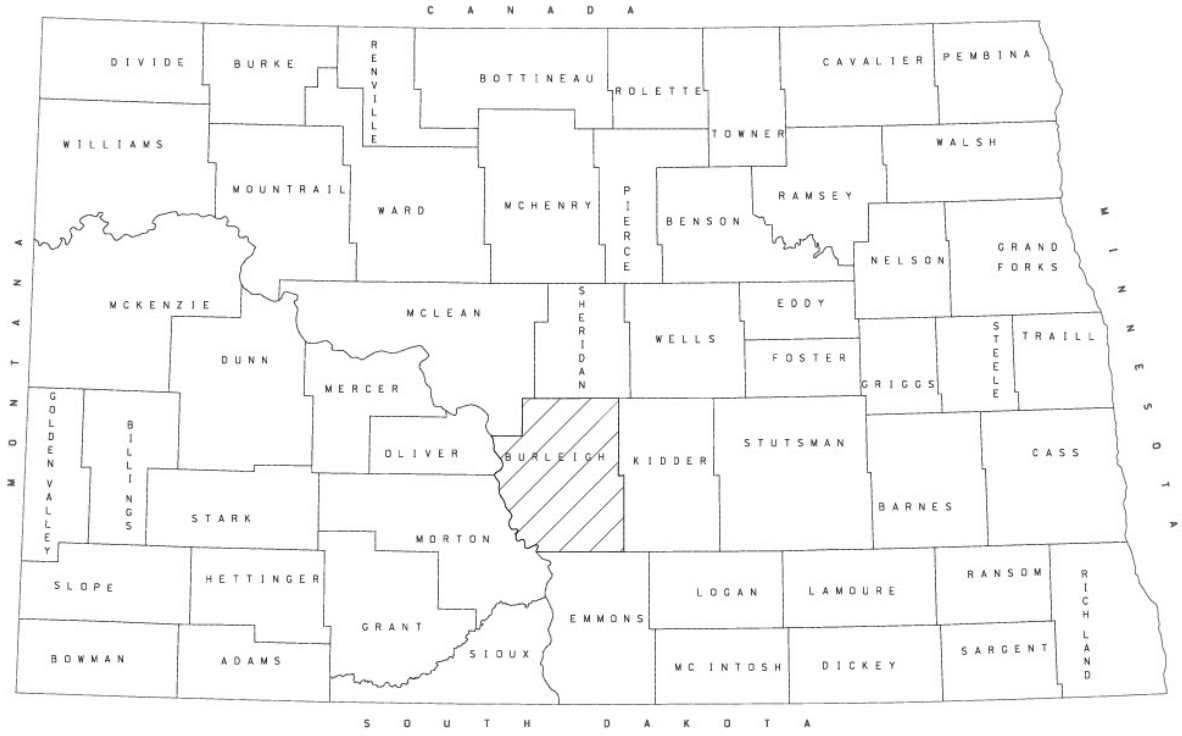
LINEAR SOILS SURVEY AND RECOMMENDATIONS

Project No. CVD-IM-1-094(238)172 & CVD-IM-1-094(239)172

PCN 23810 & 23811

Burleigh County

I-94 EB & WB, RP 172.126 to 182.488



PREPARED BY: Aaron Lehman

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
MATERIAL AND RESEARCH DIVISION

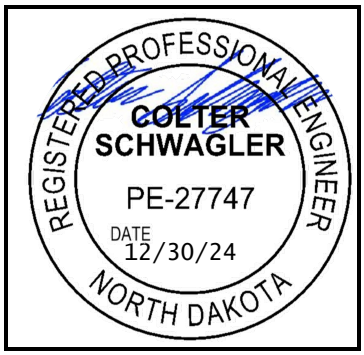
December 2024

CVD-IM-1-094(238)172 & CVD-IM-1-094(239)172

E Menoken Intr to Sterling – EB & WB

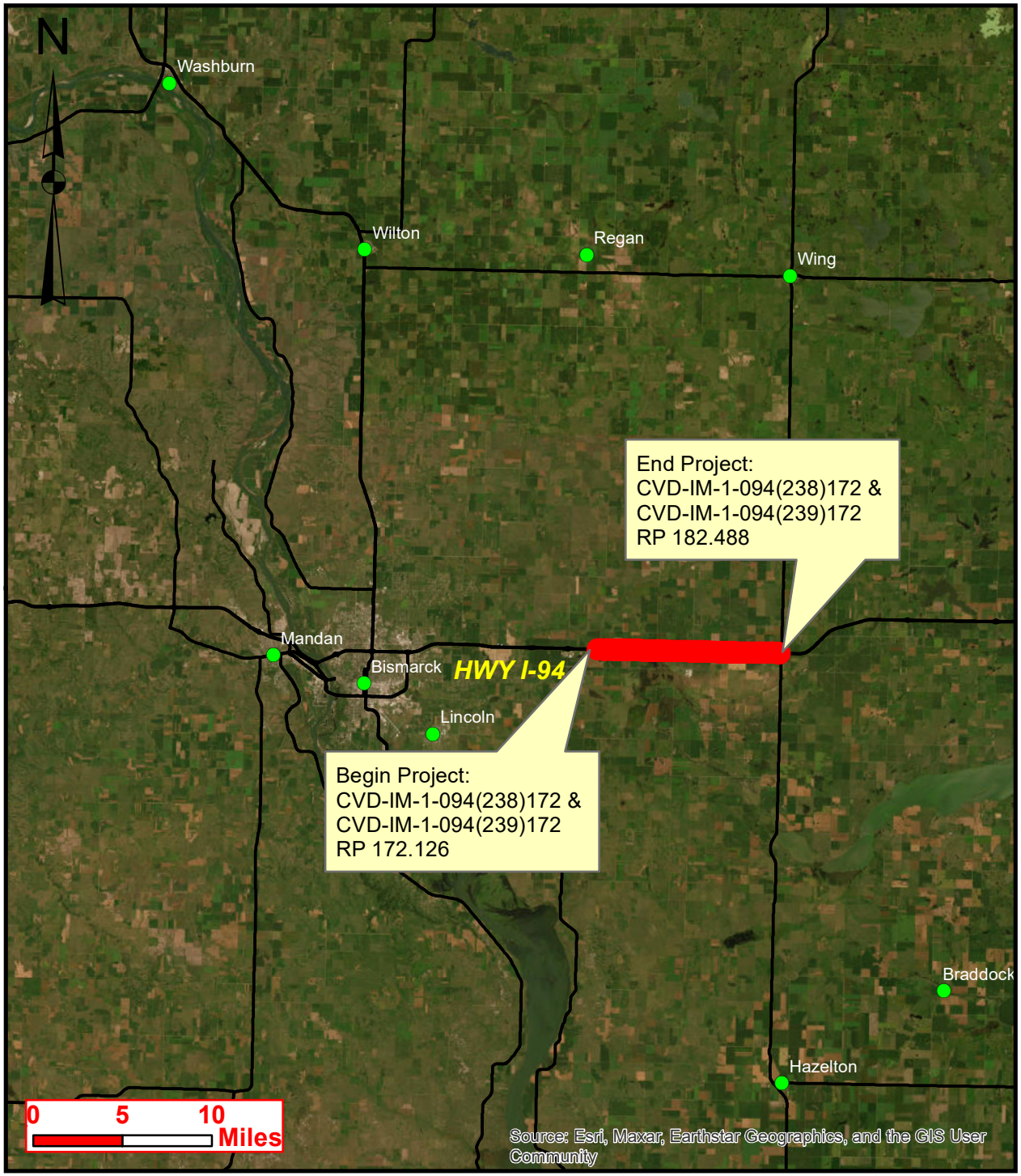
CERTIFICATION

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 Colter Schwagler, Registration number PE- 27747 on 12/30/2024 and the original document is stored at the North Dakota Department of Transportation.



Project Location

Project No: CVD-IM-1-094(238)172
& CVD-IM-1-094(239)172
PCN: 23810 & 23811
Scope: Reconstruction
Location: EB & WB, RP 172.126 to RP 182.488



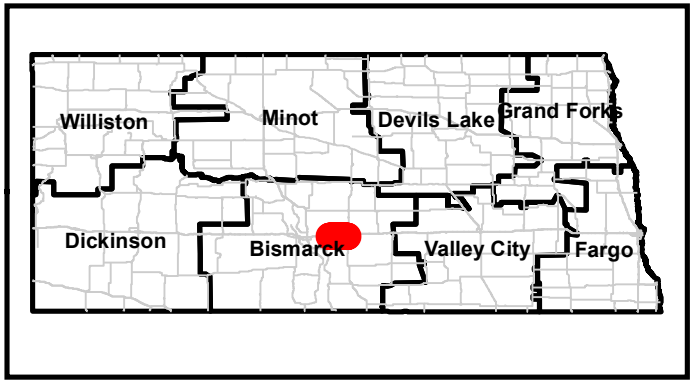


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Introduction

Location: Interstate 94 EB & WB, E Menoken Intr to Sterling
Reference Points: 172.126 to 182.488
Project Length: 10.362 Miles
Proposed Project Scope: Reconstruction
Investigation Scope: 1 boring every 1000' and Identified Maintenance Areas

Maintenance Review

Date of Maintenance Review: 03/11/2024
Materials and Research Person Conducting the Review: Jamie Naumann
Maintenance Person Conducting Review: Cory Bohne

Table 1a - Identified Maintenance Areas for I-94 Eastbound (PCN 23810)

Location RP + Feet	Distress Identified	Maintenance Comments	Drilling Required
172+0665 to 182+2576	Other	Rutting & transverse cracks throughout project; base is shot, dug out bad areas, several blowouts	No
173+0468	Corner Breaks	Pothole, concrete under surface broken up; dura patch / bag mix 2023 summer	No
173+5044 to 173+5093	Concrete Patch Deteriorating	CPR full depth patch; completed in ~2021	No
174+0819 to 174+0866	Concrete Patch Deteriorating	CPR full depth patch; not a problem after fix, completed in ~2022	No
174+4812 to 174+4866	Culvert	Void above box culvert, drilled in 2023; slurry to fill void in 2023	No
178+0000 to 178+0050	Concrete Patch Deteriorating	Hand patched, CPR; busting out within last year, durapatch, dig out in 2024	No
178+1702 to 178+2120	Concrete Patch Deteriorating	CPR, cut fill transition; fixed in 2021-22, good now	No
178+2054 to 178+2120	Concrete Patch Deteriorating	Blowout, cut fill transition; problem, last year milled passing lane	No
179+0523	Corner Breaks	Pothole; patched once, 2023 problem	No
180+0821	Bituminous Patch	Blowout, hand patch; 2' cut out last year	No
181+0182	Bituminous Patch	Blowout, cut fill transition; new, getting worse, swallowing patch	No

Table 1b - Identified Maintenance Areas for I-94 Westbound (PCN 23811)

Location RP + Feet	Distress Identified	Maintenance Comments	Drilling Required
172+0665 to 182+2576	Other	Rutting & transverse cracks throughout project; base is shot, dug out bad areas, several blowouts	No
174+4816 to 174+4875	Culvert	Void above box culvert, drilled in 2023; slurry to fill void in 2023	No
175+1661	Other	Blowout, blade patch; fixed in ~2023	No
175+1829	Bituminous Patch	Deep crack, patched; patched in 2023	No
177+1124	Bituminous Patch	Patch on edge of box culvert; problem in 2022	No
178+1276	Bituminous Patch	Left lane; patched in 2023	No
178+1670	Bituminous Patch	Dip in left lane; patched in 2022	No
178+2224	Other	Possible future blowout; patched in 2023	No
180+2252	Other	Right lane, blowout in 2023; fixed in 2023	No
181+0615	Other	Blowout, hand patch; fixed in 2023	No
181+3420	Other	Blowout, hand patch; fixed in 2023	No

Summary of Soil Investigation

The soil investigation for CVD-1-094(238)172 (PCN 23810) was completed on 07/09/2024 and consisted of 52 borings. The soil investigation for CVD-1-094(239)172 (PCN 23811) was completed on 08/01/2024 and consisted of 51 borings.

Table 2 - Boring Locations Summary

Boring Location	Pavement Distress	Justification for Boring	Boring Depth	Boring Locations/Comments
172+0665 to 182+2576	Other	Reconstruction	5 Feet	Conduct borings at 1000' intervals along the project limits. A total number of 103 borings between the two projects.

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

Summary of Soil Analysis

Soil Sample Distribution

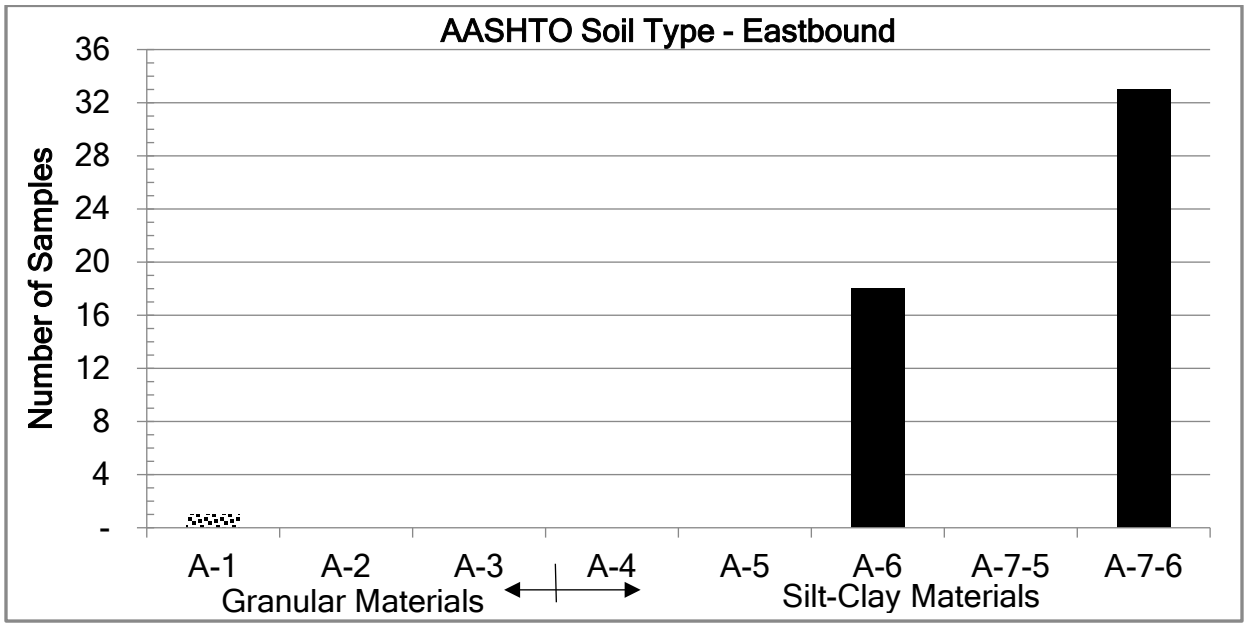


Figure 1a - Soil Sample Distribution for I-94 Eastbound (PCN 23810)

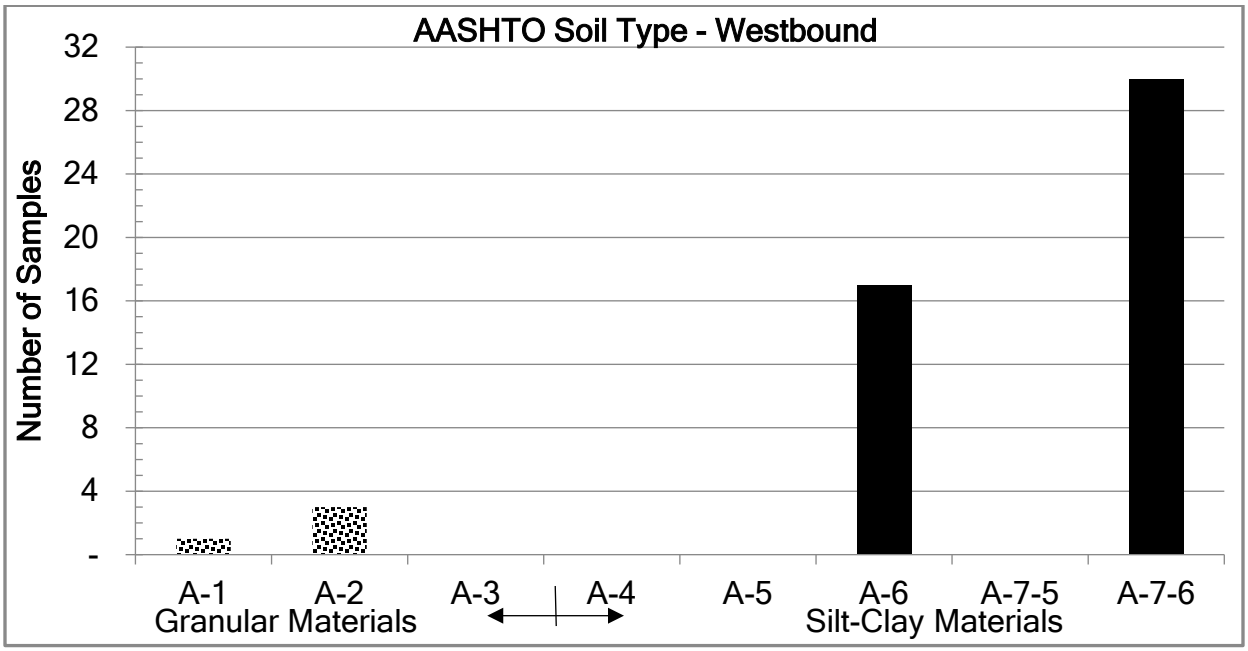


Figure 1b - Soil Sample Distribution for I-94 Westbound (PCN 23811)

Design Recommendations

Project Limits – I-94 EB & WB, 172+0665 to 182+2576: This project falls within multiple geological areas. One portion falls within the Coleharbor Formation with soils typically consisting of sandy/silty clay with some pebbles as well as bedded clay, silt, sand and gravel. Another portion falls within an area of glacial sediment typically consisting of an unbedded, unsorted mixture of clay, silt, sand, and pebbles with some cobbles and boulders.

The soils within the project were found to be primarily sandy lean clay and fat clay with sand. The soils are typical of the surrounding area and do not require additional subgrade mitigation. It is recommended to place Geosynthetic Geogrid (Type G) in lieu of performing subgrade prep to facilitate construction.

Design Information

Pipe Replacement: None

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)*			
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 :

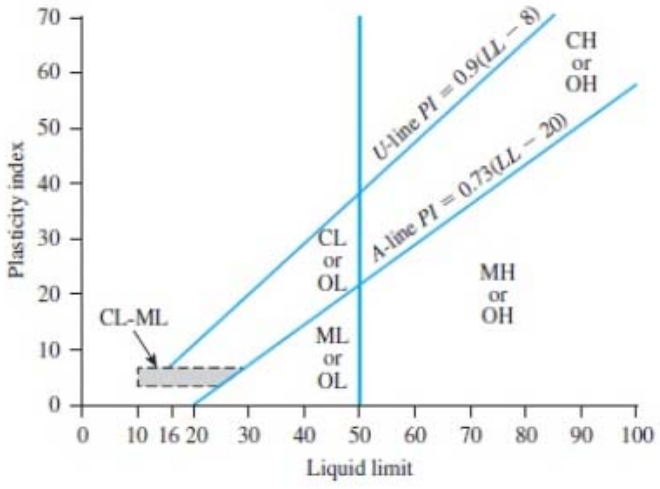


Table 7-12. Frost susceptibility classification of soils (NCHRP 1-37A).

Frost Group	Degree of Frost Susceptibility	Type of Soil	Percentage Finer than 0.075 mm (# 200) by wt.	Typical Soil Classification
F1	Negligible to low	Gravelly soils	3-10	GC, GP, GC-GM, GP-GM
F2	Low to medium	Gravelly soils	10-20	GM, GC-GM, GP-GM
		Sands	3-15	SW, SP, SM, SW-SM, SP-SM
F3	High	Gravelly Soils	Greater than 20	GM-GC
		Sands, except very fine silty sands	Greater than 15	SM, SC
		Clays PI>12	—	CL, CH
F4	Very high	All Silts	—	ML-MH
		Very Fine Silty Sands	Greater than 15	SM
		Clays PI<12	—	CL, CL-ML
		Varied clays and other fine grained, banded sediments	—	CL, ML, SM, CH

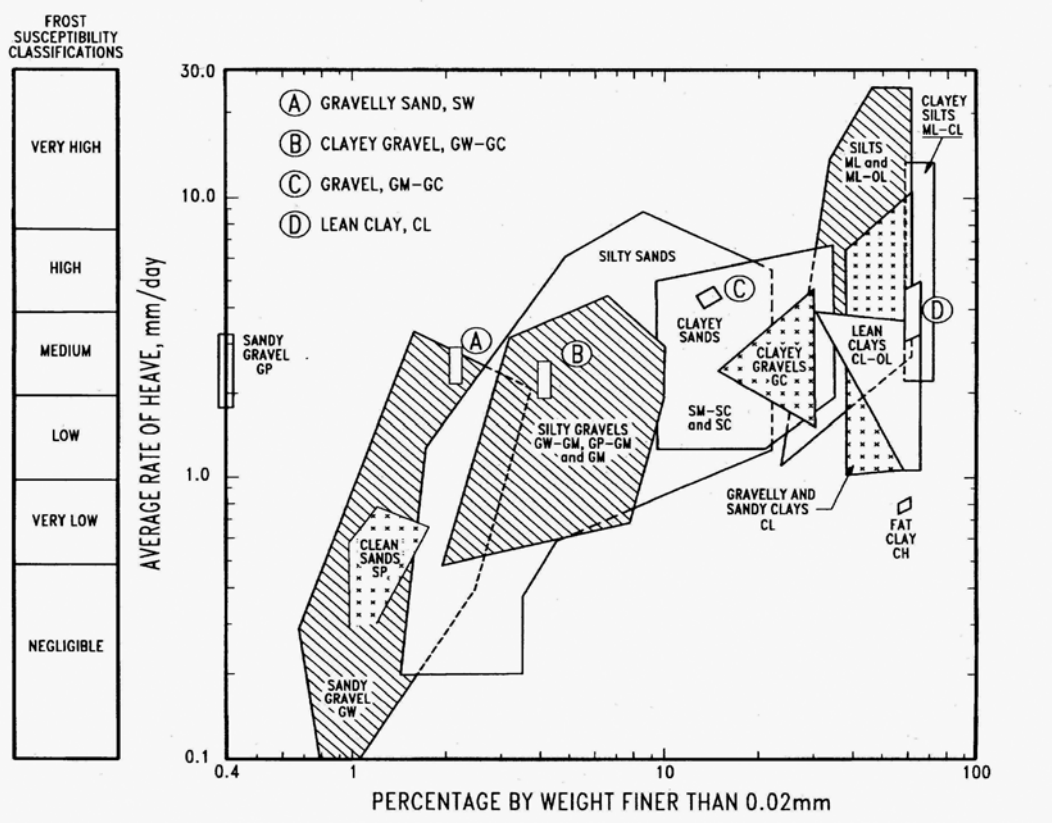


Figure 7-20. Average rate of heave versus % fines for natural soil gradations (Kaplar, 1974).

Frost Depth Map



*Values shown are in meters

APPENDIX B

MAINTENANCE REVIEW AND SUBSURFACE INVESTIGATION SCOPE

PAVEMENT EVALUATION LOG FOR LINEAR SOIL SURVEY

North Dakota Department of Transportation, Materials & Research
SFN 60472 (6-2017)

Project Number	PCN	Date of Survey
CVD-IM-1-094(238)172	23810	03/11/2024

Section Maintenance Contact	Completed By
Cory Bohne	Jamie Naumann

Highway Reference Points	Surface Types
172+0665 to 182+2576	Other

Location	Pavement Distress	Description	Maintenance Comment	Picture Number	Drilling Required
172+0665 to 182+2576	Other	Throughout project, Rutting & Transv. cracks	Base is shot, dug out bad areas, several blowouts	N/a	No
173+0468	Corner Breaks	Pothole, concrete under surface broken up	Dura patch / bag mix 2023 summer.	1	No
173+5044 to 173+5093	Concrete Patch Det	CPR Full depth patch	completed in ~2021	2	No
174+0819 to 174+0866	Concrete Patch Det	CPR Full depth patch	Not a problem after fix, completed in ~2022	3	No
174+4812 to 174+4866	Culvert	Void above box culvert, drilled in 2023	slurry to fill void 2023	4-6	No
178+0000 to 178+0050	Concrete Patch Det	hand patched, CPR	Busting out within last year, durapatch, dig out in 2024	7-8	No
178+1702 to 178+1751	Concrete Patch Det	CPR, cut fill transition	Fixed in 2021-22, good now	9	No
178+2054 to 178+2120	Concrete Patch Det	Blowout, cut fill transition	problem, last year milled passing lane	10-11	No
179+0523	Corner Breaks	Pothole	Patched once, 2023 problem	12	No

Comments

PAVEMENT EVALUATION LOG FOR LINEAR SOIL SURVEY

North Dakota Department of Transportation, Materials & Research

SFN 60472 (6-2017)

Sheet 2 of 2

Project Number	PCN	Date of Survey
CVD-IM-1-094(238)172	23810	03/11/2024

Section Maintenance Contact	Completed By
Cory Bohne	Jamie Naumann

Highway Reference Points	Surface Types
172+0665 to 182+2576	Other

Location	Pavement Distress	Description	Maintenance Comment	Picture Number	Drilling Required
180+0821	Bituminous Patch	Blowout, hand patch	2' cut out last year	13	No
181+0182	Bituminous Patch	Blowout, cut fill transition	new, getting worse, swallowing patch	14	No

Comments



1

173+0468



2

173+5044 to 173+5093



3

174+0819 to 174+0866



4

174+4812 to 174+4866



5

174+4812 to 174+4866



6

174+4812 to 174+4866



7

178+0000 to 178+0050



8

178+0000 to 178+0050



9

178+1702 to 178+1751



10

178+2054 to 178+2120



11

178+2054 to 178+2120



12

179+0523



13

180+0821



14

181+0182

PAVEMENT EVALUATION LOG FOR LINEAR SOIL SURVEY

North Dakota Department of Transportation, Materials & Research

SFN 60472 (6-2017)

Project Number	PCN	Date of Survey
CVD-IM-1-094(239)172	23811	3/11/2024

Section Maintenance Contact	Completed By
Cory Bohne	Jamie Naumann

Highway Reference Points	Surface Types
172+0665 to 182+2576	Other

Location	Pavement Distress	Description	Maintenance Comment	Picture Number	Drilling Required
172+0665 to 182+2576	Transv. Cracks	Throughout project, Rutting & Transv. cracks	Base is shot, dug out bad areas, several blowouts	N/a	No
174+4816 to 174+4875	Other	Void above box culvert, drilled in 2023	slurry to fill void 2023	1	No
175+1661	Other	Blowout, blade patch	Fixed in ~2023	2	No
175+1829	Bituminous Patch	Deep crack,patched	Patched in 2023	3	No
177+1124	Bituminous Patch	Patch on edge of box culvert	Problem in 2022	4	No
178+1276	Bituminous Patch	Left Lane	Patched in 2023	4a	No
178+1670	Bituminous Patch	Dip in left lane	Patched in 2022	5	No
178+2224	Other	Possible future blowout	Patched in 2023	6	No
180+2252	Other	Right lane, blowout in 2023	fixed in 2023	7	No

Comments

PAVEMENT EVALUATION LOG FOR LINEAR SOIL SURVEY

North Dakota Department of Transportation, Materials & Research

SFN 60472 (6-2017)

Project Number	PCN	Date of Survey
CVD-IM-1-094(239)172	23811	03/11/2024

Section Maintenance Contact	Completed By
Cory Bohne	Jamie Naumann

Highway Reference Points	Surface Types
172+0665 to 182+2576	Other

Location	Pavement Distress	Description	Maintenance Comment	Picture Number	Drilling Required
181+0615	Other	Blowout, hand patch	fixed in 2023	9	No
181+3420	Other	Blowout, hand patch	fixed in 2023	10	No

Comments



1

174+4816 to 174+4875



2

175+1661



3

175+1829



4

177+1124



4a

178+1276



5

178+1670



6

178+2224



7

180+2252



9

181+0615

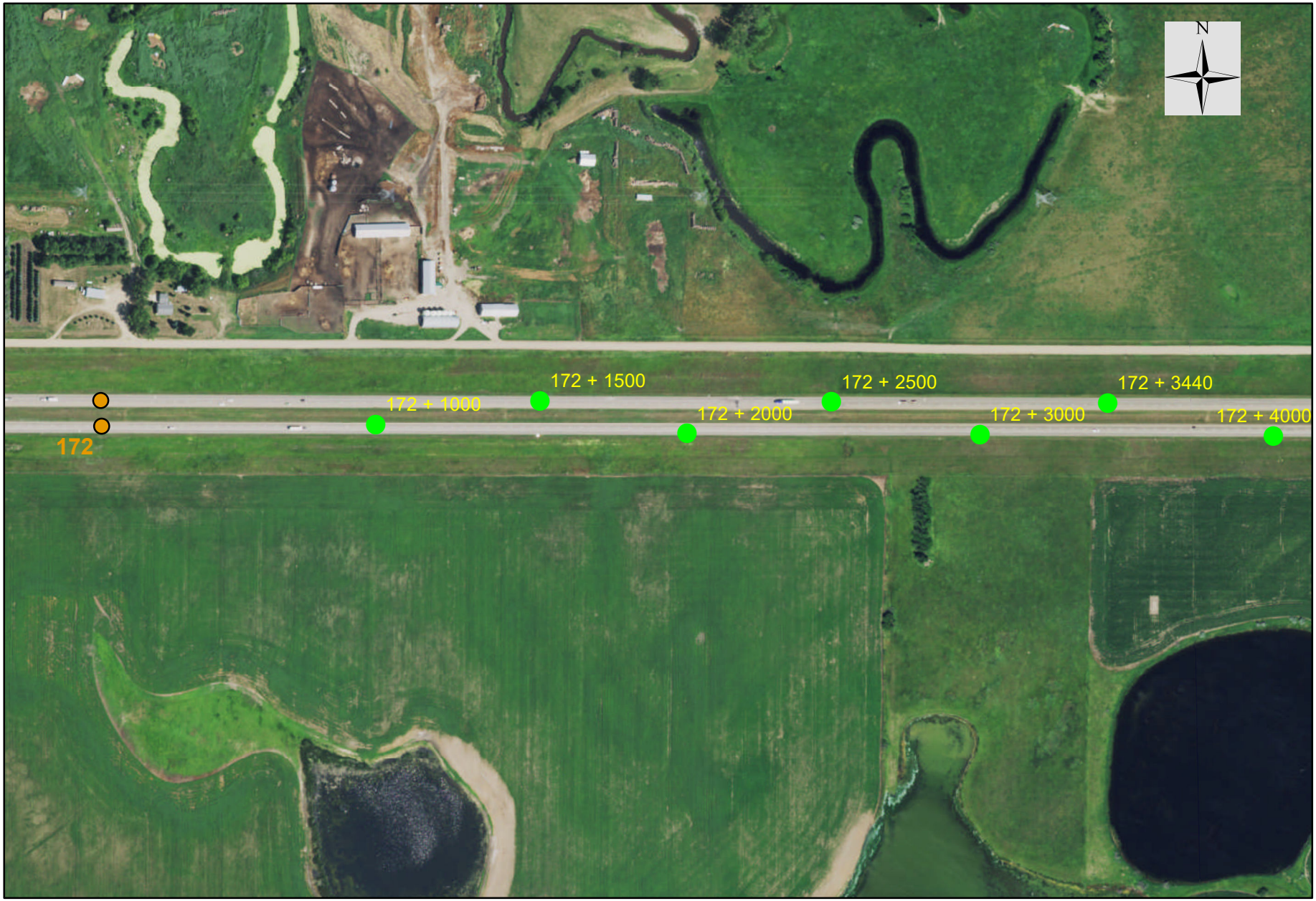


10

181+3420

APPENDIX C

BORING LOCATIONS

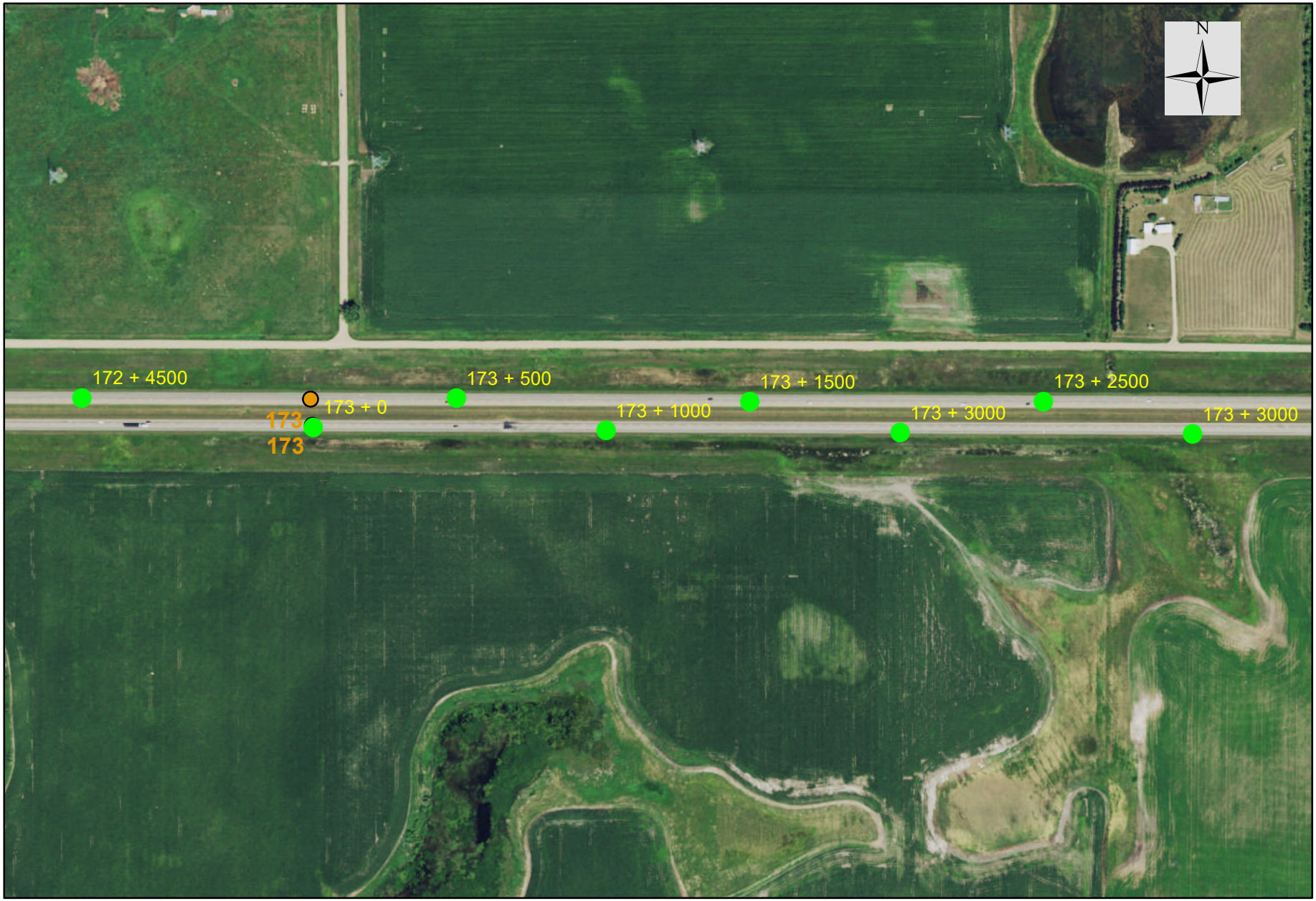


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- Boring Locations

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Project Number: CVD-IM-1-094(238)172 (EB)
CVD-IM-1-094(239)172 (WB)



Legend

- Reference Point
- Boring Locations

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CVD-IM-1-094(239)172 (WB)

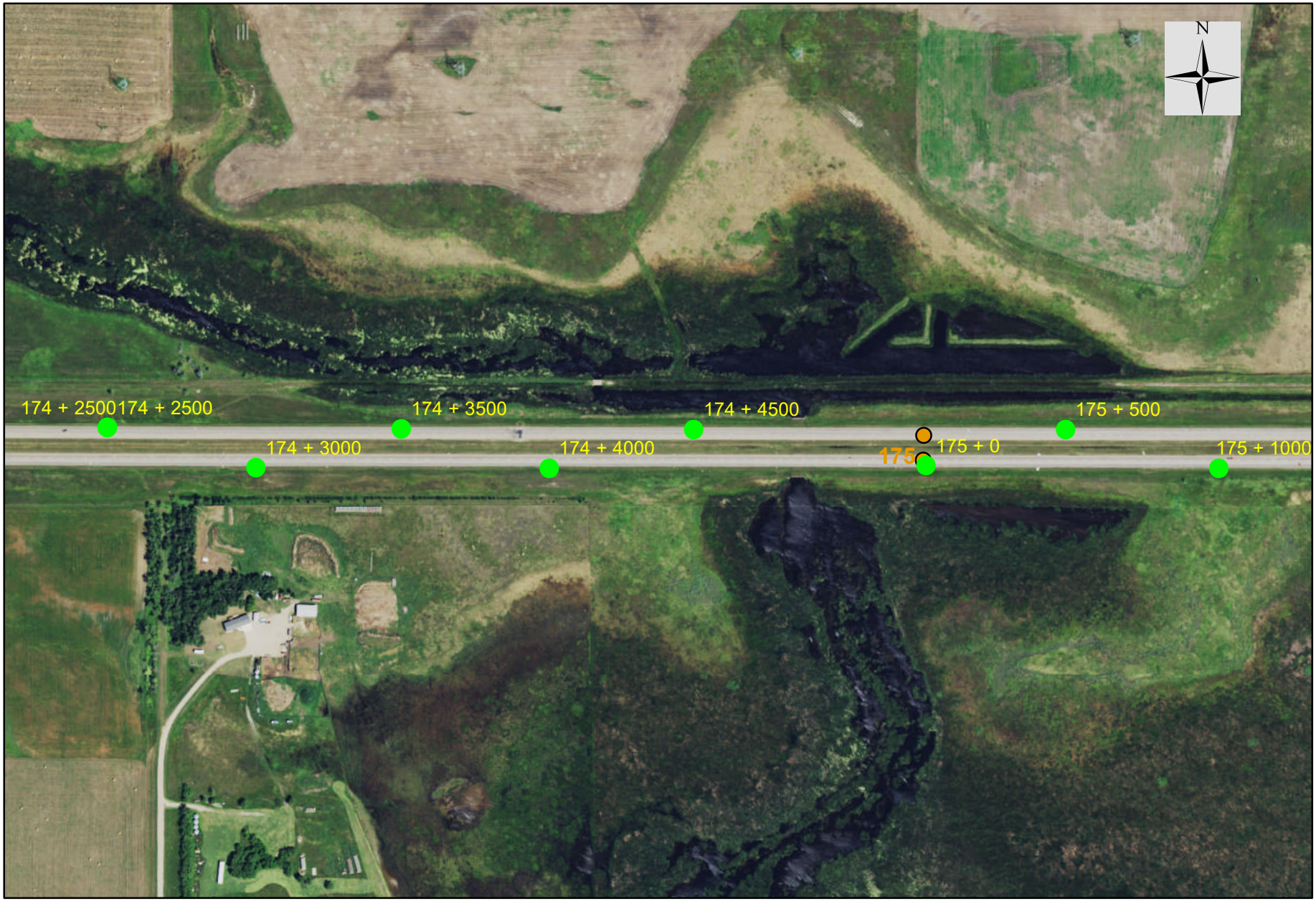


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- Boring Locations

0 750 1,500 Feet

Project Number: CVD-IM-1-094(238)172 (EB)
CVD-IM-1-094(239)172 (WB)



Legend

- Reference Point
- Boring Locations

0 750 1,500 Feet

Project Number: CVD-IM-1-094(238)172 (EB)
CVD-IM-1-094(239)172 (WB)

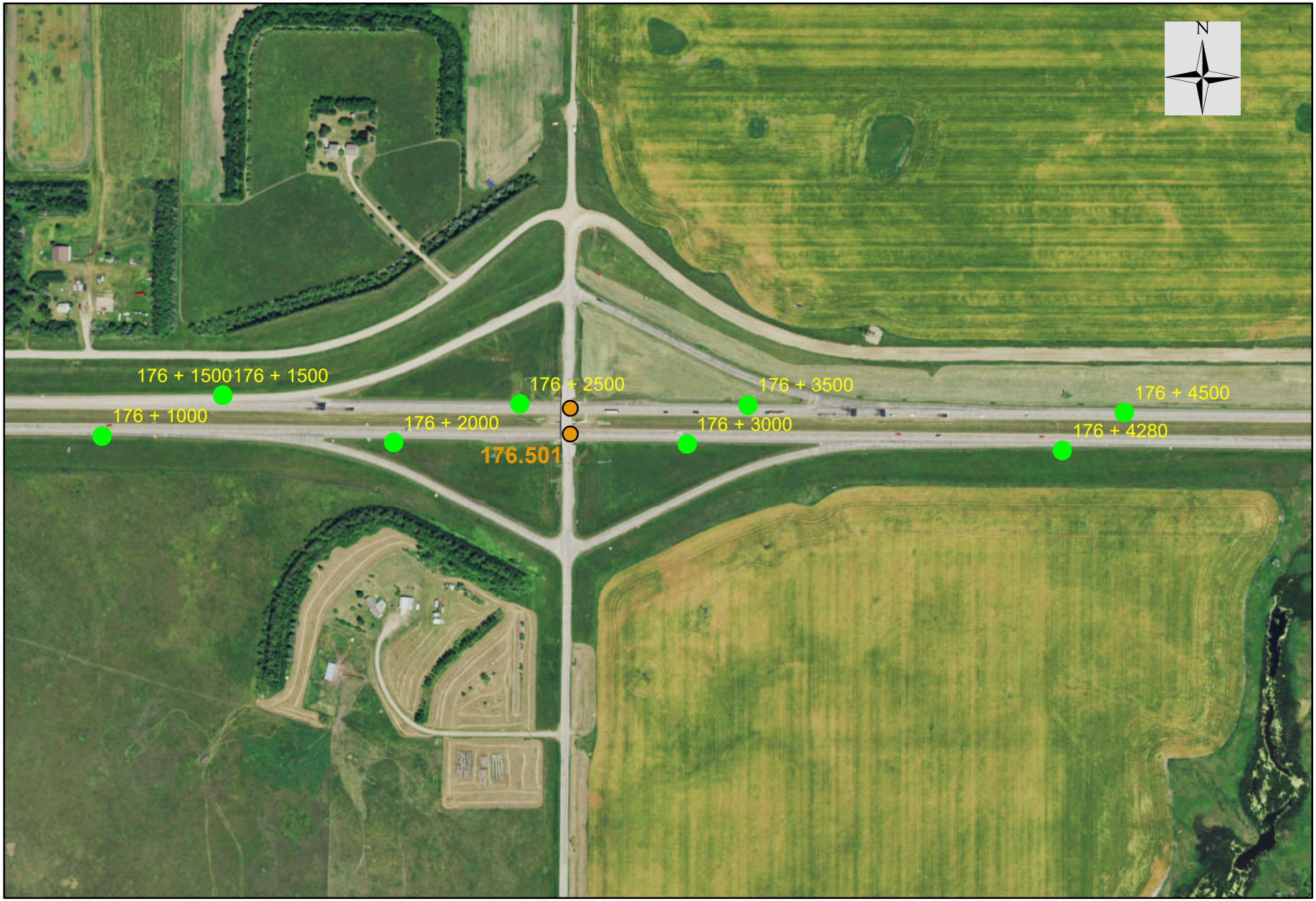


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- Boring Locations

0 750 1,500 Feet

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CVD-IM-1-094(239)172 (WB)

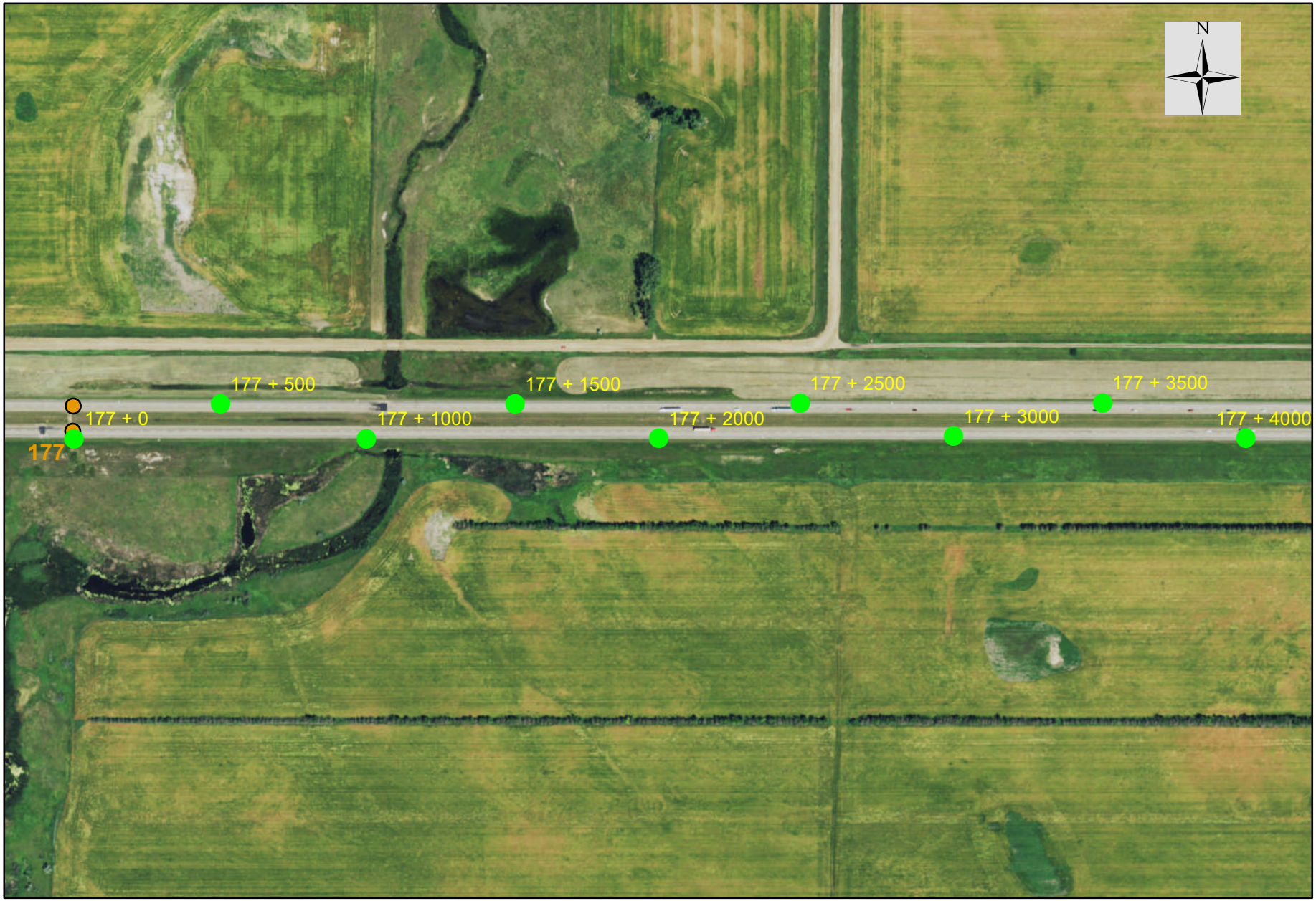


Legend

- Reference Point
- Boring Locations

0 750 1,500 Feet

Project Number: CVD-IM-1-094(238)172 (EB)
CVD-IM-1-094(239)172 (WB)



Legend

- Reference Point
- Boring Locations

0 750 1,500 Feet

Project Number: CVD-IM-1-094(238)172 (EB)
CVD-IM-1-094(239)172 (WB)

