



ENTECH
ENGINEERING, INC.

505 ELKTON DRIVE
COLORADO SPRINGS, CO 80907
PHONE (719) 531-5599

**AGGREGATE SURFACING DESIGN REPORT
SOUTH BAGGETT ROAD AND HIGHWAY 94
EL PASO COUNTY, COLORADO**

Prepared for:
**Ellicott Sand and Gravel, LLC
235 Franceville Coal Mine Road
Colorado Springs, CO 80929**

Attn: Perry Hastings

November 13, 2023

Respectfully Submitted,

ENTECH ENGINEERING, INC.



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

JCG:JCG/ed

Entech Job No. 231465

Reviewed by:

Joseph C. Goode Jr., P.E.
President

Table of Contents

1 Introduction 1

2 Project Description 1

3 Subsurface Explorations and Laboratory Testing 1

 3.1 Subsurface Exploration Program 1

 3.2 Geotechnical Index and Engineering Property Testing 2

4 Subgrade Conditions 2

 4.1 Subsurface Conditions 2

 4.2 Groundwater 3

5 Pavement Design Recommendations 3

 5.1 Subgrade Conditions 3

 5.2 Swell Mitigation 4

 5.3 Traffic Loading..... 4

 5.4 Aggregate Surfacing Design..... 4

6 Construction Recommendations 5

 6.1 Subgrade Preparation 5

 6.2 Gravel Road Maintenance 5

 6.3 Aggregate Surfacing..... 5

 6.4 Construction Observation 6

7 Closure..... 6

Figures

Figure 1: Vicinity Map

Figure 2: Site and Exploration Plan

List of Appendices

Appendix A: Test Boring Logs

Appendix B: Laboratory Test Results

Appendix C: Design Calculations

1 Introduction

Entech Engineering, Inc. (Entech) completed a subsurface investigation for a section of South Baggett Road from Highway 94 to the north entrance of Schuber Ranch in eastern El Paso County, Colorado (refer to Figure 1). This report describes the subsurface investigation conducted for the proposed gravel road improvements and construction recommendations. Our services were completed in accordance with our services agreement with Ellicott Sand and Gravel, dated July 31, 2023. The contents of this report, including the aggregate surfacing design recommendations, are subject to the limitations and assumptions presented in Section 7.

2 Project Description

The proposed improvements include a 1.7-mile section of South Baggett Road from Highway 94 to the north entrance of Schuber Ranch. The existing roadway is a gravel road which will be rehabilitated with a new aggregate surfacing section. We understand that the South Baggett Road will be used as a haul road for approximately 15 truck roundtrips per day from the Ellicott Sand and Gravel in addition to local traffic. Surrounding properties are comprised of open ranch and farm land.

3 Subsurface Explorations and Laboratory Testing

3.1 Subsurface Exploration Program

Subsurface conditions at the project site were explored by 24 test borings, designated TB-1 through TB-24, drilled on September 11, 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 to 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 providing the lithologies of the subsurface conditions encountered during drilling are presented in Appendix A. Groundwater levels were measured in each of the open boreholes at the conclusion of 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 classifications were later verified utilizing laboratory testing and grouped by

soil type. The soil type numbers are included on the boring logs. It should be understood that the soil descriptions shown on the boring logs may vary between boring 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 types and the actual stratigraphic transitions may be more gradual or variable with location.

3.2 Geotechnical Index and Engineering Property Testing

Water content testing (ASTM D2216) was performed on the samples recovered from the borings, and the results are shown on the boring logs. Grain-Size Analysis (ASTM D422) and Atterberg Limits testing (ASTM D4318) were performed on selected samples to assist in classifying the materials encountered in the borings.

Swell/Consolidation testing (ASTM D4546) was performed on select samples to determine the expansive or compressive characteristics of the soil. For roadway design, a standard proctor (ASTM D1557) and California Bearing Ratio (CBR) test (ASTM D1883) were completed. 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 presented in Appendix B and summarized in Table B-1.

4 Subgrade Conditions

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

4.1 Subsurface Conditions

Subsurface conditions along the proposed roadway consisted of loose to medium dense silty sand fill and sand with silt fill (Soil Type 1), sand with silt fill to clayey sand fill (Soil Type 2), native silty sand to sand with silt (Soil Type 3), and silty sand to sandy clay-silt (Soil Type 4). Soil type and corresponding AASHTO soil classification are listed below:

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

- Soil Type 3: A-1-b and A-2-4
- Soil Type 4: A-4 soils

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

4.2 Groundwater

Groundwater was not encountered in the test borings. Groundwater fluctuations are likely and will depend on seasonal variations, local precipitation, runoff, and other factors. We do not anticipate groundwater to affect the proposed construction.

5 Pavement Design Recommendations

Aggregate road surfacing recommendations were made in accordance with the American Association of State Highway and Transportation Officials (AASHTO), 1993, AASHTO Guide for Design of Pavement Structures (AGDPS) and the El Paso County Pavement Design Criteria Manual.

5.1 Subgrade Conditions

California Bearing Ratio (CBR) testing was performed on representative samples of the subgrade silty sand fill (Soil Type 1) from TB-8 and the sandy silt fill (Soil Type 2) from TB-18 to determine the support characteristic of the subgrade soils for the roadway. The results of the CBR testing are presented in Appendix B and summarized in Exhibit 1. The existing aggregate surfacing was assumed to be a minimum of 4 inches thick.

Exhibit 1: Subsurface Laboratory Testing Summary

Design Parameter	Value	
	1 – Silty Sand Fill	2– Sandy Silt Fill
Soil Type	1 – Silty Sand Fill	2– Sandy Silt Fill
CBR at 95%	37	30
Design CBR	10	10
Liquid Limit	NV	27
Plasticity Index	NP	1
Percent Passing 200	20.8	66.7
AASHTO Classification	A-2-4	A-4
Group Index	0	0
Unified Soils Classification	SM	ML

5.2 Swell Mitigation

Based on the swell testing and classification of the subgrade soils and the use of aggregate surfacing, mitigation for expansive soils is not required on this site.

5.3 Traffic Loading

To estimate an 18-kip equivalent single axle loading (ESAL) value for S Baggett Road traffic truck loading was provided by Ellicott Sand and Gravel. We assumed an average daily traffic (ADT) of 15 FHWA Class 13 tractor-trailers per day (15 trucks per lane per day) for the life of the project (5 years). For design we calculated an ESAL design value of 82,125 for S Baggett Road.

5.4 Aggregate Surfacing Design

The aggregate surfacing sections were determined utilizing the 1993 AGDPS low volume road design methodology, the CBR testing, and ESAL values. Design parameters used in the pavement analysis are presented in Exhibit 2.

Exhibit 2: Aggregate Surfacing Design Parameters

Design Parameter	Value
Allowable Rut Depth (inches)	2
Resilient Modulus of Roadbed Material by Season (psi)	
Winter	20,000
Spring	2,500
Summer	20,000
Fall	8,000
Modulus of Aggregate Base Layer (psi)	30,000
Allowable Serviceability Loss (Δ psi)	2.0

Based on the existing conditions of the aggregate surfaced roadway we recommend incorporating the existing aggregate surfacing into the new aggregate surfacing section. Aggregate surfacing recommended for this segment of Baggett Road are summarized in Exhibit 3. The design calculations are presented in Appendix C.

Exhibit 3: Recommended Pavement Sections

Pavement Area	Design Life	Design ESAL	Alternative
S Baggett Road	5 years	76,000	1. 8.0 inches AS over 4.0 inches existing AS

AS = Aggregate Surfacing; ESAL = equivalent single axle loads

6 Construction Recommendations

Design recommendations provided herein are contingent on good construction practices, and poor construction techniques may result in poor performance. Our analyses assumed that this project will be constructed according to the El Paso Country Engineering Criteria Manual.

6.1 Subgrade Preparation

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

Prior to placing new aggregate surfacing the existing surface should be scarified to a depth of 4 inches, moisture conditioned within +/-2% of the optimum water content, and recompacted to 95% of its maximum Modified Proctor dry density, ASTM D1557. The recompacted existing aggregate surfacing should be proof-rolled with a fully loaded, tandem-axle, 10-yard dump truck or equivalent. Any areas that are delineated to be soft, loose, or yielding during proof-rolling should be removed and reconditioned or replaced.

6.2 Gravel Road Maintenance

Proper maintenance of gravel roadways is critical to performance of gravel roadways. The roadway should include a crowned driving surface, a shoulder area, and a ditch to carry water away from the roadway surface. Keeping the shoulder and ditch established throughout the design life is paramount to avoiding failure and distress. Grading operators should be apprised of maintenance best practices in regards to proper gravel road cross sections, routine shaping principals, operating speed, and other elements of grader operation.

6.3 Aggregate Surfacing

Aggregate surfacing material shall conform to the El Paso County Pavement Design Criteria specifications presented in Table D-7 of the manual. 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.

6.4 Construction Observation

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

7 Closure

The subsurface investigation, geotechnical evaluation, and recommendations presented in this report are intended for use by Ellicott Sand and Gravel, LLC with application to the South Baggett Road and Highway 94 paving project in El Paso County, Colorado. In conducting the subsurface investigation, laboratory testing, engineering evaluation, and reporting, Entech Engineering, Inc. endeavored to work in accordance with generally accepted professional geotechnical and geologic practices and principles consistent with the level of care and skill ordinarily exercised by members of the geotechnical profession currently practicing in the same locality and under similar conditions. No other warranty, expressed or implied, is made. During final design and/or construction, if conditions are encountered which appear different from those described in this report, Entech Engineering, Inc. requests to be notified so that the evaluation and recommendations presented herein can be reviewed and modified as appropriate.

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

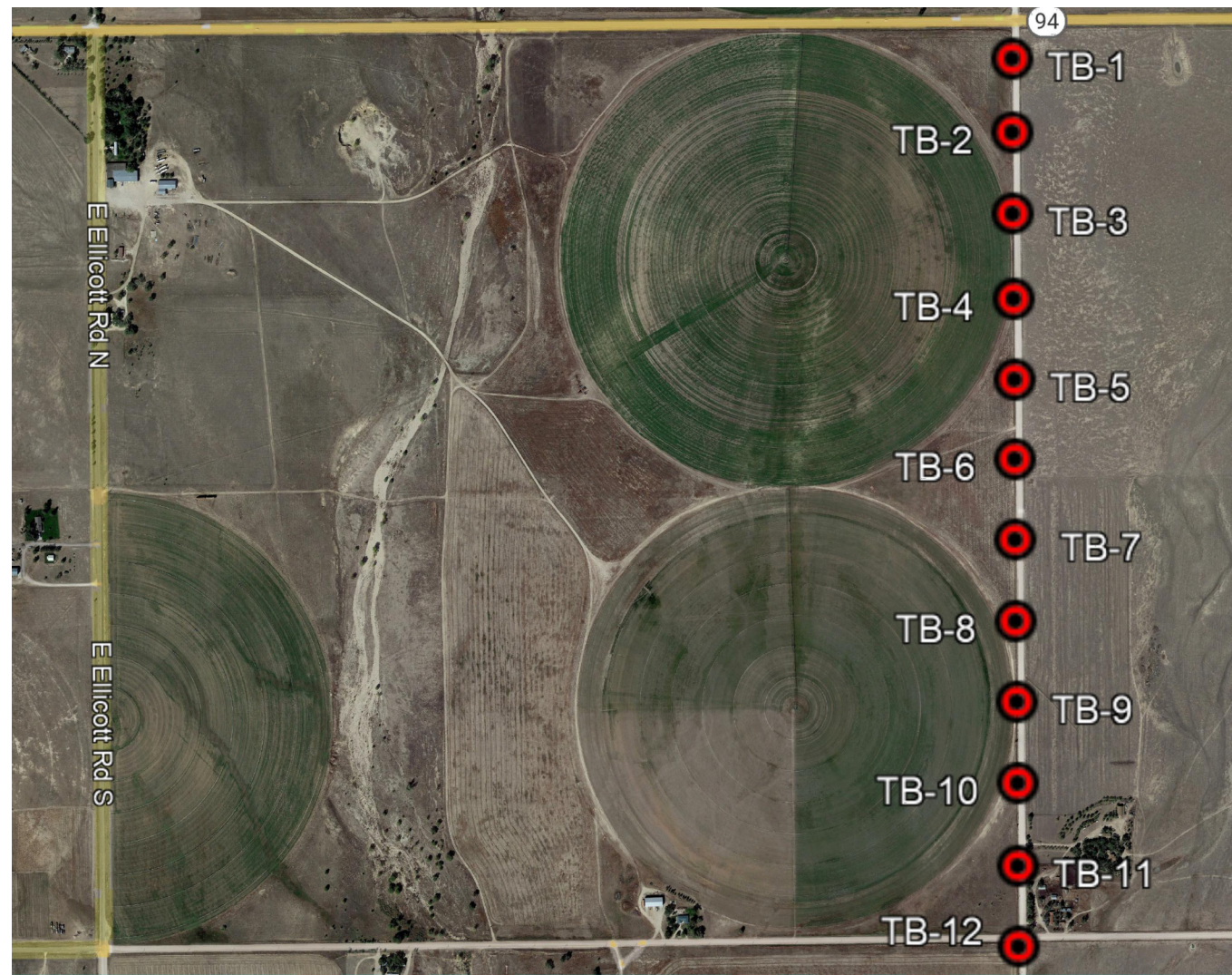


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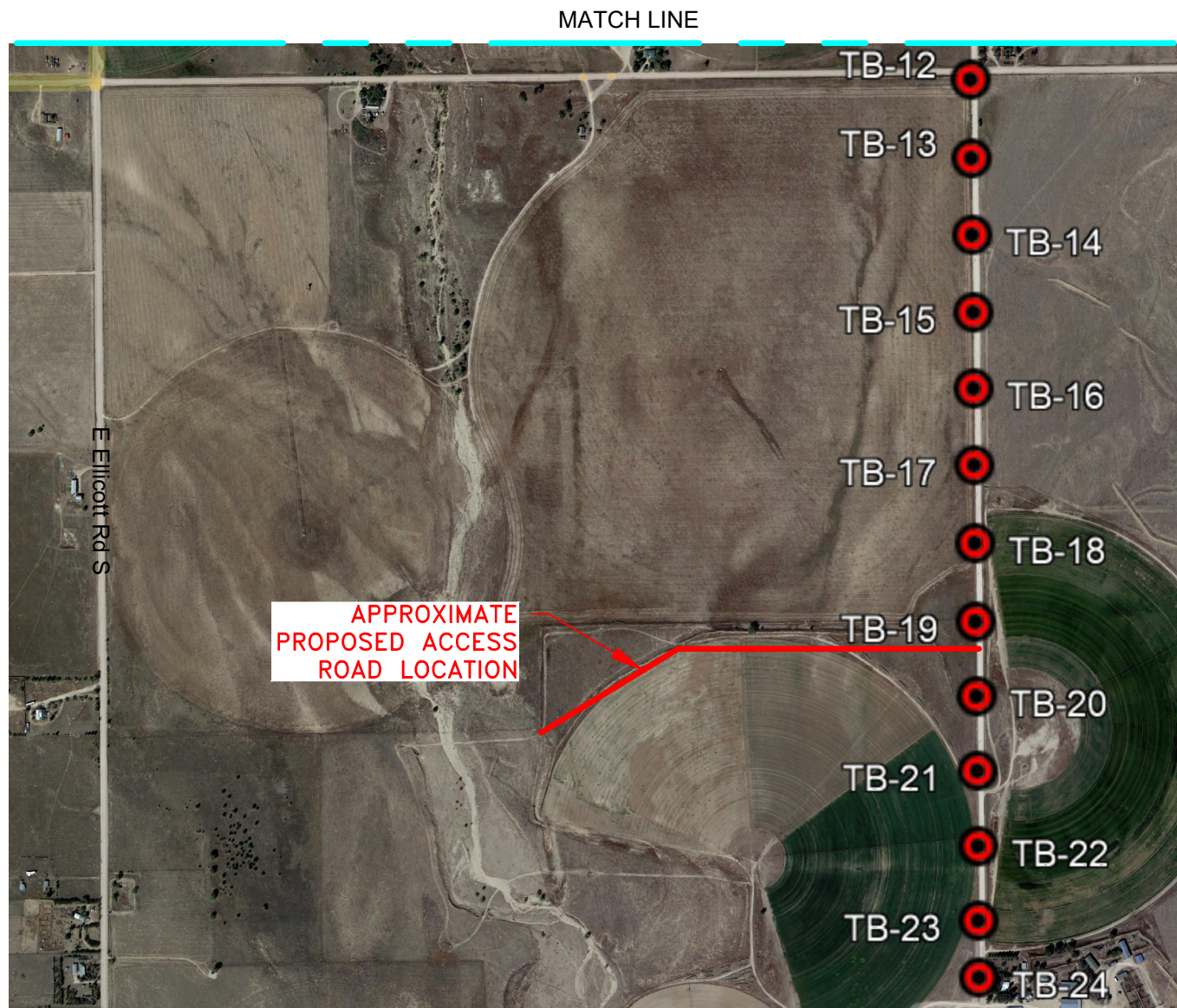
VICINITY MAP
SOUTH BAGGETT RD. & HIGHWAY 94
ELLCOTT SAND & GRAVEL, LLC

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231465

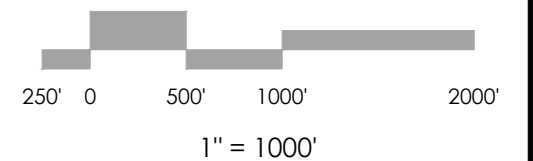
FIG. 1



MATCH LINE



MATCH LINE



 **TB- APPROXIMATE TEST BORING LOCATION AND NUMBER**



SITE AND EXPLORATION PLAN
SOUTH BAGGETT RD. & HIGHWAY 94
ELLCOTT SAND & GRAVEL, LLC

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FIG. 2

APPENDIX A: Test Boring Logs

TEST BORING 1
DATE DRILLED 9/11/2023

TEST BORING 2
DATE DRILLED 9/11/2023

REMARKS

REMARKS

DRY TO 5', 9/11/23

AGGREGATE ROAD SURFACING
FILL 0-3', SAND, SILTY, BROWN,
LOOSE, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0-5	(Symbol)		9	8.8	1
5	(Symbol)		18	7.9	3
10					
15					
20					

DRY TO 5', 9/11/23

AGGREGATE ROAD SURFACING
FILL 0-3', SAND, SILTY, BROWN,
MEDIUM DENSE, MOIST
SAND, SILTY, TAN, MEDIUM
DENSE, DRY

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0-5	(Symbol)		13	4.7	1
5	(Symbol)		15	2.1	3
10					
15					
20					



TEST BORING LOGS

S. BAGGETT RD. & HIGHWAY 94
ELLCOTT SAND & GRAVEL

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231465

FIG. A-1

TEST BORING 3
 DATE DRILLED 9/11/2023

TEST BORING 4
 DATE DRILLED 9/11/2023

REMARKS

REMARKS

DRY TO 10', 9/11/23

AGGREGATE ROAD SURFACING
 FILL 0-3', SAND, SILTY, BROWN,
 MEDIUM DENSE, MOIST
 SAND, SILTY, TAN, MEDIUM
 DENSE, MOIST

SAND, CLAYEY, BROWN, DENSE,
 MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0-3	(Symbol)		10	4.6	1
3-5	(Symbol)		24	3.8	3
5-10	(Symbol)		32		3

