November 18, 2019
Revised February 12, 2020

ENTECH
ENGINEERING, INC.

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COLORADO SPRINGS, CO 80907
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Tech Contractors
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San Diego, California 92110

Approved
by Elizabeth Nijkamp
El Paso County Planning and Community Development
on behalf of Jennifer Irvine, County Engineer
02/18/2020 3:56:52 PM

Attn: Raul Guzman

Re: Pavement Recommendations-Revised
Stonebridge, Filing 4
El Paso County, Colorado

SF 18-023

Dear Mr. Guzman:

As requested, Entech Engineering, Inc. has obtained samples of the subgrade soils from sections of the roadways in the Stonebridge Subdivision, Filing 4, in El Paso County, Colorado. Laboratory testing to determine the pavement support characteristics of the soils was performed. This letter presents the results of the laboratory testing and pavement recommendations for the roadways.

Project Description

The roadways in this project consist of two roadways: Meridian Hills Trail and a portion of Granite Ridge Drive from Enclave Scenic Drive to Meridian Hills Trail. The site layout and the locations of the test borings, drilled at approximate 500-foot intervals, are shown on the Test Boring Location Plan, Figure 1.

Subgrade Conditions

Thirteen exploratory test borings were drilled in the roadways to depths of approximately 5 to 10 feet. The Boring Logs are presented in Appendix A. Based on the test results, two general soil types were encountered at the subgrade depth. Sieve Analysis and Atterberg Limit testing were performed on soil samples obtained from the test borings for the purpose of classification. Sieve analyses performed on the subgrade soils indicated the percent passing the No. 200 sieve ranged from 14 to 35 percent for the Type 1 soils, 36 to 41 percent for the Type 2 soils. Atterberg Limit Tests performed on samples resulted in Liquid Limits ranging from 27 to 37 and no value and Plastic Indexes of 12 to 21 and non-plastic. Soil Type 1 consisted of silty to clayey sand fill which classified as A-1-b and A-2-6 soils based on the AASHTO classification system. The Type 2, 3, and 4 subgrade soils consisted of very clayey sand fill, very clayey sand, and very clayey sandstone which classified as A-6 soils. The deeper Type 4 soils classified as silty sandstone (below the subgrade influence zone) which classified as A-2-4. Soil Type 2 will group Types 2, 3, and 4 together due to their similarities. Type 1 subgrade soils encountered on this site typically have good pavement support characteristics; whereas, the Type 2 subgrade soils typically have poor to fair pavement support characteristics. Sulfate testing of the subgrade indicated that the soils exhibit a negligible potential for sulfate attack. Groundwater was not encountered in the test borings.

Swell/Consolidation testing was conducted on the Type 1 through Type 4 soils which showed swells ranging between 0.2 and 0.9 percent. These limits are below the level in which mitigation is required (2.0 percent). These results indicate that soil mitigation due to expansive soils is not required for the roadway sections investigated. Laboratory test results are presented in Appendix B and are summarized on Table 1.

California Bearing Ratio (CBR) testing was performed on a sample of the Soil Type 1 subgrade soils obtained from Test Boring No. 17. The results of the CBR and classification testing are summarized in Table 1 and presented in the following tables, and in Appendix B, attached.

Samples of the Soil Type 2 soils were not obtained from the borings during drilling. Since the Type 2 soils classify as A-6 soils, the data from a similar soil test from an adjacent filing were used to calculate the Type 2 sections. The results of the CBR testing from Stonebridge Filing # 3 were used for the Type 2 soils. The CBR and laboratory test results for the Type 2 materials from the adjacent filing are attached in Appendix D.

Soil Type 1 – Clayey Sand Fill
R @ 90% = 26.0
R @ 95% = 45.0
Use R = 40.0 for design

Classification Testing

Liquid Limit	31
Plasticity Index	18
Percent Passing 200	31.3
AASHTO Classification	A-2-6
Group Index	1
Unified Soils Classification	SC

Soil Type 2 – Very Sandy Clay Fill
R @ 90% = 1.0
R @ 95% = 7.5
Use R = 7.5 for design

Classification Testing

Liquid Limit	33
Plasticity Index	20
Percent Passing 200	57.4
AASHTO Classification	A-6
Group Index	8
Unified Soils Classification	CL

Pavement Design

The CBR testing was used to determine pavement sections for this site. The pavement sections were determined utilizing the El Paso County "Pavement Design Criteria and Report". The Meridian Hills Trail cul-de-sac classifies as a local low-volume roadway which used an 18K ESAL value of 36,500 for design. Granite Ridge Drive and Meridian Hills Trail (south of Granite Ridge Drive) classify as urban local roads, which used an 18K ESAL value of 292,000 for design. Pavement alternatives for asphalt over aggregate basecourse and cement stabilized subgrade sections are provided. Design parameters used in the pavement analysis are as follows:

Reliability (Local Roads)	80%
Serviceability Index Local Low Volume, Local Roads	2.2
"R" Value Subgrade Soil Type 1 Soil Type 2	40.0 7.5
Resilient Modulus Soil Type 1 Soil Type 2	9,497 psi 3,283 psi
Structural Coefficients:	
Hot Bituminous Pavement	0.44
Aggregate Basecourse	0.11
Cement Stabilized Subgrade	0.12

Pavement calculations are attached in Appendix C. Pavement sections recommended for the site are summarized as follows:

Pavement Sections – Soil Type 1

Urban Local (low-volume) – ESAL = 36,500 – Meridian Hills Trail (cul-de-sac)

Alternative	Asphalt (in)	Basecourse (in)	Cement Stabilized Subgrade (in.)
1. Asphalt Over Basecourse	3.0*	4.0*	--
2. Cement Stabilized Subgrade	4.0	--	10.0

Urban Local – ESAL = 292,000 - Meridian Hills Trail and Granite Ridge Drive

Alternative	Asphalt (in)	Basecourse (in)	Cement Stabilized Subgrade (in.)
1. Asphalt Over Basecourse	3.5	8.0	--
2. Cement Stabilized Subgrade	4.0	--	10.0

Pavement Sections – Soil Types 2, 3, AND 4

Urban Local (low-volume) – ESAL = 36,500 – Meridian Hills Trail (cul-de-sac)

Alternative	Asphalt (in)	Basecourse (in)	Cement Stabilized Subgrade (in.)
1. Asphalt Over Basecourse	4.0	7.0	--
2. Cement Stabilized Subgrade	4.0	--	10.0

Urban Local – ESAL = 292,000 - Meridian Hills Trail and Granite Ridge Drive

Alternative	Asphalt (in)	Basecourse (in)	Cement Stabilized Subgrade (in.)
1. Asphalt Over Basecourse	5.0	12.0	--
2. Cement Stabilized Subgrade	5.0	--	10.0

* Minimum sections required by the El Paso County Pavement Design Criteria and Report.

Mitigation

El Paso County criteria requires mitigation of expansive soils for roadway subgrade that have a swell of 2 percent or greater with a 150 pound per square foot surcharge. Samples tested resulted in consolidations of 0.1 to 0.2 percent and swells of 0.2 to 0.9 percent under a 150 pound per square foot surcharge. Overexcavation due to expansive soils is not required on the roadway sections included in this investigation. It should also be noted that the roadway soils were moisture-conditioned and compacted during the utility installations.

Roadway Construction - Asphalt on Aggregate Base Course Alternative

Prior to placement of the asphalt, the subgrade should be proofrolled and compacted to a minimum of 95 percent of its maximum Modified Proctor Dry Density, ASTM D-1557 at ±2 percent of optimum moisture content. 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, ASTM D-1557 at ±2 percent of optimum moisture content. Special attention should be given to areas adjacent to manholes, inlet structures and valves.

Roadway Construction – Cement Stabilized Subgrade Alternative

Prior to placement of the asphalt, the subgrade shall be stabilized by addition of cement to a depth of at least 10 inches. The amount of cement applied shall be 2.0 percent (by weight) of the subgrade's maximum dry density as determined by the Standard Proctor Test (ASTM D-698) based on laboratory cement stabilization testing. The cement should be spread evenly on the subgrade surface and be thoroughly mixed into the subgrade over a 10-inch depth such that a uniform blend of soil and cement is achieved. Prior to application or mixing of the cement, the upper 10 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). 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.

If significant grading is performed, the soils at subgrade may change. Modification to the pavement sections should be evaluated after site grading is completed.

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

We trust that this has provided you with the information you required. If you have any questions or need additional information, please do not hesitate to contact us.

Respectfully Submitted,

ENTECH ENGINEERING, INC.

Daniel P Stegman

DPS/ao

Encl.

Entech Job No. 191439
AAprojects/2019/191439/191439 pr-rev

Reviewed by:

Mark H. Hauschild, P.E.
Senior Engineer

TABLE

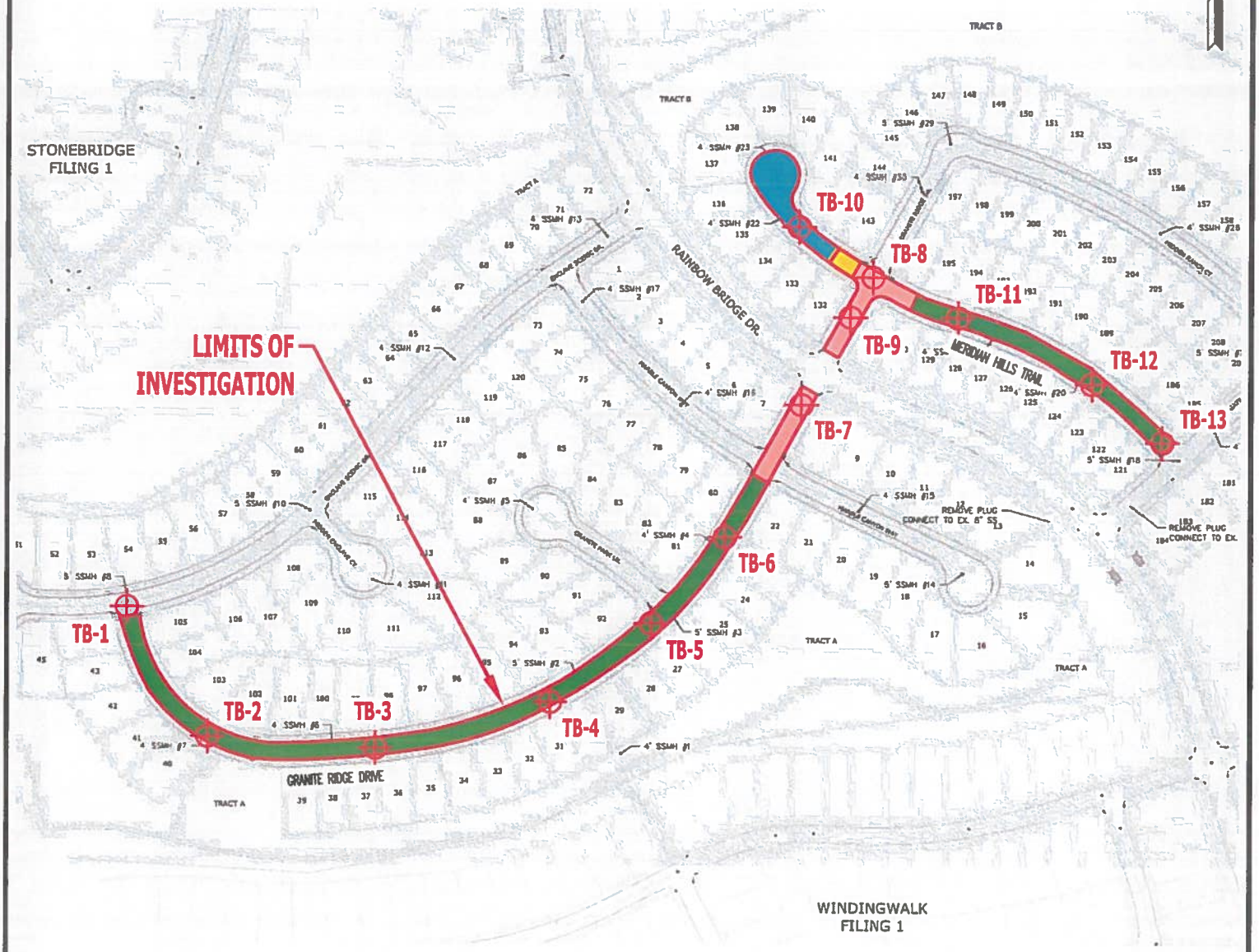
TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

CLIENT TECH CONTRACTORS
PROJECT STONEBRIDGE, FILING 4
JOB NO. 191439

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	7	0-2			31.3	31	18		A-2-6		SC	FILL, SAND, CLAYEY
1	1	0-3			24.1	29	16		A-2-6		SC	FILL, SAND, CLAYEY
1	1	1-2	8.9	116.2	20.8	27	12		A-2-6	-0.1	SC	FILL, SAND, CLAYEY
1	2	1-2	5.6	113.8	19.0	31	15		A-2-6	-0.2	SC	FILL, SAND, CLAYEY
1	3	1-2			17.3	NV	NP		A-1-b		SM	FILL, SAND, SILTY
1	4	1-2			17.4	NV	NP		A-1-b		SM	FILL, SAND, SILTY
1	5	1-2			23.4	NV	NP		A-1-b		SM	FILL, SAND, SILTY
1	6	1-2			17.6	NV	NP		A-1-b		SM	FILL, SAND, SILTY
1	7	1			14.4	NV	NP	0.01	A-1-b		SM	FILL, SAND, SILTY
1	9	1-2	11.1	120.2	34.8	36	19		A-2-6	0.9	SC	FILL, SAND, CLAYEY
1	10	1-2			15.5	NV	NP		A-1-b		SM	FILL, SAND, SILTY
1	11	1-2	9.0	107.9	20.4	30	13		A-2-6	-0.1	SC	FILL, SAND, CLAYEY
1	12	1-2	8.9	110.4	18.8	32	16		A-2-6	-0.1	SC	FILL, SAND, CLAYEY
1	6	5			15.5	35	20	<0.01	A-2-6		SC	FILL, SAND, CLAYEY
2	13	1-2	8.9	115.0	40.9	37	21		A-6	0.2	SC	FILL, SAND, VERY CLAYEY
3	7	2	10.3	116.5	48.5	35	18	<0.01	A-6	0.5	SC	SAND, VERY CLAYEY
3	1	10	16.6	109.9	50.5	28	10	<0.01	A-4	0.5	CL	CLAY, VERY SANDY
4	7	5	10.0	118.6	35.8	34	18		A-6	0.8	SC	SANDSTONE, VERY CLAYEY
4	8	1-2	9.8	119.8	35.9	28	13		A-6	0.3	SC	SANDSTONE, VERY CLAYEY
4	9	10			14.7	NV	NP		A-2-4		SM	SANDSTONE, SILTY
4	13	10			14.3	NV	NP		A-2-4		SM	SANDSTONE, SILTY

FIGURE



NOTES:

: URBAN LOCAL LOW VOLUME – SOIL TYPE 1: (36,500) – 3.0" ASPHALT OVER 4.0" BASECOURSE, OR 4.0" ASPHALT OVER 10.0" OF CEMENT–TREATED SUBGRADE.

: URBAN LOCAL LOW VOLUME – SOIL TYPES 2, 3, & 4: (36,500) – 4.0" ASPHALT OVER 7.0" BASECOURSE, OR 4.0" ASPHALT OVER 10.0" OF CEMENT–TREATED SUBGRADE.

: URBAN LOCAL – (292,000) – SOIL TYPE 1: 3.5" ASPHALT OVER 8.0" BASECOURSE, OR 4.0" ASPHALT OVER 10.0" OF CEMENT–TREATED SUBGRADE.

: URBAN LOCAL – (292,000) – SOIL TYPES 2, 3, & 4: 5.0" ASPHALT OVER 12.0" BASECOURSE, OR 5.0" ASPHALT OVER 10.0" OF CEMENT–TREATED SUBGRADE.

TB-2 - APPROXIMATE TEST BORING LOCATION AND NUMBER

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TEST BORING LOCATION PLAN
STONEBRIDGE, FILING 4
EL PASO COUNTY, CO
FOR: TECH CONTRACTORS

DRAWN BY:	DATE DRAWN:	DESIGNED BY:	CHECKED:
SC	09/19/19	SC	SC

JOB NO.: 191439

FIG. NO.: 1

APPENDIX A: Test Boring Logs

TEST BORING NO. 1
DATE DRILLED 8/26/2019
Job # 191439

REMARKS

DRY TO 10', 8/26/19

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
FILL 0-9', SAND, CLAYEY, FINE TO COARSE GRAINED, BROWN, LOOSE, MOIST			5	8.2	1
5			9	9.9	1
CLAY, VERY SANDY, GRAY BROWN, FIRM, MOIST 10			11	13.7	3
15					
20					

TEST BORING NO. 2
DATE DRILLED 8/26/2019
CLIENT TECH CONTRACTORS
LOCATION STONEBRIDGE, FILING 4

REMARKS

DRY TO 5', 8/26/19

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
FILL 0-5', SAND, CLAYEY, FINE TO COARSE GRAINED, BROWN, MEDIUM DENSE, MOIST			14	5.1	1
5			20	5.7	1
10					
15					
20					

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TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE: 9/17/19

JOB NO.: 191439
FIG NO.: A- 1

TEST BORING NO. 3
DATE DRILLED 8/26/2019
Job # 191439

REMARKS

DRY TO 5', 8/26/19

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
0						FILL 0-5', SAND, SILTY, FINE TO COARSE GRAINED, BROWN, LOOSE, MOIST
			6	5.4	1	
5			4	6.9	1	
10						
15						
20						

TEST BORING NO. 4
DATE DRILLED 8/26/2019
CLIENT TECH CONTRACTORS
LOCATION STONEBRIDGE, FILING 4

REMARKS

DRY TO 5', 8/26/19

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
0						FILL 0-5', SAND, SILTY, FINE TO COARSE GRAINED, BROWN, MEDIUM DENSE, MOIST
			26	6.3	1	
5			17	6.7	1	
10						
15						
20						

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TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE: 9/13/19

JOB NO.: 191439
FIG NO.: A- 2

TEST BORING NO. 5
DATE DRILLED 8/26/2019
Job # 191439

REMARKS

DRY TO 10', 8/26/19

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
FILL 0-10', SAND, SILTY, FINE TO COARSE GRAINED, BROWN, MEDIUM DENSE, MOIST			20	5.8	1
CLAY POCKETS			23	8.8	1
10			22	7.2	1
15					
20					

TEST BORING NO. 6
DATE DRILLED 8/26/2019
CLIENT TECH CONTRACTORS
LOCATION STONEBRIDGE, FILING 4

REMARKS

DRY TO 5', 8/26/19

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
FILL 0-5', SAND, SILTY, FINE TO COARSE GRAINED, BROWN, LOOSE TO DENSE, MOIST			7	7.5	1
CLAY POCKETS			39	8.2	1
5					
10					
15					
20					

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TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE: 9/17/19

JOB NO. 191439
FIG NO. A-3

TEST BORING NO. 7
DATE DRILLED 8/26/2019
Job # 191439

REMARKS

DRY TO 5', 8/26/19

FILL 0-1.5', SAND, SILTY, FINE TO COARSE GRAINED, BROWN, MEDIUM DENSE, MOIST

SAND, VERY CLAYEY, FINE GRAINED, GRAY BROWN, MEDIUM DENSE, MOIST

SANDSTONE, VERY CLAYEY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			28	5.6	1
				12.1	3
5			50/8"	9.0	4
10					
15					
20					