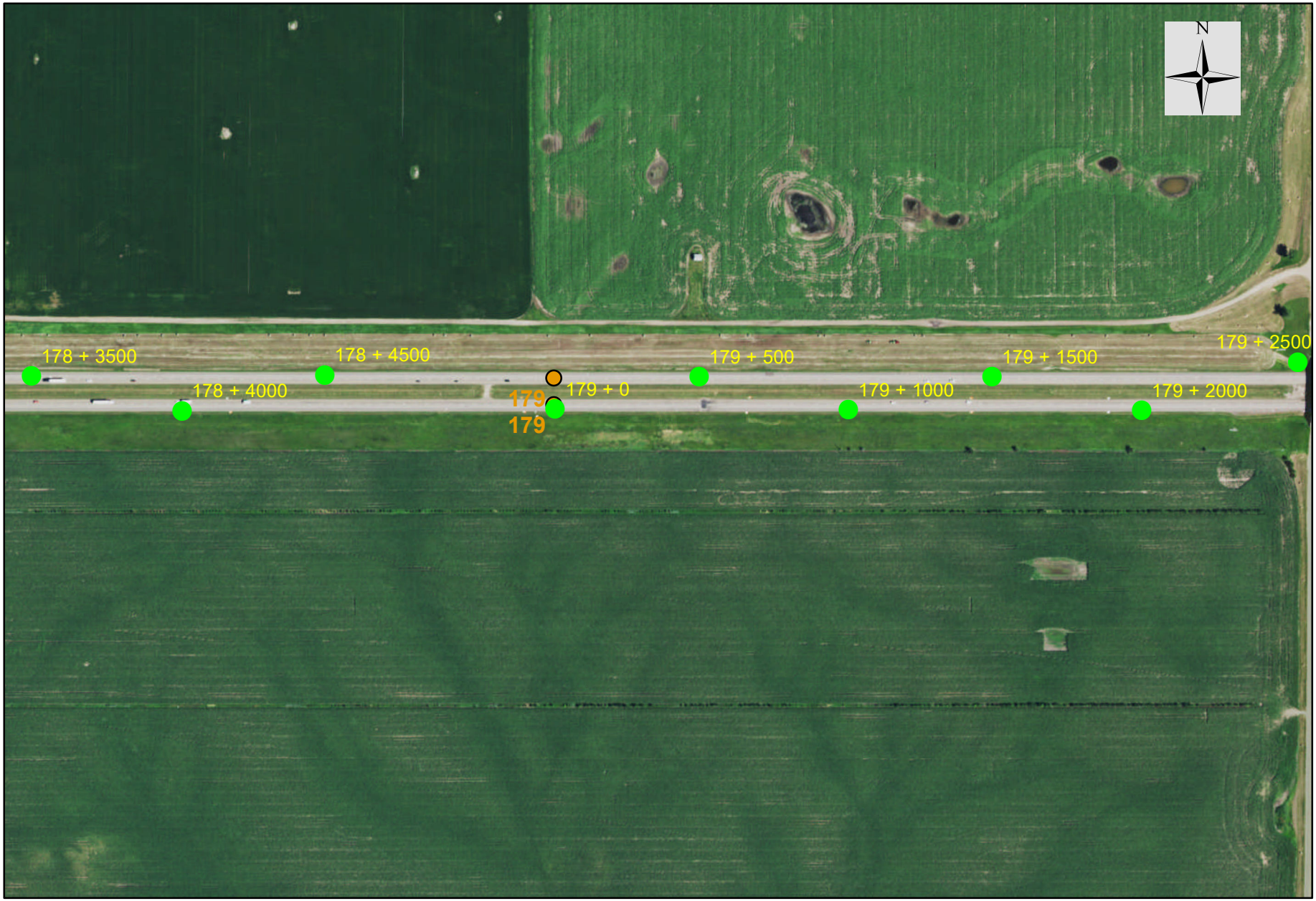


Legend

- Reference Point
- Boring Locations

0 750 1,500
Feet

Project Number: CVD-IM-1-094(238)172 (EB)
CVD-IM-1-094(239)172 (WB)



Legend

- Reference Point
- Boring Locations

0 750 1,500 Feet

Project Number: CVD-IM-1-094(238)172 (EB)
CVD-IM-1-094(239)172 (WB)



Legend

- Reference Point
- Boring Locations

0 750 1,500 Feet

Project Number: CVD-IM-1-094(238)172 (EB)
CVD-IM-1-094(239)172 (WB)

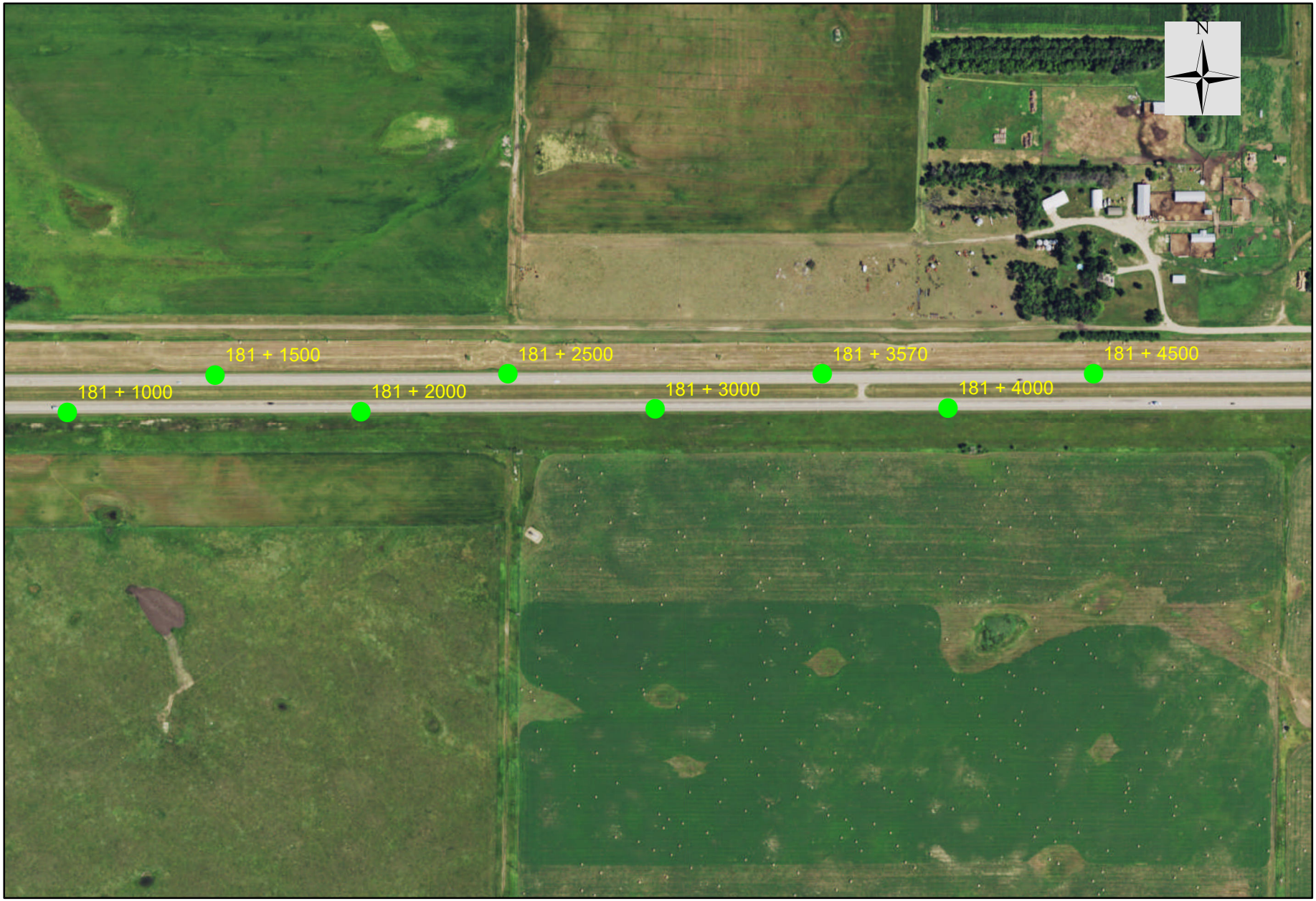


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- Reference Point
- Boring Locations

0 750 1,500 Feet

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CVD-IM-1-094(239)172 (WB)

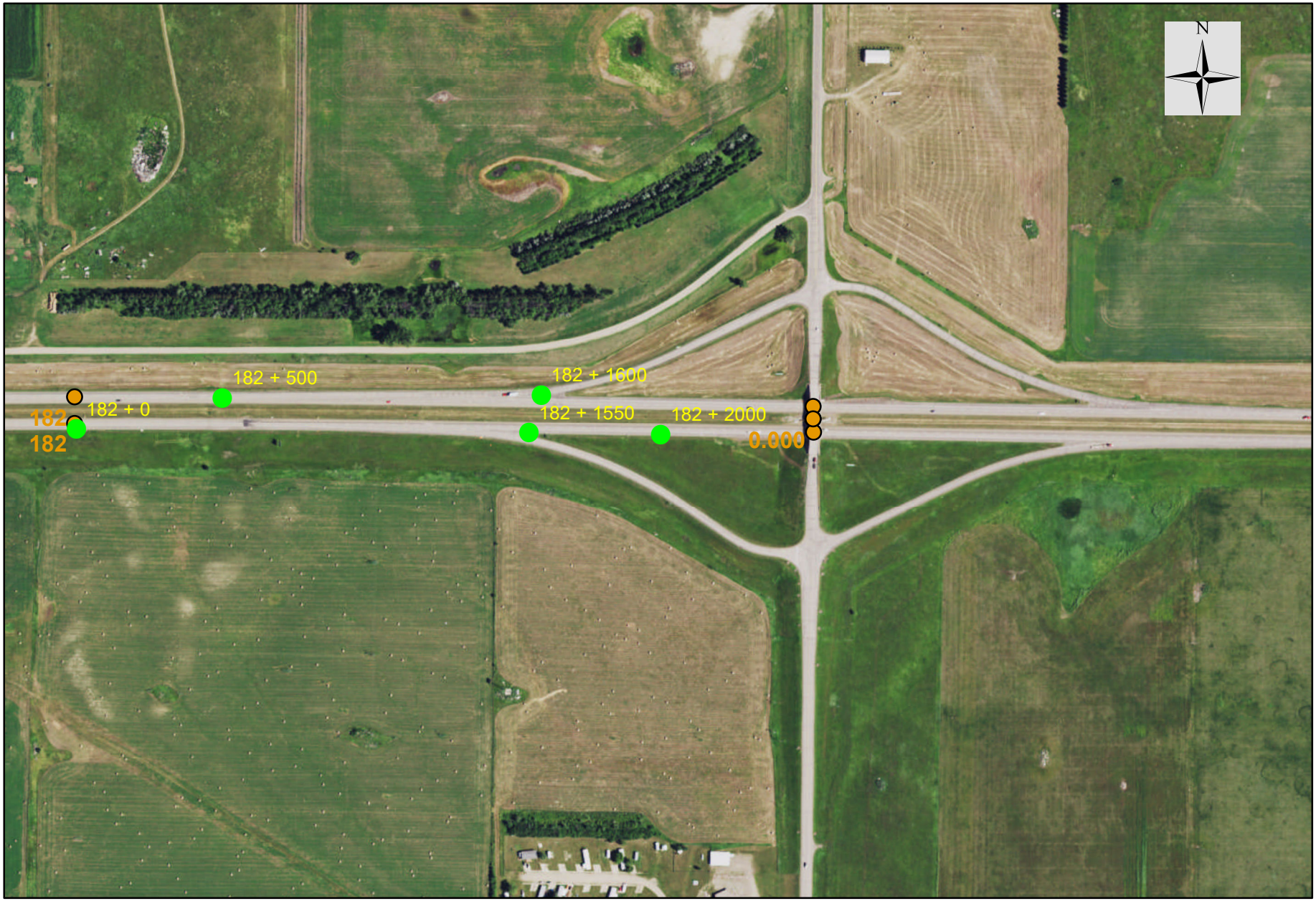


Legend

- Reference Point
- Boring Locations

0 750 1,500
Feet

Project Number: CVD-IM-1-094(238)172 (EB)
CVD-IM-1-094(239)172 (WB)



Legend

- Reference Point
- Boring Locations

0 750 1,500 Feet

Project Number: CVD-IM-1-094(238)172 (EB)
CVD-IM-1-094(239)172 (WB)

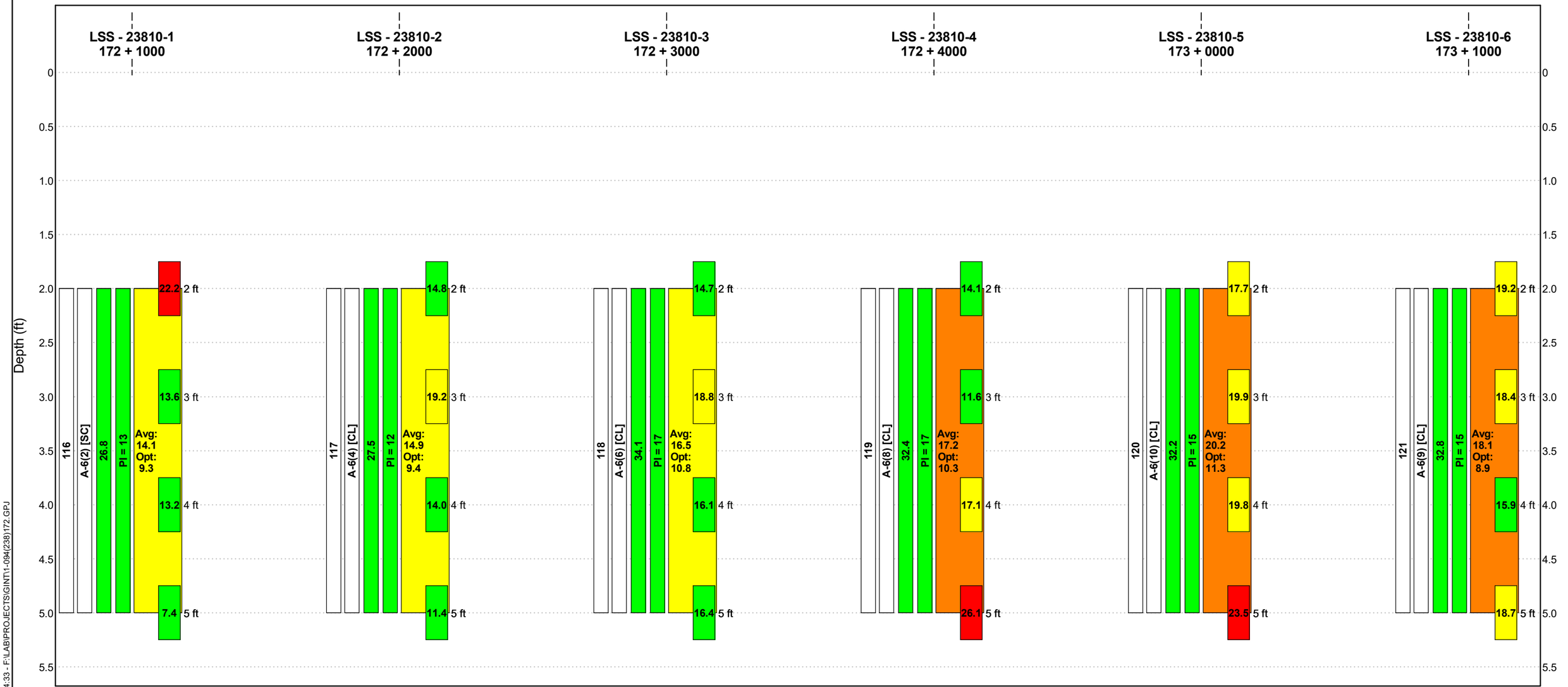
APPENDIX D

SUMMARY OF SOILS ANALYSIS

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

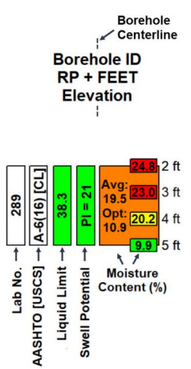
PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **PCN** 23810

LOCATION Burleigh County

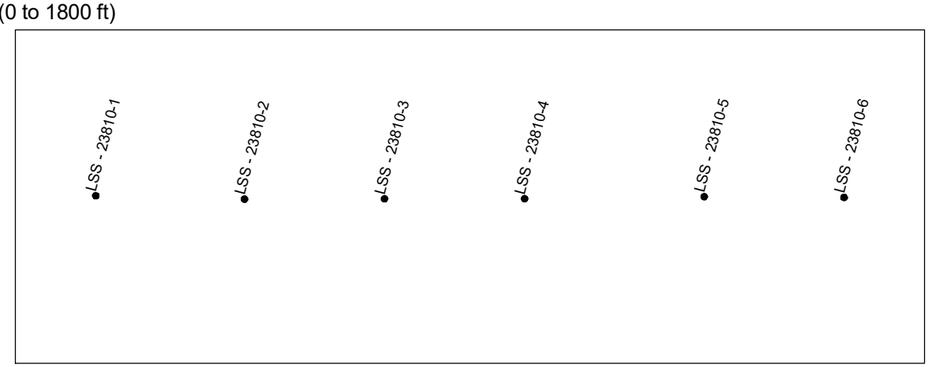


Boreholes Equally Spaced (0 to 1800 ft)

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



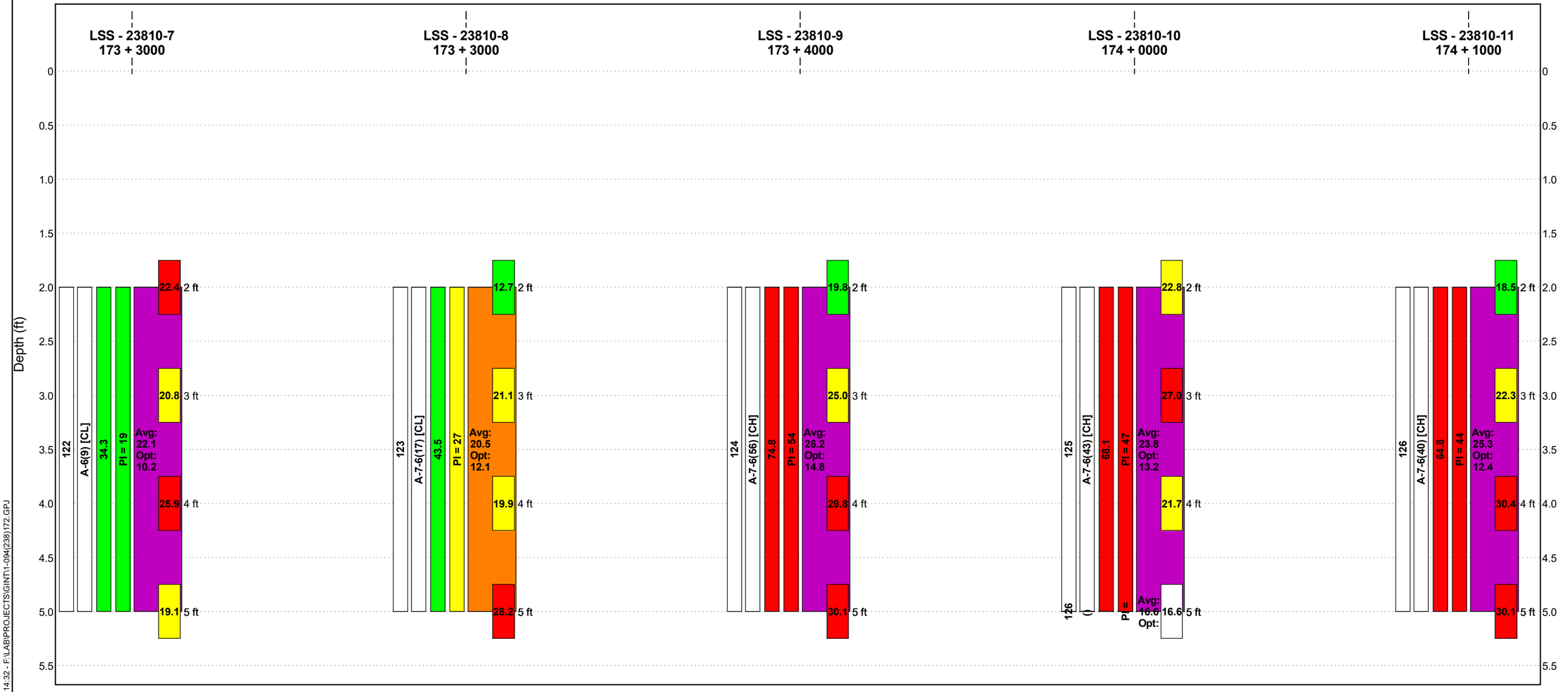
NDDOT_LINEARCOLORFENCE_DEPTH - 20171219.GDT - 12/6/24 14:33 - F:\LAB\PROJECTS\GINT\1-094(238)172.GPJ

NDDOT
North Dakota Department of Transportation

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

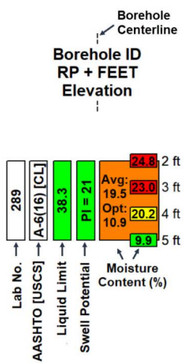
PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **PCN** 23810

LOCATION Burleigh County

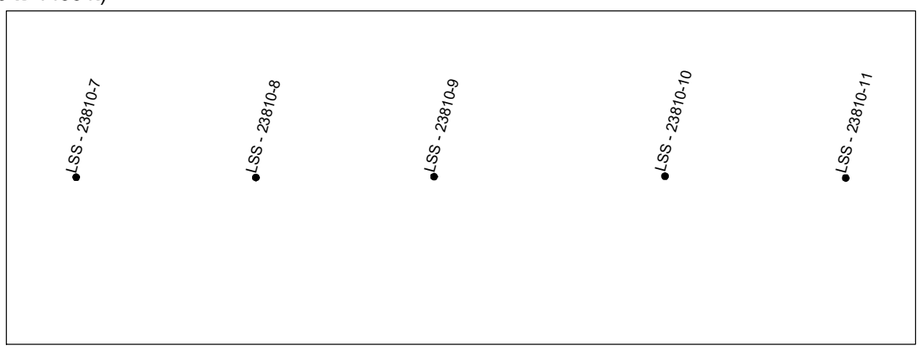


Boreholes Equally Spaced (0 to 1400 ft)

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

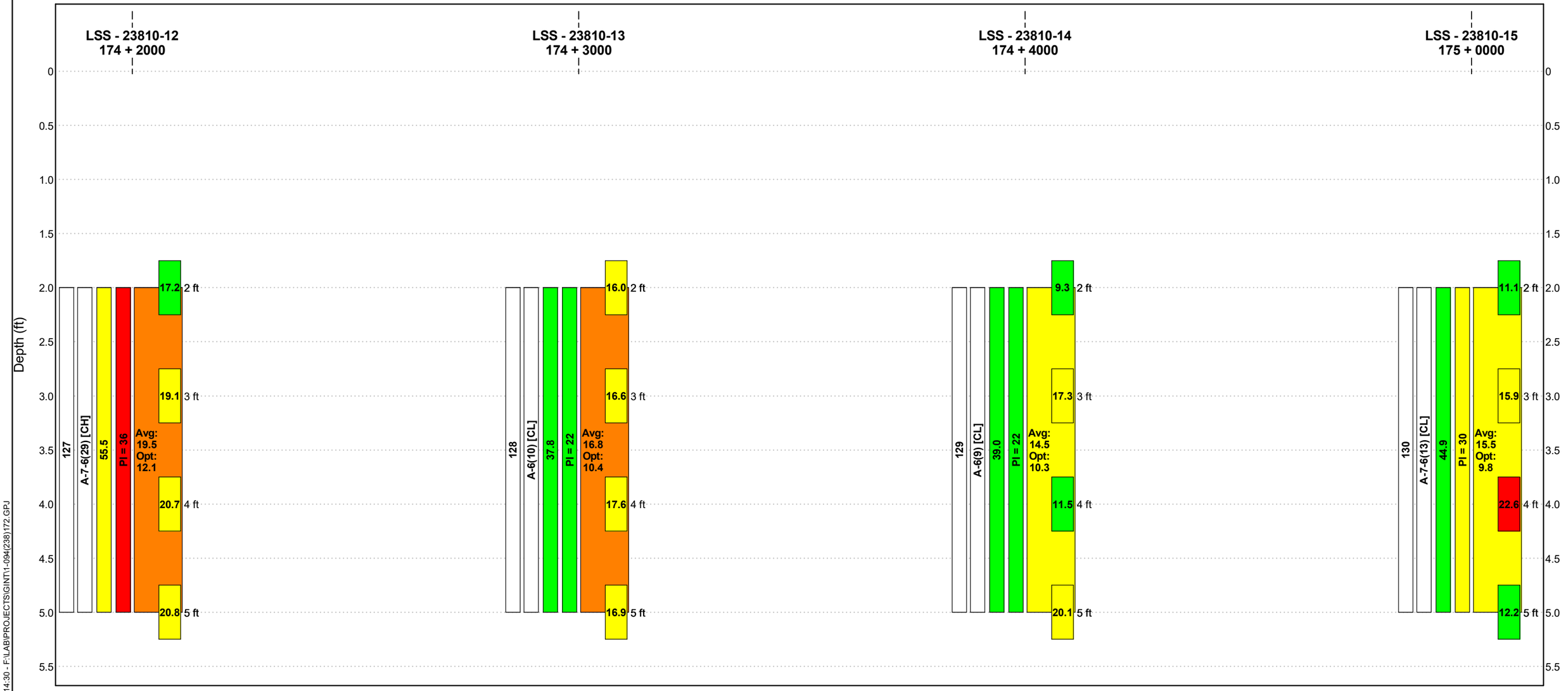


NDDOT_LINEARCOLORFENCE_DEPTH - 20171219.GDT - 12/5/24 14:32 - F:\LAB\PROJECTS\GINT\11-094(238)172.GPJ

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

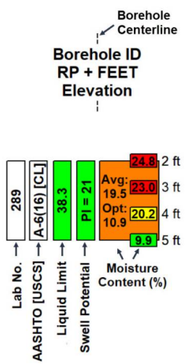
PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **PCN** 23810

LOCATION Burleigh County

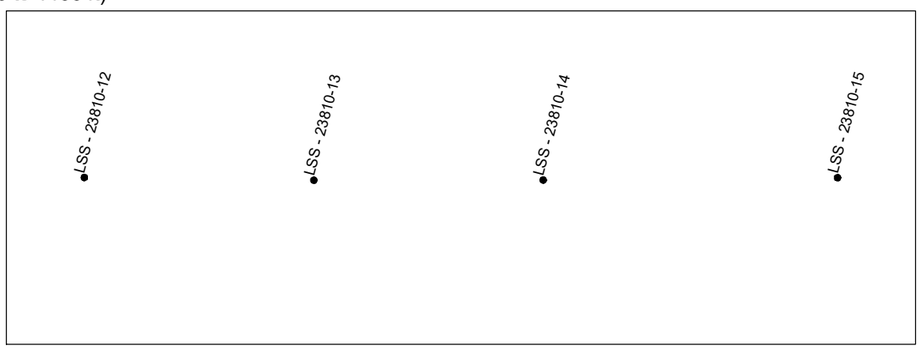


Boreholes Equally Spaced (0 to 1100 ft)

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

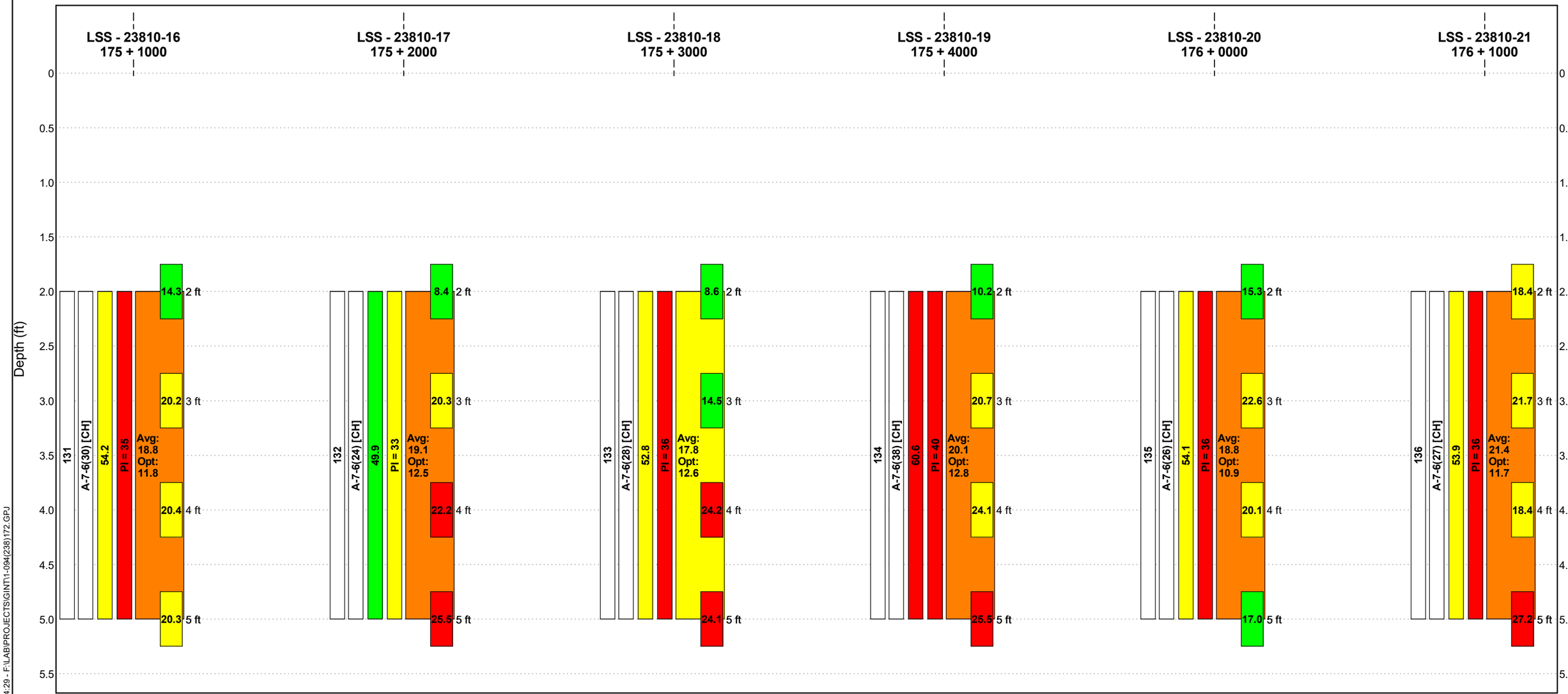


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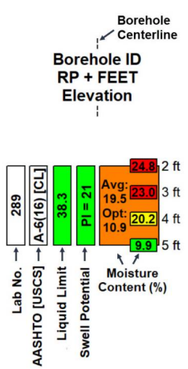
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **PCN** 23810

LOCATION Burleigh County

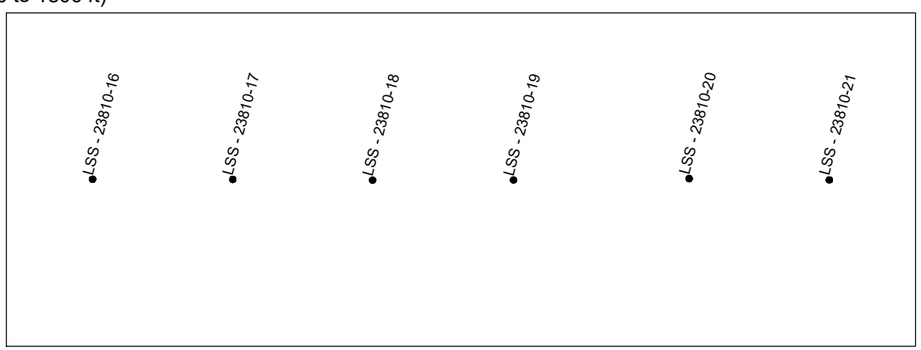


LEGEND



Liquid Limit	LL<50	50<=LL<60	LL>=60	
Swell Potential	Low	Marginal	High	
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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 1800 ft)

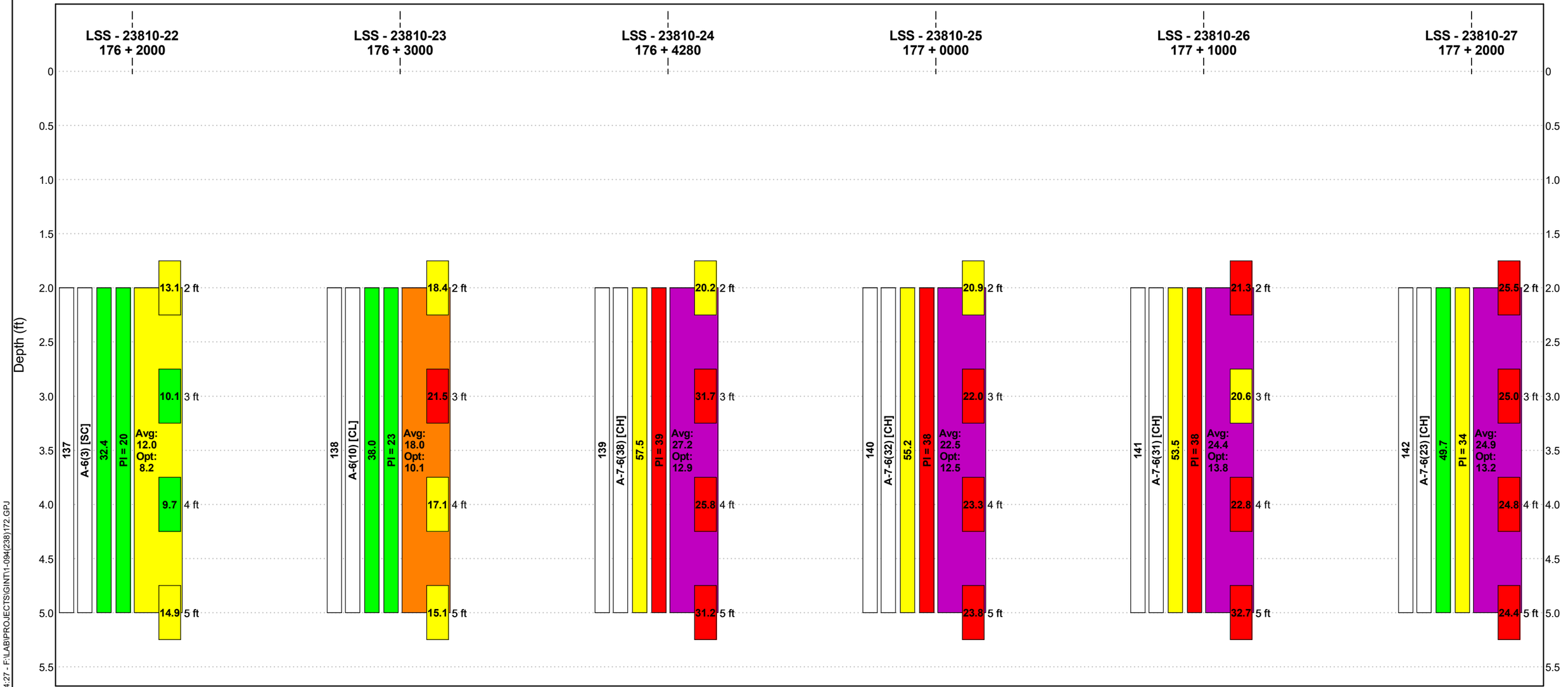


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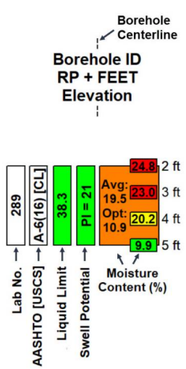
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **PCN** 23810

LOCATION Burleigh County

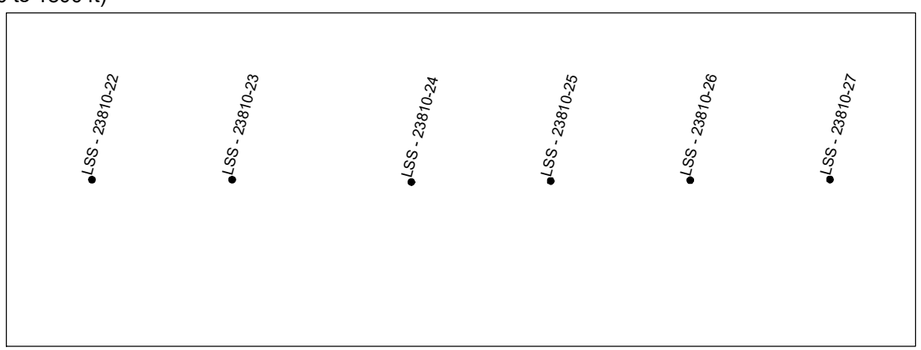


LEGEND



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Boreholes Equally Spaced (0 to 1800 ft)



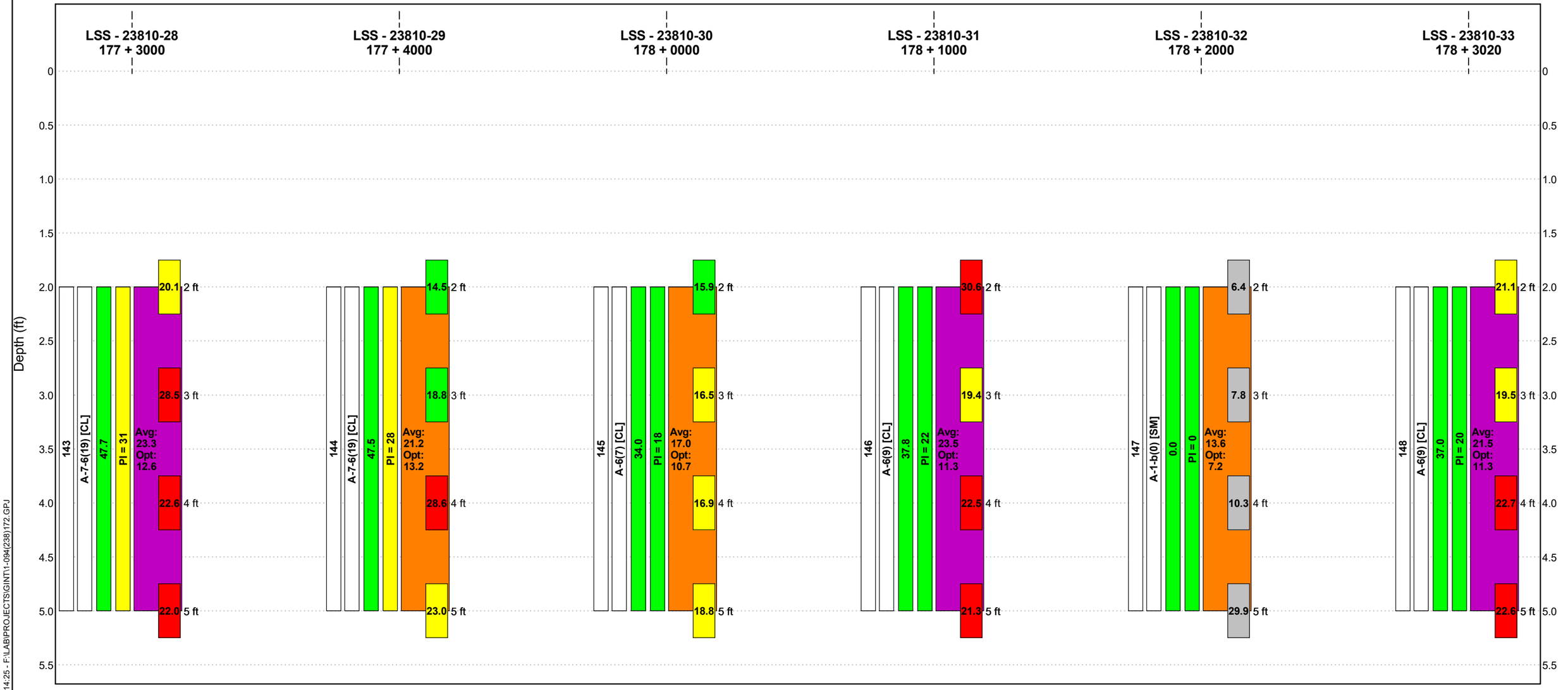
NDDOT_LINEARCOLORFENCE_DEPTH - 20171219.GDT - 12/5/24 14:27 - F:\LAB\PROJECTS\GINT\1-094(238)172.GPJ

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

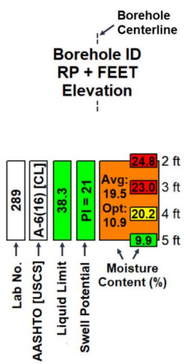
PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **PCN** 23810

LOCATION Burleigh County

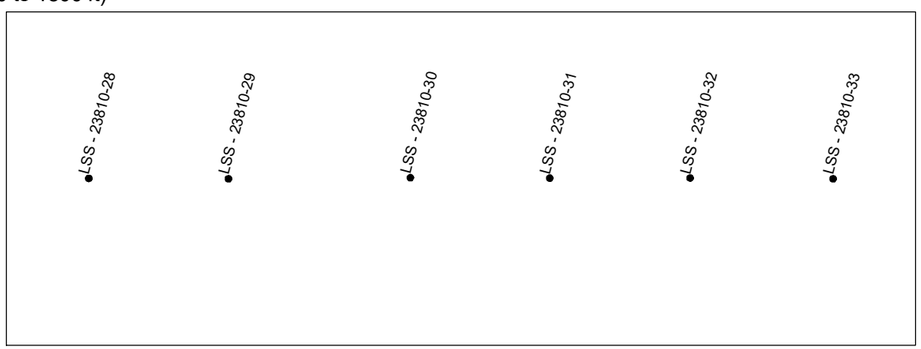


Boreholes Equally Spaced (0 to 1800 ft)

LEGEND



Liquid Limit	LL<50	50<=LL<60	LL>=60	
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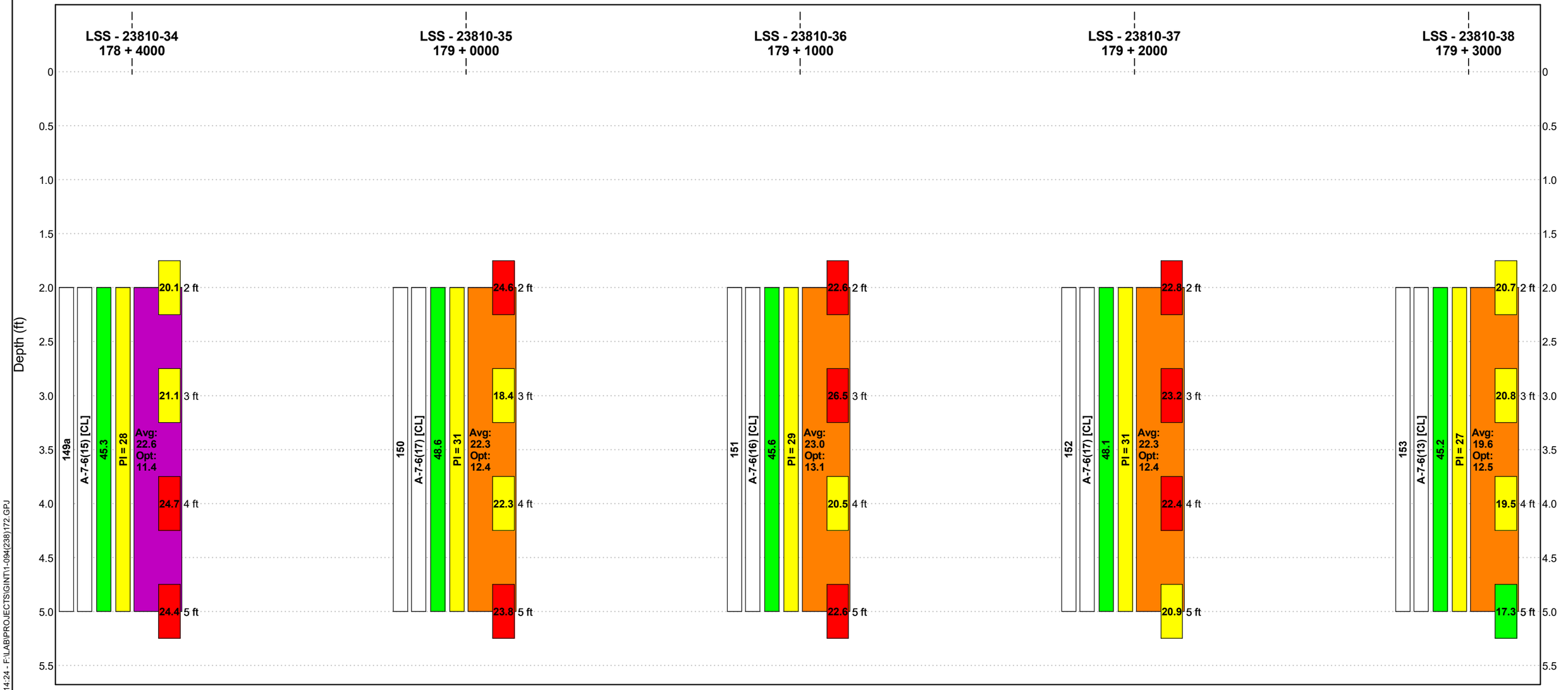


NDDOT_LINEARCOLORFENCE_DEPTH - 20171219.GDT - 12/5/24 14:25 - F:\LAB\PROJECTS\GINT\11-094(238)172.GPJ

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

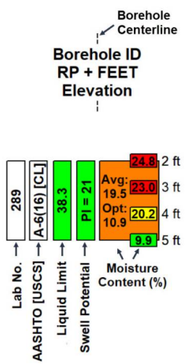
PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **PCN** 23810

LOCATION Burleigh County



Boreholes Equally Spaced (0 to 1400 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



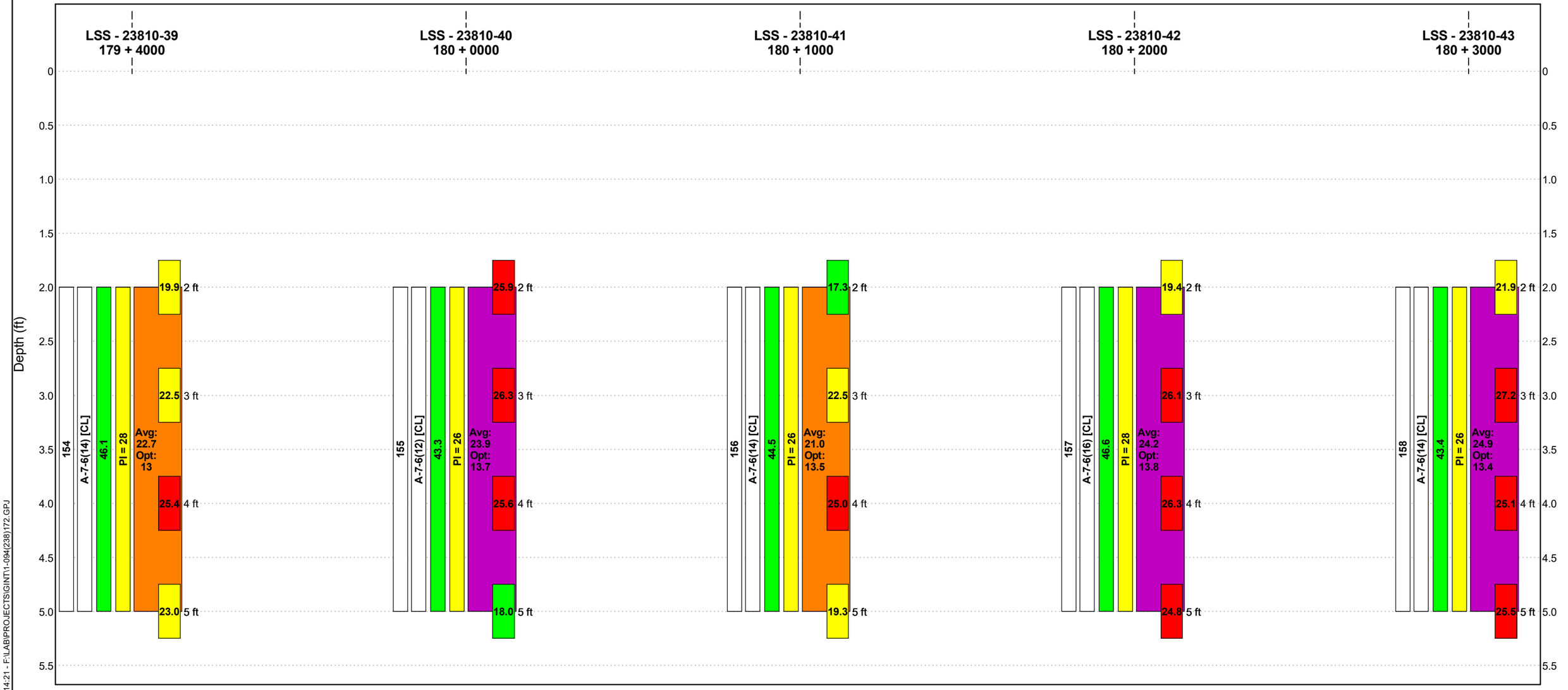
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NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

