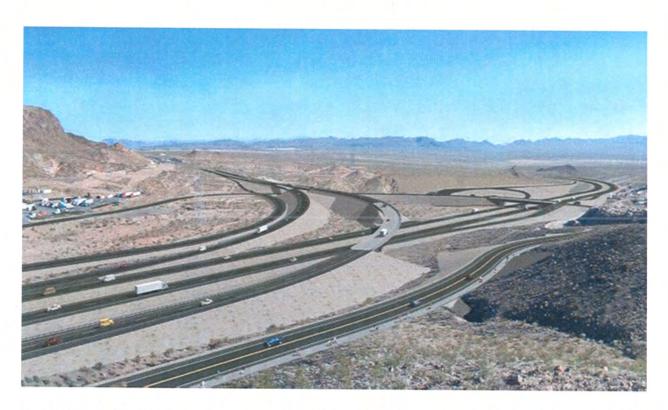
GEOTECHNICAL REPORT BOULDER CITY BYPASS PHASE 1

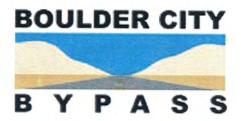
CLARK COUNTY, NEVADA

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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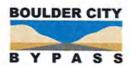




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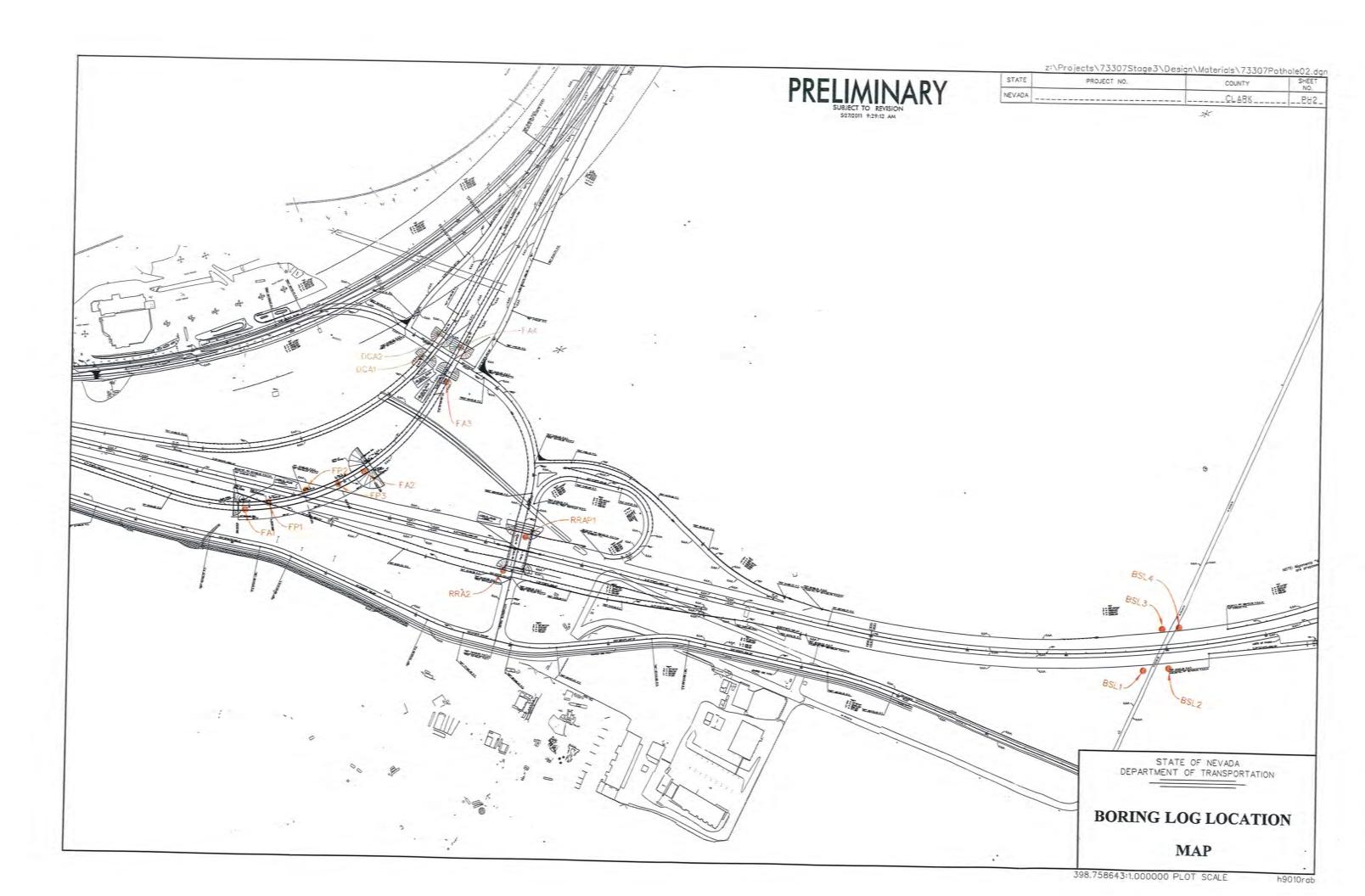


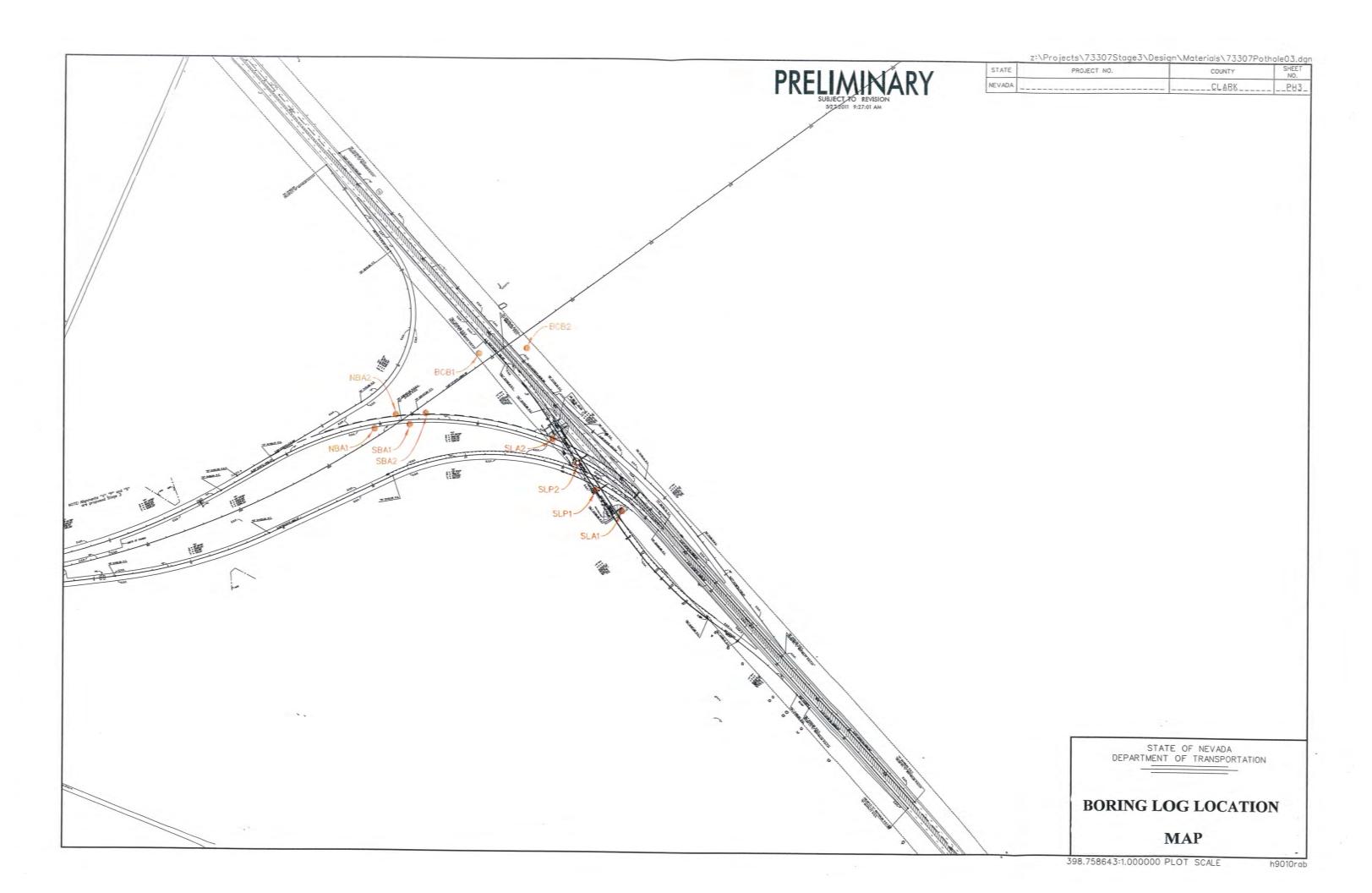


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APPENDIX A BORING LOGS

* *	PRELIMINARY	STATE	ects\73307Stage3\Design\ PROJECT NO.	COUNTY	SHEET NO.
	SUBJECT TO REVISION 616/2011 10:33:36 AM				
		*			
		× 1	· ·		/.
* *				E s	(
	RR8P1				
	RRC4 RRC2 RRC1 BRW1	\$ 100 May 100		- Jan 1	
	RRC3 RRBA1 BRW2 BRW3 BRW4	Co. See		The state of the s	
		A A	T-Sea	W	1
	*				S. Carrier
* * /:					
*					
-					
			STATE DEPARTMENT O	OF NEVADA F TRANSPORTATION	\dashv
			BORING LO		
				IAP	11





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	"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	
1-20/011	Abutment 2	"DC" 24+00, 29 ft. Left	DCA2	
	Abutillett 2	DC 24100, 29 it. Left	DCAZ	
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	
1-20/1	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	
			W	
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	
<u> </u>	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	
· armanaj eur		"P" 96+50, 12 ft. Right	RRC2	
		"P" 94+00, 30 ft. Right	RRC3	
		"P" 90+90, 3 ft. Left	RRC4	
Y 848810 08	Wast Old	(D) 214+55 52.0 T 0	DCD1	
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		GR	AVEL	COBBLES	BOULDERS
		FINE	MEDIUM	COARSE	FINE	COARSE	}	
.00	 2 mm	 ⊧200 ŧ	 #40 #:	l LO #	4 ¾ i	nch 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
СН	Inorganic clays of high plasticity, fat clays
ОН	Organic clays of medium to high plasticity
PT	Peat and other highly organic soils

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

1	GRANULAR SOIL	C	LAYEY SOIL
BLOWS/FT	DENSITY	BLOWS/FT	CONSISTENCY
N60		N60	
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
* SPT Neo-value	es are only reliable for sands	31 - 60	HARD
and should serv	ve only as estimates for other as gravels, silts and clays.	·	VERY HARD

blow counts (NCMS field) for (6< Ncms field <50) can be converted to NSPT field by: $(N_{CMS} field)(0.62) = N_{SPT} field$ SPT field blow counts (NSPT field) can be converted to N60 by: (NSPT field)(ETR/60) =N60 ETR = Energy Transfer Ratio Field blow counts from 140 lb hammer with 30 inch free fall

California Modified Sampler field

CD CH CM CU D DS E	CONSOLIDATED DRAINED CHEMICAL (CORROSIVENESS) COMPACTION CONSOLIDATED UNDRAINED DISPERSIVE SOILS DIRECT SHEAR EXPANSIVE SOIL SPECIFIC GRAVITY HYDROMETER HYDRO-COLLAPSE PERMEABILITY	O ORGANIC CONTENT OC CONSOLIDATION PI PLASTICITY INDEX RQD ROCK QUALITY DESIGNATION RV R-VALUE S SIEVE ANALYSIS SL SHRINKAGE LIMIT U UNCONFINED COMPRESSION UU UNCONSOLIDATED UNDRAINED UW UNIT WEIGHT W MOISTURE CONTENT	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 1-1.D.=2.421 inch
	, COLOR DESIGNATIONS ARE FROI RTS. EXAMPLE: (7.5 YR 5/3) BROWI	m the munsell soil/rock color	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

NEVADA	START DATE	8/8/06	EXPLORATION LOG		SHEET 1
DEPARTMENT OF TRANSPORTATION	END DATE	8/9/06 Boulder City Bypass - I	Phase1	STATION	"SL" 14+02 56 ft. Right
	JOB DESCRIPT LOCATION	I 515 @ Railroad Pass	i ilase i	OFFSET ENGINEER	Salazar
	BORING	SLA1		EQUIPMENT	Diedrich D-120, #1627 D. White
	E.A.# GROUND ELEV	73307-1 2009.10 (ft)	GROUNDWATER LEVEL DATE DEPTH ft ELEV. ft	OPERATOR DRILLING METHOD	6" H.S.A.
GEOTECHNICAL ENGINEERING	HAMMER DROP			BACKFILLED	Yes DATE 8/9/200

ELEV.	DEPTH		/IPLE	BLOW Co	DUNT Last	Percent	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
(ft)	(ft) 	NO.	TYPE	Increments	1 foot	Recov'd	2.672010	Group	SILTY GRAVEL/SILTY SAND (GM/SM) with rock fragments, small cobbles, dry. grayish orange pink (5 YR 7/2) (Alluvium).	Bridge I-2868, Abutment 1 Drill Rig unit #
2004.1	- 4.00 -5 5.50 6.00	Α	SPT	5 12 13	25	73	W, S		6.00	6 in. HSA. Auger was advanced to 4 feet.
	7.50 8.00	_	SPT	5 6 6	12	60	W, S, PI	SP SM	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) greyish orange pink to pale yellowish brown, dry (Alluvium). 8.00	
	9.50	С	SPT	13 23 36 10	59	67	W, S, PI		SILTY SAND WITH GRAVEL (SM) grayish orange pink (5 YR 7/2), (Alluvium).	
1999.1 -	11.00		SPT	16 14	30	57	W, S, PI	SM	42.00	
1994.1 -	13.99 - 14.99 - 15 16.00 16.50	-	SPT SPT	55,2	50/2" 100/3" 95/6"		W, S, PI	SM	SILTY SAND WITH GRAVEL (SM) visual description, grayish orange pink (5 YR 7/2), with gravel, cobbles, and rock fragments (Alluvium).	
1989.1 -		H	SPT	127/4.8"	127/4.8'		W, S, PI		20.00 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).	
1984.1 -	24.00 25 25.50		SPT	12 19 43	62	47		SM		
	29.00									

NEVADA	START DATE	8/8/06	EXPLORATION LOG		SHEET 2
DEPARTMENT OF TRANSPORTATION	END DATE	8/9/06		STATION	"SL" 14+02
TRANSPORTATION	JOB DESCRIPT	ION Boulder City Bypass - I	Phase1	_ OFFSET	56 ft. Right
	LOCATION	I 515 @ Railroad Pass		ENGINEER	Salazar
	BORING	SLA1		EQUIPMENT	Diedrich D-120, #1627
	E.A. #	73307-1	GROUNDWATER LEVEL	OPERATOR	D. White
	GROUND ELEV	2009.10 (ft)	DATE DEPTH ft ELEV. f	DRILLING METHOD	6" H.S.A.
GEOTECHNICAL ENGINEERING	HAMMER DROF	SYSTEM_Auto., ETR=65%		BACKFILLED	Yes DATE 8/9/200

pag page .	DE	SA	MPLE	BLOW Co 6 inch	OUNT				T	
ELEV. (ft)	DEPTH (ft)		TYPE	6 inch Increments	Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1974.1 -	34.00 34.50 - 35		SPT	72/6"	72/6"				SILTY SAND WITH GRAVEL (SM) visual description, grayish orange pink (5 YR 7/2), with gravel, cobbles, and rock fragments, granitic looking, dry.	
1969.1 -	- 39.99 40 		SPT	50/1.8"	50/1.8"			SM		
1964.1 -	1	M	SPT	50/1.9*	50/1.9*					
1959.1 -	ł .	N	SPI	100/3"	100/3**					Drill Rate: 5 fe in 3 minutes.
1954.1 -	- 54.92 - 55	0	SPT	50/1.7"	50/1.7"			SM		
	- - - - - - - - - - - - - - - - - - -									

NEVADA	START DATE	8/8/06	EXPL	ORATIO	N LOG			s	HEET 3 OF
DEPARTMENT OF TRANSPORTATION	END DATE	8/9/06				STATION	"SL" 14	+02	
	JOB DESCRIPT	ION Boulder City Bypass - I	Phase1			OFFSET	_56 ft. Ri	ight	
	LOCATION	l 515 @ Railroad Pass				ENGINEER	Salazar	<u> </u>	
	BORING	SLA1				EQUIPMENT	Diedrich	h D-120), #1627
	E.A. #	73307-1	GROU	INDWATER	RLEVEL	OPERATOR	D. Whit	<u>e</u>	
	GROUND ELEV	2009.10 (ft)	DATE	DEPTH ft	ELEV. ft	DRILLING METHOD	6" H.S.	Α.	
GEOTECHNICAL ENGINEERING	HAMMER DROP	P SYSTEM_Auto., ETR=65%				BACKFILLED	Yes	DATE.	8/9/2006

(ft)	(ft)	140.	TYPE	Increments	DUNT Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
				morements	1 1001	INCOV (·	Same as above.	
								SM		
	64:99	Q	SPT	100/1.3" -	100/1.3"				64.11	
1944.1	-65								End of Boring at 64.11 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.	
1939.1	-70 -								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.	
}	-									
	-									
1934.1	 75 -									
	-									
-	-									
1929.1	80									
	-									
	-									
1924.1	- 85									
1024.1	-									
	-									
	-									

NEVADA	START DATE	8/30/06	EXPLORATION LOG		SHEET 1
DEPARTMENT OF TRANSPORTATION	END DATE	8/31/06		STATION	"\$L" 15+65
TRANSPORTATION	JOB DESCRIPT	ION Boulder City Bypass - I	Phase1	OFFSET	0 ft.
	LOCATION	l 515 @ Railroad Pass		ENGINEER	Salazar
	BORING	SLP1		EQUIPMENT	Diedrich D-120, #1627
	E.A.#	73307-1	GROUNDWATER LEVEL	OPERATOR	D. White
	GROUND ELEV	2016.00 (ft)	DATE DEPTH ft ELEV. ft	DRILLING METHOD	6" H.S.A.
GEOTECHNICAL ENGINEERING		SYSTEM_Auto., ETR=65%		BACKFILLED	Yes DATE 8/31/20

GEOTECH ENGINE	INICAL ERING				OP SYS		uto., ETR=	65%	BACKFILLED Yes	ATE 8/31/200
ELEV. (ft)	DEPTH (ft)		MPLE TYPE	BLOW C 6 inch Increments	Last	Percent Recov'd		USCS Group	MATERIAL DESCRIPTION	REMARKS
2011.0	- 3.50 - 5.500 5.500	А	SPT	4 5 10	15	80	W, S, PI	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, feet.
	7.00 - 8.50		SPT	5 5 7	12	53	w	SM	7.00 SILTY SAND WITH GRAVEL(SM) light brown (5YR 6/4) to pale yellowish brown (10 YR 6/2), with rock fragments, small cobbles,	
2006.0	10.00 10.50	D	SPT	15 27 21 19 21	48	67	W, S, PI W, S, PI	SP	dry. 10.00 POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) moderate brown (5 YR 4/4), with rock fragments, small cobbles, dry.	
2001.0 -	12.00 - 13.50 - 15	E	SPT	25 27 49	49				WELL-GRADED SAND WITH SILT(SW-SM) moderate brown (5 YR 4/4), with rock fragments, small cobbles, dry.	
1996.0 -	- 18.89) 	SPT	-50/1.4"	50/1.4"		W, S	SW		
1991.0 -	23.59 - - - 25	G	SPT	50/2"	50/2*		W, S, PI			
		1	SPT	50/2.4"	50/2.4"		W, S, PI			

NEVADA	START DATE	8/30/06	EXPLO	RATIO	N LOG		S	HEET 2
DEPARTMENT OF TRANSPORTATION	END DATE	8/31/06				STATION	"SL" 15+65	
TRANSPORTATION	JOB DESCRIPT	ION Boulder City Bypass - I	Phase1			OFFSET	0 ft.	
	LOCATION	I 515 @ Railroad Pass				ENGINEER	Salazar	
	BORING	SLP1				EQUIPMENT	Diedrich D-12	0, #1627
	E.A. #	73307-1	GROUNE	OWATER	LEVEL	OPERATOR	D. White	
	GROUND ELEV	2016.00 (ft)	DATE D	EPTH ft	ELEV. ft	DRILLING METHOD	6" H.S.A.	
GEOTECHNICAL ENGINEERING		SYSTEM_Auto., ETR=65%				BACKFILLED	Yes DATE	8/31/20

GEOTECH ENGINE	_			ROUND EL			uto., ETR=	 65%	METHOD 6" H.S.A. BACKFILLED Yes DATE 8/31/2	2006
ENGINE ELEV.	DERTH		MPLE	BLOW C	OUNT					
(ft)	(ft)	NO.	TYPE	6 inch Increments	1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION REMARK	AS
1981.0 -	- - - - - - - - - 33:59		SPT	50/2***	50/2"				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?).	
1976.0 -	38.59 - -40	J	-SPT-	50/0.7" - -	50/0.7"					
1971.0 -	43.50 45	K	SPT	50/0.7"	50/0.7"			SW SM		
1966.0 -	48.50 48.88		SPT	100/4.5"	100/4.5'		W. S. Pl			
1961.0 -	53.50 - 55.00	м	SPT	48 93 57	150	73	W, S, PI			
	58.50 - 59.15		SPT	46 - 100/0.15	100/0.15	5	W, PI	-	60.00	

NEVADA	START DATE	8/30/06	EXPL	ORATIO	N LOG			SHEET 3 OF
DEPARTMENT OF TRANSPORTATION	END DATE	8/31/06				STATION	"SL" 15+65	5
	JOB DESCRIPT	ION Boulder City Bypass - I	Phase1			OFFSET	<u>0 ft.</u>	
	LOCATION	l 515 @ Railroad Pass				ENGINEER	Salazar	
	BORING	SLP1				EQUIPMENT	Diedrich D	-120, #1627
	E.A.#	73307-1	GROU	INDWATER	RLEVEL	OPERATOR	D. White	
	GROUND ELEV	0040.00 (ft)	DATE	DEPTH ft	ELEV. ft	DRILLING METHOD	6" H.S.A.	
GEOTECHNICAL ENGINEERING		SYSTEM_Auto., ETR=65%				BACKFILLED	Yes DA	ATE 8/31/2006

GEOTEC	HNICAL IEERING		H	AMMER DF	ROP SYS	STEM_A	uto., ETR=	65%	BACKFILLED Yes DATE 8/31/2006
ELEV.	DEPTH (ft)		MPLE TYPE	A : -	Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION REMARKS
1951.0	- - - - - - - - - - - - - - - - - - -	0	SPT	100/0.18				SW SM	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?).
1946.0	- 68.69 - 70	P	SPT	50/1.4***	50/1.4"				End of Boring at 68.62 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.
1941.0	- - - - -								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.
1936.0	80								
NV_DOT BCB MARK.GPJ NV_DOT.GDT 6/16/11 10.001 6/16/11	85								

NEVADA	START DATE	8/28/06 8/30/06	EXPL	ORATIO	N LOG
DEPARTMENT OF TRANSPORTATION	END DATE JOB DESCRIPT	TION Boulder City Bypass	- Phase1		
	LOCATION BORING	I 515 @ Railroad Pass SLP2			
	E.A. #	73307-1	GROU	UNDWATER	LEVEL
	GROUND ELEV	, 2022.20 (ft)	DATE	DEPTH ft	ELEV. ft
GEOTECHNICAL ENGINEERING	HAMMER DROI		6		

		SHEET 1 OF
	STATION	"SL" 17+29.8
	OFFSET	0 ft.
	ENGINEER	Salazar
	EQUIPMENT	Diedrich D-120, #1627
	OPERATOR	D. White
ft	DRILLING METHOD	6" H.S.A.
_	BACKFILLED	Yes _{DATE} 8/30/2006
_		

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

NEVADA	START DATE	8/28/06	EXPL	ORATIO	N LOG			SHEET 2
DEPARTMENT OF TRANSPORTATION	END DATE	8/30/06	Dhaa-4			STATION	"SL" 17+29	9.8
	JOB DESCRIPT		-hase1			OFFSET	0 ft.	
	LOCATION	I 515 @ Railroad Pass				ENGINEER	Salazar Diedrich D	-120, #1627
	BORING	SLP2				EQUIPMENT	D. White	-120, #1021
	E.A. #	73307-1	DATE	DEPTH ft		OPERATOR DRILLING		
	GROUND ELEV		DATE	DEPIRIT	ELEV. II	METHOD	6" H.S.A.	
GEOTECHNICAL ENGINEERING	HAMMER DRO			<u> </u>		BACKFILLED	Yes D	ATE <u>8/30/20</u>

ELEV.	DEPTH		MPLE	BLOW Co	OUNT	-	LADTECTO	LISCS	MATERIAL DECORIDATION DEMARKS
(ft)	(ft)	NO.	TYPE	increments	Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION REMARKS
	31.50	1	SPT	31 48 65	113		W, S, PI		POORLY GRADED SAND WITH SILT AND GRAYEL (SP-SM) pale brown (5 YR 5/2) to moderate yellowish brown, with rock fragments, angular, small cobbles.
1987.2 -	35.00 3535.35	J	SPT	50/4.2"	50/4.2"			SP SM	
1982.2 -	- - 4649.99 -	-К	SPT		50/2"				sample L: Visual Description: SILTY GRAVEL/SILTY SAND (GM/SM) with angular rock fragments (could be weathered bedrock?), highly fractured and altered.
1977.2 -	- 45.00 4545.36		SPT	_150/4.3" [^]	150/4.3"				
1972.2 -	50.00 50.50 50.50	M	SPT	115/6"	115/6"		W, S		
1967.2 -	55.00 55 56.50	N	SPT	100/3"	100/3"				
	_								

NEVADA	START DATE	8/28/06	EXPLO	RATIO	N LOG			SHEET 3 OF 3
DEPARTMENT OF TRANSPORTATION	END DATE JOB DESCRIPTI LOCATION BORING	8/30/06 ON Boulder City Bypass - F I 515 @ Railroad Pass SLP2	Phase1			STATION OFFSET ENGINEER EQUIPMENT		120, #1627
GEOTECHNICAL ENGINEERING	E.A. # GROUND ELEV HAMMER DROP	73307-1 2022.20 (ft) SYSTEM_ Auto., ETR=65%		NDWATER	ELEVEL	OPERATOR DRILLING METHOD BACKFILLED	D. White 6" H.S.A. Yes DA	TE 8/30/2006

ENGINE	INICAL ERING	 MPLE	MMER DE		1						
ELEV. (ft)	DEPTH (ft)			lact	Percent Recovid	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS		
957.2 -	-		100/3"					65.30			
1952.2 -	-							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.			
1947.2 -	-75 -										
1942.2 -	80										
1937.2 -	85										

NEVADA	START DATE	8/22/06	EXPLORATION LO	OG	SHEET 1
DEPARTMENT OF	END DATE	8/23/06		STATION	"SL" 19+02
TRANSPORTATION	JOB DESCRIPT	OFFSET	38 ft. Left		
	LOCATION	I 515 @ Railroad Pass		ENGINEER	Salazar
	BORING	SLA2	100	EQUIPMENT	Diedrich D-120, #1627
	E.A. #	73307-1	GROUNDWATER LEV	EL OPERATOR	D. White
	GROUND ELEV	0000 40 (8)		V. ft DRILLING METHOD	6" H.S.A.
GEOTECHNICAL ENGINEERING	HAMMER DROF	SYSTEM_Auto., ETR=65%		BACKFILLED	Yes DATE 8/23/20

(ft) (ft) NO. TYPE Increments 1 foot Recov'd	ELEV.	DEPTH		MPLE	BLOW C 6 inch	OUNT Last	Percent	LAB TESTS	USCS	MATERIAL DESCRIPTION	REMARKS
B SPT 18 5.00			NO.	TYPE		1 foot	Recov'd	LAD IESIS	USCS Group		KEIVIAKK
Similar cobbles, dry, (Alluvium). Switch Sw										WELL-GRADED SAND WITH SILT(SW-SM)	Deider Loop
Drill Rig ut 1627. 3.00 A SPT 12 29 67 W, S 4.50 B SPT 18 57 47 W, S, PI SM 8.00 C SPT 40 88 67 W, S 9.50 C SPT 40 88 67 W, S 11.00 11.00 D SPT 55 153 87 W 12.50 B SPT 18 65 153 87 W 12.50 SP SM 2013.1 15 18.00 D SPT 55 153 87 W 19.00 19.00 SPACE (LSP-SM) moderate brown (S YR 04/4) with rock fragments, small cobbles, dry, clutter brown (S YR 04/4) with rock fragments, small cobbles, dry, clutter brown (S YR 04/4) with rock fragments, small cobbles, dry, clutter brown (S YR 04/4) with rock fragments, small cobbles, dry, clutter brown (S YR 04/4) with rock fragments, small cobbles, dry, clutter brown (S YR 04/4) with rock fragments, small cobbles, dry, clutter brown (S YR 04/4) with rock fragments, small cobbles, dry, clutter brown (S YR 04/4) with rock fragments, small cobbles, dry, clutter brown (S YR 04/4) with rock fragments, small cobbles, dry, clutter brown (S YR 04/4) with rock fragments, small cobbles, dry, clutter brown (S YR 04/4) with rock fragments, small cobbles, dry, clutter brown (S YR 04/4) with rock fragments, small cobbles, dry, clutter brown (S YR 04/4) with rock fragments, small cobbles, dry, clutter brown (S YR 04/4) with rock fragments, small cobbles, dry, clutter brown (S YR 04/4) with rock fragments, small cobbles, dry, clutter brown (S YR 04/4) with rock fragments, small cobbles, dry, clutter brown (S YR 04/4) with rock fragments, small cobbles, dry, clutter brown (S YR 04/4) with rock fragments, small cobbles, dry, clutter brown (S YR 04/4) with rock fragments, small cobbles, dry, clutter brown (S YR 04/4) with rock fragments, small cobbles, dry, clutter brown (S YR 04/4) with rock fragments, small cobbles, dry, clutter brown (S YR 04/4) with rock fragments, small cobbles, dry, clutter brown (S YR 04/4) with rock fragments, small cobbles, dry, clutter brown (S YR 04/4) with rock fragments, small cobbles, dry, clutter brown (S YR 04/4) with rock fragments, small cobbles, dry, clutter brown (S YR 04/4) with rock fragments brown (S YR 04/4) with rock fragments brown (S		-								small cobbles, dry, (Alluvium).	Abutment 2
3.00 A SPT 12 29 67 W, S 4.50 5.00 10 17 29 67 W, S 1627. 2023.1											, , , , , , , , , , , , , , , , , , , ,
2023.1		_									Drill Rig unit
2023.1		3.00	<u></u>						SM		1627.
2023.1			_	ерт		20	67	w e			
2023.1		4.50	1	31 1		25	07	VV, S			Auger was
SW SM SW SM SM SW SM SM SW SM SM SW SM SM SW SM SW SM SM SW SM SW SM SW SM SW SM SM SW SM SM SW SW SM SW SW SM SW SM SW SW SM SW SW SM SW SM SW SM SW SW SM SW SM SW SW SM SW	2023.1 -								<u> </u>	4.80	 advanced to
SM Small cobbles, dry. (Alluvium). 6.50 ST 139 37 47 W. S. Fl SM Small cobbles, dry. (Alluvium).	2023.1]	_						sw		feet.
POORLY RAPED 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). 2018.1				SPT		57	47	W, S, PI	SM	emall cobbles day (Alluvium)	
8.00		6.50	<u> </u>		39				 	POORLY GRADED SAND WITH SILT AND	- 🛉
2018.1 - 10		-							1	GRAVEL (SP-SM) moderate brown (5 YR	
2018.1 -10		8.00	<u> </u>							4/4), with rock fragments, small cobbles, dry.	
2018.1				CDT		00	0.7			7/2) below 16 feet (Alluvium)	
2018.1 — 10 11.00 11.00 D SPT 55 153 87 W 12.50 13.00 L 14.40 E SPT 88 130/4.8" W, S, Pl 130/4 18.00 G SPT 39 118 80 W, S 19.50 2008.1		9.50	1	271	l	88	0/	VV, S			
2013.1 - 15	0040.4		-		40				t		
2013.1 D SPT 35 153 87 W 12.50 13.00 13.00 14.40 E SPT 88 130/4.8" W, S, PI 16.00 18.00 2008.1 26 19.50 79 2008.1 27 2008.1 26 20.90 H SPT 63 101/4.8" 101/4.8" 2003.1 26.10 I SPT 42 50/1.2" W, S, PI 2003.1 26.10 I SPT 42 50/1.2" W, S, PI	2018.1 -		İ								
D SPT 55 153 87 W 13.00		11.00)		- 24				-		
2013.1 - 15				SPT	1	153	87	W			:
2013.1 — 15 ————————————————————————————————		12.50		35.1		155	"	**			
2013.1 - 15						1]		
2013.1 — 15 — 18.98 F SPT 100/3.4" W, PI — 18.00 — 26 — 39 — 118 — 80 W, S — SM — 20.00 — 20.00 — 20.90 H SPT 63 — 101/4.8" — 101/4.8" — 20.90 H SPT 63 — 101/4.8" — 20.90 H SPT 29 — 42 50/1.2" W, S, PI			_	0.00		100/4 0		W 0 D			
2013.1 - 15		14.40		SPI		130/4.8"		W, S, PI			
2008.1 26.10					130/4.0						
2008.1 26 SPT 39 118 80 W, S 19.50 79 2008.1 26 SPT 39 118 80 W, S 2009 H SPT 63 101/4.8" 2003.1 25 00	2013.1 -			į							
2008.1 26 SPT 39 118 80 W, S 19.50 79 2008.1 26 SPT 39 118 80 W, S 2009 H SPT 63 101/4.8" 2003.1 25 00		16.00	-	евт	100/2 4"	100/2 4"		VAT DI			
2008.1				JAP I	100/3.4	100/.5.4		VV, F1			
2008.1		-									
2008.1		18.00)						S D		
2008.1								l			
2008.1 20.00		10.50		SPI		118	80	W, S			
20.90 H SPT 63 101/4.8" 20.90 H SPT 101/4.8" 20.90 I SPT 29 42 50/1.2" W, S, PI	0000 1	20.00	 	 	13	 	<u> </u>		1		
2003.1 25 101/4.8" 29	2008.1 -		1 11	SPT	63	101/4 8'			1		
20 I SPT 29 50/1.2" W, S, PI W, S, PI		20.90	<u>, , , , , , , , , , , , , , , , , , , </u>	 • • •	101/4.8"	0,74.0	-	-	-		
20 I SPT 29 50/1.2" W, S, PI W, S, PI											
20 I SPT 29 50/1.2" W, S, PI W, S, PI		-									
25 I SPT 29 50/1.2" W, S, PI		L									
20 I SPT 29 50/1.2" W, S, PI W, S, PI											
20 I SPT 29 50/1.2" W, S, PI W, S, PI		+									
20 I SPT 29 50/1.2" W, S, PI W, S, PI		25.00)				1				
26.10 1 SP1 42 SU/1.2 W, S, PI	2003.1 -	25	١.	0.55	29	F0/1 0"		W 0 5:	1		
		26.10		SPT	42	50/1.2"		W, S, PI			
					50/1.2"						
		-									
		T .									
		L									
30.00							1				

			EYDI (DRATIO	NIOG			
NEVADA	START DATE	8/22/06	LAFE		IN EOO			SHEET 2
DEPARTMENT OF	END DATE	8/23/06				STATION	"SL" 19+02	2
TRANSPORTATION	JOB DESCRIPT	ION Boulder City Bypass -	Phase1			OFFSET	38 ft. Left	
	LOCATION	I 515 @ Railroad Pass				ENGINEER	Salazar	
	BORING	SLA2				EQUIPMENT	Diedrich D	-120, #1627
	E.A. #	73307-1	GROU	NDWATER	RLEVEL	OPERATOR	D. White	
	GROUND ELEV	0000 40 (5)		DEPTH ft		DRILLING METHOD	6" H.S.A.	
GEOTECHNICAL ENGINEERING	HAMMER DROP					BACKFILLED	Yes DA	ATE 8/23/20

GEOTEC	INICAL			ROUND EL				65%	METHOD 6 H.S.A. BACKFILLED Yes DATE 8/23/20
GEOTECI ENGINI	EERING V					STEM_^	uto., ETR=	00 /0	BACKFILLED Yes DATE 8/23/20
ELEV. (ft)	DEPTH (ft)		MPLE TYPE	BLOW C 6 inch Increments	Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION REMARKS
(11)	30.50		SPT	74/6"	74/6"	Recov u			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).
	-]						
	35.00								
1993.1	35.00 35.53	K	SPT	60	100/0.4		W, S	1	
				100/0.4"			, =		
	-								
	-								
1988.1	40.00			31				-	
	40.90	L	SPT	100/4.8"	00/4.8		W, PI		
	-								
	Γ								
	-								
1983.1	45.00		<u> </u>					SP	
1303.1	45	М	SPT	16 38	128		W, S, PI	SM	
	46.50		5P1	90	128		W, S, PI		
					<u> </u>			1	
	<u> </u>								
	-						ļ		
	5658.99 5658.29								
1978.1	5050:25	N	SPI	100/3"	100/3"			7	
	-								
	-								
	L								
	== 0.5								
1973.1	555.00 555.28	0	SPI	100/3.3"	100/3.3	_		1	
	-								
	_								
							}		
			1						
									60.00

NV_DOT BCB MARK GPJ NV_DOT GDT 6/16/11

NEVANA	START DATE	8/22/06	EXPLORATION LOG		SHEET 3 (
	END DATE	8/23/06		STATION	"SL" 19+02
TRANSPORTATION		Boulder City Bypass - F	Phase1	OFFSET	38 ft. Left
				ENGINEER	Salazar
				EQUIPMENT	Diedrich D-120, #1627
			GROUNDWATER LEVEL	OPERATOR	D. White
		2020 40 (#)	DATE DEPTH ft ELEV. ft	DRILLING	6" H.S.A.
	-			***	0/22/20
GEOTECHNICAL ENGINEERING	HAMMER DRO	SYSTEM_AUTO., ETR=65%		BACKFILLED	Yes DATE
	GEOTECHNICAL	DEPARTMENT OF TRANSPORTATION JOB DESCRIPT LOCATION BORING E.A. # GROUND ELEV HAMMED DOOR	END DATE Solution Boulder City Bypass - Final Properties	END DATE Sold Sold	START DATE 8/22/06 END DATE 8/23/06 STATION JOB DESCRIPTION Boulder City Bypass - Phase1 LOCATION 1515 @ Railroad Pass BORING SLA2 E.A. # 73307-1 GROUND ELEV 2028.10 (ft) GROUND ELEV 2028.10 (ft) BACKFILLED BACKFILLED

SHEET 3 OF 3

			GI	ROUND EL	EV_ZU	20.10 (1	<u>'</u>		METHOD Yes DATE 8/23/2006
GEOTECH ENGIN	HNICAL EERING		HA			STEM_A	uto., ETR=	65%	BACKFILLED Yes DATE 6/23/2006
ELEV. (ft)	DEPTH (ft)		MPLE TYPE	BLOW C 6 inch Increments	OUNT Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION REMARKS
(,								SP SM	61.00
	-								End of Boring at 61 feet. Backfilled with drill cuttings.
	-								Groundwater was not encountered.
	-					ļ			Note: Partial increment blow counts may be
	L								due to the sampler shoe being jammed by a gravel piece or the sampler could be hitting a
1963.1	65								caliche layer or cobble.
1000.1									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.
	-								
1958.1	 7 0								
	-								
	-								
1953.1	T /5								
	-								
	-	8							
	}								
1948.1	80								
	-								
1943.1	+85								
	-								
	-								
	-								
	-								

NEVADA	START DATE	11/15/06	EXPLORATION LOG		SHEET 1 C
DEPARTMENT OF	END DATE	11/15/06		STATION	"RR" 108+18
TRANSPORTATION	I JOB DESCRIPT	ION Boulder City Bypass - I	Phase1	- OFFSET	24 ft. Left
	LOCATION	l 515 @ Railroad Pass		ENGINEER	Salazar
	BORING	RRAP1		EQUIPMENT	Diedrich D-120, # 1082
		73307-1	GROUNDWATER LEVEL	OPERATOR	D. White
	E.A. # GROUND ELEV		DATE DEPTH ft ELEV. ft	DRILLING	6" H.S.A.
GEOTECHNICAL				METHOD	Vaa 11/15/2
ENGINEERING	HAMMER DRO	SYSTEM Auto., ETR=79%		BACKFILLED	DATE

GEOTECH	INICAL			ROUND EL			uto., ETR=	79%				METHOD	Yes	DATE 11/15/20
GEOTECH ENGINE	EERING \	l cai	HA VPLE I			SIEM		1070						
ELEV. (ft)	DEPTH (ft)	NO.	TVDE	BLOW C 6 inch Increments	Last	Percent Recovid	LAB TESTS	USCS Group		MAT	ERIAL D	ESCRIPTIO	N	REMARKS
2185.7 -	1.50 2.50 3.99 4.50 4.87	A B	SPT SPT	25 140 50/2.6* 50/4.4*	140 50/2.6"		W, S	GW GM		yellowish I WEATHE (5 YR 3/4) YR 5/4), A	ERED BEDI and model andesite/Rh weathered v	TY SAND (GM /R 6/2), dry. ROCK, modera rate yellowish b yoite, highly vith some calicl	te brown rown (10	Bridge I-2869: Borehole is between Abutment 1 an Center Pier. Bedrock outcreat the Center Pier; no borehole at Ceneter Pier location.
2180.7 -	9.59	Đ	SPT	- 50/1.3" -	50/1.3"				9.50	Highly frac drilling.	ctured bedr	ock, iron-staine	d, smooth	Drill Rig unit # 1082. Auger was advanced to 1 feet.
2175.7 -	14. <u>56</u>) E	SPT	50/1"	50/1"				14.50	Same as a YR 5/4).	above, but	mod. yellowish	brown (10	
2170.7 -	19.56 20	F	SPT	50/1"	50/1"		W, Pl	=						
2165.7 -	- 34.69 25 	G G	SPT	50/1.4"	50/1.4"		W, S		24.50		oking, high	mod. yellowish y fractured, slid		
	29.56) <u>+</u>	8PT	- 50/1"	50/1"		W, S, Pl	_	29.50	Highly fra	ctured/wea	thered hydro-th	ermally	



START DATE 11/15

11/15/06 11/15/06

JOB DESCRIPTION Boulder City Bypass - Phase1

LOCATION I 515 @ Railroad Pass

BORING RRAP1

END DATE

E.A. #

73307-1

GROUND ELEV_ 2190.70 (ft)
HAMMER DROP SYSTEM Auto., ETR=79%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

ENGINEER

EQUIPMENT .

OPERATOR

"RR" 108+18 24 ft. Left

Salazar

Diedrich D-120, # 1082

SHEET 2 OF 3

D. White

DRILLING 6" H.S.A.

BACKFILLED Yes DATE 11/15/2006

GEOTECI ENGINI	DTECHNICAL HAMMER DROP SYSTEM Auto., ETR=								BACKFILLED Yes DATE 11/15/2006
ELEV. (ft)	DEPTH (ft)		MPLE TYPE	BLOW Co 6 inch Increments	OUNT Last	Percent	LAB TESTS	USCS Group	MATERIAL DESCRIPTION REMARKS
(11)	- (11)			Increments	1 1001	Recovid			altered bedrock, yellowish gray (5 Y 5/2), greyish pink (5 R 8/2). Sample H: SC-SM.
2155.7 -	34.50 - 35	-1-	SPT	50/1"	-50/1"-				34.50 WEATHERED BEDROCK, less weathered bedrock, granitic looking , dry. Sample J: SC-SM
2150.7	- 39.58	- J	SPT	- 50/1" -	-50/1"-		W, S, Pl		Sample K: SC-SM
2145.7	44.58 - 45	K	SPT	50/1"	-50/1"		W, S, Pl		
2140.7	- - 49.59 - 50	L	SPT	50/2"	50/2**				
2135.7 -	54.5 6	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.



START DATE ____11/15/06

11/15/06

JOB DESCRIPTION Boulder City Bypass - Phase1

LOCATION 1515 @ Railroad Pass

BORING RRAP1

E.A. # 73307-1 GROUND ELEV 2190.70 (ft)

HAMMER DROP SYSTEM Auto., ETR=79%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION "RR" 108+18

TION 24 ft. Left

OFFSET 24 π. Ler ENGINEER Salazar

EQUIPMENT Diedrich D-120, # 1082

SHEET 3 OF 3

OPERATOR D. White
DRILLING
METHOD 6" H.S.A.

BACKFILLED Yes DATE 11/15/2006

ELEV.	DEPTH	IPLE TYPE	BLOW CO 6 inch Increments	DUNT Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
(ft)	(ft)		Increments	1 foot	Recov'd		Oldap	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.	
2125.7	65								
2120.7									
2115.7	- - - - -								
2110.7	80								
NV_DOT_BCB_MARK.GPJ_NV_DOT.GDT_6/16/11 V_DOT_BCB_MARK.GPJ_VV_DOT.GDT_6/16/11	85								



START DATE	1/8/07	

END DATE JOB DESCRIPTION Boulder City Bypass - Phase1

I 515 @ Railroad Pass LOCATION

1/8/07

RRA2 BORING 73307-1 E.A. #

GROUND ELEV_2209.30 (ft)

HAMMER DROP SYSTEM_Auto., ETR=65%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

"RR" 110+09 43 ft. Right

Bafghi **ENGINEER**

Diedrich D-120, #1627 EQUIPMENT _

SHEET 1 OF 3

D. White **OPERATOR**

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 1/8/2007

	EERING N		//PLE	BLOW C					DAONITEED	
ELEV. (ft)	DEPTH (ft)	NO.			Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
2204.3 -	1.00 - 2.50 3.00 - 4.50 5 5.00 - 6.50	В	SPT SPT SPT	6 10 6 3 5 4 7 6 4 2 2	16 9 10	33 33 33		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 SPTsampler.	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.
2199.3 -	9.50 10.00 10.00	E	SPT	9	47	53				
2194.3 -	14.50	F	SPT	50	86	87			14.00 SILTY SAND WITH GRAVEL(SM) weathered and decomposed igneous rock (Rhyolite/Andesite), with rock fragments, light gray.	
2189.3 -	20.00	Н	SPT	14 13 21	34	80				
2184.3 -	25.00 25 26.50	1	SPT	14 24 42	66	67		SM		
Į	30.00									

NEVADA	START DATE	1/8/07	EXPLORATION LOG		SHEET 2
DEPARTMENT OF TRANSPORTATION	END DATE	1/8/07 Boulder City Bypass - I	Dhasa1	STATION	"RR" 110+09
	JOB DESCRIPT LOCATION	I 515 @ Railroad Pass	riidse i	OFFSET ENGINEER	43 ft. Right Bafghi
	BORING	RRA2		EQUIPMENT	Diedrich D-120, #1627 D. White
	E.A. # GROUND ELEV	73307-1 2209.30 (ft)	GROUNDWATER LEVEL DATE DEPTH ft ELEV. ft	OPERATOR DRILLING METHOD	6" H.S.A.
GEOTECHNICAL ENGINEERING	HAMMER DROP			BACKFILLED	Yes DATE 1/8/200

GEOTECH	NICAL		■ GF	ROUND EL	.EV	Δ	ປ uto., ETR=	 65%	METHOD 6"H.S.A. BACKFILLED Yes DATE 1/8/2007
GEOTECH ENGINE		I GAI	H <i>F</i> MPLE	BLOW C		S1EM	dto., 2110	T	BACKFILLED Yes DATE 1/8/2007
ELEV. (ft)	DEPTH (ft)		TYPE	6 inch Increments	Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION REMARKS
2174.3 -	30.50 - - - - - - - - - - - - - - - - - - -		SPT	66/6" 50/2.5*	50/2.5**	33			35.00 WEATHERED BEDROCK weathered and decomposed igneous rock (Rhyolite/Andesite), with rock fragments, light brown. Drilling Operation resumed: 01-09-07.
2169.3 -	- <u>46</u> 48.99	-	SPT	50/1.5"	50/1.5"				K: The auger cuttings are broken rock fragments. Smooth driling from 40 feet to 60 feet. Weather: sunny low = 37, high = 66 degrees. 100 psi downpressure from 35 feet down.
2164.3	- 43 45:98 -	M	SPT	-50/1 .9" -	50/1.9"				
2159.3 -	- 	N	SPT	 50/1.4"	50/1.4"				
2154.3 -	- - _{5\$} 5.98 -	0	SPT	- 50/2,1*-	50/2.1"				
	- 60.00								60.00

NEVADA	START DATE	1/8/07	EXPL	ORATIO	N LOG		SHEET 3 OI	F 3
DEPARTMENT OF TRANSPORTATION GEOTECHNICAL	END DATE JOB DESCRIPTI LOCATION BORING E.A. # GROUND ELEV	I 515 @ Railroad Pass RRA2 73307-1		UNDWATER		STATION OFFSET ENGINEER EQUIPMENT OPERATOR DRILLING METHOD BACKFILLED	"RR" 110+09 43 ft. Right Bafghi Diedrich D-120, #1627 D. White 6" H.S.A. Yes DATE 1/8/2007	
ENGINEERING V	III WANTER DIVOL	O I O I E IVI				D/ COM TELED		

ELEV. (ft)	DEPTH (ft)		MPLE TYPE	BLOW CO	last	Percent	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
(ii)	60.17	_	SPT		1 100t 50/2"	Recov'd			End of Boring at 60.0 feet. Borehole was 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.	
2144.3 -	-65								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.	
2139.3 -	70									
	-									
2134.3 -	75									
	-									
2129.3 ·	80									
	- - -									
2124.3	85									
	-									



START DATE	10/26/06
END DATE	10/26/06

END DATE

EXPLORATION LOG

JOB DESCRIPTION Boulder City Bypass - Phase1

I 515 @ Railroad Pass LOCATION

DCA1 **BORING** 73307-1 E.A. #

GROUND ELEV. 2240.40 (ft) HAMMER DROP SYSTEM Auto., ETR = 65%

Salazar **ENGINEER** Diedrich, #1627, #1082 **EQUIPMENT** D. White **OPERATOR GROUNDWATER LEVEL** DATE DEPTH ft ELEV. ft

DRILLING METHOD BACKFILLED Yes

STATION

OFFSET

6" H.S.A. _ DATE __10/26/2006

"DC" 22+47

25 ft. Left

ELEV. (ft)	DEPTH (ft)		MPLE TYPE	BLOW Co 6 inch Increments	Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
()	-			HOOHOHO	11000	TREESON U		SP	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-2870l Abutment 1 Drill Rig unit #
	3.00 - 4.50	A	SPT	7 13 26	39	67	W, S, PI	SC		ETR=65% was used from depths 0'-13.0
2235.4 -	5.00	В	SPT	14 24 34	58	80	W, S, PI	SC SM	5.00 SILTY, CLAYEY SAND WITH GRAVEL(SC-SM), light brown (5 Y 6/4), with cobbles and small boulders, some rock 7.00 fragments, dry.	Auger was advanced to 3 feet.
	8.00		CDT	5	25	70	W C DI	sc	CLAYEY SAND WITH GRAVEL(SC). yellowish grayish light brown (5 YR 5/6), highly weathered and altered bedrock (Rhyolite), with rock fragments, dry.	
2230.4 -	9.50 —10	C	SPT	8 17	25	73	W, S, PI		10.00	
·	11.09	-D -	SPT	-50/0.6"-	50/0.6"				WEATHERED BEDROCK, grayish yellow (5 Y 8/4), dry. Auger refusal at 14.5 feet.	
	13.04	E	SPT	50/0.5"	50/0.5"				Coring: 14 to 17.5 feet. Hydro-thermally altered bedrock (Rhyolite) with gypsum intrusions.	Drill Rig unit #
2225.4 -	- 14.50 15								Coring: 14 to 17.5 feet: coring rate = 3.5 min./ft. Coring: 17.4 to 20.3 feet: coring rate = 4.5	1082 with ETI 79% was use from depths 13.04'-20.3'.
	- 17.00	F1	CORE			97	RQD, U, G		min./ft. Unconfined Compressive Strength (psi) = 4408,	Resumed: 11/14/06.
	-	F2	CORE						5013, 5273, 6404. Unit Weight (pcf) = 158.5, 153.9. RQD = 90.7%.	
2220.4 -	- 20.00								20.30	
	-								End of Boring at 20.3 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.	
2215.4	-25								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.	
	-								(,	



10/25/06 START DATE 10/25/06

END DATE

LOCATION

BORING

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION

"DC" 24+00 29 ft. Left

-	-	-	•	-	

OFFSET ENGINEER

DRILLING METHOD

Salazar Diedrich D-120, #1627

EQUIPMENT **OPERATOR**

D. White 6" H.S.A.

E.A. # 2247.20 (ft) GROUND ELEV_

DCA2

73307-1

FTR=65% Auto

JOB DESCRIPTION Boulder City Bypass - Phase1

I 515 @ Railroad Pass

Yes

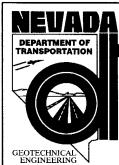
10/25/2006

GEOTECI ENGINI	HNICAL EERING \		HA	AMMER DR	OP SYS	STEM_A	uto., ETR=	65%	BACKFILLED Yes DA	ATE
ELEV.	DEPTH		MPLE TYPE	BLOW C	Last	Percent	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
(ft)	(ft) - - 3.00			Increments	1 foot	Recov'd		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	Α	SPT	10 15 21	36	67	W, S, PI		5.00	Auger was advanced to 3
2242.2	5 5.20	В	SPT	16 15 37	52	60	W, S, PI	SC SM	SILTY, CLAYEY SAND WITH GRAVEL(SC) light brown (5 Y 6/4), with cobbles and small boulders, some rock fragments, dry (Alluvium).	feet
			CORE			40			7.20 WEATHERED BEDROCK dark reddish brown (10 R 3/4), Andesite/Rhyoite, highly fractured, dry.	
2237.2	10	C2	CORE			5			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.	
	11.55		CORE			15			11.50 12.20 Coring C3: at 11.5 feet: coring rate = 3.0	
	-	D1	CORE			17			min./ft., 0.65 ft. run, recovered 0.1 feet. Coring D1: at 12.11 feet: coring rate = 3.0 min./ft., 0.65 ft. run, recovered 0.5 feet.	
2232.2	15 ₁ 5.30	D2	CORE			36			16.70	
2227.2	- - 20								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.	
25 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	25									

NEVADA	START DATE	10/18/06		EXPL	ORATIO	N LOG	
DEPARTMENT OF TRANSPORTATION	END DATE	10/18/06					STATION _
	JOB DESCRIPTI	ON Boulder City Bypa	ss - F	Phase1			OFFSET _
	LOCATION .	I 515 @ Railroad Pass					ENGINEER _
	BORING .	FA3					EQUIPMENT _
	E.A. #	73307-1		GROU	INDWATER	RLEVEL	OPERATOR _
	GROUND ELEV.	2229.50 (ft)		DATE	DEPTH ft	ELEV. ft	DRILLING METHOD _
GEOTECHNICAL ENGINEERING		SYSTEM_Auto., ETR=6	5%				BACKFILLED _

	SHEET 1 OF 1
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

ELEV. (ft)	DEPTH (ft)		MPLE TYPE	BLOW C 6 inch Increments	Last	Percent Recov'd	LAB TESTS	USCS Group		MATERIAL DESCRIPTION	REMARKS
(11)	-			morements	11000	Recov u		sw		WELL- GRADED SAND WITH SILT AND GRAVEL (SW-SM) light brown, dry, with cobbles and small boulders, some rock fragments (Alluvium).	Bridge I-2870S Abutment 1 Drill Rig unit #
	3.00	Α	SPT	11 11	27	87		SM			1627.
2224.5 -	4.50 5.00		01 1	16	21	0,			5.00		Auger was advanced to 3 feet.
	6.50	В	SPT	23 25 38	63	73		SM		SILTY SAND WITH GRAVEL(SM) grayish red (10 R 4/2), weathered/fractured and hydro-thermally altered bedrock (Rhyolite/Andesite).	leet.
	8.00			39				Sivi			
2219.5 -	9.00 1018:98		SPT	85 50/0.18	85 50/0.18					WEATHERED BEDROCK yellowish gray , weathered/fractured and hydro-thermally altered bedrock (Rhyolite/Andesite).	
	_									,	
	12.50 13.35 13.65	F4	CORE			74			12.50	BEDROCK Rhyolite/Granite, yellowish gray, slightly weathered-hydrothermaly altered.	
2214.5 -	- 15									recovery = 95%, RQD = 81%. RQD = 81%. Unit Weight (pcf) = 150.8, 154.4	
	-	E2	CORE			95					
	18.65								18.65	Find of Davis as at 40.05	
2209.5 -	20									End of Boring at 18.65. Borehole was 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.	
2204.5 -	25 									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 10/16/06 END DATE 10/16/06

/06 EXPLORATION LOG

JOB DESCRIPTION Boulder City Bypass - Phase1

LOCATION I 515 @ Railroad Pass

FA4

E.A. # 73307-1 GROUND ELEV 2239.80 (ft)

BORING

HAMMER DROP SYSTEM Auto., ETR=65%

STATIO

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION
OFFSET
ENGINEER

ENGINEER -EQUIPMENT -OPERATOR --

1.0 ft. Left
Salazar
Diedrich D-120, #1627
D. White

SHEET 1 OF 2

DRILLING 6" H.S.A.

BACKFILLED Yes DATE 10/16/2006

"F" 29+14.5

GEOTECH ENGINE	ERING		HA	MMER DF	ROP SYS	STEM_A	uto., ETR=	65%	BACKFILLED Yes D	ATE
ELEV. (ft)	DEPTH (ft)		MPLE TYPE	BLOW C 6 inch Increments	Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	2.00	A	SPT	19 72 79	151	86	W, S, PI	SM	SILTY SAND WITH GRAVEL (SM) light brown, with rock fragments, small cobbles, dry (Alluvium).	Bridge I-2870S, Abutment 2 Drill Rig unit # 1627.
	4.43	В	SPT	26 50/5.2"	50/5.2"	67	W, S, PI		5.00	6 in. HSA.
2234.8 -	5 6.50	C1 C2	SPT	17 33 41	74		W, S, PI	GM	SILTY GRAVEL WITH SAND (GM) with rock fragments, small cobbles, dry (Alluvium). 6.50	Auger was advanced to 2 feet.
	8.00	D	SPT	15 30 37	67	93	W, S, PI		SILTY, CLAYEY SAND WITH GRAVEL(SC) light brown , with rock fragments, dry (Alluvium).	Started: 10:55 am. Weather: Sunny, 65
	9.50	E	SPT	57 61 43	104	100	W, S, PI	sc		degrees.
2229.8 -	1010.25 11.00	F1 F2	SPT	31 50/3"	50/3"		W, PI			Sand Catcher was used in all
	12.50 12.03	G	SPT	23 30 98 50/1.5	128	87	W, S, PI		12.50	SPT.
	14.00		SPT	50/0.5"	50/0.5"				WEATHERED BEDROCK , grayish orange (10 YR 7/4), weathered and hydro-thermally altered bedrock (Rhyolite), with rock fragments.	
2224.8 -	15 ^{15.09}	-	SPT	50/0.8 "	50/0.8"			=	USCS: SILTY SAND WITH GRAVEL(SM).	
	_		·							
2219.8 -	2 ₂ 20.09	K	SPT	50/0.8"	50/0.8"		W, Pl	=	20.00 Same as above, but the color changes to v.	
	_								pale orange (10 YR 8/2), dry with granite looking rock fragments.	
	_									
2214.8 -	2 ∮ 9.90	-	SPT	50/1.2 "	50/1.2"		W , S			
	-									
	30.00									

NEVADA	START DATE	10/16/06	EXPL	ORATIO	N LOG			SHEET 2 OF 2
DEPARTMENT OF TRANSPORTATION	END DATE	10/16/06				STATION .	"F" 29+14.5	
	JOB DESCRIPTI	ION Boulder City Bypass - F	Phase1			OFFSET .	1.0 ft. Left	
	LOCATION	l 515 @ Railroad Pass				ENGINEER .	Salazar	
	BORING	FA4				EQUIPMENT .	Diedrich D-1	20, #1627
	E.A. #	73307-1	GROU	NDWATER	RLEVEL	OPERATOR	D. White	
	GROUND ELEV	2239.80 (ft)	DATE	DEPTH ft	ELEV. ft	DRILLING METHOD	6" H.S.A.	
GEOTECHNICAL ENGINEERING	HAMMER DROP	SYSTEM Auto., ETR=65%				BACKFILLED	Yes DATI	10/16/2006

ELEV.	DEPTH		MPLE	BLOW C 6 inch	Loct	Percent	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
(ft)	(ft) 30.12	M M	SPT	Increments 50/1.4	1 foot 50/1.4"	Recov'd		Group	WEATHERED BEDROCK, highly fractured Rhyolite/Granite, light brown (5 YR 5/6), hydro-thermaly altered.	
2204.8 -	35.00 	N	SPT	- 50/0.8" -	50/0.8"					
	39.00								38.25 Very hard, highly fractured, mottled pale red YR 6/2) and white, hydro-thermally altered bedrock (Rhyolite).	(5
2199.8 -	- 40 40.60 - 41:48		CORE						RQD = 0. 41.40	
2194.8 -	- - - - - -								End of Boring at 41.4 feet. Borehole was 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 gra (breccia/caliche), cobbles or boulders.	1
2189.8 -	- - -									
2184.8 -	- - - - -									

NEVADA	START DATE	9/11/06	EXPL	ORATIO	N LOG			SHEET 1 OF
DEPARTMENT OF	END DATE	9/13/06				STATION	"F" 14+	-80
TRANSPORTATION	JOB DESCRIPT	ION Boulder City Bypass - I	Phase1			OFFSET	20 ft. R	light
	LOCATION	l 515 @ Railroad Pass				ENGINEER	Salaza	r
	BORING	FA1		EQUIPMENT	Diedrich D-120, #1627			
	E.A. #	73307-1	GROL	NDWATER	RLEVEL	OPERATOR	D. Whi	te
	GROUND ELEV	2252.00 (#)	DATE	DEPTH ft	ELEV. ft	DRILLING METHOD	6" H.S.	Α.
GEOTECHNICAL ENGINEERING		SYSTEM Auto., ETR=65%				BACKFILLED	Yes	_ DATE9/13/200

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GEOTECH ENGINE	INICAL EERING		НА	MMER DE	ROP SYS	STEM_A	uto., ETR=	65%	BACKFILLED Yes D	ATE 9/13/2006
ELEV.	DEPTH (ft)		/PLE TYPE	BLOW C 6 inch Increments	Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
(ii)	3.50			Increments	1 1001	Recov d		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.
2248.8 -	5.00	А	SPT	27 33 23	56	73	W, H, PI		5.50	Auger was advanced to 3.5 feet.
	6.00 - 7.20	В	SPT	30 69 50/0.2'	50/0.2'	92	W, S, PI	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	
2243.8	8.50 8.90	C	SPT	50/0.4'	50/0.4		W.S		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.	
	11.66	D	SPT	50/0.1'	50/0.1		W, Pt			
2238.8	13.56 13.67 	F1	CORE	50/0.17	50/0,17	53				
	16.50 16.90	F2	CORE			40				
	18.50	F3	CORE			100	W, PI	= - -		
2233.8	19.80 20 21.0 0	G2	CORE			100				RQD of all cores = 0
	22.8	7 7 G4	CORE			50		- - -		
2228.8	23.50 24.00 24.2 24.5 — 25) H1	COR			50				
2228.8	- - <u>28.5</u>	0	- SP T	50/0.1	50/0.1		- W, 8		30.00	

NEVADA	START DATE	9/11/06	EXPL	ORATIO	N LOG			SHEET 2 OF 2
DEPARTMENT OF TRANSPORTATION	END DATE JOB DESCRIPT LOCATION BORING E.A. #	9/13/06 ION Boulder City Bypass - F I 515 @ Railroad Pass FA1 73307-1		INDWATER	RIEVEL	STATION OFFSET ENGINEER EQUIPMENT OPERATOR	"F" 14+80 20 ft. Right Salazar Diedrich D-1 D. White	20, #1627
GEOTECHNICAL ENGINEERING	GROUND ELEV	2253.80 (ft) PSYSTEM_Auto., ETR=65%	DATE	DEPTH ft		DRILLING METHOD BACKFILLED	6" H.S.A. Yes DAT	9/13/2006

(ft)	110.	TYPE	Increments	1 foot	Recov'd		USCS Group	MATERIAL DESCRIPTION	
			į		110001 0			Same as above.	
- - <u>33.59</u> - - 35	J	SPT	50/0.14	50/0.14		W, PI			
- 3 <u>8:59</u> - -40	К	SPT	50/0.23	50/0.23				38.73 End of Boring at 38.73. Borehole was 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	
- 45 -								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.	
- 50 -									
- 55 -									
	- 35 - 38.59 - 40 45 50	- 35 - 38:79 K - 40 - 45 50	- 35 - 38.59 K SPT - 40 45 50	- 35 - 38.59 K SPT 50/0.23* 40	- 35 - 38.59 K SPT 50/0.23 50/0.23 - 40 - 45 50	- 38.59 K SPT 50/0.23 50/0.23 40	- 35	- 38.59 K SPT 50/0.23 50/0.23	38.73 End of Boring at 38.73. Borehole was 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 (breccialcaliche), cobbles or boulders.

NEVADA	START DATE	9/13/06	EXPL	ORATIO	N LOG		S	SHEET 1 OF 2
DEPARTMENT OF TRANSPORTATION	END DATE JOB DESCRIPTI LOCATION BORING	I 515 @ Railroad Pass FP1	Phase1			STATION OFFSET ENGINEER EQUIPMENT	"F"16+00 8 ft. Left Salazar Diedrich D-12 D. White	0, #1627
GEOTECHNICAL ENGINEERING	E.A. # GROUND ELEV. HAMMER DROP	73307-1 2244.80 (ft) SYSTEM_Auto., ETR=65%	GROUNDWATER LEVEL DATE DEPTH ft ELEV. ft			OPERATOR DRILLING METHOD BACKFILLED	6" H.S.A. Yes DATE	9/25/2006

ELEV.	DEPTH		MPLE	BLOW Co	OUNT Last	Percent	LAB TESTS	USCS	MATERIAL DESCRIPTION	REMARKS
(ft)	(ft)	NO.	TYPE	Increments	1 foot		FVD 1E919	USCS Group	POORLY GRADED SAND WITH CLAY AND	KEIMIAKAS
	2.00	Α	SPT	19 16 22	38	67	W, S, PI	SP SC	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.
	4.00			47				L	4.00	•
2239.8 -	-5 5.50	В	SPT	17 30 49	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.
	9.00			16					7.00 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.	
2234.8 -	- 10 10.50	С	SPT	21 29	50	73	W, S, PI	sw sc		
2229.8 -	14:09 15 	D	SPT	50/2.3**	50/2.3"				MEATHERED 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. The weathered and decomposed component of the bedrock is classified as SILTY, CLAYEY	
	18:28	E	SPT	100/2.4"	100/2.4		W, S, PI		SAND WITH GRAVEL(SC-SM) in USCS. 19.00 Same as above, but not as many crystals.	
2224.8 -	-20								Sample from the auger cuttings is classified as SC-SM.	
	24.06			F0/0 ==	E0/0 ===					
2219.8 -	25 -		3 	 50/0.7" 	50/0.7"					
	_ - <u>ଥି</u> ଖ.ଡ଼ନ	G	SPT	50/1.3"	50/1.3"					Ended augeri on 9-13-06.
	29.90			00/1.0	30, 1.0			1	30.00	Resumed

			EVEL	DATIO	NI 00			
NEVADA	START DATE	9/13/06	EXPLO	DRATIO	N LOG		SI	HEET 2
DEPARTMENT OF TRANSPORTATION	END DATE	_9/25/06				STATION	"F"16+00	
TRANSPORTATION	JOB DESCRIPT	ION Boulder City Bypass - I	Pha s e1			OFFSET	8 ft. Left	
	LOCATION	I 515 @ Railroad Pass				ENGINEER	Salazar	
	BORING	FP1				EQUIPMENT	Diedrich D-120	, #1627
	E.A.#	73307-1	GROUI	NDWATER	RLEVEL	OPERATOR	D. White	
	GROUND ELEV	2244.80 (ft)	DATE	DEPTH ft	ELEV. ft	DRILLING METHOD	6" H.S.A.	
GEOTECHNICAL ENGINEERING	HAMMER DROF	SYSTEM_Auto., ETR=65%				BACKFILLED	Yes DATE	9/25/20

SHEET 2 OF 2

	ンコン	7, 1		A. #	-	11.00 (DATE	DEDTH #	ELEV. ft	DRILLING		
			G	ROUND EL	EV_22	44.80 (1	t)		DATE	DEFINIC	ELEV. IL	METHOD	6" H.S.	
GEOTECH ENGINI	HNICAL EERING		HA	AMMER DR	OP SYS	STEM_A	uto., ETR=	<u>65%</u> [BACKFILLED	Yes	DATE 9/25/200
ELEV. (ft)	DEPTH (ft)		MPLE TYPE	BLOW Co 6 inch Increments	Last	Percent Recov'd		USCS Group		MATI	ERIAL D	ESCRIPTIO	N	REMARKS
	1	1	CORE				U, RQD			Highly frac whitish thi	ctured quar n clayey se	tz rich Rhyolite o ams. Very hard	ontains	Coring on 9-25-06.
	31.80 32:00	H2	CORE			100				(?), 3683.	•	sive Strength (p	si) = 329	
	34.00	1	CORE			97				Ùnit Weigl RQD = 75	ht(pcf) = 1	55.1.		
2209.8 -	35		CORE			97			36.33					
	_								00.00	Borehole of Groundwa Note: Par due to the gravel pie	ater was no tial increme sampler st	led with drill cutti t encountered. ent blow counts i noe being jamme ampler could be	may be	
2204.8 -	- 40									Soil/rock of field identi The drill ri augering presence	descriptions ifications are general charactered brocess, who of strongly	s are derived from the discount discount discount discount of frequently during the may indicate the discount discount discount discount discount discount discount d	t data. ig the e the and grave	
2199.8 -	45													
2194.8 -	- - - 50													
2189.8 -	- 55													

NEVADA	START DATE	9/27/06	EXPL	ORATIO	N LOG			SHEET 1 OF 2
DEPARTMENT OF TRANSPORTATION	END DATE	9/27/06	lhaco1			STATION .	"F" 18+00	
	JOB DESCRIPTI	ON _Boulder City Bypass - F I 515 @ Railroad Pass	nase i			OFFSET ENGINEER	30 ft. Left Salazar	
	BORING	FP2			<u> </u>	EQUIPMENT	Diedrich [D-120, #1627
	E.A. #	73307-1		NDWATER		OPERATOR DRILLING		
	GROUND ELEV.	2234.40 (ft) SYSTEM_ Auto., ETR=65%	DATE	DEFINIC	ELEV. II	METHOD BACKFILLED	6" H.S.A. Yes	ATE 9/27/2006

ELEV.	DEPTH		MPLE TYPE	BLOW Co 6 inch	Last	Percent	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
(ft)	(ft) -			Increments	1 foot	Recov'd		sw	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 #
	3.00 - 4.50	Α	SPT	20 31 58	89	73	W, S, PI	sc		Auger was
2229.4 -	6.00		SPT	36 38 40	78	73	W, PI		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	advanced to 3 feet.
	7.00	С	SPT	18 36 51	87	87	W, S, PI	sc	altered, very dense.	
2224.4 -		D	SPT	18 16	42	93	W, S, PI			
	11.00 - 12.50		SPT	26 50/1.2"	50/1-2"		W. Pl		12.00 WEATHERED BEDROCK weathered and	-
	14.50								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.	
2219.4 -	15 ^{15.10}	F	SPT	78 50/1.2"	50/1.2"		W, S, PI		The weathered and decomposed component of the bedrock is classified as clayey sand (SC).	
	-									
2214.4	- <u>19:59</u> 20	G	SPT	50/3.2"	50/3.2"					
	-									
2209.4		++	SPT	50/0.8 "	50/0.8"			_		
	-									
	_									
	29:56	-	SPT	50/1.2"	50/1:2"	ļ		4	30.00	

NEVADA	START DATE	9/27/06	EXPL		SHEET 2 OF			
DEPARTMENT OF	END DATE	9/27/06	STATION	"F" 18+00				
TRANSPORTATION	JOB DESCRIPT	ON Boulder City Bypass - F	OFFSET	30 ft. Left				
	LOCATION	I 515 @ Railroad Pass		ENGINEER	Salazar			
	BORING	FP2		EQUIPMENT	Diedrich D-1	20, #1627		
	E.A. #	73307-1	GROU	INDWATER	RLEVEL	OPERATOR	D. White	·
	GROUND ELEV	2234.40 (ft)	DATE	DEPTH ft		DRILLING	6" H.S.A.	
GEOTECHNICAL		SYSTEM Auto., ETR=65%				METHOD		9/27/2006
ENGINEERING	HAMMER DROP	SYSTEM_ Nato., ETN-00%	L	1		BACKFILLED	Yes DAT	E

SHEET 2 OF 2

ELEV. (ft)	DEPTH (ft)	MPLE TYPE	BLOW C 6 inch Increments	Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	_		morements	11008	Vecov 0		-	Same as above, but the color is mottled red, light red, with quartz white in yellow orange.	rockier than above.
:199.4 -	- 35 - 35.62 -							35.00 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	
040.4.4	38.32	CORE			100	G, U		above. Coring with plain water. 37.90 RQD = 94.8%. Unit Weight (pcf) = 155.6, 153.7. End of Boring at 37.9 feet. Borehole was backfilled with drill cuttings. Groundwater was not encountered.	
2194.4 -	- 40 - -							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 								
	_								

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

NEVADA	START DATE	10/3/06	EXPLORATION LOG		SHEET 1
DEPARTMENT OF TRANSPORTATION	END DATE	"F" 19+65			
TRANSPORTATION	JOB DESCRIPT	ION Boulder City Bypass - F	OFFSET	0 ft.	
	LOCATION	I 515 @ Railroad Pass	ENGINEER	Salazar	
	BORING	FP3		EQUIPMENT	Diedrich D-120, #162
	E.A. #	73307-1	GROUNDWATER LEVEL	OPERATOR	D. White
	GROUND ELEV	2229.30 (ft)	DATE DEPTH ft ELEV. ft	DRILLING METHOD	6" H.S.A.
GEOTECHNICAL ENGINEERING	HAMMER DROF			BACKFILLED	Yes DATE 10/3/2

OF 2

(ft) - -	DEPTH (ft) 3.00 1.38 - 5 - 7.50	NO.	MPLE TYPE SPT	BLOW C 6 inch Increments	OUNT Last	Percent Reçov'd	uto., ETR=	USCS Group	MATERIAL DESCRIPTION POORLY GRADED SAND WITH CLAY AND GRAVEL (SP-SC) light brown (5 Y 5/6) and paleyellowish brown (10 YR 6/2), dry, with BACKFILLED Yes DATE 10/3/200 REMARKS Bridge I-2871, Pier 3
2224.3 - 5	(ft) 3.000 3.000 4.387 -5	NO.	TYPE	6 inch Increments	Last 1 foot	Recov'd	LAB TESTS	USCS Group	POORLY GRADED SAND WITH CLAY AND GRAVEL (SP-SC) light brown (5 Y 5/6) and Bridge I-2871,
2224.3 — 5	3.00 3.00 4.38 -5	А		30 62					GRAVEL (SP-SC) light brown (5 Y 5/6) and Bridge I-2871,
2219.3	7.50				50/2"	67	W, S, PI	SP SC	cobbles and small boulders, some rock fragments (Alluvium). Drill Rig unit # 1627. Auger was advanced to 3 feet.
-	8.50 9.50	C	SPT	12 55 32 35 75	55 110	93	W, S W, S, PI	SC	9.00 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
2214.3	12.50 13.80 14.69	E	SPT	12 35 50/3.6" 50/1.3"	50/3.6" 50/1.3"		W, S, PI	GP GC	altered, very dense. 12.50 GRAVEL WITH CLAY AND SAND (GP-GC) 13.50 weathered and decomposed igneous rock (Rhyolite/Andesite), with rock fragments, dry, lgrayish yellow and pinkish color, dry, lhydro-thermally altered, very dense.
2209.3	- 17.50 - - - ₂₆ 20.10	G1	CORE			96	RQD, U, G		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%
-	22.50		CORE			100	RQD, U, G		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,
2204.3 -2			CORE			100	RQD, U, G		3613. Unit Weight (pcf) = 150.9, 157.6.
-	27.50								27.70 End of Boring at 27.5 feet. Borehole was backfilled with drill cuttings. Groundwater was not encountered.

NEVADA	START DATE	10/3/06	EXPL	ORATIO	N LOG	"		SHEET 2 OF 2
DEPARTMENT OF TRANSPORTATION	END DATE JOB DESCRIPTI LOCATION	I 515 @ Railroad Pass	Phase1		STATION OFFSET ENGINEER	"F" 19+65 0 ft. Salazar	20 #4627	
	BORING E.A. # GROUND ELEV	FP3 73307-1 2229.30 (ft)	GROU DATE	DEPTH ft		EQUIPMENT OPERATOR DRILLING METHOD	Diedrich D-1: D. White 6" H.S.A.	20, #1627
GEOTECHNICAL ENGINEERING	HAMMER DROP	SYSTEM_Auto., ETR=65%				BACKFILLED	Yes DAT	10/3/2006

	DEDTU	SAI	IPLE	BLOW C	TNUC			Hece	MATERIAL RECORDERION	DEMARKS
ELEV. (ft)	DEPTH (ft)				Last	Percent Recov'd	LAB TESTS	USCS Group	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	REMARKS
2194.3	- 35 - -								(breccia/caliche), cobbles or boulders.	
2189.3 -										
2184.3 -	- - - -									
2179.3 -	50									
2174.3	55 - -									

NEVADA	START DATE	10/4/06	EXPLORATION LOG		SHEET 1
DEPARTMENT OF	END DATE	"F" 21+09			
TRANSPORTATION	JOB DESCRIPT	ION Boulder City Bypass - I	STATION . OFFSET . ENGINEER .	12 ft. Right	
	LOCATION	I 515 @ Railroad Pass		Salazar	
	BORING	FA2		EQUIPMENT	Diedrich D-120, #1627
	E.A.#	73307-1	GROUNDWATER LEVEL	OPERATOR	D. White
	GROUND ELEV		DATE DEPTH ft ELEV. ft	DRILLING METHOD	6" H.S.A.
GEOTECHNICAL ENGINEERING		SYSTEM_Auto., ETR=65%		BACKFILLED	Yes DATE 10/4/20

SHEET 1 OF 2

GEOTECH ENGINE	INICAL		-	ROUND EL AMMER DF			uto., ETR=	65%	METHOD O' H.S.A. BACKFILLED Yes DATE 10/4/2006
ELEV.	DEPTH		MPLE TYPE	BLOW C	OUNT Last	Percent		USCS Group	MATERIAL DESCRIPTION REMARKS
(ft) 2218.4 -	(ft) - - - - - - - 5 5.35		SPT	inclements	50/0.35	Recov'd	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.
2213.4 -	7.50 - 9.00 9.50 10 11.00	В	SPT SPT	35 20 17 10 15 13	37	27	W, PI W, S, PI		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).
2208.4 -	12.00 12.47 - - 14.50 15 16.00	D E	SPT	24 24 32	50/0.47	77	W, S	SW SM	
2203.4 -		F	SPT	11 14 27	41	73	W, S, PI		
2198.4 -	- 24.50 25 26.00	G	SPT	24 22 27	49	77	W, H, PI	SM	24.00 SILTY SAND WITH GRAVEL(SM), moderate to light brown and pale yellowish orange, weathered/fractured and hydro-thermally altered bedrock (Rhyolite/Andesite).
	29.50			34					Color changes to grayish yellow (5 Y 8/4) at 29 feet.

NEVADA	START DATE	10/4/06	EXPLO	DRATIO	N LOG			SHEET 2 OF
DEPARTMENT OF	END DATE	STATION	"F" 21+09					
TRANSPORTATION	JOB DESCRIPTI	ON Boulder City Bypass - I		OFFSET	12 ft. Right			
	LOCATION	I 515 @ Railroad Pass		ENGINEER	Salazar			
	BORING	FA2			EQUIPMENT	Diedrich D-120, #1627		
	E.A.#	73307-1	GROU	NDWATER	LEVEL	OPERATOR	D. White	
	GROUND ELEV	2223.40 (ft)	DATE	DEPTH ft	ELEV. ft	DRILLING METHOD	6" H.S.A.	
GEOTECHNICAL ENGINEERING		SYSTEM_Auto., ETR=65%				BACKFILLED	Yes DAT	E 10/4/2006

ELEV. (ft)	DEPTH (ft)	NO.	TYPE	6 inch Increments	OUNT Last	Percent Recov'd	LAB TESTS	USCS Group		MATERIAL DESCRIPTION	REMARKS
2188.4 -	30.72 - - - 34.59 - 35	H	SPT	50 -50/0.22'	50/0.22'		W, S, PI			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). The weathered and decomposed component of the bedrock (sample H) is classified as Poorly Graded Gravel With Silt and Sand (GP-GM).	150 psi down pressure to 34 feet.
2183.4 -	- 39.89 40		SPT	50/0.15	50/0.15		W, Pl		<u>42.00</u>		300 psi down pressure.
2178.4 ·	42.60 - 43.35 - 45	K1	CORE			97	U, RQD, UW, G			BEDROCK Very hard, with clay filled fractures (2 inches +/-), grayish mottled green to very pale green. Dense to very dense. Unconfined Compressive Strength (psi) = 1902. Unit Weight (pcf) = 162.3, 164.5. RQD = 92.5%	500 psi down pressure, Aug refusal.
2173.4	- 48.07 -50 -	,							48.35	End of Boring at 48.35. Borehole was 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.	
2168.4	- - - - - -									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.	



END DATE

3/14/11

3/15/11

Boulder City Bypass - Direct Connect, Northbound JOB DESCRIPTION _

1515 @ Railroad Pass, Bridge H-2972N LOCATION NBA1 **BORING**

73307-1 E.A. #

GROUND ELEV_2056.70 (ft) HAMMER DROP SYSTEM_Auto., ETR=72%

GROUNDWATER LEVEL DATE | DEPTH ft | ELEV. ft

EXPLORATION LOG

STATION **OFFSET**

ENGINEER

EQUIPMENT

OPERATOR

DRILLING

"P" 208+05

41 feet Left Margie Boutilier

Diedrich D-120, #1627

SHEET 1 OF 4

Larracuente

6" H.S.A METHOD 3/15/2011 Yes **BACKFILLED** DATE

SAMPLE **BLOW COUNT** ELEV. DEPTH 6 inch Last Increments 1 foot **MATERIAL DESCRIPTION** Percent LAB TESTS REMARKS NO. TYPE (ft) (ft) Recov'c ALLUVIUM: Surface: Rocky; silty sand with gravel and 1.00 cobbles, occassional boulders, sparsely 7 down pressure: vegetated (desert brushes Reese Wood), dry. 150-200 psi. SPT 7 В 16 67 W, S, PI Difficult site access due to small drainage /wash 9 2.50 7 Samples B, E, F: SILTY SAND WITH 9 С SPT 18 78 W, S, PI GRAVEL (SM) -- 30% fine to coarse, hard, angular gravel; 55 to 57% fine to coarse sand; 9 4.00 SM 12 to 14 % fines of non- plasticity, light brown, dry, med. dense. 5.00 2051.7 9 SPT 10 22 72 W, S, PI 12 6.50 12 SPT 19 35 W, S, PI 67 8.00 16 8.00 Samples G, H: WELL-GRADED SAND WITH 13 SILT AND GRAVEL (SW-SM) - 33 to 45% G SPT 15 34 78 W, S, PI fine to coarse, hard, angular gravel; 47 to 58% 19 9.50 fine to coarse sand; 9% fines of non-plasticity, SW 21 dry, dense to v. dense, light brown. SM 2046.7 - 10 SPT 40 Н 50/1.2 61 W, S, PI 50/1.2" 11.00 11.50 11.50 Sample I: SILTY SAND WITH GRAVEL (SM) 10 -- 18% fine to coarse, hard, angular gravel; 67% SPT 11 22 83 W, S, PI SM fine to coarse sand; 15% fines of non- plasticity, 13.00 11 13.00 light brown, dry, med. dense. 11 Samples J, K, L, M: WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) -- 26 to SPT 11 24 83 W, S, PI 36% fine to coarse, hard, angular gravel; 56 to 13 14.50 64% fine to coarse sand; 10% fines of non-10 plasticity, dry, dense, light brown. 2041.7 - 15 SPT 36 W, S, PI 15 89 16.00 21 SW SM 15 SPT W, S, PI 19 35 89 16 17.50 11 М SPT 18 41 78 W, S, PI 23 19.00 19.00 Sample N: WELL-GRADED GRAVEL WITH 11 6/16/1 GW SILT AND SAND (GW-GM) -- 51% fine to Ν SPT 27 62 89 W. S. PI coarse, hard, angular gravel; about 43% fine to 20.50 coarse sand; about 6 % fines of non- plasticity, GM 2036.7 20 35 DOT.GDT 20.50 16 dry, v. dense , light brown. Samples O, P, Q: WELL-GRADED SAND SPT 24 W, S, PI 0 47 89 NBA.GPJ NV WITH SILT AND GRAVEL (SW-SM) -- 33 to 22.00 23 40% fine to coarse, hard, angular gravel; 51 to 22 59% fine to coarse sand; 8% fines of non-SPT 34 76 W, S, PI plasticity, dry, v. dense, light brown. 94 42 BCB 23.50 SW 23 SM D04 SPT 38 82 W, S, PI Q 89 44 25.00



50.00

TART DATE	3/14/1
IAKIDAIE	

S 3/15/11

END DATE Boulder City Bypass - Direct Connect, Northbound JOB DESCRIPTION _

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

NBA1 **BORING**

73307-1 E.A.# GROUND ELEV 2056.70 (ft)

HAMMER DROP SYSTEM_Auto., ETR=72%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE | DEPTH ft | ELEV. ft

"P" 208+05 STATION

41 feet Left OFFSET

Margie Boutilier **ENGINEER** Diedrich D-120, #1627 **EQUIPMENT**

SHEET 2 OF 4

Larracuente **OPERATOR**

DRILLING METHOD 6" H.S.A. DATE _3/15/2011 Yes BACKFILLED .

