June 29, 2002
Revised August 2, 2022
Revised August 17, 2022

ENTECH
ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO 80907
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SR Land, LLC
20 Boulder Crescent, 2nd Floor
Colorado Springs, Colorado 80903

* APPROVED
Engineering Department
08/22/2022 3:08:07 PM
dsdnijkamp
EPC Planning & Community
Development Department

Attn: Chaz Collins

Re: Pavement Recommendations - Revised
Sterling Ranch, Filing No. 3
El Paso County, Colorado
Entech Job No. 221370

* if CTS is chosen, a mix design to determine the percent cement will be required prior to placement.

Dear Mr. Collins:

As requested, Entech Engineering, Inc. has obtained samples of the pavement subgrade soils from the roads in the Sterling Ranch, Filing No 3 Subdivision. This letter presents the results of the laboratory testing and pavement recommendations for the roadway sections within the filing.

Project Description

The roadways for this project consist of sections of Dines Boulevard, Pennydale Drive, Hazlett Drive, and Polson Drive, located in northeast of Colorado Springs, in the north portion of El Paso County, Colorado. Subsurface Soil Investigation and laboratory testing was performed in order to determine the pavement support characteristics of the soils. The approximate locations of the test borings are presented on the Test Boring Location Plan, Figure 1.

Subgrade Conditions

Ten test borings were drilled along the roadway to depths of approximately 5 and 10 feet below the existing subgrade surface. The soils in the test borings consisted of clayey sand fill and slightly silty to silty sand fill (Soil Type 1), silty to slightly silty sandstone (Soil Type 2), and very sandy siltstone (Soil Type 3).

The subgrade soils consisted of Soil Type 1. Soil Type 2 and 3 will not be encountered in the roadway excavation as they are located at depths beneath the subgrade influence zone. The Test Boring Logs are presented in Appendix A. Sieve Analyses and Atterberg Limit testing were performed on the subgrade soil samples obtained from the test borings for the purpose of classification. The percent passing the No. 200 sieve for the Type 1 soils is approximately 5 to 30 percent. The Type 1 subgrade soils classify as A-1-b, A-2-4, and A-2-6 soils. using the AASHTO classification system. Groundwater was not encountered in the test borings. Water soluble sulfate tests results indicated that the soils exhibit a negligible potential for sulfate attack. The subgrade soils on this site are not expected to be affected in any form regarding constraints resulting from frost susceptibility, special drainage requirements, or cold-weather construction.

Atterberg Limits Testing on samples of the soils taken from the test borings resulted in Liquid Limits of No Value to 46 percent and Plastic Indexes of Non-Plastic to 18 percent. A Swell/Consolidation Test indicated a volume change of 0.3%, which is in the low expansion range

for a sample of Soil Type 1 from Test Boring No. 10 at a depth of 1 to 2 feet. A Swell/Consolidation Test indicated a volume change of 3.8%, which is in the high expansion range for a sample of Soil Type 3 from Test Boring No. 8 at a depth of 10 feet. The Type 3 soils are beneath the influence zone and will not require mitigation. Based on the Type 1 soils test results, mitigation will not be required on this site. Laboratory test results are presented in Appendix B and are summarized in Table 1.

California Bearing Ratio (CBR) testing was performed on a representative sample of Soil Type 1 to determine the support characteristics of the subgrade soils for the roadway sections. The results of the CBR testing, are presented in Appendix B and summarized as follows:

Soil Type 1 – Clayey Sand Fill
R @ 90% = 22.0
R @ 95% = 40.0
Use R = 40.0 for design

Classification Testing

Liquid Limit	30
Plasticity Index	18
Percent Passing 200	29.3
AASHTO Classification	A-2-6
Group Index	1
Unified Soils Classification	SC

Pavement Design

CBR testing was used to determine pavement sections for the roadways. Pavement sections were determined utilizing the El Paso County Pavement Design Criteria Manual. The cul-de-sac section on Pennydale Drive classifies as an urban local (low volume) roadway, which will use an 18k ESAL value of 36,500 for design. Dines Boulevard, Pennydale Drive, Hazlett Drive, and Polson Drive classify as urban local roads, which will use an 18k ESAL value of 292,000 for design purposes. Alternative pavement sections were determined for full depth asphalt, asphalt supported on aggregate basecourse, asphalt on recycled concrete and asphalt on cement stabilized subgrade. El Paso County does not allow full depth asphalt sections. The approval report and laboratory testing performed for the recycled concrete are attached in Appendix D. The source and locations are provided in the report

SR Land, LLC
Pavement Recommendations - Revised
Sterling Ranch, Filing No 3
El Paso County, Colorado
Entech Job No. 221370

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

Reliability	80%
Serviceability Index 2.0	2.0%
Standard Deviation	0.44
"R" Value Subgrade	40.0
Resilient Modulus	9,497 psi
Δpsi	2.0
Structural Coefficients	
Hot Bituminous Pavement	0.44
Aggregate Basecourse	0.11
Cement Stabilized Subgrade	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. Any additional grading may result in subgrade soils with different support characteristics. The following pavement sections should be re-evaluated if additional grading is performed.

Pavement Sections
ESAL = 36,500 – Local (Low Volume)

Alternative	Asphalt (in)	Basecourse (in)	Cement Stabilized Subgrade (in)	Recycled Concrete (in)**
1. Asphalt Over Basecourse	3.0*	6.0*	—	—
2. Asphalt Over Recycled Concrete	3.0*	—	—	6.0*
3. Asphalt Over Stabilized Subgrade	4.0	—	8.0	—

Pavement Sections
ESAL = 292,000 - Urban Local

Alternative	Asphalt (in)	Basecourse (in)	Cement Stabilized Subgrade (in)	Recycled Concrete (in)**
1. Asphalt Over Basecourse	4.0*	8.0*	—	—
2. Asphalt Over Recycled Concrete	4.0*	—	—	8.0*
3. Asphalt Over Stabilized Subgrade	4.0	—	8.0	—

*Minimum sections required per El Paso County Pavement Design Criteria Manual.
** County approval pending.

Mitigation

El Paso County requires mitigation of expansive soils that have a swell of 2 percent or greater with a 150 pound per square foot surcharge. Based on the swell testing the soils at subgrade depth do not require mitigation. This site will not require mitigation.

Roadway Construction – Asphalt on Aggregate Basecourse or Recycled Concrete Alternatives

Prior to placement of the asphalt, the subgrade should be mitigated as required and compacted to a minimum of 95 percent of the soils maximum Modified Proctor Dry Density, ASTM D-1557 at ±2 percent of optimum moisture content and proofrolled. Any loose areas should be removed and replaced with suitable materials. Basecourse materials should be compacted to a minimum of 95 percent of its maximum Modified Proctor Dry Density, at ± 2 percent of optimum moisture content. Special attention should be given to areas adjacent to manholes, inlet structures and valves.

Roadway Construction – Stabilized Subgrade Alternative

Prior to placement of the asphalt, the subgrade shall be stabilized by the addition of cement to a depth of at least 8 inches (see Pavement Sections). The amount of cement applied shall be a minimum of 2 percent (by weight) of the subgrade's maximum dry density as determined by the Modified Proctor Test (ASTM D-1557). The cement should be spread evenly on the subgrade surface and be thoroughly mixed into the subgrade over an 8-inch depth, as specified, such that a uniform blend of soil and cement is achieved. Prior to application or mixing of the cement, the upper 8 inches of subgrade should be thoroughly moisture conditioned to the soil's optimum water content or as much as 2 percent more than the optimum water content as necessary to provide a compactable soil condition. Densification of the cement-stabilized subgrade should be completed to obtain a compaction of at least 95 percent of the subgrade maximum dry density as determined by the Modified Proctor Test (ASTM D-1557) or by the Standard Proctor Test (ASTM D-698). Satisfactory compaction of the subgrade shall occur within 90 minutes from the time of mixing the cement into the subgrade.

The following conditions shall be observed as part of the subgrade stabilization:

- Type I/II cement as supplied; a local supplier shall be used. All cement used for stabilization should come from the same source. If cement sources are changed a new laboratory mix design should be completed.
- Moisture conditioning of the subgrade and/or mixing of the cement into the subgrade shall not occur when soil temperatures are below 40° F. Cement treated subgrades should be maintained at a temperature of 40° F or greater until the subgrade has been compacted as required.
- Cement placement, cement mixing and compaction of the cement treated subgrade should be observed by a Soils Engineer. The Soils Engineer should complete in situ compaction tests and construct representative compacted specimens of the treated subgrade material for subsequent laboratory quality assurance testing.

- Pending the results of the field density testing, micro fracturing of the stabilized subgrade may be required. Soil strengths in excess of 200 psi require micro fracturing.

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

DPS/lu

Encl.
AAprojects/2022/221370 pr - rev

Reviewed by:

COLORADO LICENSED
AUSTIN M NOSSOKOFF
53477
8-18-22
PROFESSIONAL ENGINEER

Austin M. Nossokoff, P.E.

