

Soil Survey Summary Report

**Benton Boulevard Extension
Pooler, Chatham County, Georgia**

February 11, 2016
Terracon Project No. ES155153

Prepared for:
McGee Partners, Inc.
Atlanta, Georgia

Prepared by:
Terracon Consultants, Inc.
Savannah, Georgia

Offices Nationwide
Employee-Owned

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Terracon

Geotechnical ■ Environmental ■ Construction Materials ■ Facilities

February 11, 2016



McGee Partners, Inc.
13 Corporate Boulevard NE
Suite 200
Atlanta, Georgia 30329

Attn: Tommy Crochet
P: (770) 938 6400
E: tcrochet@mcgeepartners.com

**Re: Soil Survey Summary Report
Benton Boulevard Extension**
Pooler, Chatham County, Georgia
Terracon Project No.: ES155153

Dear Mr. Crochet:

Terracon Consultants, Inc. (Terracon) is pleased to submit this Soil Survey Summary Report for the design and construction of Benton Boulevard Extension. This report has been prepared in general accordance with the QA / QC Manual by the Geotechnical Engineering Bureau of the Georgia Department of Transportation.

Terracon appreciates the opportunity to be of service to you on this project. Should you have any questions concerning this report, or if we may be of further service, please feel free to contact us.

Sincerely,
Terracon Consultants, Inc.

A handwritten signature in blue ink, appearing to read 'Biraj Gautam', is written over a horizontal line.

Biraj Gautam, P.E.
Project Geotechnical Engineer



Guoming Lin, Ph.D., P.E., D.GE.
Senior Principal/Senior Consultant

cc: 1 – Client (PDF)

1 – File



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Geotechnical



Environmental



Construction Materials



Facilities

SOIL SURVEY SUMMARY
For
Benton Boulevard Extension
Pooler, Chatham County, Georgia

- 1. Project Description**

The project includes the extension of Benton Boulevard from the intersection with Highlands Boulevard extending north to State Route 30. The project length is about 1.4 miles. The proposed extension will include a two-lane roadway with a bridge at St. Augustine Creek. The roadway will consist of two twelve-foot travel lanes with a two-foot paved shoulder, a ten-foot shared-use path for pedestrians and bicycles, grass shoulders and ditches on each side. The proposed extension will also include intersection improvements at Highlands Boulevard, Meinhard Road and State Route 30.
- 2. Geology**

The project is geologically sited in the Pamlico Shoreline Complex of the Georgia Coastal Plain Region.
- 3. Rock**

No rock was encountered.
- 4. Removal**

Soils mixed with organics / wood debris were encountered in some areas of the project length and such soils are unsuitable for pavement support. The organic laden soils should be removed and should not be used underneath the pavement. Reference is made to the attached boring logs of HA2 (near Sta. 22+80), HA4 and HA5 (near Sta.26+80), HA18 (near Sta. 59+00) and HA45 (near Sta. 25+50).
- 5. Waste**

Class IV materials encountered in the low-lying, wet areas near St. Augustine Creek (near Sta. 44+80) should not be placed directly beneath the pavement section.
- 6. Subgrade Materials**

We recommend that top 12 inches of subgrade on this entire project be constructed of Class IIB3 or better material. Reference is made to the attached soil laboratory test results for the areas where subgrade soils do not meet these requirements.

This work shall be done in accordance with Special Provision Section 209.
- 7. Pavement Design Values**

We recommend the following values for use in the pavement design calculations for this project:

Soil Support Value = 4.0

Regional Factor = 1.7

Subgrade Reaction k=190 pci

Acceptable base materials for use on this project are graded aggregate and lime-rock bases. Asphalt concrete base is not recommended for use on this project due to potential stability problems with operating the paving spreader on the clean, gap-graded sands on this project.

- 8. Ditch Lining** We recommend the following values for use in the ditch lining calculations for this project:

Plasticity Index, PI = NP

D75 (mm) = 0.40

Unified Soils Classification System (USCS) = SM

- 9. Slope** Maximum 2:1 slopes will be safe for this project. Based on the plan available, the project will not have fill greater than 35 feet high. As such, construction of a berm will not be required.

- 10. Groundwater** Groundwater was encountered below grade at some locations of subsurface borings but is not expected to cause problems during construction. Reference is made to the attached boring logs for groundwater at each boring location.

Additionally, low wet areas were encountered on this project near St. Augustine Creek. Ditching will be required prior to construction of the embankment in these wet areas:

If these areas are inundated and it is not feasible to drain them during construction, a mat of granular embankment should be placed to a height of 18 inches above the water level prior to placing normal fills. This work shall be done in accordance with Special Provision Section 208.

- 11. Shrinkage** We recommend an average shrinkage factor of 30% for use in the earthwork calculations for this project.

- 12. Culvert** We recommend that a 12 inch blanket of Type II Foundation Backfill material be placed under the barrel of all culverts and 48 inch diameter and larger cross-drains on this project.

- 13. Corrosion** Reference should be made to the attached "Pipe Culvert Material Alternates" chart for materials allowable by the Laboratory corrosion test.

- 14. Bench Detail** Where new fills are to be placed on existing slopes steeper than 3:1, the existing slope should be benched in accordance with the attached detail.

Soil Survey Summary Report

Benton Boulevard Extension ■ Pooler, Chatham County, Georgia

February 11, 2016 ■ Terracon Project No. ES155153



15. Serrated Slopes

Serrated slopes will not be required on this project.

16. Special Problem

- A. The project will have impacts to low wet areas near St. Augustine Creek (near Sta. 44+80). We recommend that the Project Engineer contact the respective permitting / regulatory agency prior to construction in these areas.
- B. Several residences are located very close to the construction limits of this project. Vibrations from construction may cause some concern with property owners. We recommend that the Project Engineer contact the respective department prior to construction to evaluate the need for crack surveys.
- C. We recommend that all bridge approach slabs on this project be constructed in accordance with Georgia Standard 9017-R.

February 11, 2016 **Reported By:** Biraj Gautam, P.E.

Reviewed By: Guoming Lin, Ph.D., P.E., D.GE.

Enclosed:

Appendix A

Field Exploration

- Exhibit A-1 Site Location Map
- Exhibit A-2 Exploration Location Plan
- Exhibit A-3 Field Exploration Description
- Exhibit A-4 Hand Auger Boring Log
- Exhibit A-5 General Notes
- Exhibit A-6 Unified Soil Classification System
- Exhibit A-7 Field Notes

Appendix B

Laboratory Test Result

- Exhibit B-1 Summary of Soil Laboratory Test Results
- Exhibit B-2 Summary of Corrosion Test Results
- Exhibit B-3 Grain Size Analyses
- Exhibit B-4 Atterberg Limits
- Exhibit B-5 Corrosion Test Report Submitted by Avery Laboratories & Environmental Services, LLC

Soil Survey Summary Report

Benton Boulevard Extension ■ Pooler, Chatham County, Georgia
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Appendix C

Supporting Document

Exhibit C-1 Berm Detail for Cuts or Fills over 35 Feet

Exhibit C-2 Benching Detail

Exhibit C-3 Pipe Culvert Material Alternates

Exhibit C-4 Special Provision

APPENDIX A

FIELD EXPLORATION

Exhibit A-1	Site Location Map
Exhibit A-2	Exploration Location Plan
Exhibit A-3	Field Exploration Description
Exhibit A-4	Hand Auger Boring Log
Exhibit A-5	General Notes
Exhibit A-6	Unified Soil Classification System



Image Courtesy of
Google Earth™

Project Manager:	BG
Drawn by:	BG
Checked by:	GL
Approved by:	GL

Project No.	ES155153
Scale:	N.T.S.
File Name:	ES155153
Date:	2/11/2016

Terracon
Consulting Engineers & Scientists

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SITE LOCATION MAP

Benton Boulevard Extension
Pooler
Chatham County, Georgia

Exhibit:

A-1

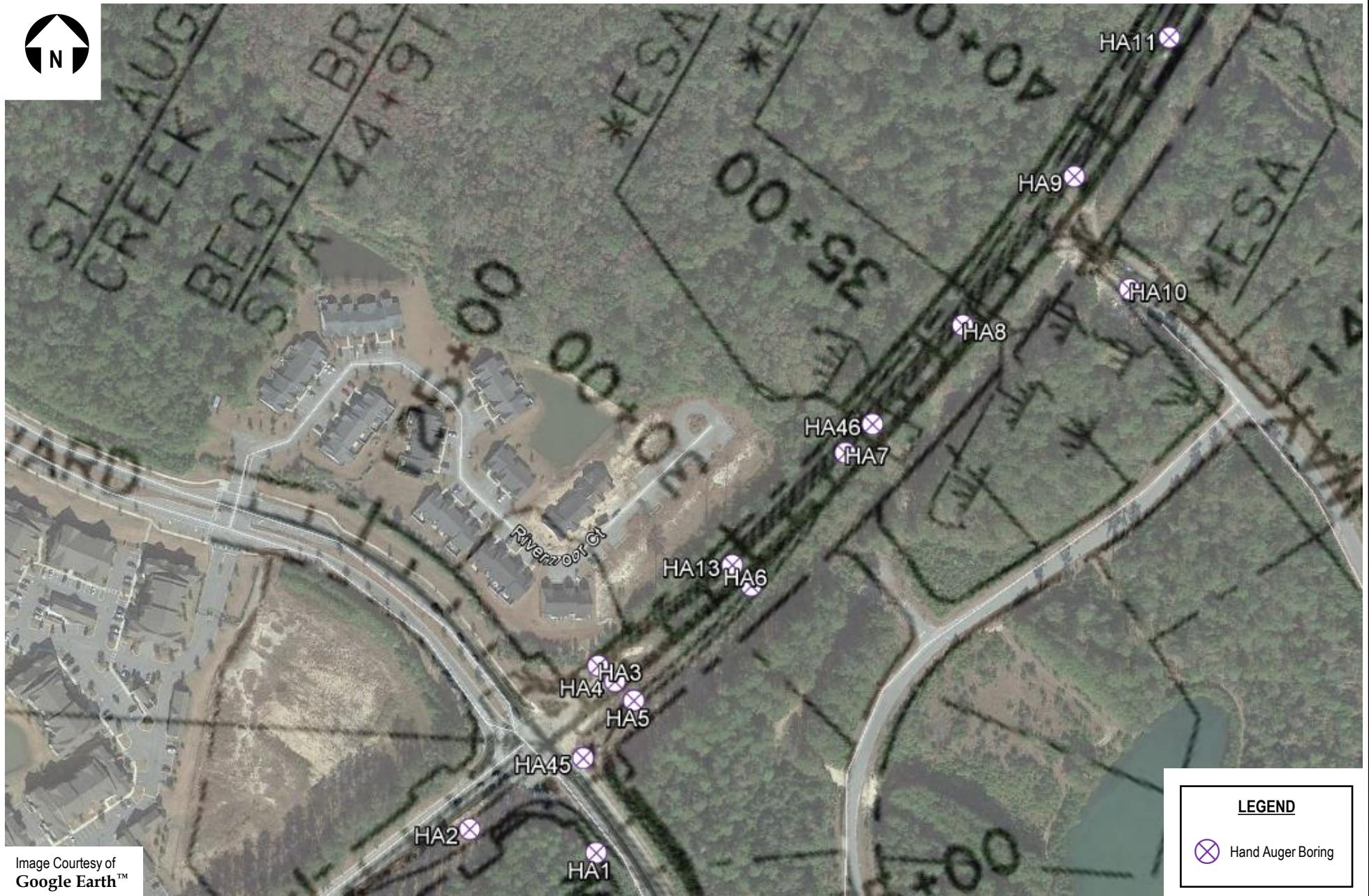


Image Courtesy of
Google Earth™

NOTE:

ALL THE EXPLORATION LOCATIONS WERE LOCATED IN THE FIELD USING A GPS UNIT, AND THE EXPLORATION LOCATIONS SHOULD BE CONSIDERED APPROXIMATE. DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES.

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EXPLORATION LOCATION PLAN

Benton Boulevard Extension
Pooler
Chatham County, Georgia

LEGEND

⊗ Hand Auger Boring

Exhibit:

A-2a



Image Courtesy of
Google Earth™

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EXPLORATION LOCATION PLAN

Benton Boulevard Extension
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Chatham County, Georgia

Exhibit:

A-2b



HA29

HA28

HA27

HA26

HA25

HA24


LEGEND Hand Auger Boring

Image Courtesy of
Google Earth™

NOTE:
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EXPLORATION LOCATION PLAN

Benton Boulevard Extension
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Exhibit:

A-2c



Image Courtesy of
Google Earth™

LEGEND

⊗ Hand Auger Boring

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EXPLORATION LOCATION PLAN

Benton Boulevard Extension
Pooler
Chatham County, Georgia

Exhibit:

A-2d

Soil Survey Summary Report

Benton Boulevard Extension ■ Pooler, Chatham County, Georgia

February 11, 2016 ■ Terracon Project No. ES155153



FIELD EXPLORATION DESCRIPTION

Hand Auger borings were determined by Terracon based on the proposed plan, and they were located in the field using a hand-held GPS unit and in reference to the existing features. These test locations are shown in **Exhibit A-2**, and they should be considered approximate.

Hand Auger Borings

Hand auger borings were conducted in general accordance with ASTM D 1452-80, Standard Practice for Soil Investigation and Sampling by Auger Borings. In this test, hand auger borings are drilled by rotating and advancing a bucket auger to the desired depths while periodically removing the auger from the hole to clear and examine the auger cuttings. The soils were classified in accordance with ASTM D2488.

Hand Auger Boring Log

Project Name: Benton Boulevard Extension

Project No.: ES155153

Project Location: Pooler, Chatham County, Georgia



HA1		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 4	Dark brown fine silty SAND with tree roots / pine needles (Topsoil).	SM
4 to 14	Dark gray and orange sandy CLAY.	CL
14 to 32	Gray and orange sandy CLAY.	CL
32 to 60	Dark gray sandy CLAY.	CL
Very moist soils @ 50" BGS		Mottling @ 14" BGS

HA2		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 14	Dark brown and orange sandy CLAY with roots (Topsoil).	CL
14 to 38	Dark brown sandy CLAY with organics.	CL
38 to 60	Gray and orange fine to medium clayey SAND.	SC
Groundwater @ 40" BGS		Mottling @ 38" BGS

HA3		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 3	Dark brown fine silty SAND with roots (Topsoil).	SM
3 to 14	Brown and orange fine to medium clayey SAND.	SC
14 to 30	Brown fine silty SAND.	SM
30 to 46	Gray fine poorly graded SAND.	SP
46 to 60	Gray and orange sandy CLAY.	CL
Very moist soils @ 44" BGS		Mottling @ 46" BGS

HA4		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 5	Dark brown fine silty SAND with roots (Topsoil).	SM
5 to 12	Orange fine to medium clayey SAND.	SC
12 to 22	Dark gray fine poorly graded SAND with silt and wood debris.	SP-SM
22 to 42	Gray fine poorly graded SAND.	SP
42 to 60	Dark gray and orange sandy CLAY.	CL
Very moist soils @ 40" BGS		Mottling @ 42" BGS

Note: BGS = Below Ground Surface

Hand Auger Boring Log

Project Name: Benton Boulevard Extension

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HA5		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 10	Dark brown and orange fine silty SAND with roots (Topsoil).	SM
10 to 16	Brown fine silty SAND with wood debris.	SM
Refusal @ 16" BGS due to wood debris.		
No groundwater encountered		No mottling noted

HA6		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 5	Dark brown fine silty SAND with roots (Topsoil).	SM
5 to 30	Light brown fine poorly graded SAND with silt.	SP-SM
30 to 48	Light brown and orange fine poorly graded SAND with clay.	SP-SC
48 to 60	Gray and orange fine clayey SAND.	SC
Very moist soils @ 50" BGS		Mottling @ 30" BGS

HA7		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 8	Dark brown fine silty SAND with roots (Topsoil).	SM
8 to 20	Light brown fine poorly graded SAND with silt.	SP-SM
20 to 42	Gray and orange fine clayey SAND.	SC
42 to 60	Gray and orange fine clayey SAND.	SC
Groundwater @ 48" BGS		Mottling @ 20" BGS

HA8		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 8	Dark brown fine silty SAND with roots and wood (Topsoil).	SM
8 to 18	Brown fine to medium silty SAND.	SM
18 to 40	Gray, brown and orange fine to medium clayey SAND.	SC
40 to 60	Gray, brown and orange sandy CLAY.	CL
Groundwater @ 28" BGS		Mottling @ 18" BGS

Note: BGS = Below Ground Surface

Hand Auger Boring Log

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HA9		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 10	Dark brown fine silty SAND with roots (Topsoil).	SM
10 to 28	Dark gray fine silty SAND.	SM
28 to 40	Dark gray fine poorly graded SAND with silt / clasts of sandy clay.	SP-SM
40 to 60	Gray and orange sandy CLAY.	CL
No groundwater encountered		Mottling @ 40" BGS

HA10		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 4	Dark brown fine to coarse poorly graded SAND with silt and gravel.	SP-SM
4 to 60	Gray fine to coarse poorly graded SAND.	SP
No groundwater encountered		No mottling noted

HA11		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 7	Dark brown fine silty SAND with roots (Topsoil).	SM
7 to 18	Light brown fine to medium poorly graded SAND with silt.	SP-SM
18 to 34	Gray fine to medium poorly graded SAND with silt.	SP-SM
34 to 60	Gray and orange fine to medium poorly graded SAND with clay.	SP-SC
Very moist soils @ 42" BGS		Mottling @ 34" BGS

HA12		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 7	Dark brown fine silty SAND with roots (Topsoil).	SM
7 to 24	Brown fine silty SAND.	SM
24 to 46	Gray, brown and orange fine to medium clayey SAND.	SC
46 to 60	Gray and orange sandy CLAY.	CL
Groundwater @ 40" BGS		Mottling @ 24" BGS

Note: BGS = Below Ground Surface

Hand Auger Boring Log

Project Name: Benton Boulevard Extension

Project No.: ES155153

Project Location: Pooler, Chatham County, Georgia



HA13		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 6	Dark brown fine silty SAND with roots (Topsoil).	SM
6 to 34	Light brown fine poorly graded SAND with silt.	SP-SM
34 to 60	Light brown and orange fine clayey SAND.	SC
Very moist soils @ 46" BGS		Mottling @ 34" BGS

HA14		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 6	Dark brown fine silty SAND with roots (Topsoil).	SM
6 to 12	Dark gray fine poorly graded SAND with silt.	SP-SM
12 to 42	Brown fine to medium silty SAND.	SM
42 to 60	Gray and orange sandy CLAY.	CL
Groundwater @ 32" BGS		Mottling @ 42" BGS

HA15		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 2	Dark brown fine silty SAND with roots (Topsoil).	SM
2 to 8	Brown and orange fine to medium clayey SAND.	SC
8 to 36	Brown fine silty SAND.	SM
36 to 60	Gray and orange fine to medium clayey SAND.	SC
Groundwater @ 40" BGS		Mottling @ 36" BGS

HA16		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 2	Dark brown fine silty SAND with roots (Topsoil).	SM
2 to 12	Dark gray sandy CLAY.	CL
12 to 34	Brown fine silty SAND.	SM
34 to 60	Gray and orange fine to medium clayey SAND.	SC
Groundwater @ 30" BGS		Mottling @ 34" BGS

Note: BGS = Below Ground Surface

Hand Auger Boring Log

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HA17		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 4	Dark brown fine silty SAND with roots (Topsoil).	SM
4 to 14	Brown and orange fine to medium clayey SAND.	SC
14 to 38	Dark gray clayey SAND.	SC
38 to 60	Gray, brown and orange sandy CLAY.	CL
Groundwater @ 44" BGS		Mottling @ 30" BGS

HA18		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 3	Dark brown fine silty SAND with roots (Topsoil).	SM
3 to 10	Light brown fine to medium poorly graded SAND with silt.	SP-SM
10 to 28	Brown fine poorly graded SAND with silt and wood debris.	SP-SM
28 to 38	Red and orange fine to medium clayey SAND.	SC
38 to 60	Gray, red and orange sandy CLAY.	CL
Very moist soils @ 44" BGS		Mottling @ 28" BGS

HA19		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 6	Dark brown fine silty SAND with roots (Topsoil).	SM
6 to 20	Light brown fine poorly graded SAND with silt.	SP-SM
20 to 40	Brown and orange fine poorly graded SAND with clay.	SP-SC
40 to 60	Brown and orange fine clayey SAND.	SC
Very moist soils @ 48" BGS		Mottling @ 20" BGS

HA20		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 2	Dark brown fine silty SAND with roots (Topsoil).	SM
2 to 10	Brown and orange sandy CLAY.	CL
10 to 18	Brown fine silty SAND.	SM
18 to 60	Light brown fine silty SAND.	SM
Very moist soils @ 50" BGS		No mottling noted

Note: BGS = Below Ground Surface

Hand Auger Boring Log

Project Name: Benton Boulevard Extension

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HA21		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 7	Dark brown fine silty SAND with roots (Topsoil).	SM
7 to 18	Gray, brown and orange fine to medium clayey SAND.	SC
18 to 60	Gray, brown and orange sandy CLAY / trace of coarse clayey sand.	CH
No groundwater encountered		Mottling @ 7" BGS

HA22		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 8	Dark brown fine silty SAND with roots (Topsoil).	SM
8 to 44	Brown fine poorly graded SAND with silt.	SP-SM
44 to 60	Gray and orange fine to coarse clayey SAND / trace of gravel.	SC
No groundwater encountered		Mottling @ 44" BGS

HA23		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 8	Dark brown fine silty SAND with roots (Topsoil).	SM
8 to 20	Brown fine poorly graded SAND with silt.	SP-SM
20 to 44	Gray fine poorly graded SAND.	SP
44 to 60	Gray and orange fine clayey SAND.	SC
Very moist soils @ 48" BGS		Mottling @ 44" BGS

HA24		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 8	Dark brown fine silty SAND with roots (Topsoil).	SM
8 to 16	Dark gray fine to medium clayey SAND.	SC
16 to 60	Gray and orange sandy CLAY.	CL
No groundwater encountered		Mottling @ 16" BGS

Note: BGS = Below Ground Surface

Hand Auger Boring Log

Project Name: Benton Boulevard Extension

Project No.: ES155153

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HA25		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 8	Dark brown fine silty SAND with roots (Topsoil).	SM
8 to 18	Brown fine poorly graded SAND with silt.	SP-SM
18 to 30	Gray and orange sandy CLAY with coarse clayey sand.	CL
30 to 60	Gray and orange fine to coarse clayey SAND.	SC
Very moist soils @ 50" BGS		Mottling @ 18" BGS

HA26		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 7	Dark brown fine silty SAND with roots (Topsoil).	SM
7 to 28	Brown fine poorly graded SAND with silt.	SP-SM
28 to 60	Gray and orange sandy CLAY.	CL
No groundwater encountered		Mottling @ 28" BGS

HA27		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 8	Dark brown fine silty SAND with roots (Topsoil).	SM
8 to 18	Brown fine poorly graded SAND with silt.	SP-SM
18 to 40	Gray fine silty SAND.	SM
40 to 60	Gray and orange sandy CLAY with coarse clayey sand.	CL
Groundwater @ 46" BGS		Mottling @ 18" BGS

HA28		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 10	Dark brown fine to medium silty SAND with roots (Topsoil).	SM
10 to 18	Gray and orange fine to medium clayey SAND.	SC
18 to 60	Gray, orange and red sandy CLAY with coarse clayey SAND.	CL
No groundwater encountered		Mottling @ 10" BGS

Note: BGS = Below Ground Surface

Hand Auger Boring Log

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HA29		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 4	Dark brown fine silty SAND with roots (Topsoil).	SM
4 to 32	Brown fine poorly graded SAND with silt.	SP-SM
32 to 60	Gray and orange sandy CLAY.	CL
No groundwater encountered		Mottling @ 32" BGS

