April 8, 2022
Revised August 23, 2022
Revised September 7, 2022

ENTECH
ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO 80907
PHONE (719) 531-5599
FAX (719) 531-5238

SR Land, LLC
20 Boulder Crescent, 2nd Floor
Colorado Springs, CO 80903

Attn: Chaz Collins

Re: Pavement Recommendations – Revised
Sterling Ranch, Filing No. 2
Sterling Ranch Road (Marksheffel Road to Dines Boulevard)
El Paso County, Colorado
Entech Job No. 220394

*note changes on sheet 3 and figure C-2 and C-3.

Dear Mr. Collins:

As requested, Entech Engineering, Inc. has obtained samples of the pavement subgrade soils from portions of Marksheffel Road and Sterling Ranch Road in the Sterling Ranch Filing No. 2 subdivision. This letter presents the results of the laboratory testing and pavement recommendations for the roadway sections.

Project Description

The roadways for this project consist of a section of Sterling Ranch Road from Marksheffel Road to Dines Boulevard in northeast Colorado Springs, Colorado. Subsurface Soil Investigation and laboratory testing was performed in order to determine the pavement support characteristics of the soils. The limits of this investigation and the approximate locations of the test borings are presented in the Site/Test Boring Location Map, Figure 1.

Subgrade Conditions

Five test borings were drilled along the above referenced roadway to depths of approximately 5 and 10 feet below the existing subgrade surface. The borings were placed at approximately 500-foot spacings. The Test Boring Logs are presented in Appendix A. Sieve Analyses and Atterberg Limit testing were performed on the soil samples obtained from the test borings for the purpose of classification. The percent passing the No. 200 sieve for the Type 1 soils at subgrade depth ranged from approximately 8 to 35 percent. The Type 2 soils ranged from 36 to 38 percent, and 19 to 39 percent for the Type 3 soils. The soils at the subgrade depth consisted of Type 1 native slightly silty to silty sand and Type 2 clayey sand fill. The subgrade soils are generally underlain with silty sand and very clayey sandstone. The underlying Type 3 soils were encountered at depths below the subgrade influence zone. Based on the results of the laboratory testing, two general subgrade soil types were determined for the roadway sections at subgrade depths; silty to slightly silty sand (Soil Type 1) and clayey sand fill (Soil Type 2). The Type 1 soils classify as A-1-b and A-2-6, and the Type 2 soils classify as A-6, based on the AASHTO Classification System. Groundwater was not encountered in any of the test borings. Water soluble sulfate testing indicates a negligible potential for sulfate attack.

Swell/Consolidation tests were performed on the A-6 soils. The Swell tests resulted in volume changes ranging from 0.3 to 1.9 percent. The results are below the level in which mitigation is required (above 2 percent). Mitigation of the subgrade is not required in this site.

California Bearing Ratio (CBR) testing was performed on representative samples of the Type 1 and Type 2 subgrade soils. The results of the CBR and classification testing are presented as follows and in Appendix B and on Table 1, attached. Based on the results of the classification and CBR testing, the soils on this site exhibit poor to good pavement support characteristics. The results of the CBR testing, classification testing, and Swell/Consolidation testing are presented in Appendix B and are summarized as follows:

CBR 1
Soil Type 1 – Silty Sand*
R @ 90% = 1.0
R @ 95% = 37.0
Use R = 35.0 for design

Classification Testing

Liquid Limit	NV
Plasticity Index	NP
Percent Passing 200	24.1
AASHTO Classification	A-1-b
Group Index	0
Unified Soils Classification	SM

CBR 2
Soil Type 1 – Clayey Sand Fill
R @ 90% = 14.0
R @ 95% = 37.0
Use R = 35.0 for design

Classification Testing

Liquid Limit	34
Plasticity Index	16
Percent Passing 200	34.6
AASHTO Classification	A-2-6
Group Index	1
Unified Soils Classification	SC

* CBR Results taken from testing performed on Marksheffel Road, directly adjacent to this site. See Appendix E.

CBR 3
Soil Type 2 – Very Clayey Sand Fill
R @ 90% = 7.5
R @ 95% = 14.0
Use R = 14.0 for design

Classification Testing

Liquid Limit	33
Plasticity Index	15
Percent Passing 200	35.6
AASHTO Classification	A-6
Group Index	1
Unified Soils Classification	SC

Pavement Design

CBR testing was used to determine pavement sections for the roadway sections. Pavement sections were determined utilizing Pavement Design Criteria for El Paso County. Sterling Ranch Road classifies as an urban nonresidential collector, which used a 18K ESAL value of 821,000 for design. Pavement sections were determined for asphalt supported on aggregate base course and on recycled concrete. County approval is required if recycled concrete is to be utilized. El Paso County does not allow full depth asphalt sections. The approval report and

laboratory testing performed for the recycled concrete is attached in Appendix D. The source and locations are provided in the report.

Design parameters used in the pavement analysis for the roadway section are as follows:

Reliability	85%
Standard Deviation	0.45
Resilient Modulus	
Soil Type 1 & 2	8,065 psi
Soil Type 2 (A-6)	4,060 psi
Δpsi	
Collector	2.5
"R" Value Subgrade	
Soil Type 1 & 2	35
Soil Type 2 (A-6)	14
Structural Coefficients:	
Hot Bituminous Asphalt	0.44
Aggregate Basecourse	0.11
Recycled Concrete	0.09

The pavement design calculations are presented in Appendix C. Pavement section alternatives for the roadway sections are presented below. Additional grading may result in subgrade soils with different support characteristics. The following pavement sections should be re-evaluated if additional grading is performed.

Sterling Ranch Road – Urban Non-Residential Collector

Soil Type 1

Composite Section	Asphalt (in)	Basecourse (in)	Recycled Concrete (in)*
1. Asphalt Over Basecourse	4.5	~~9.0~~ 9.5	-
2. Asphalt Over Recycled Concrete	4.5	-	~~11.0~~ 11.5

Soil Type 2 (A-6)

Composite Section	Asphalt (in)	Basecourse (in)	Recycled Concrete (in)*
1. Asphalt Over Basecourse	6.0	10.0	-
2. Asphalt Over Recycled Concrete	6.0	-	13.0

*County approval pending.

Roadway Construction

Prior to placement of the asphalt, the subgrade should be scarified, moisture-conditioned, compacted to a minimum of 95% of its maximum Modified Proctor Dry Density, ASTM D-1557 at ± 2 percent of optimum moisture content and proofrolled after properly compacted. Any loose or soft areas should be removed and replaced with suitable materials approved by Entech. Basecourse and recycled concrete materials should be compacted to a minimum of 95% of its maximum Modified Proctor Dry Density, ASTM D-1557 at ± 2% of optimum moisture content. Special attention should be given to areas adjacent to manholes, inlet structures and valves.

Based on the soils encountered, subgrade soil problem areas, if any, will be identified at proof roll. We do not anticipate issues with the subgrade in regards to shallow water, frost susceptible soils, groundwater or drainage conditions, soluble sulfates, or cold weather construction.

In addition to the above guidance the asphalt, subgrade conditions, compaction of materials and roadway construction methods shall meet the El Paso County specifications.

We trust that this report contains the information you require. If you have questions or need additional information, please contact us.

Respectfully Submitted,

ENTECH ENGINEERING, INC.

Daniel P. Stegman

Encl.

DPS/lu
AAprojects/2022/220394/220394 pr- Fil2 – Rev3

COLORADO REGISTERED
JOSEPH COLLIN GOODE JR.
9-7-2022
23725
PROFESSIONAL ENGINEER

Reviewed by:

Joseph C. Goode, Jr., P.E.
President

TABLE

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

CLIENT SR LAND
PROJECT STERLING RANCH, F-2
JOB NO. 220394

SOIL TYPE	TEST BORING NO.	DEPTH (FT)	WATER (%)	DRY DENSITY (PCF)	PASSING NO. 200 SIEVE (%)	LIQUID LIMIT (%)	PLASTIC INDEX (%)	SULFATE (WT %)	AASHTO CLASS.	SWELL/ CONSOL (%)	UNIFIED CLASSIFICATION	SOIL DESCRIPTION
1, CBR #1	1	0-3			24.1	NV	NP		A-1-b		SM	SAND, SILTY
1	1	1-2			8.0	NV	NP	<0.01	A-1-b		SM	SAND, SLIGHTLY SILTY
1	2	1-2			19.8	NV	NP		A-1-b		SM	SAND, SILTY
1, CBR #2	4	0-3			34.6	34	16		A-2-6		SC	FILL, SAND, CLAYEY
1	5	1-2			21.2	NV	NP		A-1-b		SM	FILL, SAND, SLIGHTLY SILTY
2, CBR #3	3	0-3	12.5	109.2	35.6	33	15		A-6	1.9	SC	FILL, SAND, VERY CLAYEY
2	3	1-2	11.9	102.9	37.3	42	32		A-6	0.4	SC	FILL, SAND, VERY CLAYEY
2	4	1-2			38.2	33	13	<0.01	A-2-6		SC	FILL, SAND, VERY CLAYEY
3	1	10	19.8	92.1	39.0	36	13		A-6	0.3	SC	SANDSTONE, VERY CLAYEY
3	5	10			18.6	NV	NP	<0.01	A-2-4		SM	SAND, SILTY

FIGURE

REVISION	BY

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SITE/TEST BORING LOCATION MAP
STERLING RANCH ROAD
COLORADO SPRINGS, CO.
FOR: SR LAND LLC

N

UNPLATTED REC. NO. 217080112
S51°21'50"E 13.67'
Δ=38°41'48" R=130.00' L=87.80'
S00°06'01"E 631.46'
TRACT F
LOT 1
LOT 2
LOT 3
LOT 4
70' GAS EASEMENT BOOK 2139 PAGE 380 BOOK 2216 PAGE 72
150' GAS EASEMENT REC. NO. 202059605
AMENDED PLAT BARBARICK SUBDIVISION REC. NO. 217713910
TRACT H
N89°17'25"E 279.65'
S00°42'35"E 241.35'
50' GAS EASEMENT APPROXIMATE LOCATION BOOK 798 PAGE 185
S02°02'55"W 130.48'
AMENDMENT TO EASEMENT AND RIGHT-OF-WAY AGREEMENT REC. NO. 221100602
S05°37'53"W 90.98'
UNPLATTED RELEASE PARCEL 1 REC. NO. 217051682
S01°51'19"W 307.22'
BRANDING IRON AT STERLING RANCH FILING NO. 1 REC. NO. 218714262
DINES BOULEVARD
STERLING RANCH FILING NO. 1 REC. NO. 218714151
TRACT CC
TRACT D
TRACT M
10' ELECTRIC EASEMENT REC. NO. 218054783
S 1/2, SW 1/4 SEC. 33 T.12S R65W 6TH P.M.
UNPLATTED REC. NO. 217051682
20' PERMANENT EASEMENT REC. NO. 201034022
S13°40'40"E 20.00'
N76°19'20"E 85.00'
S13°40'40"E 60.00'
N77°08'03"W
S. 1/4 COR. SEC. 34 T.12S, R.65W, 6TH P.M. RECOVERED 2.5" ALUMINUM CAP STAMPED "11624" AT GRADE
TRACT G
N76°19'20"E 60.00'
N13°40'40"W 20.00'
S13°40'40"E 20.00'
N76°19'20"E 842.10'
POINT OF BEGINNING
S76°19'20"W 80.00'
S13°40'40"E 20.00'
S76°19'20"W 852.10'
TRACT A
LIMITS OF INVESTIGATION
POINT OF COMMENCEMENT SW COR. SEC. 34 T.12S, R.65W, 6TH P.M. RECOVERED 2.5" ALUMINUM CAP STAMPED "11624" AT GRADE
TB-5
TB-4
TB-3
TB-2
TB-1
20' ELECTRIC EASEMENT REC. NO. 218054783
Δ=19°39'04" R=1060.00' L=369.72'
N73°29'47"E 11.27'
S16°30'13"E 179.19'
TRACT I
TRACT J
N76°19'20"E 381.99'
S76°19'20"W 386.99'
20' ELECTRIC EASEMENT REC. NO. 218054783
Δ=23°53'20" R=940.00' L=391.92'
TRACT B
ACCESS EASEMENT REC. NO. 219019375
S41°03'23"W 60.19'
S42°18'33"E(G)
Δ=8°26'12" R=930.00' L=136.94'
S40°21'31"W
TRACT E
E 1/2, SE 1/4 SEC. 32 T.12S R65W 6TH P.M.
TRACT K (FUTURE MARKSHEFFEL ROAD)
150' ACCESS AND UTILITY EASEMENT REC. NO. 214100441
N49°38'29"W 1459.95'
UNPLATTED REC. NO. 217051682
20' ELECTRIC EASEMENT REC. NO. 218054783
TRACT C
30' ACCESS AND UTILITY EASEMENT REC. NO. 214100441
20' PERMANENT EASEMENT REC. NO. 201034022
20' ACCESS EASEMENT REC. NO. 211091268
SW COR. SE 1/4, SEC. 32 RECOVERED 3-1/4" ALUMINUM CAP STAMPED "LS 10376" AT GRADE
ACCESS AND UTILITY EASEMENT REC. NO. 215051140
ACCESS AND UTILITY EASEMENT REC. NO. 214100440
NW 1/4, NW 1/4 SEC. 4 T.13S R65W 6TH P.M.
NE 1/4, NE 1/4 SEC. 5 T.13S R65W 6TH P.M.
ACCESS AND UTILITY EASEMENT REC. NO. 214100440
S48°38'29"E 16.00'
S40°21'31"W 160.00'
UNPLATTED REC. NO. 217105379
UNPLATTED REC. NO. 204209417
LIMITS OF INVESTIGATION
BYNUM DRIVE
BEAVERHEAD CIRCLE
CORDGRASS DRIVE
ALPAQA DRIVE
EXISTING VOLLMER ROAD (ROW VARIES)
ADDITIONAL VOLLMER ROAD RIGHT-OF-WAY DEDICATION
N40°24'51"E 1858.05'
TRACT D
20' ELECTRIC EASEMENT REC. NO. 218054783

75' 0 150' 300' 600'
1"=300'

TB-#- APPROXIMATE TEST BORING LOCATION AND NUMBER

SOIL TYPE 1 & 2 - COLLECTOR - 4.5" ASPHALT ON 9" OF BASE COURSE

SOIL TYPE 2 (A-6) - COLLECTOR - 6" ASPHALT ON 10" OF BASE COURSE

-SEE REPORT FOR ASPHALT OVER RECYCLED CONCRETE SECTION.
-SOIL TRANSITIONS SHALL BE FIELD DETERMINED.

