STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

M E M O R A N D U M

January 6, 2015

To: Jessen Mortensen, Principal Bridge Engineer

From: Jeff Palmer, Principal Geotechnical Engineer

Subject: US 93 Wildlife Undercrossing
Geotechnical Design Parameters
EA 73742
North of Wells, Elko County

The NDOT Geotechnical Section drilled two boreholes at approximately Stations ”X”454+37 and ”X”454+57 on US93 north of Wells, Nevada. These boreholes were drilled in response to a request for information regarding the on-site soils at the proposed location of an animal undercrossing beneath US 93 north of Wells in Elko County. Results from lab testing on samples from these two boreholes provided information to develop soil strength parameters. The boring logs for the two boreholes are attached.

The allowable bearing capacity of the soil below the proposed footing elevation is 5000 pounds per square foot (psf). This is based on a soil friction angle (ϕ) of 26°, and a cohesion (c) of 500 psf.

Any settlement due to consolidation of the clay soils should be negligible. This is due to the very small net increase in loading to the soil beneath the footings. The removal of the soil for the animal underpass will generally decrease the loading on the soil, except for directly under the structure footings.

Should you have any questions or comments, please feel free to contact Dana Boomhower at 888-7870, or me at 888-7873.

JP:DB:db

Attachment:

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	SPF-093-5(023)	ELKO	06

PRELIMINARY
SUBJECT TO REVISION
4/27/2015 8:38:48 AM

- LEGEND -

* - LIMITS OF PAVING

** - 6:1 F.S. FROM E.O.P TO CONCRETE BOX HEADWALL.

"X" 449+08.59 "X" 449+13.38 INSTALL DEER PROOF FENCE FROM 50.00' LT. TO 45.21' LT. (SEE SHEETS SD1 & SD3).

"X" 449+27.04 INSTALL 20' PRECAST CATTLE GUARD 45.21' LT. (SEE SHEET SD3)

"X" 449+40.70 "X" 449+95.49 INSTALL DEER PROOF FENCE FROM 45.21' LT. TO 100.00' LT. (SEE SHEETS SD1 & SD3).

"X" 449+95.49 "X" 453+48.82 INSTALL DEER PROOF FENCE 100.00' LT. (SEE SHEET SD1).

"X" 453+48.82 "X" 454+27.16 INSTALL DEER PROOF FENCE FROM 100.00' LT. TO 54.77' LT. (SEE SHEET SD1).

"X" 454+27.16 "X" 454+72.85 INSTALL DEER PROOF FENCE BEHIND WING WALLS AND ON TOP OF HEADWALL LT. (SEE SHEET SD1).

"X" 454+72.85 "X" 457+24.40 INSTALL DEER PROOF FENCE FROM 54.77' LT. TO 200.00' LT. (SEE SHEET SD1).

"X" 454+87.07 INSTALL 4' SWING GATE 60.00' LT. (SEE SHEETS SD1 & SD4)

"X" 457+24.40 "X" 502+05.33 REMOVE RIGHT OF WAY FENCE 200.00' LT.

"X" 457+24.40 "X" 500+67.58 INSTALL DEER PROOF FENCE 200.00' LT. (SEE SHEET SD1).

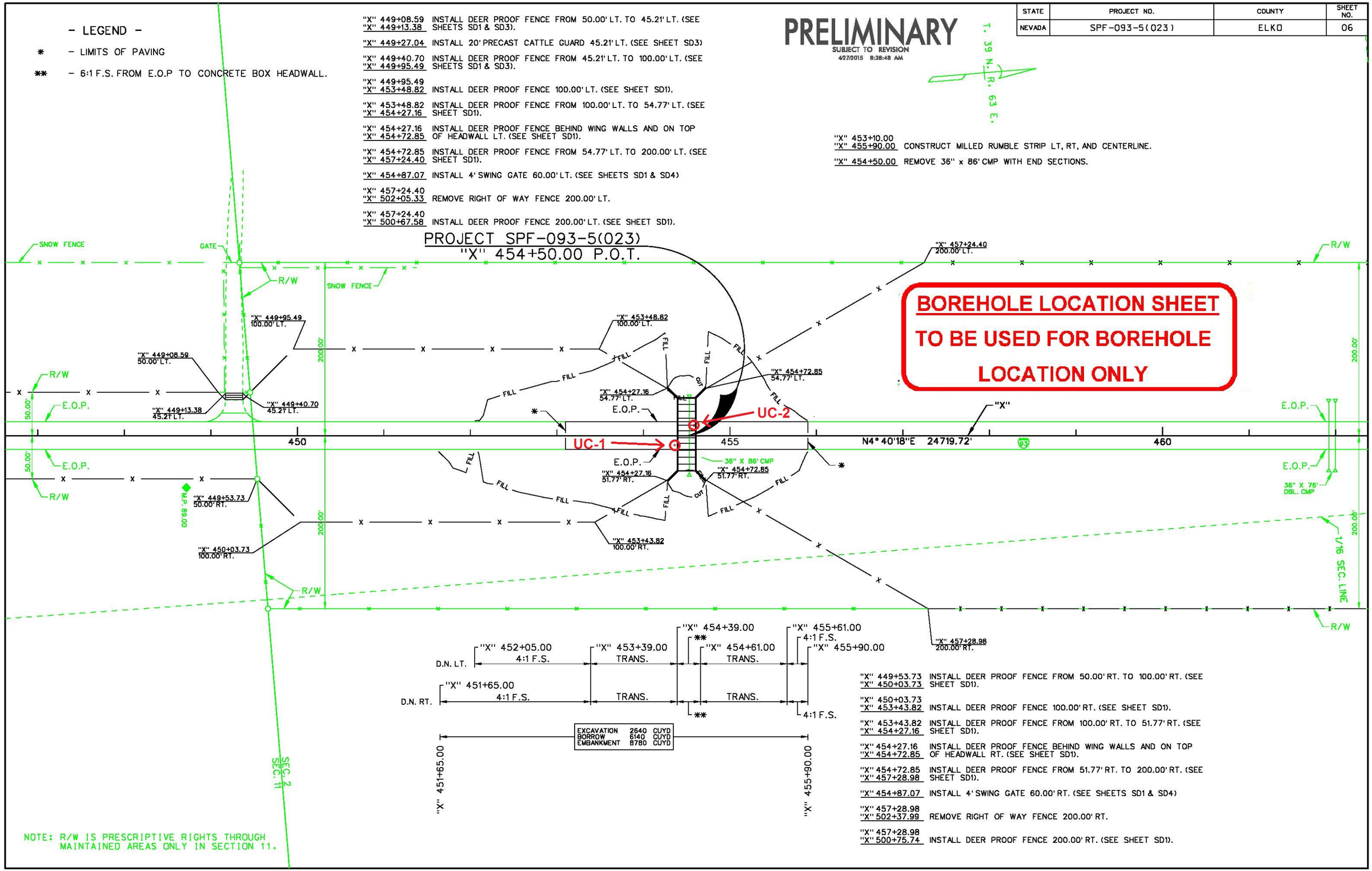
"X" 453+10.00 "X" 455+90.00 CONSTRUCT MILLED RUMBLE STRIP LT, RT, AND CENTERLINE.

"X" 454+50.00 REMOVE 36" x 86' CMP WITH END SECTIONS.

T. 39 N. R. 63 E.

PROJECT SPF-093-5(023)
"X" 454+50.00 P.O.T.

BOREHOLE LOCATION SHEET
TO BE USED FOR BOREHOLE LOCATION ONLY



"X" 449+53.73 "X" 450+03.73 INSTALL DEER PROOF FENCE FROM 50.00' RT. TO 100.00' RT. (SEE SHEET SD1).

"X" 450+03.73 "X" 453+43.82 INSTALL DEER PROOF FENCE 100.00' RT. (SEE SHEET SD1).

"X" 453+43.82 "X" 454+27.16 INSTALL DEER PROOF FENCE FROM 100.00' RT. TO 51.77' RT. (SEE SHEET SD1).

"X" 454+27.16 "X" 454+72.85 INSTALL DEER PROOF FENCE BEHIND WING WALLS AND ON TOP OF HEADWALL RT. (SEE SHEET SD1).

"X" 454+72.85 "X" 457+28.98 INSTALL DEER PROOF FENCE FROM 51.77' RT. TO 200.00' RT. (SEE SHEET SD1).

"X" 454+87.07 INSTALL 4' SWING GATE 60.00' RT. (SEE SHEETS SD1 & SD4)

"X" 457+28.98 "X" 502+37.99 REMOVE RIGHT OF WAY FENCE 200.00' RT.

"X" 457+28.98 "X" 500+75.74 INSTALL DEER PROOF FENCE 200.00' RT. (SEE SHEET SD1).

NOTE: R/W IS PRESCRIPTIVE RIGHTS THROUGH MAINTAINED AREAS ONLY IN SECTION 11.

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

START DATE 5/22/12
END DATE 5/22/12
JOB DESCRIPTION US 93 Wildlife Undercrossing
LOCATION Near Milepost 89 North of Wells, Nevada
BORING UC-1
E.A. # 73742
GROUND ELEV. 5996.50 (ft)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

STATION "X"454+37
OFFSET 11' Right
ENGINEER Boomhower
EQUIPMENT Diedrich D-120
OPERATOR Pypkowski
DRILLING METHOD 6" H.S.A.
BACKFILLED Yes DATE 5/22/2012

ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 6 inch Increments	BLOW COUNT Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
									0.70 **ASPHALTIC CONCRETE**	
5991.5	5 5.00	Bulk 1	BULK			100			**SANDY LEAN CLAY**	Bulk sample 1 @ 5'-10'.
5986.5	10 10.00							CL		
5981.5	15 15.00	Bulk 2	BULK			100			**LEAN CLAY with SAND**	Bulk sample 2 @ 15'-20'.
5976.5	20 20.00								20.00	
	21.50	A	CMS	8 17 26	43	100		SC	**CLAYEY SAND with GRAVEL** Medium brown, moist, very stiff	
	23.00	B	SPT	7 15 17	32	80			**CLAYEY SAND with GRAVEL** Medium brown, moist, hard	
	25.00								24.00	
5971.5	25									
	26.50	C	CMS	7 8 7	15	20			**SANDY LEAN CLAY** Medium brown, moist, stiff	(C) Very little sample recovery.
	28.00	D	SPT	2 3 2	5	80		CL	**SANDY LEAN CLAY** Medium brown, moist to wet, medium stiff	
	30.00								30.00	

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

START DATE 5/22/12
END DATE 5/22/12
JOB DESCRIPTION US 93 Wildlife Undercrossing
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BORING UC-1
E.A. # 73742
GROUND ELEV. 5996.50 (ft)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

STATION "X"454+37
OFFSET 11' Right
ENGINEER Boomhower
EQUIPMENT Diedrich D-120
OPERATOR Pypkowski
DRILLING METHOD 6" H.S.A.
BACKFILLED Yes DATE 5/22/2012

ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 6 inch Increments	BLOW COUNT Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		E	CMS	4 3 5	8	100			**FAT CLAY** Medium brown, moist to wet, medium stiff	
	31.50									
		F	SPT	3 4 5	9	100		**CH**	**FAT CLAY** Medium brown, moist to wet, stiff	
	33.00									
									34.00	
	35.00									
5961.5	35									
		G	CMS	3 4 4	8	100			**LEAN CLAY with SAND** Medium brown, moist to wet, medium stiff	
	36.50									
		H	SPT	5 4 6	10	100		**CL**	**SANDY LEAN CLAY with GRAVEL** Medium brown, moist to wet, stiff	
	38.00									
	40.00									
5956.5	40									
		I	CMS	10 11 19	30	100			**SANDY LEAN CLAY with GRAVEL** Medium brown, moist to wet, very stiff	
	41.50								41.50	
		J	SPT	10 14 15	29	25		**SC**	**CLAYEY SAND with GRAVEL** Medium brown, moist to wet, dense	(J) Very little sample recovery.
	43.00									
									44.00	
	45.00									
5951.5	45									
		K	CMS	6 6 7	13	100		**CL**	**SANDY LEAN CLAY** Medium brown, moist to wet, medium stiff to stiff	
	46.50								46.50	
		L	SPT	15 12 6	18	100			**CLAYEY GRAVEL with SAND** Medium brown, moist to wet, medium dense	
	48.00							**GC**		
	50.00								49.50	
5946.5	50									
		M	CMS	5 6 9	15	0				(M) No sample recovered.
	51.50									
	52.00									
		N	SPT	6 16 18	34	100			**CLAYEY SAND with GRAVEL** Medium brown, moist to wet, dense	
	53.50									
	55.00									
5941.5	55									
		O	SPT	7 5 11	16	100		**SC**	**CLAYEY SAND with GRAVEL** Medium brown, moist to wet, medium dense	
	56.50									
	60.00								60.00	

NV_DOT GINT FILES.GPJ NV_DOT.GDT 10/24/14

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

START DATE 5/22/12
END DATE 5/22/12
JOB DESCRIPTION US 93 Wildlife Undercrossing
LOCATION Near Milepost 89 North of Wells, Nevada
BORING UC-1
E.A. # 73742
GROUND ELEV. 5996.50 (ft)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

STATION "X"454+37
OFFSET 11' Right
ENGINEER Boomhower
EQUIPMENT Diedrich D-120
OPERATOR Pypkowski
DRILLING METHOD 6" H.S.A.
BACKFILLED Yes DATE 5/22/2012

ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 6 inch Increments	BLOW COUNT Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	61.50	P	SPT	5 5 8	13	0				(P) No sample recovered. Rock in sampler shoe.
	65.00									
5931.5	65	Q	SPT	3 3 4	7	100			**LEAN CLAY** Medium brown, wet, medium stiff	
	66.50									
	70.00							CL		
5926.5	70	R	SPT	4 6 12	18	100			**LEAN CLAY** Medium brown, wet, very stiff	
	71.50									
	75.00									
5921.5	75	S	SPT	4 5 7	12	115			**LEAN CLAY with SAND** Medium brown, wet, stiff	
	76.50									
									78.20	
	80.00									
5916.5	80	T	SPT	8 16 16	32	115		SC	**CLAYEY SAND with GRAVEL** Medium brown, wet, dense	
	81.50									
									83.20	
	85.00							CL		
5911.5	85	U	SPT	4 5 8	13	120			**LEAN CLAY** Greenish gray, wet, stiff	
	86.50								86.50	
									B.O.H.	

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

START DATE 5/23/12
END DATE 5/23/12
JOB DESCRIPTION US 93 Wildlife Undercrossing
LOCATION Near Milepost 89 North of Wells, Nevada
BORING UC-2
E.A. # 73742
GROUND ELEV. 5996.10 (ft)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

STATION "X"454+57
OFFSET 11' Left
ENGINEER Boomhower
EQUIPMENT Diedrich D-120
OPERATOR Pypkowski
DRILLING METHOD 6" H.S.A.
BACKFILLED Yes DATE 5/23/2012

ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 6 inch Increments	BLOW COUNT Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
									0.70 **ASPHALTIC CONCRETE**	
	2.00									
		Bulk 1	BULK			100		SC	**CLAYEY SAND with GRAVEL**	Bulk sample 1 @ 2'-5'.
5991.1	5 5.00									
									7.50	
5986.1	10 10.00								**SANDY LEAN CLAY with GRAVEL**	Bulk sample 2 @ 10'-15'.
		Bulk 2	BULK			100		CL		
5981.1	15 15.00									
	17.00									
	18.50	A	SPT	2 5 7	12	95			**LEAN CLAY** Dark brown, moist, stiff	
	20.00								19.20	
5976.1	20									
	21.50	B	SPT	15 16 22	38	95		GC	**CLAYEY GRAVEL with SAND** Greenish gray, moist, dense	
									23.20	
	25.00									
5971.1	25									
	26.50	C	CMS	4 4 6	10	95		CL	**LEAN CLAY** Greenish gray, moist, medium stiff	
	28.00	D	SPT	3 3 3	6	115			**LEAN CLAY** Greenish gray, moist, medium stiff	
	30.00								30.00	

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

START DATE 5/23/12
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LOCATION Near Milepost 89 North of Wells, Nevada
BORING UC-2
E.A. # 73742
GROUND ELEV. 5996.10 (ft)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

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OFFSET 11' Left
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BACKFILLED Yes DATE 5/23/2012

ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 6 inch Increments	BLOW COUNT Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		E	CMS	4 5 7	12	80		CL	**LEAN CLAY** Greenish brown, moist to wet, medium stiff	
	31.50								31.50	
		F	SPT	3 4 5	9	120			**FAT CLAY** Greenish brown, moist to wet, stiff	
	33.00							CH		
	35.00									
5961.1	35	G	CMS	3 3 5	8	100				
	36.50								36.00	
		H	SPT	3 3 5	8	105			**SANDY LEAN CLAY** Greenish brown, moist to wet, medium stiff	
	38.00									
	40.00									
5956.1	40	I	CMS	9 12 12	24	0				(I) No sample recovered.
	41.50							CL		
	45.00									
5951.1	45	J	CMS	7 7 7	14	45			**GRAVELLY LEAN CLAY** Greenish brown, moist to wet, medium stiff to stiff	
	46.50									
		K	SPT	3 3 4	7	115			**GRAVELLY LEAN CLAY** Greenish brown, moist to wet, medium stiff	
	48.00									
	50.00								49.00	
5946.1	50	L	CMS	11 13 14	27	105			**CLAYEY SAND with GRAVEL** Medium brown, wet, medium dense	
	51.50							SC		
		M	SPT	10 33 30	63	95			**CLAYEY SAND with GRAVEL** Medium brown, wet, very dense	
	53.00									
	55.00								54.00	
5941.1	55	N	SPT	2 3 4	7	105			**SANDY LEAN CLAY with GRAVEL** Medium brown, wet, medium stiff	
	56.50							CL		
	60.00								60.00	

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

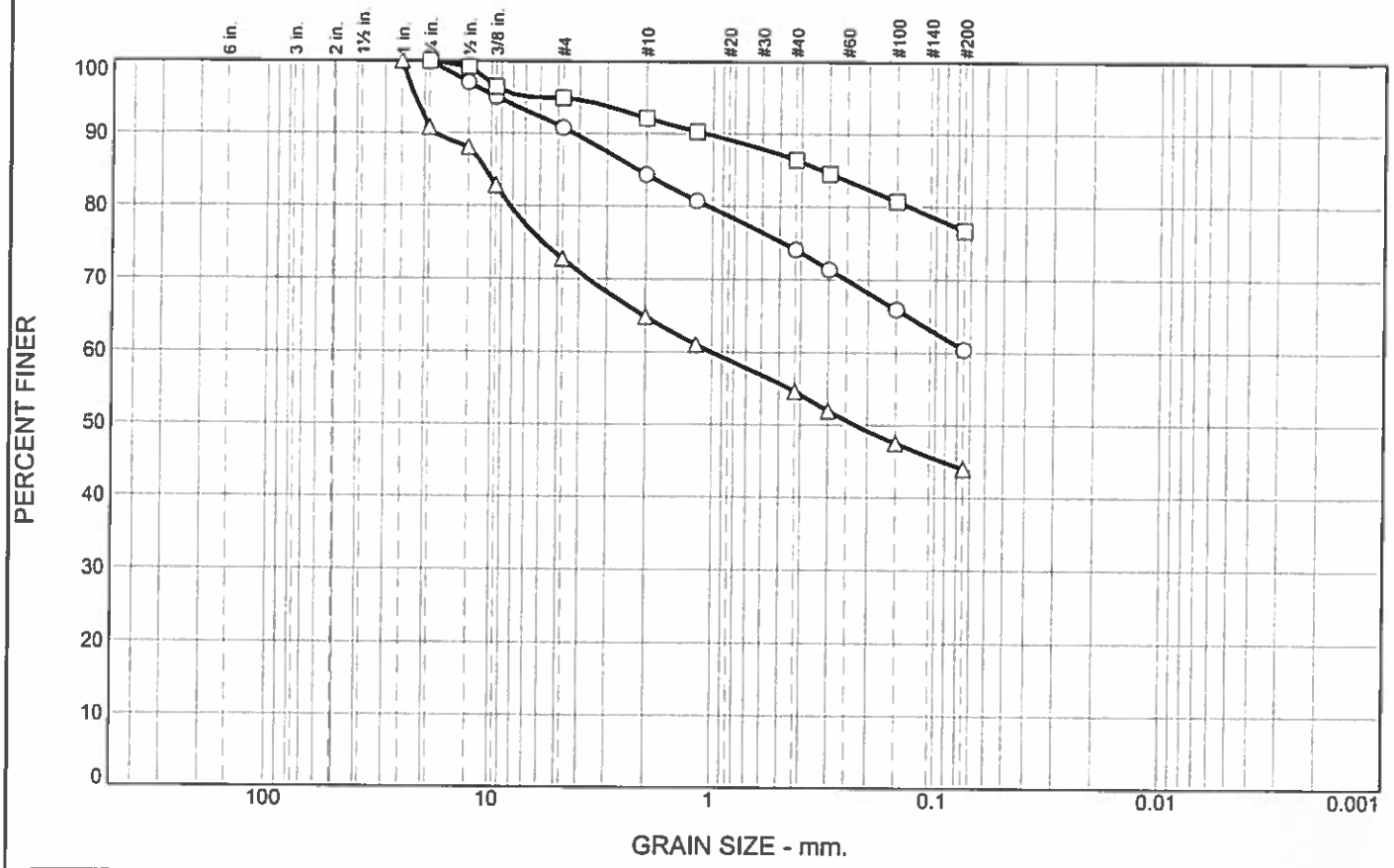
START DATE 5/23/12
END DATE 5/23/12
JOB DESCRIPTION US 93 Wildlife Undercrossing
LOCATION Near Milepost 89 North of Wells, Nevada
BORING UC-2
E.A. # 73742
GROUND ELEV. 5996.10 (ft)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

STATION "X"454+57
OFFSET 11' Left
ENGINEER Boomhower
EQUIPMENT Diedrich D-120
OPERATOR Pypkowski
DRILLING METHOD 6" H.S.A.
BACKFILLED Yes DATE 5/23/2012

ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 6 inch Increments	BLOW COUNT Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		O	SPT	3 3 4	7	115		CL	**SANDY LEAN CLAY** Medium brown, wet, medium stiff	
	61.50									
									63.20	
5931.1	65.00 65	P	SPT	3 4 4	8	125		CH	**SANDY FAT CLAY** Medium brown, wet, medium stiff	
	66.50									
									68.20	
5926.1	70.00 70	Q	SPT	6 13 27	40	120		ML	**SILT** Greenish gray, wet, hard	
	71.50									
									73.20	Hard drilling @73'. 350 psi down pressure.
5921.1	75.00 75	R	SPT	7 6 7	13	120		CL	**LEAN CLAY with SAND** Greenish gray, wet, stiff	
	76.50									
5916.1	80.00 80	S	SPT	6 7 9	16	115			**SANDY LEAN CLAY** Greenish gray, wet, very stiff	
	81.50								81.50	
									B.O.H.	
5911.1	85									