HA30		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 7	Dark brown fine to medium silty SAND with roots (Topsoil).	SM
7 to 40	Gray and orange sandy CLAY with coarse clayey sand.	CL
40 to 60	Gray and orange fine to coarse clayey SAND.	SC
Groundwater @ 32" BGS		Mottling @ 7" BGS

HA31		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 8	Dark brown fine to medium silty SAND with roots (Topsoil).	SM
8 to 36	Gray and orange sandy CLAY with coarse clayey sand.	CL
36 to 60	Gray and orange fine to coarse clayey SAND.	SC
Groundwater @ 34" BGS		Mottling @ 8" BGS

HA32		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 8	Dark brown fine silty SAND with roots (Topsoil).	SM
8 to 30	Brown fine to medium silty SAND.	SM
30 to 60	Gray and orange fine to medium clayey SAND.	SC
Groundwater @ 46" BGS		Mottling @ 30" BGS

Note: BGS = Below Ground Surface

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HA33		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 6	Dark brown fine silty SAND with roots (Topsoil).	SM
6 to 26	Brown fine to medium silty SAND.	SM
26 to 52	Gray and orange fine to medium clayey SAND.	SC
52 to 60	Gray and orange sandy CLAY.	CL
Groundwater @ 44" BGS		Mottling @ 26" BGS

HA34		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 8	Dark brown fine to medium silty SAND with roots (Topsoil).	SM
8 to 16	Brown and orange fine to medium clayey SAND.	SC
16 to 60	Gray and orange sandy CLAY with coarse clayey sand.	CL
Very moist soils @ 52" BGS		Mottling @ 8" BGS

HA35		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 7	Brown fine silty SAND with roots (Topsoil).	SM
7 to 18	Orange fine to medium poorly graded SAND with clay.	SP-SC
18 to 60	Gray, orange and red fine clayey SAND.	SC
Very moist soils @ 46" BGS		Mottling @ 18" BGS

HA36		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 7	Dark brown fine to medium silty SAND with roots (Topsoil).	SM
7 to 24	Brown fine to medium silty SAND.	SM
24 to 60	Gray, orange and red fine to medium clayey SAND.	SC
No groundwater encountered		Mottling @ 22" BGS

Note: BGS = Below Ground Surface

Hand Auger Boring Log

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HA37		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 8	Brown fine to medium silty SAND with roots (Topsoil).	SM
8 to 26	Brown fine poorly graded SAND with silt.	SP-SM
26 to 60	Gray and orange fine to medium clayey SAND.	SC
No groundwater encountered		Mottling @ 26" BGS

HA38		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 4	Dark brown fine silty SAND with roots (Topsoil).	SM
4 to 60	Gray, orange and red sandy CLAY.	CL
Groundwater @ 48" BGS		Mottling @ 4" BGS

HA39		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 6	Dark brown fine silty SAND with roots (Topsoil).	SM
6 to 22	Brown and orange fine to medium clayey SAND.	SC
22 to 60	Dark gray and orange sandy CLAY.	CL
No groundwater encountered		Mottling @ 6" BGS

HA40		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 4	Dark brown fine to medium silty SAND with roots (Topsoil).	SM
4 to 12	Brown fine silty SAND.	SM
12 to 28	Brown and orange fine to medium clayey SAND.	SC
28 to 60	Gray and orange sandy CLAY.	CL
Groundwater perched @ 18" BGS		Mottling @ 12" BGS

Note: BGS = Below Ground Surface

Hand Auger Boring Log

Project Name: Benton Boulevard Extension

Project No.: ES155153

Project Location: Pooler, Chatham County, Georgia



HA41		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 6	Dark brown fine silty SAND with roots (Topsoil).	SM
6 to 14	Light brown fine to medium poorly graded SAND with silt.	SP-SM
14 to 60	Gray, orange and red fine to medium clayey SAND.	SC
No groundwater encountered		Mottling @ 14" BGS

HA42		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 9	Brown fine to medium silty SAND with roots (Topsoil).	SM
9 to 30	Brown and orange fine to medium clayey SAND.	SC
30 to 60	Gray and orange sandy CLAY with coarse clayey sands.	CL
Very moist soils @ 50" BGS		Mottling @ 9" BGS

HA43		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 7	Dark brown fine silty SAND with roots (Topsoil).	SM
7 to 28	Brown fine to medium silty SAND.	SM
28 to 60	Gray and orange sandy CLAY.	CL
Groundwater @ 6" BGS		Mottling @ 28" BGS

HA44		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 6	Dark brown fine silty SAND with roots (Topsoil).	SM
6 to 30	Brown fine to medium silty SAND.	SM
30 to 40	Gray and orange fine to medium clayey SAND.	SC
40 to 60	Gray and orange sandy CLAY.	CL
Groundwater @ 10" BGS		Mottling @ 30" BGS

Note: BGS = Below Ground Surface

Hand Auger Boring Log

Project Name: Benton Boulevard Extension

Project No.: ES155153

Project Location: Pooler, Chatham County, Georgia














HA45		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 3	Dark brown fine silty SAND with roots (Topsoil).	SM
3 to 24	Gray, brown and orange clayey SAND.	SC
24 to 30	Black fine silty SAND with wood debris.	SM
Refusal @ 30" BGS due to wood debris.		
No groundwater encountered		No mottling noted

HA46		
Depth Below Grade (inch)	Material Description	USCS Classification
0 to 10	Dark brown fine silty SAND with roots (Topsoil).	SM
10 to 18	Dark brown fine silty SAND.	SM
18 to 46	Dark brown and orange fine clayey SAND.	SC
46 to 60	Dark brown and orange sandy CLAY.	CL
Groundwater @ 30" BGS		Mottling @ 18" BGS

Note: BGS = Below Ground Surface

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING			GROUNDWATER		Groundwater Initially Encountered	FIELD TESTS	(HP)	Hand Penetrometer
	Auger	Split Spoon			Groundwater Level After a Specified Period of Time		(T)	Torvane
					Static Groundwater Level After a Specified Period of Time		(b/f)	Standard Penetration Test (blows per foot)
	Shelby Tube	Macro Core			No Groundwater Observed		(PID)	Photo-Ionization Detector
				<p>Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.</p>			(OVA)	Organic Vapor Analyzer
No Recovery	Rock Core							
								
	Ring Sampler							

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS	RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance Includes gravels, sands and silts.		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
	Descriptive Term (Density)	Std. Penetration Resistance (blows per foot)	Descriptive Term (Consistency)	Undrained Shear Strength (kips per square foot)	Std. Penetration Resistance (blows per foot)
	Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
	Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
	Medium Dense	10 - 29	Medium-Stiff	0.50 to 1.00	5 - 7
	Dense	30 - 50	Stiff	1.00 to 2.00	8 - 14
	Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
			Hard	above 4.00	> 30

RELATIVE PROPORTIONS OF SAND AND GRAVEL

<u>Descriptive Term(s) of other constituents</u>	<u>Percent of Dry Weight</u>
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

<u>Descriptive Term(s) of other constituents</u>	<u>Percent of Dry Weight</u>
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

<u>Descriptive Term(s) of other constituents</u>	<u>Percent of Dry Weight</u>
Trace	< 5
With	5 - 12
Modifier	> 12

PLASTICITY DESCRIPTION

<u>Term</u>	<u>Plasticity Index</u>
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

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UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests^A

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A					Soil Classification	
					Group Symbol	Group Name ^B
Coarse Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines ^C	Cu ≥ 4 and 1 ≤ Cc ≤ 3 ^E		GW	Well-graded gravel ^F
			Cu < 4 and/or 1 > Cc > 3 ^E		GP	Poorly graded gravel ^F
		Gravels with Fines More than 12% fines ^C	Fines classify as ML or MH		GM	Silty gravel ^{F,G,H}
			Fines classify as CL or CH		GC	Clayey gravel ^{F,G,H}
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines ^D	Cu ≥ 6 and 1 ≤ Cc ≤ 3 ^E		SW	Well-graded sand ^I
			Cu < 6 and/or 1 > Cc > 3 ^E		SP	Poorly graded sand ^I
		Sands with Fines More than 12% fines ^D	Fines classify as ML or MH		SM	Silty sand ^{G,H,I}
			Fines Classify as CL or CH		SC	Clayey sand ^{G,H,I}
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays Liquid limit less than 50	inorganic	PI > 7 and plots on or above "A" line ^J		CL	Lean clay ^{K,L,M}
			PI < 4 or plots below "A" line ^J		ML	Silt ^{K,L,M}
		organic	Liquid limit - oven dried	< 0.75	OL	Organic clay ^{K,L,M,N}
			Liquid limit - not dried			Organic silt ^{K,L,M,O}
	Silts and Clays Liquid limit 50 or more	inorganic	PI plots on or above "A" line		CH	Fat clay ^{K,L,M}
			PI plots below "A" line		MH	Elastic Silt ^{K,L,M}
		organic	Liquid limit - oven dried	< 0.75	OH	Organic clay ^{K,L,M,P}
			Liquid limit - not dried			Organic silt ^{K,L,M,Q}
Highly organic soils	Primarily organic matter, dark in color, and organic odor				PT	Peat

^ABased on the material passing the 3-in. (75-mm) sieve

^BIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^CGravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

^DSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

$$^E Cu = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

^FIf soil contains $\geq 15\%$ sand, add "with sand" to group name.

^GIf fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^HIf fines are organic, add "with organic fines" to group name.

^IIf soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

^JIf Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

^KIf soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^LIf soil contains $\geq 30\%$ plus No. 200 predominantly sand, add "sandy" to group name.

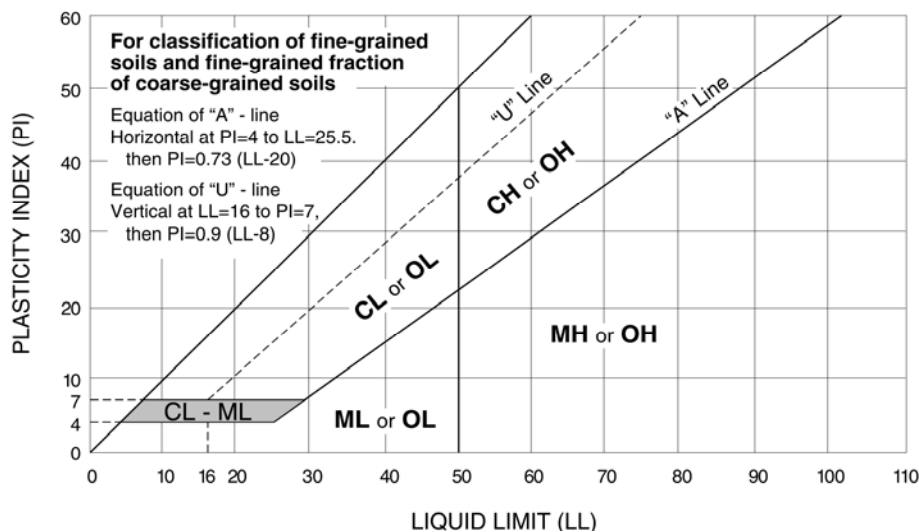
^MIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^N $PI \geq 4$ and plots on or above "A" line.

^O $PI < 4$ or plots below "A" line.

^P PI plots on or above "A" line.

^Q PI plots below "A" line.



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Exhibit A-6

APPENDIX B

LABORATORY TEST RESULT

- Exhibit B-1 Summary of Soil Laboratory Test Results
- Exhibit B-2 Summary of Corrosion Test Results
- Exhibit B-3 Grain Size Analyses
- Exhibit B-4 Atterberg Limits
- Exhibit B-5 Corrosion Test Report Submitted by Avery
Laboratories & Environmental Services, LLC

Terracon Project Name: Benton Boulevard Extension
Terracon Project No.: ES155153
Project Location: Pooler, Chatham County, Georgia



Summary of Soil Laboratory Test Results

Sample No.	Sample Depth (in)	Material Description	Material Class	USCS	Natural Moisture content (%)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Cu	Cc	No. 60 sieve, % passing	No. 200 sieve, % passing	% Clay	% Gravel	% Sand
HA1	22 to 32	Sandy CLAY	IIB3	CL	25.8	--	--	--	--	--	96.1	50.5	49.9	0.0	49.5
HA3	16 to 26	Silty SAND	IIB2	SM	12.1	--	--	--	--	--	84.4	26.4	23.8	0.0	73.6
HA7	26 to 38	Clayey SAND	IIB1	SC	10.7	--	--	--	--	--	65.3	21.2	19.1	0.2	78.6
HA9	12 to 24	Silty SAND	IIB1	SM	8.8	--	--	--	--	--	72.7	21.1	19.7	0.0	78.9
	42 to 52	Sandy CLAY	IIB4	CL	18.9	46.6	23.3	23.3	--	--		--		--	--
HA11	22 to 32	Poorly graded SAND with silt	IA1	SP-SM	4.0	--	--	--	5.24	1.49	22.0	5.2	4.9	0.0	94.8
HA12	12 to 24	Silty SAND	IA2	SM	11.8	--	--	--	--	--	52.6	16.4	15.4	0.0	83.6
HA14	30 to 40	Silty SAND	IA2	SM	15.4	--	--	--	--	--	42.7	13.2	12.8	0.0	86.8
HA16	18 to 28	Silty SAND	IIB1	SM	10.4	--	--	--	--	--	50.9	19.1	18.3	0.0	80.9
HA17	28 to 38	Clayey SAND	IIB3	SC	17.4	--	--	--	--	--	87.7	33.9	32.6	0.0	66.1
	40 to 50	Sandy CLAY	IIB4	CL	21.9	34.3	21.8	12.5	--	--				--	--
HA20	30 to 40	Silty SAND	IIB1	SM	9.0	--	--	--	--	--	85.1	17.3	15.6	0.4	82.3
HA21	28 to 38	Sandy CLAY	IIIC1	CH	20.5	53.3	26.2	27.1	--	--		--		--	--
HA22	18 to 28	Poorly graded SAND with silt	IA1	SP-SM	2.8	--	--	--	--	--	42.6	10.3	9.7	7.2	82.5
HA24	32 to 42	Sandy CLAY	IIB4	CL	22.7	--	--	--	--	--	65.0	51.4	51.3	0.1	48.5
HA25	36 to 46	Clayey SAND	IIB2	SC	20.8	--	--	--	--	--	45.5	20.9	20.5	0.0	79.1
HA27	26 to 36	Silty SAND	IA2	SM	6.3	--	--	--	--	--	35.2	15.1	14.5	1.1	83.8
	42 to 60	Sandy CLAY	IIB4	CL	6.8	37.3	22.4	14.9	--	--		--		--	--
HA30	26 to 36	Sandy CLAY	IIB4	CL	22.0	33.9	23.2	10.7	--	--		--		--	--
	42 to 52	Clayey SAND	IIB2	SC	16.6	--	--	--	--	--	38.5	24.7	24.5	0.9	74.4

Terracon Project Name: Benton Boulevard Extension
Terracon Project No.: ES155153
Project Location: Pooler, Chatham County, Georgia



Summary of Soil Laboratory Test Results

Sample No.	Sample Depth (in)	Material Description	Material Class	USCS	Natural Moisture content (%)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Cu	Cc	No. 60 sieve, % passing	No. 200 sieve, % passing	% Clay	% Gravel	% Sand
HA32	16 to 26	Silty SAND	IA2	SM	8.6	--	--	--	--	--	33.2	16.1	15.6	3.0	80.9
HA34	20 to 34	Sandy CLAY	IIB4	CL	30.3	41.1	25.9	15.2	--	--		--		--	--
HA36	14 to 24	Silty SAND	IIB1	SM	9.0	--	--	--	--	--	53.1	22.0	19.8	0.9	77.1
HA38	20 to 32	Sandy CLAY	IIB4	CL	18.2	41.4	22.2	19.2	--	--		--		--	--
HA40	32 to 42	Sandy CLAY	IIB3	CL	17.9	--	--	--	--	--	70.6	51.1	49.5	0.8	48.1
HA42	16 to 28	Clayey SAND	IIB1	SC	9.2	--	--	--	--	--	31.6	18.8	17.5	3.1	78.1
	42 to 50	Sandy CLAY	IIB4	CL	18.6	47.6	25.6	22.0	--	--		--		--	--
HA44	30 to 40	Clayey SAND	IIB3	SC	24.5	--	--	--	--	--	68.2	38.5	38.0	8.1	53.4
HA45	12 to 24	Clayey SAND	IIB2	SC	12.9	--	--	--	--	--	61.6	22.1	20.7	0.3	77.6

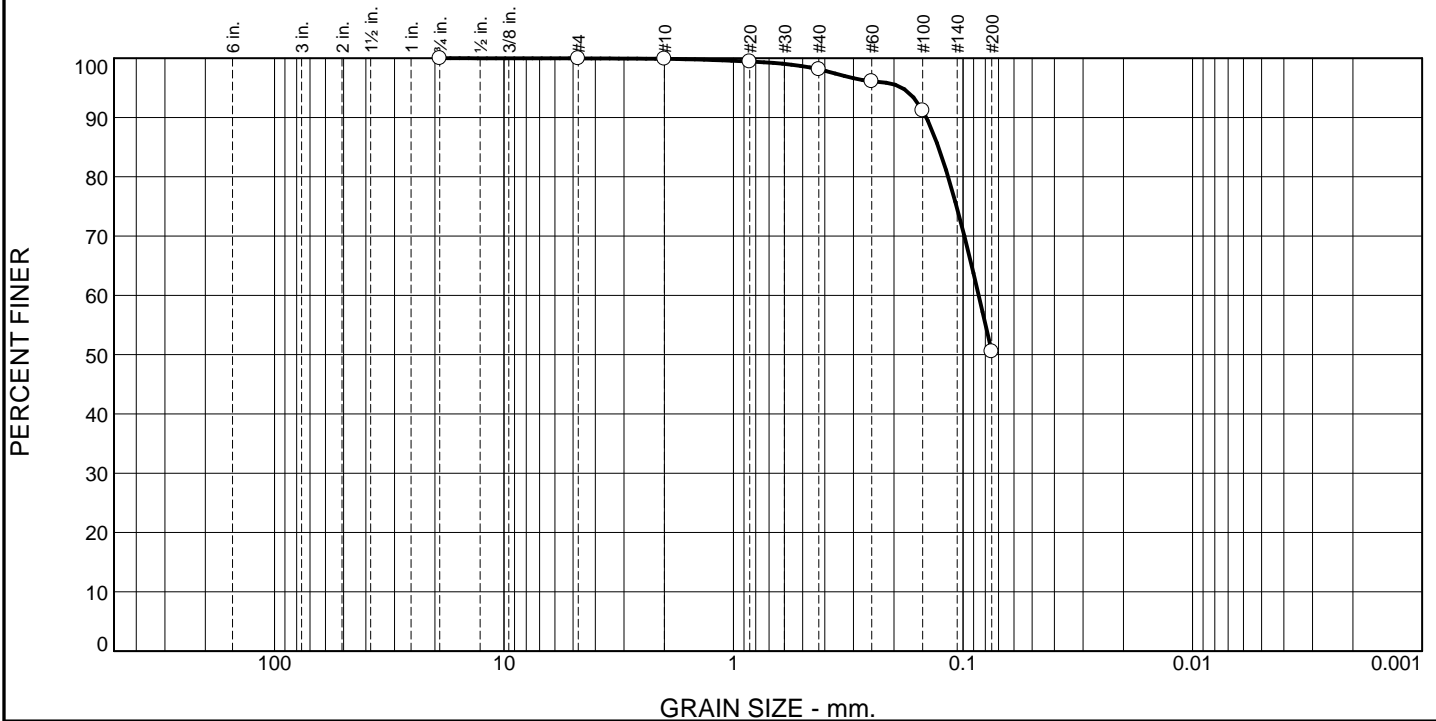
Terracon Project Name: Benton Boulevard Extension
Terracon Project No.: ES155153
Project Location: Pooler, Chatham County, Georgia



Summary of Corrosion Test Results

Sample No.	Sample Depth (inch)	Material Description	Material Class	USCS	Natural Moisture content (%)	Chloride (mg/kg or ppm)	pH	Sulfate (mg/kg or ppm)	Resistivity (ohm-cm)
HA4	24 to 36	Poorly graded SAND	IA3	SP	7.8	768	4.92	1,140	27,700
HA8	24 to 36	Clayey SAND	IIB3	SC	20.4	1,260	3.89	5,490	26,900
HA15	36 to 48	Clayey SAND	IIB3	SC	8.0	597	4.46	1,560	30,800
HA19	42 to 54	Clayey SAND	IIB3	SC	10.8	1,100	4.37	1,940	36,600
HA28	36 to 48	Sandy CLAY	IIB4	CL	18.0	< 244	4.10	614	10,100
HA39	30 to 42	Sandy CLAY	IIB4	CL	15.0	2,230	3.91	10,800	23,900

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	1.8	47.6	50.5	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4	100.0		
#4	100.0		
#10	99.9		
#20	99.4		
#40	98.1		
#60	96.1		
#100	91.2		
#200	50.5		

* (no specification provided)

Material Description

Gray Sandy CLAY

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= CL AASHTO (M 145)= A-4(0)

Coefficients

D₉₀= 0.1446 D₈₅= 0.1280 D₆₀= 0.0854
D₅₀= D₃₀= D₁₅=
D₁₀= C_u= C_c=

Remarks

Natural Moisture 25.8%

Date Received: 12/30/2015 Date Tested: 1/8/2016

Tested By: JPW

Checked By: JPW

Title: Lab Technician

Location: HA1
Depth: 22"-32"