BLOW COUNT 6 inch Las ELEV. DEPTH Last 1 foot Percent LAB TESTS **MATERIAL DESCRIPTION** REMARKS NO. TYPE (ft) (ft) Increments Recov'd 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. 30.00 2026.7 24 R SPT 33 75 94 W, S, PI SP SM 42 31.50 35.00 35.00 2021.7 Sample S: SILTY SAND WITH GRAVEL 29 (SM) - 31% fine to coarse, hard, angular SPT 37 82 94 W. S. PI gravel; 58% fine to coarse sand; 11% fines of 45 36.50 non- plasticity, light brown, dry, v. dense. SM 40.00 40.00 2016.7 Samples U, V: WELL-GRADED SAND WITH 27 SILT AND GRAVEL (SW-SM) -- 35 to 40% SPT 36 86 89 W, S, PI fine to coarse, hard, angular gravel; 50 to 56% 50 fine to coarse sand; 10% fines of non-plasticity, 41.50 dry, v. dense, light brown. BCB NBA.GPJ NV_DOT.GDT 6/16/1 **_45.00** 2011.7 33 U SPT W, S, PI 50/5.8" 46.00 50/5.8" \$W SM DOT



3/14/11 START DATE 3/15/11

END DATE

Boulder City Bypass - Direct Connect, Northbound JOB DESCRIPTION .

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

NBA1 **BORING**

73307-1 E.A.# GROUND ELEV_2056.70 (ft)

HAMMER DROP SYSTEM_Auto., ETR=72%

EXPLORATION LOG SHEET 3 OF 4 "P" 208+05 STATION 41 feet Left **OFFSET** Margie Boutilier ENGINEER Diedrich D-120, #1627 **EQUIPMENT** Larracuente OPERATOR **GROUNDWATER LEVEL**

DRILLING METHOD DATE DEPTH ft ELEV. ft 6" H.S.A. BACKFILLED Yes DATE 3/15/2011

ELEV. (ft)	DEPTH (ft)		MPLE TYPE	HICIERICIA	Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	51.39	i	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 -	60.00 660.38	X	SPT	50/4.6"	50/4.6"					
1991.7 -	65 ⁶ 5.04	Y	SPT	50/0.5"	-50/0.5"	0				
1986.7 -	- - 73 8.99	Z	SPT	50/2.3**	50/2.3"	0		GW GM		
	75.00									



START DATE 3/14/11

START DATE 3/15/11 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%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET ENGINEER

EQUIPMENT

"P" 208+05
41 feet Left
Margie Boutilier

Diedrich D-120, #1627

SHEET 4 OF 4

OPERATOR Larracuente

DRILLING 6" H.S.A.

GEOTECH ENGINE	ERING V		HA			S I E IVI	uto., ETR=		BACKFILLED Yes DA	TE 3/15/201
ELEV. (ft)	DEPTH (ft)		MPLE TYPE	BLOW Co 6 inch Increments 50/3"	last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	- / 0.20			W		V			_	
1976.7 -	8.68 8:28	ВВ	SPI	50/2.4"	50/2.4"	0			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	
1971.7 -	85 								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.	
1966.7 -	90 									
1961.7 -	95 									



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

3/16/11

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

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET ENGINEER

EQUIPMENT

OPERATOR

"P" 209+30 41 feet Left

Margie Boutilier
Diedrich D-120, #1627

SHEET 1 OF 4

Larracuente

DRILLING 6" H.S.A.

GEOTECH ENGINE	HNICAL EERING		H	AMMER DE	ROP SYS	STEM_A	uto., ETR=	72%	BACKFILLED Yes D	ATE 3/16/2011
ELEV. (ft)	DEPTH (ft)		MPLE TYPE	BLOW C 6 inch Increments	Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	1.00 2.50	В	SPT	5 4 4 4 6 50/5"	8 50/5"	22		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, C: SILTY SAND WITH GRAVEL (SM) — 18% fine to coarse, hard, angular gravel; 65 to 69% fine to coarse sand; 12 to 16	150-200 psi down pressure.
2049.2 -	***************************************	E	SPT	11 13 16 12	29	67			% 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-	
	7.00	G	SPT	20 30 14 18 28	46	72 67		SW SM	plasticity, dry, dense to v. dense, light brown.	
2044.2 -	10.00	Н	SPT	13 18	31	61			10.00 Samples I, J, K, L, M: SILTY SAND WITH GRAVEL (SM) 17 to 26% fine to coarse,	
	11.00	ı	SPT	8 12 15	27	67			hard, angular gravel; 56 to 65% fine to coarse sand; 13 to 18 % fines of non- plasticity, light brown, dry, dense to v. dense.	
	14.00	J	SPT	9 12 12 8	24	67		SM		
2039.2 -	15 15.50	к	SPT	18 21 31	39	72		SM		
	17.00	L	SPT	29 19	48	72				
	18.50	м	SPT	26 18	44	78			18.50 Sample N: POORLY-GRADED SAND WITH	
2034.2 -	20.00	N	SPT	18 22	40	67		SP SM	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.	
	21.00 21.66 - 22.50 22.76	0	SPT	50/1.3"	50/1.3"			GW GM	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.	
	22.76		SPT	50/3.1"	50/3.1"			SM	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.	
	24.87	Q	SPT	40 50/4.4"	50/4.4"			SP	Sample Q: POORLY-GRADED SAND WITH SILT AND GRAVEL (SP-SM) 36 % fine to	



3/15/11

3/16/11

JOB DESCRIPTION Boulder City Bypass - Direct Connect, Northbound

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

NBA2

E.A. #

END DATE

GROUND ELEV_2054.20 (ft)

HAMMER DROP SYSTEM Auto., ETR=72%

73307-1

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

"P" 209+30 41 feet Left SHEET 2 OF 4

Margie Boutilier **ENGINEER**

Diedrich D-120, #1627 EQUIPMENT Larracuente

OPERATOR DRILLING METHOD

6" H.S.A.

DATE 3/16/2011 Yes BACKFILLED _

ELEV.	DEPTH		MPLE	BLOW C	OUNT Last	Percent	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
(ft)	(ft)	NO.	TYPE	Increments		Recov'd	LAD IESTS			NEWARKS
	25.50	<u> </u>						SM	25.50 coarse, hard, angular gravel; 53% fine to coarse sand; 11% fines of non- plasticity, dry, v.	
	26.27	R	SPT	32	50/2.6"				dense, light brown.	
				50/2.6"					Samples R, S POORLY-GRADED GRAVEL	
	27.00			30				GP GM	WITH SILT AND SAND (GP-GM) 46% fine to coarse, hard, angular gravel; 42 to 45% fine	
	27.79	S	SPT	50/3.5"	50/3.5"				to coarse sand; 8 to 12 % fines non- plasticity,	
1	28.50			00,0.0					dry, v. dense , light brown. 28.50	
			CDT	23	EO/E 0"				Samples T, U, V, W: WELL-GRADED SAND	
	29.44		SPT	50/5.3"	50/5.3"				WITH SILT AND GRAVEL (SW-SM) 22 to 38 % fine to coarse, hard, angular gravel; 54 to	
2024.2 -	30.00								70% fine to coarse sand; 8% fines of non-	
2024.2				27					plasticity, dry, v. dense, light brown.	
	-	Ų	SPT	36	77	61				
	31.50		ļ	41	ļ					
	-									
	+									
	 									
	35.00									
2019.2	350.00			17				SW		
		V	SPT	I	64	61		SM		
	36.50		L_	32						
	-									
2014.2	40.00)	-	16	 			1		
		w	SPT	16 22	45	78				
	41.50		Jorn	23	-0	'				
	41.50			-5				†	42.00	
									Sample X POORLY-GRADED GRAVEL	
									WITH SILT AND SAND (GP-GM) 53% fine	
	Ī								to coarse, hard, angular gravel; 36% fine to coarse sand; 11 % fines non- plasticity, dry, v.	
	L								dense , light brown.	
	Γ									
2009.2	45.00									
2003.2	45,35	X	SPT	50/4.2"	50/4.2"			1		
	_							GP		
								GM		
2009.2	-									
5										
È	-									
:	-									
L	50.00	<u>'l</u>	L	<u> </u>	<u> </u>	<u> </u>	I	<u> </u>	50.00	_



END DATE 3/16/11

JOB DESCRIPTION Boulder City Bypass - Direct Connect, Northbound

LOCATION 1515 @ Railroad Pass, Bridge H-2972N

BORING NBA2

E.A. # 73307-1 GROUND ELEV 2054.20 (ft)

HAMMER DROP SYSTEM Auto., ETR=72%

EXPL	OR.	ATIC)N L	.OG
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GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION _ OFFSET _

EQUIPMENT

OPERATOR

"P" 209+30 41 feet Left

ENGINEER Margie Boutilier

Diedrich D-120, #1627

SHEET 3 OF 4

Larracuente

DRILLING 6" H.S.A.

ELEV. (ft)	DEPTH (ft)	NO.	MPLE TYPE	I C:	Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
V-2	50.48	Y	SPT	50/5.7"		Necovo			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.	
1999.2 -	555.00 555.00	z	SPT	. 32 40 44	84	89		SW SM		
1994.2 -	60.88	ΛΛ.	SPT	38 50/4.5"	50/4.5"				Samples BB, DD, EE: POORLY-GRADED SAND WITH SILT AND GRAVEL (SP-SM) 25 to 35% fine to coarse, hard, a to 10% fines of non- plasticity, dry, v. dense, light brown.	
1989.2 -	65.99	BB	SPT	35 50/5.9"	50/5.9"					
1984.2 -	- 70.00 70.43	CC	SPT	50/5.2"	50/5.2"			SP SM		
	75.00									



3/15/11

3/16/11

END DATE JOB DESCRIPTION Boulder City Bypass - Direct Connect, Northbound

LOCATION

I 515 @ Railroad Pass, Bridge H-2972N

NBA2 **BORING**

73307-1 E.A.# GROUND ELEV 2054.20 (ft)

HAMMER DROP SYSTEM_Auto., ETR=72%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

ENGINEER

EQUIPMENT .

"P" 209+30

41 feet Left Margie Boutilier

Diedrich D-120, #1627

SHEET 4 OF 4

Larracuente **OPERATOR**

DRILLING METHOD 6" H.S.A.

ELEV. (ft)	DEPTH (ft)		MPLE TYPE	BLOW Co	Last	Percent	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
(11)	75.93		SPT	24	1 foot 50/5.2"	Recov'd		ОТОВ		
1974.2 -	80.00 80.49	FF	SPT	50/5.9"	50/5.9"				90 FO	
	-		31.1	30/3.9	30/3.9				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	
1969.2 -	85 -								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 -	90	-								
1959.2 -	95 - - -									



3/14/11 START DATE

END DATE

3/15/11

JOB DESCRIPTION Boulder City Bypass - Direct Connect, Southbound I 515 @ Railroad Pass, Bridge H-2972S LOCATION

SBA1 BORING

73307-1 E.A. # GROUND ELEV_2051.40 (ft)

HAMMER DROP SYSTEM Auto., ETR=87%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

ENGINEER

OPERATOR

"P" 209+59 41 feet Right

Abbas Bafghi

Diedrich D-120, #1082

SHEET 1 OF 4

EQUIPMENT O. Altamirano

DRILLING METHOD 6" H.S.A.

DATE 3/15/2011 Yes BACKFILLED

ENGINE	ERING \		HA	AMMER DR	ROP SY	STEM	uto., ETR=	51 70 _	BACKFILLED Yes DA	ATE 3/15/2011
ELEV. (ft)	DEPTH (ft)		MPLE TYPE	BLOW Co 6 inch Increments	Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
, ,	1.00	А	SPT	10 3	5	67	w, s	SP 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	Location: Direct Connect Bridge-Southbou
	2.50		SPT	2 2 2	9		w, s	GP GM	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,	near US 95 Structure: H2972S Weather:
2046.4 -	5.00 6.00 7.50	С	SPT	7 18 33 26	59	80	W, S, PI	SM	5.00 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	Sunny, High 80 degrees
2041.4 -	- 8.50 - 10.00	D	SPT	16 23 18	41	80	W, S, PI	SP SM	8.00 (SM) 41% fine to coarse, hard, angular gravel; 45% fine to coarse sand; 14 % fines of r (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,	100 psi down
	11.00	Е	SPT	10 9 10	19	80	W, S, PI	SW SM	Alight 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.	pressure.
2036.4 -	13.50	F	SPT	16 19 14	33	83	W, S, PI	SM	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. 15.00 Samples G, I, J: WELL-GRADED SAND	
	16.00 - 17.50	G	SPT	15 15 15	30	77	W, S, PI		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.	
2031.4 -	18.50 - 20.00	Н	SPT	41 31 20	51	73	W, S, PI	SW		
	21.00	ı	SPT	11 26 35	61	87	W, S, PI	SM		new SPT shoe is used at 21 feet.
	23.50	J	SPT	15 21 27	48	83	W, S, PI		25.00	



3/14/11 START DATE

END DATE

3/15/11

JOB DESCRIPTION Boulder City Bypass - Direct Connect, Southbound

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

SBA1 **BORING**

73307-1 E.A.# GROUND ELEV_2051.40 (ft)

HAMMER DROP SYSTEM_Auto., ETR=87%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION **OFFSET**

ENGINEER

"P" 209+59

SHEET 2 OF 4

41 feet Right Abbas Bafghi

Diedrich D-120, #1082 EQUIPMENT

O. Altamirano **OPERATOR**

DRILLING METHOD 6" H.S.A.

ELEV.	DEPTH		MPLE TYPE	BLOW CO	Last	Percent	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
(ft)	(ft)	1,40.	, ,, ,	Increments	1 foot	Recov'd		Group		
	26.00									
				22						
	<u> </u>	K	SPT	22	51	80	W, S, PI			
	27.50	<u> </u>		29						
	28.50								Samples K, L, N, P: POORLY-GRADED	
				19					SAND WITH SILT AND GRAVEL (SP-SM)	
		L	SPT	31	59	80	W, S, PI		25 to 35% fine to coarse, hard, angular gravel; 55 to 64% fine to coarse sand; 10 to 12 % fines	
2021.4 -	30.00			28					of non- plasticity, dry, dense to v. dense, light brown.	
	31.00								DIOWII.	
	31.00			27						
		м	SPT	42	82	80	W, S, PI			
	32.50			40		ļ]		Drilling ended
	-									5:00 pm
										Resumed on
	_ 34.50									3/15/2011 at
2016.4 -				20				1		8:00 am.
2010.4		i	SPT	20	43	80	W, S, PI			
	36.00	_		23						
	-							SP		
	_							SM		
	39.50									
				21				1		
2011.4 -	- 4 0	0	SPT	19	34	80	W, S, PI			
	41.00	ļ		15						
	_									
	_									
	_									
	44.50	ļ		30				-		
2006.4 -	- 45	P	SPT	38 43	87	80	W, S, PI			
	46.00	•	'	44						
	_									
	_									
	49:50 49:72									
	49.72	<u> </u>	SPT	70/2 6"	70/2.6"		W, S	1	50.00	



END DATE

LOCATION

3/14/11

3/15/11

Boulder City Bypass - Direct Connect, Southbound JOB DESCRIPTION _

I 515 @ Railroad Pass, Bridge H-2972S

SBA1 **BORING**

E.A.#

73307-1

GROUND ELEV 2051.40 (ft)

DATE DEPTH ft ELEV. ft HAMMER DROP SYSTEM_Auto., ETR=87%

EXPLORATION LOG

GROUNDWATER LEVEL

STATION OFFSET

EQUIPMENT

"P" 209+59 41 feet Right

Abbas Bafghi **ENGINEER**

Diedrich D-120, #1082 O. Altamirano

SHEET 3 OF 4

OPERATOR

DRILLING METHOD 6" H.S.A.

ENGINE	EERING \					5 I ⊏IVI	uto., LTIX-C		BACKFILLED 165 D	MIL
ELEV. (ft)	DEPTH (ft)	NO.	MPLE TYPE	BLOW C 6 inch Increments	Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1996.4 -	- 54.50 -55 56.00	R		37 46 61	107	87	W, S, PI		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.
1991.4 -	59.50 60 60.72	s	SPT	27 52 50/2.8"	50/2.6"	77	W, S, PI	SP SM		
1986.4	64.50 65.00	_	SPT	84	84		W, S			
1981.4 ·	- 69.50 		SPT	55 50/1.2"	50/1.2"		W, S			
	- 74.50)		51					75.00	



	0/4 4/4 4
START DATE	3/14/11

TART DATE 3/14/11 ND DATE 3/15/11

END DATE 3/15/11

JOB DESCRIPTION Boulder City Bypass - Direct Conriect, Southbound

LOCATION 1515 @ Railroad Pass, Bridge H-2972S

BORING SBA1

E.A. # 73307-1 GROUND ELEV 2051.40 (ft)

HAMMER DROP SYSTEM_Auto., ETR=87%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE | DEPTH ft | ELEV. ft

STATION OFFSET ENGINEER

EQUIPMENT

"P" 209+59 41 feet Right

Abbas Bafghi

Diedrich D-120, #1082 O. Altamirano

SHEET 4 OF 4

OPERATOR O. Alta

DRILLING 6" H.S.A.

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,	
l l		
)	80.50 End of boring at 80.5 feet.	drilling operation was ended at 1:00 pm.
	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.	т.оо рт.
	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.	



3/15/11 START DATE

3/16/11 **END DATE**

JOB DESCRIPTION Boulder City Bypass - Direct Connect, Southbound

LOCATION **BORING**

I 515 @ Railroad Pass, Bridge H-2972S SBA2

73307-1 E.A. # GROUND ELEV_2050.50 (ft)

HAMMER DROP SYSTEM_Auto., ETR=87%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

ENGINEER

OPERATOR

"P" 210+59 41 feet Right

Abbas Bafghi Diedrich D-120, #1082 EQUIPMENT .

SHEET 1 OF 4

O. Altamirano

DRILLING METHOD 6" H.S.A.

ELEV.	DEPTH		MPLE	BLOW CO				LISCS	MATERIAL RECORDERION
(ft)	(ft)	NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION REMARKS
	1.00	А	SPT	5 8	22	73	W, S, PI		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
	2.50 - 3.50			14					Samples A, B, D, E: POORLY-GRADED SAND WITH SILT AND GRAVEL AND WITH
2045.5	- _ 5.00	В	SPT	8 10 10	20	80	W, S, PI		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. H2972S Weather: Sunny, High 82 degrees
2043.5	6.00								Drill rig chatters at 3 feet and at 6 feet due to presence of cobbles/cemented soil (caliche).
	- 7.50	С	SPT	3 6 9	15	63	W, S, PI	SP SM	
	- 8.50			10					
2040.5	10.00	D	SPT	11 24	35	80	W, S, PI		Sample D: 24 blows was due to blockage of sampler by a rock fragment. Auger cuttings are mainly rock fragments of 100 psi down
	11.00			8					gravel size.
	12.50	E	SPT	15 15	30	77	W, S, PI		
	13.50			7				 	13.00 Samples F, G, H, I: WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) 26 to
2035.5	- 15.00	F	SPT	9 8	17	60	W, S, PI		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.
	16.00			7					
	- 17.50	G	SPT	8	16	73	W, S, PI	sw	
	18.50			. 8				SM	
2030.5	- 20.00	н	SPT	10 12	22	70	W, S, PI		
	21.00			5				-	
-	- 22.50	ı	SPT	8 17	25	67	w, s		22.50
	23.50			16					Samples J, K: <u>SILTY SAND WITH GRAVEL</u> (SM) 17% fine to coarse, hard, angular gravel; 66 to 70% fine to coarse sand; 13 to 17
	- 25.00	J	SPT	20 39	59	73	W, S, PI		% fines of non- plasticity, light brown, dry, v. dense.



END DATE

3/15/11

3/16/11 Boulder City Bypass - Direct Connect, Southbound JOB DESCRIPTION _

I 515 @ Railroad Pass, Bridge H-2972S

LOCATION SBA2 BORING

73307-1 E.A. # GROUND ELEV_2050.50 (ft)

HAMMER DROP SYSTEM_Auto., ETR=87%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

ENGINEER

"P" 210+59 41 feet Right

SHEET 2 OF 4

Abbas Bafghi Diedrich D-120, #1082

EQUIPMENT O. Altamirano OPERATOR

DRILLING METHOD

6" H.S.A.

ELEV.	DEPTH	SA	IPLE	BLOW C	OUNT	_		Hece		
(ft)	(ft)	NO.	TYPE		Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
								SM	Trace of gypsum in sample K.	
	26.00		ODT	400/5 41	100/5 41		144 0 01			
	26.45	K	SPT	100/5.4"	100/5.4"		W, S, PI			
	-									
									28.00	
	28.50							├	28.00 Samples L, M, N, O, P, Q, R:	
	20.00			19	 			†	WELL-GRADED SAND WITH SILT AND	
	<u> </u>	L	SPT	34	56	80	W, S, PI		GRAVEL (SW-SM) 20 to 38% fine to coarse, hard, angular gravel; 54 to 71% fine to	
2020.5 -	30.00			22					coarse sand; 8 to 11 % fines of non- plasticity,	
2020.5	30								dry, v. dense, light brown.	Depth 30 feet:
	L								Sample Q: strong cementation (caliche).	Drilling resumed at 8:00 am on
									Sample R: Trace of gypsum.	3/16/2011.
	-				I					
	F									
	34.50						i			
				17				1		
2015.5	35	м	SPT	29	59	77	W, S, PI			
	36.00	l		30			, -,			
								1		
	_									
	39.50	ļ			ļ			-		
2010.5	40	N	SPT	22 22	E4	70	W, S, PI			
	44.00	1	581	29	51	73	W, S, PI			
	41.00		-	25				-		
					į					
	 									
	L									
	44.50									
2005.5	45			18						
_000.0		0	SPT	23	59	78	W, S, PI			
	46.00	-	 	36				SW		
								SM		
	-									
	+									
	49.50									



END DATE 3/16/11

JOB DESCRIPTION Boulder City Bypass - Direct Connect, Southbound

LOCATION 1515 @ Railroad Pass, Bridge H-2972S

BORING SBA2

E.A. # 73307-1 GROUND ELEV 2050.50 (ft)

HAMMER DROP SYSTEM_Auto., ETR=87%

E	ΧP	LC)R/	۱T	ON	LOG
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GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

ENGINEER

"P" 210+59 41 feet Right

Abbas Bafghi

EQUIPMENT Diedrich D-120, #1082
OPERATOR
O. Altamirano

SHEET 3 OF 4

OPERATOR _ DRILLING METHOD _

6" H.S.A.

ELEV. (ft)	DEPTH (ft)		MPLE TYPE	BLOW C 6 inch Increments	Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION RE	MARKS
	51.00	P	SPT	19 24	43	73	W, S, PI			
1995.5 -	54.50 55			38						
	56.00	Q	SPT	67 53	120	92	W, S, PI			
1990.5 -	59.50	R	SPT	26 38 34	72	87	W, S, PI			
	61.00			J4						
985.5 ~	- 64.50 65 66.00	s	SPT	31 38 41	79	80	W, S, PI	SM	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	
	-								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.	
1980.5 -	69.50 70.00	Т	SPT	107	107		W, PI		samples T and U: high blow counts are due to presence of gravel/cemented soils (caliche).	
	-							GP GM		
	- 74 :59			100/2.1"	100/2.1		W			



START DATE 3/15/11

3/16/11

END DATE 3/16/11

JOB DESCRIPTION Boulder City Bypass - Direct Connect, Southbound

LOCATION 1515 @ Railroad Pass, Bridge H-2972S

BORING SBA2

E.A. # 73307-1 GROUND ELEV 2050.50 (ft)

HAMMER DROP SYSTEM Auto., ETR=87%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET ENGINEER

EQUIPMENT

OPERATOR

"P" 210+59 41 feet Right

SHEET 4 OF 4

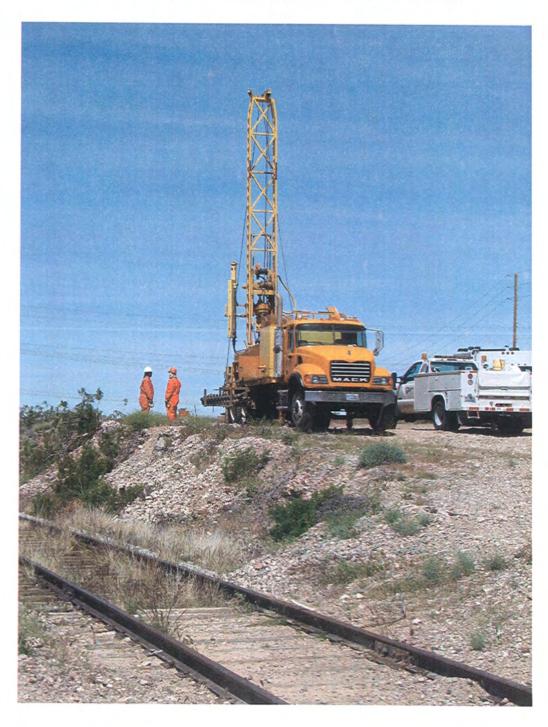
Abbas Bafghi

Diedrich D-120, #1082 O. Altamirano

DRILLING 6" H.S.A.

ELEV.	DEPTH		MPLE TYPE	BLOW CO 6 inch	OUNT Last	Percent	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
(ft)	(ft)	NO.	TYPE	Increments	1 foot	Recov'd		Group	MATERIAL DESCRIPTION	
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.	Depth 77 feet: no advancemer in augering. Drilling operation ender at 1:00 pm.
1965.5 -	85								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.	
1960.5 -	90									
1955.5 -	95									
	-									

Borehole RRBA1 Location



	_
NEVADA	١
DEPARTMENT OF TRANSPORTATION	
GEOTECHNICAL	

END DATE

3/16/11

4/4/11

JOB DESCRIPTION Boulder City Bypass - Railroad Bridge I 515 @ Railroad Pass, Bridge G-2872

LOCATION RRBA1 **BORING**

73307-1 E.A.# 2384.80 (ft) GROUND ELEV_

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

"P" 96+75 51 feet Right

ENGINEER

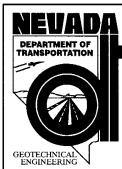
Abbas Bafghi Diedrich D-120, #1082

SHEET 1 OF 4

EQUIPMENT O. Altamirano OPERATOR

DRILLING METHOD 6" H.S.A

GEOTECH ENGINE	NICAL ERING	• •• ••		ROUND EL AMMER DR			uto., ETR =	87%	BACKFILLED Yes DATE 4/04/2011
ELEV.	DEPTH	SAI NO.	MPLE	BLOW Co	OUNT Last	Percent	LAB TESTS	USCS Group	MATERIAL DESCRIPTION REMARKS
(ft) 2379.8	(ft) - - - 5 5.00	Α	SPT	ncieneits 12	1 foot 56/4.75"	Recov'd	W, S, PI		ALLUVIUM: Alluvial deposits of River Mountains formation. Ground surface: silty-sand-gravel-cobbles, occassional 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. Drill rig chatters, hard drilling, presence of cobbles/cemented soils/breccia. 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. Borehole location was chosen based on site access condition. started: 3 pm.
2374.8	- - 10.00 - 1010.33	В	SPT	100/4"	100/4"		W. S. PI	GP GM	300 psi down pressure to depth of 20 feet. 10.00 Sample B: recovery = 4 inches; not enough sample for soil classification. Auger Cuttings: GP-GM (visual classification)
2369.8 -	- <u>45</u>]5:06	6	SPT	29/1"	20/1"		W, Pl		New Tri-Wing drill bit is used at 13 feet. Sample C: recovery = 1 inch; not enough sample for soil classification. Auger Cuttings: GP-GM (visual classification).
2364.8 -	- - 20.000 - 21.50	D	SPT	5 8 10	18	53	W, S, PI	GW GM	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. down-pressure: 100-150 psi from 20 feet down.
	- 25.00)							25.00



EXPLORATION LOG

GROUNDWATER LEVEL

DATE | DEPTH ft | ELEV. ft

SHEET 2 OF 4

4/4/11 END DATE

JOB DESCRIPTION Boulder City Bypass - Railroad Bridge

1515 @ Railroad Pass, Bridge G-2872 LOCATION

RRBA1 BORING

73307-1 E.A. # GROUND ELEV_2384.80 (ft)

"P" 96+75 STATION 51 feet Right OFFSET Abbas Bafghi **ENGINEER** Diedrich D-120, #1082 **EQUIPMENT** O. Altamirano **OPERATOR** DRILLING METHOD 6" H.S.A

GEOTECH ENGINE	HNICAL	الدار		ROUND EL AMMER DI			uto., ETR =	87%	METHOD 6 H.S.A BACKFILLED Yes DATE 4/04/2011
ELEV. (ft)	DEPTH (ft)	SA NO.	MPLE TYPE	BLOW C 6 inch Increments	Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION REMARKS
	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.
2354.8 -	30.80 30.80	l =	SPT	35 50/3.5"	50/3.5"		W, S, PI	SM	30.00 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.
2349.8 -	35.00 36.06	G	SPT	14 44 30/0.75"	30/0.75	•	W, S, PI		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.
2344.8 -	40.00 40 41.50	н	SPT	24 35 35	70	78	W, S, PI		End of the day at 41 feet.
2339.8 -	45.00 4545.43		SPT	70/5"	70/5"		W, S	GP GM	resumed drilling at 9:00 am on 04/04/11.
2339.8 -	50.00								50.00

NEVADA	START DATE	3/16/11	EXPL	ORATIO	N LOG			SHEET 3 OF
DEPARTMENT OF TRANSPORTATION	END DATE	4/4/11				STATION	"P" 96+75	
TRANSPORTATION	JOB DESCRIPT	ION Boulder City Bypass - F	Railroad I	Bridge		OFFSET	51 feet Rig	ht
	LOCATION	I 515 @ Railroad Pass, Brid	ge G-28		ENGINEER	Abbas Bafghi		
	BORING	RRBA1		EQUIPMENT	Diedrich D	-120, #1082		
	E.A.#	73307-1	GROU	NDWATER	LEVEL	OPERATOR	O. Altamira	ano
	GROUND ELEV		DATE	DEPTH ft		DRILLING METHOD	6" H.S.A	
GEOTECHNICAL ENGINEERING		SYSTEM_Auto., ETR = 87%				BACKFILLED	Yes DA	ATE 4/04/2011

SHEET 3 OF 4

ELEV. (ft)	DEPTH (ft)		MPLE TYPE	BLOW C 6 inch Increments	Last	Percent Recovid	LAB TESTS	USCS Group	MATERIAL DESCRIPTION REMARKS
	50.31.	J	SPT	Increments 50/3.75"	50/3.75"	Necova	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 Sample K SILTY GRAVEL WITH SAND
2329.8 -	- 55.00 55.40	К	SPT	50/4.75"	50/4.75"		W, S	GM	(GM) 53% fine to coarse, hard, angular gravel; 27% fine to coarse sand; 20% fines of non-plasticity, dry, v. dense , light brown.
2324.8 -	- - - - - - 61.42	L	SPT	34 49 50/5"	50/5"	93	w, s		60.00 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.
2319.8 -	65.00 65 66.00	м	SPT	54 83	83		W, S, PI	SM	
2314.8 -	- - - - - 70.00								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.
2014.0	71.30	N	SPT	31 59 50/3.5"	50/3.5"		W, S, PI	GP GM	
	75.00								75.00



END DATE

LOCATION

3/16/11

4/4/11

JOB DESCRIPTION Boulder City Bypass - Railroad Bridge

I 515 @ Railroad Pass, Bridge G-2872

RRBA1 BORING 73307-1

E.A.# GROUND ELEV_2384.80 (ft)

HAMMER DROP SYSTEM Auto., ETR = 87%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET **ENGINEER**

"P" 96+75 51 feet Right

Abbas Bafghi

Diedrich D-120, #1082 O. Altamirano

SHEET 4 OF 4

OPERATOR DRILLING METHOD

EQUIPMENT .

6" H.S.A

__ DATE __4/04/2011 BACKFILLED Yes

ELEV.	DEPTH		MPLE TYPE	BLOW C 6 inch	Last	Percent	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
(ft)	75.83		SPT	Increments 54 70/4"	70/4"	Recov'd	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 -	-8689.98	P	SPT	50/1.25"	50/1.25'				80.10 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.	Drilling was terminated at 80 feet at 3:30 pm.
2299.8 -	85								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.	
2294.8 -	90									
2289.8	- 95 -									
	-									



START DATE	3/16/11

END DATE 4/4/11

JOB DESCRIPTION Boulder City Bypass - Railroad Bridge

E.A. # 73307-1 GROUND ELEV 2376.70 (ft)

HAMMER DROP SYSTEM_Auto., ETR = 72%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION _ OFFSET -

ENGINEER

EQUIPMENT

OPERATOR

"P" 98+54 25 feet Right

Margie Boutilier

SHEET 1 OF 3

Diedrich D-120, #1627 Larracuente

DRILLING METHOD 6" H.S.A

BACKFILLED Yes DATE 4/04/2011

ELEV.	DEPTH		MPLE	BLOW C		Percent	I AR TESTS	USCS	MATERIAL DESCRIPTION	DEMVBRE
(ft)	(ft)	NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
									ALLUVIUM: Alluvial deposits of River Mountains formation.	
									Ground surface : silty-sand-gravel-cobbles, occassional boulders, sparsely vegetated (desert brushes Reese Wood), dry.	Borehole location was chosen based on site access condition.
	-								Borehole location is approximately at the same elevation as the railroad track.	200 psi down pressure.
2371.7 -	5.00 5 5.60		SPT		50/1.2"		W, S, PI		5.00 The railroad bridge foundations are approximately 30 feet below this ground	
	_			50/1.2"					surface. Drill rig chatters, hard drilling, presence of	
	-							SP SM	cobbles/cemented soils/breccia. Sample A: POORLY-GRADED SAND WITH SILT AND GRAVEL (SP-SM) 30 % fine to	
	10.00								coarse, hard, angular gravel; 58% fine to coarse sand; 12% fines of non- plasticity, dry, v. dense, light brown.	
2366.7 -		В	SPT	18 19	51		W, S, PI		Sample B : SILTY SAND WITH GRAVEL (SM) 35% fine to coarse, hard, angular	
	11.50			32					gravel; 52% fine to coarse sand; 13% fines of non- plasticity (LL = 36, PL = NP), light brown, dry, v. dense.	
	_									
2361.7 -	15.00 15.30							SM		
2001	1913.30	C	SPI	50/3.6"	50/3.6		W	O.M.		
	<u>_</u>									
2356.7 -	20.00 200.30	D	SPT	50/3.6"	50/3.6"		w.s		20.00 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.	
	-									
2351.7 -	2 5 .99	E	SPT	50/1.3"	50/1.3"	0				
	-									
	_									
	•									
	38.99									

NEVADA	START DATE	3/16/11	EXPL	ORATIO	N LOG			SHEET 2 OF
DEPARTMENT OF TRANSPORTATION	END DATE	4/4/11				STATION	"P" 98+54	
THAT OF THE THE	JOB DESCRIPT	ON Boulder City Bypass - F		OFFSET	25 feet Righ	<u>nt</u>		
	LOCATION	I 515 @ Railroad Pass, Brid	ENGINEER	Margie Bout	ilier			
	BORING	RRBP1	EQUIPMENT	Diedrich D-120, #1627				
	E.A. #	73307-1	GROL	INDWATER	RLEVEL	OPERATOR	Larracuente	
	GROUND ELEV	2376.70 (ft)	DATE	DEPTH ft	ELEV. ft	DRILLING	6" H.S.A	
GEOTECHNICAL						METHOD		4/04/2011
ENGINEERING	HAMMER DROP	SYSTEM_Auto., ETR = 72%				BACKFILLED	Yes DAT	E 4/04/2011

GEOTECH ENGINE	INICAL EERING		HA	AMMER DR	ROP SYS	STEM_A	uto., ETR =	72%	BACKFILLED Yes D	ATE 4/04/2011
ELEV.	DEPTH (ft)		TYPE	BLOW Co 6 inch Increments 50/1.3"	OUNT Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
2341.7 -	- - - - 3:45.99	F	SPT		50/1.4"	0		GP GM		
2336.7 -	- - - 4(\$10.99		SPT	50/1.5*	50/1.5"	0				The 40-foot deep borehole was backfilled with the cutting on 3/17/2011.
2331.7 -	45.00 4545.37	J	SPT	50/4.4"	50/4.4"		W. S		45.00 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.	On 4/4/2011, the backfilled borehole was re-drilled to the depth of 40 feet and drilling continued.
2326.7	5 5 8.90 - 5 5 8.21	K	SPT	50/2.5*	50/2.5"	0				
2321.7 - 232	- 5555.00 555.45	L	SPT	50/5.4"	50/5.4"		W, S			
	60.00									

NEVADA	START DATE	3/16/11	EXPLORATION LOG		SHEET 3
DEPARTMENT OF	END DATE	4/4/11		STATION	"P" 98+54
TRANSPORTATION	JOB DESCRIPT	- OFFSET	25 feet Right		
	LOCATION	I 515 @ Railroad Pass, Brid	ENGINEER	Margie Boutilier	
	BORING	RRBP1	· · · · · · · · · · · · · · · · · · ·	EQUIPMENT	Diedrich D-120, #1627
	E.A. #	73307-1	GROUNDWATER LEVEL	OPERATOR	Larracuente
	GROUND ELEV	2376.70 (ft)	DATE DEPTH ft ELEV. ft	DRILLING METHOD	6" H.S.A
GEOTECHNICAL ENGINEERING		SYSTEM_ Auto., ETR = 72%		BACKFILLED	Yes DATE 4/04/20

SHEET 3 OF 3

ELEV.	DEPTH SAMPLE BLOW COUNT DEPTH NO TYPE 6 inch Last Percent LAB TESTS USCS							USCS	MATERIAL DESCRIPTION	REMARKS
(ft)	(ft) 60.36	NO.	SPT	6 inch Increments 50/4.3"	1 foot 50/4.3"	Recov'd	W.S	USCS Group	MATERIAL DESCRIPTION	REMARKS
2311.7 -	- 65							SM		Drilling chatters at 62 feet. Down pressure was reduced to 100 psi. At 65 feet: drill string was pull out. The drill b was sheared o A new bit was used.
2306.7 -	70.00 70.32	N	SPT	50/3.8"	50/3.8"		W, S			
2301.7 -	75.00 75 76.35	0	SPT	32 44 50/4.2"	50/4.2"	87	W, S, PI			
2296.7 -	80.80 80.80	-	SPT	43 -50/3.6"	50/3.6"		W, S, Pl	sc	80.00 80.80 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. End of boring at 80.8 feet.	
2291.7 -	- - - 85								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	



4/5/11 START DATE

4/6/11

Boulder City Bypass - Railroad Bridge

JOB DESCRIPTION _ I 515 @ Railroad Pass, Bridge G-2872 LOCATION

RRBA2 BORING

END DATE

73307-1 E.A. #

GROUND ELEV_2381.20 (ft)

HAMMER DROP SYSTEM_ Auto., ETR = 87%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

ENGINEER

EQUIPMENT

"P" 100+61 125 feet Right

Abbas Bafghi

Diedrich D-120, #1082 O. Altamirano

OPERATOR DRILLING METHOD 6" H.S.A

BACKFILLED Yes DATE 4/06/2011

SHEET 1 OF 4

ELEV.	DEPTH	SA NO.		6 inch	Last	Percent	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
(ft)	(ft)			Increments	1 foot	Recov'd		CIOUP	ALLUVIUM: Alluvial deposits of River Mountains formation. Ground surface: silty-sand-gravel-cobbles, occassional 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. Drill rig chatters, hard drilling, presence of cobbles/cemented soils/breccia.	Borehole location was chosen based on site access condition and overhead pow line and underground utilities. Tri-Wing bit.
2376.2 -	6.50	А	SPT	30 17 17	34	73	W, S, Pl		Samples A, C, F: WELL-GRADED GRAVEL WITH SILT AND SAND (GW-GM) 47 to 51% fine to coarse, hard, angular gravel; about 41 to 43% fine to coarse sand; about 8 to 10% fines of non- plasticity, dry, dense, light brown.	100 psi down-pressur depth 0 to 5
2371.2 -	- - 1018.99	B	SPT	50/1.5"	50/1.5"		W. S. Pl		Drill rig chatters occassionally through the depth explored. Chattering of the drill rig is indicative of the presence of cemented soil (caliche) or cobbles/boulders.	feet: 6 minute drilling time.
	-									depth 5 to 10 feet: 9 minute drilling time.
2366.2 -	- 15 ^{15.00}	С	SPT	29 45	88	73	W, S, PI			depth 10 to 1
	16.50			43						depth 15 to 20
2361.2 -	2 2 8:98	D	SPT	50/2.25" :	50/2.25"		w,s	GW GM		feet: 6 minute drilling time. Due to lack o augering
	- 25.00									advancement 20 feet, drillin was terminate at 4:00 pm. A new borehold location was chosen 5 feet the south of toriginal borehold cation. At the south of the sout



4/5/11 START DATE

4/6/11 JOB DESCRIPTION Boulder City Bypass - Railroad Bridge

I 515 @ Railroad Pass, Bridge G-2872

RRBA2 BORING

E.A. #

END DATE

LOCATION

73307-1 GROUND ELEV_2381.20 (ft)

HAMMER DROP SYSTEM Auto., ETR = 87%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION

OFFSET

"P" 100+61

125 feet Right Abbas Bafghi

SHEET 2 OF 4

ENGINEER Diedrich D-120, #1082 EQUIPMENT

O. Altamirano OPERATOR

DRILLING METHOD 6" H.S.A

DATE 4/06/2011 BACKELLED Yes

E	NGINE	NICAL ERING		HA	AMMER DF	ROP SYS	STEM_A	uto., ETR =	0770	BACKFILLED Yes DA	TE <u>4/06/2011</u>
	.EV. ft)	DEPTH (ft)		MPLE TYPE	BLOW C 6 inch Increments 50/2,5"		Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
235	51.2	25.20		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.
	-	-	F	SPT	46	86		W, S, PI			feet: 3 minutes drilling time.
234	46.2	31.50 - - - - - - - - 35.44	G	SPT	70/5.25"	70/5 25"		W, S, PI		.35.00Sample G: SILTY SAND WITH GRAVEL	depth 30 to 35
	-	- - - 4: 4 8: 9 8								(SM) — 29% fine to coarse, hard, angular gravel; 58% fine to coarse sand; 13% fines of non- plasticity, light brown, dry, v. dense.	feet: 3 minutes drilling time.
	41.2	-		SPT	50/1.3"	50/1.3"		W, S	SM	45.00	depth 35 to 40 feet: 3 minutes drilling time.
9 LOS 233	36.2	45.00 45	1	SPT	21 51	50/2"	80	W, S, PI		45.00 Sample I: CLAYEY SAND WITH GRAVEL (SM) 24% fine to coarse, hard, angular	depth 40 to 45 feet: 2 minutes
NV_DOT BCB RRB.GPJ NV_DOT.GDT 6/16/11	-	- 46.20 - - 50.00			50/2"				sc	gravel; 48% fine to coarse sand; 28% fines of low plasticity (LL = 38, PL = 19), light brown, dry, v. dense.	drilling time.



START DATE

END DATE

LOCATION

4/5/11

4/6/11

JOB DESCRIPTION Boulder City Bypass - Railroad Bridge

I 515 @ Railroad Pass, Bridge G-2872 RRBA2

BORING

73307-1 E.A. # GROUND ELEV_2381.20 (ft)

HAMMER DROP SYSTEM_Auto., ETR = 87%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

"P" 100+61

125 feet Right Abbas Bafghi

ENGINEER Diedrich D-120, #1082 EQUIPMENT _

SHEET 3 OF 4

O. Altamirano OPERATOR

DRILLING METHOD 6" H.S.A

BACKFILLED Yes DATE 4/06/2011

1	DEPTH		MPLE	BLOW C	TNUC			LISCS	MATERIAL DESCRIPTION	DEMARKS
ELEV. (ft)	(ft)	<u> </u>	TYPE	IIIO CITICITIS	Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	-	J	SPT	50/0.25" (50/0.25"		W, S, PI		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 -	55.04 _	К	SPT	60/0.5"	60/0.5" -		W, S, Pl			depth 50 to 55 feet: 2 minutes drilling time.
2321.2 -	60.35) 5 L	SPT	70/4.25"	70/4.25'					depth 55 to 60 feet: 2 minutes drilling time.
2316.2 -	65.00 6565.33) 3 M	SPT	50/4"	50/4"		W, S	SM		depth 60 to 65 feet: 2 minutes drilling time.
2311.2	- - - - - - - - - - - - - - - - - - -	0 5 N	SPT	50/3"	50/3"					depth 65 to 70 feet: 2 minutes drilling time.
	75.0	0							75.00	

NEVADA	START DATE	4/5/11	EXPL	ORATIO	N LOG			SHEET 4 OF
DEPARTMENT OF	END DATE	4/6/11				STATION	"P" 100+6	31
TRANSPORTATION	JOB DESCRIPTI	ON Boulder City Bypass - F	Railroad I	3ridge		OFFSET	125 feet F	Right
	LOCATION	I 515 @ Railroad Pass, Brid	ge G-28	72		ENGINEER	Abbas Ba	ıfghi
	BORING	RRBA2				EQUIPMENT	Diedrich [D-120, #1082
		73307-1	GROU	NDWATER	LEVEL	OPERATOR	O. Altami	rano
	E.A. # GROUND ELEV.	0004.00 (0)	DATE	DEPTH ft		DRILLING METHOD	6" H.S.A	
GEOTECHNICAL ENGINEERING	HAMMER DROP	A 4- ETD 070/				BACKFILLED	Yes	DATE 4/06/2011

SHEET 4 OF 4

ELEV. (ft)	DEPTH (ft)		MPLE TYPE	BLOW C 6 inch Increments	Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
(11)	- 76.20 -	0	SPT	91	100/2.5"		W, S, PI	SP	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.
	-							SM		depth 75 to 80 feet: 2 minutes drilling time.
2301.2 -	80.00 - 80 - 81.20	P	SPT	58 43 100/2.25"	00/2.25	' 67	w, s	GP GM	80.00 Sample P POORLY-GRADED GRAVEL WITH SILT AND SAMD (GP-GM) 47% fine to coarse, hard, angular gravel; 42% fine to coarse sand; 11% fines of non-plasticity, dry, v. dense, light brown.	Drilling was terminated at 2:15 pm.
	-								End of boring at 81.2 feet.	
2296.2 -	- 8 5								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.	
2291.2 -	90									
	-									
2226 2	-									
2286.2 -	95 									
	- -									
	_									



11/2/09 START DATE

11/2/09

JOB DESCRIPTION Boulder City Bypass - Phase 1 I 515 @ Railroad Pass, Retaining Wall

LOCATION BORING

END DATE

BRW1

73307-1 E.A.# GROUND ELEV_2356.12 (ft)

HAMMER DROP SYSTEM Auto., ETR=72%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

"P"106+60 **ENGINEER**

95 feet Right Abbas Bafghi

SHEET 1 OF 3

Diedrich D-120, #1627 EQUIPMENT D. White OPERATOR

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes

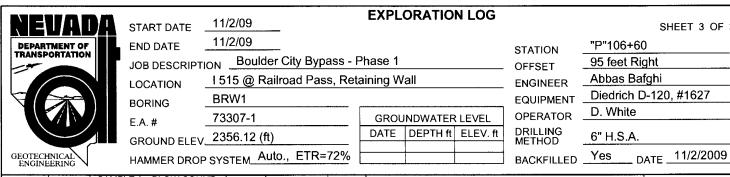
_ DATE __11/2/2009

ELEV.	DEPTH		MPLE	BLOW CO	OUNT Last	Percent	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
(ft)	(ft) 0.00		TYPE	Increments	1 foot	Recov'd	27.5 12010	Group	PROBABLE FILL:	
	-		\UGE	٦			RV, S, PI	GP G M	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. Advanced auger to 5.0 feet. Drill rig chatters. 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. Occasional drill chatter.	Retaining Wall Location Started: 9:00 am Weather: Sunn (67-80 degrees NDOT Rig Uni # 1627
2351.1 -	5 5.00							<u> </u>		150 psi down
	6.50	Α	SPT	32 48 60	108	80	s		Sample A: WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) 43% fine to coarse, hard, angular gravel; 45% fines; light brown color (5 YR 5/6), dry. Sampler shoe was plugged by a gravel	pressure
	_	2 /	S UGE	3			RV, S, PI	SW SM	fragment. 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. Occasional drill chatter.	
	10.00								10.00	
2346.1 -	_	В	SPT	15 27 29	56		s		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.	Sample B: ne sampler shoe
	11.50							GW		
	-							GM		Easier drilling from 13 feet to 17 feet.
ļ	15.00								15.00	

	NEVADA	START DATE .	11/2/09
	DEPARTMENT OF	END DATE	11/2/09
ĺ	TRANSPORTATION	JOB DESCRIPTI	ON Boulder
		LOCATION .	l 515 @ Rail
		BORING .	BRW1
		E.A. #	73307-1
		GROUND ELEV.	2356.12 (ft)
	GEOTECHNICAL ENGINEERING	HAMMER DROP	
	ENGINEERING 1		

2/09	EXPL	ORATIO	N LOG			SHEET 2 OF 3
2/09				STATION	"P"106+60	
Boulder City Bypass	- Phase 1			OFFSET	95 feet Righ	nt
I5 @ Railroad Pass, R	etaining W	/all		ENGINEER	Abbas Bafg	hi
W1				EQUIPMENT	Diedrich D-	120, #1627
307-1	GROU	JNDWATER	R LEVEL	OPERATOR	D. White	
56.12 (ft)	DATE	DEPTH ft	ELEV. ft	DRILLING METHOD	6" H.S.A.	

HAMMER DROP SYSTEM_AUTO_ ETR=72% SACKFILLED VOS DATE 11/2/2009 SAMPLE SLOW COLNT. SECOND SAMPLE SLOW COLNT. SECOND SAMPLE SLOW COLNT. SECOND SECOND SAMPLE SLOW COLNT. SECOND SECOND SECOND Sample C: WELL-GRADED SAND WITH SILT AND GRAVEL (SWS-SB) - 20% fine to coases, lead, angular gravel. (% fine be coases, lead, angular gravel.) (% fine so coases, lead, angular gravel.) (% fine to					ROUND EL					METHOD 6 H.S.A.
No. Type	GEOTECH ENGINE	INICAL EERING		HA	MMER DR	OP SYS	STEM_A	uto., EIR=	72%	BACKFILLED Yes DATE 11/2/2009
(6) No. 1/YFE nonements 1 foot. Becovis C SPT 15 33 67 S 18.50 D SPT 36 105 80 S 2336.1 D SPT 36 105 80 S 21.50 E SPT 40 50/1.5* 93	FLEV	DEPTH				TNUC	Davaget	LABTECTO	USCS	MATERIAL DESCRIPTION DEMARKS
233.1 2 2 3 1 5 2 3 3 67 S SILT AND GRAVEL (SW-SM) - 29% fine to coarse, hard, angular savel, 54% fine to coarse, hard, angular savel, 44% fine to coarse, hard, angular savel, 44% fine to coarse, hard, angular savel, 45% fine to coarse, hard			NO.	TYPE	Increments	1 foot	Recovid	LADIESIS	Group	
238.1 26.50			С	SPT		33	67	s		SILT AND GRAVEL (SW-SM)29% fine to coarse, hard, angular gravel; 64% fine to coarse, hard, angular sand; 7% fines of
2336.1 2000 D SPT 36 105 80 S 21.50 E SPT 40 50/1.5° 93 E SPT 40 50/1.5° 93 SW SM SW SM Sample D: WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) 42% fine to coarse, hard, angular sand; 10% fines of non-plastic; light brown color (5 YR 5/6), dry. SW SM Sample E: LL = 25, PL = 20. Not enough sample for gradedions. Sampler is hitting on gravel/cobble.		16.50			18					Hori-plastic, light brown color (5 TY 5/5), dry.
2331.1 25.00 E SPT 40 50/1.5" 93 SW SAMPLE SAMPLE SILT AND GRAVEL (SW-SM) 42% fine to coarse, hard, angular gravel, 49% fines of non-plastic; light brown color (5 YR 5/6), dry. Silt AND GRAVEL (SW-SM) 42% fine to coarse, hard, angular gravel, 49% fines of non-plastic; light brown color (5 YR 5/6), dry. SW SM Sample E: LL = 25, PL = 20. Not enough sample for gradations. Sampler is hitting on gravel/cobble.		10.50								
2331.1 25.00 E SPT 40 50/1.5" 93 SW SAMPLE SAMPLE SILT AND GRAVEL (SW-SM) 42% fine to coarse, hard, angular gravel, 49% fines of non-plastic; light brown color (5 YR 5/6), dry. Silt AND GRAVEL (SW-SM) 42% fine to coarse, hard, angular gravel, 49% fines of non-plastic; light brown color (5 YR 5/6), dry. SW SM Sample E: LL = 25, PL = 20. Not enough sample for gradations. Sampler is hitting on gravel/cobble.		-							CIVI	
2331.1 25.00 E SPT 40 50/1.5" 93 SW SM S S SILT AND GRAVEL (SW-SM) 42% fine to coarse, hard, angular sand; 10% fines of non-plastic; light brown color (5 YR 5/6), dry. SW SM Sample E: LL = 25, PL = 20. Not enough sample for gradations. Sampler is hitting on gravel/cobble.	2336.1 -	20.00	<u> </u>						-	
2331.1 E SPT 40 50/1.5" 93 SW SM S Sample E: LL = 25, PL = 20. Not enough sample for gradations. Sampler is hitting on gravel/cobble.					44					SILT AND GRAVEL (SW-SM) 42% fine to
2331.1			D	SPT	36	105	80	s		coarse, hard, angular gravel; 49% fine to coarse, hard, angular sand; 10% fines of
2331.1 25 SW Sample E: LL = 25, PL = 20. Not enough sample for gradations. Sampler is hitting on gravel/cobble.		-			60					
E SPT 40 50/1.5" 93 sample for gradations. Sampler is hitting on gravel/cobble.		21.50)		09				1	
E SPT 40 50/1.5" 93 sample for gradations. Sampler is hitting on gravel/cobble.										
E SPT 40 50/1.5" 93 sample for gradations. Sampler is hitting on gravel/cobble.	22211.	25.00)							Sample E: LL = 25, PL = 20. Not enough
E SPT 40 50/1.5" 93 - 26.13 - 50/1.5"	2001.1	25			1				SM	sample for gradations. Sampler is hitting on
- 26.13 50/1.5" -			E	SPT	40	50/1.5"	93			grave//cobbie.
		- 26.13	3							
30.00					50/1.5"					
30.00										
30.00		 								
- 30.00										
30.00		-								
30.00										
30.00										
30.00		-								
30.00										
		30.00								30.00



SHEET 3 OF 3

ENGINI	ERING V					SIEM	uto., Liit	<u></u> L	BACKFILLED L	DATE
ELEV.	DEPTH		MPLE	BLOW C 6 inch	OUNT Last	Percent	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
(ft)	(ft)	NO. F	SPT	Increments 25		Recov'd	S	Group	Sample F: <u>WELL-GRADED GRAVEL WITH</u> <u>SILT AND SAND (GW-GM)</u> 49% fine to coarse, hard, angular gravel; 42% fine to	T.L.W. W. W.
	30.92			50/5.0"				GW GM	coarse, hard, angular sand; 9% fines of non-plastic; light brown color (5 YR 5/6), dry. Sampler is hitting on gravel/cobble.	
									Drill rig chatters (0.5"/5 miniutes), very hard drilling, strong cementation (Caliche).	A new auger head is used.
									33.00 End of Boring at 33 feet. Backfilled with auger cuttings. Groundwater was not encountered.	Drilling was
									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.	terminated at 3:00 pm.
2321.1 -	35	-							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.	
2316.1	40									
	_									
	_									
	_									

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



START DATE 11/3/09 END DATE 11/3/09

EXPLORATION LOG

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

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET ENGINEER

EQUIPMENT

OPERATOR

100 feet Right Abbas Bafghi

Diedrich D-120, #1627

SHEET 1 OF 2

D. White

"P"109+10

DRILLING 6" H.S.A.

ELEV.	DEPTH		MPLE	BLOW Co		Percent	LAB TESTS	uscs	MATERIAL DESCRIPTION	DEMARKS
(ft)	(ft)	└	TYPE	Increments	Last 1 foot	Recovid	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	-		JUGEI	₹			RV, S, PI	GP G M	PROBABLE FILL: Approximately 3 feet of fill; ground surface is composed of gravels/cobbles, sand, and fines, dry. Advanced auger to 5.0 feet. ALLUVIUM: 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. Drill rig chatters.	Retaining Wall Location Started: 8:00 am Weather: Sunn (67 to 82 degrees) NDOT Rig Unit # 1627 New pilot bit (center head)
2333.6 -	5.00 5.33	A	SPT	50/4"	R		S		5.00	New SPT shoe for sample A
	-		.UGEI	R			RV, S, PI	GM	Sample A: SPT bouncing on cobble/boulder; only 4 inches of recovery. Sample A: SILTY GRAVEL WITH SAND (GM) 58% fine to coarse, hard, angular gravel; 31% fine to coarse, hard, angular sand; 11% fines. Sample A is composed of rock fragments in the matrix of fines. 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. Most of the auger cuttings are fractured gravel size rock fragments with some subangular cobbles. Drill rig chatters.	Drilling Terminated at: 10:10 am due lack of advancement.
	10.00								10.00	



11/3/09 START DATE

GROUND ELEV_2338.60 (ft)

EXPLORATION LOG

SHEET 2 OF 2

11/3/09 END DATE JOB DESCRIPTION Boulder City Bypass - Phase 1

STATION OFFSET

"P"109+10 100 feet Right

LOCATION

I 515 @ Railroad Pass, Retaining Wall

ENGINEER EQUIPMENT Abbas Bafghi Diedrich D-120, #1627

BORING E.A. #

BRW2 73307-1

GROUNDWATER LEVEL DATE DEPTH ft ELEV. ft

D. White **OPERATOR** DRILLING METHOD 6" H.S.A.

HAMMER DROP SYSTEM Auto., ETR=72%

ELEV.	DEPTH		IPLE TYPE	6 inch	Last	Percent	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
(ft)	(ft)	INU.	ITE	Increments 18	1 foot	Recov'd		Group	Advanced auger to 14.75 feet.	New SPT shoe for sample B
		В	SPT	17	36	80			Sample B: LL = 22, PL = non.	Easier drilling from 10 to 13.5 feet.
	11.50			19						
									Drill rig chatters.	
								GP GM		
								GW		
	-									
	-									
									14.50	
									End of Boring at 14.75 feet. Backfilled with auger cuttings. Groundwater was not encountered.	
2323.6 -	15								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.	
	-									
	-									



11/3/09 START DATE

11/3/09

Boulder City Bypass - Phase 1 JOB DESCRIPTION _

I 515 @ Railroad Pass, Retaining Wall LOCATION **BORING**

BRW3

E.A. #

END DATE

73307-1 GROUND ELEV_2336.50 (ft)

HAMMER DROP SYSTEM_Auto., ETR=72%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION

EQUIPMENT

OPERATOR

120 feet Right **OFFSET ENGINEER**

Abbas Bafghi Diedrich D-120, #1627

D. White

"P"110+80

DRILLING METHOD 6" H.S.A.

__ DATE __11/3/2009 BACKFILLED Yes

SHEET 1 OF 4

ELEV. (ft)	DEPTH (ft)	NO.	MPLE TYPE	4	Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.00		AUGE		71000	Necov u	RV, S, PI	SP SM	ALLUVIUM: Ground surface has no vegetation. It is composed of mostly sand and gravels. sloping East to West. Advanced auger to 5.0 feet. Occasional drill chatter. 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.	Retaining Wall Location Started: 10:52 am Weather: Sunn 75 degrees
0004.5	_ 5.00								Occasional drill chatter.	NDOT Rig Unit #1627 6 in. O.D. HSA
2331.5	6.50	А	SPT	38 38 44	82	87	s		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.	100 psi down pressure
	-	2	AUGE	:R			RV, S, PI	SW SM	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.	
2326.5 -	10.00								Occasional drill chatter.	
2320.3	11.00	В	SPT	12 55	55	75	PI		Sample B: 20 blows per first 3.0 inches then it hit gravel/cobble. LL = 24, PL = 23.	
								SW SM		Easier drilling from 13 feet to 17 feet.
_	15.00)							15.00	



START DATE	11/3/09
717011 0711	

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%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

ENGINEER

EQUIPMENT

OPERATOR

"P"110+80

120 feet Right Abbas Bafghi

Diedrich D-120, #1627

SHEET 2 OF 4

D. White

DRILLING 6" H.S.A.

ENGINE	EERING					STEM	uto., EIR=	7270	BACKFILLED Yes DATE	11/3/2009
ELEV. (ft)	DEPTH (ft)	NO.	MPLE TYPE	BLOW C	Last	Percent	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
(II)	16.50	С	SPT	23	54	73	PI	SW SM	Sample C: LL = 22, PL = non. Recovery length = 1.1 feet.	
2316.5 -	20.00 20.73	D	SPT	41 40/2.75"	40/2.75"		S		20.00 Sample D: SILTY GRAVEL WITH SAND (GM)43% fine to coarse, hard, angular gravel; 43% fine to coarse, hard, angular sand; 14% fines of non-plastic; light brown color (5 YR 5/6), dry. Drill rig chatters occasionally.	
2311.5 -	- - 25 ^{25.00})		13				GM	25.00 Sample E: Recovery = 1.0 feet. LL = 20, PL =	
	26 .50	E	SPT		39	67		SW SM	non.	
:	30.00								30.00	



START DATE

END DATE

LOCATION

11/3/09

11/3/09

JOB DESCRIPTION Boulder City Bypass - Phase 1

I 515 @ Railroad Pass, Retaining Wall

BRW3 BORING

73307-1 E.A. # GROUND ELEV_2336.50 (ft)

HAMMER DROP SYSTEM_Auto., ETR=72%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

"P"110+80 120 feet Right

SHEET 3 OF 4

Abbas Bafghi **ENGINEER** Diedrich D-120, #1627 EQUIPMENT

D. White

OPERATOR DRILLING METHOD

6" H.S.A.

__ DATE __11/3/2009 BACKFILLED Yes

ELEY	DEDTIL	SAN	IPLE	BLOW C				Hece		
ELEV. (ft)	DEPTH (ft)		TYPE	C:L	Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	31.50	F	SPT	23 50 65	115	. <u>1000</u> V	S, PI		Sample F <u>WELL-GRADED SAND WITH SILT</u> <u>AND GRAVEL (SW-SM)</u> 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.	
								SW SM	Drill rig chatters occasionally.	
2301.5 -	35.00 35.77	G	SPT	46 50/3.25"	50/3.25'		S		35.00 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.	
								SW SM	Drill rig chatters occasionally.	
2296.5 ·	40.00			57					40.00 Sample H <u>WELL-GRADED SAND WITH SIL</u> T <u>AND GRAVEL (SW-SM</u>) 44% fine to coarse,	
	41.50	Н	SPT	54 59	113	80	S		hard, angular gravel; 49% fine to coarse, hard, angular sand; 7% fines of non-plastic; light brown color (5 YR 5/6), dry.	
	41.30							SW SM	Drill rig chatters occasionally.	
	45.00								45.00	



START DATE	11/3/09	
Q 17 (1 C) D/ (1 E		

END DATE _______

JOB DESCRIPTION Boulder City Bypass - Phase 1
LOCATION I 515 @ Railroad Pass, Retaining Wall

LOCATION BORING

BRW3

E.A. # 73307-1 GROUND ELEV 2336.50 (ft)

HAMMER DROP SYSTEM Auto., ETR=72%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

ENGINEER

EQUIPMENT

OPERATOR

"P"110+80

120 feet Right Abbas Bafghi

Diedrich D-120, #1627

SHEET 4 OF 4

D. White

DRILLING 6" H.S.A.

ELEV.	DEPTH		APLE TYPE	BLOW C	Last	Percent	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
(ft)	(ft) - 46.15	ı	SPT	Increments 28		Recov'd	S	Group	Sample I: POORLY-GRADED SAND WITH SILT AND GRAVEL (SP-SM)45% fine to coarse, hard, angular sand; 9 % fines of non-plastic; light brown color (5 YR 5/6), dry. Drill rig chatters occasionally.	
								SP SM		Drilling Ended: 3:45 pm
2286.5	50.73	J	SPT	32 50/2:75"	50/2.75"		s	SP SM	50.00 Sample J: Recovery = 2.75 inches. Sampler is bouncying on cobble. 9% fines. 50.73	
	_			30/2./3					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.	
2281.5	55									
	-									



11/4/09 START DATE

11/4/09

JOB DESCRIPTION Boulder City Bypass - Phase 1 I 515 @ Railroad Pass, Retaining Wall

BRW4 BORING

END DATE

LOCATION

73307-1 E.A.# GROUND ELEV 2325.30 (ft)

HAMMER DROP SYSTEM_Auto., ETR=72%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

ENGINEER

"P"112+90 120 feet Right

Abbas Bafghi

SHEET 1 OF 4

Diedrich D-120, #1627 EQUIPMENT D. White OPERATOR

DRILLING METHOD 6" H.S.A.

_ DATE __11/4/2009 BACKFILLED Yes

ELEV. (ft)	DEPTH (ft)		MPLE TYPE	BLOW C 6 inch Increments	Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
(1)	0.00		S UGE		Tiost	Recova	RV, S, PI	GP GM	Ground surface is flat, covered with some Reese Wood vegetation, sand/ gravels/cobbles and some fines. Ground surface is dry. 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. Auger cuttings has some hard subangular cobbles.	Retaining Wall Location Started: 8:30 am Weather: Sunny (67-82 degrees NDOT Rig Unit #: 1627
2320.3	5 5.00							<u> </u>	5.00 Sample A: WELL-GRADED GRAVEL WITH	150 psi down
	- 6.50	А	SPT	12 18 17	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.	pressure
	-	2 /	JUGE	R			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	
	10.00								10.00	
2315.3	10 ¹	В	SPT	19 21 50	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. Auger cuttings has some hard subangular	
	_								cobbles.	
	-							GW GM	Drill rig chatters occasionally.	
	_									
	15.00								15.00	

NEVADA
DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

START DATE END DATE

LOCATION

E.A.#

11/4/09

11/4/09

JOB DESCRIPTION Boulder City Bypass - Phase 1

I 515 @ Railroad Pass, Retaining Wall

BRW4 **BORING** 73307-1

GROUND ELEV_2325.30 (ft) HAMMER DROP SYSTEM Auto., ETR=72% **EXPLORATION LOG**

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

ENGINEER

"P"112+90 120 feet Right

Abbas Bafghi

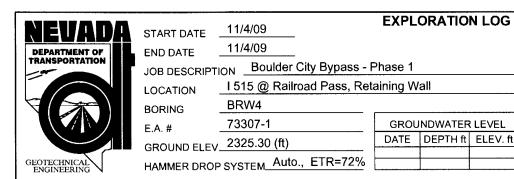
SHEET 2 OF 4

Diedrich D-120, #1627 EQUIPMENT D. White OPERATOR

DRILLING METHOD

6" H.S.A.

	DEDT	SAN	/PLE	BLOW C	OUNT			LICCO		
ELEV. (ft)	DEPTH (ft)		TVDE	٠, ١	Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
(-7	16.50	С	SPT	13 23 42	65	73	s		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.	
	10.50								Auger cuttings has some hard subangular cobbles.	
								SW	Occasional boulders.	
								SM	Drill rig chatters occasionally.	
2305.3	20.00								20.00	
2505.5	20	_		16					Sample D: LL = 20, PL = non. Recovery length = 1.2 feet. Not enough for gradations.	
	04.50	D	SPT	30 28	58	80			Auger cuttings had some hard, subangular gravels and cobbles.	
	21.50								g.e	
			***					SW SM		
	-									
	_									
2300.3	25.00 25.25	E	SPT	50/3.0"	50/3.0"			_	25.00 Sample E: SPT is bouncing on cobble. Recovery = 0.6 feet. LL = 18, PL = non.	
	-									
									Auger cuttings has some hard subangular gravel/cobbles.	
								sw		
	_							SM		
	30.00								30.00	



	SHEET 3 OF
STATION	"P"112+90
_ OFFSET	120 feet Right
ENGINEER	Abbas Bafghi
FQUIPMENT	Diedrich D-120, #1627
OPERATOR	D. White
DRILLING	011104
METHOD	6" H.S.A.

ELEV. (ft)	DEPTH (ft)		MPLE TYPE	6 inch Increments	Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION REMARKS
(iv)	30.98	F	SPT	20	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.
2290.3 ·	35.96	G	SPT	24 50/5.5"	50/5.5"			GM	35.00 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.
22 85. 3 ·	40.00 400.17	H	SPT	35/2.0"	35/2.0"				40.00 Sample H: SPT bouncing on cobble/boulder (no advancement). LL = 22, PL = non.
	45.00							GM	45.00

NEVADA	START DATE	11/4/09	EXPL	ORATIO	N LOG			SHEET 4 OF 4
DEPARTMENT OF	END DATE	11/4/09				STATION	"P"112+90	
TRANSPORTATION	JOB DESCRIPT	ION Boulder City Bypass - I	Phase 1	OFFSET	120 feet Right			
	LOCATION	I 515 @ Railroad Pass, Ret	all		ENGINEER	Abbas Bafghi		
	BORING	BRW4		EQUIPMENT	Diedrich D-120, #1627			
	E.A. #	73307-1	GROU	INDWATER	RLEVEL	OPERATOR	D. White	
	GROUND ELEV	2325.30 (ft)	DATE	DEPTH ft	ELEV. ft	DRILLING METHOD	6" H.S.A.	
GEOTECHNICAL ENGINEERING		P SYSTEM_Auto., ETR=72%				BACKFILLED	Yes DATE	11/4/2009_

REMARKS
el

NEVADA	1
DEPARTMENT OF TRANSPORTATION	
GEOTECHNICAL ENGINEERING	

1/10/07 START DATE 1/16/07 END DATE

BORING

EXPLORATION LOG

JOB DESCRIPTION Boulder City Bypass-Phase 1

I 515 @ Railroad Pass, Roadway Cut LOCATION RRC1

73307-1 E.A. # GROUND ELEV_2371.79 (ft)

HAMMER DROP SYSTEM_Auto., ETR=65%

STATION

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

OFFSET **ENGINEER**

EQUIPMENT

Abbas Bafghi Diedrich D-120, #1627

SHEET 1 OF 4

D. White

0 ft.

"P"100+75

OPERATOR DRILLING METHOD

6" H.S.A./Rotary Wash

ELEV.	DEPTH	SAI	MPLE	BLOW C				Hece		
(ft)	(ft)		TYPE	6 inch Increments	Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	-		UGEI	R			RV, S, Pi, Ch	GM	Ground surface is dry, covered with scattered desert brushes (Reese Wood vegetation) and scattered coarse gravels/cobbles. Ground surface is sloping to West. 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. Drill rig chatters occasionally.	Location: Roadway Cut drill rig unit #1627 weather: cloudy low=22 degree high=51 degrees Drilling started
2366.8 -	5 5.00	А	SPT	12 47 50/1.3"	50/1.3"				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 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	8:30 am.
	-	RVA	l UGEI	R			RV, S, PI, Ch	SP SM	LL=25; light brown color (5 YR 5/6), dry. Drill rig chatters.	
2361.8	10.00 10,09	В	SPT	50/1.1*	50/1 1"				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.	down pressure 100 psi
						,			Drill rig chatters occasionally.	
					l		1	1	Occasional cemented materials (caliche).	I

NEVADA	l
DEPARTMENT OF TRANSPORTATION	
GEOTECHNICAL	

1/10/07 START DATE

1/16/07

JOB DESCRIPTION Boulder City Bypass-Phase 1 I 515 @ Railroad Pass, Roadway Cut

LOCATION RRC1 **BORING**

END DATE

73307-1 E.A.# GROUND ELEV_2371.79 (ft)

HAMMER DROP SYSTEM_Auto., ETR=65%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

EQUIPMENT

"P"100+75 0 ft.

Abbas Bafghi **ENGINEER**

Diedrich D-120, #1627

SHEET 2 OF 4

D. White OPERATOR

DRILLING METHOD 6" H.S.A./Rotary Wash BACKFILLED Yes DATE 1/16/2007

ELEV.	DEPTH		/PLE	BLOW C 6 inch	OUNT Last	Percent	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
(ft)	(ft)		TYPE	Increments		Recov'd	RV, S, PI, Ch	Group	Sample B: SPT bouncing on cobble/boulder.	
2356.8 -	15.00 15.23		SPT	50/2.8"	50/2.8"				15.00 Sample C: SPT bouncing on cobble/boulder. 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;	
		RVA	J UGE	R			RV, S, PI, Ch	GP GM	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.	
2351.8	20.28	1	SPT	50/3.3"	50/3.3"		W, S		20.00 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. Sample D: SPT bouncing on cobble/boulder.	
		RV	AUGE	R			RV, S, PI, Ch	SP SM		



1/10/07 START DATE

1/16/07

END DATE JOB DESCRIPTION Boulder City Bypass-Phase 1

I 515 @ Railroad Pass, Roadway Cut

LOCATION RRC1 **BORING**

73307-1 E.A. # GROUND ELEV_2371.79 (ft)

HAMMER DROP SYSTEM_Auto., ETR=65%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

ENGINEER

EQUIPMENT

OPERATOR

DRILLING METHOD

"P"100+75

0 ft.

Abbas Bafghi Diedrich D-120, #1627

SHEET 3 OF 4

D. White

6" H.S.A./Rotary Wash

ELEV. DE	PTH		/PLE	BLOW Co	OUNT Last	Percent	LAB TESTS	USCS Group		MATERIAL DESCRIPTION	REMARKS
2246 0	25.00 25.03	E	SPT SPT	50/0.3"		Recov'd	RV, S, PI,	GP GC		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 30.00		CORE							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.	Coring started on 1-17-07. Coring with pla water. 29 feet to 30 feet: down pressure 150 psi water pressure = 50 psi
	32.75 33.00 34.80	RC2	CORE					GP GM	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. 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. Same as above.	30 feet to 31 feet: down pressur 250 psi water pressur = 50 psi 31 feet to 32 feet: down pressur 350 psi water pressur = 50 psi 34.8 feet to 35 feet: down pressur 100 psi



1/10/07 START DATE 1/16/07

END DATE

LOCATION

BORING

E.A. #

EXPLORATION LOG

GROUNDWATER LEVEL

STATION OFFSET

ENGINEER

EQUIPMENT

"P"100+75

0 ft.

Abbas Bafghi

Diedrich D-120, #1627

SHEET 4 OF 4

D. White

6" H.S.A./Rotary Wash

OPERATOR DRILLING METHOD

DATE __1/16/2007 Yes BACKFILLED _

GROUND ELEV_ 2371.79 (ft) DATE DEPTH ft ELEV. ft HAMMER DROP SYSTEM_Auto., ETR=65%

I 515 @ Railroad Pass, Roadway Cut

JOB DESCRIPTION Boulder City Bypass-Phase 1

RRC1

73307-1

ELEV. (ft)	DEPTH (ft)	SAMPI NO. TY	Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
, ,	 	RC4CC	7 1000	1,000,40			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 =
	37.50						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. Soil/rock descriptions are derived from visual	250 psi water pressure = 50 psi 36.8 feet to 37. feet: down pressure 300 psi water pressure = 50 psi
2331.8 -	-40						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.	
2326.8 ·	- 45							
	_							



1/17/07 START DATE

END DATE

1/29/07

JOB DESCRIPTION Boulder City Bypass-Phase 1 I 515 @ Railroad Pass, Roadway Cut

LOCATION RRC2 BORING

73307-1 E.A. # GROUND ELEV_2387.12 (ft)

HAMMER DROP SYSTEM_Auto., ETR=65%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

ENGINEER

"P"96+50 12 feet Right

Abbas Bafghi

SHEET 1 OF 5

Diedrich D-120, #1627 EQUIPMENT .

D. White OPERATOR

DRILLING METHOD 6" H.S.A.

ENGIN	EERING	<u> </u>	CAN	IPLE T	BLOW C		3 I L IVI	dio., ETT-C		BACKFILLED99 D	
ÉLEV. (ft)	DEPT (ft)			TYPE	6 inch Increments	Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
(19)		.00			ing energ	11000	Necov u			ALLUVIUM: 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.	Roadway cut Location drill rig unit #1627
			RVA	UGEI	र			RV, S, PI, Ch	GM	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. Drill rig chatters occasionally.	Auger was advanced to 4 feet. New pilot bit was used. weather: Sunny low=22 degrees
										2 III ng chatalo ossessionally	high=51 degrees
	-	.00	Α	SPT	50/2.8"	50/2.8"	214		 -	4.00 Sample A: SPT bouncing on cobble/boulder.	
2382.1										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.	
	L									Drill rig chatters occasionally.	
			RVA	WGE	R			RV, S, PI, Ch	SM		
		9.00		SPT	50/1.4"	50/1.4	71			9.00	
2377.11 PLOE RECUENT OF THE PROPERTY OF THE PR										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. Drill rig chatters.	
NV_DOI BUB 1			RVA	UGE	R			RV, S, PI, Ch	GP GM		



1/17/07 START DATE

END DATE

1/29/07

JOB DESCRIPTION Boulder City Bypass-Phase 1

I 515 @ Railroad Pass, Roadway Cut LOCATION

RRC2 BORING

73307-1 E.A. # GROUND ELEV_2387.12 (ft)

HAMMER DROP SYSTEM_Auto., ETR=65%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION

OFFSET

"P"96+50

12 feet Right Abbas Bafghi

ENGINEER EQUIPMENT

Diedrich D-120, #1627

SHEET 2 OF 5

D. White

OPERATOR DRILLING METHOD

6" H.S.A.

	EERING N		MPLE	BLOW C				1		
ELEV. (ft)	DEPTH (ft)		TYPE	- A	Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
2372.1	14.00 14.26	С	SPT	50/3.2"	50/3.2"	94	RV, S, PI, Ch		Sample C: SPT bouncing on cobble/boulder. Auger Cuttings 14 to 19 ft. and 19 to 24 ft. (RV4, RV5) samples: SILTY SAND WITH GRAVEL (SM) 32 to 34% fine to coarse, hard, angular gravel; 47 to 48% fine to coarse, hard, angular sand; 19 % fines of low plasticity with LL=34 to 36 and PL=27 to 28; light brown color (5 YR 5/6), dry. Drill rig chatters under 400 psi down-pressure.	Down Pressure= 300 to 400 psi.
	19.00 19.23		SPT	50/2.7"	50/2.7"	93		SM	Sample D: SPT bouncing on cobble/boulder.	
	24.00		JUGE	R			RV, S, PI, Ch		24.00	



1/17/07 START DATE

1/29/07

END DATE JOB DESCRIPTION Boulder City Bypass-Phase 1

I 515 @ Railroad Pass, Roadway Cut LOCATION

RRC2 BORING

73307-1 E.A.#

GROUND ELEV_2387.12 (ft) HAMMER DROP SYSTEM_Auto., ETR=65% **EXPLORATION LOG**

GROUNDWATER LEVEL

DATE | DEPTH ft | ELEV. ft

STATION OFFSET

EQUIPMENT

OPERATOR

"P"96+50 **ENGINEER**

12 feet Right Abbas Bafghi Diedrich D-120, #1627

SHEET 3 OF 5

D. White

DRILLING METHOD 6" H.S.A.

ELEV. (ft)	DEPTH (ft)	NO.	TYPE	6 inch Increments	Last s 1 foot	Percent Recov'd		USCS Group	MATERIAL DESCRIPTION	REMARKS
2362.1 -	24.23 25	E	SPT		50/2.8"	89			Sample E: SPT bouncing on cobble/boulder. Auger Cuttings 24 to 29 ft. (RV6) sample: <u>SILTY GRAVEL WITH SAND (GM)</u> 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.	Drilling was stopped at 4:00 pm. Drilling was delayed for 13 days (due to drilling re-schedule).
	-	RVA	WGE	२			RV, S, PI, Ch	GM	Drill rig chatters occasionally.	
	2 9.00									Resumed drilling: 01/29/07
	29.42	F	SPT	50/5"	50/5"	100	W, S	-	Sample F: WELL- GRADED GRAVEL WITH	
2357.1 -	- 30								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.	
	-	RV	UGEI	२			RV, S, PI, Ch	GW GM	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 fee
	34.00			500 71	500 7	100	W 0		34.00 Sample G: SPT bouncing on cobble/boulder.	
2352.1	34.31 35	G	SPT	50/3.7"	50/3.7"	100	W, S		Sample G. SFT bounding on cobble/bounder. 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.	

NEVADA	START DATE	1/17/07	EXPLORATION LOG		SHEET 4 (
DEPARTMENT OF TRANSPORTATION	END DATE	1/29/07		STATION	"P"96+50
	JOB DESCRIPTI		•	OFFSET	12 feet Right
	LOCATION	I 515 @ Railroad Pass, Roa	adway Cut	ENGINEER	Abbas Bafghi
	BORING	RRC2		EQUIPMENT	Diedrich D-120, #1627 D. White
	E.A. #	73307-1	GROUNDWATER LEVEL	OPERATOR	D. Writte
	GROUND ELEV	2387.12 (ft)	DATE DEPTH ft ELEV. ft	DRILLING METHOD	6" H.S.A.
GEOTECHNICAL ENGINEERING	HAMMER DROP	SYSTEM_Auto., ETR=65%		BACKFILLED	Yes DATE 01/29/2

SHEET 4 OF 5

ELEV. (ft)	DEPTH (ft)		MPLE TYPE	BLOW Co 6 inch Increments	Last	Percent Recov'd		USCS Group	MATERIAL DESCRIPTION REMARKS
	-	RVA	UGE	₹			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.
	39.00 39.25	 	SPT	50/3"	50/3"	100	W, S		39.00 Sample H: SPT bouncing on cobble/boulder.
2347.1 -	40								Sample H: WELL-GRADED GRAVEL WITH SAND (GW) 54% fine to coarse, hard, angular gravel; 44% fine to coarse, hard, angular sand; 2% fines.
		RV	AUGEI	R			RV, S, PI, Ch	GW	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								44.00 Sample I: SPT bouncing on cobble/boulder.
2342.1 -	4545.15	1	SPT	56 50/1.8"	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.
				33,1.0			RV, S, PI,	SM	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.
		RV	AUGE	R			Ch		



START DATE

END DATE

1/17/07

1/29/07 JOB DESCRIPTION Boulder City Bypass-Phase 1

I 515 @ Railroad Pass, Roadway Cut LOCATION

RRC2 **BORING**

73307-1 E.A.# GROUND ELEV_2387.12 (ft)

HAMMER DROP SYSTEM_Auto., ETR=65%

EXPLORATION LOG	
-----------------	--

GROUNDWATER LEVEL

DATE | DEPTH ft | ELEV. ft

STATION OFFSET

ENGINEER

EQUIPMENT

OPERATOR

"P"96+50 12 feet Right

Abbas Bafghi Diedrich D-120, #1627

SHEET 5 OF 5

D. White

DRILLING METHOD 6" H.S.A.

ELEV.	DEPTH		IPLE	BLOW CO	DUNT Last	Percent	LAB TESTS	USCS	MATERIAL DESCRIPTION	REMARKS
(ft)	(ft)	NO.	TYPE	Increments	1 foot	Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
2337.1 -	49.00 	J	SPT	49 84 139	223	89	W, S, Pl	GC	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. Occasional drill chatter.	Drilling was stopped at 3:00 pm.
									51.50 End of Boring at 51.5 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.	
2332.1 -	55								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.	
	_									



1/30/07 START DATE

1/31/07

END DATE JOB DESCRIPTION Boulder City Bypass-Phase 1

I 515 @ Railroad Pass, Roadway Cut LOCATION BORING

RRC3

73307-1 E.A. # GROUND ELEV 2388.98 (ft)

HAMMER DROP SYSTEM_Auto., ETR=65%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

ENGINEER

EQUIPMENT

OPERATOR

"P"94+00

30 feet Right

Abbas Bafghi Diedrich D-120, #1627

D. White/O. Altamirano

SHEET 1 OF 6

DRILLING METHOD 6" H.S.A.

ELEV. (ft)	DEPTH (ft)		MPLE TYPE	BLOW C	Last	Percent Percent	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
V-7	0.00	-		Increments	s 1 foot	Recov'd			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. 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.	Location: Roadway Cut weather: Cloudy, low=46 degrees high=56 degrees
		RV	UGE	R			RV, S, PI, Ch	GP GM	Drill rig chatters.	
	_									drill rig unit #1627
										Auger was advanced to 4. feet.
2384.0 -	4.50	A	SPT	26 42	97	83	W, S, PI		4.50 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.	Difficult drilling is due to presence of rocks. 300 psi down pressure
	6.00			55					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. Drill rig chatters occasionally.	
								SM		
		RV	AUGE	R			RV, S, PI, Ch			



1/30/07 START DATE

1/31/07 END DATE Boulder City Bypass-Phase 1

JOB DESCRIPTION _ I 515 @ Railroad Pass, Roadway Cut LOCATION

RRC3 **BORING**

73307-1 E.A.# GROUND ELEV 2388.98 (ft)

HAMMER DROP SYSTEM_Auto., ETR=65%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

ENGINEER

"P"94+00

30 feet Right

Abbas Bafghi Diedrich D-120, #1627 **EQUIPMENT**

D. White/O. Altamirano

SHEET 2 OF 6

OPERATOR DRILLING METHOD

6" H.S.A.