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	9.2	30.4	60.4		CL	A-6(8)	20	38
□	0.0	5.1	18.2	76.7		CL	A-7-6(19)	19	44
△	0.0	27.2	28.8	44.0		SC	A-7-6(7)	16	42

SIEVE inches size	PERCENT FINER ○	□	△
1"			100.0
3/4"	100.0	100.0	90.8
1/2"	97.0	99.2	88.1
3/8"	95.0	96.4	82.8
	GRAIN SIZE		
D_{60}			1.0056
D_{30}			
D_{10}			
	COEFFICIENTS		
C_C			
C_U			

SIEVE number size	PERCENT FINER ○	□	△
#4	90.8	94.9	72.8
#10	84.3	92.1	64.9
#16	80.8	90.3	61.0
#40	74.1	86.4	54.6
#50	71.4	84.5	51.9
#100	65.9	80.8	47.5
#200	60.4	76.7	44.0

Material Description

○ sandy lean clay

□ lean clay with sand

△ clayey sand with gravel

REMARKS:

○

□

△

○ Source of Sample: UC-1 Depth: 5.0 - 10.0' Sample Number: BULK 1

□ Source of Sample: UC-1 Depth: 15.0 - 20.0' Sample Number: BULK 2

△ Source of Sample: UC-1 Depth: 20.2 - 20.7' Sample Number: A1

NEVADA DEPARTMENT OF TRANSPORTATION

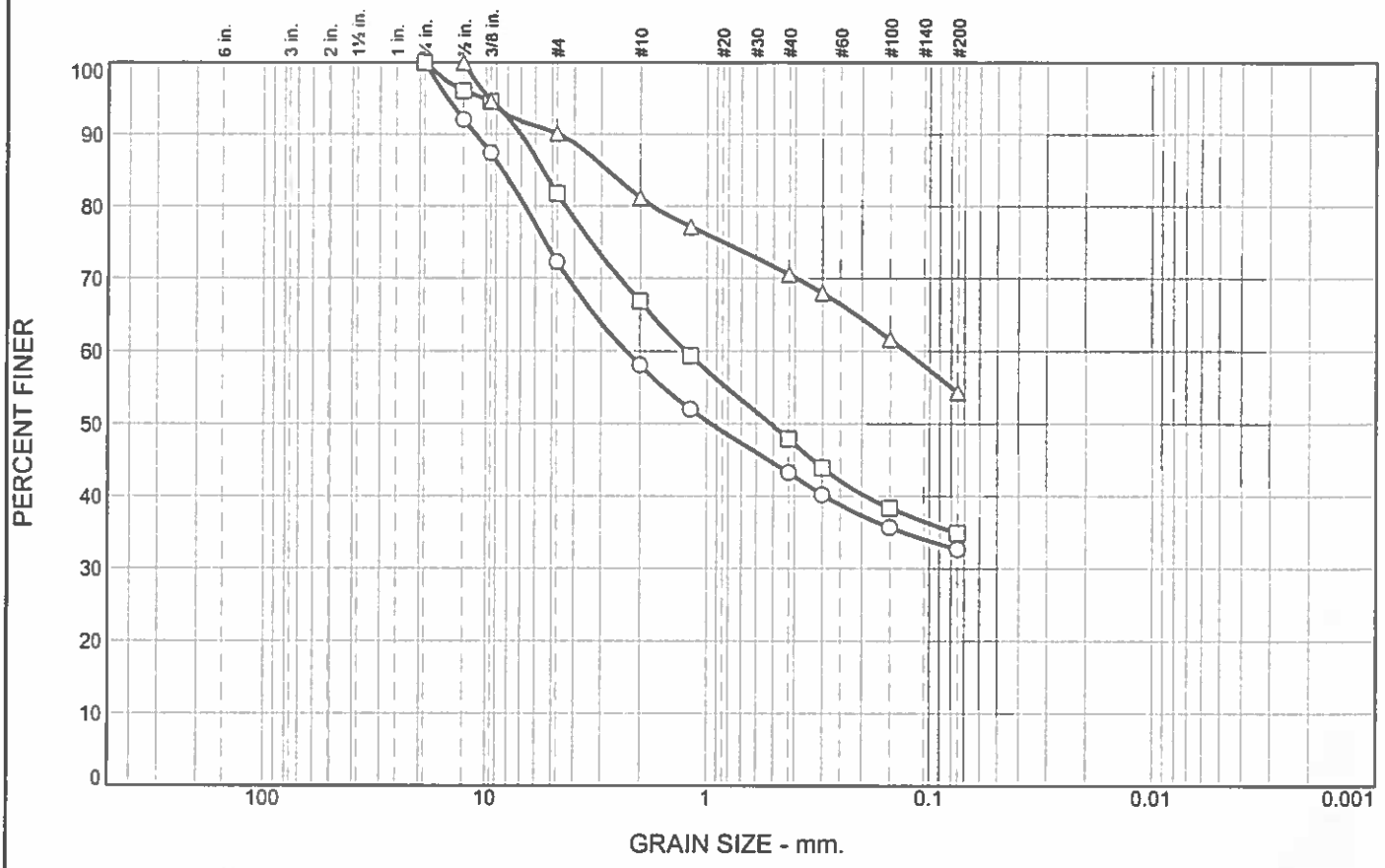
Client: D. Boomhower

Project: US 93 Animal Crossing

Project No.: FL-2-12

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	27.7	39.6	32.7		SC	A-2-7(3)	16	41
□	0.0	18.2	46.9	34.9		SC	A-2-6(2)	15	37
△	0.0	9.8	35.9	54.3		CL	A-7-6(8)	20	41

SIEVE inches size	PERCENT FINER ○	□	△
3/4"	100.0	100.0	
1/2"	92.1	96.1	100.0
3/8"	87.4	94.6	94.6
	GRAIN SIZE		
D_{60}	2.3072	1.2389	0.1281
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	72.3	81.8	90.2
#10	58.1	66.8	81.2
#16	52.0	59.4	77.2
#40	43.3	48.0	70.6
#50	40.2	43.9	68.0
#100	35.7	38.4	61.6
#200	32.7	34.9	54.3

Material Description

○ clayey sand with gravel

□ clayey sand with gravel

△ sandy lean clay

REMARKS:

○

□

△

○ Source of Sample: UC-1 Depth: 20.7 - 21.2' Sample Number: A2

□ Source of Sample: UC-1 Depth: 21.5 - 23.0' Sample Number: B

△ Source of Sample: UC-1 Depth: 25.0 - 26.5' Sample Number: C

NEVADA DEPARTMENT OF TRANSPORTATION

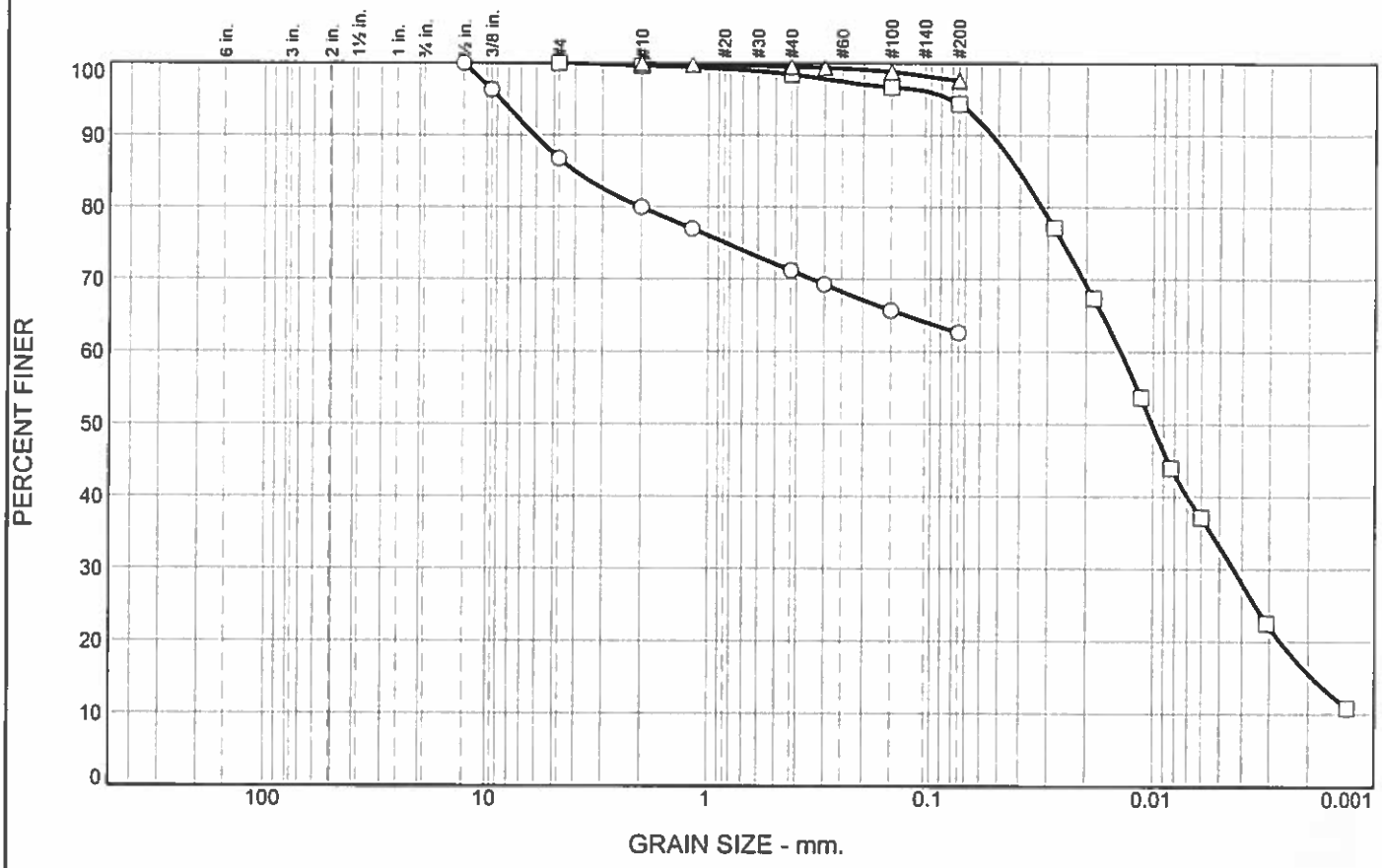
Client: D. Boomhower

Project: US 93 Animal Crossing

Project No.: FL-2-12

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	13.2	24.2	62.6		CL	A-6(7)	18	33
□	0.0	0.0	5.7	78.7	15.6	CL	A-7-6(22)	22	44
△	0.0	0.0	2.4	97.6		CL	A-7-6(24)	22	44

SIEVE inches size	PERCENT FINER ○	□	△
1/2"	100.0		
3/8"	96.3		
GRAIN SIZE			
D_{60}		0.0140	
D_{30}		0.0044	
D_{10}			
COEFFICIENTS			
C_C			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	86.8	100.0	
#10	80.0	99.6	100.0
#16	77.0		99.8
#40	71.2	98.4	99.5
#50	69.3		99.4
#100	65.7	96.6	98.8
#200	62.6	94.3	97.6

Material Description
○ sandy lean clay
□ lean clay
△ lean clay

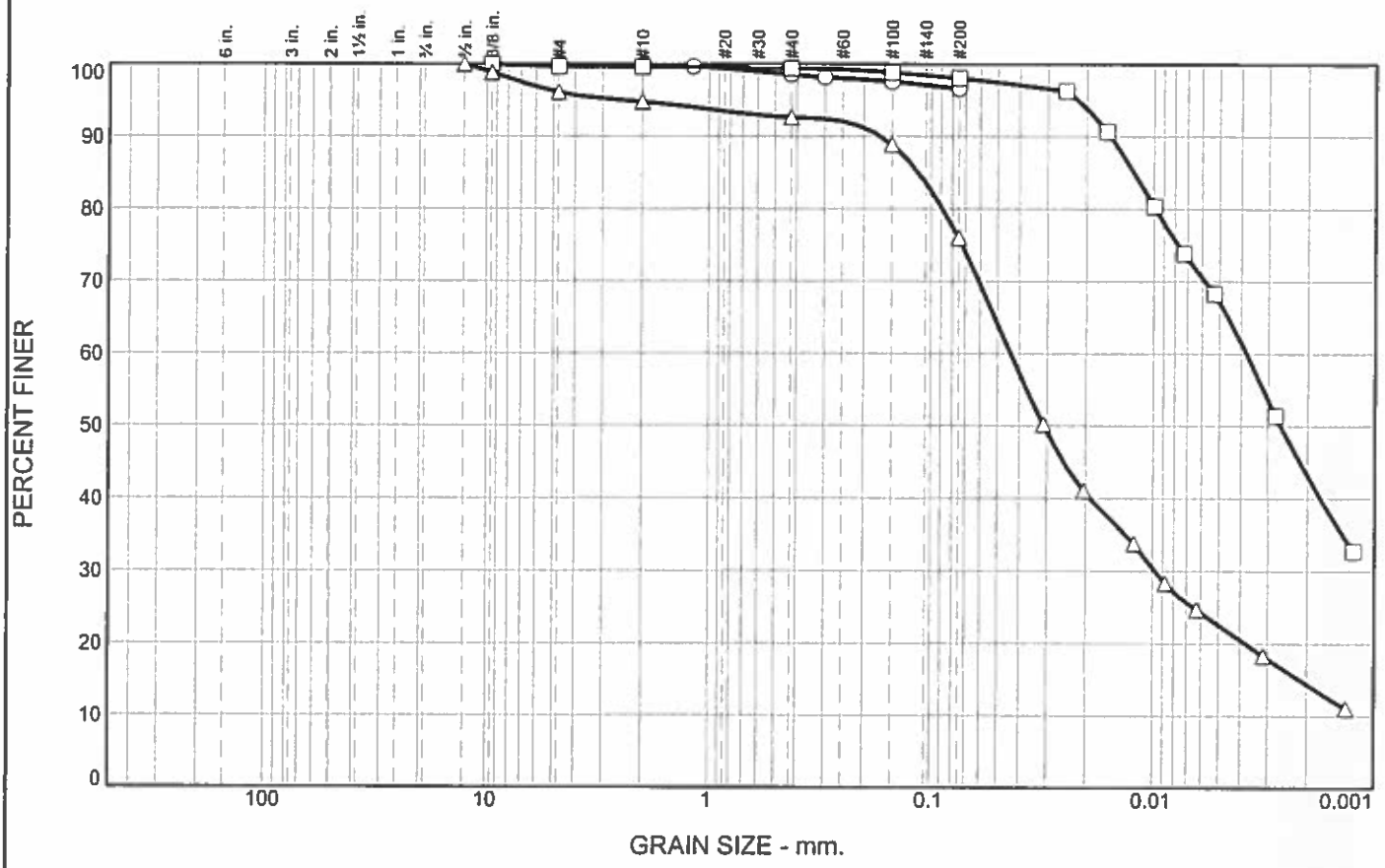
REMARKS:
○
□
△

○ Source of Sample: UC-1 Depth: 26.5 - 28.0' Sample Number: D
□ Source of Sample: UC-1 Depth: 30.2 - 30.7' Sample Number: E1
△ Source of Sample: UC-1 Depth: 30.7 - 31.2' Sample Number: E2

NEVADA DEPARTMENT OF TRANSPORTATION

Client: D. Boomhower
Project: US 93 Animal Crossing
Project No.: FL-2-12
Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	0.0	3.4	96.6		CH	A-7-6(29)	23	50
□	0.0	0.4	1.6	54.8	43.2	CH	A-7-6(30)	23	50
△	0.0	3.9	20.1	61.6	14.4	CL	A-6(11)	19	35

SIEVE inches size	PERCENT FINER ○	□	△
1/2"			100.0
3/8"		100.0	98.8
GRAIN SIZE			
D_{60}		0.0038	0.0437
D_{30}			0.0097
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	100.0	99.6	96.1
#10	99.8	99.6	94.8
#16	99.6		
#40	98.5	99.4	92.6
#50	98.2		
#100	97.5	98.8	88.9
#200	96.6	98.0	76.0

Material Description
○ fat clay
□ fat clay
△ lean clay with sand

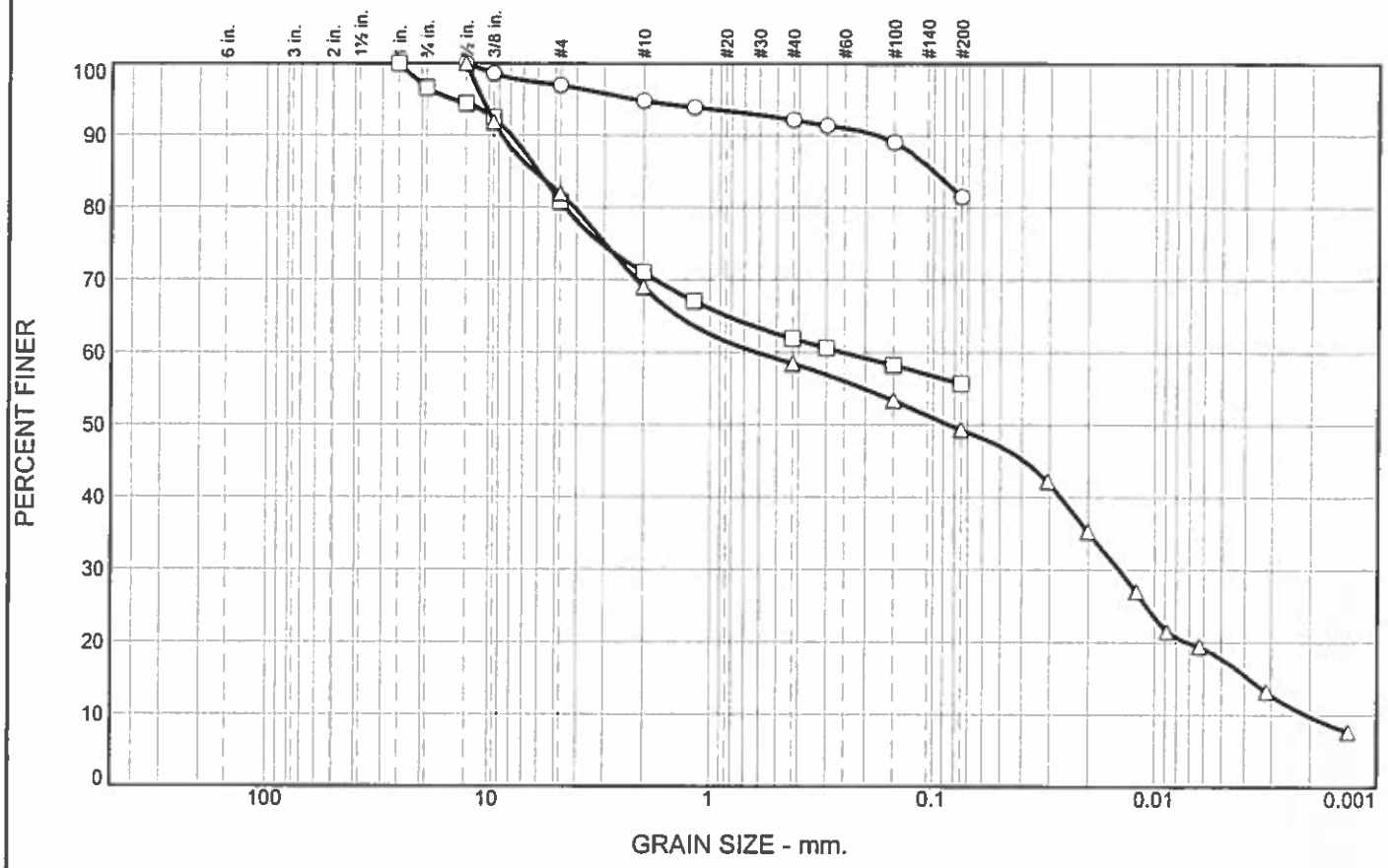
REMARKS:
○
□
△

○ Source of Sample: UC-1 Depth: 31.2 - 31.5' Sample Number: E3
□ Source of Sample: UC-1 Depth: 31.5 - 33.0' Sample Number: F
△ Source of Sample: UC-1 Depth: 35.2 - 35.7' Sample Number: G1

NEVADA DEPARTMENT OF TRANSPORTATION

Client: D. Boomhower
Project: US 93 Animal Crossing
Project No.: FL-2-12
Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	3.1	15.4	81.5		CL	A-7-6(18)	19	41
□	0.0	19.3	25.0	55.7		CL	A-6(7)	20	37
△	0.0	18.1	32.6	39.5	9.8	SC	A-6(5)	17	34

SIEVE Inches size	PERCENT FINER ○	□	△
1"		100.0	
3/4"		96.6	
1/2"	100.0	94.4	100.0
3/8"	98.6	92.5	91.8
	GRAIN SIZE		
D_{60}		0.2537	0.6187
D_{30}			0.0144
D_{10}			0.0021
	COEFFICIENTS		
C_C			0.16
C_U			297.64

SIEVE number size	PERCENT FINER ○	□	△
#4	96.9	80.7	81.9
#10	94.8	71.0	69.0
#16	93.9	67.0	
#40	92.1	61.9	58.5
#50	91.4	60.6	
#100	89.0	58.2	53.4
#200	81.5	55.7	49.3

Material Description

○ lean clay with sand

□ sandy lean clay with gravel

△ clayey sand with gravel

REMARKS:

