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PAVEMENT DESIGN REPORT
TRAILS AT ASPEN RIDGE, FILING NO. 3, PHASE 2
LAZY RIDGE DRIVE
EL PASO COUNTY, COLORADO

PCD File No. SF2122

Prepared for:
COLA, LLC
555 Middle Creek Parkway, Suite 500
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Attn: Richard A. Van Seenus

April 24, 2026

Respectfully Submitted,

ENTECH ENGINEERING, INC.

Lucas Morrison
Geotechnical Engineering Staff

Reviewed by:

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52381
PROFESSIONAL ENGINEER

Digitally signed by Joseph C Goode III
Date: 04/24/26

Joseph C. Goode III, P.E.
Sr. Engineer

LJM:JCG/ed

Entech Job No. 252188

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1 Introduction

Entech Engineering, Inc. (Entech) completed this pavement design report for Lazy Ridge Drive within Trails at Aspen Ridge, Filing No. 3, Phase 2. This report describes the subsurface exploration program and laboratory testing program conducted for the proposed roadway improvements and provides pavement section alternatives and construction recommendations. Entech participated in this project as a subconsultant to COLA, LLC. The contents of this report, including the pavement design recommendations, are subject to the limitations and assumptions presented in Section 7.

2 Project Description

The site is located southeast of the intersection of Bradley Road and South Powers Boulevard within Trails at Aspen Ridge, Filing No. 3, in El Paso County, Colorado (Figure 1). The proposed improvements include the paving of Lazy Ridge Drive within Trails at Aspen Ridge, Filing No. 3, Phase 2. The extent of our investigation is shown in Figure 2.

At the time of our subsurface exploration program, the existing roadway was rough-graded, and utilities had been installed. Prior to drilling, utility installation and the associated fill were observed by Entech personnel. The fill was tested and is considered controlled. Surrounding properties comprise an existing subdivision. Based on the development plans, the roadway is designated as an urban local roadway.

3 Subsurface Explorations and Laboratory Testing

3.1 Subsurface Exploration Program

Subsurface conditions along Lazy Ridge Drive were explored by four test borings, designated TB-1 through TB-4, drilled on March 19, 2026. The locations of the test borings are shown on the Site and Exploration Plan (Figure 2). The borings were drilled to depths of 5 to 10 feet below the existing ground surface (bgs). The drilling was performed using a truck-mounted drill rig utilizing continuous flight auger techniques, supplied and operated by Entech. Descriptive boring logs providing lithologies of the subsurface conditions encountered during drilling are presented in Appendix A. Groundwater levels were measured in each of the open boreholes at the conclusion of, and subsequent to, drilling.

Soil and bedrock samples were obtained from the borings utilizing the Standard Penetration Test (ASTM D1586) using a 2-inch outside diameter split spoon or a 2½-inch modified California sampler. Results of the Standard Penetration Test (SPT) are included on the boring logs in terms of N-values expressed in blows per foot (bpf). Soil samples recovered from the borings were visually classified and recorded on the boring logs. The soil classifications were later verified utilizing laboratory testing and grouped by soil type. The soil type numbers are included on the boring logs. It should be understood that the soil descriptions shown on the boring logs may vary between boring locations and sample depths. It should also be noted that the lines of stratigraphic separation shown on the boring logs represent approximate boundaries between soil types, and the actual stratigraphic transitions may be more gradual or variable with location.

3.2 Geotechnical Index and Engineering Property Testing

Water content testing (ASTM D2216) was performed on the samples recovered from the borings, and the results are shown on the boring logs. Grain-size analysis (ASTM D422) and Atterberg limits testing (ASTM D4318) were performed on selected samples to assist in classifying the materials encountered in the borings. One-dimensional swell/collapse testing (ASTM D4546) was performed to evaluate the expansive characteristics and collapse potential of the cohesive material found on-site. Soluble sulfate testing was performed on select soil samples to evaluate the potential for below-grade degradation of concrete due to sulfate attack.

For pavement design, a Standard Proctor (ASTM D698) and a California Bearing Ratio (CBR) test (ASTM D1883) were completed. The laboratory testing results are presented in Appendix B and summarized in Table B-1.

4 Subgrade Conditions

One primary soil type and one bedrock type were encountered in the test borings drilled for the subsurface investigation. Each soil and bedrock type was classified in accordance with the Unified Soil Classification System (USCS) and the American Association of State Highway and Transportation Officials (AASHTO) soil classification system using the laboratory testing results and the observations made during drilling.

4.1 Subsurface Conditions

Subsurface conditions along the proposed roadway consisted of loose to medium dense clayey sand fill (Soil Type 1, A-2-6) from the existing ground surface to depths of 1 to 5 feet bgs.

Claystone or shale bedrock, or sandy clay when classified as a soil (Soil Type 2, AASHTO A-7-6), was encountered underlying Soil Type 1 in borings TB-1, TB-3, and TB-4 at a depth of 1 foot and extended to the termination depth of the borings.

Laboratory test results are presented in Appendix B and are summarized in Table B-1.

4.2 Groundwater

Groundwater was not encountered in the test borings. Groundwater fluctuations are possible and will depend on seasonal variations, local precipitation, runoff, and other factors; however, we do not anticipate that groundwater will affect the proposed roadway construction.

5 Pavement Design Recommendations

Pavement design recommendations were made in accordance with the *El Paso County Engineering Criteria Manual (ECM).*

5.1 Subgrade Conditions

California Bearing Ratio (CBR) testing was performed on a representative sample of the pavement subgrade, claystone (Soil Type 2) from TB-1, to determine the support characteristics of the subgrade soils for the roadway section. The results of the CBR testing are presented in Appendix B and summarized in Exhibit 1.

Exhibit 1: Subsurface Laboratory Testing Summary

Design Parameter	Value
Soil Type	2 – Claystone (Clay with Sand)
CBR at 95%	3.4
Design CBR	3.4
Liquid Limit	48
Plasticity Index	25
Percent Passing 200	86.5
AASHTO Classification	A-7-6
Group Index	23
Unified Soils Classification	CL

5.2 Swell Mitigation

El Paso County requires swell mitigation of expansive soils with swell testing results greater than 2% under a surcharge of 150 pounds per square foot (psf). We recommend mitigating swell potential within the roadway by placing 12 inches of mechanically stabilized granular fill. The

mechanically stabilized granular fill shall consist of a layer of Tensar InterAx NX750 (or equivalent) underlying 12 inches of granular fill. Refer to Section 5.4 for a schematic of the proposed roadway section.

5.3 Traffic Loading

Traffic data is not available for Lazy Ridge Drive within Trails at Aspen Ridge, Filing No. 3; however, the roadway is classified as an urban local roadway based on current development plans. The *El Paso County Engineering Criteria Manual* provides default 18-kip equivalent single axle loadings (ESAL) based on the street classification. For design, a default ESAL value of 292,000 was used for the urban local road designation.

5.4 Pavement Design

The pavement sections were determined utilizing the *El Paso County Engineering Criteria Manual*, the CBR testing, and the default ESAL. Design parameters used in the pavement analysis are presented in Exhibit 2.

Exhibit 2: Pavement Design Parameters

Design Parameter	Value
Reliability	80%
Standard Deviation	0.45
Serviceability Loss (Δ psi)	2.5
Design CBR	3.4
Resilient Modulus	5,100 psi
Structural Coefficients	
Hot Bituminous Pavement	0.44
Aggregate Base Course	0.11
Recycled Concrete Base	0.11

Pavement section alternatives recommended for Lazy Ridge Drive are summarized in Exhibit 3. The pavement design calculations are presented in Appendix C.

