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

February 7, 2023
Revised June 6, 2023

Glen Development Co.
3 Widefield Boulevard
Colorado Springs, CO 80911

Attn: Rudy Cross

Re: Pavement Recommendations - Revised
The Glen at Widefield, Filing No. 11
El Paso County, Colorado
Entech Job No. 222360

Dear Mr. Cross:

As requested, Entech Engineering, Inc. has obtained samples of the subgrade soils from sections of the roadways in the Glen at Widefield Subdivision, Filing 11, 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 sections of Pennycress Drive, Golden Bluffs Drive, Poa Annua, and Lance Leaf Road as well as the cul-de-sacs, Marsh Elder, Horse Mint, Kitten Tail, and Mouse Ear. The site layout and the locations of the test borings are shown on the Test Boring Location Map, Figure 1.

Subgrade Conditions

Sixteen exploratory test borings were drilled in the roadways to depths of approximately 5 to 10 feet. The borings were spaced within the limits set forth in the El Paso County Criteria ECM Section D.2.1. The subgrade soils consisted of sandy to very sandy clay and very clayey sand (Soil Type 1). The Boring Logs are presented in Appendix A.

Sieve Analyses and Atterberg Limit testing were performed on all of the subgrade soil samples obtained from the test borings for the purpose of classification. Sieve analyses indicated the percent passing the No. 200 sieve ranged from approximately 36 to 70 percent. Atterberg Limit Tests resulted in Liquid Limits ranging from 29 to 41 and Plastic Indexes of 12 to 24 percent.

Swell/Consolidation Testing was required due to the plastic index values of the subgrade soils. Swell/Consolidation Tests performed on in-situ subgrade soil samples showed volume changes ranging from 1.8 to 7.8 percent, and testing on remolded Type 1 soil samples, moisture-conditioned to 4 percent over optimum, showed volume changes ranging from 1.3 to 3.3 percent.

Based on the results of the laboratory testing, one pavement subgrade soil type was determined. The subgrade soils classify as A-6 and A-7-6 soils using the AASHTO Classification System, which typically have poor pavement support characteristics. The laboratory testing results are presented in Appendix B and are summarized in Table 1.

Sulfate testing indicated that the clay soils exhibit moderate to severe potentials for sulfate attack. Due to the sulfate content of the soils, Type 1L or Type 5 cement is recommended for concrete on this site. Type 1L or Type 5 cement, or equivalent sulfate resistant materials, should be used for any concrete in contact with the site soils. If these cement types are not readily available, the cement supplier shall provide a cement which is highly resistant to sulfate degradation.

California Bearing Ratio (CBR) testing was conducted on a representative subgrade sample for the roadways in this filing. The CBR and laboratory test results are summarized in Table 1 and included in Appendix B. The laboratory classification testing results are included in the following table.

Soil Type 1 – Sandy Clay

R @ 90% = 1.0
R @ 95% = 1.0
Use R = 5.0 for design

Classification Testing

Liquid Limit	35
Plasticity Index	21
Percent Passing 200	62.6
AASHTO Classification	A-6
Group Index	10
Unified Soils Classification	CL
M_R	3,025 psi

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 cul-de-sacs, Horse Mint, Kitten Tail, Mouse Ear, and Marsh Elder classify as urban local low-volume roads, which used an 18k ESAL value of 36,500 to determine the pavement sections. Pennycress Drive, Golden Bluffs Drive, Poa Annua, and Lance Leaf Road classify as urban local roads, which used an 18k ESAL value of 292,000 for design. Pavement sections for asphalt over aggregate basecourse or asphalt on cement stabilized subgrade are provided. Design parameters used in the pavement analysis are as follows:

Serviceability Index:	
Urban Local / Urban Local Low Volume	2.0
Reliability:	
Urban Local / Urban Local Low Volume	80%
"R" Value Subgrade	5.0
Resilient Modulus	3,025 psi
Structural Coefficients:	
Hot Bituminous Pavement	0.44
Basecourse	0.11
Cement Stabilized Subgrade	0.11

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

Pavement Sections – Urban Local (Low Volume) ESAL 36,500		
Alternative	Asphalt (in)	Basecourse (in)
1. Asphalt over Basecourse	4.0	8.0
2. Asphalt over Cement Stabilized Subgrade	4.0	8.0

Pavement Sections – Urban Local ESAL 292,000		
Alternative	Asphalt (in)	Basecourse (in)
1. Asphalt over Basecourse	5.5	11.0
2. Asphalt over Cement Stabilized Subgrade	5.5	11.0

* Minimum sections required per El Paso County

-Full Depth Asphalt is not allowed in unincorporated El Paso County.

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. Several samples exceeded this threshold. Remolded swell tests moisture conditioned to 4 percent over optimum, exhibited a swell of 1.3 to 3.3 percent. The moisture conditioned remolded samples show a considerable reduction in expansion, however additional mitigation is necessary for some areas (Test Boring Nos. 4 and 14 for example). The roadway subgrade soils were initially moisture conditioned and processed during utility installation. The subgrade was conditioned and compacted to specified requirements during the utility installations. Prior to paving, the subgrade should be evaluated for proper moisture conditions. In areas that need additional moisture-conditioning, we recommend that the top 12-inches of the subgrade be scarified and moisture-conditioned to 0 to 4 percent over optimum moisture content and be recompacted. Specific areas requiring mitigation should be field determined. The subgrade soils should be observed and tested by Entech personnel prior to paving.

Roadway Construction – Asphalt on Aggregate Basecourse Alternative

Prior to placement of the asphalt, the subgrade should be proofrolled and compacted to a minimum of 95 percent of its maximum Standard Proctor Dry Density, ASTM D-698 at 0 to 4 percent over optimum moisture content. Any soft areas should be removed and replaced with suitable materials. Base course 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. Full-depth asphalt sections are currently not allowed by El Paso County.

Roadway Construction – Cement Stabilized Subgrade

Prior to placement of the asphalt, the subgrade may be stabilized by addition of cement to a depth of at least 8 to 11-inches. The amount of cement applied shall be 2.0 percent (by weight) of the subgrade's maximum dry density as determined by the Modified Proctor Test (ASTM D-1557) and based on laboratory cement stabilization testing. The cement should be spread evenly on the subgrade surface and be thoroughly mixed into the subgrade over an 8-11-inch depth such that a uniform blend of soil and cement is achieved. Prior to application or mixing of the cement, the upper 8 to 11-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 1L or Type 5 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.

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

The site soils exhibited moderate to severe sulfate levels. The use of Typ1L or Type 5 sulfate resistant cement is recommended for all concrete on this site.

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.

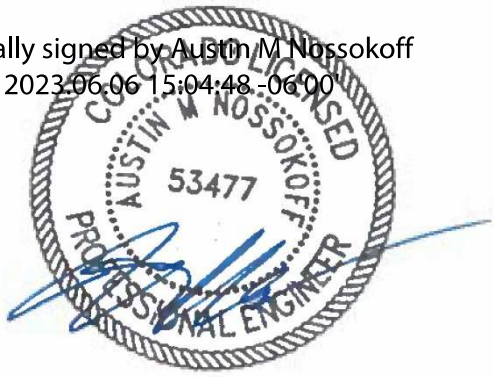
Respectfully Submitted,

ENTECH ENGINEERING, INC.

Stuart Wood

Reviewed by:

Digitally signed by Austin M Nossokoff
Date: 2023.06.06 15:04:48 -06'00'



Austin M. Nossokoff, P.E.

DPS/am

Encl.
Entech Job No. 222360
AAprojects/2022/222360 pr-Rev2

TABLE

TABLE 1

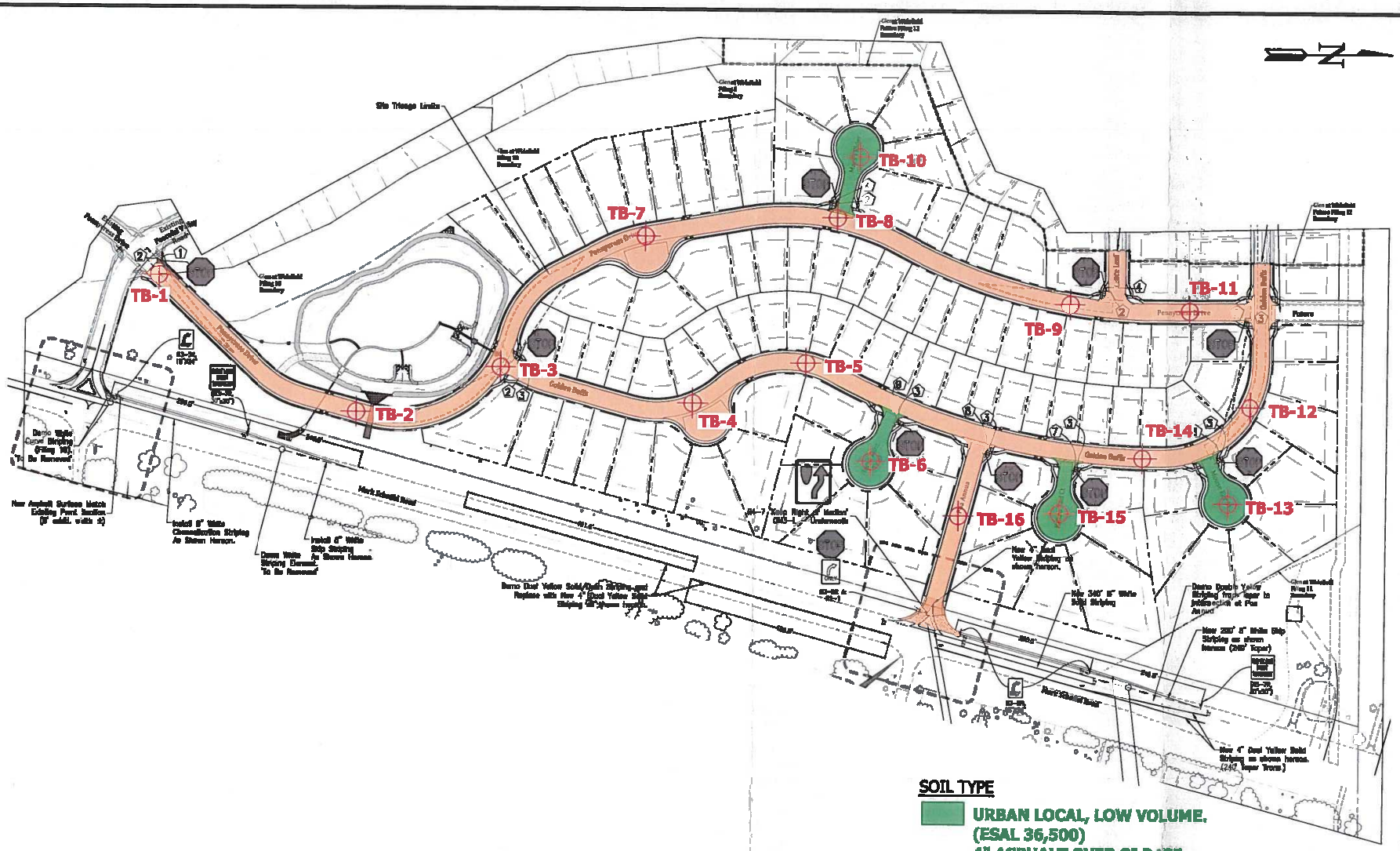
SUMMARY OF LABORATORY TEST RESULTS

CLIENT GLEN DEVELOPMENT
PROJECT GLEN AT WIDEFIELD, F-11
JOB NO. 222360

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	9	0-3			62.6	35	21		A-6		CL	CLAY, SANDY
1	1	1-2			36.0	29	15		A-6		SC	SAND, VERY CLAYEY
1	2	1-2	13.1	118.1	60.3	35	22	0.20	A-6	2.8	CL	CLAY, VERY SANDY
1	3	1-2	12.9	94.6	67.1	36	22		A-6	4.9	CL	CLAY, SANDY
1	3	1-2	16.2	102.4						1.7*	CL	CLAY, SANDY
1	4	1-2	14.3	110.6	69.6	41	23		A-7-6	5.2	CL	CLAY, SANDY
1	4	1-2	17.7	106.9						2.4*	CL	CLAY, SANDY
1	5	1-2	13.1	114.3	59.8	34	20		A-6	3.3	CL	CLAY, VERY SANDY
1	6	1-2	11.9	111.6	65.7	34	19	0.31	A-6	3.8	CL	CLAY, SANDY
1	7	1-2			63.6	37	24		A-6		CL	CLAY, SANDY
1	8	1-2	12.1	121.6	62.4	33	19		A-6	4.6	CL	CLAY, SANDY
1	8	1-2	16.4	109.5						1.3*	CL	CLAY, SANDY
1	9	1-2			56.6	32	17	0.19	A-6		CL	CLAY, VERY SANDY
1	10	1-2	8.1	104.5	61.1	34	20		A-6	3.6	CL	CLAY, VERY SANDY
1	11	1-2	11.2	118.8	58.2	33	12		A-6	4.1	CL	CLAY, VERY SANDY
1	11	1-2	15.9	112.6						1.4*	CL	CLAY, VERY SANDY
1	12	1-2	11.2	99.8	69.3	35	13	0.21	A-6	1.8	CL	CLAY, SANDY
1	13	1-2	8.9	101.9	64.6	38	16		A-6	3.4	CL	CLAY, SANDY
1	14	1-2	10.2	125.5	60.9	34	14		A-6	7.8	CL	CLAY, VERY SANDY
1	14	1-2	17.0	112.3						3.3*	CL	CLAY, VERY SANDY
1	15	1-2	8.7	97.8	58.3	36	16	0.18	A-6	2.9	CL	CLAY, VERY SANDY
1	16	1-2	15.1	117.2	61.9	37	17		A-6	3.1	CL	CLAY, SANDY
1	3	0-3			61.3						CL	CLAY, VERY SANDY
1	6	0-3			59.7						CL	CLAY, VERY SANDY
1	13	0-3			62.5						CL	CLAY, SANDY
1	15	0-3			63.1						CL	CLAY, SANDY
2	1	5			36.4	25	11		A-6		SC	SANDSTONE, VERY CLAYEY
2	7	5			63.1	30	16		A-6		CL	CLAYSTONE, SANDY
2	8	5			67.3	34	19	0.24	A-6		CL	CLAYSTONE, SANDY
2	2	5			44.1	31	15		A-6		CL	SANDSTONE, VERY CLAYEY
2	6	10			37.4	26	14	0.19	A-6		SC	SANDSTONE, VERY CLAYEY

* - REMOLDED SAMPLE

FIGURE



REVISION	BY

ENTECH ENGINEERING, INC.

TEST BORING LOCATION MAP
GLEN AT WIDEFIELD, FILING 11
COLORADO SPRINGS, CO
FOR: GLEN DEVELOPMENT COMPANY

DRAWN: JAC
CHECKED: DFS
DATE: 1/31/00
SCALE: 1"=200'
JOB NO. 2223360
FIGURE No. 1

APPENDIX A: Test Boring Logs

TEST BORING NO. 1
DATE DRILLED 12/21/2022
Job # 222360

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 5', 12/21/22						
SAND, VERY CLAYEY, FINE GRAINED, TAN, MOIST				*	7.1	1
SANDSTONE, VERY CLAYEY, FINE GRAINED, BROWN, VERY DENSE, MOIST	5			50/6"	11.9	2
	10					
	15					
	20					

TEST BORING NO. 2
DATE DRILLED 12/21/2022
CLIENT GLEN DEVELOPMENT
LOCATION GLEN AT WIDEFIELD, F-11

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 5', 12/21/22						
CLAY, VERY SANDY, GRAY BROWN, VERY STIFF, MOIST				40	10.3	1
SANDSTONE, VERY CLAYEY, FINE GRAINED, BROWN, VERY DENSE, MOIST	5			50/11"	10.0	2
	10					
	15					
	20					

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TEST BORING LOG

DRAWN:	DATE:	CHECKED: SW	DATE: 1-27-23

JOB NO.: 222360
FIG NO.: A- 1

TEST BORING NO. 3
DATE DRILLED 12/21/2022
Job # 222360

REMARKS

DRY TO 10', 12/21/22

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
CLAY, SANDY, GRAY BROWN, STIFF TO FIRM, MOIST			17	11.6	1
5			24	14.5	1
10			13	16.6	1
15					
20					

TEST BORING NO. 4
DATE DRILLED 12/21/2022
CLIENT GLEN DEVELOPMENT
LOCATION GLEN AT WIDEFIELD, F-11

REMARKS

DRY TO 5', 12/21/22

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
CLAY, SANDY, GRAY BROWN, STIFF, MOIST			18	22.6	1
5			25	14.1	1
10					
15					
20					

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TEST BORING LOG

DRAWN:	DATE:	CHECKED: SW	DATE: 1-27-23

JOB NO.: 222360
FIG NO.: A- 2

TEST BORING NO. 5
DATE DRILLED 12/21/2022
Job # 222360

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 5', 12/21/22						
CLAY, VERY SANDY, GRAY BROWN, FIRM TO STIFF, MOIST				13	14.9	1
	5			22	14.6	1
	10					
	15					
	20					

TEST BORING NO. 6
DATE DRILLED 12/21/2022
CLIENT GLEN DEVELOPMENT
LOCATION GLEN AT WIDEFIELD, F-11

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 10', 12/21/22						
CLAY, SANDY, GRAY BROWN, STIFF TO FIRM, MOIST				11	10.8	1
	5			16	10.4	1
SANDSTONE, VERY CLAYEY, FINE GRAINED, BROWN, VERY DENSE, MOIST	10			50	9.3	2
	15					
	20					

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TEST BORING LOG

DRAWN:	DATE:	CHECKED: SW	DATE: 1-27-23

JOB NO.: 222360
FIG NO.: A-3

TEST BORING NO. 7
DATE DRILLED 12/21/2022
Job # 222360

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 5', 12/21/22						
CLAY, SANDY, GRAY BROWN, STIFF, MOIST				22	8.8	1
CLAYSTONE, SANDY, GRAY BROWN, HARD, MOIST	5			50/11"	10.4	2
	10					
	15					
	20					

TEST BORING NO. 8
DATE DRILLED 12/21/2022
CLIENT GLEN DEVELOPMENT
LOCATION GLEN AT WIDEFIELD, F-11

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 10', 12/21/22						
CLAY, SANDY, GRAY BROWN, STIFF, MOIST				22	10.9	1
CLAYSTONE, SANDY, GRAY BROWN, HARD TO STIFF, MOIST	5			50/10"	11.4	2
HIGHLY WEATHERED ZONE	10			16	21.6	2
	15					
	20					

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TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		SW	1-27-23

JOB NO.: 222360
FIG NO.: A- 4

TEST BORING NO. 9
DATE DRILLED 12/21/2022
Job # 222360

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 5', 12/21/22						
CLAY, VERY SANDY, TAN, STIFF, MOIST				21	10.2	1
	5			18	14.2	1
	10					
	15					
	20					

TEST BORING NO. 10
DATE DRILLED 12/21/2022
CLIENT GLEN DEVELOPMENT
LOCATION GLEN AT WIDEFIELD, F-11

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 5', 12/21/22						
CLAY, VERY SANDY, TAN, FIRM TO VERY STIFF, MOIST				13	6.4	1
	5			35	10.3	1
	10					
	15					
	20					

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TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		SW	1-27-23

JOB NO.: 222360
FIG NO.: A- 5

TEST BORING NO. 11
DATE DRILLED 1/3/2023
Job # 222360

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 5', 1/3/23						
CLAY, VERY SANDY, TAN, FIRM, MOIST				13	9.9	1
	5			9	11.7	1
	10					
	15					
	20					

TEST BORING NO. 12
DATE DRILLED 1/3/2023
CLIENT GLEN DEVELOPMENT
LOCATION GLEN AT WIDEFIELD, F-11

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 5', 1/3/23						
CLAY, SANDY, TAN, VERY STIFF, MOIST				39	11.4	1
	5			38	12.3	1
	10					
	15					
	20					

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TEST BORING LOG

DRAWN:	DATE:	CHECKED: SW	DATE: 1-27-23

JOB NO.: 222360
FIG NO.: A- 6

TEST BORING NO. 13
DATE DRILLED 1/3/2023
Job # 222360

REMARKS

DRY TO 10', 1/3/23

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
	CLAY, SANDY, GRAY BROWN, VERY STIFF TO STIFF, MOIST		37	8.1	1
5			28	12.9	1
10			30	16.2	1
15					
20					

TEST BORING NO. 14
DATE DRILLED 1/3/2023
CLIENT GLEN DEVELOPMENT
LOCATION GLEN AT WIDEFIELD, F-11

REMARKS

DRY TO 5', 1/3/23

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
	CLAY, VERY SANDY, TAN, VERY STIFF, MOIST		40	8.4	1
5			34	11.2	1
10					
15					
20					

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TEST BORING LOG

DRAWN	DATE	CHECKED: SW	DATE 1-27-23

JOB NO. 222360
FIG NO. A-7

TEST BORING NO. 15
DATE DRILLED 1/3/2023
Job # 222360

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 5', 1/3/23						
CLAY, VERY SANDY, TAN, VERY STIFF TO STIFF, MOIST				31	8.8	1
	5			29	14.4	1
	10			26	13.3	1
	15					
	20					

TEST BORING NO. 16
DATE DRILLED 1/3/2023
CLIENT GLEN DEVELOPMENT
LOCATION GLEN AT WIDEFIELD, F-11

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 5', 1/3/23						
CLAY, VERY SANDY, TAN, STIFF, MOIST				25	13.9	1
	5			20	12.9	1
	10					
	15					
	20					

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COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

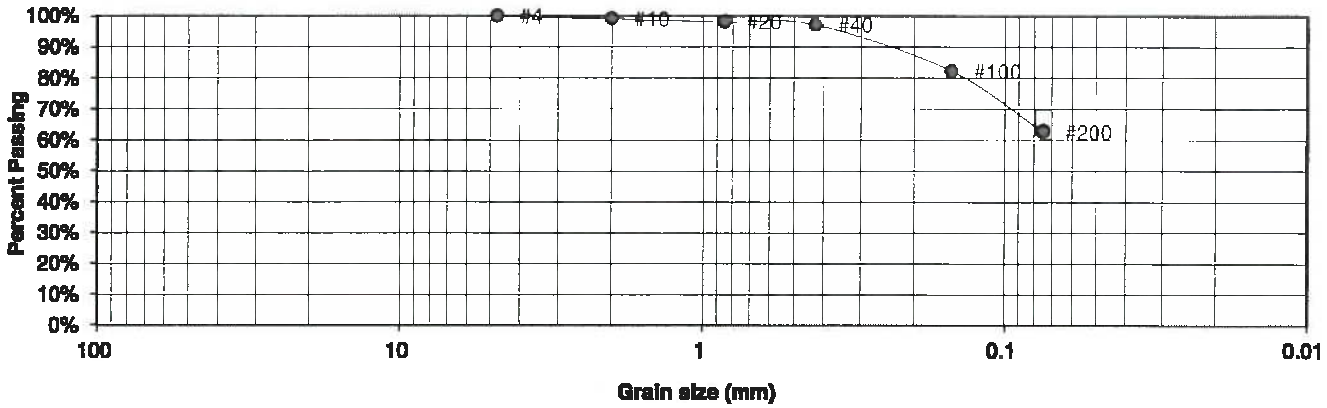
DRAWN:	DATE:	CHECKED:	DATE:
		SW	1-27-23

JOB NO.: 222360
FIG NO.: A- 8

APPENDIX B: Laboratory Test Results

UNIFIED CLASSIFICATION	CL	CLIENT	GLEN DEVELOPMENT
SOIL TYPE #	1, CBR	PROJECT	GLEN AT WIDEFIELD, F-11
TEST BORING #	9	JOB NO.	222360
DEPTH (FT)	0-3	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	10

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.1%
20	98.1%
40	97.2%
100	82.3%
200	62.6%