○

□

△

○ Source of Sample: UC-1 Depth: 35.7 - 36.2' Sample Number: G2

□ Source of Sample: UC-1 Depth: 36.5 - 38.0' Sample Number: H

△ Source of Sample: UC-1 Depth: 40.2 - 40.7' Sample Number: I1

NEVADA DEPARTMENT OF TRANSPORTATION

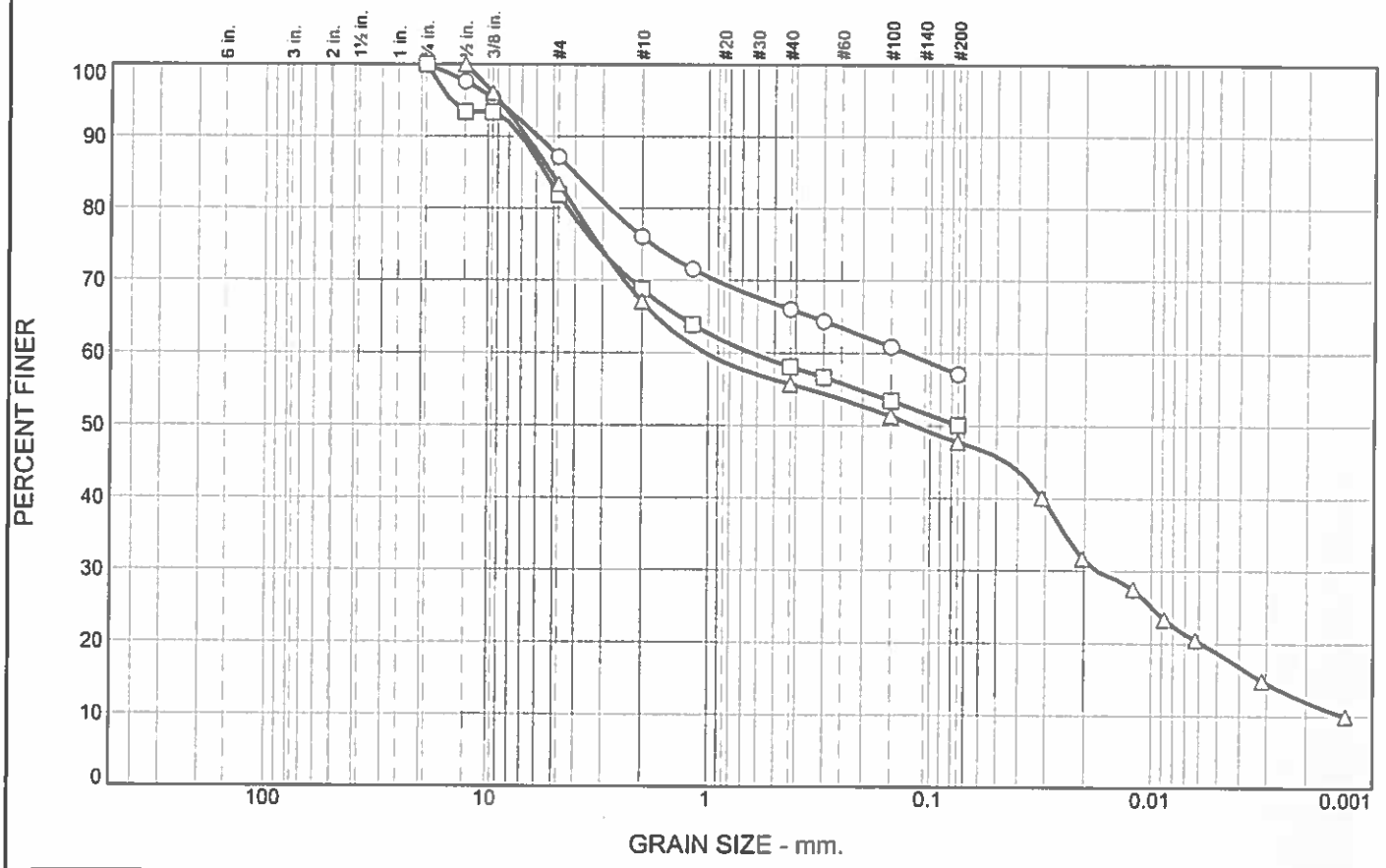
Client: D. Boomhower

Project: US 93 Animal Crossing

Project No.: FL-2-12

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	12.8	30.1	57.1		CL	A-6(7)	17	35
□	0.0	18.1	31.8	50.1		CL	A-6(6)	19	37
△	0.0	16.6	35.7	35.7	12.0	SC	A-6(5)	16	35

SIEVE inches size	PERCENT FINER ○	□	△
3/4"	100.0	100.0	
1/2"	97.6	93.3	100.0
3/8"	95.3	93.3	96.1
	GRAIN SIZE		
D_{60}	0.1277	0.6363	1.0331
D_{30}			0.0175
D_{10}			0.0014
	COEFFICIENTS		
C_C			0.22
C_U			759.68

SIEVE number size	PERCENT FINER ○	□	△
#4	87.2	81.9	83.4
#10	76.1	68.8	67.1
#16	71.5	63.9	
#40	66.0	58.1	55.7
#50	64.4	56.7	
#100	60.9	53.4	51.3
#200	57.1	50.1	47.7

Material Description

○ sandy lean clay

□ sandy lean clay with gravel

△ clayey sand with gravel

REMARKS:

○

□

△

○ Source of Sample: UC-1 Depth: 40.7 - 41.2' Sample Number: I2

□ Source of Sample: UC-1 Depth: 41.2 - 41.5' Sample Number: I3

△ Source of Sample: UC-1 Depth: 41.5 - 43.0' Sample Number: J

NEVADA DEPARTMENT OF TRANSPORTATION

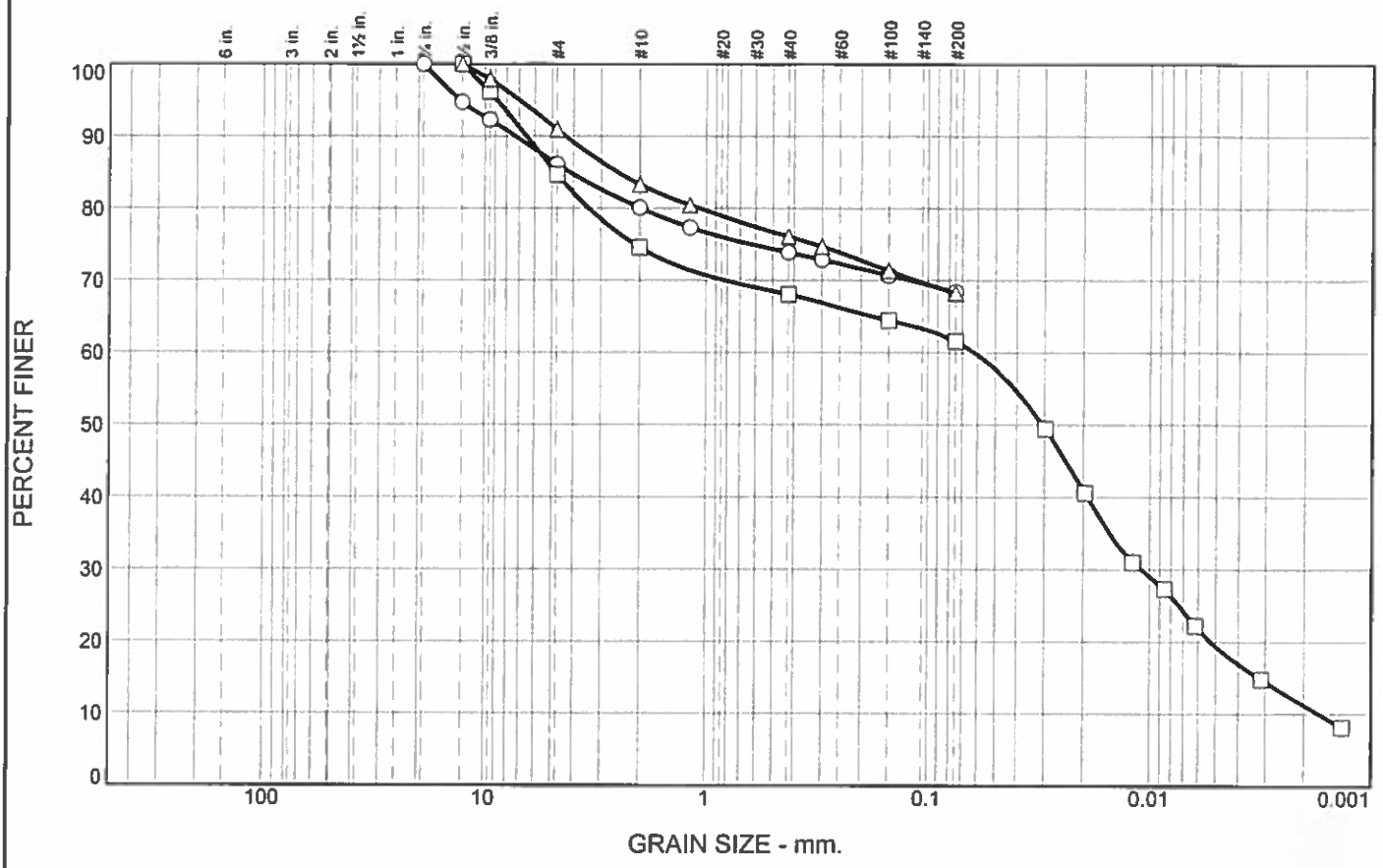
Client: D. Boomhower

Project: US 93 Animal Crossing

Project No.: FL-2-12

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	13.9	17.7	68.4		CL	A-6(11)	19	38
□	0.0	15.3	23.1	50.4	11.2	CL	A-7-6(12)	19	43
△	0.0	9.1	22.7	68.2		CL	A-6(12)	19	39

SIEVE inches size	PERCENT FINER ○	□	△
3/4"	100.0		
1/2"	94.7	100.0	100.0
3/8"	92.3	96.2	97.9
	GRAIN SIZE		
D_{60}		0.0617	
D_{30}		0.0109	
D_{10}		0.0017	
	COEFFICIENTS		
C_c		1.13	
C_u		36.26	

SIEVE number size	PERCENT FINER ○	□	△
#4	86.1	84.7	90.9
#10	80.1	74.6	83.3
#16	77.3		80.4
#40	73.9	68.0	76.1
#50	72.9		74.7
#100	70.7	64.4	71.4
#200	68.4	61.6	68.2

Material Description

○ sandy lean clay

□ sandy lean clay with gravel

△ sandy lean clay

REMARKS:

○

□

△

○ Source of Sample: UC-1 Depth: 45.2 - 45.7' Sample Number: K1

□ Source of Sample: UC-1 Depth: 45.7 - 46.2' Sample Number: K2

△ Source of Sample: UC-1 Depth: 46.2 - 46.5' Sample Number: K3

NEVADA DEPARTMENT OF TRANSPORTATION

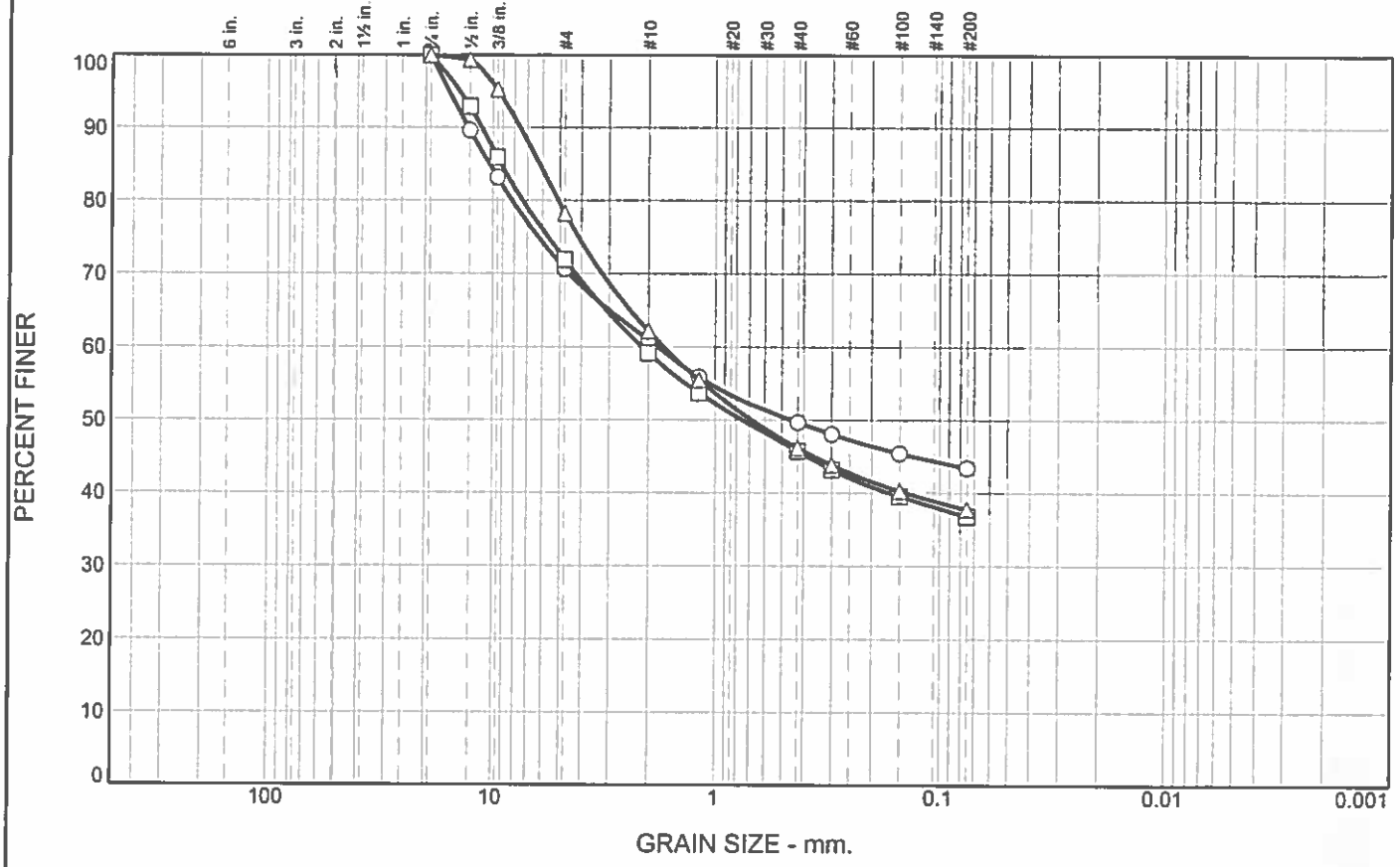
Client: D. Boomhower

Project: US 93 Animal Crossing

Project No.: FL-2-12

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	29.3	27.3	43.4		GC	A-7-6(7)	20	48
□	0.0	28.1	35.1	36.8		SC	A-7-6(4)	18	44
△	0.0	21.8	40.4	37.8		SC	A-7-6(4)	18	42

SIEVE inches size	PERCENT FINER ○	□	△
3/4"	100.0	100.0	100.0
1/2"	89.6	92.9	99.3
3/8"	83.2	85.9	95.3
	GRAIN SIZE		
D_{60}	1.8168	2.1402	1.7068
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	70.7	71.9	78.2
#10	61.0	59.2	62.2
#16	55.9	53.7	55.5
#40	49.7	45.8	46.2
#50	48.1	43.2	43.8
#100	45.5	39.6	40.3
#200	43.4	36.8	37.8

Material Description

○ clayey gravel with sand

□ clayey sand with gravel

△ clayey sand with gravel

REMARKS:

○

□

△

○ Source of Sample: UC-1 Depth: 46.5 - 48.0' Sample Number: L

□ Source of Sample: UC-1 Depth: 52.0 - 53.5' Sample Number: N

△ Source of Sample: UC-1 Depth: 55.0 - 56.5' Sample Number: O

NEVADA DEPARTMENT OF TRANSPORTATION

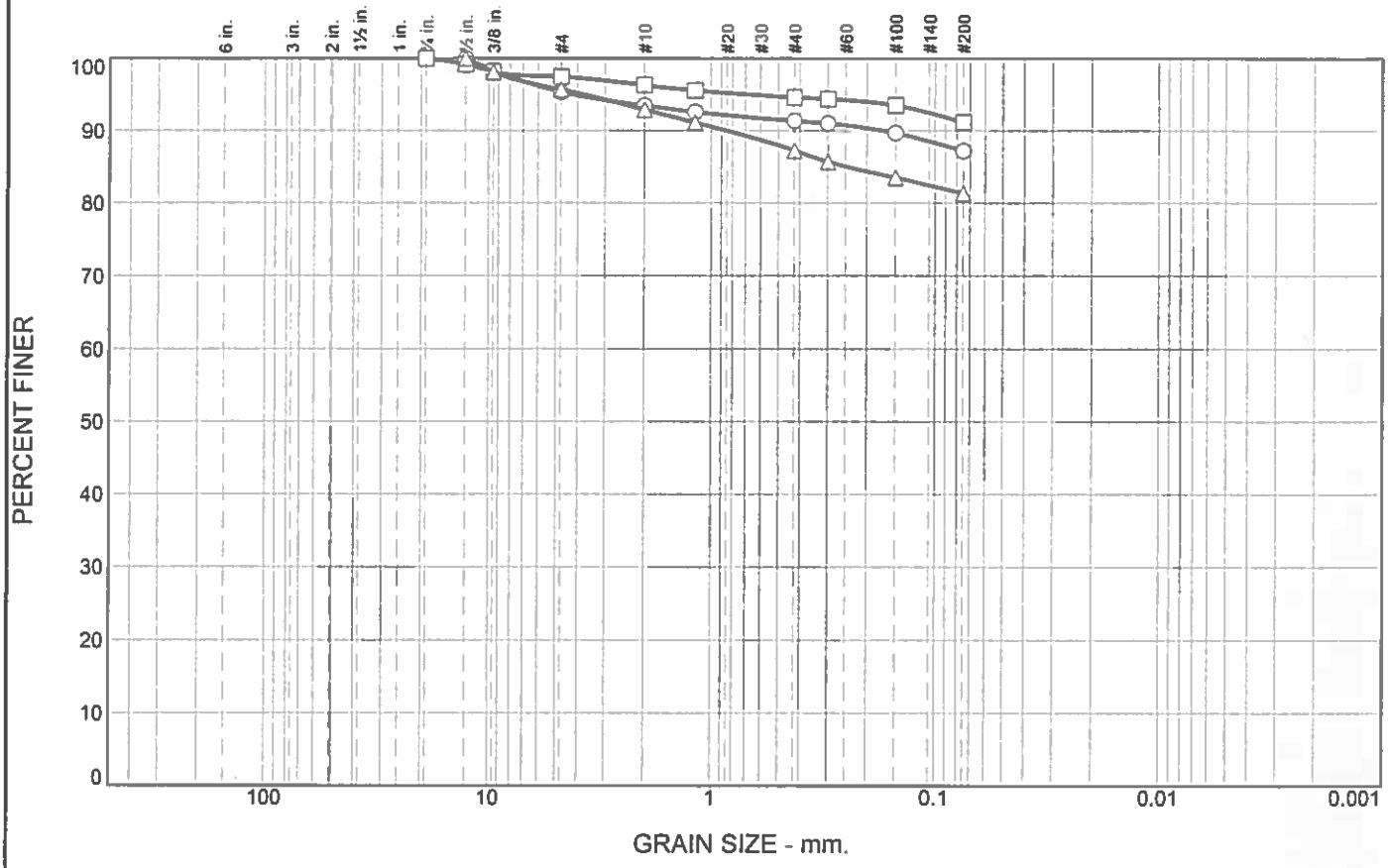
Client: D. Boomhower

Project: US 93 Animal Crossing

Project No.: FL-2-12

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	4.7	8.1	87.2		CL	A-7-6(25)	20	48
□	0.0	2.6	6.2	91.2		CL	A-7-6(23)	20	44
△	0.0	4.3	14.4	81.3		CL	A-7-6(20)	23	47

SIEVE inches size	PERCENT FINER ○	□	△
3/4"		100.0	
1/2"	100.0	99.1	100.0
3/8"	98.3	98.1	98.1
GRAIN SIZE			
D_{60}			
D_{30}			
D_{10}			
COEFFICIENTS			
C_C			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	95.3	97.4	95.7
#10	93.5	96.3	92.9
#16	92.6	95.5	91.1
#40	91.4	94.6	87.3
#50	91.0	94.4	85.7
#100	89.7	93.5	83.5
#200	87.2	91.2	81.3

Material Description

○ lean clay

□ lean clay

△ lean clay with sand

REMARKS:

○

□

△

○ Source of Sample: UC-1 Depth: 65.0 - 66.5' Sample Number: Q

□ Source of Sample: UC-1 Depth: 70.0 - 71.5' Sample Number: R

△ Source of Sample: UC-1 Depth: 75.0 - 76.5' Sample Number: S

NEVADA DEPARTMENT OF TRANSPORTATION

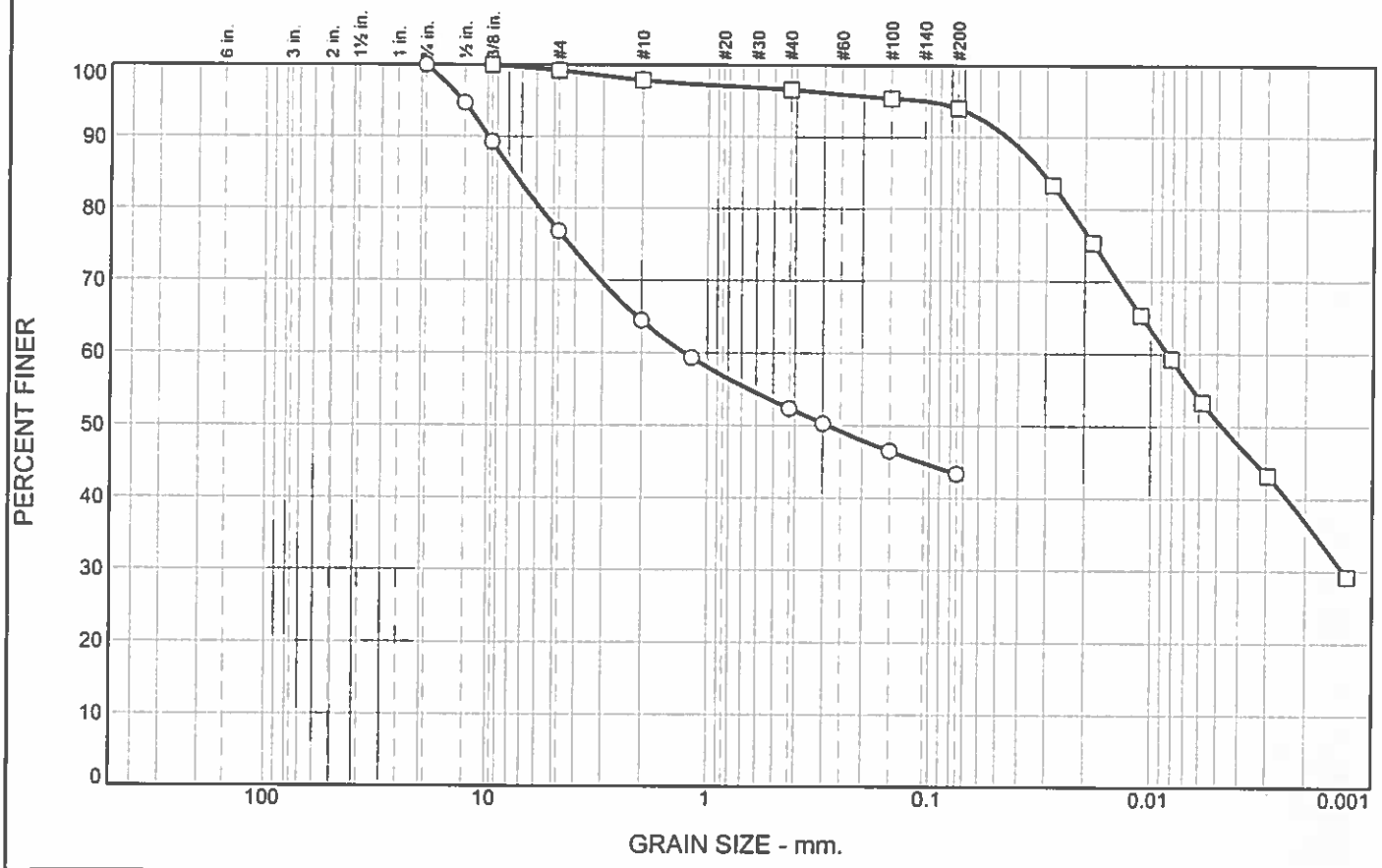
Client: D. Boomhower

Project: US 93 Animal Crossing

Project No.: FL-2-12

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	23.2	33.4	43.4		SC	A-7-6(7)	17	44
□	0.0	0.8	5.2	57.0	37.0	CL	A-7-6(26)	24	49