TEST BORING NO. 8
DATE DRILLED 8/26/2019
CLIENT TECH CONTRACTORS
LOCATION STONEBRIDGE, FILING 4

REMARKS

DRY TO 5', 8/26/19

SAND, SILTY, TAN

SANDSTONE, VERY CLAYEY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
					1
			50/11"	8.9	4
5			50/7"	9.8	4
10					
15					
20					

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TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		DT	11/7/19

JOB NO.: 191439
FIG NO.: A- 4

TEST BORING NO. 9
DATE DRILLED 8/26/2019
Job # 191439

REMARKS

DRY TO 10', 8/26/19

FILL 0-2', SAND, CLAYEY, FINE TO COARSE GRAINED, BROWN, MEDIUM DENSE, MOIST

SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, DENSE TO VERY DENSE, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			26	7.0	1
5			49	4.8	4
10			50/8"	11.7	4
15					
20					

TEST BORING NO. 10
DATE DRILLED 8/26/2019
CLIENT TECH CONTRACTORS
LOCATION STONEBRIDGE, FILING 4

REMARKS

DRY TO 5', 8/26/19

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

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			15	7.4	1
5			26	7.3	1
10					
15					
20					

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TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
			9/17/19

JOB NO.: 191439
FIG NO.: A- 5

TEST BORING NO. 11
DATE DRILLED 8/26/2019
Job # 191439

REMARKS

DRY TO 5', 8/26/19

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
0						FILL 0-5', SAND, CLAYEY, FINE TO COARSE GRAINED, BROWN, MEDIUM DENSE, MOIST
			19	7.2	1	
5			14	9.0	1	
10						
15						
20						

TEST BORING NO. 12
DATE DRILLED 8/26/2019
CLIENT TECH CONTRACTORS
LOCATION STONEBRIDGE, FILING 4

REMARKS

DRY TO 5', 8/26/19

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
0						FILL 0-5', SAND, CLAYEY, FINE TO COARSE GRAINED, BROWN, MEDIUM DENSE TO LOOSE, MOIST
			15	8.3	1	
5			9	7.8	1	
10						
15						
20						

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TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE: 9/17/19

JOB NO.: 191439
FIG NO.: A- 6

TEST BORING NO. 13
DATE DRILLED 8/26/2019
Job # 191439

TEST BORING NO.
DATE DRILLED
CLIENT TECH CONTRACTORS
LOCATION STONEBRIDGE, FILING 4

REMARKS

DRY TO 10', 8/26/19

REMARKS

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			17	11.0	2
5			17	10.0	2
			50/6"	7.1	4
10					
15					
20					

FILL 0-6', SAND, VERY CLAYEY, FINE TO COARSE GRAINED, BROWN, MEDIUM DENSE, MOIST

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

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	10/24/19

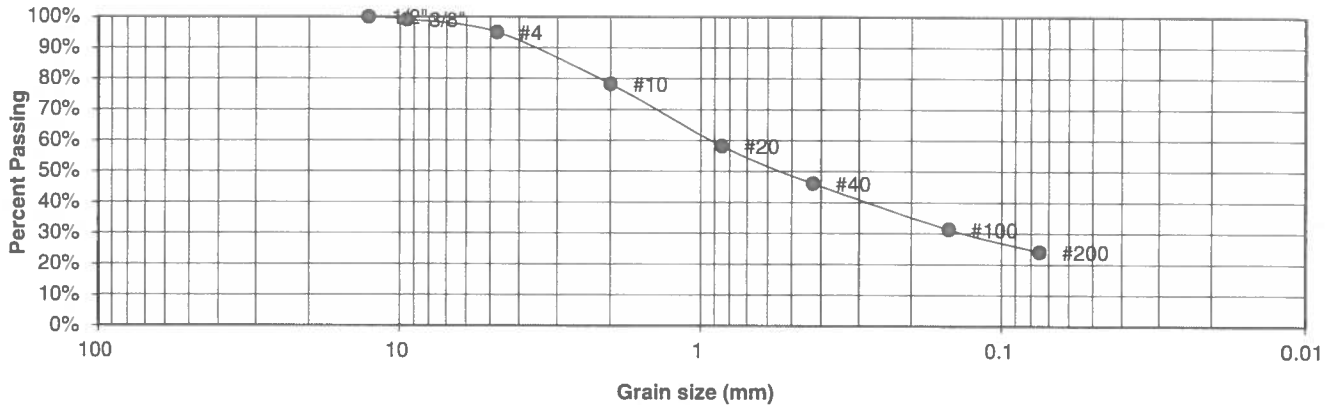
JOB NO.: 191439

FIG NO.: A- 7

APPENDIX B: Laboratory Test Results

UNIFIED CLASSIFICATION	SC	CLIENT	TECH CONTRACTORS
SOIL TYPE #	1	PROJECT	STONEBRIDGE, FILING 4
TEST BORING #	1	JOB NO.	191439
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"	100.0%
3/8"	99.1%
4	95.0%
10	78.2%
20	58.2%
40	46.1%
100	31.3%
200	24.1%

Atterberg Limits

Plastic Limit	13
Liquid Limit	29
Plastic Index	16

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

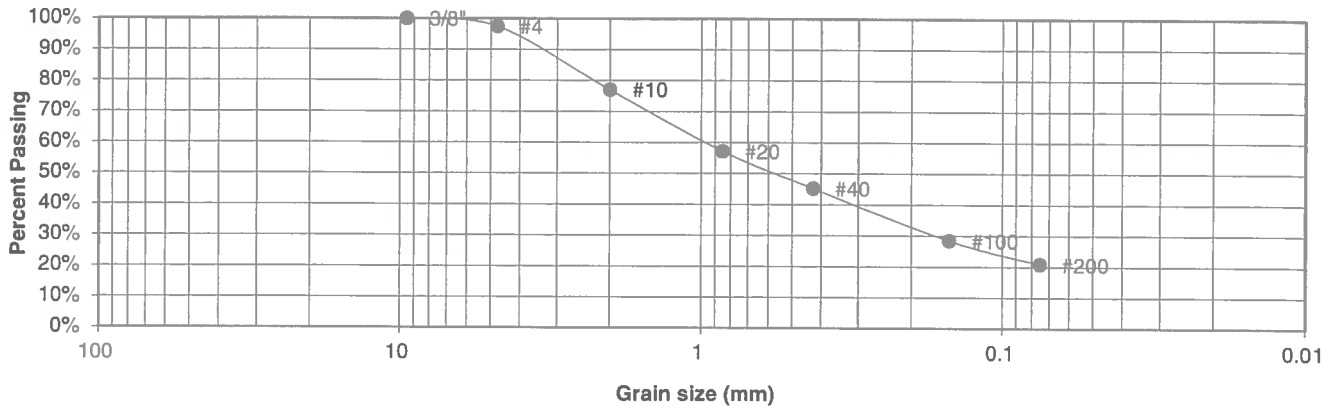
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
			9/17/19

JOB NO.: 191439
FIG NO.: B-1

UNIFIED CLASSIFICATION	SC	CLIENT	TECH CONTRACTORS
SOIL TYPE #	1	PROJECT	STONEBRIDGE, FILING 4
TEST BORING #	1	JOB NO.	191439
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	97.4%
10	77.0%
20	57.2%
40	45.2%
100	28.4%
200	20.8%

Atterberg Limits

Plastic Limit	15
Liquid Limit	27
Plastic Index	12

Swell

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

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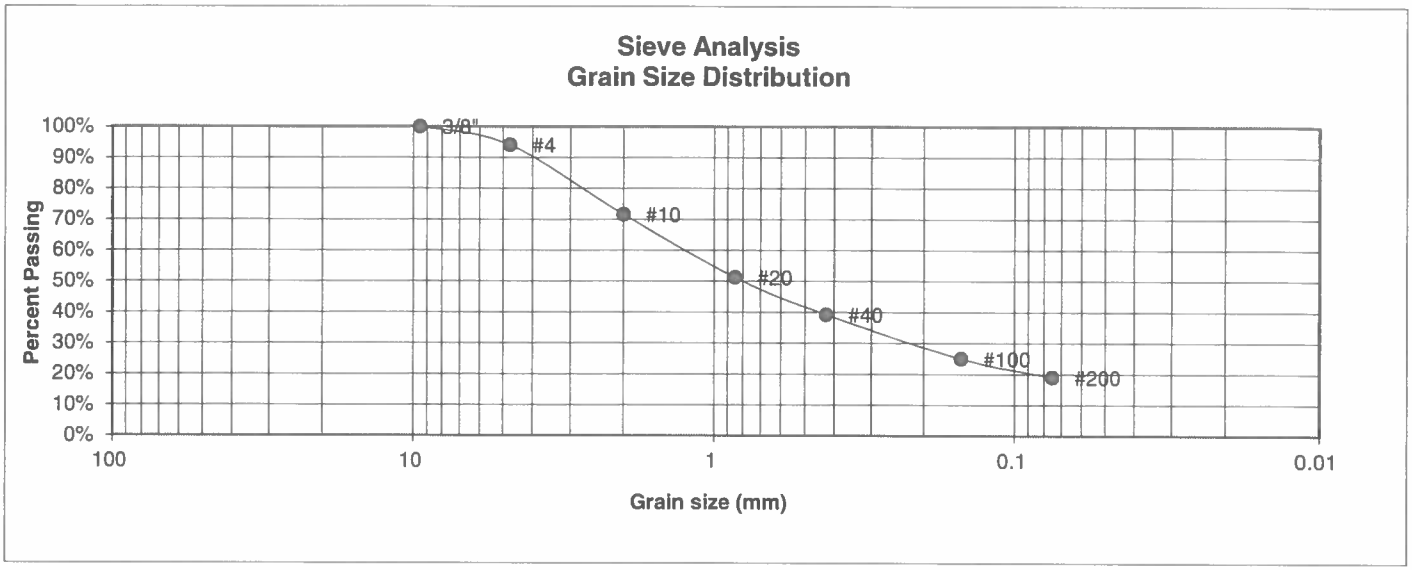
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE: 9/17/19

JOB NO.: 191439
FIG NO.: B-2

UNIFIED CLASSIFICATION	SC	CLIENT	TECH CONTRACTORS
SOIL TYPE #	1	PROJECT	STONEBRIDGE, FILING 4
TEST BORING #	2	JOB NO.	191439
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	94.1%
10	71.6%
20	51.3%
40	39.2%
100	25.0%
200	19.0%

Atterberg Limits	
Plastic Limit	16
Liquid Limit	31
Plastic Index	15

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

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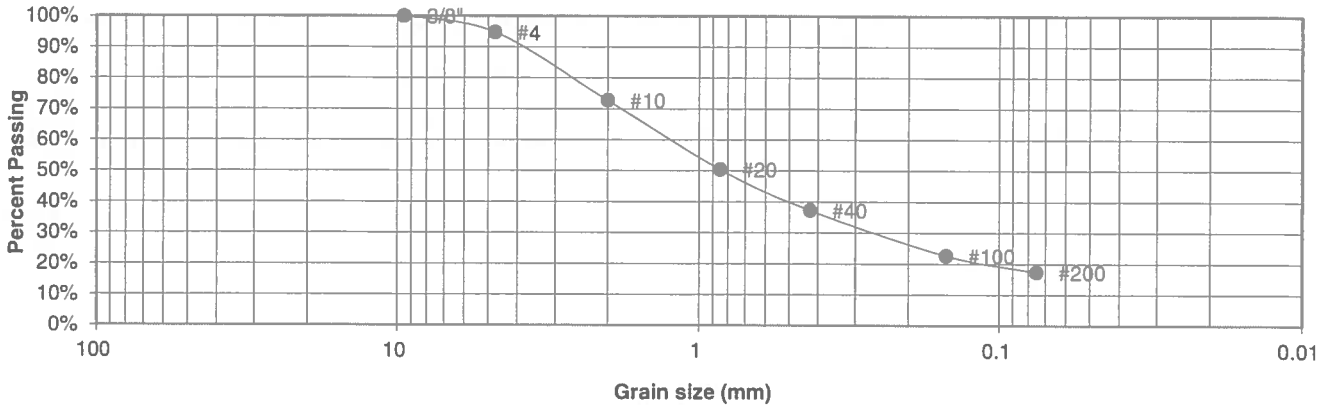
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE: 9/17/19

JOB NO.: 191439
FIG NO.: B-3

UNIFIED CLASSIFICATION	SM	CLIENT	TECH CONTRACTORS
SOIL TYPE #	1	PROJECT	STONEBRIDGE, FILING 4
TEST BORING #	3	JOB NO.	191439
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	94.7%
10	72.7%
20	50.4%
40	37.3%
100	22.6%
200	17.3%

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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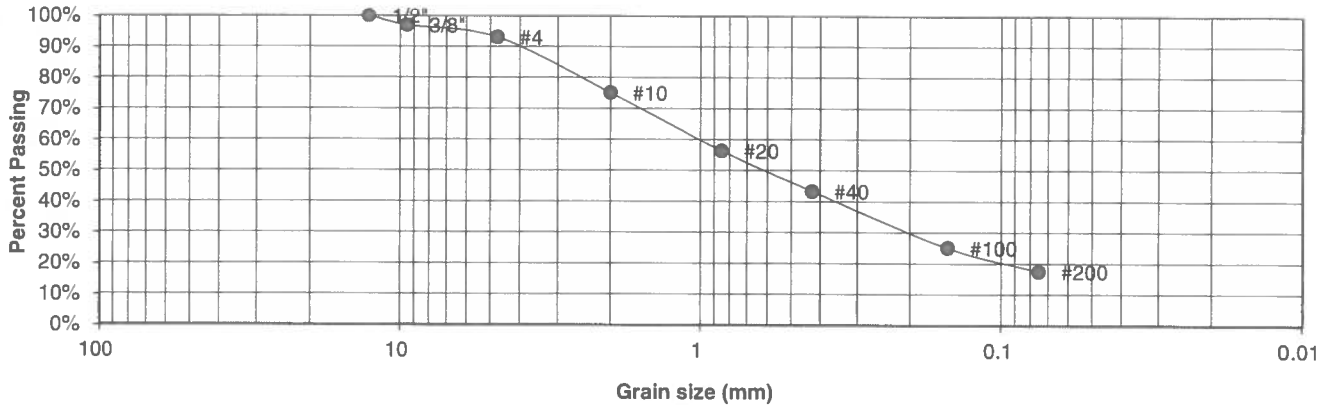
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE: 9/17/19

JOB NO.: 191439
FIG NO.: B-4

UNIFIED CLASSIFICATION	SM	CLIENT	TECH CONTRACTORS
SOIL TYPE #	1	PROJECT	STONEBRIDGE, FILING 4
TEST BORING #	4	JOB NO.	191439
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"	96.9%
4	93.0%
10	75.1%
20	56.4%
40	43.3%
100	25.0%
200	17.4%

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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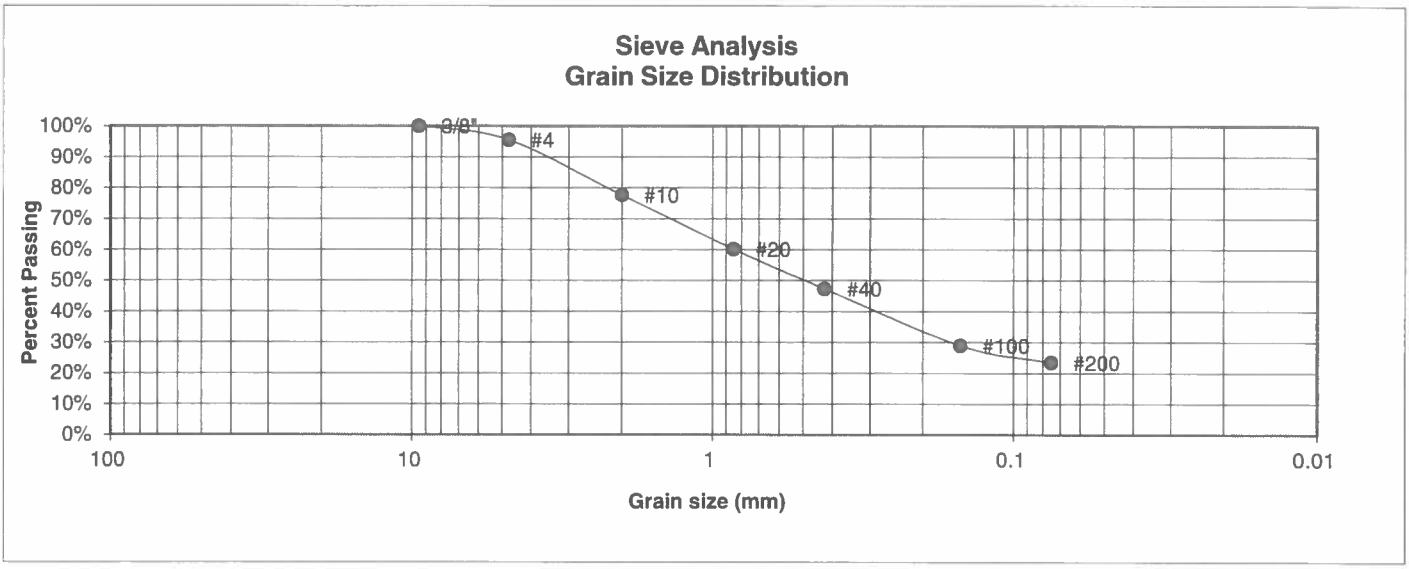
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE: 9/17/10

JOB NO.: 191439
FIG NO.: B-5

UNIFIED CLASSIFICATION	SM	CLIENT	TECH CONTRACTORS
SOIL TYPE #	1	PROJECT	STONEBRIDGE, FILING 4
TEST BORING #	5	JOB NO.	191439
DEPTH (FT)	1-2	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	95.5%
10	77.7%
20	60.2%
40	47.3%
100	28.9%
200	23.4%

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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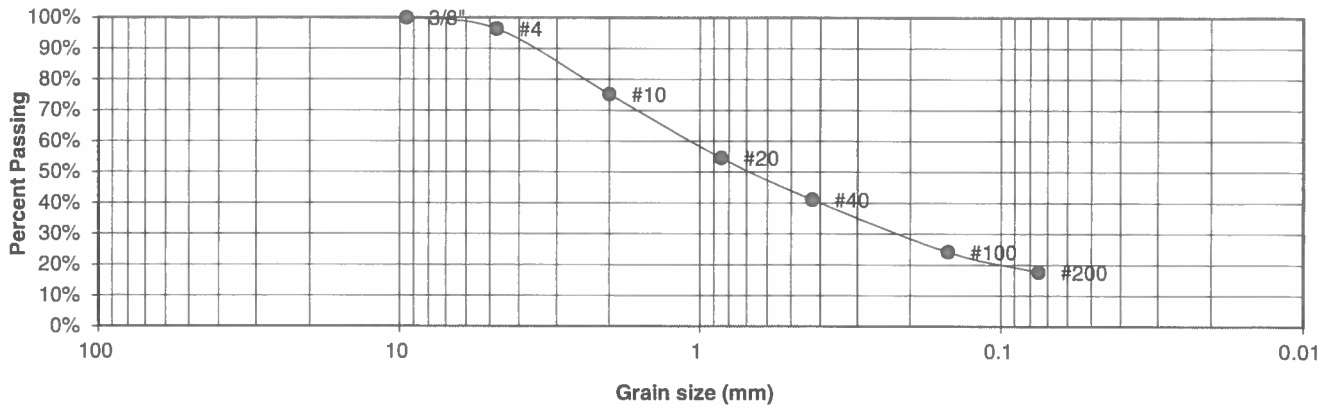
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE: 9/17/19