DRAWN	JAC
CHECKED	DPS
DATE	3/17/22
SCALE	1"=300'
JOB NO.	220394-C
FIGURE No.	1

APPENDIX A: Test Boring Logs

TEST BORING NO. 1
DATE DRILLED 2/21/2022
Job # 220394

REMARKS

DRY TO 10', 2/21/22

SAND, SLIGHTLY SILTY, FINE TO COARSE GRAINED, TAN, LOOSE TO MEDIUM DENSE, MOIST

SANDSTONE, VERY CLAYEY, FINE TO MEDIUM GRAINED, GRAY BROWN, VERY DENSE, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			6	6.0	1
5			10	7.6	1
10			50/9"	9.2	3
15					
20					

TEST BORING NO. 2
DATE DRILLED 2/21/2022
CLIENT SR LAND
LOCATION STERLING RANCH, F-2

REMARKS

DRY TO 5', 2/21/22

SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			11	7.4	1
5			11	6.5	1
10					
15					
20					

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TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		DS	9/1/22

JOB NO.: 220394
FIG NO.: A- 1

TEST BORING NO. 3
DATE DRILLED 8/4/2022
Job # 220394

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 5', 8/4/22						
FILL 0-5', SAND, VERY CLAYEY, FINE TO MEDIUM GRAINED, BROWN, MEDIUM DENSE, MOIST				12	16.3	2
	5			27	12.3	2
	10					
	15					
	20					

TEST BORING NO. 4
DATE DRILLED 8/4/2022
CLIENT SR LAND
LOCATION STERLING RANCH, F-2

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 5', 8/4/22						
FILL 0-5', SAND, VERY CLAYEY, FINE TO MEDIUM GRAINED, BROWN, MEDIUM DENSE TO DENSE, MOIST				16	17.5	2
	5			38	7.9	2
	10					
	15					
	20					

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TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		[illegible]	9/1/22

JOB NO.: 220394
FIG NO.: A- 2

TEST BORING NO. 5
DATE DRILLED 8/4/2022
Job # 220394

TEST BORING NO.
DATE DRILLED
CLIENT SR LAND
LOCATION STERLING RANCH, F-2

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 10', 8/4/22						
FILL 0-8', SAND, SLIGHTLY SILTY, FINE TO COARSE GRAINED, BROWN, MEDIUM DENSE, MOIST				18	7.0	1
	5			17	11.5	1
SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, MOIST	10			12	9.2	3
	15					
	20					

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
	5					
	10					
	15					
	20					

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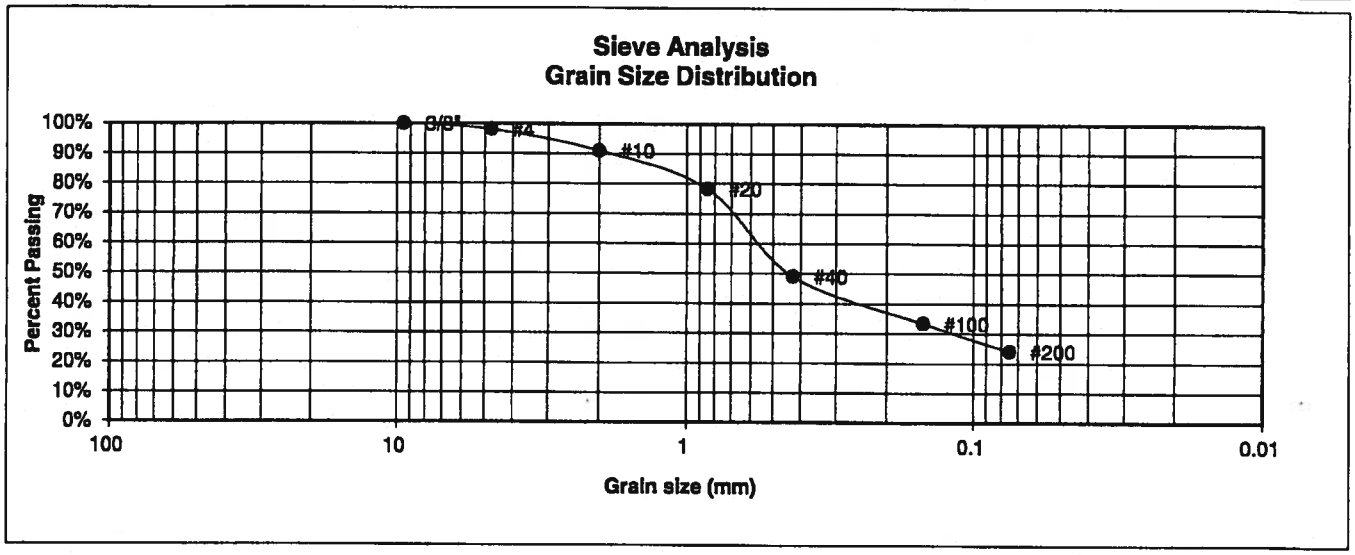
TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		DS	8/11/22

JOB NO.: 220394
FIG NO.: A- 3

APPENDIX B: Laboratory Test Results

UNIFIED CLASSIFICATION	SM	CLIENT	SR LAND
SOIL TYPE #	1, CBR #1	PROJECT	STERLING RANCH, F-2
TEST BORING #	1	JOB NO.	220394
DEPTH (FT)	0-3	TEST BY	BL
AASHTO CLASSIFICATION	A-1-b	GROUP INDEX	0



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	98.1%
10	91.0%
20	78.3%
40	49.0%
100	33.3%
200	24.1%

Atterberg Limits

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

Swell

Moisture at start

Moisture at finish

Moisture increase

Initial dry density (pcf)

Swell (psf)

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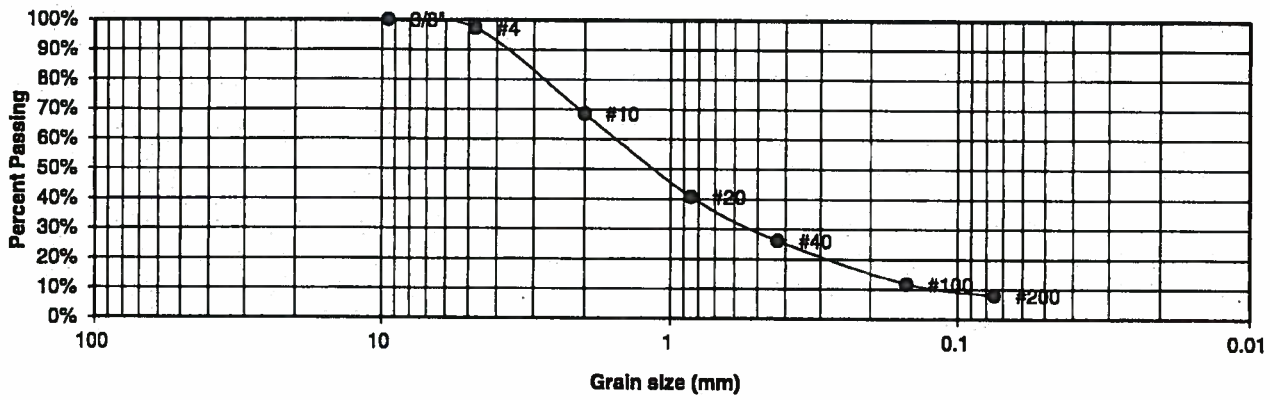
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		DS	4/27/22

JOB NO.: 220394
FIG NO.: B-1

UNIFIED CLASSIFICATION	SM	CLIENT	SR LAND
SOIL TYPE #	1	PROJECT	STERLING RANCH, F-2
TEST BORING #	1	JOB NO.	220394
DEPTH (FT)	1-2	TEST BY	BL
AASHTO CLASSIFICATION	A-1-b	GROUP INDEX	0

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	97.3%
10	68.6%
20	40.8%
40	26.1%
100	11.7%
200	8.0%

Atterberg Limits

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

Swell

Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	

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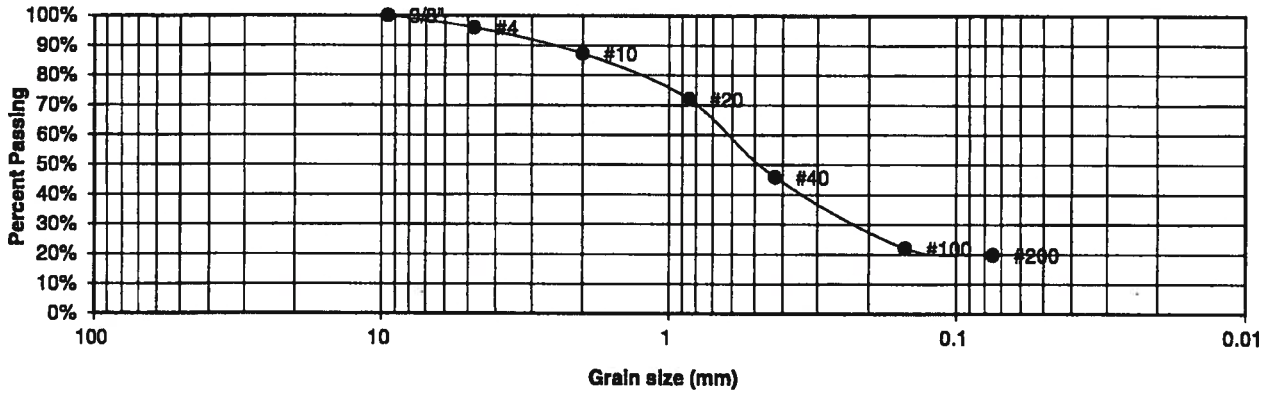
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		DS	4/4/22

JOB NO.: 220394
FIG NO.: B-2

UNIFIED CLASSIFICATION	SM	CLIENT	SR LAND
SOIL TYPE #	1	PROJECT	STERLING RANCH, F-2
TEST BORING #	2	JOB NO.	220394
DEPTH (FT)	1-2	TEST BY	BL
AASHTO CLASSIFICATION	A-1-b	GROUP INDEX	0

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	96.0%
10	87.3%
20	72.0%
40	45.9%
100	22.0%
200	19.8%

Atterberg Limits

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

Swell

Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	

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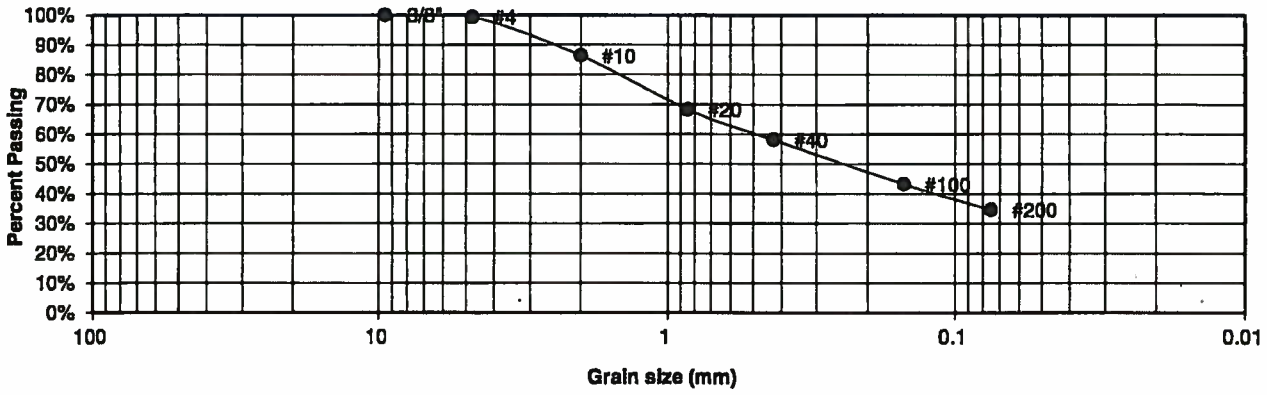
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED: DS	DATE: 4/4/22

JOB NO.: 220394
FIG NO.: B-3

UNIFIED CLASSIFICATION	SC	CLIENT	SR LAND
SOIL TYPE #	1, CBR #2	PROJECT	STERLING RANCH, F-2
TEST BORING #	4	JOB NO.	220394
DEPTH (FT)	0-3	TEST BY	BL
AASHTO CLASSIFICATION	A-2-6	GROUP INDEX	1