Exhibit 3: Recommended Pavement Sections

Pavement Area	Design ESAL	Alternative [1]
Lazy Ridge Drive	292,000	5.0 inches HMA over 8.0 inches ABC/RCB over 12 inches of Mechanically Stabilized Subgrade

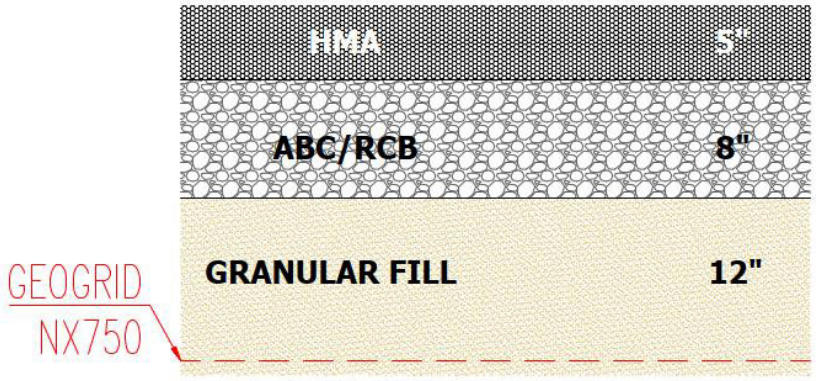
ABC = Aggregate Base Course; CTS = Cement-Treated Soil; ESAL = Equivalent Single Axle Loads; HMA = Hot Mix Asphalt; RCB = Recycled Concrete Base

Notes:

1. All pavement alternatives meet the minimum sections required per the *El Paso County Engineering Criteria Manual.*
2. Mechanically stabilized subgrade shall consist of 12 inches of granular fill over Tensar InterAx NX750 (or equivalent) geogrid.

As discussed in Section 5.2, expansive claystone and shale bedrock, will be mitigated with mechanically stabilized subgrade. The claystone or shale bedrock will require 12 inches of overexcavation and replacement with 12 inches of granular fill with the Tensar InterAx NX750 (or equivalent) composite polymer geogrid placed at the bottom of the granular fill. Pavement section alternative with mechanically stabilized subgrade is presented in Exhibit 4.

Exhibit 4: Recommend Mechanically Stabilized Subgrade Pavement Section



6 Construction Recommendations

Pavement design recommendations provided herein are contingent on good construction practices, and poor construction techniques may result in poor performance. Our analyses assumed that this project would be constructed according to the *El Paso County Engineering Criteria Manual* and the *Pikes Peak Region Asphalt Paving Specifications*.

6.1 Earthwork Recommendations for Pavement Subgrade

Proper subgrade preparation is required for adequate pavement performance. Paving areas should be cleared of all deleterious materials, including but not limited to existing pavements, utility poles, and fence poles. Surface vegetation, if any, should be removed by stripping, with the depth to be field-determined.

We do not anticipate issues with the subgrade in regard to shallow water, frost-susceptible soils, groundwater or drainage conditions, or cold weather construction.

6.1.1 Subgrade Preparation

As discussed in Sections 5.2 and 5.4, the roadway subgrade should be overexcavated to a depth of 12 inches. After overexcavation, install Tensar InterAx NX750 (or equivalent) at a depth of 12 inches below base course, followed by 12 inches of compacted granular fill placed in accordance with Section 6.1.2.

The compacted surface below pavements should be proof rolled with a fully loaded, tandem-axle, 10-yard dump truck or equivalent. Any areas that are delineated to be soft, loose, or yielding during proof rolling should be removed and reconditioned, or replaced.

6.1.2 Fill Placement and Compaction

Imported granular fill placed as part of the pavement subgrade shall consist of nonexpansive granular soil. The material shall contain no more than 35% passing the No. 200 sieve, have a plasticity index of 15 or less, and be free of organic matter, unsuitable materials, debris, and cobbles greater than 3 inches in diameter. Additionally, any granular fill placed as part of the roadway subgrade should have a minimum CBR of 5. All granular fill placed within the pavement subgrade should be compacted to a minimum of 95% of the Modified Proctor (ASTM D1557) maximum dry density at +/-2% of optimum moisture content. Fill material should be placed in horizontal lifts such that each finished lift has a compacted thickness of 6 inches or less. Entech should approve any imported fill to be used within the pavement subgrade area prior to delivery to the site.

6.1.3 Aggregate Base Course and Recycled Concrete Base

ABC or RCB materials shall conform to the *El Paso County Standard Specifications Manual*, Appendix D, Table D-6. ABC or RCB materials should be compacted to a minimum of 95% of the Modified Proctor (ASTM D1557) maximum dry density within +/-2% of optimum moisture content.

6.2 Concrete Degradation Due to Sulfate Attack

Sulfate solubility testing was conducted on several samples recovered from the test borings to evaluate the potential for sulfate attack on concrete. The test results indicated 0.23% soluble sulfate (by weight). The test results indicate that the sulfate component of the in-place soils presents a severe exposure threat to concrete placed below the site grade.

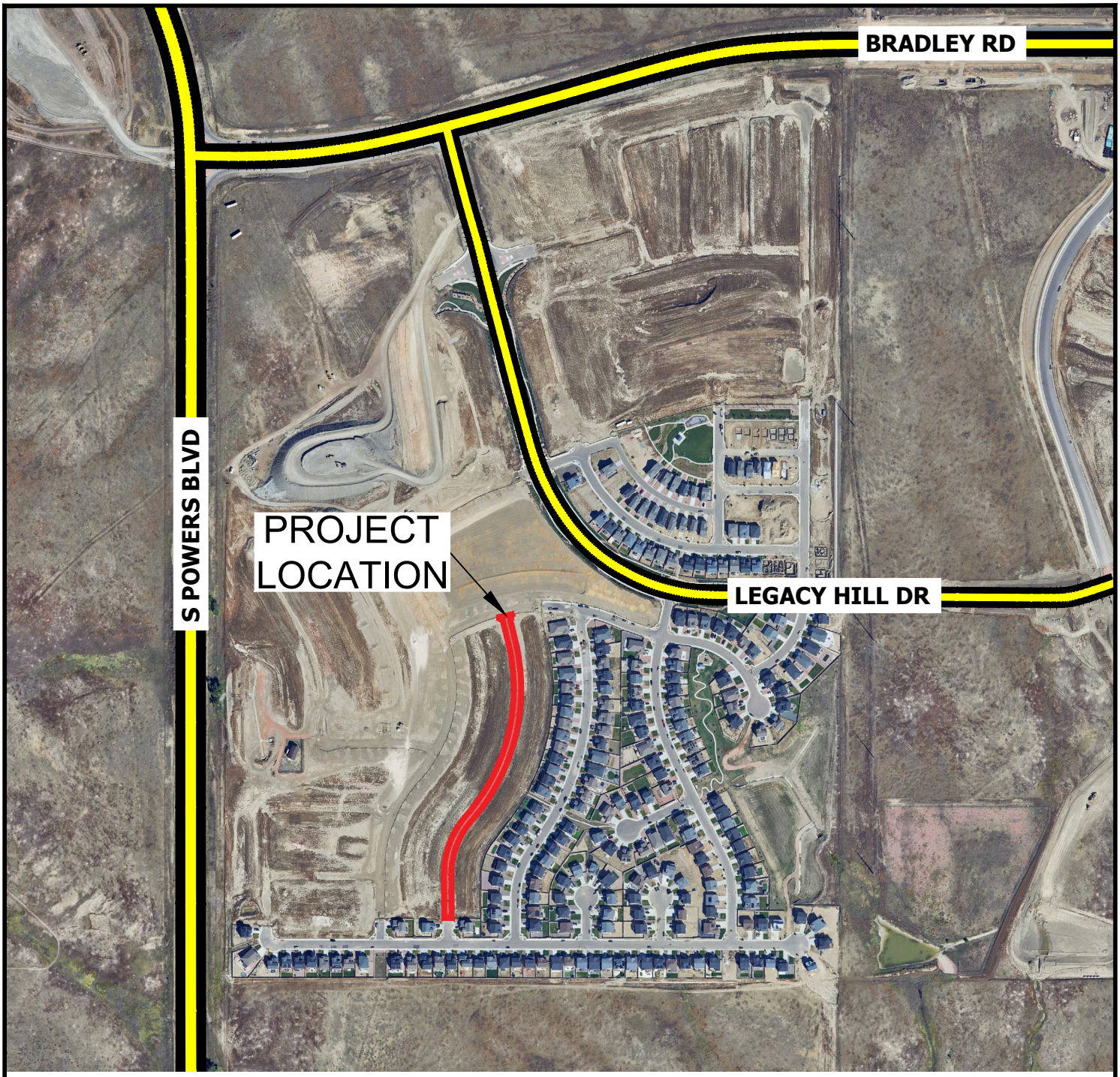
6.3 Construction Observation

Subgrade preparation for pavement structures should be observed by Entech in order to verify that (1) no anomalies are present, (2) materials similar to those described in this report have been encountered or placed, and (3) no soft spots, expansive or organic soil, or debris are present in the pavement subgrade prior to paving.