Atterberg Limits	
Plastic Limit	13
Liquid Limit	35
Plastic Index	21

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

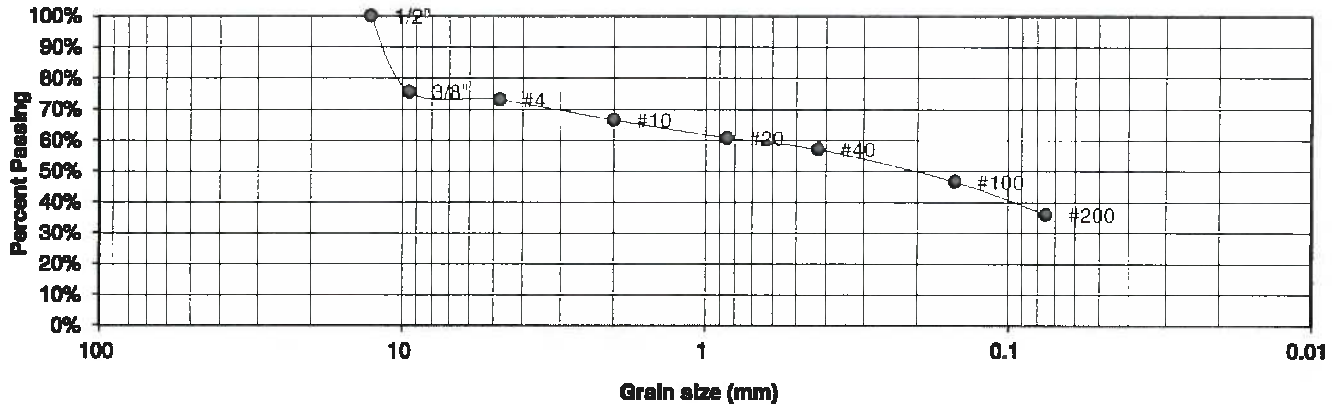
LABORATORY TEST RESULTS

DRAWN	DATE	CHECKED	DATE
		SW	2-3-23

JOB NO.: 222360
FIG NO.: B-1

UNIFIED CLASSIFICATION	SC	CLIENT	GLEN DEVELOPMENT
SOIL TYPE #	1	PROJECT	GLEN AT WIDEFIELD, F-11
TEST BORING #	1	JOB NO.	222360
DEPTH (FT)	1-2	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	1

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	75.6%
4	73.1%
10	66.6%
20	60.8%
40	57.1%
100	46.6%
200	36.0%

Atterberg Limits	
Plastic Limit	15
Liquid Limit	29
Plastic Index	15

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

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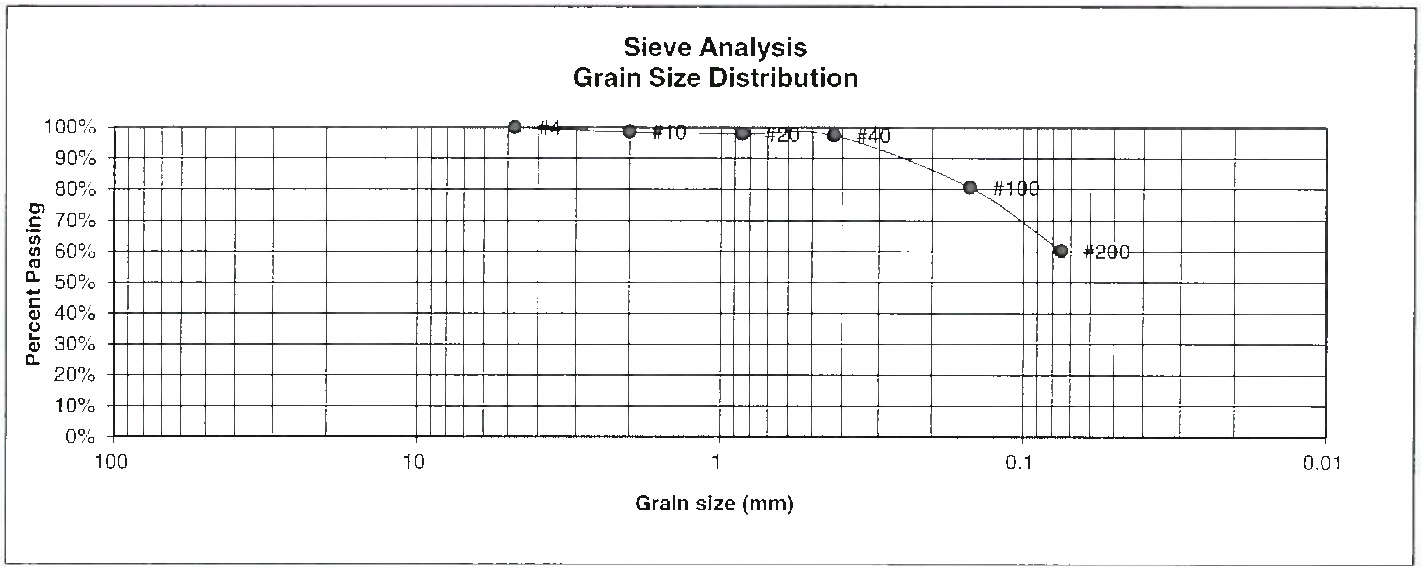
LABORATORY TEST RESULTS

DRAWN	DATE	CHECKED	DATE
		SW	2-3-23

JOB NO.: 222360
FIG NO.: B-2

UNIFIED CLASSIFICATION	CL	CLIENT	GLEN DEVELOPMENT
SOIL TYPE #	1	PROJECT	GLEN AT WIDEFIELD, F-11
TEST BORING #	2	JOB NO.	222360
DEPTH (FT)	1-2	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	10



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	98.5%
20	97.8%
40	97.4%
100	80.6%
200	60.3%

Atterberg Limits	
Plastic Limit	13
Liquid Limit	35
Plastic Index	22

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

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LABORATORY TEST RESULTS

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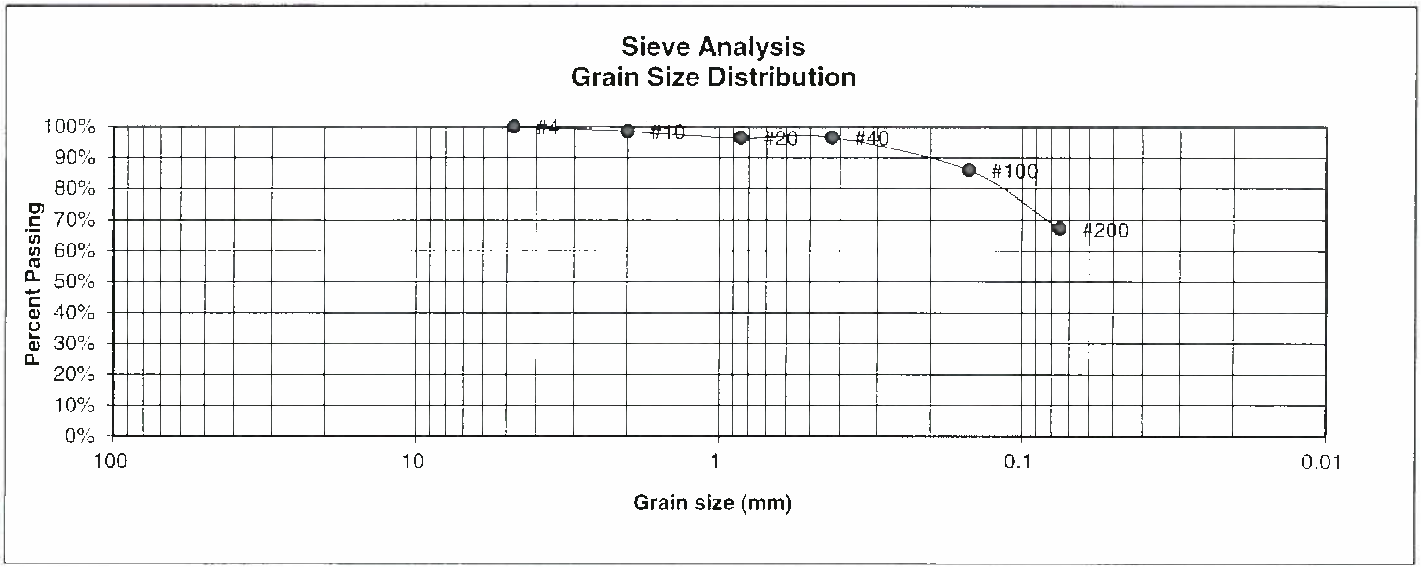
JOB NO.: 222360
FIG NO.: B-3

UNIFIED CLASSIFICATION	CL	CLIENT	GLEN DEVELOPMENT
SOIL TYPE #	1	PROJECT	GLEN AT WIDEFIELD, F-11
TEST BORING #	3	JOB NO.	222360
DEPTH (FT)	1-2	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	12



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	98.5%
20	96.3%
40	96.5%
100	86.0%
200	67.1%

Atterberg Limits	
Plastic Limit	14
Liquid Limit	36
Plastic Index	22

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

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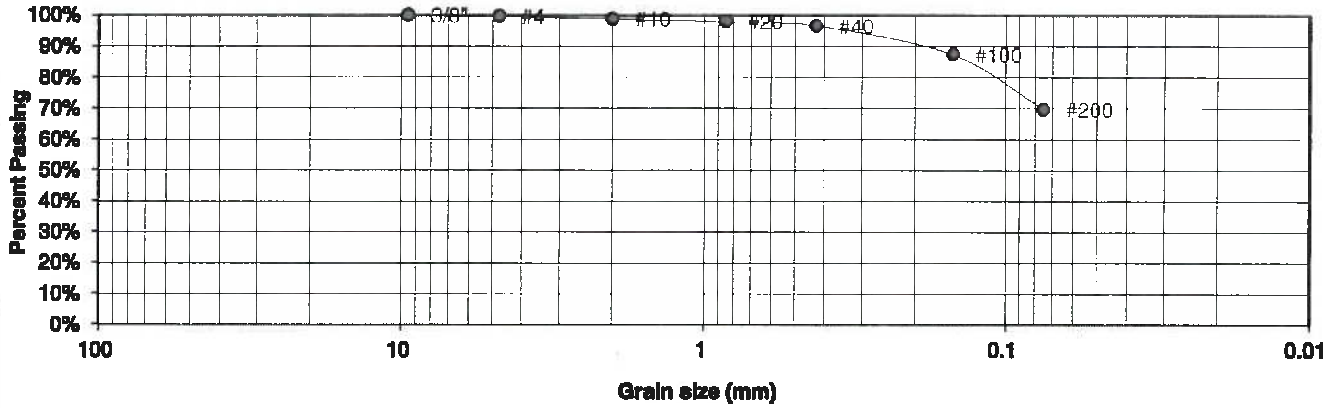
JOB NO.: 222360
FIG NO.: B-4

UNIFIED CLASSIFICATION	CL	CLIENT	GLEN DEVELOPMENT
SOIL TYPE #	1	PROJECT	GLEN AT WIDEFIELD, F-11
TEST BORING #	4	JOB NO.	222360
DEPTH (FT)	1-2	TEST BY	BL
AASHTO CLASSIFICATION	A-7-6	GROUP INDEX	14

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	98.8%
20	97.9%
40	96.6%
100	87.3%
200	69.6%

Atterberg Limits

Plastic Limit	18
Liquid Limit	41
Plastic Index	23

Swell

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

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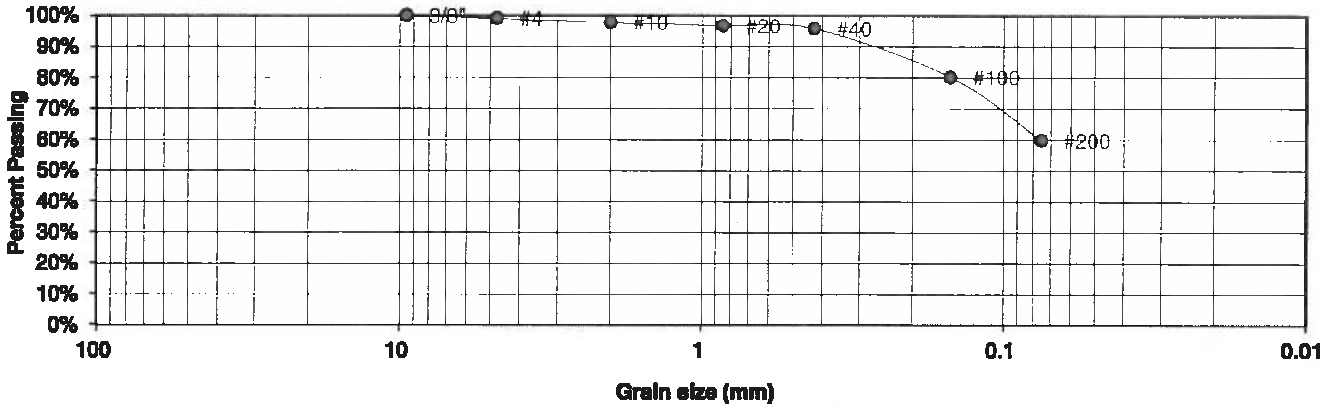
JOB NO.: 222360
FIG NO.: B-5

UNIFIED CLASSIFICATION	CL	CLIENT	GLEN DEVELOPMENT
SOIL TYPE #	1	PROJECT	GLEN AT WIDEFIELD, F-11
TEST BORING #	5	JOB NO.	222360
DEPTH (FT)	1-2	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	9

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.1%
10	97.8%
20	96.8%
40	95.9%
100	80.2%
200	59.8%

Atterberg Limits	
Plastic Limit	14
Liquid Limit	34
Plastic Index	20

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

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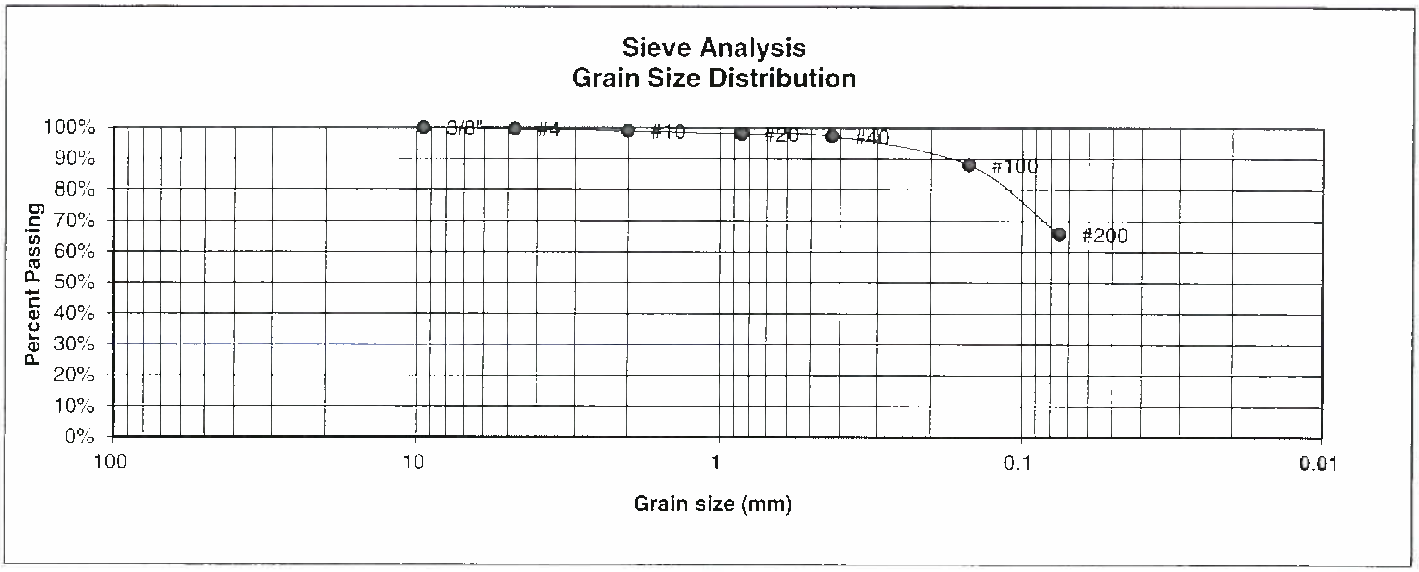
		SW	2-3-23

JOB NO.: 222360
FIG NO.: B-6

UNIFIED CLASSIFICATION	CL	CLIENT	GLEN DEVELOPMENT
SOIL TYPE #	1	PROJECT	GLEN AT WIDEFIELD, F-11
TEST BORING #	6	JOB NO.	222360
DEPTH (FT)	1-2	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	10



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.6%
10	98.9%
20	98.0%
40	97.2%
100	88.0%
200	65.7%

Atterberg Limits	
Plastic Limit	15
Liquid Limit	34
Plastic Index	19

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

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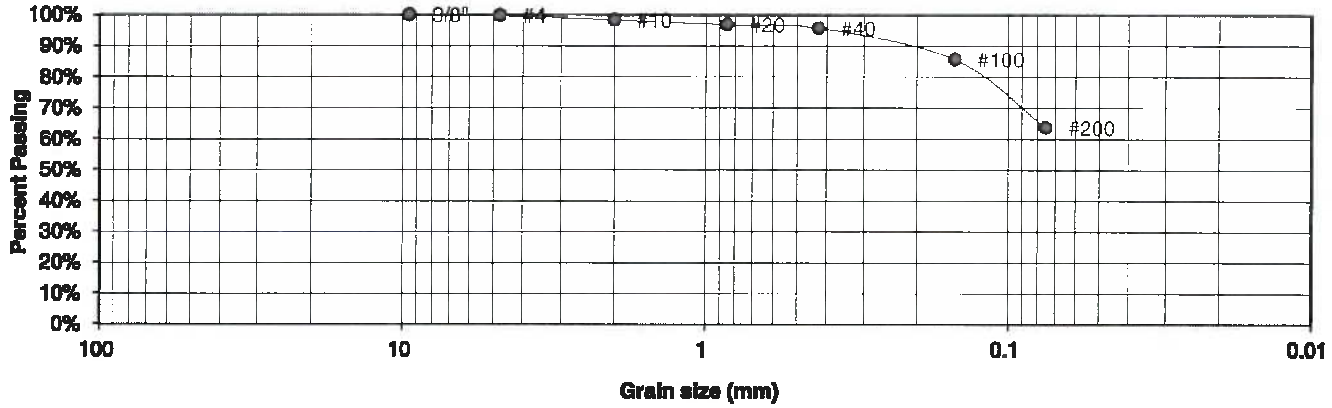
DRAWN:	DATE:	CHECKED:	DATE:
		SW	2-3-23

JOB NO.: 222360
FIG NO.: B-7

UNIFIED CLASSIFICATION	CL	CLIENT	GLEN DEVELOPMENT
SOIL TYPE #	1	PROJECT	GLEN AT WIDEFIELD, F-11
TEST BORING #	7	JOB NO.	222360
DEPTH (FT)	1-2	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	12

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.8%
10	98.4%
20	96.9%
40	95.8%
100	85.7%
200	63.6%

Atterberg Limits	
Plastic Limit	13
Liquid Limit	37
Plastic Index	24

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

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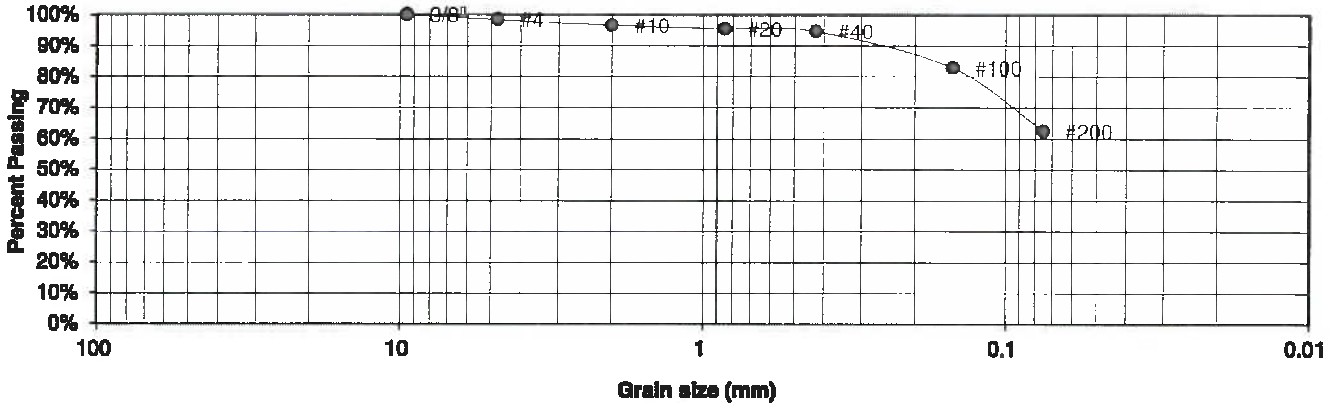
DRAWN	DATE	CHECKED	DATE
		SW	2-3-23

JOB NO.: 222360
FIG NO.: B-8

UNIFIED CLASSIFICATION	CL	CLIENT	GLEN DEVELOPMENT
SOIL TYPE #	1	PROJECT	GLEN AT WIDEFIELD, F-11
TEST BORING #	8	JOB NO.	222360
DEPTH (FT)	1-2	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	9

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	98.4%
10	96.6%
20	95.4%
40	94.7%
100	82.9%
200	62.4%

Atterberg Limits	
Plastic Limit	14
Liquid Limit	33
Plastic Index	19

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

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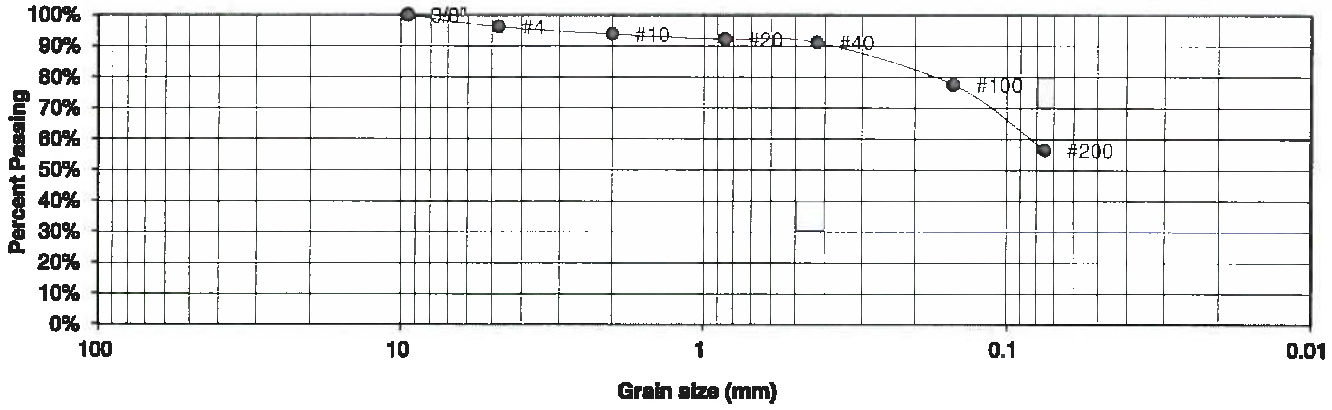
DRAWN:	DATE:	CHECKED: SW	DATE: 2-3-23

JOB NO.: 222360
FIG NO.: B-9

UNIFIED CLASSIFICATION	CL	CLIENT	GLEN DEVELOPMENT
SOIL TYPE #	1	PROJECT	GLEN AT WIDEFIELD, F-11
TEST BORING #	9	JOB NO.	222360
DEPTH (FT)	1-2	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	7

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	96.3%
10	93.9%
20	92.2%
40	91.2%
100	77.5%
200	56.6%

