

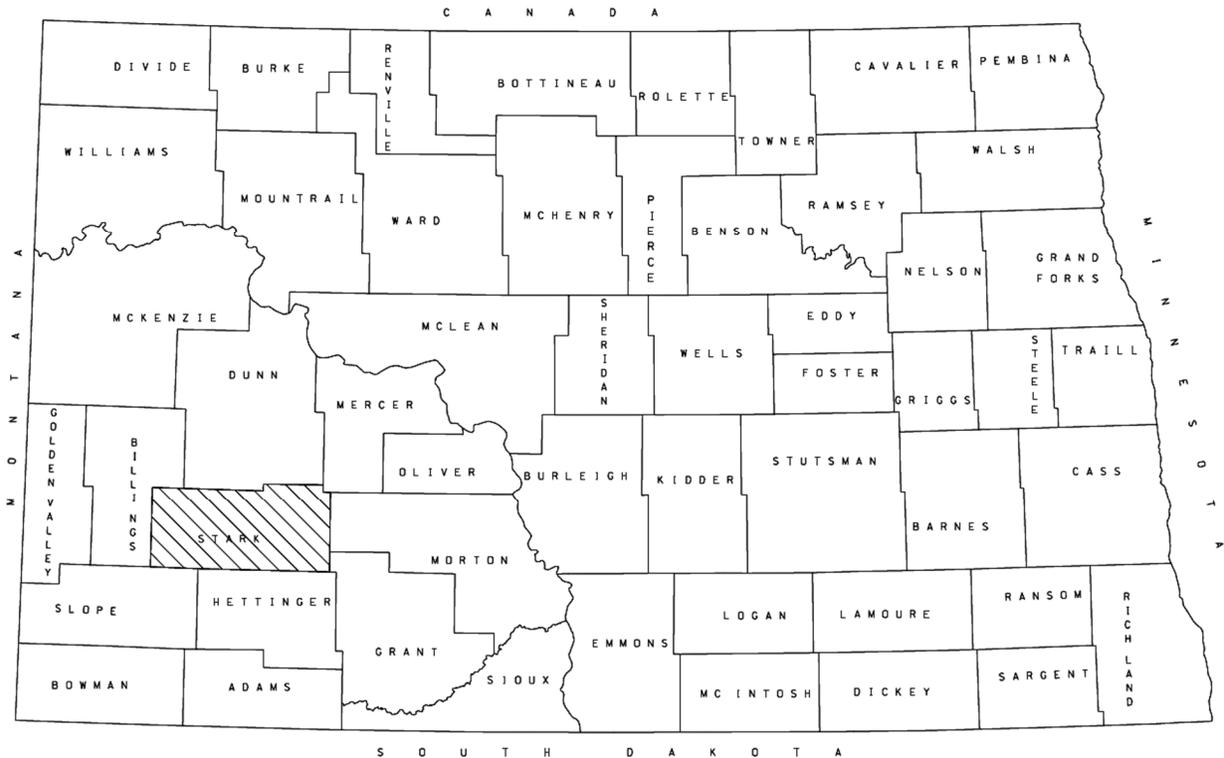
# LINEAR SOILS SURVEY AND RECOMMENDATIONS

PROJECT NO. NHU-5-094(114)907

PCN 21175

COUNTY Stark

I-94, RP 907.058 to 908.765



PREPARED BY: Jared Loegering, PE

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION  
MATERIALS AND RESEARCH DIVISION

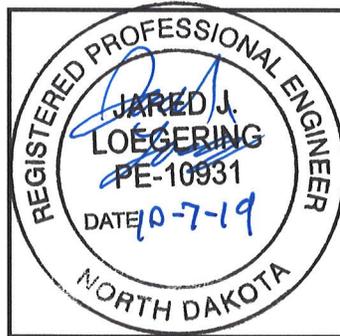
October 2019

**NHU-5-094(114)907**

E Business LP 10<sup>th</sup> Ave E – Exit 64

## ***CERTIFICATION***

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly registered professional engineer under the laws of the State of North Dakota. This document was originally issued and sealed by Jared J. Loegering, Registration number PE-10931 on 10/7/2019 and the original document is stored at the North Dakota Department of Transportation.



*Jared J. Loegering*

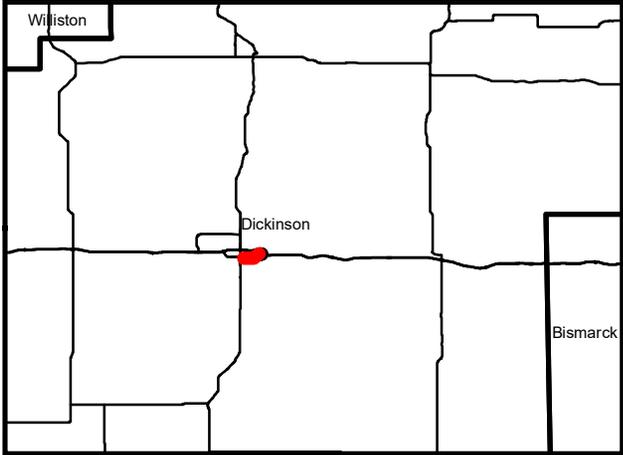
\_\_\_\_\_  
Jared J. Loegering, P.E.

*10-7-19*

\_\_\_\_\_  
Date

# Linear Soils Survey and Recommendations

**Project:** NHU-5-094(114)907  
**PCN:** 21175  
**Scope:** Major Rehabilitation/Widening  
**Length:** 1.8617 Miles  
**Location:** I-94, E Business LP 10th Ave E-Exit 64



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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## **Introduction**

Location: I-94, E Business LP 10<sup>th</sup> Ave E – Exit 64

Reference Points: 907.058 to 908.765

Project Length: 1.8617 Miles

Proposed Project Scope: Major Rehabilitation w/Widening

Investigation Scope: 250' Intervals and Identified Maintenance Areas

## **Maintenance Review**

Date of Maintenance Review: 04/23/2019

Materials and Research Person Conducting the Review: Jamie Naumann

Maintenance Person Conducting Review: Darryl Wehner – Dickinson Public Works

Table 1 – Identified Maintenance Areas

<b>Location RP + Feet</b>	<b>Distress Identified</b>	<b>Maintenance Comments</b>	<b>Drilling Required</b>
907+0329	Transverse Cracks	Longitudinal cracking in wheel path, patch every year.	Yes
907+4691 to 907+4725	Alligator Cracking	Alligator cracking and potholing, right wheel path only.	Yes

## **Summary of Soil Investigation**

The soil investigation was completed on 6/24/2019. The investigation consisted of 38 borings.

Table 2 – Boring Locations Summary

<b>Boring Location</b>	<b>Justification for Boring</b>	<b>Boring depth</b>	<b>Location</b>
906+5120 to 908+3470	Major Rehabilitation	5 feet	1 boring every 250' along the roadway within the project limits. A total number of 33 borings.
907+0329	Longitudinal cracking/patching	10 feet	Conduct 1 boring in the identified area and one approximately 100' away. A total of 2 borings.
See map in Appendix B	New Construction	10 feet	Conduct 1 boring as shown in Appendix B. A total of 1 boring.
907+4691 to 907+4725	Alligator Cracking/Potholes	10 feet	Conduct 1 boring in the identified area and one approximately 100' away. A total of 2 borings.

Maps of the boring locations are shown in Appendix C. The lab results are included in Appendix E.

## **Summary of Soil Analysis**

**Project Limits – 907+0306 to 908+4039:** The majority of the soils within the project limits are silts, sands, and silty and sandy lean and fat clays with an AASHTO classification of A-2-4, A-6 and A-7-6. These soils have on average a maximum dry density of approximately 125 lb/ft<sup>3</sup> and an optimum water content of approximately 11%. The in-place moistures of the soils are on average 0% to 16% over optimum.

**Identified Maintenance Area – 907+0329:** The soils within the identified maintenance area are silty sand and lean clays with an AASHTO classification of A-2-4 and A-6. These soils have a maximum dry density of approximately 126.5 lb/ft<sup>3</sup> and an optimum water content of approximately 10.5%. The in-place moistures of the soils are on average 0% to 10% over optimum.

**Identified Maintenance Area – 907+4691 to 907+4725:** The soils within the identified maintenance area are sandy lean clays with an AASHTO classification of A-6 and A-7-6. These soils have a maximum dry density of approximately 121.5 lb/ft<sup>3</sup> and an optimum water content of approximately 12%. The in-place moistures of the soils are on average 6% to 16% over optimum.

### Soil Sample Distribution

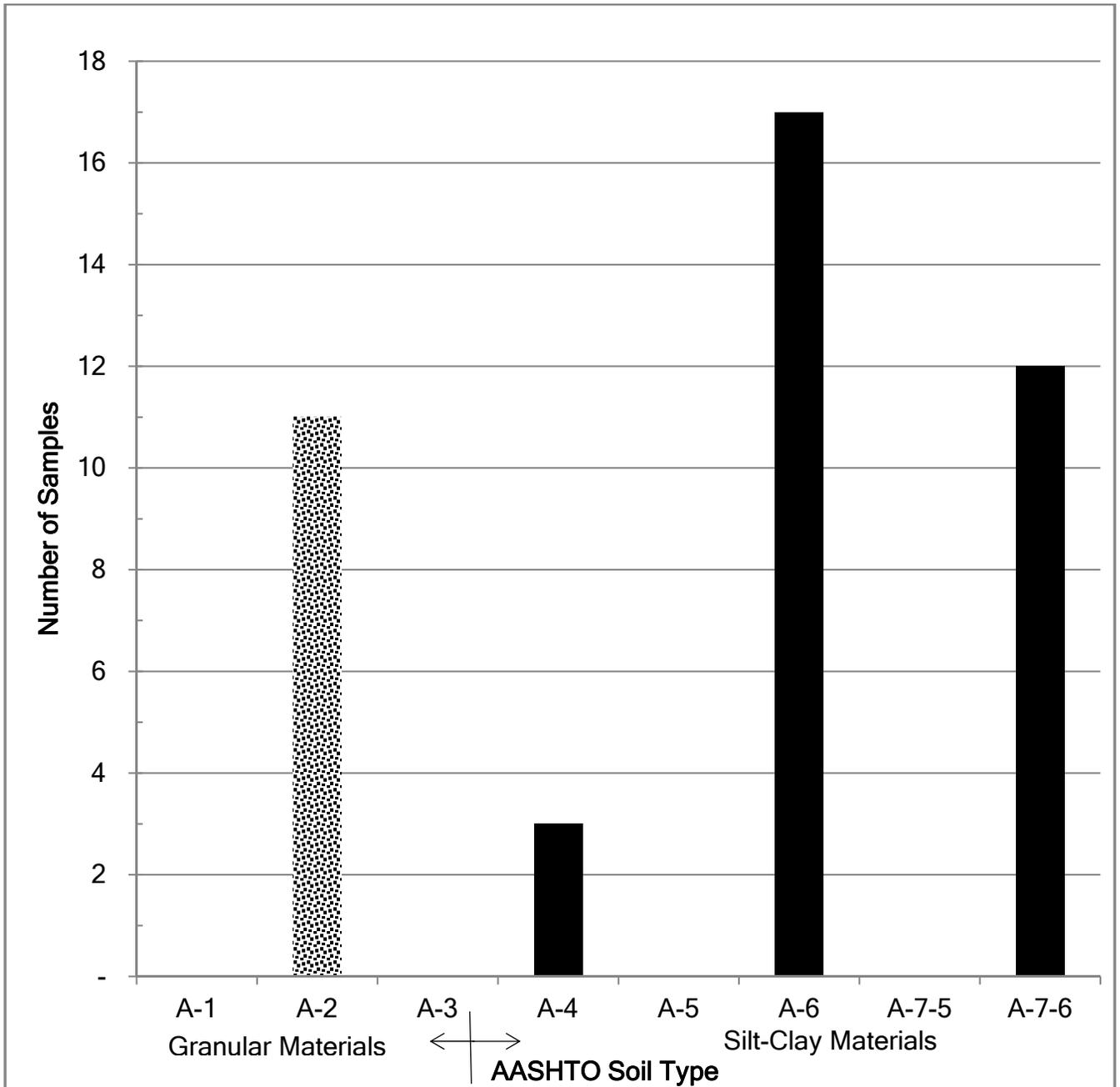


Figure 1 - Soil Sample Distribution

## **Design Recommendations**

**Project Limits – 907+0306 to 908+4039:** The existing soils within the project limits are silts, sands, and silty and sandy lean and fat clays with high moisture contents. The proposed scope of major rehabilitation should remediate any pavement distress present.

If any subgrade is exposed as part of the project (in non-widening areas), place Geosynthetic Geogrid (Type G) on top of the existing subgrade without disturbing or scarifying the subgrade. Place a minimum of 10 inches of base material over the geogrid prior to compacting the base material.

**Identified Maintenance Area – 907+0329:** The existing soils in this area are silty sand and lean clays with high moisture, silt and sand contents. The soil analysis indicates average in-place moistures from 10% to 16% over optimum. The soil analysis indicates variable soils throughout this area. There is no indication of subgrade issues and the maintenance area appears to be associated with a pavement distress. There are no recommendations at this time based on the current improvement strategy.

**Identified Maintenance Area – 907+4691 to 907+4725:** The existing soils in this area are sandy lean clays with high moisture contents. The soil analysis indicates average in-place moistures from 6% to 16% over optimum. The soil analysis in this area does not deviate from soils around it and there is no indication of subgrade issues. The maintenance area appears to be associated with a pavement distress. There are no recommendations at this time based on the current improvement strategy.

## **Design Information**

**Pipe Replacement:** Pipe replacements on this project may require a non-standard pipe backfill detail. Contact the Materials and Research Geotechnical Section prior to the PS&E if any pipes are being installed or replaced on this project. Please include any pertinent information such as location, size, depth to inlet, etc.

**Compaction Method:** T-180

**Subgrade Prep:** None

**Subcut Recommendations:** None

**Drainage:** None

## **Plan Notes**

None

**The recommendations in this report are based on the scope specified in the Introduction. If the scope of work, vertical profile or horizontal alignment is changed, in either the conceptual phase or the design phase, the Geotechnical Engineer must be notified as soon as possible to ensure that there is adequate geotechnical information addressing these areas.**

**APPENDIX A**  
**SOIL CLASSIFICATION**

# AASHTO Classification System

Table 5.1. AASHTO Classification System

General Classification	Granular materials (35% or less passing No. 200 Sieve (0.075 mm))							Silt-clay Materials More than 35% passing No. 200 Sieve (0.075 mm)			
	A-1		A-3	A-2				A-4	A-5	A-6	A-7
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6
(a) Sieve Analysis: Percent Passing											
(i) 2.00 mm (No. 10)	50 max										
(ii) 0.425 mm (No. 40)	30 max	50 max	51 min								
(iii) 0.075 mm (No. 200)	15 max	25 max	10 max	35 max	35 max	35 max	35 max	36 min	36 min	36 min	36 min
(b) Characteristics of fraction passing 0.425 mm (No. 40)											
(i) Liquid limit				40 max	41 min	40 max	41 min	40 max	41 min	40 max	41 min
(ii) Plasticity index	6 max		N.P.	10 max	10 max	11 min	11 min	10 max	10 max	11 min	11 min*
(c) Usual types of significant Constituent materials	Stone Fragments Gravel and sand		Fine Sand	Silty or Clayey Gravel Sand				Silty Soils		Clayey Soils	
(d) General rating as subgrade.	Excellent to Good							Fair to Poor			

\* If plasticity index is equal to or less than (Liquid Limit-30), the soil is A-7-5 (i.e. PL > 30%)  
If plasticity index is greater than (Liquid Limit-30), the soil is A-7-6 (i.e. PL < 30%)

# Unified Soil Classification System, USCS

Table 5.2 Unified Soil Classification System (Based on Material Passing 76.2-mm Sieve)

Criteria for assigning group symbols				Group symbol
Coarse-grained soils More than 50% of retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels	$C_u \geq 4$ and $1 \leq C_c \leq 3^c$	GW
		Less than 5% fines <sup>a</sup>	$C_u < 4$ and/or $1 > C_c > 3^c$	GP
	Gravels with Fines More than 12% fines <sup>a,d</sup>		$PI < 4$ or plots below "A" line (Figure 5.3)	GM
			$PI > 7$ and plots on or above "A" line (Figure 5.3)	GC
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands	$C_u \geq 6$ and $1 \leq C_c \leq 3^c$	SW
		Less than 5% fines <sup>b</sup>	$C_u < 6$ and/or $1 > C_c > 3^c$	SP
Sands with Fines		$PI < 4$ or plots below "A" line (Figure 5.3)	SM	
More than 12% fines <sup>b,d</sup>		$PI > 7$ and plots on or above "A" line (Figure 5.3)	SC	
Fine-grained soils 50% or more passes No. 200 sieve	Silts and clays Liquid limit less than 50	Inorganic	$PI > 7$ and plots on or above "A" line (Figure 5.3) <sup>e</sup>	CL
			$PI < 4$ or plots below "A" line (Figure 5.3) <sup>e</sup>	ML
	Organic		$\frac{\text{Liquid limit — oven dried}}{\text{Liquid limit — not dried}} < 0.75$ ; see Figure 5.3; OL zone	OL
			$PI$ plots on or above "A" line (Figure 5.3)	CH
	Silts and clays Liquid limit 50 or more	Inorganic	$PI$ plots below "A" line (Figure 5.3)	MH
		Organic	$\frac{\text{Liquid limit — oven dried}}{\text{Liquid limit — not dried}} < 0.75$ ; see Figure 5.3; OH zone	OH
Highly Organic Soils	Primarily organic matter, dark in color, and organic odor			Pt

<sup>a</sup>Gravels with 5 to 12% fine require dual symbols: GW-GM, GW-GC, GP-GM, GP-GC.

