ENTECH
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October 12, 2023

S R Land, LLC
20 Boulder Crescent, 1st Floor, Suite 100
Colorado Springs, Colorado 80903

Attn: Chaz Collins

Re: Pavement Recommendations - Revised
Homestead North at Sterling Ranch Filing No. 2
El Paso County, Colorado
Entech Job No. 230423

***Full Depth Asphalt is not allowed within unincorporated El Paso County.**

Dear Mr. Collins:

This revised report supersedes previous versions of this report. As requested, Entech Engineering, Inc. (Entech) obtained samples of the pavement subgrade soils from the roadways in Homestead North at Sterling Ranch Subdivision, Filing No. 2, in El Paso County, Colorado, refer to Figure 1. This letter presents the results of the subsurface soil investigation, laboratory testing, and provides pavement recommendations for the roadway sections within the filing.

Project Description

The roadways for this project consist of sections of Wheatland Drive and Texas Jack Drive, and Aspen Valley Road, and the full extents of Perry Owens Drive, Sam Bass Drive and associated cul-de-sac, Willey Picket Drive, and Robert Allison Circle (cul-de-sac), all within Filing No. 2. The roadways are located within a proposed residential neighborhood.

Subsurface Explorations and Laboratory Testing

Subsurface conditions at the project site were explored by 25 test borings, designated, TB-1 through TB-25, on September 15 and September 18, 2023. The locations of the test borings are shown on the Site and Exploration Plan, Figure 2. The borings were drilled to depths of 5 and 10 feet below the existing ground surface (bgs). The drilling was performed using a truck-mounted, continuous flight auger drill rig supplied and operated by Entech. Descriptive boring logs of the subsurface conditions encountered during drilling are presented in Appendix A. Groundwater levels were measured in each of the open boreholes at the conclusion of drilling.

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

Water content testing (ASTM D2216) was performed on the samples recovered from the borings, and the results are shown on the boring logs. Grain-Size Analysis (ASTM D422) and Atterberg Limits testing (ASTM D4318) were performed on selected samples to assist in classifying the materials encountered in the borings. Swell/Consolidation testing (ASTM D4546) was performed to evaluate the expansive/compressive characteristics of the roadway subgrade. Soluble sulfate

testing was performed on select soil samples to evaluate the potential for below grade degradation of concrete due to sulfate attack. The laboratory testing results are summarized on Table B-1 and are presented in Appendix B.

Strength testing was performed on two sets of soil/cement composite samples. Testing was performed on soil samples prepared with 2% and 4% Portland Cement Type 1/2. A compression strength of 160 pounds per square inch (psi) is recommended for cement stabilized subgrade. The 5-day average strength value of the 2% mix was 324 psi. The 5-day average strength value of the 4% mix was 394 psi. A 2% mix is recommended based on the laboratory test results. A summary of the testing results is attached in Appendix B, Table B-2.

Subgrade Conditions

Subsurface conditions along the proposed roadways consisted of silty to clayey sand fill and sand with silt fill (Soil Type 1), native silty to clayey sand to sand with silt (Soil Type 2), native sandy clay (Soil Type 3), and sandstone bedrock (Soil Type 4), which was generally located below the zone of subgrade influence. Soil type and corresponding AASHTO soil classification are listed below:

- Soil Type 1: A-1-b, A-2-4, and A-2-6
- Soil Type 2: A-1-b, A-2-4, and A-2-6
- Soil Type 3: A-6

Groundwater was not encountered in the test borings.

Water soluble sulfate tests results indicated that the soils exhibit a negligible potential for sulfate attack.

Based on the soil classifications and swell test results, localized mitigation of expansive soils is required on this site. All A-6 materials, such as those encountered in TB-2 and TB-14, will require removal to a depth of 18 inches and replacement with compacted, moisture treated granular soil. Laboratory test results are presented in Appendix B and are summarized in Table B-1.

California Bearing Ratio (CBR) testing was performed on a representative sample of Soil Type 1 from TB-18 and Soil Type 3 from TB-2 to determine the support characteristic of the subgrade soils for the roadway sections. The results of the CBR testing, are presented in Appendix B and summarized as follows:

Exhibit 1: Subsurface Laboratory Testing Summary

Design Parameter	Value	
Soil Type	1 – Silty Sand	3– Sandy Clay
CBR at 95%	24.2	4.2
Design CBR	10	4.2
Liquid Limit	NV	34
Plasticity Index	NP	17
Percent Passing 200	24.6	53.8
AASHTO Classification	A-2-4	A-6
Group Index	0	6
Unified Soils Classification	SM	CL

Considering that all A-6 materials will be removed to a depth of 18 inches, Soil Type 1 was used in developing the recommended pavement sections.

Pavement Design

The CBR testing was used to determine the design subgrade modulus for the roadway. The pavement sections were determined utilizing the El Paso County "Pavement Design Criteria Manual". Traffic data is not available for the local roadways within Homestead North Filing 2; however, the cul-de-sacs are classified as local low volume roadways and the remainder of the roads classify as local roads. The El Paso County Pavement Design Criteria and Report provides default 18-kip equivalent single axle loading (ESAL) based street classifications. For design, a default ESAL value of 36,500 and 292,000 was used for the local low volume and local roadway designations, respectively.

Alternative pavement sections for asphalt supported on aggregate base course (ABC) or recycled concrete, and asphalt supported on cement stabilized subgrade (CTS) are provided. Design parameters used in the pavement analysis are presented in Exhibit 2.

Exhibit 2: Pavement Design Parameters

Design Parameter	Value
Reliability (Local Roadway)	80%
Standard Deviation	0.45
Serviceability Loss (Δ psi)	2.0
Design CBR	10
Resilient Modulus - Soil Type 1	15,000 psi
Structural Coefficients	
HMA	0.44
ABC	0.11
Recycled Concrete	0.11
CTS	0.11

The pavement design calculations are presented in Appendix C. Any additional grading may result in subgrade soils with different support characteristics. The following pavement sections should be re-evaluated if additional grading is performed. Pavement sections recommended for this phase of the filing are summarized in Exhibit 3.

Exhibit 3: Recommended Pavement Sections

Pavement Area	Design ESAL	Alternative
Low volume Local Roads	36,000	1. 3.0 inches HMA over 6.0 inches ABC
		2. 4.0 inches HMA over 10.0 inches of CTS
Local Roads	292,000	1. 3.0 inches HMA over 8.0 inches ABC
		2. 4.0 inches HMA over 10.0 inches of CTS

ABC = Aggregate Base Course; ESAL = equivalent single axle loads; HMA = Hot Mix Asphalt; CTS = Cement Treated Subgrade

Notes:

1. All pavement alternatives represent the minimum sections required per El Paso County Pavement Design Criteria Manual.
2. Full depth sections are not recommended by El Paso County.

Swelling Soils 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. Swell testing on Soil Type 2 from TB-2 indicated a swell of 2.4%. Swell testing on Soil Type 2 soil from TB-1 at a depth of 5 feet indicated a swell of 5.7%, however, the material is below the zone of influence for pavements.

Any areas with high clay contents (AASHTO A-6 material) will require removal and replacement with granular fill to a depth of 18 inches. The extents of any cohesive material overexcavation should be field determined. Based on the swell testing and granular soils encountered through the site, mitigation for expansive soils will be required in the areas around TB-2 and TB-18.

Roadway Construction – Full Depth Asphalt and Asphalt on Aggregate Basecourse Alternatives

If pavement section alternatives are selected utilizing ABC, the final subgrade surface should be scarified to a depth of 12 inches, moisture conditioned within 0% to 3% over the optimum water content, and recompacted to 95% of its maximum Modified Proctor dry density, ASTM D1557. Any A-6 material identified during scarification should be removed and replaced as discussed in the Swelling Soils Mitigation Section.

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

ABC materials shall conform to the Table D-6 from the El Paso County Pavement Design Criteria and Report. ABC materials should be compacted to a minimum of 95% of its maximum Modified Proctor Dry Density (ASTM D1557) at +/-2% of optimum moisture content.

Roadway Construction – Stabilized Subgrade Alternative

Prior to placement of the asphalt, the subgrade shall be stabilized by the addition of cement to a depth of at least 10 inches if CTS alternatives are selected. The amount of cement applied shall be a minimum of 2 percent (by weight) of the subgrade's maximum dry density as determined by the Modified Proctor Test (ASTM D1557) or by the Standard Proctor Test (ASTM D698). Local practice typically recommends that the design mix be increased by 1% in the field to account for waste and construction variability. The cement should be spread evenly on the subgrade surface and be thoroughly mixed into the subgrade over a 10-inch depth, as specified, such that a uniform blend of soil and cement is achieved. Prior to application or mixing of the cement the upper 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 conditions. Densification of the cement-stabilized subgrade should be completed to obtain a compaction of at least 95 percent of the subgrade maximum dry density as determined by the Modified Proctor Test (ASTM D-1557) or by the Standard Proctor Test (ASTM D-698). Satisfactory compaction of the subgrade shall occur within 90 minutes from the time of mixing the cement into the subgrade.

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

- Type I/II cement as supplied; a local supplier shall be used. All cement used for stabilization should come from the same source. If cement sources are changed a new laboratory mix design should be completed.

- Moisture conditioning of the subgrade and/or mixing of the cement into the subgrade shall not occur when soil temperatures are below 40° F. Cement treated subgrades should be maintained at a temperature of 40° F or greater until the subgrade has been compacted as required.
- Cement placement, cement mixing and compaction of the cement treated subgrade should be observed by a Soils Engineer. The Soils Engineer should complete in situ compaction tests and construct representative compacted specimens of the treated subgrade material for subsequent laboratory quality assurance testing.
- Pending the results of the field density testing, microfracturing of the stabilized subgrade may be required. Soil strengths in excess of 200 psi require microfracturing.

In addition to the above guidance, the asphalt, cement, subgrade conditions, compaction of materials and roadway construction methods shall meet the El Paso County Pavement Desing Criteria and the Pikes Peak Region Asphalt Paving Specifications.

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

Respectfully Submitted,

ENTECH ENGINEERING, INC.

Daniel P. Stegman
Geotechnical Engineering Staff

Reviewed by:

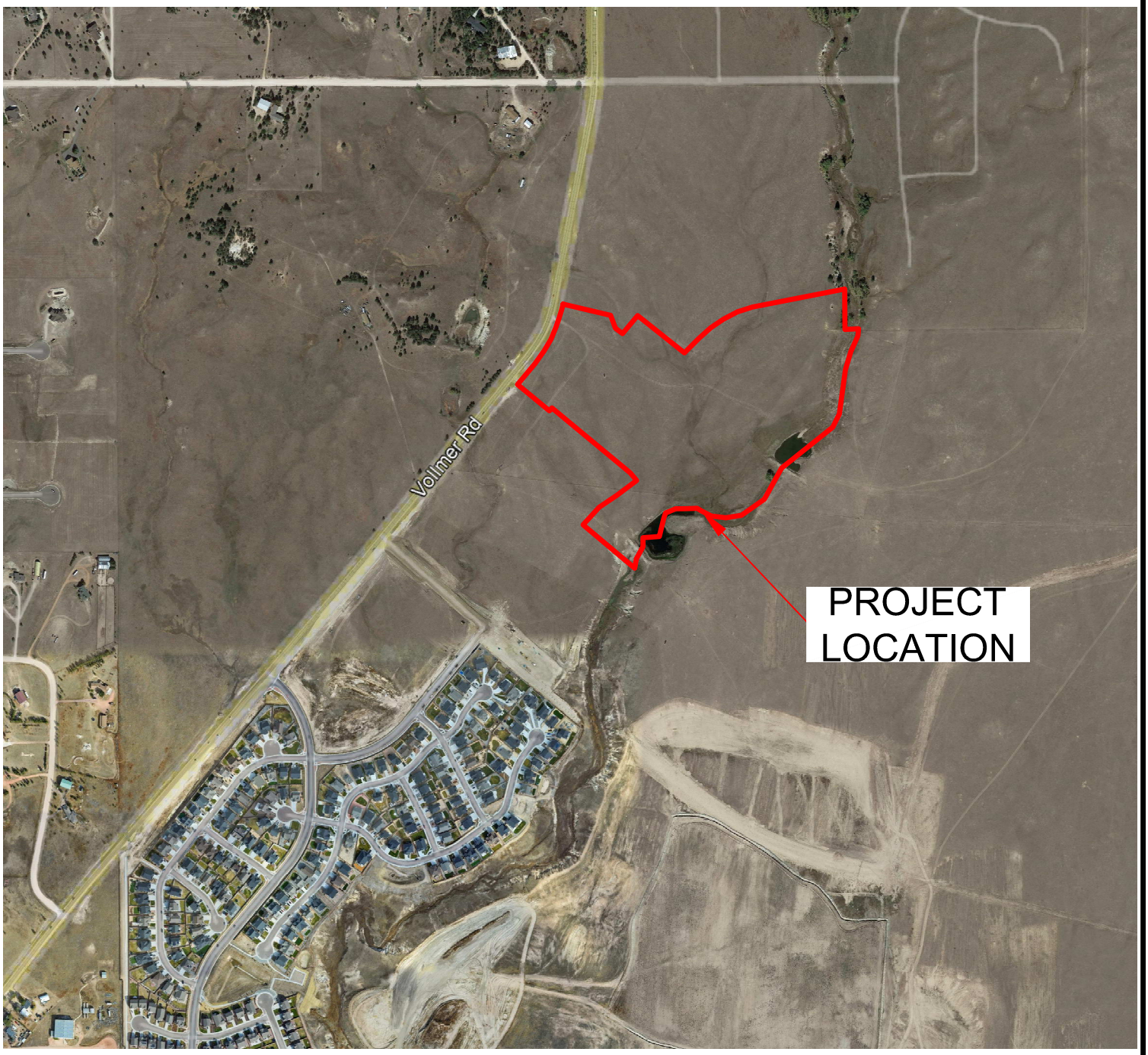
COLORADO LICENSED
JOSEPH C GOODE III
52381
PROFESSIONAL ENGINEER

Digitally signed by Joseph C Goode III
Date: 2023.10.12 09:37:01 -06'00'

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

Encl.

SW:JCG/jcg
AAProjects/2023/230423/ssi



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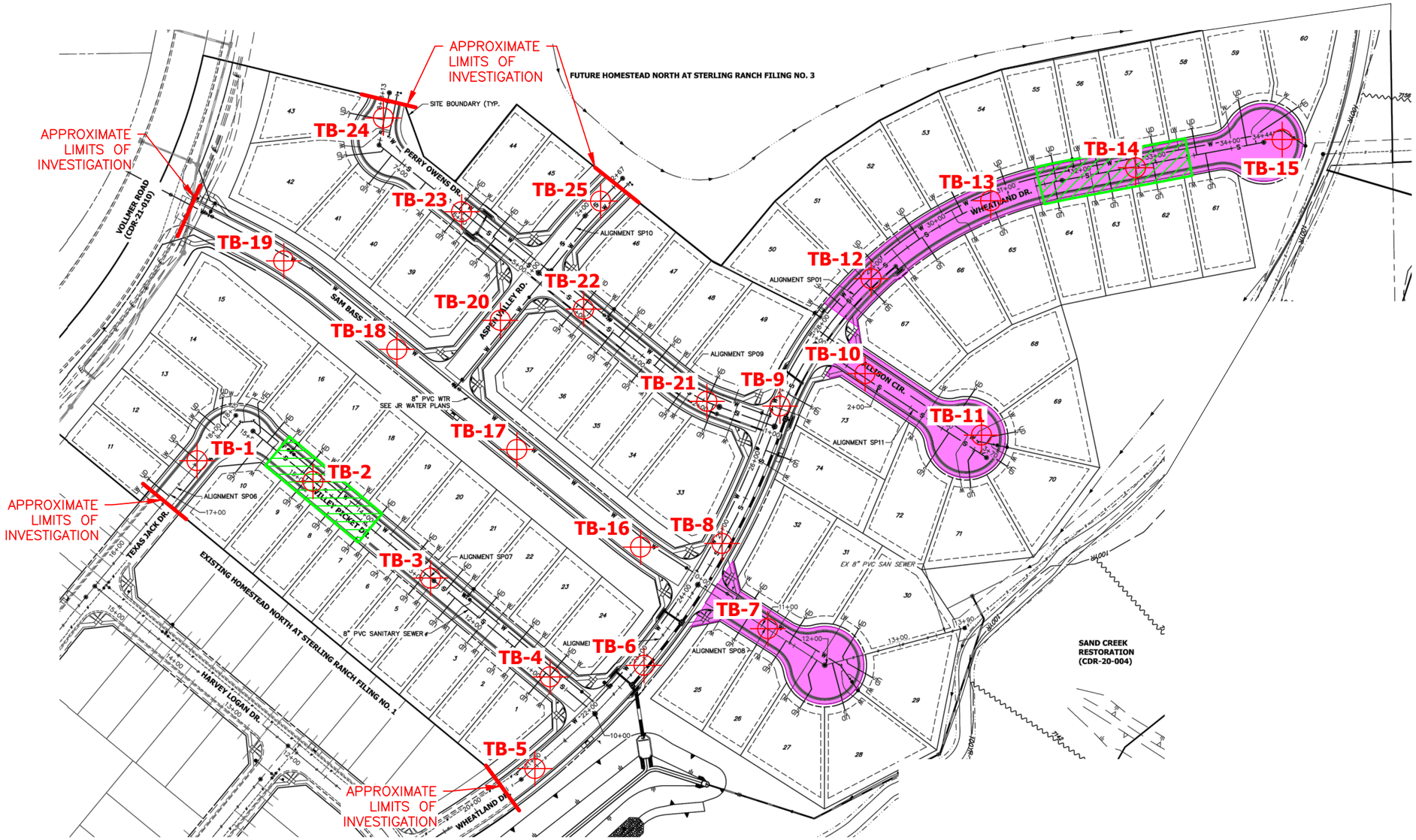
VICINITY MAP
HOMESTEAD NORTH FILING 2
SR LAND, LLC

JOB NO.
230423

FIG. 1



SOIL TYPE 1

URBAN LOCAL (LOW VOLUME) (36,500 ESAL)
- 3" ASPHALT OVER 6" AGGREGATE BASE COURSE OR RECYCLED CONCRETE OR 4" ASPHALT OVER 10" CEMENT STABILIZED SUBGRADE.

ALL OTHER ROADWAYS CLASSIFY AS URBAN LOCAL ROADS (292,000 ESAL)
- 3" ASPHALT OVER 8" AGGREGATE BASE COURSE OR RECYCLED CONCRETE OR 4" ASPHALT OVER 10" CEMENT STABILIZED SUBGRADE.

LOCATIONS IN WHICH 18 INCHES OF OVEREXCAVATION AND REPLACEMENT WILL BE REQUIRED. LOCATIONS TO BE FIELD DETERMINED BY ENTECH PERSONNEL.

–SEE REPORT FOR COMPOSITE SECTIONS

TB- APPROXIMATE TEST BORING LOCATION AND NUMBER

N

ENTECH ENGINEERING, INC.