7 Closure

The subsurface investigation, geotechnical evaluation, and recommendations presented in this report are intended for use by COLA, LLC with application to the paving of Lazy Ridge Drive within Trails at Aspen Ridge, Filing No. 3, Phase 2, in El Paso County, Colorado. In conducting the subsurface investigation, laboratory testing, engineering evaluation, and reporting, Entech Engineering, Inc. endeavored to work in accordance with generally accepted professional geotechnical and geologic practices and principles consistent with the level of care and skill ordinarily exercised by members of the geotechnical profession currently practicing in the same locality and under similar conditions. No other warranty, expressed or implied, is made. During final design and/or construction, if conditions are encountered that appear different from those described in this report, Entech Engineering, Inc. requests to be notified so that the evaluation and recommendations presented herein can be reviewed and modified as appropriate.

If there are any questions regarding the information provided herein, or if Entech Engineering, Inc. can be of further assistance, please do not hesitate to contact us.



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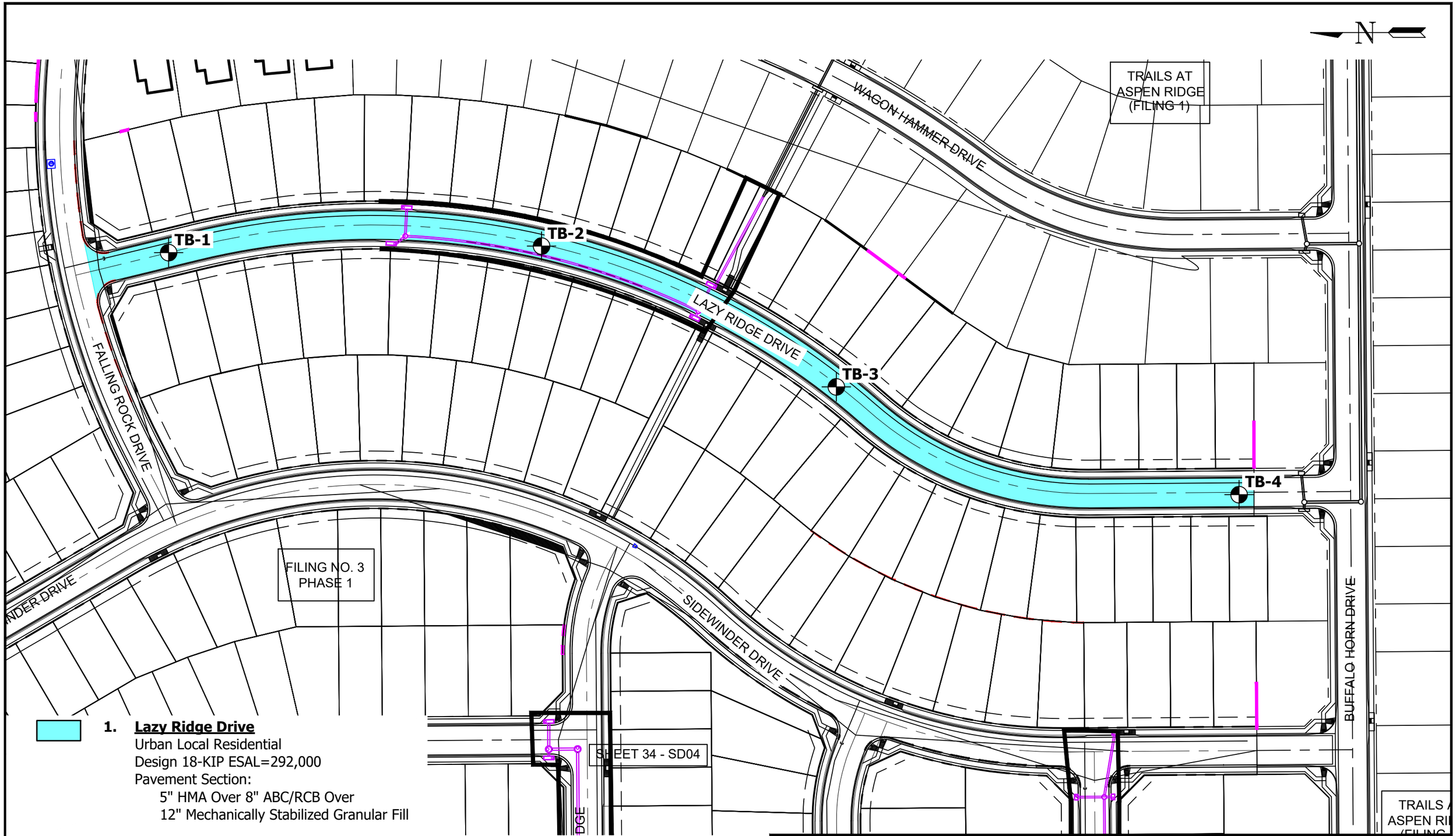
VICINITY MAP

TRAILS AT ASPEN RIDGE, FILING NO. 3, PHASE 2
COLA, LLC

JOB NO. 252188

FIG. 1



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SITE AND EXPLORATION PLAN

TRAILS AT ASPEN RIDGE, FILING NO. 3, PHASE B
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FIG. 2

APPENDIX A: Test Boring Logs

TEST BORING 1
DATE DRILLED 3/10/2026

REMARKS

DRY TO 10', 3/10/26

CLAY, SANDY, BROWN
CLAYSTONE, VERY WEAK, BROWN to GRAY, HIGHLY WEATHERED (CLAY, SLIGHTLY SANDY, HARD, MOIST)

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			50/10"	12.9	2
5			50/11"	15.7	2
10			50/10"	16.4	2
15					
20					

TEST BORING 2
DATE DRILLED 3/19/2026

REMARKS

DRY TO 5', 3/19/26

FILL 0-5', SAND, CLAYEY, TAN, LOOSE to MEDIUM DENSE, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			7	11.4	1
5			12	13.9	1
10					
15					
20					

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TEST BORING LOGS

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FIG. A-1

TEST BORING 3
DATE DRILLED 3/19/2026

REMARKS

DRY TO 5', 3/19/26

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
					1
			50/5"	10.5	2
5			50/4"	10.6	2
10					
15					
20					

FILL 0-1', SAND, CLAYEY, BROWN

SHALE, WEAK, GRAY, MODERATELY WEATHERED (CLAY, WITH SAND, HARD, MOIST)

TEST BORING 4
DATE DRILLED 3/19/2026

REMARKS

DRY TO 5', 3/19/26

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
					1
			40	14.1	2
5			50/9"	12.8	2
10					
15					
20					

FILL 0-1', SAND, CLAYEY, BROWN

SHALE, WEAK, GRAY, MODERATELY WEATHERED (CLAY, WITH SAND, HARD, MOIST)