Atterberg Limits	
Plastic Limit	15
Liquid Limit	32
Plastic Index	17

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

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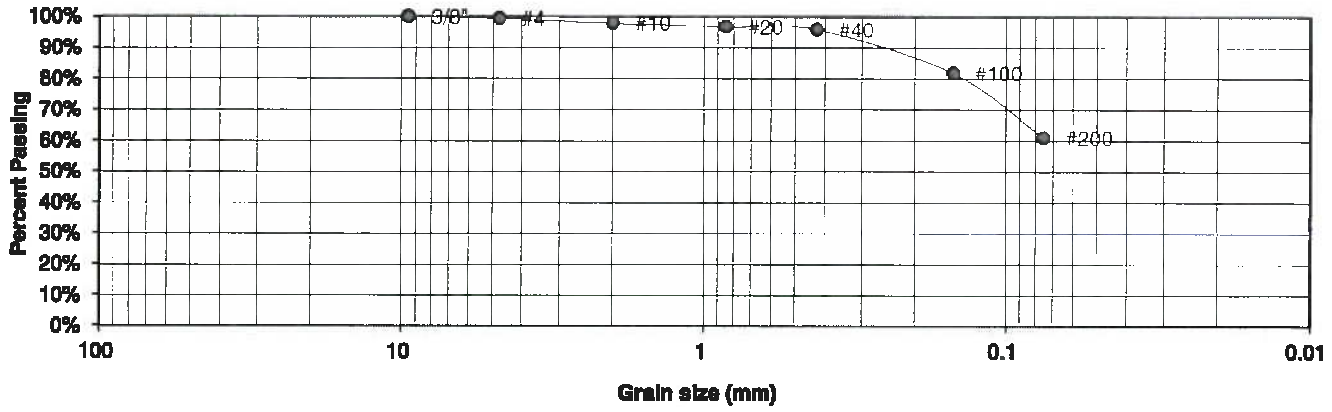
JOB NO.: 222360
FIG NO.: B-10

UNIFIED CLASSIFICATION	CL	CLIENT	GLEN DEVELOPMENT
SOIL TYPE #	1	PROJECT	GLEN AT WIDEFIELD, F-11
TEST BORING #	10	JOB NO.	222360
DEPTH (FT)	1-2	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	9

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.4%
10	97.9%
20	96.8%
40	95.9%
100	81.8%
200	61.1%

Atterberg Limits	
Plastic Limit	14
Liquid Limit	34
Plastic Index	20

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

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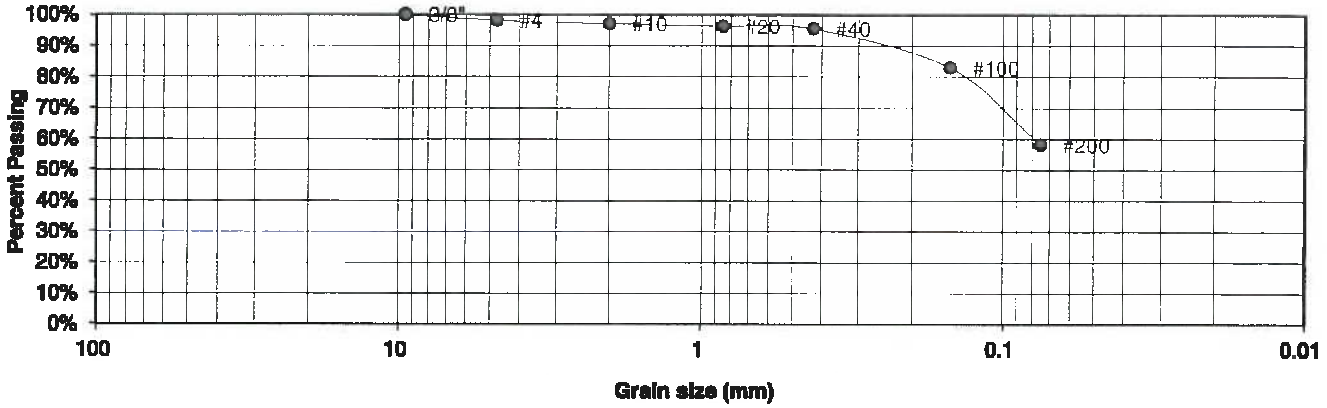
JOB NO.: 222360
FIG NO.: B-11

UNIFIED CLASSIFICATION	CL	CLIENT	GLEN DEVELOPMENT
SOIL TYPE #	1	PROJECT	GLEN AT WIDEFIELD, F-11
TEST BORING #	11	JOB NO.	222360
DEPTH (FT)	1-2	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	5

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	98.2%
10	97.2%
20	96.3%
40	95.5%
100	82.9%
200	58.2%

Atterberg Limits	
Plastic Limit	21
Liquid Limit	33
Plastic Index	12

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

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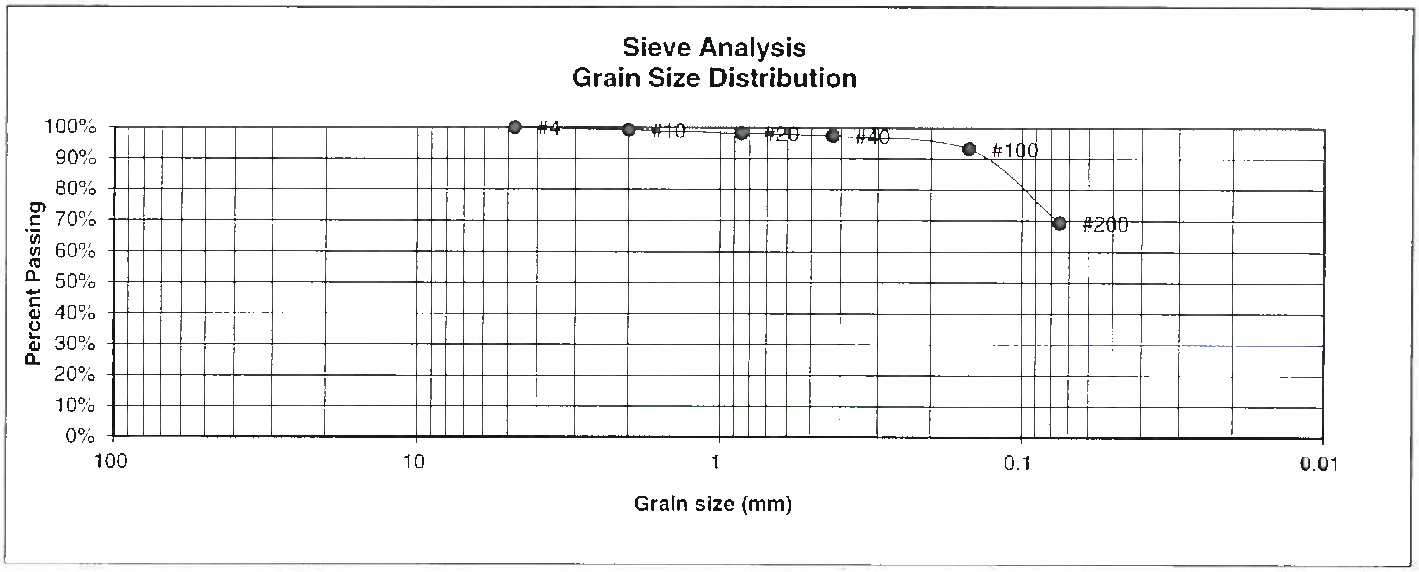
DRAWN:	DATE:	CHECKED: SW	DATE: 2-3-23

JOB NO.: 222360
FIG NO.: B-12

UNIFIED CLASSIFICATION	CL	CLIENT	GLEN DEVELOPMENT
SOIL TYPE #	1	PROJECT	GLEN AT WIDEFIELD, F-11
TEST BORING #	12	JOB NO.	222360
DEPTH (FT)	1-2	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	8



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.2%
20	98.2%
40	97.3%
100	93.1%
200	69.3%

Atterberg Limits	
Plastic Limit	22
Liquid Limit	35
Plastic Index	13

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

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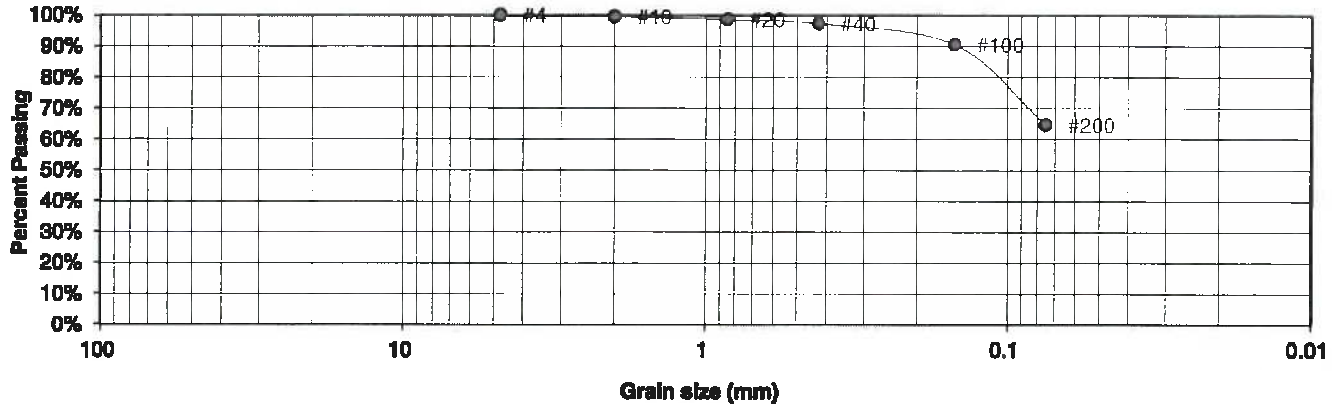
DRAWN:	DATE:	CHECKED: SW	DATE: 2-3-23

JOB NO.: 222360
FIG NO.: B-13

UNIFIED CLASSIFICATION	CL	CLIENT	GLEN DEVELOPMENT
SOIL TYPE #	1	PROJECT	GLEN AT WIDEFIELD, F-11
TEST BORING #	13	JOB NO.	222360
DEPTH (FT)	1-2	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	9

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.5%
20	98.6%
40	97.4%
100	90.7%
200	64.6%

Atterberg Limits

Plastic Limit	22
Liquid Limit	38
Plastic Index	16

Swell

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

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DRAWN	DATE	CHECKED	DATE
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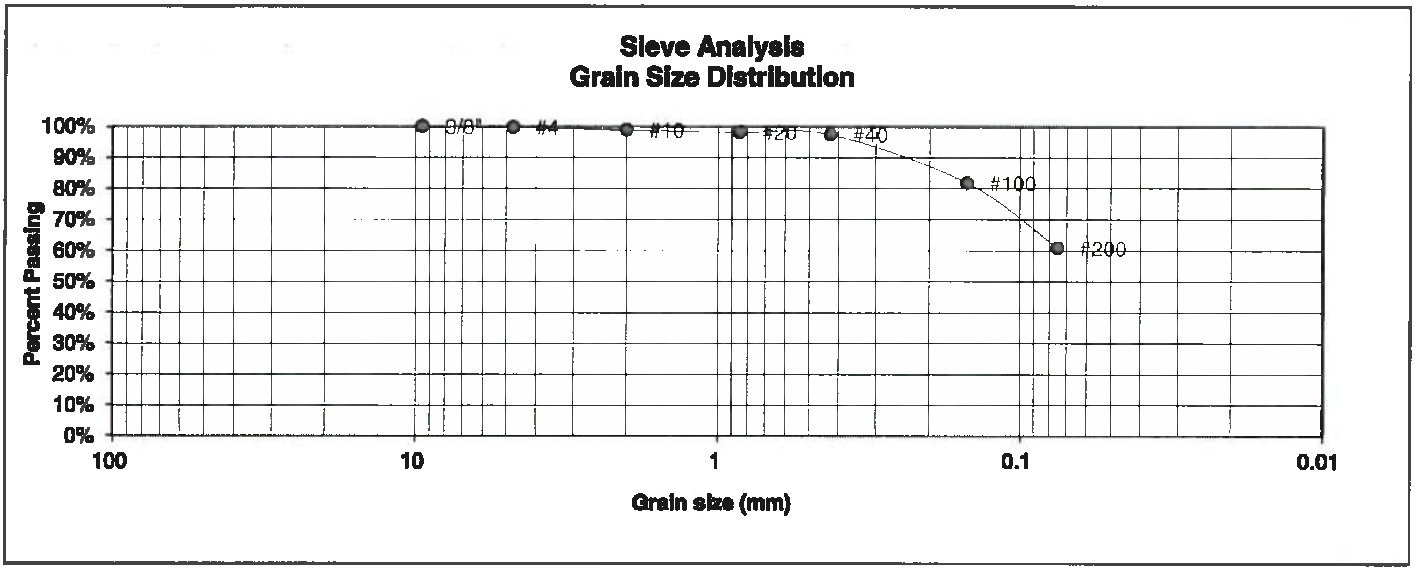
JOB NO.: 222360
FIG NO.: B-14

UNIFIED CLASSIFICATION	CL	CLIENT	GLEN DEVELOPMENT
SOIL TYPE #	1	PROJECT	GLEN AT WIDEFIELD, F-11
TEST BORING #	14	JOB NO.	222360
DEPTH (FT)	1-2	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	6



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.7%
10	98.9%
20	98.1%
40	97.5%
100	81.8%
200	60.9%

Atterberg Limits	
Plastic Limit	20
Liquid Limit	34
Plastic Index	14

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

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DRAWN	DATE	CHECKED	DATE
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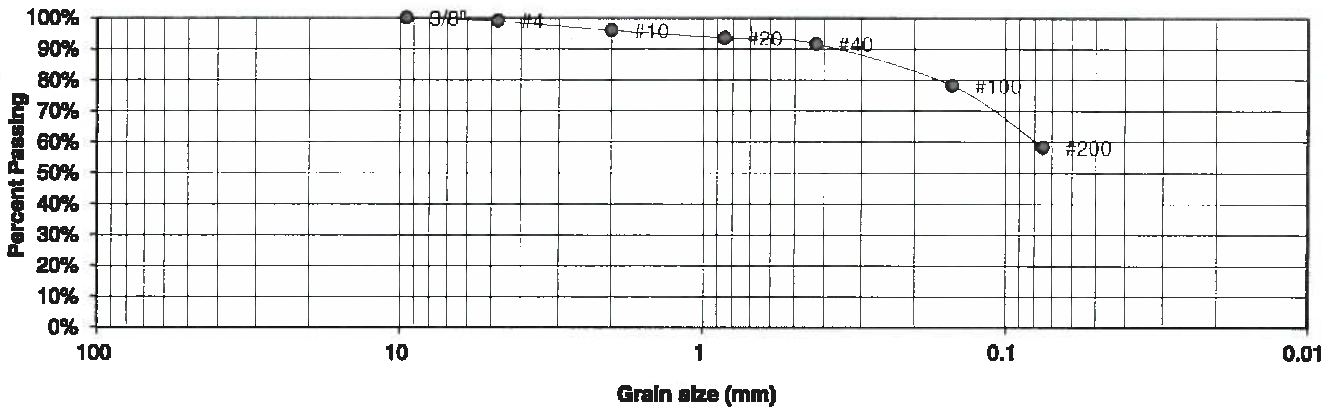
JOB NO.: 222360
FIG NO.: B-15

UNIFIED CLASSIFICATION	CL	CLIENT	GLEN DEVELOPMENT
SOIL TYPE #	1	PROJECT	GLEN AT WIDEFIELD, F-11
TEST BORING #	15	JOB NO.	222360
DEPTH (FT)	1-2	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	7

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.0%
10	96.0%
20	93.6%
40	91.7%
100	78.1%
200	58.3%

Atterberg Limits	
Plastic Limit	20
Liquid Limit	36
Plastic Index	16

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

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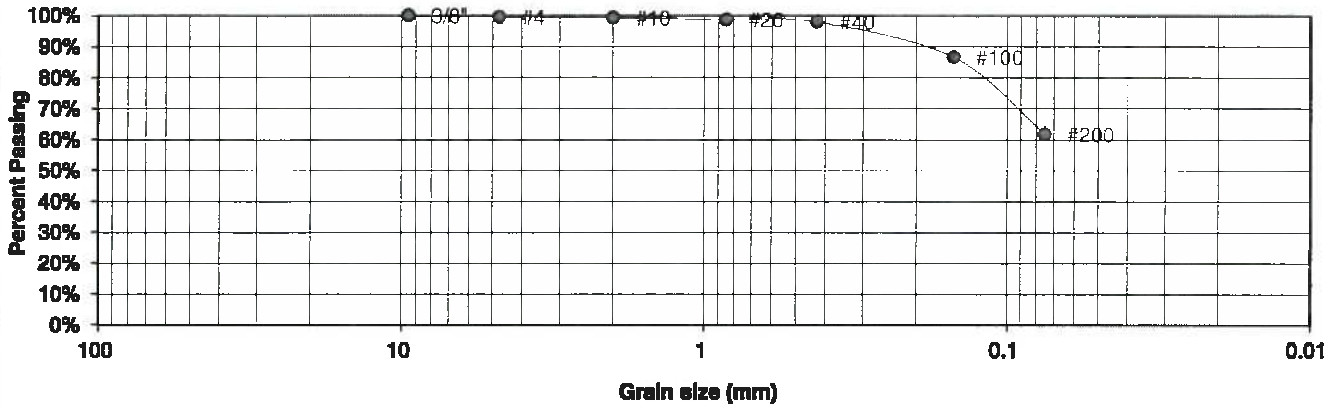
DRAWN	DATE	CHECKED	DATE
		SW	2-3-23

JOB NO.: 222360
FIG NO.: B-16

UNIFIED CLASSIFICATION	CL	CLIENT	GLEN DEVELOPMENT
SOIL TYPE #	1	PROJECT	GLEN AT WIDEFIELD, F-11
TEST BORING #	16	JOB NO.	222360
DEPTH (FT)	1-2	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	99.5%
10	99.3%
20	98.7%
40	98.0%
100	86.6%
200	61.9%

Atterberg Limits	
Plastic Limit	20
Liquid Limit	37
Plastic Index	17

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

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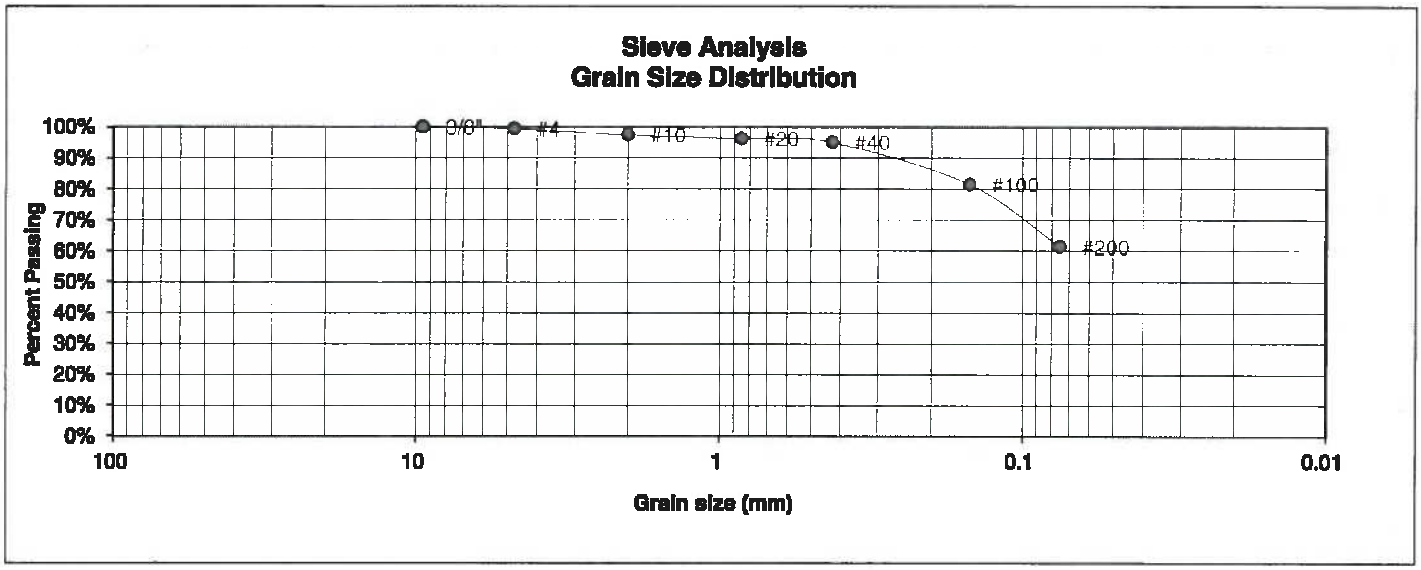
DRAWN	DATE	CHECKED	DATE
		SW	2-3-23

JOB NO.: 222360
FIG NO.: B-17

UNIFIED CLASSIFICATION	CL	CLIENT	GLEN DEVELOPMENT
SOIL TYPE #	1	PROJECT	GLEN AT WIDEFIELD, F-11
TEST BORING #	3	JOB NO.	222360
DEPTH (FT)	0-3	TEST BY	BL
AASHTO CLASSIFICATION		GROUP INDEX	



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.4%
10	97.5%
20	96.3%
40	95.1%
100	81.4%
200	61.3%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

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

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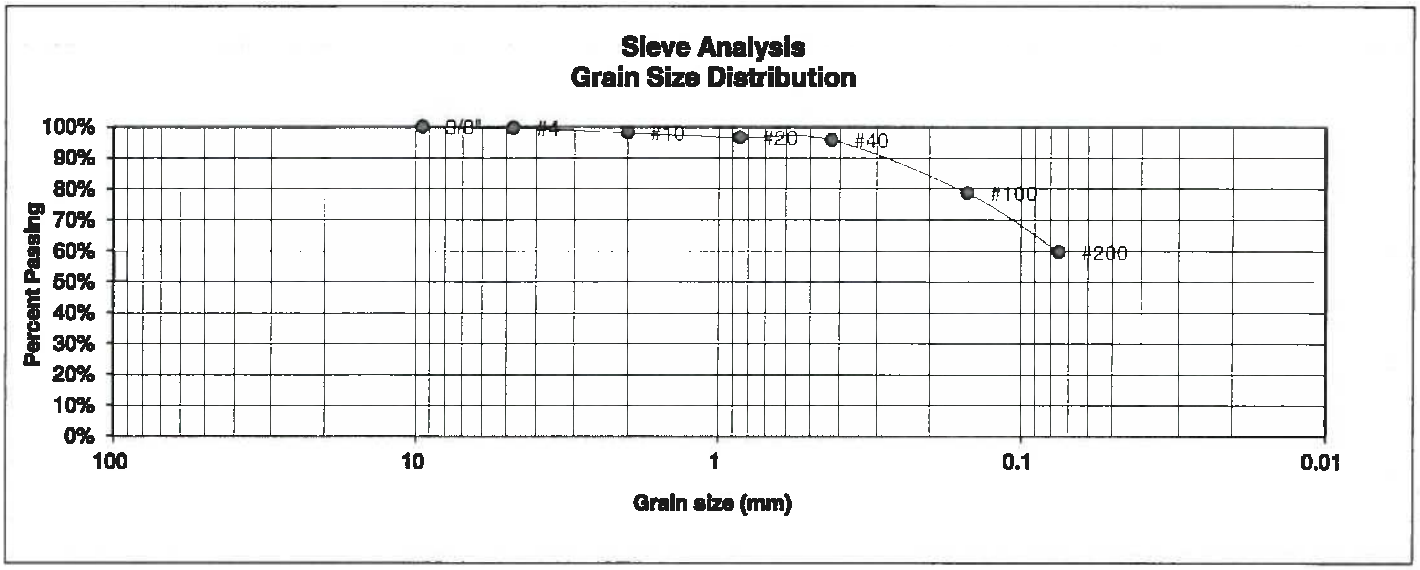
DRAWN	DATE	CHECKED	DATE
		SW	2-3-23