TABLE

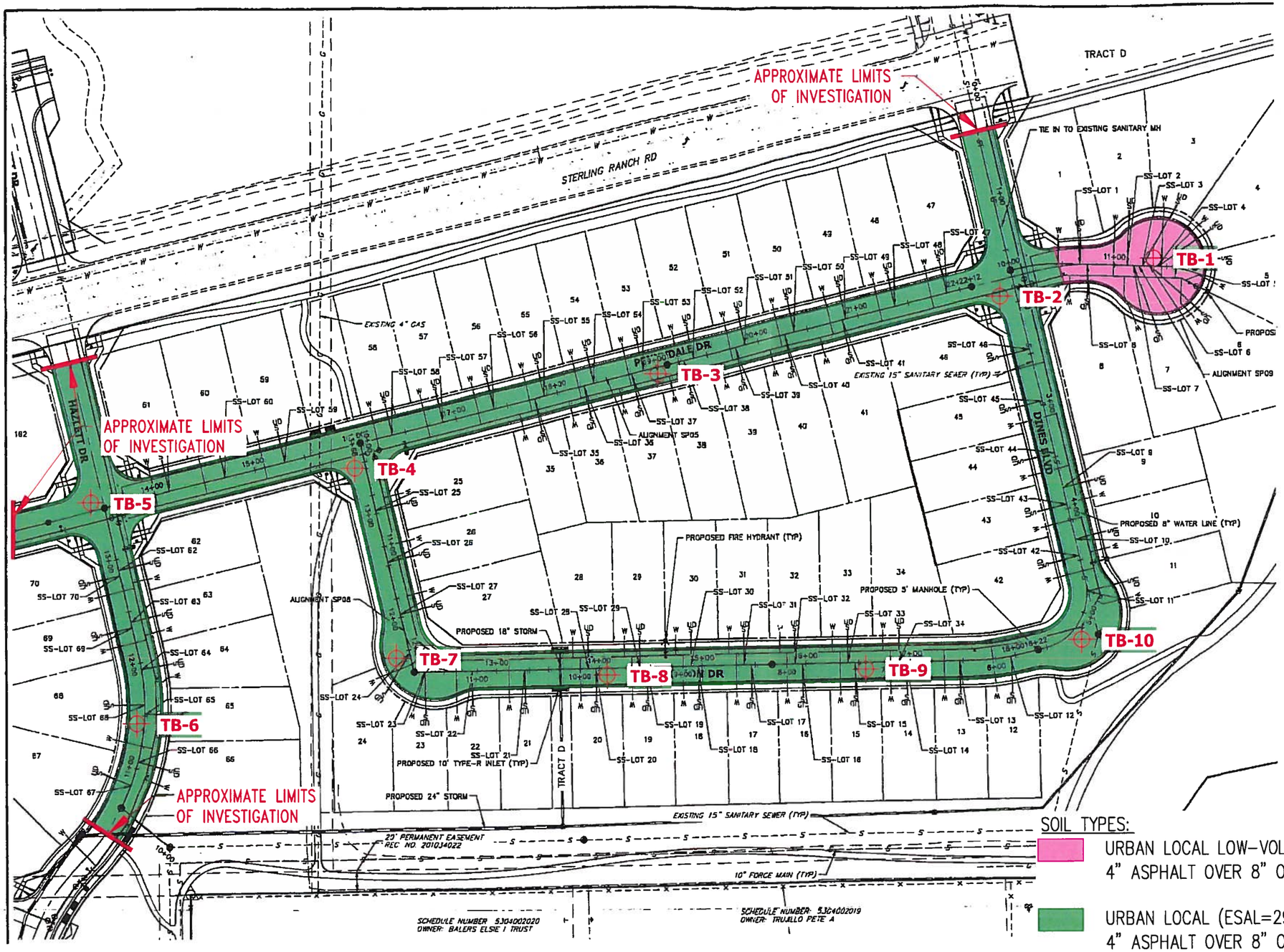
TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

CLIENT SR LAND, LLC
PROJECT STERLING RANCH, FILING 3
JOB NO. 221370

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	3	0-3			29.3	30	18		A-2-6		SC	FILL, SAND, CLAYEY
1	1	1-2			15.6	29	17	0.00	A-2-6		SC	FILL, SAND, CLAYEY
1	2	1-2			16.6	30	15	<0.01	A-2-6		SC	FILL, SAND, CLAYEY
1	3	1-2			17.3	30	12		A-2-6		SC	FILL, SAND, CLAYEY
1	4	1-2			15.0	NV	NP		A-1-b		SM	FILL, SAND, SILTY
1	5	1-2			29.8	NV	NP		A-2-4		SM	FILL, SAND, SILTY
1	6	1-2			16.6	NV	NP		A-1-b		SM	FILL, SAND, SILTY
1	7	1-2			11.1	NV	NP		A-1-b		SM-SW	FILL, SAND, SLIGHTLY SILTY
1	8	1-2			20.2	NV	NP		A-1-b		SM	FILL, SAND, SILTY
1	9	1-2			5.2	NV	NP		A-1-b		SM-SW	FILL, SAND, SLIGHTLY SILTY
1	10	1-2	11.8	105.6	16.5	28	11		A-2-6	0.3	SC	FILL, SAND, CLAYEY
2	1	10			11.2	NV	NP	<0.01	A-1-b		SM-SW	SANDSTONE, SLIGHTLY SILTY
2	4	10			10.4	NV	NP		A-1-b		SM-SW	SANDSTONE, SILTY
3	8	10	17.9	104.7	50.2	46	18	<0.01	A-7-6	3.8	ML	SILTSTONE, VERY SANDY

FIGURES



N

SOIL TYPES:

URBAN LOCAL LOW-VOLUME (ESAL=36,500)
4" ASPHALT OVER 8" OF CTS

URBAN LOCAL (ESAL=292,000)
4" ASPHALT OVER 8" OF CTS

25 0 50 100 200

1"=100'

-SEE REPORT FOR COMPOSITE SECTIONS

TB- APPROXIMATE TEST BORING LOCATIONS AND NUMBERS

REVISION	BY

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

TEST BORING LOCATION PLAN
STERLING RANCH, FILING 3
EL PASO COUNTY, CO.
FOR: SR LAND, LLC

DRAWN	JHR
CHECKED	DPS
DATE	6/25/22
SCALE	1"=100'
JOB NO.	221370
FIGURE No.	1

APPENDIX A: Test Boring Logs

TEST BORING NO. 1
DATE DRILLED 6/8/2022
Job # 221370

REMARKS

DRY TO 10', 6/8/22

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			16	8.1	1
5			17	8.4	1
10			50/11"	9.0	2
15					
20					

FILL 0-8', SAND, CLAYEY, FINE TO MEDIUM GRAINED, BROWN, MEDIUM DENSE, MOIST

SANDSTONE, SILTY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, MOIST

TEST BORING NO. 2
DATE DRILLED 6/8/2022
CLIENT SR LAND, LLC
LOCATION STERLING RANCH, FILING 3

REMARKS

DRY TO 5', 6/8/22

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			21	4.5	1
5			28	6.5	1
10					
15					
20					

FILL 0-5', SAND, CLAYEY, FINE TO MEDIUM GRAINED, BROWN, MEDIUM DENSE, MOIST

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TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		DS	6/24/22

JOB NO.: 221370
FIG NO.: A- 1

TEST BORING NO. 3
DATE DRILLED 6/8/2022
Job # 221370

REMARKS

DRY TO 5', 6/8/22

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			15	10.8	1
5			14	4.4	1
10					
15					
20					

FILL 0-5', SAND, CLAYEY, FINE TO MEDIUM GRAINED, BROWN, MEDIUM DENSE, MOIST

TEST BORING NO. 4
DATE DRILLED 6/8/2022
CLIENT SR LAND, LLC
LOCATION STERLING RANCH, FILING 3

REMARKS

DRY TO 10', 6/8/22

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			10	9.2	1
5			15	10.4	1
10			50/9"	11.8	2
15					
20					

FILL 0-8', SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, MOIST

SANDSTONE, SILTY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, MOIST

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COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		TJS	6/24/22

JOB NO.: 221370
FIG NO.: A- 2

TEST BORING NO. 5
DATE DRILLED 6/8/2022
Job # 221370

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 5', 6/8/22						
FILL 0-5', SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, MOIST				14	9.1	1
	5			16	5.4	1
	10					
	15					
	20					

TEST BORING NO. 6
DATE DRILLED 6/8/2022
CLIENT SR LAND, LLC
LOCATION STERLING RANCH, FILING 3

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 5', 6/8/22						
FILL 0-5', SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, MOIST				12	3.6	1
FILL, SAND, CLAYEY, FINE TO MEDIUM GRAINED, BROWN, MEDIUM DENSE, MOIST	5			14	15.1	1
	10					
	15					
	20					

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TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		DS	6/24/22

JOB NO.: 221370
FIG NO.: A- 3

TEST BORING NO. 7
DATE DRILLED 6/8/2022
Job # 221370

REMARKS

DRY TO 5', 6/8/22

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			7	6.4	1
5			6	11.0	1
10					
15					
20					

FILL 0-5', SAND, SLIGHTLY SILTY, FINE TO COARSE GRAINED, TAN, LOOSE, MOIST

TEST BORING NO. 8
DATE DRILLED 6/8/2022
CLIENT SR LAND, LLC
LOCATION STERLING RANCH, FILING 3

REMARKS

DRY TO 5', 6/8/22

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			18	10.8	1
5			33	18.9	1
10			50/10"	17.0	3
15					
20					

FILL 0-8', SAND, SILTY, FINE TO COARSE GRAINED, BROWN, MEDIUM DENSE, MOIST

FILL, SAND, CLAYEY, FINE TO COARSE GRAINED, BROWN, DENSE, MOIST

SILTSTONE, VERY SANDY, GRAY BROWN, HARD, MOIST

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COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		DS	6/24/22

JOB NO.: 221370
FIG NO.: A- 4

TEST BORING NO. 9
DATE DRILLED 6/8/2022
Job # 221370

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 5', 6/8/22						
FILL 0-4', SAND, SLIGHTLY SILTY, FINE TO COARSE GRAINED, TAN, DENSE, MOIST				35	9.3	1
SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST	5			50/8"	6.3	2
	10					
	15					
	20					

TEST BORING NO. 10
DATE DRILLED 6/8/2022
CLIENT SR LAND, LLC
LOCATION STERLING RANCH, FILING 3

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 5', 6/8/22						
FILL 0-5', SAND, CLAYEY, FINE TO MEDIUM GRAINED, BROWN, MEDIUM DENSE TO LOOSE, MOIST				25	5.9	1
	5			7	13.2	1
	10					
	15					
	20					

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TEST BORING LOG

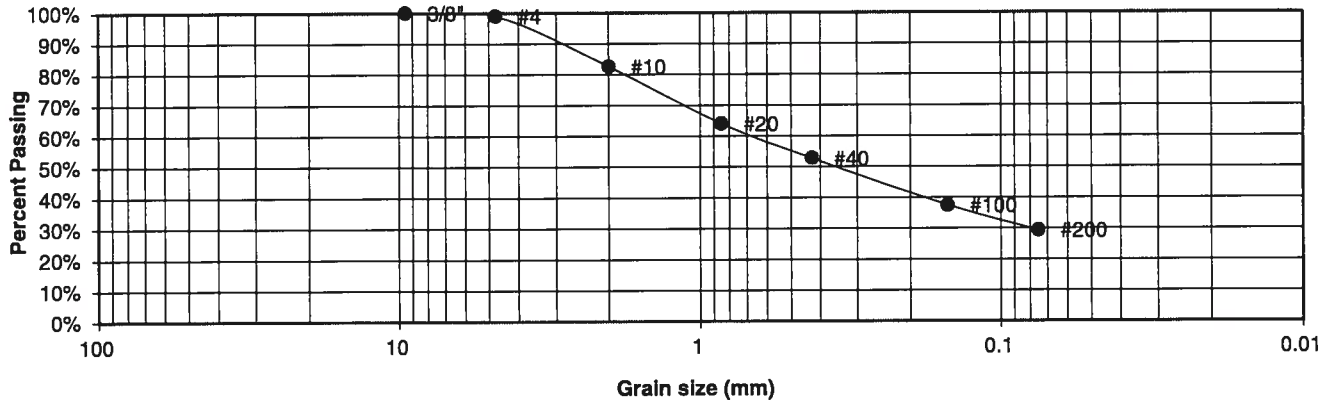
DRAWN:	DATE:	CHECKED:	DATE:
		PS	6/24/22