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TEST BORING LOGS

TRAILS AT ASPEN RIDGE, FILING NO. 3, PHASE 2
COLA, LLC

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FIG. A-2

APPENDIX B: Laboratory Test Results

TABLE B-1
SUMMARY OF LABORATORY TEST RESULTS

SOIL TYPE	TEST BORING NO.	DEPTH (FT)	WATER (%)	DRY DENSITY (PCF)	PASSING NO. 200 SIEVE (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTIC INDEX	SULFATE (WT %)	SWELL/ COLLAPSE (%)	AASHTO CLASS. (GROUP INDEX)	USCS	SOIL DESCRIPTION
1	2	1-2	11.6		30.8	25	13	12			A-2-6 (0)	SC	FILL, SAND, CLAYEY
2, CBR	1	1-3	11.6		86.5	48	23	25			A-7-6 (23)	CL	CLAYSTONE (CLAY, WITH SAND)
2	1	1-2	15.6	114.8	92.5	54	28	26	0.23	7.8	A-7-6 (28)	CH	CLAYSTONE (CLAY, SL. SANDY)
2	3	1-2	12.0	111.7	84.9	44	22	22		2.3	A-7-6 (19)	CL	SHALE (CLAY, WITH SAND)
2	4	1-2	13.8	115.3	84.5	44	25	19		2.7	A-7-6 (17)	CL	CLAYSTONE (CLAY, WITH SAND)

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Client: COLA, LLC
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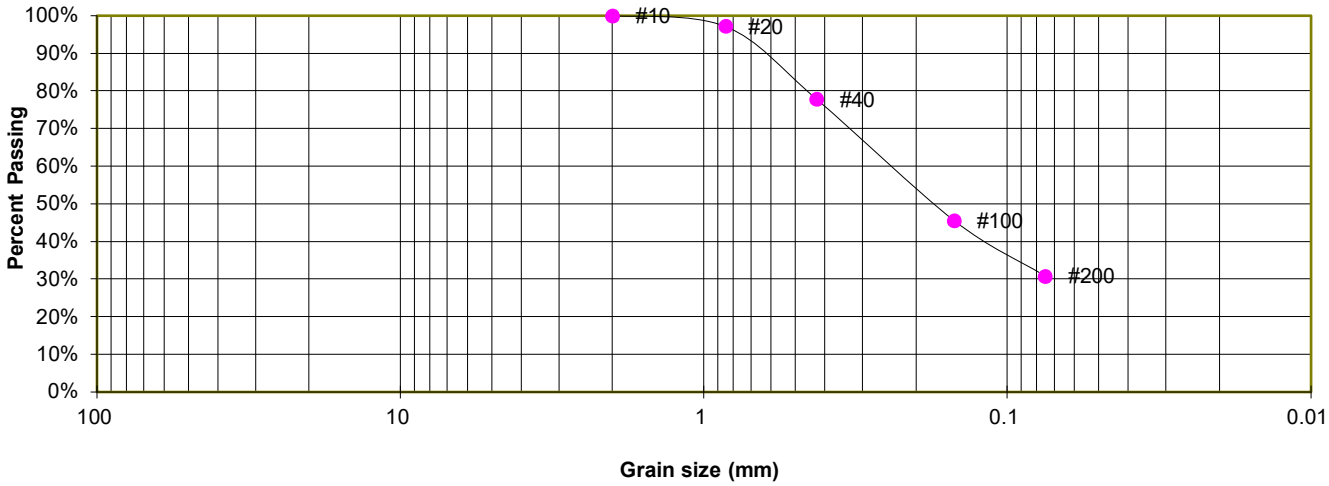
TEST BORING	2	SOIL DESCRIPTION	FILL, SAND, CLAYEY
DEPTH (FT)	1-2	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	
10	100.0%
20	97.2%
40	77.8%
100	45.6%
200	30.8%

ATTERBERG LIMITS

Plastic Limit	13
Liquid Limit	25
Plastic Index	12

SOIL CLASSIFICATION

USCS CLASSIFICATION:	SC
AASHTO CLASSIFICATION:	A-2-6
AASHTO GROUP INDEX:	0

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LABORATORY TEST RESULTS

TRAILS AT ASPEN RIDGE, FILING NO. 3, PHASE 2
COLA, LLC

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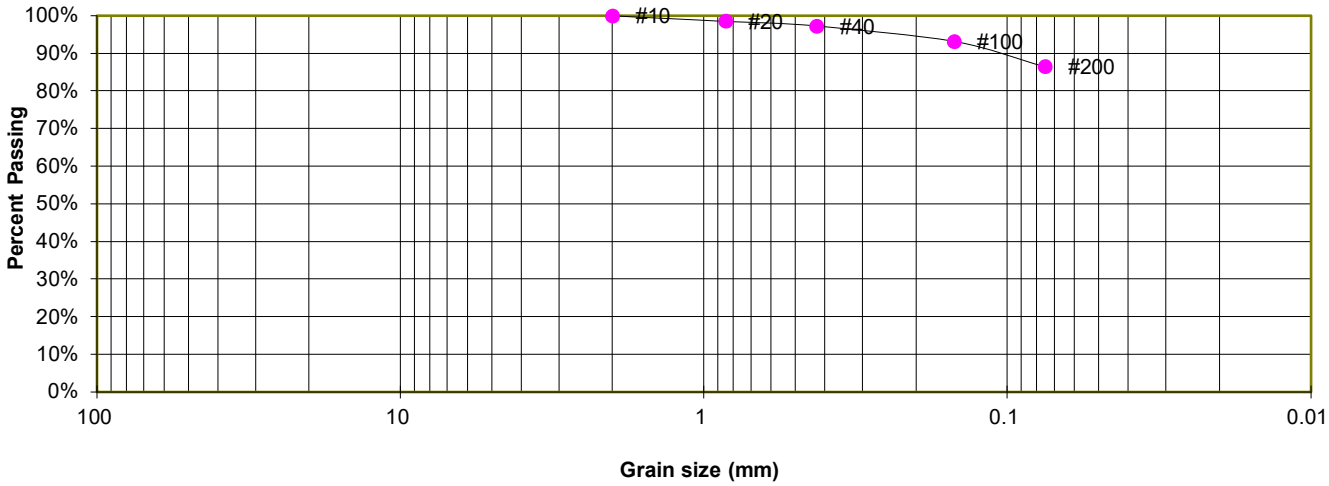
FIG. B-1

TEST BORING	1	SOIL DESCRIPTION	CLAYSTONE (CLAY, WITH SAND)
DEPTH (FT)	1-3	SOIL TYPE	2, CBR



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	
10	100.0%
20	98.6%
40	97.3%
100	93.2%
200	86.5%