SIEVE inches size	PERCENT FINER ○	□	
3/4"	100.0		
1/2"	94.7		
3/8"	89.3	100.0	
	GRAIN SIZE		
D_{60}	1.2745	0.0084	
D_{30}		0.0013	
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	
#4	76.8	99.2	
#10	64.5	97.9	
#16	59.3		
#40	52.4	96.6	
#50	50.3		
#100	46.5	95.4	
#200	43.4	94.0	

Material Description

○ clayey sand with gravel

□ lean clay

REMARKS:

○

□

○ Source of Sample: UC-1 Depth: 80.0 - 81.5' Sample Number: T

□ Source of Sample: UC-1 Depth: 85.0 - 86.5' Sample Number: U

NEVADA DEPARTMENT OF TRANSPORTATION

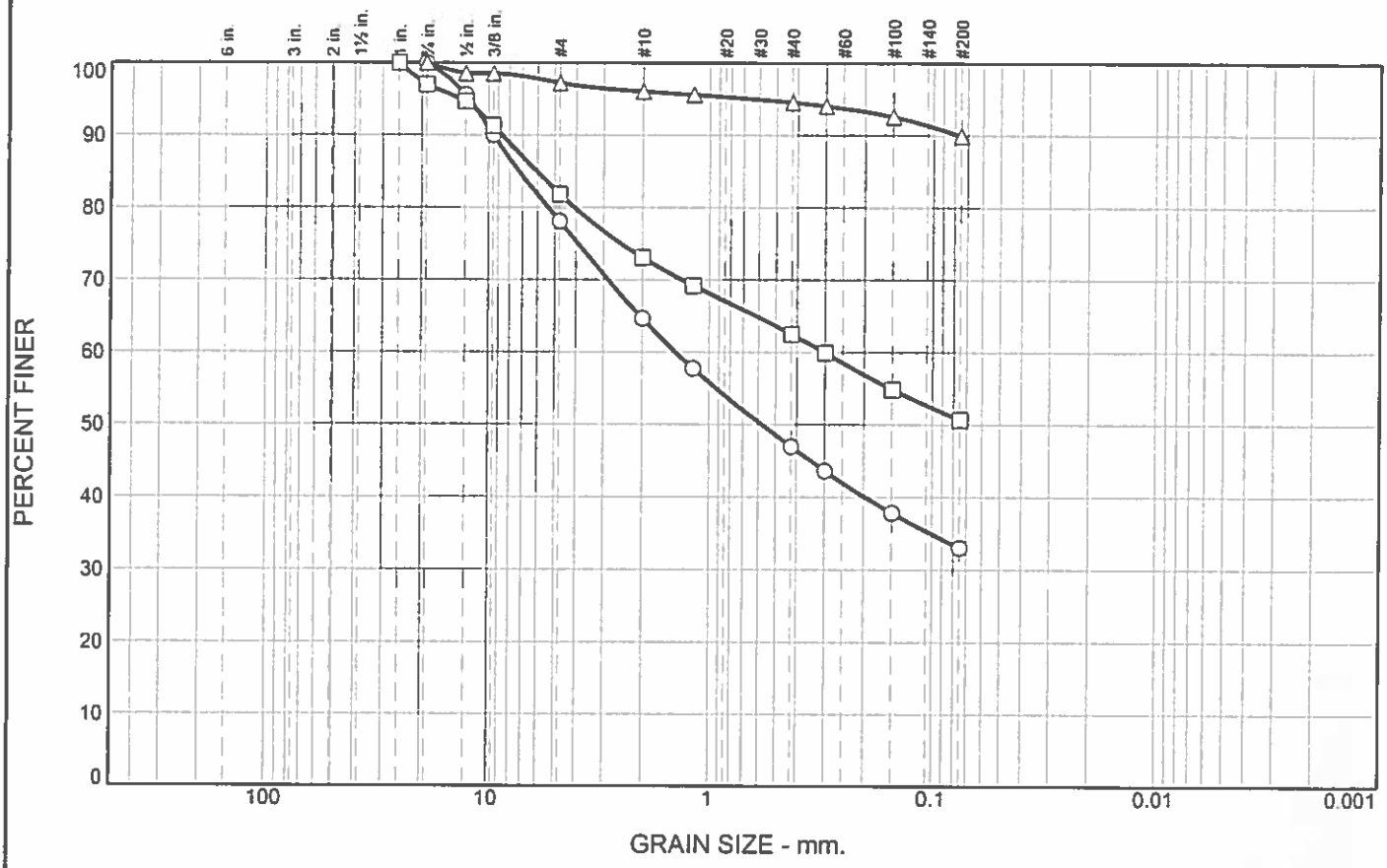
Client: D. Boomhower

Project: US 93 Animal Crossing

Project No.: FL-2-12

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	21.9	45.1	33.0		SC	A-2-6(0)	19	30
□	0.0	18.2	31.2	50.6		CL	A-7-6(8)	19	42
△	0.0	2.8	7.3	89.9		CL	A-7-6(28)	18	48

SIEVE inches size	PERCENT FINER ○	□	△
1"		100.0	
3/4"	100.0	96.9	100.0
1/2"	95.6	94.6	98.5
3/8"	90.0	91.3	98.5
	GRAIN SIZE		
D_{60}	1.4198	0.3048	
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	78.1	81.8	97.2
#10	64.6	73.1	96.0
#16	57.7	69.2	95.5
#40	46.9	62.5	94.5
#50	43.6	59.9	94.0
#100	37.8	54.8	92.5
#200	33.0	50.6	89.9

Material Description

○ clayey sand with gravel

□ sandy lean clay with gravel

△ lean clay

REMARKS:

○

□

△

○ Source of Sample: UC-2 Depth: 2.0 - 5.0' Sample Number: BULK 1

□ Source of Sample: UC-2 Depth: 10.0 - 15.0' Sample Number: BULK 2

△ Source of Sample: UC-2 Depth: 17.0 - 18.5' Sample Number: A

NEVADA DEPARTMENT OF TRANSPORTATION

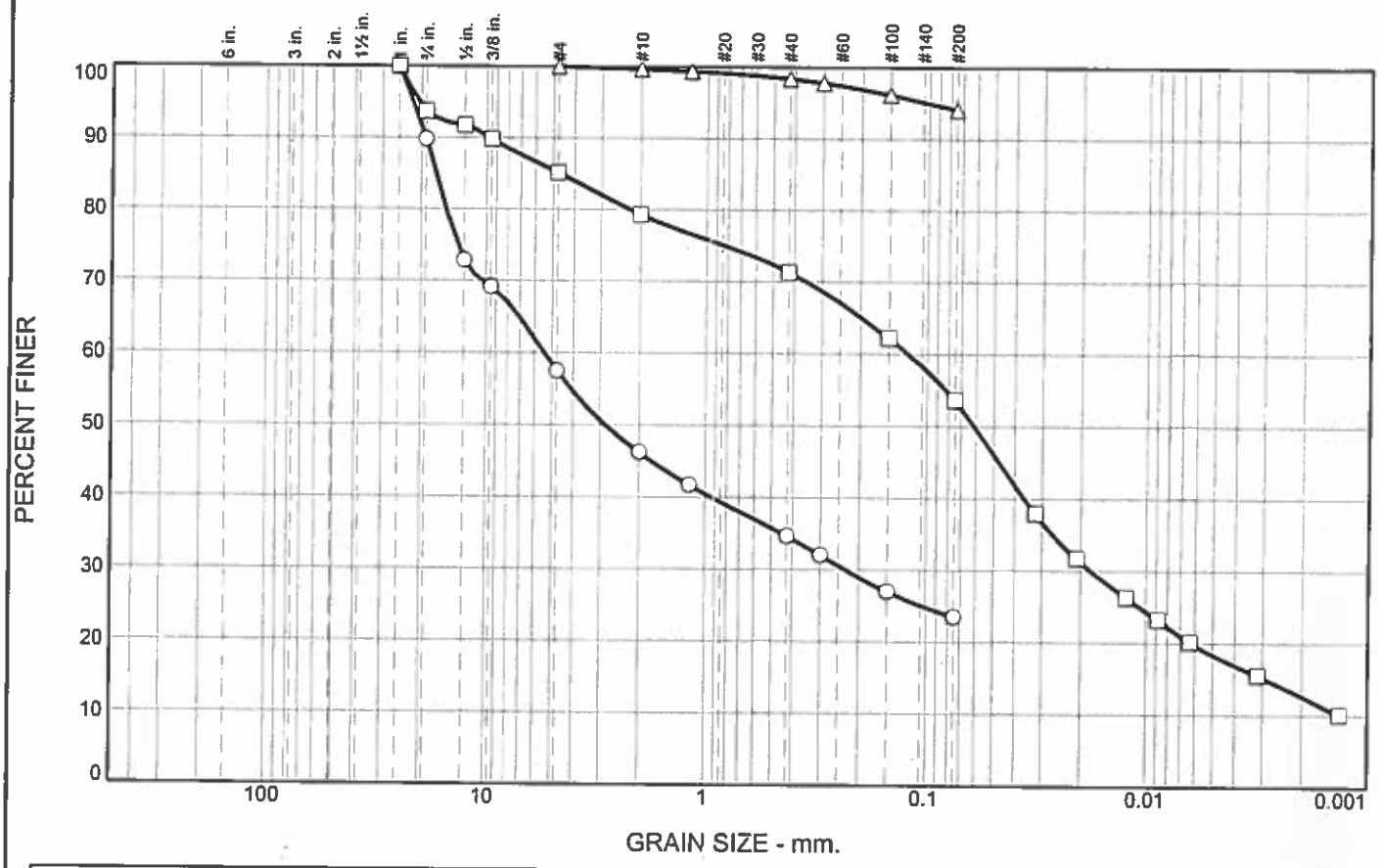
Client: D. Boomhower

Project: US 93 Animal Crossing

Project No.: FL-2-12

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	42.5	34.0	23.5		GC	A-2-6(0)	14	29
□	0.0	14.8	31.6	40.9	12.7	CL	A-6(5)	18	32
△	0.0	0.0	5.9	94.1		CL	A-7-6(25)	20	45

SIEVE inches size	PERCENT FINER ○	□	△
1"	100.0	100.0	
3/4"	89.8	93.7	
1/2"	72.9	91.8	
3/8"	69.2	89.8	
	GRAIN SIZE		
D_{60}	5.4202	0.1221	
D_{30}	0.2303	0.0180	
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	57.5	85.2	100.0
#10	46.2	79.3	99.6
#16	41.7		99.4
#40	34.7	71.3	98.4
#50	32.0		97.8
#100	27.0	62.2	96.2
#200	23.5	53.6	94.1

Material Description

○ clayey gravel with sand

□ sandy lean clay

△ lean clay

REMARKS:

○

□

△

○ Source of Sample: UC-2 Depth: 20.0 - 21.5' Sample Number: B

□ Source of Sample: UC-2 Depth: 25.2 - 25.7' Sample Number: C1

△ Source of Sample: UC-2 Depth: 25.7 - 26.2' Sample Number: C2

NEVADA DEPARTMENT OF TRANSPORTATION

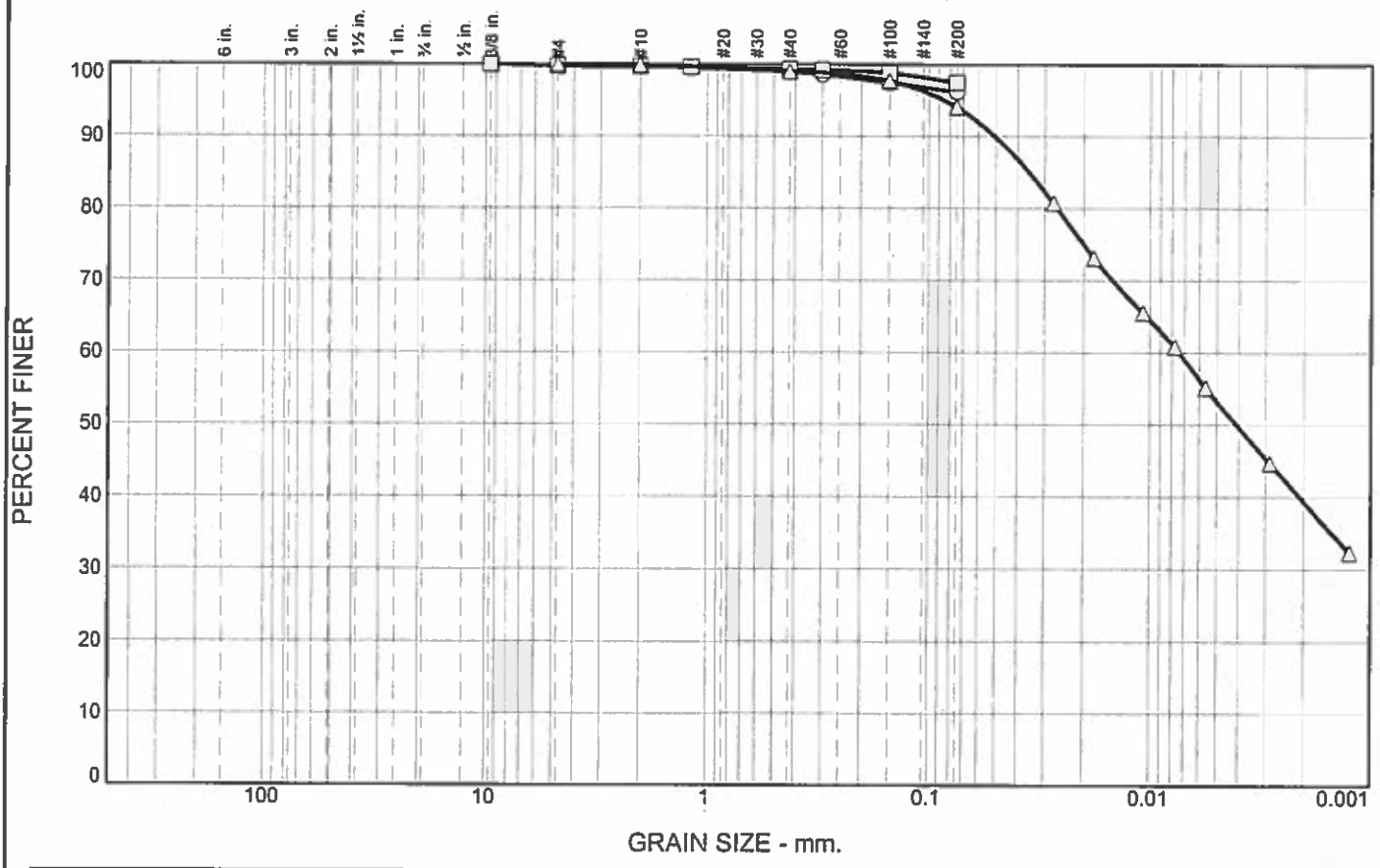
Client: D. Boomhower

Project: US 93 Animal Crossing

Project No.: FL-2-12

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	0.0	3.8	96.2		CL	A-7-6(26)	21	46
□	0.0	0.2	2.4	97.4		CL	A-7-6(22)	21	42
△	0.0	0.0	5.9	54.7	39.4	CL	A-7-6(25)	21	46

SIEVE inches size	PERCENT FINER ○	□	△
3/8"		100.0	

	GRAIN SIZE		
D_{60}			0.0074
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	100.0	99.8	100.0
#10	99.7	99.7	99.9
#16	99.5	99.6	
#40	99.0	99.3	99.0
#50	98.6	99.2	
#100	97.4	98.8	97.7
#200	96.2	97.4	94.1

Material Description
○ lean clay
□ lean clay
△ lean clay

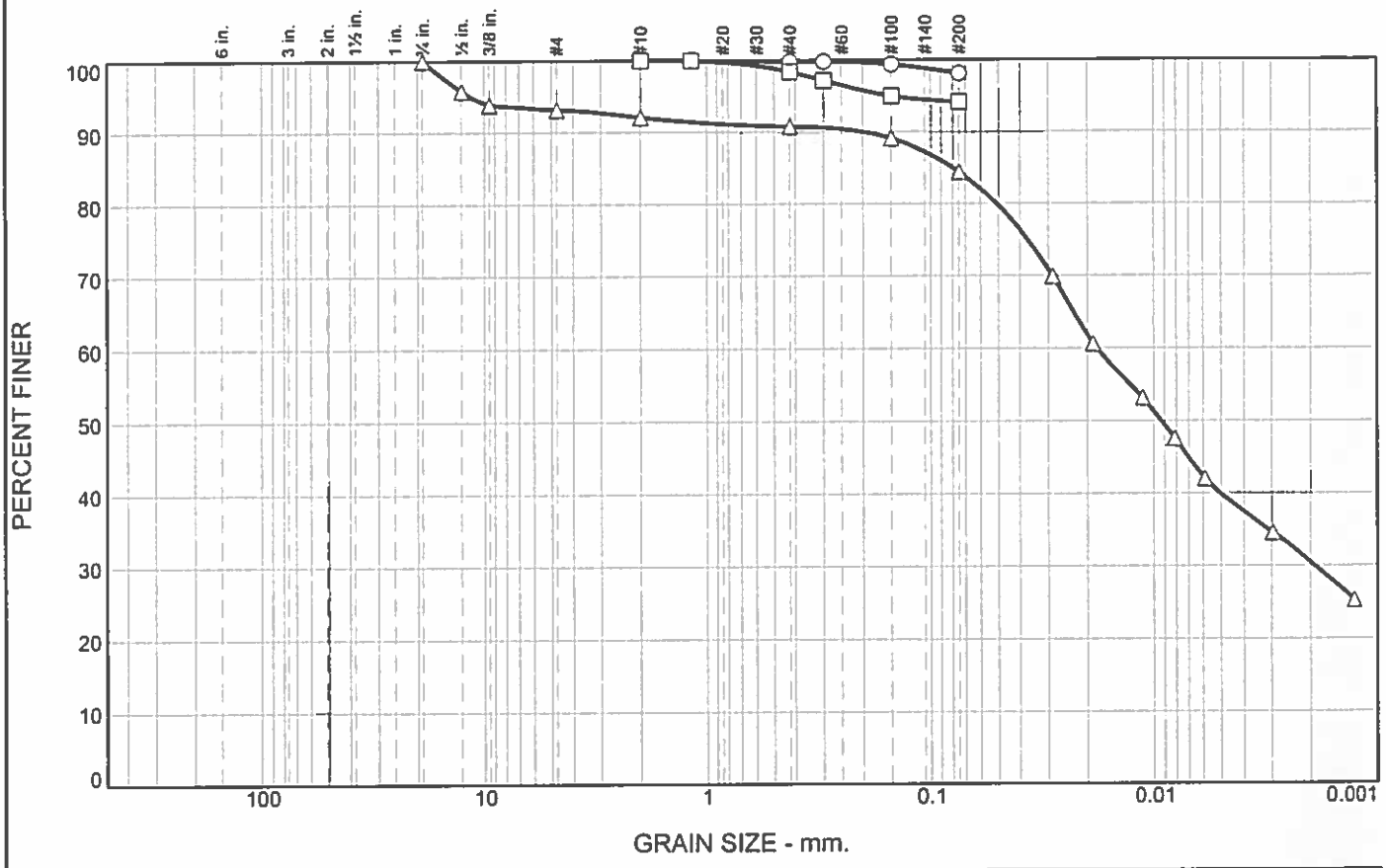
REMARKS:
○
□
△

○ Source of Sample: UC-2 Depth: 26.2 - 26.5' Sample Number: C3
□ Source of Sample: UC-2 Depth: 26.5 - 28.0' Sample Number: D
△ Source of Sample: UC-2 Depth: 30.2 - 30.7' Sample Number: E1

NEVADA DEPARTMENT OF TRANSPORTATION

Client: D. Boomhower
Project: US 93 Animal Crossing
Project No.: FL-2-12
Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	0.0	1.9	98.1		CL	A-7-6(29)	23	49
□	0.0	0.0	5.9	94.1		CH	A-7-6(34)	22	55
△	0.0	6.8	8.7	54.1	30.4	CH	A-7-6(27)	21	52

SIEVE inches size	PERCENT FINER ○	□	△
3/4"			100.0
1/2"			95.8
3/8"			93.9
GRAIN SIZE			
D_{60}			0.0183
D_{30}			0.0019
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4			93.2
#10	100.0	100.0	92.2
#16	99.9	99.9	
#40	99.8	98.4	90.8
#50	99.8	97.2	
#100	99.4	95.0	89.2
#200	98.1	94.1	84.5

Material Description
○ lean clay
□ fat clay
△ fat clay with sand

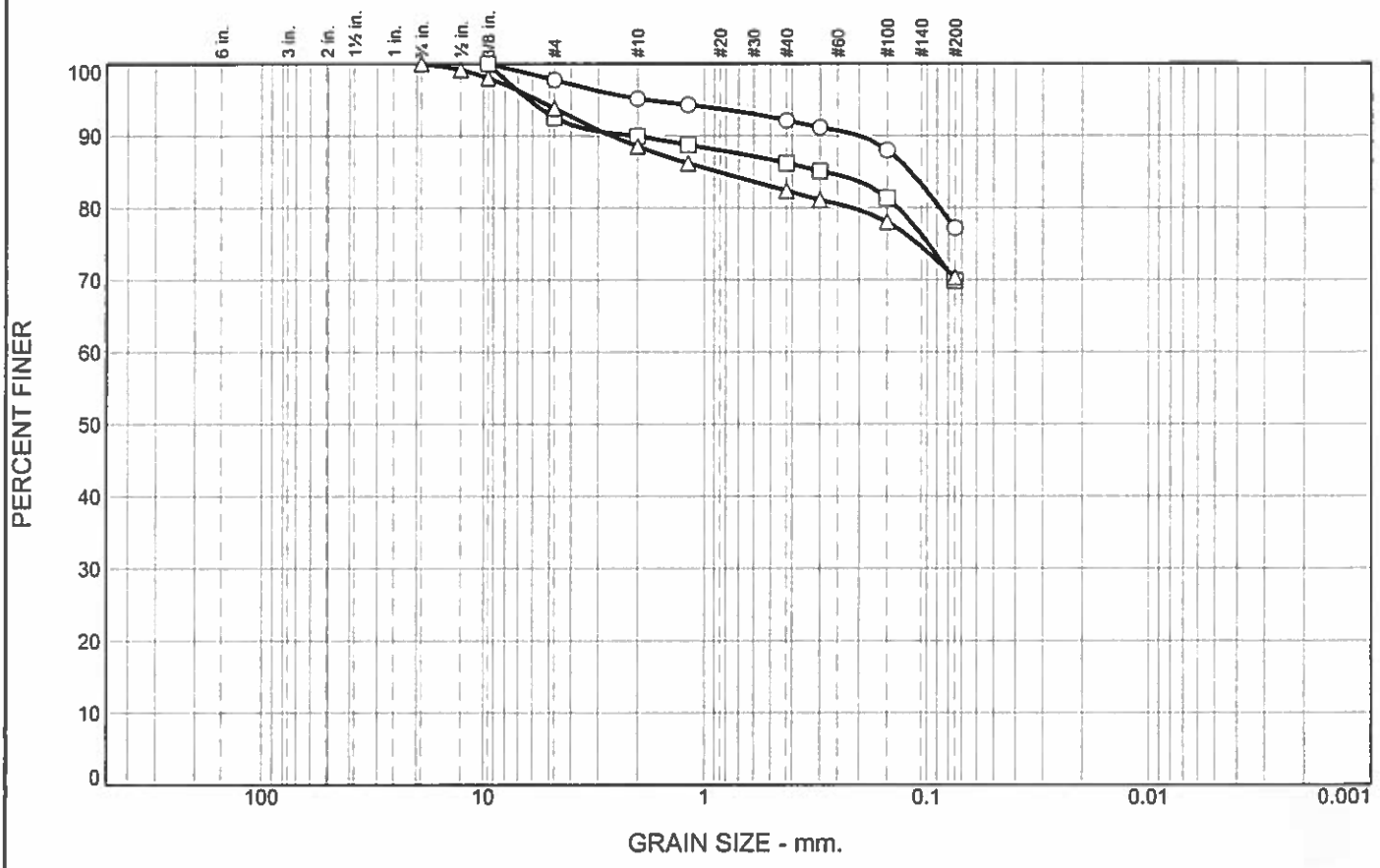
REMARKS:
○
□
△

○ Source of Sample: UC-2 Depth: 30.7 - 31.2' Sample Number: E2
□ Source of Sample: UC-2 Depth: 31.5 - 33.0' Sample Number: F
△ Source of Sample: UC-2 Depth: 35.2 - 35.7' Sample Number: G1