JOB NO.: 221370
FIG NO.: A- 5

APPENDIX B: Laboratory Testing Results

UNIFIED CLASSIFICATION	SC	CLIENT	SR LAND, LLC
SOIL TYPE #	1, CBR	PROJECT	STERLING RANCH, FILING 3
TEST BORING #	3	JOB NO.	221370
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	99.0%
10	82.6%
20	64.0%
40	52.8%
100	37.5%
200	29.3%

Atterberg Limits

Plastic Limit	12
Liquid Limit	30
Plastic Index	18

Swell

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

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505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

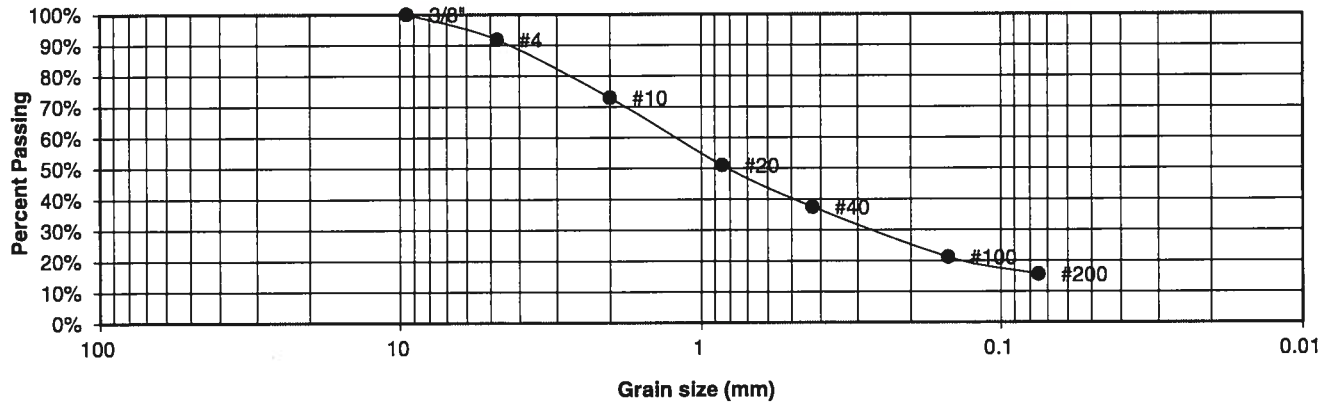
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		DS	6/24/22

JOB NO.: 221370
FIG NO.: B-1

UNIFIED CLASSIFICATION	SC	CLIENT	SR LAND, LLC
SOIL TYPE #	1	PROJECT	STERLING RANCH, FILING 3
TEST BORING #	1	JOB NO.	221370
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	91.8%
10	73.0%
20	51.0%
40	37.5%
100	21.1%
200	15.6%

Atterberg Limits

Plastic Limit	13
Liquid Limit	29
Plastic Index	17

Swell

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

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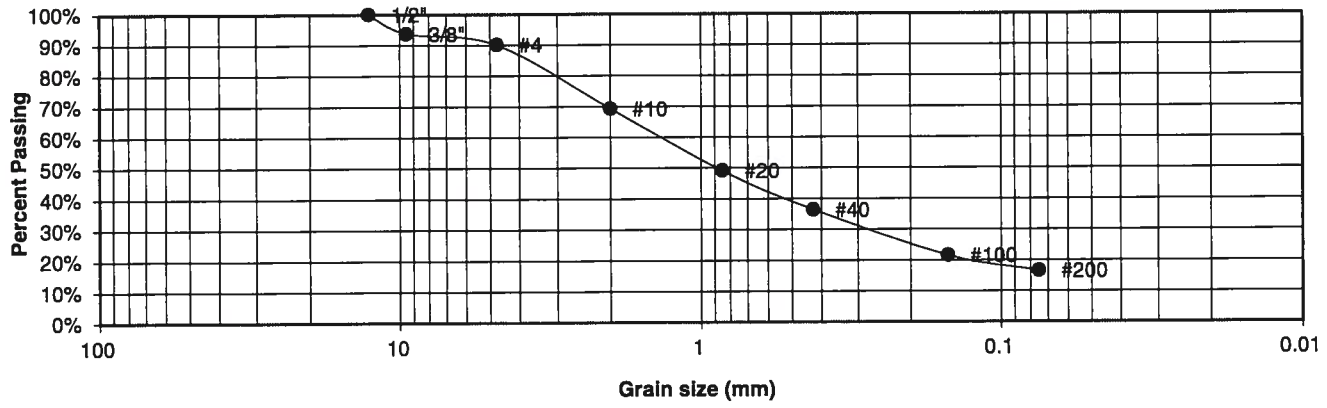
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		DS	6/24/22

JOB NO.: 221370
FIG NO.: B-2

UNIFIED CLASSIFICATION	SC	CLIENT	SR LAND, LLC
SOIL TYPE #	1	PROJECT	STERLING RANCH, FILING 3
TEST BORING #	2	JOB NO.	221370
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"	100.0%
3/8"	93.7%
4	90.1%
10	69.3%
20	49.1%
40	36.4%
100	21.5%
200	16.6%

Atterberg Limits

Plastic Limit	15
Liquid Limit	30
Plastic Index	15

Swell

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

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COLORADO SPRINGS, COLORADO 80907

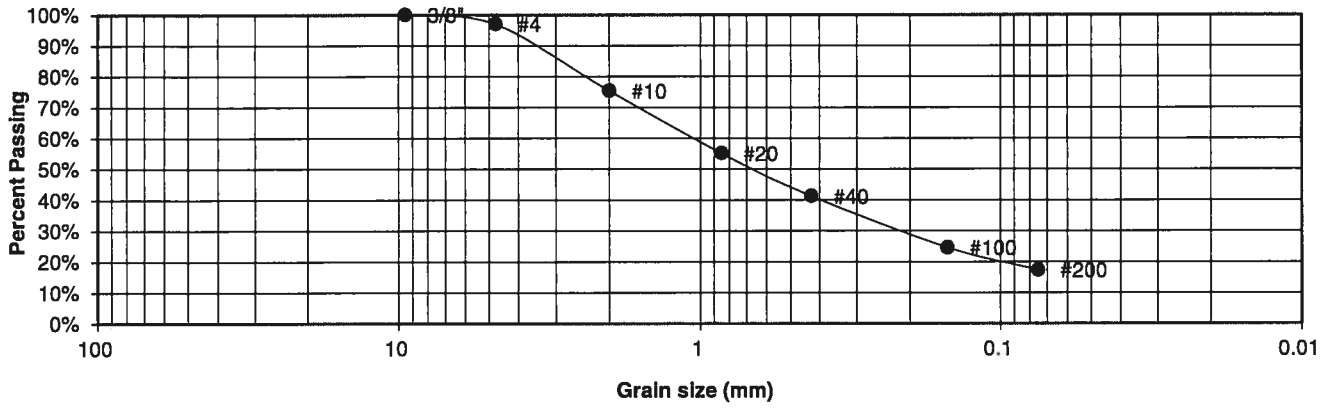
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		DS	6/24/22

JOB NO.: 221370
FIG NO.: B-3

UNIFIED CLASSIFICATION	SC	CLIENT	SR LAND, LLC
SOIL TYPE #	1	PROJECT	STERLING RANCH, FILING 3
TEST BORING #	3	JOB NO.	221370
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	97.0%
10	75.4%
20	55.1%
40	41.2%
100	24.5%
200	17.3%

Atterberg Limits	
Plastic Limit	18
Liquid Limit	30
Plastic Index	12

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

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

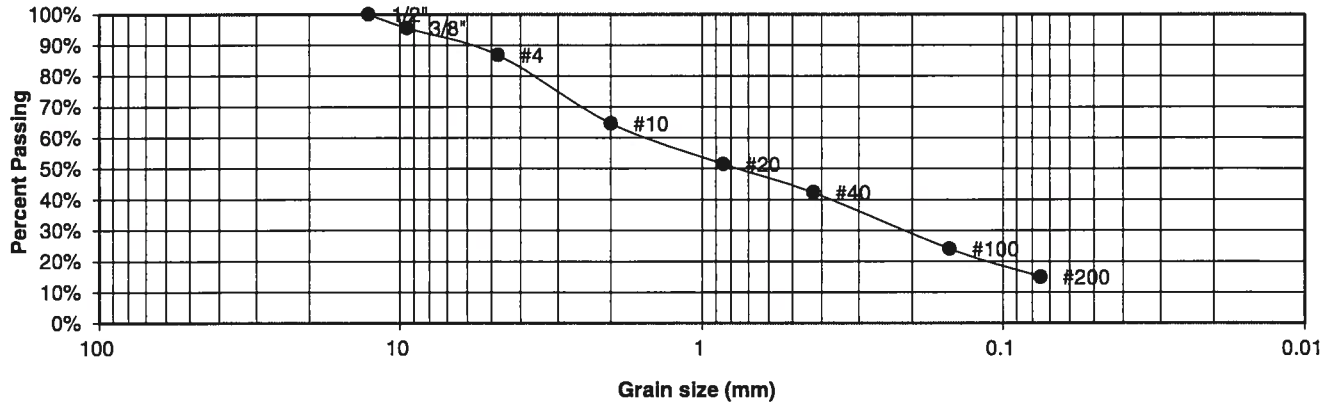
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		DS	6/24/22

JOB NO.: 221370
FIG NO.: B-4

UNIFIED CLASSIFICATION	SM	CLIENT	SR LAND, LLC
SOIL TYPE #	1	PROJECT	STERLING RANCH, FILING 3
TEST BORING #	4	JOB NO.	221370
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"	100.0%
3/8"	95.5%
4	86.8%
10	64.6%
20	51.5%
40	42.3%
100	24.0%
200	15.0%