DRY TO 5', 9/11/23

AGGREGATE ROAD SURFACING
 FILL 0-1', SAND, SILTY, BROWN
 SAND, SLIGHTLY SILTY, BROWN,
 MEDIUM DENSE, MOIST to DRY

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0-1	(Symbol)		16	7.3	3
1-5	(Symbol)		21	1.4	3
5-10	(Symbol)				
10-15	(Symbol)				
15-20	(Symbol)				



TEST BORING LOGS
 S. BAGGETT RD. & HIGHWAY 94
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JOB NO.
 231465
FIG. A-2

TEST BORING 5
DATE DRILLED 9/11/2023

TEST BORING 6
DATE DRILLED 9/11/2023

REMARKS

REMARKS

DRY TO 5', 9/11/23

AGGREGATE ROAD SURFACING
FILL 0-1', SAND, SILTY, TAN
SAND, WITH SILT, BROWN to
TAN, MEDIUM DENSE, MOIST to
DRY

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0-1	(Symbol)		17	4.6	3
5	(Symbol)		23	1.3	3
10	(Symbol)				
15	(Symbol)				
20	(Symbol)				

DRY TO 10', 9/11/23

AGGREGATE ROAD SURFACING
FILL 0-1', SAND, SILTY, BROWN
SAND, SILTY, BROWN, MEDIUM
DENSE to LOOSE, DRY to MOIST

SAND, CLAYEY, BROWN, DENSE,
DRY

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0-1	(Symbol)		11	2.5	3
5	(Symbol)		9	3.4	3
10	(Symbol)		33	1.5	3
15	(Symbol)				
20	(Symbol)				



TEST BORING LOGS

S. BAGGETT RD. & HIGHWAY 94
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231465

FIG. A-3

TEST BORING 7
 DATE DRILLED 9/11/2023

TEST BORING 8
 DATE DRILLED 9/11/2023

REMARKS

REMARKS

DRY TO 5', 9/11/23

AGGREGATE ROAD SURFACING
 FILL 0-3', SAND, SILTY, BROWN,
 LOOSE, MOIST
 SAND, SILTY, BROWN, MEDIUM
 DENSE, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			8	9.2	1
5			20	8.5	3
10					
15					
20					

DRY TO 5', 9/11/23

AGGREGATE ROAD SURFACING
 FILL 0-3', SAND, SILTY, BROWN,
 LOOSE, MOIST
 SAND, SILTY, BROWN, LOOSE,
 MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			5	3.0	1
5			6	9.2	2
10					
15					
20					



TEST BORING LOGS

S. BAGGETT RD. & HIGHWAY 94
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JOB NO.
 231465

FIG. A-4

TEST BORING 9
 DATE DRILLED 9/11/2023

TEST BORING 10
 DATE DRILLED 9/11/2023

REMARKS

REMARKS

DRY TO 10', 9/11/23

AGGREGATE ROAD SURFACING
 FILL 0-3', SILT, SANDY, TAN,
 MEDIUM STIFF, MOIST
 SAND, SILTY, BROWN, MEDIUM
 DENSE, MOIST to DRY

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0-3	(Symbol)		6	1.5	2
3-5	(Symbol)		11	8.4	3
5-10	(Symbol)		26	1.5	3
10-15	(Symbol)				
15-20	(Symbol)				

DRY TO 5', 9/11/23

AGGREGATE ROAD SURFACING
 FILL 0-1', SAND, SILTY, BROWN
 SAND, SILTY, TAN, MEDIUM
 DENSE, DRY

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0-1	(Symbol)		21	4.9	3
1-5	(Symbol)		16	3.7	3
5-10	(Symbol)				
10-15	(Symbol)				
15-20	(Symbol)				



TEST BORING LOGS

S. BAGGETT RD. & HIGHWAY 94
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JOB NO.
 231465

FIG. A-5

TEST BORING 11
 DATE DRILLED 9/11/2023

TEST BORING 12
 DATE DRILLED 9/11/2023

REMARKS

REMARKS

DRY TO 5', 9/11/23

AGGREGATE ROAD SURFACING
 FILL 0-2', SAND, CLAYEY, TAN,
 LOOSE, MOIST
 SAND, SILTY, TAN, MEDIUM
 DENSE, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0-2	(Symbol)		7	3.8	2
2-5	(Symbol)		18	5.9	3

DRY TO 10', 9/11/23

AGGREGATE ROAD SURFACING
 FILL 0-3', SAND, SILTY, DARK
 BROWN, MEDIUM DENSE, DRY
 SAND, SILTY, TAN, MEDIUM
 DENSE, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0-3	(Symbol)		18	1.1	1
3-5	(Symbol)		18	4.0	3
5-10	(Symbol)		20	3.0	3



TEST BORING LOGS

S. BAGGETT RD. & HIGHWAY 94
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JOB NO.
 231465

FIG. A-6

TEST BORING 13
 DATE DRILLED 9/11/2023

TEST BORING 14
 DATE DRILLED 9/11/2023

REMARKS

REMARKS

DRY TO 5', 9/11/23

AGGREGATE ROAD SURFACING
 FILL 0-3', SILT, SANDY, TAN,
 STIFF, MOIST
 SAND, SILTY, BROWN, MEDIUM
 DENSE, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0-3	(Symbol)		12	4.1	2
3-5	(Symbol)		24	9.2	3

DRY TO 5', 9/11/23

AGGREGATE ROAD SURFACING
 FILL 0-1', SAND, SILTY, BROWN
 SAND, SILTY, BROWN, LOOSE,
 DRY to MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0-1	(Symbol)		6	1.0	3
1-5	(Symbol)		3	8.9	3



TEST BORING LOGS

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 231465

FIG. A-7

TEST BORING 15
 DATE DRILLED 9/11/2023

TEST BORING 16
 DATE DRILLED 9/11/2023

REMARKS

REMARKS

DRY TO 10', 9/11/23

AGGREGATE ROAD SURFACING
 SAND, SILTY, BROWN, MEDIUM
 DENSE, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0			16	3.0	3
5			10	3.1	3
10			21	3.7	3
15					
20					

DRY TO 5', 9/11/23

AGGREGATE ROAD SURFACING
 FILL 0-2', SAND, WITH SILT, TAN,
 DENSE, MOIST
 SAND, SILTY, BROWN, LOOSE,
 DRY

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0			39	3.9	1
5			7	1.5	3
10					
15					
20					



TEST BORING LOGS

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JOB NO.
 231465

FIG. A-8

TEST BORING 17
 DATE DRILLED 9/11/2023

TEST BORING 18
 DATE DRILLED 9/11/2023

REMARKS

REMARKS

DRY TO 5', 9/11/23
 AGGREGATE ROAD SURFACING
 SAND, SILTY, TAN to BROWN,
 LOOSE, DRY to MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0-5	(Symbol: aggregate road surfacing)		7	1.8	3
5-8	(Symbol: aggregate road surfacing)		8	6.8	3

DRY TO 10', 9/11/23
 AGGREGATE ROAD SURFACING
 FILL 0-2', SILT, SANDY, TAN,
 MEDIUM STIFF, MOIST
 SAND, SILTY, BROWN, MEDIUM
 DENSE to LOOSE, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0-2	(Symbol: aggregate road surfacing)		7	3.7	1
2-5	(Symbol: aggregate road surfacing)		11	12.3	3
5-10	(Symbol: aggregate road surfacing)		7	3.2	3



TEST BORING LOGS

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JOB NO.
 231465

FIG. A-9

TEST BORING 19
 DATE DRILLED 9/11/2023

TEST BORING 20
 DATE DRILLED 9/11/2023

REMARKS

REMARKS

DRY TO 5', 9/11/23

AGGREGATE ROAD SURFACING
 SAND, SILTY, DARK BROWN to
 BROWN, MEDIUM DENSE, DRY to
 MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			19	2.8	3
5			11	4.9	3
10					
15					
20					

DRY TO 5', 9/11/23

AGGREGATE ROAD SURFACING
 FILL 0-1', SAND, SILTY, BROWN
 SAND, SILTY, DARK BROWN,
 MEDIUM DENSE to LOOSE,

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			23	7.5	3
5			9	8.7	3
10					
15					
20					



TEST BORING LOGS

S. BAGGETT RD. & HIGHWAY 94
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JOB NO.
 231465

FIG. A-10

TEST BORING 21
 DATE DRILLED 9/11/2023

TEST BORING 22
 DATE DRILLED 9/11/2023

REMARKS

REMARKS

DRY TO 10', 9/11/23

AGGREGATE ROAD SURFACING
 SAND, SILTY, BROWN to GRAY,
 MEDIUM DENSE, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			13	5.1	4
5			11	11.1	4
10			11	28.0	4

DRY TO 5', 9/11/23

AGGREGATE ROAD SURFACING
 SAND, SILTY, BROWN to TAN,
 LOOSE to MEDIUM DENSE, DRY
 to MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			9	2.1	3
5			18	6.2	3



TEST BORING LOGS

S. BAGGETT RD. & HIGHWAY 94
 ELLICOTT SAND & GRAVEL

JOB NO.
 231465

FIG. A-11

TEST BORING 23
 DATE DRILLED 9/11/2023

TEST BORING 24
 DATE DRILLED 9/11/2023

REMARKS

REMARKS

DRY TO 5', 9/11/23

AGGREGATE ROAD SURFACING
 FILL 0-3', SAND, SILTY, DARK
 BROWN, LOOSE, MOIST
 SAND, SILTY, TAN, MEDIUM
 DENSE, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0-3	(Symbol)		9	4.6	1
3-5	(Symbol)		18	7.3	3

DRY TO 5', 9/11/23

AGGREGATE ROAD SURFACING
 CLAY-SILT, SANDY, BROWN to
 TAN, MEDIUM STIFF to STIFF,
 MOIST to DRY

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0-3	(Symbol)		7	8.3	4
3-5	(Symbol)		13	1.8	4



TEST BORING LOGS

S. BAGGETT RD. & HIGHWAY 94
 ELLICOTT SAND & GRAVEL

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FIG. A-12

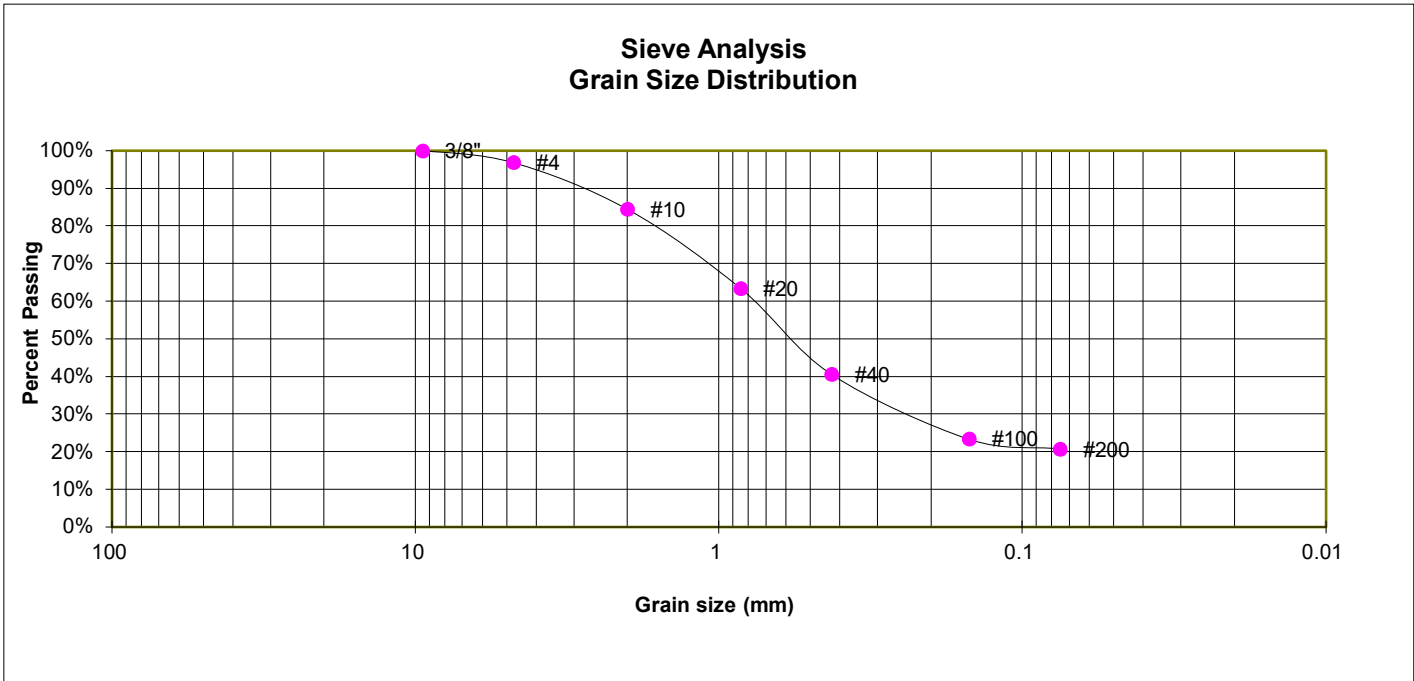
APPENDIX B: Laboratory Test Results

**TABLE B-1
SUMMARY OF LABORATORY TEST RESULTS**

SOIL TYPE	TEST BORING NO.	DEPTH (FT)	PASSING NO. 200 SIEVE (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTIC INDEX	SULFATE (WT %)	AASHTO CLASS.	USCS	SOIL DESCRIPTION
1, CBR	8	0-3	20.8	NV	NP	NP		A-2-4	SM	FILL, SAND, SILTY
1	1	1-2	27.6	17	16	1		A-2-4	SM	FILL, SAND, SILTY
1	2	1-2	24.2	NV	NP	NP	<0.01	A-2-4	SM	FILL, SAND, SILTY
1	3	1-2	20.0	NV	NP	NP		A-2-4	SM	FILL, SAND, SILTY
1	7	1-2	26.0	NV	NP	NP	0.40	A-2-4	SM	FILL, SAND, SILTY
1	8	1-2	25.1	NV	NP	NP		A-2-4	SM	FILL, SAND, SILTY
1	12	1-2	22.6	NV	NP	NP		A-2-4	SM	FILL, SAND, SILTY
1	16	1-2	6.4	NV	NP	NP	0.39	A-1-b	SW-SM	FILL, SAND, WITH SILT
1	23	1-2	25.8	NV	NP	NP		A-2-4	SM	FILL, SAND, SILTY
2, CBR	18	0-3	66.7	27	26	1		A-4	ML	FILL, SILT, SANDY
2	9	1-2	53.2	NV	NP	NP		A-4	ML	FILL, SILT, SANDY
2	11	1-2	44.3	29	16	13	0.40	A-6	SC	FILL, SAND, CLAYEY
2	13	1-2	67.8	NV	NP	NP	0.40	A-4	ML	FILL, SILT, SANDY
2	18	1-2	60.6	NV	NP	NP	0.38	A-4	ML	FILL, SILT, SANDY
3	4	1-2	4.9	NV	NP	NP		A-1-b	SW	SAND, SLIGHTLY SILTY
3	5	1-2	5.6	NV	NP	NP		A-1-b	SW-SM	SAND, WITH SILT
3	6	1-2	13.0	NV	NP	NP		A-2-4	SM	SAND, SILTY
3	10	1-2	15.6	NV	NP	NP		A-2-4	SM	SAND, SILTY
3	14	1-2	29.7	22	21	1		A-2-4	SM	SAND, SILTY
3	15	1-2	10.4	NV	NP	NP		A-1-b	SW-SM	SAND, WITH SILT
3	17	1-2	30.3	NV	NP	NP		A-2-4	SM	SAND, SILTY
3	19	1-2	27.5	NV	NP	NP		A-2-4	SM	SAND, SILTY
3	20	1-2	20.0	NV	NP	NP		A-2-4	SM	SAND, SILTY
3	22	1-2	13.3	NV	NP	NP	0.41	A-2-4	SM	SAND, SILTY
4	21	1-2	43.8	NV	NP	NP	0.39	A-4	SM	SAND, SILTY
4	24	1-2	50.8	22	17	5		A-4	CL-ML	CLAY-SILT, SANDY
Aggregate Surfacing	NA	0	6.7					A-4	SW-SM	Existing Aggregate Surfacing

TEST BORING 8
 DEPTH (FT) 0-3

SOIL DESCRIPTION FILL, SAND, SILTY
 SOIL TYPE 1, CBR



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	96.9%
10	84.5%
20	63.4%
40	40.6%
100	23.4%
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



LABORATORY TEST RESULTS

S. BAGGETT RD. & HIGHWAY 94
 ELLICOTT SAND & GRAVEL

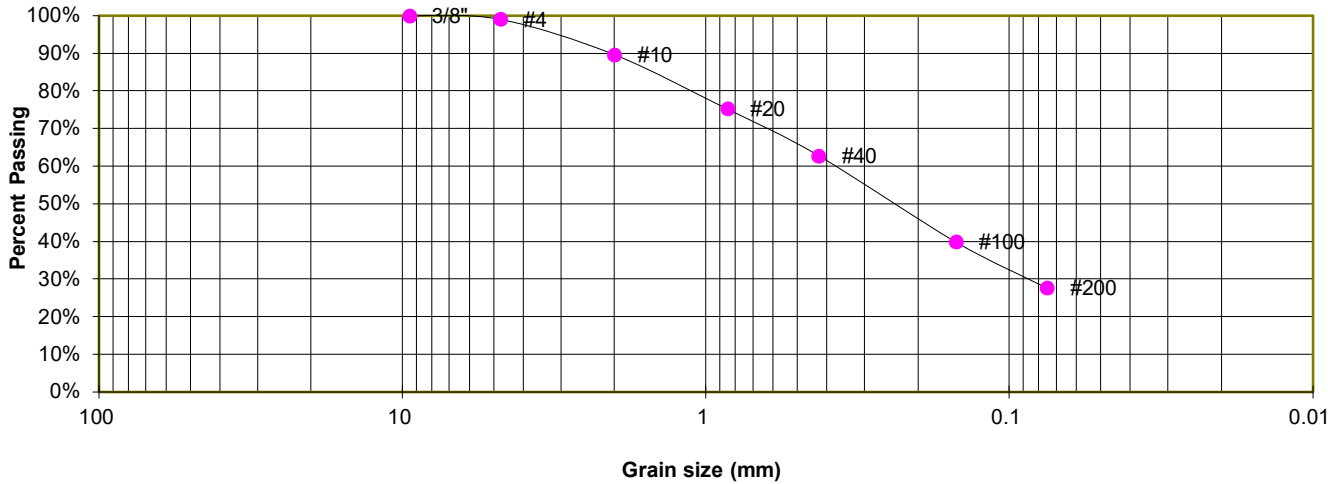
JOB NO.
231465

FIG. B-1

TEST BORING 1
DEPTH (FT) 1-2

SOIL DESCRIPTION FILL, SAND, SILTY
SOIL TYPE 1

**Sieve Analysis
Grain Size Distribution**



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.1%
10	89.6%
20	75.3%
40	62.8%
100	39.9%
200	27.6%