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.3%
10	86.4%
20	68.3%
40	58.1%
100	43.2%
200	34.6%

Atterberg Limits	
Plastic Limit	18
Liquid Limit	34
Plastic Index	16

Swell	
Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	

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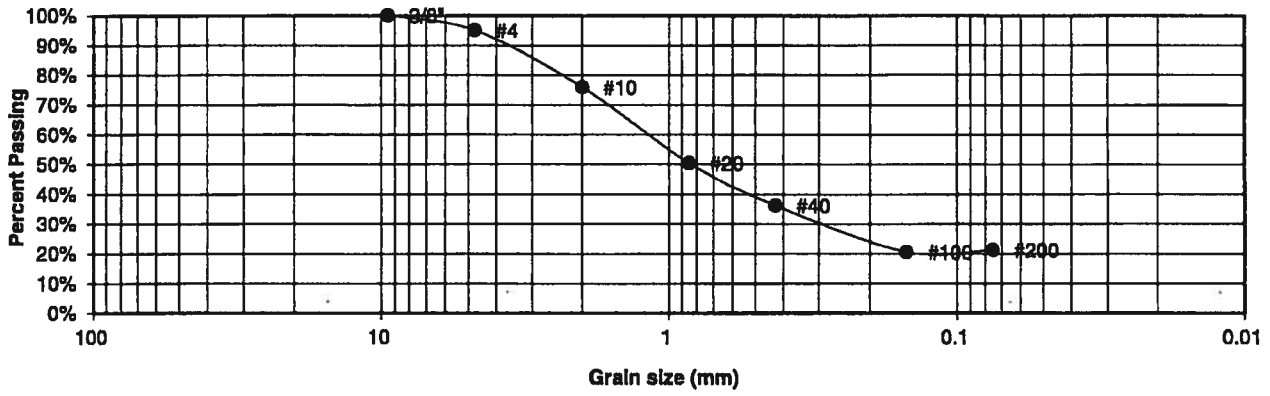
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		DS	4/4/22

JOB NO.: 220394
FIG NO.: B-4

UNIFIED CLASSIFICATION	SM	CLIENT	SR LAND
SOIL TYPE #	1	PROJECT	STERLING RANCH, F-2
TEST BORING #	5	JOB NO.	220394
DEPTH (FT)	1-2	TEST BY	BL
AASHTO CLASSIFICATION	A-1-b	GROUP INDEX	0

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	95.1%
10	76.0%
20	50.4%
40	36.2%
100	20.5%
200	21.2%

Atterberg Limits	
Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

Swell	
Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	

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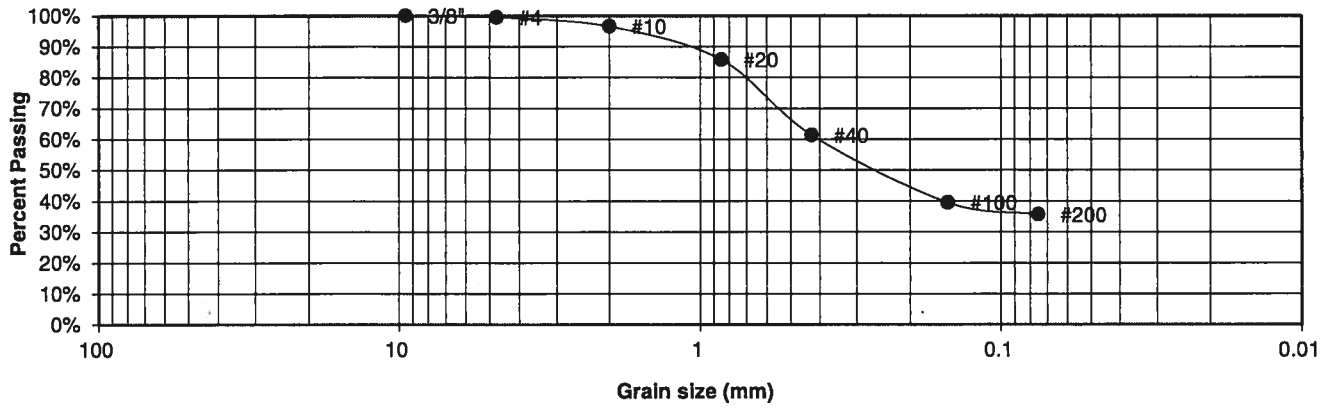
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		BS	8/23/22

JOB NO.: 220394
FIG NO.: B-5

UNIFIED CLASSIFICATION	SC	CLIENT	SR LAND
SOIL TYPE #	2, CBR #3	PROJECT	STERLING RANCH, F-2
TEST BORING #	3	JOB NO.	220394
DEPTH (FT)	0-3	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	1

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.5%
10	96.6%
20	85.8%
40	61.3%
100	39.5%
200	35.6%

Atterberg Limits	
Plastic Limit	18
Liquid Limit	33
Plastic Index	15

Swell	
Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	

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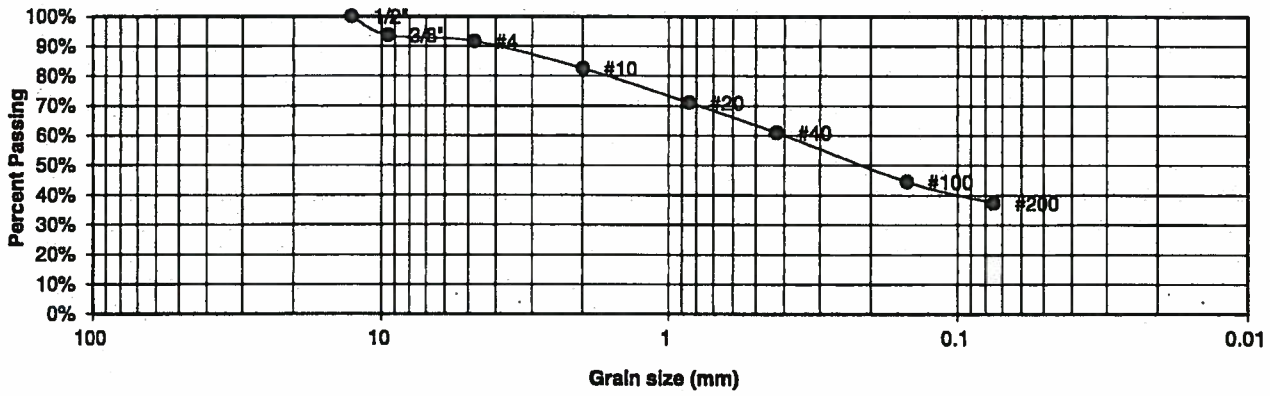
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		DF	9/7/22

JOB NO.: 220394
FIG NO.: B-6

UNIFIED CLASSIFICATION	SC	CLIENT	SR LAND
SOIL TYPE #	2	PROJECT	STERLING RANCH, F-2
TEST BORING #	3	JOB NO.	220394
DEPTH (FT)	1-2	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	5

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	93.7%
4	91.6%
10	82.5%
20	71.1%
40	61.0%
100	44.5%
200	37.3%

Atterberg Limits

Plastic Limit	10
Liquid Limit	42
Plastic Index	32

Swell

Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	

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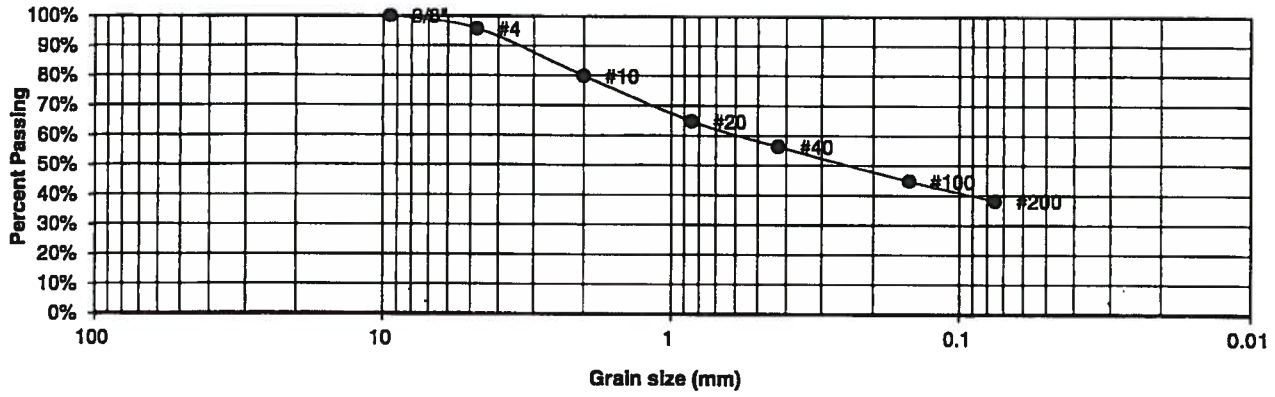
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		DS	8/23/22

JOB NO.: 220394
FIG NO.: B-7

UNIFIED CLASSIFICATION	SC	CLIENT	SR LAND
SOIL TYPE #	2	PROJECT	STERLING RANCH, F-2
TEST BORING #	4	JOB NO.	220394
DEPTH (FT)	1-2	TEST BY	BL
AASHTO CLASSIFICATION	A-2-6	GROUP INDEX	0

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	95.7%
10	79.9%
20	64.7%
40	56.3%
100	44.8%
200	38.2%

Atterberg Limits

Plastic Limit	20
Liquid Limit	33
Plastic Index	13

Swell

Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	

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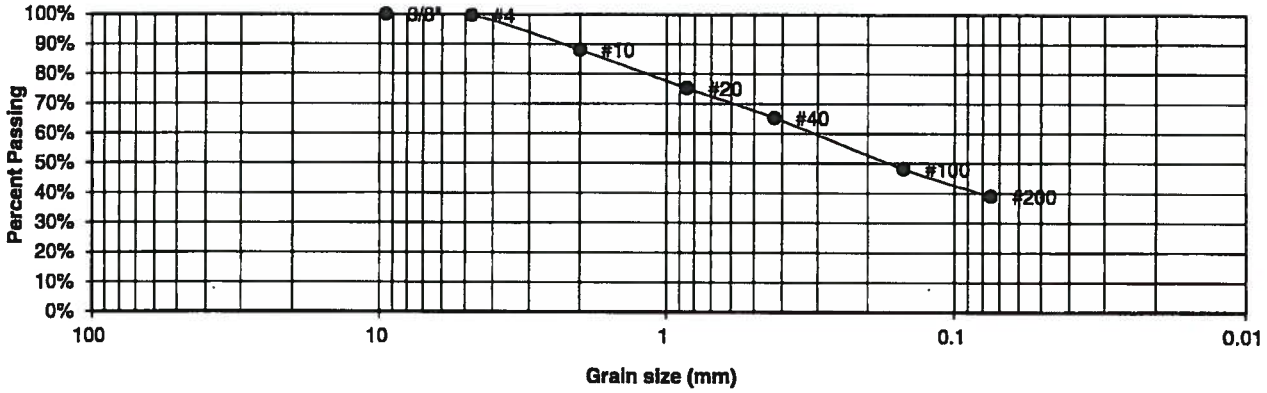
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		DS	8/23/22

JOB NO.: 220394
FIG NO.: B-8

UNIFIED CLASSIFICATION	SC	CLIENT	SR LAND
SOIL TYPE #	3	PROJECT	STERLING RANCH, F-2
TEST BORING #	1	JOB NO.	220394
DEPTH (FT)	10	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	1

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.6%
10	88.0%
20	75.2%
40	65.3%
100	48.1%
200	39.0%

Atterberg Limits	
Plastic Limit	23
Liquid Limit	36
Plastic Index	13

Swell	
Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	

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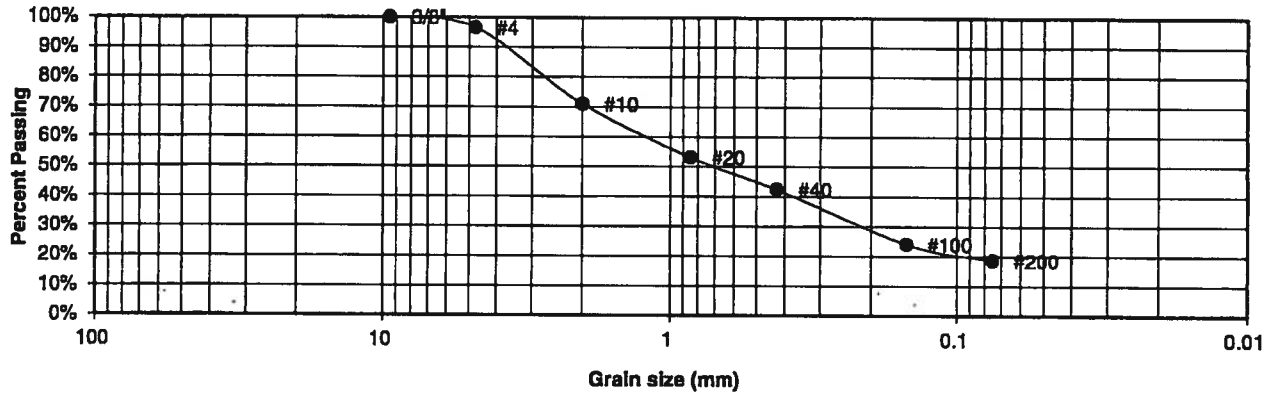
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED: BS	DATE: 4/14/22