JOB NO.: 191439
FIG NO.: B-6

UNIFIED CLASSIFICATION	SM	CLIENT	TECH CONTRACTORS
SOIL TYPE #	1	PROJECT	STONEBRIDGE, FILING 4
TEST BORING #	6	JOB NO.	191439
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	96.4%
10	75.2%
20	54.6%
40	41.1%
100	24.1%
200	17.6%

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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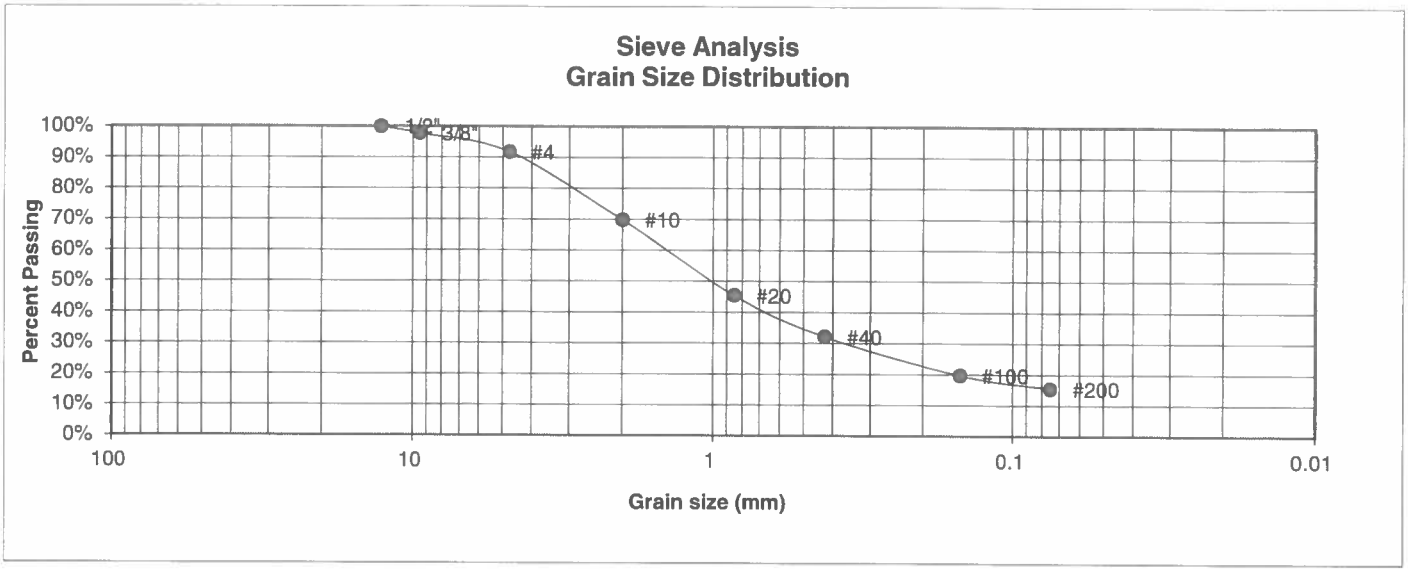
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE: 9/17/19

JOB NO.: 191439
FIG NO.: B-7

UNIFIED CLASSIFICATION	SC	CLIENT	TECH CONTRACTORS
SOIL TYPE #	1	PROJECT	STONEBRIDGE, FILING 4
TEST BORING #	6	JOB NO.	191439
DEPTH (FT)	5	TEST BY	BL
AASHTO CLASSIFICATION	A-2-6	GROUP INDEX	0



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	97.8%
4	91.7%
10	69.8%
20	45.4%
40	32.1%
100	19.7%
200	15.5%

Atterberg Limits	
Plastic Limit	15
Liquid Limit	35
Plastic Index	20

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

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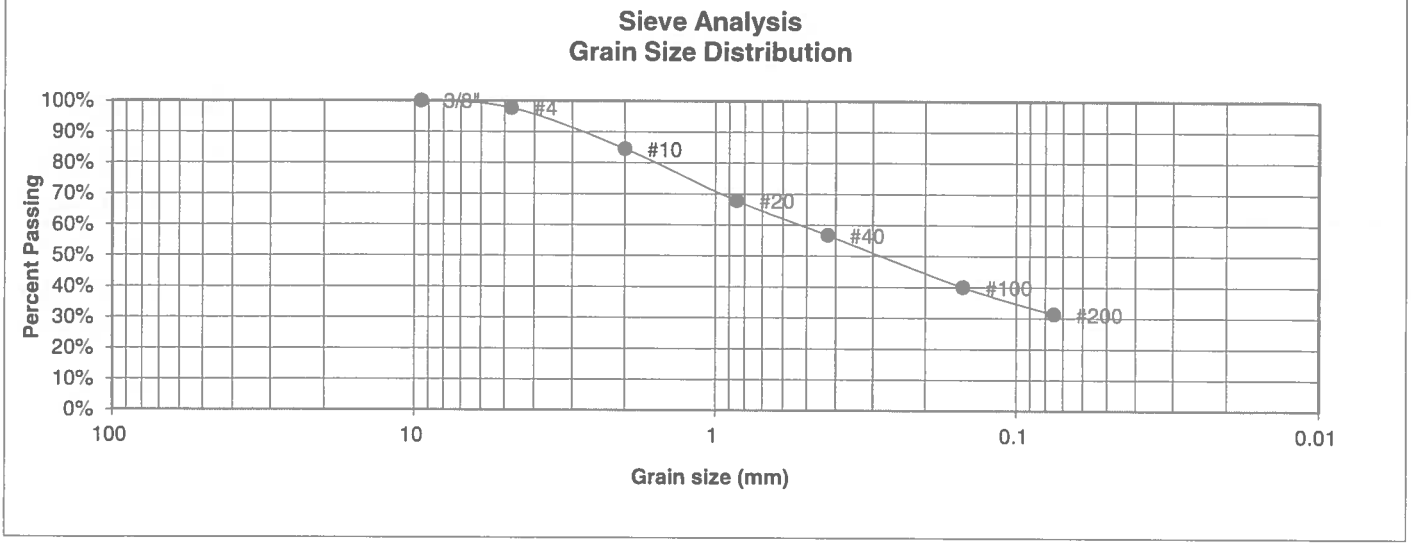
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE: 9/17/19

JOB NO.: 191439
FIG NO.: B-8

UNIFIED CLASSIFICATION	SC	CLIENT	TECH CONTRACTORS
SOIL TYPE #	1, CBR	PROJECT	STONEBRIDGE, FILING 4
TEST BORING #	7	JOB NO.	191439
DEPTH (FT)	0-2	TEST BY	BL
AASHTO CLASSIFICATION	A-2-6	GROUP INDEX	1



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	97.7%
10	84.5%
20	67.8%
40	56.7%
100	40.0%
200	31.3%

Atterberg Limits	
Plastic Limit	13
Liquid Limit	31
Plastic Index	18

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

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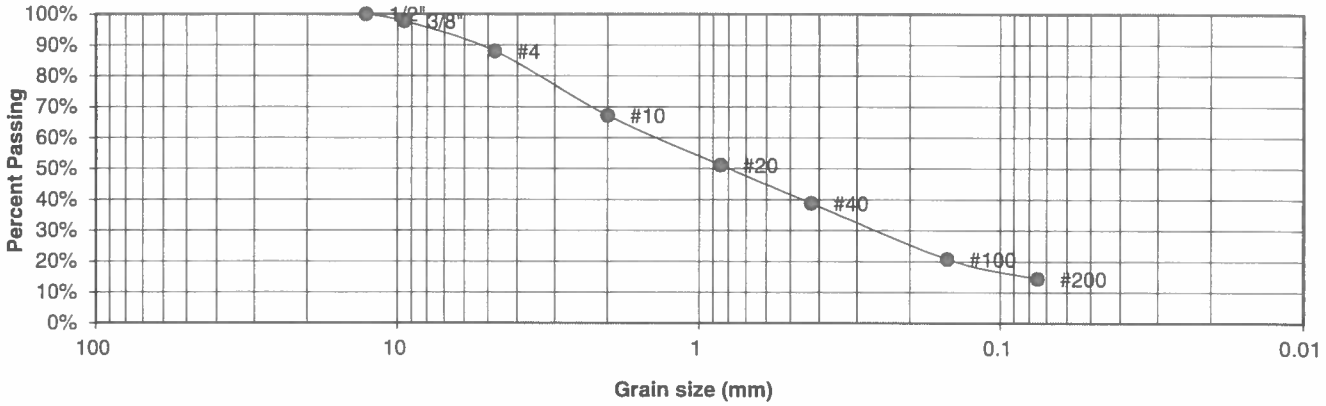
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		DS	10/22/13

JOB NO.: 191439
FIG NO.: B-9

UNIFIED CLASSIFICATION	SM	CLIENT	TECH CONTRACTORS
SOIL TYPE #	1	PROJECT	STONEBRIDGE, FILING 4
TEST BORING #	7	JOB NO.	191439
DEPTH (FT)	1	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"	97.7%
4	88.0%
10	67.3%
20	51.2%
40	38.8%
100	20.8%
200	14.4%

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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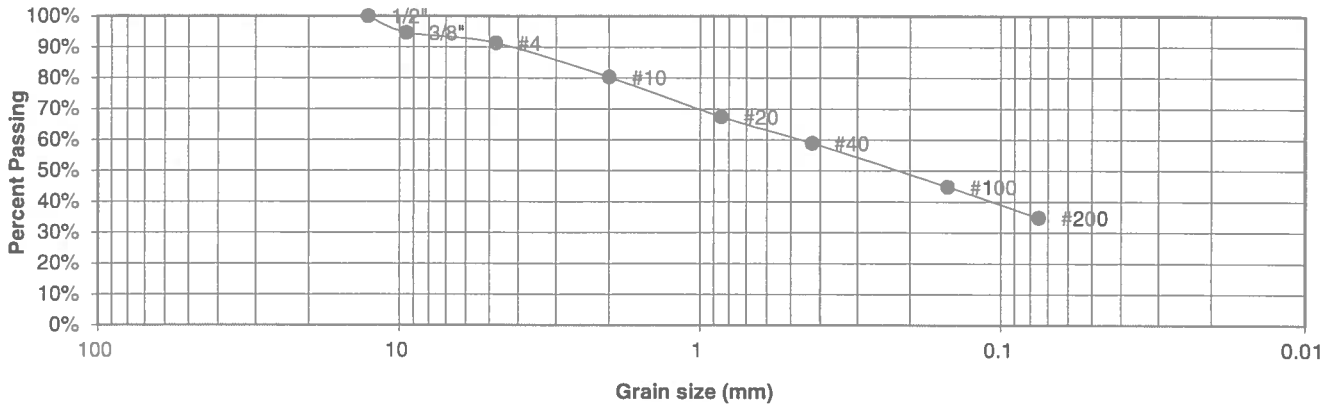
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE: 9/17/19

JOB NO.: 191439
FIG NO.: B-10

UNIFIED CLASSIFICATION	SC	CLIENT	TECH CONTRACTORS
SOIL TYPE #	1	PROJECT	STONEBRIDGE, FILING 4
TEST BORING #	9	JOB NO.	191439
DEPTH (FT)	1-2	TEST BY	BL
AASHTO CLASSIFICATION	A-2-6	GROUP INDEX	2

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	94.7%
4	91.3%
10	80.3%
20	67.5%
40	59.0%
100	44.8%
200	34.8%

Atterberg Limits

Plastic Limit	17
Liquid Limit	36
Plastic Index	19

Swell

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

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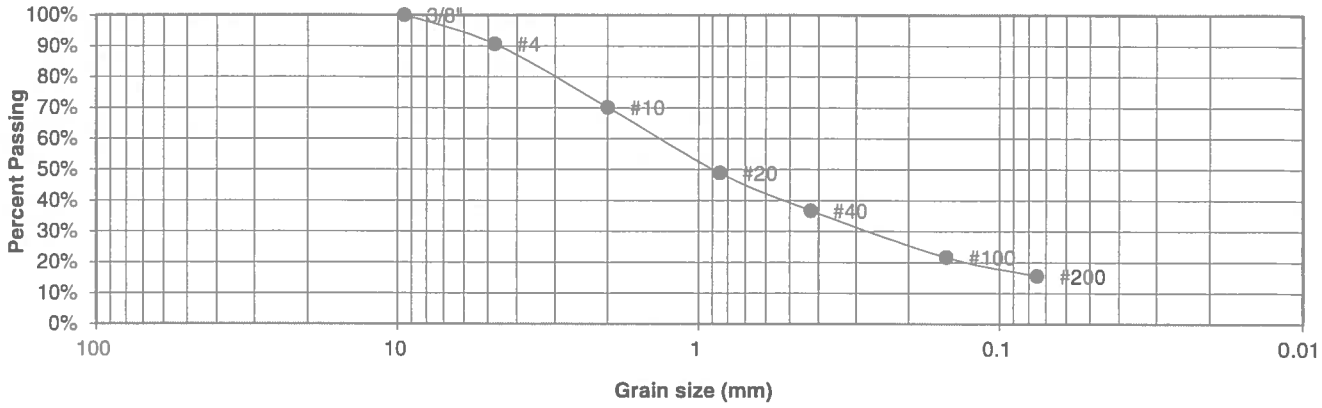
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE: 9/17/19

JOB NO.: 191439
FIG NO.: B-11

UNIFIED CLASSIFICATION	SM	CLIENT	TECH CONTRACTORS
SOIL TYPE #	1	PROJECT	STONEBRIDGE, FILING 4
TEST BORING #	10	JOB NO.	191439
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	90.7%
10	70.1%
20	48.9%
40	36.7%
100	21.6%
200	15.5%

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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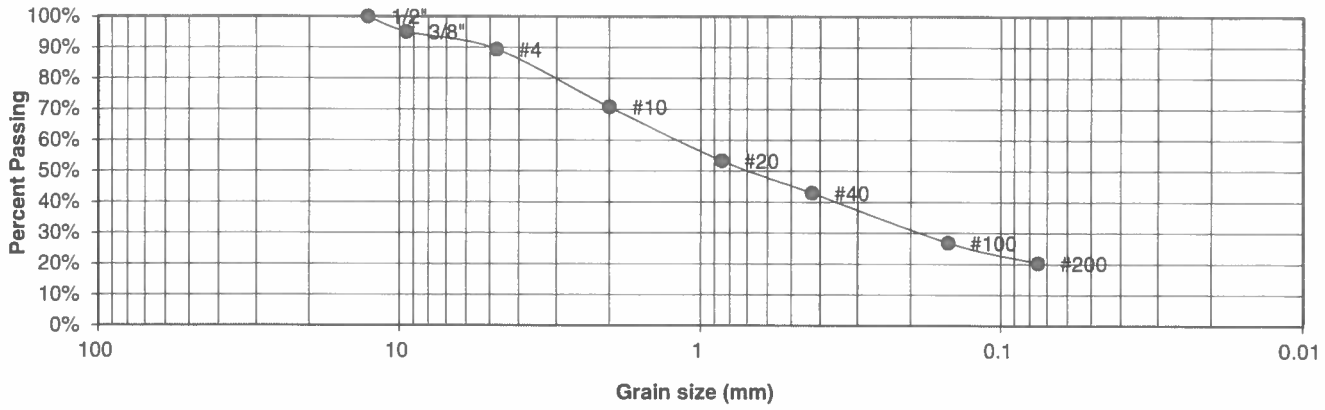
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE: 9/17/19

JOB NO.: 191439
FIG NO.: B-12

UNIFIED CLASSIFICATION	SC	CLIENT	TECH CONTRACTORS
SOIL TYPE #	1	PROJECT	STONEBRIDGE, FILING 4
TEST BORING #	11	JOB NO.	191439
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"	95.1%
4	89.4%
10	70.7%
20	53.3%
40	42.9%
100	26.9%
200	20.4%

Atterberg Limits

Plastic Limit	17
Liquid Limit	30
Plastic Index	13

Swell

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

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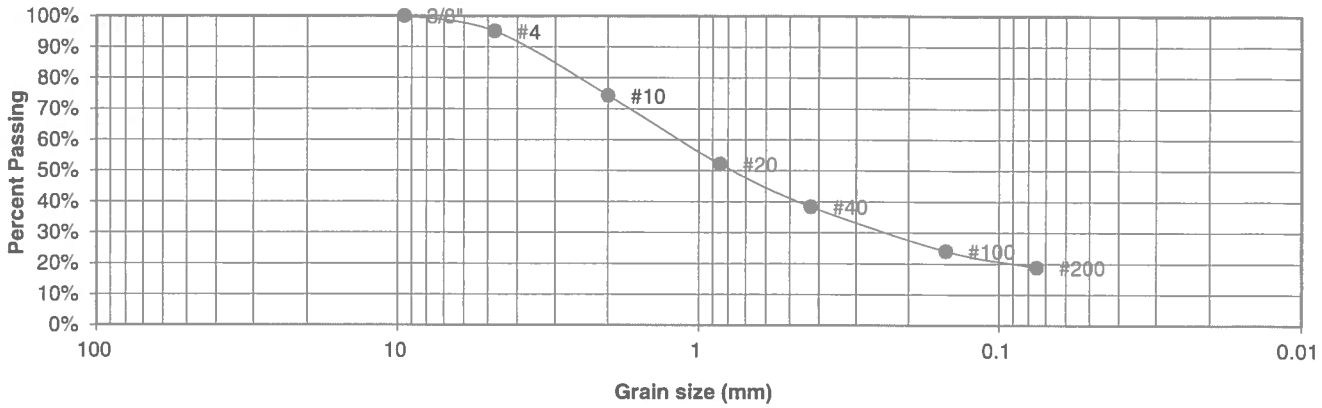
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
			9/17/19

JOB NO.: 191439
FIG NO.: B-13

UNIFIED CLASSIFICATION	SC	CLIENT	TECH CONTRACTORS
SOIL TYPE #	1	PROJECT	STONEBRIDGE, FILING 4
TEST BORING #	12	JOB NO.	191439
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	95.1%
10	74.3%
20	52.1%
40	38.4%
100	24.1%
200	18.8%

