples

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

EA/Cont # 73307 Job Description Boulder City Bypass, N. Abut. I-2868, Abutment 2 Station "SL" 19+02, 38' Lt. Date 08/23/2006
 Boring No. SLA2 Elevation (ft) 2028.1

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMPLER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												φ deg.	C psi	φ deg.	C psi	
												Peak	Residual			
A	3.0 - 4.5	SPT	29		2.6		7.5									
B	5.0 - 6.5	SPT	57	SW-SM	2.8		8.8	20	NP	NP						
C	8.0 - 9.5	SPT	88		2.7		14.0									
D	11.0 - 12.5	SPT	153		1.5										pH = 8.2, Resist. = 3155 ohm-cm	
E	13.0 - 14.4	SPT	R	SP-SM	1.6		10.3	19	NP	NP						
F	16.0 - 16.28	SPT	R		1.7			20	NP	NP						
G	18.0 - 19.5	SPT	118		1.3		9.4									
H	20.0 - 20.4	SPT	R												Visual Only	
I	25.0 - 26.1	SPT	R	SP-SM	1.6		11.8	20	NP	NP					Visual Only	
J	30.0 - 30.5	SPT	R													
K	35.0 - 35.9	SPT	R		1.8		7.8									
L	40.0 - 40.9	SPT	R		1.9			21	NP	NP						

CMS = California Modified Sampler 2.40" 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_{60s})(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_v Value
 MD = Moisture Density

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

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Bypass, N. Abut. I-2868, Abutment 2

Station "SL" 19+02, 38' Lt.

Boring No. SLA2

Elevation (ft) 2028.1

Date

08/23/2006

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP. LER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST			COMMENTS
												φ deg.	C psi	φ deg.	
M	45.0 - 46.5	SPT	128	SP-SM	1.8		10.4	21	NP	NP					
N	50.0 - 50.26	SPT	R												Visual Only
O	55.0 - 55.28	SPT	R												Visual Only

CMS = California Modified Sampler 2.40" 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_{cas})(0.62)

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

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

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Bypass, I-2869

Boring No. RRAP1

Elevation (ft) 2190.7

Station "RR" 108+18, 24' Lt. Date 11/17/2006

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W% %	DRY UW pcf	PASS #200 %	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												φ deg.	C psi	φ deg.	C psi	
												Peak	Residual			
A	1.5 - 2.5	SPT	R		2.8		8.2									
B	3.0 - 3.22	SPT	R													Visual Only
C	4.5 - 4.87	SPT	R		1.3			18	NP	NP						
D	9.5 - 9.61	SPT	R													Visual Only
E	14.5 - 14.59	SPT	R													Visual Only
F	19.5 - 19.58	SPT	R		3.2			20	18	2						
G	24.5 - 24.62	SPT	R		2.8		23.2									
H	29.5 - 29.58	SPT	R	SC-SM	2.7		30.0	22	17	5						
I	34.5 - 34.58	SPT	R													Visual Only
J	39.5 - 39.59	SPT	R	SC-SM	3.2		26.8	23	18	5						
K	44.4 - 44.59	SPT	R	SC-SM	2.5		20.9	21	17	4						
L	49.5 - 49.69	SPT	R													Visual Only

CMS = California Modified Sampler 2.40" 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_{60s})(0.62)

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

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

* = Average of subsamples

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

EA/Cont # 73307 Job Description Boulder City Bypass, I-2869 Station "RR" 108+18, 24' Lt. Date 11/17/2006
 Boring No. RRAP1 Elevation (ft) 2190.7

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS	
												φ deg.	C psi	φ deg.	C psi		
M	54.5 - 54.55	SPT	R									Peak					Visual Only
												Residual					

CMS = California Modified Sampler 2.40" 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 = (N₅₅)(0.62)

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

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

* = Average of subsamples

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

EA/Cont # 73307 Job Description Boulder City Bypass, Structure 2870W, Abut. 1 Station "DC" 22+47, 25' Lt. Date 10/30/2006
 Boring No. DCA1 Elevation (ft) 2240.4

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- IER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	STRENGTH TEST				COMMENTS	
											TEST TYPE	φ deg.	C psi	φ deg.		C psi
A	3.0 - 4.5	SPT	39	SP-SC	3.0		9.8	30	21	9						
B	5.0 - 6.5	SPT	58	SC-SM	3.1		16.7	26	22	4						
C	8.0 - 9.5	SPT	25	SC	3.9		15.6	30	21	9						
D	11.0 - 11.05	SPT	R													Visual Only
E	13.0 - 13.14	SPT	R													Visual Only
F	14.5 - 20.3	RC														RQD, U, G

CMS = California Modified Sampler 2.40" 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 $N = (N_{60})^{(0.62)}$

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

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

 * = Average of subsamples

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

EA/Cont # 73307 Job Description Boulder City Bypass Phase 1, Structure 2870W, Abut. 2 Station "DC" 24+00, 29' Lt. Date 10/30/2006
 Boring No. DCA2 Elevation (ft) 2247.2

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W% W	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS	
												φ deg.	C psi	φ deg.	C psi		
												Peak	Residual				
A	3.0 - 4.5	SPT	36	SC	3.6		13.9	30	21	9							
B	5.2 - 6.7	SPT	52	SC-SM	3.3		13.0	26	22	4							
C	6.7 - 12.2	RC															Visual Only
D	12.2 - 16.7	RC															Visual Only

CMS = California Modified Sampler 2.40" ID U = Unconfined Compressive H = Hydrometer
 SPT = Standard Penetration 1.38" ID UU = Unconsolidated Undrained S = Sieve
 CS = Continuous Sample 3.23" ID CD = Consolidated Drained G = Specific Gravity
 RC = Rock Core CU = Consolidated Undrained PI = Plasticity Index
 PB = Pitcher Barrel DS = Direct Shear LL = Liquid Limit
 CSS = Calif. Split Spoon 2.42" ID φ = Friction PL = Plastic Limit
 CPT = Cone Penetration Test C = Cohesion NP = Non-Plastic
 TP = Test Pit N = No. of blows per ft., sampler OC = Consolidation
 P = Pushed, not driven N = Field SPT Ch = Chemical
 R = Refusal N = (N_{cas})(0.62) RV = R - Value
 Sh = Shelby Tube 2.87" ID MD = Moisture Density

* = Average of subsamples

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

EA/Cont # 73307 Job Description Boulder City Bypass Phase 1, Structure I-2870E, East Abut. Station "F" 29+14.5, 1.0' Lt. Date 10/20/2006
 Boring No. FA4 Elevation (ft) 2239.8

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	STRENGTH TEST				COMMENTS	
											TEST TYPE	φ deg.	C psi	φ deg.		C psi
A	2.0 - 3.5	SPT	149	SM	4.8		15.5	49	34	15						
B	3.5 - 5.0	SPT	R	SM	6.1		22.4	54	34	20						
C1	5.0 - 6.0	SPT	74	GM	4.7		15.4	43	27	16						
C2	6.0 - 6.5	SPT														Visual Only
D	6.5 - 8.0	SPT	67	SC	4.8		20.7	41	23	18						
E	8.0 - 9.5	SPT		SC	4.0		20.9	35	21	14						
F1	9.5 - 10.0	SPT	R		4.4			43	23	20						
F2	10.0 - 10.25	SPT	104													Visual Only
G	11.0 - 12.5	SPT	128	SC-SM	3.2		12.2	29	22	7						
H	12.5 - 12.75	SPT	R		3.4			28	20	8						
I	14.0 - 14.05	SPT	R													Visual Only
J	15.0 - 15.07	SPT	R													Visual Only

CMS = California Modified Sampler 2.40" ID U = Unconfined Compressive H = Hydrometer
 SPT = Standard Penetration 1.38" ID UU = Unconsolidated Undrained S = Sieve
 CS = Continuous Sample 3.23" ID CD = Consolidated Drained G = Specific Gravity
 RC = Rock Core CU = Consolidated Undrained PI = Plasticity Index
 PB = Pitcher Barrel DS = Direct Shear LL = Liquid Limit
 CSS = Calif. Split Spoon 2.42" ID φ = Friction PL = Plastic Limit
 CPT = Cone Penetration Test C = Cohesion NP = Non-Plastic
 TP = Test Pit N = No. of blows per ft., sampler OC = Consolidation
 P = Pushed, not driven N = Field SPT Ch = Chemical
 R = Refusal N = (N₆₀)/0.62 RV = R-Value
 Sh = Shelby Tube 2.87" ID MD = Moisture Density

* = Average of subsamples

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

EAI/Cont # 73307 **Job Description** Boulder City Bypass Phase 1, Structure I-2870E, East Abut. **Station "F"** 29+14.5, 1.0' Lt. **Date** 10/20/2006
Boring No. FA4 **Elevation (ft)** 2239.8

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP. LER TYPE	N BLOWS per ft.	SOIL GROUP	W% WATER	DRY UW pcf	PASS #200 %	LL %	PL %	PI %	STRENGTH TEST				COMMENTS	
											TEST TYPE	φ deg.	C psi	φ deg.		C psi
K	20.0 - 20.07	SPT	R		2.3			21	19	2						
L	25.0 - 25.1	SPT	R		1.7		15.7									
M	35.0 - 35.07	SPT	R													Visual Only
N	39.0 - 41.4	RC	R													Visual Only
RV1	0.0 - 5.0	Comp.		GM			13.2	45	31	14						RV = 69, pH = 8.2, Res. = 847 ohm-cm
RV2	5.0 - 10.0	Comp.		GM			14.6	44	29	15						RV = 59, pH = 8.6, Res. = 661 ohm-cm
RV3	10.0 - 15.0	Comp.		GP-GC			9.8	39	24	15						RV = 70, pH = 8.4, Res. = 346 ohm-cm

CMS = California Modified Sampler 2.40" 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_{60s})(0.62)

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

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

*** = Average of subsamples**

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

EA/Cont # 73307

Job Description Boulder City Bypass, Structure G-2871, Abut. No. 1

Station "F" 14+80, 20' Rt.

Boring No. FA1

Elevation (ft) 2253.8

Date 09/18/2006

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W% pcf	DRY UW	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												φ deg.	C psi	φ deg.	C psi	
												Peak	Residual			
A	3.5 - 5.0	SPT		SW-SC	1.4		10.7	30	21	9						H
B	6.0 - 7.2	SPT		SC	3.1		25.3	32	20	12						
C	8.5 - 8.91	SPT			2.2		19.1									
D	11.5 - 11.6	SPT			1.3			22	18	4						
E	13.5 - 13.67	SPT														Visual Only
F1	13.67 - 16.5	RC														Visual Only
F2	16.5 - 17.5	RC														Visual Only
F3	17.5 - 18.5	RC														Visual Only
G1a	18.5 - 19.3	RC														Visual Only
G1b	19.3 - 19.8	RC			13.9			25	13	12						Visual Only
G2	19.8 - 21.0	RC														Visual Only
G3	21.0 - 22.17	RC														Visual Only

CMS = California Modified Sampler 2.40" 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_{cor})(0.62)

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

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

* = Average of subsamples

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

EA/Cont # 73307 **Job Description** Boulder City Bypass, Structure G-2871 Abut. No. 1 **Station "F"** 14+80, 20' Rt. **Date** 09/18/2006
Boring No. FA1 **Elevation (ft)** 2253.8

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W% pcf	DRY UW	PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												φ deg.	C psi	φ deg.	C psi	
G4	22.17 - 23.5	RC										Peak				Visual Only
H1	23.5 - 24.25	RC										Residual				Visual Only
H2	24.25 - 24.58	RC														Visual Only
I	28.5 - 28.6	SPT			1.3		15.4									
J	33.5 - 33.64	SPT			1.6			18	16	2						
K	38.5 - 38.73	SPT														Visual Only

CMS = California Modified Sampler 2.40" 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 = (N₆₀)(0.62)

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

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

*** = Average of subsamples**

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

EA/Cont # 73307

Job Description Boulder City Bypass, Structure G-2871, Pier No. 1

Station "F" 16+01, 8' Lt.

Boring No. FP1

Elevation (ft) 2244.8

Date 09/29/2006

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP. LER TYPE	N BLOWS per ft.	SOIL GROUP	W% %	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST			COMMENTS
												φ deg.	C psi	φ deg.	
												Peak	Residual		
A	2.0 - 3.5	SPT	38	SP-SC	1.4		15.4	29	20	9					H
B	4.0 - 5.5	SPT	79	GP-GM	2.0		10.3	27	23	4					
C	9.0 - 10.5	SPT	50	SW-SC	1.6		6.6	23	19	4					
D	14.0 - 14.19	SPT	R												Visual Only
E	19.0 - 19.21	SPT	R	SC	2.9		40.7	25	17	8					No Recovery
F	24.0 - 24.06	SPT	R												Visual Only
G	29.0 - 29.11	SPT	R												RQD = 75.2%, U
H	29.11 - 36.33	RC													
BULK	14.0 - 24.0	BULK		SC-SM	1.4		22.7	24	19	5					H, RV = 67, pH = 7.9, Resist. = 337 ohm-cm

CMS = California Modified Sampler 2.40" 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_{cor})(0.62)

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

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

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Bypass

Station "P" 140+55, 38' Lt.

Boring No. FP2

Elevation (ft) 2234.4

Date 09/29/2006

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W% %	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS	
												φ deg.	C psi	φ deg.	C psi		
												Peak	Residual				
A	3.0 - 4.5	SPT	89	SW-SC	2.7		11.0	26	19	7							
B1	4.5 - 5.0	SPT	78		2.6			37	19	18							
B2	5.0 - 6.0	SPT		SC	4.0		25.9	42	23	19							
C	7.0 - 8.5	SPT	87	SC	4.5		15.1	36	20	16							
D	9.5 - 11.0	SPT	42	SC	3.8		25.6	29	18	11							
E	12.5 - 12.6	SPT	R		3.4			31	17	14							
F	14.5 - 15.1	SPT	R	SC	2.7		35.6	26	14	12							
G	19.5 - 19.77	SPT	R														Visual Only
H	24.5 - 24.57	SPT	R														No Recovery
I	29.5 - 29.6	SPT	R														
J	35.6 - 37.9	RC															G, U

CMS = California Modified Sampler 2.40" 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_{60s})(0.62)

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

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

* = Average of subsamples

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

EA/Cont # 73307 Job Description Boulder City Bypass, Structure G-2871, Pier No. 3 Station "F" 19+65, Center Date 10/03/2006
 Boring No. FP3 Elevation (ft) 2229.3

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W% W ₉	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												φ deg.	C psi	φ deg.	C psi	
												Peak	Residual			
A	3.0 - 4.3	SPT		SP-SC	2.4		10.9	27	20	7						
B	4.5 - 4.68	SPT			3.1			30	21	9						
C	7.5 - 8.5	SPT			2.1		7.4									
D	9.5 - 11.0	SPT		SC-SM	2.3		15.5	24	18	6						
E	12.5 - 13.81	SPT		GP-GC	1.9		8.8	21	17	4						
F	14.5 - 14.61	SPT			1.2			25	20	5						
G1		RC														RQD, U, G
G2		RC														RQD, U, G
H		RC														RQD, U, G

CMS = California Modified Sampler 2.40" 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_{cas})(0.62)

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

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

* = Average of subsamples

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

EA/Cont # 73307 Job Description Boulder City Bypass, Structure G-2871, Abut. No. 2 Station "F" 21+09, 12' Rt. Date 10/12/2006
 Boring No. FA2 Elevation (ft) 2223.4

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W% pcf	DRY UW	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												φ deg.	C psi	φ deg.	C psi	
												Peak	Residual			
A	4.5 - 5.35	SPT	R	SP-SC	2.5		11.4	32	18	14						
B	7.5 - 9.0	SPT	37		2.0			20	NP	NP						
C	9.5 - 11.0	SPT	28	SW-SM	2.0		6.8	18	NP	NP						
D	12.0 - 12.47	SPT	R		2.2		14.3									
E	14.5 - 16.0	SPT	56	SW-SM	2.4		11.6	18	NP	NP						H
F	19.5 - 21.0	SPT	41	SW-SM	2.4		8.5	18	NP	NP						H
G	24.5 - 26.0	SPT	49	SM	4.3		21.3	25	NP	NP						
H	29.5 - 30.72	SPT	R	GP-GM	2.3		10.3	17	NP	NP						Visual Only
I	34.5 - 34.72	SPT	R													
J	39.5 - 39.65	SPT	R		3.4			25	20	5						
K1	42.6 - 43.35	RC														
K2	43.35 - 48.35	RC														RQD = 88.5%, U, G

CMS = California Modified Sampler 2.40" ID U = Unconfined Compressive H = Hydrometer
 SPT = Standard Penetration 1.38" ID UU = Unconsolidated Undrained S = Sieve
 CS = Continuous Sample 3.23" ID CD = Consolidated Drained G = Specific Gravity
 RC = Rock Core CU = Consolidated Undrained PI = Plasticity Index
 PB = Pitcher Barrel DS = Direct Shear LL = Liquid Limit
 CSS = Calif. Split Spoon 2.42" ID φ = Friction PL = Plastic Limit
 CPT = Cone Penetration Test C = Cohesion NP = Non-Plastic
 TP = Test Pit N = No. of blows per ft., sampler OC = Consolidation Ch = Chemical
 P = Pushed, not driven N = Field SPT RV = R - Value
 R = Refusal Sh = Shelby Tube 2.87" ID MD = Moisture Density

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Bypass - Bridge H 2972N

Boring No. NBA 1

Elevation (ft) 2056.7

Station "PN" 207 + 95, CL

Date 03/14/2011

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W% pcf	DRY UW	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												Φ deg.	C psi	Φ deg.	C psi	
												Peak	Residual			
BULK 1	0.0 - 5.0	Bulk		GW-GM			9.9	19	NP	NP						Ch, RV = 80
BULK 2	5.0 - 10.0	Bulk		GP-GM			8.0	24	23	1						Ch, RV = 77
B	1.0 - 2.5	SPT	16	SM	2.7		12.2	20	NP	NP						
C	2.5 - 4.0	SPT	18	SW-SM	2.9		8.2	22	NP	NP						
E	5.0 - 6.5	SPT	22	SM	2.7		13.8	27	NP	NP						
F	6.5 - 8.0	SPT	35	SM	2.7		14.0	26	NP	NP						
G	8.0 - 9.5	SPT	34	SW-SM	2.4		9.0	23	NP	NP						
H	10.0 - 11.1	SPT	R	SW-SM	2.4		8.7	21	NP	NP						
I	11.5 - 13.0	SPT	22	SM	2.6		15.4	21	NP	NP						
J	13.0 - 14.5	SPT	24	SP-SM	1.8		11.1	23	NP	NP						
K	14.5 - 16.0	SPT	36	SW-SM	1.8		9.7	19	NP	NP						
L	16.0 - 17.5	SPT	35	SW-SM	1.5		9.5	18	NP	NP						

CMS = California Modified Sampler 2.42" ID
 SPT = Standard Penetration 1.38" ID
 CS = Continuous Sample 3.23" ID
 RC = Rock Core
 PB = Pitcher Barrel
 CSS = Calif. Split Spoon 2.42" ID
 CPT = Cone Penetration Test
 TP = Test Pit
 P = Pushed, not driven
 R = Refusal
 Sh = Shelby Tube 2.87" ID

U = Unconfined Compressive
 UU = Unconsolidated Undrained
 CD = Consolidated Drained
 CU = Consolidated Undrained
 DS = Direct Shear
 Φ = Friction
 C = Cohesion
 N = No. of blows per ft., sampler
 N = Field SPT N = (N_{60s})(0.62)

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

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

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Bypass - Bridge H 2972N

Boring No. NBA 1

Elevation (ft) 2056.7

Station "PN" 207 + 95, CL

Date 03/14/2011

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMPLER TYPE	N BLOWS per ft.	SOIL GROUP	W% pcf	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST			COMMENTS
												Peak	Residual	psi	
M	17.5 - 19.0	SPT	41	SW-SM	1.4		8.9	18	NP	NP					
N	19.0 - 20.5	SPT	62	GW-GM	1.4		6.7	19	NP	NP					
O	20.5 - 22.0	SPT	47	SW-SM	1.8		8.1	18	NP	NP					
P	22.0 - 23.5	SPT	76	SW-SM	2.0		8.2	20	NP	NP					
Q	23.5 - 25.0	SPT	82	SW-SM	1.6		8.6	19	NP	NP					
R	30.0 - 31.5	SPT	75	SP-SM	2.0		10.3	20	NP	NP					
S	35.0 - 36.5	SPT	82	SM	2.8		20.0	24	NP	NP					
T	40.0 - 41.5	SPT	86	SP-SM	1.8		10.7	18	NP	NP					
U	45.0 - 46.0	SPT	R	SW-SM	2.1		9.0	19	NP	NP					
V	50.0 - 51.4	SPT	R	SW-SM	2.5		9.6	24	NP	NP					
W	55.0 - 55.5	SPT	R		3.3		10.3								
X	60.0 - 60.4	SPT	R		0.7										

CMS = California Modified Sampler 2.42" ID
 SPT = Standard Penetration 1.36" 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
 CU = Consolidated Undrained
 DS = Direct Shear
 φ = Friction
 C = Cohesion
 N = No. of blows per ft., sampler
 N = Field SPT N = (N_{max})(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_v Value
 MD = Moisture Density

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

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Bypass - Bridge H 2972N

Boring No. NBA 1

Elevation (ft) 2056.7

Station "PN" 207 + 95, CL

Date 03/14/2011

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST			COMMENTS	
												φ deg.	C psi	C psi		
												Peak	φ deg.	C psi	Residual	
Y	65.0 - 65.0	SPT	R													No Recovery
Z	70.0 - 70.2	SPT	R													No Recovery
AA	75.0 - 75.3	SPT	R													No Recovery
BB	80.0 - 80.2	SPT	R													No Recovery

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_{cor})(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_v Value
 MD = Moisture Density

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

* = Average of subsamples

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

EAI/Cont # 73307

Job Description Boulder City Bypass - Bridge H 2972N

Boring No. NBA 2

Elevation (ft) 2054.2

Station "PN" 209 + 30, CL

Date 03/15/2011

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP. LER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												φ deg.	C psi	φ deg.	C psi	
												Peak	Residual			
BULK1	0.0 - 5.0	Bulk		GW-GM			7.2	23	NP	NP						Ch, RV = 78
BULK2	5.0 - 10.0	Bulk		SP-SM			7.3	24	NP	NP						Ch, RV = 69
B	1.0 - 2.5	SPT	8	SM	5.9		16.3	24	21	3						
C	2.5 - 4.0	SPT	R	SM	2.7		12.3	27	NP	NP						
E	4.0 - 5.5	SPT	29	SP-SM	2.7		10.3	26	NP	NP						
F	5.5 - 7.0	SPT	50	SW-SM	2.2		9.5	24	NP	NP						
G	7.0 - 8.5	SPT	46	SW-SM	2.3		9.2	21	NP	NP						
H	8.5 - 10.0	SPT	31	SP-SM	2.4		11.9	20	NP	NP						
I	11.0 - 12.5	SPT	27	SM	1.5		12.8	29	NP	NP						
J	12.5 - 14.0	SPT	24	SM	1.7		17.5	23	NP	NP						
K	14.0 - 15.5	SPT	39	SM	2.2		13.6	21	NP	NP						
L	15.5 - 17.0	SPT	48	SM	2.6		17.6	23	NP	NP						

CMS = California Modified Sampler 2.42" ID
 SPT = Standard Penetration 1.38" ID
 CS = Continuous Sample 3.23" ID
 RC = Rock Core
 PB = Pitcher Barrel
 CSS = Calif. Split Spoon 2.42" ID
 CPT = Cone Penetration Test
 TP = Test Pit
 P = Pushed, not driven
 R = Refusal
 Sh = Shelby Tube 2.87" ID

U = Unconfined Compressive
 UU = Unconsolidated Undrained
 CD = Consolidated Drained
 CU = Consolidated Undrained
 DS = Direct Shear
 φ = Friction
 C = Cohesion
 N = No. of blows per ft., sampler
 N = Field SPT N = (N_{max})(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
 ROD = Rock Quality Designation
 X = X-Ray Diffraction
 HCpot = Hydro-Collapse Potential

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Bypass - Bridge H 2972N

Boring No. NBA.2

Elevation (ft) 2054.2

Station "PN" 209 + 30, CL

Date 03/15/2011

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W% pcf	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												φ deg.	C psi	φ deg.	C psi	
												Peak	Residual			
M	17.0 - 18.5	SPT	44	SM	2.5		18.3	22	NP	NP						
N	18.5 - 20.0	SPT	40	SP-SM	1.8		11.2	19	NP	NP						
O	21.0 - 22.5	SPT	R	GW-GM	1.3		9.9									
P	22.5 - 24.0	SPT	R	SM	2.4		16.0									
Q	24.0 - 25.5	SPT	R	SP-SM	2.7		11.7	19	NP	NP						
R	25.5 - 27.0	SPT	R	GP-GM	2.4		12.0	19	NP	NP						
S	27.0 - 28.5	SPT	R	GP-GM	2.3		8.1									
T	28.5 - 30.0	SPT	R	SW-SM	1.6		7.9	16	NP	NP						
U	30.0 - 31.5	SPT	77	SW-SM	1.7		7.9	17	NP	NP						
V	35.0 - 36.5	SPT	64	SW-SM	2.6		9.2	19	NP	NP						
W	40.0 - 41.5	SPT	45	SW-SM	2.5		8.1	17	NP	NP						
X	45.0 - 45.4	SPT	R	GP-GM	1.5		10.5									

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_{max})(0.62)

H = Hydrometer

S = Sieve

G = Specific Gravity

PI = Plasticity Index

LL = Liquid Limit

PL = Plastic Limit

NP = Non-Plastic

OC = Consolidation

Ch = Chemical

RV = R - Value

MD = Moisture Density

CM = Compaction

E = Swell/Pressure on Expansive Soils

SL = Shrinkage Limit

UW = Unit Weight

W = Moisture Content

K = Permeability

O = Organic Content

D = Dispersive

RQD = Rock Quality Designation

X = X-Ray Defraction

HCpot = Hydro-Collapse Potential

* = Average of subsamples

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

EAI/Cont # 73307

Job Description Boulder City Bypass - Bridge H 2972N

Boring No. NBA 2

Elevation (ft) 2054.2

Station "PN" 209 + 30, CL

Date 03/15/2011

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP. LER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												φ deg.	C psi	φ deg.	C psi	
Y	50.0 - 50.5	SPT		SW-SM	2.3		10.0					Peak			Residual	
Z	55.0 - 56.5	SPT	84	SW-SM	2.9		9.3	19	NP	NP						
AA	60.0 - 60.9	SPT	R	SM	2.7		12.8	20	NP	NP						
BB	65.0 - 66.0	SPT	R	SP-SM	3.0		10.5	21	18	3						
CC	70.0 - 70.4	SPT	R		2.1											
DD	75.0 - 75.9	SPT	R	SP-SM	2.6		10.0	19	NP	NP						
EE	80.0 - 80.5	SPT	R	SP-SM	1.9		8.1									

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 = (N₁₀₀)(0.62)

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

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

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Bypass - Bridge H 2972S

Boring No. SBA 1

Elevation (ft) 2051.4

Station "PS" 209+58, CL

Date 03/14/2011

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												φ deg.	C psi	φ deg.	C psi	
BULK 1	0.0 - 5.0	Bulk		GP			3.9	19	NP	NP		Peak			Residual	Ch, RV = 80
BULK 2	5.0 - 10.0	Bulk		GP-GM			8.2	23	22	1						Ch, RV = 75
A	1.0 - 2.5	SPT	5	SP-SM	4.6		7.9									
B	3.5 - 5.0	SPT	9	GP-GM	2.8		8.8									
C	6.0 - 7.5	SPT	59	SM	2.8		13.6	24	NP	NP						
D	8.5 - 10.0	SPT	41	SP-SM	2.9		10.9	20	NP	NP						
E	11.0 - 12.5	SPT	19	SW-SM	2.6		8.3	21	NP	NP						
F	13.5 - 15.0	SPT	33	SM	2.6		12.8	23	NP	NP						
G	16.0 - 17.5	SPT	30	SW-SM	2.6		8.8	20	NP	NP						
H	18.5 - 20.0	SPT	51	SM	2.2		12.1	23	NP	NP						
I	21.0 - 22.5	SPT	61	SW-SM	2.8		7.4	22	NP	NP						
J	23.5 - 25.0	SPT	48	SW-SM	2.7		9.1	19	NP	NP						

CMS = California Modified Sampler 2.42" ID
 SPT = Standard Penetration 1.38" ID
 CS = Continuous Sample 3.23" ID
 RC = Rock Core
 PB = Pitcher Barrel
 CSS = Calif. Split Spoon 2.42" ID
 CPT = Cone Penetration Test
 TP = Test Pit
 P = Pushed, not driven
 R = Refusal
 Sh = Shelby Tube 2.87" ID

 U = Unconfined Compressive
 UU = Unconsolidated Undrained
 CD = Consolidated Drained
 CU = Consolidated Undrained
 DS = Direct Shear
 φ = Friction
 C = Cohesion
 N = No. of blows per ft., sampler
 N = Field SPT N = (N_{max})(0.62)

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

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

 * = Average of subsamples

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

EAI/Cont # 73307

Job Description Boulder City Bypass - Bridge H 2972S

Boring No. SBA 1

Elevation (ft) 2051.4

Station "PS" 209+58, CL

Date 03/14/2011

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												φ deg.	C psi	φ deg.	C psi	
												Peak	Residual			
K	26.0 - 27.5	SPT	51	SP-SM	2.4		11.8	17	NP	NP						
L	28.5 - 30.0	SPT	59	SP-SM	2.1		10.1	19	NP	NP						
M	31.0 - 32.5	SPT	82	SM	2.8		14.5	18	NP	NP						
N	34.5 - 36.0	SPT	43	SP-SM	2.5		10.5	20	NP	NP						
O	39.5 - 41.0	SPT	34	SM	2.3		15.5	23	NP	NP						
P	49.5 - 46.0	SPT	87	SP-SM	2.4		10.2	19	NP	NP						
Q	49.5 - 49.7	SPT	R	SM	2.6		16.8									
R	54.5 - 56.0	SPT	107	SP-SM	2.3		10.3	19	NP	NP						
S	59.5 - 61.2	SPT	R	SP-SM	2.1		11.4	22	20	2						
T	64.5 - 65.0	SPT	R	SP-SM	1.7		11.3									
U	69.5 - 70.1	SPT	R	SM	2.0		12.6									
V	74.5 - 75.2	SPT	R	SP-SM	1.8		11.9	20	NP	NP						