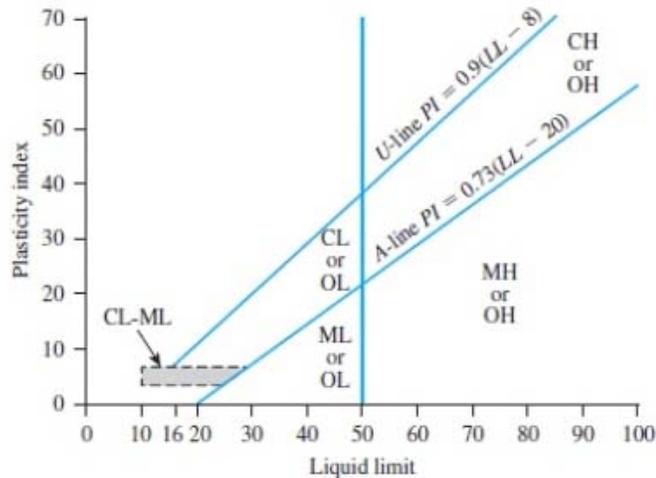
<sup>b</sup>Sands with 5 to 12% fines require dual symbols: SW-SM, SW-SC, SP-SM, SP-SC.

$$C_u = \frac{D_{60}}{D_{10}}; \quad C_c = \frac{(D_{30})^2}{D_{60} \times D_{10}}$$

<sup>d</sup>If  $4 \leq PI \leq 7$  and plots in the hatched area in Figure 5.3, use dual symbol GC-GM or SC-SM.

<sup>e</sup>If  $4 \leq PI \leq 7$  and plots in the hatched area in Figure 5.3, use dual symbol CL-ML.

## Plasticity Chart :



## **APPENDIX B**

# **MAINTENANCE REVIEW AND SUBSURFACE INVESTIGATION SCOPE**

## LINEAR SOILS SURVEY FIELD INVESTIGATION SCOPE

<b>TO:</b>	File
<b>FROM:</b>	Jared Loegering – Materials and Research (Geotechnical)
<b>DATE:</b>	5/22/2019
<b>HIGHWAY:</b>	094.907
<b>PROJECT NUMBER:</b>	NHU-5-0994(114)907
<b>PCN:</b>	21175
<b>LOCATION:</b>	I-94 E Business Loop 10 <sup>th</sup> Ave E – Exit 64
<b>IMPROVEMENT SCOPE:</b>	Reconstruction
<b>SUBJECT:</b>	Linear Soils Survey Subsurface Investigation Scope

We have completed the Maintenance Review of the roadway (attached to this memo). The linear soils survey field investigation scope is based on the improvement strategy for the roadway as per Chapter 7 of the NDDOT Design Manual.

**Improvement Strategy:** Urban Reconstruction  
**Investigation Scope:** 1 boring every 250'

The following table shows the proposed subsurface investigation scope.

Boring Location	Justification for Boring	Boring Depth	Location
906+5120 to 908+3470	Reconstruction	5 feet	1 boring every 250' along the roadway within the project limits. A total number of approximately 36 borings.
907+0329	Longitudinal cracking/patching	10 feet	Conduct 1 boring in the identified area and one approximately 100' away. A total of 2 borings.
See attached map	New Construction	10 feet	Conduct 1 boring shown in the attached map. A total of 1 boring.
907+4691 to 907+4725	Alligator Cracking/Potholes	10 feet	Conduct 1 boring in the identified area and one approximately 100' away. A total of 2 borings.

The following are the associated tasks and dates for the completion of the Linear Soils Survey and Recommendations for this project.

Task	Completion ( <i>Anticipated</i> ) Date
Maintenance Review with District Maintenance Forces	4/23/2019
Linear Soils Survey Field Work Complete	6/15/2019
Linear Soils Survey Lab Work	8/15/2019
Linear Soils Survey Report	12/01/2019*
*Milestone Task	

# Boring Location for Roundabout

**Legend**

- 907.058
- Boring Location



10th Ave E

94

E Villard St

Boring Location, 10' deep. 130' south of Centerline of Business Loop



200 ft

# PAVEMENT EVALUATION LOG FOR LINEAR SOIL SURVEY

North Dakota Department of Transportation, Materials & Research  
 SFN 60472 (9-2013)

Sheet
1 of 1

Project Number NHU-5-094(114)907	PCN 21175	Date of Survey 4/23/2019
Section Maintenance Contact Darryl Wehner		Completed By Jamie Naumann
Highway Reference Points 906+5123 to 908+3470	Surface Type Asphalt	

Location	Pavement Distress	Description	Maintenance Comment	Picture Number	Drilling Required
907+0329	Transv. Cracks	Longitudinal cracking in wheel path	Patch every year	1	Yes
907+4691 to 907+4725	Alligator Cracking	Alligator cracking and potholing	Right wheel path only.	2	Yes
	Select One				Select One
	Select One				Select One
	Select One				Select One
	Select One				Select One
	Select One				Select One
	Select One				Select One
	Select One				Select One
	Select One				Select One

Comments



1  
907+0329



2  
907+4691 to 907+4725

**APPENDIX C**  
**BORING LOCATIONS**



**Legend**

- Reference Point
- Boring Locations



Project Number: NHU-5-094(114)907



**Legend**

- Reference Point
- Boring Locations



Project Number: NHU-5-094(114)907



**Legend**

- Reference Point
- Boring Locations



Project Number: NHU-5-094(114)907



**Legend**

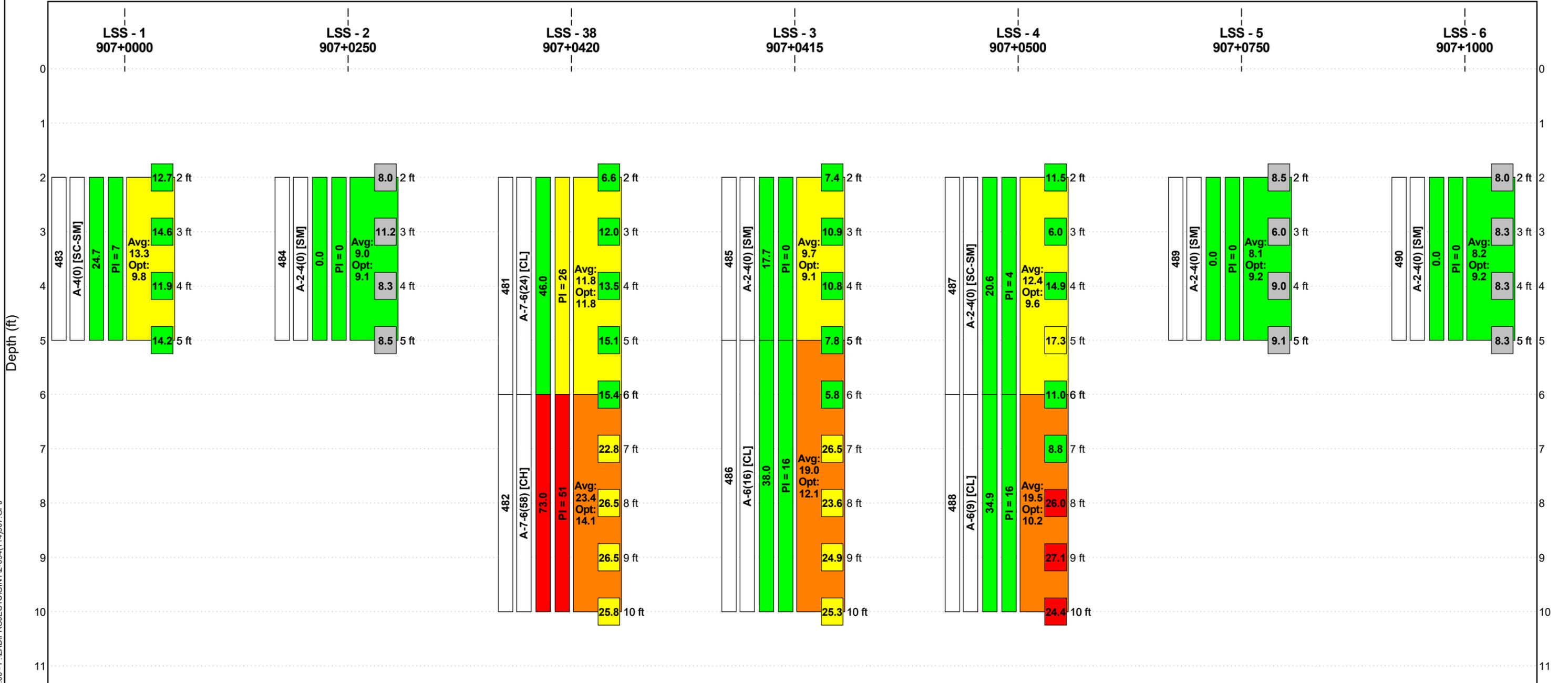
- Reference Point
- Boring Locations



Project Number: NHU-5-094(114)907

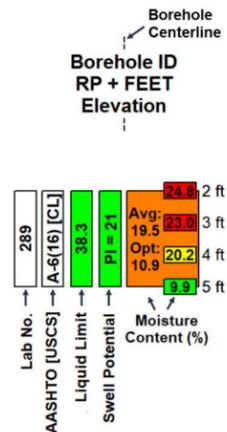
**APPENDIX D**

**SUMMARY OF SOILS ANALYSIS**

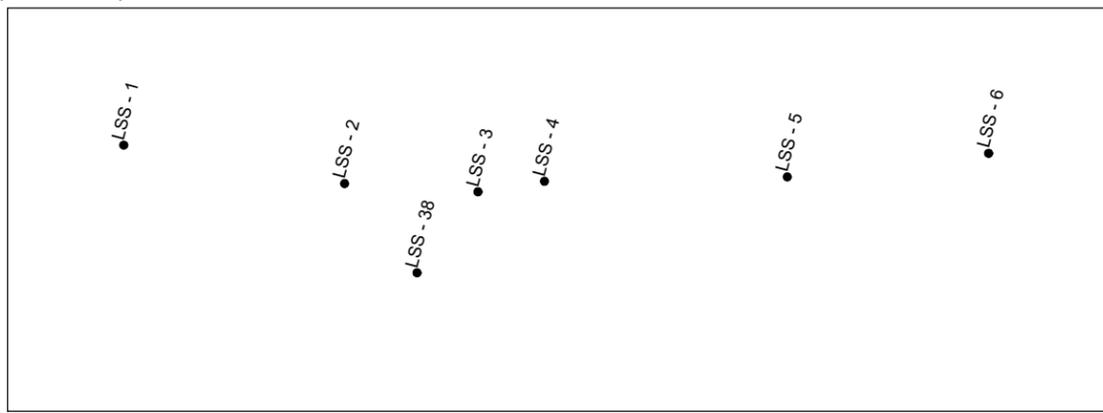


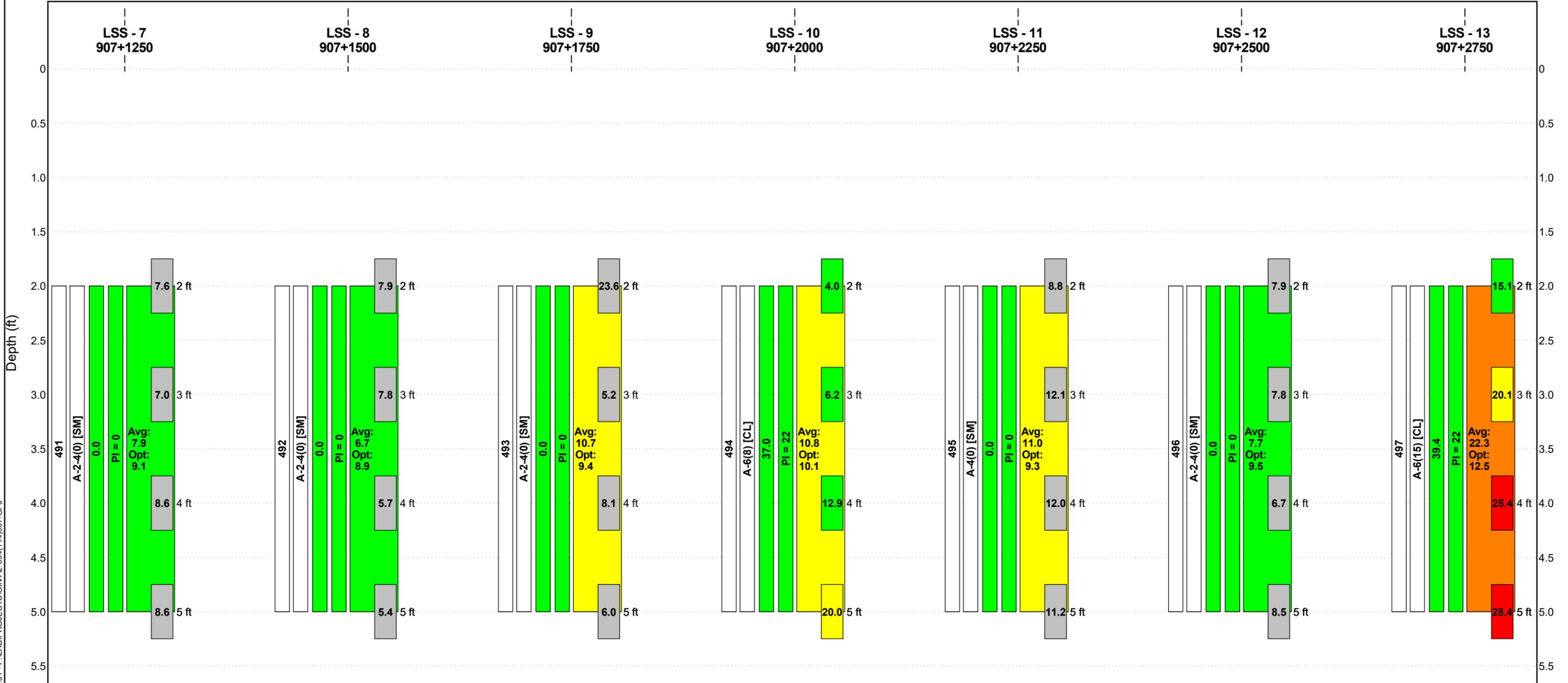
Boreholes Equally Spaced (0 to 350 ft)

**LEGEND**



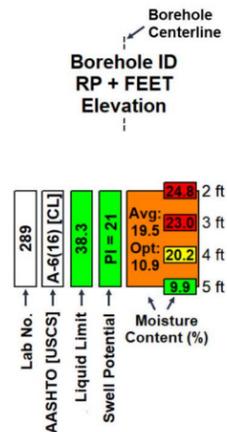
<b>Liquid Limit</b>	LL < 50	50 ≤ LL < 60	LL ≥ 60		
<b>Swell Potential</b>	Low	Marginal	High		
<b>Moisture Content</b>	Below PL	0-5% Over PL	>5% Over PL	Non-Plastic	
<b>Avg. In-Place Moisture Content</b>	MC < Opt	0 ≤ MC < 6% Over Opt	6 ≤ MC < 10% Over Opt	10 ≤ MC < 16% Over Opt	MC > 16% Over Opt



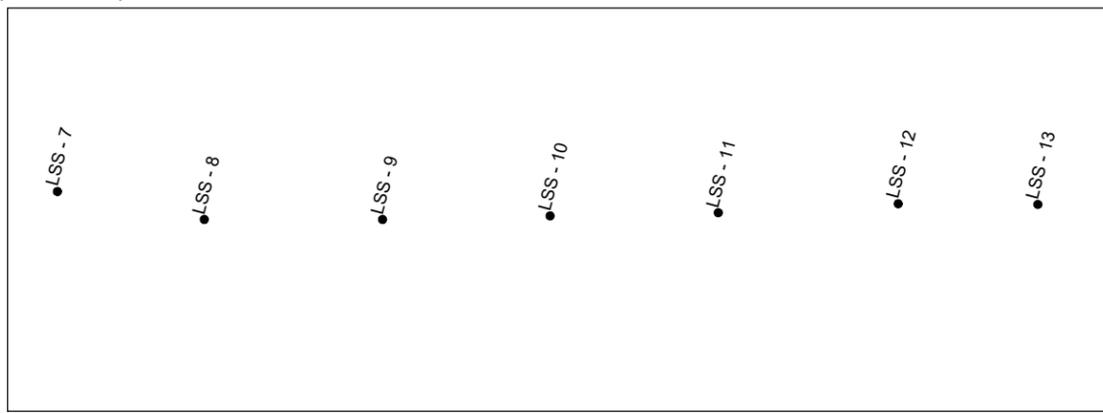


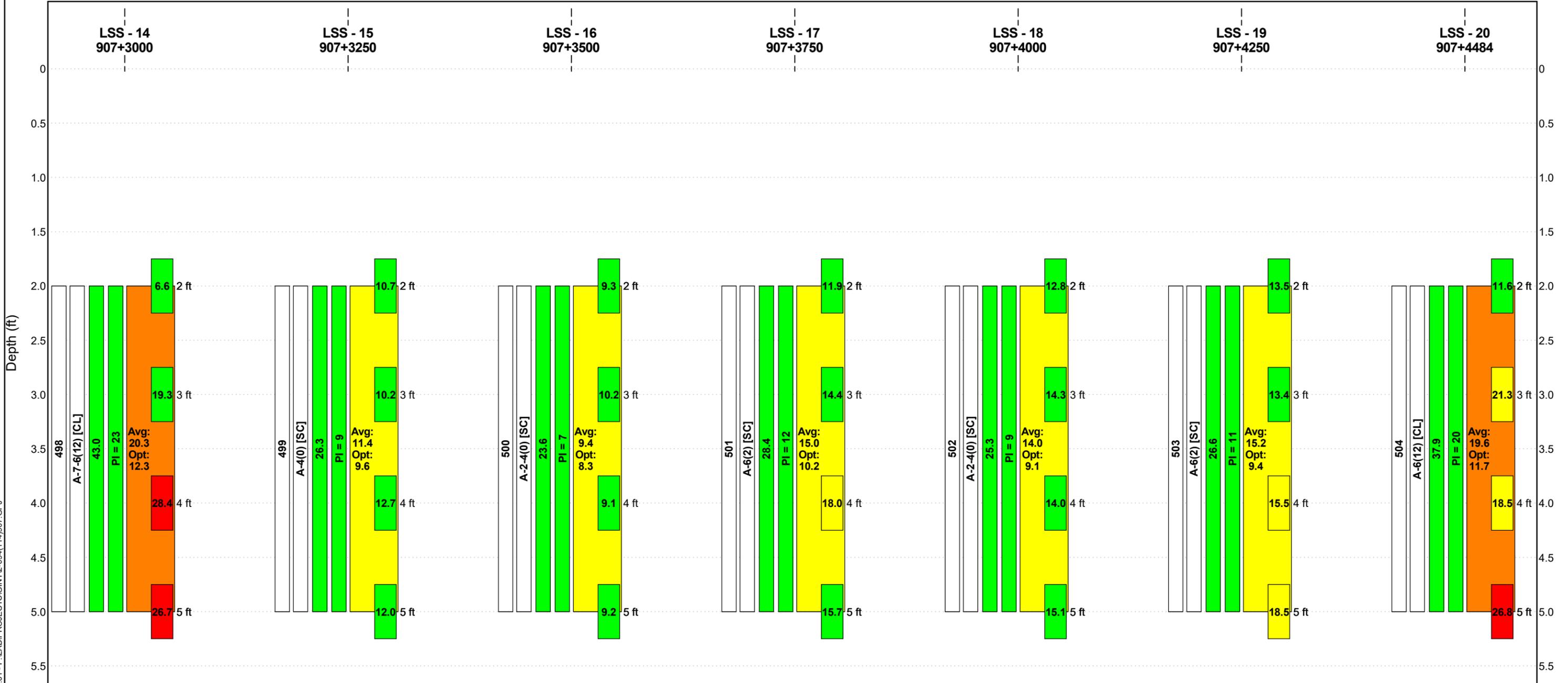
Boreholes Equally Spaced (0 to 450 ft)