SITE AND EXPLORATION PLAN
HOMESTEAD NORTH FILING 2
SR LAND, LLC

JOB NO. 230423

FIG. 2

APPENDIX A: Test Boring Logs

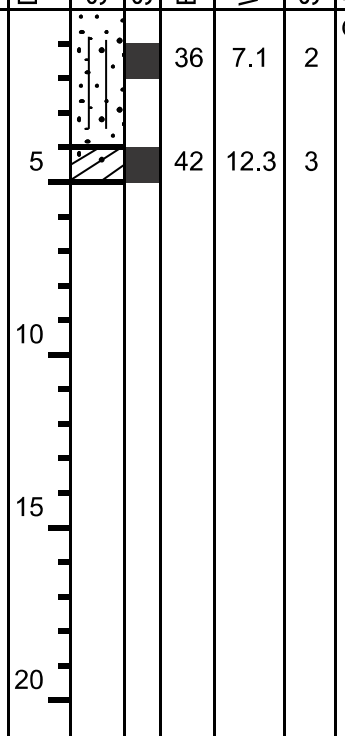
TEST BORING 1
DATE DRILLED 9/15/2023

REMARKS

DRY TO 5', 9/15/23

SAND, SILTY, BROWN, DENSE, MOIST

CLAY, SANDY, OLIVE, HARD, MOIST



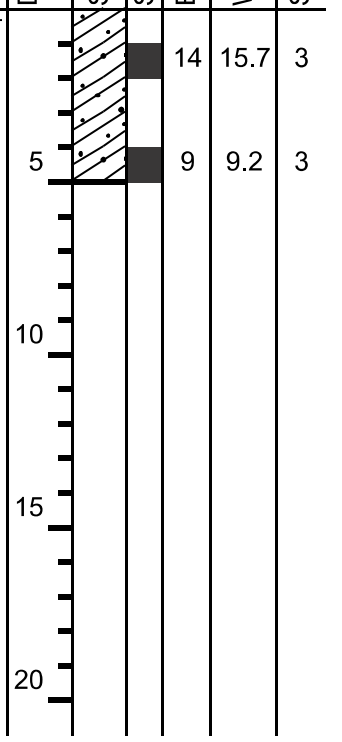
Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			36	7.1	2
5			42	12.3	3

TEST BORING 2
DATE DRILLED 9/15/2023

REMARKS

DRY TO 5', 9/15/23

CLAY, SANDY, OLIVE, STIFF, MOIST



Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			14	15.7	3
5			9	9.2	3

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TEST BORING LOGS

HOMESTEAD NORTH, FILING 2
SR LAND

JOB NO. 230423

FIG. A-1

TEST BORING 3
DATE DRILLED 9/15/2023

REMARKS

DRY TO 10', 9/15/23

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			17	7.4	2	SAND, SILTY, OLIVE, MEDIUM DENSE, MOIST
5			10	7.2	2	
						SANDSTONE, VERY WEAK, GRAY, HIGHLY WEATHERED, (SAND, SILTY, VERY DENSE, MOIST)
10			50/7"	8.2	4	
15						
20						

TEST BORING 4
DATE DRILLED 9/15/2023

REMARKS

DRY TO 5', 9/15/23

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			9	8.5	2	SAND, SILTY, OLIVE, LOOSE to MEDIUM DENSE, MOIST
5			17	9.9	2	
10						
15						
20						

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TEST BORING LOGS

HOMESTEAD NORTH, FILING 2
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JOB NO. 230423

FIG. A-2

TEST BORING 5
DATE DRILLED 9/15/2023

REMARKS

DRY TO 5', 9/15/23

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			17	6.7	2	SAND, CLAYEY, OLIVE, MEDIUM DENSE, MOIST
5			9	9.6	2	
10						
15						
20						

TEST BORING 6
DATE DRILLED 9/18/2023

REMARKS

DRY TO 5', 9/18/23

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			15	10.8	1	FILL 0-5', SAND, SILTY, BROWN, MEDIUM DENSE to LOOSE, MOIST
5			4	16.6	1	
10						
15						
20						

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TEST BORING LOGS

HOMESTEAD NORTH, FILING 2
SR LAND

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FIG. A-3

TEST BORING 7
DATE DRILLED 9/18/2023

REMARKS

DRY TO 5', 9/18/23

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			5	8.3	1	FILL 0-5', SAND, CLAYEY, BROWN, LOOSE, MOIST
5			5	8.7	1	
10						
15						
20						

TEST BORING 8
DATE DRILLED 9/18/2023

REMARKS

DRY TO 10', 9/18/23

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			19	9.2	1	FILL 0-10', SAND, CLAYEY, BROWN, MEDIUM DENSE, MOIST
5			9	6.0	1	FILL, SAND, SILTY, BROWN, LOOSE to MEDIUM DENSE, MOIST
10			12	9.4	1	
15						
20						

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TEST BORING LOGS

HOMESTEAD NORTH, FILING 2
SR LAND

JOB NO. 230423

FIG. A-4

TEST BORING 9
DATE DRILLED 9/18/2023

REMARKS

DRY TO 5', 9/18/23

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			14	7.3	1
5			11	7.2	1
10					
15					
20					

FILL 0-5', SAND, SILTY, BROWN, MEDIUM DENSE, MOIST

TEST BORING 10
DATE DRILLED 9/18/2023

REMARKS

DRY TO 5', 9/18/23

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			9	8.4	1
5			17	6.3	1
10					
15					
20					

FILL 0-5', SAND, WITH SILT, BROWN, LOOSE to MEDIUM DENSE, MOIST

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TEST BORING LOGS

HOMESTEAD NORTH, FILING 2
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FIG. A-5

TEST BORING 11
DATE DRILLED 9/18/2023

REMARKS

DRY TO 10', 9/18/23

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
FILL 0-7', SAND, SILTY, GRAVELLY, BROWN, MEDIUM DENSE, MOIST			14	7.7	1
5			22	9.9	1
SANDSTONE, EXTREMELY WEAK, TAN, COMPLETELY WEATHERED, (SAND, SILTY, VERY DENSE, MOIST)			50/11"	6.7	4
10					
15					
20					

TEST BORING 12
DATE DRILLED 9/18/2023

REMARKS

DRY TO 5', 9/18/23

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
FILL 0-5', SAND, CLAYEY, BROWN, LOOSE, MOIST			5	11.4	1
5			4	8.5	1
10					
15					
20					

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TEST BORING LOGS

HOMESTEAD NORTH, FILING 2
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JOB NO. 230423

FIG. A-6

TEST BORING 13
DATE DRILLED 9/18/2023

REMARKS

DRY TO 5', 9/18/23

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			9	10.1	1
5			48	17.4	2
10					
15					
20					

FILL 0-4', SAND, SILTY, BROWN, LOOSE, MOIST

SAND, CLAYEY, TAN, DENSE, MOIST

TEST BORING 14
DATE DRILLED 9/18/2023

REMARKS

DRY TO 5', 9/18/23

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			11	11.6	1
5			7	19.8	1
10			50/11"	10.7	4
15					
20					

FILL 0-8', SAND, CLAYEY, BROWN, MEDIUM DENSE to LOOSE, MOIST

SANDSTONE, EXTREMNELY WEAK, GRAY, HIGHLY WEATHERED, (SAND, SILTY, VERY DENSE, MOIST)

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TEST BORING LOGS

HOMESTEAD NORTH, FILING 2
SR LAND

JOB NO. 230423

FIG. A-7

TEST BORING 15
DATE DRILLED 9/18/2023

REMARKS

DRY TO 5', 9/18/23

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			11	4.3	2
			50/11"	9.2	4
5					
10					
15					
20					

SAND, WITH SILT, TAN, MEDIUM DENSE, MOIST

SANDSTONE, EXTREMELY WEAK, TAN, HIGHLY WEATHERED, (SAND, WITH SILT, VERY DENSE, MOIST)

TEST BORING 16
DATE DRILLED 9/18/2023

REMARKS

DRY TO 5', 9/18/23

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
					2
			50/11"	9.5	4
5			50/11"	13.8	4
10					
15					
20					

SAND, SILTY, BROWN SANDSTONE, EXTREMELY WEAK, TAN, HIGHLY WEATHERED, (SAND, SILTY, VERY DENSE, MOIST)

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TEST BORING LOGS

HOMESTEAD NORTH, FILING 2
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JOB NO. 230423

FIG. A-8

TEST BORING 17
DATE DRILLED 9/18/2023

REMARKS

DRY TO 5', 9/18/23

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			33	10.7	2
5			40	17.4	2
10					
15					
20					

SAND, CLAYEY, TAN, DENSE, MOIST

TEST BORING 18
DATE DRILLED 9/18/2023

REMARKS

DRY TO 10', 9/18/23

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			21	7.2	1
5			39	7.1	2
10			50/7"	7.7	3
15					
20					

FILL 0-3', SAND, WITH SILT, BROWN, MEDIUM DENSE, MOIST

SAND, SILTY, TAN, DENSE, MOIST

SANDSTONE, EXTREMELY WEAK, TAN, MODERATELY WEATHERED, (SAND, SILTY, VERY DENSE, MOIST)

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TEST BORING LOGS

HOMESTEAD NORTH, FILING 2
SR LAND

JOB NO. 230423

FIG. A-9

TEST BORING 19
DATE DRILLED 9/18/2023

REMARKS

DRY TO 5', 9/18/23

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
FILL 0-5', SAND, SILTY, BROWN, MEDIUM DENSE, DRY			16	2.7	1A
5			13	0.8	1A
10					
15					
20					

TEST BORING 20
DATE DRILLED 9/18/2023

REMARKS

DRY TO 5', 9/18/23

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
SAND, SILTY, BROWN, MEDIUM DENSE to DENSE, MOIST			27	4.6	2
5			44	4.5	2
10					
15					
20					

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TEST BORING LOGS

HOMESTEAD NORTH, FILING 2
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JOB NO. 230423

FIG. A-10

TEST BORING 21
DATE DRILLED 9/18/2023

REMARKS

DRY TO 10', 9/18/23

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			10	9.3	1
5			9	7.7	1
10			50/8"	9.0	4
15					
20					

FILL 0-8', SAND, SILTY, BROWN, MEDIUM DENSE to LOOSE,

SANDSTONE, EXTREMELY WEAK, TAN, HIGHLY WEATHERED, (SAND, SILTY, VERY DENSE,

TEST BORING 22
DATE DRILLED 9/18/2023

REMARKS

DRY TO 5', 9/18/23

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			7	7.2	1
5			11	6.4	1
10					
15					
20					

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

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TEST BORING LOGS

HOMESTEAD NORTH, FILING 2
SR LAND

JOB NO. 230423

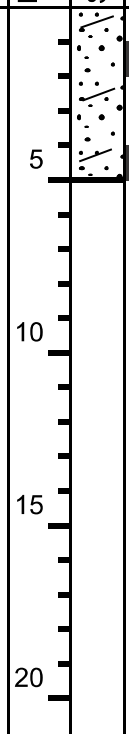
FIG. A-11

TEST BORING 23
DATE DRILLED 9/18/2023

REMARKS

DRY TO 5', 9/18/23

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



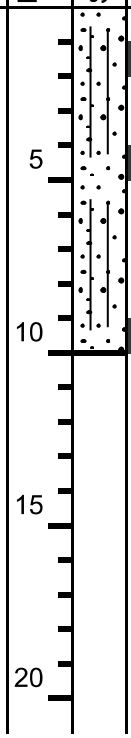
Symbol	Samples	Blows per foot	Watercontent %	Soil Type
		11	9.8	1
		9	12.8	1

TEST BORING 24
DATE DRILLED 9/18/2023

REMARKS

DRY TO 5', 9/18/23

FILL 0-10', SAND, SILTY, BROWN, LOOSE, MOIST



Symbol	Samples	Blows per foot	Watercontent %	Soil Type
		9	7.7	1
		4	10.7	1
		4	6.5	1

ENTECH ENGINEERING, INC.

TEST BORING LOGS

HOMESTEAD NORTH, FILING 2
SR LAND

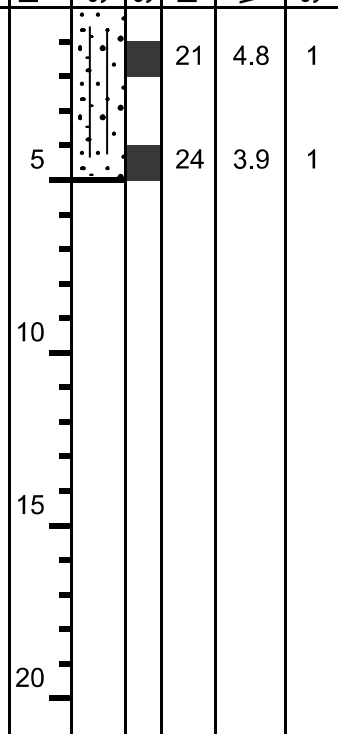
JOB NO. 230423

FIG. A-12

TEST BORING 25
DATE DRILLED 9/18/2023

REMARKS

DRY TO 5', 9/18/23



ENTECH ENGINEERING, INC.

TEST BORING LOGS

HOMESTEAD NORTH, FILING 2
SR LAND

JOB NO. 230423

FIG. A-13

APPENDIX B: Laboratory Test Results

ENTECH ENGINEERING, INC.

TABLE B-1
SUMMARY OF LABORATORY TEST RESULTS

SOIL TYPE	TEST BORING NO.	DEPTH (FT)	WATER (%)	DRY DENSITY (PCF)	PASSING NO. 200 SIEVE (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTIC INDEX	SULFATE (WT %)	SWELL/ CONSOL (%)	AASHTO CLASS.	USCS	SOIL DESCRIPTION
1, CBR	18	0-3			24.6	NV	NP	NP			A-2-4	SM	FILL, SAND, SILTY
1	6	1-2			18.7	NV	NP	NP			A-2-4	SM	FILL, SAND, SILTY
1	9	1-2			20.8	NV	NP	NP			A-2-4	SM	FILL, SAND, SILTY
1	10	1-2			11.8	NV	NP	NP			A-1-b	SW-SM	FILL, SAND, WITH SILT
1	11	1-2			15.6	NV	NP	NP			A-2-4	SM	FILL, SAND, SILTY, GRAVELLY
1	13	1-2			19.3	NV	NP	NP	0.01		A-1-b	SM	FILL, SAND, SILTY
1	8	1-2			30.3	27	19	8	<0.01		A-2-4	SC	FILL, SAND, CLAYEY
1	7	1-2			33.1	31	19	12			A-2-6	SC	FILL, SAND, CLAYEY
1	12	1-2			28.8	30	19	11			A-2-6	SC	FILL, SAND, CLAYEY
1	14	1-2			33.6	39	20	19			A-2-6	SC	FILL, SAND, CLAYEY
1	23	1-2			32.6	25	17	8			A-2-4	SC	FILL, SAND, CLAYEY
1	22	1-2			32.1	28	18	10			A-2-4	SC	FILL, SAND, CLAYEY
1	18	1-2			9.8	NV	NP	NP	<0.01		A-1-b	SW-SM	FILL, SAND, WITH SILT
1	21	1-2			21.2	NV	NP	NP			A-2-4	SM	FILL, SAND, SILTY
1	24	1-2			21.6	NV	NP	NP			A-2-4	SM	FILL, SAND, SILTY
1	25	1-2			19.4	NV	NP	NP			A-2-4	SM	FILL, SAND, SILTY
1A	19	1-2			42.5	NV	NP	NP			A-4	SM	FILL, SAND, SILTY
2	1	1-2			16.5	NV	NP	NP	<0.01		A-1-b	SM	SAND, SILTY
2	3	1-2			15.1	NV	NP	NP			A-1-b	SM	SAND, SILTY
2	4	1-2			20.2	NV	NP	NP			A-2-4	SM	SAND, SILTY
2	15	1-2			7.9	NV	NP	NP			A-1-b	SW-SM	SAND, WITH SILT
2	5	1-2	16.2	105.5	27.4	27	16	11		0.4	A-2-6	SC	SAND, CLAYEY
2	17	1-2			26.9	29	21	8			A-2-4	SC	SAND, CLAYEY
2	20	1-2			24.1	NV	NP	NP			A-2-4	SM	SAND, SILTY
2	18	5			12.1	NV	NP	NP	<0.01		A-2-4	SM	SAND, SILTY
3, CBR	2	0-3			53.8	34	17	17			A-6	CL	CLAY, SANDY
3	2	1-2	11.9	108.0	77.9	31	22	9	<0.01	2.4	A-6	CL	CLAY, SANDY
3	1	5	15.7	98.3	67.0	34	19	15	<0.01	5.7	A-6	CL	CLAY, SANDY
4	16	1-2			9.7	NV	NP	NP			A-1-b	SW-SM	SANDSTONE (SAND, WITH SILT)
4	3	10			23.0	NV	NP	NP	<0.01		A-2-4	SM	SANDSTONE (SAND, SILTY)
4	11	10			16.6	NV	NP	NP			A-2-4	SM	SANDSTONE (SAND, SILTY)
4	15	5			10.6	NV	NP	NP			A-1-b	SW-SM	SANDSTONE (SAND, WITH SILT)
4	18	10			14.4	NV	NP	NP	0.01		A-2-4	SM	SANDSTONE (SAND, SILTY)
4	21	10			10.1	NV	NP	NP			A-1-b	SW-SM	SANDSTONE (SAND, WITH SILT)

Project: Homestead North, Filing 2
Client: SR Land
Job No: 230423

ENTECH ENGINEERING, INC.

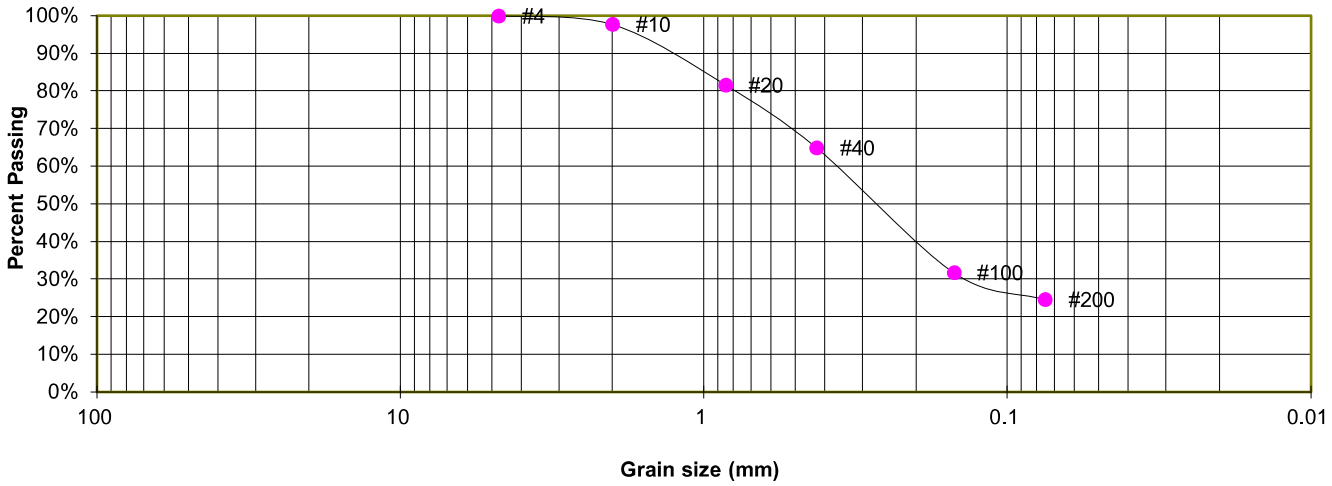
TABLE B-2
SUMMARY OF CTS TEST RESULTS

FIELD SAMPLE ID: SAND, SILTY
SOIL ADDITIVE: TYPE I/II CEMENT
CURING METHOD: 100° HUMIDIFIED OVEN

ADDITIVE %	*WATER %*	*DENSITY (dry)*	*AGE (days)*	*STRENGTH (psi)*
2	7.5	121.5	7	357
2	7.5	122.3	7	208
2	7.5	122.0	7	407
			AVERAGE:	**324**
4	7.5	121.8	7	430
4	7.5	121.5	7	321
4	7.5	121.8	7	430
			AVERAGE:	**394**

Project:Homestead North, Filing 2
Client:SR Land
Job No: 230423

TEST BORING 18	SOIL DESCRIPTION FILL, SAND, SILTY
DEPTH (FT) 0-3	SOIL TYPE 1, CBR



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	97.8%
20	81.6%
40	64.9%
100	31.7%
200	24.6%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION:	SM
AASHTO CLASSIFICATION:	A-2-4
AASHTO GROUP INDEX:	0

ENTECH ENGINEERING, INC.

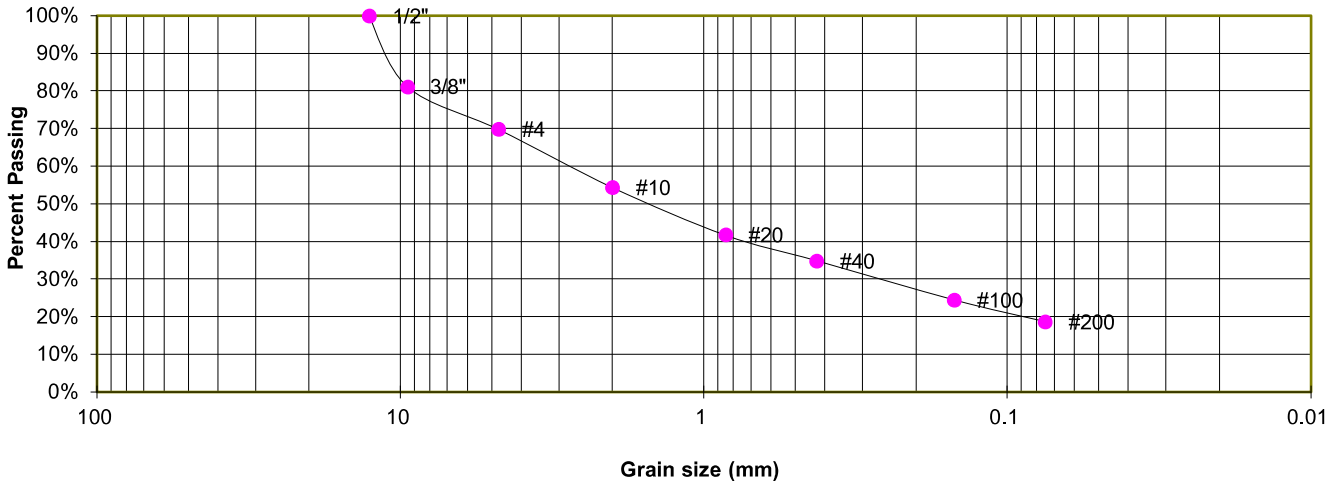
LABORATORY TEST RESULTS

HOMESTEAD NORTH, FILING 2
SR LAND

JOB NO. 230423

FIG. B-1

TEST BORING	6	SOIL DESCRIPTION	FILL, SAND, SILTY
DEPTH (FT)	1-2	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	81.2%
4	69.8%
10	54.4%
20	41.8%
40	34.9%
100	24.5%
200	18.7%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION:	SM
AASHTO CLASSIFICATION:	A-2-4
AASHTO GROUP INDEX:	0

ENTECH ENGINEERING, INC.