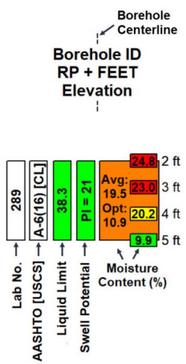
PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **PCN** 23810

LOCATION Burleigh County



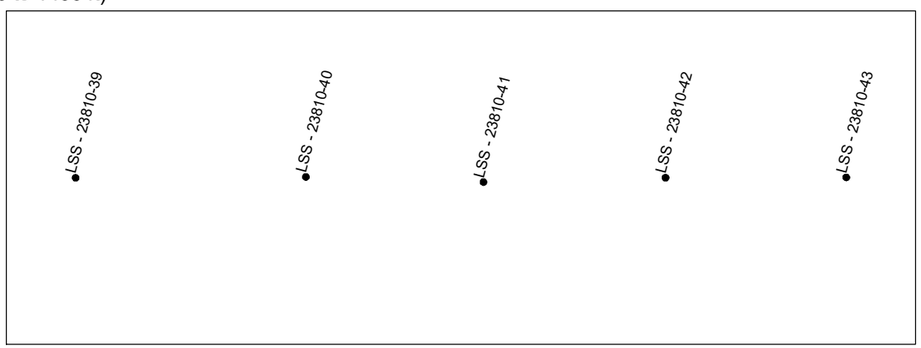
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LEGEND



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

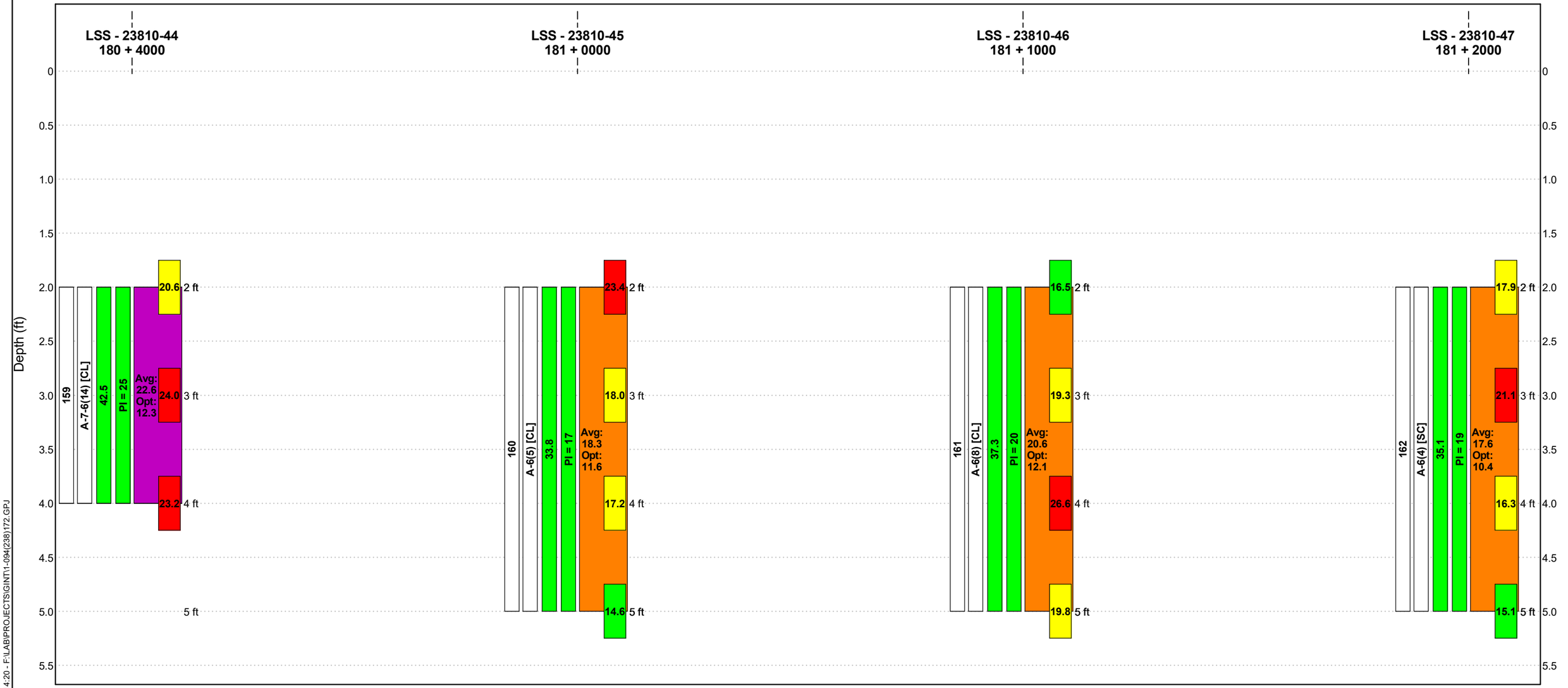
Boreholes Equally Spaced (0 to 1400 ft)



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

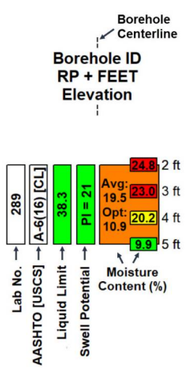
PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **PCN** 23810

LOCATION Burleigh County

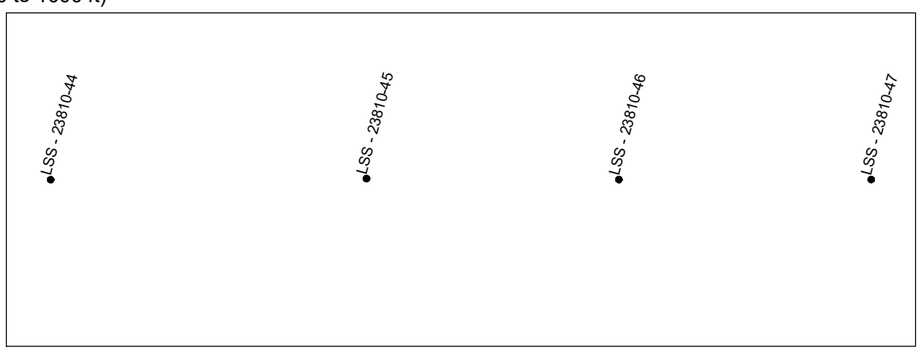


Boreholes Equally Spaced (0 to 1000 ft)

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



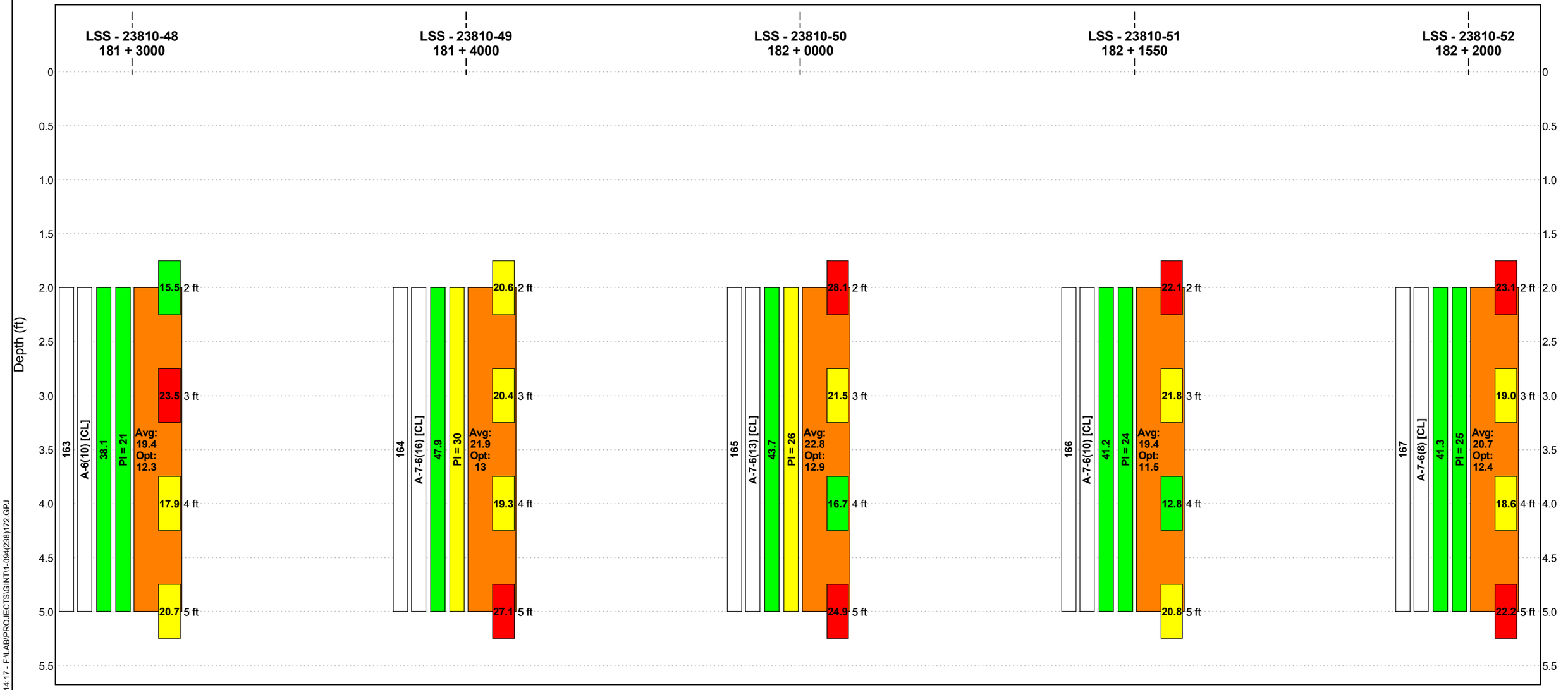
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NDDOT North Dakota Department of Transportation

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

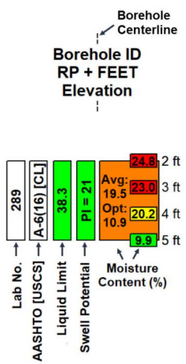
PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **PCN** 23810

LOCATION Burleigh County

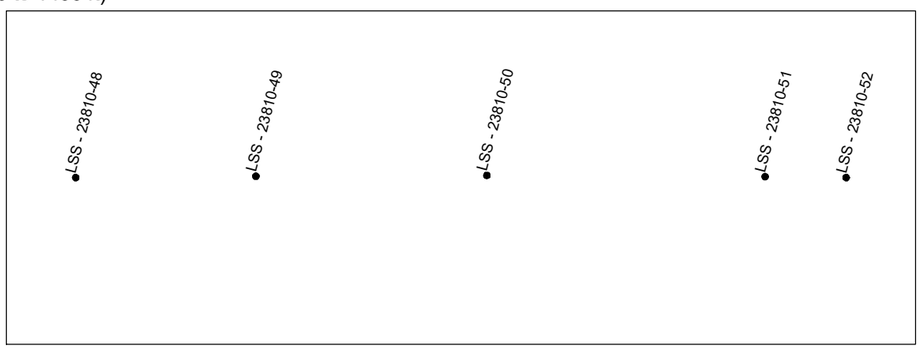


Boreholes Equally Spaced (0 to 1400 ft)

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
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NDDOT_LINEARCOLORFENCE_DEPTH - 20171219.GDT - 12/5/24 14:17 - F:\LAB\PROJECTS\GINT\1-094(238)172.GPJ

NDDOT
North Dakota Department of Transportation

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

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **PCN** 23811

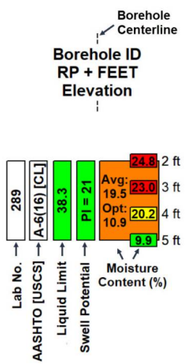
LOCATION Burleigh County

Depth (ft)

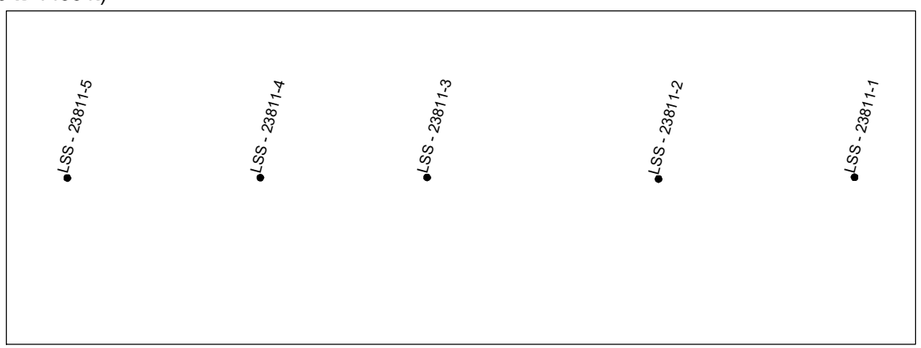
LSS - 23811-5 181 + 2500	LSS - 23811-4 181 + 3570	LSS - 23811-3 181 + 4500	LSS - 23811-2 182 + 500	LSS - 23811-1 182 + 1600
0 – 2 ft: 19.9	0 – 2 ft: 19.2	0 – 2 ft: 19.8	0 – 2 ft: 19.7	0 – 2 ft: 18.0
2 – 5 ft: 17.2	2 – 5 ft: 21.0	2 – 5 ft: 18.8	2 – 5 ft: 18.3	2 – 5 ft: 19.5
5 – 9 ft: 18.8	5 – 9 ft: 24.6	5 – 9 ft: 19.7	5 – 9 ft: 19.5	5 – 9 ft: 24.0
9 – 10 ft: 18.9	9 – 10 ft: 25.2	9 – 10 ft: 17.1	9 – 10 ft: 17.2	9 – 10 ft: 23.0
364	363	362	361	360
A-6(6) [CL]	A-6(8) [CL]	A-6(8) [CL]	A-7-6(11) [CL]	A-7-6(10) [CL]
35.8	38.8	38.4	42.5	42.4
PI = 19	PI = 21	PI = 22	PI = 24	PI = 23
Avg: 18.7 Opt: 12.4	Avg: 22.5 Opt: 12.5	Avg: 18.9 Opt: 12.8	Avg: 18.7 Opt: 12.9	Avg: 21.1 Opt: 13.9

Boreholes Equally Spaced (0 to 1400 ft)

LEGEND



Liquid Limit	LL<50	50<=LL<60	LL>=60	
Swell Potential	Low	Marginal	High	
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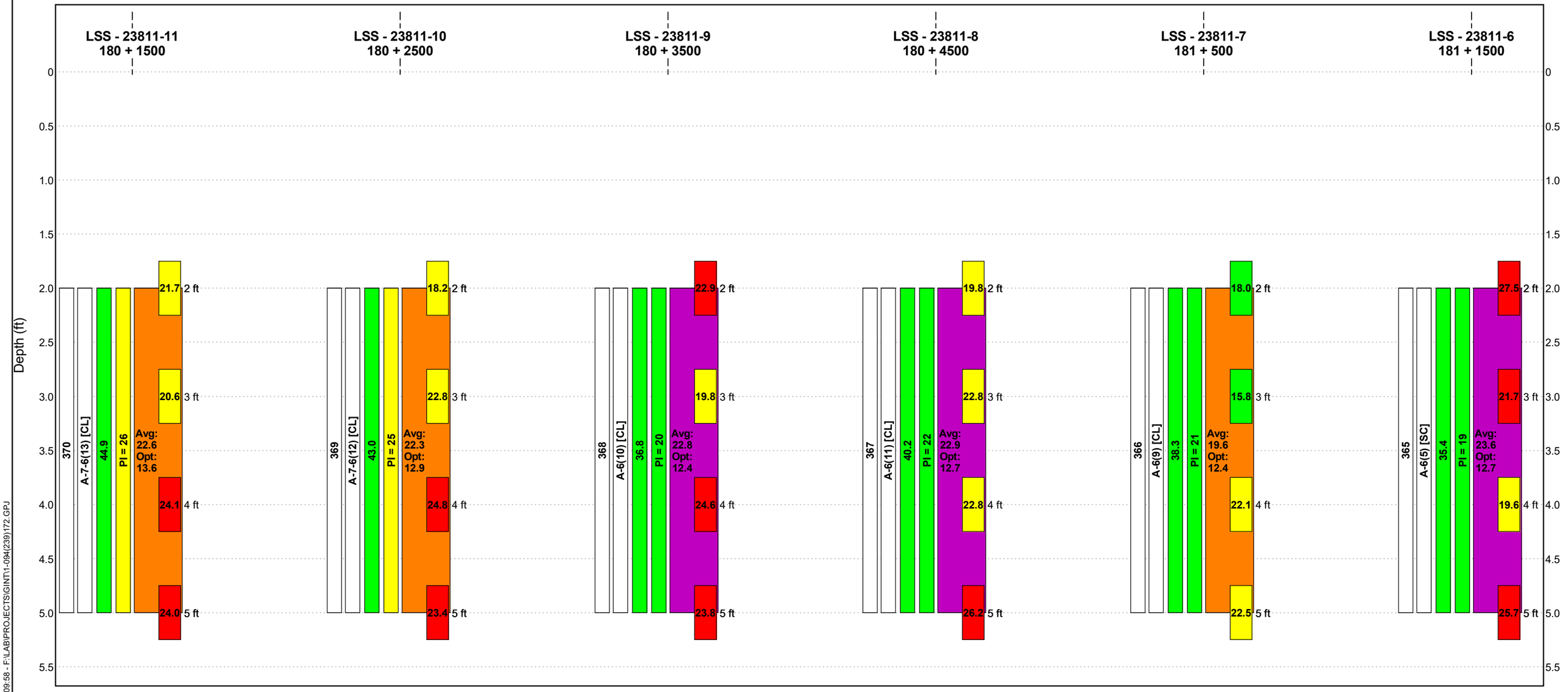


NDDOT_LINEARCOLORFENCE_DEPTH - 20171219.GDT - 12/6/24 09:56 - F:\LAB\PROJECTS\GINT\1-094(239)172.GPJ

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

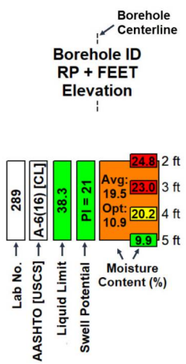
PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **PCN** 23811

LOCATION Burleigh County

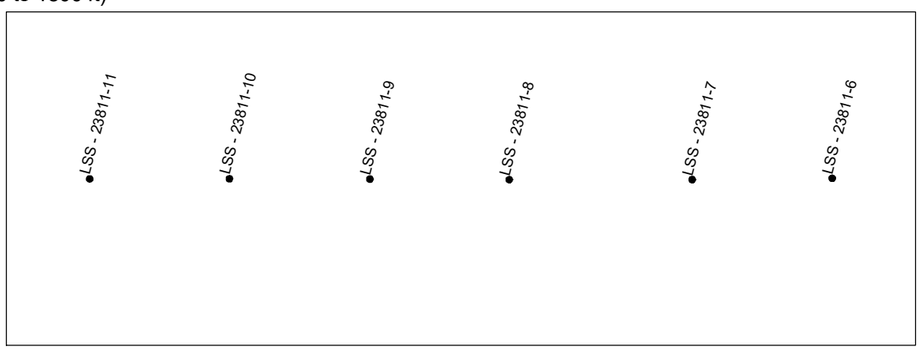


Boreholes Equally Spaced (0 to 1800 ft)

LEGEND



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Swell Potential	Low	Marginal	High	
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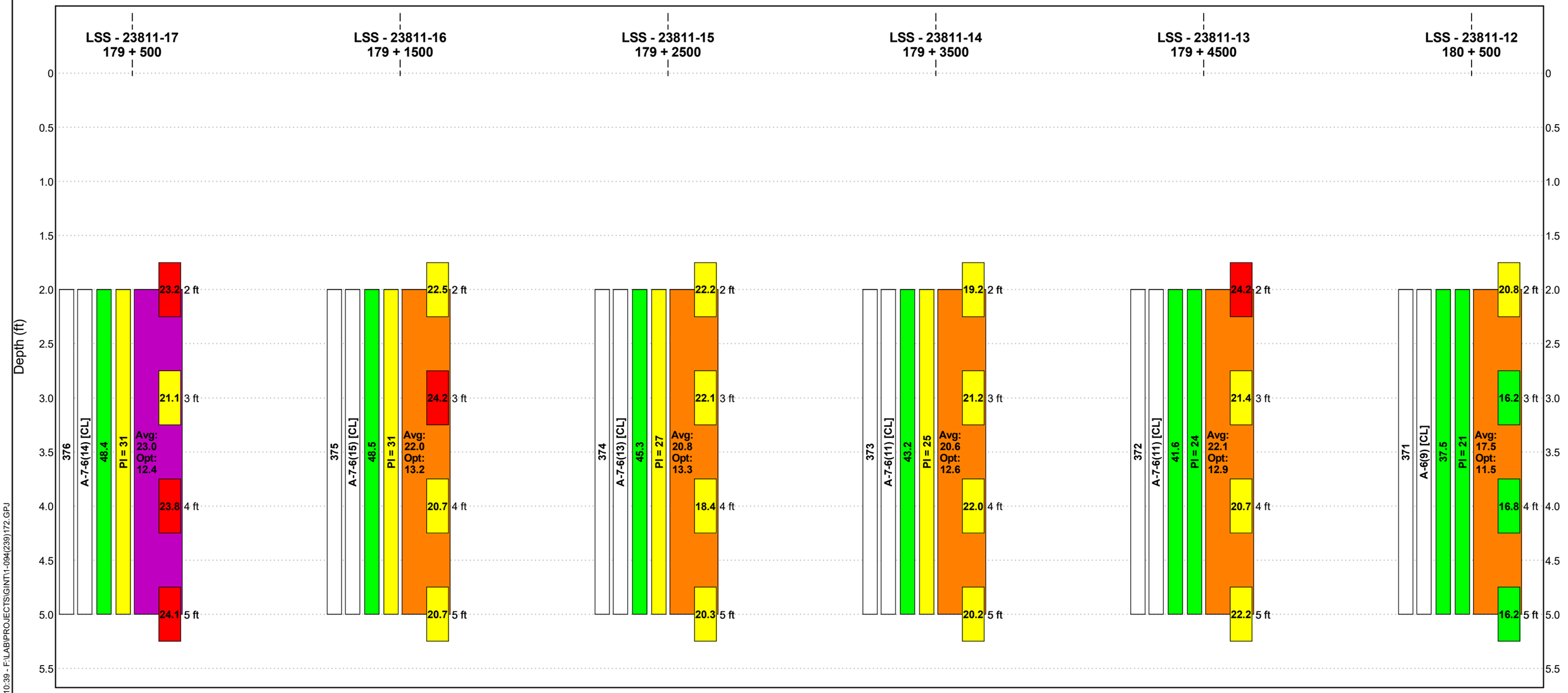


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NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
300 AIRPORT ROAD
BISMARCK, ND 58504

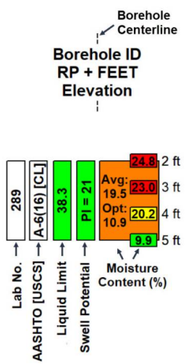
PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **PCN** 23811

LOCATION Burleigh County

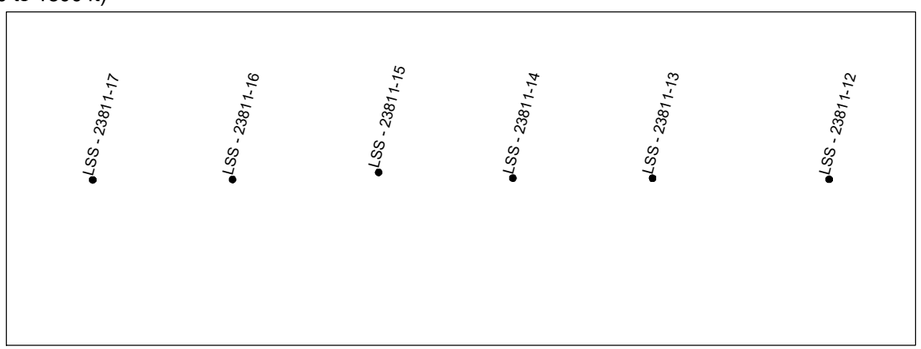


Boreholes Equally Spaced (0 to 1800 ft)

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

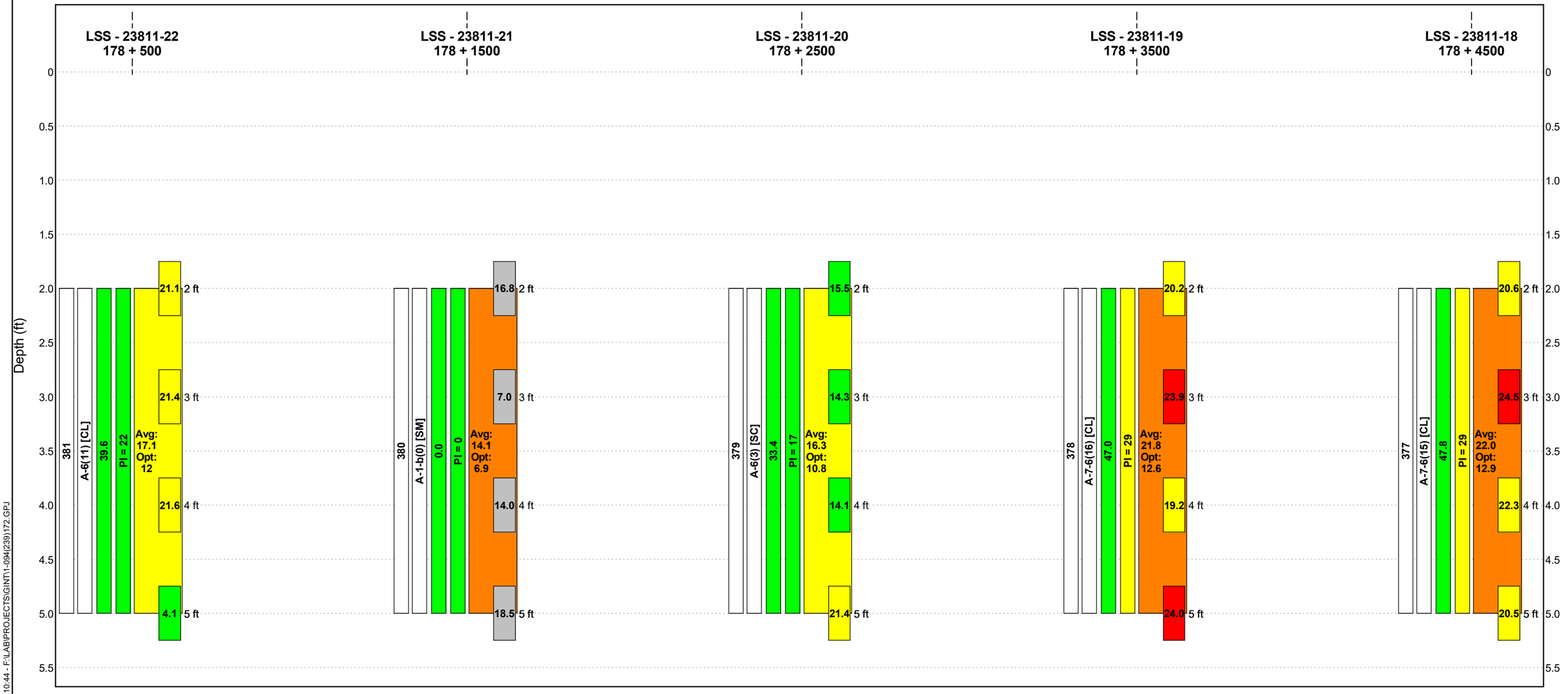


NDDOT_LINEARCOLORFENCE_DEPTH - 20171219.GDT - 12/6/24 10:39 - F:\LAB\PROJECTS\GINT\1-094(239)172.GPJ

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

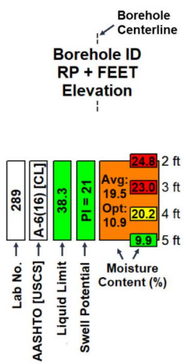
PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **PCN** 23811

LOCATION Burleigh County

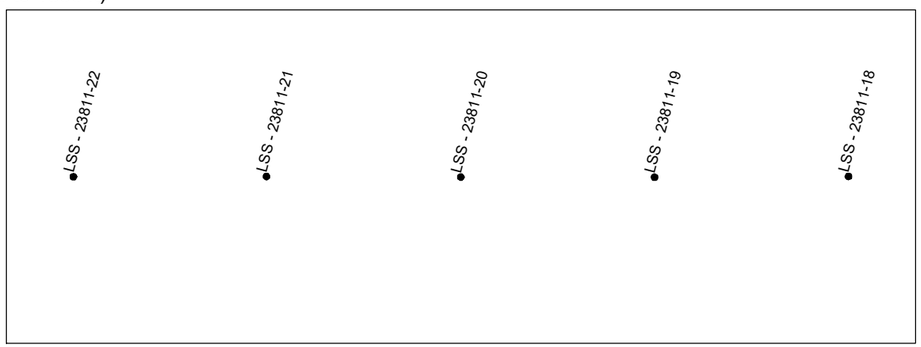


Boreholes Equally Spaced (0 to 1300 ft)

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

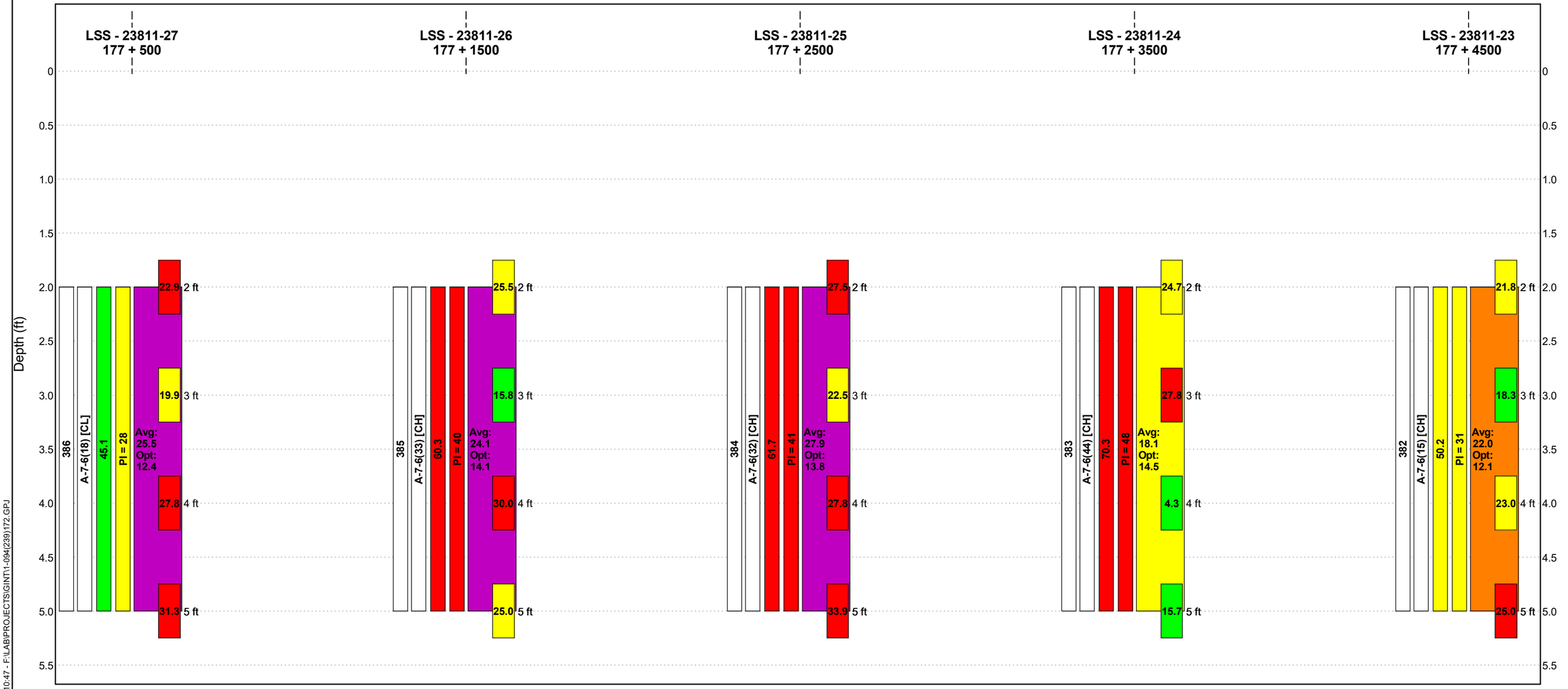


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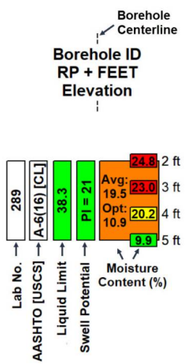
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **PCN** 23811

LOCATION Burleigh County

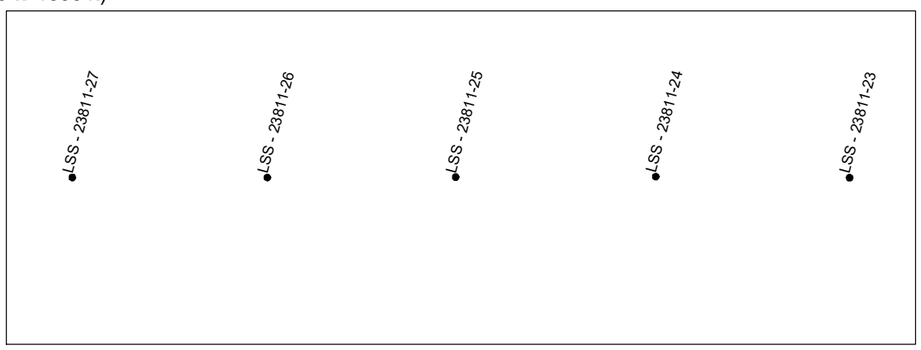


LEGEND



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 1300 ft)



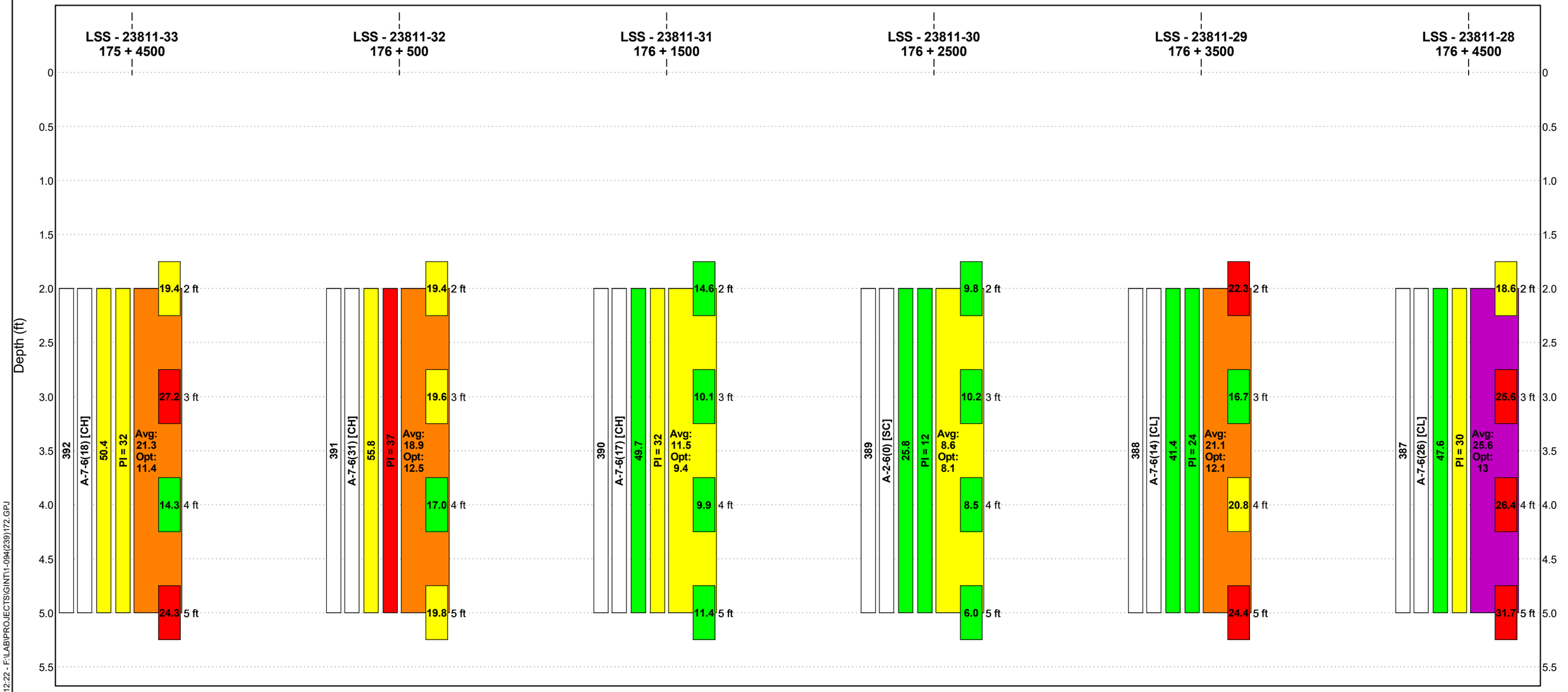
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NDDOT North Dakota Department of Transportation

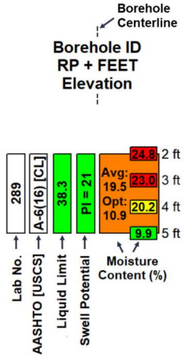
NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **PCN** 23811

LOCATION Burleigh County

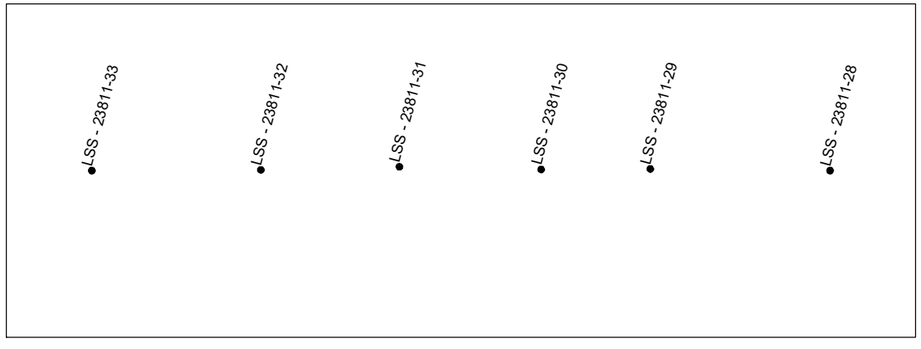


LEGEND



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 1800 ft)

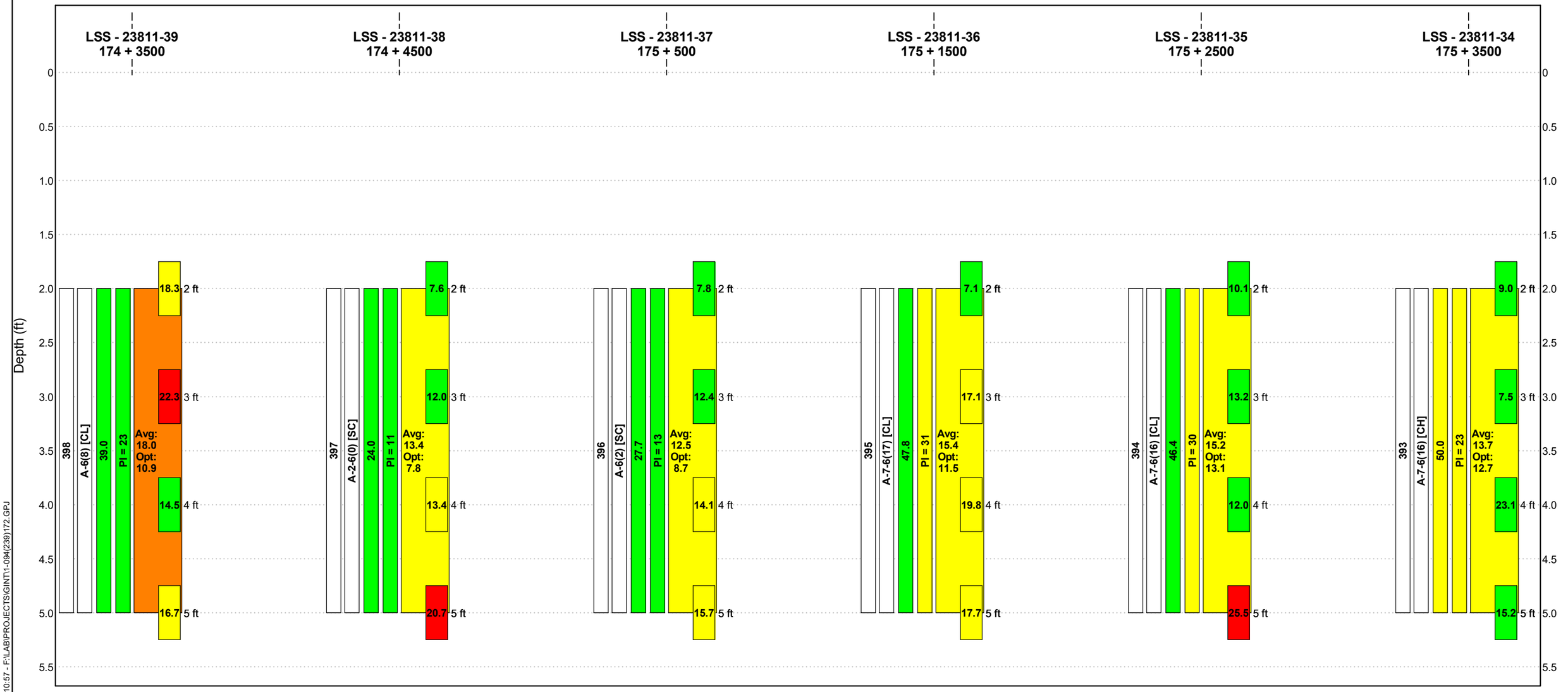


NDDOT_LINEARCOLORFENCE_DEPTH - 20171219.GDT - 12/6/24 12:22 - F:\LAB\PROJECTS\GINT\1-094(239)172.GPJ

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

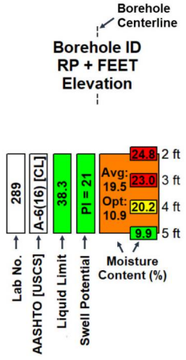
PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **PCN** 23811

LOCATION Burleigh County

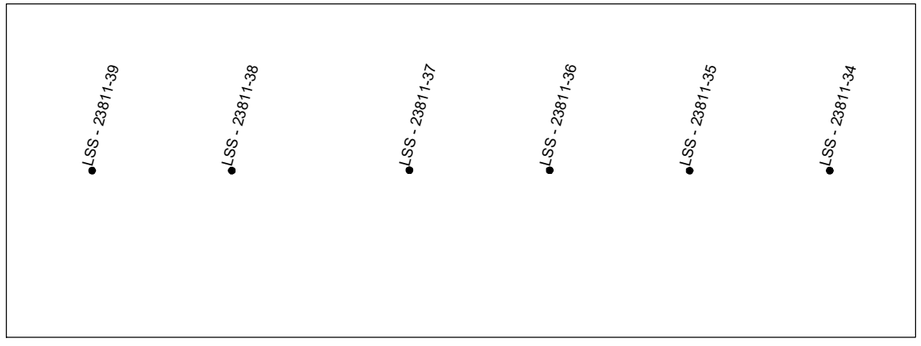


Boreholes Equally Spaced (0 to 1800 ft)

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

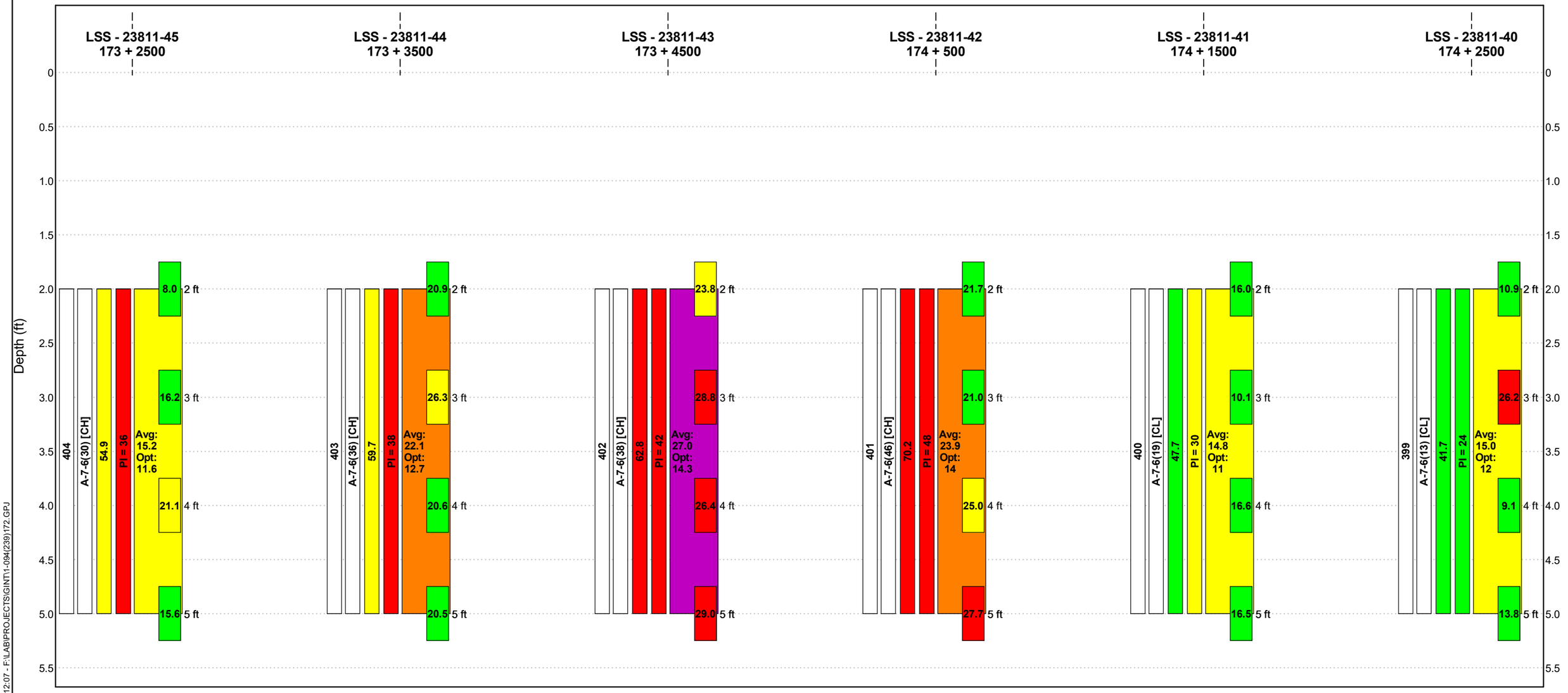


NDDOT_LINEARCOLORFENCE_DEPTH - 20171219.GDT - 12/6/24 10:57 - F:\LAB\PROJECTS\GINT\1-094(239)172.GPJ

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

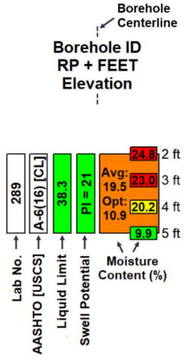
PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **PCN** 23811

LOCATION Burleigh County

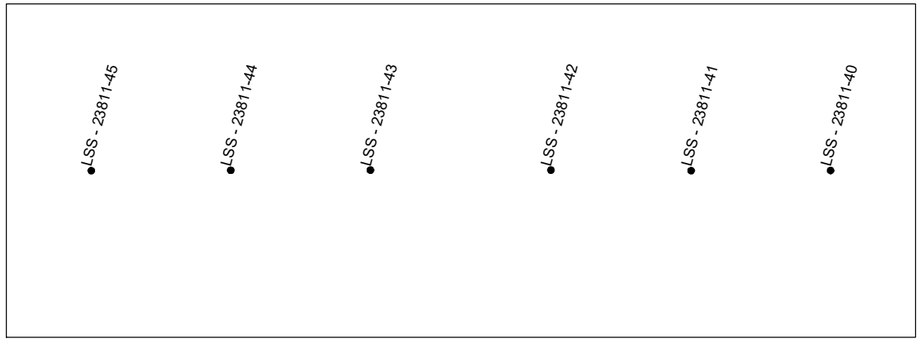


Boreholes Equally Spaced (0 to 1800 ft)