Atterberg Limits

Plastic Limit	16
Liquid Limit	32
Plastic Index	16

Swell

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

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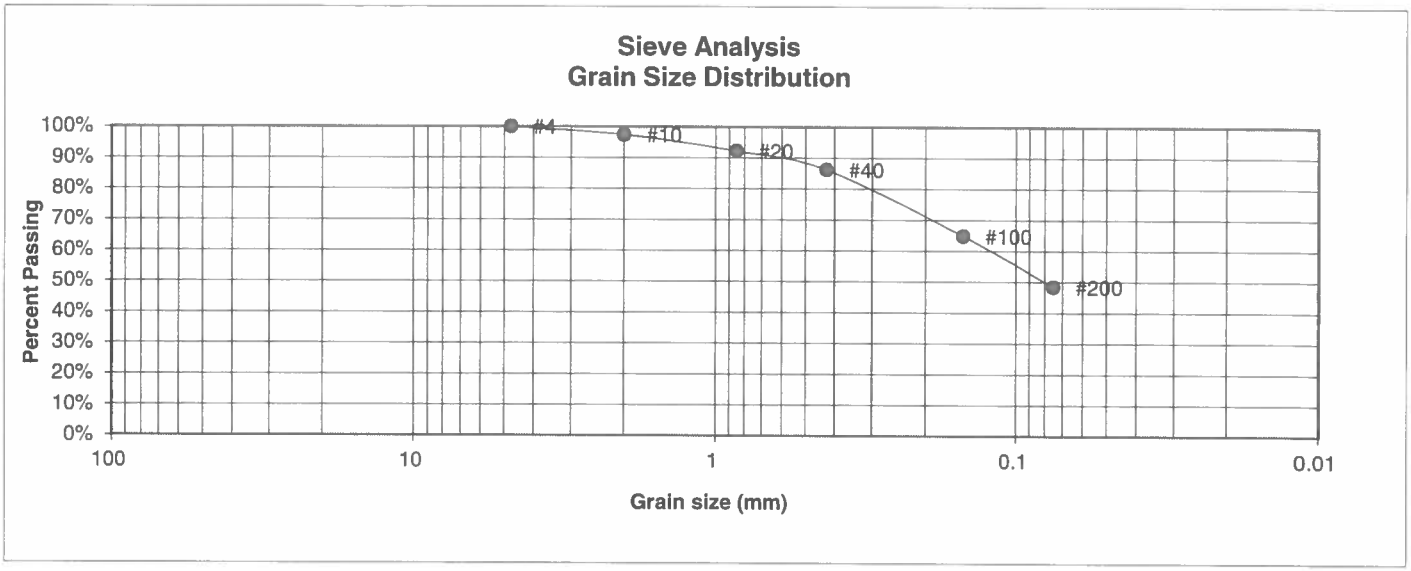
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE: 8/17/19

JOB NO.: 191439
FIG NO.: B-14

UNIFIED CLASSIFICATION	SC	CLIENT	TECH CONTRACTORS
SOIL TYPE #	3	PROJECT	STONEBRIDGE, FILING 4
TEST BORING #	7	JOB NO.	191439
DEPTH (FT)	2	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	5



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	97.4%
20	92.2%
40	86.2%
100	64.9%
200	48.5%

Atterberg Limits	
Plastic Limit	17
Liquid Limit	35
Plastic Index	18

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

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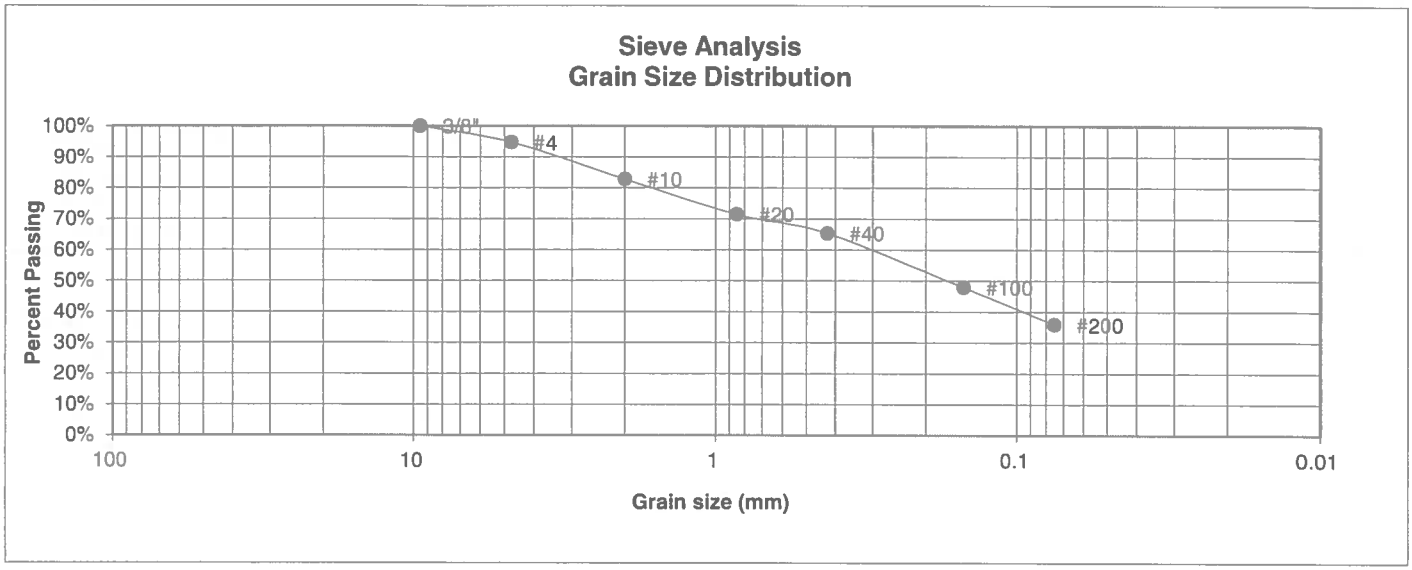
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		DS	12-24-19

JOB NO.: 191439
FIG NO.: B-15

UNIFIED CLASSIFICATION	SC	CLIENT	TECH CONTRACTORS
SOIL TYPE #	4	PROJECT	STONEBRIDGE, FILING 4
TEST BORING #	8	JOB NO.	191439
DEPTH (FT)	1-2	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	1



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	94.7%
10	82.8%
20	71.4%
40	65.4%
100	47.9%
200	35.9%

Atterberg Limits

Plastic Limit	15
Liquid Limit	28
Plastic Index	13

Swell

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

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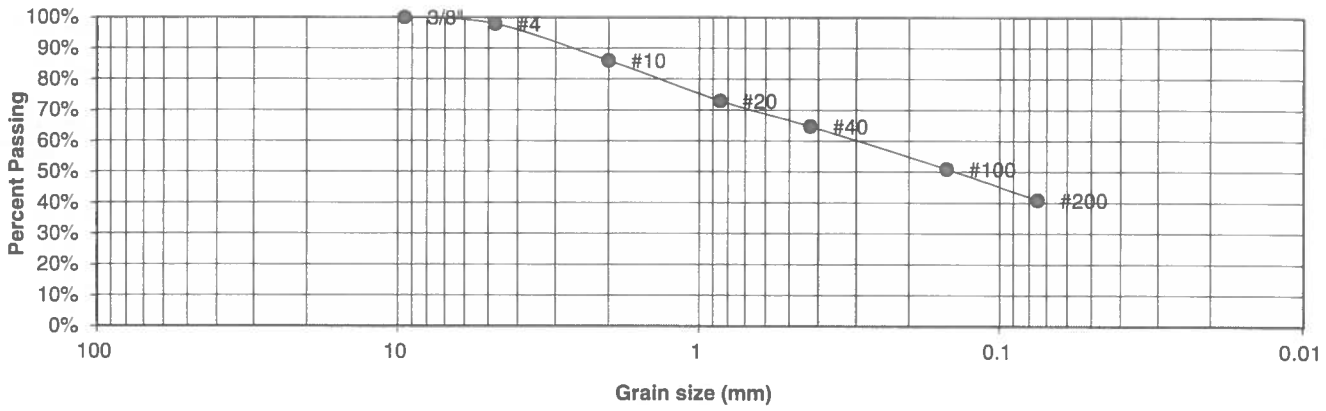
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		DJ	11/7/19

JOB NO.: 191439
FIG NO.: B-1C

UNIFIED CLASSIFICATION	SC	CLIENT	TECH CONTRACTORS
SOIL TYPE #	2	PROJECT	STONEBRIDGE, FILING 4
TEST BORING #	13	JOB NO.	191439
DEPTH (FT)	1-2	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	4

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	97.9%
10	86.0%
20	73.0%
40	64.7%
100	50.9%
200	40.9%

Atterberg Limits	
Plastic Limit	16
Liquid Limit	37
Plastic Index	21

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

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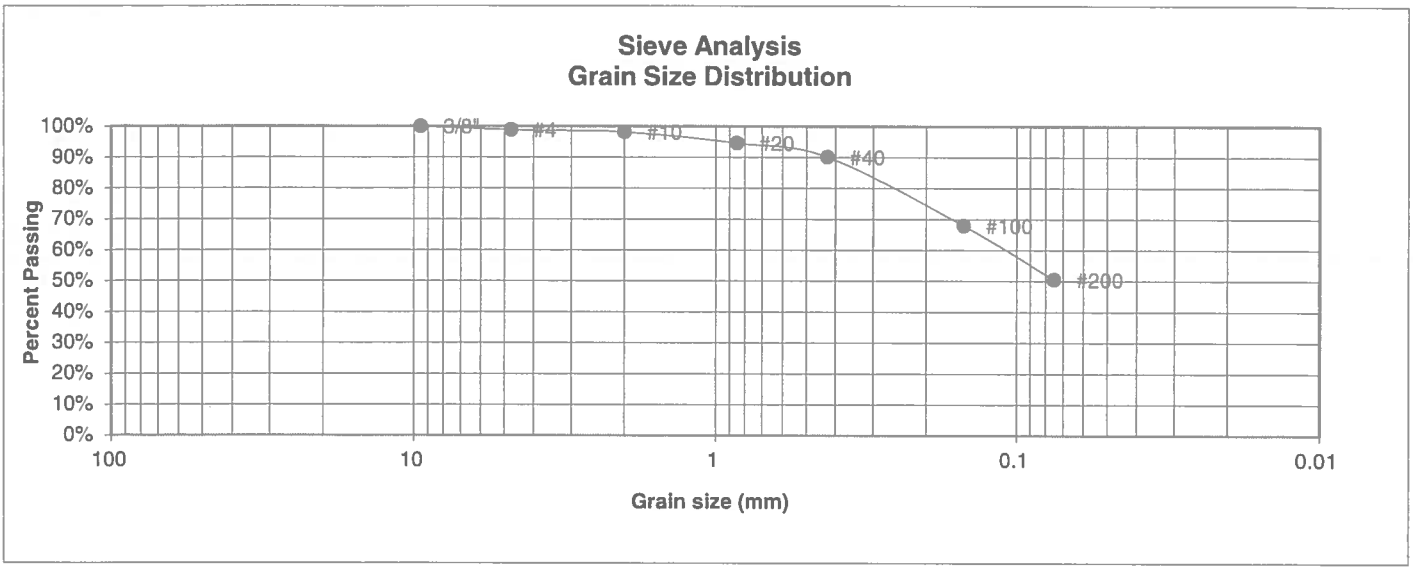
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE: 9/17/19

JOB NO.: 191439
FIG NO.: B-17

UNIFIED CLASSIFICATION	CL	CLIENT	TECH CONTRACTORS
SOIL TYPE #	3	PROJECT	STONEBRIDGE, FILING 4
TEST BORING #	1	JOB NO.	191439
DEPTH (FT)	10	TEST BY	BL
AASHTO CLASSIFICATION	A-4	GROUP INDEX	2



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	98.9%
10	98.1%
20	94.6%
40	90.1%
100	67.9%
200	50.5%

Atterberg Limits	
Plastic Limit	18
Liquid Limit	28
Plastic Index	10

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

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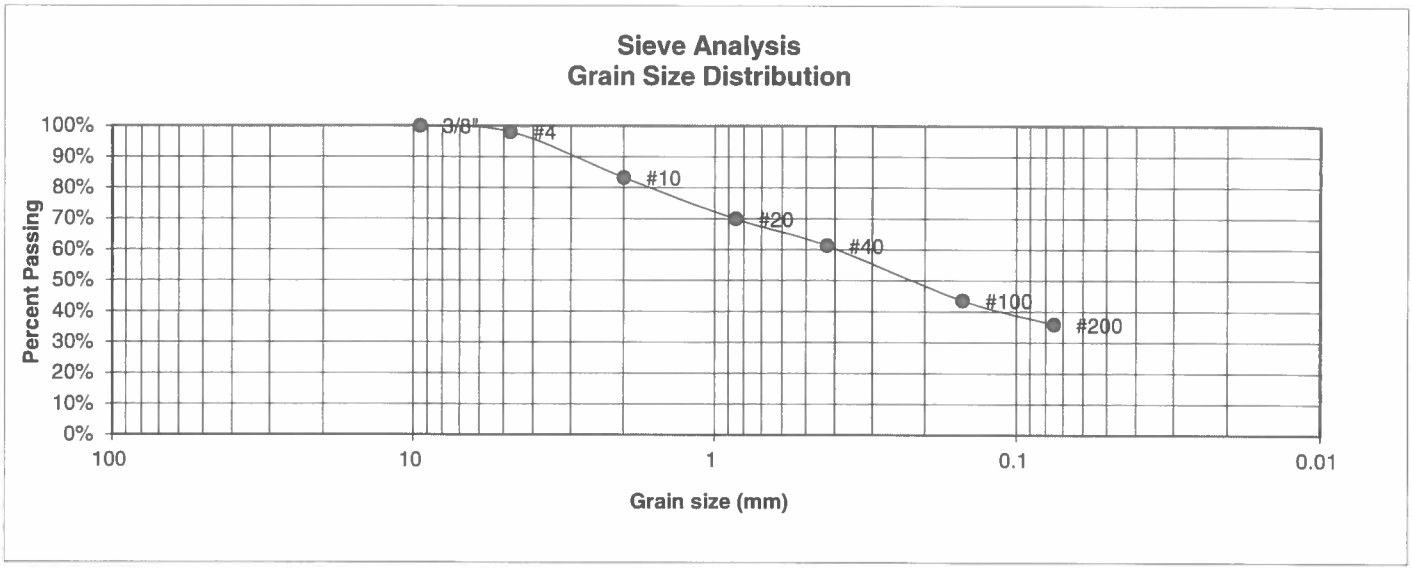
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
			9/17/19

JOB NO.: 191439
FIG NO.: B-18

UNIFIED CLASSIFICATION	SC	CLIENT	TECH CONTRACTORS
SOIL TYPE #	4	PROJECT	STONEBRIDGE, FILING 4
TEST BORING #	7	JOB NO.	191439
DEPTH (FT)	5	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	2



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	98.1%
10	83.2%
20	69.9%
40	61.3%
100	43.6%
200	35.8%

Atterberg Limits	
Plastic Limit	16
Liquid Limit	34
Plastic Index	18

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

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COLORADO SPRINGS, COLORADO 80907

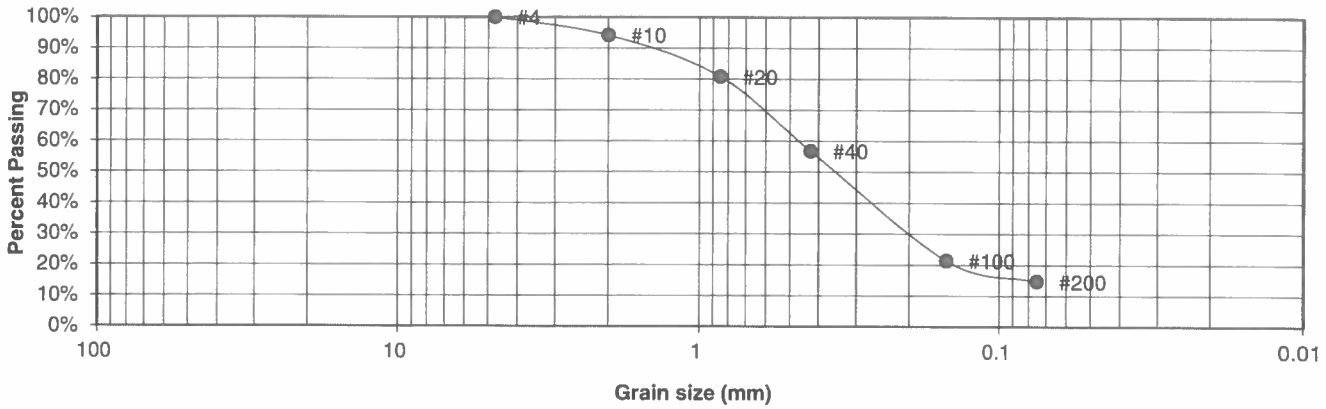
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE: 9/17/19

JOB NO.: 191439
FIG NO.: B-19

UNIFIED CLASSIFICATION	SM	CLIENT	TECH CONTRACTORS
SOIL TYPE #	4	PROJECT	STONEBRIDGE, FILING 4
TEST BORING #	9	JOB NO.	191439
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"	
4	100.0%
10	94.2%
20	80.8%
40	56.8%
100	21.4%
200	14.7%

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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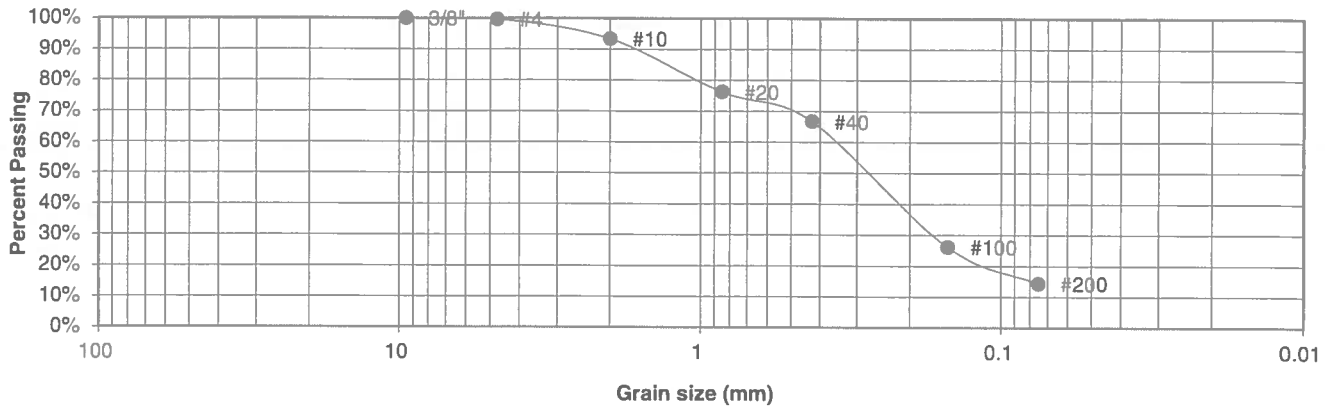
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE: 9/17/19

JOB NO.: 191439
FIG NO.: B-20

UNIFIED CLASSIFICATION	SM	CLIENT	TECH CONTRACTORS
SOIL TYPE #	4	PROJECT	STONEBRIDGE, FILING 4
TEST BORING #	13	JOB NO.	191439
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	99.6%
10	93.3%
20	76.2%
40	66.7%
100	26.1%
200	14.3%