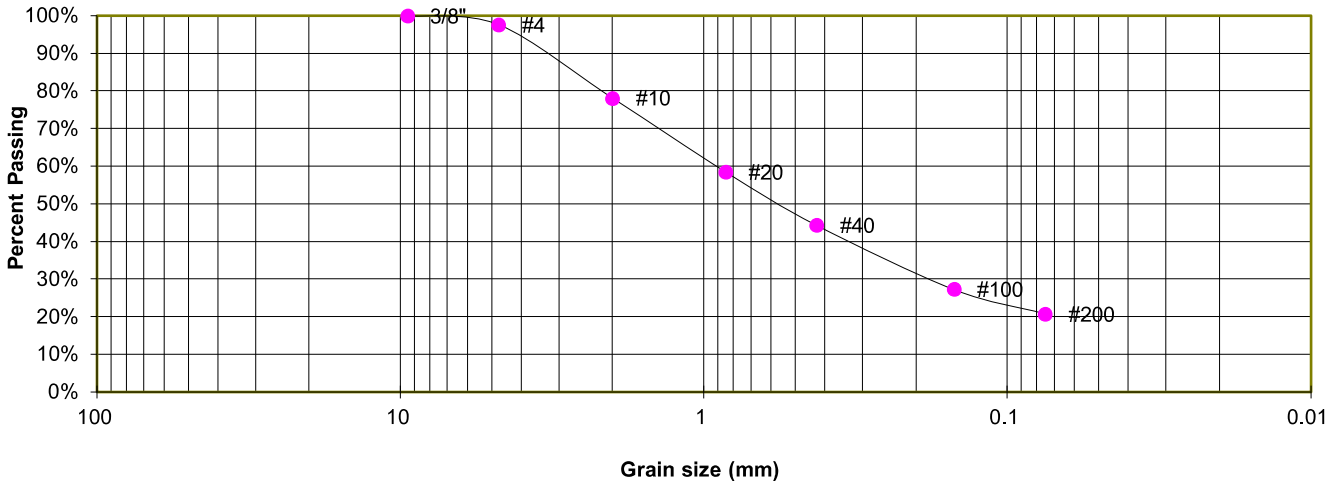
LABORATORY TEST RESULTS

HOMESTEAD NORTH, FILING 2
SR LAND

JOB NO. 230423

FIG. B-2

TEST BORING	9	SOIL DESCRIPTION	FILL, SAND, SILTY
DEPTH (FT)	1-2	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	97.6%
10	78.1%
20	58.5%
40	44.3%
100	27.3%
200	20.8%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION:	SM
AASHTO CLASSIFICATION:	A-2-4
AASHTO GROUP INDEX:	0

ENTECH ENGINEERING, INC.

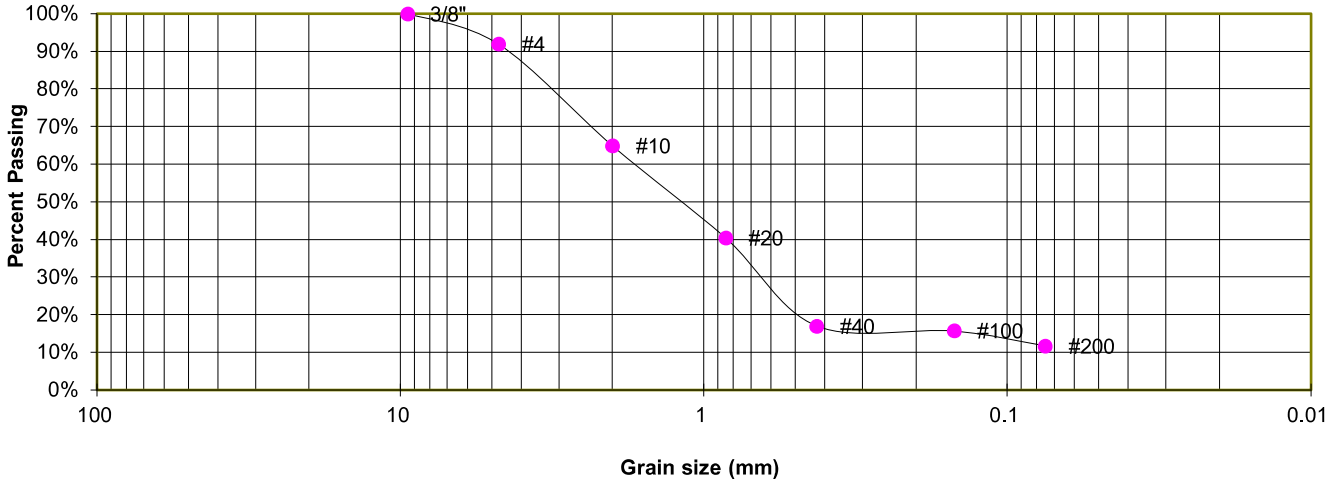
LABORATORY TEST RESULTS

HOMESTEAD NORTH, FILING 2
SR LAND

JOB NO. 230423

FIG. B-3

TEST BORING	10	SOIL DESCRIPTION	FILL, SAND, WITH SILT
DEPTH (FT)	1-2	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	91.9%
10	64.9%
20	40.4%
40	17.0%
100	15.8%
200	11.8%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION: SW-SM
AASHTO CLASSIFICATION: A-1-b
AASHTO GROUP INDEX: 0

ENTECH ENGINEERING, INC.

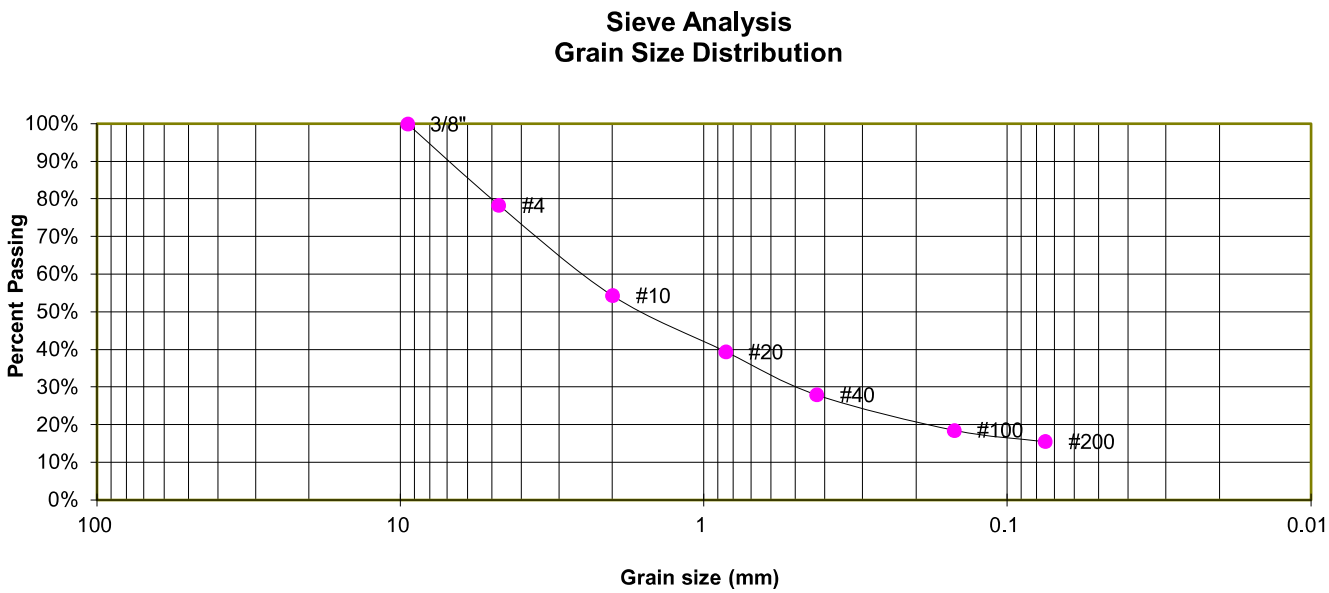
LABORATORY TEST RESULTS

HOMESTEAD NORTH, FILING 2
SR LAND

JOB NO. 230423

FIG. B-4

TEST BORING	11	SOIL DESCRIPTION	FILL, SAND, SILTY, GRAVELLY
DEPTH (FT)	1-2	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	78.4%
10	54.3%
20	39.5%
40	28.0%
100	18.6%
200	15.6%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION:	SM
AASHTO CLASSIFICATION:	A-2-4
AASHTO GROUP INDEX:	0

ENTECH ENGINEERING, INC.

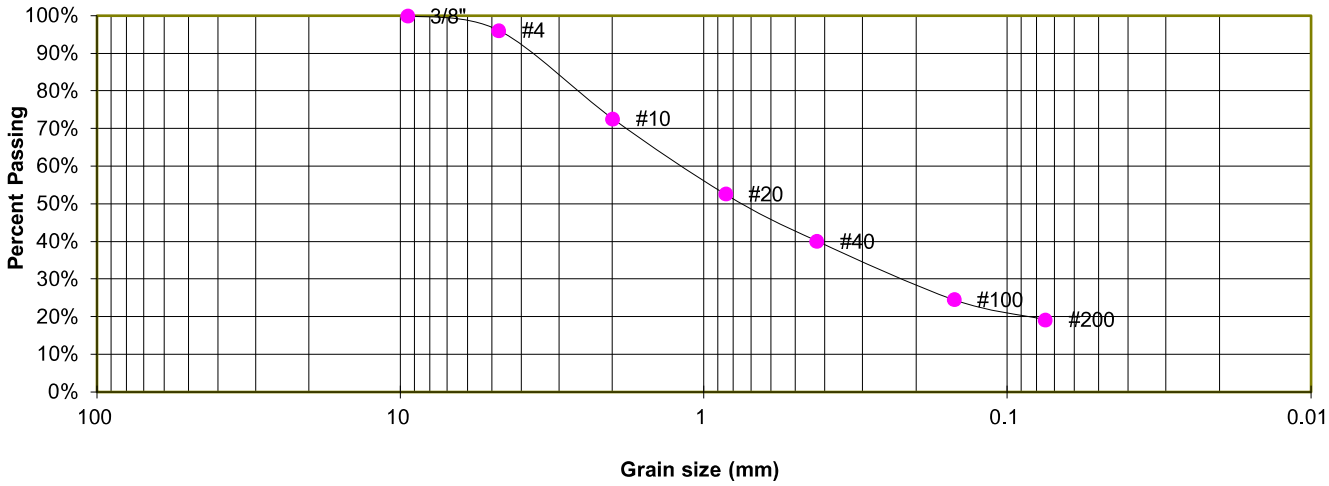
LABORATORY TEST RESULTS

HOMESTEAD NORTH, FILING 2
SR LAND

JOB NO.
230423

FIG. B-5

TEST BORING	13	SOIL DESCRIPTION	FILL, SAND, SILTY
DEPTH (FT)	1-2	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	96.1%
10	72.7%
20	52.6%
40	40.1%
100	24.6%
200	19.3%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION:	SM
AASHTO CLASSIFICATION:	A-1-b
AASHTO GROUP INDEX:	0

ENTECH ENGINEERING, INC.

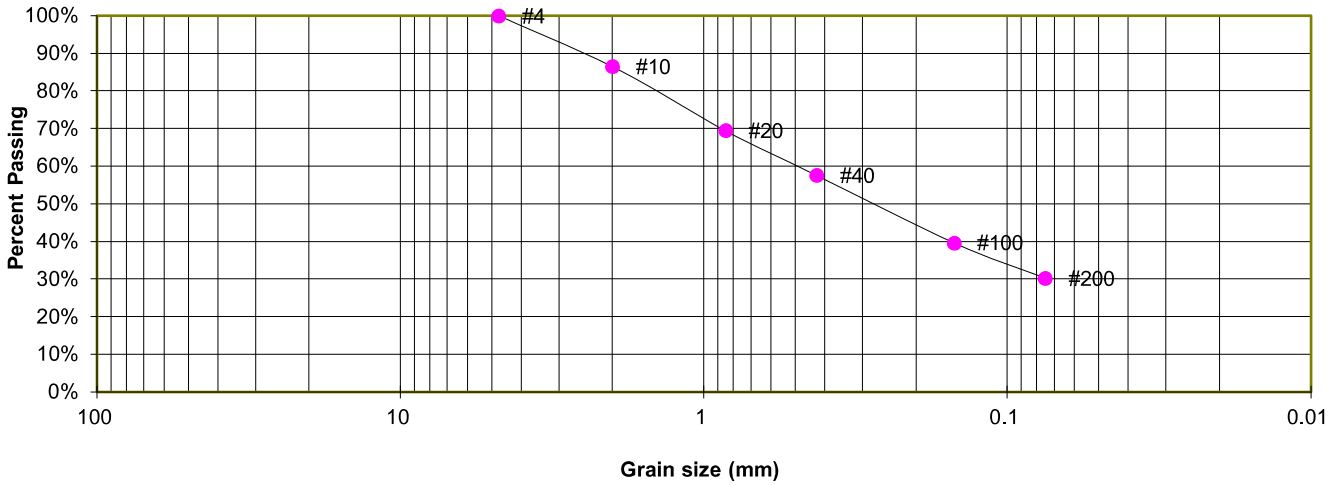
LABORATORY TEST RESULTS

HOMESTEAD NORTH, FILING 2
SR LAND

JOB NO. 230423

FIG. B-6

TEST BORING	8	SOIL DESCRIPTION	FILL, SAND, CLAYEY
DEPTH (FT)	1-2	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	86.5%
20	69.5%
40	57.6%
100	39.7%
200	30.3%

ATTERBERG LIMITS

Plastic Limit	19
Liquid Limit	27
Plastic Index	8

SOIL CLASSIFICATION

USCS CLASSIFICATION:	SC
AASHTO CLASSIFICATION:	A-2-4
AASHTO GROUP INDEX:	0

ENTECH ENGINEERING, INC.

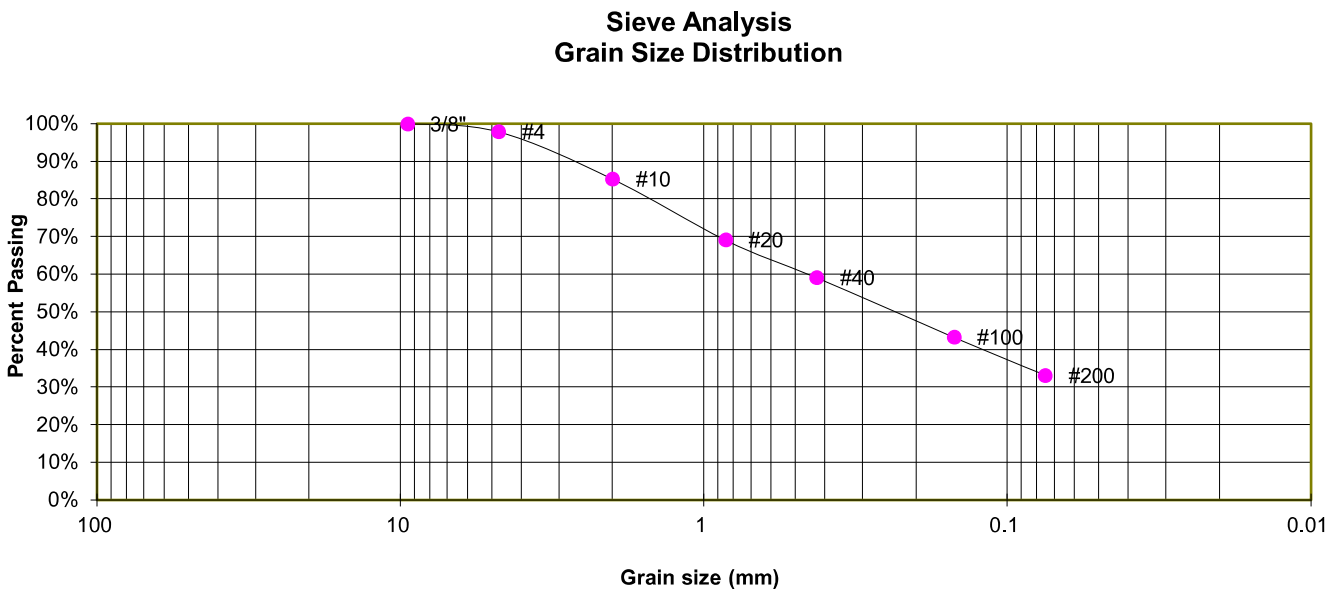
LABORATORY TEST RESULTS

HOMESTEAD NORTH, FILING 2
SR LAND

JOB NO. 230423

FIG. B-7

TEST BORING	7	SOIL DESCRIPTION	FILL, SAND, CLAYEY
DEPTH (FT)	1-2	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	97.9%
10	85.3%
20	69.1%
40	59.1%
100	43.3%
200	33.1%

ATTERBERG LIMITS

Plastic Limit	19
Liquid Limit	31
Plastic Index	12

SOIL CLASSIFICATION

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

ENTECH ENGINEERING, INC.

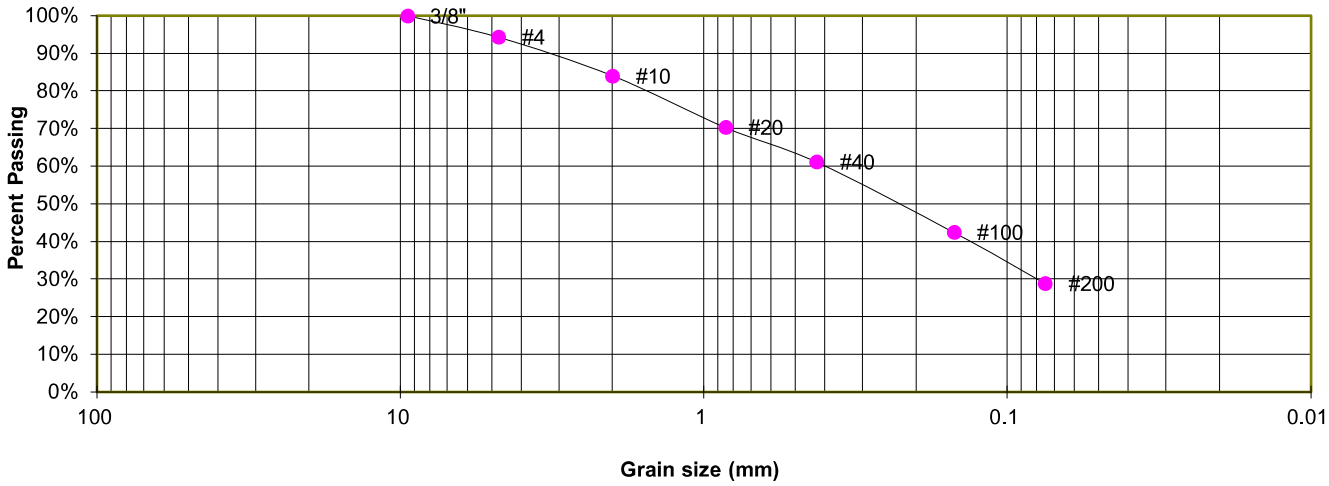
LABORATORY TEST RESULTS

HOMESTEAD NORTH, FILING 2
SR LAND

JOB NO. 230423

FIG. B-8

TEST BORING	12	SOIL DESCRIPTION	FILL, SAND, CLAYEY
DEPTH (FT)	1-2	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	94.3%
10	84.0%
20	70.3%
40	61.1%
100	42.5%
200	28.8%

ATTERBERG LIMITS

Plastic Limit	19
Liquid Limit	30
Plastic Index	11

SOIL CLASSIFICATION

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

ENTECH ENGINEERING, INC.

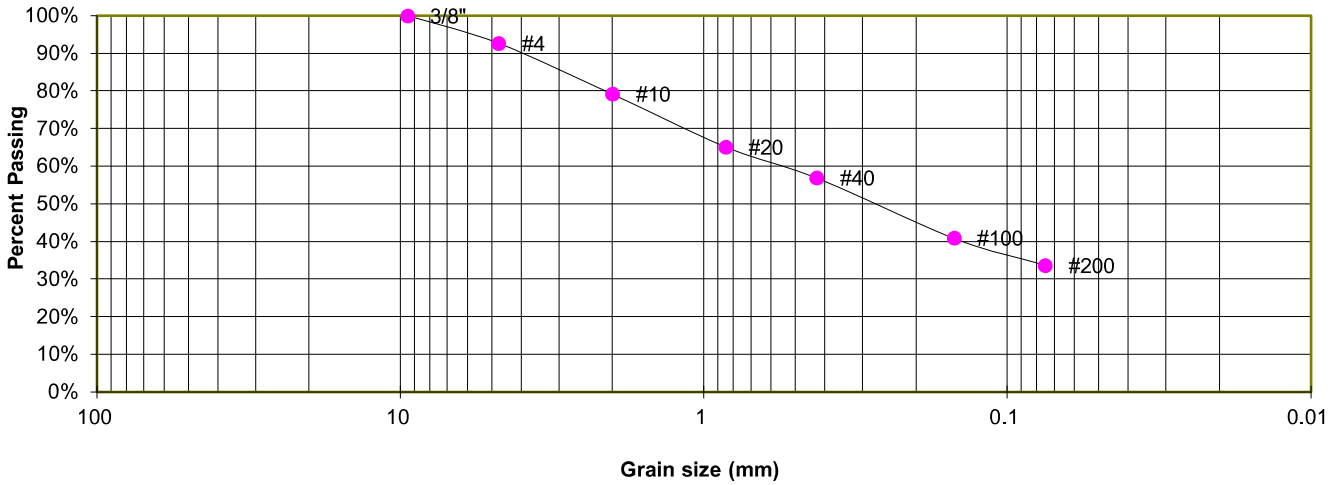
LABORATORY TEST RESULTS

HOMESTEAD NORTH, FILING 2
SR LAND

JOB NO. 230423

FIG. B-9

TEST BORING	14	SOIL DESCRIPTION	FILL, SAND, CLAYEY
DEPTH (FT)	1-2	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	92.7%
10	79.2%
20	65.1%
40	56.9%
100	40.9%
200	33.6%

ATTERBERG LIMITS

Plastic Limit	20
Liquid Limit	39
Plastic Index	19

SOIL CLASSIFICATION

USCS CLASSIFICATION:	SC
AASHTO CLASSIFICATION:	A-6
AASHTO GROUP INDEX:	1

ENTECH ENGINEERING, INC.