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



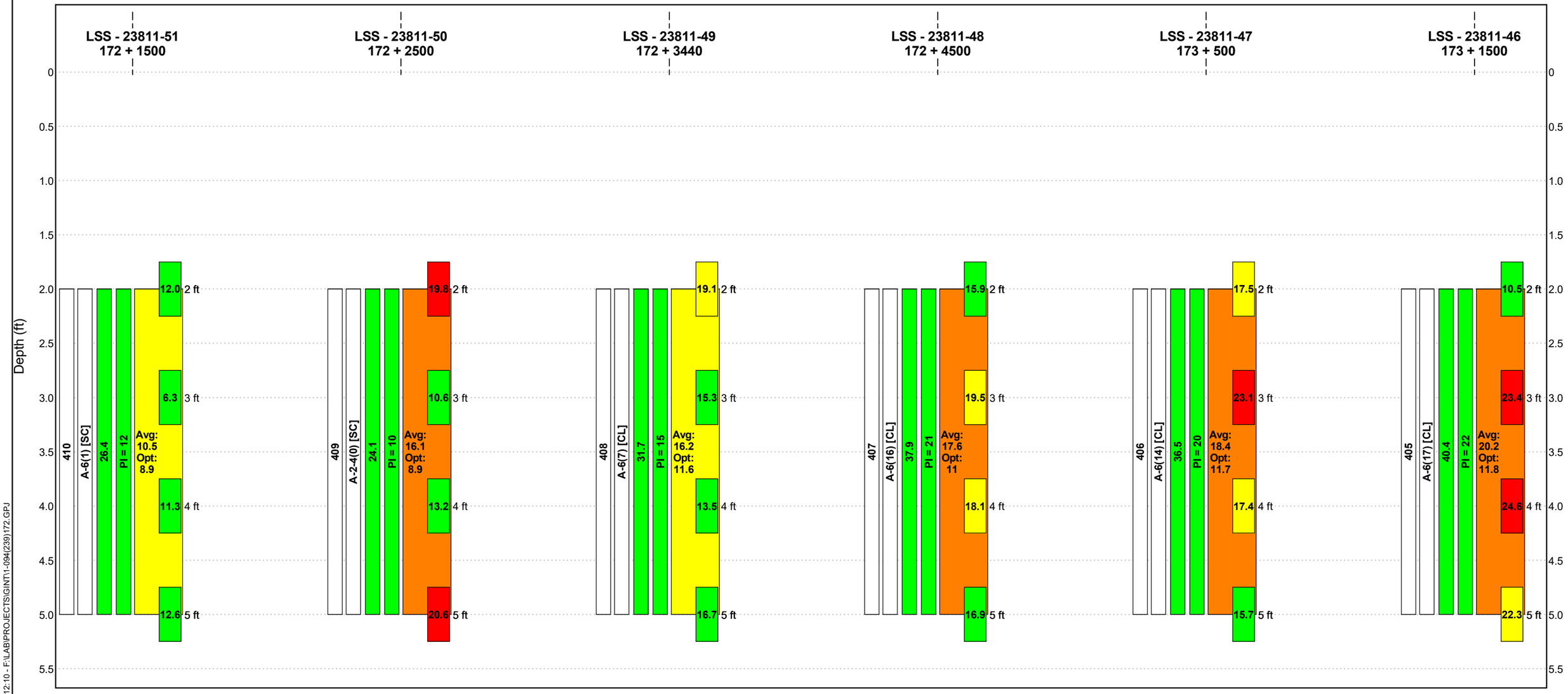
NDDOT_LINEARCOLORFENCE_DEPTH - 20171219.GDT - 12/6/24 12:07 - F:\LAB\PROJECTS\GINT\1-094(239)172.GPJ

NDDOT
North Dakota Department of Transportation

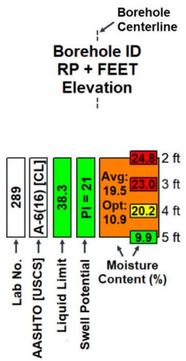
NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **PCN** 23811

LOCATION Burleigh County

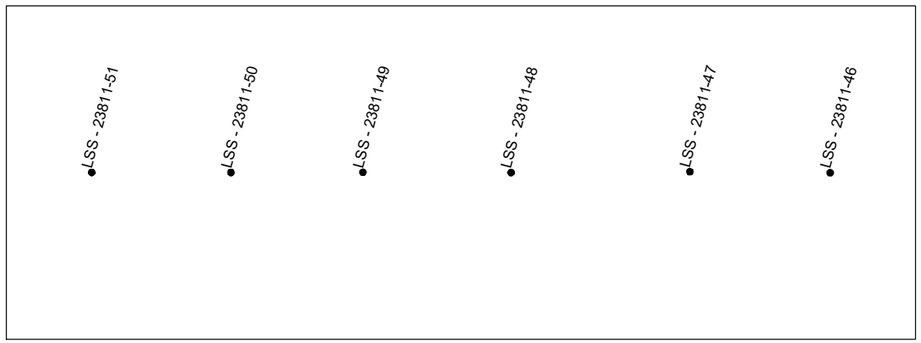


LEGEND



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 1800 ft)



NDDOT_LINEARCOLORFENCE_DEPTH - 20171219.GDT - 12/6/24 12:10 - F:\LAB\PROJECTS\GINT\1-094(239)172.GPJ

APPENDIX E

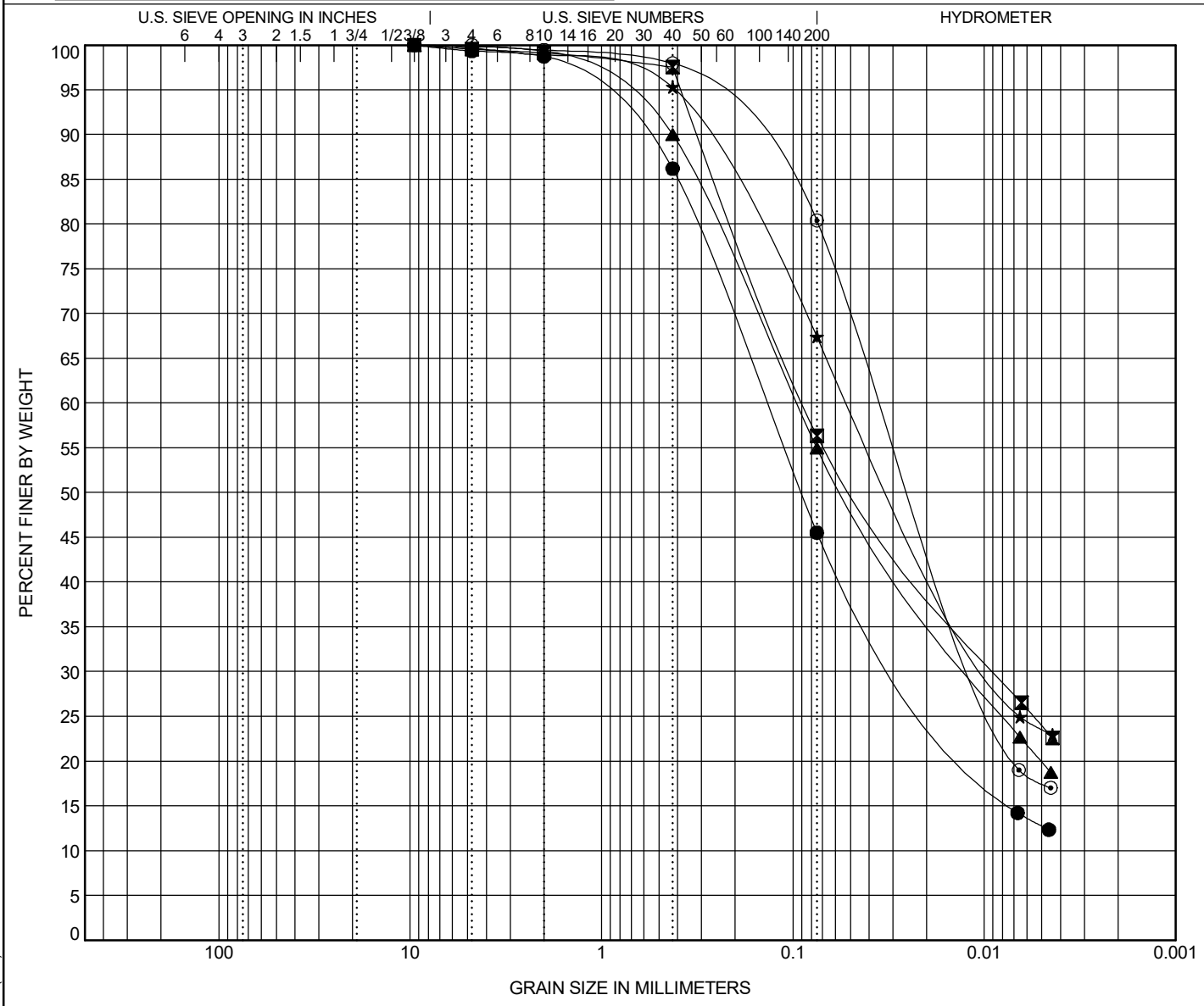
LAB RESULTS

GRAIN SIZE DISTRIBUTION

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

PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **LOCATION** Burleigh County

PCN 23810



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	**LSS - 23810-1**	**2.0**	**A-6 (2)**	**SC**	**27**	**14**	**13**		
⊠	**LSS - 23810-2**	**2.0**	**A-6 (4)**	**CL**	**27**	**15**	**12**		
▲	**LSS - 23810-3**	**2.0**	**A-6 (6)**	**CL**	**34**	**17**	**17**		
★	**LSS - 23810-4**	**2.0**	**A-6 (8)**	**CL**	**32**	**16**	**16**		
⊙	**LSS - 23810-5**	**2.0**	**A-6 (10)**	**CL**	**32**	**17**	**15**		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**LSS - 23810-1**	**2.0**	**9.5**	**0.139**	**0.023**		**0.7**	**53.8**	**45.5**	
⊠	**LSS - 23810-2**	**2.0**	**9.5**	**0.088**	**0.009**		**0.5**	**43.2**	**56.3**	
▲	**LSS - 23810-3**	**2.0**	**9.5**	**0.096**	**0.011**		**0.2**	**44.9**	**54.9**	
★	**LSS - 23810-4**	**2.0**	**9.5**	**0.049**	**0.009**		**0.3**	**32.3**	**67.4**	
⊙	**LSS - 23810-5**	**2.0**	**4.75**	**0.033**	**0.01**		**0.0**	**19.6**	**80.4**	

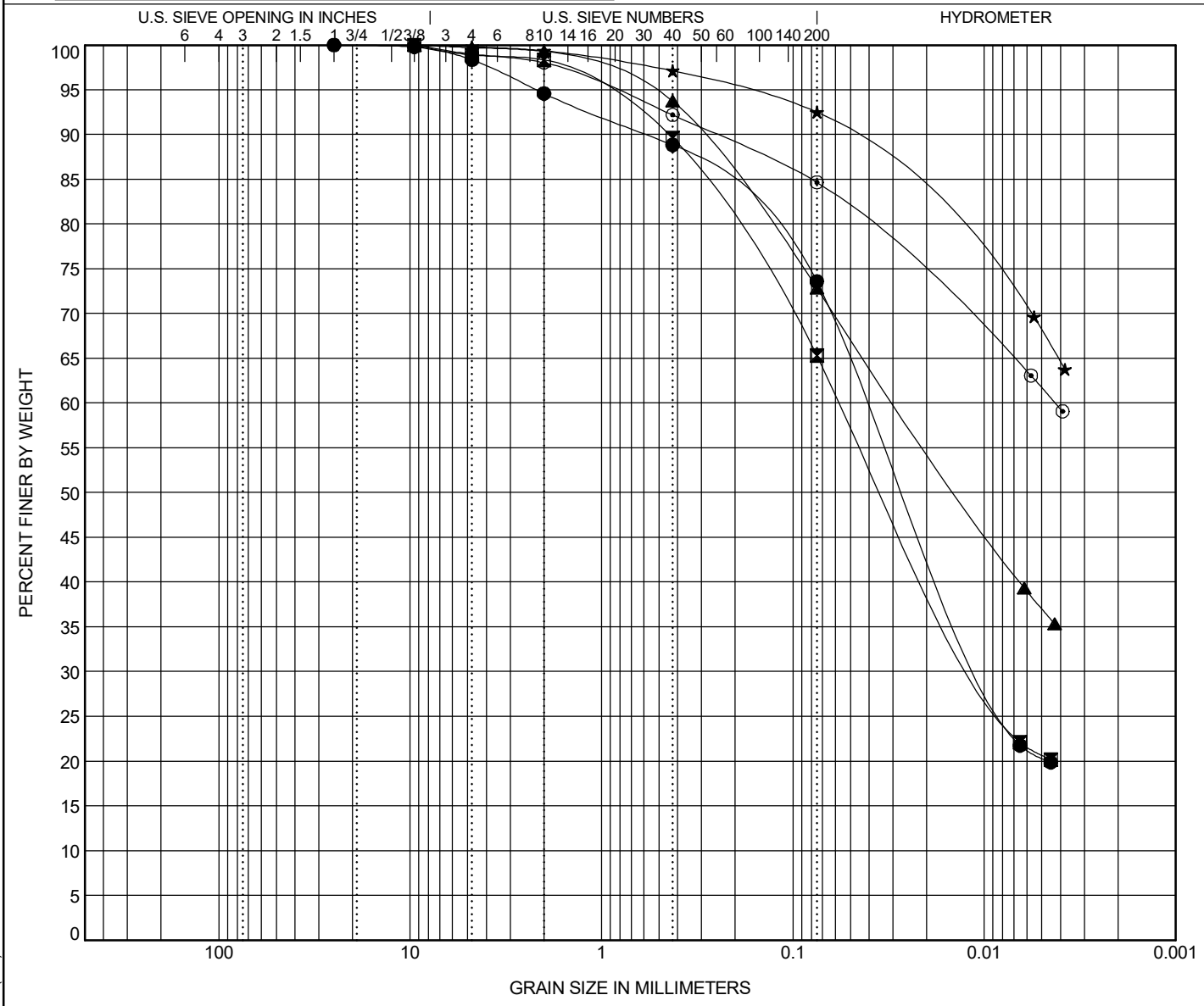
GRAIN SIZE - 20171219.GDT - 12/20/24 09:18 - F:\LAB\PROJECTS\GINT\1-094(238)172.GPJ

GRAIN SIZE DISTRIBUTION

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

PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **LOCATION** Burleigh County

PCN 23810



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	**LSS - 23810-6**	**2.0**	**A-6 (9)**	**CL**	**33**	**18**	**15**		
⊠	**LSS - 23810-7**	**2.0**	**A-6 (9)**	**CL**	**34**	**16**	**18**		
▲	**LSS - 23810-8**	**2.0**	**A-7-6 (17)**	**CL**	**43**	**17**	**26**		
★	**LSS - 23810-9**	**2.0**	**A-7-6 (56)**	**CH**	**75**	**21**	**54**		
⊙	**LSS - 23810-10**	**2.0**	**A-7-6 (43)**	**CH**	**68**	**21**	**47**		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**LSS - 23810-6**	**2.0**	**25**	**0.04**	**0.01**		**1.6**	**24.8**	**73.6**	
⊠	**LSS - 23810-7**	**2.0**	**9.5**	**0.056**	**0.01**		**1.1**	**33.6**	**65.3**	
▲	**LSS - 23810-8**	**2.0**	**9.5**	**0.029**			**0.3**	**26.9**	**72.8**	
★	**LSS - 23810-9**	**2.0**	**9.5**				**0.2**	**7.3**	**92.5**	
⊙	**LSS - 23810-10**	**2.0**	**9.5**	**0.004**			**1.0**	**14.3**	**84.7**	

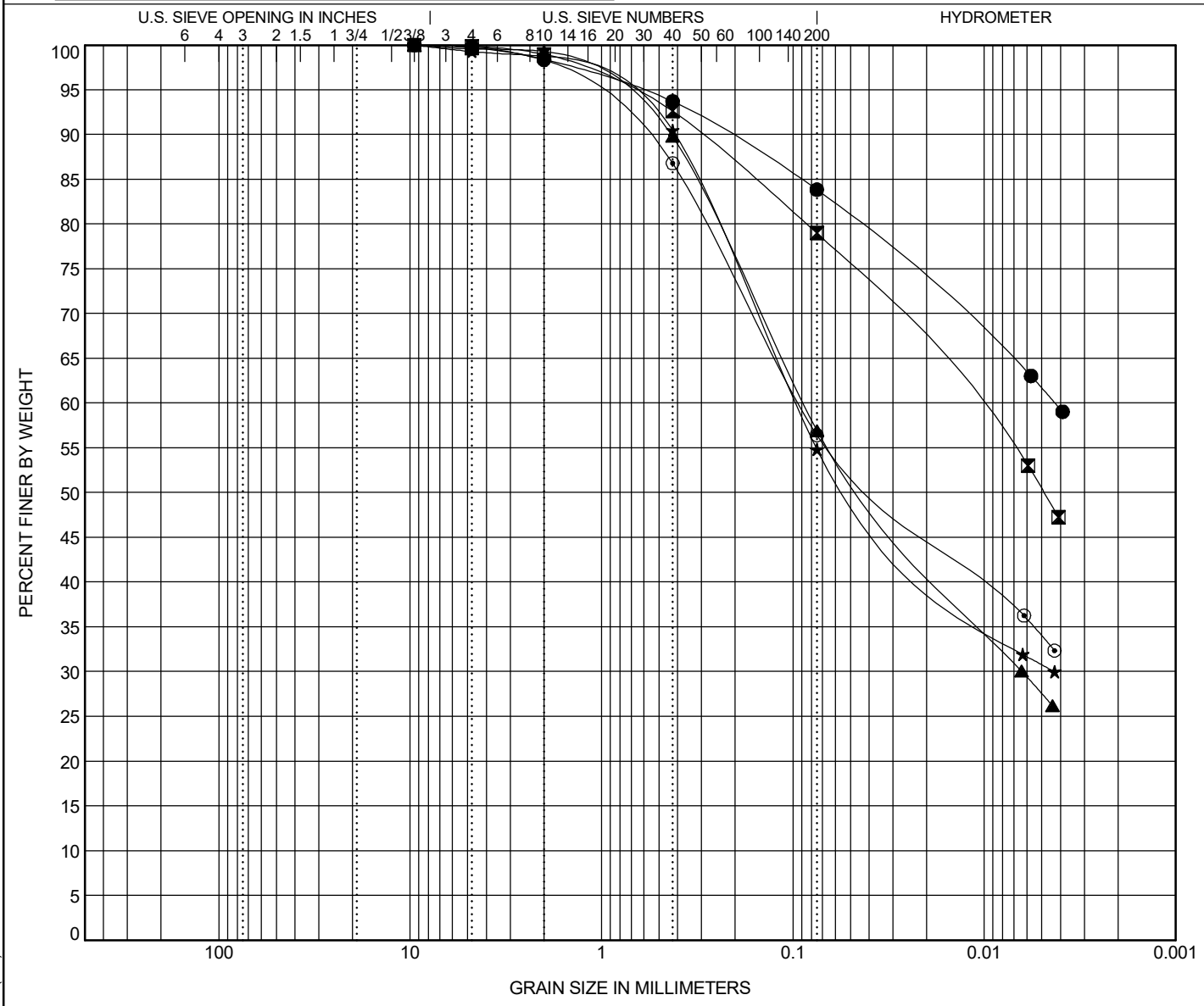
GRAIN SIZE - 20171219.GDT - 12/20/24 09:18 - F:\LAB\PROJECTS\GINT\1-094(238)172.GPJ

GRAIN SIZE DISTRIBUTION

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

PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **LOCATION** Burleigh County

PCN 23810



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	**LSS - 23810-11**	**2.0**	**A-7-6 (40)**	**CH**	**65**	**20**	**45**		
⊠	**LSS - 23810-12**	**2.0**	**A-7-6 (29)**	**CH**	**55**	**19**	**36**		
▲	**LSS - 23810-13**	**2.0**	**A-6 (10)**	**CL**	**38**	**15**	**23**		
★	**LSS - 23810-14**	**2.0**	**A-6 (9)**	**CL**	**39**	**17**	**22**		
⊙	**LSS - 23810-15**	**2.0**	**A-7-6 (13)**	**CL**	**45**	**15**	**30**		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**LSS - 23810-11**	**2.0**	**9.5**	**0.004**			**0.2**	**16.0**	**83.8**	
⊠	**LSS - 23810-12**	**2.0**	**9.5**	**0.012**			**0.1**	**20.9**	**79.0**	
▲	**LSS - 23810-13**	**2.0**	**9.5**	**0.088**	**0.006**		**0.4**	**42.6**	**56.9**	
★	**LSS - 23810-14**	**2.0**	**9.5**	**0.097**	**0.004**		**0.7**	**44.5**	**54.8**	
⊙	**LSS - 23810-15**	**2.0**	**9.5**	**0.092**			**0.3**	**43.3**	**56.4**	

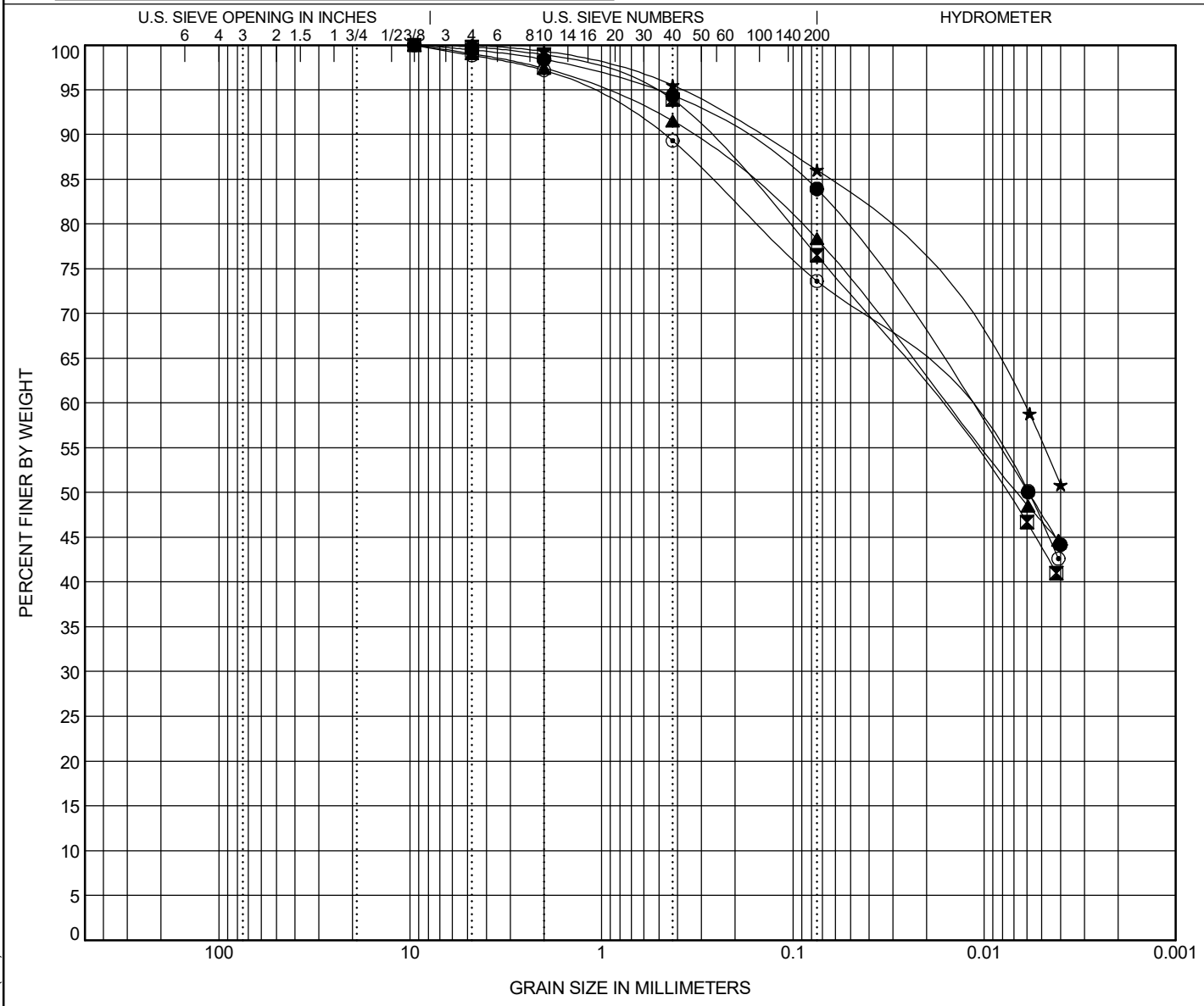
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GRAIN SIZE DISTRIBUTION

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

PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **LOCATION** Burleigh County

PCN 23810



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
● LSS - 23810-16	2.0	A-7-6 (30)	CH	54	19	35		
⊠ LSS - 23810-17	2.0	A-7-6 (24)	CH	50	17	33		
▲ LSS - 23810-18	2.0	A-7-6 (28)	CH	53	17	36		
★ LSS - 23810-19	2.0	A-7-6 (38)	CH	61	20	41		
⊙ LSS - 23810-20	2.0	A-7-6 (26)	CH	54	18	36		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● LSS - 23810-16	2.0	9.5	0.012			0.5	15.5	83.9	
⊠ LSS - 23810-17	2.0	9.5	0.019			0.2	23.3	76.5	
▲ LSS - 23810-18	2.0	9.5	0.016			1.0	20.7	78.4	
★ LSS - 23810-19	2.0	4.75	0.006			0.0	14.0	86.0	
⊙ LSS - 23810-20	2.0	9.5	0.017			1.1	25.2	73.6	

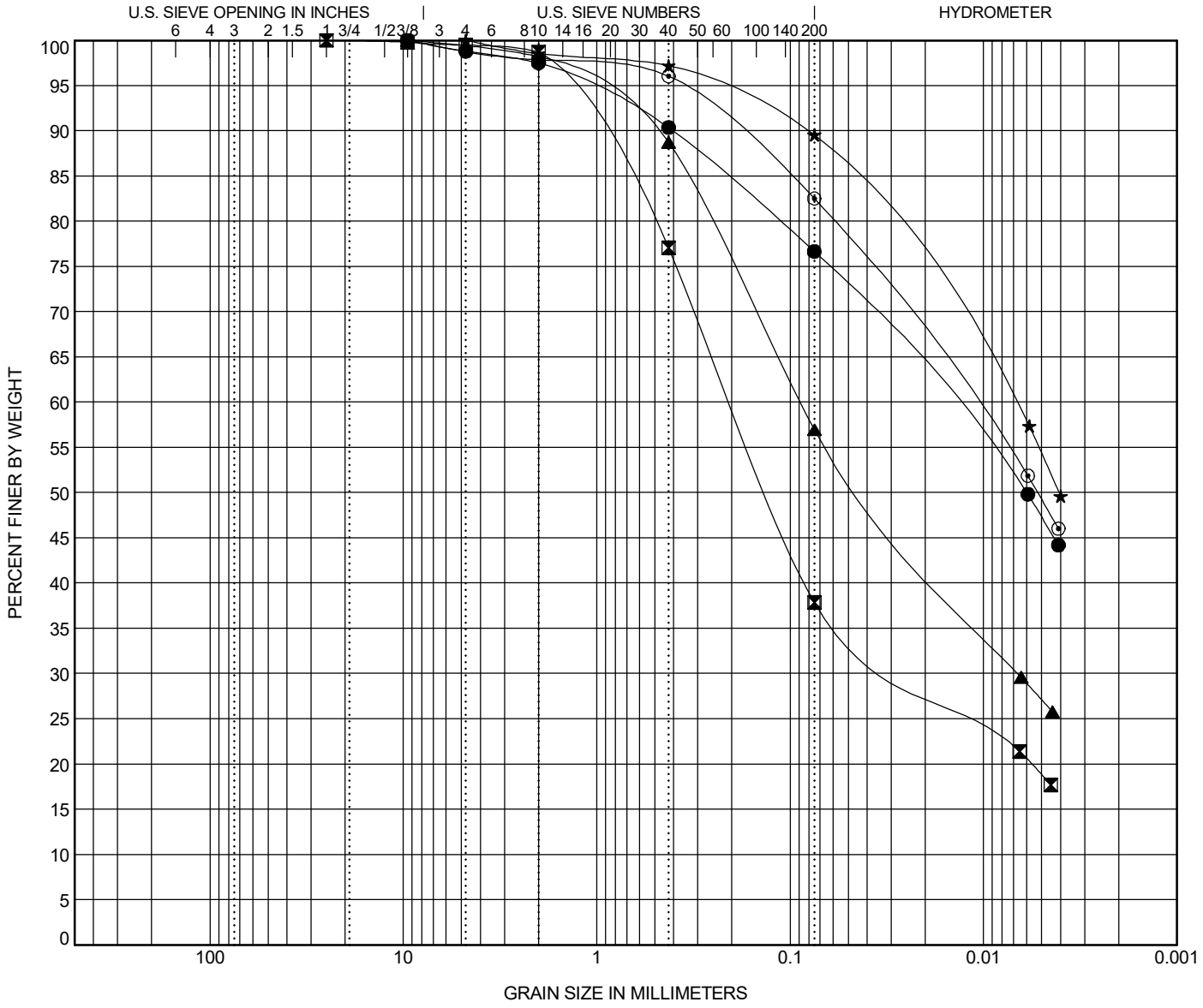
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GRAIN SIZE DISTRIBUTION

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

PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **LOCATION** Burleigh County

PCN 23810



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	**LSS - 23810-21**	**2.0**	**A-7-6 (27)**	**CH**	**54**	**18**	**36**		
⊠	**LSS - 23810-22**	**2.0**	**A-6 (3)**	**SC**	**32**	**13**	**19**		
▲	**LSS - 23810-23**	**2.0**	**A-6 (10)**	**CL**	**38**	**15**	**23**		
★	**LSS - 23810-24**	**2.0**	**A-7-6 (38)**	**CH**	**58**	**19**	**39**		
⊙	**LSS - 23810-25**	**2.0**	**A-7-6 (32)**	**CH**	**55**	**17**	**38**		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**LSS - 23810-21**	**2.0**	**9.5**	**0.015**			**1.2**	**22.1**	**76.7**	
⊠	**LSS - 23810-22**	**2.0**	**25**	**0.2**	**0.023**		**0.5**	**61.7**	**37.8**	
▲	**LSS - 23810-23**	**2.0**	**9.5**	**0.089**	**0.007**		**0.6**	**42.5**	**56.9**	
★	**LSS - 23810-24**	**2.0**	**4.75**	**0.007**			**0.0**	**10.4**	**89.6**	
⊙	**LSS - 23810-25**	**2.0**	**9.5**	**0.012**			**1.3**	**16.2**	**82.5**	

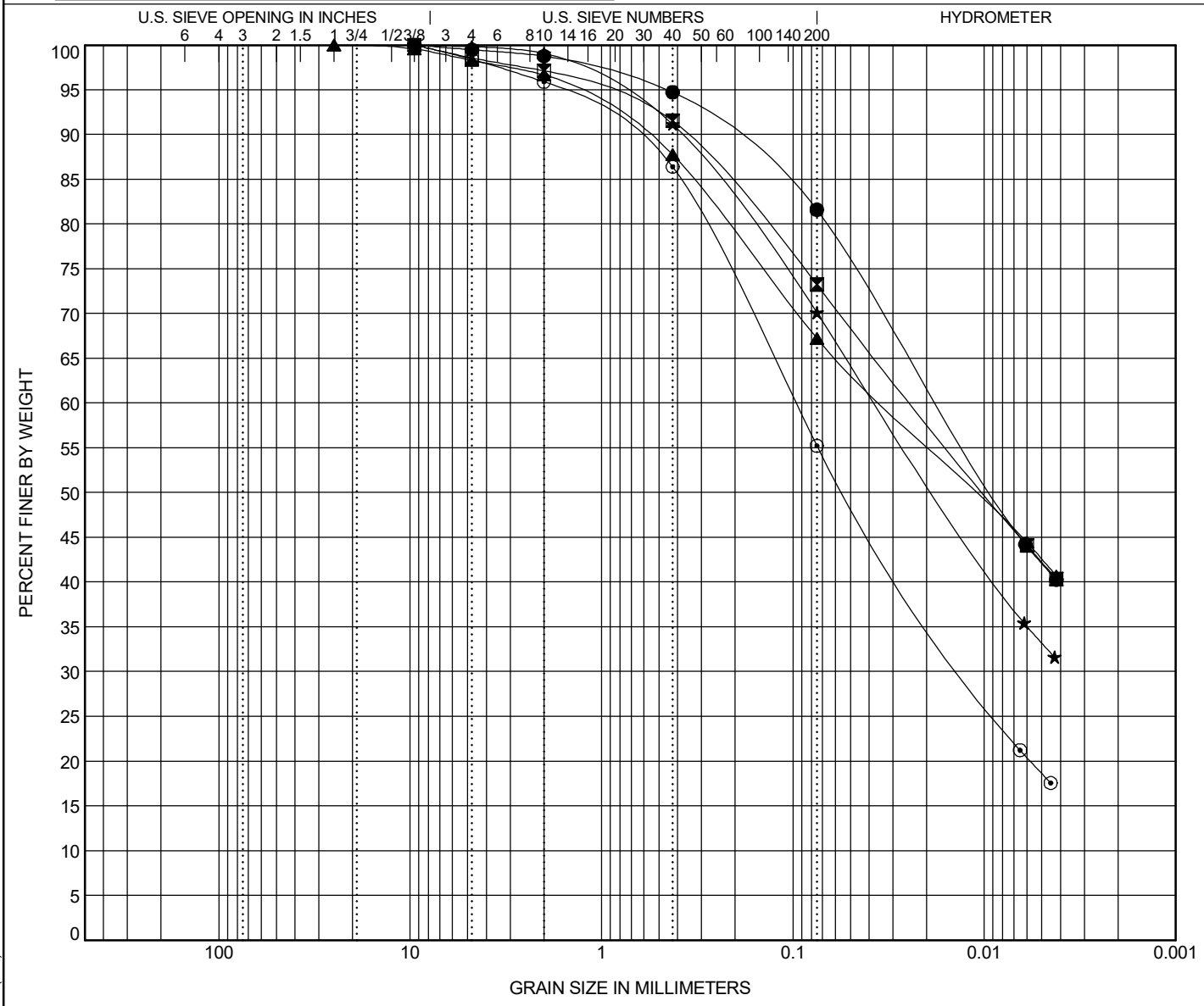
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NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **LOCATION** Burleigh County

PCN 23810



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	**LSS - 23810-26**	**2.0**	**A-7-6 (31)**	**CH**	**53**	**16**	**37**		
⊠	**LSS - 23810-27**	**2.0**	**A-7-6 (23)**	**CH**	**50**	**16**	**34**		
▲	**LSS - 23810-28**	**2.0**	**A-7-6 (19)**	**CL**	**48**	**17**	**31**		
★	**LSS - 23810-29**	**2.0**	**A-7-6 (19)**	**CL**	**48**	**19**	**29**		
⊙	**LSS - 23810-30**	**2.0**	**A-6 (7)**	**CL**	**34**	**16**	**18**		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**LSS - 23810-26**	**2.0**	**9.5**	**0.018**			**0.5**	**17.9**	**81.6**	
⊠	**LSS - 23810-27**	**2.0**	**9.5**	**0.024**			**1.4**	**25.3**	**73.2**	
▲	**LSS - 23810-28**	**2.0**	**25**	**0.034**			**1.7**	**31.1**	**67.2**	
★	**LSS - 23810-29**	**2.0**	**9.5**	**0.036**			**0.2**	**29.7**	**70.1**	
⊙	**LSS - 23810-30**	**2.0**	**9.5**	**0.098**	**0.012**		**1.6**	**43.2**	**55.2**	

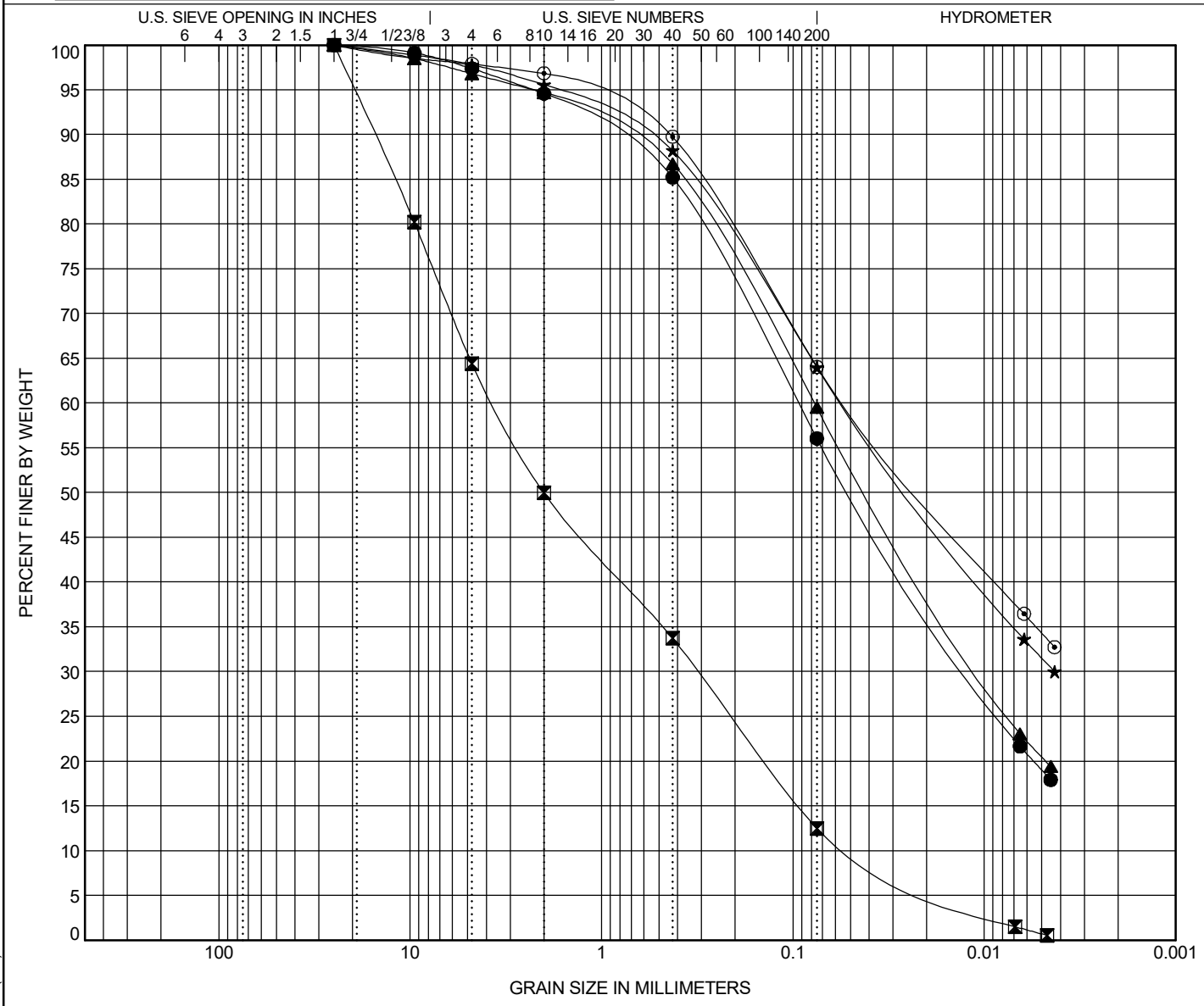
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300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **LOCATION** Burleigh County

PCN 23810



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
● LSS - 23810-31	2.0	A-6 (9)	CL	38	16	22		
⊠ LSS - 23810-32	2.0	A-1-b (0)	SM	NP	NP	NP	0.62	83.19
▲ LSS - 23810-33	2.0	A-6 (9)	CL	37	17	20		
★ LSS - 23810-34	2.0	A-7-6 (15)	CL	45	17	28		
⊙ LSS - 23810-35	2.0	A-7-6 (17)	CL	49	18	31		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● LSS - 23810-31	2.0	25	0.095	0.012		2.6	41.3	56.0	
⊠ LSS - 23810-32	2.0	25	3.648	0.314	0.044	35.6	51.9	12.5	
▲ LSS - 23810-33	2.0	25	0.077	0.01		3.2	37.3	59.5	
★ LSS - 23810-34	2.0	25	0.054	0.004		2.2	33.8	64.0	
⊙ LSS - 23810-35	2.0	25	0.052			2.1	33.9	64.0	

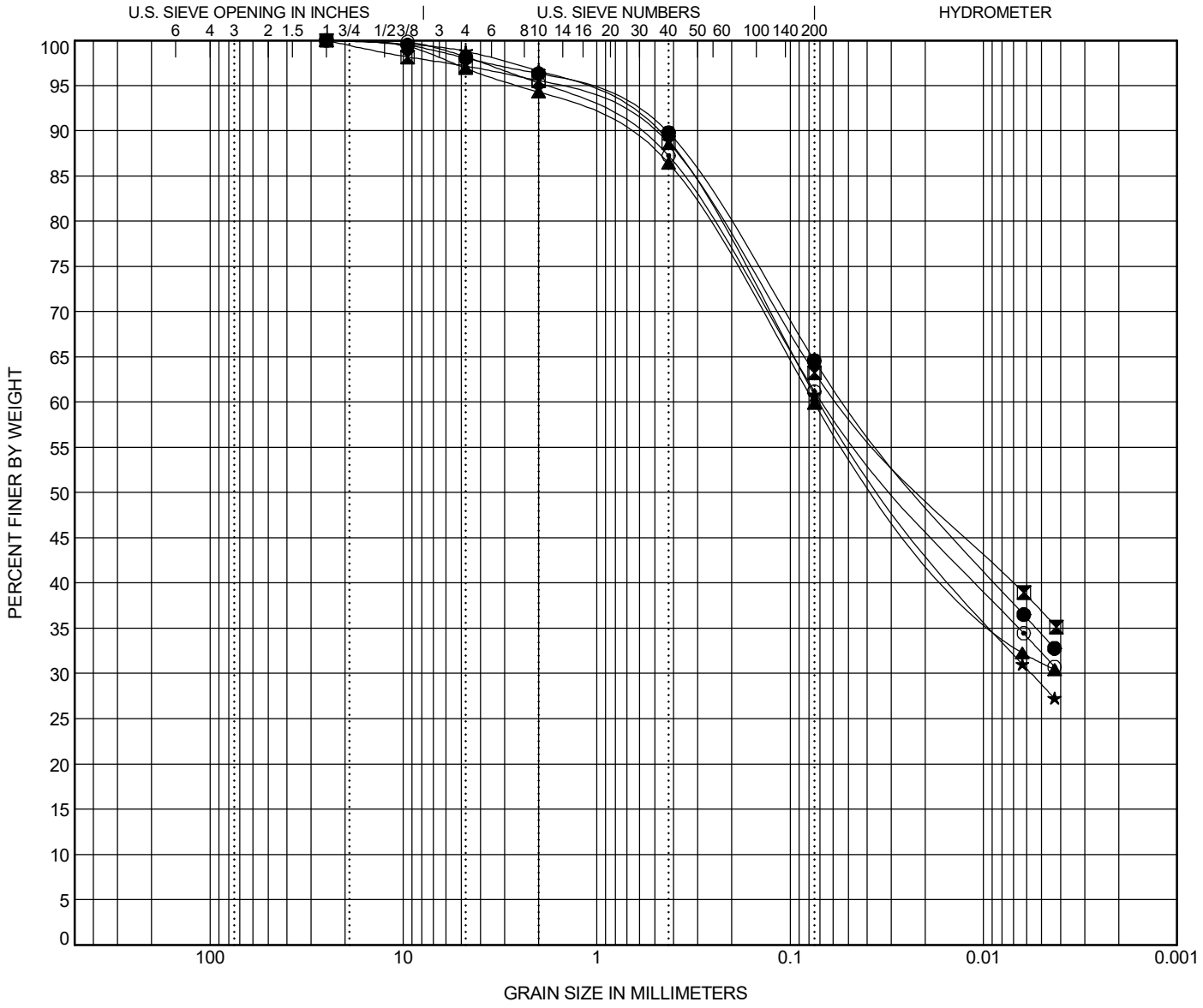
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300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **LOCATION** Burleigh County

PCN 23810



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	LSS - 23810-36	2.0	A-7-6 (16)	CL	46	17	29		
⊠	LSS - 23810-37	2.0	A-7-6 (17)	CL	48	17	31		
▲	LSS - 23810-38	2.0	A-7-6 (13)	CL	45	18	27		
★	LSS - 23810-39	2.0	A-7-6 (14)	CL	46	18	28		
⊙	LSS - 23810-40	2.0	A-7-6 (12)	CL	43	18	25		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	LSS - 23810-36	2.0	25	0.05			2.0	33.5	64.6	
⊠	LSS - 23810-37	2.0	25	0.054			2.8	33.9	63.3	
▲	LSS - 23810-38	2.0	25	0.076			3.1	37.1	59.9	
★	LSS - 23810-39	2.0	25	0.07	0.006		1.2	38.0	60.8	
⊙	LSS - 23810-40	2.0	25	0.067			1.8	37.0	61.2	

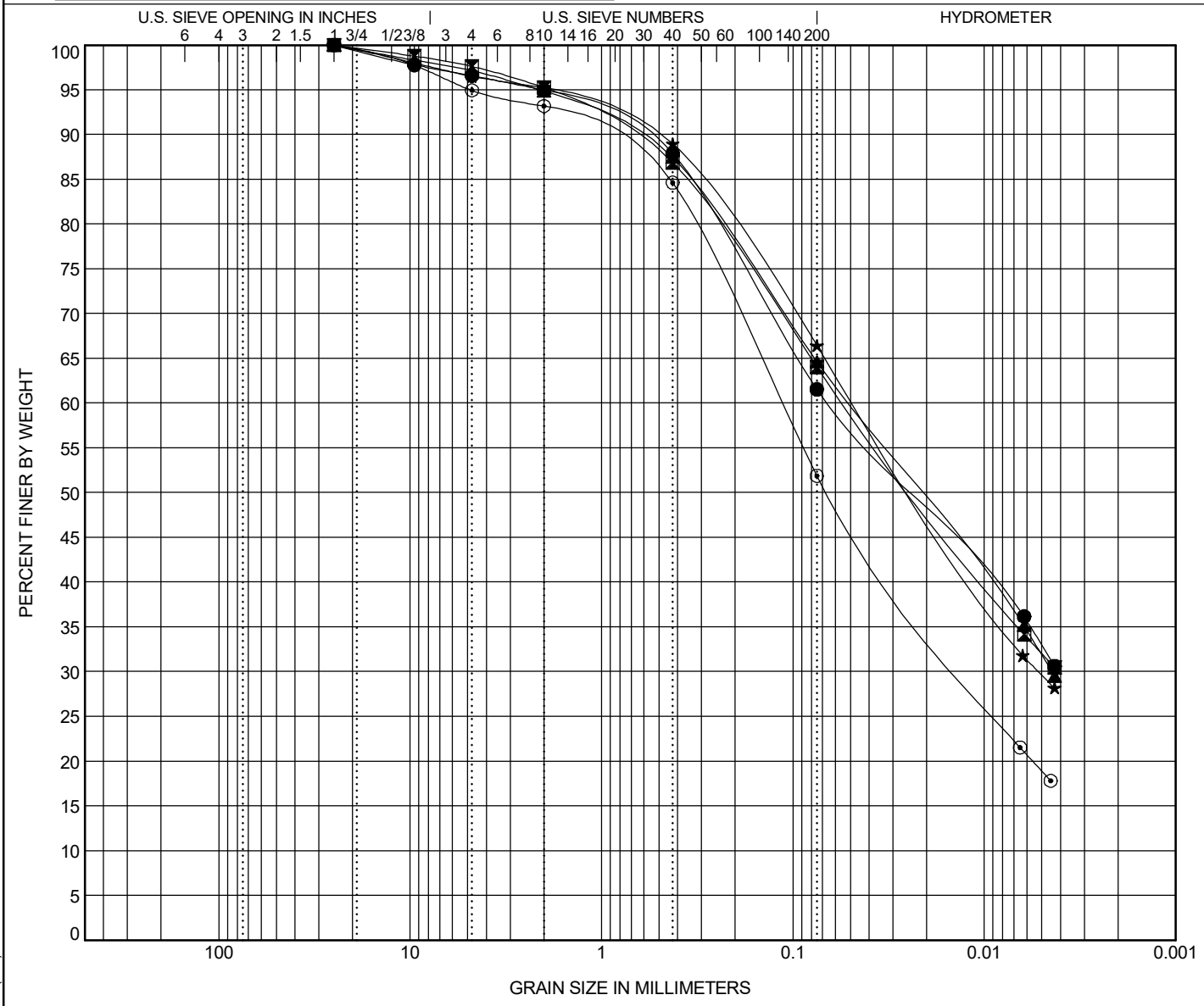
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300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **LOCATION** Burleigh County