**LEGEND**



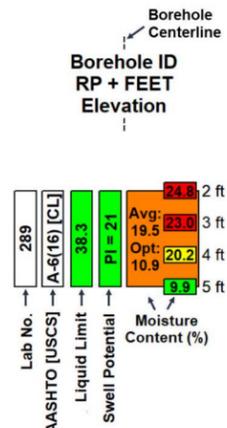
<b>Liquid Limit</b>	LL < 50	50 ≤ LL < 60	LL ≥ 60		
<b>Swell Potential</b>	Low	Marginal	High		
<b>Moisture Content</b>	Below PL	0-5% Over PL	>5% Over PL	Non-Plastic	
<b>Avg. In-Place Moisture Content</b>	MC < Opt	0 ≤ MC < 6% Over Opt	6 ≤ MC < 10% Over Opt	10 ≤ MC < 16% Over Opt	MC > 16% Over Opt



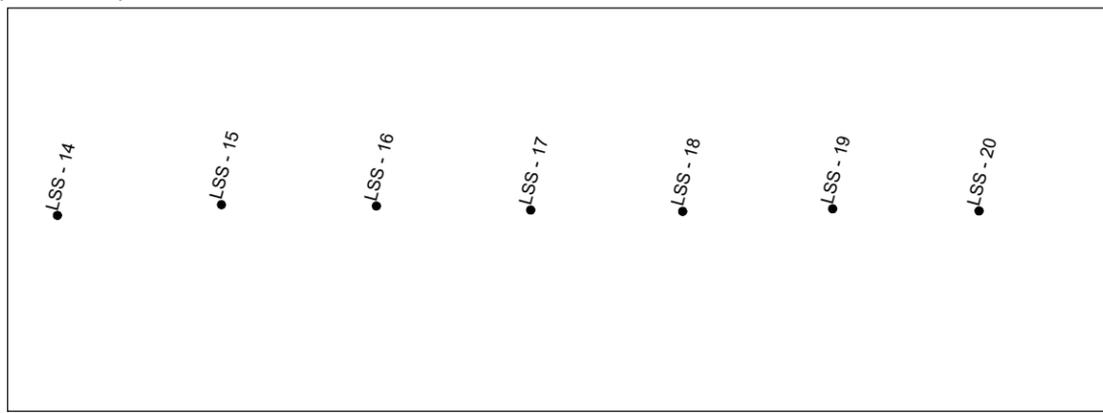


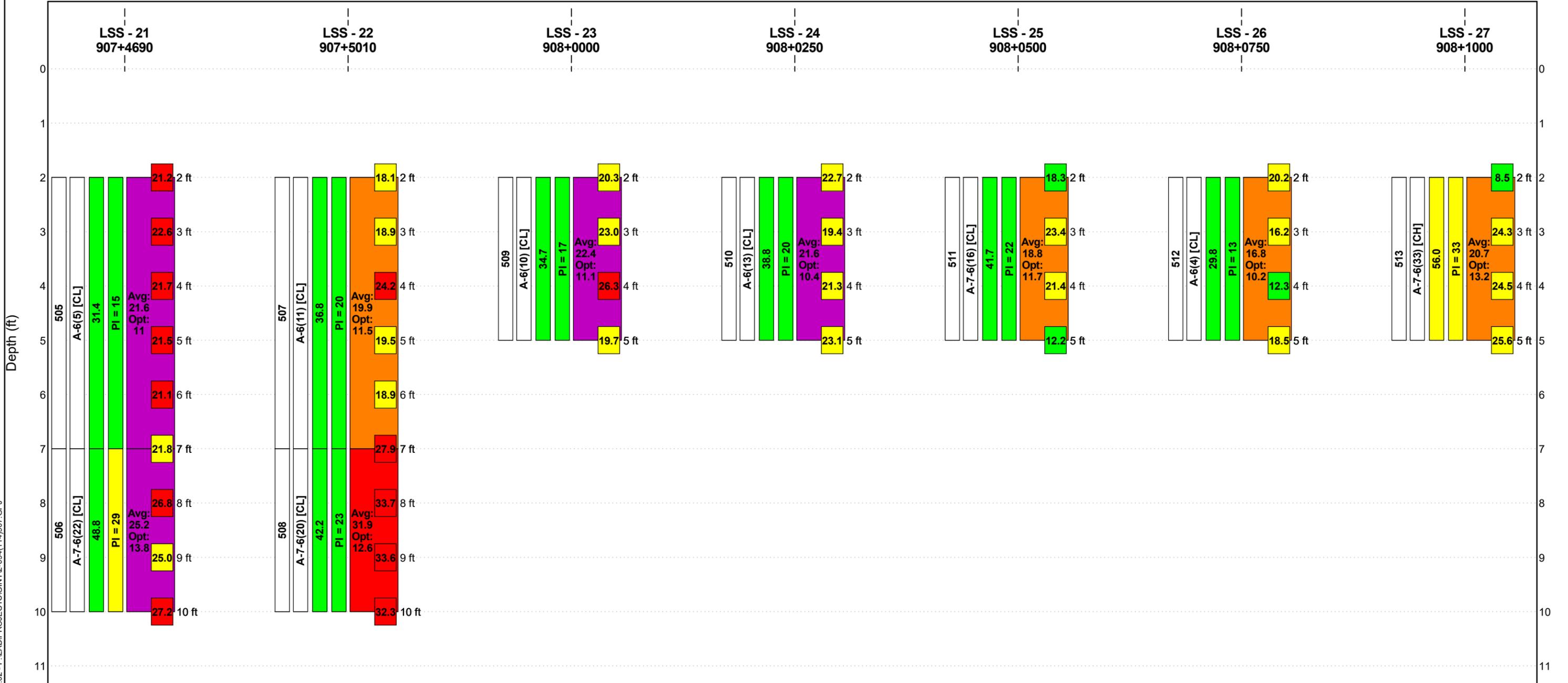
Boreholes Equally Spaced (0 to 500 ft)

**LEGEND**



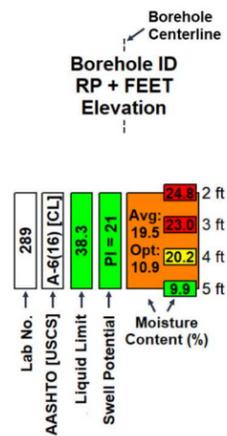
<b>Liquid Limit</b>	LL < 50	50 ≤ LL < 60	LL ≥ 60		
<b>Swell Potential</b>	Low	Marginal	High		
<b>Moisture Content</b>	Below PL	0-5% Over PL	>5% Over PL	Non-Plastic	
<b>Avg. In-Place Moisture Content</b>	MC < Opt	0 ≤ MC < 6% Over Opt	6 ≤ MC < 10% Over Opt	10 ≤ MC < 16% Over Opt	MC > 16% Over Opt



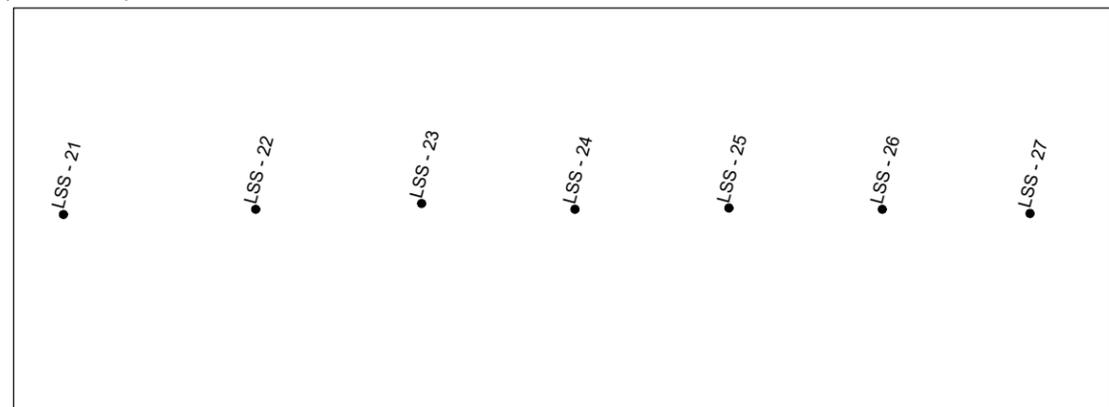


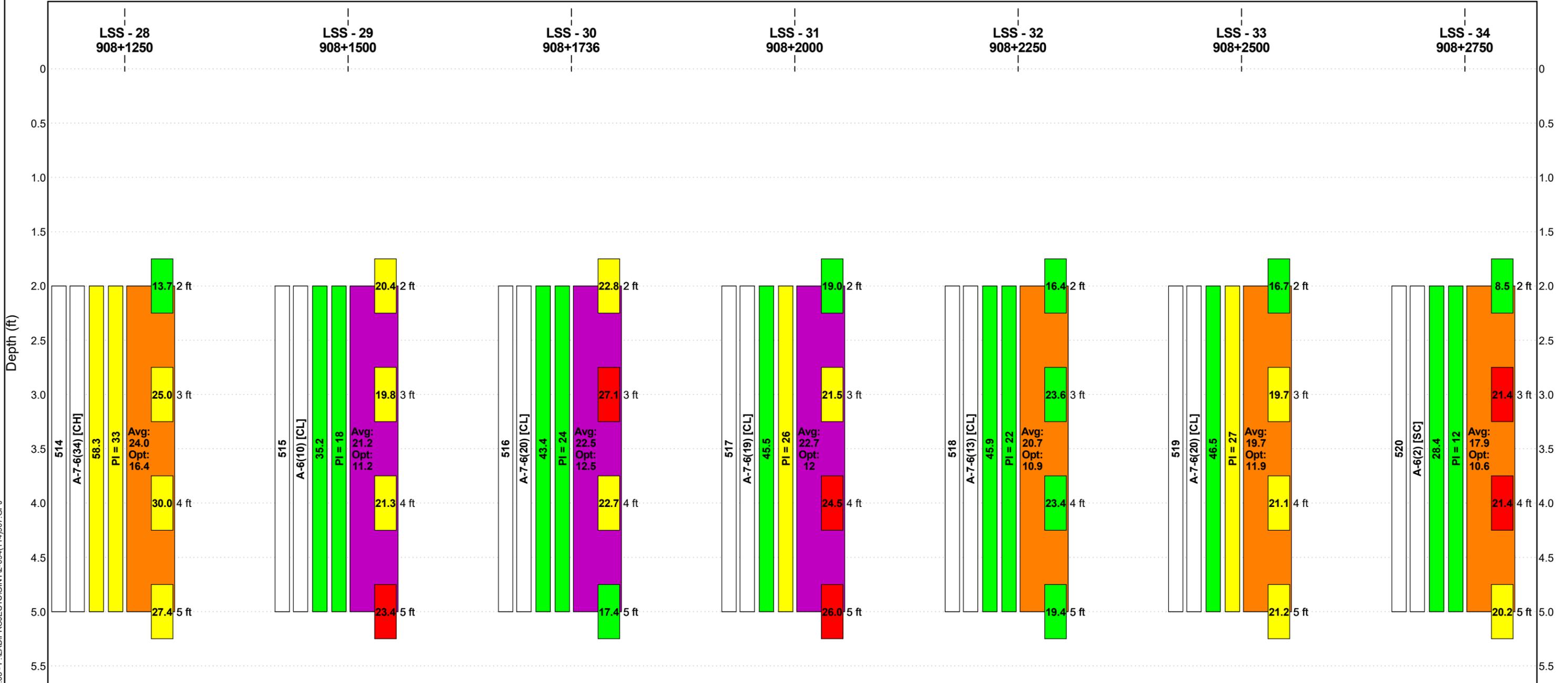
Boreholes Equally Spaced (0 to 500 ft)

**LEGEND**



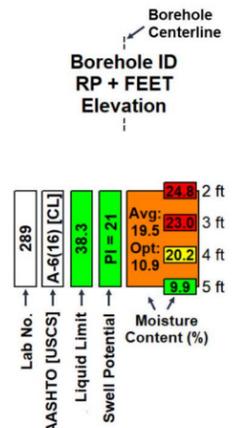
Liquid Limit	LL < 50	50 ≤ LL < 60	LL ≥ 60		
Swell Potential	Low	Marginal	High		
Moisture Content	Below PL	0-5% Over PL	>5% Over PL	Non-Plastic	
Avg. In-Place Moisture Content	MC < Opt	0 ≤ MC < 6% Over Opt	6 ≤ MC < 10% Over Opt	10 ≤ MC < 16% Over Opt	MC > 16% Over Opt



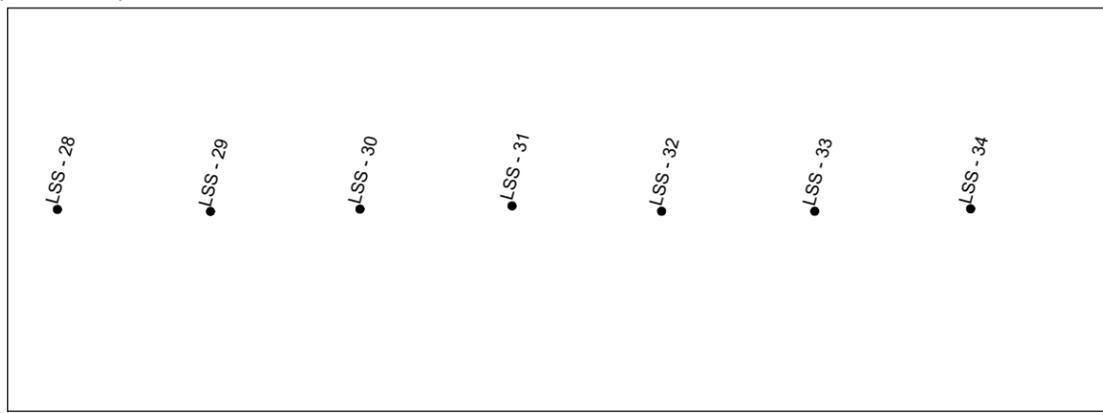


Boreholes Equally Spaced (0 to 500 ft)

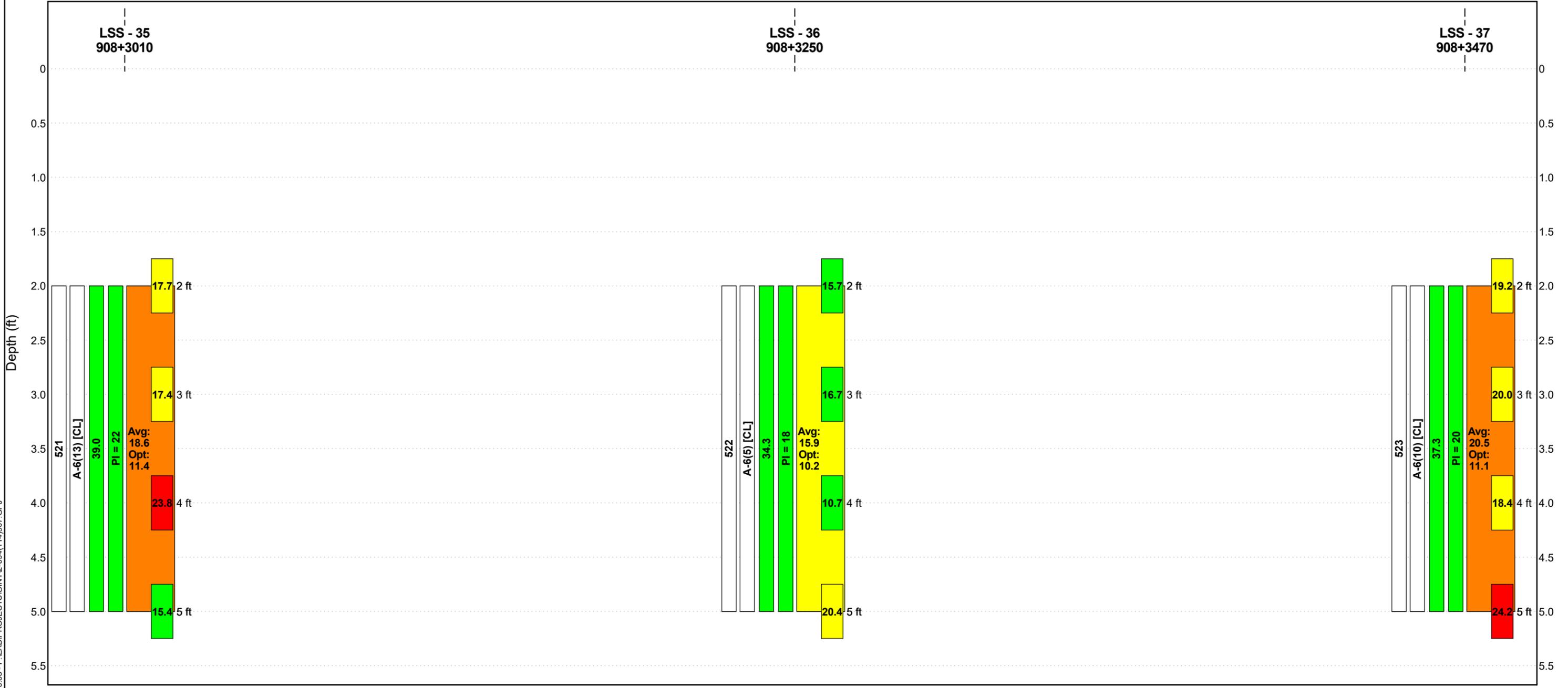
**LEGEND**



<b>Liquid Limit</b>	LL < 50	50 ≤ LL < 60	LL ≥ 60		
<b>Swell Potential</b>	Low	Marginal	High		
<b>Moisture Content</b>	Below PL	0-5% Over PL	>5% Over PL	Non-Plastic	
<b>Avg. In-Place Moisture Content</b>	MC < Opt	0 ≤ MC < 6% Over Opt	6 ≤ MC < 10% Over Opt	10 ≤ MC < 16% Over Opt	MC > 16% Over Opt