JOB NO.: 220394
FIG NO.: B-9

UNIFIED CLASSIFICATION	SM	CLIENT	SR LAND
SOIL TYPE #	3	PROJECT	STERLING RANCH, F-2
TEST BORING #	5	JOB NO.	220394
DEPTH (FT)	10	TEST BY	BL
AASHTO CLASSIFICATION	A-2-4	GROUP INDEX	0

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	96.5%
10	70.9%
20	53.1%
40	42.4%
100	24.0%
200	18.6%

Atterberg Limits

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

Swell

Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	

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LABORATORY TEST RESULTS

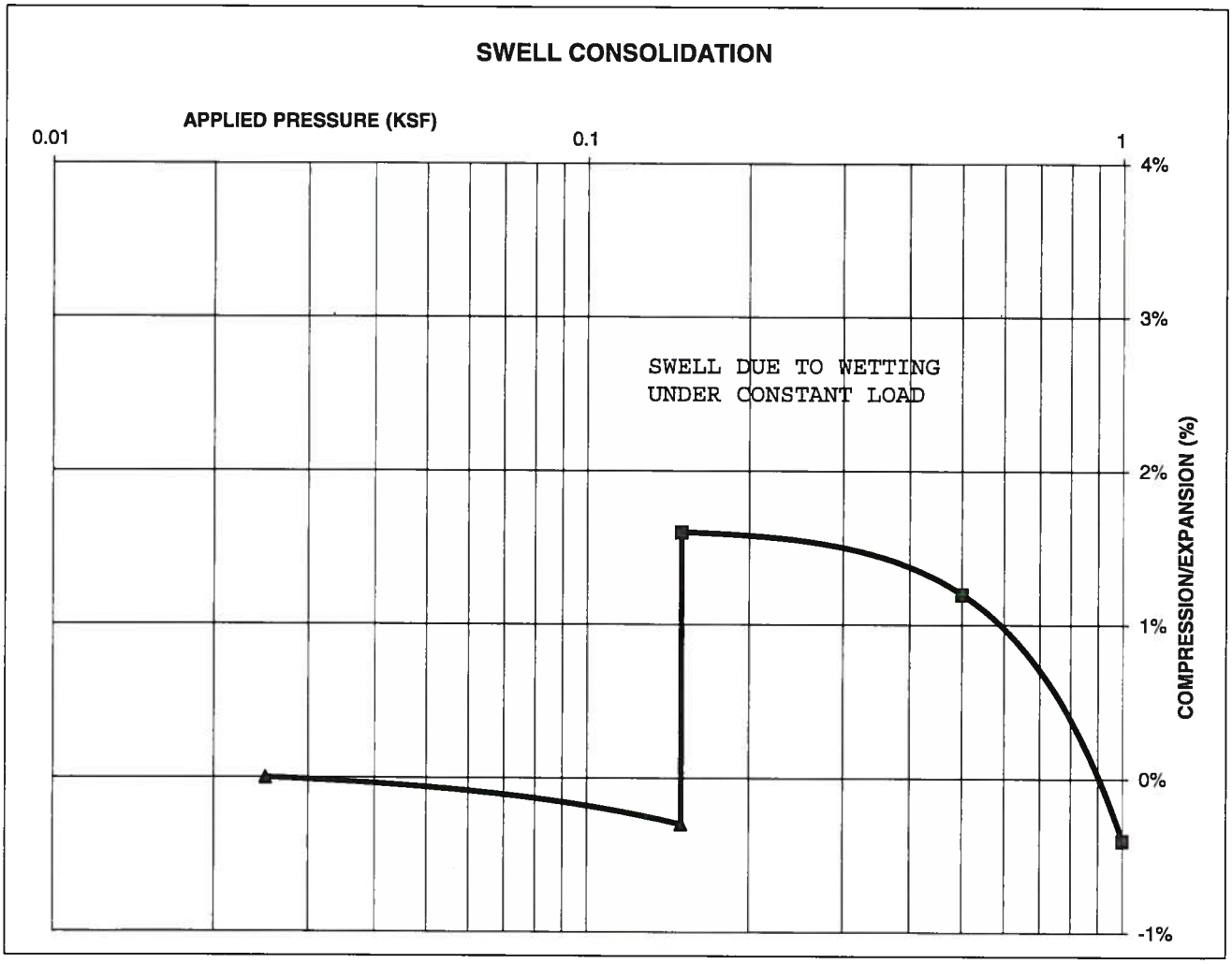
DRAWN:	DATE:	CHECKED:	DATE:
		TJS	6/23/22

JOB NO.: 220394
FIG NO.: B-10

CONSOLIDATION TEST RESULTS

TEST BORING #	3	DEPTH(ft)	0-3
DESCRIPTION	SC	SOIL TYPE	2, CBR #3
NATURAL UNIT DRY WEIGHT (PCF)			109
NATURAL MOISTURE CONTENT			12.5%
SWELL/CONSOLIDATION (%)			1.9%

JOB NO. 220394
CLIENT SR LAND
PROJECT STERLING RANCH, F-2



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SWELL CONSOLIDATION
TEST RESULTS

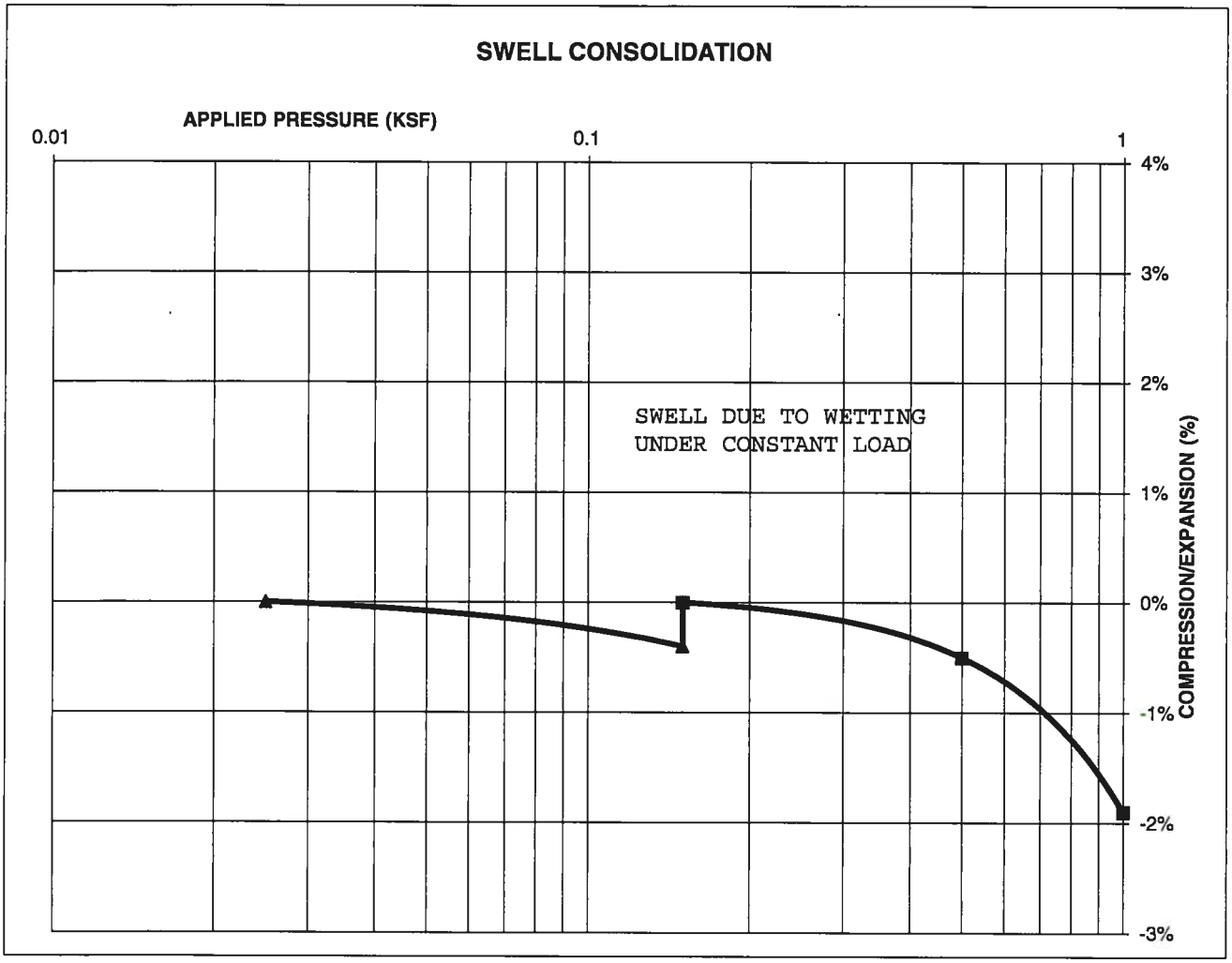
DRAWN:	DATE:	CHECKED:	DATE:
		DS	9/9/22

JOB NO.: 220394
FIG NO.: B-11

CONSOLIDATION TEST RESULTS

TEST BORING #	3	DEPTH(ft)	1-2
DESCRIPTION	SC	SOIL TYPE	2
NATURAL UNIT DRY WEIGHT (PCF)			103
NATURAL MOISTURE CONTENT			11.9%
SWELL/CONSOLIDATION (%)			0.4%

JOB NO. 220394
CLIENT SR LAND
PROJECT STERLING RANCH, F-2



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SWELL CONSOLIDATION
TEST RESULTS

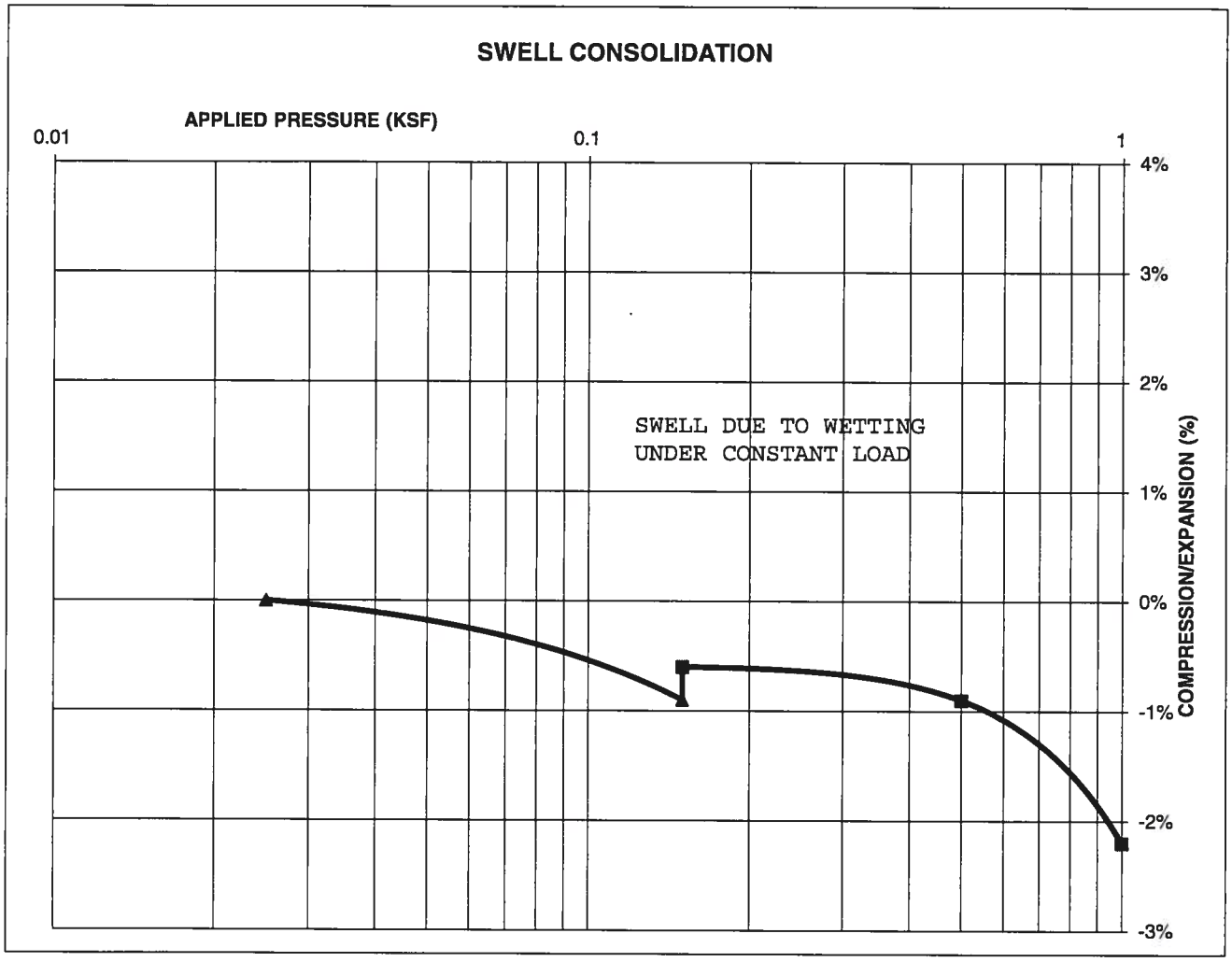
DRAWN:	DATE:	CHECKED:	DATE:
		BS	9/1/22

JOB NO.: 220394
FIG NO.: B-12

CONSOLIDATION TEST RESULTS

TEST BORING #	1	DEPTH(ft)	10
DESCRIPTION	SC	SOIL TYPE	3
NATURAL UNIT DRY WEIGHT (PCF)			92
NATURAL MOISTURE CONTENT			19.8%
SWELL/CONSOLIDATION (%)			0.3%