PCN 23810



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	**LSS - 23810-41**	**2.0**	**A-7-6 (14)**	**CL**	**45**	**18**	**27**		
⊠	**LSS - 23810-42**	**2.0**	**A-7-6 (16)**	**CL**	**47**	**18**	**29**		
▲	**LSS - 23810-43**	**2.0**	**A-7-6 (14)**	**CL**	**43**	**18**	**25**		
★	**LSS - 23810-44**	**2.0**	**A-7-6 (14)**	**CL**	**42**	**18**	**24**		
⊙	**LSS - 23810-45**	**2.0**	**A-6 (5)**	**CL**	**34**	**17**	**17**		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**LSS - 23810-41**	**2.0**	**25**	**0.065**			**3.4**	**35.0**	**61.5**	
⊠	**LSS - 23810-42**	**2.0**	**25**	**0.054**			**2.4**	**33.6**	**64.0**	
▲	**LSS - 23810-43**	**2.0**	**25**	**0.051**	**0.004**		**2.9**	**32.5**	**64.6**	
★	**LSS - 23810-44**	**2.0**	**25**	**0.047**	**0.005**		**3.5**	**30.1**	**66.4**	
⊙	**LSS - 23810-45**	**2.0**	**25**	**0.115**	**0.013**		**5.1**	**43.1**	**51.9**	

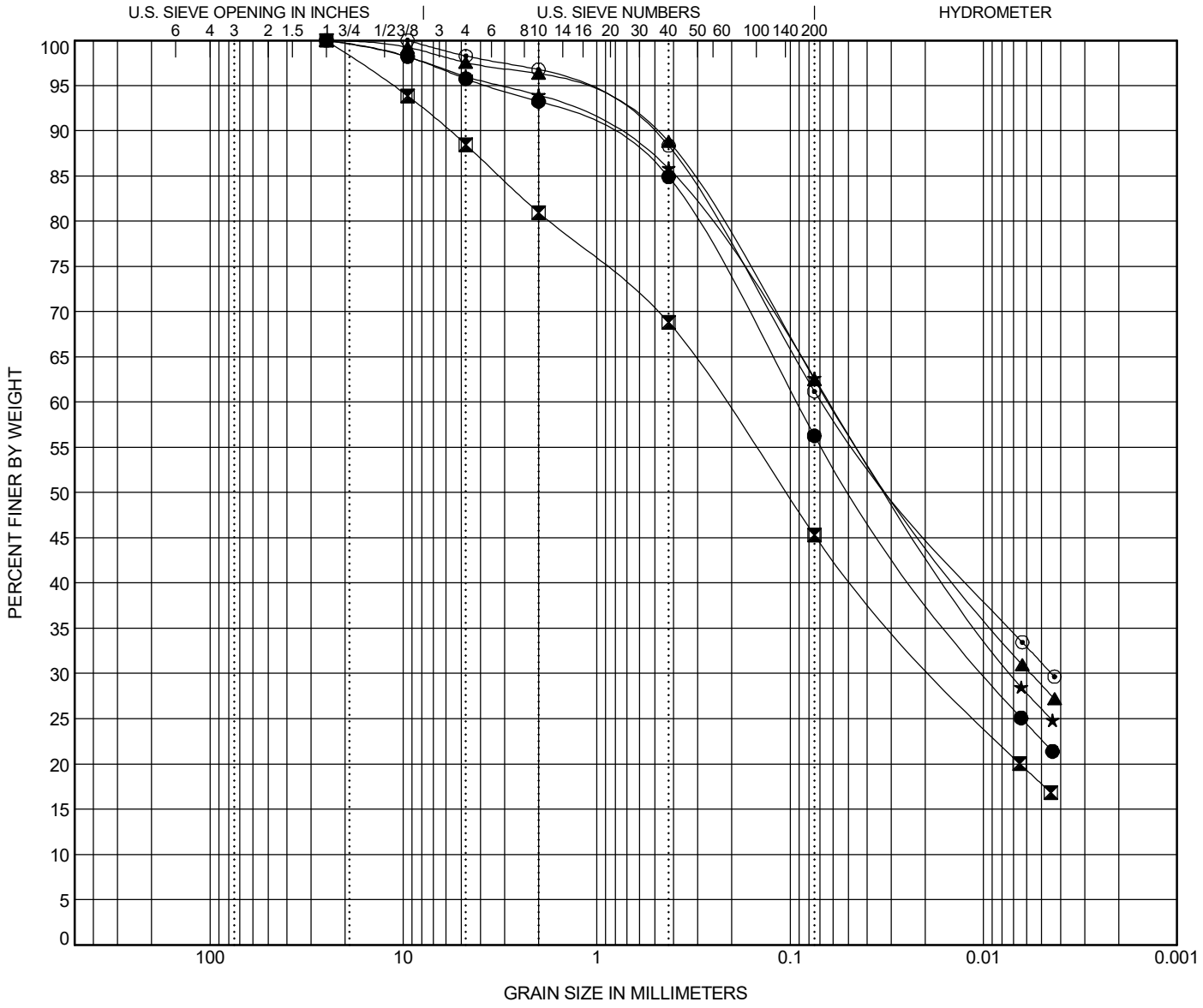
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NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **LOCATION** Burleigh County

PCN 23810



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
● LSS - 23810-46	2.0	A-6 (8)	CL	37	17	20		
⊠ LSS - 23810-47	2.0	A-6 (4)	SC	35	16	19		
▲ LSS - 23810-48	2.0	A-6 (10)	CL	38	17	21		
★ LSS - 23810-49	2.0	A-7-6 (16)	CL	48	18	30		
⊙ LSS - 23810-50	2.0	A-7-6 (13)	CL	44	18	26		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● LSS - 23810-46	2.0	25	0.094	0.009		4.2	39.5	56.3	
⊠ LSS - 23810-47	2.0	25	0.222	0.017		11.5	43.2	45.3	
▲ LSS - 23810-48	2.0	25	0.062	0.006		2.5	35.1	62.5	
★ LSS - 23810-49	2.0	25	0.062	0.007		4.0	33.3	62.7	
⊙ LSS - 23810-50	2.0	9.5	0.067	0.004		1.7	37.1	61.2	

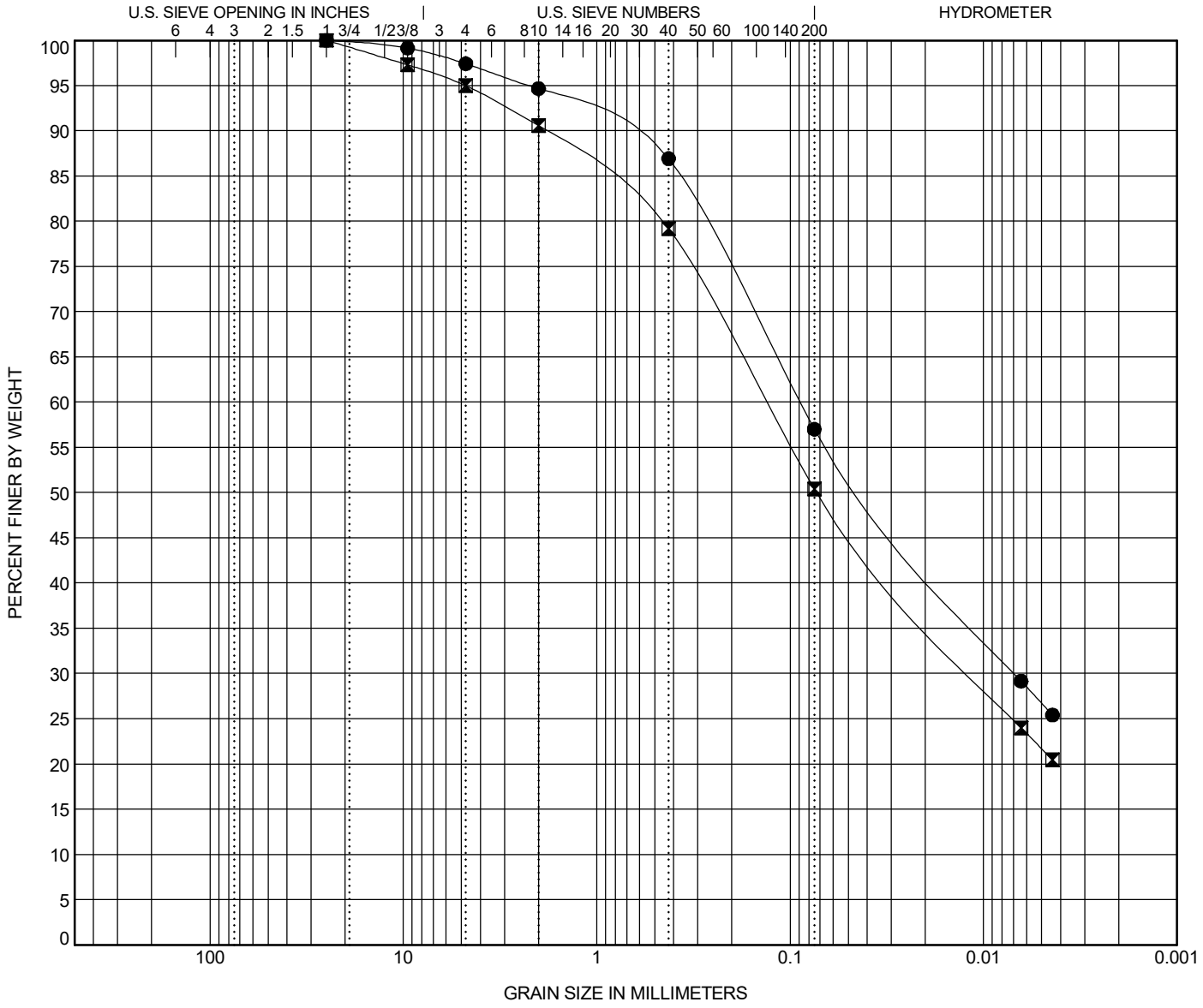
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300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **LOCATION** Burleigh County

PCN 23810



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	**LSS - 23810-51**	**2.0**	**A-7-6 (10)**	**CL**	**41**	**17**	**24**		
⊠	**LSS - 23810-52**	**2.0**	**A-7-6 (8)**	**CL**	**41**	**17**	**24**		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**LSS - 23810-51**	**2.0**	**25**	**0.089**	**0.007**		**2.6**	**40.4**	**57.0**	
⊠	**LSS - 23810-52**	**2.0**	**25**	**0.134**	**0.011**		**5.0**	**44.6**	**50.4**	

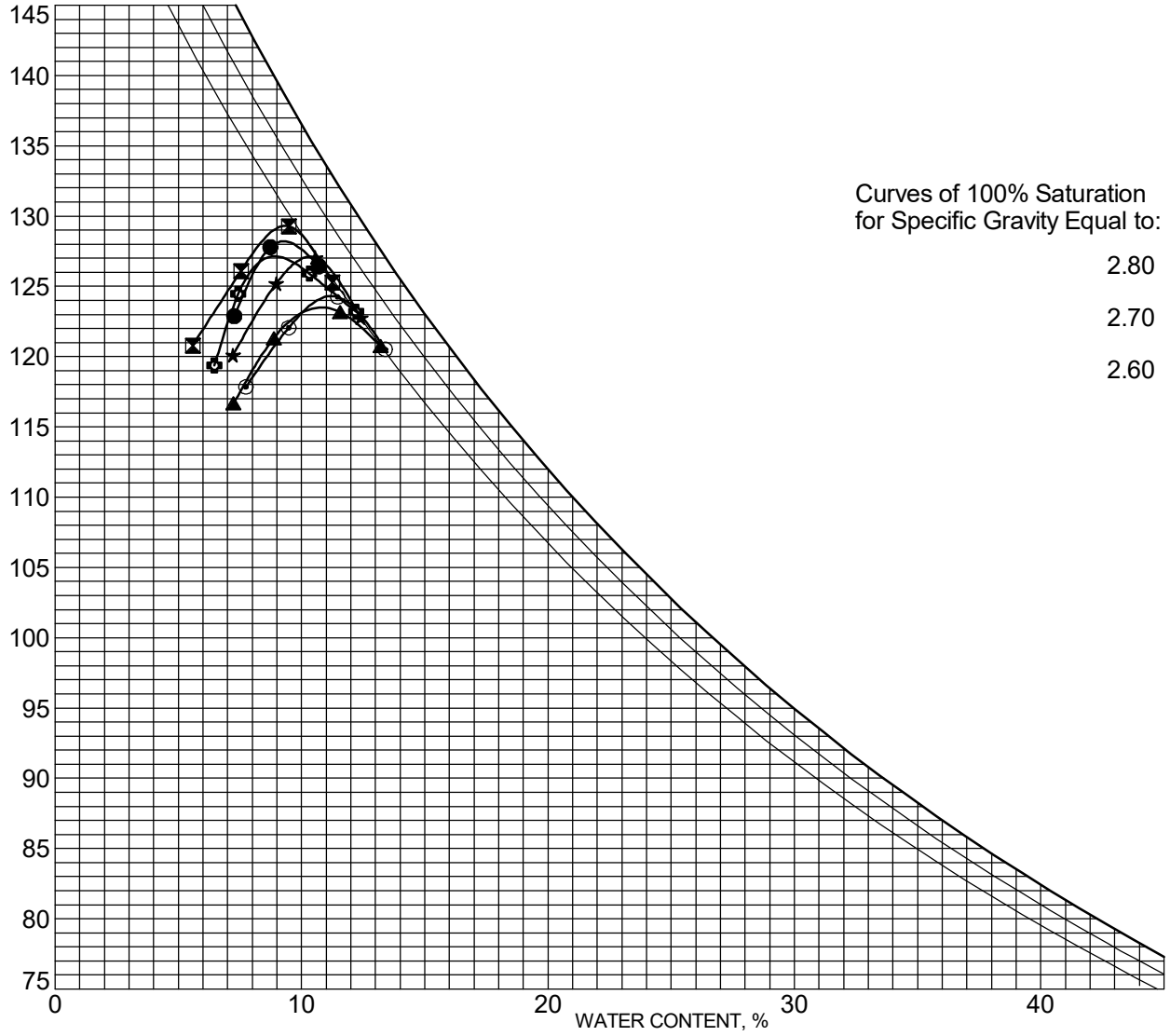
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MOISTURE-DENSITY RELATIONSHIP

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

PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **LOCATION** Burleigh County

PCN 23810



BOREHOLE		DEPTH	AASHTO Classification	USCS Description
●	LSS - 23810-1	2.0	A-6 (2)	CLAYEY SAND(SC)
⊠	LSS - 23810-2	2.0	A-6 (4)	SANDY LEAN CLAY(CL)
▲	LSS - 23810-3	2.0	A-6 (6)	SANDY LEAN CLAY(CL)
★	LSS - 23810-4	2.0	A-6 (8)	SANDY LEAN CLAY(CL)
⊙	LSS - 23810-5	2.0	A-6 (10)	LEAN CLAY with SAND(CL)
✿	LSS - 23810-6	2.0	A-6 (9)	LEAN CLAY with SAND(CL)

BOREHOLE		DEPTH	Test Method	LL	PL	PI	Max DD	Optimum WC
●	LSS - 23810-1	2.0	AASHTO T-180 Method A	27	14	13	128.2 PCF	9.3 %
⊠	LSS - 23810-2	2.0	AASHTO T-180 Method A	27	15	12	129.3 PCF	9.4 %
▲	LSS - 23810-3	2.0	AASHTO T-180 Method A	34	17	17	123.5 PCF	10.8 %
★	LSS - 23810-4	2.0	AASHTO T-180 Method A	32	16	16	127.1 PCF	10.3 %
⊙	LSS - 23810-5	2.0	AASHTO T-180 Method A	32	17	15	124.3 PCF	11.3 %
✿	LSS - 23810-6	2.0	AASHTO T-180 Method A	33	18	15	127.1 PCF	8.9 %

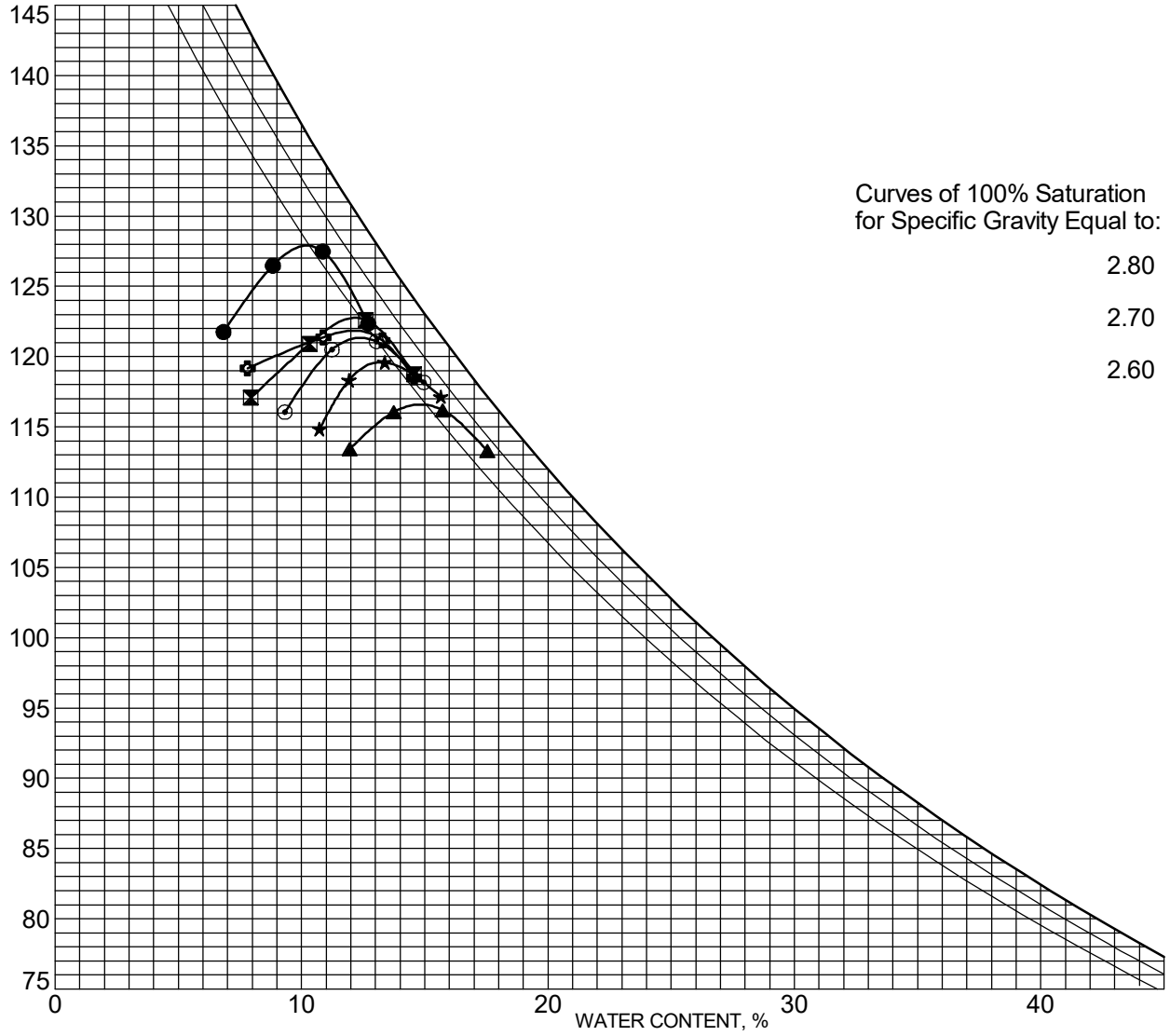
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MOISTURE-DENSITY RELATIONSHIP

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

PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **LOCATION** Burleigh County

PCN 23810



BOREHOLE		DEPTH	AASHTO Classification	USCS Description
●	LSS - 23810-7	2.0	A-6 (9)	SANDY LEAN CLAY(CL)
⊠	LSS - 23810-8	2.0	A-7-6 (17)	LEAN CLAY with SAND(CL)
▲	LSS - 23810-9	2.0	A-7-6 (56)	FAT CLAY(CH)
★	LSS - 23810-10	2.0	A-7-6 (43)	FAT CLAY with SAND(CH)
⊙	LSS - 23810-11	2.0	A-7-6 (40)	FAT CLAY with SAND(CH)
✿	LSS - 23810-12	2.0	A-7-6 (29)	FAT CLAY with SAND(CH)

BOREHOLE		DEPTH	Test Method	LL	PL	PI	Max DD	Optimum WC
●	LSS - 23810-7	2.0	AASHTO T-180 Method A	34	16	18	127.9 PCF	10.2 %
⊠	LSS - 23810-8	2.0	AASHTO T-180 Method A	43	17	26	122.8 PCF	12.1 %
▲	LSS - 23810-9	2.0	AASHTO T-180 Method A	75	21	54	116.6 PCF	14.8 %
★	LSS - 23810-10	2.0	AASHTO T-180 Method A	68	21	47	119.6 PCF	13.2 %
⊙	LSS - 23810-11	2.0	AASHTO T-180 Method A	65	20	45	121.3 PCF	12.4 %
✿	LSS - 23810-12	2.0	AASHTO T-180 Method A	55	19	36	121.9 PCF	12.1 %

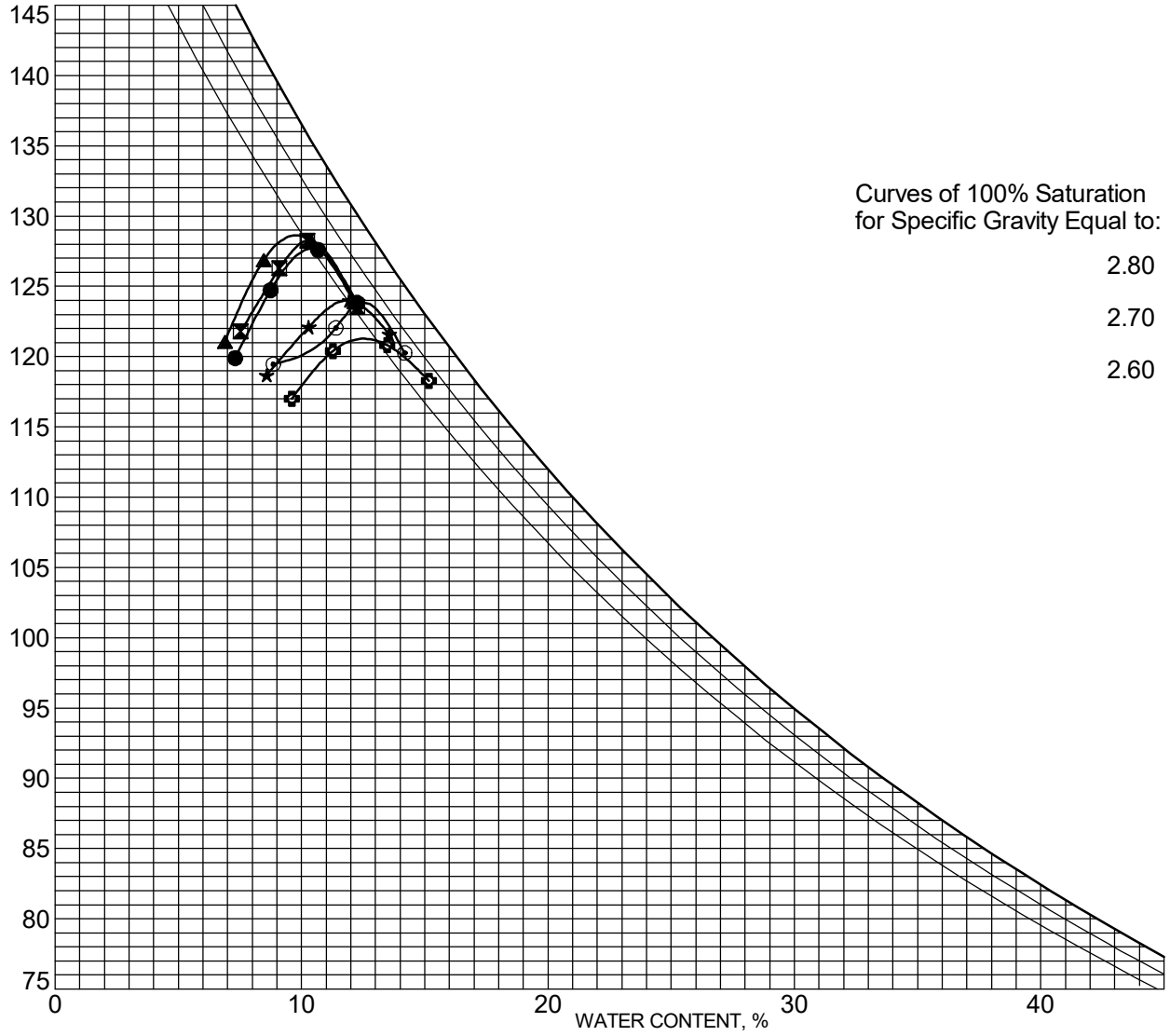
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MOISTURE-DENSITY RELATIONSHIP

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300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **LOCATION** Burleigh County

PCN 23810



BOREHOLE		DEPTH	AASHTO Classification	USCS Description
●	**LSS - 23810-13**	**2.0**	**A-6 (10)**	**SANDY LEAN CLAY(CL)**
⊠	**LSS - 23810-14**	**2.0**	**A-6 (9)**	**SANDY LEAN CLAY(CL)**
▲	**LSS - 23810-15**	**2.0**	**A-7-6 (13)**	**SANDY LEAN CLAY(CL)**
★	**LSS - 23810-16**	**2.0**	**A-7-6 (30)**	**FAT CLAY with SAND(CH)**
⊙	**LSS - 23810-17**	**2.0**	**A-7-6 (24)**	**FAT CLAY with SAND(CH)**
✿	**LSS - 23810-18**	**2.0**	**A-7-6 (28)**	**FAT CLAY with SAND(CH)**

BOREHOLE		DEPTH	Test Method	LL	PL	PI	Max DD	Optimum WC
●	**LSS - 23810-13**	**2.0**	**AASHTO T-180 Method A**	**38**	**15**	**23**	**127.7 PCF**	**10.4 %**
⊠	**LSS - 23810-14**	**2.0**	**AASHTO T-180 Method A**	**39**	**17**	**22**	**128.2 PCF**	**10.3 %**
▲	**LSS - 23810-15**	**2.0**	**AASHTO T-180 Method A**	**45**	**15**	**30**	**128.6 PCF**	**9.8 %**
★	**LSS - 23810-16**	**2.0**	**AASHTO T-180 Method A**	**54**	**19**	**35**	**124.0 PCF**	**11.8 %**
⊙	**LSS - 23810-17**	**2.0**	**AASHTO T-180 Method A**	**50**	**17**	**33**	**123.9 PCF**	**12.5 %**
✿	**LSS - 23810-18**	**2.0**	**AASHTO T-180 Method A**	**53**	**17**	**36**	**121.3 PCF**	**12.6 %**

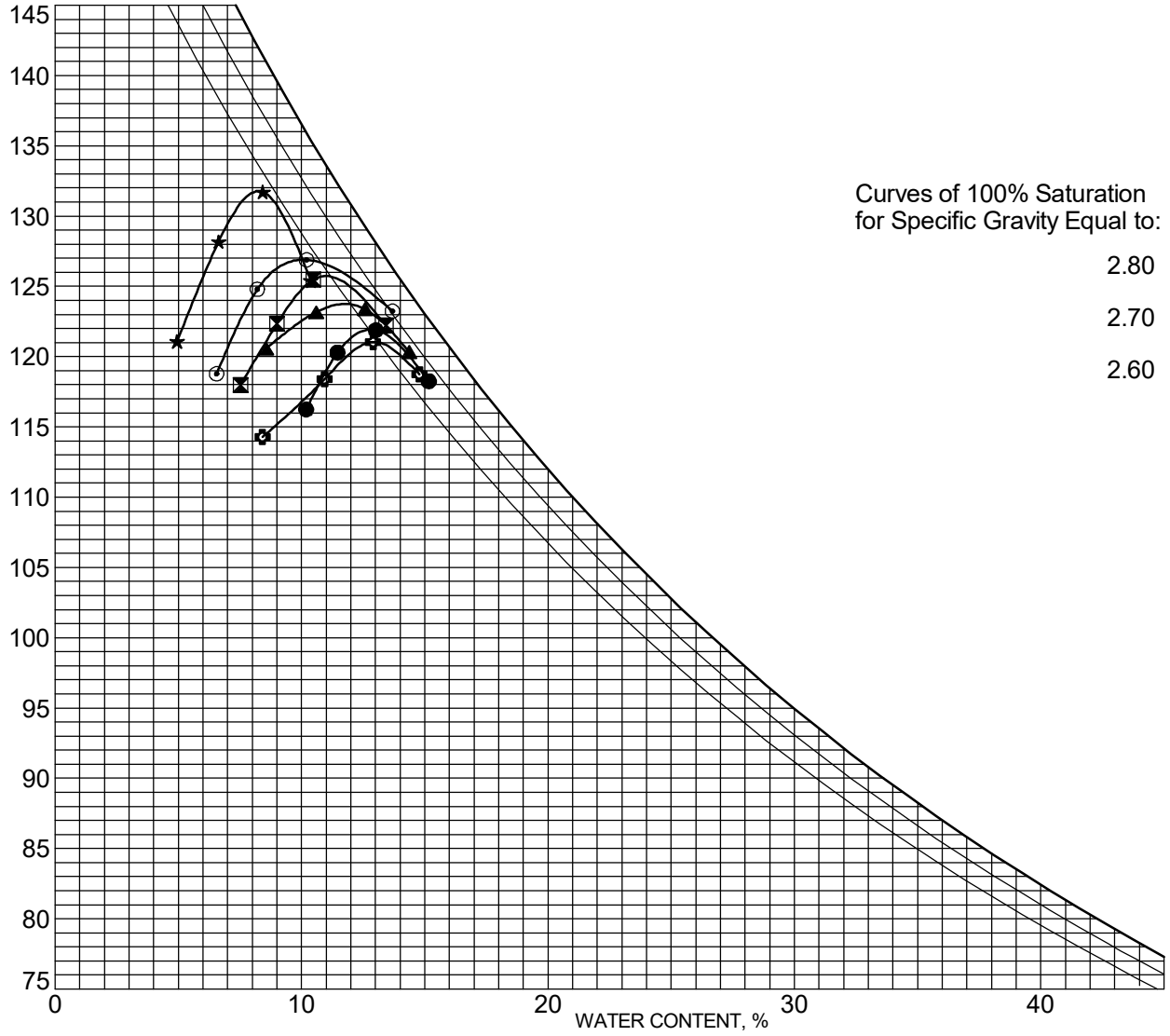
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MOISTURE-DENSITY RELATIONSHIP

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300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **LOCATION** Burleigh County

PCN 23810



BOREHOLE		DEPTH	AASHTO Classification	USCS Description
●	LSS - 23810-19	2.0	A-7-6 (38)	FAT CLAY(CH)
⊠	LSS - 23810-20	2.0	A-7-6 (26)	FAT CLAY with SAND(CH)
▲	LSS - 23810-21	2.0	A-7-6 (27)	FAT CLAY with SAND(CH)
★	LSS - 23810-22	2.0	A-6 (3)	CLAYEY SAND(SC)
⊙	LSS - 23810-23	2.0	A-6 (10)	SANDY LEAN CLAY(CL)
✿	LSS - 23810-24	2.0	A-7-6 (38)	FAT CLAY(CH)

BOREHOLE		DEPTH	Test Method	LL	PL	PI	Max DD	Optimum WC
●	LSS - 23810-19	2.0	AASHTO T-180 Method A	61	20	41	121.9 PCF	12.8 %
⊠	LSS - 23810-20	2.0	AASHTO T-180 Method A	54	18	36	125.7 PCF	10.9 %
▲	LSS - 23810-21	2.0	AASHTO T-180 Method A	54	18	36	123.7 PCF	11.7 %
★	LSS - 23810-22	2.0	AASHTO T-180 Method A	32	13	19	131.8 PCF	8.2 %
⊙	LSS - 23810-23	2.0	AASHTO T-180 Method A	38	15	23	126.9 PCF	10.1 %
✿	LSS - 23810-24	2.0	AASHTO T-180 Method A	58	19	39	121.0 PCF	12.9 %

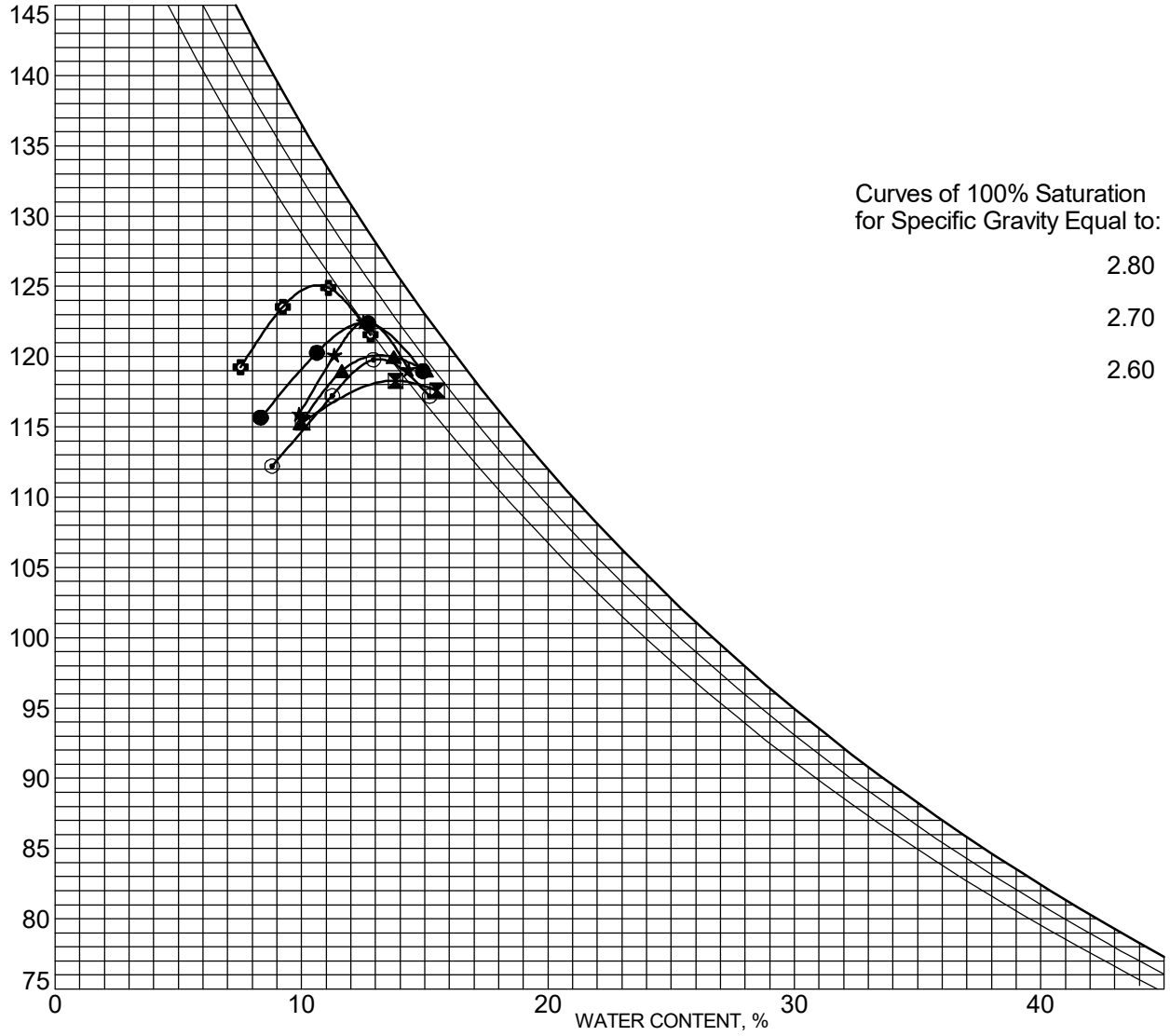
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300 AIRPORT ROAD
BISMARCK, ND 58504

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PCN 23810



BOREHOLE		DEPTH	AASHTO Classification	USCS Description
●	LSS - 23810-25	2.0	A-7-6 (32)	FAT CLAY with SAND(CH)
⊠	LSS - 23810-26	2.0	A-7-6 (31)	FAT CLAY with SAND(CH)
▲	LSS - 23810-27	2.0	A-7-6 (23)	FAT CLAY with SAND(CH)
★	LSS - 23810-28	2.0	A-7-6 (19)	SANDY LEAN CLAY(CL)
⊙	LSS - 23810-29	2.0	A-7-6 (19)	LEAN CLAY with SAND(CL)
✿	LSS - 23810-30	2.0	A-6 (7)	SANDY LEAN CLAY(CL)

BOREHOLE		DEPTH	Test Method	LL	PL	PI	Max DD	Optimum WC
●	LSS - 23810-25	2.0	AASHTO T-180 Method A	55	17	38	122.4 PCF	12.5 %
⊠	LSS - 23810-26	2.0	AASHTO T-180 Method A	53	16	37	118.3 PCF	13.8 %
▲	LSS - 23810-27	2.0	AASHTO T-180 Method A	50	16	34	120.1 PCF	13.2 %
★	LSS - 23810-28	2.0	AASHTO T-180 Method A	48	17	31	122.5 PCF	12.6 %
⊙	LSS - 23810-29	2.0	AASHTO T-180 Method A	48	19	29	119.8 PCF	13.2 %
✿	LSS - 23810-30	2.0	AASHTO T-180 Method A	34	16	18	125.1 PCF	10.7 %

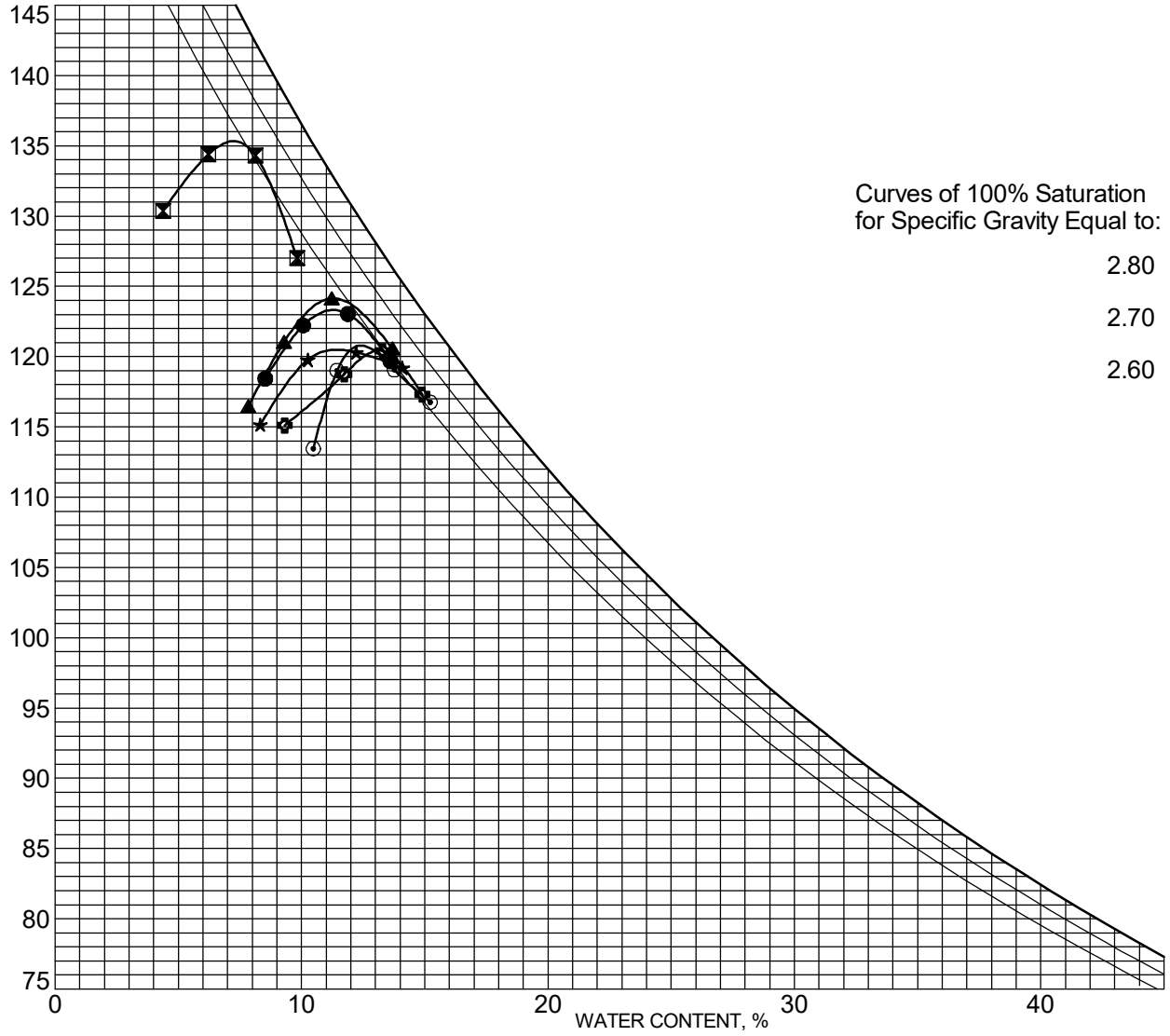
COMPACTION (MULTIPLE CURVES) - 20171219.GDT - 12/20/24 09:19 - F:\LAB\PROJECTS\GINT\1-094(238)172.GPJ

MOISTURE-DENSITY RELATIONSHIP

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

PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **LOCATION** Burleigh County

PCN 23810



BOREHOLE		DEPTH	AASHTO Classification	USCS Description
●	LSS - 23810-31	2.0	A-6 (9)	SANDY LEAN CLAY(CL)
⊠	LSS - 23810-32	2.0	A-1-b (0)	SILTY SAND with GRAVEL(SM)
▲	LSS - 23810-33	2.0	A-6 (9)	SANDY LEAN CLAY(CL)
★	LSS - 23810-34	2.0	A-7-6 (15)	SANDY LEAN CLAY(CL)
⊙	LSS - 23810-35	2.0	A-7-6 (17)	SANDY LEAN CLAY(CL)
✿	LSS - 23810-36	2.0	A-7-6 (16)	SANDY LEAN CLAY(CL)

BOREHOLE		DEPTH	Test Method	LL	PL	PI	Max DD	Optimum WC
●	LSS - 23810-31	2.0	AASHTO T-180 Method A	38	16	22	123.3 PCF	11.3 %
⊠	LSS - 23810-32	2.0	AASHTO T-180 Method A	NP	NP	NP	135.3 PCF	7.2 %
▲	LSS - 23810-33	2.0	AASHTO T-180 Method A	37	17	20	124.1 PCF	11.3 %
★	LSS - 23810-34	2.0	AASHTO T-180 Method A	45	17	28	120.5 PCF	11.4 %
⊙	LSS - 23810-35	2.0	AASHTO T-180 Method A	49	18	31	120.8 PCF	12.4 %
✿	LSS - 23810-36	2.0	AASHTO T-180 Method A	46	17	29	120.4 PCF	13.1 %

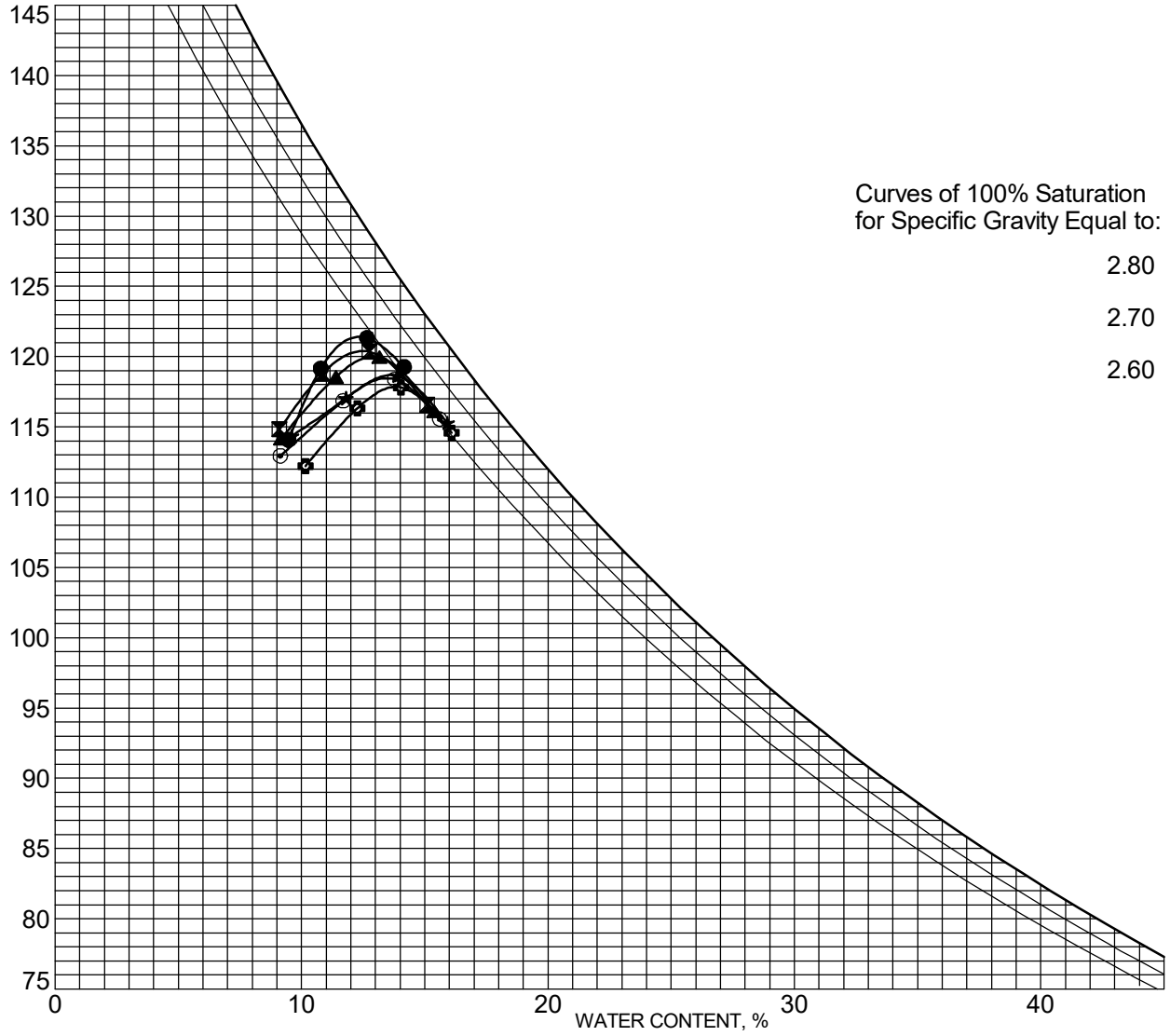
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MOISTURE-DENSITY RELATIONSHIP

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

PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **LOCATION** Burleigh County

PCN 23810



BOREHOLE		DEPTH	AASHTO Classification	USCS Description
●	**LSS - 23810-37**	**2.0**	**A-7-6 (17)**	**SANDY LEAN CLAY(CL)**
⊠	**LSS - 23810-38**	**2.0**	**A-7-6 (13)**	**SANDY LEAN CLAY(CL)**
▲	**LSS - 23810-39**	**2.0**	**A-7-6 (14)**	**SANDY LEAN CLAY(CL)**
★	**LSS - 23810-40**	**2.0**	**A-7-6 (12)**	**SANDY LEAN CLAY(CL)**
⊙	**LSS - 23810-41**	**2.0**	**A-7-6 (14)**	**SANDY LEAN CLAY(CL)**
✿	**LSS - 23810-42**	**2.0**	**A-7-6 (16)**	**SANDY LEAN CLAY(CL)**