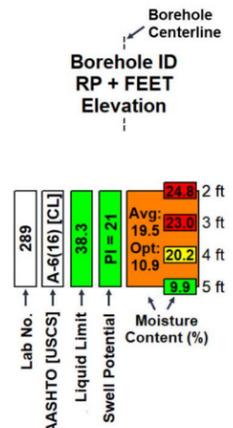


NDDOT\_LINEARCOLORFENCE\_DEPTH - 20171219.GDT - 9/30/19 10:03 - F:\LAB\PROJECTS\GINT2-094(114)907.GPJ

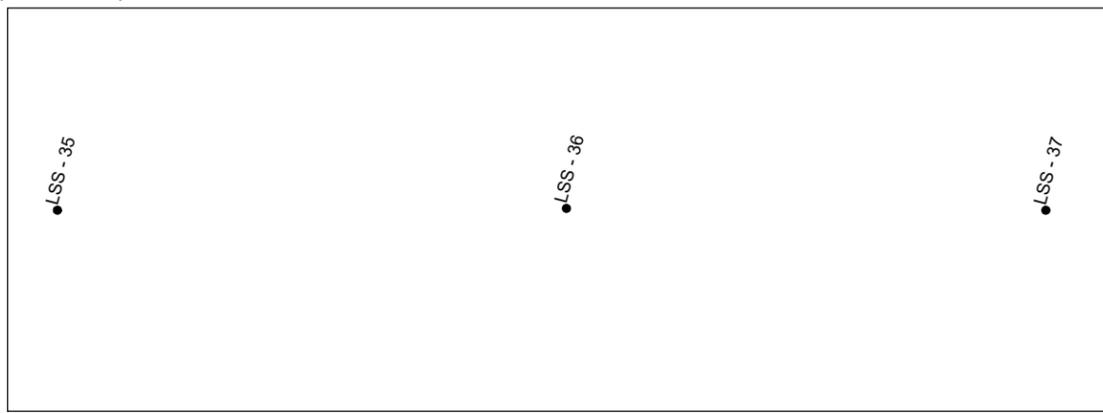


Boreholes Equally Spaced (0 to 140 ft)

**LEGEND**



<b>Liquid Limit</b>	LL < 50	50 ≤ LL < 60	LL ≥ 60		
<b>Swell Potential</b>	Low	Marginal	High		
<b>Moisture Content</b>	Below PL	0-5% Over PL	>5% Over PL	Non-Plastic	
<b>Avg. In-Place Moisture Content</b>	MC < Opt	0 ≤ MC < 6% Over Opt	6 ≤ MC < 10% Over Opt	10 ≤ MC < 16% Over Opt	MC > 16% Over Opt



**APPENDIX E**

**LAB RESULTS**



**SUMMARY OF LABORATORY RESULTS**

PROJECT NUMBER NHU-5-094(114)907

LOCATION Stark County

PCN 21175

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	AASHTO Classification	USCS Classification	Water Content (%)	Avg. Water Content (%)	Dry Density (pcf)	Saturation (%)	Void Ratio
LSS - 1	2.0	25	18	7	25	39	A-4 (0)	SC-SM	12.7	13.3			
LSS - 1	3.0								14.6	13.3			
LSS - 1	4.0								11.9	13.3			
LSS - 1	5.0								14.2	13.3			
LSS - 2	2.0	NP	NP	NP	9.5	29	A-2-4 (0)	SM	8.0	9.0			
LSS - 2	3.0								11.2	9.0			
LSS - 2	4.0								8.3	9.0			
LSS - 2	5.0								8.5	9.0			
LSS - 3	2.0	18	18	NP	9.5	34	A-2-4 (0)	SM	7.4	9.7			
LSS - 3	3.0								10.9	9.7			
LSS - 3	4.0								10.8	9.7			
LSS - 3	5.0	38	22	16	4.75	93	A-6 (16)	CL	7.8	19.0			
LSS - 3	6.0								5.8	19.0			
LSS - 3	7.0								26.5	19.0			
LSS - 3	8.0								23.6	19.0			
LSS - 3	9.0								24.9	19.0			
LSS - 3	10.0								25.3	19.0			
LSS - 4	2.0	21	17	4	9.5	34	A-2-4 (0)	SC-SM	11.5	12.4			
LSS - 4	3.0								6.0	12.4			
LSS - 4	4.0								14.9	12.4			
LSS - 4	5.0								17.3	12.4			
LSS - 4	6.0	35	19	16	9.5	68	A-6 (9)	CL	11.0	19.5			
LSS - 4	7.0								8.8	19.5			
LSS - 4	8.0								26.0	19.5			
LSS - 4	9.0								27.1	19.5			
LSS - 4	10.0								24.4	19.5			
LSS - 5	2.0	NP	NP	NP	25	31	A-2-4 (0)	SM	8.5	8.1			
LSS - 5	3.0								6.0	8.1			
LSS - 5	4.0								9.0	8.1			
LSS - 5	5.0								9.1	8.1			
LSS - 6	2.0	NP	NP	NP	25	29	A-2-4 (0)	SM	8.0	8.2			
LSS - 6	3.0								8.3	8.2			
LSS - 6	4.0								8.3	8.2			
LSS - 6	5.0								8.3	8.2			
LSS - 7	2.0	NP	NP	NP	9.5	28	A-2-4 (0)	SM	7.6	7.9			
LSS - 7	3.0								7.0	7.9			
LSS - 7	4.0								8.6	7.9			
LSS - 7	5.0								8.6	7.9			
LSS - 8	2.0	NP	NP	NP	25	22	A-2-4 (0)	SM	7.9	6.7			
LSS - 8	3.0								7.8	6.7			
LSS - 8	4.0								5.7	6.7			
LSS - 8	5.0								5.4	6.7			
LSS - 9	2.0	NP	NP	NP	9.5	33	A-2-4 (0)	SM	23.6	10.7			

LAB SUMMARY - 20171219.GDT - 9/30/19 09:55 - F:\LAB\PROJECTS\GINT\2-094(114)907.GPJ



**SUMMARY OF LABORATORY RESULTS**

PROJECT NUMBER NHU-5-094(114)907

LOCATION Stark County

PCN 21175

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	AASHTO Classification	USCS Classification	Water Content (%)	Avg. Water Content (%)	Dry Density (pcf)	Saturation (%)	Void Ratio
LSS - 9	3.0								5.2	10.7			
LSS - 9	4.0								8.1	10.7			
LSS - 9	5.0								6.0	10.7			
LSS - 10	2.0	37	15	22	25	52	A-6 (8)	CL	4.0	10.8			
LSS - 10	3.0								6.2	10.8			
LSS - 10	4.0								12.9	10.8			
LSS - 10	5.0								20.0	10.8			
LSS - 11	2.0	NP	NP	NP	9.5	37	A-4 (0)	SM	8.8	11.0			
LSS - 11	3.0								12.1	11.0			
LSS - 11	4.0								12.0	11.0			
LSS - 11	5.0								11.2	11.0			
LSS - 12	2.0	NP	NP	NP	25	26	A-2-4 (0)	SM	7.9	7.7			
LSS - 12	3.0								7.8	7.7			
LSS - 12	4.0								6.7	7.7			
LSS - 12	5.0								8.5	7.7			
LSS - 13	2.0	39	18	21	9.5	78	A-6 (15)	CL	15.1	22.3			
LSS - 13	3.0								20.1	22.3			
LSS - 13	4.0								25.4	22.3			
LSS - 13	5.0								28.4	22.3			
LSS - 14	2.0	43	20	23	25	63	A-7-6 (12)	CL	6.6	20.3			
LSS - 14	3.0								19.3	20.3			
LSS - 14	4.0								28.4	20.3			
LSS - 14	5.0								26.7	20.3			
LSS - 15	2.0	26	17	9	25	36	A-4 (0)	SC	10.7	11.4			
LSS - 15	3.0								10.2	11.4			
LSS - 15	4.0								12.7	11.4			
LSS - 15	5.0								12.0	11.4			
LSS - 16	2.0	24	16	8	9.5	32	A-2-4 (0)	SC	9.3	9.4			
LSS - 16	3.0								10.2	9.4			
LSS - 16	4.0								9.1	9.4			
LSS - 16	5.0								9.2	9.4			
LSS - 17	2.0	28	16	12	9.5	44	A-6 (2)	SC	11.9	15.0			
LSS - 17	3.0								14.4	15.0			
LSS - 17	4.0								18.0	15.0			
LSS - 17	5.0								15.7	15.0			
LSS - 18	2.0	25	17	8	25	33	A-2-4 (0)	SC	12.8	14.0			
LSS - 18	3.0								14.3	14.0			
LSS - 18	4.0								14.0	14.0			
LSS - 18	5.0								15.1	14.0			
LSS - 19	2.0	27	15	12	9.5	45	A-6 (2)	SC	13.5	15.2			
LSS - 19	3.0								13.4	15.2			
LSS - 19	4.0								15.5	15.2			
LSS - 19	5.0								18.5	15.2			

LAB SUMMARY - 20171219.GDT - 9/30/19 09:55 - F:\LAB\PROJECTS\GINT\2-094(114)907.GPJ



**SUMMARY OF LABORATORY RESULTS**

PROJECT NUMBER NHU-5-094(114)907

LOCATION Stark County

PCN 21175

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	AASHTO Classification	USCS Classification	Water Content (%)	Avg. Water Content (%)	Dry Density (pcf)	Saturation (%)	Void Ratio
LSS - 20	2.0	38	18	20	9.5	71	A-6 (12)	CL	11.6	19.6			
LSS - 20	3.0								21.3	19.6			
LSS - 20	4.0								18.5	19.6			
LSS - 20	5.0								26.8	19.6			
LSS - 21	2.0	31	16	15	9.5	54	A-6 (5)	CL	21.2	21.6			
LSS - 21	3.0								22.6	21.6			
LSS - 21	4.0								21.7	21.6			
LSS - 21	5.0								21.5	21.6			
LSS - 21	6.0								21.1	21.6			
LSS - 21	7.0	49	20	29	9.5	76	A-7-6 (22)	CL	21.8	25.2			
LSS - 21	8.0								26.8	25.2			
LSS - 21	9.0								25.0	25.2			
LSS - 21	10.0								27.2	25.2			
LSS - 22	2.0	37	17	20	4.75	65	A-6 (11)	CL	18.1	19.9			
LSS - 22	3.0								18.9	19.9			
LSS - 22	4.0								24.2	19.9			
LSS - 22	5.0								19.5	19.9			
LSS - 22	6.0								18.9	19.9			
LSS - 22	7.0	42	19	23	4.75	87	A-7-6 (20)	CL	27.9	31.9			
LSS - 22	8.0								33.7	31.9			
LSS - 22	9.0								33.6	31.9			
LSS - 22	10.0								32.3	31.9			
LSS - 23	2.0	35	18	17	4.75	69	A-6 (10)	CL	20.3	22.4			
LSS - 23	3.0								23.0	22.4			
LSS - 23	4.0								26.3	22.4			
LSS - 23	5.0								19.7	22.4			
LSS - 24	2.0	39	19	20	9.5	73	A-6 (13)	CL	22.7	21.6			
LSS - 24	3.0								19.4	21.6			
LSS - 24	4.0								21.3	21.6			
LSS - 24	5.0								23.1	21.6			
LSS - 25	2.0	42	20	22	9.5	76	A-7-6 (16)	CL	18.3	18.8			
LSS - 25	3.0								23.4	18.8			
LSS - 25	4.0								21.4	18.8			
LSS - 25	5.0								12.2	18.8			
LSS - 26	2.0	30	16	14	9.5	53	A-6 (4)	CL	20.2	16.8			
LSS - 26	3.0								16.2	16.8			
LSS - 26	4.0								12.3	16.8			
LSS - 26	5.0								18.5	16.8			
LSS - 27	2.0	56	23	33	9.5	90	A-7-6 (33)	CH	8.5	20.7			
LSS - 27	3.0								24.3	20.7			
LSS - 27	4.0								24.5	20.7			
LSS - 27	5.0								25.6	20.7			
LSS - 28	2.0	58	25	33	9.5	91	A-7-6 (34)	CH	13.7	24.0			

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PROJECT NUMBER NHU-5-094(114)907

LOCATION Stark County

PCN 21175

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	AASHTO Classification	USCS Classification	Water Content (%)	Avg. Water Content (%)	Dry Density (pcf)	Saturation (%)	Void Ratio
LSS - 28	3.0								25.0	24.0			
LSS - 28	4.0								30.0	24.0			
LSS - 28	5.0								27.4	24.0			
LSS - 29	2.0	35	18	17	9.5	69	A-6 (10)	CL	20.4	21.2			
LSS - 29	3.0								19.8	21.2			
LSS - 29	4.0								21.3	21.2			
LSS - 29	5.0								23.4	21.2			
LSS - 30	2.0	43	20	23	9.5	86	A-7-6 (20)	CL	22.8	22.5			
LSS - 30	3.0								27.1	22.5			
LSS - 30	4.0								22.7	22.5			
LSS - 30	5.0								17.4	22.5			
LSS - 31	2.0	46	19	27	9.5	74	A-7-6 (19)	CL	19.0	22.7			
LSS - 31	3.0								21.5	22.7			
LSS - 31	4.0								24.5	22.7			
LSS - 31	5.0								26.0	22.7			
LSS - 32	2.0	46	24	22	9.5	66	A-7-6 (13)	CL	16.4	20.7			
LSS - 32	3.0								23.6	20.7			
LSS - 32	4.0								23.4	20.7			
LSS - 32	5.0								19.4	20.7			
LSS - 33	2.0	46	19	27	9.5	76	A-7-6 (20)	CL	16.7	19.7			
LSS - 33	3.0								19.7	19.7			
LSS - 33	4.0								21.1	19.7			
LSS - 33	5.0								21.2	19.7			
LSS - 34	2.0	28	16	12	25	42	A-6 (2)	SC	8.5	17.9			
LSS - 34	3.0								21.4	17.9			
LSS - 34	4.0								21.4	17.9			
LSS - 34	5.0								20.2	17.9			
LSS - 35	2.0	39	17	22	9.5	70	A-6 (13)	CL	17.7	18.6			
LSS - 35	3.0								17.4	18.6			
LSS - 35	4.0								23.8	18.6			
LSS - 35	5.0								15.4	18.6			
LSS - 36	2.0	34	17	17	9.5	51	A-6 (5)	CL	15.7	15.9			
LSS - 36	3.0								16.7	15.9			
LSS - 36	4.0								10.7	15.9			
LSS - 36	5.0								20.4	15.9			
LSS - 37	2.0	37	17	20	9.5	62	A-6 (10)	CL	19.2	20.5			
LSS - 37	3.0								20.0	20.5			
LSS - 37	4.0								18.4	20.5			
LSS - 37	5.0								24.2	20.5			
LSS - 38	2.0	46	20	26	9.5	89	A-7-6 (24)	CL	6.6	11.8			
LSS - 38	3.0								12.0	11.8			
LSS - 38	4.0								13.5	11.8			
LSS - 38	5.0								15.1	11.8			



# SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER NHU-5-094(114)907

LOCATION Stark County

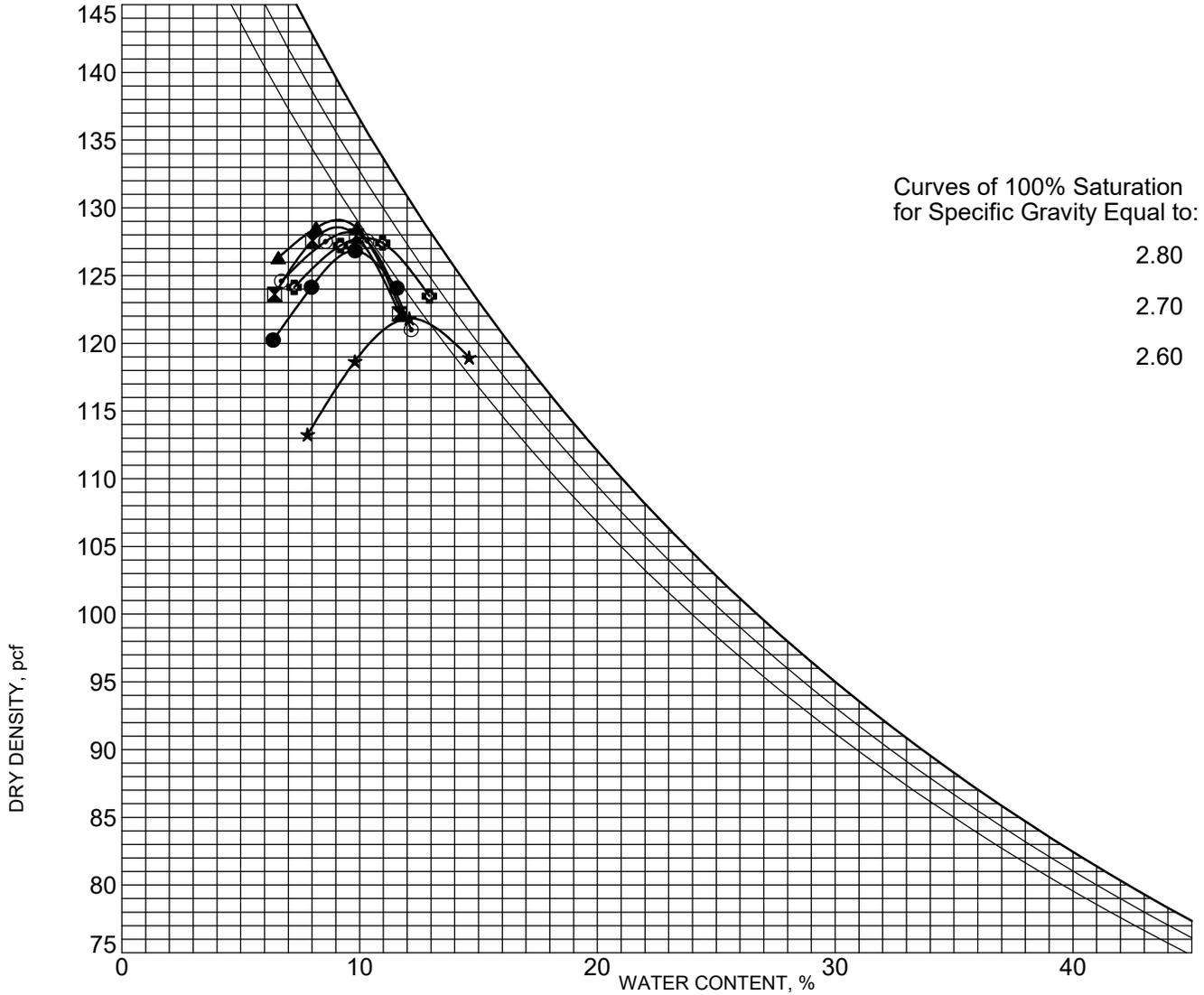
PCN 21175

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	AASHTO Classification	USCS Classification	Water Content (%)	Avg. Water Content (%)	Dry Density (pcf)	Saturation (%)	Void Ratio
LSS - 38	6.0	73	22	51	4.75	99	A-7-6 (58)	CH	15.4	23.4			
LSS - 38	7.0								22.8	23.4			
LSS - 38	8.0								26.5	23.4			
LSS - 38	9.0								26.5	23.4			
LSS - 38	10.0								25.8	23.4			