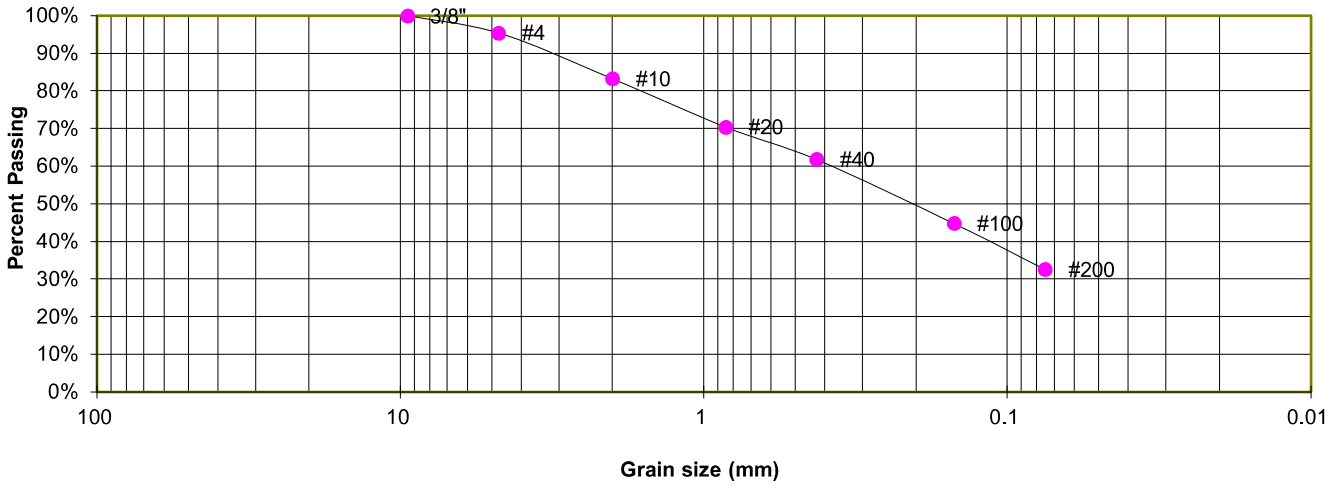
LABORATORY TEST RESULTS

HOMESTEAD NORTH, FILING 2
SR LAND

JOB NO. 230423

FIG. B-10

TEST BORING	23	SOIL DESCRIPTION	FILL, SAND, CLAYEY
DEPTH (FT)	1-2	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	95.4%
10	83.3%
20	70.5%
40	61.8%
100	44.8%
200	32.6%

ATTERBERG LIMITS

Plastic Limit	17
Liquid Limit	25
Plastic Index	8

SOIL CLASSIFICATION

USCS CLASSIFICATION:	SC
AASHTO CLASSIFICATION:	A-2-4
AASHTO GROUP INDEX:	0

ENTECH ENGINEERING, INC.

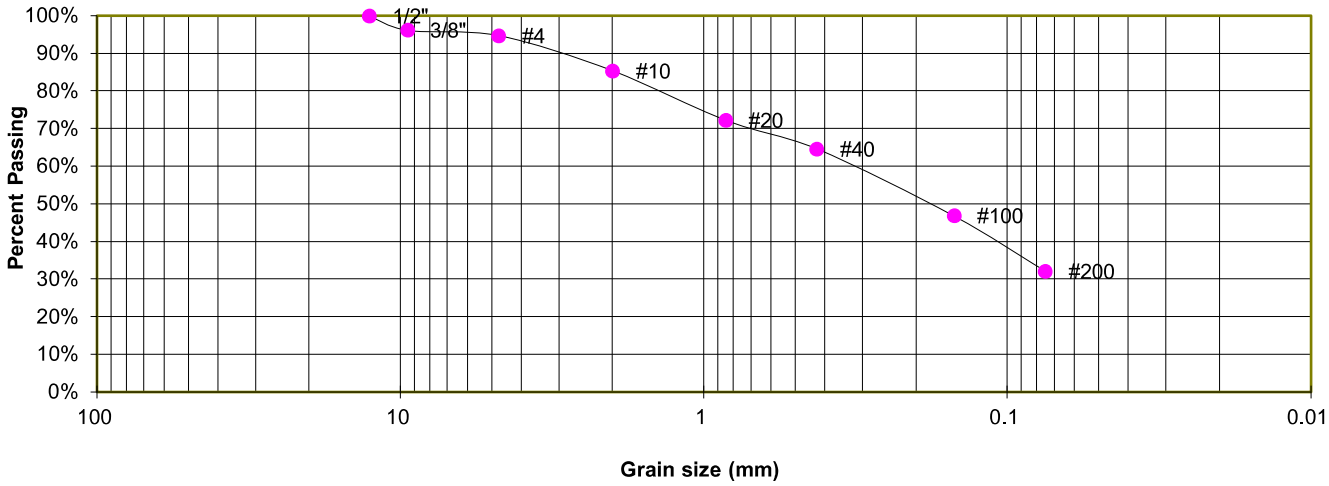
LABORATORY TEST RESULTS

HOMESTEAD NORTH, FILING 2
SR LAND

JOB NO.
230423

FIG. B-11

TEST BORING	22	SOIL DESCRIPTION	FILL, SAND, CLAYEY
DEPTH (FT)	1-2	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	96.2%
4	94.8%
10	85.3%
20	72.3%
40	64.6%
100	46.9%
200	32.1%

ATTERBERG LIMITS

Plastic Limit	18
Liquid Limit	28
Plastic Index	10

SOIL CLASSIFICATION

USCS CLASSIFICATION:	SC
AASHTO CLASSIFICATION:	A-2-4
AASHTO GROUP INDEX:	0

ENTECH ENGINEERING, INC.

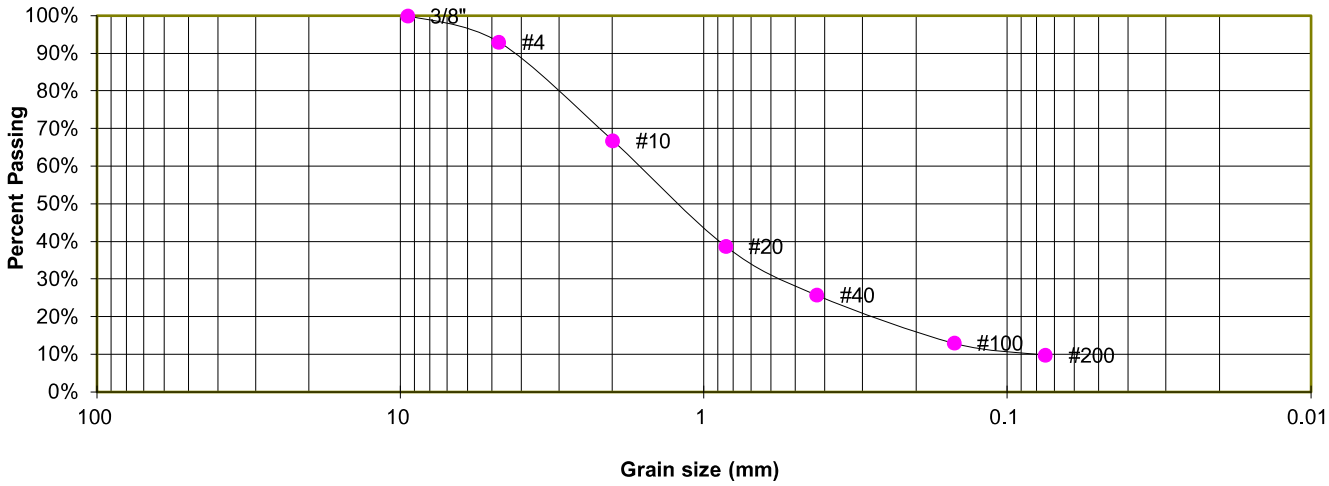
LABORATORY TEST RESULTS

HOMESTEAD NORTH, FILING 2
SR LAND

JOB NO. 230423

FIG. B-12

TEST BORING	18	SOIL DESCRIPTION	FILL, SAND, WITH SILT
DEPTH (FT)	1-2	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	93.1%
10	66.8%
20	38.7%
40	25.8%
100	13.0%
200	9.8%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION: SW-SM
AASHTO CLASSIFICATION: A-1-b
AASHTO GROUP INDEX: 0

ENTECH ENGINEERING, INC.

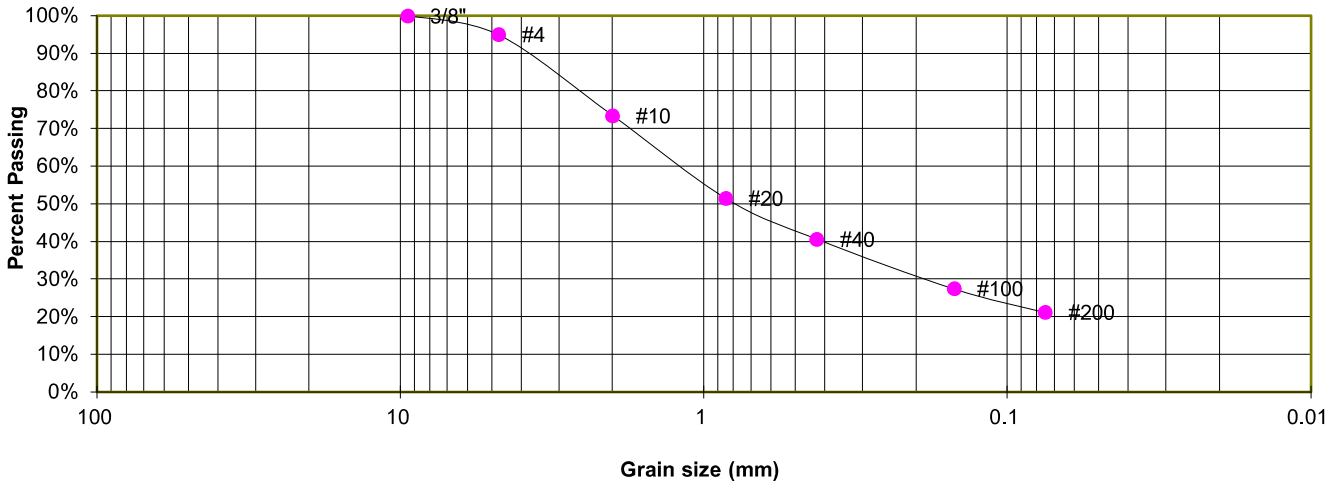
LABORATORY TEST RESULTS

HOMESTEAD NORTH, FILING 2
SR LAND

JOB NO. 230423

FIG. B-13

TEST BORING	21	SOIL DESCRIPTION	FILL, SAND, SILTY
DEPTH (FT)	1-2	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	95.0%
10	73.5%
20	51.5%
40	40.7%
100	27.5%
200	21.2%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION:	SM
AASHTO CLASSIFICATION:	A-2-4
AASHTO GROUP INDEX:	0

ENTECH ENGINEERING, INC.

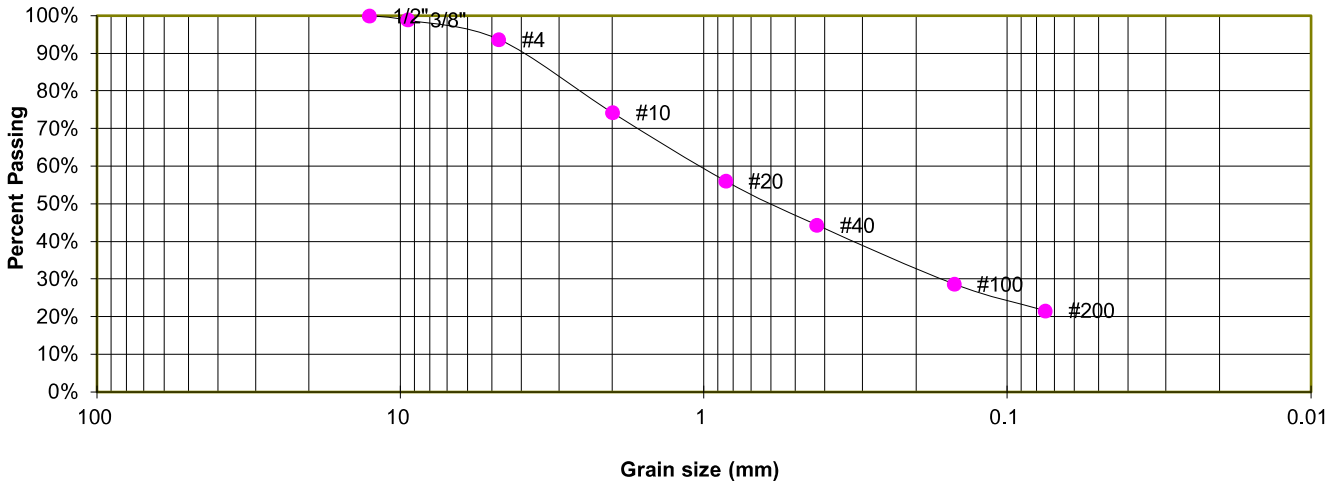
LABORATORY TEST RESULTS

HOMESTEAD NORTH, FILING 2
SR LAND

JOB NO. 230423

FIG. B-14

TEST BORING	24	SOIL DESCRIPTION	FILL, SAND, SILTY
DEPTH (FT)	1-2	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	98.9%
4	93.7%
10	74.2%
20	56.1%
40	44.4%
100	28.7%
200	21.6%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION:	SM
AASHTO CLASSIFICATION:	A-2-4
AASHTO GROUP INDEX:	0

ENTECH ENGINEERING, INC.

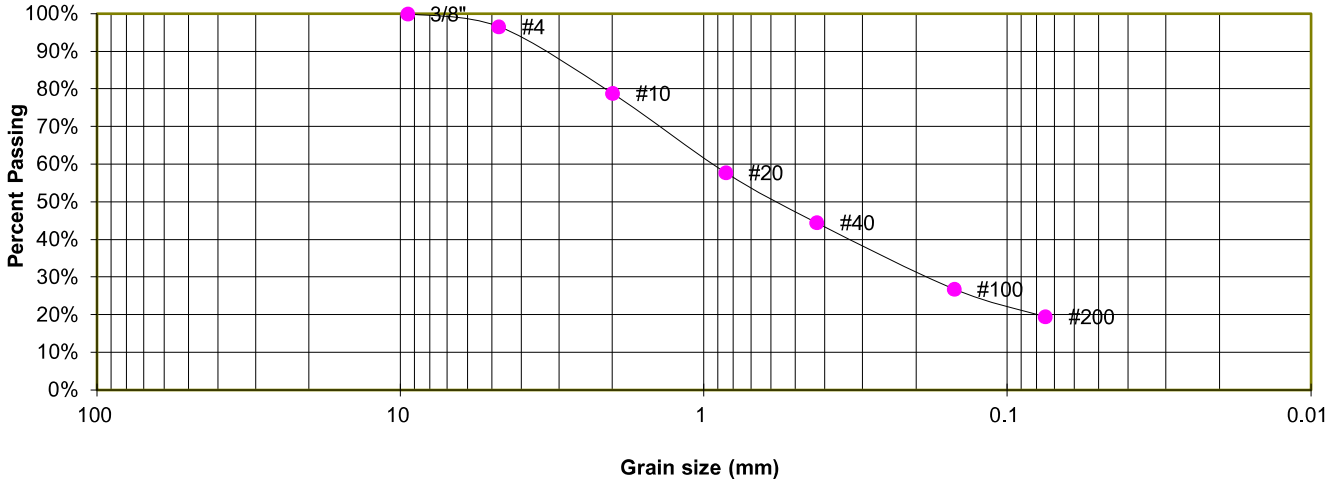
LABORATORY TEST RESULTS

HOMESTEAD NORTH, FILING 2
SR LAND

JOB NO. 230423

FIG. B-15

TEST BORING	25	SOIL DESCRIPTION	FILL, SAND, SILTY
DEPTH (FT)	1-2	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	96.6%
10	78.8%
20	57.8%
40	44.5%
100	26.9%
200	19.4%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION:	SM
AASHTO CLASSIFICATION:	A-2-4
AASHTO GROUP INDEX:	0

ENTECH ENGINEERING, INC.

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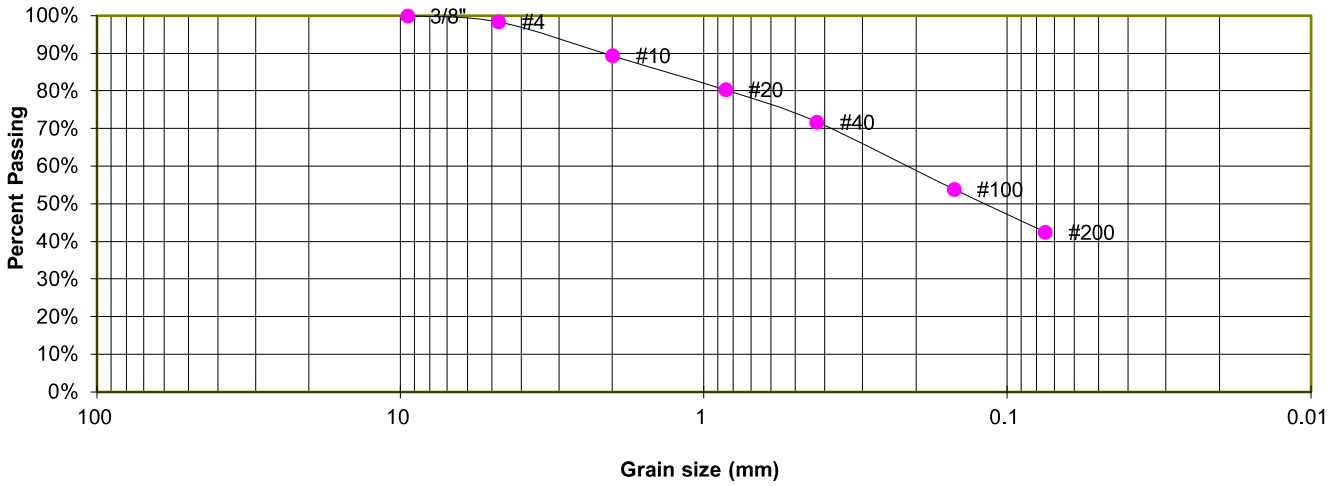
FIG. B-16

TEST BORING	19	SOIL DESCRIPTION	FILL, SAND, SILTY
DEPTH (FT)	1-2	SOIL TYPE	1A



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	98.4%
10	89.3%
20	80.3%
40	71.8%
100	53.9%
200	42.5%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION:	SM
AASHTO CLASSIFICATION:	A-4
AASHTO GROUP INDEX:	0

ENTECH ENGINEERING, INC.

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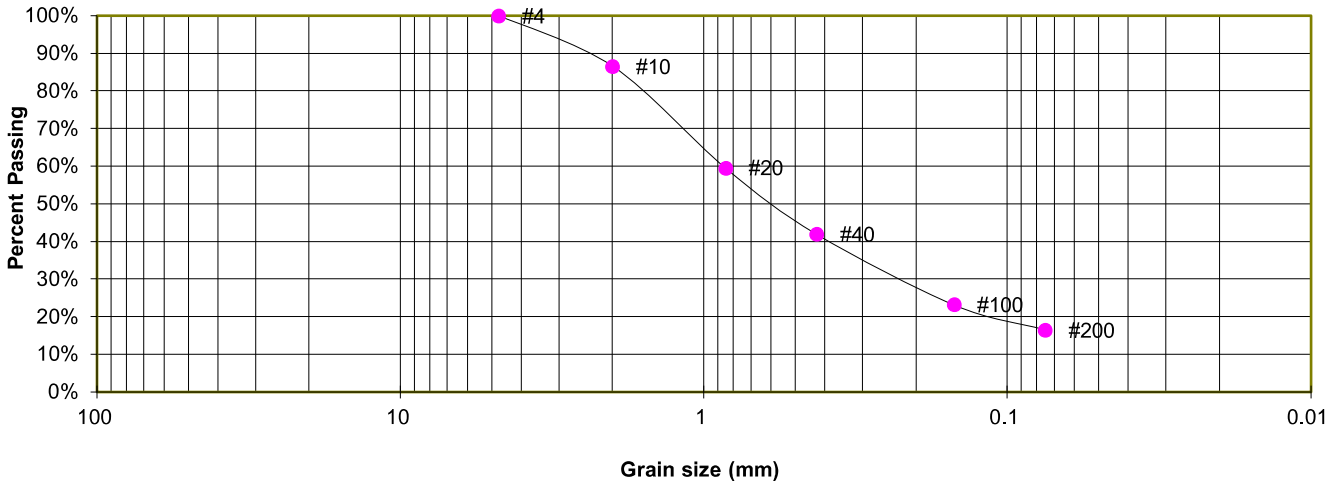
FIG. B-17

TEST BORING	1	SOIL DESCRIPTION	SAND, SILTY
DEPTH (FT)	1-2	SOIL TYPE	2



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	86.6%
20	59.6%
40	42.0%
100	23.2%
200	16.5%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION:	SM
AASHTO CLASSIFICATION:	A-1-b
AASHTO GROUP INDEX:	0

ENTECH ENGINEERING, INC.