ATTERBERG LIMITS

Plastic Limit	23
Liquid Limit	48
Plastic Index	25

SOIL CLASSIFICATION

USCS CLASSIFICATION:	CL
AASHTO CLASSIFICATION:	A-7-6
AASHTO GROUP INDEX:	23

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LABORATORY TEST RESULTS

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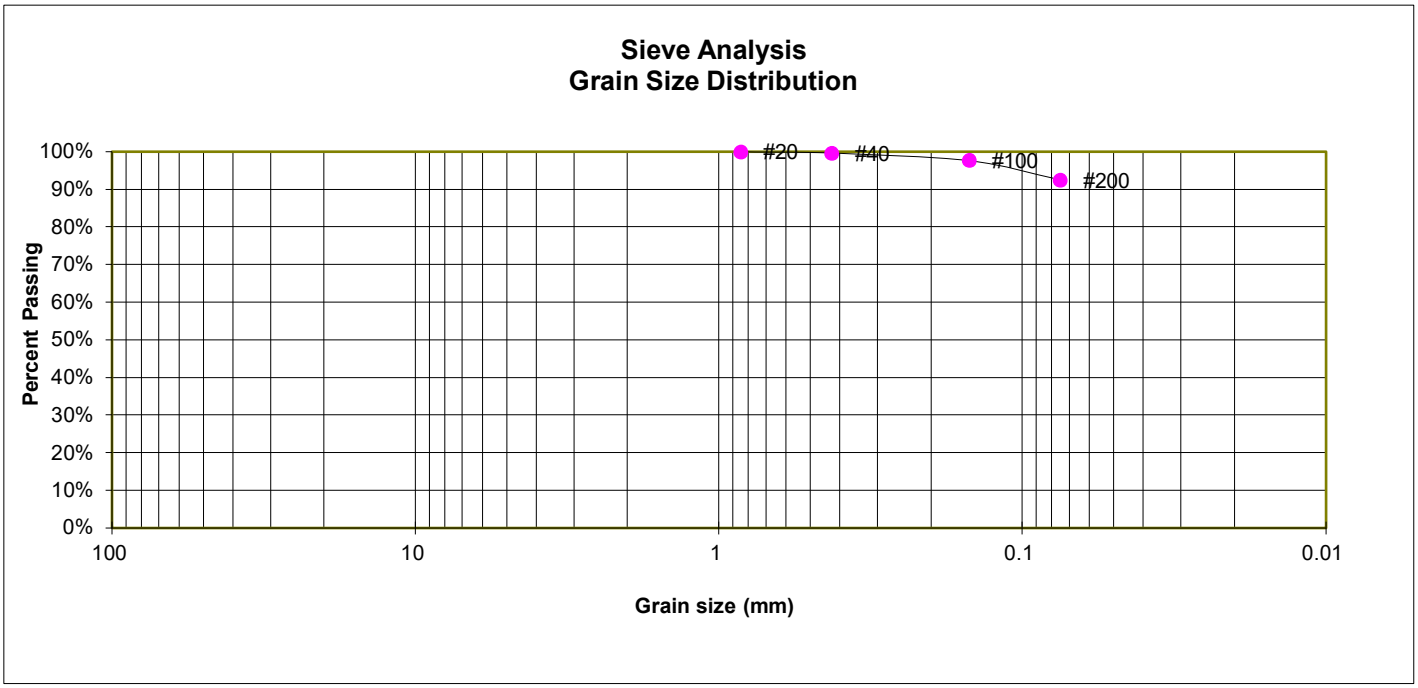
FIG. B-2

TEST BORING	1	SOIL DESCRIPTION	CLAYSTONE (CLAY, SL. SANDY)
DEPTH (FT)	1-2	SOIL TYPE	2



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	
10	
20	100.0%
40	99.7%
100	97.7%
200	92.5%

ATTERBERG LIMITS

Plastic Limit	28
Liquid Limit	54
Plastic Index	26

SOIL CLASSIFICATION

USCS CLASSIFICATION:	CH
AASHTO CLASSIFICATION:	A-7-6
AASHTO GROUP INDEX:	28

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LABORATORY TEST RESULTS

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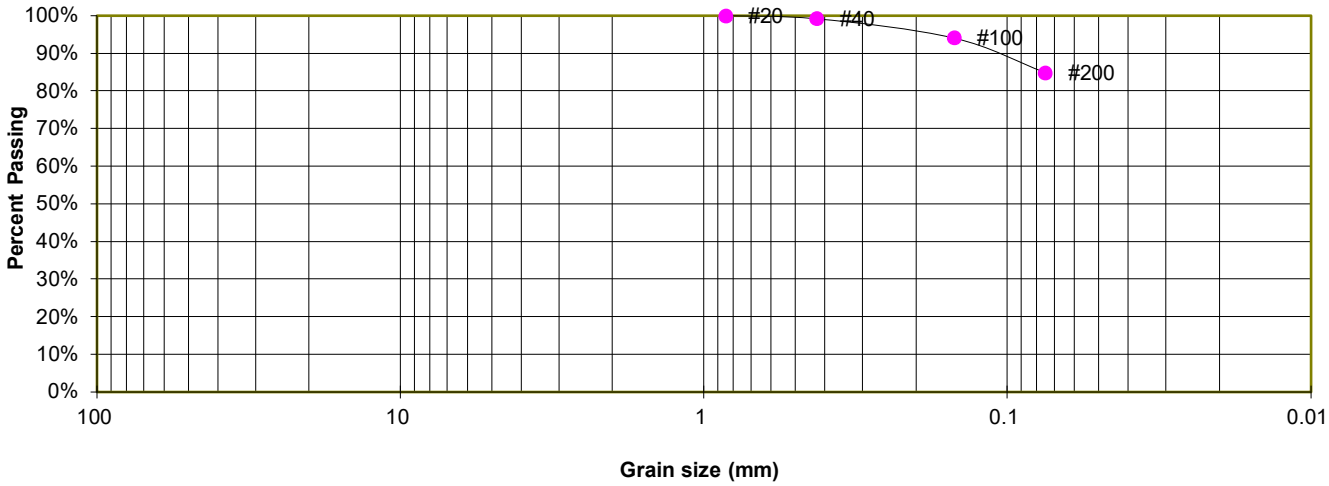
FIG. B-3

TEST BORING	3	SOIL DESCRIPTION	SHALE (CLAY, WITH SAND)
DEPTH (FT)	1-2	SOIL TYPE	2



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	
10	
20	100.0%
40	99.3%
100	94.1%
200	84.9%

ATTERBERG LIMITS

Plastic Limit	22
Liquid Limit	44
Plastic Index	22

SOIL CLASSIFICATION

USCS CLASSIFICATION:	CL
AASHTO CLASSIFICATION:	A-7-6
AASHTO GROUP INDEX:	19

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LABORATORY TEST RESULTS

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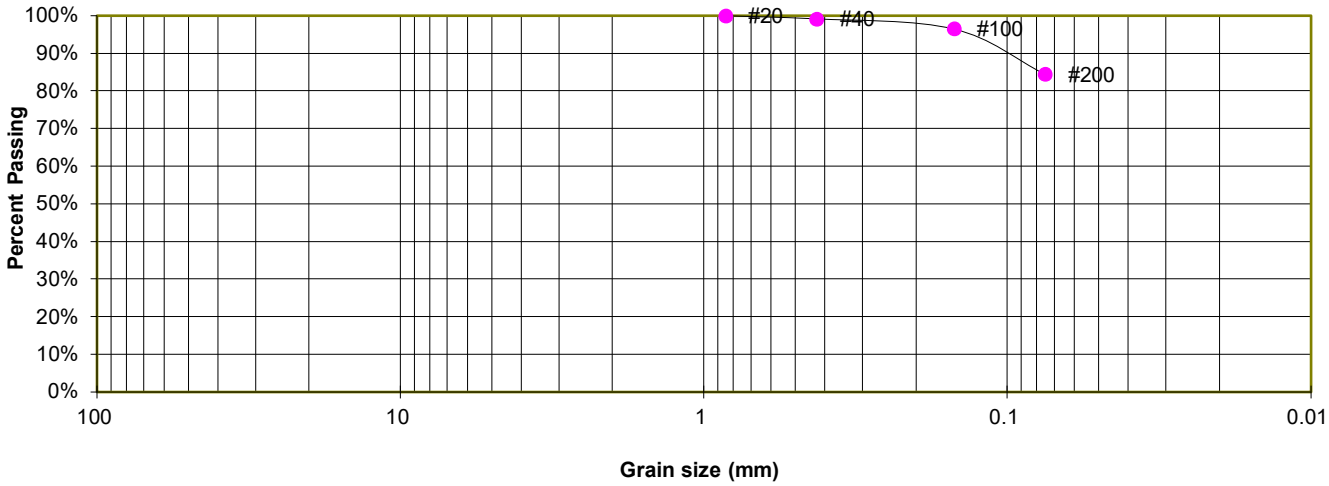
FIG. B-4

TEST BORING	4	SOIL DESCRIPTION	CLAYSTONE (CLAY, WITH SAND)
DEPTH (FT)	1-2	SOIL TYPE	2



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	
10	
20	100.0%
40	99.2%
100	96.5%
200	84.5%