CMS = California Modified Sampler 2.42" ID
 SPT = Standard Penetration 1.38" ID
 CS = Continuous Sample 3.23" ID
 RC = Rock Core
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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_{max})(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
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 K = Permeability
 O = Organic Content
 D = Dispersive
 RQD = Rock Quality Designation
 X = X-Ray Diffraction
 HCpot = Hydro-Collapse Potential

* = Average of subsamples

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

EAI/Cont # 73307

Job Description Boulder City Bypass - Bridge H 2972S

Boring No. SBA 1

Elevation (ft) 2051.4

Station "PS" 209+58, CL

Date 03/14/2011

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST			COMMENTS
												φ deg.	C psi	φ deg.	
W	79.5 - 80.5	SPT	R	GP-GM	2.2		11.9	24	21	3		Peak	Residual		

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 = (N₆₀)(0.62)

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

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

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Bypass - Bridge H 2972S

Boring No. SBA 2

Elevation (ft) 2050.5

Station "PS" 210+59, CL

Date

03/15/2011

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												Φ deg.	C psi	Φ deg.	C psi	
BULK 1	0.0 - 5.0	Bulk		SP-SM			8.4	20	NP	NP						Ch, RV = 74
BULK 2	5.0 - 10.0	Bulk		GP-GM			5.1	19	NP	NP						Ch, RV = 79
A	1.0 - 2.5	SPT	22	SP-SM	3.4		10.2	19	NP	NP						
B	3.5 - 5.0	SPT	20	SP-SM	2.9		10.7	17	NP	NP						
C	6.0 - 7.5	SPT	15	SM	1.6		14.2	28	NP	NP						
D	8.5 - 10.0	SPT	35	SP-SM	2.1		12.0	24	NP	NP						
E	11.0 - 12.5	SPT	30	SP-SM	2.3		11.0	21	NP	NP						
F	13.5 - 15.0	SPT	17	SW-SM	2.1		10.0	20	NP	NP						
G	16.0 - 17.5	SPT	16	SW-SM	2.2		8.0	18	NP	NP						
H	18.5 - 20.0	SPT	22	SW-SM	1.9		6.6									
I	21.0 - 22.5	SPT	25	SW-SM	2.1		8.0									
J	23.5 - 25.0	SPT	59	SM	2.0		12.9	23	NP	NP						

CMS = California Modified Sampler 2.42" ID

SPT = Standard Penetration 1.38" ID

CS = Continuous Sample 3.23" ID

RC = Rock Core

PB = Pitcher Barrel

CSS = Calif. Split Spoon 2.42" ID

CPT = Cone Penetration Test

TP = Test Pit

P = Pushed, not driven

R = Refusal

Sh = Shelby Tube 2.87" ID

U = Unconfined Compressive

UU = Unconsolidated Undrained

CD = Consolidated Drained

CU = Consolidated Undrained

DS = Direct Shear

Φ = Friction

C = Cohesion

N = No. of blows per ft., sampler

N = Field SPT

N = (N_{avg})(0.62)

H = Hydrometer

S = Sieve

G = Specific Gravity

PI = Plasticity Index

LL = Liquid Limit

PL = Plastic Limit

NP = Non-Plastic

OC = Consolidation

Ch = Chemical

RV = R - Value

MD = Moisture Density

CM = Compaction

E = Swell/Pressure on Expansive Soils

SL = Shrinkage Limit

UW = Unit Weight

W = Moisture Content

K = Permeability

O = Organic Content

D = Dispersive

RQD = Rock Quality Designation

X = X-Ray Diffraction

HCpot = Hydro-Collapse Potential

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Bypass - Bridge H 2972S

Boring No. SBA 2

Elevation (ft) 2050.5

Station "PS" 210+59, CL

Date

03/15/2011

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												Φ deg.	C psi	Peak	Residual	
K	26.0 - 27.5	SPT	R	SM	2.3		17.0	23	NP	NP						
L	28.5 - 30.0	SPT	56	SW-SM	2.6		9.0	22	NP	NP						
M	34.5 - 36.0	SPT	59	SW-SM	2.1		8.5	19	NP	NP						
N	39.5 - 41.0	SPT	51	SP-SM	2.2		11.3	19	NP	NP						
O	44.5 - 46.0	SPT	59	SW-SM	2.2		7.6	19	NP	NP						
P	49.5 - 51.0	SPT	43	SW-SM	2.0		8.1	20	NP	NP						
Q	54.5 - 56.0	SPT	120	SW-SM	2.2		9.8	26	NP	NP						
R	59.5 - 61.0	SPT	72	SW-SM	1.6		8.9	21	NP	NP						
S	64.5 - 66.0	SPT	79	SM	1.6		12.8	20	NP	NP						
T	69.5 - 70.0	SPT	R		2.3			27	24	3						
U	74.5 - 74.6	SPT	R		1.4											

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 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_{25s})(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
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 RQD = Rock Quality Designation
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 HCpot = Hydro-Collapse Potential

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

EA/Cont # 73307

Job Description Boulder City Bypass - Railroad Bridge

Boring No. RRBA 1

Elevation (ft) 2384.8

Station "P" 96+75.52' Rt.

Date 03/16/2011

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W% pcf	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												Φ deg.	C psi	Φ deg.	C psi	
A	5.0 - 5.9	SPT		GP-GM	3.4		10.1	24	NP	NP						
B	10.0 - 10.3	SPT														
C	15.0 - 15.1	SPT														
D	20.0 - 21.5	SPT	18	GW-GM	2.3		9.6	26	24	2						
E	25.0 - 26.5	SPT	105	SP-SM	2.4		12.0	23	21	2						
F	30.0 - 30.8	SPT		SM	2.7		16.7	43	33	10						
G	35.0 - 36.1	SPT		GP-GM	2.8		11.1	39	31	8						
H	40.0 - 41.5	SPT	70	GM	3.2		12.7	45	32	13						
I	45.0 - 45.5	SPT		GP-GM	2.3		11.6									
J	50.0 - 50.5	SPT		SM	1.6		14.9									
K	55.0 - 55.5	SPT			3.7		19.9									
L	60.0 - 60.5	SPT		SM	5.6		21.2									

CMS = California Modified Sampler 2.42" ID
 SPT = Standard Penetration 1.38" ID
 CS = Continuous Sample 3.23" ID
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 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
 CU = Consolidated Undrained
 DS = Direct Shear
 φ = Friction
 C = Cohesion
 N = No. of blows per ft., sampler
 N = Field SPT

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
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 K = Permeability
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 D = Dispersive
 RQD = Rock Quality Designation
 X = X-Ray Diffraction
 HCpot = Hydro-Collapse Potential

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Bypass - Railroad Bridge

Boring No. RRBA 1

Elevation (ft) 2384.8

Station "P" 96+75, 52' Rt.

Date 03/16/2011

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMPLER TYPE	N BLOWS per ft.	SOIL GROUP	W% pcf	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												Φ deg.	C psi	Φ deg.	C psi	
M	65.0 - 65.5	SPT		SM	3.4		12.5	21	20	1						
N	70.0 - 70.5	SPT		GP-GM	3.2		9.6	27	22	5						
O	75.0 - 75.5	SPT		SP-SM	3.9		11.1									

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
 CU = Consolidated Undrained
 DS = Direct Shear
 φ = Friction
 C = Cohesion
 N = No. of blows per ft., sampler
 N = Field SPT N = (N₆₀)(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
 ROD = Rock Quality Designation
 X = X-Ray Diffraction
 HCpot = Hydro-Collapse Potential

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Bypass - Bridge H 2972S

Boring No. RRBP 1

Elevation (ft) 2376.7

Station "P" 98+54, 25' Lt.

Date 03/16/2011

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W% pcf	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												φ deg.	C psi	φ deg.	C psi	
												Peak	Residual			
BULK 1	32.0 - 35.0	Bulk		GP-GC			10.9	29	21	8						Ch, RV = 66
A	5.0 - 5.6	SPT		SP-SM	9.2		11.5	23	NP	NP						
B	10.0 - 11.5	SPT		SM	9.9		13.1	36	NP	NP						
C	15.0 - 15.3	SPT			0.9											
D	20.0 - 20.3	SPT		GP-GM	1.7		10.1									
E	25.0 - 25.1	SPT														No Recovery
F	30.0 - 30.1	SPT														No Recovery
H	35.0 - 35.1	SPT														No Recovery
I	40.0 - 40.1	SPT														No Recovery
J	45.0 - 45.4	SPT		SM	3.3		17.6									No Recovery
K		SPT														No Recovery
L	50.0 - 50.5	SPT		SM	4.2		20.0									No Recovery

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 = (N₁₀₀)(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_v Value
 MD = Moisture Density

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

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Bypass - Bridge H 2972S

Boring No. RRRB 1

Elevation (ft) 2376.7

Station "P" 98+54, 25' Lt.

Date 03/16/2011

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMPLER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST			COMMENTS
												Φ deg.	C psi	Residual	
M	60.0 - 60.4	SPT		SM	3.8		20.2								
N	70.0 - 70.3	SPT		SM	5.0		19.2								
O	75.0 - 76.4	SPT		SM	4.4		13.4	23	20	3					
P	80.0 - 80.8	SPT		SC	5.4		19.6	33	21	12					

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_{max})(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_v Value
 MD = Moisture Density

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

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Bypass - Railroad Bridge

Boring No. RRBA 2

Elevation (ft) 2381.2

Station "P" 100+61, 125' Lt.

Date 04/05/2011

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W% pcf	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												φ deg.	C psi	φ deg.	C psi	
A	5.0 - 6.5	SPT	34	GW-GM	2.5		9.1	24	NP	NP		Peak		Residual		
B	10.0 - 10.5	SPT														
C	15.0 - 15.5	SPT	88	GP-GM	3.1		8.6	26	NP	NP						
D	20.0 - 20.5	SPT			3.4		27.1									
E	25.0 - 25.2	SPT													No Recovery	
F	30.0 - 31.5	SPT	86	GW-GM	2.7		9.8	20	NP	NP						
G	35.0 - 35.5	SPT														
H	40.0 - 40.5	SPT														
I	45.0 - 46.0	SPT		SC	6.4		28.1	38	19	19						
J	50.0 - 50.4	SPT			5.6		36	26	10	10						
K	55.0 - 55.2	SPT														
L	60.0 - 60.5	SPT		SM	2.5		13.4									

CMS = California Modified Sampler 2.42" ID
 SPT = Standard Penetration 1.38" ID
 CS = Continuous Sample 3.23" ID
 RC = Rock Core
 PB = Pitcher Barrel
 CSS = Calif. Split Spoon 2.42" ID
 CPT = Cone Penetration Test
 TP = Test Pit
 P = Pushed, not driven
 R = Refusal
 Sh = Shelby Tube 2.87" ID

U = Unconfined Compressive
 UU = Unconsolidated Undrained
 CD = Consolidated Drained
 CU = Consolidated Undrained
 DS = Direct Shear
 φ = Friction
 C = Cohesion
 N = No. of blows per ft. sampler
 N = Field SPT N = (N₆₀)(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_v Value
 MD = Moisture Density

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

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Bypass - Railroad Bridge

Boring No. RRBA 2

Elevation (ft) 2381.2

Station "P" 100+61, 125' Lt.

Date

04/05/2011

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP. LER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												φ deg.	C psi	φ deg.	C psi	
												Peak	Residual			
M	65.0 - 65.3	SPT		SM	2.9		18.0									
N																
O	75.0 - 76.2	SPT		SP-SM	3.0		11.5	23	22	1					No Recovery	
P	80.0 - 81.2	SPT		GP-GM	2.0		11.2									

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 Undrained
 CU = Consolidated Drained
 DS = Direct Shear
 φ = Friction
 C = Cohesion
 N = No. of blows per ft., sampler
 N = Field SPT N = (N_{max})(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
 ROD = Rock Quality Designation
 X = X-Ray Refraction
 HCpot = Hydro-Collapse Potential

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Retaining Walls

Boring No. BRW 1

Elevation (ft) 2356.12

Station "P" 106+60 95' Rt.

Date 11/06/2009

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMPLER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												Φ deg.	C psi	Φ deg.	C psi	
												Peak	Residual			
A	5.0 - 6.5	SPT	108	SW-SM			11.8									
B	10.0 - 11.5	SPT	56	GW-GM			12.0									
C	15.0 - 16.5	SPT	33	SW-SM			6.7									
D	20.0 - 21.5	SPT	105	SW-SM			9.9									
E	25.0 - 26.5	SPT	R					24	20	4						
F	30.0 - 31.5	SPT	R	GW-GM			9.6									
G	35.0 - 36.5	SPT													Visual Only - Cuttings	
RV1	0.0 - 5.0	Auger		GP-GM			9.3	21	NP	NP					RV = 73	
RV2	5.0 - 10.0	Auger		GP-GC			6.8	25	21	4					RV = 77	

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
 CU = Consolidated Drained
 CD = Consolidated Undrained
 DS = Direct Shear
 φ = Friction
 C = Cohesion
 N = No. of blows per ft., sampler
 N = Field SPT N = (N_{25s})(0.62)

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

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

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Retaining Walls

Boring No. BRW 2

Elevation (ft) 2338.60

Station "P" 106+60 110' Rt.

Date 11/06/2009

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMPLER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												φ deg.	C psi	φ deg.	C psi	
												Peak	Residual			
A	5.0 - 5.3	SPT	R	GM			13.4									
B	10.0 - 11.5	SPT	36					22	NP	NP						
RV1	0.0 - 5.0	Auger		GP-GM			11.1	23	21	2					RV = 77	
RV2	5.0 - 10.0	Auger		GP-GM			6.5	23	20	3					RV = 83	

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_{100s})/0.62

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

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

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Retaining Walls

Boring No. BRW 3

Elevation (ft) 2336.50

Station "P" 110+80 120' Rt.

Date

11/06/2009

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMPLER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												Φ deg.	C psi	Φ deg.	C psi	
												Peak	Residual			
A	5.0 - 6.5	SPT	82	SW-SM			11.7									
B	10.0 - 11.5	SPT	R					24	23	1						
C	15.0 - 16.5	SPT	54					22	NP	NP						
D	20.0 - 21.5	SPT	R	GW-GM			14.2									
E	25.0 - 26.5	SPT	39					20	NP	NP						
F	30.0 - 31.5	SPT	115	SW-SM			9.3	20	NP	NP						
G	35.0 - 36.5	SPT	R	SW-SM			9.2									
H	40.0 - 41.5	SPT	113	SW-SM			6.9									
I	45.0 - 46.5	SPT	R	SP-SM			8.8									
J	50.0 - 51.5	SPT	R	SW-SM			8.7									
RV1	0.0 - 5.0	Auger		SP-SM			10.4	20	18	2					RV = 79	
RV2	5.0 - 10.0	Auger		GW			4.8	21	20	1					RV = 81	

CMS = California Modified Sampler 2.42" ID

SPT = Standard Penetration 1.36" 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_{avg})(0.62)

H = Hydrometer

S = Sieve

G = Specific Gravity

PI = Plasticity Index

LL = Liquid Limit

PL = Plastic Limit

NP = Non-Plastic

OC = Consolidation

Ch = Chemical

RV = R - Value

MD = Moisture Density

CM = Compaction

E = Swell/Pressure on Expansive Soils

SL = Shrinkage Limit

UW = Unit Weight

W = Moisture Content

K = Permeability

O = Organic Content

D = Dispersive

RQD = Rock Quality Designation

X = X-Ray Diffraction

HCpot = Hydro-Collapse Potential

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Retaining Walls

Boring No. BRW 4

Elevation (ft) 2325.30

Station "P" 112+90 120' Rt.

Date

11/06/2009

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMPLER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST			COMMENTS
												φ deg.	C psi	φ deg.	
A	5.0 - 6.5	SPT	35	GW-GM			7.5								
B	10.0 - 11.5	SPT		GW-GM			7.7								
C	15.0 - 16.5	SPT		SW-SM			7.1								
D	20.0 - 21.5	SPT	58					20	NP	NP					
E	25.0 - 26.5	SPT	R					18	NP	NP					
F	30.0 - 31.5	SPT	R	SW			3.8								
G	35.0 - 36.0	SPT	R												No Recovery
H	40.0 - 41.5	SPT	R						NP	NP					
I	45.0 -	SPT	R												Visual Only
J	50.0 - 50.1	SPT	R												
RV1	0.0 - 5.0	Auger		GP-GM			7.1	24	NP	NP					RV = 77
RV2	5.0 - 10.0	Auger		GP-GM			9.3	23	NP	NP					RV = 77

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 = (N₂₅)(0.62)

H = Hydrometer

S = Sieve

G = Specific Gravity

PI = Plasticity Index

LL = Liquid Limit

PL = Plastic Limit

NP = Non-Plastic

OC = Consolidation

Ch = Chemical

RV = R - Value

MD = Moisture Density

CM = Compaction

E = Swell/Pressure on Expansive Soils

SL = Shrinkage Limit

UW = Unit Weight

W = Moisture Content

K = Permeability

O = Organic Content

D = Dispersive

RQD = Rock Quality Designation

X = X-Ray Diffraction

HCpot = Hydro-Collapse Potential

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Bypass

Station "P" 100 + 75 CL

Boring No. RRC1

Elevation (ft) 2371.79

Date 01/25/2007

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMPLER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	STRENGTH TEST				COMMENTS
											TEST TYPE	φ deg.	C psi	φ deg.	
RV1	0.0 - 5.0	Auger		GM			12.1	24	NP	NP					RV = 81, pH = 7.4, Res. = 3534 ohm-cm
RV2	5.0 - 10.0	Auger		GP-GM			8.2	25	NP	NP					RV = 85, pH = 8.0, Res. = 1241 ohm-cm
RV3	10.0 - 15.0	Auger		GM			12.9	30	6	6					RV = 74, pH = 8.0, Res. = 560 ohm-cm
RV4	15.0 - 20.0	Auger		GP-GM			11.6	30	24	6					RV = 84, pH = 8.0, Res. = 424 ohm-cm
RV5	20.0 - 25.0	Auger		GP-GM			11.0	28	24	4					RV = 83, pH = 7.9, Res. = 435 ohm-cm
RV6	25.0 - 30.0	Auger		GP-GC			8.0	28	22	6					RV = 81, pH = 8.0, Res. = 520 ohm-cm
A	5.0 - 6.1	SPT	R	SP-SM	3.5		12.7								
B	10.0 - 10.1	SPT	R												
C	15.0 - 15.2	SPT	R												
D	20.0 - 20.3	SPT	R	SP-SM	1.5		11.2								
E	25.0 - 25.03	SPT	R												

CMS = California Modified Sampler 2.40" 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
 CU = Consolidated Undrained
 DS = Direct Shear
 φ = Friction
 C = Cohesion
 N = No. of blows per ft., sampler
 N = Field SPT
 N = (N_{60s})(0.62)

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

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

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Bypass

Boring No. RRC2

Elevation (ft) 2387.12

Station "P" 96 + 50 12' Rt.

Date 01/25/2007

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												φ deg.	C psi	φ deg.	C psi	
												Peak	Residual			
RV1	0.0 - 4.0	Auger		GM			19.9	29	23	6						RV = 65, pH = 7.7, Res. = 647 ohm-cm
RV2	4.0 - 9.0	Auger		SM			20.2	34	26	8						RV = 75, pH = 8.0, Res. = 655 ohm-cm
RV3	9.0 - 14.0	Auger		GP-GM			10.5	31	25	6						RV = 81, pH = 8.2, Res. = 696 ohm-cm
RV4	14.0 - 19.0	Auger		SM			19.4	34	27	7						RV = 74, pH = 8.2, Res. = 696 ohm-cm
RV5	19.0 - 24.0	Auger		SM			19.2	36	28	8						RV = 72, pH = 8.3, Res. = 936 ohm-cm
RV6	24.0 - 29.0	Auger		GM			16.8	43	30	13						RV = 70, pH = 8.3, Res. = 938 ohm-cm
RV7	29.0 - 34.0	Auger		GM			14.1	48	31	17						RV = 70, pH = 8.5, Res. = 994 ohm-cm
RV8	34.0 - 39.0	Auger		GP-GM			8.9	50	29	21						RV = 61, pH = 8.4, Res. = 943 ohm-cm
RV9	39.0 - 44.0	Auger		GP-GM			8.9	49	30	19						RV = 64, pH = 8.6, Res. = 1088 ohm-cm
RV10	44.0 - 49.0	Auger		GP-GM			10.6	48	30	18						RV = 72, pH = 8.5, Res. = 1066 ohm-cm

CMS = California Modified Sampler 2.40" 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_{63.5})(0.62)

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

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

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Bypass

Boring No. RRC2

Elevation (ft) 2387.12

Station "P" 96 + 50 12' Rt.

Date 01/25/2007

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												φ deg.	C psi	φ deg.	C psi	
												Peak	Residual			
A	4.0	SPT	R													
B	9.0	SPT	R													
C	14.0	SPT	R													
D	19.0	SPT	R													
E	24.0	SPT	R													
F	29.0 - 29.5	SPT	R		2.7		12.1									
G	34.0 - 34.3	SPT	R		2.4		17.8									
H	39.0 - 39.3	SPT	R		2.1		2.0									
I	44.0 - 45.0	SPT	R	SM	3.5		13.6	39	27	12						
J	49.0 - 51.5	SPT	223 (R)	GC	2.9		15.5	30	22	8						

CMS = California Modified Sampler 2.40" 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 = (N₆₀)/0.62

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

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

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Bypass

Boring No. RRC3

Elevation (ft) 2388.98

Station "P" 94 + 00 30' Rt.

Date 01/30/2007

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMPLER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												φ deg.	C psi	φ deg.	C psi	
												Peak	Residual			
RV1	0.0 - 4.5	Auger		GP-GM			11.7	31	25	6					RV = 66, pH = 8.1, Res. = 620 ohm-cm	
RV2	4.5 - 9.5	Auger		GM			13.9	47	34	13					RV = 69, pH = 8.1, Res. = 372 ohm-cm	
RV3	9.5 - 14.5	Auger		GP-GM			8.7	61	42	19					RV = 73, pH = 8.2, Res. = 402 ohm-cm	
RV4	14.5 - 19.5	Auger		GM			13.0	58	38	20					RV = 52, pH = 8.3, Res. = 452 ohm-cm	
RV5	19.5 - 24.5	Auger		GM			13.7	53	37	16					RV = 72, pH = 8.3, Res. = 511 ohm-cm	
RV6	24.5 - 29.5	Auger		GP-GM			10.2	50	41	9					RV = 76, pH = 8.4, Res. = 596 ohm-cm	
RV7	29.5 - 34.5	Auger		GP-GM			10.6	46	37	9					RV = 77, pH = 8.3, Res. = 446 ohm-cm	
RV8	34.5 - 39.5	Auger		GP-GM			7.6	46	31	15					RV = 75, pH = 8.3, Res. = 537 ohm-cm	
RV9	39.5 - 44.5	Auger		GP-GM			9.2	38	26	12					RV = 75, pH = 8.3, Res. = 515 ohm-cm	
RV10	44.5 - 48.0	Auger		GP-GM			6.4	43	31	12					RV = 80, pH = 8.3, Res. = 592 ohm-cm	
															* Result is questionable	

CMS = California Modified Sampler 2.40" 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 = (N₆₀)(0.62)

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

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

* = Average of subsamples

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

EA/Cont # 73307

Job Description Boulder City Bypass

Elevation (ft) 2388.98

Boring No. RRC3

Station "P" 94 + 00 30' Rt.

Date 01/30/2007

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	PASS % #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST			COMMENTS
												φ deg.	C psi	φ deg.	
												Peak	Residual		
A	4.5 - 6.0	SPT	97	SM	7.9		16.7	67	51	16					
B	9.5 - 10.5	SPT	R	GP-GM	4.2		10.0	40	28	12					
C	14.5 - 16.0	SPT	81	GW-GC	3.7		7.8	35	23	12					
D	19.5 - 20.3	SPT	R	SW-SC	3.6		7.4								
E	24.5 - 25.3	SPT	R	SW	3.1		1.0								
F	29.5 - 29.7	SPT	R												
G	34.5 - 36.0	SPT	150	SW-SC	2.9		9.0	30	22	8					
H	39.5 - 41.0	SPT	205	SM	2.2		13.8	23	20	3					
I	44.5 - 45.5	SPT	R	GC-GM	2.0		13.4	28	22	6					
J	48.0 - 48.3	SPT	R												

CM = California Modified Sampler 2.40" 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_{55s})(0.62)

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

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

* = Average of subsamples

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

EA/Cont # 73307 Job Description Boulder City Bypass Station "P" 90 +90 3' Lt. Date 02/05/2007
 Boring No. RRC4 Elevation (ft) 2383.724

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												φ deg.	C psi	φ deg.	C psi	
RV1	0.0 - 4.0	Auger		GP-GC			5.6	27	21	6	Peak					RV = 81, pH = 7.8, Res. = 2591 ohm-cm
RV2	4.0 - 9.0	Auger		GP-GM			9.9	30	25	5	Residual					RV = 81, pH = 8.0, Res. = 1081 ohm-cm
RV3	9.0 - 14.0	Auger		GP-GM			6.0	28	25	3						RV = 81, pH = 8.0, Res. = 816 ohm-cm
RV4	14.0 - 19.0	Auger		GP-GM			7.7	27	23	4						RV = 83, pH = 8.1, Res. = 1031 ohm-cm
RV5	19.0 - 24.0	Auger		GW			4.8	28	22	6						RV = 79, pH = 8.2, Res. = 1357 ohm-cm
RV6	24.0 - 29.0	Auger		GP-GC			9.8	27	21	6						RV = 77, pH = 8.3, Res. = 1645 ohm-cm
RV7	29.0 - 34.0	Auger		GP-GC			7.0	25	21	4						RV = 80, pH = 8.3, Res. = 1852 ohm-cm
RV8	34.0 - 39.0	Auger		GP-GC			9.4	25	20	5						RV = 82, pH = 8.3, Res. = 1845 ohm-cm
RV9	39.0 - 44.0	Auger		GP-GC			9.0	26	21	5						RV = 81, pH = 8.4, Res. = 1905 ohm-cm
RV10	44.0 - 49.0	Auger		GW			4.7	26	21	5						RV = 75, pH = 8.4, Res. = 1949 ohm-cm

CMS = California Modified Sampler 2.40" 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 $N = (N_{60})^{(0.62)}$

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

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

* = Average of subsamples

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

EA/Cont # 73307 Job Description Boulder City Bypass Station "P" 90 +90 3' Lt. Date 02/05/2007
 Boring No. RRC4 Elevation (ft) 2383.724

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W% pcf	DRY UW	PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												φ deg.	C psi	φ deg.	C psi	
A	4.0 - 5.5	SPT	155	GP-GM	3.7		11.6	27	26	1						
B	9.0 - 10.5	SPT	48	SW-SM	2.6		7.5	23	NP	NP						
C	14.0 - 15.5	SPT	52	SW-SM	2.5		5.5	21	NP	NP						
D	19.0 - 20.5	SPT	174	SP-SM	2.4		11.8	23	21	2						
E	24.0 - 25.5	SPT	109	SW-SM	2.0		9.2	20	NP	NP						
F	29.0 - 29.5	SPT	R													
G	34.0 - 34.3	SPT	R	SC-SM	2.8		22.7	29	22	7						
H	39.0 - 39.3	SPT	R	SC	3.0		24.3	30	22	8						
I	44.0 - 44.3	SPT	R	SC-SM	2.5		25.9	24	17	7						
J	49.0 - 50.5	SPT	156	SM	2.7		21.0	19	18	1						

CMS = California Modified Sampler 2.40" 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 = (N₆₀)(0.62)

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

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

* = Average of subsamples

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

EAI/Cont # 73307 **Job Description** Boulder City Bypass - US 95/US 93 Intersection **Station** "P" 214+55, 52' Lt. **Date** 12/23/2005
Boring No. BCB1 **Elevation (ft)** 2049.2

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W% %	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS	
												φ deg.	C psi	φ deg.	C psi		
A	2.0 - 3.5	SPT	14	SW-SM	13.1		8.6					Peak					
B	5.0 - 6.5	SPT	17		13.2			21	NP	NP		Residual					
C	10.0 - 10.7	SPT	R														Visual Only
D	12.0 - 12.5	SPT	R	GM-SM	10.2		13.7										H
E	15.0 - 15.5	SPT	R														Visual Only
F	20.0 - 20.5	SPT	R	SM	13.2		19.9										H
G	25.0 - 25.5	SPT	R	SM	13.3		12.7										
H	35.0 - 35.45	SPT	R	SM	14.5		13.8										
I	45.0 - 45.3	SPT	R														Visual Only
J	55.0 - 55.3	SPT	R														Visual Only
K	65.0 - 66.5	SPT	55		26.6			58	39	19							
L	70.0 - 70.3	SPT	R	SM	16.4		14.4										

CMS = California Modified Sampler 2.40" 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_{max})(0.62)

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

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

*** = Average of subsamples**

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

EA/Cont # 73307

Job Description Boulder City Bypass - US 95/US 93 Intersection

Station "P" 214+55, 52' Lt.