JOB NO.: 222360
FIG NO.: B-18

UNIFIED CLASSIFICATION	CL	CLIENT	GLEN DEVELOPMENT
SOIL TYPE #	1	PROJECT	GLEN AT WIDEFIELD, F-11
TEST BORING #	6	JOB NO.	222360
DEPTH (FT)	0-3	TEST BY	BL
AASHTO CLASSIFICATION		GROUP INDEX	



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.6%
10	98.1%
20	96.6%
40	95.8%
100	78.6%
200	59.7%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

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

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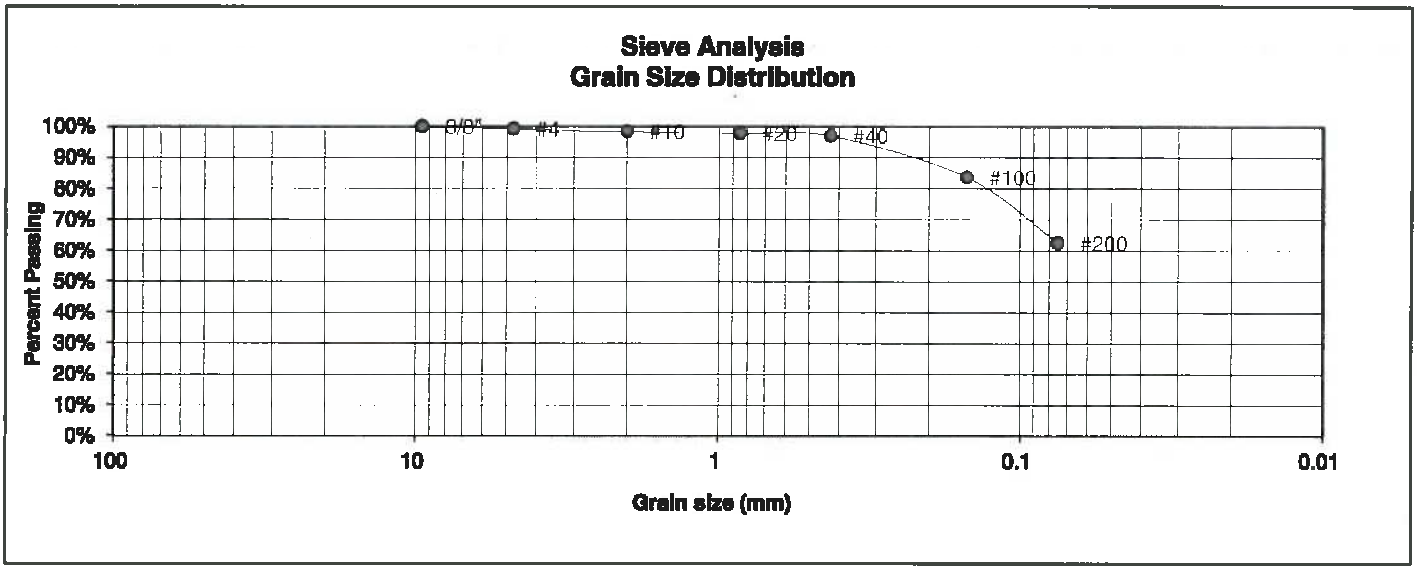
LABORATORY TEST RESULTS

DRAWN	DATE	CHECKED	DATE
		SW	2-3-23

JOB NO.: 222360
FIG NO.: B-19

UNIFIED CLASSIFICATION	CL	CLIENT	GLEN DEVELOPMENT
SOIL TYPE #	1	PROJECT	GLEN AT WIDEFIELD, F-11
TEST BORING #	13	JOB NO.	222360
DEPTH (FT)	0-3	TEST BY	BL
AASHTO CLASSIFICATION		GROUP INDEX	



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.2%
10	98.4%
20	97.7%
40	97.0%
100	83.6%
200	62.5%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

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

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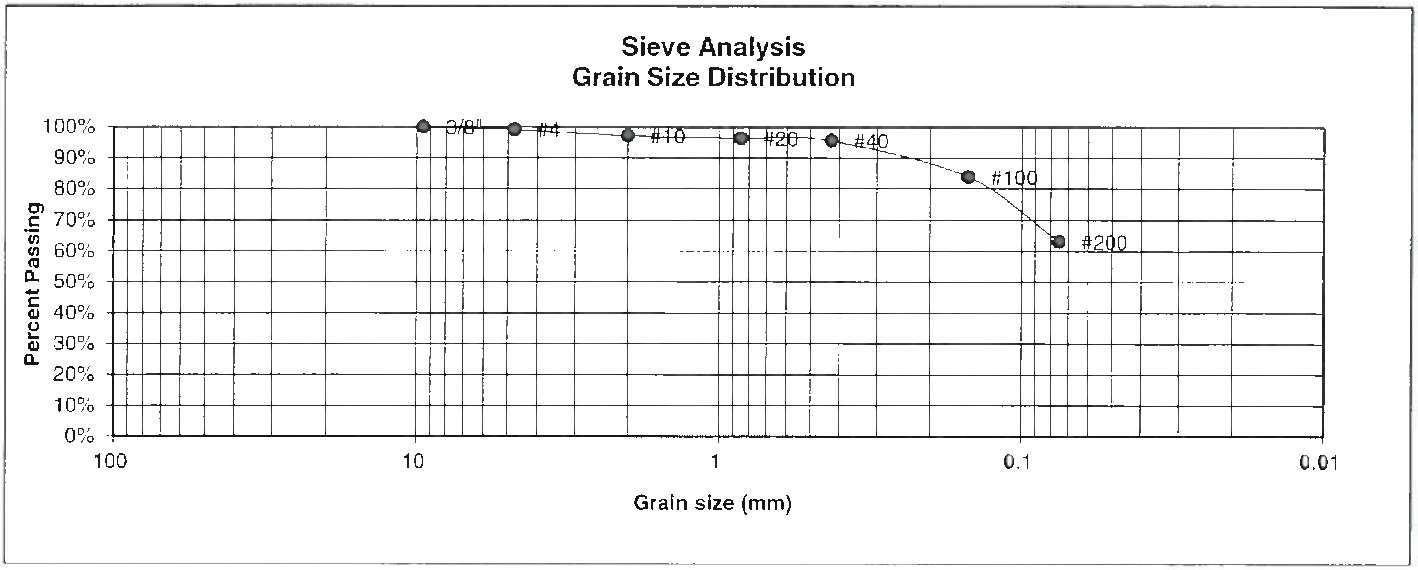
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED: SW	DATE: 2-3-23

JOB NO.: 222360
FIG NO.: B-20

UNIFIED CLASSIFICATION	CL	CLIENT	GLEN DEVELOPMENT
SOIL TYPE #	1	PROJECT	GLEN AT WIDEFIELD, F-11
TEST BORING #	15	JOB NO.	222360
DEPTH (FT)	0-3	TEST BY	BL
AASHTO CLASSIFICATION		GROUP INDEX	



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.2%
10	97.1%
20	96.3%
40	95.5%
100	83.8%
200	63.1%

Atterberg Limits

Plastic Limit

Liquid Limit

Plastic Index

Swell

Moisture at start

Moisture at finish

Moisture increase

Initial dry density (pcf)

Swell (psf)

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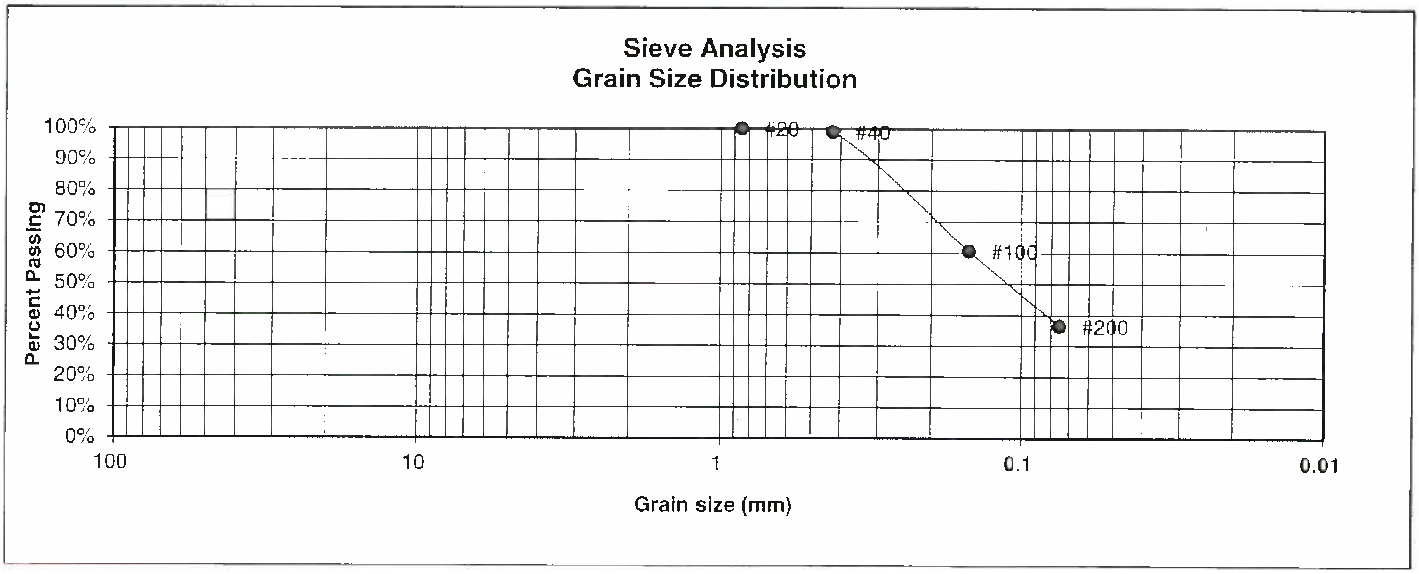
LABORATORY TEST RESULTS

DRAWN	DATE	CHECKED	DATE
		SW	2-3-23

JOB NO.: 222360
FIG NO.: B-21

UNIFIED CLASSIFICATION	SC	CLIENT	GLEN DEVELOPMENT
SOIL TYPE #	2	PROJECT	GLEN AT WIDEFIELD, F-11
TEST BORING #	1	JOB NO.	222360
DEPTH (FT)	5	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	0



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	
10	
20	100.0%
40	99.0%
100	60.6%
200	36.4%

Atterberg Limits	
Plastic Limit	14
Liquid Limit	25
Plastic Index	11

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

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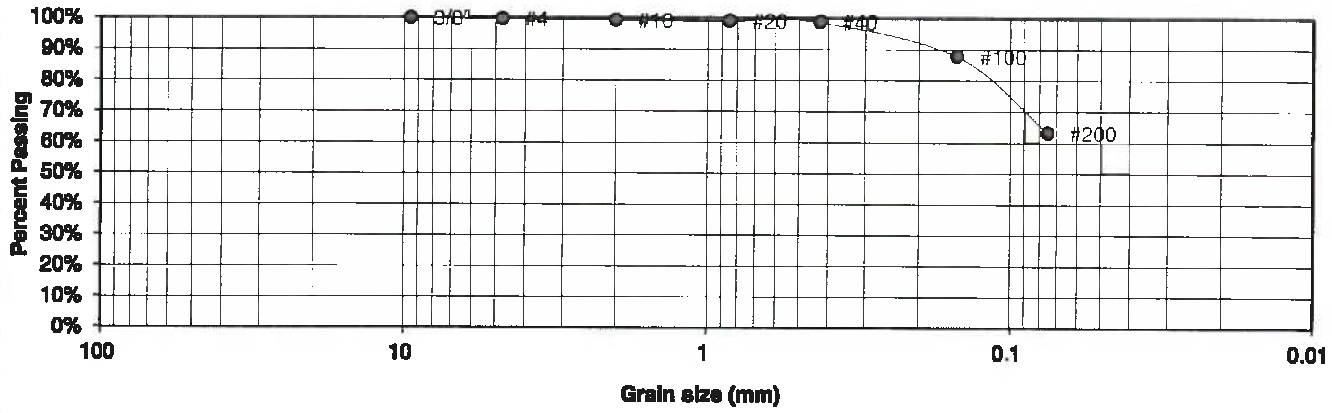
LABORATORY TEST RESULTS

DRAWN	DATE	CHECKED	DATE
		SW	2-3-23

JOB NO.: 222360
FIG NO.: B-22

UNIFIED CLASSIFICATION	CL	CLIENT	GLEN DEVELOPMENT
SOIL TYPE #	2	PROJECT	GLEN AT WIDEFIELD, F-11
TEST BORING #	7	JOB NO.	222360
DEPTH (FT)	5	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	7

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.7%
10	99.3%
20	99.1%
40	98.8%
100	87.7%
200	63.1%

Atterberg Limits

Plastic Limit	14
Liquid Limit	30
Plastic Index	16

Swell

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

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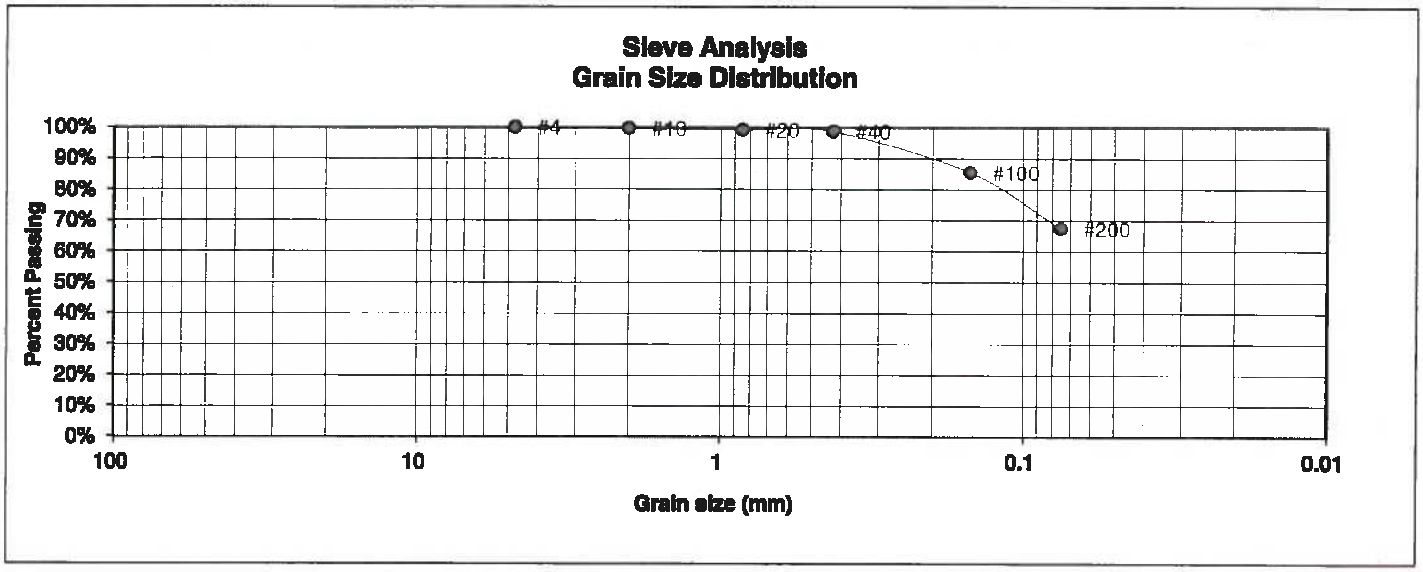
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED: SW	DATE: 2-3-23

JOB NO.: 222360
FIG NO.: B-23

UNIFIED CLASSIFICATION	CL	CLIENT	GLEN DEVELOPMENT
SOIL TYPE #	2	PROJECT	GLEN AT WIDEFIELD, F-11
TEST BORING #	8	JOB NO.	222360
DEPTH (FT)	5	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	10



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.7%
20	99.2%
40	98.7%
100	85.5%
200	67.3%

Atterberg Limits	
Plastic Limit	15
Liquid Limit	34
Plastic Index	19

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

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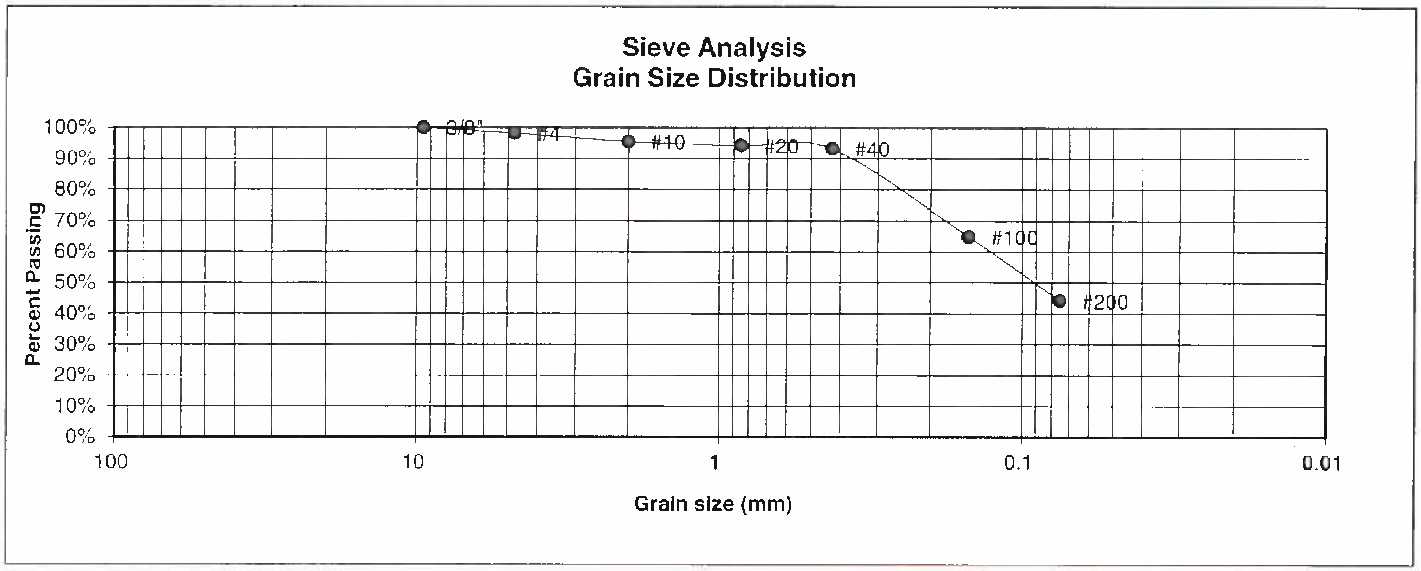
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED: SW	DATE: 2-3-23

JOB NO.: 222360
FIG NO.: B-24

UNIFIED CLASSIFICATION	CL	CLIENT	GLEN DEVELOPMENT
SOIL TYPE #	2	PROJECT	GLEN AT WIDEFIELD, F-11
TEST BORING #	2	JOB NO.	222360
DEPTH (FT)	5	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	3



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	98.2%
10	95.5%
20	94.2%
40	93.1%
100	64.9%
200	44.1%

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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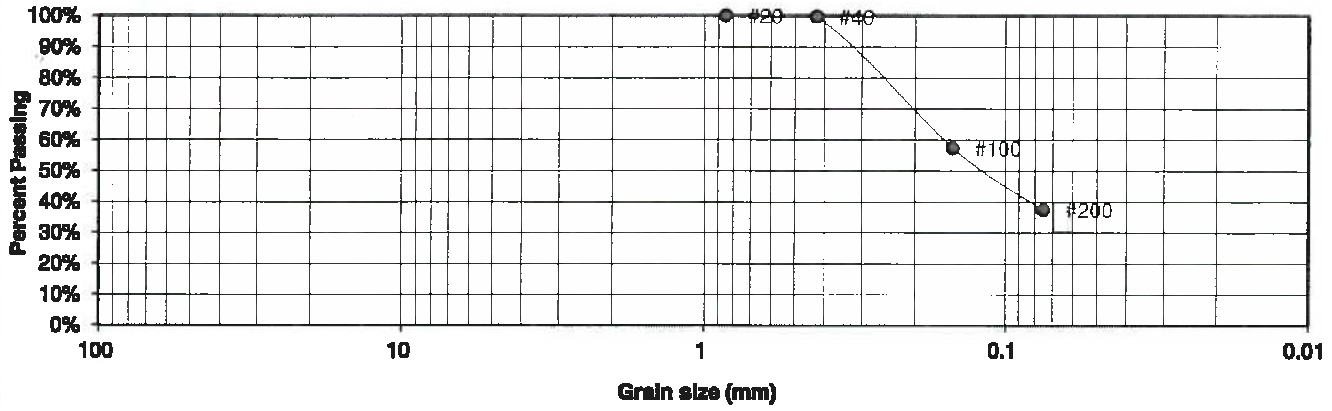
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		JW	2-3-23

JOB NO.: 222360
FIG NO.: B-25

UNIFIED CLASSIFICATION	SC	CLIENT	GLEN DEVELOPMENT
SOIL TYPE #	2	PROJECT	GLEN AT WIDEFIELD, F-11
TEST BORING #	6	JOB NO.	222360
DEPTH (FT)	10	TEST BY	BL
AASHTO CLASSIFICATION	A-6	GROUP INDEX	1

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	
10	
20	100.0%
40	99.7%
100	57.4%
200	37.4%

Atterberg Limits	
Plastic Limit	12
Liquid Limit	26
Plastic Index	14

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: SW	DATE: 2-3-23

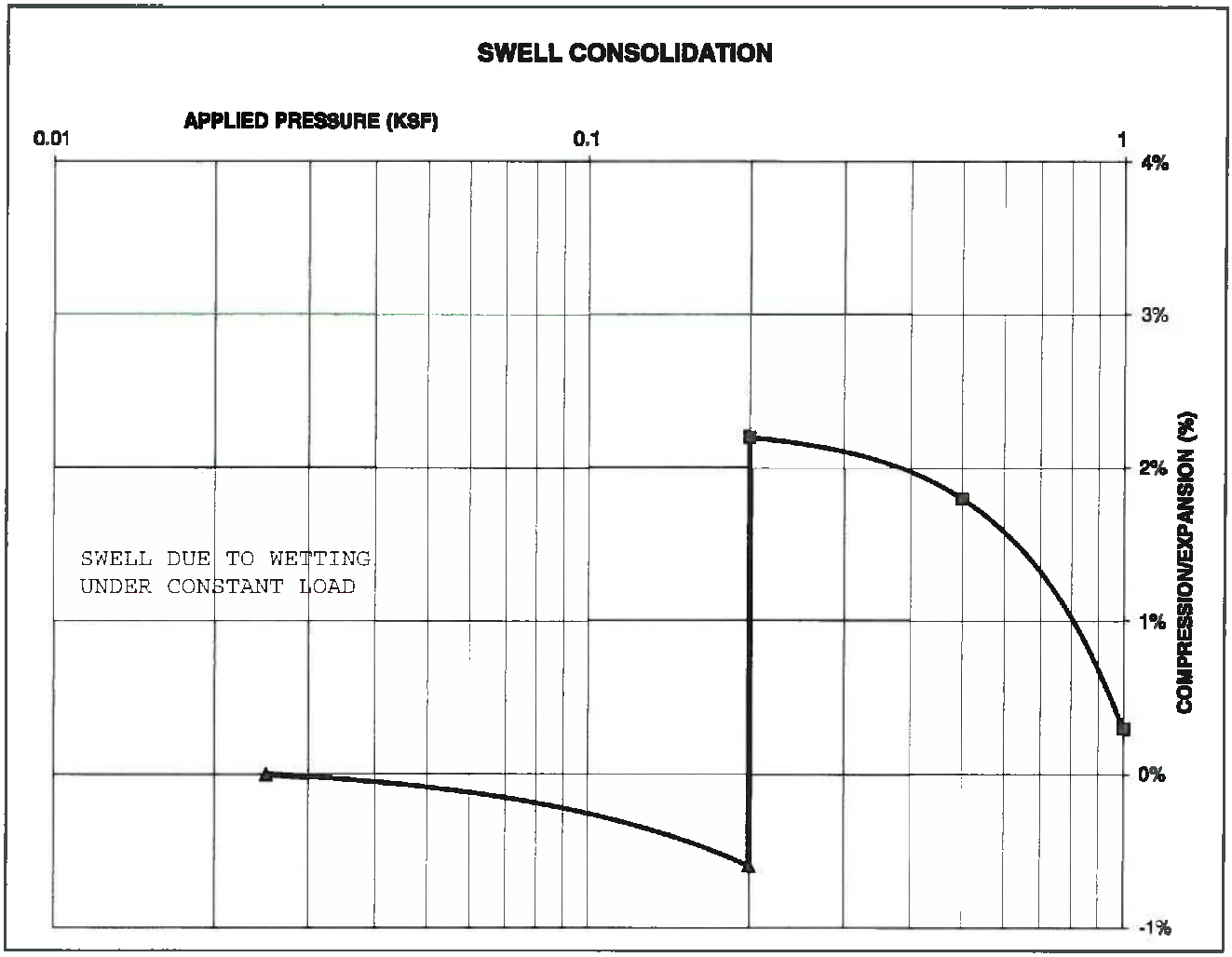
JOB NO.: 222360
FIG NO.: B-26

CONSOLIDATION TEST RESULTS

TEST BORING #	2	DEPTH(ft)	1-2
DESCRIPTION	CL	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)			118
NATURAL MOISTURE CONTENT			13.1%
SWELL/CONSOLIDATION (%)			2.8%