JOB NO. 220394
CLIENT SR LAND
PROJECT STERLING RANCH, F-2



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SWELL CONSOLIDATION
TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		DS	9/11/22

JOB NO.: 220394
FIG NO.: B-13

CLIENT	SR LAND	JOB NO.	220394
PROJECT	STERLING RANCH, F-2	DATE	8/23/2022
LOCATION	STERLING RANCH, F-2	TEST BY	BL

BORING NUMBER	DEPTH, (ft)	SOIL TYPE NUMBER	UNIFIED CLASSIFICATION	WATER SOLUBLE SULFATE, (wt%)
TB-4	1-2	1	SC	<0.01
TB-5	10	2	SM	<0.01
TB-1	1-2	1	SM	<0.01

QC BLANK PASS

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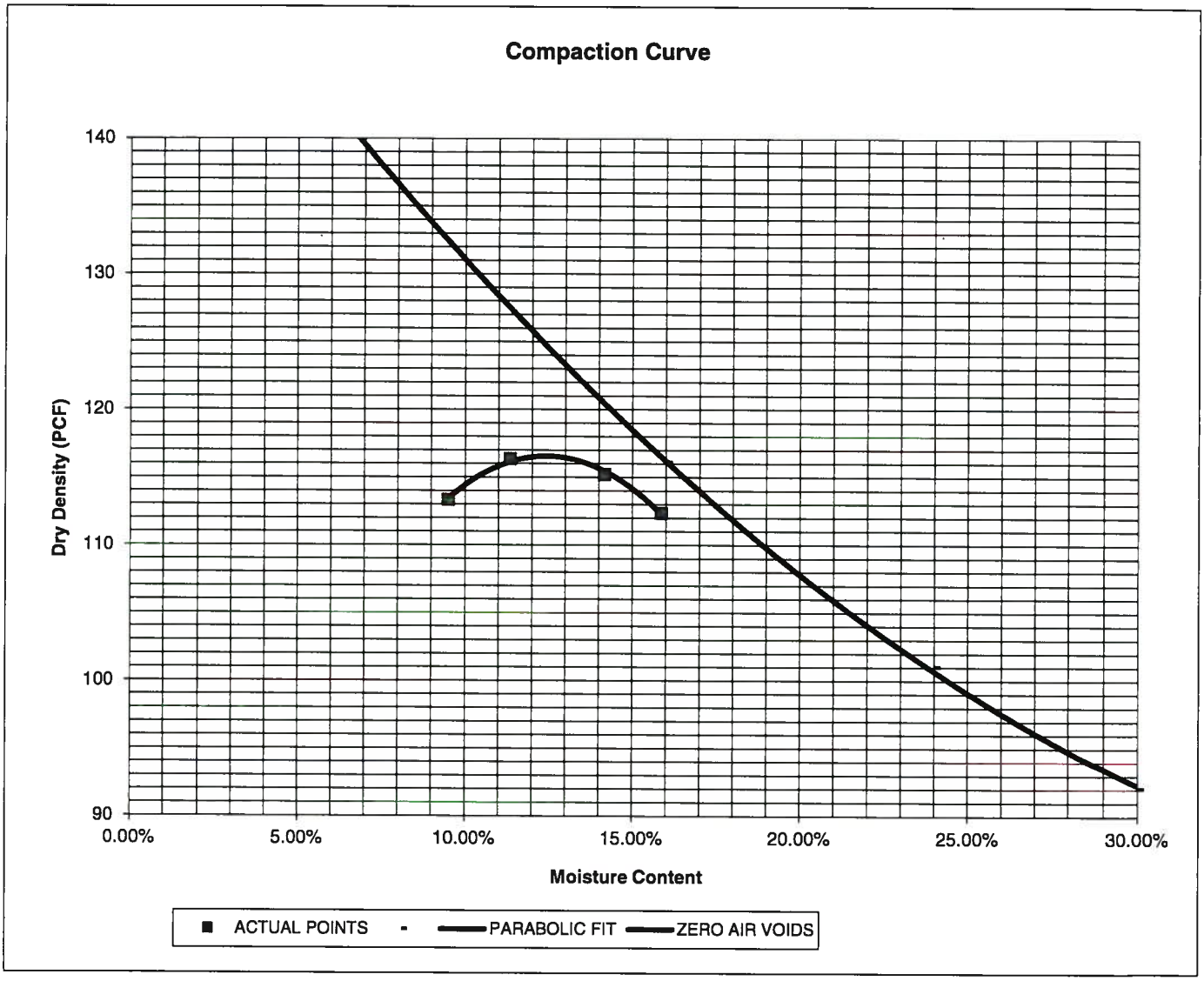
LABORATORY TEST SULFATE RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		DS	8/23/22

JOB NO.: 220394
FIG NO.: B-04

PROJECT	STERLING RANCH, F-2	CLIENT	SR LAND
SAMPLE LOCATION	TB-4 @ 0-3'	JOB NO.	220394
SOIL DESCRIPTION	FILL, SAND, V. CLAYEY, BROWN	DATE	08/04/22

IDENTIFICATION	SC	COMPACTION TEST #	3, SOIL TYPE #2
TEST DESIGNATION / METHOD	ASTM D-698-A	TEST BY	BL
MAXIMUM DRY DENSITY (PCF)	116.8	OPTIMUM MOISTURE	12.5%



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MOISTURE DENSITY RELATION

DRAWN:	DATE:	CHECKED:	DATE:
		DS	9/6/22

JOB NO.: 220394

FIG NO.: B-1.5

CBR TEST LOAD DATA

JOB NO: 220394
CLIENT: SR LAND
PROJECT: STERLING RANCH, F-2
SOIL TYPE: 2, CBR #3

PISTON DIAMETER (cm)	PISTON AREA (in^2)
4.958	2.993

PENETRATION DEPTH (INCHES)	*10 BLOWS* MOLD # 1 LOAD(LBS) (LBS)	STRESS (PSI)	*25 BLOWS* MOLD # 2 LOAD(LBS) (LBS)	STRESS (PSI)	*56 BLOWS* MOLD # 3 LOAD(LBS) (LBS)	STRESS (PSI)
0.000	0	0.00	0	0.00	0	0.00
0.025	25	8.35	43	14.37	121	40.43
0.050	30	10.03	63	21.05	156	52.13
0.075	35	11.70	76	25.40	206	68.84
0.100	40	13.37	83	27.74	231	77.19
0.125	45	15.04	95	31.75	274	91.56
0.150	50	16.71	106	35.42	337	112.61
0.175	55	18.38	115	38.43	371	123.98
0.200	60	20.05	121	40.43	401	134.00
0.300	65	21.72	126	42.11	495	165.41
0.400	70	23.39	143	47.79	575	192.15
0.500	75	25.06	156	52.13	652	217.88

FINAL MOISTURE CONTENT

	MOLD # 1	MOLD # 2	MOLD # 3
CAN #	303	352	106
WT. CAN	8.36	6.68	9.37
WT. CAN+WET	167.83	195.32	187.5
WT. CAN+DRY	142.15	165.2	162.85
WT. H20	25.68	30.12	24.65
WT. DRY SOIL	133.79	158.52	153.48
MOISTURE CONTENT	19.19%	19.00%	16.06%

WET DENSITY (PCF)	114.6	117.3	127.5
DRY DENSITY (PCF)	101.9	104.2	113.3

BEARING RATIO		1.34	2.77	7.72

90% OF DRY DENSITY	105.1
95% OF DRY DENSITY	111.0

BEARING RATIO AT 90% OF MAX	3.26	~ R VALUE	7.5
BEARING RATIO AT 95% OF MAX	6.43	~ R VALUE	14

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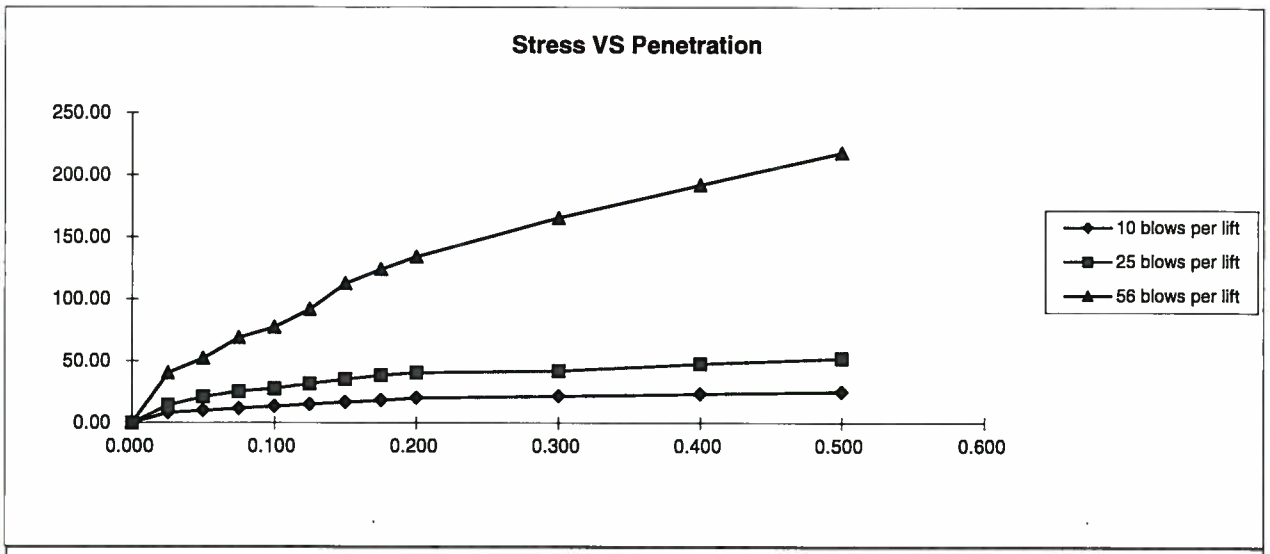
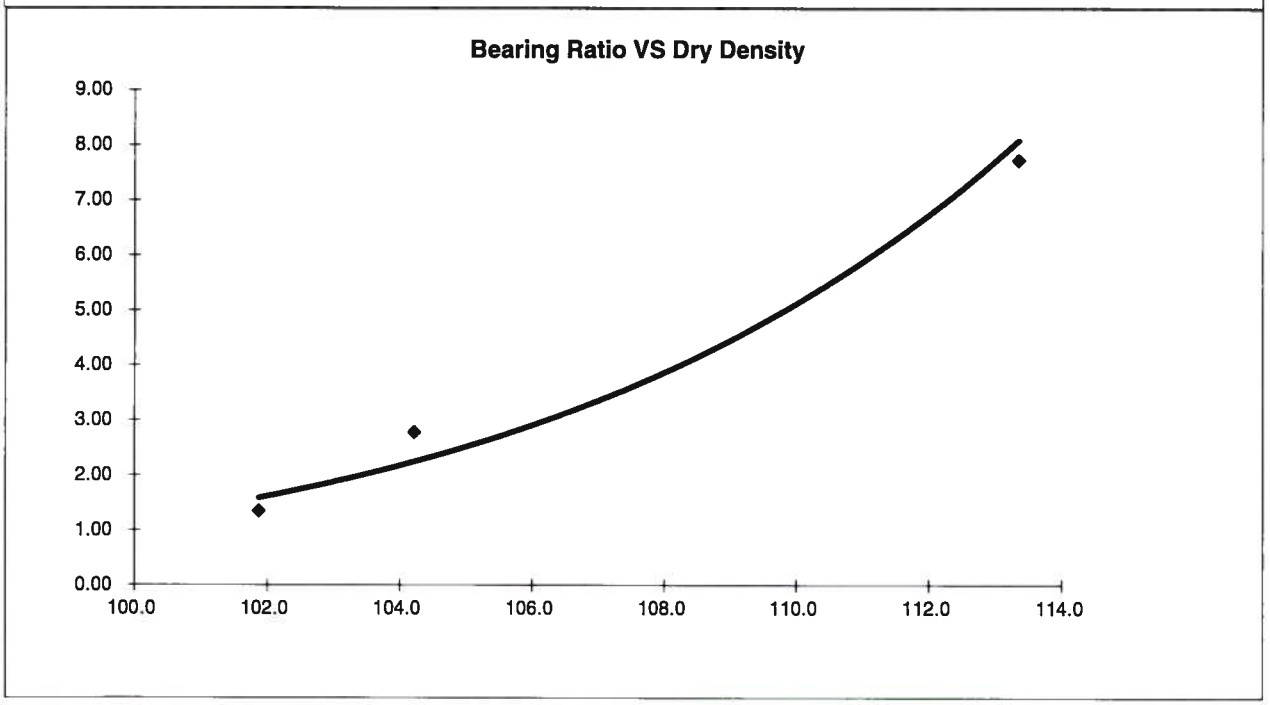
CBR TEST DATA