Boring No. BCB1

Elevation (ft) 2049.2

Date 12/23/2005

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												φ deg.	C psi	φ deg.	C psi	
M	80.0 - 80.2	SPT	R									Peak				Visual Only
												Residual				

CMS = California Modified Sampler 2.40" 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 = (N₂₅)/(0.62)
 H = Hydrometer
 S = Sieve
 G = Specific Gravity
 PI = Plasticity Index
 LL = Liquid Limit
 PL = Plastic Limit
 NP = Non-Plastic
 OC = Consolidation
 Ch = Chemical
 RV = R - Value
 MD = Moisture Density
 CM = Compaction
 E = Swell/Pressure on Expansive Soils
 SL = Shrinkage Limit
 UW = Unit Weight
 W = Moisture Content
 K = Permeability
 O = Organic Content
 D = Dispersive
 RQD = Rock Quality Designation
 X = X-Ray Diffraction
 HCpot = Hydro-Collapse Potential

* = Average of subsamples

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

EA/Cont # 73307 Job Description Boulder City Bypass - US 95/US 93 Intersection Station "P" 216+68, 66' Rt. Date 12/23/2005
 Boring No. BCB2 Elevation (ft) 2042.3

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP- LER TYPE	N BLOWS per ft.	SOIL GROUP	W% %	DRY UW pcf	PASS #200 %	LL %	PL %	PI %	TEST TYPE	STRENGTH TEST				COMMENTS
												φ deg.	C psi	φ deg.	C psi	
												Peak	Residual			
A	5.0 - 6.5	SPT	14	SM	25.6		24.8									
B	8.0 - 9.5	SPT	31		16.5			42	27	15						
C	10.0 - 11.5	SPT	61	SP-SM	14.8		11.5	27	24	3						H
D	15.0 - 15.5	SPT	R													Visual Only
E	20.0 - 20.5	SPT	R	SM	12.3		17.8									
F	30.0 - 30.5	SPT	R	SM	13.4		16.7									
G	40.0 - 40.35	SPT	R													Visual Only
H	50.0 - 50.35	SPT	R													Visual Only
I	60.0 - 60.35	SPT	R	SM	11.9		15.6									
J	70.0 - 70.2	SPT	R													Visual Only
K	80.0 - 80.3	SPT	R													Visual Only

CMS = California Modified Sampler 2.40" 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_{60s})(0.62)

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

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

 * = Average of subsamples

APPENDIX D
ELECTRO-CHEMICAL ANALYSES

**NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION
CHEMICAL ANALYSIS**

E.A. No. 73307

PROJECT Boulder City Bypass

BORING # SLA2, SLP1, SLP2, FA4, FP1, RRC1, RRC2

Sample No.	Chlorides * ppm	Sulfates * ppm	pH	Resistivity Ohm - cm	Conductivity micro sec.
SLA2 D			8.2	3,155	317
SLP1 B			8.1	939	1,065
SLP2 A			8.8	6,173	162
FA4 RV1			8.2	847	1,180
FA4 RV2			8.6	661	1,514
FA4 RV3			8.4	346	2,890
FP1 BULK			7.9	337	2,970
RRC1 RV1			7.4	3,534	283
RRC1 RV2			8.0	1,241	806
RRC1 RV3			8.0	560	1,786
RRC1 RV4			8.0	424	2,360
RRC1 RV5			7.9	435	2,300
RRC1 RV6			8.0	520	1,922
RRC2 RV1			7.7	647	1,546
RRC2 RV2			8.0	655	1,527
RRC2 RV3			8.2	696	1,436
RRC2 RV4			8.2	696	1,436
RRC2 RV5			8.3	936	1,068

* Can be tested under special request.

**NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION**

CHEMICAL ANALYSIS

E.A. No. 73307

PROJECT Boulder City Bypass

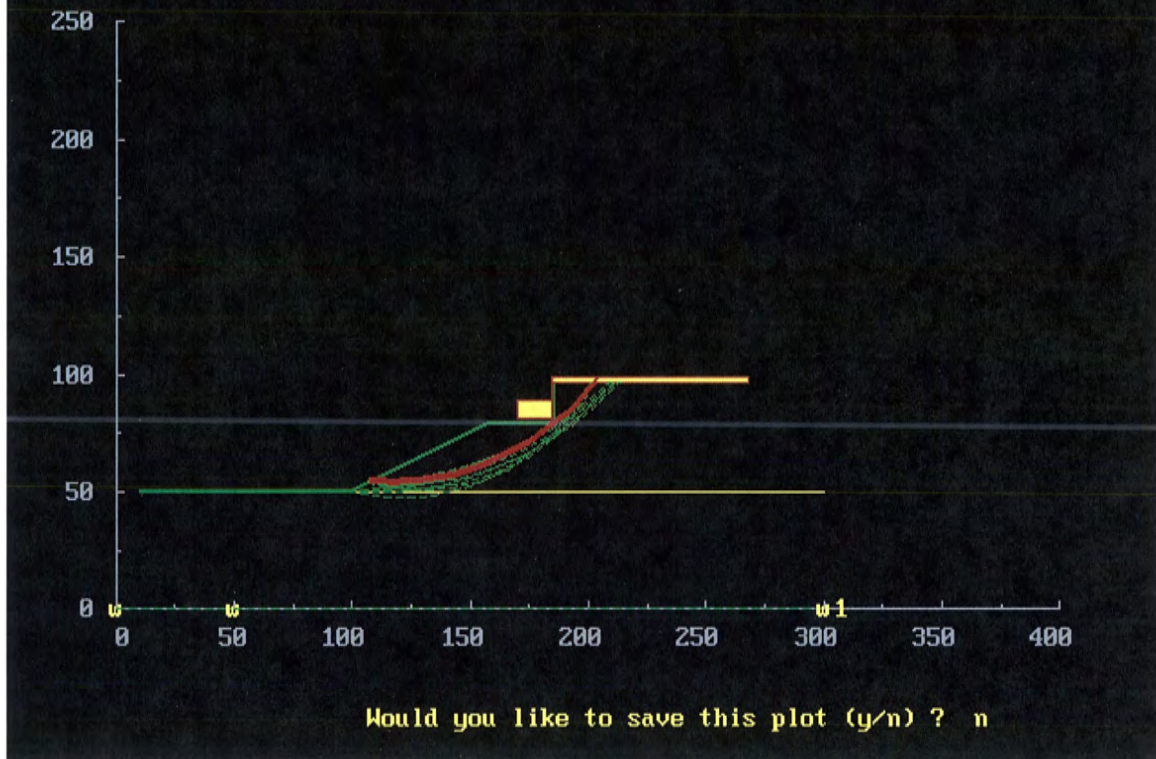
BORING # RRC3, RRC4

Sample No.	Chlorides * ppm	Sulfates * ppm	pH	Resistivity Ohm - cm	Conductivity micro sec.
RRC3 RV1			8.1	670	1,615
RRC3 RV2			8.1	372	2,690
RRC3 RV3			8.2	402	2,490
RRC3 RV4			8.3	452	2,210
RRC3 RV5			8.3	511	1,957
RRC3 RV6			8.4	596	1,677
RRC3 RV7			8.3	446	2,240
RRC3 RV8			8.3	537	1,863
RRC3 RV9			8.3	515	1,943
RRC3 RV10			8.3	592	1,689
RRC4 RV1			7.8	386	2,591
RRC4 RV2			8.0	925	1,081
RRC4 RV3			8.0	1,226	816
RRC4 RV4			8.1	970	1,031
RRC4 RV5			8.2	737	1,357
RRC4 RV6			8.3	608	1,645
RRC4 RV7			8.3	540	1,852
RRC4 RV8			8.3	542	1,845
RRC4 RV9			8.4	525	1,905
RRC4 RV10			8.4	513	1,949

* Can be tested under special request.

APPENDIX E
EMBANKMENT SLOPE STABILITY
ANALYSES

Boulder City Bypass - Static
10 most critical surfaces, MINIMUM BISHOP FOS = 1.542

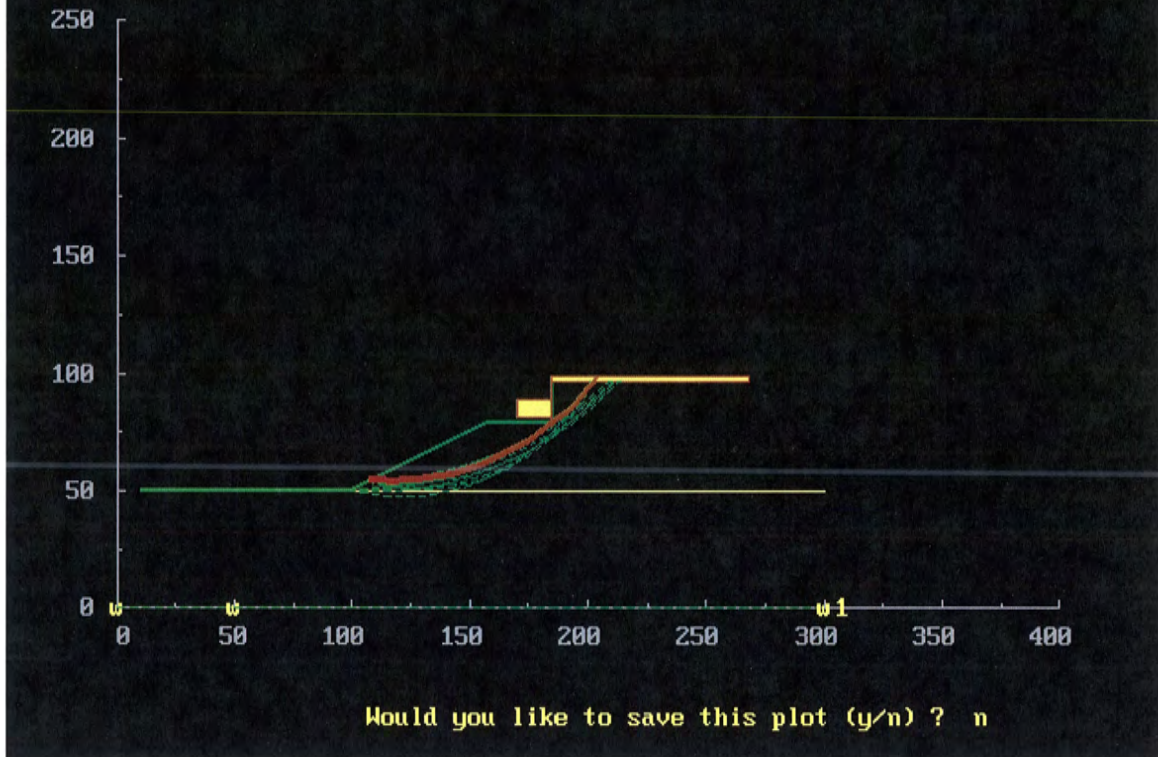


Bridge I-2871-Abutment 2

2H:1V fill slope
250 psf traffic surcharge load
4000 psf bridge abutment load

(Static Analysis)

Boulder City Bypass-Seismic
10 most critical surfaces, MINIMUM BISHOP FOS = 1.246



Bridge I-2871 – Abutment 2

2H:1V slope
250 psf traffic surcharge load
4000 psf bridge abutment load
horizontal seismic coefficient of 0.15g

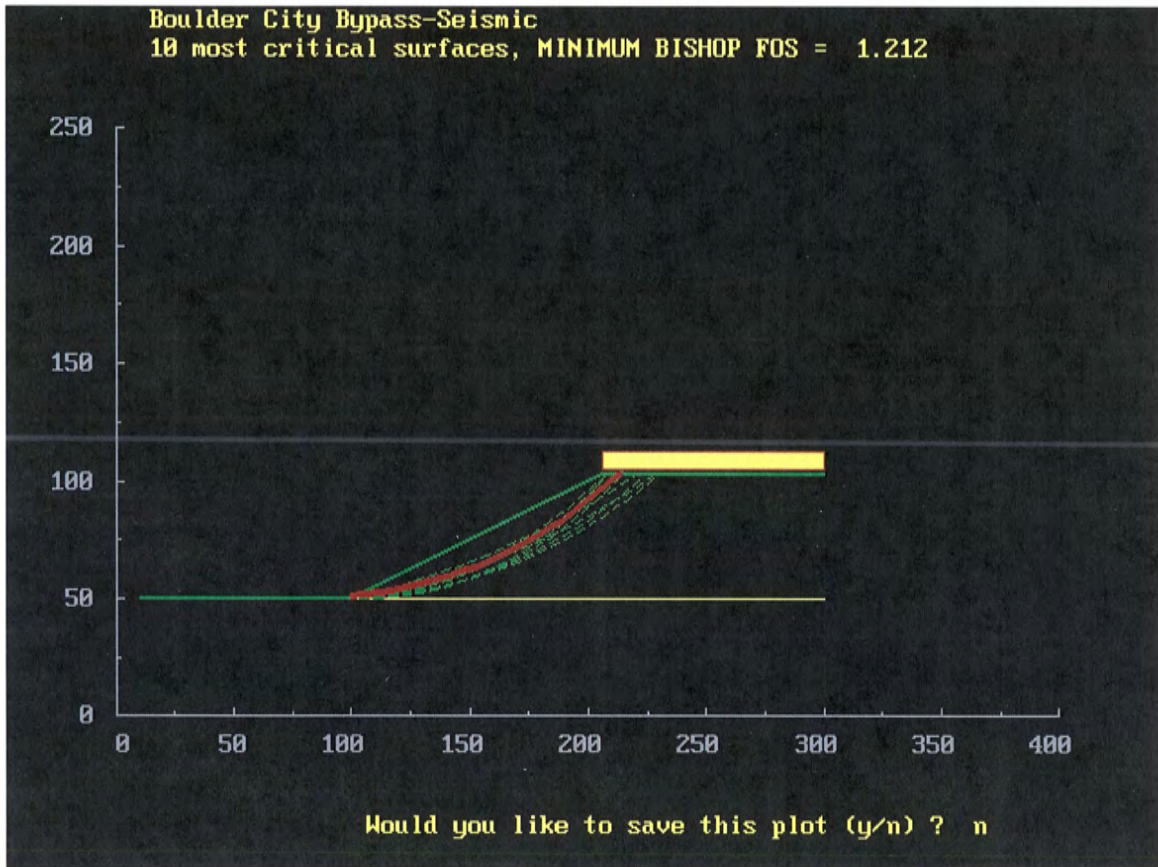
(Seismic Analysis)

Boulder City Bypass - Static
10 most critical surfaces, MINIMUM BISHOP FOS = 1.671



Fill Embankment Slope

53 feet high, 2H:1V slope, and 250 psf traffic surcharge load



Fill Embankment Slope

53 feet high, 2H:1V slope, 250 psf traffic surcharge load,
horizontal seismic coefficient of 0.15g

APPENDIX F
GEOPHYSICAL SURVEYS
SEISMIC REFRACTION

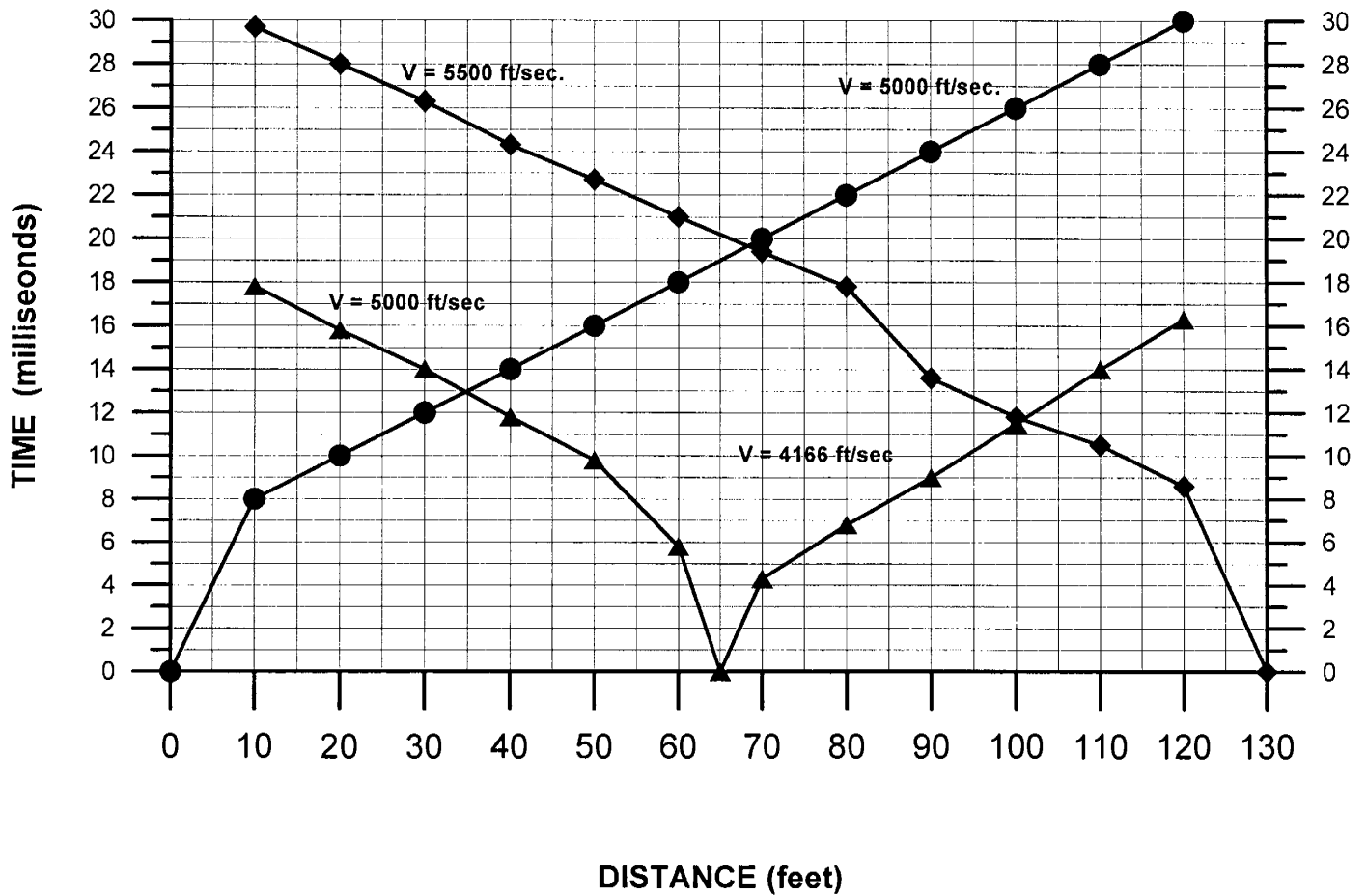
SEISMIC REFRACTION SURVEYING



SEISMIC REFRACTION

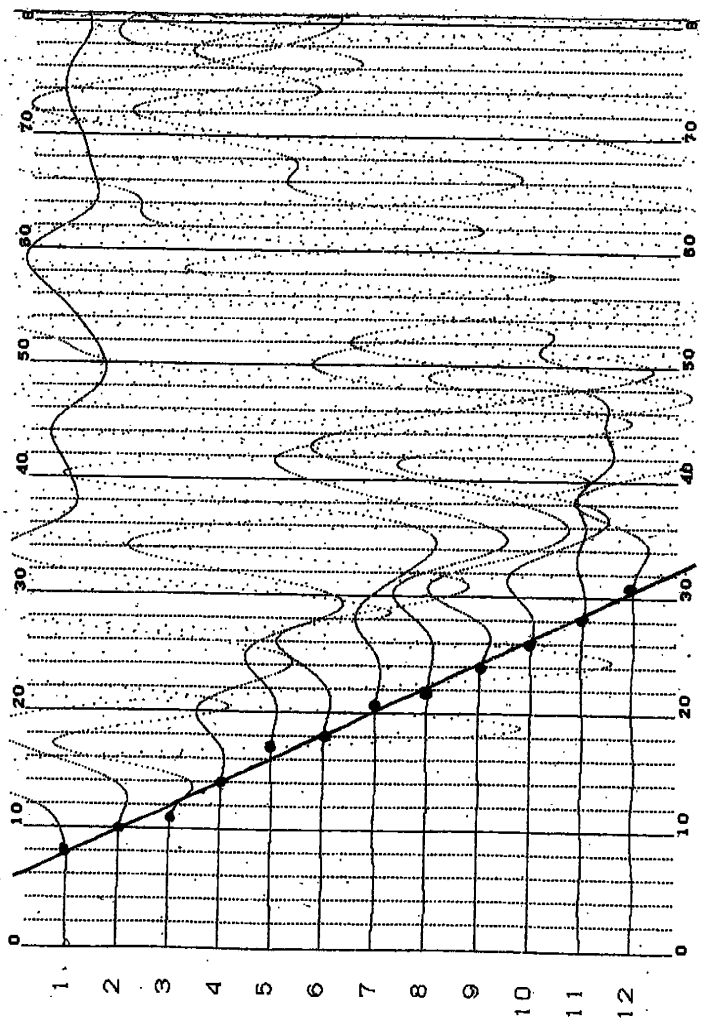
Station "P" 180, 100 feet left (top of the rock slope by Silverline Road)

- S to N Direction
- ◆ N to S direction
- ▲ Middle Shot



SEISMIC REFRACTION

Station "P" 180, 100 feet left (top of the rock slope by Silverline Road)

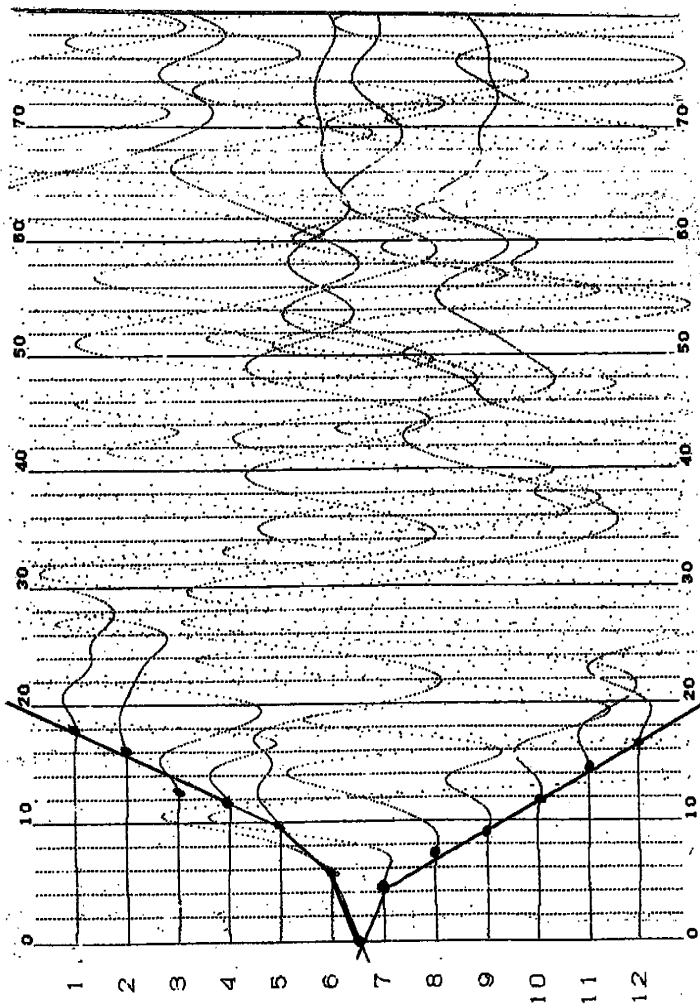


BISON 9000 SERIES

Record Name: BCBP1806
 Date 03:12:07
 Time 13:42
 Hi-cut 125
 Lo-cut 32
 Sample rt .100ms
 Stacks 0010
 Delay(ms) 12
 Channels 12
 DFhc Out
 DFic Out
 Samples 002000
 Rec len 200ms
 Asc Off
 Time scale = 2.0 (ms)/division.

P	CH	GN	STK	EX	P	CH	GN	STK	EX
+ 01	L	0010	10	+ 07	M	0010	09		
+ 02	M	0010	11	+ 08	H	0010	12		
+ 03	M	0010	09	+ 09	H	0010	11		
+ 04	M	0010	10	+ 10	H	0010	11		
+ 05	M	0010	11	+ 11	H	0010	11		
+ 06	M	0010	09	+ 12	H	0010	11		

SEISMIC REFRACTION
 Station "P" 180, 100 feet left (top of the rock slope by Silverline Road)



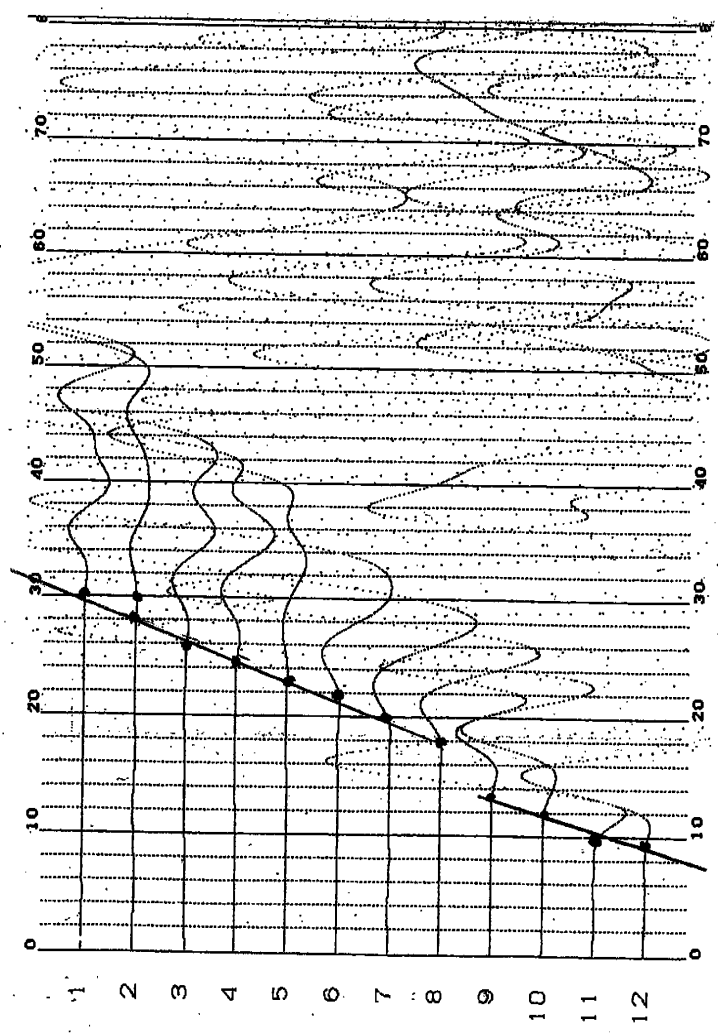
BISON 9000 SERIES

Record Name: BCBP1802
 Date: 03:12:07
 Time: 13:15
 Hi-cut: 125
 Lo-cut: 32
 Sample rt: 100ms
 Stacks: 0010
 Delay(ms):
 DFhc: Out
 Channels: 12
 DFic: Out
 Samples: 002000
 Rec len: 200ms
 Asc: Off
 Time scale = 2.0 (ms)/division.