ELEV.	DEPTH		MPLE	BLOW C	OUNT Last	Percent	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
(ft)	(ft)	NO.	TYPE	Increments		Recov'd	END 12010	Group	MATERIAL DEGORIT HOR	112
	9.50								9.50	
				30					Sample B: POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM)59% fine to	
				30					coarse, hard, angular gravel; 31% fine to	
2379.0 -	 10	В	SPT		50/1"	92	W, S, PI		coarse, hard, angular sand; 10% fines of medium plasticity with LL=40 and PL=28; light	
				47					brown color (5 YR 5/6), dry.	
	10.58									150 psi down pressure from (
				50/1"					Auger Cuttings; 9.5 to 14.5 ft. (RV 3):	to 9.5 feet.
	_								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.	
									5/0), dry.	
	-							GP GM		
									Drill rig chatters.	
		l]	L			RV, S, PI,			
		RV	AUGE	R			Ch			
	-									300 psi down
										pressure from 10 to 10.5 feet
										10 to 10.5 leet
	14.50								14.50	
	14.50	1-						 -	Sample C: WELL- GRADED GRAVEL WITH	1
				20					CLAY AND SAND (GP-GC)50% fine to coarse, hard, angular gravel; 42% fine to	
2374.0 -	— 15								coarse, hard, angular sand; 8% fines with LL =	
		С	SPT	32	81	89	W, S, PI		35 nad PL = 23; light brown color (5 YR 5/6), dry.	
				"-	"		, -, -		,	
				,,					Auger Cuttings 14.5 to 19.5 feet (RV 4):	
	16.00			49					SILTY GRAVEL WITH SAND (GM) 47% fine	
	10.00							1	to coarse, hard, angular gravel; 40% fine to coarse, hard, angular sand; 13 % fines of	
						1	:		medium plasticity with LL= 58 and PL= 38; light	
									brown color (5 YR 5/6), dry.	
	_							GW		
								GC	Drill rig chatters occasionally.	
		RV	UGE	R			RV, S, PI, Ch			

NEVADA
DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL

1/31/07

JOB DESCRIPTION Boulder City Bypass-Phase 1

LOCATION 1515 @ Railroad Pass, Roadway Cut
BORING RRC3

E.A. # 73307-1 GROUND ELEV 2388.98 (ft)

HAMMER DROP SYSTEM_Auto., ETR=65%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

ENGINEER

EQUIPMENT

<u>"P"94+00</u>

30 feet Right

Abbas Bafghi

Diedrich D-120, #1627 D. White/O. Altamirano

SHEET 3 OF 6

OPERATOR DRILLING METHOD

6" H.S.A.

ENGINE	ERING					STEM_^	uto., ETR=6	5570	BACKFILLED Yes DA	re <u>01/31/200</u> 7
ELEV. (ft)	DEPTH (ft)	NO.	MPLE TYPE	BLOW Co 6 inch Increments	Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	19.50								19.50	
2369.0 -	20 20.33	D	SPT	26 50/4"	50/4"	60	W, S		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.	
	-								Sample D: SPT hitting gravel. 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	
	-	RV/	\ UGE	R			RV, S, PI, Ch	sw sc	coarse, hard, angular sand; 14 % fines of medium plasticity with LL= 53 and PL= 37; light brown color (5 YR 5/6), dry.	
2364.0 -	24.50 25 25.33	Е	SPT	22 50/4"	50/4"	80	w, s		24.50 Sample E: WELL- GRADED SAND WITH GRAVEL (SW) 49% fine to coarse, hard, angular gravel; 50% fine to coarse, hard, angular sand; 1% fines Sample E: SPT hitting gravel.	
2364.0 1										

NEVADA	
DEPARTMENT OF TRANSPORTATION	
GEOTECHNICAL	

1/30/07 START DATE

1/31/07

JOB DESCRIPTION Boulder City Bypass-Phase 1

LOCATION **BORING**

END DATE

I 515 @ Railroad Pass, Roadway Cut

RRC3

73307-1 E.A. # GROUND ELEV 2388.98 (ft)

HAMMED DROP SYSTEM Auto., ETR=65%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

"P"94+00

30 feet Right Abbas Bafghi

ENGINEER EQUIPMENT **OPERATOR**

Diedrich D-120, #1627 D. White/O. Altamirano

SHEET 4 OF 6

DRILLING METHOD

6" H.S.A.

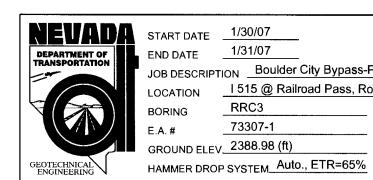
Yes DATE 01/31/2007

GEOTECH ENGINE	EERING V					STEM	uto., ETR=6	7070	BACKFILLED Yes D.	ATE 01/31/200
ELEV. (ft)	DEPTH (ft)		MPLE TYPE	BLOW CO 6 inch Increments	Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		RVA	lUGEI				RV, S, PI, Ch		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.	
	29.50									Drilling was stopped at 4:30 pm at 29.5 feet
	29.67		SPT	50/2"	50/2"	100		SW	Sample F: SPT bouncing on cobble/boulder	
2359.0 -	30									
		RV	JUGE	R			RV, S, PI, Ch			
										Drilling was resumed from 29.5 feet of
	34.50							 	34.50 Sample G: <u>WELL- GRADED SAND WITH</u>	depth at 8:00 am on 1/31/07.
2354.0	35	G	SPT	24 55	150	83	W, S, PI		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.	3 3 1/3 1/0/
				95					ын пу спацеть.	
	36.00							l		

NEVADA	START DATE	1/30/07	EXPLORATION LOG		SHEET 5 C
DEPARTMENT OF TRANSPORTATION	END DATE	1/31/07		STATION	"P"94+00
TRANSPORTATION	JOB DESCRIPTI	ON Boulder City Bypass-P	hase 1	OFFSET	30 feet Right
	LOCATION	I 515 @ Railroad Pass, Roa	adway Cut	ENGINEER	Abbas Bafghi
	BORING	RRC3		EQUIPMENT	Diedrich D-120, #1627
	E.A. #	73307-1	GROUNDWATER LEVEL	OPERATOR	D. White/O. Altamirano
	GROUND ELEV.	2388.98 (ft)	DATE DEPTH ft ELEV. ft	DRILLING METHOD	6" H.S.A.
GEOTECHNICAL ENGINEERING	HAMMER DROP	SYSTEM_Auto., ETR=65%		BACKFILLED	Yes DATE 01/31/2

SHEET 5 OF 6

GEOTECH ENGINE	ERING \	CAL				STEM_A	uto., ETR=6	55%	BACKFILLED Yes D	ATE 01/31/2007
ELEV. (ft)	DEPTH (ft)	NO.	TYPE	BLOW CO 6 inch Increments	Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	-	RV	WGE	R			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.	
2349.0 -	39.50 40 41.00	Н	SPT	67 85 120	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. 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	
	-	RV	AUGE	R			RV, S, PI, Ch	SM	to 41; light brown color (5 YR 5/6), dry. Drill rig chatters.	
	44.50								44.50	
				25					Sample I: SPT hitting gravel.	



	EXPL	ORATIO	N LOG		0.455
					SHEET 6 OF 6
				STATION	"P"94+00
가	na s e 1			OFFSET	30 feet Right
s	idway Cu	ut		ENGINEER	Abbas Bafghi
				EQUIPMENT	Diedrich D-120, #1627
	GROU	NDWATER	LEVEL	OPERATOR	D. White/O. Altamirano
	DATE	DEPTH ft	ELEV. ft	DRILLING METHOD	6" H.S.A.
	1	ı	l		THE RESERVE OF THE PERSON OF T

ELEV. DEPTI			IPLE TYPE	BLOW C	Last	Percent	LAB TESTS	USCS	MATERIAL DESCRIPTION	REMARKS
45.4			SPT	163/5.5"	1 foot 163/5.5"	Recov'd 87	W, S, PI		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.	
-	F	RVA	UGEF	₹			RV, S, PI, Ch	GC GM	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.	
48.0	20								Sample J: SPT bouncing on cobble/boulder	
48.3		J	SPT	75/3.5"	75/3.5"	57			48.30	Auger bit broke at 48 feet.
2339.0 50									End of Boring at 48.3 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.	Therefore, drilling was terminated.



2/5/07 START DATE

2/6/07

END DATE JOB DESCRIPTION Boulder City Bypass-Phase 1

LOCATION **BORING**

I 515 @ Railroad Pass, Roadway Cut

RRC4 73307-1

E.A. # GROUND ELEV_2383.72 (ft)

HAMMER DROP SYSTEM_Auto., ETR=65%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

ENGINEER

OPERATOR

"P"90+90 3 feet Left

Abbas Bafghi

Diedrich D-120, #1627

SHEET 1 OF 5

EQUIPMENT D. White

DRILLING METHOD

6" H.S.A.

__ DATE __2/06/2007 BACKFILLED Yes

ELEV. (ft)	DEPTH (ft)	NO.	MPLE TYPE	0 1	Last Loot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.00		JUGE		3 11001	Necov U	RV, S, PI, Ch	GP GC	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. Drill rig chatters. 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.	Location: Roadway Cut drill rig unit #1627 Auger was advanced to 4.4 feet. 50 psi down pressure. weather: sunny
	4.00								4.00	
2378.7 -	−5 5.50	Α	SPT	55 69 86	155	89	W, S, PI		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.	
	-							GP GM	Auger cutting samples from 4.0 to 9.0 ft. (RV2): POORLY GRADED GRAVEL WITH SILT, SAND, AND COBBLES (GP-GM)-63% fine to coarse, hard, angular gravel; 27% fine to coarse, hard, angular sand; 10% fines of low plasticity with LL=30 and PL=25; light brown color (5 YR 5/6), dry.	
	-	RV/	A UGE	R			RV, S, PI, Ch			
	9.00								9.00	
2373.7		В	SPT	11 21 27	48	78	W, S, PI		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.	
	10.50									

NEVADA	START DA
DEPARTMENT OF TRANSPORTATION	END DATE
	JOB DESC
	LOCATION
	BORING
	E.A. #
	GROUND E
GEOTECHNICAL ENGINEERING	HAMMER D

2/5/07

2/6/07

RIPTION Boulder City Bypass-Phase 1 I 515 @ Railroad Pass, Roadway Cut

RRC4

73307-1 ELEV_2383.72 (ft)

HAMMER DROP SYSTEM_Auto., ETR=65%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

ENGINEER

EQUIPMENT

"P"90+90

SHEET 2 OF 5

3 feet Left

Abbas Bafghi

Diedrich D-120, #1627 D. White

OPERATOR DRILLING METHOD

6" H.S.A.

__ DATE __2/06/2007 BACKFILLED Yes

Т	ELEV.	DEPTH		/PLE	BLOW C		5	LAD TECTO	LISCS	MATERIAL DECORIDATION	DEMARKS
L	(ft)	(ft)	NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		_	RVA	UGEI	R			RV, S, PI, Ch	0.11	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.	
		14.00							SW SM		
	2368.7	– 15	С	SPT	17 25	52	83	W, S, PI			
		15.50			27						
		- 19.00	RV/	UGE	R			RV, S, PI, Ch		19.00	
					22				 	Sample D: POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) 33% fine to	Drilling was stopped at 19.0
	2363.7 -		D	SPT		174	83	W, S, PI		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.	ft. at 3:30 pm. Drilling was resumed at 19.0
NV_DOT BCB RRC.GPJ NV_DOT.GDT 6/16/11		20.50		AUGE				RV, S, PI, Ch	SP SM	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.	ft. of depth at 8:05 am on 2/6/07.
N N		24.00								24.00	

NEVAD	l
DEPARTMENT OF TRANSPORTATION	
GEOTECHNICAL	

2/6/07

END DATE JOB DESCRIPTION Boulder City Bypass-Phase 1

I 515 @ Railroad Pass, Roadway Cut LOCATION RRC4 **BORING**

73307-1 E.A.# GROUND ELEV_2383.72 (ft)

HAMMER DROP SYSTEM_Auto., ETR=65%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

"P"90+90

SHEET 3 OF 5

3 feet Left Abbas Bafghi

ENGINEER Diedrich D-120, #1627 EQUIPMENT

D. White OPERATOR

DRILLING METHOD 6" H.S.A.

Yes BACKFILLED _

ELEV.	DEPTH		MPLE	BLOW C		Dorsont	LAB TESTS	USCS	MATERIAL DESCRIPTION	DEMARKS
(ft)	(ft)	NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recovid		USCS Group	MATERIAL DESCRIPTION	REMARKS
2358.7 -		E	SPT	24 54 55	109	83	W, S, PI		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.	
	25.50		J UGE	3			RV, S, PI,		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.	
	29.00	F	SPT	100/5"	100/5"	80	Ch	SW SM		
	29.42									
2353.7 -	-30									
	-	RVA	\ UGE	R			RV, S, PI, Ch			
٥ - -	04.00								24.00	
2348.7 -	34.00 34.23 - 35	-	SPT	100/2.8"	100/2.8'	178	W, S, Pl		34.00 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 VR 5/6) dry	
100 No. Les Res Res Cap. 100 No. Les 2348.7	⊢ 35								YR 5/6), dry.	

NEVAVA
DEPARTMENT OF
TRANSPORTATION
GEOTECHNICAL
ENGINEERING

2/5/07 START DATE

2/6/07

JOB DESCRIPTION Boulder City Bypass-Phase 1

LOCATION **BORING**

E.A.#

END DATE

I 515 @ Railroad Pass, Roadway Cut

RRC4 73307-1

GROUND ELEV 2383.72 (ft)

HAMMER DROP SYSTEM_Auto., ETR=65%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

OPERATOR

"P"90+90

3 feet Left Abbas Bafghi

ENGINEER EQUIPMENT .

Diedrich D-120, #1627

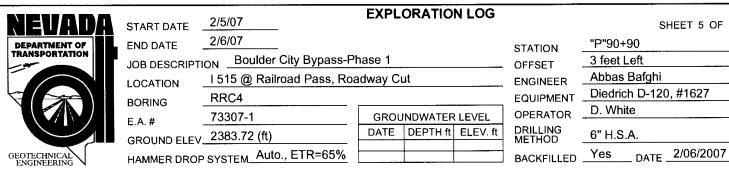
SHEET 4 OF 5

D. White

DRILLING METHOD 6" H.S.A.

BACKFILLED Yes DATE 2/06/2007

ELEV.	DEPTH		MPLE TYPE	BLOW Co	Last	Percent	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
(ft)	(ft) -		JUGE	Increments	1 foot	Recov'd	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.	
2343.7 -	39.00 39.21	_	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.	
	-	RVA	UGE	R			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	١.	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	
2338.7 -	- -	RVA	WGE	R			RV, S, PI, Ch	SC SM	YR 5/6), dry. 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.	



SHEET 5 OF 5

	ERING V		MPLE	BLOW C	TNUC		uto., LTN-t			
ELEV. (ft)	DEPTH (ft)		TYPE		Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
2333.7 -	49.00 50 50.50	J	SPT	25 27 129	156	78	W, S, PI	SM	49.00 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. 50.50 End of Boring at 50.5 feet.	Drilling was stopped at 4:00 pm.
									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 _______12/20/0

12/20/05 12/20/05

JOB DESCRIPTION Boulder City Bypass-Phase 1

LOCATION 1515 @ Railroad Pass, I515-US 95 Interchange

BORING BCB1 73307-1

GROUND ELEV 2049.20 (ft)

HAMMER DROP SYSTEM_Auto., ETR=79%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

"P"214+55

52 ft. Left Mark Salazar

ENGINEER __ EQUIPMENT __ OPERATOR __

Diedrich D-120, #1082

SHEET 1 OF 3

K. Marshall

DRILLING Rotary Wash

BACKFILLED _____ DATE ___

ELEV.	DEPTH		MPLE	BLOW Co	OUNT Last	Percent	LAB TESTS	uscs	MATERIAL DESCRIPTION	REMARKS
(ft)	(ft)	NO.	TYPE	Increments		Recov'd	LAD IESIS	USCS Group	MATERIAL DESCRIPTION	REMARKS
2044.2 -	2.00 - 2.00 - 3.50 - 5 5.00		SPT	8 7 7	14	100	W, S	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.	Location: I-515/US 95 Interchange. started: 9:15 am. Drilling with bentonite mud
	6.50			9		100			Drill rig chatters. 7.00 Sample C: Visual Description SILTY GRAVEL/SILTY SAND AND COBBLES (GM/SM) very dense, yellowish brown.	and a 4.5 in. Tricone bit. 300 psi down pressure.
2039.2 -	10.00 10.63 - 12.00	C	SPT	50/1.5"	50/1.5"				Drill rig chatters some but mostly smooth to 12 feet.	
	12.50	О	SPT	125/6"	125/6"		W, H	GM	Sample D: <u>SILTY GRAVEL WITH SAND (GM)</u> 44% fine to coarse, hard, angular gravel; 42% fine to coarse sand; 14 % fines of non- plasticity.	
2034.2 -	15.50 15.50	E	SPT	80/6"	80/6"				Sample E (Visual Description): some reddish color, more angular and broken gravel fragments.	
2029.2 -	20.00 20.50	F	SPT	200/6"	200/6"		W, H		20.00 Samples F and G: SILTY SAND WITH	
2024.2 -	- - 25.00 25.50	G	SPT	300/6"	300/6"		W, S	SM	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.	
	-								30.00	



END DATE

LOCATION

BORING

E.A. #

12/20/05 12/20/05

JOB DESCRIPTION Boulder City Bypass-Phase 1

EXPLORATION LOG

GROUNDWATER LEVEL

I 515 @ Railroad Pass, I515-US 95 Interchange

STATION OFFSET

"P"214+55

52 ft. Left

SHEET 2 OF 3

Mark Salazar **ENGINEER**

Diedrich D-120, #1082

EQUIPMENT K. Marshall

OPERATOR

GROUND ELEV 2049.20 (ft) HAMMER DROP SYSTEM_Auto., ETR=79%

BCB1

73307-1

DRILLING METHOD DATE DEPTH ft ELEV. ft Rotary Wash BACKFILLED ____ _ DATE

ENGIN	EERING V					,	uto., E111-1		BACKFILLED DATE	
ELEV. (ft)	DEPTH (ft)		MPLE TYPE	BLOW Co 6 inch Increments	Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION REM	MARKS
2014.2	355.00 3535.42	Н	SPT		350/5"		W, S		Sample H: SILTY SAND WITH GRAVEL (SM) 30% fine to coarse, hard, angular gravel; 56% fine to coarse sand; 14 % fines of non- plasticity.	
2009.2	40									
2004.2	45.00 45.33		SPT	300/4"	300/4"			SM	Sample Ⅰ (Visual Description):same as above	
1999.2	- - - -									
1994.2	555.00 555.32		CDT	200/3.8"	200/3 8					
	-			ZVVI3.0	0.00				Sample J (Visual Description): same as above	



12/20/05 START DATE

12/20/05

END DATE JOB DESCRIPTION Boulder City Bypass-Phase 1

I 515 @ Railroad Pass, I515-US 95 Interchange LOCATION BCB1

BORING 73307-1

E.A. # GROUND ELEV_2049.20 (ft)

HAMMER DROP SYSTEM_Auto., ETR=79%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE | DEPTH ft | ELEV. ft

STATION OFFSET

ENGINEER

"P"214+55

52 ft. Left

Mark Salazar Diedrich D-120, #1082

SHEET 3 OF 3

EQUIPMENT K. Marshall **OPERATOR**

DRILLING METHOD Rotary Wash

BACKFILLED

	T	SA	MPLE	BLOW CO	TNUC				
ELEV. (ft)	DEPTH (ft)		TYPE		Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION REMARK
1984.2 ~	- - - 65 - 66.50	к	SPT	8 24 31	55	100	W, PI		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, Pl = 19) inclusion.
	- -								300 psi dov pressure.
1979.2 -	70.00 7070.29		SPT	200/3.5" 2	200/3.5"		W, S		Sample L: SILTY SAND WITH GRAVEL (SM) 19% fine to coarse, hard, angular gravel; 66% fine to coarse sand; 15 % fines of non-plasticity.
1974.2 -	- 75 -							SM	
1969.2 -	- - 888:29	M	SPI	100/2.8"	100/2.8				80.20 End of Boring at 80.2 feet. Groundwater was not encountered. UTM Coordinate: N 3980697.51
1964.2 -	85 								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.



12/21/05 START DATE

END DATE

12/22/05

JOB DESCRIPTION Boulder City Bypass-Phase 1 I 515 @ Railroad Pass, I515-US 95 Interchange

LOCATION BCB2 **BORING**

73307-1 E.A. # GROUND ELEV_2042.30 (ft)

HAMMER DROP SYSTEM_Auto., ETR=79%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE | DEPTH ft | ELEV. ft

STATION OFFSET

ENGINEER

EQUIPMENT

OPERATOR

"P"216+68 66 ft. Right

Mark Salazar

Diedrich D-120, #1082

SHEET 1 OF 3

K. Marshall

DRILLING Rotary Wash METHOD

BACKFILLED . DATE NO. TYPE BLOW COUNT Last Increments 1 foot ELEV. DEPTH USCS Group LAB TESTS **MATERIAL DESCRIPTION** Percent REMARKS (ft) Recov'd 0.00 ALLUVIUM: Location: I-515/US 95 Sample A: <U>> SILTY SAND WITH Interchange. 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. Drilling with SM bentonite mud and a 4.5 in. Tricone bit. 5.00 2037.3 5 SPT 6 W, S 14 100 6.50 8 7.00 Sample B: LL = 42, PL = 27. 8.00 10 Sample C: <U>> POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM)-- 30% SPT 13 31 100 W, PI SP 9.50 18 SM fine to coarse, hard, angular gravel; 59% fine to 10.00 2032.3 coarse sand; 11 % fines of low plasticity (LL = 18 27, PL = 24), dense. SPT С 30 61 100 W, S, PI 11.50 31 11.50 15.00 2027.3 5 15.50 D SPT 167/6" 167/6" 20.00 20.50 2022.3 E SPT 295/6" 295/6" W. PI hole/mud tank seal got broke. SM Sample E: SILTY SAND WITH GRAVEL lost the mud in (SM) -- 32% fine to coarse, hard, angular the tank. gravel; 50% fine to coarse sand; 18 % fines of hole/mud tank non- plasticity. connection was re-sealed. BCB BCB.GPJ NV_DOT.GDT 6/16/11 2017.3 - 25 5 30.00 30.00



END DATE

LOCATION

BORING

12/21/05

12/22/05

JOB DESCRIPTION Boulder City Bypass-Phase 1

I 515 @ Railroad Pass, I515-US 95 Interchange

BCB2

73307-1 E.A.# GROUND ELEV_ 2042.30 (ft)

HAMMER DROP SYSTEM_Auto., ETR=79%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

EQUIPMENT

"P"216+68 66 ft. Right

SHEET 2 OF 3

Mark Salazar **ENGINEER**

Diedrich D-120, #1082 K. Marshall

OPERATOR DRILLING METHOD

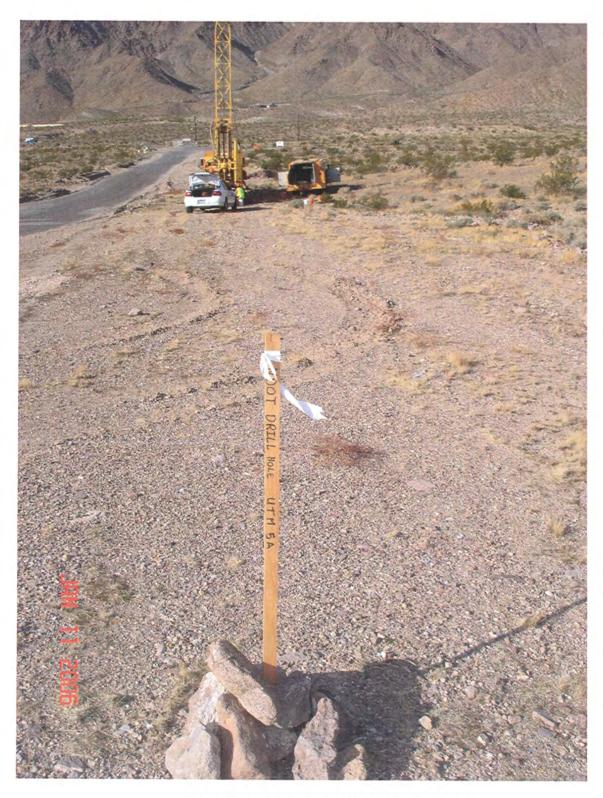
Rotary Wash

BACKFILLED _____ DATE

ELEV.	DEPTH		/PLE	BLOW C 6 inch	Last	Percent	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
(ft)	(ft) 30.48		SPT	Increments	1 foot	Recov'd	W, S	Group	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	
2007.3 -	35 									
2002.3 -	40.00 4010.36	G	SPT	100/4.3"	100/4.3"				Sample G (Visual Description) : same as above	450 psi down pressure.
1997.3 -	- 45 -							SM		
1992.3 -	50.00 560.35	H	SPT	.100/4.2"	100/4.2"				Sample H (Visual Description): same as above	
1987.3 -	- - - -									
	60.00								60.00	

NEVADA	START DATE	12/21/05	EXPLO	ORATIO	N LOG			SHEET 3 OF	= 3
DEPARTMENT OF TRANSPORTATION	END DATE JOB DESCRIPTI LOCATION BORING	12/22/05 ON Boulder City Bypass-Ph I 515 @ Railroad Pass, I515 BCB2		nterchan	ge	STATION OFFSET ENGINEER EQUIPMENT	"P"216+68 66 ft. Right Mark Salaza Diedrich D-1		_ _ _
GEOTECHNICAL ENGINEERING	E.A. # GROUND ELEV.	73307-1 2042.30 (ft) SYSTEM_Auto., ETR=79%	DATE	NDWATER DEPTH ft		OPERATOR DRILLING METHOD BACKFILLED	K. Marshall Rotary Was		- - -

ELEV.	DEPTH	SA	JPLE	BLOW C	TNUC			Hece	MATERIAL DECORPTION
(ft)	(ft)	NO.	TYPE	6 inch Increments 100/4.2" '	Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION REMARKS
			SPT	100/4.2"	00/4.2"		W, S		Samole 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 resumed at 8: am on 12/22/2005.
1977.3 -	-65 -								
1972.3 -	- - 78 9:98 -	J	SPT	100/2.2**	100/2.2°			SM	Sample J (Visual Description): same as above
1967.3 -	- - - 75 -								Sample K (Visual Description): same as above
1962.3 -	880:00 880:27	K.	SPT	100/3-2"	100/3-2"				80.30 End of Boring at 80.3 feet. Groundwater was not encountered. Hole was flushed with clean water.
1957.3 -	- - - 85								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.



Silverline Drive Borehole Locations



END DATE

LOCATION

BORING

1/10/06 1/12/06

EXPLORATION LOG

STATION JOB DESCRIPTION Boulder City Bypass - Phase 1

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

1515 @ Railroad Pass: Silverline Drive

BSL1

73307-1 E.A.# GROUND ELEV 2097.46 (ft)

HAMMER DROP SYSTEM_Auto., ETR=79%

OFFSET **ENGINEER**

EQUIPMENT

"P" 183+80 100 feet Right

Abbas Bafghi

Diedrich D-120, #1082

SHEET 1 OF 4

K. Marshall OPERATOR

DRILLING METHOD Rotary Wash

__ DATE __1/12/2006 Yes BACKFILLED _

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



1/10/06

1/12/06

JOB DESCRIPTION _

Boulder City Bypass - Phase 1 I 515 @ Railroad Pass: Silverline Drive

BORING

BSL1

E.A. #

END DATE

LOCATION

73307-1 GROUND ELEV_2097.46 (ft)

HAMMER DROP SYSTEM Auto., ETR=79%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

"P" 183+80 100 feet Right

Abbas Bafghi

ENGINEER Diedrich D-120, #1082 EQUIPMENT

SHEET 2 OF 4

K. Marshall OPERATOR

DRILLING METHOD Rotary Wash

BACKFILLED Yes DATE 1/12/2006

		ŠĀ.	MPLE	BLOW C	OUNT					
ELEV. (ft)	DEPTH (ft)		TYPE	- A - 1	Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	15.50				1,99				15.50 RC3 (15.5'-17.25'): 0.50 feet/0.75 minutes.	
	17.25		CORE						17.25 RC4 (17.25'-19.5'): 1.0 foot/1.0 minute. core barrel got plugged at depth 19.5 feet.	
	-	RC4	1CORE			48				
2077.5 -	19.50 20								19.50 RC5 (19.5'-21.9'): rate 2.0 feet/2.5 minutes.	
	-		COR			55			04.00	
	21.90 22.25		SPT	50/2.0"	50/2.0"				21.90 RC6 (22.5'-25.25'): rate 7.5 inches/ minute.	Resumed on 01-11-06 at 8:05 am. The borehole cuttings caved in overnight to
	-		6CORI			61				depth of 13.0 feet.
2072.5 -	^{— 25} 25.25 -		7CORI			0			25.25 RC7 (25.25'-27.0'): No recovery.	
	27.00 27.27		SPT	50/3.25"	50/3.25				27.00	A new core bit was used from
	27.75					70			RC8 (27.75'-29.5'): 16.0 inches of recovery.	27.75 feet (Run 8) down.
	29.50		BCORI			76			29.50	

DEPARTMENT OF TRANSPORTATION	
GEOTECHNICAL ENGINEERING	

START DATE	1/10/06
SIAKIDAIC	

TE 1/10/06 1/12/06

In Date 1/12/06

JOB DESCRIPTION Boulder City Bypass - Phase 1

LOCATION BORING I 515 @ Railroad Pass: Silverline Drive

BSL1

E.A. # 73307-1 GROUND ELEV 2097.46 (ft)

HAMMER DROP SYSTEM_Auto., ETR=79%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

OPERATOR

"P" 183+80

100 feet Right Abbas Bafghi

EQUIPMENT Abbas Bafghi
Diedrich D-120, #1082

SHEET 3 OF 4

K. Marshall

DRILLING Rotary Wash

BACKFILLED Yes DATE 1/12/2006

ELEV.	DEPTH	SA	MPLE	BLOW C				Hece	MATERIAL RESORVETION
(ft)	(ft)	NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION REMARKS
	-	RC9	CORE			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.
	33.50								33.50
2062.5 -	 35								
									rate of augering = 10.5 inches/minute under 400 psi.
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. Nearby Mining Representative says, "There is a fiber optic line
	-								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. In this vicinity. Hydraulic hammer was tried to excavat 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 high abrasive."

NEVADA	START DATE	1/10/06	EXPL	ORATIO	N LOG			SI	HEET 4 OF 4
DEPARTMENT OF	END DATE	1/12/06				STATION	"P" 183	+80	
TRANSPORTATION	JOB DESCRIPT	ION Boulder City Bypass - F	Phase 1			OFFSET	100 fee	t Right	
	LOCATION	I 515 @ Railroad Pass: Silv	erline Dr	ive		ENGINEER	Abbas	Bafghi	
	BORING	BSL1			_	EQUIPMENT	Diedric	h D-120	, #1082
	E.A. #	73307-1	GROU	INDWATER	RLEVEL	OPERATOR	K. Mars	hall	
	GROUND ELEV	0007.40 (%)	DATE	DEPTH ft	ELEV. ft	DRILLING METHOD	Rotary	Wa s h	
GEOTECHNICAL ENGINEERING		SYSTEM_Auto., ETR=79%				BACKFILLED	Yes	_ DATE _	1/12/2006

ELEV.	DEPTH	NO.	MPLE TYPE	BLOW C	Last	Percent	LAB TESTS	USCS Group	MATERIAL DESCRIPTION REM	MARKS
(ft)				6 inch Increments	1 foot	Recov'd				
2047.5 -	- 50								50.00 End of Boring at 50.0 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	
2042.5 -	- 55								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°57'27.672"N Longitude: 114°54'32.657"W Elevation: 2097.46'	



1/24/06 START DATE

1/25/06 JOB DESCRIPTION Boulder City Bypass - Phase 1

I 515 @ Railroad Pass: Silverline Drive LOCATION

BSL₂ **BORING**

END DATE

73307-1 E.A.# GROUND ELEV_ 2096.45 (ft)

HAMMER DROP SYSTEM_Auto., ETR=79%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE | DEPTH ft | ELEV. ft

STATION **OFFSET**

ENGINEER

EQUIPMENT

OPERATOR

"P" 185+00 100 feet Right

Abbas Bafghi Diedrich D-120, #1082

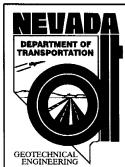
SHEET 1 OF 3

K. Marshall

DRILLING METHOD Rotary Wash

DATE _ 1/25/2006 Yes BACKFILLED

	ERING \		MPL		BLOW C			uto., EIR=			BACKFILLED Yes D	ATE
ELEV. (ft)	DEPTH (ft)	NO		DE	6 inch Increments	Last	Percent Recov'd	LAB TESTS	USCS Group		MATERIAL DESCRIPTION	REMARKS
	1.00	А	SF	rT	11 11	26	90			1.00	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	Location: UTM5B ground surface is sloping N to S.
	2.50 3.00	1			15						mixture of sand/silt, dry, (Alluvium/colluvium). A: light brown, about 20% fine, about 30% gravel, the rest is rock fragments. Recovery	Started: 9:00 am.
	4.00	В	SF	·Τ	73 90	90	100		GW		length = 1.33 feet. B: gray, about 80% gravel, fines < 10%.	Rig # 1082 weather: sunn
2091.5 ~	4.50 - 5 5.50	С	SF	·τ	27 42 50/0.5"	50/0.5"	92		GW.		Recovery length = 1.08 feet. C: gray gravels from fracturing boulders and cobbles. Recovery length = 0.917 feet.	cold. Rotary wash using bentonite slurry. Type of bit: 4.5 inch tricone.
	7.00									_7 <u>.00</u>	Drill rig chattered from 7 feet down. 6 inch/1.25 minutes drilling under 300 psi down pressure.	sand catcher was used in th SPT sampler.
	7.46	D	SF	Υ.	100/5.5" 1	100/5.5"					Bedrock contact at 7 feet. Install core barrel at 8.0 feet.	300 psi down pressure
2086.5 -		F	SE	2.	50/2 0"	50/2 N"				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.
·	-	RC	100	RE			50				RC1 (9.5'-14.5'): rate of coring = 1 foot/minute. 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.	
	16.00		200	RE			0				RQD cannot be determined because the cores were highly fractured.	
	-	RC	300	RE			33			17.25		
	- 19.50									19.50		
											RC4 (19.5'-21.90'): 1.3 feet/1.0 minute.	



1/24/06 START DATE

END DATE

LOCATION

1/25/06

JOB DESCRIPTION Boulder City Bypass - Phase 1 I 515 @ Railroad Pass: Silverline Drive

BSL2

BORING 73307-1 E.A. #

GROUND ELEV_ 2096.45 (ft) HAMMER DROP SYSTEM_Auto., ETR=79% **EXPLORATION LOG**

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

ENGINEER

EQUIPMENT

OPERATOR

"P" 185+00

100 feet Right Abbas Bafghi

Diedrich D-120, #1082

SHEET 2 OF 3

K. Marshall

DRILLING METHOD Rotary Wash

BACKFILLED Yes DATE 1/25/2006

51.51/	DEDTU	SA	MPLE	BLOW C	OUNT						
ELEV. (ft)	DEPTH (ft)	NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recovid	LAB TESTS	USCS Group		MATERIAL DESCRIPTION	REMARKS
		RC4	CORE		1,000	0			24.00	RQD could not be determined because the cores were highly fractured.	used smaller tricone bit (2.75 in.) from 20 feet down.
	22.25								21.90		
										DOE (04.0) 05.05() 4.0.5 1/4.0 1/4.0	
	22.75 22.95 23.25		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.	
2071.5	25		CORE			55			25.25		
	26.00								07.00		Resumed on 01-25-06 at 8:05 am.
	-	RC	CORE			64			27.00	RC6 (26'-29.5'): rate 2.0 feet/2.5 minutes. RQD could not be determined because the cores were highly fractured.	The hole sloughed in 2.0 feet overnight. A new core bit was used from
	29.50								29.50		27.75 feet (Run 8) down.
	30.00		CORE			0		1	30.00	RC7: (29.5'-30'): core barrel got plugged;	İ
2066.5	300.00		CORE			100			30.00	coring stopped. RC8: (30.0'-32.0'): RQD could not be determined because the cores were highly fractured.	
	32.00							_	32.00	RC9 (32.0'-33.75'): rate 1.75 feet/2.0 minute.	
	33.75		CORE								
:			CORE			100			34.00	RC10 (33.75'-35.5'): rate 8.0 inches/0.5 minute.	
2061.5	35.50 35.50										
	-	RC1	CORE			31			36.00	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										
									39.00		
:[39.75	<u> </u>	+		-			1			



1/24/06 START DATE 1/25/06

END DATE

JOB DESCRIPTION Boulder City Bypass - Phase 1

I 515 @ Railroad Pass: Silverline Drive

LOCATION BSL2 **BORING**

73307-1 E.A.#

GROUND ELEV_ 2096.45 (ft)

HAMMER DROP SYSTEM Auto., ETR=79%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION **OFFSET**

100 feet Right Abbas Bafghi **ENGINEER** EQUIPMENT

Diedrich D-120, #1082

SHEET 3 OF 3

K. Marshall **OPERATOR**

DRILLING METHOD Rotary Wash

BACKFILLED Yes DATE 1/25/2006

"P" 185+00

ELEV.	DEPTH		MPLE	BLOW C			LAB TECTO	USCS	MATERIAL RECORDINGS	DEMARKS
(ft)	(ft)	NO.	TYPE	6 inch Increments	Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	41.50		CORE			0		1	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
	43.50		CORE			79			42.00 RC13 (41.50-43.50'): rate 2.0 foot /1.30 minutes. RQD could not be determined because the cores were highly fractured.	tried to excavate the bedrock to instal the fiber optic line but did not work. Explosive was
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.	used to break the bedrock to pass through the humps of the bedrock. Rocks are highly
	_		i.						All obtained samples were classified visually. Note: Partial increment blow counts may be	abrasive" (Mining Representative-K
	_								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.	
2046.5	50								GPS: Latitude: 35°57'26.924"N Longitude: 114°54'34.597"W Elevation: 2096.45'	
	-									
	-			:		į				
2041.5	55									
	-									
	-									
	-				1					



TART DATE	1/26/06

1/26/06

END DATE JOB DESCRIPTION Boulder City Bypass - Phase 1

I 515 @ Railroad Pass: Silverline Drive LOCATION BSL3

BORING 73307-1

E.A. #

GROUND ELEV 2106.26 (ft)

HAMMER DROP SYSTEM Auto., ETR=79%

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

STATION OFFSET

ENGINEER EQUIPMENT

Diedrich D-120, #1082 K. Marshall OPERATOR DRILLING METHOD

6 in. HSA

"P" 184+90

100 feet Left

Abbas Bafghi

BACKFILLED Yes DATE 1/26/2006

SHEET 1 OF 2

ELEV.	DEPTH		MPLE.	BLOW CO	Last	Percent	LAB TESTS	USCS	MATERIAL DESCRIPTION	REMARKS
(ft)	(ft)	NO.	TYPE	Increments		Recov'd	LAD (ES15	USCS Group		
	4.00								Ground is covered with cobbles/boulders, very rocky, dry, very hard drilling.	Location: UTM5A
-	1.00							-	1.00 WELL-GRADED GRAVEL WITH SAND	started: 7:30
				9					(GW) rock fragments of gravel size with	am am
	_	A	SPT	17	30	78			mixture of sand/silt, dry, light brown, (Alluvium	i.
	2.50			13					Sample A: rock fragments with sand/silt.	stopped: 10:1
Ī				7					Recovery length = 1.167 feet.	am
İ	F	В	SPT	6	15	44			Complete Control of the Control of t	41
		ັ	0, ,		10	"		0.44	Sample B: SPT shoe was plugged by a piece of rock fragment. Recovery length = 0.67 feet	weather: sunn and cool.
	4.00	-		9				GW		
				12					Sample C: more fines, less rock fragments.	Rig #1082
	_	С	SPT	13	32	72			Recovery length = 1.08 feet.	
2101.3	-5 5.50			19		ļ				Automatic Hammer broke
ŀ	3.30			14				1		at 8:20, fixed t
ŀ	-	_								8:50.
		P	SPT	20	80			L	6.50	sand catcher was used in
	7.00			60					Drill rig chattered from 7.5 feet down, no penetration.	SPT sampler.
f	7.13 7.59	-	SPI	100/1.5"	100/1.5			1	penetiation.	Drilling was
ŀ	7:63	F	SPT	100/2.251	00/2.25	•		†	Bedrock contact at 7.5 feet.	terminated at
ŀ	-								FRACTURED BEDROCK undifferentiated	10:15 am due
						1			8.50 Volcanic rocks including granite porphyry,	advancement
									rhyolite, and other intrusive rocks ranging fron	Inner bit ("fish
									basaltic to rhyolitic. Cretaceous and Tertiary	tail") got broke
									age formation of Black Hills. Discontinuity Spacing = very closely jointed bedrock, highly	due to hard drilling in
2096.3	-10	1							fractured, no signs of decomposition, non-filling	
									gray.	1
		1							Sample E: looks like bedrock material,	
									fractured rock fragments, pulverized during SI	PT
									driving. Recovery length = 0.42 feet. SPT	
-	_								bouncing on rock.	
									Sample F: Recovery length = 2 inches of	
	<u> </u>								slough. no SPT penetration. SPT bouncing	on
									rock.	
	_								End of Boring at 7.5 feet.	
									Drilling was terminated due to lack of HSA	
2091.3	– 15								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	
ł	<u> </u>								presence of strongly cemented sand and grav	el
									(breccia/caliche), cobbles or boulders.	
İ	_								Note: The station and the offset are measure	d
	l	1	1	1	1	1		1	off the roadway alignment plan sheet. The	1
		1			i		1	i i	elevation is measured by hand-held GPS.	1

NEVADA	START DATE	1/26/06	EXPL	ORATIO	N LOG			ŞI	HEET 2 OF
DEPARTMENT OF	END DATE	1/26/06				STATION	"P" 184	l+90	
TRANSPORTATION	JOB DESCRIPT	ION Boulder City Bypass - I	Phase 1			OFFSET	100 fee	et Left	
	LOCATION	I 515 @ Railroad Pass: Silv	erline Dr	ive		ENGINEER	Abbas	Bafghi	
	BORING	BSL3				EQUIPMENT	Diedric	h D-120	, #1082
	E.A. #	73307-1	GROU	INDWATER	RLEVEL	OPERATOR	K. Mars	shall	
	GROUND ELEV	2106.26 (ft)	DATE	DEPTH ft	ELEV. ft	DRILLING METHOD	6 in. H	SA	
GEOTECHNICAL ENGINEERING	HAMMER DROF	P SYSTEM Auto., ETR=79%				BACKFILLED	Yes	_ DATE .	1/26/2006

SHEET 2 OF 2

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



_1/26/06 START DATE 1/26/06 END DATE

LOCATION

BORING

EXPLORATION LOG

GROUNDWATER LEVEL

DATE DEPTH ft ELEV. ft

JOB DESCRIPTION Boulder City Bypass - Phase 1 I 515 @ Railroad Pass: Silverline Drive **ENGINEER**

BSL4

73307-1 E.A.# GROUND ELEV_ 2103.13 (ft)

HAMMER DROP SYSTEM Auto., ETR=79%

STATION OFFSET

"P" 185+70 100 feet left

Abbas Bafghi

Diedrich D-120, #1082 K. Marshall

SHEET 1 OF 1

OPERATOR DRILLING METHOD

EQUIPMENT

6 in. HSA

BACKFILLED Yes DATE 1/26/2006

<u> </u>	1	SAI	MPLE	BLOW C	OUNT				
ELEV. (ft)	DEPTH (ft)			Cinala	Last	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION REMARKS
	1.00			6					Ground is covered with cobbles/boulders, very rocky, dry, very hard drilling 1.00 Sample A: WELL-GRADED GRAVEL WITH SAND (GW) rock fragments of gravel size with
	2.50	A	SPT	11 11	22				mixture of sand/silt, dry, light brown, (Alluvium).
	2.00	В	SPT	17 24	45				Sample A: mainly rock fragments with some sand/silt. Rig #1082
	4.00		JF 1	21	45			GW	Sample B: mainly rock fragments with some sand/silt. boulder made the drill rod to go out of plumb
2098.1 -	5 5.50	С	SPT	35 30	65				Sample C: SPT shoe was plugged by a piece of rock fragment.
	_	D	SPT	20 22	41				Sample E: Gray rock fragments with pulverized rocks.
	7.00 7.13		SPT		00/2.0				7.50
	- 8:59			100/2.0"					Drill rig chattered from 7.5 feet down, no penetration. 8.50
	-	F	SPT	17/0.5"	17/0.5**				Bedrock contact at 7.5 feet. Drilling was terminated at 12:07 pm.
2093.1	10								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.
2088.1	15								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'
	_								

APPENDIX B SOIL CLASSIFICATION TEST RESULTS

L	+3"	%	GRAVEL	% SAN	ND	% SILT	%	CLAY	USCS	AASHTO	PL	LL
C	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
4	0.0		29.6	51.7			18.7		SM	A-1-b	NP	24
	SIEVE	PE	RCENT FI	NER	SIEVE	PE	RCENT FIN	NER	Material Des			
l	inches	0		Δ	number	0		Δ	☐ ○ well-graded	l sand with silt a	ad gravel	i

GRAIN SIZE - mm.

SIEVE	PEI	RCENT FIN	IER
inches size	0		Δ
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 SIZI	Ξ
D ₆₀	5.7279	3RAIN SIZI 2.1507	2.3612
D ₆₀			
1	5.7279	2.1507	2.3612
D ₃₀	5.7279 1.2591 0.1092	2.1507	2.3612 0.2085
D ₃₀	5.7279 1.2591 0.1092	2.1507 0.4298	2.3612 0.2085

SIEVE	PERCENT FI		1ER
number size	0		Δ
#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

☐ poorly graded sand with silt and gravel
\triangle silty sand with gravel
REMARKS:
0

○ Source of Sample: SLA1□ Source of Sample: SLA1

Depth: 4.0 - 5.5' Depth: 6.0 - 7.5' Sample Number: A Sample Number: B Sample Number: C

△ Source of Sample: SLA1

Depth: 8.0 - 9.5'

Client: Abbas Bafghi

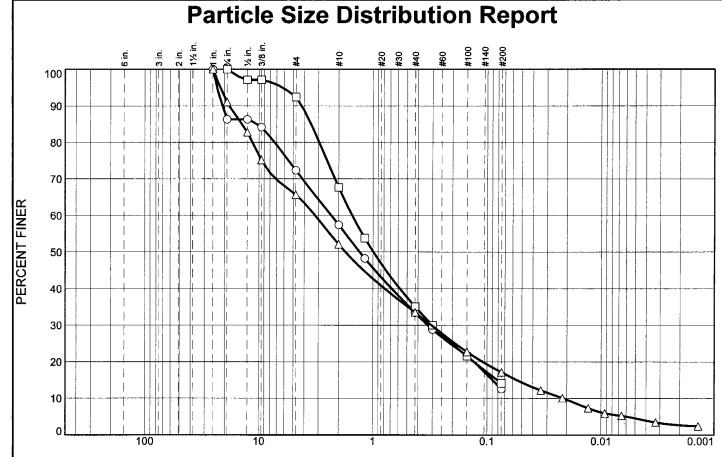
Project: Boulder City Bypass - US 93/US 95 Intersection

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DEPARTMENT OF TRANSPORTATION

NEVADA

Project No.: FL-02-06



GRAIN	SIZE -	mm.
--------------	--------	-----

		+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
		0.0	27.7	59.8	12	2.5	SM	A-1-b	NP	21
C	ב	0.0	7.6	78.2	14.2		SM	A-1-b	NP	19
4	7	0.0	34.4	48.4	12.6	4.6	SM			

SIEVE	PEI	RCENT FIN	IER		
inches size	0	Δ			
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		
	C	GRAIN SIZI	≣		
D ₆₀	2.3220	1.5240	3.2147		
D ₃₀	0.3295	0.3000	0.3058		
D ₁₀			0.0215		
	CC	COEFFICIENT			
c _c			1.35		
C _c			149.68		

SIEVE	PEI	RCENT FIN	IER
number size	0		Δ
#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
1			
ļ			
ŀ			

□ silty sand
\triangle silty sand with gravel
REMARKS:
NEWAKKS.
0

Material Description
O silty sand with gravel

○ Source of Sample: SLA1
□ Source of Sample: SLA1
△ Source of Sample: SLA1

Depth: 10.0 - 11.5' Depth: 12.0 - 12.18'

Depth: 29.0 - 29.8'

Sample Number: D Sample Number: E Sample Number: J

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Client: Abbas Bafghi

Project: Boulder City Bypass - US 93/US 95 Intersection

Δ

Project No.: FL-02-06

\prod	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	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
Δ	0.0	36.8	53.0	10.2		SP-SM	A-1-a	NP	23

GRAIN SIZE - mm.

SIEVE	PE	PERCENT FIN					
inches size	0		Δ				
1"		100.0	100.0				
3/4"	100.0 98.4	94.5	96.0				
1/2"		87.3	89.4				
3/8"	95.4	83.6	82.2				
	(GRAIN SIZI	E				
D ₆₀	1.7652	2.8833	4.1491				
D ₃₀	0.5283	0.4788	0.6855				
D ₁₀	0.1291						
	CC	TS					
င် ၁	1.22						
C _{II}	13.67		•				

SIEVE	PE	PERCENT FINER				
number size	0		Δ			
#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			

☐ silty sand with gravel
△ poorly graded sand with silt and gravel
REMARKS:
0

Material Description

O well-graded sand with silt

○ Source of Sample: SLP1□ Source of Sample: SLP1

Depth: 3.5-5.0 Depth: 8.5-10.0 Sample Number: A Sample Number: C

△ Source of Sample: SLP1

Depth: 10.5-12.0

Sample Number: D

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Client: Abbas Bafghi

Project: Boulder City Bypass - US 93/US 95 Intersection

Δ

Project No.: FL-02-06

GRAIN SIZE - mm.

	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	28.8	55.3	15	5.9	SM			
	0.0	39.9	49.4	8.4	2.3	SW-SM	A-1-a	20	23

SIEVE	PE	RCENT FIN	NER	SIEVE	PEI	RCENT FIN	
inches size	0			number size	0		O silty sand with gravel
1"		100.0		#4	71.2	60.1	
3/4"	100.0	88.8		#10	53.0	43.6	□ well-graded sand with silt and gravel
1/2"	90.9	84.8		#16	44.1		
3/8"	85.6	75.8		#40	29.5	24.0	
			1	#50	25.4		
				#100	19.8	15.1	
				#200	15.9	10.7	
	GRAIN SIZE		E				REMARKS:
D ₆₀	2.8322	4.7296					
D ₃₀	0.4422	0.7638					
D ₁₀		0.0631					
	CC	EFFICIEN	TS				
C _C		1.96					
Cu		74.98					
O Source o	f Sample:	SLP1	Depth: 18	8.5-18.67	Sampl	e Number:	· F

☐ Source of Sample: SLP1

Depth: 18.5-18.67 Depth: 53.5-55.0 Sample Number: F Sample Number: M

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100

Client: Abbas Bafghi

Project: Boulder City Bypass - US 93/US 95 Intersection

Project No.: FL-02-06

Figure

0.01

0.001

Particle Size Distribution Report

GRAIN SIZE - mm.

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

SIEVE	PEI	RCENT FIN	NER		
inches size	0		Δ		
1-1/2"		100.0			
1"		89.4	100.0		
3/4"	100.0	78.9	88.6		
1/2"	97.9	70.4	83.2		
3/8"	91.3	65.1	78.9		
	(GRAIN SIZE			
D ₆₀	2.4201	7.4790	3.2761		
D ₃₀	0.3762	1.0583	0.6179		
D ₁₀	0.0220				
	CC	DEFFICIEN	TS		
C _c	2.65				
C _u	109.80				

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SIEVE	PEI	RCENT FIN	IER
number size	0		Δ
#4	75.8	50.4	67.2
#10	55.7	37.5	49.9
#16		31.1	40.1
#40	31.2	22.3	25.0
#50		19.5	20.9
#100	22.0	16.6	16.1
#200	16.3	12.1	11.0
0.145	Co	Manual and T	`

4	
	☐ silty gravel with sand
	\triangle poorly graded sand with silt and gravel
	REMARKS:

Material Description

○ silty sand with gravel

0.01

0.001

○ Source of Sample: SLP2□ Source of Sample: SLP2

100

90

80

70

60

50

40

30

20

10

PERCENT FINER

Depth: 13.0-14.5 Depth: 15.0-16.28 Sample Number: D Sample Number: E Sample Number: F

△ Source of Sample: SLP2

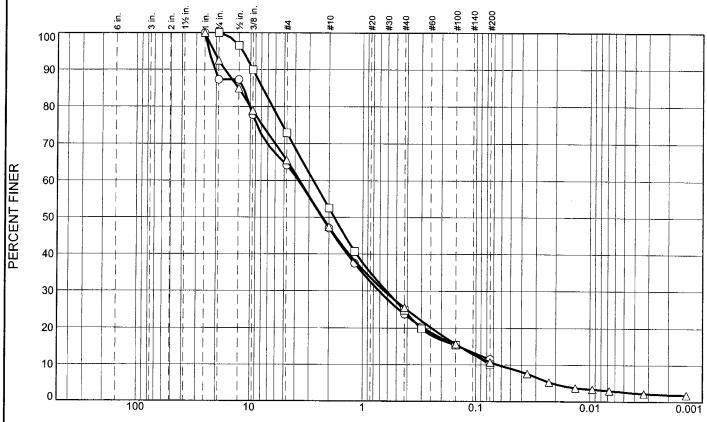
Depth: 18.0-19.5

Client: Abbas Bafghi

DEPARTMENT OFProject: Boulder City Bypass - US 93/US 95 Intersection

Project No.: FL-02-06

Particle Size Distribution Report



GRAIN	SIZE	- mm.
-------	------	-------

	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	35.8	52.7	1 1	1.5	SP-SM	A-1-a	NP	23
	0.0	27.1	62.8	10.1		SP-SM	A-1-b	NP	21
Δ	0.0	34.4	54.9	8.1	2.6	SW-SM	A-1-a	NP	21

SIEVE	PE	PERCENT FINER						
inches size	0		Δ					
1"	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 SIZI	 E					
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					
1			56.59					

SIEVE	PEI	RCENT FIN	IER
number size	0		Δ
#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

O poorly graded sand with silt and grav	vel
☐ poorly graded sand with silt and gra-	vel

Material Description

 \triangle poorly graded sand with silt and gravel

<u> </u>	

○ Source of Sample: SLP2□ Source of Sample: SLP2

Depth: 20.0-21.0 Depth: 25.0-26.0 Sample Number: G Sample Number: H Sample Number: I

△ Source of Sample: SLP2

Depth: 30.0-31.5

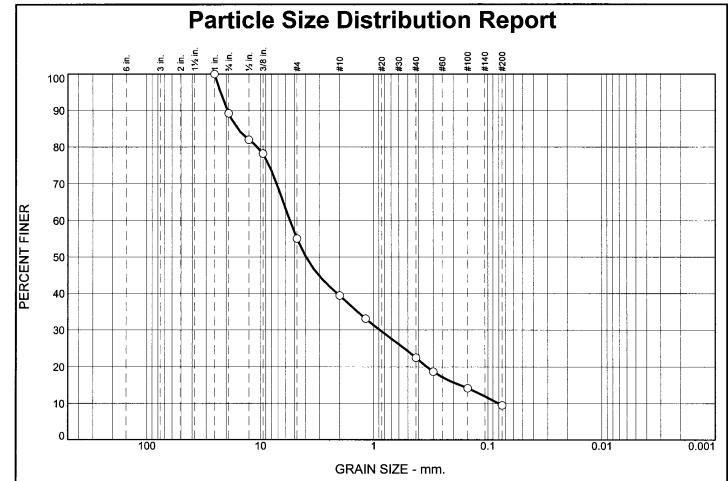
. .11 5 611

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Project: Boulder City Bypass - US 93/US 95 Intersection

Project No.: FL-02-06



+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0.0	44.9	45.6	9	.5	SP-SM			

SIEVE	PEF	RCENT FIN	NER	SIEVE	PEI	RCENT FIN	IER	Material Description
inches size	0			number size	0			O poorly graded sand with silt and gravel
1"	100.0			#4	55.1			
3/4"	89.2			#10	39.4			
1/2"	82.0			#16	33.1			
3/8"	78.2]	#40	22.5			
1				#50	18.7			
				#100	14.1			
				#200	9.5			
	(GRAIN SIZ	<u> </u>					REMARKS:
D ₆₀	5.4838							0
D ₃₀	0.8818							
D ₁₀	0.0806							
	CC	DEFFICIEN	TS					
c _c	1.76							
Cu	68.06							
O Source o	f Sample:	SLP2	Depth: 50	0.0-50.5	Sample	Number: N	л	

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 100 90 80 70 PERCENT FINER 60 50 40 30 20 10 0 100 0.01 0.001

SIEVE	PEI	IER	
inches size	0		Δ
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	Ε
D ₆₀	3.6807	7.1937	3.1728
D ₃₀	0.5625	1.0799	0.5078
D ₁₀		0.0819	
$\geq <$	CC	TS	
C _C		1.98	
C _c		87.87	

% GRAVEL

35.2

49.1

30.1

SIEVE	PEI	RCENT FIN	IER
number size	0		Δ
#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

GRAIN SIZE - mm.

10.3

9.4

11.8

% CLAY

USCS

SP-SM

GP-GM

SP-SM

Δ

% SILT

Material Description
O poorly graded sand with silt and gravel
☐ poorly graded gravel with silt and sand
△ poorly graded sand with silt and gravel
REMARKS:
0

AASHTO

A-1-a

A-1-a

PL

NP

NP

LL

19

20

○ Source of Sample: SLA2□ Source of Sample: SLA2

+3"

0.0

0.0

0.0

Depth: 13.0 - 14.4' Depth: 18.0 - 19.5'

% SAND

54.5

41.5

58.1

Sample Number: E

△ Source of Sample: SLA2

Depth: 25.0 - 26.1'

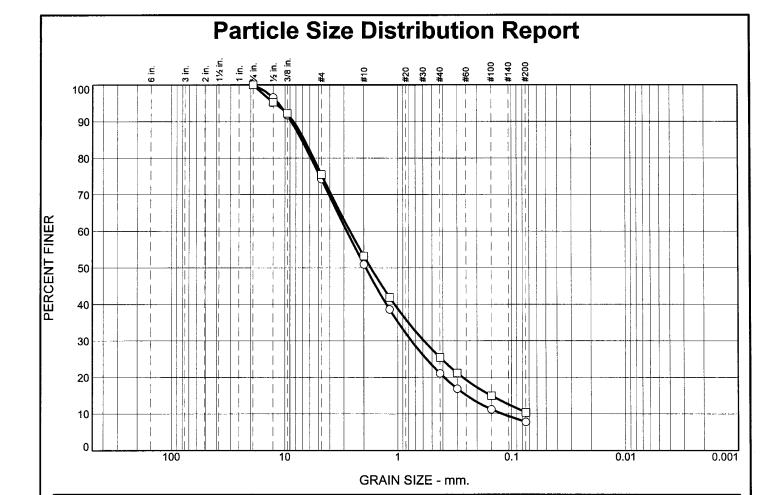
Sample Number: G Sample Number: I

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Client: Abbas Bafghi

Project: Boulder City Bypass - US 93/US 95 Intersection

Project No.: FL-02-06



SIEVE PERCENT FINER		SIEVE	PE	RCENT FINER	Material Description		
inches size	0			number size	0		O poorly graded sand with silt and gravel
3/4	100.0	100.0		#4	74.3	75.5	
1/2	96.6	95.3		#10	50.9	53.2	poorly graded sand with silt and gravel
3/8	91.8	92.2		#16	38.6	41.9	
				#40 #50	21.1 16.9	25.5	i I
				#100	11.2	15.0	
		<u></u>		#200	7.8	10.4	
><	(GRAIN SIZI	Ē				REMARKS:
D ₆₀	2.8289	2.6519					
D ₃₀	0.7564	0.5865					
D ₁₀	0.1203						
><	CC	DEFFICIEN	TS				
C _C	1.68						
cu	23.52						
Source of	f Sample:	SLA2	Depth: 3	5.0 - 35.9'	Samp	le Number: K	

Client: Abbas Bafghi

Project No.: FL-02-06

Project: Boulder City Bypass - US 93/US 95 Intersection

% SILT

7.8

10.4

% CLAY

USCS

SP-SM

SP-SM

AASHTO

A-1-b

Figure

PL

NP

LL

21

+3"

0.0

0.0

% GRAVEL

25.7

24.5

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% SAND

66.5

65.1

	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
С	0.0	20.2	72.3	5.0	2.5	SW-SM			
		30.4	60.8	8	8.8		A-1-a	NP	20
Δ	0.0	36.8	49.2	10.9	3.1	SM			

GRAIN SIZE - mm.

SIEVE	PERCENT FINER		NER	SIEVE	PE	RCENT FIN	NER	Material Description
inches size	0		Δ	number size	0		Δ	o well-graded sand with silt and gravel
1-1/2			100.0	#4	79.8	69.6	63.2	
1		100.0	91.6	#10	54.3	48.4	46.4	☐ well-graded sand with silt and gravel
3/4	100.0	92.1	83.2	#16		37.1		
1/2	95.1	92.1	76.8	#40	20.8	21.6	27.6	A gilty good with anaval
3/8	92.9	85.5	74.3	#50		17.8		△ silty sand with gravel
				#100	11.4	12.5	18.9	
				#200	7.5	8.8	14.0	
	(GRAIN SIZ	Ė					REMARKS:
D ₆₀	2.4181	3.1867	4.0361					
D ₃₀	0.7438	0.7838	0.5537					
D ₁₀	0.1207	0.0949	0.0316					
	COEFFICIENTS		TS					
C _c	1.90	2.03	2.41					
Cu	20.04	33.59	127.81					
O Source of Sample: SLA2 Depth: 3				.0 - 4.5'	Sample	Number: A	1	

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☐ Source of Sample: SLA2

△ Source of Sample: SLA2

Client: Abbas Bafghi

Sample Number: B

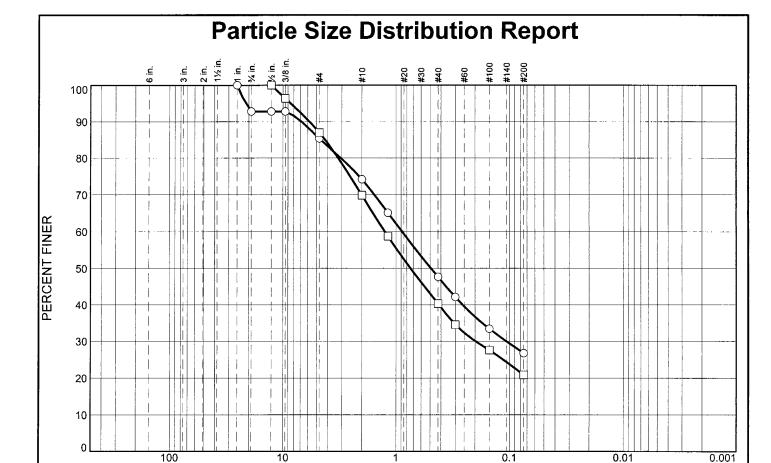
Sample Number: C

Depth: 5.0 - 6.5'

Depth: 8.0 - 9.5'

Project: Boulder City Bypass - US 93/US 95 Intersection

Project No.: FL-02-06



GRAIN	SIZE	- mm.
-------	------	-------

	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	14.6	58.6	26	5.8	SC-SM	A-2-4(0)	18	23
	0.0	13.0	66.1	20).9	SC-SM	A-1-b	17	21

SIEVE	PEI	RCENT FIN	IER					
inches size	0							
1"	100.0							
3/4"	92.8							
1/2"	92.8	100.0						
3/8"	92.8	96.4						
\mathbb{R}	(SRAIN SIZI	Ē					
D ₆₀	0.8831	1.2574						
D ₃₀	0.1063	0.1979						
D ₁₀								
$\geq \leq$	CC	TS						
ဂ ဂ								
c _u								
O Courage o								

SIEVE	PE	RCENT FIN	IER
number size	0		
#4	85.4	87.0	
#10	74.2	69.9	
#16	65.1	58.7	
#40	47.7	40.3	
#50	42.1	34.6	
#100	33.4	27.6	
#200	26.8	20.9	
39.5-39.59	Sam	ple Numbe	er: J

REMA	ARKS:		
0			

Material Description O silty, clayey sand

☐ silty, clayey sand

O Source of Sample: RRAP1

Depth: 39.5-39.59

☐ Source of Sample: RRAP1

Depth: 44.5-44.59

Sample Number: K

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 100 90 80 70 PERCENT FINER 60 50 40 30 20 10

GRAIN SIZE - mm.

0.1

	+3"	% GRAVEL	% SAND	% SILT	% CLAY	uscs	AASHTO	PL	LL
0	0.0	49.6	42.2	8.	2	GW-GM			
		4.5	72.3	23	.2	SM			
Δ	0.0	8.9	61.1	30	.0	SC-SM	A-2-4(0)	17	22

SIEVE	PEI	RCENT FIN	IER
inches size	0		Δ
1"	100.0		
3/4"	89.5	100.0	100.0
1/2"	72.6	98.1	97.3
3/8"	67.0	97.4	96.4
	(SRAIN SIZE	Ē
D ₆₀	6.9165	0.9849	0.5738
D ₃₀	1.4751	0.1620	0.0751
D ₁₀	0.1029		
	CC	EFFICIEN	TS
C _C	3.06		
Cu	67.21		
O Course o	f Commla.	DD A D1	Donth

SIEVE	PE	RCENT FIN	IER
number size	0		Δ
#4	50.4	95.5	91.1
#10	34.4	77.2	81.0
#16	27.1	64.1	72.6
#40	17.1	43.3	54.5
#50	14.6	37.6	48.1
#100	11.8	29.2	37.9
#200	8.2	23.2	30.0
		:	
1 5-2 5	Sample	Number: A	\

O well-graded gravel with silt and sand
□ silty sand
\triangle silty, clayey sand
. 211.00
REMARKS:
\circ

Material Description

0.01

0.001

REMARKS:
0
Δ

O Source of Sample: RRAP1 ☐ Source of Sample: RRAP1 Depth: 1.5-2.5

Sample Number: A

△ Source of Sample: RRAP1

Depth: 24.5-24.62

Sample Number: G

Depth: 29.5-29.58

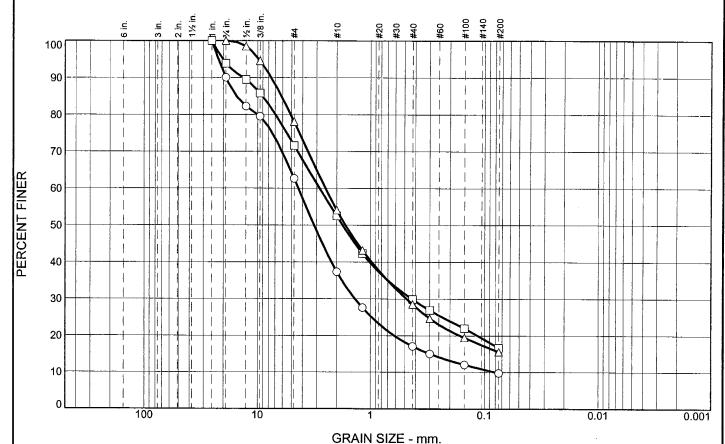
Sample Number: H

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	0.0	37.4	52.8	9	.8	SP-SC	A-2-4(0)	21	30
	0.0	28.4	54.9	16	5.7	SC-SM	A-1-b	22	26
Δ	0.0	21.9	62.5	15	5.6	SC	A-2-4(0)	21	30

SIEVE	PEI	RCENT FINER		
inches size	0		Δ	
1"	100.0	100.0		
3/4"	90.1	93.8	100.0	
1/2"	82.3	89.5	98.5	
3/8"	79.6	85.8	94.6	
	(SRAIN SIZI	E	
D ₆₀	4.3649	2.8329	2.5167	
D ₃₀	1.3724	0.4271	0.4774	
D ₁₀	0.0799			
	CC	DEFFICIEN	TS	
C _C	5.40			
	54.64			

SIEVE	PEI	RCENT FIN	IER
number size	0		Δ
#4	62.6	71.6	78.1
#10	37.4	52.5	54.1
#16	27.7	42.3	43.2
#40	17.1	30.0	28.6
#50	15.0	26.9	24.7
#100	12.1	22.0	19.5
#200	9.8	16.7	15.6
	·		
	:		

☐ silty, clayey sand with gravel	
△ clayey sand with gravel	
REMARKS:	

O poorly graded sand with clay and gravel

Material Description

O	Source	of Sample:	DCAI
	Source	of Sample:	DCA1
Δ	Source	of Sample:	DCA1

Depth: 3.0-4.5 Depth: 5.0-6.5 Depth: 8.0-9.5

Sample Number: A Sample Number: B Sample Number: C

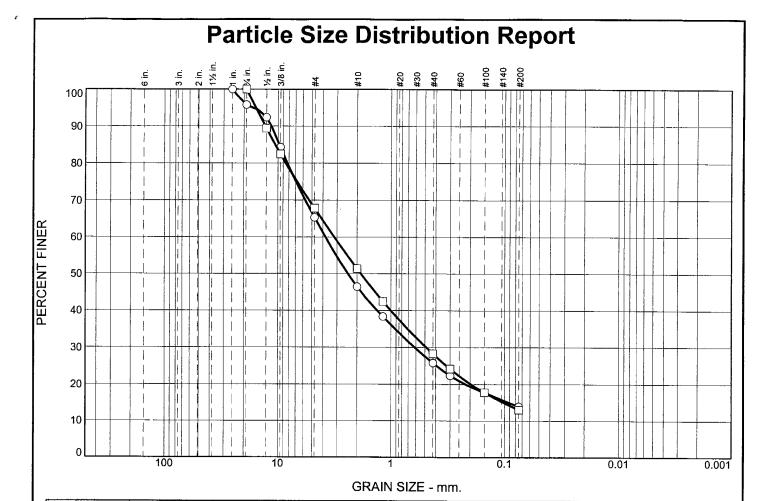
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Client: Abbas Bafghi

Project: Boulder City Bypass - US 93/US 95 Intersection

Δ

Project No.: FL-02-06



L	+3"	%	GRAVEL	% SA	ND	% SILT	% CLA	Y USCS	AASHTO	PL	LL
С	0.0		34.7	51.4	4		13.9	SC	A-2-4(0)	21	30
	0.0		32.2	54.8	3		13.0	SC-SM	A-1-b	22	26
	SIEVE	PE	RCENT FIN	IER	SIEVE	PE	RCENT FINER		Description sand with gravel		
Н	size	0			size	0		Clayey s	sand with graver		

SIEVE	PE	PERCENT FINER					
inches size	0						
1"	100.0						
3/4"	95.8	100.0					
1/2"	92.4	89.4					
3/8"	84.3	82.5					
	C	GRAIN SIZI	Ē				
D ₆₀	3.8058	3.1849					
D ₆₀	3.8058 0.6141	3.1849 0.4856					
D ₃₀	0.6141		TS				
D ₃₀	0.6141	0.4856	TS				

SIEVE	PERCENT FINER				
number size	0		-		
#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			
1					
			,		
	·				

REMARKS:

□ silty, clayey sand with gravel

○ Source of Sample: DCA2□ Source of Sample: DCA2

Depth: 3.0-4.5 Depth: 5.2-6.7

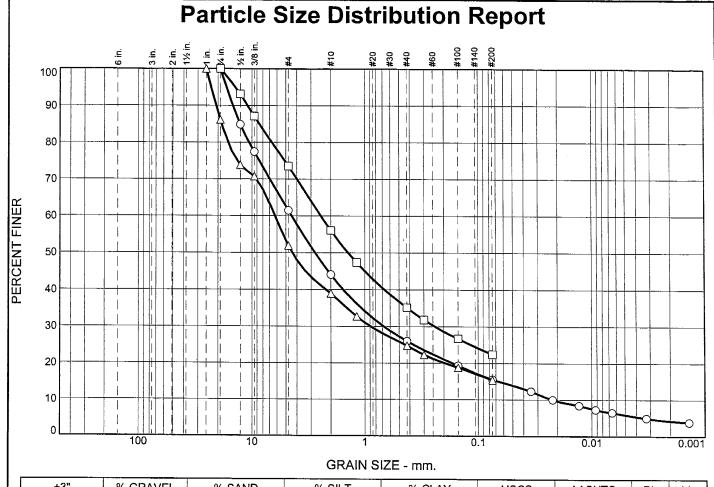
Sample Number: A Sample Number: B

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TRANSPORTATION

Client: Abbas Bafghi

Project: Boulder City Bypass - US 93/US 95 Intersection

Project No.: FL-02-06



Ц	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	38.5	46.0	9.6	5.9	SM	A-2-7(0)	34	49
	0.0	26.4	51.2	22	2.4	SM	A-2-7(1)	34	54
	0.0	48.1	36.5	15	5,4	GM	A-2-7(0)	27	43

SIEVE	PEI	PERCENT FINER				
inches size	0		Δ			
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 SIZ	E			
D ₆₀	4.4469	2.4546	6.2312			
D ₃₀	0.6766	0.2397	0.8843			
D ₁₀	0.0222					
	CC	DEFFICIEN	TS			
C _C	4.63					
C _c C _u	200.13					
O Source o	f Sample:	FA4	Denth: 2			

SIEVE	PEI	RCENT FIN	IER
number size	0		Δ
#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
<u></u>		L	L

O silty sand with gravel
☐ silty sand with gravel
\triangle silty gravel with sand
REMARKS:
0

Material Description

0	Source	of	Sample:	FA4
---	--------	----	---------	-----

□ Source of Sample: FA4

△ Source of Sample: FA4

Depth: 2.0-3.5 Depth: 3.5-5.0

Depth: 5.0-6.0

Sample Number: A

Sample Number: B

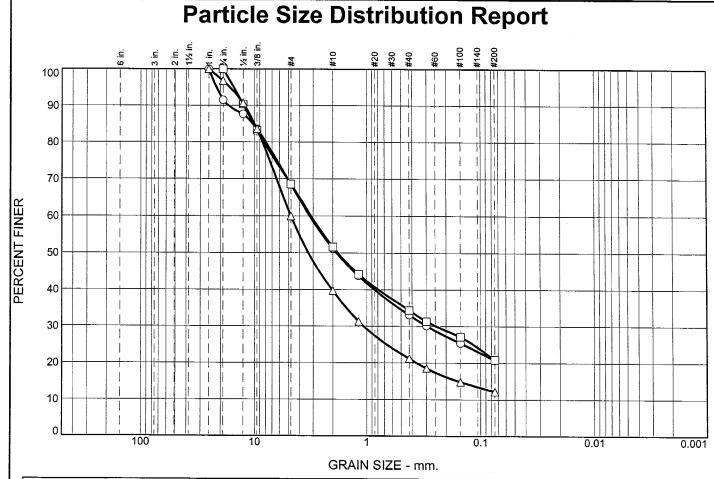
Sample Number: C1

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Ш	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	31.6	47.7	20	0.7	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		2.2	SC-SM	A-2-4(0)	22	29

SIEVE	PE	RCENT FIN	NER					
inches size	0	Ο 🗆 Δ						
1"	100.0		100.0					
3/4"	91.5	100.0	96.8					
1/2"	87.7	90.4	90.7					
3/8"	83.6	83.2	83.6					
	C	SRAIN SIZI	E					
D ₆₀	3.2193	3.1259	4.7598					
D ₃₀	0.2948	0.2459	1.0657					
D ₁₀								
	COEFFICIENTS							
C _C								
C _u								

SIEVE	PERCENT FINER					
number size	0		Δ			
#4	68.4	68.6	59.9			
#10	51.2	51.6	39.7			
#16	43.8	44.2	31.3			
#40	33.1	34.4	21.2			
#50	30.1	31.3	18.5			
#100	25.4	27.1	14.8			
#200	20.7	20.9	12.2			
1						

Material Description	_
O clayey sand with gravel	
□ clayey sand with gravel	
A gilty alayay and with amount	
△ silty, clayey sand with gravel	

REMARKS:	-
Δ	

O Source of Sample: FA4

Depth: 6.5-8.0 Depth: 8.0-9.5 Sample Number: D Sample Number: E

□ Source of Sample: FA4△ Source of Sample: FA4

Depth: 11.0-12.5

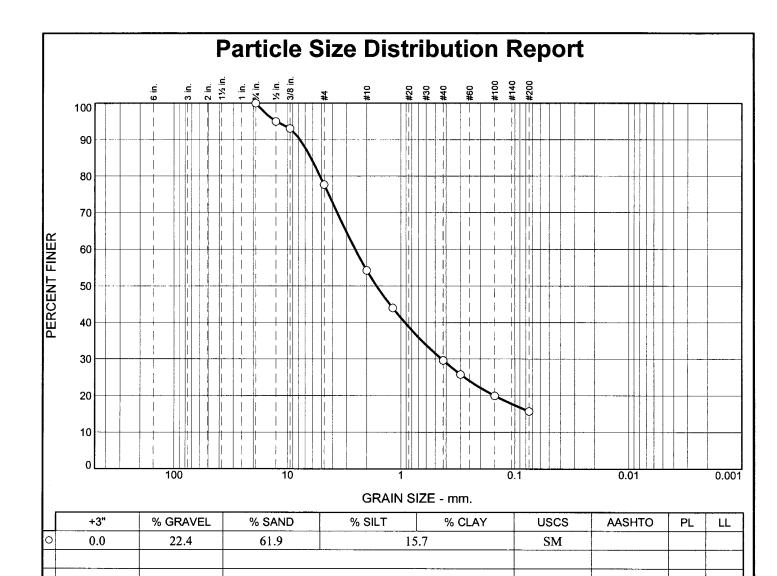
Sample Number: G

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SIEVE	PERCENT FINER			SIEVE	PERCENT FINER			Material Description
inches size	0			number size	0			o silty sand with gravel
3/4"	100.0			#4	77.6			
1/2"	95.0			#10	54.2			
3/8"	93.0			#16	44.0			
				#40	29.6			
				#50	25.8			
				#100	20.0			
	GRAIN SIZE			#200	15.7			DEMARKO
			-					REMARKS:
D ₆₀	2.5294		l					0
D ₃₀	0.4394							
D ₁₀								
	COEFFICIENTS							
C _C	·	,						
Cu								
O Source of Sample: FA4 Depth: 25.0-25.1					Sample Number: L			

Client: Abbas Bafghi

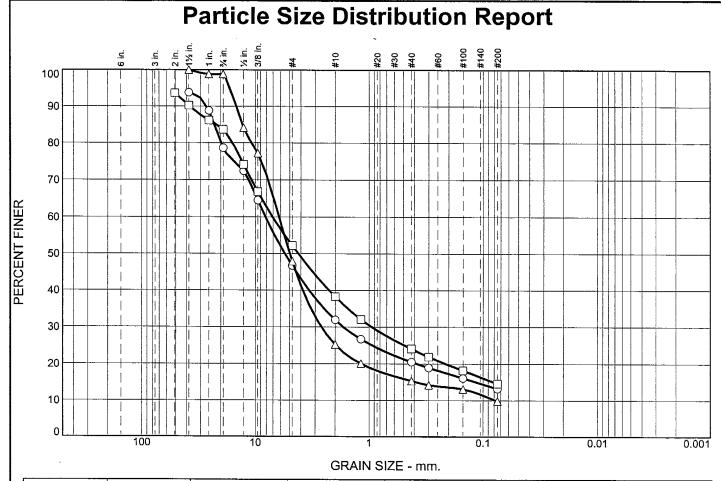
Project No.: FL-02-06

Project: Boulder City Bypass - US 93/US 95 Intersection

Figure

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L	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0			33.6	13.2		GM	A-2-7(0)	31	45
			37.6	14.6		GM	A-2-7(0)	29	44
Δ	0.0	52.1	38.1	9	.8	GP-GC	A-2-6(0)	24	39

SIEVE	PE	PERCENT FINER							
inches size	0		Δ						
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						
$\geq \leq$	(GRAIN SIZ	Ε						
D ₆₀	8.1494	7.0461	6.1815						
D ₃₀	1.6887	0.9446	2.6408						
D ₁₀			0.0775						
$\geq \leq$	COEFFICIENTS								
C _C			14.55						
C _c			79.74						
- 0									

SIEVE	PERCENT FINER				
number size	0		Δ		
#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		
			•		
İ					
50 0	omen la Nive	1 DX7	1		

Sifty graver with sand
☐ silty gravel with sand
△ poorly graded gravel with clay and sand

Material Description

REMARKS:	
0	
Δ	
1	

○ Source of Sample: FA4□ Source of Sample: FA4

Depth: 0.0-5.0 Depth: 5.0-10.0 Sample Number: RV-1

△ Source of Sample: FA4

Depth: 10.0-15.0

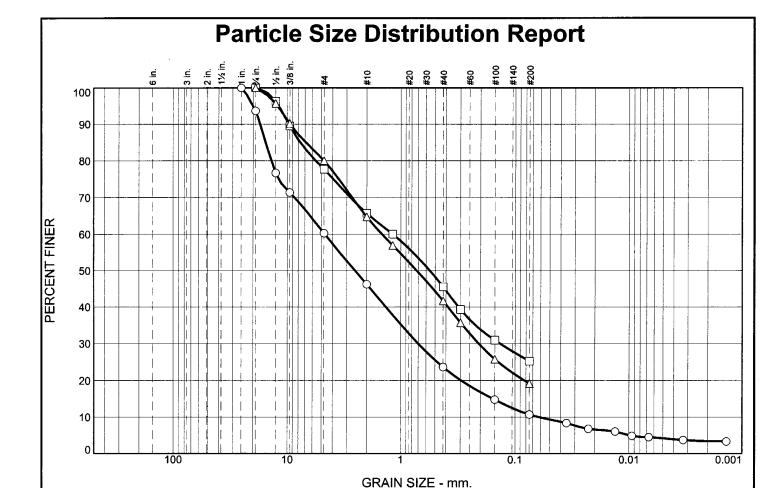
Sample Number: RV-2 Sample Number: RV-3

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1								
SIEVE	PERCENT FINER							
inches size	0 🗆		Δ					
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					
><	C	GRAIN SIZI	ZE					
D ₆₀	4.6858	1.1832	1.4705					
D ₃₀	0.7020	0.1353	0.2076					
D ₁₀	0.0619							
	CC	COEFFICIEN						
СС	1.70							
C _c	75.68							
O Source of Source EA1 Donthy 2								

% GRAVEL

39.8

22.3

20.0

+3"

0.0

0.0

0.0

SIEVE	PEI	RCENT FIN	IER
number size	0		Δ
#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

% SILT

6.5

25.3

19.1

65.7 60.0 45.5 39.3 30.9 25.3	64.7 56.9 41.7 35.7 25.8 19.1	□ clayey sand with gravel △ clayey sand with gravel	
23.3	19.1	REMARKS:	
	:	Δ	

USCS

SW-SC

SC

SC

Material Description

AASHTO

A-2-4(0)

A-2-6(0)

O well-graded sand with clay and gravel

PL

21

20

LL

30

32

O Source of Sample:	FAl
☐ Source of Sample:	FA1

Depth: 3.5-5.0 Depth: 6.0-7.2

% SAND

49.5

52.4

60.9

Sample Number: A Sample Number: B Sample Number: C

△ Source of Sample: FA1

Depth: 8.5-8.91

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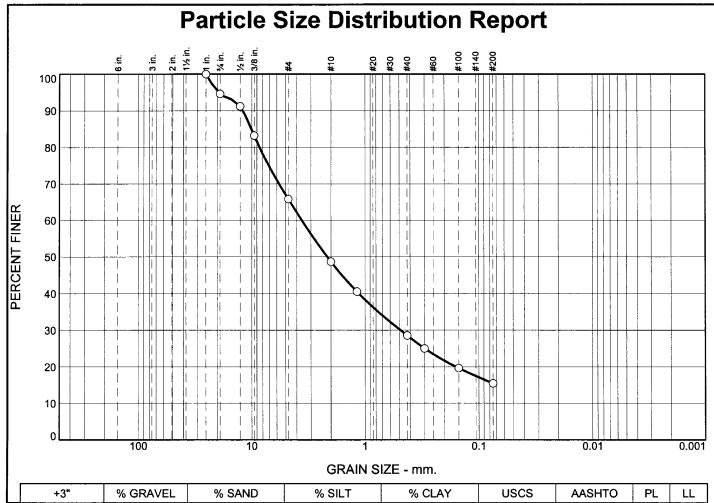
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% CLAY

4.2

Project No.: FL-02-06



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	34.2	50.4	15.4		SM			

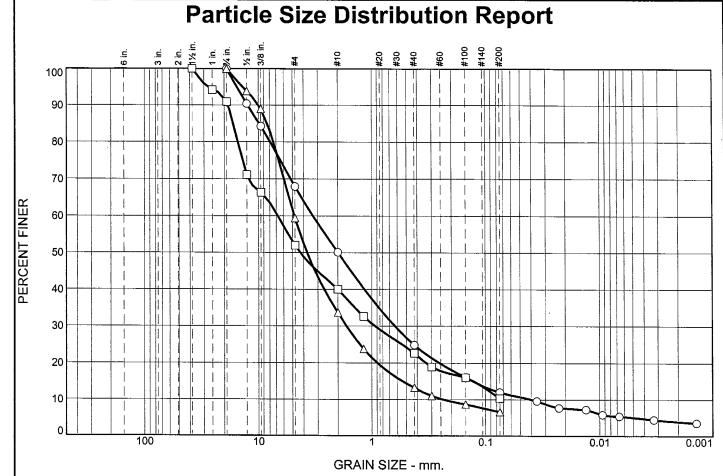
SIEVE	PERCENT FINER		SIEVE	PE	RCENT FIN	IER	Material Description		
inches size	0			number size	0			○ silty sand with gravel	
1"	100.0			#4	65.8				
3/4"	94.6			#10	48.7			The state of the s	
1/2"	91.2			#16	40.5				
3/8"	83.3			#40	28.6				
				#50	25.0				
				#100	19.6				
				#200	15.4				
	(GRAIN SIZ	E					REMARKS:	
D ₆₀	3.6070							0	
D ₃₀	0.4858								
D ₁₀									
	CC	DEFFICIEN	ITS						
c _c									
C _u									
O Source o	f Sample:	FA1	Depth: 28.	5-28.6	Sample N	Jumber: I			

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	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	32.1	55.9	6.9	5.1	SP-SC	A-2-4(0)	20	29
	0.0	48.0	41.7	10.3		GP-GM	A-1-a	23	27
Δ	0.0	40.6	52.8	6.6		SW-SC	A-1-a	19	23

SIEVE	PERCENT FINER			
inches size	0		Δ	
1-1/2"		100.0		
1"		94.2		
3/4"	100.0	90.9	100.0	
1/2"	90.4	71.1	93.8	
3/8"	84.3	66.3	89.0	
		RAIN SIZI	Ξ.	
D ₆₀	3.2977	6.7411	4.8118	
D ₃₀	0.6270	0.9359	1.6730	
D ₁₀	0.0396		0.2386	
	COEFFICIENTS			
C _C	3.01		2.44	
C _c	83.28		20.17	
O Course of Commits, ED1 David O				

SIEVE	PEI	RCENT FIN	IER
number size	0		Δ
#4	67.9	52.0	59.4
#10	50.1	40.0	33.7
#16		32.6	23.8
#40	24.9	22.6	13.2
#50		19.0	11.0
#100	16.0	16.0	8.7
#200	12.0	10.3	6.6
3.5 8	amnle Nur	nher: Δ	

	Description	

- O poorly graded sand with clay and gravel
- ☐ poorly graded gravel with silt and sand
- \triangle well-graded sand with clay and gravel

DEMARKO	
REMARKS:	
0	
L	
Δ	

- Source of Sample: FP1□ Source of Sample: FP1
- Depth: 2.0-3.5 Depth: 4.0-5.5
- Sample Number: A Sample Number: B

Sample Number: C

△ Source of Sample: FP1 Depth: 9.0-10.5

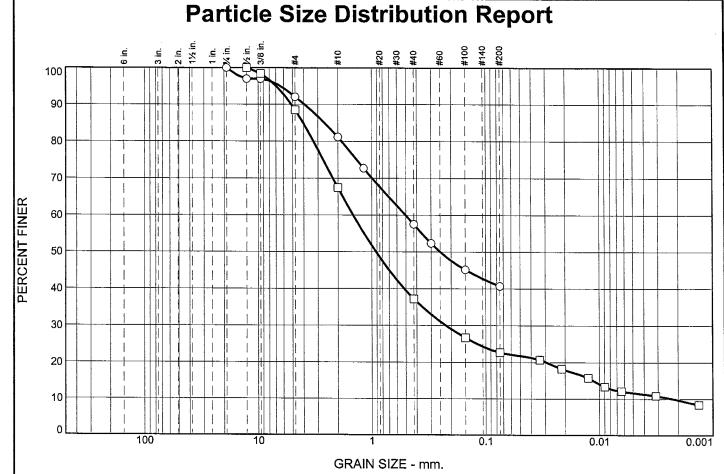
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	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	7.9	51.4	40	0.7	SC	A-4(0)	17	25
	0.0	11.5	65.8	11.1	11.6	SC-SM	A-1-b	19	24

SIEVE	PERCENT FINER		
inches size	0		
3/4"	100.0		
1/2"	97.0	100.0	
3/8"	97.0	98.4	
	(SRAIN SIZI	E
D ₆₀	0.5015	1.4667	
D ₃₀		0.2222	
D ₁₀		0.0022	
	CC	EFFICIEN	TS
1			
l C _C		15.19	
C _c		15.19 662.05	

SIEVE	PE	PERCENT FINER			
number size	0				
#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			
1					
•					
0-19.21	Sample	Number: E	<u> </u>		

o vary by build
□ silty, clayey sand
REMARKS:
0

Material Description
O clayey sand

○ Source of Sample: FP1

Depth: 19.0-19.21

Sample Number: E Sample Number: BULK

□ Source of Sample: FP1

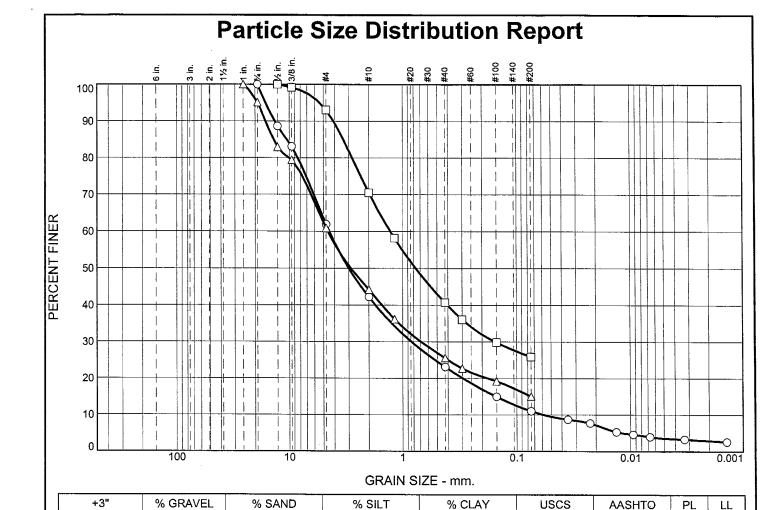
Depth: 14.0-24.0

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Δ	0.0	39.1 45.		45.8	}	
ſ	SIEVE		PERCENT FINER			5
	inches size	C)		, Δ	r
	1" 3/4" 1/2" 3/8"	100 88 83	.7	100.0 99.1	100.0 95.1 82.9 79.4	
ŀ			(GRAIN SIZE	<u> </u>	1
ſ	D ₆₀	4.4:	576	1.2874	4.5960	
	D ₃₀	0.83	362	0.1531	0.6880	
	D ₁₀	0.0	581			
	$\geq <$		CC	DEFFICIEN	TS	
	c_c	2.	70		·	
L	С _с С _и	76.	75			
O Source of Sample: FP2 Depth: 3.0-					-4.5	

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38.1

6.9

SIEVE	PERCENT FINER			
number size	0		Δ	
#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	
			!	