BOREHOLE		DEPTH	Test Method	LL	PL	PI	Max DD	Optimum WC
●	**LSS - 23810-37**	**2.0**	**AASHTO T-180 Method A**	**48**	**17**	**31**	**121.4 PCF**	**12.4 %**
⊠	**LSS - 23810-38**	**2.0**	**AASHTO T-180 Method A**	**45**	**18**	**27**	**120.4 PCF**	**12.5 %**
▲	**LSS - 23810-39**	**2.0**	**AASHTO T-180 Method A**	**46**	**18**	**28**	**120.0 PCF**	**13.0 %**
★	**LSS - 23810-40**	**2.0**	**AASHTO T-180 Method A**	**43**	**18**	**25**	**118.7 PCF**	**13.7 %**
⊙	**LSS - 23810-41**	**2.0**	**AASHTO T-180 Method A**	**45**	**18**	**27**	**118.5 PCF**	**13.5 %**
✿	**LSS - 23810-42**	**2.0**	**AASHTO T-180 Method A**	**47**	**18**	**29**	**117.8 PCF**	**13.8 %**

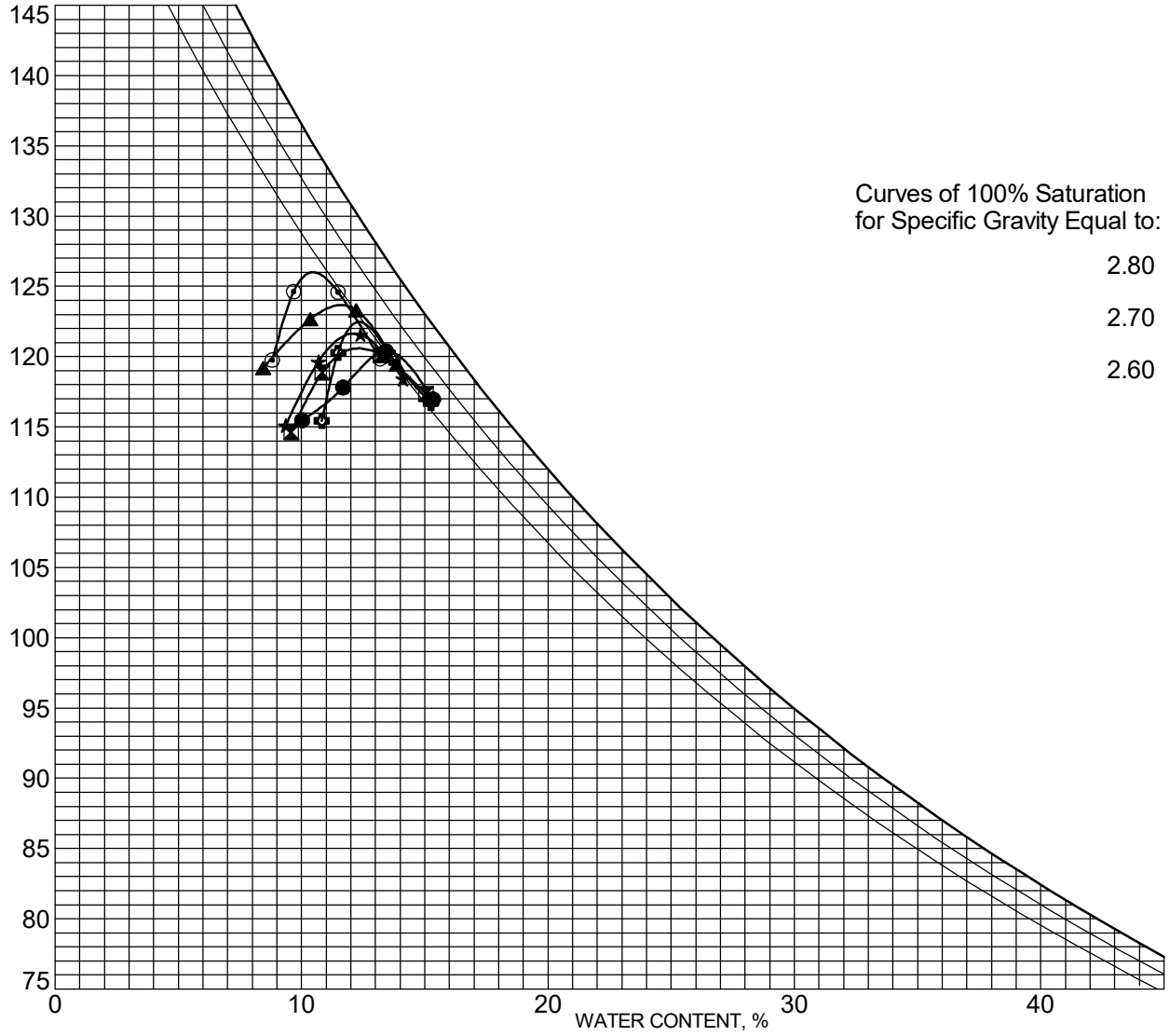
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MOISTURE-DENSITY RELATIONSHIP

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

PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **LOCATION** Burleigh County

PCN 23810



BOREHOLE		DEPTH	AASHTO Classification	USCS Description
●	**LSS - 23810-43**	**2.0**	**A-7-6 (14)**	**SANDY LEAN CLAY(CL)**
⊠	**LSS - 23810-44**	**2.0**	**A-7-6 (14)**	**SANDY LEAN CLAY(CL)**
▲	**LSS - 23810-45**	**2.0**	**A-6 (5)**	**SANDY LEAN CLAY(CL)**
★	**LSS - 23810-46**	**2.0**	**A-6 (8)**	**SANDY LEAN CLAY(CL)**
⊙	**LSS - 23810-47**	**2.0**	**A-6 (4)**	**CLAYEY SAND(SC)**
✿	**LSS - 23810-48**	**2.0**	**A-6 (10)**	**SANDY LEAN CLAY(CL)**

BOREHOLE		DEPTH	Test Method	LL	PL	PI	Max DD	Optimum WC
●	**LSS - 23810-43**	**2.0**	**AASHTO T-180 Method A**	**43**	**18**	**25**	**120.4 PCF**	**13.4 %**
⊠	**LSS - 23810-44**	**2.0**	**AASHTO T-180 Method A**	**42**	**18**	**24**	**120.6 PCF**	**12.3 %**
▲	**LSS - 23810-45**	**2.0**	**AASHTO T-180 Method A**	**34**	**17**	**17**	**123.7 PCF**	**11.6 %**
★	**LSS - 23810-46**	**2.0**	**AASHTO T-180 Method A**	**37**	**17**	**20**	**121.6 PCF**	**12.1 %**
⊙	**LSS - 23810-47**	**2.0**	**AASHTO T-180 Method A**	**35**	**16**	**19**	**126.0 PCF**	**10.4 %**
✿	**LSS - 23810-48**	**2.0**	**AASHTO T-180 Method A**	**38**	**17**	**21**	**122.5 PCF**	**12.3 %**

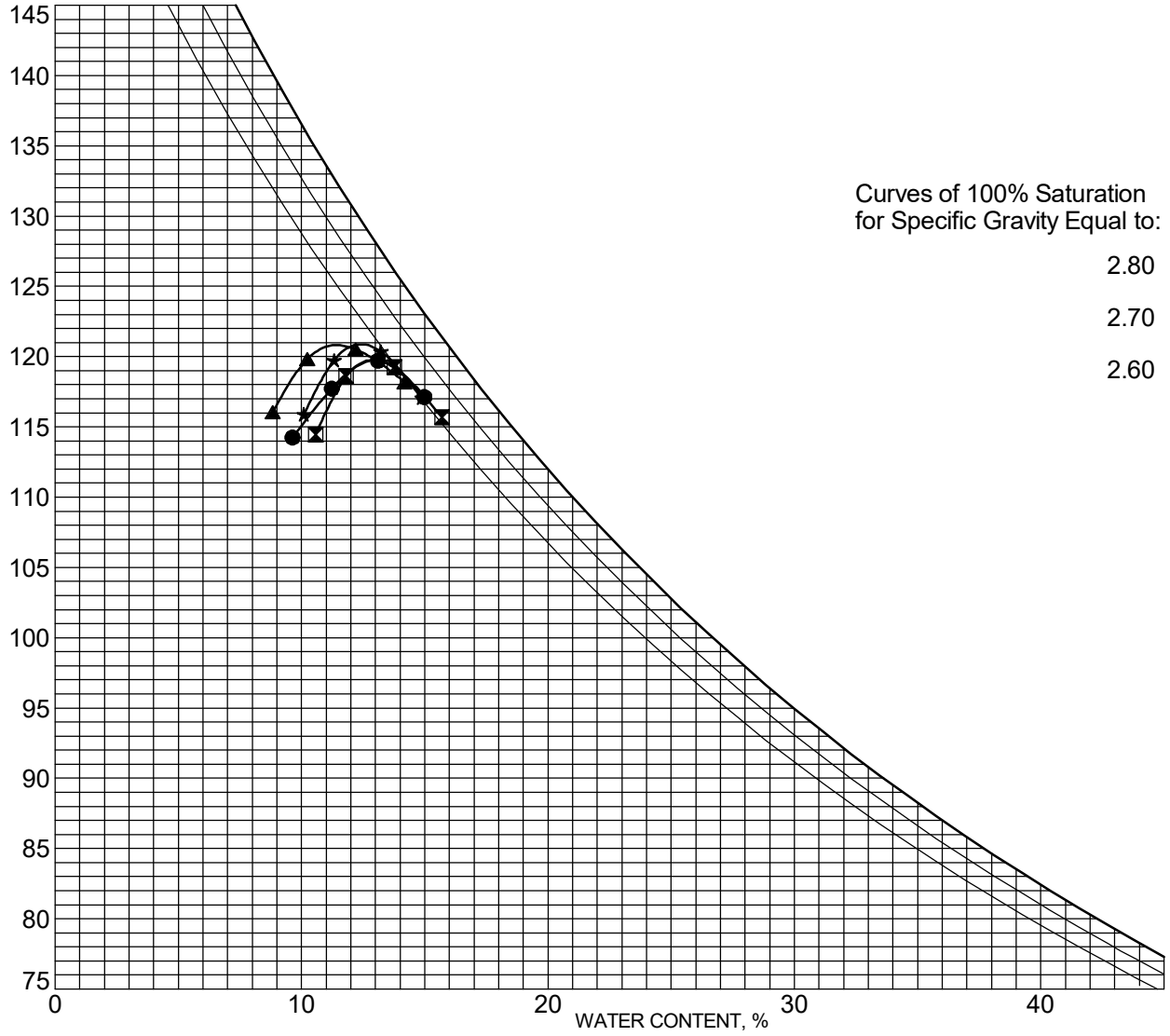
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MOISTURE-DENSITY RELATIONSHIP

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

PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **LOCATION** Burleigh County

PCN 23810



	BOREHOLE	DEPTH	AASHTO Classification	USCS Description
●	**LSS - 23810-49**	**2.0**	**A-7-6 (16)**	**SANDY LEAN CLAY(CL)**
⊠	**LSS - 23810-50**	**2.0**	**A-7-6 (13)**	**SANDY LEAN CLAY(CL)**
▲	**LSS - 23810-51**	**2.0**	**A-7-6 (10)**	**SANDY LEAN CLAY(CL)**
★	**LSS - 23810-52**	**2.0**	**A-7-6 (8)**	**SANDY LEAN CLAY(CL)**

	BOREHOLE	DEPTH	Test Method	LL	PL	PI	Max DD	Optimum WC
●	**LSS - 23810-49**	**2.0**	**AASHTO T-180 Method A**	**48**	**18**	**30**	**119.7 PCF**	**13.0 %**
⊠	**LSS - 23810-50**	**2.0**	**AASHTO T-180 Method A**	**44**	**18**	**26**	**119.8 PCF**	**12.9 %**
▲	**LSS - 23810-51**	**2.0**	**AASHTO T-180 Method A**	**41**	**17**	**24**	**120.8 PCF**	**11.5 %**
★	**LSS - 23810-52**	**2.0**	**AASHTO T-180 Method A**	**41**	**17**	**24**	**120.9 PCF**	**12.4 %**

COMPACTION (MULTIPLE CURVES) - 20171219.GDT - 12/20/24 09:20 - F:\LAB\PROJECTS\GINT\1-094(238)172.GPJ

SUMMARY OF LABORATORY RESULTS

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

PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **LOCATION** Burleigh County

PCN 23810

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 - 23810-1	2.0	27	14	13	9.5	46	A-6 (2)	SC	22.2	14.1			
LSS - 23810-1	3.0								13.6	14.1			
LSS - 23810-1	4.0								13.2	14.1			
LSS - 23810-1	5.0								7.4	14.1			
LSS - 23810-2	2.0	27	15	12	9.5	56	A-6 (4)	CL	14.8	14.9			
LSS - 23810-2	3.0								19.2	14.9			
LSS - 23810-2	4.0								14.0	14.9			
LSS - 23810-2	5.0								11.4	14.9			
LSS - 23810-3	2.0	34	17	17	9.5	55	A-6 (6)	CL	14.7	16.5			
LSS - 23810-3	3.0								18.8	16.5			
LSS - 23810-3	4.0								16.1	16.5			
LSS - 23810-3	5.0								16.4	16.5			
LSS - 23810-4	2.0	32	16	16	9.5	67	A-6 (8)	CL	14.1	17.2			
LSS - 23810-4	3.0								11.6	17.2			
LSS - 23810-4	4.0								17.1	17.2			
LSS - 23810-4	5.0								26.1	17.2			
LSS - 23810-5	2.0	32	17	15	4.75	80	A-6 (10)	CL	17.7	20.2			
LSS - 23810-5	3.0								19.9	20.2			
LSS - 23810-5	4.0								19.8	20.2			
LSS - 23810-5	5.0								23.5	20.2			
LSS - 23810-6	2.0	33	18	15	25	74	A-6 (9)	CL	19.2	18.1			
LSS - 23810-6	3.0								18.4	18.1			
LSS - 23810-6	4.0								15.9	18.1			
LSS - 23810-6	5.0								18.7	18.1			
LSS - 23810-7	2.0	34	16	18	9.5	65	A-6 (9)	CL	22.4	22.1			
LSS - 23810-7	3.0								20.8	22.1			
LSS - 23810-7	4.0								25.9	22.1			
LSS - 23810-7	5.0								19.1	22.1			
LSS - 23810-8	2.0	43	17	26	9.5	73	A-7-6 (17)	CL	12.7	20.5			
LSS - 23810-8	3.0								21.1	20.5			
LSS - 23810-8	4.0								19.9	20.5			
LSS - 23810-8	5.0								28.2	20.5			
LSS - 23810-9	2.0	75	21	54	9.5	93	A-7-6 (56)	CH	19.8	26.2			
LSS - 23810-9	3.0								25.0	26.2			
LSS - 23810-9	4.0								29.8	26.2			
LSS - 23810-9	5.0								30.1	26.2			
LSS - 23810-10	2.0	68	21	47	9.5	85	A-7-6 (43)	CH	22.8	23.8			
LSS - 23810-10	3.0								27.0	23.8			
LSS - 23810-10	4.0								21.7	23.8			
LSS - 23810-10	5.0								16.6	16.6			
LSS - 23810-11	2.0	65	20	45	9.5	84	A-7-6 (40)	CH	18.5	25.3			
LSS - 23810-11	3.0								22.3	25.3			
LSS - 23810-11	4.0								30.4	25.3			

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SUMMARY OF LABORATORY RESULTS

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

PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **LOCATION** Burleigh County

PCN 23810

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 - 23810-11	5.0								30.1	25.3			
LSS - 23810-12	2.0	55	19	36	9.5	79	A-7-6 (29)	CH	17.2	19.5			
LSS - 23810-12	3.0								19.1	19.5			
LSS - 23810-12	4.0								20.7	19.5			
LSS - 23810-12	5.0								20.8	19.5			
LSS - 23810-13	2.0	38	15	23	9.5	57	A-6 (10)	CL	16.0	16.8			
LSS - 23810-13	3.0								16.6	16.8			
LSS - 23810-13	4.0								17.6	16.8			
LSS - 23810-13	5.0								16.9	16.8			
LSS - 23810-14	2.0	39	17	22	9.5	55	A-6 (9)	CL	9.3	14.5			
LSS - 23810-14	3.0								17.3	14.5			
LSS - 23810-14	4.0								11.5	14.5			
LSS - 23810-14	5.0								20.1	14.5			
LSS - 23810-15	2.0	45	15	30	9.5	56	A-7-6 (13)	CL	11.1	15.5			
LSS - 23810-15	3.0								15.9	15.5			
LSS - 23810-15	4.0								22.6	15.5			
LSS - 23810-15	5.0								12.2	15.5			
LSS - 23810-16	2.0	54	19	35	9.5	84	A-7-6 (30)	CH	14.3	18.8			
LSS - 23810-16	3.0								20.2	18.8			
LSS - 23810-16	4.0								20.4	18.8			
LSS - 23810-16	5.0								20.3	18.8			
LSS - 23810-17	2.0	50	17	33	9.5	76	A-7-6 (24)	CH	8.4	19.1			
LSS - 23810-17	3.0								20.3	19.1			
LSS - 23810-17	4.0								22.2	19.1			
LSS - 23810-17	5.0								25.5	19.1			
LSS - 23810-18	2.0	53	17	36	9.5	78	A-7-6 (28)	CH	8.6	17.8			
LSS - 23810-18	3.0								14.5	17.8			
LSS - 23810-18	4.0								24.2	17.8			
LSS - 23810-18	5.0								24.1	17.8			
LSS - 23810-19	2.0	61	20	41	4.75	86	A-7-6 (38)	CH	10.2	20.1			
LSS - 23810-19	3.0								20.7	20.1			
LSS - 23810-19	4.0								24.1	20.1			
LSS - 23810-19	5.0								25.5	20.1			
LSS - 23810-20	2.0	54	18	36	9.5	74	A-7-6 (26)	CH	15.3	18.8			
LSS - 23810-20	3.0								22.6	18.8			
LSS - 23810-20	4.0								20.1	18.8			
LSS - 23810-20	5.0								17.0	18.8			
LSS - 23810-21	2.0	54	18	36	9.5	77	A-7-6 (27)	CH	18.4	21.4			
LSS - 23810-21	3.0								21.7	21.4			
LSS - 23810-21	4.0								18.4	21.4			
LSS - 23810-21	5.0								27.2	21.4			
LSS - 23810-22	2.0	32	13	19	25	38	A-6 (3)	SC	13.1	12.0			
LSS - 23810-22	3.0								10.1	12.0			

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SUMMARY OF LABORATORY RESULTS

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

PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **LOCATION** Burleigh County

PCN 23810

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 - 23810-22	4.0								9.7	12.0			
LSS - 23810-22	5.0								14.9	12.0			
LSS - 23810-23	2.0	38	15	23	9.5	57	A-6 (10)	CL	18.4	18.0			
LSS - 23810-23	3.0								21.5	18.0			
LSS - 23810-23	4.0								17.1	18.0			
LSS - 23810-23	5.0								15.1	18.0			
LSS - 23810-24	2.0	58	19	39	4.75	90	A-7-6 (38)	CH	20.2	27.2			
LSS - 23810-24	3.0								31.7	27.2			
LSS - 23810-24	4.0								25.8	27.2			
LSS - 23810-24	5.0								31.2	27.2			
LSS - 23810-25	2.0	55	17	38	9.5	83	A-7-6 (32)	CH	20.9	22.5			
LSS - 23810-25	3.0								22.0	22.5			
LSS - 23810-25	4.0								23.3	22.5			
LSS - 23810-25	5.0								23.8	22.5			
LSS - 23810-26	2.0	53	16	37	9.5	82	A-7-6 (31)	CH	21.3	24.4			
LSS - 23810-26	3.0								20.6	24.4			
LSS - 23810-26	4.0								22.8	24.4			
LSS - 23810-26	5.0								32.7	24.4			
LSS - 23810-27	2.0	50	16	34	9.5	73	A-7-6 (23)	CH	25.5	24.9			
LSS - 23810-27	3.0								25.0	24.9			
LSS - 23810-27	4.0								24.8	24.9			
LSS - 23810-27	5.0								24.4	24.9			
LSS - 23810-28	2.0	48	17	31	25	67	A-7-6 (19)	CL	20.1	23.3			
LSS - 23810-28	3.0								28.5	23.3			
LSS - 23810-28	4.0								22.6	23.3			
LSS - 23810-28	5.0								22.0	23.3			
LSS - 23810-29	2.0	48	19	29	9.5	70	A-7-6 (19)	CL	14.5	21.2			
LSS - 23810-29	3.0								18.8	21.2			
LSS - 23810-29	4.0								28.6	21.2			
LSS - 23810-29	5.0								23.0	21.2			
LSS - 23810-30	2.0	34	16	18	9.5	55	A-6 (7)	CL	15.9	17.0			
LSS - 23810-30	3.0								16.5	17.0			
LSS - 23810-30	4.0								16.9	17.0			
LSS - 23810-30	5.0								18.8	17.0			
LSS - 23810-31	2.0	38	16	22	25	56	A-6 (9)	CL	30.6	23.5			
LSS - 23810-31	3.0								19.4	23.5			
LSS - 23810-31	4.0								22.5	23.5			
LSS - 23810-31	5.0								21.3	23.5			
LSS - 23810-32	2.0	NP	NP	NP	25	12	A-1-b (0)	SM	6.4	13.6			
LSS - 23810-32	3.0								7.8	13.6			
LSS - 23810-32	4.0								10.3	13.6			
LSS - 23810-32	5.0								29.9	13.6			
LSS - 23810-33	2.0	37	17	20	25	59	A-6 (9)	CL	21.1	21.5			

LAB SUMMARY - 20171219.GDT - 12/20/24 09:21 - F:\LAB\PROJECTS\GINT\1-094(238)172.GPJ

SUMMARY OF LABORATORY RESULTS

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

PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **LOCATION** Burleigh County

PCN 23810

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 - 23810-33	3.0								19.5	21.5			
LSS - 23810-33	4.0								22.7	21.5			
LSS - 23810-33	5.0								22.6	21.5			
LSS - 23810-34	2.0	45	17	28	25	64	A-7-6 (15)	CL	20.1	22.6			
LSS - 23810-34	3.0								21.1	22.6			
LSS - 23810-34	4.0								24.7	22.6			
LSS - 23810-34	5.0								24.4	22.6			
LSS - 23810-35	2.0	49	18	31	25	64	A-7-6 (17)	CL	24.6	22.3			
LSS - 23810-35	3.0								18.4	22.3			
LSS - 23810-35	4.0								22.3	22.3			
LSS - 23810-35	5.0								23.8	22.3			
LSS - 23810-36	2.0	46	17	29	25	65	A-7-6 (16)	CL	22.6	23.0			
LSS - 23810-36	3.0								26.5	23.0			
LSS - 23810-36	4.0								20.5	23.0			
LSS - 23810-36	5.0								22.6	23.0			
LSS - 23810-37	2.0	48	17	31	25	63	A-7-6 (17)	CL	22.8	22.3			
LSS - 23810-37	3.0								23.2	22.3			
LSS - 23810-37	4.0								22.4	22.3			
LSS - 23810-37	5.0								20.9	22.3			
LSS - 23810-38	2.0	45	18	27	25	60	A-7-6 (13)	CL	20.7	19.6			
LSS - 23810-38	3.0								20.8	19.6			
LSS - 23810-38	4.0								19.5	19.6			
LSS - 23810-38	5.0								17.3	19.6			
LSS - 23810-39	2.0	46	18	28	25	61	A-7-6 (14)	CL	19.9	22.7			
LSS - 23810-39	3.0								22.5	22.7			
LSS - 23810-39	4.0								25.4	22.7			
LSS - 23810-39	5.0								23.0	22.7			
LSS - 23810-40	2.0	43	18	25	25	61	A-7-6 (12)	CL	25.9	23.9			
LSS - 23810-40	3.0								26.3	23.9			
LSS - 23810-40	4.0								25.6	23.9			
LSS - 23810-40	5.0								18.0	23.9			
LSS - 23810-41	2.0	45	18	27	25	62	A-7-6 (14)	CL	17.3	21.0			
LSS - 23810-41	3.0								22.5	21.0			
LSS - 23810-41	4.0								25.0	21.0			
LSS - 23810-41	5.0								19.3	21.0			
LSS - 23810-42	2.0	47	18	29	25	64	A-7-6 (16)	CL	19.4	24.2			
LSS - 23810-42	3.0								26.1	24.2			
LSS - 23810-42	4.0								26.3	24.2			
LSS - 23810-42	5.0								24.8	24.2			
LSS - 23810-43	2.0	43	18	25	25	65	A-7-6 (14)	CL	21.9	24.9			
LSS - 23810-43	3.0								27.2	24.9			
LSS - 23810-43	4.0								25.1	24.9			
LSS - 23810-43	5.0								25.5	24.9			

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SUMMARY OF LABORATORY RESULTS

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

PROJECT NUMBER CVD-IM-1-094(238)172 (EB) **LOCATION** Burleigh County

PCN 23810

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 - 23810-44	2.0	42	18	24	25	66	A-7-6 (14)	CL	20.6	22.6			
LSS - 23810-44	3.0								24.0	22.6			
LSS - 23810-44	4.0								23.2	22.6			
LSS - 23810-45	2.0	34	17	17	25	52	A-6 (5)	CL	23.4	18.3			
LSS - 23810-45	3.0								18.0	18.3			
LSS - 23810-45	4.0								17.2	18.3			
LSS - 23810-45	5.0								14.6	18.3			
LSS - 23810-46	2.0	37	17	20	25	56	A-6 (8)	CL	16.5	20.6			
LSS - 23810-46	3.0								19.3	20.6			
LSS - 23810-46	4.0								26.6	20.6			
LSS - 23810-46	5.0								19.8	20.6			
LSS - 23810-47	2.0	35	16	19	25	45	A-6 (4)	SC	17.9	17.6			
LSS - 23810-47	3.0								21.1	17.6			
LSS - 23810-47	4.0								16.3	17.6			
LSS - 23810-47	5.0								15.1	17.6			
LSS - 23810-48	2.0	38	17	21	25	62	A-6 (10)	CL	15.5	19.4			
LSS - 23810-48	3.0								23.5	19.4			
LSS - 23810-48	4.0								17.9	19.4			
LSS - 23810-48	5.0								20.7	19.4			
LSS - 23810-49	2.0	48	18	30	25	63	A-7-6 (16)	CL	20.6	21.9			
LSS - 23810-49	3.0								20.4	21.9			
LSS - 23810-49	4.0								19.3	21.9			
LSS - 23810-49	5.0								27.1	21.9			
LSS - 23810-50	2.0	44	18	26	9.5	61	A-7-6 (13)	CL	28.1	22.8			
LSS - 23810-50	3.0								21.5	22.8			
LSS - 23810-50	4.0								16.7	22.8			
LSS - 23810-50	5.0								24.9	22.8			
LSS - 23810-51	2.0	41	17	24	25	57	A-7-6 (10)	CL	22.1	19.4			
LSS - 23810-51	3.0								21.8	19.4			
LSS - 23810-51	4.0								12.8	19.4			
LSS - 23810-51	5.0								20.8	19.4			
LSS - 23810-52	2.0	41	17	24	25	50	A-7-6 (8)	CL	23.1	20.7			
LSS - 23810-52	3.0								19.0	20.7			
LSS - 23810-52	4.0								18.6	20.7			
LSS - 23810-52	5.0								22.2	20.7			

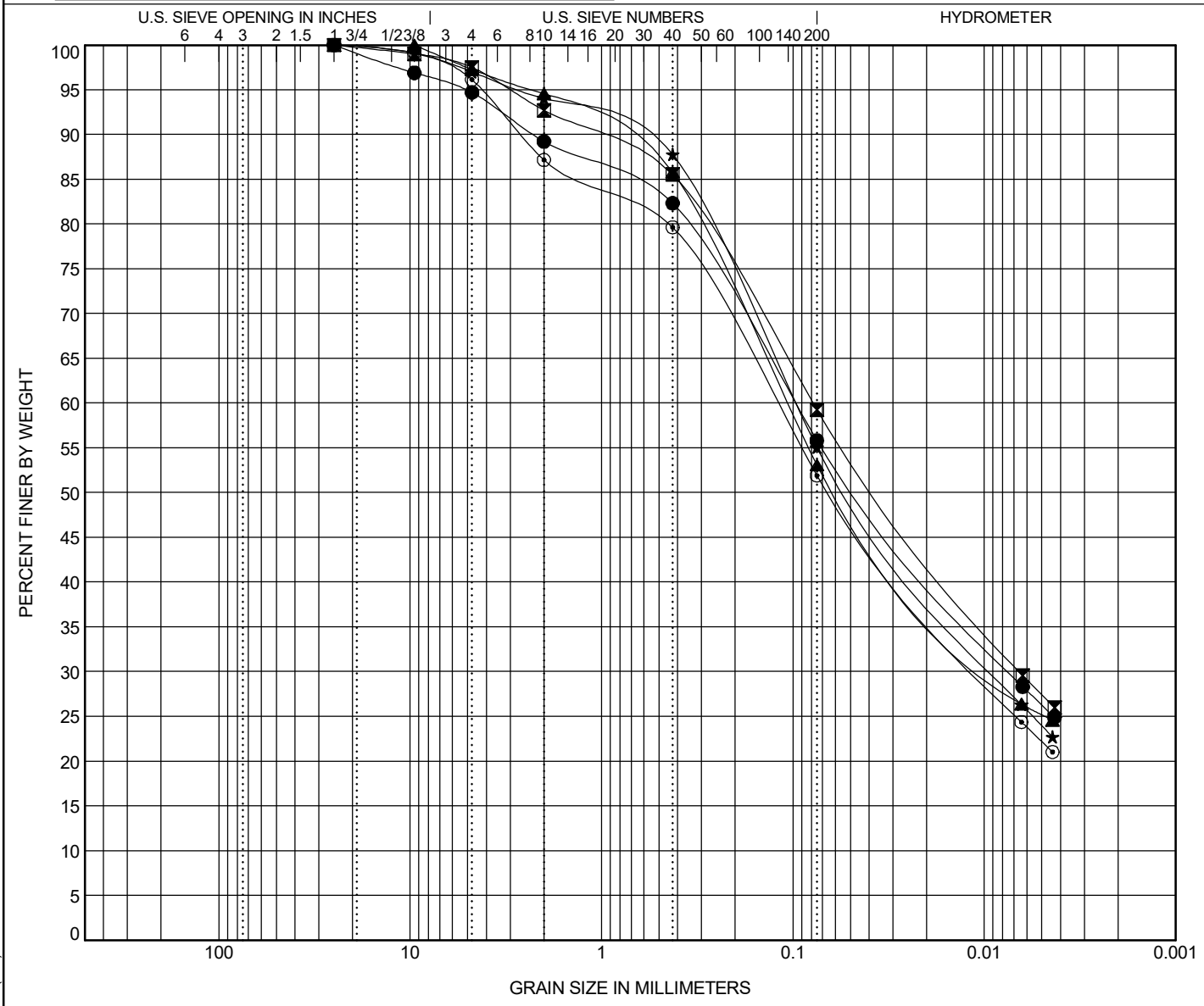
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GRAIN SIZE DISTRIBUTION

NDDOT North Dakota Department of Transportation
NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **LOCATION** Burleigh County

PCN 23811



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	**LSS - 23811-1**	**2.0**	**A-7-6 (10)**	**CL**	**42**	**19**	**23**		
⊠	**LSS - 23811-2**	**2.0**	**A-7-6 (11)**	**CL**	**43**	**19**	**24**		
▲	**LSS - 23811-3**	**2.0**	**A-6 (8)**	**CL**	**38**	**17**	**21**		
★	**LSS - 23811-4**	**2.0**	**A-6 (8)**	**CL**	**39**	**18**	**21**		
⊙	**LSS - 23811-5**	**2.0**	**A-6 (6)**	**CL**	**36**	**17**	**19**		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**LSS - 23811-1**	**2.0**	**25**	**0.099**	**0.007**		**5.3**	**38.9**	**55.8**	
⊠	**LSS - 23811-2**	**2.0**	**25**	**0.079**	**0.007**		**2.5**	**38.2**	**59.3**	
▲	**LSS - 23811-3**	**2.0**	**9.5**	**0.108**	**0.009**		**2.7**	**44.2**	**53.1**	
★	**LSS - 23811-4**	**2.0**	**25**	**0.098**	**0.009**		**3.0**	**42.0**	**55.0**	
⊙	**LSS - 23811-5**	**2.0**	**25**	**0.124**	**0.011**		**3.9**	**44.2**	**51.9**	

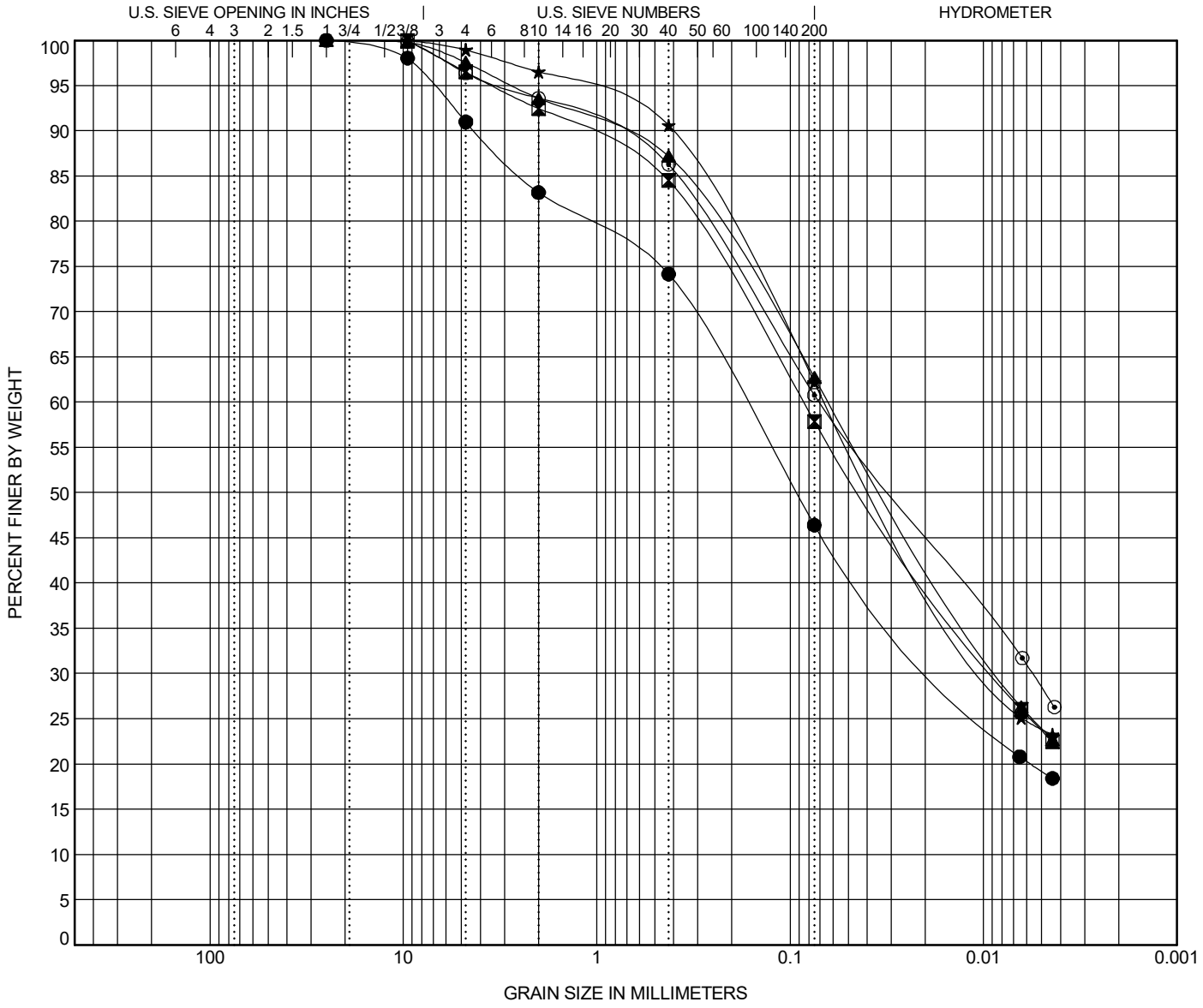
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NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **LOCATION** Burleigh County

PCN 23811



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	**LSS - 23811-6**	**2.0**	**A-6 (5)**	**SC**	**35**	**16**	**19**		
⊠	**LSS - 23811-7**	**2.0**	**A-6 (9)**	**CL**	**38**	**18**	**20**		
▲	**LSS - 23811-8**	**2.0**	**A-6 (11)**	**CL**	**40**	**18**	**22**		
★	**LSS - 23811-9**	**2.0**	**A-6 (10)**	**CL**	**37**	**17**	**20**		
⊙	**LSS - 23811-10**	**2.0**	**A-7-6 (12)**	**CL**	**43**	**18**	**25**		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**LSS - 23811-6**	**2.0**	**25**	**0.175**	**0.016**		**9.0**	**44.6**	**46.4**	
⊠	**LSS - 23811-7**	**2.0**	**9.5**	**0.086**	**0.009**		**3.5**	**38.7**	**57.8**	
▲	**LSS - 23811-8**	**2.0**	**25**	**0.062**	**0.008**		**2.4**	**34.8**	**62.7**	
★	**LSS - 23811-9**	**2.0**	**9.5**	**0.065**	**0.009**		**1.1**	**36.8**	**62.2**	
⊙	**LSS - 23811-10**	**2.0**	**25**	**0.07**	**0.006**		**3.6**	**35.6**	**60.8**	

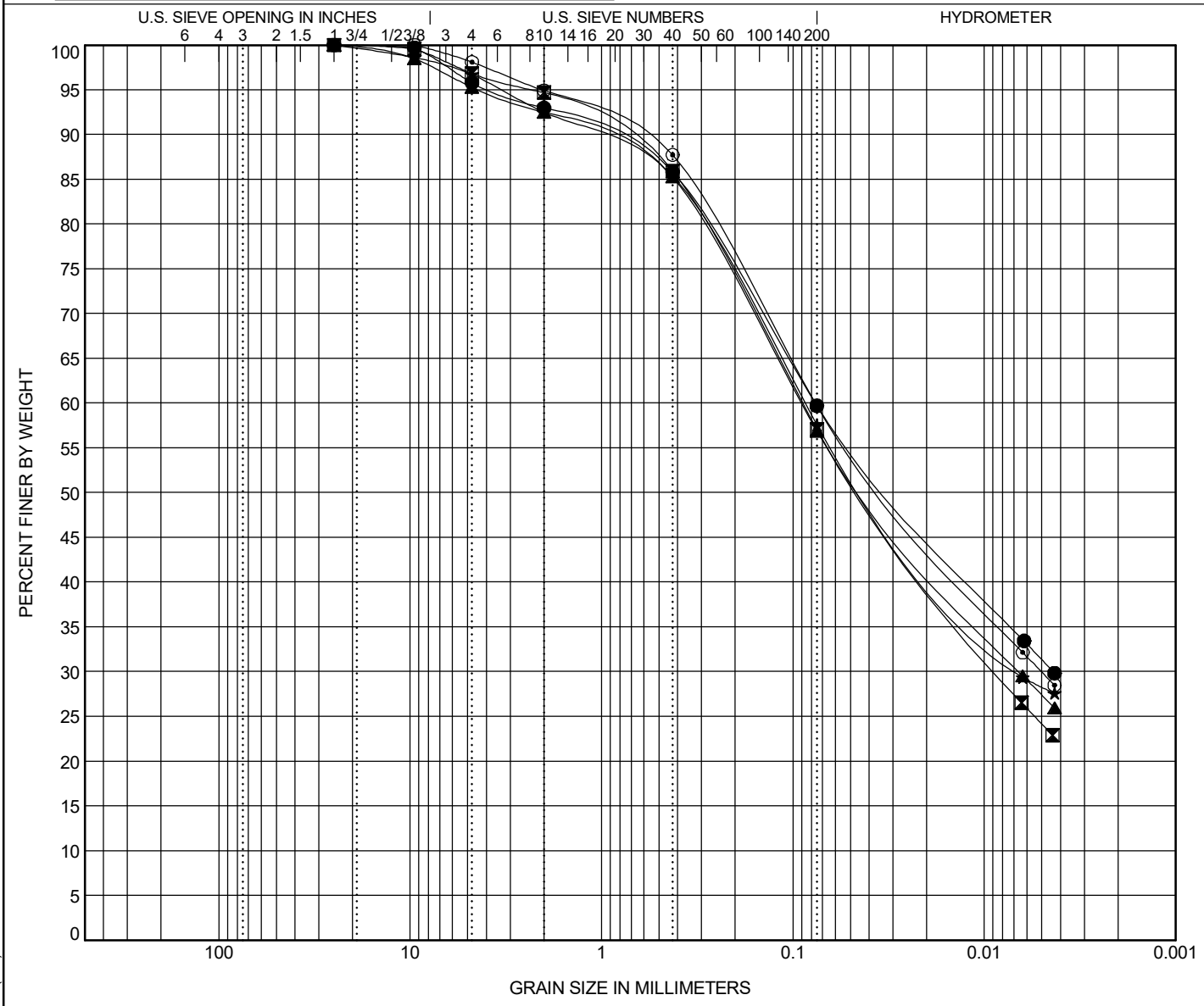
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GRAIN SIZE DISTRIBUTION

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

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **LOCATION** Burleigh County

PCN 23811



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	**LSS - 23811-11**	**2.0**	**A-7-6 (13)**	**CL**	**45**	**19**	**26**		
⊠	**LSS - 23811-12**	**2.0**	**A-6 (9)**	**CL**	**38**	**17**	**21**		
▲	**LSS - 23811-13**	**2.0**	**A-7-6 (11)**	**CL**	**42**	**18**	**24**		
★	**LSS - 23811-14**	**2.0**	**A-7-6 (11)**	**CL**	**43**	**18**	**25**		
⊙	**LSS - 23811-15**	**2.0**	**A-7-6 (13)**	**CL**	**45**	**18**	**27**		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**LSS - 23811-11**	**2.0**	**25**	**0.077**	**0.004**		**4.2**	**36.1**	**59.7**	
⊠	**LSS - 23811-12**	**2.0**	**25**	**0.09**	**0.008**		**3.2**	**39.8**	**57.0**	
▲	**LSS - 23811-13**	**2.0**	**25**	**0.091**	**0.007**		**4.7**	**38.4**	**56.9**	
★	**LSS - 23811-14**	**2.0**	**25**	**0.087**	**0.007**		**3.3**	**39.1**	**57.6**	
⊙	**LSS - 23811-15**	**2.0**	**9.5**	**0.077**	**0.005**		**1.9**	**38.4**	**59.7**	

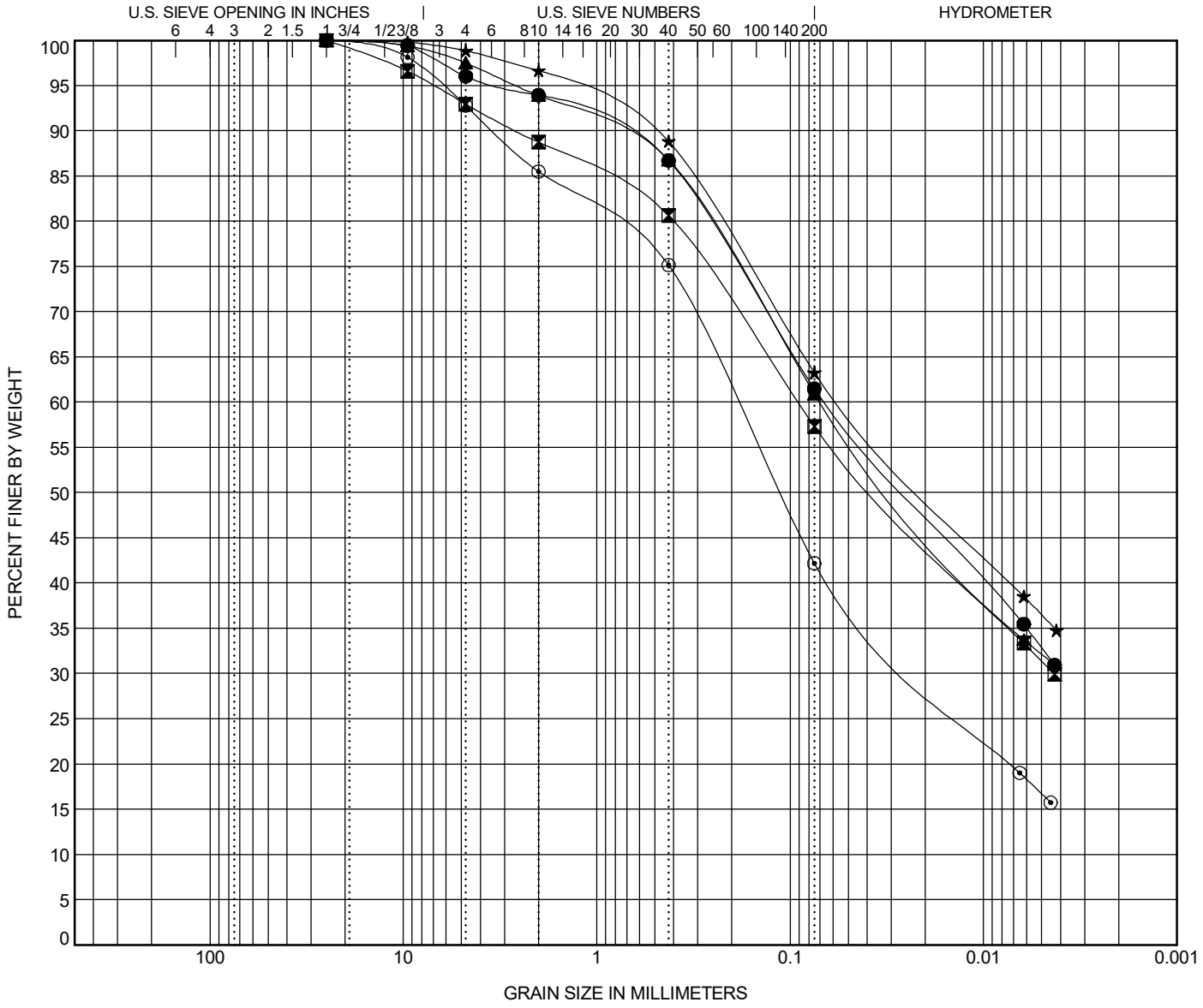
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GRAIN SIZE DISTRIBUTION

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

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **LOCATION** Burleigh County

PCN 23811



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	**LSS - 23811-16**	**2.0**	**A-7-6 (15)**	**CL**	**48**	**18**	**30**		
⊠	**LSS - 23811-17**	**2.0**	**A-7-6 (14)**	**CL**	**48**	**18**	**30**		
▲	**LSS - 23811-18**	**2.0**	**A-7-6 (15)**	**CL**	**48**	**19**	**29**		
★	**LSS - 23811-19**	**2.0**	**A-7-6 (16)**	**CL**	**47**	**18**	**29**		
⊙	**LSS - 23811-20**	**2.0**	**A-6 (3)**	**SC**	**33**	**17**	**16**		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**LSS - 23811-16**	**2.0**	**25**	**0.065**			**4.0**	**34.6**	**61.5**	
⊠	**LSS - 23811-17**	**2.0**	**25**	**0.092**	**0.004**		**7.0**	**35.7**	**57.3**	
▲	**LSS - 23811-18**	**2.0**	**25**	**0.069**			**2.5**	**36.6**	**60.9**	
★	**LSS - 23811-19**	**2.0**	**25**	**0.054**			**1.2**	**35.6**	**63.2**	
⊙	**LSS - 23811-20**	**2.0**	**25**	**0.192**	**0.021**		**7.2**	**50.6**	**42.2**	

