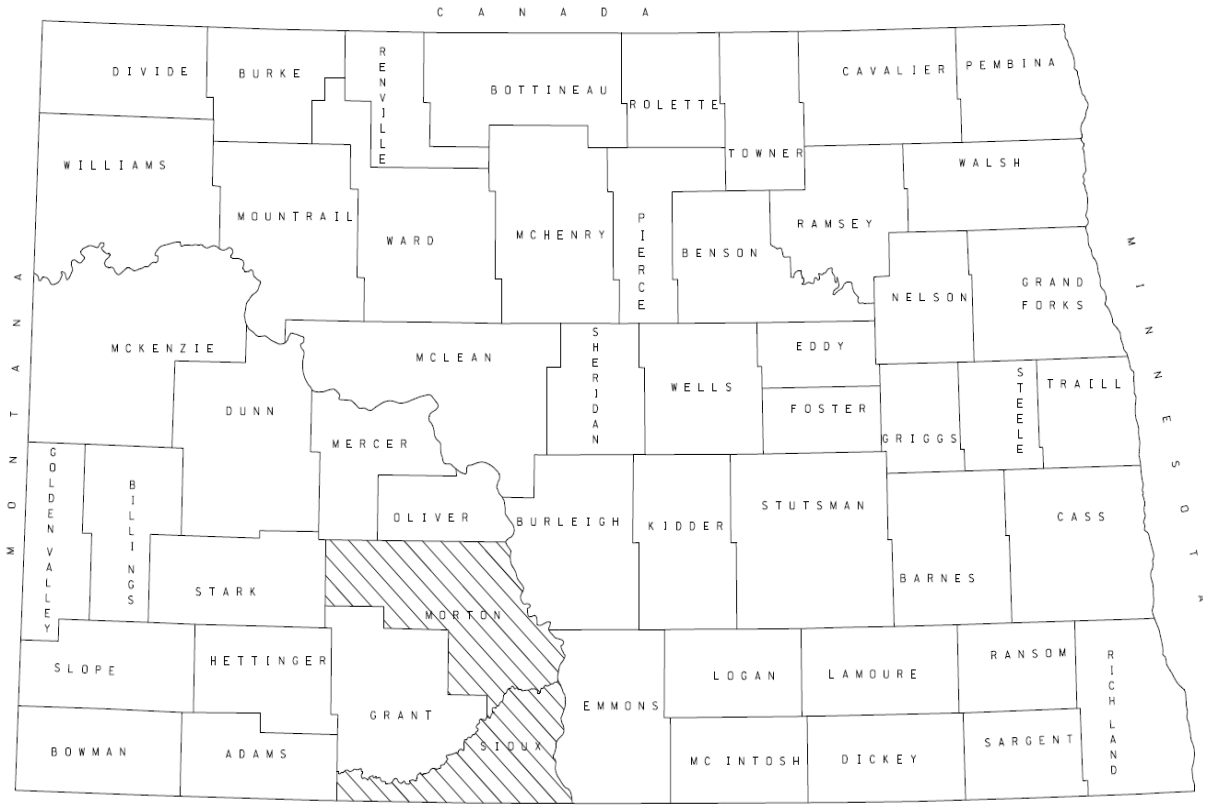
LINEAR SOILS SURVEY AND RECOMMENDATIONS

PROJECT NO. NH-SS-1-006(025)022

PCN 22207

COUNTY: MORTON & SIOUX

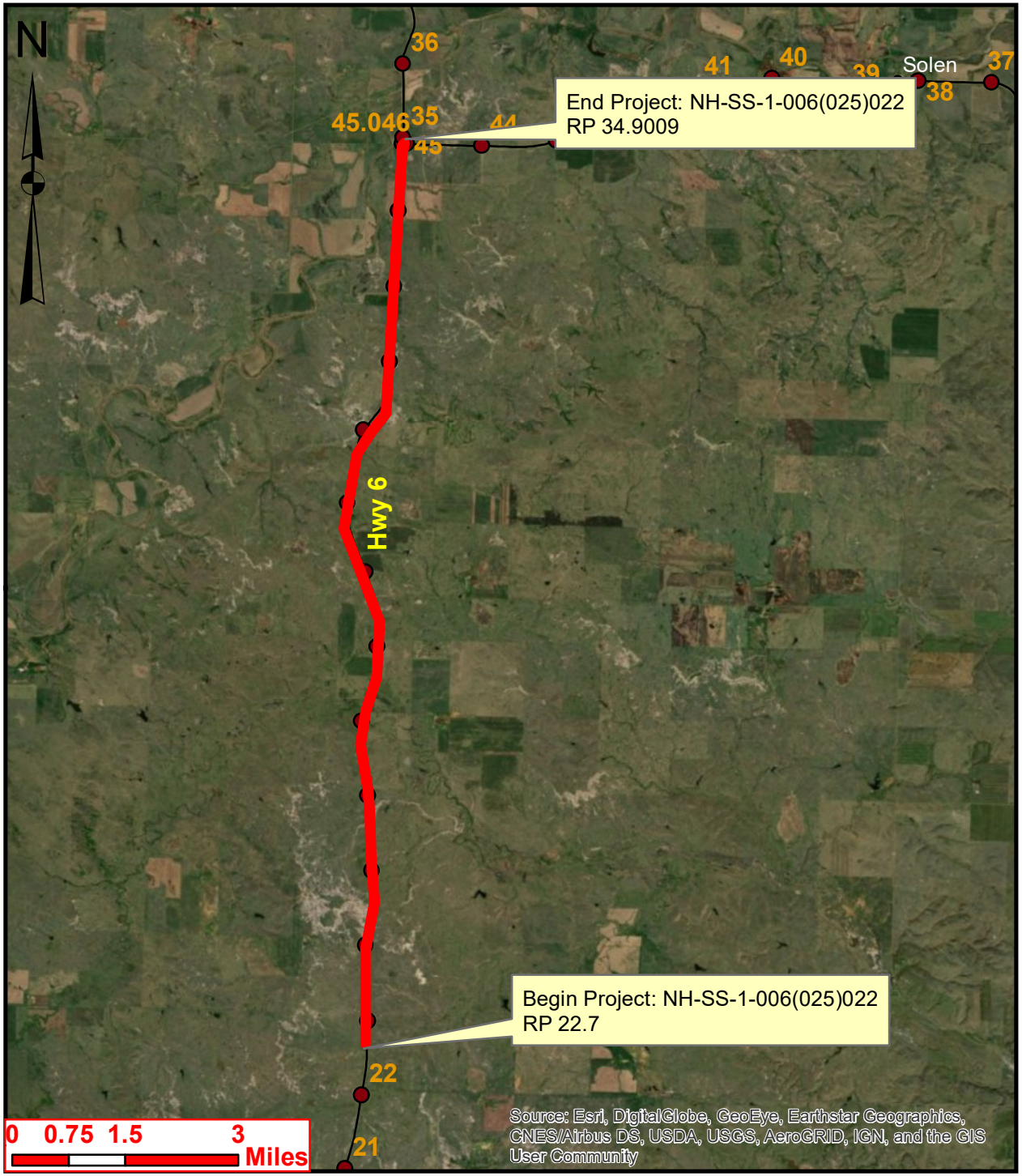
ND 6, RP 22.7000 to 34.9009



PREPARED BY: Naveed Haider

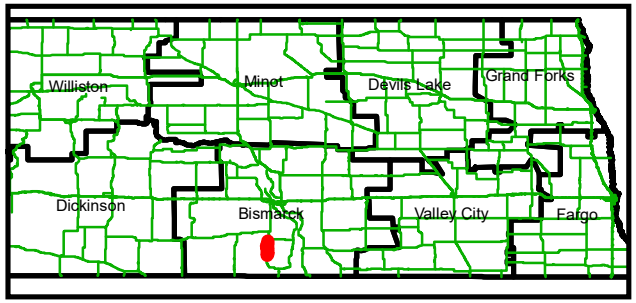
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
MATERIALS AND RESEARCH DIVISION

March 2020



Linear Soils Survey and Recommendations

Project: NH-SS-1-006(025)022 (Hwy 6)
PCN: 22207
Scope: Minor Rehabilitation
Length: 12.1889 Miles
Location: W JCT BIA 7- PorcupineTO JCT ND 21

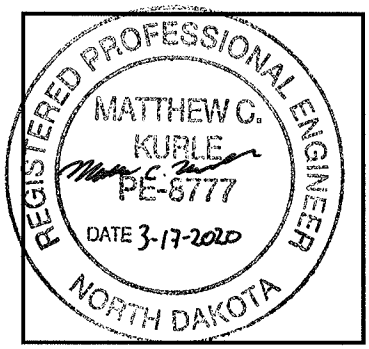


NH-SS-1-006(025)022

Location: W JCT BIA 7-Porcupine to JCT ND 21

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 Matthew C. Kurle, Registration number PE-8777 on 03/17/2019 and the original document is stored at the North Dakota Department of Transportation.



Matthew C. Kurle, P.E.

17 MARCH 2020
Date

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Appendices

Introduction

PCN No: 22207
Highway: 006.022
Location: W JCT BIA 7-Porcupine to JCT ND 21
Reference Points: RP 22.700 to 34.9009
Project Length: 12.1889 Miles
Proposed Project Scope: Minor Rehabilitation / Structural Improvement
Investigation Scope: Identified Maintenance Areas

Maintenance Review

Date of Maintenance Review: 3/25/2019
Materials and Research Person Conducting the Review: Jamie Naumann
Maintenance Person Conducting Review: Kerry Beckman –Maintenance Superintendent

Table 1 – Identified Maintenance Areas

Location RP + Feet	Distress Identified	Description & Maintenance Comments	Drilling Required
22+3696 to 34+4757	Alligator Cracking	Alligator cracking, depressed traverse cracks, blade patching	No
23+2764	Culvert	Transverse cracking, box culvert with low cover, high severity, affects both lanes	Yes
25+3942	Culvert	Dip, separated culvert Affects both lanes	Yes
28+0726 to 28+0800	Alligator Cracking	Alligator cracking Affects both lanes	Yes
32+1793	Culvert	Dip at box culvert and Wing wall separating	Yes
36+1109 to 36+1149	Culvert	Bump at box culvert-Bump at the lower cover	Yes
37+2970 to 37+3003	Culvert	Dip at box culvert and Dip on both edges, low cover	Yes

Note: After the maintenance review inspection was completed, the district identified several additional distress areas, which were include at a later stage. Additional identified areas are mentioned in table 2 (Boring Locations Summary).

Summary of Soil Investigation

The soil investigation was completed on 6/4/2019. The investigation consisted of 26 borings.

Table 2 – Boring Locations Summary

Boring Location	Justification for Boring	Boring depth	Location
23+2764	High severity transverse cracking	25 feet	Conduct 1 boring as close to the existing box culvert as possible and one boring 100' away. A total of 2 borings. Obtain 2 SPT samples every 5 feet for each boring.
24+1426 *	Bump	10 feet	Conduct 1 boring within the distress area and two outside the distress area on each side 100' away. A total of 3 borings.
24+2112 *	Bump	10 feet	Conduct 1 boring within the distress area and two outside the distress area on each side 100' away. A total of 3 borings.
25+3942	Dip; Separated Culvert	15 feet	Conduct 1 boring as close to existing culvert as possible and two borings to the north of the culvert a distance of 20' and 150', respectively. A total number of 3 borings. Obtain 2 SPT samples every 5 feet for each boring.
28+0726 to 28+0800	Alligator Cracking	10 feet	Conduct 1 boring within the distress area and two outside the distress area on each side 100' away. A total of 3 borings. Obtain 2 SPT samples every 5 feet for each boring.
28+4013 *	Bump	10 feet	Conduct 1 boring within the distress area and two outside the distress area on each side 100' away. A total of 3 borings.
32+1793	Dip	25 feet	Conduct 1 boring as close to the existing box culvert as possible and one boring 100' away. A total of 2 borings. Obtain 2 SPT samples every 5 feet for each boring.
33+0158 *	Bump	10 feet	Conduct 1 boring within the distress area and two outside the distress area on each side 100' away. A total of 3 borings.
36+1109 to 36+1149	Bump	25 feet	Conduct 1 boring as close to the existing box culvert as possible and one boring 100' away. A total of 2 borings. Obtain 2 SPT samples every 5 feet for each boring.
37+2970 to 37+3003	Dip	25 feet	Conduct 1 boring as close to the existing box culvert as possible and one boring 100' away. A total of 2 borings. Obtain 2 SPT samples every 5 feet for each boring.

Note: * - Distressed area identified additionally by District.

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

Summary of Soil Analysis

23+2764: Two borings have been carried out at the locations to the depth of 25 ft. One boring was carried out near the culvert and the other was approx. 100 ft from the culvert.

The soils near the culvert were fine sand and silty sands, which became fat clay at the depth of 16 feet. Average water content of the soil ranged from 15% to 35%.

The soils beyond the area of culvert were fat clays and silty sands. Silty sand has been encountered till the depth of 6 feet, and then from 6 feet to 24 feet fat clay has been found. Average water content of the soil ranged from 9% to 40%.

24+1426: Three borings have been carried out at this location to a depth of 10 ft. One boring was done in the distressed area and the others were approximately 100 ft away at each end.

The soils within the distressed area were clayey sand. This soil has a maximum dry density of approximately 121.8 pcf and an optimum water content of approximately 11.3%. The in-place moisture content of the soil was 3% over optimum.

The soils beyond the distressed area are sandy lean clay and clayey sand. These soils have on average a maximum dry density of approximately 122 pcf and an optimum water content of approximately 11.5%. The in-place moistures of the soils are on average 3% to 6% over optimum.

24+2112: Three borings have been carried out at this location to a depth of 10 ft. One boring was done in the distressed area and the others were approximately 100 ft away at each end.

The soils within the distressed area were fat clay with sand. These soils have a maximum dry density of approximately 114.6 pcf and an optimum water content of approximately 14%. The in-place moistures of the soils are on average 8% over optimum.

The soils beyond the distressed area are also fat clay with sand. These soils have on average a maximum dry density of approximately 113 pcf and an optimum water content of approximately 13%. The in-place moistures of the soils are on average 9% over optimum.

25+3942: Three borings have been carried out to a depth of 15 ft. One boring was carried out near the culvert and the others were carried out 20ft and 150 ft north of the culvert.

The soils near the culvert were silty sands. Average water contents of the soil ranged from 16% to 29%.

The soils beyond the area of culvert were silty sands, with pockets of fine sand. Average water content of the soil ranged from 17% to 34%.

28+0726 to 28+0800: Three borings have been carried out to a depth of 10 ft. One boring was carried out within the distressed area and the others were carried out 100 ft away at both ends.

The soils within the distressed area were silty sands. The average water content of the soil was 21%.

The soils beyond the distressed area were silty sands with pockets of fat clay. Average water content of the soil ranged from 19% to 30%.

28+4013: Three borings have been carried out to a depth of 10 ft. One boring was done in the distressed area and the others were approximately 100 ft away at each end.

The soils within the distressed area were lean clay with sand. These soils have a maximum dry density of approximately 122.4 pcf and an optimum water content of approximately 12%. The in-place moistures of the soils are on average 11% over optimum.

The soils beyond the distressed area are also silty sand and clayey sand. These soils have on average a maximum dry density of approximately 122 pcf and an optimum water content of approximately 11.5%. The in-place moistures of the soils are on average 9% over optimum.

32+1793: Two borings have been carried out to a depth of 25 ft. One boring was carried out near the culvert and the other was approximately 100 ft from the culvert.

The soils near the culvert were lean clay with silty sand, with a pocket of fat clay at a depth of 16 feet. Average water content of the soil ranged from 19% to 29%.

The soils beyond the area of culvert were silty sands. Silty sand and sandy clay has been encountered till the depth of 22 feat. From the depth of 22 feet, fat clay has been found. Average water contents of the soil ranged from 6% to 38%.

33+0158: Three borings have been carried out to a depth of 10 ft. One boring was done in the distressed area and the others were approximately 100 ft away at each end.

The soils within the distressed area were fat clay with sand. These soils have a maximum dry density of approximately 118 pcf and an optimum water content of approximately 13%. The in-place moistures of the soils are on average 15% over optimum.

The soils beyond the distressed area are also lean clay with fat clay with sand. These soils have on average a maximum dry density 119 pcf and an optimum water content of approximately 13%. The in-place moistures of the soils are on average 14% over optimum.

36+1109 to 36+1149: Two borings have been carried out at the locations to the depth of 25 ft. One boring was carried out near the culvert and the other was approx. 100 ft from the culvert.

The soils near the culvert were silty sand, with average water content of the soil ranged from 13% to 28%.

The soils beyond the area of culvert were lean clay with some pockets of silty sand at the depth of 11 feet. Average water content of the soil ranged from 8% to 41%.

37+2970 to 37+3003: Two borings have been carried out at the locations to the depth of 25 ft. One boring was carried out near the culvert and the other was approx. 100 ft from the culvert.

The soils near the culvert were lean clay with pockets of silty sand at the depth of 14 feet, with average water content of the soil ranged from 16% to 28%.

The soils beyond the area of culvert were silty sand. Average water content of the soil ranged from 16% to 26%.

Design Recommendations

23+2764: The pavement distress at this location is not directly related to the subgrade soils. We do not recommend performing work at this location based on the current project scope. Re-establish the ride via the mill and overlay operation.

24+1350 to 24+2400: This distress in this area is due to seasonal movement of the subgrade and is identified as a frost heave. A 36" subcut is recommended from RP 24+1350 to 24+2400.

A culvert is located within the subcut area. Excavation during the subcut operation will expose the culvert. It is recommended to remove and relay/replace the culvert.

25+3942: Pavement distress at this location is not directly related to the subgrade material. Visual observations conducted prior to and during frozen ground conditions indicate the distress is not related to seasonal movement. Visual observations also indicate that the culvert sections are separated which may be contributing to the pavement distress.

28+0726 to 28+0800: The pavement distress at this location is not directly related to the subgrade soils. Visual observations conducted prior to and during frozen ground conditions indicate that the distress is not related to seasonal movement. Subgrade work is not recommended at this location. Re-establish the ride via the mill and overlay operation.

28+4013: This distress in this area is due to seasonal movement of the subgrade and is identified as a frost heave. A 36" subcut is recommended from RP 28+3925 to 28+4025.

32+1793: The pavement distress at this location is not directly related to the subgrade soils. Visual observations conducted prior to and during frozen ground conditions indicate that the distress is not related to seasonal movement. Subgrade work is not recommended at this location. Re-establish the ride via the mill and overlay operation.

33+0158: The pavement distress at this location is not directly related to the subgrade soils. We do not recommend performing work at this location based on the current project scope. Re-establish the ride via the mill and overlay operation.

36+1109 to 36+1149: The pavement distress at this location is not directly related to the subgrade soils. We do not recommend performing work at this location based on the current project scope. Re-establish the ride via the mill and overlay operation.

37+2970 to 37+3003: The pavement distress at this location is not directly related to the subgrade soils. We do not recommend performing work at this location based on the current project scope. Re-establish the ride via the mill and overlay operation.

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:

Table 3 – Subcut Recommendations

Location RP + Feet	Length	Depth
24+1350 to 24+2400	1050'	36”
28+3925 to 28+4025	100'	36"

Calculate the subcut quantity based on the lengths and depths as shown in Table 3 above and adhere to the guidelines stated below.

Remarks: The depth of recommended subcut is from the top of existing pavement. Place Geosynthetic Geogrid (Type G) at the bottom of all subcut excavations and backfill with Class 5 aggregate. Place 10” of aggregate on the geogrid prior to compacting. Do not scarify the bottom of the subcut.

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)*			
Group Classification	*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 Less than 5% fines[a]	$C_u \geq 4$ and $1 \leq C_c \leq 3$[c]	GW
			$C_u < 4$ and/or $1 > C_c > 3$[c]	GP
		Gravels with Fines More than 12% fines[a,d]	$PI < 4$ 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 Less than 5% fines[b]	$C_u \geq 6$ and $1 \leq C_c \leq 3$[c]	SW
			$C_u < 6$ and/or $1 > C_c > 3$[c]	SP
		Sands with Fines More than 12% fines[b,d]	$PI < 4$ or plots below "A" line (Figure 5.3)	SM
			$PI > 7$ 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)[e]	CL
			$PI < 4$ or plots below "A" line (Figure 5.3)[e]	ML
		Organic	$\frac{\text{Liquid limit — oven dried}}{\text{Liquid limit — not dried}} < 0.75$; see Figure 5.3; OL zone	OL
	Silts and clays Liquid limit 50 or more	Inorganic	PI plots on or above "A" line (Figure 5.3)	CH
			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

[a] Gravels with 5 to 12% fine require dual symbols: GW-GM, GW-GC, GP-GM, GP-GC.

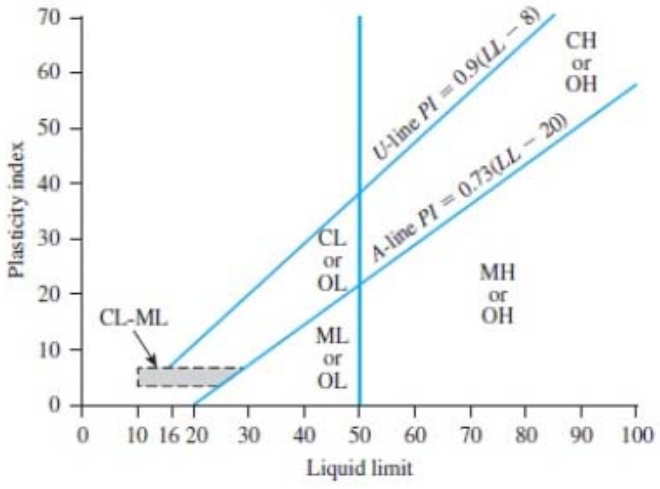
[b] Sands with 5 to 12% fines require dual symbols: SW-SM, SW-SC, SP-SM, SP-SC.

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

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

[e] 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

TO:	**File**
FROM:	**Jared Loegering – Materials and Research (Geotechnical)**
DATE:	**5/28/2019**
HIGHWAY:	**006.022**
PROJECT NUMBER:	**NH-SS-1-006(025)022**
PCN:	**22207**
LOCATION:	**W Jct BIA 7-Porcupine to Jct ND 21**
IMPROVEMENT SCOPE:	**Minor Rehabilitation w/Sliver Grading**
SUBJECT:	**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: Minor Rehabilitation
Investigation Scope: Identified Areas Only

The following table shows the proposed subsurface investigation scope.

Boring Location	Justification for Boring	Boring Depth	Location
23+2764	High severity transverse cracking	25 feet	Conduct 1 boring as close to the existing box culvert as possible and one boring 100' away. A total of 2 borings. Obtain 2 SPT samples every 5 feet for each boring.
24+1426	Bump	10 feet	Conduct 1 boring within the distress area and two outside the distress area on each side 100' away. A total of 3 borings.
24+2112	Bump	10 feet	Conduct 1 boring within the distress area and two outside the distress area on each side 100' away. A total of 3 borings.
25+3942	Dip; Separated Culvert	15 feet	Conduct 1 boring as close to existing culvert as possible and two borings to the north of the culvert a distance of 20' and 150', respectively. A total number of 3 borings. Obtain 2 SPT samples every 5 feet for each boring.
28+0726 to 28+0800	Alligator Cracking	10 feet	Conduct 1 boring within the distress area and two outside the distress area on each side 100' away. A total of 3 borings. Obtain 2 SPT samples every 5 feet for each boring.
28+4013	Bump	10 feet	Conduct 1 boring within the distress area and two outside the distress area on each side 100' away. A total of 3 borings.
32+1793	Dip	25 feet	Conduct 1 boring as close to the existing box culvert as possible and one boring 100' away. A total of 2 borings. Obtain 2 SPT samples every 5 feet for each boring.
33+0158	Bump	10 feet	Conduct 1 boring within the distress area and two outside the distress area on each side 100' away. A total of 3 borings.
36+1109 to 36+1149	Bump	25 feet	Conduct 1 boring as close to the existing box culvert as possible and one boring 100' away. A total of 2 borings. Obtain 2 SPT samples every 5 feet for each boring.
37+2970 to 37+3003	Dip	25 feet	Conduct 1 boring as close to the existing box culvert as possible and one boring 100' away. A total of 2 borings. Obtain 2 SPT samples every 5 feet for each boring.

PAVEMENT EVALUATION LOG FOR LINEAR SOIL SURVEY

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

Sheet 1 of 1

Project Number	PCN	Date of Survey
NH-SS-1-006(025)022	22207	3/25/2019

Section Maintenance Contact	Completed By
Kerry Beckman	Jamie Naumann

Highway Reference Points	Surface Type
22+3696 to 42+0786	Asphalt

Location	Pavement Distress	Description	Maintenance Comment	Picture Number	Drilling Required
22+3696 to 42+0786	Aligator Cracking	Alligator cracking, depressed transverse cracks, blade patching		1-2	No
23+2764	Culvert	Box culvert, low cover	High severity, affects both lanes	3	Yes
25+3942	Culvert	Separated culvert	Affects both lanes	4-5	Yes
28+0726 to 28+0800	Aligator Cracking	Alligator cracking	Affects both lanes	6	Yes
32+1793	Culvert	Dip at box culvert	Wing wall separating	7-8	Yes
36+1109 to 36+1149	Culvert	Bump at box culvert	Bump, low cover	9-11	Yes
37+2970 to 37+3003	Culvert	Dip at box culvert	Dip on both edges, low cover	12	Yes
	Select One				Select One
	Select One				Select One

Comments

Met with Kerry Beckman and he indicated these problem areas.