P	CH	GN	STK	EX	M	0010	09	+ 07	L	0010	10
P	CH	GN	STK	EX	M	0010	10	+ 08	M	0010	11
P	CH	GN	STK	EX	M	0010	09	+ 09	M	0010	10
P	CH	GN	STK	EX	M	0010	10	+ 10	M	0010	10
P	CH	GN	STK	EX	L	0010	09	+ 11	M	0010	09
P	CH	GN	STK	EX	O	0010	07	+ 12	M	0010	10

SEISMIC REFRACTION

Station "P" 180, 100 feet left (top of the rock slope by Silverline Road)



BISON 9000 SERIES

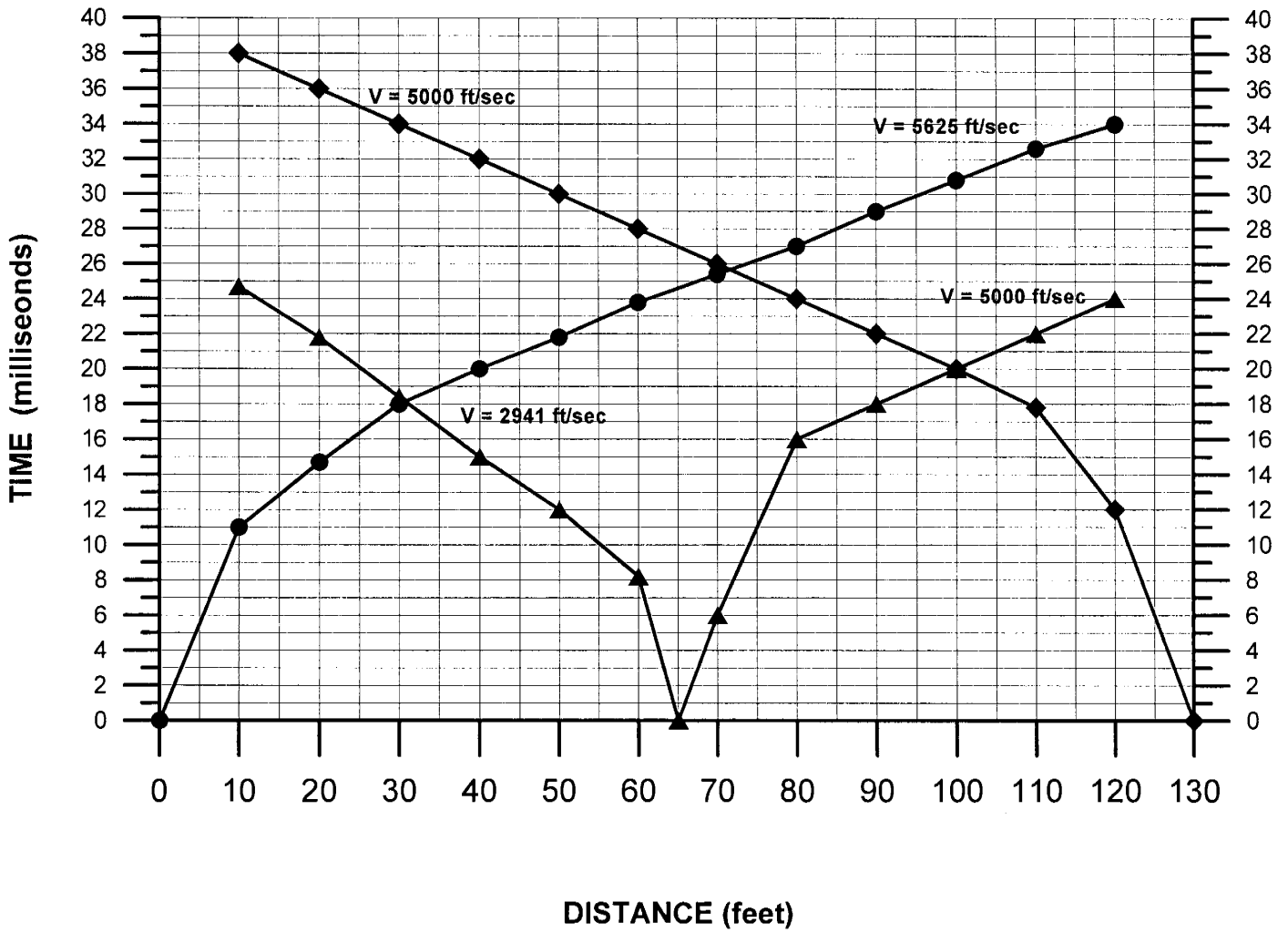
Record Name: BCBP1804
 Date 03:12:07
 Hi-cut 125
 Sample rt. 100ms
 Delay(ms) 12
 Channels 12
 Samples 002000
 Rec len 200ms
 Time scale = 2.0 (ms)/division.
 Time 18:33
 Lo-cut 32
 Stacks 0010
 DFhc Out
 DFic Out
 Agc Off

P CH GN STRK EX P CH GN STRK EX
 + 01 H 0010 11 + 07 M 0010 09
 + 02 H 0010 12 + 08 M 0010 10
 + 03 H 0010 11 + 09 M 0010 09
 + 04 H 0010 12 + 10 M 0010 10
 + 05 M 0010 10 + 11 M 0010 10
 + 06 M 0010 09 + 12 L 0010 10

SEISMIC REFRACTION

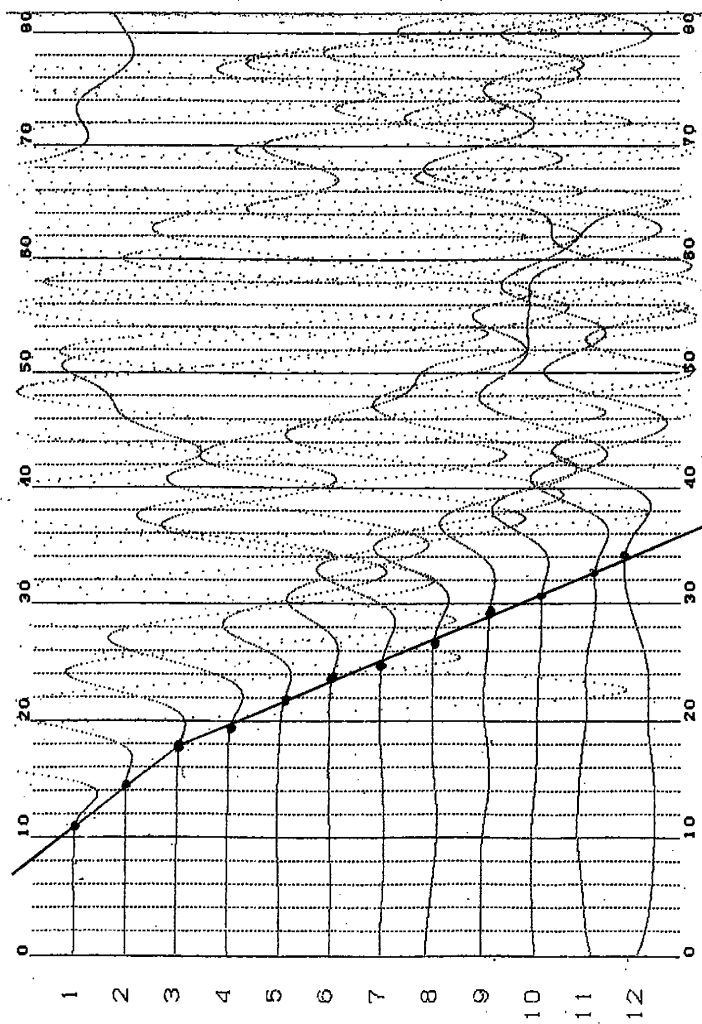
Station "P" 179, 350 feet right (Drainage Basin)

- S to N Direction
- ◆ N to S direction
- ▲ Middle Shot



SEISMIC REFRACTION

Station "P" 179, 350 feet right (Drainage Basin)

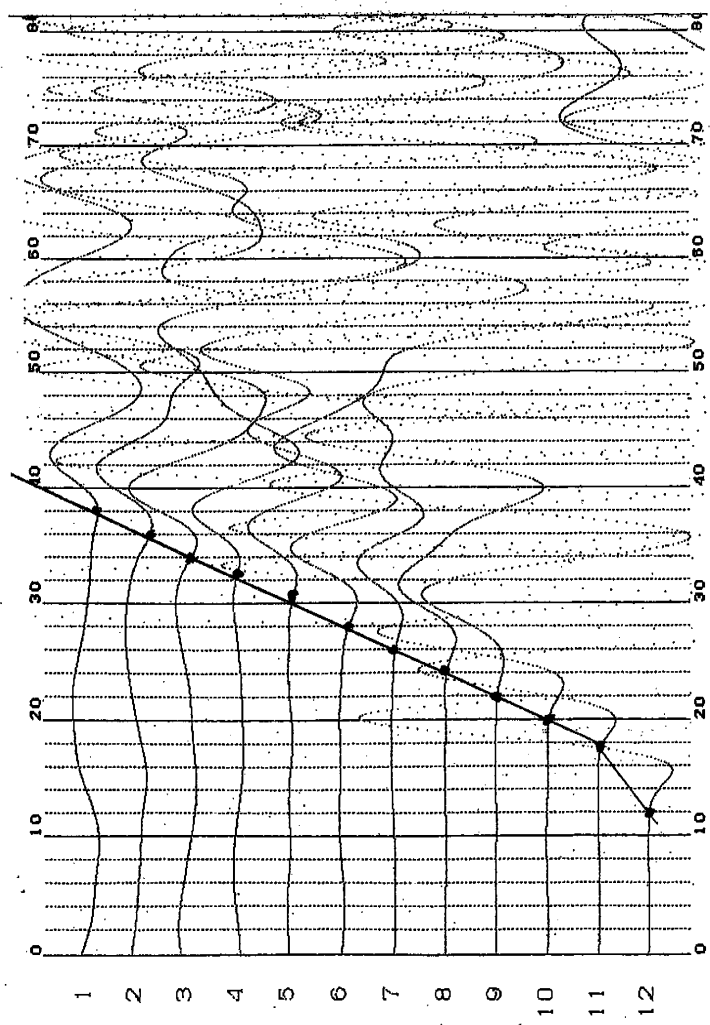


BISON 9000 SERIES

Record Name: BCBP1813
 Date 03:13:07
 Time 09:22
 Hi-cut 125
 Lo-cut 32
 Stacks 0010
 Sample rt. 100ms
 Delay(ms) 12
 Channels 12
 Samples 002000
 Rec len 200ms
 Asc Off
 Time scale = 2.0 (ms)/division.

P	CH	GN	STK	EX	P	CH	GN	STK	EX
+ 01	L	0010	10	+ 07	M	0010	09	+ 01	L
+ 02	M	0010	12	+ 08	H	0010	12	+ 02	M
+ 03	M	0010	11	+ 09	H	0010	12	+ 03	M
+ 04	M	0010	10	+ 10	H	0010	12	+ 04	M
+ 05	M	0010	10	+ 11	H	0010	11	+ 05	M
+ 06	M	0010	10	+ 12	H	0010	11	+ 06	M

SEISMIC REFRACTION
 Station "P" 179, 350 feet right (Drainage Basin)



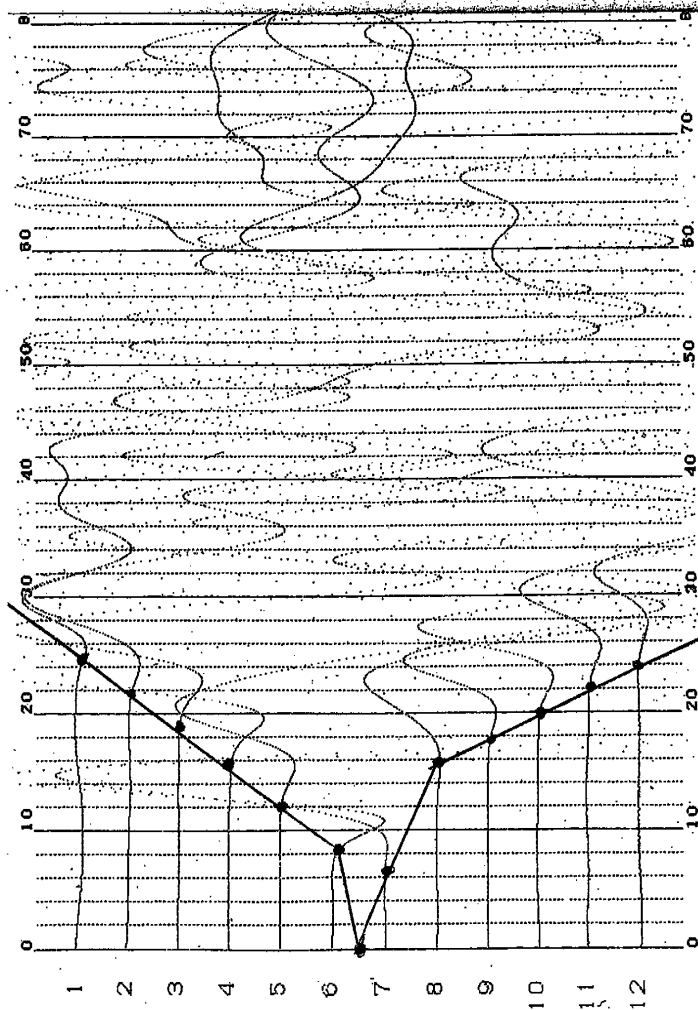
BISON 9000 SERIES

Record Name: BCBP1807
 Date 03:13:07
 Time 08:49
 Hi-cut 125
 Sample rt. 100ms
 Stacks 0010
 DFhc Out
 DFic Out
 Samples 002000
 Rec len 200ms
 Agc Off
 Time scale = 2.0 (ms)/division.

Station	Type	Time	Channel
+01	H	0010 11	07
+02	H	0010 11	08
+03	H	0010 11	09
+04	H	0010 12	10
+05	M	0010 09	11
+06	M	0010 09	12
EX	P	0010 11	07
EX	CH GN	0010 11	07
EX	STK	0010 11	07
EX	STK	0010 11	07

SEISMIC REFRACTION

Station "P" 179, 350 feet right (Drainage Basin)



BISON 9000 SERIES

Record Name: BCBP1810

Date 03:13:07

Time 09:06

Hi-cut 125 Lo-cut 32

Sample rt. 100ms

Stacks 0011

Delay(ms)

DFhc Out

Channels 12

DFic Out

Samples 002000

Asc Off

Rec len 200ms

Time scale = 2.0 (ms)/division.

Station	Time	Channel	Depth	Order	
+ 01	H 0011	13	+ 07	M 0011	14
+ 02	H 0011	13	+ 08	M 0011	13
+ 03	H 0011	14	+ 09	M 0011	14
+ 04	H 0011	14	+ 10	M 0011	11
+ 05	M 0011	13	+ 11	L 0011	07
+ 06	M 0011	14	+ 12	L 0011	07

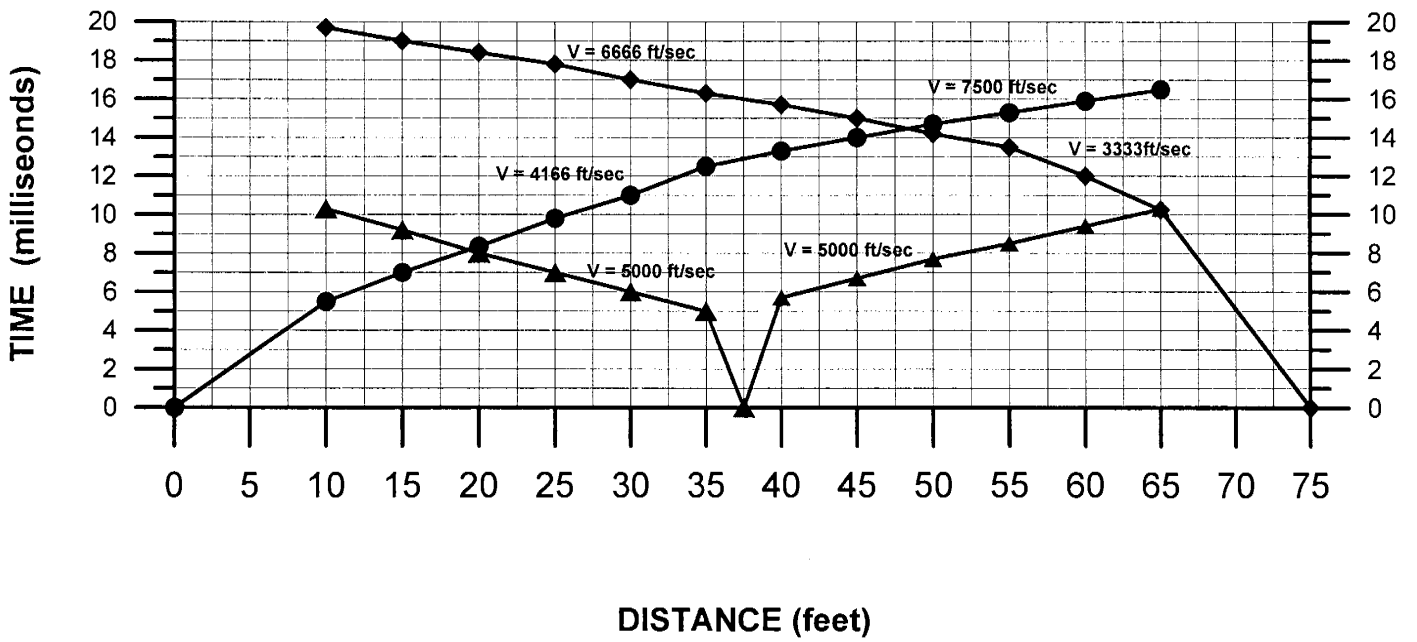


**Seismic Refraction Surveying
Station "P" 151+50
Borehole "RRP"**

SEISMIC REFRACTION

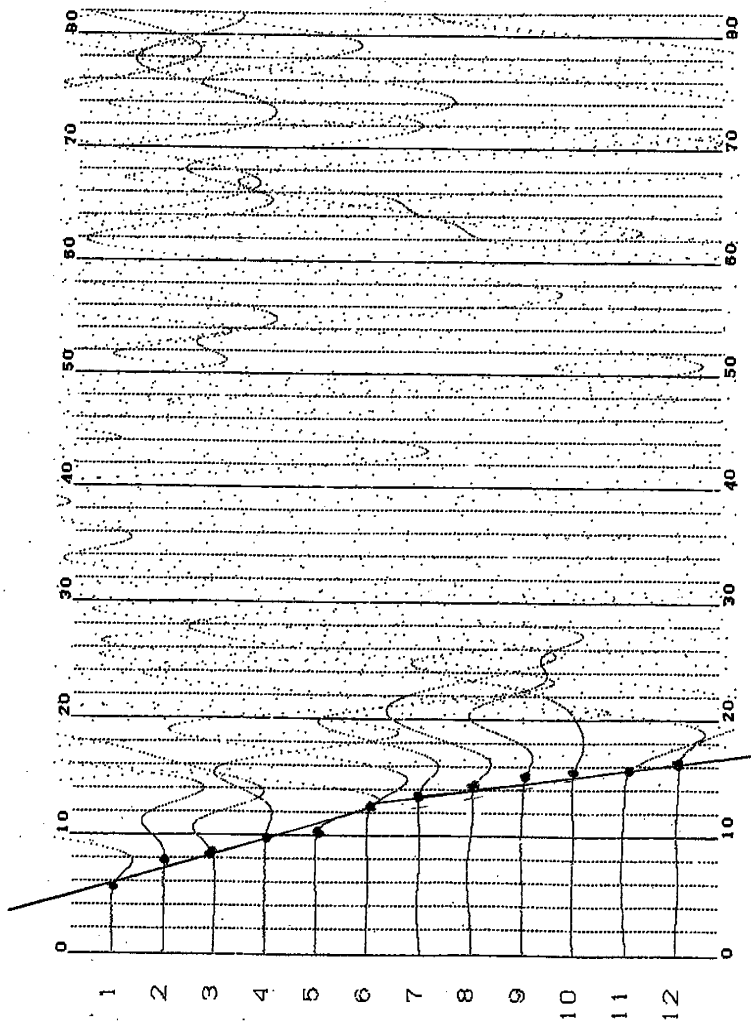
Station "P" 151+50

- S to N Direction
- ◆ N to S direction
- ▲ Middle Shot



SEISMIC REFRACTION

Station "P" 151+50 (Bridge Center Pier)



BISON 9000 SERIES

Record Name: BCBP1821

Date 03:13:07

Hi-cut 125

Lo-cut 32

Sample rt. 100ms

Delay(ms)

Channels 12

Samples 002000

Rec len 200ms

Asc

Off

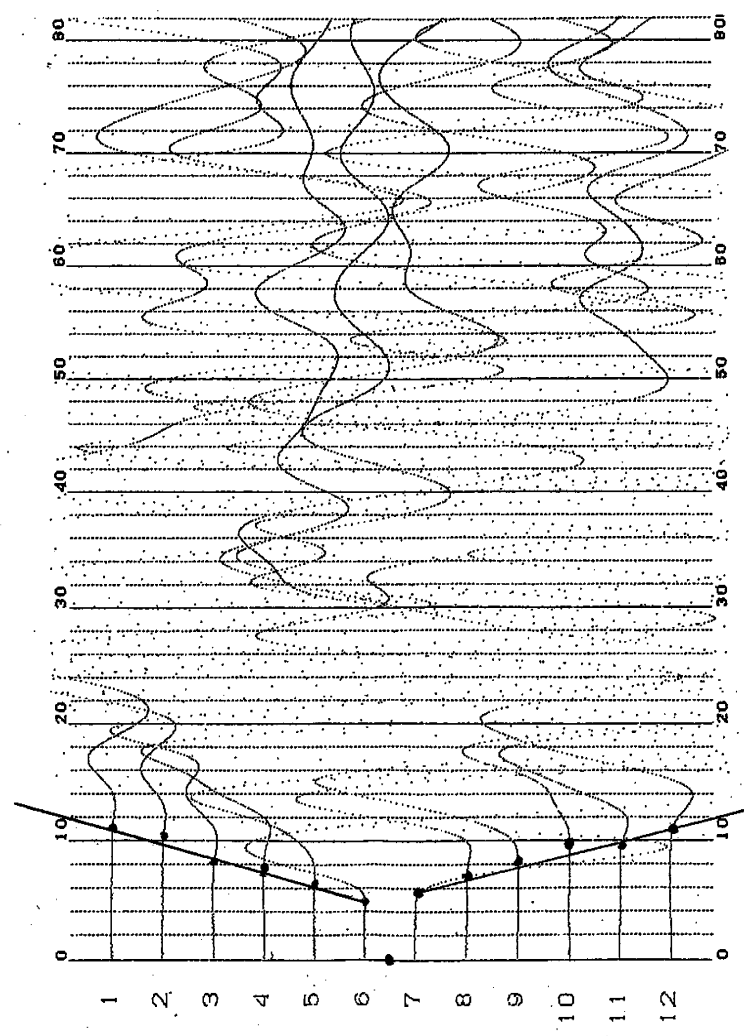
Time scale = 2.0 (ms)/division.

P	CH	GN	STK	EX	P	CH	GN	STK	EX
+ 01	L	0010	09	+ 07	M	0010	09	+ 01	L
+ 02	L	0010	08	+ 08	M	0010	08	+ 02	L
+ 03	M	0010	11	+ 09	M	0010	08	+ 03	M
+ 04	L	0010	08	+ 10	M	0010	08	+ 04	L
+ 05	M	0010	09	+ 11	H	0010	10	+ 05	M
+ 06	M	0010	09	+ 12	M	0010	08	+ 06	M

P CH GN STK EX P CH GN STK EX
 + 01 L 0010 09 + 07 O 0010 09
 + 02 L 0010 09 + 08 L 0010 10
 + 03 L 0010 09 + 09 M 0010 11
 + 04 L 0010 10 + 10 M 0010 12
 + 05 O 0010 08 + 11 M 0010 11
 + 06 O 0010 09 + 12 M 0010 11

Record Name: BCBP1818-
 Date 03:13:07
 Time 10:51
 Hi-cut 125
 Lo-cut 32
 Sample rt .100ms
 Stacks 0010
 Delay(ms)
 DFhc Out
 Channels 12
 Samples 002000
 Rec len 200ms
 Asc Off
 Time scale = 2.0 (ms)/division.

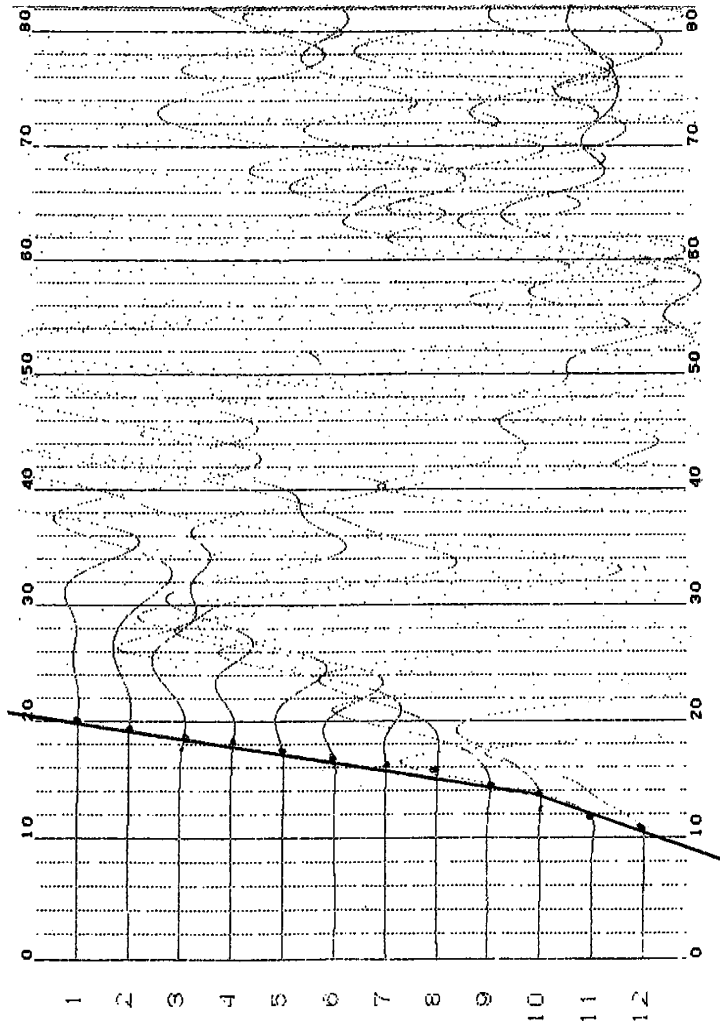
BISON 9000 SERIES



SEISMIC REFRACTION

Station "P" 151+50 (Bridge Center Pier)

SEISMIC REFRACTION
 Station "P" 151+50 (Bridge Center Pier)



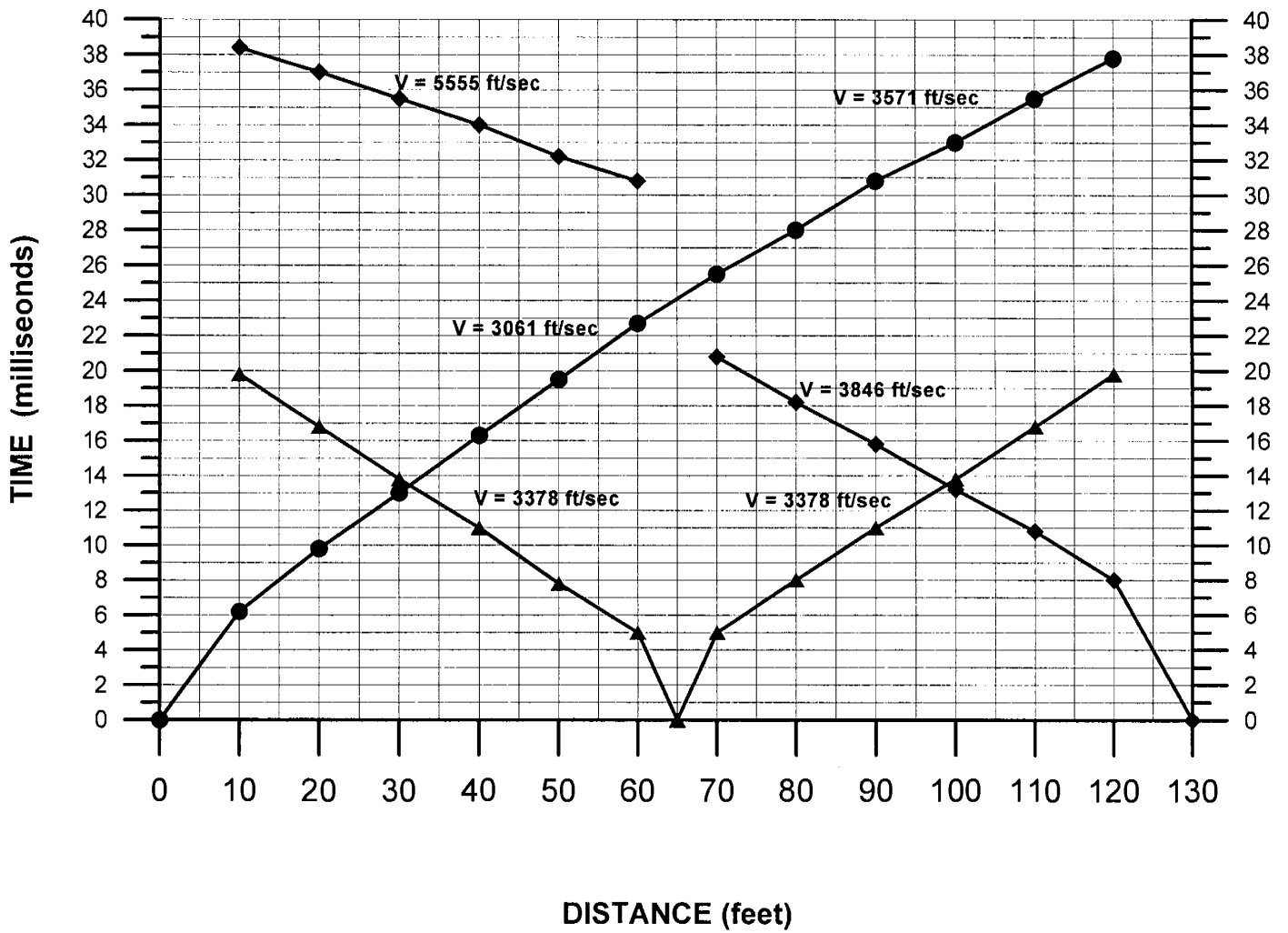
BISON 9000 SERIES

Record Name: BCBP1815
 Date 03:13:07
 Time 10:45
 Hi-cut 125
 Lo-cut 32
 Sample rt. 100ms
 Stacks 0010
 Delay(ms)
 Channels 12
 DFhc Out
 DFic Out
 Samples 002000
 Rec len 200ms
 Time scale = 2.0 (ms)/division.
 P CH GN STK EX P CH GN STK EX
 + 01 M 0010 11 + 07 M 0010 11
 + 02 M 0010 11 + 08 M 0010 11
 + 03 M 0010 10 + 09 M 0010 11
 + 04 M 0010 11 + 10 M 0010 12
 + 05 M 0010 11 + 11 M 0010 11
 + 06 M 0010 11 + 12 L 0010 09

SEISMIC REFRACTION

Station "P" 96+50

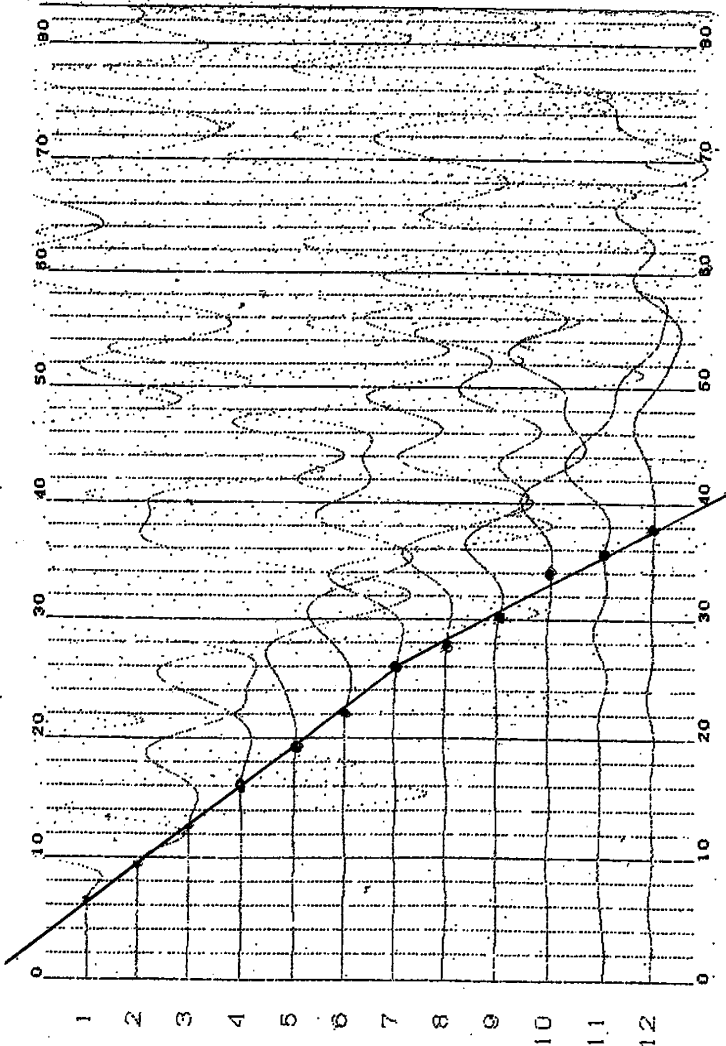
- S to N Direction
- ◆ N to S direction
- ▲ Middle Shot