JOB NO. 222360
CLIENT GLEN DEVELOPMENT
PROJECT GLEN AT WIDEFIELD, F-11

SWELL CONSOLIDATION



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SWELL CONSOLIDATION
TEST RESULTS

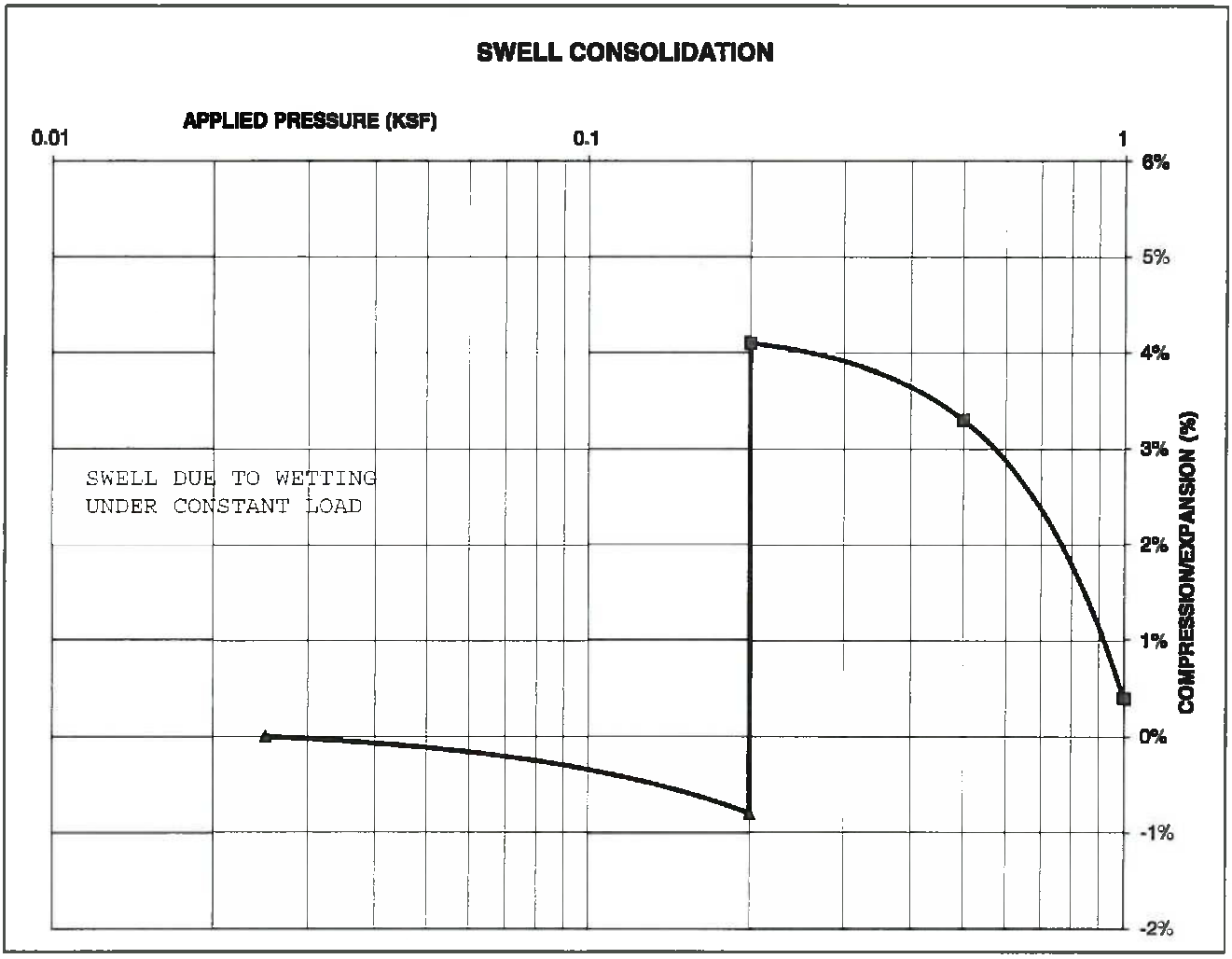
DRAWN:	DATE:	CHECKED:	DATE:
		SW	2-3-23

JOB NO.: 222360
FIG NO.: B-27

CONSOLIDATION TEST RESULTS

TEST BORING #	3	DEPTH(ft)	1-2
DESCRIPTION	CL	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)			95
NATURAL MOISTURE CONTENT			12.9%
SWELL/CONSOLIDATION (%)			4.9%

JOB NO. 222360
CLIENT GLEN DEVELOPMENT
PROJECT GLEN AT WIDEFIELD, F-11



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SWELL CONSOLIDATION
TEST RESULTS

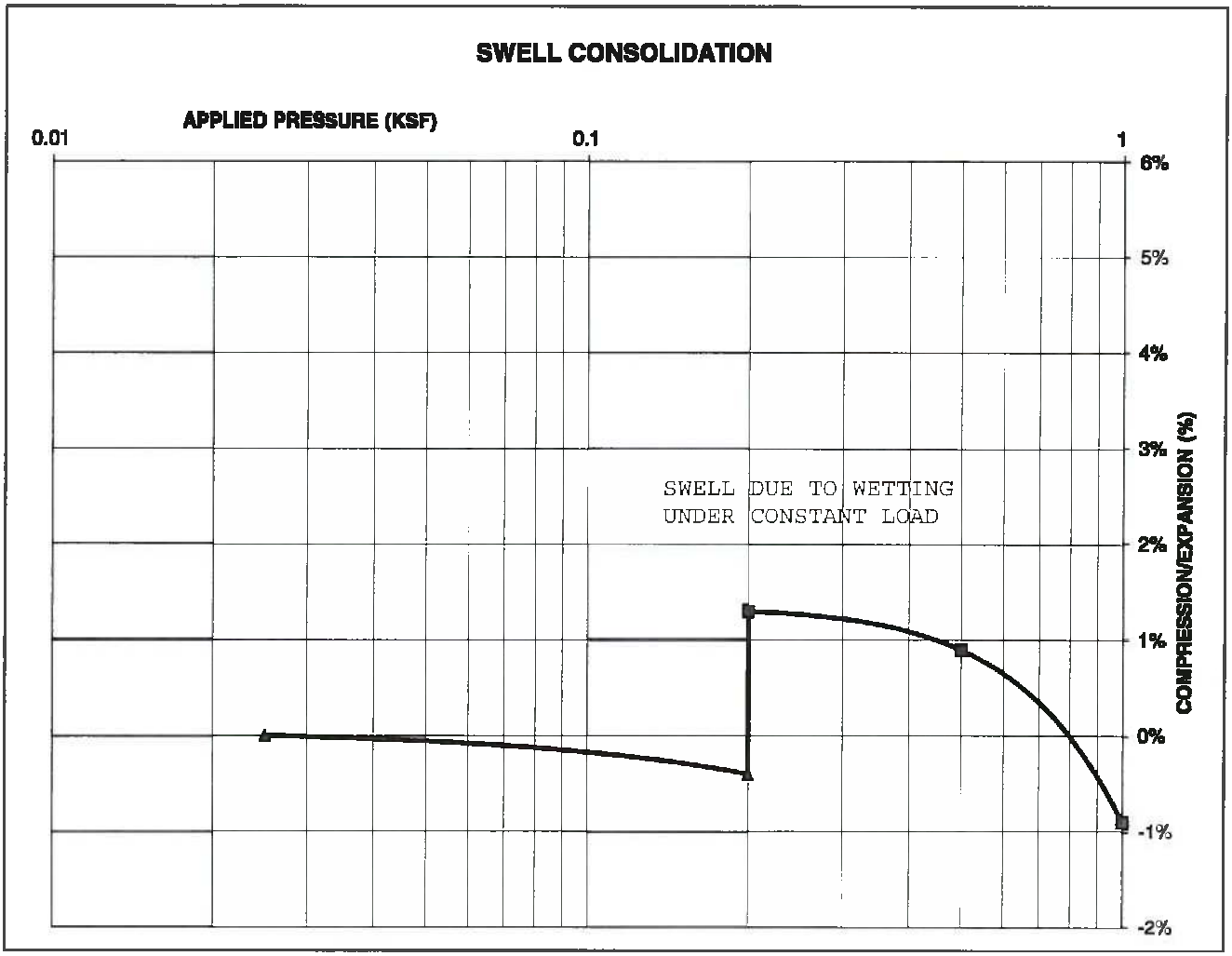
DRAWN:	DATE:	CHECKED:	DATE:
		SW	2-3-23

JOB NO.: 222360
FIG NO.: B-24

CONSOLIDATION TEST RESULTS

TEST BORING #	3	DEPTH(ft)	1-2
DESCRIPTION	CL	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)			102
NATURAL MOISTURE CONTENT			16.2%
SWELL/CONSOLIDATION (%)			1.7%

JOB NO. 222360
CLIENT GLEN DEVELOPMENT
PROJECT GLEN AT WIDEFIELD, F-11
REMOLDED SAMPLE



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SWELL CONSOLIDATION
TEST RESULTS

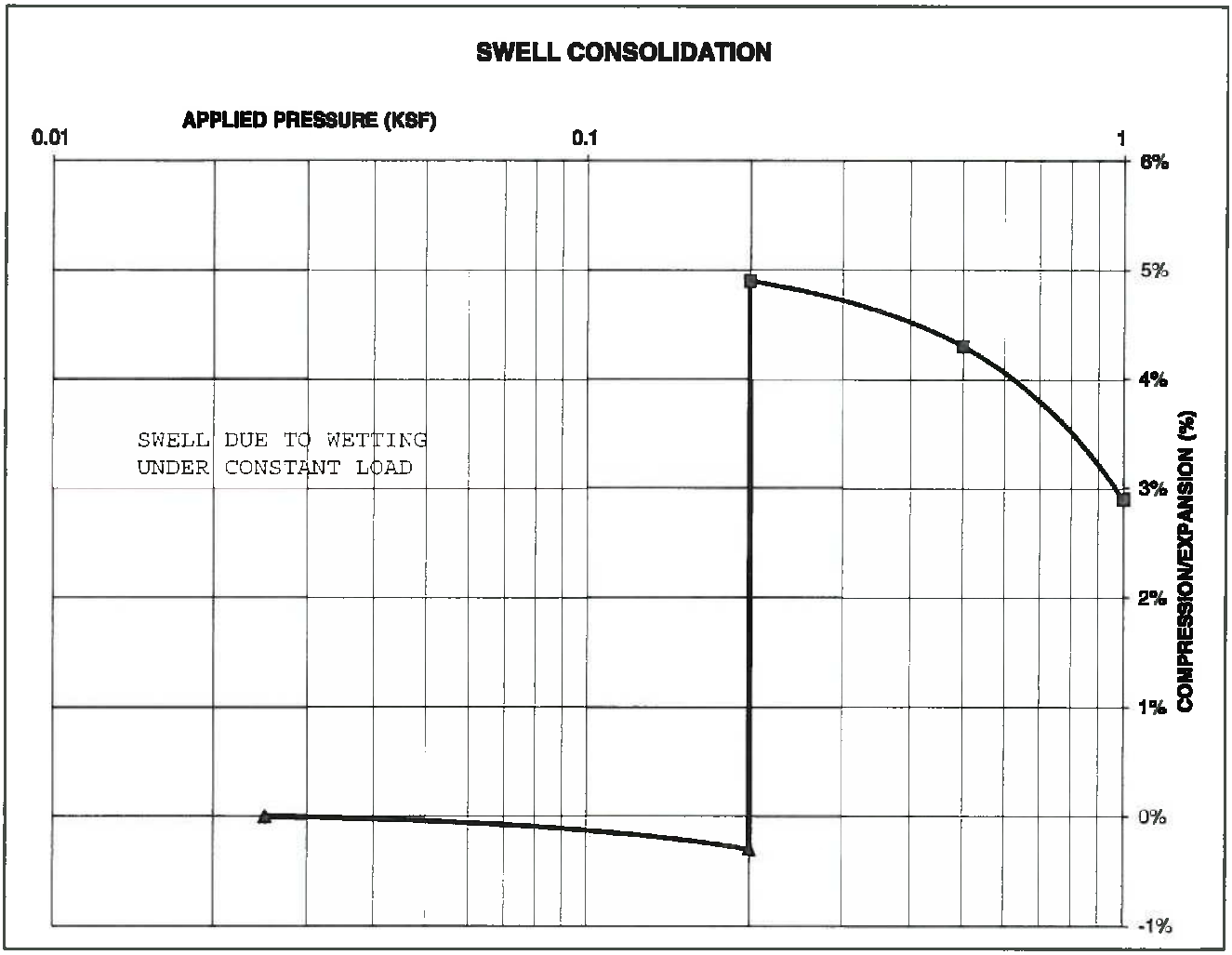
DRAWN:	DATE:	CHECKED: SW	DATE: 2-3-23

JOB NO.: 222360
FIG NO.: B-28A

CONSOLIDATION TEST RESULTS

TEST BORING #	4	DEPTH(ft)	1-2
DESCRIPTION	CL	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)			111
NATURAL MOISTURE CONTENT			14.3%
SWELL/CONSOLIDATION (%)			5.2%

JOB NO. 222360
CLIENT GLEN DEVELOPMENT
PROJECT GLEN AT WIDEFIELD, F-11



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SWELL CONSOLIDATION
TEST RESULTS

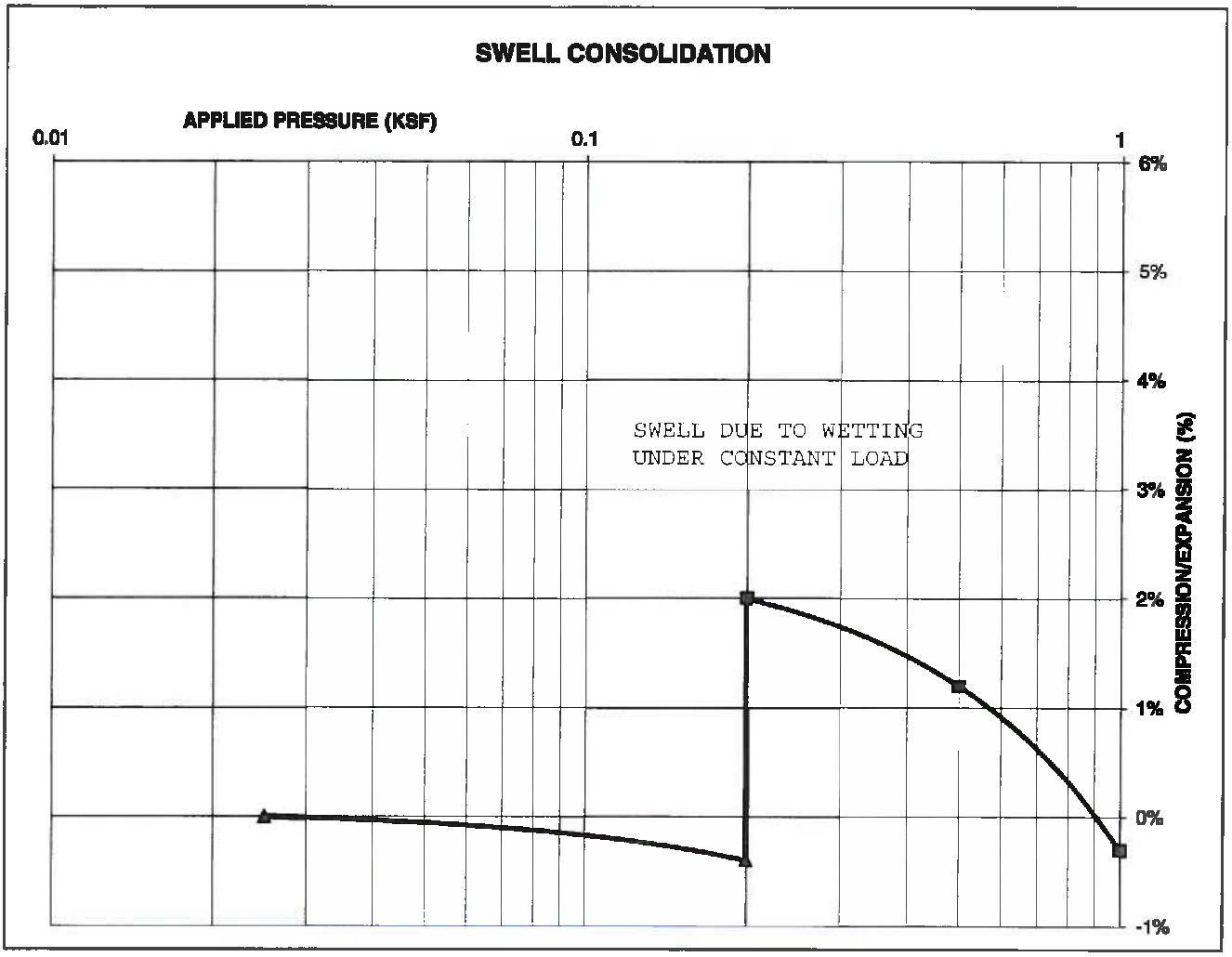
DRAWN:	DATE:	CHECKED:	DATE:
		SW	2-3-23

JOB NO.: 222360
FIG NO.: B-24

CONSOLIDATION TEST RESULTS

TEST BORING #	4	DEPTH(ft)	1-2
DESCRIPTION	CL	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)			107
NATURAL MOISTURE CONTENT			17.7%
SWELL/CONSOLIDATION (%)			2.4%

JOB NO. 222360
CLIENT GLEN DEVELOPMENT
PROJECT GLEN AT WIDEFIELD, F-11
REMOLDED SAMPLE



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SWELL CONSOLIDATION
TEST RESULTS

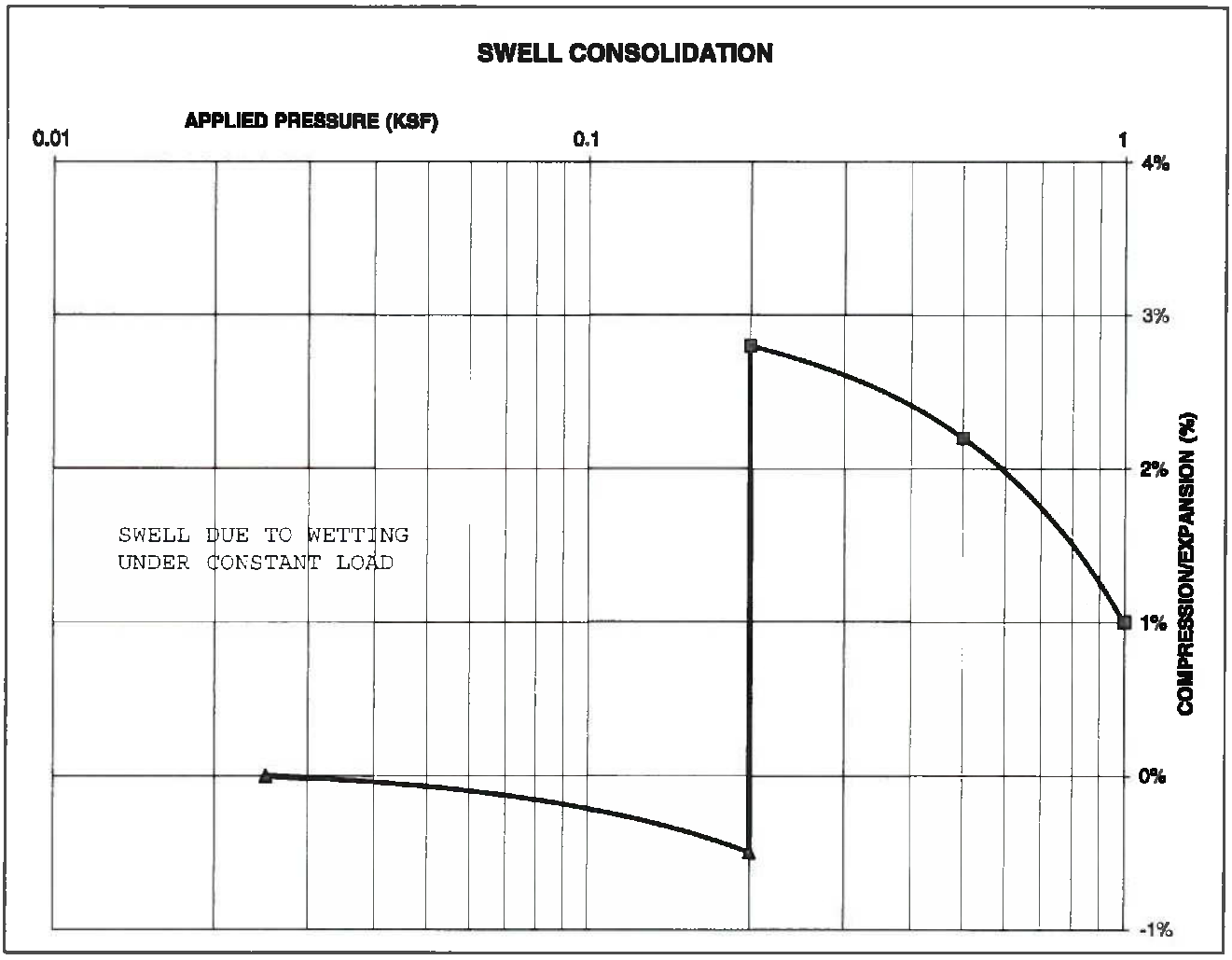
DRAWN:	DATE:	CHECKED:	DATE:
		SW	2-3-23

JOB NO.: 222360
FIG NO.: B-29A

CONSOLIDATION TEST RESULTS

TEST BORING #	5	DEPTH(ft)	1-2
DESCRIPTION	CL	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)			114
NATURAL MOISTURE CONTENT			13.1%
SWELL/CONSOLIDATION (%)			3.3%

JOB NO. 222360
CLIENT GLEN DEVELOPMENT
PROJECT GLEN AT WIDEFIELD, F-11



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SWELL CONSOLIDATION
TEST RESULTS