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

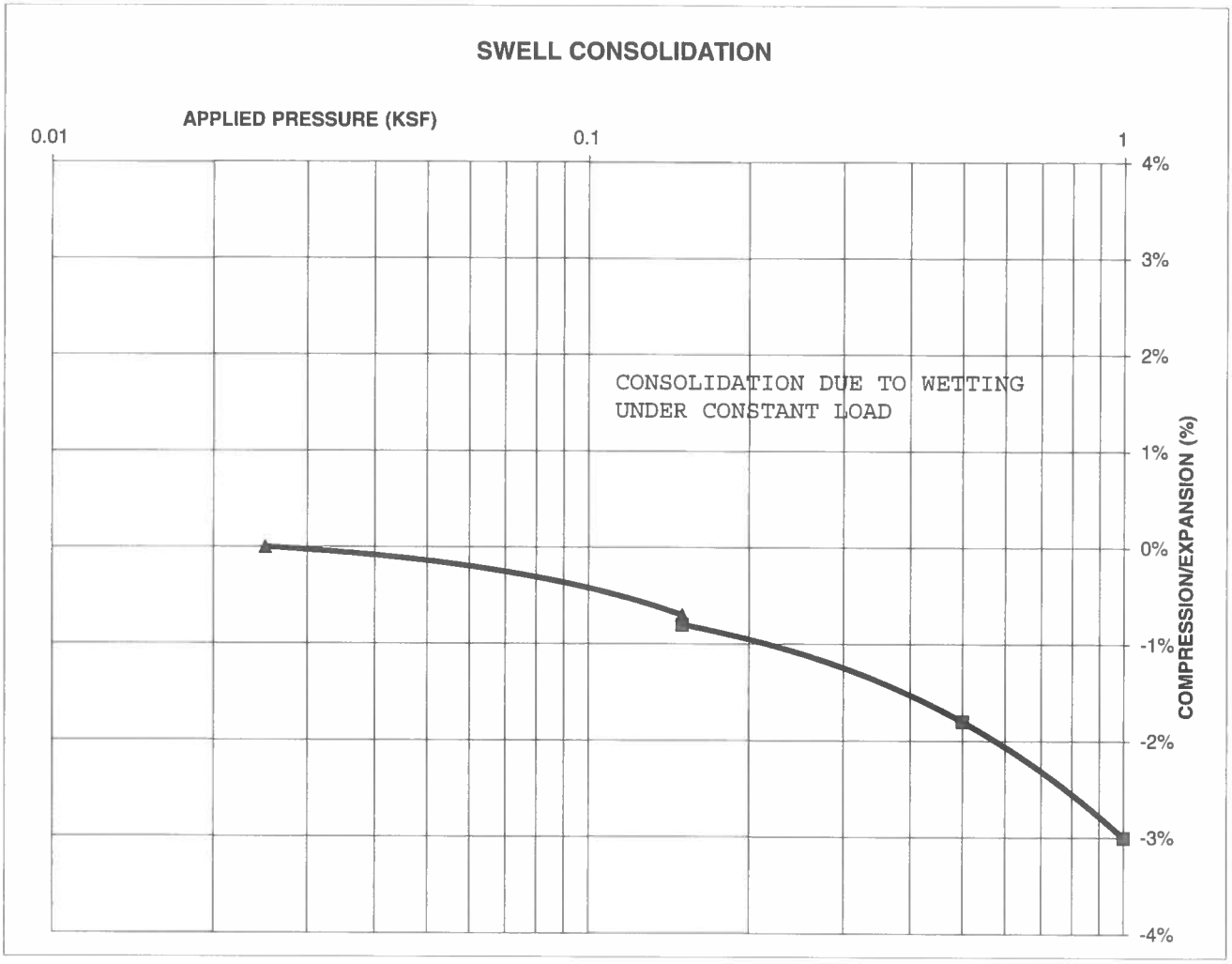
DRAWN:	DATE:	CHECKED:	DATE: 9/17/19

JOB NO.: 191439
FIG NO.: B-21

CONSOLIDATION TEST RESULTS

TEST BORING #	1	DEPTH(ft)	1-2
DESCRIPTION	SC	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)			116
NATURAL MOISTURE CONTENT			8.9%
SWELL/CONSOLIDATION (%)			-0.1%

JOB NO. 191439
CLIENT TECH CONTRACTORS
PROJECT STONEBRIDGE, FILING 4



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SWELL CONSOLIDATION
TEST RESULTS

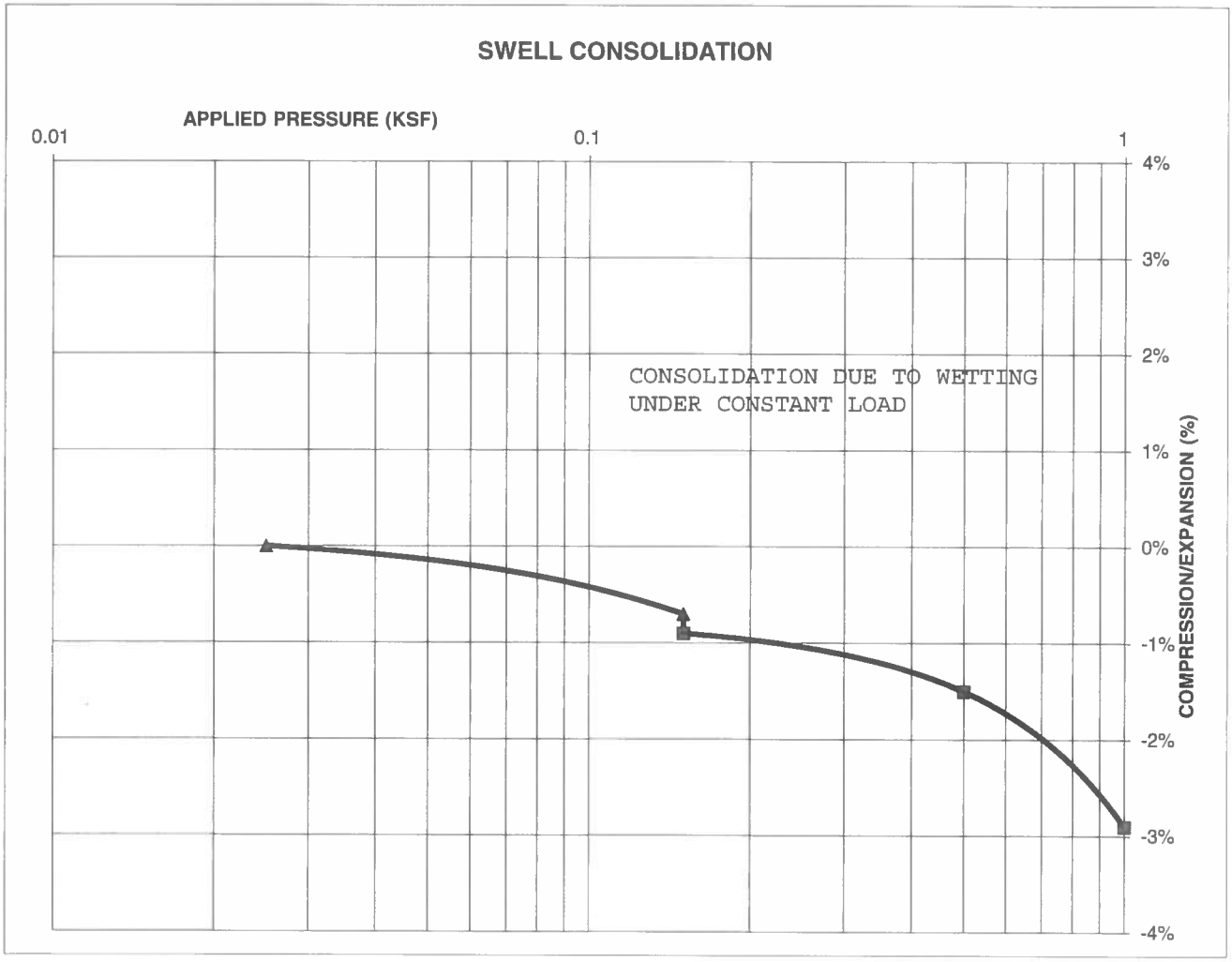
DRAWN:	DATE:	CHECKED:	DATE:
			9/17/19

JOB NO.: 191439
FIG NO.: B-22

CONSOLIDATION TEST RESULTS

TEST BORING #	2	DEPTH(ft)	1-2
DESCRIPTION	SC	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)			114
NATURAL MOISTURE CONTENT			5.6%
SWELL/CONSOLIDATION (%)			-0.2%

JOB NO. 191439
CLIENT TECH CONTRACTORS
PROJECT STONEBRIDGE, FILING 4



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SWELL CONSOLIDATION
TEST RESULTS

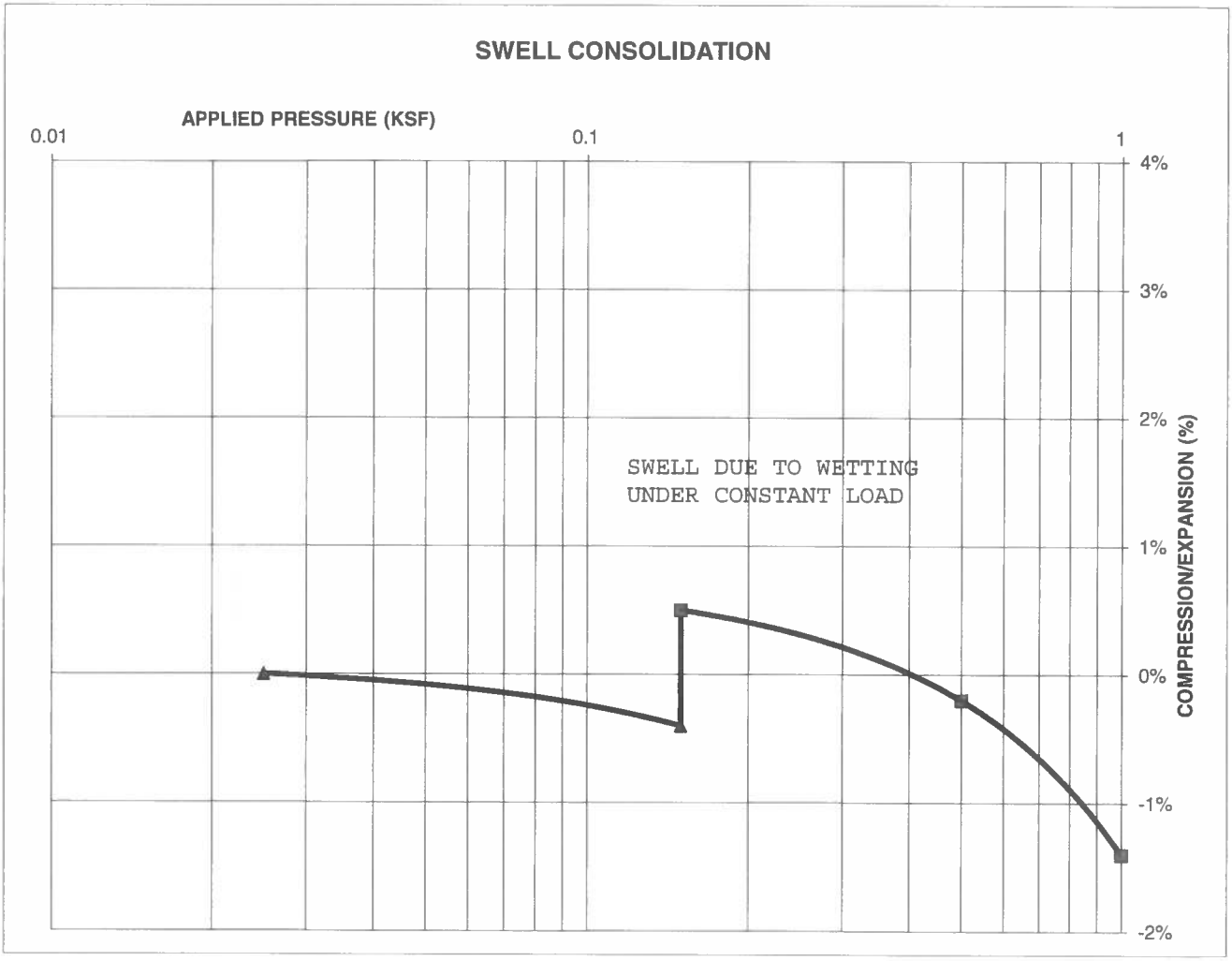
DRAWN:	DATE:	CHECKED:	DATE:
			9/17/19

JOB NO.: 191439
FIG NO.: B-23

CONSOLIDATION TEST RESULTS

TEST BORING #	9	DEPTH(ft)	1-2
DESCRIPTION	SC	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)			120
NATURAL MOISTURE CONTENT			11.1%
SWELL/CONSOLIDATION (%)			0.9%

JOB NO. 191439
CLIENT TECH CONTRACTORS
PROJECT STONEBRIDGE, FILING 4



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SWELL CONSOLIDATION
TEST RESULTS

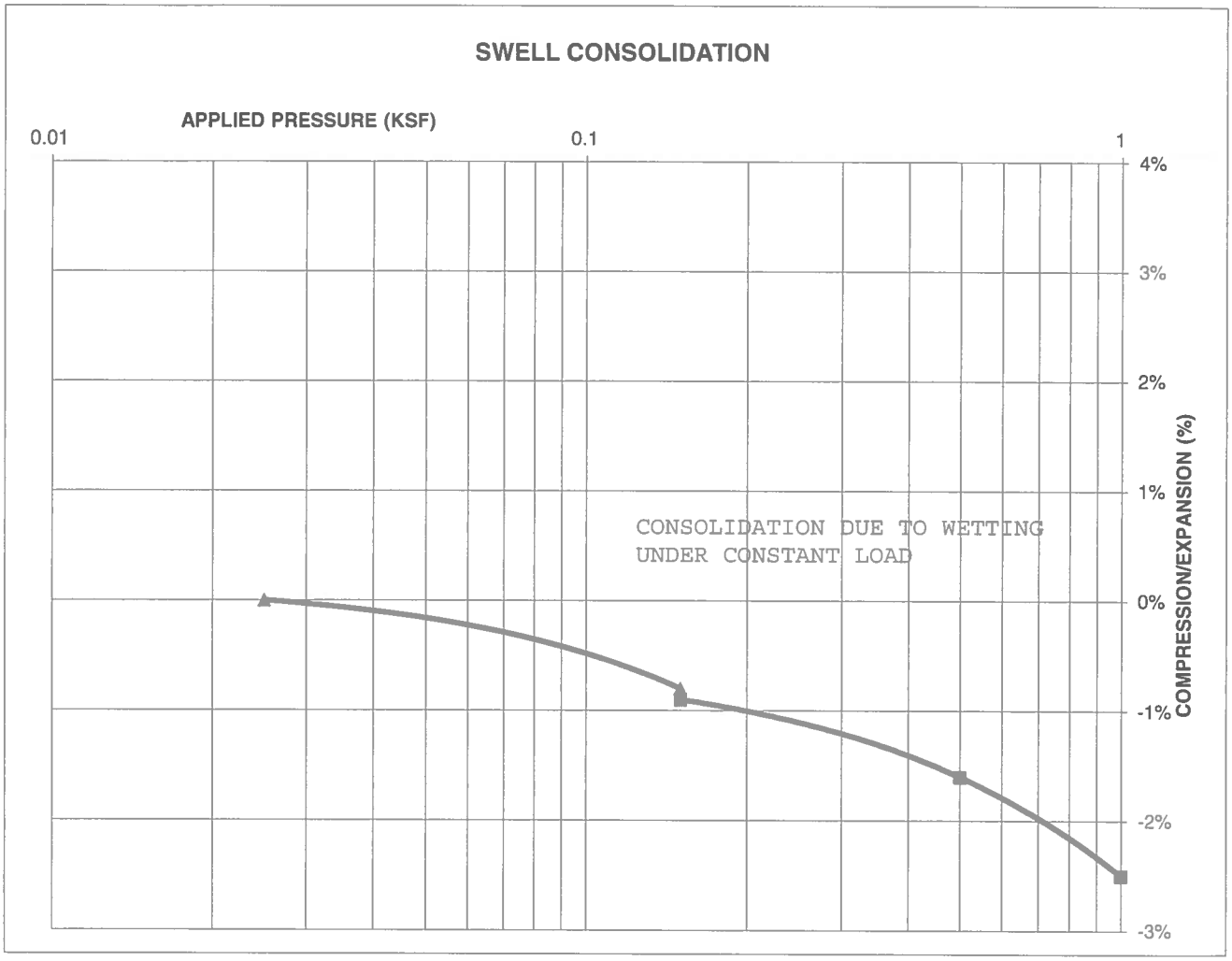
DRAWN:	DATE:	CHECKED:	DATE: 9/17/19

JOB NO.: 191439
FIG NO.: B-24

CONSOLIDATION TEST RESULTS

TEST BORING #	11	DEPTH(ft)	1-2
DESCRIPTION	SC	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)			108
NATURAL MOISTURE CONTENT			9.0%
SWELL/CONSOLIDATION (%)			-0.1%

JOB NO. 191439
CLIENT TECH CONTRACTORS
PROJECT STONEBRIDGE, FILING 4



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SWELL CONSOLIDATION
TEST RESULTS

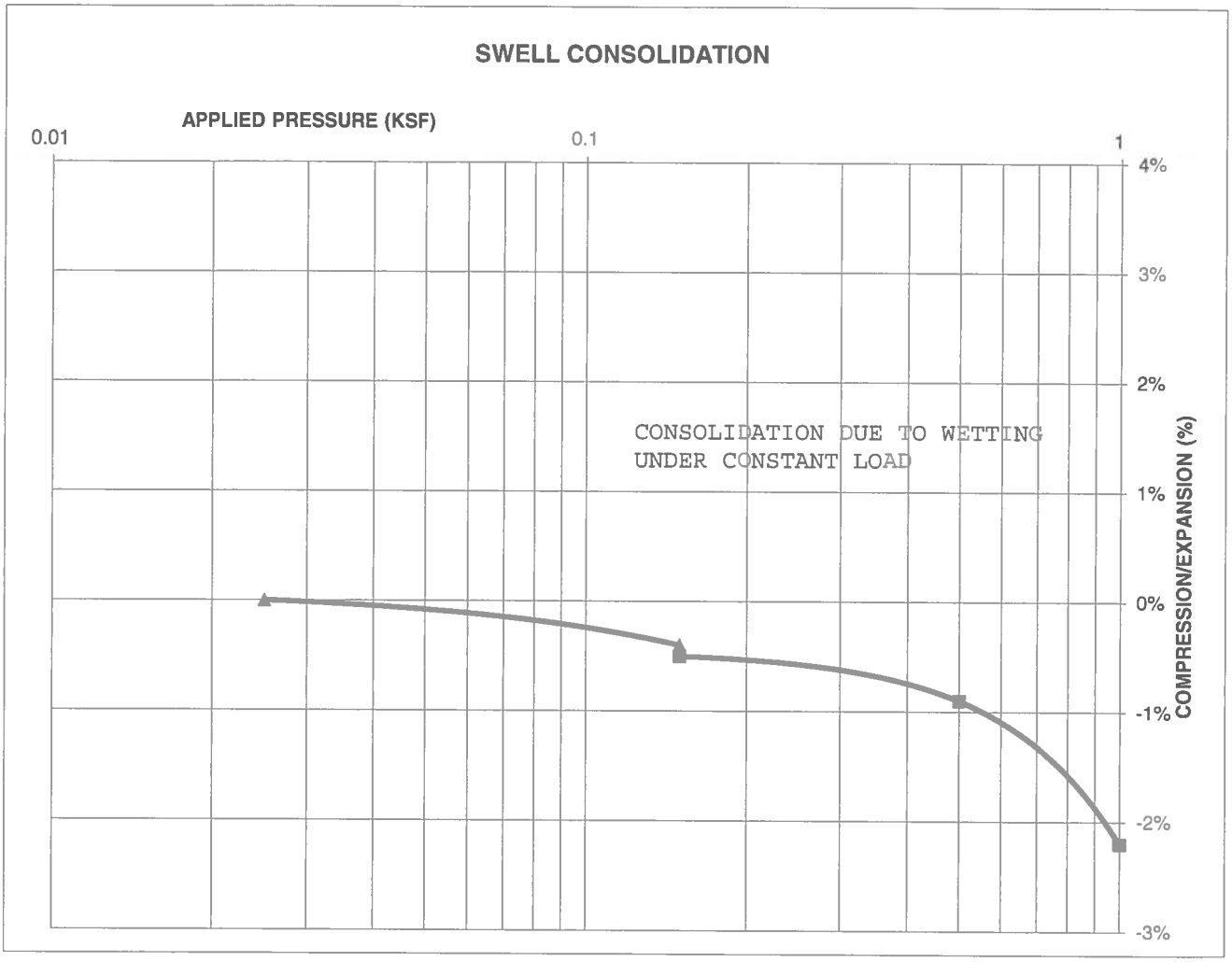
DRAWN:	DATE:	CHECKED:	DATE: 9/17/19

JOB NO.: 191439
FIG NO.: B-25

CONSOLIDATION TEST RESULTS

TEST BORING #	12	DEPTH(ft)	1-2
DESCRIPTION	SC	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)			110
NATURAL MOISTURE CONTENT			8.9%
SWELL/CONSOLIDATION (%)			-0.1%