P CH GN STK EX P CH GN STK EX
 + 01 M 0010 09 + 07 H 0010 09
 + 02 M 0010 07 + 08 H 0010 09
 + 03 H 0010 11 + 09 H 0010 08
 + 04 H 0010 10 + 10 H 0010 08
 + 05 H 0010 10 + 11 H 0010 07
 + 06 H 0010 09 + 12 H 0010 07

Record Name: BCBP1860
 Date 03:14:07
 Hi-cut 125
 Sample rt. 100ms
 Delay(ms) 12
 Channels 12
 Samples 002000
 Rec len 200ms
 Asc Off
 Time scale = 2.0 (ms)/division.
 Time 11:19
 Lo-cut 384
 Stacks 0010
 Dfbc Out
 Dfbc Out
 Dfbc Out

BISON 9000 SERIES

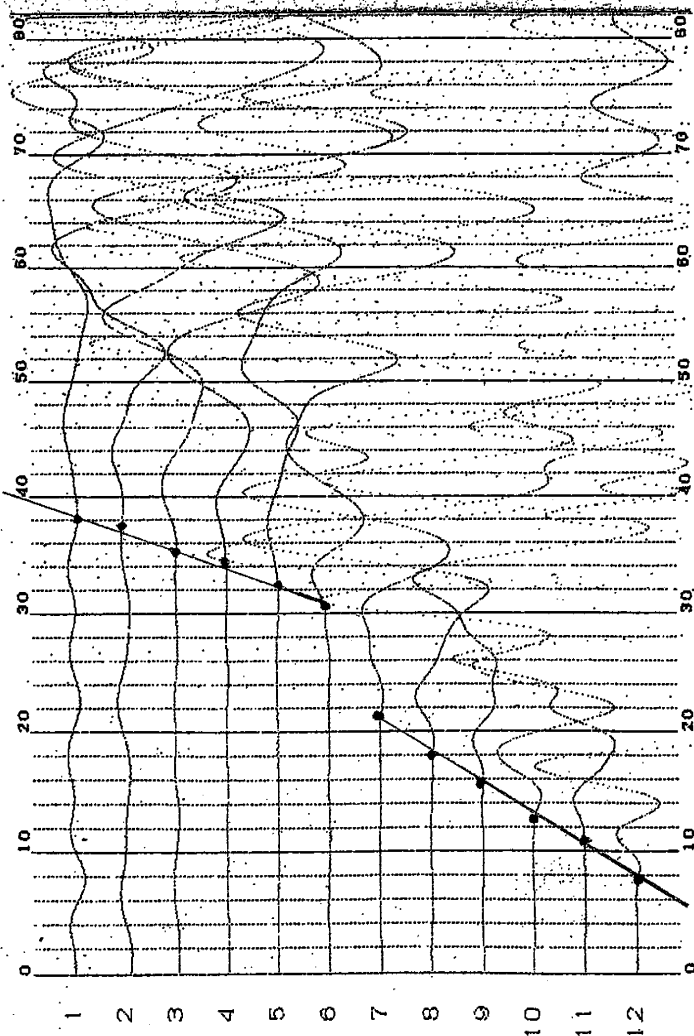


SEISMIC REFRACTION

Station "P" 96+50

SEISMIC REFRACTION

Station "P" 96+50



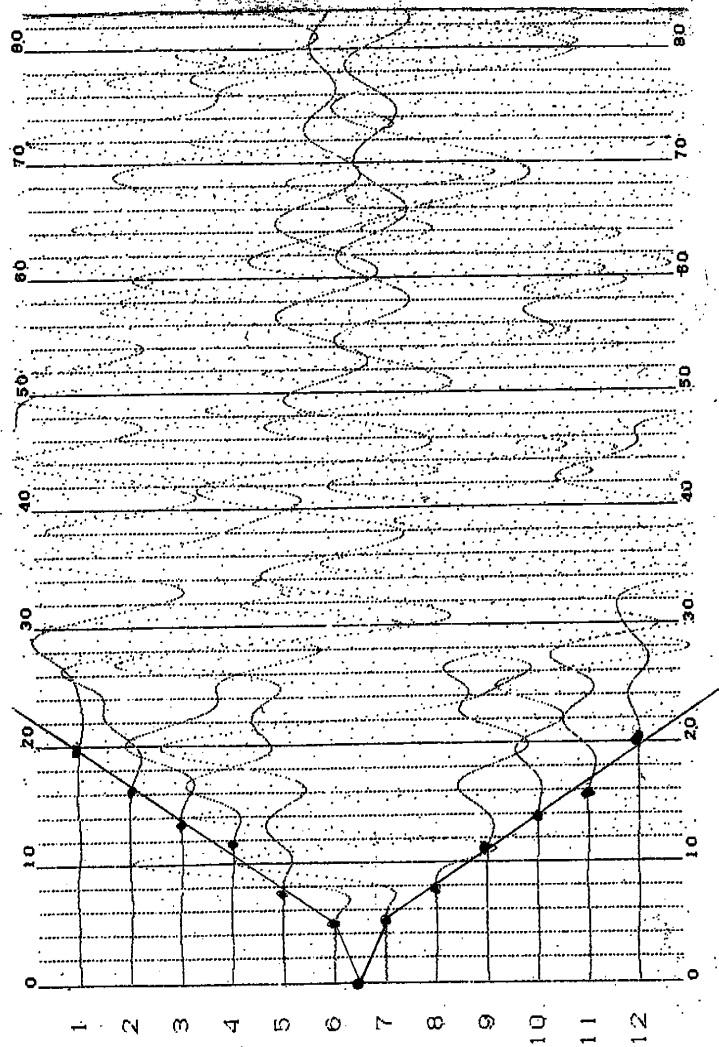
BISON 9000 SERIES

Record Name: BCB1854
 Date 03:14:07
 Time 11:19
 Hi-cut 125
 Lo-cut 384
 Sample rt. 100ms
 Stacks 0010
 DFhc Out
 Delay(ms) 12
 Channels 12
 Samples 002000
 Rec len 200ms
 Asc Off
 Time scale = 2.0 (ms)/division.

P	CH	GN	STK	EX	P	CH	GN	STK	EX
+ 01	H	0010	07	+ 07	H	0010	09	+ 07	H
+ 02	H	0010	07	+ 08	H	0010	09	+ 08	H
+ 03	H	0010	08	+ 09	H	0010	10	+ 09	H
+ 04	H	0010	09	+ 10	H	0010	10	+ 10	H
+ 05	H	0010	09	+ 11	M	0010	09	+ 11	M
+ 06	H	0010	09	+ 12	M	0010	10	+ 12	M

SEISMIC REFRACTION

Station "P" 96+50

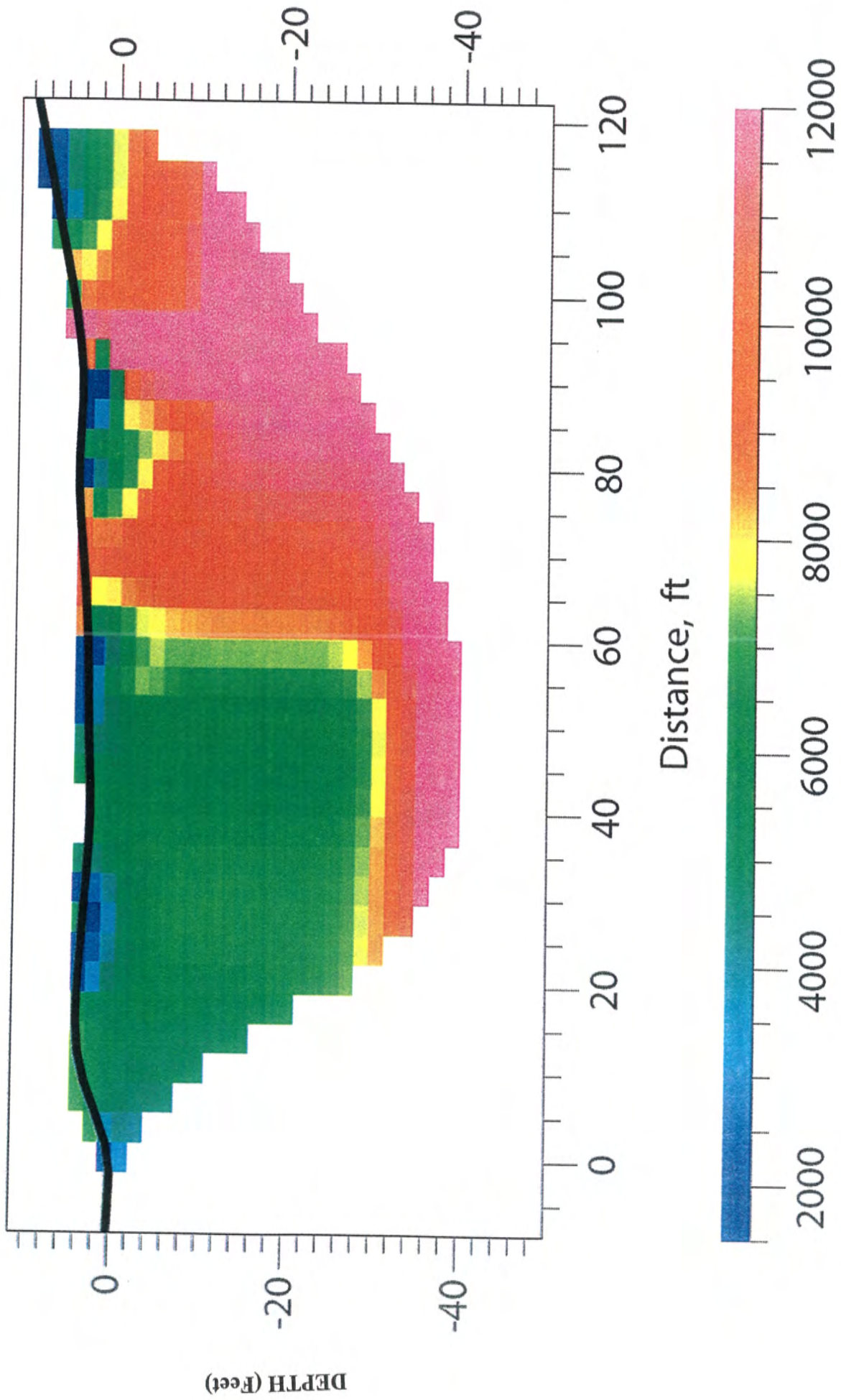


BISON 9000 SERIES

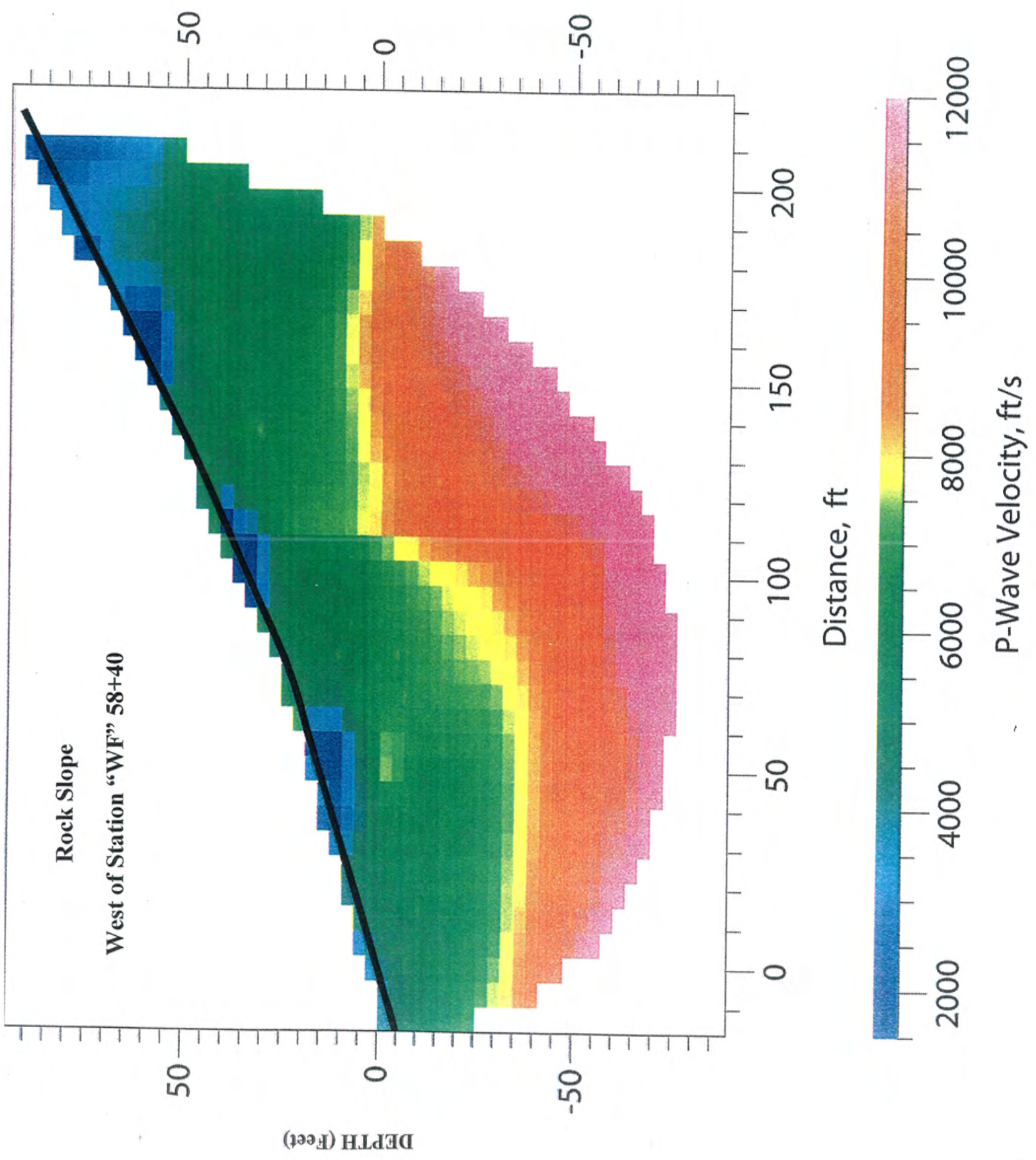
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 Date 03:14:07
 Time 11:19
 Hi-cut 125
 Lo-cut 384
 Sample rt. 100ms
 Stacks 0010
 Delay(ms) 12
 Channels 12
 Samples 002000
 Rec len 200ms
 Asc Off
 Dfbc Out
 Dfbc Out
 Time scale = 2.0 (ms)/division.

P CH GN STK EX P CH GN STK EX

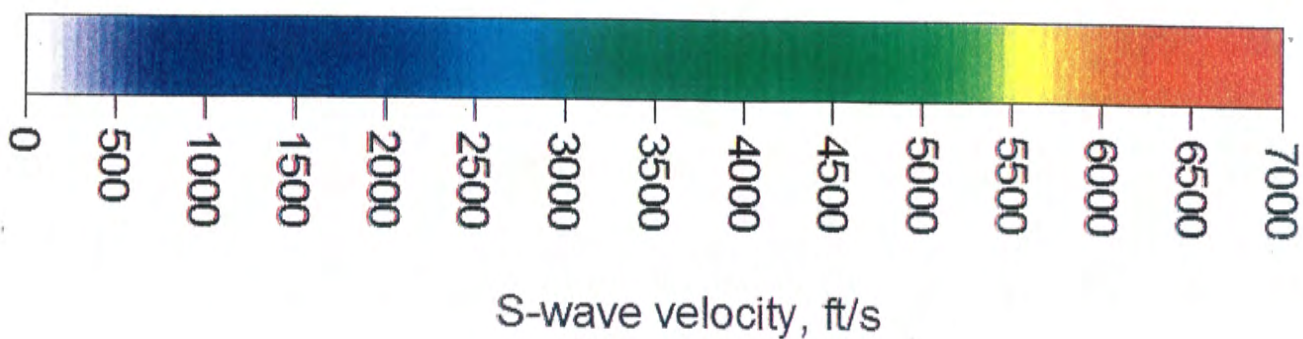
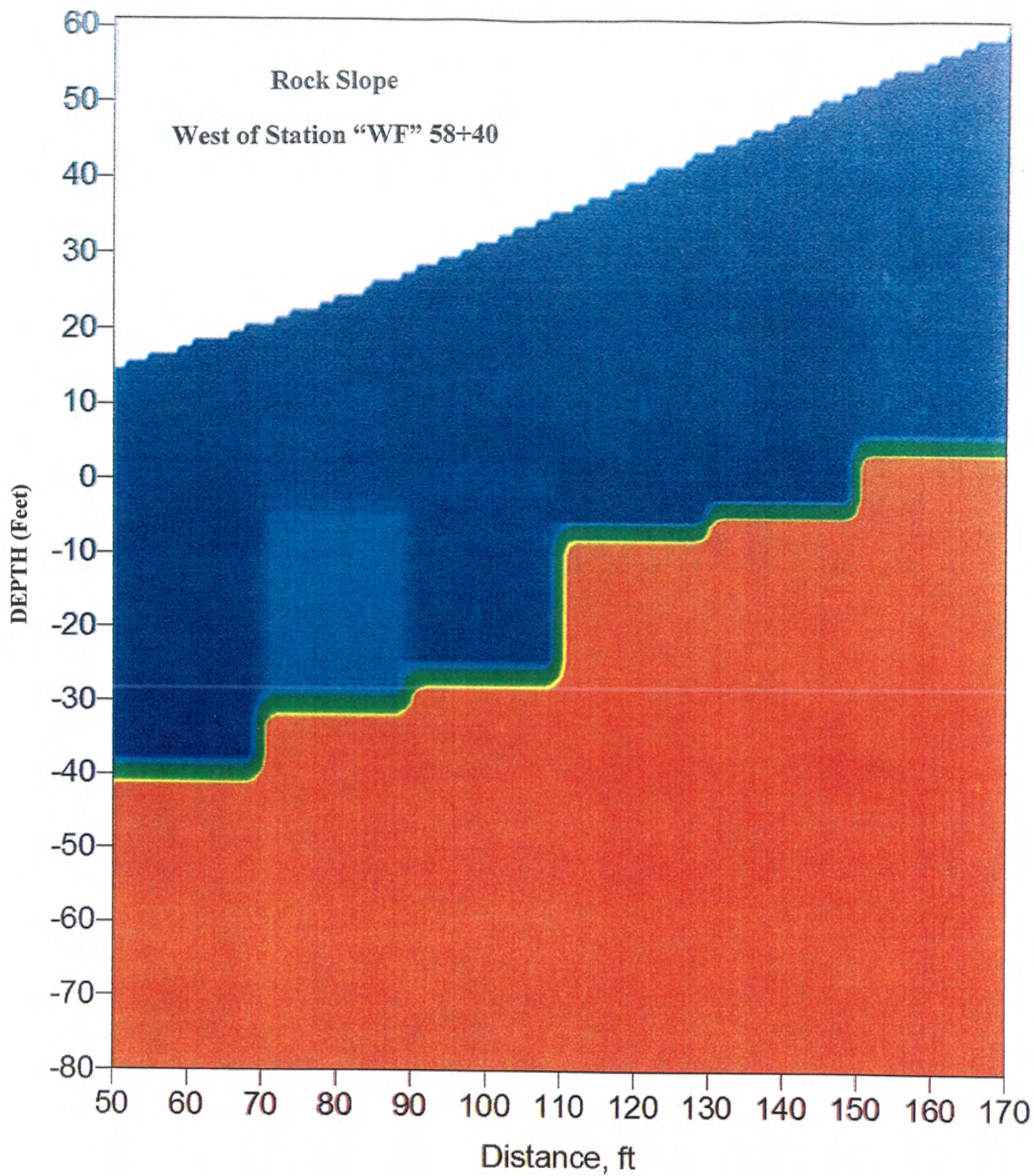
+ 01	H	0010	09	+ 07	L	0010	08
+ 02	H	0010	09	+ 08	M	0010	08
+ 03	H	0010	10	+ 09	H	0010	11
+ 04	H	0010	11	+ 10	H	0010	11
+ 05	M	0010	09	+ 11	H	0010	10
+ 06	L	0010	08	+ 12	H	0010	09