ATTERBERG LIMITS

Plastic Limit	25
Liquid Limit	44
Plastic Index	19

SOIL CLASSIFICATION

USCS CLASSIFICATION:	CL
AASHTO CLASSIFICATION:	A-7-6
AASHTO GROUP INDEX:	17

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LABORATORY TEST RESULTS

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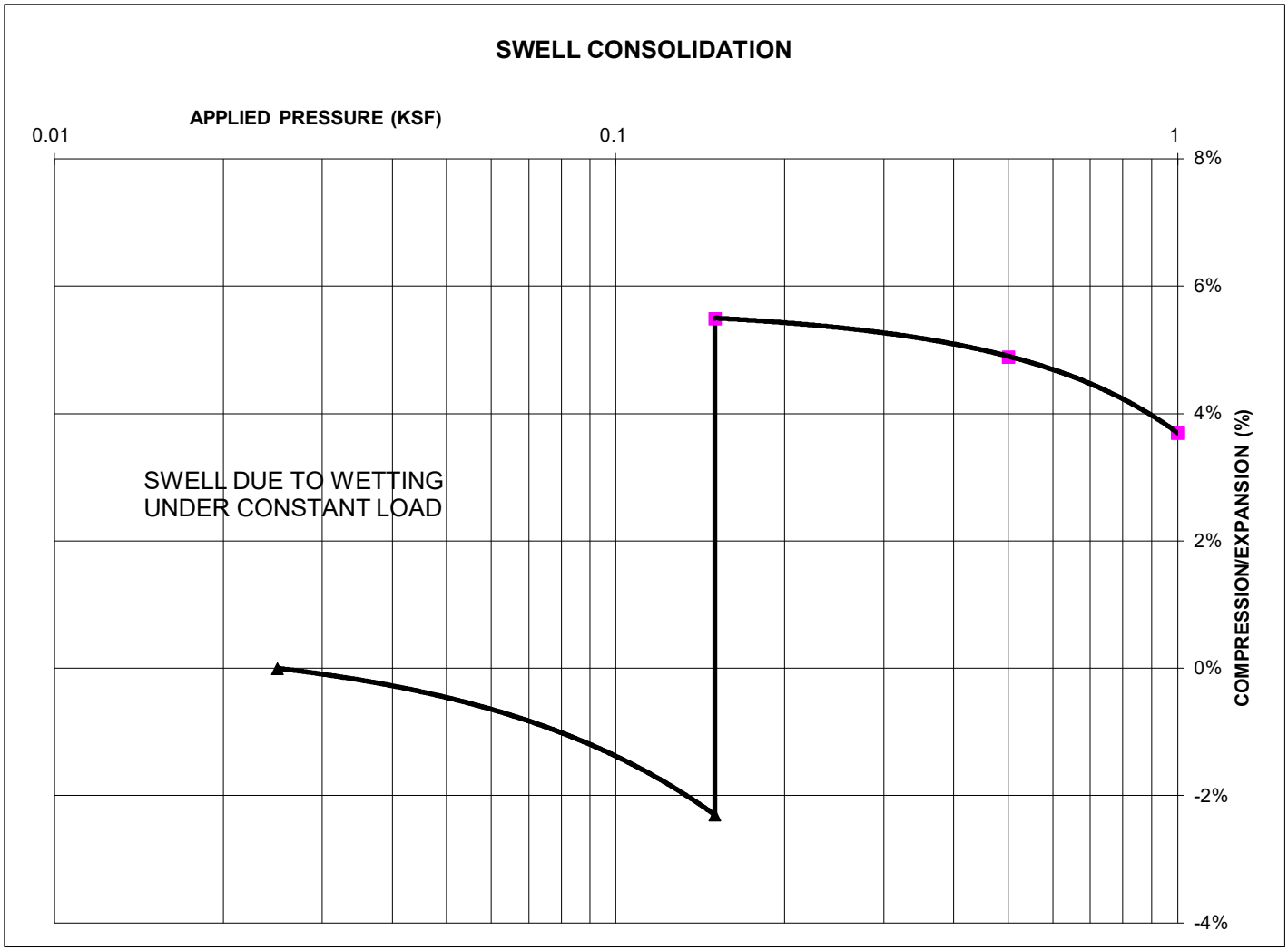
FIG. B-5

TEST BORING	1	SOIL DESCRIPTION	CLAYSTONE (CLAY, SL. SANDY)
DEPTH (FT)	1-2	SOIL TYPE	2



SWELL/COLLAPSE TEST RESULTS

NATURAL UNIT DRY WEIGHT (PCF): 115
NATURAL MOISTURE CONTENT: 15.6%
SWELL/COLLAPSE (%): 7.8%

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SWELL TEST RESULTS

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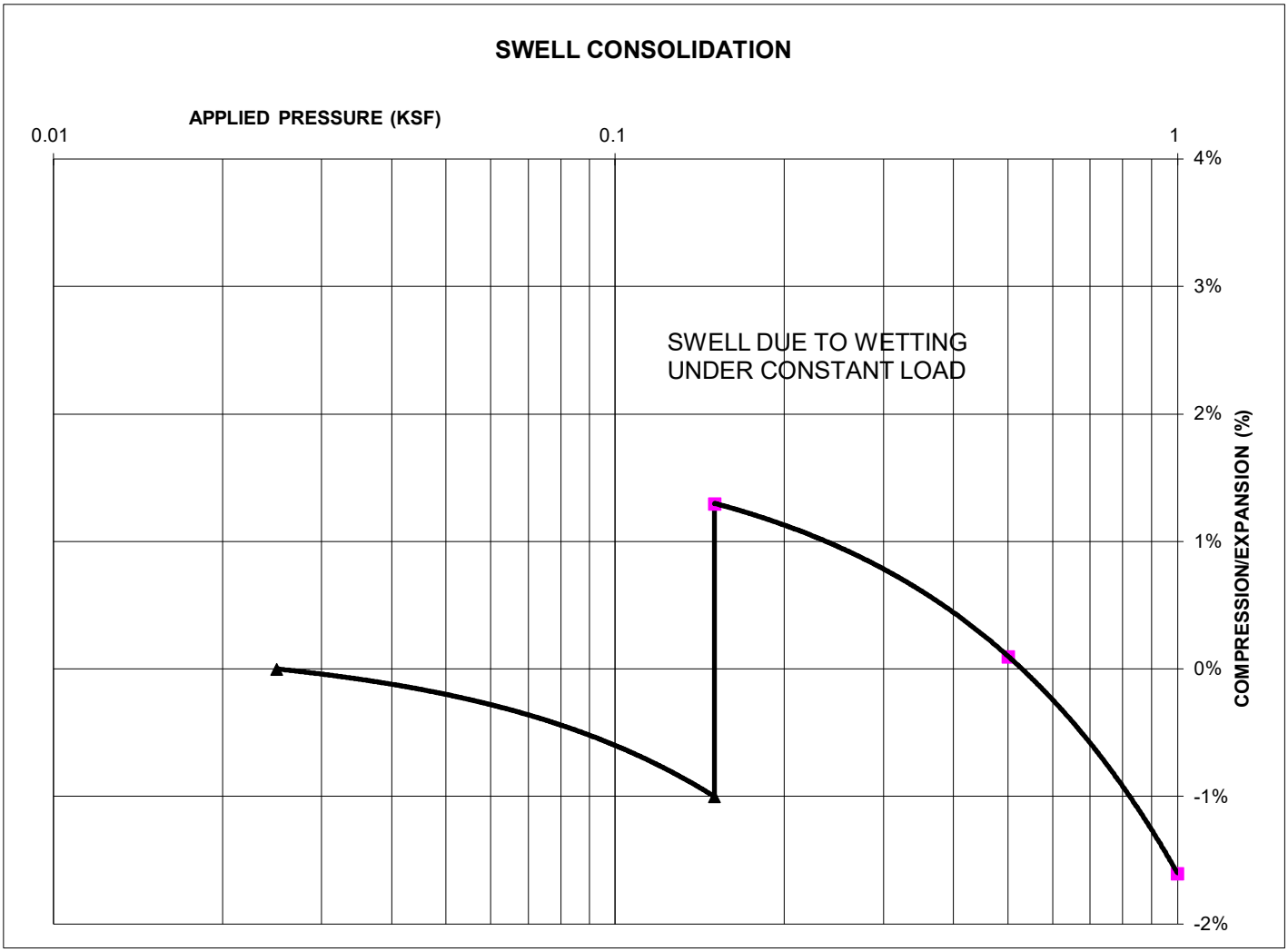
FIG. B-6