7.4

Material Description
 well-graded sand with clay and gravel
D -11
□ clayey sand
△ clayey sand with gravel

A-2-4(0)

A-2-7(1)

A-2-6(0)

19

23

20

26

42

36

SW-SC

SC

SC

REMARKS:
0
Δ

□ Source of Sample: FP2

0.0

0.0

- Depth: 5.0-6.0
- Sample Number: A Sample Number: B2

- △ Source of Sample: FP2
- Depth: 7.0-8.5

50.9

67.2

Sample Number: C

Client: Abbas Bafghi

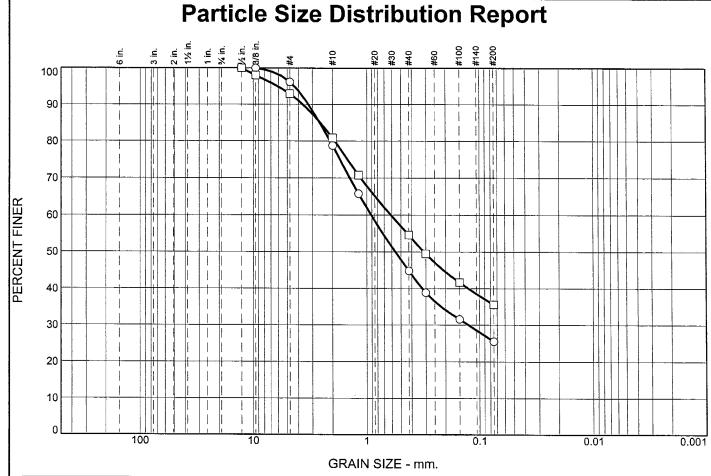
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3.6

25.9

15.1

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○ 0.0 3.8 70.6 25.6 SC A-2-6(0) □ 0.0 7.1 57.3 35.6 SC A-6(1)	1	F	AASHTO	USCS	% CLAY	% SILT	% SAND	% GRAVEL	+3"	
	18 29	1		SC	.6	2:		3.8	0.0	0
$\begin{bmatrix} -1 & 0.0 & 7.1 & 57.3 & 55.0 & 5C & A-0(1) \end{bmatrix}$	14 26	-	A-6(1)	SC	.6	3:	57.3	. /	0.0	

SIEVE	PEI	RCENT FIN	NER .
inches size	0		
1/2"		100.0	
3/8"	100.0	98.0	
$\geq \leq$	(Ε	
D ₆₀	0.9136	0.6103	
D ₃₀	0.1244		
D ₁₀			
$\backslash\!\!\!/$	CC	DEFFICIEN	TS
C _c			
ပ ပ			
O Source o	f Sample:	FP2	Denth: 9.5

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PE	RCENT FIN	IER
0		
96.2	92.9	
78.8	80.8	
65.8	70.8	
44.8	54.6	
38.9	49.5	
31.6	41.7	
25.6	35.6	
	·	
Sample Nu	mber: D	
	96.2 78.8 65.8 44.8 38.9 31.6 25.6	96.2 92.9 78.8 80.8 65.8 70.8 44.8 54.6 38.9 49.5 31.6 41.7

□ clayey sand
REMARKS:

Material Description
O clayey sand

O Source of Sample: FP2

Depth: 9.5-11.0

Sample Number: D
Sample Number: F

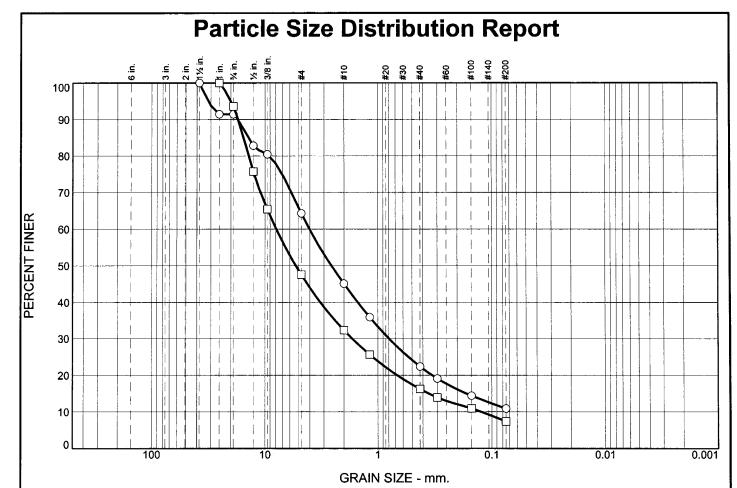
 $\hfill\Box$ Source of Sample: FP2

Depth: 14.5-15.1

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Project No.: FL-02-06



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	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	PEI	RCENT FIN	NER	SIEVE	PE	RCENT FIN	NER	Material Description
inches size	0			number size	0			o poorly graded sand with clay and gravel
1-1/2"	100.0			#4	64.3	47.6		
1"	91.4	100.0		#10	45.1	32.3		☐ poorly graded gravel with silt and sand
3/4"	91.4	93.6		#16	35.9	25.6		
1/2"	82.8	75.7		#40	22.4	16.2	1	
3/8"	80.4	65.4		#50	19.1	13.9		
				#100	14.4	10.9		
			<u> </u>	#200	10.9	7.4		
		GRAIN SIZ	E					REMARKS:
D ₆₀	4.0320	7.9260						0
D ₃₀	0.7949	1.6860						
D ₁₀		0.1230						
	CC	DEFFICIEN	TS					
c _c		2.92						
C _u		64.44						
O Source of	f Sample:	FP3	Depth: 3.0	-4.3 S	ample Nur	nber: A		

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☐ Source of Sample: FP3

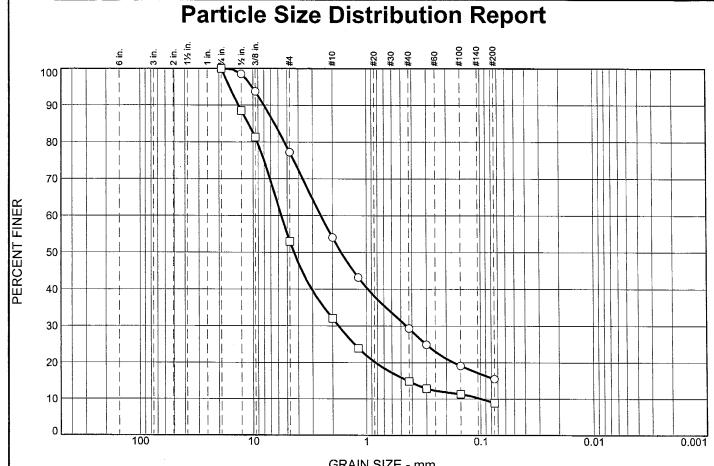
Depth: 7.5-8.5

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Sample Number: C

Project: Boulder City Bypass - US 93/US 95 Intersection

Project No.: FL-02-06



GRA	JN	SIZE	- r	nm.
-----	----	------	-----	-----

	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	22.7	61.8	15	5.5	SC-SM	A-1-b	18	24
	0.0	47.1	44.1		.8	GP-GC	A-1-a	17	21

SIEVE	PEI	RCENT FIN	IER
inches size	0		
3/4"	100.0	100.0	
1/2"	98.5	88.5 81.3	
3/8"	93.7		
	(Ē	
D ₆₀	2.5288		
D ₃₀	0.4460 1.7661		
D ₁₀			
	cc	TS	
C _c		5.59	
C _c		57.00	
- C	£ C	ED2	D 41 0

	···		
SIEVE	PE	RCENT FIN	IER
number size	0		
#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	
1			
11.0	Sample Nu	ımber: D	

O silty, clayey sand with gravel
☐ poorly graded gravel with siltyclay and sand

Material Description

REI	MARKS:		
0			

O Source of Sample: FP3

Depth: 9.5-

Sample Number: E

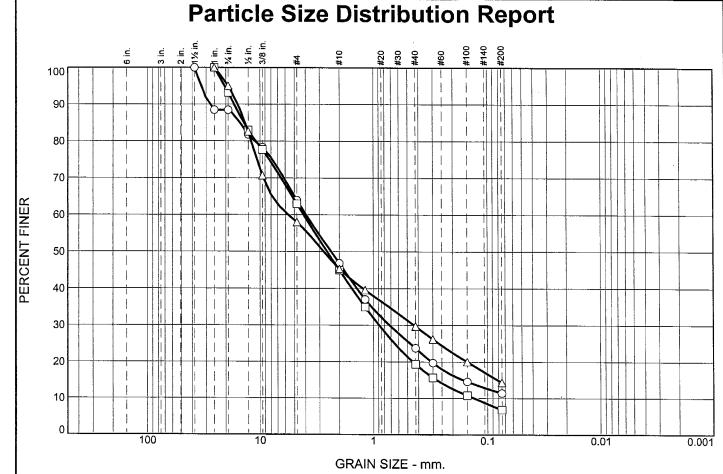
☐ Source of Sample: FP3

Depth: 12.5-13.81

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Project: Boulder City Bypass - US 93/US 95 Intersection

Project No.: FL-02-06



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	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
Δ	0.0	42.0	43.7	14	.3				

SIEVE	PEI	RCENT FIN	IER			
inches size	0		Δ			
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				
D ₆₀	3.9577	4.1510	5.6413			
D ₃₀	0.7165	0.8860	0.4343			
D ₁₀		0.1311				
	C	DEFFICIEN	TS			
Cc		1.44				
C _c		31.65				

SIEVE	PERCENT FINER				
number size	0		Δ		
#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		
F 3.5	C 1) I				

O poorly graded sand with clay and gravel
□ well-graded sand with silt and gravel
Δ
REMARKS:
0

Material Description

O Source of Sample:	FA2
☐ Source of Sample:	FA2

Depth: 4.5-5.35 Depth: 9.5-11.0 Sample Number: A Sample Number: C

△ Source of Sample: FA2

Depth: 12.0-12.47

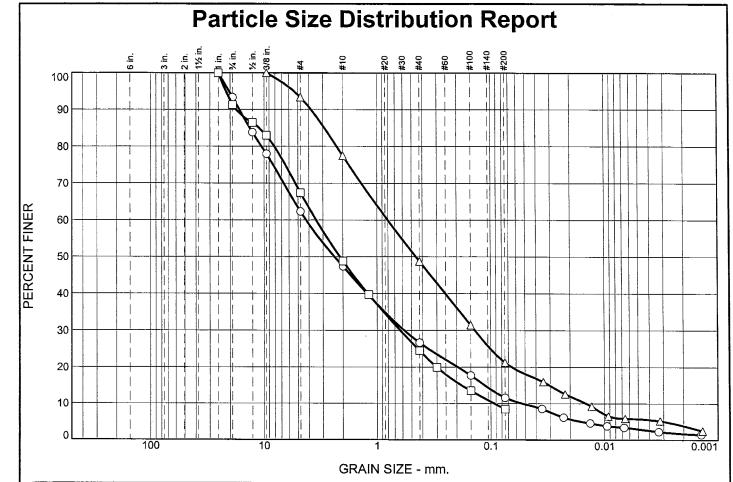
Sample Number: D

NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: Abbas Bafghi

Project: Boulder City Bypass - US 93/US 95 Intersection

Project No.: FL-02-06



L	+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	3.5	SW-SM	A-1-a	NP	18
4	0.0	6.6	72.1	15.5	5.8	SM	A-1-b	NP	25
	SIEVE	PERCENT FINE	R SIE	VE PERC	ENT FINER	Material Des	•		
ı	inches	0 🗆	△ numi			☐ O well-graded	l sand with silt a	nd grave	1

SIEVE	PEI	IER	
inches size	0		Δ
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 SIZI	E
			0.000
D ₆₀	4.2434	3.4524	0.8036
D ₆₀	4.2434 0.5772	3.4524 0.6258	0.8036 0.1373
1			
D ₃₀	0.5772 0.0529	0.6258	0.1373 0.0144
D ₃₀ D ₁₀	0.5772 0.0529	0.6258 0.0932	0.1373 0.0144
D ₃₀	0.5772 0.0529	0.6258 0.0932 DEFFICIEN	0.1373 0.0144 TS

NEVADA

DEPARTMENT OF

SIEVE	PERCENT FINER				
number size	0		Δ		
#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		

O well-graded sand with silt and gravel
□ well-graded sand with silt and gravel
△ silty sand
REMARKS: O

O Source of Sample: FA2

Depth: 14.5-16.0 Depth: 19.5-21.0 Sample Number: E Sample Number: F Sample Number: G

□ Source of Sample: FA2△ Source of Sample: FA2

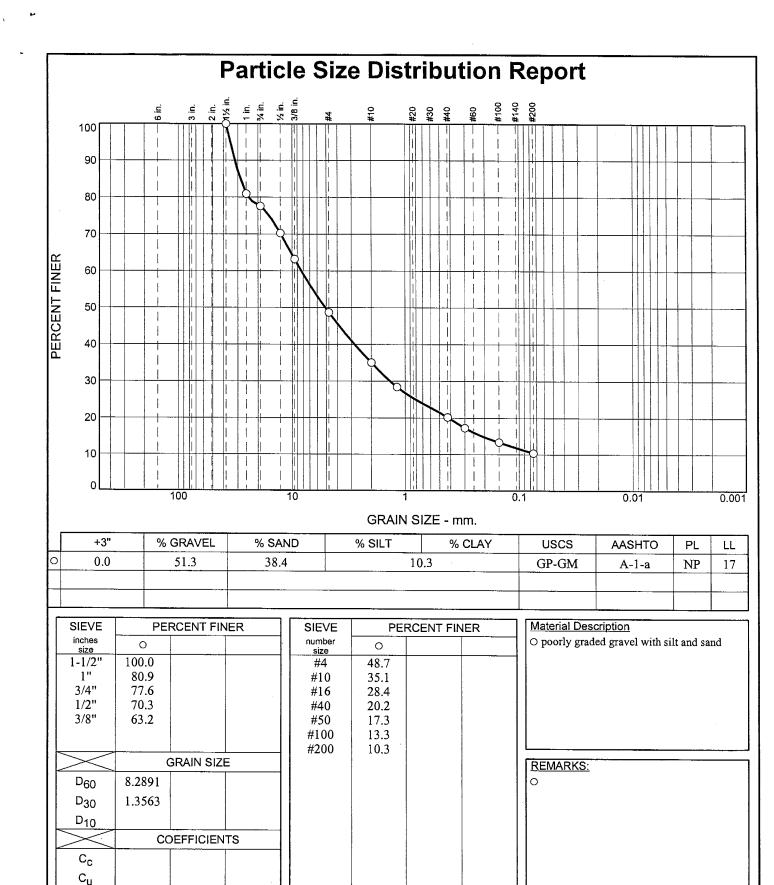
Depth: 24.5-26.0

Client: Abbas Bafghi

Project: Boulder City Bypass - US 93/US 95 Intersection

Δ

TRANSPORTATION Project No.: FL-02-06



O Source of Sample: FA2

Depth: 29.5-30.72

Sample Number: H

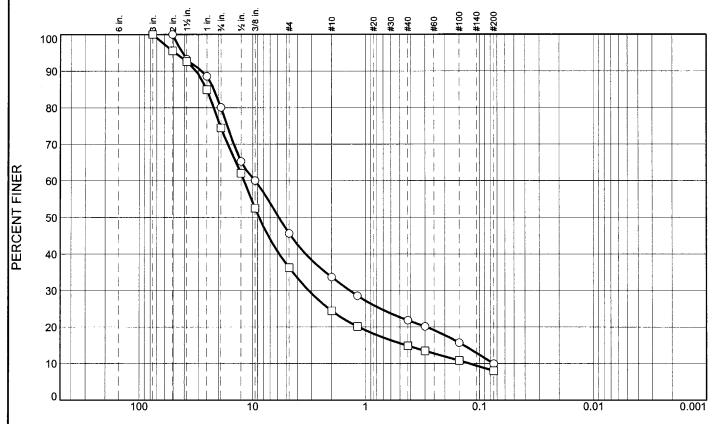
NEVADA DEPARTMENT OF TRANSPORTATION

Client: Abbas Bafghi

Project: Boulder City Bypass - US 93/US 95 Intersection

Project No.: FL-02-06

Particle Size Distribution Report



GRAIN	SIZE	- mm.
-------	------	-------

L		+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL	
	-	0.0	54.4	35.7	9	.9	GW-GM	A-1-a	NP	19	
	٦.	0.0	63.7	28.3	8	.0	GP-GM	A-1-a	23	24	
Γ											l

SIEVE	PEI	IER	
inches size	0		
3"		100.0	
2"	100.0	95.5	
1.5"	93.2	92.6	
1"	88.6	85.0	
3/4"	80.1	74.5	
1/2"	65.3	62.1	
3/8"	60.0	52.5	
	(GRAIN SIZE	
D ₆₀	9.5096	11.9217	
D ₃₀	1.3794	3.1815	
D ₁₀	D ₁₀ 0.0756		
	CC	DEFFICIEN	TS
C _C C _a	2.65	6.96	TS

	SIEVE	PEI	RCENT FIN	NER
	number size	0		
	#4	45.6	36.3	
	#10	33.7	24.5	
	#16	28.6	20.2	
	#40	21.9	14.9	
	#50	20.2	13.5	
	#100	15.7	10.8	
	#200	9.9	8.0	
		·		
C	0.0 - 5.0'	Sample	Number:	BULK 1 -

Material Description
O well-graded gravel with silt and sand

□ poorly graded gravel with silt and sand

REMARKS:

○ Source of Sample: NBA 1□ Source of Sample: NBA 1

Depth: 0.0 - 5.0'

Depth: 5.0 - 10.0'

Sample Number: BULK 1 - Sample A

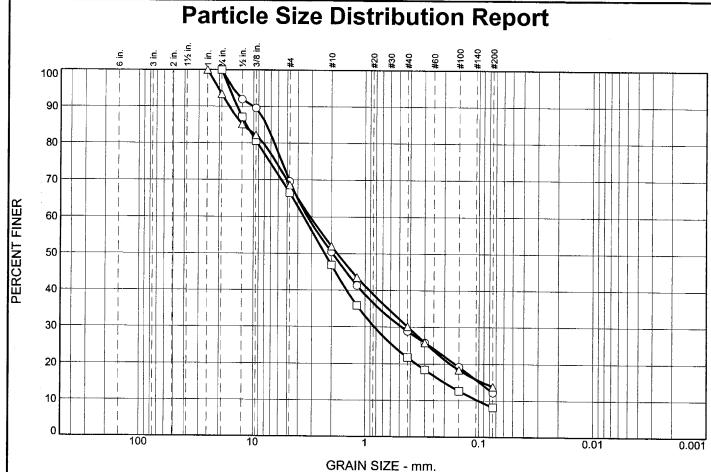
Sample Number: BULK 2 - Sample D

NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: A. Bafghi

Project: Boulder City Bypass

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



GRAIN	SIZE	-	mm.
--------------	------	---	-----

Ц	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	30.4	57.4		2.2	SM	A-1-a	NP	20
	0.0	33.5	58.3	8	.2	SW-SM	A-1-a	NP	22
Δ	0.0	31.4	54.8	13	3.8	SM	A-1-b	NP	27

SIEVE	PE	PERCENT FIN			
inches size	0	Ο.	Δ		
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		
	(RAIN SIZI			
D ₆₀	3.2878	3.5439	3.1124		
D ₆₀	3.2878 0.4777	3.5439 0.8314	3.1124 0.4215		
1		- 10 102			
D ₃₀	0.4777	0.8314	0.4215		
D ₃₀ D ₁₀	0.4777	0.8314 0.1011	0.4215		
D ₃₀	0.4777	0.8314 0.1011 DEFFICIEN	0.4215		

SIEVE	PERCENT FINER				
number size	0		Δ		
#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		
0 251	C1	NT1.	<u> </u>		

Material Description O silty sand with gravel

Δ

O Source of Sample: NBA 1 ☐ Source of Sample: NBA 1 Depth: 1.0 - 2.5' Depth: 2.5 - 4.0'

Sample Number: B

△ Source of Sample: NBA 1

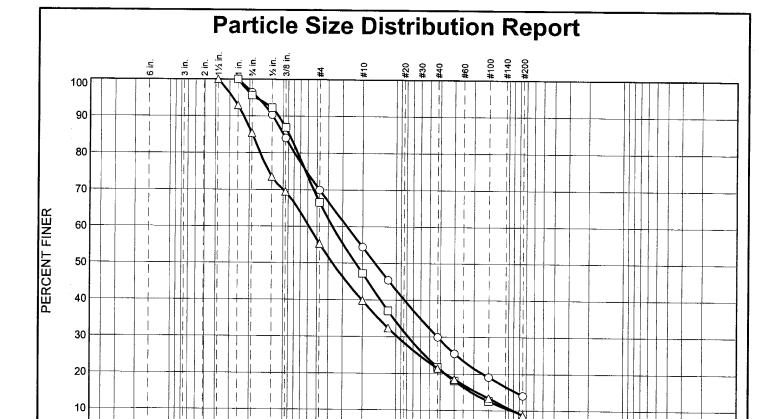
Depth: 5.0 - 6.5'

Sample Number: C Sample Number: E

NEVADA DEPARTMENT OF TRANSPORTATION Client: A. Bafghi

Project: Boulder City Bypass

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



GRAIN SIZE - mm.

Ц	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	30.0	56.0	14	1.0	SM	A-1-b	NP	26
	0.0	33.4	57.6	9	.0	SW-SM	A-1-a	NP	23
Δ	0.0	44.7	46.6	8	.7	SW-SM	A-1-a	NP	21

SIEVE	PERCENT FINER			
inches size	0		Δ	
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	
Cu		39.31	64.32	
O Source of Complex NDA 1 Dentle				

SIEVE	PERCENT FINER				
number size	0		Δ		
#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		
			1		

	○ silty sand with gravel
	☐ well-graded sand with silt and gravel
	\triangle well-graded sand with silt and gravel
ı	

Material Description

0.01

0.001

	REMARKS:
ļ	0
ļ	
	Δ

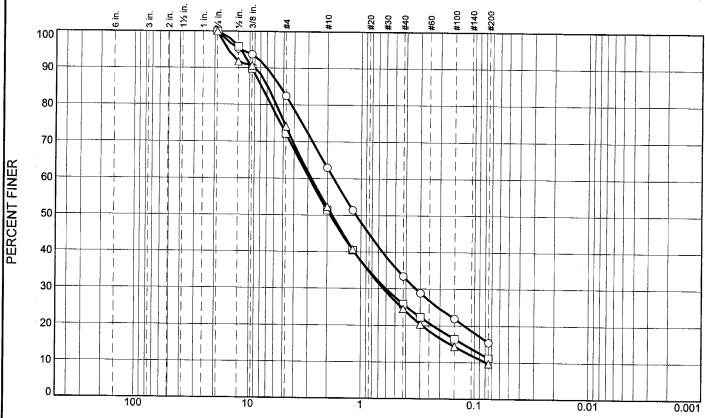
- O Source of Sample: NBA 1
- ☐ Source of Sample: NBA 1
- △ Source of Sample: NBA 1
- Depth: 6.5 8.0'
- Depth: 8.0 9.5'
- Depth: 10.0 11.1'
- Sample Number: F
- Sample Number: G
 - Sample Number: H

NEVADA DEPARTMENT OF TRANSPORTATION Client: A. Bafghi

Project: Boulder City Bypass

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





GRAIN	SIZE	-	mm.
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Ш	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	17.6	67.0	15	5.4	SM	A-1-b	NP	21
	0.0	27.8	61.1	1	1.1	SP-SM	A-1-b	NP	23
Δ	0.0	25.9	64.4	9	.7	SW-SM	A-1-b	NP	19

SIEVE	PEI	RCENT FIN	NER			
inches size	0		Δ			
3/4"	100.0	100.0	100.0			
1/2"	95.3	95.9	91.7			
3/8"	93.7	89.8	90.7			
		SRAIN SIZI				
D ₆₀	1.7539	2.8983	2.7768			
D ₃₀	0.3302	0.6028	0.6343			
D ₁₀			0.0787			
	COEFFICIENTS					
C _c			1.84			
Cu			35.26			
- C- CO 1 NTD-1						

SIEVE	PE	RCENT FIN	NER
number size	0		Δ
#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
1.5. 12.01			

74.1 52.3 40.7 24.5 20.4 14.3 9.7	☐ poorly graded sand with silt and gravel △ well-graded sand with silt and gravel
· · ·	REMARKS:
	Δ

Material Description
O silty sand with gravel

○ Source of Sample: NBA 1□ Source of Sample: NBA 1

Depth: 11.5 - 13.0'

Sample Number: I

△ Source of Sample: NBA 1

Depth: 13.0 - 14.5' Depth: 14.5 - 16.0' Sample Number: J Sample Number: K

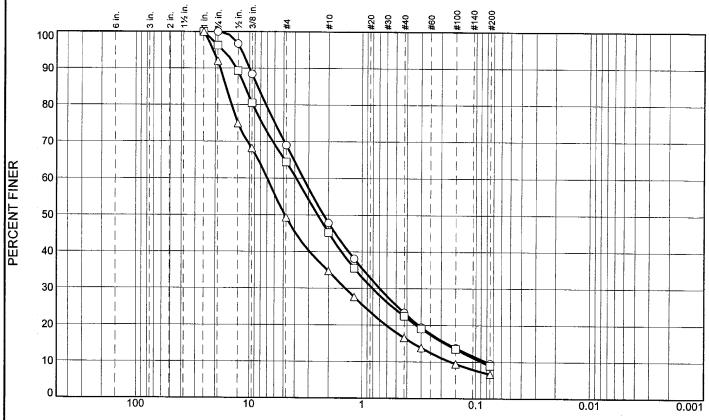
NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: A. Bafghi

Project: Boulder City Bypass

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

Particle Size Distribution Report



GRAIN	SIZE	-	mm.
--------------	------	---	-----

Ш	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	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	PEI	PERCENT FINER				
inches size	0		Δ			
1"		100.0	100.0			
3/4"	100.0	96.3	92.0			
1/2"	96.7	89.3	74.9			
3/8"	88.4	80.5	68.2			
		SRAIN SIZI	Ė			
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			
O Source o	f Sample:	NRA 1	Denth			

_ 			·· · · · · · · · · · · · · · · · · · ·
SIEVE	PEI	RCENT FIN	IER
number size	0		Δ
#4	69.0	64.4	49.3
#10	47.9	45.2	34.7
#16	38.1	35.5	27.6
#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
(0 17.5)		1 37 4	

Material Description	•
O well-graded sand with silt and gravel	

☐ well-graded sand with silt and gravel

 \triangle well-graded gravel with silt and sand

REMARKS:	•	
0		
_		

O Source of Sample: NBA 1

☐ Source of Sample: NBA 1

△ Source of Sample: NBA 1

Depth: 16.0 - 17.5'

Depth: 17.5 - 19.0'

Depth: 19.0 - 20.5'

Sample Number: L

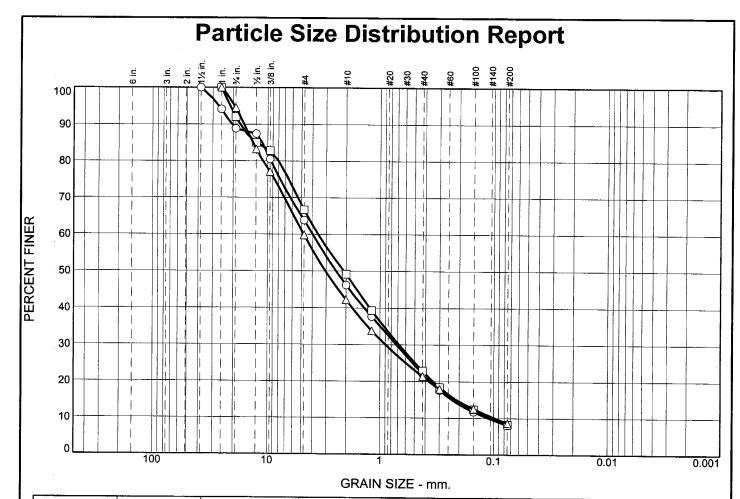
Sample Number: M

Sample Number: N

NEVADA DEPARTMENT OF TRANSPORTATION Client: A. Bafghi

Project: Boulder City Bypass

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



Ц	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	36.2	55.7		3.1	SW-SM	A-1-a	NP	18
	0.0	33.3	58.5		3.2	SW-SM	A-1-a	NP	20
Δ	0.0	40.2	51.2		3.6	SW-SM	A-1-a	NP	19
lг	SIEVE	PERCENT FINE	R S	IEVE PERC	ENT FINER	Material Des	cription	·	

SIEVE	PEI	PERCENT FIN			
inches size	0		Δ		
1.5"	100.0				
1"	94.1	100.0	100.0		
3/4"	88.8	92.0	94.5		
1/2"	87.4	85.0	83.2		
3/8"	80.5	82.8	77.1		
	C	BRAIN SIZI	=		
D ₆₀	3.9822	3.5554	4.7934		
D ₆₀	3.9822 0.7200	3.5554 0.6845	4.7934 0.8972		
1					
D ₃₀	0.7200 0.1106	0.6845	0.8972 0.0975		
D ₃₀	0.7200 0.1106	0.6845 0.1025	0.8972 0.0975		
D ₃₀	0.7200 0.1106 CC	0.6845 0.1025 DEFFICIEN	0.8972 0.0975 TS		

SIEVE	PERCENT FINER ○ □ △ 63.8 66.7 59.8 46.2 49.2 42.2 37.7 39.3 33.8 22.1 22.9 21.4 17.6 18.4 17.9 11.7 12.4 12.5 8.1 8.2 8.6		
number size	0		Δ
#4	63.8	66.7	59.8
#10	46.2	49.2	42.2
#16	37.7	39.3	33.8
#40	22.1	22,9	21.4
#50	17.6	18.4	17.9
#100	11.7	12.4	12.5
#200	8.1	8.2	8.6
0.5.00.01			

42.2	☐ well-graded sand with silt and gravel
33.8 21.4 17.9 12.5 8.6	△ well-graded sand with silt and gravel
8.0	REMARKS:
	C C C C C C C C C C C C C C C C C C C
	0
	Δ
)	

O well-graded sand with silt and gravel

O Source of Sample: NBA 1 □ Source of Sample: NBA 1 Depth: 20.5 - 22.0'

Sample Number: C

△ Source of Sample: NBA 1

Depth: 22.0 - 23.5'

Sample Number: P

Depth: 23.5 - 25.0'

Sample Number: Q

NEVADA DEPARTMENT OF TRANSPORTATION Client: A. Bafghi

Project: Boulder City Bypass

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

Particle Size Distribution Report

GRAIN SIZE - mm.

Ц	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	39.9	49.8	10	0.3	SP-SM	A-1-a	NP	20
	0.0	31.4	48.6	20	0.0	SM	A-1-b	NP	24
Δ	0.0	31.0	58.3	10	0.7	SP-SM	A-1-a	NP	18

SIEVE	PEI	PERCENT FIN			
inches size	0		Δ		
1.5"	100.0				
1"	93.4	100.0			
3/4"	84.4	91.5	100.0		
1/2"	82.4	86.7	93.8		
3/8"	77.2	82.9	89.3		
	(SRAIN SIZ	E		
D ₆₀	4.7271	2.8053	3.3100		
D ₆₀			1		
l l	4.7271	2.8053	3.3100		
D ₃₀	4.7271 0.7881	2.8053	3.3100 0.6432		
D ₃₀	4.7271 0.7881	2.8053 0.1927	3.3100 0.6432		

SIEVE	PEI	PERCENT FINER ○ □ △ 60.1 68.6 69.0 44.9 55.4 50.1 35.8 48.2 40.0			
number size	O □ 60.1 68.6		Δ		
#4	60.1	68.6	69.0		
#10	44.9	55.4	50.1		
#16	35.8	48.2	40.0		
#40	23.2	37.7	24.5		
#50	20.0	34.3	20.7		
#100	14.7	27.4	14.8		
#200	10.3	20.0	10.7		

VE	PE	RCENT FIN	NER	Material Description
ber e	0		Δ	o poorly graded sand with silt and gravel
4	60.1	68.6	69.0	
0	44.9	55.4	50.1	☐ silty sand with gravel
6	35.8	48.2	40.0	
0	23.2	37.7	24.5	
0	20.0	34.3	20.7	\triangle poorly graded sand with silt and gravel
00	14.7	27.4	14.8	
00	10.3	20.0	10.7	
				REMARKS:
				0
				lla

0.1

0.01

0.001

O Source of Sample: NBA 1

100

90

80

70

60

50

40

30

20

10

PERCENT FINER

□ Source of Sample: NBA 1

△ Source of Sample: NBA 1

Depth: 30.0 - 31.5'

Depth: 35.0 - 36.5'

Depth: 40.0 - 41.5'

Sample Number: R

Sample Number: S

Sample Number: T

NEVADA DEPARTMENT OF TRANSPORTATION Client: A. Bafghi

Project: Boulder City Bypass

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

Particle Size Distribution Report 100 90 80 70 PERCENT FINER 60 50 40 30 20 10 0.001 0.01 100 10

SIEVE	PE	RCENT FIN	IER				
inches size	0		Δ				
1"		100.0	100.0				
3/4"	100.0	92.9	78.4				
1/2"	94.7	84.7	69.8				
3/8"	3/8" 88.4		57.0				
><	C	GRAIN SIZE					
D ₆₀	4.0484	4.9112	10.1788				
D ₃₀	0.7847	0.6454	1.0379				
D ₁₀	0.0909	0.0805					
><	CC	DEFFICIEN	TS				
C _C	1.67	1.05					
C _c C _u	44.55	61.04					

% GRAVEL

35.2

40.4

52.7

SIEVE	PERCENT FINER		
number size	0		Δ
#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
50 460	C	1 NI 1	TT

GRAIN SIZE - mm.

9.0

9.6

10.3

% CLAY

USCS

SW-SM

SW-SM

GW-GM

Material Description

% SILT

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

AASHTO

A-1-a

A-1-a

PL

NP

NP

LL 19

24

0	Source	of Sample:	NBA 1
_	C	- C C 1	NID A 1

+3"

0.0

0.0

0.0

☐ Source of Sample: NBA 1 △ Source of Sample: NBA 1 Depth: 45.0 - 46.0' Depth: 50.0 - 51.4'

Depth: 55.0 - 55.5'

% SAND

55.8

50.0

37.0

Sample Number: U Sample Number: V Sample Number: W

NEVADA

DEPARTMENT OF TRANSPORTATION

Client: A. Bafghi

Project: Boulder City Bypass

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

GRAIN SIZE - mm.

+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	PE	RCENT FIN	IER
inches size	0		
1.5"	100.0		
1"	95.0		
3/4"	94.3	100.0	
1/2"	81.9	96.4	
3/8"	72.4	91.0	
	(GRAIN SIZI	Ē
D ₆₀	6.3475	4.3771	
D ₃₀	1.4697	1.5085	
D ₁₀	0.1367	0.1552	
	CC	DEFFICIEN	TS
C _C	2.49	3.35	
C _c	46.45	28.20	

SIEVE	PE	RCENT FIN	IER
number size	0		
#4	52.1	63.3	
#10	34.9	36.1	
#16	26.9	25.7	
#40	17.0	15.4	
#50	14.7	13.4	
#100	10.5	9.9	
#200	7.2	7.3	
0.0 - 5.0'	Sample	Number:	BULK 1 -

☐ poorly graded sand with silt and gravel
REMARKS:
0
0
0

O well-graded gravel with silt and sand

0.01

Material Description

0.001

O 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'

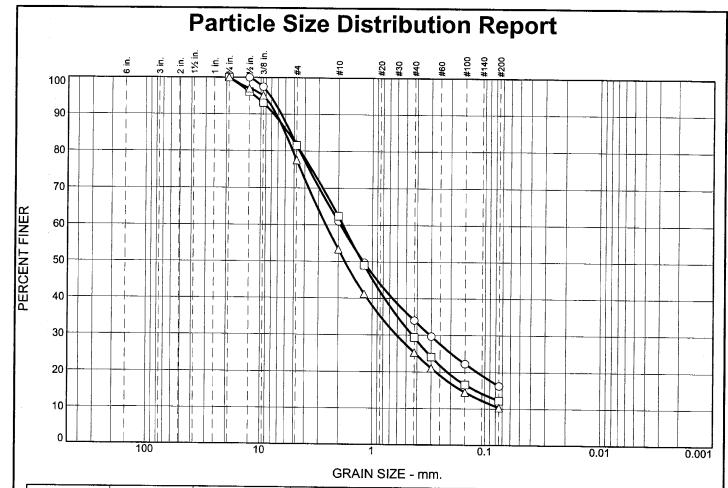
Sample Number: BULK 2 - Sample D

NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: A. Bafghi

Project: Boulder City Bypass

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



Щ	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	18.4	65.3	16	5.3	SM	A-1-b	21	24
믜	0.0	18.5	69.2	12	2.3	SM	A-1-b	NP	27
Δ	0.0	22.4	67.3	10).3	SP-SM	A-1-b	NP	26

SIEVE	PEI	RCENT FIN	NER
inches size	0		Δ
3/4"		100.0	100.0
1/2"	100.0	96.1	97.0
3/8"	97.5	93.1	95.1
$\geq \leq$		BRAIN SIZE	≣_
D ₆₀	1.9144	1.8195	2.5806
D ₆₀	1.9144 0.3084	1.8195 0.4420	2.5806 0.6063
1 1			
D ₃₀	0.3084		0.6063
D ₃₀ D ₁₀	0.3084	0.4420	0.6063
D ₃₀	0.3084	0.4420	0.6063

6
4
2
3
1
5
3

	○ silty sand with gravel
6 4 2 3 1 5	□ silty sand with gravel △ poorly graded sand with silt and gravel
3	REMARKS:

Material Description

U	Source	ΟĽ	Samp.	ie:	NBA	Z
\Box	Source	٥f	Samn	۰ما	NRA	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'

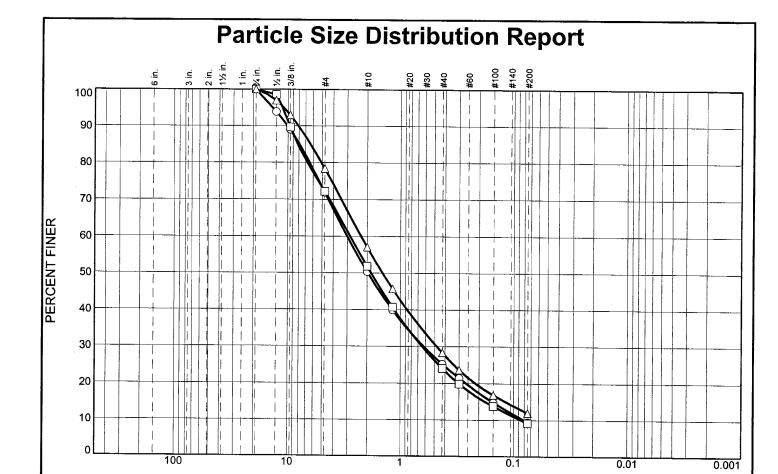
Sample Number: E

NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: A. Bafghi

Project: Boulder City Bypass

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



L	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	28.1	62.4	9	.5	SW-SM	A-1-a	NP	24
	0.0	27.8	63.0	. 9	.2	SW-SM	A-1-b	NP	21
Δ	0.0	21.6	66.5	11	1.9	SP-SM	A-1-b	NP	20

GRAIN SIZE - mm.

	, -		
SIEVE	PEI	RCENT FIN	NER
inches size	0		Δ
3/4"	100.0	100.0	100.0
1/2"	93.9	98.5	96.9
3/8"	89.0	89.6	92.9
:			
	(SRAIN SIZI	Ξ
D ₆₀	3.0060	2.8293	2.2649
D ₃₀	0.6219	0.6405	0.4762
D ₁₀	0.0808	0.0857	
	COEFFICIENTS		
CC	1.59	1.69	
C _C	37.18	33.01	

SIEVE	PE	RCENT FIN	IER
number size	0		Δ
#4	71.9	72.2	78.4
#10	50.4	51.8	57.0
#16	39.9	40.7	45.7
#40	25.3	24.1	28.3
#50	21.4	19.9	23.6
#100	14.8	13.8	16.8
#200	9.5	9.2	11.9
ļ			
5 701	0 1	NT 1	

<u>M</u>	<u>aterial</u>	Desci	riptio	<u>n</u>	
\cap	well-o	raded s	cand	with	ei ei

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

REMARKS:	 	
0		
_		
Δ		
		i

- O Source of Sample: NBA 2
- □ Source of Sample: NBA 2△ Source of Sample: NBA 2
- Depth: 5.5 7.0'
- Depth: 7.0 8.5'
- Depth: 8.5 10.0'
- Sample Number: F
- Sample Number: G Sample Number: H

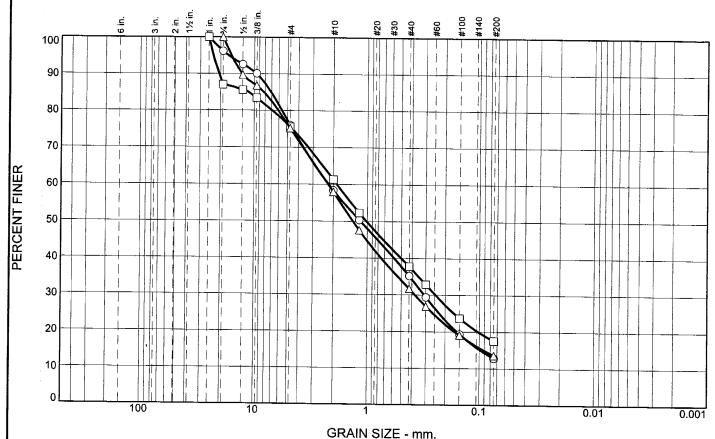
NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: A. Bafghi

Project: Boulder City Bypass

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





	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	24.0	63.2	12	2.8	SM	A-1-b	NP	29
	0.0	24.4	58.1	I 4	7.5	SM	A-1-b	NP	23
Δ	0.0	24.8	61.6	13	3.6	SM	A-1-b	NP	21

SIEVE	PERCENT FINER				
inches size	0		Δ		
1"	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		
			1		
					
	(GRAIN SIZ	L E		
D ₆₀	2.1974	GRAIN SIZ	E 2.2133		
D ₆₀					
	2.1974	1.8605	2.2133		
D ₃₀	2.1974 0.3108	1.8605	2.2133 0.3764		
D ₃₀	2.1974 0.3108	1.8605 0.2453	2.2133 0.3764		

SIEVE	PERCENT FINER					
number size	0		Δ			
#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			
ľ						

Material Description	
o silty sand with gravel	
□ silty sand with gravel	
△ silty sand with gravel	
, June gravor	
REMARKS:	
0	Ī
·	ŀ

O	Source	10	Samp	ie:	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'

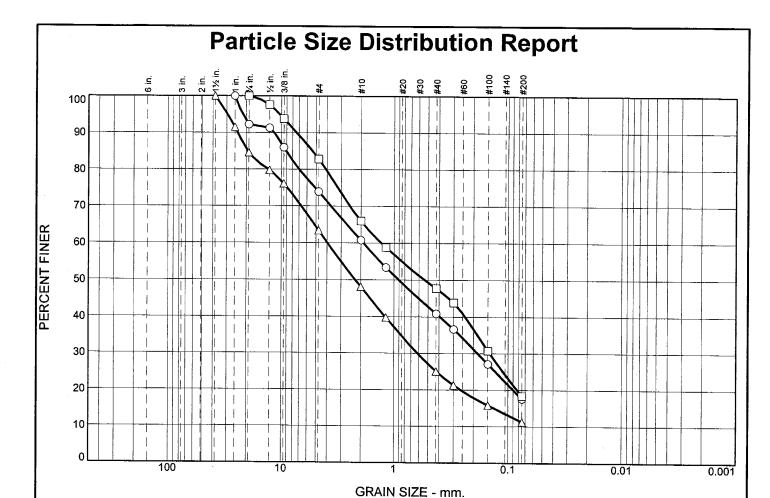
Sample Number: K

NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: A. Bafghi

Project: Boulder City Bypass

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



Ц	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	26.1	56.3	17	7.6	SM	A-1-b	NP	23
	0.0	17.2	64.5	18	3.3	SM	A-1-b	NP	22
Δ	0.0	36.6	52.2	11	.2	SP-SM	A-1-a	NP	19

SIEVE	PERCENT FINER							
inches size	0		Δ					
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					
	(SRAIN SIZI						
D ₆₀	1.9040	1.3025	3.9704					
D ₃₀	0.1838	0.1446	0.6162					
D ₁₀								
	COEFFICIENTS							
C _c								
Cu								

SIEVE	PERCENT FINER					
number size	0		Δ			
#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			
			•			

☐ silty sand with gravel
Δ poorly graded sand with silt and gravel
DEMARKO
REMARKS:
0
_

Material Description
O silty sand with gravel

O	Source	OI	Sample:	NBA Z
	Source	of	Sample:	NBA 2

Depth: 15.5 - 17.0'

Sample Number: L

△ Source of Sample: NBA 2

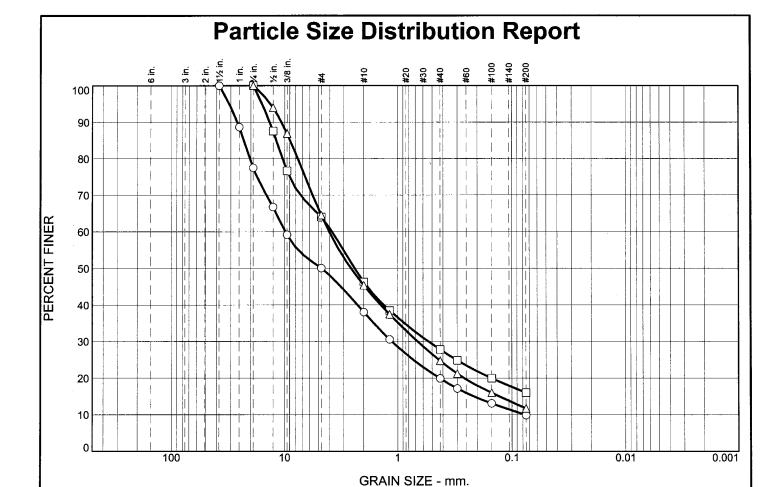
Depth: 17.0 - 18.5' Depth: 18.5 - 20.0' Sample Number: M Sample Number: N

NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: A. Bafghi

Project: Boulder City Bypass

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



SIEVE	PERCENT FINER						
inches size	0		Δ				
1.5"	100.0						
1"	88.7						
3/4"	77.5	100.0	100.0				
1/2"	66.7	87.6	94.0				
3/8"	59.2	76.6	86.9				
	(GRAIN SIZI					
D ₆₀	9.8641	3.8127	4.0463				
D ₃₀	1.1257	0.5373	0.6689				
D ₁₀	0.0770						
	COEFFICIENTS						
C _C	1.67						
Cu	128.05						
O Source o	f Sample:	NBA 2	Depth:				

% GRAVEL

49.9

36.0

35.5

% SAND

40.2

48.0

52.8

SIEVE	PERCENT FINER			
number size	0		Δ	
#4	50.1	64.0	64.5	
#10	38.1	46.3	45.4	
#16	30.6	38.5	37.5	
#40	19.9	27.8	24.7	
#50	17.2	24.9	21.2	
#100	13.1	20.0	16.0	
#200	9.9	16.0	11.7	
1				
10 22 51	Com	ala Nivaba		

% SILT

9.9

16.0

11.7

% CLAY

USCS

GW-GM

SM

SP-SM

Δ

Material Description

	☐ silty sand with gravel
	\triangle poorly graded sand with silt and gravel
[REMARKS:
	0

AASHTO

A-1-a

O well-graded gravel with silt and sand

PL

NP

LL

19

+3"

0.0

0.0

0.0

□ Source of Sample: NBA 2 △ Source of Sample: NBA 2 21.0 - 22.5'

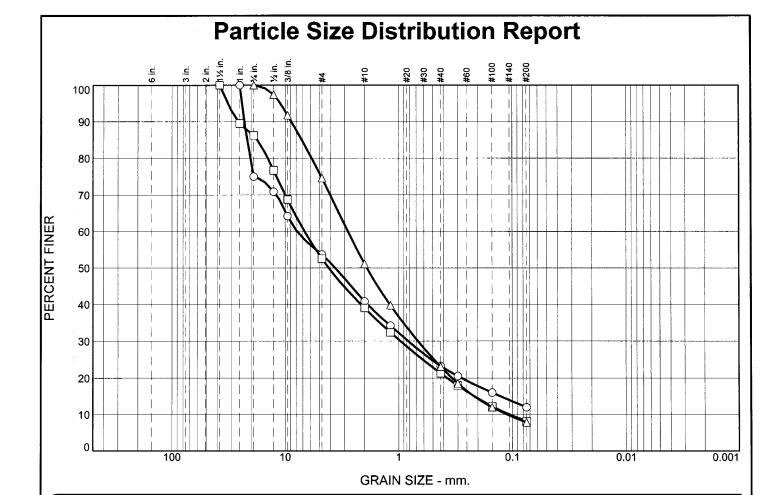
Depth: 22.5 - 24.0' Depth: 24.0 - 25.5' Sample Number: O Sample Number: P

Sample Number: Q

NEVADA DEPARTMENT OF TRANSPORTATION Client: A. Bafghi

Project: Boulder City Bypass

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



SIEVE	PERCENT FINER			
inches size	0		Δ	
1.5"		100.0		
1"	100.0	89.5		
3/4"	75.0	86.2	100.0	
1/2"	70.9	76.7	97.4	
3/8"	64.2	68.7	91.8	
	GRAIN SIZE			
D ₆₀	7.8229	6.7293	2.8047	
D ₃₀	0.8208	0.9628	0.6745	
D ₁₀		0.1053	0.1107	
	COEFFICIENTS			
C _C		1.47		
C _c		63.88	25.33	
O Source o	f Sample:	NBA 2	Depth:	

% GRAVEL

46.3

47.4

25.4

% SAND

41.7

44.5

66.7

SIEVE	PERCENT FINER					
number size	0		Δ			
#4	53.7	52.6	74.6			
#10	40.9	39.1	51.1			
#16	34.2	32.4	39.8			
#40	23.3	21.3	23.1			
#50	20.5	18.0	18.5			
#100	16.0	12.2	12.0			
#200	12.0	8.1	7.9			
5 5 37 N	C	1 NY 1	D			

% SILT

12.0

8.1

7.9

% CLAY

USCS

GP-GM

GP-GM

SW-SM

Material Description

\triangle well-graded sand with silt and gravel
REMARKS:
0
Δ

AASHTO

A-1-a

A-1-b

O poorly graded gravel with silt and sand

□ poorly graded gravel with silt and sand

LL

19

16

NP

NP

☐ Source of Sample: NBA 2☐ Source of Sample: NBA 2☐

+3"

0.0

0.0

0.0

Depth: 25.5 - 27.0'

Sample Number: R

△ Source of Sample: NBA 2

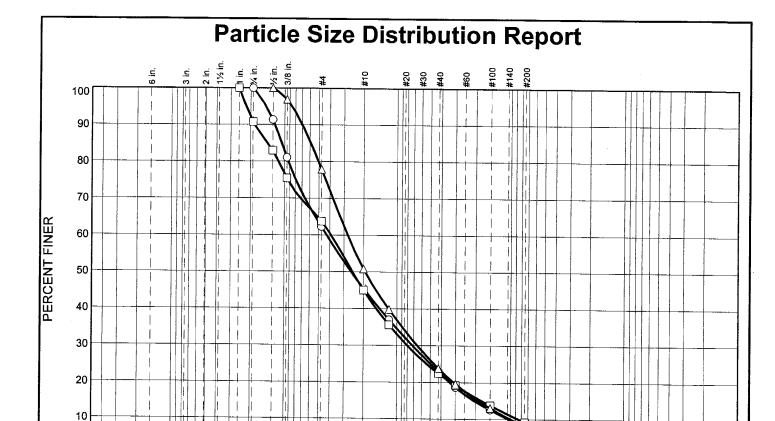
Depth: 27.0 - 28.5' Depth: 28.5 - 30.0' Sample Number: S Sample Number: T

NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: A. Bafghi

Project: Boulder City Bypass

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



GRAIN SIZE - mm.

0.1

Ш	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	37.7	54.4	7	.9	SW-SM	A-1-a	NP	17
	0.0	36.3	54.5	9.	.2	SW-SM	A-1-a	NP	19
Δ	0.0	22.1	69.8	8.	.1	SW-SM	A-1-b	NP	17

SIEVE	PE	NER				
inches size	0		Δ			
1"		100.0				
3/4"	100.0	90.8				
1/2"	91.3	82.9	100.0			
3/8"	81.1	75.5	96.9			
İ						
ļ ~—						
$\geq \leq$		GRAIN SIZE				
D ₆₀	4.2705	3.9047	2.7674			
D ₃₀	0.7200	0.8018	0.6535			
D ₁₀	0.1027	0.0850	0.0996			
\sim	CC	TS				
C _C	1.18	1.94	1.55			
Cu	41.56	45.94	27.79			
O Source o	f Sample:	NBA 2	Denth:			

100

SIEVE	PERCENT FINER				
number size	0		Δ		
#4	62.3	63.7	77.9		
#10	45.5	45.0	50.8		
#16	37.0	35.6	39.9		
#40	23.0	22.5	23.9		
#50	18.7	19.2	19.6		
#100	12.6	13.8	13.0		
#200	7.9	9.2	8.1		
į					
0.0 21.5!	C	.1. NT 1	T T		

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

Material Description

0.01

0.001

REMARKS:
Δ

- O Source of Sample: NBA 2
- □ Source of Sample: NBA 2△ Source of Sample: NBA 2
- Depth: 30.0 31.5'
- Depth: 35.0 36.5'
- Depth: 40.0 41.5'
- Sample Number: U
- Sample Number: V Sample Number: W

Sample Ivallion

NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: A. Bafghi

Project: Boulder City Bypass

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

Particle Size Distribution Report 100 90 80 80 40 30 20

GRAIN SIZE - mm.

0.1

- 1				1						
L		+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
	0	0.0	53.5	36.0	10	0.5	GP-GM			
		0.0	40.3	49.7	10	0.0	SW-SM			
I	Δ	0.0	24.1	66.6	9	.3	SW-SM	A-1-b	NP	19

SIEVE	PEI	RCENT FIN	IER			
inches size	0		Δ			
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 _c			30.10			
~ C	Course of Commiss NDA 2 Domits					

SIEVE	PEI	RCENT FIN	IER
number size	0		Δ
#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
5.0 - 45.4'	Sam	nle Numbe	er: X

boorly graded gravel with silt and sand
☐ well-graded sand with silt and gravel

Material Description

0.01

0.001

 \triangle well-graded sand with silt and gravel

REMARKS:		
0		
Δ		

○ Source of Sample: NBA 2□ Source of Sample: NBA 2

Depth: 45.0 - 45.4' Depth: 50.0 - 50.5'

Sample Number: X Sample Number: Y

△ Source of Sample: NBA 2

Depth: 55.0 - 56.5'

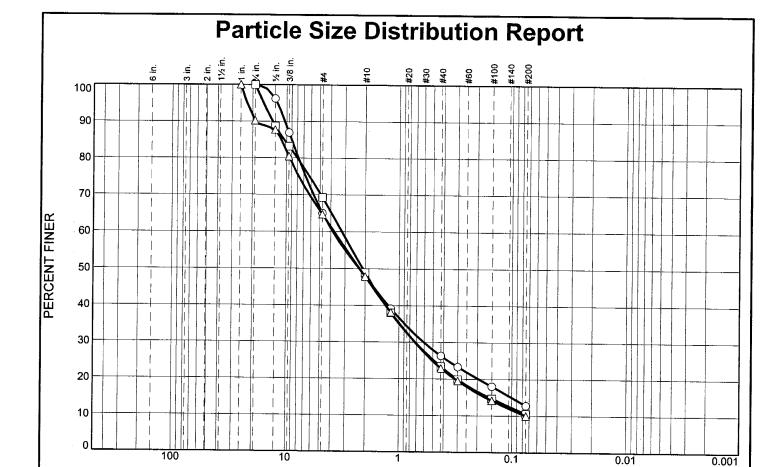
Sample Number: Z

NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: A. Bafghi

Project: Boulder City Bypass

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



GRAIN	SIZE	- mm.
-------	------	-------

	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	35.0	52.2	12	2.8	· SM	A-1-a	NP	20
	0.0	30.7	58.8	10).5	SP-SM	A-1-a	18	21
Δ	0.0	35.3	54.7	10	0.0	SP-SM	A-1-a	NP	19

PEI	RCENT FIN	NER		
0	0 0			
		100.0		
100.0	100.0	90.2		
	88.7	87.7		
86.9	83.2	80.4		
C	SRAIN SIZE	Ξ		
3.8440	3.1962	3.7357		
0.6024	0.7183	0.7220		
CC	EFFICIEN	TS		
	0 100.0 96.2 86.9 3.8440 0.6024	100.0 100.0 88.7 86.9 83.2 GRAIN SIZE 3.8440 3.1962		

SIEVE	PERCENT FINER		
number size	0		Δ
#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
	i		

Material Description	1

- O silty sand with gravel
- ☐ poorly graded sand with silt and gravel
- \triangle poorly graded sand with silt and gravel

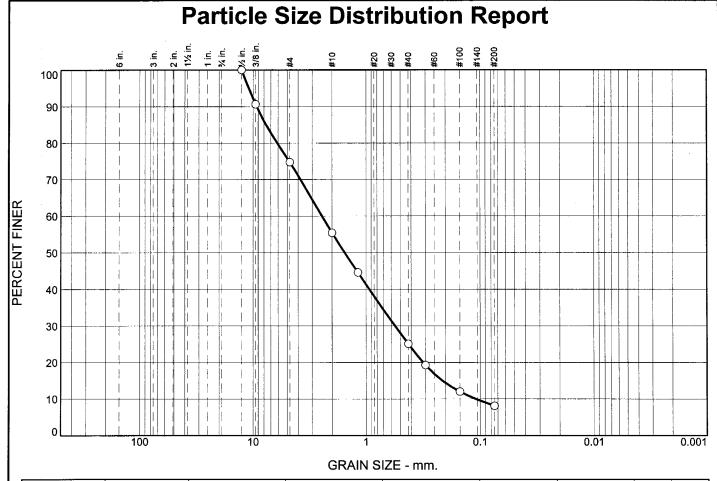
REMARKS:

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

NEVADA DEPARTMENT OF TRANSPORTATION Client: A. Bafghi

Project: Boulder City Bypass

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



	+3"	% GRAVEL	% \$AND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	25.2	66.7	8	.1	SP-SM			

SIEVE	PE	RCENT FIN	IER
inches size	0		
1/2"	100.0		
3/8"	90.7		
			<u> </u>
	(3RAIN SIZI	=
D ₆₀	2.4589		
D ₃₀	0.5548		
D ₁₀	0.1086		
	cc	EFFICIEN	TS
C _C	1.15		
C _c	22.63		

SIEVE	PE	RCENT FIN	IER
number size	0		
#4	74.8		
#10	55.4		
#16	44.6		
#40	25.1		
#50	19.3		
#100	12.0		
#200	8.1		
0.0 - 80.5'	Sam	ple Numbe	er: EE

		_
REMARKS:		
0		

O poorly graded sand with silt and gravel

Material Description

O Source of Sample: NBA 2

Depth: 80.0 - 80.5'

Sample Number: EE

NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: A. Bafghi

Project: Boulder City Bypass

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

Particle Size Distribution Report 100 90 80 80 70 40 30 20 10

G	$\square \Delta$	INI	C	フロ		mm.
G	RА	III.	3	ᅜ	-	mm.

Ш	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	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	PERCENT FINER			
inches size	0			
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		
1				
			<u> </u>	
	(GRAIN SIZI	<u> </u>	
D ₆₀	9.5789	GRAIN SIZI 7.0481	Ē	
D ₆₀		r	=	
1	9.5789	7.0481	E	
D ₃₀	9.5789 3.9639 0.5120	7.0481 1.6637		
D ₃₀	9.5789 3.9639 0.5120	7.0481 1.6637 0.1113		

100

	SIEVE	PE	RCENT FIN	NER .
	number size	0		
	#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	
			1	
į				
'n	0 5 01	G1-	NT 1	DITT IZ 1

	☐ poorly graded gravel with silt and sand
П	REMARKS:
	0

Material Description

o poorly graded gravel with sand

0.001

○ Source of Sample: SBA 1□ Source of Sample: SBA 1

0

Depth: 0.0 - 5.0' Depth: 5.0 - 10.0' Sample Number: BULK 1
Sample Number: BULK 2

NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: A. Bafghi

Project: Boulder City Bypass

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

	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	19.0	73.1	7	.9	SP-SM			
	0.0	54.2	37.0	8	.8	GP-GM			
Δ	0.0	41.2	45.2	13	.6	SM	A-1-a	NP	24

GRAIN SIZE - mm.

SIEVE	PERCENT FINER			
inches size	0		Δ	
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 SIZI		
D ₆₀	2.3361	8.1359	5.0383	
D ₃₀	0.7317	1.5862	0.4479	
D ₁₀	0.1050	0.0962		
	CC	EFFICIEN	TS	
C _C	2.18	3.21		
Cu	22.24	84.58		

SIEVE	PE	RCENT FIN	IER
number size	0		Δ
#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
0 25!	Camara la	Manakan	A

REMARKS:	
·	
Δ	

O poorly graded sand with silt and gravel

□ poorly graded gravel with silt and sand

Material Description

△ silty sand with gravel

○ Source of Sample: SBA 1
 □ Source of Sample: SBA 1
 △ Source of Sample: SBA 1

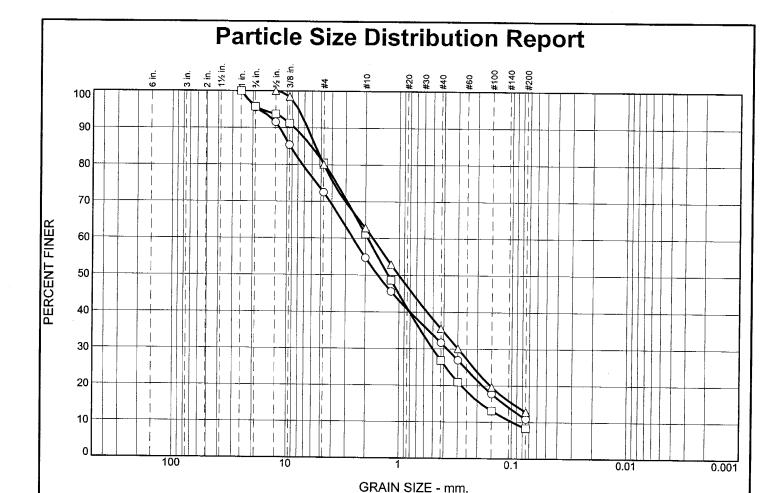
Depth: 1.0 - 2.5' Depth: 3.5 - 5.0' Depth: 6.0 - 7.5' Sample Number: A Sample Number: B Sample Number: C

NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: A. Bafghi

Project: Boulder City Bypass

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



Δ	0.0			19.9	67.	3
٢	SIEVE		PE	RCENT FIN	NER	[
L	inches size	C)		Δ	
ĺ	1"	100		100.0		
ı	3/4"	95	.5	95.7	l	
	1/2"	91	.6	93.7	100.0	ı
ı	3/8"	85	.4	91.2	98.4	
				GRAIN SIZ	E	
[D ₆₀	2.58	353	1.9081	1.7175	
	D ₃₀	0.37	36	0.5010	0.2977	
L	D ₁₀			0.0980		İ
Ĺ	$\geq \leq$		CC	EFFICIEN	TS	1
	cc			1.34		
L	C _c C _u	•		19.48		L

% GRAVEL

27.4

19.5

SIEVE	PEI	RCENT FIN	IER
number size	0		Δ
#4	72.6	80.5	80.1
#10	54.7	61.1	62.8
#16	45.6	48.6	52.9
#40	31.7	26.9	35.6
#50	27.0	21.0	30.1
#100	17.7	13.1	19.6
#200	10.9	8.3	12.8
			ĺ
		•	
	•		

% SILT

% CLAY

10.9

8.3

12.8

USCS

SP-SM

SW-SM

SM

_		Material Description
		O poorly graded sand with silt and gravel
		☐ well-graded sand with silt and gravel
		△ silty sand with gravel
	1	•B
		REMARKS:
		0
	ı	
	i	
		_
ı		^
1		Δ

AASHTO

A-1-b

A-1-b

A-1-b

PL

NP

NP

NP

LL

20

21

23

O Source of Sample: SBA 1 □ Source of Sample: SBA 1

+3"

0.0

0.0

Depth: 8.5 - 10.0'

% SAND

61.7

72.2

Sample Number: D

△ Source of Sample: SBA 1

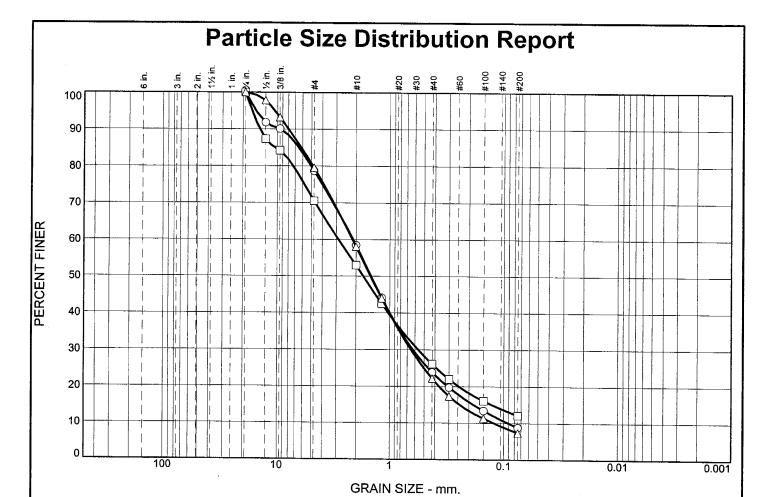
Depth: 11.0 - 12.5' Depth: 13.5 - 15.0'

Sample Number: E Sample Number: F

NEVADA DEPARTMENT OF TRANSPORTATION Client: A. Bafghi

Project: Boulder City Bypass

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



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	21.3	69.9	8	.8	SW-SM	A-1-b	NP	20
	0.0	29.4	58.5	12	2.1	SM	A-1-b	NP	23
Δ	0.0	20.5	72.1	7	.4	SW-SM	A-1-b	NP	22

SIEVE	PE	PERCENT FINER				
inches size	0		△ 100.0			
3/4"	100.0	100.0				
1/2"	91.8	87.3 84.2	97.8			
3/8"	90.1	93.2				
	GRAIN SIZE					
D ₆₀	2.1210	2.8642	2.1495			
D ₃₀	0.6243	0.5620	0.6489			
D ₁₀	0.0908		0.1213			
$\geq <$	COEFFICIENTS					
C _C	2.02		1.61			
\sim	23.36		17.71			

SIEVE	PE	PERCENT FINER				
number size	0		Δ			
#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			
!						

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

Material Description

REMARKS:
0
Δ

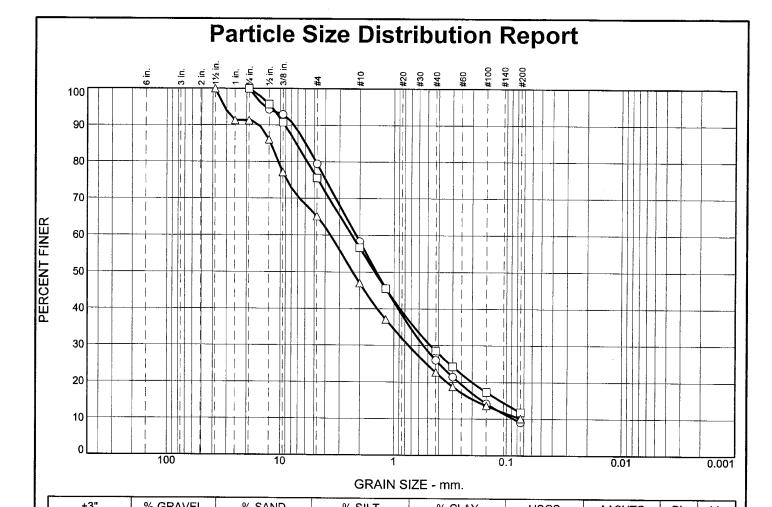
- Source of Sample: SBA 1
- □ Source of Sample: SBA 1
- △ Source of Sample: SBA 1
- Depth: 16.0 17.5'
- Depth: 18.5 20.0'
- Depth: 21.0 22.5'
- Sample Number: G
- Sample Number: H
- Sample Number: I

NEVADA DEPARTMENT OF TRANSPORTATION

Client: A. Bafghi

Project: Boulder City Bypass

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



Ш		70	GRAVEL	% SA	עט	% SILI	9	6 CLAY	USCS	AASHTO	PL	LL
0	0.0		20.6	70.3	3		9.1		SW-SM	A-1-b	NP	19
	0.0		24.5	63.7	7		11.8		SP-SM	A-1-b	NP	17
Δ	0.0		34.9	55.0)		10.1		SP-SM	A-1-a	NP	19
١٢	SIEVE	PE	RCENT FI	NER	SIEVE	PE	RCENT FI	NER	Material Des	cription		
IL	inches size	0		Δ	number size	0		Δ	o well-graded sand with silt and gravel		l	
	1.5"			100.0	#4	79.4	75.5	65.1				

	SIEVE	PERCENT FINER				
	inches size	0		Δ		
	1.5"			100.0		
П	1"			91.3		
П	3/4"	100.0	100.0	91.3		
П	1/2"	94.2	95.7	86.1		
	3/8"	92.9	90.8	77.1		
	,					
	\mathbb{X}	GRAIN SIZE				
	D ₆₀	2.1458	2.3391	3.6001		
	D ₃₀	0.5479	0.4732	0.7433		
	D ₁₀	0.0859				
	><	COEFFICIENTS				
	ဂ ၁ ၁	1.63				
	Cu	24.99				

	number size	0		Δ
	#4	79.4	75.5	65.1
	#10	58.3	56.6	47.0
	#16	45.6	45.5	37.1
	#40	26.0	28.5	22.7
	#50	21.5	24.2	18.7
1	#100	14.2	17.3	13.6
	#200	9.1	11.8	10.1
Į				
ł				
1				i

- ☐ poorly graded sand with silt and gravel
- \triangle poorly graded sand with silt and gravel

REMARKS:		
0		
0		
_		ļ
Δ		

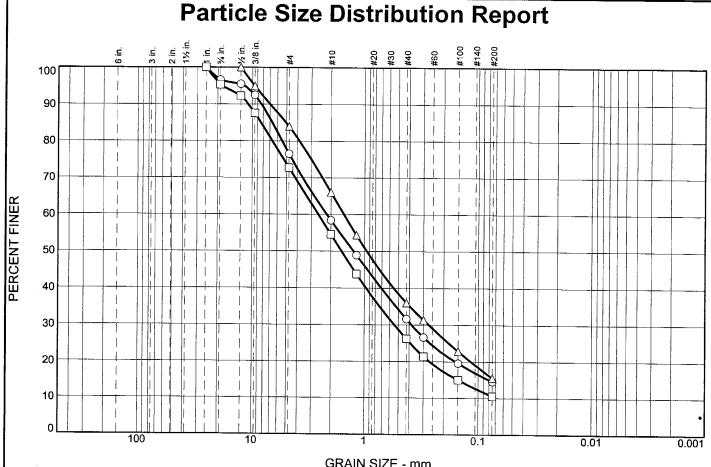
- O Source of Sample: SBA 1
- □ Source of Sample: SBA 1
- △ Source of Sample: SBA 1
- Depth: 23.5 25.0'
- Depth: 26.0 27.5'
- Depth: 28.5 30.0'
- Sample Number: J
- Sample Number: K
- Sample Number: L

NEVADA DEPARTMENT OF TRANSPORTATION

Client: A. Bafghi

Project: Boulder City Bypass

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



GRAIN SIZE - mm	GRAIN	SIZE	-	mm.
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Ш	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	23.5	62.0	14	1.5	SM	A-1-b	NP	18
	0.0	27.3	62.2	10).5	SP-SM	A-1-b	NP	20
Δ	0.0	16.0	68.5	15	5.5	SM	A-1-b	NP	23

l						
SIEVE	PE	RCENT FIN	NER			
inches size	0		Δ			
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			
	(SRAIN SIZI	=			
D ₆₀	2.1798	2.5949	1.5284			
D ₃₀	0.3812	0.5410	0.2698			
D ₁₀						
	CC	EFFICIEN	TS			
C _c						
C						

SIEVE	PEI	RCENT FIN	IER
number size	0		Δ
#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
0 22.51	C	1. NT 1	3.6

Material Description
o silty sand with gravel
☐ poorly graded sand with silt and gravel △ silty sand with gravel
REMARKS.

	C
	Δ
ı	

- O Source of Sample: SBA 1 ☐ Source of Sample: SBA 1
- △ Source of Sample: SBA 1
- Depth: 31.0 32.5' Depth: 34.5 - 36.0' Depth: 39.5 - 41.0'
- Sample Number: M Sample Number: N Sample Number: O
- **NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Bafghi

Project: Boulder City Bypass

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

L	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
С	0.0	28.0	61.8	10	0.2	SP-SM	A-1-b	NP	19
	0.0	22.7	60.5	16	8.8	SM			
Δ	0.0	34.4	55,3	10	0.3	SP-SM	A-1-a	NP	19

GRAIN SIZE - mm.

SIEVE	PEI	PERCENT FINER				
inches size	0		Δ			
1"		100.0	100.0			
3/4"	100.0	95.0	97.6			
1/2"	96.7	92.1	90.0			
3/8"	89.8	91.3	82.8			
:						
	(GRAIN SIZI	Ξ			
D ₆₀	2.9512	2.0594	3.6983			
D ₃₀	0.6580	0.3534	0.6474			
D ₁₀						
	COEFFICIENTS					
C _C						
Cu						
O Source o	f Sample	SBA 1	Denth			

100

SIEVE	PEI	PERCENT FIN			
number size	0		Δ		
#4	72.0	77.3	65.6		
#10	50.6	59.4	48.0		
#16	39.5	48.7	39.1		
#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		
14.5 46.01	Came	ala Numba	r. D		

O poorly graded sand with silt and gravel
☐ silty sand with gravel
△ poorly graded sand with silt and gravel
REMARKS:

Material Description

0.01

0.1

0.001

REMARKS:		
0		
Δ		

○ Source of Sample: SBA 1
□ Source of Sample: SBA 1
△ Source of Sample: SBA 1

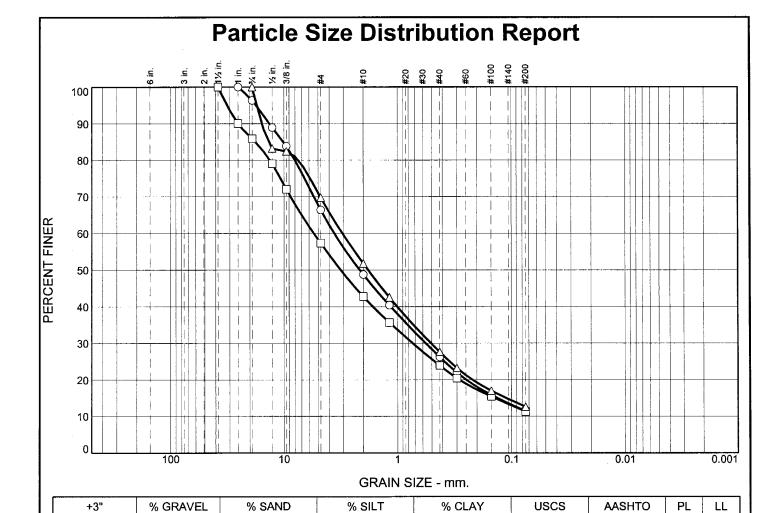
Depth: 44.5 - 46.0' Depth: 49.5 - 49.7' Depth: 54.5 - 56.0' Sample Number: P Sample Number: Q Sample Number: R

NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: A. Bafghi

Project: Boulder City Bypass

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



QIEV/E	SIEVE PERCENT FINER						
inches							
size	0		Δ				
1.5"		100.0					
1"	100.0	90.0	1000				
3/4"	96.3	85.9	100.0				
1/2"	89.0	79.0	83.2				
3/8"	83.9	72.1	82.4				
	(GRAIN SIZE					
D ₆₀	3.6187	5.4720	3.0655				
D ₃₀	0.5636	0.7343	0.5060				
D ₁₀							
	COEFFICIENTS						
C _C							
Cu							
O Source of Sample: SBA 1 Depth:							

33.6

42.7

30.3

1	SIEVE	PEI	RCENT FIN	IER
	number size	0		Δ
1	#4	66.4	57.3	69.7
1	#10	48.8	42.8	51.8
	#16	40.4	35.7	42.6
	#40	26.3	23.9	27.6
	#50	22.0	20.4	23.2
	#100	15.9	15.4	17.0
1	#200	11.4	11.3	12.6
1				
	i			
1				
┨				
5	9.5 - 61.2'	Samp	ole Numbe	r: S

11.4

11.3

12.6

1			
		☐ poorly graded sand with silt and gravel	
		△ silty sand with gravel	
	1	REMARKS:	1
I		O	l
l			
l			l
l			
l		Δ	
1			ı

A-1-a

O poorly graded sand with silt and gravel

20

22

SP-SM

SP-SM

SM

Material Description

☐ Source of Sample: SBA 1 \triangle Source of Sample: SBA 1

+3"

0.0

0.0

0.0

Depth: 64.5 - 65.0' Depth: 69.5 - 70.1'

55.0

46.0

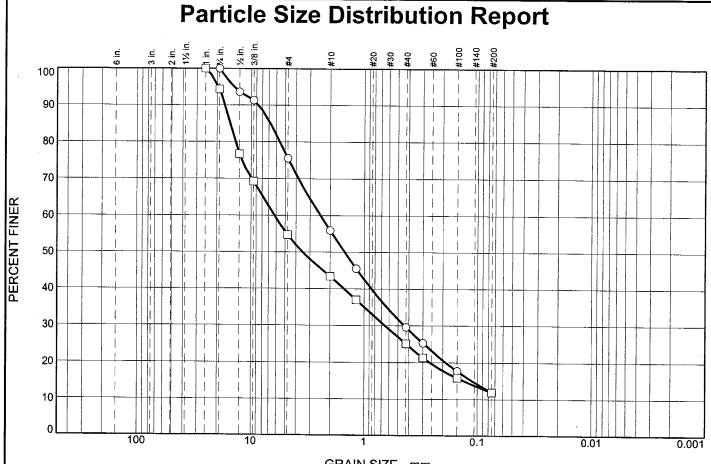
57.1

Sample Number: S Sample Number: T Sample Number: U

NEVADA DEPARTMENT OF TRANSPORTATION Client: A. Bafghi

Project: Boulder City Bypass

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



GRAIN	SIZE -	- mm.
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Ш	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	24.4	63.7	1	1.9	SP-SM	A-1-b	NP	20
	0.0	45.3	42.8	11	1.9	GP-GM	A-1-a	21	24

SIEVE	PEI	RCENT FIN	IER
inches size	0		
1"	100.0	100.0	
3/4" 1/2"	100.0 93.6	94.3 76.7	
3/8"	91.3	69.3	
	C	RAIN SIZI	≣
D ₆₀	2.4288	6.2097	
D ₃₀	0.4383	0.6511	
D ₁₀			
	CC	EFFICIEN	TS
C _C			
Cu			

	SIEVE	PE	RCENT FIN	IER
	number size	0		
	#4	75.6	54.7	
	#10	56.0	43.4	
	#16	45.5	37.0	
	#40	29.6	25.1	
	#50	25.3	21.3	
	#100	17.7	15.8	
	#200	11.9	11.9	
7	4.5 - 75.21		olo Numbo	3.7

Material Description
o poorly graded sand with silt and gravel
•
☐ poorly graded gravel with silt and sand

REMARKS:	

○ Source of Sample: SBA 1□ Source of Sample: SBA 1

Depth: 74.5 - 75.2'

Depth: 79.5 - 80.5'

Sample Number: V Sample Number: W

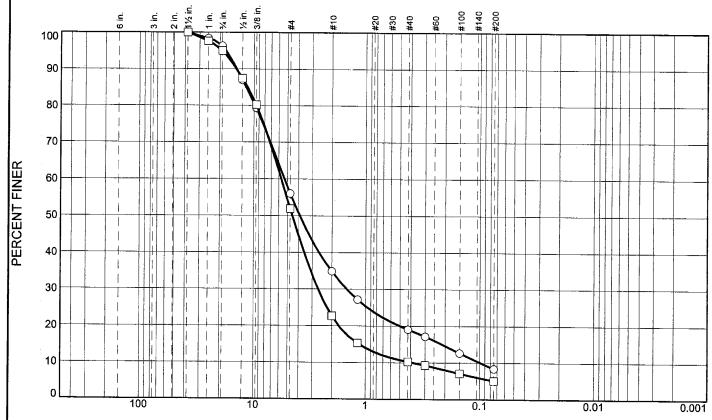
NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: A. Bafghi

Project: Boulder City Bypass

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

Particle Size Distribution Report



GRAIN SIZE - mm.