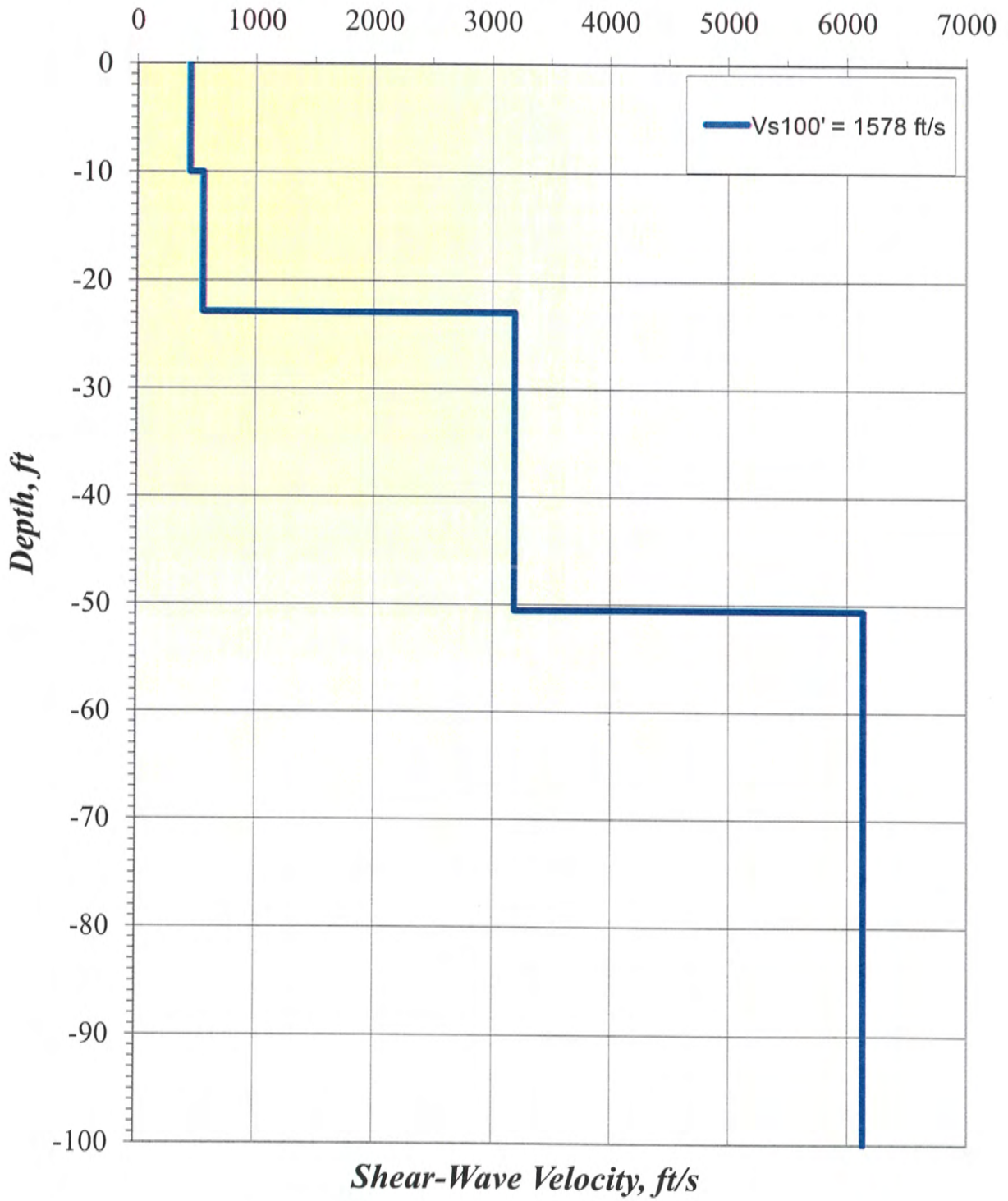
Rock Slope
RAMP "R3" 4+50



APPENDIX F
GEOPHYSICAL SURVEYS
ReMi



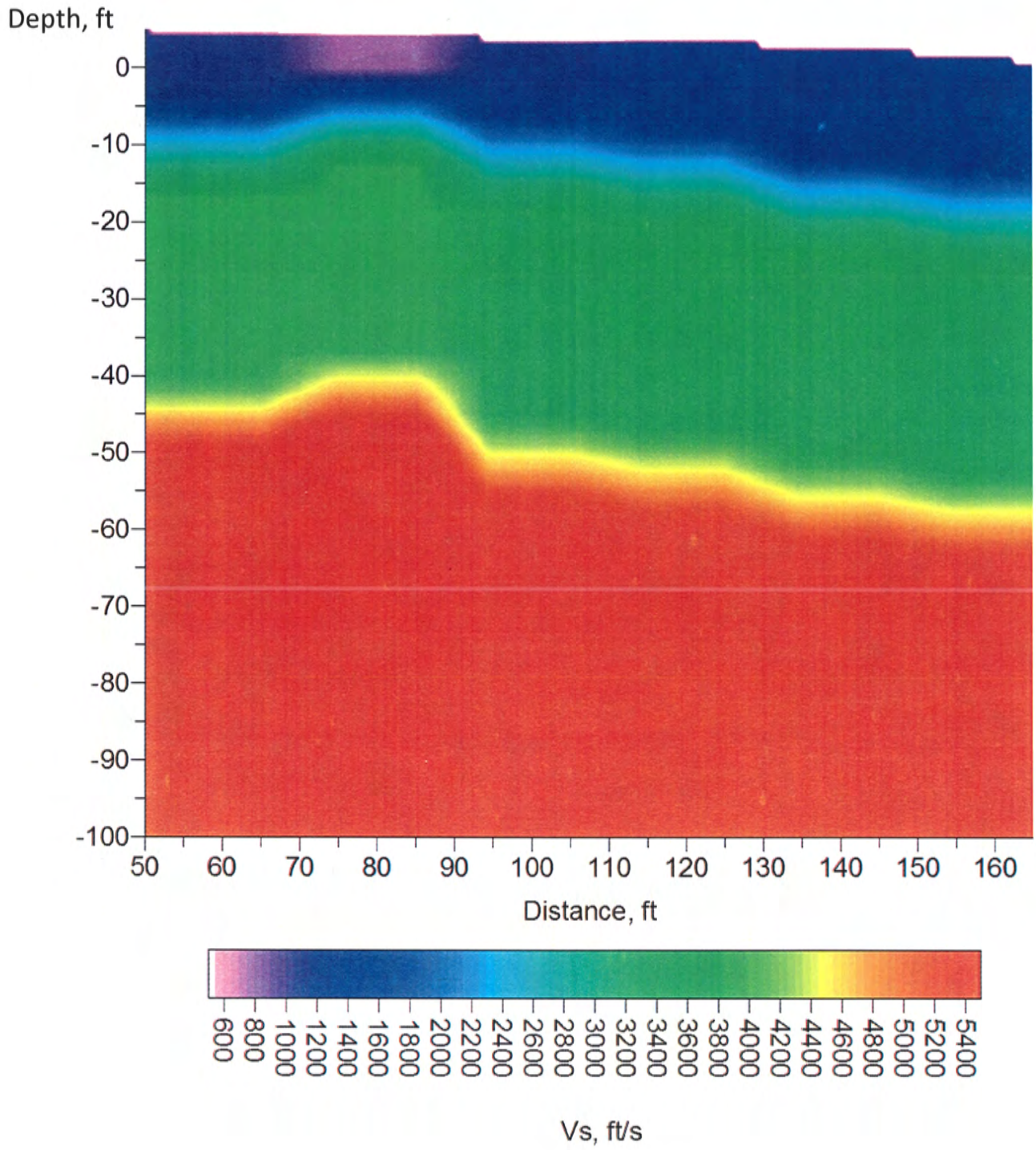
1D Vs Model from ReMi



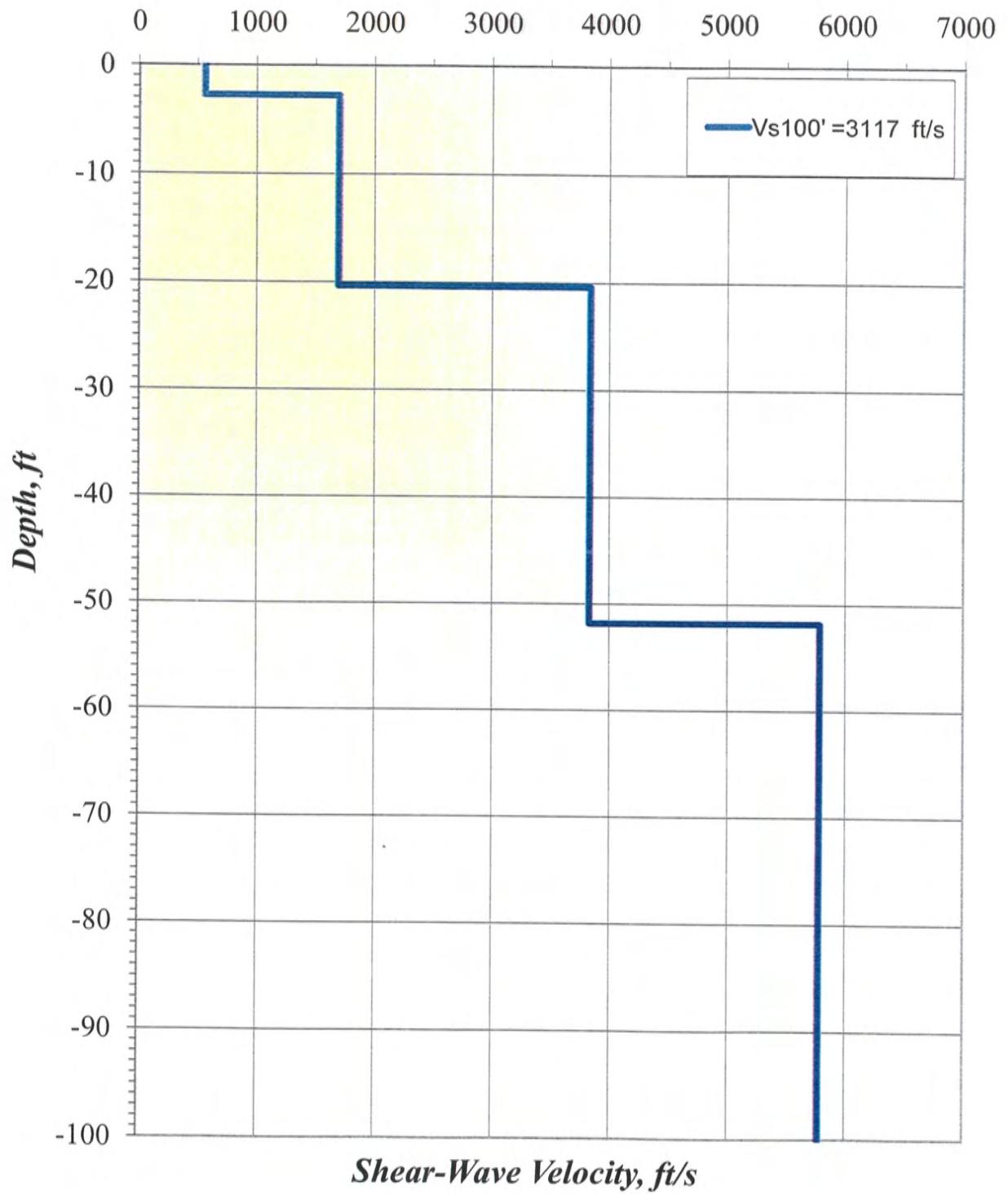
Rock Slope

West of Station "WF" 58+40

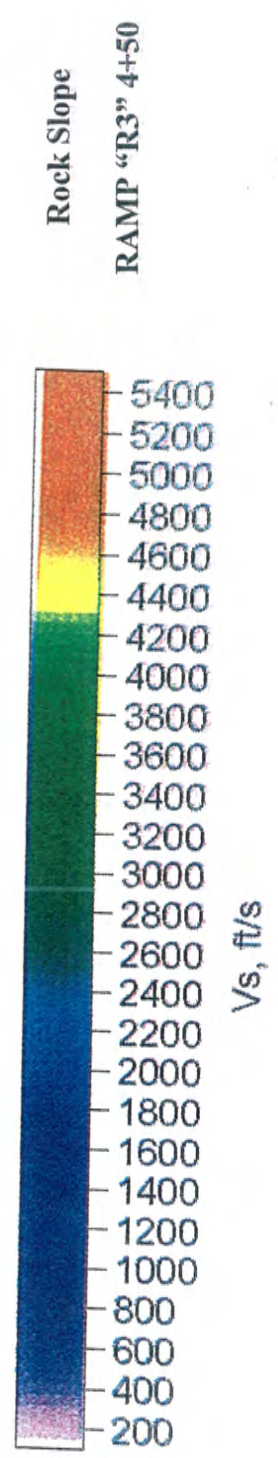
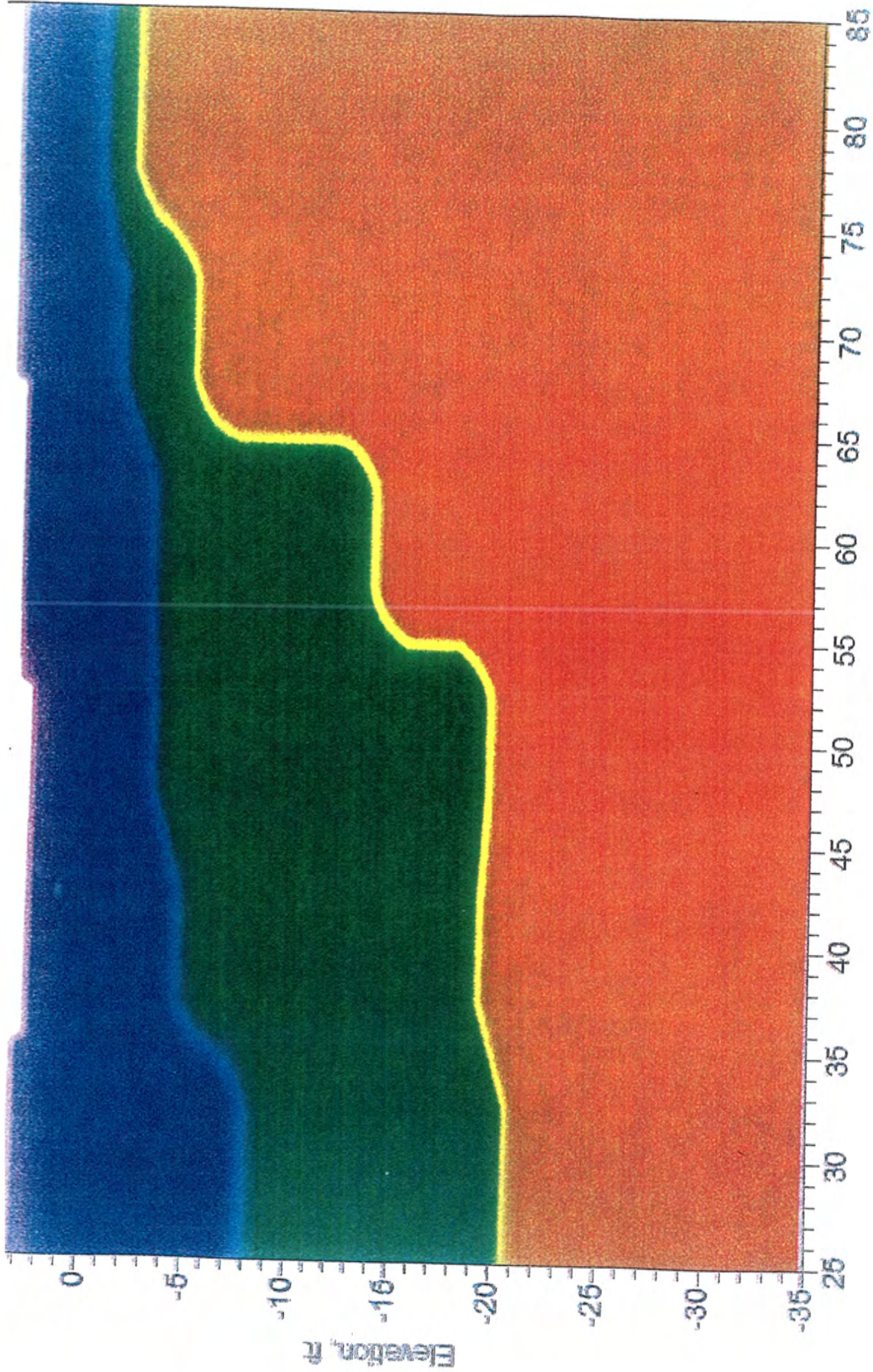
2D ReMi Shear Wave Velocity Profile near "P" 154+00



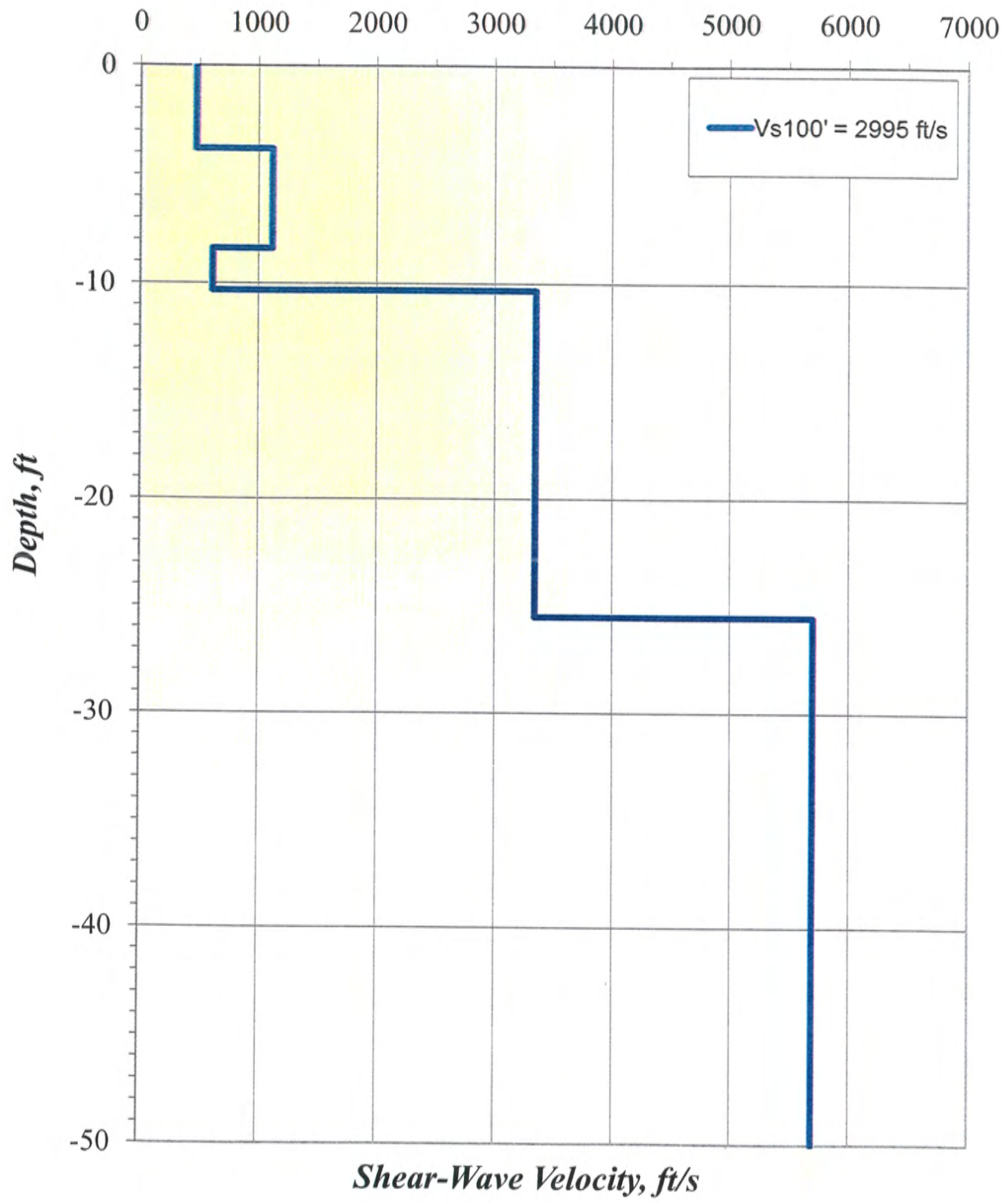
Mainline: 1D Vs Model from ReMi



Shear Wave Velocity Profile near Station "P" 154+00



R3: 1D Vs Model from ReMi



Rock Slope

RAMP "R3" 4+50

APPENDIX G
ROCK CORE TEST RESULTS



**Unconfined Compression Strength testing of a rock core
Rock Mechanics Laboratory – University of Nevada-Reno**

**NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION**

ROCK CORE DATA

EA # 73307

Job Description: Boulder City Bypass

Boring	Core ID	SG (measured)	Unit Weight pcf	Unconfined Compressive Strength (UNR Rock Mechanics Lab)	
				Peak Strength psi	Axial Displacement in.
FP1	H a	2.520	155.1	329	0.006
FP1	H b	2.455	152.0		
FP1	H c			3683	0.022
FP2	J a	2.513	155.6		
FP2	J b	2.471	153.7		
FP3	G1 a	2.496	154.8	2008	0.026
FP3	G1 b	2.504	156.5	3787	0.018
FP3	G1 c			4142	0.018
FP3	G2 a	2.450	154.1		
FP3	G2 b	2.516	156.8	2045	0.035
FP3	G2 c			5784	0.016
FP3	H a	2.373	150.9	834	0.045
FP3	H b	2.526	157.6		
FP3	H c			3613	0.015
FA2	K2 a	2.676	164.5		
FA2	K2 b	2.571	162.3		
FA2	K2 c			1902	0.008
FA3	E a	2.475	154.4		
FA3	E b	2.430	150.8		
DCA1	F a	2.552	158.5		
DCA1	F b	2.473	153.9	6404	0.025
DCA1	F c			5273	0.018
DCA1	F d			5013	0.017
DCA1	F 6			4408	0.021

APPENDIX H
X-RAY DIFFRACTION ANALYSES

Laboratory Report

www.nbmj.unr.edu/lab/

J. Mark Salazar, P.E.
Abbas A. Bafghi, P.E.
Nevada Department of Transportation
1263 S. Stewart Street
Carson City NV 89712

Invoice: **LAB-237**
Date: **11 June 2007**



Mineralogy is determined for all samples using X-ray Diffraction analysis. The scale of some diffractograms has been set to better reveal low intensity detail, in doing so the higher intensity peaks are truncated. Glycolated patterns are represented in purple. The results are as follows:

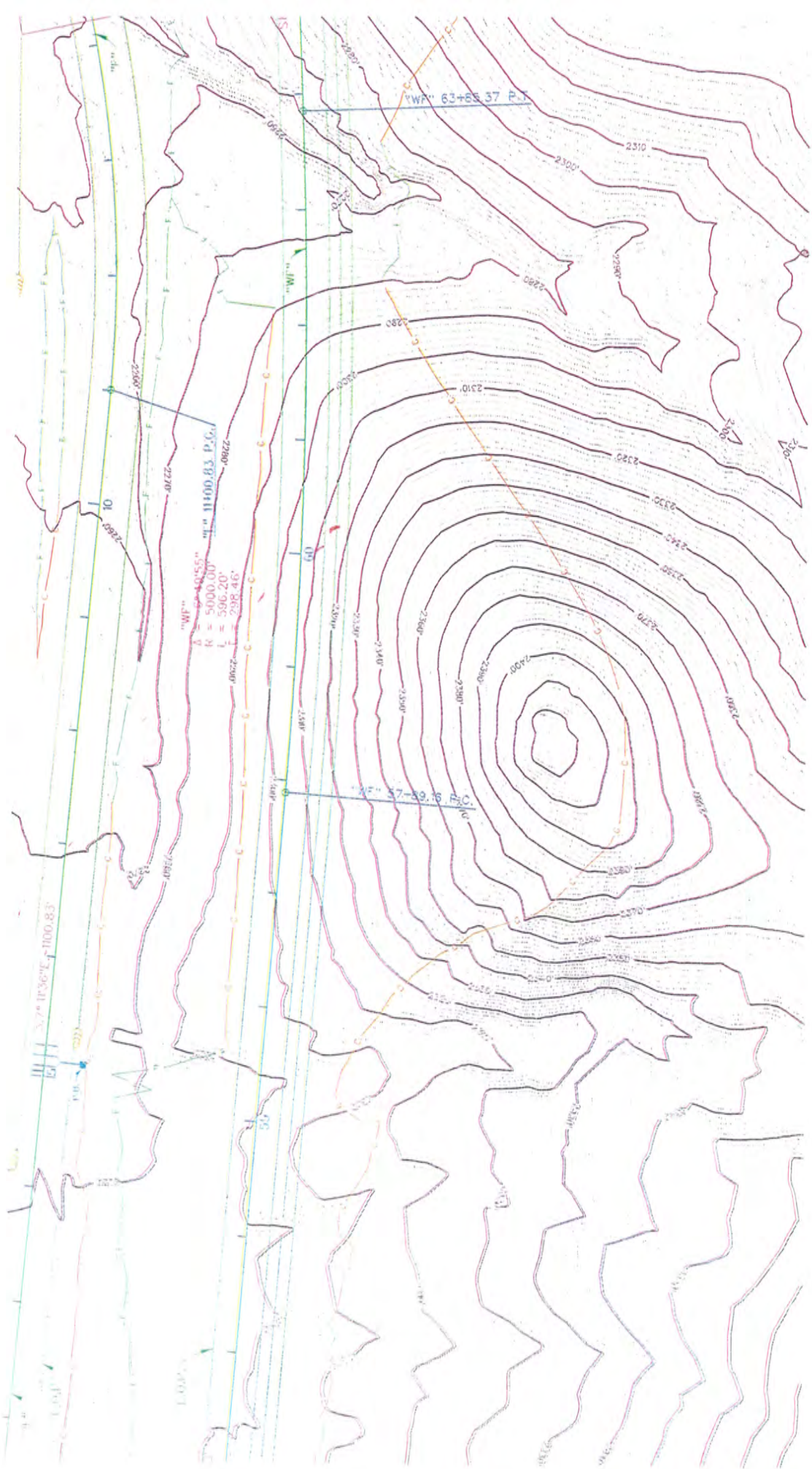
- FA3 Ea: The white vein material in this core is gypsum.
- FA3 Ea green: The white/green material in this core contains major gypsum with minor plagioclase and quartz.
- FA3-Ec Black Vein: The black vein material in this core contains major gypsum, plagioclase and quartz with minor tourmaline, hematite and saponite.
- FP2 Ja: The bulk sample from this core contains major quartz, minor gypsum, plagioclase and K-feldspar with trace muscovite.
- FA2 K2a: The bulk sample from this core contains major quartz and plagioclase, minor pyrite, mixed saponite/chlorite and phlogopite with possible trace pyrophyllite.

The results of this assay were based solely upon the content of the sample submitted. Any decision to invest should be made only after the potential investment value of the claim or deposit has been determined based on the result of assays of multiple samples of rocks or minerals collected by the prospective investor or by a qualified person selected by him.

Mario Desilets
Assistant Chemist/Geochemist

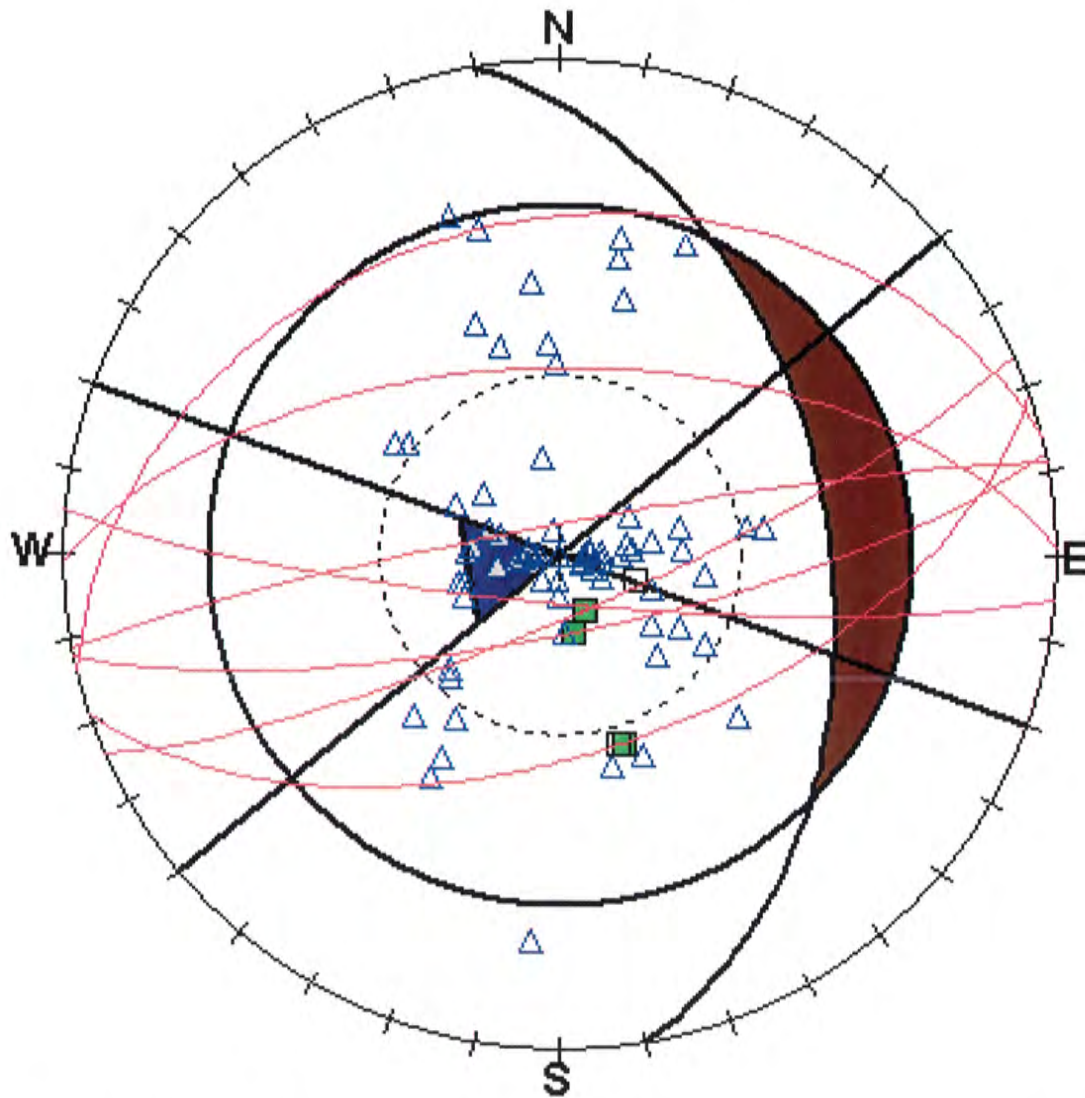
APPENDIX I
ROCK SLOPE STABILITY ANALYSES

WEST FRONTAGE ROAD ROCK SLOPE



WEST FRONTAGE ROAD ROCK SLOPE

Markland Test Plot



Friction Angle = 30 degrees

Slope Dip = 45 degrees

Slope Dip Direction = 80 degrees

Number of Joint Sets = 82

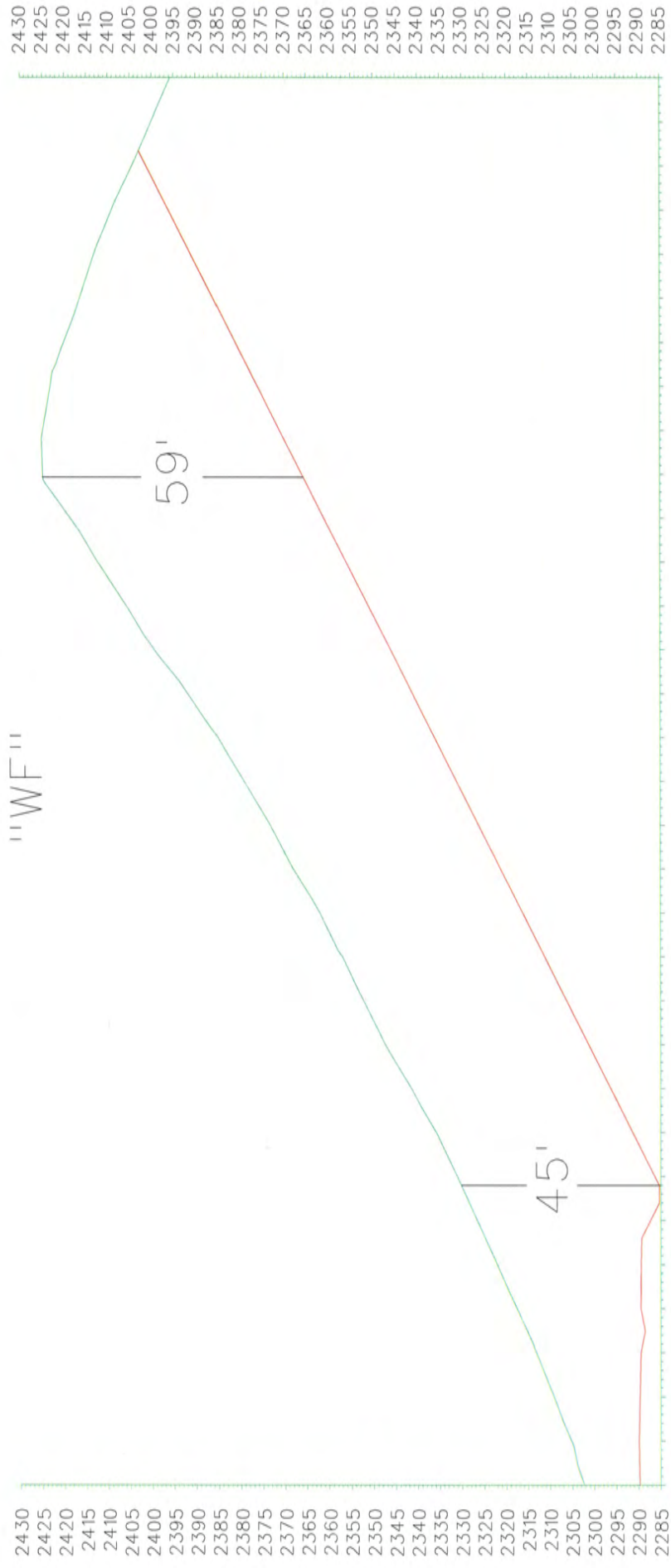
Red circles are the Great Circles bounding the inner and outer limits of two joint clusters and also the three Great Circles passing through the three faults.

Shaded reddish brown crescent is Critical Zone for Plane & Wedge Failures.