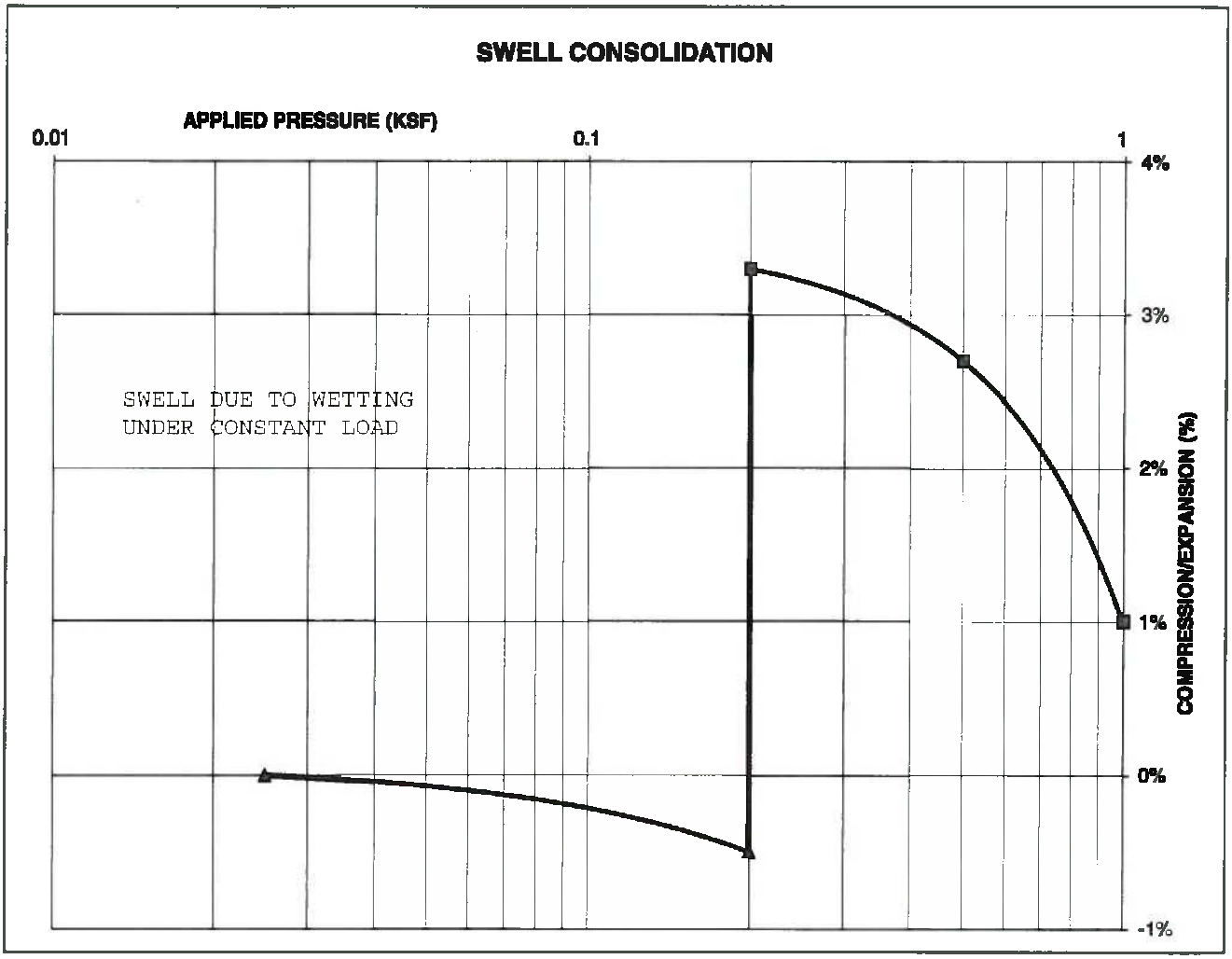
DRAWN:	DATE:	CHECKED:	DATE:
		SW	2-3-23

JOB NO.: 222360
FIG NO.: B-30

CONSOLIDATION TEST RESULTS

TEST BORING #	6	DEPTH(ft)	1-2
DESCRIPTION	CL	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)			112
NATURAL MOISTURE CONTENT			11.9%
SWELL/CONSOLIDATION (%)			3.8%

JOB NO. 222360
CLIENT GLEN DEVELOPMENT
PROJECT GLEN AT WIDEFIELD, F-11



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SWELL CONSOLIDATION
TEST RESULTS

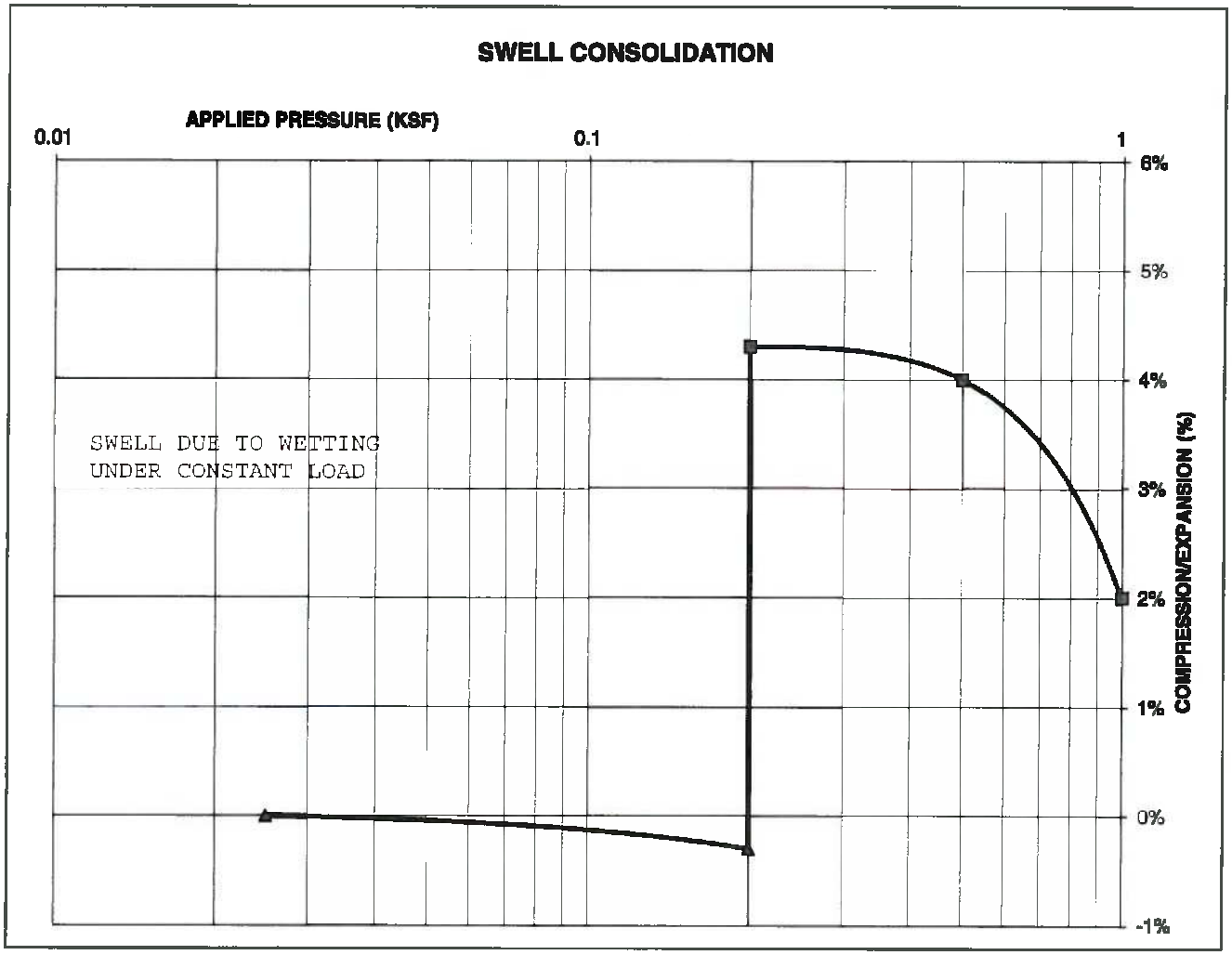
DRAWN:	DATE:	CHECKED:	DATE: 2-3-23

JOB NO.: 222360
FIG NO.: B-31

CONSOLIDATION TEST RESULTS

TEST BORING #	8	DEPTH(ft)	1-2
DESCRIPTION	CL	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)			122
NATURAL MOISTURE CONTENT			12.1%
SWELL/CONSOLIDATION (%)			4.6%

JOB NO. 222360
CLIENT GLEN DEVELOPMENT
PROJECT GLEN AT WIDEFIELD, F-11



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SWELL CONSOLIDATION
TEST RESULTS

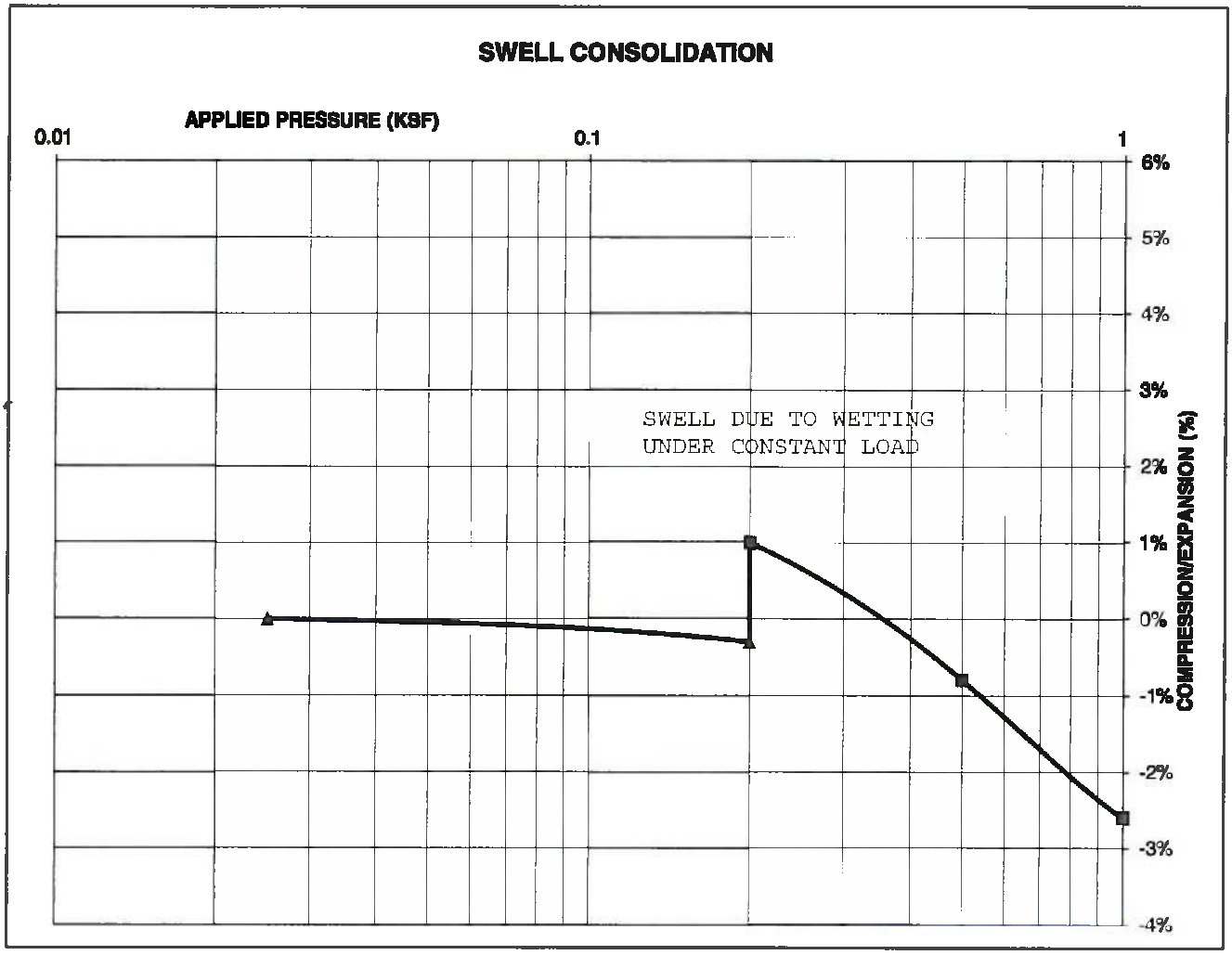
DRAWN:	DATE:	CHECKED:	DATE:
		SW	2-3-23

JOB NO.: 222360
FIG NO.: B-32

CONSOLIDATION TEST RESULTS

TEST BORING #	8	DEPTH(ft)	1-2
DESCRIPTION	CL	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)			110
NATURAL MOISTURE CONTENT			16.4%
SWELL/CONSOLIDATION (%)			1.3%

JOB NO. 222360
CLIENT GLEN DEVELOPMENT
PROJECT GLEN AT WIDEFIELD, F-11
REMOLDED SAMPLE



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SWELL CONSOLIDATION
TEST RESULTS

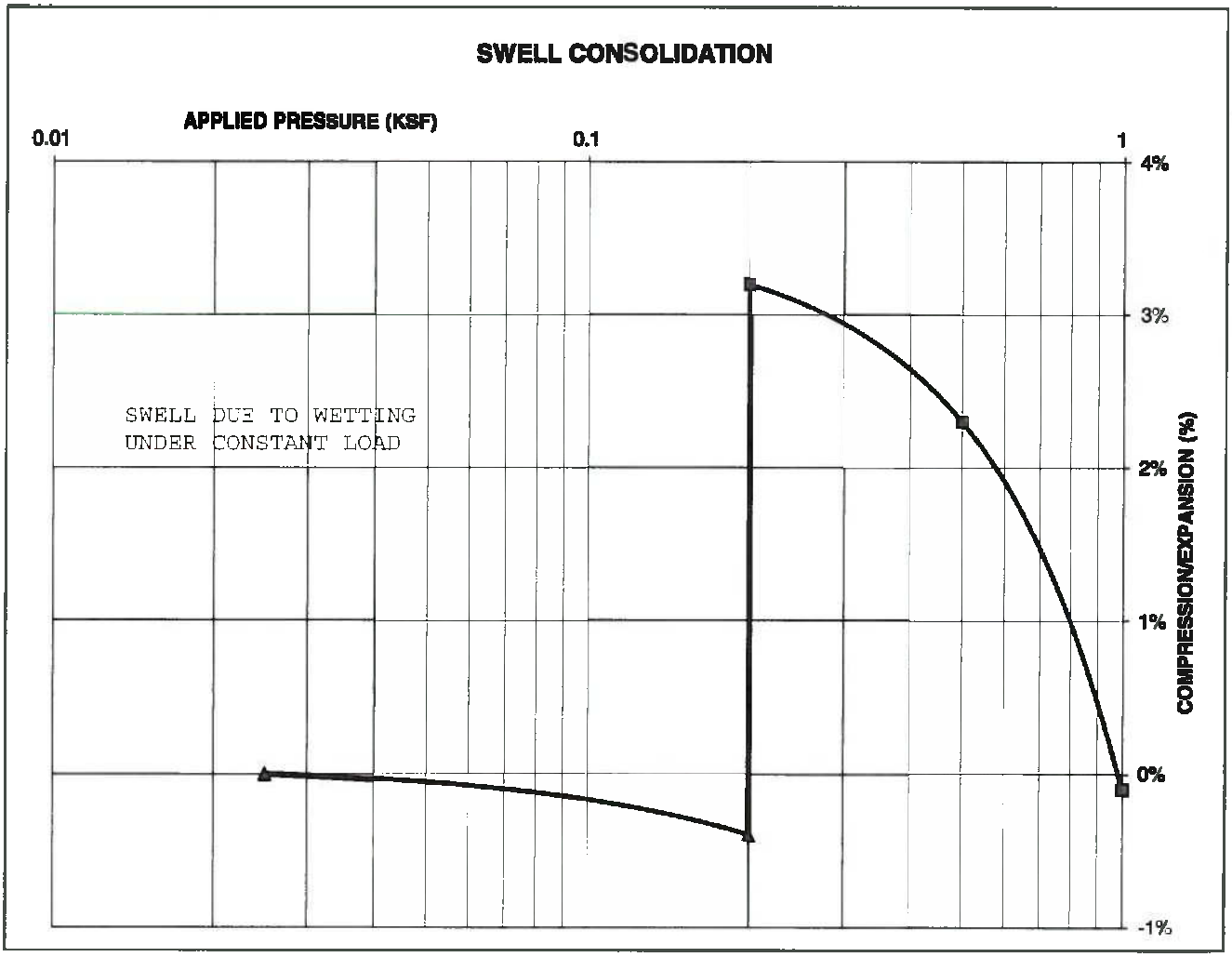
DRAWN:	DATE:	CHECKED:	DATE:
		SW	2-3-23

JOB NO.: 222360
FIG NO.: B-32 A

CONSOLIDATION TEST RESULTS

TEST BORING #	10	DEPTH(ft)	1-2
DESCRIPTION	CL	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)			105
NATURAL MOISTURE CONTENT			8.1%
SWELL/CONSOLIDATION (%)			3.6%

JOB NO. 222360
CLIENT GLEN DEVELOPMENT
PROJECT GLEN AT WIDEFIELD, F-11



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SWELL CONSOLIDATION
TEST RESULTS

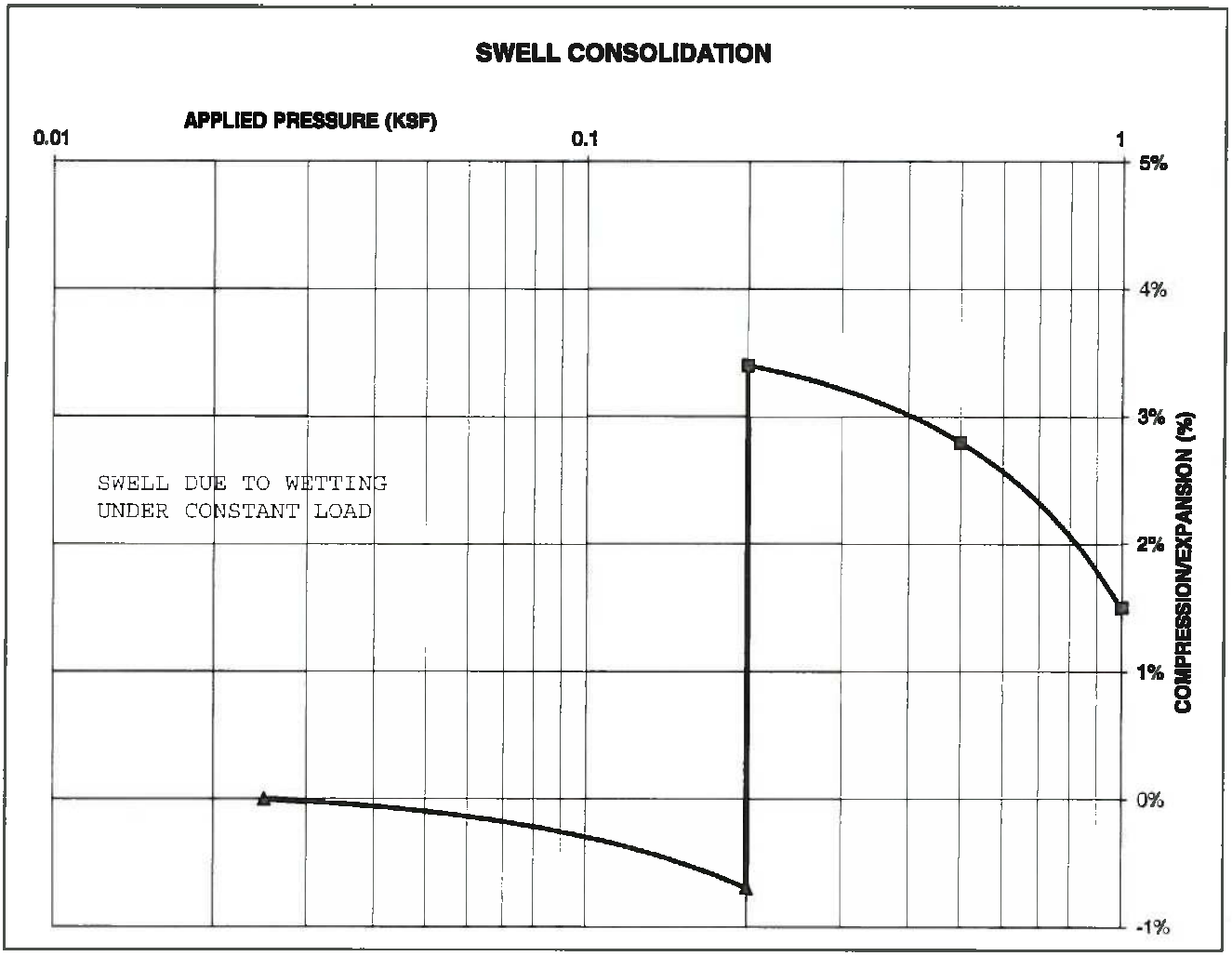
DRAWN:	DATE:	CHECKED:	DATE:
		SW	2-3-23

JOB NO.: 222360
FIG NO.: B-33

CONSOLIDATION TEST RESULTS

TEST BORING #	11	DEPTH(ft)	1-2
DESCRIPTION	CL	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)			119
NATURAL MOISTURE CONTENT			11.2%
SWELL/CONSOLIDATION (%)			4.1%

JOB NO. 222360
CLIENT GLEN DEVELOPMENT
PROJECT GLEN AT WIDEFIELD, F-11



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COLORADO SPRINGS, COLORADO 80907

SWELL CONSOLIDATION
TEST RESULTS

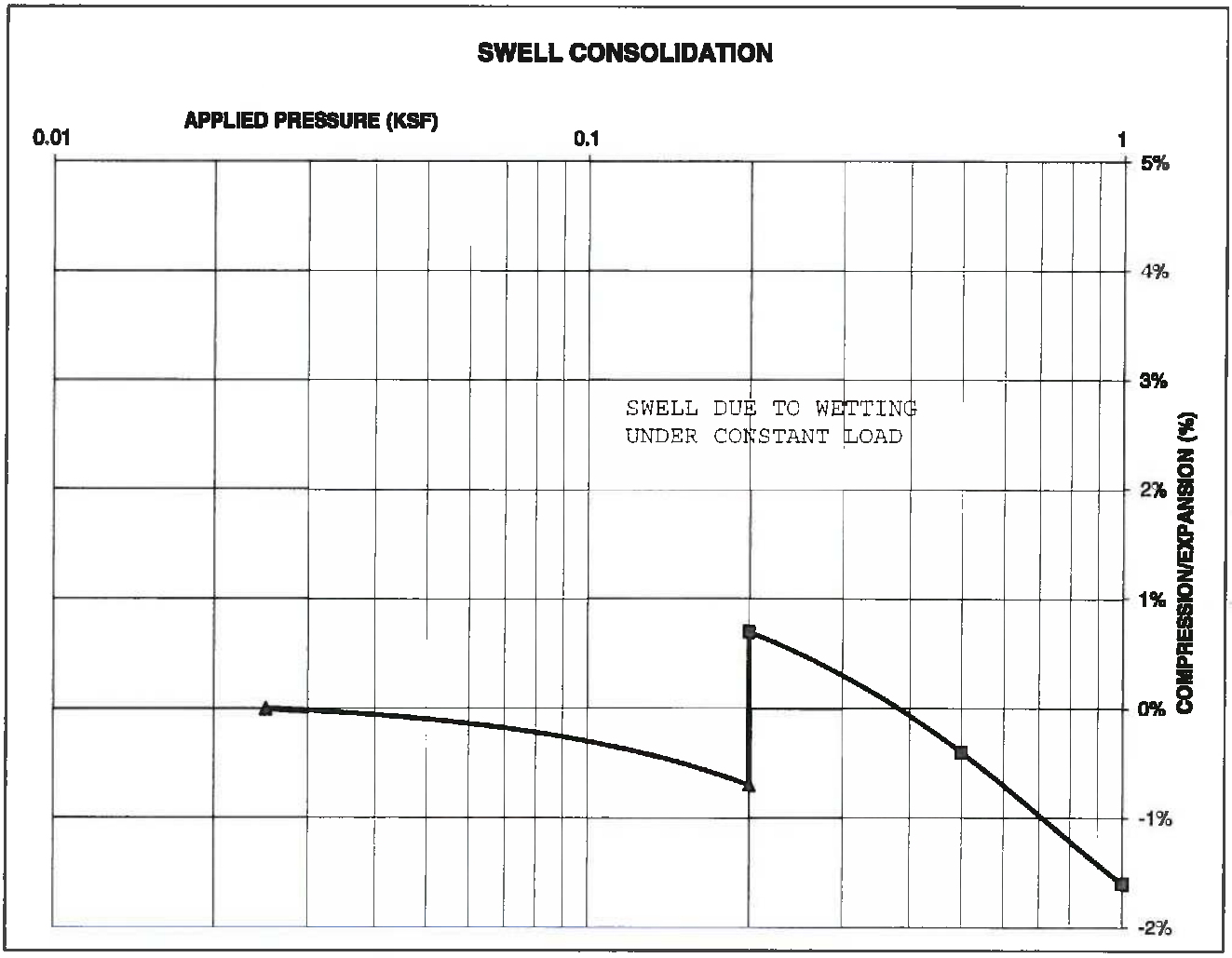
DRAWN:	DATE:	CHECKED: SW	DATE: 2-3-23

JOB NO.: 222360
FIG NO.: B-34

CONSOLIDATION TEST RESULTS

TEST BORING #	11	DEPTH(ft)	1-2
DESCRIPTION	CL	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)			113
NATURAL MOISTURE CONTENT			15.9%
SWELL/CONSOLIDATION (%)			1.4%