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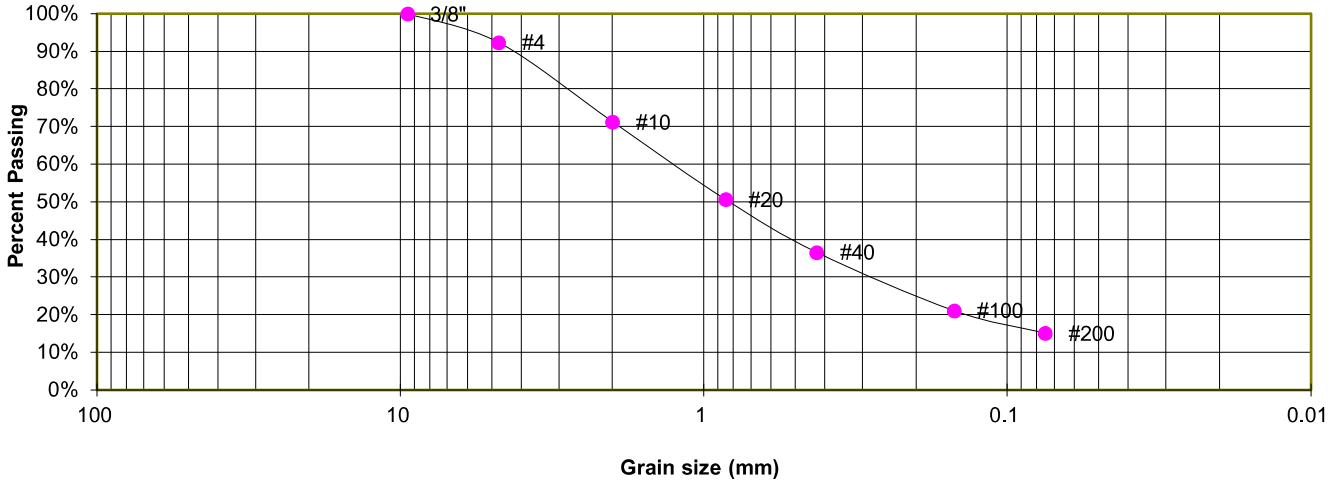
FIG. B-18

TEST BORING	3	SOIL DESCRIPTION	SAND, SILTY
DEPTH (FT)	1-2	SOIL TYPE	2



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	92.4%
10	71.3%
20	50.7%
40	36.6%
100	21.1%
200	15.1%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION:	SM
AASHTO CLASSIFICATION:	A-1-b
AASHTO GROUP INDEX:	0

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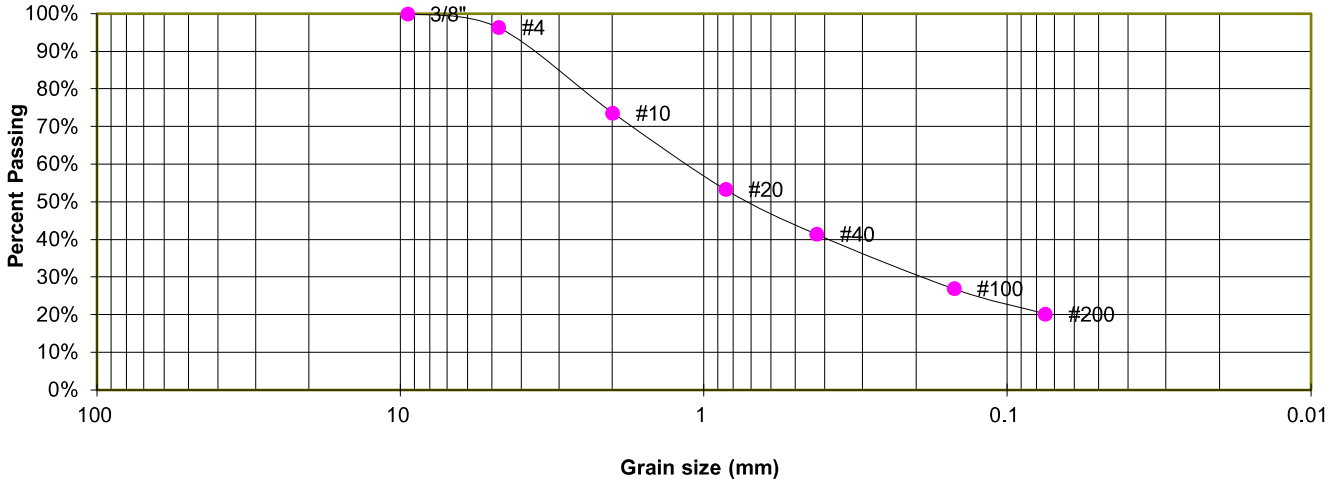
FIG. B-19

TEST BORING	4	SOIL DESCRIPTION	SAND, SILTY
DEPTH (FT)	1-2	SOIL TYPE	2



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	96.3%
10	73.6%
20	53.3%
40	41.4%
100	26.9%
200	20.2%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION:	SM
AASHTO CLASSIFICATION:	A-2-4
AASHTO GROUP INDEX:	0

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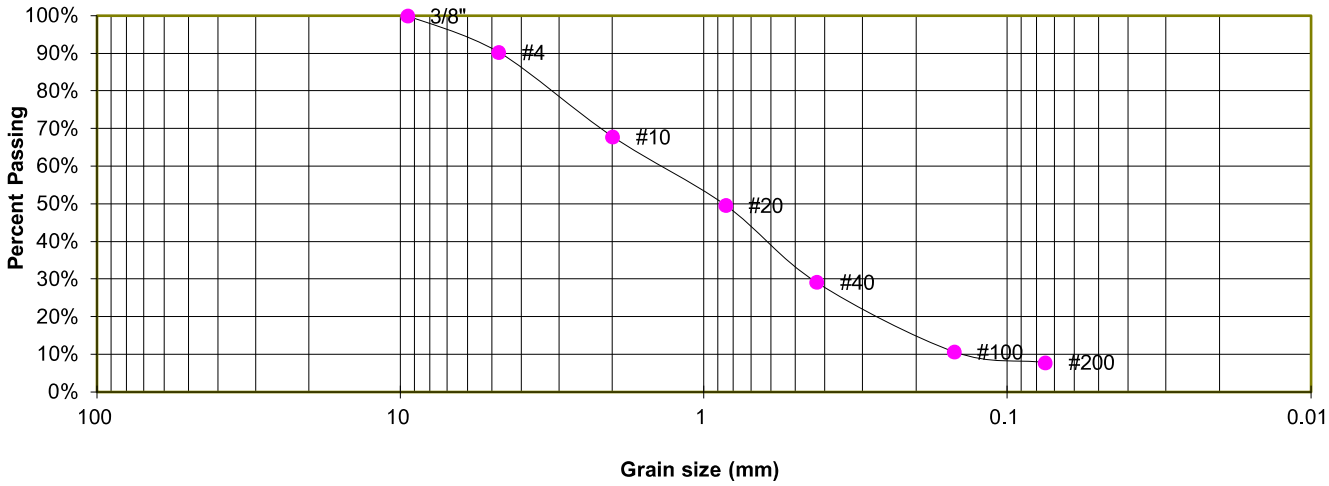
FIG. B-20

TEST BORING 15	SOIL DESCRIPTION SAND, WITH SILT
DEPTH (FT) 1-2	SOIL TYPE 2



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	90.3%
10	67.8%
20	49.7%
40	29.2%
100	10.7%
200	7.9%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION: SW-SM
AASHTO CLASSIFICATION: A-1-b
AASHTO GROUP INDEX: 0

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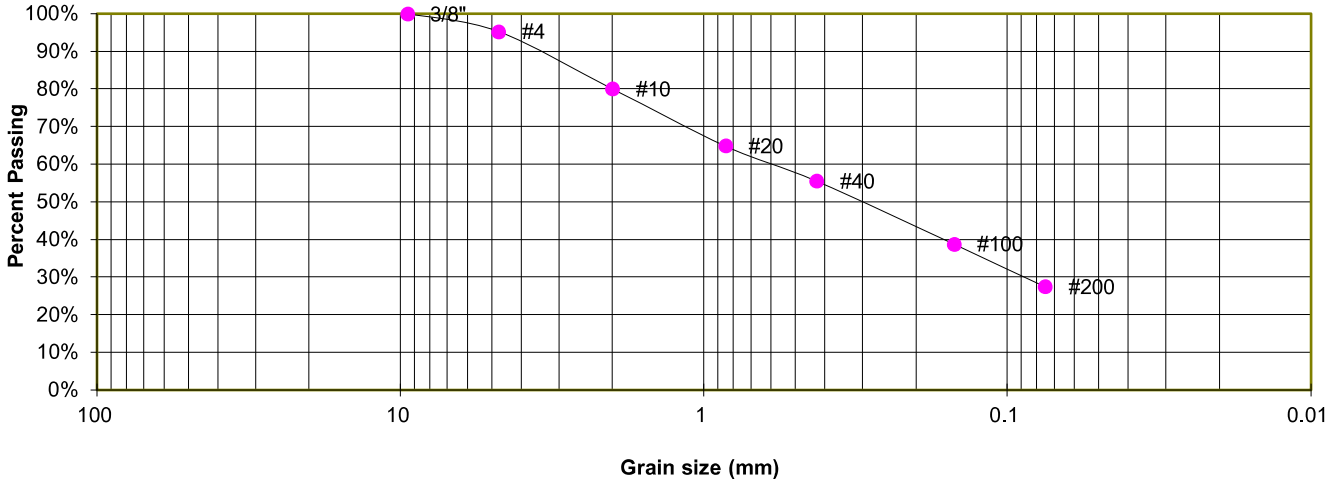
FIG. B-21

TEST BORING	5	SOIL DESCRIPTION	SAND, CLAYEY
DEPTH (FT)	1-2	SOIL TYPE	2



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	95.3%
10	80.0%
20	64.9%
40	55.5%
100	38.8%
200	27.4%

ATTERBERG LIMITS

Plastic Limit	16
Liquid Limit	27
Plastic Index	11

SOIL CLASSIFICATION

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

ENTECH ENGINEERING, INC.

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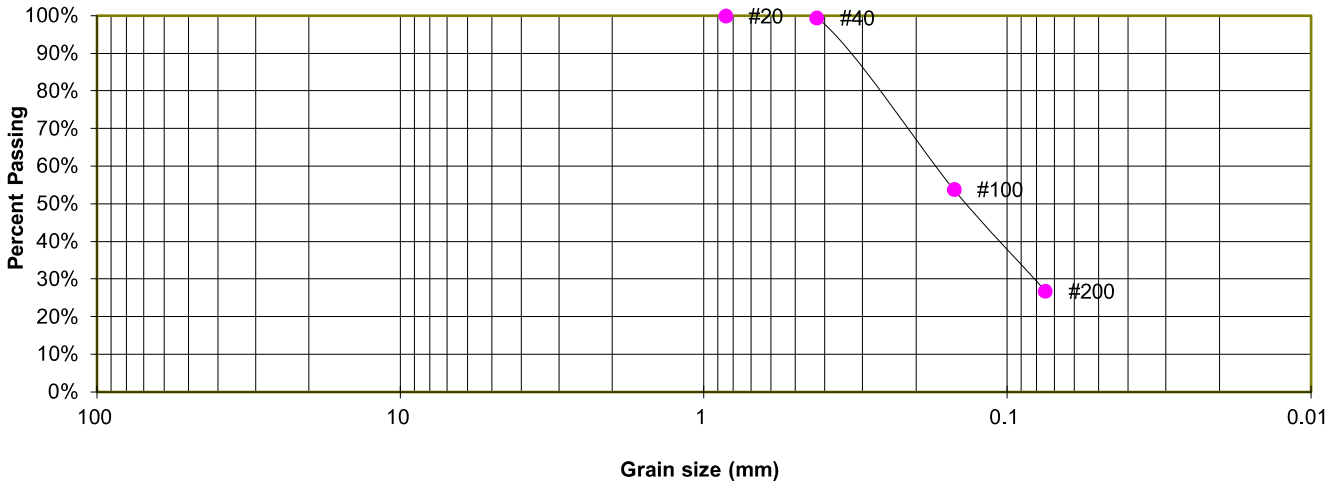
FIG. B-22

TEST BORING	17	SOIL DESCRIPTION	SAND, CLAYEY
DEPTH (FT)	1-2	SOIL TYPE	2



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	
10	
20	100.0%
40	99.5%
100	53.9%
200	26.9%

ATTERBERG LIMITS

Plastic Limit	21
Liquid Limit	29
Plastic Index	8

SOIL CLASSIFICATION

USCS CLASSIFICATION:	SC
AASHTO CLASSIFICATION:	A-2-4
AASHTO GROUP INDEX:	0

ENTECH ENGINEERING, INC.

LABORATORY TEST RESULTS

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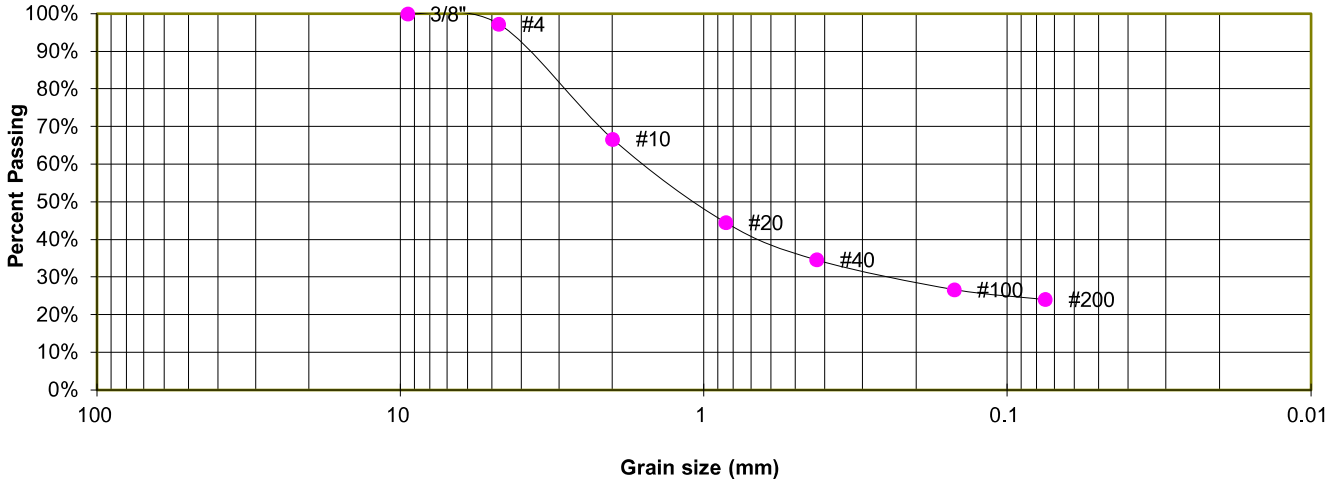
FIG. B-23

TEST BORING	20	SOIL DESCRIPTION	SAND, SILTY
DEPTH (FT)	1-2	SOIL TYPE	2



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	97.3%
10	66.7%
20	44.6%
40	34.6%
100	26.7%
200	24.1%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION:	SM
AASHTO CLASSIFICATION:	A-2-4
AASHTO GROUP INDEX:	0

ENTECH ENGINEERING, INC.

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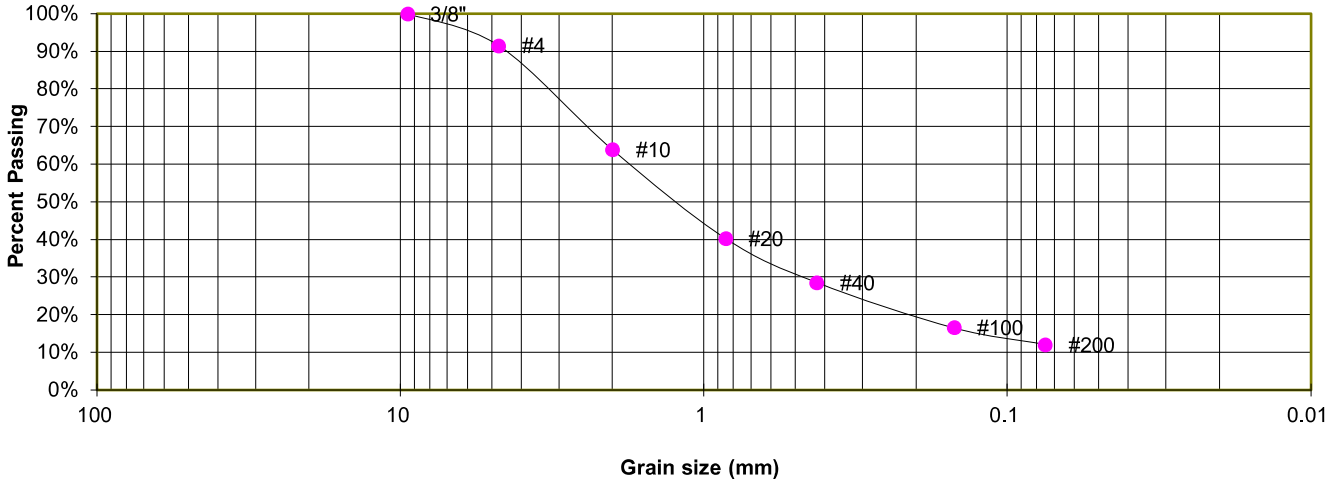
FIG. B-24

TEST BORING	18	SOIL DESCRIPTION	SAND, SILTY
DEPTH (FT)	5	SOIL TYPE	2



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	91.6%
10	63.8%
20	40.3%
40	28.6%
100	16.6%
200	12.1%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION:	SM
AASHTO CLASSIFICATION:	A-2-4
AASHTO GROUP INDEX:	0

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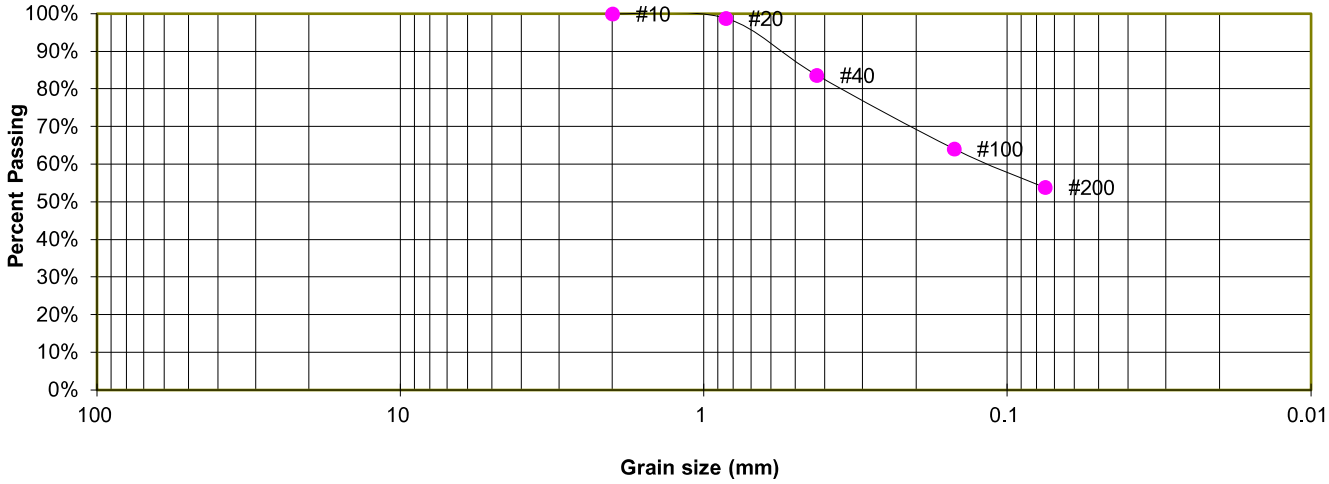
FIG. B-25

TEST BORING	2	SOIL DESCRIPTION	CLAY, SANDY
DEPTH (FT)	0-3	SOIL TYPE	3, CBR



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	
10	100.0%
20	98.8%
40	83.7%
100	64.1%
200	53.8%

ATTERBERG LIMITS

Plastic Limit	17
Liquid Limit	34
Plastic Index	17

SOIL CLASSIFICATION

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

ENTECH ENGINEERING, INC.

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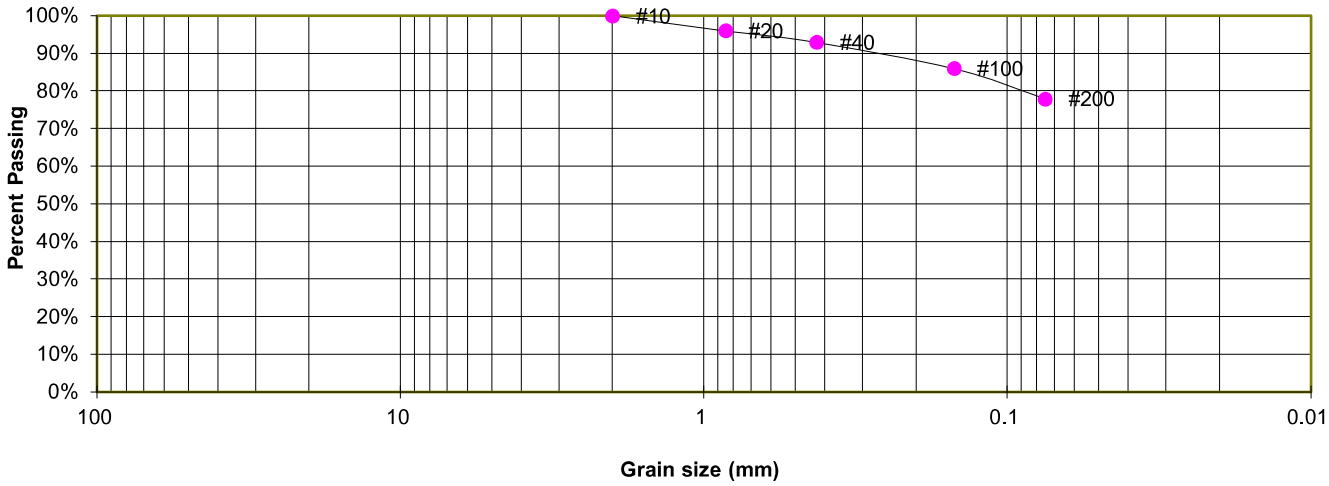
FIG. B-26

TEST BORING	2	SOIL DESCRIPTION	CLAY, SANDY
DEPTH (FT)	1-2	SOIL TYPE	3



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	
10	100.0%
20	96.0%
40	92.9%
100	86.0%
200	77.9%

ATTERBERG LIMITS

Plastic Limit	22
Liquid Limit	31
Plastic Index	9

SOIL CLASSIFICATION

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

ENTECH ENGINEERING, INC.