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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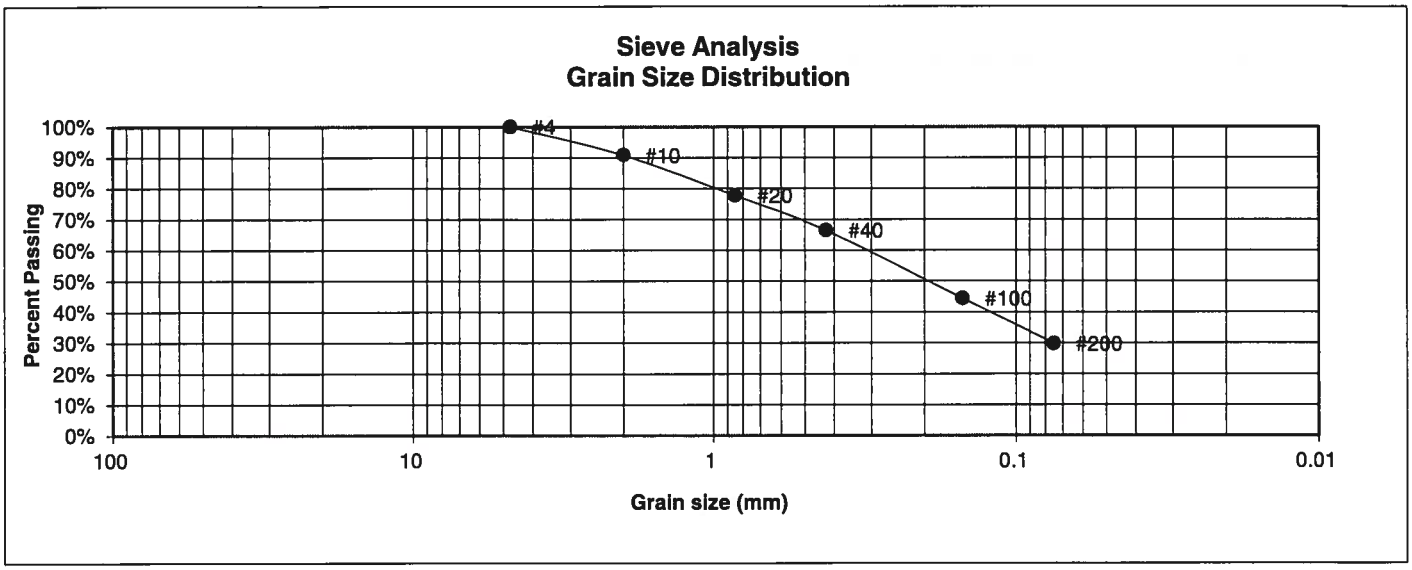
COLORADO SPRINGS, COLORADO 80907

LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		DS	6/24/22

JOB NO.: 221370
FIG NO.: B-5

UNIFIED CLASSIFICATION	SM	CLIENT	SR LAND, LLC
SOIL TYPE #	1	PROJECT	STERLING RANCH, FILING 3
TEST BORING #	5	JOB NO.	221370
DEPTH (FT)	1-2	TEST BY	BL
AASHTO CLASSIFICATION	A-2-4	GROUP INDEX	0



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	90.8%
20	77.8%
40	66.5%
100	44.4%
200	29.8%

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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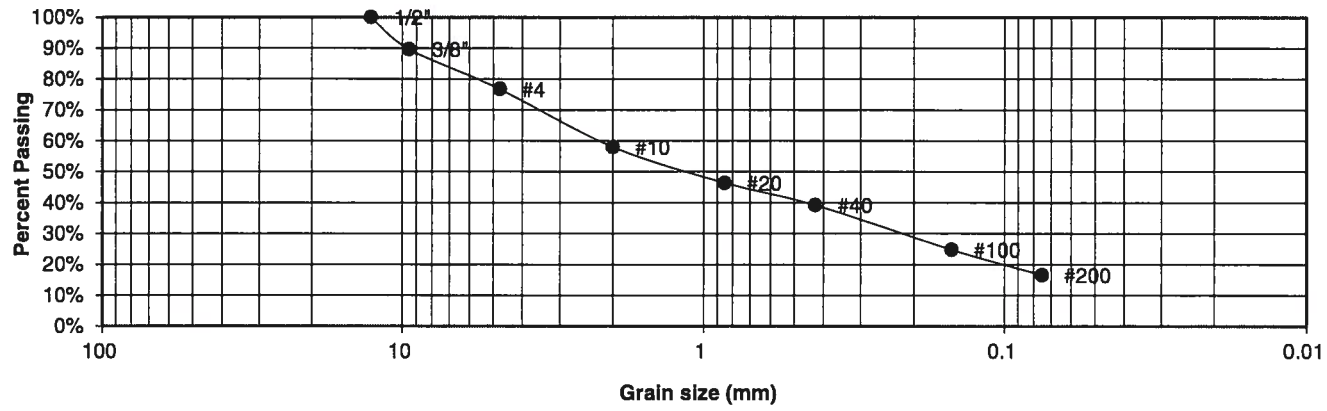
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		DS	6/20/22

JOB NO.: 221370
FIG NO.: B-6

UNIFIED CLASSIFICATION	SM	CLIENT	SR LAND, LLC
SOIL TYPE #	1	PROJECT	STERLING RANCH, FILING 3
TEST BORING #	6	JOB NO.	221370
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"	100.0%
3/8"	89.6%
4	76.7%
10	58.0%
20	46.4%
40	39.2%
100	24.8%
200	16.6%

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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COLORADO SPRINGS, COLORADO 80907

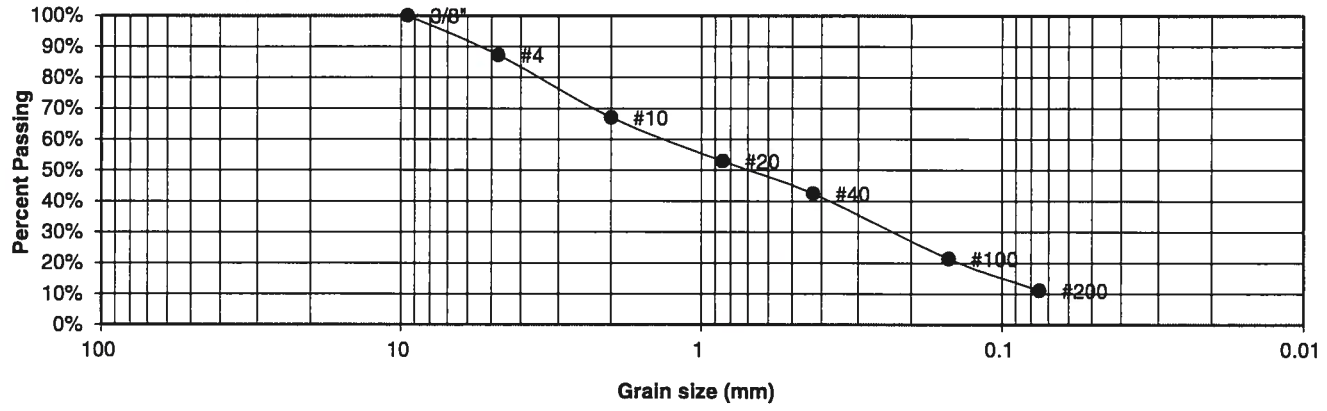
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		DS	6/24/22

JOB NO.: 221370
FIG NO.: B-7

UNIFIED CLASSIFICATION	SM-SW	CLIENT	SR LAND, LLC
SOIL TYPE #	1	PROJECT	STERLING RANCH, FILING 3
TEST BORING #	7	JOB NO.	221370
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	87.2%
10	67.0%
20	52.9%
40	42.4%
100	21.3%
200	11.1%

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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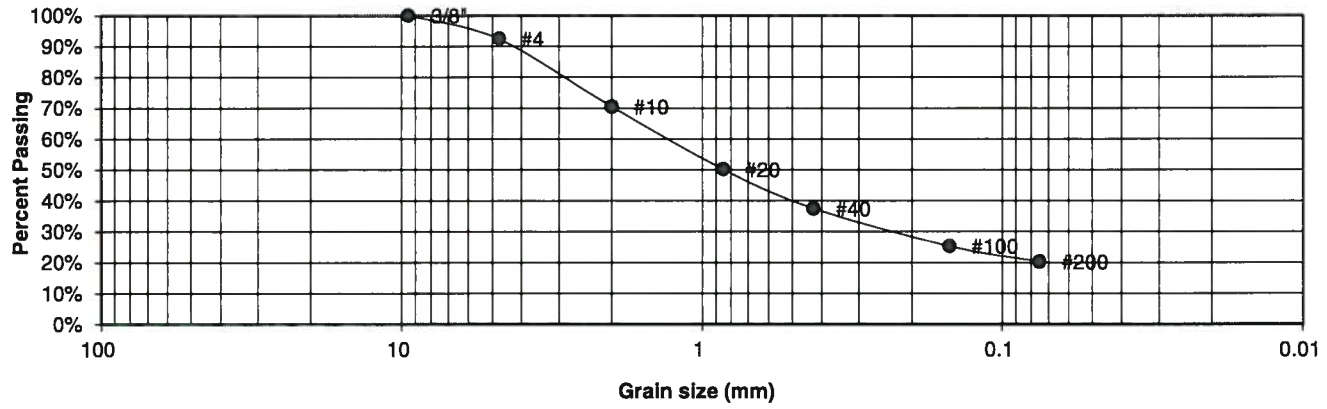
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		DS	6/24/22

JOB NO.: 221370
FIG NO.: B-8

UNIFIED CLASSIFICATION	SM	CLIENT	SR LAND, LLC
SOIL TYPE #	1	PROJECT	STERLING RANCH, FILING 3
TEST BORING #	8	JOB NO.	221370
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	92.4%
10	70.5%
20	50.2%
40	37.5%
100	25.3%
200	20.2%