PROJECT NUMBER NHU-5-094(114)907

LOCATION Stark County

PCN 21175



BOREHOLE	DEPTH	AASHTO Classification	USCS Description
● LSS - 1	2.0	A-4 (0)	SILTY, CLAYEY SAND(SC-SM)
☒ LSS - 2	2.0	A-2-4 (0)	SILTY SAND(SM)
▲ LSS - 3	2.0	A-2-4 (0)	SILTY SAND(SM)
★ LSS - 3	5.0	A-6 (16)	LEAN CLAY(CL)
⊙ LSS - 4	2.0	A-2-4 (0)	SILTY, CLAYEY SAND(SC-SM)
⊕ LSS - 4	6.0	A-6 (9)	SANDY LEAN CLAY(CL)

BOREHOLE	DEPTH	Test Method	LL	PL	PI	Max DD	Optimum WC
● LSS - 1	2.0	AASHTO T-180 Method A	25	18	7	126.8 PCF	9.8 %
☒ LSS - 2	2.0	AASHTO T-180 Method A	NP	NP	NP	128.6 PCF	9.1 %
▲ LSS - 3	2.0	AASHTO T-180 Method A	18	18	NP	129.1 PCF	9.1 %
★ LSS - 3	5.0	AASHTO T-180 Method A	38	22	16	121.8 PCF	12.1 %
⊙ LSS - 4	2.0	AASHTO T-180 Method A	21	17	4	128.2 PCF	9.6 %
⊕ LSS - 4	6.0	AASHTO T-180 Method A	35	19	16	127.8 PCF	10.2 %

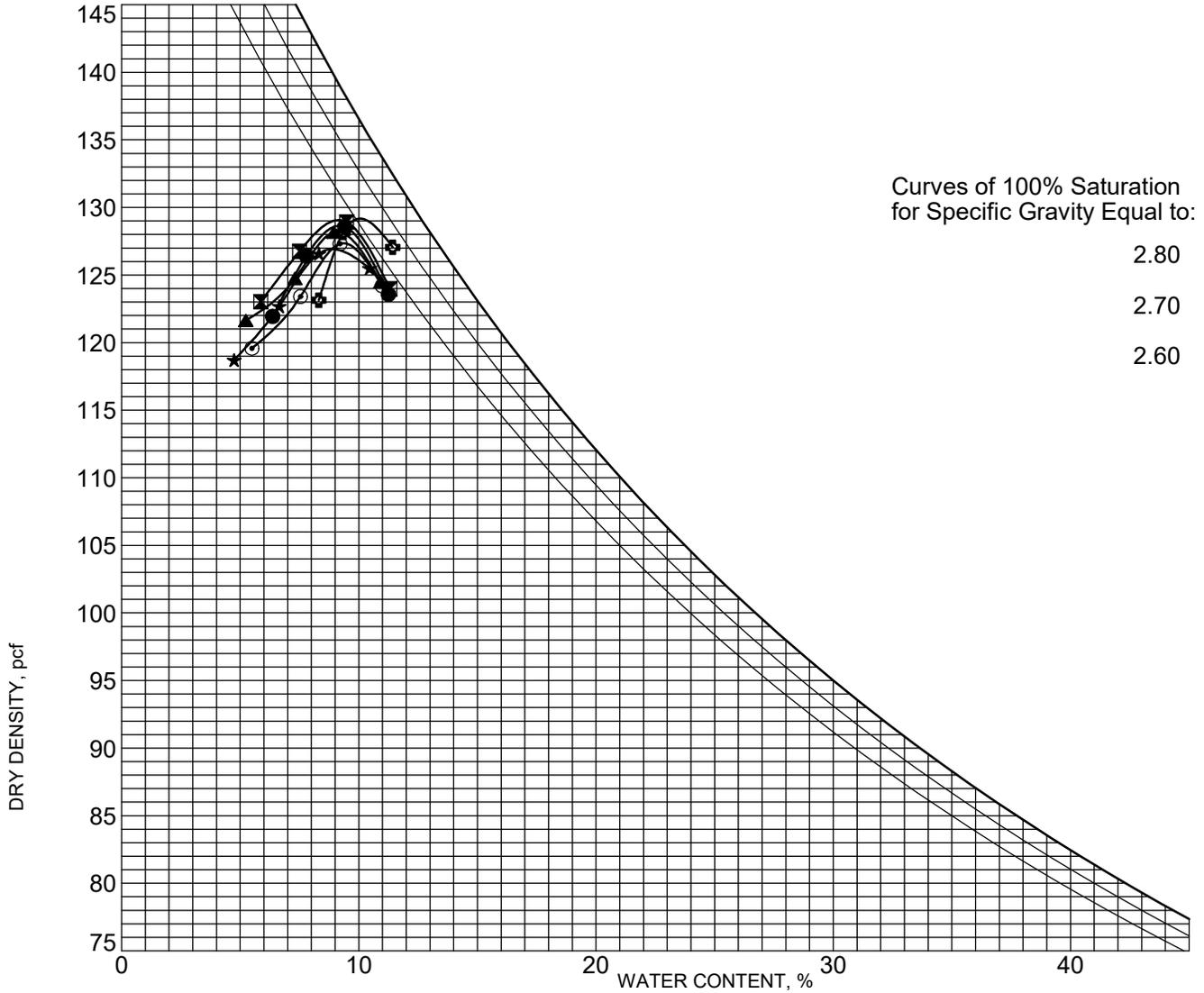


# MOISTURE-DENSITY RELATIONSHIP

PROJECT NUMBER NHU-5-094(114)907

LOCATION Stark County

PCN 21175



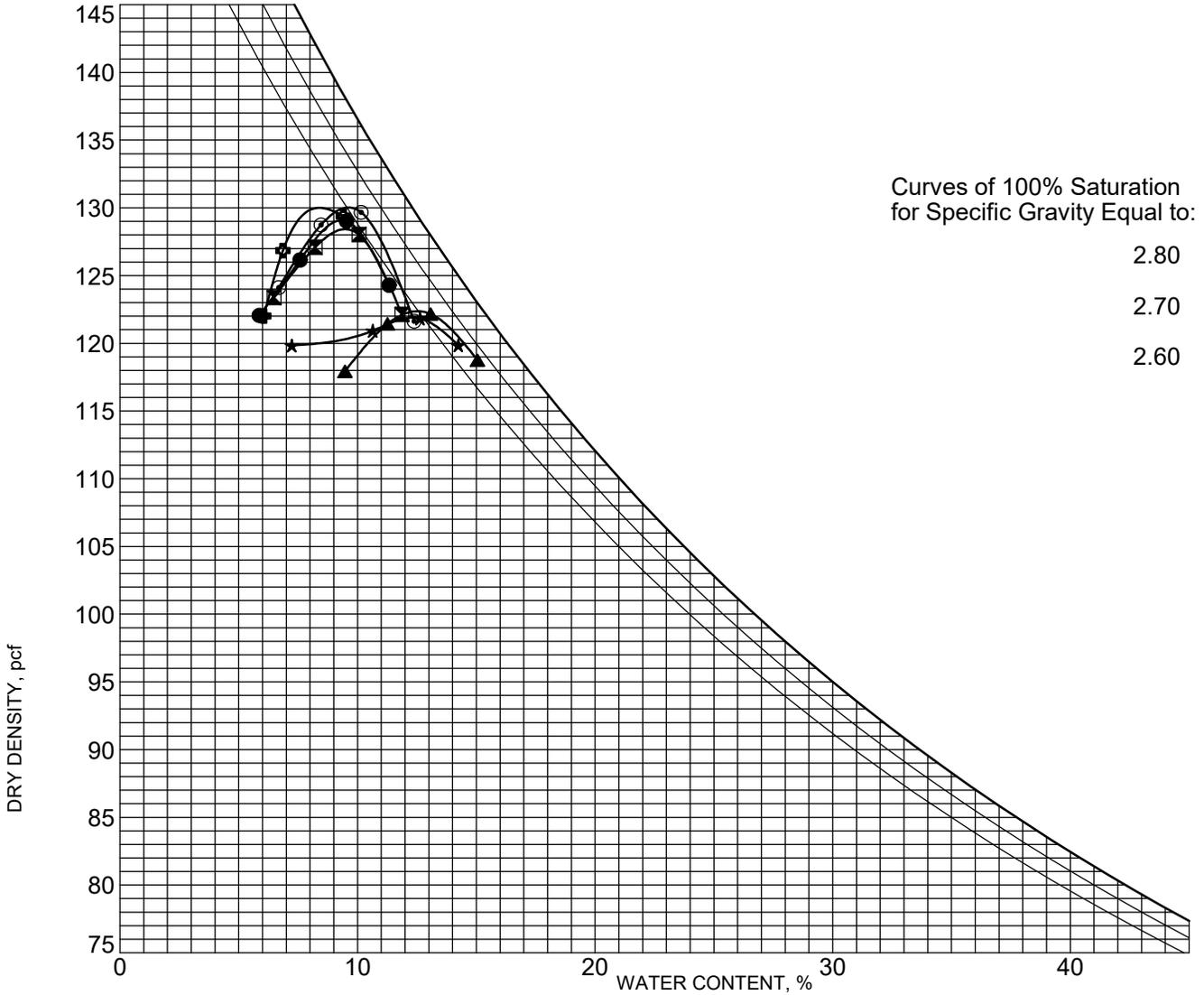
BOREHOLE	DEPTH	AASHTO Classification	USCS Description
● LSS - 5	2.0	A-2-4 (0)	SILTY SAND(SM)
☒ LSS - 6	2.0	A-2-4 (0)	SILTY SAND(SM)
▲ LSS - 7	2.0	A-2-4 (0)	SILTY SAND(SM)
★ LSS - 8	2.0	A-2-4 (0)	SILTY SAND(SM)
⊙ LSS - 9	2.0	A-2-4 (0)	SILTY SAND(SM)
⊕ LSS - 10	2.0	A-6 (8)	SANDY LEAN CLAY(CL)

BOREHOLE	DEPTH	Test Method	LL	PL	PI	Max DD	Optimum WC
● LSS - 5	2.0	AASHTO T-180 Method A	NP	NP	NP	128.6 PCF	9.2 %
☒ LSS - 6	2.0	AASHTO T-180 Method A	NP	NP	NP	129.1 PCF	9.2 %
▲ LSS - 7	2.0	AASHTO T-180 Method A	NP	NP	NP	128.2 PCF	9.1 %
★ LSS - 8	2.0	AASHTO T-180 Method A	NP	NP	NP	126.9 PCF	8.9 %
⊙ LSS - 9	2.0	AASHTO T-180 Method A	NP	NP	NP	127.3 PCF	9.4 %
⊕ LSS - 10	2.0	AASHTO T-180 Method A	37	15	22	129.2 PCF	10.1 %

PROJECT NUMBER NHU-5-094(114)907

LOCATION Stark County

PCN 21175



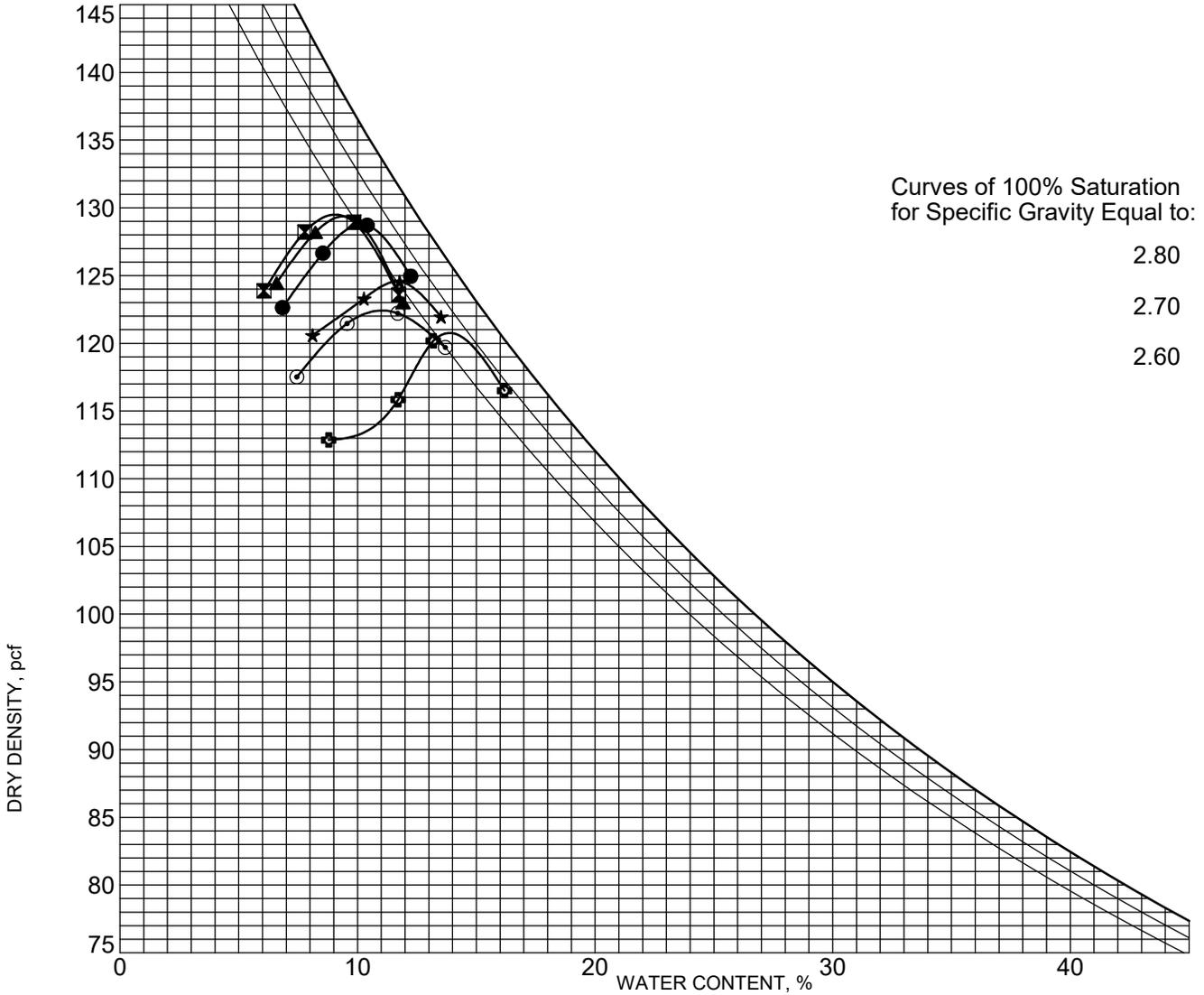
BOREHOLE	DEPTH	AASHTO Classification	USCS Description
● LSS - 11	2.0	A-4 (0)	SILTY SAND(SM)
☒ LSS - 12	2.0	A-2-4 (0)	SILTY SAND(SM)
▲ LSS - 13	2.0	A-6 (15)	LEAN CLAY with SAND(CL)
★ LSS - 14	2.0	A-7-6 (12)	SANDY LEAN CLAY(CL)
⊙ LSS - 15	2.0	A-4 (0)	CLAYEY SAND(SC)
⊕ LSS - 16	2.0	A-2-4 (0)	CLAYEY SAND(SC)

BOREHOLE	DEPTH	Test Method	LL	PL	PI	Max DD	Optimum WC
● LSS - 11	2.0	AASHTO T-180 Method A	NP	NP	NP	129.1 PCF	9.3 %
☒ LSS - 12	2.0	AASHTO T-180 Method A	NP	NP	NP	128.4 PCF	9.5 %
▲ LSS - 13	2.0	AASHTO T-180 Method A	39	18	21	122.4 PCF	12.5 %
★ LSS - 14	2.0	AASHTO T-180 Method A	43	20	23	121.9 PCF	12.3 %
⊙ LSS - 15	2.0	AASHTO T-180 Method A	26	17	9	130.0 PCF	9.6 %
⊕ LSS - 16	2.0	AASHTO T-180 Method A	24	16	8	130.0 PCF	8.3 %