Date Sampled: 12/30/2015

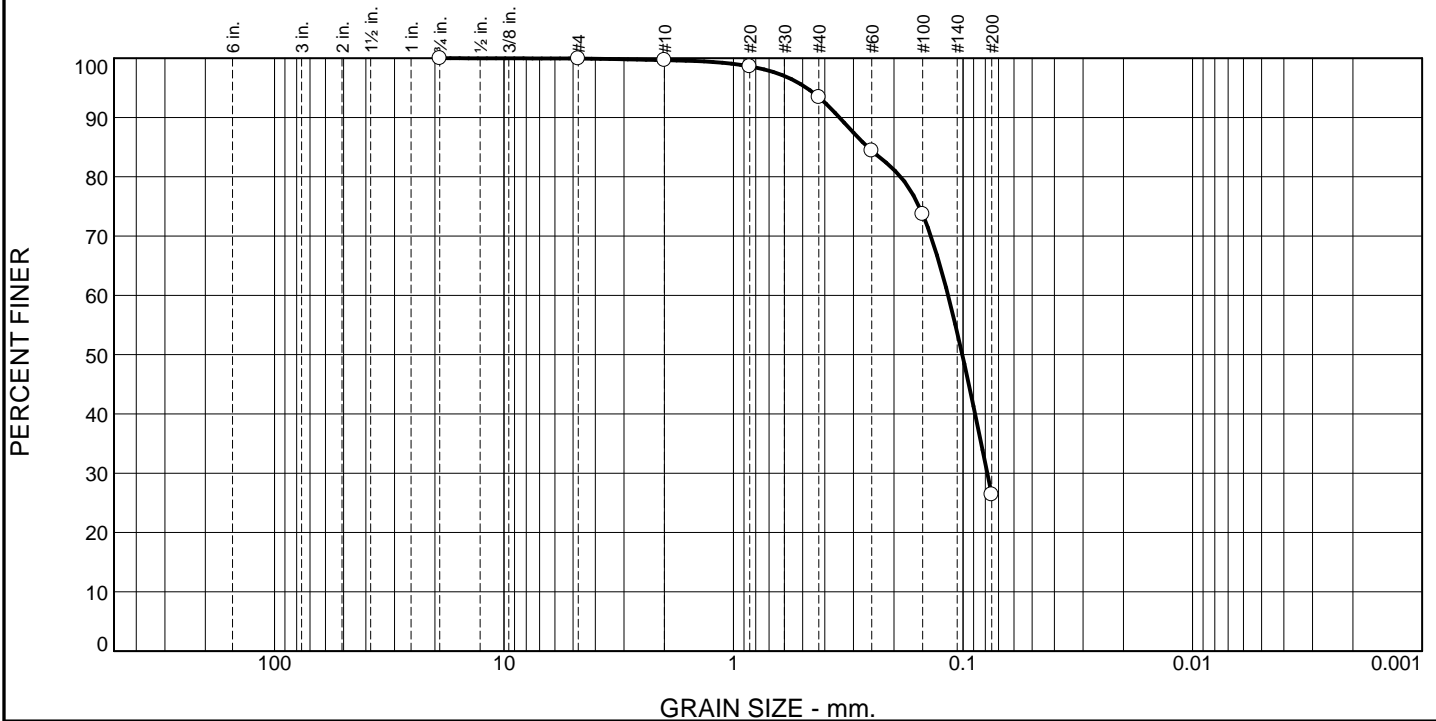
Terracon

Client: McGee Partners, Inc.
Project: Benton Boulevard Extension

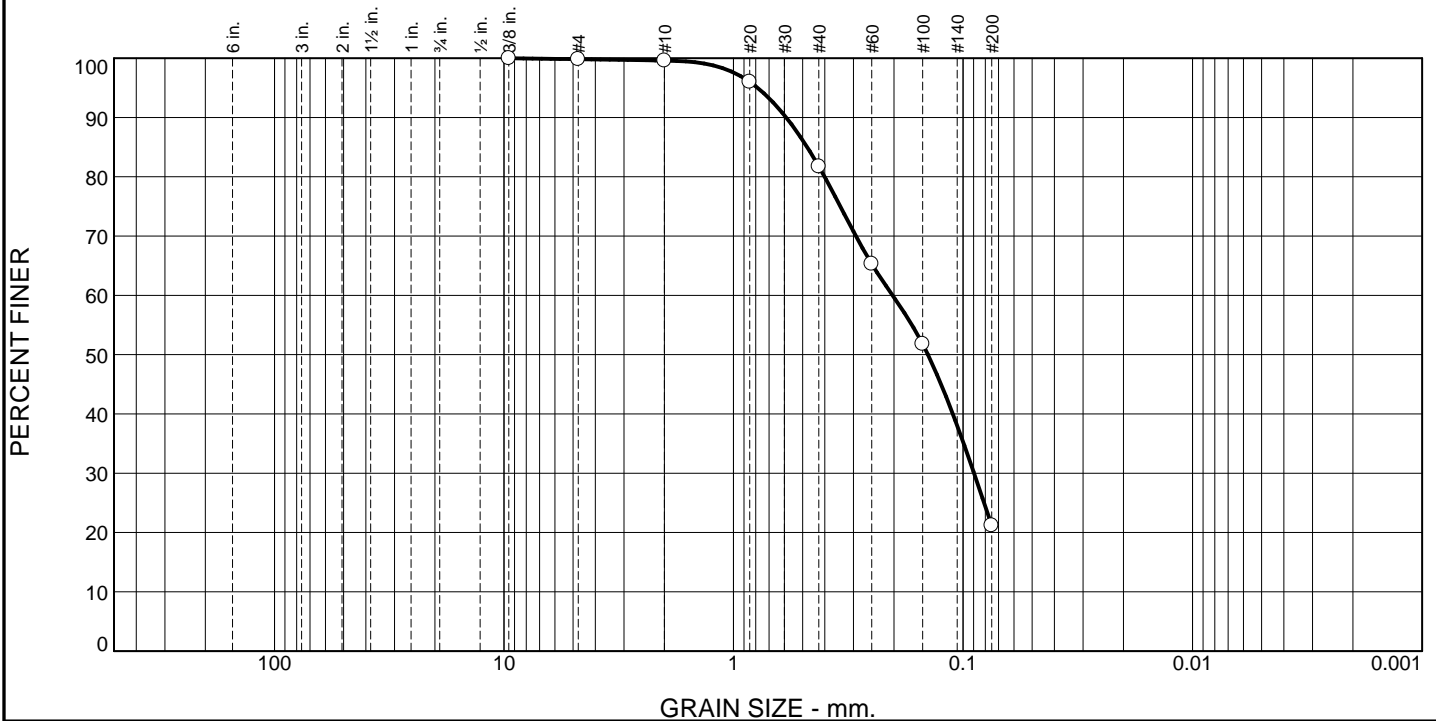
Project No: ES155153

Figure

Particle Size Distribution Report



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.2	17.9	60.5	21.2	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8	100.0		
#4	99.8		
#10	99.6		
#20	96.0		
#40	81.7		
#60	65.3		
#100	51.8		
#200	21.2		

* (no specification provided)

Material Description

Gray/Orange Clayey Sand

Atterberg Limits (ASTM D 4318)

PL= nP

LL= NV

PI=

Classification

USCS (D 2487)= SC

AASHTO (M 145)= A-2-4(0)

Coefficients

D₉₀= 0.5893

D₈₅= 0.4776

D₆₀= 0.2028

D₅₀= 0.1422

D₃₀= 0.0896

D₁₅=

D₁₀=

C_u=

C_c=

Remarks

Natural Moisture 10.7%

Date Received: 12/23/2015

Date Tested: 12/25/2015

Tested By: JPW

Checked By: JPW

Title: Lab Technician

Location: HA7
Depth: 26"-38"

Date Sampled: 12/23/2015

Terracon

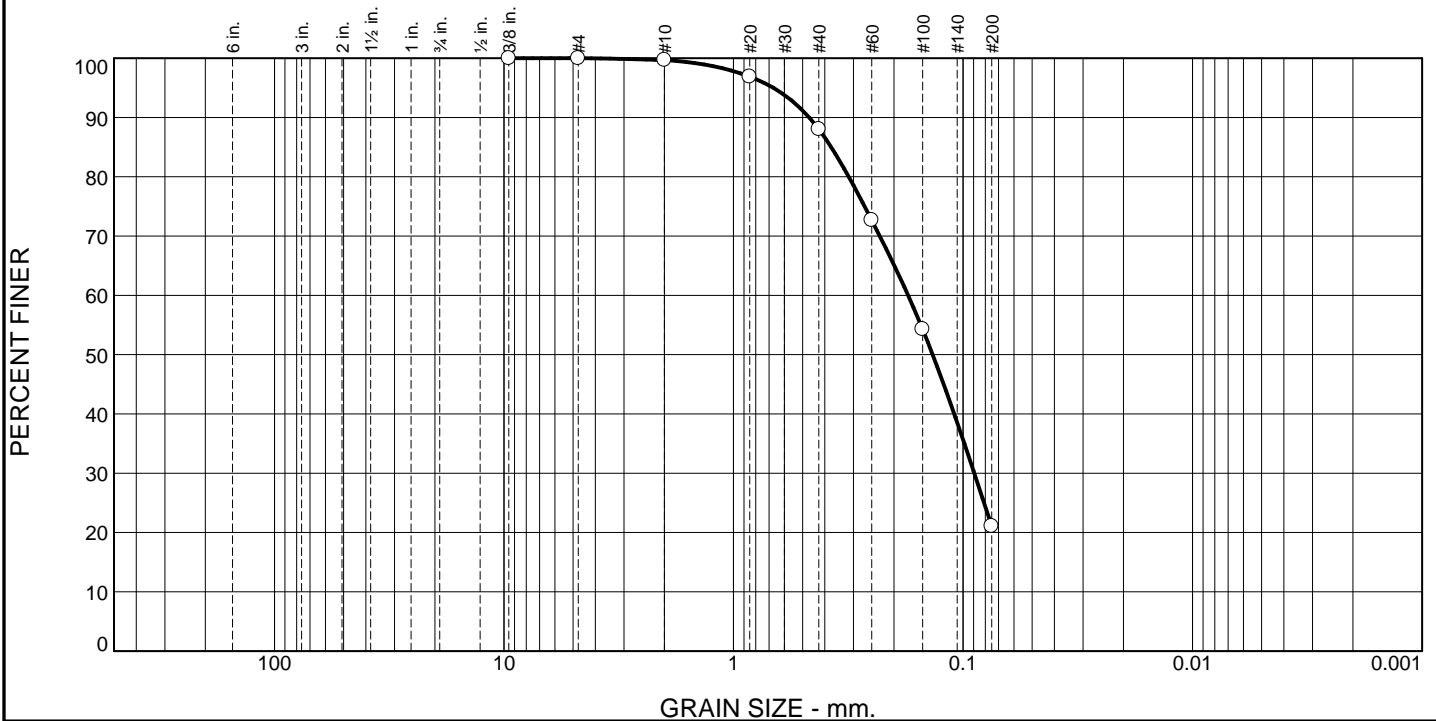
Client: McGee Partners, Inc.

Project: Benton Boulevard Extension

Project No: ES155153

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	11.7	66.9	21.1	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8	100.0		
#4	100.0		
#10	99.7		
#20	96.9		
#40	88.0		
#60	72.7		
#100	54.3		
#200	21.1		

* (no specification provided)

Material Description

Dark Gray Silty Sand

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SM AASHTO (M 145)= A-2-4(0)

Coefficients

D₉₀= 0.4679 D₈₅= 0.3752 D₆₀= 0.1734
D₅₀= 0.1356 D₃₀= 0.0893 D₁₅=
D₁₀= C_u= C_c=

Remarks

Natural Moisture 8.8%

Date Received: 12/23/2015 Date Tested: 12/25/2015

Tested By: JPW

Checked By: JPW

Title: Lab Technician

Location: HA9
Depth: 12"-24"

Date Sampled: 12/23/2015

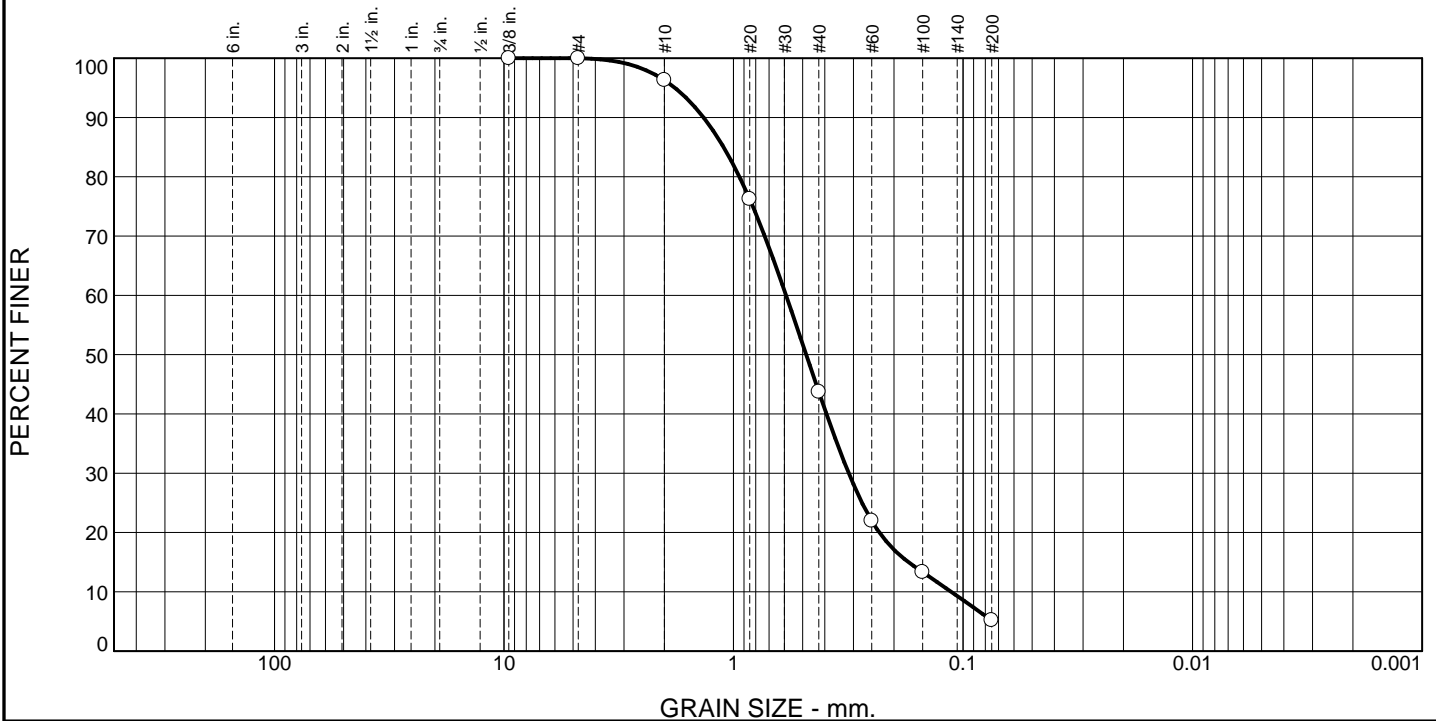
Terracon

Client: McGee Partners, Inc.
Project: Benton Boulevard Extension

Project No: ES155153

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	3.7	52.6	38.5	5.2	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8	100.0		
#4	100.0		
#10	96.3		
#20	76.2		
#40	43.7		
#60	22.0		
#100	13.3		
#200	5.2		

* (no specification provided)

Material Description

Gray Fine-Medium Sand with Silt

Atterberg Limits (ASTM D 4318)

PL= NP

LL= NV

PI=

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-b

Coefficients

D₉₀= 1.3504

D₈₅= 1.1049

D₆₀= 0.5902

D₅₀= 0.4824

D₃₀= 0.3146

D₁₅= 0.1728

D₁₀= 0.1127

C_u= 5.24

C_c= 1.49

Remarks

Natural Moisture 4.0%

Date Received: 12/23/2015

Date Tested: 12/25/2015

Tested By: JPW

Checked By: JPW

Title: Lab Technician

Location: HA11
Depth: 22"-32"

Date Sampled: 12/23/2015

Terracon

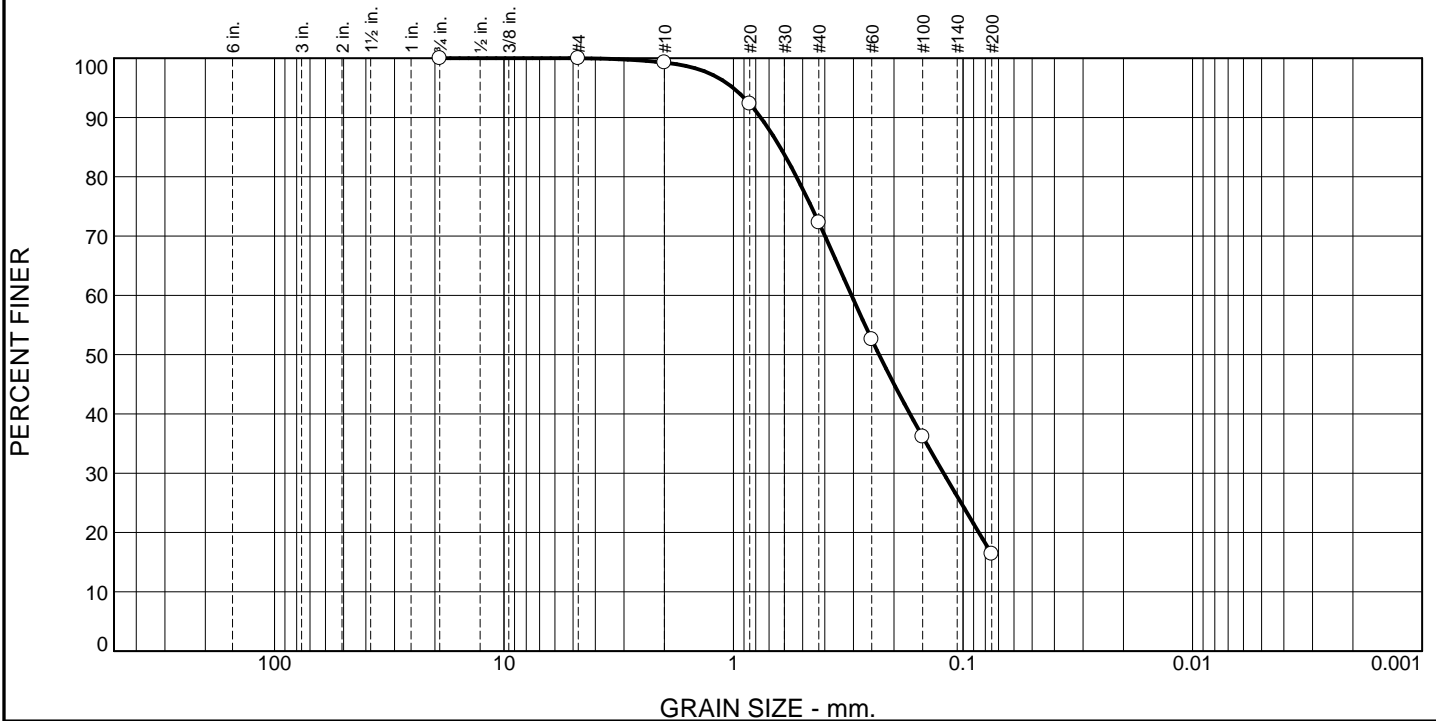
Client: McGee Partners, Inc.

Project: Benton Boulevard Extension

Project No: ES155153

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.7	27.0	55.9	16.4	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4	100.0		
#4	100.0		
#10	99.3		
#20	92.3		
#40	72.3		
#60	52.6		
#100	36.2		
#200	16.4		

* (no specification provided)

Material Description

Dark Brown Silty SAND

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SM AASHTO (M 145)= A-2-4(0)

Coefficients

D₉₀= 0.7608 D₈₅= 0.6266 D₆₀= 0.3060
D₅₀= 0.2321 D₃₀= 0.1216 D₁₅=
D₁₀= C_u= C_c=

Remarks

Natural Moisture 11.8%

Date Received: 12/30/2015 Date Tested: 1/8/2016

Tested By: JPW

Checked By: JPW

Title: Lab Technician

Location: HA12
Depth: 12"-24"

Date Sampled: 12/30/2015

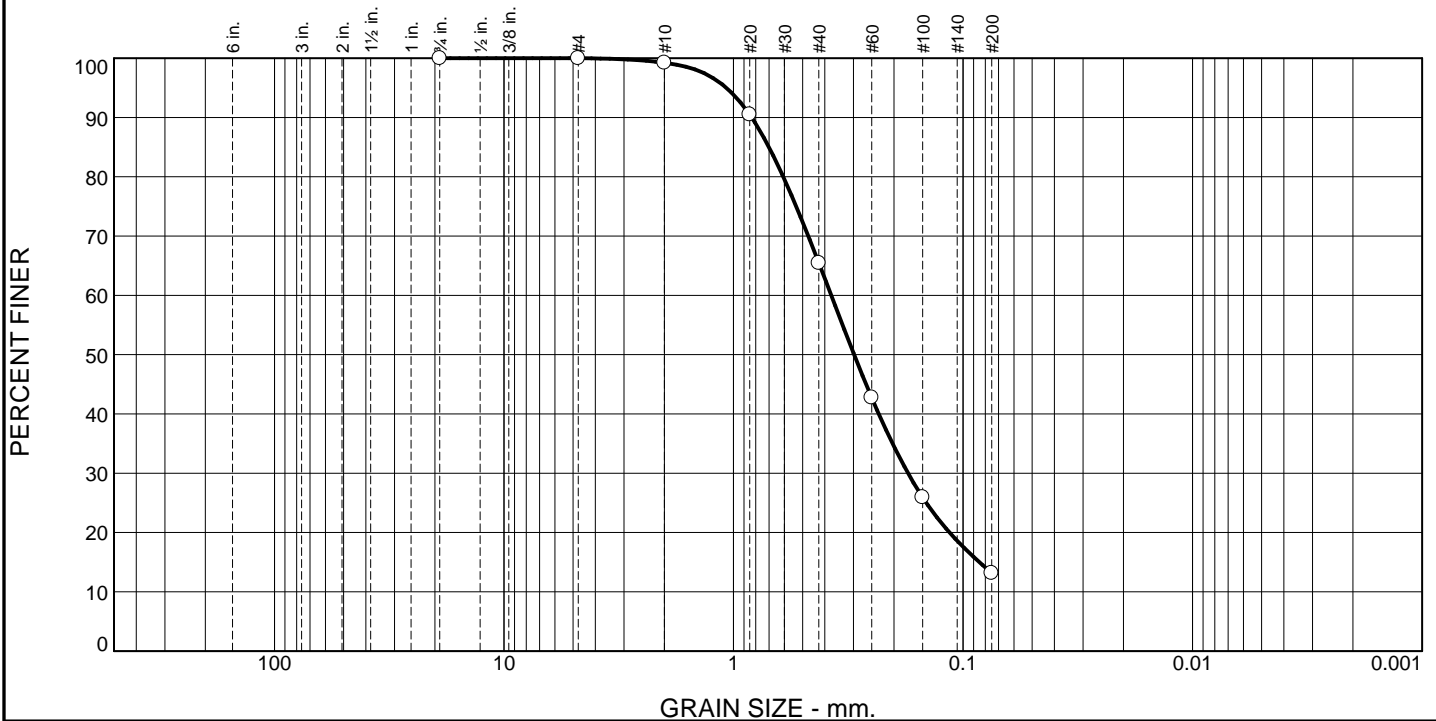
Terracon

Client: McGee Partners, Inc.
Project: Benton Boulevard Extension

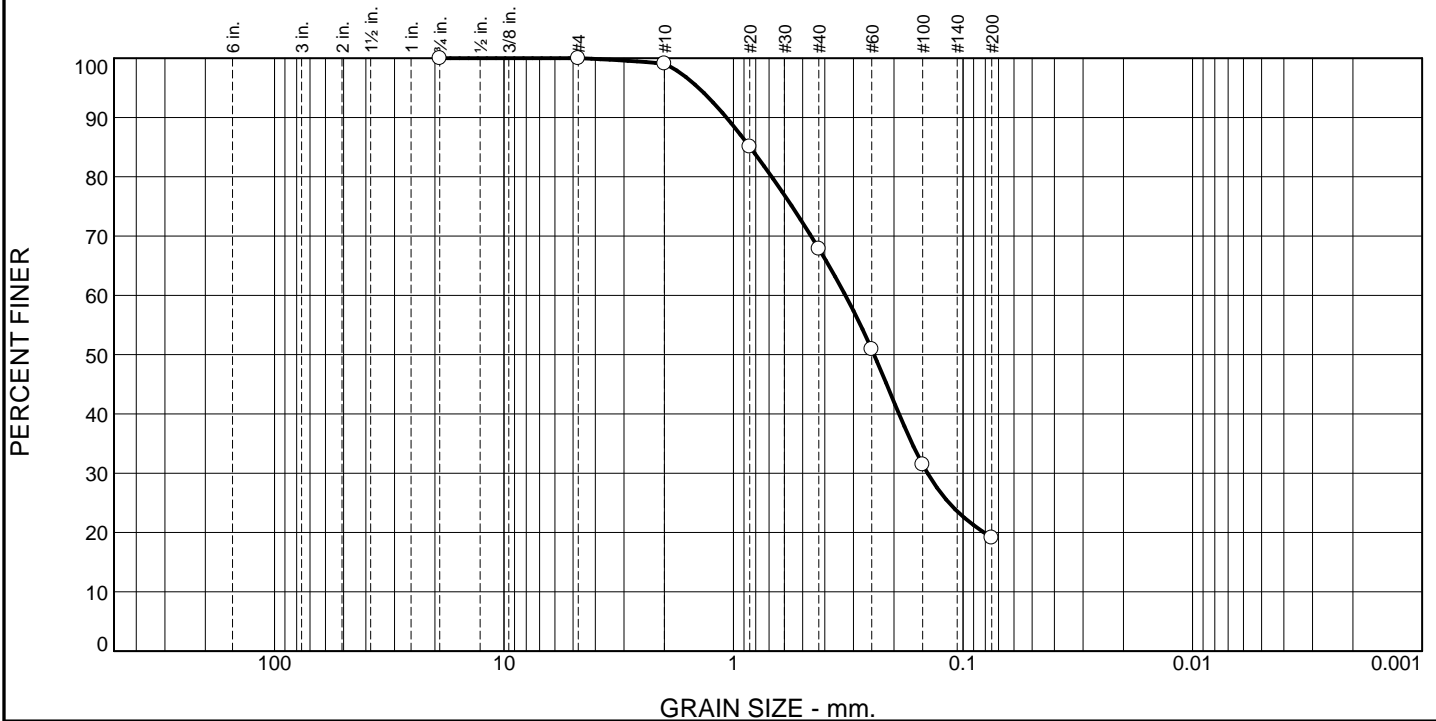
Project No: ES155153

Figure

Particle Size Distribution Report



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.9	31.2	48.8	19.1	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4	100.0		
#4	100.0		
#10	99.1		
#20	85.1		
#40	67.9		
#60	50.9		
#100	31.5		
#200	19.1		