1
22+3696 to 42+0786

2
22+3696 to 42+0786

3
23+2764

4
25+3942

5
25+3942

6
28+0726 to 28+0800

7
32+1793

8
32+1793

9
36+1109 to 36+1149

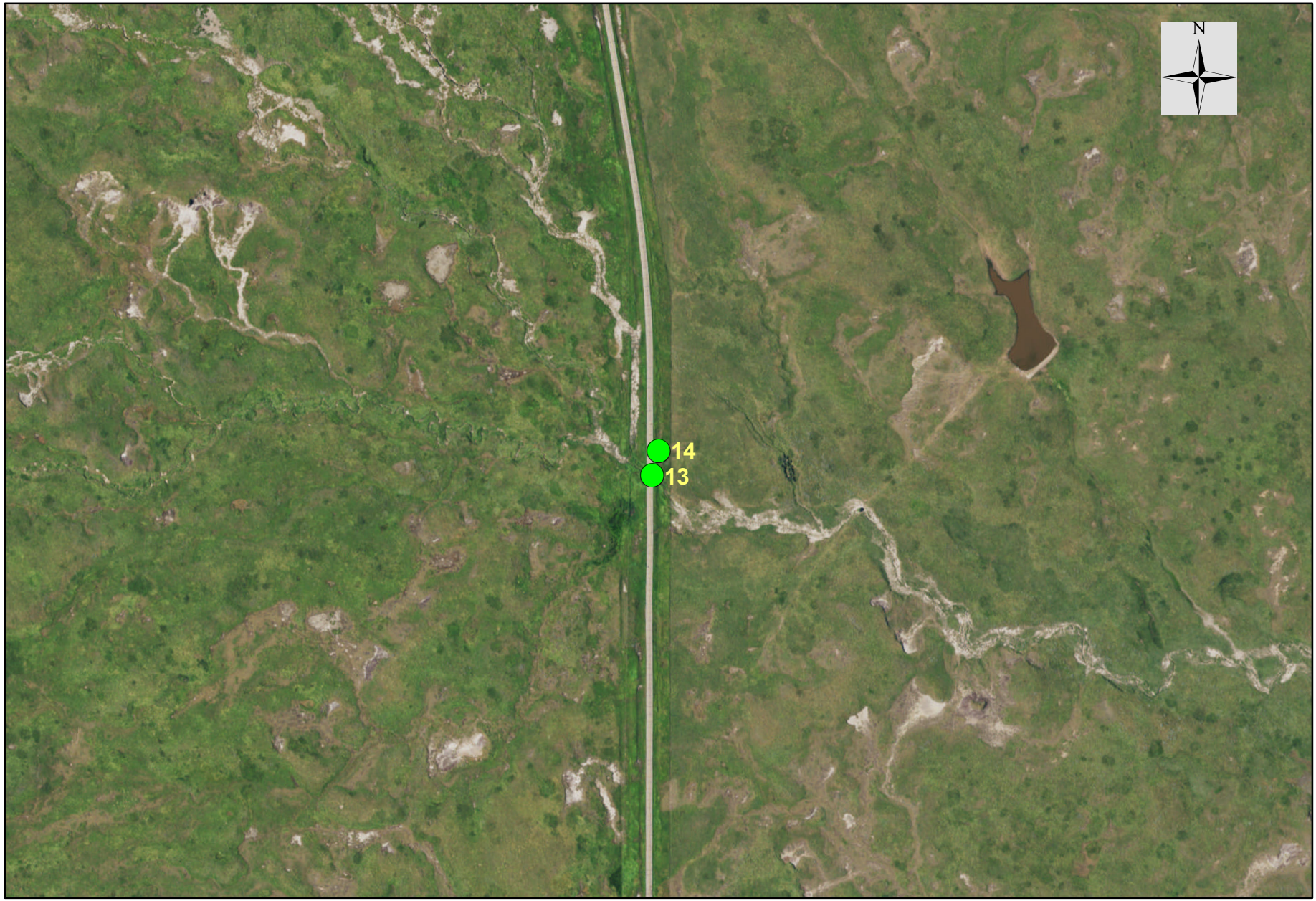
10
36+1109 to 36+1149

11
36+1109 to 36+1149

12
37+2970 to 37+3003

APPENDIX C

BORING LOCATIONS

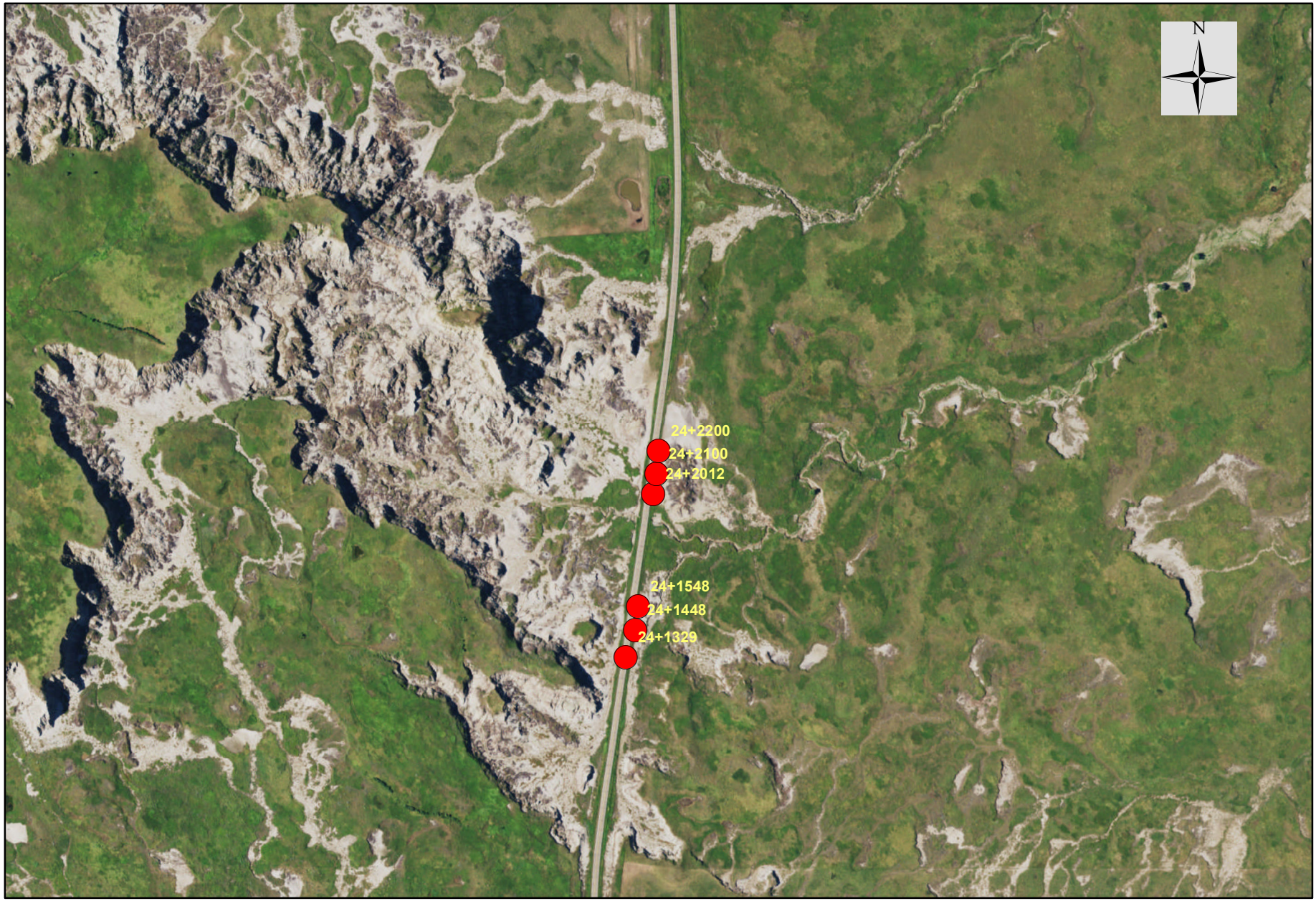


Legend

- Reference Point
- Linear Soil Boring Locations
- Deep Foundation Soil Borings

0 1,000 2,000
Feet

Project Number: SS-1-006(025)022

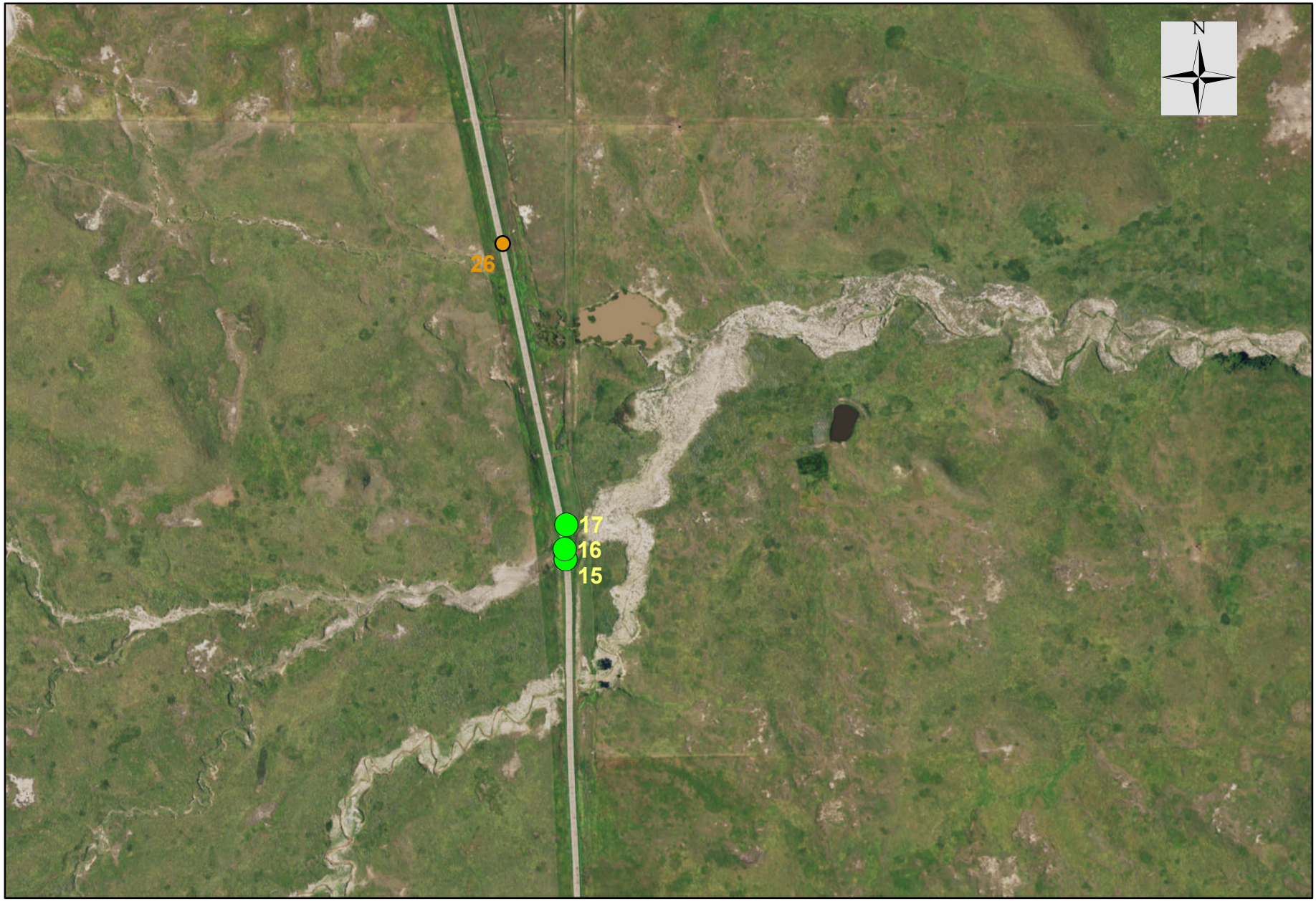


Legend

- Reference Point
- Linear Soil Boring Locations
- Deep Foundation Soil Borings

0 1,000 2,000 Feet

Project Number: SS-1-006(025)022

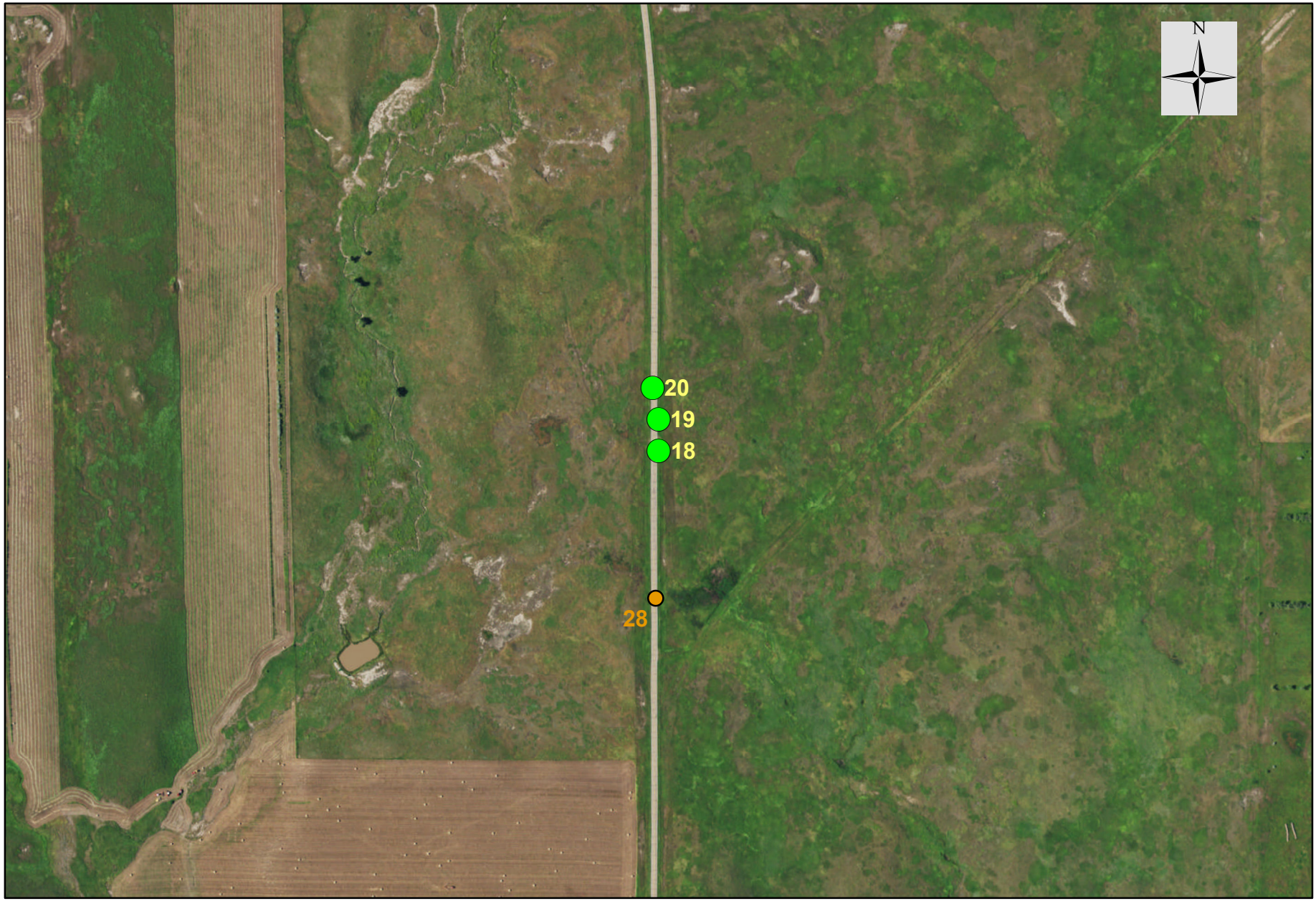


Legend

- Reference Point
- Linear Soil Boring Locations
- Deep Foundation Soil Borings

0 1,000 2,000
Feet

Project Number: SS-1-006(025)022



Legend

- Reference Point
- Linear Soil Boring Locations
- Deep Foundation Soil Borings

0 1,000 2,000 Feet

Project Number: SS-1-006(025)022

Legend

- Reference Point
- Linear Soil Boring Locations
- Deep Foundation Soil Borings

0 1,000 2,000 Feet

Project Number: SS-1-006(025)022

Legend

- Reference Point
- Linear Soil Boring Locations
- Deep Foundation Soil Borings

0 1,000 2,000
Feet

Project Number: SS-1-006(025)022

Legend

- Reference Point
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- Deep Foundation Soil Borings

0 1,000 2,000 Feet

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0 1,000 2,000 Feet

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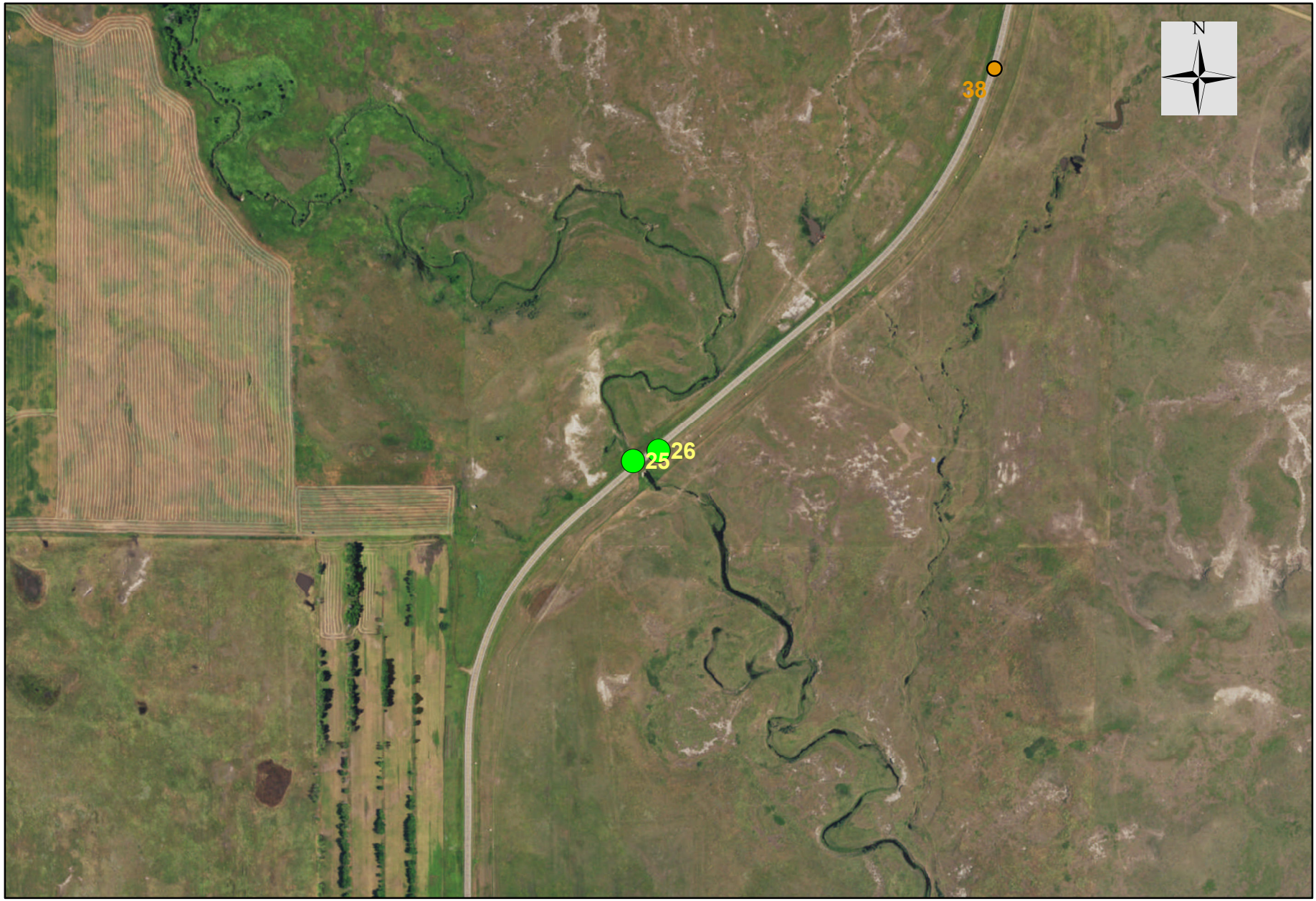


Legend

- Reference Point
- Linear Soil Boring Locations
- Deep Foundation Soil Borings

0 1,000 2,000 Feet

Project Number: SS-1-006(025)022

APPENDIX D

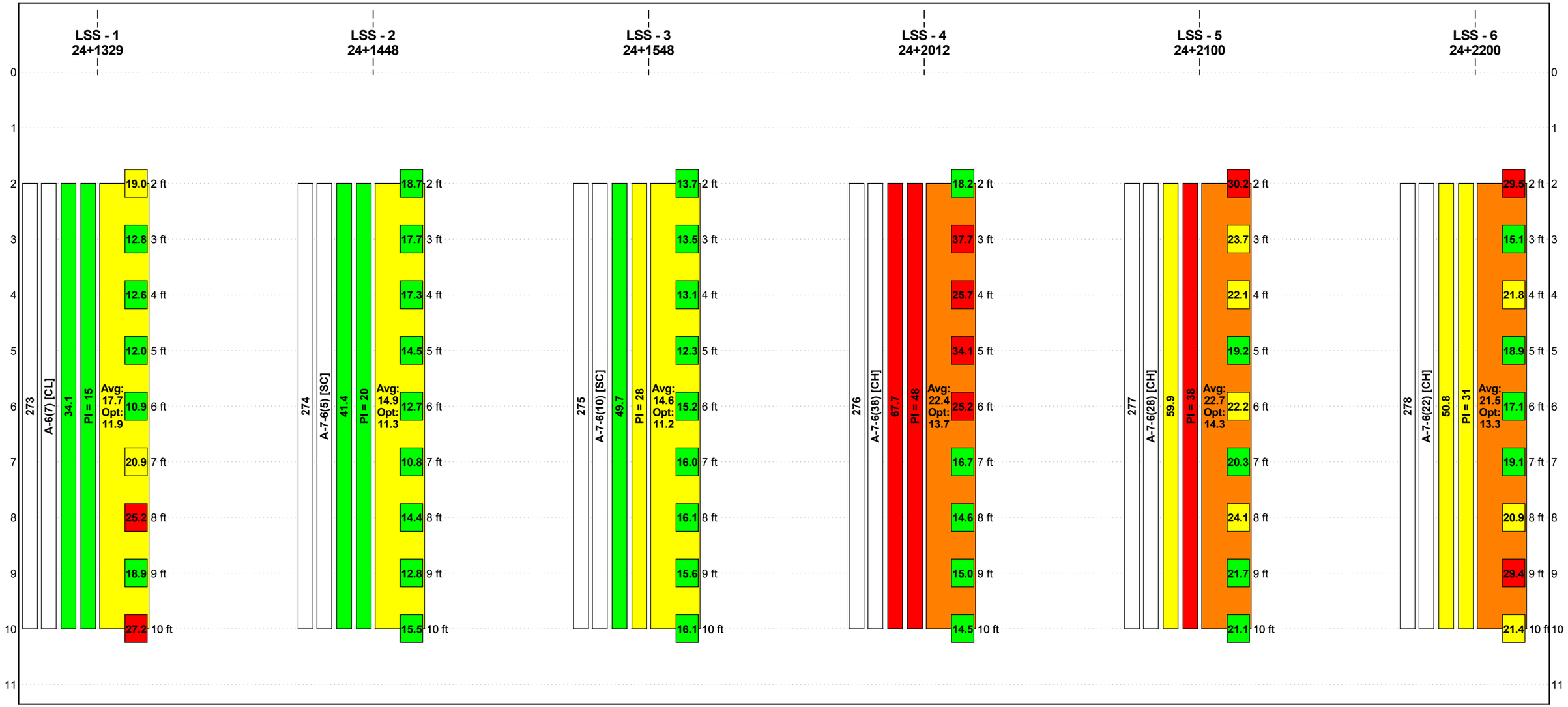
SUMMARY OF SOILS ANALYSIS

NDDOT North Dakota Department of Transportation

NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

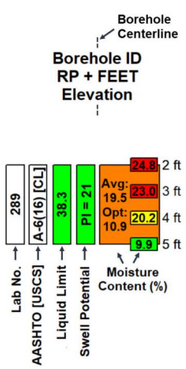
PROJECT NUMBER NH-SS-1-006(025)022 L **PCN** 22207

LOCATION Morton County



Boreholes Equally Spaced (0 to 280 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

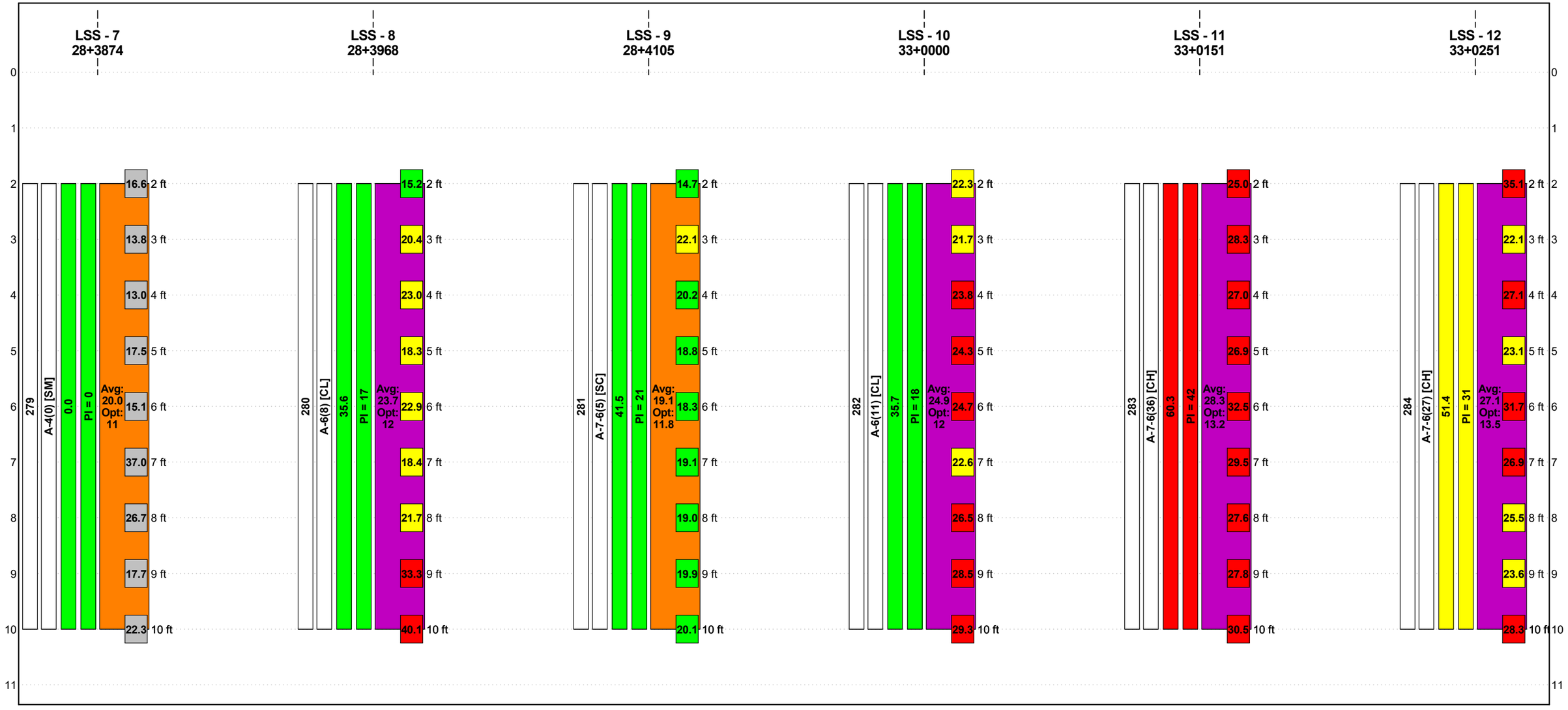
NDDOT_LINEARCOLORFENCE_DEPTH - 20171219.GDT - 12/12/19 14:37 - F:\LAB\PROJECTS\GINT\1-006(025)022.GPJ

NDDOT
North Dakota Department of Transportation

NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

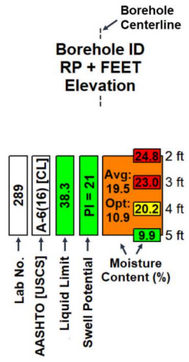
PROJECT NUMBER NH-SS-1-006(025)022 L **PCN** 22207

LOCATION Morton County

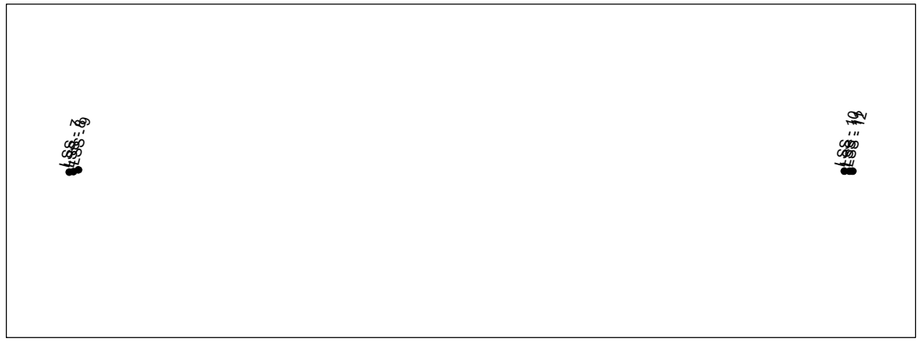


Boreholes Equally Spaced (0 to 7000 ft)

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



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LOG OF BORING SB - 13

NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER NH-SS-1-006(025)022 L **DATE STARTED** 5/28/19 **COMPLETED** 5/28/19

PCN 22207 **ELEVATION** 0 ft

LOCATION Morton County **Northing** 5119255.95 ft **Easting** 350467.93 ft

DRILLED BY Dallan **LOGGED BY** Jamie **DRILLING METHOD**

ENGINEER

NOTES

ELEVATION (ft)	DEPTH (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	AASHTO	USCS	SAMPLE TYPE & NUMBER	RECOVERY (%)	SPT N VALUE	MC / PL / LL / CLAY FRACTION (%)	TESTS & REMARKS
0	0	Pavement Section								
		-1.4 ft 1.4 ft								
		Soft, Moist, Brown, Silty Sand		A-4	ML	SS 132	60	9	0	
-5	5			A-4	SM	SS 133	50	2	0	
				A-4	ML	SS 134	50	2	0	
-10	10			A-4	SM	SS 135	70	6	0	
				A-2-4	SM	SS 136	75	10	0	
-15	15			A-2-4	SM	SS 137	80	10	0	
		-16.2 ft 16.2 ft								
		Very Stiff to Hard, Mosit, Brown, Fat Clay		A-7-6	CH	SS 138	90	10	PL 24 LL 113	
-20	20			A-7-6	CH	SS 139	100	22	PL 28 LL 101	
				A-7-6	CH	SS 140	100	25	PL 27 LL 92	
-25	25	-25.0 ft 25.0 ft								
		Bottom of borehole at 25.0 ft		A-7-6	CH	SS 141	100	25	PL 27 LL 77	