ATTERBERG LIMITS

Plastic Limit	16
Liquid Limit	17
Plastic Index	1

SOIL CLASSIFICATION

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



LABORATORY TEST RESULTS

S. BAGGETT RD. & HIGHWAY 94
ELLCOTT SAND & GRAVEL

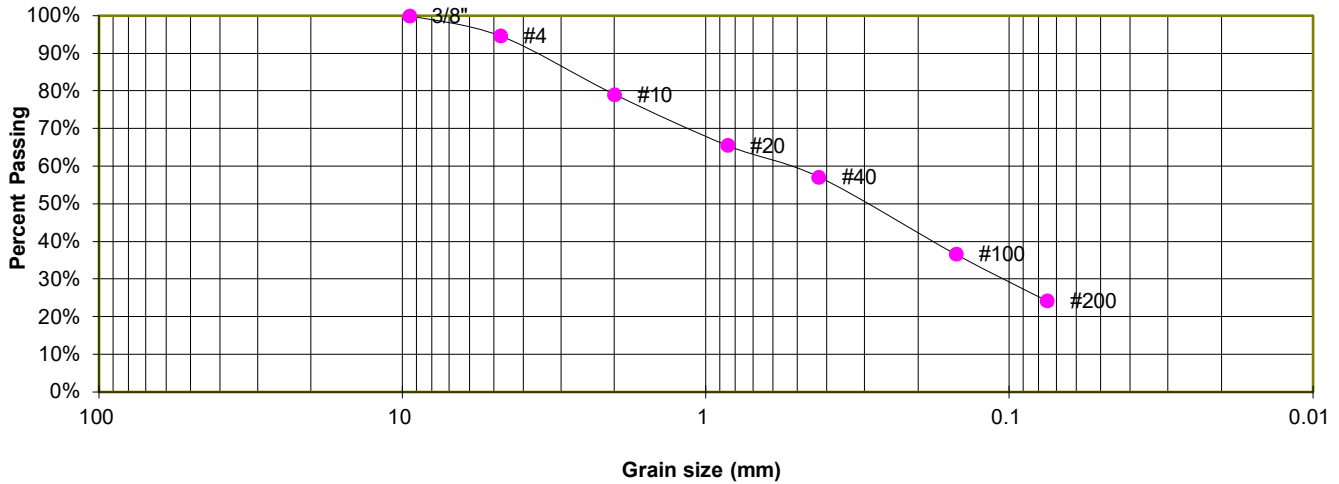
JOB NO.
231465

FIG. B-2

TEST BORING 2
 DEPTH (FT) 1-2

SOIL DESCRIPTION FILL, SAND, SILTY
 SOIL TYPE 1

**Sieve Analysis
 Grain Size Distribution**



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	94.7%
10	79.1%
20	65.6%
40	57.2%
100	36.6%
200	24.2%

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



LABORATORY TEST RESULTS

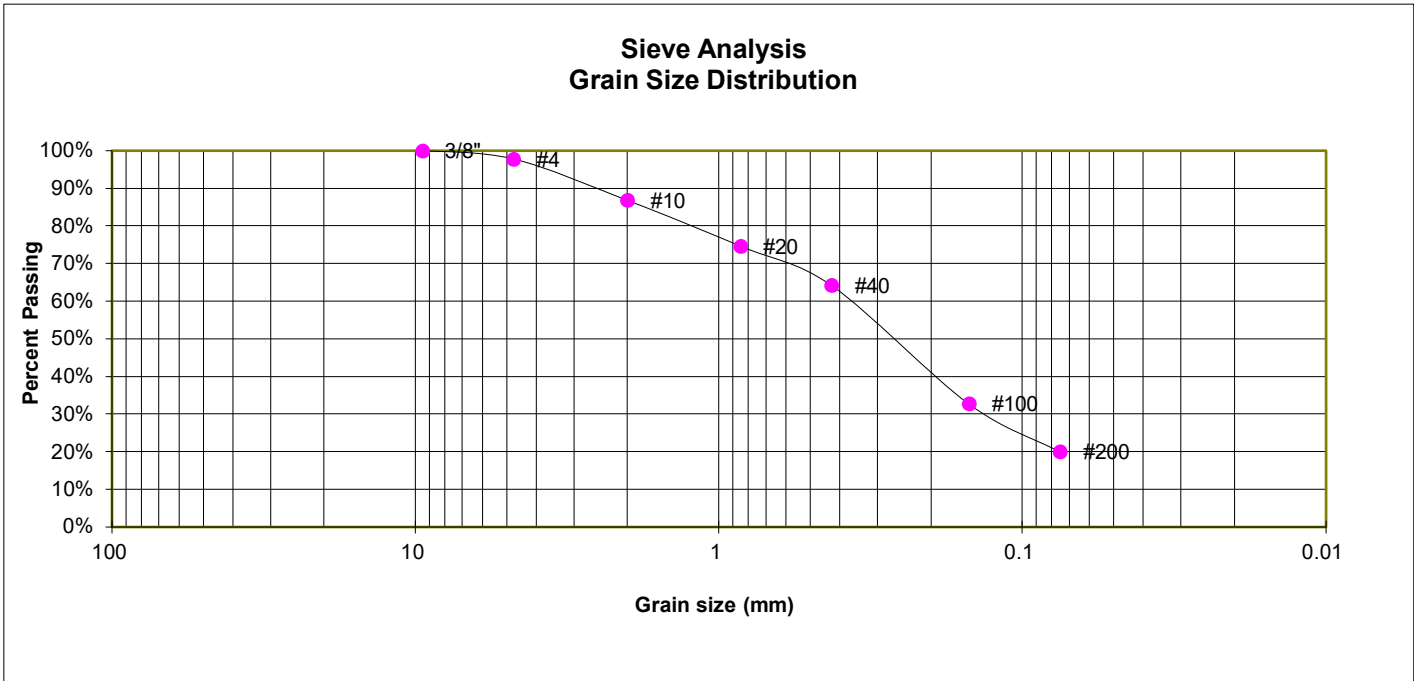
S. BAGGETT RD. & HIGHWAY 94
 ELLICOTT SAND & GRAVEL

JOB NO.
 231465

FIG. B-3

TEST BORING 3
 DEPTH (FT) 1-2

SOIL DESCRIPTION FILL, SAND, SILTY
 SOIL TYPE 1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	97.8%
10	86.9%
20	74.7%
40	64.2%
100	32.7%
200	20.0%

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



LABORATORY TEST RESULTS

S. BAGGETT RD. & HIGHWAY 94
 ELLICOTT SAND & GRAVEL

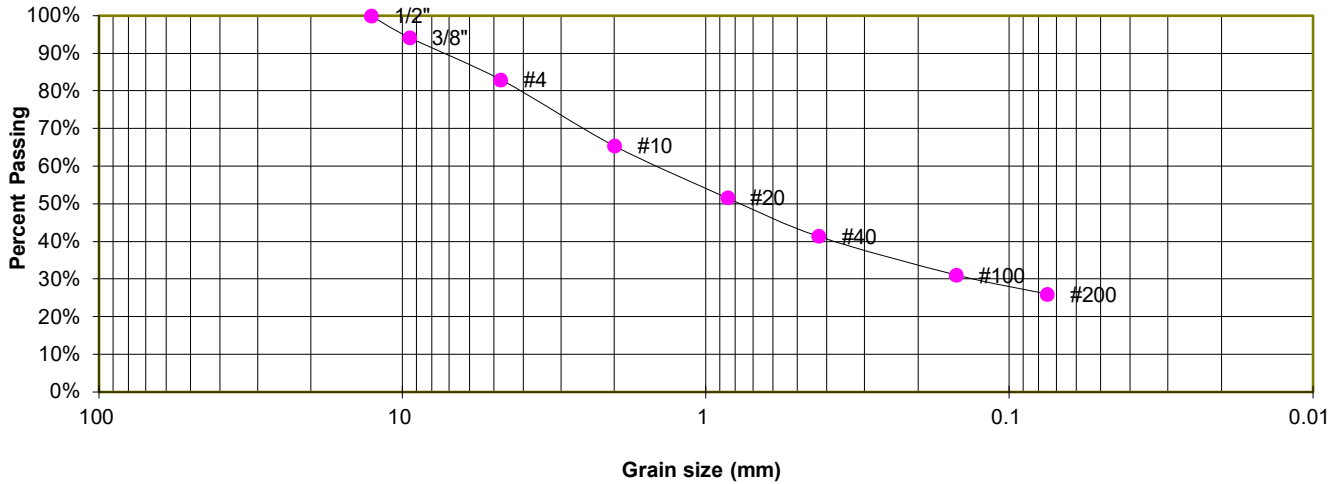
JOB NO.
 231465

FIG. B-4

TEST BORING 7
 DEPTH (FT) 1-2

SOIL DESCRIPTION FILL, SAND, SILTY
 SOIL TYPE 1

**Sieve Analysis
 Grain Size Distribution**



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	94.2%
4	83.0%
10	65.4%
20	51.6%
40	41.5%
100	31.1%
200	26.0%

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



LABORATORY TEST RESULTS

S. BAGGETT RD. & HIGHWAY 94
 ELLICOTT SAND & GRAVEL

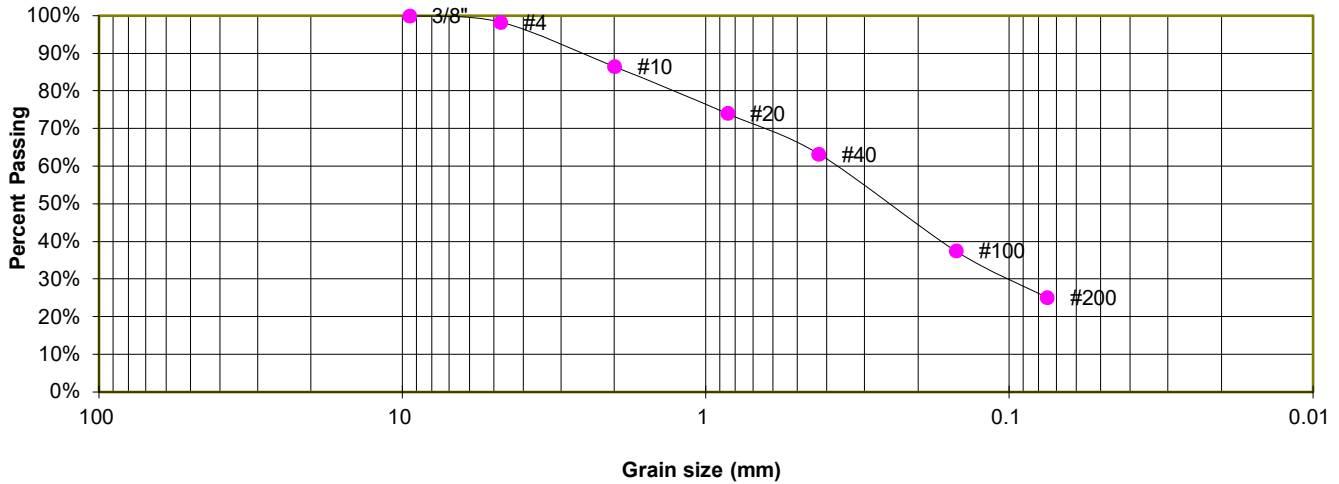
JOB NO.
 231465

FIG. B-5

TEST BORING 8
 DEPTH (FT) 1-2

SOIL DESCRIPTION FILL, SAND, SILTY
 SOIL TYPE 1

**Sieve Analysis
 Grain Size Distribution**



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	98.3%
10	86.5%
20	74.1%
40	63.3%
100	37.5%
200	25.1%

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



LABORATORY TEST RESULTS

S. BAGGETT RD. & HIGHWAY 94
 ELLICOTT SAND & GRAVEL

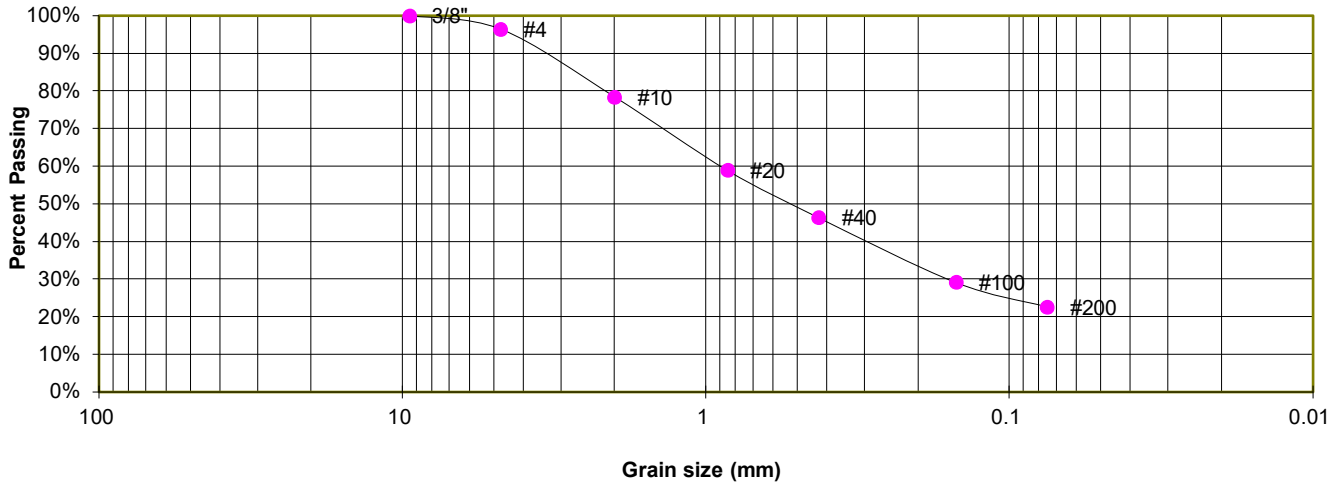
JOB NO.
 231465

FIG. B-6

TEST BORING 12
 DEPTH (FT) 1-2

SOIL DESCRIPTION FILL, SAND, SILTY
 SOIL TYPE 1

**Sieve Analysis
 Grain Size Distribution**



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	96.5%
10	78.4%
20	59.0%
40	46.4%
100	29.2%
200	22.6%

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



LABORATORY TEST RESULTS

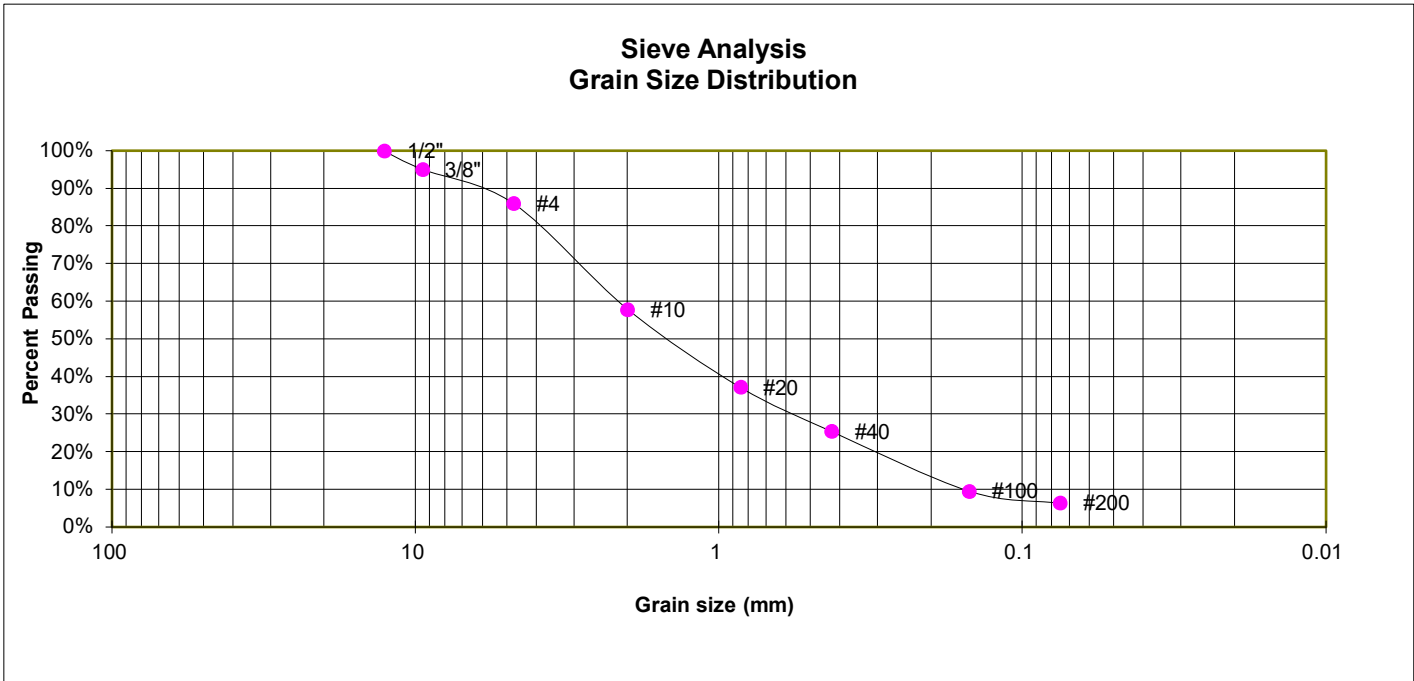
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 ELLICOTT SAND & GRAVEL

JOB NO.
 231465

FIG. B-7

TEST BORING 16
 DEPTH (FT) 1-2

SOIL DESCRIPTION FILL, SAND, WITH SILT
 SOIL TYPE 1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	95.1%
4	86.0%
10	57.8%
20	37.2%
40	25.4%
100	9.6%
200	6.4%