* (no specification provided)

Material Description

Gray Silty SAND

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SM AASHTO (M 145)= A-2-4(0)

Coefficients

D₉₀= 1.0735 D₈₅= 0.8471 D₆₀= 0.3253
D₅₀= 0.2441 D₃₀= 0.1428 D₁₅=
D₁₀= C_u= C_c=

Remarks

Natural Moisture 10.4%

Date Received: 12/30/2015 Date Tested: 1/8/2016

Tested By: JPW

Checked By: JPW

Title: Lab Technician

Location: HA16
Depth: 18"-28"

Date Sampled: 12/30/2015

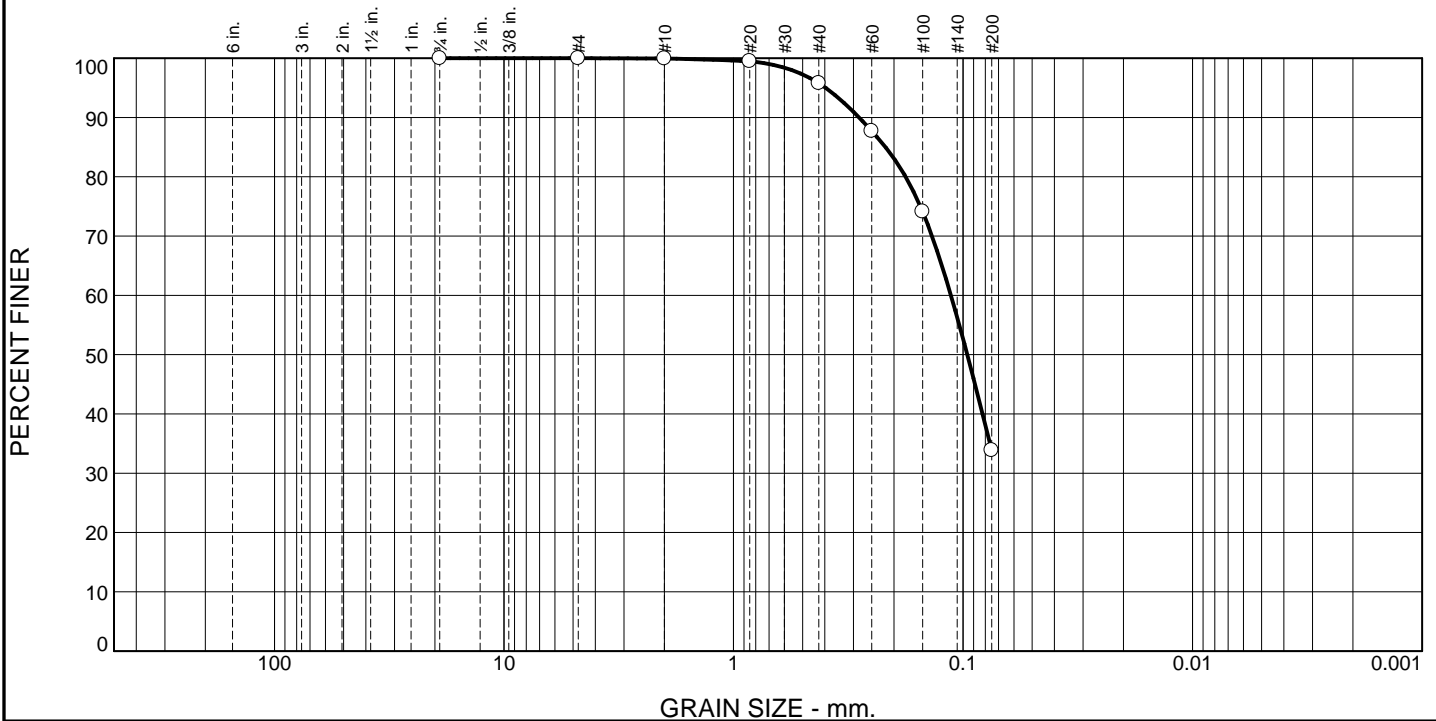
Terracon

Client: McGee Partners, Inc.
Project: Benton Boulevard Extension

Project No: ES155153

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	4.1	61.9	33.9	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4	100.0		
#4	100.0		
#10	99.9		
#20	99.5		
#40	95.8		
#60	87.7		
#100	74.1		
#200	33.9		

* (no specification provided)

Material Description

Light Brown Clayey SAND

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SC AASHTO (M 145)= A-2-4(0)

Coefficients

D₉₀= 0.2837 D₈₅= 0.2176 D₆₀= 0.1129
D₅₀= 0.0958 D₃₀= C_u= D₁₅=
D₁₀= C_c=

Remarks

Natural Moisture 17.4%

Date Received: 12/30/2015 Date Tested: 1/8/2016

Tested By: JPW

Checked By: JPW

Title: Lab Technician

Location: HA17
Depth: 28"-38"

Date Sampled: 12/30/2015

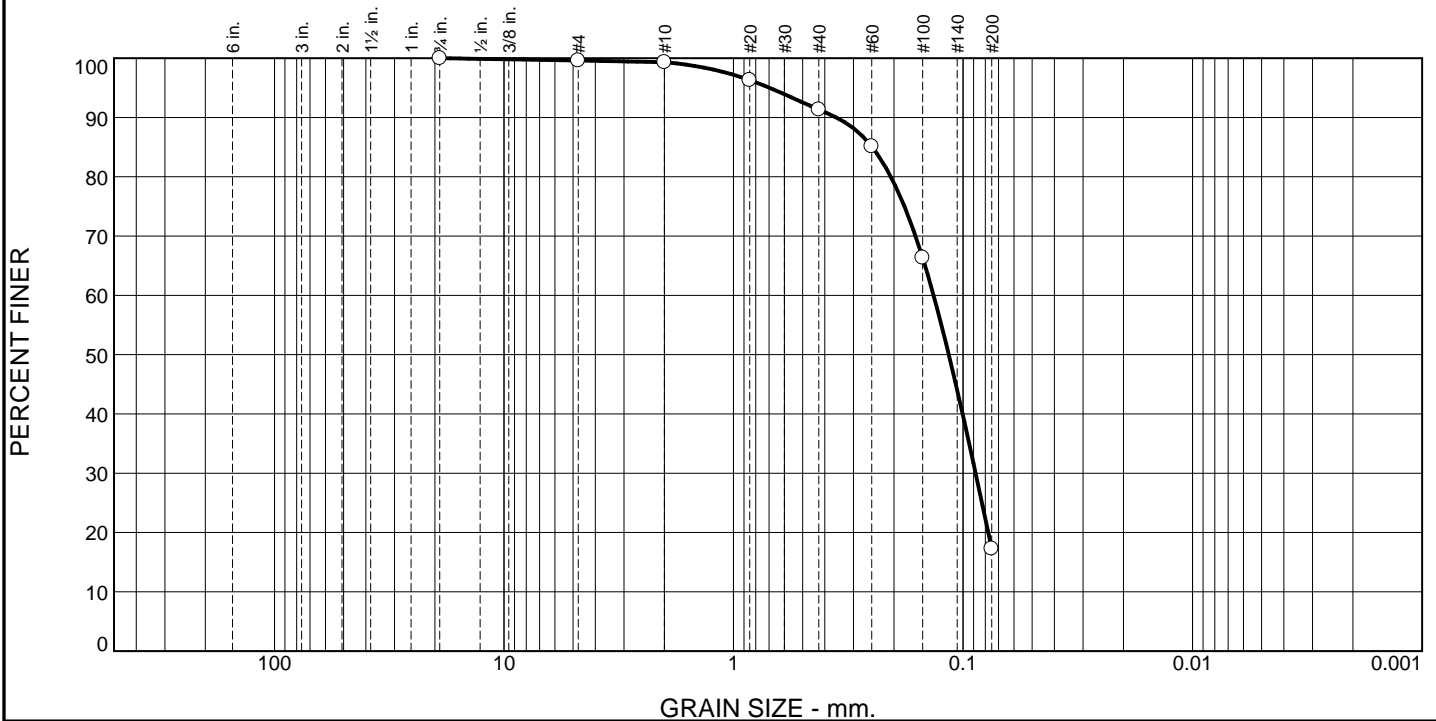
Terracon

Client: McGee Partners, Inc.
Project: Benton Boulevard Extension

Project No: ES155153

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	0.3	8.0	74.0	17.3	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4	100.0		
#4	99.6		
#10	99.3		
#20	96.3		
#40	91.3		
#60	85.1		
#100	66.4		
#200	17.3		

* (no specification provided)

Material Description

Light Gray Silty SAND

Atterberg Limits (ASTM D 4318)

PL= NP

LL= NV

PI=

Classification

USCS (D 2487)= SM

AASHTO (M 145)= A-2-4(0)

Coefficients

D₉₀= 0.3570

D₈₅= 0.2485

D₆₀= 0.1344

D₅₀= 0.1154

D₃₀= 0.0881

D₁₅=

D₁₀=

C_u=

C_c=

Remarks

Natural Moisture 9.0%

Date Received: 12/30/2015

Date Tested: 1/8/2016

Tested By: JPW

Checked By: JPW

Title: Lab technician

Location: HA20
Depth: 30"-40"

Date Sampled: 12/30/2015

Terracon

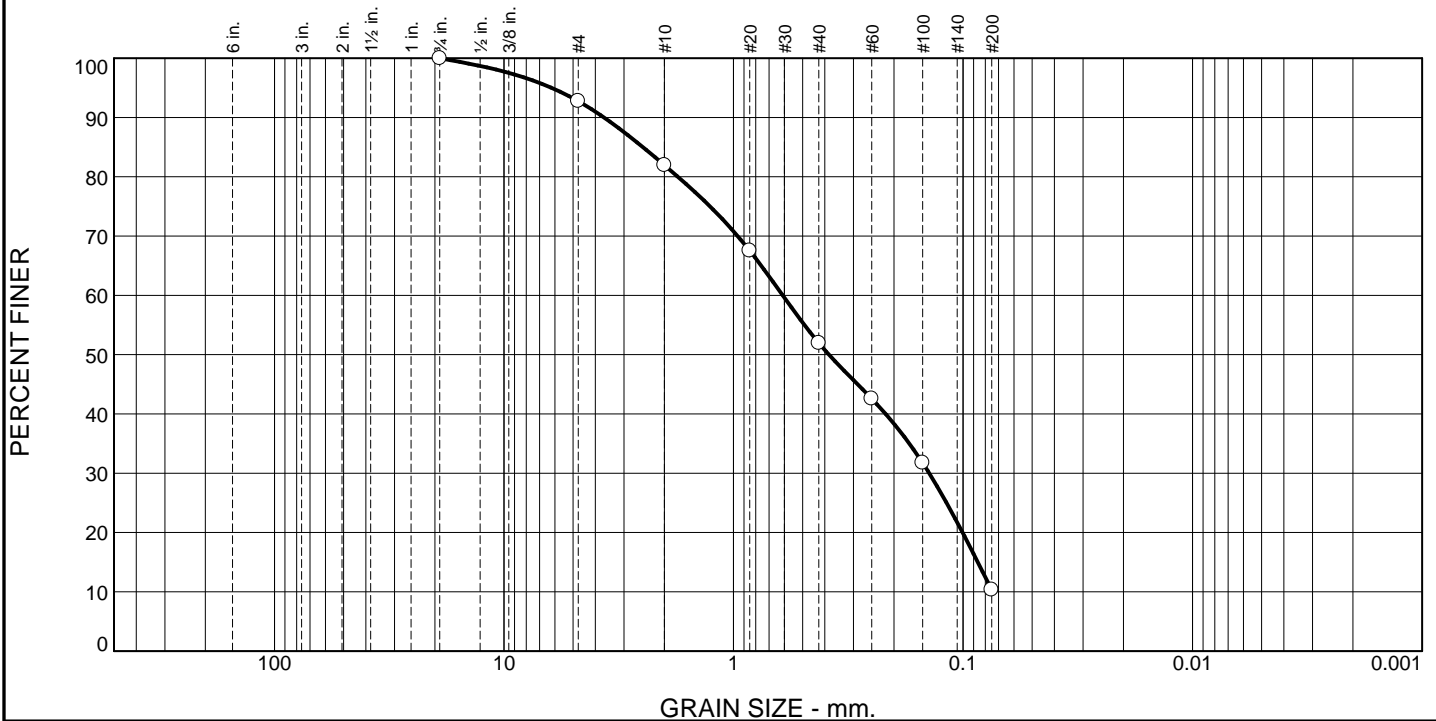
Client: McGee Partners, Inc.

Project: Benton Boulevard Extension

Project No: ES155153

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	7.2	10.8	30.1	41.6	10.3	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4	100.0		
#4	92.8		
#10	82.0		
#20	67.5		
#40	51.9		
#60	42.6		
#100	31.8		
#200	10.3		

* (no specification provided)

Material Description

Light Brown Fine SAND with Silt

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-3

Coefficients

D₉₀= 3.6652 D₈₅= 2.4826 D₆₀= 0.6103
D₅₀= 0.3840 D₃₀= 0.1404 D₁₅= 0.0862
D₁₀= C_u= C_c=

Remarks

Natural Moisture 2.8%

Date Received: 12/30/2015 Date Tested: 1/8/2016

Tested By: JPW

Checked By: JPW

Title: Lab Technician

Location: HA22
Depth: 18"-28"

Date Sampled: 12/30/2015

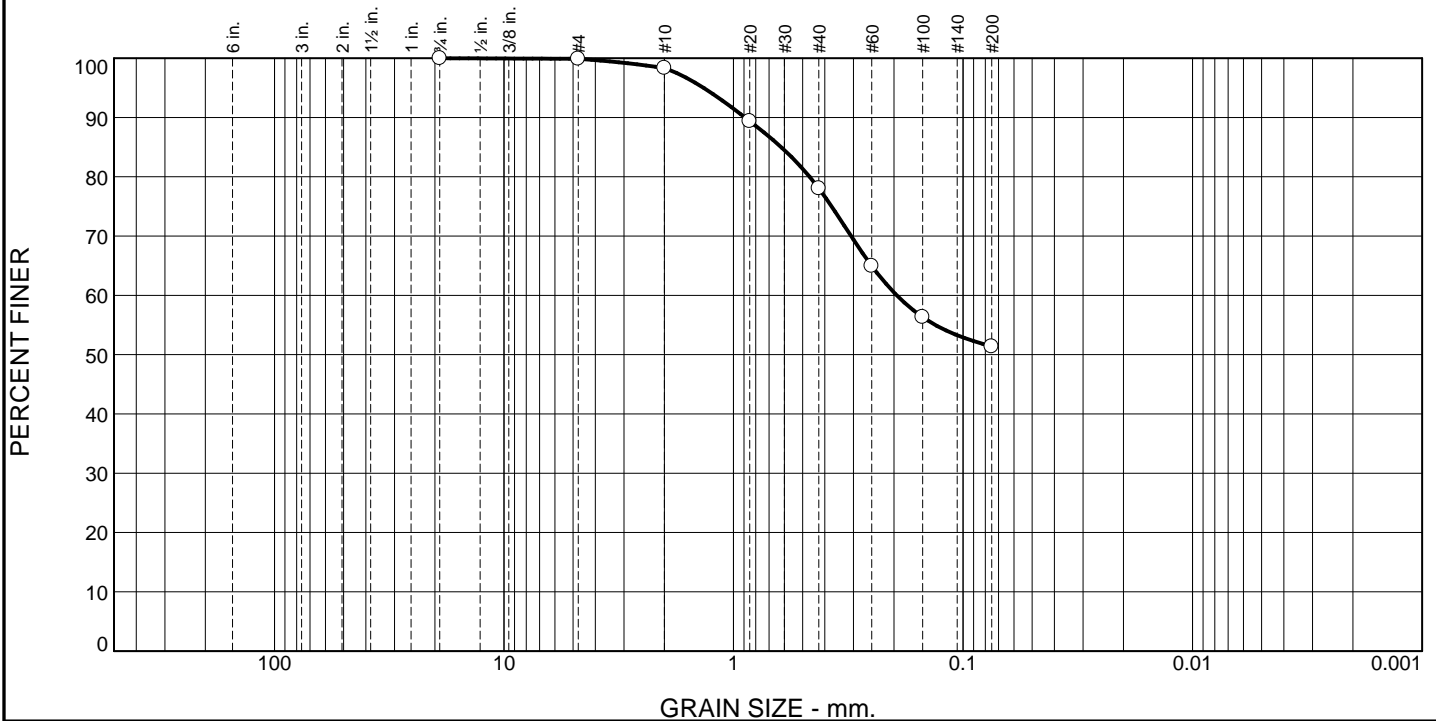
Terracon

Client: McGee Partners, Inc.
Project: Benton Boulevard Extension

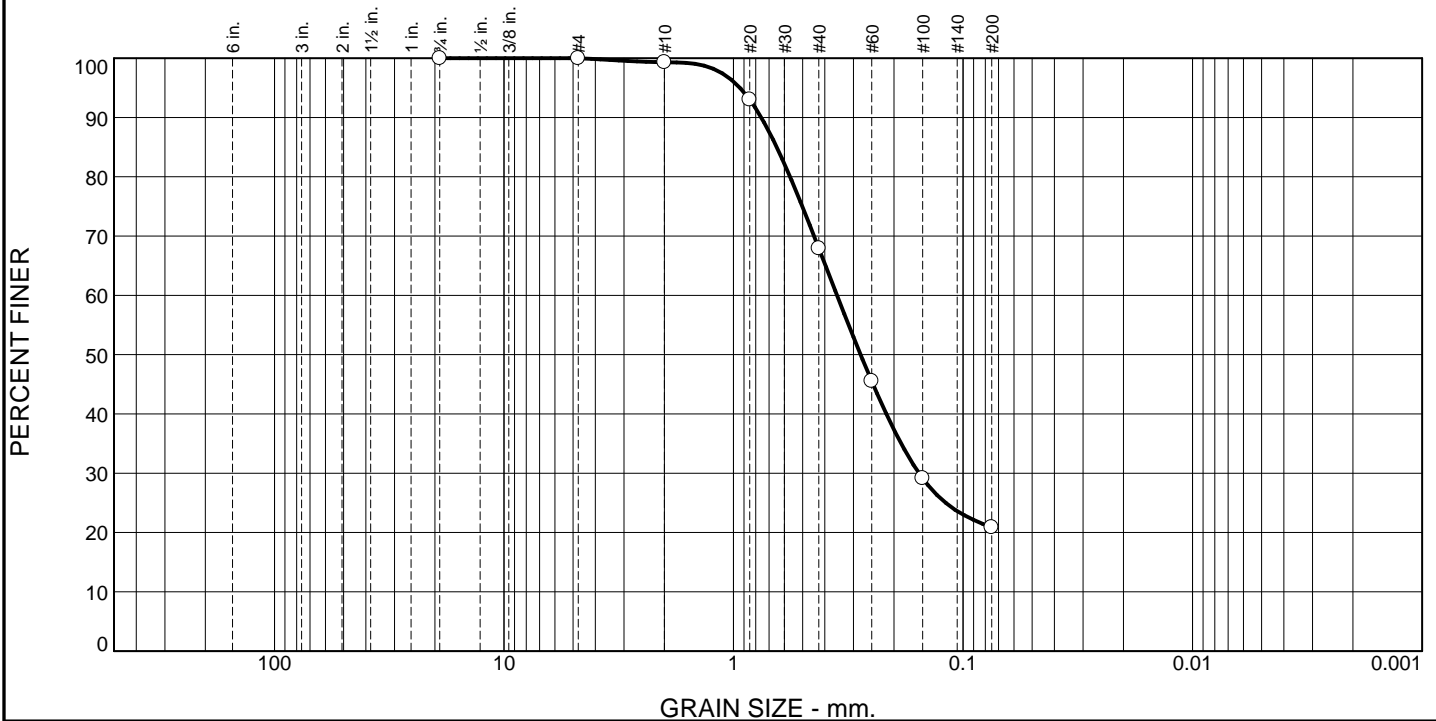
Project No: ES155153

Figure

Particle Size Distribution Report



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.7	31.4	47.0	20.9	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4	100.0		
#4	100.0		
#10	99.3		
#20	93.0		
#40	67.9		
#60	45.5		
#100	29.1		
#200	20.9		

* (no specification provided)

Material Description

Dark Brown Clayey SAND

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SC AASHTO (M 145)= A-2-4(0)

Coefficients

D₉₀= 0.7568 D₈₅= 0.6482 D₆₀= 0.3540
D₅₀= 0.2794 D₃₀= 0.1556 D₁₅=
D₁₀= C_u= C_c=

Remarks

Natural Moisture 20.8%

Date Received: 12/30/2015 Date Tested: 1/8/2016

Tested By: JPW

Checked By: JPW

Title: Lab Technician

Location: HA25
Depth: 36"-46"

Date Sampled: 12/30/2015

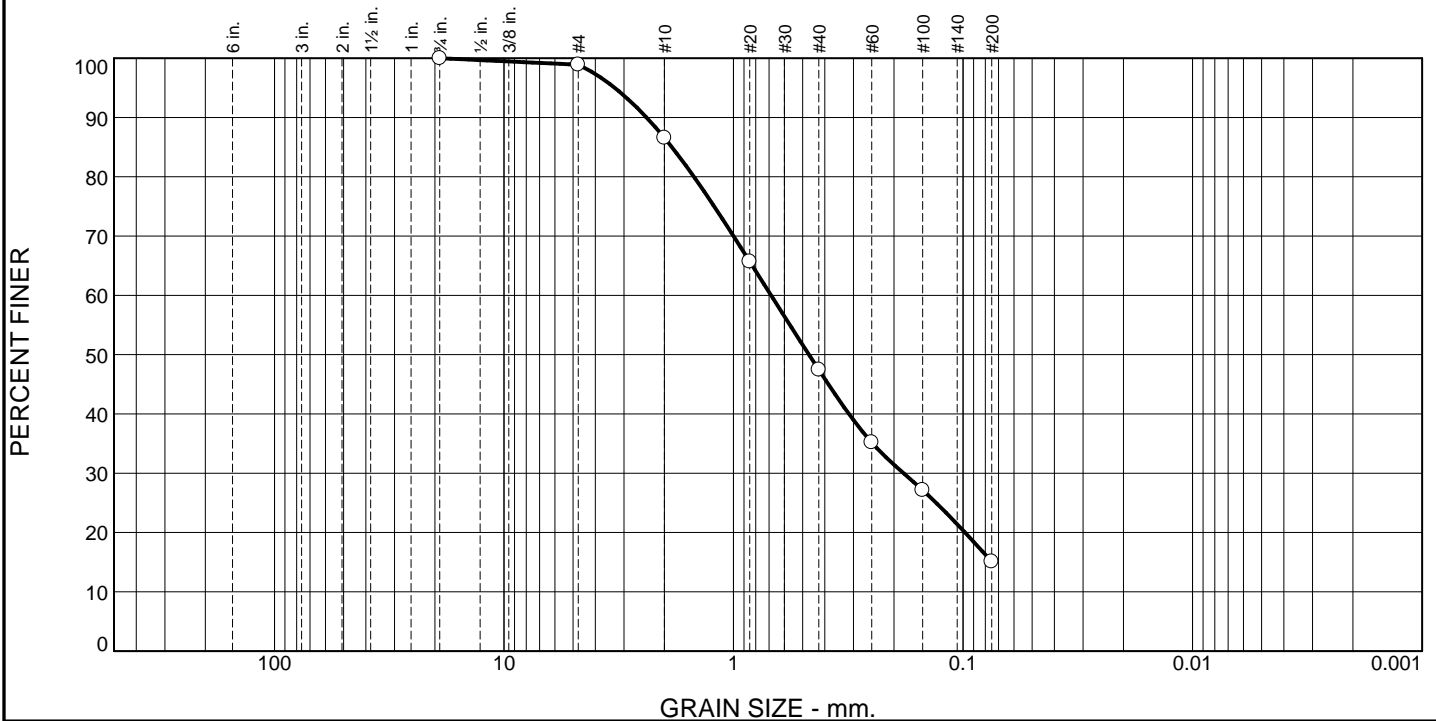
Terracon

Client: McGee Partners, Inc.
Project: Benton Boulevard Extension

Project No: ES155153

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.1	12.3	39.2	32.3	15.1	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4	100.0		
#4	98.9		
#10	86.6		
#20	65.7		
#40	47.4		
#60	35.2		
#100	27.2		
#200	15.1		