	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	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
						GI GIVI	71-1-4	111	t

SIEVE	PE	RCENT FIN	NER
inches size	0		
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 SIZI	<u> </u>
D ₆₀	5.3500	5.7035	
D ₃₀	1.4713	2.6477	
D ₁₀	0.0983	0.3884	
	CC	DEFFICIEN	TS
C _C	4.12	3.16	
Cu	54.42	14.68	

SIEVE	PEI	RCENT FIN	NER
number size	,0		
#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	

O poorly graded sand with silt and gravel

Material Description

REMARKS:	"	 	
0			

O Source of Sample: SBA 2

Depth: 0.0 - 5.0'

Sample Number: BULK 1

☐ Source of Sample: SBA 2 Depth: 5.0 - 10.0'

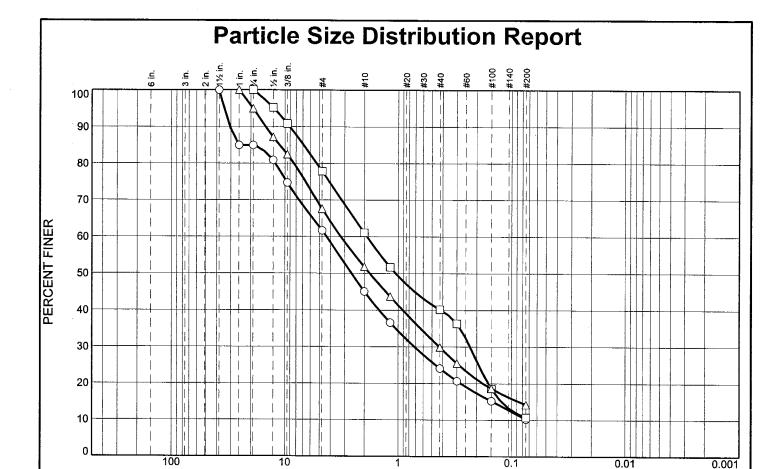
Sample Number: BULK 2

NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: A. Bafghi

Project: Boulder City Bypass

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



GRAIN SIZE - mm.

Ц	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL.
0	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
Δ	0.0	32.4	53.4	14	.2	SM	A-1-b	NP	28

SIEVE	PEI	RCENT FIN	IER		
inches size	0		Δ		
1.5"	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 SIZI	Ē		
D ₆₀	4.3516	1.8936	3.2458		
D ₃₀	0.7142	0.2286	0.4282		
D ₁₀					
	C	TS			
က _က					
C _u					

SIEVE	PE	RCENT FIN	IER
number size	0		Δ
#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	
O poorly graded sand with silt and gravel	
- Francis Paris Man Pile and Braitor	
☐ poorly graded sand with silt and gravel	
= poorly graded sand with sitt and graver	
△ silty sand with gravel	
2 Sifty Saild with graver	

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

Client: A. Bafghi

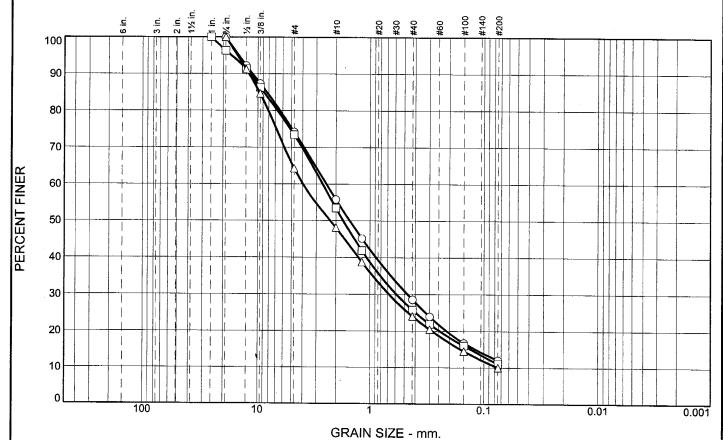
Project: Boulder City Bypass

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

Figure

NEVADA DEPARTMENT OF TRANSPORTATION

Particle Size Distribution Report



Ш	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL.	LL
0	0.0	25.8	62.2	12	2.0	SP-SM	A-1-b	NP	24
	0.0	26.5	62.5	11	.0	SP-SM	A-1-b	NP	21
Δ	0.0	35.7	54.3	. 10	0.0	SW-SM	A-1-a	NP	20

SIEVE	PEI	RCENT FIN	IER		
inches size	0		Δ		
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		
			!		
		BRAIN SIZE	=		
D ₆₀	2.4381	2.6315	3.9627		
D ₃₀	0.4675	0.5844	0.6781		
D ₁₀			0.0751		
	COEFFICIENTS				
cc			1.54		
C _c			52.75		
O Course of	f Commiss	CD A C	D 41		

SIEVE	PEI	RCENT FIN	IER
number size	0	D,	Δ
#4 #10 #16	74.2 55.8 45.2	73.5 53.4	64.3 48.1
#16 #40 #50 #100 #200	28.6 24.0 16.8 12.0	41.9 25.8 21.9 16.0 11.0	38.8 24.1 20.5 14.5 10.0

O poorly graded sand with silt and gravel	
☐ poorly graded sand with silt and gravel	
△ well-graded sand with silt and gravel	
REMARKS:	_
0	

Material Description

į	REMARKS:	
	0	
i		
١		
1	i	

- Source of Sample: SBA 2□ Source of Sample: SBA 2
- Depth: 8.5 10.0' Depth: 11.0 - 12.5'
- Sample Number: D

- △ Source of Sample: SBA 2
- Depth: 13.5 15.0'
- Sample Number: E Sample Number: F

NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: A. Bafghi

Project: Boulder City Bypass

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

Particle Size Distribution Report 100 90 80 70 PERCENT FINER 60 50 40 30 20 10 0.001 0.01

l	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
C	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	
Δ	0.0	35.2	56.8		8.0	SW-SM		NP	
	SIEVE	PERCENT FI	NER SIE		CENT FINER	Material Des	cription I sand with silt a		1

GRAIN SIZE - mm.

SIEVE	PERCENT FINER			
inches size	0		Δ	
1.5"		100.0		
1"		96.1	100.0	
3/4"	100.0	90.7	96.3	
1/2"	94.8	81.5	87.7	
3/8"	91.3	74.0	81.6	
	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	

SIEVE	PERCENT FINER			
number size	0		Δ	
#4	74.3	60.2	64.8	
#10	52.3	43.0	44.1	
#16	41.2	33.6	35.0	
#40	24.6	19.0	20.9	
#50	20.5	15.4	17.2	
#100	13.5	10.1	11.6	
#200	8.0	6.6	8.0	
6 0 - 17 5'	Same	ale Numbe		

REMARKS:	
0	

☐ well-graded sand with silt and gravel

△ well-graded sand with silt and gravel

O Source of Sample: SBA 2

☐ Source of Sample: SBA 2

 \triangle Source of Sample: SBA 2

Depth: 16.0 - 17.5

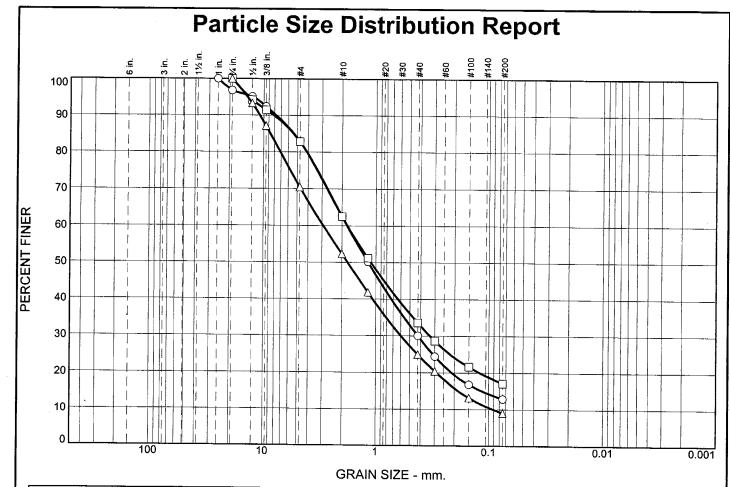
Depth: 18.5 - 20.0' Depth: 21.0 - 22.5' Sample Number: G Sample Number: H

Sample Number: I

NEVADA DEPARTMENT OF TRANSPORTATION Client: A. Bafghi

Project: Boulder City Bypass

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



L	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	17.1	70.0	12	2.9	SM	A-1-b	NP	23
	0.0	17.2	65.8	17	7.0	SM	A-1-b	NP	23
Δ	0.0	29.5	61.5	9	.0	SW-SM	A-1-b	NP	22
lſ	SIEVE	PERCENT FINE	R SI	EVE PERC	ENT FINER	Material Des	cription		L

SIEVE	PERCENT FINER				
inches size	0		Δ		
1"	100.0				
3/4"	96.8	100.0	100.0		
1/2"	95.1	94.2	93.3		
3/8"	92.4	91.4	87.1		
į					
	GRAIN SIZE				
D ₆₀	1.8039	1.7971	2.9256		
D ₃₀	0.4233	0.3326	0.5969		
D ₁₀			0.0908		
>><	COEFFICIENTS				
C _C			1.34		
Cu			32.23		
o C	CC 1 (3D 4 0	75 .1		

SIEVE	PERCENT FINER			
number size	0		Δ	
#4	82.9	82.8	70.5	
#10	62.5	62.5	52.3	
#16	50.1	51.2	41.9	
#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	
			1	

☐ silty sand with gravel
\triangle well-graded sand with silt and gravel
REMARKS:
0

O silty sand with gravel

O 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

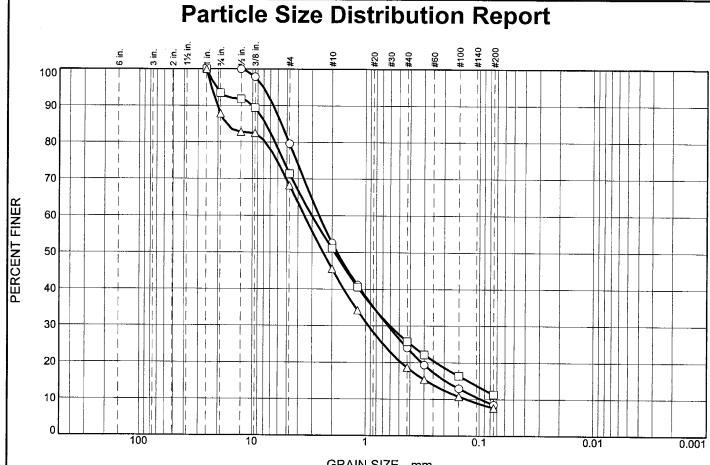
Depth: 28.5 - 30.0'

Sample Number: L

NEVADA DEPARTMENT OF TRANSPORTATION Client: A. Bafghi

Project: Boulder City Bypass

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



GRAIN	SIZE	- mm.
--------------	------	-------

Ш	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	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
Δ	0.0	31.8	60.6	7	.6	SW-SM	A-1-a	NP	19

)			
0		Δ	
	100.0	100.0	
	93.5	87.8	
100.0	91.9	82.8	
97.9	89.4	82.5	
GRAIN SIZE			
2.6006	3.0166	3.5154	
0.6262	0.6020	0.9403	
0.0961		0.1295	
COEFFICIENTS			
1.57		1.94	
27.07		27.15	
	97.9 2.6006 0.6262 0.0961 CC 1.57 27.07	100.0 93.5 91.9 97.9 89.4 GRAIN SIZE 2.6006 3.0166 0.6262 0.6020 0.0961 COEFFICIEN 1.57	

SIEVE	PERCENT FINER				
number size	0		Δ		
#4	79.6	71.4	68.2		
#10	52.6	51.1	45.6		
#16	41.2	40.6	34.2		
#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		
4 5 - 36 0'	Same	le Numbe	r: M		

<u>Materia</u>	al Desc	ription
O wall		

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

KEWARKS:		
0		
Δ		

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

NEVADA DEPARTMENT OF TRANSPORTATION Client: A. Bafghi

Project: Boulder City Bypass

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

Particle Size Distribution Report 100 90 80 70 PERCENT FINER 60 50 40 30 20 10

GRAIN SIZE - mm.

Ц	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	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
Δ	0.0	35.8	55.3	8	.9	SW-SM	A-1-a	NP	21

SIEVE	PERCENT FINER							
inches size	0		Δ					
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							
D ₆₀	4.3261	2.2348	3.8430					
D ₃₀	0.8783	0.6551	0.7870					
D ₁₀	0.1103	0.0794	0.0948					
	CC	EFFICIEN	TS					
C _C	1.62	2.42	1.70					
Cu	39.22	28.16	40.54					
O Source o	f Sample:	SBA 2	Denth:					

SIEVE	PE	RCENT FIN	NER
number size	0		Δ
	62.4 44.4 34.8 20.4 16.6 11.6 8.1	80.3 56.8 42.3 23.3 19.0 13.2 9.8	64.2 46.8 36.7 21.7 17.9 12.5 8.9
9.5 - 51.0'	Comm	ile Numbe	r· D

	well-graded sand with silt and gravel
	☐ well-graded sand with silt and gravel
	\triangle well-graded sand with silt and gravel
1	REMARKS:

Material Description

0.01

0.001

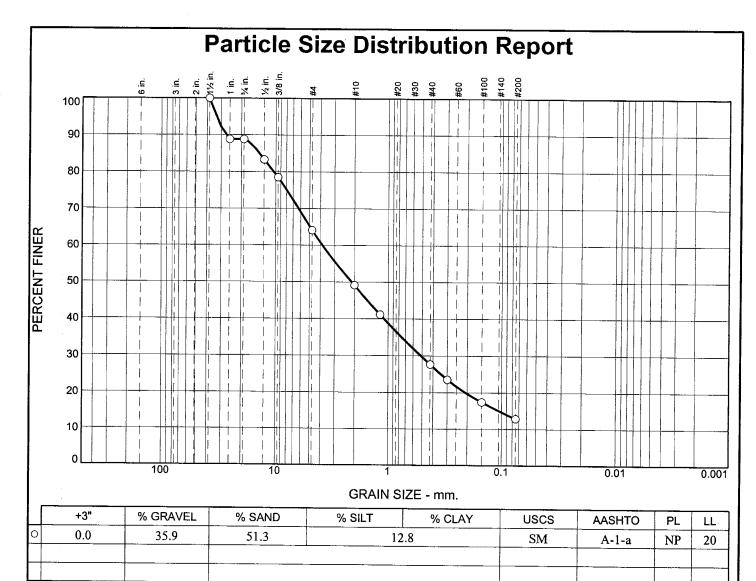
	REMARKS:
	0
	U
	Δ
Ì	

- O Source of Sample: SBA 2
- ☐ Source of Sample: SBA 2
- \triangle Source of Sample: SBA 2
- Depth: 49.5 51.0'
 - Depth: 54.5 56.0'
 - Depth: 59.5 61.0'
- Sample Number: P
- Sample Number: Q
- Sample Number: R

NEVADA DEPARTMENT OF TRANSPORTATION Client: A. Bafghi

Project: Boulder City Bypass

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



	······································								
SIEVE	PE	PERCENT FINER							
inches size	0								
1.5"	100.0								
1"	88.8								
3/4"	88.8								
1/2"	83.3								
3/8"	78.5								
		i							
	(GRAIN SIZE							
D ₆₀	3.8502								
D ₃₀	0.5113								
D ₁₀									
	CC	DEFFICIEN	TS						
C _C									
Cu									
O Source of	f Sample:	SBA 2	Depth:						

SIEVE	PEI	RCENT FIN	VER
number size	0		
#4	64.1		
#10	49.1		
#16	41.2		
#40	27.7		
#50	23.6		
#100	17.4		
#200	12.8		

<u> </u>		REMARKS:	RE

Material Description O silty sand with gravel

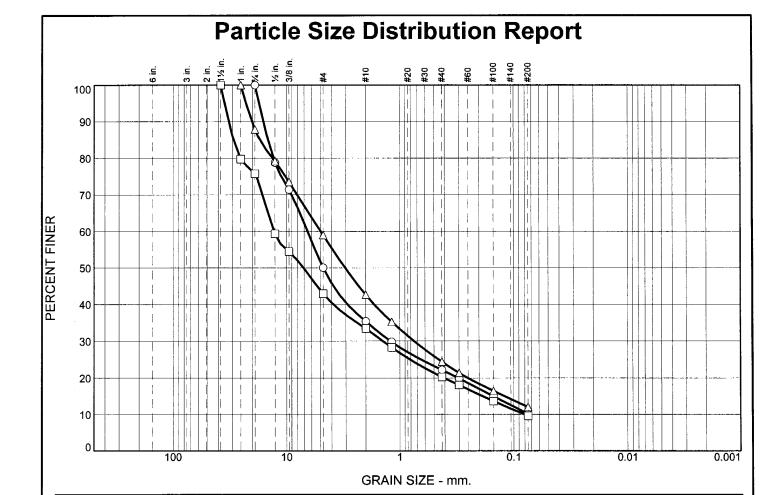
epth: 64.5 - 66.0'

Sample Number: S

NEVADA DEPARTMENT OF TRANSPORTATION Client: A. Bafghi

Project: Boulder City Bypass

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



Δ	0.0		41.0	47.0	0			12.0		SP-SM	A-1-a	21	23
İ٢	SIEVE	PE	RCENT FIN	IER	SIE	VE	PEI	RCENT FIN	NER	Material Des			
	inches size	0		Δ	numl siz		0		Δ	○ poorly grad	ed gravel with si	lt and sa	nd
\prod	1.5"		100.0		#4		50.0	42.9	59.0				
П	1" 3/4"	100.0	79.7 75.8	100.0 87.8	#1		35.4 29.8	33.4 28.3	42.6 35.3	□ well-graded	l gravel with silt	and sand	i
	1/2"	78.8	59.3	79.2	#4		22.2	20.3	24.4				
	3/8"	71.5	54.5	73.6	#5		19.8	18.1	21.4	│ △ poorly grad	ed sand with silt	and grav	vel
П					#10		15.0 10.1	13.6 9.6	16.5 12.0				
			GRAIN SIZI	Ē	#20	,,	10.1	7.0	12.0	REMARKS:			.
П	D ₆₀	6.5172	12.9626	4.9919						0			
Ш	D ₃₀	1.2067	1.4078	0.7462									
Ш	D ₁₀		0.0802										
	$\geq <$	C	DEFFICIEN	TS									
	Cc		1.91							Δ			
	Cu		161.63										
-	Source o	f Sample:	RRBA 1	Depth	n: 5.0 - 5	5.9'	Samp	le Number	r: A				
	□ Source o	f Sample:	RRBA 1	Depth	n: 20.0 -	21.5	' San	mple Num	ber: D				

Client: A. Bafghi

Project: Boulder City Bypass

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

Sample Number: E

% SILT

10.1

9.6

% CLAY

USCS

GP-GM

GW-GM

AASHTO

A-1-a

A-1-a

Figure

PL

NP

24

LL

24

26

+3"

0.0

0.0

△ Source of Sample: RRBA 1

NEVADA

DEPARTMENT OF TRANSPORTATION

% GRAVEL

50.0

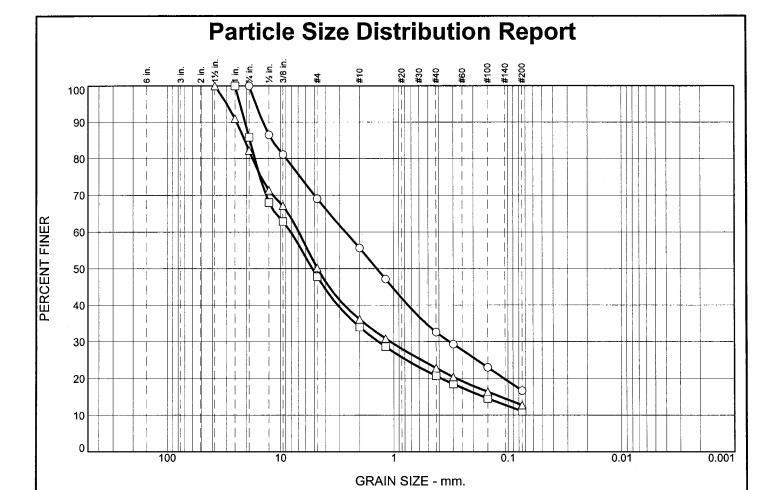
57.1

% SAND

39.9

33.3

Depth: 25.0 - 26.5'



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	30.9	52.4		5.7	SM	A-2-5(0)	33	43
	0.0	52.2	36.7	11	.1	GP-GM	A-2-4(0)	31	39
Δ	0,0	49.8	37.5	12	2.7	GM	A-2-7(0)	32	45

SIEVE	PERCENT FINER			SIEVE	PERCENT FINER			Material Description
inches size	0		Δ	number size	0		Δ	o silty sand with gravel
1.5"			100.0	#4	69.1	47.8	50.2	
1"		100.0	91.0	#10	55.7	34.0	36.2	☐ poorly graded gravel with silt and sand
3/4"	100.0	85.8	82.2	#16	47.2	28.6	30.8	
1/2"	86.5	68.1	71.4	#40	32.6	20.7	22.8	│ │
3/8"	81.1	62.9	67.2	#50	29.3	18.5	20.4	Sitty graver with saile
				#100 #200	23.0 16.7	14.6 11.1	16.4 12.7	
	(GRAIN SIZ	E	#200	10.7	11.1	12.7	REMARKS:
D ₆₀	2.6561	8.1075	6.8916					0
D ₃₀	0.3232	1.3683	1.0720					
D ₁₀								
	CC	DEFFICIEN	TS					
C _C								
c_{u}								
Source o	f Sample:	RRBA 1	Depth	30.0 - 30.8	Sar	nple Num	ber F	

NEVADA
DEPARTMENT OF
TRANSPORTATION

□ Source of Sample: RRBA 1

△ Source of Sample: RRBA 1

Client: A. Bafghi

Depth: 35.0 - 36.06'

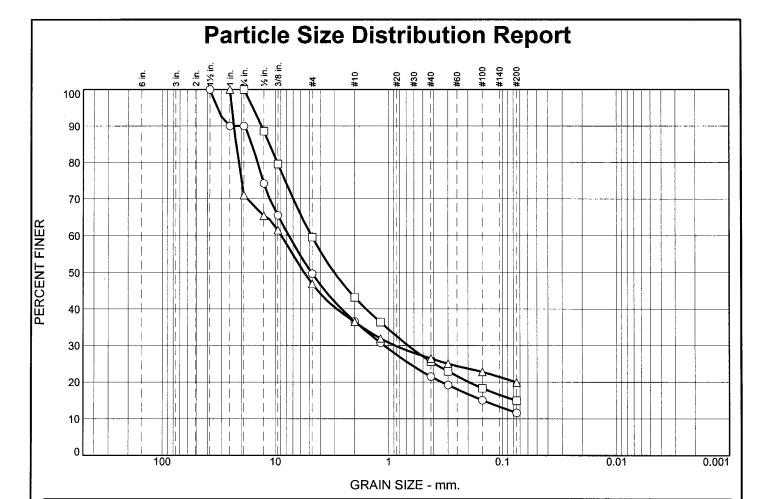
Depth: 40.0 - 41.5'

Project: Boulder City Bypass

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

Sample Number: G

Sample Number: H



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	50.4	38.0	11	.6	GP-GM			
	0.0	40.4	44.7	14	9	SM			
Δ	0.0	53.1	27.0	. 19	9.9	GM			
١	SIEV/E	DEDCENT EIN	ED SIEV	/E DEDC	ENT FINED	Material Des	crintion		

SIEVE	PE	RCENT FIN	IER	SIEVE	PE	RCENT FIN	IER	Material Description
inches size	0		Δ	number size	0		Δ	o poorly graded gravel with silt and sand
1.5"	100.0			#4	49.6	59.6	46.9	
1"	90.0		100.0	#10	36.7	43.2	36.5	☐ silty sand with gravel
3/4"	90.0	100.0	71.0	#16	30.8	36.4	32.0	
1/2"	74.2	88.6	65.4	#40	21.5	25.6	26.5	A gilty arough with good
3/8"	3/8" 65.5			#50	19.2	23.0	25.0	△ silty gravel with sand
				#100	15.1	18.3	22.8	
	0041110175			#200	11.6	14.9	19.9	
	(SRAIN SIZI						REMARKS:
D ₆₀	7.6159	4.8319	8.8783					0
D ₃₀	1.0948	0.6732	0.8804					
D ₁₀								
	CC	EFFICIEN	TS					
C _c							Δ	
Cu								
O Source of	f Sample:	RRBA 1	Denth	: 45.0 - 45.5'	Sar	nple Numl	her: I	

NEVADA
DEPARTMENT OF
TRANSPORTATION

☐ Source of Sample: RRBA 1

 \triangle Source of Sample: RRBA 1

Client: A. Bafghi

Depth: 50.0 - 50.5'

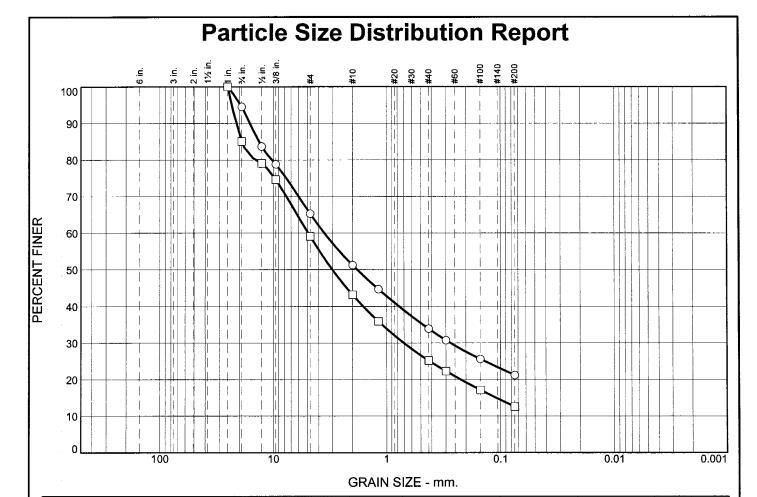
Depth: 55.0 - 55.5'

Project: Boulder City Bypass

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

Sample Number: J

Sample Number: K



ı	+3"	% GRAVEL	% SAND	% SILT	% CLAY	uscs	AASHTO	PL	LL
C	0.0	34.7	44.1	21	,	SM			
	0.0	40.9	46.6		2.5	SM	A-1-a	20	21

SIEVE	PE	RCENT FIN	IER							
inches size	0									
1"	100.0	100.0								
3/4"	94.5	85.1								
1/2"	83.7	79.1								
3/8"	78.8	74.6								
	(Ξ								
D ₆₀	3.5657	4.9574								
1 -00	2.000	7.2371								
D ₃₀	0.2737	0.7036								
D ₃₀	0.2737		TS							
D ₃₀ D ₁₀	0.2737	0.7036	TS							
D ₃₀	0.2737	0.7036	TS							

SIEVE	PEI	RCENT FIN	IER
number size	0		
#4	65.3	59.1	
#10	51.2	43.2	
#16	44.7	35.9	
#40	33.9	25.2	
#50	30.8	22.3	
#100	25.6	17.2	
#200	21.2	12.5	

REMARKS:		
0		

Material Description

output
silty sand with gravel

☐ silty sand with gravel

O Source of Sample: RRBA 1

Depth: 60.0 - 60.5'

Sample Number: L Sample Number: M

☐ Source of Sample: RRBA 1

Depth: 65.0 - 65.5'

Client: A. Bafghi

Project: Boulder City Bypass

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

Figure

NEVADA
DEPARTMENT OF
TRANSPORTATION

Particle Size Distribution Report 100 90 80 70 PERCENT FINER 60 50 40 30 20 10 0.001 0.1 0.01 100 10

SIEVE	PE	RCENT FIN	IER					
inches size	0							
1"		100.0						
3/4"	100.0	89.7						
1/2"	79.9	79.7						
3/8"	70.3	76.4						
j								
	(GRAIN SIZI						
D ₆₀	6.7473	4.4510						
D ₃₀	1.4915	0.7319						
D ₁₀	0.0821							
	CC	DEFFICIEN	TS					
C _C	4.02							
C _c C _u	82.20							
O Source of Sample: RRBA 1 De								

% GRAVEL

49.6

38.5

% SAND

40.8

50.4

+3"

0.0

0.0

SIEVE	PEF	RCENT FIN	IER
number size	0		
#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	
	,		
70.0 - 70.5	Sat	nnle Numl	ner: N

GRAIN SIZE - mm.

9.6

11.1

% CLAY

USCS

GP-GM

SP-SM

Material Description

% SILT

Γ	REMARKS:	
	0	
١		
1		

AASHTO

A-1-a

O poorly graded gravel with silt and sand

□ poorly graded sand with silt and gravel

PL

22

LL

25

th: 70.0 - 70.5

Sample Number: N

☐ Source of Sample: RRBA 1

Depth: 75.0 - 75.5'

Sample Number: O

NEVADA DEPARTMENT OF TRANSPORTATION Client: A. Bafghi

Project: Boulder City Bypass

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

	+3"	%	GRAVEL	% SA	ND	% SILT	%	CLAY	USCS	AASHTO	PL	LL
0	0.0		56.5	32.0	6	10.9		GP-GC	A-2-4(0)	21	29	
	0.0		30.3	58.2	2	11.5		SP-SM	A-1-a	NP	23	
Δ	0.0 35.1 5		51.8	8	13.1		SM	A-1-b	NP	36		
١٢	SIEVE PERCENT FINER SI				SIEVE	PE	RCENT FIN	NER	Material Description			
	inches	0		Δ	number	0		Δ	o poorly graded gravel with clay ar			and

GRAIN SIZE - mm.

SIEVE	PEI	PERCENT FINER			PEI	RCENT FIN	IER	Material Description
inches size	0		Δ	number size	0		Δ	o poorly graded gravel with clay and sand
1.5" 1" 3/4" 1/2" 3/8"	100.0 98.4 90.8 77.9 65.7	100.0 91.3 85.5 83.6	100.0 88.9 81.0	#4 #10 #16 #40 #50 #100 #200	43.5 27.4 22.7 17.8 16.4 13.8 10.9	69.7 50.5 39.8 25.7 22.3 16.6 11.5	64.9 49.4 41.6 31.4 28.0 20.8 13.1	□ poorly graded sand with silt and gravel △ silty sand with gravel
$\geq \leq$	(GRAIN SIZ	E					REMARKS:
D ₆₀	8.2383	3.1145	3.6890					0
D ₃₀	2.4156	0.6198	0.3680					
D ₁₀								
	cc	EFFICIEN	TS					
C _C								
Cu								
O Source o	f Sample:	RRBP 1	Depth:	32.0 - 35.0'	Sar	nple Numb	er: BULK	.1

Δ Source of Sample: RRBP 1 Depth: 10.0 - 11.5'

NEVADA
DEPARTMENT OF

Client: Project

TRANSPORTATION

☐ Source of Sample: RRBP 1

Client: A. Bafghi

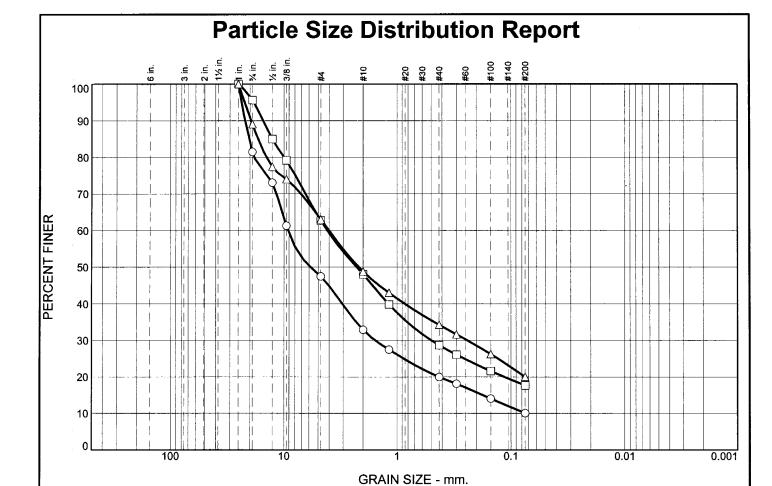
Depth: 5.0 - 5.6'

Project: Boulder City Bypass

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

Sample Number: A

Sample Number: B



L	+3"	% GRAVEL	% SANI	D	% 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			
Г										
ı	SIEVE	SIEVE PERCENT FINER		SIEVE	PERCENT FINER Material Desc			<u>cription</u>		

SIEVE	DEI	RCENT FIN	IED	SIEVE	SIEVE PERCENT FINER			Material Description
inches		KUENT FIN	NER .	number		CENTEN	NEK -	O poorly graded gravel with silt and sand
size	0		Δ	size	0		Δ	o poorly graded graver with site and saild
1"	100.0	100.0	100.0	#4	47.4	62.7	63.1	
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	
3/8"	61.3	79.2	74.0	#40	20.0	28.7	34.3	1 24 1
				#50	18.1	26.1	31.6	△ silty sand with gravel
				#100	14.0	21.6	26.3	
				#200	10.1	17.6	20.0	
	(SRAIN SIZI	E					REMARKS:
D ₆₀	9.2047	4.1697	4.0161					0
D ₃₀	1.5606	0.4967	0.2405					
D ₁₀								
	COEFFICIENTS							
C _C								Δ
Cu								
O Source o	f Sample:	RRBP 1	Depth:	20.0 - 20.3'	San	nple Numb	er: D	

NEVADA
DEPARTMENT OF
TRANSPORTATION

□ Source of Sample: RRBP 1

△ Source of Sample: RRBP 1

Client: A. Bafghi

Depth: 45.0 - 45.4'

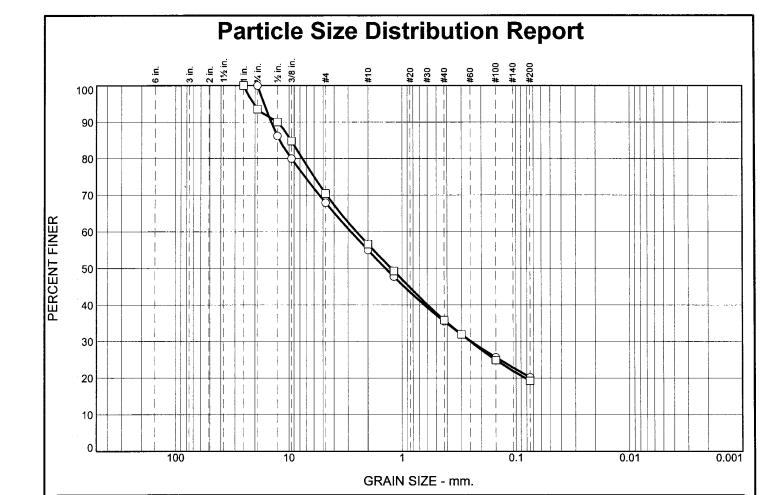
Depth: 50.0 - 50.5'

Project: Boulder City Bypass

Sample Number: J

Sample Number: L

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



% SILT

% CLAY

20.2

19.2

USCS

SM

SM

SIEVE	PEI	RCENT FIN	IER	SIEVE	PEI	RCENT FI	NER	Material Description
inches size	0			number size	0			o silty sand with gravel
1"		100.0		#4	67.9	70.4		
3/4"	100.0	93.6		#10	55.0	56.6		☐ silty sand with gravel
1/2"	86.2	90.0		#16	47.7	49.3		
3/8"	80.0	84.8						
					-			
		DAIN 0171	_	#200	20.2	19.2		
		FRAIN SIZI	=					REMARKS:
D ₆₀	2.8288	2.5280						0
D ₃₀	0.2461	0.2505						
D ₁₀								
	CC	DEFFICIEN	TS					
C _C								
c _u								
Source o	f Sample:	RRBP 1	Depth	n: 60.0 - 60.4'	San	nple Numl	per: M	
	inches size 1" 3/4" 1/2" 3/8" D ₆₀ D ₃₀ D ₁₀ C _c C _u	Inches Size 1	1	1	Inches Size O	1"	1	1"

% SAND

47.7

51.2

	Ü		
REMARKS:		 	
0			

AASHTO

PL

LL

☐ Source of Sample: RRBP 1

+3"

0.0

0.0

% GRAVEL

32.1

29.6

Depth: 70.0 - 70.3'

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 4 0 4 100 90 80 70 PERCENT FINER 60 50 40 30 20 10 0.001 100 0.01 10 GRAIN SIZE - mm.

SIEVE	PE	RCENT FINE	₹	SIEVE	PE	RCENT FIN	IER	Material Desc	ription	
inches size	0			number size	0			o silty sand w	ith gravel	
1"	100.0	100.0		#4	61.8	65.8				
3/4"	95.6	93.3		#10	44.3	53.1		☐ clayey sand	with gravel	ļ
1/2"	87.3	85.0		#16	36.5	46.4				
3/8"	80.8	80.6		#40	24.8	34.7				
				#50	22.0	31.2		1		
				#100	17.5	25.2				
		GRAIN SIZE		#200	13.4	19.6		REMARKS:		
								O CONTRACTOR		
D ₆₀	4.4213	3.3799								
D ₃₀	0.7078	0.2634								
D ₁₀		Ì								
	cc	DEFFICIENTS								
C _C										
Cu										
O Source o	O Source of Sample: RRBP 1 Depth: 75.0 - 76.			75.0 - 76.4'	San	nple Numb	er: O			
□ Source o	□ Source of Sample: RRBP 1 Depth: 8			80.0 - 80.8'	San	nple Numb	er: P			

Client: A. Bafghi

Project: Boulder City Bypass

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

% SILT

13.4

19.6

+3"

0.0

0.0

% GRAVEL

38.2

34.2

NEVADA

DEPARTMENT OF TRANSPORTATION

% SAND

48.4

46.2

% CLAY

USCS

SM

SC

AASHTO

A-1-a

A-2-6(0)

Figure

LL

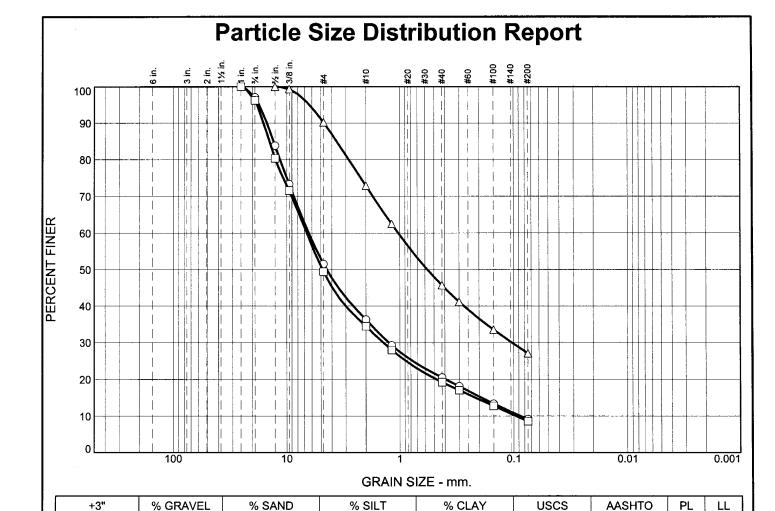
23

33

PL

20

21



Δ 0.0		9.8	63.1			27.1			
SIEVE	PEI	PERCENT FINER		SIEVE	PE	RCENT FI	NER	Material Description	
inches size	0		Δ	number size	0		Δ	well-graded gravel with silt and sand	
1"	100.0	100.0		#4	51.6	49.4	90.2		
3/4"	97.1	96.2		#10	36.3	34.4	72.9	☐ poorly graded gravel with silt and sand	
1/2"	83.8	80.3	100.0	#16	29.2	27.9	62.5	[]	
3/8"	73.3	71.6	99.3	#40	20.5	19.2	45.7	$ \cdot _{\Delta}$	
				#50 #100	18.1	17.0 12.7	41.2 33.5		
				#200	9.1	8.6	27.1		
	(GRAIN SIZI	E	11200).1	0.0	27.1	REMARKS:	
D ₆₀	6.4120	6.6695	1.0321					0	
D ₃₀	1.2557	1.4054	0.1036						
D ₁₀	0.0871	0.0955							
	cc	DEFFICIEN	TS						
C _C	2.82	3.10							
Cu	73.64	69.84							
O Source o	f Sample:	RRBA-2	Depth	: 5.0 - 6.5'	Samp	ole Numbe	r: A		

9.1

8.6

GW-GM

GP-GM

A-1-a

A-1-a

NP

NP

24

26

NEVADA
DEPARTMENT OF
TRANSPORTATION

□ Source of Sample: RRBA-2

△ Source of Sample: RRBA-2

0.0

0.0

48.4

50.6

42.5

40.8

Client: A. Bafghi

Depth: 15.0 - 15.5'

Depth: 20.0 - 20.5'

Project: Boulder City Bypass

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

Sample Number: C

Sample Number: D

Particle Size Distribution Report 100 90 80 70 PERCENT FINER 60 50 40 30 20 10

GRAIN	SIZE -	mm.
--------------	--------	-----

0.1

	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
०	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
Δ	0.0	21.8	64.8	13	.4	SM			

	inches size	0		Δ	
	1"	100.0			
	3/4"	90.6	100.0	100.0	
1	1/2"	79.4	90.1	95.5	
	3/8"	70.2	86.6	92.7	
ĺ	> <	(Ē		
	D ₆₀	6.6255	1.0305	2.3447	
	D ₃₀	0.8953	0.0836	0.4813	
	D ₁₀	0.0772			
	><	CC	DEFFICIEN	TS	
	C _c	1.57			
	C _c C _u	85.83			
	o C	CC1	DDD A 3	D	

SIEVE

100

PERCENT FINER

SIEVE	PEI	RCENT FIN	IER
number size	0		Δ
#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
30.0 - 31.5	Sa	mple Numi	ber: F

Material Description
\bigcirc well-graded gravel with silt

0.01

0.001

and sand

□ clayey sand with gravel

△ silty sand with gravel

REMARKS:
0
Δ

O Source of Sample: RRBA-2

☐ Source of Sample: RRBA-2 △ Source of Sample: RRBA-2 Depth: 60.0 - 60.5'

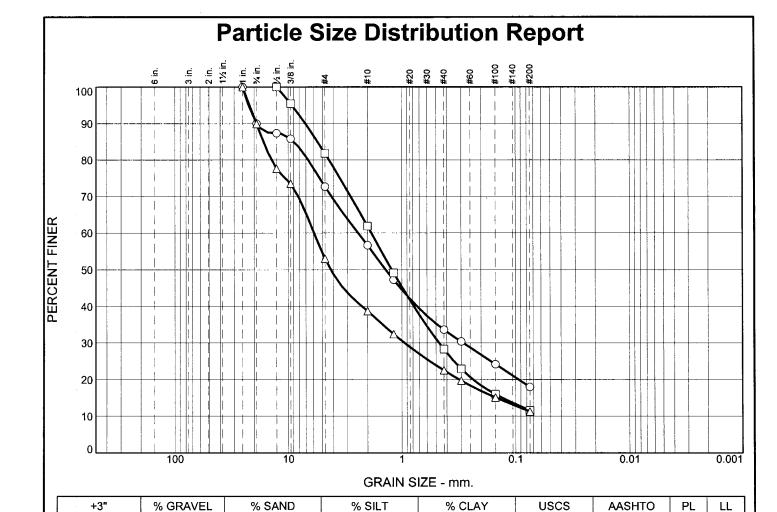
Depth: 30.0 - 31.5' Depth: 45.0 - 46.0'

Sample Number: F Sample Number: I Sample Number: L

NEVADA DEPARTMENT OF TRANSPORTATION Client: A. Bafghi

Project: Boulder City Bypass

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



Δ	0.0		47.0	41.8	41.8		11.2		GP-GM		
l٢	SIEVE PERCENT		RCENT FIN	IER	SIEVE		PEI	RCENT FIN	NER	Material Description	
Ц	inches size	0		Δ	numl siz		0		Δ	o silty sand with gravel	
	1" 3/4" 1/2" 3/8"	100.0 90.0 87.4 85.9	100.0 95.4	100.0 89.9 77.6 73.5	#4 #1 #4 #4 #5 #10	0 6 0 0 0	72.7 56.6 47.3 33.6 30.4 24.2 18.0	81.8 61.9 49.2 28.3 22.9 16.0 11.5	53.0 38.8 32.4 22.5 19.7 15.1 11.2	☐ poorly graded sand with silt and gravel △ poorly graded gravel with silt and sand	
	><		GRAIN SIZI	Ē	"-`	, ,	10.0	11.5	11.2	REMARKS:	
П	D ₆₀	2.4186	1.8514	5.9265						0	
П	D ₃₀	0.2869	0.4678	0.9449							
Ц	D ₁₀				:						
	$\geq \leq$	C	DEFFICIEN	TS							
	C _c C _u										
	O Source of Sample: RRBA-2 De		Depth	n: 65.0 -	: 65.0 - 65.3' Sample Number: M			ber: M			
	□ Source of Sample: RRBA-2		Depth	n: 75.0 -	76.2	' Sa	mple Num	ber: O			

Client: A. Bafghi

Project: Boulder City Bypass

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

Sample Number: P

18.0

11.5

SM

SP-SM

23

22

A-1-b

Figure

0.0

0.0

△ Source of Sample: RRBA-2

NEVADA

DEPARTMENT OF TRANSPORTATION

27.3

18.2

54.7

70.3

Depth: 80.0 - 81.2'

Particle Size Distribution Report 100 90 80 70 PERCENT FINER 60 50 40 30 20 10 0.1 0.001 0.01 100 10

SIEVE	PERCENT FINER			
inches size	0			
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 SIZI	E	
D ₆₀	18.0837	19.4996		
D ₃₀	5.9559	7.1496		
D ₁₀	0.0826	0.2156		
	COEFFICIENTS			
СС	23.76	12.16		
C _c	219.04	90.45		
O Source o	of Sample: BRW 1 Depth			

% GRAVEL

72.4

75.3

+3"

0.0

0.0

SIEVE	PEI	RCENT FIN	IER
number size	0		
#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	
0.0 - 5.0'	Sample	e Number:	RV1

GRAIN SIZE - mm.

9.3

6.8

% CLAY

USCS

GP-GM

GP-GC

Material Description

% SILT

REMARKS:
0

AASHTO

A-1-a

A-1-a

O poorly graded gravel with silt and sand

□ poorly graded gravel with siltyclay and sand

PL

NP

21

LL

21

25

○ Source of Sample: BRW 1□ Source of Sample: BRW 1

Depth: 0.0 - 5.0'

% SAND

18.3

17.9

Depth: 5.0 - 10.0' Sam

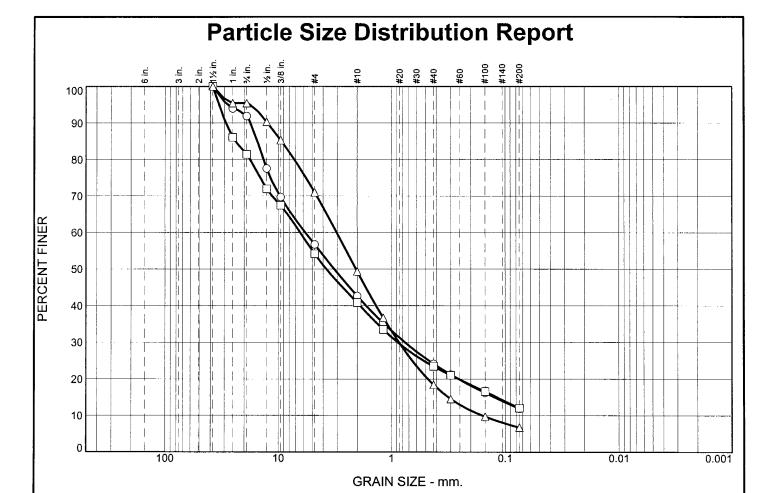
Sample Number: RV2

NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: A. Bafghi

Project: Boulder City Retaining Walls

Project No.: EA 73307, FL-8-09



L	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	43.3	44.9	11.8		SW-SM			
	0.0	45.9	42.1	12.0		GW-GM			
Δ	0.0	29.0	64.3	6.7		SW-SM			

SIEVE	PEI	RCENT FIN	NER	SIEVE	PERCENT FINER		IER	Material Description
inches size	0		Δ	number size	0		Δ	o well-graded sand with silt and gravel
1 1/2"	100.0	100.0	100.0	#4	56.7	54.1	71.0	
1"	93.9	86.1	95.4	#10	42.6	40.8	49.3	☐ will-graded gravel with silt and sand
3/4"	91.9	81.5	95.4	#16	35.3	33.5	36.7	
1/2"	77.6	72.0	90.3	#40	24.2	23.4	18.4	△ well-graded sand with silt and gravel
3/8"	69.7	67.4	85.3	#50	21.2	21.0	14.5	\(Well-graded saild with silt and graver
				#100	16.2	16.6	9.7	
		DAIN CIZI	_	#200	11.8	12.0	6.7	[BEWENS
		SRAIN SIZI						REMARKS:
D ₆₀	5.7691	6.3838	3.0348					
D ₃₀	0.7589	0.8781	0.8571					
D ₁₀			0.1593					
	CC	DEFFICIEN	TS					
C _c			1.52					
Cu			19.06					
O Source of Sample: BRW 1 Depth: 5.0 - 6.5' Sample Number: A								

NEVADA
DEPARTMENT OF
TRANSPORTATION

☐ Source of Sample: BRW 1

 \triangle Source of Sample: BRW 1

Client: A. Bafghi

Depth: 10.0 - 11.5'

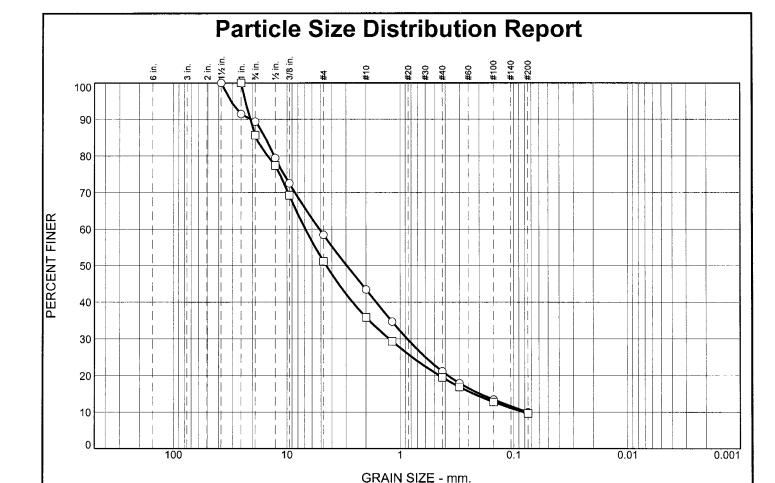
Depth: 15.0 - 16.5'

Project: Boulder City Retaining Walls

Sample Number: B

Sample Number: C

Project No.: EA 73307, FL-8-09



SIEVE	PEI	PERCENT FINER			
inches size	0 🗆				
1 1/2"	100.0				
1"	91.5	100.0			
3/4"	89.3	85.7			
1/2"	79.4	77.4			
3/8"	72.5	69.3			
	(GRAIN SIZE			
D ₆₀	5.1707	6.8730			
D ₃₀	0.8645	1.2488			
D ₁₀	0.0759	0.0817			
	COEFFICIENTS				
CC	1.90	2.78			
C _c	68.12	84.16			
O Source of Sample: BRW 1 Dept					

% GRAVEL

41.6

48.8

% SAND

48.5

41.6

	SIEVE	PE	RCENT FIN	≀ER
	number size	0		
	#4	58.4	51.2	
	#10	43.5	35.9	
	#16	34.7	29.4	
	#40	21.2	19.6	
	#50	17.9	16.9	
	#100	13.4	12.8	
	#200	9.9	9.6	
1	20.0 - 21.5'	Sam	ple Numbe	er: D

% SILT

9.9

9.6

% CLAY

USCS

SW-SM

GW-GM

Material Description

REMARKS:		
0		

AASHTO

O well-graded sand with silt and gravel

□ will-graded gravel with silt and sand

PL

LL

+3"

0.0

0.0

☐ Source of Sample: BRW 1

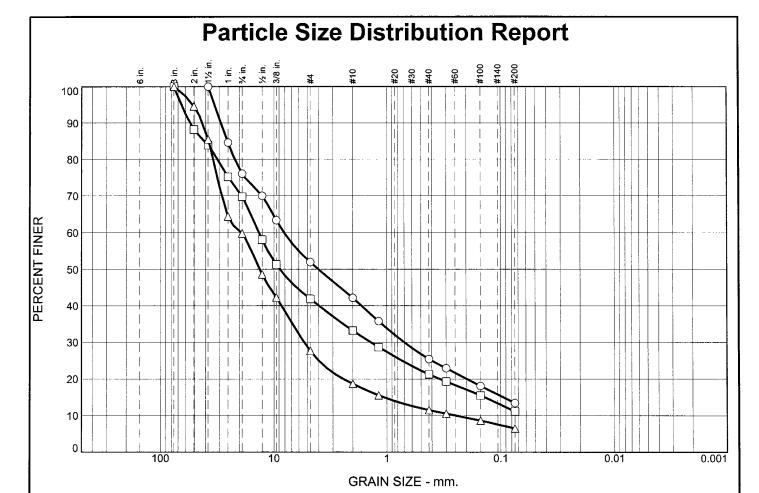
Depth: 30.0 - 31.5'

Sample Number: F

NEVADA DEPARTMENT OF TRANSPORTATION Client: A. Bafghi

Project: Boulder City Retaining Walls

Project No.: EA 73307, FL-8-09



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

SIEVE	PERCENT FINER			
inches size	0		Δ	
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	0.7000 1.3796 5.38		
D ₁₀			0.2461	
	COEFFICIENTS			
C _C			6.10	
C _c			78.58	
o Course of Courseles DDW 2 Down				

SIEVE	PEI	PERCENT FINER				
number size	0		Δ			
#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			
5.0 - 5.3'	Sample Number: A					

□ poorly graded gravel with silt and sand
\triangle poorly graded gravel with silt and sand
REMARKS:
0

Material Description

○ silty gravel with sand

Δ

○ Source of Sample: BRW 2
□ Source of Sample: BRW 2
△ Source of Sample: BRW 2

Depth: 5.0 - 5.3' Depth: 0.0 - 5.0' Depth: 5.0 - 10.0'

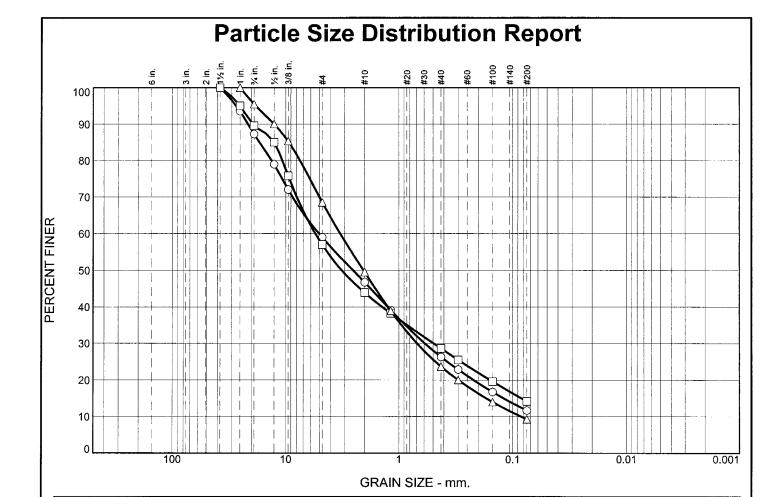
Sample Number: A
Sample Number: RV1
Sample Number: RV2

NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: A. Bafghi

Project: Boulder City Retaining Walls

Project No.: EA 73307, FL-8-09



SIEVE	PERCENT FINER					
inches size	0	Δ				
1 1/2"	100.0	100.0				
1"	93.5	95.0	100.0			
3/4"	87.3	89.6	95.5			
1/2"	78.9	85.0	90.0			
3/8"	72.0	75.8	85.4			
$\bigg \bigg $	(GRAIN SIZE				
D ₆₀	5.0788	5.4768	3.2926			
D ₃₀	0.5897	0.4932	0.6908			
D ₁₀			0.0841			
	COEFFICIENTS					
C _c C _u						
C_{u}		39.15				

% GRAVEL

41.0

43.1

31.5

% SAND

47.3

42.7

59.2

+3"

0.0

0.0

0.0

1	SIEVE	PEI	RCENT FIN	IER
Δ	number size	0		Δ
	#4	59.0	56.9	68.5
0.00	#10	46.7	43.9	49.5
95.5	#16	39.2	38.3	38.9
90.0	#40	26.3	28.6	23.7
85.4	#50	22.9	25.5	20.1
	#100	16.7	19.6	14.0
	#200	11.7	14.2	9.3
2026				
.2926				
.6908				
.0841				
1.72				
9.15				
Depth	: 5.0 - 6.5'	Sampl	e Number:	A

% SILT

11.7

14.2

9.3

% CLAY

USCS

SW-SM

GM

SW-SM

Δ

Material Description

☐ silty gravel wi	th sand
△ well-graded sa	nd with silt and gravel
REMARKS:	
[0	

AASHTO

A-1-a

O well-graded sand with silt and gravel

PL

NP

LL

20

O Source of Sample: BRW 3

□ Source of Sample: BRW 3

△ Source of Sample: BRW 3

Depth: 20.0 - 21.5' Depth: 30.0 - 31.5'

Sample Number: D Sample Number: F

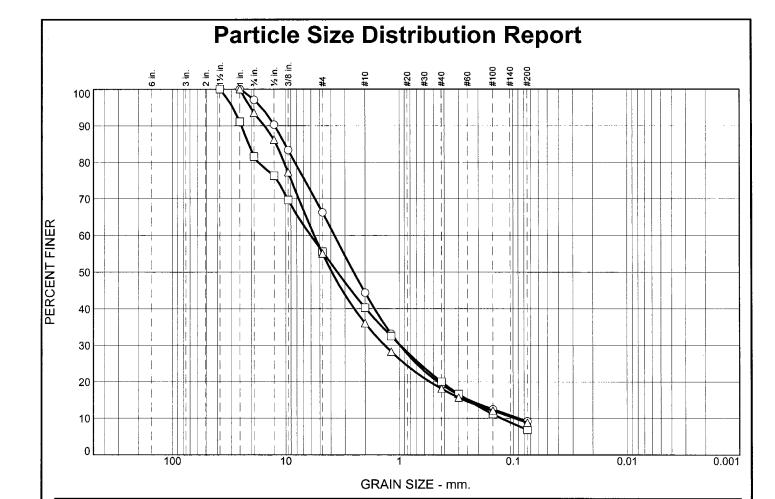
NEVADA DEPARTMENT OF

TRANSPORTATION

Project: Boulder City Retaining Walls

Project No.: EA 73307, FL-8-09

Client: A. Bafghi



% SILT

9.2

6.9

8.8

% CLAY

USCS

SW-SM

SW-SM

SP-SM

Material Description

SIEVE	PEI	RCENT FIN	IER	SIE
inches size	0		Δ	nur
1 1/2"		100.0		#
1"	100.0	91.1	100.0	#
3/4"	97.1	81.6	93.5	#
1/2"	90.3	76.3	86.2	#
3/8"	83.4	69.7	77.3	#
				#1
				#2
	(GRAIN SIZI	Ε	
D ₆₀	3.7144	6.0390	5.6180	
D ₃₀	0.9876	0.9808	1.3463	
D ₁₀	0.0893	0.1264	0.0961	
	CC	DEFFICIEN	TS	
C _C	2.94	1.26	3.36	
C _c C _u	41.61	47.79	58.49	
- 0	CO 1	DDUIA	T) (1	25.0

NEVADA

DEPARTMENT OF

% GRAVEL

33.7

44.4

44.9

SIEVE	PE	RCENT FIN	IER	
number size	0		Δ	
#4	66.3	55.6	55.1	
#10	44.4	40.3	36.1	
#16	33.1	32.5	28.3	
#40	19.3	20.0	18.1	
#50	16.4	16.6	15.7	
#100	12.5	11.1	12.1	
#200	9.2	6.9	8.8	
35.0 - 36.5'	Sam	ple Numbe	er: G	•

☐ well-graded sand with silt and gravel
\triangle poorly-graded sand with silt and gravel
REMARKS:
KEWAKKO.
Δ

AASHTO

O well-graded sand with silt and gravel

PL

LL

○ Source of Sample: BRW 3□ Source of Sample: BRW 3

+3"

0.0

0.0

0.0

Depth: 35.0 - 36.5' Depth: 40.0 - 41.5'

Sample Number: G Sample Number: H Sample Number: I

△ Source of Sample: BRW 3

Depth: 45.0 - 46.5'

% SAND

57.1

48.7

46.3

Client: A. Bafghi

Project: Boulder City Retaining Walls

TRANSPORTATION Project No.: EA 73307, FL-8-09

SIEVE	PE	PERCENT FINER			
inches size	0		Δ	number size	
2"		100.0	100.0	#4	
1 1/2"	100.0	97.7	95.7	#10	
1"	94.3	96.8	85.9	#16	
3/4"	90.9	92.3	77.2	#40	
1/2"	78.1	87.3	69.0	#50	
3/8"	73.2	81.3	60.4	#100	
				#200	
	(GRAIN SIZE			
D ₆₀	5.3260	3.7235	9.4111		
D ₃₀	1.1453	0.9021	2.8299		
D ₁₀	0.0924		0.4635		
	CC	DEFFICIEN	TS		
C _c	2.67		1.84		
Cu	57.64		20.30		
O Source o	f Sample:	BRW 3	Depth	50.0 - 51.5'	

% GRAVEL

43.0

34.5

58.1

% SAND

48.3

55.1

37.1

SIEVE	PE	RCENT FIN	IER	
number size	0		Δ	
#4	57.0	65.5	41.9	
#10	38.4	46.0	23.4	
#16	30.4	34.6	16.5	
#40	19.5	21.0	9.6	
#50	17.0	17.8	8.3	
#100	12.9	13.6	6.4	
#200	8.7	10.4	4.8	
•				
	,			
50.0 51.51	C	1 . NJ1.	T	

GRAIN SIZE - mm.

8.7

10.4

4.8

% CLAY

USCS

SW-SM

SP-SM

GW

% SILT

Material Description O well-graded sand with silt and gravel	
☐ poorly graded sand with silt and gravel	
△ well-graded gravel with sand	

AASHTO

A-1-a

A-1-a

PL

18

20

LL

20

21

1	REMARKS:
	Δ

○ Source of Sample: BRW 3
□ Source of Sample: BRW 3
△ Source of Sample: BRW 3

+3"

0.0

0.0

0.0

Depth: 0.0 - 5.0'
Depth: 5.0 - 10.0'

Sample Number: J Sample Number: RV1 Sample Number: RV2

NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: A. Bafghi

Project: Boulder City Retaining Walls

Project No.: EA 73307, FL-8-09

GRAIN	SIZE	- mm.
-------	------	-------

l	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	49.0	43.5	7.	.5	GW-GM			
		47.4	44.9	7.	1	GW-GM			
Δ	0.0	44.9	48.0	7.	.1	SW-SM			

SIEVE	PERCENT FINER						
inches size	0		Δ				
1 1/2"	100.0	100.0	100.0				
1"	86.9	96.3	92.7				
3/4"	82.0	93.1	84.5				
1/2"	71.7	80.2	73.6				
3/8"	67.3	72.8	68.9				
	GRAIN SIZE						
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						
Cc	1.73	1.75	1.61				
C _c	59.31	53.49	42.40				

100

SIEVE	PERCENT FINER						
number size	0		Δ				
#4	51.0	52.6	55.1				
#10	37.5	38.1	39.4				
#16	30.2	30.8	30.1				
#40	18.7	18.6	17.3				
#50	16.0	15.8	14.5				
#100	11.6	11.4	10.3				
#200	7.5	7.7	7.1				
	i						
5.0 - 6.5'	Sample	e Number:	Α				

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

Material Description

0.01

0.001

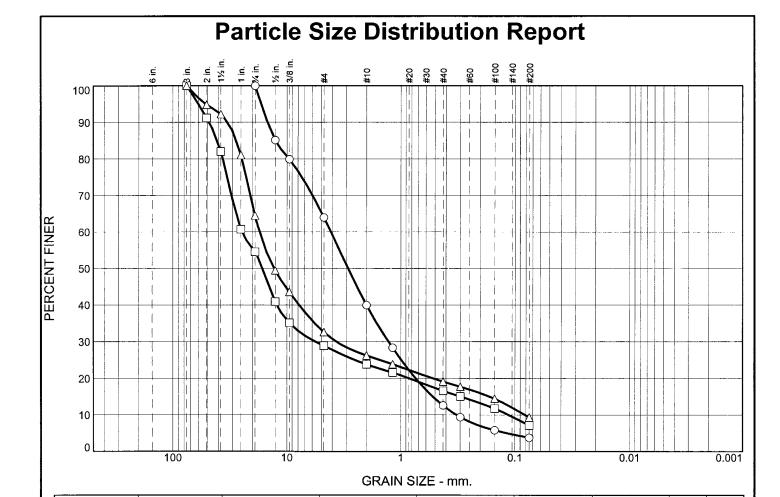
- O Source of Sample: BRW 4
- □ Source of Sample: BRW 4△ Source of Sample: BRW 4
- Depth: 5.0 6.5'
- Depth: 10.0 11.5' Depth: 15.0 - 16.5'
- Sample Number: A
 Sample Number: B
 - Sample Number: C

NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: A. Bafghi

Project: Boulder City Retaining Walls

Project No.: EA 73307, FL-8-09



Δ	0.0			67.4	23.3		
ſ	SIEVE		PE	IER			
	inches size	C)		Δ		
	3" 2" 1 1/2" 1" 3/4" 1/2" 3/8"	100 85 79	.1	100.0 91.2 82.0 60.7 54.5 40.9 35.2	100.0 94.8 92.2 81.0 64.5 49.4 43.6		
			(GRAIN SIZI	E		
ſ	D ₆₀	4.12	212	24.8596	17.3959		
	D_{30}	1.28	320	5.6116	3.6695		
	D ₁₀	0.32	244	0.1133	0.0815		
	><	COEFFICIENTS					
ſ	Cc	1.2	23	11.18	9.49		
	С _с С _и	12.	71	219.39	213.38		

% GRAVEL

36.0

71.1

% SAND

60.2

21.8

SIEVE	PERCENT FINER					
number size	0		Δ			
#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			

% SILT

3.8

7.1

9.3

% CLAY

_			·-· ·	
er	0		Δ	o well-graded sand with gravel
) ; ;)))))	64.0 40.0 28.3 12.6 9.4 5.8 3.8	28.9 23.8 21.6 16.6 15.0 11.7 7.1	32.6 26.3 23.9 19.1 17.7 14.4 9.3	□ poorly graded gravel with silt and sand □ poorly graded gravel with silt and sand □ poorly graded gravel with silt and sand □ REMARKS: □ □

USCS

SW

GP-GM

GP-GM

Material Description

AASHTO

A-1-a

A-1-a

PL

NP

NP

LL

24

23

O Source of Sample: BRW 4 □ Source of Sample: BRW 4 △ Source of Sample: BRW 4

+3"

0.0

0.0

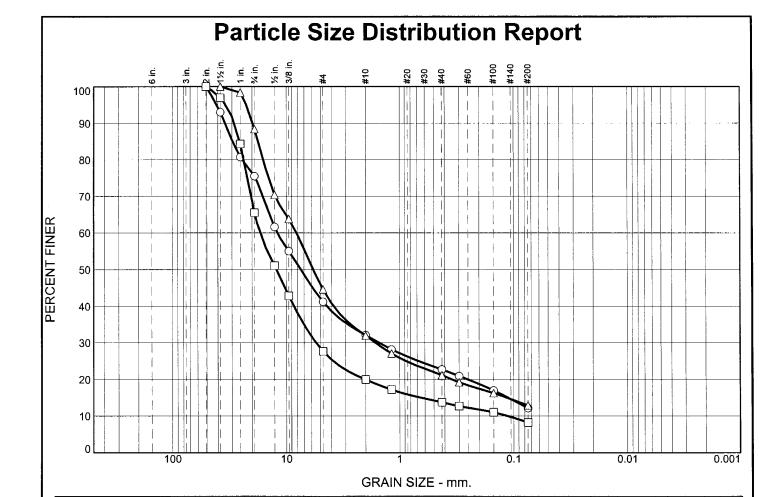
Depth: 30.0 - 31.5' Depth: 0.0 - 5.0' Depth: 5.0 - 10.0'

Sample Number: F Sample Number: RV1 Sample Number: RV2

NEVADA DEPARTMENT OF TRANSPORTATION Client: A. Bafghi

Project: Boulder City Retaining Walls

Project No.: EA 73307, FL-8-09



		**							 				
Δ 0.	0	55.4	31.	1.7 12.9		31.7 12.9 GM A-1		12.9		A-1-a	24	30	
SIEVE	F	ERCENT FIN	NER	SIE	VΕ	PEI	RCENT FIN	NER	Material Description				
inches size	0		Δ	num siz		0		Δ	o silty gravel	with sand			
2"	100.0	100.0		#4		41.2	27.7	44.6					
1-1/2"	93.0	96.9	100.0	#1	_	32.1	19.9	32.0	poorly grad	ed gravel with si	It and sa	nd	
1" 3/4"	80.8 75.5	84.3 65.5	98.4 88.4	#1		28.2 22.7	17.2 13.7	27.1 21.1					
1/2"	61.6	51.1	70.4	#5	-	20.9	12.7	19.2	△ silty gravel	with sand			
3/8"	55.0	42.8	63.8	#10	-	17.0	11.0	16.2					
				#20	00	12.1	8.2	12.9	L				
	GRAIN SIZE		E						REMARKS:				
D ₆₀	12.003	9 17.0079	8.1559						0				
D ₃₀	1.5173	5.4595	1.6345										
D ₁₀		0.1130											
	COEFFICIENTS												
C _C		15.52							Δ				
Cu		150.57											
O Source	O Source of Sample: RRC1 Depth: 0-5 Sample Number: RV1												

Sample Number: RV2

Client: Abbas Bafghi

Project No.: FL-02-06

Sample Number: RV3

Project: Boulder City Bypass - US 93/US 95 Intersection

% SILT

12.1

8.2

% CLAY

USCS

GM

GP-GM

AASHTO

A-1-a

A-1-a

Figure

PL

NP

NP

LL

24

25

+3"

0.0

0.0

☐ Source of Sample: RRC1

△ Source of Sample: RRC1

NEVADA

DEPARTMENT OF TRANSPORTATION

% GRAVEL

58.8

72.3

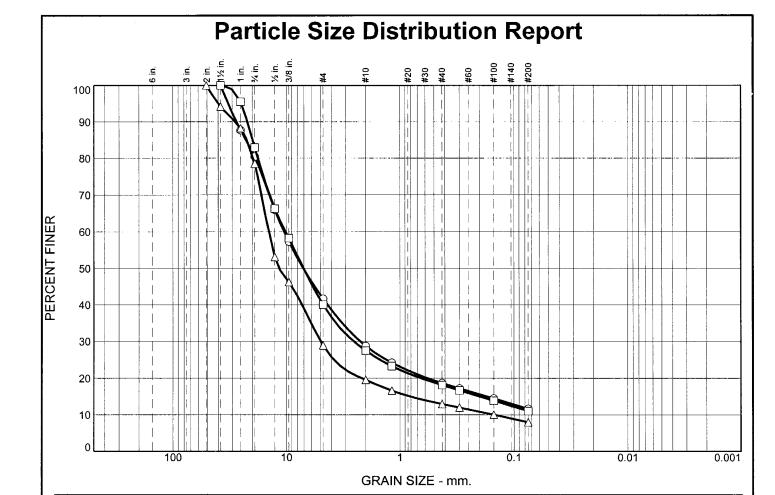
% SAND

29.1

19.5

Depth: 5-10

Depth: 10-15



-									1		
SIEVE	PERCENT FINER			SIEVE PERCENT FINES			NER	Material Description			
inches size	0		Δ	number size	0		Δ	o poorly grad	led gravel with s	ilt and sai	nd
2"			100.0	#4	41.7	40.0	28.9				
1-1/2"	100.0	100.0	94.2	#10	28.8	27.5	19.5	☐ poorly grad	led gravel with s	ilt and sa	nd
1"	87.7	95.5	88.2	#16	24.2	23.3	16.6				
3/4"	80.5	82.9	78.5	#40	18.7	18.1	12.9	A poorly grad	led gravel with s	iltvolav a	nd cand
1/2"	66.0	66.3	53.1	#50	17.2	16.6	12.0	DA poorty grad	ica graver with s	iliyciay a	iiu saiiu
3/8"	57.3	58.2	46.2	#100	14.5	13.9	10.0				
		L GRAIN SIZI	<u> </u>	#200	11.6	11.0	8.0	REMARKS:			
		ı									
D ₆₀	10.4962	10.1820	14.3828					0			
D ₃₀	2.2302	2.5464	4.9824								
D ₁₀			0.1477								
	COEFFICIENTS		TS								
C _C			11.68								
Cu			97.36								
O Source o	f Sample:	RRC1	Depth: 1	5-20	Sample Nu	ımber: RV	4				
□ Source o	f Sample:	RRC1	Depth: 2	20-25	Sample Nu	ımber: RV	5				

Sample Number: RV6

Project: Boulder City Bypass - US 93/US 95 Intersection

Client: Abbas Bafghi

Project No.: FL-02-06

% SILT

11.6

11.0

8.0

% CLAY

USCS

GP-GM

GP-GM

GP-GC

AASHTO

A-1-a

A-1-a

A-1-a

Figure

PL

24

24

22

LL

30

28

28

+3"

0.0

0.0

0.0

△ Source of Sample: RRC1

NEVADA

DEPARTMENT OF TRANSPORTATION

% GRAVEL

58.3

60.0

71.1

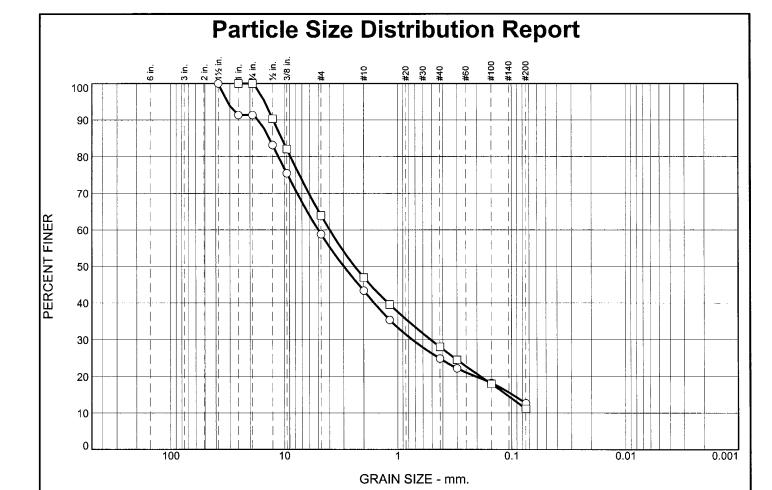
% SAND

30.1

29.0

20.9

Depth: 25-30



% SILT

12.7

11.2

SIEVE	PERCENT FINER						
inches size	0						
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 SIZ	Ē				
D ₆₀	5.0278	3.9903					
D ₃₀	0.7430	0.5107					
D ₁₀							
	COEFFICIENTS						
C _C							
C _c							
O Source of Sample: RRC1 Depth:							

% GRAVEL

41.2

36.0

SIEVE	PERCENT FINER						
number size	0						
#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					
		-					

REMARKS:
0

AASHTO

O poorly graded sand with silt and gravel

☐ poorly graded sand with silt and gravel

PL

LL

O Source of Sample: RRC1

+3"

0.0

0.0

☐ Source of Sample: RRC1

Depth: 5-6.1

% SAND

46.1

52.8

Depth: 20-20.5

Sample Number: A

Sample Number: D

NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: Abbas Bafghi

Project: Boulder City Bypass - US 93/US 95 Intersection

% CLAY

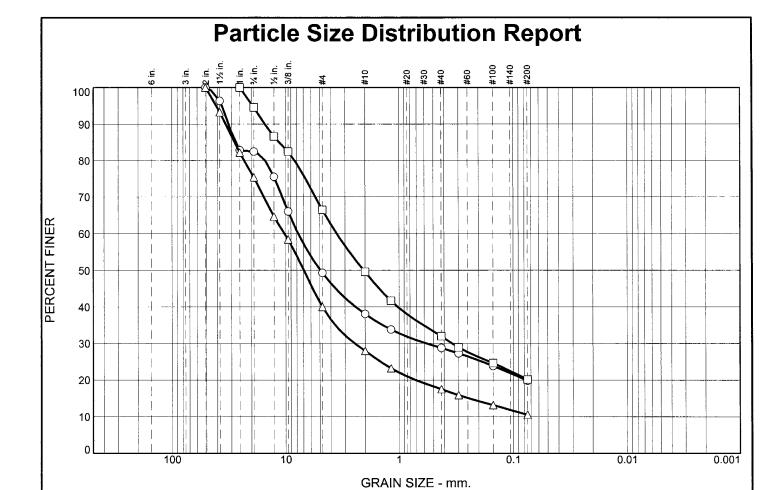
USCS

SP-SM

SP-SM

Material Description

Project No.: FL-02-06



SIEVE	PERCENT FINER				
inches size	0	Δ			
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		
\geq	GRAIN SIZE				
D ₆₀	7.7786	3.5478	10.2482		
D ₃₀	0.5703	0.3400	2.4580		
D ₁₀					
	COEFFICIENTS				
C _C					
C _c					
O Source of Sample: RRC2 Depth:					

% GRAVEL

50.7

33.5

60.0

SIEVE	PERCENT FINER				
number size	0		Δ		
#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		
		ļ			
4 So-	and lo Niveral	- DV1			

% SILT

19.9

20.2

10.5

□ silty sand with gravel
△ poorly graded gravel with silt and sand
REMARKS:

AASHTO

A-1-b

A-2-4(0)

A-1-a

PL

23

26

25

LL

29

34

31

○ Source of Sample: RRC2
 □ Source of Sample: RRC2
 △ Source of Sample: RRC2

+3"

0.0

0.0

0.0

Depth: 0-4 Depth: 4-9 Depth: 9-14

% SAND

29.4

46.3

29.5

Sample Number: RV1 Sample Number: RV2 Sample Number: RV3

NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: Abbas Bafghi

Project: Boulder City Bypass - US 93/US 95 Intersection

% CLAY

USCS

GM

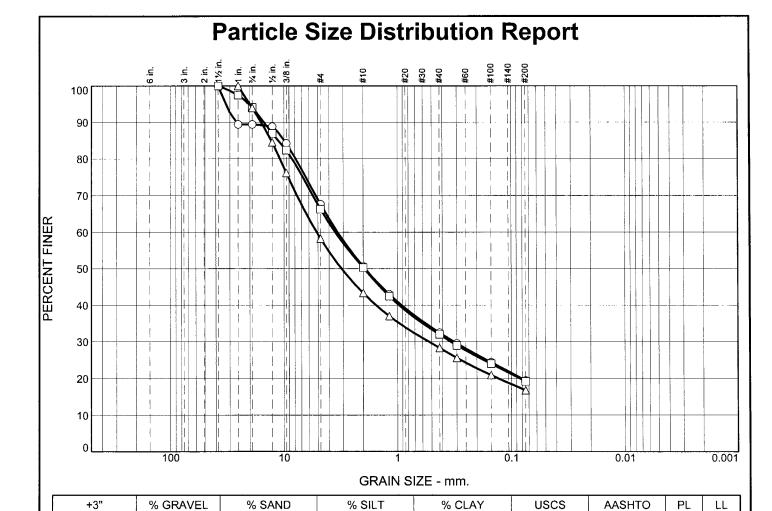
SM

GP-GM

Δ

Material Description
O silty gravel with sand

Project No.: FL-02-06



SIEVE	PERCENT FINER				
inches size	0	Δ			
1-1/2"	100.0	100.0			
1"	89.4	97.4	100.0		
3/4"	89.4	94.1	93.9		
1/2"	88.8	87.0	84.5		
3/8"	84.3	82.4	76.2		
	GRAIN SIZE				
D ₆₀	3.3541	3.5253	5.1368		
D ₃₀	0.3167	0.3384	0.5262		
D ₁₀					
	COEFFICIENTS				
C _c					
c _c					
Course of Complet DDC2 Donth					

32.3

33.7

41.7

SIEVE	PEI	PERCENT FINER			
number size	0		Δ		
#4	67.7	66.3	58.3		
#10	50.6	50.3	43.3		
#16	43.0	42.4	37.0		
#40	32.5	32.0	28.3		
#50	29.6	29.0	25.6		
#100	24.4	24.0	20.9		
#200	19.4	19.2	16.8		
1_10	Sample Nu	mber: RV	1		

19.4

19.2

16.8

Material Description
O silty sand with gravel
☐ silty sand with gravel
△ silty gravel with sand
DEMARKS.