NEVADA DEPARTMENT OF TRANSPORTATION

Client: D. Boomhower
Project: US 93 Animal Crossing
Project No.: FL-2-12 Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	2.3	20.5	77.2		CL	A-6(15)	20	40
□	0.0	7.4	22.7	69.9		CL	A-6(7)	19	32
△	0.0	6.2	23.4	70.4		CL	A-6(7)	19	32

SIEVE inches size	PERCENT FINER ○	□	△
3/4"			100.0
1/2"			99.1
3/8"	100.0	100.0	98.0
	GRAIN SIZE		
D_{60}			
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	97.7	92.6	93.8
#10	95.1	89.9	88.5
#16	94.3	88.7	86.2
#40	92.1	86.2	82.4
#50	91.1	85.1	81.1
#100	88.0	81.4	78.0
#200	77.2	69.9	70.4

Material Description

○ lean clay with sand

□ sandy lean clay

△ sandy lean clay

REMARKS:

○

□

△

○ Source of Sample: UC-2 Depth: 35.7 - 36.2' Sample Number: G2

□ Source of Sample: UC-2 Depth: 36.2 - 36.5' Sample Number: G3

△ Source of Sample: UC-2 Depth: 36.5 - 38.0' Sample Number: H

NEVADA DEPARTMENT OF TRANSPORTATION

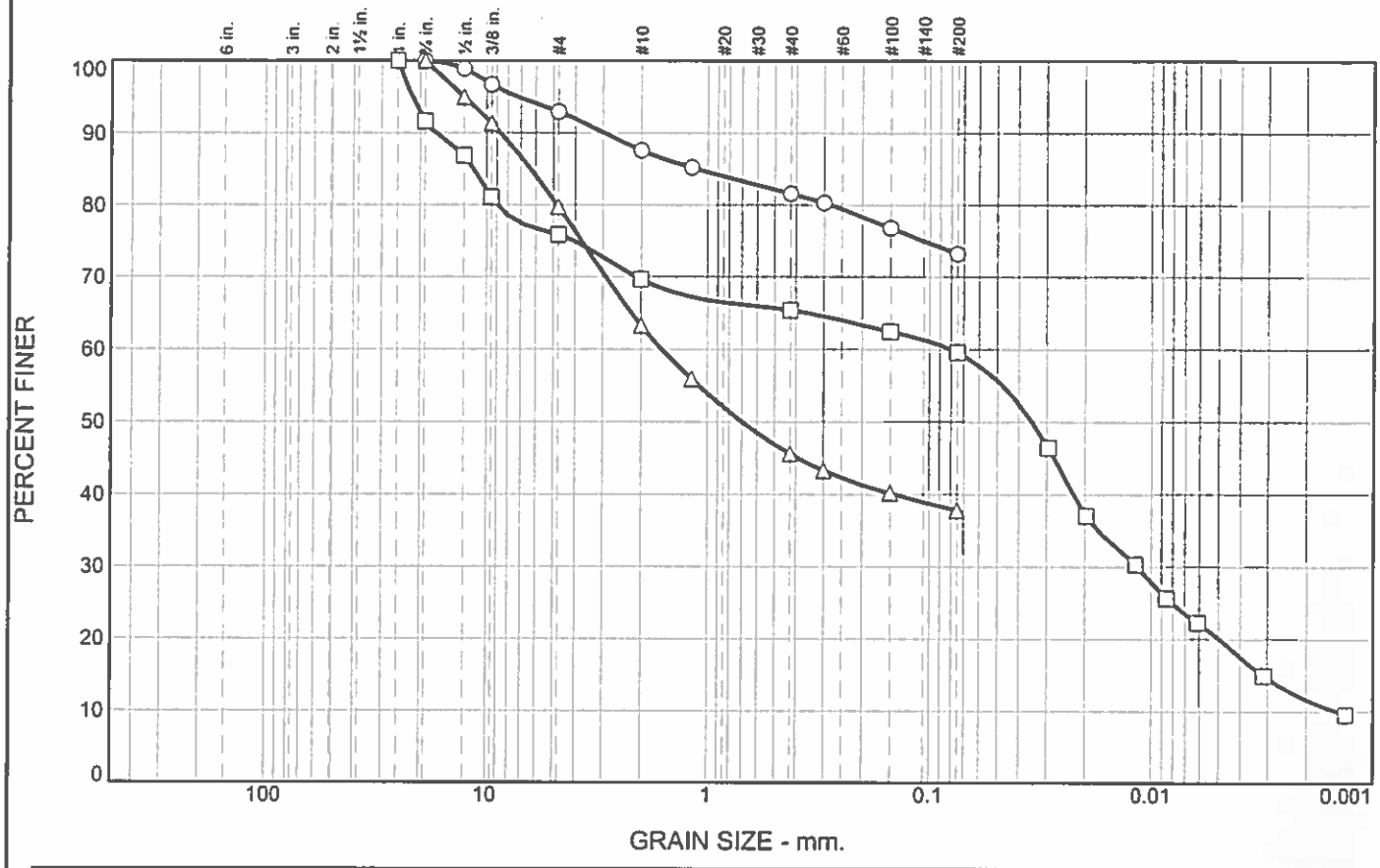
Client: D. Boomhower

Project: US 93 Animal Crossing

Project No.: FL-2-12

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	7.1	19.7	73.2		CL	A-6(12)	18	37
□	0.0	24.1	16.3	48.0	11.6	CL	A-6(8)	20	38
△	0.0	20.3	41.9	37.8		SC	A-6(2)	18	36

SIEVE inches size	PERCENT FINER ○	□	△
1"		100.0	
3/4"	100.0	91.6	100.0
1/2"	98.9	86.8	94.9
3/8"	96.7	81.1	91.4
	GRAIN SIZE		
D_{60}		0.0803	1.6160
D_{30}		0.0115	
D_{10}		0.0015	
	COEFFICIENTS		
C_c		1.11	
C_u		54.17	

SIEVE number size	PERCENT FINER ○	□	△
#4	92.9	75.9	79.7
#10	87.6	69.6	63.2
#16	85.2		55.9
#40	81.6	65.4	45.6
#50	80.3		43.3
#100	76.8	62.4	40.1
#200	73.2	59.6	37.8

Material Description

○ lean clay with sand

□ gravelly lean clay with sand

△ clayey sand with gravel

REMARKS:

○

□

△

○ Source of Sample: UC-2 Depth: 45.7 - 46.2' Sample Number: J

□ Source of Sample: UC-2 Depth: 46.5 - 48.0' Sample Number: K

△ Source of Sample: UC-2 Depth: 50.2 - 50.7' Sample Number: LI

NEVADA DEPARTMENT OF TRANSPORTATION

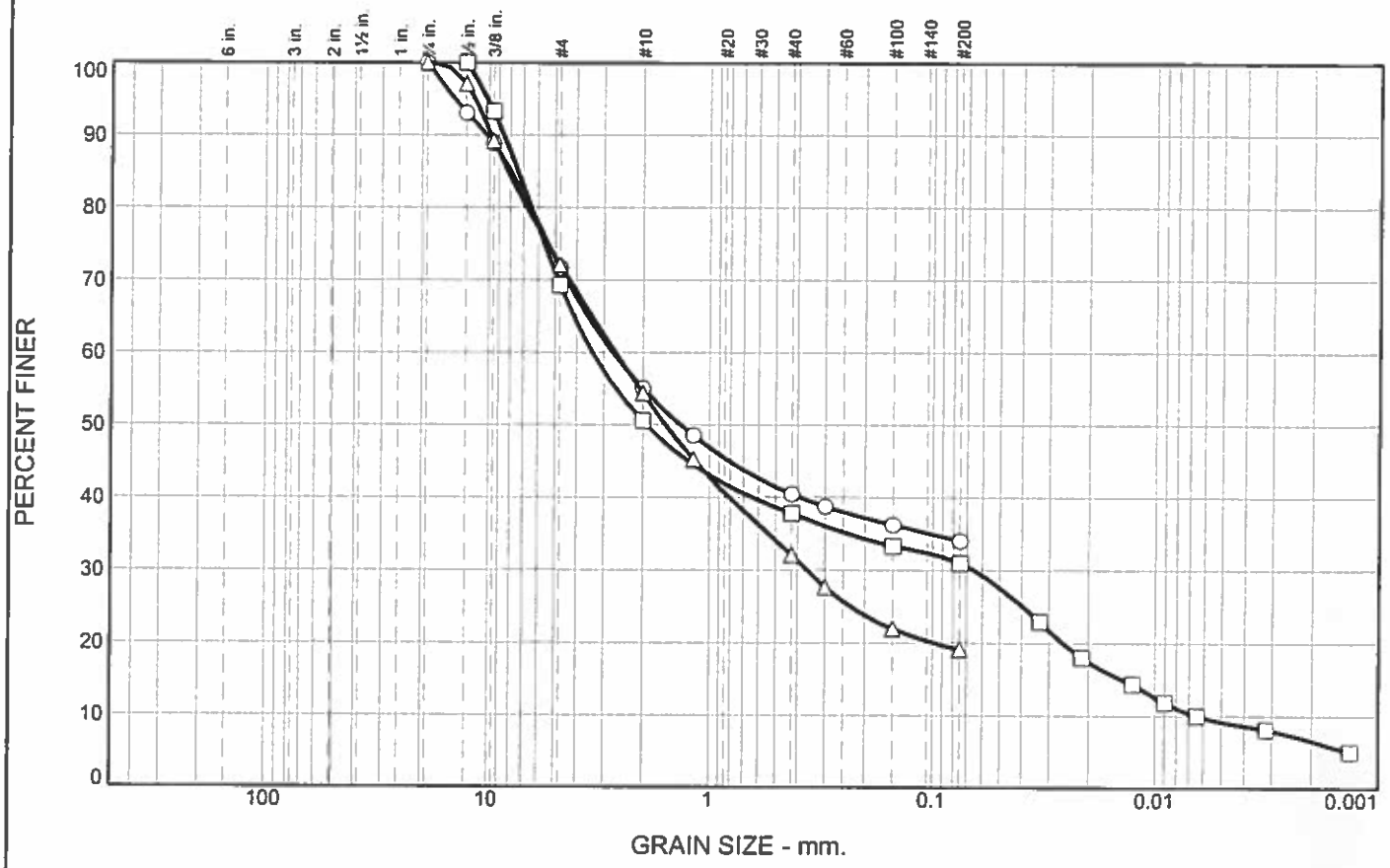
Client: D. Boomhower

Project: US 93 Animal Crossing

Project No.: FL-2-12

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	28.3	37.7	34.0		SC	A-2-6(2)	18	36
□	0.0	30.7	38.4	24.3	6.6	SC	A-2-6(1)	21	39
△	0.0	27.9	53.0	19.1		SC	A-2-6(0)	15	33

SIEVE inches size	PERCENT FINER ○	□	△
3/4"	100.0		100.0
1/2"	93.0	100.0	97.1
3/8"	88.8	93.2	89.2
	GRAIN SIZE		
D_{60}	2.7437	3.3892	2.6697
D_{30}		0.0653	0.3621
D_{10}		0.0065	
	COEFFICIENTS		
C_c		0.19	
C_u		519.53	

SIEVE number size	PERCENT FINER ○	□	△
#4	71.7	69.3	72.1
#10	55.0	50.5	54.4
#16	48.5		45.2
#40	40.5	37.8	32.1
#50	38.7		27.7
#100	36.2	33.3	21.9
#200	34.0	30.9	19.1

Material Description

○ clayey sand with gravel

□ clayey sand with gravel

△ clayey sand with gravel

REMARKS:

○

□

△

○ Source of Sample: UC-2 Depth: 50.7 - 51.2' Sample Number: L2

□ Source of Sample: UC-2 Depth: 51.2 - 51.5' Sample Number: L3

△ Source of Sample: UC-2 Depth: 51.5 - 53.0' Sample Number: M

NEVADA DEPARTMENT OF TRANSPORTATION

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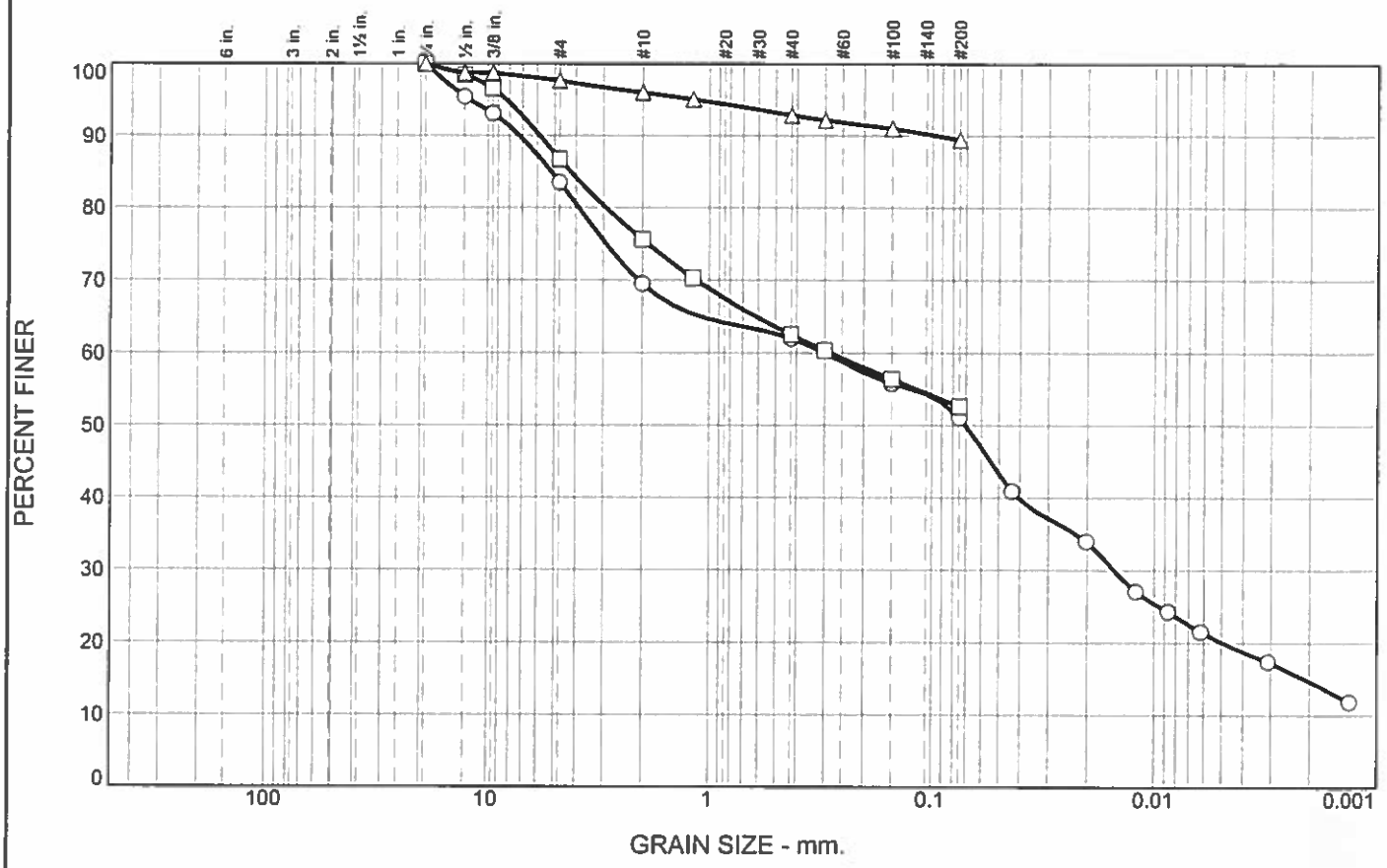
Project No.: FL-2-12

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	16.5	32.4	36.4	14.7	CL	A-6(6)	17	35
□	0.0	13.3	34.1	52.6		CL	A-7-6(9)	19	43
△	0.0	2.4	8.2	89.4		CH	A-7-6(25)	26	51

SIEVE inches size	PERCENT FINER ○	□	△
3/4"	100.0	100.0	100.0
1/2"	95.4	98.4	98.7
3/8"	93.1	96.6	98.7
	GRAIN SIZE		
D_{60}	0.2998	0.2826	
D_{30}	0.0151		
D_{10}			
	COEFFICIENTS		
C_C			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	83.5	86.7	97.6
#10	69.5	75.6	96.0
#16		70.3	95.0
#40	62.0	62.5	92.9
#50		60.4	92.1
#100	55.8	56.4	91.0
#200	51.1	52.6	89.4

Material Description

○ sandy lean clay with gravel

□ sandy lean clay

△ fat clay

REMARKS:

○

□

△

○ Source of Sample: UC-2 Depth: 55.0 - 56.5' Sample Number: N

□ Source of Sample: UC-2 Depth: 60.0 - 61.5' Sample Number: O

△ Source of Sample: UC-2 Depth: 65.0 - 66.5' Sample Number: P

NEVADA DEPARTMENT OF TRANSPORTATION

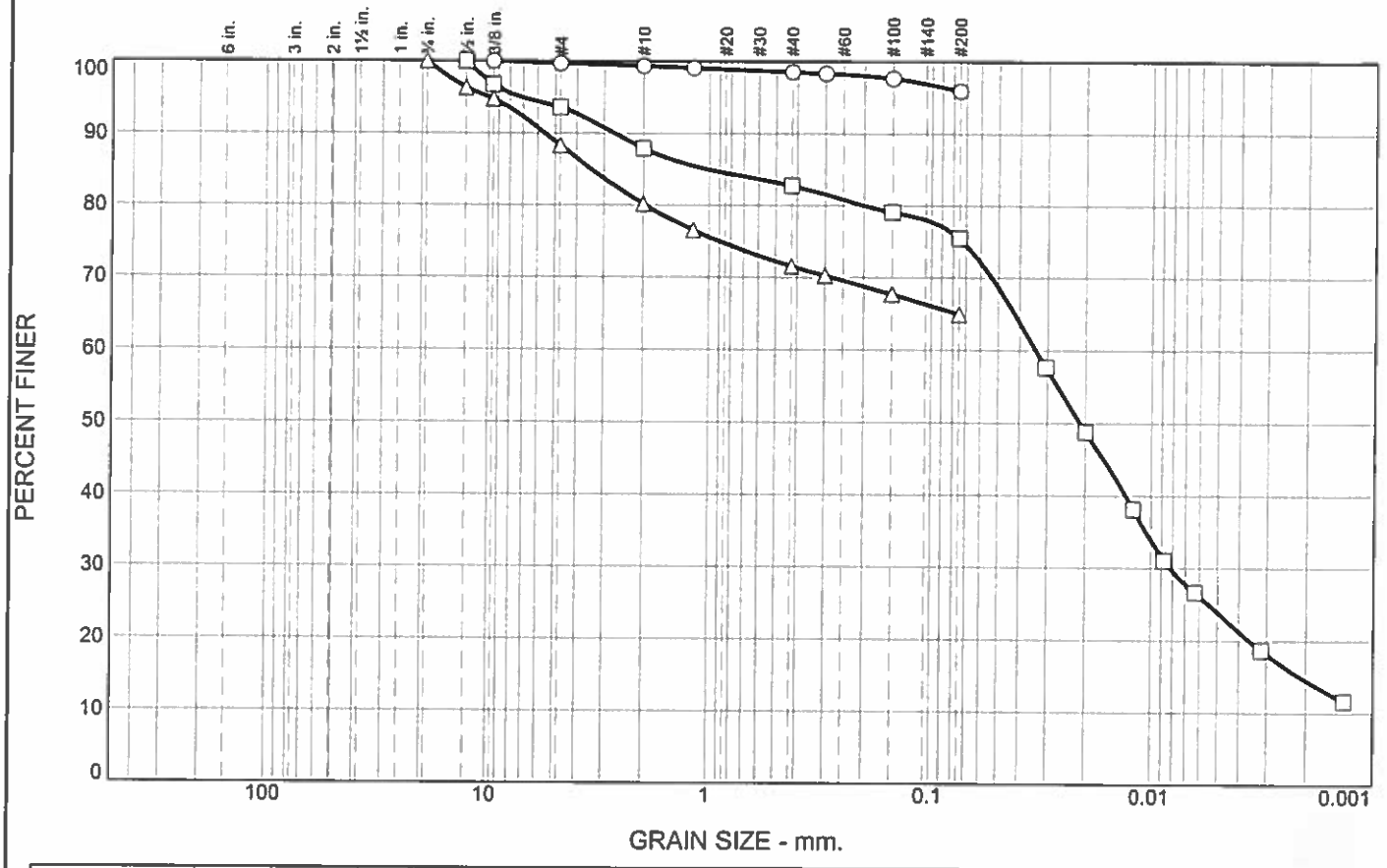
Client: D. Boomhower

Project: US 93 Animal Crossing

Project No.: FL-2-12

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	0.3	3.8	95.9		ML	A-7-6(17)	29	44
□	0.0	6.4	18.1	61.0	14.5	CL	A-7-6(15)	24	44
△	0.0	11.7	23.4	64.9		CL	A-7-6(17)	19	48

SIEVE inches size	PERCENT FINER ○	□	△
3/4"			100.0
1/2"		100.0	96.3
3/8"	100.0	96.7	94.8
GRAIN SIZE			
D_{60}		0.0338	
D_{30}		0.0082	
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	99.7	93.6	88.3
#10	99.3	87.9	80.2
#16	99.1		76.5
#40	98.5	82.8	71.6
#50	98.3		70.2
#100	97.7	79.1	67.7
#200	95.9	75.5	64.9