* (no specification provided)

Material Description

Gray Silty SAND

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SM AASHTO (M 145)= A-1-b

Coefficients

D₉₀= 2.3919 D₈₅= 1.8553 D₆₀= 0.6858
D₅₀= 0.4692 D₃₀= 0.1817 D₁₅=
D₁₀= C_u= C_c=

Remarks

Natural Moisture 6.3%

Date Received: 12/30/2015 Date Tested: 1/8/2016

Tested By: JPW

Checked By: JPW

Title: Lab Technician

Location: HA27
Depth: 26"-36"

Date Sampled: 12/30/2015

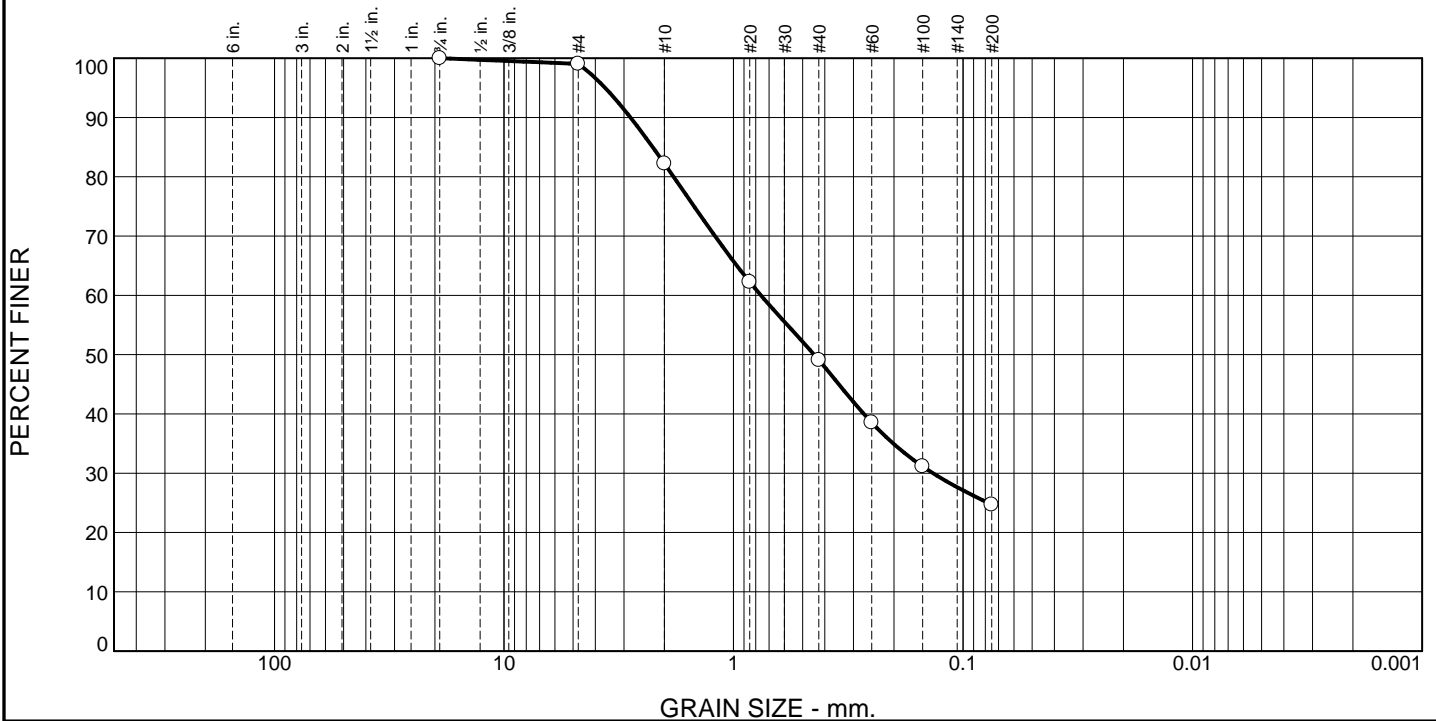
Terracon

Client: McGee Partners, Inc.
Project: Benton Boulevard Extension

Project No: ES155153

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.9	16.9	33.1	24.4	24.7	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4	100.0		
#4	99.1		
#10	82.2		
#20	62.3		
#40	49.1		
#60	38.5		
#100	31.1		
#200	24.7		

* (no specification provided)

Material Description

Red Clayey SAND

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SC AASHTO (M 145)= A-1-b

Coefficients

D₉₀= 2.8098 D₈₅= 2.2497 D₆₀= 0.7593
D₅₀= 0.4458 D₃₀= 0.1353 D₁₅=
D₁₀= C_u= C_c=

Remarks

Natural Moisture 16.6%

Date Received: 12/30/2015 Date Tested: 1/8/2016

Tested By: JPW

Checked By: JPW

Title: Lab Technician

Location: HA30
Depth: 42"-52"

Date Sampled: 12/30/2015

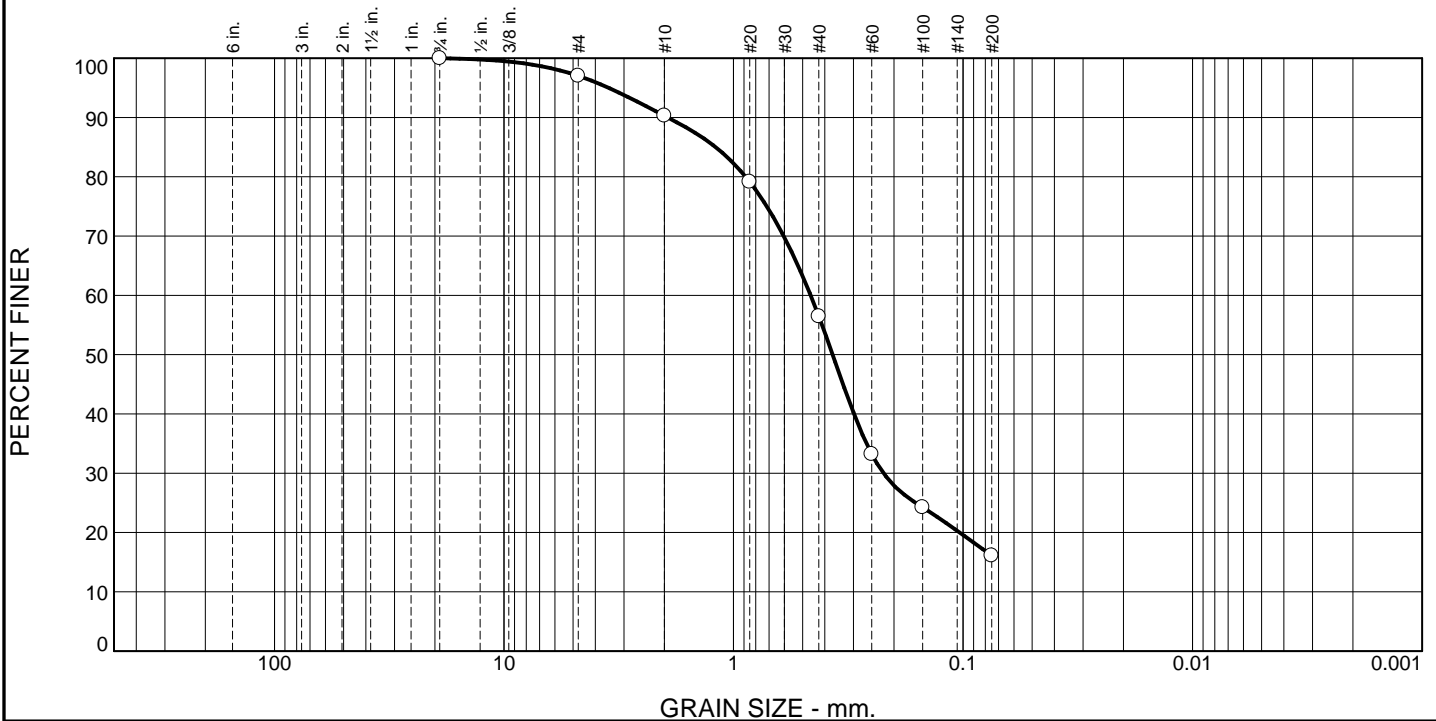
Terracon

Client: McGee Partners, Inc.
Project: Benton Boulevard Extension

Project No: ES155153

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.0	6.7	33.8	40.4	16.1	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4	100.0		
#4	97.0		
#10	90.3		
#20	79.2		
#40	56.5		
#60	33.2		
#100	24.3		
#200	16.1		

* (no specification provided)

Material Description

Dark Gray Silty SAND

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SM AASHTO (M 145)= A-2-4(0)

Coefficients

D₉₀= 1.9345 D₈₅= 1.1968 D₆₀= 0.4613
D₅₀= 0.3701 D₃₀= 0.2220 D₁₅=
D₁₀= C_u= C_c=

Remarks

Natural Moisture 8.6%

Date Received: 12/30/2015 Date Tested: 1/8/2016

Tested By: JPW

Checked By: JPW

Title: Lab Technician

Location: HA32
Depth: 16"-26"

Date Sampled: 12/30/2015

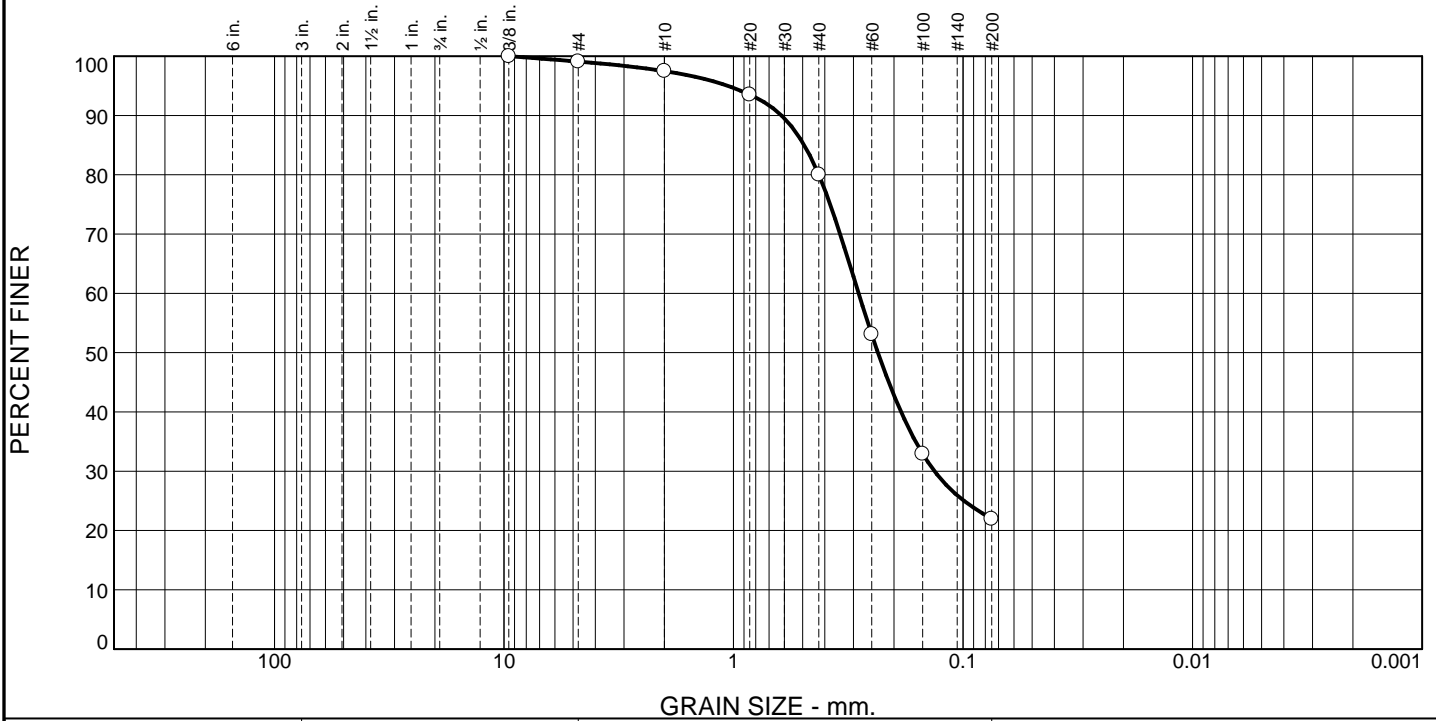
Terracon

Client: McGee Partners, Inc.
Project: Benton Boulevard Extension

Project No: ES155153

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.9	1.6	17.5	58.0	22.0	

Test Results (D422 & D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0		
#4	99.1		
#10	97.5		
#20	93.5		
#40	80.0		
#60	53.1		
#100	32.9		
#200	22.0		

* (no specification provided)

Material Description

Light Gray Silty SAND

Atterberg Limits (ASTM D 4318)

PL= NP

LL= NV

PI=

Classification

USCS (D 2487)= SM

AASHTO (M 145)= A-2-4(0)

Coefficients

D₉₀= 0.6177

D₈₅= 0.4920

D₆₀= 0.2849

D₅₀= 0.2348

D₃₀= 0.1332

D₁₅=

D₁₀=

C_u=

C_c=

Remarks

Date Received: 12-30-15

Date Tested: 1-8-16

Tested By: JPW

Checked By: GKT

Title: Lab Manager

Location: HA36
Depth: 14-24"

Date Sampled: 12-30-15

Terracon

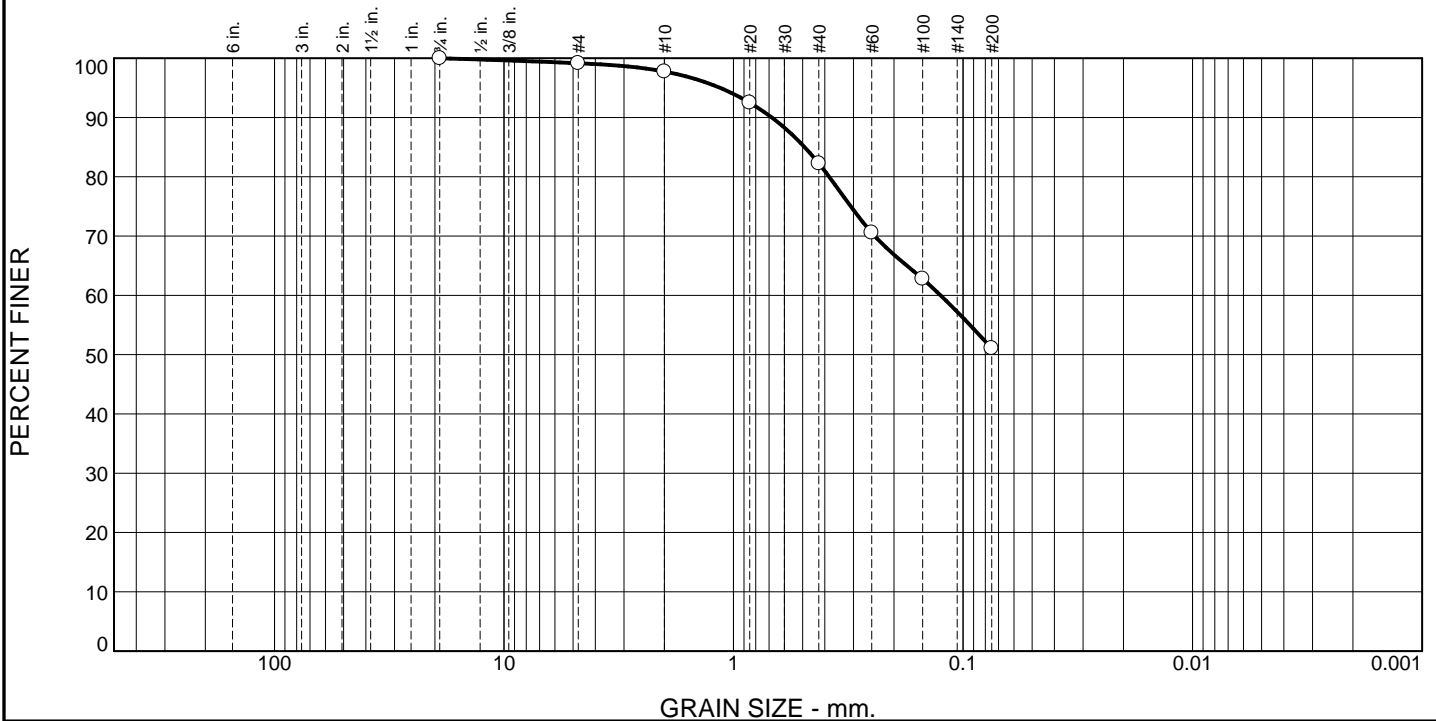
Client: McGee Partners, Inc.

Project: Benton Boulevard Extension

Project No: ES155153

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.8	1.4	15.5	31.2	51.1	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4	100.0		
#4	99.2		
#10	97.8		
#20	92.5		
#40	82.3		
#60	70.6		
#100	62.8		
#200	51.1		

* (no specification provided)

Material Description

Brown/Red Sandy CLAY

Atterberg Limits (ASTM D 4318)

PL= NP

LL= NV

PI=

Classification

USCS (D 2487)= CL

AASHTO (M 145)= A-4(0)

Coefficients

D₉₀= 0.6806

D₈₅= 0.4898

D₆₀= 0.1252

D₅₀=

D₃₀=

D₁₅=

D₁₀=

C_u=

C_c=

Remarks

Natural Moisture 17.9%

Date Received: 12/30/2015

Date Tested: 1/8/2016

Tested By: JPW

Checked By: JPW

Title: Lab Technician

Location: HA40
Depth: 32"-42"

Date Sampled: 12/30/2015

Terracon

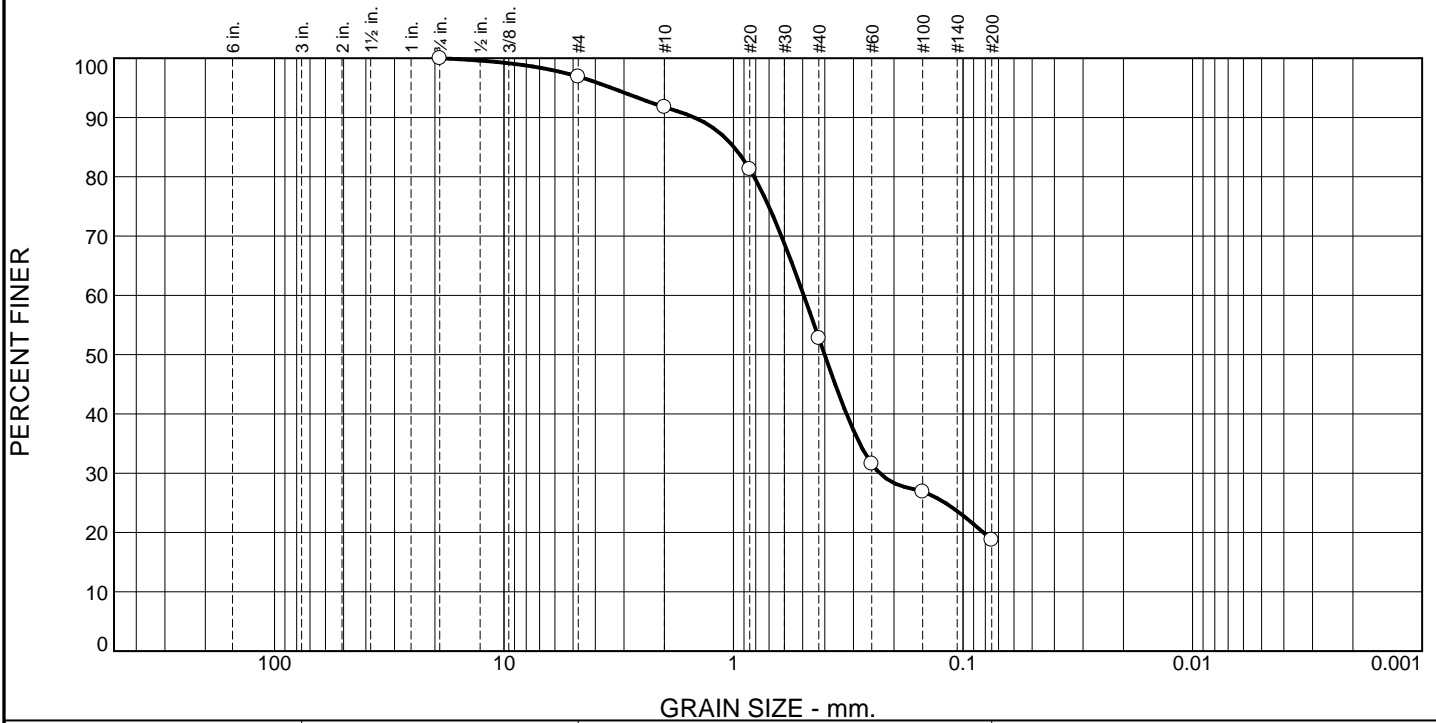
Client: McGee Partners, Inc.