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NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

LOG OF BORING SB - 14

PROJECT NUMBER NH-SS-1-006(025)022 L **DATE STARTED** 5/28/19 **COMPLETED** 5/28/19

PCN 22207 **ELEVATION** 0 ft

LOCATION Morton County **Northing** 5119286.72 ft **Easting** 350476.77 ft

DRILLED BY Dallan **LOGGED BY** Jamie **DRILLING METHOD**

ENGINEER

NOTES

ELEVATION (ft)	DEPTH (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	AASHTO	USCS	SAMPLE TYPE & NUMBER	RECOVERY (%)	SPT N VALUE	MC / PL / LL / CLAY FRACTION (%)	TESTS & REMARKS
0	0	Pavement Section								
		-1.1 ft 1.1 ft								
		Soft, Moist, Dark Brown, Silty Sand		A-4	SM	SS 142	50	7	0	
-5	5			A-2-4	SM	SS 143	75	8	0	
		-6.2 ft 6.2 ft								
		Soft to Stiff, Moist, Brown, Fat Clay		A-7-6	CH	SS 144	75	9	27 85	
-10	10			A-7-6	CH	SS 145	75	9	27 77	
				A-7-6	CH	SS 146	75	18	24 71	
-15	15			A-7-6	CH	SS 147	85	26	20 61	
		-16.0 ft 16.0 ft								
		Very Stiff , Moist, Gray, Fat Clay		A-7-6	CH	SS 148	100	35	27 90	
-20	20			A-7-6	CH	SS 149	100	35	28 71	
				A-7-6	CH	SS 150	100	40	26 70	
-25	25	-25.0 ft 25.0 ft								
				A-7-6	CH	SS 151	50	32	26 68	

Bottom of borehole at 25.0 ft

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NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

LOG OF BORING SB - 15

PROJECT NUMBER NH-SS-1-006(025)022 L **DATE STARTED** 5/29/19 **COMPLETED** 5/29/19

PCN 22207 **ELEVATION** 0 ft

LOCATION Morton County **Northing** 5122824.51 ft **Easting** 350518.66 ft

DRILLED BY Dallan **LOGGED BY** Jamie **DRILLING METHOD**

ENGINEER

NOTES

ELEVATION (ft)	DEPTH (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	AASHTO	USCS	SAMPLE TYPE & NUMBER	RECOVERY (%)	SPT N VALUE	MC / PL / LL / CLAY FRACTION (%)	TESTS & REMARKS
0.0	0.0	Pavement Section								
		-1.8 ft 1.8 ft								
		Soft, Moist, Brown, Silty Sand								
-2.5	2.5			A-4	SM	SS 152	35	5	0	
-5.0	5.0			A-4	SM	SS 153	35	6	0	
				A-4	SM	SS 154	60	2	0	
-7.5	7.5									
-10.0	10.0			A-4	SM	SS 155	70	3	0	
				A-4	SM	SS 156	75	7	0	
-12.5	12.5									
-15.0	15.0	-15.0 ft 15.0 ft		A-4	SM	SS 157	60	4	0	
		Bottom of borehole at 15.0 ft								

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NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

LOG OF BORING SB - 16

PROJECT NUMBER NH-SS-1-006(025)022 L **DATE STARTED** 5/29/19 **COMPLETED** 5/29/19

PCN 22207 **ELEVATION** 0 ft

LOCATION Morton County **Northing** 5122836.60 ft **Easting** 350518.15 ft

DRILLED BY Dallan **LOGGED BY** Jamie **DRILLING METHOD**

ENGINEER

NOTES

ELEVATION (ft)	DEPTH (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	AASHTO	USCS	SAMPLE TYPE & NUMBER	RECOVERY (%)	SPT N VALUE	MC / PL / LL / CLAY FRACTION (%)	TESTS & REMARKS
0.0	0.0	Pavement Section								
		-1.2 ft 1.2 ft								
		Soft to Stiff, Moist, Brown, Silty Sand								
-2.5	2.5			A-4	SM	SS 158	40	10	0	
-5.0	5.0			A-4	SM	SS 159	40	6	0	
				A-4	ML	SS 160	50	4	0	
-7.5	7.5									
-10.0	10.0			A-4	SM	SS 161	40	3	0	
-12.5	12.5			A-4	SM	SS 162	40	3	0	
		-15.0 ft 15.0 ft								
-15.0	15.0	Bottom of borehole at 15.0 ft		A-2-4	SM	SS 163	50	14	0	

NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

LOG OF BORING SB - 17

PROJECT NUMBER NH-SS-1-006(025)022 L **DATE STARTED** 5/29/19 **COMPLETED** 5/29/19

PCN 22207 **ELEVATION** 0 ft

LOCATION Morton County **Northing** 5122867.94 ft **Easting** 350520.89 ft

DRILLED BY Dallan **LOGGED BY** Jamie **DRILLING METHOD**

ENGINEER

NOTES

ELEVATION (ft)	DEPTH (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	AASHTO	USCS	SAMPLE TYPE & NUMBER	RECOVERY (%)	SPT N VALUE	MC / PL / LL / CLAY FRACTION (%)	TESTS & REMARKS
0.0	0.0	Pavement Section								
		-0.7 ft 0.7 ft								
		Soft to Stiff , Moist, Brown, Silty Sand								
-2.5	2.5			A-4	ML	SS 164	35	7	0	
-5.0	5.0			A-4	ML	SS 165	50	5	0	
				A-4	SM	SS 166	75	4	0	
-7.5	7.5									
-10.0	10.0			A-4	SM	SS 167	75	9	0	
				A-4	SM	SS 168	85	13	0	
-12.5	12.5									
-15.0	15.0	-15.0 ft 15.0 ft		A-2-4	SM	SS 169	90	9	0	
		Bottom of borehole at 15.0 ft								

LOG OF BORING SB - 18

NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER NH-SS-1-006(025)022 L **DATE STARTED** 5/29/19 **COMPLETED** 5/29/19

PCN 22207 **ELEVATION** 0 ft

LOCATION Morton County **Northing** 5126589.41 ft **Easting** 350654.39 ft

DRILLED BY Dallan **LOGGED BY** Jamie **DRILLING METHOD**

ENGINEER

NOTES

ELEVATION (ft)	DEPTH (ft)	MATERIAL DESCRIPTION	AASHTO	USCS	SAMPLE TYPE & NUMBER	RECOVERY (%)	SPT N VALUE	MC / PL / LL / CLAY FRACTION (%)	TESTS & REMARKS
0.0	0.0	Pavement Section							
-1.2 ft	1.2 ft								
		Soft, Moist, Brown, Silty Sand	A-4	SM	SS 170	50	9	0	
-2.5	2.5								
			A-2-4	SM	SS 171	75	7	0	
-5.0	5.0								
-6.0 ft	6.0 ft								
		Stiff, Moist, Brown & Gray, Clayey Sand	A-7-6	CH	SS 172	75	9	18 54	
-7.5	7.5								
-10.0 ft	10.0 ft		A-7-6	SC	SS 173	85	23	22 55	
-10.0	10.0	Bottom of borehole at 10.0 ft							

NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

LOG OF BORING SB - 19

PROJECT NUMBER NH-SS-1-006(025)022 L **DATE STARTED** 5/29/19 **COMPLETED** 5/29/19

PCN 22207 **ELEVATION** 0 ft

LOCATION Morton County **Northing** 5126629.51 ft **Easting** 350655.12 ft

DRILLED BY Dallan **LOGGED BY** Jamie **DRILLING METHOD**

ENGINEER

NOTES

ELEVATION (ft)	DEPTH (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	AASHTO	USCS	SAMPLE TYPE & NUMBER	RECOVERY (%)	SPT N VALUE	MC / PL / LL / CLAY FRACTION (%)	TESTS & REMARKS
0.0	0.0	Pavement Section								
		-0.9 ft 0.9 ft								
		Soft, Moist, Dark Brown, Silty Sand		A-4	ML	SS 174	60	5	0	
-2.5	2.5									
-5.0	5.0			A-2-4	SM	SS 175	75	8	0	
		-6.0 ft 6.0 ft								
		Stiff, Moist, Brown & Gray, Clayey Sand with Loom		A-7-6	SM	SS 176	75	14	26 41	
-7.5	7.5									
		-10.0 ft 10.0 ft		A-7-6	SC	SS 177	90	25	24 48	
-10.0	10.0	Bottom of borehole at 10.0 ft								

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LOG OF BORING SB - 20

NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER NH-SS-1-006(025)022 L **DATE STARTED** 5/29/19 **COMPLETED** 5/29/19

PCN 22207 **ELEVATION** 0 ft

LOCATION Morton County **Northing** 5126669.88 ft **Easting** 350648.52 ft

DRILLED BY Dallan **LOGGED BY** Jamie **DRILLING METHOD**

ENGINEER

NOTES

ELEVATION (ft)	DEPTH (ft)	MATERIAL DESCRIPTION	AASHTO	USCS	SAMPLE TYPE & NUMBER	RECOVERY (%)	SPT N VALUE	MC / PL / LL / CLAY FRACTION (%)	TESTS & REMARKS
0.0	0.0	Pavement Section							
-1.1 ft	1.1 ft	Medium Stiff, Moist, Brown, Sandy Clay							
-2.5	2.5		A-2-4	SM	SS 178	70	11	0	
-5.0	5.0		A-2-4	SM	SS 179	60	10	0	
-7.5 ft	7.5 ft		A-6	CL	SS 180	75	9	1932	
-7.5	7.5	Medium Stiff, Moist, Brown & Gray, Lean Clay with Loom							
-10.0 ft	10.0 ft		A-7-6	CL	SS 181	90	24	21 49	
-10.0	10.0	Bottom of borehole at 10.0 ft							

NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

LOG OF BORING SB - 21

PROJECT NUMBER NH-SS-1-006(025)022 L **DATE STARTED** 5/29/19 **COMPLETED** 5/29/19

PCN 22207 **ELEVATION** 0 ft

LOCATION Morton County **Northing** 5133039.23 ft **Easting** 350941.86 ft

DRILLED BY Dallan **LOGGED BY** Jamie **DRILLING METHOD**

ENGINEER

NOTES

ELEVATION (ft)	DEPTH (ft)	MATERIAL DESCRIPTION	AASHTO	USCS	SAMPLE TYPE & NUMBER	RECOVERY (%)	SPT N VALUE	MC / PL / LL / CLAY FRACTION (%)	TESTS & REMARKS
0	0	Pavement Section							
		-2.5 ft 2.5 ft							
		Soft, Moist, Brown, Silty Sand	A-4	SM	SS 182	40	8	0	
		-5.0 ft 5.0 ft							
-5	5	Soft, Moist, Brown, Lean Clay	A-6	CL	SS 183	50	4	16 32	
			A-6	CL	SS 184	50	4	17 33	
		-10.0 ft 10.0 ft							
-10	10	Soft, Moist, Brown, Silty Sand and Clayey Sand	A-6	CL	SS 185	55	6	18 31	
			A-4	CL	SS 186	50	4	1 28	
-15	15	-16.0 ft 16.0 ft	A-4	SM	SS 187	60	7	227	
		Stiff, Moist, Brown & Gray, Fat Clay with loom	A-7-6	CH	SS 188	90	28	22 56	
-20	20		A-7-6	CH	SS 189	90	37	26 52	
			A-7-6	CL	SS 190	100	39	22 46	
-25	25	-25.0 ft 25.0 ft	A-6	CL	SS 191	100	45	20 38	
		Bottom of borehole at 25.0 ft							

NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

LOG OF BORING SB - 22

PROJECT NUMBER NH-SS-1-006(025)022 L **DATE STARTED** 5/29/19 **COMPLETED** 5/29/19

PCN 22207 **ELEVATION** 0 ft

LOCATION Morton County **Northing** 5133066.07 ft **Easting** 350950.47 ft

DRILLED BY Dallan **LOGGED BY** Jamie **DRILLING METHOD**

ENGINEER

NOTES

ELEVATION (ft)	DEPTH (ft)	MATERIAL DESCRIPTION	AASHTO	USCS	SAMPLE TYPE & NUMBER	RECOVERY (%)	SPT N VALUE	MC / PL / LL / CLAY FRACTION (%)	TESTS & REMARKS
0	0	Pavement Section							
		-1.4 ft 1.4 ft							
		Loose, Moist, Brown, Silty Sand	A-4	CL-ML	SS 192	50	6	226	
-5	5		A-4	SM	SS 193	60	6	0	
		-6.0 ft 6.0 ft							
		Very loose, Moist, Brown, Fine Sand	A-2-4	SM	SS 194	50	8	0	
-10	10		A-2-4	SM	SS 195	75	10	0	
		-12.5 ft 12.5 ft	A-7-6	CH	SS 196	75	12	18 73	
		Stiff, Mosit, Brown & Black, Fat Clay Loom	A-7-6	ML	SS 197	90	24	28 45	
-15	15		A-7-6	CH	SS 198	100	36	28 63	
-20	20		A-7-5	SM	SS 199	100	55	3851	
			A-7-6	CH	SS 200	100	45	24 63	
		-24.0 ft 24.0 ft							
		VeryStiff, Brown, Gray, Fat Clay							
-25	25	-25.0 ft 25.0 ft	A-7-6	CH	SS 201	100	41	21 60	
		Bottom of borehole at 25.0 ft							

NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

LOG OF BORING SB - 23

PROJECT NUMBER NH-SS-1-006(025)022 L **DATE STARTED** 5/30/19 **COMPLETED** 5/30/19

PCN 22207 **ELEVATION** 0 ft

LOCATION Morton County **Northing** 5139176.57 ft **Easting** 351268.93 ft

DRILLED BY Dallan **LOGGED BY** Jamie **DRILLING METHOD**

ENGINEER

NOTES

ELEVATION (ft)	DEPTH (ft)	MATERIAL DESCRIPTION	AASHTO	USCS	SAMPLE TYPE & NUMBER	RECOVERY (%)	SPT N VALUE	MC / PL / LL / CLAY FRACTION (%)	TESTS & REMARKS
0	0	Pavement Section -1.0 ft 1.0 ft							
		Medium Stiff to very Soft, Moist, Brown, Silty Sand with Clay	A-4	SC-SM	SS 202	75	10	MC 122	
-5	5		A-4	SM	SS 203	75	8	MC 0	
			A-4	SM	SS 204	75	4	MC 0	
-10	10		A-2-4	SM	SS 205	85	2	MC 0	
			A-2-4	SM	SS 206	50	2	MC 0	
		-14.0 ft 14.0 ft							
		Loose, Moist, Brown, Fine Sand	A-2-4	SM	SS 207	75	13	MC 0	
-15	15		A-3	SP-SM	SS 208	75	11	MC 0	
		-19.0 ft 19.0 ft							
		Medium Dense to Loose, Moist, Brown, Gravel with Sand	A-1-a	SW-SM	SS 209	50	11	MC 0	
-20	20		A-1-b	SM	SS 210	30	13	MC 0	
		-25.0 ft 25.0 ft							
-25	25		A-3	SP-SM	SS 211	50	7	MC 0	
		Bottom of borehole at 25.0 ft							

NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

LOG OF BORING SB - 24

PROJECT NUMBER NH-SS-1-006(025)022 L **DATE STARTED** 5/30/19 **COMPLETED** 5/30/19

PCN 22207 **ELEVATION** 0 ft

LOCATION Morton County **Northing** 5139207.77 ft **Easting** 351279.61 ft

DRILLED BY Dallan **LOGGED BY** Jamie **DRILLING METHOD**

ENGINEER

NOTES

ELEVATION (ft)	DEPTH (ft)	MATERIAL DESCRIPTION	AASHTO	USCS	SAMPLE TYPE & NUMBER	RECOVERY (%)	SPT N VALUE	MC / PL / LL / CLAY FRACTION (%)	TESTS & REMARKS
0	0	Pavement Section							
		-1.0 ft 1.0 ft							
		Soft, Moist, Brown, Silty Clay			SS 212	70	5		
		-4.0 ft 4.0 ft							
-5	5	Soft, Moist, Brown, Silty Clay with Loom	A-4	CL-ML	SS 213	70	6	226	
			A-7-6	CL	SS 214	75	2	21 49	
-10	10		A-7-6	CL	SS 215	100	2	17 48	
			A-4	ML	SS 216	60	5	0	
		-14.0 ft 14.0 ft							
-15	15	Loose, Moist, Brown, Silty Sand	A-2-4	SM	SS 217	85	13	0	
		-16.0 ft 16.0 ft							
		Medium Stiff, Moist, Brown, Clayey Sand	A-6	SC	SS 218	75	9	1830	
		-19.0 ft 19.0 ft							
-20	20	Loose, Moist, Brown, Silty Sand and Gravel	A-3	SP-SM	SS 219	75	13	0	
			A-3	SP-SM	SS 220	95	6	0	
-25	25	-25.0 ft 25.0 ft	A-2-4	SM	SS 221	85	12	0	
		Bottom of borehole at 25.0 ft							

NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

LOG OF BORING SB - 25

PROJECT NUMBER NH-SS-1-006(025)022 L **DATE STARTED** 5/30/19 **COMPLETED** 5/30/19

PCN 22207 **ELEVATION** 0 ft

LOCATION Morton County **Northing** 5141259.45 ft **Easting** 351571.26 ft

DRILLED BY Dallan **LOGGED BY** Jamie **DRILLING METHOD**

ENGINEER

NOTES

ELEVATION (ft)	DEPTH (ft)	MATERIAL DESCRIPTION	AASHTO	USCS	SAMPLE TYPE & NUMBER	RECOVERY (%)	SPT N VALUE	MC / PL / LL / CLAY FRACTION (%)	TESTS & REMARKS
0	0	Pavement Section							
		-1.8 ft 1.8 ft							
		Medium Stiff to Soft, Moist, Brown & Gray, Sandy Clay	A-6	CL	SS 222	55	13	17 29	
			A-6	CL	SS 223	30	5	17 30	
-5	5		A-6	CL	SS 224	30	5	15 29	
			A-6	CL	SS 225	20	2	15 37	
-10	10		A-7-6	CH	SS 226	50	9	15 57	
		-14.4 ft 14.4 ft							
-15	15	Loose, Moist, Brown & Gray, Silty Sand with Gravels	A-2-4	SP-SM	SS 227	65	11	0	
		-16.0 ft 16.0 ft							
		Soft, Moist, Brown, Well Graded Sand with Silt	A-1-a	SW-SM	SS 228	70	24	0	
		-19.2 ft 19.2 ft							
-20	20	Stiff to Very Stiff, Moist, Gray, Silt	A-4	ML	SS 229	75	25	0	
			A-4	ML	SS 230	85	44	0	
-25	25	-25.0 ft 25.0 ft							
		Bottom of borehole at 25.0 ft	A-4	SM	SS 231	75	28	0	

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LOG OF BORING SB - 26

NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER NH-SS-1-006(025)022 L **DATE STARTED** 5/30/19 **COMPLETED** 5/30/19

PCN 22207 **ELEVATION** 0 ft

LOCATION Morton County **Northing** 5141271.23 ft **Easting** 351604.16 ft

DRILLED BY Dallan **LOGGED BY** Jamie **DRILLING METHOD**

ENGINEER

NOTES

ELEVATION (ft)	DEPTH (ft)	MATERIAL DESCRIPTION	AASHTO	USCS	SAMPLE TYPE & NUMBER	RECOVERY (%)	SPT N VALUE	MC / PL / LL / CLAY FRACTION (%)	TESTS & REMARKS
0	0	Pavement Section							
		-1.1 ft 1.1 ft							
		Medium Stiff, Moist, Brown, Silty Sand	A-4	ML	SS 232	60	11	0	
			A-4	SM	SS 233	50	11	0	
-5	5		A-4	ML	SS 234	75	4	0	
			A-1-b	SM	SS 235	50	18	0	
-10	10	-11.0 ft 11.0 ft							
		Loose, Moist, Brown & Gray, Silty Sand & Gravel	A-2-4	SM	SS 236	50	12	0	
			A-2-4	SM	SS 237	75	16	0	
-15	15		A-1-b	SM	SS 238	20	12	0	
		-19.3 ft 19.3 ft							
		Stiff, Moist, Gray, Clayey Sand with Silt	A-7-6	SC	SS 239	90	27	23 47	
-20	20		A-4	SM	SS 240	90	42	0	
-25	25	-25.0 ft 25.0 ft	A-4	SM	SS 241	100	40	0	
		Bottom of borehole at 25.0 ft							

APPENDIX E

LAB RESULTS

GRAIN SIZE DISTRIBUTION

NORTH DAKOTA DEPARTMENT OF TRANSPORATION
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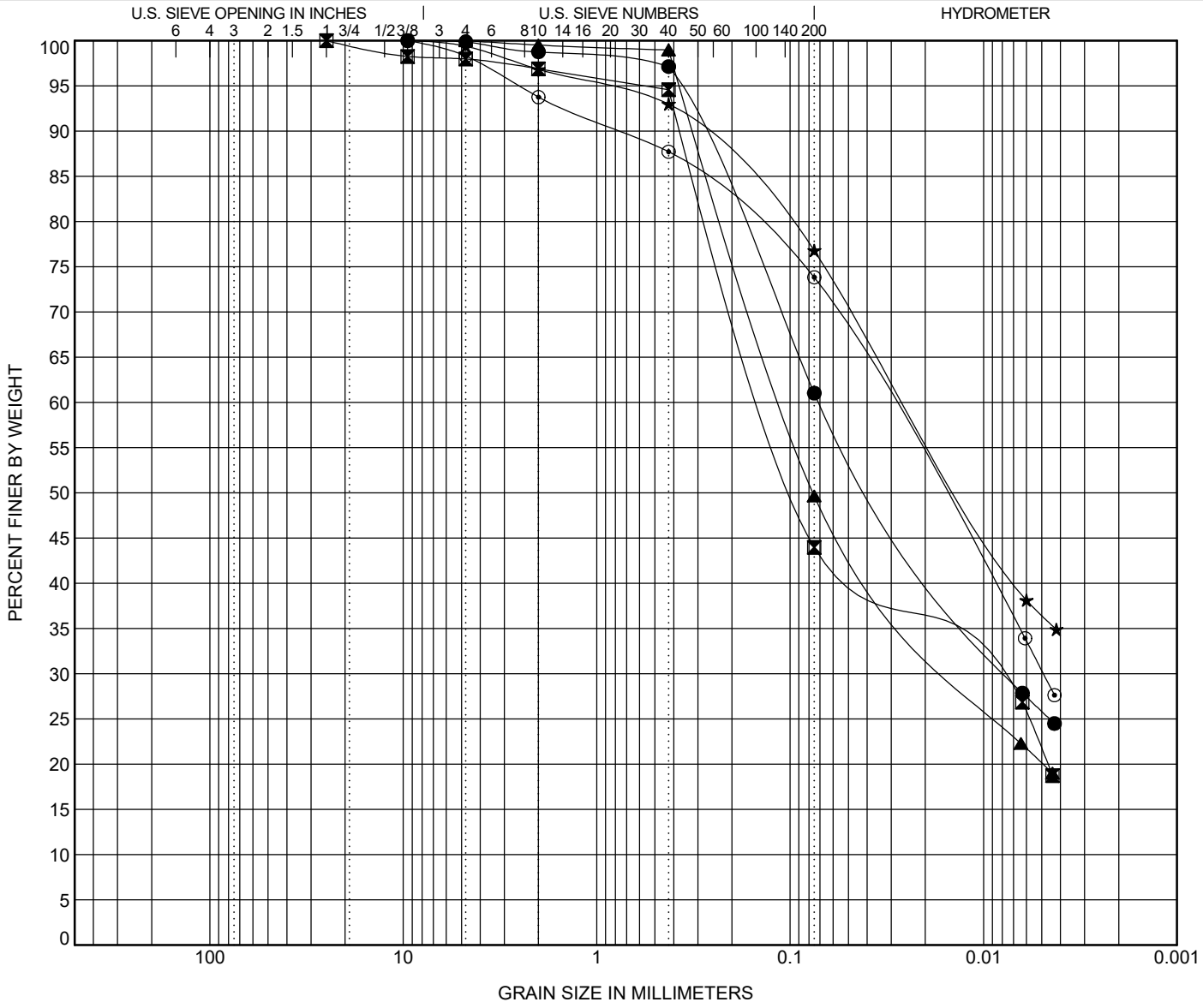

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	**LSS - 1**	**2.0**	**A-6 (7)**	**CL**	**34**	**19**	**15**		
⊠	**LSS - 2**	**2.0**	**A-7-6 (5)**	**SC**	**41**	**21**	**20**		
▲	**LSS - 3**	**2.0**	**A-7-6 (10)**	**SC**	**50**	**22**	**28**		
★	**LSS - 4**	**2.0**	**A-7-6 (38)**	**CH**	**68**	**20**	**48**		
⊙	**LSS - 5**	**2.0**	**A-7-6 (28)**	**CH**	**60**	**22**	**38**		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**LSS - 1**	**2.0**	**9.5**	**0.069**	**0.007**		**0.1**	**38.9**	**35.2**	**25.8**
⊠	**LSS - 2**	**2.0**	**25**	**0.13**	**0.01**		**2.0**	**54.0**	**22.3**	**21.6**
▲	**LSS - 3**	**2.0**	**4.75**	**0.108**	**0.013**		**0.0**	**50.4**	**29.5**	**20.1**
★	**LSS - 4**	**2.0**	**9.5**	**0.025**			**0.6**	**22.6**	**40.3**	**36.5**
⊙	**LSS - 5**	**2.0**	**9.5**	**0.031**	**0.005**		**1.7**	**24.5**	**43.5**	**30.3**

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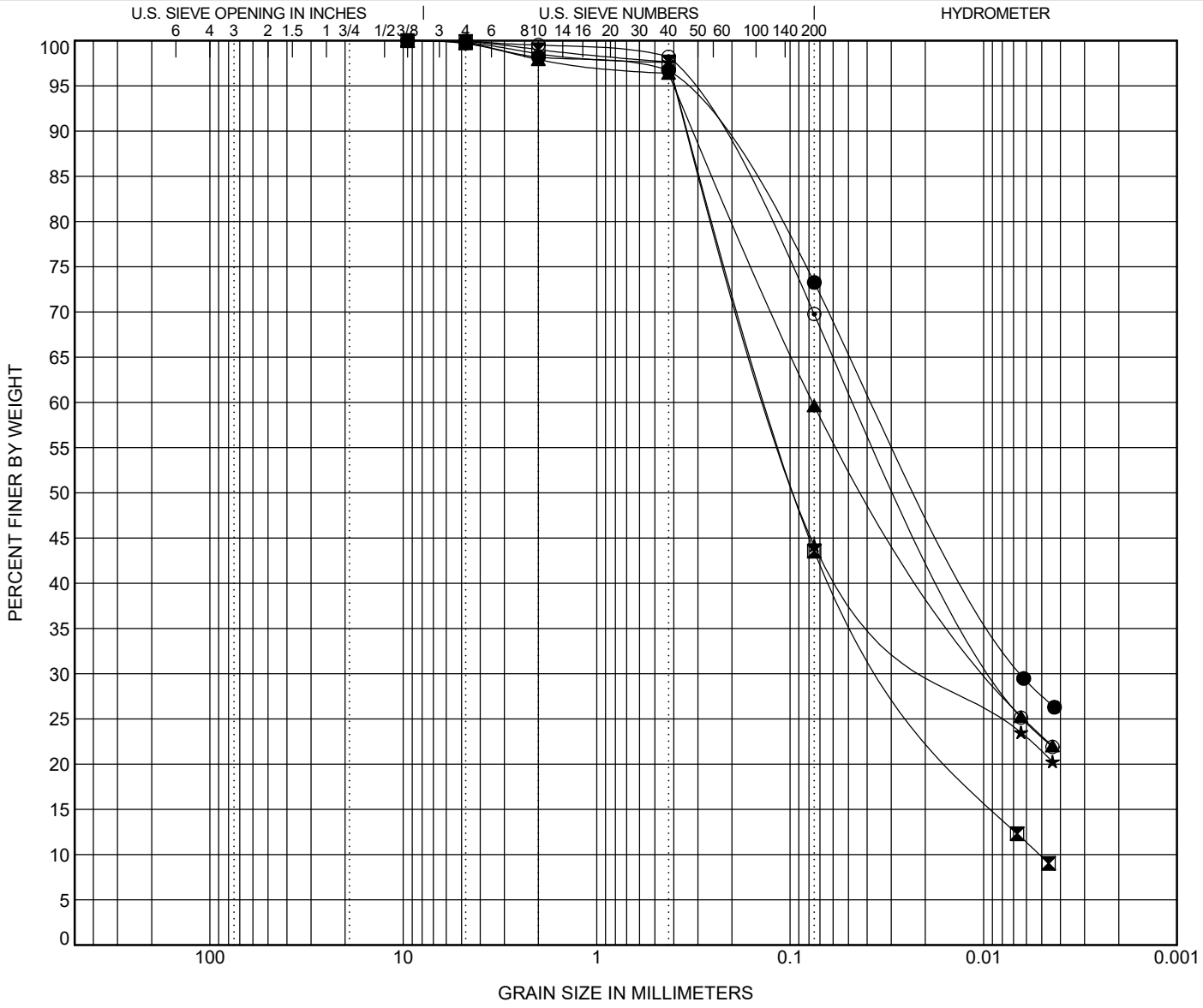