Material Description
○ silt
□ lean clay with sand
△ sandy lean clay

REMARKS:
○
□
△

○ Source of Sample: UC-2 Depth: 70.0 - 71.5' Sample Number: Q
□ Source of Sample: UC-2 Depth: 75.0 - 76.5' Sample Number: R
△ Source of Sample: UC-2 Depth: 80.0 - 81.5' Sample Number: S

NEVADA DEPARTMENT OF TRANSPORTATION

Client: D. Boomhower
Project: US 93 Animal Crossing
Project No.: FL-2-12
Figure

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

EA/Cont # **Job Description** US 93 Animal Crossing

Boring No. UC - 1 **Elevation (ft)** 5996.5 **Station** "X" 454 + 37, 11' Rt. **Date** 5/22/12

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP-LER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	STRENGTH TEST					COMMENTS
											TEST TYPE	Φ deg. Peak	C psi Peak	Φ deg. Residual	C psi Residual	
BULK 1	5.0 - 10.0	BULK		CL			60.4	38	20	18						Ch, RV = 14
BULK 2	15.0 - 20.0	BULK		CL			76.7	44	19	25						Ch, RV = 22
A1	20.2 - 20.7	CMS	43	SC	13.5	114.0	44.0	42	16	26						
A2	20.7 - 21.2	CMS		SC	11.2	110.5	32.7	41	16	25						
B	21.5 - 23.0	SPT	32	SC			34.9	37	15	22						
C	25.0 - 26.5	CMS	15	CL			54.3	41	20	21						
D	26.5 - 28.0	SPT	5	CL			62.6	33	18	15						
E1	30.2 - 30.7	CMS	8	CL	55.0	67.0	94.3	44	22	22						H, OC
E2	30.7 - 31.2	CMS		CL	45.4	74.5	97.6	44	22	22						OC
E3	31.2 - 31.5	CMS_{shoe}		CH			96.6	50	23	27						
F	31.5 - 33.0	SPT	9	CH			98.0	50	23	27						H
G1	35.2 - 35.7	CMS	8	CL	38.5	81.4	76.0	35	19	16						H, OC

CMS = California Modified Sampler 2.42" ID
SPT = Standard Penetration 1.38" ID
CS = Continuous Sample 3.23" ID
RC = Rock Core
PB = Pitcher Barrel
CSS = Calif. Split Spoon 2.42" ID
CPT = Cone Penetration Test
TP = Test Pit
P = Pushed, not driven
R = Refusal
Sh = Shelby Tube 2.87" ID

U = Unconfined Compressive
UU = Unconsolidated Undrained
CD = Consolidated Drained
CU = Consolidated Undrained
DS = Direct Shear
Φ = Friction
C = Cohesion
N = No. of blows per ft., sampler

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

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

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E = Swell/Pressure on Expansive Soils
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O = Organic Content
D = Dispersive
RQD = Rock Quality Designation
X = X-Ray Defraction
HCpot = Hydro-Collapse Potential

* = Average of subsamples

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

EA/Cont # **Job Description** US 93 Animal Crossing

Boring No. UC - 1 **Elevation (ft)** 5996.5 **Station** "X" 454 + 37, 11' Rt. **Date** 5/22/12

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP-LER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	STRENGTH TEST					COMMENTS
											TEST TYPE	Φ deg.	C psi	Φ deg.	C psi	
												Peak		Residual		
G2	35.7 - 36.2	CMS	8	CL	37.4	83.2	81.5	41	19	22						
H	36.5 - 38.0	SPT	10	CL			55.7	37	20	17						
I1	40.2 - 40.7	CMS	30	SC	18.7	110.5	49.3	34	17	17						H
I2	40.7 - 41.2	CMS		CL	22.0	103.0	57.1	35	17	18						
I3	41.2 - 41.5	CMS_{shoe}		CL			50.1	37	19	18						
J	41.5 - 43.0	SPT	29	SC			47.7	35	16	19						H
K1	45.2 - 45.7	CMS	13	CL	27.1	96.1	68.4	38	19	19						
K2	45.7 - 46.2	CMS		CL	28.4	94.0	61.6	43	19	24						H, CU
K3	46.2 - 46.5	CMS_{shoe}		CL			68.2	39	19	20						
L	46.5 - 48.0	SPT	18	GC			43.4	48	20	28						
M	50.0 - 51.5	CMS	15													No Recovery
N	52.0 - 53.5	SPT	34	SC			36.8	44	18	26						

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

EA/Cont # **Job Description** US 93 Animal Crossing

Boring No. UC - 1 **Elevation (ft)** 5996.5 **Station** "X" 454 + 37, 11' Rt. **Date** 5/22/12

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP-LER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	STRENGTH TEST					COMMENTS
											TEST TYPE	Φ deg.	C psi	Φ deg.	C psi	
												Peak		Residual		
O	55.0 - 56.5	SPT	16	SC			37.8	42	18	24						
P	60.0 - 61.5	SPT	13													No Recovery
Q	65.0 - 66.5	SPT	7	CL			87.2	48	20	28						
R	70.0 - 71.5	SPT	18	CL			91.2	44	20	24						
S	75.0 - 76.5	SPT	12	CL			81.3	47	23	24						
T	80.0 - 81.5	SPT	32	SC			43.4	44	17	27						
U	85.0 - 86.5	SPT	13	CL			94.0	49	24	25						H

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

EA/Cont # **Job Description** US 93 Animal Crossing

Boring No. UC - 2 **Elevation (ft)** 5996.1 **Station** "X" 454 + 57, 11' Lt. **Date** 5/23/12

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP-LER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	STRENGTH TEST					COMMENTS
											TEST TYPE	Φ deg.	C psi	Φ deg.	C psi	
												Peak		Residual		
BULK 1	2.0 - 5.0	BULK		SC			33.0	30	19	11						Ch, RV = 54
BULK 2	10.0 - 15.0	BULK		CL			50.6	42	19	23						Ch, RV = 26
A	17.0 - 18.5	SPT	12	CL			89.9	48	18	30						
B	20.0 - 21.5	SPT	38	GC			23.5	29	14	15						
C1	25.2 - 25.7	CMS	10	CL	23.6	99.5	53.6	32	18	14						H
C2	25.7 - 26.2	CMS		CL	36.2	83.4	94.1	45	20	25						OC
C3	26.2 - 26.5	CMS_{shoe}		CL			96.2	46	21	25						OC
D	26.5 - 28.0	SPT	6	CL			97.4	42	21	21						
E1	30.2 - 30.7	CMS	12	CL	35.2	84.8	94.1	46	21	25						H
E2	30.7 - 31.2	CMS		CL	52.5	68.6	98.1	49	23	26						OC
F	31.5 - 33.0	SPT	9	CH			94.1	55	22	33						
G1	35.2 - 35.7	CMS	8	CH	51.3	69.8	84.5	52	21	31						H, CU

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

EA/Cont # **Job Description** US 93 Animal Crossing

Boring No. UC - 2 **Elevation (ft)** 5996.1 **Station** "X" 454 + 57, 11' Lt. **Date** 5/23/12

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP-LER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	STRENGTH TEST					COMMENTS
											TEST TYPE	Φ deg.	C psi	Φ deg.	C psi	
												Peak		Residual		
G2	35.7 - 36.2	CMS	8	CL	47.6	73.2	77.2	40	20	20						OC
G3	36.2 - 36.5	CMS_{shoe}		CL			69.9	32	19	13						
H	36.5 - 38.0	SPT	8	CL			70.4	32	19	13						
I	40.0 - 41.5	CMS	24													No Recovery
J	45.7 - 46.2	CMS	14	CL	24.1	99.4	73.2	37	18	19						
K	46.5 - 48.0	SPT	7	CL			59.6	38	20	18						H
L1	50.2 - 50.7	CMS	27	SC	17.8	112.7	37.8	36	18	18						CU
L2	50.7 - 51.2	CMS		SC	21.3	104.6	34.0	36	18	18						
L3	51.2 - 51.5	CMS_{shoe}		SC			30.9	39	21	18						H
M	51.5 - 53.0	SPT	63	SC			19.1	33	15	18						
N	55.0 - 56.5	SPT	7	CL			51.1	35	17	18						H
O	60.0 - 61.5	SPT	7	CL			52.6	43	19	24						

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

EA/Cont # **Job Description** US 93 Animal Crossing

Boring No. UC - 2 **Elevation (ft)** 5996.1 **Station** "X" 454 + 57, 11' Lt. **Date** 5/23/12

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMP-LER TYPE	N BLOWS per ft.	SOIL GROUP	W%	DRY UW pcf	% PASS #200	LL %	PL %	PI %	STRENGTH TEST					COMMENTS
											TEST TYPE	Φ deg.	C psi	Φ deg.	C psi	
												Peak		Residual		
P	65.0 - 66.5	SPT	8	CH			89.4	51	26	25						
Q	70.0 - 71.5	SPT	40	ML			95.9	44	29	15						
R	75.0 - 76.5	SPT	13	CL			75.5	44	24	20						H
S	80.0 - 81.5	SPT	16	CL			64.9	48	19	29						

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DS = Direct Shear
Φ = Friction
C = Cohesion
N = No. of blows per ft., sampler

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

H = Hydrometer
S = Sieve
G = Specific Gravity
PI = Plasticity Index
LL = Liquid Limit
PL = Plastic Limit
NP = Non-Plastic
OC = Consolidation
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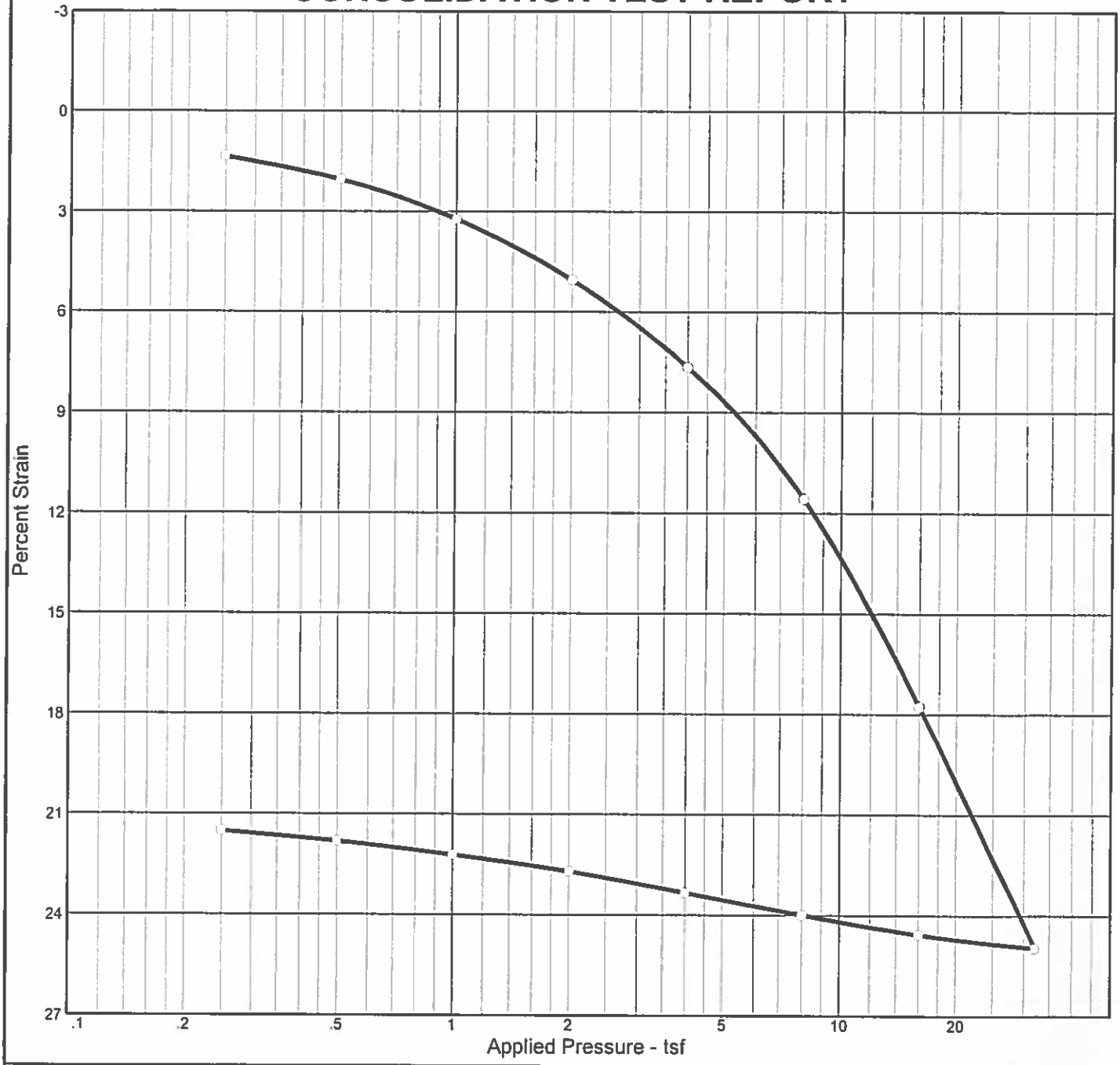
K = Permeability
O = Organic Content
D = Dispersive
RQD = Rock Quality Designation
X = X-Ray Defraction
HCpot = Hydro-Collapse Potential

* = Average of subsamples

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
99.0 %	51.3 %	70.6	44	22	2.734	1.50	9.61	0.58	0.04	1.417

MATERIAL DESCRIPTION	USCS	AASHTO
lean clay	CL	A-7-6(22

Project No. FL-2-12 **Client:** D. Boomhower

Project: US 93 Animal Crossing

Source: UC-1 **Sample No.:** E1 a **Elev./Depth:** 30.2 - 30.7'

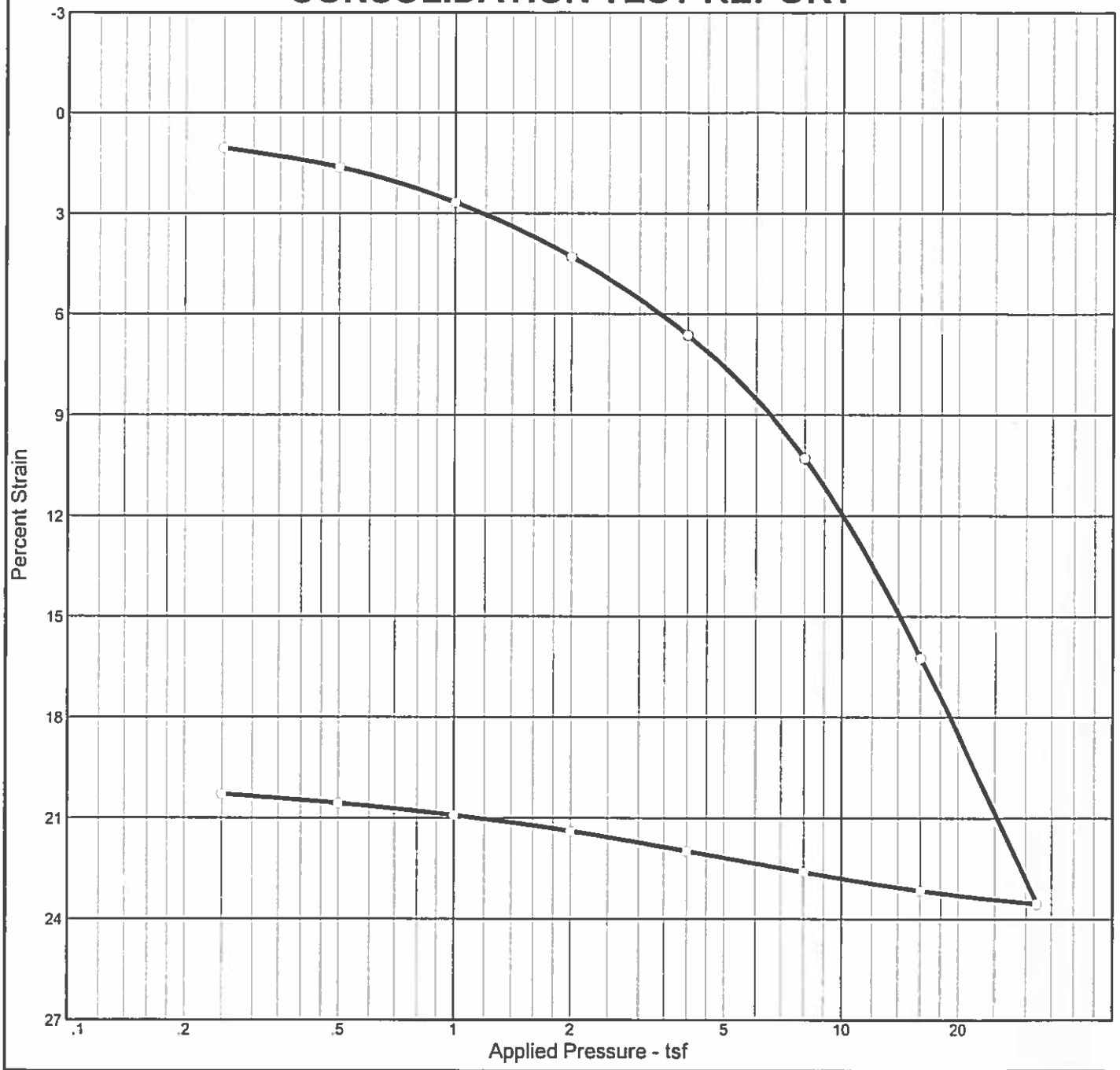
CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

Remarks:

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
99.4 %	49.9 %	72.0	44	22	2.734	1.50	10.12	0.58	0.04	1.371

MATERIAL DESCRIPTION	USCS	AASHTO
lean clay	CL	A-7-6(22

Project No. FL-2-12 **Client:** D. Boomhower

Project: US 93 Animal Crossing

Source: UC-1 **Sample No.:** E1 b **Elev./Depth:** 30.2 - 30.7'

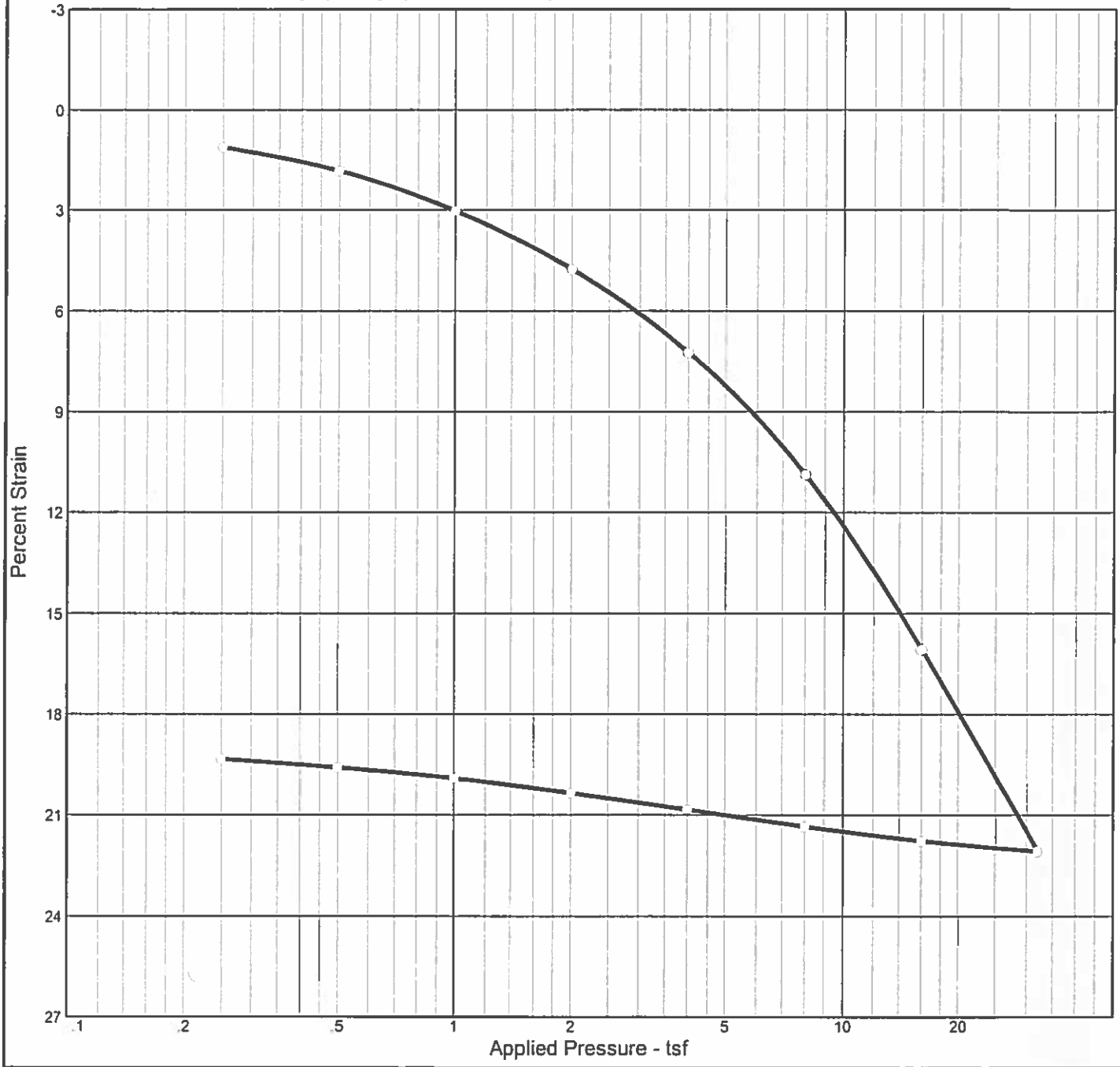
Remarks:

CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
101.7 %	46.4 %	75.9	44	22	2.731	1.60	9.65	0.45	0.03	1.246

MATERIAL DESCRIPTION	USCS	AASHTO
lean clay	CL	A-7-6(24

Project No. FL-2-12 **Client:** D. Boomhower

Project: US 93 Animal Crossing

Source: UC-1 **Sample No.:** E2 a **Elev./Depth:** 30.7 - 31.2'