PROJECT NUMBER NHU-5-094(114)907

LOCATION Stark County

PCN 21175



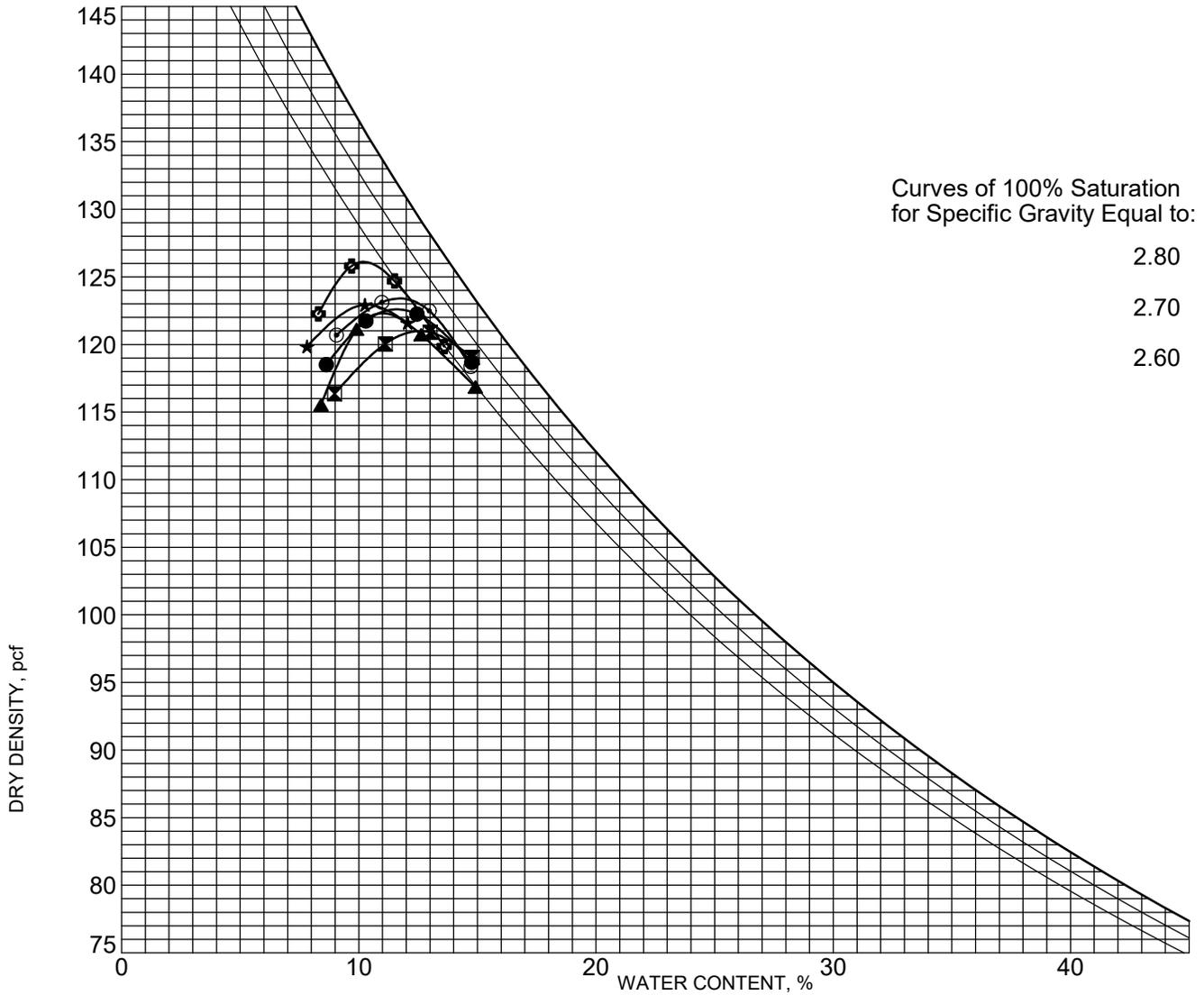
BOREHOLE	DEPTH	AASHTO Classification	USCS Description
● LSS - 17	2.0	A-6 (2)	CLAYEY SAND(SC)
▣ LSS - 18	2.0	A-2-4 (0)	CLAYEY SAND(SC)
▲ LSS - 19	2.0	A-6 (2)	CLAYEY SAND(SC)
★ LSS - 20	2.0	A-6 (12)	LEAN CLAY with SAND(CL)
⊙ LSS - 21	2.0	A-6 (5)	SANDY LEAN CLAY(CL)
⊕ LSS - 21	7.0	A-7-6 (22)	LEAN CLAY with SAND(CL)

BOREHOLE	DEPTH	Test Method	LL	PL	PI	Max DD	Optimum WC
● LSS - 17	2.0	AASHTO T-180 Method A	28	16	12	128.8 PCF	10.2 %
▣ LSS - 18	2.0	AASHTO T-180 Method A	25	17	8	129.5 PCF	9.1 %
▲ LSS - 19	2.0	AASHTO T-180 Method A	27	15	12	129.4 PCF	9.4 %
★ LSS - 20	2.0	AASHTO T-180 Method A	38	18	20	124.6 PCF	11.7 %
⊙ LSS - 21	2.0	AASHTO T-180 Method A	31	16	15	122.4 PCF	11.0 %
⊕ LSS - 21	7.0	AASHTO T-180 Method A	49	20	29	120.8 PCF	13.8 %

PROJECT NUMBER NHU-5-094(114)907

LOCATION Stark County

PCN 21175



COMPACTION (MULTIPLE CURVES) - 20171219.GDT - 9/30/19 09:56 - F:\LAB\PROJECTS\GINT2-094(114)907.GPJ

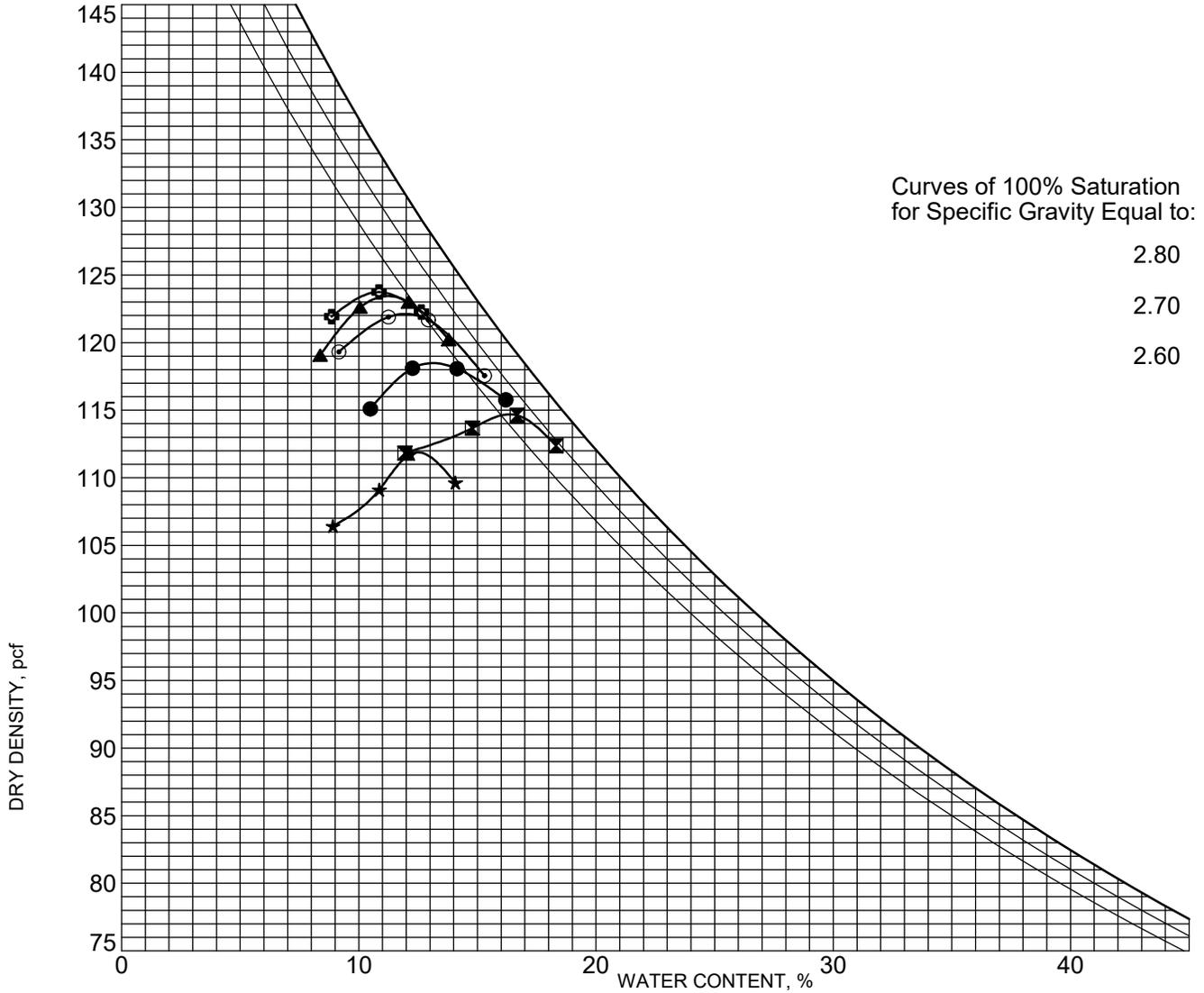
BOREHOLE	DEPTH	AASHTO Classification	USCS Description
● LSS - 22	2.0	A-6 (11)	SANDY LEAN CLAY(CL)
☒ LSS - 22	7.0	A-7-6 (20)	LEAN CLAY(CL)
▲ LSS - 23	2.0	A-6 (10)	SANDY LEAN CLAY(CL)
★ LSS - 24	2.0	A-6 (13)	LEAN CLAY with SAND(CL)
⊙ LSS - 25	2.0	A-7-6 (16)	LEAN CLAY with SAND(CL)
⊕ LSS - 26	2.0	A-6 (4)	SANDY LEAN CLAY(CL)

BOREHOLE	DEPTH	Test Method	LL	PL	PI	Max DD	Optimum WC
● LSS - 22	2.0	AASHTO T-180 Method A	37	17	20	122.6 PCF	11.5 %
☒ LSS - 22	7.0	AASHTO T-180 Method A	42	19	23	121.0 PCF	12.6 %
▲ LSS - 23	2.0	AASHTO T-180 Method A	35	18	17	122.3 PCF	11.1 %
★ LSS - 24	2.0	AASHTO T-180 Method A	39	19	20	122.9 PCF	10.4 %
⊙ LSS - 25	2.0	AASHTO T-180 Method A	42	20	22	123.4 PCF	11.7 %
⊕ LSS - 26	2.0	AASHTO T-180 Method A	30	16	14	126.1 PCF	10.2 %

PROJECT NUMBER NHU-5-094(114)907

LOCATION Stark County

PCN 21175



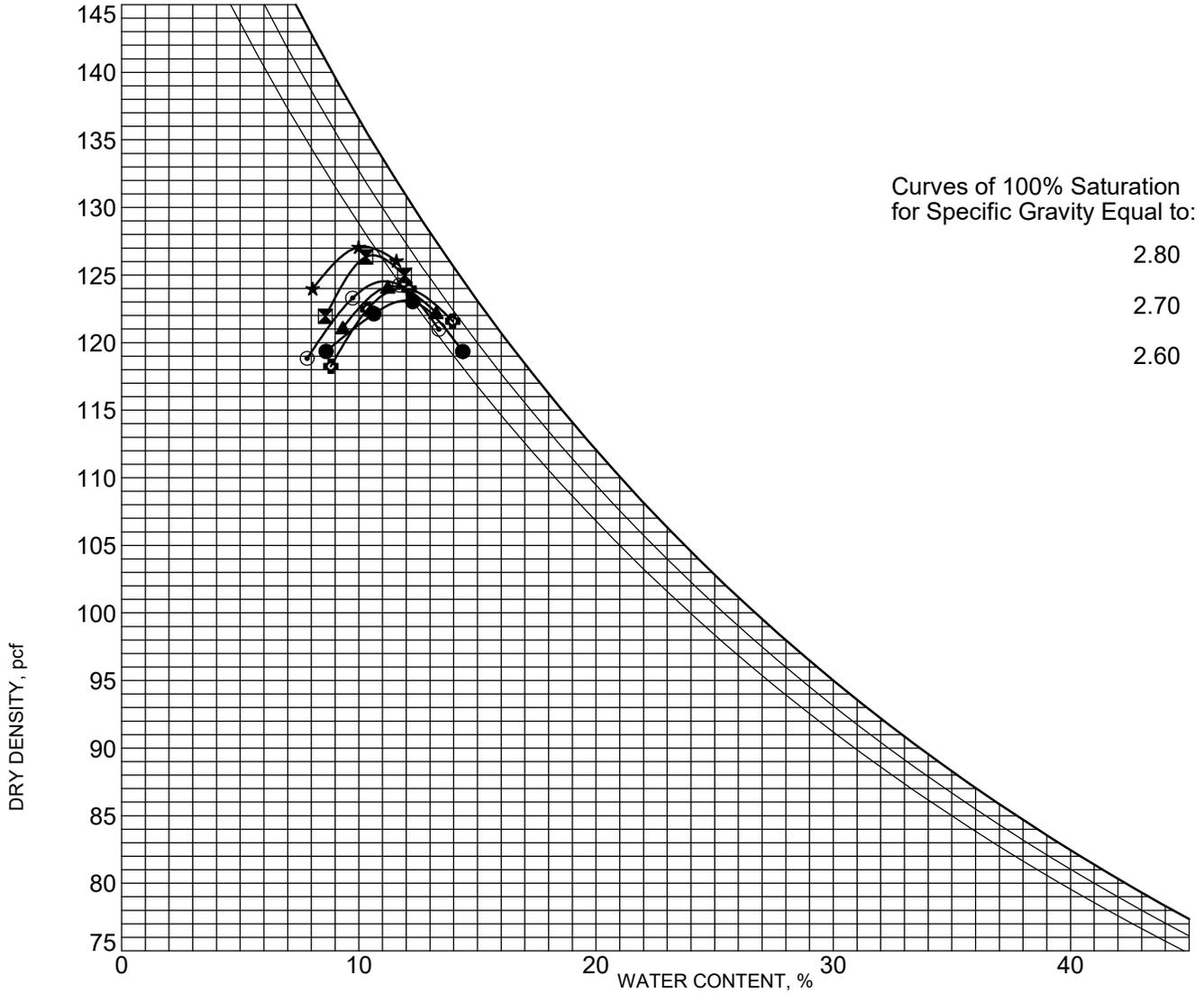
BOREHOLE	DEPTH	AASHTO Classification	USCS Description
● LSS - 27	2.0	A-7-6 (33)	FAT CLAY(CH)
⊠ LSS - 28	2.0	A-7-6 (34)	FAT CLAY(CH)
▲ LSS - 29	2.0	A-6 (10)	SANDY LEAN CLAY(CL)
★ LSS - 30	2.0	A-7-6 (20)	LEAN CLAY(CL)
⊙ LSS - 31	2.0	A-7-6 (19)	LEAN CLAY with SAND(CL)
⊕ LSS - 32	2.0	A-7-6 (13)	SANDY LEAN CLAY(CL)

BOREHOLE	DEPTH	Test Method	LL	PL	PI	Max DD	Optimum WC
● LSS - 27	2.0	AASHTO T-180 Method A	56	23	33	118.5 PCF	13.2 %
⊠ LSS - 28	2.0	AASHTO T-180 Method A	58	25	33	114.7 PCF	16.4 %
▲ LSS - 29	2.0	AASHTO T-180 Method A	35	18	17	123.4 PCF	11.2 %
★ LSS - 30	2.0	AASHTO T-180 Method A	43	20	23	111.9 PCF	12.5 %
⊙ LSS - 31	2.0	AASHTO T-180 Method A	46	19	27	122.1 PCF	12.0 %
⊕ LSS - 32	2.0	AASHTO T-180 Method A	46	24	22	123.7 PCF	10.9 %

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BOREHOLE	DEPTH	AASHTO Classification	USCS Description
● LSS - 33	2.0	A-7-6 (20)	LEAN CLAY with SAND(CL)
☒ LSS - 34	2.0	A-6 (2)	CLAYEY SAND(SC)
▲ LSS - 35	2.0	A-6 (13)	LEAN CLAY with SAND(CL)
★ LSS - 36	2.0	A-6 (5)	SANDY LEAN CLAY(CL)
⊙ LSS - 37	2.0	A-6 (10)	SANDY LEAN CLAY(CL)
⊕ LSS - 38	2.0	A-7-6 (24)	LEAN CLAY(CL)

BOREHOLE	DEPTH	Test Method	LL	PL	PI	Max DD	Optimum WC
● LSS - 33	2.0	AASHTO T-180 Method A	46	19	27	123.1 PCF	11.9 %
☒ LSS - 34	2.0	AASHTO T-180 Method A	28	16	12	126.5 PCF	10.6 %
▲ LSS - 35	2.0	AASHTO T-180 Method A	39	17	22	124.2 PCF	11.4 %
★ LSS - 36	2.0	AASHTO T-180 Method A	34	17	17	127.1 PCF	10.2 %
⊙ LSS - 37	2.0	AASHTO T-180 Method A	37	17	20	124.5 PCF	11.1 %
⊕ LSS - 38	2.0	AASHTO T-180 Method A	46	20	26	124.0 PCF	11.8 %