JOB NO. 191439
CLIENT TECH CONTRACTORS
PROJECT STONEBRIDGE, FILING 4



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SWELL CONSOLIDATION
TEST RESULTS

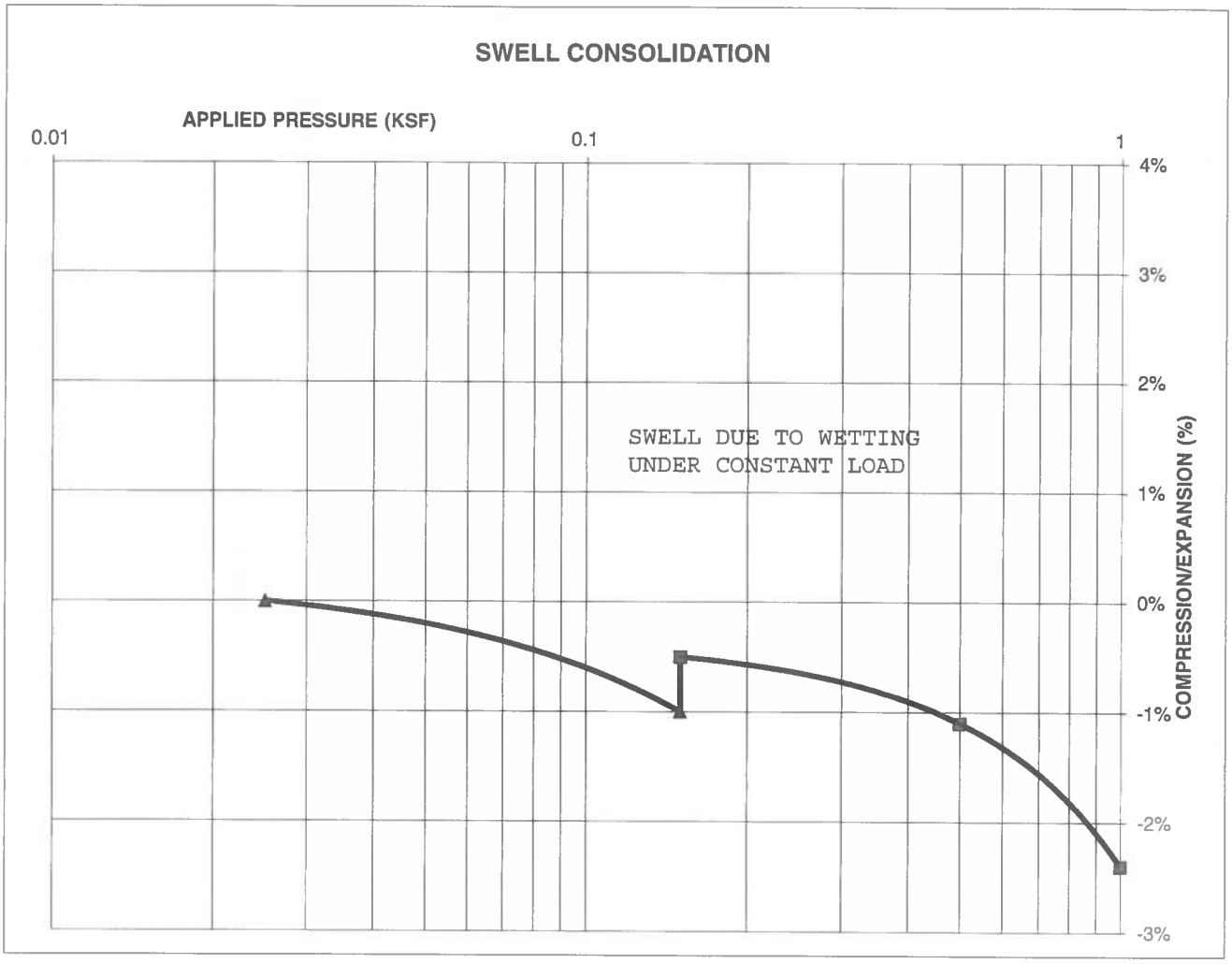
DRAWN:	DATE:	CHECKED:	DATE:
			9/17/19

JOB NO.: 191439
FIG NO.: B-26

CONSOLIDATION TEST RESULTS

TEST BORING #	7	DEPTH(ft)	2
DESCRIPTION	SC	SOIL TYPE	3
NATURAL UNIT DRY WEIGHT (PCF)			117
NATURAL MOISTURE CONTENT			10.3%
SWELL/CONSOLIDATION (%)			0.5%

JOB NO. 191439
CLIENT TECH CONTRACTORS
PROJECT STONEBRIDGE, FILING 4



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SWELL CONSOLIDATION
TEST RESULTS

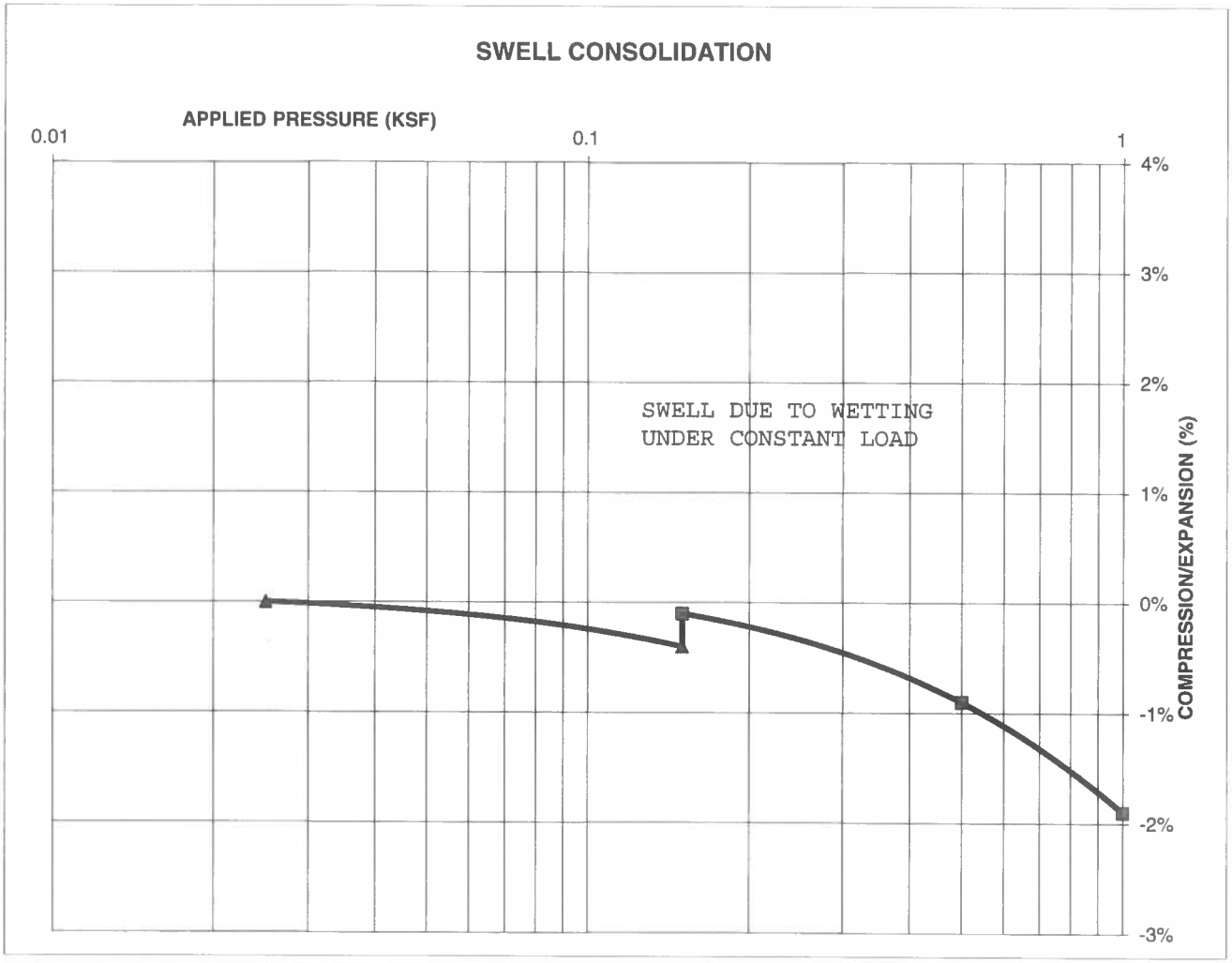
DRAWN:	DATE:	CHECKED:	DATE:
		DS	10/24/19

JOB NO.: 191439
FIG NO.: B-27

CONSOLIDATION TEST RESULTS

TEST BORING #	8	DEPTH(ft)	1-2
DESCRIPTION	SC	SOIL TYPE	4
NATURAL UNIT DRY WEIGHT (PCF)			120
NATURAL MOISTURE CONTENT			9.8%
SWELL/CONSOLIDATION (%)			0.3%

JOB NO. 191439
CLIENT TECH CONTRACTORS
PROJECT STONEBRIDGE, FILING 4



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SWELL CONSOLIDATION
TEST RESULTS

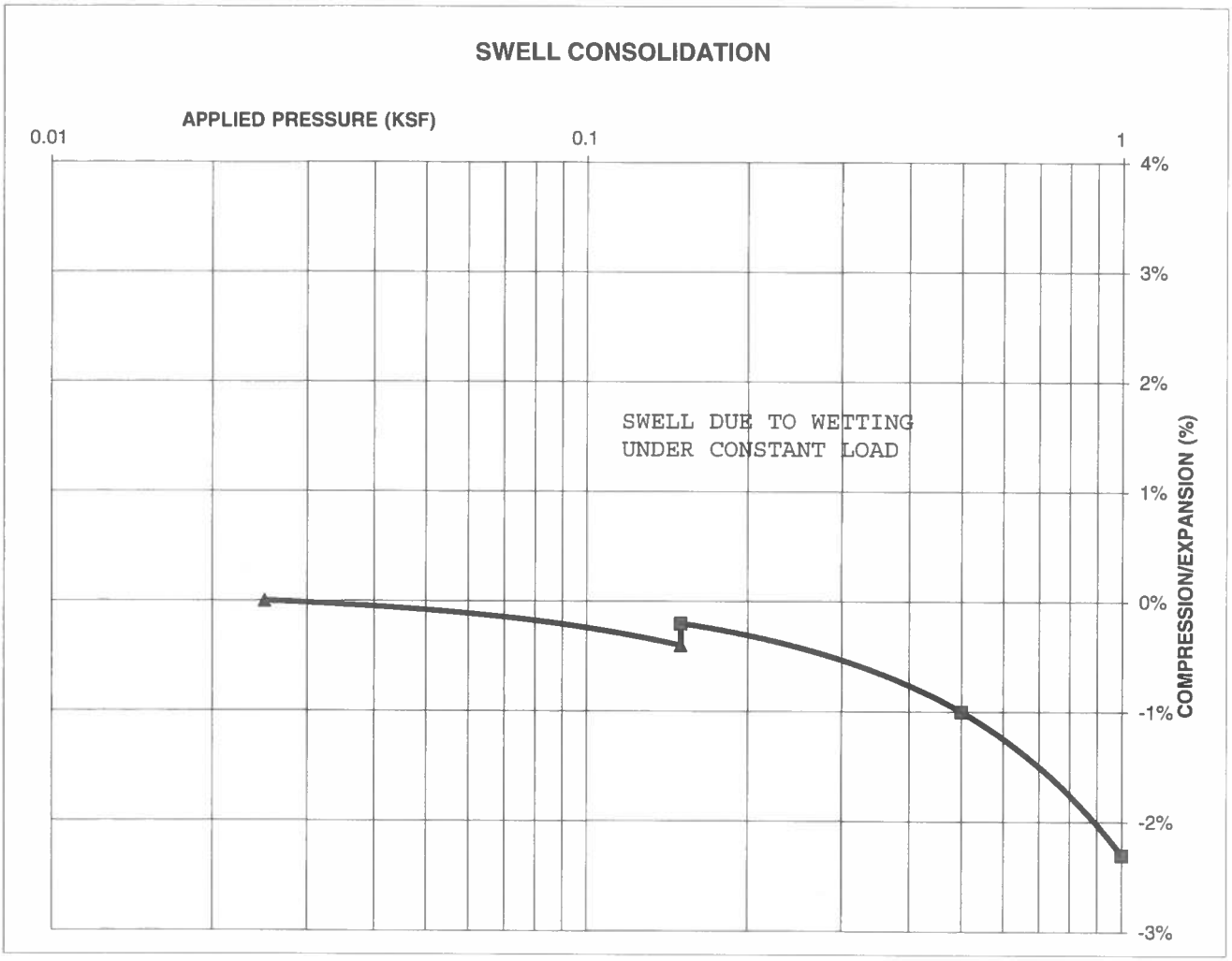
DRAWN:	DATE:	CHECKED:	DATE:
		RS	11/1/19

JOB NO.: 191439
FIG NO.: B-28

CONSOLIDATION TEST RESULTS

TEST BORING #	13	DEPTH(ft)	1-2
DESCRIPTION	SC	SOIL TYPE	2
NATURAL UNIT DRY WEIGHT (PCF)			115
NATURAL MOISTURE CONTENT			8.9%
SWELL/CONSOLIDATION (%)			0.2%

JOB NO. 191439
CLIENT TECH CONTRACTORS
PROJECT STONEBRIDGE, FILING 4



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SWELL CONSOLIDATION
TEST RESULTS

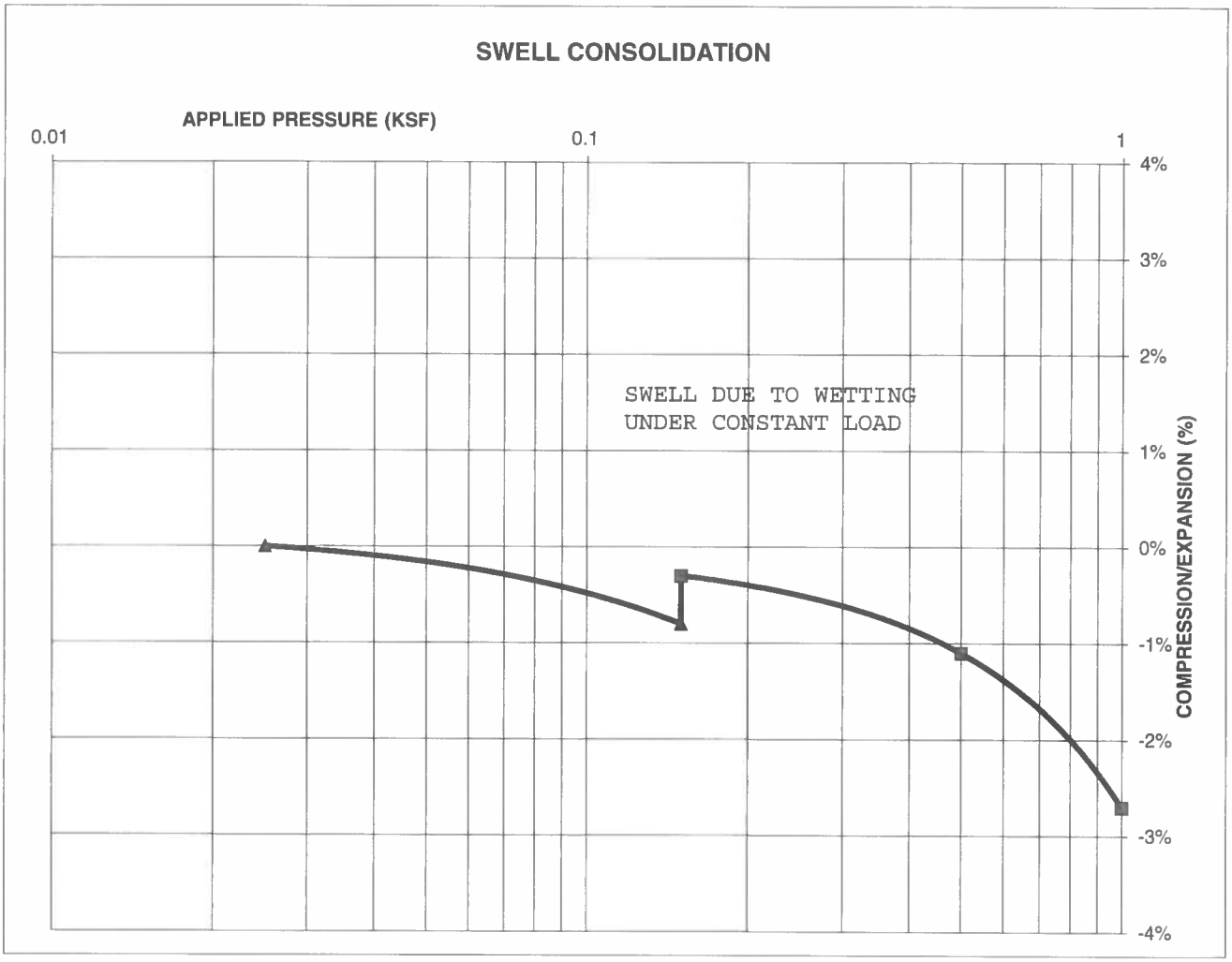
DRAWN:	DATE:	CHECKED:	DATE:
			9/17/19

JOB NO.: 191439
FIG NO.: B-29

CONSOLIDATION TEST RESULTS

TEST BORING #	1	DEPTH(ft)	10
DESCRIPTION	CL	SOIL TYPE	3
NATURAL UNIT DRY WEIGHT (PCF)			110
NATURAL MOISTURE CONTENT			16.6%
SWELL/CONSOLIDATION (%)			0.5%

JOB NO. 191439
CLIENT TECH CONTRACTORS
PROJECT STONEBRIDGE, FILING 4



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SWELL CONSOLIDATION
TEST RESULTS