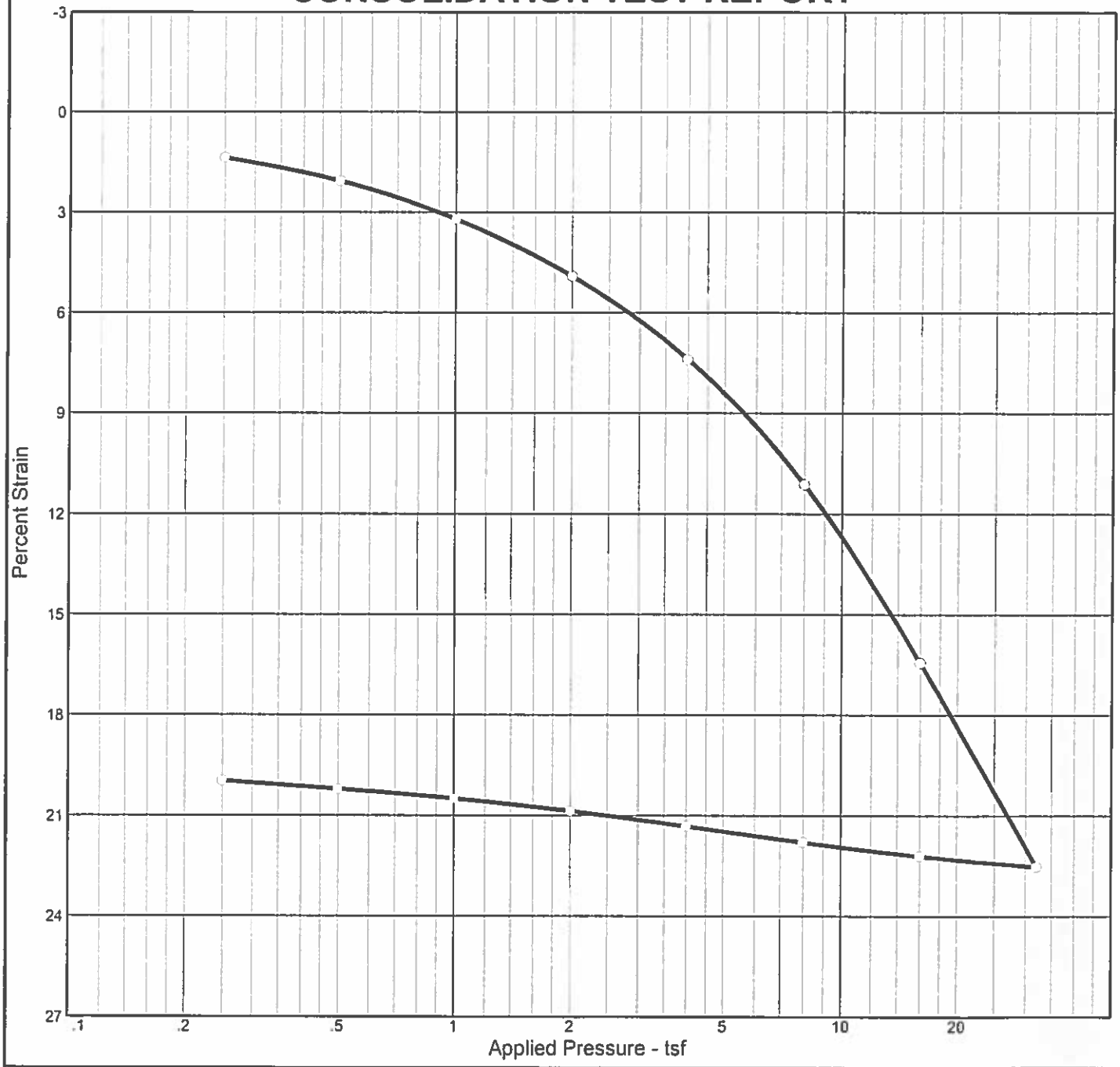
Remarks:

CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
99.8 %	46.9 %	74.7	44	22	2.731	1.60	9.01	0.46	0.03	1.284

MATERIAL DESCRIPTION	USCS	AASHTO
lean clay	CL	A-7-6(24

Project No. FL-2-12 **Client:** D. Boomhower

Project: US 93 Animal Crossing

Source: UC-1 **Sample No.:** E2 b **Elev./Depth:** 30.7 - 31.2'

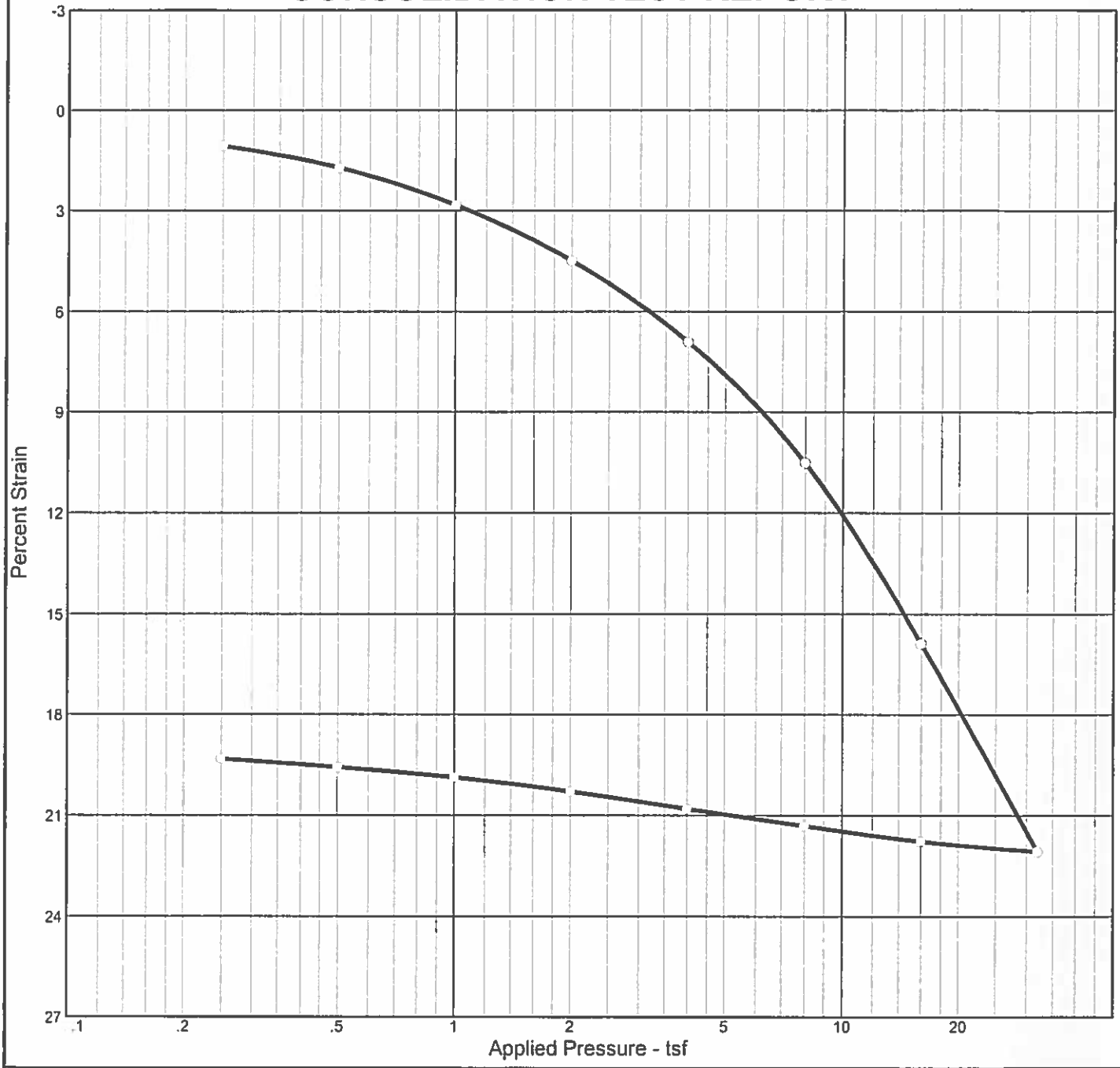
CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

Remarks:

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
98.4 %	47.1 %	73.9	44	22	2.731	1.60	9.59	0.48	0.03	1.306

MATERIAL DESCRIPTION	USCS	AASHTO
lean clay	CL	A-7-6(24

Project No. FL-2-12 **Client:** D. Boomhower

Project: US 93 Animal Crossing

Source: UC-1 **Sample No.:** E2 c **Elev./Depth:** 30.7 - 31.2'

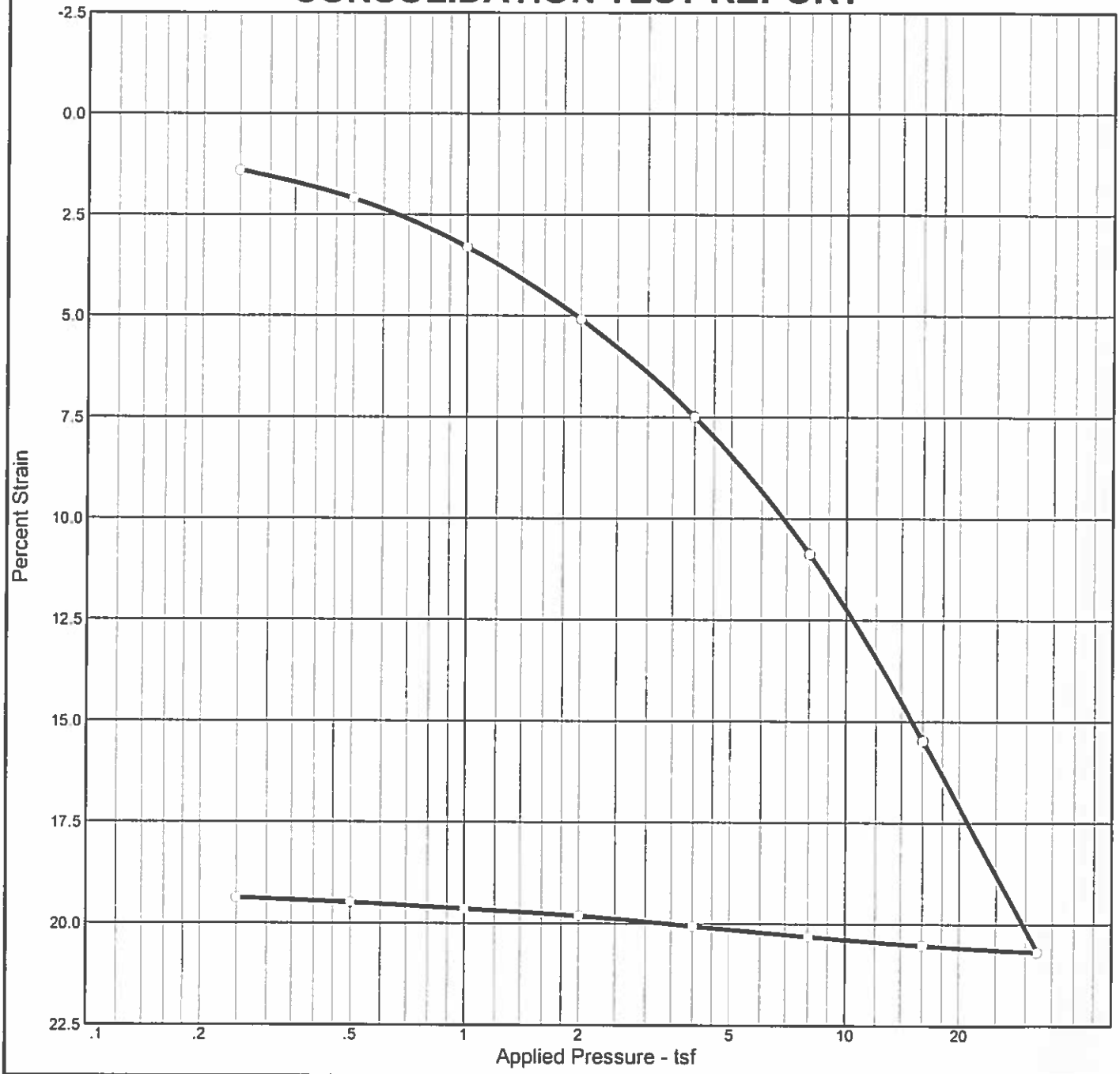
CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

Remarks:

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
98.8 %	39.3 %	81.8	35	16	2.737	1.80	9.47	0.36	0.01	1.089

MATERIAL DESCRIPTION	USCS	AASHTO
lean clay with sand	CL	A-6(11)

Project No. FL-2-12 **Client:** D. Boomhower

Project: US 93 Animal Crossing

Source: UC-1 **Sample No.:** G1 a **Elev./Depth:** 35.2 - 35.7'

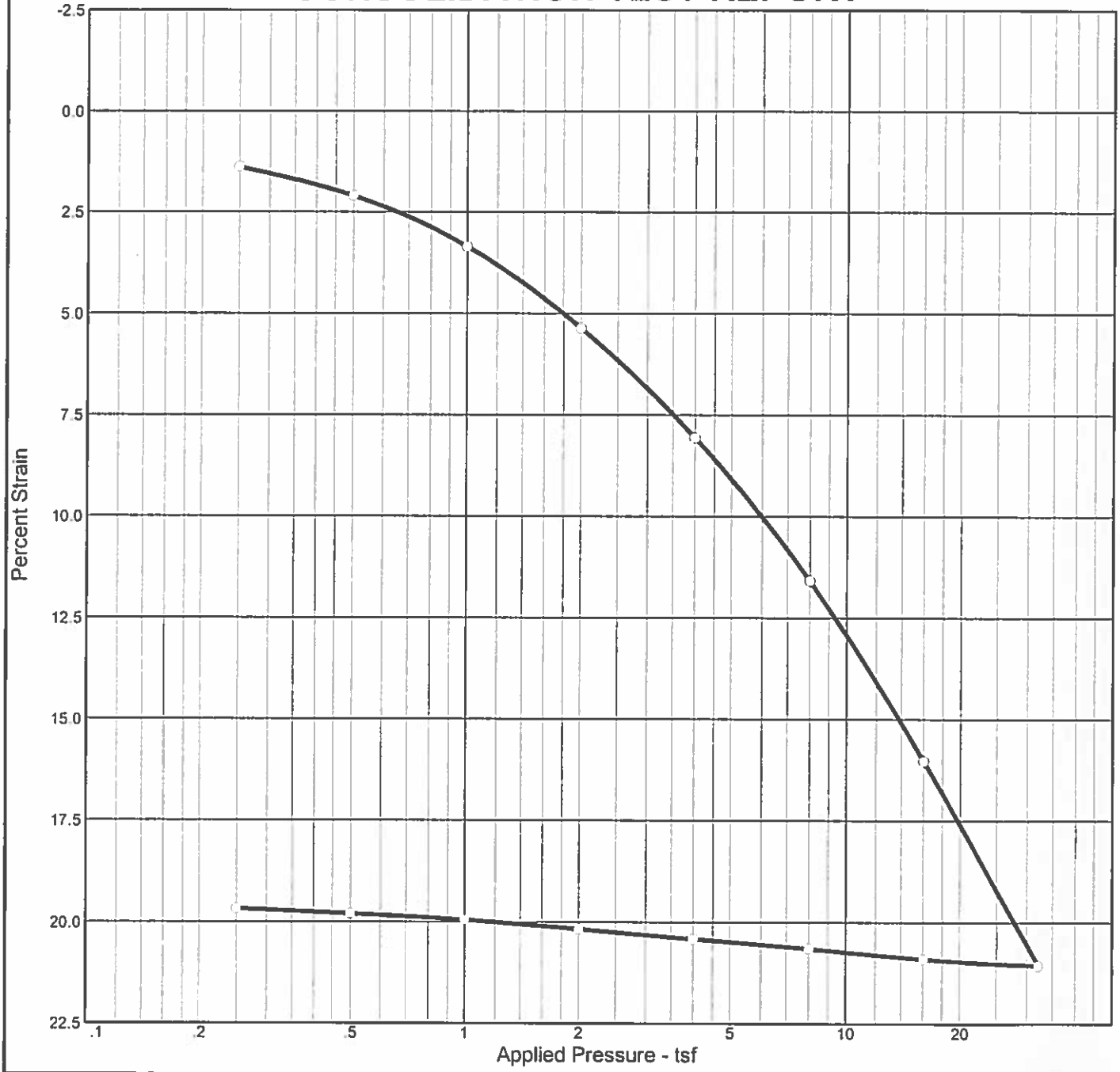
CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

Remarks:

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
98.7 %	39.2 %	81.9	35	16	2.737	1.80	3.55	0.35	0.01	1.086

MATERIAL DESCRIPTION	USCS	AASHTO
lean clay with sand	CL	A-6(11)

Project No. FL-2-12 **Client:** D. Boomhower

Project: US 93 Animal Crossing

Source: UC-1 **Sample No.:** G1 b **Elev./Depth:** 35.2 - 35.7'

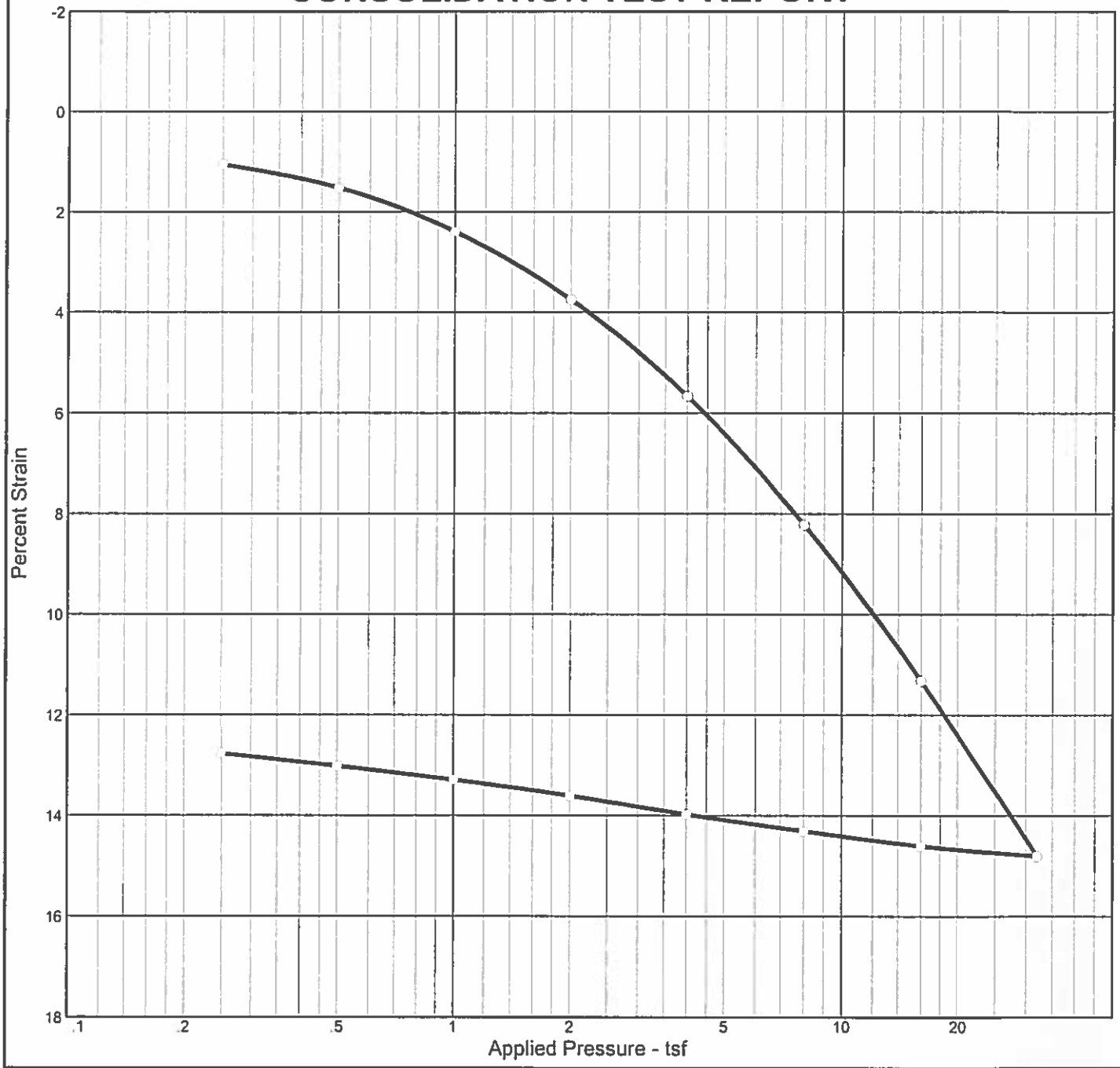
CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

Remarks:

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
97.2 %	28.5 %	94.8	45	25	2.737	1.30	6.12	0.21	0.02	0.802

MATERIAL DESCRIPTION	USCS	AASHTO
lean clay	CL	A-7-6(25

Project No. FL-2-12 **Client:** D. Boomhower

Project: US 93 Animal Crossing

Source: UC-2 **Sample No.:** C2 a **Elev./Depth:** 25.7 - 26.2'

Remarks:

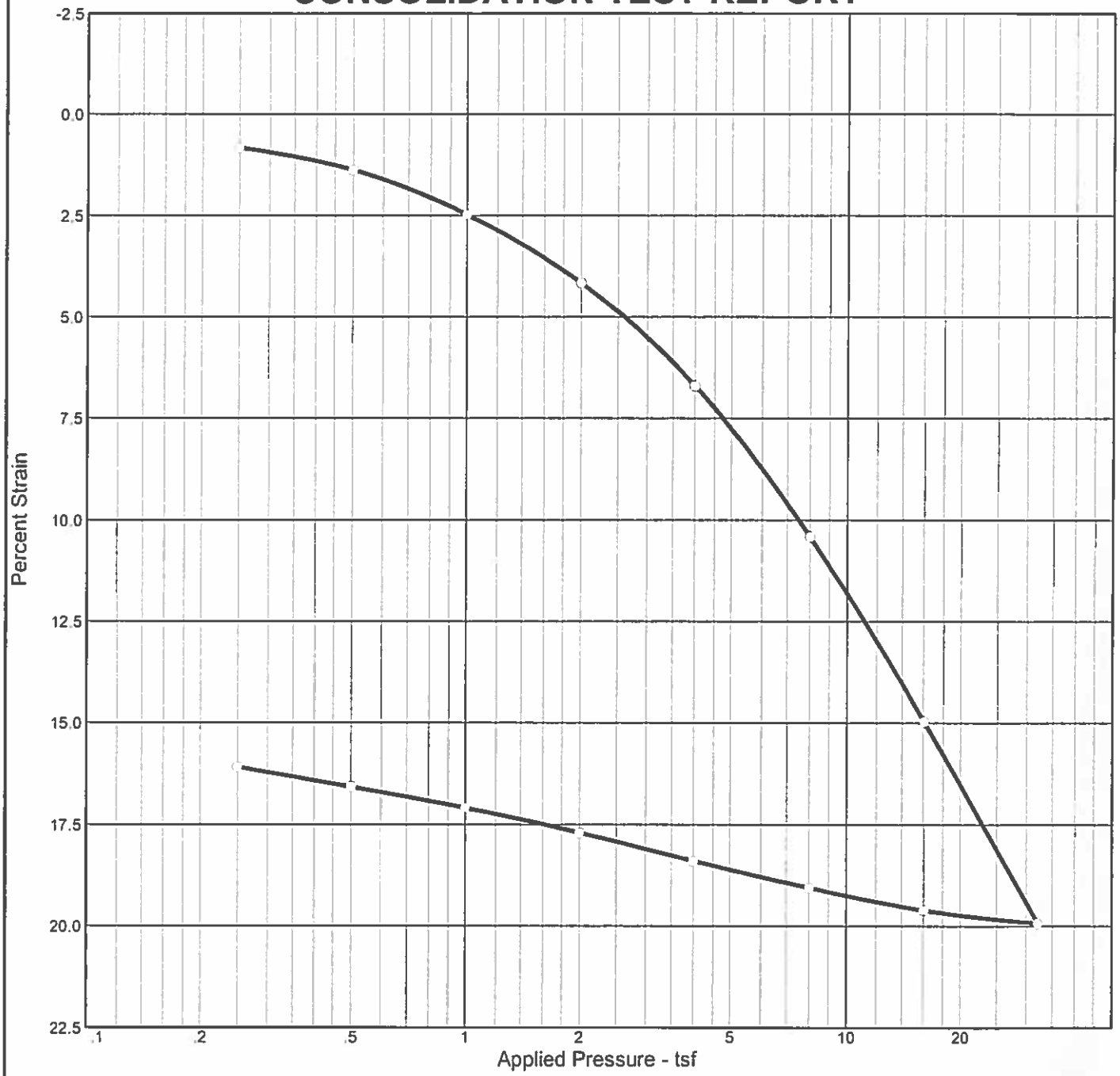
Material change between C2 a and C2 b

CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
98.9 %	40.0 %	81.1	45	25	2.737	1.30	5.82	0.35	0.04	1.106