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



LABORATORY TEST RESULTS

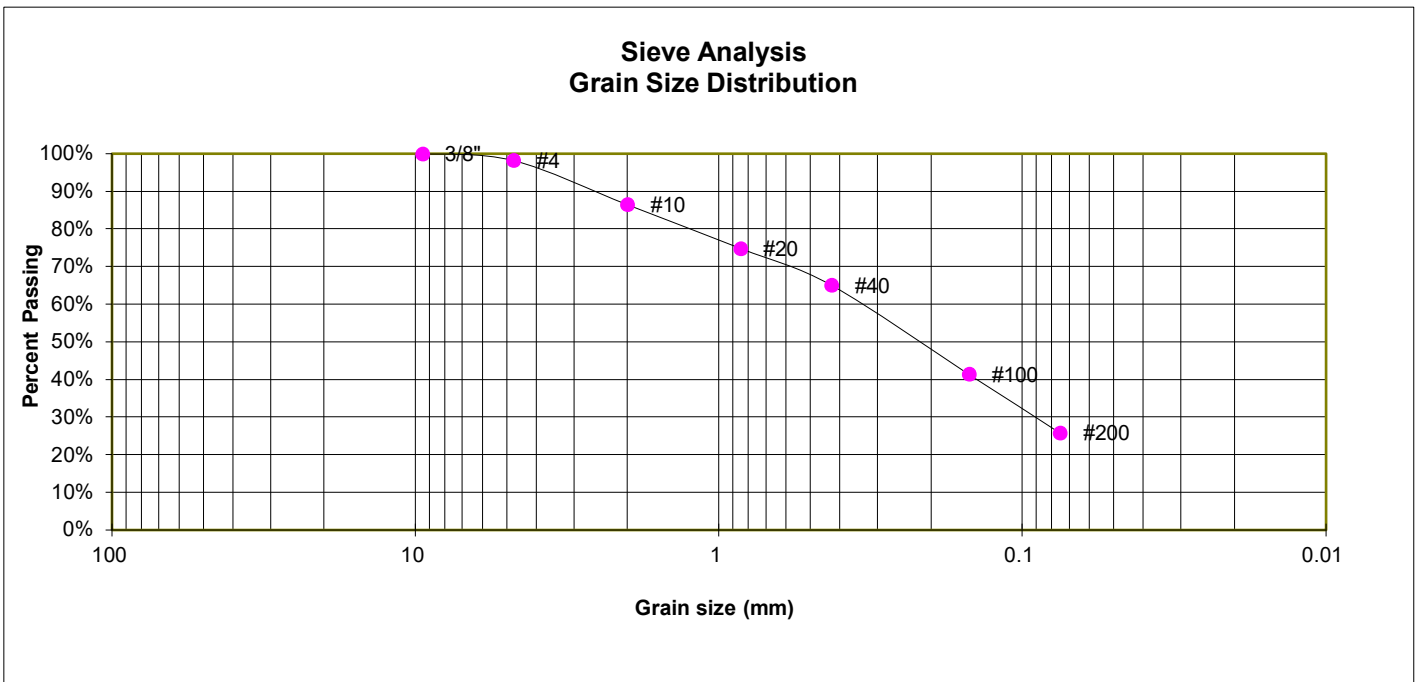
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 ELLICOTT SAND & GRAVEL

JOB NO.
231465

FIG. B-8

TEST BORING 23
 DEPTH (FT) 1-2

SOIL DESCRIPTION FILL, SAND, SILTY
 SOIL TYPE 1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	98.2%
10	86.5%
20	74.8%
40	65.0%
100	41.4%
200	25.8%

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



LABORATORY TEST RESULTS

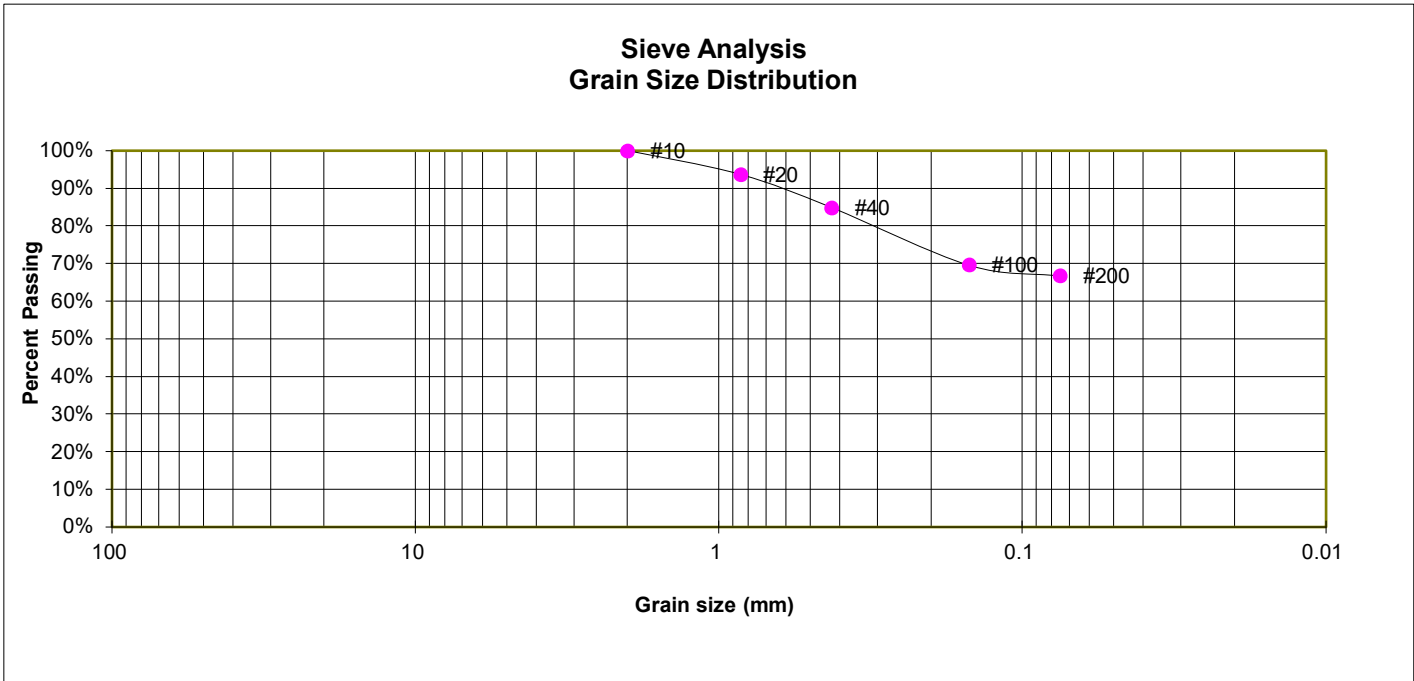
S. BAGGETT RD. & HIGHWAY 94
 ELLICOTT SAND & GRAVEL

JOB NO.
 231465

FIG. B-9

TEST BORING 18
 DEPTH (FT) 0-3

SOIL DESCRIPTION FILL, SILT, SANDY
 SOIL TYPE 2, CBR



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	
10	100.0%
20	93.7%
40	84.9%
100	69.6%
200	66.7%

ATTERBERG LIMITS

Plastic Limit	26
Liquid Limit	27
Plastic Index	1

SOIL CLASSIFICATION

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



LABORATORY TEST RESULTS

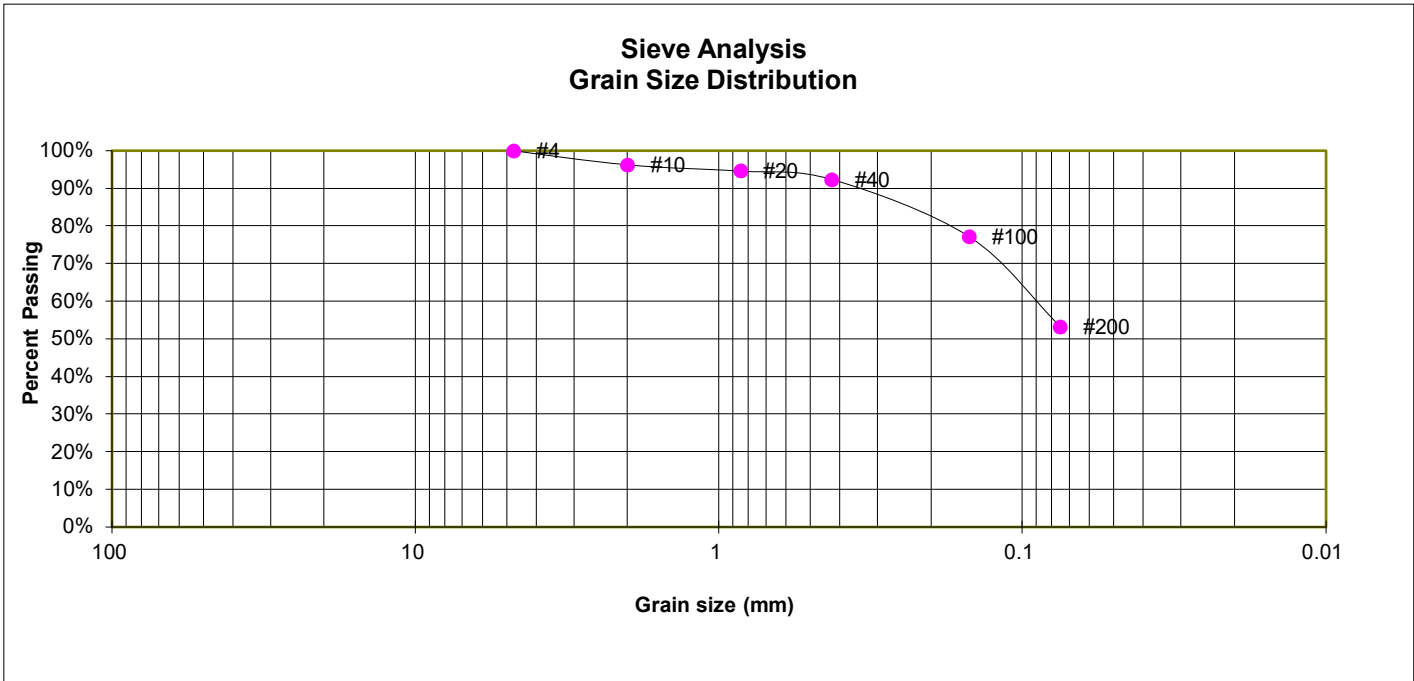
S. BAGGETT RD. & HIGHWAY 94
 ELLICOTT SAND & GRAVEL

JOB NO.
 231465

FIG. B-10

TEST BORING 9
 DEPTH (FT) 1-2

SOIL DESCRIPTION FILL, SILT, SANDY
 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	96.3%
20	94.7%
40	92.3%
100	77.2%
200	53.2%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

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



LABORATORY TEST RESULTS

S. BAGGETT RD. & HIGHWAY 94
 ELLICOTT SAND & GRAVEL

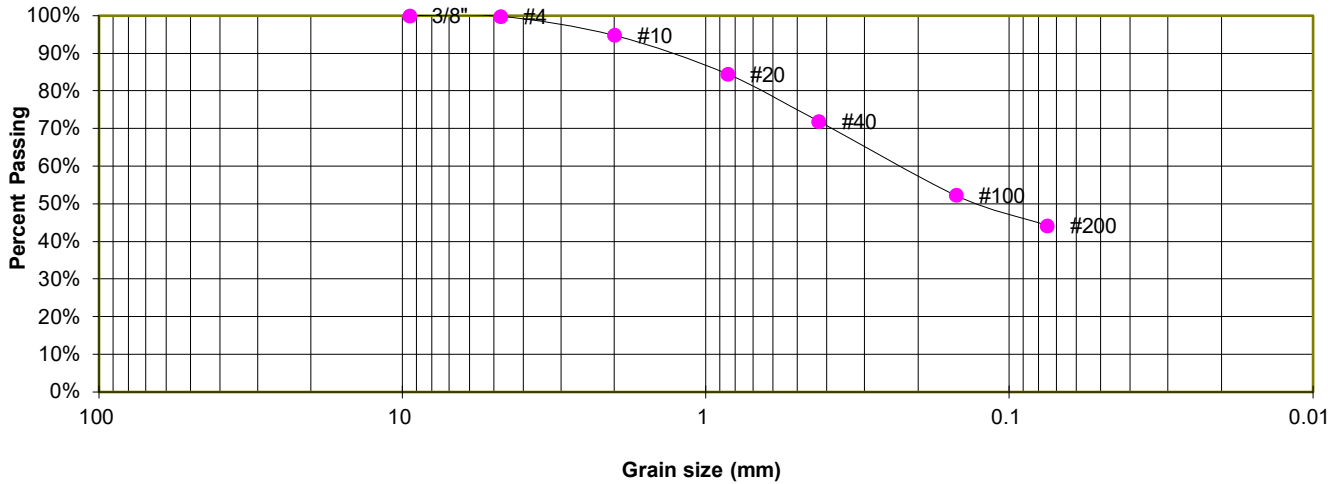
JOB NO.
 231465

FIG. B-11

TEST BORING 11
 DEPTH (FT) 1-2

SOIL DESCRIPTION FILL, SAND, CLAYEY
 SOIL TYPE 2

**Sieve Analysis
 Grain Size Distribution**



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.8%
10	94.8%
20	84.5%
40	72.0%
100	52.3%
200	44.3%

ATTERBERG LIMITS

Plastic Limit	16
Liquid Limit	29
Plastic Index	13

SOIL CLASSIFICATION

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



LABORATORY TEST RESULTS

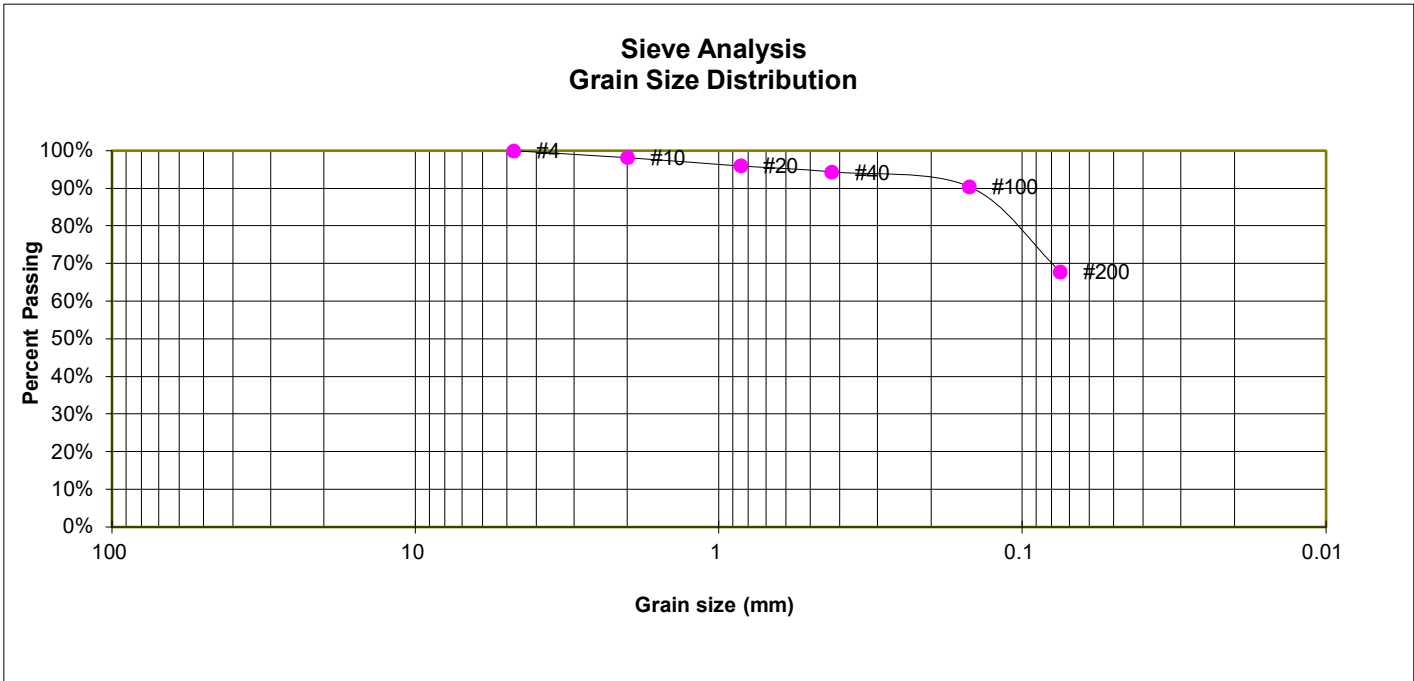
S. BAGGETT RD. & HIGHWAY 94
 ELLICOTT SAND & GRAVEL

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 231465

FIG. B-12

TEST BORING 13
 DEPTH (FT) 1-2

SOIL DESCRIPTION FILL, SILT, SANDY
 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	98.2%
20	96.0%
40	94.4%
100	90.5%
200	67.8%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

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



LABORATORY TEST RESULTS

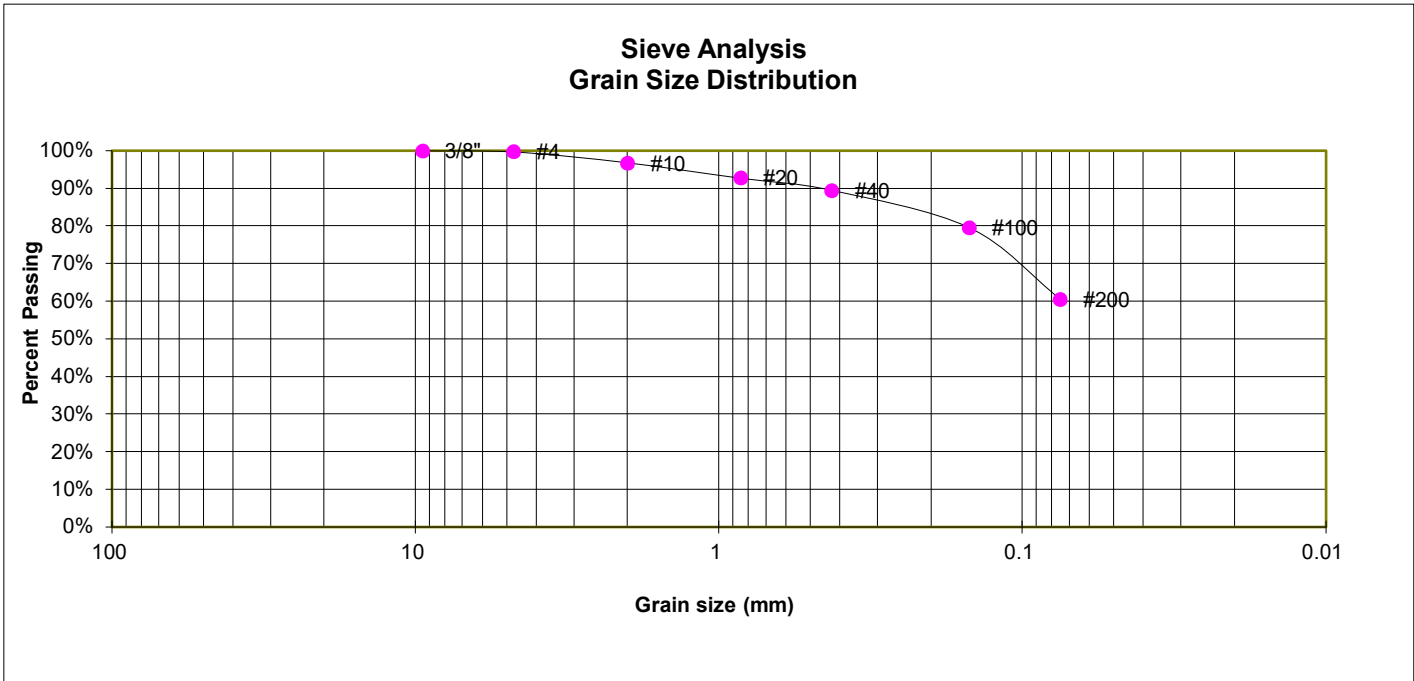
S. BAGGETT RD. & HIGHWAY 94
 ELLICOTT SAND & GRAVEL