Project: Benton Boulevard Extension

Project No: ES155153

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.1	5.1	39.0	34.0	18.8	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4	100.0		
#4	96.9		
#10	91.8		
#20	81.3		
#40	52.8		
#60	31.6		
#100	26.9		
#200	18.8		

* (no specification provided)

Material Description

Light Brown Clayey SAND

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SC AASHTO (M 145)= A-2-4(0)

Coefficients

D₉₀= 1.4803 D₈₅= 0.9946 D₆₀= 0.4945
D₅₀= 0.4010 D₃₀= 0.2305 D₁₅=
D₁₀= C_u= C_c=

Remarks

Natural Moisture 9.2%

Date Received: 12/30/2015 Date Tested: 1/8/2016

Tested By: JPW

Checked By: JPW

Title: Lab Technician

Location: HA42
Depth: 16"-28"

Date Sampled: 12/30/2015

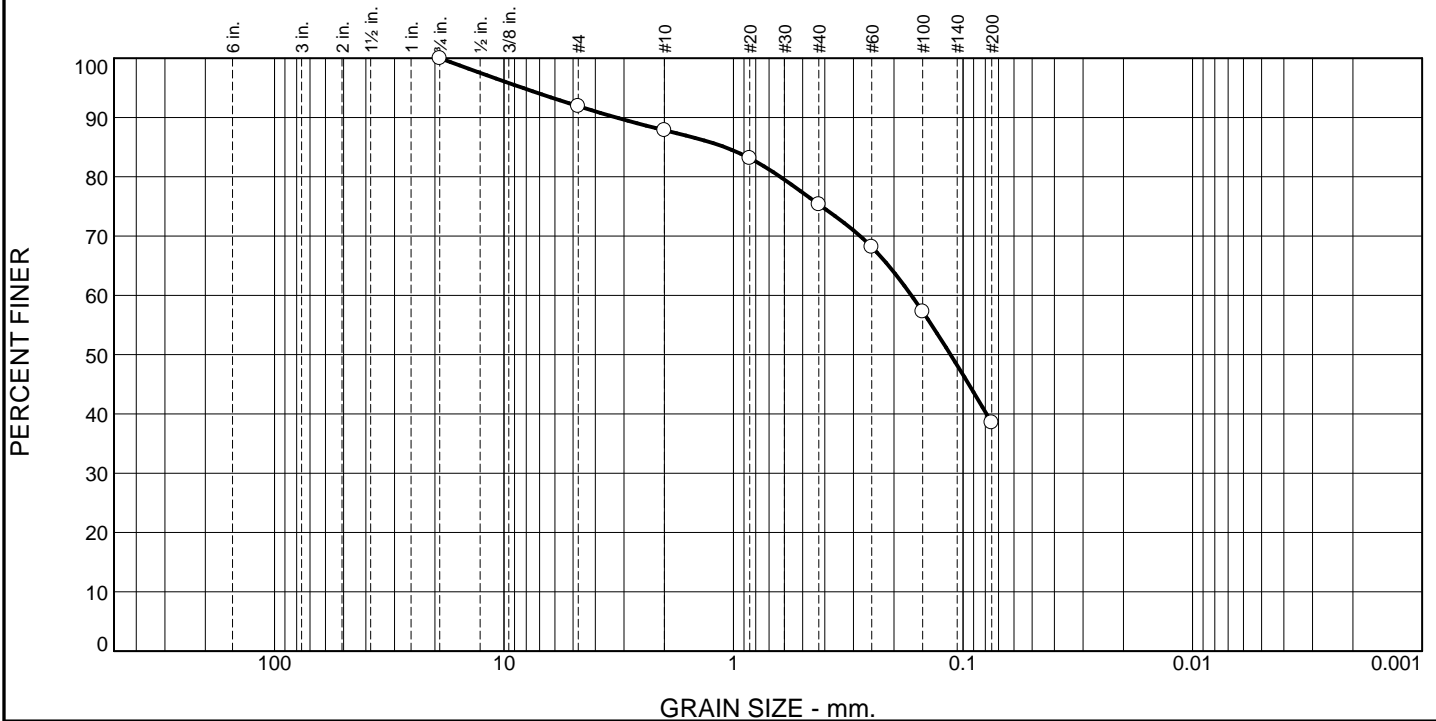
Terracon

Client: McGee Partners, Inc.
Project: Benton Boulevard Extension

Project No: ES155153

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	8.1	4.1	12.5	36.8	38.5	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4	100.0		
#4	91.9		
#10	87.8		
#20	83.1		
#40	75.3		
#60	68.2		
#100	57.3		
#200	38.5		

* (no specification provided)

Material Description

Gray Clayey SAND

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SC AASHTO (M 145)= A-4(0)

Coefficients

D₉₀= 3.2422 D₈₅= 1.0917 D₆₀= 0.1680
D₅₀= 0.1134 D₃₀= C_u= D₁₅=
D₁₀= C_c=

Remarks

Natural Moisture 24.5%

Date Received: 12/30/2015 Date Tested: 1/8/2016

Tested By: JPW

Checked By: JPW

Title: Lab Technician

Location: HA44
Depth: 30"-40"

Date Sampled: 12/30/2015

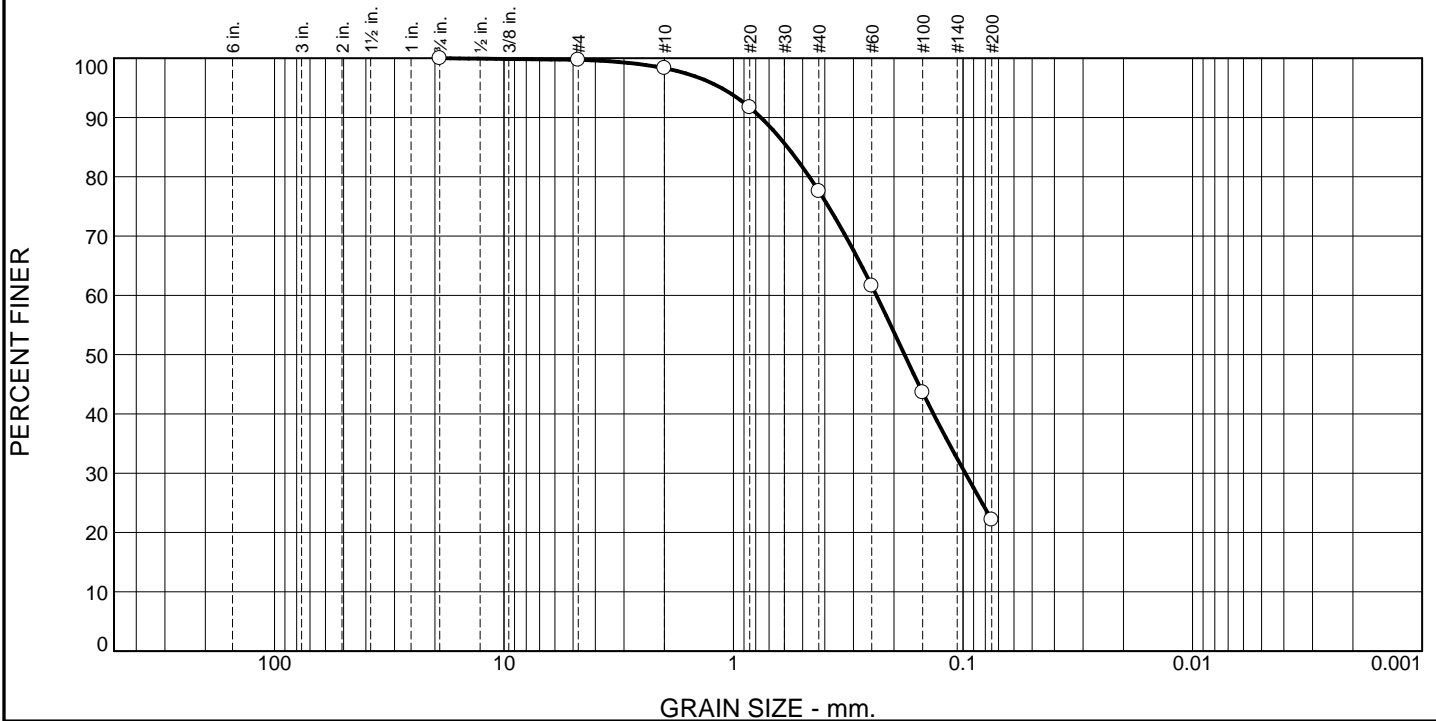
Terracon

Client: McGee Partners, Inc.
Project: Benton Boulevard Extension

Project No: ES155153

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	1.4	20.7	55.5	22.1	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4	100.0		
#4	99.7		
#10	98.3		
#20	91.7		
#40	77.6		
#60	61.6		
#100	43.6		
#200	22.1		

* (no specification provided)

Material Description

Gray Clayey SAND

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SC AASHTO (M 145)= A-2-4(0)

Coefficients

D₉₀= 0.7598 D₈₅= 0.5817 D₆₀= 0.2384
D₅₀= 0.1799 D₃₀= 0.0978 D₁₅=
D₁₀= C_u= C_c=

Remarks

Natural Moisture 12.9%

Date Received: 12/30/2015 Date Tested: 1/8/2016

Tested By: JPW

Checked By: JPW

Title: Lab Technician

Location: HA45
Depth: 12"-24"

Date Sampled: 12/30/2015

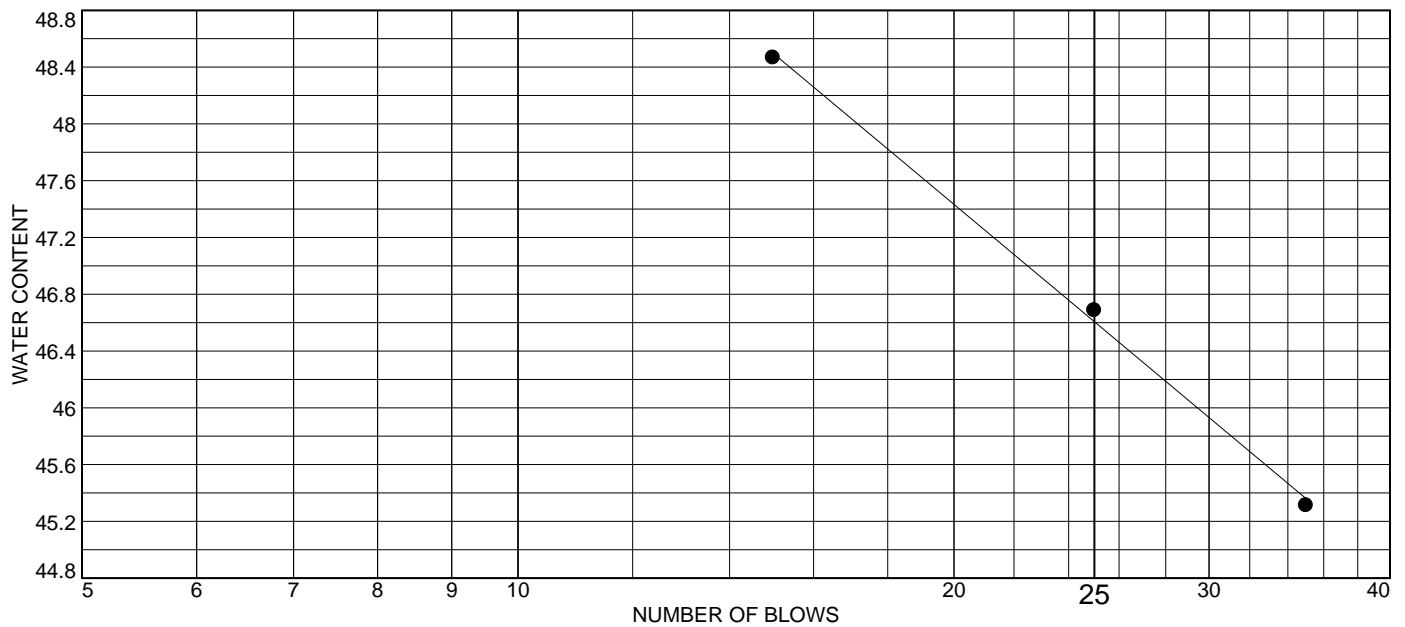
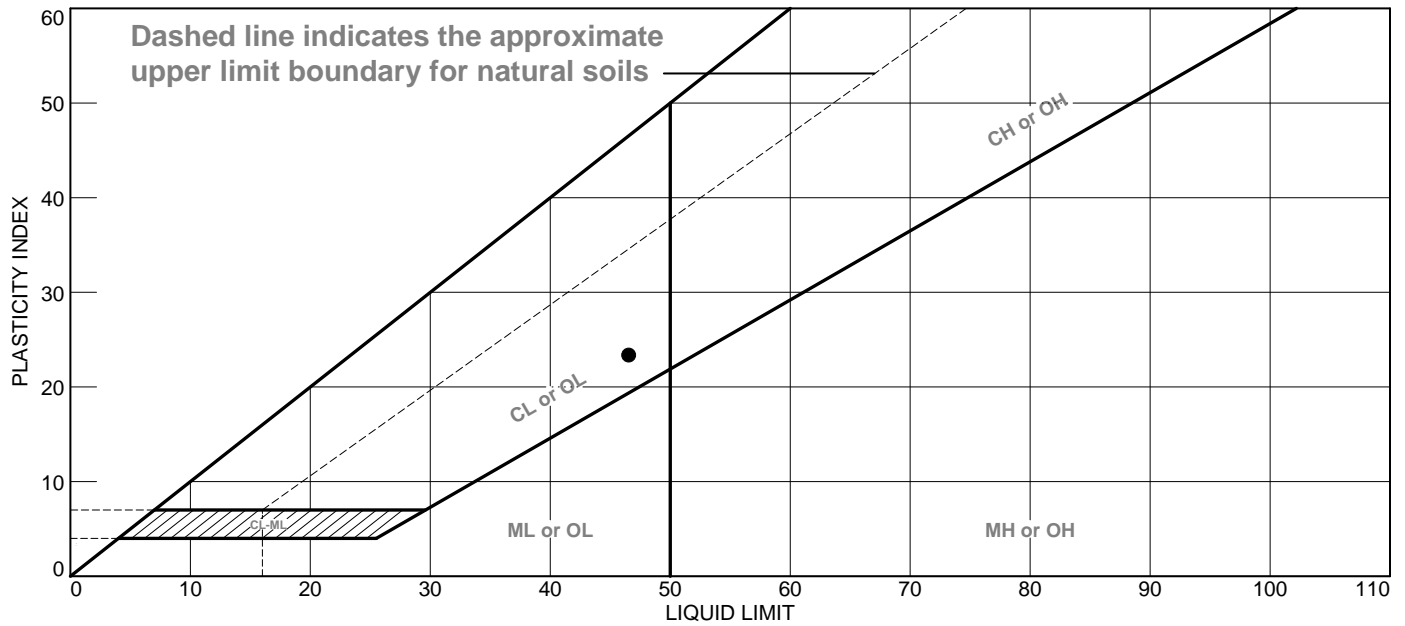
Terracon

Client: McGee Partners, Inc.
Project: Benton Boulevard Extension

Project No: ES155153

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray/Orange Sandy Clay	46.6	23.3	23.3			CL

Project No. ES155153 **Client:** McGee Partners, Inc.

Project: Benton Boulevard Extension

Location: HA9

Depth: 42"-52"

Remarks:

● Natural Moisture 18.9%

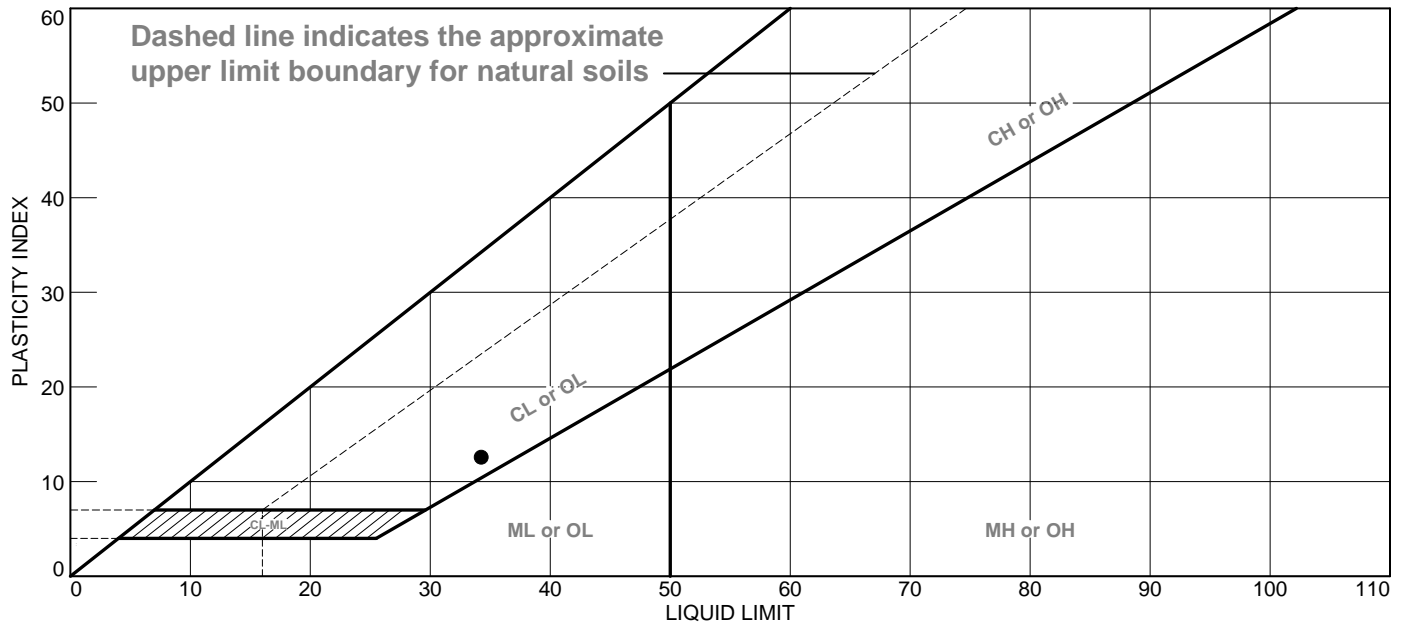
Terracon

Figure

Tested By: JPW

Checked By: JPW

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Red Sandy CLAY	34.3	21.8	12.5			CL

Project No. ES155153 **Client:** McGee Partners, Inc.

Project: Benton Boulevard Extension

Location: HA17

Depth: 40"-50"

Remarks:

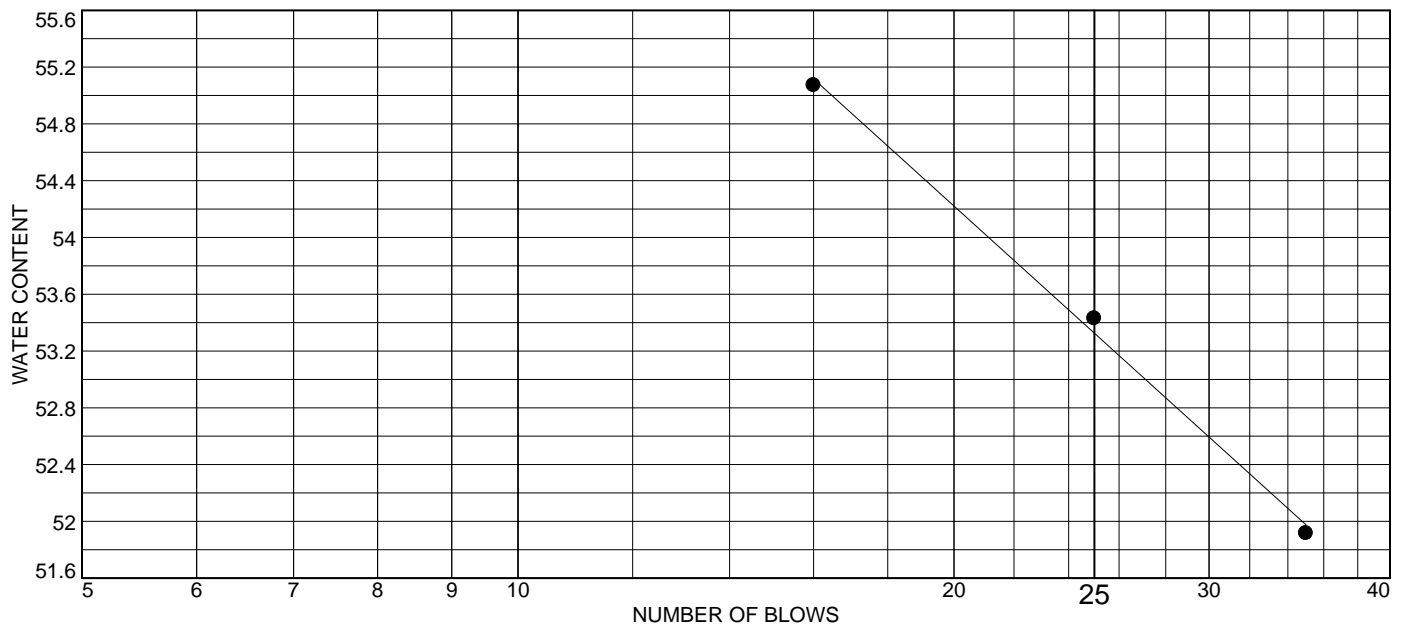
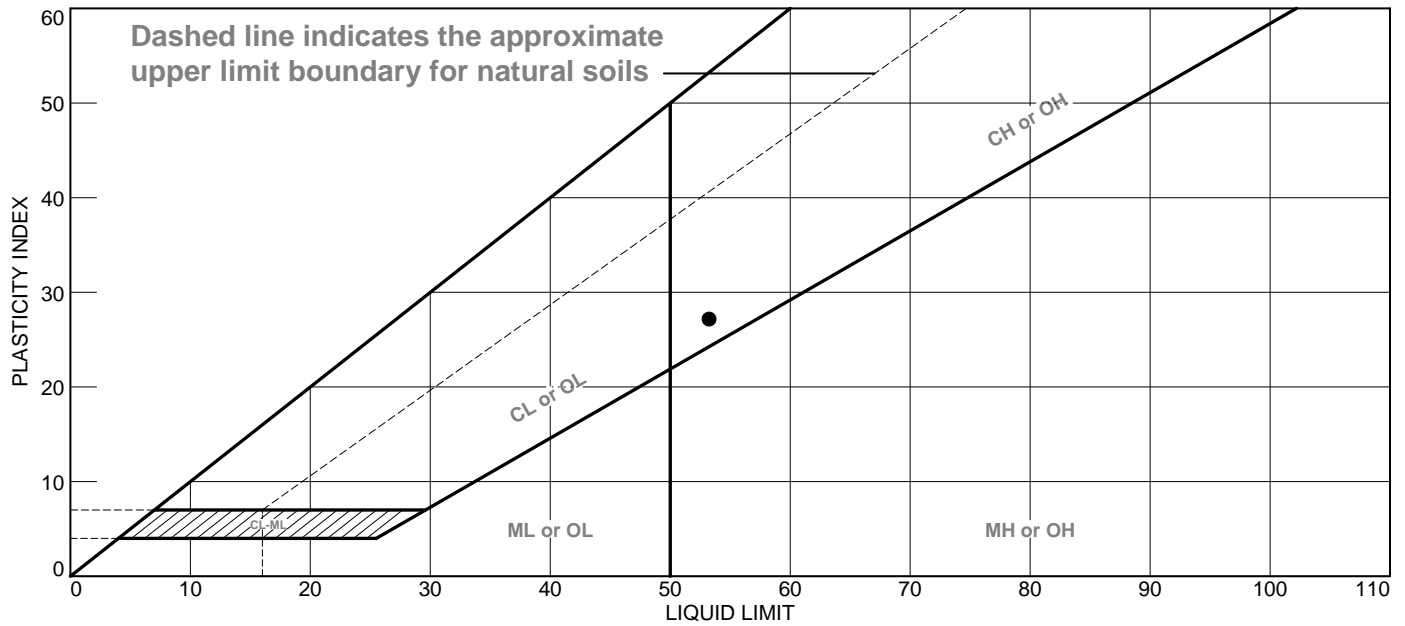
Terracon

Figure

Tested By: JPW

Checked By: JPW

LIQUID AND PLASTIC LIMITS TEST REPORT



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
Red/Light Brown Fat CLAY	53.3	26.2	27.1			CH

Project No. ES155153 **Client:** McGee Partners, Inc.