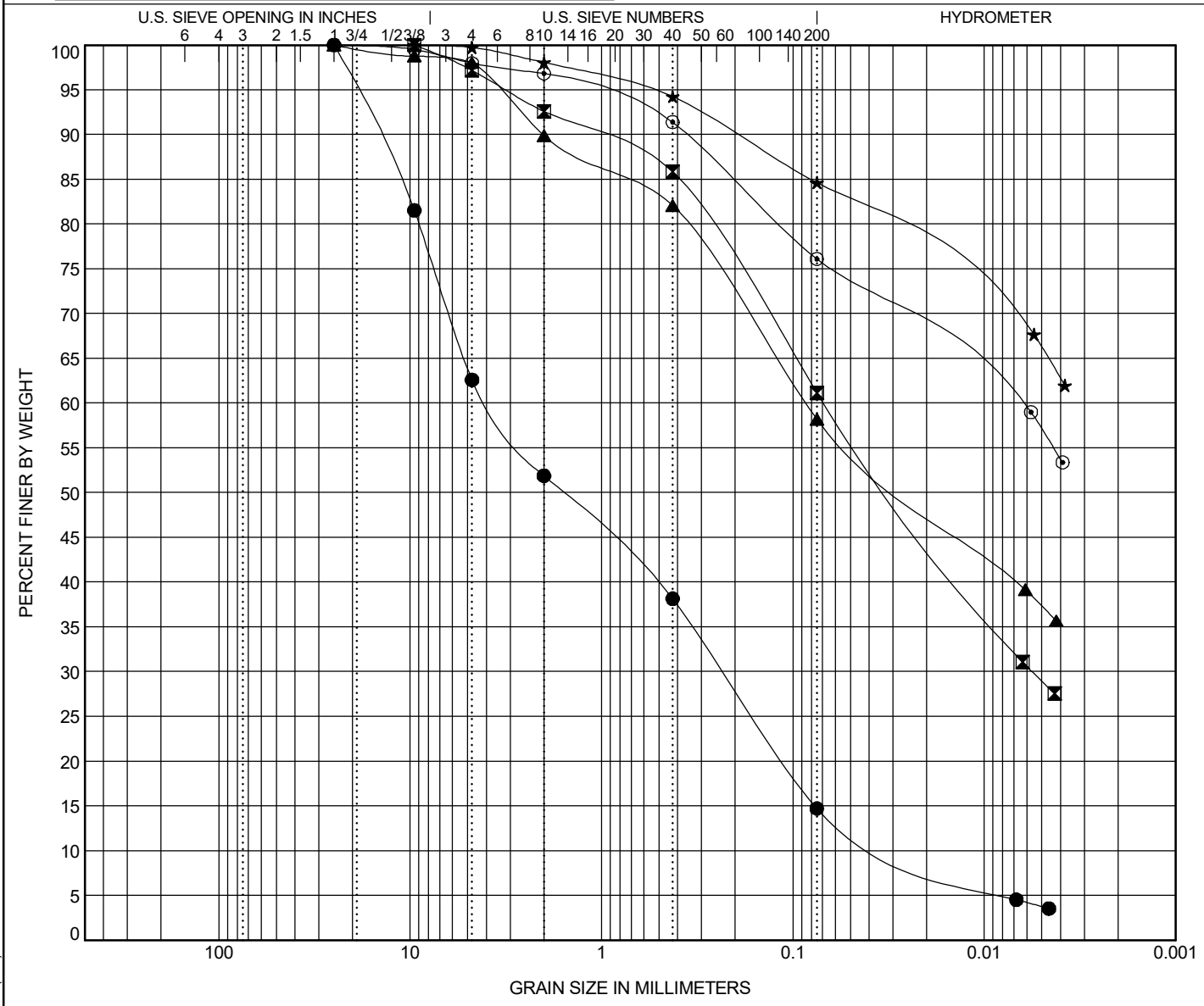
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GRAIN SIZE DISTRIBUTION

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

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **LOCATION** Burleigh County

PCN 23811



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	**LSS - 23811-21**	**2.0**	**A-1-b (0)**	**SM**	**NP**	**NP**	**NP**	**0.57**	**155.25**
⊠	**LSS - 23811-22**	**2.0**	**A-6 (11)**	**CL**	**40**	**17**	**23**		
▲	**LSS - 23811-23**	**2.0**	**A-7-6 (15)**	**CH**	**50**	**19**	**31**		
★	**LSS - 23811-24**	**2.0**	**A-7-6 (44)**	**CH**	**70**	**22**	**48**		
⊙	**LSS - 23811-25**	**2.0**	**A-7-6 (32)**	**CH**	**62**	**21**	**41**		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**LSS - 23811-21**	**2.0**	**25**	**3.856**	**0.233**	**0.025**	**37.4**	**47.9**	**14.7**	
⊠	**LSS - 23811-22**	**2.0**	**9.5**	**0.068**	**0.006**		**2.8**	**36.0**	**61.2**	
▲	**LSS - 23811-23**	**2.0**	**25**	**0.086**			**2.0**	**39.8**	**58.2**	
★	**LSS - 23811-24**	**2.0**	**9.5**				**0.3**	**15.1**	**84.6**	
⊙	**LSS - 23811-25**	**2.0**	**25**	**0.007**			**2.0**	**21.9**	**76.1**	

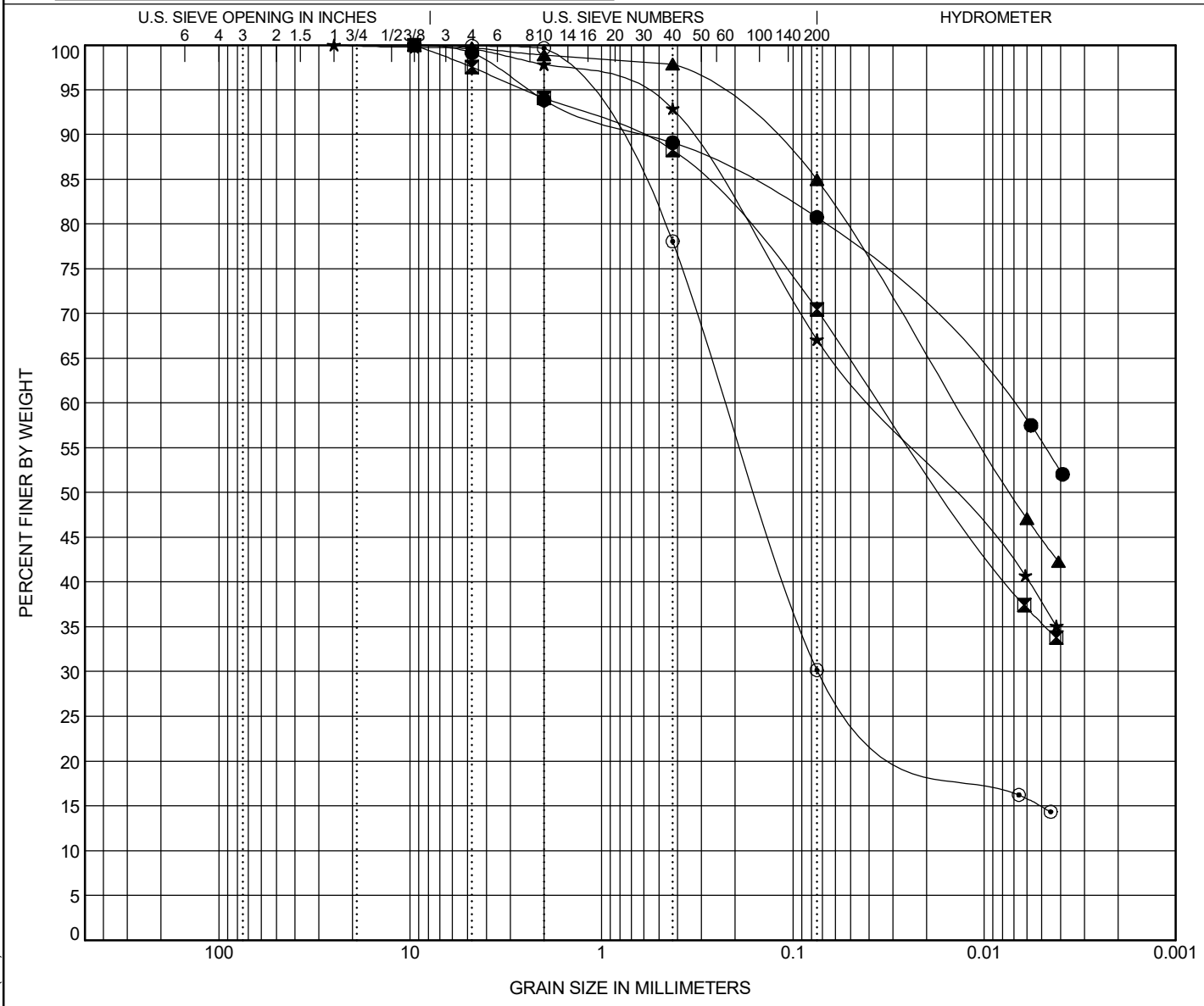
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GRAIN SIZE DISTRIBUTION

NDDOT North Dakota Department of Transportation
NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **LOCATION** Burleigh County

PCN 23811



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	**LSS - 23811-26**	**2.0**	**A-7-6 (33)**	**CH**	**60**	**21**	**39**		
⊠	**LSS - 23811-27**	**2.0**	**A-7-6 (18)**	**CL**	**45**	**17**	**28**		
▲	**LSS - 23811-28**	**2.0**	**A-7-6 (26)**	**CL**	**48**	**18**	**30**		
★	**LSS - 23811-29**	**2.0**	**A-7-6 (14)**	**CL**	**41**	**17**	**24**		
⊙	**LSS - 23811-30**	**2.0**	**A-2-6 (0)**	**SC**	**26**	**13**	**13**		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**LSS - 23811-26**	**2.0**	**9.5**	**0.008**			**0.9**	**18.4**	**80.8**	
⊠	**LSS - 23811-27**	**2.0**	**9.5**	**0.034**			**2.5**	**27.1**	**70.4**	
▲	**LSS - 23811-28**	**2.0**	**9.5**	**0.014**			**0.3**	**14.7**	**85.0**	
★	**LSS - 23811-29**	**2.0**	**25**	**0.038**			**0.5**	**32.5**	**67.1**	
⊙	**LSS - 23811-30**	**2.0**	**9.5**	**0.221**	**0.073**		**0.1**	**69.7**	**30.2**	

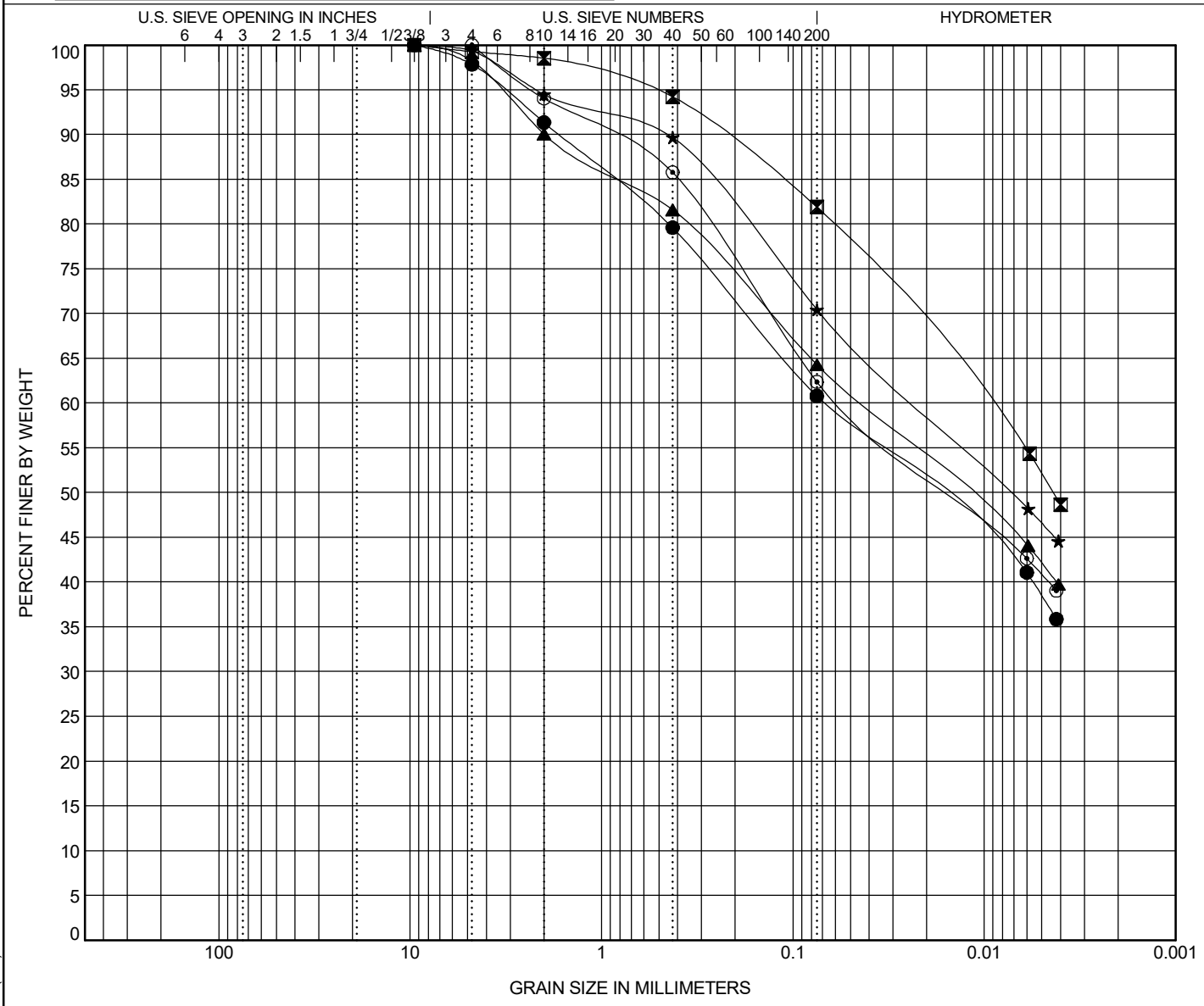
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GRAIN SIZE DISTRIBUTION

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

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **LOCATION** Burleigh County

PCN 23811



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	**LSS - 23811-31**	**2.0**	**A-7-6 (17)**	**CH**	**50**	**17**	**33**		
⊠	**LSS - 23811-32**	**2.0**	**A-7-6 (31)**	**CH**	**56**	**19**	**37**		
▲	**LSS - 23811-33**	**2.0**	**A-7-6 (18)**	**CH**	**50**	**18**	**32**		
★	**LSS - 23811-34**	**2.0**	**A-7-6 (16)**	**CH**	**50**	**27**	**23**		
⊙	**LSS - 23811-35**	**2.0**	**A-7-6 (16)**	**CL**	**46**	**16**	**30**		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**LSS - 23811-31**	**2.0**	**9.5**	**0.068**			**2.2**	**37.0**	**60.8**	
⊠	**LSS - 23811-32**	**2.0**	**9.5**	**0.01**			**0.7**	**17.4**	**81.9**	
▲	**LSS - 23811-33**	**2.0**	**9.5**	**0.044**			**1.8**	**34.0**	**64.3**	
★	**LSS - 23811-34**	**2.0**	**9.5**	**0.023**			**0.6**	**28.9**	**70.4**	
⊙	**LSS - 23811-35**	**2.0**	**4.75**	**0.055**			**0.0**	**37.6**	**62.4**	

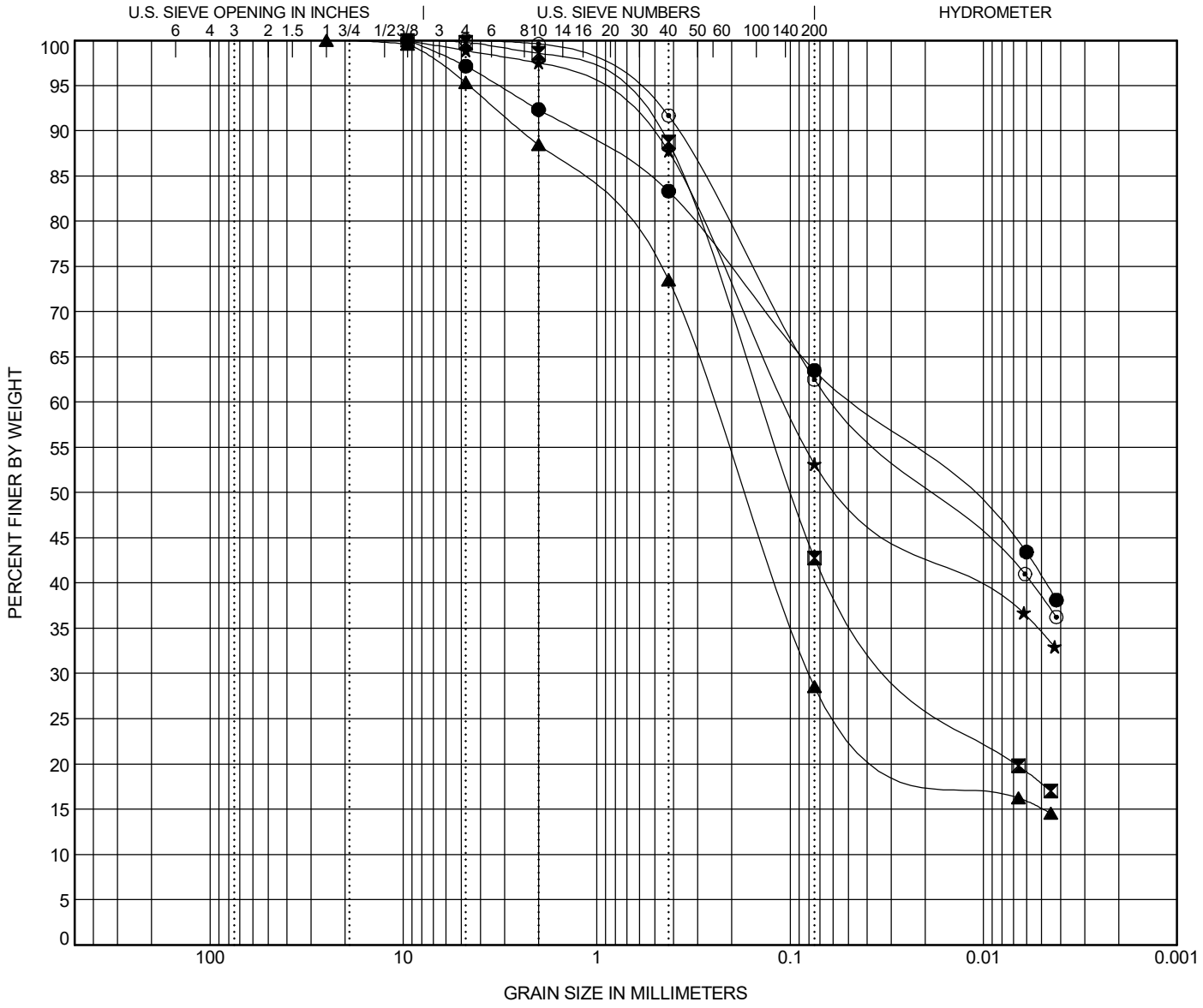
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NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **LOCATION** Burleigh County

PCN 23811



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	**LSS - 23811-36**	**2.0**	**A-7-6 (17)**	**CL**	**48**	**17**	**31**		
⊠	**LSS - 23811-37**	**2.0**	**A-6 (2)**	**SC**	**28**	**14**	**14**		
▲	**LSS - 23811-38**	**2.0**	**A-2-6 (0)**	**SC**	**24**	**13**	**11**		
★	**LSS - 23811-39**	**2.0**	**A-6 (8)**	**CL**	**39**	**16**	**23**		
⊙	**LSS - 23811-40**	**2.0**	**A-7-6 (13)**	**CL**	**42**	**17**	**25**		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**LSS - 23811-36**	**2.0**	**9.5**	**0.048**			**2.9**	**33.6**	**63.5**	
⊠	**LSS - 23811-37**	**2.0**	**9.5**	**0.144**	**0.019**		**0.2**	**57.0**	**42.8**	
▲	**LSS - 23811-38**	**2.0**	**25**	**0.252**	**0.079**		**4.7**	**66.8**	**28.5**	
★	**LSS - 23811-39**	**2.0**	**9.5**	**0.106**			**1.1**	**45.7**	**53.1**	
⊙	**LSS - 23811-40**	**2.0**	**4.75**	**0.056**			**0.0**	**37.5**	**62.5**	

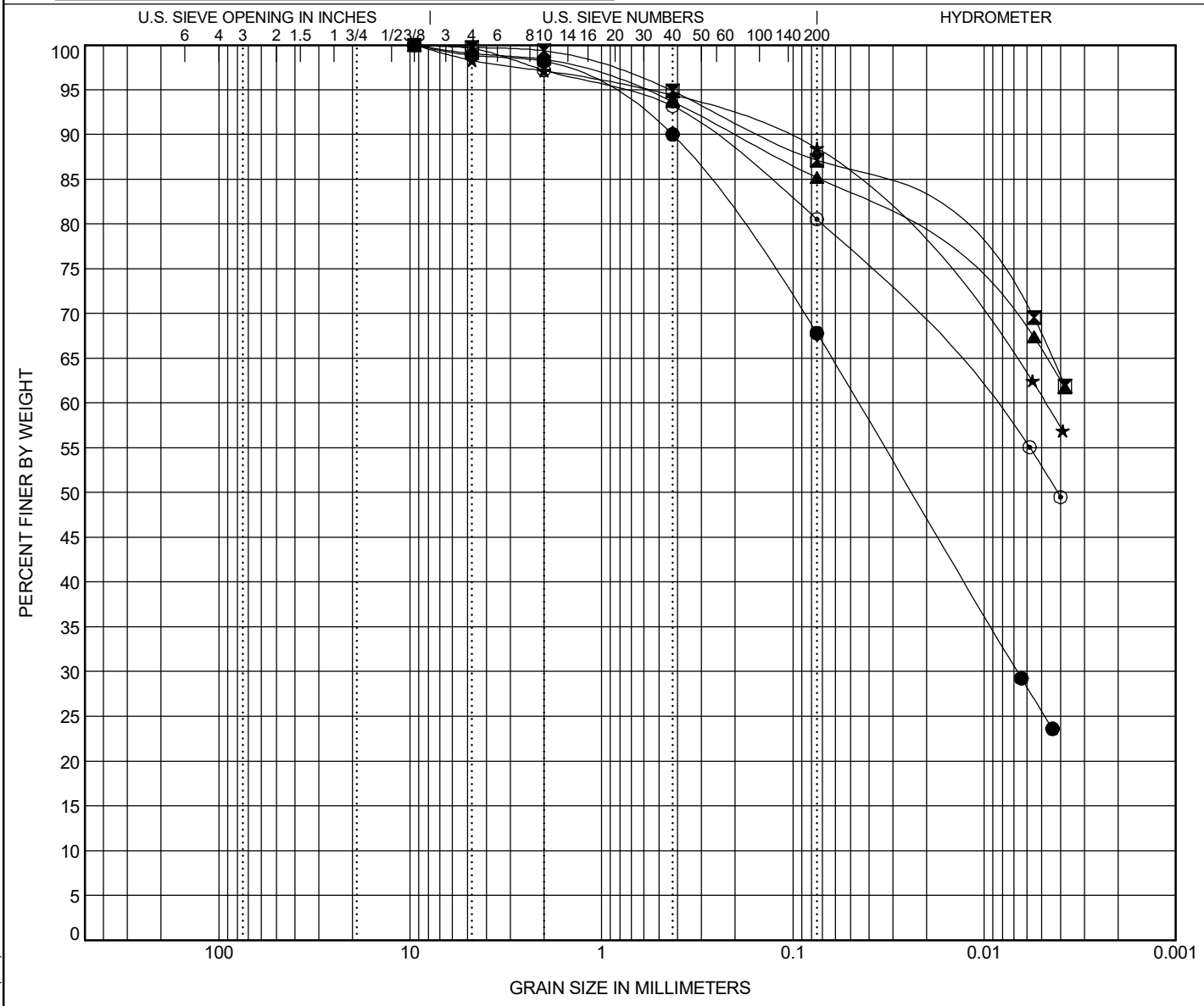
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300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **LOCATION** Burleigh County

PCN 23811



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
●	**LSS - 23811-41**	**2.0**	**A-7-6 (19)**	**CL**	**48**	**17**	**31**		
⊠	**LSS - 23811-42**	**2.0**	**A-7-6 (46)**	**CH**	**70**	**22**	**48**		
▲	**LSS - 23811-43**	**2.0**	**A-7-6 (38)**	**CH**	**63**	**21**	**42**		
★	**LSS - 23811-44**	**2.0**	**A-7-6 (36)**	**CH**	**60**	**22**	**38**		
⊙	**LSS - 23811-45**	**2.0**	**A-7-6 (30)**	**CH**	**55**	**19**	**36**		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**LSS - 23811-41**	**2.0**	**9.5**	**0.046**	**0.007**		**1.1**	**31.1**	**67.8**	
⊠	**LSS - 23811-42**	**2.0**	**9.5**				**0.3**	**12.6**	**87.1**	
▲	**LSS - 23811-43**	**2.0**	**9.5**				**0.9**	**13.9**	**85.2**	
★	**LSS - 23811-44**	**2.0**	**9.5**	**0.005**			**1.7**	**9.8**	**88.5**	
⊙	**LSS - 23811-45**	**2.0**	**9.5**	**0.01**			**0.3**	**19.1**	**80.5**	

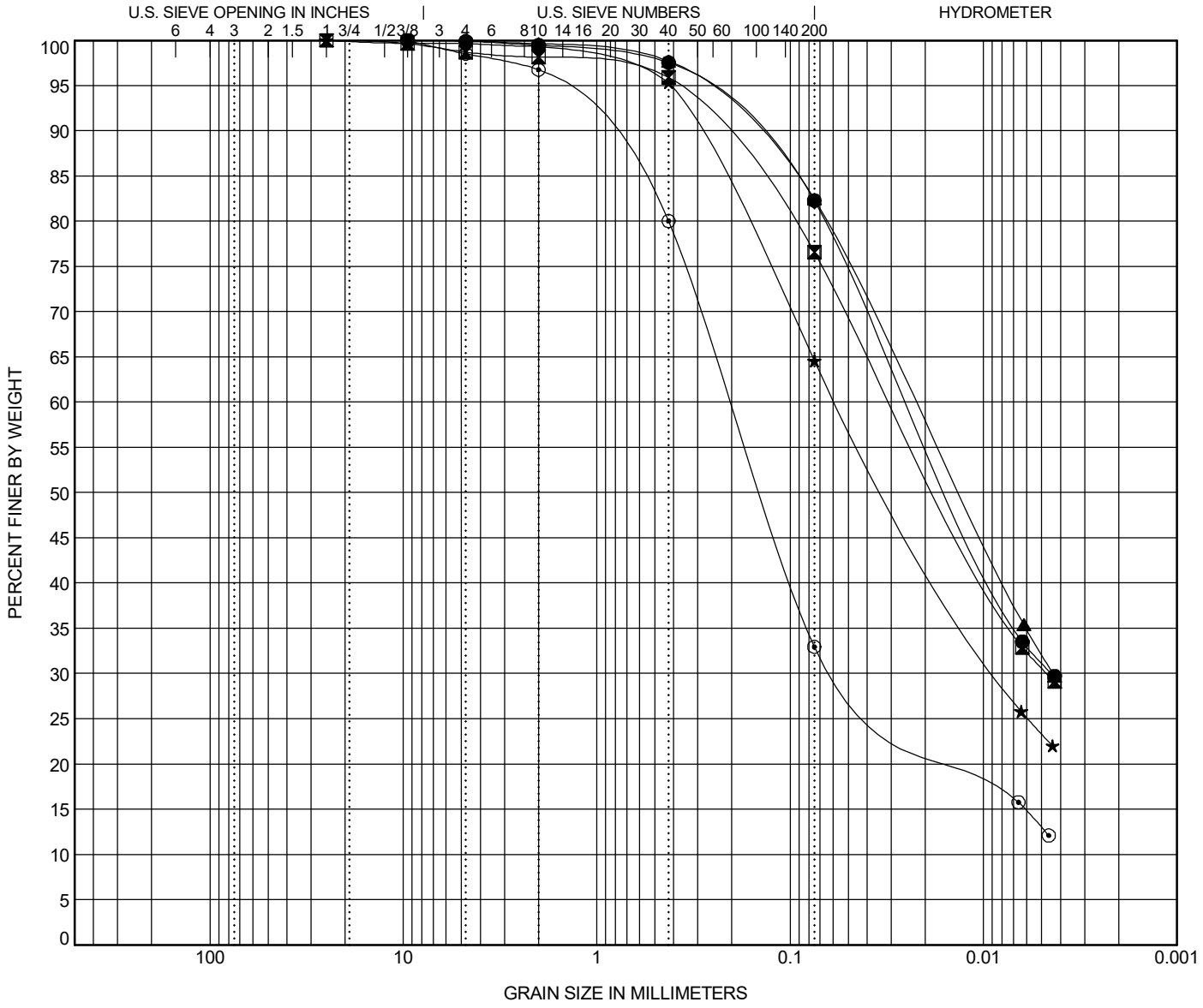
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300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **LOCATION** Burleigh County

PCN 23811



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
● LSS - 23811-46	2.0	A-6 (17)	CL	40	18	22		
⊠ LSS - 23811-47	2.0	A-6 (14)	CL	37	17	20		
▲ LSS - 23811-48	2.0	A-6 (16)	CL	38	17	21		
★ LSS - 23811-49	2.0	A-6 (7)	CL	32	17	15		
⊙ LSS - 23811-50	2.0	A-2-4 (0)	SC	24	14	10		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● LSS - 23811-46	2.0	9.5	0.024	0.004		0.1	17.6	82.3	
⊠ LSS - 23811-47	2.0	25	0.029	0.005		1.3	22.1	76.6	
▲ LSS - 23811-48	2.0	4.75	0.023	0.004		0.0	17.5	82.5	
★ LSS - 23811-49	2.0	25	0.056	0.008		0.4	35.1	64.6	
⊙ LSS - 23811-50	2.0	9.5	0.203	0.049		1.5	65.6	32.9	

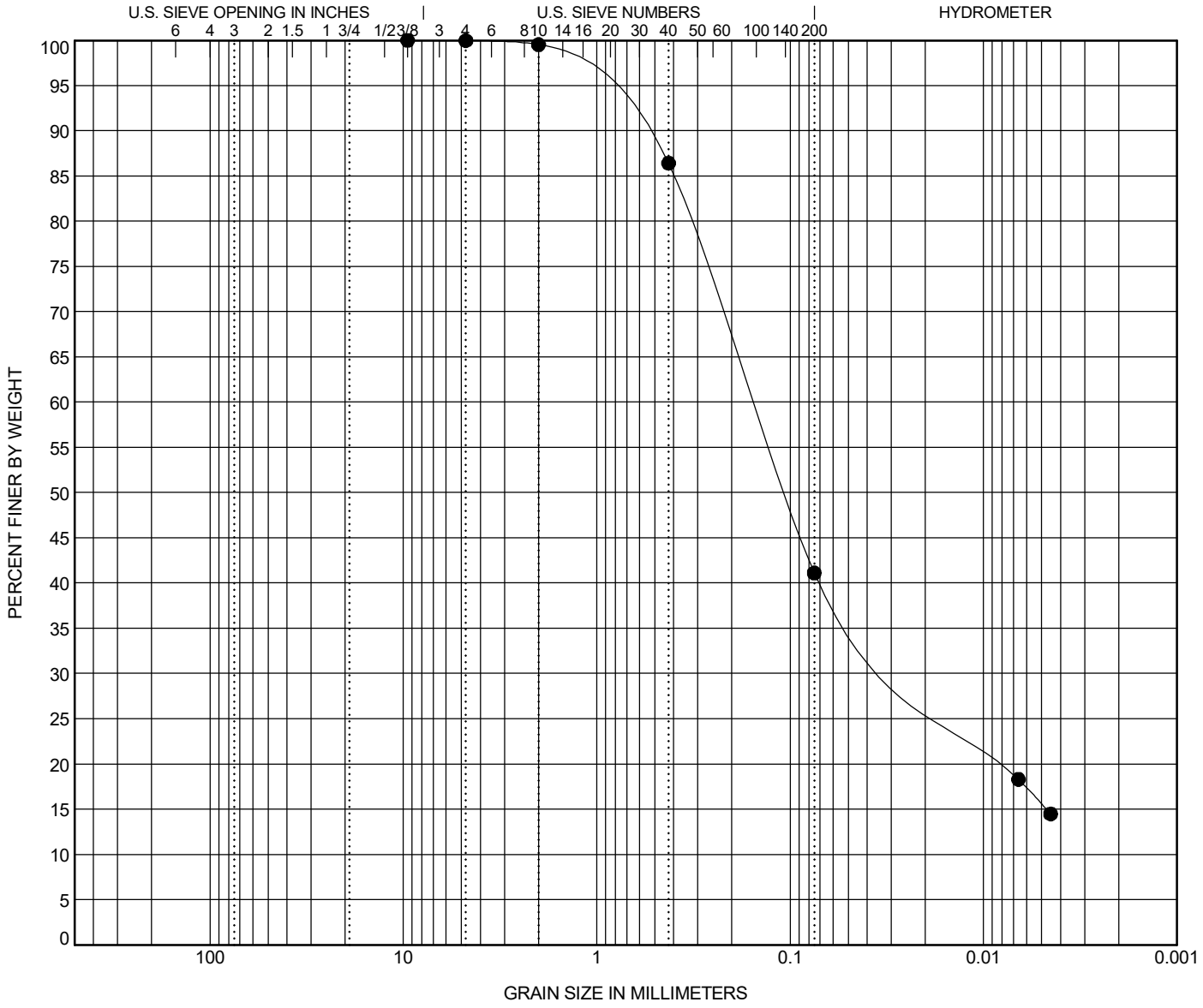
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300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **LOCATION** Burleigh County

PCN 23811



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	AASHTO Classification	USCS Classification	LL	PL	PI	Cc	Cu
● **LSS - 23811-51**	**2.0**	**A-6 (1)**	**SC**	**26**	**14**	**12**		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **LSS - 23811-51**	**2.0**	**9.5**	**0.155**	**0.023**		**0.0**	**58.9**	**41.1**	

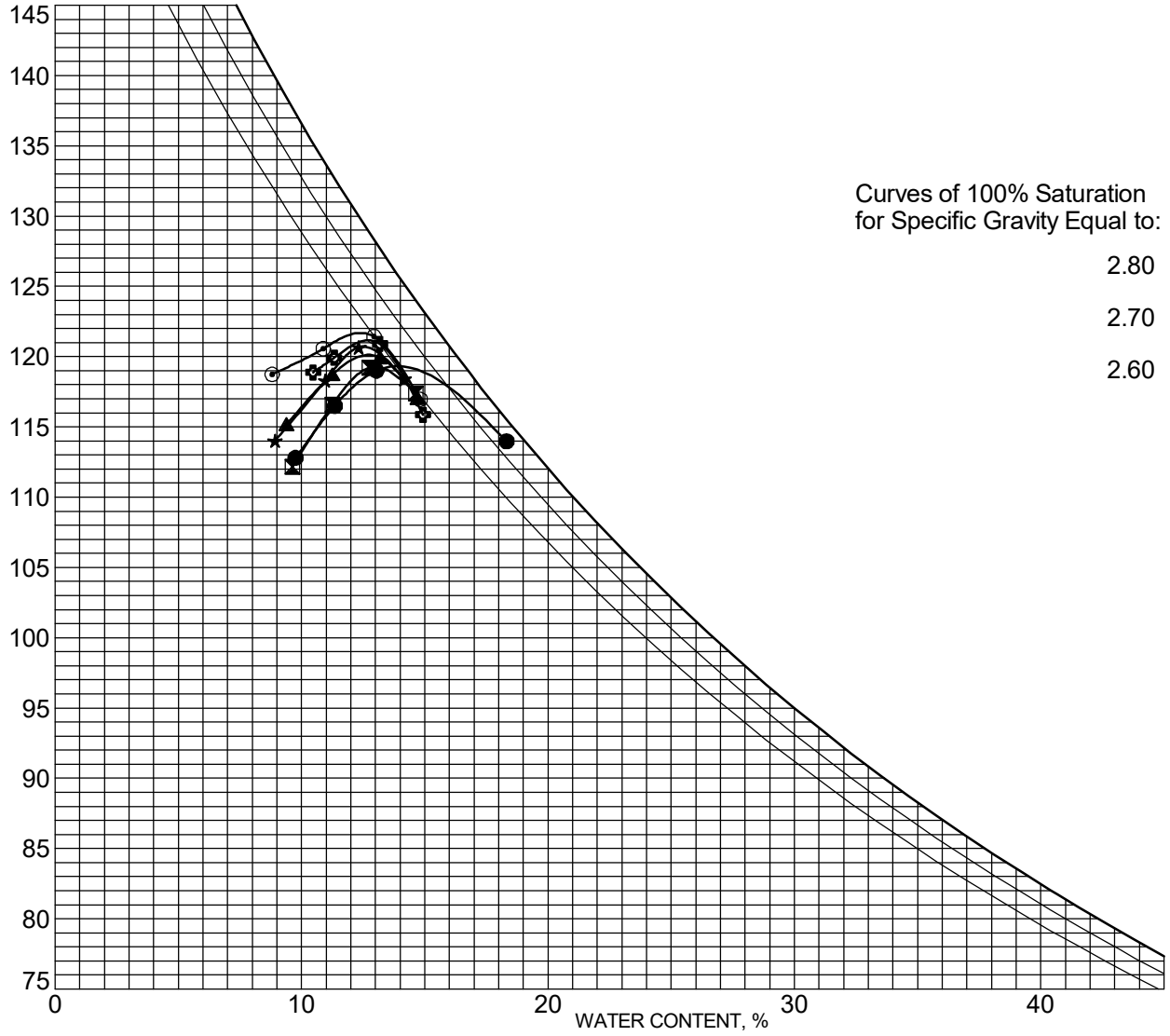
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MOISTURE-DENSITY RELATIONSHIP

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

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **LOCATION** Burleigh County

PCN 23811



BOREHOLE		DEPTH	AASHTO Classification	USCS Description
●	LSS - 23811-1	2.0	A-7-6 (10)	SANDY LEAN CLAY(CL)
⊠	LSS - 23811-2	2.0	A-7-6 (11)	SANDY LEAN CLAY(CL)
▲	LSS - 23811-3	2.0	A-6 (8)	SANDY LEAN CLAY(CL)
★	LSS - 23811-4	2.0	A-6 (8)	SANDY LEAN CLAY(CL)
⊙	LSS - 23811-5	2.0	A-6 (6)	SANDY LEAN CLAY(CL)
✿	LSS - 23811-6	2.0	A-6 (5)	CLAYEY SAND(SC)

BOREHOLE		DEPTH	Test Method	LL	PL	PI	Max DD	Optimum WC
●	LSS - 23811-1	2.0	AASHTO T-180 Method A	42	19	23	119.3 PCF	13.9 %
⊠	LSS - 23811-2	2.0	AASHTO T-180 Method A	43	19	24	119.3 PCF	12.9 %
▲	LSS - 23811-3	2.0	AASHTO T-180 Method A	38	17	21	120.1 PCF	12.8 %
★	LSS - 23811-4	2.0	AASHTO T-180 Method A	39	18	21	120.7 PCF	12.5 %
⊙	LSS - 23811-5	2.0	AASHTO T-180 Method A	36	17	19	121.7 PCF	12.4 %
✿	LSS - 23811-6	2.0	AASHTO T-180 Method A	35	16	19	121.2 PCF	12.7 %

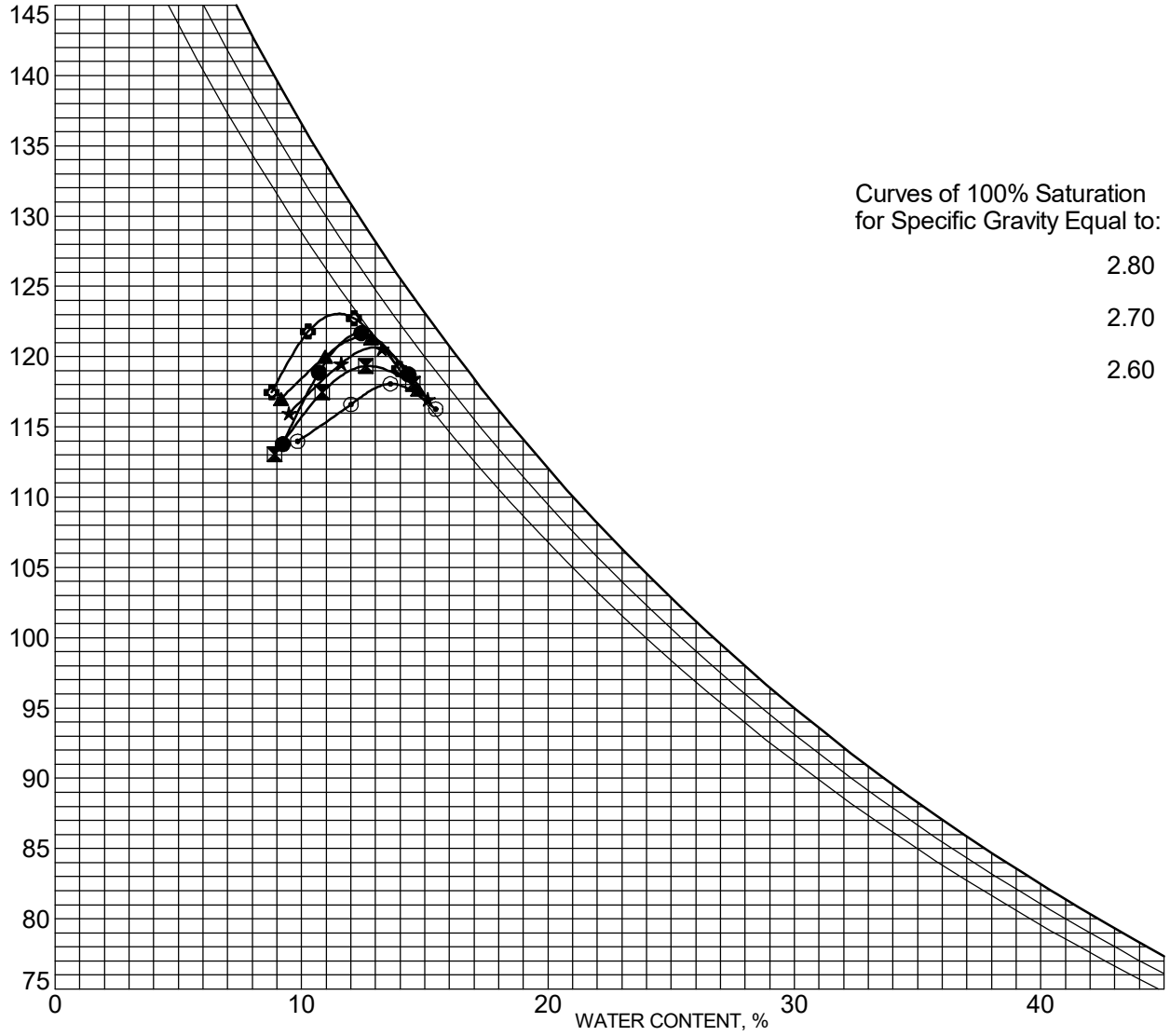
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MOISTURE-DENSITY RELATIONSHIP

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

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **LOCATION** Burleigh County

PCN 23811



BOREHOLE		DEPTH	AASHTO Classification	USCS Description
●	LSS - 23811-7	2.0	A-6 (9)	SANDY LEAN CLAY(CL)
⊠	LSS - 23811-8	2.0	A-6 (11)	SANDY LEAN CLAY(CL)
▲	LSS - 23811-9	2.0	A-6 (10)	SANDY LEAN CLAY(CL)
★	LSS - 23811-10	2.0	A-7-6 (12)	SANDY LEAN CLAY(CL)
⊙	LSS - 23811-11	2.0	A-7-6 (13)	SANDY LEAN CLAY(CL)
✪	LSS - 23811-12	2.0	A-6 (9)	SANDY LEAN CLAY(CL)

BOREHOLE		DEPTH	Test Method	LL	PL	PI	Max DD	Optimum WC
●	LSS - 23811-7	2.0	AASHTO T-180 Method A	38	18	20	121.7 PCF	12.4 %
⊠	LSS - 23811-8	2.0	AASHTO T-180 Method A	40	18	22	119.3 PCF	12.7 %
▲	LSS - 23811-9	2.0	AASHTO T-180 Method A	37	17	20	121.4 PCF	12.4 %
★	LSS - 23811-10	2.0	AASHTO T-180 Method A	43	18	25	120.6 PCF	12.9 %
⊙	LSS - 23811-11	2.0	AASHTO T-180 Method A	45	19	26	118.1 PCF	13.6 %
✪	LSS - 23811-12	2.0	AASHTO T-180 Method A	38	17	21	123.0 PCF	11.5 %

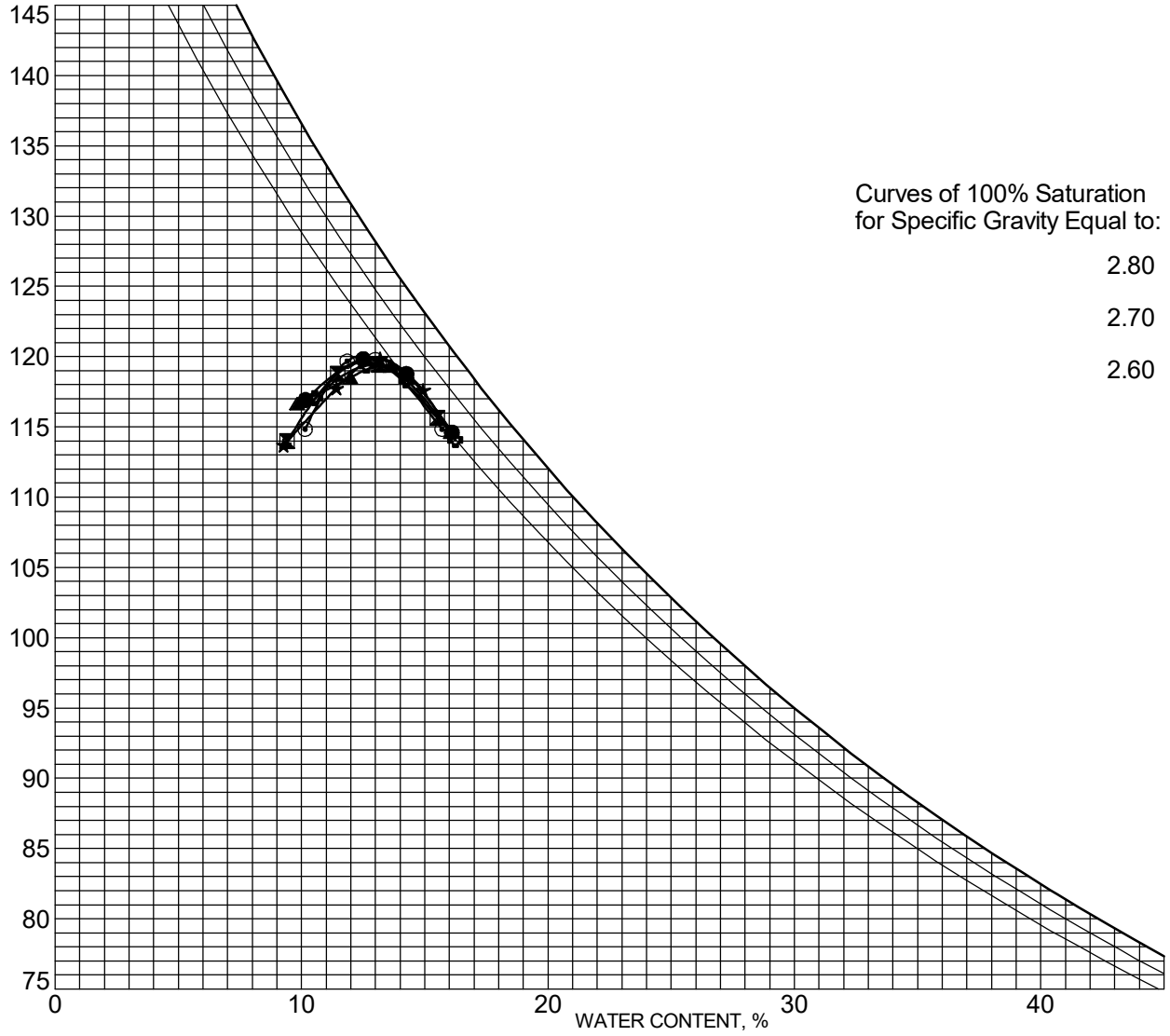
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MOISTURE-DENSITY RELATIONSHIP

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

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **LOCATION** Burleigh County

PCN 23811



BOREHOLE		DEPTH	AASHTO Classification	USCS Description
●	**LSS - 23811-13**	**2.0**	**A-7-6 (11)**	**SANDY LEAN CLAY(CL)**
⊠	**LSS - 23811-14**	**2.0**	**A-7-6 (11)**	**SANDY LEAN CLAY(CL)**
▲	**LSS - 23811-15**	**2.0**	**A-7-6 (13)**	**SANDY LEAN CLAY(CL)**
★	**LSS - 23811-16**	**2.0**	**A-7-6 (15)**	**SANDY LEAN CLAY(CL)**
⊙	**LSS - 23811-17**	**2.0**	**A-7-6 (14)**	**SANDY LEAN CLAY(CL)**
✪	**LSS - 23811-18**	**2.0**	**A-7-6 (15)**	**SANDY LEAN CLAY(CL)**