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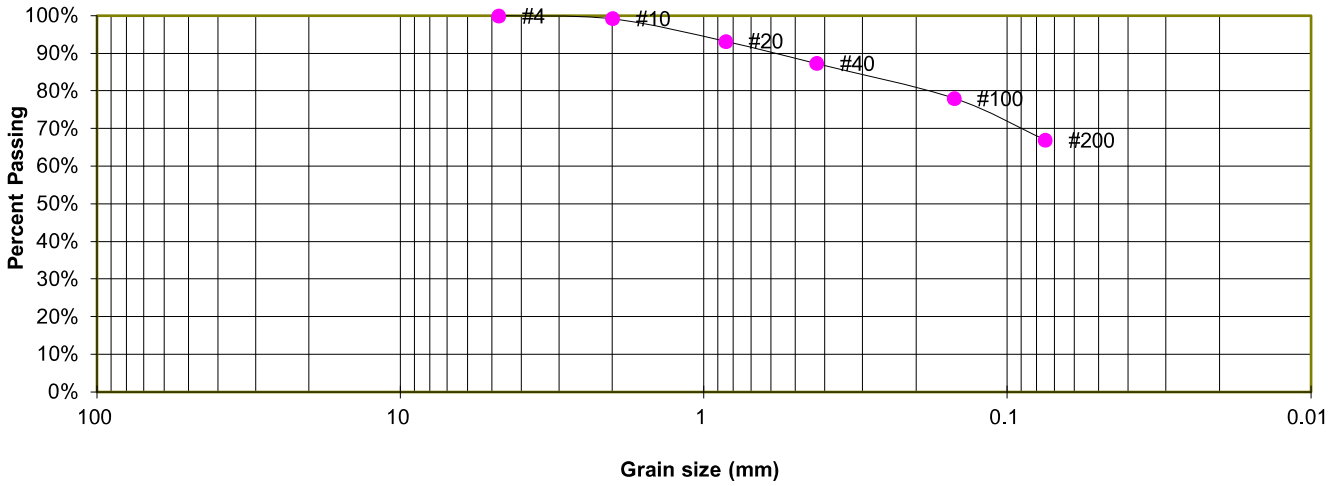
FIG. B-27

TEST BORING	1	SOIL DESCRIPTION	CLAY, SANDY
DEPTH (FT)	5	SOIL TYPE	3



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.2%
20	93.2%
40	87.3%
100	78.0%
200	67.0%

ATTERBERG LIMITS

Plastic Limit	19
Liquid Limit	34
Plastic Index	15

SOIL CLASSIFICATION

USCS CLASSIFICATION:	CL
AASHTO CLASSIFICATION:	A-6
AASHTO GROUP INDEX:	8

ENTECH ENGINEERING, INC.

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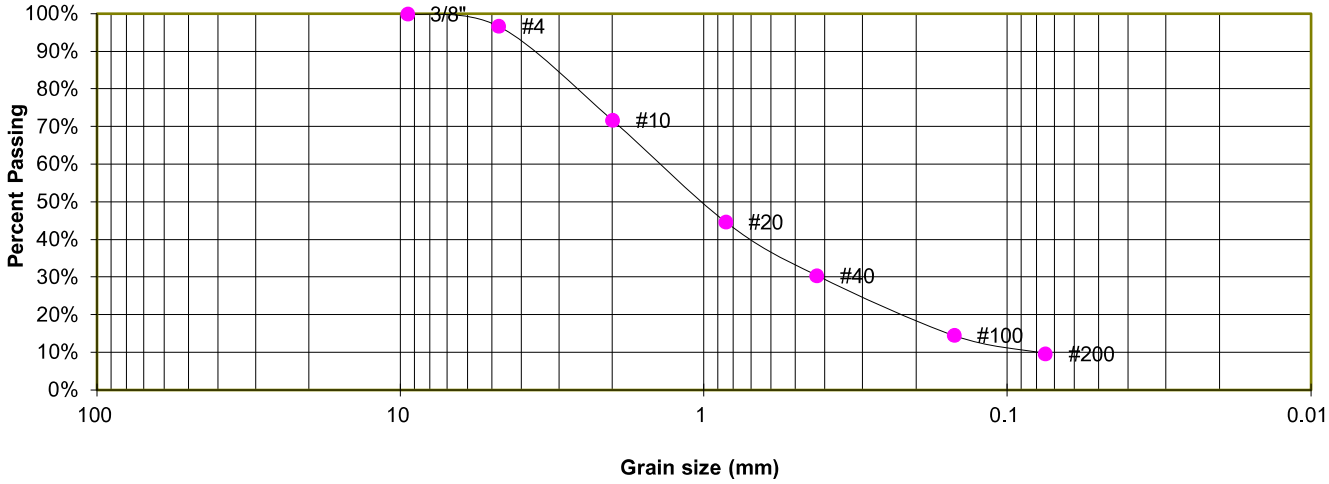
FIG. B-28

TEST BORING 16	SOIL DESCRIPTION SANDSTONE (SAND, WITH SILT)
DEPTH (FT) 1-2	SOIL TYPE 4



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	96.7%
10	71.7%
20	44.7%
40	30.5%
100	14.5%
200	9.7%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION: SW-SM
AASHTO CLASSIFICATION: A-1-b
AASHTO GROUP INDEX: 0

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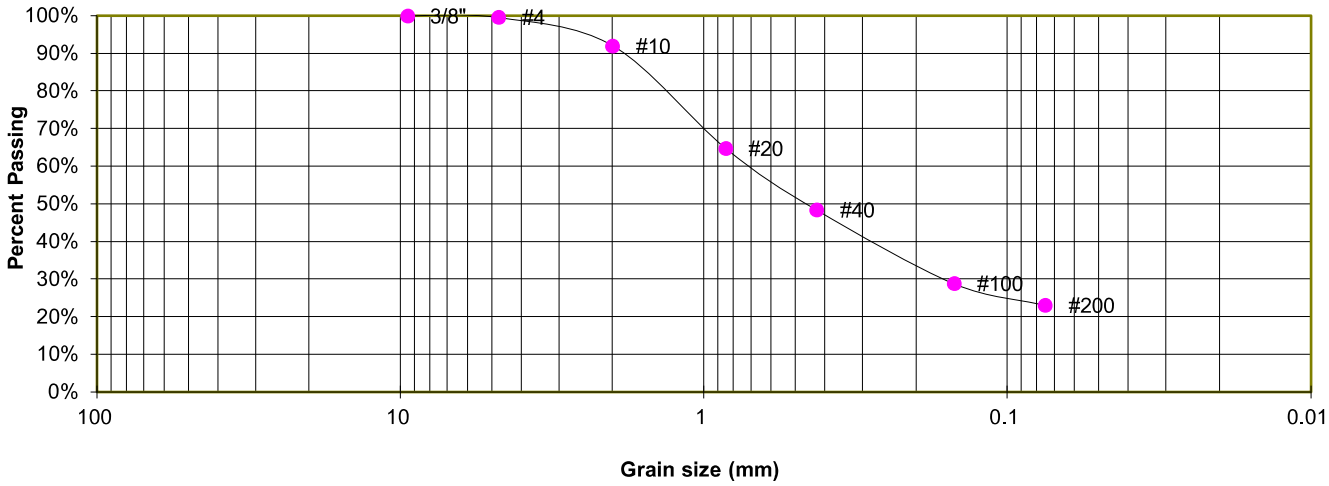
FIG. B-29

TEST BORING	3	SOIL DESCRIPTION	SANDSTONE (SAND, SILTY)
DEPTH (FT)	10	SOIL TYPE	4



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.6%
10	92.0%
20	64.8%
40	48.4%
100	28.9%
200	23.0%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION:	SM
AASHTO CLASSIFICATION:	A-2-4
AASHTO GROUP INDEX:	0

ENTECH ENGINEERING, INC.

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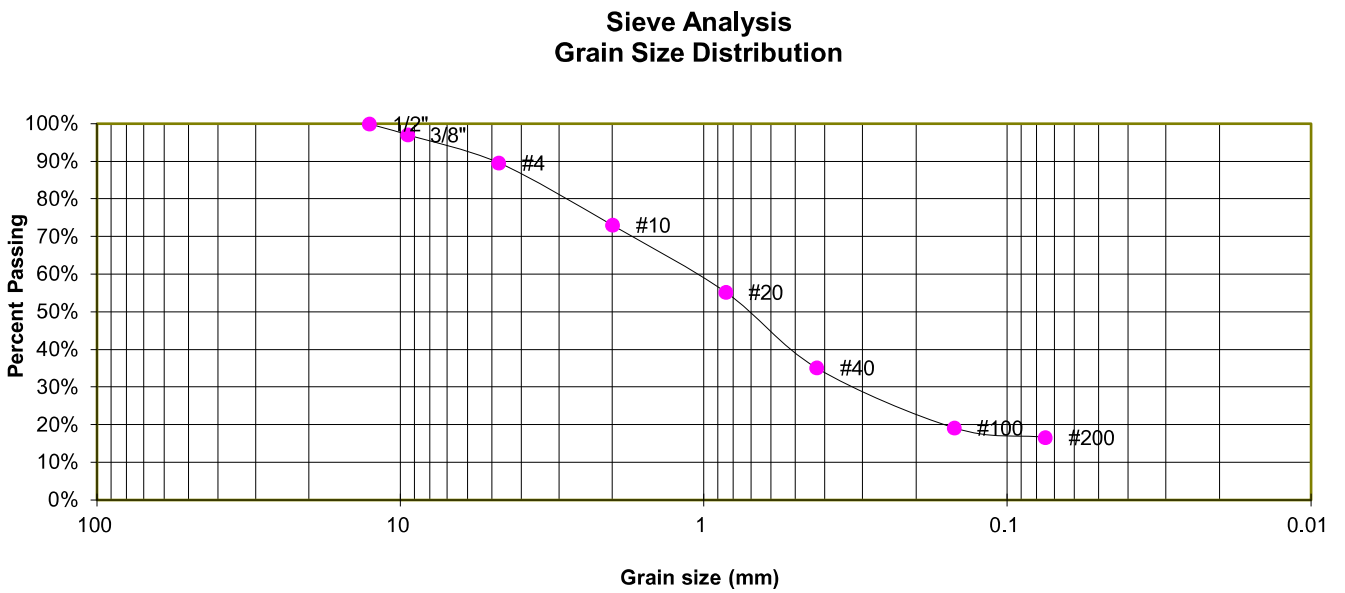
FIG. B-30

TEST BORING	11	SOIL DESCRIPTION	SANDSTONE (SAND, SILTY)
DEPTH (FT)	10	SOIL TYPE	4



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	97.1%
4	89.6%
10	73.0%
20	55.3%
40	35.1%
100	19.2%
200	16.6%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION:	SM
AASHTO CLASSIFICATION:	A-2-4
AASHTO GROUP INDEX:	0

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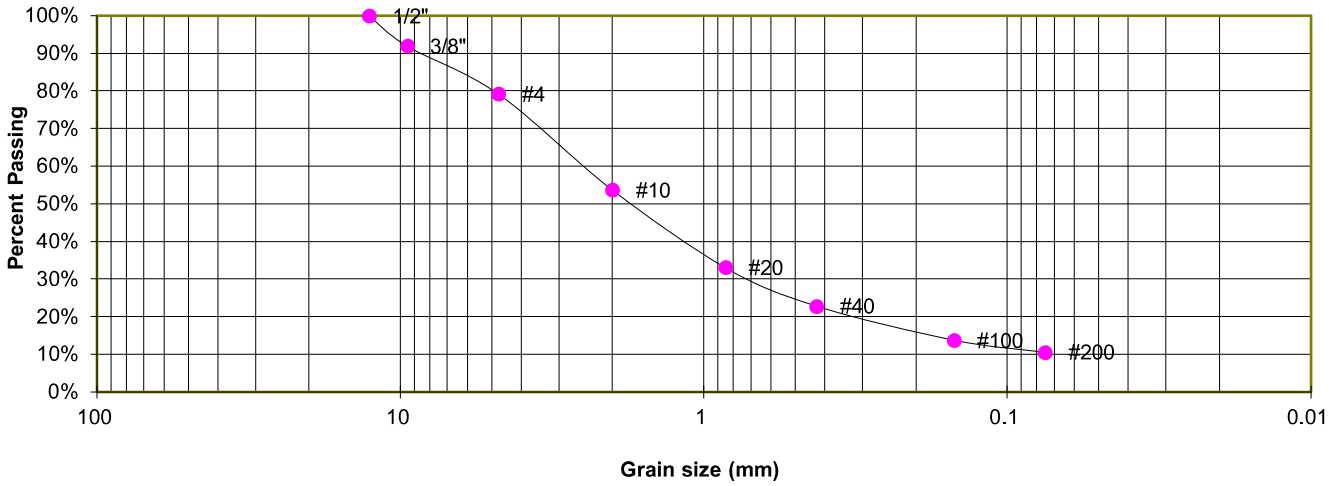
FIG. B-31

TEST BORING	15	SOIL DESCRIPTION	SANDSTONE (SAND, WITH SILT)
DEPTH (FT)	5	SOIL TYPE	4



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	91.9%
4	79.2%
10	53.6%
20	33.1%
40	22.8%
100	13.8%
200	10.6%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION: SW-SM
AASHTO CLASSIFICATION: A-1-b
AASHTO GROUP INDEX: 0

ENTECH ENGINEERING, INC.

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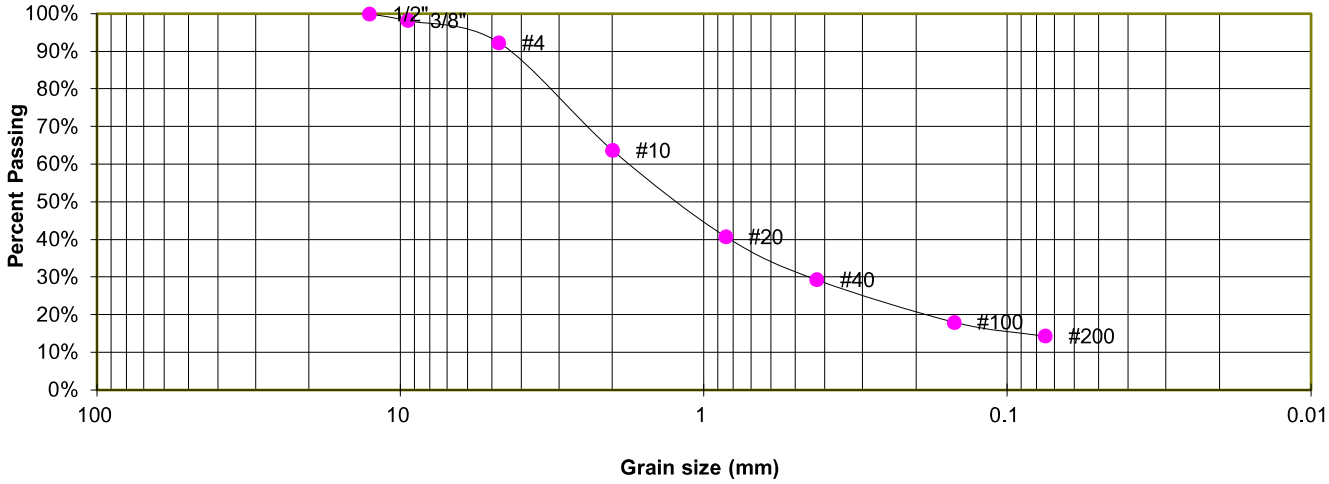
FIG. B-32

TEST BORING	18	SOIL DESCRIPTION	SANDSTONE (SAND, SILTY)
DEPTH (FT)	10	SOIL TYPE	4



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	98.2%
4	92.4%
10	63.7%
20	40.8%
40	29.3%
100	18.1%
200	14.4%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION:	SM
AASHTO CLASSIFICATION:	A-2-4
AASHTO GROUP INDEX:	0

ENTECH ENGINEERING, INC.

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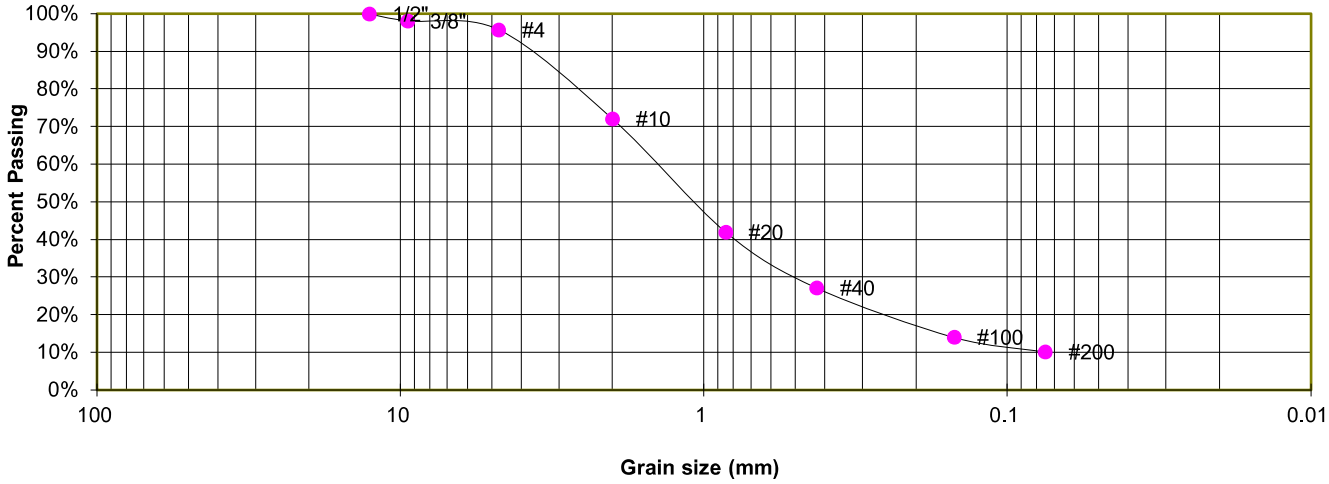
FIG. B-33

TEST BORING	21	SOIL DESCRIPTION	SANDSTONE (SAND, WITH SILT)
DEPTH (FT)	10	SOIL TYPE	4



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	98.1%
4	95.7%
10	72.0%
20	42.0%
40	27.1%
100	14.1%
200	10.1%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION: SW-SM
AASHTO CLASSIFICATION: A-1-b
AASHTO GROUP INDEX: 0

ENTECH ENGINEERING, INC.