DRAWN:	DATE:	CHECKED:	DATE:
		DS	9/6/22

JOB NO.: 220394
FIG NO.: B-16





BEARING RATIO AT 90% OF MAX	3.26	~ R VALUE	7.50
BEARING RATIO AT 95% OF MAX	6.43	~ R VALUE	14.00

JOB NO: 220394
SOIL TYPE: 2, CBR #3

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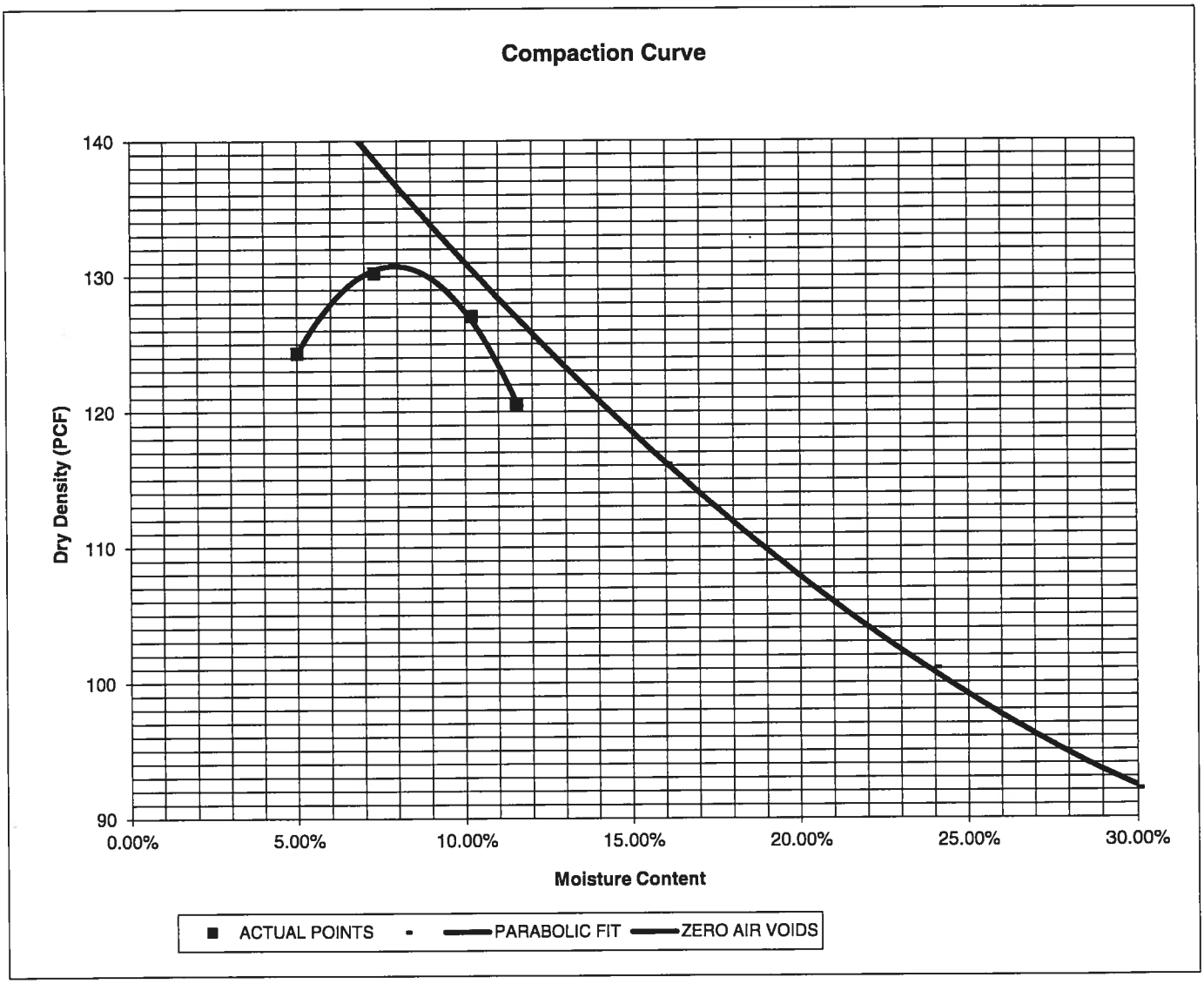
CALIFORNIA BEARING RATIO

DRAWN:	DATE:	CHECKED:	DATE:
		BT	9/6/22

JOB NO.: 220394
FIG NO.: B-17

PROJECT	STERLING RANCH, F-2	CLIENT	SR LAND
SAMPLE LOCATION	TB-4 @ 0-3'	JOB NO.	220394
SOIL DESCRIPTION	FILL, SAND, CLAYEY, BROWN	DATE	08/04/22

IDENTIFICATION	SC	COMPACTION TEST #	2, SOIL TYPE #1
TEST DESIGNATION / METHOD	ASTM D-1557-A	TEST BY	FV
MAXIMUM DRY DENSITY (PCF)	129.1	OPTIMUM MOISTURE	8.0%



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MOISTURE DENSITY RELATION

DRAWN:	DATE:	CHECKED:	DATE:
		DS	9-7-22

JOB NO.: 220394
FIG NO.: B-18

CBR TEST LOAD DATA

JOB NO: 220394
CLIENT: SR LAND
PROJECT: STERLING RANCH, F-2
SOIL TYPE: 1, CBR #2

PISTON DIAMETER (cm)	PISTON AREA (in^2)
4.958	2.993

PENETRATION DEPTH (INCHES)	*10 BLOWS* MOLD # 1 LOAD(LBS) (LBS)	STRESS (PSI)	*25 BLOWS* MOLD # 2 LOAD(LBS) (LBS)	STRESS (PSI)	*56 BLOWS* MOLD # 3 LOAD(LBS) (LBS)	STRESS (PSI)
0.000	0	0.00	0	0.00	0	0.00
0.025	76	25.40	189	63.16	325	108.60
0.050	96	32.08	297	99.25	583	194.82
0.075	108	36.09	357	119.30	748	249.96
0.100	134	44.78	438	146.37	965	322.47
0.125	158	52.80	540	180.45	1015	339.18
0.150	163	54.47	613	204.84	1118	373.60
0.175	179	59.82	670	223.89	1299	434.08
0.200	196	65.50	718	239.93	1449	484.21
0.300	222	74.19	817	273.02	1839	614.53
0.400	245	81.87	919	307.10	2076	693.73
0.500	279	93.23	1035	345.86	2363	789.64

FINAL MOISTURE CONTENT

	MOLD # 1	MOLD # 2	MOLD # 3
CAN #	341	357	340
WT. CAN	8.355	7.85	8.59
WT. CAN+WET	167.83	180.68	222.45
WT. CAN+DRY	142.15	157.57	178.69
WT. H20	25.68	23.11	43.76
WT. DRY SOIL	133.795	149.72	170.1
MOISTURE CONTENT	19.19%	15.44%	25.73%

WET DENSITY (PCF)	123.4	134.7	141.1
DRY DENSITY (PCF)	114.3	124.7	130.6

BEARING RATIO		4.48	14.64	32.25
90% OF DRY DENSITY	116.2			
95% OF DRY DENSITY	122.6			

BEARING RATIO AT 90% OF MAX	6.34	~ R VALUE	14
BEARING RATIO AT 95% OF MAX	12.65	~ R VALUE	37

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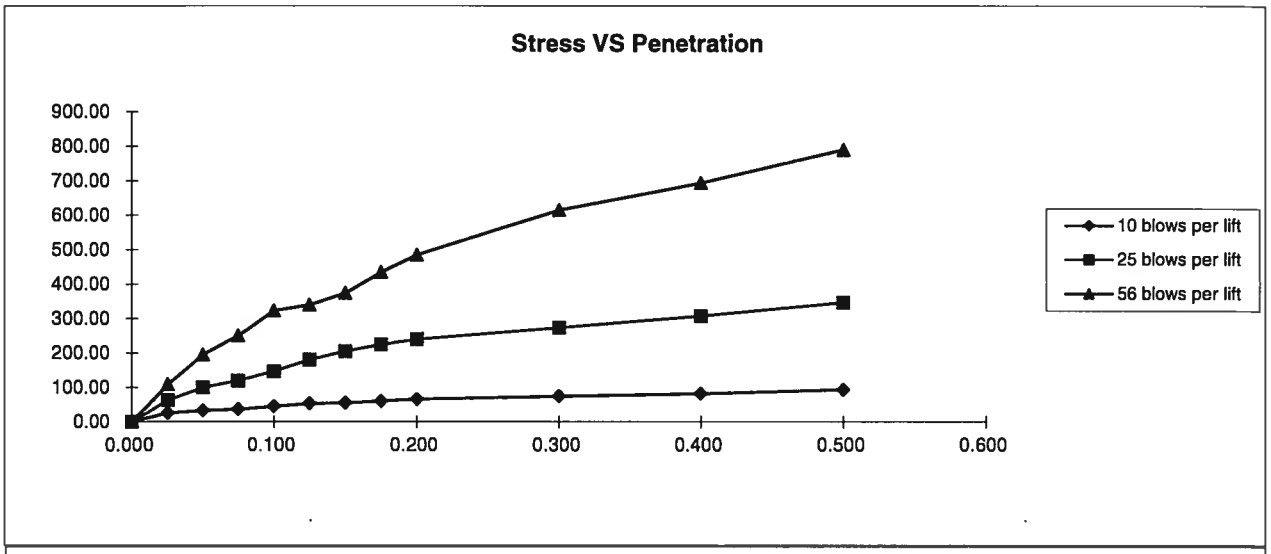
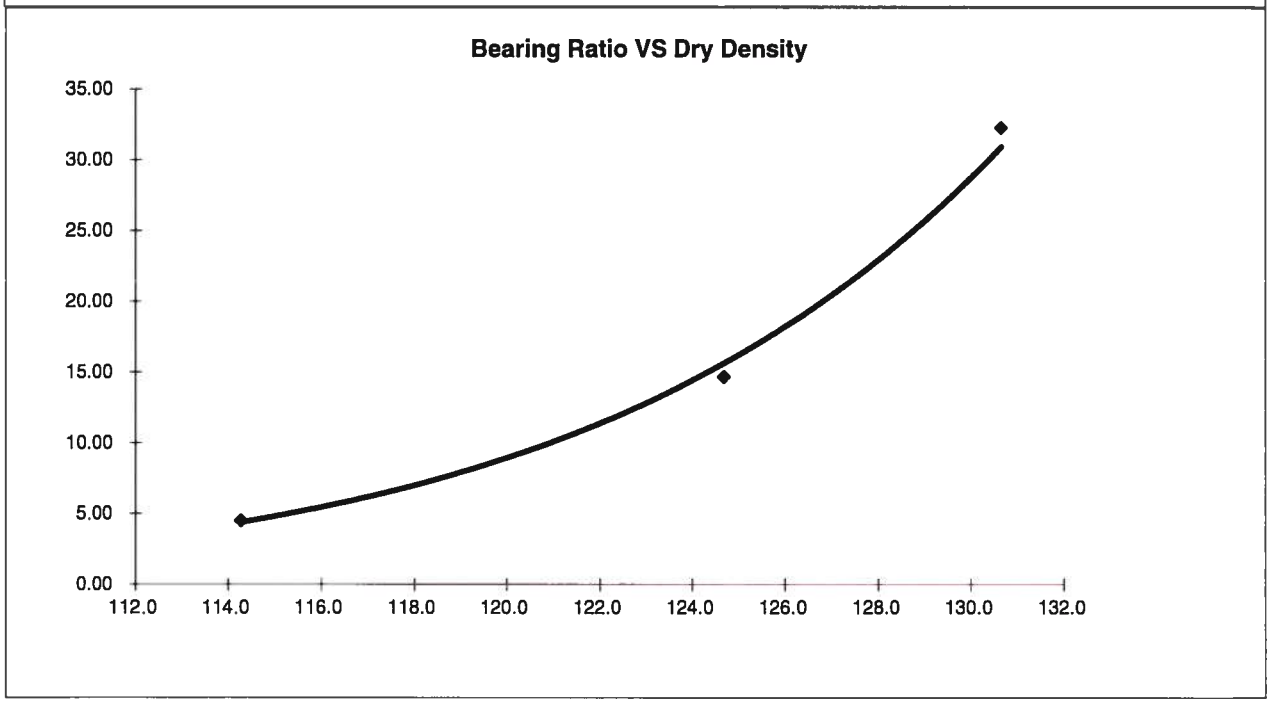
CBR TEST DATA

DRAWN:	DATE:	CHECKED:	DATE:
		DS	9/7/22

JOB NO.: 220394
FIG NO.: B-19





BEARING RATIO AT 90% OF MAX	6.34	~ R VALUE	14.00
BEARING RATIO AT 95% OF MAX	12.65	~ R VALUE	37.00

JOB NO: 220394
SOIL TYPE: 1, CBR #2

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CALIFORNIA BEARING RATIO

DRAWN:	DATE:	CHECKED:	DATE:
		BJ	9/9/22

JOB NO.: 220394
FIG NO.: B-20

APPENDIX C: Pavement Design Calculations

FLEXIBLE PAVEMENT DESIGN

DESIGN DATA

SR LAND, LLC - SOIL TYPE 1
COLLECTORS

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL (W_{18}) =	821,000
Hveem Stabilometer (R Value) Results:	R =	35
Standard Deviation	S_o =	0.45
Loss in Serviceability	Δpsi =	2.5
Reliability	Reliability =	85
Reliability (z-statistic)	Z_R =	-1.04
Soil Resilient Modulus	M_R =	8065

Weighted Structural Number (WSN): → WSN = 2.98

DESIGN TABLES AND EQUATIONS

$S_1 = [(R - 5) / 11.29] + 3$

$M_R = 10^{[(S_1 + 18.72) / 6.24]}$

$k = M_R / 19.4$

Where:

M_R = resilient modulus (psi)