TEST BORING	3	SOIL DESCRIPTION	SHALE (CLAY, WITH SAND)
DEPTH (FT)	1-2	SOIL TYPE	2



SWELL/COLLAPSE TEST RESULTS

NATURAL UNIT DRY WEIGHT (PCF): 112
NATURAL MOISTURE CONTENT: 12.0%
SWELL/COLLAPSE (%): 2.3%

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SWELL TEST RESULTS

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FIG. B-7

TEST BORING	4	SOIL DESCRIPTION	CLAYSTONE (CLAY, WITH SAND)
DEPTH (FT)	1-2	SOIL TYPE	2

SWELL/COLLAPSE TEST RESULTS

NATURAL UNIT DRY WEIGHT (PCF): 115
NATURAL MOISTURE CONTENT: 13.8%
SWELL/COLLAPSE (%): 2.7%

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SWELL TEST RESULTS

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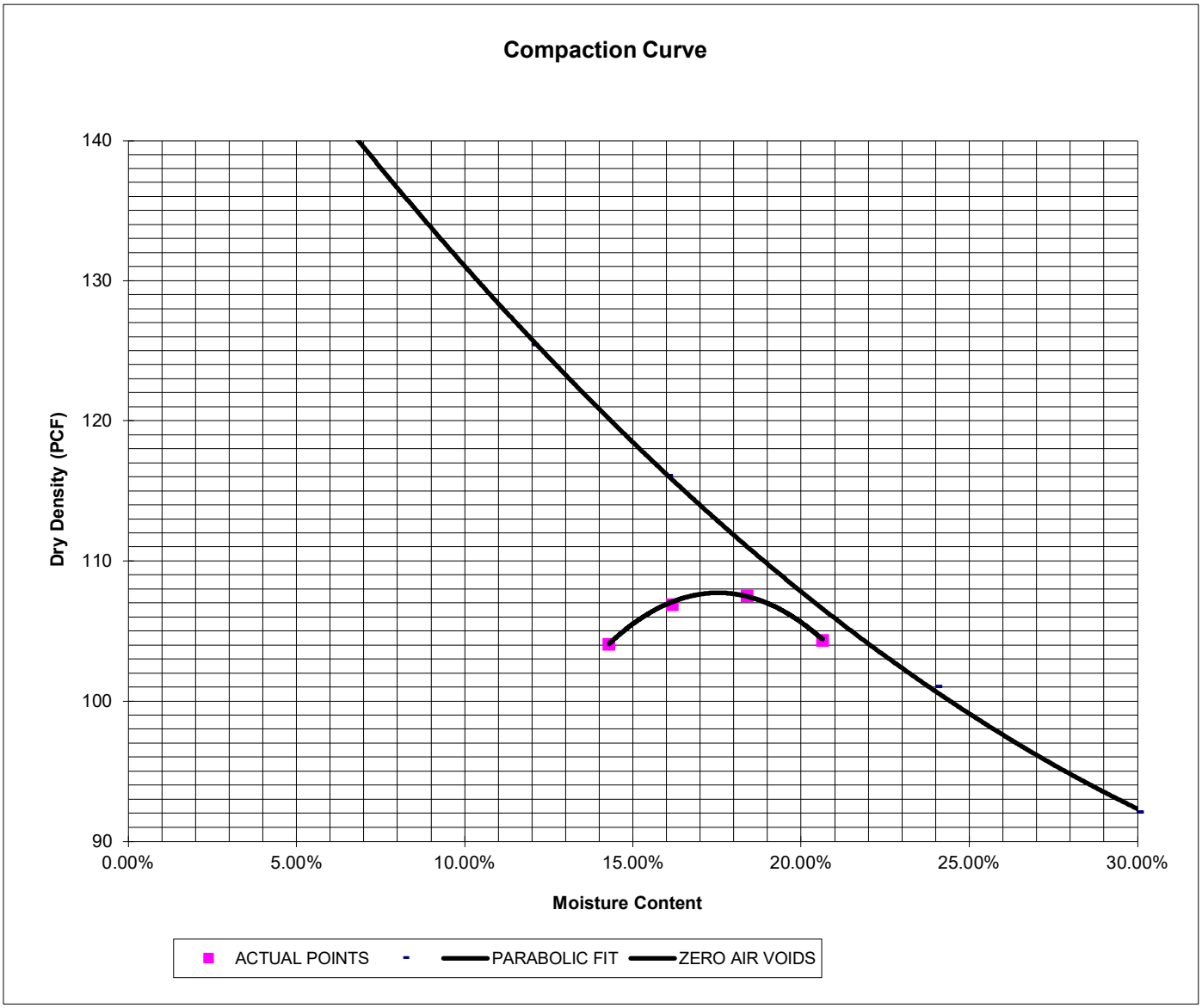
FIG. B-8

SAMPLE LOCATION TB-1 @ 1-3' | SOIL DESCRIPTION CLAYSTONE (CLAY, SL. SANDY)
SOIL TYPE 1

PROCTOR DATA

IDENTIFICATION:	CH
PROCTOR TEST #:	1
TEST BY:	DK
TEST DESIGNATION:	ASTM-698-A
MAXIMUM DRY DENSITY (PCF):	106.9
OPTIMUM MOISTURE:	17.6



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LABORATORY TEST RESULTS

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JOB NO. 252188

FIG. B-9

SAMPLE LOCATION TB-1 @ 1-3' | SOIL DESCRIPTION CLAYSTONE (CLAY, SL. SANDY)
SOIL TYPE 2

CBR TEST LOAD DATA

Piston Diameter (cm): 4.958
Piston Area (in^2): 2.993

Penetration Depth (inches)	*10 BLOWS* Mold # 1 Load (lbs)	Stress (psi)	*25 BLOWS* Mold # 2 Load (lbs)	Stress (psi)	*56 BLOWS* Mold # 3 Load (lbs)	Stress (psi)
0.000	0	0.00	0	0.00	0	0.00
0.025	42	14.04	65	21.72	110	36.76
0.050	49	16.37	78	26.07	125	41.77
0.075	52	17.38	85	28.40	132	44.11
0.100	55	18.38	92	30.74	142	47.45
0.125	60	20.05	102	34.09	148	49.46
0.150	66	22.06	107	35.76	152	50.79
0.175	70	23.39	112	37.43	155	51.80
0.200	73	24.39	107	35.76	158	52.80
0.300	72	24.06	115	38.43	181	60.48
0.400	77	25.73	132	44.11	210	70.18
0.500	80	26.73	142	47.45	231	77.19

MOISTURE AND DENSITY DATA

	Mold # 1	Mold # 2	Mold # 3
Can #	506	5007	508
Wt. Can	8.39	8.37	8.45
Wt. Can+Wet	231.74	262.78	242.05
Wt. Can+Dry	183.1	210.48	197.84
Wt. H20	48.64	52.3	44.21
Wt. Dry Soil	174.71	202.11	189.39
Moisture Content	27.84%	25.88%	23.34%
Wet Density (PCF)	110.6	118.2	124.4
Dry Density (PCF)	94.1	100.5	105.8
% Compaction	88%	94%	99%
CBR	1.84	3.07	4.75

PROCTOR DATA

Maximum Dry Density (pcf)	106.9
Optimum Moisture	17.6
90% of Max. Dry Density (pcf)	96.2
95% of Max. Dry Density (pcf)	101.6

CBR at 90% of Max. Density = 2.2 ~ R VALUE 6
CBR at 95% of Max. Density = 3.4 ~ R VALUE 7.5

ENTECH ENGINEERING, INC.