A-2-4(0)

A-2-4(0)

A-2-7(0)

27

28

30

34

36

43

SM

SM

GM

REMARKS:		
0		
Δ		

O Source of Sample: RRC2

0.0

0.0

0.0

☐ Source of Sample: RRC2

△ Source of Sample: RRC2

Depth: 14-19

Depth: 19-24 Depth: 24-29

48.3

47.1

41.5

Sample Number: RV4

Sample Number: RV5 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 100 90 80 70 PERCENT FINER 60 50 40 30 20 10

١.
Ì

	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	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
Δ	0.0	48.1	43.0	8.	.9	GP-GM	A-2-7(0)	30	49

SIEVE	PERCENT FINER			
inches size	0		Δ	
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 C _u		3.71	3.48	
Cu		73.30	71.86	
o Course of Courseles DDCO Double (

100

R	SIEVE	PEI	RCENT FIN	IER
\triangle	number size	0		Δ
100.0	#4	54.2	49.2	51.9
95.8	#10	40.1	33.3	34.9
93.0	#16	34.1	27.3	28.3
82.2	#40	25.3	19.2	19.8
73.4	#50	22.7	16.8	17.3
	#100	18.2	12.7	13.7
	#200	14.1	8.9	8.9
6.2557				
1.3769				
0.0871				
3				
3.48				
71.86				
Depth: 29-34 Sample Number: RV7				

o silty gravel with sand	
□ poorly graded gravel with silt and sand	
△ poorly graded gravel with silt and sand	

Material Description

0.01

0.001

REMARKS:	
0	
 	
Δ	
1	

- Source of Sample: RRC2
- □ Source of Sample: RRC2
- Depth: 34-39 △ Source of Sample: RRC2 Depth: 39-44

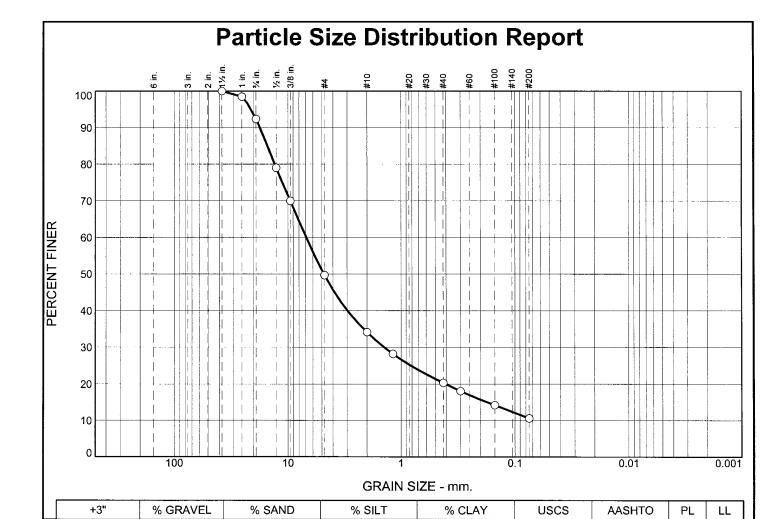
TRANSPORTATION

Sample Number: RV8 Sample Number: RV9

NEVADA DEPARTMENT OF Client: Abbas Bafghi

Project: Boulder City Bypass - US 93/US 95 Intersection

Project No.: FL-02-06



0.0	number size #4	0		o poorly graded gravel with silt and sand
i i	#4	40.7		
3.4		49.7		
	#10	34.1		
2.3	#16	28.2		
2.0				
0.0				
		I		
CDAIN SIZE	#200	10.6		[DEMINIO
				REMARKS:
776				0
087				
COEFFICIENTS				
7700	GRAIN SIZE 776 087 COEFFICIENTS	GRAIN SIZE 776 087 COEFFICIENTS	GRAIN SIZE 776 COEFFICIENTS #50 #100 14.2 #200 10.6	GRAIN SIZE 776 087 COEFFICIENTS #50 #100 14.2 #200 10.6

Client: Abbas Bafghi

Project No.: FL-02-06

Project: Boulder City Bypass - US 93/US 95 Intersection

10.6

GP-GM

A-2-7(0)

Figure

30

48

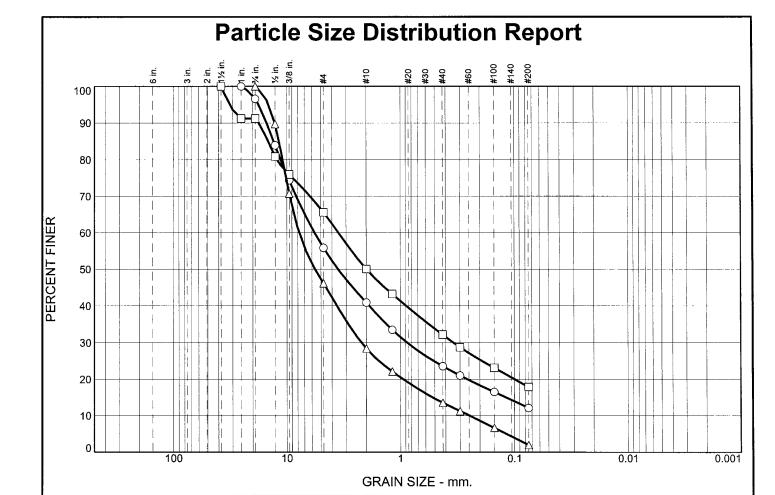
0.0

50.3

NEVADA

DEPARTMENT OF TRANSPORTATION

39.1



\triangle 0.0		53.9	44.1			2.0		GW
SIEVE	PEI	RCENT FIN	IER	SIEVE	PEI	RCENT FIN	NER	Material Description
inches size	0		Δ	number size	0		Δ	o well-graded gravel with silt and sand
1-1/2" 1" 3/4" 1/2" 3/8"	100.0 96.6 83.9 74.4	100.0 91.2 91.2 80.8 76.0	100.0 89.7 70.7	#4 #10 #16 #40 #50 #100 #200	55.8 40.9 33.5 23.5 21.0 16.5 12.1	65.6 50.0 43.2 32.1 28.7 23.1 17.8	46.1 28.4 22.1 13.5 11.3 6.7 2.0	□ silty sand with gravel △ well-graded gravel with sand
	(GRAIN SIZI	E				1	REMARKS:
D ₆₀	5.6884	3.5026	7.7542					
D ₃₀	0.8765	0.3439	2.2109					
D ₁₀			0.2458					
	COEFFICIENTS							
C _C			2.56					
C _u			31.54					
 Source of 	f Sample:	RRC2	Depth: 2	9-29.5	Sample 1	Number: F		·

% SILT

12.1

17.8

NEVADA
DEPARTMENT OF
TRANSPORTATION

☐ Source of Sample: RRC2

△ Source of Sample: RRC2

+3"

0.0

0.0

% GRAVEL

44.2

34.4

% SAND

43.7

47.8

Depth: 34-34.5

Depth: 39-39.3

Client: Abbas Bafghi

Project: Boulder City Bypass - US 93/US 95 Intersection

% CLAY

USCS

GW-GM

SM

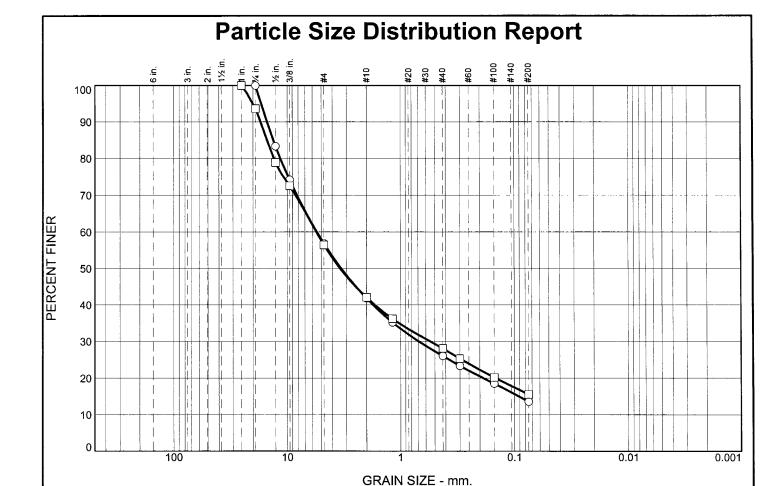
AASHTO

LL

Project No.: FL-02-06

Sample Number: G

Sample Number: H



SIEVE	PEI	RCENT FIN	IER
inches size	0		
1"		100.0	
3/4"	100.0	93.6	
1/2"	83.3	78.9	
3/8"	74.2	72.5	
$\bigg\} \bigg / \bigg \rangle$	(SRAIN SIZI	
D ₆₀	5.4843	5.5396	
D ₃₀	0.6914	0.5484	
D ₁₀			
	CC	DEFFICIEN	TS
C C a			
C., 1			

% GRAVEL

43.1

43.5

SIEVE	PE	RCENT FIN	IER
number size	0		
#4	56.9	56.5	
#10	41.8	42.0	
#16	35.2	36.2	
#40	26.0	28.1	
#50	23.3	25.3	
#100	18.5	20.2	
#200	13.6	15.5	
		:	
l-45 S	Sample Nu	mber: I	

% SILT

13.6

15.5

REMARKS:	
0	
П	

AASHTO

A-2-6(0)

A-2-4(0)

PL

27

22

LL

39

30

O Source of Sample: RRC2

+3"

0.0

0.0

Depth: 44-45

% SAND

43.3

41.0

Sample Number: I Sample Number: J

☐ Source of Sample: RRC2

Depth: 49-51.5

Client: Abbas Bafghi

Project: Boulder City Bypass - US 93/US 95 Intersection

% CLAY

USCS

SM

GC

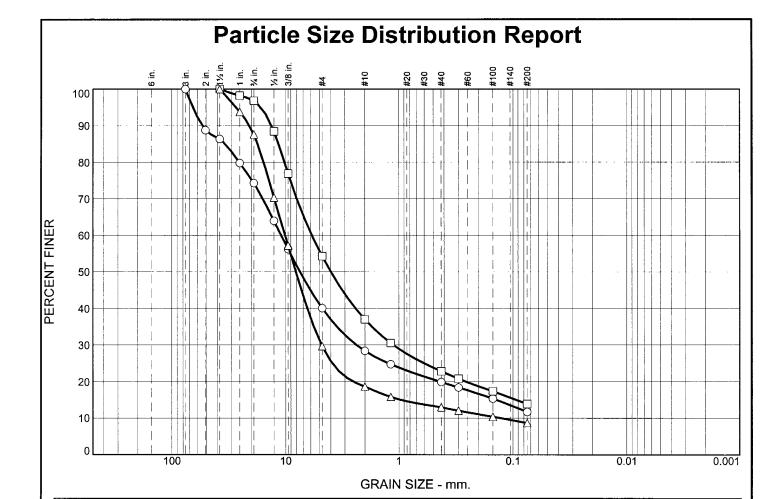
Material Description
O silty sand with gravel

□ clayey gravel with sand

Project No.: FL-02-06

Figure

NEVADA
DEPARTMENT OF
TRANSPORTATION



\vdash											 		
Δ	0.0		70.3	21.0)			8.7		GP-GM	A-2-7(0)	42	61
١٢	SIEVE	PE	RCENT FIN	IER	SIE	/E	PE	RCENT FIN	IER	Material Des			
$\ \ $	inches size	0		Δ	numt		0		Δ	O poorly grad	ed gravel with si	lt and sa	nd
	3" 2" 1 1/2" 1" 3/4" 1/2" 3/8"	100.0 88.8 86.4 79.8 74.3 64.0 56.2	100.0 98.2 96.8 88.4 76.9	100.0 93.8 87.6 70.4 57.2	#2 #1 #1 #4 #5 #10	0 6 0 0 0	40.1 28.4 24.8 19.9 18.4 15.4	54.3 37.1 30.5 22.9 20.8 17.3 13.9	29.7 18.6 15.8 13.0 12.0 10.4 8.7	□ silty gravel	with sand ed gravel with si	lt and sa	nd
	$\geq \leq$	(GRAIN SIZI	=						REMARKS:			
	D ₆₀	10.9712	5.8545	10.1338		1				0			
	D ₃₀	2.3641	1.1191	4.8044									
	D ₁₀			0.1265									
	$\geq <$	CC	DEFFICIEN	TS									
	c_c			18.01						Δ			
	C _u			80.12									
	Source o	f Sample:	RRC3	Depth: 0	-4.5	S	ample Nur	nber: RV1		·	·		

Sample Number: RV2

Client: Abbas Bafghi

Project No.: FL-02-06

Sample Number: RV3

Project: Boulder City Bypass - US 93/US 95 Intersection

% SILT

11.7

13.9

% CLAY

USCS

GP-GM

GM

AASHTO

A-1-a

A-2-7(0)

Figure

PL

25

34

LL

31

47

+3"

0.0

0.0

□ Source of Sample: RRC3

△ Source of Sample: RRC3

NEVADA

DEPARTMENT OF TRANSPORTATION

% GRAVEL

59.9

45.7

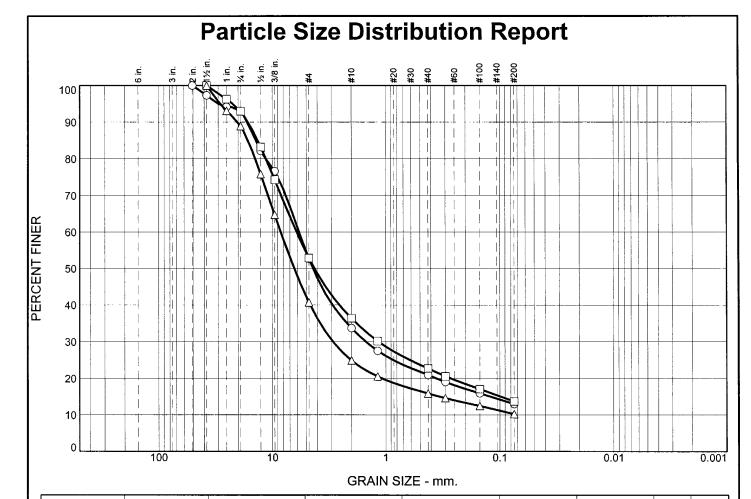
% SAND

28.4

40.4

Depth: 4.5-9.5

Depth: 9.5-14.5



L		+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
	0	0.0	47.4	39.6	13	13.0		A-2-7(0)	38	58
		0.0	47.1	39.2	13.7		GM	A-2-7(0)	37	53
	Δ	0.0	59.3	30.5	10		GP-GM	A-2-5(0)	41	50

SIEVE	PEI	RCENT FIN	IER .		
inches size	0		Δ		
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		
L					
	(E			
D ₆₀	5.8007	6.0892	8.4193		
D ₃₀	1.4945	1.1548	2.9113		
D ₁₀					
	CC	COEFFICIENT			
C _C					
C _u					
o Course o	£ C 1	DDC2	Donth.		

number size □ △ #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	
#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	
#16 27.5 30.2 20.5 #40 21.0 22.7 15.9	
#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	
5 10 5 Samula Number DVA	

REMARKS:	
0	
_	
Δ	

△ poorly graded gravel with silt and sand

Material Description
O silty gravel with sand

□ silty gravel with sand

○ Source of Sample: RRC3
 □ Source of Sample: RRC3
 △ Source of Sample: RRC3

Depth: 14.5-19.5 Depth: 19.5-24.5 Depth: 24.5-29.5

Sample Number: RV4 Sample Number: RV5 Sample Number: RV6

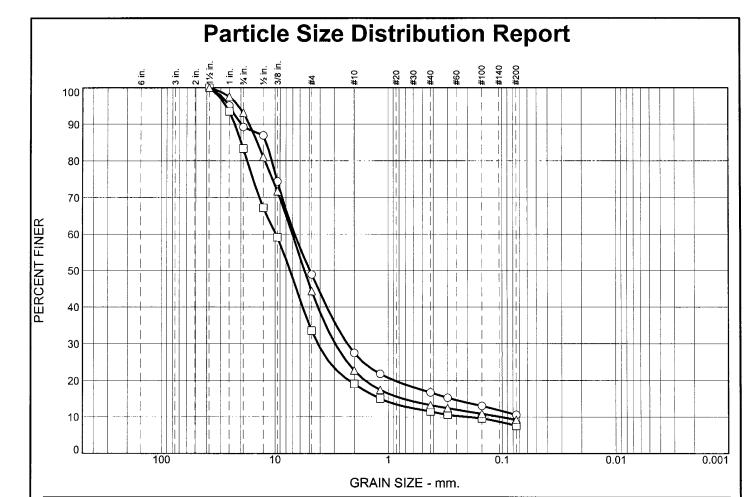
NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: Abbas Bafghi

Project: Boulder City Bypass - US 93/US 95 Intersection

Project No.: FL-02-06

iaure



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	uscs	AASHTO	PL	LL
0	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
Δ	0.0	55.7	35.1	9	.2	GP-GM	A-2-6(0)	26	38
Г	SIEVE	PERCENT FIN	FR SIEV	VE PERC	FNT FINER	Material Des	cription		

SIEVE	PERCENT FINER		SIEVE PERCE			IER	Material Description	
inches size	0		Δ	number size	0		Δ	o poorly graded gravel with silt and sand
1-1/2"	100.0	100.0	100.0	#4	48.9	33.5	44.3]
1"	95.1	93.5	97.5	#10	27.5	19.0	22.7	☐ poorly graded gravel with silt and sand
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	A monthly ameded amount with aits and rend
3/8"	74.4	59.1	71.7	#50	15.2	10.6	12.4	△ poorly graded gravel with silt and sand
				#100	13.0	9.6	10.9	
				#200	10.6	7.6	9.2	
		BRAIN SIZI	Ξ					REMARKS:
D ₆₀	6.7296	9.8252	7.0338					
D ₃₀	2.2994	4.2010	2.9404					
D ₁₀		0.1960	0.1034					
	COEFFICIENTS		TS	1				
C _C		9.16	11.89					
C _u		50.13	68.03					

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DEPARTMENT OF
TRANSPORTATION

☐ Source of Sample: RRC3

△ Source of Sample: RRC3

Client: Abbas Bafghi

Depth: 34.5-39.5

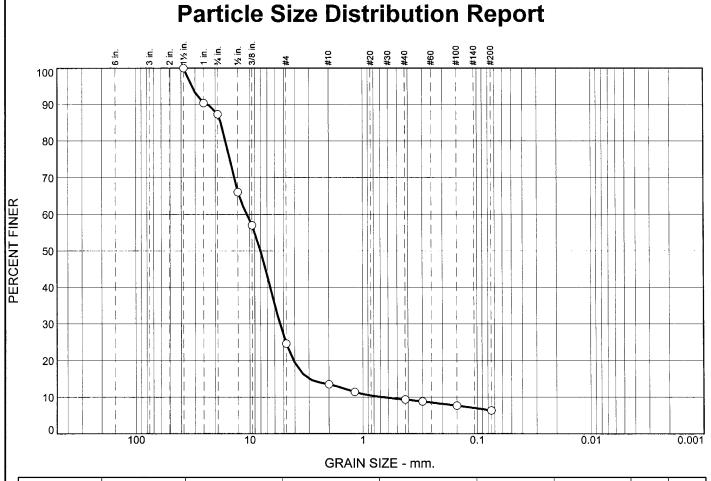
Depth: 39.5-44.5

Project: Boulder City Bypass - US 93/US 95 Intersection

Sample Number: RV8

Sample Number: RV9

Project No.: FL-02-06



	+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
l									
Г									

ı	SIEVE	PEI	RCENT FIN	IER		SIEVE	PE	RCENT FIN	ER
ı	inches size	0				number size	0		
ı	1-1/2"	100.0				#4	24.6		
ı	1"	90.4				#10	13.6		
ı	3/4"	87.3				#16	11.4		
ı	1/2"	66.1			Н	#40	9.4		
ı	3/8"	57.0			Ш	#50	8.8		
1						#100	7.7		
1						#200	6.4		
١		(GRAIN SIZE	E	.				
	D ₆₀	10.5568							
1	D ₃₀	5.3873							
I	D ₁₀	0.6651							
ı		cc	DEFFICIEN	TS					
1	C _C	4.13							
۱	Cu	15.87			L				
1	O Source o	f Sample:	RRC3	Depth:	44.	5-48	Sample N	Jumber: R	V10

Ì	DEMARKO
	I REMARKS.
	REMARKS:

O poorly graded gravel with silt and sand

Material Description

○ Source of Sample: RRC3

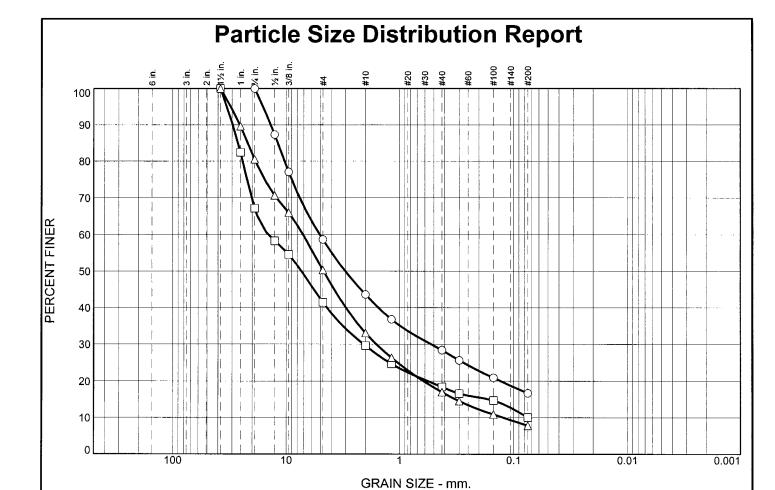
Depth: 44.5-48

Sample Number: RV10

NEVADA DEPARTMENT OF TRANSPORTATION Client: Abbas Bafghi

Project: Boulder City Bypass - US 93/US 95 Intersection

Project No.: FL-02-06



Δ	0.0 49.7 42.5			7.8			GW-GC	A-2-6(0)	23	35			
$I \Gamma$	SIEVE PERCENT FINER			SIEVE PERCENT FINER				Material Description					
	inches size	0		Δ	number size		0		Δ	o silty sand with gravel			
	1-1/2"		100.0	100.0	#4		58.6	41.5	50.3				
Ш	3/4"	100.0	82.4 67.2	89.6 80.5	#1	-	43.6 36.8	29.6 24.7	33.1 26.3	□ poorly grad	ed gravel with si	lt and sa	nd
	1/2"	87.3	58.3	70.7	#4		28.4	18.4	17.0				
	3/8"	77.1	54.6	66.0	#5		25.7	16.6	14.5	△ well-graded	gravel with clay	and san	.d
П					#10		20.9 16.7	14.7 10.0	10.9 7.8				
			GRAIN SIZI	Ε	"20	,,,	10.7	10.0	7.0	REMARKS:			
	D ₆₀	5.0613	14.5220	7.1027						0			
Ш	D ₃₀	0.5267	2.0823	1.6078									
	D ₁₀			0.1235									
	$\geq <$	COEFFICIENTS											
	C _C			2.95						Δ			
	Cu			57.51									
C	○ Source of Sample: RRC3 Depth: 4.				.5-6.0		Sample N	umber: A					

Sample Number: B

Project: Boulder City Bypass - US 93/US 95 Intersection

Sample Number: C

Client: Abbas Bafghi

Project No.: FL-02-06

% SILT

16.7

10.0

% CLAY

USCS

SM

GP-GM

AASHTO

A-2-7(0)

A-2-6(0)

Figure

PL

51

28

LL

67

40

+3"

0.0

0.0

□ Source of Sample: RRC3

 \triangle Source of Sample: RRC3

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DEPARTMENT OF TRANSPORTATION

% GRAVEL

41.4

58.5

% SAND

41.9

31.5

Depth: 9.5-10.5

Depth: 14.5-16

Particle Size Distribution Report 100 90 80 70 PERCENT FINER 60 50 40 30 20 10 0.001 100 0.01

GRAIN	SIZE -	mm.
-------	--------	-----

	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
C		30.5	62.1	7.4		SW-SC			
	0.0	48.8	50.2	1.0		SW			
Δ	0.0	44.7	46.3	9	.0	SW-SC	A-2-4(0)	22	30

SIEVE	PEI	RCENT FIN	IER		
inches size	0		Δ		
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		
:					
	C	SRAIN SIZI	Ξ		
D ₆₀	3.2330	6.7215	5.8525		
D ₃₀	0.9297	1.5740	0.9468		
D ₁₀	0.1417	0.2876	0.0905		
	CC	COEFFICIENTS			
Cc	1.89	1.28	1.69		
C _c	22.81	23.37	64.66		

SIEVE	PER	RCENT FIN	IER
number size	0		Δ
#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
:			
) 5 20 2	0 1	NI1	<u> </u>

o well-graded sand with clay and gravel	
□ well-graded sand	
△ well-graded sand with clay and gravel	

Material Description

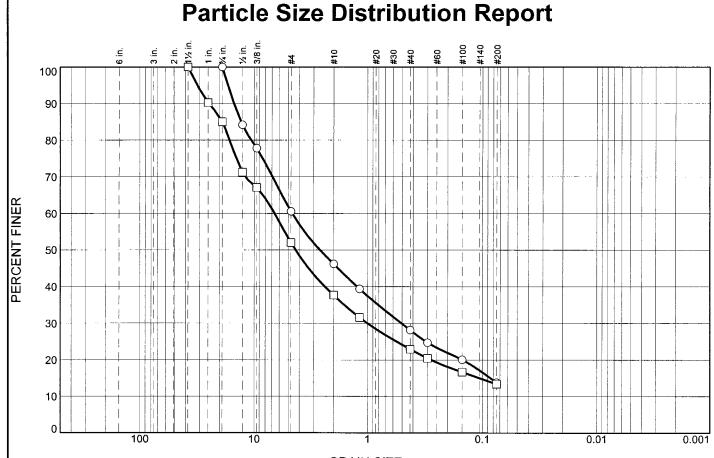
REMARKS:		
0		
l ₋		
_		

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

NEVADA DEPARTMENT OF TRANSPORTATION Client: Abbas Bafghi

Project: Boulder City Bypass - US 93/US 95 Intersection

Project No.: FL-02-06



GR/	A INI	CIT	7 🗆	mn	
GK	VIIV-	OIZ	<u>'</u>	- mm	1.

+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
	39.4	46.8	13.8		SM	A-1-a	20	23
11 00	48.0	38.6	13	13.4		A-1-a	22	28

SIEVE	PEI	IER	
inches size	0		
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 SIZI	E
D ₆₀	4.6316	6.6201	
D ₃₀	0.5050	1.0047	
D ₁₀			
	CC	DEFFICIEN	TS
C _c			
Cu			

SIEVE	PERCENT FINER						
number size	0						
#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					
1							
5 41 Samula Number, H							

[REMARKS:
	0
1	

Material Description

○ silty sand with gravel

☐ silty, clayey gravel with sand

O Source of Sample: RRC3

□ Source of Sample: RRC3

Depth: 39.5-41

Depth: 44.5-45.5

Sample Number: H

Sample Number: I

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 100 90 80 70 40 30 20 10

GRAIN	SIZE -	mm.
-------	--------	-----

0.1

ı	Γ	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
İ		0.0	85.5	8.9	7- 1 7 1		GP-GC	A-1-a	21	27
		0.0	62.7	27.4	9.9		GP-GM	A-1-a	25	30
ſ	Δ	0.0	73.8	20.2	6	.0	GP-GM	A-1-a	25	28

SIEVE	PERCENT FINER					
inches size	0		Δ			
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			
	C	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			
	cc	TS				
C _C	4.00	11.22	7.76			
C _c	23.37	134.02	46.29			
Course of Communication DDC4 Double						

100

SIEVE	PEI	RCENT FIN	IER
number size	0		Δ
#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
İ			
1			
4 521	mnle Numl	per: PV1	

□ poorly graded gravel with silt and sand △ poorly graded gravel with silt and sand	
DEMADKS:	

O poorly graded gravel with siltyclay

Material Description

0.01

0.001

REMARKS:		
0		
Δ		

○ Source of Sample: RRC4□ Source of Sample: RRC4

Depth: 0-4 Depth: 4-9

10

Sample Number: RV1 Sample Number: RV2

△ Source of Sample: RRC4

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

Particle Size Distribution Report 100 90 80 70 PERCENT FINER 60 50 40 30 20 10 100 0.1 0.01 0.001

	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
С	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
Δ	0.0	52.0	38.2	9.8		GP-GC	A-1-a	21	27

GRAIN SIZE - mm.

SIEVE	PEI	RCENT FIN	IER	SIEVE	PE	RCENT FIN	NER	Material Description
inches size	0		Δ	number size	0		Δ	o poorly graded gravel with silt and sand
2"	100.0	100.0	100.0	#4	34.7	24.5	48.0	
1-1/2"	98.1	97.8	98.1	#10	21.2	11.2	27.2	☐ well-graded gravel with sand
1"	89.6	88.0	93.6	#16	17.7	9.2	22.2	
3/4"	83.5	83.8	91.1	#40	13.8	7.5	16.9	A manufactured and amoved with either and and
1/2"	67.1	68.4	82.0	#50	12.5	7.0	15.4	△ poorly graded gravel with siltyclay and sand
3/8"	56.5	51.8	72.5	#100	10.3	6.0	12.8	
			_	#200	7.7	4.8	9.8	
		SRAIN SIZ	=					REMARKS:
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		TS					
C _c	10.33	1.90	10.59					
Cu	77.25	6.95	85.42					
O Source o	O Source of Sample: RRC4 Depth: 14-19			14-19	Sample Nu	ımber: RV	4	
☐ Source of Sample: RRC4 Depth: 19-24					Sample Nu	ımber: RV	5	

NEVADA
DEPARTMENT OF
TRANSPORTATION

Depth: 24-29

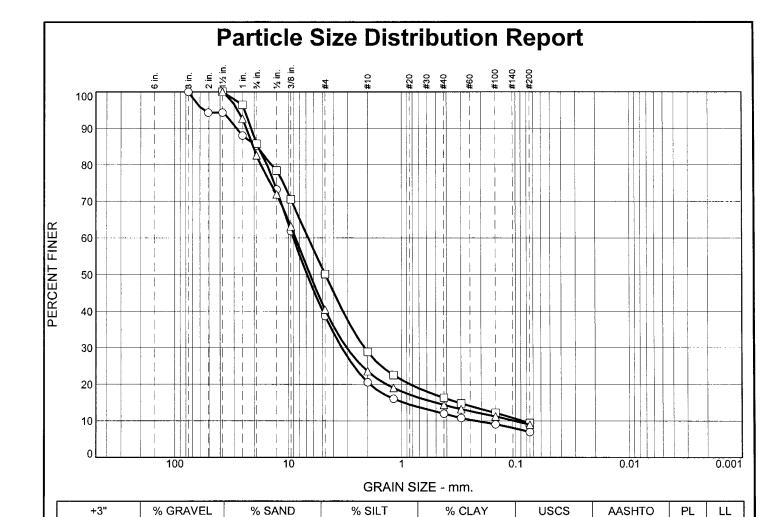
△ Source of Sample: RRC4

Client: Abbas Bafghi

Sample Number: RV6

Project: Boulder City Bypass - US 93/US 95 Intersection

Project No.: FL-02-06



SIEVE	PEI	S		
inches size	0		Δ	nı
3"	100.0			
2" 1 1/2"	94.3	100.0	100.0	1 7
1"	94.3 88.0	96.4	92.6	,
3/4"	85.2	85.8	82.6	,
1/2"	73.2	78.4	71.9	1 7
3/8"	61.8	70.5	63.1	#
L				#
	(GRAIN SIZI	E	
D ₆₀	9.0809	6.7004	8.6730	
D ₃₀	3.3767	2.1295	3.0514	
D ₁₀	0.2225	0.0865	0.1018	
	cc	DEFFICIEN	TS	
C _c	5.64	7.83	10.54	
C _c C _u	40.81	77.48	85.17	
O Source o	f Sample:	RRC4	Depth:	29-34

61.3

49.9

59.6

SIEVE	PERCENT FINER							
number size	0		Δ					
#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					
			i i					
ŀ								
9-34	Sample Nu	mber: RV	7					

7.0

9.4

9.0

☐ poorly graded gravel with siltyclay and sand
△ poorly graded gravel with siltyclay and sand
REMARKS:
0

A-1-a

A-1-a

A-1-a

o poorly graded gravel with siltyclay and sand

21

20

21

25

25

26

GP-GC

GP-GC

GP-GC

Δ

Material Description

○ Source of Sample: RRC4
 □ Source of Sample: RRC4
 △ Source of Sample: RRC4

0.0

0.0

0.0

Depth: 34-39 Depth: 39-44

31.7

40.7

31.4

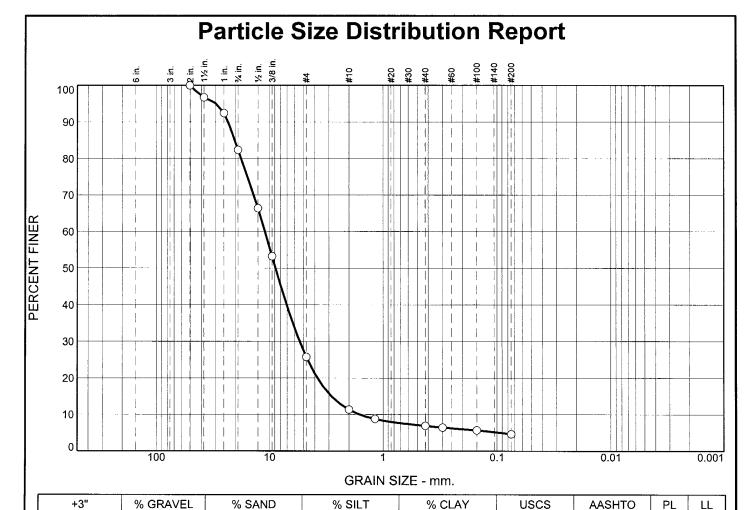
Sample Number: RV8
Sample Number: RV8

NEVADA DEPARTMENT OF TRANSPORTATION

Client: Abbas Bafghi

Project: Boulder City Bypass - US 93/US 95 Intersection

Project No.: FL-02-06



ш		1 *				, ,	74 0	1	1	–	
	0.0 74.2		21.1			4.7	GW	A-1-a	21	26	
L			- · <u>-</u> ·								
	SIEVE	SIEVE PERCENT FINER		IER	SIEVE	PER	CENT FINER	Material De	•		
l	inches size	0			number size	0		O well-grade	O well-graded gravel with sand		
ı	2"	100.0			#4	25.8		71			

inches size	0		
2"	100.0		
1-1/2"	96.7		
1"	92.4		
3/4"	82.4		
1/2"	66.4		
3/8"	53.2		
	(GRAIN SIZI	Ε
D ₆₀	11.0116		
D ₃₀	5.4232		
D ₁₀	1.6086		
	CC	PEFFICIEN	TS
c _c	1.66		
C _c	6.85		

number size	0		
#4	25.8		
#10	11.3		
#16	8.8		
#40	6.9		
#50	6.5		
#100	5.7		
#200	4.7		
}			
4.40	1 N	1 D37	1.0

REMARKS:		
0		

O Source of Sample: RRC4

Depth: 44-49

Sample Number: RV10

NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: Abbas Bafghi

Project: Boulder City Bypass - US 93/US 95 Intersection

Project No.: FL-02-06

L	+3"	%	GRAVEL	% SAN	1D	% SILT		CLAY	USCS	AASHTO	PL	L,L
0	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
Δ	0.0		31.1	63.4		5.5			SW-SM	A-1-a	NP	21
lſ	SIEVE PERCENT FINER			IER	SIEVE	PEI	RCENT FIN	NER	Material Des		•	
	inches	0		Δ	number size	0		Δ	○ poorly grad	ed gravel with si	lt and sa	nd
	size		1		size		1		1 1			
	1-1/2"	100.0			#4	49.4	62.2	68.9				

GRAIN SIZE - mm.

inches size	0		Δ
1-1/2"	100.0		
1"	85.7	100.0	
3/4"	82.8	95.8	100.0
1/2"	71.2	89.3	93.2
3/8"	61.6	83.1	87.2
	(SRAIN SIZI	Ē
D ₆₀	8.9582	4.4196	3.3767
D ₃₀	0.9951	1.0414	0.7676
D ₁₀		0.1155	0.1622
	CC	EFFICIEN	TS
Cc		2.13	1.08
С _с С _и		38.27	20.82

SIEVE	PEI	RCENT FIN	IER
number size	0		Δ
#4	49.4	62.2	68.9
#10	36.9	39.8	47.8
#16	31.4	31.6	37.6
#40	24.0	19.9	20.4
#50	21.6	16.5	15.6
#100	18.3	11.6	9.5
#200	11.6	7.5	5.5
5.5	1 3 Y	1 4	L

REMARKS:	
0	
Δ	

 \triangle well-graded sand with silt and gravel

○ Source of Sample: RRC4□ Source of Sample: RRC4

Depth: 4-5.5 Depth: 9-10.5 Sample Number: A Sample Number: B

△ Source of Sample: RRC4

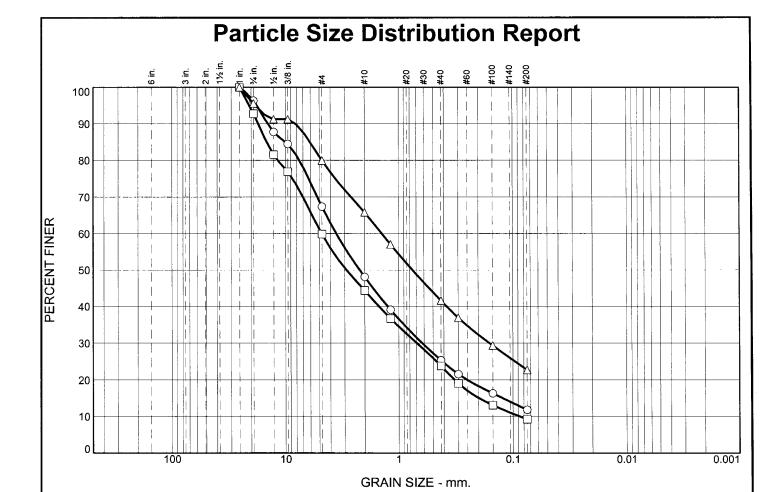
Depth: 14-15.5

Sample Number: C

NEVADA DEPARTMENT OF TRANSPORTATION Client: Abbas Bafghi

Project: Boulder City Bypass - US 93/US 95 Intersection

Project No.: FL-02-06



	0.0		20.0	57.3	3			22.7		SC-SM	A-2-4(0)	22	29
Г	SIEVE	E PERCENT FINER		PERCENT FINER SIEVE PERCENT FINER					Material Description				
	inches size	0		Δ	numb size		0		Δ	o poorly grad	ed sand with silt	and grav	vel
	1" 3/4" 1/2" 3/8"	100.0 96.3 87.8 84.5	100.0 92.8 81.6 76.9	100.0 95.6 91.2 91.2	#10 #10 #40 #50 #10 #20	0 6 0 0	67.4 48.1 39.1 25.3 21.6 16.3 11.8	59.8 44.4 36.7 23.8 19.0 13.1 9.2	80.0 65.8 57.0 41.6 36.9 29.4 22.7	☐ well-graded sand with silt and gravel △ silty, clayey sand with gravel			1
		(GRAIN SIZI	Ε	#20	.0	11.6	9.2	22.7	REMARKS.			
	D ₆₀	3.5510	4.7814	1.4078	İ					0			
	D ₃₀	0.6211	0.6929	0.1601									
	D ₁₀		0.0874										
	$\geq \leq$	COEFFICIENTS											
	Cc		1.15										
ΙL	Cu		54.74										
0	Source o	f Sample:	RRC4	Depth: 1	9-20.5		Sample N	lumber: D					

Sample Number: E

Sample Number: G

Project: Boulder City Bypass - US 93/US 95 Intersection

Client: Abbas Bafghi

Project No.: FL-02-06

% SILT

11.8

9.2

% CLAY

USCS

SP-SM

SW-SM

AASHTO

A-1-a

A-1-a

Figure

+3"

0.0

0.0

☐ Source of Sample: RRC4

△ Source of Sample: RRC4

NEVADA

DEPARTMENT OF TRANSPORTATION

% GRAVEL

32.6

40.2

% SAND

55.6

50.6

Depth: 24-25.5

Depth: 34-34.3

LL

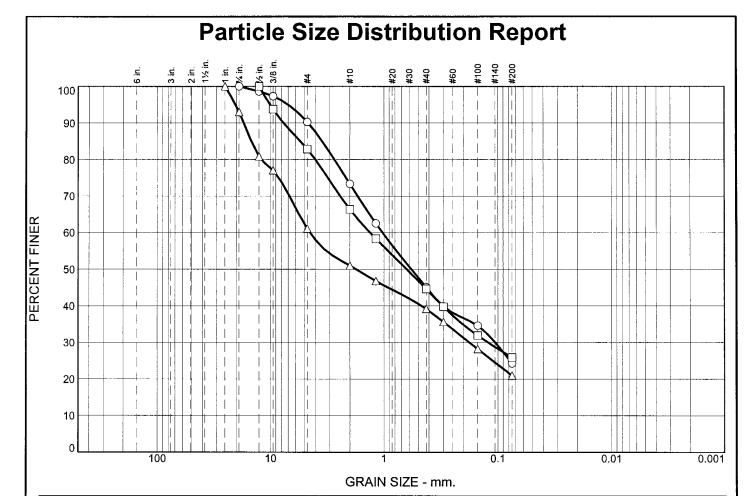
23

20

PL

21

NP



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	uscs	AASHTO	PL	LL
0	0.0	9.8	65.9	24	1.3	SC	A-2-4(0)	22	30
	0.0	17.1	57.0	25	25.9		A-2-4(0)	17	24
Δ	0.0	38.9	40.1	21	.0	SM	A-1-b	18	19

SIEVE	PEI	PERCENT FINER					
inches size	0		Δ				
1"			100.0				
3/4"	100.0		93.0				
1/2"	98.6	100.0	80.9				
3/8"	97.3	93.7	77.1				
	(BRAIN SIZI	=				
D ₆₀	1.0298	1.3261	4.5065				
D ₃₀	0.1052	0.1219	0.1775				
D ₁₀							
	cc	EFFICIEN	TS				
C _c							
1 .							

SIEVE	PEI	RCENT FIN	IER
number size	0		Δ
#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

☐ silty, clayey sand with gravel
△ silty sand with gravel
REMARKS:
0

Material Description O clayey sand

O Source of Sample: RRC4

△ Source of Sample: RRC4

Depth: 39-39.3 ☐ Source of Sample: RRC4 Depth: 44-44.3

Depth: 49-50.5

Sample Number: H Sample Number: I Sample Number: J

NEVADA DEPARTMENT OF TRANSPORTATION Client: Abbas Bafghi

Project: Boulder City Bypass - US 93/US 95 Intersection

Δ

Project No.: FL-02-06

	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	44.7	46.7	8	3.6	SW-SM			
	0.0	44.1	42.2	9.3	4.4	GM			
Δ	0.0	22.1	58.0	15.6	4.3	SM			
Ι_				-					

GRAIN SIZE - mm.

SIEVE	PERCENT FINER		SIEVE	PE	RCENT FIN	IER	Material Description	
inches size	0		Δ	number size	0		Δ	O Well-graded sand with silt and gravel
1.5	100.0			#4	55.3	55.9	77.9	
1	93.1	100.0		#10	38.2	40.7	55.0	☐ Silty gravel with sand
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	△ Silty sand with gravel
3/8	71.8	77.2	95.8	#50	17.5		252	A Only Sand with graver
				#100	12.4	18.2	25.2	
	-	RAIN SIZI		#200	8.6	13.7	19.9	DEMARKO
		JIVAIIV SIZI						REMARKS:
D ₆₀	5.8471	5.3807	2.5098					0
D ₃₀	1.1253	0.6545	0.2692					
D ₁₀	0.0988	0.0315	0.0266					
	CC	EFFICIEN	TS					
C _c	2.19	2.53	1.08					Δ
Cu	59.20	170.86	94.23					
O Source of	f Sample:	BCB1	Depth: 2	2.0-3.5'	Sample N	lumber: A		

NEVADA
DEPARTMENT OF
TRANSPORTATION

☐ Source of Sample: BCB1

△ Source of Sample: BCB1

Client: Abbas Bafghi

Sample Number: D

Sample Number: F

Depth: 12.0-12.5'

Depth: 20.0-20.5'

Project: Boulder City Bypass - US 93/US 95 Intersection

Project No.: FL-02-06

GRAIN SIZE - m	nm
----------------	----

	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	33.0	54.3	12		SM			
	0.0	30.2	56.0	13	.8	SM			
Δ	0.0	19.3	66.3	14	.4	SM		† · · · · ·	

SIEVE	PEI	RCENT FIN	IER	
inches size	0		Δ	
3/4	100.0	100.0	100.0	
1/2	85.5	95.1	93.4	
3/8	82.1	88.4	89.3	
	-	SRAIN SIZI	-	
	,	SKAIN SIZI	=	
D ₆₀	3.5152	3.1593	1.0915	
D ₆₀				
l .	3.5152	3.1593	1.0915	
D ₃₀	3.5152 0.6068	3.1593	1.0915 0.3475	
D ₃₀	3.5152 0.6068	3.1593 0.5398	1.0915 0.3475	

SIEVE	PEI	RCENT FIN	IER
number size	0		Δ
#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

☐ Silty sand with gravel
△ Silty sand with gravel
REMARKS:
REMARKS:
REMARKS:
REMARKS: ○
0

Material Description

O Silty sand with gravel

○ Source of Sample: BCB1□ Source of Sample: BCB1

Depth: 25.0-25.5' Depth: 35.0-35.45' Sample Number: G
Sample Number: H

△ Source of Sample: BCB1

Depth: 70.0-70.3' Sample Number: L

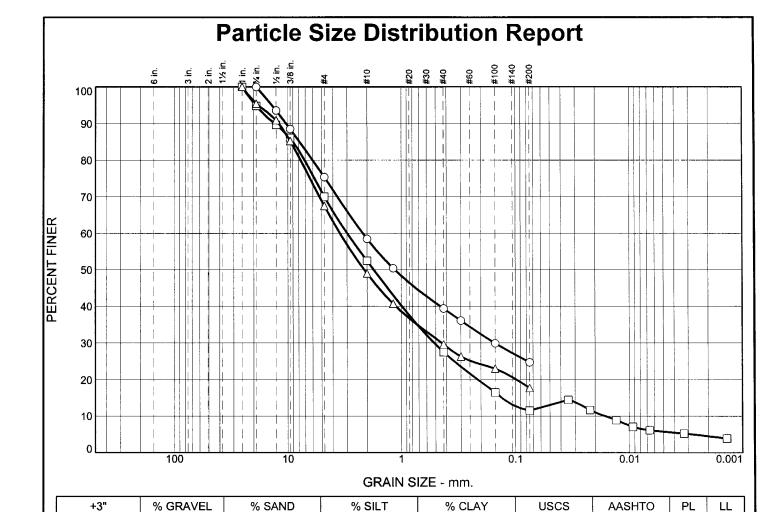
NEVADA
DEPARTMENT OF
TRANSPORTATION

Client: Mark Salazar

Project: Boulder City Bypass - US 93/US 95 Intersection

Δ

Project No.: FL-02-06



0.0		32.5	49.7	7		17.8		SM
SIEVE	PE	RCENT FIN	IER	SIEVE	PE	RCENT FIN	NER	Material Description
inches size	0		Δ	number size	0		Δ	O Silty sand with gravel
1 3/4 1/2 3/8	100.0 93.5 88.5	100.0 94.8 89.7 86.1	100.0 95.4 90.9 85.3	#4 #10 #16 #40 #50 #100	75.4 58.5 50.4 39.4 36.1 29.9	70.1 52.4 27.5	67.5 48.9 40.7 29.6 26.3 23.0	□ Poorly graded sand with silt and gravel △ Silty sand and gravel
		GRAIN SIZI	E	#200	24.8	11.5	17.8	REMARKS:
D ₆₀	2.1790	2.9902	3.4606					0
D ₃₀	0.1511	0.5140	0.4406					
D ₁₀		0.0162						
><	C	DEFFICIEN	TS					
C _C		5.44 184.02						
	of Sample:		Depth: 5	5.0-6.5'	Sample N	l Number: A		

Sample Number: C

Sample Number: E

Project: Boulder City Bypass - US 93/US 95 Intersection

Client: Abbas Bafghi

Project No.: FL-02-06

24.8

5.8

5.7

SM

SP-SM

24

A-1-b

Figure

27

0.0

0.0

☐ Source of Sample: BCB2

△ Source of Sample: BCB2

NEVADA

DEPARTMENT OF TRANSPORTATION

24.6

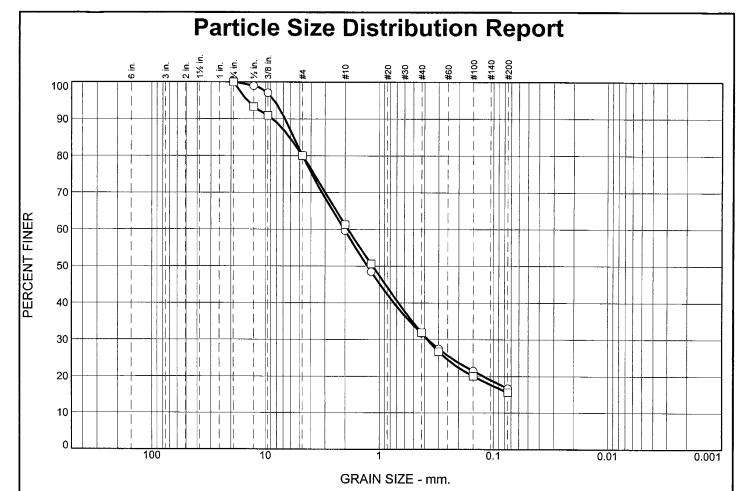
29.9

50.6

58.6

Depth: 10.0-11.5'

Depth: 20.0-20.5'



Ш	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.0	19.9	63.4	16	5.7	SM			
	0.0	20.0	64.4	15	5.6	SM			

SIEVE	PEI	RCENT FIN	NER	SIEVE	PE	RCENT FIN	NER	Material Description
inches size	0			number size	0			O Silty sand with gravel
3/4	100.0	100.0		#4	80.1	80.0		
1/2	98.9	93.3		#10	59.6	61.2		☐ Silty sand with gravel
3/8	97.1	91.0		#16	48.5	50.6		
				#40	31.8	31.9		
				#50	27.5	26.7		
				#100	21.5	20.1		
		<u> </u>	<u> </u>	#200	16.7	15.6		
	(GRAIN SIZ	E					REMARKS:
D ₆₀	2.0337	1.8855						0
D ₃₀	0.3704	0.3763						
D ₁₀								
	CC	DEFFICIEN	TS					
C _C								
Cu								
O Source o	f Sample:	BCB2	Denth: 3	0.0-30.5'	Sample	Number:	E .	

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

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

Boulder City Bypass Phase 1, Structure I-2868

Job Description

73307

EA/Cont#

Visual Only Visual Only Visual Only Visual Only Visual Only 08/09/2006 COMMENTS Date C Psi Residual Station "SL" 14+02, 56' Rt. E = Swell/Pressure on Expansive Soils HCpot = Hydro-Collapse Potential ၁- မွ RQD = Rock Quality Designation W = Moisture Content SL = Shrinkage Limit X = X-Ray Defraction C Dai O = Organic Content UW= Unit Weight K = Permeability Peak D = Dispersive ဝ မွ TYPE TEST Š Š Ŗ Ŗ PI % 2 MD = Moisture Density G = Specific Gravity PI = Plasticity Index OC = Consolidation Š Ā Ā 鱼 LL = Liquid Limit PL = Plastic Limit NP = Non-Plastic 4 ₽ % H = Hydrometer RV = R - Value Ch = Chemical S = Sieve 2009.1 % [[24 19 6 24 7 12.5 PASS #200 14.2 17.2 11.7 18.7 8.0 % DRY UW pcf Elevation (ft) $N = (N_{ces})(0.62)$ %М 2.2 2.2 2.0 2.0 6. 4. 2.0 UU = Unconsolidated Undrained N = No. of blows per ft., sampler CU = Consolidated Undrained U = Unconfined Compressive CD = Consolidated Drained SP-SM GROUP SOIL SM S S DS = Direct Shear () = Friction N = Field SPT C = Cohesion BLOWS per ft. 25 59 30 12 62 z œ α α α \simeq α α SAMP-LER SPT SPT SPT SPT SPT SPT SPT SPT SPT SPT SPT SPT CMS = California Modified Sampler 2.40" ID SLA1 12.0 - 12.18 34.0 - 34.15 SPT = Standard Penetration 1.38" ID 14.0 - 14.26 10.0 - 11.524.0 - 25.5 29.0 - 29.8 34.0 - 34.5 16.0 - 16.519.0 - 19.4 4.0 - 5.58.0 - 9.5 CS = Continuous Sample 3.23" ID 6.0 - 7.5CSS = Calif. Split Spoon 2.42" ID DEPTH SAMPLE Ξ CPT = Cone Penetration Test Sh = Shelby Tube 2.87" ID P = Pushed, not driven PB = Pitcher Barrel RC = Rock Core Boring No. TP = Test Pit SAMPLE ŊŎ. ⋖ Ф ပ Ω ш ш ტ I _ ¥ _

* = Average of subsamples

Boulder City Bypass Phase 1, Structure I-2868

Job Description

73307

EA/Cont#

Boring No.	lo. SLA1			_	Elevation (ft)	(#)	.,	2009.1			Static	Station "SL" 14+02, 56' Rt.	+02, 56' R		Date	08/09/2006	
	SAMPLE	SAMP-	z			DRY	%					STRENGTH TEST	EST				г
SAMPLE NO.	DEPTH (ft)	LER TYPE	BLOWS per ft.	SOIL	%M	UW	PASS #200	LL %	PL %	PI TEST % TYPE	ф ——	O.	qe C	C isi		COMMENTS	
	()							:			Ц	Peak	Resid	ual			
Σ	44.0 - 44.16	SPT	~													Visual Only	
z	49.0 - 49.26	SPT	œ													Visual Only	1
0	54.0 - 54.14	SPT	œ													Visual Only	Ι
<u> </u>	59.0 - 59.2	SPT	œ													Visual Only	
σ	64.0 - 64.11	SPT	œ													Visual Only	
																	ı
CMS = Califo	CMS = California Modified Sampler 2.40" ID	Ω.	U = Unconfine	U = Unconfined Compressive	ě		_	H = Hydrometer	eter		CM = C	CM = Compaction					
SPT = Stand	SPT = Standard Penetration 1.38" ID		UU = Unconso	UU = Unconsolidated Undrained	lined			S = Sieve			E = Sw(E = Swell/Pressure on Expansive Soils	xpansive Soils				
CS = Continu	CS = Continuous Sample 3.23" ID		CD = Consolidated Drained	dated Drained				G = Specific Gravity	c Gravity		SL = St	SL = Shrinkage Limit					
RC = Rock Core	ore		CU = Consolic	CU = Consolidated Undrained	be		- ,	PI = Plasticity Index	ty Index		in =Mn	UW= Unit Weight					
PB = Pitcher Barrel	Barrel			hear			_	LL = Liquid Limit	Ĕ		oM = Wo	W = Moisture Content					
CSS = Calif.	CSS = Calif. Split Spoon 2.42" ID		φ = Friction	tion			- 4	PL = Plastic Limit ND = Nos Blastic	: Limit Soctio		K=Per	K = Permeability					
	renegator lest			4	100		- `	or - Consolidation	dout		O - Organic CO	Jonesiae					
P = Pushed, not driven	r not driven		N = NO. Of BIO	N = No. or blows per it., sampler	Jaid:			Ch = Chemical	Marion		ROD = 1	D = Dispensive RQD = Rock Quality Designation	signation				
R = Refusal			N = Field SPT		N = (N _{css})(0.62)	(2)	<u>.</u>	RV = R - Value	ţ.		X=X-R	X = X-Ray Defraction					
Sh = Shelby	Sh = Shelby Tube 2.87" ID						-	MD = Moisture Density	ıre Density		HCpot ₃	HCpot = Hydro-Collapse Potential	Potential				

* = Average of subsamples

Boulder City Bypass, I-2868, Pier 1

Job Description

73307

EA/Cont#

Boring No.	Vo. SLP1				Elevation (ft)	n (ft)	•	2016.0			ξ	Station "SL" 14+75, Center	14+75, C	enter	Date	08/31/2006
	SAMPLE	SAMP-	z			DRY	%					STRENGTH TEST	TH TEST			
SAMPLE NO.	DEPTH (ft)	LER	BLOWS per ft.	SOIL	%M	UW	PASS #200	77 %	» FL	IT M	TEST	p C	ф.	C		COMMENTS
								?	2			Peak	<u>-</u>	esidu		
A	3.5 - 5.0	SPT	15	SW-SM	3.6		6.5	19	₽ N	dN						
В	5.5 - 7.0	SPT	12		2.7										8 = Hq	8.1, Resist. = 939 ohm-cm
၁	8.5 - 10.0	SPT	48	SM	2.8		13.7	23	윤	g N						
Q	10.5 - 12.0	SPT	46	SP-SM	2.3		10.2	23	₽	₽ P						
ш	13.5 - 14.5	SPT	œ													Visual Only
Щ	18.5 - 18.64	SPT	æ		1.7		15.9									
ຶ່ນ	23.5 - 23.67	SPT	82		1.2			18	17	-						
I	28.5 - 28.7	SPT	Я		3.0			20	18	2						
_	33.5 - 33.68	SPT	82													Visual Only
ſ	38.5 - 38.56	SPT	R													Visual Only
쏘	43.5 - 43.56	SPT	R													Visual Only
Γ	48.5 - 48.88	SPT	Я		2.0			19	18	2						
CMS = Calife SPT = Stand. CS = Continu	CMS = California Modified Sampler 2.40" ID SPT = Standard Penetration 1.38" ID CS = Continuous Sample 3.23" ID	<u>Q</u>	U = Unconfined Compressive UU = Unconsolidated Undrained CD = Consolidated Drained	U = Unconfined Compressive UU = Unconsolidated Undrain CD = Consolidated Drained	ve iined		_	H = Hydrometer S = Sieve G = Specific Gravity	neter ic Gravity		CM E= SL.	CM = Compaction E = Swell/Pressure on Expansive Soils SL = Shrinkage Limit	on Expansive	Soils		
RC = Rock Core	Sore		CU = Consolidated Undrained	lated Undrain	pa		_	PI = Plasticity Index	ity Index		S	UW≃ Unit Weight				
PB = Pitcher Barrel	PB = Pitcher Barrel CSS = Calif Solit Spoon 2.42" ID		DS = Direct Shear	hear				LL = Liquid Limit OI = Plaetic I imit			" ' X	W = Moisture Content	jų.			
CPT = Cone	CPT = Cone Penetration Test			į.			_	NP = Non-Plastic	lastic		. "	O = Organic Content	#			
TP = Test Pit			N = No. of blows per ft., sampler	ws per ft., sam	ıpler		J	OC = Consolidation	olidation		= O	D = Dispersive				
P = Pushed, not driven	not driven		HOO FIGURE		90%	ţ	- L	Ch = Chemical	<u> </u>		8 3	RQD = Rock Quality Designation	y Designation			
Sh = Shelby	K = Kerusal Sh = Shelby Tube 2.87" ID		N = Field SP		N = (N _{css})(0.62)	52)		RV = R - Value MD = Moisture Density	alue ure Densit	>	H Q	X = X-Ray Defraction HCpot = Hydro-Collapse Potential	on Iapse Potential			

* = Average of subsamples

Boulder City Bypass, I-2868, Pier 1

Job Description

73307

EA/Cont #

08/31/2006		COMMENTS				Visual Only	No Recovery															
Date	L																					
nter		C	Residual							 			sils									
+75, Ce	FEST	ф deg.	Re										xpansive So						;	signation	Potential	
"SL" 14	STRENGTH TEST	C Dsi	Peak									action	essure on E	age Limit	'eight	e Content	pility -	Content	.ve	c Quality De	efraction dro-Collapse	
Station "SL" 14+75, Center	STR	φ deg.	Pe									CM = Compaction	E = Swell/Pressure on Expansive Soils	St. = 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	
		TEST															_	_			, _	•
		И %		3	В									≥	J				_		sit	7
0.		PL %		20	Α							H = Hydrometer	e «	G = Specific Gravity	PI = Plasticity Index	LL = Liquid Limit	PL = Plastic Limit	NP = Non-Plastic	OC = Consolidation	emica	RV = R - Value MD = Moisture Density	
2016.0		% [[23	70							H = Hyd	S = Sieve	G = Spe	PI = Pla	LL = Liq	PL = Pla	NP = N	ပ္ ၂ ၂	Ch = Chemical	RV = R - Value MD = Moisture [<u>:</u>
	%	PASS #200		10.7			-															
n (ft)	DRY	UW	- 1																		62)	
Elevation (ft)		%M		1.9	1.9							ø	ned		ō				pler		N = (N _{css})(0.62)	
-		SOIL		SW-SM								1 Compressiv	idated Undrai	ited Drained	ited Undraine	ar	E		s per ft., sam		2	
	z	BLOWS per ft.		150	ď	œ	œ					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	
	SAMP-	LER		SPT	SPT	SPT	SPT							O	O	Ш		O	Z		Z	
o. SLP1	SAMPLE	DEPTH (ft)		53.5 - 55.0	58.5 - 59.15	63.5 - 63.68	68.5 - 68.62					CMS = California Modified Sampler 2.40" ID	SPT = Standard Penetration 1.38" ID	CS = Continuous Sample 3.23" ID	ıre	запе	CSS = Calif. Split Spoon 2.42" ID	CPT = Cone Penetration Test		ot driven	iba 9 87" ID	On 2.57 IO
Boring No.		SAMPLE NO.		Σ	z	0	۵					CMS = Califon	SPT = Standa	CS = Continuc	RC = Rock Core	PB = Pitcher Barrel	CSS = Calif. S	CPT = Cone F	TP = Test Pit	P = Pushed, not driven	R = Refusal Sh = Shelby Tube 2.87" ID	OII - OIIGION

* = Average of subsamples

Boulder City Bypass, I-2868, Pier 2

Job Description

73307

EA/Cont#

	Γ			L-Cm]
08/30/2006		COMMENTS		pH = 8.8, Resist. = 6173 ohm-cm	Visual Only	Visual Only				Visual Only			Visual Only	Visual Only	Visual Only	
Date				= Hd												
enter		C	Residual	·												sic
+29.8, C	EST	ф deg.	Res													xpansive Sc signation
Station "SL" 17+29.8, Center	STRENGTH TEST	C	Peak	i												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
Station	STR	φ deg.	Pe													CM = Compaction E = SwellPressure on SL = Shrinkaga Limit UW= Unit Weight W = Moisture Content K = Permeability O = Organic Content D = Dispersive RQD = Rock Quality E X = X-Ray Defraction HCpot = Hydro-Collap
		TEST														
		П %	:				က	4	Α̈́	ď	ΔN	М				ax sity
2	L	FL %	:			_	26	25	₽ B	₽	₽	A N				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
2022.2		71 %					29	29	22	23	21	21				H = Hydrometa S = Sieve G = Specific G PI = Plasticity I: LL = Liquid Lim PL = Plastic LI: NP = Non-Plas OC = Consolid Ch = Chemical RV = R - Value MD = Moisture
	%	PASS #200	:				16.3	12.1	11.0	11.5	10.1	10.7				
on (ft)	DRY	UW	<u>.</u>													.62)
Elevation (ft)		%M	,	8.1			12.5	10.9	10.6	10.4	10.4	8.6				ive ained ed npler N = (N _{oss})(0.62)
		SOIL					SM	GM	SP-SM	SP-SM	SP-SM	SP-SM				d Compressi idated Undrained ated Undrained ear on s per ft., san
	z	BLOWS per ft.	I	19	23	102	78	œ	06	æ	œ	113	8	œ	R	U = Unconfined Compressive UU = Unconsolidated Undrained CD = Consolidated Drained CU = Consolidated Undrained DS = Direct Shear Q = Friction C = Cohesion N = No. of blows per ft., sampler N = Field SPT N = ()
	SAMP-	LER TYPE		SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	
SLP2	SAMPLE	DEPTH (ft)		3.0 - 4.5	5.0 - 6.5	10.0 - 11.5	13.0 - 14.5	15.0 - 16.28	18.0 - 19.5	20.0 - 21.0	25.0 - 26.0	30 - 31.5	35.0 - 35.38	40.0 - 40.18	45.0 - 45.36	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 Shelby Tube 2.87" ID
Boring No.		SAMPLE NO.		∢	В	O	۵	Ш	ட	ŋ	I	_	7	У	-L	CMS = California Modified Sample SPT = Standard Penetration 1.38 CS = Confinuous Sample 3.23" ID RC = Rock Core PB = Pitcher Barrel CSS = Calif. Split Spoon 2.42" ID CPT = Cone Penetration Test TP = Test Pit Pest Pit Pest Pit Pest Pit Pest Pit Pest Pit Split Spoon S.42" ID SP = Refusal Sh = Shelby Tube 2.87" ID

* = Average of subsamples

EA/Cont#	ıt# 73307			•	Job Description	ription		Boulder City Bypass, I-2868, Pier 2	City By	pass, I-2	2868, Pi	er 2					
Boring No.	No. SLP2				Elevation (ft)	(#)		2022.2			o,	Station "SL" 17+29.8, Center	" 17+29	.8, Cente	ır Date	æ	08/30/2006
	SAMPLE	SAMP-	z			DRY	%			H		STRENGTH TEST	TH TEST				
SAMPLE NO.	DEPTH (ft)	LER TYPE	BLOWS per ft.	SOIL	%M	UW	PASS #200	77 %	PL %	PI T	TEST	ф (C	deg.	ر ية:		COMMENTS
)	?	<u> </u>			Peak	+	sidu			
Σ	50.0 - 50.5	SPT	œ		10.2		9.5		- · · · · · · · · · · · · · · · · · · ·								
z	55.0 - 55.75	SPT	œ														Visual Only
0	60.0 - 60.2	SPT	œ														Visual Only
۵	65.0 - 65.25	SPT	Ж														Visual Only
													:				
CMS = Cali	CMS = California Modified Sampler 2.40" ID	Ω	U = Unconfined Compressive	ed Compressiv	ě		-	H = Hydrometer	eter		Ö	CM = Compaction					
SPT = Stan	SPT = Standard Penetration 1.38" ID		UU = Unconsolidated Undrained	Midated Undra	ined			S = Sieve	į		ш	E = Swell/Pressure on Expansive Soils	on Expan	sive Soils			
RC = Rock Core	Core		CU = Consolidated Undrained	ated Undraine	Ŗ		_	PI = Plasticity Index	ty Index		5 5	UW= Unit Weight	Í				
PB = Pitcher Barrel	ж Вапеl		DS = Direct Shear	ıear			_	LL = Liquid Limit	Limit		\$	W = Moisture Content	tent				
CSS = Cali	CSS = Calif. Split Spoon 2.42" ID		φ = Friction	ion				PL = Plastic Limit	: Limit Isotio		Χ (K = Permeability	į				
TP = Test Pit	a raneualon resul		N = No. of blows per ft., sampler	vs per ft., sam	pler		. 0	OC = Consolidation	lidation		_	D = Dispersive	į				
P = Pushed	P = Pushed, not driven						Ū	Ch = Chemical	<u> </u>		œ	RQD = Rock Quality Designation	ty Designa	ion			
R = Refusal Sh = Shelby	R = Refusal Sh = Shelby Tube 2.87" ID		N = Field SPT		N = (N _{css})(0.62)	5)		RV = R - Value MD = Moisture Density	llue ure Density		×Ξ	X = X-Ray Defraction HCpot = Hydro-Collapse Potential	ion Ilapse Pote	ntial			

* = Average of subsamples

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

Job Description

73307

EA/Cont#

							= 3155 ohm-cm										
08/23/2006		COMMENTS					8.2, Resist. = 3155				Visual Only		Visual Only				
Date							pH = 8.										
'' Lt		ပ က် က်	Residual													ojis	
9+02, 38	TEST	ф.	Re													Expansive S	Dotontial
Station "SL" 19+02, 38' Lt.	STRENGTH TEST	C Ssi	Peak													CM = Compaction E = Swell/Pressure on Expansive Soils SL = Shrinkage Limit UW= Unit Weight W = Moisture Content K = Permeability O = Organic Content D = Dispersive RQD = Rock Quality Designation X = X-Ray Defraction	HOnot = Hydro-Collapse Botostial
Station	ST	ф ф	P									:				CM = Compaction E = Swell/Pressure or SL = Shrinkage Limit UW= Unit Weight UW= Unit Weight K = Permeability O = Organic Content D = Dispersive RQD = Rock Quality X = X-Ray Defraction	H tood H
		TEST TYPE															
	L	M %			₽			₽	₽						N N	yiy xe ro	neitv
7.	L	PL %			₽			₽	₽			₽			A P	H = Hydrometer S = Sieve G = Specific Gravity PI = Plasticity Index LL = Liquid Limit NP = Non-Plastic OC = Consolidation Ch = Chemical RV = R - Value	MD = Moisture Density
2028.1		% CF		-	8			19	8			8			21	H = Hydron S = Sieve G = Specif PI = Plastic LL = Liquid PL = Plastic NP = Non-I, OC = Cons Ch = Chem	N N
	%	PASS #200		7.5	8.8	14.0		10.3		9.4		11.8		7.8			
on (ft)	DRY	UW	Ţ														.
Elevation (ft)		%M		2.6	2.8	2.7	1.5	1.6	1.7	1.3		1.6		1.8	1.9	ve sined ed ppler ppler N = (N)(0.62)	
		SOIL GROUP			SW-SM			SP-SM				SP-SM				d Compressi idated Undra ided Drained sar on	
	z	BLOWS per ft.		29	25	88	153	æ	œ	118	œ	œ	Я	æ	Я	U = Unconfined Compressive UU = Unconsolidated Undrained CD = Consolidated Drained CU = Consolidated Undrained CU = Consolidated Undrained DS = Direct Shear \$\phi\$ = Friction C = Cohesion N = No. of blows per ft., sampler N = Field SPT N = Consolidated N = Field SPT	
	SAMP-	LER TYPE		SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	1dS	SPT		
SLA2	SAMPLE	DEPTH (ft)		3.0 - 4.5	5.0 - 6.5	8.0 - 9.5	11.0 - 12.5	13.0 - 14.4	16.0 - 16.28	18.0 - 19.5	20.0 - 20.4	25.0 - 26.1	30.0 - 30.5	35.0 - 35.9	40.0 - 40.9	CMS = California Modified Sampler 2.40" ID SPT = Standard Penetration 1.38" ID CS = Continuous Sample 3.23" ID CS = 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	3.2.87* ID
Boring No.		SAMPLE NO.		∢	8	ပ	Ω	Ш	щ	၅	I	_	7	¥	٦	CMS = Callfornia Modified Sample SPT = Standard Penetration 1.39° 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

* = Average of subsamples

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

Job Description

73307

EA/Cont#

	Г		Γ	<u> </u>				 											
Date 08/23/2006		COMMENTS		Visual Only	Visual Only														
۵		DSI.				:													
8' Lt		npis					 				:	Soils							_
1+02, 3	LEST	deg.										Expansive					signation		e Potentia
'SL" 19	STRENGTH TEST	C Psi								:	ction	ssure on E	go carrier	Content	ilit Ha	Content	Quality De	efraction	ro-Collaps
Station "SL" 19+02, 38' Lt.	STRE	φ deg. Peak									CM = Compaction	E = Swell/Pressure on Expansive Soils	UW= Unit Weight	W = Moisture Content	K = Permeability	O = Organic Content O = Disparativa	RQD = Rock Quality Designation	X = X-Ray Defraction	HCpot = Hydro-Collapse Potential
0,		TEST TYPE									O	ши))	5	Χ (5 6	ıα	× :	I
		M %	₽																žį
		PL %	₽								meter	S = Sieve	PI = Plasticity Index	d Limit	tic Limit	NP = Non-Plastic	mical	/alue	MD = Moisture Density
2028.1		%	21								H = Hydrometer	S = Sieve	PI = Plasti	LL = Liquid Limit	PL = Plastic Limit	NP = Non-Plastic	Ch = Chemical	RV = R - Value	MD = Moi
	%	PASS #200	10.4																
Œ	DRY	UW				-												5	
Elevation (ft)		%M	1.8								ø	peu	10				<u> </u>	$N = (N_{css})(0.62)$	
ш		SOIL	SP-SM								Compressiv	dated Undrain	ted Undraine	ar	_	4	per it., saint	z	
	z	BLOWS per ft.	128	œ	œ						U = Unconfined Compressive	UU = Unconsolidated Undrained	CU = Consolidated Undrained	DS = Direct Shear	φ = Friction	C = Cohesion		N = Field SPT	
	SAMP-	LER I	SPT	SPT	SPT						ח	3 5	ਰ ਹ	SO		Üź	Ż	Ë	
SLA2	r	`				 					er 2.40" ID	<u>₽</u>							
S	SAMPLE	DEPTH (ft)	45.0 - 46.5	50.0 - 50.26	55.0 - 55.28						CMS = California Modified Sampler 2.40" ID	SPT = Standard Penetration 1.38" ID	11 07.50 III		CSS = Calif. Split Spoon 2.42" ID	ition Test	Ĕ		87" ID
O	L	ы	4	2	, 5						ilifomia Mo	indard Pen	k Core	ner Barrel	lif. Split Sp	CPT = Cone Penetration Test	IF = Test Fil. P = Pushed, not driven	ज	Sh = Shelby Tube 2.87" ID
Boring No.	L	SAMPLE NO.	Σ	z	0			:			CMS = C2	SPT = St	RC = Rock Core	PB = Pitcher Barrel	CSS = Ca	CPT = Cone F	P = Pushe	R = Refusal	Sh = Shel

* = Average of subsamples

Visual Only Visual Only Visual Only Visual Only Visual Only 11/17/2006 COMMENTS Date [S] Station "RR" 108+18, 24' Lt. Residual ф deg. STRENGTH TEST C psi Peak ф deg. Boulder City Bypass, I-2869 TYPE TEST 윤 PI % 2 S S 4 Š 8 8 1 1 % <u>P</u> Hydrometer 2190.7 8 20 22 23 % ∏ 7 PASS #200 26.8 20.9 23.2 30.0 8.2 % Job Description DRY UW pcf Elevation (ft) 2.8 2.8 2.5 %M د. 3.2 3.2 2.7 U = Unconfined Compressive SC-SM SC-SM SC-SM GROUP SOIL BLOWS per ft. ď œ α α α α α α œ œ \propto α LER TYPE SAMP-SPT SPT SPT SPT SPT SPT SPT SPT SPT SPT SPT SPT CMS = California Modified Sampler 2.40" ID RRAP1 73307 49.5 - 49.69 34.5 - 34.58 39.5 - 39.59 44.4 - 44.59 14.5 - 14.59 19.5 - 19.58 24.5 - 24.62 29.5 - 29.58 3.0 - 3.22 4.5 - 4.87 1.5 - 2.59.5 - 9.61 SAMPLE DEPTH Œ Boring No. EA/Cont# SAMPLE Ö. ပ ۵ G ⋖ Ф ш ш I ¥ _

 $N = (N_{css})(0.62)$ UU = Unconsolidated Undrained N = No. of blows per ft., sampler CU = Consolidated Undrained CD = Consolidated Drained DS = Direct Shear φ = Friction N = Field SPT C = Cohesion SPT = Standard Penetration 1.38" ID CS = Continuous Sample 3.23" ID CSS = Calif. Split Spoon 2.42" ID CPT = Cone Penetration Test R = Refusal Sh = Shelby Tube 2.87" ID P = Pushed, not driven RC = Rock Core PB = Pitcher Barrel TP = Test Pit

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

* = Average of subsamples

Boulder City Bypass, I-2869

Job Description

73307

EA/Cont #

Boring No.	lo. RRAP1			-	Elevation (ft)	Ē.	"	2190.7			Station	Station "RR" 108+18, 24' Lt.	8+18, 2	4' Lt.	Date	11/17/2006	
	SAMPLE	SAMP-	z			DRY	%	_	\vdash		ST	STRENGTH TEST	EST				Г
SAMPLE NO.	DEPTH (ft)	LER	BLOWS per ft.	SOIL	%M	UW	PASS #200	77 %	PL P	PI TEST %	r p	C	ф	ပ ်စွ		COMMENTS	
						<u>.</u>		\dashv	\dashv	$\overline{}$		Peak	Res	Residual			
Σ	54.5 - 54.55	SPT	æ													Visual Only	
CMS = Califo	CMS = California Modified Sampler 2.40" ID	Q	U = Unconfine	U = Unconfined Compressive	φ		I	H = Hydrometer	iter		CM = Compaction	paction					
SPT = Standa	SPT = Standard Penetration 1.38" ID		UU = Uncons	UU = Unconsolidated Undrained	ned		3)	S = Sieve			E = Swell/	E = Swell/Pressure on Expansive Soils	xpansive So	sis			
CS = Continu	CS = Continuous Sample 3.23" ID		CD = Consolic	CD = Consolidated Drained			-	G = Specific Gravity	Gravity		SL = Shrin	SL = Shrinkage Limit					
KC = Kock Core PB = Pitcher Barrel	ore Barrel		CU = Consolidated DS = Direct Shear	CU = Consolidated Undrained DS = Direct Shear	D.		a =	PI ≈ Plasticity Index LL = Liquid Limit	y Index imit		UW= Unit Weight W = Moisture Con	UW= Unit Weight W = Moisture Content					
CSS = Calif.	CSS = Calif. Split Spoon 2.42" ID		φ = Friction	fion			Δ.	PL = Plastic Limit	Limit		K = Permeability	ability					
CPT = Cone	CPT = Cone Penetration Test		C = Cohesion				Z	NP = Non-Plastic	astic		O = Organic Content	ic Content					
TP = Test Pit	;		N = No. of blo	N = No. of blows per ft., sampler	pler		O	OC = Consolidation	lidation		D = Dispersive	sive	:				
P = Pushed, not driven	not driven		T00 M4:3 - M		9 07	â	<u>ة</u> د	Ch = Chemical	: <i>ग</i>		RQD = Ko	RQD = Rock Quality Designation	signation				
Sh = Shelby	K = Kelusal Sh = Shelby Tube 2.87" ID		N = rieid or		N = (N _{css})(0.6Z)	(Ž	ĽΣ	KV = K - Value MD = Moisture Density	ue re Density		A = A-Ray HCpot = H	X = X-Kay Defraction HCpot = Hydro-Collapse Potential	Potential				

* = Average of subsamples

Boulder City Bypass, Structure 2870W, Abut. 1

Job Description

73307

EA/Cont #

Boring No.	DCA1	SAMP-	z		Elevation (ft)	n (ft) DRY	%	2240.4			Ś	Station "DC" 22+47, 25' Lt. STRENGTH TEST	on "DC" 22+47 STRENGTH TEST	, 25' Lt.	Date	10/30/2006	
DEPTH (ft)		LER	BLOWS per ft.	SOIL	%M	UW	PASS #200	TI %	PL %	PI 7	TEST	ф deg.	C C	φ C		COMMENTS	
)						-				-		Peak	H	sidu			
3.0 - 4.5	2	SPT	39	SP-SC	3.0		9.8	30	21	6							
5.0 - 6.5	rύ	SPT	58	SC-SM	3.1		16.7	56	22	4							
8.0 - 9.5	75	SPT	25	SC	3.9		15.6	30	21	6							
11.0 - 11.05	.05	SPT	œ													Visual Only	
13.0 - 13.14	3.14	SPT	œ													Visual Only	
14.5 - 20.3	0.3	RC		,												RQD, U, G	
CMS = California Modified Sampler 2.40" ID	pler 2.40"	Q	U = Unconfine	U = Unconfined Compressive	g ₂		_	H = Hydrometer	neter		ō	CM = Compaction					
SPT = Standard Penetration 1.38" ID	38" ID		UU = Unconsc	UU = Unconsolidated Undrained	ined			S = Sieve			ш	E = Swell/Pressure on Expansive Soils	e on Expansi	ve Soils			
CS = Continuous Sample 3.23" ID	<u>□</u>		CD = Consolidated Drained	dated Drained				G = Specific Gravity	ic Gravity		ซี	SL = Shrinkage Limit	nit				
RC = Rock Core			CU = Consolic	CU = Consolidated Undrained	pe		_	PI = Plasticity Index	ify Index		3	UW= Unit Weight					
PB = Pitcher Barrel			DS ≈ Direct Shear	hear			_	LL = Liquid Limit	Limit		≥	W = Moisture Content	tent				
CSS = Calif. Split Spoon 2.42" ID	₽		φ = Friction	tion				PL = Plastic Limit	c Limit		Ÿ (K ≈ Permeability O = Organic Content	ţ				
			N = No. of blow	N = No. of blows ner ft. sampler	pler		. •	OC = Consolidation	olidation) Ë	D = Disnersive	•				
P = Pushed, not driven					ļ		J	Ch = Chemical	is		ı &	RQD = Rock Quality Designation	ity Designati	E			
			N = Field SPT		$N = (N_{css})(0.62)$	(5)	_	RV = R - Value	alue		×	X = X-Ray Defraction					
Sh = Shelby Tube 2.87" ID							_	MD = Moisture Density	ure Densit	>	¥	HCpot = Hydro-Collapse Potential	llapse Poten	fial			

Boulder City Bypass Phase 1, Structure 2870W, Abut. 2

Job Description

73307

EA/Cont#

Boring No.	lo. DCA2			_	Elevation (ft)	τ (¥)		2247.2			Ø	Station "DC" 24+00, 29' Lt.	JC" 24+(10, 29' L		Date	10/30/2006	
	SAMPLE	SAMP-	z			DRY	%					STRE	STRENGTH TEST	T				_
SAMPLE	DEPTH (#)	LER	BLOWS	SOIL	%M	UW	PASS #200	LL %	PL	PI %	TEST		ن ن	ф. ф.	ပ ်ဖွ		COMMENTS	
<u>;</u>	(44)		F 22.			is d		2				Peak		Residual	lat			
¥	3.0 - 4.5	SPT	98	SC	3.6		13.9	30	21	6	·							
В	5.2 - 6.7	SPT	52	SC-SM	3.3		13.0	26	22	4								
ပ	6.7 - 12.2	RC													·		Visual Only	
٥	12.2 - 16.7	RC															Visual Only	
CMS = Califo	CMS = California Modified Sampler 2.40" ID	<u>_</u>	U = Unconfin	U = Unconfined Compressive	ō.			H = Hydrometer	neter		5	CM = Compaction	ion					
SPT = Stand	SPT = Standard Penetration 1.38" ID		UU = Uncons	UU = Unconsolidated Undrained	ined			S = Sieve			Ш	E = Swell/Pressure on Expansive Soils	sure on Expa	nsive Soils				
CS = Continu	CS = Continuous Sample 3.23" ID		CD = Consoli	CD = Consolidated Drained				G = Specific Gravity	fic Gravity		ਲ :	SL = Shrinkage Limit	9 Limit					
RC = Rock Core	e o o		CU = Consoli	CU = Consolidated Undrained	<u>R</u>		-	PI = Plasticity Index	city Index		5	UW= Unit Weight	gnt Vootest					
CSS = Calif. Split Si	PB = Pitcher Barrel CSS = Calif. Solit Spoon 2.42" ID		DS = Direct Silear	tion			_	LL - Liquiu Lilliit PL = Plastic Limit	S Limit		₹ ⊻	W = Monstare Con K = Permeability	ty ty					
CPT = Cone	CPT = Cone Penetration Test			_			-	NP = Non-Plastic	Plastic		0	O = Organic Content	ontent					
TP = Test Pit			N = No. of blo	N = No. of blows per ft., sampler	pler			OC = Consolidation	solidation		۵	D = Dispersive						
P = Pushed, not driven	not driven		i		:	į		Ch = Chemical	nical .		Œ;	RQD = Rock Quality Designation	luality Design	ation				
R = Refusal Sh = Shelby 1	R = Refusal Sh = Shelby Tube 2.87" ID		N = Field SPT		N = (N _{css})(0.62)	(2)	_	RV = R - Value MD = Moisture [RV = R - Value MD = Moisture Density	≥	ĸΪ	X = X-Kay Defraction HCpot = Hydro-Collapse Potential	raction -Collapse Po	ential				
	!									,								

* = Average of subsamples

Visual Only Visual Only Visual Only Visual Only 10/20/2006 COMMENTS Date C. Psi Residual Station "F" 29+14.5, 1.0' Lt. Boulder City Bypass Phase 1, Structure I-2870E, East Abut. deg. STRENGTH TEST psi Ö Peak ф deg. TEST TYPE 5 20 16 8 4 2 Z % / ω 34 34 23 23 22 20 27 7 <u>R</u> % 2239.8 % ∐ 49 43 35 43 29 28 54 4 15.5 20.7 20.9 PASS #200 22.4 15.4 12.2 % Job Description DRY UW pcf Elevation (ft) 4.8 6.1 4.7 4.8 4.0 **4**. 3.2 3.4 %М SOIL GROUP SC-SM Θ S⊠ S SC SC BLOWS per ft. 149 128 104 7 67 α \simeq α α α SAMP-LER TYPE SPT SPT SPT SPT SPT SPT SPT SPT SPT SPT SPT SPT 73307 FA4 10.0 - 10.2512.5 - 12.75 14.0 - 14.05 11.0 - 12.5 15.0 - 15.07 9.5 - 10.0 2.0 - 3.53.5 - 5.0 6.0 - 6.56.5 - 8.08.0 - 9.55.0 - 6.0 SAMPLE DEPTH $\mathbf{\Xi}$ EA/Cont# Boring No. SAMPLE Ö. ⋖ $^{\circ}$ 됴 $\frac{1}{2}$ G 7 В \overline{c} Δ ш I

CMS = California Modified Sampler 2.40" ID	U = Unconfined Compressive	pressive	H = Hydrometer	CM = Compaction
SPT = Standard Penetration 1.38" ID	UU = Unconsolidated Undrained	Undrained	S = Sieve	E = Swell/Pressure on Expansive Soils
CS = Continuous Sample 3.23" ID	CD = Consolidated Drained	ained	G = Specific Gravity	SL = Shrinkage Limit
RC = Rock Core	CU = Consolidated Undrained	ndrained	PI = Plasticity Index	UW= Unit Weight
PB = Pitcher Barrel	DS = Direct Shear		LL = Liquid Limit	W = Moisture Content
CSS = Calif. Split Spoon 2.42" ID	φ = Friction		PL = Plastic Limit	K = Permeability
CPT = Cone Penetration Test	C = Cohesion		NP = Non-Plastic	O = Organic Content
TP = Test Pit	N = No. of blows per ft., sampler	t., sampler	OC = Consolidation	D = Dispersive
P = Pushed, not driven			Ch = Chemical	RQD = Rock Quality Designation
R = Refusal	N = Field SPT	$N = (N_{css})(0.62)$	RV = R - Value	X = X-Ray Defraction
Sh = Shelby Tube 2.87" ID			MD = Moisture Density	HCpot = Hydro-Collapse Potential

Boulder City Bypass Phase 1, Structure I-2870E, East Abut.

Job Description

73307

EA/Cont#

RV = 69, pH = 8.2, Res. = 847 ohm-cm RV = 59, pH = 8.6, Res. = 661 ohm-cm RV = 70, pH = 8.4, Res. = 346 ohm-cm Visual Only Visual Only 10/20/2006 COMMENTS Date psi Residual Station "F" 29+14.5, 1.0' Lt. E = Swell/Pressure on Expansive Soils X = X-Ray Defraction HCpot = Hydro-Collapse Potential ⊕ ë RQD = Rock Quality Designation STRENGTH TEST W = Moisture Content SL = Shrinkage Limit O = Organic Content psi C CM = Compaction UW= Unit Weight K = Permeability Peak D = Dispersive de g. TYPE TEST 4 15 5 Ы % ~ RV = R - Value MD = Moisture Density G = Specific Gravity OC = Consolidation PI = Plasticity Index NP = Non-Plastic PL = Plastic Limit LL = Liquid Limit 9 29 24 PL % 3 Hydrometer Ch = Chemical 2239.8 45 39 ∃ % 4 7 PASS #200 13.2 14.6 15.7 9.8 % DRY M pcf Elevation (ft) $N = (N_{css})(0.62)$ %М 2.3 1.7 UU = Unconsolidated Undrained N = No. of blows per ft., sampler U = Unconfined Compressive CU = Consolidated Undrained CD = Consolidated Drained GROUP GP-GC SOIL ΘM ΘM DS = Direct Shear Friction N = Field SPT C = Cohesion BLOWS per ft. œ œ œ α Comp. Comp. Comp. LER TYPE SAMP-SPT SPT SPT 20 CMS = California Modified Sampler 2.40" ID FA4 SPT = Standard Penetration 1.38" ID 20.0 - 20.07 35.0 - 35.07 39.0 - 41.4 10.0 - 15.025.0 - 25.1 5.0 - 10.00.0 - 5.0CS = Continuous Sample 3.23" ID SAMPLE DEPTH CSS = Calif. Split Spoon 2.42" ID € CPT = Cone Penetration Test R = Refusal Sh = Shelby Tube 2.87" ID P = Pushed, not driven RC = Rock Core PB = Pitcher Barrel Boring No. TP = Test Pit SAMPLE RV2R33 Ö. Z ¥ Σ z _

Boulder City Bypass, Structure G-2871, Abut. No. 1 Job Description 73307 EA/Cont #

09/18/2006

Date

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

2253.8

Elevation (ft)

FA1

Boring No.