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 231465

FIG. B-13

TEST BORING 18
 DEPTH (FT) 1-2

SOIL DESCRIPTION FILL, SILT, SANDY
 SOIL TYPE 2



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.7%
10	96.8%
20	92.8%
40	89.5%
100	79.6%
200	60.6%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

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



LABORATORY TEST RESULTS

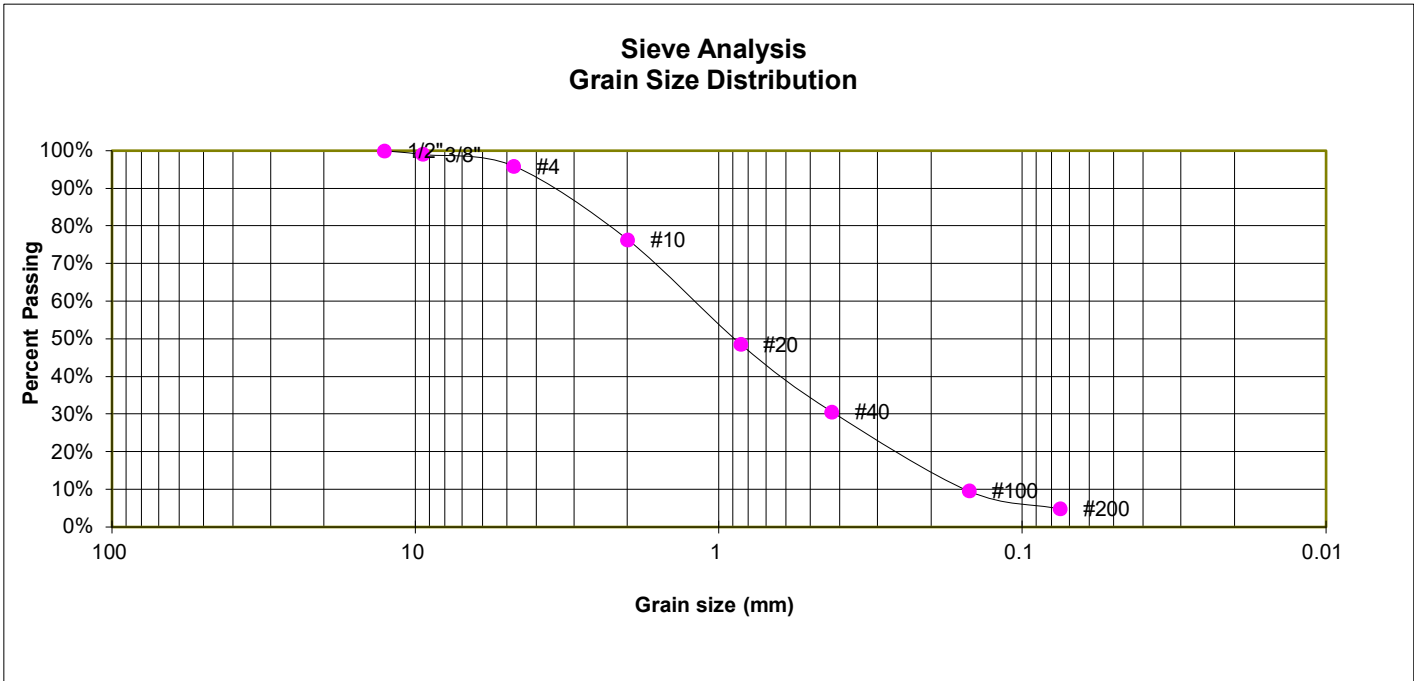
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 ELLICOTT SAND & GRAVEL

JOB NO.
 231465

FIG. B-14

TEST BORING 4
 DEPTH (FT) 1-2

SOIL DESCRIPTION SAND, SLIGHTLY SILTY
 SOIL TYPE 3



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	99.1%
4	95.9%
10	76.4%
20	48.7%
40	30.7%
100	9.6%
200	4.9%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

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



LABORATORY TEST RESULTS

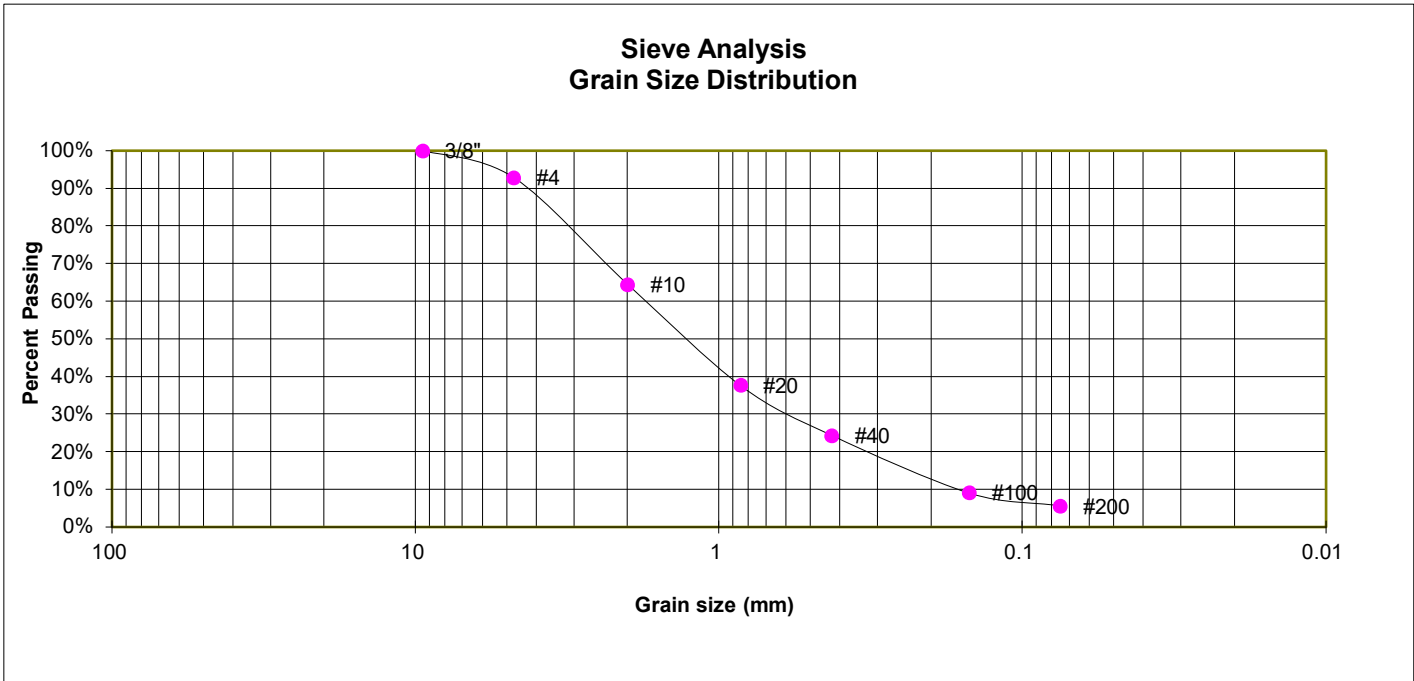
S. BAGGETT RD. & HIGHWAY 94
 ELLICOTT SAND & GRAVEL

JOB NO.
 231465

FIG. B-15

TEST BORING 5
 DEPTH (FT) 1-2

SOIL DESCRIPTION SAND, WITH SILT
 SOIL TYPE 3



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	92.9%
10	64.5%
20	37.7%
40	24.3%
100	9.1%
200	5.6%

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



LABORATORY TEST RESULTS

S. BAGGETT RD. & HIGHWAY 94
 ELLICOTT SAND & GRAVEL

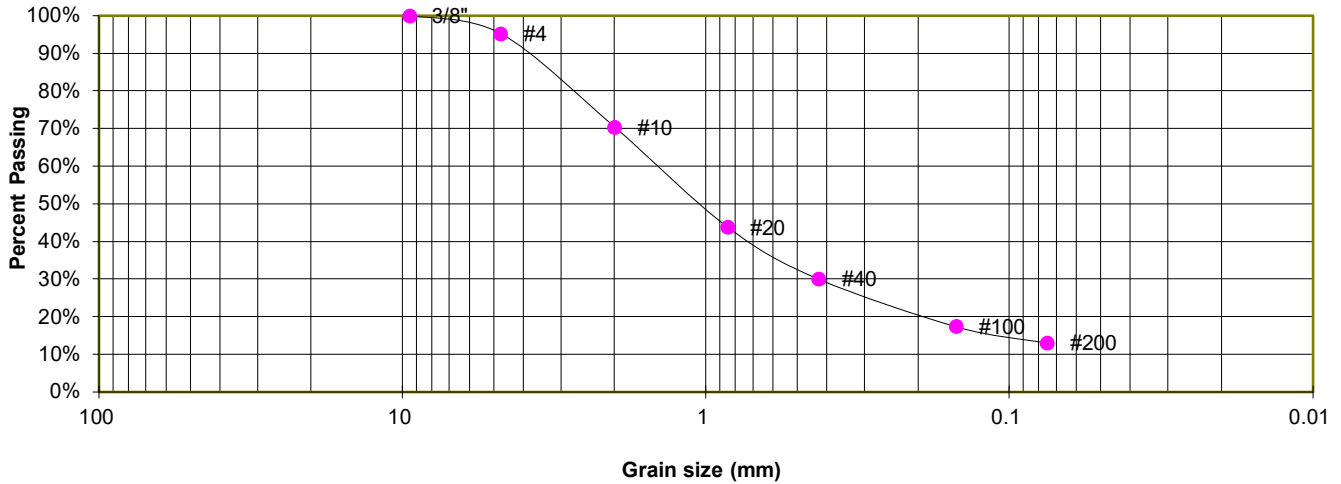
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 231465

FIG. B-16

TEST BORING 6
 DEPTH (FT) 1-2

SOIL DESCRIPTION SAND, SILTY
 SOIL TYPE 3

**Sieve Analysis
 Grain Size Distribution**



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	95.2%
10	70.4%
20	43.9%
40	30.1%
100	17.4%
200	13.0%

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



LABORATORY TEST RESULTS

S. BAGGETT RD. & HIGHWAY 94
 ELLICOTT SAND & GRAVEL

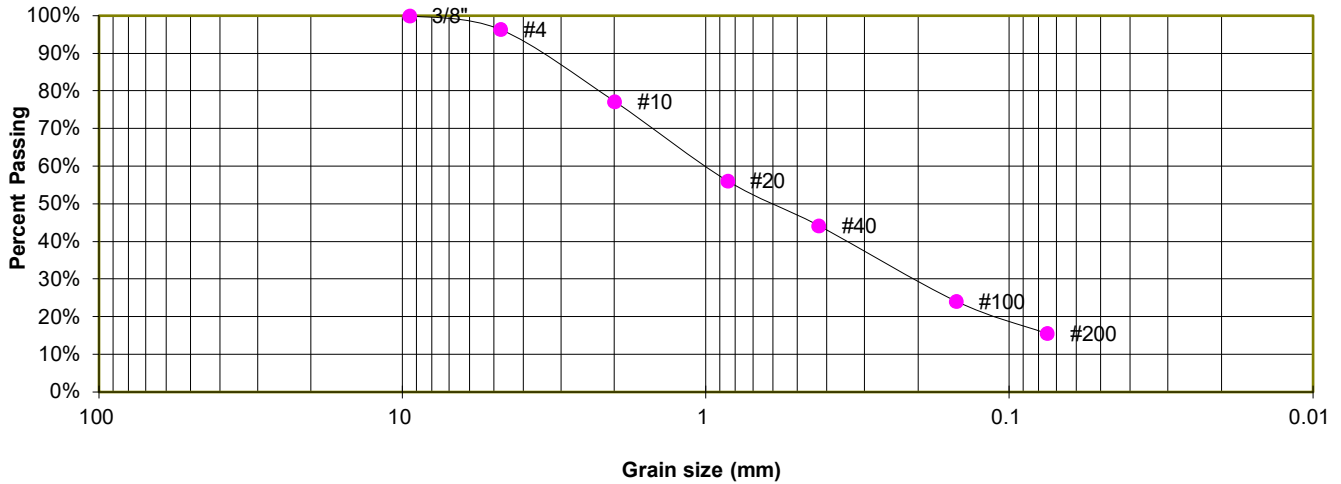
JOB NO.
 231465

FIG. B-17

TEST BORING 10
 DEPTH (FT) 1-2

SOIL DESCRIPTION SAND, SILTY
 SOIL TYPE 3

**Sieve Analysis
 Grain Size Distribution**



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	96.4%
10	77.2%
20	56.2%
40	44.2%
100	24.1%
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



LABORATORY TEST RESULTS

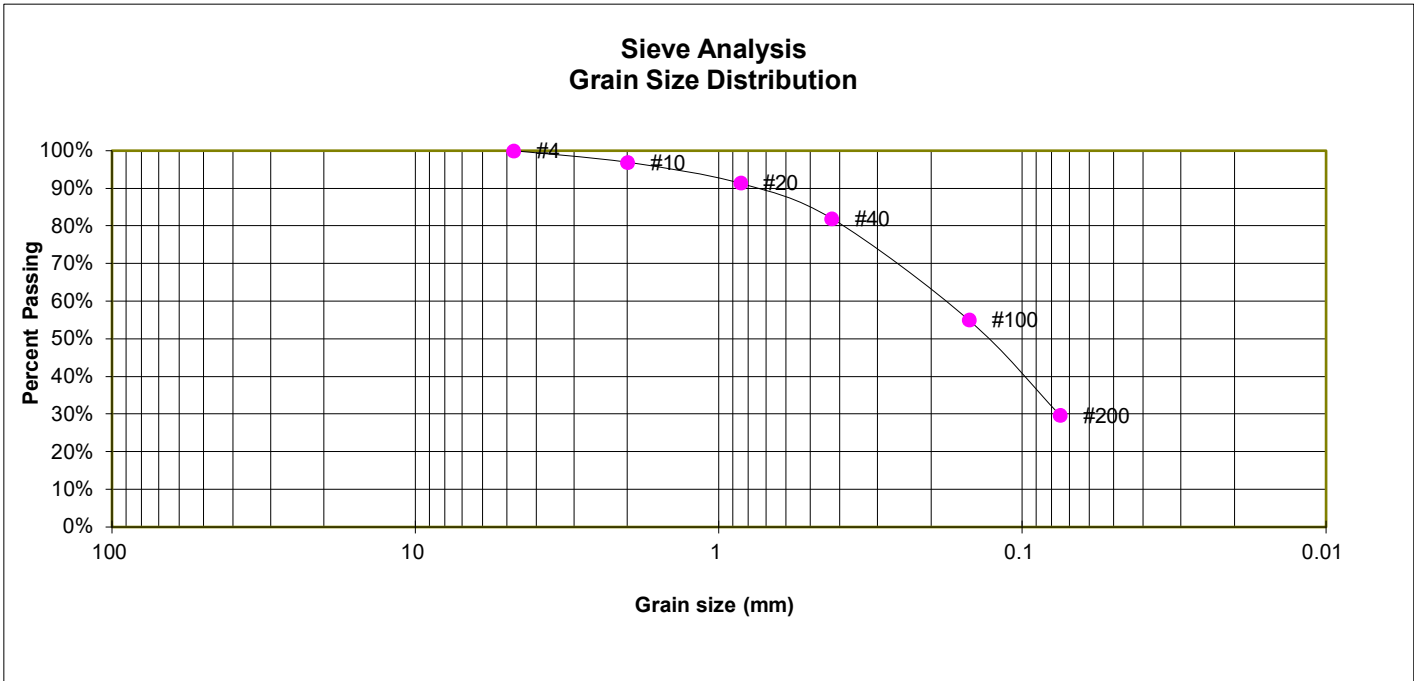
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 ELLICOTT SAND & GRAVEL

JOB NO.
 231465

FIG. B-18

TEST BORING 14
 DEPTH (FT) 1-2

SOIL DESCRIPTION SAND, SILTY
 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	96.9%
20	91.4%
40	82.0%
100	55.1%
200	29.7%

ATTERBERG LIMITS

Plastic Limit	21
Liquid Limit	22
Plastic Index	1

SOIL CLASSIFICATION

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



LABORATORY TEST RESULTS

S. BAGGETT RD. & HIGHWAY 94
 ELLICOTT SAND & GRAVEL

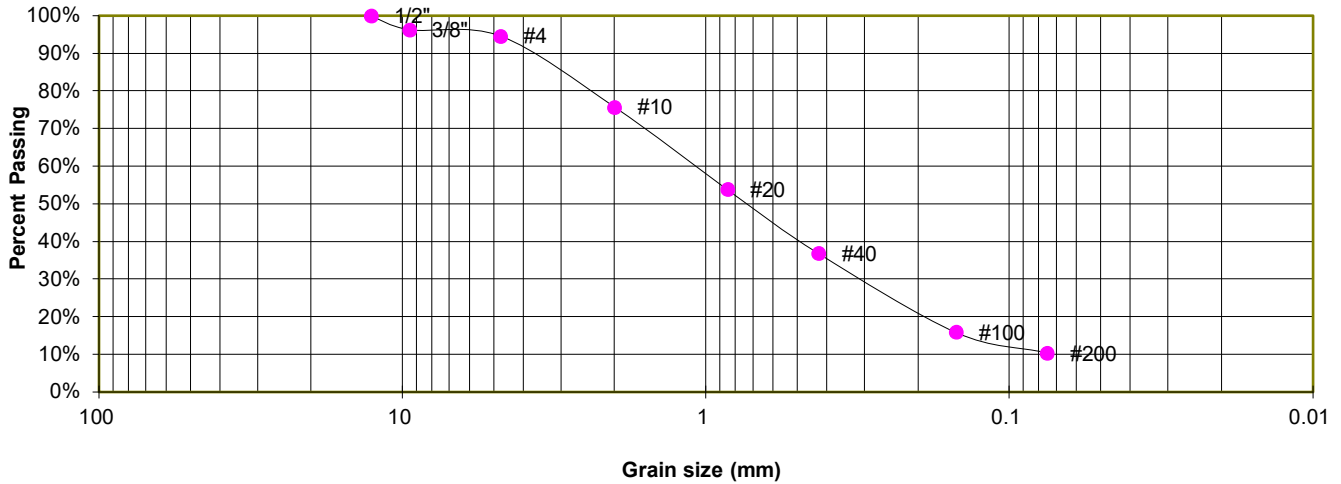
JOB NO.
231465

FIG. B-19

TEST BORING 15
 DEPTH (FT) 1-2

SOIL DESCRIPTION SAND, WITH SILT
 SOIL TYPE 3

**Sieve Analysis
 Grain Size Distribution**



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	96.3%
4	94.6%
10	75.7%
20	53.9%
40	36.8%
100	15.9%
200	10.4%