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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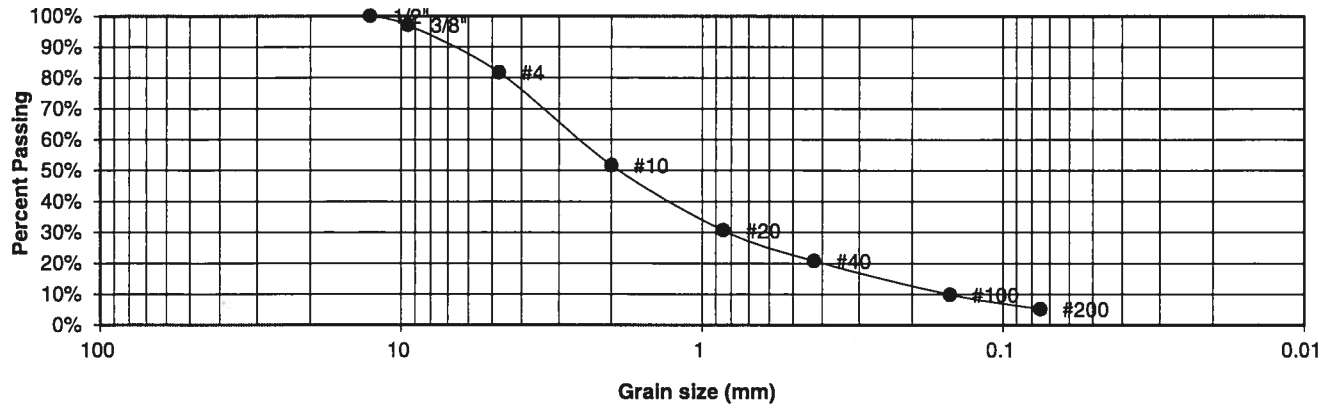
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		DS	6/24/22

JOB NO.: 221370
FIG NO.: B-9

UNIFIED CLASSIFICATION	SM-SW	CLIENT	SR LAND, LLC
SOIL TYPE #	1	PROJECT	STERLING RANCH, FILING 3
TEST BORING #	9	JOB NO.	221370
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"	100.0%
3/8"	97.1%
4	81.7%
10	51.7%
20	30.7%
40	20.7%
100	9.9%
200	5.2%

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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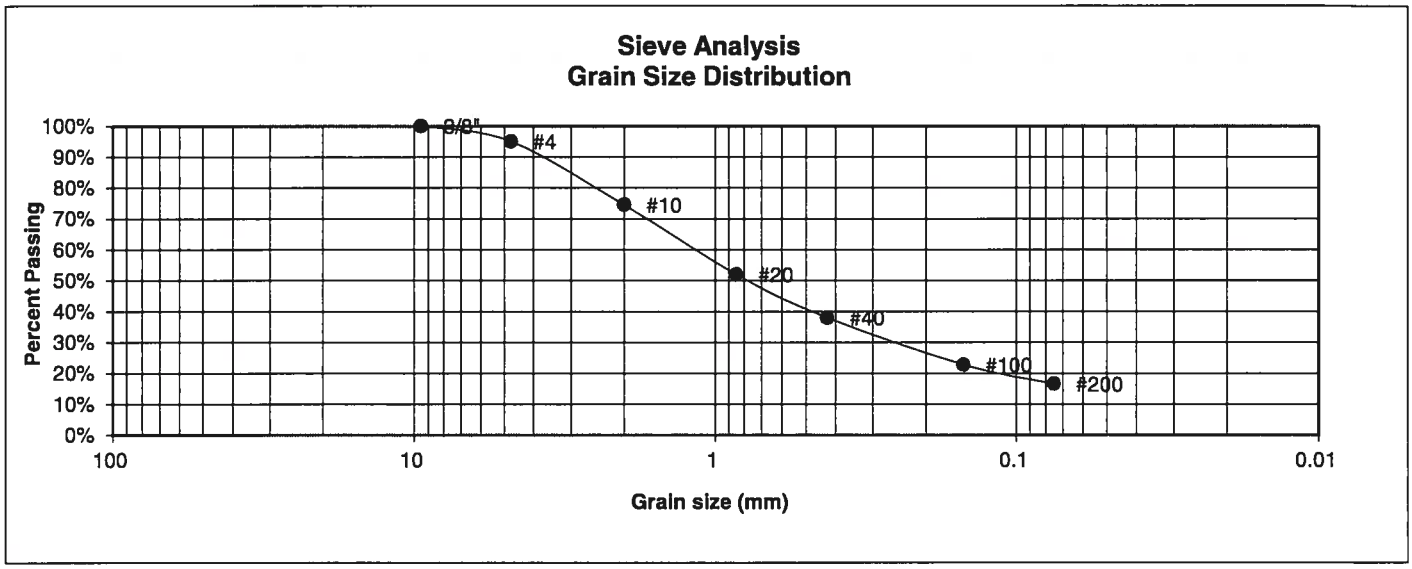
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		DS	6/24/22

JOB NO.: 221370
FIG NO.: B-10

UNIFIED CLASSIFICATION	SC	CLIENT	SR LAND, LLC
SOIL TYPE #	1	PROJECT	STERLING RANCH, FILING 3
TEST BORING #	10	JOB NO.	221370
DEPTH (FT)	1-2	TEST BY	BL
AASHTO CLASSIFICATION	A-2-6	GROUP INDEX	0



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	95.1%
10	74.5%
20	52.0%
40	38.0%
100	22.7%
200	16.5%

Atterberg Limits	
Plastic Limit	18
Liquid Limit	28
Plastic Index	11

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

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505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

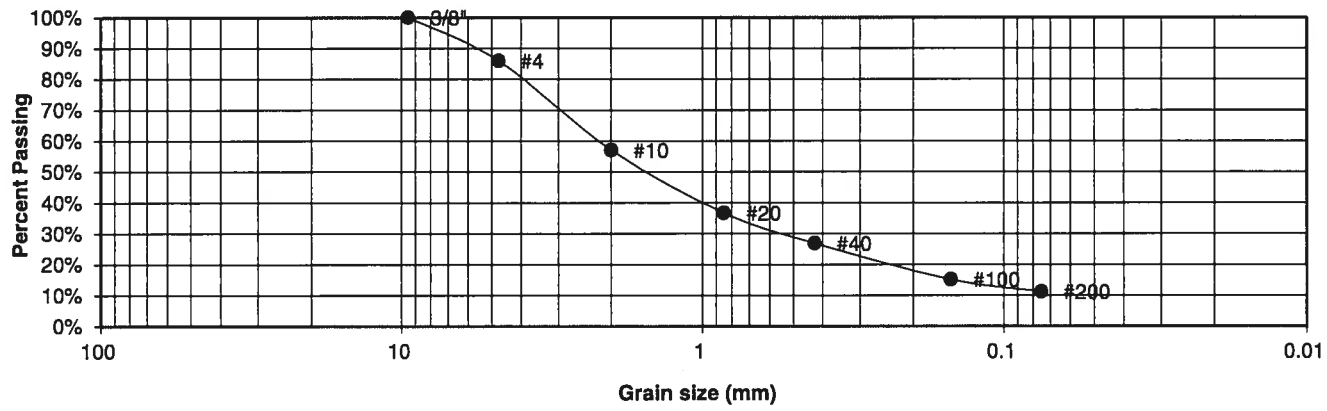
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		DS	6/24/22

JOB NO.: 221370
FIG NO.: B-11

UNIFIED CLASSIFICATION	SM-SW	CLIENT	SR LAND, LLC
SOIL TYPE #	2	PROJECT	STERLING RANCH, FILING 3
TEST BORING #	1	JOB NO.	221370
DEPTH (FT)	10	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	86.0%
10	57.1%
20	36.7%
40	26.9%
100	15.1%
200	11.2%

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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505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

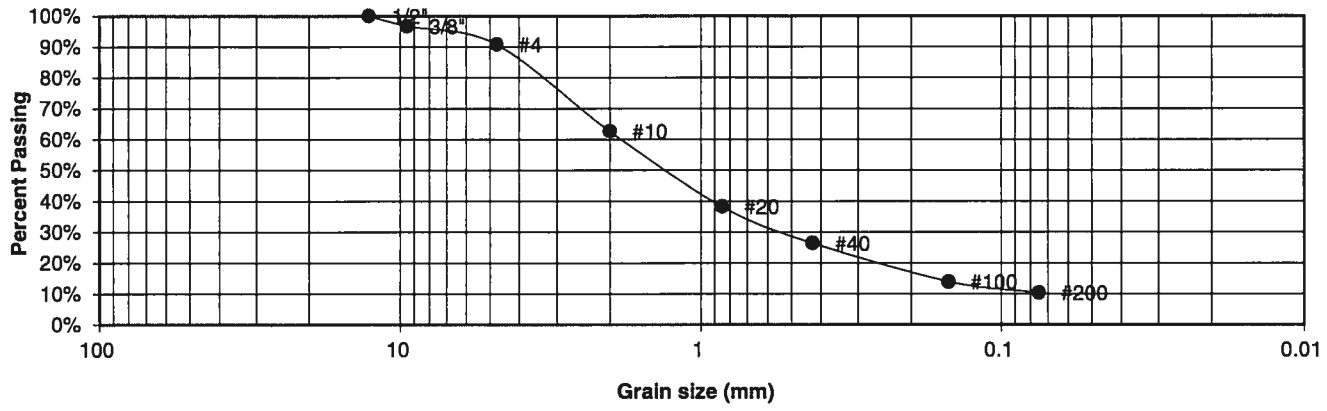
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		DS	6/24/22

JOB NO.: 221370
FIG NO.: B-12

UNIFIED CLASSIFICATION	SM-SW	CLIENT	SR LAND, LLC
SOIL TYPE #	2	PROJECT	STERLING RANCH, FILING 3
TEST BORING #	4	JOB NO.	221370
DEPTH (FT)	10	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"	100.0%
3/8"	96.7%
4	90.8%
10	62.6%
20	38.2%
40	26.4%
100	13.9%
200	10.4%

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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COLORADO SPRINGS, COLORADO 80907

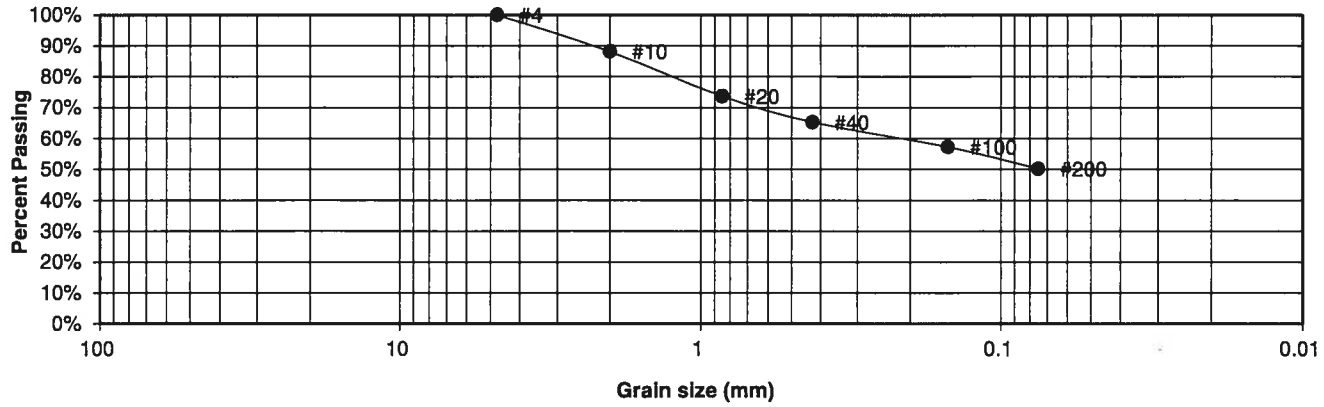
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		DS	6/24/22