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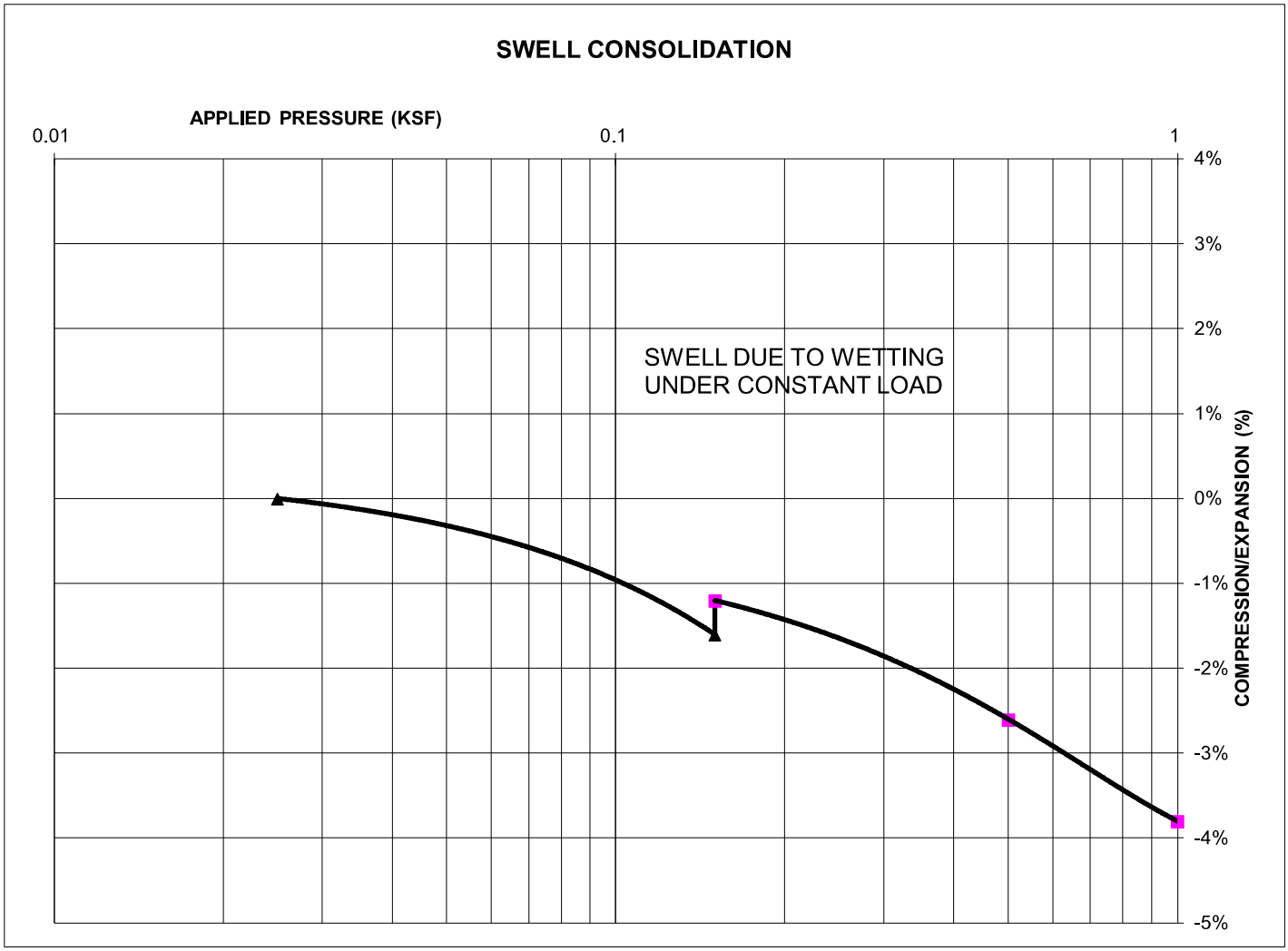
FIG. B-34

TEST BORING	5	SOIL DESCRIPTION	SAND, CLAYEY
DEPTH (FT)	1-2	SOIL TYPE	2



SWELL/CONSOLIDATION TEST RESULTS

NATURAL UNIT DRY WEIGHT (PCF): 106
NATURAL MOISTURE CONTENT: 16.2%
SWELL/CONSOLIDATION (%): 0.4%

ENTECH ENGINEERING, INC.

SWELL/CONSOLIDATION TEST RESULTS

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SR LAND

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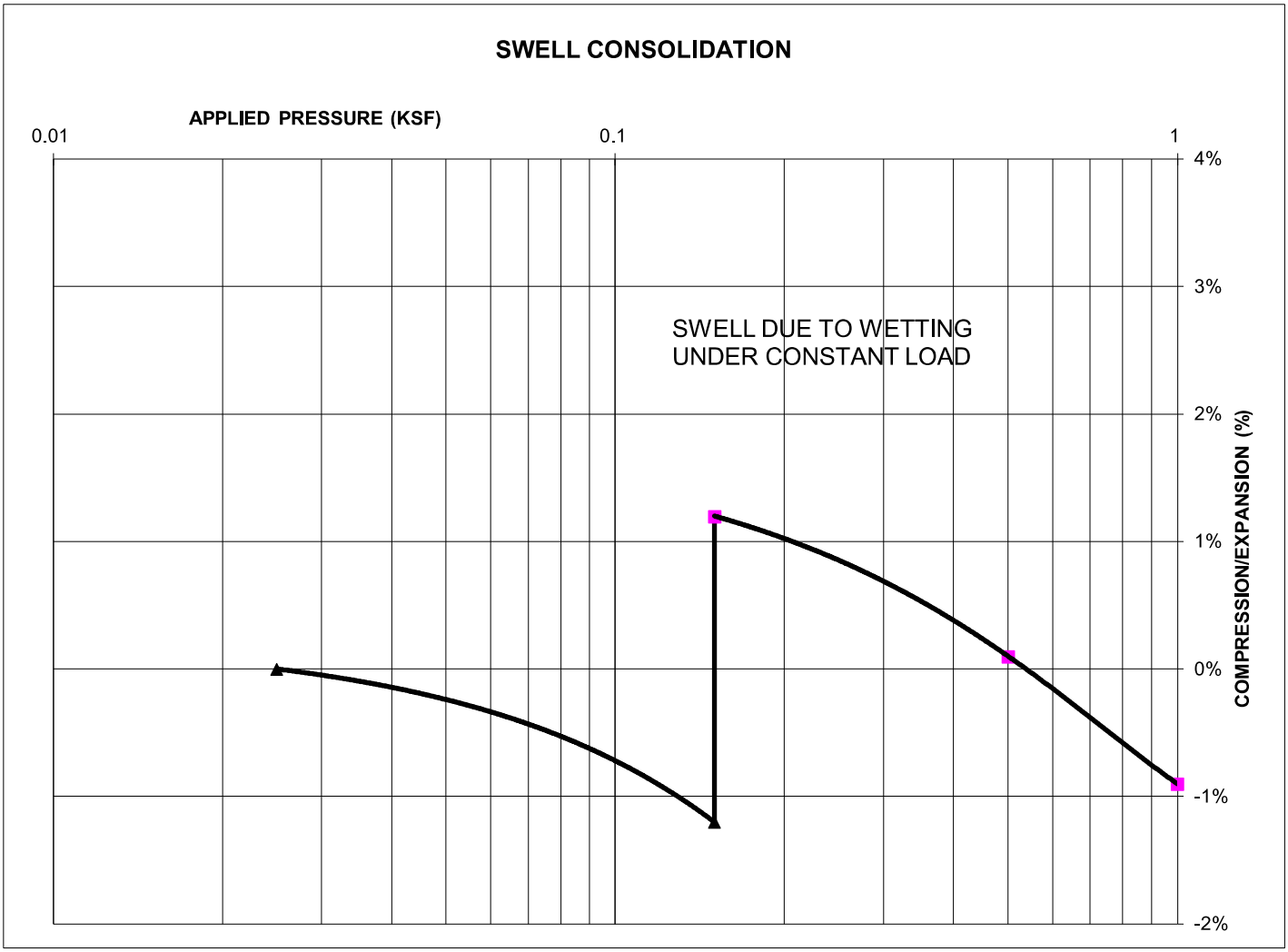
FIG. B-35

TEST BORING	2	SOIL DESCRIPTION	CLAY, SANDY
DEPTH (FT)	1-2	SOIL TYPE	3



SWELL/CONSOLIDATION TEST RESULTS

NATURAL UNIT DRY WEIGHT (PCF): 108
NATURAL MOISTURE CONTENT: 11.9%
SWELL/CONSOLIDATION (%): 2.4%

ENTECH ENGINEERING, INC.

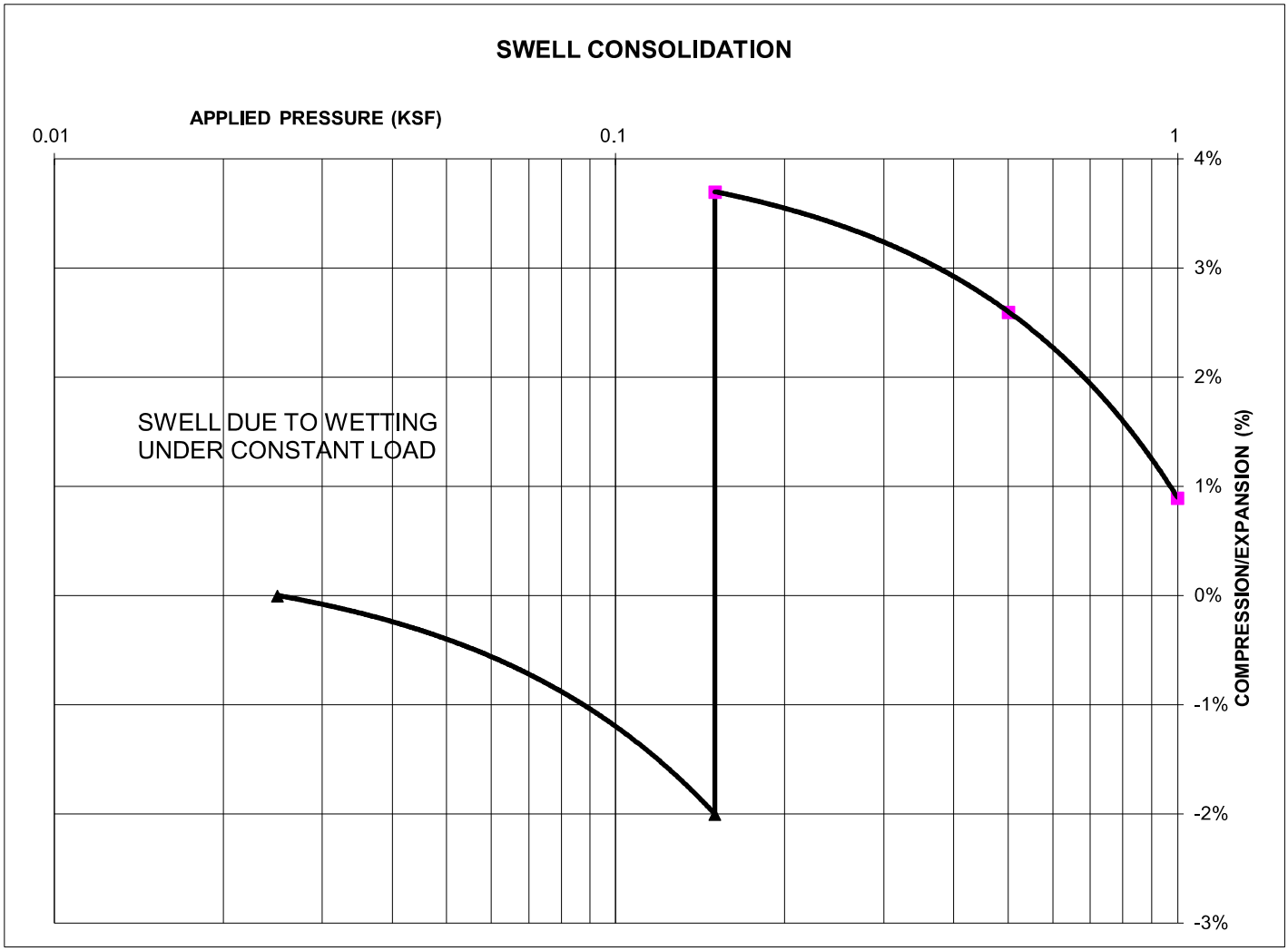
SWELL/CONSOLIDATION TEST RESULTS

HOMESTEAD NORTH, FILING 2
SR LAND

JOB NO. 230423

FIG. B-36

TEST BORING	1	SOIL DESCRIPTION	CLAY, SANDY
DEPTH (FT)	5	SOIL TYPE	3



SWELL/CONSOLIDATION TEST RESULTS

NATURAL UNIT DRY WEIGHT (PCF):	98
NATURAL MOISTURE CONTENT:	15.7%
SWELL/CONSOLIDATION (%):	5.7%

ENTECH ENGINEERING, INC.

SWELL/CONSOLIDATION TEST RESULTS

HOMESTEAD NORTH, FILING 2
SR LAND

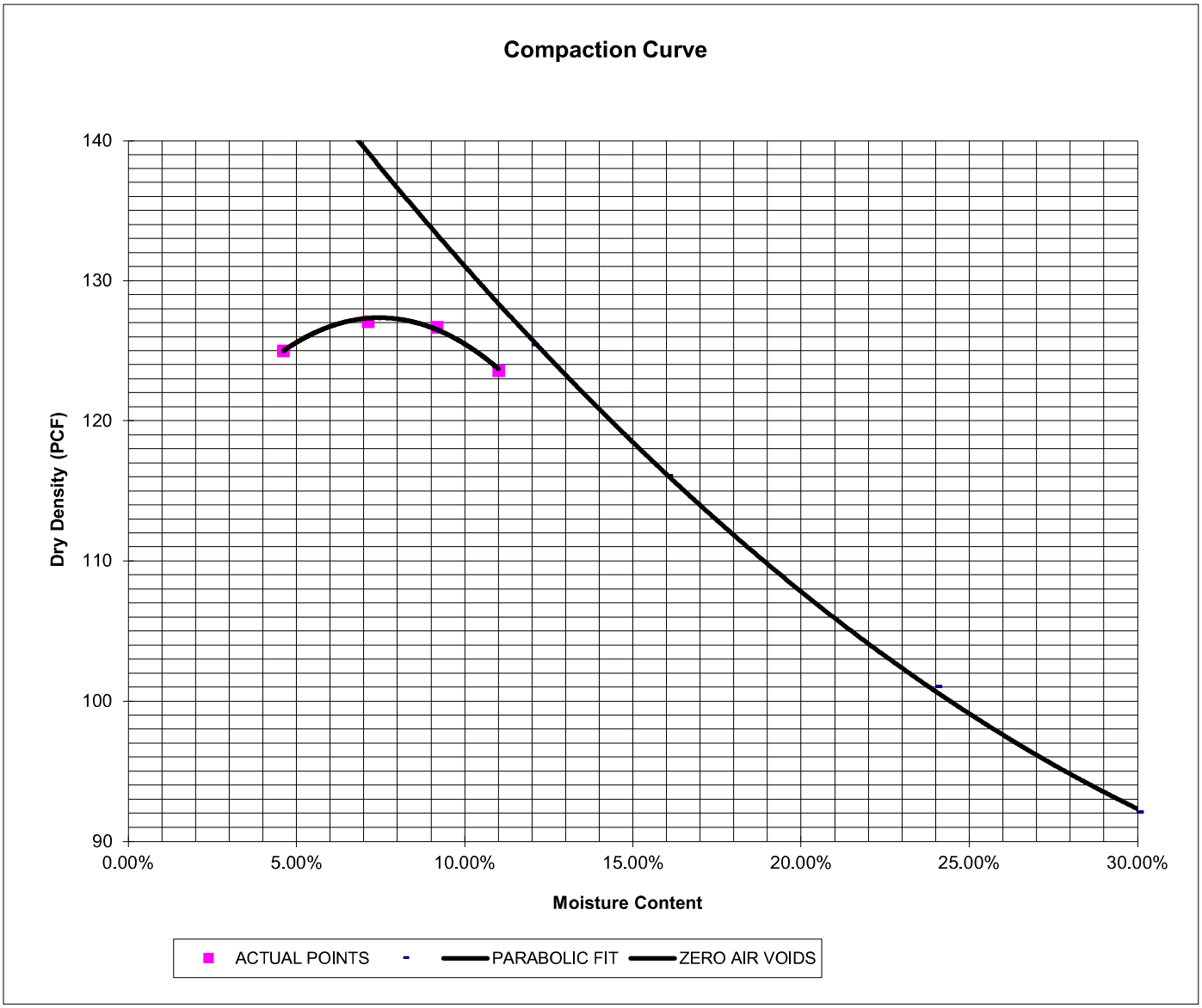
JOB NO. 230423

FIG. B-37

SAMPLE LOCATION TB-18 @ 0-3'	SOIL DESCRIPTION FILL, SAND, SILTY, BROWN
	SOIL TYPE 1

PROCTOR DATA

IDENTIFICATION:	SC
PROCTOR TEST #:	1, SOIL TYPE #1
TEST BY:	BL
TEST DESIGNATION:	ASTM-1557-A
MAXIMUM DRY DENSITY (PCF):	128.3
OPTIMUM MOISTURE:	7.5



ENTECH ENGINEERING, INC.

LABORATORY TEST RESULTS

HOMESTEAD NORTH, FILING 2
SR LAND

JOB NO. 230423

FIG. B-38

SAMPLE LOCATION TB-18 @ 0-3' SOIL DESCRIPTION FILL, SAND, SILTY, BROWN
SOIL TYPE 1

CBR TEST LOAD DATA

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

Penetration Depth (inches)	*10 BLOWS* Mold # 1 Load (lbs)	Stress (psi)	*25 BLOWS* Mold # 2 Load (lbs)	Stress (psi)	*56 BLOWS* Mold # 3 Load (lbs)	Stress (psi)
0.000	0	0.00	0	0.00	0	0.00
0.025	126	42.11	264	88.22	440	147.03
0.050	319	106.60	389	129.99	750	250.63
0.075	542	181.12	561	187.47	944	315.45
0.100	631	210.86	779	260.32	1185	395.99
0.125	745	248.95	1007	336.51	1596	533.33
0.150	827	276.36	1219	407.35	2140	715.12
0.175	897	299.75	1455	486.21	2420	808.69
0.200	962	321.47	1711	571.76	2826	944.36
0.300	1151	384.63	2199	734.83	4385	1465.33
0.400	1391	464.83	2750	918.96	5330	1781.11
0.500	1480	494.57	3122	1043.27	6530	2182.12

MOISTURE AND DENSITY DATA

	Mold # 1	Mold # 2	Mold # 3
Can #	399	347	342
Wt. Can	8.71	8.59	8.61
Wt. Can+Wet	213.63	202.59	166.2
Wt. Can+Dry			
Wt. H20	213.63	202.59	166.2
Wt. Dry Soil	-8.71	-8.59	-8.61
Moisture Content	-2452.70%	-2358.44%	-1930.31%
Wet Density (PCF)	126.7	134.1	139.5
Dry Density (PCF)	117.6	124.4	129.4
% Compaction	92%	97%	101%
CBR	21.09	26.03	39.60

PROCTOR DATA

Maximum Dry Density (pcf)	128.3
Optimum Moisture	7.5
90% of Max. Dry Density (pcf)	115.5
95% of Max. Dry Density (pcf)	121.9

CBR at 90% of Max. Density = 19.58	~ R VALUE 70
CBR at 95% of Max. Density = 24.22	~ R VALUE 71

ENTECH ENGINEERING, INC.

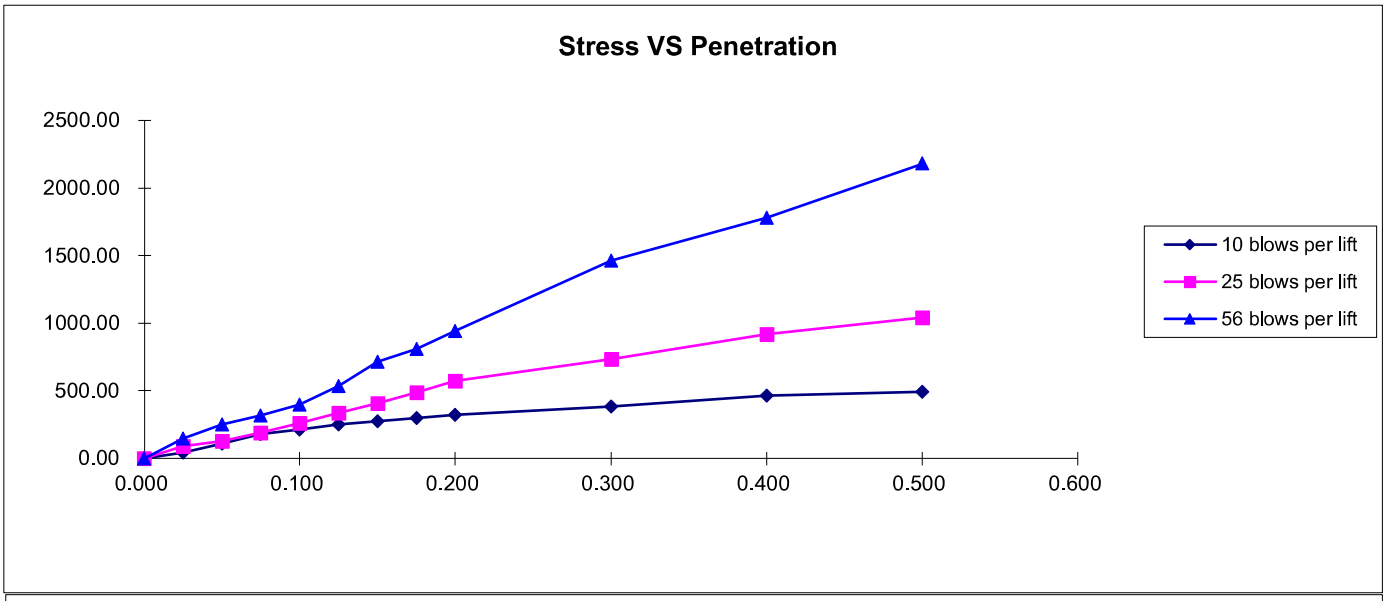
LABORATORY TEST RESULTS

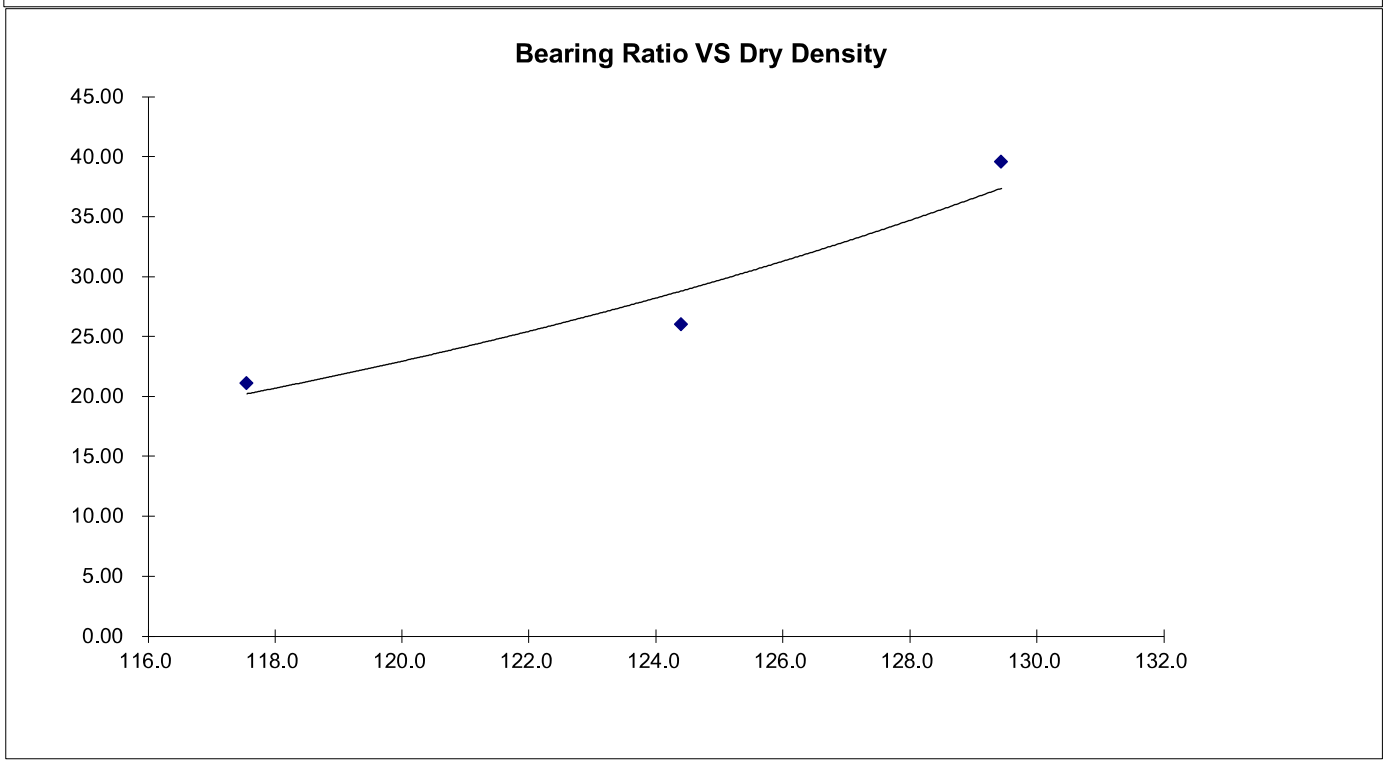
HOMESTEAD NORTH, FILING 2
SR LAND

JOB NO. 230423

FIG. B-39

SAMPLE LOCATION TB-18 @ 0-3'	SOIL DESCRIPTION FILL, SAND, SILTY, BROWN
	SOIL TYPE 1





ENTECH ENGINEERING, INC.