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



LABORATORY TEST RESULTS

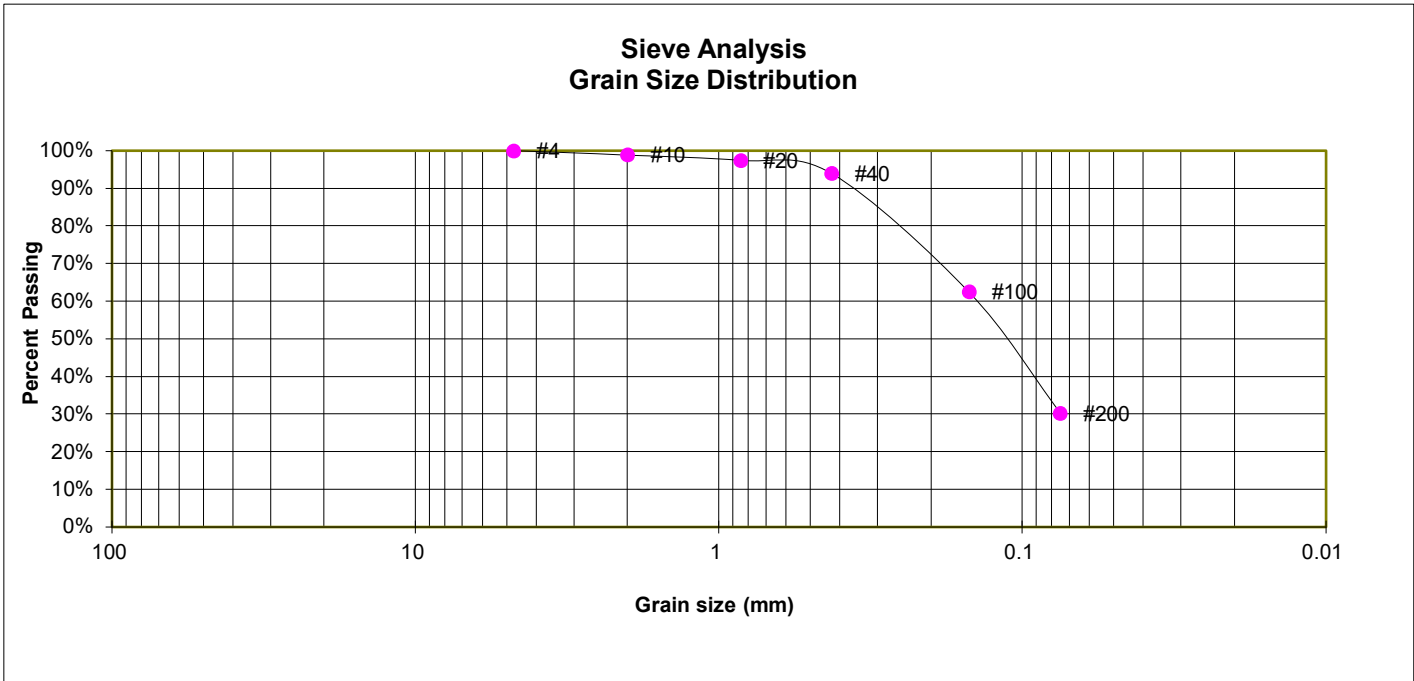
S. BAGGETT RD. & HIGHWAY 94
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 231465

FIG. B-20

TEST BORING 17
 DEPTH (FT) 1-2

SOIL DESCRIPTION SAND, SILTY
 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	98.9%
20	97.4%
40	94.0%
100	62.5%
200	30.3%

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



LABORATORY TEST RESULTS

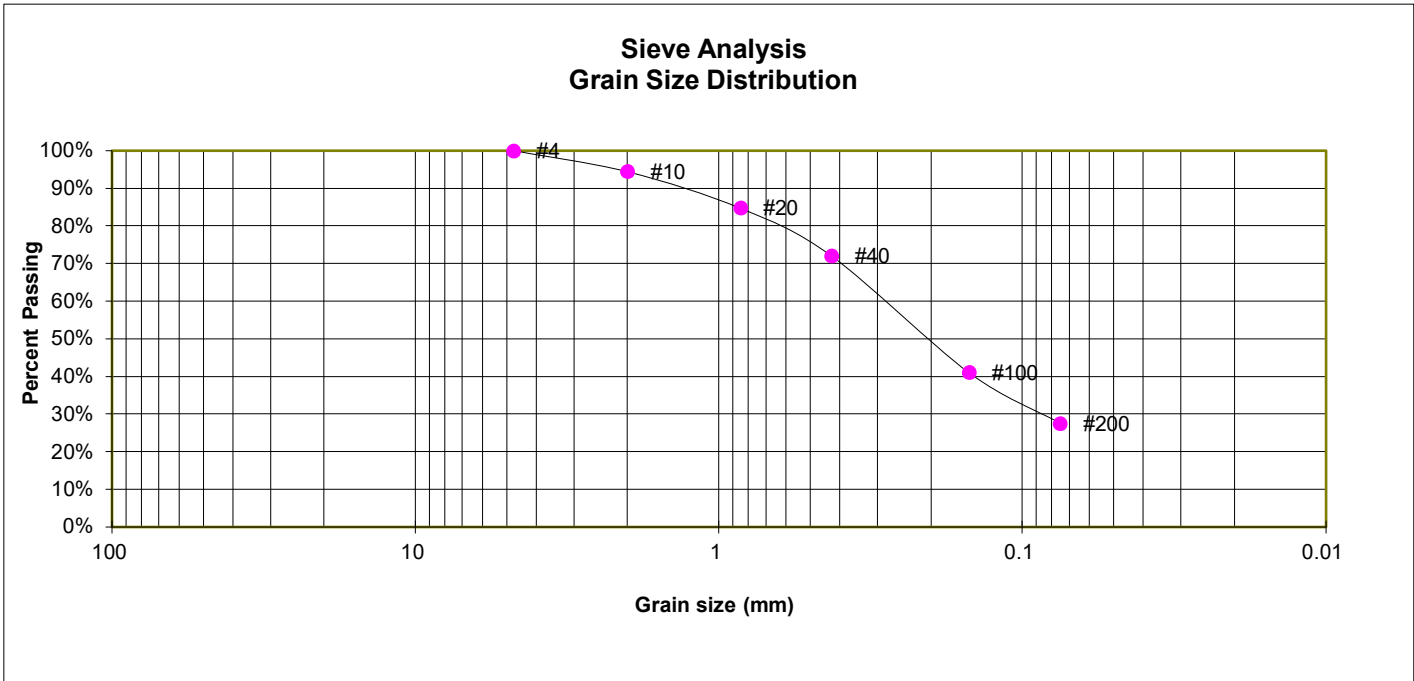
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FIG. B-21

TEST BORING 19
 DEPTH (FT) 1-2

SOIL DESCRIPTION SAND, SILTY
 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	94.5%
20	84.8%
40	72.0%
100	41.1%
200	27.5%

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



LABORATORY TEST RESULTS

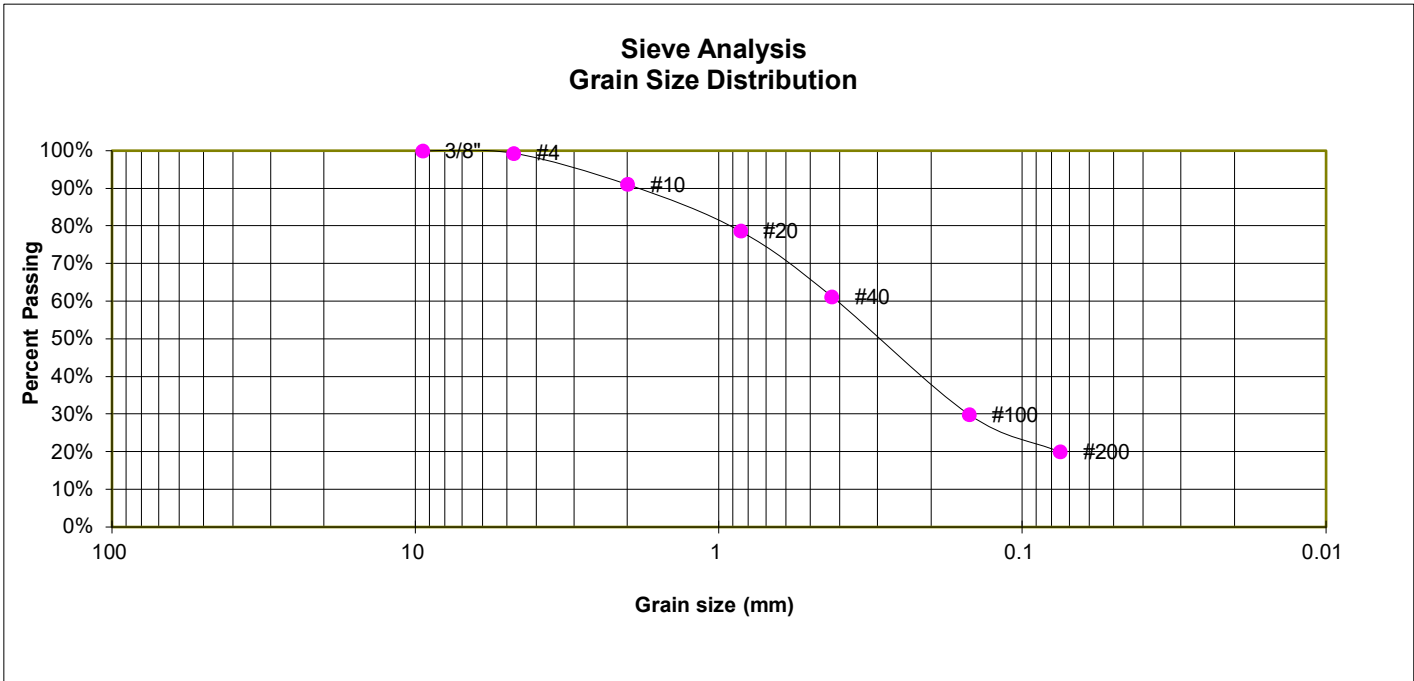
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 231465

FIG. B-22

TEST BORING 20
 DEPTH (FT) 1-2

SOIL DESCRIPTION SAND, SILTY
 SOIL TYPE 3



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.4%
10	91.1%
20	78.7%
40	61.3%
100	29.9%
200	20.0%

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



LABORATORY TEST RESULTS

S. BAGGETT RD. & HIGHWAY 94
 ELLICOTT SAND & GRAVEL

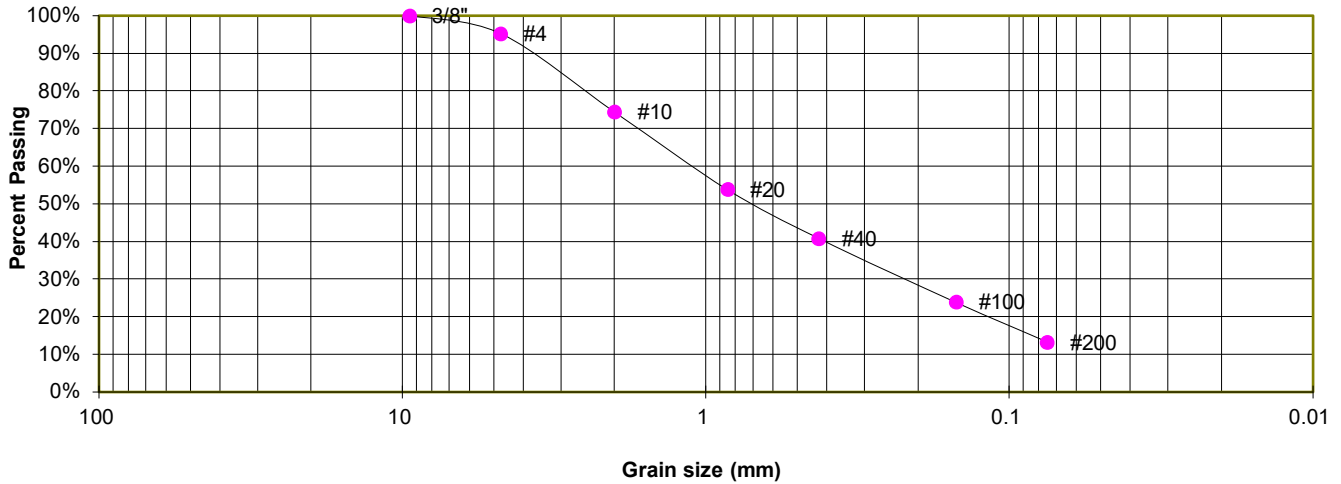
JOB NO.
 231465

FIG. B-23

TEST BORING 22
 DEPTH (FT) 1-2

SOIL DESCRIPTION SAND, SILTY
 SOIL TYPE 3

**Sieve Analysis
 Grain Size Distribution**



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	95.3%
10	74.4%
20	53.9%
40	40.8%
100	23.9%
200	13.3%

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



LABORATORY TEST RESULTS

S. BAGGETT RD. & HIGHWAY 94
 ELLICOTT SAND & GRAVEL

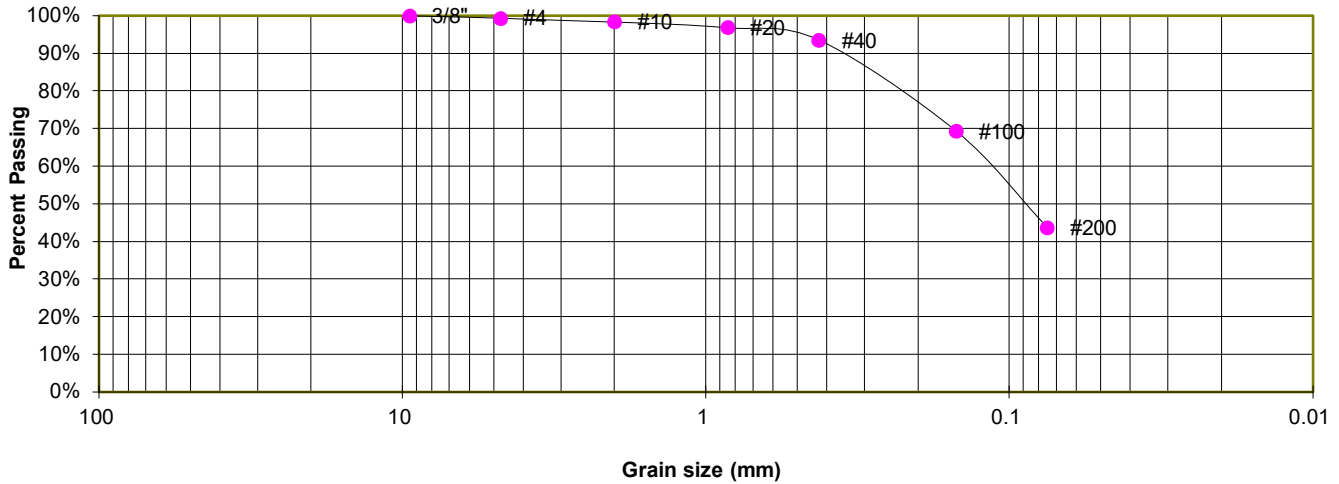
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FIG. B-24

TEST BORING 21
DEPTH (FT) 1-2

SOIL DESCRIPTION SAND, SILTY
SOIL TYPE 4

**Sieve Analysis
Grain Size Distribution**



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.4%
10	98.4%
20	96.9%
40	93.5%
100	69.4%
200	43.8%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

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



LABORATORY TEST RESULTS

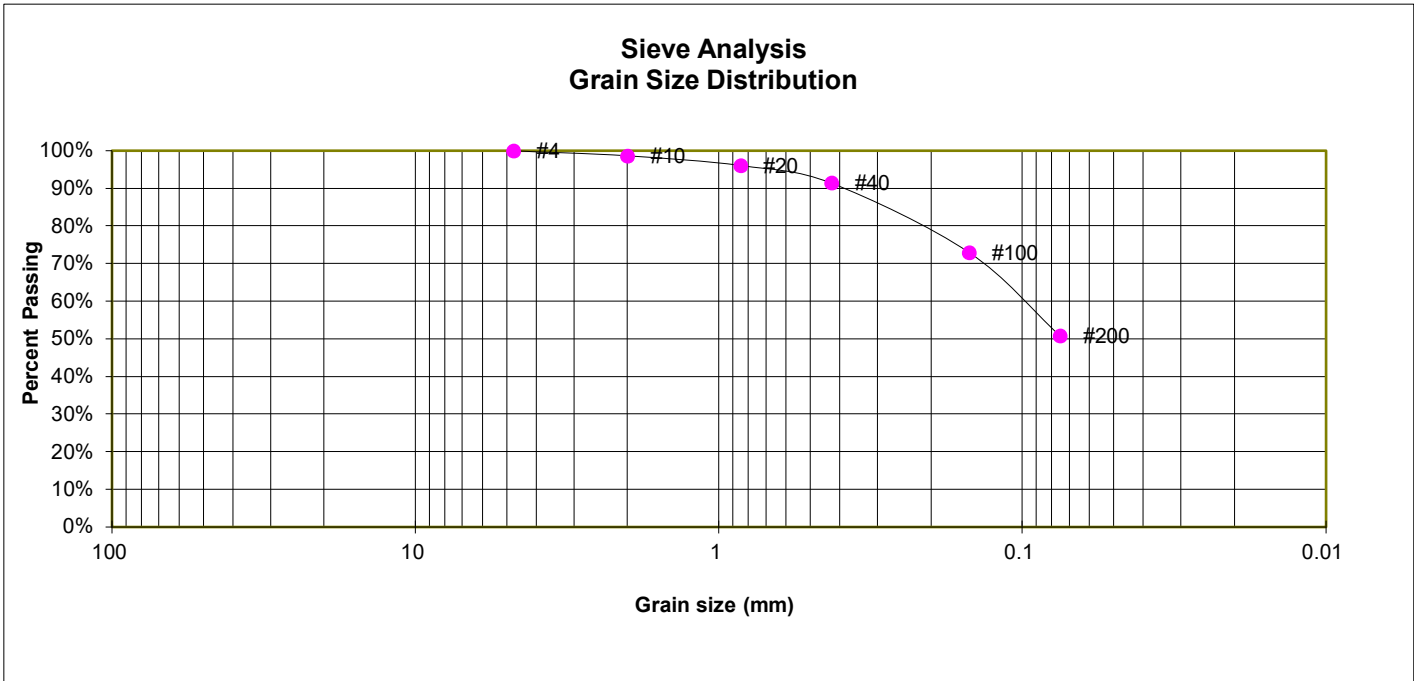
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FIG. B-25

TEST BORING 24
 DEPTH (FT) 1-2

SOIL DESCRIPTION CLAY-SILT, SANDY
 SOIL TYPE 4



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	98.7%
20	96.1%
40	91.4%
100	73.0%
200	50.8%