			T	1	1										1
	COMMENTS		Ι				Visual Only	Visual Only	Visual Only	Visual Only	Visual Only		Visual Only	Visual Only	
	ပ ်	psi 													
EST	о •	deg. Resir													
STRENGTH TEST		psi													action
STR	9 .	deg.													CM = Compaction
	TEST	TYPE													
	Ы	%	6	12		4						12			
	PL	%	21	8		18						13			rometer
L	LL	%	8	32		22						25			H = Hydrometer
%	PASS	#200	10.7	25.3	19.1										
DRY	WD.	pcf													
	%M		1.4	3.1	2.2	1.3						13.9			, ve
	SOIL	GROUP	SW-SC	SC											d Compressi
z	BLOWS	per ft.													U = Unconfined Compressive
SAMP-	LER	TAPE	SPT	SPT	SPT	SPT	SPT	RC	RC	SC C	RC	RC	RC	RC	
SAMPLE	DEPTH	(II)	3.5 - 5.0	6.0 - 7.2	8.5 - 8.91	11.5 - 11.6	13.5 - 13.67	13.67 - 16.5	16.5 - 17.5	17.5 - 18.5	18.5 - 19.3	19.3 - 19.8	19.8 - 21.0	21.0 - 22.17	CMS = California Modified Sampler 2.40" ID
	SAMPLE	Ž	∢	В	ပ	۵	ш	7	F2	F3	G1a	G1b	G2	63	CMS = Califor

UU = Unconsolidated Undrained DS = Direct Shear φ = Friction C = Cohesion SPT = Standard Penetration 1.38" ID CS = Continuous Sample 3.23" ID CSS = Calif. Split Spoon 2.42" ID CPT = Cone Penetration Test PB = Pitcher Barrel RC = Rock Core

N = No. of blows per ft., sampler CU = Consolidated Undrained CD = Consolidated Drained

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

* = Average of subsamples

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

N = Field SPT

Sh = Shelby Tube 2.87" 1D

P = Pushed, not driven

TP = Test Pit

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

Job Description

73307

EA/Cont #

Boring No.	No. FA1			_	Elevation (ft)	(£)	N	2253.8			Station "F" 14+80, 20' Rt.	14+80, 2	o' Rt.	Date	09/18/2006	
	SAMPLE	SAMP-	z			DRY	%	\vdash	-		STREN	STRENGTH TEST				Г
SAMPLE	DEPTH (ft)	LER	BLOWS per ft.	SOIL	%M	UW	PASS #200	TT %	PL P	PI TEST % TYPE	ф	C Q	C		COMMENTS	
}	()					I.				-	Peak		sidu			
G4	22.17 - 23.5	RC													Visual Only	
Ξ	23.5 - 24.25	RC													Visual Only	
무	24.25 - 24.58	RC													Visual Only	
_	28.5 - 28.6	SPT			1.3		15.4									
ſ	33.5 - 33.64	SPT			1.6			18	16 2	2						
ㅗ	38.5 - 38.73	SPT													Visual Only	
																-
CMS = Califo	CMS = California Modified Sampler 2.40" ID	<u>۔</u>	U = Unconfine	U = Unconfined Compressive	,e		I I	H = Hydrometer	iter		CM = Compaction	_				
SPT = Stand	SPT = Standard Penetration 1.38" ID		UU = Uncons(UU = Unconsolidated Undrained	ined		<i>.,</i>	S = Sieve			E = Swell/Pressure on Expansive Soils	re on Expansiv	e Soils			
CS = Contin	CS = Continuous Sample 3.23" ID		CD = Consolic	CD = Consolidated Drained			_	G = Specific Gravity	Gravity		SL = Shrinkage Limit	ij				
RC = Rock Core	Sore - Barrel		CU = Consolidated	CU = Consolidated Undrained DS = Direct Shear	p _a		<u>.</u>	PI = Plasticity Index LL = Liquid Limit	y Index imit		UW= Unit Weight W = Moisture Content	ntent				
CSS = Calif.	CSS = Calif. Split Spoon 2.42" ID		φ = Friction	fion			<u> </u>	PL = Plastic Limit	Limit		K = Permeability					
CPT = Cone	CPT = Cone Penetration Test		C = Cohesion				Z	NP = Non-Plastic	astic		O = Organic Content	tent				
TP = Test Pit	:		N = No. of blo	N = No. of blows per ft., sampler	ıpler		0 (OC = Consolidation	lidation		D = Dispersive					
P = Pusned, not anven P = Peties(not driven		N = Field CDT		(CB 0)/ N) = N	ŝ	Ω ر		P 57		X = X-Ray Defraction	ility Designatio	=			
Sh = Shelby	Sh = Shelby Tube 2.87" ID					Ž,	. 2	MD = Moisture Density	re Density		HCpot = Hydro-Collapse Potential	ollapse Potent	ial			

* = Average of subsamples

Station "F" 16+01, 8' Lt. Boulder City Bypass, Structure G-2871, Pier No. 1 2244.8 Job Description Elevation (ft) 73307 FP1 Boring No. EA/Cont#

09/29/2006

Date

_												- 1	-	ı	
	COMMENTS			Н			Visual Only		No Recovery	Visual Only	RQD = 75.2%, U		H, RV = 67, pH = 7.9, Resist. = 337 ohm-cm		
	C	psi	dual												
EST	9	deg.	Residual												
STRENGTH TEST	ပ	psi													
STRE	9	deg.	Peak												
	TEST	TYPE													
	PI	%		6	4	4		80					5		
	bΓ	%		20	23	19		17					19		
	LL	%		29	27	23		25					24	•	
%	PASS	#200		15.4	10.3	6.6		40.7					22.7		
DRY	MΩ	jod	•												
	%M			1.4	2.0	1.6		2.9					1.4		
	SOIL	GROUP		SP-SC	GP-GM	SW-SC		SC					SC-SM		
Z	BLOWS	per ft.		38	79	50	Ж	R	R	ж					
SAMP-	LER	TYPE		SPT	SPT	SPT	SPT	SPT	SPT	SPT	RC		BULK		
SAMPLE	DEPTH	(ff)		2.0 - 3.5	4.0 - 5.5	9.0 - 10.5	14.0 - 14.19	19.0 - 19.21	24.0 - 24.06	29.0 - 29.11	29.11 - 36.33		14.0 - 24.0		
	SAMPLE	NO.		Α	В	၁	۵	ш	u	ტ	I		BULK		

H = Hydrometer	S = Sieve	G = Specific Gravity	PI = Plasticity Index	LL = Liquid Limit	PL = Plastic Limit	NP = Non-Plastic	OC = Consolidation	Ch = Chernical	RV = R - Value	MD = Moisture Density
U = Unconfined Compressive	JU = Unconsolidated Undrained	lated Drained	CU = Consolidated Undrained	near	ion		N = No. of blows per ft., sampler		$N = (N_{css})(0.62)$	
U = Unconfine	OU = Unconso	CD = Consolidated Drained	CU = Consolid	DS = Direct Shear	φ = Friction	C = Cohesion	N = No. of blov		N = Field SPT	
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

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

Boulder City Bypass

Job Description

73307

EA/Cont#

Boring No.	io. FP2			-	Elevation (ft)	(ff)		2234.4			S	Station "P" 140+55, 38' Lt.	-" 140+	55, 38'	'	Date	09/29/2006	
	SAMPLE	SAMP-	z			DRY	%		r	۲		STRE	STRENGTH TEST	ST				
SAMPLE NO.	DEPTH (ft)	LER TYPE	BLOWS per ft.	SOIL	%M	UW pcf	PASS #200	rr %	» FL	II %	TEST	Ф ф	C DSi	ф фед.	C		COMMENTS	
						,				-	L	Peak	_ _	Residual	dual			
∢	3.0 - 4.5	SPT	88	SW-SC	2.7		11.0	56	19	7								
B1	4.5 - 5.0	SPT	78		2.6			37	19	8								
B2	2.0 - 6.0	SPT		၁၄	4.0		25.9	42	23	19								
ပ	2.8 - 0.7	SPT	87	SC	4.5		15.1	36	20	16								
D	9.5 - 11.0	SPT	42	၁၄	3.8		25.6	29	8	11								
Ш	12.5 - 12.6	SPT	œ		3.4			31	17	4								
ш	14.5 - 15.1	SPT	œ	၁၄	2.7		35.6	26	4	12								
9	19.5 - 19.77	SPT	æ														Visual Only	
Ι	24.5 - 24.57	SPT	œ														No Recovery	
_	29.5 - 29.6	SPT	œ															
٦	35.6 - 37.9	RC															G, U	
CMS = Califor	CMS = California Modified Sampler 2.40" ID	٥	U = Unconfine	U = Unconfined Compressive	é		_	H = Hydrometer	neter		5	CM = Compaction	ion					
SPT = Stand	SPT = Standard Penetration 1.38" ID		UU = Unconso	UU = Unconsolidated Undrained	ined			S = Sieve			ш	E = Swell/Pressure on Expansive Soils	sure on Exp	ansive Soil	<u>s</u>			
CS = Continuous	CS = Continuous Sample 3.23" ID RC = Rock Core		CD = Consolidated Drained	CD = Consolidated Drained CI = Consolidated Undrained	7		_	G = Specific Gravity PI = Plasticity Index	c Gravity		ಪ ≘	St = Shrinkage Limit	e Limit					
PB = Pitcher Barrel	Barrel		DS = Direct Shear	hear			-	LL = Liquid Limit	Limit		` ≯	W = Moisture Content	Content					
CSS = Calif. t	CSS = Calif. Split Spoon 2.42" ID		φ = Friction	fjou			_	PL = Plastic Limit	: Limit		¥	K = Permeability	ξ					
CPT = Cone	CPT = Cone Penetration Test		C = Cohesion				-	NP = Non-Plastic	lastic		0	O = Organic Content	ontent					
TP = Test Pit			N = No. of blo	N = No. of blows per ft., sampler	pler			OC = Consolidation	olidation		<u> </u>	D = Dispersive	:	:				
P = Pushed, not driven	not driven		TOS Mail		9 OX N/ - 2	ć		Ch = Chemical BV = R - Value	<u> </u>		ř×	RQD = Rock Quality Designation X = X_Ray Defraction	tuality Designantion	nation				
Sh = Shelby	K = Kerusal Sh = Shelby Tube 2.87" (D		N i riend or i		N = (N _{css})(U.52)	Ž)	_	KV = K - value MD = Moisture Density	ilue ure Densit	`	ξĬ	x = x-ray Derracuon HCpot = Hydro-Collapse Potential	racuori Collapse F	otential				

Boulder City Bypass, Structure G-2871, Pier No. 3

Job Description

73307

EA/Cont#

Boring No.	lo. FP3				Elevation (ft)	(#)		2229.3			Static	Station "F" 19+65, Center	.65, Cent	ē	Date	10/03/2006	
	SAMPLE	SAMP-	z			DRY	%					STRENGTH TEST	TEST				
SAMPLE NO.	DEPTH (ft)	LER TYPE	BLOWS per ft.	SOIL	%M	UW	PASS #200	77 %	J. %	PI TEST % TYPE	T ϕ	C	φ deg.	C isi		COMMENTS	
						L		:	:		Ц	Peak	Res	Residual			
Y	3.0 - 4.3	SPT		SP-SC	2.4		10.9	27	20	2							
В	4.5 - 4.68	SPT			3.1			30	21	6							
ပ	7.5 - 8.5	SPT			2.1		7.4										T
۵	9.5 - 11.0	SPT		SC-SM	2.3		15.5	24	18	9							I.
ш	12.5 - 13.81	SPT		GP-GC	1.9		8.8	21	17	4							
Ш	14.5 - 14.61	SPT			1.2			25	20	5							_
G1		RC														RQD, U, G	
62		RC														RQD, U, G	
I		RC														RQD, U, G	
																	r
CMS = Califor	CMS = California Modified Sampler 2.40" ID	₽	U = Unconfine	U = Unconfined Compressive	Đ.		_	H = Hydrometer	eter		Ŏ ₩ O	CM = Compaction					
SPT = Stand&	SPT = Standard Penetration 1.38" ID		UU = Unconso	UU = Unconsolidated Undrained	ined		-	S = Sieve			E = Sw(E = Swell/Pressure on Expansive Soils	xpansive So	iis			
CS = Continu	CS = Continuous Sample 3.23" ID		CD = Consolidated Drained	lated Drained				G = Specific Gravity	c Gravity		SI = SI	SL = Shrinkage Limit					
KC = Rock Core PR = Pitcher Barrel	Orð Barnel		CU = Consolidated	CU = Consolidated Undrained DS = Direct Shear	2			PI = Plasticity Index	ity Index		U = WU	UW= Unit Weight W = Moisture Content					
CSS = Calif. 8	CSS = Calif. Split Spoon 2.42" ID		() = Friction	, Loi				PL = Plastic Limit	Limit		K = Pen	K = Permeability					
CPT = Cone I	CPT = Cone Penetration Test		C = Cohesion				_	NP = Non-Plastic	lastic		0=0	O = Organic Content					
TP = Test Pit			N = No. of blov	N = No. of blows per ft., sampler	pler		•	OC = Consolidation	Jidation		D = Dispersive	persive					
P = Pushed, not driven	not driven		TOO PIOIS - N		90%	ć	. u	Ch = Chemical	ical ::3		RQD=	RQD = Rock Quality Designation	signation				
K = Kelusal Sh = Shelby Tube 2.87" ID	Tube 2.87" ID				N = (N _{css})(U.62)	(Z	~ =	KV = K - Value MD = Moisture Density	nue ure Density		X = X-H HCpot =	x = x-ray Derraction HCpot = Hydro-Collapse Potential	e Potential				

Boulder City Bypass, Structure G-2871, Abut. No. 2

Job Description

73307

EA/Cont#

Boring No.	lo. FA2				Elevation (ft)	(f)		2223.4			U)	Station "F" 21+09, 12' Rt.	09, 12' Rt.	Date	10/12/2006	
	SAMPLE	SAMP-	z			DRY	%					STRENGTH TEST	EST			
SAMPLE NO.	DEPTH (ft)	LER TYPE	BLOWS per ft.	SOIL	%M	UW	PASS #200] %	PL		TEST	φ C	ф	C	COMMENTS	
						5		?	:			Peak	Residual	lal		_
∢	4.5 - 5.35	SPT	R	SP-SC	2.5		11.4	32	18	14						
В	7.5 - 9.0	SPT	37		2.0			8	Ð	₽						
ပ	9.5 - 11.0	SPT	28	SW-SM	2.0		6.8	8	Ð	₽			! ' '			
Q	12.0 - 12.47	SPT	œ		2.2		14.3									Υ
ш	14.5 - 16.0	SPT	56	SW-SM	2.4		11.6	18	₽ B	₽ B					I	Γ
ш	19.5 - 21.0	SPT	41	SW-SM	2.4		8.5	81	원	₽ B						
Ð	24.5 - 26.0	SPT	49	SM	4.3		21.3	25	<u>₽</u>	₽ B					Ι	
Ι	29.5 - 30.72	SPT	R	GP-GM	2.3		10.3	17	ΡN	NP	·					
_	34.5 - 34.72	SPT	R												Visual Only	
J	39.5 - 39.65	SPT	2		3.4			25	20	5						
3	42.6 - 43.35	RC												:	RQD = 88.5%, U, G	
K 2	43.35 - 48.35	RC														
CMS = Califo	CMS = California Modified Sampler 2.40" ID	Ω	U = Unconfin	U = Unconfined Compressive	Đ,			H = Hydrometer	neter		0	CM = Compaction				
SPT = Stand	SPT = Standard Penetration 1.38" ID		UU = Uncons	UU = Unconsolidated Undrained	peu			S = Sieve			Ш	E = Swell/Pressure on Expansive Soils	xpansive Soils			
CS = Continu	CS = Continuous Sample 3.23" ID		CD = Consolidated Drained	lated Drained				G = Specific Gravity	c Gravity		S	SL = Shrinkage Limit				
RC = Rock Core PB = Pitcher Barrel	ore Ramel		CU = Consolidated DS = Direct Shear	CU = Consolidated Undrained DS = Direct Shear	D.			PI ≈ Plasticity Index II = I iouid I imit	ity Index I imit) s	UW= Unit Weight W = Moishire Content				
CSS = Calif.	CSS = Calif. Split Spoon 2.42" ID		φ = Friction	lion			_	PL = Plastic Limit	Limit		· *	K = Permeability				
CPT = Cone	CPT = Cone Penetration Test		C = Cohesion				-	NP = Non-Plastic	Plastic		0	O = Organic Content				
TP = Test Pit	:		N = No. of blo	N = No. of blows per ft., sampler	pler			OC = Consolidation	olidation			D = Dispersive	;			
P = Pushed, not driven	not driven		i			į		Ch = Chemical	<u>.</u>		œ ;	RQD = Rock Quality Designation	signation			
K = Ketusal Sh = Shelby	K = Ketusal Sh = Shelby Tube 2.87" ID		N = Field SPT		N = (N _{css})(0.62)	(Z		RV = R - Value MD = Moisture Density	alue ure Densit	.≥.	ΚI	X = X-Ray Defraction HCpot = Hydro-Collapse Potential	Potential			

EA/Cont#

73307

Job Description Boulder City Bypass - Bridge H 2972N

Boring No.

NBA 1

Elevation (ft)

2056.7

Station "PN" 207 + 95, CL

03/14/2011 Date

	SAMPLE	SAMP-	2			DRY	%			\vdash		STRENGTH TEST	TEST			Γ
SAMPLE	DEPTH	LER	BLOWS	SOIL	%M) \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	PASS #200	∃ %	김 %	⊡ %	TEST	φ δ	Φ ξ	ပ ခု	COMMENTS	
j	<u>(1)</u>		<u>:</u>	5		₹	207	₹	9] = -	Peak	Re	Residual		
BULK 1	0.0 - 5.0	Bulk		GW-GM			6.6	19	₽	₽					Ch, RV = 80	
BULK 2	5.0 - 10.0	Bulk		GP-GM			8.0	24	23	-					Ch, RV = 77	
В	1.0 - 2.5	SPT	16	SM	2.7		12.2	20	g Z	g Z						
U	2.5 - 4.0	SPT	18	SW-SM	2.9		8.2	22	₽	₽						
Ш	5.0 - 6.5	SPT	22	SM	2.7		13.8	27	Ā	₽ B						
<u>њ</u>	6.5 - 8.0	SPT	35	SM	2.7		14.0	56	₽	₽ B						
g	8.0 - 9.5	SPT	34	SW-SM	2.4		0.6	23	₽ B	鱼						
エ	10.0 - 11.1	SPT	œ	SW-SM	2.4		8.7	21	₽	₽						
_	11.5 - 13.0	SPT	22	SM	2.6		15.4	21	₽ B	鱼						
٦	13.0 - 14.5	SPT	24	SP-SM	1.8		11.1	23	₽ P	₽						:
ㅗ	14.5 - 16.0	SPT	36	SW-SM	1.8		9.7	19	₽ B	₽ B						
7	16.0 - 17.5	SPT	35	SW-SM	1.5		9.5	18	QN	NP						
CMS = California Modif SPT = Standard Penetr CS = Continuous Samp RC = Rock Core PB = Pitcher Barrel CSS = Calif. Split Spoo CPT = Cone Penetratio TP = Test Pit P = Pushed, not driven R = Refusal Sh = Shelby Tube 2.87'	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	Q	U = Unconfined C UU = Unconsolidate CD = Consolidate CU = Consolidate DS = Direct Shear Φ = Friction C = Cohesion N = No. of blows p	ad Compressi Nidated Undra lated Undrain near ws per ft., san	ve ed ed pler npler N = (N _{css})(0.62)	32)		H = Hydrometer S = Sieve G = Specific Gravity PI = Plasticity Index LL = Liquid Limit PL = Plastic Limit NP = Non-Plastic OC = Consolidation Ch = Chernical RV = R - Value MD = Moisture Dens	H = Hydrometer S = Sieve G = Specific Gravity PI = Plasticity Index LL = Liquid Limit PL = Plastic Limit NP = Non-Plastic OC = Consolidation Ch = Chernical 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	Expansive S Oesignation	oils		

EA/Cont#

Job Description Boulder City Bypass - Bridge H 2972N

73307

NBA 1

Boring No.

Elevation (ft)

2056.7

Station "PN" 207 + 95, CL

03/14/2011 Date

						•									
		SAMP-	z			DRY	%			├┤		STRENGTH TEST	H TEST		
SAMPLE NO.	E DEPTH (#)	LER	BLOWS per ft.	SOIL GROUP	%M	ğ A	PASS #200	∃%	립 %	≣ %	TEST TYPE	deg.	Ф <u>В</u>	ပ <u>်စွ</u>	COMMENTS
	,									_		Peak		sidu	
Σ	17.5 - 19.0	SPT	14	SW-SM	1.4		8.9	18	Ā	Ρ̈́					
z	19.0 - 20.5	SPT	62	GW-GM	4.		6.7	19	₽	₽					
0	20.5 - 22.0	SPT	47	SW-SM	1.8		8.1	18	물	₽ B					
۵	22.0 - 23.5	SPT	92	SW-SM	2.0		8.2	20	鱼	₽ P					
Ø	23.5 - 25.0	SPT	82	SW-SM	1.6		8.6	19	₽	₽					
<u>~</u>	30.0 - 31.5	SPT	75	SP-SM	2.0		10.3	20	₽	Ā					
σ	35.0 - 36.5	SPT	82	SM	2.8		20.0	24	₽ P	₽ Q					
-	40.0 - 41.5	SPT	98	SP-SM	1.8		10.7	18	윤	₽					
⊃	45.0 - 46.0	SPT	~	SW-SM	2.1		0.6	19	윤	₽					
>	50.0 - 51.4	SPT	œ	SW-SM	2.5		9.6	24	₽	₽					
3	55.0 - 55.5	SPT	~		3.3		10.3								
×	60.0 - 60.4	SPT	œ		0.7										
CMS = California M SPT = Standard Pe CS = Continuous Si RC = Rock Core PB = Pitcher Barrel CSS = Calif. Split S CPT = Cone Penet TP = Test Pit P = Pushed, not driv R = Refusal Sh = Shellys Tube 2	CMS = California Modified Sampler 2.42" ID SPT = Standard Penetration 1.38" ID CS = Condinuous Sample 3.23" ID RC = Rock Core RB = 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> </u>	U = Unconfined Co UU = Unconsolidate UU = Consolidated CU = Consolidated CU = Consolidated CS = Direct Shear DS = Direct Shear C = Cohesion N = No. of blows p	ompressi ed Undra Undrain Undrain	ve iined ed pjer N = (N _{css})(0.62)	(5)		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	meter fire Gravity city Index city Index is Limit is Limit Plastic solidation nical alue	<u>.</u>	0 0	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	on Expansivon t t Designation n pse Potenti	Solis	

EA/Cont #

73307

Job Description Boulder City Bypass - Bridge H 2972N

NBA 1 Boring No.

Elevation (ft)

2056.7

Station "PN" 207 + 95, CL

03/14/2011 Date

	COMMENTS		No Recovery	No Recovery	No Recovery	No Recovery					
	Si O	Residual									
TEST	ф	Res									
STRENGTH TEST	သ <u>i</u> g	Peak									
	— д ф ф										
Н	PI TEST % TYPE										
	급 %										
	∃%					:			<u> </u>		
%	PASS #200										
ORY	gt ≤										
	% M										
	SOIL		٠								
z	BLOWS per ft.		œ	۳	۳	~					
SAMP-	LER TYPE		SPT	SPT	SPT	SPT			•		
SAMPLE	DEPTH (ft)	,	65.0 - 65.0	70.0 - 70.2	75.0 - 75.3	80.0 - 80.2					
	SAMPLE NO.		,	Z	\$	88					

EA/Cont#

73307

Job Description Boulder City Bypass - Bridge H 2972N

Boring No.

NBA 2

Elevation (ft)

2054.2

Station "PN" 209 + 30, CL

03/15/2011 Date

	- 100	2			ORY	%					STRENGTH TEST	TEST		
DEPTH (#)	LER F	BLOWS	SOIL	%M	<u>}</u>	PASS #200	∃ %	즉 %	E 6	TEST	Φ ξ	Φ ξ	O ig	COMMENTS
(III)		hel it.	GNOOF		2	4200	e	ę.		<u>. </u>	Peak	Re	Residual	
0.0 - 5.0	Bulk		พย-พอ			7.2	23	₽	d _N					Ch, RV = 78
5.0 - 10.0	Bulk		SP-SM			7.3	24	₽ B	A N					Ch, RV = 69
1.0 - 2.5	SPT	8	SM	5.9		16.3	24	21	е					
2.5 - 4.0	SPT	œ	SM	2.7		12.3	27	₽ G	₽ G					
4.0 - 5.5	SPT	29	SP-SM	2.7		10.3	26	A D	d _N					
5.5 - 7.0	SPT	90	SW-SM	2.2		9.5	24	₽ P	A N					
7.0 - 8.5	SPT	46	SW-SM	2.3		9.2	21	₽	A N					
8.5 - 10.0	SPT	31	SP-SM	2.4		11.9	8	₽ B	₽ P					
11.0 - 12.5	SPT	27	SM	1.5		12.8	62	₽.	₽					
12.5 - 14.0	SPT	24	SM	1.7		17.5	23	₽	₽ B					
14.0 - 15.5	SPT	39	SM	2.2		13.6	21	₽	₽ B					
15.5 - 17.0	SPT	48	SM	2.6		17.6	23	М	gN GN					
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 Shelby Tube 2.87" ID	<u> </u>	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 = Field SPT	d Compressi itidated Undra ated Undrain tear ws per ft., sarr	ve inned ed ppler N = (N _{css})(0.62)	25)		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 Denx	H = Hydrometer S = Sieve G = Specific Gravity PI = Plasticity Index LL = Liquid Limit PL = Plastic Limit NP = Non-Plastic CC = Consolidation Ch = Chemical RV = R - Value MD = Moisture Density	<u>.</u>	%	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	Expansive S esignation	olis	

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

				•			,								
	COMMENTS														
	ပ ်ဖြ	Residual													Silo
TEST	θ <u>θ</u>	Re													Expansive S signation
STRENGTH TEST	ပ ဖွ	Peak													CM = Compaction E = Swell/Pressure on Expansive Soils SL = Shrinkage Limit UW= Unit Weight W = Moisture Content K = Permeability O = Organic Content D = Dispersive RQD = Rock Quality Designation X = X-Ray Defraction HCpot = Hydro-Collapse Potential
STF	0 ξ	Pe													CM = Compaction E = Swell/Pressure on SL = Shrinkage Limit UW= Unit Weight W = Moisture Content K = Permeability O = Organic Content D = Dispersive RQD = Rock Quality D X = X-Ray Defraction
	TEST	J :													
	⊡ %	?	dΝ	₽			₽	₽		ď	₽	ď	ď		ity xx nn nsity
L	┨%	2	ΔN	Ą			₽	₽		₽	₽	₽	₽		H = Hydrometer S = Sieve G = Specific Gravity PI = Plasticity Index LL = Liquid Limit PL = Plastic Limit NP = Non-Plastic OC = Consolidation Ch = Chemicat RV = R - Value MD = Moisture Density
L	∃%		22	19			19	19		16	17	19	17		H = Hydron S = Sieve G = Specif PI = Plastic LL = Liquid PL = Plastii NP = Non-K OC = Cons Ch = Chem RV = R - VK
%	PASS #200		18.3	11.2	6.6	16.0	11.7	12.0	8.1	7.9	7.9	9.2	8.1	10.5	
DRY	MO Dict	Š.													62)
	%M		2.5	1.8	1.3	2.4	2.7	2.4	2.3	1.6	1.7	2.6	2.5	1.5	ve ed pler N = (N _{css})(0.62)
	SOIL)	SM	SP-SM	GW-GM	SM	SP-SM	GP-GM	GP-GM	SW-SM	SW-SM	SW-SM	SW-SM	GP-GM	d Compressis dated Undra tted Undrain tted Undrain sar s per ft., sam
z	BLOWS		44	40	œ	œ	œ	œ	œ	α	77	64	45	æ	U = Unconfined Compressive UU = Unconsolidated Undrained CD = Consolidated Undrained CU = Consolidated Undrained DS = Direct Shear Φ = Friction C = Cohesion N = No. of blows per ft., sampler N = Field SPT N = (
SAMP-	ᆔ	1	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	
SAMPLE	DEPTH (#)	()	17.0 - 18.5	18.5 - 20.0	21.0 - 22.5	22.5 - 24.0	24.0 - 25.5	25.5 - 27.0	27.0 - 28.5	28.5 - 30.0	30.0 - 31.5	35.0 - 36.5	40.0 - 41.5	45.0 - 45.4	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 Shelby Tube 2.87" ID
	SAMPLE		Σ	z	0	۵	σ	œ	ဟ	⊢	ח	>	3	×	CMS = California Modified Sal SPT = Standard Penetration 1 CS = Continuous Sample 3.23 RC = Rock Core PB = Pitcher Barrel CSS = Calif. Split Spoon 2.42 CPT = Cone Penetration Test TP = Test Pit P = Pushed, not driven R = Refusal Sh = Shelby Tube 2.87" ID

* = Average of subsamples

EA/Cont#

73307

Job Description Boulder City Bypass - Bridge H 2972N

Boring No.

NBA 2

2054.2 Elevation (ft)

Station "PN" 209 + 30, CL

Date

03/15/2011

		COMMENTS											
		ပြ	Residual										<u>s</u> :
	TEST	Ф <u>Б</u>	Re										Expansive S esignation
	STRENGTH TEST	ပ ်စွ	Peak										CM = Compaction E = Swell/Pressure on Expansive Soils SL = Shrinkage Limit UW= Unit Weight W = Moisture Content K = Permeability O = Organic Content D = Dispersive RQD = Rock Quality Designation X = X-Ray Defraction HCpot = Hydro-Collapse Potential
	ST	Ф Б											CM = Compaction E = Swell/Pressure SL = Shrinkage Lir UW= Unit Weight W = Moisture Cont K = Permeability O = Organic Conte D = Dispersive RQD = Rock Quali X = X-Ray Defract HCpot = Hydro-Co
		TEST TYPE	 - -										
		⊡ %	!		A G	₽	က	-	₽				 ensity
		집 %	:		₽ B	₽	92		윤	1			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
		∃%	:		19	70	21		19				H = Hydron S = Sieve G = Specif P = Plastic LL = Liquid PL = Plasti NP = Non-H OC = Cons Ch = Chem RV = R - V,
	%	PASS #200		10.0	9.3	12.8	10.5		10.0	8.1			
3	DRY	Λ C	_										
		%M		2.3	2.9	2.7	3.0	2.1	2.6	1.9			ve ained ed pher N = (N _{css})(0.62)
		SOIL		SW-SM	SW-SM	SM	SP-SM		SP-SM	SP-SM			ompressi ied Undra I Drained I Undrain
		BLOWS per ft.			84	ď	œ	œ	œ	œ			U = Unconfined Compressive UU = Unconsolidated Undrained CD = Consolidated Drained CU = Consolidated Undrained CU = Consolidated Undrained DS = Direct Shear Φ = Friction C = Cohesion N = No. of blows per ft., sampler N = Field SPT N = Field SPT N = (Field SPT)
	SAMP-	LER TYPE		SPT	SPT	SPT	SPT	SPT	SPT	SPT			۵
	SAMPLE	DEPTH (ft)		50.0 - 50.5	55.0 - 56.5	6.09 - 60.9	65.0 - 66.0	70.0 - 70.4	75.0 - 75.9	80.0 - 80.5			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
		SAMPLE NO.		>	Z	\$	BB	8	8	Ш			CMS = California Modified SPT = Standard Penetration CS = Confinuous Sample 3 RC = Rock Core PB = Pitcher Barrel CSS = Calif. Split Spoon 2. CPT = Cone Penetration T TP = Test Pit P = Pushed, not driven R = Refusal Sh = Shelby Tube 2.87* ID

EA/Cont #

73307

Job Description Boulder City Bypass - Bridge H 2972S

Boring No.

SBA 1

Elevation (ft) 2051.4

Station "PS" 209+58, CL

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Date 03/14/2011

	VTS		= 80	= 75											
	COMMENTS		Ch, RV = 80	Ch, RV = 75											
	ပ ဖွ	sidu													e Soils
H TEST	Ф	3													on Expansiv t nt
STRENGTH TEST	ပ ဖွ	Peak													CM = Compaction E = Swell/Pressure on Expansive Soils SL = Shrinkage Limit UW= Unit Weight W = Moisture Content K = Permeability O = Organic Content D = Dispersive
S	Φ 2	8													CM = Compactic E = Swell/Press SL = Shrinkage UW= Unit Weigh W = Moisture CX K = Permeability O = Organic Co
	TEST														
	⊡ %	?	٩	-			Ą	₽	Ρ̈́	₽	₽	₽	₽	N ■	vity on
	도 %	2	٩	22			₽ B	₽	₽ P	₽	₽ B	₽	₽	₽ B	H = Hydrometer S = Sieve G = Specific Gravity PI = Plasticity Index LL = Liquid Limit PL = Plastic Limit NP = Non-Plastic OC = Consolidation
	% □		19	23			24	70	21	23	70	23	72	19	H = Hydror S = Sieve G = Specif PI = Plastic LL = Liquid PL = Plasti NP = Non-H
%	PASS #200	2	3.9	8.2	7.9	8.8	13.6	10.9	8.3	12.8	8.8	12.1	7.4	9.1	
DRY	O.V.	<u>.</u>										:			
	%M				4.6	2.8	2.8	2.9	2.6	2.6	2.6	2.2	2.8	2.7	e ned d
	SOIL)	GP	GP-GM	SP-SM	GP-GM	SM	SP-SM	SW-SM	SM	SW-SM	SM	SW-SM	SW-SM	d Compressiv idated Undrai ated Undrained ated Undraine ear
z	BLOWS				5	6	59	14	19	33	30	51	61	48	U = Unconfined Compressive UU = Unconsolidated Undrained CD = Consolidated Drained CU = Consolidated Undrained DS = Direct Shear Φ = Friction C = Cothesion N = No. of blows per ft., sampler
SAMP-	LER TYPE	I :	Bulk	Bulk	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT]
SAMPLE	DEPTH (#)		0.0 - 5.0	5.0 - 10.0	1.0 - 2.5	3.5 - 5.0	6.0 - 7.5	8.5 - 10.0	11.0 - 12.5	13.5 - 15.0	16.0 - 17.5	18.5 - 20.0	21.0 - 22.5	23.5 - 25.0	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. Spit Spoon 2.42" ID CPT = Cone Penetration Test TP = Test Pit
	SAMPLE	<u>.</u>	BULK 1	BULK 2	∢	В	O	۵	Ш	ш	ŋ	I	_	7	CMS = California Modified Sai SPT = Standard Penetration 1 CS = Continuous Sample 3.23 RC = Rock Core PB = Pitcher Barrel CSS = Calif. Split Spoon 2.42' CPT = Cone Penetration Test TP = Test Pit

EA/Cont #

73307

Job Description Boulder City Bypass - Bridge H 2972S

Boring No.

SBA 1

2051.4 Elevation (ft)

Station "PS" 209+58, CL

03/14/2011 Date

		_	_							-						1
	COMMENTS															
	ပ ်ဖွဲ့	Residual	Sinda													Soils
TEST	Ф	3														Expansive t
STRENGTH TEST	ပ ်	Peak	Jak L		• •											CM = Compaction E = Swell/Pressure on Expansive: 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
STR	Ф	Pg			:											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
	TEST															
	⊡ %	?		<u>R</u>	NP	М	Ð	В	Ą		ď	2			ď	y x L isi
	로 %	?		ΔN	NP	ΔN	ΔN	ΝP	ΝP		М	20			NP	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
	∃ %	?		17	19	18	20	23	19		19	22			20	H = Hydrometer S = Sieve G = Specific Gr Pl = Plasticity In LL = Liquid Limit PL = Plastic Lim PP = Non-Plasti OC = Consolida Ch = Chemical RV = R - Value MD = Moisture I
%	PASS #200	207		11.8	10.1	14.5	10.5	15.5	10.2	16.8	10.3	11.4	11.3	12.6	11.9	
DRY	λ C V	Ī														25)
	%M			2.4	2.1	2.8	2.5	2.3	2.4	2.6	2.3	2.1	1.7	2.0	1.8	ve ed ppler N = (N _{css})(0.62)
	SOIL	5		SP-SM	SP-SM	SM	SP-SM	SM	SP-SM	SM	SP-SM	SP-SM	SP-SM	SM	SP-SM	Compressiv dated Undrai ted Undraine ted Undraine sar s per ft., sam
z	BLOWS			21	59	82	43	34	87	œ	107	۳	œ	œ	œ	U = Unconfined Compressive UU = Unconsolidated Undrained CD = Consolidated Drained CU = Consolidated Undrained CU = Consolidated Undrained DS = Direct Shear Φ = Friction C = Cohesion N = No. of blows per ft., sampler N = Field SPT N = Field SPT
SAMP-	TER TPF	1		SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	
SAMPLE	DEPTH	<u> </u>		26.0 - 27.5	28.5 - 30.0	31.0 - 32.5	34.5 - 36.0	39.5 - 41.0	49.5 - 46.0	49.5 - 49.7	54.5 - 56.0	59.5 - 61.2	64.5 - 65.0	69.5 - 70.1	74.5 - 75.2	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
	SAMPLE	<u>.</u>		エ	٠,	Σ	z	0	۵	ø	~	S	⊢	⊃	>	CMS = California Modified Sa SPT = Standard Penetration 1 CS = Continuous Sample 3.23 RC = Rock Core PB = Pitcher Barrel CSS = Calif. Split Spoon 2.42 CPT = Cone Penetration Test TP = Test Pit P = Pushed, not driven R = Refusal Sh = Shelby Tube 2.87" ID

EA/Cont #

73307

Job Description Boulder City Bypass - Bridge H 2972S

2051.4

SBA 1 Boring No.

Elevation (ft)

Station "PS" 209+58, CL

Date

03/14/2011

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	COMMENTS																				
	ф dea.	sidu										nsive Soils						,	ation		tenuai
 STRENGTH TEST	dea.	Peak									CM = Compaction	E = Swell/Pressure on Expansive Soils	SL = Shrinkage Limit	UW= Unit Weight	W = Moisture Content	K = Permeability	O = Organic Content	D = Dispersive	RQD = Rock Quality Designation	X = X-Ray Defraction	HCpot = Hydro-Collapse Potential
Н	PI TEST % TYPE		3								NO	ü	SF	δ	×	<u>"</u>	Ö	=O	יים א	" (2
_	김 %		21								eter		: Gravity	y Index	jiji jiji	Limit	lastic	lidation	<u> </u>	lue Doogle	Te Density
_	∃ %		24								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	MU = Moisture Density
%	PASS #200		11.9									u,	Ŭ	<u>.</u>	_	а.	Z	0	0 (r a	2
DRY																				2)	
			2.2								ø	ned		Ę.				oler	:	N = (N _{css})(0.62)	
	SOIL GROUP		GP-GM								Compressiv	dated Undrai	ted Drained	ted Undraine	ar			s per ft., samı	•	-	
Z	BLOWS per ft.		ď								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	ļ	N = Field SPT	
SAMP-	LER TYPE		IdS								۵										
SAMPLE	DEPTH (#)		79.5 - 80.5								CMS = California Modified Sampler 2.42" ID	SPT = Standard Penetration 1.38" ID	CS = Continuous Sample 3.23" ID	ē	ате	CSS = Calif. Split Spoon 2.42" ID	CPT = Cone Penetration Test		ot driven	-	ube 2.87" IU
	SAMPLE NO.		۸				. <u>-</u>	_			CMS = Californ	SPT = Standan	CS = Continuo	RC = Rock Core	PB = Pitcher Barrel	CSS = Calif. Sp	CPT = Cone P.	TP = Test Pit	P = Pushed, not driven	R = Refusal	Sh = Shelby Tube 2.87" ID

EA/Cont#

73307

Job Description Boulder City Bypass - Bridge H 2972S

Boring No.

SBA 2

2050.5 Elevation (ft)

Station "PS" 210+59, CL

Date

03/15/2011

						,		,				,	,	-
COMMENTS		Ch, RV = 74	Ch, RV = 79											
O 2	g. psi Residual	:						·						
EST Ф	deg. Res													
STRENGTH TEST	Peak													
STR Ф	deg. Pe													
TEST	I YPE													
ď %	%	ΑN	Ą	ΑN	ď	NP	М	ď	ΝD	ΔN			ΔN	
P	%	鱼	물	鱼	鱼	Ą	원	Ą	М	₽			В	
 	%	20	19	19	17	28	24	21	20	18			23	
% PASS	00Z#	8.4	5.1	10.2	10.7	14.2	12.0	11.0	10.0	8.0	9.9	8.0	12.9	
DRY UW	bct													
%M				3.4	2.9	1.6	2.1	2.3	2.1	2.2	1.9	2.1	2.0	
SOIL	GROUP	MS-4S	GP-GM	SP-SM	SP-SM	SM	SP-SM	SP-SM	MS-WS	SW-SM	SW-SM	SW-SM	MS	
N BLOWS	per π.			22	20	15	35	30	17	16	22	25	59	
SAMP- LER	1 7 7 5	Bulk	Bulk	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	
SAMPLE DEPTH #)	(II)	0.0 - 5.0	5.0 - 10.0	1.0 - 2.5	3.5 - 5.0	6.0 - 7.5	8.5 - 10.0	11.0 - 12.5	13.5 - 15.0	16.0 - 17.5	18.5 - 20.0	21.0 - 22.5	23.5 - 25.0	
SAMPLE	O	BULK 1	BULK 2	۷	В	၁	Q	Ш	щ.	9	I	_	٦	

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

o - Olicolillied Collibrasive	UU = Unconsolidated Undrained	CD = Consolidated Drained	CU = Consolidated Undrained	DS = Direct Shear	Φ = Friction	C = Cohesion	N = No. of blows per ft., sampler	
2								

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	
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	

* = Average of subsamples

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

N = Field SPT

P = Pushed, not driven R = Refusal Sh = Shelby Tube 2.87" ID

EA/Cont #

73307

Job Description Boulder City Bypass - Bridge H 2972S

2050.5

Elevation (ft)

Boring No.

SBA2

Station "PS" 210+59, CL

Date

03/15/2011

	SAMPLE	SAMP-	z			DRY	%				ŀ	TREN('H TEST			
SAMPLE	DEPTH	LER	BLOWS	SOIL	%M	۸n	PASS #200	∃ %	┨%	⊡ %	TEST	Φ C	o o	ပ <u>်ရ</u>	COMMENTS	
	(m)					3	207	2	?	₹		Peak	ŝ	sidu		
t	26.0 - 27.5	SPT	œ	SM	2.3		17.0	23	Ā	₽						
	28.5 - 30.0	SPT	56	SW-SM	2.6		9.0	22	٩	Ą						
	34.5 - 36.0	SPT	29	SW-SM	2.1		8.5	19	₽	₽						
	39.5 - 41.0	SPT	51	SP-SM	2.2		11.3	19	٩	₽						
	44.5 - 46.0	SPT	29	SW-SM	2.2		9.7	19	М	Ą						
	49.5 - 51.0	SPT	43	SW-SM	2.0		8.1	20	鱼	₽				1		
	54.5 - 56.0	SPT	120	SW-SM	2.2		9.8	26	윤	₽ N						
	59.5 - 61.0	SPT	72	SW-SM	1.6		8.9	21	₽	٩						
	64.5 - 66.0	SPT	62	SM	1.6		12.8	20	鱼	₽ B						
	69.5 - 70.0	SPT	œ		2.3			27	24	က						
1	74.5 - 74.6	SPT	œ		1.4											
CMS = California SPT = Standard CS = Continuous RC = Rock Core PB = Pitcher Bar CSS = Calif. Splii CPT = Cone Pen TP = Test Pit P = Pushed, not of R = Refusal Sh = Shelby Tub	CMS = California Modified Sampler 2.42" ID SPT = Standard Penetration 1.38" ID CS = Continuous Sample 3.23" ID RC = Rock Core 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	Ω.	U = Unconfined C UU = Unconsolidate CD = Consolidate CU = Consolidate CD = Friction C = Friction C = Cohesion N = No. of blows p	d Compressi ilidated Undra ated Drained ated Undrain tear	ve ained ed npler npler N = (N _{css})(0.62)	62)		H = Hydrometer S = Sieve G = Specific Gravit PI = Plasticity Index LL = Liquid Limit PL = Plastic Limit NP = Non-Plastic CC = Consolidation Ch = Chemical RV = R - Value MD = Moisture Den	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	<u>.</u>	0 0 2 . 2 0 2 1	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	on Expansive int ent t t nt y Designation nn apse Potentië	Soils		
				,												

EA/Cont #

73307

Job Description Boulder City Bypass - Railroad Bridge

Boring No.

RRBA 1

2384.8 Elevation (ft)

Station "P" 96+75, 52' Rt.

Date

03/16/2011

	SAMPLE	SAMP-	z			DRY	%			F		STREN	STRENGTH TEST	ST		
SAMPLE NO.	DEPTH (ft)	LER TYPE	BLOWS per ft.	SOIL	%M	oct OW	PASS #200	∃%	김 %	≣ %	TEST TYPE	deg.	ာ Sgi	e de	ာ Sei	COMMENTS
												Peak		Residual	lual	
∢	6'9 - 0'9	SPT		GP-GM	3.4		10.1	24	A D	В						
Ф	10.0 - 10.3	SPT														
U	15.0 - 15.1	SPT														
۵	20.0 - 21.5	SPT	18	GW-GM	2.3		9.6	56	24	2						
Ш	25.0 - 26.5	SPT	105	SP-SM	2.4		12.0	23	21	2						
Щ	30.0 - 30.8	SPT		SM	2.7		16.7	43	33	10						
ტ	35.0 - 36.1	SPT		GP-GM	2.8		11.1	39	31	80						
I	40.0 - 41.5	SPT	02	В	3.2		12.7	45	32	13						
	45.0 - 45.5	SPT		GP-GM	2.3		11.6									
~	50.0 - 50.5	SPT		SM	1.6		14.9									
ㅈ	55.0 - 55.5	SPT			3.7		19.9									
7	60.0 - 60.5	SPT		SM	5.6		21.2									
CMS = Califc SPT = Standi	CMS = California Modified Sampler 2.42" ID SPT = Standard Penetration 1.38" ID	Ω	U = Unconfined Compressive UU = Unconsolidated Undrained	ed Compressi	ve ained			H = Hydrometer S = Sieve	meter		0 11	CM = Compaction E = Swell/Pressure on Expansive Soils	on ure on Exp	ansive Soils		

CMS = California Modified Sampler 2.42" ID	U = Unconfined Compressive	ressive
SPT = Standard Penetration 1.38" ID	UU = Unconsolidated Undrained	Jndrained
CS = Continuous Sample 3.23" ID	CD = Consolidated Drained	ained
RC = Rock Core	CU = Consolidated Undrained	drained
PB = Pitcher Barrel	DS = Direct Shear	
CSS = Calif. Split Spoon 2.42" ID	Φ = Friction	
CPT = Cone Penetration Test	C = Cohesion	
TP = Test Pit	N = No. of blows per ft., sampler	, sampler
P = Pushed, not driven		
R = Refusal	N = Field SPT	N) II N
Sh = Shelby Tube 2.87" ID		

Sive	n – nydronietei
rained	S = Sieve
Ď	G = Specific Gravity
ined	PI = Plasticity Index
	LL = Liquid Limit
	PL = Plastic Limit
	NP = Non-Plastic
ımpler	OC = Consolidation
	Ch = Chemical
$N = (N_{css})(0.62)$	RV = R - Value
	MO - Moishus Doseih

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

* = Average of subsamples

EA/Cont #

73307

Job Description Boulder City Bypass - Railroad Bridge

Boring No.

RRBA 1

2384.8

Elevation (ft)

Station "P" 96+75, 52' Rt.

Date

03/16/2011

	SAMPLE	SAMP.	z			DRY	%					STRENGTH TEST	TEST			
SAMPLE	DEPTH	LER	BLOWS per ff.	SOIL	%M	of C	PASS #200	ן%	┨%	PI TEST %	9	ပ 🛚	о <u>Б</u>	၁ <u>ig</u>	COMMENTS	
į						Ĺ		!				Peak	Re	Residual		
Σ	65.0 - 65.5	SPT		SM	3.4		12.5	21	20	1						
z	70.0 - 70.5	SPT		GP-GM	3.2		9.6	27	22	5						
0	75.0 - 75.5	SPT		SP-SM	3.9		11.1									
]									
												,				
CMS = Califor	CMS = California Modified Sampler 2.42" ID	<u>α</u> .	U = Unconfine	U = Unconfined Compressive	é			H = Hydrometer	neter		CM = C	CM = Compaction				
SPT = Standa	SPT = Standard Penetration 1.38" ID		UU = Unconsolidated Undrained	Nidated Undra	ined			S = Sieve			E = SW	E = Swell/Pressure on Expansive Soils	Expansive S	oils		
CS = Continu	CS = Continuous Sample 3.23" ID		CD = Consolidated Drained	lated Drained				G = Specific Gravity	fic Gravity		SF = SI	SL = Shrinkage Limit				
RC = Rock Core	ore		CU = Consolidated Undrained	dated Undraint	Da.			Pi = Plasticity Index	ity Index		∩=M∩	UW= Unit Weight				
PВ = Pitcher Ваrrel	Вате		DS = Direct Shear	hear				LL = Liquid Limit	Limit		W= Mc	W = Moisture Content				
CSS = Calif. (CSS = Calif. Split Spoon 2.42" ID		Φ = Friction					PL = Plastic Limit	c Limit		K⊨Pel	K = Permeability				
CPT = Cone	CPT = Cone Penetration Test		C = Cohesion					NP = Non-Plastic	Plastic		င် (၁)	O = Organic Content				
TP = Test Pit	;		N = No. of blows per ft., sampler	ws per ft., sam	pler			OC = Consolidation	olidation		D = Dis	D = Dispersive	1			
P = Pushed, not driven	not driven		:		;	í		Cn = Cnemical	<u> </u>		אלק אלק אלק	KUD ≅ Kock Quality Designation	noneu6ra			
R = Refusal	R = Refusal es = escitor T. to 2 677 ID		N = Field SPT		N = (N _{css})(0.62)	62)		RV = R - Value MD = Moisture I	KV = K - Value M∩ = Moisture Density	3	7 = A-r	X = X-Kay Defraction HCnot = Hxdro-Collanse Potential	Potential			
Sn = Sneiny	Inde 2.57" ID							MIC - MICE	100 pm	٠.	5	- 119410-V-0414F	-			

EA/Cont #

73307

Job Description Boulder City Bypass - Bridge H 2972S

RRBP 1

Boring No.

2376.7 Elevation (ft)

Station "P" 98+54, 25' Lt.

Date

03/16/2011

	COMMENTS		Ch, RV = 66					No Recovery	No Recovery	No Recovery	No Recovery		No Recovery		
	ပ isa	Residual													solis
TEST	o 6	Re													Expansive S signation
STRENGTH TES	ပ <u>ig</u>	Peak													CM = Compaction E = Swell/Pressure on Expansive Soils SL = Shrinkage Limit UW= Unit Weight W = Moisture Content K = Permeability O = Organic Content D = Dispersive RQD = Rock Quality Designation X = X-Ray Defraction HCpot = Hydro-Collapse Potential
STR	Ф В	Pe													CM = Compaction E = Swell/Pressure on SL = Shrinkage Limit UW= Unit Weight W = Moisture Content K = Permeability O = Organic Content D = Dispersive RQD = Rock Quality C X = X-Ray Defraction HCpot = Hydro-Collap
	TEST TYPE														
	⊡ %		8	₽	₽										y × n sist
	로 %	:	21	₽	Ā	1									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
	∃%	!	29	23	36										H = Hydromete S = Sieve G = Specific G PI = Plasticity if LL = Liquid Lim PL = Plastic Lin NP = Non-Plast OC = Consolidd Ch = Chemical RV = R - Value MD = Moisture
%	PASS #200		10.9	11.5	13.1		10.1					17.6	į	20.0	
DRY	oct C	-							į						(29
	%M			9.2	6.6	6.0	1.7					3.3		4.2	ve ined ed ppler N = (N _{css})(0.62)
	SOIL		GP-GC	SP-SM	SM		GP-GM					SM		SM	I Compressiv dated Undrained ted Undraine ted Undraine sar
z	BLOWS per ft.														U = Unconfined Compressive UU = Unconsolidated Undrained CD = Consolidated Drained CU = Consolidated Undrained DS = Direct Shear Φ = Friction C = Cohesion N = No. of blows per ft., sampler N = Field SPT N = Field SPT
SAMP-	LER TYPE		Bulk	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	
SAMPLE	DEPTH (ft)		32.0 - 35.0	5.0 - 5.6	10.0 - 11.5	15.0 - 15.3	20.0 - 20.3	25.0 - 25.1	30.0 - 30.1	35.0 - 35.1	40.0 - 40.1	45.0 - 45.4		50.0 - 50.5	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 Shelby Tube 2.87" ID
	SAMPLE NO.		BULK 1	∢	ω	ပ	۵	Ш	Ш	Ŧ	-	7	ㅗ	7	CMS = California Modified SPT = Standard Penetratio CS = Continuous Sample 3 RC = Rock Core PB = Pitcher Barrel CSS = Calif. Split Spoon 2. CPT = Cone Penetration T TP = Test Pit P = Pushed, not driven R = Refusal Sh = Shelby Tube 2.87" ID

EA/Cont#

73307

Job Description Boulder City Bypass - Bridge H 2972S

Boring No.

RRBP 1

2376.7 Elevation (ft)

Station "P" 98+54, 25' Lt.

Date

03/16/2011

	COMMENTS										
-	C Dsi	Residual									<u>s</u>
<u>rest</u>	o ge	Res									Expansive So signation
STRENGTH TEST	ပ <u>အ</u>	Peak									CM = Compaction E = Swell/Pressure on Expansive Soils SL = Shrinkage Limit UW= Unit weight W = Moisture Content K = Permeability O = Organic Content D = Dispersive RQD = Rock Quality Designation X = X-Ray Defraction HCpot = Hydro-Collapse Potential
STE	e e	, L									CM = Compaction E = Swell/Pressure or SL = Shrinkage Limit UW= Unit Weight W = Moisture Content K = Permeability O = Organic Content D = Dispersive RQD = Rock Quality X = X-Ray Defraction HCpot = Hydro-Collal
	TEST TYPE										
ŀ					6 0	1 12					sravity ndex nuit mit ctic ctic color
-	니 				23 20	33 21					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
%	% 0		20.2	19.2	13.4	19.6					ま v o g コ g A Q 2 g M M
DRY	DC O										
-	%M		3.8	5.0	4.4	5.4					ve iined ed pler N = (N _{css})(0.62)
F	SOIL		SM	SM	SM	SC					Compressive ated Undrained at Undrained at Undrained on n
z	نړ کې نړ										U = Unconfined Compressive UU = Unconsolidated Undrained CD = Consolidated Drained CU = Consolidated Undrained CU = Consolidated Undrained DS = Direct Shear Φ = Fri Φ = Friction C = Cohesion N = No. of blows per ft., sampler N = Field SPT N = Field SPT
SAMP-	LER TYPE		SPT	SPT	SPT	SPT]
SAMPLE	DEPTH (#)		60.0 - 60.4	70.0 - 70.3	75.0 - 76.4	80.0 - 80.8					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
	SAMPLE NO.		Σ	z	0	۵					CMS = California Modified SPT = Standard Penetratio CS = Continuous Sample 3 RC = Rock Core PB = Pitcher Barrel CSS = Calif. Split Spoon 2. CPT = Cone Penetration TT P = Test Pit P = Pushed, not driven R = Refusal Sh = Shelby Tube 2.87* ID

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

05/2011	
9	
ģ	

	COMMENTS						No Recovery								
	C psi	Residual													sic
TEST	IV WI	Res													expansive So
STRENGTH TEST	O is	Peak													CM = Compaction E = Swell/Pressure on Expansive Soils SL = Shrinkage Limit UW= Unit weight W = Moisture Content K = Permeability O = Organic Content D = Dispersive RQD = Rock Quality Designation X = X-Ray Defraction HCpot = Hydro-Collapse Potential
STS	φ . deg	Д.													CM = Compaction E = Swell/Pressure or SL = Shrinkage Limit UW= Unit Weight W = Moisture Content K = Permeability O = Organic Content D = Dispersive RQD = Rock Quality I X = X-Ray Defraction HCpot = Hydro-Collap
	TEST TYPE														
L	⊡ %		ΝP		₽			₽ B			19	10			vity lex t : on ensity
_	곱 %		ΑN		₽			₽			6	26			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
_	, ;		24		56	-		70			38	36			H = Hydron S = Steve G = Specif PI = Plastic LL = Liquid PL = Plastic NP = Non-4 NP = Non-4 NP = Non-4 NP = Non-4 NP = Non-4 NP = Non-4 NP = Non-4 NP = Non-4 NP = Non-4
%	PASS #200		9.1		8.6	27.1	\ 	9.8			28.1			13.4	
DRY	DQ.														
	%M		2.5		3.1	3.4		2.7			6.4	5.6		2.5	ve ed pler N = (N _{cas})(0.62)
	SOIL GROUP		GW-GM		GP-GM			GW-GM			SC			SM	d Compressividated Undrained Interesting Undrained Interesting Int
z	BLOWS per ft.		34		88			98							U = Unconfined Compressive UU = Unconsolidated Undrained CD = Consolidated Drained CU = Consolidated Undrained DS = Direct Shear Φ = Friction C = Cohesion N = No. of blows per ft., sampler N = Field SPT N = (
SAMP-	LER TYPE		SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	
SAMPLE	DЕРТН (ft)		5.0 - 6.5	10.0 - 10.5	15.0 - 15.5	20.0 - 20.5	25.0 - 25.2	30.0 - 31.5	35.0 - 35.5	40.0 - 40.5	45.0 - 46.0	50.0 - 50.4	55.0 - 55.2	60.0 - 60.5	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
	SAMPLE NO.		۷	മ	U	۵	Ш	Ш	၅	I		7	ス		CMS = California Modified Sar SPT = Standard Penetration 1 CS = Continuous Sample 3.23 RC = Rock Core PB = Pitcher Barrel CSS = Calif. Spit Spoon 2.42* CPT = Cone Penetration Test TP = Test Pit P = Pushed, not driven R = Refusal Sh = Shelby Tube 2.87* ID

* = Average of subsamples

EA/Cont#

73307

Job Description Boulder City Bypass - Railroad Bridge

Boring No.

RRBA 2

2381.2 Elevation (ft)

Station "P" 100+61, 125' Lt.

Date

04/05/2011

	SAMPLE	SAMP-	z			DRY	%	r	ŀ	ŀ		STRENGTH TEST	TEST			
SAMPLE NO.	DEPTH (ft)	LER	BLOWS per ft.	SOIL	%M	M Jo	PASS #200	∃%	┨%	۳. % ته	TEST TYPE	deq.	de de	C isi	COMMENTS	
] : :)					}			Peak	Re	Residual		
Σ	65.0 - 65.3	SPT		SM	2.9		18.0									
z															No Recovery	
0	75.0 - 76.2	SPT		SP-SM	3.0		11.5	23	22	·						
۵	80.0 - 81.2	SPT		GP-GM	2.0		11.2									
CMS = Califo	CMS = California Modified Sampler 2 42" ID	₽	U = Unconfined Compressive	ed Compressiv	ę.			H = Hvdrometer	neter		Š	CM = Compaction				
SPT = Stands	SPT = Standard Penetration 1.38" ID	!	UU = Unconsolidated Undrained	olidated Undra	peu			S = Sieve			Ë	E = Swell/Pressure on Expansive Soils	Expansive S	oils		
CS = Continu	CS = Continuous Sample 3.23" ID		CD = Consolidated Drained	lated Drained				G = Specific Gravity	fic Gravity		S	SL = Shrinkage Limit				
RC = Rock Core	ore		CU = Consolidated Undrained	lated Undraine	Þ			PI = Plasticity Index	city Index		<u> </u>	UW= Unit Weight				
PB = Pitcher Barrel	Вате		DS = Direct Shear	ıear				LL = Liquid Limit	Limit		≥ 2	W = Moisture Content				
CSS = Calif.	CSS = Calif. Split Spoon 2.42" ID		ψ = Friction					PL = Plastic Limit NP = Non-Plastic	IC LIMIT Plastic			n = Permeability O = Organic Content				
TP = Test Pit	Near Incapaga		N = No. of blows per ft., sampler	ws per ft., sam	pler			OC = Consolidation	solidation		<u>ۃ</u>	D = Dispersive				
P = Pushed, not driven	not driven							Ch = Chemical	nical		8	RQD = Rock Quality Designation	esignation			
R = Refusal			N = Field SPT		$N = (N_{css})(0.62)$	62)		RV = R - Value	alue		×	X = X-Ray Defraction				
Sh = Shelby	Sh = Shelby Tube 2.87" ID							MD = Mois	MD = Moisture Density	_	오	HCpot = Hydro-Collapse Potential	se Potential			

EA/Cont #

73307

Job Description Boulder City Retaining Walls

Boring No.

BRW 1

2356.12 Elevation (ft)

Station "P" 106+60 95' Rt.

Date

11/06/2009

	SAMPLE	SAMP-	Z G	Ş	18/0/	DRY	%°°°	=	ō	Ī	1001	TREN	STH TES	 - -		STINDINGS	
(ft) TYPE	TYPE	111	BLOWS per ft.	SOIL	%	bct O.W.	#200	∃%	┨%	ī%	TYPE	deg.	Si C	deg. pi Residual	Si E	COMMENIS	
5.0 - 6.5	SP		108	SW-SM			11.8										
10.0 - 11.5 SPT	S	F	56	GW-GM			12.0										
15.0 - 16.5 S	S	SPT	33	SW-SM			6.7										1
20.0 - 21.5 S	တ	SPT	105	SW-SM			6.6										1
25.0 - 26.5	0,	SPT	œ					24	20	4							
30.0 - 31.5		SPT	R	GW-GM			9.6										l
35.0 - 36.5		SPT														Visual Only - Cuttings	
0.0 - 5.0		Auger		GP-GM			9.3	21	₽	₽						RV = 73	
5.0 - 10.0		Auger		GP-GC			8.9	25	21	4						RV = 77	
											•						
																	ı
CMS = California Modified Sampler 2.42" ID	٥		U = Unconfine	U = Unconfined Compressive	Φ			H = Hydrometer	neter		0	CM = Compaction	_				
SPT = Standard Penetration 1.38" ID		-	UU = Unconso	UU = Unconsolidated Undrained	peu		•,	S = Sieve			Ш	E = Swell/Pressure on Expansive Soils	e on Expar	nsive Soils			
CS = Continuous Sample 3.23" ID		_	CD = Consolidated Drained	ated Drained			•	G = Specific Gravity	ic Gravity		S	SL = Shrinkage Limit	mit				
		7	CU = Consolid	CU = Consolidated Undrained	70		ш.	PI = Plasticity Index	ity Index		_	UW= Unit Weight					
		-	DS = Direct Shear	lear			_	LL = Liquid Limit	Limit		>	W = Moisture Content	tent				
CSS = Calif. Split Spoon 2.42" ID			Φ = Friction				ш	PL = Plastic Limit	c Limit		¥	K = Permeability					
CPT = Cone Penetration Test			C = Cohesion				2	NP = Non-Plastic	Plastic		O	O = Organic Content	ent				
		_	N = No. of blow	N = No. of blows per ft., sampler	oler		O	OC = Consolidation	olidation			D = Dispersive					
							U	Ch = Chemical	Ē		nz :	RQD = Rock Quality Designation	lity Designa	ation			
í			N ≈ Field SPT	z	$N = (N_{css})(0.62)$	_	u	RV = R - Value	aine		×	X = X-Ray Defraction	tion	;			
Sh = Shelby Tube 2.87" ID							κ.	AD = Mois	MD = Moisture Density	≿	L	HCpot = Hydro-Collapse Potential	ollapse Pot	ential			

73307 EA/Cont #

Job Description Boulder City Retaining Walls

BRW 2

Boring No.

Elevation (ft)

2338.60

Station "P" 106+60 110' Rt.

Date

11/06/2009

	SAMPLE	SAMP.	Z			DRY	%		\mid	-		STRENGTH TEST	TEST			
SAMPLE NO.	DEPTH (#)	LER	BLOWS per ft.	SOIL	%M	oc (P A SS #200	∃ %	┨%	۱۳ × ۲ × ۲ × ۲ × ۲ × ۲ × ۲ × ۲ × ۲ × ۲ ×	TEST Ф	G. C.	Φ 🖁	C	COMMENTS	
	,		_			L		!	!	-	i.	Peak	Re	Residual		
A	5.0 - 5.3	SPT	N.	В			13.4								:	
Ф	10.0 - 11.5	SPT	36					22	g G	₽						
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	က					RV = 83	
					:											
CMS = Califor	CMS = California Modified Sampler 2.42" ID	۵	U = Unconfine	U = Unconfined Compressive	ě			H = Hydrometer	neter		CM CM	CM = Compaction				
SPT = Standa	SPT = Standard Penetration 1.38" ID		UU = Unconso	UU = Unconsolidated Undrained	ined			S = Sieve			E=S	E = Swell/Pressure on Expansive Soils	Expansive 5	Soils		
CS = Continuo	CS = Continuous Sample 3.23* ID		CD = Consolidated Drained	dated Drained				G = Specific Gravity	fic Gravity		}= 7s	SL = Shrinkage Limit				
RC = Rock Core	ore		CU = Consolidated Undrained	dated Undrain	pa			P! = Plasticity Index	ity Index		= MO	UW= Unit Weight				
PB = Pitcher Barrel	Sarrel		DS = Direct Shear	hear				LL = Liquid Limit			≥ (} }	W = Moisture Content				
CSS = Calif. 5	CSS = Calif. Split Spoon 2.42" ID		Φ ≈ Friction					PL = Plastic Limit	c Limit		Α (Ε	K = Permeability				
CPT = Cone F	CPT = Cone Penetration Test		C = Cohesion					NP = Non-Plastic	Plastic) i	U = Organic Content				
TP = Test Pit			N = No. of blo	N = No. of blows per ft., sampler	ıpler			OC = Consolidation	solidation		0=0	D = Dispersive	nosionation			
P = Pushed, not dnven	not dnven		TOO Ploid - IV		(C9 U) (N) = N	(53)	_		<u> </u>		۲ : ۱ : ۲ :	X = X-Bay Defraction) dolg:			
Sh = Shelby Tube 2.87" ID	ube 2.87" ID		5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5		- \140081/ - N	,76		MD = Mois	MD = Moisture Density		HCpot	HCpot = Hydro-Collapse Potential	se Potential			

73307 EA/Cont #

Job Description Boulder City Retaining Walls

BRW 3 Boring No.

2336.50

Elevation (ft)

Station "P" 110+80 120' Rt.

Date

11/06/2009

		SAMP-				DRY	%					STRE	STRENGTH TEST	ST		
SAMPLE NO.	DEPTH (ft)	LER	BLOWS per ft.	SOIL GROUP	%M	O.W	PASS #200	∃%	로 %	≅ %	TEST TYPE	0 9	ာ isi	o deg	ာ Sei	COMMENTS
										:		Peak	¥	Residual	dual	
A	5.0 - 6.5	SPT	82	WS-WS			11.7									
Ф	10.0 - 11.5	SPT	œ					24	23	-						
၁	15.0 - 16.5	SPT	54					22	₽	₽			,			
Q	20.0 - 21.5	SPT	œ	ВМ-СМ			14.2									
Ш	25.0 - 26.5	SPT	39					20	₽	₽						
Щ	30.0 - 31.5	SPT	115	SW-SM			9.3	20	₽	В						
9	35.0 - 36.5	SPT	X	SW-SM			9.2									
工	40.0 - 41.5	SPT	113	SW-SM			6.9									
_	45.0 - 46.5	SPT	œ	SP-SM			8.8									
ŗ	50.0 - 51.5	SPT	œ	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 = Califor	CMS = California Modified Sampler 2.42" ID	<u></u>	U = Unconfin	U = Unconfined Compressive	9			H = Hydrometer	meter		Ŭ	CM = Compaction	tion			

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
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	CS = Continuous Sample 3.23" ID RC = Rock Core PB = Pitcher Barrel CSS = Calif. Split Spoon 2.42" ID CPT = Cone Penetration Test	RC = Rock Core PB = Pitcher Barrel CSS = Calif. Split Spoon 2.42" ID CPT = Cone Penetration Test	PB = Pitcher Barrel CSS = Calif. Split Spoon 2.42" ID CPT = Cone Penetration Test	CSS = Calif. Split Spoon 2.42" ID CPT = Cone Penetration Test	CPT = Cone Penetration Test	
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	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	RC = Rock Core PB = Pitcher Barrel CSS = Calif. Split Spoon 2.42" ID CPT = Cone Penetration Test TP = Test Pit	PB = Pitcher Barrel CSS = Calif. Split Spoon 2.42" ID CPT = Cone Penetration Test TP = Test Pit	CSS = Calif. Split Spoon 2.42" ID CPT = Cone Penetration Test TP = Test Pit	CPT = Cone Penetration Test TP = Test Pit	TP = Test Pit
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	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	RC = Rock Core PB = Pitcher Barrel CSS = Calif. Split Spoon 2.42" ID CPT = Cone Penetration Test TP = Test Pit P = Pushed, not driven	PB = Pitcher Barrel CSS = Calif. Split Spoon 2.42" ID CPT = Cone Penetration Test TP = Test Pit P = Pushed, not driven	CSS = Calif. Split Spoon 2.42" ID CPT = Cone Penetration Test TP = Test Pit P = Pushed, not driven	CPT = Cone Penetration Test TP = Test Pit P = Pushed, not driven	TP = Test Pit P = Pushed, not driven

CU = Consolidated Undrained DS = Direct Shear

N = No. of blows per ft., sampler C = Cohesion

E = Swell/Pressure on Expansive Soils W = Moisture Content SL = Shrinkage Limit UW= Unit Weight K = Permeability D = Dispersive Ch = Chemical RV = R - Value MD = Moisture Density G = Specific Gravity PI = Plasticity Index OC = Consolidation NP = Non-Plastic H = Hydrometer S = Sieve PL = Plastic Limit LL = Liquid Limit

O = Organic Content

RQD = Rock Quality Designation X = X-Ray Defraction HCpot = Hydro-Collapse Potential

* = Average of subsamples

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

N = Field SPT

R = Refusal Sh = Shelby Tube 2.87" ID

EA/Cont#

Job Description Boulder City Retaining Walls

73307

BRW 4

Boring No.

2325.30 Elevation (ft)

Station "P" 112+90 120' Rt.

Date

11/06/2009

	COMMENTS								No Recovery		Visual Only		RV = 77	RV = 77
	deg.	Residual												
4 TEST	Φ jg	1 1												
STRENGTH TEST	S isi	Peak							,					
	g e										, ,			
	TEST TYPE													
L	₫%					鱼	₽ B			Ā		·	₽	₽
L	┨%					₽	₽			₽			Α	A P
_	% L					20	18			22			24	23
%	P A SS #200		7.5	7.7	7.1			3.8					7.1	9.3
DRY	pct CM													
	%M													
	SOIL GROUP		МЭ-МЭ	GW-GM	SW-SM			SW					GP-GM	GP-GM
z	BLOWS per ft.		35			58	æ	æ	æ	æ	æ	R		,
_	LER TYPE		SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	Auger	Auger
SAMPLE	DEPTH (ft)		5.0 - 6.5	10.0 - 11.5	15.0 - 16.5	20.0 - 21.5	25.0 - 26.5	30.0 - 31.5	35.0 - 36.0	40.0 - 41.5	45.0 -	50.0 - 50.1	0.0 - 5.0	5.0 - 10.0
	SAMPLE NO.		Y	В	U	Q	ш	ш	უ	ェ	_	ſ	RV1	RV2

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

	ō			
U = Uncontined Compressive	UU = Unconsolidated Undrained	CD ≂ Consolidated Drained	CU = Consolidated Undrained	DS = Direct Shear
	nn =	₽ CD	=no	DS=
2				

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

> R = Refusal Sh = Shelby Tube 2.87" ID P = Pushed, not driven

C = Cohesion Φ = Friction

E = Swell/Pressure on Expansive Soils SL = Shrinkage Limit UW= Unit Weight H = Hydrometer S = Sieve G = Specific Gravity PI = Plasticity Index OC = Consolidation PL = Plastic Limit LL = Liquid Limit NP = Non-Plastic RV = R - Value Ch = Chemical

RQD = Rock Quality Designation O = Organic Content D = Dispersive W = Moisture Content K = Permeability

CM = Compaction

HCpot = Hydro-Collapse Potential X = X-Ray Defraction

MD = Moisture Density

Boulder City Bypass

Job Description

73307

EA/Cont #

Boring No.	o. RRC1				Elevation (ft)	u (£)		2371.79			Ø	Station "P" 100 + 75 CL	+ 75 CL	Date 01/25/2007
	SAMPLE	SAMP-	z			DRY	%					STRENGTH TEST	rest	
SAMPLE NO.	ДЕРТН (ft)	LER TYPE	BLOWS per ft.	SOIL	%M	UW	PASS #200	"" %	PL %	M %	TEST	φ C deg. psi Peak	φ C deg. psi	COMMENTS
RV1	0.0 - 5.0	Auger		ВМ			12.1	24	₽ Q	₽ B				RV = 81, pH = 7.4, Res. = 3534 ohm-cm
RV2	5.0 - 10.0	Auger		GP-GM			8.2	25	₽ D	₽ B				RV = 85, pH = 8.0, Res. = 1241 ohm-cm
RV3	10.0 - 15.0	Auger		GM			12.9	30	24	9				RV = 74, pH = 8.0, Res. = 560 ohm-cm
RV4	15.0 - 20.0	Auger		GP-GM			11.6	30	24	9				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	9				RV = 81, pH = 8.0, Res. = 520 ohm-cm
∢	5.0 - 6.1	SPT	æ	SP-SM	3.5		12.7							
Ф	10.0 - 10.1	SPT	æ											
U	15.0 - 15.2	SPT	æ											
۵	20.0 - 20.3	SPT	æ	SP-SM	1.5		11.2							
ш	25.0 - 25.03	SPT	æ											
CMS = California Modified SPT = Standard Penetratio CS = Continuous Sample 3 RC = Rock Core PB = Pitchre Barrel CSS = Calif. Split Spoon 2. CPT = Cone Penetration T TP = Test Pit P = Pushed, not driven R = Refusal Sh = Shelby Tube 2.87" ID	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 Q = Friction C = Cohesion N = No. of blows per ft., sampler N = Field SPT N = Field SPT	U = Unconfined Compressive UU = Unconsolidated Undrained SD = Consolidated Undrained SU = Consolidated Undrained SS = Direct Shear Q = Friction C = Cohesion N = No. of blows per ft., sample	ve sined ed pler N = (N _{css})(0.62)	(5)		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	neter ic Gravity ity Index Limit Limit Limit Plastic Olidation ical alue ure Densii	>	g m ω 2 ≥ ⊼ 6 σ & × ‡	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	expansive Soils signation	

* = Average of subsamples

Boulder City Bypass

Job Description

73307

EA/Cont #

Boring No.	o. RRC2			~	Elevation (ft)	(ft)	N	2387.12			Σ	Station "P" 96 + 50 12' Rt.	- 50 12' Rt.	۵	Date 01/25/2007
	SAMPLE	SAMP-	z			DRY	%			H		STRENGTH TEST	FEST	\vdash	
SAMPLE NO.	ДЕРТН (ft)	LER TYPE	BLOWS per ft.	SOIL	%M	UW	PASS #200	% Tr	PL %	PI T %	TEST TYPE	φ C deg. psi	o deg.	C psi	COMMENTS
						. J		:	:			Peak	esidu		
RV1	0.0 - 4.0	Auger		ВЭ		-	19.9	29	23	9					RV = 65, pH = 7.7, Res. = 647 ohm-cm
RV2	4.0 - 9.0	Auger		SM			20.2	34	26	80					RV = 75, pH = 8.0, Res. = 655 ohm-cm
RV3	9.0 - 14.0	Auger		GP-GM			10.5	31	25	9					RV = 81, pH = 8.2, Res. = 696 ohm-cm
RV4	14.0 - 19.0	Auger		SM			19.4	34	27	2					RV = 74, pH = 8.2, Res. = 696 ohm-cm
RV5	19.0 - 24.0	Auger		SM			19.2	36	28	ω				<u>.</u>	RV = 72, pH = 8.3, Res. = 936 ohm-cm
RV6	24.0 - 29.0	Auger		ωg			16.8	43	30	13					RV = 70, pH = 8.3, Res. = 938 ohm-cm
RV7	29.0 - 34.0	Auger		ΒÖ			14.1	48	31	17					RV = 70, pH = 8.5, Res. = 994 ohm-cm
RV8	34.0 - 39.0	Auger		GP-GM			8.9	20	29	21					RV = 61, pH = 8.4, Res. = 943 ohm-cm
RV9	39.0 - 44.0	Auger		GP-GM			6.8	49	30	19				<u> </u>	RV = 64, pH = 8.6, Res. = 1088 ohm-cm
RV10	44.0 - 49.0	Auger		GP-GM			10.6	48	30	18				Œ	RV = 72, pH = 8.5, Res. = 1066 ohm-cm
												i		-	
CMS = Califor	CMS = California Modified Sampler 2.40" ID	Ω	U = Unconfine	U = Unconfined Compressive	φ		ı	H = Hydrometer	eter		5	CM = Compaction			
SPT = Standa	SPT = Standard Penetration 1.38" ID		UU = Unconsc	UU = Unconsolidated Undrained	peu			S = Sieve			Ü	E = Swell/Pressure on Expansive Soils	Expansive Soils		
CS = Continuo	CS = Continuous Sample 3.23" ID		CD = Consolidated Drained	lated Drained			-	G = Specific Gravity	c Gravity		ਲ ਂ	SL = Shrinkage Limit			
RC = Rock Core	ore		CU = Consolidated	CU = Consolidated Undrained	ğ		-	PI = Plasticity Index	ity Index I imit		5 ≩	UW= Unit Weight W = Moisture Content			
CSS = Calif. S	CSS = Calif. Split Spoon 2.42" ID		(t) = Friction	uo.			а.	PL = Plastic Limit	: Limit		χ.	K = Permeability			
CPT = Cone F	CPT = Cone Penetration Test		0				~	NP = Non-Plastic	'lastic		0	O = Organic Content			
TP = Test Pit			N = No. of blov	N = No. of blows per ft., sampler	pler			OC = Consolidation	olidation		۵ ۵	D = Dispersive	1		
P = Pushed, not driven	not driven		i i				J (Ch = Chemical	<u>. g</u>		ť >	RQD = Rock Quality Designation	ssignation		
R = Refusal Sh = Shelby Tube 2.87" ID	ube 2.87" ID		N = Field SPT		N = (N _{css})(0.62)	•	. 2	RV = R - Value MD = Moisture Density	alue ure Densit	>-	¥Ξ	x = x-kay Derraction HCpot = Hydro-Collapse Potential	e Potential		

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														:										
01/25/2007		COMMENTS		-																				
Date			T									-												
ž		C	Residual													sils								
50 12'	EST	ф deg.	Res									:				xpansive So						option	olgri au ci	Potential
Station "P" 96 + 50 12' Rt.	STRENGTH TEST	C	Peak												action	E = Swell/Pressure on Expansive Soils	age Limit	eight	e Content	oility	Content	U = Dispersive ROD = Rock Ouality Designation	efraction	HCpot = Hydro-Collapse Potential
Station	STR	φ deg.	Pe												CM = Compaction	E = Swell/Pr	SL = Shrinkage Limit	UW= Unit Weight	W = Moisture Content	K = Permeability	U = Organic Content	U = Dispersive	X = X-Ray Defraction	HCpot = Hyo
		TEST												,										_
		Ы. М	:									12	8					J			_	_		sity
12		PL %	:									27	22		rometer	ě	G = Specific Gravity	PI = Plasticity Index	LL = Liquid Limit	PL = Plastic Limit	NP = Non-Plastic	OC = Consolidation	.Value	MD = Moisture Density
2387.12		LL %	:									39	30		H = Hydrometer	S = Sieve	G=Spe	PI=Plag		PL = Pla	S I I	Ch = Chemical	RV = R - Value	MD = MC
	%	PASS #200							12.1	17.8	2.0	13.6	15.5											
n (ft)	DRY	UW	1																				32)	ì
Elevation (ft)		%M							2.7	2.4	2.1	3.5	2.9		ę.	ned		D.			3	pier	$N = (N_{res})(0.62)$	
		SOIL										SM	25		Compressiv	dated Undra	ted Drained	ted Undraine	ā	_	4	per II., sam	_	
	z	BLOWS per ft.	<u>.</u>	R	œ	œ	Δ.	œ	R	æ	Ж	Я	223 (R)		U = Unconfined Compressive	UU = Unconsolidated Undrained	CD = Consolidated Drained	CU = Consolidated Undrained	DS = Direct Shear	φ = Friction	C = Conesion	N ≃ No. or blows per π., sampler	N = Field SPT	
	SAMP-	LER TYPE		SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT		۵									
o. RRC2	SAMPLE	DEPTH (ft)		4.0	9.6	14.0	19.0	24.0	29.0 - 29.5	34.0 - 34.3	39.0 - 39.3	44.0 - 45.0	49.0 - 51.5		CMS = California Modified Sampler 2.40" ID	SPT = Standard Penetration 1.38" ID	CS = Continuous Sample 3.23" ID		arrel	CSS = Calif. Split Spoon 2.42" ID	UPI = Cone Penetration lest	* driven		Jbe 2.87" ID
Boring No.		SAMPLE NO.		٧	В	O	O	Ш	L	9	I	_	ſ		CMS = Californ	SPT ≈ Standar	CS = Continuo	RC = Rock Core	PB = Pitcher Barrel	CSS = Calif. Sp	TD - Total	IP = Lest Pit P = Pitched not driven	R = Refusal	Sh = Shelby Tube 2.87" ID

* = Average of subsamples

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Boring No.	lo. RRC3			_	Elevation (ft)	(£)		2388.98			Σ	Station "P" 94 + 00 30' Rt.	.00 30' R		Date 01/30/2007
	SAMPLE	SAMP-	z			DRY	%			H		STRENGTH TEST	FEST		
SAMPLE NO.	DEPTH (ft)	LER TYPE	BLOWS per ft.	SOIL	%M	UW pcf	PASS #200	LL %	PL %	PI T %	TEST TYPE	φ C deg. psi	φ C deg. psi	C psi	COMMENTS
	` '					,				\dashv		Peak	Resid	Juai	
RV1	0.0 - 4.5	Auger		GP-GM			11.7	31	25	9					RV = 66, pH = 8.1, Res. = 620 ohm-cm
RV2	4.5 - 9.5	Auger		В			13.9	47	2 8	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		В			13.0	58	38	20					RV =*52 , pH = 8.3, Res. = 452 ohm-cm
RV5	19.5 - 24.5	Auger		В			13.7	53	37	16					RV = 72, pH = 8.3, Res. = 511 ohm-cm
RV6	24.5 - 29.5	Auger		GP-GM			10.2	20	41	6					RV = 76, pH = 8.4, Res. = 596 ohm-cm
RV7	29.5 - 34.5	Auger		GP-GM			10.6	46	37	6					RV = 77, pH = 8.3, Res. = 446 ohm-cm
RV8	34.5 - 39.5	Auger		GP-GM			9.7	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 = Califor	CMS = California Modified Sampler 2.40" ID	<u></u>	U = Unconfine	U = Unconfined Compressive	go.		ı I	H = Hydrometer	eter		ซี	CM = Compaction			
SPT = Standa	SPT = Standard Penetration 1.38" ID		UU = Unconsc	UU = Unconsolidated Undrained	ined		υ,	S = Sieve			ш	E = Swell/Pressure on Expansive Soils	xpansive Soik		
CS = Continu	CS = Continuous Sample 3.23" ID		CD = Consolidated Drained	lated Drained			-	G = Specific Gravity	c Gravity		S	SL = Shrinkage Limit			
RC = Rock Core	ore		CU = Consolidated	CU ≈ Consolidated Undrained	p _e		ш_	PI = Plasticity Index	ity Index		3	UW= Unit Weight			
CSS = Calif. 5	CSS = Calif. Split Spoon 2.42" ID		m = Friction	i oi			. 0.	EL Elastic Limit	Limit		: Ÿ	K = Permeability			
CPT = Cone F	CPT = Cone Penetration Test		C = Cohesion				Z	NP = Non-Plastic	lastic		ö	O = Organic Content			
TP = Test Pit			N = No. of blov	N = No. of blows per ft., sampler	pler		0	OC = Consolidation	olidation		ٔ ۵	D = Dispersive	:		
P = Pushed, not driven	not driven		i			:	<i>.</i>	Ch = Chemical	<u>.</u>		χ ;	RQD = Rock Quality Designation	signation		
K = Kefusal Sh = Shelby Tube 2.87" ID	Tube 2.87" ID		L Tield of		N = (N _{css})(0.62)	۔	. 2	KV ≅ K - Vaiue MD = Moisture Density	ifue Jre Densit		", ¥ ¥	x = x-kay Defraction HCpot = Hydro-Collapse Potential	Potential		