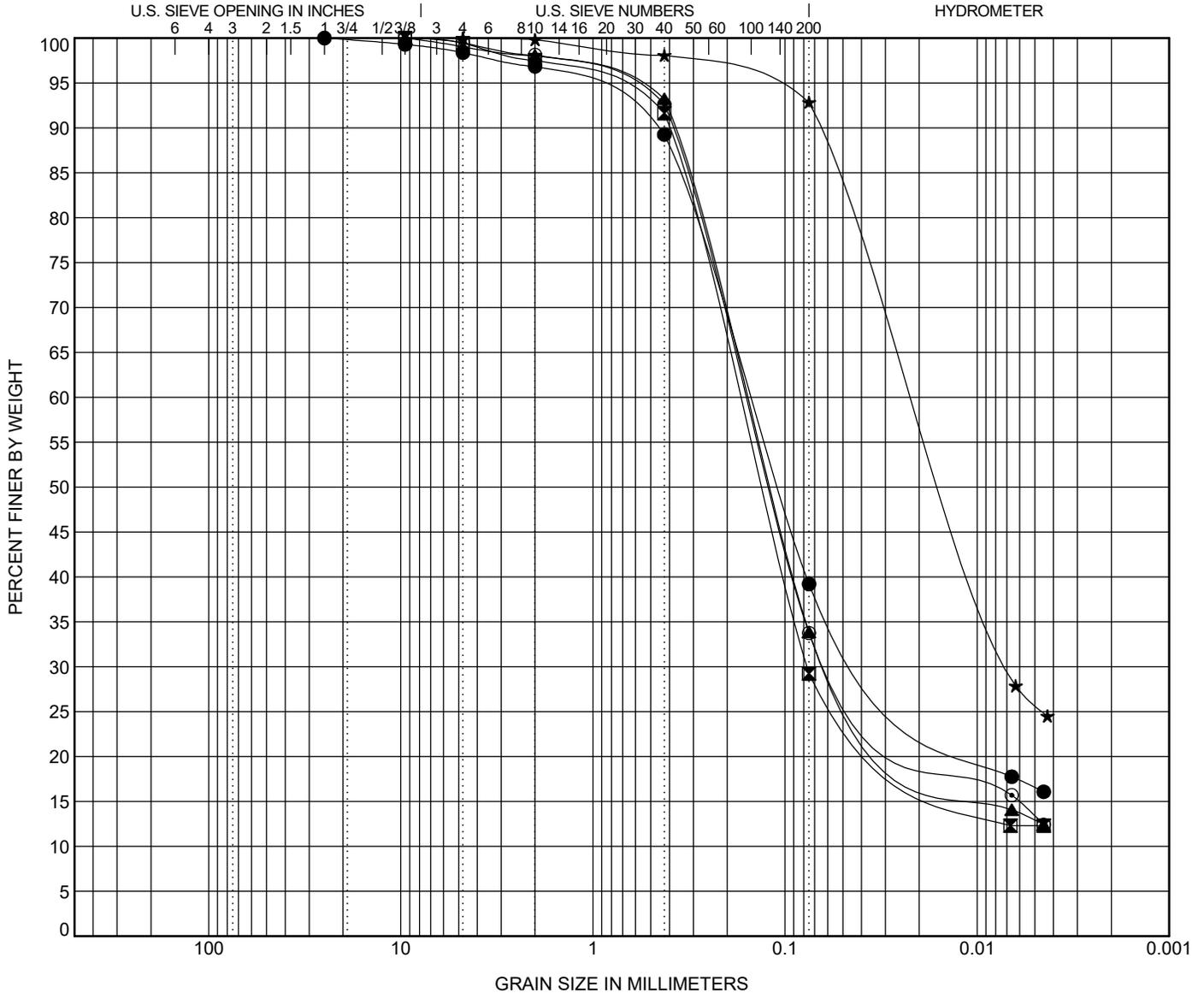


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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	AASHTO Classification	USCS Classification			LL	PL	PI	Cc	Cu
● LSS - 1	2.0	A-4 (0)	SC-SM			25	18	7		
☒ LSS - 2	2.0	A-2-4 (0)	SM			NP	NP	NP		
▲ LSS - 3	2.0	A-2-4 (0)	SM			18	18	NP		
★ LSS - 3	5.0	A-6 (16)	CL			38	22	16		
◎ LSS - 4	2.0	A-2-4 (0)	SC-SM			21	17	4		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● LSS - 1	2.0	25	0.154	0.026		1.6	59.2	22.7	16.5
☒ LSS - 2	2.0	9.5	0.176	0.077		0.6	70.2	17.0	12.3
▲ LSS - 3	2.0	9.5	0.161	0.047		1.0	65.1	21.0	12.9
★ LSS - 3	5.0	4.75	0.021	0.007		0.0	7.1	67.0	25.8
◎ LSS - 4	2.0	9.5	0.162	0.045		0.5	65.7	20.4	13.3

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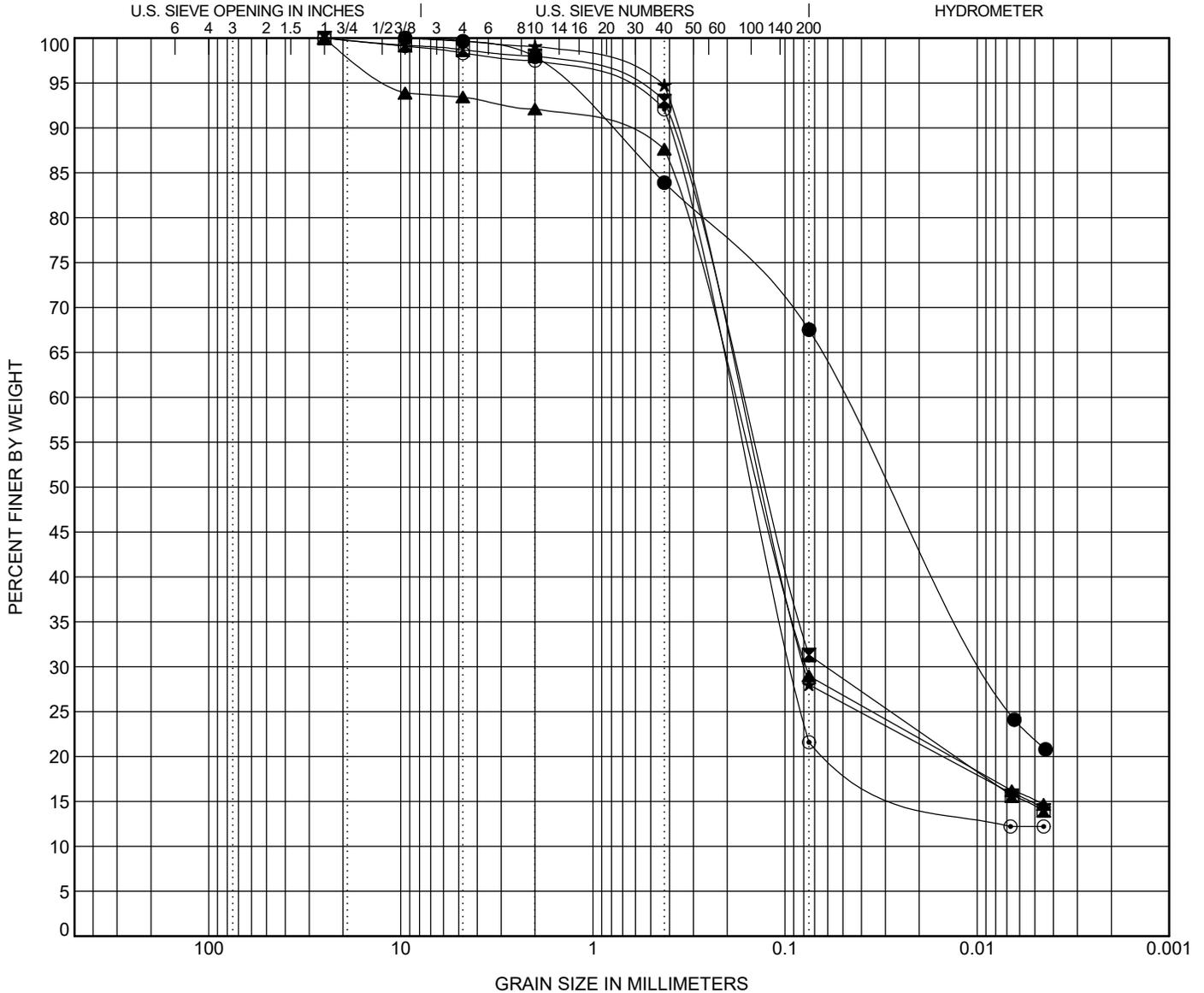
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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
● LSS - 4	6.0	A-6 (9)	CL	35	19	16		
☒ LSS - 5	2.0	A-2-4 (0)	SM	NP	NP	NP		
▲ LSS - 6	2.0	A-2-4 (0)	SM	NP	NP	NP		
★ LSS - 7	2.0	A-2-4 (0)	SM	NP	NP	NP		
⊙ LSS - 8	2.0	A-2-4 (0)	SM	NP	NP	NP		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● LSS - 4	6.0	9.5	0.049	0.009		0.4	32.1	45.6	21.9
☒ LSS - 5	2.0	25	0.168	0.061		1.3	67.4	16.8	14.4
▲ LSS - 6	2.0	25	0.188	0.077		6.6	64.5	13.9	15.1
★ LSS - 7	2.0	9.5	0.172	0.079		0.3	71.7	13.3	14.7
⊙ LSS - 8	2.0	25	0.193	0.092		1.7	76.7	9.4	12.2

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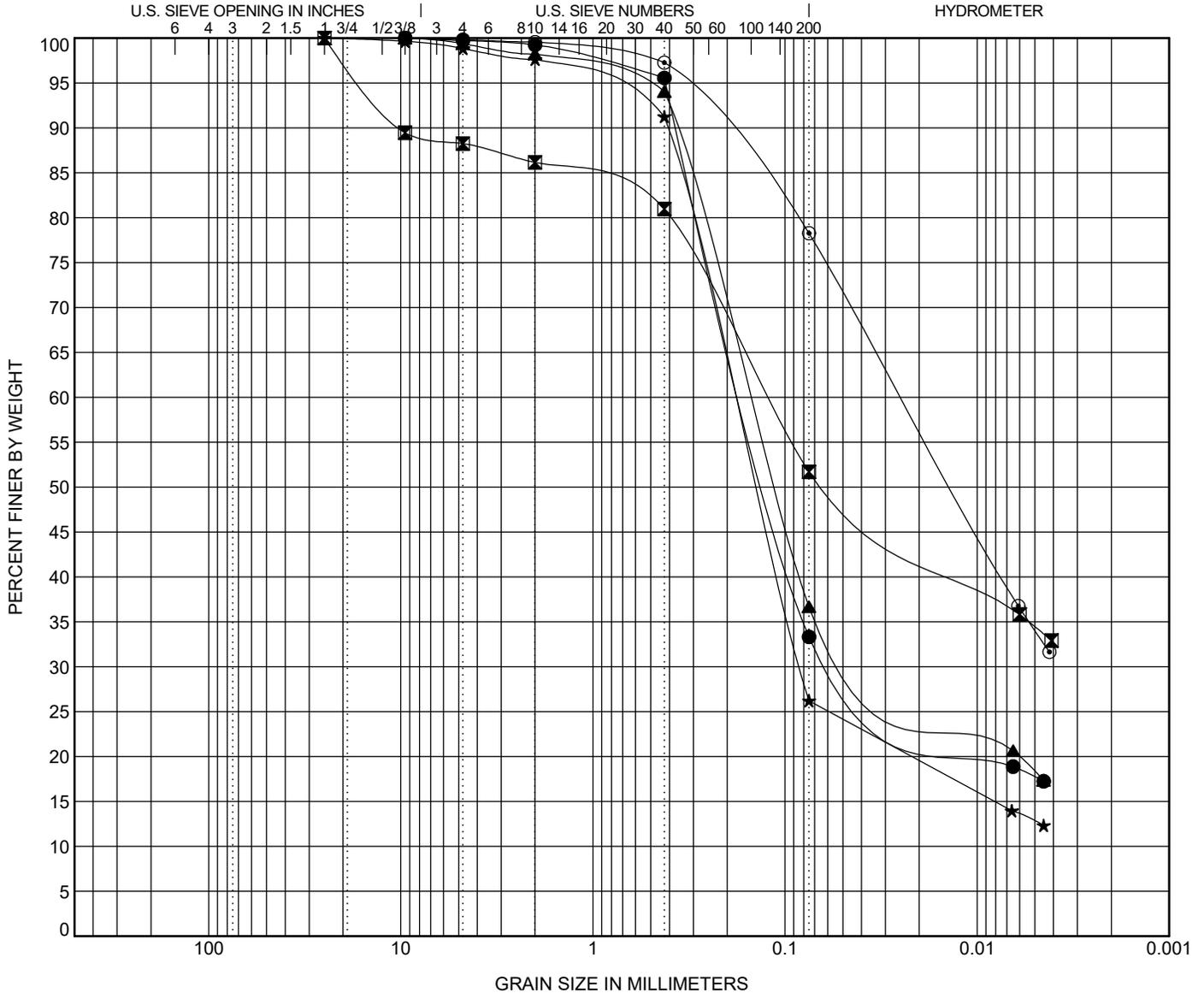
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BISMARCK, ND 58504

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
● LSS - 9	2.0	A-2-4 (0)	SM	NP	NP	NP		
☒ LSS - 10	2.0	A-6 (8)	CL	37	15	22		
▲ LSS - 11	2.0	A-4 (0)	SM	NP	NP	NP		
★ LSS - 12	2.0	A-2-4 (0)	SM	NP	NP	NP		
⊙ LSS - 13	2.0	A-6 (15)	CL	39	18	21		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● LSS - 9	2.0	9.5	0.158	0.043		0.3	66.4	15.6	17.7
☒ LSS - 10	2.0	25	0.123			11.8	36.5	17.3	34.4
▲ LSS - 11	2.0	9.5	0.152	0.027		0.6	62.7	18.4	18.3
★ LSS - 12	2.0	25	0.185	0.083		1.2	72.6	13.4	12.8
⊙ LSS - 13	2.0	9.5	0.025			0.2	21.6	44.2	34.0

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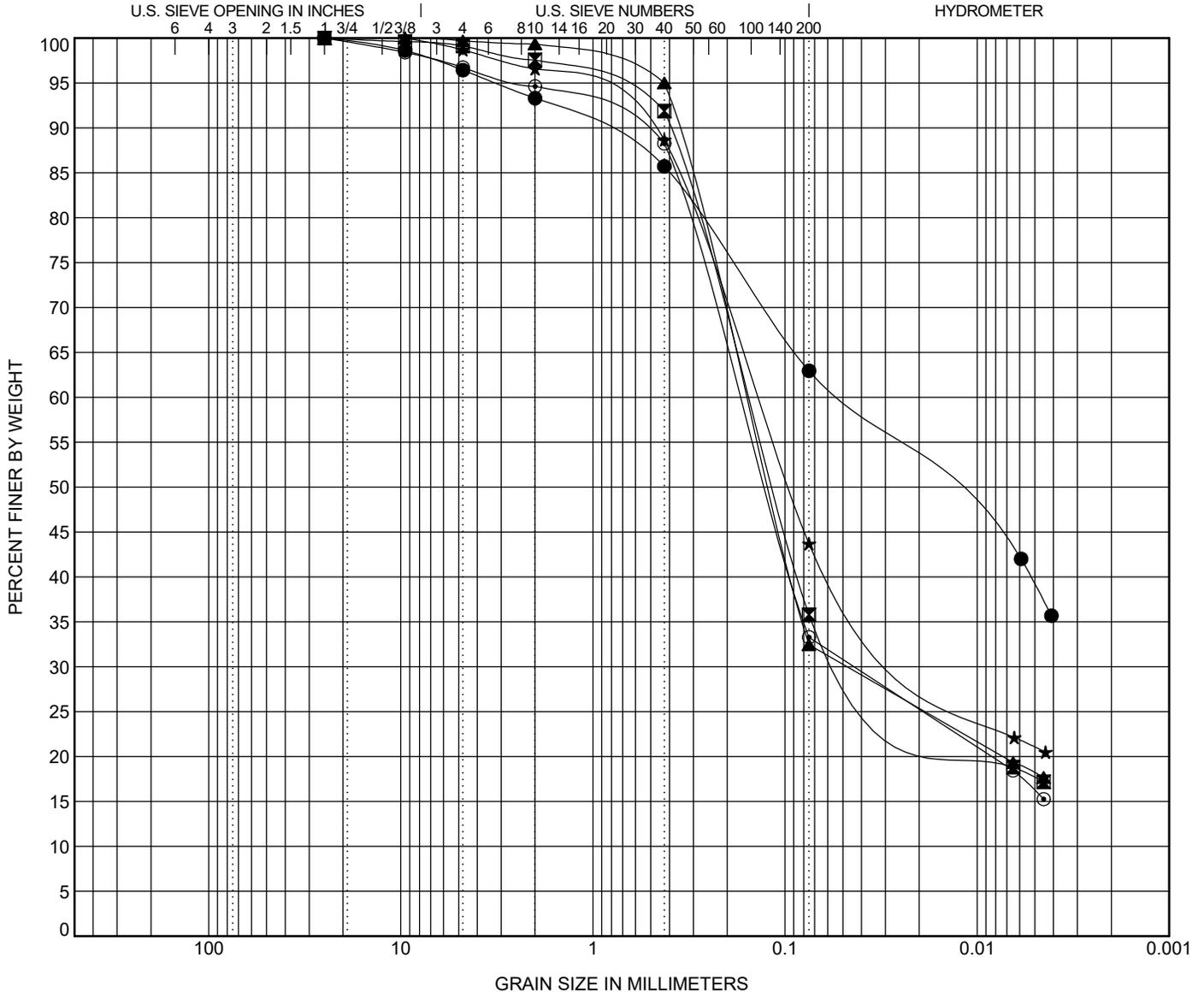


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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	AASHTO Classification	USCS Classification		LL	PL	PI	Cc	Cu
● LSS - 14	2.0	A-7-6 (12)	CL		43	20	23		
☒ LSS - 15	2.0	A-4 (0)	SC		26	17	9		
▲ LSS - 16	2.0	A-2-4 (0)	SC		24	16	8		
★ LSS - 17	2.0	A-6 (2)	SC		28	16	12		
◎ LSS - 18	2.0	A-2-4 (0)	SC		25	17	8		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● LSS - 14	2.0	25	0.052			3.6	33.5	23.8	39.1
☒ LSS - 15	2.0	25	0.159	0.033		0.9	63.3	18.1	17.7
▲ LSS - 16	2.0	9.5	0.161	0.047		0.3	67.2	14.3	18.1
★ LSS - 17	2.0	9.5	0.141	0.016		1.3	55.0	22.7	21.0
◎ LSS - 18	2.0	25	0.174	0.044		3.3	63.4	17.1	16.2