ATTERBERG LIMITS

Plastic Limit	17
Liquid Limit	22
Plastic Index	5

SOIL CLASSIFICATION

USCS CLASSIFICATION: CL-ML
 AASHTO CLASSIFICATION: A-4
 AASHTO GROUP INDEX: 0



LABORATORY TEST RESULTS

S. BAGGETT RD. & HIGHWAY 94
 ELLICOTT SAND & GRAVEL

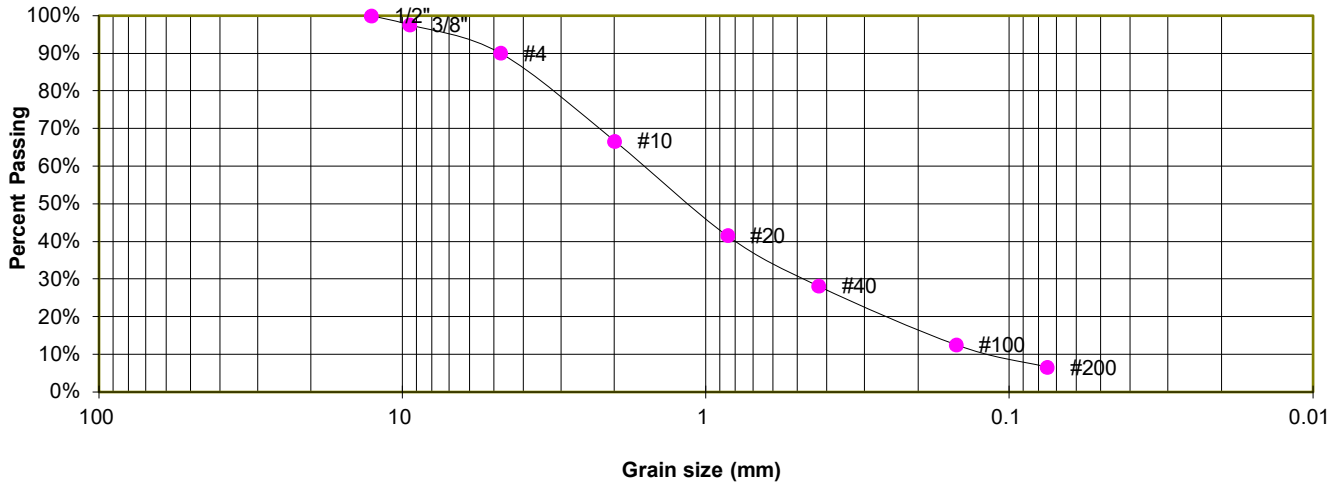
JOB NO.
231465

FIG. B-26

TEST BORING NA
 DEPTH (FT) 0

SOIL DESCRIPTION Aggregate Surfacing

**Sieve Analysis
 Grain Size Distribution**



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	97.6%
4	90.1%
10	66.7%
20	41.6%
40	28.2%
100	12.6%
200	6.7%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SW-SM



LABORATORY TEST RESULTS

S. BAGGETT RD. & HIGHWAY 94
 ELLICOTT SAND & GRAVEL

JOB NO.
 231465

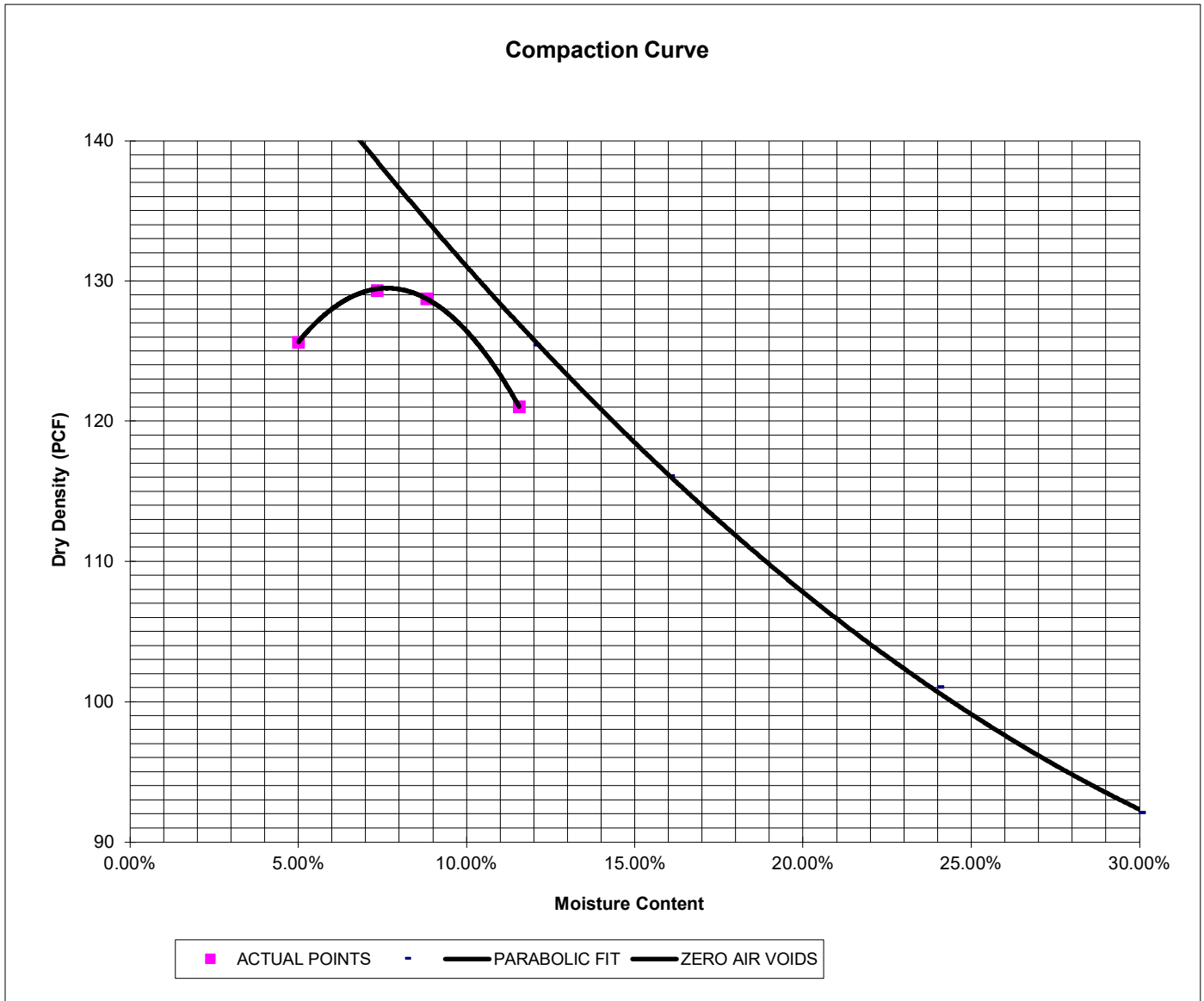
FIG. B-27

SAMPLE LOCATION TB-8 @ 0-3'

SOIL DESCRIPTION SAND, SILTY, BROWN
SOIL TYPE 1

PROCTOR DATA

IDENTIFICATION: SM
PROCTOR TEST #: 1
TEST BY: DK
TEST DESIGNATION: ASTM-1557-A
MAXIMUM DRY DENSITY (PCF): 129.4
OPTIMUM MOISTURE: 7.7



LABORATORY TEST RESULTS

S. BAGGETT RD. & HIGHWAY 94
ELLCOTT SAND & GRAVEL

JOB NO.
231465

FIG. B-28

SAMPLE LOCATION TB-8 @ 0-3'
DEPTH (FT) 0

SOIL DESCRIPTION SAND, SILTY, BROWN
SOIL TYPE 1

CBR TEST LOAD DATA

Piston Diameter (cm): 4.958
Piston Area (in²): 2.993

Penetration Depth (inches)	10 BLOWS Mold # 1		25 BLOWS Mold # 2		56 BLOWS Mold # 3	
	Load (lbs)	Stress (psi)	Load (lbs)	Stress (psi)	Load (lbs)	Stress (psi)
0.000	0	0.00	0	0.00	0	0.00
0.025	68	22.72	70	23.39	168	56.14
0.050	104	34.75	120	40.10	348	116.29
0.075	141	47.12	285	95.24	980	327.48
0.100	229	76.52	392	130.99	1219	407.35
0.125	369	123.31	465	155.39	1670	558.06
0.150	508	169.76	580	193.82	1780	594.82
0.175	636	212.53	686	229.24	1889	631.24
0.200	756	252.63	814	272.01	2155	720.13
0.300	1188	396.99	1364	455.80	3198	1068.67
0.400	1814	606.18	2103	702.75	4020	1343.35
0.500	2441	815.70	2765	923.97	4843	1618.37

MOISTURE AND DENSITY DATA

	Mold # 1	Mold # 2	Mold # 3
Can #	343	345	401
Wt. Can	8.58	8.62	8.16
Wt. Can+Wet	266.28	231.85	194.15
Wt. Can+Dry	245.44	214.64	179.82
Wt. H2O	20.84	17.21	14.33
Wt. Dry Soil	236.86	206.02	171.66
Moisture Content	8.80%	8.35%	8.35%
Wet Density (PCF)	127.3	133.0	140.9
Dry Density (PCF)	118.2	123.5	130.8
% Compaction	91%	95%	101%
CBR	7.65	13.10	40.74

PROCTOR DATA

Maximum Dry Density (pcf) 129.4
Optimum Moisture 7.7
90% of Max. Dry Density (pcf) 116.5
95% of Max. Dry Density (pcf) 122.9

CBR at 90% of Max. Density = 5.86 ~ R VALUE 12
CBR at 95% of Max. Density = 12.51 ~ R VALUE 37



LABORATORY TEST RESULTS

S. BAGGETT RD. & HIGHWAY 94
ELLCOTT SAND & GRAVEL

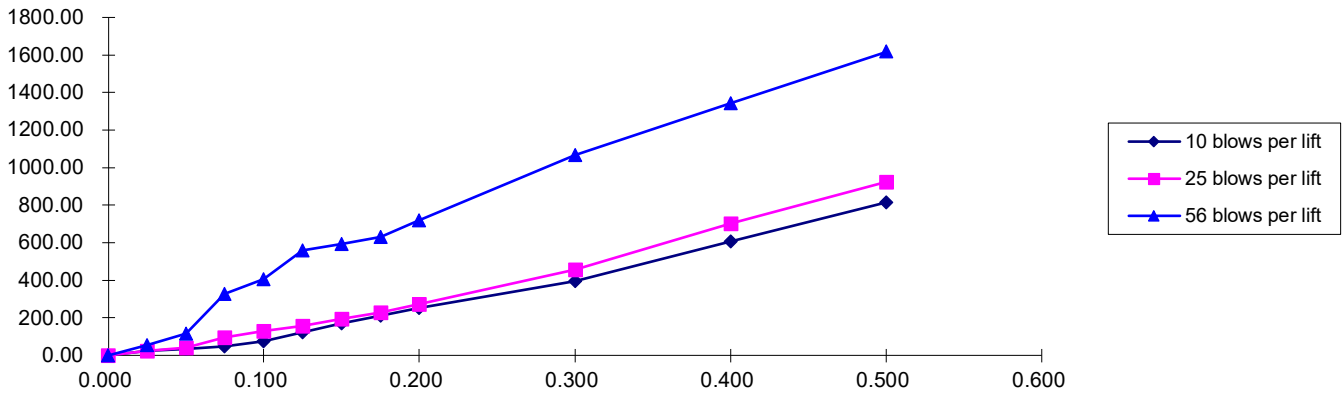
JOB NO.
231465

FIG. B-29

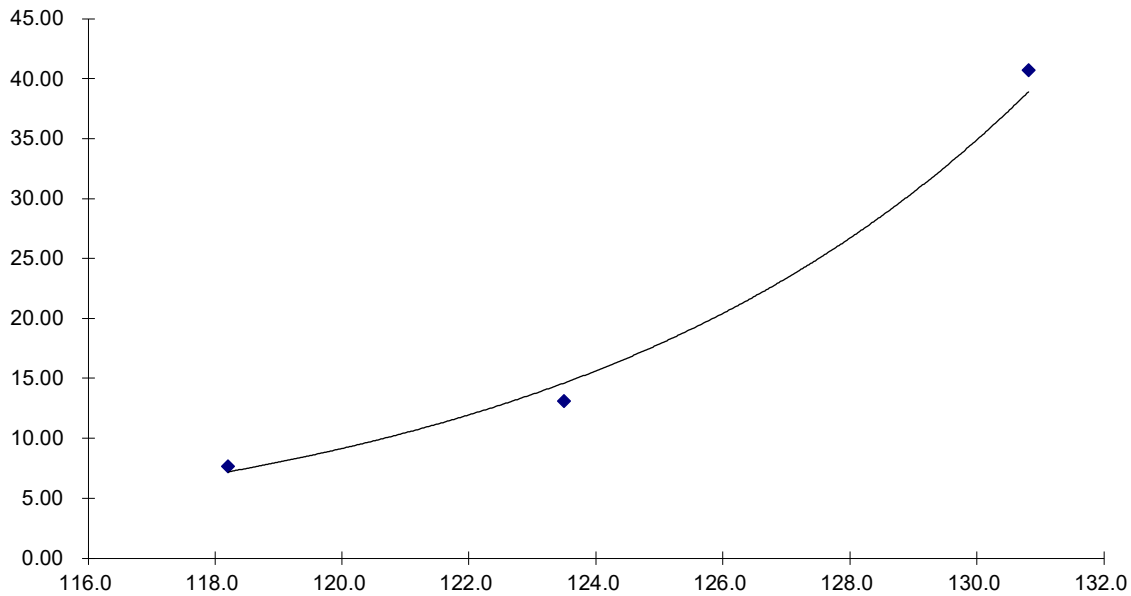
SAMPLE LOCATION TB-8 @ 0-3'
DEPTH (FT) 0

SOIL DESCRIPTION SAND, SILTY, BROWN
SOIL TYPE 0

Stress VS Penetration



Bearing Ratio VS Dry Density



LABORATORY TEST RESULTS

S. BAGGETT RD. & HIGHWAY 94
ELLCOTT SAND & GRAVEL

JOB NO.
231465

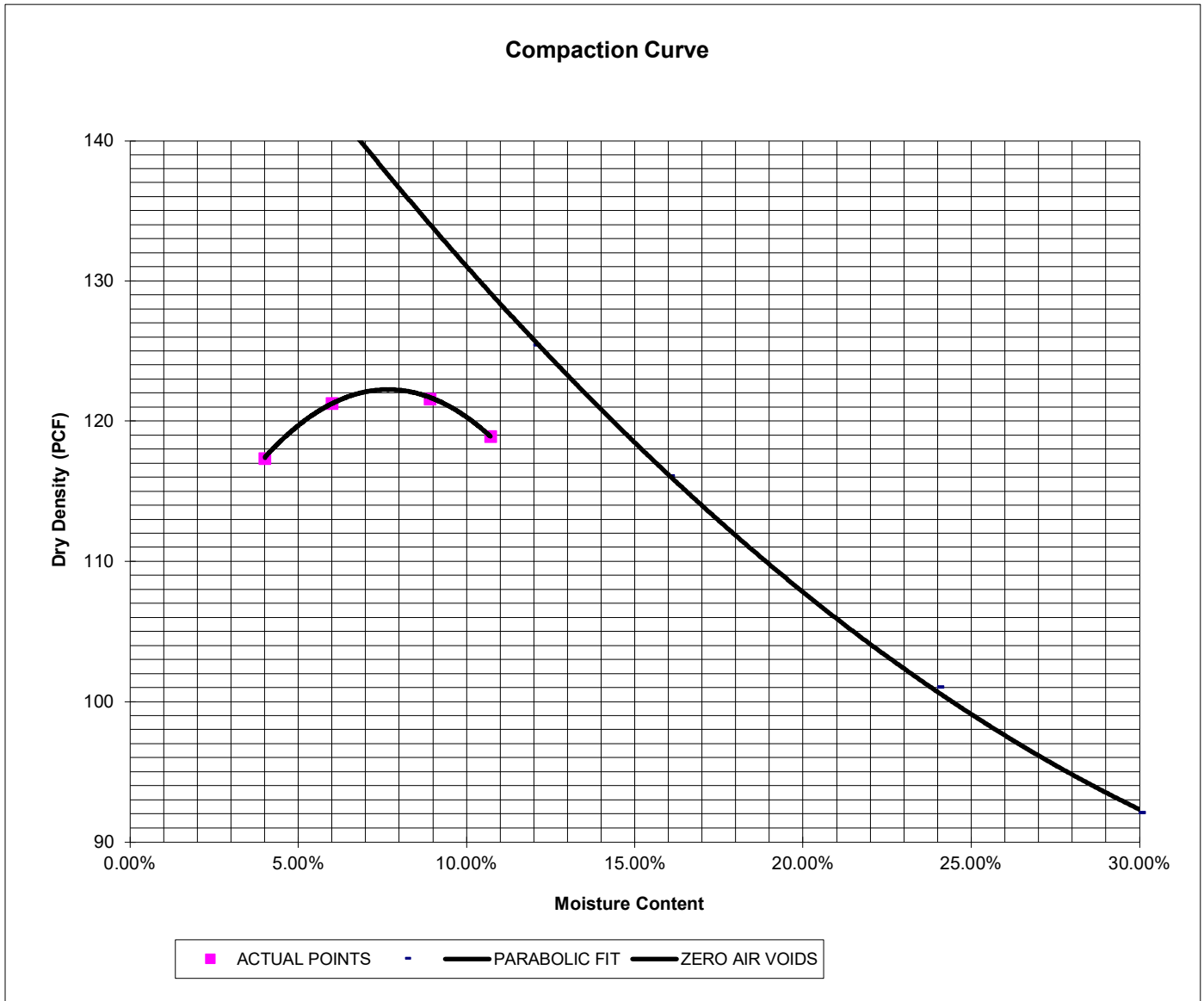
FIG. B-30

SAMPLE LOCATION TB-18 @ 0-3'

SOIL DESCRIPTION SILT, SANDY, BROWN
SOIL TYPE 2

PROCTOR DATA

IDENTIFICATION: ML
PROCTOR TEST #: 2
TEST BY: DK
TEST DESIGNATION: ASTM-1557-A
MAXIMUM DRY DENSITY (PCF): 118.1
OPTIMUM MOISTURE: 7.8



LABORATORY TEST RESULTS

S. BAGGETT RD. & HIGHWAY 94
ELLCOTT SAND & GRAVEL

JOB NO.
231465

FIG. B-31

SAMPLE LOCATION TB-18 @ 0-3'
DEPTH (FT) 0

SOIL DESCRIPTION SILT, SANDY, BROWN
SOIL TYPE 2

CBR TEST LOAD DATA

Piston Diameter (cm): 4.958
Piston Area (in²): 2.993

Penetration Depth (inches)	10 BLOWS Mold # 1		25 BLOWS Mold # 2		56 BLOWS Mold # 3	
	Load (lbs)	Stress (psi)	Load (lbs)	Stress (psi)	Load (lbs)	Stress (psi)
0.000	0	0.00	0	0.00	0	0.00
0.025	63	21.05	123	41.10	185	61.82
0.050	91	30.41	216	72.18	241	80.53
0.075	131	43.78	269	89.89	276	92.23
0.100	163	54.47	334	111.61	345	115.29
0.125	210	70.18	364	121.64	447	149.37
0.150	282	94.24	410	137.01	546	182.46
0.175	360	120.30	455	152.05	638	213.20
0.200	455	152.05	582	194.49	745	248.95
0.300	578	193.15	920	307.43	1100	367.58
0.400	668	223.22	1261	421.39	1462	488.55
0.500	786	262.66	1596	533.33	1892	632.25