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NAMPLE SAAMP	Boring No.	. RRC3				Elevation (ft)	(ff)	•	2388.98	8		•	Station "P" 94 + 00 30' Rt.	" 94 + 00	30' Rt.	Date	ď	01/30/2007	
1 ER BLOWS SOIL Ww, UW PASS LL PL PL TYPE GROUP Fish GROUP Fish GROUP Fish Fish GROUP Fish		SAMPLE	SAMP-	z			DRY	%					STREN	GTH TEST					Г
SPT SPT SM 7.9 16.7 67 51 16 SPT R GP-GM 4.2 10.0 40 28 12 SPT R SW-SC 3.6 7.4 1.0 1.2 1.0 SPT R SW-SC 2.9 9.0 30 22 8 SPT SPT SW 2.2 13.8 2.3 20 3 SPT R GC-GM 2.0 13.4 28 22 6 SPT R GC-GM 2.0 13.4 28 22 6 SPT R GC-GM 2.0 13.4 28 22 6 SPT R GC-GM 2.0 13.4 28 22 6 SPT R GC-GM 2.0 13.4 28 22 6 SPT R GC-GM 2.0 13.4 28 25 6 SPT R GC-GM 2.0 13.4 28 22 6 SPT R GC-GM 2.0 13.4 28 22 6 SPT R GC-GM 2.0 13.4 28 22 6 SPT R GC-GM 2.0 13.4 28 22 6 SPT R GC-GM 2.0 13.4 28 22 6 SPT R GC-GM 2.0 13.4 28 22 6 SPT R GC-GM 2.0 13.4 28 22 6 SPT R GC-GM 2.0 13.4 28 22 6 SPT R GC-GM 2.0 13.4 28 22 6 SPT R GC-GM 2.0 13.4 28 22 6 SPT R GC-GM 2.0 2.0 2.0 2.0 SPT R GC-GM 2.0 2.0 2.0 2.0 SPT R GC-GM	l	DEPTH (ft)	LER TYPE	BLOWS per ft.	SOIL GROUP	%M	UW	PASS #200	% 7T	PL %	PI %	TEST TYPE	φ deg. Peak	C psi	φ leg. Residu	C psi Jal		COMMENTS	
5 SPT R GP-GM 4.2 10.0 40 28 12 3 SPT 81 GW-GC 3.7 7.8 35 23 12 3 SPT R SW-SC 3.6 7.4 1.0 12 12 7 SPT R SW-SC 2.9 9.0 30 22 8 0 SPT L50 SM 2.2 13.8 23 20 3 5 SPT R GC-GM 2.0 13.4 28 22 6 5 SPT R GC-GM 2.0 13.4 28 22 6 5 SPT R GC-GM 2.0 13.4 28 22 6 5 SPT R GC-GM 2.0 13.4 28 22 6 5 SPT R GC-GM 2.0 13.4 28 22 6		4.5 - 6.0	SPT	26	SM	6.7		16.7	29	51	16								
3 SPT R SW-SC 3.6 7.4 7.4 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2		9.5 - 10.5	SPT	α.	GP-GM	4.2		10.0	40	28	12								
3 SPT R SW-SC 3.6 7.4 1.0		14.5 - 16.0	SPT	81	GW-GC	3.7		7.8	35	23	12								
3 SPT R SW 3.1 1.0		19.5 - 20.3	SPT	œ	SW-SC	3.6		7.4											
7 SPT R 0 SPT 150 SW-SC 2.9 9.0 30 22 8 0 SPT 205 SM 2.2 13.8 23 20 3 5 SPT 205 SM 2.0 13.4 28 22 6 3 SPT R 10 Ul = Unconfined Compressive CD = Consolidated Undrained CD = CD = Consolidated Undrained CD = CD = Consolidated Undrained CD = CD = CD = CD = CD = CD = CD = CD		24.5 - 25.3	SPT	œ	SW	3.1		1.0											
0 SPT 150 SW-SC 2.9 9.0 30 22 8 0 SPT 205 SM 2.2 13.8 23 20 3 5 SPT R GC-GM 2.0 13.4 28 22 6 3 SPT R GC-GM 2.0 13.4 28 22 6 3 SPT R GC-GM 2.0 13.4 28 22 6 3 SPT R GC-GM 2.0 13.4 28 22 6 3 SPT R GC-GM 2.0 14.4 <t< td=""><td></td><td>29.5 - 29.7</td><td>SPT</td><td>œ</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>		29.5 - 29.7	SPT	œ															
0 SPT 205 SM 2.2 13.8 23 20 3 5 SPT R GC-GM 2.0 13.4 28 22 6 3 SPT R GC-GM 2.0 13.4 28 22 6 3 SPT R		34.5 - 36.0	SPT	150	SW-SC	2.9		9.0	30	22	8								
5 SPT R GC-GM 2.0 13.4 28 22 6 3 SPT R GC-GM 2.0 13.4 28 22 6 3 SPT R R 22 6 8 6 6 8 6 6 8 6 8 6 6 8 6 8 8 8 8 2 6 8 6 6 8 6 8 6 8 6 8 6 8 6 8 6 8 6 8 8 6 8 6 8 6 8 8 6 8 8 8 6 8 8 8 8 <t< td=""><td></td><td>39.5 - 41.0</td><td>SPT</td><td>205</td><td>SM</td><td>2.2</td><td></td><td>13.8</td><td>23</td><td>20</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>		39.5 - 41.0	SPT	205	SM	2.2		13.8	23	20	3								
3 SPT R H = Hydrometer Fr 2.40" ID U = Unconfined Compressive Fr 2.40" ID U = Unconsolidated Undrained CD = Consolidated Drained CD = Consolidated Undrained CD = Consolidated Undrained CD = Consolidated Undrained CD = Consolidated Undrained CD = Consolidated Undrained CD = Consolidated Undrained CD = Consolidated Undrained CD = Consolidated Undrained CD = Consolidated Undrained CD = Consolidated Undrained CD = Consolidated Undrained CD = Consolidation CD = COnsolidation CD = COnsolidation CD = COnsolidation CD = COnsolidation CD = COnsolidation CD = COnsolidation CD = COnsolidation CD = COnsolidation CD = COnsolidation CD = COnsolidation CD = COns		44.5 - 45.5	SPT	œ	GC-GM	2.0		13.4	28	22	9								
er 2.40" ID U = Unconfined Compressive H = Hydrometer UU = Unconsolidated Undrained S = Sieve CD = Consolidated Drained G = Specific Gravity CU = Consolidated Undrained G = Specific Gravity CU = Consolidated Undrained C = Consolidated Undrained C = Consolidated Undrained C = Consolidated Undrained C = Cohesion N = Friction C = Cohesion N = No. of blows per ft., sampler C = Chemical N = Field SPT N = (N ₂₅₃)(0.62) RV = R - Value		48.0 - 48.3	SPT	œ															
re 2.40" ID U = Unconfined Compressive H = Hydrometer UU = Unconsolidated Undrained S = Sieve CD = Consolidated Drained G = Specific Gravity CU = Consolidated Undrained G = Specific G = Specific G = Specific G = Specific G = Specific G = Specific G = Specific G = Specific G = Specific G = Specific G = Specific G = Specific G = Specific G = Specific G = Specific G = Specific G =																			
rer 2.40" ID U = Unconfined Compressive H = Hydrometer S = Sieve S = Sieve CD = Consolidated Undrained G = Specific Gravity CU = Consolidated Drained G = Specific Gravity CU = Consolidated Undrained G = Specific Gravity PI = Plasticity Index CD = Direct Shear PL = Inquid Limit PL = Plastic Limit PL = Plastic Limit PL = Plastic Limit C = Cohesion N = No. of blows per ft., sampler C = Consolidation Ch = Chemical N = Field SPT N = (N ₂₅₁)(0.62) RV = R - Value																			
ID UU = Unconsolidated Drained S = Sieve CD = Consolidated Drained G = Specific Gravity CU = Consolidated Undrained PI = Plasticity Index DS = Direct Shear PL = Plastic Limit φ = Friction PL = Plastic Limit C = Cohesion NP = Non-Plastic N = No. of blows per ft., sampler OC = Consolidation Chemical Chemical N = Field SPT N = (N _{ass})(0.62) RV = R - Value		a Modified Sampler 2.40"	Ω	U = Unconfin	ed Compressiv	ě			→ = Hydror	neter			:M = Compactic	Ę					
CD = Consolidated Drained G = Specific Gravity CU = Consolidated Undrained DS = Direct Shear Q = Friction Q = Friction C = Cohesion N = No. of blows per ft., sampler C = Cohesion C = Consolidation C = Consolidation C = Consolidation C = Consolidation C = Cohesion C = Consolidation C = Consolidation C = Consolidation C = Cohesion C = Consolidation C = Cohesion C = Consolidation C = Consolidation C = Cohesical C = Cohesi		Penetration 1.38" ID		UU = Unconso	olidated Undra	ined			S = Sieve				= Swell/Press	ure on Expans	sive Soils				
CU = Consolidated Undrained DS = Direct Shear Q = Friction Q = Friction C = Cohesion N = No. of blows per ft., sampler N = Field SPT N = Fie		is Sample 3.23" ID		CD = Consolic	dated Drained				G = Specii	fic Gravity		U,	L = Shrinkage	Limit					
OS = Unext Shear φ = Friction C = Cohesion N = No. of blows per ft., sampler OC = Consolidation OC = Consolidation OC = Chemical N = Field SPT N = Field SPT RV = R - Value				CU = Consolid	dated Undrain	eq			PI = Plastik Imid	city Index		<i>د</i> د	JW= Unit Weigh	ıt Safası					
C = Cohesion N = No. of blows per ft., sampler OC = Consolidation Ch = Chemical N = Field SPT N = (N _{css})(0.62) RV = R - Value		iit Spoon 2.42" ID		oo oleete	i dai				ol = Diactiv	, clinit			v = Molstale Co						
N = No. of blows per ft., sampler OC = Consolidation Ch = Chemical $N = Field SPT \qquad N = (N_{css})(0.62) \qquad RV = R \cdot Value$		netration Test		C = Cohesion				_	VP = Non-i	Plastic		. 0) = Organic Cor	ntent					
$Ch = Chemical$ $N = Field SPT \qquad N = (N_{css})(0.62) \qquad RV = R - Value$				N = No. of blo	ws per ft., sam	ıpler		J	OC = Cons	olidation		_	= Dispersive						
N = Field SPT N = (N _{css})(0.62) RV = R - Value		t driven						-	Ch = Cherr	lical		_	QD = Rock Qu	ality Designat	ion				
				N = Field SPT		9.0)(ssp) = N	(2)		RV = R - V	alne			(= X-Ray Defra	ction	:				

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Boring No.	lo. RRC4			_	Elevation (ft)	n (ft)		2383.724	4		ί	Station "P" 90 +90 3' Lt.) +90 3'L	ı.	Date	02/05/2007
	SAMPLE	SAMP-	z			DRY	%					STRENGTH TEST	H TEST			
SAMPLE NO.	DEPTH (ft)	LER TYPE	BLOWS per ft.	SOIL GROUP	%M	UW	PASS #200	7T %	PL %		TEST TYPE	ф С deg. psi	ф deg.	C		COMMENTS
			3									Peak	Re	Residual		
RV1	0.0 - 4.0	Auger		GP-GC			5.6	27	21	9					RV = 81, pH	= 81, pH = 7.8, Res. = 2591 ohm-cm
RV2	4.0 - 9.0	Auger		GP-GM			6.6	30	25	5					RV = 81, pH:	1 = 8.0, Res. = 1081 ohm-cm
RV3	9.0 - 14.0	Auger		GP-GM			6.0	28	25	က					RV = 81, pl	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	RV = 83, pH = 8.1, Res. = 1031 ohm-cm
RV5	19.0 - 24.0	Auger		GW			4.8	28	22	9					RV = 79, pH	= 79, pH = 8.2, Res. = 1357 ohm-cm
RV6	24.0 - 29.0	Auger		GP-GC			9.6	27	21	9					RV = 77, pH	1 = 8.3, Res. = 1645 ohm-cm
RV7	29.0 - 34.0	Auger		GP-GC			7.0	25	21	4					RV = 80, pH	1 = 8.3, Res. = 1852 ohm-cm
RV8	34.0 - 39.0	Auger		GP-GC			9.4	25	20	2					RV = 82, pH	RV = 82, pH = 8.3, Res. = 1845 ohm-cm
RV9	39.0 - 44.0	Auger		GP-GC			9.0	26	21	5					RV = 81, pt	RV = 81, pH = 8.4, Res. = 1905 ohm-cm
RV10	44.0 - 49.0	Auger		ВМ			4.7	26	21	2					RV = 75, pH	RV = 75, pH = 8.4, Res. = 1949 ohm-cm
CMS = Califor	CMS = California Modified Sampler 2.40" ID	Q.	U = Unconfin	U = Unconfined Compressive	e)		_	H = Hydrometer	neter		อ์	CM = Compaction				
SPT = Standa	SPT = Standard Penetration 1.38" ID		UU = Uncons	UU = Unconsolidated Undrained	ined			S = Sieve			ш	E = Swell/Pressure on Expansive Soils	ın Expansive S	soils		
CS = Continu	CS = Continuous Sample 3.23" ID		CD = Consoliv	CD = Consolidated Drained			•	G = Specific Gravity	ic Gravity		ร	SL = Shrinkage Limit				
RC = Rock Core	ore Barrel		CU = Consolidated	CU = Consolidated Undrained DS = Direct Shear	De		- -	PI ≅ Plasucity Index II = I iouid I imit	ity index		ີ ≩	Uw≃ Unit wetgnt W = Moisture Content	÷			
CSS = Calif. 5	CSS = Calif. Split Spoon 2.42" ID		φ = Friction	tion			-	PL = Plastic Limit	c Limit		Ÿ	K = Permeability	:			
CPT = Cone !	CPT = Cone Penetration Test		C = Cohesion	_			_	NP = Non-Plastic	Plastic		Ö	O = Organic Content				
TP = Test Pit			N = No. of blo	N = No. of blows per ft., sampler	ıpler		_	OC = Consolidation	olidation		Ö	D = Dispersive				
P = Pushed, not driven	not driven		i			;		Ch = Chemical	ical .		Z >	RQD = Rock Quality Designation	Designation			
R = Refusal Sh = Shelby Tube 2.87" ID	Tube 2.87" ID		N = Field SPT		N = (N _{css})(0.62)	(2)		RV = R - Value MD = Moisture Density	alue ture Densit	>-	¥Ξ	X = X-Kay Detraction HCpot = Hydro-Collapse Potential	، pse Potential			

* = Average of subsamples

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02/05/2007		COMMENTS																						
02/06		COMI																						
Date	L																							
ند		C	Residual													soils								
Station "P" 90 +90 3'Lt.	TEST	ф	Re													E = Swell/Pressure on Expansive Soils							signaton	•
- 06 "d"	STRENGTH TEST	C	Peak												action	ressure on	age Limit	Veight	re Content	ibility	Content	ive ::	KUD = Kock Quality Designation	Jerraction
Station	STF	ф	Pe												CM = Compaction	E = Swell/P	SL = Shrinkage Limit	UW= Unit Weight	W = Moisture Content	K = Permeability	O = Organic Content	D = Dispersive	מא = קא ;	X = X-Kay Defraction
		TEST	1111																					
		PI %	?	1	원	ď	2	A D		7	8	7	-				<u>4</u>	×				_		į
.724		PL %	0/	26	鱼	P D	21	A		22	22	17	18		H = Hydrometer	ķķ	G = Specific Gravity	PI = Plasticity Index	LL ≈ Liquid Limit	PL = Plastic Limit	NP = Non-Plastic	OC = Consolidation	Cn = Cnemical	KV = K - Value
2383.724		LL %	0/	27	23	21	23	20		29	30	24	19		H = Hyd	S = Sieve	G=Sp	PI = Pla	LL = Lie	PL = PI	Ž II da	٥ ٥ ٥	5 6	۲ ا ۱ ۱ ۲ ۱ ۲ ۱
	%	PASS	#200	11.6	7.5	5.5	11.8	9.2		22.7	24.3	25.9	21.0											
on (ft)	DRY	UW	per																				í	(29.
Elevation (ft)		%M		3.7	2.6	2.5	2.4	2.0		2.8	3.0	2.5	2.7		ve	ined		þa				pler	107	N = (N _{css})(0.62)
		SOIL	ONO	GP-GM	SW-SM	SW-SM	SP-SM	SW-SM		SC-SM	sc	SC-SM	SM		1 Compressi	dated Undra	ted Drained	ted Undrain	sar.	Ę		s per ft., sam		
	z	BLOWS	pc1 1t.	155	48	52	174	109	œ	œ	R	ď	156		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	H 00	Z = Field SPI
	SAMP-	LER	1111	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT		0									
. RRC4	SAMPLE	DEPTH	(11)	4.0 - 5.5	9.0 - 10.5	14.0 - 15.5	19.0 - 20.5	24.0 - 25.5	29.0 - 29.5	34.0 - 34.3	39.0 - 39.3	44.0 - 44.3	49.0 - 50.5		CMS = California Modified Sampler 2.40" ID	SPT = Standard Penetration 1.38" ID	CS = Continuous Sample 3.23" ID	gs.	ırrel	CSS = Calif. Split Spoon 2.42" ID	netration lest		raliveli	7 3 87" ID
Boring No.		SAMPLE		∢	Ф	O	۵	Ш	tĽ	၅	ェ	_	J		CMS = Californi	SPT = Standard	CS = Continuou	RC = Rock Core	PB = Pitcher Barrel	CSS = Calif. Sp	CP1 = Cone Penetration Test	TP = Test Pit	r - rusilea, llot	K = Kerusai Sh = Shelby Tube 3.97" ID

* = Average of subsamples

Boulder City Bypass - US 95/US 93 Intersection

Job Description

73307

EA/Cont #

TEST		PI	II.	PASS I.I. PI.	DRY % [IW PASS I.I. PI.	DRY % UW PASS II. Pl.	SOIL W% UW PASS II. PI
TEST ϕ TYPE deg.		. PL PI %	LL PL %	»	W% UW PASS LL PL pcf #200 % %	UW PASS II PL pcf #200 % %	W% UW PASS LL PL pcf #200 % %
			8.6	8.6	13.1	15	13.1
_	ш.	NP NP		ΔN	ΔN	21 NP	21 NP
							ک
			13.7	13.7	10.2		10.2
							8
			6.61	19.9	13.2 19.9		13.2
			12.7	12.7	13.3 12.7		13.3
	ı		13.8	13.8	14.5 13.8		14.5
							<u>د</u>
							~
6	19	39		39	39	58 39	58 39
	I		14.4	14.4	16.4 14.4		16.4
CM = Compaction		/drometer	H = Hydrometer	H = Hydrometer			
E = Swell/Pressure on Expansive Soils		ieve posific Gravity	S = Sieve	S = Sieve S = Sieve			UU = Unconsolidated Undrained S = Sieve
SC = Shillinage Li UW≈ Unit Weight		lasticity Index	PI = Plasticity Index	PI = Plasticity Index			_
W = Moisture Content		iquid Limit	LL = Liquid Limit	LL = Liquid Limit	LL = Liquid Limit		DS = Direct Shear
K = Permeability		lastic Limit	PL = Plastic Limit	PL = Plastic Limit	PL = Plastic Limit	On	On
O = Organic Content		Von-Plastic	NP = Non-Plastic	NP = Non-Plastic			
D = Dispersive		Consolidation	OC = Consolidation	OC = Consolidation			N = No. of blows per ft., sampler OC = Consolidation
RQD = Rock Quality Designation × = X-Pay Defraction		nemical 3 - Value	Ch = Chemical RV = R - Value		Ch = Chemical Ch = (N)(0.62) RV = R - Value	(29 0)(N) = N	
X = X-Ray Deliaction X = A-Ray Deliaction		NV = N = Value	מומא - און אין			(CSS (C.O.Z)	1 - (1 css)(0.07)

* = Average of subsamples

Boulder City Bypass - US 95/US 93 Intersection

Job Description

73307

EA/Cont#

SAMP-	z	Ť -	Elevation (π)	(ii) DRY		2049.2	-		STR	STRENGTH TEST	-55, 52 FST		Date	12/23/2005	
	. r	SOIL	%M		70 PASS #200	%	PL	PI TEST %	de de	C C Psi	φ C Geg. psi	C Dsi psi	, . ,	COMMENTS	
+	~						-							Visual Only	
			,												
<u> </u>	:						·								
ļ										·					
⊃	U = Unconfined Compressive	ompressive			Ι	H = Hydrometer	eter		CM = Compaction	action					
\supset	UU = Unconsolidated Undrained	ed Undraine	70		0,	S = Sieve			E = Swell/Pr	E = Swell/Pressure on Expansive Soils	pansive Soil	S			
Ö	CD = Consolidated Drained	Drained			Ü	G = Specific Gravity	: Gravity		SL = Shrinkage Limit	age Limit					
Ö	CU = Consolidated Undrained	Undrained			<u>а</u>	PI = Plasticity Index	y Index		UW= Unit Weight	eight					
	DS = Direct Shear				_	LL = Liquid Limit	imit		W = Moisture Content	e Content					
	φ = Friction				a .∶	PL = Plastic Limit	_imit		K = Permeability	pility .					
ပ :	C = Cohesion				2 (NP = Non-Plastic	astic		U = Organic Content	Content					
z	N = No. of blows per ft., sampler	er ft., sample	L		5 0	UC = Consolidation Ch = Chemical	idation 22		D = Dispersive ROD = Rock Qu	U = Dispersive RQD = Rock Quality Designation	ionation				
Z	N = Field SPT	II Z	$N = (N_{css})(0.62)$		œ	RV = R - Value	ne ne		X = X-Ray Defraction	efraction	,				
					2	MD = Moisture Density	re Density		HCpot = Hyd	HCpot = Hydro-Collapse Potential	Potential				

* = Average of subsamples

Boulder City Bypass - US 95/US 93 Intersection

Job Description

73307

EA/Cont #

Boring No.				_	Elevation (ft)	(tt)	- *	2042.3	:		St	Station "P" 216+68, 66' Rt.	16+68, 66	5' Rt.	Date	12/23/2005	
l	SAMPLE	SAMP-	z			DRY	%					STRENGTH TEST	I TEST		L		
	DEPTH (ft)	LER TYPE	BLOWS per ft.	SOIL GROUP	%M	UW pcf	PASS #200	LL %	PL %	PI T %	TEST TYPE	φ C deg. psi	ф ф	C Dsi		COMMENTS	
- 1											Ц	Peak	, &	Residual			
	5.0 - 6.5	SPT	14	SM	25.6		24.8										
	8.0 - 9.5	SPT	31		16.5			42	27	15							
	10.0 - 11.5	SPT	61	SP-SM	14.8	<u></u>	11.5	27	24	က	-					Î	
	15.0 - 15.5	SPT	œ													Visual Only	
	20.0 - 20.5	SPT	œ	SM	12.3		17.8										
	30.0 - 30.5	SPT	œ	SM	13.4		16.7										
	40.0 - 40.35	SPT	œ													Visual Only	
	50.0 - 50.35	SPT	œ													Visual Only	
	60.0 - 60.35	SPT	ď	SM	11.9		15.6										
	70.0 - 70.2	SPT	œ													Visual Only	
	80.0 - 80.3	SPT	œ													Visual Only	
	CMS = California Modified Sampler 2.40" ID	₽	U = Unconfine	U = Unconfined Compressive	Φ		_	H = Hydrometer	neter		Ö	CM = Compaction					
	SPT = Standard Penetration 1.38" ID		UU = Unconsc	UU = Unconsolidated Undrained	ined			S = Sieve			ш	E = Swell/Pressure on Expansive Soils	n Expansive S	Soils			
	CS = Continuous Sample 3.23" ID		CD = Consolidated Drained	dated Drained				G = Specific Gravity	ic Gravity		S	SL = Shrinkage Limit					
	RC = Rock Core		CU = Consolidated	CU = Consolidated Undrained	þ			PI = Plasticity Index	ity Index		5 :	UW= Unit Weight					
	CSS = Calif Split Spoon 2.42" ID		DS = Direct Silear	io iea			_ 4	LL = Liquid Limit Pl = Plastic l imit			" H	v = Moisture Content K = Permeability	_				
	CPT = Cone Penetration Test		$\overline{}$					NP = Non-Plastic	Pastic		: 0	O = Organic Content					
			N = No. of blov	N = No. of blows per ft., sampler	pler		J	OC = Consolidation	olidation			D = Dispersive					
	P = Pushed, not driven						~	Ch = Chemical	ical		g	RQD = Rock Quality Designation	Designation				
	<u> </u>		N = Field SPT		N = (N _{css})(0.62)	2)		RV = R - Value	alue :		* :	X = X-Ray Defraction					
	Sh = Shelby Tube 2.87" ID						_	MD = Moist	MD = Moisture Density	>-	유	HCpot = Hydro-Collapse Potential	ose 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	Sulfates	рН	Resistivity	Conductivity
	* ppm	* ppm		Ohm - cm	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	3 1000		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

Date: 2/16/11

Sample ID	Chlorides	Sulfates	рН	Resistivity
	ppm	ppm	i	ohm - cm
	AASHTO T 291 A	AASHTO T 290 B	AASHTO T 289	AASHTO T 288
SBA 1 BULK 1	20	583	6.8	1,034
SBA 1 BULK 2	30	4,116	7.1	504
SBA 2 BULK 1	20	549	7.2	900
SBA 2 BULK 2	60	2,256	7.3	467
RRBP 1 BULK 1	50	190	7.8	1,334
NBA 1 BULK 1	130	530	7.6	867
NBA 1 BULK 2	410	5,003	7.6	320
NBA 2 BULK 1	20	2,975	7.4	520
NBA 2 BULK 2	30	4,432	7.5	504

NEVADA DEPARTMENT OF TRANSPORTATION GEOTECHNICAL SECTION

CHEMICAL ANALYSIS

E.A. No.	73307	

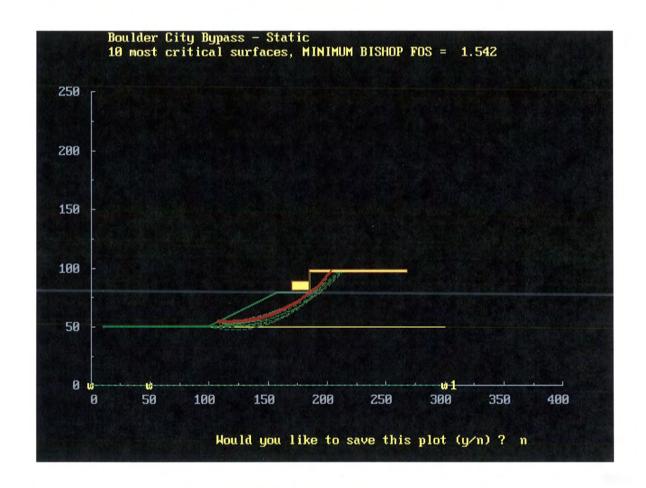
PROJECT Boulder City Bypass

BORING # RRC3, RRC4

Sample No.	Chlorides	Sulfates	рН	Resistivity	Conductivity
	* ppm	* ppm		Ohm - cm	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.

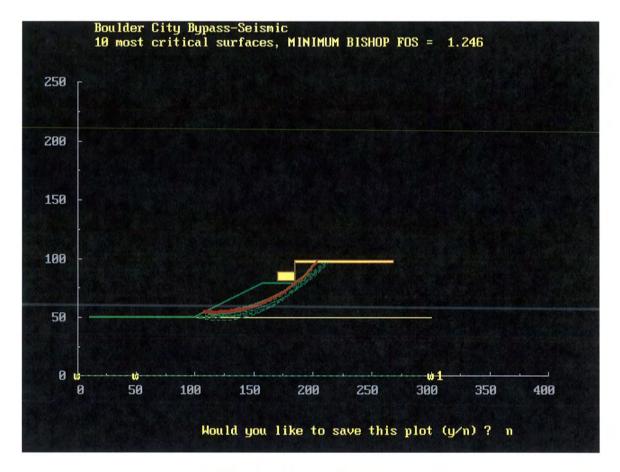
APPENDIX E EMBANKMENT SLOPE STABILITY ANALYSES



Bridge I-2871-Abutment 2

2H:1V fill slope 250 psf traffic surcharge load 4000 psf bridge abutment load

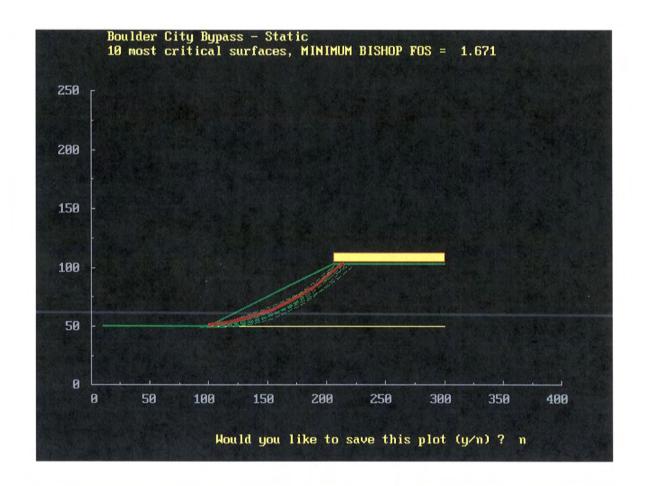
(Static Analysis)



Bridge I-2871 – Abutment 2

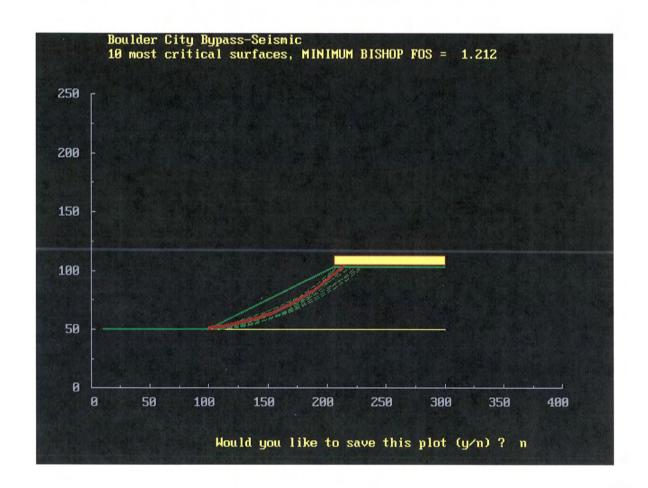
2H:1V slope 250 psf traffic surcharge load 4000 psf bridge abutment load horizontal seismic coefficient of 0.15g

(Seismic Analysis)



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

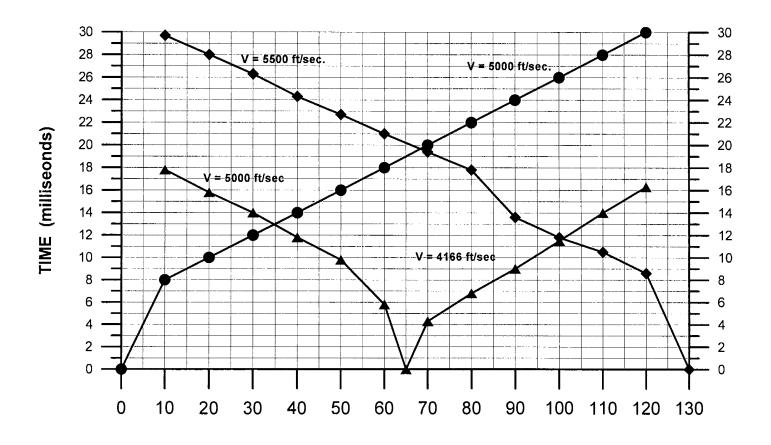
APPENDIX F GEOPHYSICAL SURVEYS SEISMIC REFERACTION

SEISMIC REFRACTION SURVEYING

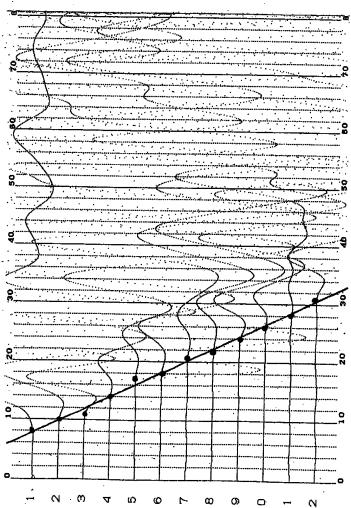


Station "P" 180, 100 feet left (top of the rock slope by Silverline Road)

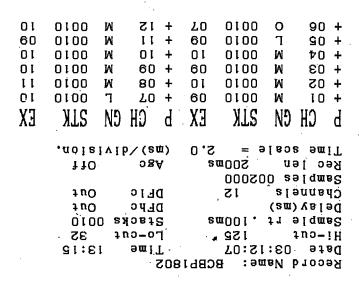
- S to N Direction
- ◆ N to S direction
- **▲** Middle Shot



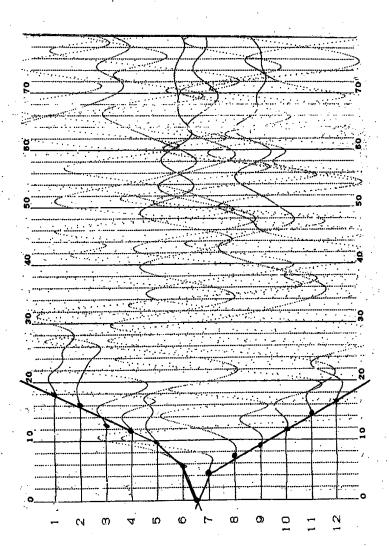
DISTANCE (feet)

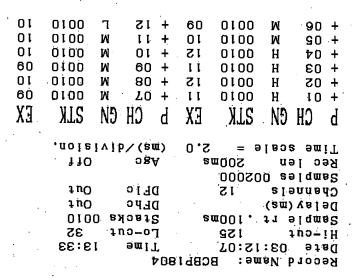


Station "P" 180, 100 feet left (top of the rock slope by Silverline Road)

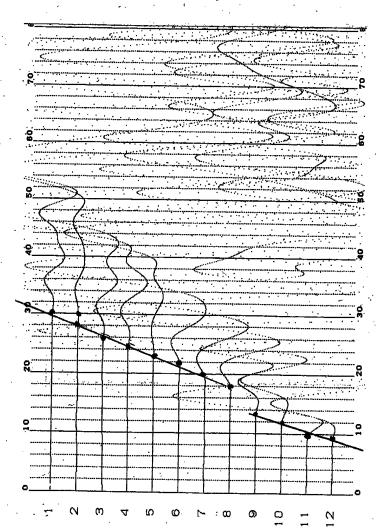


BIRON 8000 REKIER



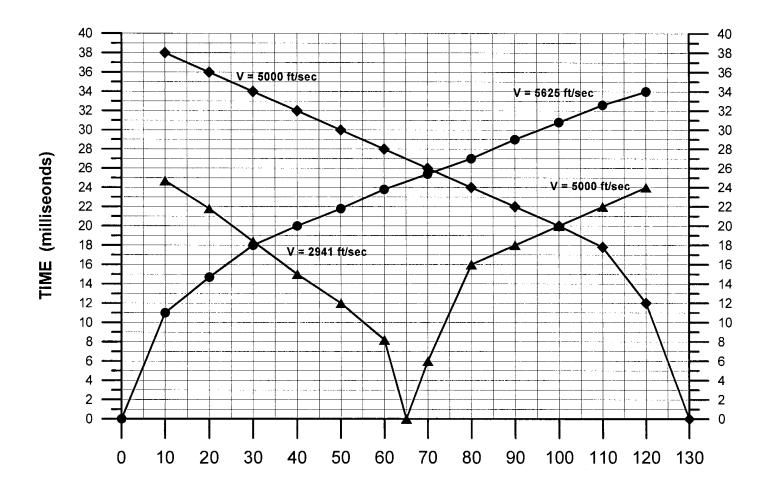


BIRON 8000 REKIER

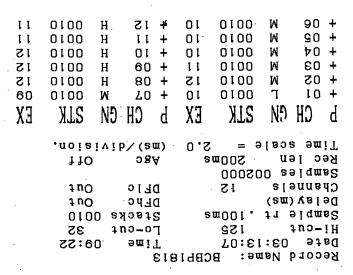


Station "P" 179, 350 feet right (Drainage Basin)

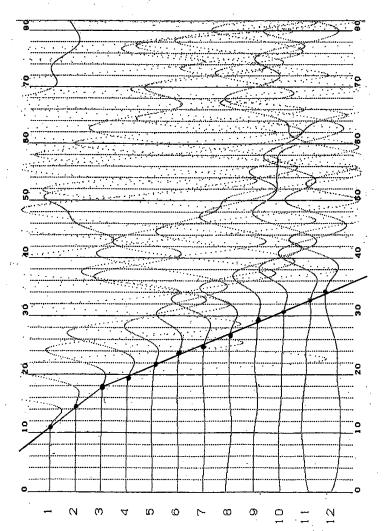
- S to N Direction
- ◆ N to S direction
- **▲** Middle Shot

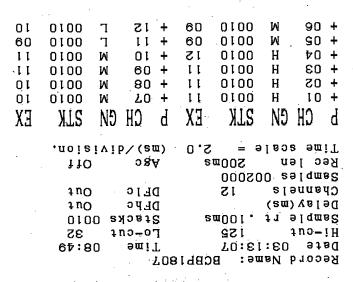


DISTANCE (feet)

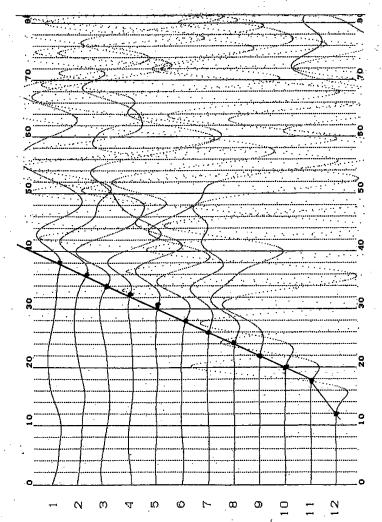


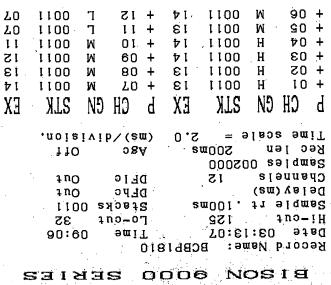
BIRON 8000 REKIER

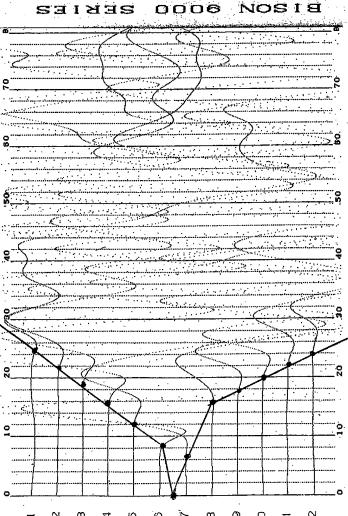




BISON SOOD SEKIES





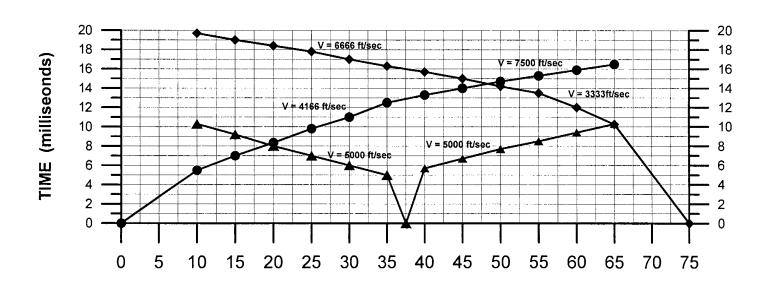




Seismic Refraction Surveying Station "P" 151+50 Borehole "RRP"

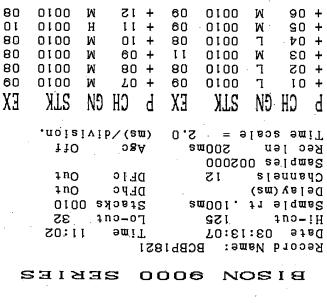
Station "P" 151+50

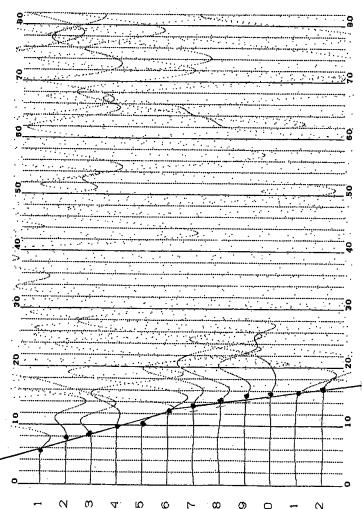
- S to N Direction
- ♦ N to S direction
- ▲ Middle Shot



DISTANCE (feet)

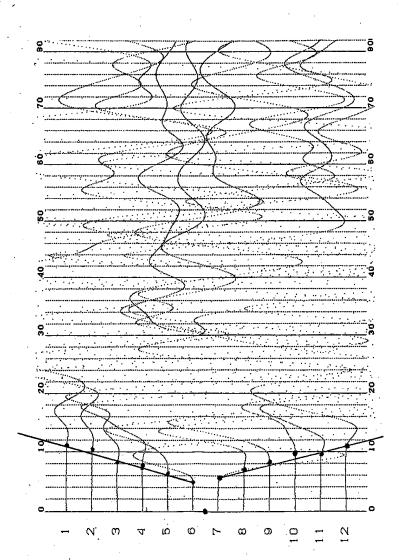
Station "P" 151+50 (Bridge Center Pier)





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                           Date 03:13:07
      10:21
                             Record Name:
                 BCB51818-
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BIRON 8000 REKIER

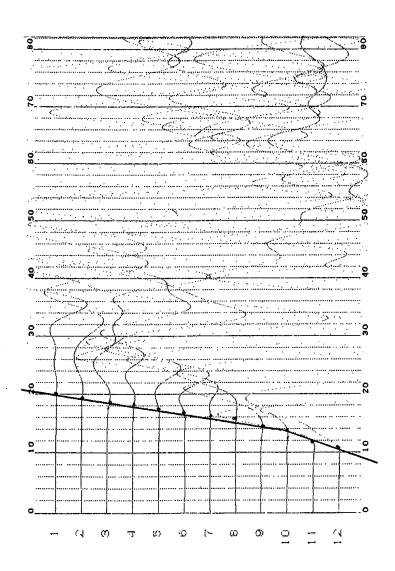


SEISMIC REFRACTION

Station "P" 151+50 (Bridge Center Pier)

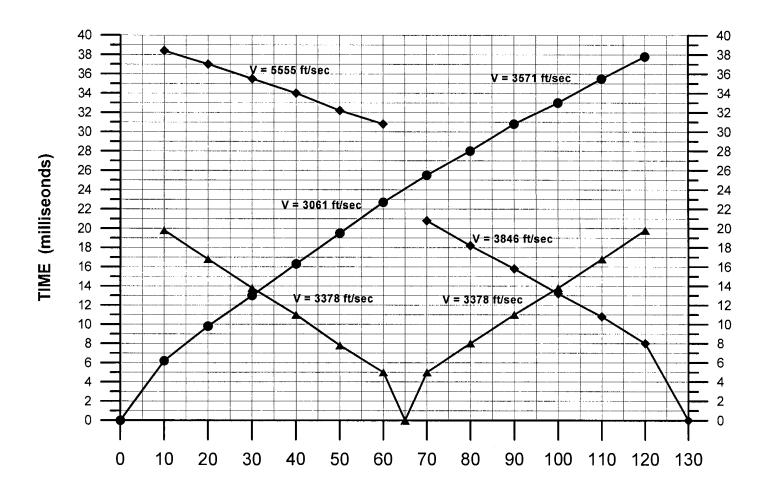
00 11 15 11 11	0100 00100 0100 0100 0100	r w w w w CM	15 10 00 08 04 04	+ + + + +	11 11 10 11 11	00100 00100 00100 00100 00100	W W W W CN	00 03 03 01 01	p. + + + + + +
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BIRON 8000 REKIER



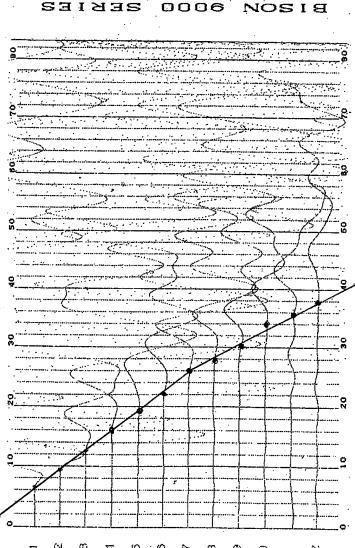
Station "P" 96+50

- S to N Direction
- ◆ N to S direction
- **▲** Middle Shot

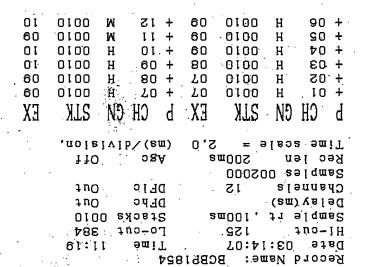


DISTANCE (feet)

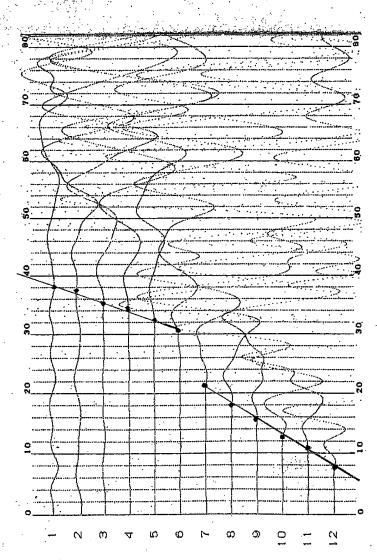
Station "P" 96+50



Station "P" 96+50

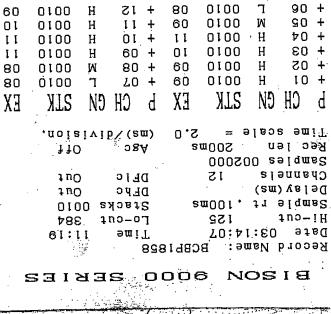


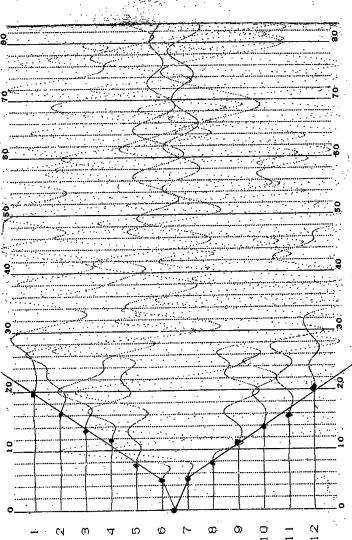
BIRON 8000 REKIER



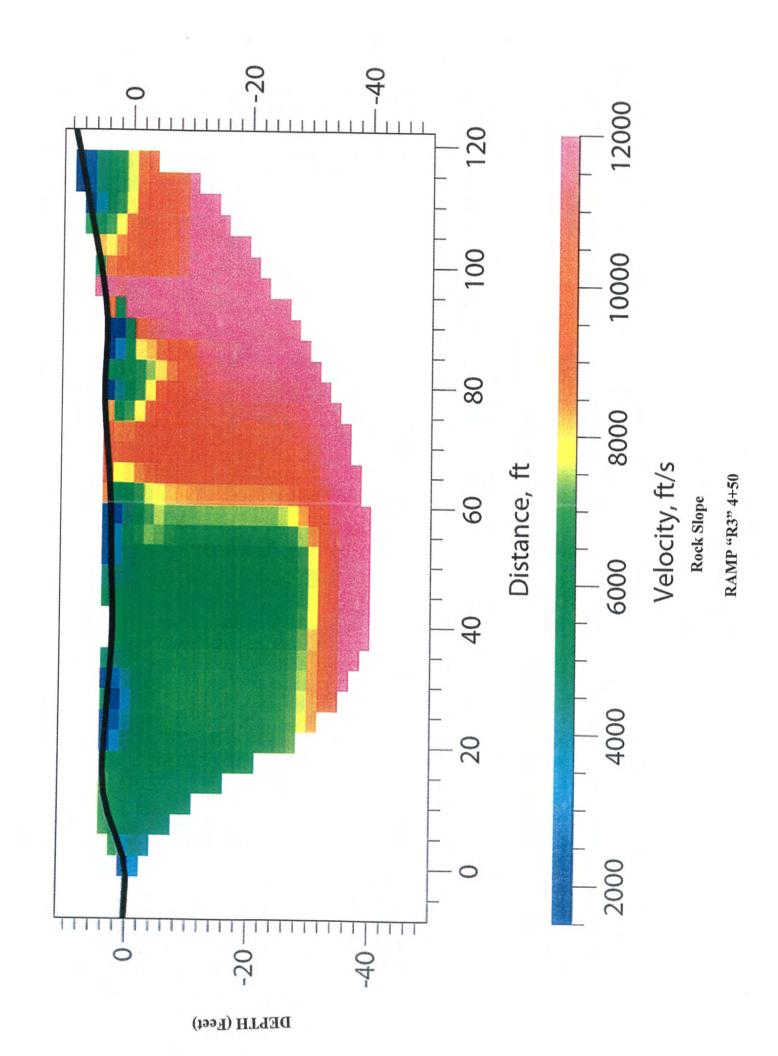
Station "P" 96+50

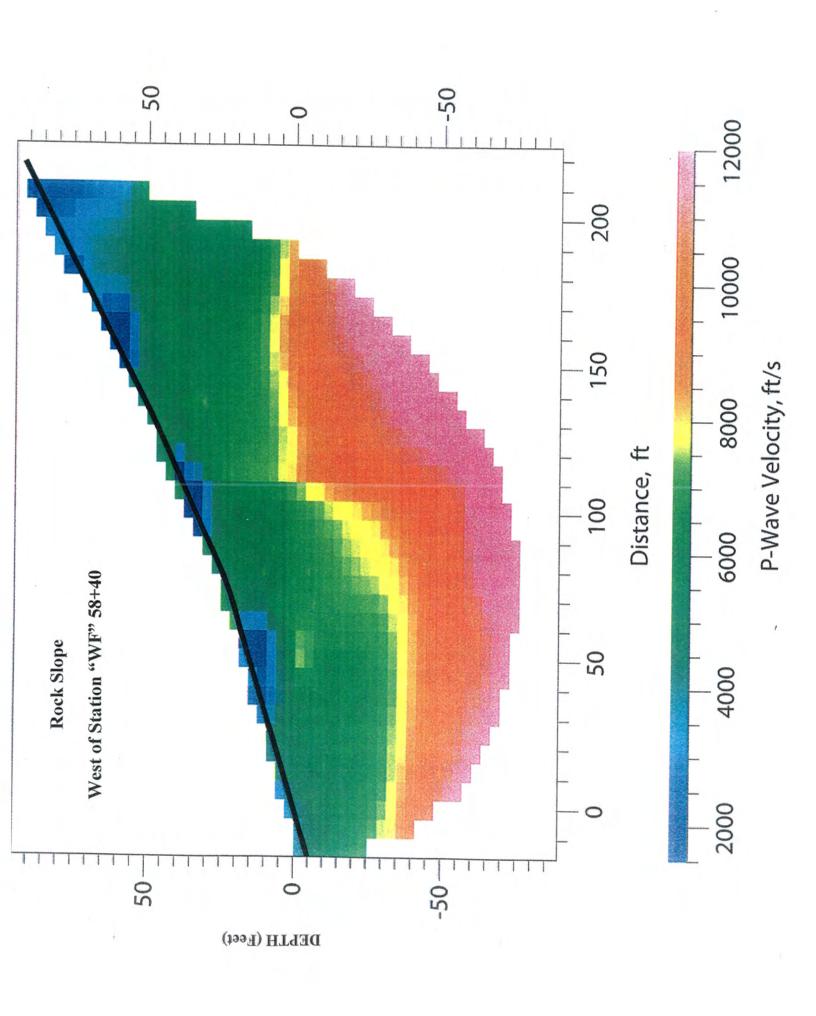
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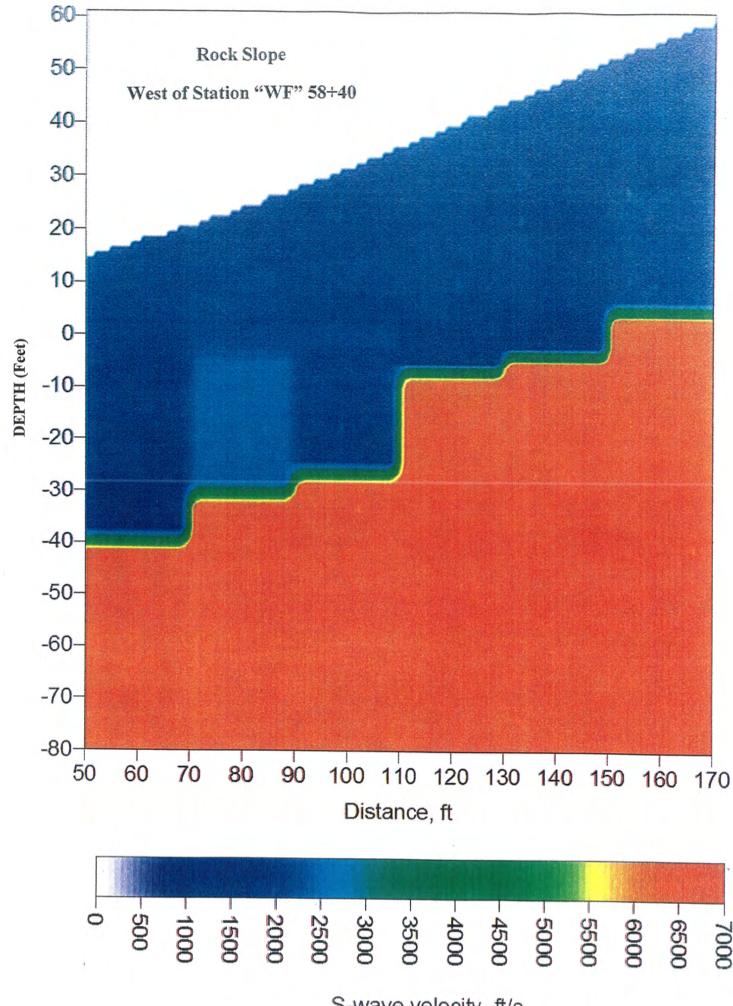


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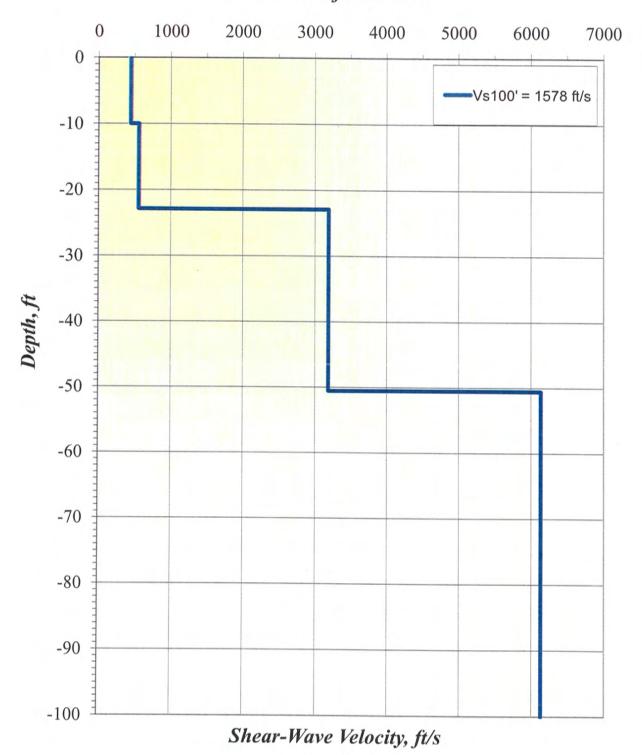


APPENDIX F GEOPHYSICAL SURVEYS ReMi

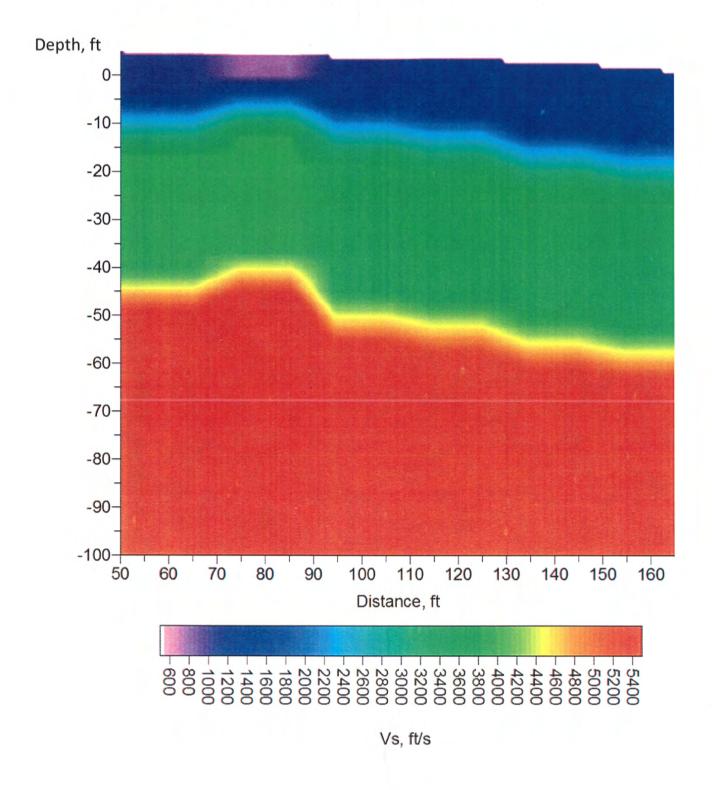


S-wave velocity, ft/s

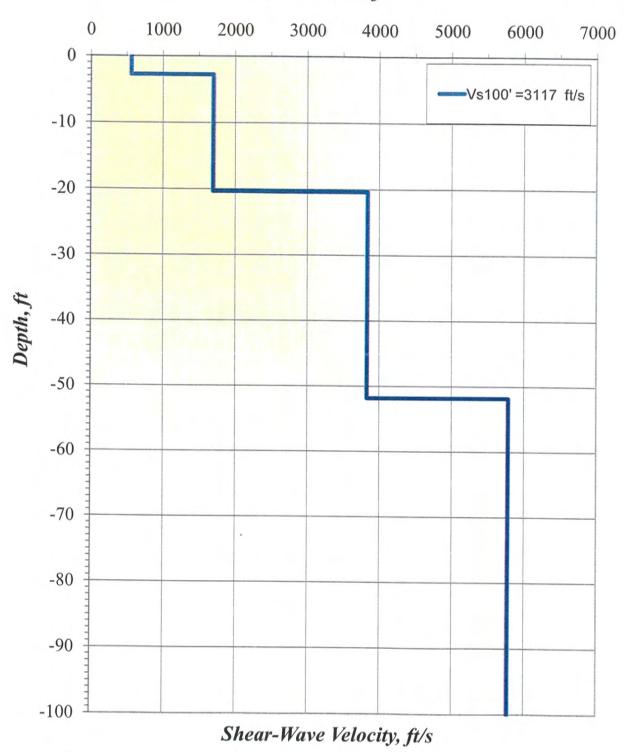
1D Vs Model from ReMi

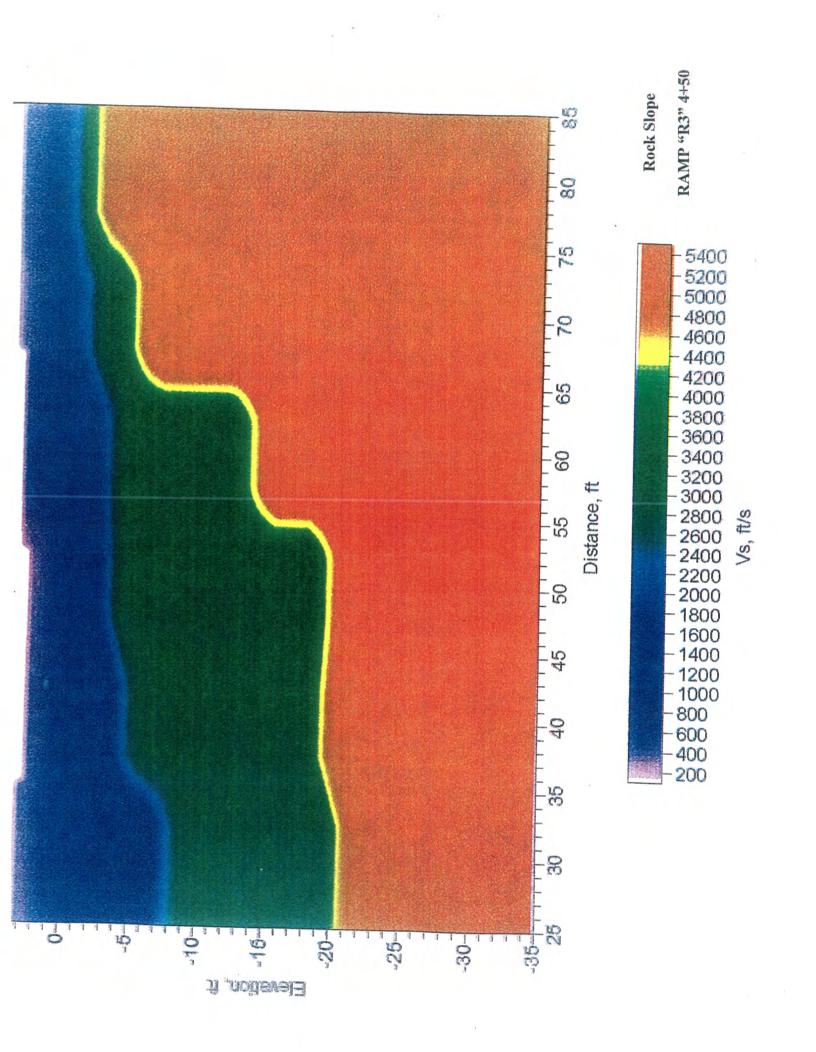


Rock Slope
West of Station "WF" 58+40

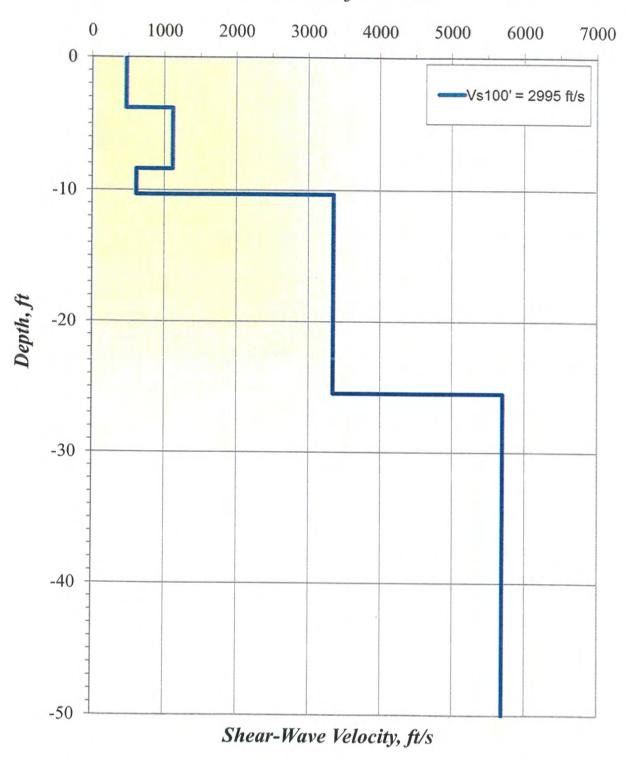


Mainline: 1D Vs Model from ReMi





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#

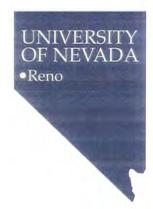
73307

Job Description:

Boulder City Bypass

				Unconfined Compressive Strength	
		SG Unit Weight		(UNR Rock Mechanics Lab)	
Boring	Core ID	(measured)		Peak Strength	Axial Displacement
			pcf	psi	in.
FP1	На	2.520	155.1	329	0.006
FP1	Нb	2.455	152.0		
FP1	Нс			3683	0.022
FP2	Ja	2.513	155.6		
FP2	JЬ	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	На	2.373	150.9	834	0.045
FP3	Нb	2.526	157.6	·	
FP3	Нс			3613	0.015
FA2	K2 a	2.676	164.5		
FA2	K2 b	2.571	162.3		
FA2	K2 c		_	1902	0.008
FA3	Еa	2.475	154.4		•
FA3	Еb	2.430	150.8		
DCA1	Fa	2.552	158.5		
DCA1	Fb	2.473	153.9	6404	0.025
DCA1	Fc	_		5273	0.018
DCA1	Fd	_		5013	0.017
DCA1	F6			4408	0.021

APPENDIX H X-RAY DIFFRACTION ANALYSES



Mail Stop 178 Reno, Nevada 89557-0088 Telephone: (775) 784-6691 FAX: (775) 784-1709 www.nbmg.unr.edu

Laboratory Report

www.nbmg.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.

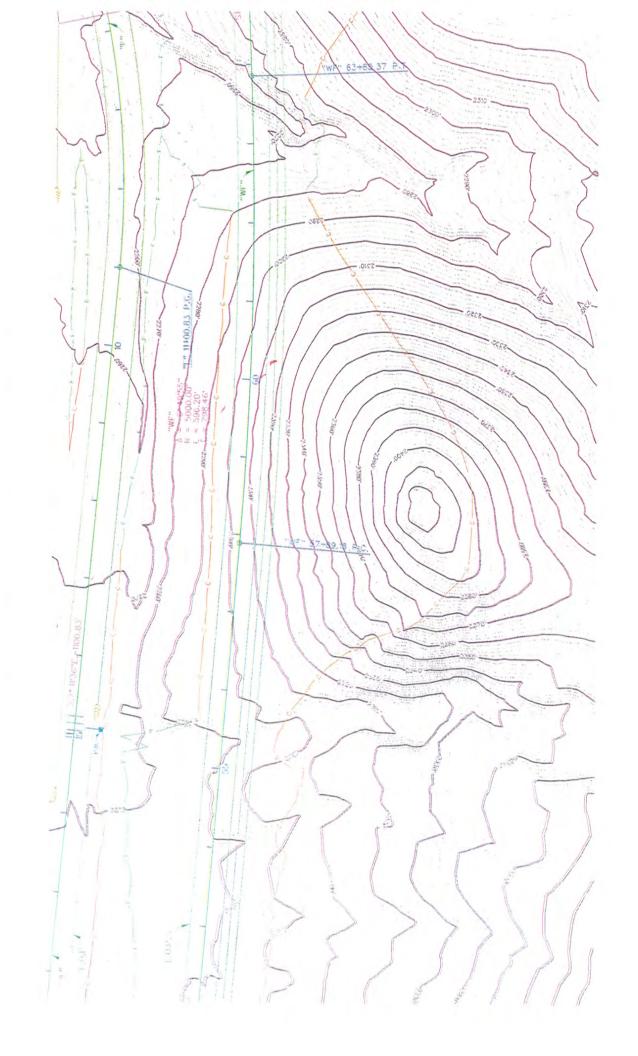
The results of this assay were based solely upon the content of the sample submitted. Any decision to invest should be made only after the potential investment value of the claim or deposit has been determined based on the result of assays of multiple samples of rocks or minerals collected by the prospective investor or by a qualified person selected by him.

Mario Desilets

Assistant Chemist/Geochemist

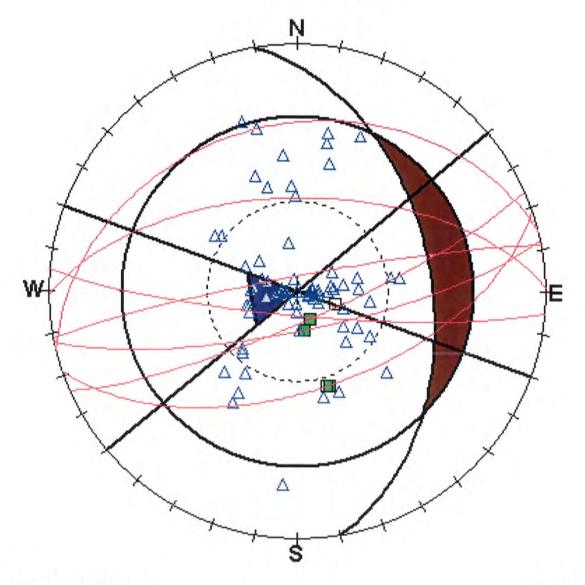
APPENDIX I ROCK SLOPE STABILITY ANALYSES

WEST FRONTAGE ROAD ROCK SLOPE



WEST FRONTAGE ROAD ROCK SLOPE

Markland Test Plot



Friction Angle = 30 degrees blue: Joints

Slope Dip = 45 degrees green: Faults

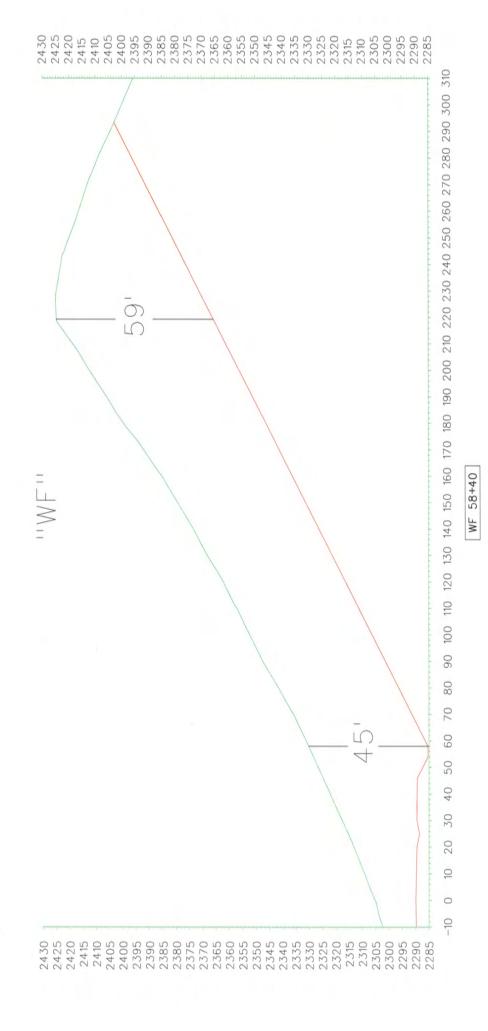
Slope Dip Direction = 80 degrees

Number of Joint Sets = 82

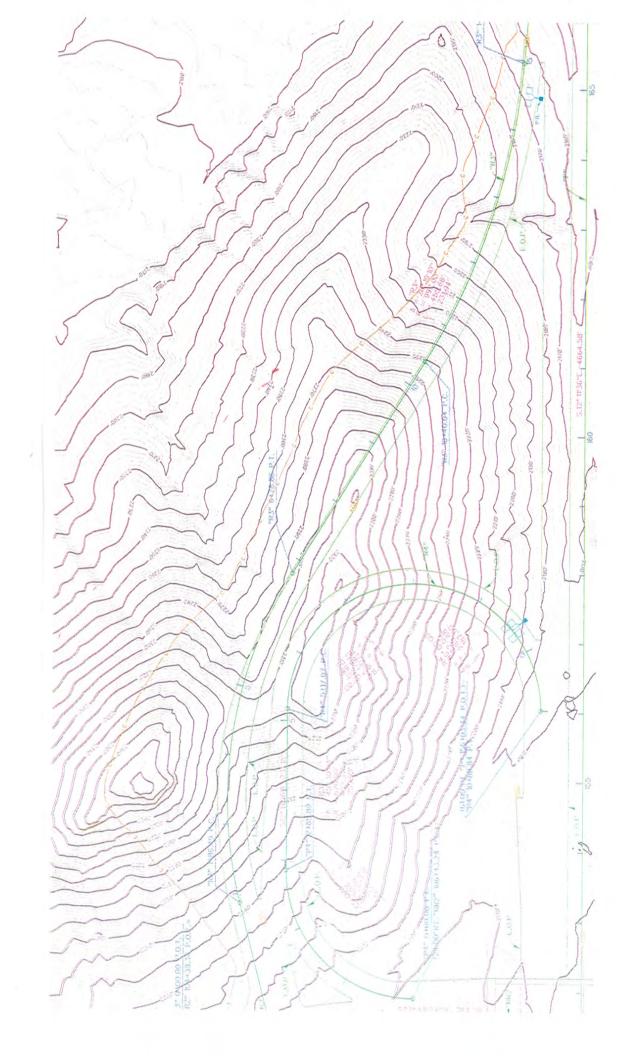
Red circles are the Great Circles bounding the inner and outer limits of two joint clusters and also the three Great Circles passing through the three faults.

Shaded reddish brown crescent is Critical Zone for Plane & Wedge Failures.

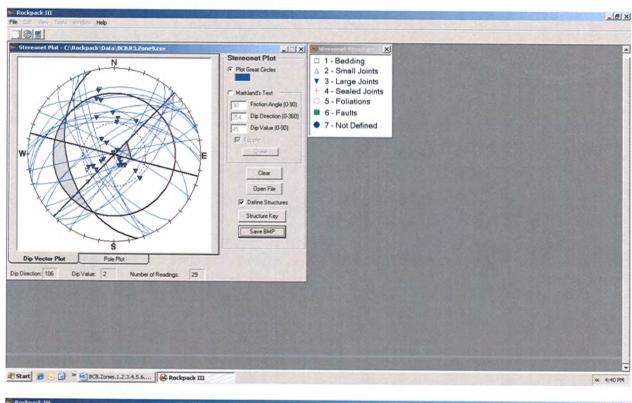
Shaded purple triangle is Critical Zone for Toppling Failures.

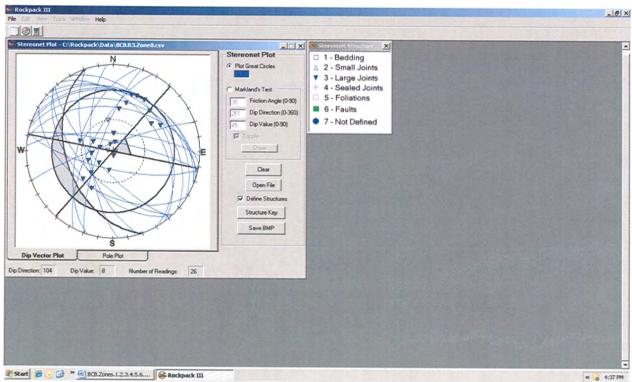


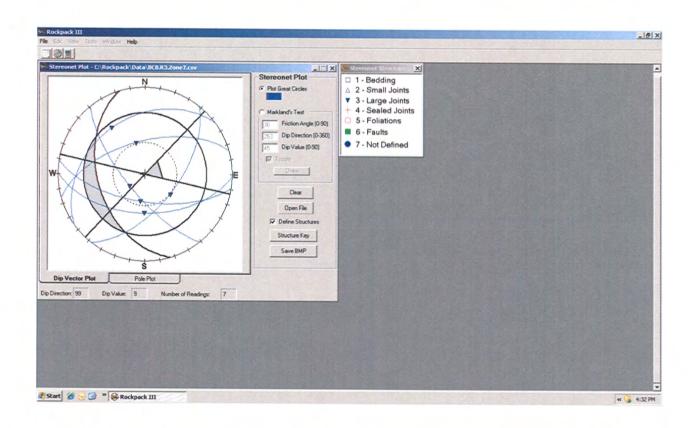
RAMP 3 ROCK SLOPE

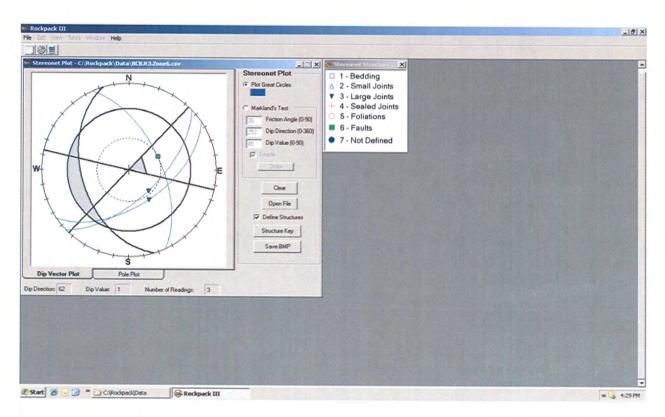


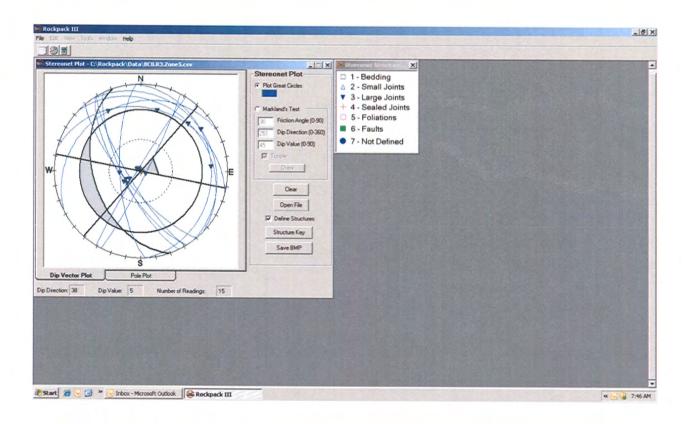
RAMP 3 PROPOSED CUT SLOPE 1H:1V

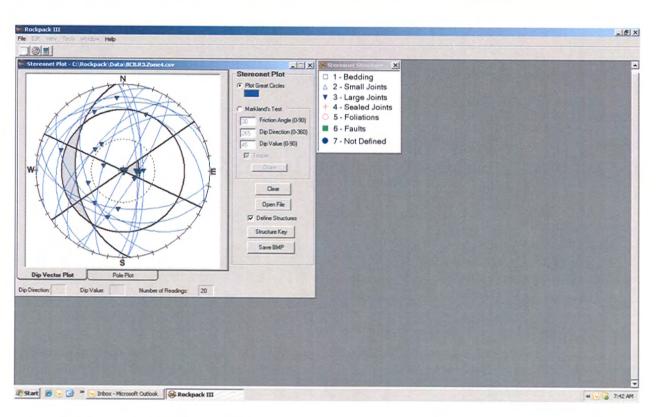


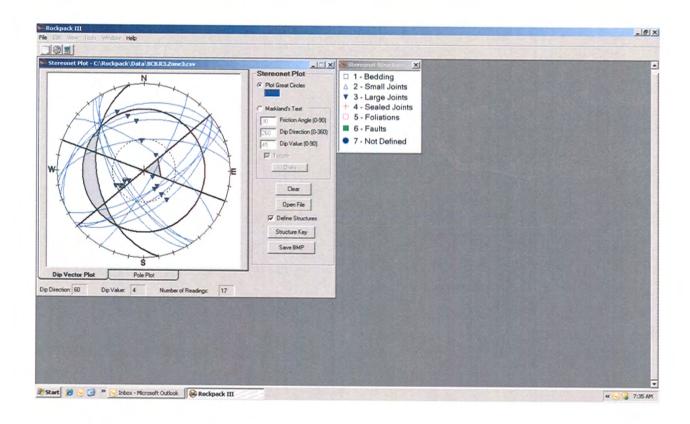


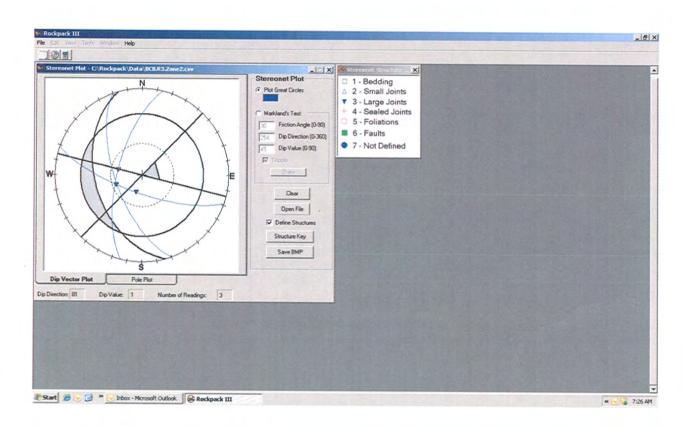


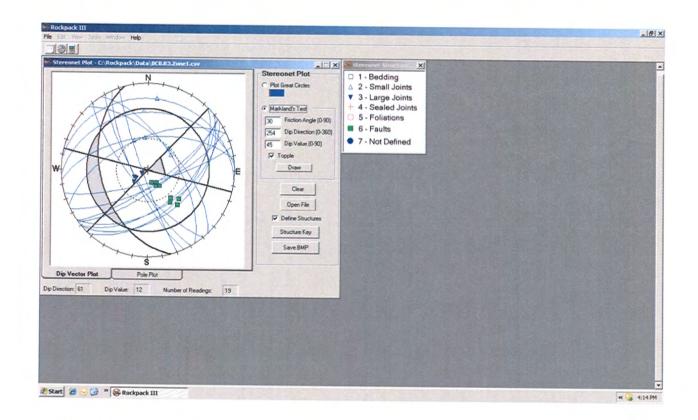


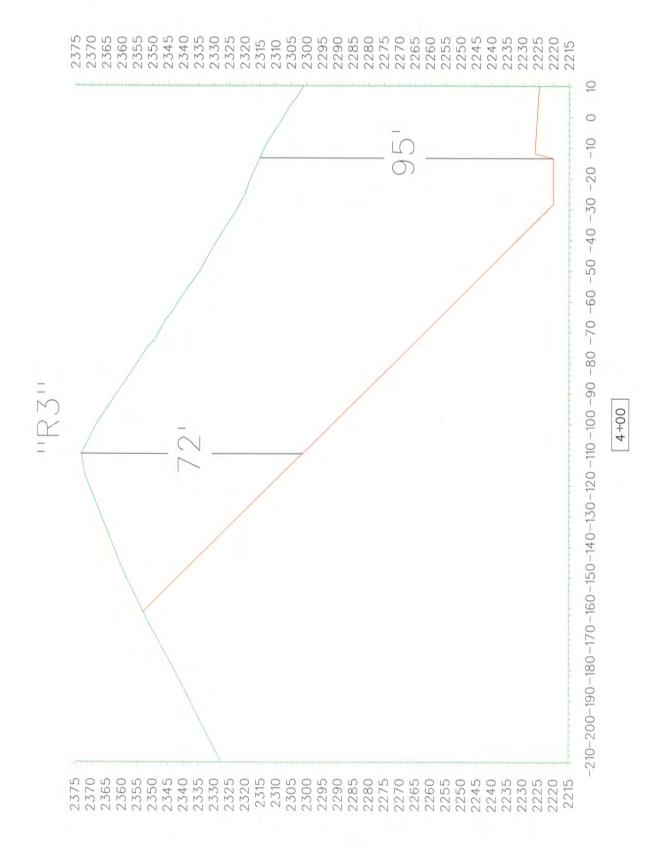






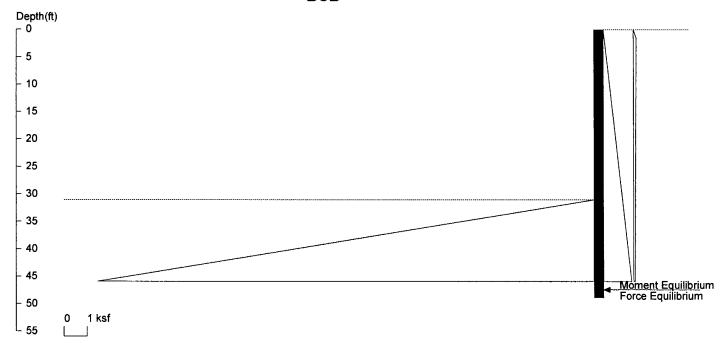






APPENDIX J TANGENT PILE WALL

Boulder City Bypass-Tangent Wall.31 feet High.



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Date: 5/7/2011 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

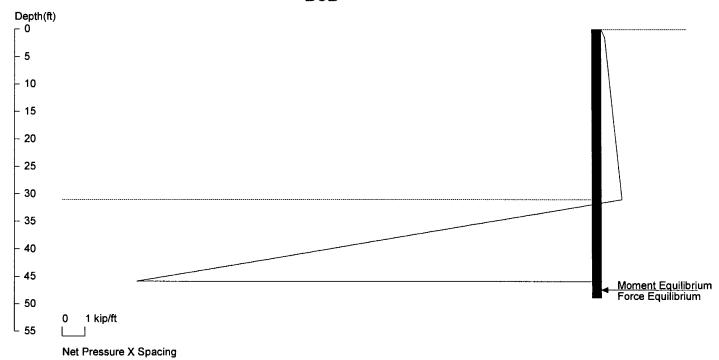
MOMENT IN PILE: Max. Moment=261.97 per Pile Spacing=1.0 at Depth=37.84

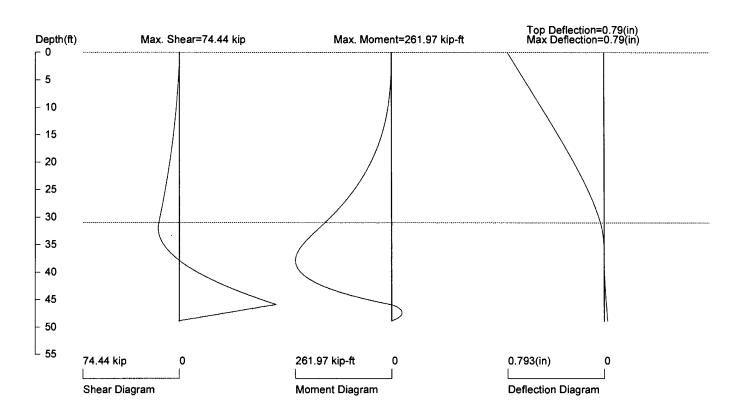
PILE SELECTION:

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.





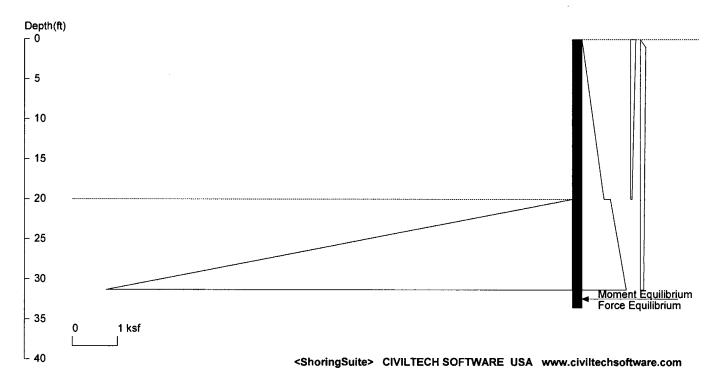
PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

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.



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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

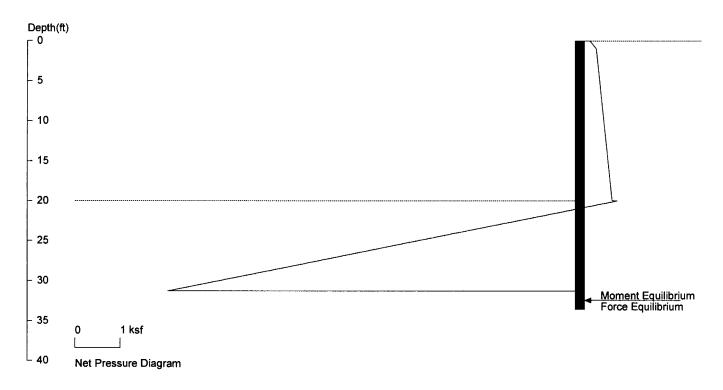
MOMENT IN PILE: Max. Moment=103.66 per Pile Spacing=1.0 at Depth=25.26

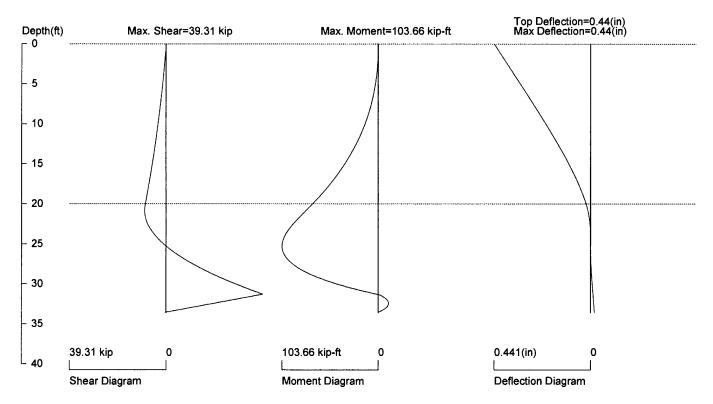
PILE SELECTION:

Request Min. Section Modulus = 52.4 in3/pile, Fy= 36 ksi = 248 MPa, Fb/Fy=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.



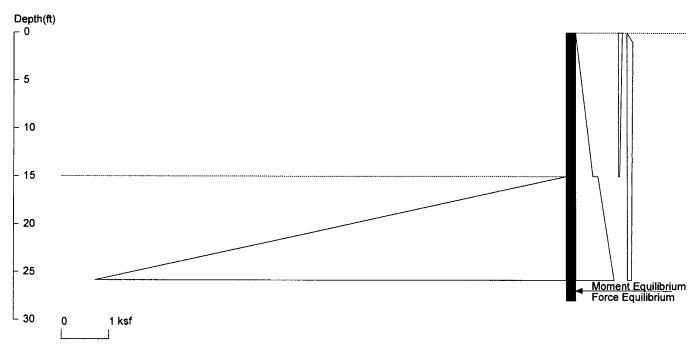


PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

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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Date: 5/7/2011

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

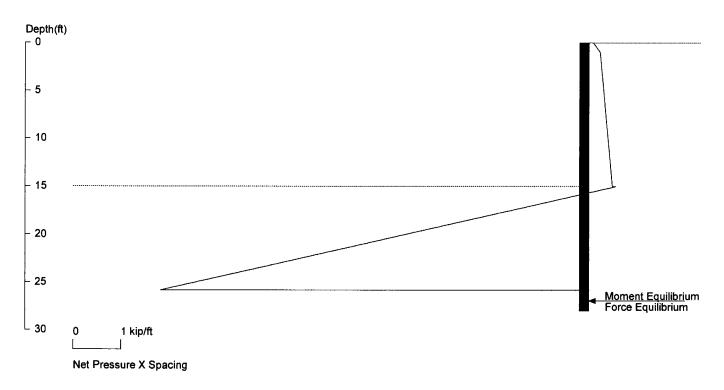
MOMENT IN PILE: Max. Moment=54.15 per Pile Spacing=1.0 at Depth=20.35

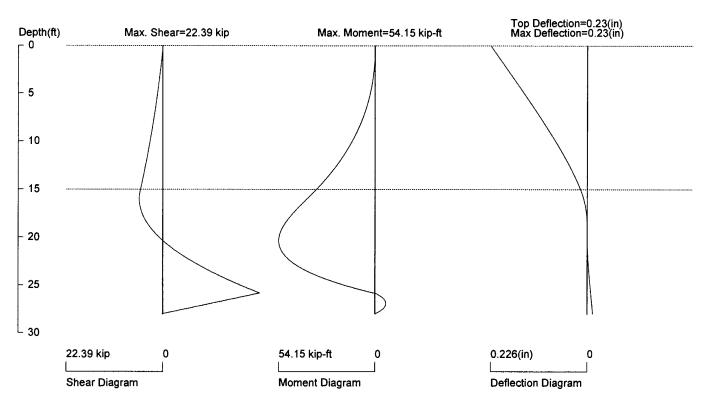
PILE SELECTION:

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