LABORATORY TEST RESULTS

HOMESTEAD NORTH, FILING 2
SR LAND

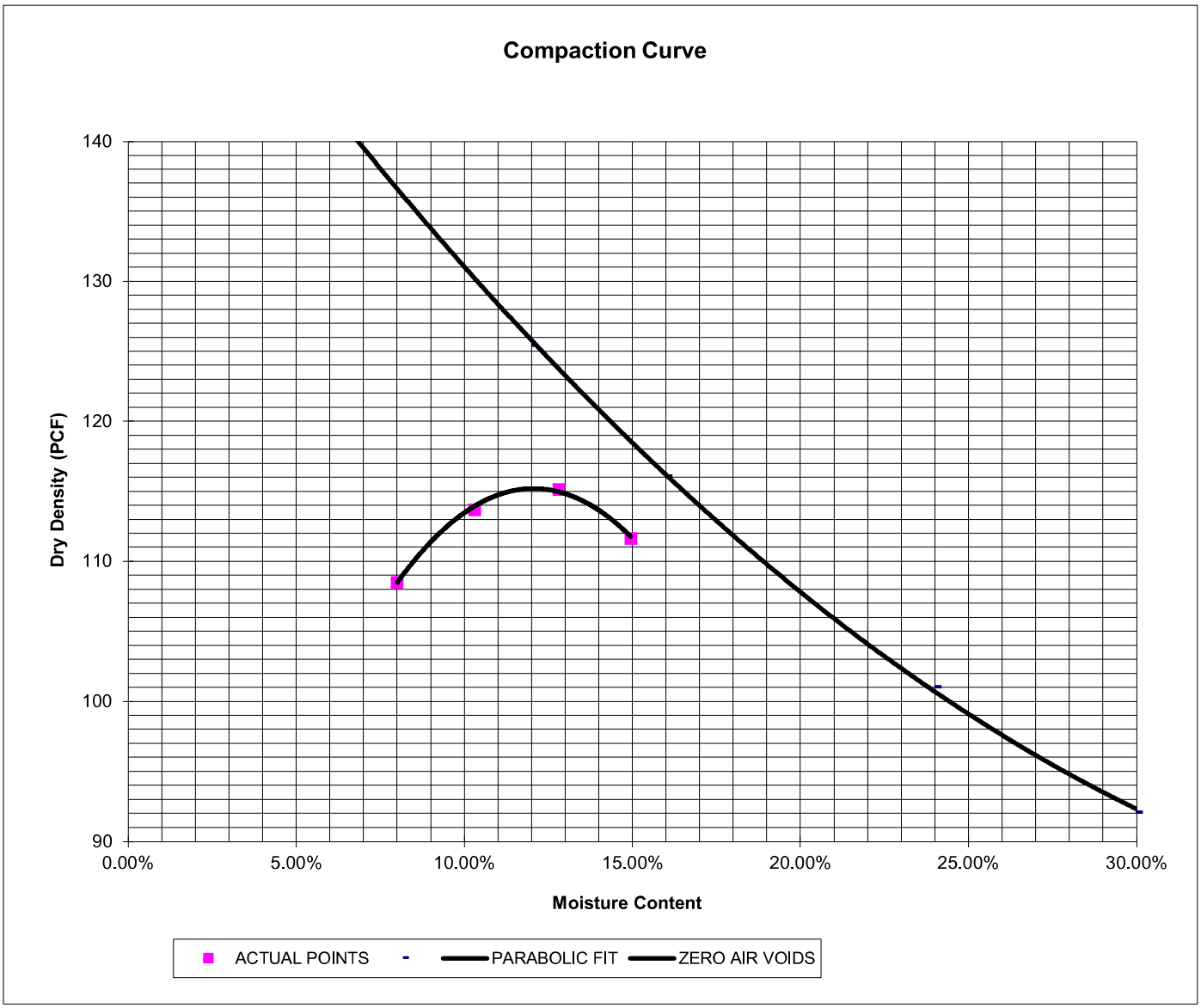
JOB NO.
230423

FIG. B-40

SAMPLE LOCATION TB-2 @ 0-3'	SOIL DESCRIPTION CLAY, SANDY, BROWN SOIL TYPE 3

PROCTOR DATA

IDENTIFICATION:	CL
PROCTOR TEST #:	2, SOIL TYPE #3
TEST BY:	DK
TEST DESIGNATION:	ASTM-698-A
MAXIMUM DRY DENSITY (PCF):	115.2
OPTIMUM MOISTURE:	12



ENTECH ENGINEERING, INC.

LABORATORY TEST RESULTS

HOMESTEAD NORTH, FILING 2
SR LAND

JOB NO.
230423

FIG. B-41

SAMPLE LOCATION TB-2 @ 0-3'	SOIL DESCRIPTION CLAY, SANDY, BROWN
	SOIL TYPE 3

CBR TEST LOAD DATA

Piston Diameter (cm): 4.958

Piston Area (in^2): 2.993

Penetration Depth (inches)	*10 BLOWS* Mold # 1 Load (lbs)	Stress (psi)	*25 BLOWS* Mold # 2 Load (lbs)	Stress (psi)	*56 BLOWS* Mold # 3 Load (lbs)	Stress (psi)
0.000	0	0.00	0	0.00	0	0.00
0.025	41	13.70	48	16.04	104	34.75
0.050	54	18.05	59	19.72	154	51.46
0.075	56	18.71	68	22.72	176	58.81
0.100	59	19.72	73	24.39	191	63.83
0.125	63	21.05	86	28.74	215	71.85
0.150	64	21.39	93	31.08	242	80.87
0.175	68	22.72	101	33.75	257	85.88
0.200	71	23.73	108	36.09	269	89.89
0.300	66	22.06	118	39.43	332	110.94
0.400	69	23.06	129	43.11	380	126.98
0.500	74	24.73	141	47.12	427	142.69

MOISTURE AND DENSITY DATA

	Mold # 1	Mold # 2	Mold # 3
Can #	399	342	343
Wt. Can	8.39	8.57	8.59
Wt. Can+Wet	149.21	189.46	167.58
Wt. Can+Dry	122.08	148.56	142.37
Wt. H20	27.13	40.9	25.21
Wt. Dry Soil	113.69	139.99	133.78
Moisture Content	23.86%	29.22%	18.84%
Wet Density (PCF)	108.9	120.3	125.3
Dry Density (PCF)	97.2	107.4	111.9
% Compaction	84%	93%	97%
CBR	1.97	2.44	6.38

PROCTOR DATA

Maximum Dry Density (pcf)	115.2
Optimum Moisture	12
90% of Max. Dry Density (pcf)	103.7
95% of Max. Dry Density (pcf)	109.4

CBR at 90% of Max. Density = 2.27	~ R VALUE 6
CBR at 95% of Max. Density = 4.22	~ R VALUE 10

ENTECH ENGINEERING, INC.

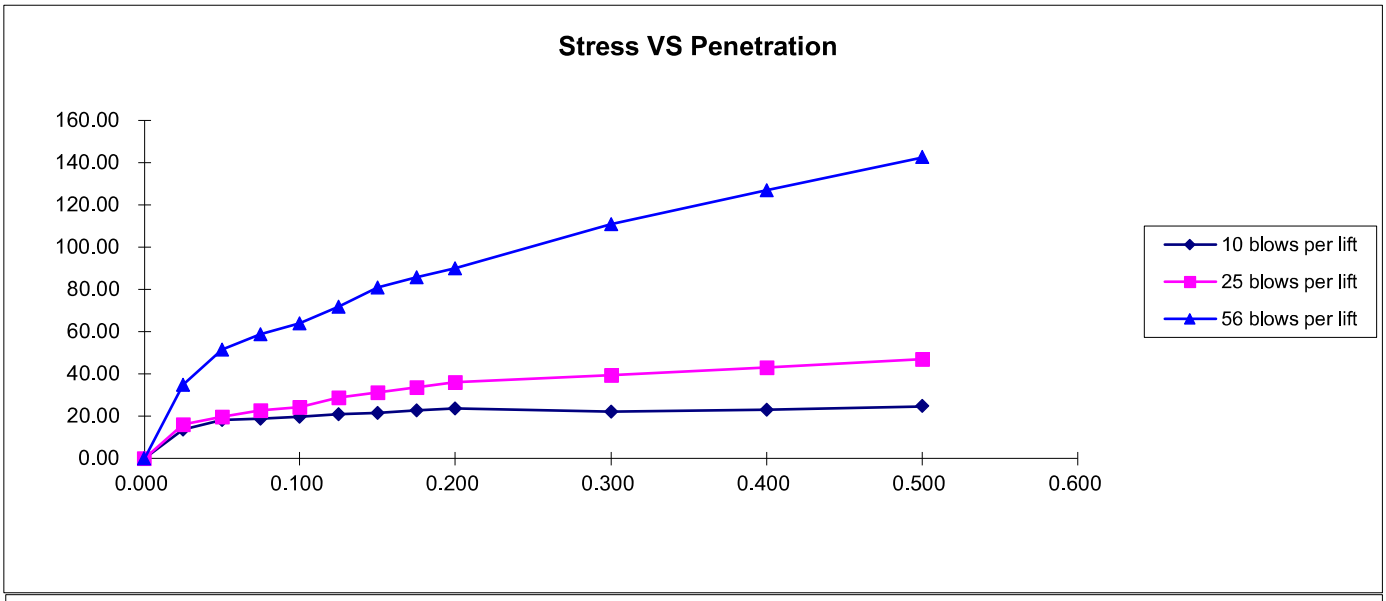
LABORATORY TEST RESULTS

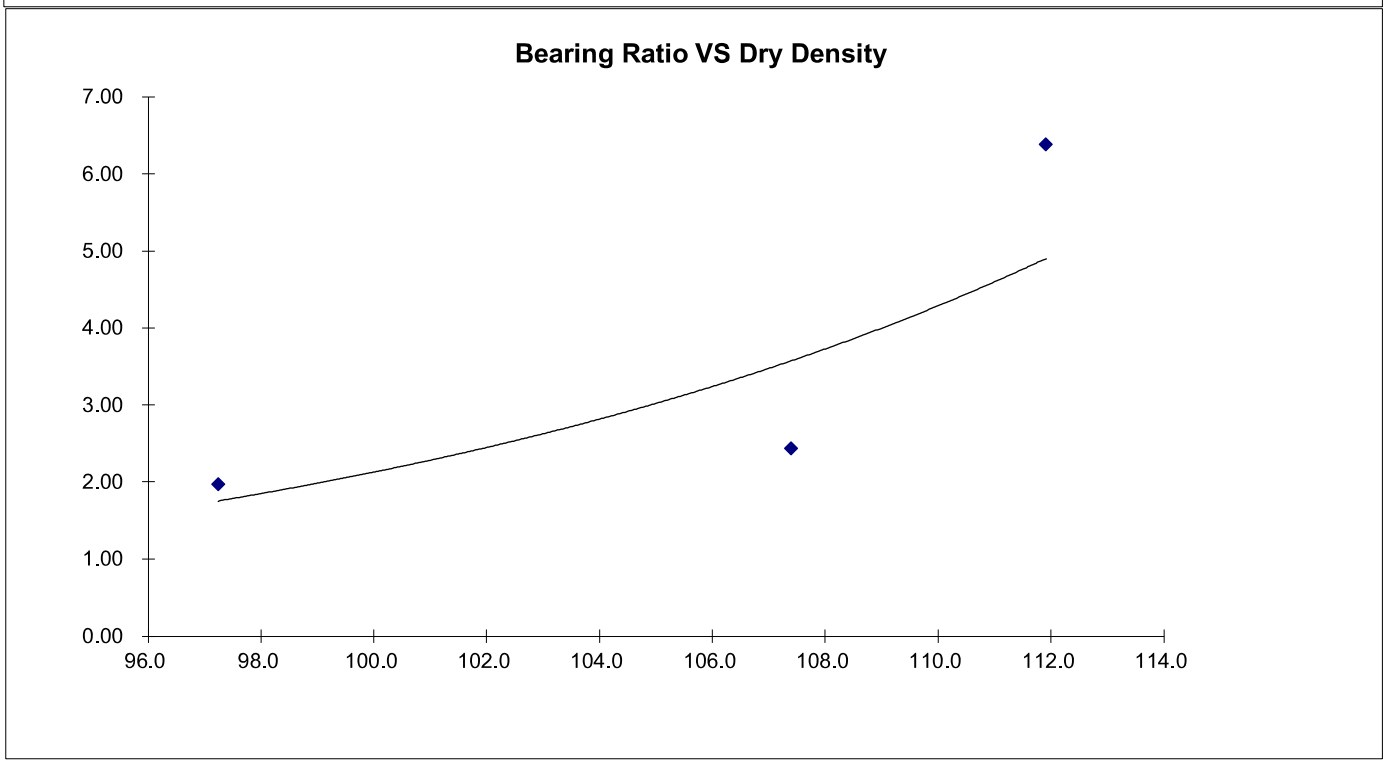
HOMESTEAD NORTH, FILING 2
SR LAND

JOB NO. 230423

FIG. B-42

SAMPLE LOCATION TB-2 @ 0-3'	SOIL DESCRIPTION CLAY, SANDY, BROWN SOIL TYPE 3





ENTECH ENGINEERING, INC.

LABORATORY TEST RESULTS

HOMESTEAD NORTH, FILING 2
SR LAND

JOB NO.
230423

FIG. B-43

APPENDIX C: Pavement Design Calculations

FLEXIBLE PAVEMENT DESIGN

PROJECT DATA

Project Location Homestead North Filing 2 - Local Low Volume Road

Job Number: 230423

DESIGN DATA

Equivalent (18-kip) Single Axle Load Applications (ESAL):	ESAL (W_{18}) =	36,500
Design CBR	CBR =	10
Standard Deviation	S_o =	0.45
Loss in Serviceability	Δpsi =	2.0
Reliability	Reliability =	85
Reliability (z-statistic)	Z_R =	-1.04
Soil Resilient Modulus	M_R =	15,000 psi

Required Structural Number (SN): → SN = 1.44

DESIGN EQUATIONS

Resilient Modulus

If using CBR:

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

If using R-Value:

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

Required Structural Number

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

Pavement Section Thickness

$SN^* = C_1D_1 + C_2D_2$ where:

C_1 = Strength Coefficient - HMA

C_2 = Strength Coefficient - ABC

D_1 = Depth of HMA (inches)

D_2 = Depth of ABC (inches)

RECOMMENED THICKNESSES

Layer	Material	Structural Layer	Thickness (D^*_i)	SN^*_i	SN
1	HMA	C_1 = 0.44	3.0 inches	1.320	-
2	ABC	C_2 = 0.11	6.0 inches	0.660	
			SN* =	1.980	1.44

Pavement SN > Required SN, Design is Acceptable

FIG. C-1

FLEXIBLE PAVEMENT DESIGN

PROJECT DATA

Project Location Homestead North Filing 2 - Local Low Volume Road

Job Number: 230423

DESIGN DATA

Equivalent (18-kip) Single Axle Load Applications (ESAL):	ESAL (W_{18}) =	36,500
Design CBR	CBR =	10
Standard Deviation	S_o =	0.45
Loss in Serviceability	Δpsi =	2.0
Reliability	Reliability =	85
Reliability (z-statistic)	Z_R =	-1.04
Soil Resilient Modulus	M_R =	15,000 psi

Required Structural Number (SN): → SN = 1.44

DESIGN EQUATIONS

Resilient Modulus

If using CBR:

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

If using R-Value:

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

Required Structural Number

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

Pavement Section Thickness

$SN^* = C_1D_1 + C_2D_2$ where:

C_1 = Strength Coefficient - HMA

C_2 = Strength Coefficient - CTS

D_1 = Depth of HMA (inches)

D_2 = Depth of CTS (inches)

RECOMMENED THICKNESSES

Layer	Material	Structural Layer	Thickness (D^*_i)	SN^*_i	SN
1	HMA	C_1 = 0.44	4.0 inches	1.760	-
2	CTS	C_2 = 0.11	10.0 inches	1.100	
			SN* = 2.860		1.44

Pavement SN > Required SN, Design is Acceptable

FIG. C-2

FLEXIBLE PAVEMENT DESIGN

PROJECT DATA

Project Location Homestead North Filing 2 - Local Road

Job Number: 230423

DESIGN DATA

Equivalent (18-kip) Single Axle Load Applications (ESAL):	ESAL (W_{18}) =	292,000
Design CBR	CBR =	10
Standard Deviation	S_o =	0.45
Loss in Serviceability	Δpsi =	2.0
Reliability	Reliability =	85
Reliability (z-statistic)	Z_R =	-1.04
Soil Resilient Modulus	M_R =	15,000 psi

Required Structural Number (SN): → SN = 2.06

DESIGN EQUATIONS

Resilient Modulus

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

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

Required Structural Number

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

Pavement Section Thickness

$SN^* = C_1D_1 + C_2D_2$ where:

C_1 = Strength Coefficient - HMA

C_2 = Strength Coefficient - ABC

D_1 = Depth of HMA (inches)

D_2 = Depth of ABC (inches)

RECOMMENED THICKNESSES

Layer	Material	Structural Layer	Thickness (D^*_i)	SN^*_i	SN
1	HMA	C_1 = 0.44	3.0 inches	1.320	-
2	ABC	C_2 = 0.11	8.0 inches	0.880	
			SN* = 2.200		2.06

Pavement SN > Required SN, Design is Acceptable

FIG. C-3

FLEXIBLE PAVEMENT DESIGN

PROJECT DATA

Project Location Homestead North Filing 2 - Local Road

Job Number: 230423

DESIGN DATA

Equivalent (18-kip) Single Axle Load Applications (ESAL):	ESAL (W_{18}) =	292,000
Design CBR	CBR =	10
Standard Deviation	S_o =	0.45
Loss in Serviceability	Δpsi =	2.0
Reliability	Reliability =	85
Reliability (z-statistic)	Z_R =	-1.04
Soil Resilient Modulus	M_R =	15,000 psi

Required Structural Number (SN): → SN = 2.06

DESIGN EQUATIONS

Resilient Modulus

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

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

Required Structural Number

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

Pavement Section Thickness

$SN^* = C_1D_1 + C_2D_2$ where:

C_1 = Strength Coefficient - HMA

C_2 = Strength Coefficient - CTS

D_1 = Depth of HMA (inches)

D_2 = Depth of CTS (inches)

RECOMMENED THICKNESSES

Layer	Material	Structural Layer	Thickness (D^*_i)	SN^*_i	SN
1	HMA	C_1 = 0.44	4.0 inches	1.760	-
2	CTS	C_2 = 0.11	10.0 inches	1.100	
			SN* = 2.860		2.06

Pavement SN > Required SN, Design is Acceptable

FIG. C-4