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	LSS - 6	2.0	A-7-6 (22)	CH	51	20	31		
⊠	LSS - 7	2.0	A-4 (0)	SM	NP	NP	NP	1.06	24.73
▲	LSS - 8	2.0	A-6 (8)	CL	36	18	18		
★	LSS - 9	2.0	A-7-6 (5)	SC	42	21	21		
⊙	LSS - 10	2.0	A-6 (11)	CL	36	18	18		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	LSS - 6	2.0	9.5	0.035	0.006		0.2	26.5	45.7	27.6
⊠	LSS - 7	2.0	9.5	0.127	0.026	0.005	0.1	56.4	33.8	9.8
▲	LSS - 8	2.0	9.5	0.076	0.009		0.3	40.1	36.5	23.1
★	LSS - 9	2.0	9.5	0.125	0.014		0.2	55.6	22.8	21.4
⊙	LSS - 10	2.0	9.5	0.044	0.008		0.0	30.2	46.8	23.0

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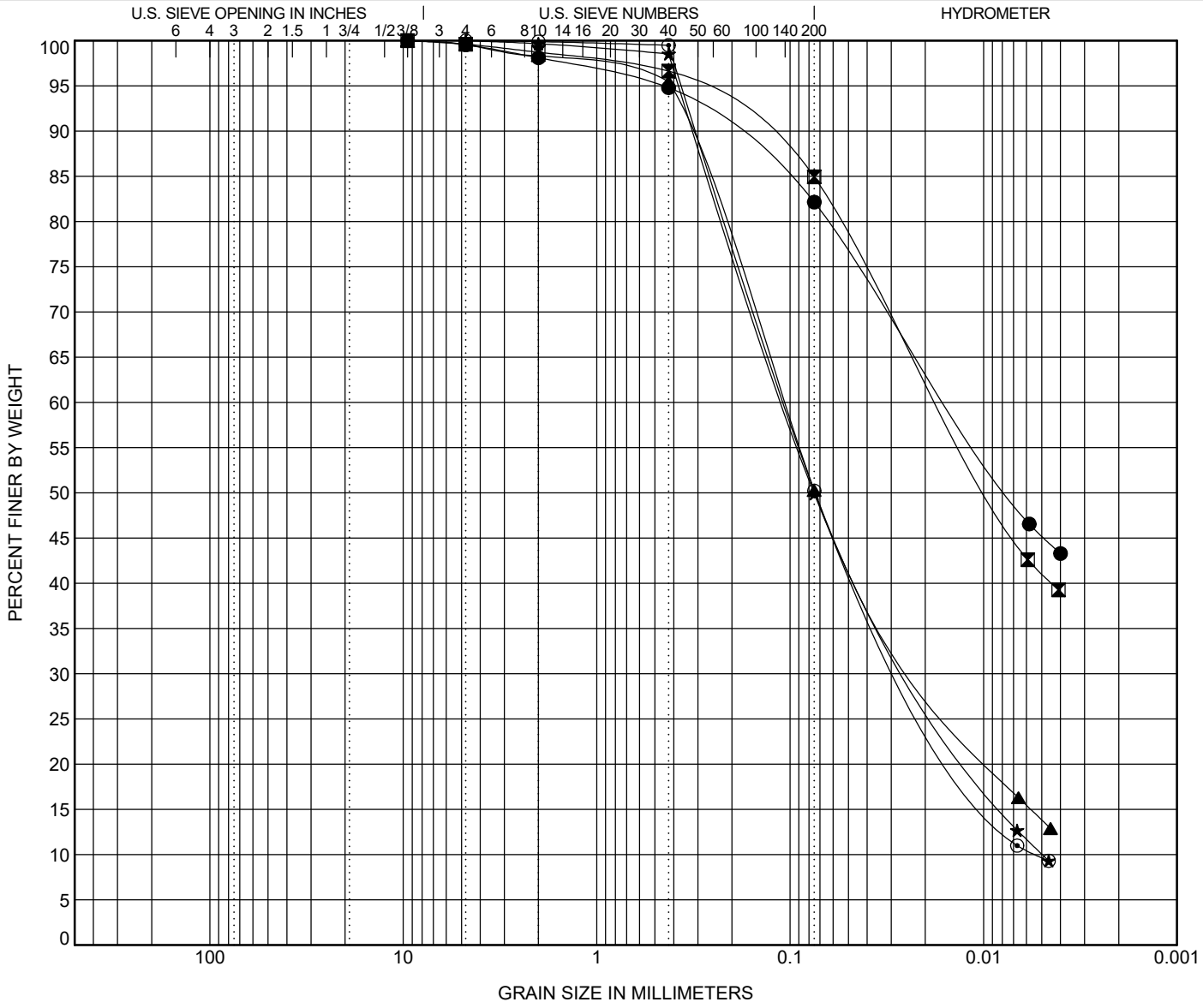

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	**LSS - 11**	**2.0**	**A-7-6 (36)**	**CH**	**60**	**18**	**42**		
⊠	**LSS - 12**	**2.0**	**A-7-6 (27)**	**CH**	**51**	**21**	**30**		
▲	**SB - 13**	**2.0**	**A-4 (0)**	**ML**	**NP**	**NP**	**NP**		
★	**SB - 13**	**4.0**	**A-4 (0)**	**SM**	**NP**	**NP**	**NP**	**0.80**	**21.68**
⊙	**SB - 13**	**6.0**	**A-4 (0)**	**ML**	**NP**	**NP**	**NP**	**0.82**	**19.74**

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**LSS - 11**	**2.0**	**9.5**	**0.015**			**0.5**	**17.4**	**36.9**	**45.3**
⊠	**LSS - 12**	**2.0**	**9.5**	**0.017**			**0.4**	**14.7**	**43.9**	**41.1**
▲	**SB - 13**	**2.0**	**9.5**	**0.109**	**0.018**		**0.4**	**49.3**	**36.4**	**13.8**
★	**SB - 13**	**4.0**	**4.75**	**0.107**	**0.021**	**0.005**	**0.0**	**50.1**	**39.8**	**10.1**
⊙	**SB - 13**	**6.0**	**4.75**	**0.106**	**0.022**	**0.005**	**0.0**	**49.8**	**40.5**	**9.7**

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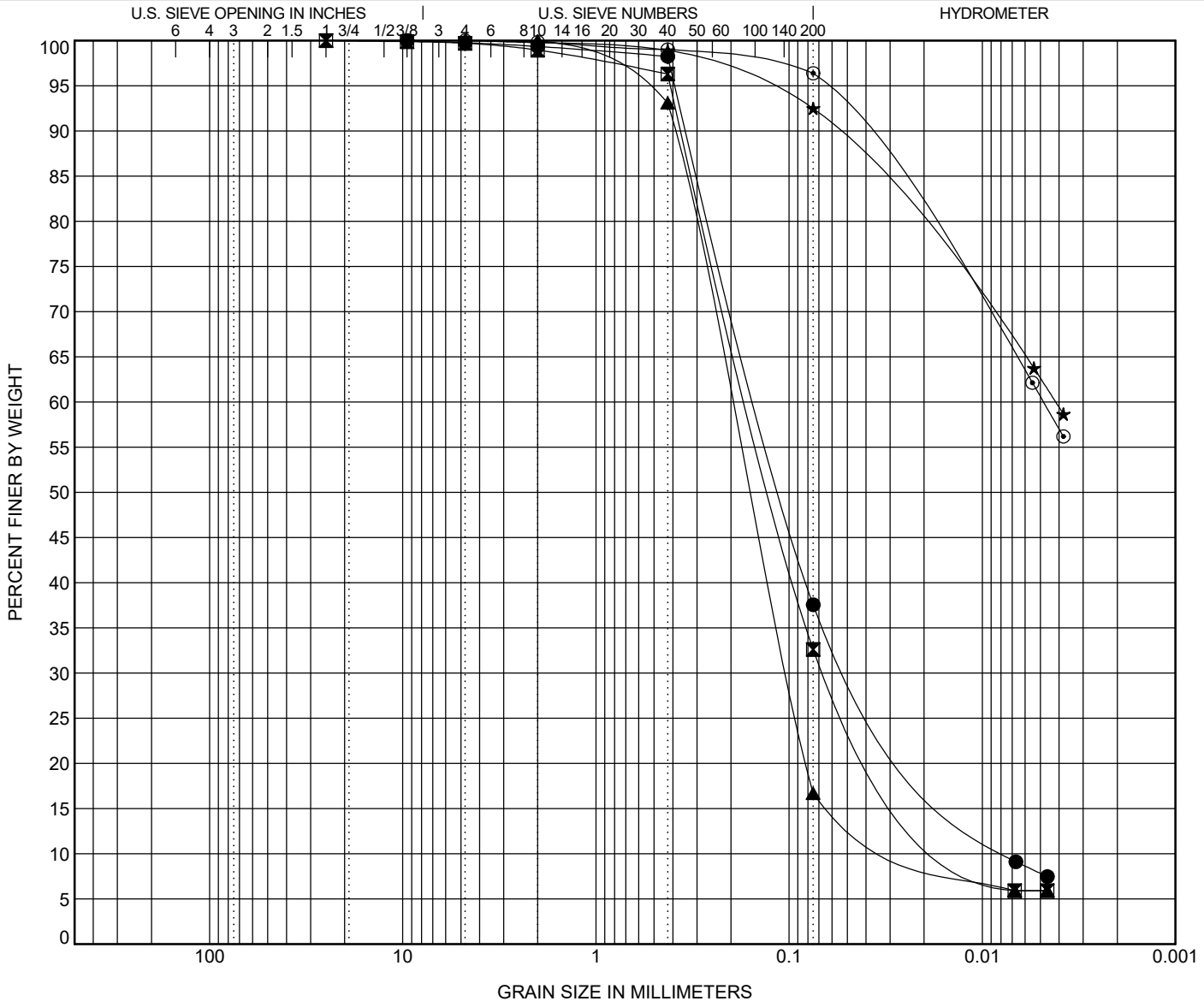

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	SB - 13	9.0	A-4 (0)	SM	NP	NP	NP	1.51	19.71
⊠	SB - 13	11.0	A-2-4 (0)	SM	NP	NP	NP	2.26	16.10
▲	SB - 13	14.0	A-2-4 (0)	SM	NP	NP	NP	3.04	11.85
★	SB - 13	16.0	A-7-6 (93)	CH	113	24	89		
⊙	SB - 13	19.0	A-7-6 (82)	CH	101	28	73		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	SB - 13	9.0	9.5	0.142	0.039	0.007	0.2	62.2	29.7	7.8
⊠	SB - 13	11.0	25	0.158	0.059	0.01	0.3	67.1	26.7	5.9
▲	SB - 13	14.0	2	0.201	0.101	0.017	0.0	83.3	10.8	5.9
★	SB - 13	16.0	4.75	0.004			0.0	7.5	29.9	62.6
⊙	SB - 13	19.0	4.75	0.005			0.0	3.6	35.8	60.6

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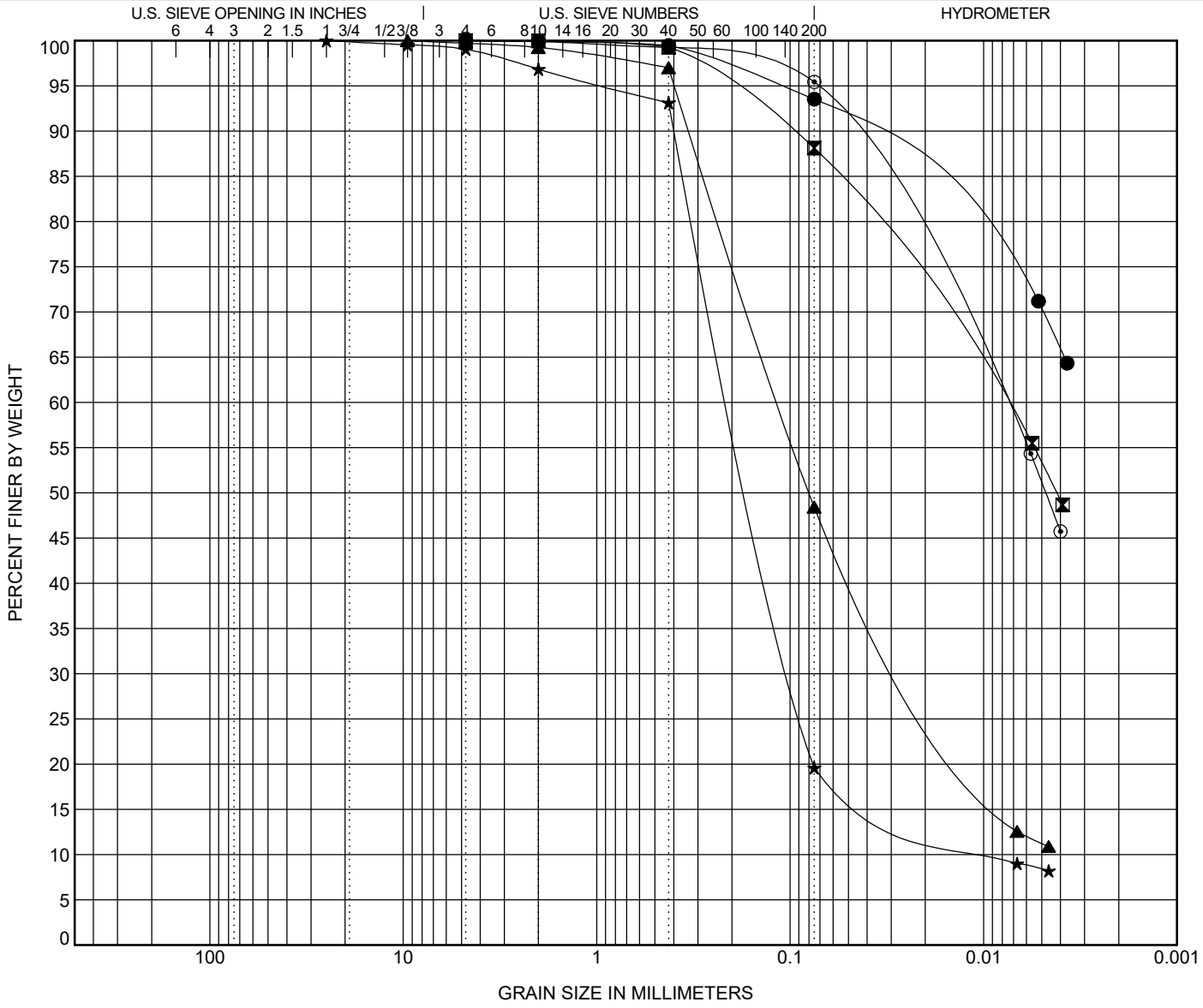

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	SB - 13	21.0	A-7-6 (71)	CH	92	27	65		
⊠	SB - 13	24.0	A-7-6 (50)	CH	77	27	50		
▲	SB - 14	2.0	A-4 (0)	SM	NP	NP	NP		
★	SB - 14	4.0	A-2-4 (0)	SM	NP	NP	NP	5.62	23.15
⊙	SB - 14	6.0	A-7-6 (64)	CH	85	27	58		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	SB - 13	21.0	4.75				0.0	6.5	23.1	70.4
⊠	SB - 13	24.0	4.75	0.008			0.0	11.9	34.8	53.4
▲	SB - 14	2.0	9.5	0.113	0.022		0.3	51.3	37.2	11.3
★	SB - 14	4.0	25	0.195	0.096	0.008	1.0	79.4	11.2	8.4
⊙	SB - 14	6.0	4.75	0.008			0.0	4.6	44.3	51.2

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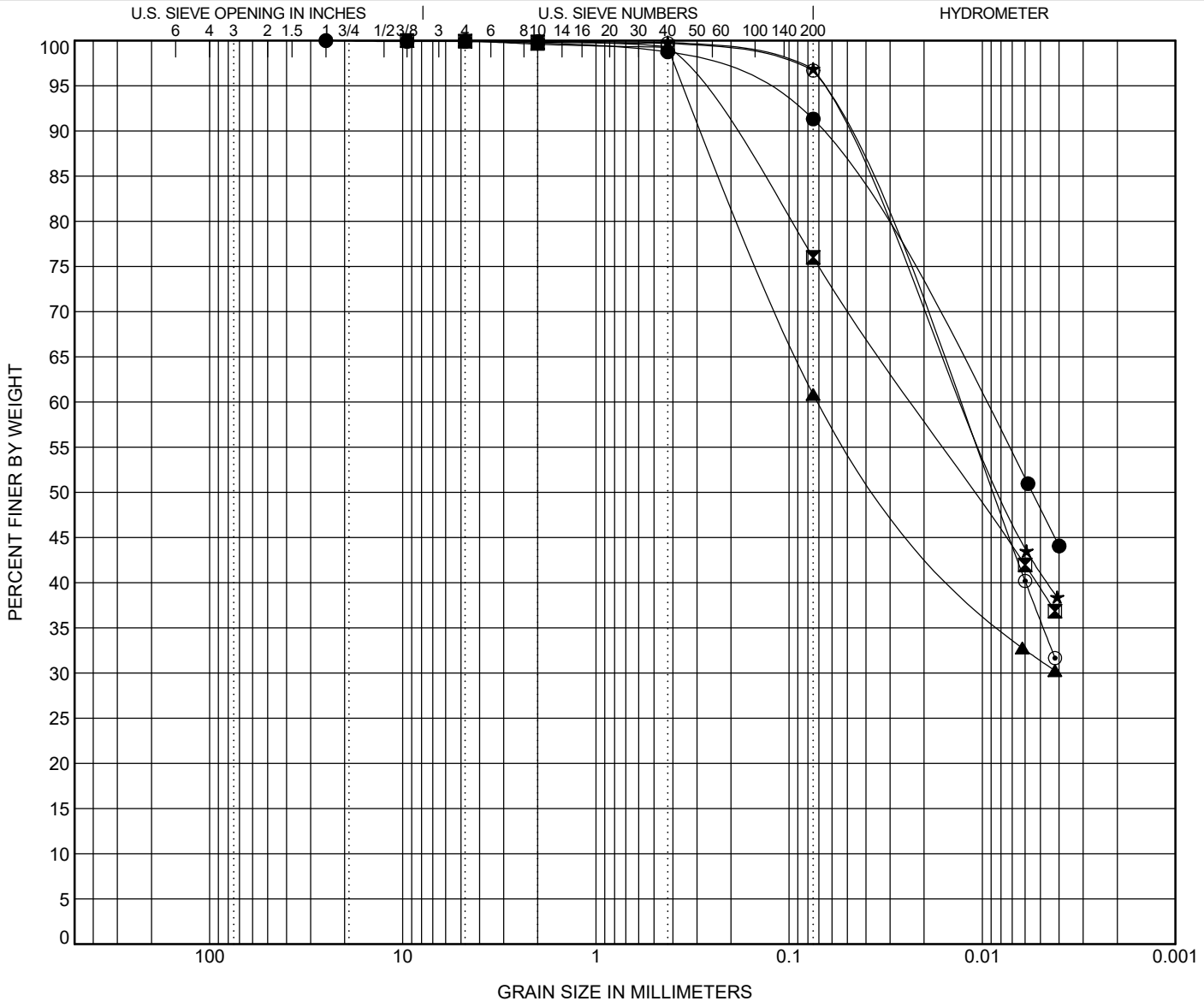

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	SB - 14	9.0	A-7-6 (52)	CH	77	27	50		
⊠	SB - 14	11.0	A-7-6 (37)	CH	71	24	47		
▲	SB - 14	14.0	A-7-6 (22)	CH	61	20	41		
★	SB - 14	16.0	A-7-6 (71)	CH	90	27	63		
⊙	SB - 14	19.0	A-7-6 (49)	CH	71	28	43		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	SB - 14	9.0	25	0.01			0.1	8.6	43.1	48.2
⊠	SB - 14	11.0	9.5	0.023			0.1	23.9	36.6	39.4
▲	SB - 14	14.0	4.75	0.07			0.0	39.2	29.5	31.4
★	SB - 14	16.0	4.75	0.013			0.0	3.1	55.7	41.2
⊙	SB - 14	19.0	4.75	0.015			0.0	3.3	60.9	35.8

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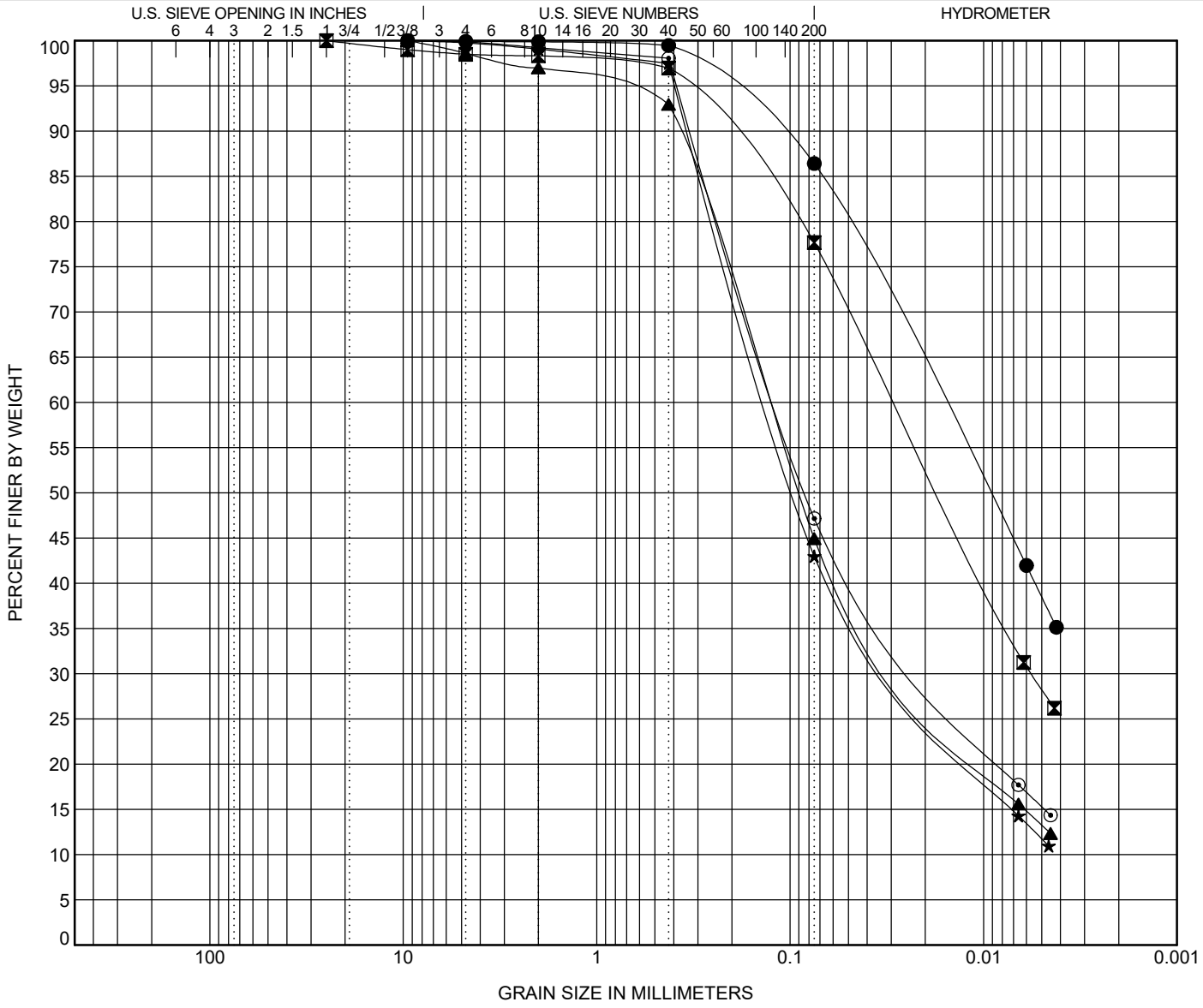

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	SB - 14	21.0	A-7-6 (42)	CH	70	26	44		
⊠	SB - 14	24.0	A-7-6 (35)	CH	68	26	42		
▲	SB - 15	2.0	A-4 (0)	SM	NP	NP	NP		
★	SB - 15	4.0	A-4 (0)	SM	NP	NP	NP		
⊙	SB - 15	6.0	A-4 (0)	SM	NP	NP	NP		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	SB - 14	21.0	9.5	0.017			0.1	13.5	47.9	38.5
⊠	SB - 14	24.0	25	0.029	0.006		1.5	20.8	49.4	28.3
▲	SB - 15	2.0	9.5	0.129	0.022		1.4	53.7	31.7	13.2
★	SB - 15	4.0	9.5	0.129	0.025		0.2	56.8	31.3	11.7
⊙	SB - 15	6.0	9.5	0.116	0.018		0.2	52.7	31.9	15.3

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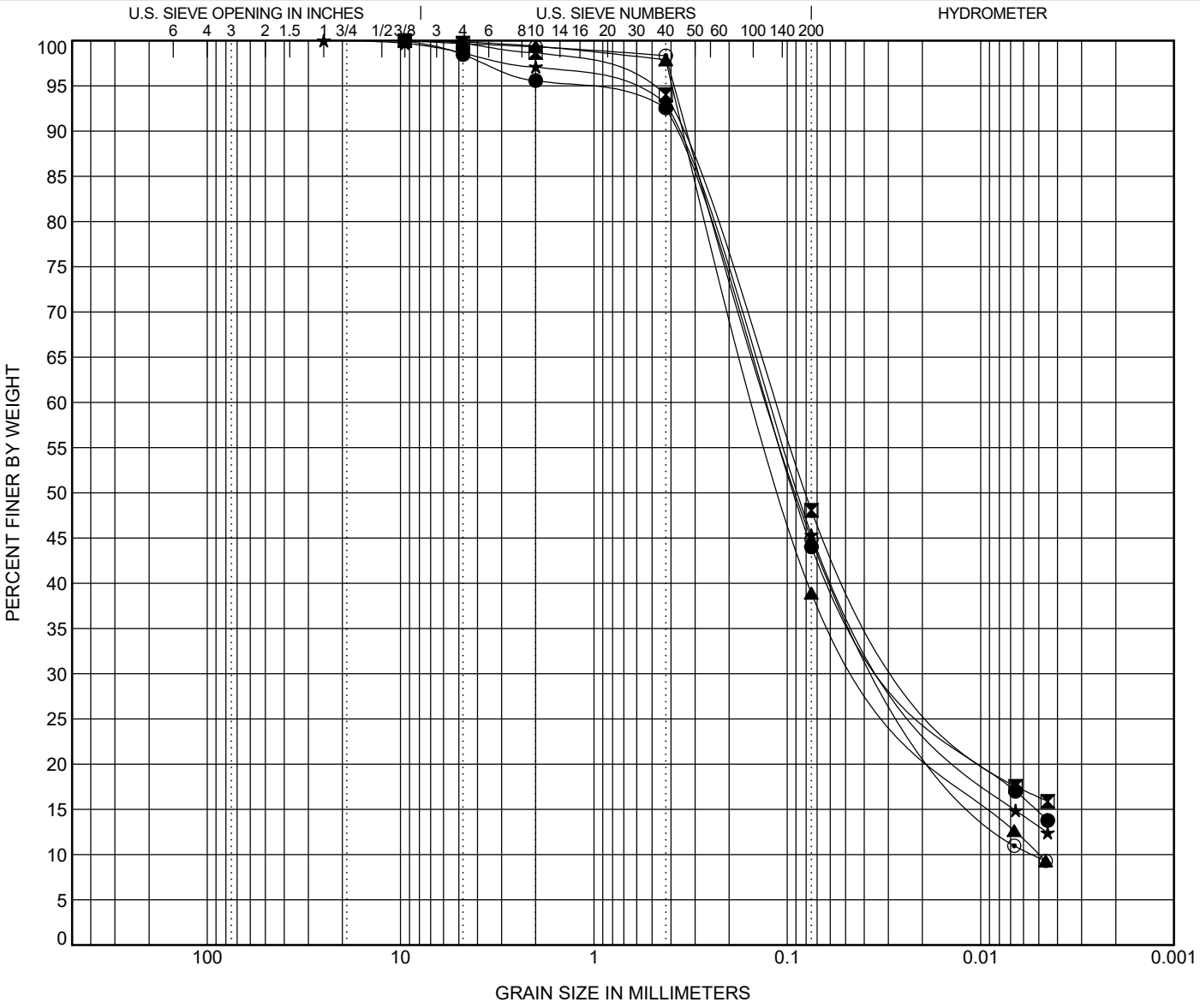