JOB NO.: 221370
FIG NO.: B-13

UNIFIED CLASSIFICATION	ML	CLIENT	SR LAND, LLC
SOIL TYPE #	3	PROJECT	STERLING RANCH, FILING 3
TEST BORING #	8	JOB NO.	221370
DEPTH (FT)	10	TEST BY	BL
AASHTO CLASSIFICATION	A-7-6	GROUP INDEX	6

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	88.2%
20	73.7%
40	65.3%
100	57.3%
200	50.2%

Atterberg Limits	
Plastic Limit	28
Liquid Limit	46
Plastic Index	18

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

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LABORATORY TEST RESULTS

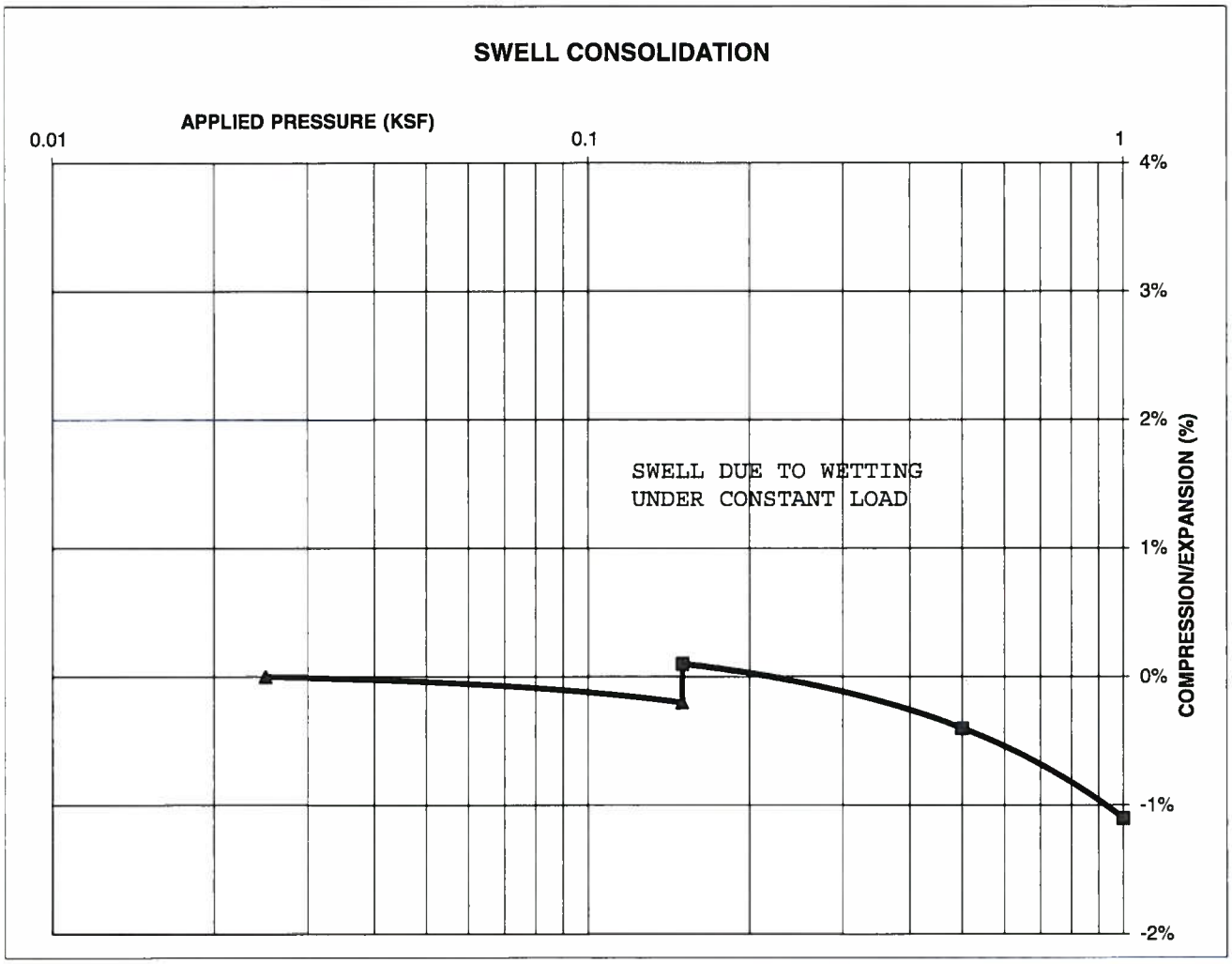
DRAWN:	DATE:	CHECKED:	DATE:
			6/24/22

JOB NO.: 221370
FIG NO.: B-14

CONSOLIDATION TEST RESULTS

TEST BORING #	10	DEPTH(ft)	1-2
DESCRIPTION	SC	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)			106
NATURAL MOISTURE CONTENT			11.8%
SWELL/CONSOLIDATION (%)			0.3%

JOB NO. 221370
CLIENT SR LAND, LLC
PROJECT STERLING RANCH, FILING 3



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COLORADO SPRINGS, COLORADO 80907

SWELL CONSOLIDATION
TEST RESULTS

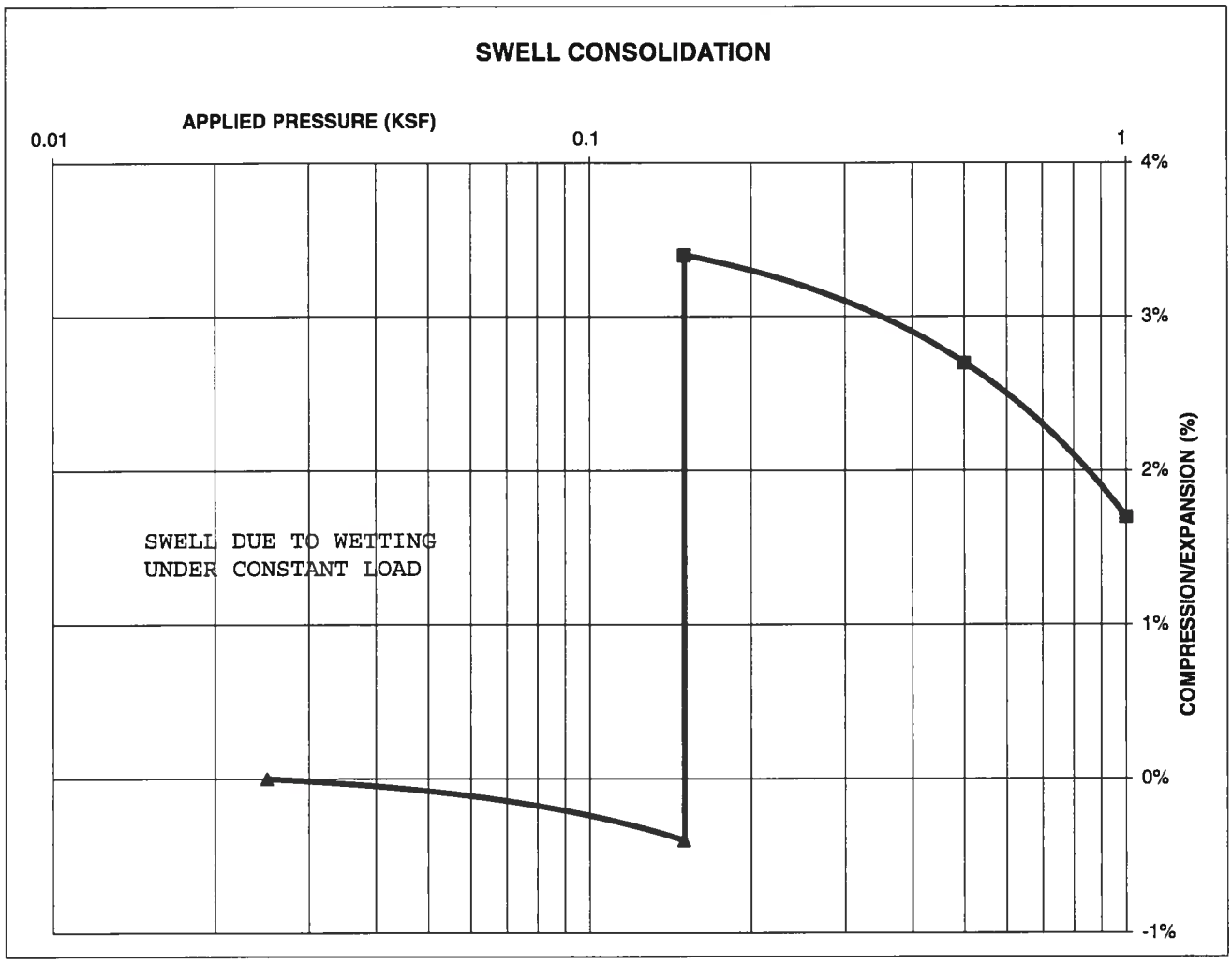
DRAWN:	DATE:	CHECKED:	DATE:
		DS	6/24/22

JOB NO.: 221370
FIG NO.: B-15

CONSOLIDATION TEST RESULTS

TEST BORING #	8	DEPTH(ft)	10
DESCRIPTION	ML	SOIL TYPE	3
NATURAL UNIT DRY WEIGHT (PCF)			105
NATURAL MOISTURE CONTENT			17.9%
SWELL/CONSOLIDATION (%)			3.8%

JOB NO. 221370
CLIENT SR LAND, LLC
PROJECT STERLING RANCH, FILING 3



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COLORADO SPRINGS, COLORADO 80907

SWELL CONSOLIDATION
TEST RESULTS

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

JOB NO.: 221370
FIG NO.: B-16

CLIENT	SR LAND, LLC	JOB NO.	221370
PROJECT	STERLING RANCH, FILING 3	DATE	6/16/2022
LOCATION	STERLING RANCH, FILING 3	TEST BY	BL