Project: Benton Boulevard Extension

Location: HA21

Depth: 28"-38"

Remarks:

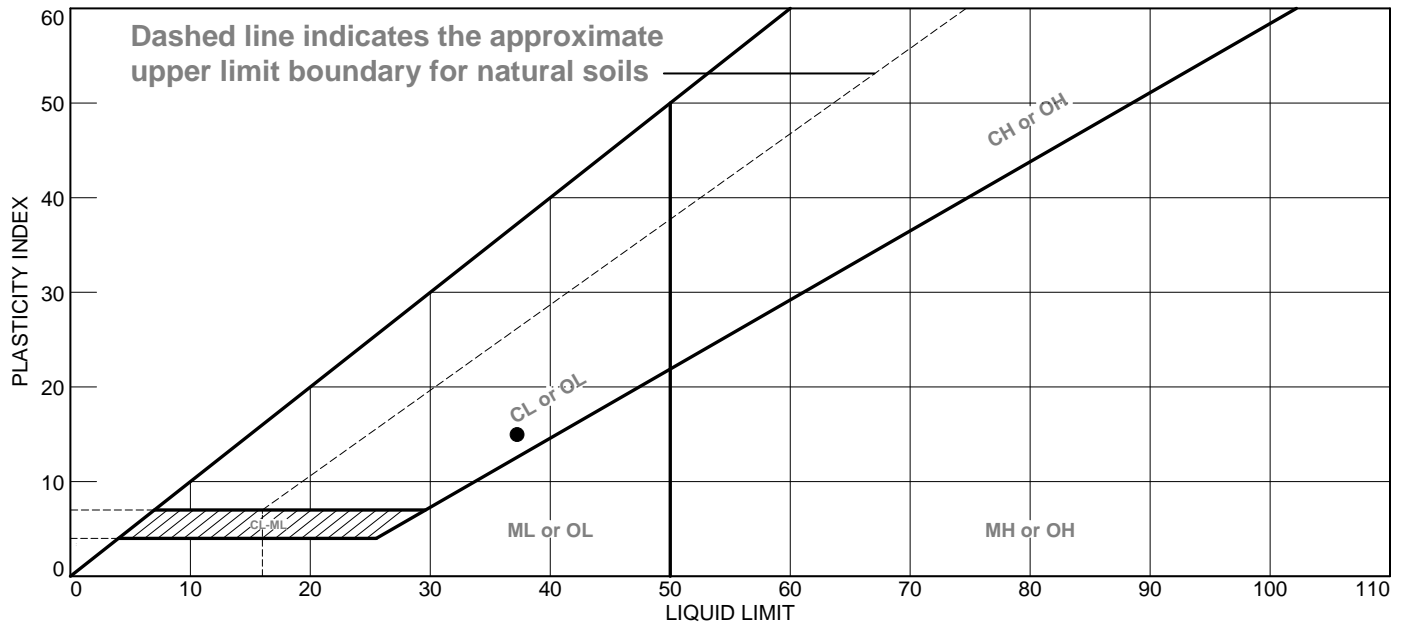
Terracon

Figure

Tested By: JPW

Checked By: JPW

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Light Gray/Red Lean CLAY	37.3	22.4	14.9			CL

Project No. ES155153 **Client:** McGee Partners, Inc.

Project: Benton Boulevard Extension

Location: HA27

Depth: 42"-60"

Remarks:

● Natural Moisture 6.8%

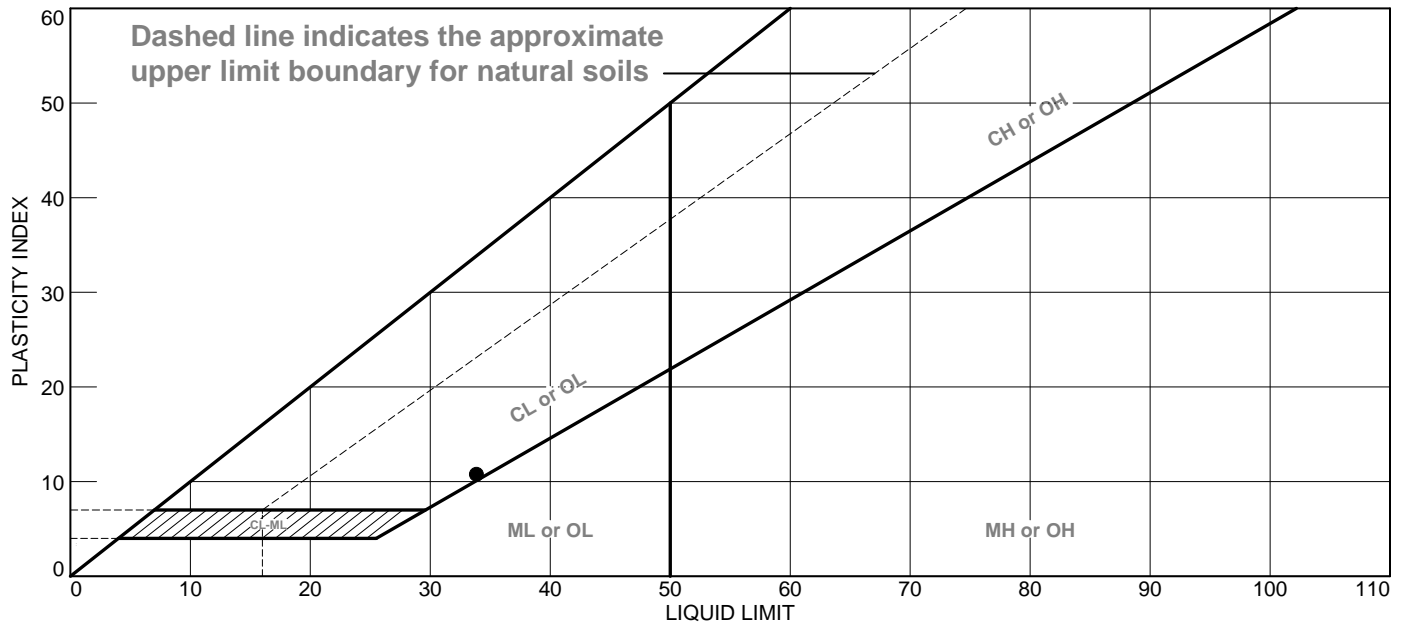
Terracon

Figure

Tested By: JPW

Checked By: JPW

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Light Gray/Brown Sandy Lean CLAY	33.9	23.2	10.7			CL

Project No. ES155153 **Client:** McGee Partners, Inc.

Project: Benton Boulevard Extension

Location: HA30

Depth: 26"-36"

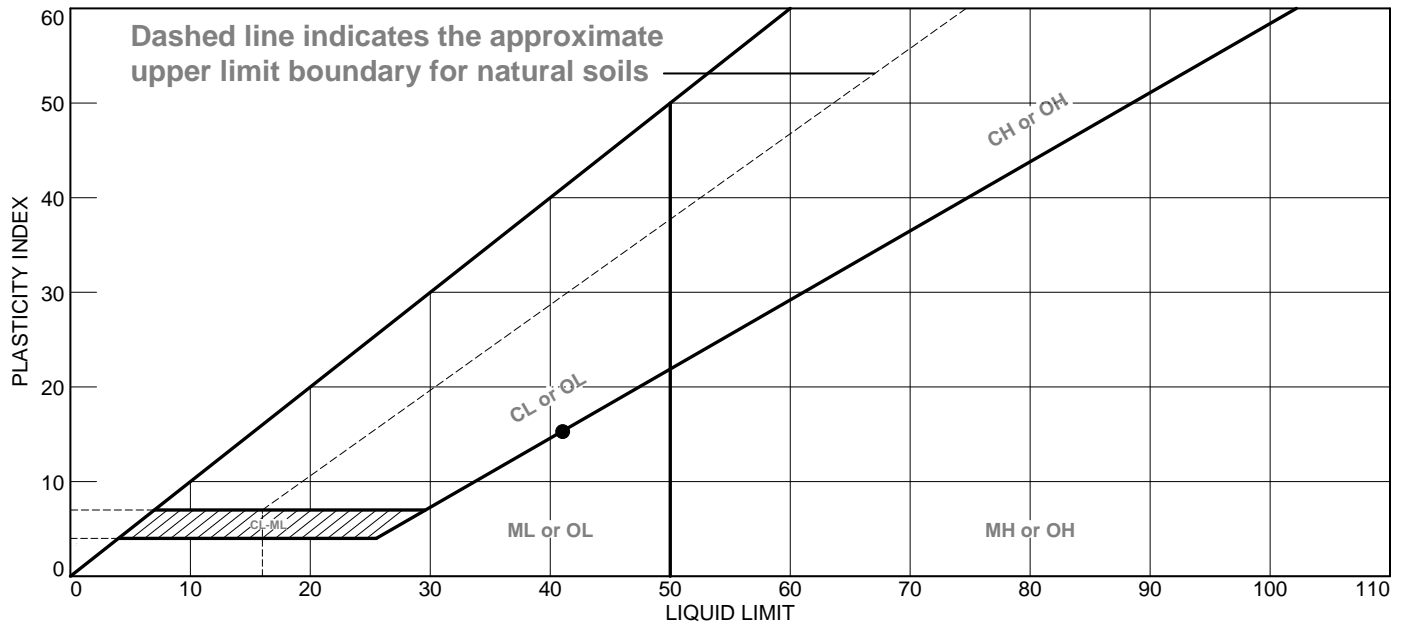
Remarks:

Terracon

Figure

Tested By: JPW **Checked By:** JPW

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Red/ Light Gray Sandy Lean CLAY	41.1	25.9	15.2			CL

Project No. ES155153 **Client:** McGee Partners, Inc.

Project: Benton Boulevard Extension

Location: HA34

Depth: 20"-34"

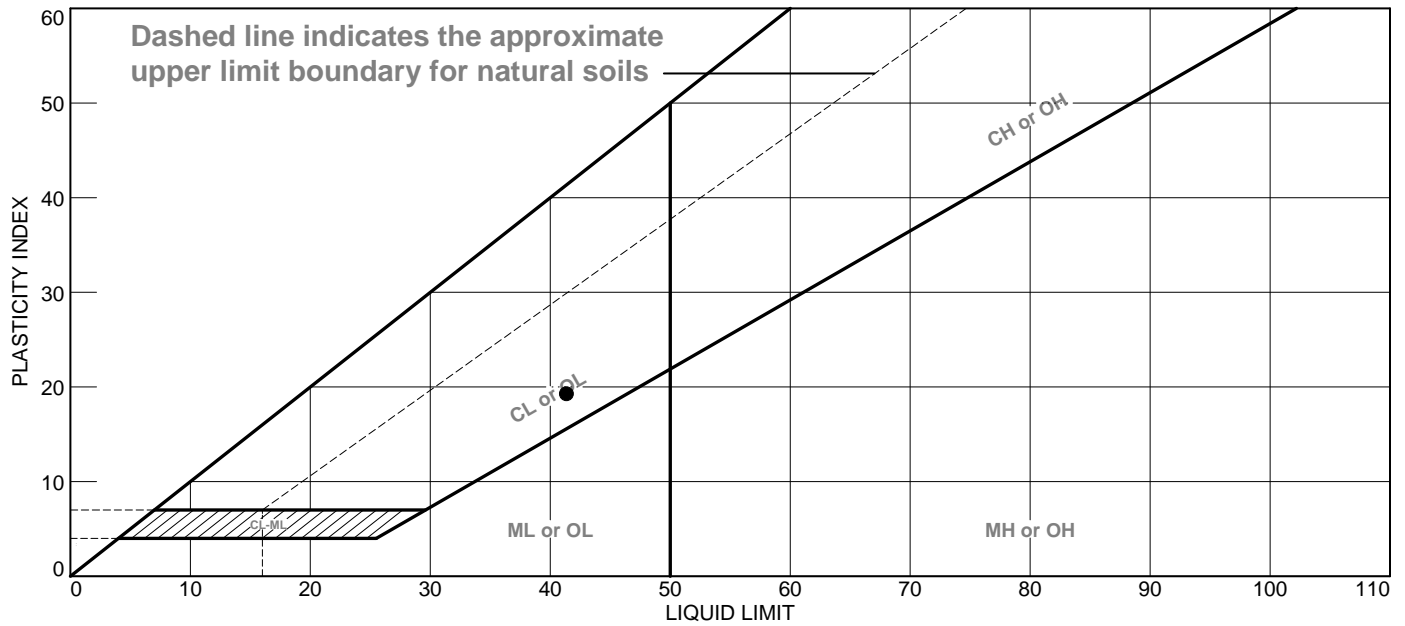
Remarks:

Terracon

Figure

Tested By: JPW **Checked By:** JPW

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Red/Gray Sandy Lean CLAY	41.4	22.2	19.2			CL

Project No. ES155153 **Client:** McGee Partners, Inc.

Project: Benton Boulevard Extension

Location: HA38

Depth: 20"-32"

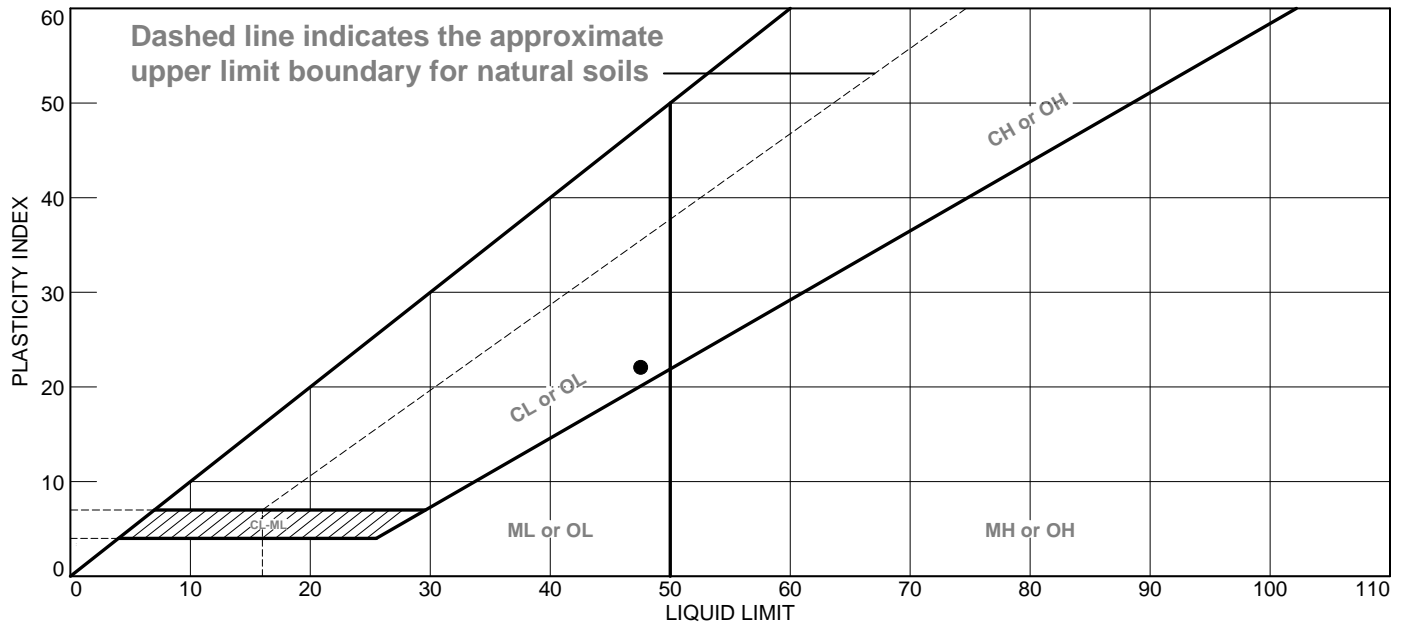
Remarks:

Terracon

Figure

Tested By: JPW **Checked By:** JPW

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Light Gray/Orange Sandy Lean CLAY	47.6	25.6	22.0			CL

Project No. ES155153 **Client:** McGee Partners, Inc.

Project: Benton Boulevard Extension

Location: HA42

Depth: 42"-50"

Terracon

Remarks:

Figure

Tested By: JPW

Checked By: JPW

LABORATORY ANALYSIS REPORT

Job ID : 16011104



Avery Laboratories &
Environmental Services, LLC

■ 2720 Gregory St. Unit 200 ■ Savannah, Georgia 31404 ■ Tel: (912) 944-3748 ■ Fax: (912) 234-9294 ■

Client Project ID :
Corrosion Series

Report To : Client Name: Terracon
Client Address: 2201 Rowland Ave.
City, State, Zip: Savannah, GA, 31404

Attn: Kyle Houston
P.O.#.:

Dear Kyle Houston

The following test results meet all NELAP requirements for analytes for which certification is available. Any deviations from these quality systems will be noted in this case narrative. All analyses performed by Avery Laboratories & Environmental Services, LLC unless noted. Parameters not performed by Avery Laboratories will be listed on the Sample Summary section of the report.

For questions regarding this report, contact Robert Paul Grimm at (912)944-3748.

Sincerely,



This Laboratory is NELAP accredited.

I am the laboratory manager, or his/her designee, and I am responsible for the release of this data package. This laboratory data package has been reviewed and is complete and technically compliant with the requirements of the methods used, except where noted in the attached exception reports. I affirm, to the best of my knowledge that all problems/anomalies observed by this laboratory (and if applicable, any and all laboratories subcontracted through this laboratory) that might affect the quality of the data, have been identified in the Laboratory Review Checklist, and that no information or data have been knowingly withheld that would affect the quality of the data.

Date: 01/13/2016 11:17

Primary Accreditation State and Number: Florida E87941

CLIENT SAMPLE RESULTS

Job ID : 16011104



Avery Laboratories &
Environmental Services, LLC

■ 2720 Gregory St. Unit 200 ■ Savannah, Georgia 31404 ■ Tel: (912) 944-3748 ■ Fax: (912) 234-9294 ■

Client Name:	Terracon	Attn:	Kyle Houston
Project ID:	Corrosion Series	Date:	01/13/2016

Job ID :	16011104	Sample Matrix:	Soil
Client Sample ID:	HA-4	Date Collected:	01/02/2016
Job Sample ID:	16011104.01	Time Collected:	11:00
Other Information:			

Test Method	Parameter	Result	Units	DF	RL	Q	Date/Time Analyzed	Analyst
ASTM D516-90	(Water Extraction)							
	Sulfate	1140	mg/kg dw	1	271		01/12/2016 13:12	EH
EPA 120.1	(By Calculation)							
	Resistivity	0.027700	megaohm/cm	1	0.001		01/12/2016 17:01	CW
SM2540b	% Moisture							
	% Moisture	7.78	%	1			01/12/2016 08:20	EH
SM4500-CL e	(Water Extraction)							
	Chloride	768	mg/kg dw	1	217		01/12/2016 11:28	EH
SW 9045c	pH - Soils							
	pH	4.92	s.u.	1		H	01/12/2016 15:08	CW

Date: 01/13/2016 11:17

CLIENT SAMPLE RESULTS

Job ID : 16011104



Avery Laboratories &
Environmental Services, LLC

■ 2720 Gregory St. Unit 200 ■ Savannah, Georgia 31404 ■ Tel: (912) 944-3748 ■ Fax: (912) 234-9294 ■

Client Name:	Terracon	Attn:	Kyle Houston
Project ID:	Corrosion Series	Date:	01/13/2016

Job ID :	16011104	Sample Matrix:	Soil
Client Sample ID:	HA-8	Date Collected:	01/02/2016
Job Sample ID:	16011104.02	Time Collected:	11:00
Other Information:			

Test Method	Parameter	Result	Units	DF	RL	Q	Date/Time Analyzed	Analyst
ASTM D516-90	(Water Extraction)							
	Sulfate	5490	mg/kg dw	2	628		01/12/2016 15:49	EH
EPA 120.1	(By Calculation)							
	Resistivity	0.026900	megaohm/cm	1	0.001		01/12/2016 17:02	CW
SM2540b	% Moisture							
	% Moisture	20.4	%	1			01/12/2016 08:20	EH
SM4500-CL e	(Water Extraction)							
	Chloride	1260	mg/kg dw	1	251		01/12/2016 11:28	EH
SW 9045c	pH - Soils							
	pH	3.89	s.u.	1		H	01/12/2016 15:01	CW

Date: 01/13/2016 11:17

CLIENT SAMPLE RESULTS

Job ID : 16011104



Avery Laboratories &
Environmental Services, LLC

■ 2720 Gregory St. Unit 200 ■ Savannah, Georgia 31404 ■ Tel: (912) 944-3748 ■ Fax: (912) 234-9294 ■

Client Name:	Terracon	Attn:	Kyle Houston
Project ID:	Corrosion Series	Date:	01/13/2016

Job ID :	16011104	Sample Matrix:	Soil
Client Sample ID:	HA-15	Date Collected:	01/02/2016
Job Sample ID:	16011104.03	Time Collected:	11:00
Other Information:			

Test Method	Parameter	Result	Units	DF	RL	Q	Date/Time Analyzed	Analyst
ASTM D516-90	(Water Extraction)							
	Sulfate	1560	mg/kg dw	1	272		01/12/2016 13:12	EH
EPA 120.1	(By Calculation)							
	Resistivity	0.030800	megaohm/cm	1	0.001		01/12/2016 17:02	CW
SM2540b	% Moisture							
	% Moisture	8.02	%	1			01/12/2016 08:20	EH
SM4500-CL e	(Water Extraction)							
	Chloride	597	mg/kg dw	1	217		01/12/2016 11:28	EH
SW 9045c	pH - Soils							
	pH	4.46	s.u.	1		H	01/12/2016 15:33	CW

Date: 01/13/2016 11:17

CLIENT SAMPLE RESULTS

Job ID : 16011104



Avery Laboratories &
Environmental Services, LLC

■ 2720 Gregory St. Unit 200 ■ Savannah, Georgia 31404 ■ Tel: (912) 944-3748 ■ Fax: (912) 234-9294 ■

Client Name:	Terracon	Attn:	Kyle Houston
Project ID:	Corrosion Series	Date:	01/13/2016

Job ID :	16011104	Sample Matrix:	Soil
Client Sample ID:	HA-19	Date Collected:	01/02/2016
Job Sample ID:	16011104.04	Time Collected:	11:00
Other Information:			

Test Method	Parameter	Result	Units	DF	RL	Q	Date/Time Analyzed	Analyst
ASTM D516-90	(Water Extraction)							
	Sulfate	1940	mg/kg dw	1	280		01/12/2016 13:12	EH
EPA 120.1	(By Calculation)							
	Resistivity	0.036600	megaohm/cm	1	0.001		01/12/2016 17:03	CW
SM2540b	% Moisture							
	% Moisture	10.8	%	1			01/12/2016 08:20	EH
SM4500-CL e	(Water Extraction)							
	Chloride	1100	mg/kg dw	1	224		01/12/2016 11:28	EH
SW 9045c	pH - Soils							
	pH	4.37	s.u.	1		H	01/12/2016 15:52	CW

Date: 01/13/2016 11:17

CLIENT SAMPLE RESULTS

Job ID : 16011104



Avery Laboratories &
Environmental Services, LLC

■ 2720 Gregory St. Unit 200 ■ Savannah, Georgia 31404 ■ Tel: (912) 944-3748 ■ Fax: (912) 234-9294 ■

Client Name:	Terracon	Attn:	Kyle Houston
Project ID:	Corrosion Series	Date:	01/13/2016

Job ID :	16011104	Sample Matrix:	Soil
Client Sample ID:	HA-28	Date Collected:	01/02/2016
Job Sample ID:	16011104.05	Time Collected:	11:00
Other Information:			

Test Method	Parameter	Result	Units	DF	RL	Q	Date/Time Analyzed	Analyst
ASTM D516-90	(Water Extraction)							
	Sulfate	614	mg/kg dw	1	305		01/12/2016 13:12	EH
EPA 120.1	(By Calculation)							
	Resistivity	0.010100	megaohm/cm	1	0.001		01/12/2016 17:05	CW
SM2540b	% Moisture							
	% Moisture	18.0	%	1			01/12/2016 08:20	EH
SM4500-CL e	(Water Extraction)							
	Chloride	BRL	mg/kg dw	1	244		01/12/2016 11:28	EH
SW 9045c	pH - Soils							
	pH	4.10	s.u.	1		H	01/12/2016 16:12	CW

Date: 01/13/2016 11:17

CLIENT SAMPLE RESULTS

Job ID : 16011104



Avery Laboratories &
Environmental Services, LLC

■ 2720 Gregory St. Unit 200 ■ Savannah, Georgia 31404 ■ Tel: (912) 944-3748 ■ Fax: (912) 234-9294 ■

Client Name:	Terracon	Attn:	Kyle Houston
Project ID:	Corrosion Series	Date:	01/13/2016

Job ID :	16011104	Sample Matrix:	Soil
Client Sample ID:	HA-39	Date Collected:	01/02/2016
Job Sample ID:	16011104.06	Time Collected:	11:00
Other Information:			

Test Method	Parameter	Result	Units	DF	RL	Q	Date/Time Analyzed	Analyst
ASTM D516-90	(Water Extraction)							
	Sulfate	10800	mg/kg dw	5	1470		01/12/2016 15:49	EH
EPA 120.1	(By Calculation)							
	Resistivity	0.023900	megaohm/cm	1	0.001		01/12/2016 17:06	CW
SM2540b	% Moisture							
	% Moisture	15.0	%	1			01/12/2016 08:20	EH
SM4500-CL e	(Water Extraction)							
	Chloride	2230	mg/kg dw	1	235		01/12/2016 11:28	EH
SW 9045c	pH - Soils							
	pH	3.91	s.u.	1		H	01/12/2016 16:44	CW

Date: 01/13/2016 11:17

QUALITY CONTROL DATA

Job ID : 16011104


Avery Laboratories &
Environmental Services, LLC

■ 2720 Gregory St. Unit 200 ■ Savannah, Georgia 31404 ■ Tel: (912) 944-3748 ■ Fax: (912) 234-9294 ■

Analysis: (Water Extraction)	Method: SM4500-CL e	Reporting Units: mg/kg dw
QC Batch ID: Qb16011201	Created Date: 01/12/2016 11:34	Created By: ehadwin
Samples in this QC Batch: 16011104,01,02,03,04,05,06		

Sample Preparation	PB16011202	SM4500-CL e	ehadwin
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QC Type: Method Blank								
Parameter	CAS	Result	Units	DF	RL	MDL	Qual	
Method Blank Chloride		BRL	mg/kg dw	1	200	200		

QC Type: LCS/LCSD										
Parameter	LCS Spk Amt	LCS Result	LCS % Rec	LCSD Spk Amt	LCSD Result	LCS % Rec	RPD	RPD CtrlLimit	% Rec CtrlLimit	Qual
Chloride	2500	2240	89.5	2500	2320	92.9	3.60	30	70-130	

QC Type: MS/MSD													
QC Sample ID	Parameter	Sample Result	MS Spk Amt	MS Result	MS % Rec	MS Spk Amt	MSD Result	MSD % Rec	RPD	RPD CtrlLimit	% Rec CtrlLimit	Qual	
MS 16011104.06	Chloride	1890	2500	2430	21.6	2500	2340	17.7	4.10	30	70-130	J1	

Refer to the Definition page for terms.