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	SB - 15	9.0	A-4 (0)	SM	NP	NP	NP		
⊠	SB - 15	11.0	A-4 (0)	SM	NP	NP	NP		
▲	SB - 15	14.0	A-4 (0)	SM	NP	NP	NP	1.57	28.03
★	SB - 16	2.0	A-4 (0)	SM	NP	NP	NP		
⊙	SB - 16	4.0	A-4 (0)	SM	NP	NP	NP	1.02	22.76

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	SB - 15	9.0	9.5	0.133	0.021		1.5	54.4	29.4	14.7
⊠	SB - 15	11.0	9.5	0.118	0.018		0.3	51.7	31.7	16.3
▲	SB - 15	14.0	9.5	0.139	0.033	0.005	0.1	60.9	28.9	10.0
★	SB - 16	2.0	25	0.128	0.022		1.4	53.3	32.3	13.1
⊙	SB - 16	4.0	9.5	0.123	0.026	0.005	0.3	54.8	35.2	9.7

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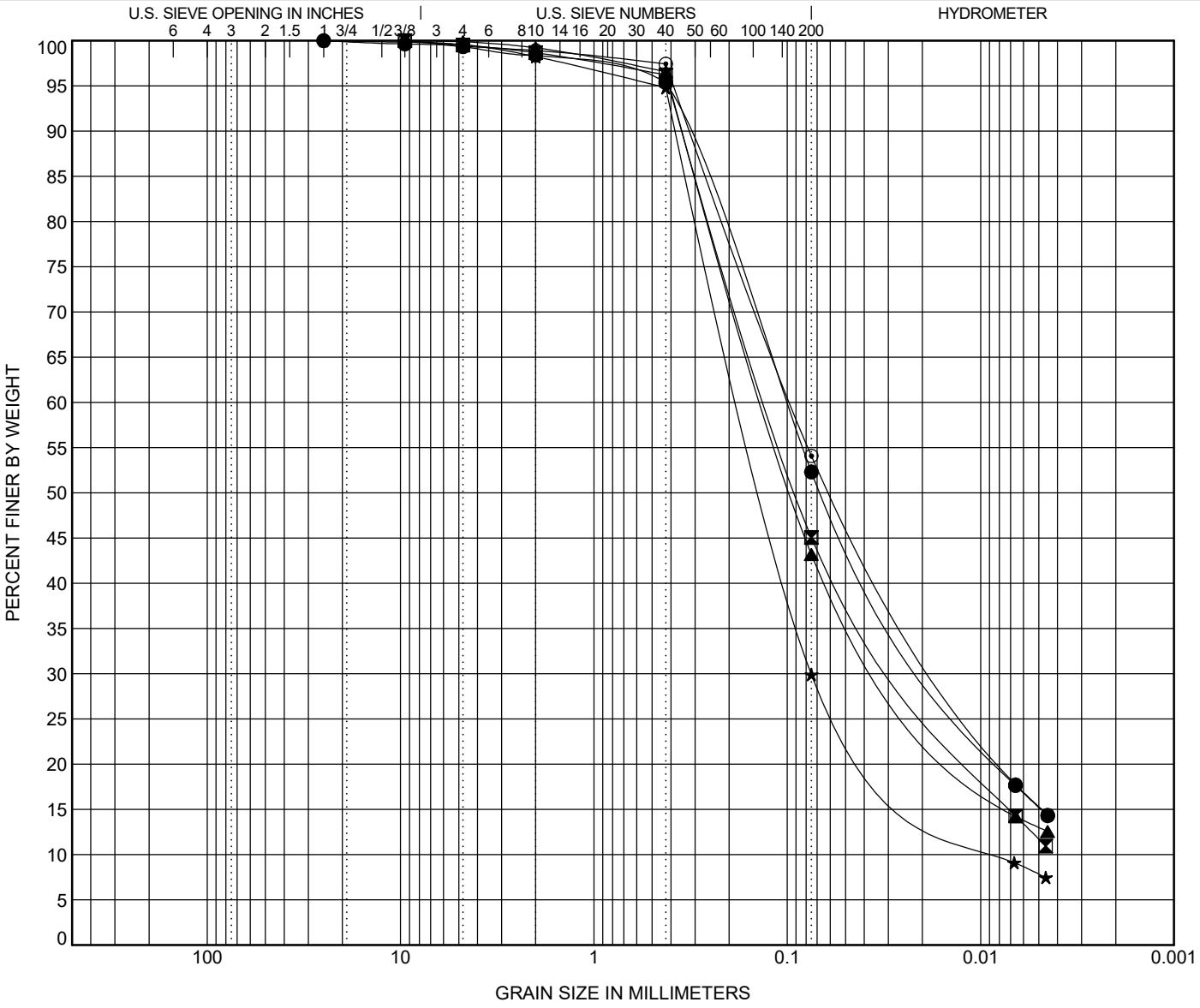

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	SB - 16	6.0	A-4 (0)	ML	NP	NP	NP		
⊠	SB - 16	9.0	A-4 (0)	SM	NP	NP	NP		
▲	SB - 16	11.0	A-4 (0)	SM	NP	NP	NP		
★	SB - 16	14.0	A-2-4 (0)	SM	NP	NP	NP	4.53	22.55
⊙	SB - 17	2.0	A-4 (0)	ML	NP	NP	NP		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	SB - 16	6.0	25	0.102	0.016		0.7	47.0	37.1	15.2
⊠	SB - 16	9.0	9.5	0.124	0.023		0.5	54.5	33.4	11.7
▲	SB - 16	11.0	9.5	0.13	0.025		0.1	56.7	30.2	13.0
★	SB - 16	14.0	25	0.168	0.075	0.007	0.4	69.6	22.1	7.8
⊙	SB - 17	2.0	9.5	0.095	0.015		0.6	45.3	38.8	15.3

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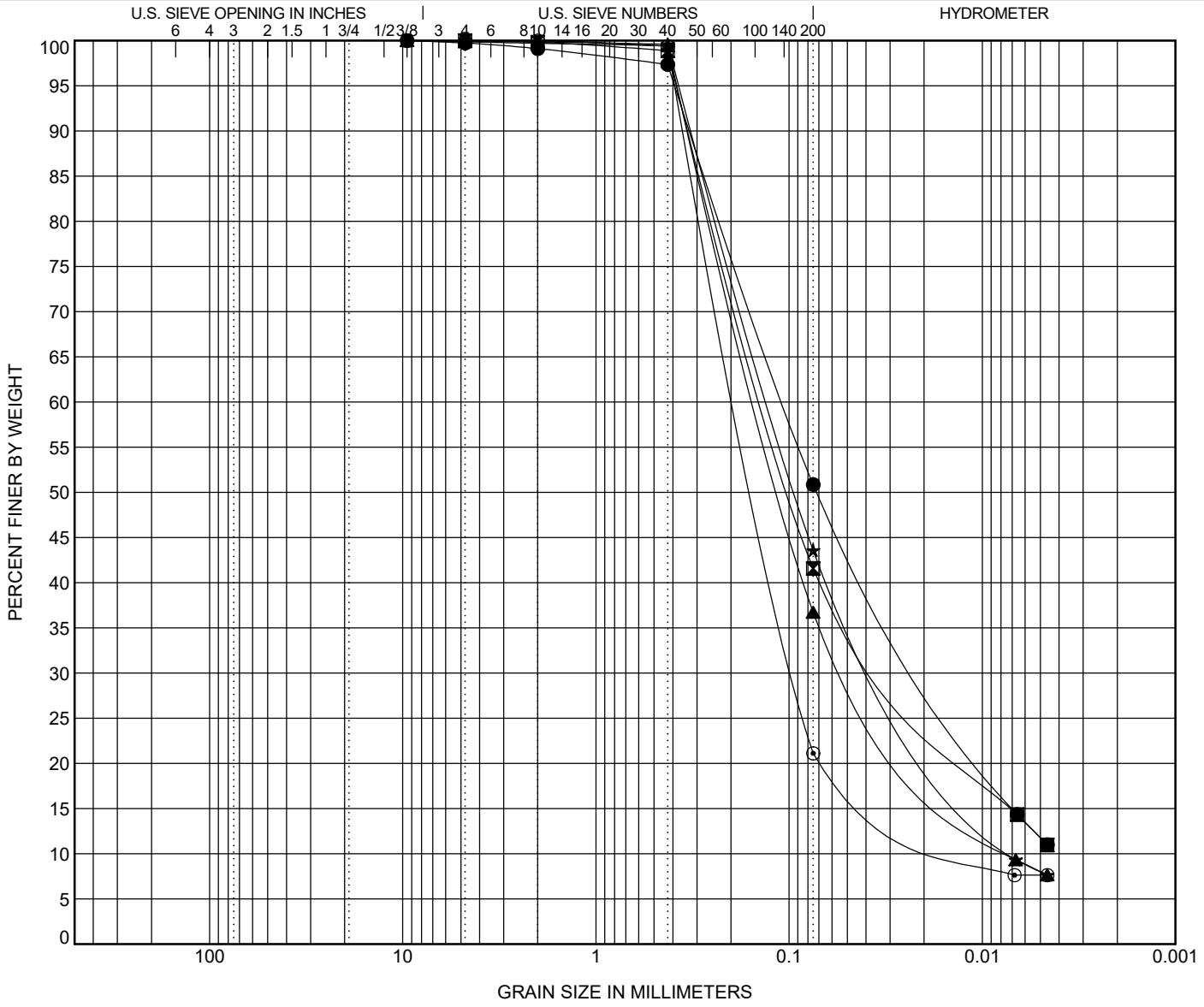

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	SB - 17	4.0	A-4 (0)	ML	NP	NP	NP		
⊠	SB - 17	6.0	A-4 (0)	SM	NP	NP	NP		
▲	SB - 17	9.0	A-4 (0)	SM	NP	NP	NP	1.69	20.10
★	SB - 17	11.0	A-4 (0)	SM	NP	NP	NP	0.95	17.74
⊙	SB - 17	14.0	A-2-4 (0)	SM	NP	NP	NP	4.53	17.13

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	SB - 17	4.0	9.5	0.105	0.019		0.3	48.9	39.1	11.8
⊠	SB - 17	6.0	4.75	0.131	0.027		0.0	58.4	29.8	11.7
▲	SB - 17	9.0	9.5	0.143	0.041	0.007	0.1	63.1	28.7	8.0
★	SB - 17	11.0	9.5	0.125	0.029	0.007	0.1	56.3	35.6	8.0
⊙	SB - 17	14.0	4.75	0.178	0.091	0.01	0.0	78.9	13.5	7.6

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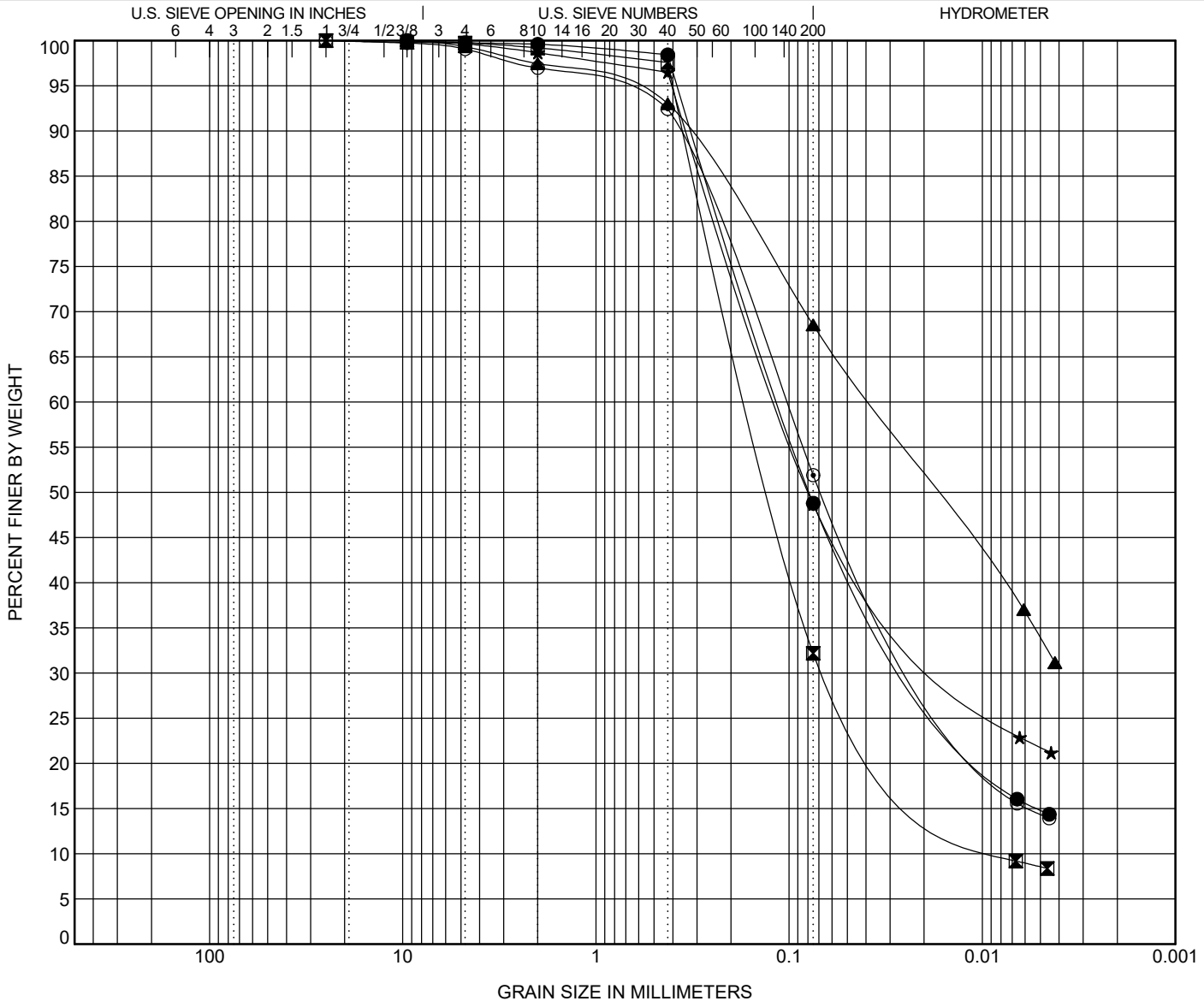

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE		DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	SB - 18	2.0	A-4 (0)	SM	NP	NP	NP		
⊠	SB - 18	4.0	A-2-4 (0)	SM	NP	NP	NP	3.11	21.51
▲	SB - 18	6.0	A-7-6 (23)	CH	54	18	36		
★	SB - 18	9.0	A-7-6 (12)	SC	55	22	33		
⊙	SB - 19	2.0	A-4 (0)	ML	NP	NP	NP		

BOREHOLE		DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	SB - 18	2.0	9.5	0.111	0.019		0.2	51.0	34.0	14.8
⊠	SB - 18	4.0	25	0.157	0.06	0.007	0.3	67.5	23.6	8.6
▲	SB - 18	6.0	9.5	0.038			0.7	30.8	34.6	33.9
★	SB - 18	9.0	9.5	0.113	0.013		0.4	51.0	26.9	21.8
⊙	SB - 19	2.0	25	0.106	0.017		0.9	47.2	37.5	14.4

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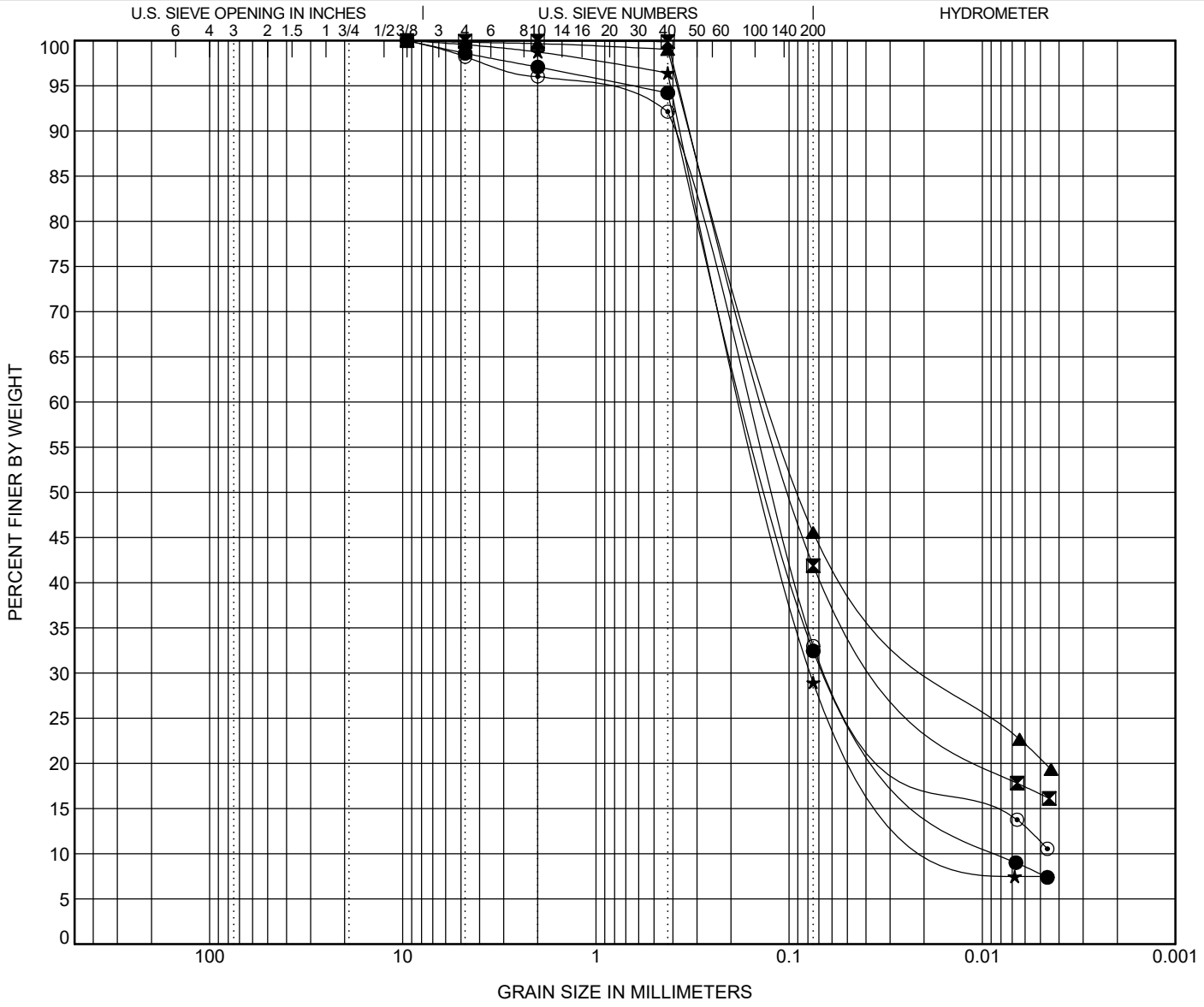
GRAIN SIZE DISTRIBUTION

NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER NH-SS-1-006(025)022 L **LOCATION** Morton County

PCN 22207



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	SB - 19	4.0	A-2-4 (0)	SM	NP	NP	NP	2.82	21.92
⊠	SB - 19	6.0	A-7-6 (3)	SM	41	26	15		
▲	SB - 19	9.0	A-7-6 (7)	SC	48	24	24		
★	SB - 20	2.0	A-2-4 (0)	SM	NP	NP	NP	3.95	18.47
⊙	SB - 20	4.0	A-2-4 (0)	SM	NP	NP	NP		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	SB - 19	4.0	9.5	0.163	0.058	0.007	1.4	66.2	24.7	7.7
⊠	SB - 19	6.0	9.5	0.129	0.023		0.0	58.1	25.3	16.6
▲	SB - 19	9.0	9.5	0.12	0.014		0.2	54.3	25.1	20.5
★	SB - 20	2.0	9.5	0.167	0.077	0.009	0.5	70.6	21.5	7.5
⊙	SB - 20	4.0	9.5	0.166	0.051		1.8	65.2	21.7	11.3

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BISMARCK, ND 58504

PROJECT NUMBER NH-SS-1-006(025)022 L **LOCATION** Morton County

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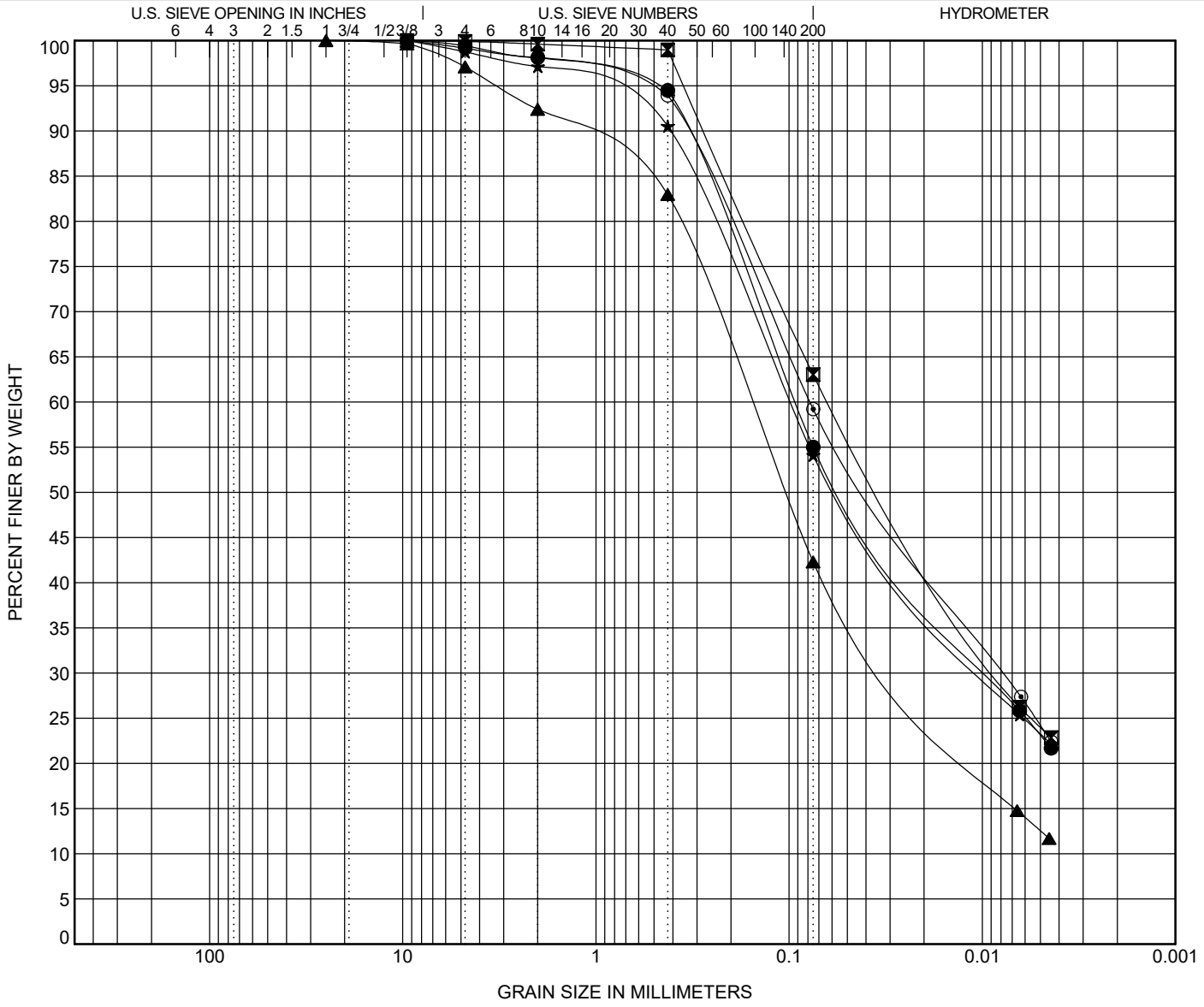

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	SB - 20	6.0	A-6 (4)	CL	32	19	13		
⊠	SB - 20	9.0	A-7-6 (16)	CL	49	21	28		
▲	SB - 21	2.0	A-4 (0)	SM	NP	NP	NP		
★	SB - 21	4.0	A-6 (5)	CL	32	16	16		
⊙	SB - 21	6.0	A-6 (7)	CL	33	17	16		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	SB - 20	6.0	9.5	0.093	0.009		0.6	44.4	31.9	23.1
⊠	SB - 20	9.0	9.5	0.061	0.008		0.1	36.9	39.0	24.0
▲	SB - 21	2.0	25	0.16	0.025		2.9	54.8	29.8	12.5
★	SB - 21	4.0	9.5	0.099	0.009		1.2	44.6	30.9	23.2
⊙	SB - 21	6.0	9.5	0.078	0.008		0.8	39.9	35.0	24.2

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BISMARCK, ND 58504

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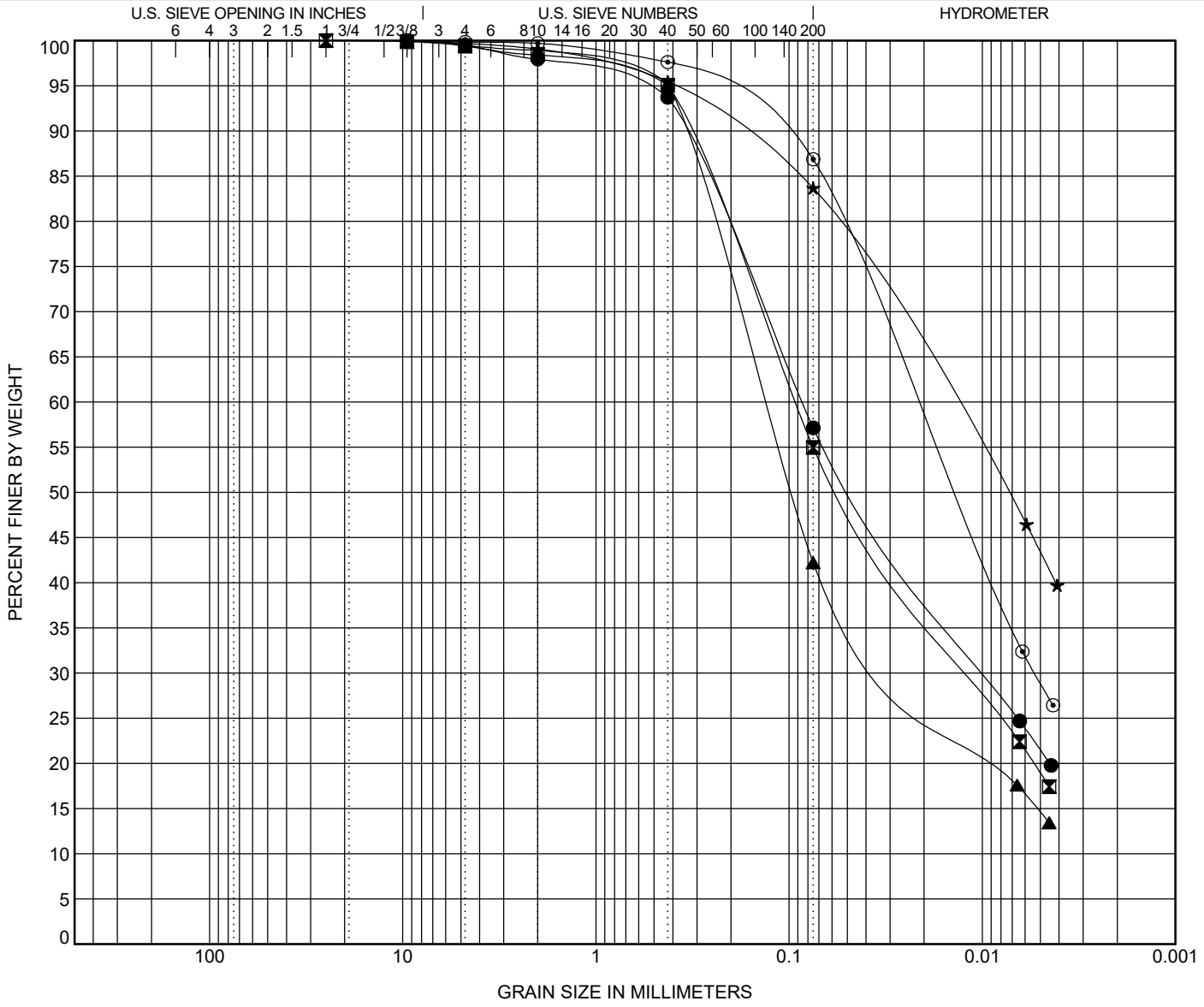