MOISTURE AND DENSITY DATA

	Mold # 1	Mold # 2	Mold # 3
Can #	343	345	401
Wt. Can	8.58	8.62	8.16
Wt. Can+Wet	266.28	231.85	194.15
Wt. Can+Dry	245.44	214.64	179.82
Wt. H2O	20.84	17.21	14.33
Wt. Dry Soil	236.86	206.02	171.66
Moisture Content	8.80%	8.35%	8.35%
Wet Density (PCF)	116.6	122.0	126.5
Dry Density (PCF)	108.2	113.2	117.3
% Compaction	92%	96%	99%
CBR	5.45	11.16	11.53

PROCTOR DATA

Maximum Dry Density (pcf) 118.1
Optimum Moisture 7.8
90% of Max. Dry Density (pcf) 106.3
95% of Max. Dry Density (pcf) 112.2

CBR at 90% of Max. Density = 3.25 ~ R VALUE 7.5
CBR at 95% of Max. Density = 10.05 ~ R VALUE 30



LABORATORY TEST RESULTS

S. BAGGETT RD. & HIGHWAY 94
ELLICOTT SAND & GRAVEL

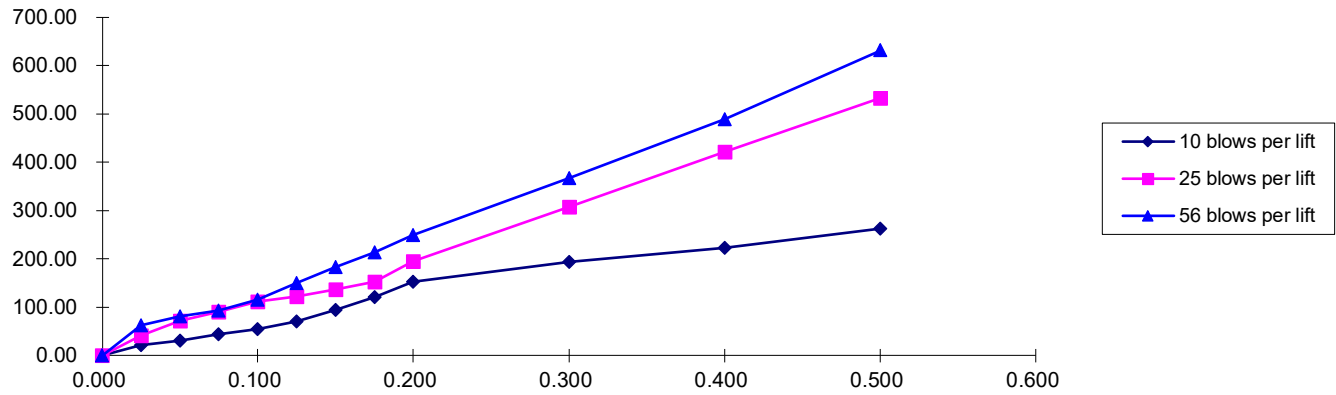
JOB NO.
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FIG. B-32

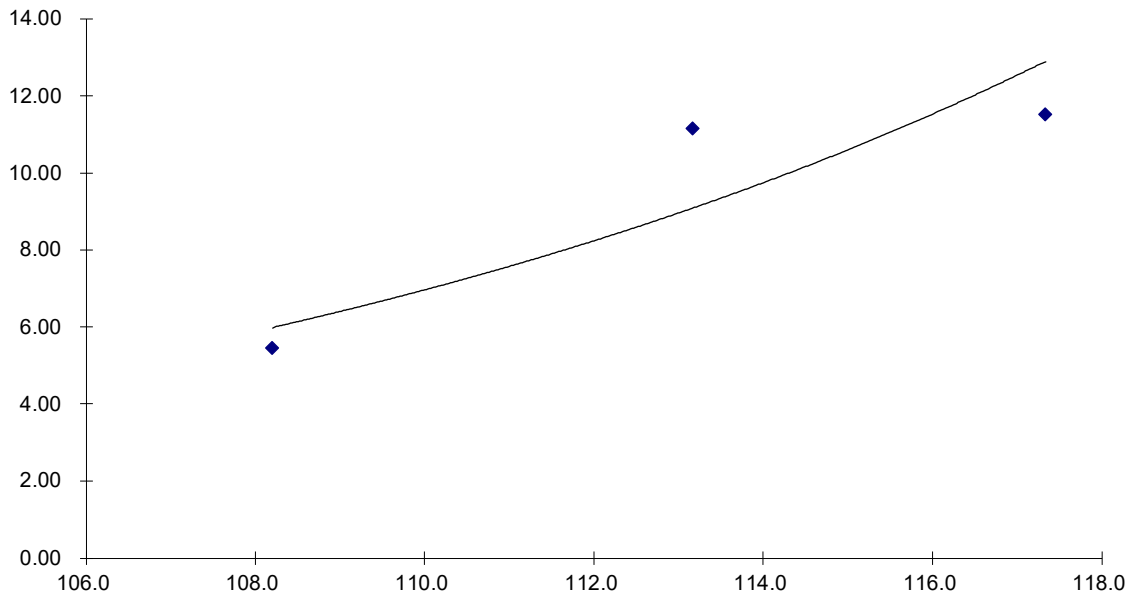
SAMPLE LOCATION TB-18 @ 0-3'
DEPTH (FT) 0

SOIL DESCRIPTION SILT, SANDY, BROWN
SOIL TYPE 0

Stress VS Penetration



Bearing Ratio VS Dry Density



LABORATORY TEST RESULTS

S. BAGGETT RD. & HIGHWAY 94
ELLCOTT SAND & GRAVEL

JOB NO.
231465

FIG. B-33

APPENDIX C: Pavement Design Calculations

**Table 4.4 Chart for Computing Total Pavement Damage (for both Serviceability and Rutting Criteria)
Based on a Trial Aggregate Base Thickness**

TRIAL BASE THICKNESS, D_{BS} (inches) <u>12</u>				Serviceability Criteria, $\Delta PSI =$ <u>2</u>		Rutting Criteria, RD (inches) = <u>2</u>		
(1) Season (Roadbed Moisture Condition)	(2) Roadbed Resilient Modulus, M_R (psi)	(3) Base Elastic Modulus, E_{BS} (psi)	(4) Projected 18- kip ESAL Traffic, w_{18}	(5) Allowable 18- kip ESAL Traffic, $(W_{18})_{PSI}$	(6) Seasonal Damage, $w_{18}/(W_{18})_{PSI}$	(7) Allowable 18- kip ESAL Traffic, $(W_{18})_{RUT}$	(8) Seasonal Damage, $w_{18}/(W_{18})_{RUT}$	
Winter (Frozen)	20,000	30,000	20,531	500,000	0.04	190,000	0.11	
Spring/Thaw (Saturated)	2,500	30,000	10,266	20,000	0.51	22,000	0.47	
Spring/Fall (Wet)	8,000	30,000	20,531	90,000	0.23	70,000	0.29	
Summer (Dry)	20,000	30,000	30,797	500,000	0.06	190,000	0.16	
Total Traffic =			82,125	Total Damage =		0.84	Total Damage = 1.03	

Season Length (months)	
Winter	3.0
Spring/Thaw	1.5
Spring/Fall	3.0
Summer	4.5

ESAL Calculation		
AADTT:	15	trucks/day
Equivalency Factor:	3	ESALs/pass
Design Life:	5	Years

Example :

$D_{BS} = 8$ inches

$E_{BS} = 30,000$ psi

$M_R = 4,900$ psi

$\Delta PSI = 3.0$

Solution: $W_{18PSI} = 16,000$ (18-kip ESAL)

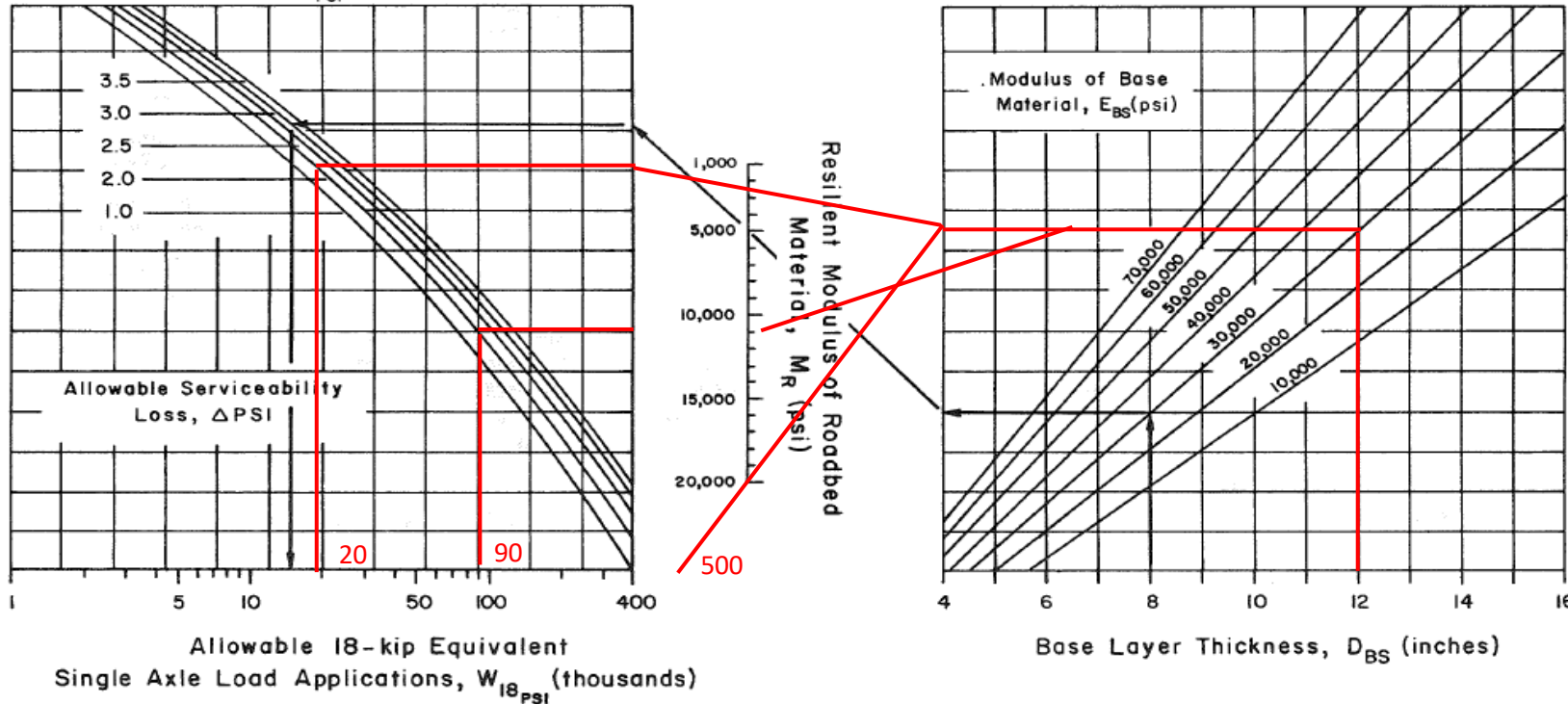


Figure 4.2. Design Chart for Aggregate-Surfaced Roads Considering Allowable Serviceability Loss

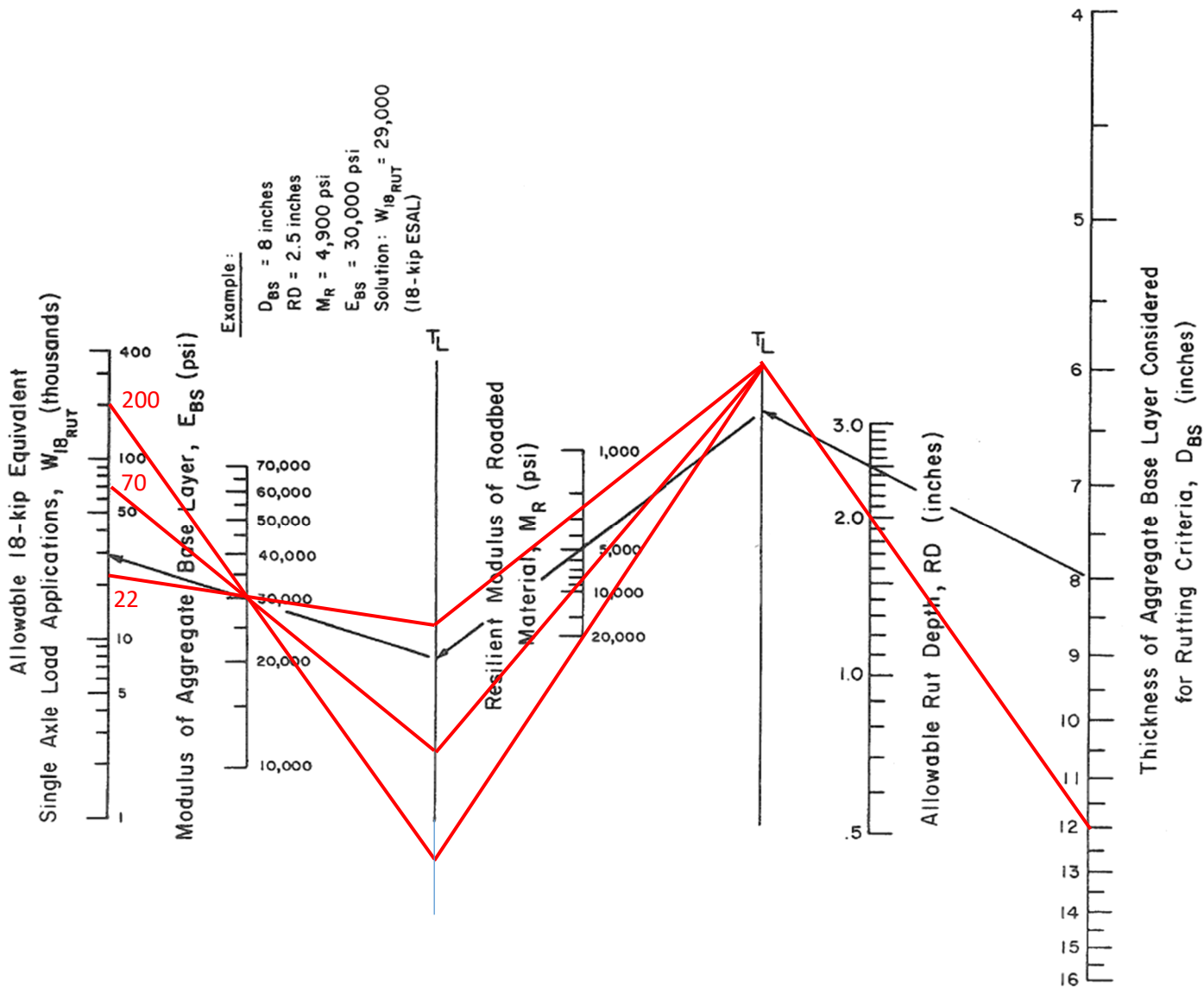


Figure 4.3. Design Chart for Aggregate-Surfaced Roads Considering Allowable Rutting

Table 4.1. Suggested Seasons Length (Months) for the Six U.S. Climatic Regions

U.S. Climatic Region	Season (Roadbed Soil Moisture Condition)			
	Winter (Roadbed Frozen)	Spring-Thaw (Roadbed Saturated)	Spring/Fall (Roadbed Wet)	Summer (Roadbed Dry)
I	0.0*	0.0	7.5	4.5
II	1.0	0.5	7.0	3.5
III	2.5	1.5	4.0	4.0
IV	0.0	0.0	4.0	8.0
V	1.0	0.5	3.0	7.5
VI	3.0	1.5	3.0	4.5

*Number of months for the season.

Table 4.2. Suggested Seasonal Roadbed Soil Resilient Moduli, M_R (psi), as a Function of the Relative Quality of the Roadbed Material

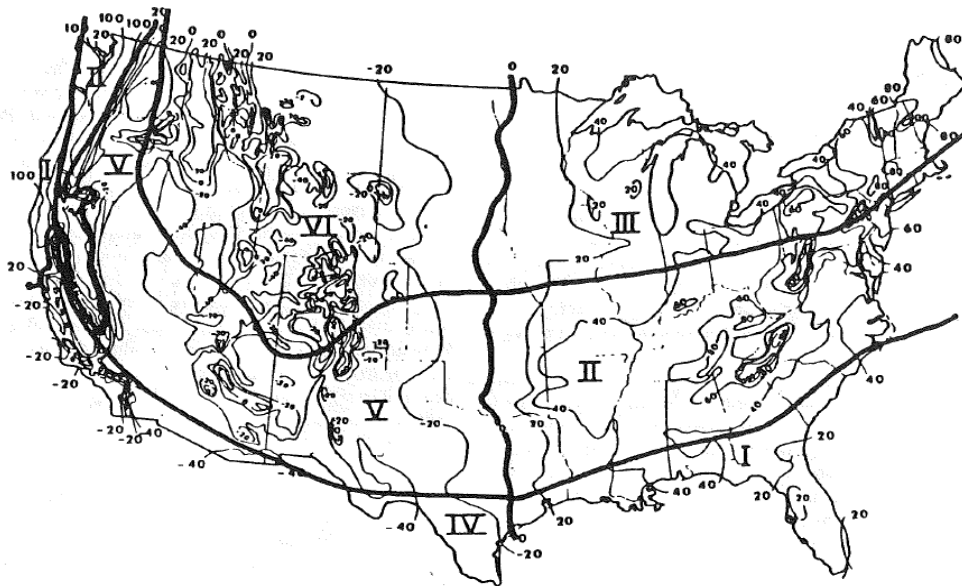
Relative Quality of Roadbed Soil	Season (Roadbed Soil Moisture Condition)			
	Winter (Roadbed Frozen)	Spring-Thaw (Roadbed Saturated)	Spring/Fall (Roadbed Wet)	Summer (Roadbed Dry)
Very good	20,000*	2,500	8,000	20,000
Good	20,000	2,000	6,000	10,000
Fair	20,000	2,000	4,500	6,500
Poor	20,000	1,500	3,300	4,900
Very poor	20,000	1,500	2,500	4,000

*Values shown are Resilient Modulus in psi.

Table 4.3. Effective Roadbed Soil Resilient Modulus Values, M_R (psi), That May be Used in the Design of Flexible Pavements for Low-Volume Roads. Suggested values depend on the U.S. climatic region and the relative quality of the roadbed soil.

U.S. Climatic Region	Relative Quality of Roadbed Soil				
	Very Poor	Poor	Fair	Good	Very Good
I	2,800*	3,700	5,000	6,800	9,500
II	2,700	3,400	4,500	5,500	7,300
III	2,700	3,000	4,000	4,400	5,700
IV	3,200	4,100	5,600	7,900	11,700
V	3,100	3,700	5,000	6,000	8,200
VI	2,800	3,100	4,100	4,500	5,700

*Effective Resilient Modulus in psi.



<u>REGION</u>	<u>CHARACTERISTICS</u>
I	Wet, no freeze
II	Wet, freeze - thaw cycling
III	Wet, hard-freeze, spring thaw
IV	Dry, no freeze
V	Dry, freeze - thaw cycling
VI	Dry, hard freeze, spring thaw

Figure 4.1. The Six Climatic Regions in the United States (12)