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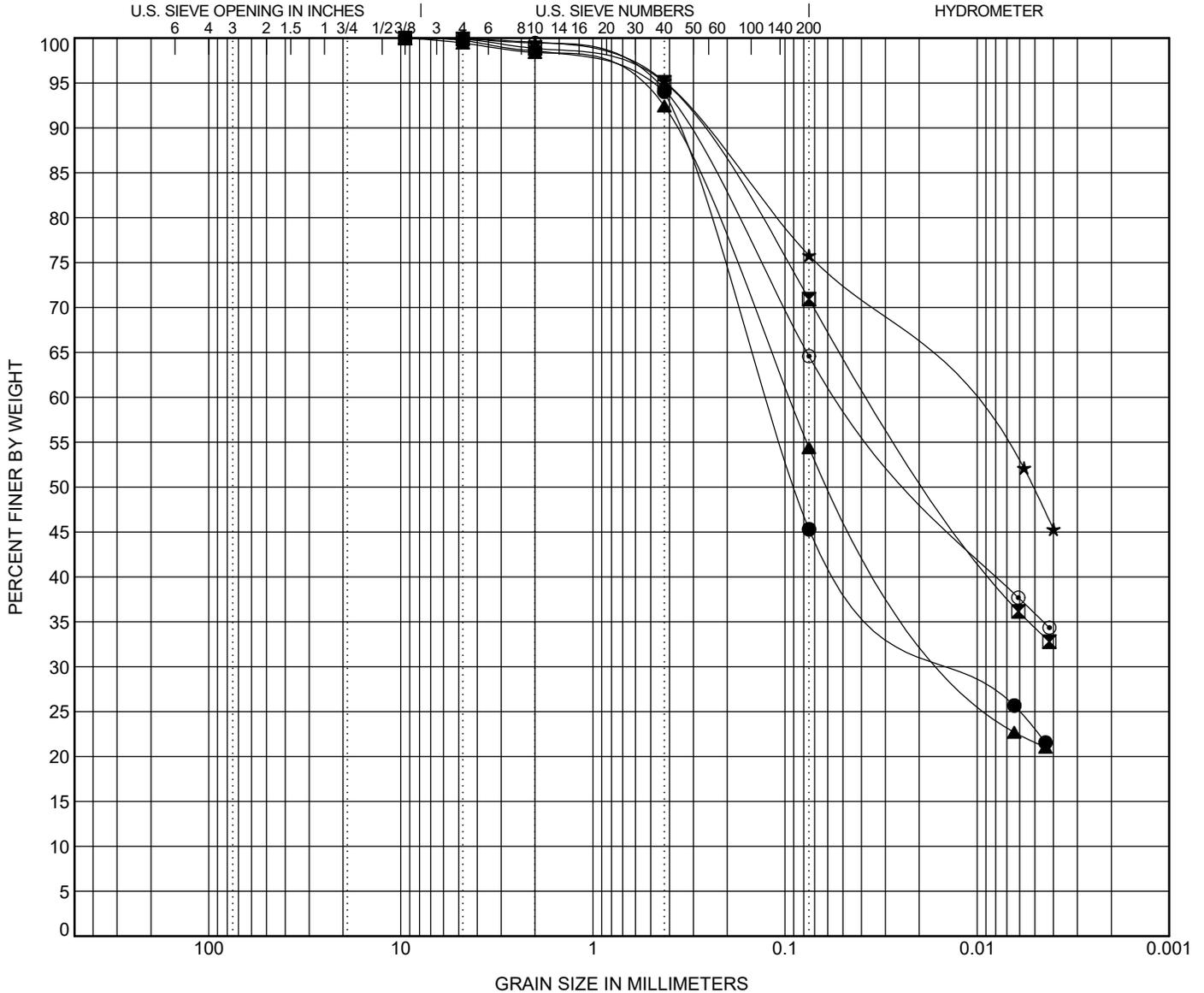
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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	AASHTO Classification	USCS Classification			LL	PL	PI	Cc	Cu
● LSS - 19	2.0	A-6 (2)	SC			27	15	12		
☒ LSS - 20	2.0	A-6 (12)	CL			38	18	20		
▲ LSS - 21	2.0	A-6 (5)	CL			31	16	15		
★ LSS - 21	7.0	A-7-6 (22)	CL			49	20	29		
⊙ LSS - 22	2.0	A-6 (11)	CL			37	17	20		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● LSS - 19	2.0	9.5	0.127	0.011		0.2	54.4	22.3	23.0
☒ LSS - 20	2.0	9.5	0.034			0.1	29.0	36.6	34.4
▲ LSS - 21	2.0	9.5	0.097	0.011		0.6	45.1	32.8	21.6
★ LSS - 21	7.0	9.5	0.013			0.1	24.1	26.2	49.6
⊙ LSS - 22	2.0	4.75	0.049			0.0	35.4	28.7	35.9

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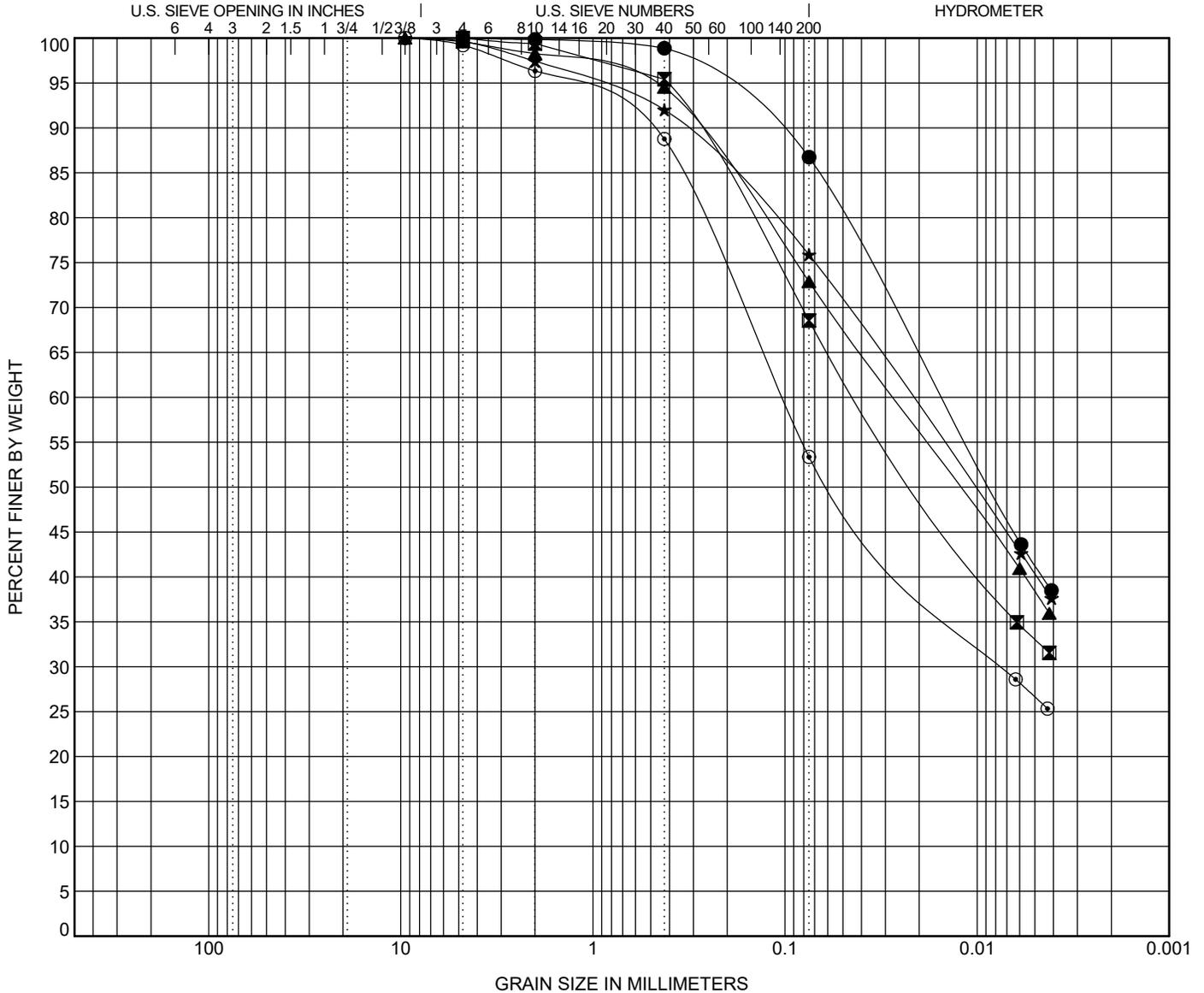
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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	AASHTO Classification	USCS Classification		LL	PL	PI	Cc	Cu
● LSS - 22	7.0	A-7-6 (20)	CL		42	19	23		
☒ LSS - 23	2.0	A-6 (10)	CL		35	18	17		
▲ LSS - 24	2.0	A-6 (13)	CL		39	19	20		
★ LSS - 25	2.0	A-7-6 (16)	CL		42	20	22		
⊙ LSS - 26	2.0	A-6 (4)	CL		30	16	14		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● LSS - 22	7.0	4.75	0.016			0.0	13.3	45.5	41.3
☒ LSS - 23	2.0	4.75	0.04			0.0	31.5	35.5	33.1
▲ LSS - 24	2.0	9.5	0.027			0.4	26.7	34.5	38.4
★ LSS - 25	2.0	9.5	0.022			0.4	23.7	35.5	40.4
⊙ LSS - 26	2.0	9.5	0.104	0.007		0.8	45.8	26.7	26.6

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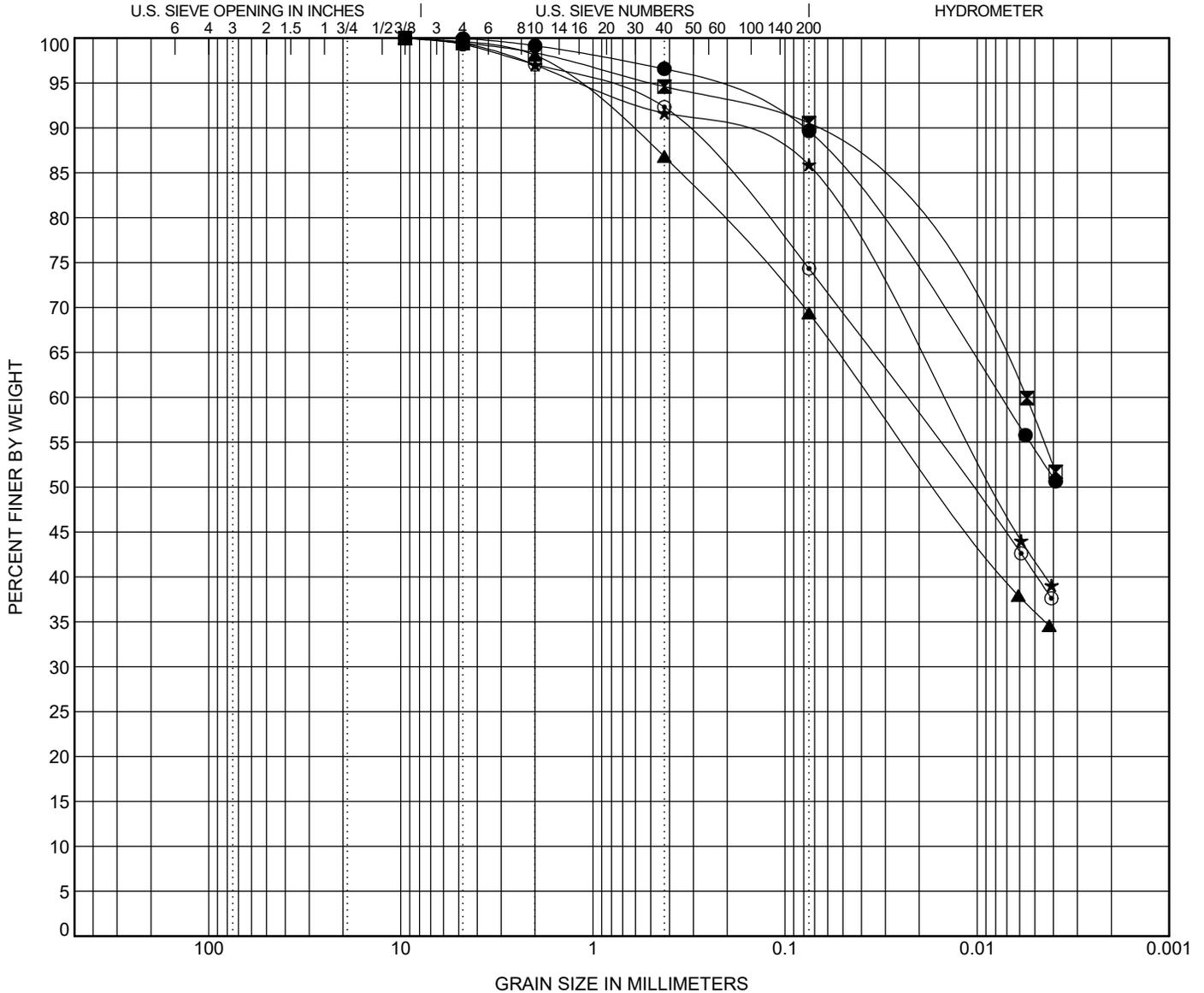
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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	AASHTO Classification	USCS Classification			LL	PL	PI	Cc	Cu
● LSS - 27	2.0	A-7-6 (33)	CH			56	23	33		
☒ LSS - 28	2.0	A-7-6 (34)	CH			58	25	33		
▲ LSS - 29	2.0	A-6 (10)	CL			35	18	17		
★ LSS - 30	2.0	A-7-6 (20)	CL			43	20	23		
◎ LSS - 31	2.0	A-7-6 (19)	CL			46	19	27		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● LSS - 27	2.0	9.5	0.008			0.1	10.3	35.5	54.2
☒ LSS - 28	2.0	9.5	0.006			0.6	8.9	32.9	57.6
▲ LSS - 29	2.0	9.5	0.035			0.4	30.2	33.2	36.1
★ LSS - 30	2.0	9.5	0.016			0.6	13.5	44.1	41.8
◎ LSS - 31	2.0	9.5	0.024			0.7	25.0	34.0	40.3

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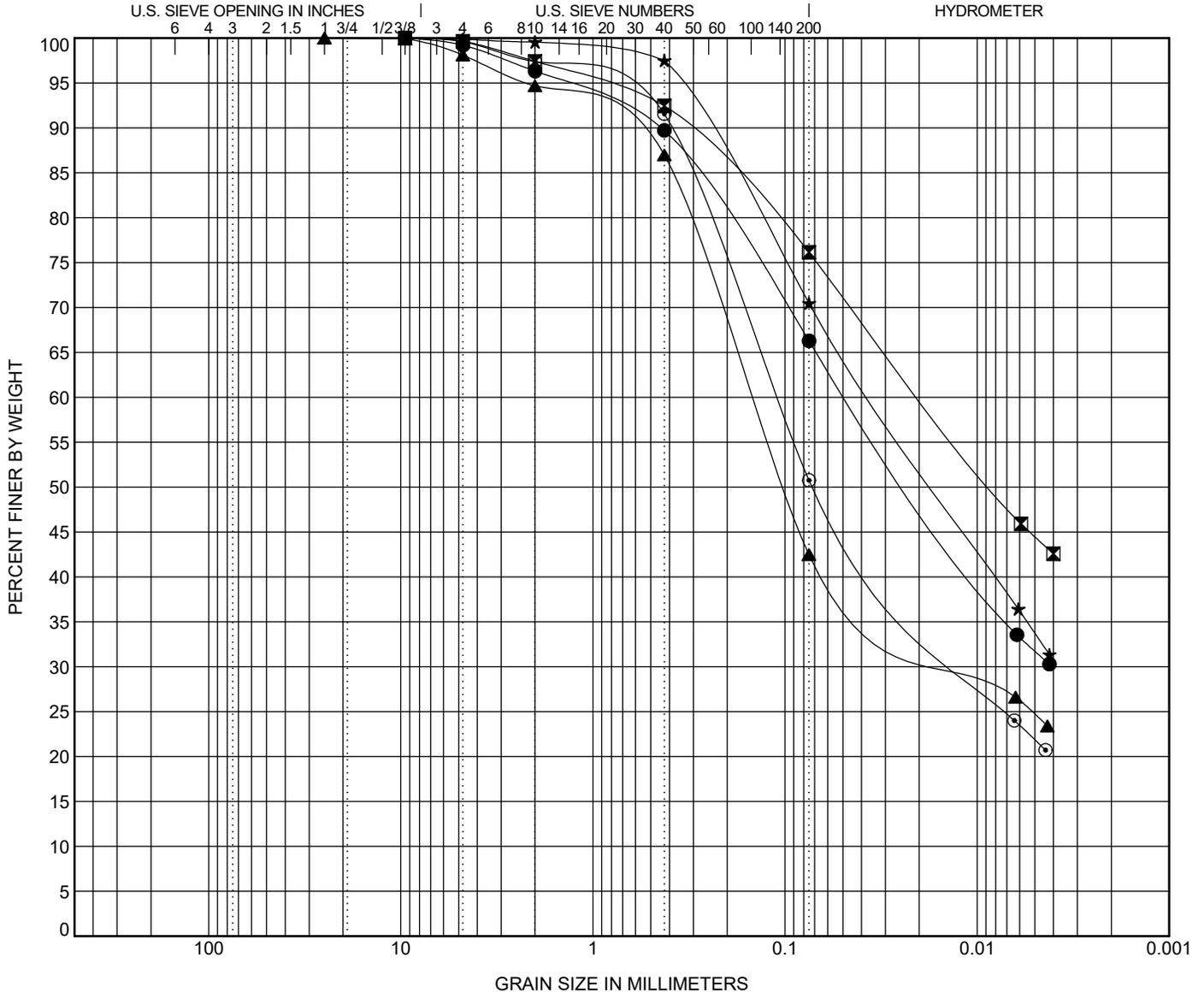
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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
● LSS - 32	2.0	A-7-6 (13)	CL	46	24	22		
☒ LSS - 33	2.0	A-7-6 (20)	CL	46	19	27		
▲ LSS - 34	2.0	A-6 (2)	SC	28	16	12		
★ LSS - 35	2.0	A-6 (13)	CL	39	17	22		
◎ LSS - 36	2.0	A-6 (5)	CL	34	17	17		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● LSS - 32	2.0	9.5	0.046			0.8	32.9	34.5	31.8
☒ LSS - 33	2.0	9.5	0.019			0.4	23.5	31.7	44.5
▲ LSS - 34	2.0	25	0.148	0.011		1.9	55.6	17.8	24.7
★ LSS - 35	2.0	9.5	0.035			0.1	29.4	36.8	33.7
◎ LSS - 36	2.0	9.5	0.111	0.011		0.4	48.9	28.9	21.8

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