BORING NUMBER	DEPTH, (ft)	SOIL TYPE NUMBER	UNIFIED CLASSIFICATION	WATER SOLUBLE SULFATE, (wt%)
TB-1	1-2	1	SC	0.00
TB-1	10	2	SM-SW	<0.01
TB-2	1-2	1	SC	<0.01
TB-8	10	3	ML	<0.01

QC BLANK PASS

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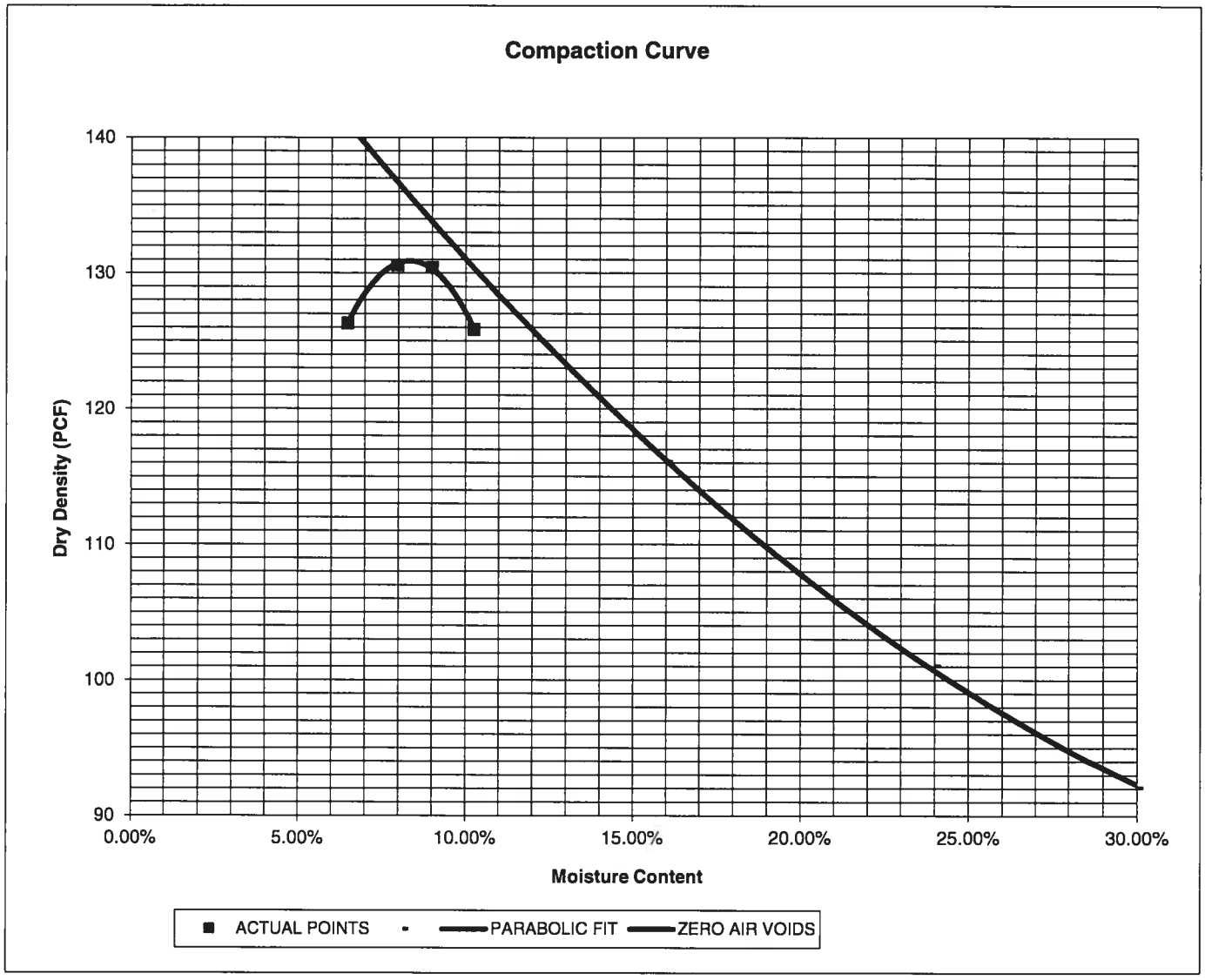
LABORATORY TEST
SULFATE RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		DS	6/24/22

JOB NO.: 221370
FIG NO.: B-17

PROJECT	STERLING RANCH, FILING 3	CLIENT	SR LAND, LLC
SAMPLE LOCATION	TB-3 @ 0-3'	JOB NO.	221370
SOIL DESCRIPTION	SAND, CLAYEY, BROWN	DATE	06/09/22

IDENTIFICATION	SC	COMPACTION TEST #	1
TEST DESIGNATION / METHOD	ASTM D-1557-A	TEST BY	AL
MAXIMUM DRY DENSITY (PCF)	130.9	OPTIMUM MOISTURE	8.4%



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505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

MOISTURE DENSITY RELATION

DRAWN:	DATE:	CHECKED:	DATE:
		DS	6/24/22

JOB NO.: 221370

FIG NO.: B-8

CBR TEST LOAD DATA

JOB NO: 221370
CLIENT: SR LAND, LLC
PROJECT: STERLING RANCH, FILING 3
SOIL TYPE: 1

PISTON DIAMETER (cm)	PISTON AREA (in²)
4.958	2.993

	10 BLOWS		*25 BLOWS*		*56 BLOWS*	
PENETRATION	MOLD # 1		MOLD # 2		MOLD # 3	
DEPTH (INCHES)	LOAD(LBS) (LBS)	STRESS (PSI)	LOAD(LBS) (LBS)	STRESS (PSI)	LOAD(LBS) (LBS)	STRESS (PSI)
0.000	0	0.00	0	0.00	0	0.00
0.025	141	47.12	178	59.48	199	66.50
0.050	216	72.18	263	87.89	401	134.00
0.075	269	89.89	354	118.30	555	185.46
0.100	384	128.32	510	170.43	710	237.26
0.125	428	143.02	641	214.20	838	280.03
0.150	532	177.78	710	237.26	955	319.13
0.175	625	208.85	739	246.95	1095	365.91
0.200	719	240.27	899	300.42	1256	419.71
0.300	901	301.09	1213	405.35	1744	582.79
0.400	1140	380.95	1596	533.33	2118	707.77
0.500	1300	434.42	2061	688.72	2611	872.51

FINAL MOISTURE CONTENT

	MOLD # 1	MOLD # 2	MOLD # 3
CAN #	351	357	352
WT. CAN	7.93	7.88	7.91
WT. CAN+WET	177.32	164.94	190.3
WT. CAN+DRY	156.66	149.4	173.32
WT. H20	20.66	15.54	16.98
WT. DRY SOIL	148.73	141.52	165.41
MOISTURE CONTENT	13.89%	10.98%	10.27%

WET DENSITY (PCF)	133.7	139.4	142.6
DRY DENSITY (PCF)	123.4	128.6	131.5

BEARING RATIO	12.83	17.04	23.73

90% OF DRY DENSITY	117.8
95% OF DRY DENSITY	124.4

BEARING RATIO AT 90% OF MAX	8.37	~ R VALUE	22
BEARING RATIO AT 95% OF MAX	13.64	~ R VALUE	40

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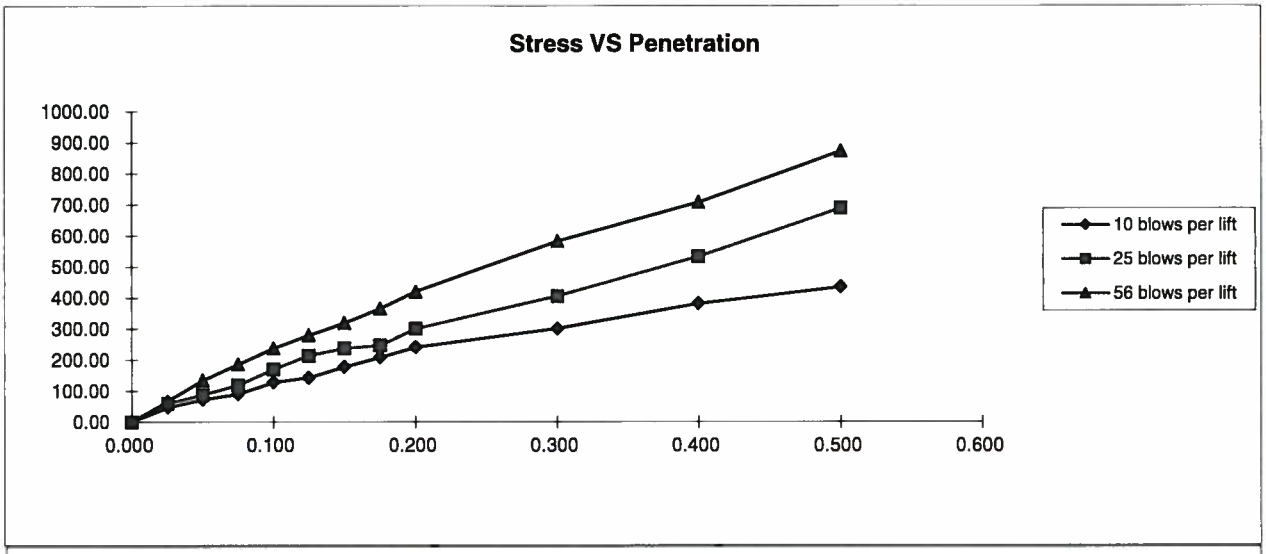
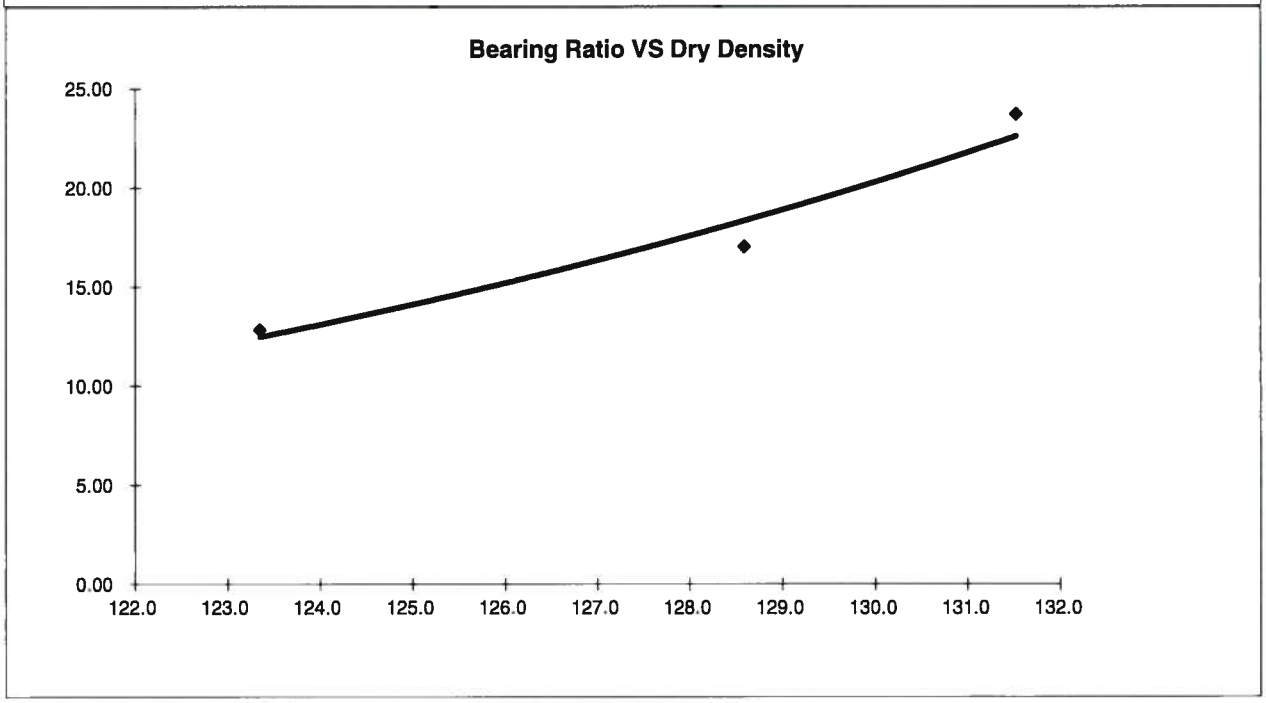
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