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	SB - 21	9.0	A-6 (5)	CL	31	18	13		
⊠	SB - 21	11.0	A-4 (2)	CL	28	19	9		
▲	SB - 21	14.0	A-4 (0)	SM	27	22	5		
★	SB - 21	16.0	A-7-6 (30)	CH	56	22	34		
⊙	SB - 21	19.0	A-7-6 (25)	CH	52	26	26		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	SB - 21	9.0	9.5	0.086	0.01		0.5	42.4	35.7	21.5
⊠	SB - 21	11.0	25	0.093	0.011		0.6	44.4	36.1	18.9
▲	SB - 21	14.0	9.5	0.134	0.022		0.5	57.2	27.6	14.6
★	SB - 21	16.0	9.5	0.015			0.3	16.0	40.3	43.4
⊙	SB - 21	19.0	9.5	0.022	0.005		0.2	13.0	58.0	28.9

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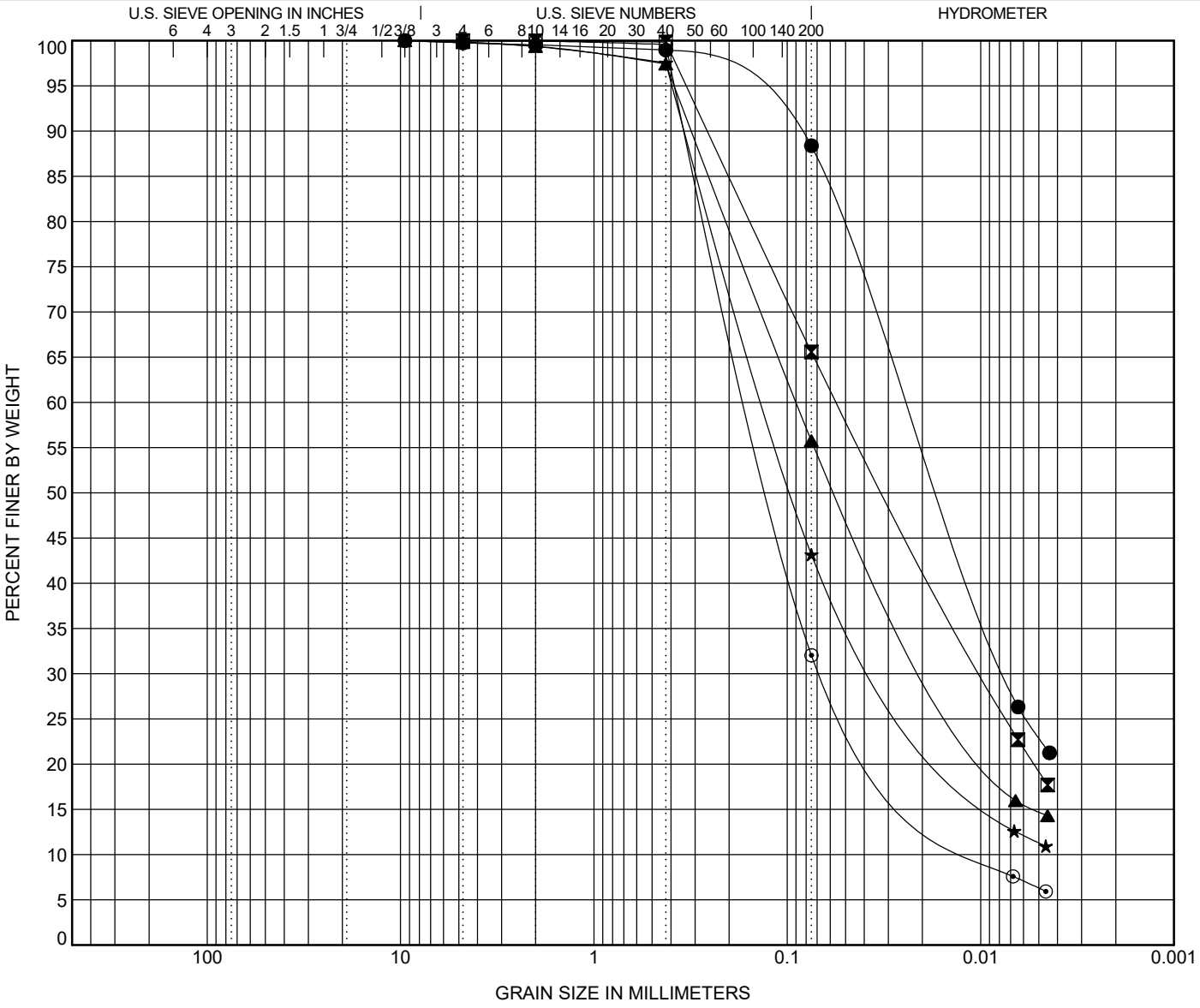

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	SB - 21	21.0	A-7-6 (22)	CL	46	22	24		
⊠	SB - 21	24.0	A-6 (10)	CL	38	20	18		
▲	SB - 22	2.0	A-4 (1)	CL-ML	26	20	6		
★	SB - 22	4.0	A-4 (0)	SM	NP	NP	NP		
⊙	SB - 22	6.0	A-2-4 (0)	SM	NP	NP	NP	2.85	17.85

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	SB - 21	21.0	9.5	0.024	0.007		0.2	11.4	65.4	23.0
⊠	SB - 21	24.0	4.75	0.054	0.01		0.0	34.4	46.4	19.2
▲	SB - 22	2.0	9.5	0.089	0.016		0.2	44.0	41.0	14.8
★	SB - 22	4.0	9.5	0.128	0.026		0.2	56.7	31.9	11.3
⊙	SB - 22	6.0	4.75	0.154	0.061	0.009	0.0	68.0	25.8	6.3

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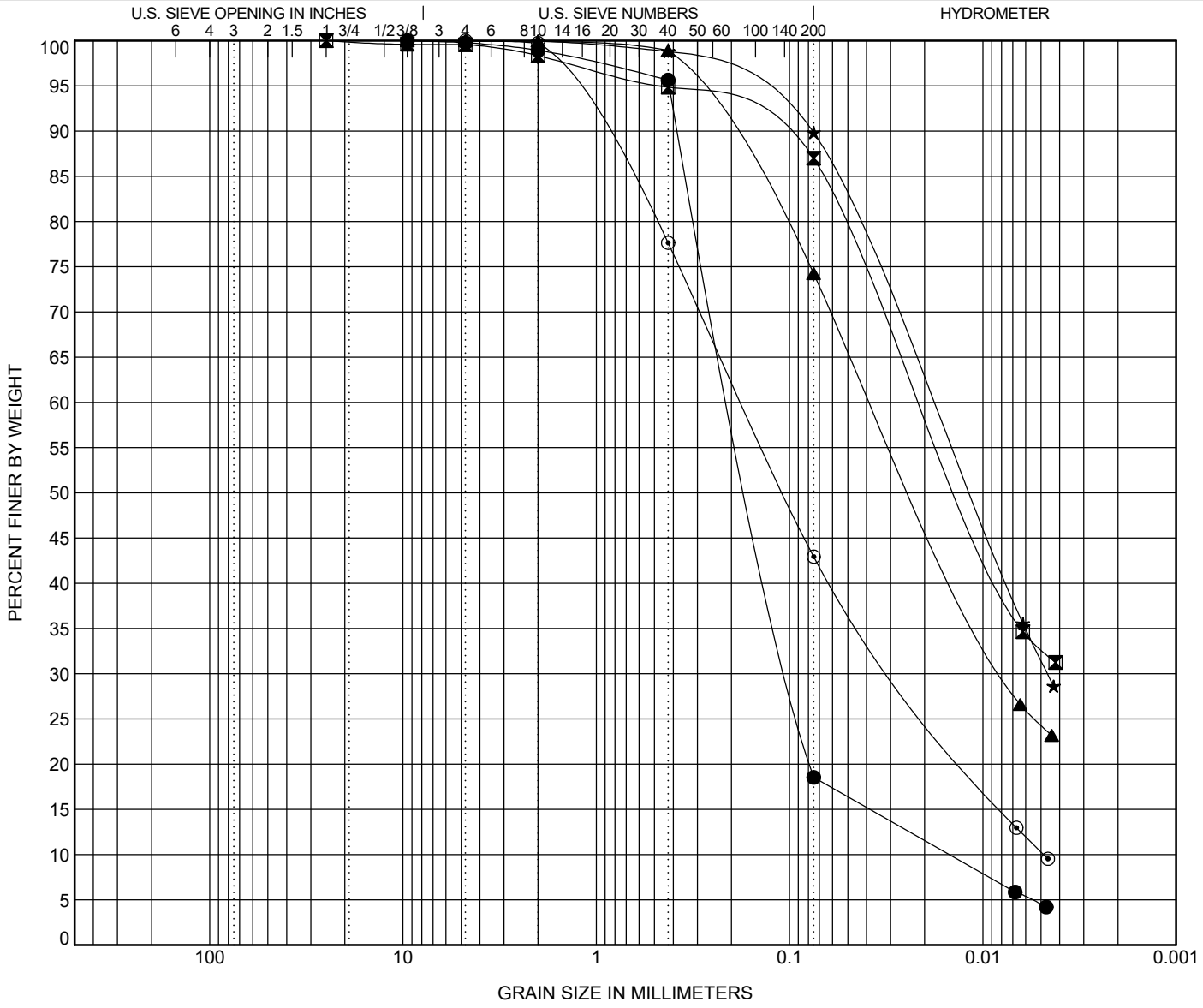

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE		DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	SB - 22	9.0	A-2-4 (0)	SM	NP	NP	NP	3.31	12.78
⊠	SB - 22	11.0	A-7-6 (51)	CH	73	18	55		
▲	SB - 22	14.0	A-7-6 (13)	ML	45	28	17		
★	SB - 22	16.0	A-7-6 (36)	CH	63	28	35		
⊙	SB - 22	19.0	A-7-5 (3)	SM	51	38	13	0.82	36.34

BOREHOLE		DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	SB - 22	9.0	9.5	0.191	0.097	0.015	0.2	81.2	14.1	4.5
⊠	SB - 22	11.0	25	0.021			0.4	12.6	54.2	32.8
▲	SB - 22	14.0	9.5	0.036	0.008		0.0	25.8	49.9	24.3
★	SB - 22	16.0	9.5	0.019	0.005		0.1	10.1	58.4	31.5
⊙	SB - 22	19.0	4.75	0.176	0.026	0.005	0.0	57.1	32.6	10.3

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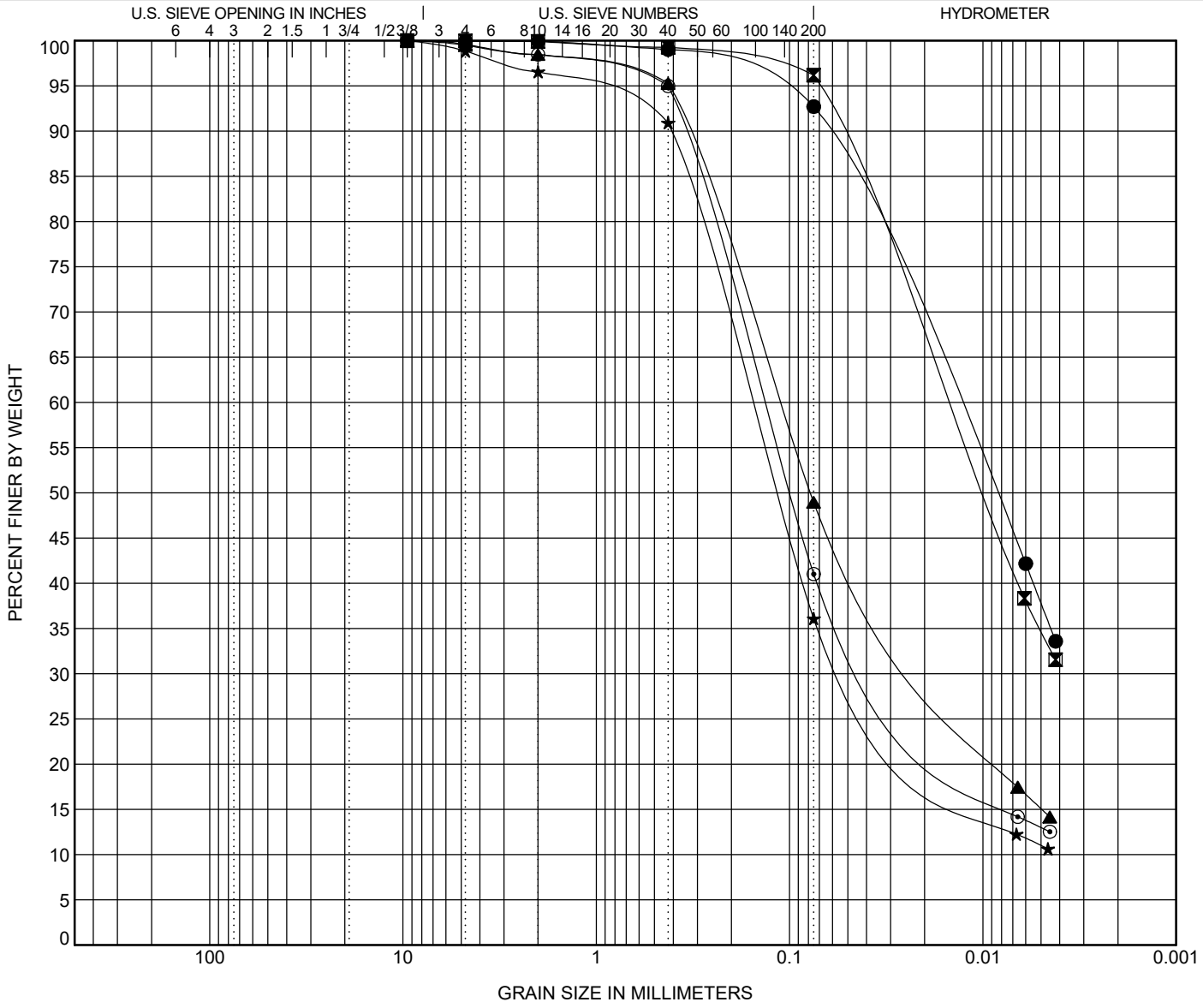

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	SB - 22	21.0	A-7-6 (41)	CH	63	24	39		
⊠	SB - 22	24.0	A-7-6 (42)	CH	60	21	39		
▲	SB - 23	2.0	A-4 (0)	SC-SM	22	18	4		
★	SB - 23	4.0	A-4 (0)	SM	NP	NP	NP		
⊙	SB - 23	6.0	A-4 (0)	SM	NP	NP	NP		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	SB - 22	21.0	9.5	0.015			0.1	7.2	54.9	37.8
⊠	SB - 22	24.0	9.5	0.016			0.0	3.8	61.5	34.7
▲	SB - 23	2.0	9.5	0.113	0.017		0.5	50.5	33.9	15.1
★	SB - 23	4.0	9.5	0.16	0.04		1.2	62.7	25.1	11.0
⊙	SB - 23	6.0	9.5	0.138	0.028		0.4	58.6	28.0	13.0

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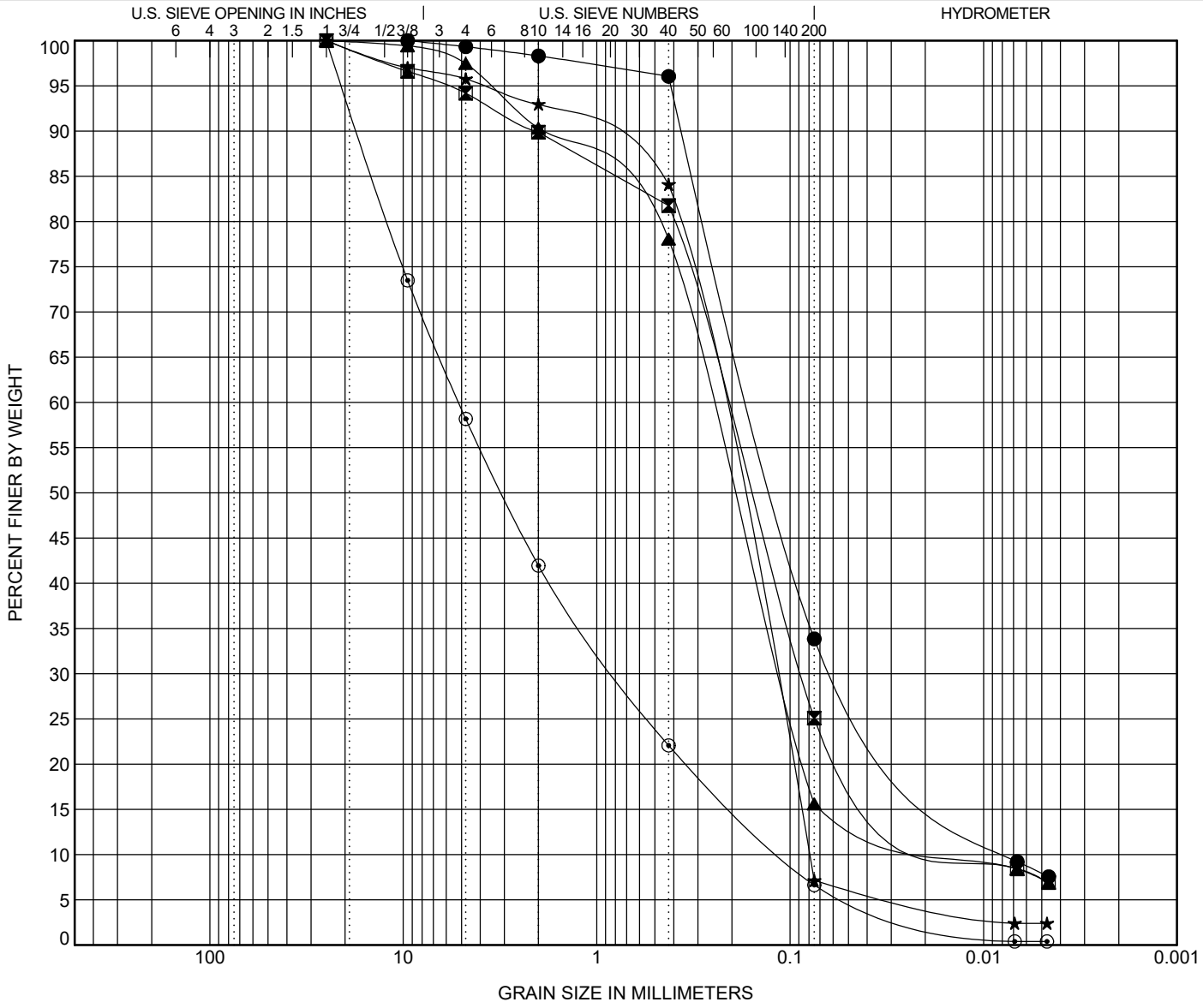

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	SB - 23	9.0	A-2-4 (0)	SM	NP	NP	NP	2.35	21.50
⊠	SB - 23	11.0	A-2-4 (0)	SM	NP	NP	NP	4.13	25.94
▲	SB - 23	14.0	A-2-4 (0)	SM	NP	NP	NP	4.27	22.62
★	SB - 23	16.0	A-3 (0)	SP-SM	NP	NP	NP	0.80	3.09
⊙	SB - 23	19.0	A-1-a (0)	SW-SM	NP	NP	NP	1.10	47.13

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	SB - 23	9.0	9.5	0.156	0.051	0.007	0.7	65.5	25.9	7.9
⊠	SB - 23	11.0	25	0.218	0.087	0.008	5.8	69.1	17.8	7.2
▲	SB - 23	14.0	25	0.257	0.112	0.011	2.5	81.9	8.4	7.2
★	SB - 23	16.0	25	0.247	0.126	0.08	4.2	88.6	4.7	2.4
⊙	SB - 23	19.0	25	5.159	0.788	0.109	41.8	51.5	6.2	0.4

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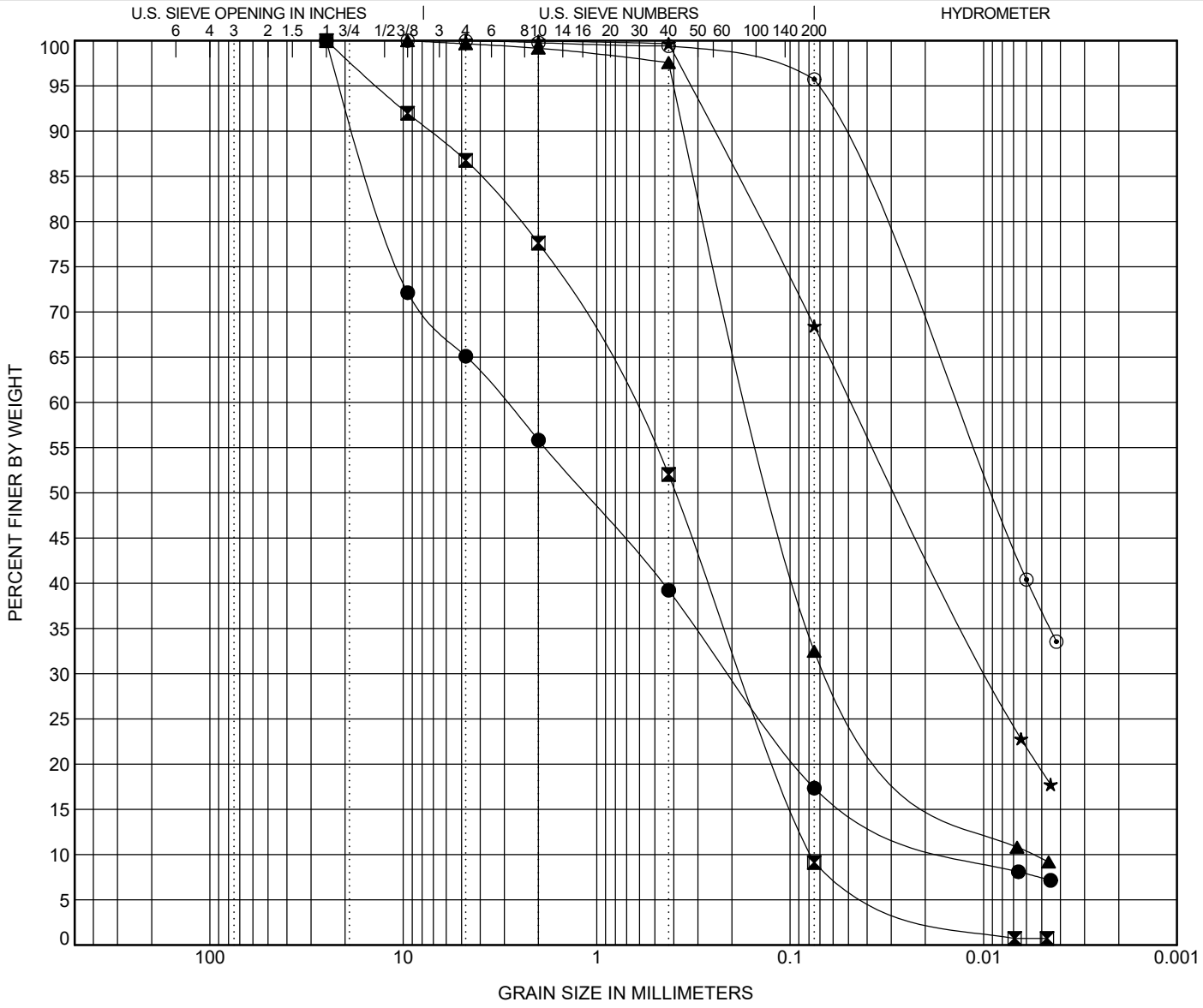

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	SB - 23	21.0	A-1-b (0)	SM	NP	NP	NP	1.30	271.34
⊠	SB - 23	24.0	A-3 (0)	SP-SM	NP	NP	NP	0.57	8.86
▲	SB - 24	2.0						3.72	28.13
★	SB - 24	4.0	A-4 (2)	CL-ML	26	20	6		
⊙	SB - 24	6.0	A-7-6 (30)	CL	49	21	28		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	SB - 23	21.0	25	2.951	0.204	0.011	34.9	47.8	9.9	7.4
⊠	SB - 23	24.0	25	0.689	0.174	0.078	13.2	77.6	8.4	0.7
▲	SB - 24	2.0	9.5	0.156	0.057	0.006	0.3	67.2	23.0	9.5
★	SB - 24	4.0	4.75	0.048	0.009		0.0	31.6	49.2	19.3
⊙	SB - 24	6.0	9.5	0.015			0.0	4.3	58.8	36.9

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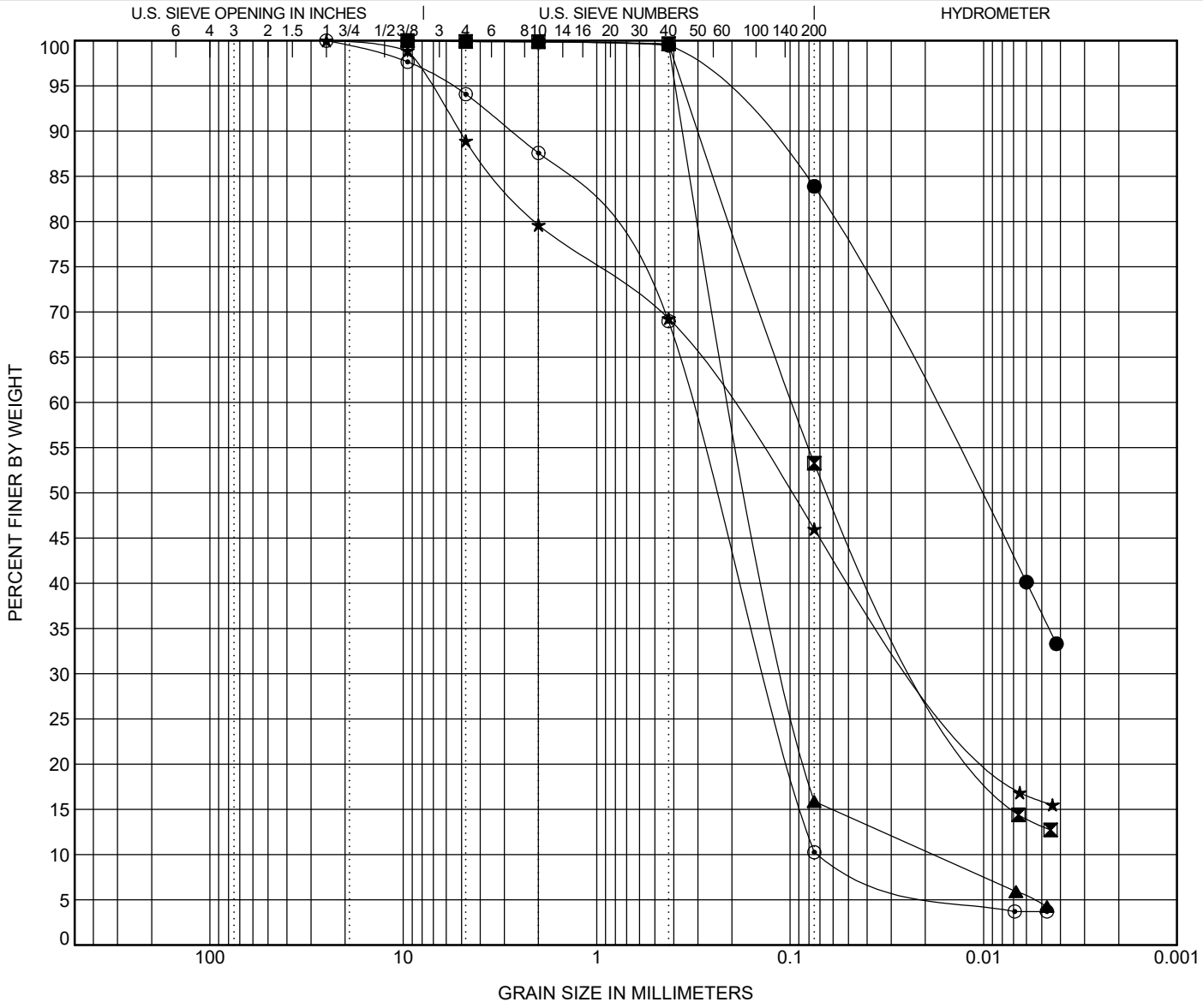