JOB NO. 222360
CLIENT GLEN DEVELOPMENT
PROJECT GLEN AT WIDEFIELD, F-11
REMOLDED SAMPLE



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COLORADO SPRINGS, COLORADO 80907

SWELL CONSOLIDATION
TEST RESULTS

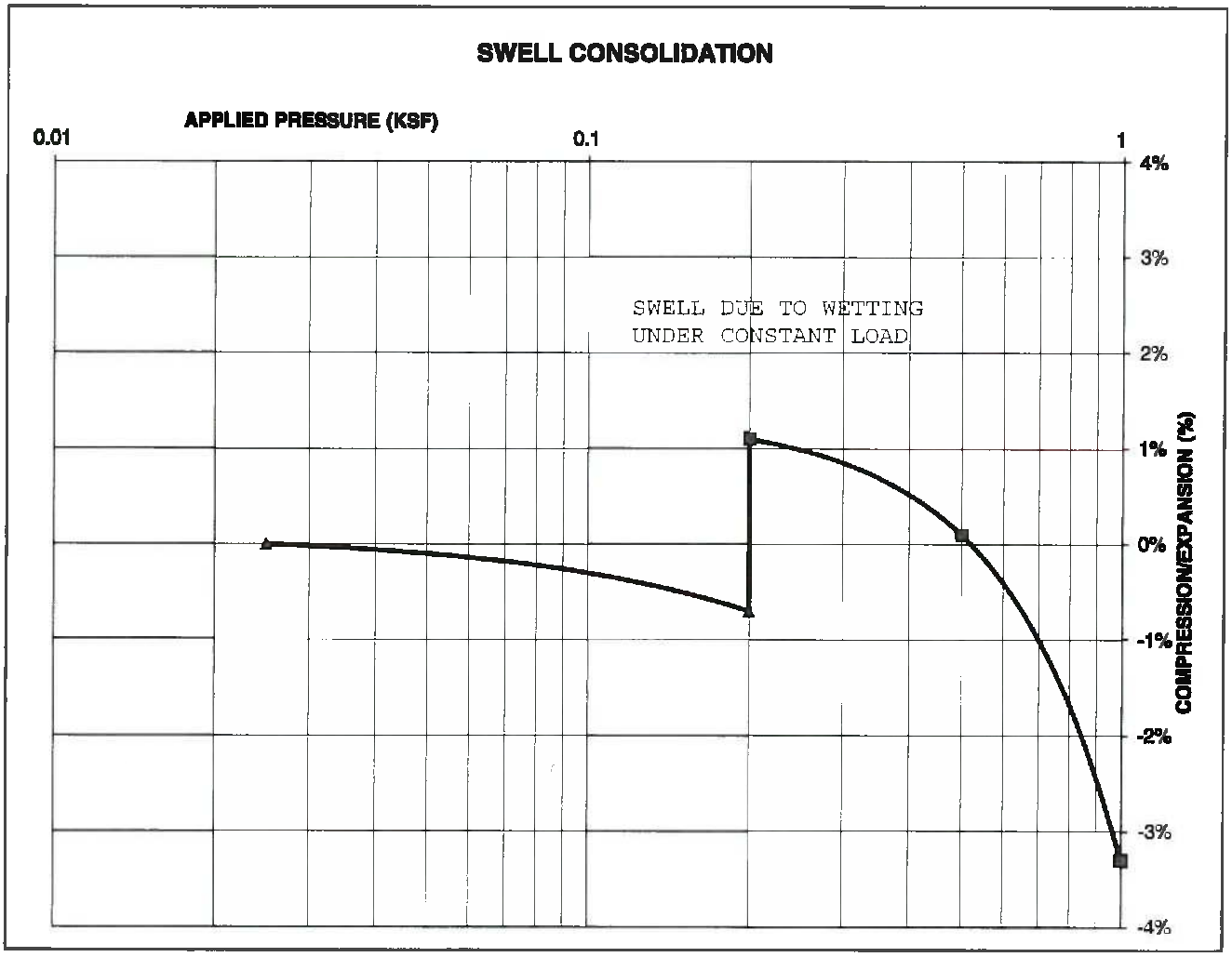
DRAWN:	DATE:	CHECKED: SP	DATE: 2-3-23

JOB NO.: 222360
FIG NO.: B-34A

CONSOLIDATION TEST RESULTS

TEST BORING #	12	DEPTH(ft)	1-2
DESCRIPTION	CL	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)			100
NATURAL MOISTURE CONTENT			11.2%
SWELL/CONSOLIDATION (%)			1.8%

JOB NO. 222360
CLIENT GLEN DEVELOPMENT
PROJECT GLEN AT WIDEFIELD, F-11



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SWELL CONSOLIDATION
TEST RESULTS

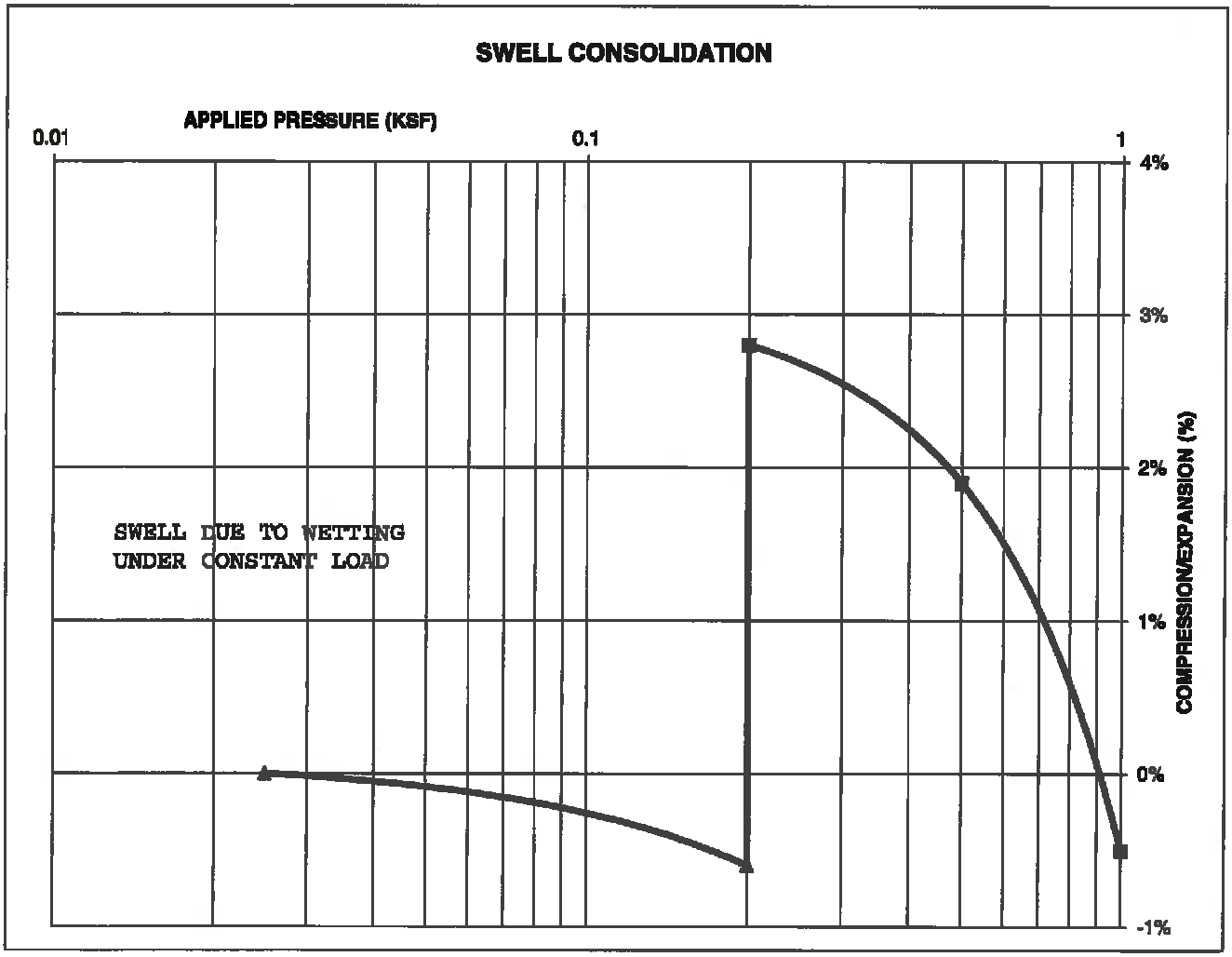
DRAWN	DATE	CHECKED	DATE
		SW	2-3-23

JOB NO.: 222360
FIG NO.: B-35

CONSOLIDATION TEST RESULTS

TEST BORING #	13	DEPTH(ft)	1-2
DESCRIPTION	CL	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)			102
NATURAL MOISTURE CONTENT			8.9%
SWELL/CONSOLIDATION (%)			3.4%

JOB NO. 222360
CLIENT GLEN DEVELOPMENT
PROJECT GLEN AT WIDEFIELD, F-11



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SWELL CONSOLIDATION
TEST RESULTS

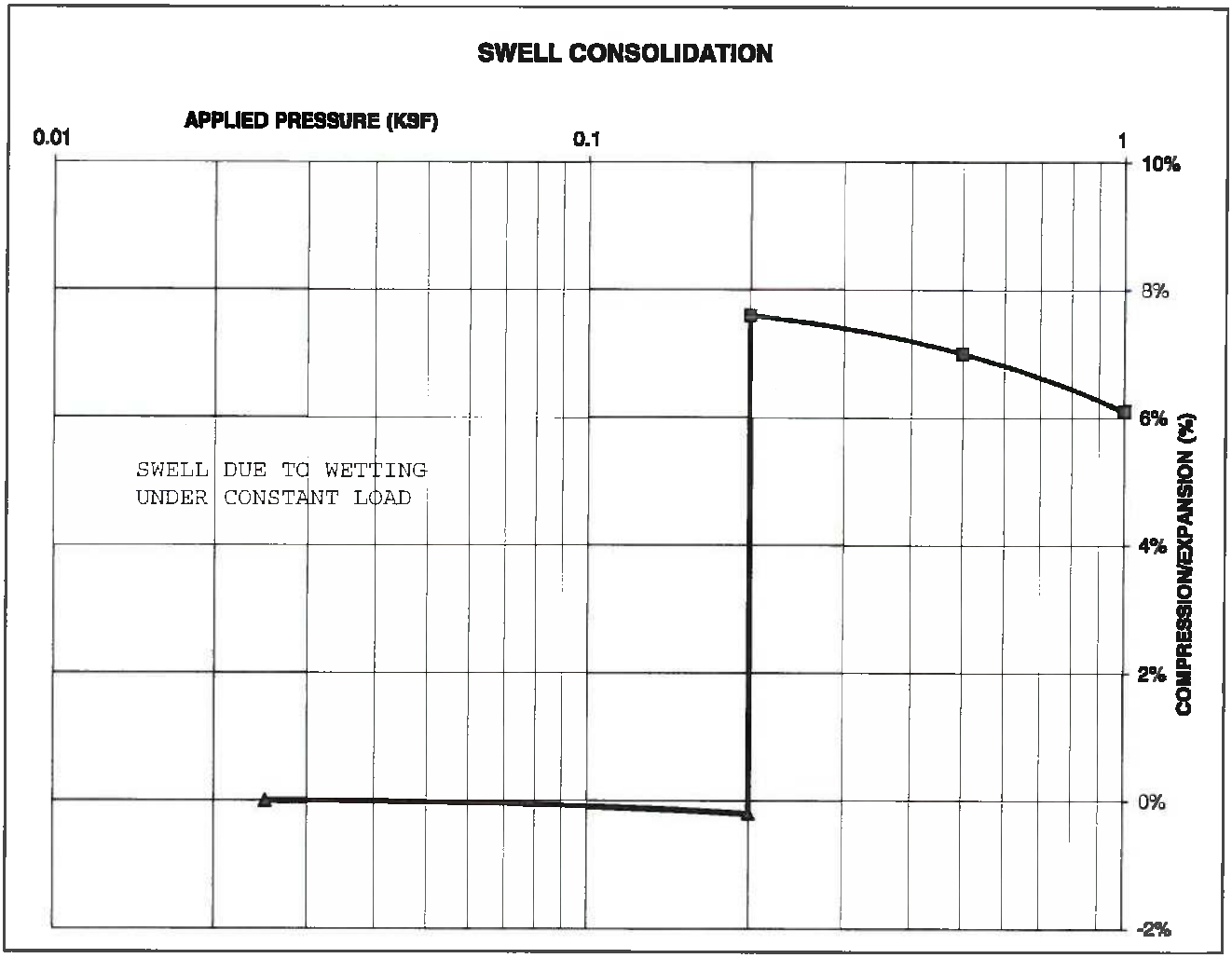
DRAWN	DATE	CHECKED	DATE
		SW	2-3-23

JOB NO.: 222360
FIG NO.: B-36

CONSOLIDATION TEST RESULTS

TEST BORING #	14	DEPTH(ft)	1-2
DESCRIPTION	CL	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)			126
NATURAL MOISTURE CONTENT			10.2%
SWELL/CONSOLIDATION (%)			7.8%

JOB NO. 222360
CLIENT GLEN DEVELOPMENT
PROJECT GLEN AT WIDEFIELD, F-11



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SWELL CONSOLIDATION
TEST RESULTS

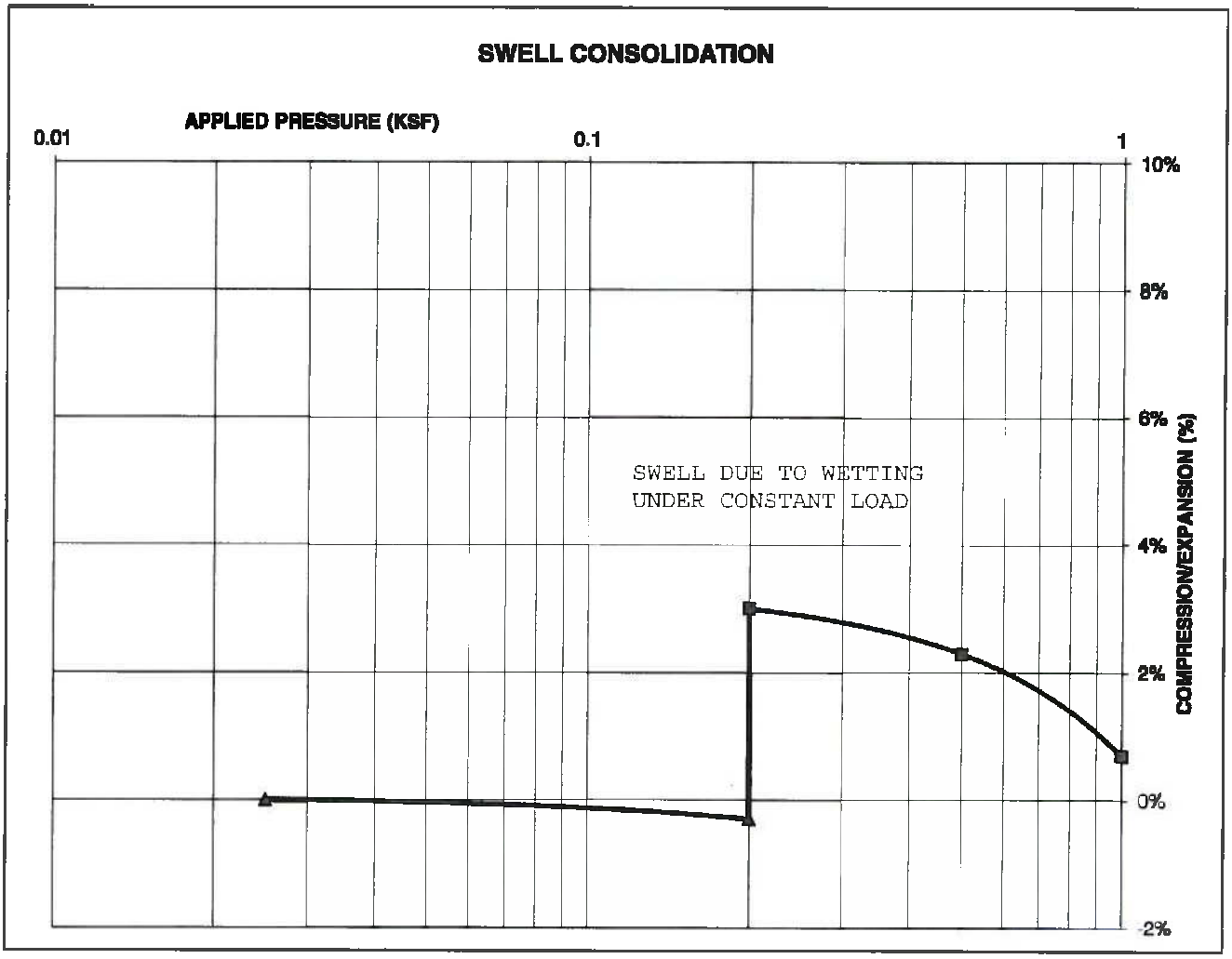
DRAWN:	DATE:	CHECKED:	DATE:
		SW	2-3-23

JOB NO.: 222360
FIG NO.: B-37

CONSOLIDATION TEST RESULTS

TEST BORING #	14	DEPTH(ft)	1-2
DESCRIPTION	CL	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)			112
NATURAL MOISTURE CONTENT			17.0%
SWELL/CONSOLIDATION (%)			3.3%

JOB NO. 222360
CLIENT GLEN DEVELOPMENT
PROJECT GLEN AT WIDEFIELD, F-11
REMOLDED SAMPLE



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SWELL CONSOLIDATION
TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		SW	2-3-23

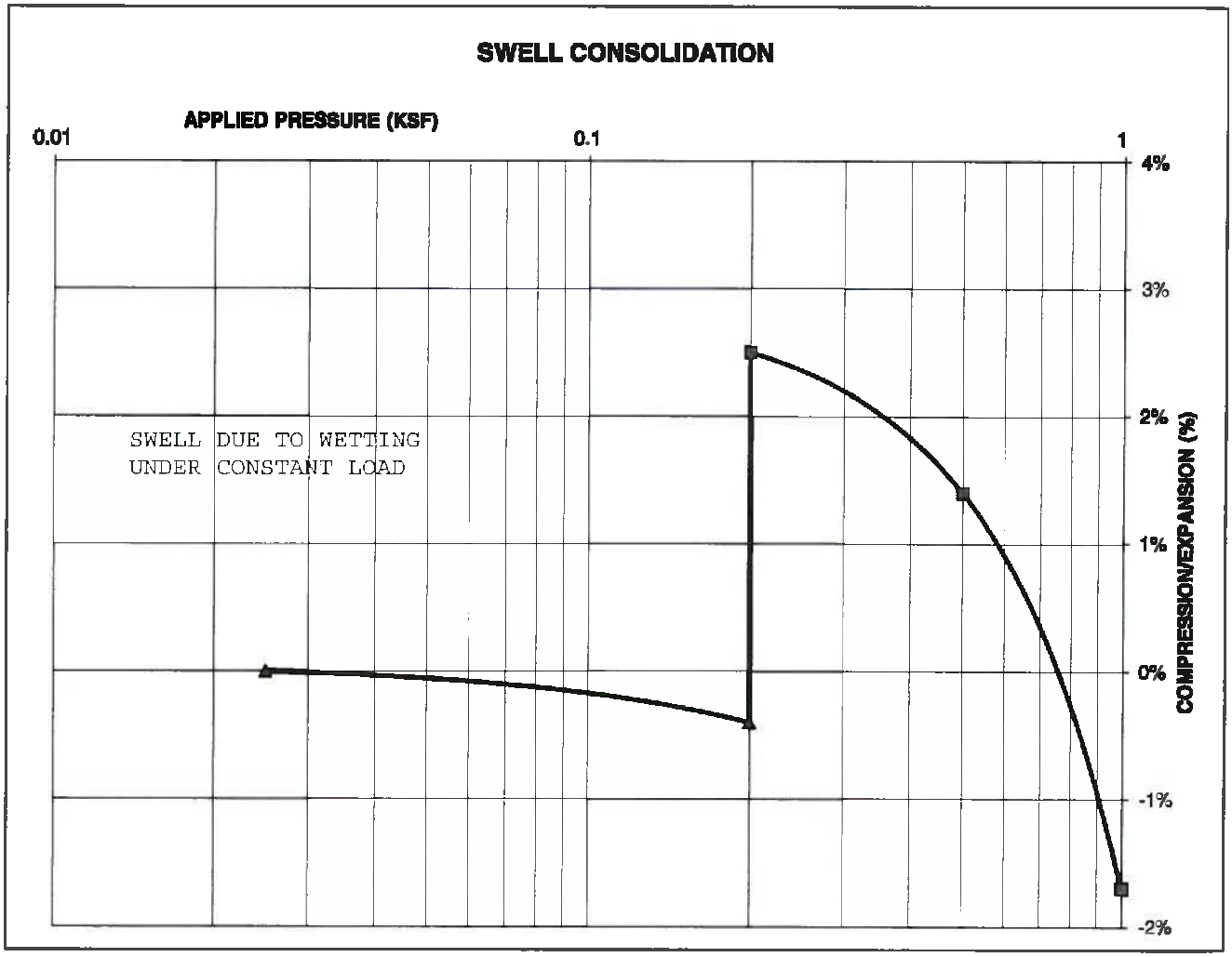
JOB NO.: 222360
FIG NO.: B-3 A

CONSOLIDATION TEST RESULTS

TEST BORING #	15	DEPTH(ft)	1-2
DESCRIPTION	CL	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)			98
NATURAL MOISTURE CONTENT			8.7%
SWELL/CONSOLIDATION (%)			2.9%

JOB NO. 222360
CLIENT GLEN DEVELOPMENT
PROJECT GLEN AT WIDEFIELD, F-11

SWELL CONSOLIDATION



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SWELL CONSOLIDATION
TEST RESULTS