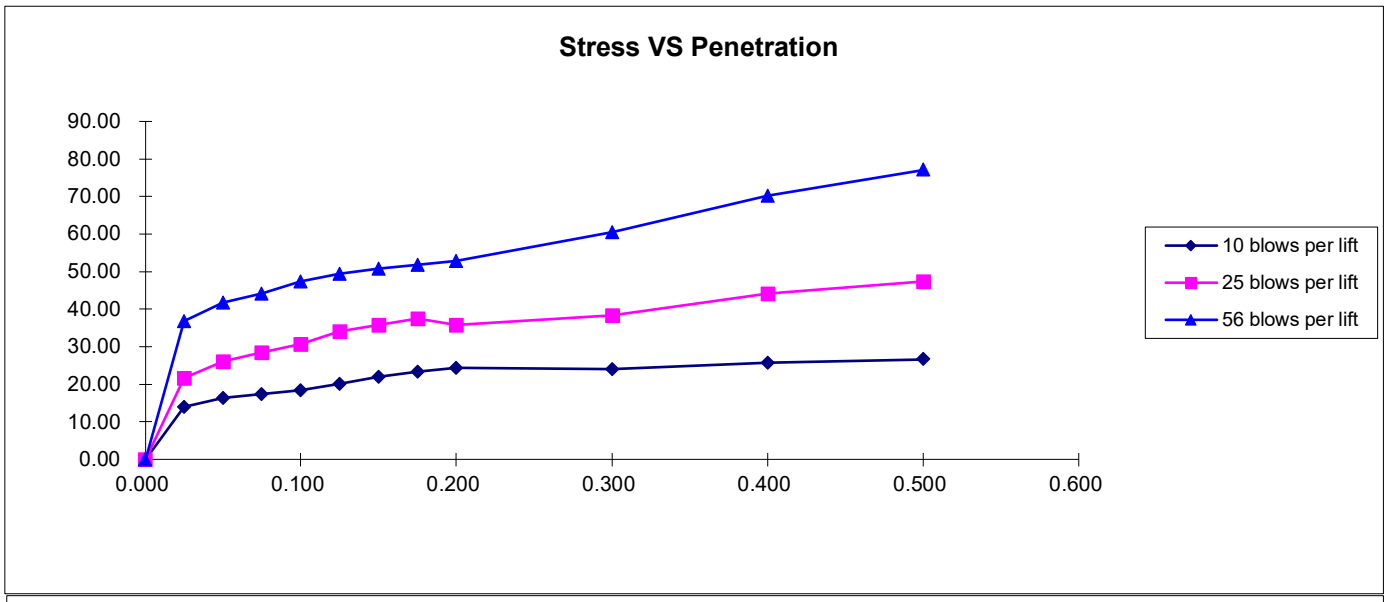
LABORATORY TEST RESULTS

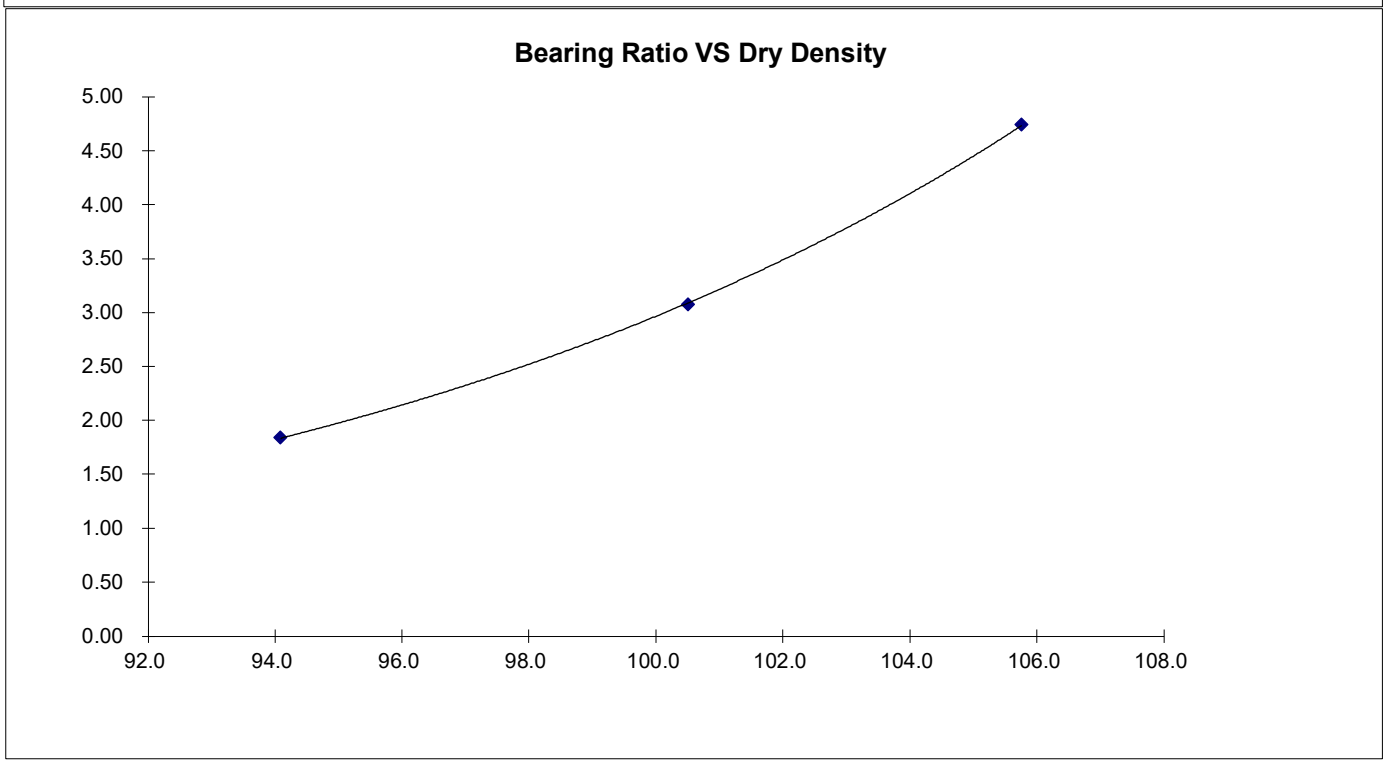
TRAILS AT ASPEN RIDGE, FILING NO. 3, PHASE 2
COLA, LLC

JOB NO. 252188

FIG. B-10

SAMPLE LOCATION TB-1 @ 1-3' | SOIL DESCRIPTION CLAYSTONE (CLAY, SL. SANDY)
SOIL TYPE 2





ENTECH ENGINEERING, INC.

LABORATORY TEST RESULTS

TRAILS AT ASPEN RIDGE, FILING NO. 3, PHASE 2
COLA, LLC

JOB NO. 252188

FIG. B-11

APPENDIX C: Pavement Design Calculations

FLEXIBLE PAVEMENT DESIGN

PROJECT DATA

Project Location: Trails at Aspen Ridge, Filing No. 3, Phase 2

Job Number: 252188

DESIGN DATA

Equivalent (18-kip) Single Axle Load Applications (ESAL):	ESAL (W_{18}) =	292,000	
Design CBR	CBR =	3.4	
Standard Deviation	S_o =	0.45	
Loss in Serviceability	Δpsi =	2.5	
Reliability	Reliability =	80	
Reliability (z-statistic)	Z_R =	-0.84	
Soil Resilient Modulus	M_R =	5,100	psi

Required Structural Number (SN): → SN = 2.91

DESIGN EQUATIONS

Resilient Modulus

If using CBR: $M_R = (CBR) \times 1{,}500$

If using R-Value: $M_R = 10^{[(S_1 + 18.72) / 6.24]}$ where: $S_1 = [(R\text{-value} - 5) / 11.29] + 3$

Required Structural Number

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

Pavement Section Thickness

$SN^* = C_1D_1 + C_2D_2$ where:

C_1 = Strength Coefficient - HMA

C_2 = Strength Coefficient - ABC/RCB

D_1 = Depth of HMA (inches)

D_2 = Depth of ABC/RCB (inches)

RECOMMENED THICKNESSES

Layer	Material	Structural Layer	Thickness (D^*_i)	SN^*_i	SN
1	HMA	C_1 = 0.44	5.0 inches	2.200	-
2	ABC/RCB	C_2 = 0.11	8.0 inches	0.880	
			SN* =	3.080	2.91

Pavement SN > Required SN, Design is Acceptable

FIG. C-1