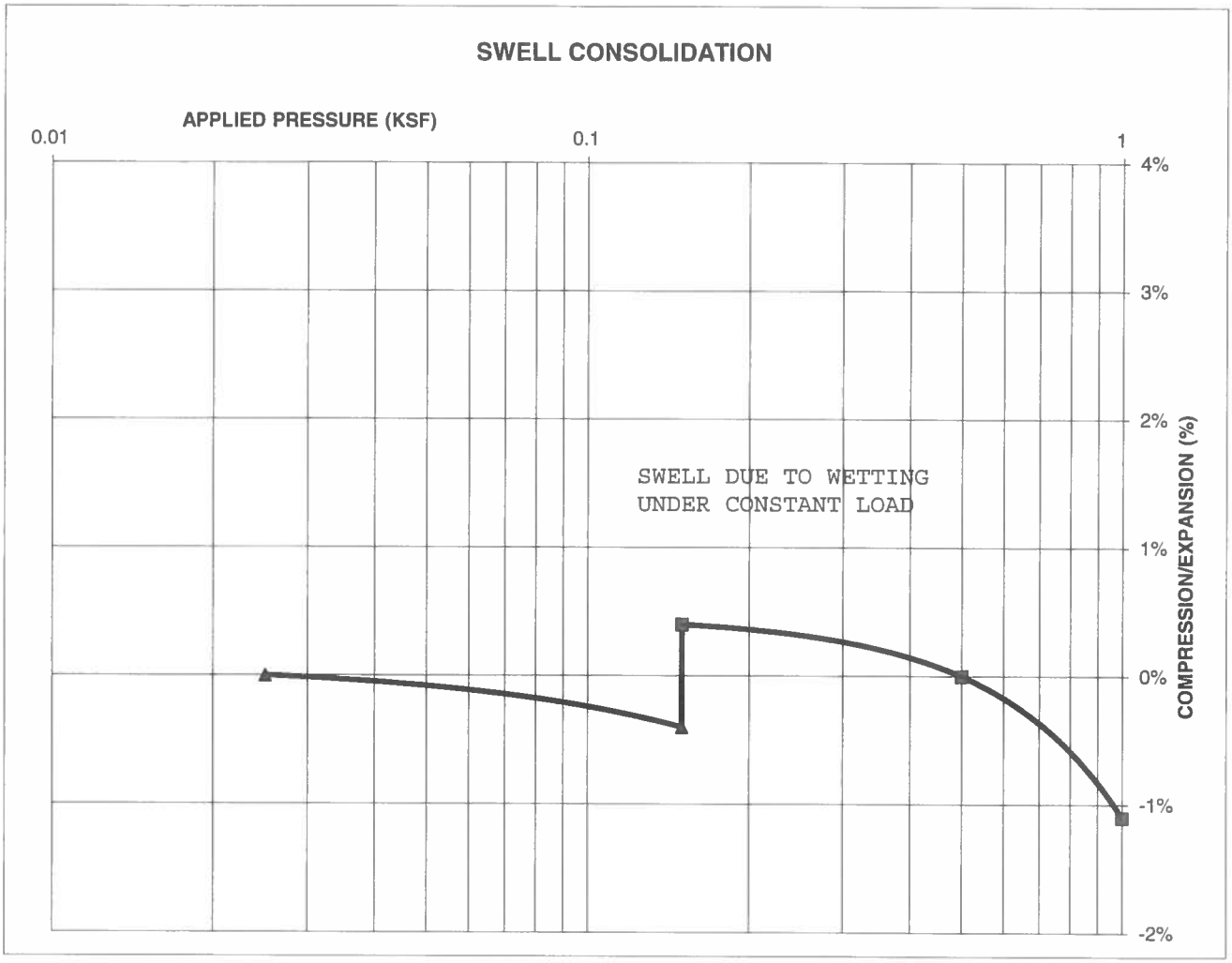
DRAWN:	DATE:	CHECKED:	DATE: 9/17/19

JOB NO.: 191439
FIG NO.: B-30

CONSOLIDATION TEST RESULTS

TEST BORING #	7	DEPTH(ft)	5
DESCRIPTION	SC	SOIL TYPE	4
NATURAL UNIT DRY WEIGHT (PCF)			119
NATURAL MOISTURE CONTENT			10.0%
SWELL/CONSOLIDATION (%)			0.8%

JOB NO. 191439
CLIENT TECH CONTRACTORS
PROJECT STONEBRIDGE, FILING 4



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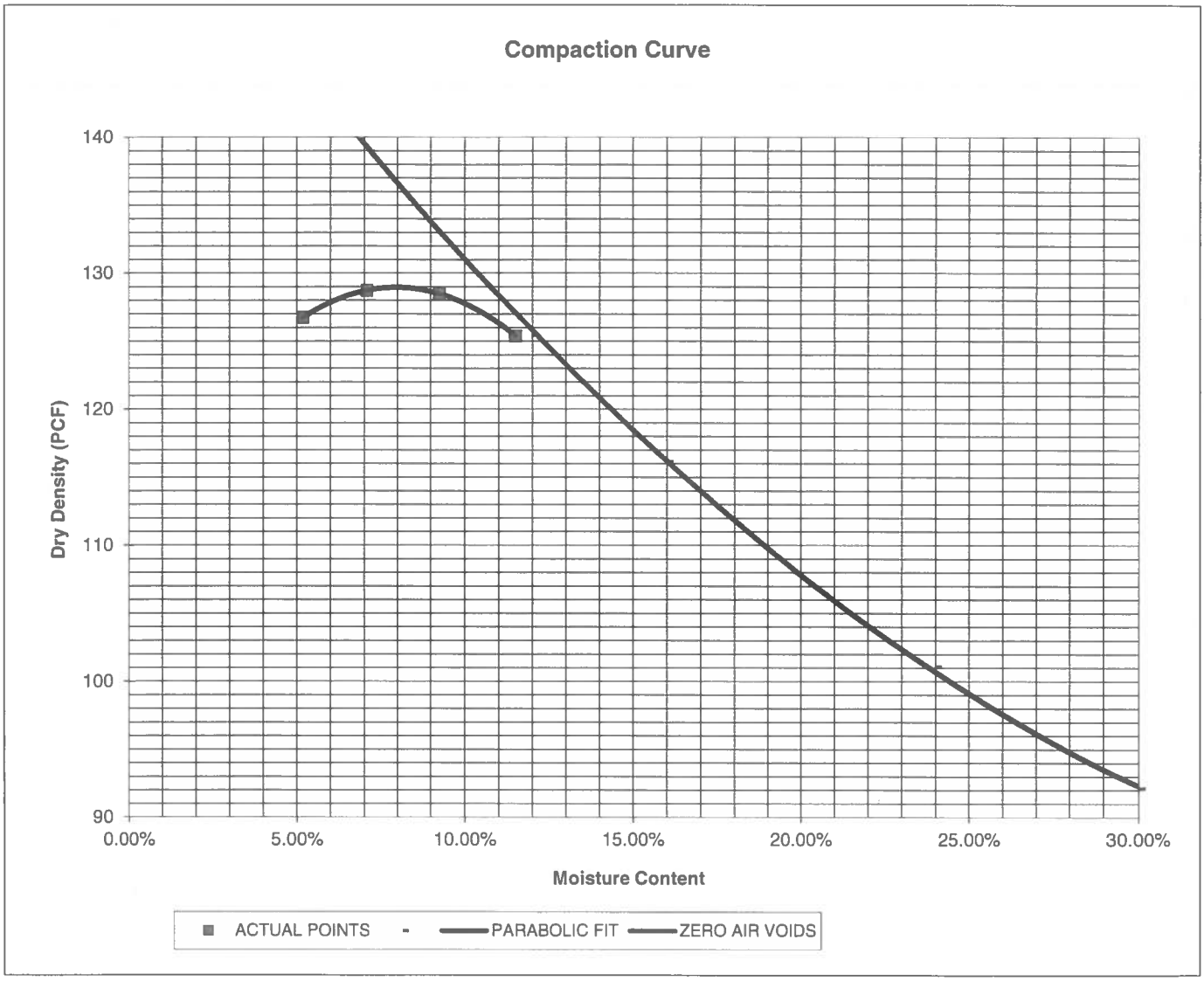
SWELL CONSOLIDATION
TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
			9/17/19

JOB NO.: 191439
FIG NO.: B-31

PROJECT	STONEBRIDGE, FILING 4	CLIENT	TECH CONTRACTORS
SAMPLE LOCATION	TB-7 @ 0-3'	JOB NO.	191439
SOIL DESCRIPTION	SAND, CLAYEY, BROWN	DATE	09/12/19

IDENTIFICATION	SC	COMPACTION TEST #	1
TEST DESIGNATION / METHOD	ASTM D-1557-A	TEST BY	BL
MAXIMUM DRY DENSITY (PCF)	129	OPTIMUM MOISTURE	8.0%



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MOISTURE DENSITY RELATION

DRAWN:	DATE:	CHECKED:	DATE:
			9/17/19

JOB NO.: 191439

FIG NO.: B-32

CBR TEST LOAD DATA

JOB NO: 191439
CLIENT: TECH CONTRACTORS
PROJECT: STONEBRIDGE, FILING 4
SOIL TYPE: 1

PISTON DIAMETER (cm)	PISTON AREA (in^2)
4.958	2.99250919

PENETRATION DEPTH (INCHES)	*10 BLOWS* MOLD # 1 LOAD(LBS) (LBS)	STRESS (PSI)	*25 BLOWS* MOLD # 16 LOAD(LBS) (LBS)	STRESS (PSI)	*56 BLOWS* MOLD # 18 LOAD(LBS) (LBS)	STRESS (PSI)
0.000	0	0.00	0	0.00	0	0.00
0.025	78	26.07	114	38.10	158	52.80
0.050	146	48.79	221	73.85	304	101.59
0.075	209	69.84	327	109.27	422	141.02
0.100	252	84.21	440	147.03	548	183.12
0.125	281	93.90	525	175.44	665	222.22
0.150	304	101.59	603	201.50	788	263.32
0.175	327	109.27	670	223.89	892	298.08
0.200	352	117.63	753	251.63	1040	347.53
0.300	415	138.68	1005	335.84	1608	537.34
0.400	462	154.39	1173	391.98	1958	654.30
0.500	512	171.09	1372	458.48	2345	783.62

FINAL MOISTURE CONTENT

	MOLD #	1	MOLD #	16	MOLD #	18
CAN #		349		345		106
WT. CAN		8.37		8.28		8.34
WT. CAN+WET		148.36		186.81		183.11
WT. CAN+DRY		129.15		163.43		163.52
WT. H20		19.21		23.38		19.59
WT. DRY SOIL		120.78		155.15		155.18
MOISTURE CONTENT		15.90%		15.07%		12.62%
WET DENSITY (PCF)		123.5		132.3		140.0
DRY DENSITY (PCF)		114.4		122.5		129.7
BEARING RATIO		8.42		14.70		18.31
90% OF DRY DENSITY	116.1					
95% OF DRY DENSITY	122.6					

BEARING RATIO AT 90% OF MAX	9.74	~ R VALUE	26
BEARING RATIO AT 95% OF MAX	14.73	~ R VALUE	45

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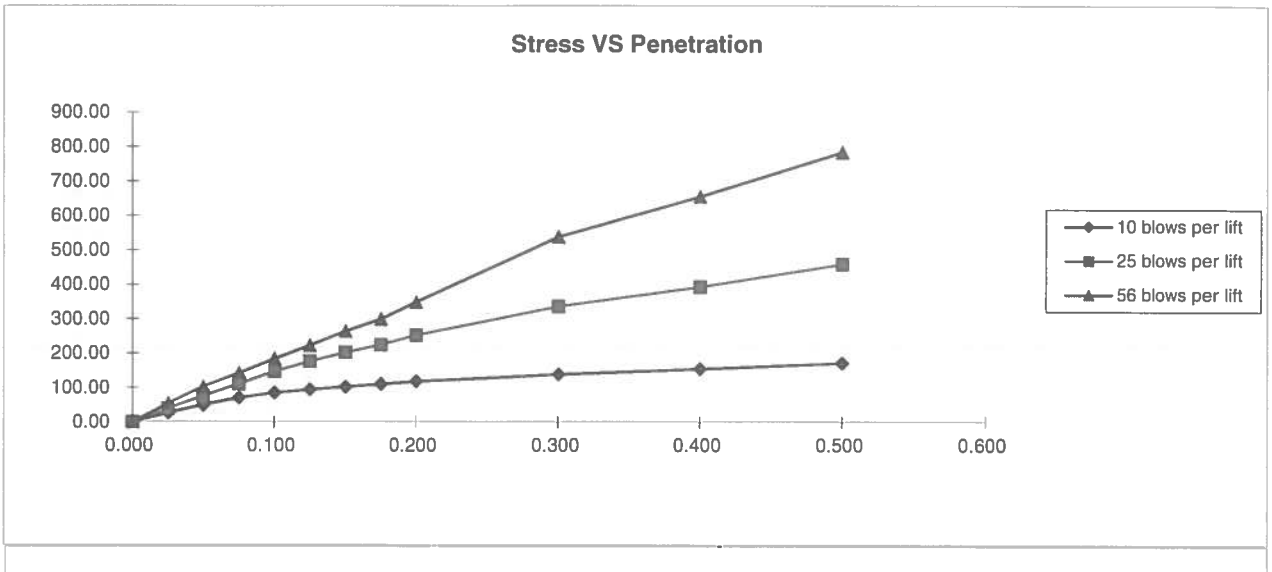
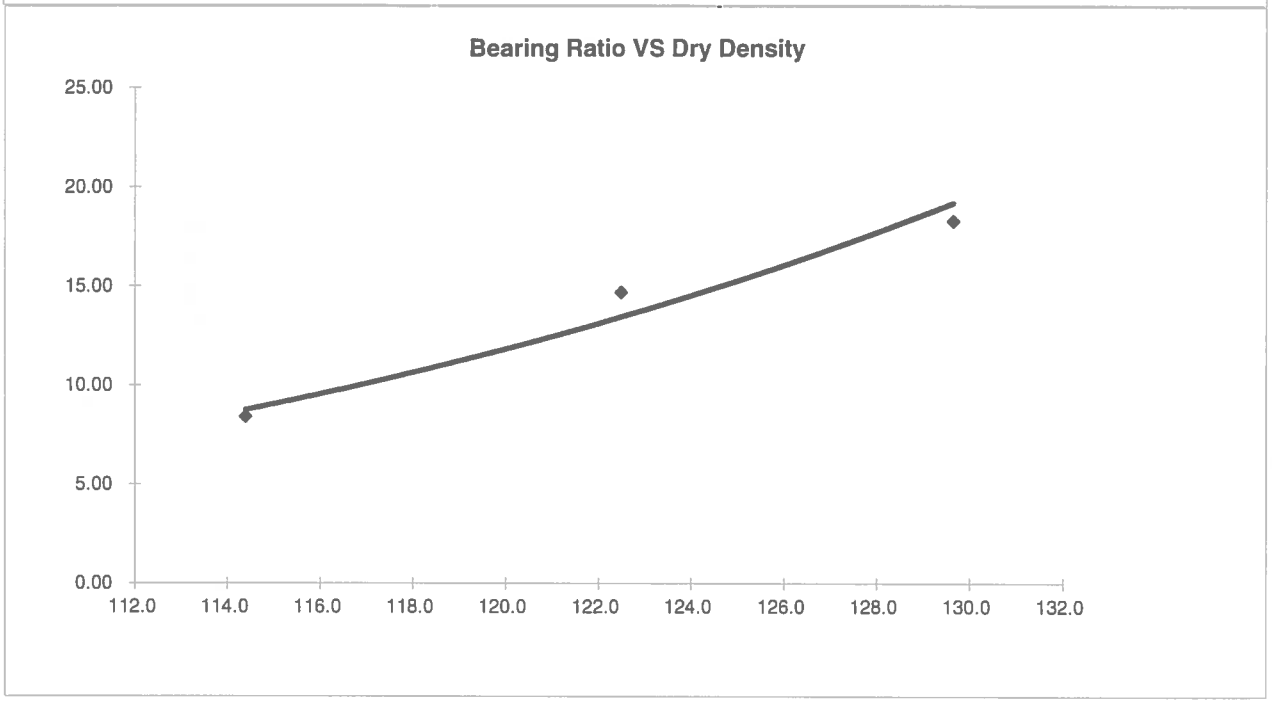
CBR TEST DATA

DRAWN:	DATE:	CHECKED:	DATE: 9/17/19

JOB NO.: 191439
FIG NO.: B-33





BEARING RATIO AT 90% OF MAX	9.74	~ R VALUE	26.00
BEARING RATIO AT 95% OF MAX	14.73	~ R VALUE	45.00

JOB NO: 191439
SOIL TYPE: 1

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COLORADO SPRINGS, COLORADO 80907

CALIFORNIA BEARING RATIO

DRAWN:	DATE:	CHECKED:	DATE: 9/17/19

JOB NO.: 191439
FIG NO.: B-34

CLIENT	TECH CONTRACTORS	JOB NO.	191439
PROJECT	STONEBRIDGE, FILING 4	DATE	9/16/2019
LOCATION	STONEBRIDGE, FILING 4	TEST BY	BL

BORING NUMBER	DEPTH, (ft)	SOIL TYPE NUMBER	UNIFIED CLASSIFICATION	WATER SOLUBLE SULFATE, (wt%)
TB-7	1	1	SM	0.01
TB-7	2	3	SC	<0.01
TB-1	10	3	CL	<0.01
TB-6	5	1	SC	<0.01

QC BLANK PASS

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LABORATORY TEST
SULFATE RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		DS	10/24/19

JOB NO.: 191439
FIG NO.: B-35

APPENDIX C: Pavement Design Calculations

FLEXIBLE PAVEMENT DESIGN

DESIGN DATA

TECH CONTRACTORS
STONEBRIDGE, FILING 4 - LOCAL LOW-VOLUME
SOIL TYPE 1

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 =	2.2
Reliability	Reliability =	80
Reliability (z-statistic)	Z_R =	-0.84
Soil Resilient Modulus	M_R =	9497

Weighted Structural Number (WSN): → WSN = 1.67

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. 191439
Fig. No. C-1

DESIGN CALCULATIONS

DESIGN DATA TECH CONTRACTORS
STONEBRIDGE, FILING 4 - LOCAL LOW-VOLUME
SOIL TYPE 1

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL =	36,500
Hveem Stabilometer (R Value) Results:	R =	40
Weighted Structural Number (WSN):	WSN =	1.67

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)

$D_1 = (WSN)/C_1$ = 3.8 inches of Full Depth Asphalt
Use 4.0 inches Full Depth

FOR ASPHALT + AGGREGATE BASE COURSE SECTION

Asphalt Thickness (t) = [3] inches
$D_2 = ((WSN) - (t)(C_1))/C_2$ = 3.2 inches of Aggregate
Base Course, use 4.0 inches

RECOMMENDED ALTERNATIVES

1. 3.0 inches of Asphalt + 4.0 inches of Aggregate Base Course, or
2. 4.0 inches of Full Depth Asphalt

Job No. 191439
Fig. No. C-2

DESIGN CALCULATIONS

CEMENT TREATED SECTIONS

DESIGN DATA: TECH CONTRACTORS
STONEBRIDGE, FILING 4 - LOCAL LOW VOLUME
SOIL TYPE 1

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL =	36,500
Hveem Stabilometer (R Value) Results:	R =	40
Weighted Structural Number (WSN):	WSN =	1.67

DESIGN EQUATION

$$WSN = C_1D_1 + C_2D_2$$

C_1 = 0.44 Strength Coefficient - Hot Bituminous Asphalt
C_2 = 0.12 Strength Coefficient - Cement Treated Subgrade.

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

FOR FULL DEPTH ASPHALT SECTION - (CURRENTLY NOT ALLOWED)

$D_1 = (WSN)/C_1$ = 3.8 inches of Full Depth Asphalt
Use 4.0 inches Full Depth

FOR ASPHALT + CEMENT TREATED SUBGRADE SECTION

Asphalt Thickness (t) = 4 inches USE 4 INCH MINIMUM.
$D_2 = ((WSN) - (t)(C_1))/C_2$ = -0.8 inches
Use 10.0 inches of Cement Treated Subgrade.