QUALITY CONTROL DATA

Job ID : 16011104


Avery Laboratories &
Environmental Services, LLC

■ 2720 Gregory St. Unit 200 ■ Savannah, Georgia 31404 ■ Tel: (912) 944-3748 ■ Fax: (912) 234-9294 ■

Analysis: (Water Extraction)	Method: ASTM D516-90	Reporting Units: mg/kg dw
QC Batch ID: Qb16011203	Created Date: 01/12/2016 16:30	Created By: ehadwin
Samples in this QC Batch: 16011104,01,02,03,04,05,06		
Sample Preparation	PB16011204	ASTM D516-90
		ehadwin

QC Type: Method Blank								
Parameter	CAS	Result	Units	DF	RL	MDL	Qual	
Method Blank Sulfate		BRL	mg/kg dw	1	250	250		

QC Type: LCS/LCSD										
Parameter	LCS Spk Amt	LCS Result	LCS % Rec	LCSD Spk Amt	LCSD Result	LCS % Rec	RPD	RPD CtrlLimit	% Rec CtrlLimit	Qual
Sulfate	2000	1820	91.0	2000	2010	100.0	9.90	30	70-130	

QC Type: MS/MSD													
QC Sample ID	Parameter	Sample Result	MS Spk Amt	MS Result	MS % Rec	MS Spk Amt	MSD Result	MSD % Rec	RPD	RPD CtrlLimit	% Rec CtrlLimit	Qual	
MS 16011104.06	Sulfate	9160	2000	1920	-362.0	2000	1900	-363.0	0.80	30	70-130		

Refer to the Definition page for terms.

QUALITY CONTROL DATA

Job ID : 16011104



Avery Laboratories &
Environmental Services, LLC

■ 2720 Gregory St. Unit 200 ■ Savannah, Georgia 31404 ■ Tel: (912) 944-3748 ■ Fax: (912) 234-9294 ■

Analysis: (By Calculation)		Method: EPA 120.1	Reporting Units: megaohm/c
QC Batch ID: Qb16011206		Created Date: 01/12/2016 17:28	Created By: CWaller
Samples in this QC Batch: 16011104,01,02,03,04,05,06			
Sample Preparation	PB16011207	EPA 120.1	CWaller

Refer to the Definition page for terms.

CASE NARRATIVE

Job ID : 16011104



Avery Laboratories &
Environmental Services, LLC

■ 2720 Gregory St. Unit 200 ■ Savannah, Georgia 31404 ■ Tel: (912) 944-3748 ■ Fax: (912) 234-9294 ■

Client Name:	Terracon
Project ID:	Corrosion Series
Date Received:	01/11/2016
Collected By:	KH

The results in this report are for non-regulatory purposes only.

Matrix Spikes

Method(s) ASTM D516-90, SM4500 CL-E: The matrix spike/ matrix spike duplicate recoveries were outside the established laboratory control limits. The lab spike recoveries were inside acceptable limits, so the data was reported. The matrix spikes have been qualified accordingly.

Released By: PGrimm

Title: Technical Director

TERM AND QUALIFIER DEFINITION

Job ID : 16011104



Avery Laboratories &
Environmental Services, LLC

2720 Gregory St. Unit 200 Savannah, Georgia 31404 Tel: (912) 944-3748 Fax: (912) 234-9294

General Term Definition

Conc.	Concentration
DF	Dilution Factor - the factor applied to the reported data due to sample preparation, dilution, or moisture content
ND	Non Detect - Not Detected at or above adjusted reporting limit
J	Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit
RL	adjusted Reporting Limit (QL – Quantification Limit)
MDL	adjusted Method Detection Limit (LOD – Limit of Detection)
RegLimit	Regulatory Limit
mg/l	Milligrams per Liter
mg/kg	Milligrams per Kilogram
ppm	Parts per Million
µg/L	Micrograms per Liter
µg/g	Micrograms per Gram
ppb	Parts per Billion
gr/gal	Grains per Gallon
SU	Standard Units
CCU	Cobalt Color Units
NTU	Nephelometric Turbidity Units
µS/cm	Microsiemens per cm at 25C
P/A	Presence/Absence
CFU	Colony Forming Units
MPN	Most Probable Number
RB	Reagent Blank
MB	Method Blank
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LFM	Laboratory Fortified Matrix (MS – Matrix Spike)
LFMD	Laboratory Fortified Matrix Duplicate (MSD – Matrix Spike Duplicate)
DUP	Sample Duplicate
RPD	Relative Percent Difference
%Rec	Percent Recovery
TNTC	Too numerous to count
NC	Not Calculable
SG	Silica Gel - Clean-Up
BRL	Below Reporting Limit
BDL	Below Detection Limit

Qualifier Definition

H	The parameter was analyzed outside the method specified holding time.
J1	Estimated value-The reported value failed the established quality control criteria for accuracy and /or precision.

SAMPLE SUMMARY



Avery Laboratories &
Environmental Services, LLC

Job ID : 16011104

2720 Gregory St. Unit 200 Savannah, Georgia 31404 Tel: (912) 944-3748 Fax: (912) 234-9294

Client Project ID : Corrosion Series

Report To : Client Name: Terracon Attn: Kyle Houston
Client Address: 2201 Rowland Ave. P.O.#.:
City, State, Zip: Savannah, GA, 31404

The laboratory has analyzed the following samples:

Client Sample ID	Matrix	Sample ID	Date Received	Date Collected	Collected by
HA-4	Soil	16011104.01	1/11/2016 10:06	1/2/2016 11:00	KH
HA-8	Soil	16011104.02	1/11/2016 10:06	1/2/2016 11:00	KH
HA-15	Soil	16011104.03	1/11/2016 10:06	1/2/2016 11:00	KH
HA-19	Soil	16011104.04	1/11/2016 10:06	1/2/2016 11:00	KH
HA-28	Soil	16011104.05	1/11/2016 10:06	1/2/2016 11:00	KH
HA-39	Soil	16011104.06	1/11/2016 10:06	1/2/2016 11:00	KH

SAMPLE PREPARATION INFORMATION



Avery Laboratories &
Environmental Services, LLC

Job ID : 16011104

■ 2720 Gregory St. Unit 200 ■ Savannah, Georgia 31404 ■ Tel: (912) 944-3748 ■ Fax: (912) 234-9294 ■

Client Name:	Terracon			Attn:	Kyle Houston
Project Name:	Corrosion Series			Date:	01/13/2016
Sample ID	Test	Prep Method	Date Prepared	Analyst	Prep Batch ID
16011104.01	% Moisture	SM2540b	01/11/2016 15:35	ehadwin	PB16011201
16011104.01	Chloride-Soils	SM4500-CL e	01/11/2016 16:59	ehadwin	PB16011202
16011104.01	pH Soil	SW 9045c	01/12/2016 13:00	CWaller	PB16011206
16011104.01	Resistivity	EPA 120.1	01/12/2016 16:50	CWaller	PB16011207
16011104.01	Sulfate-Soils	ASTM D516-90	01/11/2016 16:29	ehadwin	PB16011204
16011104.02	% Moisture	SM2540b	01/11/2016 15:35	ehadwin	PB16011201
16011104.02	Chloride-Soils	SM4500-CL e	01/11/2016 16:59	ehadwin	PB16011202
16011104.02	pH Soil	SW 9045c	01/12/2016 13:00	CWaller	PB16011206
16011104.02	Resistivity	EPA 120.1	01/12/2016 16:50	CWaller	PB16011207
16011104.02	Sulfate-Soils	ASTM D516-90	01/11/2016 16:29	ehadwin	PB16011204
16011104.03	% Moisture	SM2540b	01/11/2016 15:35	ehadwin	PB16011201
16011104.03	Chloride-Soils	SM4500-CL e	01/11/2016 16:59	ehadwin	PB16011202
16011104.03	pH Soil	SW 9045c	01/12/2016 13:00	CWaller	PB16011206
16011104.03	Resistivity	EPA 120.1	01/12/2016 16:50	CWaller	PB16011207
16011104.03	Sulfate-Soils	ASTM D516-90	01/11/2016 16:29	ehadwin	PB16011204
16011104.04	% Moisture	SM2540b	01/11/2016 15:35	ehadwin	PB16011201
16011104.04	Chloride-Soils	SM4500-CL e	01/11/2016 16:59	ehadwin	PB16011202
16011104.04	pH Soil	SW 9045c	01/12/2016 13:00	CWaller	PB16011206
16011104.04	Resistivity	EPA 120.1	01/12/2016 16:50	CWaller	PB16011207
16011104.04	Sulfate-Soils	ASTM D516-90	01/11/2016 16:29	ehadwin	PB16011204
16011104.05	% Moisture	SM2540b	01/11/2016 15:35	ehadwin	PB16011201
16011104.05	Chloride-Soils	SM4500-CL e	01/11/2016 16:59	ehadwin	PB16011202
16011104.05	pH Soil	SW 9045c	01/12/2016 13:00	CWaller	PB16011206
16011104.05	Resistivity	EPA 120.1	01/12/2016 16:50	CWaller	PB16011207
16011104.05	Sulfate-Soils	ASTM D516-90	01/11/2016 16:29	ehadwin	PB16011204
16011104.06	% Moisture	SM2540b	01/11/2016 15:35	ehadwin	PB16011201
16011104.06	Chloride-Soils	SM4500-CL e	01/11/2016 16:59	ehadwin	PB16011202
16011104.06	pH Soil	SW 9045c	01/12/2016 13:00	CWaller	PB16011206
16011104.06	Resistivity	EPA 120.1	01/12/2016 16:50	CWaller	PB16011207
16011104.06	Sulfate-Soils	ASTM D516-90	01/11/2016 16:29	ehadwin	PB16011204

Date: 01/13/2016 11:17

SAMPLE CONDITION CHECKLIST

Job ID : 16011104



Avery Laboratories &
Environmental Services, LLC

■ 2720 Gregory St. Unit 200 ■ Savannah, Georgia 31404 ■ Tel: (912) 944-3748 ■ Fax: (912) 234-9294 ■

Client Name : Terracon		Contact : Kyle Houston
Client Address : 2201 Rowland Ave.		Contact Phone : 673-852-1130
JobID : 16011104	Date Received : 01/11/2016	Time Received : 10:06 AM
Temperature : n/a	Sample pH :	
ThermometerID :	pHPaperID :	

Comments : Include actions taken to resolve discrepancies/problem:

	Check Points	Yes	No	N/A
1	All samples were logged or labeled.	✓		
2	Bottle count on C-O-C matches bottle found.	✓		
3	C-O-C signed and dated.	✓		
4	Cooler seal present and signed.			✓
5	If requested, sample(s) received with signed sample custody seal			✓
6	Sample amount is sufficient for analyses requested	✓		
7	Sample containers arrived in tact. (if no, comment)	✓		
8	Sample ID lables Match C-O-C ID's	✓		
9	Sample received at 6°C or Less		✓	
10	Sample(s) in a cooler.		✓	
11	Sample(s) were received at the proper pH.	✓		
12	Sample(s) were received in appropriate container. (If no, comment)	✓		
13	Samples accepted.	✓		
14	Samples received within holding time for analysis requested	✓		
15	Zero headspace in liquid VOA vials			✓

CheckIn By : Elizabeth Grimm

CheckIn Date : 01/11/2016

Date: 01/13/2016 11:17

COMMERCIAL LABORATORY STIPULATION

Georgia Rules for Commercial Environmental Laboratory Accreditation Chapter 391-3-26

Job ID : 16011104



Avery Laboratories &
Environmental Services, LLC

■ 2720 Gregory St. Unit 200 ■ Savannah, Georgia 31404 ■ Tel: (912) 944-3748 ■ Fax: (912) 234-9294 ■

Laboratory: Avery Laboratories and Environmental Services, LLC

Accreditor: NELAC: State of Florida, Department of Health, Bureau of Laboratories

Accreditation ID: E87941

Scope: NON-POTABLE WATER - EXTRACTABLE ORGANICS, NON-POTABLE WATER - GENERAL CHEMISTRY, NON-POTABLE WATER - METALS, NON-POTABLE WATER - PESTICIDES-HERBICIDES-PCB'S, NON-POTABLE WATER - VOLATILE ORGANICS, SOLID AND CHEMICAL MATERIALS - EXTRACTABLE ORGANICS, SOLID AND CHEMICAL MATERIALS - GENERAL CHEMISTRY, SOLID AND CHEMICAL MATERIALS - METALS, SOLID AND CHEMICAL MATERIALS - VOLATILE ORGANICS

Effective Date: July 1, 2015 **Expiration Date:** July 1, 2016

As per the Georgia EPD Rules and Regulations for Commercial Laboratories, Avery Laboratories and Environmental Services - Savannah is accredited by the Florida Department of Health under the National Environmental Laboratory Approval Program (NELAP). If you have any further questions regarding accreditation status for Avery Laboratories and Environmental Services, please contact: Paul Grimm.

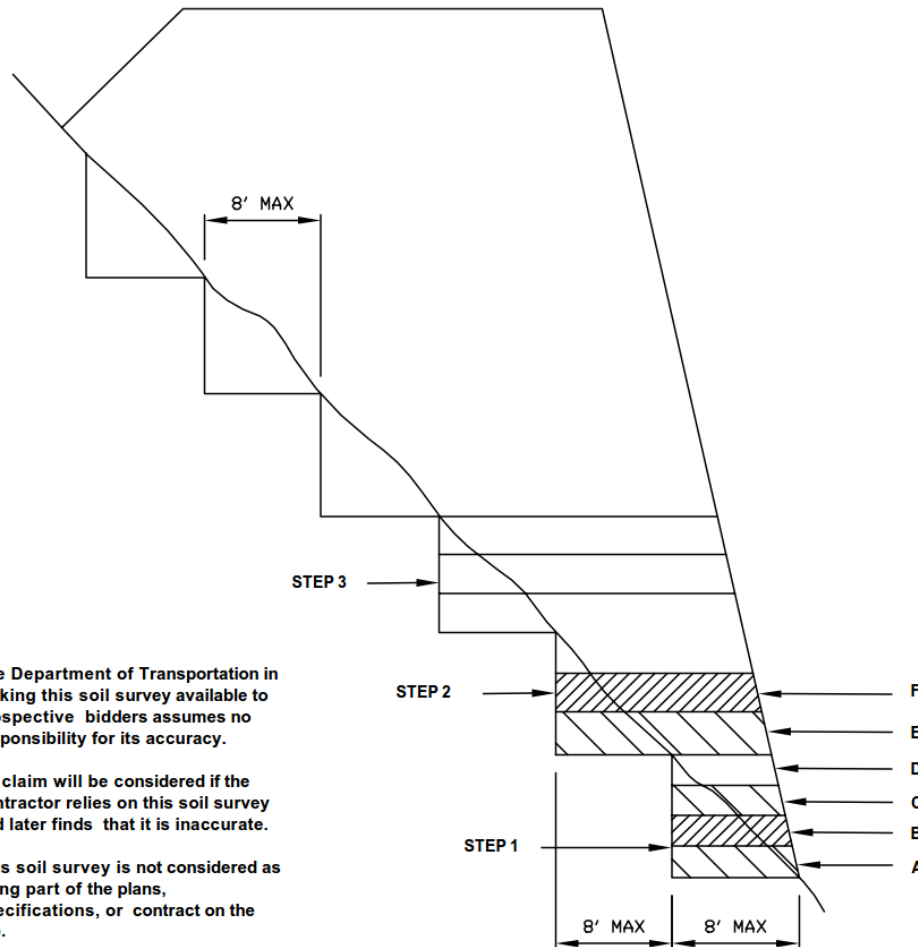
Avery Laboratories and Environmental Services, LLC
101B Estus Drive
Savannah, GA 31404
Phone: (912) 944-3748
Fax: (912) 234-9294

APPENDIX C

SUPPORTING INFORMATION

- Exhibit C-1 Benching Detail
- Exhibit C-2 Pipe Culvert Material Alternates
- Exhibit C-3 Special Provision

BENCHING DETAIL



The Department of Transportation in making this soil survey available to prospective bidders assumes no responsibility for its accuracy.

No claim will be considered if the contractor relies on this soil survey and later finds that it is inaccurate.

This soil survey is not considered as being part of the plans, specifications, or contract on the job.

This soil survey is made available as provided for in specifications of the Department.

1. WHERE THE EMBANKMENT IS TO BE PLACED ON A HILLSIDE OR ANOTHER EXISTING EMBANKMENT HAVING A SLOPE OF 3 TO 1 OR STEEPER, THE FOUNDATION MUST BE BENCHED WHILE THE EMBANKMENT IS BEING MADE. (SEE DIAGRAM AT LEFT)
2. THE DIAGRAM SHOWS THAT BEFORE LAYER "A" IS PLACED THE FIRST STEP (1) IS CUT INTO THE SLOPE A MAXIMUM DISTANCE OF ABOUT 8' (ABOUT 3/4 THE WIDTH OF THE USUAL D-8 BULLDOZER BLADE). SUCCESSIVE LAYER B, C, AND D ARE THEN PLACED. BEFORE LAYER "E" IS PLACED. THE SECOND STEP IS CUT 8' INTO THE SLOPE AND SUCCESSIVE LAYERS ARE AGAIN PLACED. IF IT IS ANTICIPATED THAT THE VERTICAL PART OF THE STEP WILL EXCEED 4' IF AN HORIZONTAL CUT IS MADE, THEN THE ACTUAL CUT STOPS WHEN THE VERTICAL PART REACHES A MAXIMUM OF 4' ALLOWING THE HORIZONTAL DISTANCE TO VARY.
3. THE PROCESS OF BENCHING IS CONSIDERED INCIDENTAL TO THE ITEM OF UNCLASSIFIED EXCAVATION AND BORROW IN CONSTRUCTION OF THE EMBANKMENT AND NO ADDITIONAL MEASUREMENT OF QUANTITY OR PAYMENT WILL BE MADE FOR BENCHING.

NO SCALE

Project Manager:	BG	Project No.	ES155153	 <p>2201 Rowland Avenue Savannah, Georgia 31404 Phone (912) 629 4000 Fax (912) 629 4001</p>	BENCHING DETAIL		Exhibit: C-1
Drawn by:	BG	Scale:	N.T.S.		Benton Boulevard Extension		
Checked by:	GL	File Name:	ES155153		Pooler		
Approved by:	GL	Date:	2/11/2016		Chatham County, Georgia		

pH 3.89
 Resistivity 26900
 Project No.: ES155153

County: Chatham

P.I. No.:

Pipe Culvert Material Alternates For Coastal Plain Region

TYPE OF PIPE INSTALLATION				C O N C R E T E	CORRUGATED STEEL AASHTO M-36		CORRU- GATED ALUMINUM AASHTO M-196	PLASTIC			
					ALUMINUM COATED (TYPE 2) CORR. STEEL	PLAIN ZINC COATED	PLAIN UNCOATED ALUMINUM	CORR. POLY- ETHYLENE AASHTO M-252	CORR. POLY- ETHYLENE SMOOTHED LINED AASHTO M-294 TYPE "S"	POLY VINYL CHLORIDE (PVC) PROFILE WALL AASHTO M-304	POLY VINYL CHLORIDE (PVC) CORRUGATED SMOOTH INTERIOR ASTM F-949
S T O R M D R A I N	LONGITUDINAL INTERSTATE AND TRAVEL BEARING			X							
	LONGITUDINAL NON- INTERSTATE AND NON- TRAVEL BEARING			X					X	X	X
	C R O S S D R A I N	GRADE ≤ 10%	ADT < 250	X					X	X	X
			250 < ADT < 1,500	X					X	X	X
			1,500 < ADT < 15,000	X					X	X	X
			ADT > 15,000	X							
	GRADE > 10%	ADT < 250							X	X	X
		ADT > 250							X	X	X
	SIDE DRAIN			X						X	X
PERMANENT SLOPE DRAIN				X	X	X			X	X	X
PERFORATED UNDERDRAIN				X	X	X	X	X			X

NOTES:

- 1 Allowable materials are indicated by an "X".
- 2 Structural requirements of storm drain pipe will be in accordance with Georgia Standard 1030-D or 1030-P, whichever is applicable, and the Standard Specifications.
- 3 Graded aggregate backfill shall be used in cross drain applications for all plastic pipes (AASHTO M-294, HDPE pipe; AASHTO M-304, PVC pipe; ASTM F-949, PVC pipe).
- 4 The Contractor shall provide additional storm sewer capacity calculations if a pipe material other than concrete is selected.
- 5 Pipe used under mechanically stabilized earth (MSE) walls, within MSE wall backfill, or within five feet of an MSE wall face shall be Class V Concrete Pipe.
- 6 Project specific pH and Resistivity values are entered into the respective boxes above to determine allowable pipe materials.

**DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA**

**SPECIAL PROVISION
PROJECT NO. ES155153, CHATHAM COUNTY
P.I. NO. _____**

SECTION 208 – EMBANKMENTS

Modify Sub-Section 208.2A.1 to read as follows:

INUNDATED EMBANKMENTS: Construct embankments in inundated areas with granular embankment placed to a level of 18 inches (457 mm) above the water surface at the time of construction.

Retain Sub-Section 208.5 - PAYMENT – as written and add the following:

Include costs for granular embankment construction in the pay item provided in the contract for earthwork.

January 15, 2003

**DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA**

SPECIAL PROVISION

PROJECT NO.: ES155153, CHATHAM COUNTY

P.I. NO.: _____

SECTION 209 – SUBGRADE CONSTRUCTION

Delete Sub-Section 209.2.A and Substitute the following:

209.2.A SUBGRADE MATERIALS: Construct the top 12 inches (305 mm) of subgrade on this project, including crossroads and ramps, with Class IIB3 or better materials. If the existing soils at grade do not meet this requirement, undercut and replace these soils to provide 12 inches (305 mm) of Class IIB3 or better material at subgrade. Include the costs for this work in the pay item provided in the contract for earthwork.

Office of Material and Research