S_1 = the soil support value

R = R-value obtained from the Hveem stabilometer

CBR = California Bearing Ratio

Reliability (%)	Z_R (z-statistic)
80	-0.84
85	-1.04
90	-1.28
93	-1.48
94	-1.56
95	-1.65
96	-1.75
97	-1.88
98	-2.05
99	-2.33
99.9	-3.09
99.99	-3.75

$$\log_{10}W_{18} = Z_R * S_O + 9.36*\log_{10}(SN+1) - 0.20 + \frac{\log_{10}\left[\frac{\Delta PSI}{4.2 - 1.5}\right]}{0.40 + \frac{1094}{(SN+1)^{5.19}}} + 2.32*\log_{10}M_R - 8.07$$

Left	Right	Difference
5.91	5.91	0.0

Job No. 220394
Fig. No. C-1

DESIGN CALCULATIONS

AGGRGATE BASE COURSE

DESIGN DATA

SR LAND, LLC - SOIL TYPE 1
URBAN NON-RESIDENTIAL COLLECTOR -

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL =	821,000
Hveem Stabilometer (R Value) Results:	R =	35
Weighted Structural Number (WSN):	WSN =	2.98

DESIGN EQUATION

$$WSN = C_1D_1 + C_2D_2$$

C_1 = 0.44 Strength Coefficient - Hot Bituminous Asphalt
C_2 = 0.11 Strength Coefficient - Aggregate Base Course

D_1 = Depth of Asphalt (inches)
D_2 = Depth of Base Course (inches)

FOR FULL DEPTH ASPHALT SECTION (CURRENTLY NOT ALLOWED)

$D_1 = (WSN)/C_1$ = 6.8 inches of Full Depth Asphalt
Use 7.0 inches Full Depth

FOR ASPHALT + AGGREGATE BASE COURSE SECTION

Asphalt Thickness (t) = [4.5] inches
$D_2 = ((WSN) - (t)(C_1))/C_2$ = 9.1 inches of Aggregate
Base Course, use ~~9.0~~ 9.5 inches

RECOMMENDED ALTERNATIVES

1. 4.5 inches of Asphalt + ~~9.0~~ 9.5 inches of Aggregate Base Course, or
3. 7.0 inches of Asphalt

Job No. 220394
Fig. No. C-2

DESIGN CALCULATIONS

RECYCLED CONCRETE

DESIGN DATA

SR LAND, LLC - SOIL TYPE 1
COLLECTORS

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL =	821,000
Hveem Stabilometer (R Value) Results:	R =	35
Weighted Structural Number (WSN):	WSN =	2.98

DESIGN EQUATION

$$WSN = C_1D_1 + C_2D_2$$

C_1 = 0.44 Strength Coefficient - Hot Bituminous Asphalt
C_2 = 0.09 Strength Coefficient - Recycled Concrete

D_1 = Depth of Asphalt (inches)
D_2 = Depth of Recycled Concrete (inches)

FOR FULL DEPTH ASPHALT SECTION (CURRENTLY NOT ALLOWED)

$D_1 = (WSN)/C_1$ = 6.8 inches of Full Depth Asphalt
Use 7.0 inches Full Depth

FOR ASPHALT + AGGREGATE BASE COURSE SECTION

Asphalt Thickness (t) = [4.5] inches
$D_2 = ((WSN) - (t)(C_1))/C_2$ = 11.1 inches of Recycled Concrete
Recycled Concrete, use ~~11.0~~ 11.5 inches

RECOMMENDED ALTERNATIVES

1. 4.5 inches of Asphalt + ~~11.0~~ 11.5 inches of Recycled Concrete, or
2. 7.0 inches of Asphalt

Job No. 220394
Figure No. C-3

FLEXIBLE PAVEMENT DESIGN

DESIGN DATA

SR LAND, LLC - SOIL TYPE 2 (A-6)
URBAN NON-RESIDENTIAL COLLECTOR

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL (W_{18}) =	821,000
Hveem Stabilometer (R Value) Results:	R =	14
Standard Deviation	S_o =	0.45
Loss in Serviceability	Δpsi =	2.5
Reliability	Reliability =	85
Reliability (z-statistic)	Z_R =	-1.04
Soil Resilient Modulus	M_R =	4060

Weighted Structural Number (WSN): → WSN = 3.74

DESIGN TABLES AND EQUATIONS

$S_1 = [(R - 5) / 11.29] + 3$

$M_R = 10^{[(S_1 + 18.72) / 6.24]}$

$k = M_R / 19.4$

Where:

M_R = resilient modulus (psi)

S_1 = the soil support value

R = R-value obtained from the Hveem stabilometer

CBR = California Bearing Ratio

Reliability (%)	Z_R (z-statistic)
80	-0.84
85	-1.04
90	-1.28
93	-1.48
94	-1.56
95	-1.65
96	-1.75
97	-1.88
98	-2.05
99	-2.33
99.9	-3.09
99.99	-3.75

$$\log_{10}W_{18} = Z_R * S_O + 9.36*\log_{10}(SN+1) - 0.20 + \frac{\log_{10}\left[\frac{\Delta PSI}{4.2 - 1.5}\right]}{0.40 + \frac{1094}{(SN+1)^{5.19}}} + 2.32*\log_{10}M_R - 8.07$$

Left	Right	Difference
5.91	5.91	0.0

Job No. 220394
Fig. No. C-4

DESIGN CALCULATIONS

AGGRGATE BASE COURSE

DESIGN DATA

SR LAND, LLC - SOIL TYPE 2 (A-6)
URBAN NON-RESIDENTIAL COLLECTOR -

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL =	821,000
Hveem Stabilometer (R Value) Results:	R =	14
Weighted Structural Number (WSN):	WSN =	3.74

DESIGN EQUATION

$$WSN = C_1D_1 + C_2D_2$$

C_1 = 0.44 Strength Coefficient - Hot Bituminous Asphalt
C_2 = 0.11 Strength Coefficient - Aggregate Base Course

D_1 = Depth of Asphalt (inches)
D_2 = Depth of Base Course (inches)

FOR FULL DEPTH ASPHALT SECTION (CURRENTLY NOT ALLOWED)

$D_1 = (WSN)/C_1$ = 8.5 inches of Full Depth Asphalt
Use 8.5 inches Full Depth

FOR ASPHALT + AGGREGATE BASE COURSE SECTION

Asphalt Thickness (t) = [6] inches
$D_2 = ((WSN) - (t)(C_1))/C_2$ = 10.0 inches of Aggregate Base Course, use 10.0 inches

RECOMMENDED ALTERNATIVES

1. 6.0 inches of Asphalt + 10.0 inches of Aggregate Base Course, or
3. 8.5 inches of Asphalt

Job No. 220394
Fig. No. C-5

DESIGN CALCULATIONS

RECYCLED CONCRETE

DESIGN DATA

SR LAND, LLC - SOIL TYPE 2 (A-6)
URBAN NON-RESIDENTIAL COLLECTOR

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL =	821,000
Hveem Stabilometer (R Value) Results:	R =	14
Weighted Structural Number (WSN):	WSN =	3.74

DESIGN EQUATION

$$WSN = C_1D_1 + C_2D_2$$

C_1 = 0.44 Strength Coefficient - Hot Bituminous Asphalt
C_2 = 0.09 Strength Coefficient - Recycled Concrete

D_1 = Depth of Asphalt (inches)
D_2 = Depth of Recycled Concrete (inches)

FOR FULL DEPTH ASPHALT SECTION (CURRENTLY NOT ALLOWED)

$D_1 = (WSN)/C_1$ = 8.5 inches of Full Depth Asphalt
Use 8.5 inches Full Depth

FOR ASPHALT + AGGREGATE BASE COURSE SECTION

Asphalt Thickness (t) = 6 inches
$D_2 = ((WSN) - (t)(C_1))/C_2$ = 12.2 inches of Recycled Concrete
Recycled Concrete, use 13.0 inches

RECOMMENDED ALTERNATIVES

1. 6.0 inches of Asphalt + 13.0 inches of Recycled Concrete, or
2. 8.5 inches of Asphalt

Job No. 220394
Figure No. C-6

APPENDIX D: Laboratory Test Results – Recycled Concrete Report by Entech Engineering Inc. dated September 1, 2022, Entech Job No. 220394.

ENTECH
ENGINEERING, INC.

505 ELKTON DRIVE
COLORADO SPRINGS, CO 80907
PHONE (719) 531-5599
FAX (719) 531-5238

April 15, 2022
Revised September 1, 2022

SR Land, LLC
20 Boulder Crescent, 2nd Floor
Colorado Springs, CO 80903

Attn: Chaz Collins

Re: Laboratory Test Results – Recycled Concrete
Sterling Ranch Stockpiles
Sterling Ranch – Filing No. 2
Colorado Concrete Crushing
El Paso County, Colorado
Entech Job No. 220394

Dear Mr. Collins:

As requested, Entech Engineering, Inc. have performed laboratory testing on representative samples of recycled concrete obtained from the stockpile at Colorado Crushing at Sterling Ranch. The sampling of the stockpile was performed by personnel of Entech Engineering, Inc. This letter presents the results of the laboratory testing.

The stockpile was located southwest of the future Dines Boulevard and Sterling Ranch Road Intersection. This is the only source location for the reclaimed concrete on the subject site. The pile appears to be of uniform material based on visual observations during sampling.

Sieve analyses and Atterberg Limits testing were performed on the samples. Testing was performed to determine the support characteristic of the crushed concrete for use in the Filing No. 2 roadways. In addition, LA Abrasion (ASTM C-131) testing was performed on the sample

The recycled concrete is non-plastic and meets the gradation for Class 5 and 6 basecourse.

The results of the laboratory testing are summarized below and are presented in Figures 1 and 2.

Soil Properties	Recycled Concrete
Liquid Limit	NV
Plastic Iindex	NP
%200	7.9
LA Abrasion Loss (%)	44

SR Land, LLC
Laboratory Test Results – Recycled Concrete
Sterling Ranch Stockpiles
Sterling Ranch – Filing No. 2
El Paso County, Colorado
Entech Job No. 220394

We trust that this report contains the information you require. If you have questions or need additional information, please contact us.

Respectfully Submitted,

ENTECH ENGINEERING, INC.

Daniel P. Stegman

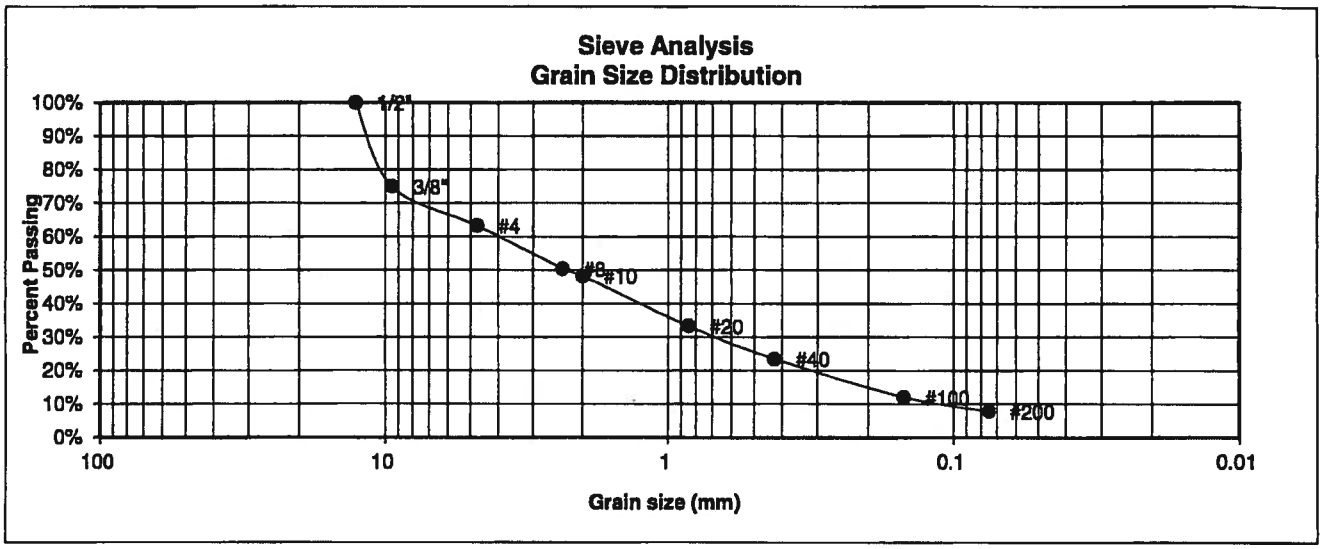
Reviewed By:

Joseph C. Goode, Jr., P.E.
President

DPS/am

AAprojects/2022/220394Recconc- rev

SOIL TYPE #	CRUSHED CONCRETE	UNIFIED CLASSIFICATION	SM-SW	TEST BY	BL
CLIENT	SR LAND, LLC	AASHTO CLASSIFICATION		JOB NO.	220394
PROJECT	STERLING RANCH, FILING 2			DATE	4/15/2022



U.S. Sieve #	SAMPLE Percent Finer	CLASS 2 *Base Aggregates*	CLASS 5 *Base Aggregates*	CLASS 6 *Base Aggregates*
3"		95-100		
1 1/2"			100	
1"			95-100	
3/4"				100
1/2"	100.0%			
3/8"	75.0%			
4	63.3%		30-70	30-65
8	50.4%			25-55
10	48.3%			
20	33.3%			
40	23.5%			
100	12.0%			
200	7.9%	3-15	3-15	3-12

Atterberg Limits					FHA Swell
					Moisture at start
					Moisture at finish
Plastic Limit	NP				Moisture increase
Liquid Limit	NV	35 max	30 max	30 max	Initial dry density (pcf)
Plastic Index	NP	6 max	6 max	6 max	Swell (psf)

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ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		RS	4/15/22

JOB NO.: 220394
FIG NO.: 1

KLEINFELDER
Bright People. Right Solutions.