MATERIAL DESCRIPTION	USCS	AASHTO
lean clay	CL	A-7-6(25

Project No. FL-2-12 **Client:** D. Boomhower

Project: US 93 Animal Crossing

Source: UC-2 **Sample No.:** C2 b **Elev./Depth:** 25.7 - 26.2'

Remarks:

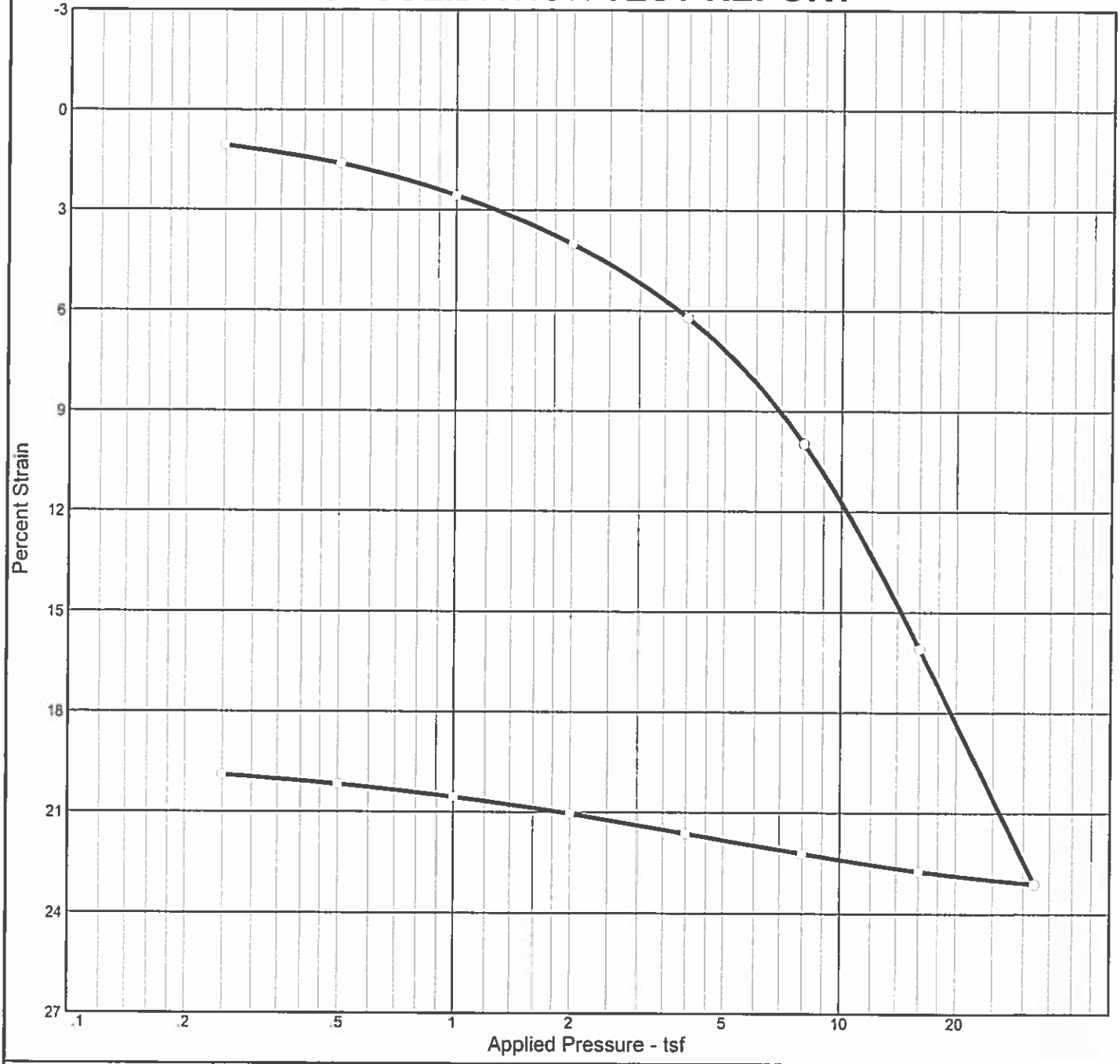
Material change between C2 a and C2 b

CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
99.5 %	49.5 %	72.4	49	26	2.741	1.60	9.04	0.55	0.04	1.365

MATERIAL DESCRIPTION	USCS	AASHTO
lean clay	CL	A-7-6(29

Project No. FL-2-12 **Client:** D. Boomhower

Project: US 93 Animal Crossing

Source: UC-2 **Sample No.:** E2 a **Elev./Depth:** 30.7 - 31.2'

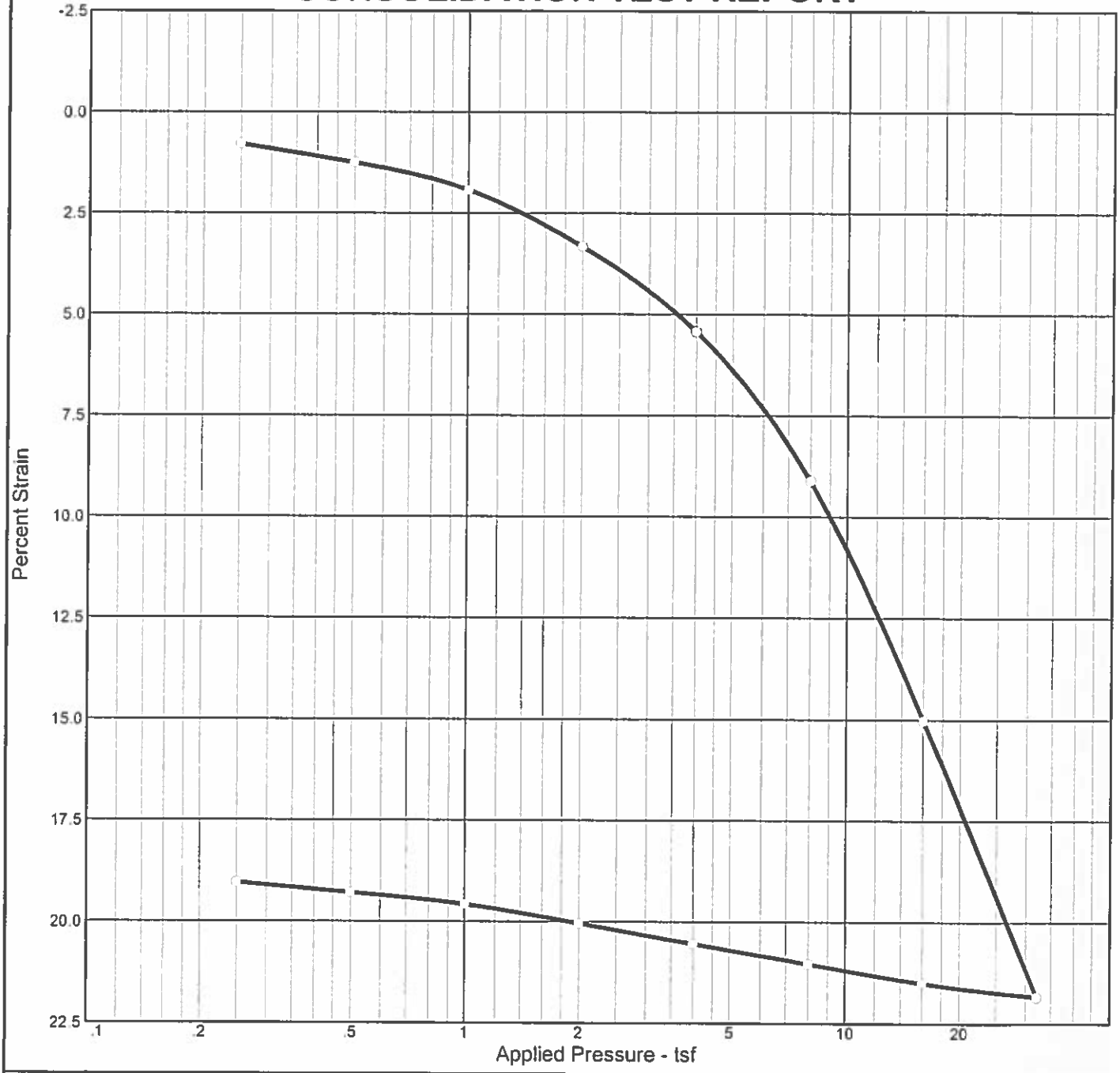
CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

Remarks:

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
99.4 %	48.5 %	73.2	49	26	2.741	1.60	8.48	0.53	0.03	1.337

MATERIAL DESCRIPTION	USCS	AASHTO
lean clay	CL	A-7-6(29

Project No. FL-2-12 **Client:** D. Boomhower

Project: US 93 Animal Crossing

Source: UC-2 **Sample No.:** E2 b **Elev./Depth:** 30.7 - 31.2'

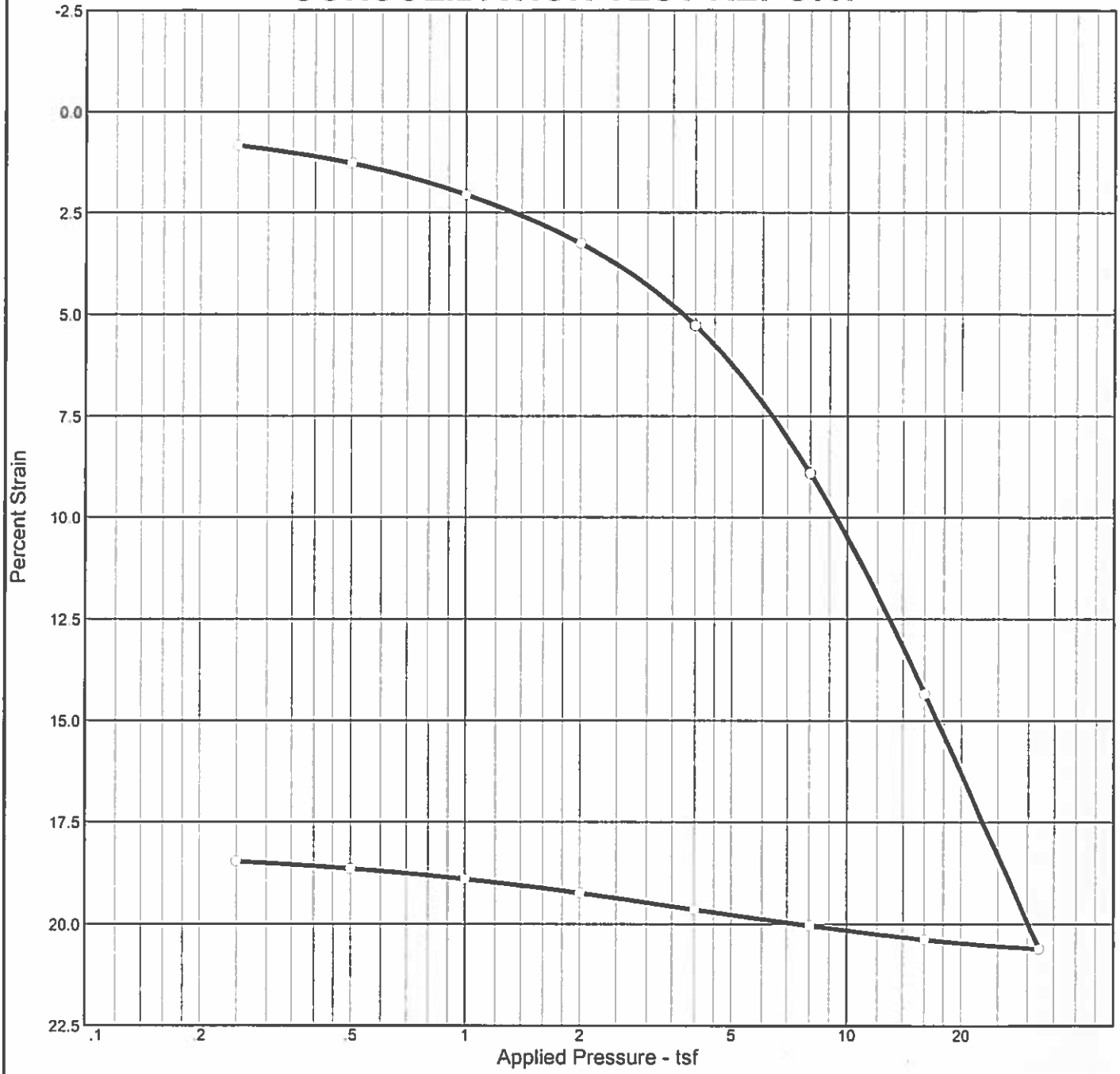
CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

Remarks:

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
98.8 %	41.1 %	79.9	40	20	2.735	1.80	6.78	0.45	0.02	1.137

MATERIAL DESCRIPTION	USCS	AASHTO
lean clay with sand	CL	A-6(15)

Project No. FL-2-12 **Client:** D. Boomhower

Project: US 93 Animal Crossing

Source: UC-2 **Sample No.:** G2 a **Elev./Depth:** 35.7 - 36.2'

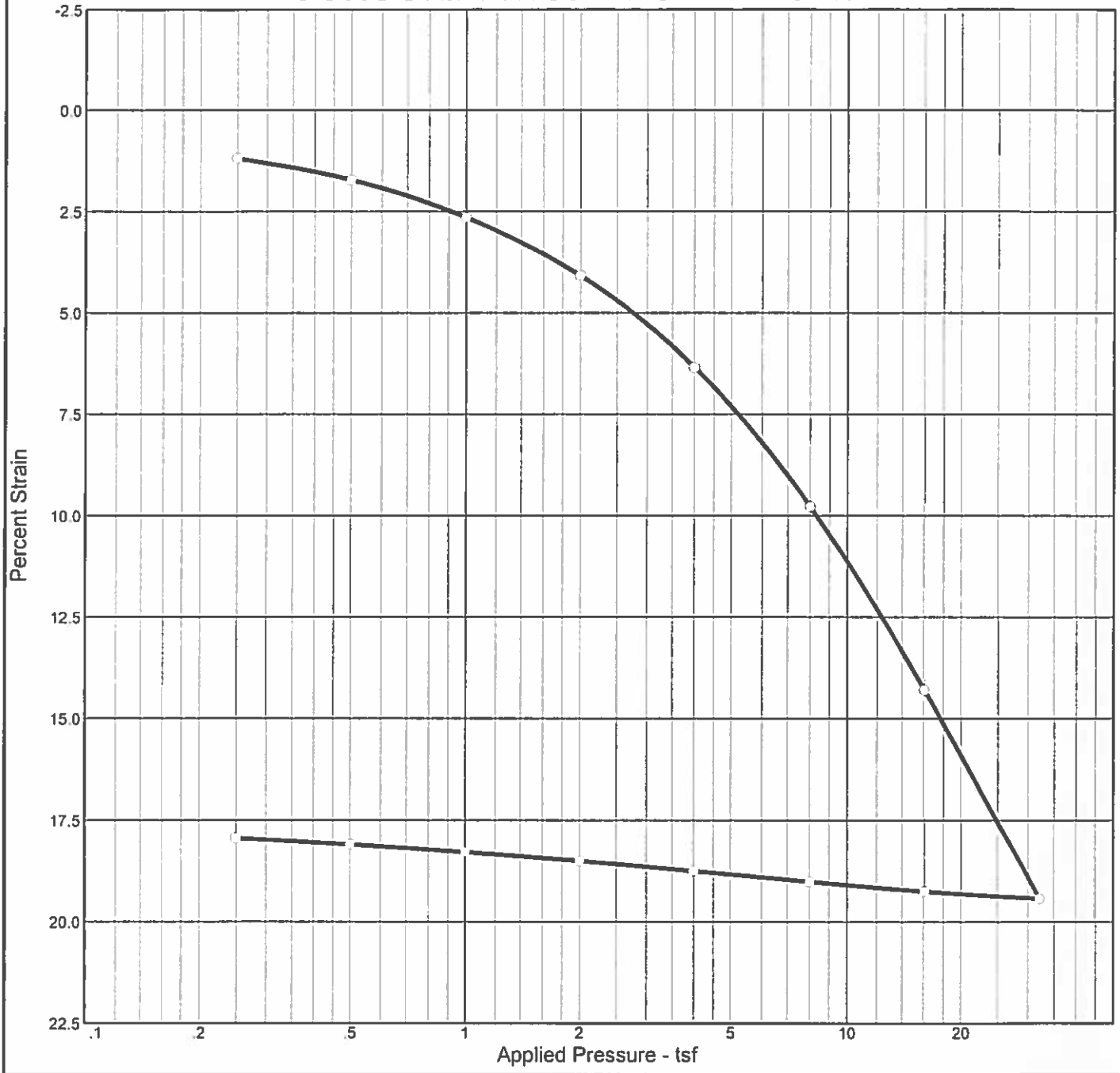
CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

Remarks:

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
97.2 %	37.2 %	83.5	40	20	2.735	1.80	6.39	0.35	0.01	1.046

MATERIAL DESCRIPTION	USCS	AASHTO
lean clay with sand	CL	A-6(15)

Project No. FL-2-12 **Client:** D. Boomhower

Project: US 93 Animal Crossing

Source: UC-2 **Sample No.:** G2 b **Elev./Depth:** 35.7 - 36.2'

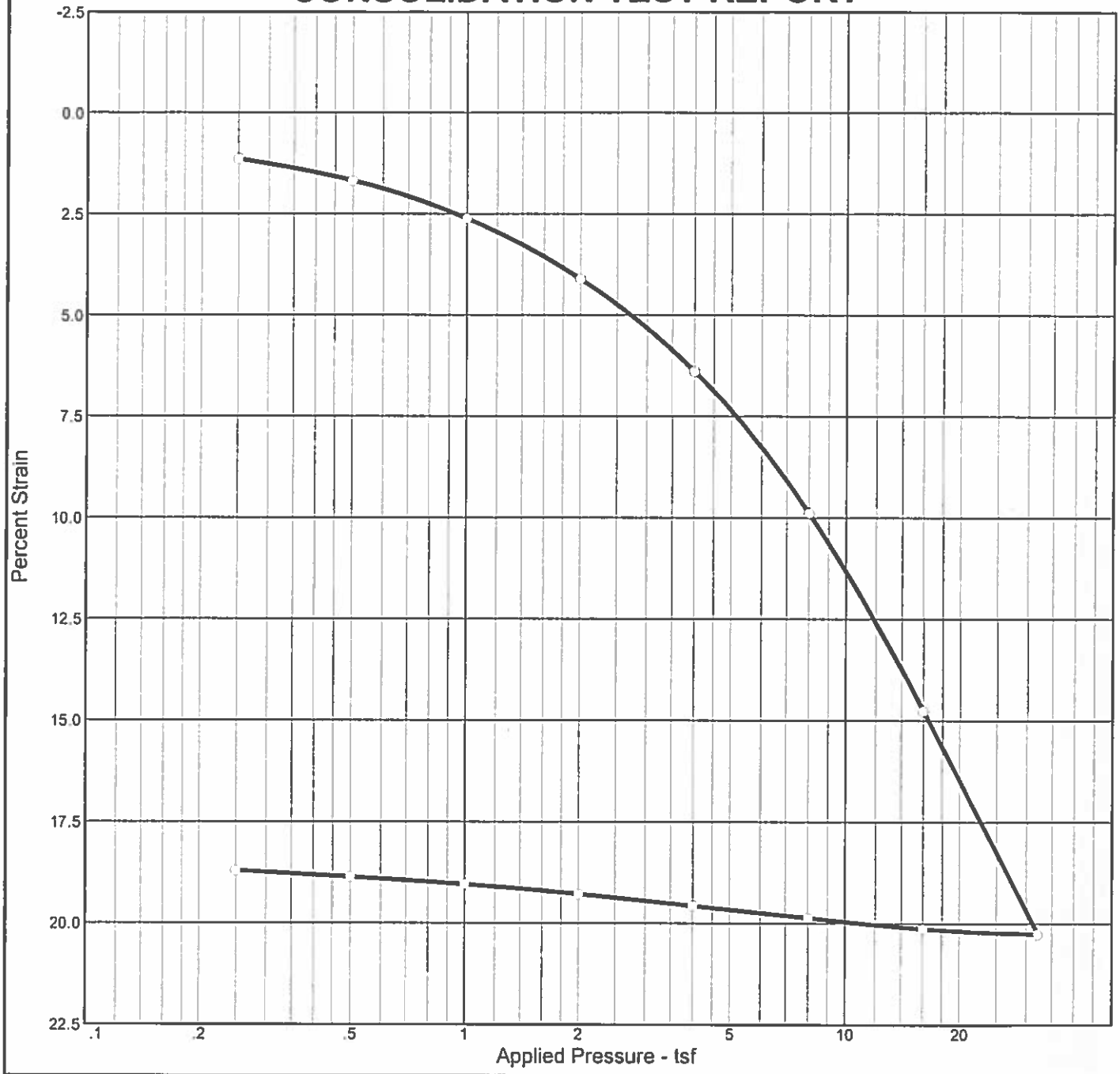
CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

Remarks:

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
97.0 %	40.1 %	80.1	40	20	2.735	1.80	7.54	0.39	0.02	1.131

MATERIAL DESCRIPTION	USCS	AASHTO
lean clay with sand	CL	A-6(15)

Project No. FL-2-12 **Client:** D. Boomhower

Project: US 93 Animal Crossing

Source: UC-2 **Sample No.:** G2 c **Elev./Depth:** 35.7 - 36.2'

Remarks:

CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

Figure

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

CHEMICAL ANALYSIS

E.A. No.: _____

Project: US 93 Animal Crossing

Date: 5/31/12

Sample ID	Chlorides ppm AASHTO T 291 A	Sulfates ppm AASHTO T 290 B	pH AASHTO T 289	Resistivity ohm - cm AASHTO T 288
UC - 1 BULK 1	1,455	149	7.3	280
UC - 1 BULK 2	630	0	7.6	487
UC - 2 BULK 1	930	239	7.9	417
UC - 2 BULK 2	305	50	7.9	767