Shaded purple triangle is Critical Zone for Toppling Failures.

blue: Joints

green: Faults

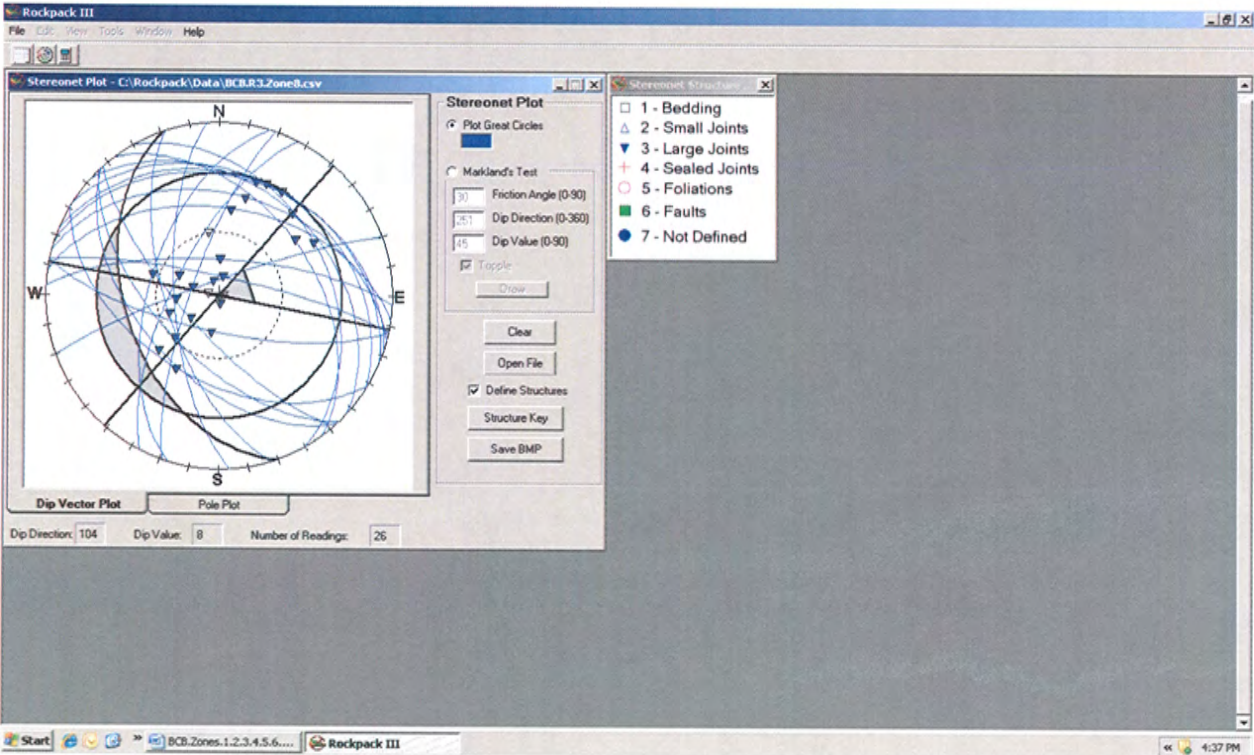
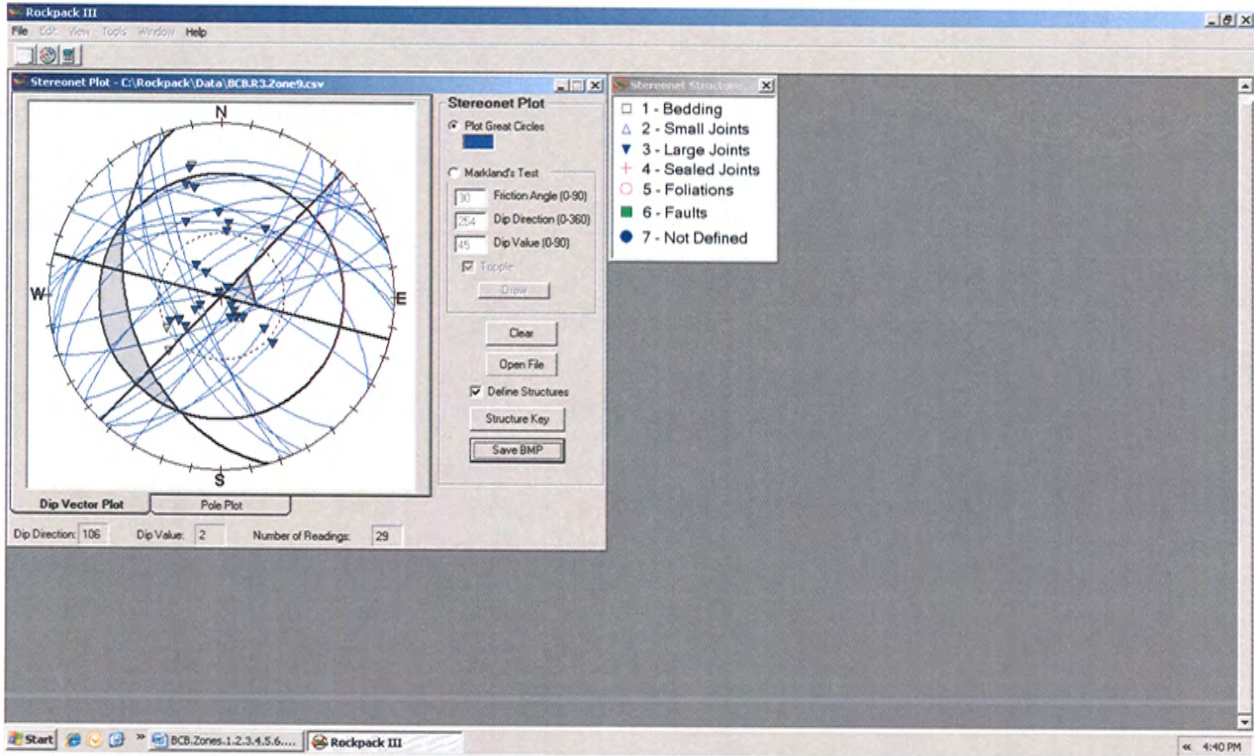


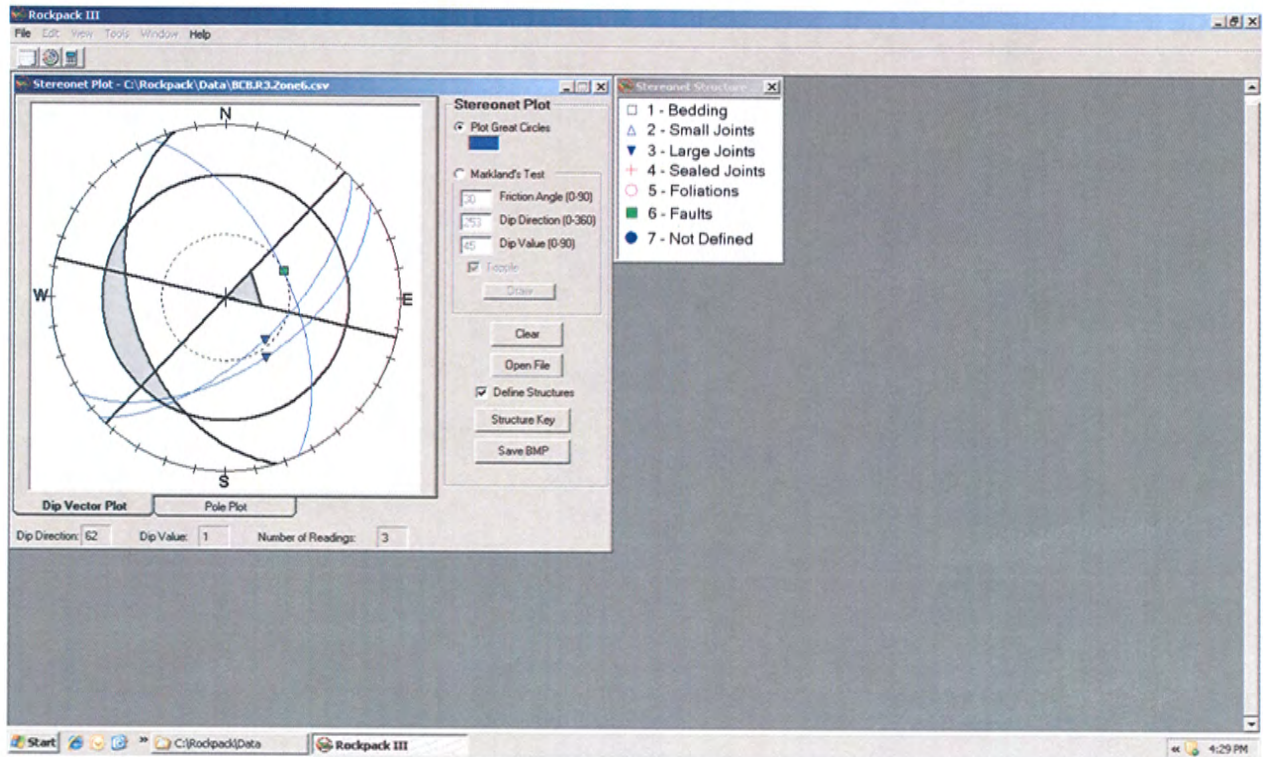
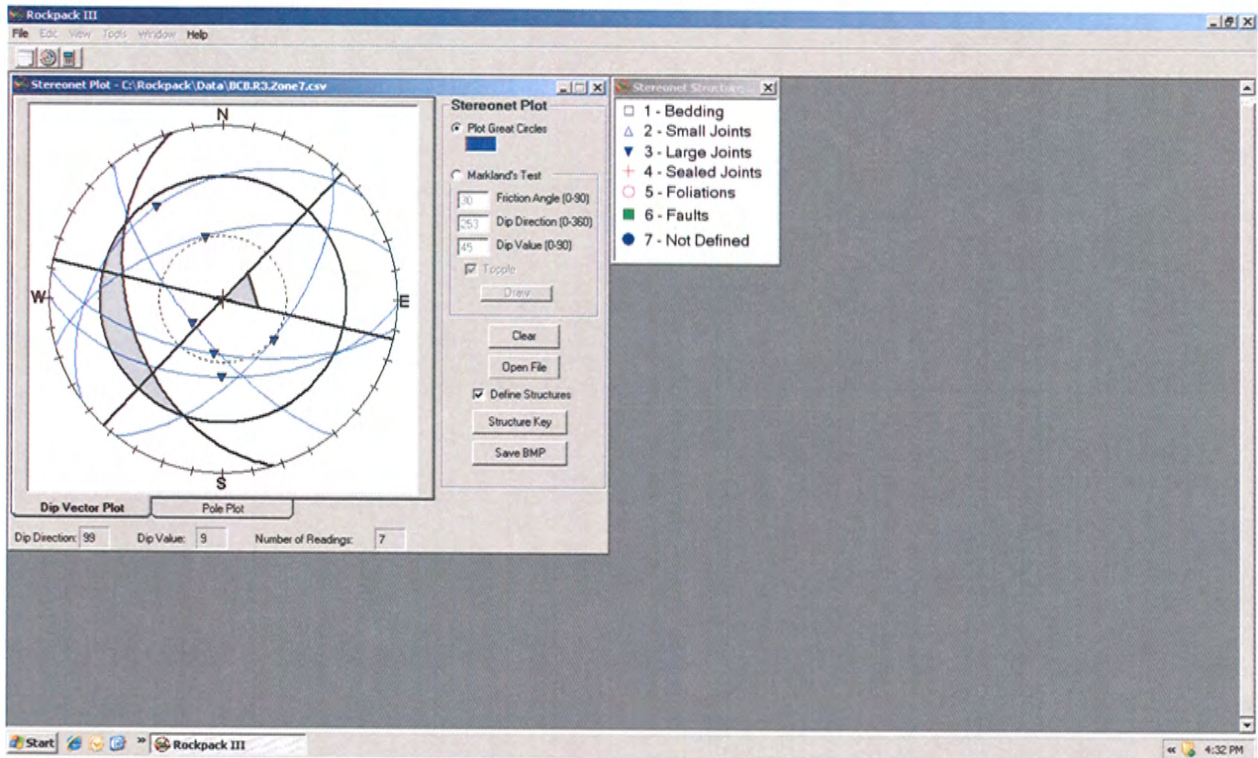
1"WF 1"

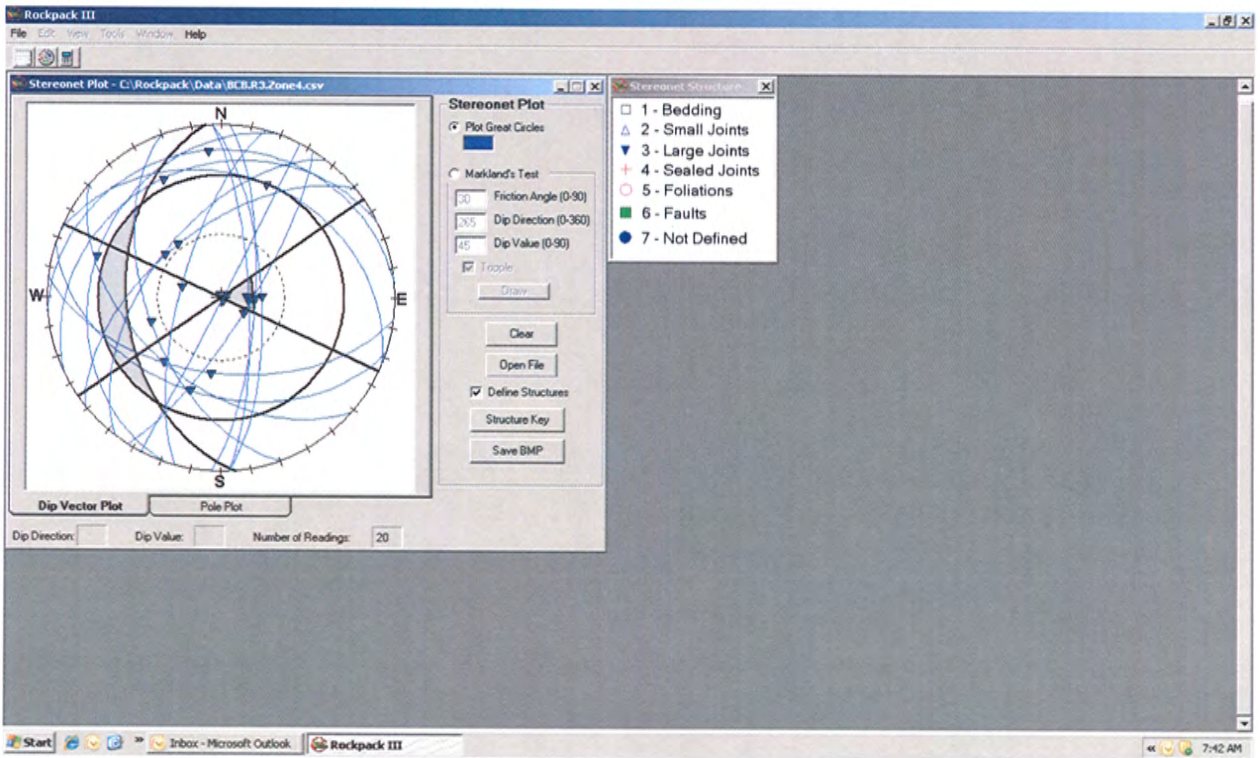
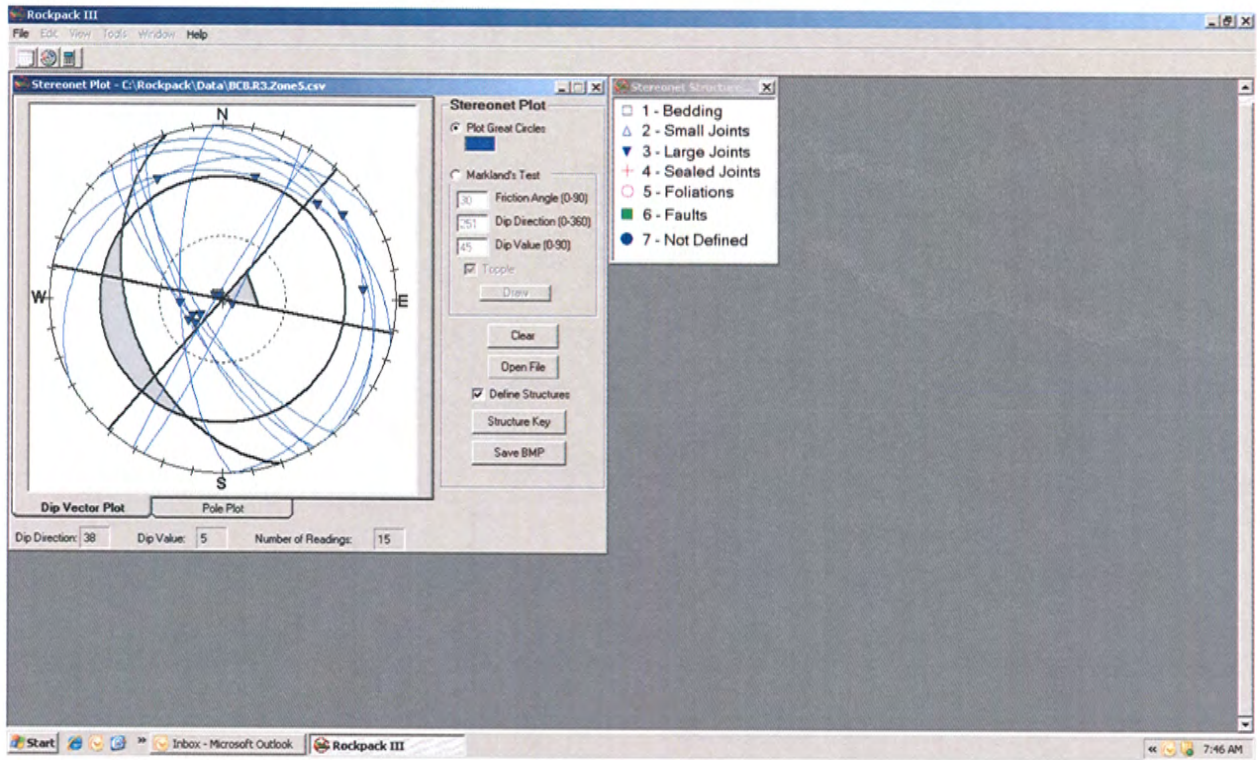
WF 58+40

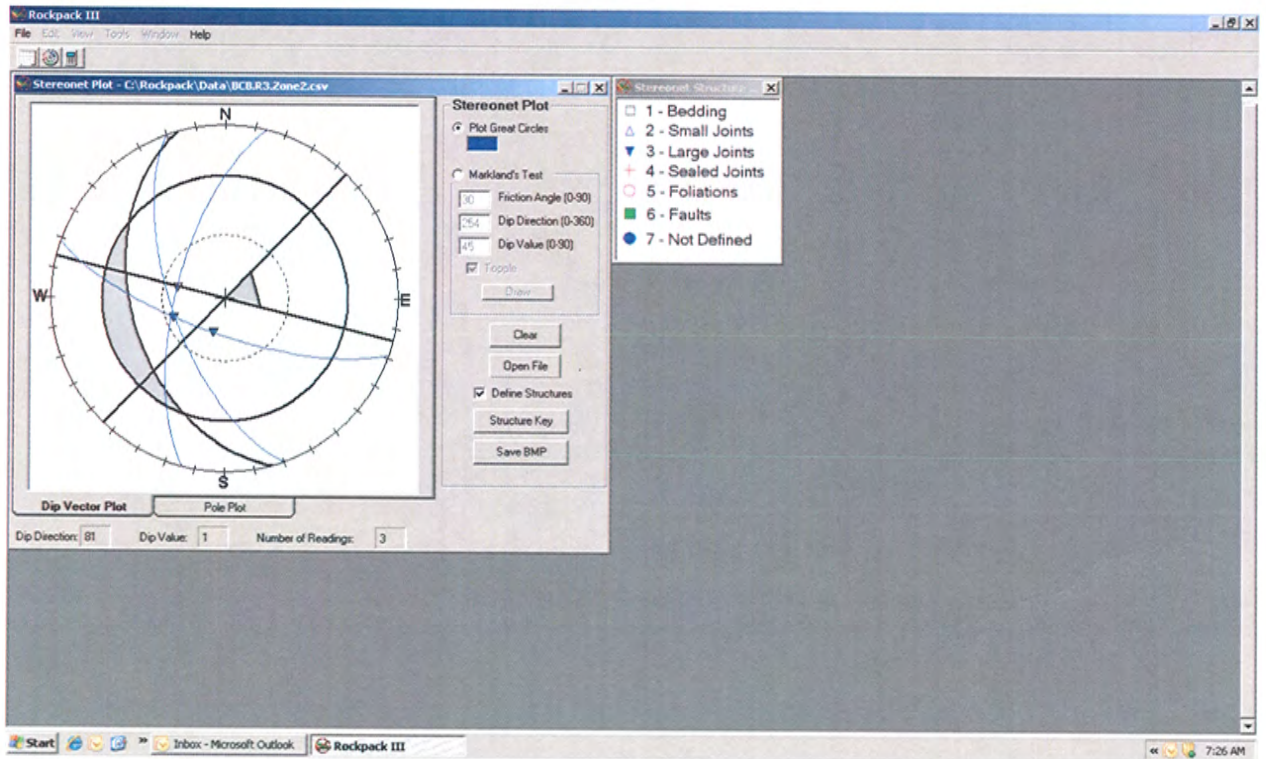
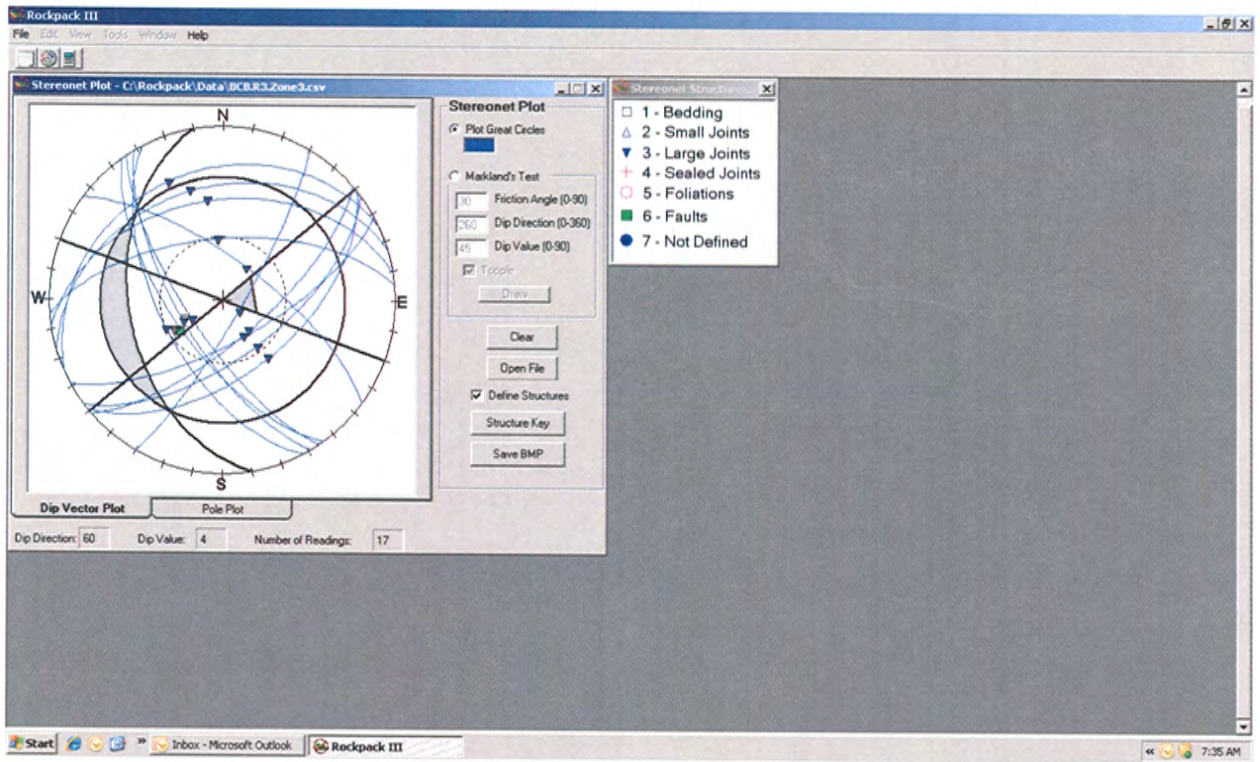
RAMP 3

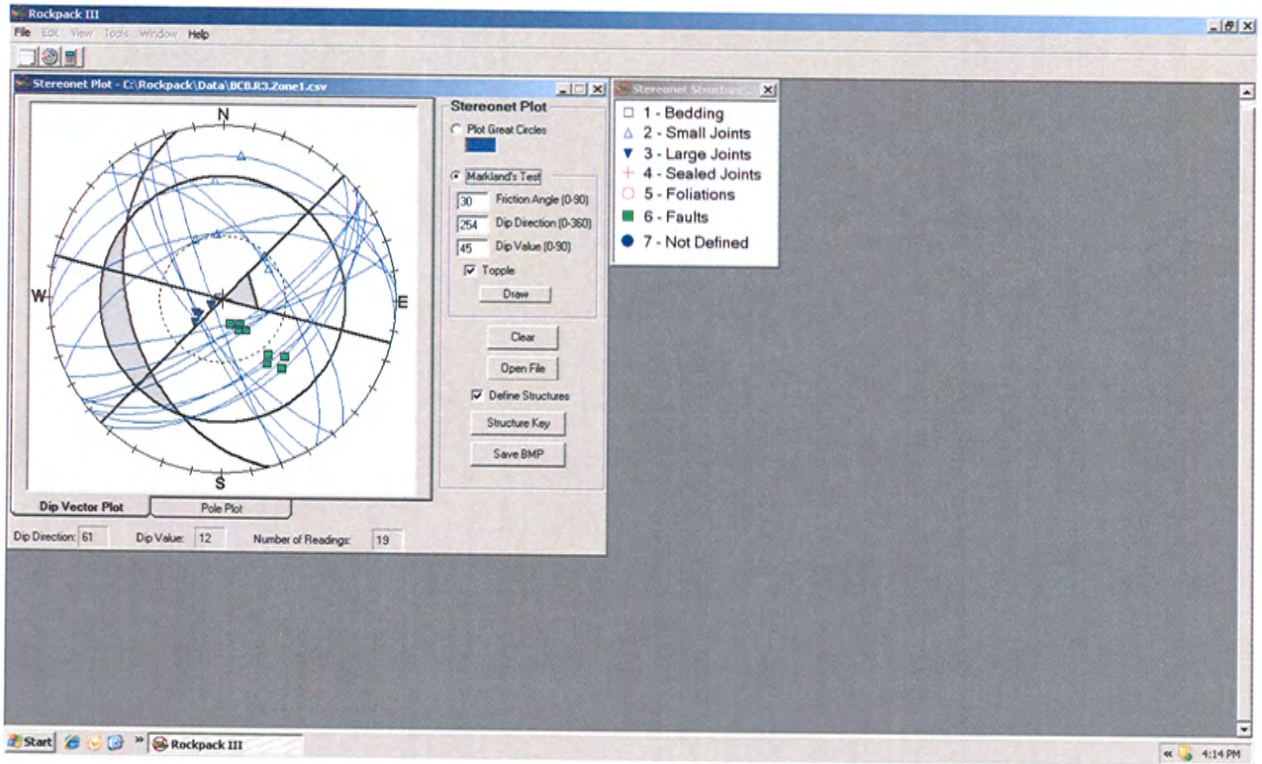
PROPOSED CUT SLOPE 1H:1V



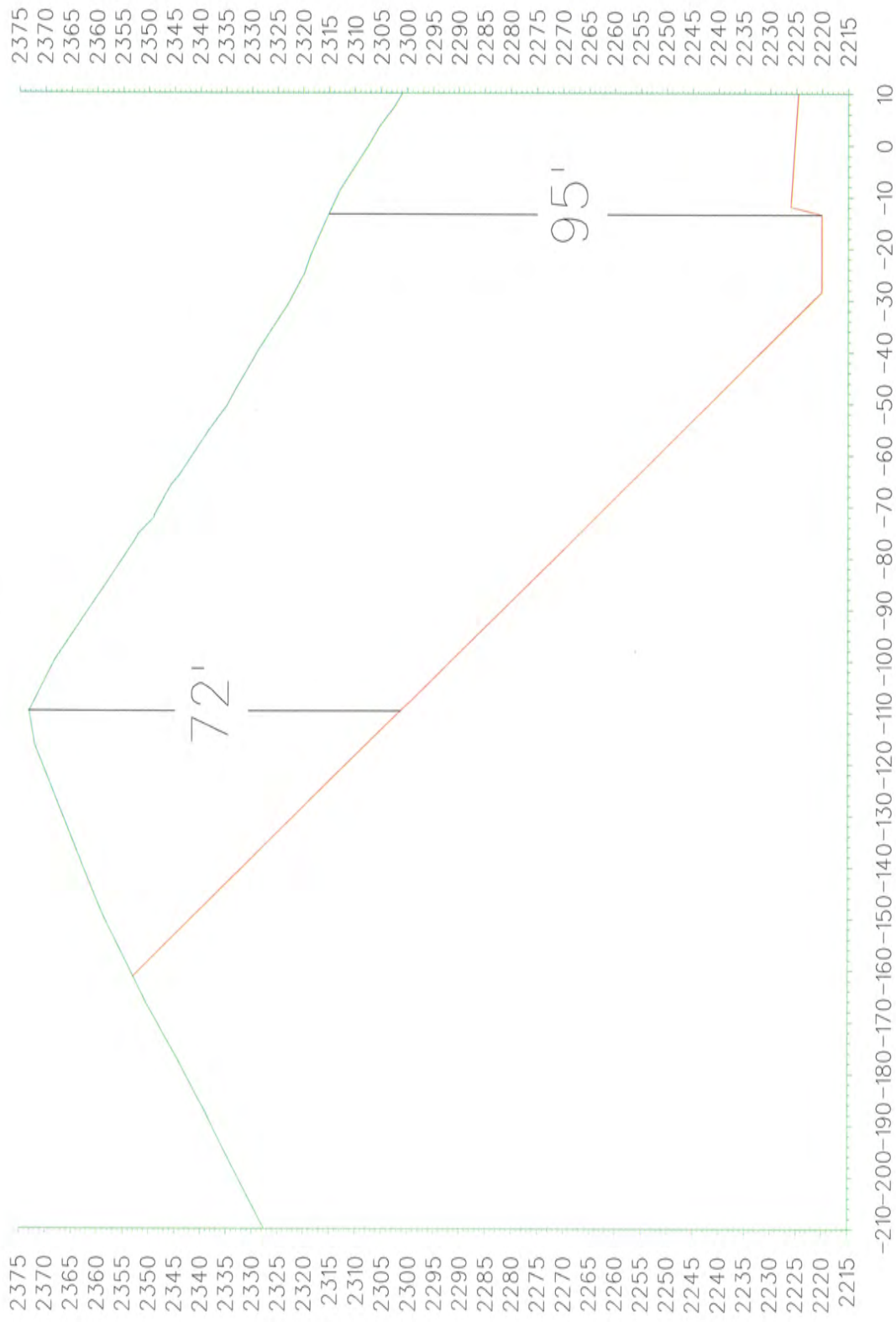








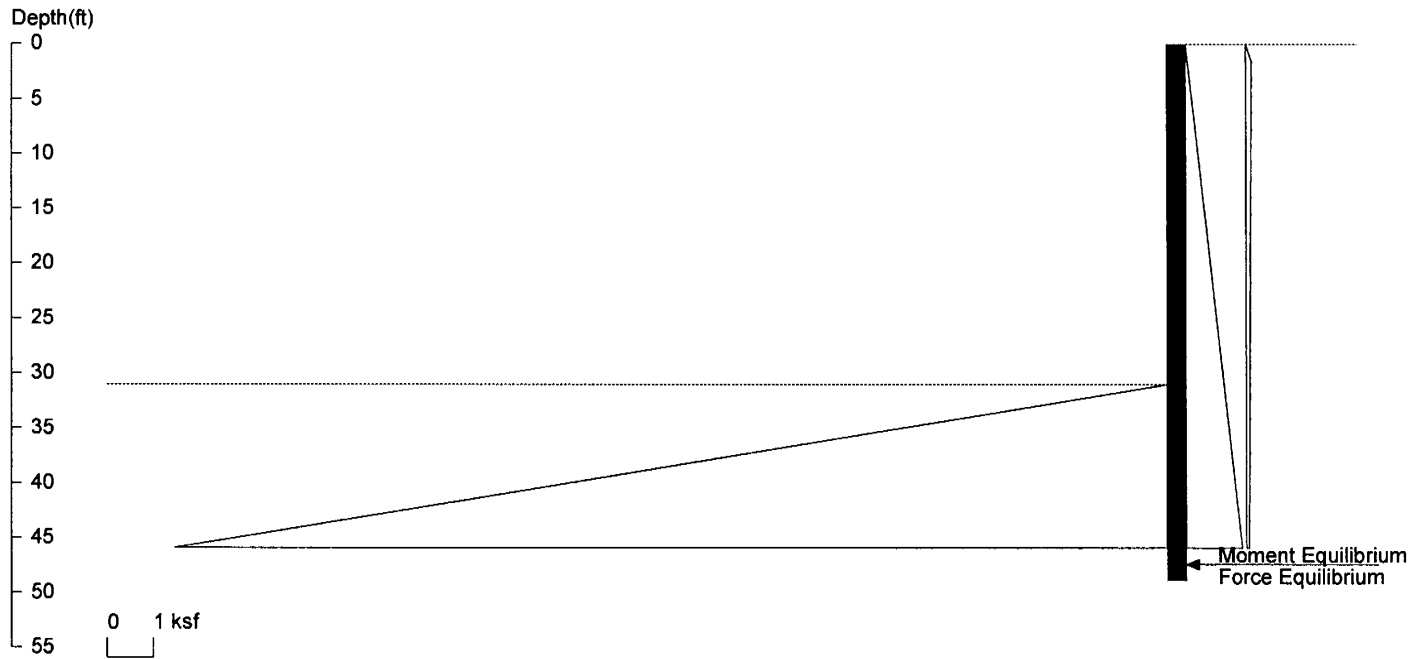
"R3"



4+00

APPENDIX J
TANGENT PILE WALL

Boulder City Bypass-Tangent Wall.31 feet High. BCB



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File: C:\Shoring8\BCB.Tangent Pile.31.sh8

UNITS: Dimension - ft; Force and Shear - kip; Pressure and Stress - ksf; Moment - kip-ft; Pres. Slope - kip/ft³; Deflection - in.