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	SB - 24	9.0	A-7-6 (26)	CL	48	17	31		
⊠	SB - 24	11.0	A-4 (0)	ML	NP	NP	NP		
▲	SB - 24	14.0	A-2-4 (0)	SM	NP	NP	NP	2.96	10.28
★	SB - 24	16.0	A-6 (2)	SC	30	18	12		
⊙	SB - 24	19.0	A-3 (0)	SP-SM	NP	NP	NP	0.81	4.78

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	SB - 24	9.0	9.5	0.019			0.1	16.1	47.2	36.6
⊠	SB - 24	11.0	9.5	0.096	0.018		0.1	46.6	40.1	13.2
▲	SB - 24	14.0	9.5	0.187	0.101	0.018	0.0	84.1	11.3	4.5
★	SB - 24	16.0	25	0.213	0.02		11.1	42.9	30.1	15.9
⊙	SB - 24	19.0	25	0.326	0.134	0.068	5.9	83.8	6.5	3.7

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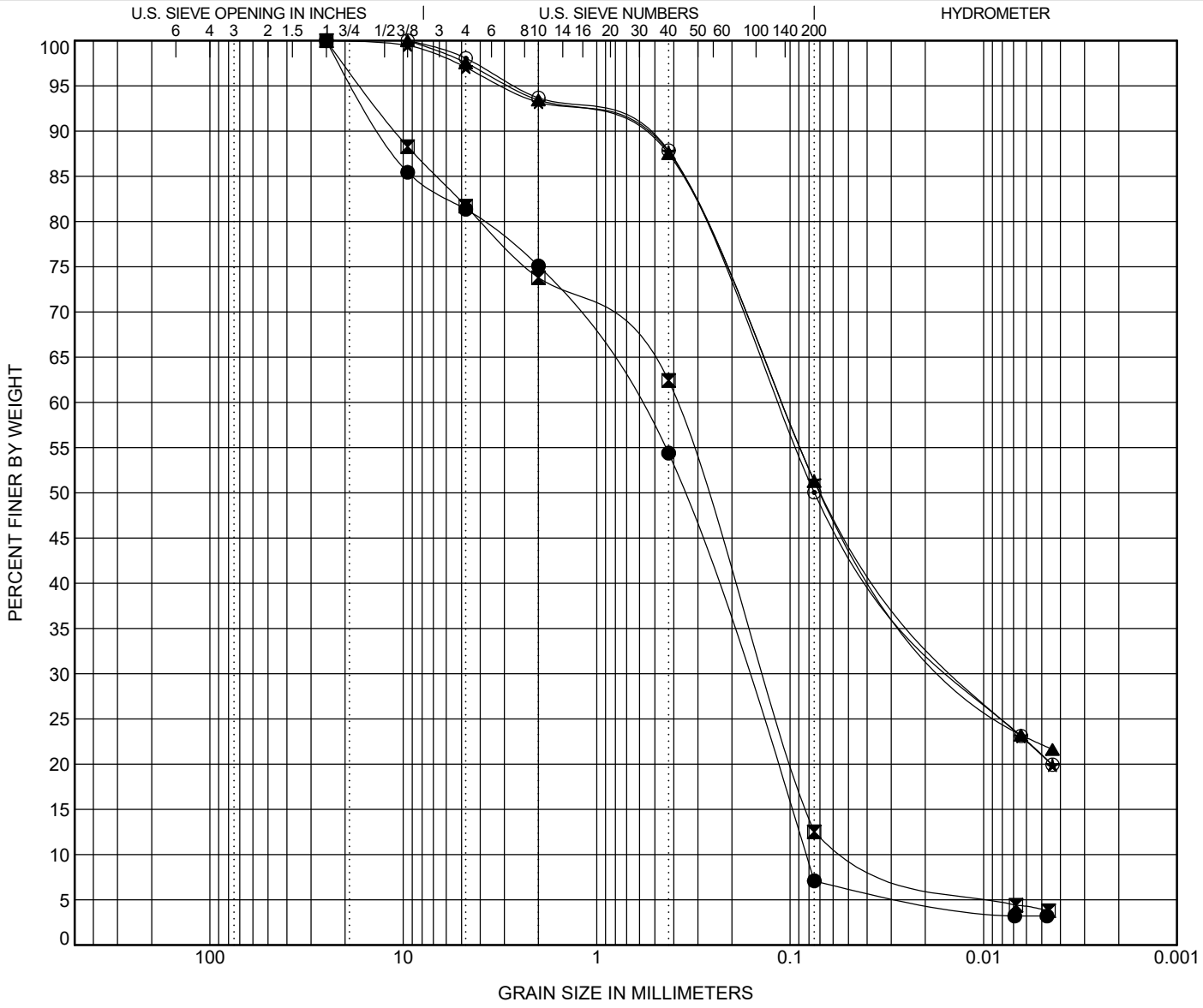

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	SB - 24	21.0	A-3 (0)	SP-SM	NP	NP	NP	0.56	7.75
⊠	SB - 24	24.0	A-2-4 (0)	SM	NP	NP	NP	1.36	10.92
▲	SB - 25	2.0	A-6 (3)	CL	29	17	12		
★	SB - 25	4.0	A-6 (3)	CL	30	17	13		
⊙	SB - 25	6.0	A-6 (4)	CL	29	15	14		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	SB - 24	21.0	25	0.647	0.174	0.083	18.6	74.3	3.9	3.2
⊠	SB - 24	24.0	25	0.391	0.138	0.036	18.3	69.2	8.6	3.9
▲	SB - 25	2.0	9.5	0.114	0.012		2.4	46.3	29.1	22.2
★	SB - 25	4.0	25	0.113	0.012		3.0	45.7	30.4	21.0
⊙	SB - 25	6.0	9.5	0.118	0.012		1.9	48.0	29.0	21.0

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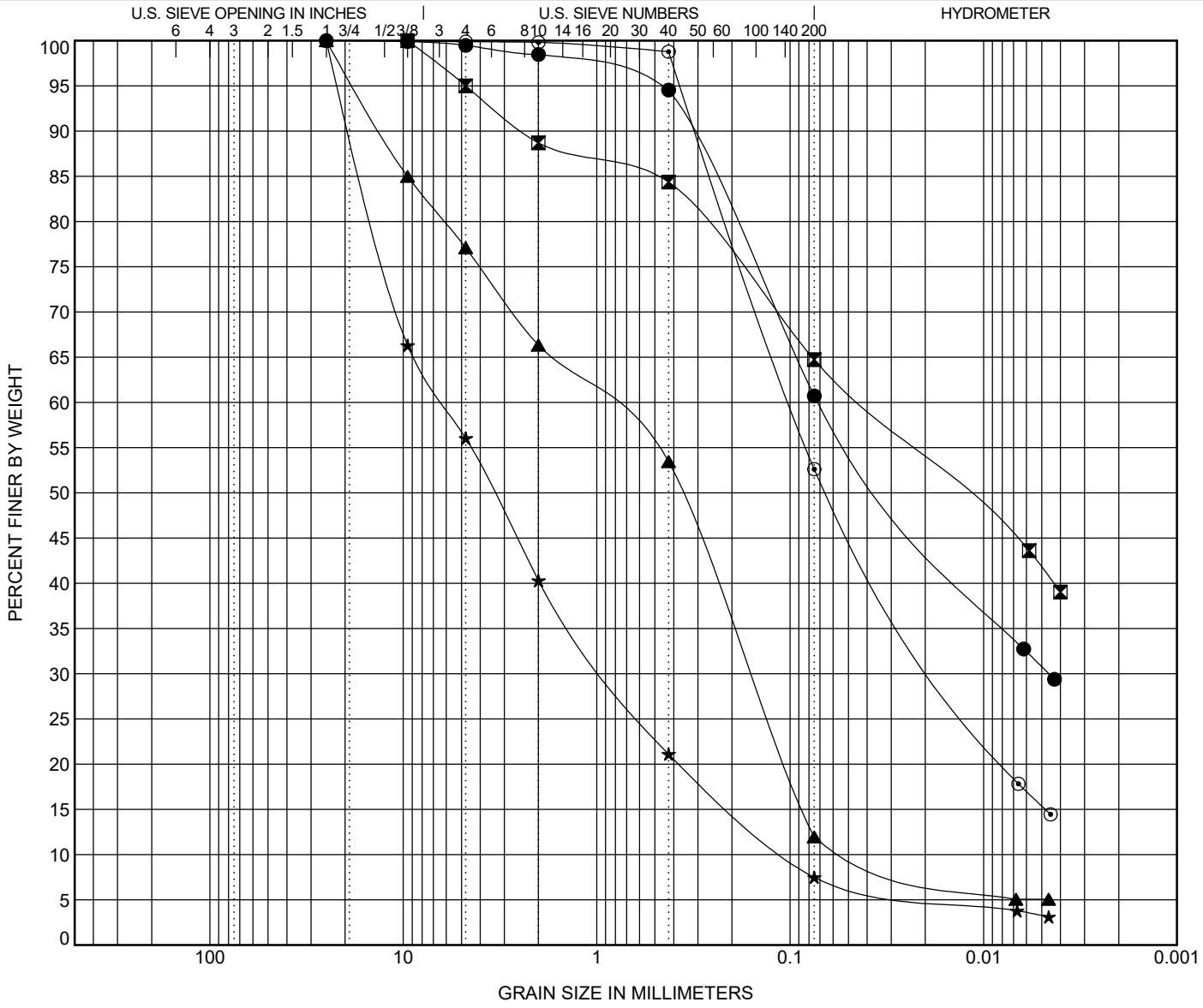

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	SB - 25	9.0	A-6 (10)	CL	37	15	22		
⊠	SB - 25	11.0	A-7-6 (25)	CH	57	15	42		
▲	SB - 25	14.0	A-2-4 (0)	SP-SM	NP	NP	NP	0.72	24.56
★	SB - 25	16.0	A-1-a (0)	SW-SM	NP	NP	NP	1.18	60.13
⊙	SB - 25	19.0	A-4 (0)	ML	NP	NP	NP		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	SB - 25	9.0	25	0.07	0.005		0.5	38.8	30.0	30.8
⊠	SB - 25	11.0	9.5	0.042			5.0	30.3	22.9	41.8
▲	SB - 25	14.0	25	0.934	0.159	0.038	22.9	65.1	6.9	5.1
★	SB - 25	16.0	25	6.207	0.871	0.103	44.0	48.5	4.2	3.3
⊙	SB - 25	19.0	9.5	0.099	0.015		0.1	47.3	37.2	15.4

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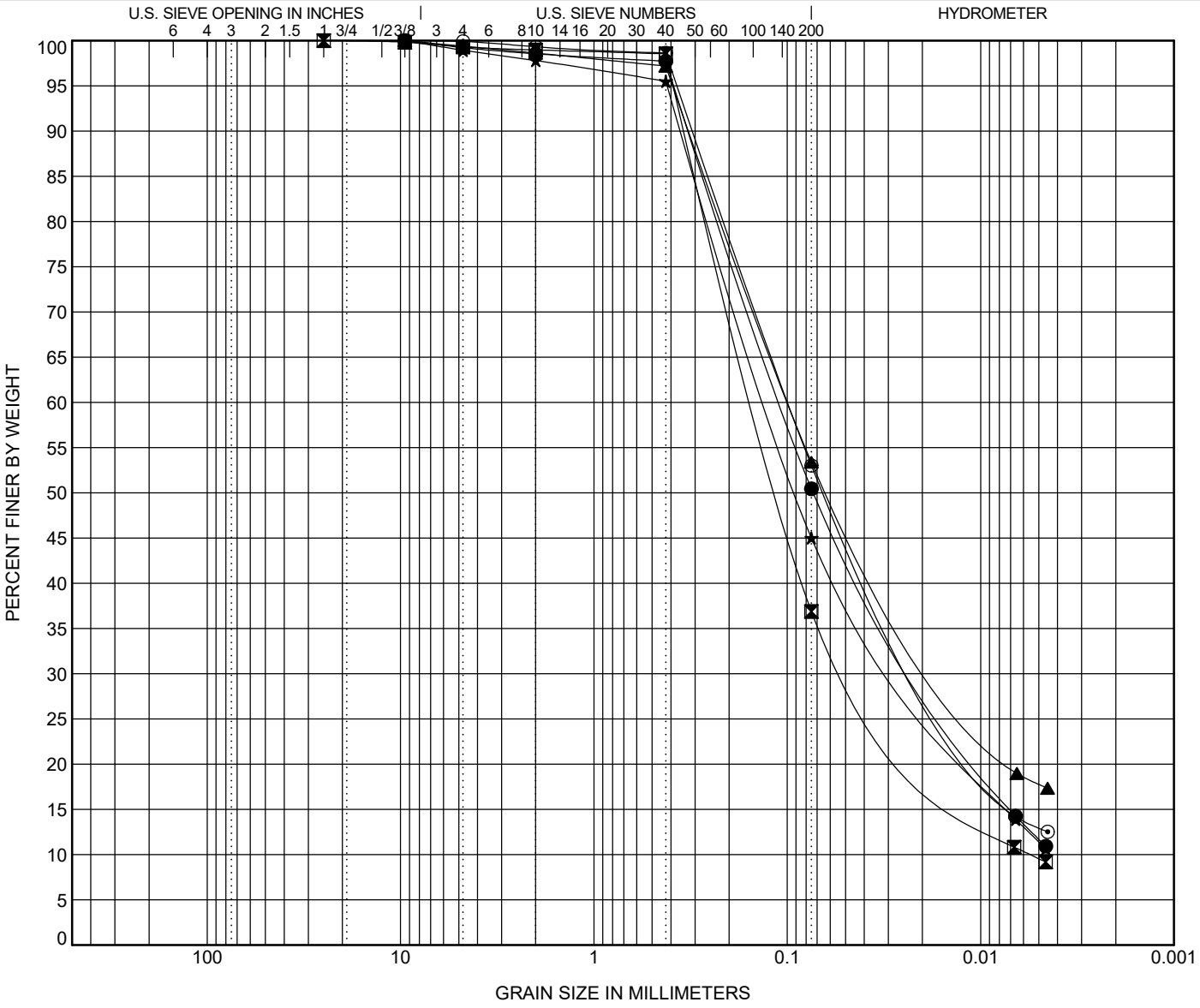


COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	SB - 25	21.0	A-4 (0)	ML	NP	NP	NP		
⊠	SB - 25	24.0	A-4 (0)	SM	NP	NP	NP	1.97	25.88
▲	SB - 26	2.0	A-4 (0)	ML	NP	NP	NP		
★	SB - 26	4.0	A-4 (0)	SM	NP	NP	NP		
⊙	SB - 26	6.0	A-4 (0)	ML	NP	NP	NP		

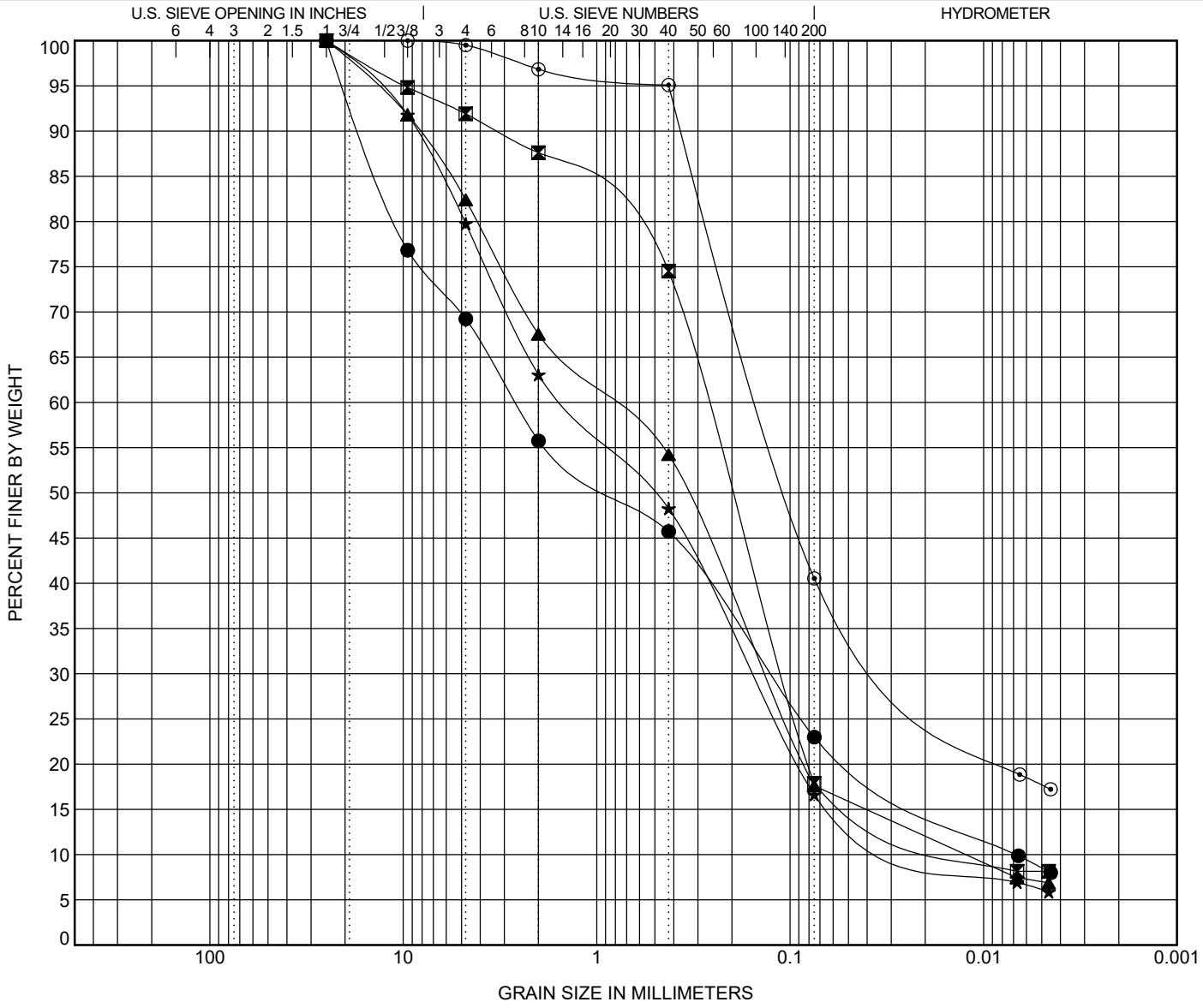
	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	SB - 25	21.0	9.5	0.106	0.019		0.8	48.8	38.7	11.7
⊠	SB - 25	24.0	25	0.144	0.04	0.006	0.7	62.4	27.4	9.5
▲	SB - 26	2.0	9.5	0.097	0.014		0.6	46.0	35.6	17.8
★	SB - 26	4.0	9.5	0.126	0.023		1.1	53.9	33.6	11.4
⊙	SB - 26	6.0	9.5	0.098	0.018		0.1	46.9	40.0	13.0

GRAIN SIZE DISTRIBUTION

NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER NH-SS-1-006(025)022 L **LOCATION** Morton County

PCN 22207



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	SB - 26	9.0	A-1-b (0)	SM	NP	NP	NP	0.92	388.28
⊠	SB - 26	11.0	A-2-4 (0)	SM	NP	NP	NP	4.09	25.67
▲	SB - 26	14.0	A-2-4 (0)	SM	NP	NP	NP	1.77	67.34
★	SB - 26	16.0	A-1-b (0)	SM	NP	NP	NP	1.16	100.86
⊙	SB - 26	19.0	A-7-6 (5)	SC	47	23	24		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	SB - 26	9.0	25	2.627	0.128	0.007	30.8	46.2	14.5	8.5
⊠	SB - 26	11.0	25	0.272	0.109	0.011	8.1	74.0	9.7	8.1
▲	SB - 26	14.0	25	0.832	0.135	0.012	17.6	64.8	10.6	7.0
★	SB - 26	16.0	25	1.452	0.156	0.014	20.2	63.1	10.5	6.1
⊙	SB - 26	19.0	9.5	0.139	0.023		0.5	59.0	22.8	17.7

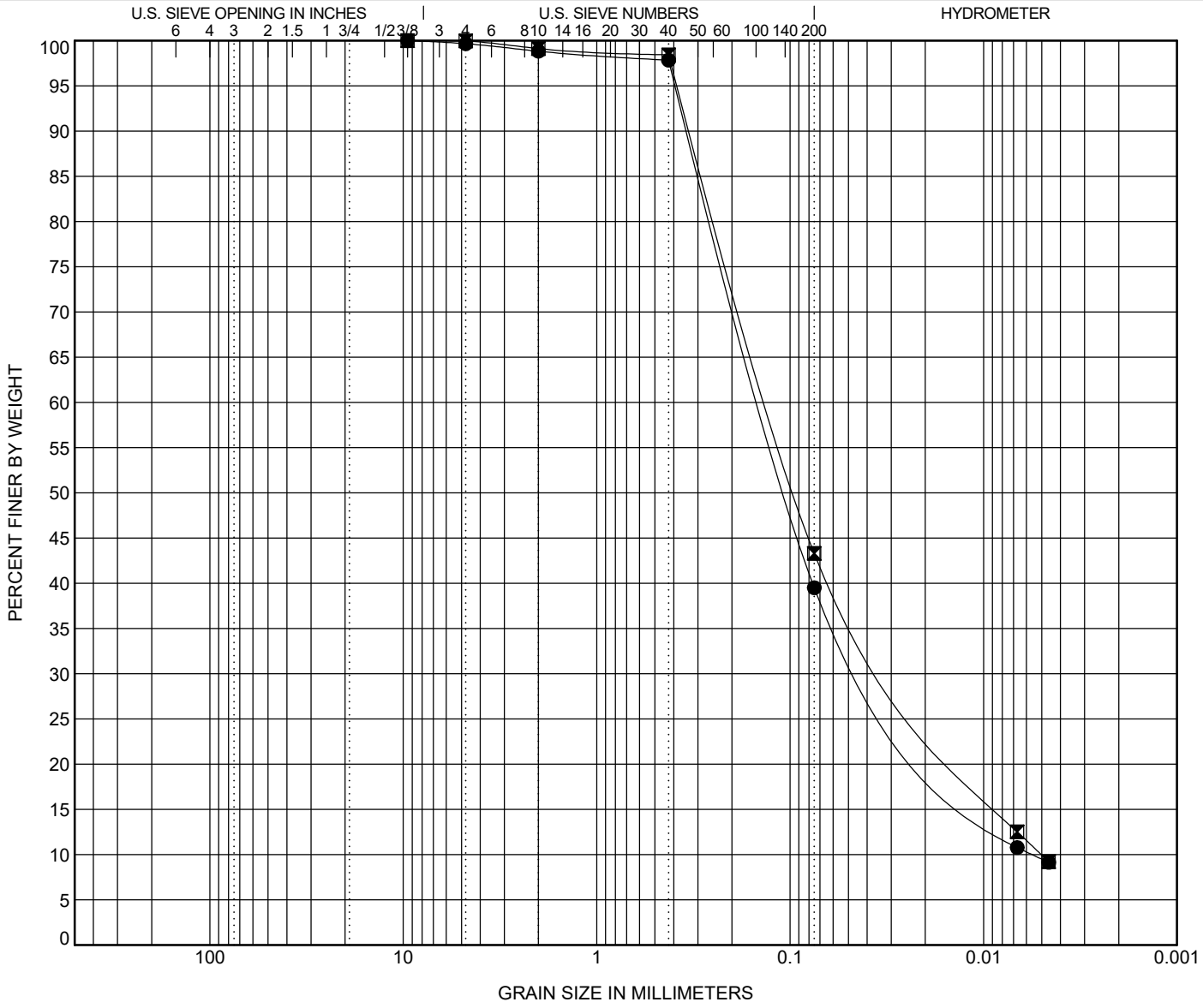
GRAIN SIZE - 20171219.GDT - 12/12/19 14:42 - F:\LAB\PROJECTS\GINT\1-006(025)022.GPJ

GRAIN SIZE DISTRIBUTION

NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER NH-SS-1-006(025)022 L **LOCATION** Morton County

PCN 22207



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	**SB - 26**	**21.0**	**A-4 (0)**	**SM**	**NP**	**NP**	**NP**	**1.47**	**24.62**
⊠	**SB - 26**	**24.0**	**A-4 (0)**	**SM**	**NP**	**NP**	**NP**	**1.09**	**25.19**

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**SB - 26**	**21.0**	**9.5**	**0.138**	**0.034**	**0.006**	**0.3**	**60.2**	**30.0**	**9.5**
⊠	**SB - 26**	**24.0**	**9.5**	**0.127**	**0.026**	**0.005**	**0.0**	**56.7**	**33.4**	**9.9**

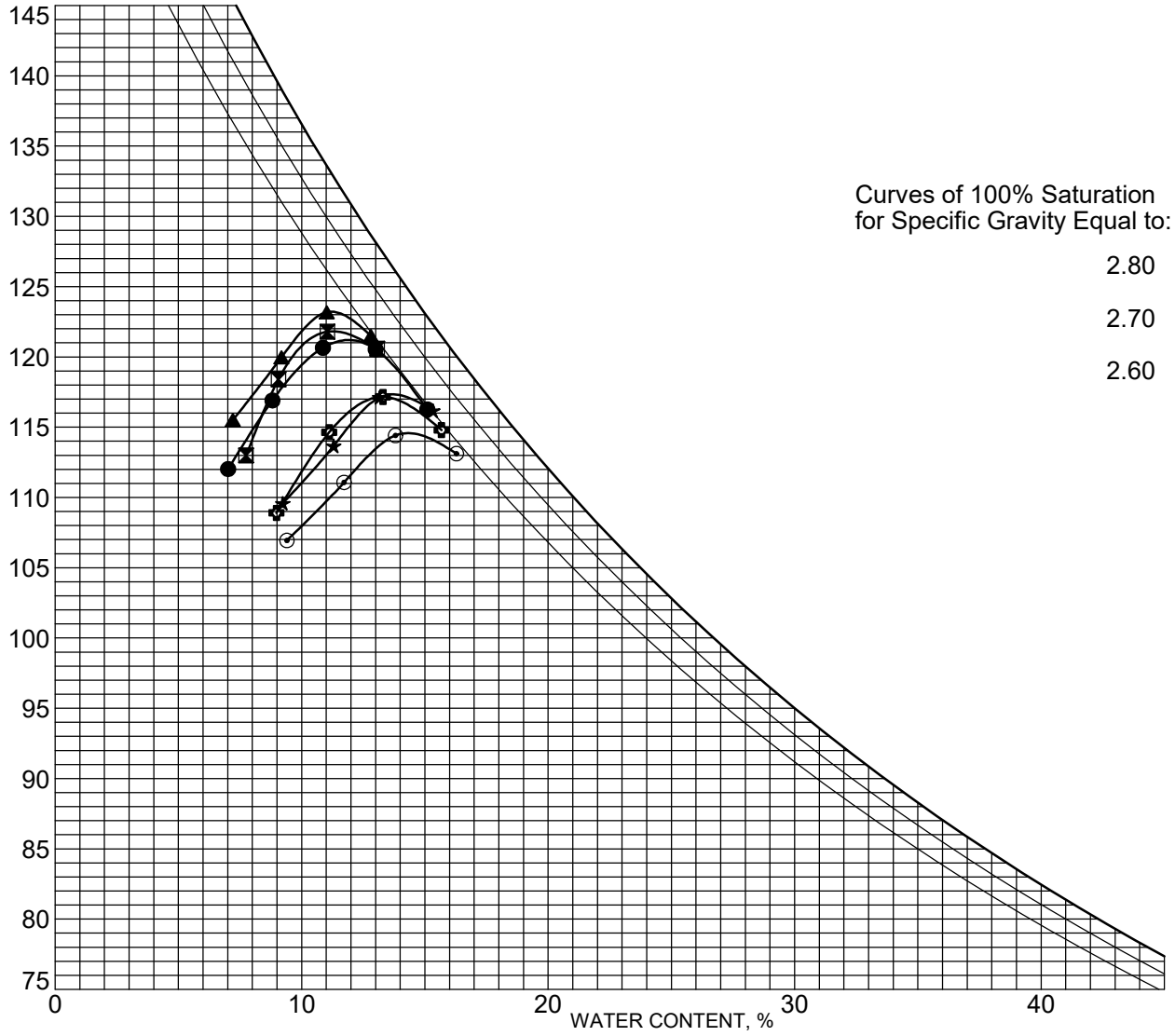
GRAIN SIZE - 20171219.GDT - 12/12/19 14:42 - F:\LAB\PROJECTS\GINT\1-006(025)022.GPJ