CBR TEST DATA

DRAWN:	DATE:	CHECKED:	DATE:
		DS	6/24/22

JOB NO.: 221370
FIG NO.: B-19





BEARING RATIO AT 90% OF MAX	8.37	~ R VALUE	22.00
BEARING RATIO AT 95% OF MAX	13.64	~ R VALUE	40.00

JOB NO: 221370
SOIL TYPE: 1

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505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

CALIFORNIA BEARING RATIO

DRAWN:	DATE:	CHECKED:	DATE:
		DS	6/24/22

JOB NO.: 221370
FIG NO.: B-20

APPENDIX C: Pavement Design Calculations

FLEXIBLE PAVEMENT DESIGN

DESIGN DATA

SR LAND, LLC
STERLING RANCH, FILING 3
URBAN LOCAL

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL (W_{18}) =	292,000
Hveem Stabilometer (R Value) Results:	R =	40
Standard Deviation	S_o =	0.45
Loss in Serviceability	Δpsi =	2.0
Reliability	Reliability =	80
Reliability (z-statistic)	Z_R =	-0.84
Soil Resilient Modulus	M_R =	9497

Weighted Structural Number (WSN): → WSN = 2.37

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
5.47	5.47	0.0

Job No. 221370
Fig. No. C-1

DESIGN CALCULATIONS

DESIGN DATA SR LAND, LLC
STERLING RANCH, FILING 3
URBAN LOCAL

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL = 292,000
Hveem Stabilometer (R Value) Results:	R = 40
Weighted Structural Number (WSN):	WSN = 2.37

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 Basecourse

D_1 = Depth of Asphalt (inches)
D_2 = Depth of Basecourse (inches)

FOR FULL DEPTH ASPHALT SECTION

$D_1 = (WSN)/C_1$ = 5.4 inches of Full Depth Asphalt
Use 5.5 inches Full Depth

FOR ASPHALT + AGGREGATE BASECOURSE SECTION

Asphalt Thickness (t) = [4] inches
$D_2 = ((WSN) - (t)(C_1))/C_2$ = 5.5 inches of Aggregate
Basecourse, use 8.0 inches USE 8 INCHES MINIMUM.

RECOMMENDED ALTERNATIVES

1. 4.0 inches of Asphalt + 8.0 inches of Aggregate Basecourse, or
2. 5.5 inches of Asphalt

Job No. 221370
Fig. No. C-2

DESIGN CALCULATIONS

CEMENT SECTIONS

DESIGN DATA SR LAND, LLC
STERLING RANCH, FILING 3
URBAN LOCAL

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL =	292,000
Hveem Stabilometer (R Value) Results:	R =	40
Weighted Structural Number (WSN):	WSN =	2.37

DESIGN EQUATION

$$WSN = C_1D_1 + C_2D_2$$

C_1 = 0.44 Strength Coefficient - Hot Bituminous Asphalt
C_2 = 0.11 Strength Coefficient - Cement Stabilized Subgrade

D_1 = Depth of Asphalt (inches)
D_2 = Depth of Cement Stabilized Subgrade (inches)

FOR ASPHALT + CEMENT STABILIZED SUBGRADE SECTION

Asphalt Thickness (t) = [4] inches
$D_2 = ((WSN) - (t)(C_1))/C_2$ = 5.5 inches of Cement Stabilized Subgrade
Cement Stabilized Subgrade, Use 8.0 inches minimum

RECOMMENDED ALTERNATIVES

1. 4.0 inches of Asphalt + 8.0 inches of Cement Stabilized Subgrade

Job No. 221370
Fig. No. C-3

DESIGN CALCULATIONS

RECYCLED CONCRETE

DESIGN DATA

STERLING RANCH - SOIL TYPE 3
URBAN LOCAL

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL =	292,000
Hveem Stabilometer (R Value) Results:	R =	40
Weighted Structural Number (WSN):	WSN =	2.37

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

$D_1 = (WSN)/C_1$ = 5.4 inches of Full Depth Asphalt
Use 5.5 inches Full Depth

FOR ASPHALT + AGGREGATE BASE COURSE SECTION

Asphalt Thickness (t) = [4] inches
$D_2 = ((WSN) - (t)(C_1))/C_2$ = 6.8 inches of Recycled Concrete
Recycled Concrete, use 8.0 inches

RECOMMENDED ALTERNATIVES

1. 4.0 inches of Asphalt + 8.0 inches of Recycled Concrete, or
2. 5.5 inches of Asphalt

Job No. 221370
Fig. No. C-4

FLEXIBLE PAVEMENT DESIGN

DESIGN DATA

SR LAND, LLC - SOIL TYPE 3
COLLECTORSURBAN LOCALLOCAL LOW-VOLUME

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL (W_{18}) =	36,500
Hveem Stabilometer (R Value) Results:	R =	40
Standard Deviation	S_o =	0.45
Loss in Serviceability	Δpsi =	2.0
Reliability	Reliability =	80
Reliability (z-statistic)	Z_R =	-0.84
Soil Resilient Modulus	M_R =	9497

Weighted Structural Number (WSN): → WSN = 1.68

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
4.56	4.56	0.0

Job No. 221370
Fig. No. C-5

DESIGN CALCULATIONS

DESIGN DATA SR LAND, LLC
STERLING RANCH, FILING 3
LOCAL LOW-VOLUME

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL =	36,000
Hveem Stabilometer (R Value) Results:	R =	40
Weighted Structural Number (WSN):	WSN =	1.68

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 Basecourse

D_1 = Depth of Asphalt (inches)
D_2 = Depth of Basecourse (inches)

FOR FULL DEPTH ASPHALT SECTION

$D_1 = (WSN)/C_1$ = 3.8 inches of Full Depth Asphalt
Use 5.0 inches Full Depth

FOR ASPHALT + AGGREGATE BASECOURSE SECTION

Asphalt Thickness (t) = [3] inches
$D_2 = ((WSN) - (t)(C_1))/C_2$ = 3.3 inches of Aggregate
Basecourse, use 6.0 inches USE 6 INCHES MINIMUM.

RECOMMENDED ALTERNATIVES

1. 3.0 inches of Asphalt + 6.0 inches of Aggregate Basecourse, or
2. 5.0 inches of Asphalt

Job No. 221370
Fig. No. C-6

DESIGN CALCULATIONS

CEMENT SECTIONS

DESIGN DATA SR LAND, LLC
STERLING RANCH, FILING 3
LOCAL LOW-VOLUME

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL =	50,000
Hveem Stabilometer (R Value) Results:	R =	40
Weighted Structural Number (WSN):	WSN =	1.68

DESIGN EQUATION

$$WSN = C_1D_1 + C_2D_2$$

C_1 = 0.44 Strength Coefficient - Hot Bituminous Asphalt
C_2 = 0.11 Strength Coefficient - Cement Stabilized Subgrade

D_1 = Depth of Asphalt (inches)
D_2 = Depth of Cement Stabilized Subgrade (inches)

FOR ASPHALT + CEMENT STABILIZED SUBGRADE SECTION

Asphalt Thickness (t) = [4] inches
$D_2 = ((WSN) - (t)(C_1))/C_2$ = -0.7 inches of Cement Stabilized Subgrade
Cement Stabilized Subgrade, Use 8.0 inches minimum

RECOMMENDED ALTERNATIVES

1. 4.0 inches of Asphalt + 8.0 inches of Cement Stabilized Subgrade

Job No. 221370
Fig. No. C-7

DESIGN CALCULATIONS

RECYCLED CONCRETE

DESIGN DATA

STERLING RANCH - SOIL TYPE 3
LOCAL LOW-VOLUME

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL =	36,500
Hveem Stabilometer (R Value) Results:	R =	40
Weighted Structural Number (WSN):	WSN =	1.68

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

$D_1 = (WSN)/C_1$ = 3.8 inches of Full Depth Asphalt
Use 5.0 inches Full Depth

FOR ASPHALT + AGGREGATE BASE COURSE SECTION

Asphalt Thickness (t) = [3] inches
$D_2 = ((WSN) - (t)(C_1))/C_2$ = 4.0 inches of Recycled Concrete
Recycled Concrete, use 6.0 inches

RECOMMENDED ALTERNATIVES

1. 3.0 inches of Asphalt + 6.0 inches of Recycled Concrete, or
2. 5.0 inches of Asphalt

Job No. 221370
Fig. No. C-8