BOREHOLE		DEPTH	Test Method	LL	PL	PI	Max DD	Optimum WC
●	**LSS - 23811-13**	**2.0**	**AASHTO T-180 Method A**	**42**	**18**	**24**	**119.9 PCF**	**12.9 %**
⊠	**LSS - 23811-14**	**2.0**	**AASHTO T-180 Method A**	**43**	**18**	**25**	**119.6 PCF**	**12.6 %**
▲	**LSS - 23811-15**	**2.0**	**AASHTO T-180 Method A**	**45**	**18**	**27**	**119.4 PCF**	**13.3 %**
★	**LSS - 23811-16**	**2.0**	**AASHTO T-180 Method A**	**48**	**18**	**30**	**119.8 PCF**	**13.2 %**
⊙	**LSS - 23811-17**	**2.0**	**AASHTO T-180 Method A**	**48**	**18**	**30**	**120.0 PCF**	**12.4 %**
✪	**LSS - 23811-18**	**2.0**	**AASHTO T-180 Method A**	**48**	**19**	**29**	**119.4 PCF**	**12.9 %**

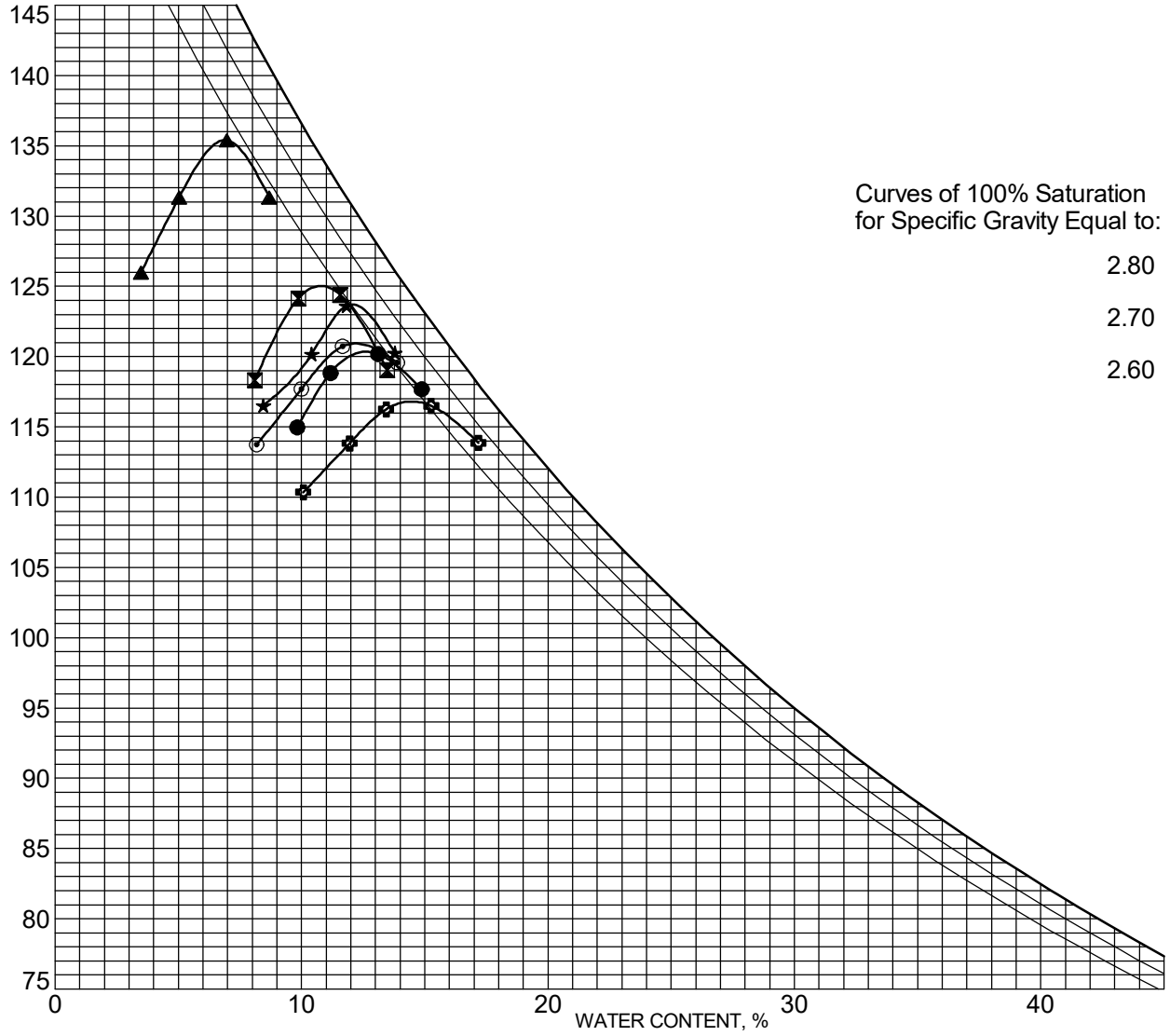
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MOISTURE-DENSITY RELATIONSHIP

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300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **LOCATION** Burleigh County

PCN 23811



BOREHOLE		DEPTH	AASHTO Classification	USCS Description
●	LSS - 23811-19	2.0	A-7-6 (16)	SANDY LEAN CLAY(CL)
⊠	LSS - 23811-20	2.0	A-6 (3)	CLAYEY SAND(SC)
▲	LSS - 23811-21	2.0	A-1-b (0)	SILTY SAND with GRAVEL(SM)
★	LSS - 23811-22	2.0	A-6 (11)	SANDY LEAN CLAY(CL)
⊙	LSS - 23811-23	2.0	A-7-6 (15)	SANDY FAT CLAY(CH)
✿	LSS - 23811-24	2.0	A-7-6 (44)	FAT CLAY with SAND(CH)

BOREHOLE		DEPTH	Test Method	LL	PL	PI	Max DD	Optimum WC
●	LSS - 23811-19	2.0	AASHTO T-180 Method A	47	18	29	120.3 PCF	12.6 %
⊠	LSS - 23811-20	2.0	AASHTO T-180 Method A	33	17	16	125.0 PCF	10.8 %
▲	LSS - 23811-21	2.0	AASHTO T-180 Method A	NP	NP	NP	135.4 PCF	6.9 %
★	LSS - 23811-22	2.0	AASHTO T-180 Method A	40	17	23	123.7 PCF	12.0 %
⊙	LSS - 23811-23	2.0	AASHTO T-180 Method A	50	19	31	120.9 PCF	12.1 %
✿	LSS - 23811-24	2.0	AASHTO T-180 Method A	70	22	48	116.8 PCF	14.5 %

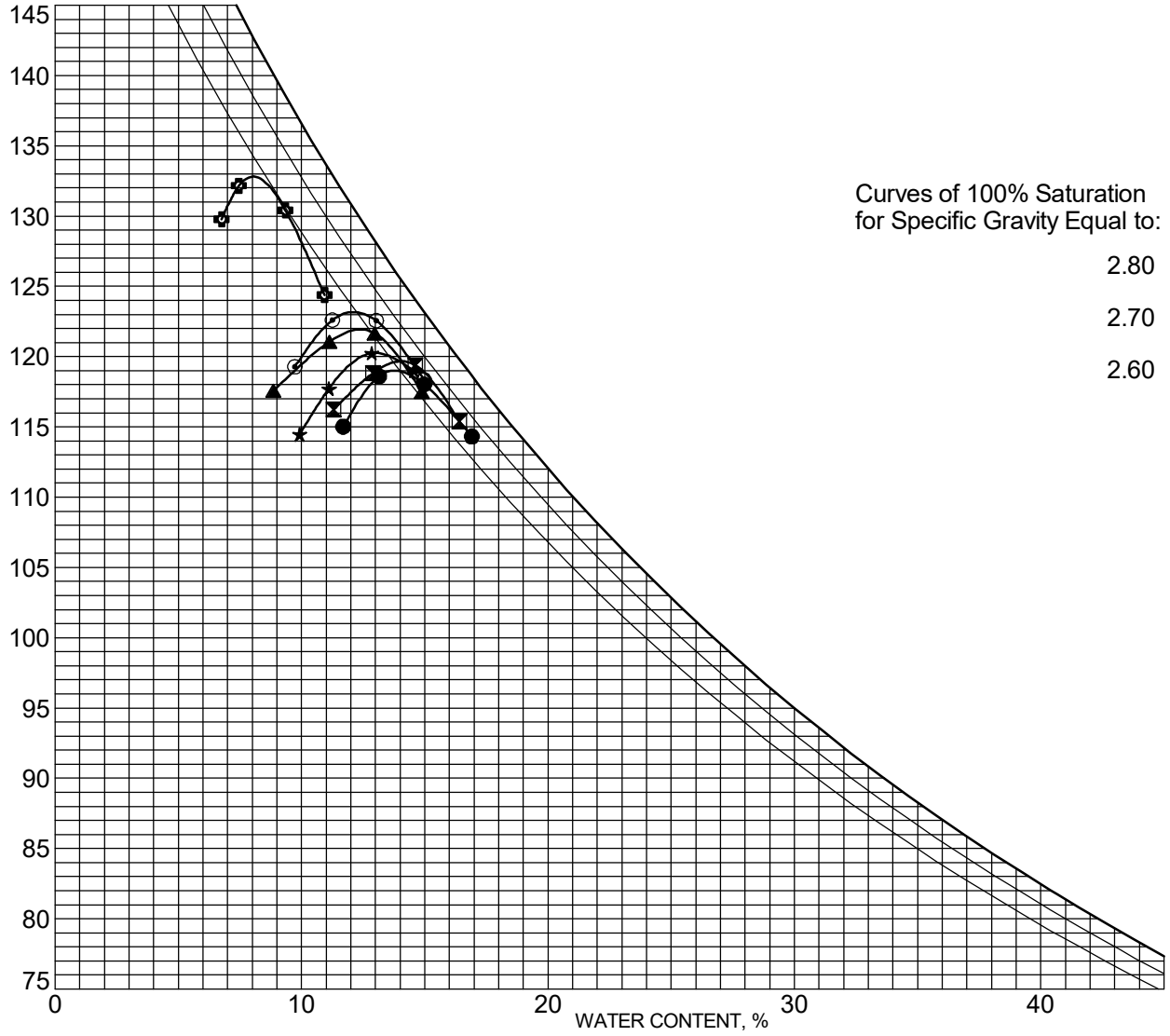
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300 AIRPORT ROAD
BISMARCK, ND 58504

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **LOCATION** Burleigh County

PCN 23811



BOREHOLE		DEPTH	AASHTO Classification	USCS Description
●	LSS - 23811-25	2.0	A-7-6 (32)	FAT CLAY with SAND(CH)
⊠	LSS - 23811-26	2.0	A-7-6 (33)	FAT CLAY with SAND(CH)
▲	LSS - 23811-27	2.0	A-7-6 (18)	LEAN CLAY with SAND(CL)
★	LSS - 23811-28	2.0	A-7-6 (26)	LEAN CLAY with SAND(CL)
⊙	LSS - 23811-29	2.0	A-7-6 (14)	SANDY LEAN CLAY(CL)
✪	LSS - 23811-30	2.0	A-2-6 (0)	CLAYEY SAND(SC)

BOREHOLE		DEPTH	Test Method	LL	PL	PI	Max DD	Optimum WC
●	LSS - 23811-25	2.0	AASHTO T-180 Method A	62	21	41	119.0 PCF	13.8 %
⊠	LSS - 23811-26	2.0	AASHTO T-180 Method A	60	21	39	119.7 PCF	14.1 %
▲	LSS - 23811-27	2.0	AASHTO T-180 Method A	45	17	28	121.9 PCF	12.4 %
★	LSS - 23811-28	2.0	AASHTO T-180 Method A	48	18	30	120.3 PCF	13.0 %
⊙	LSS - 23811-29	2.0	AASHTO T-180 Method A	41	17	24	123.2 PCF	12.1 %
✪	LSS - 23811-30	2.0	AASHTO T-180 Method A	26	13	13	132.8 PCF	8.1 %

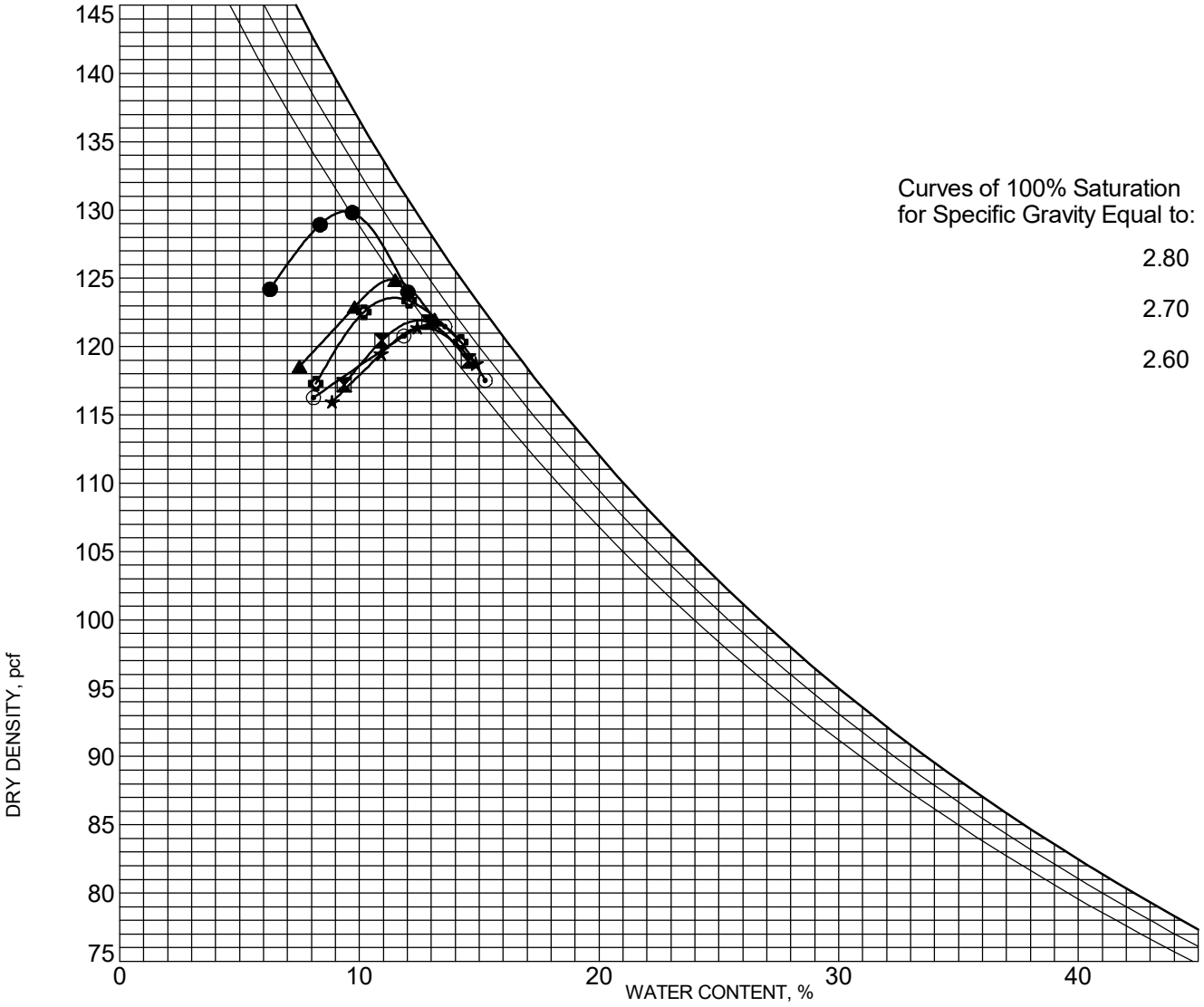
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PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **LOCATION** Burleigh County

PCN 23811



BOREHOLE		DEPTH	AASHTO Classification	USCS Description
●	LSS - 23811-31	2.0	A-7-6 (17)	SANDY FAT CLAY(CH)
⊠	LSS - 23811-32	2.0	A-7-6 (31)	FAT CLAY with SAND(CH)
▲	LSS - 23811-33	2.0	A-7-6 (18)	SANDY FAT CLAY(CH)
★	LSS - 23811-34	2.0	A-7-6 (16)	FAT CLAY with SAND(CH)
⊙	LSS - 23811-35	2.0	A-7-6 (16)	SANDY LEAN CLAY(CL)
✪	LSS - 23811-36	2.0	A-7-6 (17)	SANDY LEAN CLAY(CL)

BOREHOLE		DEPTH	Test Method	LL	PL	PI	Max DD	Optimum WC
●	LSS - 23811-31	2.0	AASHTO T-180 Method A	50	17	33	129.9 PCF	9.4 %
⊠	LSS - 23811-32	2.0	AASHTO T-180 Method A	56	19	37	121.9 PCF	12.5 %
▲	LSS - 23811-33	2.0	AASHTO T-180 Method A	50	18	32	124.9 PCF	11.4 %
★	LSS - 23811-34	2.0	AASHTO T-180 Method A	50	27	23	121.4 PCF	12.7 %
⊙	LSS - 23811-35	2.0	AASHTO T-180 Method A	46	16	30	121.7 PCF	13.1 %
✪	LSS - 23811-36	2.0	AASHTO T-180 Method A	48	17	31	123.6 PCF	11.5 %

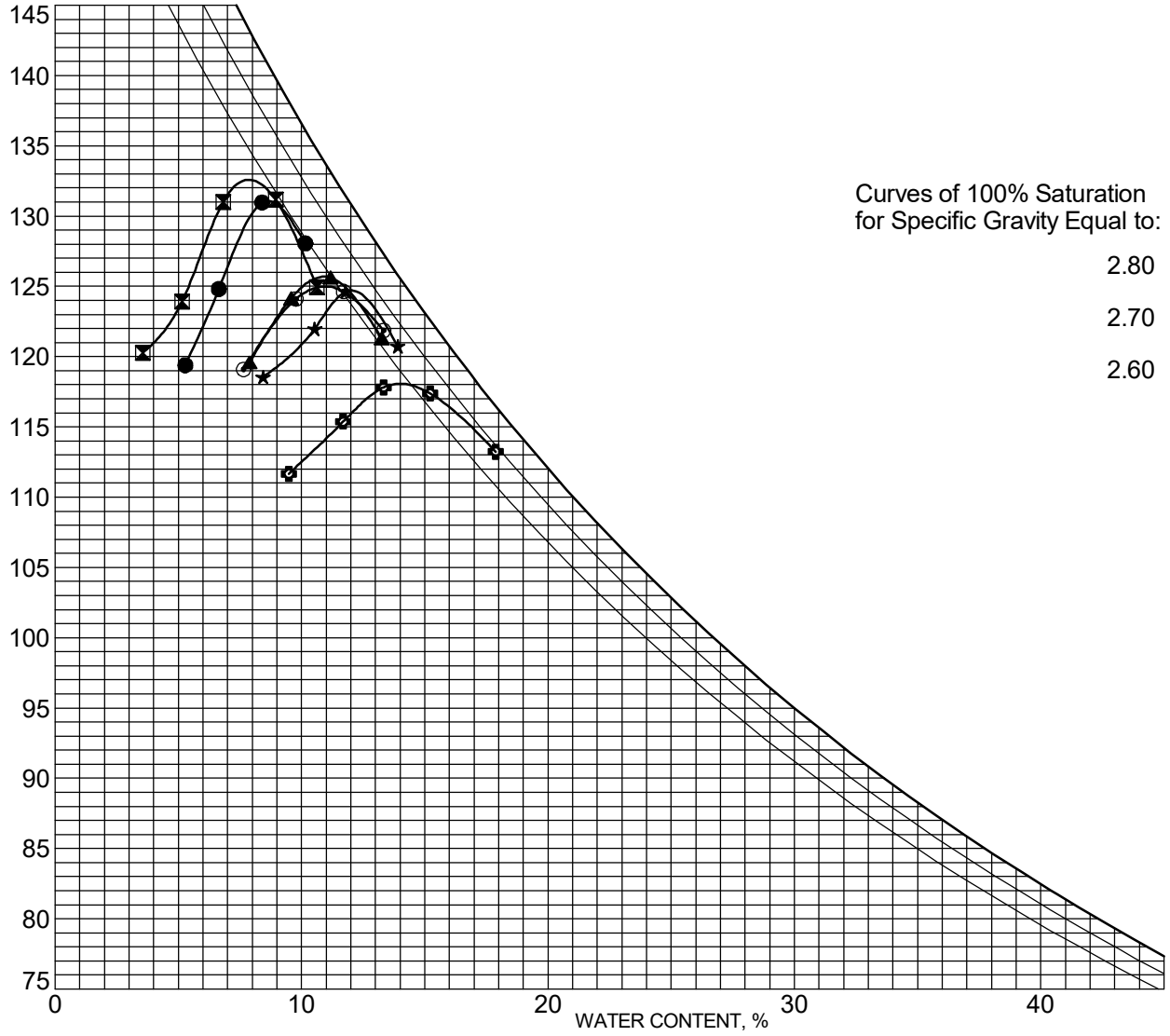
COMPACTION (MULTIPLE CURVES) - 20171219.GDT - 12/20/24 09:27 - F:\LAB\PROJECTS\GINT\1-094(239)172.GPJ

MOISTURE-DENSITY RELATIONSHIP

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

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **LOCATION** Burleigh County

PCN 23811



BOREHOLE		DEPTH	AASHTO Classification	USCS Description
●	LSS - 23811-37	2.0	A-6 (2)	CLAYEY SAND(SC)
⊠	LSS - 23811-38	2.0	A-2-6 (0)	CLAYEY SAND(SC)
▲	LSS - 23811-39	2.0	A-6 (8)	SANDY LEAN CLAY(CL)
★	LSS - 23811-40	2.0	A-7-6 (13)	SANDY LEAN CLAY(CL)
⊙	LSS - 23811-41	2.0	A-7-6 (19)	SANDY LEAN CLAY(CL)
✿	LSS - 23811-42	2.0	A-7-6 (46)	FAT CLAY(CH)

BOREHOLE		DEPTH	Test Method	LL	PL	PI	Max DD	Optimum WC
●	LSS - 23811-37	2.0	AASHTO T-180 Method A	28	14	14	131.1 PCF	8.7 %
⊠	LSS - 23811-38	2.0	AASHTO T-180 Method A	24	13	11	132.6 PCF	7.8 %
▲	LSS - 23811-39	2.0	AASHTO T-180 Method A	39	16	23	125.7 PCF	10.9 %
★	LSS - 23811-40	2.0	AASHTO T-180 Method A	42	17	25	124.7 PCF	12.0 %
⊙	LSS - 23811-41	2.0	AASHTO T-180 Method A	48	17	31	125.0 PCF	11.0 %
✿	LSS - 23811-42	2.0	AASHTO T-180 Method A	70	22	48	118.1 PCF	14.0 %

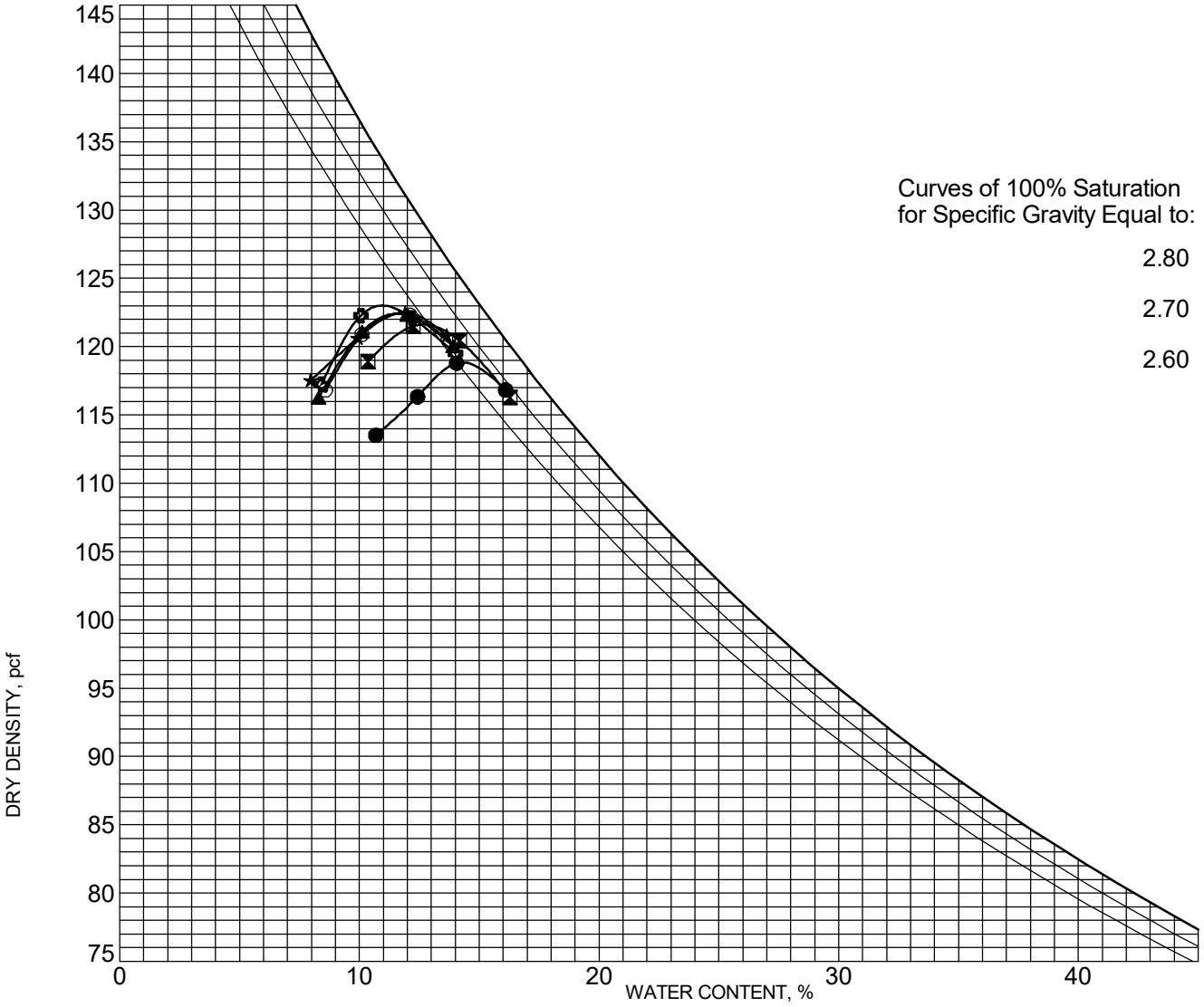
COMPACTION (MULTIPLE CURVES) - 20171219.GDT - 12/20/24 09:27 - F:\LAB\PROJECTS\GINT\1-094(239)172.GPJ

MOISTURE-DENSITY RELATIONSHIP

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

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **LOCATION** Burleigh County

PCN 23811



BOREHOLE		DEPTH	AASHTO Classification	USCS Description
●	**LSS - 23811-43**	**2.0**	**A-7-6 (38)**	**FAT CLAY(CH)**
⊠	**LSS - 23811-44**	**2.0**	**A-7-6 (36)**	**FAT CLAY(CH)**
▲	**LSS - 23811-45**	**2.0**	**A-7-6 (30)**	**FAT CLAY with SAND(CH)**
★	**LSS - 23811-46**	**2.0**	**A-6 (17)**	**LEAN CLAY with SAND(CL)**
⊙	**LSS - 23811-47**	**2.0**	**A-6 (14)**	**LEAN CLAY with SAND(CL)**
✪	**LSS - 23811-48**	**2.0**	**A-6 (16)**	**LEAN CLAY with SAND(CL)**

BOREHOLE		DEPTH	Test Method	LL	PL	PI	Max DD	Optimum WC
●	**LSS - 23811-43**	**2.0**	**AASHTO T-180 Method A**	**63**	**21**	**42**	**118.8 PCF**	**14.3 %**
⊠	**LSS - 23811-44**	**2.0**	**AASHTO T-180 Method A**	**60**	**22**	**38**	**121.6 PCF**	**12.7 %**
▲	**LSS - 23811-45**	**2.0**	**AASHTO T-180 Method A**	**55**	**19**	**36**	**122.4 PCF**	**11.6 %**
★	**LSS - 23811-46**	**2.0**	**AASHTO T-180 Method A**	**40**	**18**	**22**	**122.5 PCF**	**11.8 %**
⊙	**LSS - 23811-47**	**2.0**	**AASHTO T-180 Method A**	**37**	**17**	**20**	**122.4 PCF**	**11.7 %**
✪	**LSS - 23811-48**	**2.0**	**AASHTO T-180 Method A**	**38**	**17**	**21**	**123.0 PCF**	**11.0 %**

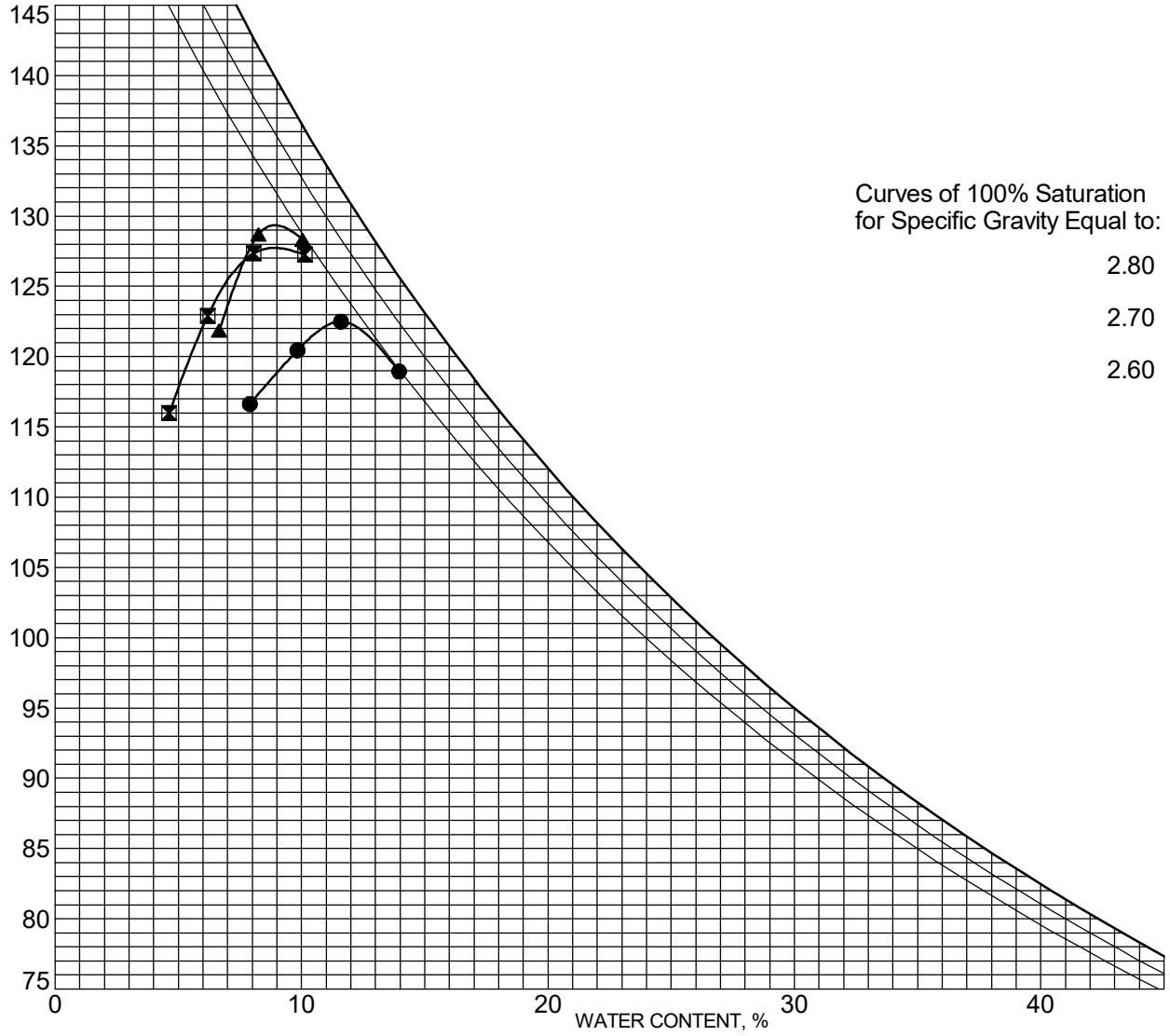
COMPACTION (MULTIPLE CURVES) - 20171219.GDT - 12/20/24 09:27 - F:\LAB\PROJECTS\GINT\1-094(239)172.GPJ

MOISTURE-DENSITY RELATIONSHIP

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

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **LOCATION** Burleigh County

PCN 23811



BOREHOLE		DEPTH	AASHTO Classification	USCS Description
●	**LSS - 23811-49**	**2.0**	**A-6 (7)**	**SANDY LEAN CLAY(CL)**
⊠	**LSS - 23811-50**	**2.0**	**A-2-4 (0)**	**CLAYEY SAND(SC)**
▲	**LSS - 23811-51**	**2.0**	**A-6 (1)**	**CLAYEY SAND(SC)**

BOREHOLE		DEPTH	Test Method	LL	PL	PI	Max DD	Optimum WC
●	**LSS - 23811-49**	**2.0**	**AASHTO T-180 Method A**	**32**	**17**	**15**	**122.5 PCF**	**11.6 %**
⊠	**LSS - 23811-50**	**2.0**	**AASHTO T-180 Method A**	**24**	**14**	**10**	**127.7 PCF**	**8.9 %**
▲	**LSS - 23811-51**	**2.0**	**AASHTO T-180 Method A**	**26**	**14**	**12**	**129.4 PCF**	**8.9 %**

COMPACTION (MULTIPLE CURVES) - 20171219.GDT - 12/20/24 09:27 - F:\LAB\PROJECTS\GINT\1-094(239)172.GPJ

SUMMARY OF LABORATORY RESULTS

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

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **LOCATION** Burleigh County

PCN 23811

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 - 23811-1	2.0	42	19	23	25	56	A-7-6 (10)	CL	18.0	21.1			
LSS - 23811-1	3.0								19.5	21.1			
LSS - 23811-1	4.0								24.0	21.1			
LSS - 23811-1	5.0								23.0	21.1			
LSS - 23811-2	2.0	43	19	24	25	59	A-7-6 (11)	CL	19.7	18.7			
LSS - 23811-2	3.0								18.3	18.7			
LSS - 23811-2	4.0								19.5	18.7			
LSS - 23811-2	5.0								17.2	18.7			
LSS - 23811-3	2.0	38	17	21	9.5	53	A-6 (8)	CL	19.8	18.9			
LSS - 23811-3	3.0								18.8	18.9			
LSS - 23811-3	4.0								19.7	18.9			
LSS - 23811-3	5.0								17.1	18.9			
LSS - 23811-4	2.0	39	18	21	25	55	A-6 (8)	CL	19.2	22.5			
LSS - 23811-4	3.0								21.0	22.5			
LSS - 23811-4	4.0								24.6	22.5			
LSS - 23811-4	5.0								25.2	22.5			
LSS - 23811-5	2.0	36	17	19	25	52	A-6 (6)	CL	19.9	18.7			
LSS - 23811-5	3.0								17.2	18.7			
LSS - 23811-5	4.0								18.8	18.7			
LSS - 23811-5	5.0								18.9	18.7			
LSS - 23811-6	2.0	35	16	19	25	46	A-6 (5)	SC	27.5	23.6			
LSS - 23811-6	3.0								21.7	23.6			
LSS - 23811-6	4.0								19.6	23.6			
LSS - 23811-6	5.0								25.7	23.6			
LSS - 23811-7	2.0	38	18	20	9.5	58	A-6 (9)	CL	18.0	19.6			
LSS - 23811-7	3.0								15.8	19.6			
LSS - 23811-7	4.0								22.1	19.6			
LSS - 23811-7	5.0								22.5	19.6			
LSS - 23811-8	2.0	40	18	22	25	63	A-6 (11)	CL	19.8	22.9			
LSS - 23811-8	3.0								22.8	22.9			
LSS - 23811-8	4.0								22.8	22.9			
LSS - 23811-8	5.0								26.2	22.9			
LSS - 23811-9	2.0	37	17	20	9.5	62	A-6 (10)	CL	22.9	22.8			
LSS - 23811-9	3.0								19.8	22.8			
LSS - 23811-9	4.0								24.6	22.8			
LSS - 23811-9	5.0								23.8	22.8			
LSS - 23811-10	2.0	43	18	25	25	61	A-7-6 (12)	CL	18.2	22.3			
LSS - 23811-10	3.0								22.8	22.3			
LSS - 23811-10	4.0								24.8	22.3			
LSS - 23811-10	5.0								23.4	22.3			
LSS - 23811-11	2.0	45	19	26	25	60	A-7-6 (13)	CL	21.7	22.6			
LSS - 23811-11	3.0								20.6	22.6			
LSS - 23811-11	4.0								24.1	22.6			

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SUMMARY OF LABORATORY RESULTS

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

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **LOCATION** Burleigh County

PCN 23811

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 - 23811-11	5.0								24.0	22.6			
LSS - 23811-12	2.0	38	17	21	25	57	A-6 (9)	CL	20.8	17.5			
LSS - 23811-12	3.0								16.2	17.5			
LSS - 23811-12	4.0								16.8	17.5			
LSS - 23811-12	5.0								16.2	17.5			
LSS - 23811-13	2.0	42	18	24	25	57	A-7-6 (11)	CL	24.2	22.1			
LSS - 23811-13	3.0								21.4	22.1			
LSS - 23811-13	4.0								20.7	22.1			
LSS - 23811-13	5.0								22.2	22.1			
LSS - 23811-14	2.0	43	18	25	25	58	A-7-6 (11)	CL	19.2	20.6			
LSS - 23811-14	3.0								21.2	20.6			
LSS - 23811-14	4.0								22.0	20.6			
LSS - 23811-14	5.0								20.2	20.6			
LSS - 23811-15	2.0	45	18	27	9.5	60	A-7-6 (13)	CL	22.2	20.8			
LSS - 23811-15	3.0								22.1	20.8			
LSS - 23811-15	4.0								18.4	20.8			
LSS - 23811-15	5.0								20.3	20.8			
LSS - 23811-16	2.0	48	18	30	25	61	A-7-6 (15)	CL	22.5	22.0			
LSS - 23811-16	3.0								24.2	22.0			
LSS - 23811-16	4.0								20.7	22.0			
LSS - 23811-16	5.0								20.7	22.0			
LSS - 23811-17	2.0	48	18	30	25	57	A-7-6 (14)	CL	23.2	23.0			
LSS - 23811-17	3.0								21.1	23.0			
LSS - 23811-17	4.0								23.8	23.0			
LSS - 23811-17	5.0								24.1	23.0			
LSS - 23811-18	2.0	48	19	29	25	61	A-7-6 (15)	CL	20.6	22.0			
LSS - 23811-18	3.0								24.5	22.0			
LSS - 23811-18	4.0								22.3	22.0			
LSS - 23811-18	5.0								20.5	22.0			
LSS - 23811-19	2.0	47	18	29	25	63	A-7-6 (16)	CL	20.2	21.8			
LSS - 23811-19	3.0								23.9	21.8			
LSS - 23811-19	4.0								19.2	21.8			
LSS - 23811-19	5.0								24.0	21.8			
LSS - 23811-20	2.0	33	17	16	25	42	A-6 (3)	SC	15.5	16.3			
LSS - 23811-20	3.0								14.3	16.3			
LSS - 23811-20	4.0								14.1	16.3			
LSS - 23811-20	5.0								21.4	16.3			
LSS - 23811-21	2.0	NP	NP	NP	25	15	A-1-b (0)	SM	16.8	14.1			
LSS - 23811-21	3.0								7.0	14.1			
LSS - 23811-21	4.0								14.0	14.1			
LSS - 23811-21	5.0								18.5	14.1			
LSS - 23811-22	2.0	40	17	23	9.5	61	A-6 (11)	CL	21.1	17.1			
LSS - 23811-22	3.0								21.4	17.1			

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SUMMARY OF LABORATORY RESULTS

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

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **LOCATION** Burleigh County

PCN 23811

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 - 23811-22	4.0								21.6	17.1			
LSS - 23811-22	5.0								4.1	17.1			
LSS - 23811-23	2.0	50	19	31	25	58	A-7-6 (15)	CH	21.8	22.0			
LSS - 23811-23	3.0								18.3	22.0			
LSS - 23811-23	4.0								23.0	22.0			
LSS - 23811-23	5.0								25.0	22.0			
LSS - 23811-24	2.0	70	22	48	9.5	85	A-7-6 (44)	CH	24.7	18.1			
LSS - 23811-24	3.0								27.8	18.1			
LSS - 23811-24	4.0								4.3	18.1			
LSS - 23811-24	5.0								15.7	18.1			
LSS - 23811-25	2.0	62	21	41	25	76	A-7-6 (32)	CH	27.5	27.9			
LSS - 23811-25	3.0								22.5	27.9			
LSS - 23811-25	4.0								27.8	27.9			
LSS - 23811-25	5.0								33.9	27.9			
LSS - 23811-26	2.0	60	21	39	9.5	81	A-7-6 (33)	CH	25.5	24.1			
LSS - 23811-26	3.0								15.8	24.1			
LSS - 23811-26	4.0								30.0	24.1			
LSS - 23811-26	5.0								25.0	24.1			
LSS - 23811-27	2.0	45	17	28	9.5	70	A-7-6 (18)	CL	22.9	25.5			
LSS - 23811-27	3.0								19.9	25.5			
LSS - 23811-27	4.0								27.8	25.5			
LSS - 23811-27	5.0								31.3	25.5			
LSS - 23811-28	2.0	48	18	30	9.5	85	A-7-6 (26)	CL	18.6	25.6			
LSS - 23811-28	3.0								25.6	25.6			
LSS - 23811-28	4.0								26.4	25.6			
LSS - 23811-28	5.0								31.7	25.6			
LSS - 23811-29	2.0	41	17	24	25	67	A-7-6 (14)	CL	22.3	21.1			
LSS - 23811-29	3.0								16.7	21.1			
LSS - 23811-29	4.0								20.8	21.1			
LSS - 23811-29	5.0								24.4	21.1			
LSS - 23811-30	2.0	26	13	13	9.5	30	A-2-6 (0)	SC	9.8	8.6			
LSS - 23811-30	3.0								10.2	8.6			
LSS - 23811-30	4.0								8.5	8.6			
LSS - 23811-30	5.0								6.0	8.6			
LSS - 23811-31	2.0	50	17	33	9.5	61	A-7-6 (17)	CH	14.6	11.5			
LSS - 23811-31	3.0								10.1	11.5			
LSS - 23811-31	4.0								9.9	11.5			
LSS - 23811-31	5.0								11.4	11.5			
LSS - 23811-32	2.0	56	19	37	9.5	82	A-7-6 (31)	CH	19.4	18.9			
LSS - 23811-32	3.0								19.6	18.9			
LSS - 23811-32	4.0								17.0	18.9			
LSS - 23811-32	5.0								19.8	18.9			
LSS - 23811-33	2.0	50	18	32	9.5	64	A-7-6 (18)	CH	19.4	21.3			

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SUMMARY OF LABORATORY RESULTS

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

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **LOCATION** Burleigh County

PCN 23811

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 - 23811-33	3.0								27.2	21.3			
LSS - 23811-33	4.0								14.3	21.3			
LSS - 23811-33	5.0								24.3	21.3			
LSS - 23811-34	2.0	50	27	23	9.5	70	A-7-6 (16)	CH	9.0	13.7			
LSS - 23811-34	3.0								7.5	13.7			
LSS - 23811-34	4.0								23.1	13.7			
LSS - 23811-34	5.0								15.2	13.7			
LSS - 23811-35	2.0	46	16	30	4.75	62	A-7-6 (16)	CL	10.1	15.2			
LSS - 23811-35	3.0								13.2	15.2			
LSS - 23811-35	4.0								12.0	15.2			
LSS - 23811-35	5.0								25.5	15.2			
LSS - 23811-36	2.0	48	17	31	9.5	64	A-7-6 (17)	CL	7.1	15.4			
LSS - 23811-36	3.0								17.1	15.4			
LSS - 23811-36	4.0								19.8	15.4			
LSS - 23811-36	5.0								17.7	15.4			
LSS - 23811-37	2.0	28	14	14	9.5	43	A-6 (2)	SC	7.8	12.5			
LSS - 23811-37	3.0								12.4	12.5			
LSS - 23811-37	4.0								14.1	12.5			
LSS - 23811-37	5.0								15.7	12.5			
LSS - 23811-38	2.0	24	13	11	25	29	A-2-6 (0)	SC	7.6	13.4			
LSS - 23811-38	3.0								12.0	13.4			
LSS - 23811-38	4.0								13.4	13.4			
LSS - 23811-38	5.0								20.7	13.4			
LSS - 23811-39	2.0	39	16	23	9.5	53	A-6 (8)	CL	18.3	18.0			
LSS - 23811-39	3.0								22.3	18.0			
LSS - 23811-39	4.0								14.5	18.0			
LSS - 23811-39	5.0								16.7	18.0			
LSS - 23811-40	2.0	42	17	25	4.75	62	A-7-6 (13)	CL	10.9	15.0			
LSS - 23811-40	3.0								26.2	15.0			
LSS - 23811-40	4.0								9.1	15.0			
LSS - 23811-40	5.0								13.8	15.0			
LSS - 23811-41	2.0	48	17	31	9.5	68	A-7-6 (19)	CL	16.0	14.8			
LSS - 23811-41	3.0								10.1	14.8			
LSS - 23811-41	4.0								16.6	14.8			
LSS - 23811-41	5.0								16.5	14.8			
LSS - 23811-42	2.0	70	22	48	9.5	87	A-7-6 (46)	CH	21.7	23.9			
LSS - 23811-42	3.0								21.0	23.9			
LSS - 23811-42	4.0								25.0	23.9			
LSS - 23811-42	5.0								27.7	23.9			
LSS - 23811-43	2.0	63	21	42	9.5	85	A-7-6 (38)	CH	23.8	27.0			
LSS - 23811-43	3.0								28.8	27.0			
LSS - 23811-43	4.0								26.4	27.0			
LSS - 23811-43	5.0								29.0	27.0			

LAB SUMMARY - 20171219.GDT - 12/20/24 09:32 - F:\LAB\PROJECTS\GINT\1-094(239)172.GPJ

SUMMARY OF LABORATORY RESULTS

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

PROJECT NUMBER CVD-IM-1-094(239)172 (WB) **LOCATION** Burleigh County

PCN 23811

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 - 23811-44	2.0	60	22	38	9.5	88	A-7-6 (36)	CH	20.9	22.1			
LSS - 23811-44	3.0								26.3	22.1			
LSS - 23811-44	4.0								20.6	22.1			
LSS - 23811-44	5.0								20.5	22.1			
LSS - 23811-45	2.0	55	19	36	9.5	81	A-7-6 (30)	CH	8.0	15.2			
LSS - 23811-45	3.0								16.2	15.2			
LSS - 23811-45	4.0								21.1	15.2			
LSS - 23811-45	5.0								15.6	15.2			
LSS - 23811-46	2.0	40	18	22	9.5	82	A-6 (17)	CL	10.5	20.2			
LSS - 23811-46	3.0								23.4	20.2			
LSS - 23811-46	4.0								24.6	20.2			
LSS - 23811-46	5.0								22.3	20.2			
LSS - 23811-47	2.0	37	17	20	25	77	A-6 (14)	CL	17.5	18.4			
LSS - 23811-47	3.0								23.1	18.4			
LSS - 23811-47	4.0								17.4	18.4			
LSS - 23811-47	5.0								15.7	18.4			
LSS - 23811-48	2.0	38	17	21	4.75	82	A-6 (16)	CL	15.9	17.6			
LSS - 23811-48	3.0								19.5	17.6			
LSS - 23811-48	4.0								18.1	17.6			
LSS - 23811-48	5.0								16.9	17.6			
LSS - 23811-49	2.0	32	17	15	25	65	A-6 (7)	CL	19.1	16.2			
LSS - 23811-49	3.0								15.3	16.2			
LSS - 23811-49	4.0								13.5	16.2			
LSS - 23811-49	5.0								16.7	16.2			
LSS - 23811-50	2.0	24	14	10	9.5	33	A-2-4 (0)	SC	19.8	16.1			
LSS - 23811-50	3.0								10.6	16.1			
LSS - 23811-50	4.0								13.2	16.1			
LSS - 23811-50	5.0								20.6	16.1			
LSS - 23811-51	2.0	26	14	12	9.5	41	A-6 (1)	SC	12.0	10.5			
LSS - 23811-51	3.0								6.3	10.5			
LSS - 23811-51	4.0								11.3	10.5			
LSS - 23811-51	5.0								12.6	10.5			