Laboratory Test Report

Client:	Entech Engineering, Inc.	Report No.:	22-DEN-00237 Rev. 0	Issued:	4/13/2022
Project:	20220841.001A				
	08-000L - Entech Lab	Sampled by:	Entech Lab	Date:	4/1/2022
		Submitted by:	Entech Lab	Date:	4/1/2022

Aggregate Test Report: Los Angeles Abrasion

Tested on 4/6/2022 by MJ Landrus

Material Description: Light Gray, Reconstituted Concrete

Test Method: ASTM C131 Grading B

Loss after 500 revolutions: 44

Remarks:

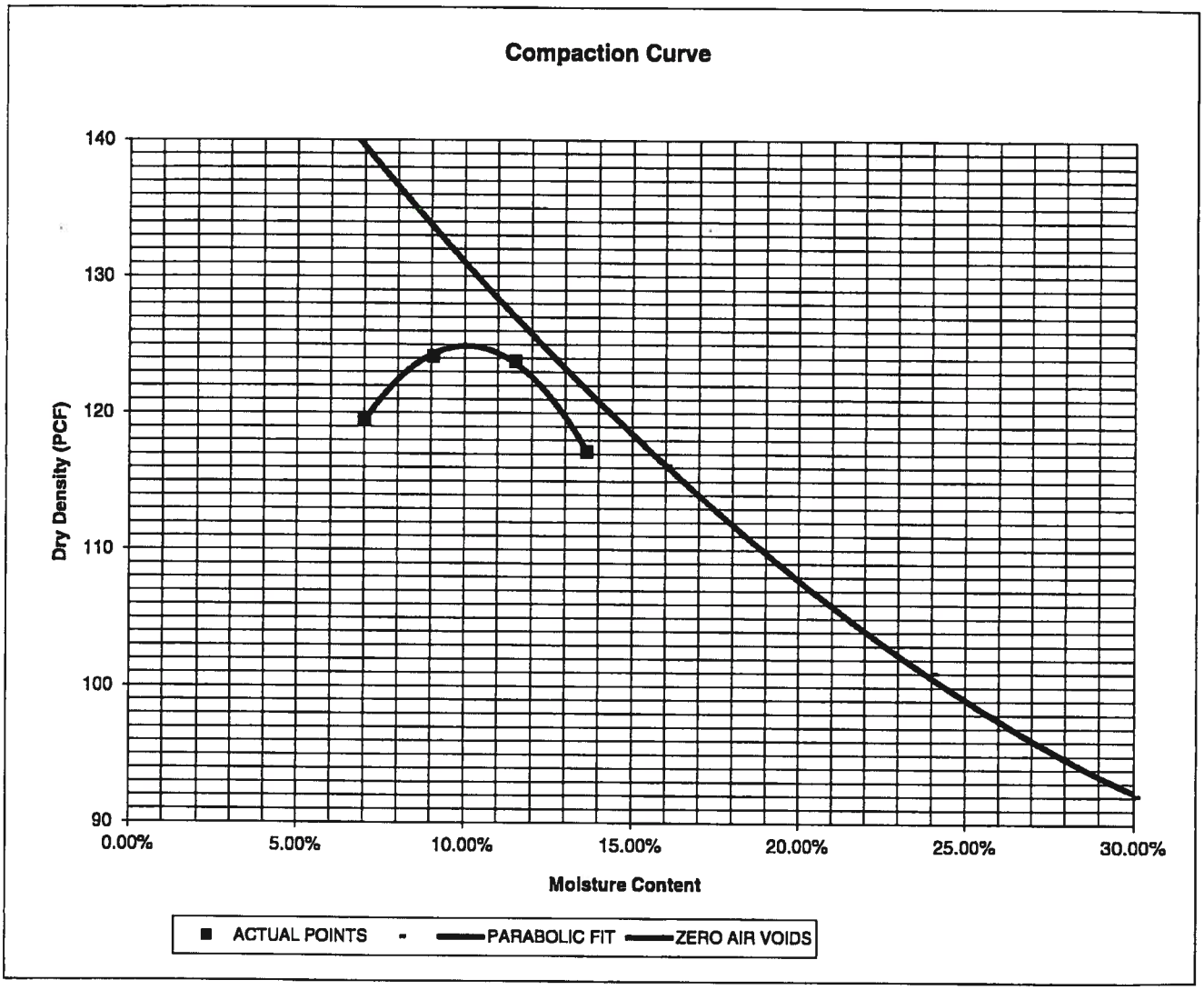
Reviewed on 4/13/2022 by Tim Ryan,
Project Manager

Timothy Ryan

APPENDIX E: Laboratory Testing Results
CBR Test No. 1 – from Pavement Recommendations Report by EEI, dated August 23, 2022 (revised)
Entech Job No. 220394

PROJECT	STERLING RANCH, F-2	CLIENT	SR LAND
SAMPLE LOCATION	TB-1 @ 0-3'	JOB NO.	220394
SOIL DESCRIPTION	SAND, SILTY, BROWN	DATE	08/27/16

IDENTIFICATION	SM	COMPACTION TEST #	1
TEST DESIGNATION / METHOD	ASTM D-1557-A	TEST BY	DC
MAXIMUM DRY DENSITY (PCF)	125	OPTIMUM MOISTURE	10.1%



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COLORADO SPRINGS, COLORADO 80907

MOISTURE DENSITY RELATION

DRAWN:	DATE:	CHECKED:	DATE:
		DS	4/4

JOB NO.: 220394
FIG NO.: E-1

CBR TEST LOAD DATA

JOB NO: 220394
CLIENT: SR LAND
PROJECT: STERLING RANCH, F-2
SOIL TYPE: 1, CBR #1

PISTON DIAMETER (cm)	PISTON AREA (in^2)
4.958	2.993

PENETRATION DEPTH (INCHES)	*10 BLOWS* MOLD # 1 LOAD(LBS) (LBS)	STRESS (PSI)	*25 BLOWS* MOLD # 2 LOAD(LBS) (LBS)	STRESS (PSI)	*56 BLOWS* MOLD # 3 LOAD(LBS) (LBS)	STRESS (PSI)
0.000	0	0.00	0	0.00	0	0.00
0.025	86	28.74	108	36.09	211	70.51
0.050	120	40.10	316	105.60	336	112.28
0.075	165	55.14	452	151.04	500	167.08
0.100	226	75.52	480	160.40	645	215.54
0.125	291	97.24	678	226.57	827	276.36
0.150	371	123.98	823	275.02	1110	370.93
0.175	425	142.02	939	313.78	1420	474.52
0.200	691	230.91	1070	357.56	1663	555.72
0.300	1319	440.77	1450	484.54	2657	887.88
0.400	1806	603.51	2012	672.35	3506	1171.59
0.500	2093	699.41	2911	972.76	4311	1440.60

FINAL MOISTURE CONTENT

	MOLD # 1	MOLD # 2	MOLD # 3
CAN #	346	351	98
WT. CAN	6.89	6.84	6.98
WT. CAN+WET	116.98	121.64	82.66
WT. CAN+DRY	103.63	110.19	75.27
WT. H20	13.35	11.45	7.39
WT. DRY SOIL	96.74	103.35	68.29
MOISTURE CONTENT	13.80%	11.08%	10.82%

WET DENSITY (PCF)	127.8	133.3	136.7
DRY DENSITY (PCF)	116.1	121.1	124.1

BEARING RATIO	7.55	16.04	21.55

90% OF DRY DENSITY	112.5
95% OF DRY DENSITY	118.8

BEARING RATIO AT 90% OF MAX	1.49	~ R VALUE	1
BEARING RATIO AT 95% OF MAX	12.06	~ R VALUE	37

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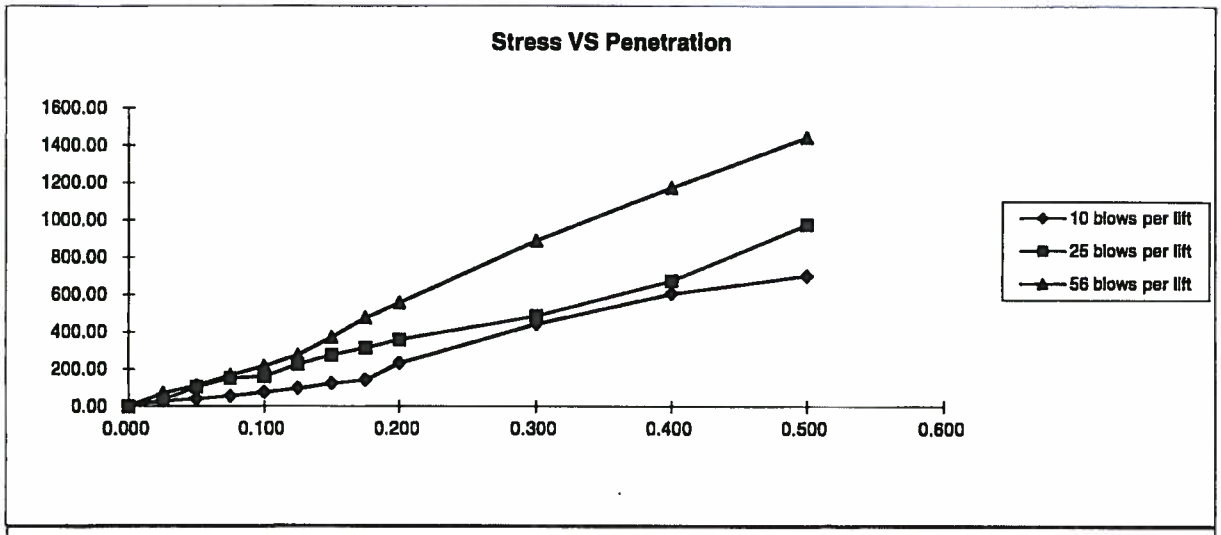
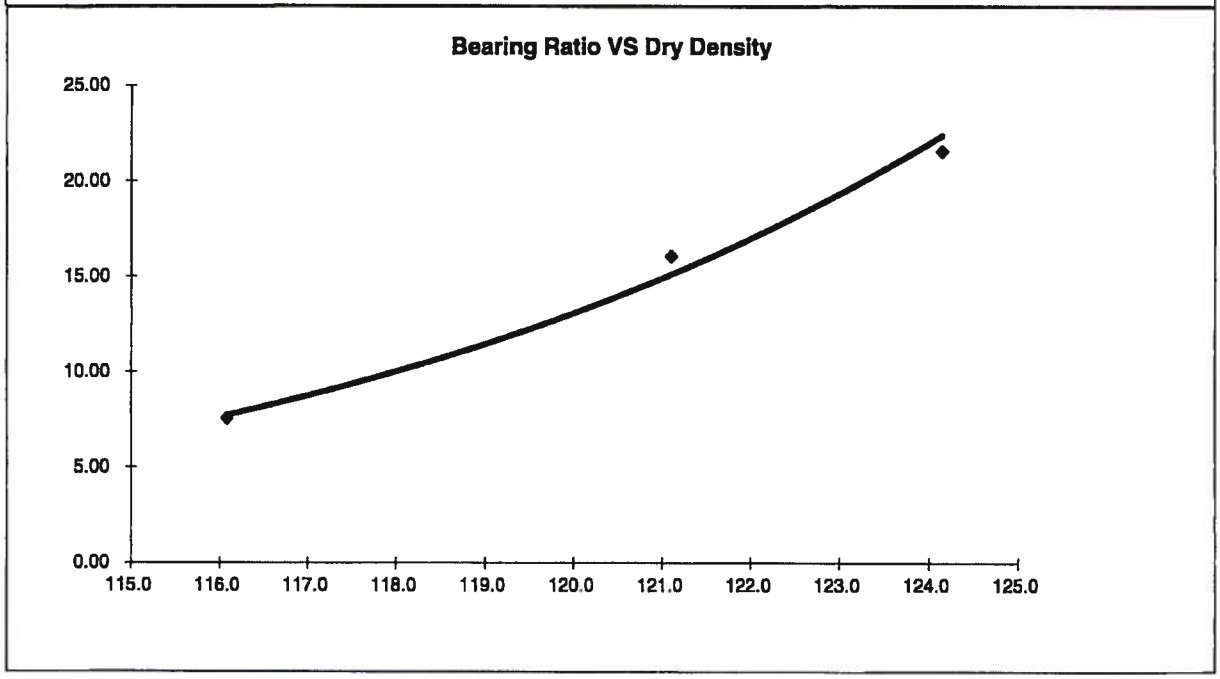
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

CBR TEST DATA

DRAWN:	DATE:	CHECKED: DS	DATE: 4/22/22

JOB NO.: 220394
FIG NO.: E-2





BEARING RATIO AT 90% OF MAX	1.49	~ R VALUE	1.00
BEARING RATIO AT 95% OF MAX	12.06	~ R VALUE	37.00

JOB NO: 220394
SOIL TYPE: 1, CBR #1

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505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

CALIFORNIA BEARING RATIO

DRAWN:	DATE:	CHECKED:	DATE:
		DS	4/21/22

JOB NO.: 220394
FIG NO.: E-3