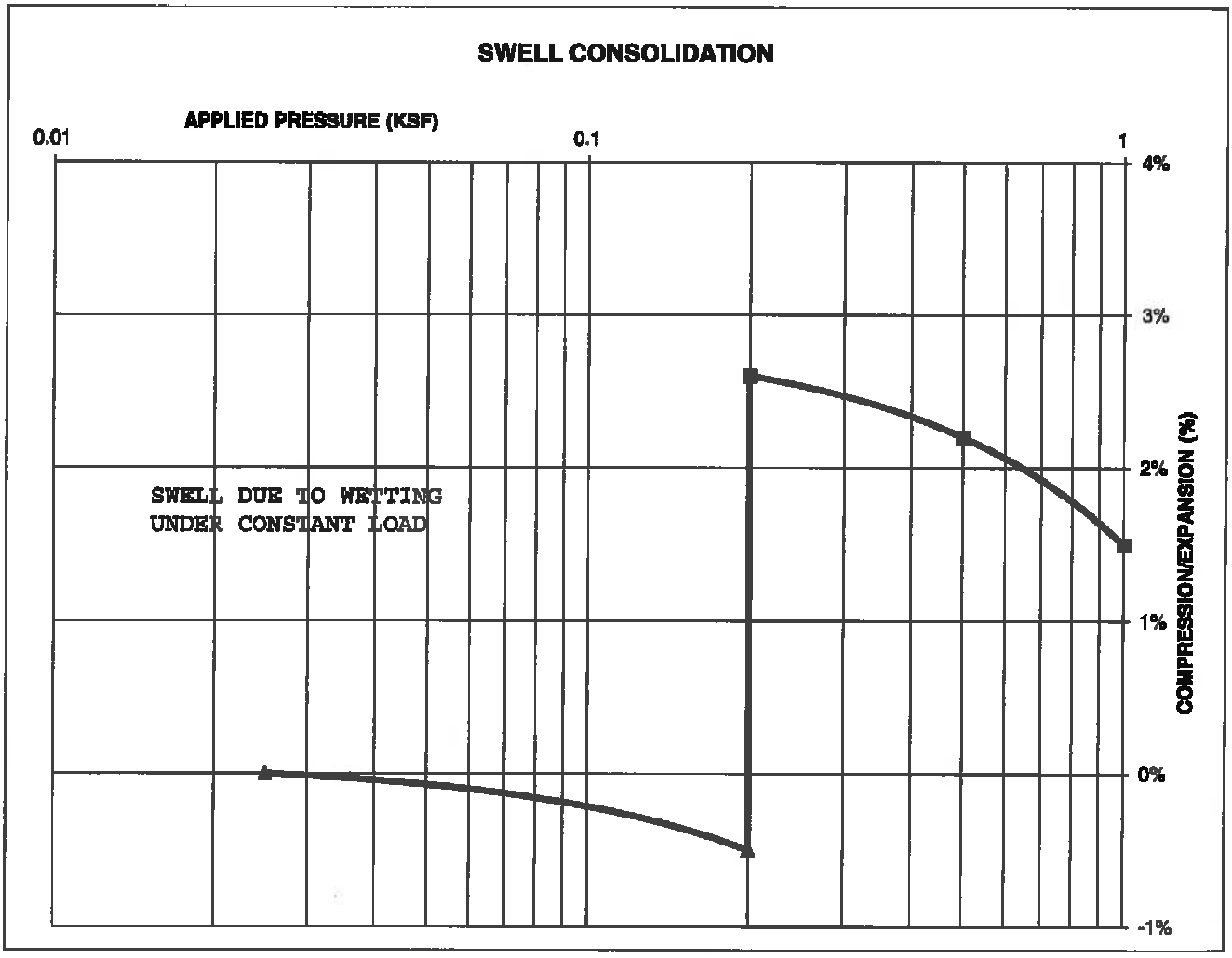
DRAWN	DATE	CHECKED:	DATE
		SW	2-3-23

JOB NO.: 222360
FIG NO.: B-38

CONSOLIDATION TEST RESULTS

TEST BORING #	16	DEPTH(ft)	1-2
DESCRIPTION	CL	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)			117
NATURAL MOISTURE CONTENT			15.1%
SWELL/CONSOLIDATION (%)			3.1%

JOB NO. 222360
CLIENT GLEN DEVELOPMENT
PROJECT GLEN AT WIDEFIELD, F-11



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SWELL CONSOLIDATION
TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		SW	2-3-23

JOB NO.: 222360
FIG NO.: B-39

CLIENT	GLEN DEVELOPMENT	JOB NO.	222360
PROJECT	GLEN AT WIDEFIELD, F-11	DATE	1/12/2023
LOCATION	GLEN AT WIDEFIELD, F-11	TEST BY	BL

BORING NUMBER	DEPTH, (ft)	SOIL TYPE NUMBER	UNIFIED CLASSIFICATION	WATER SOLUBLE SULFATE, (wt%)
TB-2	1-2	1	CL	0.20
TB-6	1-2	1	CL	0.31
TB-6	10	1	SC	0.19
TB-8	5	1	CL	0.24
TB-9	1-2	1	CL	0.19
TB-12	1-2	1	CL	0.21
TB-15	1-2	1	CL	0.18

QC BLANK PASS

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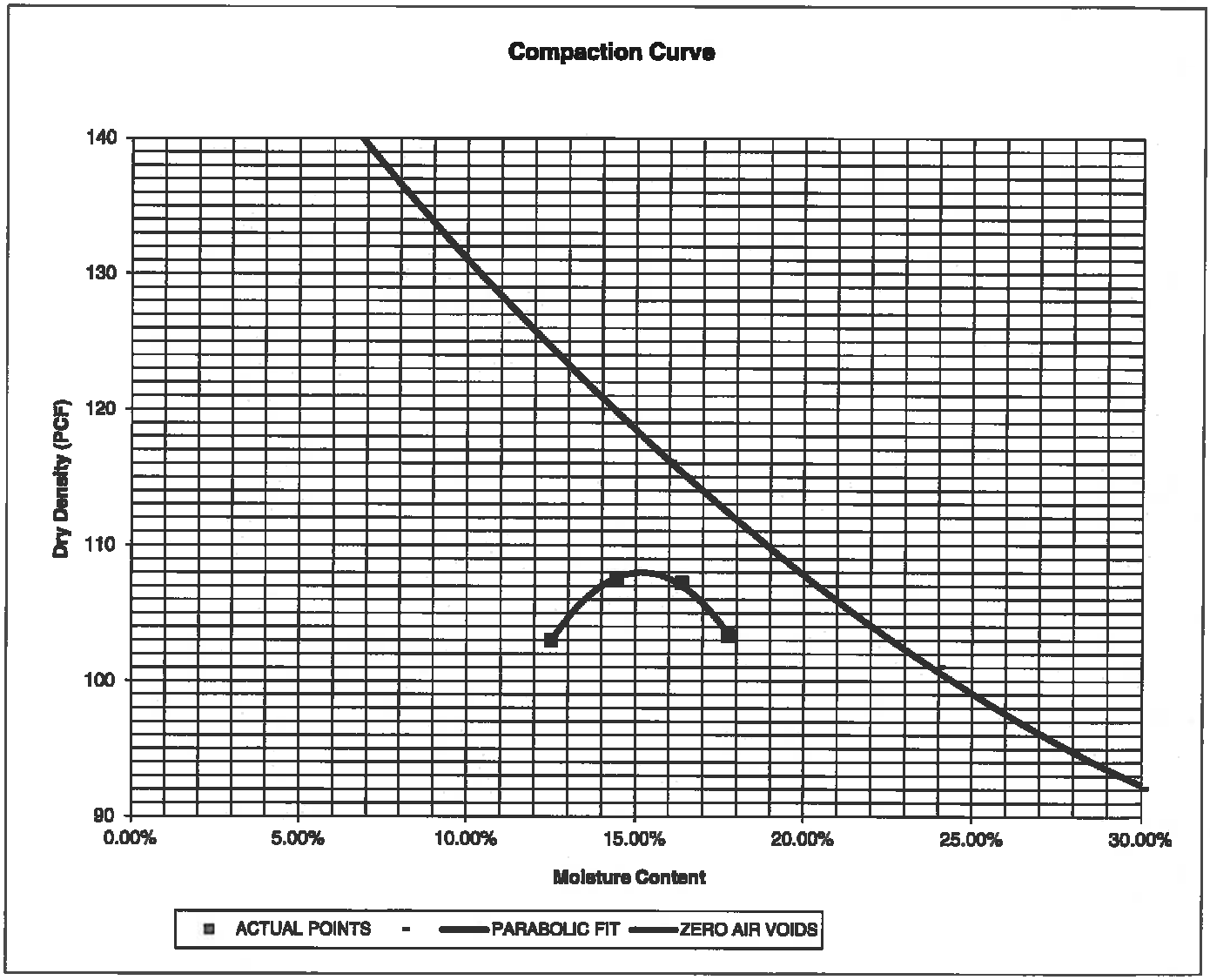
LABORATORY TEST
SULFATE RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		JW	2-3-23

JOB NO.: 222360
FIG NO.: B-40

PROJECT	GLEN AT WIDEFIELD, F-11	CLIENT	GLEN DEVELOPMENT
SAMPLE LOCATION	TB-9 @ 0-3'	JOB NO.	222360
SOIL DESCRIPTION	CLAY, SANDY, BROWN	DATE	12/28/22

IDENTIFICATION	CL	COMPACTION TEST #	1
TEST DESIGNATION / METHOD	ASTM D-698-A	TEST BY	AL
MAXIMUM DRY DENSITY (PCF)	108.1	OPTIMUM MOISTURE	15.2%



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MOISTURE DENSITY RELATION

DRAWN	DATE	CHECKED: SW	DATE: 2-3-23

JOB NO.: 222360
FIG NO.: B-41

CBR TEST LOAD DATA

JOB NO: 222360
CLIENT: GLEN DEVELOPMENT
PROJECT: GLEN AT WIDEFIELD, F-11
SOIL TYPE: 1, CBR #1

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

PENETRATION DEPTH (INCHES)	*10 BLOWS* MOLD # 1 LOAD(LBS) (LBS)	STRESS (PSI)	*25 BLOWS* MOLD # 2 LOAD(LBS) (LBS)	STRESS (PSI)	*56 BLOWS* MOLD # 3 LOAD(LBS) (LBS)	STRESS (PSI)
0.000	0	0.00	0	0.00	0	0.00
0.025	28	9.36	33	11.03	38	12.70
0.050	33	11.03	45	15.04	53	17.71
0.075	40	13.37	51	17.04	60	20.05
0.100	43	14.37	54	18.05	71	23.73
0.125	46	15.37	61	20.38	77	25.73
0.150	51	17.04	64	21.39	81	27.07
0.175	54	18.05	70	23.39	84	28.07
0.200	58	19.38	72	24.06	89	29.74
0.300	70	23.39	80	26.73	91	30.41
0.400	71	23.73	82	27.40	101	33.75
0.500	73	24.39	91	30.41	113	37.76

4.32

FINAL MOISTURE CONTENT

	MOLD #	1	MOLD #	2	MOLD #	3
CAN #		347		303		349
WT. CAN		8.82		8.15		8.9
WT. CAN+WET		174.72		147.85		159.5
WT. CAN+DRY		138.18		121.12		131.35
WT. H20		36.54		26.73		28.15
WT. DRY SOIL		129.36		112.97		122.45
MOISTURE CONTENT		28.25%		23.66%		22.99%
WET DENSITY (PCF)		111.1		116.4		121.4
DRY DENSITY (PCF)		96.5		101.0		105.4
BEARING RATIO		1.44		1.80		2.37
90% OF DRY DENSITY	94.8					
95% OF DRY DENSITY	100.1					

BEARING RATIO AT 90% OF MAX	1.31	~ R VALUE	1
BEARING RATIO AT 95% OF MAX	1.73	~ R VALUE	1

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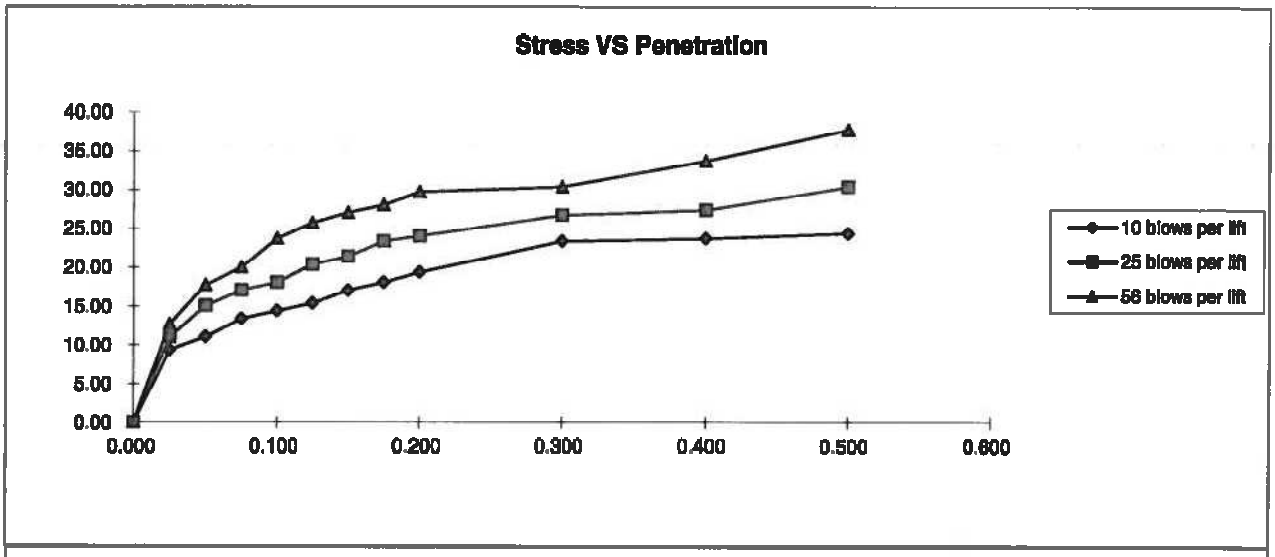
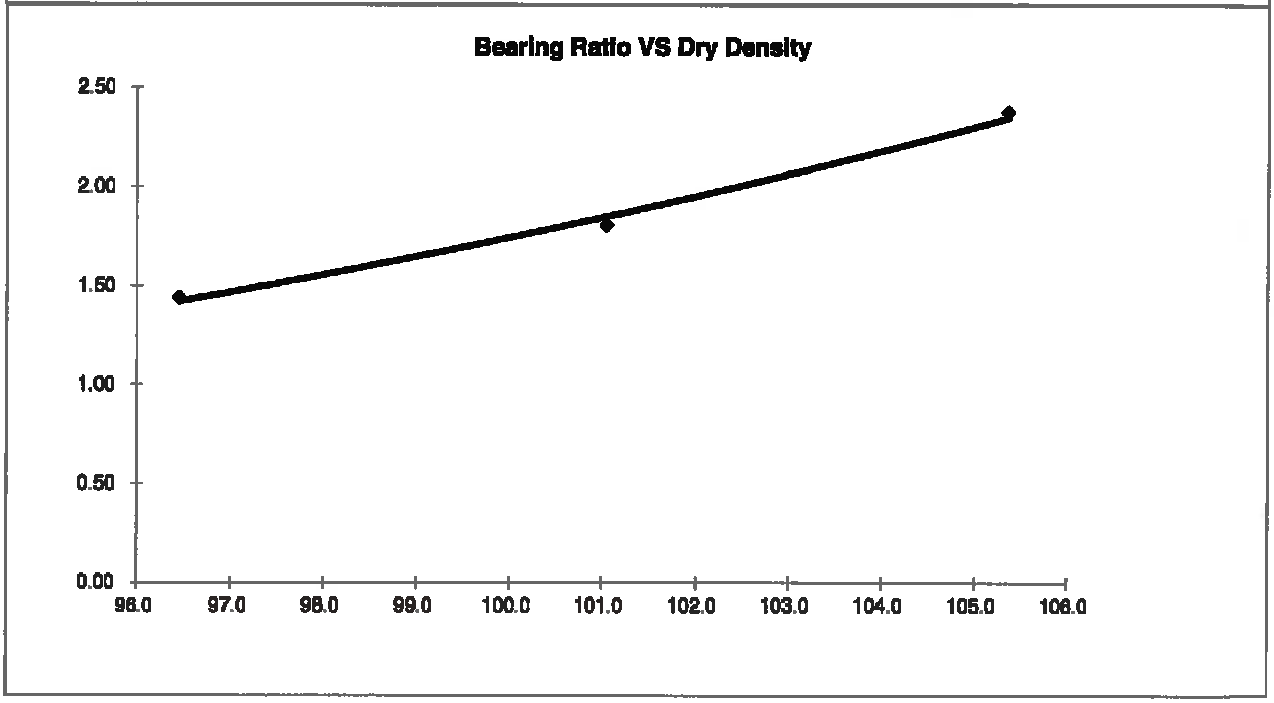
CBR TEST DATA

DRAWN:	DATE:	CHECKED:	DATE:
		SW	2-3-23

JOB NO.: 222360
FIG NO.: B-42





BEARING RATIO AT 90% OF MAX	1.31 ~ R VALUE	1.00
BEARING RATIO AT 95% OF MAX	1.73 ~ R VALUE	1.00

JOB NO: 222360
SOIL TYPE: 1, CBR #1

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CALIFORNIA BEARING RATIO

DRAWN:	DATE:	CHECKED: SW	DATE: 2-3-23

JOB NO.: 222360
FIG NO.: B-43

APPENDIX C: Pavement Design Calculations

FLEXIBLE PAVEMENT DESIGN

DESIGN DATA GLEN DEVELOPMENT GLEN AT WIDEFIELD FILING NO. 11
CUL DE SACS URBAN LOCAL (LOW VOLUME)

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL (W_{18}) =	36,500
Hveem Stabilometer (R Value) Results:	R =	5
Standard Deviation	S_o =	0.45
Loss in Serviceability	Δpsi =	2.0
Reliability	Reliability =	80
Reliability (z-statistic)	Z_R =	-0.841
Soil Resilient Modulus	M_R =	3025

Weighted Structural Number (WSN): → WSN = 2.60

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)
50	0
60	-0.253
70	-0.524
75	-0.674
80	-0.841
90	-1.282
95	-1.65
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.222360
Fig. No. C-1

DESIGN CALCULATIONS

DESIGN DATA GLEN DEVELOPMENT
CUL DE SACS URBAN LOCAL (LOW VOLUME)

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL =	36,500
Hveem Stabilometer (R Value) Results:	R =	5
Weighted Structural Number (WSN):	WSN =	2.60

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)

$D_1 = (WSN)/C_1$ = 5.9 inches of Full Depth Asphalt
Use 6.0 inches Full Depth

FOR ASPHALT + AGGREGATE BASE COURSE SECTION

Asphalt Thickness (t) = 4 inches
$D_2 = ((WSN) - (t)(C_1))/C_2$ = 7.6 inches of Aggregate
Base Course, use 8.0 inches

RECOMMENDED ALTERNATIVES

1. 4.0 inches of Asphalt + 8.0 inches of Aggregate Base Course, or
2. 6.0 inches of Full-Depth Asphalt

Job No.222360
Fig. No. C-2

FLEXIBLE PAVEMENT DESIGN

DESIGN DATA — GLEN DEVELOPMENT THH GLEN AT WIDEFIELD FILING NO. 11
SOIL TYPE 1 - URBAN LOCAL

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL (W_{18}) =	292,000
Hveem Stabilometer (R Value) Results:	R =	5
Standard Deviation	S_o =	0.45
Loss in Serviceability	Δpsi =	2.0
Reliability	Reliability =	80
Reliability (z-statistic)	Z_R =	-0.841
Soil Resilient Modulus	M_R =	3025

Weighted Structural Number (WSN): → WSN = 3.60

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)
50	0
60	-0.253
70	-0.524
75	-0.674
80	-0.841
90	-1.282
95	-1.65
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. 222360
Fig. No. C-3

DESIGN CALCULATIONS

DESIGN DATA GLEN DEVELOPMENT
SOIL TYPE 1 - URBAN LOCAL

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL =	292,000
Hveem Stabilometer (R Value) Results:	R =	5
Weighted Structural Number (WSN):	WSN =	3.60

DESIGN EQUATION

$$WSN = C_1D_1 + C_2D_2$$

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

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

FOR FULL DEPTH ASPHALT SECTION (CURRENTLY NOT ALLOWED)

$D_1 = (WSN)/C_1$ = 8.2 inches of Full Depth Asphalt
Use 8.5 inches Full Depth

FOR ASPHALT + AGGREGATE BASE COURSE SECTION

Asphalt Thickness (t) = 5.5 inches
$D_2 = ((WSN) - (t)(C_1))/C_2$ = 10.7 inches of Aggregate Base Course, use 11.0 inches

RECOMMENDED ALTERNATIVES

1. 5.5 inches of Asphalt + 11.0 inches of Aggregate Base Course, or
2. 8.5 inches of Full-Depth Asphalt

Job No. 222360
Fig. No. C-4

FLEXIBLE PAVEMENT DESIGN

DESIGN DATA — Glen Development
The Glen at Widefield Filing No. 11 - Rural 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 =	5
Standard Deviation	S_o =	0.45
Loss in Serviceability	Δpsi =	2.0
Reliability	Reliability =	75
Reliability (z-statistic)	Z_R =	-0.674
Soil Resilient Modulus	M_R =	3025

Weighted Structural Number (WSN): → WSN = 2.53

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)
50	0
60	-0.253
70	-0.524
75	-0.674
80	-0.841
90	-1.282
95	-1.65
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. 222360
Fig. No. C-5

DESIGN CALCULATIONS

CEMENT TREATED SECTIONS

DESIGN DATA Glen Development
The Glen at Widefield Filing No. 11 - Rural Local (low-volume) - Soil Type 1

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL =	36,500
Hveem Stabilometer (R Value) Results:	R =	5
Weighted Structural Number (WSN):	WSN =	2.53

DESIGN EQUATION

$$WSN = C_1D_1 + C_2D_2$$

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

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

FOR 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 STABILIZED SUBGRADE SECTION

Asphalt Thickness (t) = [4] inches
$D_2 = ((WSN) - (t)(C_1))/C_2$ = 7.0 inches of Cement Stabilized Subgrade,
use 8.0 inches

RECOMMENDED ALTERNATIVES

1. 4.0 inches of Asphalt + 8.0 inches of Cement Stabilized Subgrade, or
2. 6.0 inches of Full-Depth Asphalt

Job No. 222360
Fig. No. C-6

FLEXIBLE PAVEMENT DESIGN

DESIGN DATA — Glen Development
The Glen at Widefield Filing No. 11 - Rural Local - Soil Type 1

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL (W_{18}) =	292,000
Hveem Stabilometer (R Value) Results:	R =	5
Standard Deviation	S_o =	0.45
Loss in Serviceability	Δpsi =	2.0
Reliability	Reliability =	80
Reliability (z-statistic)	Z_R =	-0.841
Soil Resilient Modulus	M_R =	3025

Weighted Structural Number (WSN): → WSN = 3.60

DESIGN TABLES AND EQUATIONS

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

$M_R = 10^{[(S_1 + 18.72) / 8.24]}$

$k = M_R / 19.4$

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)
50	0
60	-0.253
70	-0.524
75	-0.674
80	-0.841
90	-1.282
95	-1.65
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. 222360
Fig. No. C-7

DESIGN CALCULATIONS

CEMENT TREATED SECTIONS

DESIGN DATA Glen Development
The Glen at Widefield Filing No. 11 - Rural Local - Soil Type 1

Equivalent (18 kip) Single Axle Load Applications (ESAL):	ESAL =	292,000
Hveem Stabilometer (R Value) Results:	R =	5
Weighted Structural Number (WSN):	WSN =	3.60

DESIGN EQUATION

$$WSN = C_1D_1 + C_2D_2$$

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

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

FOR FULL DEPTH ASPHALT SECTION(CURRENTLY NOT ALLOWED)

$D_1 = (WSN)/C_1$ = 8.2 inches of Full Depth Asphalt
Use 8.5 inches Full Depth

FOR ASPHALT + CEMENT STABILIZED SUBGRADE SECTION

Asphalt Thickness (t) = 5.5 inches
$D_2 = ((WSN) - (t)(C_1))/C_2$ = 10.7 inches of Cement Stabilized Subgrade,
use 11.0 inches

RECOMMENDED ALTERNATIVES

1. 5.5 inches of Asphalt + 11.0 inches of Cement Stabilized Subgrade, or
2. 8.5 inches of Full-Depth Asphalt

Job No. 222360
Fig. No. C-8