MOISTURE-DENSITY RELATIONSHIP

NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER NH-SS-1-006(025)022 L **LOCATION** Morton County

PCN 22207



BOREHOLE		DEPTH	AASHTO Classification	USCS Description
●	**LSS - 1**	**2.0**	**A-6 (7)**	**SANDY LEAN CLAY(CL)**
⊠	**LSS - 2**	**2.0**	**A-7-6 (5)**	**CLAYEY SAND(SC)**
▲	**LSS - 3**	**2.0**	**A-7-6 (10)**	**CLAYEY SAND(SC)**
★	**LSS - 4**	**2.0**	**A-7-6 (38)**	**FAT CLAY with SAND(CH)**
⊙	**LSS - 5**	**2.0**	**A-7-6 (28)**	**FAT CLAY with SAND(CH)**
✪	**LSS - 6**	**2.0**	**A-7-6 (22)**	**FAT CLAY with SAND(CH)**

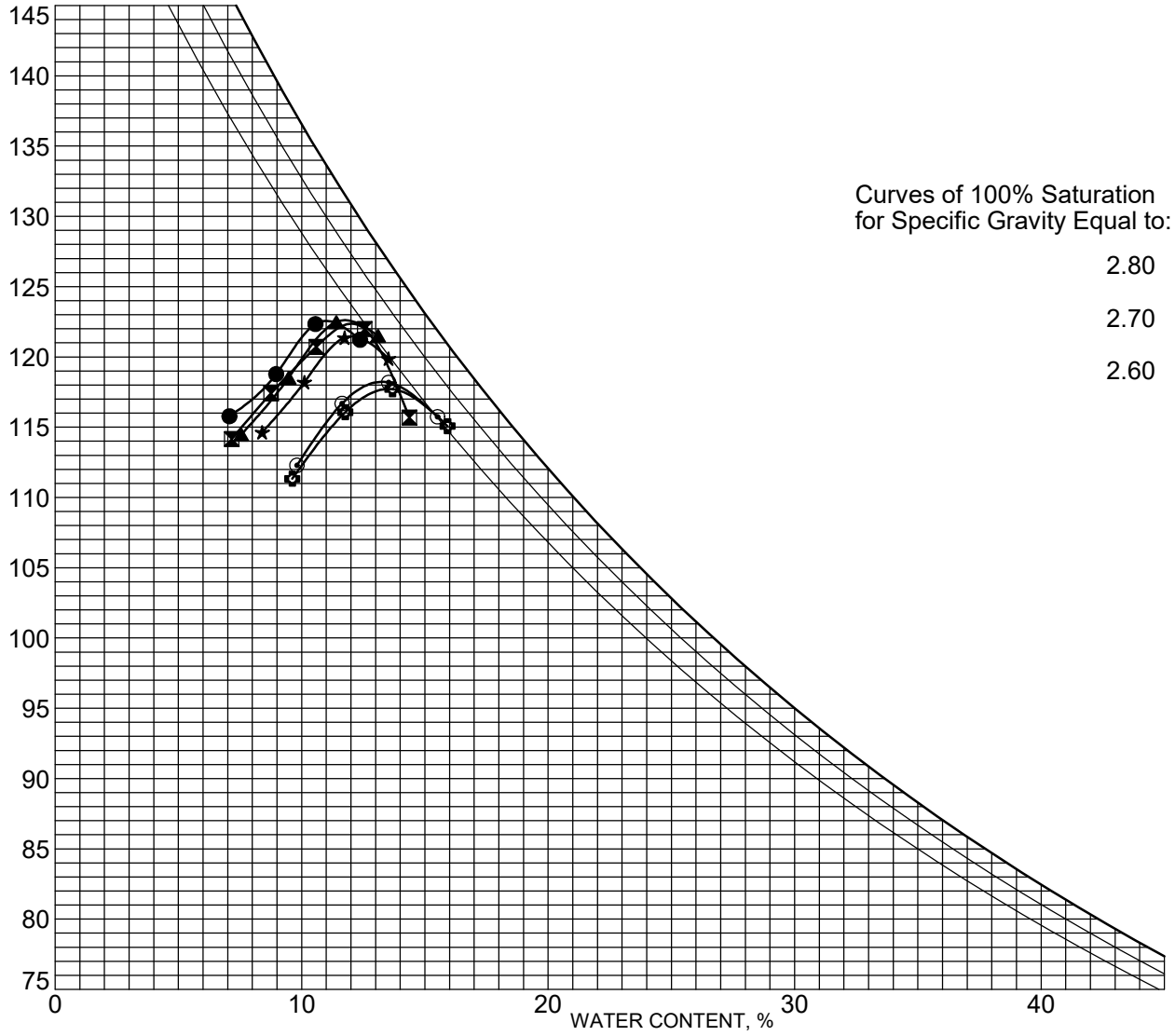
BOREHOLE		DEPTH	Test Method	LL	PL	PI	Max DD	Optimum WC
●	**LSS - 1**	**2.0**	**AASHTO T-180 Method A**	**34**	**19**	**15**	**121.2 PCF**	**11.9 %**
⊠	**LSS - 2**	**2.0**	**AASHTO T-180 Method A**	**41**	**21**	**20**	**121.8 PCF**	**11.3 %**
▲	**LSS - 3**	**2.0**	**AASHTO T-180 Method A**	**50**	**22**	**28**	**123.2 PCF**	**11.2 %**
★	**LSS - 4**	**2.0**	**AASHTO T-180 Method A**	**68**	**20**	**48**	**117.3 PCF**	**13.7 %**
⊙	**LSS - 5**	**2.0**	**AASHTO T-180 Method A**	**60**	**22**	**38**	**114.6 PCF**	**14.3 %**
✪	**LSS - 6**	**2.0**	**AASHTO T-180 Method A**	**51**	**20**	**31**	**117.2 PCF**	**13.3 %**

MOISTURE-DENSITY RELATIONSHIP

NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER NH-SS-1-006(025)022 L **LOCATION** Morton County

PCN 22207



BOREHOLE		DEPTH	AASHTO Classification	USCS Description
●	**LSS - 7**	**2.0**	**A-4 (0)**	**SILTY SAND(SM)**
⊠	**LSS - 8**	**2.0**	**A-6 (8)**	**SANDY LEAN CLAY(CL)**
▲	**LSS - 9**	**2.0**	**A-7-6 (5)**	**CLAYEY SAND(SC)**
★	**LSS - 10**	**2.0**	**A-6 (11)**	**SANDY LEAN CLAY(CL)**
⊙	**LSS - 11**	**2.0**	**A-7-6 (36)**	**FAT CLAY with SAND(CH)**
✿	**LSS - 12**	**2.0**	**A-7-6 (27)**	**FAT CLAY with SAND(CH)**

BOREHOLE		DEPTH	Test Method	LL	PL	PI	Max DD	Optimum WC
●	**LSS - 7**	**2.0**	**AASHTO T-180 Method A**	**NP**	**NP**	**NP**	**122.6 PCF**	**11.0 %**
⊠	**LSS - 8**	**2.0**	**AASHTO T-180 Method A**	**36**	**18**	**18**	**122.4 PCF**	**12.0 %**
▲	**LSS - 9**	**2.0**	**AASHTO T-180 Method A**	**42**	**21**	**21**	**122.6 PCF**	**11.8 %**
★	**LSS - 10**	**2.0**	**AASHTO T-180 Method A**	**36**	**18**	**18**	**121.5 PCF**	**12.0 %**
⊙	**LSS - 11**	**2.0**	**AASHTO T-180 Method A**	**60**	**18**	**42**	**118.2 PCF**	**13.2 %**
✿	**LSS - 12**	**2.0**	**AASHTO T-180 Method A**	**51**	**21**	**30**	**117.7 PCF**	**13.5 %**

SUMMARY OF LABORATORY RESULTS

NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER NH-SS-1-006(025)022 L **LOCATION** Morton County

PCN 22207

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	AASHTO Classification	USCS Class-ification	Water Content (%)	Avg. Water Content (%)	Dry Density (pcf)	Satur-ation (%)	Void Ratio
LSS - 1	2.0	34	19	15	9.5	61	A-6 (7)	CL	19.0	17.7			
LSS - 1	3.0								12.8	17.7			
LSS - 1	4.0								12.6	17.7			
LSS - 1	5.0								12.0	17.7			
LSS - 1	6.0								10.9	17.7			
LSS - 1	7.0								20.9	17.7			
LSS - 1	8.0								25.2	17.7			
LSS - 1	9.0								18.9	17.7			
LSS - 1	10.0								27.2	17.7			
LSS - 2	2.0	41	21	20	25	44	A-7-6 (5)	SC	18.7	14.9			
LSS - 2	3.0								17.7	14.9			
LSS - 2	4.0								17.3	14.9			
LSS - 2	5.0								14.5	14.9			
LSS - 2	6.0								12.7	14.9			
LSS - 2	7.0								10.8	14.9			
LSS - 2	8.0								14.4	14.9			
LSS - 2	9.0								12.8	14.9			
LSS - 2	10.0								15.5	14.9			
LSS - 3	2.0	50	22	28	4.75	50	A-7-6 (10)	SC	13.7	14.6			
LSS - 3	3.0								13.5	14.6			
LSS - 3	4.0								13.1	14.6			
LSS - 3	5.0								12.3	14.6			
LSS - 3	6.0								15.2	14.6			
LSS - 3	7.0								16.0	14.6			
LSS - 3	8.0								16.1	14.6			
LSS - 3	9.0								15.6	14.6			
LSS - 3	10.0								16.1	14.6			
LSS - 4	2.0	68	20	48	9.5	77	A-7-6 (38)	CH	18.2	22.4			
LSS - 4	3.0								37.7	22.4			
LSS - 4	4.0								25.7	22.4			
LSS - 4	5.0								34.1	22.4			
LSS - 4	6.0								25.2	22.4			
LSS - 4	7.0								16.7	22.4			
LSS - 4	8.0								14.6	22.4			
LSS - 4	9.0								15.0	22.4			
LSS - 4	10.0								14.5	22.4			
LSS - 5	2.0	60	22	38	9.5	74	A-7-6 (28)	CH	30.2	22.7			
LSS - 5	3.0								23.7	22.7			
LSS - 5	4.0								22.1	22.7			
LSS - 5	5.0								19.2	22.7			
LSS - 5	6.0								22.2	22.7			
LSS - 5	7.0								20.3	22.7			
LSS - 5	8.0								24.1	22.7			

SUMMARY OF LABORATORY RESULTS

NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER NH-SS-1-006(025)022 L **LOCATION** Morton County

PCN 22207

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	AASHTO Classification	USCS Class-ification	Water Content (%)	Avg. Water Content (%)	Dry Density (pcf)	Satur-ation (%)	Void Ratio
LSS - 5	9.0								21.7	22.7			
LSS - 5	10.0								21.1	22.7			
LSS - 6	2.0	51	20	31	9.5	73	A-7-6 (22)	CH	29.5	21.5			
LSS - 6	3.0								15.1	21.5			
LSS - 6	4.0								21.8	21.5			
LSS - 6	5.0								18.9	21.5			
LSS - 6	6.0								17.1	21.5			
LSS - 6	7.0								19.1	21.5			
LSS - 6	8.0								20.9	21.5			
LSS - 6	9.0								29.4	21.5			
LSS - 6	10.0								21.4	21.5			
LSS - 7	2.0	NP	NP	NP	9.5	44	A-4 (0)	SM	16.6	20.0			
LSS - 7	3.0								13.8	20.0			
LSS - 7	4.0								13.0	20.0			
LSS - 7	5.0								17.5	20.0			
LSS - 7	6.0								15.1	20.0			
LSS - 7	7.0								37.0	20.0			
LSS - 7	8.0								26.7	20.0			
LSS - 7	9.0								17.7	20.0			
LSS - 7	10.0								22.3	20.0			
LSS - 8	2.0	36	18	18	9.5	60	A-6 (8)	CL	15.2	23.7			
LSS - 8	3.0								20.4	23.7			
LSS - 8	4.0								23.0	23.7			
LSS - 8	5.0								18.3	23.7			
LSS - 8	6.0								22.9	23.7			
LSS - 8	7.0								18.4	23.7			
LSS - 8	8.0								21.7	23.7			
LSS - 8	9.0								33.3	23.7			
LSS - 8	10.0								40.1	23.7			
LSS - 9	2.0	42	21	21	9.5	44	A-7-6 (5)	SC	14.7	19.1			
LSS - 9	3.0								22.1	19.1			
LSS - 9	4.0								20.2	19.1			
LSS - 9	5.0								18.8	19.1			
LSS - 9	6.0								18.3	19.1			
LSS - 9	7.0								19.1	19.1			
LSS - 9	8.0								19.0	19.1			
LSS - 9	9.0								19.9	19.1			
LSS - 9	10.0								20.1	19.1			
LSS - 10	2.0	36	18	18	9.5	70	A-6 (11)	CL	22.3	24.9			
LSS - 10	3.0								21.7	24.9			
LSS - 10	4.0								23.8	24.9			
LSS - 10	5.0								24.3	24.9			
LSS - 10	6.0								24.7	24.9			

SUMMARY OF LABORATORY RESULTS

NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER NH-SS-1-006(025)022 L **LOCATION** Morton County

PCN 22207

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	AASHTO Classification	USCS Class-ification	Water Content (%)	Avg. Water Content (%)	Dry Density (pcf)	Satur-ation (%)	Void Ratio
LSS - 10	7.0								22.6	24.9			
LSS - 10	8.0								26.5	24.9			
LSS - 10	9.0								28.5	24.9			
LSS - 10	10.0								29.3	24.9			
LSS - 11	2.0	60	18	42	9.5	82	A-7-6 (36)	CH	25.0	28.3			
LSS - 11	3.0								28.3	28.3			
LSS - 11	4.0								27.0	28.3			
LSS - 11	5.0								26.9	28.3			
LSS - 11	6.0								32.5	28.3			
LSS - 11	7.0								29.5	28.3			
LSS - 11	8.0								27.6	28.3			
LSS - 11	9.0								27.8	28.3			
LSS - 11	10.0								30.5	28.3			
LSS - 12	2.0	51	21	30	9.5	85	A-7-6 (27)	CH	35.1	27.1			
LSS - 12	3.0								22.1	27.1			
LSS - 12	4.0								27.1	27.1			
LSS - 12	5.0								23.1	27.1			
LSS - 12	6.0								31.7	27.1			
LSS - 12	7.0								26.9	27.1			
LSS - 12	8.0								25.5	27.1			
LSS - 12	9.0								23.6	27.1			
LSS - 12	10.0								28.3	27.1			
SB - 13	2.0	NP	NP	NP	9.5	50	A-4 (0)	ML	15.6	15.6			
SB - 13	4.0	NP	NP	NP	4.75	50	A-4 (0)	SM	17.5	17.5			
SB - 13	6.0	NP	NP	NP	4.75	50	A-4 (0)	ML	28.8	28.8			
SB - 13	9.0	NP	NP	NP	9.5	38	A-4 (0)	SM	24.1	24.1			
SB - 13	11.0	NP	NP	NP	25	33	A-2-4 (0)	SM	22.0	22.0			
SB - 13	14.0	NP	NP	NP	2	17	A-2-4 (0)	SM	40.3	40.3			
SB - 13	16.0	113	24	89	4.75	92	A-7-6 (93)	CH	31.7	31.7			
SB - 13	19.0	101	28	73	4.75	96	A-7-6 (82)	CH	26.8	26.8			
SB - 13	21.0	92	27	65	4.75	94	A-7-6 (71)	CH					
SB - 13	24.0	77	27	50	4.75	88	A-7-6 (50)	CH	37.5	37.5			
SB - 14	2.0	NP	NP	NP	9.5	48	A-4 (0)	SM	21.1	21.1			
SB - 14	4.0	NP	NP	NP	25	20	A-2-4 (0)	SM	9.9	9.9			
SB - 14	6.0	85	27	58	4.75	95	A-7-6 (64)	CH	54.2	54.2			
SB - 14	9.0	77	27	50	25	91	A-7-6 (52)	CH	44.5	44.5			
SB - 14	11.0	71	24	47	9.5	76	A-7-6 (37)	CH	29.5	29.5			
SB - 14	14.0	61	20	41	4.75	61	A-7-6 (22)	CH	31.5	31.5			
SB - 14	16.0	90	27	63	4.75	97	A-7-6 (71)	CH	33.1	33.1			
SB - 14	19.0	71	28	43	4.75	97	A-7-6 (49)	CH	33.1	33.1			
SB - 14	21.0	70	26	44	9.5	86	A-7-6 (42)	CH	36.2	36.2			
SB - 14	24.0	68	26	42	25	78	A-7-6 (35)	CH	31.2	31.2			
SB - 15	2.0	NP	NP	NP	9.5	45	A-4 (0)	SM	16.1	16.1			

SUMMARY OF LABORATORY RESULTS

NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER NH-SS-1-006(025)022 L **LOCATION** Morton County

PCN 22207

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	AASHTO Classification	USCS Class-ification	Water Content (%)	Avg. Water Content (%)	Dry Density (pcf)	Satur-ation (%)	Void Ratio
SB - 15	4.0	NP	NP	NP	9.5	43	A-4 (0)	SM	25.0	25.0			
SB - 15	6.0	NP	NP	NP	9.5	47	A-4 (0)	SM	28.3	28.3			
SB - 15	9.0	NP	NP	NP	9.5	44	A-4 (0)	SM	29.7	29.7			
SB - 15	11.0	NP	NP	NP	9.5	48	A-4 (0)	SM	23.1	23.1			
SB - 15	14.0	NP	NP	NP	9.5	39	A-4 (0)	SM	23.6	23.6			
SB - 16	2.0	NP	NP	NP	25	45	A-4 (0)	SM	19.7	19.7			
SB - 16	4.0	NP	NP	NP	9.5	45	A-4 (0)	SM	17.5	17.5			
SB - 16	6.0	NP	NP	NP	25	52	A-4 (0)	ML	34.0	34.0			
SB - 16	9.0	NP	NP	NP	9.5	45	A-4 (0)	SM	21.1	21.1			
SB - 16	11.0	NP	NP	NP	9.5	43	A-4 (0)	SM	18.5	18.5			
SB - 16	14.0	NP	NP	NP	25	30	A-2-4 (0)	SM	23.6	23.6			
SB - 17	2.0	NP	NP	NP	9.5	54	A-4 (0)	ML	18.8	18.8			
SB - 17	4.0	NP	NP	NP	9.5	51	A-4 (0)	ML	17.6	17.6			
SB - 17	6.0	NP	NP	NP	4.75	42	A-4 (0)	SM	25.1	25.1			
SB - 17	9.0	NP	NP	NP	9.5	37	A-4 (0)	SM	23.9	23.9			
SB - 17	11.0	NP	NP	NP	9.5	44	A-4 (0)	SM	33.4	33.4			
SB - 17	14.0	NP	NP	NP	4.75	21	A-2-4 (0)	SM	24.3	24.3			
SB - 18	2.0	NP	NP	NP	9.5	49	A-4 (0)	SM	19.5	19.5			
SB - 18	4.0	NP	NP	NP	25	32	A-2-4 (0)	SM	25.4	25.4			
SB - 18	6.0	54	18	36	9.5	69	A-7-6 (23)	CH	39.5	39.5			
SB - 18	9.0	55	22	33	9.5	49	A-7-6 (12)	SC	26.6	26.6			
SB - 19	2.0	NP	NP	NP	25	52	A-4 (0)	ML	21.9	21.9			
SB - 19	4.0	NP	NP	NP	9.5	32	A-2-4 (0)	SM	21.8	21.8			
SB - 19	6.0	41	26	15	9.5	42	A-7-6 (3)	SM	23.5	23.5			
SB - 19	9.0	48	24	24	9.5	46	A-7-6 (7)	SC	21.6	21.6			
SB - 20	2.0	NP	NP	NP	9.5	29	A-2-4 (0)	SM	19.4	19.4			
SB - 20	4.0	NP	NP	NP	9.5	33	A-2-4 (0)	SM	15.1	15.1			
SB - 20	6.0	32	19	13	9.5	55	A-6 (4)	CL	23.7	23.7			
SB - 20	9.0	49	21	28	9.5	63	A-7-6 (16)	CL	30.1	30.1			
SB - 21	2.0	NP	NP	NP	25	42	A-4 (0)	SM	19.1	19.1			
SB - 21	4.0	32	16	16	9.5	54	A-6 (5)	CL	27.5	27.5			
SB - 21	6.0	33	17	16	9.5	59	A-6 (7)	CL	29.1	29.1			
SB - 21	9.0	31	18	13	9.5	57	A-6 (5)	CL	20.8	20.8			
SB - 21	11.0	28	19	9	25	55	A-4 (2)	CL	21.3	21.3			
SB - 21	14.0	27	22	5	9.5	42	A-4 (0)	SM	22.5	22.5			
SB - 21	16.0	56	22	34	9.5	84	A-7-6 (30)	CH	34.4	34.4			
SB - 21	19.0	52	26	26	9.5	87	A-7-6 (25)	CH	32.1	32.1			
SB - 21	21.0	46	22	24	9.5	88	A-7-6 (22)	CL	25.6	25.6			
SB - 21	24.0	38	20	18	4.75	66	A-6 (10)	CL	21.5	21.5			
SB - 22	2.0	26	20	6	9.5	56	A-4 (1)	CL-ML	22.4	22.4			
SB - 22	4.0	NP	NP	NP	9.5	43	A-4 (0)	SM	20.4	20.4			
SB - 22	6.0	NP	NP	NP	4.75	32	A-2-4 (0)	SM	14.0	14.0			
SB - 22	9.0	NP	NP	NP	9.5	19	A-2-4 (0)	SM	6.9	6.9			

SUMMARY OF LABORATORY RESULTS

NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER NH-SS-1-006(025)022 L **LOCATION** Morton County

PCN 22207

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	AASHTO Classification	USCS Class-ification	Water Content (%)	Avg. Water Content (%)	Dry Density (pcf)	Satur-ation (%)	Void Ratio
SB - 22	11.0	73	18	55	25	87	A-7-6 (51)	CH	29.2	29.2			
SB - 22	14.0	45	28	17	9.5	74	A-7-6 (13)	ML	24.5	24.5			
SB - 22	16.0	63	28	35	9.5	90	A-7-6 (36)	CH	38.6	38.6			
SB - 22	19.0	51	38	13	4.75	43	A-7-5 (3)	SM	36.2	36.2			
SB - 22	21.0	63	24	39	9.5	93	A-7-6 (41)	CH	31.2	31.2			
SB - 22	24.0	60	21	39	9.5	96	A-7-6 (42)	CH	23.7	23.7			
SB - 23	2.0	22	18	4	9.5	49	A-4 (0)	SC-SM	15.5	15.5			
SB - 23	4.0	NP	NP	NP	9.5	36	A-4 (0)	SM	13.6	13.6			
SB - 23	6.0	NP	NP	NP	9.5	41	A-4 (0)	SM	18.2	18.2			
SB - 23	9.0	NP	NP	NP	9.5	34	A-2-4 (0)	SM	10.0	10.0			
SB - 23	11.0	NP	NP	NP	25	25	A-2-4 (0)	SM	14.8	14.8			
SB - 23	14.0	NP	NP	NP	25	16	A-2-4 (0)	SM	15.4	15.4			
SB - 23	16.0	NP	NP	NP	25	7	A-3 (0)	SP-SM	27.0	27.0			
SB - 23	19.0	NP	NP	NP	25	7	A-1-a (0)	SW-SM	15.6	15.6			
SB - 23	21.0	NP	NP	NP	25	17	A-1-b (0)	SM	29.6	29.6			
SB - 23	24.0	NP	NP	NP	25	9	A-3 (0)	SP-SM	38.9	38.9			
SB - 24	2.0				9.5	32			12.7	12.7			
SB - 24	4.0	26	20	6	4.75	68	A-4 (2)	CL-ML	28.6	28.6			
SB - 24	6.0	49	21	28	9.5	96	A-7-6 (30)	CL	41.2	41.2			
SB - 24	9.0	48	17	31	9.5	84	A-7-6 (26)	CL	32.8	32.8			
SB - 24	11.0	NP	NP	NP	9.5	53	A-4 (0)	ML	34.1	34.1			
SB - 24	14.0	NP	NP	NP	9.5	16	A-2-4 (0)	SM	8.1	8.1			
SB - 24	16.0	30	18	12	25	46	A-6 (2)	SC	26.4	26.4			
SB - 24	19.0	NP	NP	NP	25	10	A-3 (0)	SP-SM	24.3	24.3			
SB - 24	21.0	NP	NP	NP	25	7	A-3 (0)	SP-SM	24.7	24.7			
SB - 24	24.0	NP	NP	NP	25	13	A-2-4 (0)	SM	12.0	12.0			
SB - 25	2.0	29	17	12	9.5	51	A-6 (3)	CL	16.4	16.4			
SB - 25	4.0	30	17	13	25	51	A-6 (3)	CL	19.6	19.6			
SB - 25	6.0	29	15	14	9.5	50	A-6 (4)	CL	19.3	19.3			
SB - 25	9.0	37	15	22	25	61	A-6 (10)	CL	50.5	50.5			
SB - 25	11.0	57	15	42	9.5	65	A-7-6 (25)	CH	3.7	3.7			
SB - 25	14.0	NP	NP	NP	25	12	A-2-4 (0)	SP-SM	22.2	22.2			
SB - 25	16.0	NP	NP	NP	25	7	A-1-a (0)	SW-SM	16.6	16.6			
SB - 25	19.0	NP	NP	NP	9.5	53	A-4 (0)	ML	23.8	23.8			
SB - 25	21.0	NP	NP	NP	9.5	50	A-4 (0)	ML	29.8	29.8			
SB - 25	24.0	NP	NP	NP	25	37	A-4 (0)	SM	27.1	27.1			
SB - 26	2.0	NP	NP	NP	9.5	53	A-4 (0)	ML	13.9	13.9			
SB - 26	4.0	NP	NP	NP	9.5	45	A-4 (0)	SM	10.7	10.7			
SB - 26	6.0	NP	NP	NP	9.5	53	A-4 (0)	ML	14.6	14.6			
SB - 26	9.0	NP	NP	NP	25	23	A-1-b (0)	SM	16.2	16.2			
SB - 26	11.0	NP	NP	NP	25	18	A-2-4 (0)	SM	24.9	24.9			
SB - 26	14.0	NP	NP	NP	25	18	A-2-4 (0)	SM	25.8	25.8			
SB - 26	16.0	NP	NP	NP	25	17	A-1-b (0)	SM	21.0	21.0			

SUMMARY OF LABORATORY RESULTS

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER NH-SS-1-006(025)022 L **LOCATION** Morton County

PCN 22207

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	AASHTO Classification	USCS Class-ification	Water Content (%)	Avg. Water Content (%)	Dry Density (pcf)	Satur-ation (%)	Void Ratio
SB - 26	19.0	47	23	24	9.5	41	A-7-6 (5)	SC	26.1	26.1			
SB - 26	21.0	NP	NP	NP	9.5	40	A-4 (0)	SM	22.4	22.4			
SB - 26	24.0	NP	NP	NP	9.5	43	A-4 (0)	SM	22.1	22.1			