RECOMMENDED ALTERNATIVES

1. 4.0 inches of Asphalt + 10 inches of Cement Treated Subgrade.
2. 4.0 inches of Full Depth Asphalt

Job No. 191439
Fig. No. C-3

FLEXIBLE PAVEMENT DESIGN

DESIGN DATA

TECH CONTRACTORS
STONEBRIDGE, FILING 4 - LOCAL LOW-VOLUME
SOIL TYPE 2,3,4

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL (W_{18}) =	36,500
Hveem Stabilometer (R Value) Results:	R =	7.5
Standard Deviation	S_o =	0.45
Loss in Serviceability	Δpsi =	2.2
Reliability	Reliability =	80
Reliability (z-statistic)	Z_R =	-0.84
Soil Resilient Modulus	M_R =	3283

Weighted Structural Number (WSN): → WSN = 2.50

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. 191439
Fig. No. C-4

DESIGN CALCULATIONS

DESIGN DATA TECH CONTRACTORS
STONEBRIDGE, FILING 4 - LOCAL LOW-VOLUME
SOIL TYPE 2,3,4

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL =	36,500
Hveem Stabilometer (R Value) Results:	R =	7.5
Weighted Structural Number (WSN):	WSN =	2.50

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)

$D_1 = (WSN)/C_1$ = 5.7 inches of Full Depth Asphalt
Use 6.0 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 Aggregate
Base Course, use 7.0 inches

RECOMMENDED ALTERNATIVES

1. 4.0 inches of Asphalt + 7.0 inches of Aggregate Base Course, or
2. 6.0 inches of Full Depth Asphalt

Job No. 191439
Fig. No. C-5

DESIGN CALCULATIONS

CEMENT TREATED SECTIONS

DESIGN DATA: TECH CONTRACTORS
STONEBRIDGE, FILING 4 - LOCAL LOW VOLUME
SOIL TYPE 2,3,4

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL =	36,500
Hveem Stabilometer (R Value) Results:	R =	7.5
Weighted Structural Number (WSN):	WSN =	2.5

DESIGN EQUATION

$$WSN = C_1D_1 + C_2D_2$$

C_1 = 0.44 Strength Coefficient - Hot Bituminous Asphalt
C_2 = 0.12 Strength Coefficient - Cement Treated Subgrade.

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

FOR FULL DEPTH ASPHALT SECTION - (CURRENTLY NOT ALLOWED)

$D_1 = (WSN)/C_1$ = 5.7 inches of Full Depth Asphalt
Use 6.0 inches Full Depth

FOR ASPHALT + CEMENT TREATED SUBGRADE SECTION

Asphalt Thickness (t) = 4 inches
$D_2 = ((WSN) - (t)(C_1))/C_2$ = 6.2 inches
Use 10.0 inches of Cement Treated Subgrade.

RECOMMENDED ALTERNATIVES

1. 4.0 inches of Asphalt + 10 inches of Cement Treated Subgrade.
2. 6.0 inches of Full Depth Asphalt

Job No. 191439
Fig. No. C -4

FLEXIBLE PAVEMENT DESIGN

DESIGN DATA

TECH CONTRACTORS
STONEBRIDGE, FILING 4 - LOCAL ROADS
SOIL TYPE 1

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 =	2.2
Reliability	Reliability =	80
Reliability (z-statistic)	Z_R =	-0.84
Soil Resilient Modulus	M_R =	9497

Weighted Structural Number (WSN): → WSN = 2.36

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. 191439
Fig. No. C-7

DESIGN CALCULATIONS

DESIGN DATA TECH CONTRACTORS
STONEBRIDGE, FILING 4 - LOCAL ROADS
SOIL TYPE 1

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL = 292,000
Hveem Stabilometer (R Value) Results:	R = 40
Weighted Structural Number (WSN):	WSN = 2.36

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)

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

FOR ASPHALT + AGGREGATE BASE COURSE SECTION

Asphalt Thickness (t) = [3.5] inches
$D_2 = ((WSN) - (t)(C_1))/C_2$ = 7.4 inches of Aggregate
Base Course, use 8.0 inches

RECOMMENDED ALTERNATIVES

1. 3.5 inches of Asphalt + 8.0 inches of Aggregate Base Course, or
2. 5.5 inches of Full Depth Asphalt

Job No. 191439
Fig. No. C-8

DESIGN CALCULATIONS

CEMENT TREATED SECTIONS

DESIGN DATA: TECH CONTRACTORS
STONEBRIDGE, FILING 4 - LOCAL ROADS
SOIL TYPE 1

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL =	292,000
Hveem Stabilometer (R Value) Results:	R =	40
Weighted Structural Number (WSN):	WSN =	2.36

DESIGN EQUATION

$$WSN = C_1D_1 + C_2D_2$$

C_1 = 0.44 Strength Coefficient - Hot Bituminous Asphalt
C_2 = 0.12 Strength Coefficient - Cement Treated Subgrade.

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

FOR FULL DEPTH ASPHALT SECTION - (CURRENTLY NOT ALLOWED)

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

FOR ASPHALT + CEMENT TREATED SUBGRADE SECTION

Asphalt Thickness (t) = 4 inches
$D_2 = ((WSN) - (t)(C_1))/C_2$ = 5.0 inches
Use 10.0 inches of Cement Treated Subgrade.

RECOMMENDED ALTERNATIVES

1. 4.0 inches of Asphalt + 10.0 inches of Cement Treated Subgrade.
2. 5.5 inches of Full Depth Asphalt

Job No. 191439
Fig. No. C-9

FLEXIBLE PAVEMENT DESIGN

DESIGN DATA

TECH CONTRACTORS
STONEBRIDGE, FILING 4 - LOCAL ROADS
SOIL TYPE 2,3,4

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL (W_{18}) =	292,000
Hveem Stabilometer (R Value) Results:	R =	7.5
Standard Deviation	S_o =	0.45
Loss in Serviceability	Δpsi =	2.2
Reliability	Reliability =	80
Reliability (z-statistic)	Z_R =	-0.84
Soil Resilient Modulus	M_R =	3283

Weighted Structural Number (WSN): → WSN = 3.44

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. 191439
Fig. No. C-46

DESIGN CALCULATIONS

DESIGN DATA TECH CONTRACTORS
STONEBRIDGE, FILING 4 - LOCAL ROADS
SOIL TYPE 2,3,4

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL =	292,000
Hveem Stabilometer (R Value) Results:	R =	7.5
Weighted Structural Number (WSN):	WSN =	3.44

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)

$D_1 = (WSN)/C_1$ = 7.8 inches of Full Depth Asphalt
Use 8.0 inches Full Depth

FOR ASPHALT + AGGREGATE BASE COURSE SECTION

Asphalt Thickness (t) = [5] inches
$D_2 = ((WSN) - (t)(C_1))/C_2$ = 11.2 inches of Aggregate
Base Course, use 12.0 inches

RECOMMENDED ALTERNATIVES

1. 5.0 inches of Asphalt + 12.0 inches of Aggregate Base Course, or
2. 8.0 inches of Full Depth Asphalt

Job No. 191439
Fig. No. C-11

DESIGN CALCULATIONS

CEMENT TREATED SECTIONS

DESIGN DATA: TECH CONTRACTORS
STONEBRIDGE, FILING 4 - LOCAL ROADS
SOIL TYPE 2,3,4

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL =	292,000
Hveem Stabilometer (R Value) Results:	R =	7.5
Weighted Structural Number (WSN):	WSN =	3.44

DESIGN EQUATION

$$WSN = C_1D_1 + C_2D_2$$

C_1 = 0.44 Strength Coefficient - Hot Bituminous Asphalt
C_2 = 0.12 Strength Coefficient - Cement Treated Subgrade.

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

FOR FULL DEPTH ASPHALT SECTION - (CURRENTLY NOT ALLOWED)

$D_1 = (WSN)/C_1$ = 7.8 inches of Full Depth Asphalt
Use 7.0 inches Full Depth

FOR ASPHALT + CEMENT TREATED SUBGRADE SECTION

Asphalt Thickness (t) = 5 inches
$D_2 = ((WSN) - (t)(C_1))/C_2$ = 10.0 inches
Use 10.0 inches of Cement Treated Subgrade.

RECOMMENDED ALTERNATIVES

1. 5.0 inches of Asphalt + 10.0 inches of Cement Treated Subgrade.
2. 7.0 inches of Full Depth Asphalt

Job No. 191439
Fig. No. C-12

APPENDIX D: Pavement Recommendations Report by Entech Engineering, Inc., dated January 23, 2018, revised March 23, 2018, Entech Job No. 172016.

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

CLIENT TECH CONTRACTORS
PROJECT STONEBRIDGE, FILING 3
JOB NO. 172016

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
2, CBR #1	1	0-3	13.6	112.3	57.4	33	20		A-6	0.5	CL	FILL, CLAY, VERY SANDY
1	1	1-2			27.1	31	17		A-2-6		SC	FILL, SAND, CLAYEY
1	2	1-2	8.8	108.0	31.6	46	32	<0.01	A-2-6	0.0	SC	FILL, SAND, CLAYEY
1	3	1-2			27.5	26	13		A-2-6		SC	FILL, SAND, CLAYEY
3	2	10			22.5	21	4	0.01	A-2-4		SM	SANDSTONE, SILTY

TEST BORING NO. 1
DATE DRILLED 1/4/2018
Job # 172016

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 5', 1/4/18						
FILL 0-3', SAND, CLAYEY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, MOIST				17	7.7	1
CLAY LENSE AT 3'						2
SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST	5			50/7"	4.8	3
	10					
	15					
	20					

TEST BORING NO. 2
DATE DRILLED 1/4/2018
CLIENT TECH CONTRACTORS
LOCATION STONEBRIDGE, FILING 3

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 10', 1/4/18						
FILL 0-6', SAND, CLAYEY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, MOIST				13	9.7	1
	5			13	8.8	1
SANDSTONE, SILTY, FINE TO COARSE GRAINED, BUFF, VERY DENSE, MOIST	10			50/5"	5.4	1
	15					
	20					

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

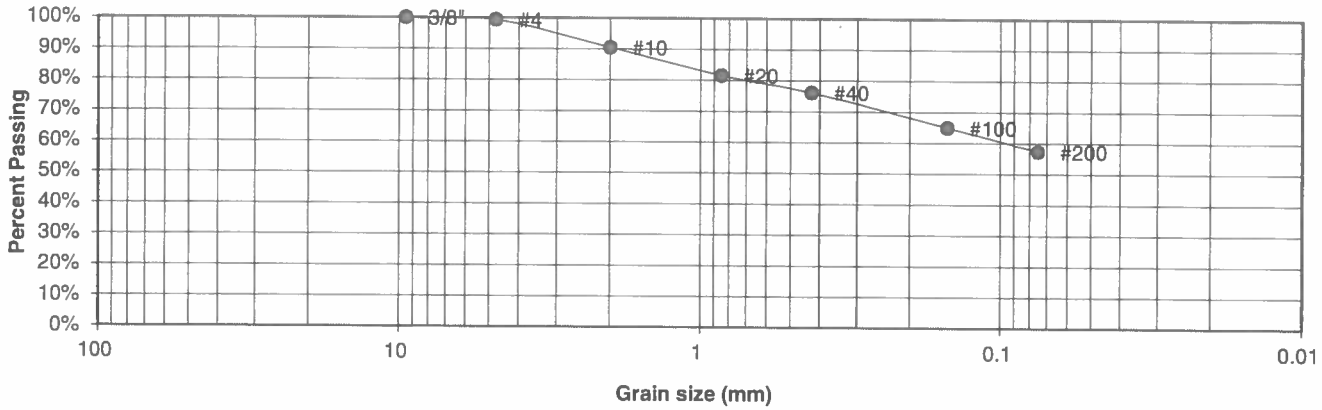
TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 172016
FIG NO.: D-1

UNIFIED CLASSIFICATION	CL	CLIENT	TECH CONTRACTORS
SOIL TYPE #	2, CBR #1	PROJECT	STONEBRIDGE, FILING 3
TEST BORING #	1	JOB NO.	172016
DEPTH (FT)	0-3	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	8

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	90.5%
20	81.6%
40	76.1%
100	65.0%
200	57.4%

Atterberg Limits

Plastic Limit	13
Liquid Limit	33
Plastic Index	20

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:

JOB NO.: 172016
FIG NO.: D-2

CBR TEST LOAD DATA

JOB NO: 172016
CLIENT: TECH CONTRACTORS
PROJECT: STONEBRIDGE, FILING 3
SOIL TYPE: 2, CBR #1

PISTON DIAMETER (cm)	PISTON AREA (in^2)
4.958	2.99250919

PENETRATION DEPTH (INCHES)	*10 BLOWS* MOLD # 1 LOAD(LBS) (LBS)	STRESS (PSI)	*25 BLOWS* MOLD # 11 LOAD(LBS) (LBS)	STRESS (PSI)	*56 BLOWS* MOLD # 9 LOAD(LBS) (LBS)	STRESS (PSI)
0.000	0	0.00	0	0.00	0	0.00
0.025	17	5.68	32	10.69	90	30.08
0.050	19	6.35	38	12.70	108	36.09
0.075	24	8.02	45	15.04	128	42.77
0.100	32	10.69	50	16.71	143	47.79
0.125	38	12.70	55	18.38	155	51.80
0.150	46	15.37	60	20.05	165	55.14
0.175	47	15.71	66	22.06	175	58.48
0.200	51	17.04	66	22.06	184	61.49
0.300	49	16.37	65	21.72	224	74.85
0.400	50	16.71	71	23.73	258	86.22
0.500	41	13.70	75	25.06	290	96.91

FINAL MOISTURE CONTENT

	MOLD # 1	MOLD # 11	MOLD # 9
CAN #	303	352	343
WT. CAN	6.97	6.96	6.91
WT. CAN+WET	184.12	225.67	156.4
WT. CAN+DRY	156.24	185.54	134.76
WT. H20	27.88	40.13	21.64
WT. DRY SOIL	149.27	178.58	127.85
MOISTURE CONTENT	18.68%	22.47%	16.93%

WET DENSITY (PCF)	109.4	114.7	128.4
DRY DENSITY (PCF)	97.4	102.0	114.3

BEARING RATIO	1.07	1.67	4.78

90% OF DRY DENSITY	102.8
95% OF DRY DENSITY	108.5

BEARING RATIO AT 90% OF MAX	1.87	~ R VALUE	1
BEARING RATIO AT 95% OF MAX	3.32	~ R VALUE	7.5

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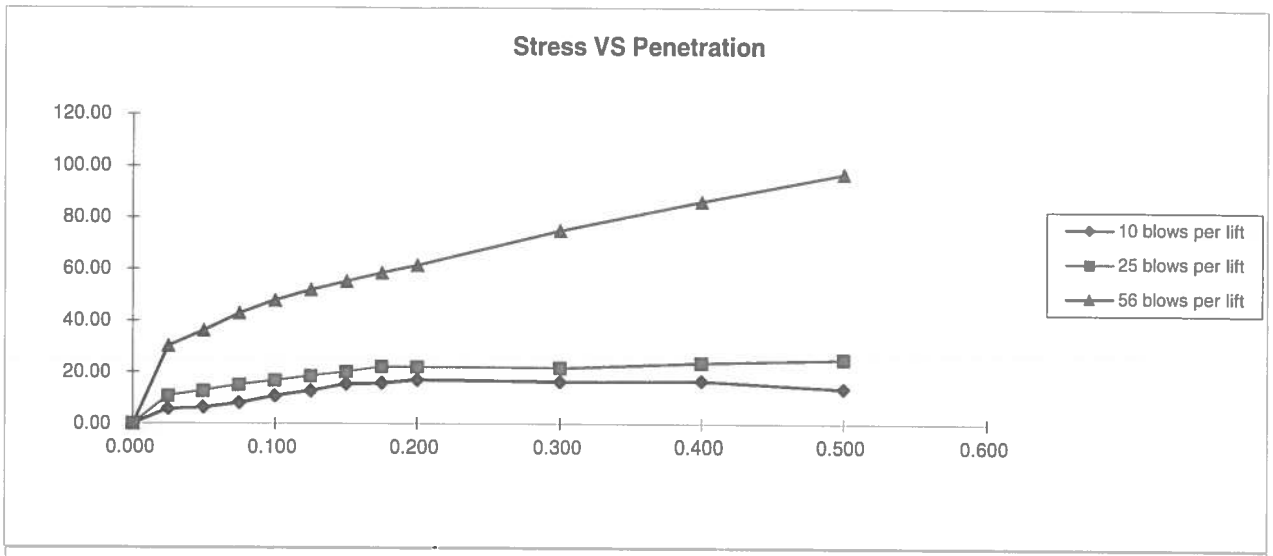
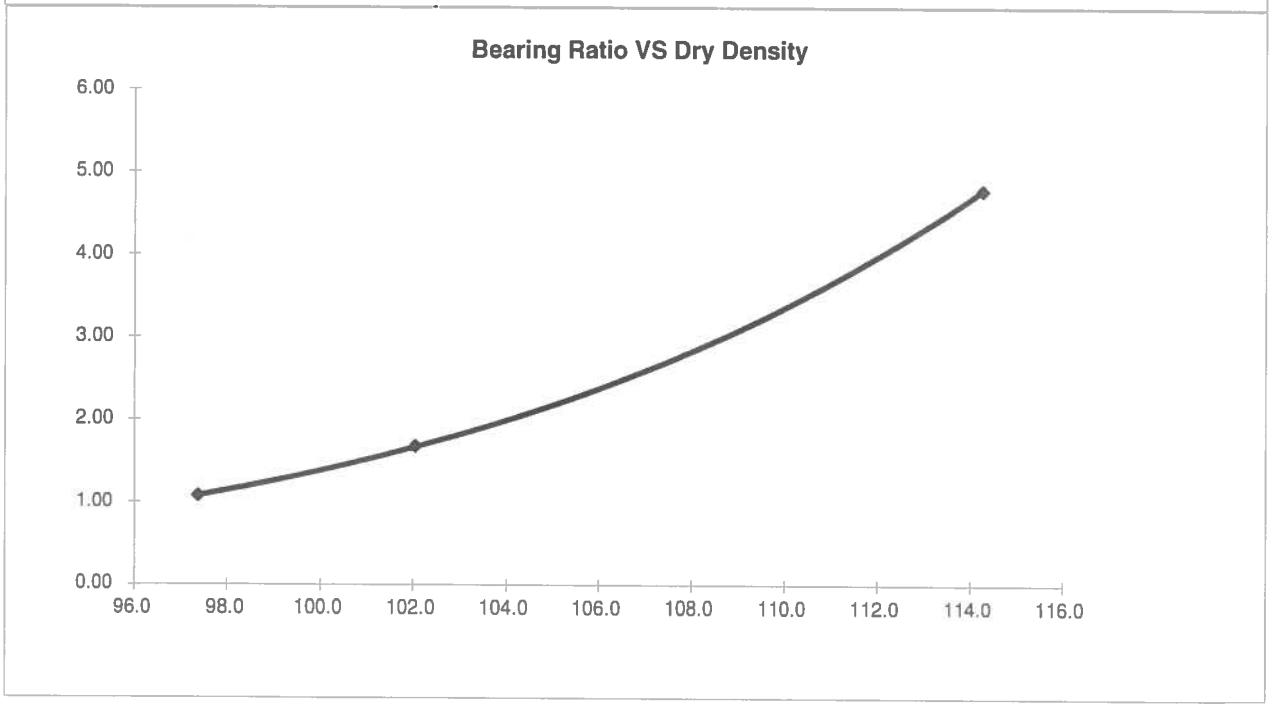
CBR TEST DATA

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 172016
FIG NO.: D-3





BEARING RATIO AT 90% OF MAX	1.87	~ R VALUE	1.00
BEARING RATIO AT 95% OF MAX	3.32	~ R VALUE	7.50

JOB NO: 172016
SOIL TYPE: 2, CBR #1

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CALIFORNIA BEARING RATIO

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 172016
FIG NO.: D-21