Wall Height=31.0 Pile Diameter=3.0 Pile Spacing=1.0 Wall Type: 4. Secant/Tangent

PILE LENGTH: Min. Embedment=17.91 Min. Pile Length=48.91

MOMENT IN PILE: Max. Moment=261.97 per Pile Spacing=1.0 at Depth=37.84

PILE SELECTION:

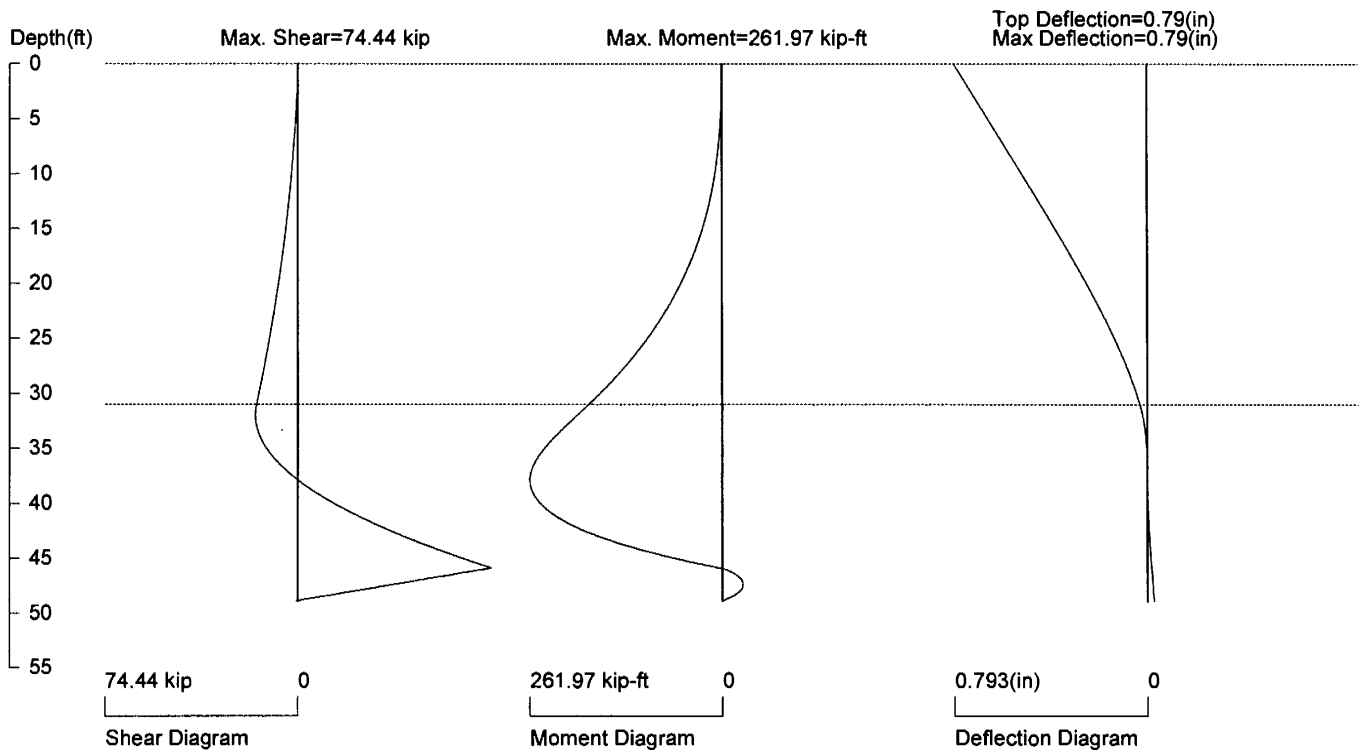
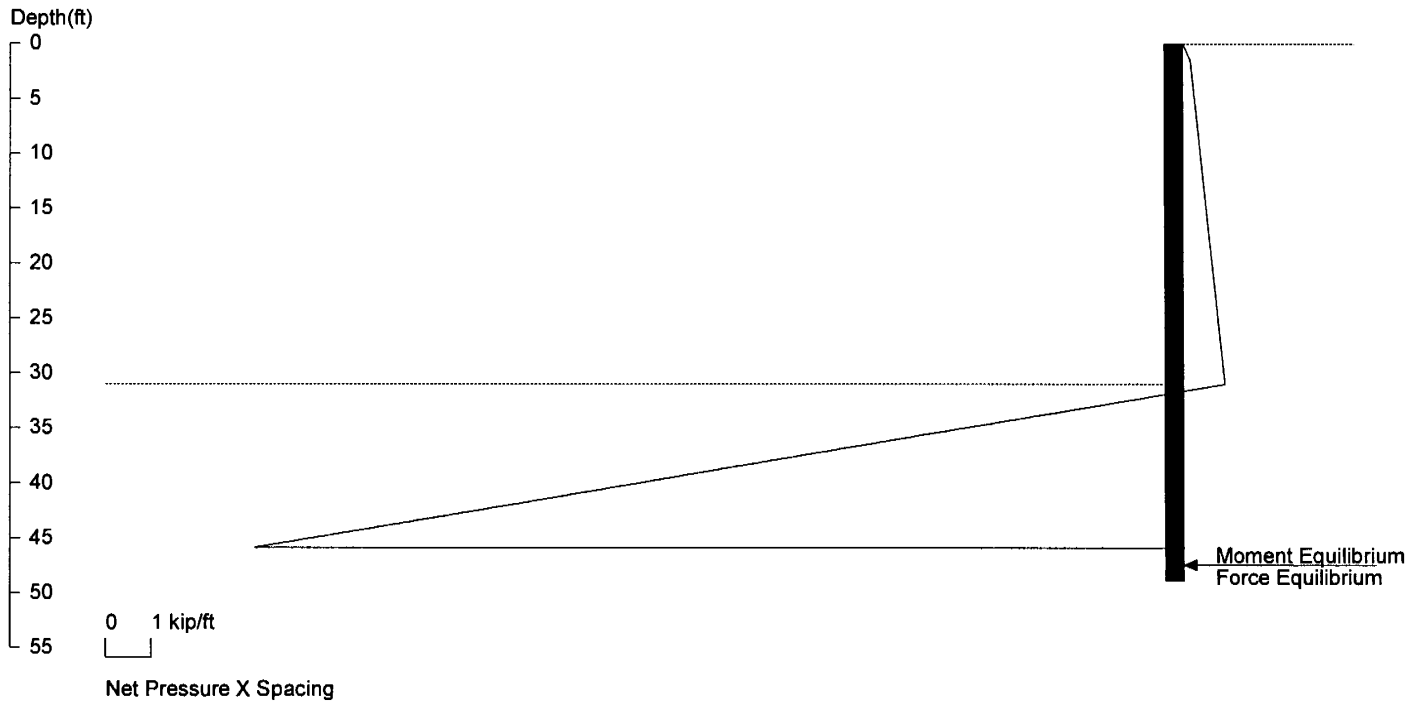
Request Min. Section Modulus = 132.3 in³/pile, Fy= 36 ksi = 248 MPa, Fb/Fy=0.66

Selected Pile, W24X192, S = 491.0 in³/pile It is greater than Request Min. Section Modulus

Top Deflection = 0.79(in) based on E (ksi)= 29000.00, I (in⁴)/pile= 6260.0

UNITS: Width, Spacing, Diameter, Length, and Depth - ft; Force - kip; Moment - kip-ft
Friction, Bearing, and Pressure - ksf; Pres. Slope - kip/ft³; Deflection - in

Boulder City Bypass-Tangent Wall.31 feet High. BCB



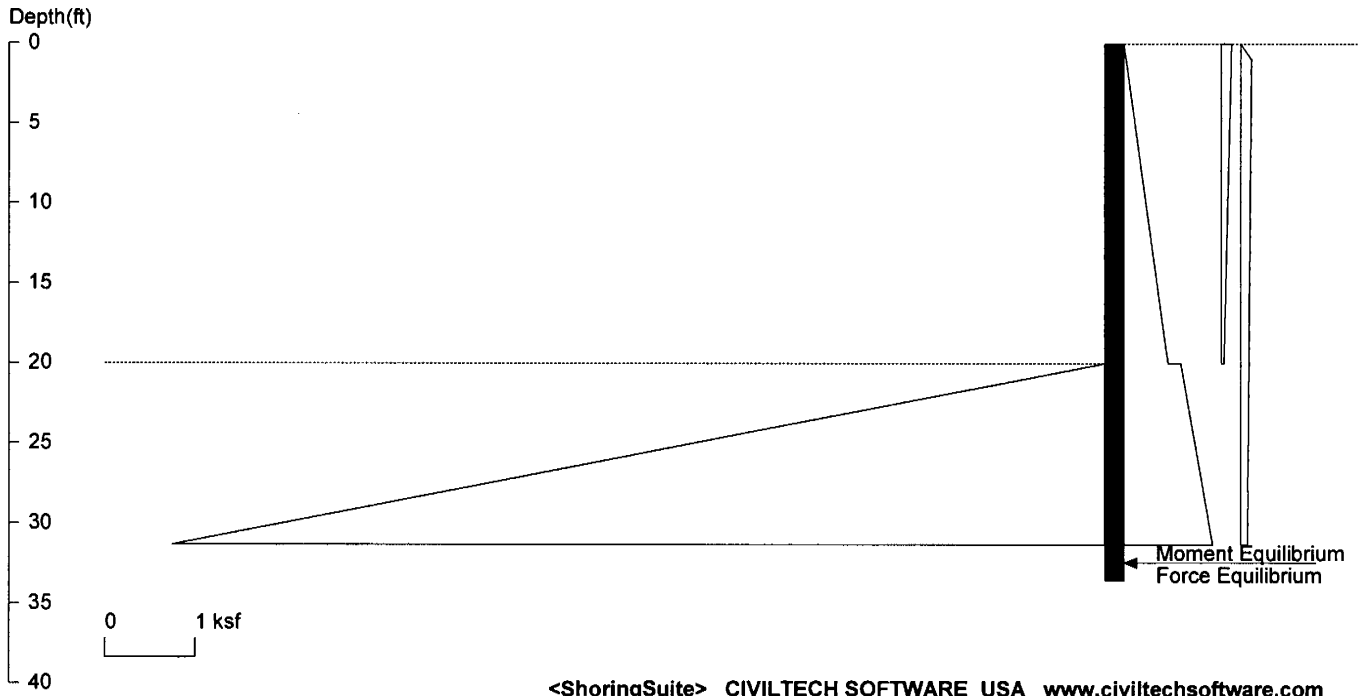
PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

Based on pile spacing: 1.0 foot or meter

User Input Pile, W24X192 E (ksi)=29000.0, I (in⁴)/pile=6260.0

File: C:\Shoring8\BCB.Tangent Pile.31.sh8

Boulder City Bypass-Tangent Wall.20 feet High.



Licensed to Date: 5/7/2011

File: C:\Shoring8\BCB.Tangent Pile.20.sh8

UNITS: Dimension - ft; Force and Shear - kip; Pressure and Stress - ksf; Moment - kip-ft; Pres. Slope - kip/ft³; Deflection - in.

Wall Height=20.0 Pile Diameter=3.0 Pile Spacing=1.0 Wall Type: 4. Secant/Tangent

PILE LENGTH: Min. Embedment=13.57 Min. Pile Length=33.57

MOMENT IN PILE: Max. Moment=103.66 per Pile Spacing=1.0 at Depth=25.26

PILE SELECTION:

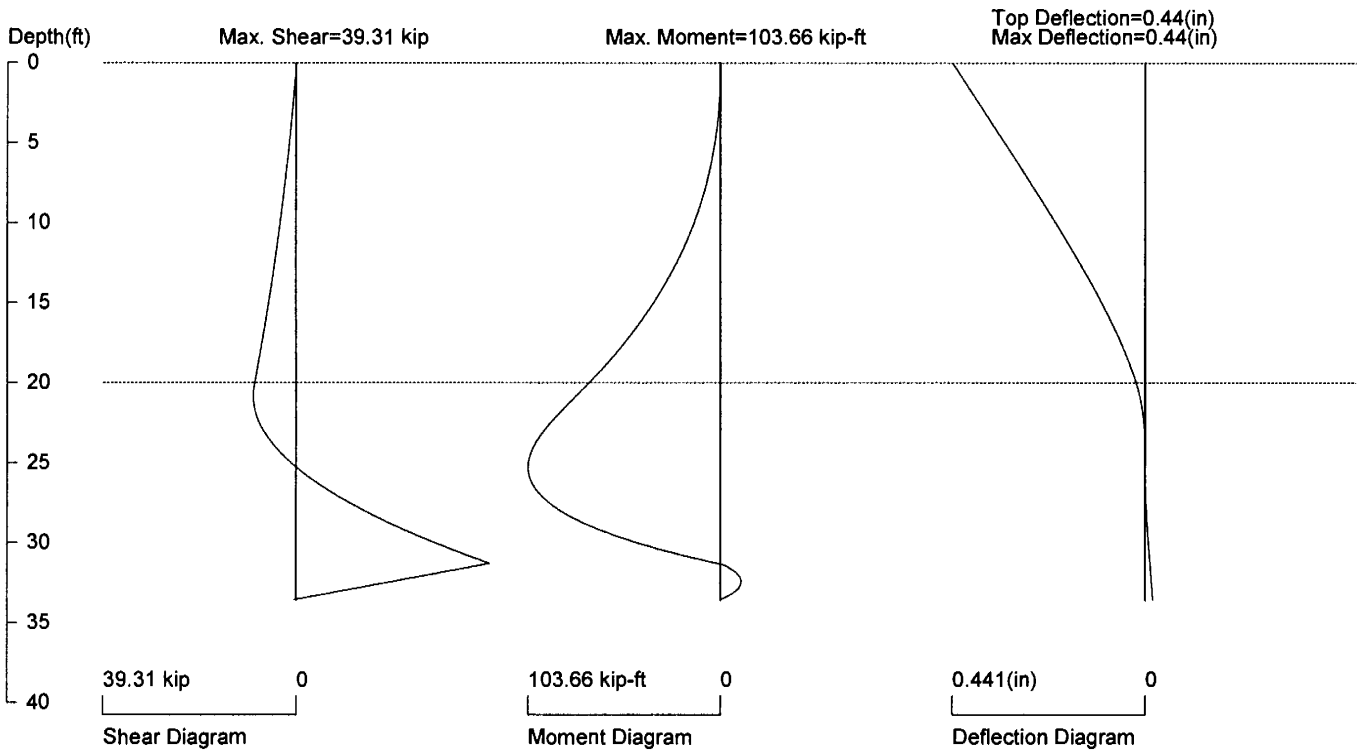
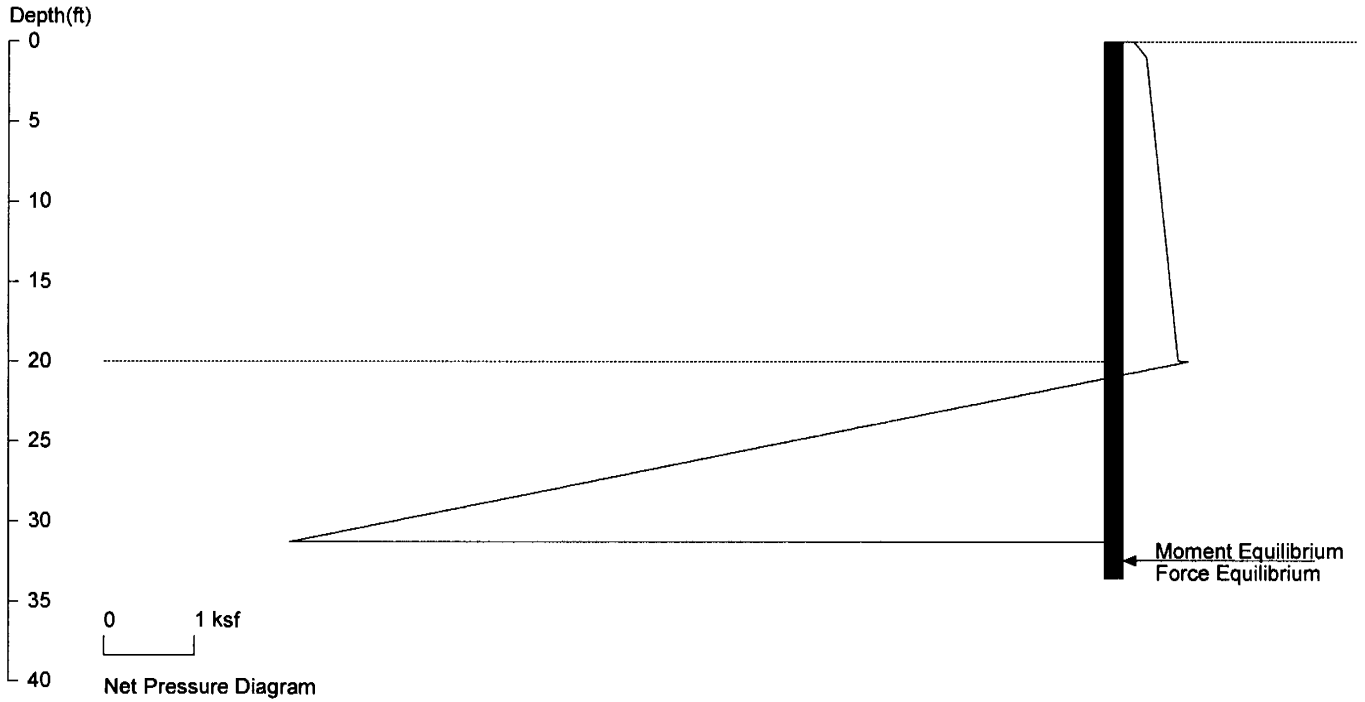
Request Min. Section Modulus = 52.4 in³/pile, F_y = 36 ksi = 248 MPa, F_b/F_y=0.66

Selected Pile, W24X76, S = 176.0 in³/pile It is greater than Request Min. Section Modulus

Top Deflection = 0.44(in) based on E (ksi)= 29000.00, I (in⁴)/pile= 2100.0

UNITS: Width, Spacing, Diameter, Length, and Depth - ft; Force - kip; Moment - kip-ft
Friction, Bearing, and Pressure - ksf; Pres. Slope - kip/ft³; Deflection - in

Boulder City Bypass-Tangent Wall.20 feet High.



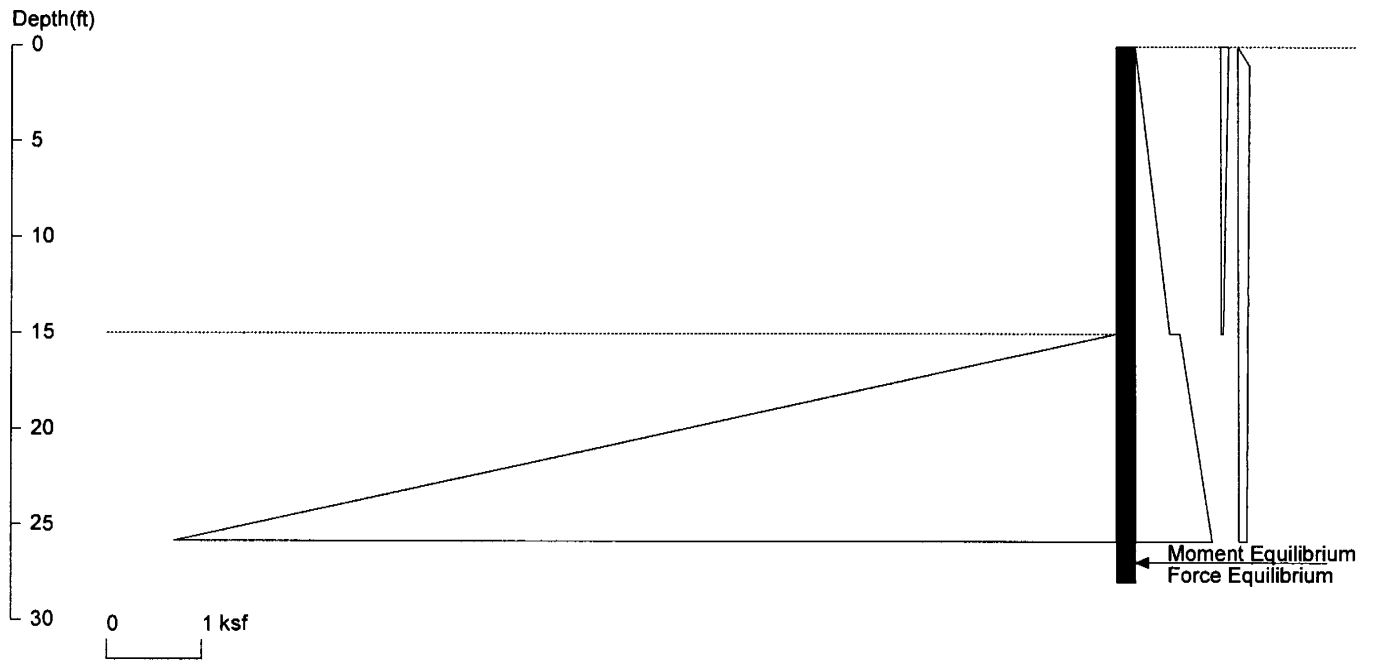
PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

Based on pile spacing: 1.0 foot or meter

User Input Pile, W24X76 E (ksi)=29000.0, I (in4)/pile=2100.0

File: C:\Shoring8\BCB.Tangent Pile.20.sh8

Boulder City Bypass-Tangent Wall.15 feet High



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File: C:\Shoring8\BCB.Tangent Pile.15.sh8

UNITS: Dimension - ft; Force and Shear - kip; Pressure and Stress - ksf; Moment - kip-ft; Pres. Slope - kip/ft³; Deflection - in.

Wall Height=15.0 Pile Diameter=3.0 Pile Spacing=1.0 Wall Type: 4. Secant/Tangent

PILE LENGTH: Min. Embedment=13.03 Min. Pile Length=28.03

MOMENT IN PILE: Max. Moment=54.15 per Pile Spacing=1.0 at Depth=20.35

PILE SELECTION:

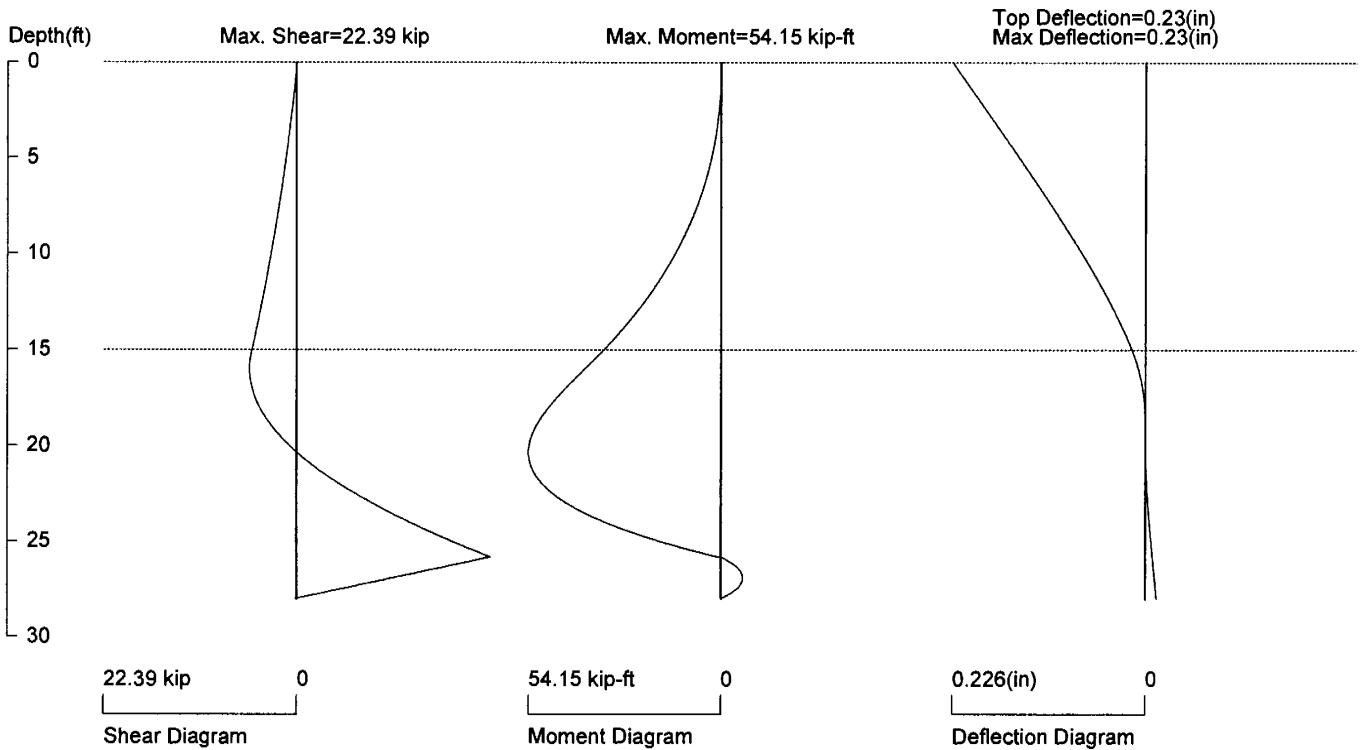
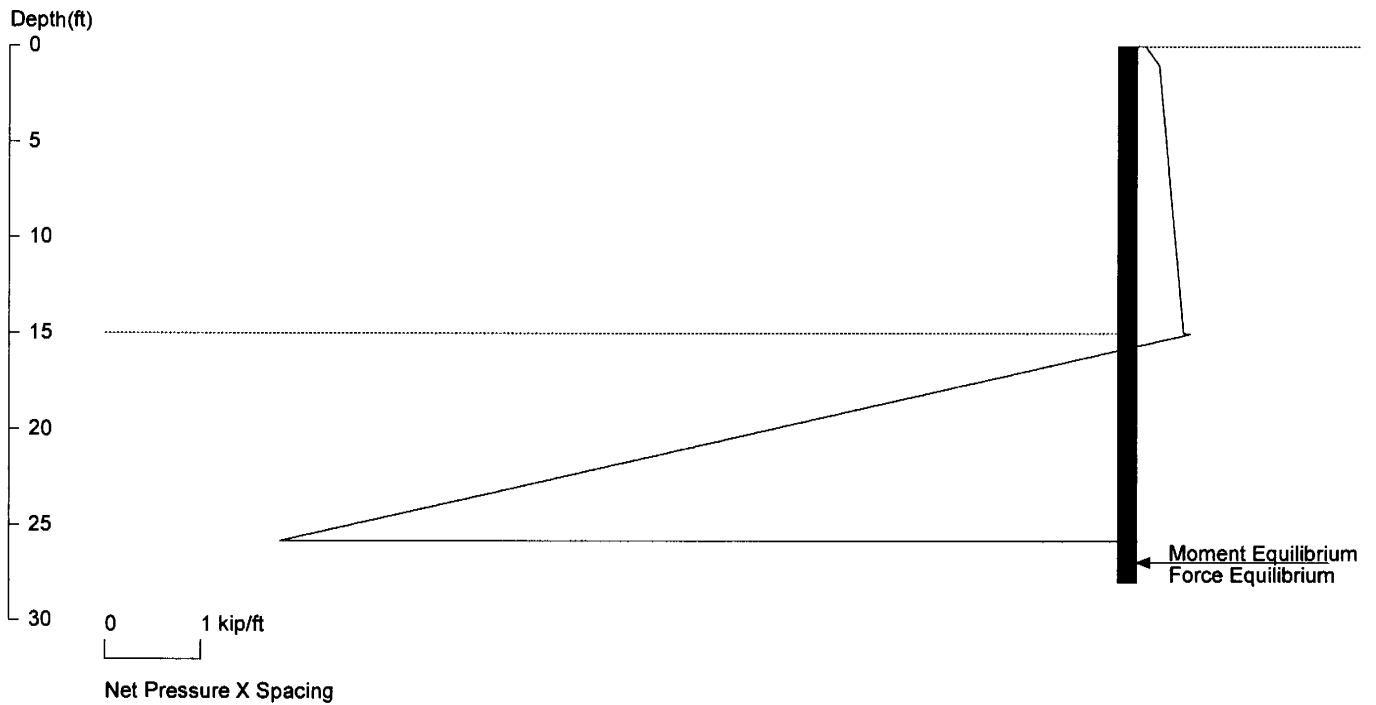
Request Min. Section Modulus = 27.3 in³/pile, Fy= 36 ksi = 248 MPa, Fb/Fy=0.66

Selected Pile, W24X55, S = 114.0 in³/pile It is greater than Request Min. Section Modulus

Top Deflection = 0.23(in) based on E (ksi)= 29000.00, I (in⁴)/pile= 1350.0

UNITS: Width, Spacing, Diameter, Length, and Depth - ft; Force - kip; Moment - kip-ft
Friction, Bearing, and Pressure - ksf; Pres. Slope - kip/ft³; Deflection - in

Boulder City Bypass-Tangent Wall.15 feet High



PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

Based on pile spacing: 1.0 foot or meter

User Input Pile, W24X55 E (ksi)=29000.0, I (in⁴)/pile=1350.0

File: C:\Shoring8\BCB.Tangent Pile.15.sh8